Notice for TAIYO YUDEN products

Please read this notice before using the TAIYO YUDEN products.

REMINDERS

Product information in this catalog is as of October 2016. All of the contents specified herein are subject to change without notice due to technical improvements, etc. Therefore, please check for the latest information carefully before practical application or use of our products.

Please note that TAIYO YUDEN shall not be in any way responsible for any damages and defects in products or equipment incorporating our products, which are caused under the conditions other than those specified in this catalog or individual specification.

- Please contact TAIYO YUDEN for further details of product specifications as the individual specification is available.
- Please conduct validation and verification of our products in actual condition of mounting and operating environment before using our products.
- The products listed in this catalog are intended for use in general electronic equipment (e.g., AV equipment, OA equipment, home electric appliances, office equipment, information and communication equipment including, without limitation, mobile phone, and PC). Please be sure to contact TAIYO YUDEN for further information before using the products for any equipment which may directly cause loss of human life or bodily injury (e.g., transportation equipment including, without limitation, automotive powertrain control system, train control system, and ship control system, traffic signal equipment, disaster prevention equipment, medical equipment, highly public information network equipment including, without limitation, telephone exchange, and base station).

Please do not incorporate our products into any equipment requiring high levels of safety and/or reliability (e.g., aerospace equipment, aviation equipment, nuclear control equipment, undersea equipment, military equipment).

When our products are used even for high safety and/or reliability-required devices or circuits of general electronic equipment, it is strongly recommended to perform a thorough safety evaluation prior to use of our products and to install a protection circuit as necessary.

Please note that unless you obtain prior written consent of TAIYO YUDEN, TAIYO YUDEN shall not be in any way responsible for any damages incurred by you or third parties arising from use of the products listed in this catalog for any equipment requiring inquiry to TAIYO YUDEN or prohibited for use by TAIYO YUDEN as described above.

- Please note that TAIYO YUDEN shall have no responsibility for any controversies or disputes that may occur in connection with a third party's intellectual property rights and other related rights arising from use of our products. TAIYO YUDEN grants no license for such rights.
- Please note that unless otherwise agreed in writing, the scope of warranty for our products is limited to the delivered our products themselves and TAIYO YUDEN shall not be in any way responsible for any damages resulting from a fault or defect in our products.
- The contents of this catalog are applicable to our products which are purchased from our sales offices or authorized distributors (hereinafter "TAIYO YUDEN's official sales channel"). Please note that the contents of this catalog are not applicable to our products purchased from any seller other than TAIYO YUDEN's official sales channel.
- Caution for Export

Some of our products listed in this catalog may require specific procedures for export according to "U.S. Export Administration Regulations", "Foreign Exchange and Foreign Trade Control Law" of Japan, and other applicable regulations. Should you have any questions on this matter, please contact our sales staff.

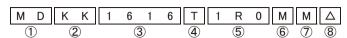
METAL CORE SMD POWER INDUCTORS(MCOILTM MD SERIES)



REFLOW

■PARTS NUMBER

*Operating Temp.:-40~+125°C (Including self-generated heat)



△=Blank space

	name

Code	Series name
MD	Metal base coil specification

②Dimensions(H)

Code	Dimensions (H) [mm]
JE	0.95
KK	1.0
MK	1.2
PK	1.4
WK	2.0

③Dimensions (L×W)

Code	Dimensions (L × W) [mm]
1616	1.6 × 1.6
2020	2.0 × 2.0
3030	3.0 × 3.0
4040	4.0 × 4.0
5050	4.9 × 4.9

4 Packaging

- aonaging	
Code	Packaging
Т	Taping

⑤Nominal inductance

Code (example)	Nominal inductance [μ H]
R47	0.47
1R0	1.0
4R7	4.7

*R=Decimal point

6 Inductance tolerance

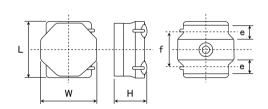
Code	Inductance tolerance			
М	±20%			
N	±30%			

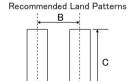
7)Special code

O-F	
Code	Special code
F	Ferrite coating
М	Metal coating

®Internal code

■STANDARD EXTERNAL DIMENSIONS / STANDARD QUANTITY





Type	Α	В	С
1616	0.5	1.10	1.65
2020	0.65	1.35	2.0
3030	0.8	2.2	2.7
4040	1.2	2.8	3.7
5050	1.5	3.6	4.2

Unit:mm

Туре	L	W	Н	е	f	Standard quantity [pcs] Taping
MDKK1616	1.64±0.1 (0.065±0.004)	1.64±0.1 (0.065±0.004)	1.0 max (0.039 max)	0.40 +0.2/-0.1 (0.016 +0.008/-0.004)	1.0±0.2 (0.039±0.008)	2500
MDJE2020	2.0±0.15 (0.079±0.006)	2.0±0.15 (0.079±0.006)	0.95 max (0.0374 max)	0.50±0.2 (0.02±0.008)	1.25±0.2 (0.049±0.008)	2500
MDKK2020	2.0±0.15 (0.079±0.006)	2.0±0.15 2.0±0.15 1.0 max		0.50±0.2 (0.02±0.008)	1.25±0.2 (0.049±0.008)	2500
MDMK2020	2.0±0.15 (0.079±0.006)			0.50±0.2 (0.02±0.008)	1.25±0.2 (0.049±0.008)	2500
MDKK3030	3.0±0.1 3.0±0.1 1.0 max (0.118±0.004) (0.118±0.004) (0.039 max)		0.90±0.2 (0.035±0.008)	1.9±0.2 (0.075±0.008)	2000	
MDMK3030	3.0±0.1 (0.118±0.004)			0.90±0.2 (0.035±0.008)	1.9±0.2 (0.075±0.008)	2000
MDJE4040	MDJE4040 4.0±0.2 4.0 (0.157±0.008) (0.157		0.95 max (0.0374 max)	1.1±0.2 (0.043±0.008)	2.5±0.2 (0.098±0.008)	1000
MDMK4040	4.0±0.2 (0.157±0.008)	4.0±0.2 (0.157±0.008)	1.2 max (0.047 max)	1.1±0.2 (0.043±0.008)	2.5±0.2 (0.098±0.008)	1000
MDWK4040	4.0±0.2 (0.157±0.008)	4.0±0.2 (0.157±0.008)	2.0 max (0.0787 max)	1.1±0.2 (0.043±0.008)	2.5±0.2 (0.098±0.008)	700
MDPK5050	4.9±0.2 (0.193±0.008)	4.9±0.2 (0.193±0.008)	1.4 max (0.055 max)	1.20±0.2 (0.047±0.008)	3.3±0.2 (0.130±0.008)	1000
						Unit:mm(incl

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MDKK1616 type 【Thickness:1.0mm	DKK1616 type	[Thickness:1.0mm max.]
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		Nominal inductance			requency DC Resistance[Ω]		Rated current ※) [mA]				Managemina
Parts number EHS	EHS	[μ H]	Inductance tolerance				Saturation current: Idc1		Temperature rise current: Idc2		Measuring frequency[kHz]
		[M II]		[MHz] (min.)	Max.	Тур.	Max.	Тур.	Max.	Тур.	irequericy[Ki12]
MDKK1616TR47MM	RoHS	0.47	±20%	-	0.095	0.080	3,300	4,100	1,500	1,780	1
MDKK1616T1R0MM	RoHS	1.0	±20%	-	0.140	0.120	2,200	2,750	1,200	1,490	1
MDKK1616T1R5MM	RoHS	1.5	±20%	-	0.185	0.160	1,750	2,200	1,100	1,330	1
MDKK1616T2R2MM	RoHS	2.2	±20%	-	0.250	0.215	1,500	1,800	950	1,110	1
MDKK1616T3R3MM	RoHS	3.3	±20%	-	0.515	0.450	1,150	1,450	650	730	1
MDKK1616T4R7MM	RoHS	4.7	±20%	-	0.640	0.550	950	1,200	550	630	1
MDKK1616T6R8MM	RoHS	6.8	±20%	-	0.820	0.710	630	880	520	600	1
MDKK1616T100MM	RoHS	10	±20%	-	1.120	0.970	550	800	450	500	1
MDKK1616T150MM	RoHS	15	±20%	_	1.800	1.600	460	640	400	440	1

	Nominal inductance			Self-resonant	DC Resist	-072000		Rated curr	ent ※)[mA]		Measuring
Parts number	EHS	[μ H]	Inductance tolerance	frequency	DO Resis	ance[32]	Saturation of	current: Idc1	Temperature ri	se current: Idc2	frequency[kHz]
				[MHz] (min.)	Max.	Typ.	Max.	Тур.	Max.	Тур.	oquonoy [2]
MDJE2020T1R0MM	RoHS	1.0	±20%	-	0.121	0.106	3,100	3,800	1,550	1,800	1
MDJE2020T2R2MM	RoHS	2.2	±20%	-	0.266	0.230	1,550	1,900	1,050	1,200	1
MDJE2020T3R3MM	RoHS	3.3	±20%	-	0.340	0.290	1,350	1,600	950	1,100	1
MDJE2020T4R7MM	RoHS	4.7	±20%	-	0.475	0.410	1,200	1,550	850	950	1
MDJE2020T6R8MM	RoHS	6.8	±20%	-	0.630	0.550	800	1,100	750	850	1
MDJE2020T100MM	RoHS	10	±20%	-	1.040	0.910	700	900	550	600	1

MDKK2020 type [Thickness: 1.0mm max.]

		Name to all the decisions are		Self-resonant	DC Resist	101		Rated curi	rent ※)[mA]		Manager
Parts number	EHS	Nominal inductance [μ H]	Inductance tolerance	frequency	DC Resis	ance[32]	Saturation of	urrent: Idc1	Temperature ri	se current: Idc2	Measuring frequency[kHz]
		[[[]		[MHz] (min.)	Max.	Тур.	Max.	Тур.	Max.	Typ.	Trequency[KT12]
MDKK2020TR47MM	RoHS	0.47	±20%	ı	0.046	0.040	3,500	4,150	2,200	2,500	1
MDKK2020TR68MM	RoHS	0.68	±20%	ı	0.060	0.052	3,200	3,650	2,000	2,100	1
MDKK2020T1R0MM	RoHS	1.0	±20%	-	0.085	0.074	2,900	3,400	1,700	1,900	1
MDKK2020T1R5MM	RoHS	1.5	±20%	-	0.133	0.115	1,900	2,250	1,350	1,500	1
MDKK2020T2R2MM	RoHS	2.2	±20%	-	0.165	0.139	1,650	1,950	1,200	1,350	1
MDKK2020T3R3MM	RoHS	3.3	±20%	-	0.275	0.240	1,300	1,550	940	1,050	1
MDKK2020T4R7MM	RoHS	4.7	±20%	I	0.435	0.375	1,050	1,250	750	850	1
MDKK2020T100MM	RoHS	10	±20%	-	0.690	0.600	750	900	630	680	1
MDKK2020T150MM	RoHS	15	±20%	ı	1.180	1.020	550	750	480	550	1

	Parts number FHS Nominal inductance			Self-resonant	I DC Resistance Ω ⊢			Measuring			
Parts number	EHS	[μ H]	Inductance tolerance	frequency	DO Resis	rance [32]	Saturation of	current: Idc1	Temperature ri	se current: Idc2	frequency[kHz]
		[[[]		[MHz] (min.)	Max.	Тур.	Max.	Тур.	Max.	Тур.	ir equerioy [iti iz]
MDMK2020TR47MM	RoHS	0.47	±20%	-	0.046	0.040	4,200	4,800	2,300	2,450	1
MDMK2020TR68MM	RoHS	0.68	±20%	-	0.058	0.050	3,500	4,100	2,000	2,200	1
MDMK2020T1R0MM	RoHS	1.0	±20%	-	0.064	0.056	2,550	2,900	1,900	2,050	1
MDMK2020T1R5MM	RoHS	1.5	±20%	-	0.086	0.075	2,000	2,300	1,650	1,750	1
MDMK2020T2R2MM	RoHS	2.2	±20%	-	0.109	0.095	1,750	2,000	1,450	1,550	1
MDMK2020T3R3MM	RoHS	3.3	±20%	-	0.178	0.155	1,350	1,550	1,150	1,200	1
MDMK2020T4R7MM	RoHS	4.7	±20%	-	0.242	0.210	1,150	1,300	950	1,050	1

MDKK3030 type [Thickness: 1.0mm max.]

- WIDININGOOD type		L I IIICKIIESS. I.UIII	III IIIax.]								
		Nominal inductance		Self-resonant	DC Resist	tonac[0]		Rated curr	ent ※)[mA]		Measuring
Parts number	EHS	[μ H]	Inductance tolerance	frequency	DO Resis	rance [32]	Saturation of	current: Idc1	Temperature ri	Temperature rise current: Idc2	
		(M 11)		[MHz] (min.)	Max.	Тур.	Max.	Тур.	Max.	Тур.	frequency[kHz]
MDKK3030TR47MM	RoHS	0.47	±20%	-	0.039	0.033	5,400	6,500	3,900	4,500	1
MDKK3030T1R0MM	RoHS	1.0	±20%	-	0.086	0.074	4,400	5,200	2,400	2,800	1
MDKK3030T1R5MM	RoHS	1.5	±20%	-	0.100	0.087	3,000	3,500	2,100	2,400	1
MDKK3030T2R2MM	RoHS	2.2	±20%	-	0.144	0.125	2,500	3,000	1,900	2,200	1
MDKK3030T3R3MM	RoHS	3.3	±20%	-	0.248	0.215	2,000	2,400	1,350	1,500	1
MDKK3030T4R7MM	RoHS	4.7	±20%	-	0.345	0.300	1,700	2,000	1,150	1,300	1
MDKK3030T6R8MM	RoHS	6.8	±20%	-	0.437	0.380	1,400	1,700	1,000	1,150	1
MDKK3030T100MM	RoHS	10	±20%	-	0.575	0.500	1,100	1,300	850	1,000	1

MDMK3030 type [Thickness: 1.2mm max.]

		Nominal inductance		Self-resonant	DC Resis				Measuring		
Parts number	EHS [μ H]		Inductance tolerance	frequency	DC Resis	rance[37]	Saturation of	current: Idc1	Temperature ri	se current: Idc2	frequency[kHz]
		2,111		[MHz] (min.)	Max.	Тур.	Max.	Тур.	Max.	Тур.	ir oquonoy [iii iz]
MDMK3030TR30MM	RoHS	0.30	±20%	I	0.020	0.017	7,600	9,200	5,500	6,400	1
MDMK3030TR33MM	RoHS	0.33	±20%	I	0.020	0.017	6,400	8,700	5,500	6,400	1
MDMK3030TR47MM	RoHS	0.47	±20%	I	0.027	0.023	6,300	7,500	4,700	5,500	1
MDMK3030T1R0MM	RoHS	1.0	±20%	-	0.050	0.043	4,300	5,100	3,300	3,900	1
MDMK3030T1R5MM	RoHS	1.5	±20%	-	0.074	0.064	3,400	4,100	2,500	3,000	1
MDMK3030T2R2MM	RoHS	2.2	±20%	-	0.112	0.097	2,800	3,600	2,100	2,400	1
MDMK3030T3R3MM	RoHS	3.3	±20%	-	0.167	0.145	2,100	2,700	1,650	1,900	1
MDMK3030T4R7MM	RoHS	4.7	±20%	_	0.263	0.228	1,800	2,300	1,350	1,550	1

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MDJE4040 type [Thickness: 0.95mm max.]

		Nominal inductance	nal inductance		DC Resistance[Ω]				Measuring		
Parts number	EHS	[μ H]	Inductance tolerance	frequency	DO Resis	rance[32]	Saturation of	current: Idc1	Temperature ri	se current: Idc2	Measuring frequency[kHz]
		2,000		[MHz] (min.)	Max.	Тур.	Max.	Тур.	Max.	Тур.	in equation [in iz]
MDJE4040TR47MM	RoHS	0.47	±20%	-	0.040	0.035	6,000	7,900	4,000	4,500	1
MDJE4040T1R0MM	RoHS	1.0	±20%	-	0.069	0.060	4,700	5,700	3,000	3,500	1
MDJE4040T1R5MM	RoHS	1.5	±20%	-	0.084	0.073	3,000	4,000	2,700	3,100	1
MDJE4040T2R2MM	RoHS	2.2	±20%	-	0.115	0.100	2,400	3,100	2,400	2,700	1
MDJE4040T3R3MM	RoHS	3.3	±20%	-	0.200	0.175	2,000	2,600	1,800	2,000	1
MDJE4040T4R7MM	RoHS	4.7	±20%	-	0.250	0.220	1,900	2,300	1,600	1,900	1
MDJE4040T6R8MM	RoHS	6.8	±20%	=	0.370	0.320	1,500	1,800	1,300	1,500	1
MDJE4040T100MM	RoHS	10	±20%	=	0.510	0.440	1,400	1,700	1,100	1,300	1

	Nominal inductance			Self-resonant		DC Resistance[Ω]		Rated current ※)[mA]			
Parts number	EHS	[μ H]	Inductance tolerance	frequency	DO Resis	tance[it]	Saturation of	current: Idc1	Temperature ri	se current: Idc2	Measuring frequency[kHz]
		[[[11]		[MHz] (min.)	Max.	Тур.	Max.	Typ.	Max.	Тур.	irequency[kiiz]
MDMK4040TR47MF	RoHS	0.47	±20%	ı	0.029	0.025	7,500	10,000	4,600	5,400	100
MDMK4040T1R0MF	RoHS	1.0	±20%	-	0.047	0.041	5,200	7,500	3,500	4,200	100
MDMK4040T1R2MF	RoHS	1.2	±20%	ı	0.047	0.041	4,200	6,200	3,500	4,200	100
MDMK4040T1R5MF	RoHS	1.5	±20%	ı	0.065	0.056	3,700	5,400	3,300	3,600	100
MDMK4040T2R2MF	RoHS	2.2	±20%	ı	0.092	0.080	3,200	4,500	2,500	2,900	100

MDMK4040M type [Thickness: 1.2mm max.]

- INDINICTO TOTAL CYP	,0	T THIOTHIOGO . T.ZIIII	III III ax.								
		Nominal inductance		Self-resonant	DC Resist	tance[0]			ent ※)[mA]		Measuring
Parts number	EHS	[μ H]	Inductance tolerance	frequency	DO Nesis	tance[it]	Saturation of	current: Idc1	Temperature ri	se current: Idc2	frequency[kHz]
				[MHz] (min.)	Max.	Тур.	Max.	Тур.	Max.	Тур.	
MDMK4040TR68MM	RoHS	0.68	±20%	ı	0.029	0.025	6,700	7,800	5,000	5,700	1
MDMK4040T1R0MM	RoHS	1.0	±20%	-	0.036	0.031	5,000	6,200	4,500	5,100	1
MDMK4040T1R5MM	RoHS	1.5	±20%	-	0.065	0.056	4,500	5,600	3,200	3,600	1
MDMK4040T2R2MM	RoHS	2.2	±20%	-	0.079	0.069	3,800	4,500	2,800	3,200	1
MDMK4040T3R3MM	RoHS	3.3	±20%	ı	0.130	0.113	3,200	4,000	2,200	2,500	1
MDMK4040T4R7MM	RoHS	4.7	±20%	-	0.160	0.140	2,500	3,000	1,900	2,200	1
MDMK4040T6R8MM	RoHS	6.8	±20%		0.230	0.200	1,900	2,200	1,600	1,800	1
MDMK4040T100MM	RoHS	10	±20%	-	0.330	0.280	1,700	2,000	1,400	1,600	1

— IIID III (TO TOIII Cy	PO	L THIORHIOGO . E.OH	III IIIax.								
		Nominal inductance		Self-resonant	DC Resist	-0000[0]		Rated cur	rent ※)[mA]		Measuring
Parts number	EHS	[μ H]	Inductance tolerance	frequency	DO Resis	rance[32]	Saturation of	current: Idc1	Temperature ri	se current: Idc2	frequency[kHz]
		[μπ]		[MHz] (min.)	Max.	Тур.	Max.	Typ.	Max.	Тур.	in equency [it iz]
MDWK4040TR33NM	RoHS	0.33	±30%	-	0.013	0.011	16,000	21,000	7,800	8,800	1
MDWK4040TR47NM	RoHS	0.47	±30%	-	0.013	0.011	10,000	15,000	7,800	8,800	1
MDWK4040TR68MM	RoHS	0.68	±20%	-	0.016	0.014	8,000	12,000	7,300	8,300	1
MDWK4040T1R0MM	RoHS	1.0	±20%	-	0.027	0.023	7,000	9,400	5,100	5,800	1
MDWK4040T1R5MM	RoHS	1.5	±20%	-	0.041	0.035	7,000	9,400	4,100	4,700	1
MDWK4040T2R2MM	RoHS	2.2	±20%	-	0.054	0.047	5,400	7,500	3,500	4,000	1
MDWK4040T3R3MM	RoHS	3.3	±20%	-	0.075	0.066	3,700	5,200	3,000	3,300	1
MDWK4040T4R7MM	RoHS	4.7	±20%	-	0.107	0.093	3,500	5,000	2,500	2,800	1
MDWK4040T6R8MM	RoHS	6.8	±20%		0.158	0.138	2,900	4,000	2,000	2,300	1
MDWK4040T100MM	RoHS	10	+20%	-	0 194	0.169	2 200	3 100	1 600	1 900	1

	Nominal inductant			Self-resonant	DC Resist	tonac[O]			Measuring		
Parts number	EHS	[μ H]	Inductance tolerance	frequency	DO Resis	rance [32]	Saturation of	current: Idc1	Temperature ri	se current: Idc2	Measuring frequency[kHz]
		[M II]		[MHz] (min.)	Max.	Тур.	Max.	Тур.	Max.	Тур.	ir equency [it iz]
MDPK5050T1R0MM	RoHS	1.0	±20%	-	0.040	0.034	8,500	10,000	4,300	4,700	1
MDPK5050T2R2MM	RoHS	2.2	±20%	-	0.055	0.047	4,100	5,000	3,600	4,200	1
MDPK5050T3R3MM	RoHS	3.3	±20%	-	0.086	0.073	3,800	4,500	2,900	3,400	1
MDPK5050T4R7MM	RoHS	4.7	±20%	-	0.102	0.088	3,500	4,200	2,500	3,000	1
MDPK5050T6R8MM	RoHS	6.8	±20%	-	0.138	0.12	2,700	3,200	2,200	2,500	1
MDPK5050T100MM	RoHS	10	±20%	-	0.225	0.19	2,200	2,600	1,700	2,000	1

- imes) The saturation current value (Idc1) is the DC current value having inductance decrease down to 30%. (at 20°C)
- **) The temperature rise current value (Idc2) is the DC current value having temperature increase up to 40°C. (at 20°C)
- XX) The rated current is the DC current value that satisfies both of current value saturation current value and temperature rise current value.

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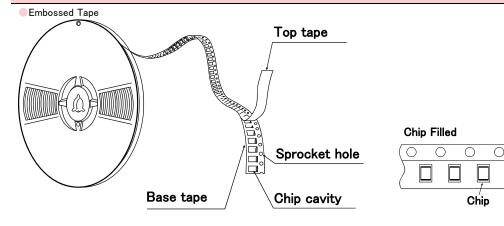
METAL CORE SMD POWER INDUCTORS (MCOIL™ MD SERIES)

■PACKAGING

1)Minimum Quantity

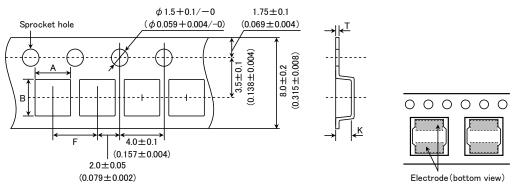
Туре	Standard Quantity [pcs]
туре	Tape & Reel
MDKK1616	2500
MDJE2020	
MDKK2020	2500
MDMK2020	
MDKK3030	2000
MDMK3030	2000
MDJE4040	1000
MDMK4040	1000
MDWK4040	700
MDPK5050	1000

2Tape Material



3 Taping dimensions

Embossed tape 8mm wide (0.315 inches wide)

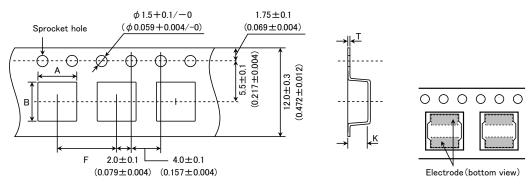


Turne	Chip	cavity	Insertion pitch	Tape thickness			
Туре	Α	В	F	Т	K		
MDKK1616	1.79±0.1 (0.071±0.004)	1.79±0.1 (0.071±0.004)	4.0±0.1 (0.157±0.004)	0.25±0.05 (0.010±0.002)	1.1±0.1 (0.043±0.004)		
MDJE2020 MDKK2020 MDMK2020	2.2±0.1 (0.102±0.004)	2.2±0.1 (0.102±0.004)	4.0±0.1 (0.157±0.004)	0.25±0.05 (0.009±0.002)	1.3±0.1 (0.051±0.004)		
MDKK3030	3.2±0.1	3.2±0.1	4.0±0.1	0.3±0.05	1.4±0.1		
MDMK3030	(0.126 ± 0.004)	(0.126 ± 0.004)	(0.157 ± 0.004)	(0.012 ± 0.002)	(0.055 ± 0.004)		

Unit:mm(inch)

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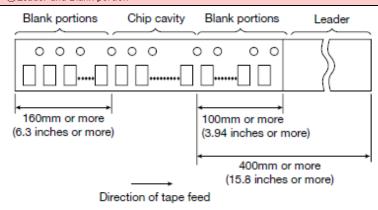
Embossed tape 12mm wide (0.47 inches wide)



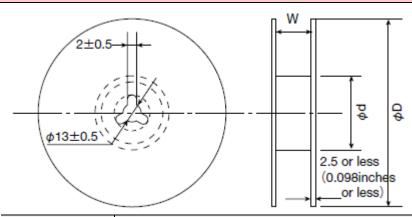
Tuna	Chip	cavity	Insertion pitch	Tape th	ickness
Туре	Α	В	F	T	K
MDJE4040 MDMK4040 MDWK4040	4.3±0.1 (0.169±0.004)	4.3±0.1 (0.169±0.004)	8.0±0.1 (0.315±0.004)	0.3±0.1 (0.012±0.004)	1.6±0.1 (0.063±0.004)
MDPK5050	5.25±0.1 (0.207±0.004)	5.25±0.1 (0.207±0.004)	8.0±0.1 (0.315±0.004)	0.3±0.1 (0.012±0.004)	1.6±0.1 (0.063±0.004)

Unit:mm(inch)

4 Leader and Blank portion



⑤Reel size



Type	Reel size (Reference values)					
туре	ϕ D	ϕ d	W			
MDKK1616						
MDJE2020						
MDKK2020	180 ± 0.5	60±1.0	10.0 ± 1.5			
MDMK2020	(7.087 ± 0.019)	(2.36 ± 0.04)	(0.394 ± 0.059)			
MDKK3030						
MDMK3030						
MDJE4040						
MDMK4040	180 ± 3.0	60±2.0	14.0 ± 1.5			
MDWK4040	(7.087 ± 0.118)	(2.36 ± 0.08)	(0.551 ± 0.059)			
MDPK5050						

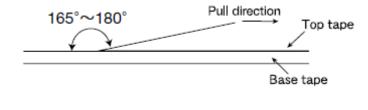
Unit:mm(inch)

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©Top Tape Strength

Top tape strength

Туре	Peel-off strength
MDKK1616	
MDJE2020	
MDKK2020	0.1N~1.0N
MDMK2020	0.1N~1.0N
MDKK3030	
MDMK3030	
MDJE4040	
MDMK4040	0.1N~1.3N
MDWK4040	0.11N~1.3N
MDPK5050	



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METAL CORE SMD POWER INDUCTORS (MCOIL™ MD SERIES)

■RELIABILITY DATA

RELIABILITY DA	IA	
1. Operating Tempe	erature Range	
Specified Value	MD series	-40~+125°C
Test Methods and Remarks	Including self-generated heat	
	_	
2. Storage Tempera		T -
Specified Value	MD series	
Test Methods and Remarks	-5 to 40°C for the product with taping.	
3. Rated current		
Specified Value	MD series	Within the specified tolerance
4. Inductance		
Specified Value	MD series	Within the specified tolerance
Test Methods and		1285A or equivalent)
Remarks	Measuring condition : Please see item li	st.
5. DC Resistance		
	MD series	Within the constitution of
Specified Value Test Methods and	MD series	Within the specified tolerance
Remarks	Measuring equipment : DC ohmmeter (H	IOKI 3227 or equivalent)
6. Self resonance fr	requency	
Specified Value	MD series	_
	I	
7. Temperature cha	racteristic	
Specified Value	MD series	Inductance change : Within ±10%
Test Methods and Remarks	Measurement of inductance shall be taken at With reference to inductance value at $\pm 20^\circ$	t temperature range within $-40^{\circ}\text{C}\!\sim\!+125^{\circ}\text{C}$. C., change rate shall be calculated.
0.0	6.1	
8. Resistance to fle	I	N. I
Specified Value	MD series	No damage
Test Methods and Remarks	until deflection of the test board reaches to Test board size : 100 × 40 × 1.0 Test board material : Glass epoxy— Solder cream thickness : 0.10 mm	mm Force Rod 10, 20
9. Insulation resista	nce : between wires	
Specified Value	MD series	-
		·
10. Insulation resist	ance : between wire and core	
Specified Value	MD series	_
11. Withstanding vo	ltage : between wire and core	
Specified Value	MD series	_

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Specified Value	MD series		Shall not come off PC board	
	The test samples shall be s	soldered to the tes	st board by the reflow.	
Test Methods and	Applied force	: 10N to X and	Y directions.	
Remarks	Duration	: 5s.		
	Solder cream thickness	: 0.10mm.		
13. Resistance to v	ibration			
Specified Value	MD series		Inductance change : Within ±10%	
•			No significant abnormality in appearance.	
	The test samples shall be s	soldered to the tes		
			st board by the reflow.	
	The test samples shall be s		st board by the reflow.	
T . M . I . I	The test samples shall be s	to below test cond 10~55Hz	st board by the reflow.	
Test Methods and Remarks	The test samples shall be so then it shall be submitted frequency Range	to below test cond 10~55Hz	exceed acceleration 196m/s²)	

14. Solderability						
Specified Value	MD series	ies At least 90% of surface of terminal electrode is covered by new solder.				
T . M .!	The test samples shall be dipped in flux, and then immersed in molten solder as shown in below table. Flux: Methanol solution containing rosin 25%.					
Test Methods and Remarks	Solder Temperature	245±5°C				
Remarks	Time	5±1.0 sec.				
	*XImmersion depth : All sides of mounting terminal shall be immersed.					

Recovery: At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48hrs.

15. Resistance to se	oldering heat	
Specified Value MD series		Inductance change : Within ±10%
Specified value	MD series	No significant abnormality in appearance.
Test Methods and	The test sample shall be exposed to reflow ov	ven at 230±5°C for 40 seconds, with peak temperature at 260±5°C for 5 seconds, 2 times.
Remarks	Test board material : Glass epoxy-resin	
Remarks	Test board thickness : 1.0mm	

16. Thermal shock										
Specified Value	MD series			Inductance change : Within ±10% No significant abnormality in appearance.						
				-	he test samples shall be placed at specified temperature for specified emperature cycle shall be repeated 100 cycles.					
		Conditions of 1	cycle							
Test Methods and	Step	Temperature (°C)	[Duration (min)						
Remarks	1	1 -40±3		30±3						
	2	Room temperature		Within 3						
	3	+85±2		30±3						
	4	Room temperature		Within 3						

17. Damp heat			
Specified Value	MD series		Inductance change : Within $\pm 10\%$ No significant abnormality in appearance.
Test Methods and	•	all be soldered to the tes all be placed in thermosta	t board by the reflow. atic oven set at specified temperature and humidity as shown in below table.
Remarks	Temperature	60±2°C	
	Humidity	90~95%RH	
	Time	500+24/-0 hour	

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18. Loading under o	lamp heat			
Specified Value	pecified Value MD series		Inductance change: Within ±10%	
			No significant abnormality in appearance.	
	1	all be soldered to the te	•	
	· ·	•	mostatic oven set at specified temperature and humidity and applied the rated currer	
Test Methods and	continuously as show	60±2°C		
Remarks	Temperature	90~95%RH	_	
	Humidity Applied current	Rated current	_	
	Time	500+24/-0 hour	_	
	Time	300 + 24/ - 0 riour		
40.1				
19. Low temperatur	re life test			
Specified Value	MD series		Inductance change : Within ±10%	
·			No significant abnormality in appearance.	
Test Methods and	The test samples shall be soldered to the test board by the reflow. After that, the test samples shall be placed at test conditions as show			
Remarks	in below table.			
	Temperature	-40±2°C		
	Time	500+24/-0 hour		
20. High temperatur	ra lifa taat			
20. High temperatu	re me test			
Specified Value	MD series		_	
			_	
Specified Value			_	
Specified Value 21. Loading at high	MD series temperature life test		Inductance change : Within ±10%	
Specified Value	MD series		Inductance change : Within ±10% No significant abnormality in appearance.	
Specified Value 21. Loading at high	MD series temperature life test MD series	all be soldered to the te	No significant abnormality in appearance.	
Specified Value 21. Loading at high Specified Value	MD series temperature life test MD series The test samples sha		No significant abnormality in appearance.	
Specified Value 21. Loading at high Specified Value Test Methods and	MD series temperature life test MD series The test samples sha		No significant abnormality in appearance.	
Specified Value 21. Loading at high Specified Value Test Methods and	MD series temperature life test MD series The test samples shall		No significant abnormality in appearance.	
Specified Value 21. Loading at high Specified Value Test Methods and	MD series temperature life test MD series The test samples shabelow table.	all be placed in thermost	No significant abnormality in appearance.	
Specified Value 21. Loading at high Specified Value Test Methods and	MD series temperature life test MD series The test samples shadelow table. Temperature	all be placed in thermost	No significant abnormality in appearance.	
Specified Value 21. Loading at high Specified Value Test Methods and	MD series temperature life test MD series The test samples shadelow table. Temperature Applied current	all be placed in thermost 85±2°C Rated current	No significant abnormality in appearance.	
Specified Value 21. Loading at high Specified Value Test Methods and	MD series temperature life test MD series The test samples shabelow table. Temperature Applied current Time	all be placed in thermost 85±2°C Rated current	No significant abnormality in appearance.	
Specified Value 21. Loading at high Specified Value Test Methods and Remarks	MD series temperature life test MD series The test samples shabelow table. Temperature Applied current Time	all be placed in thermost 85±2°C Rated current	No significant abnormality in appearance.	
Specified Value 21. Loading at high Specified Value Test Methods and Remarks	MD series temperature life test MD series The test samples shabelow table. Temperature Applied current Time	all be placed in thermost 85±2°C Rated current	No significant abnormality in appearance. est board by the reflow. tatic oven set at specified temperature and applied the rated current continuously as shown	
Specified Value 21. Loading at high Specified Value Test Methods and Remarks	MD series temperature life test MD series The test samples shabelow table. Temperature Applied current Time	all be placed in thermost 85±2°C Rated current	No significant abnormality in appearance. est board by the reflow. tatic oven set at specified temperature and applied the rated current continuously as shown Standard test condition:	
Specified Value 21. Loading at high Specified Value Test Methods and Remarks	MD series temperature life test MD series The test samples shabelow table. Temperature Applied current Time	all be placed in thermost 85±2°C Rated current	No significant abnormality in appearance. est board by the reflow. tatic oven set at specified temperature and applied the rated current continuously as shown Standard test condition: Unless otherwise specified, temperature is 20±15°C and 65±20% of relative humidity.	

METAL CORE SMD POWER INDUCTORS (MCOIL™ MD SERIES)

■PRECAUTIONS

1. Circuit Design

◆Operating environment

Precautions

1. The products described in this specification are intended for use in general electronic equipment, (office supply equipment, telecommunications systems, measuring equipment, and household equipment). They are not intended for use in mission-critical equipment or systems requiring special quality and high reliability (traffic systems, safety equipment, aerospace systems, nuclear control systems and medical equipment including life-support systems,) where product failure might result in loss of life, injury or damage. For such uses, contact TAIYO YUDEN Sales Department in advance.

2. PCB Design Precautions ◆Land pattern design 1. Please refer to a recommended land pattern.

◆Land pattern design Surface Mounting

Technical considerations

Mounting and soldering conditions should be checked beforehand.

· Applicable soldering process to this products is reflow soldering only.

3. Considerations for automatic placement

Precautions

- ◆Adjustment of mounting machine
 - 1. Excessive impact load should not be imposed on the products when mounting onto the PC boards.
 - 2. Mounting and soldering conditions should be checked beforehand.

Technical considerations

- ◆Adjustment of mounting machine
 - 1. When installing products, care should be taken not to apply distortion stress as it may deform the products.

4. Soldering

Reflow soldering

- 1. Please contact any of our offices for a reflow soldering, and refer to the recommended condition specified.
- 2. The product shall be used reflow soldering only.
- 3. Please do not add any stress to a product until it returns in normal temperature after reflow soldering.

♦Lead free soldering

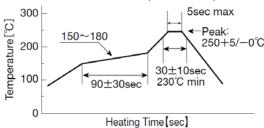
Precautions

- 1. When using products with lead free soldering, we request to use them after confirming adhesion, temperature of resistance to soldering heat, soldering etc sufficiently.
- ◆Recommended conditions for using a soldering iron (NR10050 Type)
 - Put the soldering iron on the land-pattern.
 - Soldering iron's temperature Below 350°C
 - Duration 3 seconds or less
- · The soldering iron should not directly touch the inductor.

◆Reflow soldering

- 1. If products are used beyond the range of the recommended conditions, heat stresses may deform the products, and consequently degrade the reliability of the products.
 - •NR30/40/50/60/80, NRV20/30, NRH24/30, NRS20/40/50/60/80 Type, NR10050 Type, NS101/125 Type Recommended reflow condition (Pb free solder)

Technical considerations



5. Cleaning

Precautions

♦Cleaning conditions

1. Washing by supersonic waves shall be avoided.

Technical considerations

♦Cleaning conditions

1. If washed by supersonic waves, the products might be broken.

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6. Handling Precautions

◆Handling

- 1. Keep the product away from all magnets and magnetic objects.
- ◆Breakaway PC boards (splitting along perforations)
- 1. When splitting the PC board after mounting product, care should be taken not to give any stresses of deflection or twisting to the board.
- 2. Board separation should not be done manually, but by using the appropriate devices.
- ◆Mechanical considerations
- 1. Please do not give the product any excessive mechanical shocks.
- 2. Please do not add any shock and power to a product in transportation.
- ◆Pick-up pressure
 - 1. Please do not push to add any pressure to a winding part. Please do not give any shock and push into a ferrite core exposure part.
- ◆Packing
- 1. Please avoid accumulation of a packing box as much as possible.
- ◆Board mounting
- 1. There shall be no pattern or via between terminals at the bottom of product.
- 2. Components which are located in peripheral of product shall not make contact with surface (top, side) of product.

◆Handling

- 1. There is a case that a characteristic varies with magnetic influence.
- ◆Breakaway PC boards (splitting along perforations)
 - 1. The position of the product on PCBs shall be carefully considered to minimize the stress caused from splitting of the PCBs.
- ◆Mechanical considerations
 - 1. There is a case to be damaged by a mechanical shock.
 - 2. There is a case to be broken by the handling in transportation.
- Technical considerations

 Technical Pick-up pressure
 - 1. Damage and a characteristic can vary with an excessive shock or stress.
 - ◆Packing
 - 1. If packing boxes are accumulated, that could cause a deformation on packing tapes or a damage on the products.
 - ◆Board mounting
 - 1. If there is pattern or via between terminals at the bottom of product, it may cause characteristics change.
 - 2. If components which are located in peripheral of product make contact with surface (top, side) of product, it may cause damage or characteristics change.

7. Storage conditions

♦Storage

- To maintain the solderability of terminal electrodes and to keep the packing material in good condition, temperature and humidity in the storage area should be controlled.
 - · Recommended conditions

Ambient temperature : −5~40°C

Humidity: Below 70% RH

- The ambient temperature must be kept below 30°C. Even under ideal storage conditions, solderability of products electrodes may
 decrease as time passes.
 - For this reason, product should be used within 6 months from the time of delivery.
 - In case of storage over 6 months, solderability shall be checked before actual usage.

Technical considerations

Precautions

♦Storage

1. Under a high temperature and humidity environment, problems such as reduced solderability caused by oxidation of terminal electrodes and deterioration of taping/packaging materials may take place.

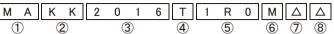
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METAL CORE WIRE-WOUND CHIP POWER INDUCTORS(MCOIL™ MA SERIES)



■PARTS NUMBER

* Operating Temp.:- $40\sim+105^{\circ}$ C (Including self-generated heat)



141 / 1	11	2 0 1	<u> </u>	1 11 0		_	_
1	2	3	4	5	6	7	8

USeries name	
Code	Series name
MA	Metal Core Wire-wound Chip Power Inductor

(2)Dimensions (T)	
Code	Dimensions (T) [mm]
KK	1.0
MK	1.2

③Dimensions(L)	×W)
Code	Dimensions (L × W) [mm]
2016	2.0 × 1.6
2520	2.5 × 2.0

4 Packaging	
Code	Packaging
Т	Taping
T	Taping

⑤Nominal inductance

△=Blank space

Code (example)	Nominal inductance[μ H]
R47	0.47
1R0	1.0
4R7	4.7

※R=Decimal point

6 Inductance tolerance

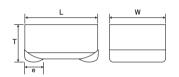
Code	Inductance tolerance
М	±20%

(E) a		
(/)Sr	pecial	code

Oppositi ocac	
Code	Special code
Δ	Standard

®Internal code

■STANDARD EXTERNAL DIMENSIONS / STANDARD QUANTITY

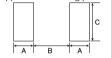


Recommended Land Patterns

Surface Mounting

•Mounting and soldering conditions should be checked beforehand.

•Applicable soldering process to these products is reflow soldering only.



Type	Α	В	С
2016	0.7	0.8	1.8
2520	0.8	1.2	2.0
			Unit:mm

Туре	L	W	Т	е	Standard quantity[pcs] Taping
MAKK2016	2.0±0.1 (0.079±0.004)	1.6±0.1 (0.063±0.004)	1.0 max (0.039 max)	0.5±0.3 (0.020±0.012)	3000
MAKK2520	2.5±0.2 (0.098±0.008)	2.0±0.2 (0.079±0.008)	1.0 max (0.039 max)	0.5 ± 0.3 (0.020 \pm 0.012)	3000
MAMK2520	2.5±0.2 (0.098±0.008)	2.0±0.2 (0.079±0.008)	1.2 max (0.047 max)	0.5±0.3 (0.020±0.012)	3000

Unit:mm(inch)

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MAKK2016 type
[Thickness: 1.0mm max.]

- III II I								
		Nominal inductance		Self-resonant	DC Resistance	Rated current ※) [mA](max.)		Measuring
Parts number	EHS	[μ H]	Inductance tolerance	frequency [MHz] (min.)	[Ω](max.)	Saturation current Idc1	Temperature rise current Idc2	frequency[MHz]
MAKK2016TR24M	RoHS	0.24	±20%	-	0.037	4,200	3,000	2
MAKK2016TR33M	RoHS	0.33	±20%	-	0.040	3,600	3,200	2
MAKK2016TR47M	RoHS	0.47	±20%	-	0.460	3,200	2,800	2
MAKK2016TR68M	RoHS	0.68	±20%	-	0.065	2,500	2,500	2
MAKK2016T1R0M	RoHS	1.0	±20%	-	0.075	2,200	2,200	2
MAKK2016T1R5M	RoHS	1.5	±20%	-	0.130	1,600	1,650	2
MAKK2016T2R2M	RoHS	2.2	±20%	-	0.160	1,500	1,500	2
MAKK2016T3R3M	RoHS	3.3	±20%	-	0.255	1,150	1,200	2
MAKK2016T4R7M	RoHS	4.7	±20%	-	0.380	1,000	950	2

The date of the last of the la								
		Nominal inductance		Self-resonant	DC Resistance	Rated current ※) [mA](max.)		Measuring
Parts number	EHS	[μ H]	Inductance tolerance	frequency [MHz] (min.)	[Ω](max.)	Saturation current	Temperature rise current	frequency[MHz]
				[IVITZ] (MIN.)		Idc1	Idc2	
MAKK2520TR33M	RoHS	0.33	±20%	-	0.038	4,700	3,500	2
MAKK2520TR47M	RoHS	0.47	±20%	1	0.046	3,900	3,200	2
MAKK2520TR68M	RoHS	0.68	±20%	1	0.059	3,700	2,900	2
MAKK2520T1R0M	RoHS	1.0	±20%	1	0.072	2,700	2,500	2
MAKK2520T1R5M	RoHS	1.5	±20%	-	0.125	2,300	1,800	2
MAKK2520T2R2M	RoHS	2.2	±20%	-	0.156	1,900	1,500	2
MAKK2520T3R3M	R ₀ HS	3.3	±20%	-	0.200	1,550	1,300	2
MAKK2520T4R7M	R₀HS	4.7	±20%	-	0.300	1,300	1,100	2

MAMK2520 type [Thickness: 1.2mm max.]

- IVII (IVII (EDEO CYPO		This income to the state of the							
		Nominal inductance	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω](max.)	Rated current ※) [mA](max.)		Manager	
Parts number	EHS	[μ H]				Saturation current Idc1	Temperature rise current Idc2	Measuring frequency[MHz]	
MAMK2520TR47M	RoHS	0.47	±20%	-	0.039	4,200	3,400	2	
MAMK2520TR68M	R₀HS	0.68	±20%	-	0.048	3,200	3,200	2	
MAMK2520T1R0M	RoHS	1.0	±20%	1	0.059	3,100	2,700	2	
MAMK2520T2R2M	RoHS	2.2	±20%	1	0.110	2,000	1,900	2	
MAMK2520T3R3M	RoHS	3.3	±20%	1	0.156	1,800	1,700	2	
MAMK2520T4R7M	R₀HS	4.7	±20%	-	0.260	1,500	1,300	2	

- $\mbox{\%}$) The saturation current value (Idc1) is the DC current value having inductance decrease down to 30%. (at 20°C)
- $\mbox{\%}$) The temperature rise current value (ldc2) is the DC current value having temperature increase by 40°C. (at 20°C)
- X) The rated current value is following either Idc1 or Idc2, which is the lower one.

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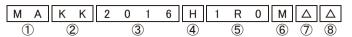
METAL CORE WIRE-WOUND CHIP POWER INDUCTORS(MCOIL™ MA-H SERIES)



REFLOW

■PARTS NUMBER

* Operating Temp.:-40~+125°C (Including self-generated heat)



①Series name

Code	Series name
MA	Metal Core Wire-wound Chip Power Inductor

②Dimensions (T)

Code	Dimensions (T) [mm]
KK	1.0
MK	1.2

③Dimensions (L × W)

-	·
Code	Dimensions (L × W) [mm]
2016	2.0 × 1.6
2520	2.5 × 2.0

4 Packaging

O	
Code	Packaging or Special specification
H	Taping (High characteristics)

⑤Nominal inductance

 Δ =Blank space

Code (example)	Nominal inductance[μ H]
R47	0.47
1R0	1.0
4R7	4.7

*R=Decimal point

6Inductance tolerance

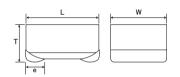
Code	Inductance tolerance
М	±20%

(7)Special code

Oppositi codo	
Code	Special code
Δ	Standard

8 Internal code

■STANDARD EXTERNAL DIMENSIONS / STANDARD QUANTITY



Recommended Land Patterns

Surface Mounting

- •Mounting and soldering conditions should be checked beforehand.
- *Applicable soldering process to these products is reflow soldering only



Type	Α	В	С
2016	0.7	0.8	1.8
2520	0.8	1.2	2.0
			Unit:mm

Type	L	W	Т	е	Standard quantity[pcs]
31			'		Taping
MAKK2016H	2.0±0.1	1.6±0.1	1.0 max	0.5 ± 0.3	3000
MANNZUION	(0.079 ± 0.004)	(0.063 ± 0.004)	(0.039 max)	(0.020 ± 0.012)	3000
MAKK2520H	2.5±0.2	2.0±0.2	1.0 max	0.5±0.3	3000
IVIANNZOZUH	(0.098 ± 0.008)	(0.079 ± 0.008)	(0.039 max)	(0.020 ± 0.012)	3000
MAMK2520H	2.5±0.2	2.0±0.2	1.2 max	0.5±0.3	3000
INIVINIVIZUZUL	(0.098 ± 0.008)	(0.079 ± 0.008)	(0.047 max)	(0.020 ± 0.012)	3000

Unit:mm(inch)

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MAKK2016H type	е	[Thickness: 1.0mm	Thickness: 1.0mm max.]							
				Self-resonant	DC Resistance	Rated current ※) [mA](max.)		Measuring		
Parts number	EHS	Nominal inductance [μ H]	Inductance tolerance	frequency [MHz] (min.)	[Ω] (max.)	Saturation current Idc1	Temperature rise current Idc2	frequency[MHz]		
MAKK2016HR24M	RoHS	0.24	±20%	-	0.026	5,800	4,000	2		
MAKK2016HR33M	RoHS	0.33	±20%	-	0.030	4,700	3,500	2		
MAKK2016HR47M	RoHS	0.47	±20%	-	0.036	4,300	3,300	2		
MAKK2016HR68M	RoHS	0.68	±20%	-	0.050	3,200	2,700	2		
MAKK2016H1R0M	RoHS	1.0	±20%	=	0.070	2,700	2,300	2		
MAKK2016H1R5M	PoHS	1.5	+ 20%	_	0.105	2 100	1 800	2		

MAKK2520H type	•	[Thickness: 1.0mm	max.]					
		Nominal inductance		Self-resonant	DC Resistance	Rated current ※) [mA] (max.)		Measuring
Parts number	EHS	[μ H]	Inductance tolerance	frequency [MHz] (min.)	[Ω] (max.)	Saturation current Idc1	Temperature rise current Idc2	frequency[MHz]
MAKK2520HR22M	RoHS	0.22	±20%	-	0.021	7500	4900	2
MAKK2520HR33M	RoHS	0.33	±20%	-	0.026	6200	4300	2
MAKK2520HR47M	R₀HS	0.47	±20%	-	0.029	5700	4000	2
MAKK2520HR68M	RoHS	0.68	±20%	-	0.043	4300	3400	2
MAKK2520H1R0M	RoHS	1.0	±20%	-	0.053	3800	3000	2
MAKK2520H1R5M	RoHS	1.5	±20%	-	0.078	3000	2400	2
MAKK2520H2R2M	RoHS	2.2	±20%	-	0.120	2500	1800	2

MAMK2520H type	е	[Thickness: 1.2mm	max.]					
Parts number	EHS	Nominal inductance [μ H]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (max.)		Max.	Measuring frequency[MHz]
MAMK2520HR22M	R₀HS	0.22	±20%	-	0.021	7500	5000	2
MAMK2520HR33M	RoHS	0.33	±20%	-	0.023	6600	4400	2
MAMK2520HR47M	RoHS	0.47	±20%	-	0.026	5800	4100	2
MAMK2520HR68M	R₀HS	0.68	±20%	-	0.036	5100	3500	2
MAMK2520H1R0M	RoHS	1.0	±20%	1	0.045	4300	3100	2
MAMK2520H1R5M	R₀HS	1.5	±20%	1	0.065	3300	2600	2
MAMK2520H2R2M	RoHS	2.2	±20%	-	0.090	2800	2200	2

- %) The saturation current value (Idc1) is the DC current value having inductance decrease down to 30% (at 20°C) %) The temperature rise current value (Idc2) is the DC current value having temperature increase by 40°C. (at 20°C)
- *) The rated current value is following either Idc1 or Idc2, which is the lower one.

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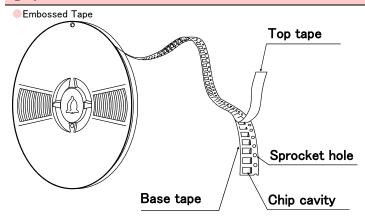
METAL CORE WIRE-WOUND CHIP POWER INDUCTORS (MCOIL™ MA SERIES / MCOIL™ MA-H SERIES)

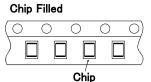
PACKAGING

1 Minimum Quantity

Type	Standard Quantity [pcs]
туре	Tape & Reel
MAKK2016	3000
MAKK2520	3000
MAMK2520	3000

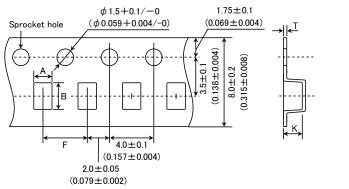
2Tape Material

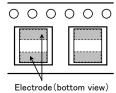




3 Taping dimensions

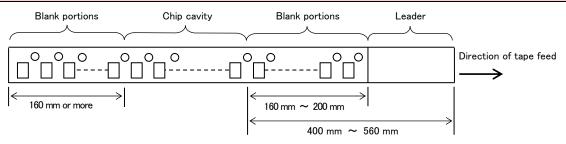
Embossed tape 8mm wide (0.315 inches wide)





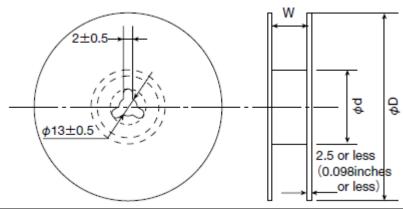
Type	Chip	Chip cavity		Tape thickness	
туре	Α	В	F	T	K
MAKK2016	1.9±0.1	2.3±0.1	4.0±0.1	0.25±0.05	1.2 max
MARKZUTO	(0.075 ± 0.004)	(0.091 ± 0.004)	(0.157 ± 0.004)	(0.009 ± 0.002)	(0.047 max)
MAKK2520	2.3±0.1	2.8±0.1	4.0±0.1	0.3±0.05	1.25 max
WARRZUZU	(0.091 ± 0.004)	(0.110 ± 0.004)	(0.157 ± 0.004)	(0.012 ± 0.002)	(0.049 max)
MANIZOEGO	2.3±0.1	2.8±0.1	4.0±0.1	0.3±0.05	1.4 max
MAMK2520	(0.091 ± 0.004)	(0.110 ± 0.004)	(0.157 ± 0.004)	(0.012 ± 0.002)	(0.055 max)
	·				Unit:mm(inch)

4 Leader and Blank portion



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⑤Reel size

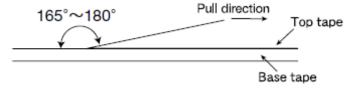


Type	Reel size (Reference values)			
Туре	ϕ D	ϕ d	W	
MAKK2016	100+0 / 2	60+1/-0	10.0±1.5	
MAKK2520	180+0/-3 (7.087+0/-0.118)	(2.36+0.039/0)	(0.394 ± 0.059)	
MAMK2520			(0.394±0.059)	
•				

Unit:mm(inch)

6Top Tape Strength

The top The top tape requires a peel-off force of 0.1 to 1.2N in the direction of the arrow as illustrated below.



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METAL CORE WIRE-WOUND CHIP POWER INDUCTORS (MCOIL™ MA SERIES / MCOIL™ MA-H SERIES)

■RELIABILITY DATA

1. Operating Temperature Range				
Specified Value	MA series	-40~+105°C		
Specified Value	MA-H series	-40~+125°C		
Test Methods and Remarks	Including self-generated heat			
2. Storage Tempera				
Specified Value	MA series	-40~+85°C		
Test Methods and	MA-H series			
Remarks	0 to 40°C for the product with taping.			
3. Rated current				
0	MA series			
Specified Value	MA-H series	Within the specified tolerance		
	W/ TI Solies	<u>I</u>		
4. Inductance				
0 10 111	MA series	West of the Control o		
Specified Value	MA-H series	Within the specified tolerance		
Test Methods and	Measuring equipment : LCR Meter (HP 4	285A or equivalent)		
Remarks	Measuring frequency : 2MHz、1V			
5. DC Resistance				
Specified Value	MA series	Within the specified tolerance		
	MA-H series	<u> </u>		
Test Methods and Remarks	Measuring equipment : DC ohmmeter (HIOKI 3227 or equivalent)			
6. Self resonance fr	requency			
Specified Value	MA series	_		
	MA-H series			
7. Temperature cha	racteristic			
Specified Value	MA series	Inductance change : Within ±15%		
	MA-H series			
Test Methods and Remarks	ds and Measurement of inductance shall be taken at temperature range within $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$. With reference to inductance value at $+20^{\circ}\text{C}$., change rate shall be calculated.			
8. Resistance to fle				
Specified Value	MA series	No damage		
	MA-H series			
Test Methods and Remarks	The test samples shall be soldered to the test until deflection of the test board reaches to Test board size : 100 × 40 × 1.0 Test board material : Glass epoxy-results of the solder cream thickness : 0.12 mm	resin Force Rod		
		R5 Board Test Sample 45±2mm 45±2mm		

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9. Insulation resista	nce : between wires			
0 :5 1)/1	MA series			
Specified Value	MA-H series	1 -		
10. Insulation resist	ance : between wire and core			
0 :5 1)/1	MA series	D00EV 400LO :		
Specified Value	MA-H series	DC25V 100kΩ min		
11. Withstanding vo	Itage : between wire and core			
0 :5 1)/1	MA series			
Specified Value	MA-H series	-		
12. Adhesion of terr	minal electrode			
	MA series			
Specified Value	MA-H series	No abnormality.		
	The test samples shall be soldered to the tes	st board by the reflow.		
Test Methods and	Applied force : 10N to X and	Y directions.		
Remarks	Duration : 5s. Solder cream thickness : 0.12mm.			
	Solder Greatif trilckriess . 0.12mm.			
12 Desistance to v	ikustian			
13. Resistance to v				
Specified Value	MA series	Inductance change : Within ±10% No significant abnormality in appearance.		
	MA-H series	5 27		
	The test samples shall be soldered to the test board by the reflow. Then it shall be submitted to below test conditions.			
	Frequency Range 10~55Hz			
Test Methods and	Total Amplitude 1.5mm (May not	exceed acceleration 196m/s²)		
Remarks	Sweeping Method 10Hz to 55Hz to	10Hz for 1min.		
	Time X	For 2 hours on each X, Y, and Z axis.		
	Z	TOT 2 HOURS ON EACH A, T, and 2 axis.		
	Recovery: At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48hrs.			
14. Solderability				
0 :0 17/1	MA series			
Specified Value	MA-H series	At least 90% of surface of terminal electrode is covered by new solder.		
	The test samples shall be dipped in flux, and then immersed in molten solder as shown in below table.			
Test Methods and	Flux: Methanol solution containing rosin 25%.			
Remarks	Solder Temperature 245±5°C Time 5±0.5 sec.	_		
	Time 5±0.5 sec.			
	Action and a second a second and a second an			
15. Resistance to s	oldering heat			
	MA series	Inductance change : Within ±10%		
Specified Value	MA-H series	No significant abnormality in appearance.		
		ren at 230°C for 40 seconds, with peak temperature at $260+0/-5$ °C for 5 seconds, 3 times.		
Test Methods and	Test board material : Glass epoxy-resin			
Remarks	Test board thickness : 1.0mm			
	Recovery : At least 2hrs of recovery under the	ne standard condition after the test, followed by the measurement within 48hrs.		

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16. Thermal shock MA series Inductance change: Within ±10% Specified Value No significant abnormality in appearance. MA-H series The test samples shall be soldered to the test board by the reflow. The test samples shall be placed at specified temperature for specified time by step 1 to step 4 as shown in below table in sequence. The temperature cycle shall be repeated 100 cycles. Conditions of 1 cycle Duration (min) Step Temperature (°C) Test Methods and -40±3 30 ± 3 1 Remarks 2 Room temperature Within 3 3 +85±2 30 ± 3 Room temperature Within 3 Recovery: At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48hrs. 17. Damp heat MA series Inductance change: Within ±10% Specified Value No significant abnormality in appearance. MA-H series The test samples shall be soldered to the test board by the reflow. The test samples shall be placed in thermostatic oven set at specified temperature and humidity as shown in below table. Test Methods and 60±2°C Temperature Remarks Humidity 90~95%RH 500+24/-0 hour Time Recovery: At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48hrs. 18. Loading under damp heat MA series Inductance change : Within $\pm 10\%$ Specified Value No significant abnormality in appearance. MA-H series The test samples shall be soldered to the test board by the reflow. The test samples shall be placed in thermostatic oven set at specified temperature and humidity and applied the rated current continuously as shown in below table. Test Methods and Temperature 60±2°C Remarks Humidity 90∼95%RH Applied current Rated current Time 500+24/-0 hour Recovery: At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48hrs. 19. Low temperature life test MA series Inductance change : Within $\pm 10\%$ Specified Value No significant abnormality in appearance. MA-H series The test samples shall be soldered to the test board by the reflow. After that, the test samples shall be placed at test conditions as shown in below table. Test Methods and Remarks Temperature -40±2°C Time 500+24/-0 hour Recovery: At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48hrs. 20. High temperature life test MA series Inductance change: Within ±10% Specified Value No significant abnormality in appearance. MA-H series The test samples shall be soldered to the test board by the reflow. After that, the test samples shall be placed at test conditions as shown Test Methods and in below table 85 ± 2°C Remarks Temperature 500+24/-0 hour Time Recovery: At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48hrs. 21. Loading at high temperature life test MA series

Specified Value

MA-H series

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22. Standard condition		
Specified Value	MA series	Standard test condition : Unless otherwise specified, temperature is 20±15°C and 65±20% of relative humidity.
	MA-H series	When there is any question concerning measurement result: In order to provide correlation data, the test shall be condition of $20\pm2^{\circ}C$ of temperature, $65\pm5\%$ relative humidity. Inductance is in accordance with our measured value.

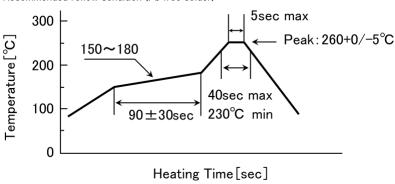
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METAL CORE WIRE-WOUND CHIP POWER INDUCTORS (MCOIL™ MA SERIES / MCOIL™ MA-H SERIES)

PRECAUTIONS

1. Circuit Design Operating environment 1. The products described in this specification are intended for use in general electronic equipment, office supply equipment, telecommunications systems, measuring equipment, and household equipment). They are not intended for use in mission-critical Precautions equipment or systems requiring special quality and high reliability (traffic systems, safety equipment, aerospace systems, nuclear control systems and medical equipment including life-support systems,) where product failure might result in loss of life, injury or damage. For such uses, contact TAIYO YUDEN Sales Department in advance. 2. PCB Design Land pattern design Precautions 1. Please refer to a recommended land pattern. ◆Land pattern design Technical Surface Mounting Mounting and soldering conditions should be checked beforehand. considerations · Applicable soldering process to this products is reflow soldering only. 3. Considerations for automatic placement Adjustment of mounting machine Precautions 1. Excessive impact load should not be imposed on the products when mounting onto the PC boards. 2. Mounting and soldering conditions should be checked beforehand. Adjustment of mounting machine considerations 1. When installing products, care should be taken not to apply distortion stress as it may deform the products. 4. Soldering ◆Reflow soldering 1. Please contact any of our offices for a reflow soldering, and refer to the recommended condition specified. 2. The product shall be used reflow soldering only Precautions 3. Please do not add any stress to a product until it returns in normal temperature after reflow soldering. ◆Lead free soldering 1. When using products with lead free soldering, we request to use them after confirming adhesion, temperature of resistance to soldering heat, soldering etc sufficiently. Reflow soldering 1. If products are used beyond the range of the recommended conditions, heat stresses may deform the products, and consequently degrade the reliability of the products. Recommended reflow condition (Pb free solder)

Technical considerations



5. Cleaning Precautions ↑ Cleaning conditions 1. Washing by supersonic waves shall be avoided. Technical considerations 1. If washed by supersonic waves, the products might be broken.

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6. Handling ◆Handling 1. Keep the product away from all magnets and magnetic objects. ◆Breakaway PC boards (splitting along perforations) 1. When splitting the PC board after mounting product, care should be taken not to give any stresses of deflection or twisting to the board. 2. Board separation should not be done manually, but by using the appropriate devices. ◆Mechanical considerations Precautions 1. Please do not give the product any excessive mechanical shocks. 2. Please do not add any shock and power to a product in transportation. ◆Pick-up pressure 1. Please do not push to add any pressure to a winding part. Please do not give any shock and push into a ferrite core exposure part. ◆Packing 1. Please avoid accumulation of a packing box as much as possible. 1. There is a case that a characteristic varies with magnetic influence. ◆Breakaway PC boards (splitting along perforations) 1. The position of the product on PCBs shall be carefully considered to minimize the stress caused from splitting of the PCBs. ◆Mechanical considerations Technical 1. There is a case to be damaged by a mechanical shock. considerations 2. There is a case to be broken by the handling in transportation. ◆Pick-up pressure 1. Damage and a characteristic can vary with an excessive shock or stress. **♦**Packing 1. If packing boxes are accumulated, that could cause a deformation on packing tapes or a damage on the products.

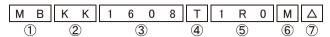
7. Storage conditions		
Precautions	 ♦ Storage 1. To maintain the solderability of terminal electrodes and to keep the packing material in good condition, temperature and humidity in the storage area should be controlled. • Recommended conditions Ambient temperature : 0~40°C Humidity : Below 70% RH • The ambient temperature must be kept below 30°C. Even under ideal storage conditions, solderability of products electrodes may decrease as time passes. For this reason, product should be used within 6 months from the time of delivery. In case of storage over 6 months, solderability shall be checked before actual usage. 	
Technical considerations	◆Storage 1. Under a high temperature and humidity environment, problems such as reduced solderability caused by oxidation of terminal electrodes and deterioration of taping/packaging materials may take place.	

METAL WIRE-WOUND CHIP POWER INDUCTORS(MCOILTM MB SERIES)



PARTS NUMBER

* Operating Temp.:-40 \sim +105 $^{\circ}$ C (Including self-generated heat)



△=Blank space

①Series name

Code	Series name	
MB	Metal Wire-Wound chip power inductor	

⑤Nominal inductance

eries riarrie			- I ackaging	
Code	Series name		Code	Packaging
MB	Metal Wire-Wound chip power inductor		Т	Taping

②Dimensions (T)			
Code	Dimensions (T) [mm]		
KK	1.0		
MK	1.2		

	-	
	Code (example)	Nominal inductance[μH]
	R24	0.24
1R0		1.0
	4R7	4.7

③Dimensions (L × W)

Code	Type(inch)	Dimensions (L×W)[mm]
1608	1608 (0603)	1.6 × 0.8
2012	2012 (0805)	2.0 × 1.25
2520	2520(1008)	2.5 × 2.0

6 Inductance tolerance

Code	Inductance tolerance
М	±20%
N	±30%

7Internal code

■ STANDARD EXTERNAL DIMENSIONS / STANDARD QUANTITY

Recommended Land Patterns

•Mounting and soldering conditions should be checked beforehand.

*Applicable soldering process to these products is reflow soldering only.



Type	Α	В	С
1608	0.55	0.70	1.00
2012	0.60	1.00	1.45
2520	0.60	1.50	2.00

Unit:mm

Type		W	_		Standard quantity[pcs]	
Туре	L	VV	_	е	Paper tape	Embossed tape
MBKK1608	1.6±0.2	0.8±0.2	1.0 max	0.45±0.15	_	3000
MDLVION	(0.063 ± 0.008)	(0.031 ± 0.008)	(0.040 max)	(0.016±0.006)	_	3000
MBKK2012	2.0±0.2	1.25±0.2	1.0 max	0.5±0.2	_	3000
MIDINAZUTZ	(0.079 ± 0.008)	(0.049 ± 0.008)	(0.040 max)	(0.020 ± 0.008)	_	3000
MBMK2520	2.5±0.2	2.0±0.2	1.2 max	0.5±0.2		3000
MIDIMINZOZU	(0.098 ± 0.008)	(0.079 ± 0.008)	(0.047 max)	(0.020 ± 0.008)	_	3000
						Unit:mm(inch)

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		Manada at Sauli a kanana	Name to all trades shows a	Manada al Sada akan a		Self-resonant	DO Desistence	Rated curre		Managara
Parts number	EHS	Nominal inductance [μ H]	Inductance tolerance	frequency [MHz] (min.)	DC Resistance [Ω] (max.)	Saturation current Idc1	Temperature rise current Idc2	Measuring frequency[MHz]		
MBKK1608TR24N	RoHS	0.24	±30%	-	0.049	1,650	2,300	1.0		
MBKK1608TR47N	RoHS	0.47	±30%	-	0.104	1,100	1,400	1.0		
MBKK1608TR68N	RoHS	0.68	±30%	-	0.120	950	1,200	1.0		
MBKK1608T1R0M	RoHS	1.0	±20%	-	0.150	800	1,150	1.0		
MBKK1608T1R5M	RoHS	1.5	±20%	-	0.200	650	1,000	1.0		
MBKK1608T2R2M	RoHS	2.2	±20%	-	0.345	520	750	1.0		
MBKK1608T3R3M	RoHS	3.3	±20%	-	0.512	450	600	1.0		
MBKK1608T4R7M	RoHS	4.7	±20%	-	0.730	370	500	1.0		

	Nominal inductance			Self-resonant	DC Resistance	Rated curre	Measuring	
Parts number	EHS	[μ H]			Saturation current Idc1	Temperature rise current Idc2	frequency[MHz]	
MBKK2012TR24N	RoHS	0.24	±30%	-	0.041	3,000	2,400	1.0
MBKK2012TR47N	RoHS	0.47	±30%	-	0.078	2,000	1,650	1.0
MBKK2012TR68N	RoHS	0.68	±30%	-	0.090	1,800	1,500	1.0
MBKK2012T1R0M	RoHS	1.0	±20%	-	0.106	1,500	1,450	1.0
MBKK2012T1R5M	RoHS	1.5	±20%	ı	0.173	1,200	1,100	1.0
MBKK2012T2R2M	RoHS	2.2	±20%	ı	0.290	900	850	1.0
MBKK2012T3R3M	RoHS	3.3	±20%	=	0.500	700	650	1.0
MBKK2012T4R7M	RoHS	4.7	±20%	-	0.615	600	600	1.0

MBMK2520(1008) type Thickness: 1.2mm max.

THIS MILE SECTION COST COST COST COST COST COST COST COST								
		Nominal inductance		Self-resonant	DC Resistance	Rated current ※) [mA]		Measuring
Parts number	EHS	[µ H]			[Ω] (max.)	Saturation current Idc1	Temperature rise current Idc2	frequency[MHz]
MBMK2520TR24N	RoHS	0.24	±30%	ı	0.026	4,750	3,500	1.0
MBMK2520TR47N	RoHS	0.47	±30%	1	0.042	3,900	2,600	1.0
MBMK2520TR68N	RoHS	0.68	±30%	-	0.058	3,150	2,150	1.0
MBMK2520T1R0M	R ₀ HS	1.0	±20%	-	0.072	2,350	1,850	1.0
MBMK2520T1R5M	RoHS	1.5	±20%	-	0.106	2,050	1,500	1.0
MBMK2520T2R2M	R ₀ HS	2.2	±20%	-	0.159	1,800	1,250	1.0
MBMK2520T3R3M	R ₀ HS	3.3	±20%	-	0.260	1,400	970	1.0
MBMK2520T4R7M	R ₀ HS	4.7	±20%	-	0.380	1,150	800	1.0

- $\frak{\%}$) The saturation current value (Idc1) is the DC current value having inductance decrease down to 30%. (at 20°C)
- $\frak{\%}$) The temperature rise current value (Idc2) is the DC current value having temperature increase by 40°C. (at 20°C)
- $\ensuremath{\mbox{\%}}\xspace) The rated current value is following either Idc1 or Idc2, which is the lower one.$

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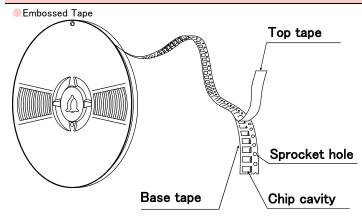
METAL WIRE-WOUND CHIP POWER INDUCTORS (MCOIL™ MB SERIES)

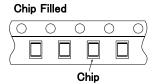
PACKAGING

1 Minimum Quantity

Type	Standard Quantity [pcs]			
туре	Tape & Reel			
MBKK1608	3000			
MBKK2012	3000			
MBMK2520	3000			

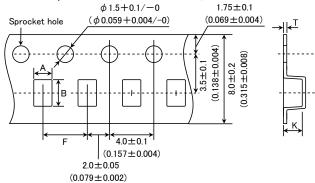
2Tape Material

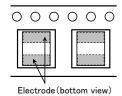




3Taping dimensions

Embossed tape 8mm wide (0.315 inches wide) ϕ 1.5+0.1/-0

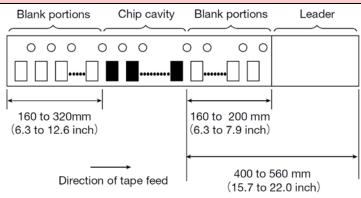




Tuma	Chip	cavity	Insertion pitch	Tape thickness	
Туре	Α	В	F	T	K
MBKK1608	1.1	1.9	4.0±0.1	0.25 ± 0.05	1.2 max
MBKK1008	(0.043)	(0.075)	(0.157 ± 0.004)	(0.010 ± 0.002)	(0.047 max)
MBKK2012	1.45	2.2	4.0±0.1	0.25±0.05	1.2 max
WIDKKZUIZ	(0.057)	(0.087)	(0.157 ± 0.004)	(0.010 ± 0.002)	(0.047 max)
MBMK2520	2.3	2.8	4.0±0.1	0.3 ± 0.05	1.45 max
MBMVZ3Z0	(0.091)	(0.110)	(0.157 ± 0.004)	(0.012 ± 0.002)	(0.057 max)

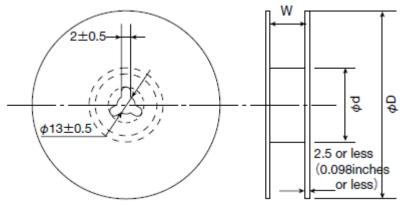
Unit:mm(inch)

4 Leader and Blank portion



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⑤Reel size

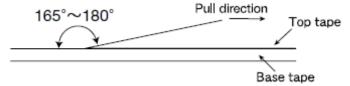


Type	Reel size (Reference values)					
Type	ϕ D	ϕ d	W			
MBKK1608	180+0/-3	60+1/-0	100+15			
MBKK2012	(7.087+0/-0.118)	(2.36+0.039/0)	10.0 ± 1.5 (0.394 ± 0.059)			
MBMK2520	(7.067+0/-0.116)	(2.30+0.039/0)	(0.394±0.059)			

Unit:mm(inch)

6Top Tape Strength

The top The top tape requires a peel-off force of 0.2 to 0.7N in the direction of the arrow as illustrated below.



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METAL WIRE-WOUND CHIP POWER INDUCTORS (MCOIL™ MB SERIES)

■RELIABILITY DATA

1. Operating Tempe	rature Range						
Specified Value	MB series	-40~+105°C					
Test Methods and Remarks	Including self-generated heat						
2. Storage Tempera	ture Range						
Specified Value	MB series	-40~+85°C					
Test Methods and Remarks	0 to 40°C for the product with taping.						
3. Rated current							
Specified Value	MB series	Within the specified tolerance					
Specified value	WD Series	within the specified tolerance					
4. Inductance							
Specified Value	MB series	Within the specified tolerance					
Test Methods and Remarks	Measuring equipment : LCR Meter (HP 4 Measuring frequency : 1MHz, 1V						
F DO Design							
5. DC Resistance	MB series	With the second section of the section of the second section of the section of the second section of the second section of the se					
Specified Value Test Methods and	MB series	Within the specified tolerance					
Remarks	Measuring equipment : DC ohmmeter (HI	OKI 3227 or equivalent)					
6. Self resonance fr	requency						
Specified Value	MB series	_					
7. Temperature cha	racteristic						
Specified Value	MB series	Inductance change : Within ±15%					
Test Methods and Remarks	Measurement of inductance shall be taken at With reference to inductance value at +20°C	temperature range within $-40^{\circ}\text{C} \sim +105^{\circ}\text{C}$.					
8. Resistance to fle							
Specified Value	MB series	No damage					
Test Methods and Remarks	The test samples shall be soldered to the test board by the reflow. As illustrated below, apply force in the direction of the arrow indicating until deflection of the test board reaches to 2 mm. Test board size : 100 × 40 × 1.0 mm (1608:0.8mm) Test board material : Glass epoxy-resin Solder cream thickness : 0.1 mm						
9. Insulation resista	nce : between wires						
Specified Value	MB series	-					
10. Insulation resist	ance : between wire and core						
Specified Value	MB series	DC25V 100kΩ min					
11. Withstanding vo	Itage : between wire and core						
Specified Value	MB series	_					

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12. Adhesion of terr	ninal electrode					
Specified Value	MB series		No abnormality.			
Test Methods and Remarks	The test samples shall be s Applied force Duration Solder cream thickness		st board by the reflow. N) to X and Y directions.			
13. Resistance to vi	bration					
Specified Value	MB series		Inductance change : No significant abnorm			
	The test samples shall be	soldered to the te	st board by the reflow.			
	Then it shall be submitted		ditions.			
	Frequency Range	10∼55Hz			_	
Test Methods and	Total Amplitude		t exceed acceleration 19	96m/s²)	_	
Remarks	Sweeping Method		o 10Hz for 1min.		_	
. Komarko	Time	X Y Z	For 2 hours on each X, Y, and Z axis.			
	Recovery : At least 2hrs of	recovery under t	he standard condition a	fter the test, followed by	ப் the measurement within 48hrs.	
14. Solderability						
Specified Value	MB series		At least 90% of surf	ace of terminal electrode	is covered by new solder.	
	The test samples shall be	lipped in flux, and	then immersed in molte	en solder as shown in belo	w table.	
	Flux : Methanol solution co					
Test Methods and	Solder Temperature	245±5°C				
Remarks	Immersing speed	25mm/s				
	Time	5±0.5 sec.				
	XImmersion depth : All sid	es of mounting te	 rminal shall be immerse	d.		
	<u> </u>					
15. Resistance to so	oldering heat					
To. Resistance to se	ordering float		Industance - Leave V	N;+b;; → 100/		
Specified Value	MB series		Inductance change : V			
	The test comple shall be as	nacad to refler	<u> </u>		uro at 260±0/=5°C for 5 accords 2±ims	
Test Methods and				orius, with peak temperatu	are at $260+0/-5^{\circ}$ C for 5 seconds, 3 time	
Remarks		Glass epoxy-resir 1.0mm	1			
I CHIMINS			he standard condition of	fter the test followed by	the measurement within 48hrs.	
	Recovery . At least zrirs of	recovery under t	rie standard condition a	Tter the test, followed by	trie measurement within 40ms.	
16. Thermal shock						
Specified Value	MB series		Inductance change : No significant abnorm			
	The test samples shall be s	oldered to the tes	st board by the reflow. T	he test samples shall be p	laced at specified temperature for specifie	
	time by step 1 to step 4 as	shown in below t	able in sequence. The t	emperature cycle shall be	repeated 100 cycles.	
	Cor	nditions of 1 cycle				
Test Methods and	Step Temperature	e (°C)	Duration (min)			

Tot Titotitial offort					
Specified Value	I MR series		Inductance change : No significant abnor	Within $\pm10\%$ mality in appearance.	
		•	elow table in sequence. The	The test samples shall be placed at specified temperature for specified temperature cycle shall be repeated 100 cycles.	
Test Methods and	Step	Temperature (°C)	Duration (min)		
Remarks	1	-40 ± 3	30±3		
Remarks	2	Room temperature	Within 3		
	3	+85±2	30±3		
	4	Room temperature	Within 3		
	Recovery: At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48hrs.				

17. Damp heat					
Specified Value	llue MB series		Inductance change : Within ±10% No significant abnormality in appearance.		
T . M .:	The test samples shall be soldered to the test board by the reflow. The test samples shall be placed in thermostatic oven set at specified temperature and humidity as shown in below table.				
Test Methods and	Temperature	60±2°C			
Remarks	Humidity	90∼95%RH			
	Time	1000+24/-0 hour			
	Recovery : At leas	t 2hrs of recovery under t	he standard condition after the test, followed by the measurement within 48hrs.		

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18. Loading under d	lamp heat			
Specified Value	MP parios		Inductance change : Within ±10%	
Specified Value MB series			No significant abnormality in appearance.	
	The test samples shall be soldered to the test		st board by the reflow.	
	The test samples	shall be placed in therr	nostatic oven set at specified temperature and humidity and applied the rated current	
Test Methods and	continuously as sho			
Remarks	Temperature	60±2°C		
	Humidity	90~95%RH		
	Applied current	Rated current		
	Time	1000+24/-0 hour		
	Recovery : At least	2hrs of recovery under t	he standard condition after the test, followed by the measurement within 48hrs.	
19. Low temperatur	e life test			
0 15 11/1			Inductance change : Within ±10%	
Specified Value	MB series		No significant abnormality in appearance.	
	The test samples sh	all be soldered to the tes	t board by the reflow. After that, the test samples shall be placed at test conditions as shown	
	in below table.			
Test Methods and	in below table.			
Test Methods and Remarks	Temperature	-40±2°C		
		-40±2°C 1000+24/-0 hour		
	Temperature Time	1000+24/-0 hour	he standard condition after the test, followed by the measurement within 48hrs.	
	Temperature Time	1000+24/-0 hour	he standard condition after the test, followed by the measurement within 48hrs.	
	Temperature Time Recovery : At least	1000+24/-0 hour	he standard condition after the test, followed by the measurement within 48hrs.	
Remarks 20. High temperatur	Temperature Time Recovery : At least	1000+24/-0 hour	he standard condition after the test, followed by the measurement within 48hrs. Inductance change: Within ±10%	
Remarks	Temperature Time Recovery : At least	1000+24/-0 hour		
Remarks 20. High temperatur	Temperature Time Recovery : At least re life test MB series	1000+24/-0 hour 2hrs of recovery under t	Inductance change : Within ±10% No significant abnormality in appearance.	
Remarks 20. High temperatur	Temperature Time Recovery : At least re life test MB series	1000+24/-0 hour 2hrs of recovery under t	Inductance change : Within ±10% No significant abnormality in appearance.	
20. High temperatur Specified Value	Temperature Time Recovery: At least re life test MB series The test samples sh	1000+24/-0 hour 2hrs of recovery under t	Inductance change : Within ±10% No significant abnormality in appearance.	
20. High temperatur Specified Value Test Methods and	Temperature Time Recovery: At least re life test MB series The test samples sh in below table.	1000+24/-0 hour 2hrs of recovery under t	Inductance change : Within ±10% No significant abnormality in appearance.	
20. High temperatur Specified Value Test Methods and	Temperature Time Recovery: At least Te life test MB series The test samples sh in below table. Temperature Time	$1000+24/-0$ hour 2hrs of recovery under to all be soldered to the tes $85\pm2^{\circ}\text{C}$ $1000+24/-0$ hour	Inductance change : Within ±10% No significant abnormality in appearance.	
20. High temperatur Specified Value Test Methods and	Temperature Time Recovery: At least Te life test MB series The test samples sh in below table. Temperature Time	$1000+24/-0$ hour 2hrs of recovery under to all be soldered to the tes $85\pm2^{\circ}\text{C}$ $1000+24/-0$ hour	Inductance change: Within ±10% No significant abnormality in appearance. It board by the reflow. After that, the test samples shall be placed at test conditions as shown	
20. High temperature Specified Value Test Methods and Remarks	Temperature Time Recovery: At least Te life test MB series The test samples sh in below table. Temperature Time	$1000+24/-0$ hour 2hrs of recovery under to all be soldered to the tes $85\pm2^{\circ}\text{C}$ $1000+24/-0$ hour	Inductance change : Within ±10% No significant abnormality in appearance. It board by the reflow. After that, the test samples shall be placed at test conditions as shown	
20. High temperature Specified Value Test Methods and Remarks	Temperature Time Recovery: At least MB series The test samples sh in below table. Temperature Time Recovery: At least	$1000+24/-0$ hour 2hrs of recovery under to all be soldered to the tes $85\pm2^{\circ}\text{C}$ $1000+24/-0$ hour	Inductance change: Within ±10% No significant abnormality in appearance. It board by the reflow. After that, the test samples shall be placed at test conditions as shown	
20. High temperature Specified Value Test Methods and Remarks 21. Loading at high	Temperature Time Recovery: At least MB series The test samples sh in below table. Temperature Time Recovery: At least	$1000+24/-0$ hour 2hrs of recovery under to all be soldered to the tes $85\pm2^{\circ}\text{C}$ $1000+24/-0$ hour	Inductance change : Within ±10% No significant abnormality in appearance. It board by the reflow. After that, the test samples shall be placed at test conditions as shown	
20. High temperature Specified Value Test Methods and Remarks 21. Loading at high	Temperature Time Recovery: At least MB series The test samples sh in below table. Temperature Time Recovery: At least	$1000+24/-0$ hour 2hrs of recovery under to all be soldered to the tes $85\pm2^{\circ}\text{C}$ $1000+24/-0$ hour	Inductance change: Within ±10% No significant abnormality in appearance. It board by the reflow. After that, the test samples shall be placed at test conditions as shown	
20. High temperature Specified Value Test Methods and Remarks 21. Loading at high Specified Value	Temperature Time Recovery: At least MB series The test samples sh in below table. Temperature Time Recovery: At least	$1000+24/-0$ hour 2hrs of recovery under to all be soldered to the tes $85\pm2^{\circ}\text{C}$ $1000+24/-0$ hour	Inductance change: Within ±10% No significant abnormality in appearance. It board by the reflow. After that, the test samples shall be placed at test conditions as shown he standard condition after the test, followed by the measurement within 48hrs.	
20. High temperature Specified Value Test Methods and Remarks 21. Loading at high Specified Value	Temperature Time Recovery: At least MB series The test samples sh in below table. Temperature Time Recovery: At least	$1000+24/-0$ hour 2hrs of recovery under to all be soldered to the tes $85\pm2^{\circ}\text{C}$ $1000+24/-0$ hour	Inductance change: Within ±10% No significant abnormality in appearance. It board by the reflow. After that, the test samples shall be placed at test conditions as shown he standard condition after the test, followed by the measurement within 48hrs. — Standard test condition:	
20. High temperature Specified Value Test Methods and Remarks 21. Loading at high Specified Value	Temperature Time Recovery: At least MB series The test samples sh in below table. Temperature Time Recovery: At least	$1000+24/-0$ hour 2hrs of recovery under to all be soldered to the tes $85\pm2^{\circ}\text{C}$ $1000+24/-0$ hour	Inductance change: Within ±10% No significant abnormality in appearance. It board by the reflow. After that, the test samples shall be placed at test conditions as shown he standard condition after the test, followed by the measurement within 48hrs.	
20. High temperature Specified Value Test Methods and Remarks 21. Loading at high Specified Value 22. Standard condit	Temperature Time Recovery: At least MB series The test samples sh in below table. Temperature Time Recovery: At least temperature life test MB series	$1000+24/-0$ hour 2hrs of recovery under to all be soldered to the tes $85\pm2^{\circ}\text{C}$ $1000+24/-0$ hour	Inductance change: Within ±10% No significant abnormality in appearance. It board by the reflow. After that, the test samples shall be placed at test conditions as shown he standard condition after the test, followed by the measurement within 48hrs. Standard test condition: Unless otherwise specified, temperature is 20±15°C and 65±20% of relative humidity.	

METAL WIRE-WOUND CHIP POWER INDUCTORS (MCOIL™ MB SERIES)

damage. For such uses, contact TAIYO YUDEN Sales Department in advance.

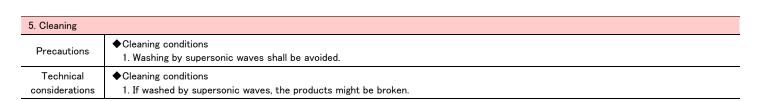
■PRECAUTIONS

1. Circuit Design Operating environment 1. The products described in this specification are intended for use in general electronic equipment, (office supply equipment, telecommunications systems, measuring equipment, and household equipment). They are not intended for use in mission-critical equipment or systems requiring special quality and high reliability (traffic systems, safety equipment, aerospace systems, nuclear control systems and medical equipment including life-support systems,) where product failure might result in loss of life, injury or

2. PCB Design	
Precautions	◆Land pattern design 1. Please refer to a recommended land pattern.
Technical considerations	 ◆Land pattern design Surface Mounting • Mounting and soldering conditions should be checked beforehand. • Applicable soldering process to this products is reflow soldering only.

3. Considerations for automatic placement		
Precautions	 ◆Adjustment of mounting machine 1. Excessive impact load should not be imposed on the products when mounting onto the PC boards. 2. Mounting and soldering conditions should be checked beforehand. 	
Technical considerations	◆Adjustment of mounting machine 1. When installing products, care should be taken not to apply distortion stress as it may deform the products.	

4. Soldering 1. Please contact any of our offices for a reflow soldering, and refer to the recommended condition specified. 2. The product shall be used reflow soldering only. Precautions 3. Please do not add any stress to a product until it returns in normal temperature after reflow soldering. Lead free soldering 1. When using products with lead free soldering, we request to use them after confirming adhesion, temperature of resistance to soldering heat, soldering etc sufficiently. ◆Reflow soldering 1. If products are used beyond the range of the recommended conditions, heat stresses may deform the products, and consequently degrade the reliability of the products. Recommended reflow condition (Pb free solder) 5sec max 300 Peak: 260+0/-5°C $Temperature[^{\circ}C]$ 150~180 Technical 200 considerations 100 90±30sec 230°C min 0 Heating Time[sec]



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6. Handling ◆Handling 1. Keep the product away from all magnets and magnetic objects. ◆Breakaway PC boards (splitting along perforations) 1. When splitting the PC board after mounting product, care should be taken not to give any stresses of deflection or twisting to the board. 2. Board separation should not be done manually, but by using the appropriate devices. ◆Mechanical considerations Precautions 1. Please do not give the product any excessive mechanical shocks. 2. Please do not add any shock and power to a product in transportation. ◆Pick-up pressure 1. Please do not push to add any pressure to a winding part. Please do not give any shock and push into a ferrite core exposure part. ◆Packing 1. Please avoid accumulation of a packing box as much as possible. 1. There is a case that a characteristic varies with magnetic influence. ◆Breakaway PC boards (splitting along perforations) 1. The position of the product on PCBs shall be carefully considered to minimize the stress caused from splitting of the PCBs. ◆Mechanical considerations Technical 1. There is a case to be damaged by a mechanical shock. considerations 2. There is a case to be broken by the handling in transportation. ◆Pick-up pressure 1. Damage and a characteristic can vary with an excessive shock or stress. **♦**Packing 1. If packing boxes are accumulated, that could cause a deformation on packing tapes or a damage on the products.

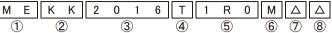
7. Storage conditions				
Precautions	 ◆Storage 1. To maintain the solderability of terminal electrodes and to keep the packing material in good condition, temperature and humidity in the storage area should be controlled. Recommended conditions Ambient temperature : 0~40°C Humidity : Below 70% RH The ambient temperature must be kept below 30°C. Even under ideal storage conditions, solderability of products electrodes may decrease as time passes. For this reason, product should be used within 6 months from the time of delivery. In case of storage over 6 months, solderability shall be checked before actual usage. 			
Technical considerations	◆Storage 1. Under a high temperature and humidity environment, problems such as reduced solderability caused by oxidation of terminal electrodes and deterioration of taping/packaging materials may take place.			

METAL WIRE-WOUND CHIP POWER INDUCTORS(MCOIL™ ME SERIES)



PARTS NUMBER

* Operating Temp.:-40~+125°C (Including self-generated heat)



①Series name	
Code	Series name
ME	Metal Wire-wound Chip Power Inductor

②Dimensions(T) Code Dimensions (T) [mm]

③Dimensions (L × W)			
Code	Dimensions (L × W) [mm]		
2016	2.0 × 1.6		
2520	2.5 × 2.0		

4)Packaging	
Code	Packaging
Т	Taping

(5)Nominal inductance

△=Blank space

Code (example)	Nominal inductance[μ H]
R47	0.47
1R0	1.0
4R7	4.7

※R=Decimal point

6Inductance tolerance

Code	Inductance tolerance
М	±20%

(7)Special code

	O openial coup	
	Code	Special code
Ī	Δ	Standard

®Internal code

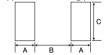
■ STANDARD EXTERNAL DIMENSIONS / STANDARD QUANTITY

Recommended Land Patterns

Surface Mounting

• Mounting and soldering conditions should be checked beforehand.

· Applicable soldering process to these products is reflow soldering only.



Туре	Α	В	С
2016	0.7	0.8	1.8
2520	0.9	1.0	2.2
			Unit : mm

Type	L	W	Т	е	Standard quantity[pcs] Taping
MEKK2016	2.0 ± 0.2 (0.079 ± 0.008)	1.6±0.2 (0.063±0.008)	1.0 max (0.039 max)	0.5 ± 0.3 (0.020 ± 0.012)	3000
MEKK2520	2.5±0.2 (0.098±0.008)	2.0±0.2 (0.079±0.008)	1.0 max (0.039 max)	0.65±0.3 (0.026±0.012)	3000

Unit:mm(inch)

■PARTS NUMBER

MFKK2016 type [Thickness: 1 0mm max]

- WILKINZOTO	THICKNESS. I.OHIII Hax.								
Parts number		EHS	Nominal inductance [μ H]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω](max.)	Rated current ※) [mA](max.)		Management
	er						Saturation current Idc1	Temperature rise current Idc2	Measuring frequency[MHz]
MEKK2016TR47N	Л	RoHS	0.47	±20%	-	0.030	4,500	4,300	1
MEKK2016T1R0M	И	RoHS	1.0	±20%	-	0.060	3,600	3,100	1
MEKK2016T2R2M	Л	RoHS	2.2	±20%	-	0.150	2,400	1,900	1

MFKK2520 type [Thickness: 1.0mm max.]

	EHS	Nominal inductance [μ H]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (max.)	Rated current ※) [mA](max.)		Measuring
Parts number						Saturation current Idc1	Temperature rise current Idc2	frequency[MHz]
MEKK2520TR33M	RoHS	0.33	±20%	-	0.022	6,400	5,100	1
MEKK2520TR47M	RoHS	0.47	±20%	-	0.025	5,900	4,800	1
MEKK2520T1R0M	RoHS	1.0	±20%	-	0.053	4,300	3,300	1

- ※) The saturation current value (Idc1) is the DC current value having inductance decrease down to 30%. (at 20°C)
- X) The temperature rise current value (Idc2) is the DC current value having temperature increase up to 40°C. (at 20°C)
- ※) The rated current is the DC current value that satisfies both of current value saturation current value and temperature rise current value.

ealse) Idc2 Measurement board data Material:FR4

Board dimensions: $100 \times 50 \times 1.6t$ mm

Pattern dimensions: 45×45 mm (Double side board)

Pattern thickness: 70 μ m

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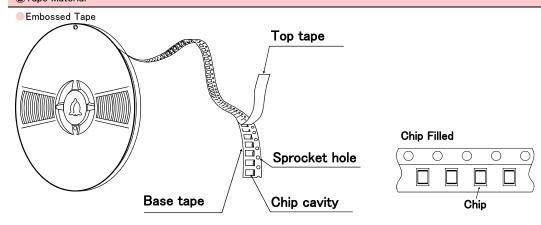
METAL WIRE-WOUND CHIP POWER INDUCTORS (MCOIL™ ME SERIES)

PACKAGING

1 Minimum Quantity

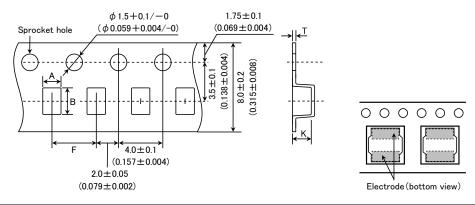
Type	Standard Quantity [pcs]			
Type	Tape & Reel			
MEKK2016	3000			
MEKK2520	3000			

2Tape Material



3Taping dimensions

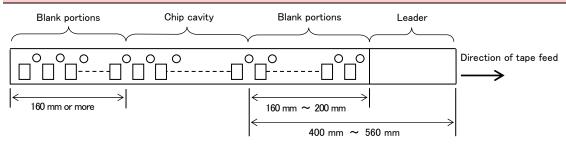
Embossed tape 8mm wide (0.315 inches wide)



T	Chip	cavity	Insertion pitch	Tape thickness	
Туре	Α	В	F	T	K
MEKK2016	1.9±0.1	2.45±0.1	4.0±0.1	0.25 ± 0.05	1.2 max
MENNZUIO	(0.075 ± 0.004)	(0.097 ± 0.004)	(0.157 ± 0.004)	(0.009 ± 0.002)	(0.047 max)
MERKATAA	2.4±0.1	2.9±0.1	4.0±0.1	0.25 ± 0.05	1.1 max
MEKK2520	(0.094 ± 0.004)	(0.114 ± 0.004)	(0.157 ± 0.004)	(0.009 ± 0.002)	(0.043 max)
					11.21 (2.11)

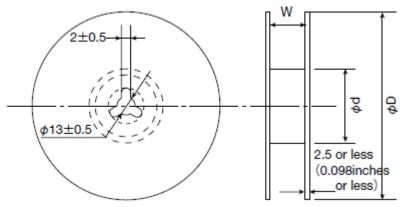
Unit:mm(inch)

4 Leader and Blank portion



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⑤Reel size

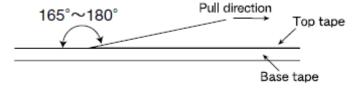


Type	Reel size (Reference values)					
Туре	ϕ D	ϕ d	W			
MEKK2016	180+0/-3	60+1/-0	10.0±1.5			
MEKK2520	(7.087+0/-0.118)	(2.36+0.039/0)	(0.394 ± 0.059)			

Unit:mm(inch)

6Top Tape Strength

The top The top tape requires a peel-off force of 0.1 to 1.0N in the direction of the arrow as illustrated below.



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METAL WIRE-WOUND CHIP POWER INDUCTORS (MCOIL™ ME SERIES)

■RELIABILITY DATA

1 One T	vakuus Danas	
1. Operating Tempe		401.105°0
Specified Value	ME series	-40~+125°C
Test Methods and Remarks	Including self-generated heat	
2. Storage Tempera	ture Range	
Specified Value	ME series	-40~+85°C
Test Methods and Remarks	0 to 40°C for the product with taping.	
3. Rated current		
Specified Value	ME series	Within the specified tolerance
opcomed value	ME 30103	Main the specified tolerance
4. Inductance		
Specified Value	ME series	Within the specified tolerance
Test Methods and Remarks	Measuring equipment : LCR Meter (HP 4 Measuring frequency : 1MHz, 0.5V	
5. DC Resistance		
Specified Value	ME series	Within the specified tolerance
Test Methods and Remarks	Measuring equipment : DC ohmmeter (HI	IOKI 3227 or equivalent)
6 C-1t t		
6. Self resonance fr		_
Specified Value	ME series	-
7. Temperature cha	uo atauiatia	
Specified Value	ME series	Inductance change : Within ±15%
Test Methods and		temperature range within $-40^{\circ}\text{C} \sim +125^{\circ}\text{C}$.
Remarks	With reference to inductance value at $+20^{\circ}$	
8. Resistance to flex	yura of cubatrata	
Specified Value	ME series	No damage
Test Methods and Remarks	The test samples shall be soldered to the test until deflection of the test board reaches to the test board size and the solder size are to the solder cream thickness and the solder cream thickness are solder cream thickness.	mm Force Rod 10 20
		R5 Test Sample 45±2mm
9. Insulation resista	nce : between wires	
Specified Value	ME series	-
		1
10. Insulation resist	ance : between wire and over-coating	
Specified Value	ME series	DC25V 100k Ωmin
11 Withstanding vo	Itage : between wire and over-coating	
Specified Value	ME series	_
		1

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Specified Value	ME series		No abnormality.	
	The test samples shall be soldered to the te		st board by the reflow.	
Test Methods and	Applied force	: 10N to X and \	Y directions.	
Remarks	Duration	Duration : 5s.		
	Solder cream thickness	: 0.12mm.		
13. Resistance to v		: 0.12mm.		
	ibration	: 0.12mm.	Inductance change : Within ±10%	
13. Resistance to v		: 0.12mm.	Inductance change : Within ±10% No significant abnormality in appearance.	
	ibration		No significant abnormality in appearance.	

Test Methods and Remarks

10 TI I I

Frequency Range	10~55	iHz
Total Amplitude 1.5m		(May not exceed acceleration 196m/s²)
Sweeping Method	10Hz to 55Hz to 10Hz for 1min.	
	Χ	
Time	Υ	For 2 hours on ach X, Y, and Z axis.
	Z	

Recovery: At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48hrs.

14. Solderability			
Specified Value	ME series		At least 90% of surface of terminal electrode is covered by new solder.
Test Methods and Remarks	The test samples shall be dip Flux: Methanol solution cont Solder Temperature Time **Immersion depth: All sides*	aining rosin 25%. 245±5°C 5±0.5 sec.	then immersed in molten solder as shown in below table.

15. Resistance to soldering heat		
Specified Value	ME series	Inductance change : Within $\pm 10\%$ No significant abnormality in appearance.
Test Methods and Remarks	Test board material : Glass epoxy-resin Test board thickness : 1.0mm	ren at 230°C for 40 seconds, with peak temperature at $260+0/-5$ °C for 5 seconds, 2 times. The standard condition after the test, followed by the measurement within 48hrs.

16. Thermal shock				
Specified Value	ME series		Inductance change : No significant abnorm	
The test samples shall be soldered to the test board by the reflow. The test samples shall be placed at time by step 1 to step 4 as shown in below table in sequence. The temperature cycle shall be repeated				
		Conditions of 1 c	ycle	
To at Mother decemb	Step	Temperature (°C)	Duration (min)	
Test Methods and Remarks	-40 ± 3 30 ± 3			
Remarks	2	Room temperature	Within 3	
	3	+85±2	30±3	
	4	Room temperature	Within 3	

Recovery: At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48hrs.

17. Damp heat			
Specified Value	ME series		Inductance change : Within ±10% No significant abnormality in appearance.
T . M .!	The test samples shall be soldered to the test board by the reflow. The test samples shall be placed in thermostatic oven set at specified temperature and humidity as shown in below table. Temperature $60\pm2^{\circ}C$		·
Test Methods and Remarks			
Remarks	Humidity	90∼95%RH	
	Time	500+24/-0 hour	
	Recovery: At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48hrs.		

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18. Loading under d	amp heat		
Specified Value	ME series		Inductance change : Within ±10% No significant abnormality in appearance.
Test Methods and	The test samples si continuously as show	n in below table.	ost board by the reflow. Inostatic oven set at specified temperature and humidity and applied the rated current
Remarks	Temperature		ne standard condition after the test, followed by the measurement within 48hrs.
	-	<u> </u>	
19. Low temperatur	e life test		
Specified Value	ME series		Inductance change : Within $\pm 10\%$ No significant abnormality in appearance.
Test Methods and Remarks	in below table.	,	t board by the reflow. After that, the test samples shall be placed at test conditions as shown
Remarks	Temperature -40±2°C Time 500+24/-0 hour Recovery : At least 2hrs of recovery under		ne standard condition after the test, followed by the measurement within 48hrs.
20. High temperatur	e life test		
Specified Value	ME series		Inductance change : Within ±10% No significant abnormality in appearance.
Test Methods and Remarks	in below table.		t board by the reflow. After that, the test samples shall be placed at test conditions as shown The standard condition after the test, followed by the measurement within 48hrs.
	Theody of y . At least 2	ins of recovery under the	to standard condition after the test, followed by the measurement within 40ms.
21. Loading at high	temperature life test		
Specified Value	ME series		_
22. Standard condit	ion		
Specified Value	ME series		Standard test condition: Unless otherwise specified, temperature is 20±15°C and 65±20% of relative humidity. When there is any question concerning measurement result: In order to provide correlation data, the test shall be condition of 20±2°C of temperature, 65±5% relative humidity. Inductance is in accordance with our measured value.

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METAL WIRE-WOUND CHIP POWER INDUCTORS (MCOIL™ ME SERIES)

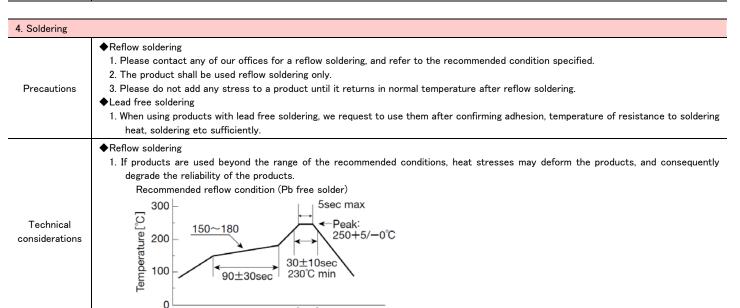
damage. For such uses, contact TAIYO YUDEN Sales Department in advance.

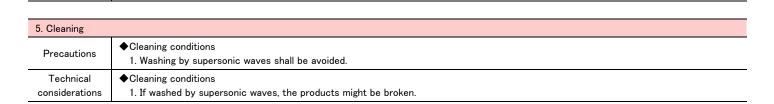
■PRECAUTIONS

1. Circuit Design Operating environment 1. The products described in this specification are intended for use in general electronic equipment, (office supply equipment, telecommunications systems, measuring equipment, and household equipment). They are not intended for use in mission-critical equipment or systems requiring special quality and high reliability (traffic systems, safety equipment, aerospace systems, nuclear control systems and medical equipment including life-support systems,) where product failure might result in loss of life, injury or

2. PCB Design	
Precautions	◆Land pattern design 1. Please refer to a recommended land pattern.
Technical considerations	 ◆Land pattern design Surface Mounting • Mounting and soldering conditions should be checked beforehand. • Applicable soldering process to this products is reflow soldering only.

3. Considerations	3. Considerations for automatic placement		
Precautions	◆Adjustment of mounting machine 1. Excessive impact load should not be imposed on the products when mounting onto the PC boards. 2. Mounting and soldering conditions should be checked beforehand.		
Technical considerations	◆Adjustment of mounting machine 1. When installing products, care should be taken not to apply distortion stress as it may deform the products.		





Heating Time [sec]

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6. Handling ◆Handling 1. Keep the product away from all magnets and magnetic objects. ◆Breakaway PC boards (splitting along perforations) 1. When splitting the PC board after mounting product, care should be taken not to give any stresses of deflection or twisting to the board. 2. Board separation should not be done manually, but by using the appropriate devices. ◆Mechanical considerations Precautions 1. Please do not give the product any excessive mechanical shocks. 2. Please do not add any shock and power to a product in transportation. ◆Pick-up pressure 1. Please do not push to add any pressure to a winding part. Please do not give any shock and push into a ferrite core exposure part. ◆Packing 1. Please avoid accumulation of a packing box as much as possible. 1. There is a case that a characteristic varies with magnetic influence. ◆Breakaway PC boards (splitting along perforations) 1. The position of the product on PCBs shall be carefully considered to minimize the stress caused from splitting of the PCBs. ◆Mechanical considerations Technical 1. There is a case to be damaged by a mechanical shock. considerations 2. There is a case to be broken by the handling in transportation. ◆Pick-up pressure 1. Damage and a characteristic can vary with an excessive shock or stress. **♦**Packing 1. If packing boxes are accumulated, that could cause a deformation on packing tapes or a damage on the products.

7. Storage condi	tions
Precautions	 ♦ Storage 1. To maintain the solderability of terminal electrodes and to keep the packing material in good condition, temperature and humidity in the storage area should be controlled. • Recommended conditions Ambient temperature : 0~40°C Humidity : Below 70% RH • The ambient temperature must be kept below 30°C. Even under ideal storage conditions, solderability of products electrodes may decrease as time passes. For this reason, product should be used within 6 months from the time of delivery. In case of storage over 6 months, solderability shall be checked before actual usage.
Technical considerations	◆Storage 1. Under a high temperature and humidity environment, problems such as reduced solderability caused by oxidation of terminal electrodes and deterioration of taping/packaging materials may take place.

METAL MULTILAYER CHIP POWER INDUCTORS(MCOIL™ MC SERIES)



REFLOW

■PARTS NUMBER

* Operating Temp.: -40~+125°C(Including self-generated heat)



△=Blank space

①Series name

Code	Series name
MC	Metal base multilayer chip power inductor

②Thickness

Code	Thickness[mm]
FK	0.60 max
FE	0.65 max
HK	0.80 max
KK	1.0 max

6Inductance tolerance

⑤Nominal inductance

Code

(example) R24

R47

1R0

※R=Decimal point

@inductance tolerance				
Code	Inductance tolerance			
М	±20%			

Nominal inductance [μ H]

0.24

0.47

1.0

③Dimensions (L×W)

Code	Type (inch)	Dimensions (L×W)[mm]
1608	1608 (0603)	1.6 × 0.8
2012	2012 (0805)	2.0 × 1.25

7 Special code

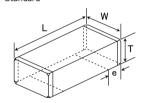
Oppositi ocao	
Code	Special code
Δ	Standard
G	5 surface terminal

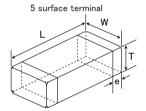
(A) Dackaging

Ti donaging	
Code	Packaging
Т	Taping

■STANDARD EXTERNAL DIMENSIONS / STANDARD QUANTITY

Standard





Туре	_	W	т		Standard quantity[pcs]		
Type		VV		е	Paper tape	Embossed tape	
MCFK1608	1.6±0.2	0.8 ± 0.2	0.60 max	0.3±0.2	4000	_	
(0603)	(0.063 ± 0.008)	(0.031 ± 0.008)	(0.024 max)	(0.012 ± 0.008)	4000		
MCFE1608	1.6±0.2	0.8 ± 0.2	0.65 max	0.3±0.2	4000	_	
(0603)	(0.063 ± 0.008)	(0.031 ± 0.008)	(0.026 max)	(0.012 ± 0.008)	4000	_	
MCHK2012	2.0±0.2	1.25±0.2	0.80 max	0.5±0.3	4000	_	
(0805)	(0.079 ± 0.008)	(0.049 ± 0.008)	(0.031 max)	(0.02 ± 0.012)	4000		
MCKK2012	2.0±0.2	1.25±0.2	1.0 max	0.5±0.3	_	3000	
(0805)	(0.079 ± 0.008)	(0.049 ± 0.008)	(0.039 max)	(0.02 ± 0.012)	_	3000	

Unit:mm(inch)

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MC1608

Parts number	EHS	EHS Nominal inductance [μ H]	Inductance tolerance	DC Resistance [Ω]		Rated Rated current(Idc1) current(Idc2)	Measuring frequency	Thickness [mm] (max.)	
				(max.)	(typ.)	[A] (max.)	[A] (max.)	[MHz]	[IIIII] (IIIax.)
MCFK1608TR24M	RoHS	0.24	±20%	0.050	0.040	2.30	2.10	1	0.60
MCFK1608TR47M	RoHS	0.47	±20%	0.085	0.069	1.90	1.60	1	0.60
MCFE1608TR24MG	RoHS	0.24	±20%	0.100	0.075	2.60	1.50	1	0.65
MCFE1608TR47MG	RoHS	0.47	±20%	0.150	0.114	2.00	1.20	1	0.65
MCFE1608T1R0MG	R₀HS	1.0	±20%	0.340	0.270	1.40	0.80	1	0.65

MC2012

Parts number	EHS	Nominal inductance [μ H]	Inductance tolerance	DC Resistance [Ω]		Rated Rated current(Idc1) current(Idc2)	Measuring frequency	Thickness [mm] (max.)	
				(max.)	(typ.)	[A] (max.)	[A] (max.)	[MHz]	[IIIII] (IIIax.)
MCHK2012TR24M	RoHS	0.24	±20%	0.024	0.019	4.32	3.60	1	0.80
MCHK2012TR47M	RoHS	0.47	±20%	0.036	0.030	3.21	3.15	1	0.80
MCKK2012TR24M	RoHS	0.24	±20%	0.025	0.020	6.20	4.00	1	1.00
MCKK2012TR47M	RoHS	0.47	±20%	0.039	0.032	4.50	3.10	1	1.00

 $\frac{1}{2}$ Idc1 is the DC value at which the initial L value is decreased within 30% by the application of DC bias. (at 20°C)

^{*}Idc2 is the DC value at which the temperature of element is increased within 40°C by the application of DC bias. (at 20°C)

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Multilayer chip inductors Multilayer chip inductors for high frequency, Multilayer chip bead inductors Multilayer common mode choke coils (MC series F type) Metal Multilayer Chip Power Inductors (MCOILTM MC series)

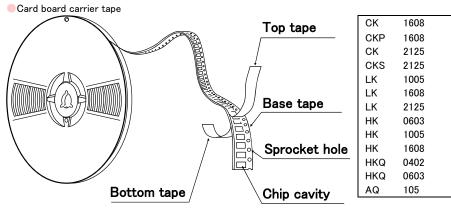
PACKAGING

1 Minimum Quantity

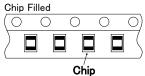
Tape & Reel Packaging	5		
Type	Thickness	Standard Q	uantity [pcs]
Турс	mm(inch)	Paper Tape	Embossed Tape
CK1608(0603)	0.8 (0.031)	4000	_
CK2125 (0805)	0.85(0.033)	4000	_
	1.25(0.049)	_	2000
CKS2125(0805)	0.85(0.033)	4000	_
	1.25(0.049)	_	2000
CKP1608 (0603)	0.8 (0.031)	4000	_
CKP2012 (0805)	0.9 (0.035)	_	3000
CKP2016 (0806)	0.9 (0.035)	_	3000
	0.7 (0.028)	_	3000
CKP2520(1008)	0.9 (0.035)	_	3000
-	1.1 (0.043)	_	2000
NM2012 (0805)	0.9 (0.035)	_	3000
NM2520(1008)	0.9 (0.035)	_	3000
	1.1 (0.043)	_	2000
LK1005 (0402)	0.5 (0.020)	10000	_
LK1608(0603)	0.8 (0.031)	4000	_
LK2125(0805)	0.85(0.033)	4000	_
	1.25(0.049)	_	2000
HK0603(0201)	0.3 (0.012)	15000	_
HK1005(0402)	0.5 (0.020)	10000	_
HK1608(0603)	0.8 (0.031)	4000	_
HK2125(0805)	0.85 (0.033)	_	4000
HK2120(0000)	1.0 (0.039)	_	3000
HKQ0402(01005)	0.2 (0.008)	20000	40000
HKQ0603W(0201)	0.3 (0.012)	15000	_
HKQ0603C(0201)	0.3 (0.012)	15000	_
HKQ0603S(0201)	0.3 (0.012)	15000	_
HKQ0603U(0201)	0.3 (0.012)	15000	_
AQ105(0402)	0.5 (0.020)	10000	_
BK0402(01005)	0.2 (0.008)	20000	_
BK0603(0201)	0.3 (0.012)	15000	_
BK1005(0402)	0.5 (0.020)	10000	_
BKH0603(0201)	0.3 (0.012)	15000	_
BKH1005(0402)	0.5 (0.020)	10000	_
BK1608(0603)	0.8 (0.031)	4000	_
DK010E (000E)	0.85(0.033)	4000	_
BK2125(0805)	1.25(0.049)	_	2000
BK2010(0804)	0.45(0.018)	4000	_
BK3216(1206)	0.8 (0.031)	_	4000
BKP0402 (01005)	0.2 (0.008)	20000	_
BKP0603(0201)	0.3 (0.012)	15000	_
BKP1005 (0402)	0.5 (0.020)	10000	_
BKP1608 (0603)	0.8 (0.031)	4000	_
BKP2125(0805)	0.85 (0.033)	4000	_
MCF0605 (0202)	0.3 (0.012)	15000	_
MCF0806 (0302)	0.4 (0.016)	_	10000
MCF1210(0504)	0.55(0.022)	_	5000
MCF2010(0804)	0.45(0.018)	_	4000
MCFK1608(0603)	0.6 (0.024)	4000	_
MCFE1608 (0603)	0.65 (0.026)	4000	_
MCHK2012(0806)	0.8 (0.031)	4000	_
MCKK2012 (0805)	1.0(0.039)	-	3000
· · · · · · · · · · · · · · · · · · ·		1	

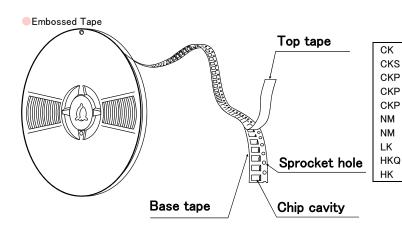
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Taping material

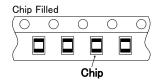


BK	0402
BK	0603
BK	1005
BK	1608
BK	2125
BK	2010
BKP	0402
BKP	0603
BKP	1005
BKP	1608
BKP	2125
BKH	0603
BKH	1005
MCF	0605
MC	1608
MC	2012

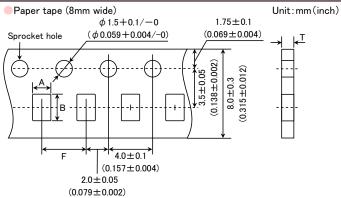




2125
3216
0806
1210
2010
2012



Taping Dimensions

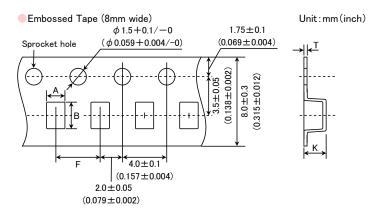


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_	Thickness	Chip	cavity	Insertion Pitch	Tape Thickness
Туре	mm(inch)	А	В	F	Т
CK1608(0603)	0.8 (0.031)	1.0±0.2	1.8±0.2	4.0±0.1	1.1max
OK1000 (0000)	0.0 (0.001)	(0.039 ± 0.008)	(0.071 ± 0.008)	(0.157 ± 0.004)	(0.043max)
CK2125(0805)	0.85(0.033)	1.5±0.2	2.3±0.2	4.0±0.1	1.1max
		(0.059±0.008)	(0.091 ± 0.008)	(0.157±0.004)	(0.043max)
CKS2125 (0805)	0.85 (0.033)	1.5±0.2 (0.059±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	1.1max (0.043max)
		1.0±0.2	1.8±0.2	4.0±0.1	1.1max
CKP1608(0603)	0.8 (0.031)	(0.039 ± 0.008)	(0.071 ± 0.008)	(0.157 ± 0.004)	(0.043max)
	(2.222)	0.65±0.1	1.15±0.1	2.0±0.05	0.8max
LK1005(0402)	0.5 (0.020)	(0.026 ± 0.004)	(0.045 ± 0.004)	(0.079 ± 0.002)	(0.031max)
LK1608 (0603)	0.8 (0.031)	1.0±0.2	1.8±0.2	4.0±0.1	1.1max
LK1006(0003)	0.6 (0.031)	(0.039 ± 0.008)	(0.071 ± 0.008)	(0.157±0.004)	(0.043max)
LK2125(0805)	0.85(0.033)	1.5±0.2	2.3±0.2	4.0±0.1	1.1max
ERE120 (0000)	0.00 (0.000)	(0.059 ± 0.008)	(0.091 ± 0.008)	(0.157 ± 0.004)	(0.043max)
HK0603(0201)	0.3 (0.012)	0.40±0.06	0.70±0.06	2.0±0.05	0.45max
		(0.016±0.002)	(0.028±0.002)	(0.079±0.002)	(0.018max)
HK1005(0402)	0.5 (0.020)	0.65 ± 0.1	1.15±0.1	2.0±0.05	0.8max (0.031max)
		(0.026±0.004) 1.0±0.2	(0.045±0.004) 1.8±0.2	(0.079±0.002) 4.0±0.1	(0.031max) 1.1max
HK1608(0603)	0.8 (0.031)	(0.039 ± 0.008)	(0.071 ± 0.008)	(0.157 ± 0.004)	(0.043max)
		0.25±0.04	0.45±0.04	2.0±0.05	0.36max
HKQ0402(01005)	0.2 (0.008)	(0.010 ± 0.002)	(0.018 ± 0.002)	(0.079 ± 0.002)	(0.014max)
LU(0.0000::/(0.0)	0.0 (2.7.1.)	0.40±0.06	0.70±0.06	2.0±0.05	0.45max
HKQ0603W(0201)	0.3 (0.012)	(0.016 ± 0.002)	(0.028 ± 0.002)	(0.079 ± 0.002)	(0.018max)
LIKO06020 (0201)	0.2 (0.010)	0.40±0.06	0.70±0.06	2.0±0.05	0.45max
HKQ0603C(0201)	0.3 (0.012)	(0.016 ± 0.002)	(0.028 ± 0.002)	(0.079 ± 0.002)	(0.018max)
HKQ0603S(0201)	0.3 (0.012)	0.40 ± 0.06	0.70±0.06	2.0±0.05	0.45max
111(400000 (0201)	0.0 (0.012)	(0.016±0.002)	(0.028 ± 0.002)	(0.079 ± 0.002)	(0.018max)
HKQ0603U(0201)	0.3 (0.012)	0.40±0.06	0.70±0.06	2.0±0.05	0.45max
		(0.016±0.002)	(0.028±0.002)	(0.079±0.002)	(0.018max)
AQ105(0402)	0.5 (0.020)	0.75±0.1	1.15±0.1	2.0±0.05	0.8max
		(0.030 ± 0.004) 0.25 ± 0.04	(0.045±0.004) 0.45±0.04	(0.079±0.002) 2.0±0.05	(0.031max) 0.36max
BK0402(01005)	0.2 (0.008)	(0.010±0.002)	(0.018±0.002)	(0.079 ± 0.002)	(0.014max)
		0.40±0.06	0.70±0.06	2.0±0.05	0.45max
BK0603(0201)	0.3 (0.012)	(0.016±0.002)	(0.028 ± 0.002)	(0.079 ± 0.002)	(0.018max)
DI(1005(0400)	2.5 (2.222)	0.65±0.1	1.15±0.1	2.0±0.05	0.8max
BK1005(0402)	0.5 (0.020)	(0.026 ± 0.004)	(0.045 ± 0.004)	(0.079 ± 0.002)	(0.031max)
BK1608(0603)	0.8 (0.031)	1.0±0.2	1.8±0.2	4.0±0.1	1.1max
BK1008(0003)	0.6 (0.031)	(0.039 ± 0.008)	(0.071 ± 0.008)	(0.157±0.004)	(0.043max)
BK2125(0805)	0.85(0.033)	1.5±0.2	2.3±0.2	4.0±0.1	1.1max
2.12.120 (0000)		(0.059 ± 0.008)	(0.091 ± 0.008)	(0.157 ± 0.004)	(0.043max)
BK2010(0804)	0.45(0.018)	1.2±0.1	2.17±0.1	4.0±0.1	0.8max
		(0.047±0.004)	(0.085 ± 0.004)	(0.157±0.004)	(0.031max)
BKP0402 (01005)	0.2 (0.008)	0.25±0.04 (0.010±0.002)	0.45±0.04 (0.018±0.002)	2.0±0.05 (0.079±0.002)	0.36max (0.014max)
		0.40±0.06	0.70±0.06	2.0±0.05	0.45max
BKP0603 (0201)	0.3 (0.012)	(0.016±0.002)	(0.028 ± 0.002)	(0.079 ± 0.002)	(0.018max)
DIVD1005 (0100)	0.5 (0.000)	0.65±0.1	1.15±0.1	2.0±0.05	0.8max
BKP1005 (0402)	0.5 (0.020)	(0.026 ± 0.004)	(0.045 ± 0.004)	(0.079±0.002)	(0.031max)
BKP1608 (0603)	0.8 (0.031)	1.0±0.2	1.8±0.2	4.0±0.1	1.1max
DIVE 1000 (0009)	0.0 (0.031)	(0.039 ± 0.008)	(0.071 ± 0.008)	(0.157±0.004)	(0.043max)
BKP2125 (0805)	0.85(0.033)	1.5±0.2	2.3±0.2	4.0±0.1	1.1max
		(0.059 ± 0.008)	(0.091 ± 0.008)	(0.157±0.004)	(0.043max)
BKH0603(0201)	0.3 (0.012)	0.40 ± 0.06	0.70 ± 0.06	2.0±0.05	0.45max
		(0.016±0.002)	(0.028±0.002)	(0.079±0.002)	(0.018max)
BKH1005(0402)	0.5 (0.020)	0.65±0.1 (0.026±0.004)	1.15±0.1 (0.045±0.004)	2.0±0.05 (0.079±0.002)	0.8max (0.031max)
		0.62±0.004)	0.77±0.03	2.0±0.05	0.45max
MCF0605 (0202)	0.3 (0.012)	(0.02±0.03 (0.024±0.001)	(0.030 ± 0.001)	(0.079 ± 0.002)	(0.018max)
		1.1±0.05	1.9±0.05	4.0±0.1	0.72max
	/ :				
MCFK1608 (0603)	0.6 (0.024)	(0.043 ± 0.002)	(0.075 ± 0.002)	(0.157 ± 0.004)	(0.028max)
	· · ·		(0.075±0.002) 1.9±0.05	(0.157±0.004) 4.0±0.1	(0.028max) 0.9max
MCFK1608 (0603) MCFE1608 (0603)	0.6 (0.024) 0.65 (0.026)	(0.043±0.002)			
	· · ·	(0.043±0.002) 1.1±0.05	1.9±0.05	4.0±0.1	0.9max

Unit : mm(inch)

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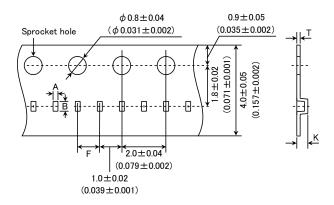
Turne	Thickness	Chip	cavity	Insertion Pitch	Tape Ti	nickness
Туре	mm(inch)		В	F	K	Т
CK2125(0805)	1.25 (0.049)	1.5±0.2 (0.059±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	2.0 (0.079)	0.3 (0.012)
CKS2125(0805)	1.25(0.049)	1.5±0.2 (0.059±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	2.0 (0.079)	0.3 (0.012)
CKP2012 (0805)	0.9 (0.035)	1.55 ± 0.2 (0.061 \pm 0.008)	2.3 ± 0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	1.3 (0.051)	0.3 (0.012)
CKP2016 (0806)	0.9 (0.035)	1.8±0.1 (0.071±0.004)	2.2±0.1 (0.087±0.004)	4.0±0.1 (0.157±0.004)	1.3 (0.051)	0.25 (0.01)
	0.7 (0.028)				1.4 (0.055)	
CKP2520 (1008)	0.9 (0.035)	2.3±0.1 (0.091±0.004)	2.8±0.1 (0.110±0.004)	4.0±0.1 (0.157±0.004)	1.4 (0.055)	0.3 (0.012)
	1.1 (0.043)				1.7 (0.067)	
NM2012 (0805)	0.9 (0.035)	1.55±0.2 (0.061±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	1.3 (0.051)	0.3 (0.012)
NM2520(1008)	0.9 (0.035)	2.3±0.1	2.8±0.1	4.0±0.1	1.4 (0.055)	0.3
	1.1 (0.043)	(0.091 ± 0.004)	(0.110±0.004)	(0.157 ± 0.004)	1.7 (0.067)	(0.012)
LK2125(0805)	1.25(0.049)	1.5±0.2 (0.059±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	2.0 (0.079)	0.3 (0.012)
HK2125(0805)	0.85(0.033)	1.5±0.2	2.3±0.2	4.0±0.1	1.5 (0.059)	0.3
	1.0 (0.039)	(0.059 ± 0.008)	(0.091 ± 0.008)	(0.157±0.004)	2.0 (0.079)	(0.012)
BK2125(0805)	1.25(0.049)	1.5±0.2 (0.059±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	2.0 (0.079)	0.3 (0.012)
BK3216(1206)	0.8(0.031)	1.9±0.1 (0.075±0.004)	3.5 ± 0.1 (0.138 ± 0.004)	4.0±0.1 (0.157±0.004)	1.4 (0.055)	0.3 (0.012)
MCF0806(0302)	0.4 (0.016)	0.75±0.05 (0.030±0.002)	0.95 ± 0.05 (0.037 \pm 0.002)	2.0±0.05 (0.079±0.002)	0.55 (0.022)	0.3 (0.012)
MCF1210(0504)	0.55(0.022)	1.15±0.05 (0.045±0.002)	1.40 ± 0.05 (0.055 \pm 0.002)	4.0±0.1 (0.157±0.004)	0.65 (0.026)	0.3 (0.012)
MCF2010(0804)	0.45(0.018)	1.1±0.1 (0.043±0.004)	2.3±0.1 (0.091±0.004)	4.0±0.1 (0.157±0.004)	0.85	0.3 (0.012)
MCKK2012 (0805)	1.0 (0.039)	1.55±0.2 (0.061±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	1.3 (0.051)	0.25 (0.010)

Unit: mm(inch)

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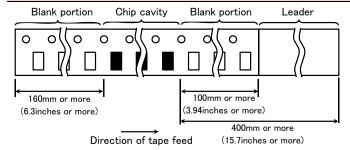
Embossed Tape (4mm wide)

Unit:mm(inch)

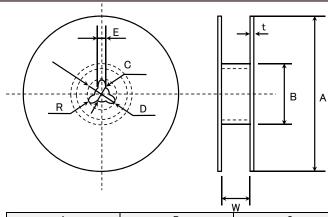


T	Thickness	kness Chip cavity		Insertion Pitch Tape Thickness		nickness
Туре	mm(inch)	Α	В	F	K	Т
HKQ0402 (01005)	0.2 (0.008)	0.23	0.43	1.0±0.02	0.5max.	0.25max.
					Unit	: mm

4LEADER AND BLANK PORTION



5Reel Size



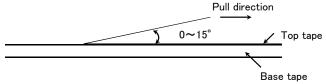
Α	В	С	D	E	R
ϕ 178 ± 2.0	ϕ 50 or more	ϕ 13.0 \pm 0.2	ϕ 21.0±0.8	2.0±0.5	1.0

	t	W
4mm width tape	1.5max.	5±1.0
8mm width tape	2.5max.	10±1.5

(Unit : mm)

6Top tape strength

The top tape requires a peel-off force of $0.1 \sim 0.7 N$ in the direction of the arrow as illustrated below.



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Multilayer chip inductors

Multilayer chip inductors for high frequency, Multilayer chip bead inductors

Multilayer common mode choke coils (MC series F type)

Metal Multilayer Chip Power Inductors (MCOIL™ MC series)

■RELIABILITY DATA

1. Operating Tempe				
	BK0402			
	BK0603			
	BK1005			
	BKH0603			
	BKH1005			
	BK1608			
	BK2125			
	ARRAY	BK2010		
		BK3216		
	BKP0402			
	BKP0603			
	BKP1005			
	BKP1608			
	BKP2125			
	MCF 0605			
	MCF 0806		-40∼+85°C	
	MCF 1210		40 · 100 O	
	MCF 2010			
- Specified Value	CK1608			
	CK2125			
	CKS2125			
opecined value	CKP1608			
	CKP2012			
	CKP2016		-40~+85°C	
	CKP2520			
	NM2012			
	NM2520			
	LK1005			
	LK1608			
	LK2125		<u> </u>	
	HKQ0402			
	HK0603			
	HK1005			
	HK1608		—————————————————————————————————————	
	HK2125		-40.4 ± 63 C	
	HKQ0603W/HK0	Q0603C/HKQ0603S/		
	HKQ0603U/		-55~+125°C	
	AQ105			
	MCFK1608			
	MCFE1608			
	MCHK2012		-40∼+125°C (Including self-generated heat)	
	MCKK2012			

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2. Storage Tempera					
	BK0402				
	BK0603				
	BK1005				
	BKH0603				
	BKH1005				
	BK1608				
	BK2125				
	ARRAY	BK2010			
	70000	BK3216			
	BKP0402				
	BKP0603				
	BKP1005				
	BKP1608				
	BKP2125				
	MCF 0605				
	MCF 0806		-40∼+85°C		
	MCF 1210				
	MCF 2010				
	CK1608				
	CK2125				
Specified Value	CKS2125				
Specified value	CKP1608				
	CKP2012				
	CKP2016				
	CKP2520				
	NM2012				
	NM2520				
	LK1005				
	LK1608				
	LK2125				
	HKQ0402				
	HK0603				
	HK1005				
	HK1608				
	HK2125		-40~+85 C		
	HKQ0603W/HK	(Q0603C/HKQ0603S/			
	HKQ0603U/				
	AQ105				
	MCFK1608				
	MCFE1608				
	MCHK2012		-40~+85°C		
	MCKK2012				

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3. Rated Current			
	BK0402		150~750mA DC
	BK0603		100∼500mA DC
	BK1005		120~1000mA DC
BKH0603			115~450mA DC
	BKH1005		200~300mA DC
	BK1608		150~1500mA DC
	BK2125		200~1200mA DC
	ADDAY	BK2010	100mA DC
	ARRAY	BK3216	100∼200mA DC
	BKP0402	•	0.55~1.1A DC
	BKP0603		0.8~1.8A DC
	BKP1005		0.8~2.4A DC
	BKP1608		1.0~3.0A DC
	BKP2125		1.5~4.0A DC
	MCF 0605		0.05A DC
	MCF 0806		0.1~0.13A DC
	MCF 1210		0.1~0.15A DC
	MCF 2010		0.1A DC
	CK1608		50∼60mA DC
	CK2125		60~500mA DC
	CKS2125		110~280mA DC
	CKP1608		0.35~0.9A DC
Specified Value	CKP2012		0.7∼1.7A DC
	CKP2016		0.9∼1.6A DC
	CKP2520		1.1~1.8A DC
	NM2012		1.0~1.2A DC
	NM2520		0.9~1.2A DC
	LK1005		20~25mA DC
	LK1608		1~150mA DC
	LK2125		5~300mA DC
	HK0603		60~470mA DC
	HK1005		110~300mA DC (-55~+125°C) 200~900mA DC (-55~+85°C)
	HK1608		150~300mA DC
	HK2125		300mA DC
	HKQ0402		100~500mA DC
	HKQ0603W		100∼850mA DC
	HKQ0603C		160~850mA DC
	HKQ0603S		130~600mA DC
	HKQ0603U		190~900mA DC
	AQ105		280~710mA DC
	MCFK1608		Idc1 : 1900~2300mA DC, Idc2 : 1600~2100mA DC

Definition of rated current:

MCFE1608

MCHK2012

MCKK2012

- •In the CK, CKS and BK Series, the rated current is the value of current at which the temperature of the element is increased within 20°C.
- In the BK Series P type, CK Series P type, NM Series, the rated current is the value of current at which the temperature of the element is increased within 40°C.

Idc1:

Idc1

•In the LK, HK, HKQ0603, and AQ Series, the rated current is either the DC value at which the initial L value is decreased within 5% with the application of DC bias, or the value of current at which the temperature of the element is increased within 20°C.

1400~2600mA DC,

3210~4320mA DC,

Idc2 : 800~1500mA DC

3240~3600mA DC

Idc2

Idc1: 4500~6200mA DC, Idc2: 3100~4000mA DC

- •In the HKQ0402(~9N1), the rated current is either the DC value at which the initial L value is decreased within 5% with the application of DC bias, or the value of current at which the temperature of the element is increased within 20°C.
- •In the HKQ0402(10N~), the rated current is either the DC value at which the initial L value is decreased within 5% with the application of DC bias, or the value of current at which the temperature of the element is increased within 25°C.
- •In the MC Series, Idc1 is the DC value at which the initial L value is decreased within 30% and Idc2 is the DC value at which the temperature of element is increased within 40°C by the application of DC bias. (at 20°C)

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$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	
ARRAY BK3216 $60 \sim 1000 \Omega \pm 25\%$ BKP0402 $10 \sim 33 \Omega \pm 5 \Omega (10 \Omega), \pm 25\% (Other)$ BKP0603 $10 \sim 120 \Omega \pm 5 \Omega (10 \Omega), \pm 25\% (Other)$ BKP1005 $10 \sim 330 \Omega \pm 5 \Omega (EM100), \pm 25\% (Other)$ BKP1608 $33 \sim 470 \Omega \pm 25\%$	
BKP0402 $10 \sim 33 \Omega \pm 5 \Omega (10 \Omega, \pm 25\% (Other))$ BKP0603 $10 \sim 120 \Omega \pm 5 \Omega (10 \Omega, \pm 25\% (Other))$ BKP1005 $10 \sim 330 \Omega \pm 5 \Omega (EM100), \pm 25\% (Other)$ BKP1608 $33 \sim 470 \Omega \pm 25\%$	
BKP1005 $10 \sim 120 \Omega \pm 5 \Omega (10 \Omega)$, $\pm 25\% (Other)$ BKP1608 $10 \sim 330 \Omega \pm 5 \Omega (EM100)$, $\pm 25\% (Other)$ 33 ~ 470 Ω ± 25%	
BKP1005 $10\sim330\Omega\pm 5\Omega$ (EM100), ±25 %(Other) BKP1608 $33\sim470\Omega\pm25$ %	
BKP1608 $33\sim470\Omega\pm25\%$	
\mid BKP2125 \mid 33 \sim 330 Ω \pm 25%	
MCF 0605 $12 \sim 90 \Omega \pm 5 \Omega (12 \Omega), \pm 20\% (35 \Omega), \pm 25\% (Other)$	
MCF 0806 $12 \sim 90 \Omega \pm 5 \Omega (12 \Omega), \pm 20\% (Other)$	
MCF 1210 $40 \sim 90 \Omega \pm 20\% (2H900), \pm 25\% (Other)$	
MCF 2010 90Ω ±25%	
CK1608	
CK2125	
CKS2125	
Specified Value CKP1608	
CKP1000 CKP2012	
CKP2012 CKP2016	
CKP2520	
NM2012	
NM2520	
LK1005	
LK1608	
LK2125	
HKQ0402 HK0603	
HK1005	
HK1608	
HK2125	
HKQ0603W/HKQ0603C/HKQ0603S/	
HKQ0603U	
AQ105	
MCFK1608 MCFE1608	
MCHK2012	
MCKK2012 BK0402Series, BKP0402Series	
Measuring frequency : 100±1MHz	
Measuring equipment : E4991A(or its equivalent)	
Measuring jig : 16197A(or its equivalent)	
BK0603Series, BKP0603Series	
Measuring frequency : 100±1MHz	
Measuring equipment : 4291A (or its equivalent)	
Measuring jig : 16193A(or its equivalent)	
BK1005Series. BKP1005Series. BKH1005Series	
Test Methods and Measuring frequency : 100±1MHz	
Remarks Measuring equipment : 4291A(or its equivalent)	
Measuring jig : 16192A(or its equivalent), 16193A(or its equivalent)	
BK1608 • 2125Series, BKP1608 • 2125Series	
Measuring frequency : 100±1MHz	
Measuring frequency : 100±1MHz Measuring equipment : 4291A(or its equivalent), 4195A(or its equivalent)	
Measuring equipment : 4291A(or its equivalent), 4195A(or its equivalent)	
Measuring equipment : 4291A(or its equivalent), 4195A(or its equivalent) Measuring jig : 16092A(or its equivalent) or 16192A(or its equivalent)/HW	
Measuring equipment : 4291A(or its equivalent), 4195A(or its equivalent) Measuring jig : 16092A(or its equivalent) or 16192A(or its equivalent)/HW BK2010-3216Series, MCF Series	

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5 Industria			
5. Inductance	DK0403		
	BK0402		-
	BK0603		4
	BK1005		-
	BKH0603		-
	BKH1005 BK1608		-
			-
	BK2125 BK2010		-
	ARRAY BK3216		-
	BKP0402		-
	BKP0603		-
	BKP1005		
	BKP1608		
	BKP2125		
	MCF 0605		-
	MCF 0806		1
	MCF 1210		1
	MCF 2010		
	CK1608		4.7~10.0 µH: ±20%
	CK2125		0.1~10.0 µH: ±20%
	CKS2125		1.0~10.0 µH: ±20%
	CKP1608		0.33~2.2 µH: ±20%
Specified Value	CKP2012		0.47~4.7 µH: ±20%
Specified Value	CKP2016		0.47~4.7 µH: ±20%
	CKP2520		0.47~4.7 μH: ±20%
	NM2012		0.82∼1.0 µH: ±20%
	NM2520		1.0~2.2 µH: ±20%
	LK1005		0.12~2.2 μH: ±10 or 20%
	LK1608		0.047~33.0 µH: ±20% 0.10~12.0 µH: ±10%
	LK2125		0.047~33.0 µH: ±20% 0.10~12.0 µH: ±10%
	HK0603		1.0~6.2nH: ±0.3nH 6.8~100nH: ±5%
	HK1005		1.0~6.2nH: ±0.3nH 6.8~270nH: ±5%
	HK1608		1.0~5.6nH: ±0.3nH 6.8~470nH: ±5%
	HK2125		1.5∼5.6nH: ±0.3nH 6.8∼470nH: ±5%
	HKQ0402		0.5 \sim 3.9nH: \pm 0.1 or 0.2 or 0.3nH 4.3 \sim 5.6nH: \pm 0.3nH or 3% or 5%
	111(40102		6.2~47nH: ±3 or 5%
	HKQ0603W		0.6~3.9nH: ±0.1 or 0.2 or 0.3nH 4.3~6.2nH: ±0.2 or 0.3nH or 3 or 5%
	1114000000		6.8~30nH: ±3 or 5% 33~100nH: ±5%
	HKQ0603C		0.6~3.9nH: ±0.1 or 0.2 or 0.3nH 4.3~6.2nH: ±0.2 or 0.3nH 6.8~22nH: ±3 or 5%
	HKQ0603S		0.6~6.2nH: ±0.2 or 0.3nH 6.8~22nH: ±3 or 5%
	HKQ0603U		0.6~4.2nH: ±0.1 or 0.2 or 0.3nH 4.3~6.5nH: ±0.2 or 0.3nH 6.8~22nH: ±3 or 5% 1.0~6.2nH: ±0.3nH 6.8~15nH: ±5%
	AQ105		
	MCFK1608 MCFE1608		0.24~0.47H: ±20% 0.24~1.0 µH: ±20%
	MCHK2012		0.24~0.47H: ±20%
	MCKK2012		0.24~0.47H: ±20%
	CK, LK, CKP, NM, MC Series		V.E.1 V.1711. ±20//
	Measuring frequency	: 2~4MHz(CK16	608)
	Measuring frequency	: 2~25MHz(CK2	
	Measuring frequency	: 2~10MHz(CKS	
	Measuring frequency	: 10~25MHz(LK	(1005)
	Measuring frequency	: 1~50MHz(LK1	608)
	Measuring frequency	: 0.4~50MHz(Lh	
	Measuring frequency		8 • CKP2012 • CKP2016 • CKP2520 • NM2012 • NM2520 • MCFK1608 • MCFE1608 • MCHK2012 • MCKK2012)
	Measuring equipment /jig		B+16092A(or its equivalent) ·4195A+41951+16092A(or its equivalent)
			2A(or its equivalent) •4291A+16193A(or its equivalent)/LK1005
			H1A + 42842C + 42851 - 61100 (or its equivalent)/CKP1608 · CKP2012 · CKP2016 · CKP2520 · NM2012 · K1608 · MCEE1609 · MCHK2012 · MCKK2012
Test Methods and	Measuring ourrent	NM2520 • MCF :•1mA rms(0.047	K1608·MCFE1608·MCHK2012·MCKK2012
Remarks	Measuring current	•0.1mA rms(0.04)	
	HK, HKQ, AQ Series	0.1111A 11115 (J.C	υ ου μι,
	Measuring frequency	: 100MHz(HK060	03•HK1005•AQ105)
	Measuring frequency	: 50/100MHz(Hk	
	Measuring frequency		603C·HKQ0603S·HKQ0603U)
	Measuring frequency	: 300/500MHz(H	
	Measuring frequency	: 100/500MHz(H	
	Measuring equipment /jig	:•4291A+16197	A(or its equivalent)/HK0603•AQ105
			3A(or its equivalent)/HK1005
			97A(or its equivalent)/HKQ0603S•HKQ0603U•HKQ0603W•HKQ0603C
			2A + in-house made jig(or its equivalent)/HK1608•HK2125
		•E4991A+1619	96D(or its equivalent)/HKQ0402

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6.0			
6. Q	BK0402		
	BK0603		1
	BK1005		1
	BKH0603		1
	BKH1005		
	BK1608		1
	BK2125		1
	BK2010		1
	ARRAY BK3216		1
	BKP0402		 -
	BKP0603		1
	BKP1005		1
	BKP1608		1
	BKP2125		1
	MCF 0605		
	MCF 0806		
	MCF 1210		
	MCF 2010		
	CK1608		
Specified Value	CK2125		
	CKS2125		
	CKP1608		
	CKP2012		_
	CKP2016		-
	CKP2520		-
	NM2012 NM2520		1
	LK1005		10~20 min.
-	LK1608		10~20 min.
	LK2125		15~50 min.
	HK0603		4~5 min.
	HK1005		8 min.
	HK1608		8~12 min.
	HK2125		10~18 min.
	HKQ0402		3∼8 min.
	HKQ0603W		6∼15 min.
	HKQ0603C		14~15 min.
	HKQ0603S		10~13 min.
	HKQ0603U		14 min.
	AQ105		8 min.
	MCFK1608 MCFE1608		1
	MCHK2012		
	MCKK2012		1
	LK Series		I .
	Measuring frequency	: 10~25MHz(LK10	005)
	Measuring frequency	: 1~50MHz(LK160	
	Measuring frequency	: 0.4~50MHz(LK21	
	Measuring equipment /jig		+16092A(or its equivalent)
			-16092A(or its equivalent)
			(or its equivalent)
	Measuring current	•4291A + 16193A •1mA rms(0.047	(or its equivalent)/LK1005 ~4.7./H)
	Measuring current	•0.1mA rms(5.6~	
Test Methods and	HK、HKQ、AQ Series	2.1111/111113(0.0	y - y - y - y - y - y - y - y - y -
Remarks	Measuring frequency	: 100MHz(HK0603•	·HK1005·AQ105)
	Measuring frequency	: 50/100MHz(HK16	
	Measuring frequency		3C·HKQ0603S•HKQ0603U)
	Measuring frequency	: 300/500MHz(HKC	
	Measuring frequency	: 100/500MHz(HKC	
	Measuring equipment /jig		or its equivalent) /HK0603 · AQ105
			(or its equivalent) /HK1005 A (or its equivalent) /HKQ0603S∙HKQ0603U∙HKQ0603W∙HKQ0603C
			+ in-house made jig(or its equivalent)/HK1608, HK2125
			D(or its equivalent) HKQ0402
	ı		

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7. DC Resistance			
	BK0402		0.07∼1.2Ωmax.
	BK0603		0.065∼1.50 Ω max.
	BK1005		0.03~0.90 Ω max.
	BKH0603		0.26∼3.20 Ω max.
	BKH1005		0.85~2.00 Ω max.
	BK1608		0.05∼1.10Ω max.
	BK2125		0.05~0.75Ω max.
	4004)/	BK2010	0.10~0.90Ω max.
	ARRAY	BK3216	0.15~0.80 Ω max.
	BKP0402		0.05~0.15 Ω max.
	BKP0603		0.030~0.180Ω max.
	BKP1005		0.0273~0.220 Ω max.
	BKP1608		0.025~0.18 Ω max.
	BKP2125		0.020~0.075Ω max.
	MCF 0605		2.5~6.5 Ω max
	MCF 0806		2.5∼5.0 Ω max.
	MCF 1210		2.5~4.5 Ω max.
	MCF 2010		4.5Ω max.
	CK1608		$0.45 \sim 0.85 \Omega(\pm 30\%)$
	CK2125		0.16~0.65 Ω max.
	CKS2125		0.12~0.52 Ω max.
	CKP1608		0.15~0.35Ω max.
Specified Value	CKP2012		0.08~0.28 Ω max.
	CKP2016		0.075~0.20 Ω max
	CKP2520		0.05~0.16 Ω max.
	NM2012		0.10~0.15Ω max.
	NM2520		0.11~0.22 Ω max.
	LK1005		0.41~1.16Ω max.
	LK1608		0.2~2.2Ω max.
	LK2125		0.1~1.1Ω max.
	HK0603		0.11~3.74Ω max.
	HK1005		0.08~4.8 Ω max.
	HK1608		0.05~2.6 Ω max.
	HK2125		0.10~1.5Ω max.
	HKQ0402		0.08~5.0Ω max.
	HKQ0603W		0.07~4.1 Ω max.
	HKQ0603W		0.07~1.6Ω max.
	HKQ0603S		0.06~1.29 Ω max.
	HKQ0603U		0.06~1.29 Ω max.
	AQ105 MCFK1608		0.07~0.45 Ω max. 0.050~0.085 Ω max.
	MCFE1608		0.100~0.340 Ω max.
	MCHK2012		0.024~0.036 Ω max.
	MCKK2012		0.025 ~0.039 Ω max.
Test Methods and Remarks	Measuring equipme	ent:VOAC-7412, VOA	AC-7512, VOAC-7521 (made by Iwasaki Tsushinki), HIOKI3227 (or its equivalent)

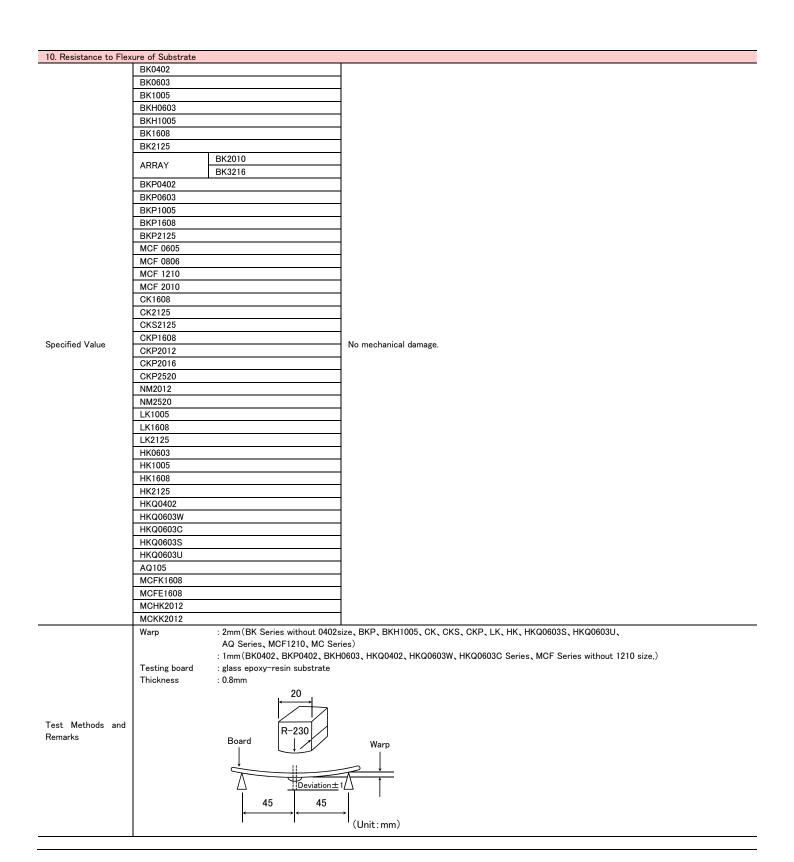
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	, <u> </u>			
8. Self Resonance Free	· · ·			
	BK0402			
	BK0603			
	BK1005			
	BKH0603			
	BKH1005			
	BK1608			
	BK2125			
	ARRAY	BK2010		
		BK3216	_ _	_
	BKP0402			
	BKP0603			
	BKP1005			
	BKP1608			
	BKP2125		_ _	
	MCF 0605			
	MCF 0806			
	MCF 1210			
	MCF 2010			
	CK1608			17~25MHz min.
	CK2125			24~235MHz min.
	CKS2125			24~75MHz min.
Specified Value	CKP1608			
Specifica Value	CKP2012			
	CKP2016			_
	CKP2520			
	NM2012			1
	NM2520			
	LK1005			40~180MHz min.
	LK1608			9~260MHz min.
	LK2125			13~320MHz min.
	HK0603			900~10000MHz min.
	HK1005			400~10000MHz min.
	HK1608			300~10000MHz min.
	HK2125			200~4000MHz min.
	HKQ0402			1200~10000MHz min.
	HKQ0603W			800~10000MHz min.
	HKQ0603C			2500~10000MHz min.
	HKQ0603S			1900~10000MHz min.
	HKQ0603U			1900~10000MHz min.
	AQ105			2300~10000MHz min.
	MCFK1608			
	MCFE1608			-
	MCHK2012			-
	MCKK2012			
	LK, CK Series :		41054/ "	
Test Methods and	Measuring equip	oment	: 4195A (or its equiv	
Remarks	Measuring jig	vice :	: 41951+16092A(o	or its equivalent)
	HK, HKQ, AQ Se Measuring equip		· 87190 (or its	valent) •8753D(or its equivalent)/HK2125
	wieasuring equip	ment	. 07190 (or its equit	valent/ -0/000 (or its equivalent// IRZ120

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9. Temperature Chara							
	BK0402						
	BK0603						
	BK1005						
	BKH0603						
	BKH1005						
	BK1608						
	BK2125						
	ARRAY	BK2010					
		BK3216					
	BKP0402						
	BKP0603						
	BKP1005						
	BKP1608						
	BKP2125						
	MCF 0605			_			
	MCF 0806						
	MCF 1210						
	MCF 2010						
	CK1608						
	CK2125						
	CKS2125						
Specified Value	CKP1608						
	CKP2012						
	CKP2016						
	CKP2520						
	NM2012						
	NM2520						
	LK1005						
	LK1608						
	LK2125						
	HK0603						
	HK1005						
	HK1608						
	HK2125						
	HKQ0402						
	HKQ0603W						
	HKQ0603C			Inductance change:Within ±10%			
	HKQ0603S			andocanos change. Manin = 1070			
	HKQ0603U						
	AQ105						
	MCFK1608						
	MCFE1608						
	MCHK2012						
	MCKK2012						
	HK, HKQ, AQ Se						
	Temperature rar		: −30~+85°C				
Test Methods and	Reference temp	erature	: +20°C				
Remarks	MC Series:						
	Temperature rar	-	: −40~+85°C				
	Reference temp	erature	: +20°C				

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11. Solderability						
	BK0402					
	BK0603					
	BK1005		<u> </u>			
	BKH0603		<u> </u>			
	BKH1005					
	BK1608					
	BK2125	1				
	ARRAY	BK2010				
		BK3216				
	BKP0402					
	BKP0603					
	BKP1005					
	BKP1608					
	BKP2125					
	MCF 0605					
	MCF 0806					
Specified Value	MCF 1210					
	MCF 2010					
	CK1608					
	CK2125					
	CKS2125					
	CKP1608					
	CKP2012		At least 75% of terminal electrode is covered by new solder.			
	CKP2016					
	CKP2520					
	NM2012]			
	NM2520]			
	LK1005					
	LK1608					
	LK2125					
	HK0603		1			
	HK1005]			
	HK1608		1			
	HK2125		1			
	HKQ0402		1			
	HKQ0603W		1			
	HKQ0603C		1			
	HKQ0603S		1			
	HKQ0603U		1			
	AQ105		1			
	MCFK1608		1			
	MCFE1608		1			
	MCHK2012		1			
	MCKK2012		1			
T . M .:	Solder temperatu	re :230±5°C (JIS Z 32				
Test Methods and	Solder temperatu					
Remarks	Duration	:4±1 sec.				

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10 Decistant to 0.11	lavias.					
12. Resistance to Sold						
	BK0402					
	BK0603					
	BK1005					
	BKH0603					
	BKH1005					
	BK1608		1 N 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			
	BK2125		Appearance: No significant abnormality			
	ARRAY BK201		Impedance change: Within ±30%			
	BK321	6				
	BKP0402					
	BKP0603					
	BKP1005					
	BKP1608					
	BKP2125					
	MCF 0605					
	MCF 0806		Appearance: No significant abnormality			
	MCF 1210		Impedance change: Within ±20%			
	MCF 2010					
	CK1608		No mechanical damage.			
	CK2125		Remaining terminal electrode: 70% min			
	CKS2125		1			
	CKP1608		Inductance change			
	CKP2012		R10~4R7: Within ±10% 6R8~100: Within ±15% CKS2125: Within ±20% CKP1608, CKP2012, CKP2016, CKP2520, NM2012, NM2520: Within ±30%			
Specified Value	CKP2016					
Specified value	CKP2520					
	NM2012					
	NM2520					
	11/1005		No mechanical damage.			
	LK1005		Remaining terminal electrode: 70% min. Inductance change: Within ±15%			
	LK1608		No mechanical damage.			
	LK1000		Remaining terminal electrode: 70% min.			
			Inductance change			
	LK2125		47N~4R7: Within ±10%			
			5R6~330: Within ±15%			
	HK0603					
	HK1005					
	HK1608		No mechanical damage.			
	HK2125					
	HKQ0402					
	HKQ0603W		Remaining terminal electrode: 70% min.			
	HKQ0603C		Inductance change: Within ±5%			
	HKQ0603S					
	HKQ0603U					
	AQ105					
	MCFK1608		N			
	MCFE1608		No mechanical damage.			
	MCHK2012		Remaining terminal electrode: 70% min.			
	MCKK2012		Inductance change: Within ±10%			
	Solder temperature	:260±5°C				
	Duration	$:10\pm0.5\;{\rm sec.}$				
Test Methods and	Preheating temperature	:150 to 180°C				
Remarks	Preheating time	:3 min.				
	Flux		methanol solution with colophony for 3 to 5 sec.			
	Recovery		covery under the standard condition after the test.(See Note 1)			
(Note 1) When there a	re questions concerning me	asurement result; measure	ement shall be made after 48±2 hrs of recovery under the standard condition.			

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13. Thermal Shock						
13. Thermal Shock	BK0402		1			
	BK0603		-			
	BK1005		-			
	BKH0603		-			
			-			
	BKH1005		4			
	BK1608		┪, ,, ,	200 - 1 - 12		
	BK2125	L DIVOCALO.		gnificant abnormality		
	ARRAY	BK2010	Impedance change	: Within ±30%		
	DI/D0400	BK3216	_			
	BKP0402		-			
	BKP0603		-			
	BKP1005					
	BKP1608					
	BKP2125					
	MCF 0605					
	MCF 0806		- 1	gnificant abnormality		
	MCF 1210		Impedance change	: Within ±20%		
	MCF 2010					
	CK1608		No mechanical dan			
	CK2125			:Within ±20% Q change:Within ±30%		
	CKS2125		Inductance change	:Within ±20% (CKS2125)		
Specified Value	CKP1608					
opcomou valuo	CKP2012					
	CKP2016		No mechanical dan	nage.		
	CKP2520		Inductance change	: Within ±30%		
	NM2012					
		NM2520				
	LK1005		No mechanical damage. Inductance change: Within ±10% Q change: Within ±30%			
	LK1608					
	LK2125					
	HK0603					
	HK1005					
	HK1608					
	HK2125					
	HKQ0402		No mechanical dan	No mechanical damage. Inductance change: Within $\pm 10\%$ Q change: Within $\pm 20\%$		
	HKQ0603W		Inductance change			
	HKQ0603C					
	HKQ0603S					
	HKQ0603U					
	AQ105					
	MCFK1608					
	MCFE1608		Appearance: No sig	gnificant abnormality		
	MCHK2012		Inductance change	: Within ±10%		
	MCKK2012					
	Conditions for	1 cycle				
	Step	temperature (°C)		time (min.)		
	1	Minimum operating temperature	re +0/-3	30±3		
Test Methods and	2	Room temperature		2~3		
Remarks	3	Maximum operating temperatu	re $+3/-0$	30±3		
	4	Room temperature		2~3		
	Number of cycl	les:5				
	Recovery: 2 to	3 hrs of recovery under the standar	rd condition after the	test (See Note 1)		

Recovery: 2 to 3 hrs of recovery under the standard condition after the test. (See Note 1)

(Note 1) When there are questions concerning measurement result; measurement shall be made after 48 ± 2 hrs of recovery under the standard condition.

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14 Damm Hart C	du stata)					
14. Damp Heat (Stead	dy state) BK0402					
	BK0603					
	BK1005					
	BKH0603					
	BKH1005					
	BK1608					
	BK2125		Appearance: No significant abnormality			
	ARRAY BK2010 BK3216		Impedance change: Within ±30%			
	BKP0402					
	BKP0603					
	BKP1005					
	BKP1608					
	BKP2125					
	MCF 0605					
	MCF 0806		Appearance: No significant abnormality			
	MCF 1210		Impedance change: Within ±20%			
	MCF 2010		ampodunos shangs. Walini =1575			
	CK1608		No mechanical damage.			
	CK1008		4			
			Inductance change: Within ±20% Q change: Within ±30%			
	CKS2125		Inductance change: Within ±20%			
	CKP1608					
Specified Value	CKP2012					
	CKP2016		No mechanical damage.			
	CKP2520		Inductance change: Within ±30%			
	NM2012					
	NM2520					
	LK1005		No mechanical damage.			
	LK1608		Inductance change: Within ±10% Q change: Within ±30%			
	11/0105		No mechanical damage.			
	LK2125		Inductance change: Within ±20% Q change: Within ±30%			
	HK0603					
	HK1005					
	HK1608					
	HK2125					
	HKQ0402		No mechanical damage.			
	HKQ0603W		Inductance change: Within ±10% Q change: Within ±20%			
	HKQ0603W		madetarioe charge. Walling 21070 & charge. Walling 22070			
	HKQ0603C					
	HKQ0603U					
	AQ105					
	MCFK1608					
	MCFE1608		Appearance: No significant abnormality			
	MCHK2012		Inductance change: Within ±10%			
	MCKK2012					
	BK, BKP, BKH S	eries, MCF Series:				
	Temperature	:40±2°C				
	Humidity	:90 to 95%RH				
	Duration	:500+24/-0 hrs				
	Recovery	:2 to 3 hrs of recovery under the	ne standard condition after the removal from test chamber.(See Note 1)			
Test Methods and						
Remarks	LK, CK, CKS, CH	KP、NM、HK、HKQ、AQ、MC Serie				
	Temperature	:40±2°C(LK, CK, CKS, CKP				
		:60±2°C(HK, HKQ, AQ, MC	Series)			
	Humidity	:90 to 95%RH				
	I D ::	. 500 ± 12 hun				
	Duration	:500±12 hrs				
	Recovery		ne standard condition after the removal from test chamber.(See Note 1)			

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15. Loading under Dar	mn Heat				
To. Loading under Dar	BK0402				
	BK0603		1		
	BK1005				
	BKH0603				
	BKH1005				
	BK11003				
	BK2125		Appearance: No significant abnormality		
	BK2010		Impedance change: Within ±30%		
	I ARRAY —		Impedance change. Within ±30%		
	BK3216				
	BKP0603				
	BKP1005				
	BKP1608				
	BKP2125				
	CK1608		No mechanical damage.		
	CK2125		Inductance change: Within ±20% Q change: Within ±30%		
	OKETEO		No mechanical damage.		
	CKS2125		Inductance change: Within ±20%		
	CKP1608		The state of the light in the l		
	CKP2012		1		
	CKP2016		No mechanical damage.		
	CKP2520		Inductance change: Within ±30%		
Specified Value	NM2012				
	NM2520				
			No mechanical damage.		
	LK1005		Inductance change: Within ±10% Q change: Within ±30%		
			No mechanical damage.		
	LK1608		Inductance change: $0.047 \sim 12.0 \mu\text{H}$: Within $\pm 10\%$ $15.0 \sim 33.0 \mu\text{H}$: Within $\pm 15\%$		
			Q change: Within ±30%		
	LK2125		No mechanical damage.		
	LIVETES		Inductance change: Within ±20% Q change: Within ±30%		
	HK0603				
	HK1005				
	HK1608				
	HK2125		No mechanical damage.		
	HKQ0402				
	HKQ0603W		Inductance change: Within ±10% Q change: Within ±20%		
	HKQ0603C				
	HKQ0603S				
	HKQ0603U		_		
	AQ105				
	MCFK1608※				
	MCFE1608※		Appearance: No significant abnormality		
	MCHK2012※		Inductance change: Within ±10%		
	MCKK2012※				
	BK, BKP, BKH Serie				
	Temperature	:40±2°C			
	Humidity Applied current	: 90 to 95%RH : Rated current			
	Duration	:500+24/-0 hrs			
	Recovery		der the standard condition after the removal from test chamber.(See Note 1)		
Test Methods and	-	NM, HK, HKQ, AQ, MC Serie			
Remarks	Temperature	:40±2°C(LK, CK, CKS,			
	· .	:60±2°C(HK, HKQ, AQ,			
	Humidity	:90 to 95%RH			
	Applied current	:Rated current ※MC seri	ies ; Idc2max		
	Duration	$:500\pm12\; hrs$			
-	Recovery	:2 to 3 hrs of recovery und	der the standard condition after the removal from test chamber.(See Note 1)		

Note on standard condition: "standard condition" referred to herein is defined as follows:

5 to $35^{\circ}\!\text{C}\,$ of temperature, 45 to 85% relative humidity, and 86 to 106kPa of air pressure.

When there are questions concerning measurement results:

In order to provide correlation data, the test shall be conducted under condition of $20\pm2^{\circ}C$ of temperature, 60 to 70% relative humidity, and 86 to 106kPa of air pressure.

Unless otherwise specified, all the tests are conducted under the "standard condition."

(Note 1) Measurement shall be made after 48 ± 2 hrs of recovery under the standard condition.

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16 Looding at High T.	amparatura					
16. Loading at High Te	BK0402					
			4			
	BK0603					
	BK1005		-			
	BKH0603		4			
	BKH1005		4			
	BK1608		Annual No. 1 of the Street of the country of the			
	BK2125	DK9010	Appearance: No significant abnormality			
	ARRAY	BK2010	Impedance change: Within ±30%			
		BK3216	-			
	BKP0402					
	BKP0603					
	BKP1005					
	BKP1608					
	BKP2125					
	MCF 0605					
	MCF 0806		Appearance: No significant abnormality			
	MCF 1210		Impedance change: Within ±20%			
	MCF 2010					
	CK1608		No mechanical damage.			
	CK2125		Inductance change: Within ±20% Q change: Within ±30%			
	CKS2125		No mechanical damage.			
			Inductance change: Within ±20%			
	CKP1608		-			
0 (0 1)/ 1	CKP2012					
Specified Value	CKP2016		No mechanical damage.			
	CKP2520		Inductance change: Within ±30%			
	NM2012					
	NM2520					
	LK1005		No mechanical damage.			
			Inductance change: Within ±10% Q change: Within ±30%			
			No mechanical damage.			
	LK1608		Inductance change: $0.047 \sim 12.0 \mu\text{H}$: Within $\pm 10\%$ $15.0 \sim 33.0 \mu\text{H}$: Within $\pm 15\%$			
			Q change: Within ±30%			
	LK2125		No mechanical damage.			
	HK0603		Inductance change: Within ±20% Q change: Within ±30%			
	HK1005		-			
	HK1608					
	HK2125					
	HKQ0402		No mechanical damage.			
	HKQ0603W					
	HKQ0603W HKQ0603C		Inductance change: Within ±10% Q change: Within ±20%			
			-			
	HKQ0603S		-			
	HKQ0603U					
	AQ105					
	MCFK1608%		Annual No. 1 of the Street of the country of the			
	MCFE1608※		Appearance: No significant abnormality			
	MCHK2012※ MCKK2012※		Inductance change: Within ±10%			
	+	Porios MCE Savias				
	Temperature	eries、MCF Series: : 125±3°C(BK、BKH Series)				
	remperature	: 85±3°C(BKP, MCF Series)				
	Applied current	: Rated current				
	Duration	:500+24/-0 hrs				
	Recovery		he standard condition after the removal from test chamber.			
T . M		(See Note 1)				
Test Methods and	LK, CK, CKS, CH	KP, NM, HKQ, AQ, MC Series:				
Remarks	Temperature	:85±2°C(LK,CK,CKS,CKP,	NM、MC Series)			
		: 85±2°C(HK1608, 2125)				
			rating temperature range $-55 \sim +85^{\circ}$ C)			
		: 125±2°C (HKQ0402, HK0603,	HK1005, HKQ0603S, HKQ0603U, HKQ0603W, HKQ0603C, AQ105			
		operating temperature	e range -55~+125°C)			
	Applied current	: Rated current ※MC series ;	Idc2max			
	Duration	:500±12 hrs				
	Recovery	:2 to 3 hrs of recovery under the	he standard condition after the test. (See Note 1)			
Note on standard con-	dition: "standard co	ndition" referred to herein is defin	ned as follows:			

5 to $35^{\circ}\!C$ of temperature, 45 to 85% relative humidity, and 86 to 106kPa of air pressure.

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Precautions on the use of Multilayer chip inductors

Multilayer chip inductors for high frequency, Multilayer chip bead inductors

Multilayer common mode choke coils (MC series F type)

Metal Multilayer Chip Power Inductors (MCOILTM MC series)

PRECAUTIONS

1. Circuit Design

- ◆Verification of operating environment, electrical rating and performance
 - 1. A malfunction in medical equipment, spacecraft, nuclear reactors, etc. may cause serious harm to human life or have severe social ramifications.

As such, any inductors to be used in such equipment may require higher safety and/or reliability considerations and should be clearly

Precautions differentiated from components used in general purpose applications.

- ◆Operating Current(Verification of Rated current)

 1. The operating current including inrush current for inductors must always be lower than their rated values.
- 2. Do not apply current in excess of the rated value because the inductance may be reduced due to the magnetic saturation effect.

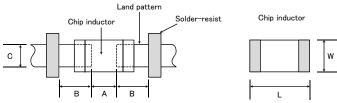
2. PCB Design

Precautions

- ◆Pattern configurations (Design of Land-patterns)
- 1. When inductors are mounted on a PCB, the size of land patterns and the amount of solder used (size of fillet) can directly affect inductor performance.

Therefore, the following items must be carefully considered in the design of solder land patterns:

- (1) The amount of solder applied can affect the ability of chips to withstand mechanical stresses which may lead to breaking or cracking. Therefore, when designing land-patterns it is necessary to consider the appropriate size and configuration of the solder pads which in turn determines the amount of solder necessary to form the fillets.
- (2) When more than one part is jointly soldered onto the same land or pad, the pad must be designed so that each component's soldering point is separated by solder-resist.
- (3) The larger size of land patterns and amount of solder, the smaller Q value after mounting on PCB. It makes higher the Q value to design land patterns smaller than terminal electrode of chips.
- ◆Pattern configurations (Inductor layout on panelized[breakaway] PC boards)
 - 1. After inductors have been mounted on the boards, chips can be subjected to mechanical stresses in subsequent manufacturing processes (PCB cutting, board inspection, mounting of additional parts, assembly into the chassis, wave soldering the reflow soldered boards etc.) For this reason, planning pattern configurations and the position of SMD inductors should be carefully performed to minimize stress.
- ◆Pattern configurations(Design of Land-patterns)
 - The following diagrams and tables show some examples of recommended patterns to prevent excessive solder amounts (larger fillets which extend above the component end terminations). Examples of improper pattern designs are also shown.
 - (1) Recommended land dimensions for a typical chip inductor land patterns for PCBs



Recommended land dimensions for wave-soldering (Unit:mm)

Ту	ре	1608	2012	2125	2016	2520	3216
Size	L	1.6	2.0	2.0	2.0	2.5	3.2
Size	W	0.8	1.25	1.25	1.6	2.0	1.6
A	4	0.8~1.0	1.0~1.4	1.0~1.4	1.0~1.4	1.0~1.4	1.8~2.5
Е	3	0.5~0.8	0.8~1.5	0.8~1.5	0.8~1.5	0.6~1.0	0.8~1.7
()	0.6~0.8	0.9~1.2	0.9~1.2	1.3~1.6	1.6~2.0	1.2~1.6

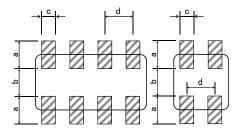
Technical considerations

Recommended land dimensions for reflow-soldering (Unit:mm)

Т	ype	0402	0603	1005	105	1608	2012	2125	2016	2520	3216
Size	L	0.4	0.6	1.0	1.0	1.6	2.0	2.0	2.0	2.5	3.2
Size	W	0.2	0.3	0.5	0.6	0.8	1.25	1.25	1.6	2.0	1.6
	Α	0.15~0.25	0.20~0.30	0.45~0.55	0.50~0.55	0.8~1.0	0.8~1.2	0.8~1.2	0.8~1.2	1.0~1.4	1.8~2.5
	В	0.10~0.20	0.20~0.30	0.40~0.50	0.30~0.40	0.6~0.8	0.8~1.2	0.8~1.2	0.8~1.2	0.6~1.0	0.6~1.5
	С	0.15~0.30	0.25~0.40	0.45~0.55	0.60~0.70	0.6~0.8	0.9~1.6	0.9~1.6	1.2~2.0	1.8~2.2	1.2~2.0

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Excess solder can affect the ability of chips to withstand mechanical stresses. Therefore, please take proper precautions when designing land-patterns.



Recommended land dimension for Reflow-soldering

Ty	эе	3216	3216 2010		0806	0605
. L		3.2	2.0	1.25	0.85	0.65
Size	W	1.6	1.0	1.0	0.65	0.50
а		0.7~0.9	0.5~0.6	0.45~0.55	0.25~0.35	0.27~0.33
b		0.8~1.0	0.5~0.6	0.7~0.8	0.25~0.35	0.17~0.23
С		c 0.4~0.5		0.25~0.35	0.25~0.35	0.20~0.26
d		8.0	0.5	0.55	0.5	0.4

(Unit:mm)

((2) Examples of good and bad solder application

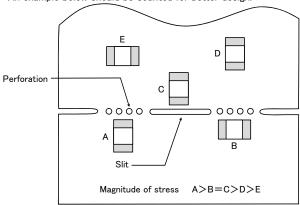
z) Examples of good and bad solde		
Item	Not recommended	Recommended
Mixed mounting of SMD and leaded components	Lead wire of component	Solder-resist
Component placement close to the chassis	Chassis Solder (for grounding) Electrode pattern	Solder-resist
Hand-soldering of leaded components near mounted components	Lead wire of component Soldering iron	Solder-resist
Horizontal component placement		Solder-resist

- ◆Pattern configurations (Inductor layout on panelized[breakaway] PC boards)
 - 1-1. The following are examples of good and bad inductor layout; SMD inductors should be located to minimize any possible mechanical stresses from board warp or deflection.

Item	Not recommended	Recommended	
Deflection of the board		Position the component at a right angle to the direction of the mechanical stresses that are anticipated.	of

1-2. To layout the inductors for the breakaway PC board, it should be noted that the amount of mechanical stresses given will vary depending on inductor layout.

An example below should be counted for better design.



1-3. When breaking PC boards along their perforations, the amount of mechanical stress on the inductors can vary according to the method used. The following methods are listed in order from least stressful to most stressful: push-back, slit, V-grooving, and perforation. Thus, any ideal SMD inductor layout must also consider the PCB splitting procedure.

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3. Considerations for automatic placement

- ◆Adjustment of mounting machine
 - 1. Excessive impact load should not be imposed on the inductors when mounting onto the PC boards.
 - 2. The maintenance and inspection of the mounter should be conducted periodically.

Precautions

◆ Selection of Adhesives

1. Mounting inductors with adhesives in preliminary assembly, before the soldering stage, may lead to degraded inductor characteristics unless the following factors are appropriately checked; the size of land patterns, type of adhesive, amount applied, hardening temperature and hardening period. Therefore, it is imperative to consult the manufacturer of the adhesives on proper usage and amounts of adhesive to use.

◆Adjustment of mounting machine

- 1. If the lower limit of the pick-up nozzle is low, too much force may be imposed on the inductors, causing damage. To avoid this, the following points should be considered before lowering the pick-up nozzle:
 - (1) The lower limit of the pick-up nozzle should be adjusted to the surface level of the PC board after correcting for deflection of the board.
 - (2) The pick-up pressure should be adjusted between 1 and 3N static loads.
 - (3) To reduce the amount of deflection of the board caused by impact of the pick-up nozzle, supporting pins or back-up pins should be used under the PC board. The following diagrams show some typical examples of good pick-up nozzle placement:

Item	Improper method	Proper method
Single-sided mounting	chipping or cracking	supporting pins or back-up pins
Double-sided mounting	chipping or cracking	supporting pins or back-up pins

Technical considerations

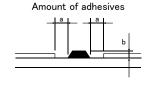
2. As the alignment pin wears out, adjustment of the nozzle height can cause chipping or cracking of the inductors because of mechanical impact on the inductors. To avoid this, the monitoring of the width between the alignment pin in the stopped position, and maintenance, inspection and replacement of the pin should be conducted periodically.

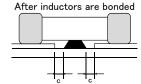
◆Selection of Adhesives

- 1. Some adhesives may cause reduced insulation resistance. The difference between the shrinkage percentage of the adhesive and that of the inductors may result in stresses on the inductors and lead to cracking. Moreover, too little or too much adhesive applied to the board may adversely affect component placement, so the following precautions should be noted in the application of adhesives.
 - (1) Required adhesive characteristics
 - a. The adhesive should be strong enough to hold parts on the board during the mounting & solder process.
 - b. The adhesive should have sufficient strength at high temperatures.
 - c. The adhesive should have good coating and thickness consistency.
 - d. The adhesive should be used during its prescribed shelf life.
 - e. The adhesive should harden rapidly.
 - f. The adhesive must not be contaminated.
 - g. The adhesive should have excellent insulation characteristics.
 - h. The adhesive should not be toxic and have no emission of toxic gasses.
 - (2) When using adhesives to mount inductors on a PCB, inappropriate amounts of adhesive on the board may adversely affect component placement. Too little adhesive may cause the inductors to fall off the board during the solder process. Too much adhesive may cause defective soldering due excessive flow of adhesive on to the land or solder pad.

[Recommended conditions]

Figure	0805 case sizes as examples	
а	0.3mm min	
b	100∼120 μm	
С	Area with no adhesive	





4. Soldering

Precautions

◆Selection of Flux

- 1. Since flux may have a significant effect on the performance of inductors, it is necessary to verify the following conditions prior to use;
 - (1) Flux used should be with less than or equal to 0.1 wt% (Chlorine conversion method) of halogenated content. Flux having a strong acidity content should not be applied.
 - (2) When soldering inductors on the board, the amount of flux applied should be controlled at the optimum level.
 - (3) When using water-soluble flux, special care should be taken to properly clean the boards.

◆Soldering

1. Temperature, time, amount of solder, etc. are specified in accordance with the following recommended conditions, and please contact us about peak temperature when you use lead-free paste.

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◆Selection of Flux

- 1-1. When too much halogenated substance (Chlorine, etc.) content is used to activate the flux, or highly acidic flux is used, an excessive amount of residue after soldering may lead to corrosion of the terminal electrodes or degradation of insulation resistance on the surface of the Inductor.
- 1-2. Flux is used to increase solderability in flow soldering, but if too much is applied, a large amount of flux gas may be emitted and may detrimentally affect solderability. To minimize the amount of flux applied, it is recommended to use a flux-bubbling system.
- 1-3. Since the residue of water-soluble flux is easily dissolved by water content in the air, the residue on the surface of Inductor in high humidity conditions may cause a degradation of insulation resistance and therefore affect the reliability of the components. The cleaning methods and the capability of the machines used should also be considered carefully when selecting water-soluble flux.

Soldering

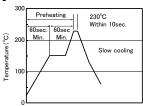
1-1. Preheating when soldering

Heating: Chip inductor components should be preheated to within $100 \text{ to } 130^{\circ}\text{C}$ of the soldering. Cooling: The temperature difference between the components and cleaning process should not be greater than 100°C .

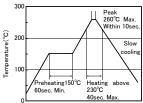
Chip inductors are susceptible to thermal shock when exposed to rapid or concentrated heating or rapid cooling. Therefore, the soldering process must be conducted with a great care so as to prevent malfunction of the components due to excessive thermal shock.

[Reflow soldering]

[Recommended conditions for eutectic soldering]



[Recommended condition for Pb-free soldering]



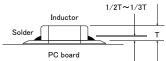
- m %Ceramic chip components should be preheated to within 100 to 130°C of the soldering.
- *Assured to be reflow soldering for 2 times.
- *MC series; Peak 230°C(eutectic soldering), 260°C(Pb-free soldering)max within 5sec.

Caution

Technical

considerations

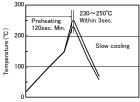
1. The ideal condition is to have solder mass (fillet) controlled to 1/2 to 1/3 of the thickness of the inductor, as shown below:



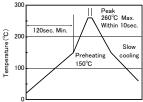
2. Because excessive dwell times can detrimentally affect solderability, soldering duration should be kept as close to recommended times as possible.

[Wave soldering]

[Recommended conditions for eutectic soldering]



[Recommended condition for Pb-free soldering]



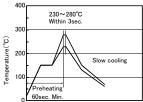
- $\rm \% Ceramic \ chip \ components \ should \ be \ preheated \ to \ within \ 100 \ to \ 130 \ C$ of the soldering.
- XAssured to be wave soldering for 1 time.
- Except for reflow soldering type

Caution

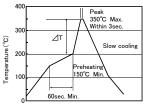
- 1. Make sure the inductors are preheated sufficiently.
- 2. The temperature difference between the inductor and melted solder should not be greater than 100 to 130° C.
- 3. Cooling after soldering should be as gradual as possible.
- 4. Wave soldering must not be applied to the inductors designated as for reflow soldering only.

[Hand soldering]

[Recommended conditions for eutectic soldering



[Recommended condition for Pb-free soldering]



- (**※**⊿T≦190°C(3216Type max), ⊿T≦130°C(3225 Type min)
- \times It is recommended to use 20W soldering iron and the tip is 1 ϕ or less.
- XThe soldering iron should not directly touch the components.
- *Assured to be soldering iron for 1 time

Note: The above profiles are the maximum allowable soldering condition, therefore these profiles are not always recommended.

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Caution 1. Use a 20W soldering iron with a maximum tip diameter of 1.0 mm. 2. The soldering iron should not directly touch the inductor.

5. Cleaning

Precautions

considerations

♦Cleaning conditions

- 1. When cleaning the PC board after the Inductors are all mounted, select the appropriate cleaning solution according to the type of flux used and purpose of the cleaning (e.g. to remove soldering flux or other materials from the production process.)
- 2. Cleaning conditions should be determined after verifying, through a test run, that the cleaning process does not affect the inductor's characteristics.

◆Cleaning conditions

- 1. The use of inappropriate solutions can cause foreign substances such as flux residue to adhere to the inductor, resulting in a degradation of the inductor's electrical properties (especially insulation resistance).
- 2. Inappropriate cleaning conditions (insufficient or excessive cleaning) may detrimentally affect the performance of the inductors.

Technical (1) Excessive cleaning

a. In the case of ultrasonic cleaning, too much power output can cause excessive vibration of the PC board which may lead to the cracking of the inductor or the soldered portion, or decrease the terminal electrodes' strength. Thus the following conditions should be carefully checked;

Ultrasonic output Below 20W/2
Ultrasonic frequency Below 40kHz
Ultrasonic washing period 5 min. or less

6. Post cleaning processes

◆Application of resin coatings, moldings, etc. to the PCB and components.

Precautions

- With some type of resins a decomposition gas or chemical reaction vapor may remain inside the resin during the hardening period or while
 left under normal storage conditions resulting in the deterioration of the inductor's performance.
- 2. When a resin's hardening temperature is higher than the inductor's operating temperature, the stresses generated by the excess heat may lead to inductor damage or destruction.
- 3. Stress caused by a resin's temperature generated expansion and contraction may damage inductors.

The use of such resins, molding materials etc. is not recommended.

7. Handling

- ◆Breakaway PC boards (splitting along perforations)
 - 1. When splitting the PC board after mounting inductors and other components, care is required so as not to give any stresses of deflection or twisting to the board.
 - 2. Board separation should not be done manually, but by using the appropriate devices.
- ◆General handling precautions
 - 1. Always wear static control bands to protect against ESD.
 - 2. Keep the inductors away from all magnets and magnetic objects.
- Precautions
- 3. Use non-magnetic tweezers when handling inductors.4. Any devices used with the inductors (soldering irons, measuring instruments) should be properly grounded.
- 5. Keep bare hands and metal products (i.e., metal desk) away from chip electrodes or conductive areas that lead to chip electrodes.
- 6. Keep inductors away from items that generate magnetic fields such as speakers or coils.
- ◆Mechanical considerations
 - 1. Be careful not to subject the inductors to excessive mechanical shocks.
 - (1) If inductors are dropped on the floor or a hard surface they should not be used.
 - (2) When handling the mounted boards, be careful that the mounted components do not come in contact with or bump against other boards or components.

8. Storage conditions

◆Storage

1. To maintain the solderability of terminal electrodes and to keep the packaging material in good condition, care must be taken to control temperature and humidity in the storage area. Humidity should especially be kept as low as possible.

Precautions

Recommended conditions
Ambient temperature Below 30°C

Humidity Below 70% RH

The ambient temperature must be kept below 40°C. Even under ideal storage conditions inductor electrode solderability decreases as time passes, so inductors should be used within 6 months from the time of delivery.

*The packaging material should be kept where no chlorine or sulfur exists in the air.

◆Storage

Technical considerations

1. If the parts are stocked in a high temperature and humidity environment, problems such as reduced solderability caused by oxidation of terminal electrodes and deterioration of taping/packaging materials may take place. For this reason, components should be used within 6 months from the time of delivery. If exceeding the above period, please check solderability before using the inductors.

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