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⚠ REMINDERS

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- Please contact Taiyo Yuden Co., Ltd. for further details of product specifications as the individual specification is available.

- Please conduct validation and verification of products in actual condition of mounting and operating environment before commercial shipment of the equipment.

- All electronic components or functional modules listed in this catalog are developed, designed and intended for use in general electronics equipment.(for AV, office automation, household, office supply, information service, telecommunications, (such as mobile phone or PC) etc.). Before incorporating the components or devices into any equipment in the field such as transportation,(automotive control, train control, ship control), transportation signal, disaster prevention, medical, public information network (telephone exchange, base station) etc. which may have direct influence to harm or injure a human body, please contact Taiyo Yuden Co., Ltd. for more detail in advance.
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- The contents of this catalog are applicable to the products which are purchased from our sales offices or distributors (so called "TAIYO YUDEN's official sales channel").
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  Certain items in this catalog may require specific procedures for export according to "Foreign Exchange and Foreign Trade Control Law" of Japan, "U.S. Export Administration Regulations", and other applicable regulations. Should you have any question or inquiry on this matter, please contact our sales staff.

HIGH-Q MULTILAYER CHIP INDUCTOR FOR HIGH FREQUENCY APPLICATIONS (HK SERIES Q TYPE / AQ SERIES)

REFLOW

FEATURES

HKQ Series

- Multilayer inductor made of advanced ceramics with low-resistivity silver used as internal conductors provides excellent Q and SRF characteristics.
- Designed to address surface mount inductor needs for applications above 500MHz.
- Multilayer block structure ensures outstanding reliability, high productivity and product quality.

AQ Series

- High frequency inductors with high Q and high SRF suitable for high frequency circuit.
- Easy mounting and heat-resistance suitable for replacement of wire-wound inductors.
- E24 series lineup in a range from 2nH to 10nH makes circuit design easy.
- Monolithic structure provides high-reliability.

APPLICATIONS

HKQ Series

- Portable telephones, PHS and W-LAN
- Miscellaneous high-frequency circuits
- EMI countermeasure in high-frequency circuits

AQ Series

- Mobile telephone, Wireless LAN
- High frequency module
- Tuner
- High-frequency circuits

ORDERING CODE

H K Q 0 6 0 3 S 1 0 N J — T

❶Type	
HKQ	Multilayer chip inductors for high frequency High Q Version

❷External Dimensions (L×W) (mm)	
0603(0201)	0.6×0.3

❸Series
S
U

❹Nominal Inductance (nH)	
Example	
3N9	3.9
10N	10

*N=0.0(nH type)

❺Inductance Tolerances	
H	±3%
J	±5%
B	±0.1nH
C	±0.2nH
S	±0.3nH

❻Packaging	
—T	Tape & Reel

A Q 1 0 5 1 0 N J — T

❶Type	
AQ	Chip inductors for high frequency High Q type

❷External Dimensions (mm)	
105(0402)	1.0×0.6

❸Nominal Inductance (nH)	
Example	
3N9	3.9
10N	10

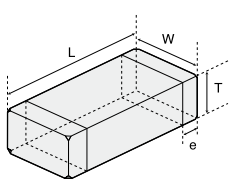
*N=0.0(nH type)

❹Inductance Tolerances	
H	±3%
J	±5%
C	±0.2nH
S	±0.3nH

❺Packaging	
—T	Tape & Reel

EXTERNAL DIMENSIONS/STANDARD QUANTITY

HKQ Type



Type	L	W	T	e	Standard Quantity [pcs]	
					Paper Tape	Embossed Tape
HKQ0603S (0201)	0.6±0.03 (0.024±0.001)	0.3±0.03 (0.012±0.001)	0.3±0.03 (0.012±0.001)	0.1±0.05 (0.004±0.002)	15000	—
HKQ0603U (0201)	0.6±0.03 (0.024±0.001)	0.3±0.03 (0.012±0.001)	0.3±0.03 (0.012±0.001)	0.1±0.05 (0.004±0.002)	15000	—
AQ105 (0402)	1.0±0.05 (0.039±0.002)	0.6±0.1 (0.024±0.004)	0.5±0.05 (0.020±0.002)	0.175±0.075 (0.007±0.003)	10000	—

Unit : mm(inch)

*Please Contact Our Sales Department office for Products Details.

AVAILABLE INDUCTANCE RANGE

HKQ0603S Series

Inductance [nH]	0.6	0.7	0.8	0.9	1.0	1.2	1.5	1.8	2.2	2.7	3.3	3.9	4.7	5.6	6.8	8.2	10.0	12.0	15.0	18.0	22.0
HKQ0603S (Imax. [mA])	0N6□	0N7□	0N8□	0N9□	1N0□	1N2□	1N5□	1N8□	2N2□	2N7□	3N3□	3N9□	4N7□	5N6□	6N8○	8N2○	10N○	12N○	15N○	18N○	22N○
Operating temp.: −55～+125℃	600	550	550	520	490	380	420	370	270	300	260	210	220	210	190	190	160	160	150	140	130

※ □, ○mark indicates the Inductance tolerance code. The product with tolerance less than ±0.3nH(□), ±5% (○)is also available. Please contact your local sales office.

HKQ0603U Series

Inductance [nH]	0.6	0.7	0.8	0.9	1.0	1.2	1.5	1.8	2.2	2.7	3.3	3.9	4.7	5.6	6.8	8.2	10.0	12.0	15.0	18.0	22.0
HKQ0603U (Imax. [mA])	0N6□	0N7□	0N8□	0N9□	1N0□	1N2□	1N5□	1N8□	2N2□	2N7□	3N3□	3N9□	4N7□	5N6□	6N8○	8N2○	10N○	12N○	15N○	18N○	22N○
Operating temp.: −55～+125℃	900	900	900	900	850	800	600	640	500	400	415	390	350	325	305	290	230	230	220	205	190

※ □, ○mark indicates the Inductance tolerance code. The product with tolerance less than ±0.3nH(□), ±5% (○)is also available. Please contact your local sales office.

AQ Series

Inductance [nH]	1.0	1.2	1.5	1.8	2.2	2.7	3.3	3.9	4.7	5.6	6.8	8.2	10.0	12.0	15.0
AQ105 (Imax. [mA])	1N0□	1N2□	1N5□	1N8□	2N2□	2N7□	3N3□	3N9□	4N7□	5N6□	6N8○	8N2○	10N○	12N○	15N○
Operating temp.: −55～+125℃	710	710	710	710	660	630	540	490	450	420	390	360	330	300	280
Operating temp.: −55～+85℃	930	930	930	930	870	820	710	630	590	550	510	470	440	390	360

※ □, ○mark indicates the Inductance tolerance code. The product with tolerance less than ±0.3nH(□), ±5% (○)is also available. Please contact your local sales office.

PART NUMBERS

HKQ0603S

Ordering code		EHS (Environmental Hazardous Substances)	Inductance [nH]	Tolerance	Q min.	LQ Measuring frequency [MHz]	Q (Typical) Frequency [Hz]					Self-resonant frequency [MHz]	Resistance DC [Ω]	Rated current [mA] max.	Thickness [mm] (inch)
							500M	800M	1.8G	2.0G	2.4G	min.	max.		
HKQ0603S 0N6□	0.1nH Step	RoHS	0.6	±0.3nH, ±0.2nH	13	500	>24	>31	>53	>56	>64	10000	0.06	600	0.3±0.03 (0.012±0.001)
HKQ0603S 0N7□		RoHS	0.7	±0.3nH, ±0.2nH	13	500	>24	>31	>53	>56	>64	10000	0.07	550	
HKQ0603S 0N8□		RoHS	0.8	±0.3nH, ±0.2nH	13	500	>24	>31	>53	>56	>64	10000	0.07	550	
HKQ0603S 0N9□		RoHS	0.9	±0.3nH, ±0.2nH	13	500	>24	>31	>53	>56	>64	10000	0.08	520	
HKQ0603S 1N0□		RoHS	1	±0.3nH, ±0.2nH	13	500	24	31	53	56	64	10000	0.09	490	
HKQ0603S 1N1□		RoHS	1.1	±0.3nH, ±0.2nH	13	500	19	26	44	47	54	10000	0.12	420	
HKQ0603S 1N2□		RoHS	1.2	±0.3nH, ±0.2nH	13	500	19	25	42	44	51	10000	0.15	380	
HKQ0603S 1N3□		RoHS	1.3	±0.3nH, ±0.2nH	13	500	19	25	40	42	47	10000	0.19	330	
HKQ0603S 1N4□		RoHS	1.4	±0.3nH, ±0.2nH	13	500	19	24	39	41	47	10000	0.11	440	
HKQ0603S 1N5□		RoHS	1.5	±0.3nH, ±0.2nH	13	500	19	24	39	41	46	10000	0.12	420	
HKQ0603S 1N6□		RoHS	1.6	±0.3nH, ±0.2nH	13	500	19	24	39	41	46	10000	0.13	410	
HKQ0603S 1N7□		RoHS	1.7	±0.3nH, ±0.2nH	13	500	19	24	39	41	46	10000	0.15	380	
HKQ0603S 1N8□		RoHS	1.8	±0.3nH, ±0.2nH	13	500	18	24	39	41	46	10000	0.16	370	
HKQ0603S 1N9□		RoHS	1.9	±0.3nH, ±0.2nH	13	500	18	23	38	40	45	10000	0.20	330	
HKQ0603S 2N0□		RoHS	2	±0.3nH, ±0.2nH	13	500	17	23	37	39	44	10000	0.24	300	
HKQ0603S 2N1□		RoHS	2.1	±0.3nH, ±0.2nH	13	500	17	23	37	39	44	10000	0.26	290	
HKQ0603S 2N2□		RoHS	2.2	±0.3nH, ±0.2nH	13	500	17	23	37	39	43	10000	0.28	270	
HKQ0603S 2N3□		RoHS	2.3	±0.3nH, ±0.2nH	13	500	17	23	36	38	43	10000	0.30	270	
HKQ0603S 2N4□		RoHS	2.4	±0.3nH, ±0.2nH	13	500	17	22	36	38	42	10000	0.32	260	
HKQ0603S 2N5□		RoHS	2.5	±0.3nH, ±0.2nH	13	500	17	22	34	35	39	9500	0.20	330	
HKQ0603S 2N6□		RoHS	2.6	±0.3nH, ±0.2nH	13	500	17	22	33	35	39	9300	0.22	310	
HKQ0603S 2N7□		RoHS	2.7	±0.3nH, ±0.2nH	13	500	17	22	33	35	39	9100	0.24	300	
HKQ0603S 2N8□		RoHS	2.8	±0.3nH, ±0.2nH	13	500	17	22	33	35	39	8900	0.25	290	
HKQ0603S 2N9□		RoHS	2.9	±0.3nH, ±0.2nH	13	500	17	22	33	35	39	8700	0.28	270	
HKQ0603S 3N0□		RoHS	3	±0.3nH, ±0.2nH	13	500	17	22	33	35	39	8600	0.28	270	
HKQ0603S 3N1□		RoHS	3.1	±0.3nH, ±0.2nH	13	500	17	22	33	35	39	8400	0.29	270	
HKQ0603S 3N2□		RoHS	3.2	±0.3nH, ±0.2nH	13	500	17	22	33	35	39	8200	0.30	270	
HKQ0603S 3N3□		RoHS	3.3	±0.3nH, ±0.2nH	13	500	17	22	33	35	39	8100	0.32	260	
HKQ0603S 3N4□		RoHS	3.4	±0.3nH, ±0.2nH	13	500	16	22	33	35	39	8000	0.36	240	
HKQ0603S 3N5□		RoHS	3.5	±0.3nH, ±0.2nH	13	500	16	22	33	35	39	7800	0.40	230	
HKQ0603S 3N6□		RoHS	3.6	±0.3nH, ±0.2nH	13	500	16	22	33	35	39	7700	0.41	230	
HKQ0603S 3N7□		RoHS	3.7	±0.3nH, ±0.2nH	13	500	16	22	33	35	38	7600	0.44	220	
HKQ0603S 3N8□		RoHS	3.8	±0.3nH, ±0.2nH	13	500	16	22	33	35	38	7500	0.48	210	
HKQ0603S 3N9□		RoHS	3.9	±0.3nH, ±0.2nH	13	500	16	22	33	35	38	7300	0.48	210	
HKQ0603S 4N3□	E24 Step	RoHS	4.3	±0.3nH, ±0.2nH	13	500	16	21	32	34	37	6500	0.39	230	
HKQ0603S 4N7□		RoHS	4.7	±0.3nH, ±0.2nH	13	500	16	21	32	34	37	6200	0.44	220	
HKQ0603S 5N1□		RoHS	5.1	±0.3nH, ±0.2nH	13	500	16	21	32	34	37	5900	0.49	210	
HKQ0603S 5N6□		RoHS	5.6	±0.3nH, ±0.2nH	13	500	16	21	32	34	37	5500	0.47	210	
HKQ0603S 6N2□		RoHS	6.2	±0.3nH, ±0.2nH	13	500	16	21	32	33	36	5100	0.52	200	
HKQ0603S 6N8○		RoHS	6.8	±5%, ±3%	13	500	16	21	31	32	35	4800	0.55	190	
HKQ0603S 7N5○		RoHS	7.5	±5%, ±3%	13	500	16	20	30	32	34	4600	0.51	200	
HKQ0603S 8N2○		RoHS	8.2	±5%, ±3%	13	500	16	20	30	31	33	4300	0.57	190	
HKQ0603S 9N1○		RoHS	9.1	±5%, ±3%	13	500	16	20	30	30	32	4000	0.73	170	
HKQ0603S 10N○	E12 Step	RoHS	10	±5%, ±3%	13	500	16	20	28	29	31	3800	0.85	160	
HKQ0603S 12N○		RoHS	12	±5%, ±3%	12	500	16	20	27	27	27	3300	0.85	160	
HKQ0603S 15N○		RoHS	15	±5%, ±3%	12	500	15	19	24	24	23	2600	0.89	150	
HKQ0603S 18N○		RoHS	18	±5%, ±3%	11	500	15	19	23	23	21	2300	1.05	140	
HKQ0603S 22N○		RoHS	22	±5%, ±3%	10	500	15	19	22	22	19	1900	1.29	130	

※ □, ○mark indicates the Inductance tolerance code.

* This catalog contains the typical specification only due to the limitation of space. When you consider the purchase of our products, please check our specification. For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (http://www.ty-top.com/) or CD catalogs.

PART NUMBERS

HKQ0603U

Ordering code		EHS (Environmental Hazardous Substances)	Inductance (nH)	Tolerance	Q min.	LQ Measuring frequency [MHz]	Q (Typical) Frequency [MHz]					Self-resonant frequency (MHz)	DC.Resistance (Ω)	Rated current (mA) max.	Thickness (mm) (inch)
							500M	800M	1.8G	2.0G	2.4G	min.	max.		
HKQ0603U 0N6□		RoHS	0.6	±0.3nH、±0.2nH、±0.1nH	14	500	>35	>47	>75	>80	>88	10000	0.06	900	
HKQ0603U 0N7□		RoHS	0.7	±0.3nH、±0.2nH、±0.1nH	14	500	>35	>47	>75	>80	>88	10000	0.06	900	
HKQ0603U 0N8□		RoHS	0.8	±0.3nH、±0.2nH、±0.1nH	14	500	>35	>47	>75	>80	>88	10000	0.06	900	
HKQ0603U 0N9□		RoHS	0.9	±0.3nH、±0.2nH、±0.1nH	14	500	>35	>47	>75	>80	>88	10000	0.06	900	
HKQ0603U 1N0□		RoHS	1	±0.3nH、±0.2nH、±0.1nH	14	500	>35	>47	>75	>80	>88	10000	0.07	850	
HKQ0603U 1N1□		RoHS	1.1	±0.3nH、±0.2nH、±0.1nH	14	500	>35	>47	>75	>80	>88	10000	0.07	850	
HKQ0603U 1N2□		RoHS	1.2	±0.3nH、±0.2nH、±0.1nH	14	500	35	47	75	80	88	10000	0.08	800	
HKQ0603U 1N3□		RoHS	1.3	±0.3nH、±0.2nH、±0.1nH	14	500	32	43	70	74	82	10000	0.09	760	
HKQ0603U 1N4□		RoHS	1.4	±0.3nH、±0.2nH、±0.1nH	14	500	29	39	63	67	75	10000	0.12	640	
HKQ0603U 1N5□		RoHS	1.5	±0.3nH、±0.2nH、±0.1nH	14	500	27	36	59	62	69	10000	0.15	600	
HKQ0603U 1N6□		RoHS	1.6	±0.3nH、±0.2nH、±0.1nH	14	500	25	33	54	57	63	10000	0.19	510	
HKQ0603U 1N7□		RoHS	1.7	±0.3nH、±0.2nH、±0.1nH	14	500	25	32	52	54	61	10000	0.11	680	
HKQ0603U 1N8□		RoHS	1.8	±0.3nH、±0.2nH、±0.1nH	14	500	25	32	51	53	59	10000	0.12	640	
HKQ0603U 1N9□		RoHS	1.9	±0.3nH、±0.2nH、±0.1nH	14	500	24	31	50	53	58	10000	0.13	620	
HKQ0603U 2N0□		RoHS	2	±0.3nH、±0.2nH、±0.1nH	14	500	24	31	50	53	58	10000	0.15	600	
HKQ0603U 2N1□		RoHS	2.1	±0.3nH、±0.2nH、±0.1nH	14	500	24	31	50	53	58	10000	0.16	550	
HKQ0603U 2N2□		RoHS	2.2	±0.3nH、±0.2nH、±0.1nH	14	500	24	31	50	53	58	10000	0.20	500	
HKQ0603U 2N3□		RoHS	2.3	±0.3nH、±0.2nH、±0.1nH	14	500	24	31	49	52	58	10000	0.24	460	
HKQ0603U 2N4□		RoHS	2.4	±0.3nH、±0.2nH、±0.1nH	14	500	22	28	45	48	53	10000	0.26	430	
HKQ0603U 2N5□		RoHS	2.5	±0.3nH、±0.2nH、±0.1nH	14	500	22	29	46	49	54	10000	0.28	415	
HKQ0603U 2N6□		RoHS	2.6	±0.3nH、±0.2nH、±0.1nH	14	500	21	27	44	46	51	10000	0.30	405	
HKQ0603U 2N7□		RoHS	2.7	±0.3nH、±0.2nH、±0.1nH	14	500	20	26	41	43	48	10000	0.32	400	
HKQ0603U 2N8□		RoHS	2.8	±0.3nH、±0.2nH、±0.1nH	14	500	20	26	41	43	47	9500	0.20	500	
HKQ0603U 2N9□		RoHS	2.9	±0.3nH、±0.2nH、±0.1nH	14	500	20	26	41	43	47	9300	0.22	480	
HKQ0603U 3N0□		RoHS	3	±0.3nH、±0.2nH、±0.1nH	14	500	20	26	41	43	47	9100	0.24	460	
HKQ0603U 3N1□		RoHS	3.1	±0.3nH、±0.2nH、±0.1nH	14	500	20	26	41	43	47	8900	0.25	450	
HKQ0603U 3N2□		RoHS	3.2	±0.3nH、±0.2nH、±0.1nH	14	500	20	26	40	43	47	8700	0.28	415	
HKQ0603U 3N3□		RoHS	3.3	±0.3nH、±0.2nH、±0.1nH	14	500	20	26	40	43	47	8600	0.28	415	
HKQ0603U 3N4□		RoHS	3.4	±0.3nH、±0.2nH、±0.1nH	14	500	20	25	40	43	47	8400	0.29	410	
HKQ0603U 3N5□		RoHS	3.5	±0.3nH、±0.2nH、±0.1nH	14	500	20	25	40	42	46	8200	0.30	405	0.30±0.03 (0.012±0.001)
HKQ0603U 3N6□		RoHS	3.6	±0.3nH、±0.2nH、±0.1nH	14	500	19	25	40	42	46	8100	0.32	400	
HKQ0603U 3N7□		RoHS	3.7	±0.3nH、±0.2nH、±0.1nH	14	500	19	25	40	42	46	8000	0.36	370	
HKQ0603U 3N8□		RoHS	3.8	±0.3nH、±0.2nH、±0.1nH	14	500	19	25	39	41	45	7800	0.40	355	
HKQ0603U 3N9□		RoHS	3.9	±0.3nH、±0.2nH、±0.1nH	14	500	19	25	39	41	45	7700	0.41	350	
HKQ0603U 4N0□		RoHS	4	±0.3nH、±0.2nH、±0.1nH	14	500	18	25	39	41	45	7600	0.44	335	
HKQ0603U 4N1□		RoHS	4.1	±0.3nH、±0.2nH、±0.1nH	14	500	19	25	39	41	45	7500	0.48	320	
HKQ0603U 4N2□		RoHS	4.2	±0.3nH、±0.2nH、±0.1nH	14	500	18	24	37	39	43	7300	0.48	320	
HKQ0603U 4N3□		RoHS	4.3	±0.2nH、±0.3nH	14	500	18	24	37	39	43	6500	0.48	320	
HKQ0603U 4N6□		RoHS	4.6	±0.2nH、±0.3nH	14	500	18	24	37	39	42	6500	0.39	360	
HKQ0603U 4N7□		RoHS	4.7	±0.2nH、±0.3nH	14	500	19	24	37	39	42	6400	0.42	350	
HKQ0603U 5N0□		RoHS	5	±0.2nH、±0.3nH	14	500	19	24	37	39	42	6200	0.44	335	
HKQ0603U 5N1□		RoHS	5.1	±0.2nH、±0.3nH	14	500	19	24	37	39	42	6100	0.45	330	
HKQ0603U 5N4□		RoHS	5.4	±0.2nH、±0.3nH	14	500	18	24	36	38	42	5900	0.49	315	
HKQ0603U 5N6□		RoHS	5.6	±0.2nH、±0.3nH	14	500	18	24	36	37	41	5500	0.47	325	
HKQ0603U 5N9□		RoHS	5.9	±0.2nH、±0.3nH	14	500	18	23	35	36	39	5500	0.47	325	
HKQ0603U 6N2□		RoHS	6.2	±0.2nH、±0.3nH	14	500	18	23	35	36	39	5100	0.52	305	
HKQ0603U 6N5□		RoHS	6.5	±0.2nH、±0.3nH	14	500	18	23	35	36	39	5100	0.52	305	
HKQ0603U 6N8○		RoHS	6.8	±3%、±5%	14	500	18	23	35	36	39	4800	0.55	305	
HKQ0603U 7N1○		RoHS	7.1	±3%、±5%	14	500	18	23	35	36	39	4800	0.55	305	
HKQ0603U 7N5○		RoHS	7.5	±3%、±5%	14	500	18	23	34	35	38	4600	0.55	305	
HKQ0603U 7N8○		RoHS	7.8	±3%、±5%	14	500	17	22	33	34	36	4600	0.51	310	
HKQ0603U 8N2○		RoHS	8.2	±3%、±5%	14	500	17	22	33	34	36	4300	0.57	290	
HKQ0603U 8N5○		RoHS	8.5	±3%、±5%	14	500	17	22	33	34	36	4300	0.57	290	
HKQ0603U 9N1○		RoHS	9.1	±3%、±5%	14	500	17	22	33	34	36	4000	0.65	270	
HKQ0603U 9N4○		RoHS	9.4	±3%、±5%	14	500	17	22	33	34	36	4000	0.73	250	
HKQ0603U 10N○		RoHS	10	±3%、±5%	14	500	17	22	33	34	36	3800	0.85	230	
HKQ0603U 12N○		RoHS	12	±3%、±5%	14	500	17	22	31	32	33	3300	0.85	230	
HKQ0603U 15N○		RoHS	15	±3%、±5%	14	500	17	21	28	29	29	2600	0.89	220	
HKQ0603U 18N○		RoHS	18	±3%、±5%	14	500	16	21	26	26	25	2300	1.05	205	
HKQ0603U 22N○		RoHS	22	±3%、±5%	14	500	16	21	26	26	24	1900	1.29	190	

※ □, ○mark indicates the Inductance tolerance code.

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PART NUMBERS

AQ105

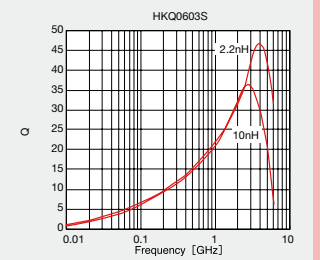
Ordering code		EHS (Environmental Hazardous Substances)	Inductance [nH]	Q min.	LQ Measuring frequency [MHz]	Q (Typical) Frequency [MHz]					Self-resonant frequency [MHz]		DC.Resistance [Ω]		Rated current [mA] max.		Thickness [mm] (inch)
						300	800	900	1500	1800	min.	Typ.	max.	Typ.	−55~ +125℃	−55~ +85℃	
AQ 105 1N0□		RoHS	1.0±0.3nH	8	100	53	129	147	217	244	10000	>13000	0.07	0.014	710	930	0.50±0.05 (0.020±0.002)
AQ 105 1N2□		RoHS	1.2±0.3nH	8	100	45	97	110	156	177	10000	>13000	0.07	0.016	710	930	
AQ 105 1N5□		RoHS	1.5±0.3nH	8	100	35	69	76	104	116	8000	>13000	0.07	0.030	710	930	
AQ 105 1N8□		RoHS	1.8±0.3nH	8	100	32	61	66	92	100	6000	11000	0.07	0.035	710	930	
AQ 105 2N0□		RoHS	2.0±0.3nH	8	100	38	68	73	94	103	6000	10500	0.08	0.035	660	870	
AQ 105 2N2□		RoHS	2.2±0.3nH	8	100	37	67	71	92	101	6000	10000	0.08	0.040	660	870	
AQ 105 2N4□		RoHS	2.4±0.3nH	8	100	34	54	59	74	86	6000	9600	0.09	0.050	630	820	
AQ 105 2N7□		RoHS	2.7±0.3nH	8	100	30	49	52	67	73	6000	9200	0.09	0.060	630	820	
AQ 105 3N0□		RoHS	3.0±0.3nH	8	100	31	51	54	70	76	6000	8700	0.11	0.070	570	740	
AQ 105 3N3□		RoHS	3.3±0.3nH	8	100	32	54	57	72	79	6000	8300	0.12	0.075	540	710	
AQ 105 3N6□		RoHS	3.6±0.3nH	8	100	33	53	56	71	77	5000	7800	0.14	0.080	500	650	
AQ 105 3N9□		RoHS	3.9±0.3nH	8	100	34	53	56	70	76	4000	7300	0.15	0.085	490	630	
AQ 105 4N3□		RoHS	4.3±0.3nH	8	100	29	47	50	64	71	4000	6900	0.16	0.090	470	610	
AQ 105 4N7□		RoHS	4.7±0.3nH	8	100	30	48	51	65	72	4000	6400	0.17	0.095	450	590	
AQ 105 5N1□		RoHS	5.1±0.3nH	8	100	30	48	51	64	71	4000	6300	0.19	0.110	430	560	
AQ 105 5N6□		RoHS	5.6±0.3nH	8	100	30	48	51	65	71	4000	6200	0.20	0.120	420	550	
AQ 105 6N2□		RoHS	6.2±0.3nH	8	100	31	49	52	66	72	3900	6100	0.22	0.130	400	520	
AQ 105 6N8○		RoHS	6.8±5%	8	100	28	44	49	59	64	3900	6000	0.23	0.130	390	510	
AQ 105 7N5○		RoHS	7.5±5%	8	100	28	45	50	60	65	3700	5500	0.25	0.135	370	490	
AQ 105 8N2○		RoHS	8.2±5%	8	100	29	46	50	62	66	3600	5000	0.27	0.140	360	470	
AQ 105 9N1○		RoHS	9.1±5%	8	100	29	45	49	59	62	3400	4800	0.29	0.150	350	450	
AQ 105 10N○		RoHS	10±5%	8	100	28	45	48	57	60	3200	4500	0.31	0.165	330	440	
AQ 105 12N○		RoHS	12±5%	8	100	26	40	45	51	52	2700	4300	0.39	0.165	300	390	
AQ 105 15N○		RoHS	15±5%	8	100	25	38	42	49	51	2300	4100	0.45	0.190	280	360	

※ □, ○mark indicates the Inductance tolerance code. The product with tolerance less than ±0.3nH(□), ±5% (○) is also available. Please contact your local sales office.

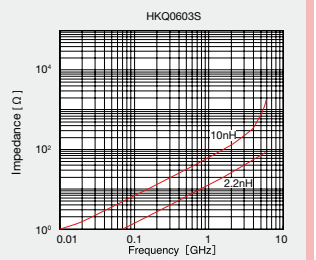
ELECTRICAL CHARACTERISTICS

HKQ0603S Series

Q-Characteristics Measured by 8719C



Impedance-vs-Frequency characteristics Measured by 8719C



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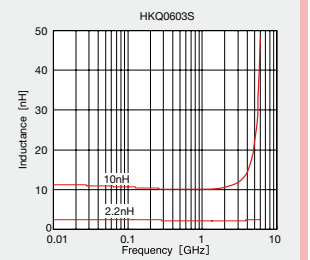

HKQ0603U Series

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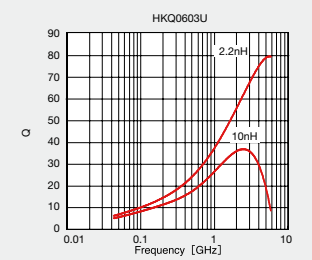

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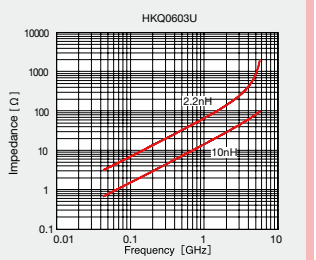
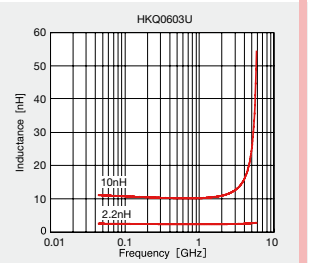
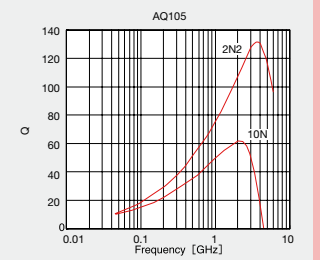


Inductance-vs-Frequency characteristics Measured by 8719C

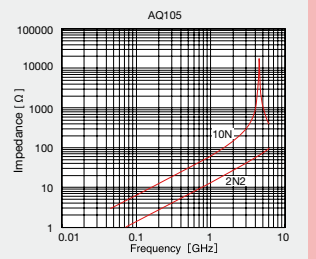


AQ Series

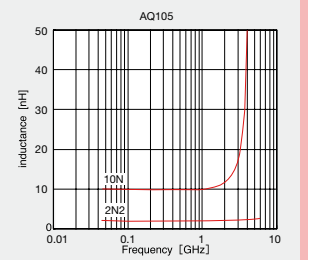
Q-Characteristics Measured by 8719C



Impedance-vs-Frequency characteristics Measured by 8719C



Inductance-vs-Frequency characteristics Measured by 8719C



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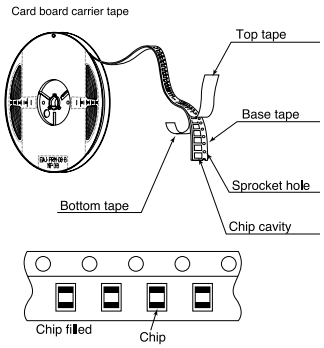
PACKAGING

①Minimum Quantity

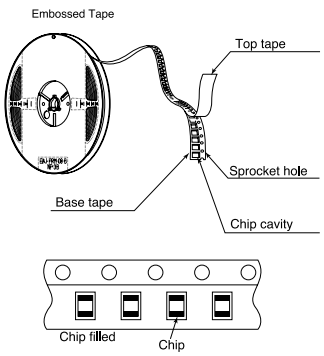
● Tape & Reel Packaging

Type	Thickness [mm] (inch)	Standard Quantity [pcs]	
		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
CKP2012(0805)	0.9 (0.035)	—	3000
CKP2016(0806)	0.9 (0.035)	—	3000
CKP2520(1008)	0.7 (0.028)	—	3000
	0.9 (0.035)	—	3000
	1.1 (0.043)	—	2000
NM2012(0805)	0.9 (0.035)	—	3000
NM2520(1008)	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
HK0402(01005)	0.2 (0.008)	20000	—
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
	1.0 (0.039)	—	3000
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	—
BKH1005(0402)	0.5 (0.020)	10000	—
BK1608(0603)	0.8 (0.031)	4000	—
BK2125(0805)	0.85 (0.033)	4000	—
	1.25 (0.049)	—	2000
BK2010(0804)	0.45 (0.018)	4000	—
BK3216(1206)	0.8 (0.031)	—	4000
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	—

②Taping material



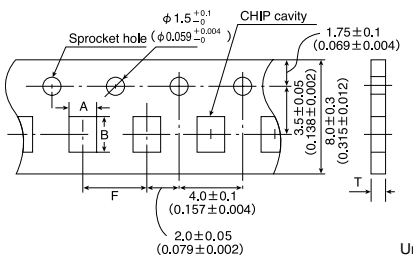
CK	1608
CK	2125
CKS	2125
LK	1005
LK	1608
LK	2125
HK	0402
HK	0603
HK	1005
HK	1608
HKQ	0603
AQ	105
BK	0402
BK	0603
BK	1005
BK	1608
BK	2125
BK	2010
BKP	0603
BKP	1005
BKP	1608
BKP	2125
BKH	1005



CK	2125
CKS	2125
CKP	2012
CKP	2016
CKP	2520
NM	2012
NM	2520
LK	2125
HK	2125
BK	2125
BK	3216

③Taping Dimensions

● Paper tape (0.315 inches wide)



Unit : mm (inch)

Type	Thickness (mm) (inch)	Chip cavity		Insertion Pitch	Tape Thickness
		A	B	F	T
CK1608(0603)	0.8 (0.031)	1.0±0.2 (0.039±0.008)	1.8±0.2 (0.071±0.008)	4.0±0.1 (0.157±0.004)	1.1max (0.043max)
CK2125(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)
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)
LK1005(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)
LK1608(0603)	0.8 (0.031)	1.0±0.2 (0.039±0.008)	1.8±0.2 (0.071±0.008)	4.0±0.1 (0.157±0.004)	1.1max (0.043max)
LK2125(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)
HK0402(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)
HK0603(0201)	0.3 (0.012)	0.40±0.06 (0.016±0.002)	0.70±0.06 (0.028±0.002)	2.0±0.05 (0.079±0.002)	0.45max (0.018max)
HK1005(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)
HK1608(0603)	0.8 (0.031)	1.0±0.2 (0.039±0.008)	1.8±0.2 (0.071±0.008)	4.0±0.1 (0.157±0.004)	1.1max (0.043max)
HKQ0603S(0201)	0.3 (0.012)	0.40±0.06 (0.016±0.002)	0.70±0.06 (0.028±0.002)	2.0±0.05 (0.079±0.002)	0.45max (0.018max)
HKQ0603U(0201)	0.3 (0.012)	0.40±0.06 (0.016±0.002)	0.70±0.06 (0.028±0.002)	2.0±0.05 (0.079±0.002)	0.45max (0.018max)
AQ105(0402)	0.5 (0.020)	0.75±0.1 (0.030±0.004)	1.15±0.1 (0.045±0.004)	2.0±0.05 (0.079±0.002)	0.8max (0.031max)

To next page

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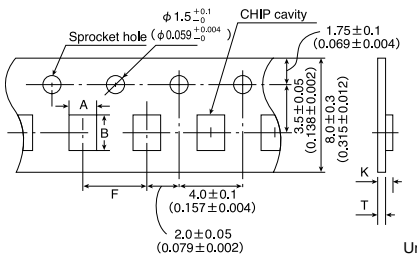
PACKAGING

Type	Thickness (mm) (inch)	Chip cavity		Insertion Pitch	Tape Thickness
		A	B	F	T
BK0402(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)
BK0603(0201)	0.3 (0.012)	0.40±0.06 (0.016±0.002)	0.70±0.06 (0.028±0.002)	2.0±0.05 (0.079±0.002)	0.45max (0.018max)
BK1005(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)
BK1608(0603)	0.8 (0.031)	1.0±0.2 (0.039±0.008)	1.8±0.2 (0.071±0.008)	4.0±0.1 (0.157±0.004)	1.1max (0.043max)
BK2125(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)
BK2010(0804)	0.45 (0.018)	1.2±0.1 (0.047±0.004)	2.17±0.1 (0.085±0.004)	4.0±0.1 (0.157±0.004)	0.8max (0.031max)
BKP0603(0201)	0.3 (0.012)	0.40±0.06 (0.016±0.002)	0.70±0.06 (0.028±0.002)	2.0±0.05 (0.079±0.002)	0.45max (0.018max)
BKP1005(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)
BKP1608(0603)	0.8 (0.031)	1.0±0.2 (0.039±0.008)	1.8±0.2 (0.071±0.008)	4.0±0.1 (0.157±0.004)	1.1max (0.043max)
BKP2125(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)
BKH1005(0805)	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)

Unit : mm (inch)

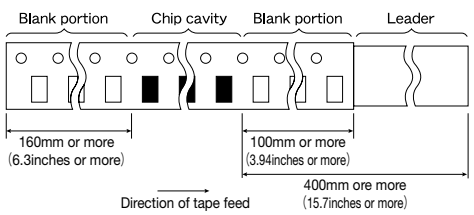
●Embossed Tape (0.315 inches wide)



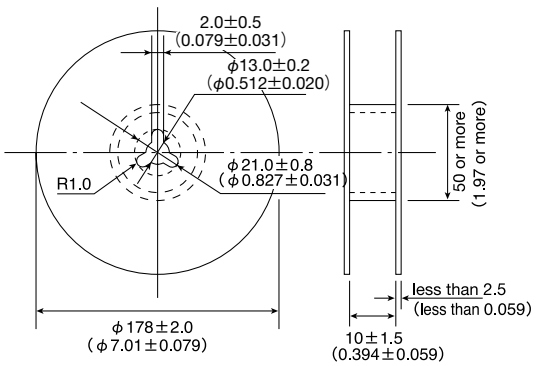
Unit : mm (inch)

Type	Thickness (mm) (inch)	Chip cavity		Insertion Pitch	Tape Thickness	
		A	B	F	K	T
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±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)
CKP2520(1008)	0.7 (0.028)	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)
	0.9 (0.035)				1.4 (0.055)	
	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)	1.1 (0.043)	2.3±0.1 (0.091±0.004)	2.8±0.1 (0.110±0.004)	4.0±0.1 (0.157±0.004)	1.7 (0.067)	0.3 (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 (0.059±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	1.5 (0.059)	0.3 (0.012)
	1.0 (0.039)				2.0 (0.079)	
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)

④LEADER AND BLANK PORTION

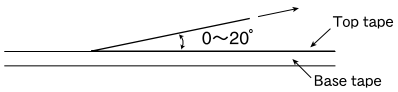


⑤Reel Size



⑥Top tape strength

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



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RELIABILITY DATA

Multilayer chip inductors and beads

1. Operating Temperature Range		
BK0402		−55～+125℃
BK0603		
BK1005		
BKH1005		
BK1608		
BK2125		
ARRAY	BK2010	
	BK3216	
BKP0603		−55～+85℃
BKP1005		
BKP1608		
BKP2125		
CK1608		−40～+85℃
CK2125		
CKS2125		
CKP2012		
CKP2016		
CKP2520		
NM2012		
NM2520		
LK1005		
LK1608		
LK2125		
HK0402		−55～+125℃
HK0603		
HK1005		
HK1608		−40～+85℃
HK2125		
HKQ0603S		−55～+125℃
HKQ0603U		
AQ105		

2. Storage Temperature Range		
BK0402		−55～+125℃
BK0603		
BK1005		
BKH1005		
BK1608		
BK2125		
ARRAY	BK2010	
	BK3216	
BKP0603		−55～+85℃
BKP1005		
BKP1608		
BKP2125		
CK1608		−40～+85℃
CK2125		
CKS2125		
CKP2012		
CKP2016		
CKP2520		
NM2012		
NM2520		
LK1005		
LK1608		
LK2125		
HK0402		−55～+125℃
HK0603		
HK1005		
HK1608		−40～+85℃
HK2125		
HKQ0603S		−55～+125℃
HKQ0603U		
AQ105		

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RELIABILITY DATA

Multilayer chip inductors and beads

3. Rated Current		
BK0402		240～540mA DC
BK0603		100～500mA DC
BK1005		120～1000mA DC
BKH1005		200mA DC
BK1608		150～1500mA DC
BK2125		200～1200mA DC
ARRAY	BK2010	100mA DC
	BK3216	100～200mA DC
BKP0603		1.0A DC
BKP1005		800～2000mA DC
BKP1608		1.0～3.0A DC
BKP2125		1.5～4.0A DC
CK1608		50～60mA DC
CK2125		60～500mA DC
CKS2125		110～280mA DC
CKP2012		0.7～1.2A DC
CKP2016		0.9～1.6A DC
CKP2520		1.1～1.8A DC
NM2012		0.8～1.5A DC
NM2520		0.9～1.1A DC
LK1005		20～25mA DC
LK1608		1～150mA DC
LK2125		5～300mA DC
HK0402		160～380mA DC
HK0603		60～470mA DC
HK1005		110～300mA DC
HK1608		150～300mA DC
HK2125		300mA DC
HKQ0603S		130～600mA DC
HKQ0603U		130～600mA DC
AQ105		280～710mA DC

Definition of rated current:
- 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℃.
- In the BK Series P type and 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℃.
- In the LK,HK,HKQ,and AQ Series, the rated current is either the DC value at which the internal 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℃.

4. Impedance		
BK0402		10～120Ω ±25%
BK0603		10～600Ω ±25%
BK1005		10～1800Ω ±25%
BKH1005		1500～1800Ω ±25%
BK1608		22～2500Ω ±25%
BK2125		15～2500Ω ±25%
ARRAY	BK2010	5～1000Ω ±25%
	BK3216	68～1000Ω ±25%
BKP0603		22～33Ω ±25%
BKP1005		10～220Ω ±25%
BKP1608		33～470Ω ±25%
BKP2125		33～330Ω ±25%
CK1608		—
CK2125		
CKS2125		
CKP2012		
CKP2016		
CKP2520		
NM2012		
NM2520		
LK1005		
LK1608		
LK2125		
HK0402		
HK0603		
HK1005		
HK1608		
HK2125		
HKQ0603S		
HKQ0603U		
AQ105		

【Test Methods and Remarks】
BK0402 Series
Measuring frequency : 100±1MHz
Measuring equipment : E4991A(or its equivalent)
Measuring jig : 16196D(or its equivalent)
BK0603 Series, BKP0603 Series
Measuring frequency : 100±1MHz
Measuring equipment : 4291A(or its equivalent)
Measuring jig : 16193A(or its equivalent)
BK1005 Series, BKP1005 Series, BKH1005 Series
Measuring frequency : 100±1MHz
Measuring equipment : 4291A(or its equivalent)
Measuring jig : 16192A(or its equivalent), 16193A(or its equivalent)
BK1608・2125 Series, BKP1608・2125 Series
Measuring frequency : 100±1MHz
Measuring equipment : 4291A(or its equivalent), 4195A(or its equivalent)
Measuring jig : 16092A(or its equivalent) or 16192A(or its equivalent)/HW
BK2010・3216 Series
Measuring frequency : 100±1MHz
Measuring equipment : 4291A(or its equivalent), 4195A(or its equivalent)
Measuring jig : 16192A(or its equivalent)

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RELIABILITY DATA

Multilayer chip inductors and beads

5. Inductance	
BK0402	—
BK0603	
BK1005	
BKH1005	
BK1608	
BK2125	
ARRAY BK2010	
ARRAY BK3216	
BKP0603	
BKP1005	
BKP1608	
BKP2125	
CK1608	4.7～10.0μH：±20%
CK2125	0.1～10.0μH：±20%
CKS2125	1.0～10.0μH：±20%
CKP2012	0.47～4.7μH：±20%
CKP2016	0.47～4.7μH：±20%
CKP2520	0.47～4.7μH：±20%
NM2012	0.82～1.0μH：±20%
NM2520	1.0～2.2μH：±20%
LK1005	0.12～2.2μH：±10%　Q 0.12～2.2μH：±30%
LK1608	0.047～33.0μH：±20%　0.10～12.0μH：±10%　Q 0.12～2.2μH：±30%
LK2125	0.047～33.0μH：±20%　0.10～12.0μH：±10%　Q 0.12～2.2μH：±30%
HK0402	1.0～6.2nH：±0.3nH　6.8～12nH：±5%
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%
HKQ0603S	0.6～6.2nH：±0.3nH　6.8～22nH：±5%
HKQ0603U	0.6～6.2nH：±0.3nH　6.8～22nH：±5%
AQ105	1.0～6.2nH：±0.3nH　6.8～15nH：±5%

【Test Methods and Remarks】
CK Series：
Measuring frequency：2 to 4MHz（CK1608）
Measuring frequency：2 to 25MHz（CK2125）
Measuring frequency：2 to 10MHz（CKS2125）
LK Series：
Measuring frequency：10 to 25MHz（LK1005）
Measuring frequency：1 to 50MHz（LK1608）
Measuring frequency：0.4 to 50MHz（LK2125）
CKP Series, NM Series：
Measuring frequency：1MHz(CKP2012, CKP2016, CKP2520, NM2012・NM2520)
Measuring equipment, jig：・4194A+16085B+16092A(or its equivalent)
・4195A+41951+16092A(or its equivalent)
・4294A+16192A(or its equivalent)
・4291A+16193A(or its equivalent)/LK1005
・4285A+42841A+42842C+42851−61100(CKP2012・CKP2016・CKP2520・NM2012・NM2520)
Measuring current：・1mA rms(0.047 to 4.7μH)　・0.1mA rms(5.6 to 33μH)
HK、HKQ、AQ Series：
Measuring frequency：100MHz(HK0402・HK0603・HK1005・AQ105)
Measuring frequency：50/100MHz(HK1608・HK2125)
Measuring frequency：500MHz(HKQ0603S・HKQ0603U)
Measuring equipment, jig：・4291A+16197A(or its equivalent)/HK0603・AQ105
・4291A+16193A(or its equivalent)/HK1005
・E4991A+16197A(or its equivalent)/HKQ0603S・HKQ0603U
・4291A+16092+in-house made jig(or its equivalent)/HK1608・HK2125
・E4991A+16196D(or its equivalent)/HK0402

RELIABILITY DATA

Multilayer chip inductors and beads

6. Q		
BK0402		—
BK0603		
BK1005		
BKH1005		
BK1608		
BK2125		
ARRAY	BK2010	
	BK3216	
BKP0603		
BKP1005		
BKP1608		
BKP2125		
CK1608		20 min.
CK2125		15～20 min.
CKS2125		—
CKP2012		
CKP2016		
CKP2520		
NM2012		
NM2520		
LK1005		10～20 min.
LK1608		10～35 min.
LK2125		15～50 min.
HK0402		3 min.
HK0603		4～5 min.
HK1005		8 min.
HK1608		8～12 min.
HK2125		10～18 min.
HKQ0603S		10～13 min.
HKQ0603U		10～13 min.
AQ105		8 min.

【Test Methods and Remarks】
CK Series：
Measuring frequency：2 to 4MHz（CK1608）
Measuring frequency：2 to 25MHz（CK2125）
LK Series：
Measuring frequency：10 to 25MHz（LK1005）
Measuring frequency：1 to 50MHz（LK1608）
Measuring frequency：0.4 to 50MHz（LK2125）
Measuring equipment, jig：・4194A+16085B+16092A（or its equivalent）
・4195A+41951+16092A（or its equivalent）
・4294A+16192A（or its equivalent）
・4291A+16193A（or its equivalent）/LK1005
Measuring current：・1mA rms（0.047 to 4.7μH）　・0.1mA rms（5.6 to 33μH）

HK、HKQ、AQ Series：
Measuring frequency：100MHz（HK0603・HK1005・AQ105）
Measuring frequency：50/100MHz（HK1608・HK2125）
Measuring frequency：500MHz（HKQ0603S・HKQ0603U）
Measuring equipment, jig：・4291A+16197A（or its equivalent）/HK0603・AQ105
・4291A+16193A（or its equivalent）/HK1005
・E4991A+16197A（or its equivalent）/HKQ0603S・HKQ0603U
・4291A+16092A+ in-house made jig（or its equivalent）/HK1608・HK2125
・E4991A+16196D（or its equivalent）HK0402

7. DC Resistance		
BK0402		0.10～0.53Ω max.
BK0603		0.065～1.50Ω max.
BK1005		0.03～0.80Ω max.
BKH1005		1.50～2.00Ω max.
BK1608		0.05～1.10Ω max.
BK2125		0.05～0.75Ω max.
ARRAY	BK2010	0.10～0.90Ω max.
	BK3216	0.15～0.80Ω max.
BKP0603		0.065～0.070Ω max.
BKP1005		0.030～0.20Ω max.
BKP1608		0.025～0.18Ω max.
BKP2125		0.020～0.075Ω max.
CK1608		0.45～0.85Ω（±30%）
CK2125		0.16～0.65Ω max.
CKS2125		0.09～0.40Ω typ.
		0.12～0.52Ω max.
CKP2012		0.10～0.28Ω max.
CKP2016		0.08～0.20Ω max.
CKP2520		0.05～0.16Ω max.
NM2012		0.10～0.19Ω max.
NM2520		0.13～0.22Ω max.
LK1005		0.41～1.16Ω max.
LK1608		0.2～2.2Ω max.
LK2125		0.1～1.1Ω max.
HK0402		0.18～0.99Ω max.
HK0603		0.11～3.74Ω max.
HK1005		0.08～4.8Ω max.
HK1608		0.05～2.6Ω max.
HK2125		0.10～1.5Ω max.
HKQ0603S		0.06～1.29Ω max.
HKQ0603U		0.06～1.29Ω max.
AQ105		0.07～0.45Ω max.

【Test Methods and Remarks】
Measuring equipment：VOAC-7412（made by Iwasaki Tsushinki）　VOAC-7512（made by Iwasaki Tsushinki）

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RELIABILITY DATA

Multilayer chip inductors and beads

8. Self Resonance Frequency (SRF)	
BK0402	—
BK0603	
BK1005	
BKH1005	
BK1608	
BK2125	
ARRAY BK2010	
ARRAY BK3216	
BKP0603	
BKP1005	
BKP1608	
BKP2125	
CK1608	17～25MHz min.
CK2125	24～235MHz min.
CKS2125	—
CKP2012	
CKP2016	
CKP2520	
NM2012	
NM2520	
LK1005	40～180MHz min.
LK1608	9～260MHz min.
LK2125	13～320MHz min.
HK0402	29000～10000MHz min.
HK0603	900～10000MHz min.
HK1005	400～10000MHz min.
HK1608	300～10000MHz min.
HK2125	200～4000MHz min.
HKQ0603S	1900～10000MHz min.
HKQ0603U	1900～10000MHz min.
AQ105	2300～10000MHz min.

【Test Methods and Remarks】
LK Series :
Measuring equipment : 4195A (or its equivalent)
Measuring jig : 41951+16092A (or its equivalent)
HK、HKQ、AQ Series :
Measuring equipment : 8719C (or its equivalent) ・8753D (or its equivalent) /HK2125

9. Temperature Characteristic	
BK0402	—
BK0603	
BK1005	
BKH1005	
BK1608	
BK2125	
ARRAY BK2010	
ARRAY BK3216	
BKP0603	
BKP1005	
BKP1608	
BKP2125	
CK1608	
CK2125	
CKS2125	
CKP2012	
CKP2016	
CKP2520	
NM2012	
NM2520	
LK1005	
LK1608	
LK2125	
HK0402	Inductance change : Within ±10%
HK0603	
HK1005	
HK1608	
HK2125	
HKQ0603S	
HKQ0603U	
AQ105	

【Test Methods and Remarks】
HK、HKQ、AQ Series : Temperature range : −30 to +85℃
Reference temperature : +20℃

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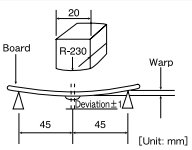
RELIABILITY DATA

Multilayer chip inductors and beads

10. Resistance to Flexure of Substrate	
BK0402	No mechanical damage.
BK0603	
BK1005	
BKH1005	
BK1608	
BK2125	
ARRAY	BK2010
	BK3216
BKP0603	
BKP1005	
BKP1608	
BKP2125	
CK1608	
CK2125	
CKS2125	
CKP2012	
CKP2016	
CKP2520	
NM2012	
NM2520	
LK1005	
LK1608	
LK2125	
HK0402	
HK0603	
HK1005	
HK1608	
HK2125	
HKQ0603S	
HKQ0603U	
AQ105	

【Test Methods and Remarks】
Warp : 2mm (BK Series without 0402size, BKP, BKH, CK, CKS, CKP, NM, LK, HK, HKQ, AQ Series)
: 1mm (BK0402, HK0402 Series)
Testing board : glass epoxy-resin substrate
Thickness : 0.8mm



11. Solderability	
BK0402	At least 75% of terminal electrode is covered by new solder.
BK0603	
BK1005	
BKH1005	
BK1608	
BK2125	
ARRAY	BK2010
	BK3216
BKP0603	
BKP1005	
BKP1608	
BKP2125	
CK1608	At least 75% of terminal electrode is covered by new solder.
CK2125	
CKS2125	
CKP2012	
CKP2016	
CKP2520	
NM2012	
NM2520	
LK1005	
LK1608	
LK2125	
HK0402	
HK0603	
HK1005	
HK1608	
HK2125	
HKQ0603S	
HKQ0603U	
AQ105	

【Test Methods and Remarks】
Solder temperature : 230±5℃
Duration : 4±1 sec.

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RELIABILITY DATA

Multilayer chip inductors and beads

12. Resistance to Soldering	
BK0402	Appearance : No significant abnormality. Impedance change : Within ±30%
BK0603	
BK1005	
BKH1005	
BK1608	
BK2125	
ARRAY BK2010	
ARRAY BK3216	
BKP0603	
BKP1005	
BKP1608	
BKP2125	
CK1608	No mechanical damage. Remaining terminal electrode : 70% min. Inductance change R10～4R7 : Within ±10% 6R8～100 : Within ±15% CKS2125 : Within ±20% CKP2012、CKP2016、CKP2520、NM2012、NM2520 : Within ±30%
CK2125	
CKS2125	
CKP2012	
CKP2016	
CKP2520	
NM2012	
NM2520	
LK1005	No mechanical damage. Remaining terminal electrode : 70% min. Inductance change : Within ±15%
LK1608	No mechanical damage. Remaining terminal electrode : 70% min. Inductance change 47N～4R7 : Within ±10% 5R6～330 : Within ±15%
LK2125	
HK0402	No mechanical damage. Remaining terminal electrode : 70% min. Inductance change : Within ±5%
HK0603	
HK1005	
HK1608	
HK2125	
HKQ0603S	
HKQ0603U	
AQ105	

【Test Methods and Remarks】
Solder temperature : 260±5℃
Duration : 10±0.5 sec.
Preheating temperature : 150 to 180℃
Preheating time : 3 min.
Flux : Immersion into methanol solution with colophony for 3 to 5 sec.
Recovery : 2 to 3 hrs of recovery under the standard condition after the test.(See Note 1)

13. Thermal Shock	
BK0402	Appearance : No significant abnormality. Impedance change : Within ±30%
BK0603	
BK1005	
BKH1005	
BK1608	
BK2125	
ARRAY BK2010	
ARRAY BK3216	
BKP0603	
BKP1005	
BKP1608	
BKP2125	
CK1608	No mechanical damage. Inductance change : Within ±20% Q change : Within ±30% Inductance change : Within ±20% (CKS2125)
CK2125	
CKS2125	
CKP2012	No mechanical damage. Inductance change : Within ±30%
CKP2016	
CKP2520	
NM2012	
NM2520	
LK1005	No mechanical damage. Inductance change : Within ±10% Q change : Within ±30%
LK1608	
LK2125	
HK0402	No mechanical damage. Inductance change : Within ±10% Q change : Within ±20%
HK0603	
HK1005	
HK1608	
HK2125	
HKQ0603S	
HKQ0603U	
AQ105	

【Test Methods and Remarks】
Conditions for 1 cycle
Step 1 : Minimum operating temperature $^{+0}_{-3}$℃ 30±3 min.
Step 2 : Room temperature 2 to 3 min.
Step 3 : Maximum operating temperature $^{+3}_{-0}$℃ 30±3 min.
Step 4 : Room temperature 2 to 3 min.
Number of cycles : 5
Recovery : 2 to 3 hrs of recovery under the standard condition after the test.(See Note 1)

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

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For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (http://www.ty-top.com/) or CD catalogs.

Multilayer chip inductors and beads

14. Damp Heat (Steady state)	
BK0402	Appearance : No significant abnormality. Impedance change : Within ±30%
BK0603	
BK1005	
BKH1005	
BK1608	
BK2125	
ARRAY BK2010	
ARRAY BK3216	
BKP0603	
BKP1005	
BKP1608	
BKP2125	
CK1608	No mechanical damage. Inductance change : Within ±20% Q change : Within ±30%
CK2125	
CKS2125	Inductance change : Within ±20%
CKP2012	No mechanical damage. Inductance change : Within ±30%
CKP2016	
CKP2520	
NM2012	
NM2520	
LK1005	No mechanical damage. Inductance change : Within ±10% Q change : Within ±30%
LK1608	
LK2125	No mechanical damage. Inductance change : Within ±20% Q change : Within ±30%
HK0402	No mechanical damage. Inductance change : Within ±10% Q change : Within ±20%
HK0603	
HK1005	
HK1608	
HK2125	
HKQ0603S	
HKQ0603U	
AQ105	

【Test Methods and Remarks】
BK, BKP, BKH Series :
Temperature : 40±2℃
Humidity : 90 to 95%RH
Duration : 500^{+24}_{-0} hrs
Recovery : 2 to 3 hrs of recovery under the standard condition after the removal from test chamber.(See Note 1)

LK、CK、CKS、CKP、NM、HK、HKQ、AQ Series :
Temperature : 40±2℃ (LK、CK、CKS、CKP、NM Series)
: 60±2℃ (HK、HKQ、AQ Series)
Humidity : 90 to 95%RH
Duration : 500±12 hrs
Recovery : 2 to 3 hrs of recovery under the standard condition after the removal from test chamber.(See Note 1)

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RELIABILITY DATA

Multilayer chip inductors and beads

15. Loading under Damp Heat	
BK0402	Appearance : No significant abnormality. Impedance change : Within ±30%
BK0603	
BK1005	
BKH1005	
BK1608	
BK2125	
ARRAY BK2010	
ARRAY BK3216	
BKP0603	
BKP1005	
BKP1608	
BKP2125	
CK1608	No mechanical damage. Inductance change : Within ±20%　Q change : Within ±30%
CK2125	
CKS2125	No mechanical damage.　Inductance change : Within ±20%
CKP2012	No mechanical damage.　Inductance change : Within ±30%
CKP2016	
CKP2520	
NM2012	
NM2520	
LK1005	No mechanical damage.　Inductance change : Within ±10%　Q change : Within ±30%
LK1608	No mechanical damage. Inductance change : 0.047 to 12.0μH : Within ±10%　15.0 to 33.0μH : Within ±15%　Q change : Within ±30%
LK2125	No mechanical damage.　Inductance change : Within ±20%　Q change : Within ±30%
HK0402	No mechanical damage. Inductance change : Within ±10%　Q change : Within ±20%
HK0603	
HK1005	
HK1608	
HK2125	
HKQ0603S	
HKQ0603U	
AQ105	

【Test Methods and Remarks】
BK, BKP, BKH Series :
Temperature : 40±2℃
Humidity : 90 to 95%RH
Applied current : Rated current
Duration : 500^{+24}_{0} hrs
Recovery : 2 to 3 hrs of recovery under the standard condition after the removal from test chamber.(See Note 1)

LK、CK、CKS、CKP、NM、HK、HKQ、AQ Series :
Temperature : 40±2℃ (LK、CK、CKS、CKP、NM Series)
: 60±2℃ (HK、HKQ、AQ Series)
Humidity : 90 to 95%RH
Applied current : Rated current
Duration : 500±12 hrs
Recovery : 2 to 3 hrs of recovery under 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℃ 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±2℃ 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.

RELIABILITY DATA

Multilayer chip inductors and beads

16. Loading at High Temperature	
BK0402	Appearance : No significant abnormality Impedance change : Within ±30%
BK0603	
BK1005	
BKH1005	
BK1608	
BK2125	
ARRAY BK2010	
ARRAY BK3216	
BKP0603	
BKP1005	
BKP1608	
BKP2125	
CK1608	No mechanical damage. Inductance change : Within ±20%　Q change : Within ±30%
CK2125	
CKS2125	No mechanical damage.　Inductance change : Within ±20%
CKP2012	No mechanical damage.　Inductance change : Within ±30%
CKP2016	
CKP2520	
NM2012	
NM2520	
LK1005	No mechanical damage.　Inductance change : Within ±10%　Q change : Within ±30%
LK1608	No mechanical damage. Inductance change : 0.047 to 12.0μH : Within ±10%　15.0 to 33.0μH : Within ±15%　Q change : Within ±30%
LK2125	No mechanical damage.　Inductance change : Within ±20%　Q change : Within ±30%
HK0402	No mechanical damage. Inductance change : Within ±10%　Q change : Within ±20%
HK0603	
HK1005	
HK1608	
HK2125	
HKQ0603S	
HKQ0603U	
AQ105	

【Test Methods and Remarks】
BK, BKH Series :
Temperature : 125±3℃
Applied current : Rated current
Duration : 500^{+24}_{0} hrs
Recovery : 2 to 3 hrs of recovery under the standard condition after the removal from test chamber.(See Note 1)

LK、CK、CKS、CKP、NM、HK、HKQ、AQ、BKP Series :
Temperature : 85±2℃ (LK、CK、CKS、CKP、NM、BKP Series)
: 85±2℃ (HK1608, 2125)
: 85±2℃ (HK1005, AQ105 operating temperature range −55 to +85℃)
: 125±2℃ (HK0402, HK0603, HK1005, HKQ0603S, HKQ0603U, AQ105 operating temperature range −55 to +125℃)
Applied current : Rated current
Duration : 500±12 hrs
Recovery : 2 to 3 hrs of recovery under the standard condition after the test.(See Note 1)

Note on standard condition: "standard condition" referred to herein is defined as follows:
5 to 35℃ 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±2℃ 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.

PRECAUTIONS

Precautions on the use of Multilayer chip Inductors, Multilayer chip inductors for high frequency, Multilayer chip bead Inductors

1. Circuit Design

Precautions

◆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 differentiated from components used in general purpose applications.

◆Operating Current (Verification of Rated current)

1. The operating 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.

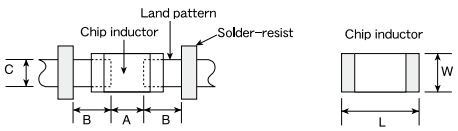
◆Pattern configurations (Inductor layout on panelized [breakaway] PC boards)

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.

Technical consider-ations

◆Pattern configurations (Design of Land-patterns)

1. 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

Type		1608	2125	3216
Size	L	1.6	2.0	3.2
	W	0.8	1.25	1.6
A		0.8～1.0	1.0～1.4	1.8～2.5
B		0.5～0.8	0.8～1.5	0.8～1.7
C		0.6～0.8	0.9～1.2	1.2～1.6

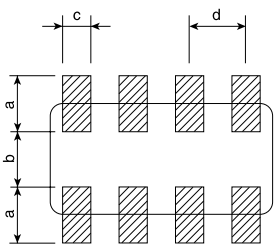
(Unit : mm)

Recommended land dimensions for reflow-soldering

Type		0402	0603	1005	105	1608	2012	2125	2016	3216	2520
Size	L	0.4	0.6	1.0	1.0	1.6	2.0	2.0	2.0	3.2	2.5
	W	0.2	0.3	0.5	0.6	0.8	1.25	1.25	1.6	1.6	2.0
A		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	1.8～2.5	1.0～1.4
B		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	0.6～1.5	0.6～1.0
C		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	1.2～2.0	1.8～2.2

(Unit : mm)

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

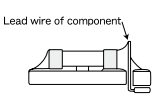
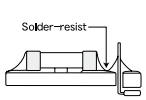
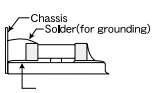
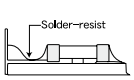
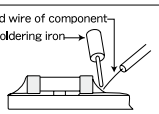
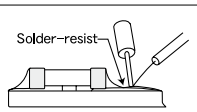
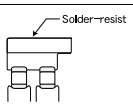


Recommended land dimension for Reflow-soldering

Type		3216	2010
Size	L	3.2	2.0
	W	1.6	1.0
a		0.7～0.9	0.5～0.6
b		0.8～1.0	0.5～0.6
c		0.4～0.5	0.2～0.3
d		0.8	0.5

(Unit : mm)

(2) Examples of good and bad solder application

Item	Not recommended	Recommended
Mixed mounting of SMD and leaded components		
Component placement close to the chassis		
Hand-soldering of leaded components near mounted components		
Horizontal component placement		

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PRECAUTIONS

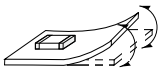
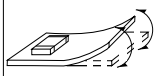
Precautions on the use of Multilayer chip Inductors, Multilayer chip inductors for high frequency, Multilayer chip bead Inductors

2. PCB Design

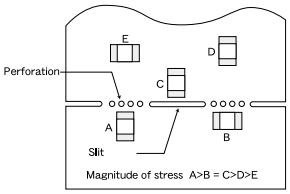
Technical consider-ations

◆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.

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.

3. Considerations for automatic placement

Precautions

◆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.

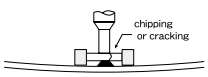
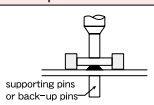
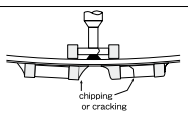
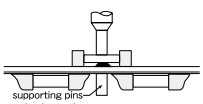
◆Selection of Adhesives

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.

Technical consider-ations

◆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		
Double-sided mounting		

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.

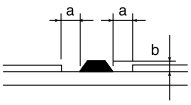
Technical consider-ations

◆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]

Amount of adhesives



After inductors are bonded

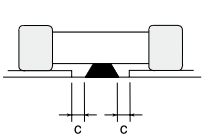


Figure	0805 case sizes as examples
a	0.3mm min
b	100～120μm
c	Area with no adhesive

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Precautions on the use of Multilayer chip Inductors, Multilayer chip inductors for high frequency, Multilayer chip bead Inductors

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.**

Technical considerations

◆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

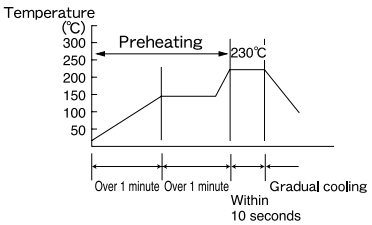
Heating: Chip inductor components should be preheated to within 100 to 130℃ of the soldering. Cooling: The temperature difference between the components and cleaning process should not be greater than 100℃.

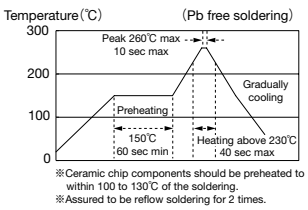
Chip inductors are susceptible to thermal shock when exposed to rapid or concentrated heating or rapid cooling. Therefore, the soldering process must be conducted with a great care so as to prevent malfunction of the components due to excessive thermal shock.

Recommended conditions for soldering

[Reflow soldering]

Temperature profile

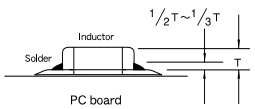




※Ceramic chip components should be preheated to within 100 to 130℃ of the soldering.
※Assured to be reflow soldering for 2 times.

Caution

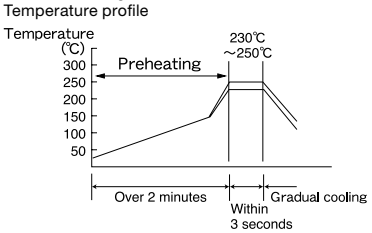
1. The ideal condition is to have solder mass (fillet) controlled to 1/2 to 1/3 of the thickness of the inductor, as shown below:

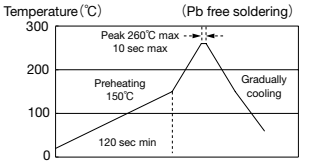


2. Because excessive dwell times can detrimentally affect solderability, soldering duration should be kept as close to recommended times as possible.

[Wave soldering]

Temperature profile





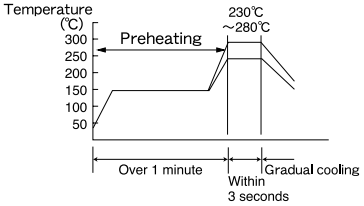
※Ceramic chip components should be preheated to within 100 to 130℃ of the soldering.
※Assured to be wave soldering for 1 time.
※Except for reflow soldering type.

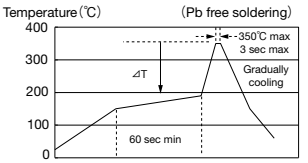
Caution

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℃.
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]

Temperature profile





(※ΔT190℃ (3216Type max), ΔT≦130℃ (3225 Type ming)
※It is recommended to use 20W soldering iron and the tip is 1φ or less.
※The 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.

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.

* This catalog contains the typical specification only due to the limitation of space. When you consider the purchase of our products, please check our specification. For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (http://www.ty-top.com/) or CD catalogs.

PRECAUTIONS

Precautions on the use of Multilayer chip Inductors, Multilayer chip inductors for high frequency, Multilayer chip bead Inductors

5. Cleaning	
Precautions	◆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.
Technical consider-ations	◆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. (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/ℓ Ultrasonic frequency Below 40kHz Ultrasonic washing period 5 min. or less

6. Post cleaning processes	
Precautions	◆Application of resin coatings, moldings, etc. to the PCB and components. 1. 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	
Precautions	◆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. 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	
Precautions	◆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. Recommended conditions Ambient temperature Below 40℃ Humidity Below 70% RH The ambient temperature must be kept below 30℃. 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.
Technical consider-ations	◆Storage 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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