FEATURES 特征

- High self-resonant frequency.
  可在宽频率范围内用于抑制电磁干扰（EMI）高自谐振频率
- Multilayer monolithic construction yields high reliability.
  叠层独石结构，具有高可靠性
- Excellent solderability and high heat resistance.
  良好的可焊性和耐焊性
- Operating Temp：-55℃~+125℃(Including self heating)
  工作温度范围:-55~+125°℃(包括自身温度上升)

APPLICATIONS 用途

- Radio frequency circuit of mobile phones, walkie-talkies, PHS, PDAs and various communication electronic devices, etc..
  移动电话、对讲机、PHS、PDA 和各种通讯电子设备等的射频线路.

PART NUMBERING 产品型号

APGL	1005	-	4N7	S	E	T	D9
①	②		③	④	⑤	⑥	⑦

① Series Name	
APGL	Multilayer Chip High Frequency Ceramic Inductors

② External Dimensions [inch]
0603 [0201]
1005 [0402]
1608 [0603]
2012 [0805]

③ Inductance	
Code (example)	Nominal inductance［nH］
4N7	4.7
10N	10
R10	100

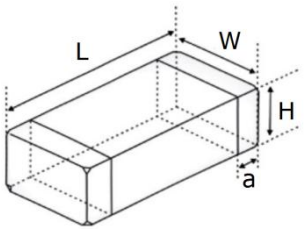
⑤ Characteristics Code
Q、E

④ Inductance Tolerance	
B	±0.1nH
C	±0.2nH
S	±0.3nH
G	±2%
H	±3%
J	±5%

⑥ Packaging	
T	Tape & Reel

⑦ Special Material Code
D9

DIMENSIONS 尺寸



Unit: mm [inch]

Dimensions				
Series	L	W	H	a
APGL0603 [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]	0.15±0.05 [0.006±0.002]
APGL1005 [0402]	1.0± 0.15 [0.040± 0.006]	0.5± 0.15 [0.020± 0.006]	0.5± 0.15 [0.020± 0.006]	0.25± 0.1 [0.010± 0.004]
APGL1608 [0603]	1.6± 0.20 [0.063± 0.008]	0.8± 0.20 [0.031± 0.008]	0.8± 0.20 [0.031± 0.008]	0.3± 0.2 [0.01± 0.008]
APGL2012 [0805]	2.0± 0.20 [0.079± 0.008]	1.2± 0.20 [0.047± 0.008]	0.9± 0.20 [0.035± 0.008]	0.5± 0.3 [0.020± 0.012]

ELECTRICAL CHARACTERISTICS 电气特性

● APGL0603 Series

Part Number	Inductance (nH)	Tolerance	L,Q Test Freq. (MHz)	Max. DC Resistance (Ω)	Max. Rated Current (mA)	Min. Q	Min. SRF (MHZ)
APGL0603-0N6□QTD9	0.6	B、C、S	500	0.05	1050	14	10000
APGL0603-0N7□QTD9	0.7	B、C、S	500	0.05	1050	14	10000
APGL0603-0N8□QTD9	0.8	B、C、S	500	0.06	1050	14	10000
APGL0603-0N9□QTD9	0.9	B、C、S	500	0.06	830	14	10000
APGL0603-1N0□QTD9	1	B、C、S	500	0.07	830	14	10000
APGL0603-1N1□QTD9	1.1	B、C、S	500	0.07	830	14	10000
APGL0603-1N2□QTD9	1.2	B、C、S	500	0.1	830	14	10000
APGL0603-1N3□QTD9	1.3	B、C、S	500	0.1	730	14	10000
APGL0603-1N4□QTD9	1.4	B、C、S	500	0.1	730	14	10000
APGL0603-1N5□QTD9	1.5	B、C、S	500	0.1	680	14	10000
APGL0603-1N6□QTD9	1.6	B、C、S	500	0.1	680	14	10000
APGL0603-1N7□QTD9	1.7	B、C、S	500	0.1	680	14	10000
APGL0603-1N8□QTD9	1.8	B、C、S	500	0.15	680	14	9000
APGL0603-2N0□QTD9	2	B、C、S	500	0.15	680	14	8500
APGL0603-2N2□QTD9	2.2	B、C、S	500	0.15	680	14	7500
APGL0603-2N4□QTD9	2.4	B、C、S	500	0.15	570	14	7500
APGL0603-2N6□QTD9	2.6	B、C、S	500	0.2	570	14	7500
APGL0603-2N7□QTD9	2.7	B、C、S	500	0.2	570	14	7500
APGL0603-2N8□QTD9	2.8	B、C、S	500	0.2	520	14	7500

ELECTRICAL CHARACTERISTICS 电气特性

APGL0603 Series

Part Number	Inductance (nH)	Tolerance	L,Q Test Freq. (MHz)	Max. DC Resistance (Ω)	Max. Rated Current (mA)	Min. Q	Min. SRF (MHZ)
APGL0603-3N0□QTD9	3	B、C、S	500	0.2	470	14	7500
APGL0603-3N3□QTD9	3.3	B、C、S	500	0.25	470	14	7500
APGL0603-3N6□QTD9	3.6	B、C、S	500	0.25	420	14	6500
APGL0603-3N9□QTD9	3.9	B、C、S	500	0.25	420	14	6500
APGL0603-4N3□QTD9	4.3	H、J、S	500	0.35	360	14	6000
APGL0603-4N7□QTD9	4.7	H、J、S	500	0.4	360	14	6000
APGL0603-5N1□QTD9	5.1	H、J、S	500	0.4	360	14	5500
APGL0603-5N6□QTD9	5.6	H、J	500	0.4	360	14	5000
APGL0603-6N2□QTD9	6.2	H、J	500	0.4	310	14	5000
APGL0603-6N8□QTD9	6.8	H、J	500	0.5	310	14	4500
APGL0603-7N5□QTD9	7.5	H、J	500	0.5	310	14	4000
APGL0603-8N2□QTD9	8.2	H、J	500	0.5	260	14	4000
APGL0603-9N1□QTD9	9.1	H、J	500	0.7	260	14	4000
APGL0603-10N□QTD9	10	H、J	500	0.7	260	14	4000
APGL0603-12N□QTD9	12	H、J	500	0.7	260	13	3500
APGL0603-15N□QTD9	15	H、J	500	0.85	260	13	3200
APGL0603-18N□QTD9	18	H、J	500	1	210	13	3000
APGL0603-20N□QTD9	20	H、J	500	1.1	160	13	2200
APGL0603-22N□QTD9	22	H、J	500	1.2	160	13	2200
APGL0603-27N□QTD9	27	H、J	500	1.5	150	13	2200
APGL0603-33N□QTD9	33	H、J	300	1.8	130	12	1800
APGL0603-36N□QTD9	36	H、J	300	2	130	12	1700
APGL0603-39N□QTD9	39	H、J	300	2	130	12	1600
APGL0603-43N□QTD9	43	H、J	300	2.2	110	12	1600
APGL0603-47N□QTD9	47	H、J	300	2.2	110	12	1500
APGL0603-56N□QTD9	56	H、J	300	2.5	110	12	1200
APGL0603-68N□QTD9	68	H、J	300	3.2	110	12	1000
APGL0603-75N□QTD9	75	H、J	300	3.6	110	11	1000
APGL0603-82N□QTD9	82	H、J	300	3.8	110	11	1000
APGL0603-91N□QTD9	91	H、J	300	3.8	85	11	900
APGL0603-R10□QTD9	100	H、J	300	4	85	11	800
APGL0603-R12□QTD9	120	H、J	300	5	85	10	800

APGL1005 Series

Part Number	Inductance (nH)	Tolerance	L,Q Test Freq. (MHz)	Max. DC Resistance (Ω)	Max. Rated Current (mA)	Min. Q	Min. SRF (MHZ)
APGL1005-1N0□ETD9	1	B、C、S	100	0.06	1050	8	10000
APGL1005-1N1□ETD9	1.1	B、C、S	100	0.07	1050	8	10000
APGL1005-1N2□ETD9	1.2	B、C、S	100	0.07	1050	8	10000
APGL1005-1N3□ETD9	1.3	B、C、S	100	0.07	1050	8	10000

ELECTRICAL CHARACTERISTICS 电气特性

● APGL1005 Series

Part Number	Inductance (nH)	Tolerance	L,Q Test Freq. (MHz)	Max. DC Resistance (Ω)	Max. Rated Current (mA)	Min. Q	Min. SRF (MHZ)
APGL1005-1N5□ETD9	1.5	B、C、S	100	0.08	1050	8	6000
APGL1005-1N6□ETD9	1.6	B、C、S	100	0.08	1050	8	6000
APGL1005-1N8□ETD9	1.8	B、C、S	100	0.08	930	8	6000
APGL1005-2N0□ETD9	2	B、C、S	100	0.09	930	8	6000
APGL1005-2N2□ETD9	2.2	B、C、S	100	0.09	930	8	6000
APGL1005-2N4□ETD9	2.4	B、C、S	100	0.1	830	8	6000
APGL1005-2N7□ETD9	2.7	B、C、S	100	0.12	830	8	6000
APGL1005-3N0□ETD9	3	B、C、S	100	0.12	830	8	6000
APGL1005-3N3□ETD9	3.3	B、C、S	100	0.13	830	8	6000
APGL1005-3N6□ETD9	3.6	B、C、S	100	0.15	730	8	4000
APGL1005-3N9□ETD9	3.9	B、C、S	100	0.16	730	8	4000
APGL1005-4N3□ETD9	4.3	B、C、S	100	0.16	730	8	4000
APGL1005-4N7□ETD9	4.7	B、C、S	100	0.16	730	8	4000
APGL1005-5N1□ETD9	5.1	B、C、S	100	0.16	620	8	4000
APGL1005-5N6□ETD9	5.6	B、C、S	100	0.2	620	8	4000
APGL1005-6N2□ETD9	6.2	B、C、S	100	0.2	620	8	3900
APGL1005-6N8□ETD9	6.8	G、H、J	100	0.2	620	8	3900
APGL1005-7N5□ETD9	7.5	G、H、J	100	0.24	520	8	3700
APGL1005-8N2□ETD9	8.2	G、H、J	100	0.24	520	8	3600
APGL1005-9N1□ETD9	9.1	G、H、J	100	0.26	520	8	3400
APGL1005-10N□ETD9	10	G、H、J	100	0.26	520	8	3200
APGL1005-12N□ETD9	12	G、H、J	100	0.5	420	8	2700
APGL1005-15N□ETD9	15	G、H、J	100	0.5	420	8	2300
APGL1005-18N□ETD9	18	G、H、J	100	0.6	360	8	2100
APGL1005-20N□ETD9	20	G、H、J	100	0.6	360	8	2000
APGL1005-22N□ETD9	22	G、H、J	100	0.6	360	8	1900
APGL1005-27N□ETD9	27	G、H、J	100	0.7	310	8	1600
APGL1005-33N□ETD9	33	G、H、J	100	0.8	310	8	1300
APGL1005-39N□ETD9	39	G、H、J	100	1	260	8	1200
APGL1005-43N□ETD9	43	G、H、J	100	1.1	260	8	1100
APGL1005-47N□ETD9	47	G、H、J	100	1.1	260	8	1000
APGL1005-56N□ETD9	56	G、H、J	100	1.2	210	8	750
APGL1005-68N□ETD9	68	G、H、J	100	1.4	210	8	750
APGL1005-82N□ETD9	82	G、H、J	100	1.6	210	8	750
APGL1005-R10□ETD9	100	G、H、J	100	2	210	8	700
APGL1005-R12□ETD9	120	G、H、J	100	2.5	160	8	600
APGL1005-R15□ETD9	150	G、H、J	100	3	160	8	550
APGL1005-R18□ETD9	180	G、H、J	100	3.5	160	8	500
APGL1005-R22□ETD9	220	G、H、J	100	3.7	110	8	450
APGL1005-R27□ETD9	270	G、H、J	100	4.5	110	8	400
APGL1005-R33□ETD9	330	G、H、J	50	5	85	6	350

ELECTRICAL CHARACTERISTICS 电气特性

● APGL1608 Series

Part Number	Inductance (nH)	Tolerance	L,Q Test Freq. (MHz)	Max. DC Resistance (Ω)	Max. Rated Current (mA)	Min. Q	Min. SRF (MHZ)
APGL1608-1N0□ETD9	1	S、D	100	0.05	520	8	10000
APGL1608-1N2□ETD9	1.2	S、D	100	0.05	520	8	10000
APGL1608-1N5□ETD9	1.5	S、D	100	0.1	520	8	6000
APGL1608-1N8□ETD9	1.8	S、D	100	0.1	520	8	6000
APGL1608-2N0□ETD9	2	S、D	100	0.1	520	8	6000
APGL1608-2N2□ETD9	2.2	S、D	100	0.1	520	8	6000
APGL1608-2N4□ETD9	2.4	S、D	100	0.12	520	8	6000
APGL1608-2N7□ETD9	2.7	S、D	100	0.12	520	10	6000
APGL1608-3N3□ETD9	3.3	S、D	100	0.15	520	10	6000
APGL1608-3N6□ETD9	3.6	S、D	100	0.16	520	10	6000
APGL1608-3N9□ETD9	3.9	S、D	100	0.16	520	10	6000
APGL1608-4N3□ETD9	4.3	S、D	100	0.18	520	10	6000
APGL1608-4N7□ETD9	4.7	S、D	100	0.2	520	10	6000
APGL1608-5N1□ETD9	5.1	S、D	100	0.25	520	10	5500
APGL1608-5N6□ETD9	5.6	J、K	100	0.25	520	10	5000
APGL1608-6N8□ETD9	6.8	J、K	100	0.3	520	10	5000
APGL1608-7N5□ETD9	7.5	J、K	100	0.35	520	10	4500
APGL1608-8N2□ETD9	8.2	J、K	100	0.35	520	10	4500
APGL1608-9N1□ETD9	9.1	J、K	100	0.4	520	10	3500
APGL1608-10N□ETD9	10	J、K	100	0.4	310	12	3500
APGL1608-12N□ETD9	12	J、K	100	0.45	310	12	3000
APGL1608-15N□ETD9	15	J、K	100	0.5	310	12	2300
APGL1608-18N□ETD9	18	J、K	100	0.55	310	12	2200
APGL1608-22N□ETD9	22	J、K	100	0.6	310	12	2000
APGL1608-24N□ETD9	24	J、K	100	0.6	310	12	2000
APGL1608-27N□ETD9	27	J、K	100	0.65	310	12	1700
APGL1608-33N□ETD9	33	J、K	100	0.7	310	12	1500
APGL1608-36N□ETD9	36	J、K	100	0.7	310	12	1400
APGL1608-39N□ETD9	39	J、K	100	0.7	310	12	1400
APGL1608-47N□ETD9	47	J、K	100	0.7	310	12	1200
APGL1608-56N□ETD9	56	J、K	100	0.75	310	12	1100
APGL1608-68N□ETD9	68	J、K	100	0.85	310	12	900
APGL1608-82N□ETD9	82	J、K	100	1	310	8	800
APGL1608-R10□ETD9	100	J、K	100	1.2	310	8	700
APGL1608-R12□ETD9	120	J、K	50	1.4	210	8	600
APGL1608-R15□ETD9	150	J、K	50	1.6	210	8	500
APGL1608-R18□ETD9	180	J、K	50	1.9	210	8	400
APGL1608-R22□ETD9	220	J、K	50	2.4	210	8	350
APGL1608-R27□ETD9	270	J、K	50	2.6	160	8	350
APGL1608-R33□ETD9	330	J、K	50	2.8	160	8	350
APGL1608-R39□ETD9	390	J、K	50	3.2	160	8	300
APGL1608-R43□ETD9	430	J、K	50	3.4	160	8	280
APGL1608-R47□ETD9	470	J、K	50	3.6	160	8	250

ELECTRICAL CHARACTERISTICS 电气特性

- APGL2012 Series

Part Number	Inductance (nH)	Tolerance	L,Q Test Freq. (MHz)	Max. DC Resistance (Ω)	Max. Rated Current (mA)	Min. Q	Min. SRF (MHZ)
APGL2012-1N5□ETD9	1.5	S、D	100	0.1	520	10	6000
APGL2012-1N8□ETD9	1.8	S、D	100	0.1	520	10	6000
APGL2012-2N2□ETD9	2.2	S、D	100	0.1	520	10	6000
APGL2012-2N7□ETD9	2.7	S、D	100	0.1	520	12	5500
APGL2012-3N3□ETD9	3.3	S、D	100	0.13	520	12	5000
APGL2012-3N9□ETD9	3.9	S、D	100	0.15	520	12	4500
APGL2012-4N3□ETD9	4.3	S、D	100	0.2	520	12	4000
APGL2012-4N7□ETD9	4.7	S、D	100	0.2	520	12	4000
APGL2012-5N6□ETD9	5.6	S、D	100	0.23	520	15	3500
APGL2012-6N8□ETD9	6.8	J、K	100	0.25	520	15	3000
APGL2012-8N2□ETD9	8.2	J、K	100	0.28	520	15	2500
APGL2012-10N□ETD9	10	J、K	100	0.3	520	15	2200
APGL2012-12N□ETD9	12	J、K	100	0.35	520	15	2000
APGL2012-15N□ETD9	15	J、K	100	0.4	520	15	1800
APGL2012-18N□ETD9	18	J、K	100	0.45	310	15	1600
APGL2012-22N□ETD9	22	J、K	100	0.5	310	15	1500
APGL2012-27NJETD9	27	J、K	100	0.55	310	15	1400
APGL2012-33N□ETD9	33	J、K	100	0.6	310	15	1300
APGL2012-39N□ETD9	39	J、K	100	0.65	310	15	1100
APGL2012-43N□ETD9	43	J、K	100	0.7	310	18	1000
APGL2012-47N□ETD9	47	J、K	100	0.7	310	18	1000
APGL2012-56N□ETD9	56	J、K	100	0.75	310	18	900
APGL2012-68N□ETD9	68	J、K	100	0.8	310	18	850
APGL2012-82N□ETD9	82	J、K	100	0.9	310	18	800
APGL2012-R10□ETD9	100	J、K	100	0.9	310	18	700
APGL2012-R12□ETD9	120	J、K	50	0.95	310	13	600
APGL2012-R15□ETD9	150	J、K	50	1.2	310	13	550
APGL2012-R18□ETD9	180	J、K	50	1.3	310	13	500
APGL2012-R22□ETD9	220	J、K	50	1.5	310	12	400
APGL2012-R27□ETD9	270	J、K	50	1.8	310	12	350
APGL2012-R33□ETD9	330	J、K	50	2	310	12	300
APGL2012-R39□ETD9	390	J、K	50	2	310	10	250
APGL2012-R47□ETD9	470	J、K	50	2	310	10	200

- Inductance and Q testing conditions: E4982A or equivalent, test voltage 50mV ± 5mV, Temperature 15℃~35℃, Humidity 25%~75%.
- RDC Testing conditions：RM3542A or equivalent, Temperature 15℃~35℃, Humidity 25%~75%.
- Rated current：Apply the rated current, and the surface temperature rise of the product shall not exceed 40℃ .

ELECTRICAL CHARACTERISTICS 电气特性

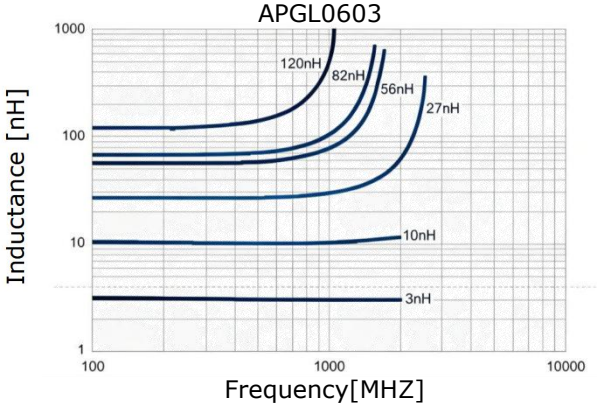
● The compensation value table.

Product series	Inductance range	Test Frequency	Inductance range	Compensation value	Testing instruments and fixtures
APGL0603	Ls＜33nH	500MHZ	Ls＜1N0	0.25nH	E4892A+16197A
			1N0≤Ls＜33N	0.48nH	E4892A+16197A
	Ls≥33nH	300MHZ	Ls≥33N	0.48nH	E4892A+16197A
APGL1005	ALL	100MHZ	ALL	0 nH	E4892A+16197A
APGL1608	ALL	100MHZ	ALL	0 nH	E4892A+16196B
APGL2012	Ls＜120nH	100MHZ	Ls≤39N	0 nH	E4892A+16197A
			39N＜Ls≤68N	-1 nH	E4892A+16197A
			75N＜Ls＜R12	-2 nH	E4892A+16197A
	Ls＜120nH	50MHZ	Ls=R12	-2 nH	E4892A+16197A
			R15≤Ls≤R18	-4 nH	E4892A+16197A
			Ls=R22	-5 nH	E4892A+16197A
			Ls=R27	-8 nH	E4892A+16197A
			Ls=R33	-9 nH	E4892A+16197A
			Ls=R39	-11 nH	E4892A+16197A
			Ls=R47	-13 nH	E4892A+16197A

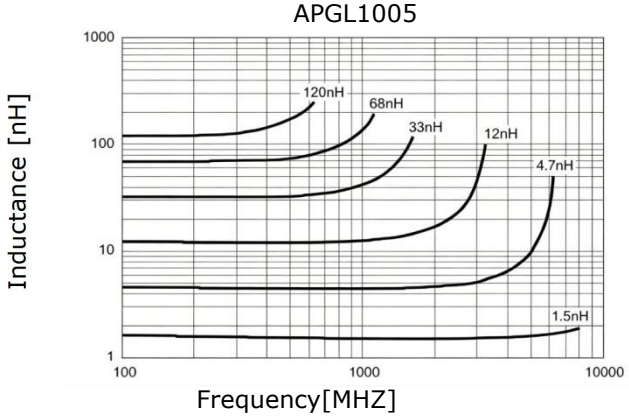
Explain：Test values=Nominal inductance-Compensation value
For example :APGL0603-1N0SQTD9,The nominal inductance of its inductance is 1.0nH,the compensation value is 0.48nH,and the actual test center value is 0.52nH.
0.52nH（Test values）=1.0nH（Nominal inductance）-0.48nH（Compensation value）.

INDUCTANCE VS. FREQUENCY CHARACTERISTICS 感量-频率特性

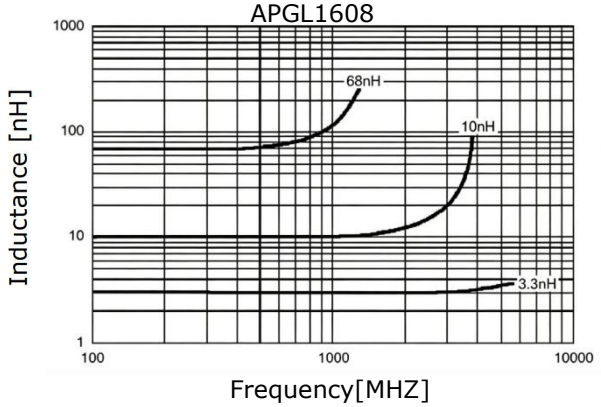
APGL0603



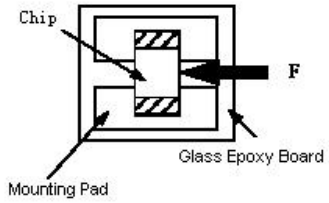
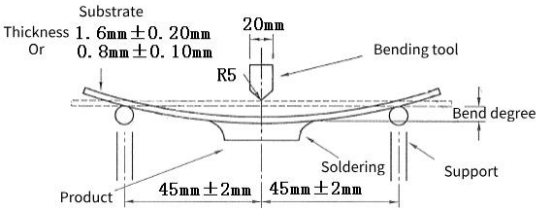
APGL1005



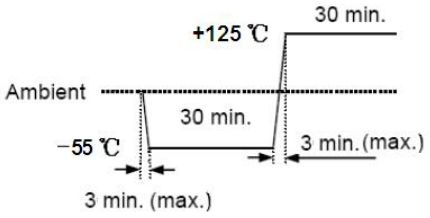
APGL1608



RELIABILITY TEST 可靠性测试

Items	Requirements	Test Methods and Remarks
1. Solder ability	No mechanical damage 95%（75% for 0402/0603 series） or more of electrode area shall be coated by new solder.	Preheating temperature:120℃ to 150℃ Preheating time: 60s Solder 96.5%Sn/3.0%Ag/0.5%Cu of the Sn solder. Solder temperature: 245±3℃ Immersion tin depth:10mm Duration：3±0.3s Dip performance to a flux of about:3 ~ 5 s
2. Resistance to Soldering Heat	No mechanical damage. Inductance： H/HQ：change within ± 10% Q value change(ceramic): within ± 20%	Preheating temperature: 120℃ to 150℃ Preheating time: 60s Solder 96.5%Sn/3.0%Ag/0.5%Cu of the Sn solder. Solder temperature: 260℃±5℃ Immersion tin depth:10mm Duration：10±1s Dip performance to a flux of about:3～5 s
3. Adhesion of electrode	The termination and body should be no damage.	Applied force: 2N force for APGL0603 series：5N force for APGL1005 series.：7N force for APGL1608：10N force for APGL2012. Keep time：10±1S 
4. Low temperature resistance	No mechanical damage. Inductance change: within ± 10% Q value change(ceramic): within ± 20%	Temperature:-55±2℃ Testing time: 1000 h （+24h）
5. Bending strength	No mechanical damage	Testing board: glass epoxy-resin substrate For（1±0.5） mm/s compression speed, curvature: 2mm, hold time20s±1s . 
6. Vibration	Inductance change: within ±10% Q value change(ceramic): within ±20%	Amplitude modulation: 1.5mm Test time: A period of 2h in each of 3 mutually perpendicular directions. Frequency range: 10Hz to 55Hz to 10Hz for 1min.
7. High temperature resistance	No mechanical damage. Inductance change: within ±10% Q value change(ceramic): within ±20%	Testing time: 1000 h （+24h） Temperature: 125±2℃

RELIABILITY TEST 可靠性测试

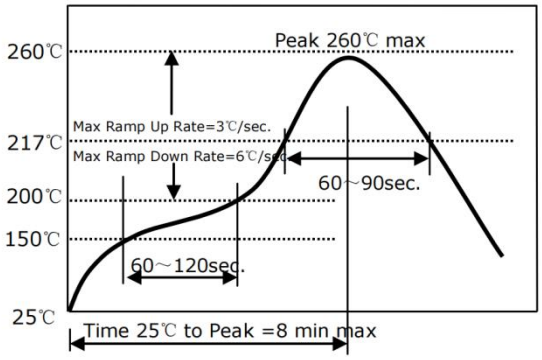
Items	Requirements	Test Methods and Remarks
8. Static Humidity	No mechanical damage. Inductance change: within ±10% Q value change(ceramic): within ±20%	Humidity: 90% to 95% RH Temperature: 60℃±2℃ Testing time:1000 h （+24h）
9. High temperature load	Inductance change: within ±10% Q value change(ceramic): within ±20%	impose current: Rated current. Testing time: 1000 h （+24h） Temperature: 125±2℃
10. Temperature Shock	No mechanical damage. Inductance change: within ±10% Q value change(ceramic): within ±20%	Temperature: -55℃ for 30±3min +125℃ for 30±3min Number of cycles: 100 
Note: When there are questions concerning, measurement shall be made after 24±2hrs of recovery under the standard condition.		

Recommended Soldering Technologies 回流焊建议

Reflowing Profile

- Preheat condition: 150~200℃/60~120sec.
- Allowed time above 217℃: 60~90sec.
- Max temp: 260℃
- Max time at max temp: 10sec.
- Solder paste: Sn/3.0Ag/0.5Cu
- Allowed Reflow time: 2x max

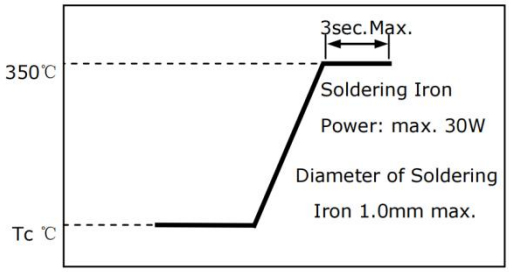
Note: The reflow profile in the above table is only for qualification and is not meant to specify board assembly profiles. Actual board assembly profiles must be based on the customer's specific board design, solder paste and process, and should not exceed the parameters as the Reflow profile shows.



Iron Soldering Profile

- Iron soldering power: Max.30W
- Pre-heating: 150 ℃ / 60sec.
- Soldering Tip temperature: 350℃Max.
- Soldering time: 3sec Max.
- Solder paste: Sn/3.0Ag/0.5Cu
- Max.1 times for iron soldering

Note: Take care not to apply the tip of the soldering iron to the terminal electrodes.



Safety Reminders 注意事项

SAFETY REMINDERS

- The storage period is within 12 months. Be sure to follow the storage conditions (temperature: 15 to 35℃, humidity: 75% RH or less).If the storage period elapses, the soldering of the terminal electrodes may deteriorate.
- Do not use or store in locations where there are conditions such as gas corrosion (salt, acid, alkali, etc.).
- Soldering corrections after mounting should be within the range of the conditions determined in the specifications. If overheated, a short circuit, performance deterioration, or lifespan shortening may occur.
- When embedding a printed circuit board where a chip is mounted to a set, be sure that residual stress is not given to the chip due to the overall distortion of the printed circuit board and partial distortion such as at screw tightening portions.
- Self heating (temperature increase) occurs when the power is turned ON, so the tolerance should be sufficient for the set thermal design.
- This product is not designed for production processes involving ultrasonic welding, as high-frequency vibration may cause application issues such as product detachment and breakage.
- Carefully layout the coil for the circuit board design of the non-magnetic shield type. A malfunction may occur due to magnetic interference.
- Use a wrist band to discharge static electricity in your body through the grounding wire.
- Do not expose the products to magnets or magnetic fields.
- Do not use for a purpose outside of the contents regulated in the delivery specifications.
- The products listed on this catalog are intended for use in general electronic equipment, under a normal operation and use condition.

All products listed in this specification are developed, designed and intended for use in general electronics equipment. The products are not designed or Warranted to meet the requirements of the applications listed below, whose performance and/or quality require especially high reliability, or whose failure, malfunction or trouble might directly cause damage to society, person, or property. Please understand that we are not responsible for any damage or liability caused by use of the products in any of the applications below. Please contact us for more details if you intend to use our products in the following applications.

(1) Aerospace/aviation equipment
(2) Transportation equipment (cars, electric trains, ships, etc.)
(3) Medical equipment
(4) Power-generation control equipment
(5) Atomic energy-related equipment
(6) Seabed equipment
(7) Transportation control equipment
(8) Public information-processing equipment
(9) Military equipment
(10) Electric heating apparatus, burning equipment
(11) Disaster prevention/crime prevention equipment
(12) Safety equipment
(13) Other applications that are not considered general-purpose applications

When designing your equipment even for general-purpose applications, you are kindly requested to take into consideration securing protection circuit/device or providing backup circuits in your equipment.