Hongda Capacitors
Email: sales@hongdacap.com.hk Web: www.hongdacap.com.hk
Skype: Hongdacapacitors Tel: +86 (0)769 82207248

1 Scope

This specification applies to the HDCI series of multilayer chip ceramic inductors.

2 Product Identification

HDCI	0603	T	12N	J	T	- LF
①	②	③	④	⑤	⑥	⑦

① Product Symbol

② Dimensions

③ Material Code

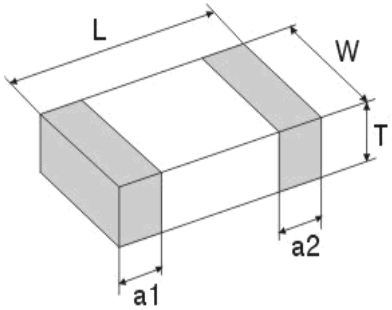
④ Inductance Value(12N: 12nH)

⑤ Inductance Tolerance(B:±0.1nH;C:±0.2nH;S:±0.3nH;D:±0.5nH;G:±2%; H:±3%;J:±5%;K:±10%;)

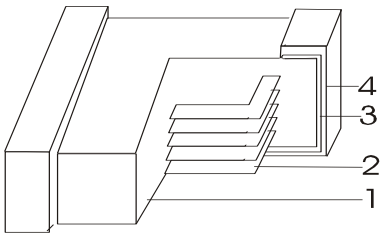
⑥ Packaging Style (B: Bulk; T: Tape & Reel)

⑦ Lead Free

3 Appearance, Dimensions and Material



Type	Dimensions (mm) [inch]			
	L	W	T	a1, a2
0603 [0201]	0.60±0.05 [0.024±0.002]	0.30±0.05 [0.012±0.002]	0.30±0.05 [0.012±0.002]	0.15±0.05 [0.006±0.002]



	Composition	Material	Supplier
1	Base Material	Ceramic Material	Japan
2	Internal Conductor	Ag	Japan
3	Terminal Electrode	Ag	Japan
4	Terminal Electrode	Ni-Sn	USA

4 Testing Conditions

<Unless otherwise specified>

Temperature : Ordinary Temperature (5 to 35℃)
Humidity : Ordinary Humidity (25 to 85% RH)

Atmospheric Pressure : 86 to 106 kPa

<In case of doubt>

Temperature : 20±2℃

Humidity : 60 to 75% RH

Atmospheric Pressure : 86 to 106 kPa

5 Rating

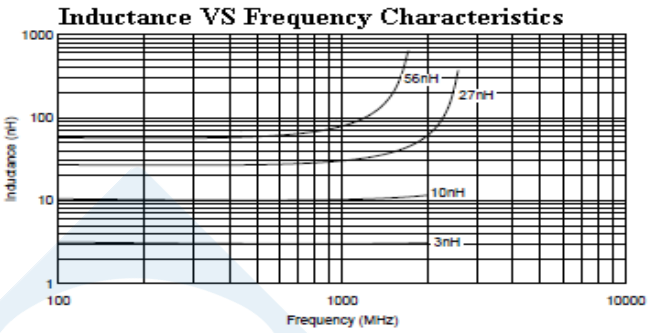
Operating Temperature Range : -55 to +125℃

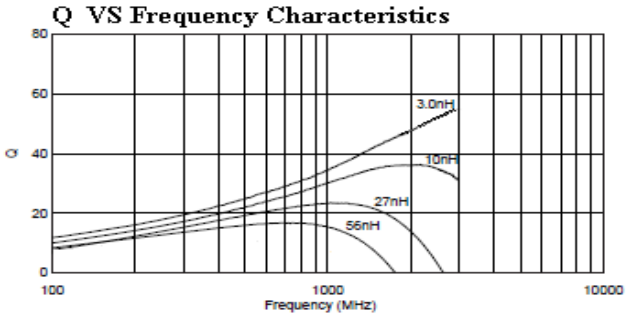
Storage Temperature Range : -55 to +125℃

CUST Part No.	HD Part No	L (nH)	Q min	L,Q Test Freq. (MHz)	Q 500 MHz Typ	Q 800 MHz Typ	Q 1800 MHz Typ	Q 2000 MHz Typ	Q 2400 MHz Typ	SRF(min) MHz	Rdc(MAX) (Ω)	Ir(mA) (max)
	HDCI0603 T0N6□T-LF	0.6	13	500	>24	>32	>54	>57	>65	10000	0.06	600
	HDCI0603T0N9 □T-LF	0.9	13	500	24	32	54	57	65	10000	0.07	550
	HDCI0603T1N0 □T-LF	1.0	13	500	24	32	54	57	65	10000	0.08	520
	HDCI0603 T1N2□T-LF	1.2	13	500	19	25	43	44	52	10000	0.12	420
	HDCI0603 T1N5□T-LF	1.5	13	500	19	24	39	41	46	10000	0.13	420
	HDCI0603T 1N8□T-LF	1.8	13	500	19	24	39	41	46	10000	0.15	380
	HDCI0603T2N0 □T-LF	2.0	13	500	17	24	38	39	44	10000	0.23	300
	HDCI0603T2N2 □T-LF	2.2	13	500	17	24	38	40	43	10000	0.25	290
	HDCI0603T2 N4□T-LF	2.4	13	500	17	23	36	38	42	10000	0.22	310
	HDCI0603T2 N7□T-LF	2.7	13	500	17	22	34	35	39	9200	0.22	310
	HDCI0603T3 N0□T-LF	3.0	13	500	17	22	34	35	39	8600	0.26	280
	HDCI0603T3 N3□T-LF	3.3	13	500	18	23	34	36	40	8100	0.30	270
	HDCI0603T3 N6□T-LF	3.6	13	500	16	23	33	35	39	7700	0.38	240
	HDCI060 3T3N9□T-LF	3.9	13	500	16	22	33	35	38	7400	0.42	230
	HDCI0603T4N3 □T-LF	4.3	13	500	16	21	32	34	37	6800	0.44	220
	HDCI0603T4N7 □T-LF	4.7	13	500	16	22	33	35	38	6200	0.45	220
	HDCI0603T5N1 □T-LF	5.1	13	500	17	22	34	36	38	5900	0.46	210
	HDCI0603T5N6 □T-LF	5.6	13	500	16	21	33	34	37	5500	0.46	210
	HDCI0603T6N2 □T-LF	6.2	13	500	18	23	34	35	37	5100	0.48	210
	HDCI0603T6N8 □T-LF	6.8	13	500	17	22	32	33	35	4900	0.50	200
	HDCI06 03T7N5□T-LF	7.5	13	500	16	21	31	33	34	4700	0.50	200
	HDCI06 03T8N2□T-LF	8.2	13	500	16	21	31	32	34	4300	0.56	190
	HDCI0603T9N1 □T-LF	9.1	13	500	16	20	30	31	32	4100	0.72	170
	HDCI0603T 10N□T-LF	10	13	500	16	20	28	29	31	3800	0.80	160
	HDCI0603T12N □T-LF	12	13	500	16	20	27	28	28	3400	0.80	160
	HDCI0603T15N □T-LF	15	13	500	15	19	24	24	23	2600	0.85	160
	HDCI0603T18N □T-LF	18	13	500	15	19	23	24	22	2300	1.00	140
	HDCI0603T22N □T-LF	22	13	500	15	19	22	23	20	1900	1.30	130
	HDCI0603T27N □T-LF	27	12	500	14	17	15	12	5	1800	1.60	100
	HDCI0603T33N □T-LF	33	12	300	15	17	12	8	–	1700	2.20	100
	HDCI0603T39N □T-LF	39	9	300	14	15	3	–	–	1500	2.50	80
	HDCI0603T47N □T-LF	47	9	300	14	14	1	–	–	1300	2.70	80
	HDCI0603T56N □T-LF	56	9	300	13	13	–	–	–	1200	3.20	60
	HDCI0603T68N □T-LF	68	9	300	13	13	–	–	–	1200	3.20	60
	HDCI0603T82N □T-LF	82	8	300	10	–	–	–	–	1000	4.50	50
	HDCI0603 TR10□T-LF	100	8	300	9	–	–	–	–	900	5.80	40

Note: □: Please specify the inductance tolerance. For L≤6.2nH, choose B=±0.1nH or C=±0.2nH or S=±0.3nH; For L>6.2nH, choose H=±3% or J=±5%.

Typical Electrical Characteristics





6.1 Inductance；Q factor

Inductance；Q factor shall meet item 5 when measured on the condition of Table 1.

Table 1

Measuring Equipment	Impedance analyzer HP4291 or equivalent
Measuring Frequency	(see item 5)
Measuring signal level	50mV

6.2 DC Resistance

D.C Resistance shall meet item 5 when measured on the condition of Table 2.

Table 2

Measuring Equipment	LCR Meter HP4263A or equivalent

6.3 Self Resonant Frequency (S.R.F)

S.R.F. shall meet item 5 when measured on the condition of Table 3.

Table 3

Measuring Equipment	Impedance analyzer HP4291， Network analyzer HP8753 or equivalent

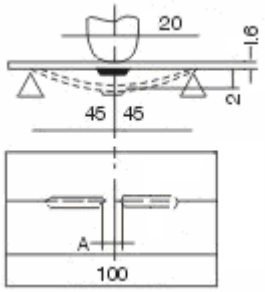
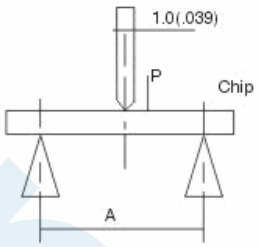
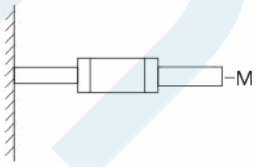
6.4 Rated current

Inductance change shall be within ±5% or temperature rise no more than 20℃ against chip surface temperature when the allowable current (which is mentioned in item 5) is applied.

Table 4

Measuring Equipment	DC Power Supplier, Current Meter, Thermometer

7 Reliable Performance

<table>
<tr><th>NO.</th><th>Item</th><th>Specifications</th><th>Test Methods</th></tr>
<tr><td>1</td><td>Solder-Ability</td><td>More than 90% of termination should be covered with new solder.</td><td>Solder: Sn
Temperature : 255℃+5℃/-0℃
Flux : rosin
Duration : 3.5±0.5s</td></tr>
<tr><td>2</td><td>Leaching Resistance</td><td>More than 75% of termination Should be covered with new solder.</td><td>Solder : Sn
Temperature : 270℃+2℃/-0℃
Flux : rosin
Duration : 10±0.5s</td></tr>
<tr><td>3</td><td>Bending Strength</td><td>No mechanical damage should be noticed</td><td>When the board curve to 2mm(0.079 inches)
<table><tr><td>Size</td><td>A(mm)</td></tr><tr><td>0603</td><td>0.3</td></tr></table> 
</td></tr>
<tr><td>4</td><td>Body Strength</td><td>No mechanical damage should be noticed</td><td>Applied specified pull strength in axial direction
<table><tr><td>Size</td><td>A/mm</td><td>P/N</td></tr><tr><td>0603</td><td>0.3</td><td>4.9</td></tr></table> 
</td></tr>
<tr><td>5</td><td>Terminal Strength</td><td>The terminal and body should be no damage</td><td>Applied specified pull strength in axial
<table><tr><td>Size</td><td>Pull Strength</td><td>Time (s)</td></tr><tr><td>0603</td><td>2 N</td><td>5±1</td></tr></table> 
</td></tr>
</table>

NO.	Item	Specifications	Test Methods
6	Drop	1.No mechanical damage shall be noticed 2. Inductance shall be within : 0.001μH ~ 10μH: ±10% 10μH ~ 220μH: ±20% 3. Q factor shall be within : ±30%	Drop 10 times on a concrete floor from a height of 1m.
7	Vibration		Frequency : 10 to 55Hz Amplitude : 1.52mm Direction and time : X, Y and Z directions for 2 hours each.
8	Humidity resistance		a. Test condition Temp. : 60±2℃ Humidity: 90%~95% Test time : 1000 h b. Measurement method : The component should be stabilized at normal condition for 24 hours before test.
9	High temperature resistance		a. Test condition Applied rated current Temp. : 125±2℃ Test time : 1000 h b. Measurement method : The component should be stabilized at normal condition for 24 hours before test.
10	Low temperature resistance		a. Test condition Temp. : -55±2℃ Test time : 1000 h b. Measurement method : The component should be stabilized at normal condition for 24 hours before test.
11	Thermal shock		a. Test condition 1) Temp. : -55℃, time : 30±3min 2) Temp. : +125℃, time : 30±3min 100 cycles b. Measurement method : The component should be stabilized at normal condition for 24 hours before test.

8 Recommended Soldering Conditions

Product can be applied to flow and reflow soldering.

(1) Flux, Solder

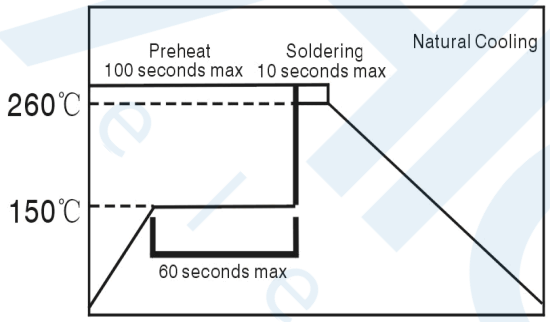
① Use rosin-based flux. Don't use highly acidic flux with halide content exceeding 0.2wt% (chlorine conversionvalue).

② Use Sn solder.

(2) Flow soldering conditions

① Pre-heating should be in such a way that the temperature difference between solder and product surface is limited to 150℃ max. Cooling into solvent after soldering also should be in such a way that temperature difference is limited to 100℃ max. Unwrought pre-heating may cause cracks on the product, resulting in the deterioration of products quality.

② Standard soldering profile.



Pre-heating	150℃,1 minute min
Peak	260℃,10 seconds max

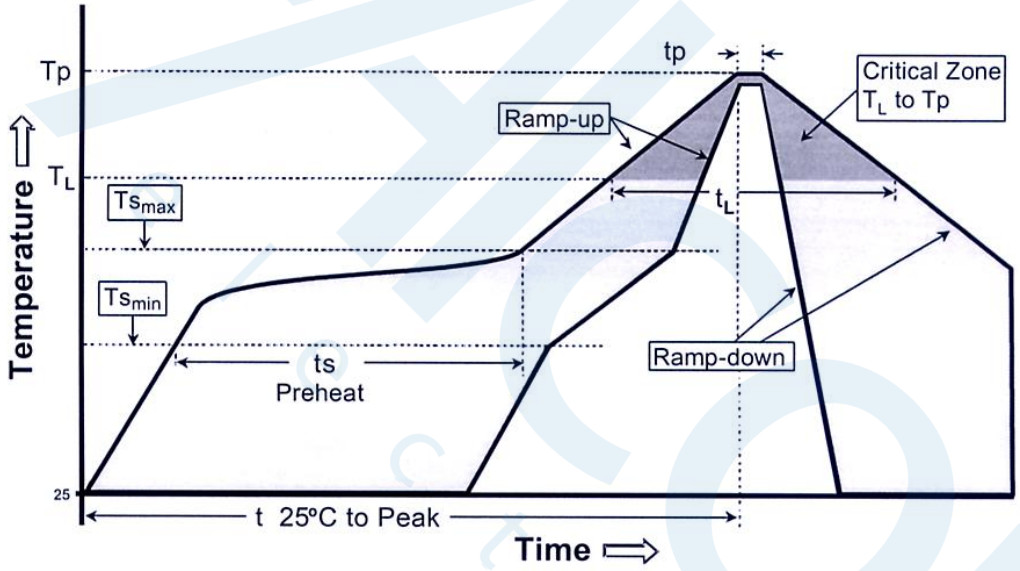
(3) Reflow soldering conditions

Profile Feature	**Lead-Free Assembly**
Average Ramp-Up Rate (Tsmax to Tp)	3℃ C/second max.
Preheat – Temperature Min (Tsmin) – Temperature Max (Tsmax) – Time (tsmin to tsmax) min to tsmax)	 150 ℃ 200 ℃ 60-180 seconds

Profile Feature	Lead-Free Assembly
Time maintained above: – Temperature (TL) – Time (tL)	217 ℃ 60-150 seconds
Peak/Classification Temperature (Tp) Peak/Classification Time (Tp)	260 ℃ 3-4 seconds
Time within 5 ℃ of actual Peak Temperature (tp)	20-40 seconds
Ramp-Down Rate	6℃/second max.
Time 25 ℃ to Peak Temperature	8 minutes max.

Note 1: All temperatures refer to topside of the package, measured on the package body surface.

Standard soldering profile



(4) Reworking with soldering iron

The following conditions must be strictly followed when using a soldering iron.

Pre-heating	150℃, 1 minute
Tip temperature	350℃ max
Soldering iron output	80w max
End of soldering iron	Φ 1mm max
Soldering time	3 seconds max

9 Cleaning Conditions

Products shall be cleaned on the following conditions.

(1) Cleaning temperature shall be limited to 60℃ max.(40℃ max for fluoride and alcohol type cleaner.)

(2) Ultrasonic cleaning shall comply with the following conditions with avoiding the resonance phenomenon at the mounted products and P.C.B.

Power : 20W/t max

Frequency: 40 kHz

Time : 5 minutes max

(3) Cleaner

a) Alternative cleaner

Isopropyl alcohol (IPA) HCFC-225

b) Aqueous agent

Surface Active Agent Type (CLEANTHROUGH 750H)

Hydrocarbon Type (TECHNOCLEANER 335)

Higher Alcohol Type (PINE ALPHA ST-100S)

Alkali Saponification Type (*AQUACLEANER 240)

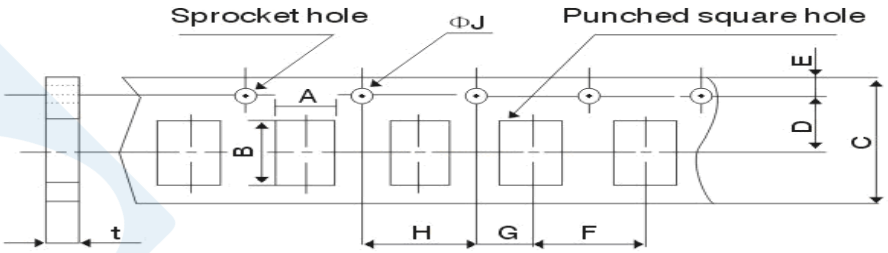
(4) Thee shall be no residual flux and residual cleaner after cleaning. In the case of using aqueous agent, products shall be dried completely after rinse with de-ionized water in order to remove the cleaner.

(5) Other cleaning Please contact us.

10 Packaging

(1) Dimensions of Tape:

Paper / Embossed carrier tape:

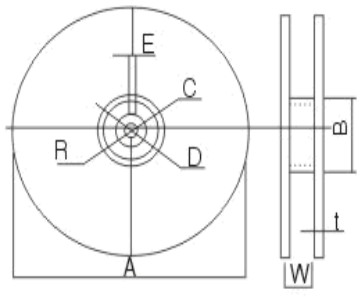


Unit: mm

Type	3216		2012		1608	1005	0603
T*	1.1±0.3		0.85±0.2	1.25±0.2	0.8±0.15	0.5±0.15	0.3±0.05
	Paper carrier tape	Embossed carrier tape	Paper carrier tape	Embossed carrier tape	Paper carrier tape	Paper carrier tape	Paper carrier tape
A	2.0±0.2	2.0±0.2	1.5±0.15	1.5±0.15	1.05±0.15	0.65±0.10	0.4±0.05
B	3.6±0.2	3.6±0.2	2.5±0.2	2.5±0.2	1.9±0.15	1.15±0.10	0.7±0.05
C	8.0±0.3	8.0±0.3	8.0±0.3	8.0±0.3	8.0±0.3	8.0±0.3	8.0±0.3
D	3.5±0.05	3.5±0.05	3.5±0.05	3.5±0.05	3.5±0.05	3.5±0.05	3.5±0.05
E	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1
F	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1	2.0±0.05	2.0±0.05
G	2.0±0.05	2.0±0.05	2.0±0.05	2.0±0.05	2.0±0.05	2.0±0.05	2.0±0.05
H	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1
ΦJ	1.5+0.1/-0	1.5+0.1/-0	1.5+0.1/-0	1.5+0.1/-0	1.5+0.1/-0	1.5+0.1/-0	1.5+0.1/-0
t(max)	1.1±0.05	2.0±0.05	1.1±0.05	1.0±0.05	1.0±0.05	0.8±0.05	0.55±0.05

T*：Product thickness

(2) Dimensions of Reel



Reel material: PS (Polystyrene)

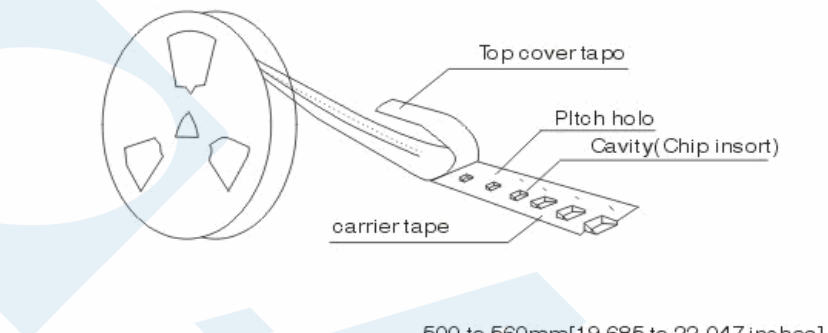
Unit: mm

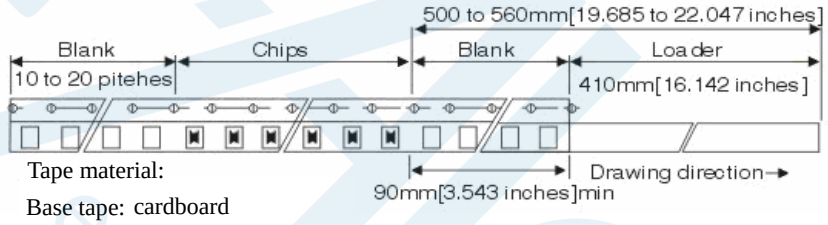
A	178±2
B	60±2
C	13.0±0.5
D	21.0±0.8
E	2.0±0.5
W	10.0±1.15
t	1.2±0.2
R	1.0±0.25

(3) Pulling strength of tapes

Carrier tape	10N or more (1kgf or more)
Cover tape	5N or more (0.5kgf or more)

(4) Taping figure and drawing direction





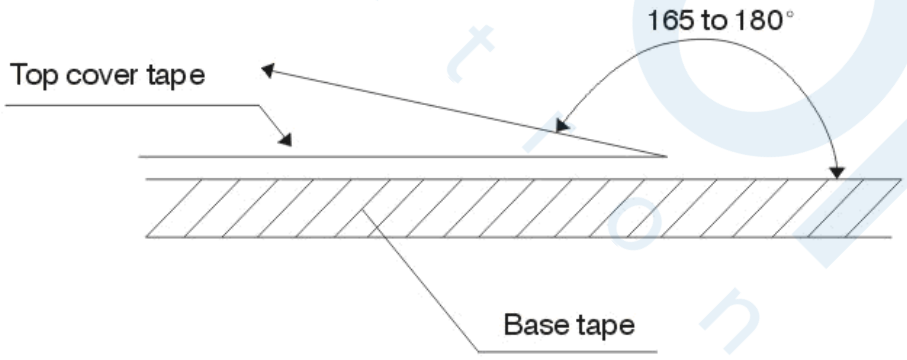
Tape material:

Base tape: cardboard

Cover tape: polyethylene

(5) Peeling strength of cover tape

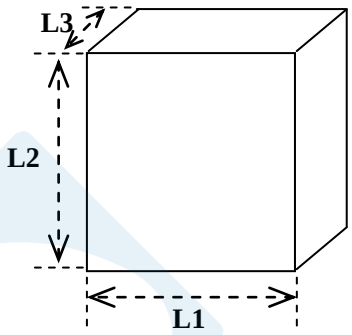
Cover tape	0.3~0.7N (30gf~70gf)



Test condition:

1) peel angle: 165°~180° vs. carrier tape.
2) peel speed: 300 mm/min±10%.

⑹ Box and case dimensions



Unit: mm

Type	L1	L2	L3
Box	180±2	180±2	75±1
Box	180±2	180±2	120±2
Case	400±2	400±2	200±2

A 6 reels in a box.

B 10 boxes in a case.

⑺ Packaging quantities

Type	Thickness(mm)	Bulk	Tape and reel
3216	1.10±0.30	----	3000pcs
2012	1.25±0.20	----	3000pcs
	0.85±0.20	----	4000pcs
1608	0.8±0.15	----	4000pcs
1005	0.5±0.15	----	10000pcs
0603	0.3±0.05	----	15000pcs

11 Storage

Storage period

⑵Products which inspected in over 6 months ago should be examined and used, which can be confirmed with inspection No. marked on the container. Solder ability should be checked if this period is exceeded.

Storage conditions

① Products should be storage in the warehouse on the following conditions

Temperature: ≦40℃

Humidity : ≦70% relative humidity

② No rapid change on temperature and humidity

Don’t keep products in corrosive gases such as sulfur, chlorine gas or acid, or it may cause oxidization of electrode, resulting in poor solder ability.

③ Products should be storage on the palette for the prevention of the influence from humidity, dust and so on.

④ Products should be storage in the warehouse without heat shock, vibration, direct sunlight and so on.

⑤ Products should be storage under the airtight packaged condition.

12 Usage of Nonflammable Material

For these materials listed below, we don't use in process.

Cd, Hg, As and its compound, PCB, etc.

PBBS, PBBOs, PBDO, PBDE, PBB.

13 Usage of ODS

For ODS listed below, we don't use in process.

ODS: CCL_4, HCFC, etc. ODS。

14 Flammability Class

UL 94V-1

15 Note

① This product specification guarantees the quality of our product as a single unit. Please make sure that your product is evaluated and confirmed against your specificat ions when our product is mounted to your product.

② We cannot warrant against failure caused by any use of our product that deviates from the intended use as described in this product specification.

③ Please return our copy of this product specification in two month after issued date with your signature of receipt. If the copy is not returned by the date, this product specification will be deemed to have been received.