1 Scope

This specification applies to the HDF L series of multilayer chip ferrite Large Current inductors.

2 Product Identification

HDF L	1608	F	1R0	M	T	-	LF
①	②	③	④	⑤	⑥		⑦

① Product Symbol

② Dimensions

③ Material Code

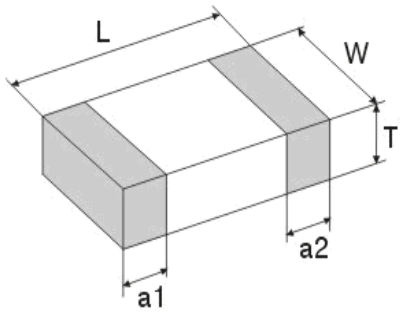
④ Inductance Value (1R0: 1.0μH)

⑤ Inductance Tolerance (K:±10%; M:±20%; N:±30%)

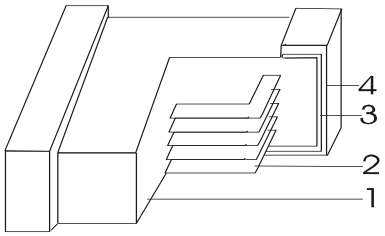
⑥ Packaging Style (B:; Bulk; T: Tape & Reel)

⑦ Lead Free

3 Appearance, Dimensions and Material



Type	Dimensions (mm) [inch]			
	L	W	T	a1, a2
1608	1.60±0.15 [0.063±0.006]	0.80±0.15 [0.031±0.006]	0.80±0.15 [0.031±0.006]	0.30±0.20 [0.012±0.008]
2012	2.00±0.20 [0.079±0.008]	1.25±0.20 [0.049±0.008]	0.85±0.10 [0.045±0.004]	0.50±0.30 [0.02±0.012]
2016	2.00±0.20 [0.079±0.008]	1.60±0.20 [0.063±0.008]	0.80±0.20 [0.031±0.008]	0.50±0.30 [0.020±0.012]
2520	2.50±0.20 [0.098±0.008]	2.00±0.20 [0.079±0.008]	0.85±0.15 [0.033±0.006]	0.50±0.30 [0.020±0.012]
3216	3.20±0.20 [0.126±0.008]	1.60±0.20 [0.063±0.008]	1.10±0.30 [0.043±0.012]	0.50±0.30 [0.020±0.012]



	Composition	Material	Supplier
1	Base Material	Ferrite (Ni-Cu-Zn series)	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)

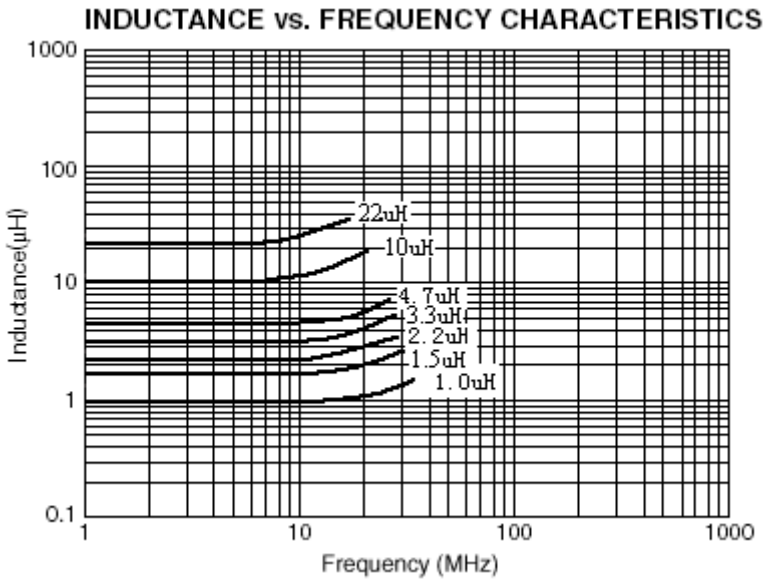
<In case of doubt>
Temperature : 20±2℃
Humidity : 60 to 75% RH
Atmospheric Pressure : 86 to 106 kPa

5 Rating

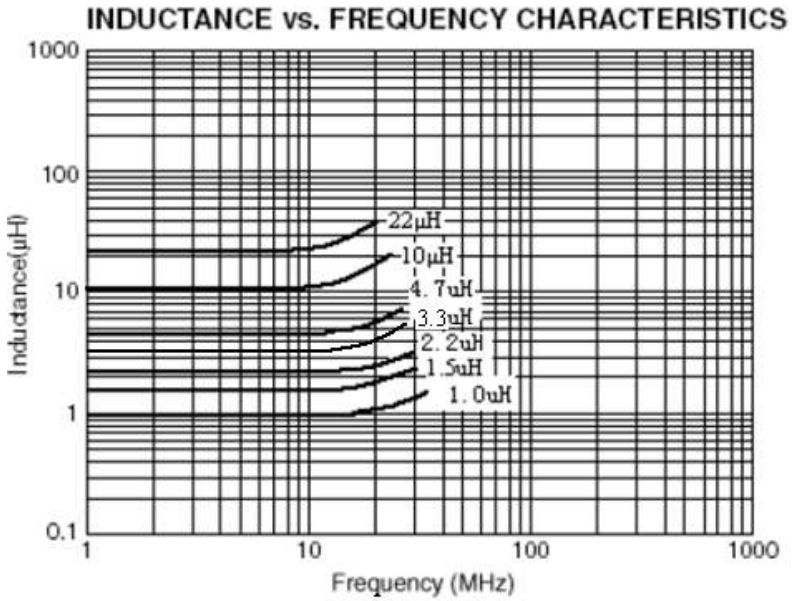
Operating Temperature Range : -55 to +125℃

Storage Temperature Range : -55 to +125℃

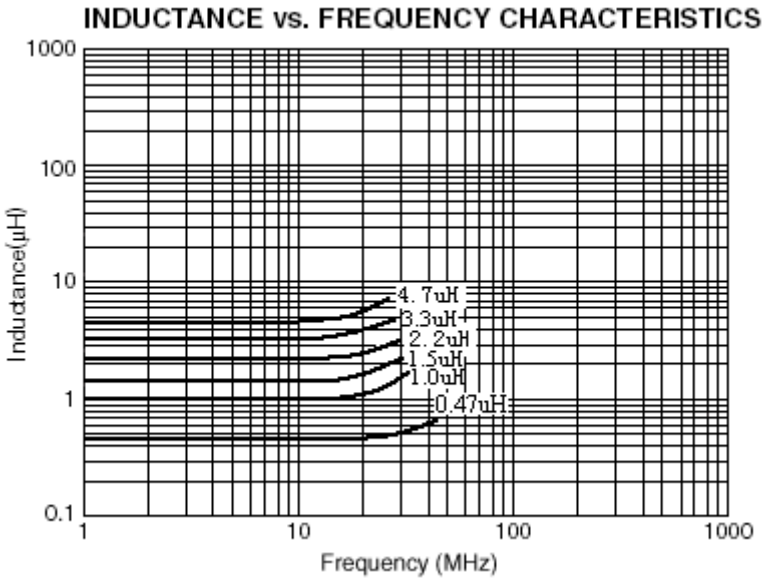
HONGDA Part No.	Inductance (µH)	L Test Freq. (MHz)	SRF (MHz) min	RDC (Ω) ± 30%	IR* (mA) max
HDFL1608F1R0 MT-LF	1.0±20%	1	125	0.18	1000
HDFL1608F1R5MT-LF	1.5±20%	1	109	0.22	800
HDFL1608F2R2MT-LF	2.2±20%	1	90	0.30	700
HDFL1608F3 R3MT-LF	3.3±20%	1	70	0.40	600
HDFL1608F4R7MT-LF	4.7±20%	1	50	0.50	500
HDFL1608F100MT-LF	10±20%	1	33	0.80	400
HDFL1608F150MT-LF	15±20%	1	20	0.90	220
HDFL1608F220MT-LF	22±20%	1	15	1.00	200



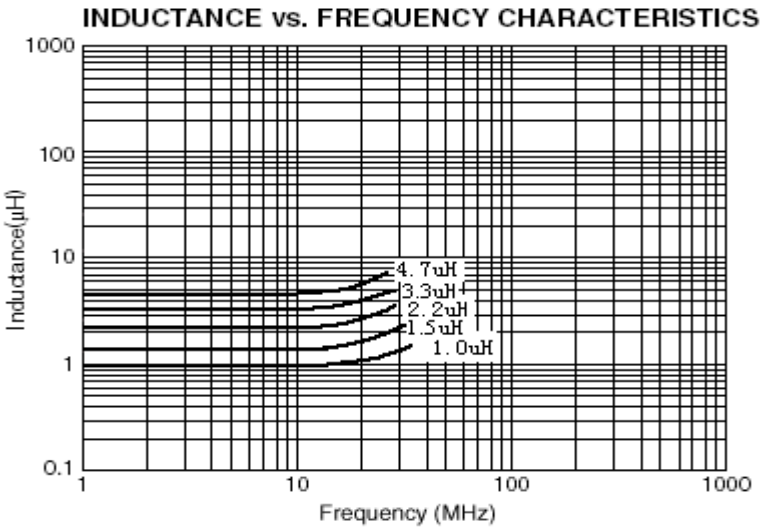
HONGDA Part No.	Inductance (μH)	L Test Freq. (MHz)	SRF (MHz) min	RDC (Ω) ± 30%	IR* (mA) max	Thickness (mm)
HDFL2012F1R0MT-LF	1.0±20%	1	75	0.15	1400	0.85±0.10
HDFL2012F1R5MT-LF	1.5±20%	1	60	0.16	1300	0.85±0.10
HDFL2012F2R2MT-LF	2.2±20%	1	50	0.20	1200	0.85±0.10
HDFL2012F 3R3MT-LF	3.3±20%	1	41	0.22	1100	0.85±0.10
HDFL2012F4R7MT-LF	4.7±20%	1	35	0.25	1000	0.85±0.10
HDFL2012F6R8MT-LF	6.8±20%	1	29	0.35	550	0.85±0.10
HDFL2012F100MT-LF	10±20%	1	24	0.50	500	1.15±0.10
HDFL2012F220MT-LF	22±20%	1	18	0.70	300	1.15±0.10



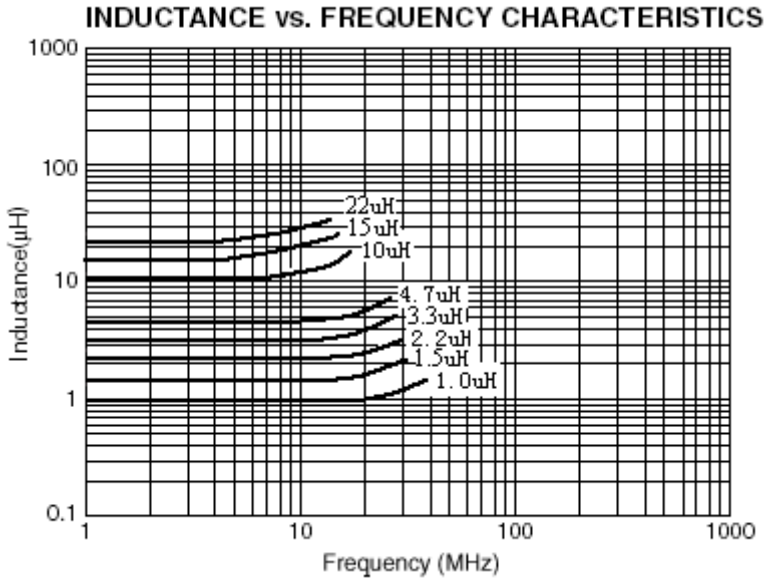
HONGDA Part No.	Inductance (µH)	L Test Freq. (MHz)	SRF (MHz) min	RDC (Ω) ±30%	IR* (mA) max
HDFL2016FR47MT-LF	0.47±20%	1	100	0.10	1600
HDFL2016F1R0MT-LF	1.0±20%	1	60	0.11	1400
HDFL2016F1R5MT-LF	1.5±20%	1	50	0.15	1200
HDFL2016F2R2MT-LF	2.2±20%	1	40	0.15	1200
HDFL2016F3R3MT-LF	3.3±20%	1	30	0.20	1200
HDFL2016F4R7MT-LF	4.7±20%	1	20	0.25	1100



HONGDA Part No.	Inductance (μH)	L Test Freq. (MHz)	SRF (MHz) min	RDC (Ω) ±30%	IR* (mA) max
HDFL2520F1R0MT-LF	1.0±20%	1	60	0.10	1600
HDFL2520F1R5MT-LF	1.5±20%	1	50	0.11	1500
HDFL2520F2R2MT-LF	2.2±20%	1	40	0.12	1500
HDFL2520F3R3MT-LF	3.3±20%	1	30	0.15	1300
HDFL2520F4R7MT-LF	4.7±20%	1	20	0.25	1300



HONGDA Part No.	Inductance (µH)	L Test Freq. (MHz)	SRF (MHz) min	RDC (Ω) ±30%	IR* (mA) max
HDFL3216F1R0MT-LF	1.0±20%	1	90	0.10	1600
HDFL3216F1R5MT-LF	1.5±20%	1	75	0.12	1500
HDFL3216F1R8MT-LF	1.8±20%	1	66	0.14	1400
HDFL3216F2R2MT-LF	2.2±20%	1	58	0.15	1300
HDFL3216F3R3MT-LF	3.3±20%	1	49	0.20	1200
HDFL3216F3R9MT-LF	3.9±20%	1	48	0.30	1100
HDFL3216F4R7MT-LF	4.7±20%	1	41	0.32	980
HDFL3216F100MT-LF	10±20%	1	28	0.50	670
HDFL3216F150MT-LF	15±20%	1	23	0.55	600
HDFL3216F220MT-LF	22±20%	1	19	0.60	500



6 Electrical Performance

6.1 Inductance ;

Inductance; 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 Rated current

Rated current based on increasing product temperature: Current when temperature of the product reaches +40°C

Table 4

Measuring Equipment	Impedance analyzer HP4291 or equivalent DC power HP6632 and Adapter HP16200

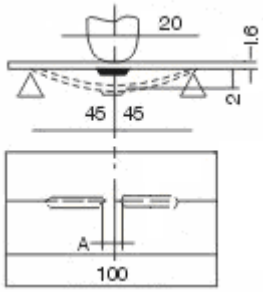
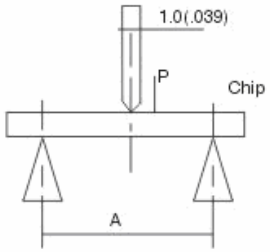
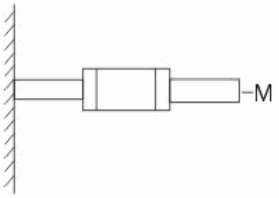
6.4 Variance after Soldering

Inductance change shall be within 0.001μH ~ 10μH: ±10%;10μH ~ 220μH: ±20% and when the inductor is dipped into solder for 3.5 seconds which is 255ºC.

Table 5

Measuring Equipment	Impedance analyzer HP4291 or equivalent Solder furnace

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 inch)
<table><tr><td>Size</td><td>A(mm)</td></tr><tr><td>1608</td><td>0.7</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>1608</td><td>1.0</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>1608</td><td>5 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%	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

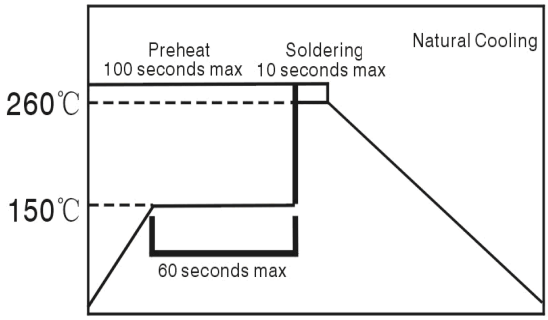
Use rosin-based flux. Don't use highly acidic flux with halide content exceeding 0.2wt% (chlorine conversion value).

② Use Sn solder.

(2) Flow soldering conditions

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.



预热 Pre-heating	150℃,1 minute min
最高温度 Peak	260℃,10 seconds max

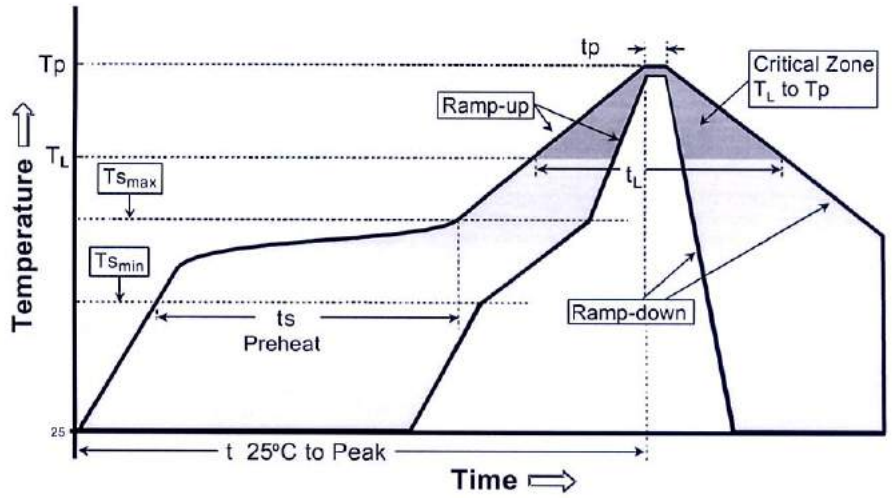
(3) Reflow soldering conditions

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 °C of actual Peak Temperature (tp)	20-40 seconds
Ramp-Down Rate	6°C/second max.
Time 25 °C 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 temper ature	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.

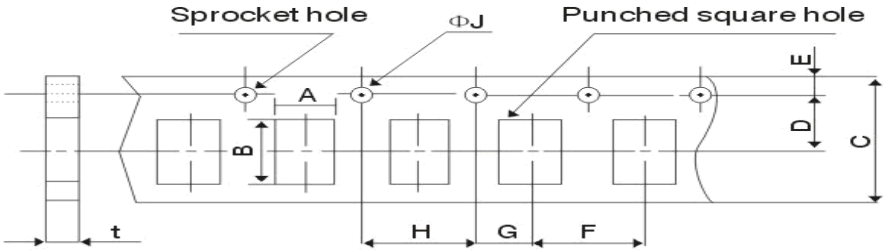
(5) Other cleaning

Please contact us.

10 Packaging

(1) Dimensions of Tape:

Paper / Embossed carrier tape:



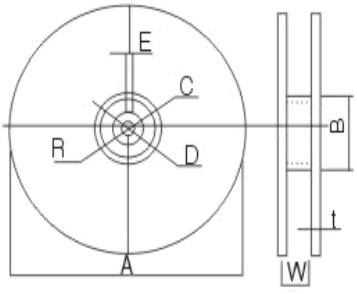
Unit: mm

Type	1608
T*	0.8±0.15
	Paper carrier tape
A	1.05±0.15
B	1.9±0.15
C	8.0±0.3
D	3.5±0.05
E	1.75±0.1
F	4.0±0.1
G	2.0±0.05
H	4.0±0.1
ΦJ	1.5+0.1/-0
t(max)	1.0±0.05

T*：Product thickness

(2) Dimensions of Reel

Unit: mm



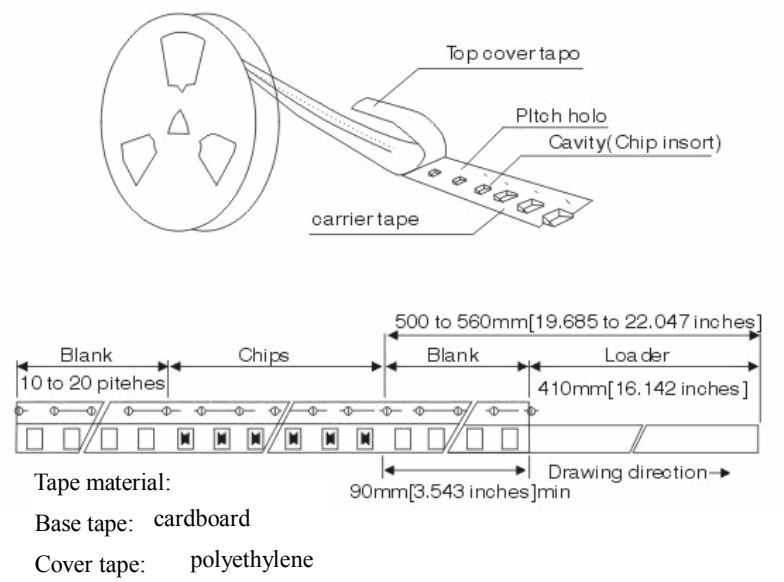
Reel material: PS (Polystyrene)

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



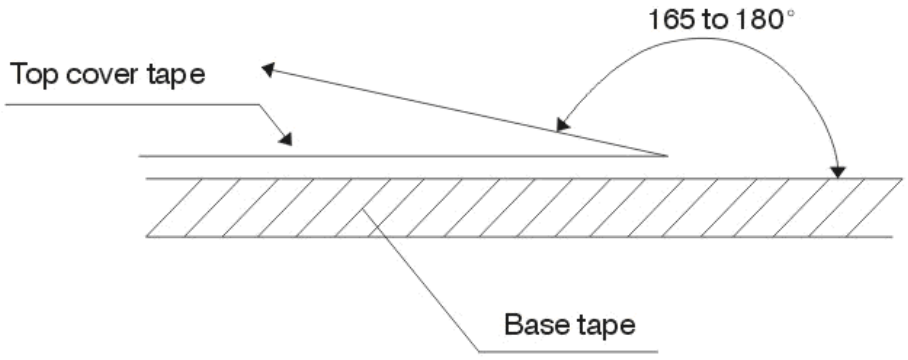
Tape material:

Base tape: cardboard

Cover tape: polyethylene

(5) Peeling strength of cover tape

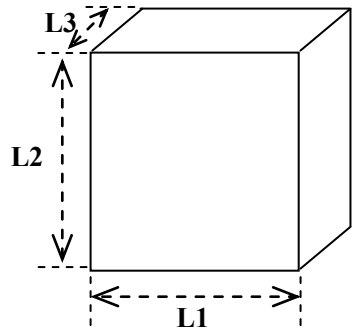
Cover tape	0.3~0.7N (30gf~70gf)



Test condition:

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

(6) 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.

(7) Packaging quantities

Type	Thickness(mm)	Bulk	Tape and reel
1608	0.8±0.15	----	4000pcs

12 Storage

(1) Storage period

Products which inspected in HONGDAover 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.

(2) Storage conditions

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

Temperature: ≦40℃

Humidity : ≦70% relative humidity

No rapid change on temperature and humidity

② 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.

13 Usage of Nonflammable Material

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

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

PBBS, PBBOs, PBDO, PBDE, PBB.

14 ODS Usage of ODS

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

HCFC ODS: CCL_4, HCFC, etc. ODS。

15 Flammability Class

UL 94V-1

16 Note

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 specifications when our product is mounted to your product.

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

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.