HITANO ENTERPRISE CORP.

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Data Sheet

Customer：

Product : Automotive Multilayer Chip Inductors

Size: 0603、1005、1608、201209、201212

Issued Date:

Edition :

Record of change

Date	Ver.	Description	Page

VENDOR：

☐ **HITANO ENTERPRISE CORP.**

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MAKER：

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1. SCOPE

◆ HALVS series multilayer chip inductor for automotive application. Size 0603、1005、1608、201209、201212。

◆ AEC-Q200 certified.

2. STANDARD ATMOSPHERIC CONDITIONS

Unless otherwise specified the standard range of atmospheric conditions for making measurements and tests is as follows:

- Ambient temperature : 20±15℃
- Relative humidity : 30~70%

If there may be any doubt on the results, measurements shall be made within the following limits :

- Ambient temperature : 25±5℃
- Relative humidity : 30~70%

3. RATINGS

SIZE 0603 TYPE：HAHVS

PART NO.	AT100 MHz 250mV			SELF-RESONANT FREQUENCY	DC RESISTANCE	Rated Current
	INDUCTANCE (nH)	TOLERANCE	Q Min	(GHz) Min	(Ω) Max	(mA) Max
HAHVS0603-1N0_M	1	±0.1~0.3nH	4	10	0.11	470
HAHVS0603-1N2_M	1.2	±0.1~0.3nH	4	10	0.12	450
HAHVS0603-1N5_M	1.5	±0.1~0.3nH	4	10	0.13	430
HAHVS0603-1N8_M	1.8	±0.1~0.3nH	4	10	0.16	390
HAHVS0603-2N2_M	2.2	±0.1~0.3nH	4	8.8	0.19	360
HAHVS0603-2N7_M	2.7	±0.1~0.3nH	4	7.7	0.21	340
HAHVS0603-3N0_M	3	±0.1~0.3nH	4	7.2	0.22	330
HAHVS0603-3N3_M	3.3	±0.1~0.3nH	4	6.7	0.23	320
HAHVS0603-3N6_M	3.6	±0.1~0.3nH	4	6.4	0.25	310
HAHVS0603-3N9_M	3.9	±0.1~0.3nH	4	6	0.27	300
HAHVS0603-4N3_M	4.3	±0.1~0.3nH	4	5.7	0.3	280
HAHVS0603-4N7_M	4.7	±0.1~0.3nH	4	5.3	0.3	280
HAHVS0603-5N1_M	5.1	±0.1~0.3nH	4	5	0.33	270
HAHVS0603-5N6_M	5.6	±0.1~0.3nH	4	4.6	0.36	260
HAHVS0603-6N2_M	6.2	±0.1~0.3nH	4	4.2	0.38	250
HAHVS0603-6N8_M	6.8	±3%,±5%	4	3.9	0.39	250
HAHVS0603-7N5_M	7.5	±3%,±5%	4	3.6	0.41	240
HAHVS0603-8N2_M	8.2	±3%,±5%	4	3.4	0.45	230
HAHVS0603-9N1_M	9.1	±3%,±5%	4	3.2	0.48	220
HAHVS0603-10N_M	10	±3%,±5%	4	2.9	0.51	220
HAHVS0603-12N_M	12	±3%,±5%	4	2.7	0.68	190
HAHVS0603-15N_M	15	±3%,±5%	4	2.3	0.71	180
HAHVS0603-18N_M	18	±3%,±5%	4	2.1	0.81	170
HAHVS0603-22N_M	22	±3%,±5%	4	1.8	1.0	150

E:±0.1nH B:±0.2nH S:±0.3nH H:±3% J:±5%

SIZE 1005 TYPE：HAHVS

PART NO.	AT100 MHz 250mV			SELF-RESONANT FREQUENCY	DC RESISTANCE	Rated Current
	INDUCTANCE (nH)	TOLERANCE	Q Min	(GHz) Min	(Ω) Max	(mA) Max
HAHVS1005-1N0_M	1	±0.1~0.3nH	8	8	0.10	300
HAHVS1005-1N2_M	1.2	±0.1~0.3nH	8	8	0.10	300
HAHVS1005-1N5_M	1.5	±0.1~0.3nH	8	8	0.10	300
HAHVS1005-1N8_M	1.8	±0.1~0.3nH	8	6	0.10	300
HAHVS1005-2N0_M	2	±0.1~0.3nH	8	6	0.12	300
HAHVS1005-2N2_M	2.2	±0.1~0.3nH	8	6	0.15	300
HAHVS1005-2N4_M	2.4	±0.1~0.3nH	8	6	0.16	300
HAHVS1005-2N4 0.9A_M	2.4	±0.1~0.3nH	8	6	0.11	900
HAHVS1005-2N7_M	2.7	±0.1~0.3nH	8	6	0.17	300
HAHVS1005-3N0_M	3	±0.1~0.3nH	8	6	0.18	300
HAHVS1005-3N3_M	3.3	±0.1~0.3nH	8	6	0.19	300
HAHVS1005-3N6 0.7A_M	3.6	±0.1~0.3nH	8	5	0.13	700
HAHVS1005-3N9_M	3.9	±0.1~0.3nH	8	6	0.19	300
HAHVS1005-4N7_M	4.7	±0.1~0.3nH	8	6	0.23	300
HAHVS1005-5N6_M	5.6	±0.1~0.3nH	8	5.3	0.26	300
HAHVS1005-6N8_M	6.8	±3%,±5%	8	4.2	0.29	300
HAHVS1005-8N2_M	8.2	±3%,±5%	8	3.6	0.33	300
HAHVS1005-9N1 0.5A_M	9.1	±3%,±5%	8	3.4	0.26	500
HAHVS1005-10N_M	10	±3%,±5%	8	3.2	0.35	300
HAHVS1005-12N_M	12	±3%,±5%	8	2.8	0.41	300
HAHVS1005-15N_M	15	±3%,±5%	8	2.3	0.46	300
HAHVS1005-18N_M	18	±3%,±5%	8	2.1	0.51	300
HAHVS1005-22N_M	22	±3%,±5%	8	1.8	0.58	300
HAHVS1005-27N_M	27	±3%,±5%	8	1.6	0.67	300
HAHVS1005-33N_M	33	±3%,±5%	8	1.5	0.67	200
HAHVS1005-39N_M	39	±3%,±5%	8	1.2	1.06	200
HAHVS1005-47N_M	47	±3%,±5%	8	1.0	1.15	200
HAHVS1005-56N_M	56	±3%,±5%	8	0.8	1.2	200
HAHVS1005-68N_M	68	±3%,±5%	8	0.8	1.25	180
HAHVS1005-82N_M	82	±3%,±5%	8	0.6	1.6	150
HAHVS1005-R10_M	100	±3%,±5%	8	0.6	1.6	150
HAHVS1005-R12_M	120	±3%,±5%	8	0.6	1.6	150
HAHVS1005-R15_M	150	±3%,±5%	8	0.5	2.99	140
HAHVS1005-R18_M	180	±3%,±5%	8	0.5	3.38	150
HAHVS1005-R22_M	220	±3%,±5%	8	0.5	3.77	120
HAHVS1005-R27_M	270	±3%,±5%	8	0.5	4.9	110

E:±0.1nH B:±0.2nH S:±0.3nH H:±3% J:±5%

SIZE 1608 TYPE：HAHVS

PART NO.	AT100 MHz 250mV			SELF-RESONANT FREQUENCY	DC RESISTANCE	RATED CURRENT
	INDUCTANCE (nH)	TOLERANCE	Q Min	(GHz) Min	(Ω) Max	(mA) Max
HAHVS1608-1N0_M	1	±0.1~0.3nH	8	10	0.05	300
HAHVS1608-1N2_M	1.2	±0.1~0.3nH	8	10	0.05	300
HAHVS1608-1N5_M	1.5	±0.1~0.3nH	8	6	0.10	300
HAHVS1608-1N8_M	1.8	±0.1~0.3nH	8	6	0.10	300
HAHVS1608-2N2_M	2.2	±0.1~0.3nH	8	6	0.10	300
HAHVS1608-2N7_M	2.7	±0.1~0.3nH	10	6	0.1	300
HAHVS1608-3N3_M	3.3	±0.1~0.3nH	10	6	0.12	300
HAHVS1608-3N9_M	3.9	±0.1~0.3nH	10	6	0.14	300
HAHVS1608-4N7_M	4.7	±0.1~0.3nH	10	4	0.16	300
HAHVS1608-5N6_M	5.6	±0.1~0.3nH	10	4	0.18	300
HAHVS1608-6N8_M	6.8	±3%,±5%	10	4	0.22	300
HAHVS1608-8N2_M	8.2	±3%,±5%	10	3.5	0.24	300
HAHVS1608-10N_M	10	±3%,±5%	12	3.4	0.26	300
HAHVS1608-12N_M	12	±3%,±5%	12	2.6	0.28	300
HAHVS1608-15N_M	15	±3%,±5%	12	2.3	0.32	300
HAHVS1608-18N_M	18	±3%,±5%	12	2.0	0.35	300
HAHVS1608-22N_M	22	±3%,±5%	12	1.6	0.40	300
HAHVS1608-27N_M	27	±3%,±5%	12	1.4	0.45	300
HAHVS1608-33N_M	33	±3%,±5%	12	1.2	0.55	300
HAHVS1608-39N_M	39	±3%,±5%	12	1.1	0.60	300
HAHVS1608-47N_M	47	±3%,±5%	12	0.9	0.70	300
HAHVS1608-56N_M	56	±3%,±5%	12	0.9	0.75	300
HAHVS1608-68N_M	68	±3%,±5%	12	0.7	0.85	300
HAHVS1608-82N_M	82	±3%,±5%	12	0.6	0.95	300
HAHVS1608-R10_M	100	±3%,±5%	12	0.6	1.00	300
HAHVS1608-R12_M	120	±3%,±5%	8	0.5	1.20	300
HAHVS1608-R15_M	150	±3%,±5%	8	0.5	1.20	300
HAHVS1608-R18_M	180	±3%,±5%	8	0.4	1.30	300
HAHVS1608-R22_M	220	±3%,±5%	8	0.4	1.50	300
HAHVS1608-R27_M	270	±3%,±5%	8	0.4	1.90	300
HAHVS1608-R33_M	330	±3%,±5%	8	0.4	2.10	300
HAHVS1608-R39_M	390	±3%,±5%	8	0.4	2.30	150
HAHVS1608-R47_M	470	±3%,±5%	8	0.3	2.60	150

E:±0.1nH B:±0.2nH S:±0.3nH H:±3% J:±5%

SIZE 201209

TYPE：HAHVS

PART NO.	AT100 MHz 250mV			SELF-RESONANT FREQUENCY	DC RESISTANCE	RATED CURRENT
	INDUCTANCE (nH)	TOLERANCE	Q Min	(GHz) Min	(Ω) Max	(mA) Max
HAHVS2012-1N0S	1	±0.1~0.3nH	10	10	0.10	300
HAHVS2012-1N2S	1.2	±0.1~0.3nH	10	10	0.10	300
HAHVS2012-1N5S	1.5	±0.1~0.3nH	10	4	0.10	300
HAHVS2012-1N8S	1.8	±0.1~0.3nH	10	4	0.10	300
HAHVS2012-2N2S	2.2	±0.1~0.3nH	10	4	0.10	300
HAHVS2012-2N7S	2.7	±0.1~0.3nH	12	4	0.10	300
HAHVS2012-3N3S	3.3	±0.1~0.3nH	12	4	0.13	300
HAHVS2012-3N9S	3.9	±0.1~0.3nH	12	4	0.15	300
HAHVS2012-4N7S	4.7	±0.1~0.3nH	12	3.5	0.20	300
HAHVS2012-5N6S	5.6	±0.1~0.3nH	15	3.2	0.23	300
HAHVS2012-6N8J	6.8	±3%,±5%	15	2.8	0.25	300
HAHVS2012-8N2J	8.2	±3%,±5%	15	2.4	0.28	300
HAHVS2012-10NJ	10	±3%,±5%	15	2.1	0.30	300
HAHVS2012-12NJ	12	±3%,±5%	15	1.9	0.35	300
HAHVS2012-15NJ	15	±3%,±5%	15	1.6	0.40	300
HAHVS2012-18NJ	18	±3%,±5%	15	1.5	0.45	300
HAHVS2012-22NJ	22	±3%,±5%	18	1.4	0.50	300
HAHVS2012-27NJ	27	±3%,±5%	18	1.3	0.55	300
HAHVS2012-33NJ	33	±3%,±5%	18	1.2	0.60	300
HAHVS2012-39NJ	39	±3%,±5%	18	1.0	0.65	300
HAHVS2012-47NJ	47	±3%,±5%	18	0.9	0.70	300
HAHVS2012-56NJ	56	±3%,±5%	18	0.8	0.75	300
HAHVS2012-68NJ	68	±3%,±5%	18	0.7	0.80	300
HAHVS2012-82NJ	82	±3%,±5%	18	0.6	0.90	300
HAHVS2012-R10J	100	±3%,±5%	18	0.6	0.90	300
HAHVS2012-R12J	120	±3%,±5%	13	0.5	0.95	300

E:±0.1nH B:±0.2nH S:±0.3nH H:±3% J:±5%

SIZE 201212

TYPE：HAHVS

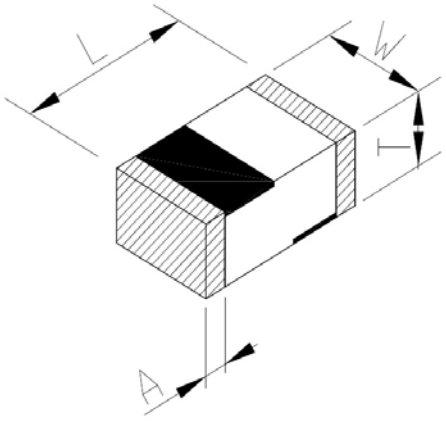
PART NO.	AT100 MHz 250mV			SELF-RESONANT FREQUENCY	DC RESISTANCE	RATED CURRENT
	INDUCTANCE (nH)	TOLERANCE	Q Min	(GHz) Min	(Ω) Max	(mA) Max
HAHVS2012-R15	150	±3%,±5%	13	0.5	1.00	300
HAHVS2012-R18	180	±3%,±5%	13	0.4	1.10	300
HAHVS2012-R22	220	±3%,±5%	12	0.35	1.20	300
HAHVS2012-R27	270	±3%,±5%	12	0.3	1.30	300
HAHVS2012-R33	330	±3%,±5%	12	0.25	1.40	300
HAHVS2012-R39	390	±3%,±5%	10	0.25	1.40	300
HAHVS2012-R47	470	±3%,±5%	10	0.2	2.00	300
HAHVS2012-R56	560	±3%,±5%	10	0.18	5.00	50
HAHVS2012-R68	680	±3%,±5%	10	0.16	5.00	50

E:±0.1nH B:±0.2nH S:±0.3nH H:±3% J:±5%

***** If you have any request not find from above datas, please contact our sales for further information, we may do our best to meet your request.***

3. DIMENSION

TYPE：HAHVS



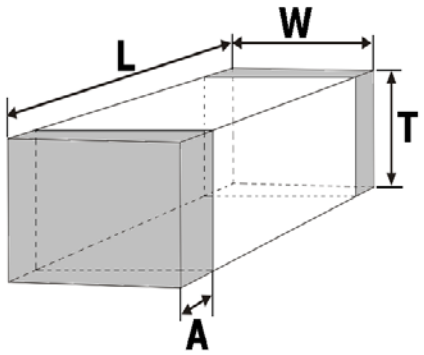
Unit:mm(inch)

OPERATING TEMP RANGE : -55℃ ~ +125℃
STORAGE TEMP RANGE : -40℃ ~ +85℃

TYPE	L	W	T	A(m/m)
HAHVS-0603	0.6±0.03 (0.024±0.001)	0.3±0.03 (0.012±0.001)	0.3±0.03 (0.012±0.001)	0.1~0.2 (0.004~0.008)

TYPE	L	W	T	A(m/m)
HAHVS-1005	1.0±0.1 (0.039±0.004)	0.5±0.05 (0.02±0.002)	0.5±0.05 (0.02±0.002)	0.1~0.3 (0.004~0.012)

TYPE	L	W	T	A(m/m)
HAHVS-1608	1.6±0.15 (0.063±0.006)	0.8±0.15 (0.031±0.006)	0.8±0.15 (0.031±0.006)	0.2~0.5 (0.008~0.02)



Unit:mm(inch)

OPERATING TEMP RANGE : -55℃ ~ +125℃
STORAGE TEMP RANGE : -40℃ ~ +85℃

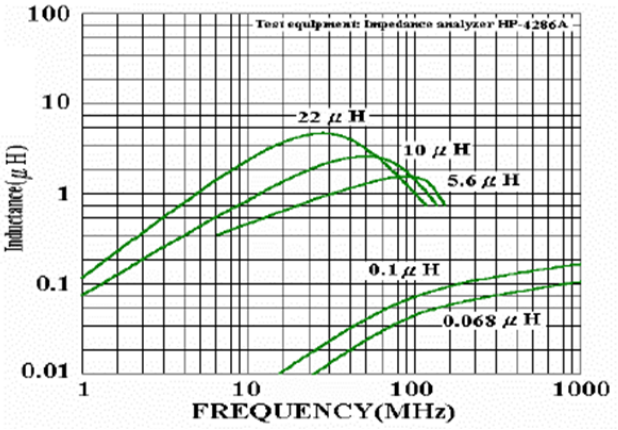
TYPE	L	W	T	A(m/m)
HAHVS-201209	2±0.2 (0.079±0.008)	1.25±0.2 (0.049±0.008)	0.85±0.2 (0.033±0.008)	0.2~0.8 (0.008~0.031)

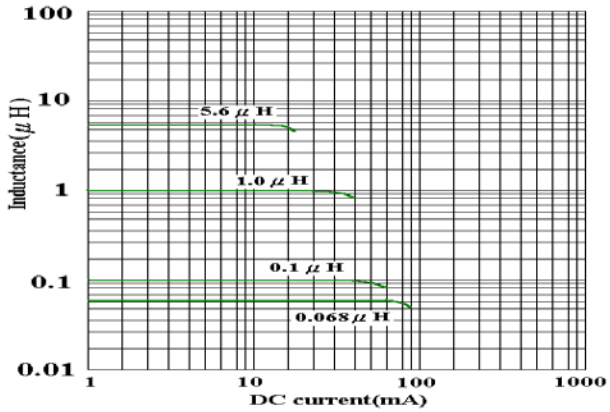
TYPE	L	W	T	A(m/m)
HAHVS-201212	2±0.2 (0.079±0.008)	1.25±0.2 (0.049±0.008)	1.25±0.2 (0.049±0.008)	0.2~0.8 (0.008~0.031)

4. The place of origin : **Taiwan**

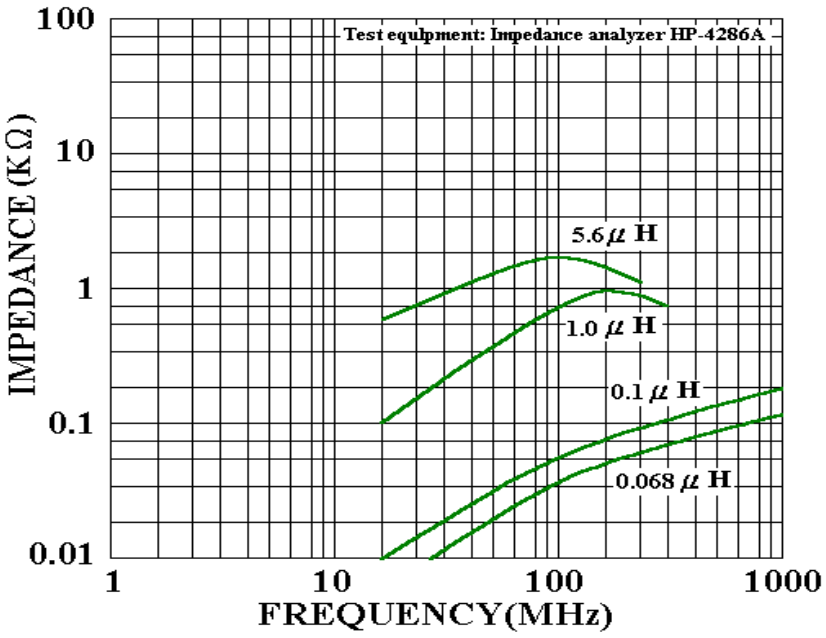
TYPE：HAHVS

INDUCTANCE VS DC SUPERPOSITION CHARACTERISTICS

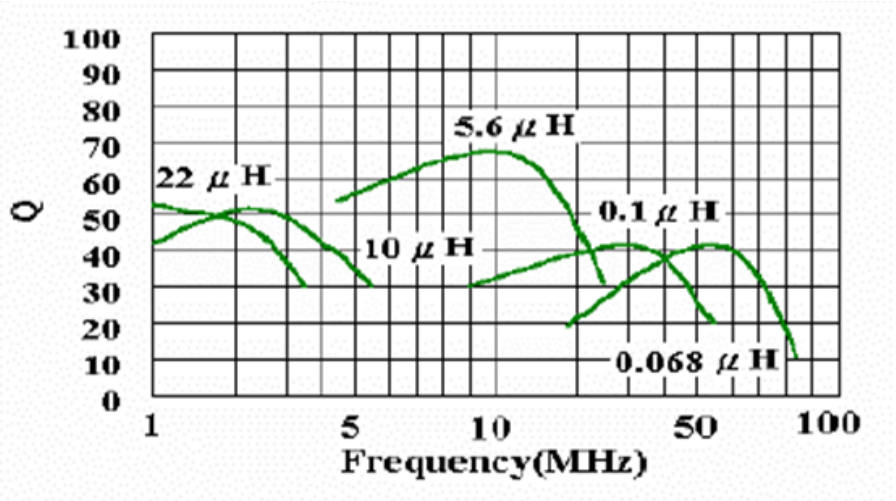




IMPEDANCE VS FREQUENCY CHARACTERISTICS



Q VS FREQUENCY CHARACTERISTICS



6. Reflow soldering conditions

TYPE：HAHVS

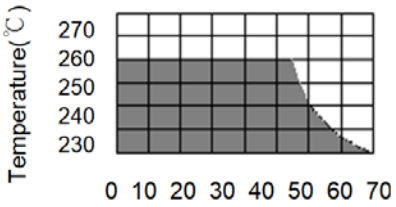
- Pre－heating should be in such a way that the temperature difference between solder and ferrite surface is limited to 150℃ max.

Also cooling into solvent after soldering should be in such away that the temperature difference is limited to 100℃ max.

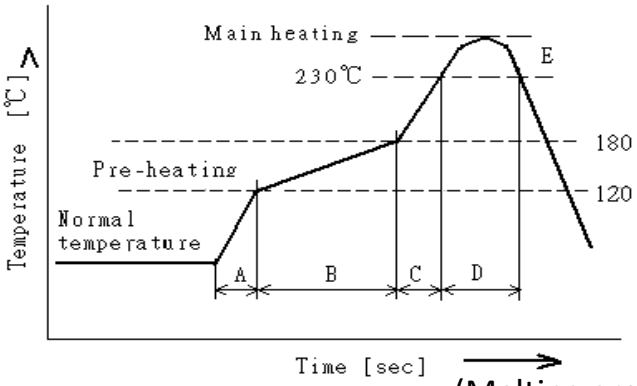
Insufficient pre－heating may cause cracks on the ferrite, resulting in the deterioration of product quality.

- Products should be soldered within the following allowable range indicated by the slanted line.

The excessive soldering conditions may cause the corrosion of the electrode, when soldering is repeated, allowable time is the accumulated time.



◆ Temperature Profile



(Melting area of solder)

A	Slope of temp rise	1 to 5	℃/sec
B	Heat time	50 to 150	sec
	Heat temperature	120 to 180	℃
C	Slope of temp rise	1 to 5	℃/sec
D	Time over 230℃	90~120	sec
E	Peak temperature	255~260	℃
	Peak hold time	10 max	sec
No. of mounting		3	times

6-1 Reworking with soldering

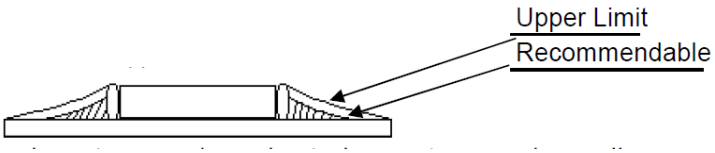
Preheating	150℃, 1 minute
Tip temperature	280℃ max.
Soldering time	3 seconds max.
Soldering iron output	30w max.
End of soldering iron	ϕ 3mm max.

◆ Reworking should be limited to only one time.

Note : Do not directly touch the products with the tip of the soldering iron in order to prevent the crack on the ferrite material due to the thermal shock.

6-2 Solder Volume

Solder shall be used not to be exceed the upper limits as shown below.



Accordingly increasing the solder volume, the mechanical stress to product is also increased. Exceeding solder volume may cause the failure of mechanical or electrical performance.

7. Equipment

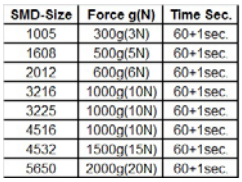
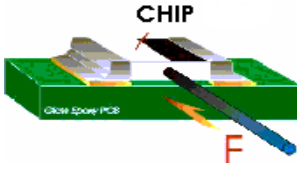
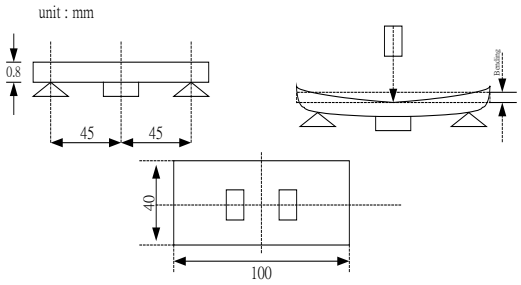
7-1 IMPEDANCE

Impedance shall be measured with HP－4286A impedance analyzer or equivalent system.

7-2 DC RESISTANCE

DC resistance shall be measured using HP 4338 digital mili－ohm meter with 4 terminal method.

8. Mechanical Characteristics

ITEM	Specification	Test Conditions
Terminal Strength	Terminal strength does not distort the case shall meet SPEC DC resistance specifications.	 
Substrate Bending Test	SPEC substrate bending test DC resistance shall meet specifications ± 30%.	After soldering a chip to a test substrate, bend the substrate by 2mm hold for 60s and then return. Soldering shall be done in accordance with the recommended PC board p a 
Resistance to Solder Heat	No visible damage Electrical characteristics and mechanical characteristics shall be satisfied. **Consult standard MIL-STD-202 METHOD 210**	Solder Temp. : 265±3℃ Immersion time : 6±1 sec Preheating : 100℃ to 150℃, 1 minute. Measurement to be made after keeping at room temp for 24±2 hrs. Solder : Sn-3Ag-0.5Cu
Solderability	95% min. coverage of all metabolised area **Consult standard J-STD-002**	Solder temp. : 240±5℃ Immersion time : 3±1 sec

9. RELIABILITY AND TEST CONDITIONS

TYPE：HAHVS

9-1 HIGH TEMPERATURE RESISTANCE

a. Performance specification

1.Appearance：no mechanical damage

2.Inductance shall be with ±20% of the initial value

b.Test condition

1.Temperature: 125℃ ±2℃

2.Testing time：1000±12hrs

3.Measurement：After placing at room ambient temperature for 24 hours minimum

9-2 Biased Humidity RESISTANCE

a.Performance specification

1.Appearance：no mechanical damage

2.Inductance shall be with ±20% of the initial value

b.Test condition

1.Humidity: 85 ± 5%RH

2. Temperature: 85℃ ±2℃

3.Testing time: 1000 ± 12 hours

4.Measurement：After placing at room ambient temperature for 24 hours minimum

9-3 TEMPERATURE CYCLE

a.Performance specification

1.Appearance：no mechanical damage

2.Inductance shall be with ±20% of the initial value

b.Test condition

1. Low Temperature: - 55℃ ±5℃ kept stabilized for 30 minutes each

2. High Temperature: 125℃ ±5℃kept stabilized for 30 minutes each

3.Cycle：1000 cycles

4. Measurement：After placing for 24hours minimum at room ambient temperature

5. step1. -55℃ temp±3℃ 30±3 minutes

step2. Room temperature 2to5 minutes

step3. +125℃ temp±3℃ 30±3 minutes

step4. room temperature 2to5 minutes

9-4 VIBRATION TEST

a.Performance specification

1.Appearance：no mechanical damage

2.Inductance shall be with ±20% of the initial value

b.Test condition

1.Frequency and Amplitude:10-2000-10Hz

2.Direction:X,Y,Z.

3.Test duration:4 hours for each direction,12hours in total.

9-5 Mechanical Shock TEST

a.Performance specification

1.Appearance：no mechanical damage

2.Inductance shall be with ±20% of the initial value

b.Test condition

1.peak acceleration：100 g's

2.Duration of pulse：6 ms

3.Waveform：Half-sine

4.Velocity change：12.3 ft/sec

5. Direction：X，Y，Z（3axes/3 times）

9-6 Operational Life

a. Performance specification

1.Appearance：no mechanical damage

2.Inductance shall be with ±20% of the initial value

b.Test condition

1.Temperature: 125℃ ±2℃

2.Testing time：1000±12hrs

3.Measurement：After placing at room ambient temperature for 24 hours minimum

9-7 Electrostatic discharge test

a. Performance specification

1.Appearance：no mechanical damage

2.Inductance shall be with ±20% of the initial value

b.Test condition

1.ESD voltage: 15k volts

2.Mode 1:150 pF/330 Ohm

3.Mode 2:150 pF/2000 Ohm

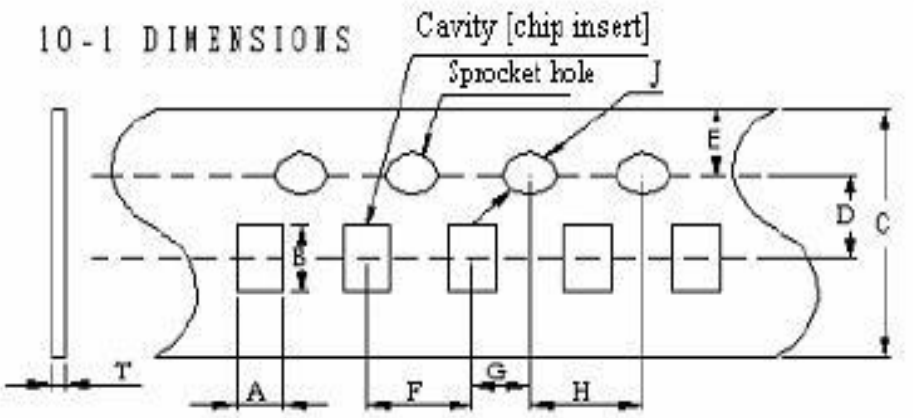
9.1 REMARK

The reliability test customers if there are special requirements in accordance with customer needs.

◆ PAPER CARRIER TYPE PACKING

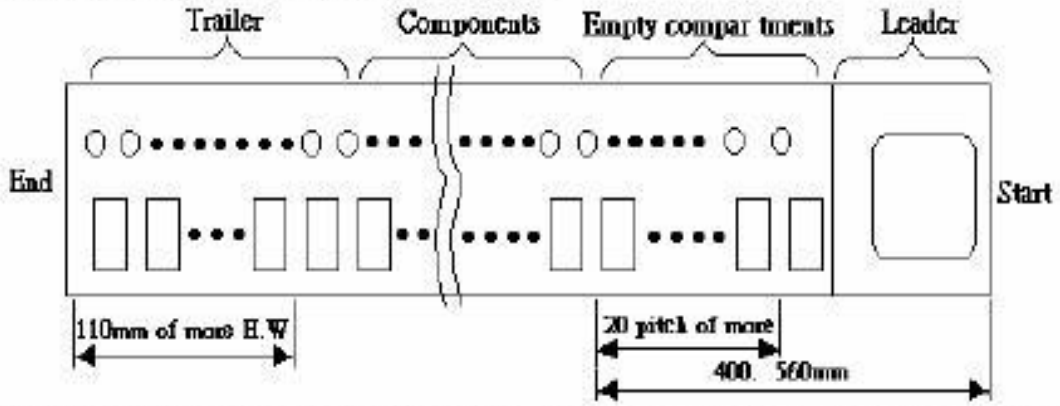
TYPE：HAHVS

10-1 DIMENSIONS



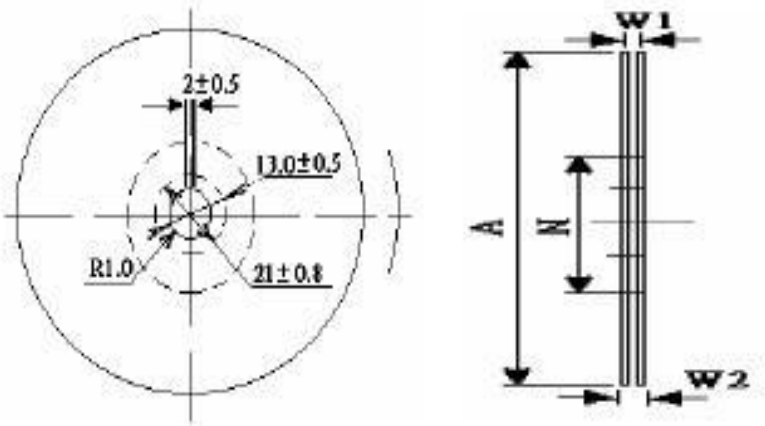
A	B	C	D	E	F	G	H	J	T
1.03 ±0.05	1.85 ±0.05	8.00 ±0.10	3.50 ±0.05	1.75 ±0.10	4.00 ±0.10	2.00 ±0.05	4.00 ±0.10	1.55 ±0.05	0.95 ±0.05

10-2 LEADER AND TRAILER TAPE



10-3 DIRECTION THE DIRECTION SHALL BE SEEN FROM THE TOP OF COVER TAPE

10-4 REELS



UNIT:mm

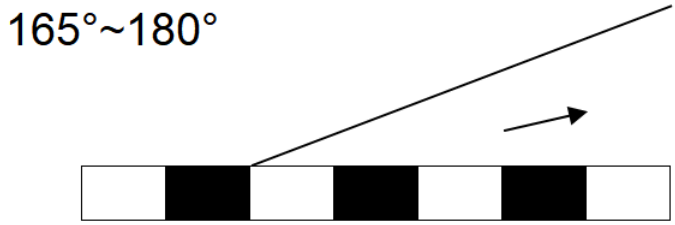
A	178 ±2.0
N	50 MIN
W1	10 ±1.5
W2	20 MAX

PACKING QTY.
4,000 PCS REEL

10-5 PEELING STRENGTH OF COVER TAPE

TYPE：HAHVS

Cover tape	(10g~100g)



◆ Test condition

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

11. Packaging

1. Tape & Reel packaging in composite specification 6/8
2. Reel and a bag of desiccant shall be packed in Nylon or plastic bag
3. Maximum of 5 reels shall be packaged in a inner box
4. Maximum of 6 inner box shall be packaged in a outer box

12. Reel Label

Producing the goods label needs to indicate (1) Pb Free (2) RoHS Compliant

13. Storage

13-1 The solderability of the external electrode may be deteriorated if packages are stored where they are exposed to high humidity. Packages must be stored at 40℃ or less and 70% RH or less.

13-2 The solderability of the external electrode may be deteriorated if packages are stored where they are exposed to dust or harmful gas (hydrogen chloride,sulfurous acid gas or hydrogen sulfide).

13-3 Packaging material may be deformed if packages are stored where they are exposed to heat or direct sun-light.

13-4 Minimum packages, such as polyvinyl heat－seal packages shall not be opened until just before they are used. If opened, use the reels as soon as possible.

13-5 Solderability specified in composite specification 4/8 shall be for 12 months from the date of delivery on condition that they are stored at the environment specified clause 13-1 & 13-2. For those parts which passed more than 6 months shall be checked solderability before it is used.

14. Quality System

- **ISO/IATF16949**
- **IECQ QC 080000**
- **AEC-Q200 COMPLIANT**
- **AUTOMOTIVE QUALITY**