



SPECIFICATION FOR APPROVAL

MULTILAYER CHIP INDUCTOR

LOW FREQUENCY TYPE CHIP INDUCTOR
HIGH FREQUENCY TYPE CHIP INDUCTOR

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MULTILAYER CHIP INDUCTOR

***** MULTILAYER CHIP INDUCTOR *****

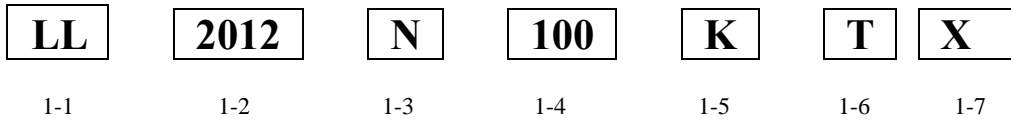
FEATURES

- Monolithic structure for highly reliable surface mount applications .
- Excellent solderability and high heat resistance for either flow or reflow soldering .
- No cross coupling between inductors due to magnetic shield ideal for high density installation .
- Superior Q characteristics guaranteed over the wide frequency allow high frequency application.
- Dimensions are suitable for automatic mounting.

APPLICATIONS

- Prevention of electro – magnetic interference to signals on the secondary side of electric equipment
- RF module of telecommunication products , personal handy –phone systems , pagers , cellular phones , computercommunications , etc

1.Product Identification



- 1-1. LL LL : UWA LOW FREQUENCY TYPE CHIP INDUCTOR .
 LH : UWA HIGH FREQUENCY TYPE CHIP INDUCTOR .

1-2. 2012 Size

(Unit : mm)

| Code | EIA Code | Length * Width | mm / (inch) |
|------|----------|----------------|-------------------|
| 1005 | 0402 | 1.00 * 0.50 | / (0.04 * 0.02) |
| 1608 | 0603 | 1.60 * 0.80 | / (0.06 * 0.03) |
| 2012 | 0805 | 2.00 * 1.25 | / (0.08 * 0.05) |
| 3216 | 1206 | 3.20 * 1.60 | / (0.12 * 0.06) |

1-3. N Material Code

| Code | Description Of The Code |
|-----------------|-------------------------|
| Standard Code : | P : 10 uH ~ 33 uH |
| | Q : 5.6 uH ~ 8.2 uH |
| | S : 1.0 uH ~ 4.7 uH |
| N | T : 82 nH ~ 0.1 uH |
| | P : 47 nH ~ 82 nH |
| | P : 1.5 nH ~ 68 nH |



MULTILAYER CHIP INDUCTOR

1-4. **100** Inductance

| Code | Inductance | Code | Inductance |
|------|------------------|------|------------|
| 4N7 | 4.7 n H | 4R7 | 4.7 uH |
| 82N | 82 nH (0.082 uH) | 100 | 10 uH |
| R10 | 100 nH (0.1 uH) | 470 | 47 uH |

1-5. **K** Inductance Tolerance

| Code | G | J | K | M | S |
|-----------|-------|-------|--------|--------|----------|
| Tolerance | ± 2 % | ± 5 % | ± 10 % | ± 20 % | ± 0.3n H |

1-6. **T** Packaging

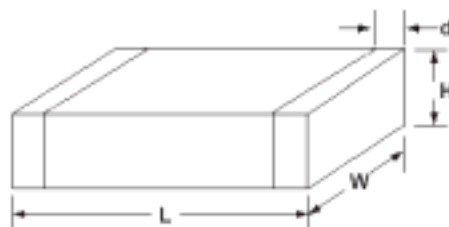
| Code | Description Of The Code |
|------|-------------------------|
| T | 7 " Tape & Reel |
| D | 13 " Tape & Reel |
| B | Bulk |

1-7. **X** Material Option

| Code | Description Of The Code |
|------|-----------------------------------|
| | Sn – Pb Plating (Sn 90% , Pb 10%) |
| X | Pb – Free Plating (Sn 100%) |

2.Dimension & Structure

| Code | EIA Code | L | W | H | d |
|------|----------|----------|----------|----------|----------|
| 1005 | 0402 | 1.0±0.05 | 0.5±0.05 | 0.5±0.05 | 0.25±0.1 |
| 1608 | 0603 | 1.6±0.1 | 0.8±0.1 | 0.8±0.1 | 0.3±0.2 |
| 2012 | 0805 | 2.0±0.1 | 1.25±0.1 | 1.25±0.1 | 0.5±0.3 |
| 3216 | 1206 | 3.2±0.15 | 1.6±0.15 | 1.6±0.15 | 0.5±0.3 |





MULTILAYER CHIP INDUCTOR

3. Electrical Characteristic Low Frequency * LL1608 (0603) Type*

| Part Number | Inductance (uH) | Q Min. | L,Q Test Frequency (MHZ) | Self-Resonant Frequency (MHZ) | DC Resistance (Ω) Max . | Rated Current (mA) Max. |
|-------------|-----------------|--------|--------------------------|-------------------------------|-------------------------|-------------------------|
| LL1608N47N | 0.047±20%,10% | 10 | 50 | 260 | 0.30 | 50 |
| LL1608N68N | 0.068±20%,10% | 10 | 50 | 250 | 0.30 | 50 |
| LL1608N82N | 0.082±20%,10% | 10 | 50 | 245 | 0.30 | 50 |
| LL1608NR10 | 0.10±20%,10% | 15 | 25 | 240 | 0.50 | 50 |
| LL1608NR12 | 0.12±20%,10% | 15 | 25 | 205 | 0.50 | 50 |
| LL1608NR15 | 0.15±20%,10% | 15 | 25 | 180 | 0.60 | 50 |
| LL1608NR18 | 0.18±20%,10% | 15 | 25 | 165 | 0.60 | 50 |
| LL1608NR22 | 0.22±20%,10% | 15 | 25 | 150 | 0.80 | 50 |
| LL1608NR27 | 0.27±20%,10% | 15 | 25 | 136 | 0.80 | 50 |
| LL1608NR33 | 0.33±20%,10% | 15 | 25 | 125 | 0.85 | 35 |
| LL1608NR39 | 0.39±20%,10% | 15 | 25 | 110 | 1.00 | 35 |
| LL1608NR47 | 0.47±20%,10% | 15 | 25 | 105 | 1.35 | 35 |
| LL1608NR56 | 0.56±20%,10% | 15 | 25 | 95 | 1.55 | 35 |
| LL1608NR68 | 0.68±20%,10% | 15 | 25 | 80 | 1.70 | 35 |
| LL1608NR82 | 0.82±20%,10% | 15 | 25 | 75 | 2.10 | 35 |
| LL1608N1R0 | 1.0±20%,10% | 35 | 10 | 70 | 0.60 | 25 |
| LL1608N1R2 | 1.2±20%,10% | 35 | 10 | 60 | 0.80 | 25 |
| LL1608N1R5 | 1.5±20%,10% | 35 | 10 | 55 | 0.80 | 25 |
| LL1608N1R8 | 1.8±20%,10% | 35 | 10 | 50 | 0.95 | 25 |
| LL1608N2R2 | 2.2±20%,10% | 35 | 10 | 45 | 1.15 | 15 |
| LL1608N2R7 | 2.7±20%,10% | 35 | 10 | 40 | 1.35 | 15 |
| LL1608N3R3 | 3.3±20%,10% | 35 | 10 | 38 | 1.55 | 15 |
| LL1608N3R9 | 3.9±20%,10% | 35 | 10 | 36 | 1.70 | 15 |
| LL1608N4R7 | 4.7±20%,10% | 35 | 10 | 33 | 2.10 | 15 |
| LL1608N5R6 | 5.6±20%,10% | 35 | 4 | 22 | 1.55 | 5 |
| LL1608N6R8 | 6.8±20%,10% | 35 | 4 | 20 | 1.70 | 5 |
| LL1608N8R2 | 8.2±20%,10% | 35 | 4 | 18 | 2.10 | 5 |
| LL1608N100 | 10.0±20%,10% | 35 | 2 | 17 | 2.55 | 3 |
| LL1608N120 | 12.0±20%,10% | 35 | 2 | 15 | 2.75 | 3 |
| LL1608N150 | 15.0±20%,10% | 20 | 1 | 14 | 1.70 | 1 |
| LL1608N180 | 18.0±20%,10% | 20 | 1 | 13 | 1.85 | 1 |
| LL1608N220 | 22.0±20%,10% | 20 | 1 | 11 | 2.10 | 1 |
| LL1608N270 | 27.0±20%,10% | 20 | 1 | 10 | 2.75 | 1 |
| LL1608N330 | 33.0±20%,10% | 20 | 0.4 | 9 | 2.95 | 1 |

Inductance Tolerance * Others values are available upon customer's request *



MULTILAYER CHIP INDUCTOR

Electrical Characteristic Low Frequency * LL2012 (0805) Type*

| Part Number | Inductance (uH) | Q Min. | L,Q Test Frequency (MHZ) | Self-Resonant Frequency (MHZ) | DC Resistance (Ω) Max . | Rated Current (mA) Max. |
|-------------|--------------------|-----------|--------------------------------|-------------------------------------|-------------------------------|-------------------------------|
| LL2012N47N | 0.047±20%,10% | 15 | 50 | 320 | 0.20 | 300 |
| LL2012N78N | 0.068±20%,10% | 15 | 50 | 280 | 0.20 | 300 |
| LL2012N82N | 0.082±20%,10% | 15 | 50 | 255 | 0.20 | 300 |
| LL2012NR10 | 0.10±20%,10% | 20 | 25 | 235 | 0.30 | 250 |
| LL2012NR12 | 0.12±20%,10% | 20 | 25 | 220 | 0.30 | 250 |
| LL2012NR15 | 0.15±20%,10% | 20 | 25 | 200 | 0.40 | 250 |
| LL2012NR18 | 0.18±20%,10% | 20 | 25 | 185 | 0.40 | 250 |
| LL2012NR22 | 0.22±20%,10% | 20 | 25 | 170 | 0.50 | 250 |
| LL2012NR27 | 0.27±20%,10% | 20 | 25 | 150 | 0.50 | 250 |
| LL2012NR33 | 0.33±20%,10% | 20 | 25 | 145 | 0.55 | 250 |
| LL2012NR39 | 0.39±20%,10% | 25 | 25 | 135 | 0.65 | 200 |
| LL2012NR47 | 0.47±20%,10% | 25 | 25 | 125 | 0.65 | 200 |
| LL2012NR56 | 0.56±20%,10% | 25 | 25 | 115 | 0.75 | 150 |
| LL2012NR68 | 0.68±20%,10% | 25 | 25 | 105 | 0.80 | 150 |
| LL2012NR82 | 0.82±20%,10% | 25 | 25 | 100 | 1.00 | 150 |
| LL2012N1R0 | 1.0±20%,10% | 45 | 10 | 75 | 0.40 | 50 |
| LL2012N1R2 | 1.2±20%,10% | 45 | 10 | 65 | 0.50 | 50 |
| LL2012N1R5 | 1.5±20%,10% | 45 | 10 | 60 | 0.50 | 50 |
| LL2012N1R8 | 1.8±20%,10% | 45 | 10 | 55 | 0.60 | 50 |
| LL2012N2R2 | 2.2±20%,10% | 45 | 10 | 50 | 0.65 | 30 |
| LL2012N2R7 | 2.7±20%,10% | 45 | 10 | 45 | 0.75 | 30 |
| LL2012N3R3 | 3.3±20%,10% | 45 | 10 | 41 | 0.80 | 30 |
| LL2012N3R9 | 3.9±20%,10% | 45 | 10 | 38 | 0.90 | 30 |
| LL2012N4R7 | 4.7±20%,10% | 45 | 10 | 35 | 1.00 | 30 |
| LL2012N5R6 | 5.6±20%,10% | 50 | 4 | 32 | 0.90 | 15 |
| LL2012N6R8 | 6.8±20%,10% | 50 | 4 | 29 | 1.00 | 15 |
| LL2012N8R2 | 8.2±20%,10% | 50 | 4 | 26 | 1.10 | 15 |
| LL2012N100 | 10.0±20%,10% | 50 | 2 | 24 | 1.15 | 15 |
| LL2012N120 | 12.0±20%,10% | 50 | 2 | 22 | 1.25 | 15 |
| LL2012N150 | 15.0±20%,10% | 30 | 1 | 19 | 0.80 | 5 |
| LL2012N180 | 18.0±20%,10% | 30 | 1 | 18 | 0.90 | 5 |
| LL2012N220 | 22.0±20%,10% | 30 | 1 | 16 | 1.10 | 5 |
| LL2012N270 | 27.0±20%,10% | 30 | 1 | 14 | 1.15 | 5 |
| LL2012N330 | 33.0±20%,10% | 30 | 0.4 | 13 | 1.25 | 5 |

Inductance Tolerance

* Others values are available upon customer's request *



MULTILAYER CHIP INDUCTOR

Electrical Characteristic Low Frequency * LL3216 (1206) Type*

| Part Number | Inductance (uH) | Q Min. | L,Q Test Frequency (MHZ) | Self-Resonant Frequency (MHZ) | DC Resistance (Ω)Max . | Rated Current (Ma) Max. |
|-------------|--------------------|-----------|--------------------------------|-------------------------------------|------------------------------|-------------------------------|
| LL3216N47N | 0.047±20%,10% | 20 | 50 | 320 | 0.15 | 300 |
| LL3216N68N | 0.068±20%,10% | 20 | 50 | 280 | 0.25 | 300 |
| LL3216NR10 | 0.10±20%,10% | 20 | 25 | 235 | 0.25 | 250 |
| LL3216NR12 | 0.12±20%,10% | 20 | 25 | 220 | 0.30 | 250 |
| LL3216NR15 | 0.15±20%,10% | 20 | 25 | 200 | 0.30 | 250 |
| LL3216NR18 | 0.18±20%,10% | 20 | 25 | 185 | 0.40 | 250 |
| LL3216NR22 | 0.22±20%,10% | 20 | 25 | 170 | 0.40 | 250 |
| LL3216NR27 | 0.27±20%,10% | 20 | 25 | 150 | 0.50 | 250 |
| LL3216NR33 | 0.33±20%,10% | 20 | 25 | 145 | 0.60 | 250 |
| LL3216NR39 | 0.39±20%,10% | 25 | 25 | 135 | 0.50 | 200 |
| LL3216NR47 | 0.47±20%,10% | 25 | 25 | 125 | 0.60 | 200 |
| LL3216NR56 | 0.56±20%,10% | 25 | 25 | 115 | 0.70 | 150 |
| LL3216NR68 | 0.68±20%,10% | 25 | 25 | 105 | 0.80 | 150 |
| LL3216NR82 | 0.82±20%,10% | 25 | 25 | 100 | 0.90 | 150 |
| LL3216N1R0 | 1.0±20%,10% | 45 | 10 | 75 | 0.40 | 100 |
| LL3216N1R2 | 1.2±20%,10% | 45 | 10 | 65 | 0.50 | 100 |
| LL3216N1R5 | 1.5±20%,10% | 45 | 10 | 60 | 0.50 | 50 |
| LL3216N1R8 | 1.8±20%,10% | 45 | 10 | 55 | 0.50 | 50 |
| LL3216N2R2 | 2.2±20%,10% | 45 | 10 | 50 | 0.60 | 50 |
| LL3216N2R7 | 2.7±20%,10% | 45 | 10 | 45 | 0.60 | 50 |
| LL3216N3R3 | 3.3±20%,10% | 45 | 10 | 41 | 0.70 | 50 |
| LL3216N3R9 | 3.9±20%,10% | 45 | 10 | 38 | 0.80 | 50 |
| LL3216N4R7 | 4.7±20%,10% | 45 | 10 | 35 | 0.90 | 50 |
| LL3216N5R6 | 5.6±20%,10% | 50 | 4 | 32 | 0.70 | 25 |
| LL3216N6R8 | 6.8±20%,10% | 50 | 4 | 29 | 0.80 | 25 |
| LL3216N8R2 | 8.2±20%,10% | 50 | 4 | 26 | 0.90 | 25 |
| LL3216N100 | 10.0±20%,10% | 50 | 2 | 24 | 1.00 | 25 |
| LL3216N120 | 12.0±20%,10% | 50 | 2 | 22 | 1.05 | 15 |
| LL3216N150 | 15.0±20%,10% | 35 | 1 | 19 | 0.70 | 5 |
| LL3216N180 | 18.0±20%,10% | 35 | 1 | 18 | 0.70 | 5 |
| LL3216N220 | 22.0±20%,10% | 35 | 1 | 16 | 0.90 | 5 |
| LL3216N270 | 27.0±20%,10% | 35 | 1 | 14 | 0.90 | 5 |
| LL3216N330 | 33.0±20%,10% | 35 | 0.4 | 13 | 1.05 | 5 |

Inductance Tolerance

* Others values are available upon customer's request *



MULTILAYER CHIP INDUCTOR

Electrical Characteristic High Frequency * LH1005 (0402) Type*

| Part Number | Inductance (nH) | Q Min. | | | Self-Resonant Frequency (MHZ) | DC Resistance (Ω) Max . | Rated Current (mA) Max. |
|-------------|--------------------|--------|--------|---------|-------------------------------------|-------------------------------|-------------------------------|
| | | 100MHZ | 800MHZ | 1800MHZ | | | |
| LH1005N1N0 | 1.0±0.3 nH | 8 | 20 | 30 | 10000 | 0.12 | 300 |
| LH1005N1N2 | 1.2±0.3 nH | 8 | 20 | 28 | 10000 | 0.12 | 300 |
| LH1005N1N5 | 1.5±0.3 nH | 8 | 22 | 35 | 6000 | 0.13 | 300 |
| LH1005N1N8 | 1.8±0.3 nH | 8 | 22 | 35 | 6000 | 0.14 | 300 |
| LH1005N2N2 | 2.2±0.3 nH | 8 | 22 | 35 | 6000 | 0.16 | 300 |
| LH1005N2N7 | 2.7±0.3 nH | 8 | 22 | 35 | 6000 | 0.17 | 300 |
| LH1005N3N3 | 3.3±0.3 nH,10% | 8 | 22 | 35 | 6000 | 0.19 | 300 |
| LH1005N3N9 | 3.9±0.3 nH,10% | 8 | 22 | 32 | 4000 | 0.22 | 300 |
| LH1005N4N7 | 4.7±0.3 nH,10% | 8 | 22 | 32 | 4000 | 0.24 | 300 |
| LH1005N5N6 | 5.6±0.3 nH,10% | 8 | 22 | 29 | 4000 | 0.27 | 300 |
| LH1005N6N8 | 6.8±10%,5% | 8 | 21 | 29 | 3900 | 0.32 | 250 |
| LH1005N8N2 | 8.2±10%,5% | 8 | 21 | 29 | 3600 | 0.37 | 250 |
| LH1005N10N | 10.0±10%,5% | 8 | 21 | 28 | 3200 | 0.42 | 250 |
| LH1005N12N | 12.0±10%,5% | 8 | 20 | 27 | 2700 | 0.50 | 250 |
| LH1005N15N | 15.0±10%,5% | 8 | 20 | 21 | 2300 | 0.55 | 250 |
| LH1005N18N | 18.0±10%,5% | 8 | 20 | 15 | 2100 | 0.65 | 200 |
| LH1005N22N | 22.0±10%,5% | 8 | 20 | 13 | 1900 | 0.80 | 200 |
| LH1005N27N | 27.0±10%,5% | 8 | 17 | - | 1600 | 0.90 | 200 |
| LH1005N33N | 33.0±10%,5% | 8 | 17 | - | 1300 | 1.00 | 200 |
| LH1005N39N | 39.0±10%,5% | 8 | 16 | - | 1200 | 1.20 | 150 |
| LH1005N47N | 47.0±10%,5% | 8 | 15 | - | 1000 | 1.30 | 150 |
| LH1005N56N | 56.0±10%,5% | 8 | - | - | 750 | 1.40 | 150 |
| LH1005N68N | 68.0±10%,5% | 8 | - | - | 750 | 1.40 | 150 |
| LH1005N82N | 82.0±10%,5% | 8 | - | - | 600 | 1.60 | 100 |
| LH1005NR10 | 100.0±10%,5% | 8 | - | - | 600 | 1.60 | 100 |

Inductance Tolerance

* Others values are available upon customer's request*



MULTILAYER CHIP INDUCTOR

Electrical Characteristic High Frequency * LH1608 (0603) Type*

| Part Number | Inductance (nH) | Q Min | | Self-Resonant Frequency (MHZ) | DC Resistance (Ω) Max . | Rated Current (mA) Max. |
|-------------|--------------------|---------|-----------|-------------------------------------|-------------------------------|-------------------------------|
| | | 100MHZ. | 800MHZ | | | |
| LH1608N1N2 | 1.2±0.3 Nh | 8 | 20 | 10000 | 0.05 | 300 |
| LH1608N1N5 | 1.5±0.3 nH | 8 | 20 | 6000 | 0.10 | 300 |
| LH1608N1N8 | 1.8±0.3 nH | 8 | 20 | 6000 | 0.10 | 300 |
| LH1608N2N2 | 2.2±0.3 nH | 8 | 20 | 6000 | 0.10 | 300 |
| LH1608N2N7 | 2.7±0.3 nH | 10 | 25 | 6000 | 0.10 | 300 |
| LH1608N3N3 | 3.3±0.3 nH,10% | 10 | 25 | 6000 | 0.12 | 300 |
| LH1608N3N9 | 3.9±0.3 nH,10% | 10 | 27 | 6000 | 0.14 | 300 |
| LH1608N4N7 | 4.7±0.3 nH,10% | 10 | 27 | 4000 | 0.16 | 300 |
| LH1608N5N6 | 5.6±0.3 nH,10% | 10 | 27 | 4000 | 0.18 | 300 |
| LH1608N6N8 | 6.8±10%,5% | 10 | 27 | 4000 | 0.22 | 300 |
| LH1608N8N2 | 8.2±10%,5% | 10 | 26 | 3500 | 0.24 | 300 |
| LH1608N10N | 10.0±10%,5% | 12 | 26 | 3400 | 0.26 | 300 |
| LH1608N12N | 12.0±10%,5% | 12 | 24 | 2600 | 0.28 | 300 |
| LH1608N15N | 15.0±10%,5% | 12 | 24 | 2300 | 0.32 | 300 |
| LH1608N18N | 18.0±10%,5% | 12 | 24 | 2000 | 0.35 | 300 |
| LH1608N22N | 22.0±10%,5% | 12 | 25 | 1600 | 0.40 | 300 |
| LH1608N27N | 27.0±10%,5% | 12 | 25 | 1400 | 0.45 | 300 |
| LH1608N33N | 33.0±10%,5% | 12 | 24 | 1200 | 0.55 | 300 |
| LH1608N39N | 39.0±10%,5% | 12 | 20 | 1100 | 0.60 | 300 |
| LH1608N47N | 47.0±10%,5% | 12 | 20 | 900 | 0.77 | 300 |
| LH1608N56N | 56.0±10%,5% | 12 | 500MHZ 20 | 900 | 0.75 | 300 |
| LH1608N68N | 68.0±10%,5% | 12 | 500MHZ 20 | 700 | 0.85 | 300 |
| LH1608N82N | 82.0±10%,5% | 12 | 500MHZ 20 | 600 | 0.95 | 300 |
| LH1608NR10 | 100.0±10%,5% | 12 | 500MHZ 20 | 600 | 1.00 | 300 |
| LH1608NR12 | 120.0±10%,5% | 50MHZ 8 | - | 500 | 1.20 | 300 |
| LH1608NR15 | 150.0±10%,5% | 50MHZ 8 | - | 500 | 1.20 | 300 |
| LH1608NR18 | 180.0±10%,5% | 50MHZ 8 | - | 400 | 1.30 | 300 |
| LH1608NR22 | 220.0±10%,5% | 50MHZ 8 | - | 400 | 1.50 | 300 |
| LH1608NR27 | 270.0±10%,5% | 50MHZ 8 | - | 400 | 1.50 | 300 |

□ Inductance Tolerance * Others values are available upon customer's request *



MULTILAYER CHIP INDUCTOR

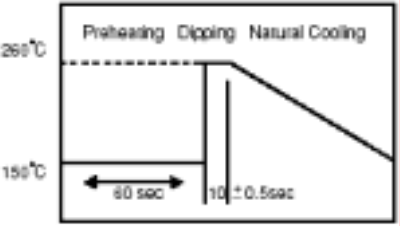
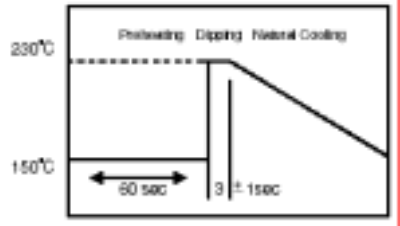
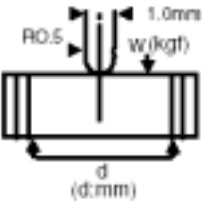
Electrical Characteristic High Frequency * LH2012 (0805) Type*

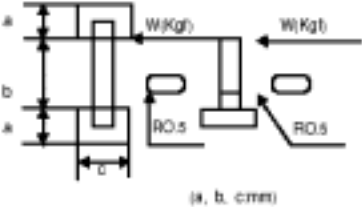
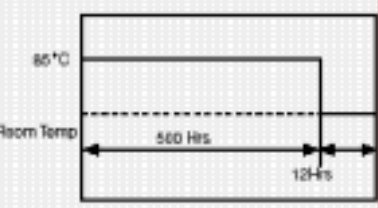
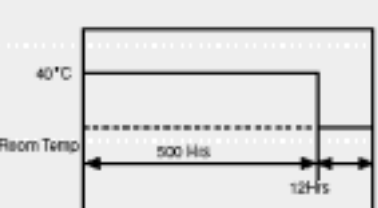
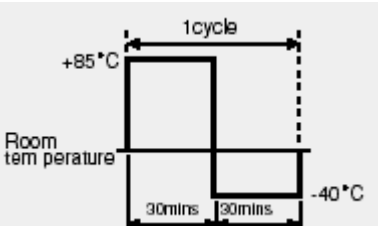
| Part Number | Inductance (nH) | Q Min. | L,Q Test Frequency (MHZ) | Self-Resonant Frequency (MHZ) | DC Resistance (Ω) Max . | Rated Current (mA) Max. |
|-------------|-----------------|--------|--------------------------|-------------------------------|----------------------------------|-------------------------|
| LH2012N1N5 | 1.5±0.3 nH | 10 | 100 | 4000 | 0.10 | 300 |
| LH2012N1N8 | 1.8±0.3 nH | 10 | 100 | 4000 | 0.10 | 300 |
| LH2012N2N2 | 2.2±0.3 nH | 10 | 100 | 4000 | 0.10 | 300 |
| LH2012N2N7 | 2.7±0.3 nH | 12 | 100 | 4000 | 0.10 | 300 |
| LH2012N3N3 | 3.3±0.3 nH,10% | 12 | 100 | 4000 | 0.13 | 300 |
| LH2012N3N9 | 3.9±0.3 nH,10% | 12 | 100 | 4000 | 0.15 | 300 |
| LH2012N4N7 | 4.7±0.3 nH,10% | 12 | 100 | 3500 | 0.20 | 300 |
| LH2012N5N6 | 5.6±0.3 nH,10% | 15 | 100 | 3200 | 0.23 | 300 |
| LH2012N6N8 | 6.8±10%,5% | 15 | 100 | 2800 | 0.25 | 300 |
| LH2012N8N2 | 8.2±10%,5% | 15 | 100 | 2400 | 0.28 | 300 |
| LH2012N10N | 10.0±10%,5% | 15 | 100 | 2100 | 0.30 | 300 |
| LH2012N12N | 12.0±10%,5% | 15 | 100 | 1900 | 0.35 | 300 |
| LH2012N15N | 15.0±10%,5% | 15 | 100 | 1600 | 0.40 | 300 |
| LH2012N18N | 18.0±10%,5% | 15 | 100 | 1500 | 0.45 | 300 |
| LH2012N22N | 22.0±10%,5% | 18 | 100 | 1400 | 0.50 | 300 |
| LH2012N27N | 27.0±10%,5% | 18 | 100 | 1300 | 0.55 | 300 |
| LH2012N33N | 33.0±10%,5% | 18 | 100 | 1200 | 0.60 | 300 |
| LH2012N39N | 39.0±10%,5% | 18 | 100 | 1000 | 0.65 | 300 |
| LH2012N47N | 47.0±10%,5% | 18 | 100 | 900 | 0.70 | 300 |
| LH2012N56N | 56.0±10%,5% | 18 | 100 | 800 | 0.75 | 300 |
| LH2012N68N | 68.0±10%,5% | 18 | 100 | 700 | 0.80 | 300 |
| LH2012N82N | 82.0±10%,5% | 18 | 100 | 600 | 0.90 | 300 |
| LH2012NR10 | 100.0±10%,5% | 18 | 100 | 600 | 0.90 | 300 |
| LH2012NR12 | 120.0±10%,5% | 13 | 50 | 500 | 0.95 | 300 |
| LH2012NR15 | 150.0±10%,5% | 13 | 50 | 500 | 1.00 | 300 |
| LH2012NR18 | 180.0±10%,5% | 13 | 50 | 400 | 1.00 | 300 |
| LH2012NR22 | 220.0±10%,5% | 12 | 50 | 350 | 1.20 | 300 |
| LH2012NR27 | 270.0±10%,5% | 12 | 50 | 300 | 1.30 | 300 |
| LH2012NR33 | 330.0±10%,5% | 12 | 50 | 250 | 1.40 | 300 |
| LH2012NR39 | 390.0±10%,5% | 10 | 50 | 250 | 1.50 | 300 |
| LH2012NR47 | 470.0±10%,5% | 10 | 50 | 200 | 1.50 | 300 |

Inductance Tolerance * Others values are available upon customer's request *

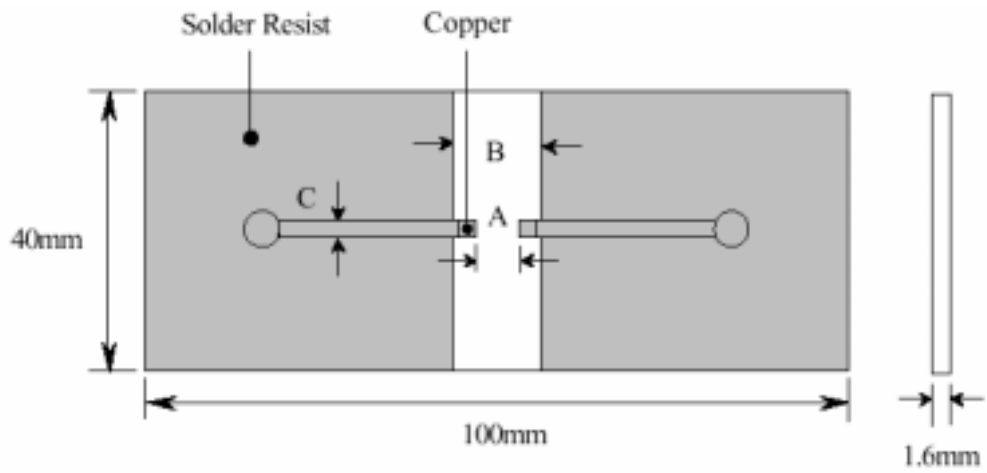
4. Reliability And Test Condition

Requirement : 1005 1608 2012 3216

| Item | Specification | Test Conditions |
|---|---|--|
| (1)Operating Temp.Rang | -40 ~ + 85 | |
| (2)Storage Temp. Range Humidity Range | -40 ~ + 85 70% RH MAX | |
| (3)Resistance to Solder Heat  | The chip shall not be cracks. More than 75% of the terminal Electrode shall be covered with New solder . | Preheat Temp:100~150 Preheat Time:60sec Solder Temp:260±5 Dipping Time:10 ±1sec |
| (4)Solderability  | More than 75% of the terminal Electrode shall be covered with New solder . | Preheat Temp:100~150 Preheat Time:60sec Solder Temp:230±5 Dipping Time:3 ±1sec Sn / Pb : Solder Temperature : 230 ± 5 °C Dip Time : 3 ± 1 sec. Solder : H63A Flux : RMA Type Preheat : At 80~120 °C For 10~30 sec. Pb Free : Solder Temperature : 250 ± 5 °C Dip Time : 3 ±1 sec. Solder : H63A Flux : RMA Type Preheat : At 80~120 °C For 10~30 sec. Hand Soldering : Solder Temperature : Sn/Pb 230 ~ 280 °C Pb Free 250 ~ 300 °C Use a 20W Soldering Iron And The Soldering Iron Should Not Directly Touch Inductor |
| (5)Bending strength  | (1) The Ferrite shall not be Damaged by the force on the right . (2) Impedance change : within±10 % | Recommend Applied force :5N Duration : 10sec |

| tem | Specification | Test Conditions | | | | | | | | | | | | | | | | | | | | |
|---|---|--|-----|---|---|---|---------------|-----|-----|-----|---------------|-----|-----|-----|---------------|-----|-----|-----|---------------|-----|-----|-----|
| <p>(6)Flexure Strength</p>  <p>(a, b, c:cm)</p> | <p>(1) No mechanical damage shall Be noticed even when the board is bent 2mm(0.079inches)</p> | <table border="1"> <thead> <tr> <th></th> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <tr> <td>(LL,LH)100505</td> <td>0.5</td> <td>0.5</td> <td>1.0</td> </tr> <tr> <td>(LL,LH)160808</td> <td>0.8</td> <td>0.8</td> <td>1.3</td> </tr> <tr> <td>(LL,LH)201209</td> <td>1.0</td> <td>1.0</td> <td>1.3</td> </tr> <tr> <td>(LL,LH)321611</td> <td>1.3</td> <td>1.5</td> <td>3.0</td> </tr> </tbody> </table> <p>W(kgf) > 500 g.f</p> | | a | b | c | (LL,LH)100505 | 0.5 | 0.5 | 1.0 | (LL,LH)160808 | 0.8 | 0.8 | 1.3 | (LL,LH)201209 | 1.0 | 1.0 | 1.3 | (LL,LH)321611 | 1.3 | 1.5 | 3.0 |
| | a | b | c | | | | | | | | | | | | | | | | | | | |
| (LL,LH)100505 | 0.5 | 0.5 | 1.0 | | | | | | | | | | | | | | | | | | | |
| (LL,LH)160808 | 0.8 | 0.8 | 1.3 | | | | | | | | | | | | | | | | | | | |
| (LL,LH)201209 | 1.0 | 1.0 | 1.3 | | | | | | | | | | | | | | | | | | | |
| (LL,LH)321611 | 1.3 | 1.5 | 3.0 | | | | | | | | | | | | | | | | | | | |
| <p>(7)Heat Resistance (High Temp. Load)</p>  | <p>(1) No mechanical damage. (2) Impedance change : within±10 % (3) Q change : within 30%</p> | <p>Temperature :(85±2) Time : 500 hours Applied current :Rated current</p> | | | | | | | | | | | | | | | | | | | | |
| <p>(8)Humidity Resistance</p>  | <p>(1)No mechanical damage. (2) Impedance change : within±10 % (3) Q change : within 30%</p> | <p>Temperature :(40±2) (104) Humidity:90~95% RH Time : 500±12 hours Applied current :Rated current</p> | | | | | | | | | | | | | | | | | | | | |
| <p>(9)Thermal Shock (Temperature Cycle)</p>  | <p>(1) No mechanical damage (2) Impedance change : within±10 % (3) Q change : within 30%</p> | <p>-40 ~ +85 for 30 minutes each , 100 cycle Measurement : After placing for 24 hours</p> | | | | | | | | | | | | | | | | | | | | |
| <p>(10)Drop</p> | <p>(1) No mechanical damage (2) Impedance change : within±10 %</p> | <p>Dropped 10 times on A concrete floor from A height of 91cm (35.827 inches)</p> | | | | | | | | | | | | | | | | | | | | |
| <p>(11)Vibration</p> | <p>(1) No mechanical damage. (2) Impedance change : within±30 %</p> | <p>Frequency:10~55Hz Amplitude:1.52mm (0.060 inches) Direction and time :X,Y,Z Directions for 1 hs each</p> | | | | | | | | | | | | | | | | | | | | |

5. P.C. Board for Bending Strength Test



Unit : mm

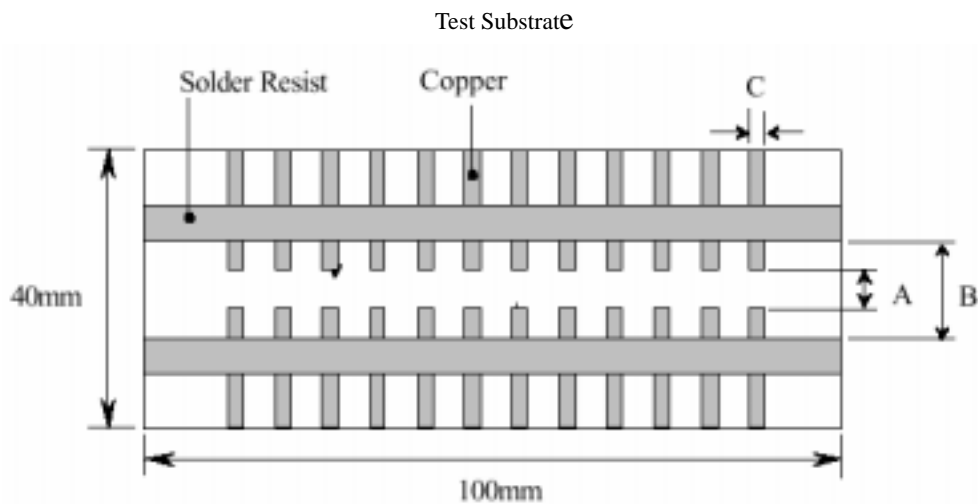
| Code | A | B | C |
|------|-----|-----|-----|
| 0402 | 0.4 | 1.4 | 0.5 |
| 0603 | 1.0 | 3.0 | 1.0 |
| 0805 | 1.2 | 4.0 | 1.6 |
| 1206 | 2.2 | 5.0 | 2.0 |

Test Substrate

Material: Glass Epoxy Substrate

Copper (Thickness : 0.035mm)

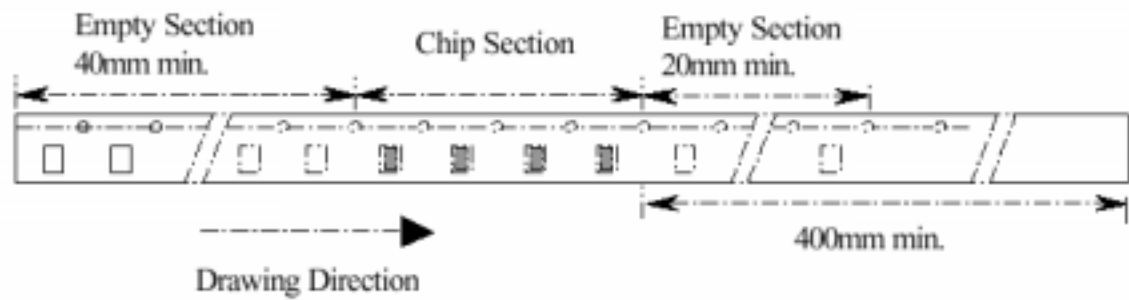
Solder Resist



(Unit: mm)

| Code | A | B | C |
|------|-----|-----|-----|
| 0402 | 0.4 | 1.4 | 0.5 |
| 0603 | 1.0 | 3.0 | 1.0 |
| 0805 | 1.2 | 4.0 | 1.6 |
| 1206 | 2.2 | 5.0 | 2.0 |

6. Packaging



6-1. Material And Quantity

| Size | EIA Code | Thickness (mm) | 7 " Reel |
|------|----------|----------------|--------------------|
| 1005 | 0402 | T 0.6 | 10K pcs / Reel |
| 1608 | 0603 | T 0.95 | 4K pcs / Reel |
| 2012 | 0805 | T 0.95 | 4K pcs / Reel |
| | | 0.95 < T | 3K / 2K pcs / Reel |
| 3216 | 1206 | T 0.95 | 4K pcs / Reel |
| | | 0.95 < T | 3K pcs / Reel |

V

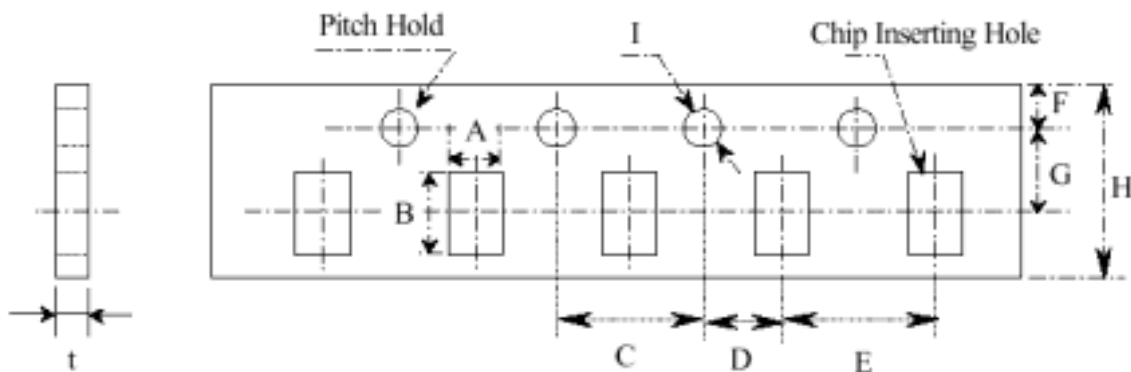
6-2. Peel-Off Force : 5 g . f Peel-Off Force 70 g . f

Cover Tape reel Off Force



The for peel off cover tape is 5 to 70 grams in the arrow direction.

6-3. Paper Tape

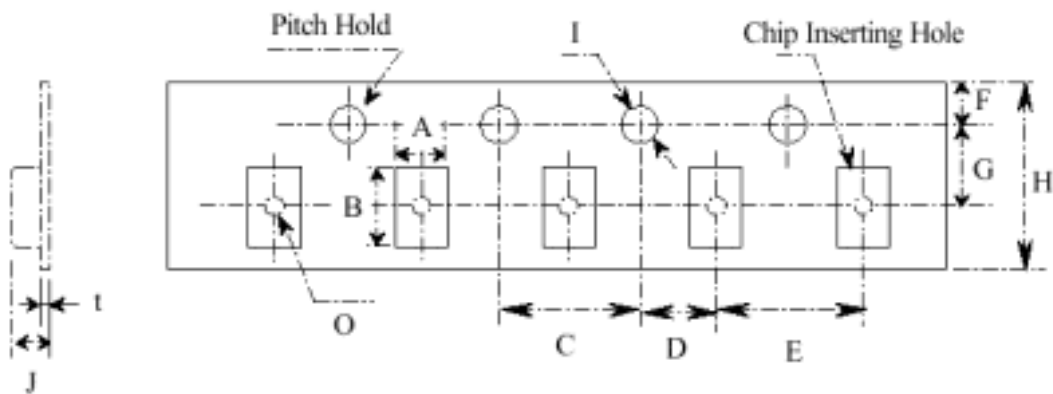


(Unit: mm)

| Code | A | B | C | D | E |
|------|-----------------|---------------|---------------|----------------|---------------|
| 0402 | 0.61 ± 0.10 | 1.2 ± 0.1 | 2.0 ± 0.1 | 1.0 ± 0.05 | 2.0 ± 0.1 |
| 0603 | 1.10 ± 0.20 | 1.9 ± 0.2 | 4.0 ± 0.1 | 2.0 ± 0.05 | 4.0 ± 0.1 |
| 0805 | 1.50 ± 0.20 | 2.3 ± 0.2 | | | |

| Code | F | G | H | I | t |
|------|----------------|----------------|---------------|-------------------|--------------------|
| 0402 | 1.75 ± 0.1 | 3.5 ± 0.05 | 8.0 ± 0.3 | $1.5 + 0.1 / - 0$ | 0.70 Max |
| 0603 | | | | | 0.95 Max |
| 0805 | | | | | 1.05 Max |

6-4. Plastic Tape



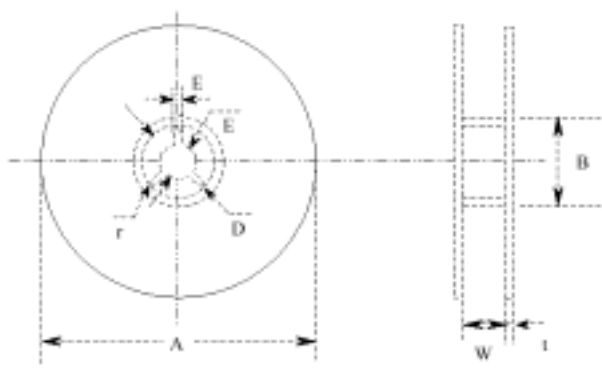
(Unit: mm)

| Code | A | B | C | D | E | F |
|------|---------------|---------------|---------------|----------------|---------------|----------------|
| 0805 | 1.5 ± 0.2 | 2.3 ± 0.2 | 4.0 ± 0.1 | 2.0 ± 0.05 | 4.0 ± 0.1 | 1.75 ± 0.1 |
| 1206 | 1.9 ± 0.2 | 3.5 ± 0.2 | | | | |

| Code | G | H | I | J | t | J |
|------|----------------|---------------|-------------------|--------------------|--------------------|--------------------|
| 0805 | 3.5 ± 0.05 | 8.0 ± 0.3 | $1.5 + 0.1 / - 0$ | 1.05 Max | 0.3 max. | 1.5 min. |
| 1206 | | | | 1.90 Max | | |

6-5. Reel Dimensions

Reel Material : Polystyrene



| Tape Size | 7 " Reel | |
|-----------|----------|------|
| | 8mm | 12mm |
| A | 178±2 | |
| B | 50±2 | |
| C | 13±0.5 | |
| D | 21±1 | |
| E | 2±0.5 | |
| W | 10±1.5 | 14±2 |
| T | 1.5±0.5 | |
| r | 1.0 | |

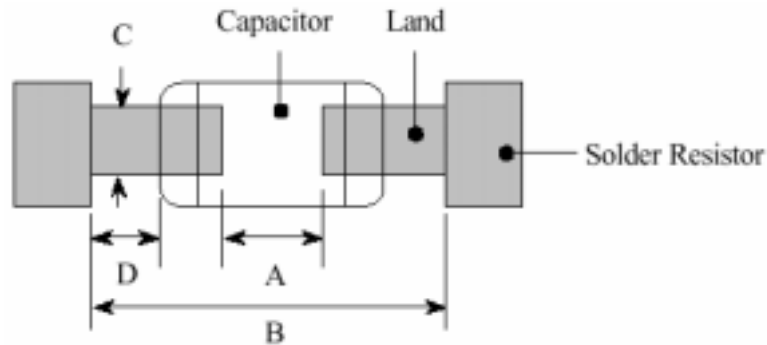
7. Precaution Of Usage

7-1.Storage

Store the Inductor where the temperature and relative humidity don't exceed 40°C and 70°RH.

We recommend you use Inductors within 6 months from the manufactured date. In case of packaging, don't the last wrapped , polyethylene bag, till just before using. If it is opened, seal it as soon as possible or keep it in a desiccant with a desiccation agent.

7-2. Size and recommend land dimensions.



Unit : mm

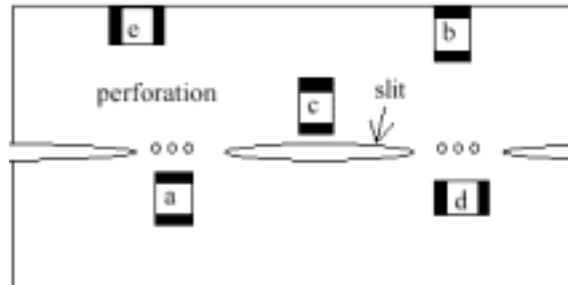
| Code | Chip Capacitor | | Land | | | |
|------|----------------|------|---------|---------|---------|---------|
| | L | W | A | B | C | D |
| 0402 | 1.00 | 0.05 | 0.3~0.5 | 1.3~1.5 | 0.3~0.5 | 0.1~0.3 |
| 0603 | 1.60 | 0.80 | 0.6~0.8 | 1.9~2.1 | 0.6~0.8 | 0.2~0.5 |
| 0805 | 2.00 | 1.25 | 0.8~1.2 | 2.4~3.2 | 0.9~1.2 | 0.2~0.6 |
| 1206 | 3.20 | 1.60 | 1.8~2.5 | 3.8~4.8 | 1.2~1.6 | 0.3~0.8 |

7-3..Mechanical strength varies according to location of chip Inductor the P.C. board.

Design layout of components on the PC board to minimize the stress imposed on the wrap or flexure of the board.

Component layout close to board break

Susceptibility to stress is in the order of : $a > b > c$ $d > e$



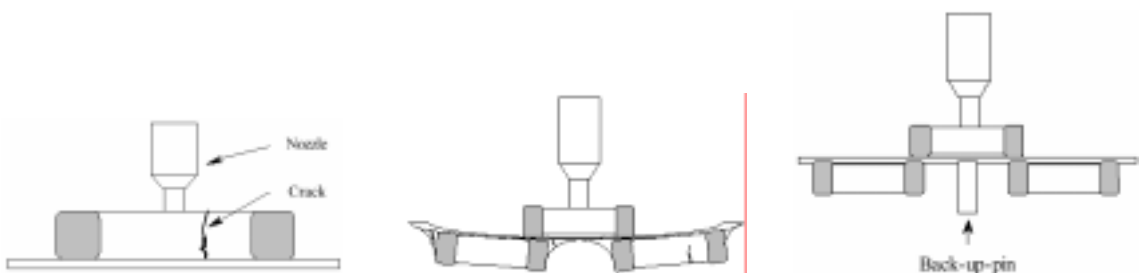
7-4.Layout Recommendation

| Example | Use of Common Solder Land | Solder With Chassis | Use of Common Solder Land With Other SMD |
|----------------|---------------------------|---------------------|--|
| Need to Avoid | | | |
| Recommendation | | | |

7-5. Mounting

Crack is caused by impact load due to suction nozzle at the mounted.

In mounting an element to board, If the low dead point is too low , excessive stress is applied to element. This will cause cracking. In this case, it is required to shift the low dead point of a suction nozzle to the upper surface of board so that warping of board is eliminated. Nozzle pressure is adjusted to 1N to 3N(static load)during mounting.



To Fix Board With Support Pin (OK)

If board is warped during mounting, crack or peeling of soldering will be caused. To avoid this, it is required to fix the board with back up pins or the like to avoid warping. Also, similar precautions are required when inserting a part with lead.

7-6. Amount of Adhesive



| Example : 0805 & 1206 Size MLCC | |
|---------------------------------|------------------------------|
| A | 0.2mm (min) |
| B | 70 ~ 100 μ M |
| C | Do Not Touch The Solder Land |

7-7. Soldering

7-7-1. Avoiding Thermal Shock

(a). preheat Condition

Carefully perform pre-heating so that the temperature difference (ΔT) between the solder and component surface should be in the follow range.

| Soldering Method | 3.2x1.6mm max. | 3.2x1.6mm min. |
|------------------|------------------|------------------|
| Reflow method | ΔT 190°C | ΔT 190°C |
| Immersion method | ΔT 150°C | ΔT 100°C |

(b). Colling Condition

Natural colling using air is recommended. If the chips are dipped into a solvent for cleaning, the temperature difference (ΔT) must be less than 100°C

7-7-2. Recommend Soldering Profile By various Methods

Infrared reflow soldering standard condition Iron/immersion soldering standard condition

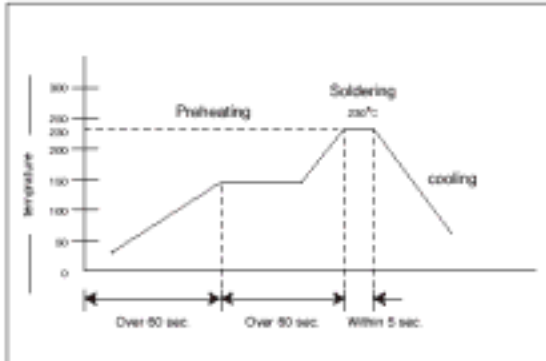
7-7-3. Amount of Solder

Excessive solder will induce higher tensile force in chip Bead when temperature change and it may result in chip cracking. In Sufficient solder may detach the Inductor from the P.C. board.

Soldering recommendation :

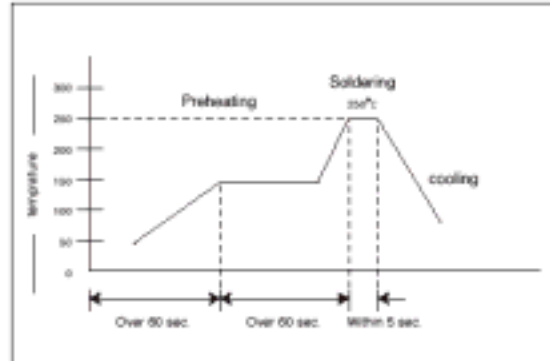
Sr/Pb Plating

Reflow

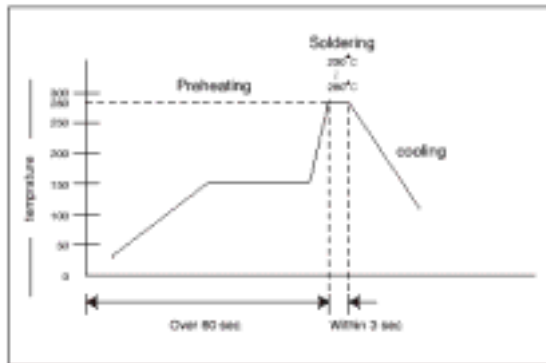


Pb-Free (Sn 100%) Plating

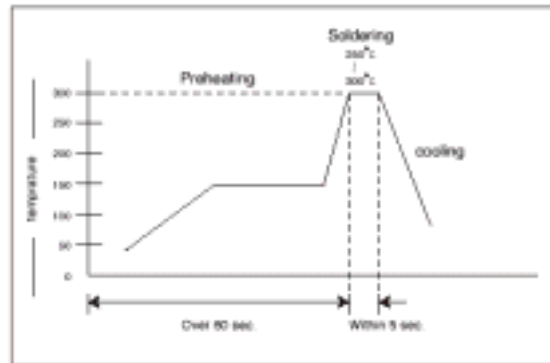
Reflow



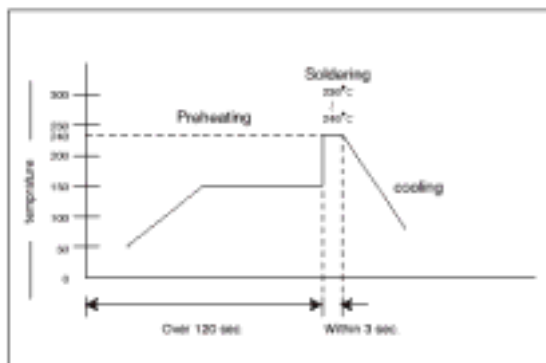
Solder Iron



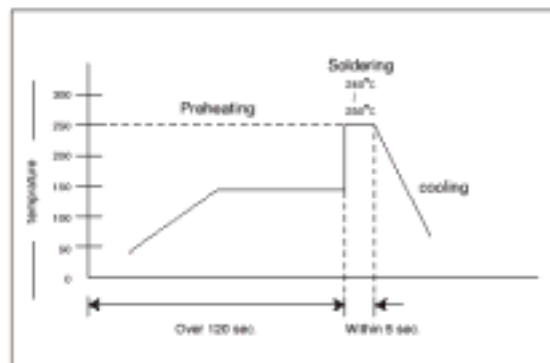
Solder Iron

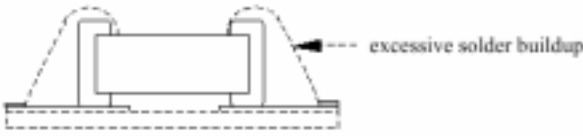





Flow



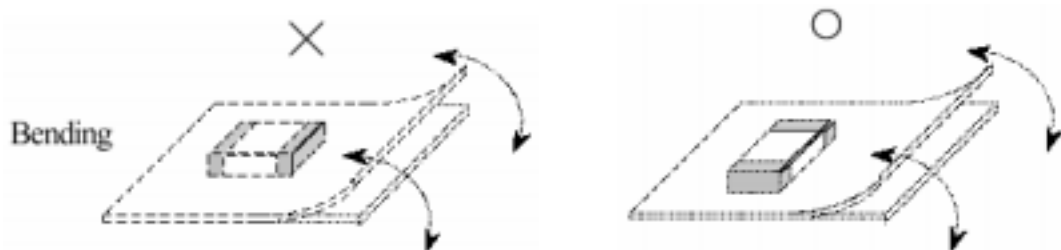
Flow



| | |
|---------------------------------|---|
| Excessive Solder |  |
| Adequate |  |
| Insufficient Solder |  |
| Solder buildup by Reflow method |  |

7-8. Caution : Handling after chip mounted

7-8-1. Please pay attention put the component lateral to the direction in which stress acts.



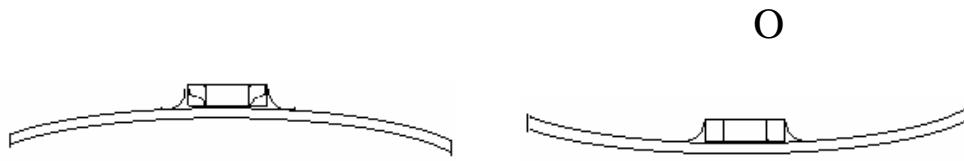
7-8-2. Crack Will be caused if board is warped due to excessive load by check pin.



7-8-3. Mechanical stress due to warping and torsion by dividing.

(a) Crack occurrence ratio will be increased by manual separation.

(b) Crack occurrence ratio will be increased by tensile force, rather than compressive force.



7-8-4. Handling to Loose Chip Inductor

- (a) IF dropped the chip Inductor may crack.
- (b) Piling the P.C.board after mounting for storage or handling, the corner of the P.C. board may hit the chip Inductor of another of board to cause crack.

