

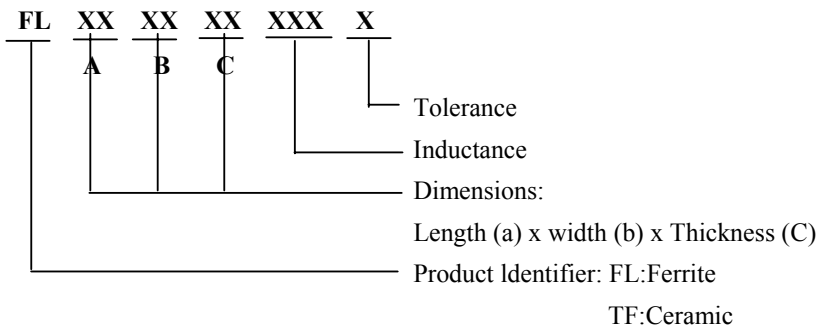


SPECIFICATION

CUSTOMER MARITEX	CUSTOMER P/N FL321611-SERIES-LFR	REV. ORIG	SPL. LOT NO.	
PART NAME CHIP INDUCTORS (ROHS)	FRONTIER P/N FL321611-SERIES-LFR	REV. ORIG	DATE OF ISSUE 06/30/'08	Q'TY

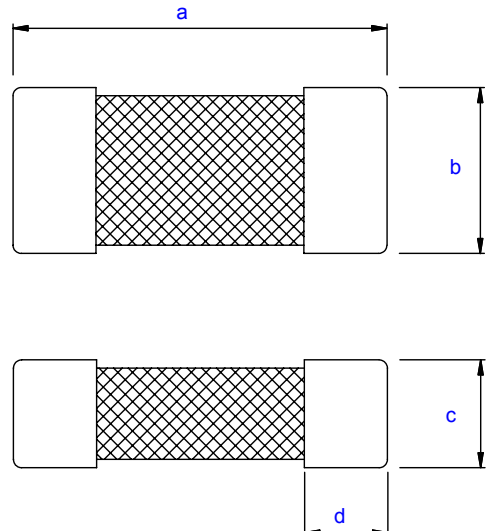
★Scope: This specification applies to multi-layer ferrite & ceramic-chip inductors.

1. Part Number Key & Mechanical Drawing



Dimensions :Unit: mm/(INCH)

Package Size	a	b	c	d
100505 (0402)	1.0±0.1 (0.04±0.004)	0.5±0.1 (0.020±0.004)	0.5±0.1 (0.020±0.004)	0.1 Min. (0.004 Min.)
160808 (0603)	1.6±0.2 (0.063±0.008)	0.8±0.2 (0.031±0.008)	0.8±0.2 (0.031±0.008)	0.3±0.2 (0.012±0.008)
201209 (0805)	2.0±0.2 (0.079±0.008)	1.2±0.2 (0.047±0.008)	0.9±0.2 (0.035±0.008)	0.5±0.3 (0.020±0.012)
201212 (0805)	2.0±0.2 (0.079±0.008)	1.2±0.2 (0.047±0.008)	1.2±0.2 (0.047±0.008)	0.5±0.3 (0.020±0.012)
321611 (1206)	3.2±0.2 (0.0126±0.008)	1.6±0.2 (0.063±0.008)	1.1±0.2 (0.043±0.008)	0.5±0.3 (0.020±0.012)
321616 (1206)	3.2±0.2 (0.126±0.008)	1.6±0.2 (0.063±0.008)	1.6±0.2 (0.063±0.008)	0.5±0.3 (0.020±0.012)





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ELECTRICAL

Part Number	L (μ H)	Q MIN	L · Q TEST Frequency (MHz)	SRF MHz MIN	DCR (Ω) MAX.	RETED CURRENT (mA) MAX.
FL321611-47NK-LFR	0.047 \pm 20%	20	50	320	0.15	300
FL321611-68NK-LFR	0.068 \pm 20%	20	50	280	0.25	300
FL321611-R10K-LFR	0.10 \pm 10%	20	25	235	0.25	250
FL321611-R12K-LFR	0.12 \pm 10%	20	25	220	0.30	250
FL321611-R15K-LFR	0.15 \pm 10%	20	25	200	0.30	250
FL321611-R18K-LFR	0.18 \pm 10%	20	25	185	0.40	250
FL321611-R22K-LFR	0.22 \pm 10%	20	25	170	0.40	250
FL321611-R27K-LFR	0.27 \pm 10%	20	25	150	0.50	250
FL321611-R33K-LFR	0.33 \pm 10%	20	25	145	0.60	250
FL321611-R39K-LFR	0.39 \pm 10%	25	25	135	0.50	200
FL321611-R47K-LFR	0.47 \pm 10%	25	25	125	0.60	200
FL321611-R56K-LFR	0.56 \pm 10%	25	25	115	0.70	150
FL321611-R68K-LFR	0.68 \pm 10%	25	25	105	0.80	150
FL321611-R82K-LFR	0.82 \pm 10%	25	25	100	0.90	150
FL321611-1R0K-LFR	1.0 \pm 10%	45	10	75	0.40	100
FL321611-1R2K-LFR	1.2 \pm 10%	45	10	65	0.50	100
FL321611-1R5K-LFR	1.5 \pm 10%	45	10	60	0.50	50
FL321611-1R8K-LFR	1.8 \pm 10%	45	10	55	0.50	50
FL321611-2R2K-LFR	2.2 \pm 10%	45	10	50	0.60	50
FL321611-2R7K-LFR	2.7 \pm 10%	45	10	45	0.60	50
FL321611-3R3K-LFR	3.3 \pm 10%	45	10	41	0.70	50
FL321611-3R9K-LFR	3.9 \pm 10%	45	10	38	0.80	50
FL321611-4R7K-LFR	4.7 \pm 10%	45	10	35	0.90	50
FL321611-5R6K-LFR	5.6 \pm 10%	50	4	32	0.70	25
FL321611-6R8K-LFR	6.8 \pm 10%	50	4	29	0.80	25
FL321611-8R2K-LFR	8.2 \pm 10%	50	4	26	0.90	25
FL321611-100K-LFR	10 \pm 10%	50	2	24	1.00	25
FL321611-120K-LFR	12 \pm 10%	50	2	22	1.05	15
FL321611-150K-LFR	15 \pm 10%	35	1	19	0.70	5
FL321611-180K-LFR	18 \pm 10%	35	1	18	0.70	5
FL321611-220K-LFR	22 \pm 10%	35	1	16	0.90	5
FL321611-270K-LFR	27 \pm 10%	35	1	14	0.90	5
FL321611-330K-LFR	33 \pm 10%	35	1	13	1.05	5

TEST INSTRUMENT: HP4291B & Zentech 502BC

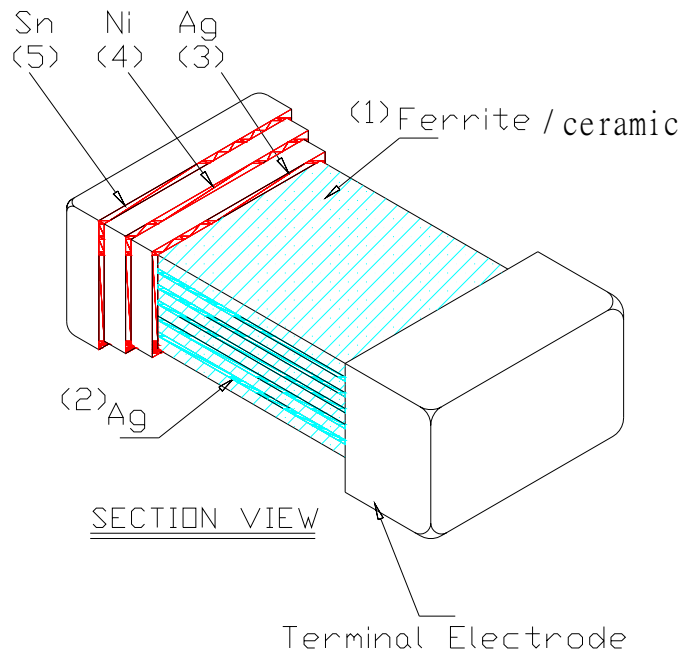
Inductance tolerance: K: \pm 10%、L: \pm 15%、M: \pm 20%



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2. Construction:



NO	Specifications	Material
1.	Ferrite & ceramic dielectric	Ni-Cu-Zn-Fe
2.	Internal Electrode	Ag
3.		Inner layer Ag
4.	End Termination	Middle layer Ni
5.		Outer layer Sn



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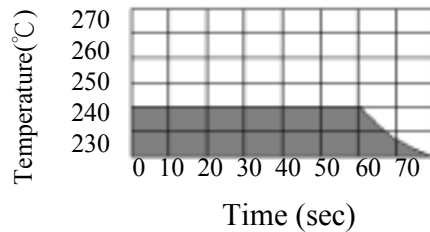
3. Reflow soldering conditions

- Pre—heating should be in such a way that the temperature difference between solder and ferrite surface is limited to 150°C max. Also cooling into solvent after soldering should be in such a way that the temperature difference is limited to 100°C max.

Unenough 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.



(Melting area of solder)

3-1. Reworking with soldering iron

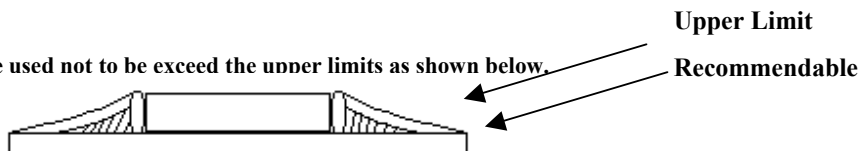
Preheating	150°C, 1minute
Tip temperature	280°C max
Soldering time	3seconds max.
Soldering iron output	30w max.
End of soldering iron	§ 3mm max.

- 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.

3-2. 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.



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4. EQUIPMENT


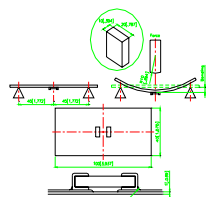
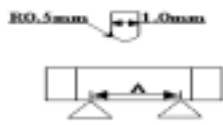
4-1. IMPEDANCE:

Impedance shall be measured with HP—4291A impedance analyzer or equivalent system.

4-2. DC RESISTANCE:

DC resistance shall be measured using digital mili—ohm meter with 4 terminal method.

5. MECHANICAL CHARACTERISTICS:

ITEM	REQUIREMENTS	TEST CONDITIONS
TERMINAL STRENGTH	THE TERMINAL ELECTRODE AND THE FERRITE MUST NOT BE DAMAGED BY THE FORCE APPLIED ON THE RIGHT CONDITIONS.	AFTER SOLDERING A LEAD WIRE TO A TERMINAL ELECTRODE, APPLY A LOAD POWER IN THE ARROW DIRECTION. 
FLEXURE STRENGTH	THE TERMINAL ELECTRODE AND THE FERRITE MUST NOT BE DAMAGED BY THE FORCE APPLIED ON THE RIGHT CONDITIONS.	AFTER SOLDERING A CHIP TO A TEST SUBSTRATE, BEND THE SUBSTRATE BY 2M/M AND THEN RETURN. 
BODY STRENGTH	THE FERRITE SHALL NOT BE DAMAGED BY FORCES APPLIED ON THE RIGHT SPECIFICATION $\geq 1.0W(Kgf)$ (mm) (INCHES) A : 0.9 0.04	 
RESISTANCE TO SOLDER HEAT	THE CHIPS MUST HAVE NO CRACKS. MORE THAN 75% OF THE TERMINAL ELECTRODE MUST BE COVERED WITH NEW SOLDER. IMPEDANCE & RDC SHALL BE WITHIN $\pm 30\%$ of the initial value. Inductance: within $\pm 20\%$ of initial value.	PREHEAT TEMP : 100 TO 150°C PREHEAT TIME : 1 MINUTE SOLDER TEMP : 275 \pm 5°C DIPPING TIME : 5 \pm 1sec
SOLDER—ABILITY	MORE THAN 90% OF THE TERMINAL ELECTRODES SHALL BE COVERED WITH NEW SOLDER.	PREHEAT TEMP : 100 TO 150°C PREHEAT TIME : 1 MINUTE SOLDER TEMP : 215 \pm 5°C DIPPING TIME : 3 \pm 1sec



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6. RELIABILITY AND TEST CONDITIONS

6-1. HIGH TEMPERATURE RESISTANCE

- a. Performance specification
 - 1. Appearance : no mechanical damage
 - 2. Impedance shall be with $\pm 30\%$ of the initial value
- b. Test condition
 - 1. Temperature $125^{\circ}\text{C} \pm 2^{\circ}\text{C}$
 - 2. Applied current : Rated current
 - 3. Testing time : 1008 ± 12 hrs (maximum value)
 - 4. Measurement : After placing at room ambient temperature for 24 hours minimum

6-2. HUMIDITY RESISTANCE

- a. Performance specification
 - 1. Appearance : no mechanical damage
 - 2. Impedance shall be with $\pm 30\%$ of the initial value
- b. Test condition
 - 1. Humidity : 90 to 95% RH
 - 2. Temperature : $40 \pm 2^{\circ}\text{C}$
 - 3. Applied current : Rated current (maximum value)
 - 4. Testing time : 1008 ± 12 hours
 - 5. Measurement : After placing at room ambient temperature for 24 hours minimum

6-3. TEMPERATURE CYCLE

- a. Performance specification
 - 1. Appearance : no mechanical damage
 - 2. Impedance shall be with $\pm 30\%$ of the initial value
- b. Test condition
 - 1. Temperature $-55^{\circ}\text{C}, +125^{\circ}\text{C}$ kept stabilized for 30 minutes each
 - 2. Cycle : 100 cycles
 - 3. Measurement : After placing for 24hours minimum at room ambient temperature
 - 4. step1. -55°C temp $\pm 3^{\circ}\text{C}$ 30 ± 3 minutes
 - step2. Room temperature 2to5 minutes
 - step3. $+125^{\circ}\text{C}$ temp $\pm 2^{\circ}\text{C}$ 30 ± 3 minutes
 - step4. room temperature 2to5 minutes

6-4. LOW TEMPERATURE STORAGE LIFE TEST

- a. Performance specification
 - 1. Appearance : no mechanical damage
 - 2. Impedance shall be with $\pm 30\%$ of the initial value
- b. Test condition
 - 1. Temperature $-55^{\circ}\text{C} \pm 2^{\circ}\text{C}$
 - 2. Testing time : 1008 ± 12 hours
 - 3. Measurement : After placing for 24 hours minimum at room ambient temperature



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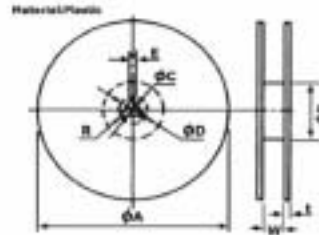
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7. Packaging

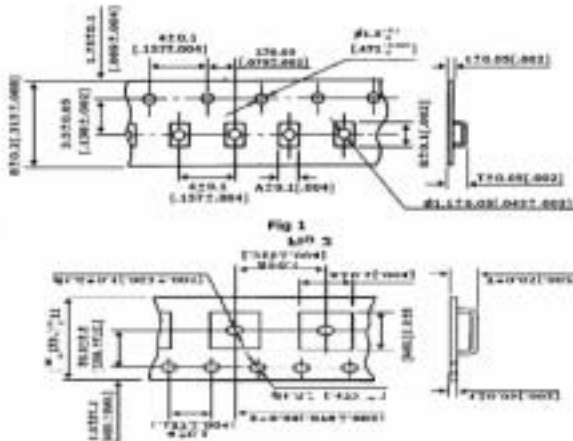
7-1. Packaging Quantities

Type	T (Ø178mm) [7.008 inches] reel	T (Ø330mm) [12.992 inches] reel
1005	1000 pcs./reel	-----
1608	400 pcs./reel	1000 pcs./reel
2012	400 pcs./reel	1000 pcs./reel
3216	200 pcs./reel	1000 pcs./reel
3225	200 pcs./reel	1000 pcs./reel
4516	200 pcs./reel	1000 pcs./reel
4532	100 pcs./reel	500 pcs./reel

7-3. Reel Dimensions



7-2. Carrier TAPE DIMENSIONS

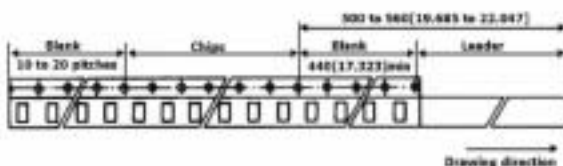
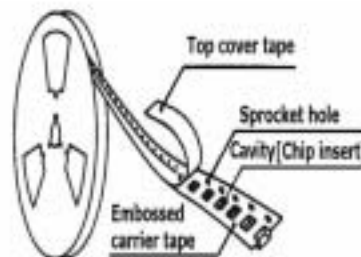


Symbol	T (Ø178mm) [7.008 inches] reel	T (Ø330mm) [12.992 inches] reel
A	Ø178±2 [7.008±0.079]	Ø330±2 [12.992±0.079]
B	Ø10±2 [2.952±0.079]	Ø10±2 [3.937±0.079]
C	Ø13±0.8 [3.512±0.031]	Ø13±0.8 [3.512±0.031]
D	Ø21±0.8 [5.827±0.031]	Ø21±0.8 [5.827±0.031]
E	2±0.05 [0.079]	2±0.05 [0.079]
WR [Ø15]	10±1.5 [3.094±0.039]	10±1.5 [3.094±0.039]
W12 [Ø12]	14.5±1.5 [3.571±0.039]	14.5±1.5 [3.571±0.039]
T	2±0.5 [0.079±0.025]	2±0.5 [0.079±0.025]
R	100±0.5 [0.039]	100±0.5 [0.039]

Type	A	B	T	t	Fig
1005	0.65 [.026]	1.15 [.045]	0.8 [.031]	0.2 [.008]	1
1608	1.1 [.043]	1.9 [.075]	1.1 [.043]	0.2 [.008]	1
2012	1.55 [.061]	2.3 [.091]	1.2 [.047]	0.2 [.008]	1
3216	1.9 [.075]	3.5 [.138]	1.4 [.055]	0.2 [.008]	1
3225	2.9 [.114]	3.6 [.142]	1.7 [.067]	0.25 [.010]	1
4516	2.9 [.114]	4.9 [.193]	1.4 [.055]	0.3 [.012]	2
4532	3.6 [.142]	4.9 [.193]	2.05 [.081]	0.3 [.012]	2

7-4. Reel and Carrier Diagram

Carrier tape material: Polystyrene
Cover tape material: Polystyrene





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7-5. STRENGTH OF COVER TAPE:

Cover tape (20g~120g)



Test condition

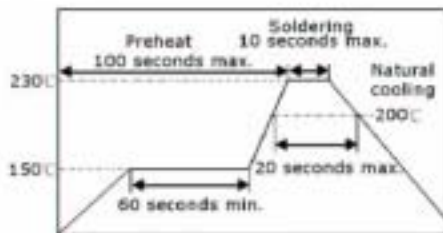
- 1) peel angle : 165°~180° vs carrier tape
- 2) peel speed : 300mm/min

8. PACKAGING

- 1) Tape & Reel packaging in composite specification 7
- 2) Reel and a bag of desiccant shall be packed in Nylon or plastic bag
- 3) Maximum of 5 bags shall be packaged in a inner box
- 4) Maximum of 7 inner box shall be packaged in a outer box

9. RECOMMENDED SOLDERING CONDITIONS

9-1 REFLOW SOLDERING



IRON SOLDERING

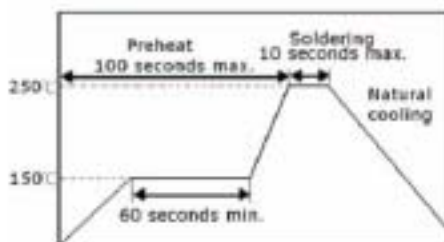
Perform soldering at 280°C on 30W max. Within 5 seconds

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



9-2 FLOW SOLDERING

64-solder shall be used.



FLUX AND CLEANING

- Rosin-based flux is recommended
- Isopropyl Alcohol Cleaning agent is recommended



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FRONTIER Lead-Free IR Reflow Chart

