

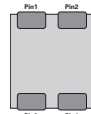
LCF Series

RoHS



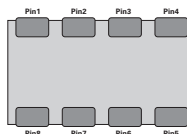
Pinout

Two Lines



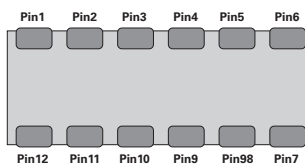
Item	Description	Source	Equipment
Rdc	Pin 1-3, 2-4	10mA DC Source	Source Meter
CM Impedance	Pin 1-2(Short) to Pin 3-4(Short)		LCR Meter (3GHz)

Four Lines



Item	Description	Source	Equipment
Rdc	Pin 1-8, 2-7, 3-6, 4-5	10mA DC Source	Source Meter
CM Impedance	Pin 1-2(Short) to Pin 8-7(Short) Pin 3-4(Short) to Pin 6-5(Short)	500mV	LCR Meter (3GHz)

Six Lines



Item	Description	Source	Equipment
Rdc	Pin 1-12, 2-11, 3-10, 4-9, 5-8, 6-7	10mA DC Source	Source Meter
CM Impedance	Pin 1-2(Short) to Pin 12-11(Short) Pin 3-4(Short) to Pin 10-9(Short) Pin 5-6(Short) to Pin 8-7(Short)	500mV	LCR Meter (3GHz)

Description

LCF Series covers the specification of the engineering requirements for both Common Mode Noise Filter (CMF) for high speed differential serial interfaces, such as USB 3.1, USB 2.0, MIPI, D-PHY or HDMI.

Features

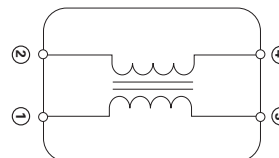
- Effective for suppressing common mode noise and almost no effect for high speed differential data line
- Differential mode cut-off frequency up to 8.78GHz at -3dB
- Ultra low profile as low as 0.64X0.57X0.35mm
- Ceramic multilayer type SMD component
- Non-polarized product
- Conforming to RoHS directive
- High temperature soldering guaranteed: 260°C/10 seconds

Applications

- Mobile Phone and Tablet
 - USB 3.1 Gen 1 & 2 (5 & 10Gbps) with Type C
 - Display Port 1.2 (5.4Gbps)
 - HDMI 2.0 (6.0Gbps)
 - MDDI, MIPI, MHL
- Portable/Wearable Devices
 - Game console, POS, VR, Dongle, and IoT module
- Consumer
 - PDP, LCD TV, DVD Player, PC, Audio player, DSC, Set top box, Laptop, SSD, and Home Automation

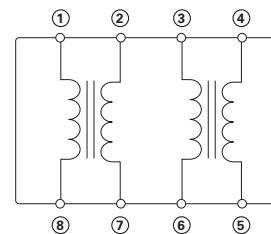
Functional Block Diagram

Two Lines



①~④: Data Line

Four Lines

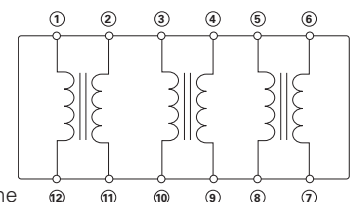


①~⑧: Data Line

LCF160804A750TG
LCF201204A300TG
LCF201204A101TG
LCF201204B101TG
LCF201204C101TG
LCF201204A181TG

LCF060502A650TG
LCF060502B650TG
LCF080602A250TG
LCF080602A750TG
LCF080602B750TG
LCF080602A900TG
LCF080602G900TG
LCF121002A350TG
LCF121002B350TG
LCF121002A650TG
LCF121002B650TG
LCF121002A750TG
LCF121002S750TG
LCF121002A900TG
LCF121002B900TG
LCF121002C900TG
LCF121002D900TG
LCF201202A900TG
LCF201202A121TG

Six Lines (LCF300806A750TG)



①~⑫: Data Line

Electrical Characteristics

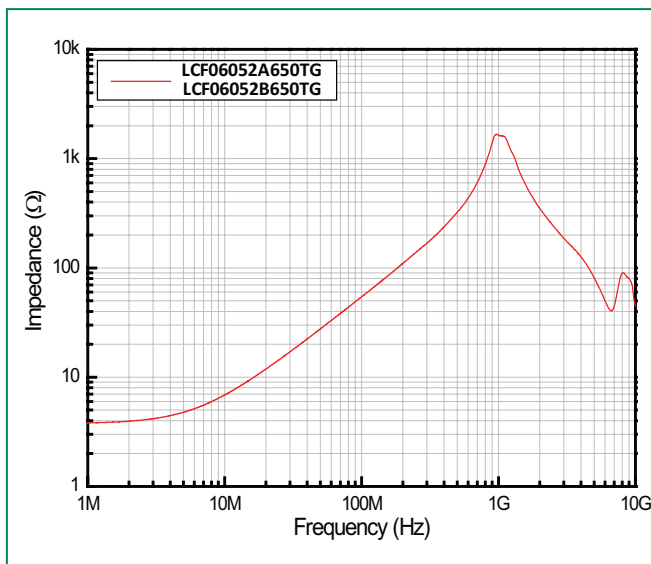
Part Number	Size (mm)	Size (mm)	Common Mode Impedance (Ω)	Rated Current(mA) Max.	Cut-off Freq/Hz	DC Resistance (Ω), Max.	Number of Lines	Leakage Current (μA), Max.	Insulation Resistance (MΩ), Min.
LCF060502A650TG	0605	0202	65(±25%)	50	4.71	Max 10.0	2	1.0	10
LCF060502B650TG	0605	0202	65(±25%)	130	4.71	Max 10.0	2	1.0	10
LCF080602A250TG	0806	0302	25(±25%)	100	8.22	Max 5.0	2	1.0	10
LCF080602A750TG	0806	0302	75(±25%)	100	4.00	Max 5.0	2	1.0	10
LCF080602B750TG	0806	0302	75(±25%)	110	4.00	Max 5.0	2	1.0	10
LCF080602A900TG	0806	0302	90(±25%)	100	4.10	Max 6.0	2	1.0	10
LCF080602G900TG	0806	0302	90(±25%)	100	3.29	Max 14.0	2	1.0	10
LCF160804A750TG	1608	0603	75(±25%)	100	4.86	Max 6.0	4	1.0	10
LCF121002A350TG	1210	0504	35(±25%)	100	8.78	Max 4.0	2	1.0	10
LCF121002B350TG	1210	0504	35(±25%)	200	8.78	Max 4.0	2	1.0	10
LCF121002A650TG	1210	0504	65(±25%)	100	5.35	Max 4.0	2	1.0	10
LCF121002B650TG	1210	0504	65(±25%)	250	5.35	Max 4.0	2	1.0	10
LCF121002A750TG	1210	0504	75(±25%)	100	3.59	Max 4.0	2	1.0	10
LCF121002S750TG	1210	0504	75(±25%)	100	4.06	Max 4.0	2	1.0	10
LCF121002A900TG	1210	0504	90(±25%)	100	4.65	Max 4.0	2	1.0	10
LCF121002B900TG	1210	0504	90(±25%)	130	4.65	Max 4.0	2	1.0	10
LCF121002C900TG	1210	0504	90(±25%)	150	4.65	Max 4.0	2	1.0	10
LCF121002D900TG	1210	0504	90(±25%)	160	4.65	Max 4.0	2	1.0	10
LCF201202A900TG	2012	0805	90(±25%)	100	3.89	Max 4.0	2	1.0	10
LCF201202A121TG	2012	0805	120(±25%)	100	3.95	Max 4.0	2	1.0	10
LCF201204A300TG	2012	0805	30(±25%)	100	7.38	Max 4.0	4	1.0	10
LCF201204A101TG	2012	0805	100(±25%)	100	2.92	Max 4.0	4	1.0	10
LCF201204B101TG	2012	0805	100(±25%)	120	2.92	Max 4.0	4	1.0	10
LCF201204C101TG	2012	0805	100(±25%)	130	2.92	Max 4.0	4	1.0	10
LCF201204A181TG	2012	0805	180(±25%)	100	4.23	Max 4.0	4	1.0	10
LCF300806A750TG	3008	1203	75(±25%)	100	4.35	Max 6.0	6	1.0	10

Test Conditions:

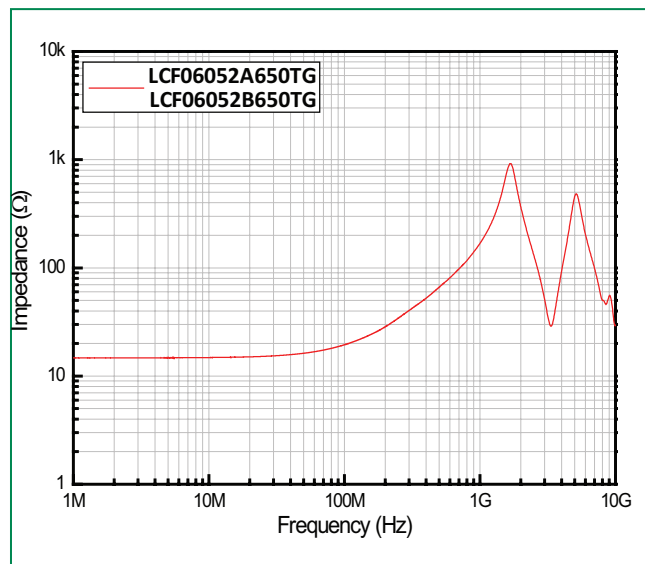
- Common Mode Impedance(Ω): @100MHz
- DC Resistance (Ω): 25°C±2°C
- Leakage Current (μA): 5V
- Insulation Resistance (Max. MΩ): 5V
- Rated Current(mA): 25°C±2°C

0605mm size

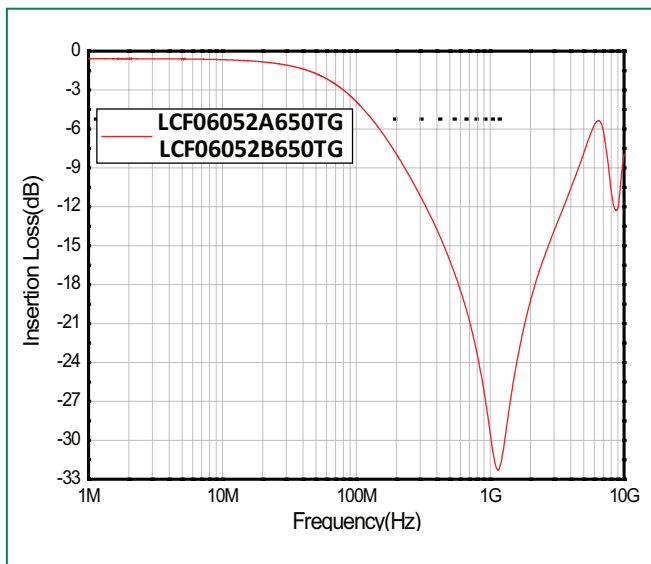
Impedance Curves (Common Mode)



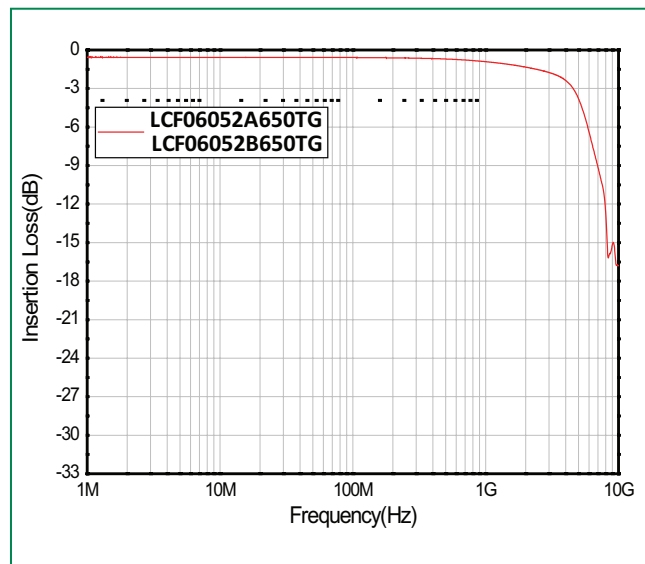
Impedance Curves (Differential Mode)



Transmission Characteristics (S-parameter) Common Mode S21

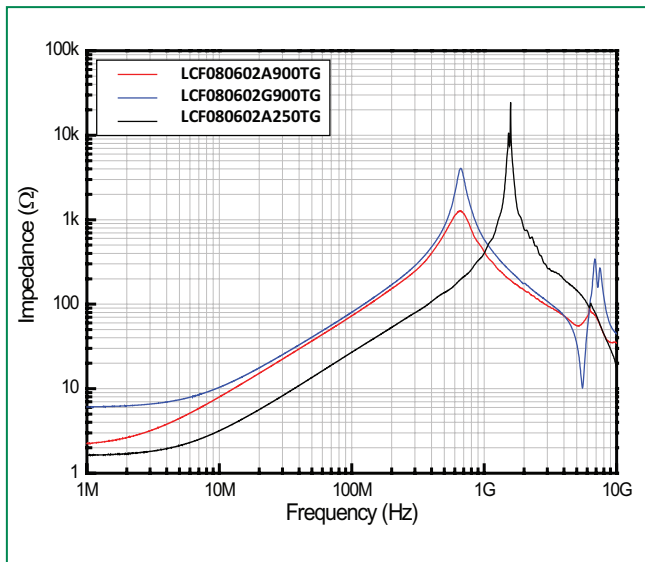


Differential Mode S21

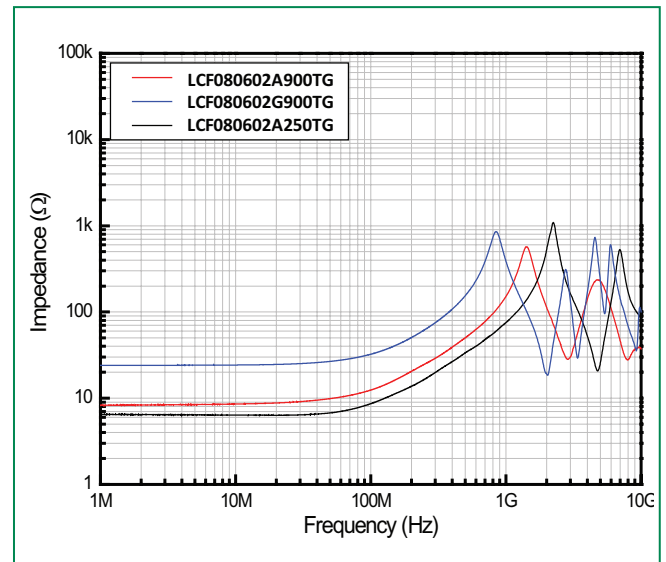


0806mm size

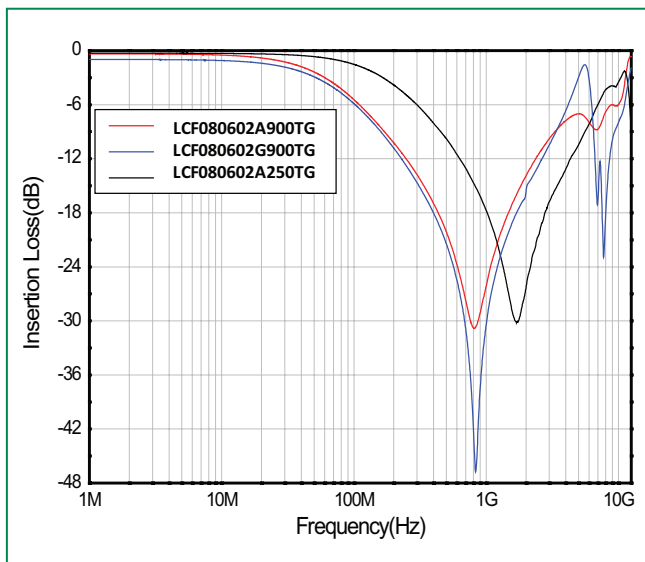
Impedance Curves (Common Mode)



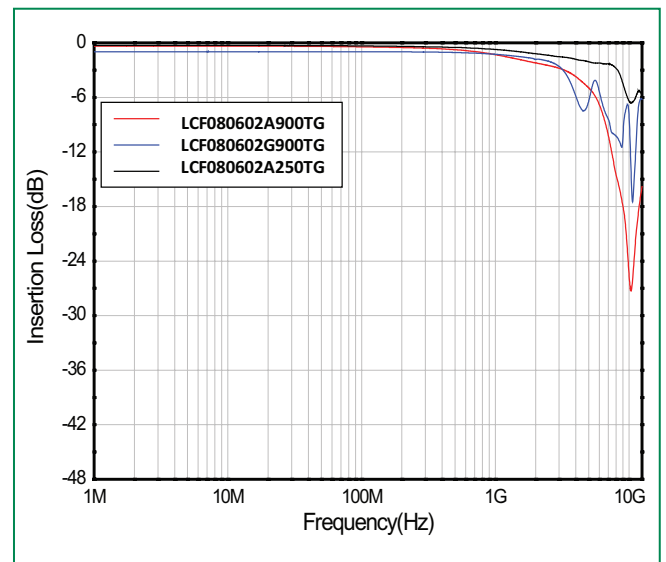
Impedance Curves (Differential Mode)



Transmission Characteristics (S-parameter) Common Mode S21

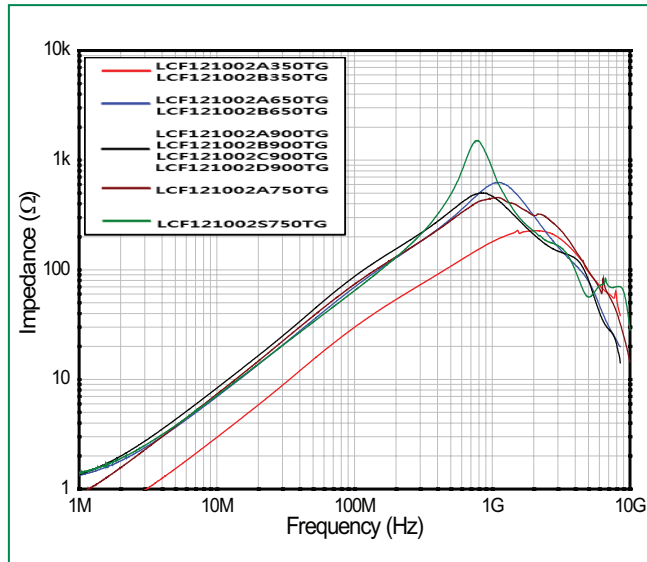


Differential Mode S21

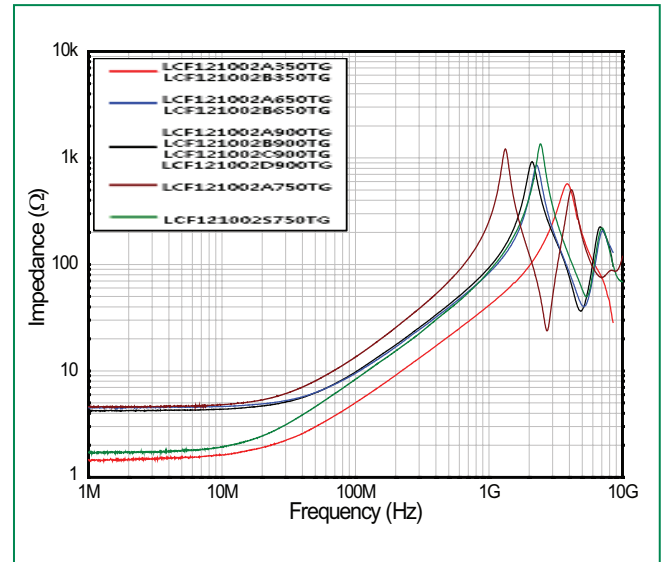


1210mm size

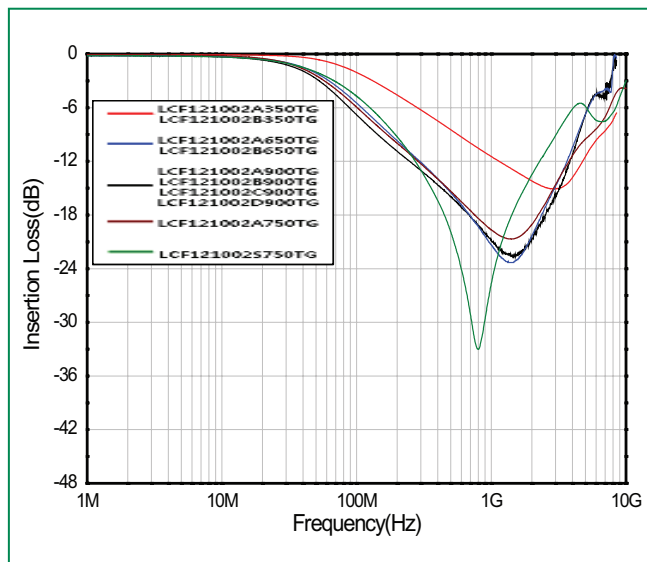
Impedance Curves (Common Mode)



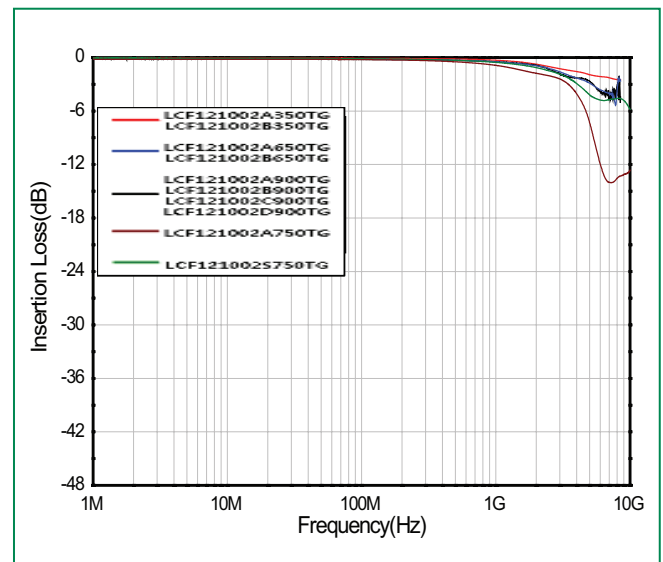
Impedance Curves (Differential Mode)



Transmission Characteristics (S-parameter) Common Mode S21

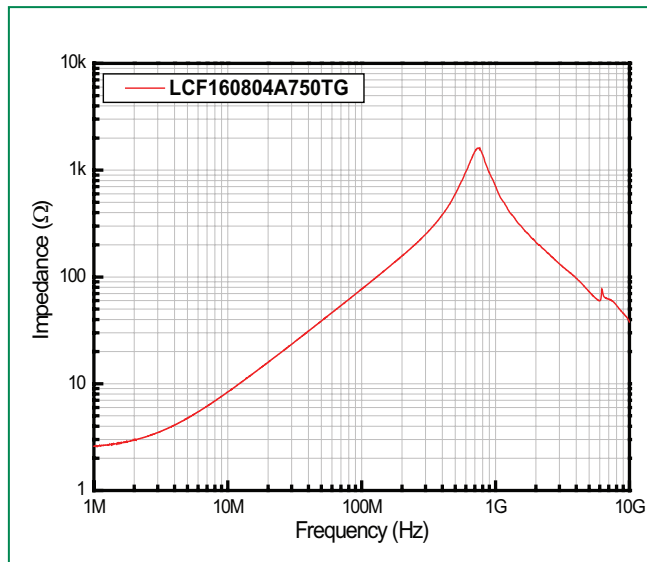


Differential Mode S21

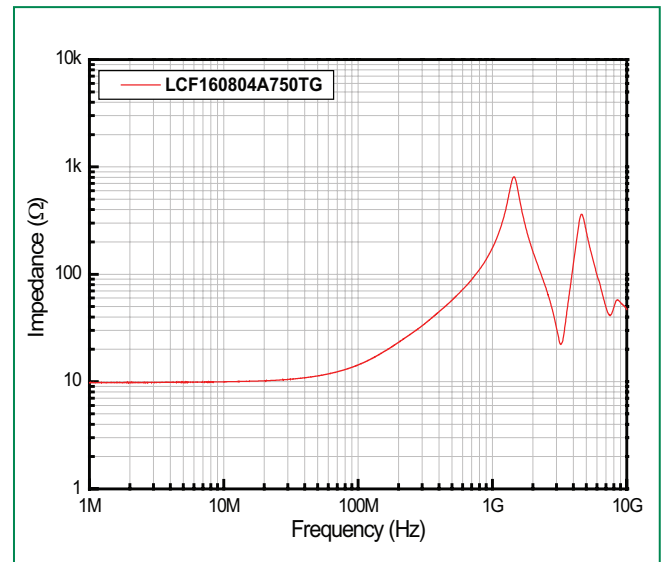


1608mm size

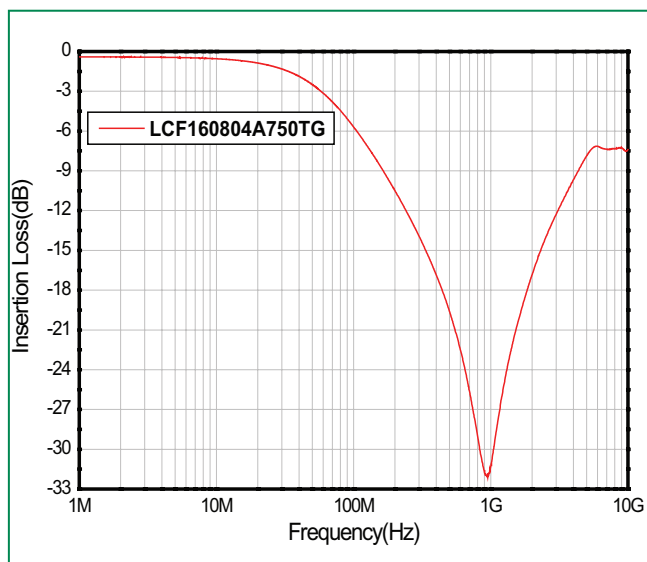
Impedance Curves (Common Mode)



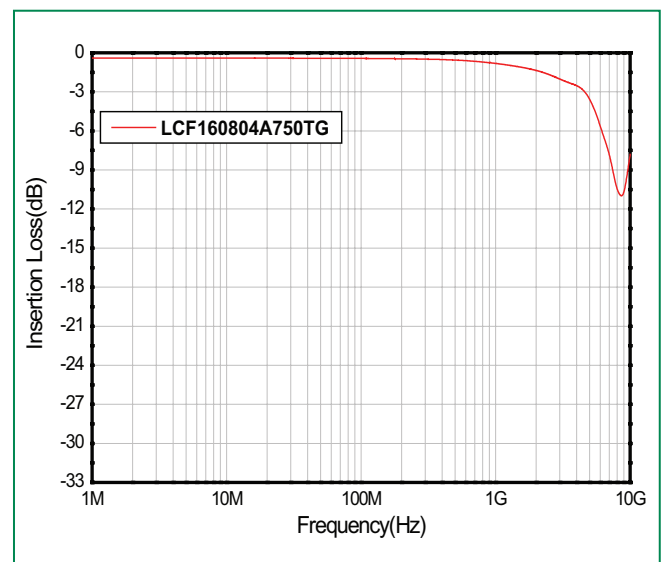
Impedance Curves (Differential Mode)



Transmission Characteristics (S-parameter) Common Mode S21

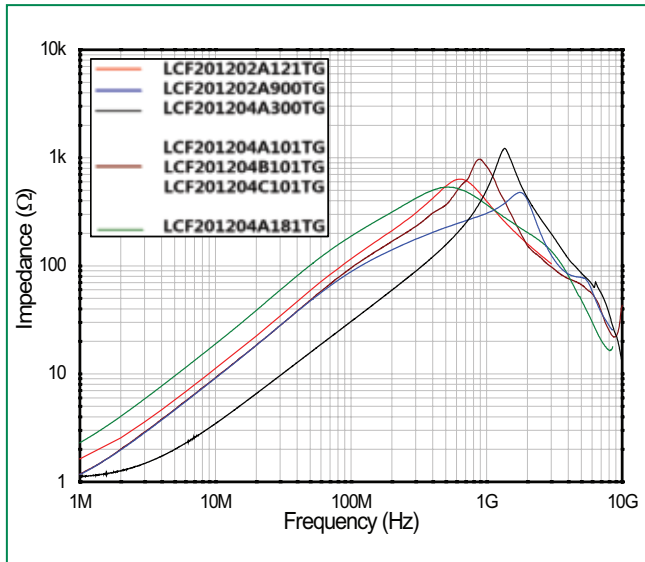


Differential Mode S21

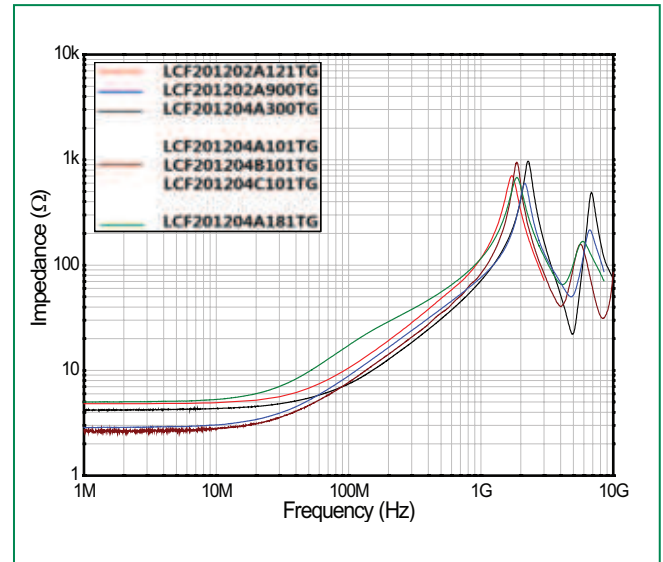


2012mm size

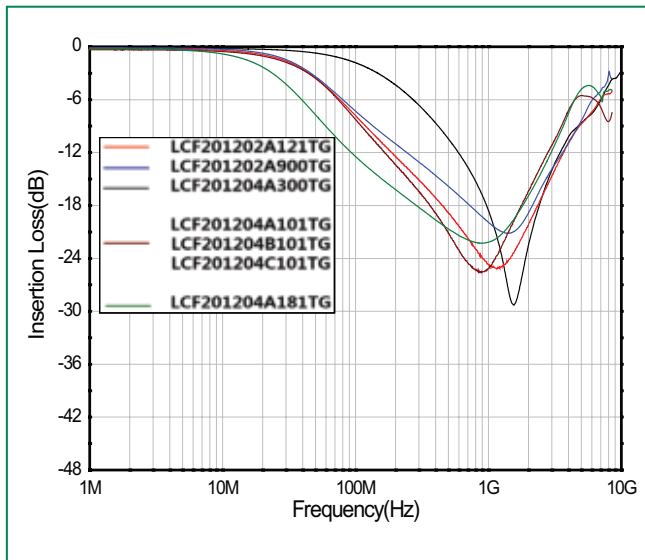
Impedance Curves (Common Mode)



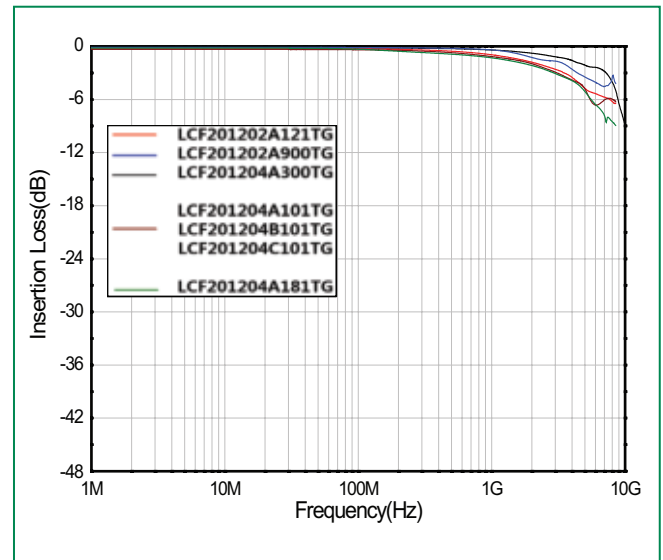
Impedance Curves (Differential Mode)



Transmission Characteristics (S-parameter) Common Mode S21

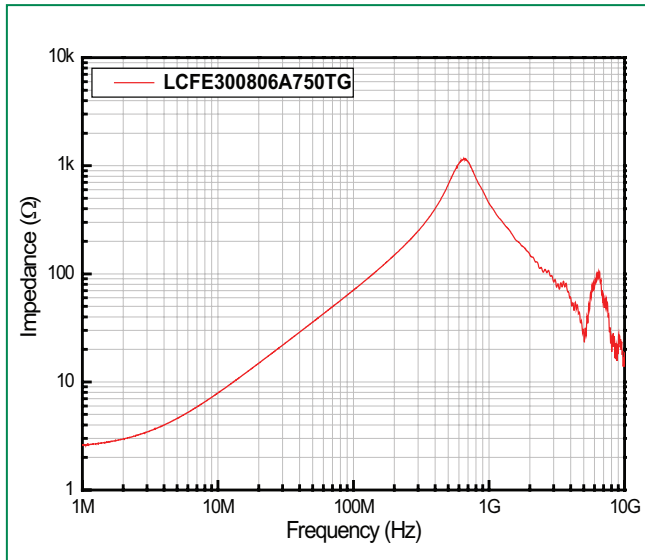


Differential Mode S21

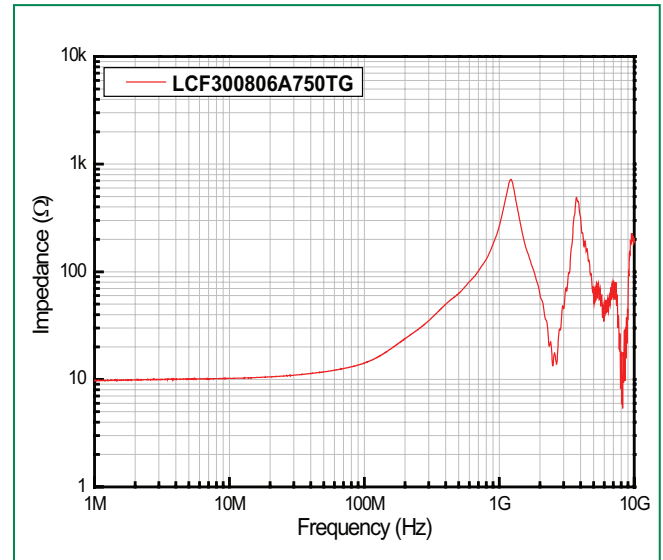


3008 mm size

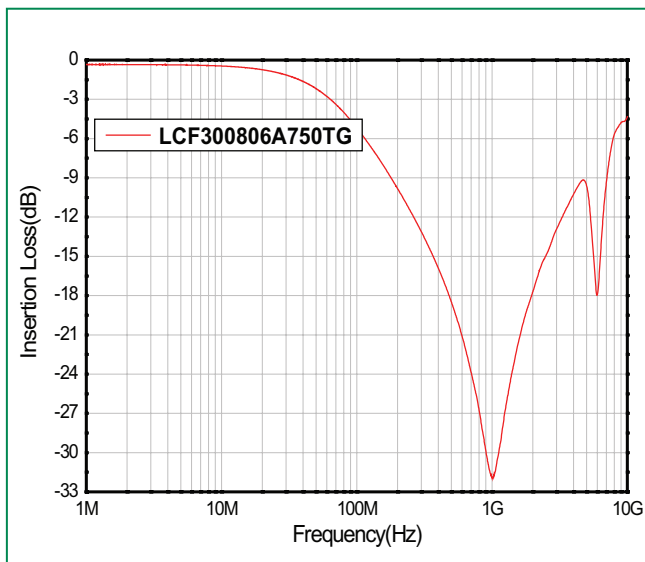
Impedance Curves (Common Mode)



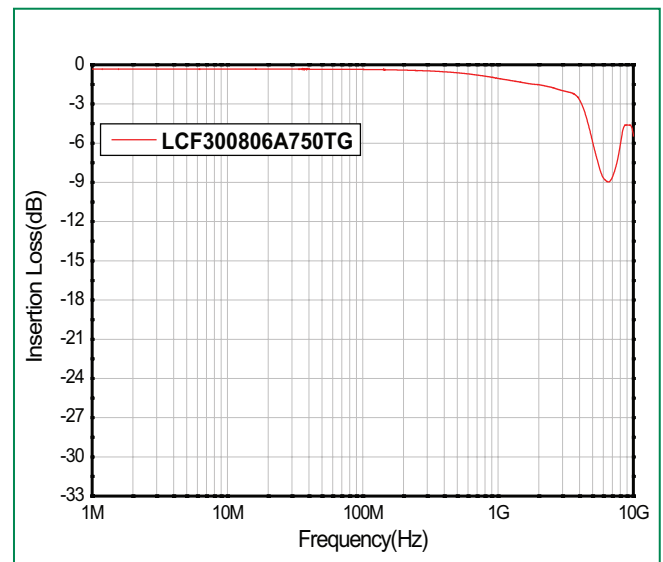
Impedance Curves (Differential Mode)



Transmission Characteristics (S-parameter) Common Mode S21

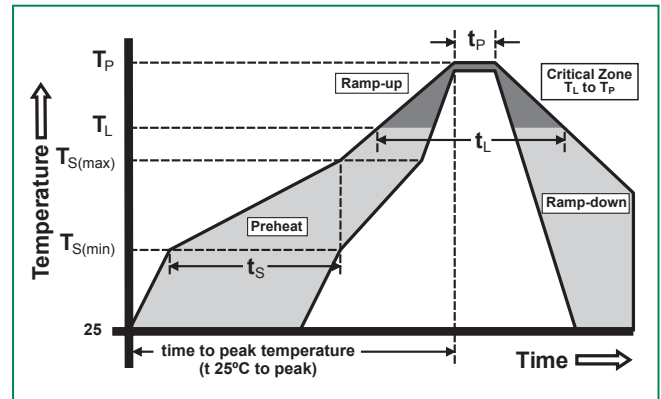


Differential Mode S21



Soldering Parameters

Reflow Condition		Pb-free assembly
Pre Heat	- Temperature Min ($T_{s(min)}$)	160°C
	- Temperature Max ($T_{s(max)}$)	185°C
	- Time (Min to Max) (t_s)	100 – 120 seconds
Average Ramp-up Rate (Liquidus Temp (T_L) to peak)		1°C/second max
$T_{s(max)}$ to T_L - Ramp-up Rate		1°C/second max
Reflow	- Temperature (T_L) (Liquidus)	220°C
	- Temperature (t_L)	30 – 50 seconds
Peak Temperature (T_P)		260 ^{+0/-5} °C
Time within 5°C of actual peak Temperature (t_p)		5 – 10 seconds
Ramp-down Rate		2°C/second max
Time 25°C to Peak Temperature (T_P)		4 minutes max
Do not exceed		260°C
Wave Soldering		260°C, 10 sec. max



Recommended Soldering Profile (Lead free condition)

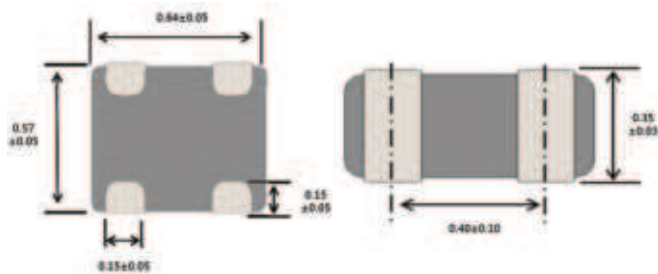
Product Characteristics

Lead Pull Strength	5N
Solderability	260°C, ≤10s (Reflow), Max 380°C, ≤5s (Soldering iron)
Soldering Heat Resistance	Max 260°C 10sec(Wave), Max Temperature: Max 380°C (Max 5sec)

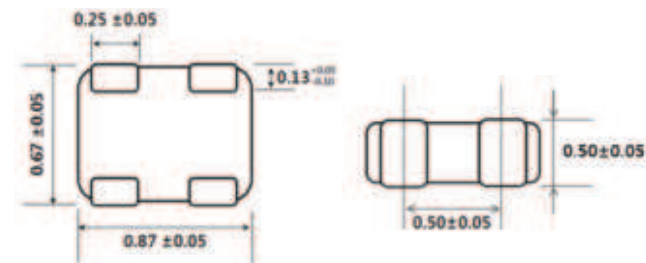
Operating Temperature	-40°C to +85°C (consider re-rating)
Climatic Category	-40°C + 85°C/8 days
Stock Conditions	-10°C + 40°C RH, ≤ 70%
Vibration Resistance	5 g's for 20 minutes, 12 cycles each of three orientations

Dimensions (Unit = mm)

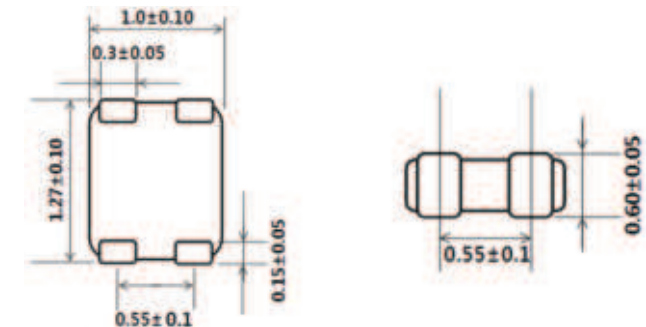
0605mm size



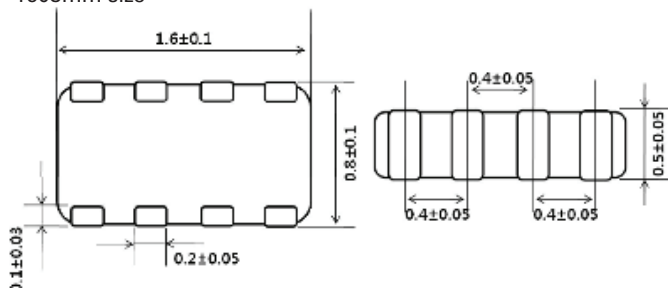
0806mm size



1210mm size



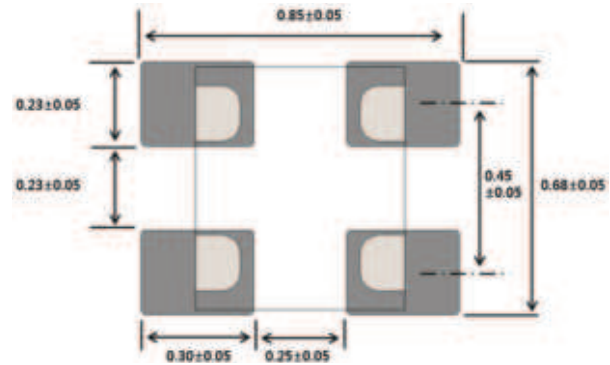
1608mm size



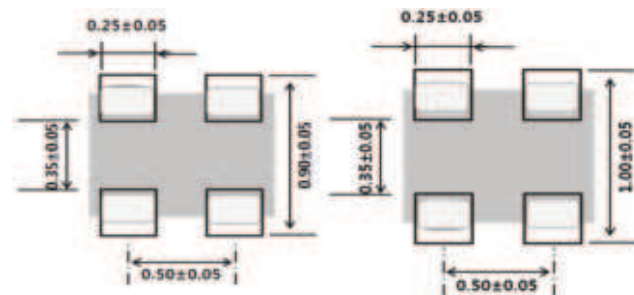
Recommended Footprint and Stencil Mask

Stencil Mask T = 0.10mm

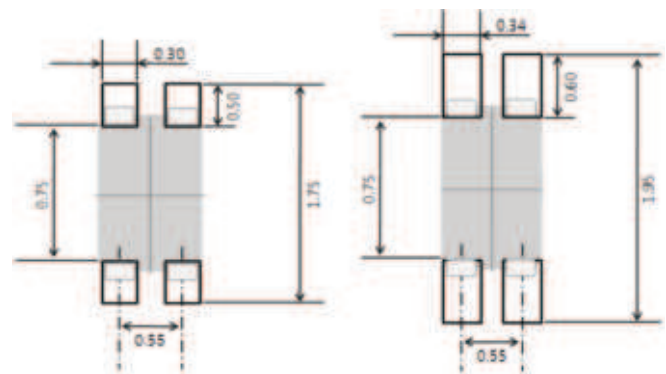
0605mm size



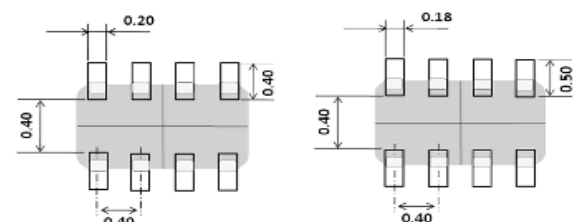
0806mm size



1210mm size



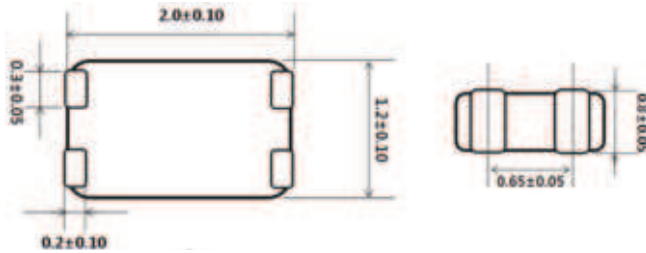
1608mm size



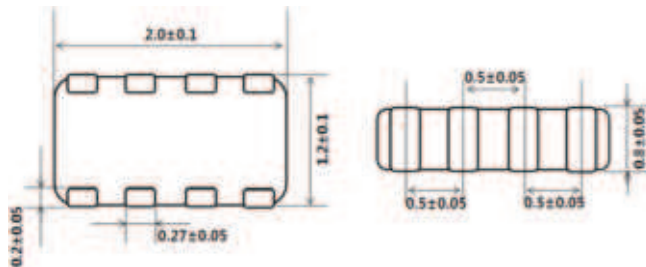
LCF Series

Dimensions (Unit = mm)

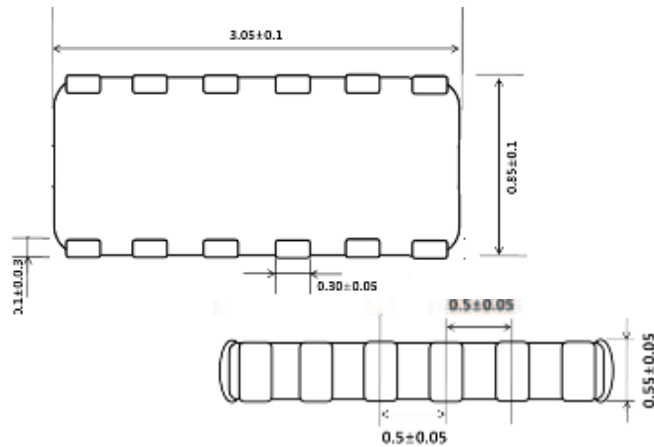
2012mm size (LCF201202A121TG, LCF201202A121TG)



2012mm size (LCF201204A300TG, LCF201204A101TG, LCF201204B101TG, LCF201204C101TG, LCF201204A181TG)



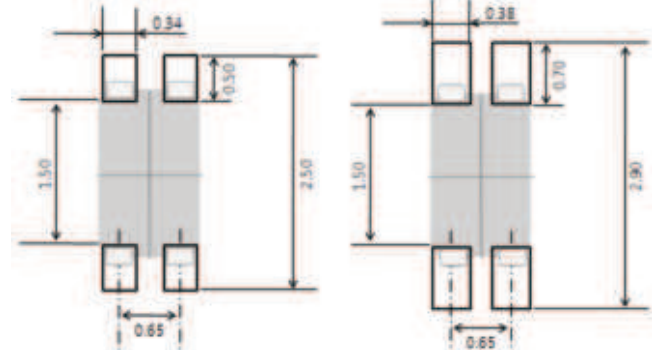
3008mm size



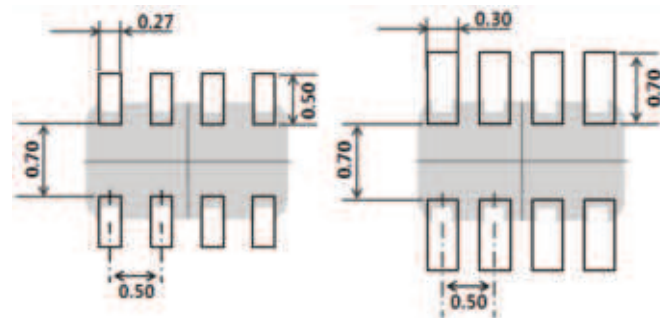
Recommended Footprint and Stencil Mask

Stencil Mask T = 0.10mm

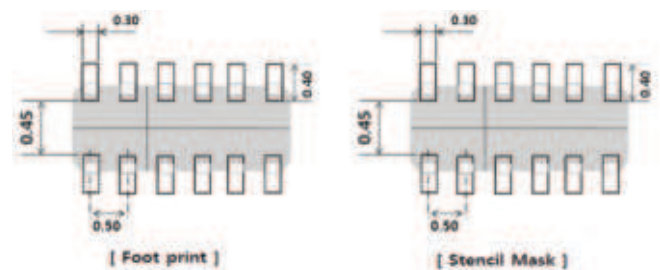
2012mm size (LCF201202A121TG, LCF201202A121TG)



2012mm size (LCF201204A300TG, LCF201204A101TG , LCF201204B101TG , LCF201204C101TG, LCF201204A181TG)

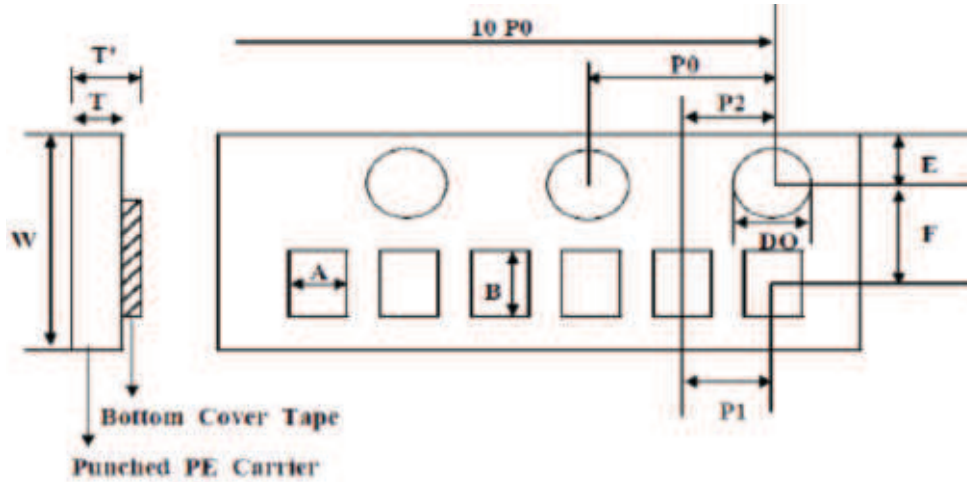


3008mm size



Carrie Tape Dimensions

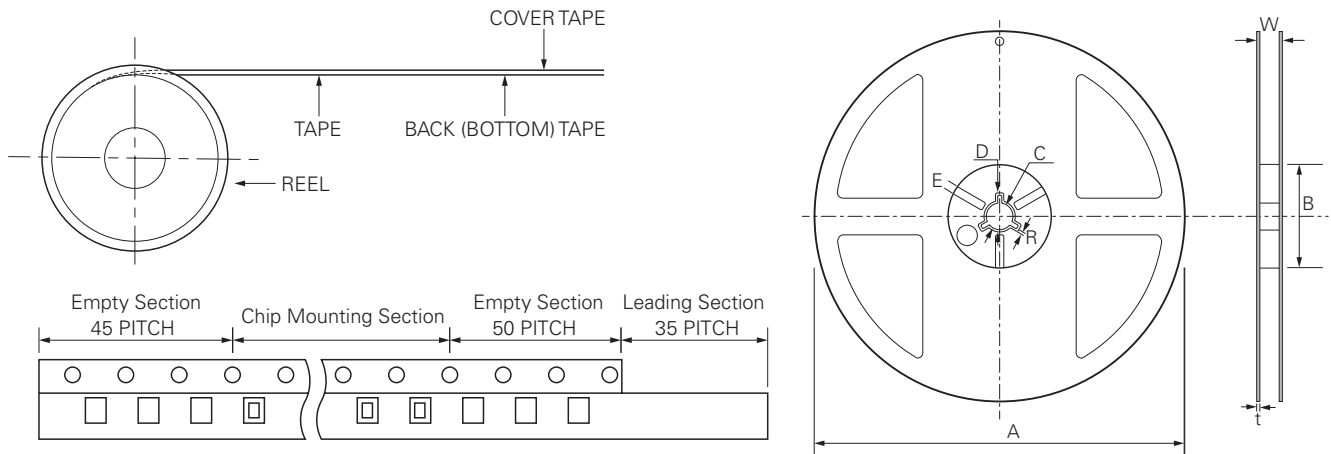
0605mm size



Symbol	Dimensions
	Millimeters
A	0.62 ± 0.03
B	0.78 ± 0.03
E	1.75 ± 0.05
F	3.50 ± 0.05
D0	1.55 ± 0.03
P1	2.00 ± 0.05
P2	2.00 ± 0.05
P0	4.00 ± 0.05
10P0	40.00 ± 0.10
W	8.00 ± 0.10
T	0.40 ± 0.02
T'	0.43 ± 0.05

Tape and Reel Dimension

0605mm size

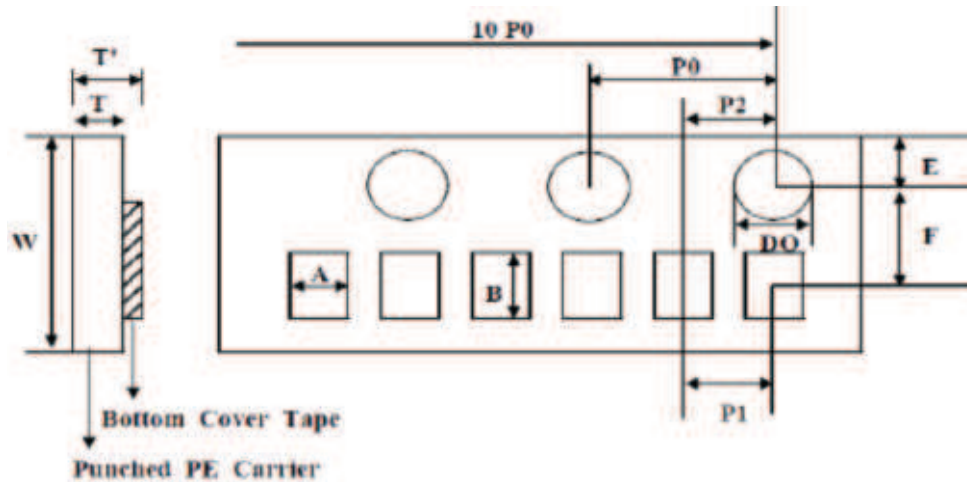


- (1) Reel Materials: Polystyrene (2) Label (3) Taping
 - Standard Packing Quantity per Reel ($\varnothing 178$)
 - PE Tape: 10,000pcs

Code	A	B	C	D	E	W	T	R
Dimension	$\varnothing 178 \pm 2$	Min. $\varnothing 50$	$\varnothing 13 \pm 0.5$	$\varnothing 21 \pm 0.8$	2.0 ± 0.5	10 ± 1.5	0.8 ± 0.2	1.0

Carrie Tape Dimensions

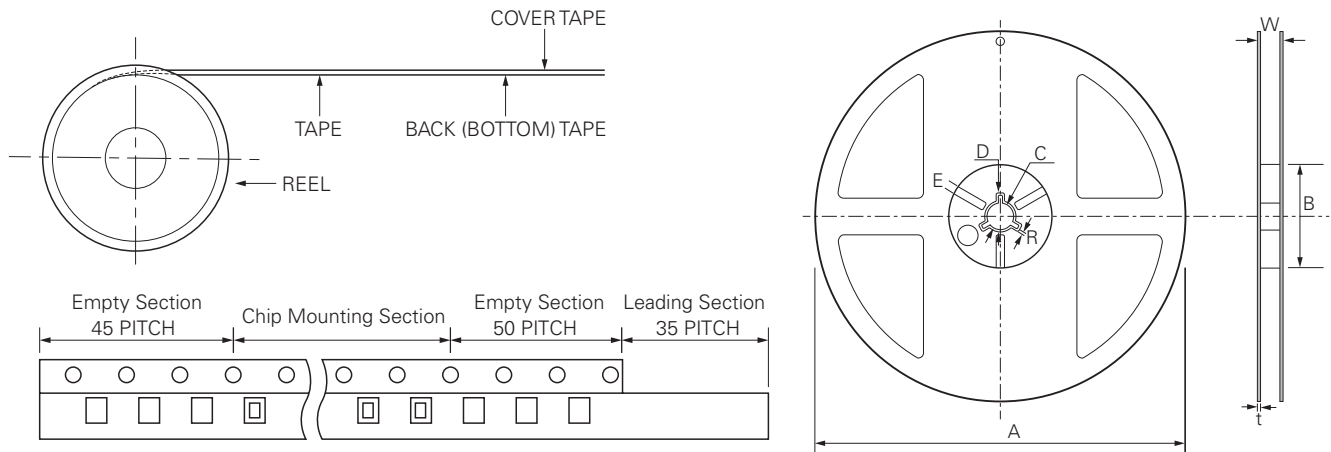
0806mm size



Symbol	Dimensions
	Millimeters
A	0.80±0.03
B	1.02±0.03
E	1.75±0.05
F	3.50±0.05
D0	1.55±0.03
P1	2.00±0.05
P2	2.00±0.05
P0	4.00±0.05
10P0	40.00±0.10
W	8.00±0.10
T	0.60±0.02
T'	0.63±0.05

Tape and Reel Dimension

0806mm size

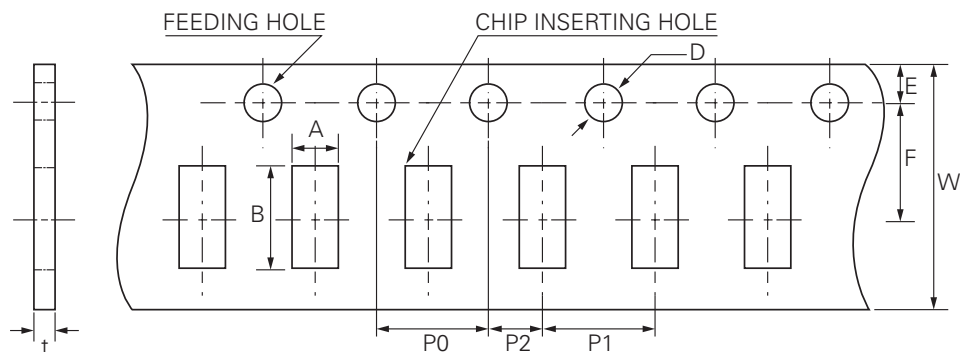


- (1) Reel Materials: Polystyrene (2) Label (3) Taping
- Standard Packing Quantity per Reel (Ø178)
- PE Tape: 10,000pcs

Code	A	B	C	D	E	W	T	R
Dimension	Ø178±2	Min. Ø50	Ø13±0.5	Ø21±0.8	2.0±0.5	10±1.5	0.8±0.2	1.0

Carrie Tape Dimensions

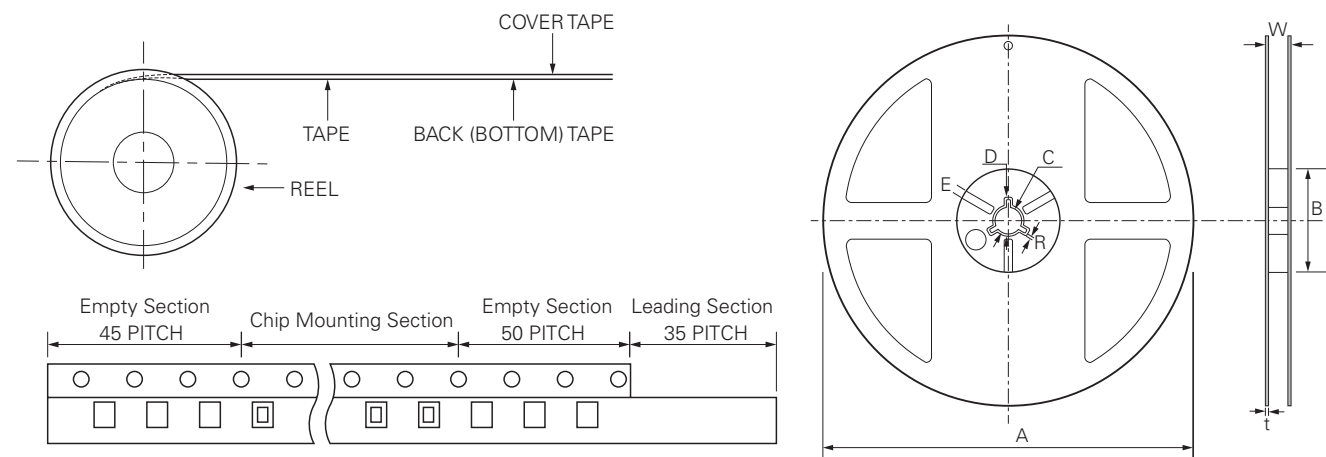
1210mm size



Symbol	Dimensions Millimeters
A	1.15±0.05
B	1.50±0.05
W	8.00+0.30-0.10
F	3.50±0.05
E	1.75±0.05
P1	4.00±0.10
P2	2.00±0.05
P0	4.00±0.05
D	1.55±0.03
T	0.75±0.05

Tape and Reel Dimension

0806mm size

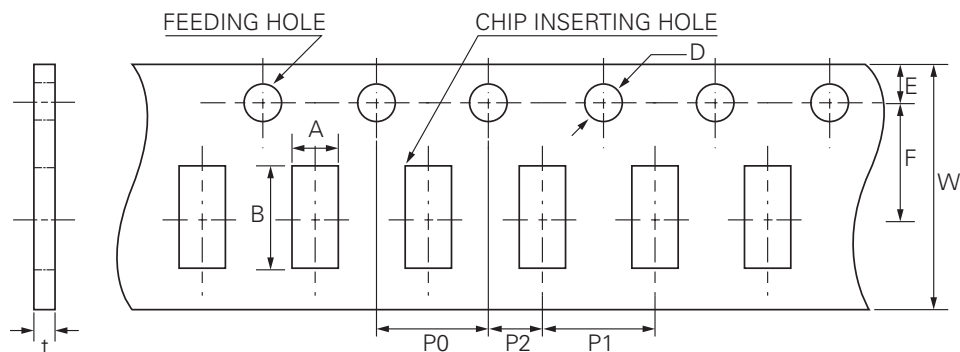


- (1) Reel Materials: Polystyrene (2) Label (3) Taping
- Standard Packing Quantity per Reel (Ø178)
- PE Tape: 4,000pcs

Code	A	B	C	D	E	W	T	R
Dimension	Ø178±2	Min. Ø50	Ø13±0.5	Ø21±0.8	2.0±0.5	10±1.5	0.8±0.2	1.0

Carrie Tape Dimensions

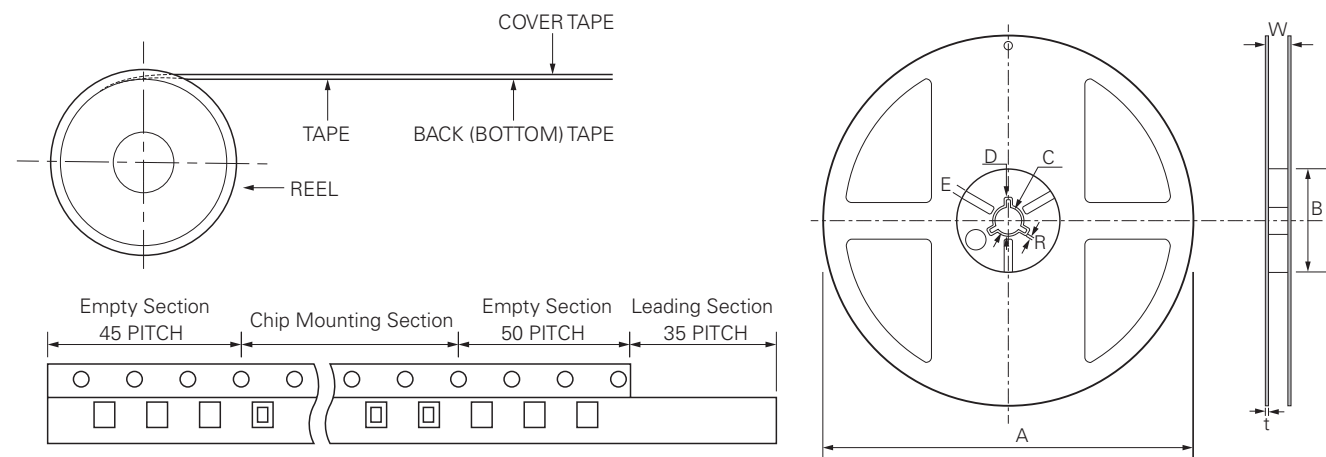
1608mm size



Symbol	Dimensions Millimeters
A	0.97±0.03
B	1.80±0.03
W	8.00±0.10
F	3.50±0.05
E	1.75±0.05
P1	4.00±0.10
P2	2.00±0.05
P0	4.00±0.05
D	1.55±0.03
T	0.58±0.03

Tape and Reel Dimension

1608mm size

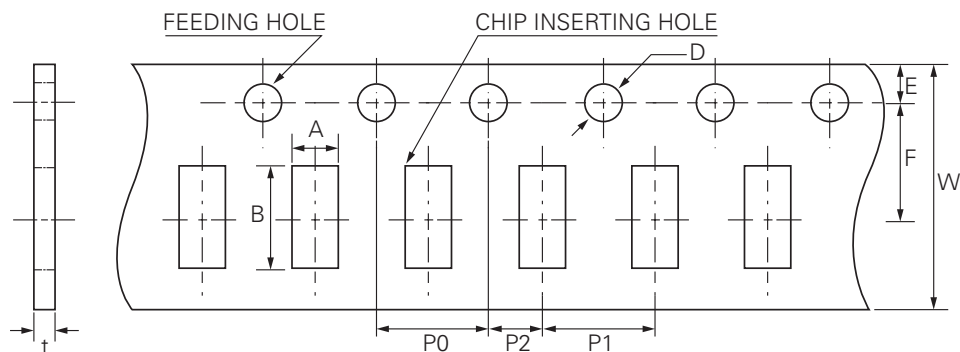


- (1) Reel Materials: Polystyrene (2) Label (3) Taping
- Standard Packing Quantity per Reel (Ø178)
- PE Tape: 4,000pcs

Code	A	B	C	D	E	W	T	R
Dimension	Ø178±2	Min. Ø50	Ø13±0.5	Ø21±0.8	2.0±0.5	10±1.5	0.8±0.2	1.0

Carrie Tape Dimensions

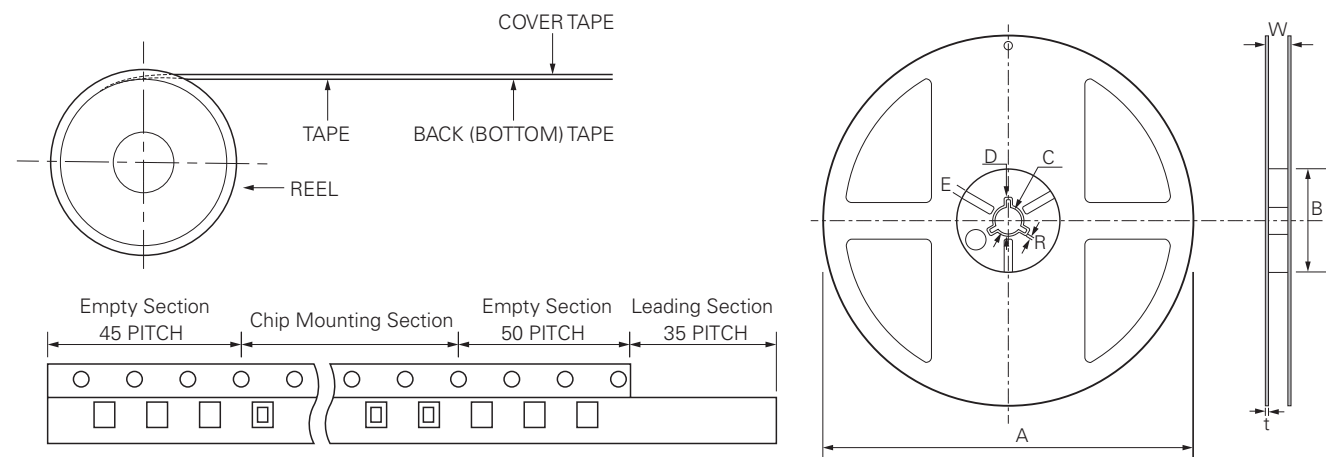
2012mm size



Symbol	Dimensions Millimeters
A	1.55±0.05
B	2.30±0.05
W	8.00±0.10
F	3.50±0.05
E	1.75±0.05
P1	4.00±0.10
P2	2.00±0.05
P0	4.00±0.10
D	1.55±0.03
T	0.95±0.05

Tape and Reel Dimension

2012mm size

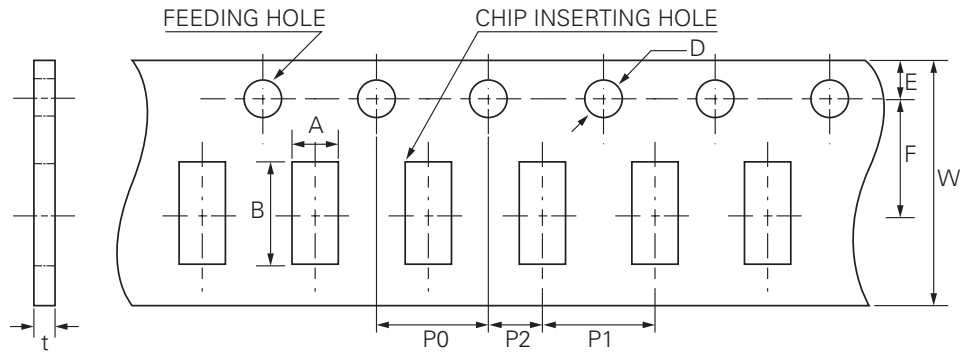


- (1) Reel Materials: Polystyrene (2) Label (3) Taping
- Standard Packing Quantity per Reel (Ø178)
- PE Tape: 4,000pcs

Code	A	B	C	D	E	W	T	R
Dimension	Ø178±2	Min. Ø50	Ø13±0.5	Ø21±0.8	2.0±0.5	10±1.5	0.8±0.2	1.0

Carrie Tape Dimensions

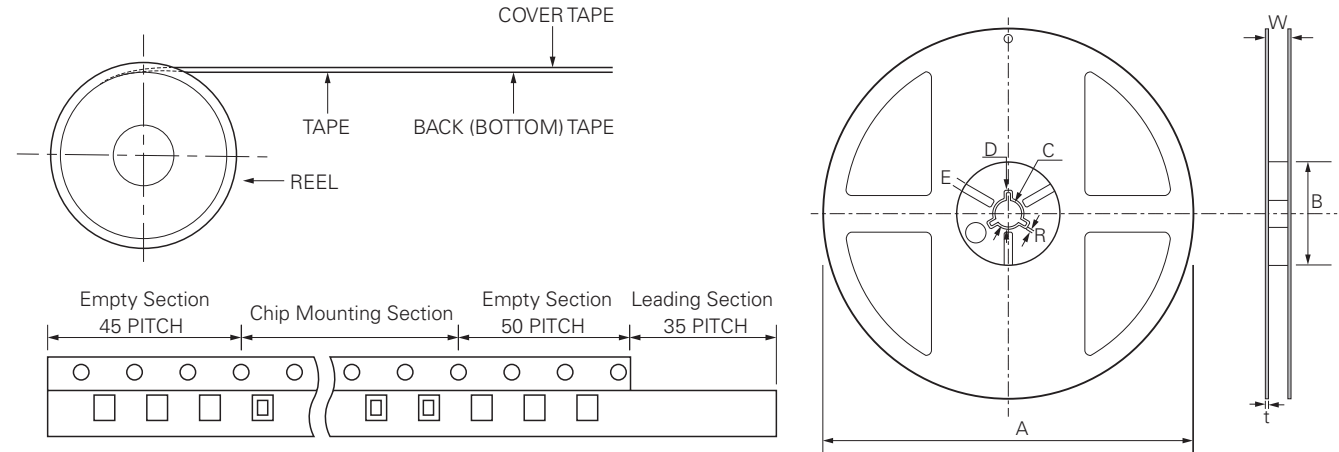
3008mm size



Symbol	Dimensions Millimeters
A	1.05±0.05
B	3.30±0.05
W	8.00±0.10
F	3.50±0.05
E	1.75±0.05
P1	4.00±0.10
P2	2.00±0.05
P0	4.00±0.10
D	1.55±0.03
T	0.60±0.05

Tape and Reel Dimension

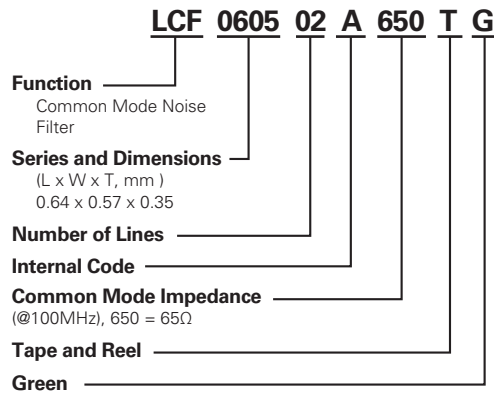
3008mm size



- (1) Reel Materials: Polystyrene (2) Label (3) Taping
- Standard Packing Quantity per Reel (Ø178)
- PE Tape: 4,000pcs

Code	A	B	C	D	E	W	T	R
Dimension	Ø178±2	Min. Ø50	Ø13±0.5	Ø21±0.8	3.0±0.5	10±1.5	1.3±0.2	1.0±0.2

Part Numbering System



Ordering Information

Part Number	Reel Quantity
LCF0605xxxxxx/LCF0806xxxxxx	10,000
LCF1608xxxxxx/LCF1210xxxxxx	4,000
LCF2012xxxxxx/LCF3008xxxxxx	