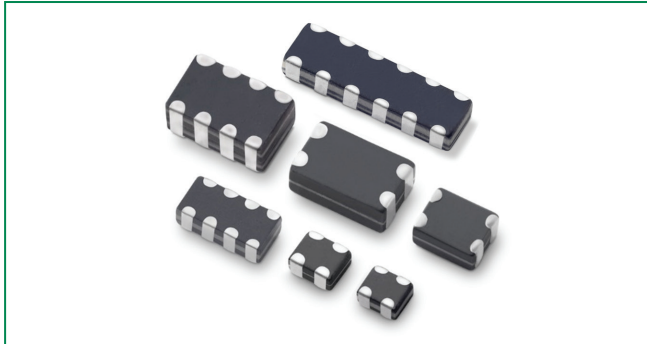


**LCF Series**

RoHS



**Description**

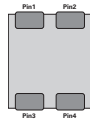
LCF Series covers the specification of the engineering requirements for both Common Mode Noise Filter (CMF) for high speed differential serial interfaces, such as USB 3.1 , USB 2.0 , MIPI, D-PHY or HDMI.

**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

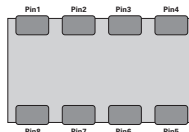
**Pinout**

**Two Lines**



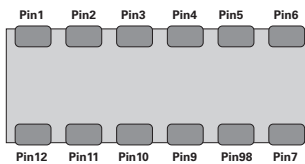
Item	Description	Source	Equipment
Rdc	Pin 1-3, 2-4	10mA DC Source	Source Meter
CM Impedance	Pin 1-2(Short) to Pin 3-4(Short)		LCR Meter (3GHz)

**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**



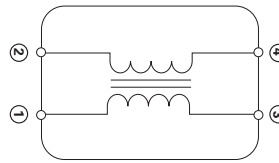
Item	Description	Source	Equipment
Rdc	Pin 1-12, 2-11, 3-10, 4-9, 5-8, 6-7	10mA DC Source	Source Meter
CM Impedance	Pin 1-2(Short) to Pin 12-11(Short) Pin 3-4(Short) to Pin 10-9(Short) Pin 5-6(Short) to Pin 8-7(Short)	500mV	LCR Meter (3GHz)

**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

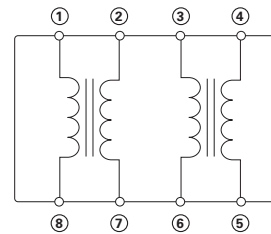
**Functional Block Diagram**

**Two Lines**



①~④: Data Line

**Four Lines**

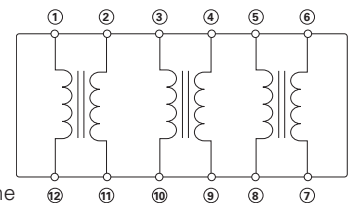


①~⑧: Data Line

- 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

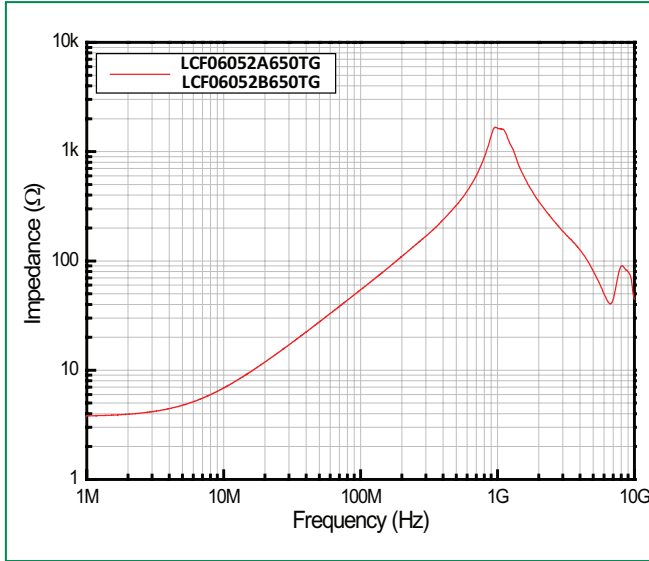
### Electrical Characteristics

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

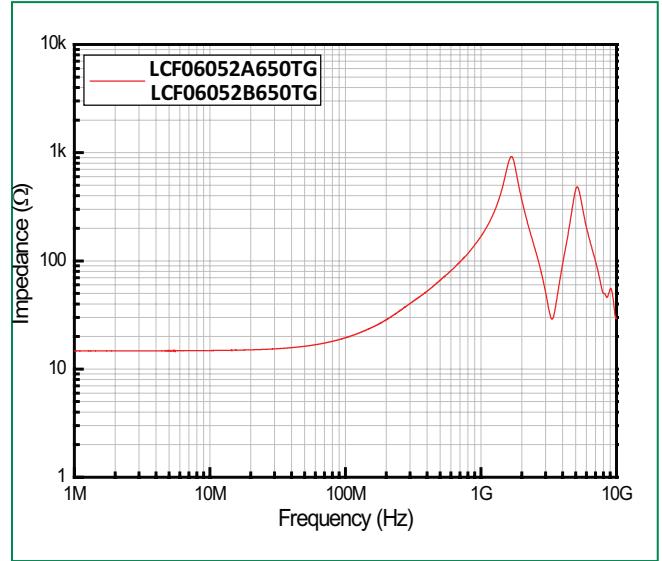
**Test Conditions:**

- 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

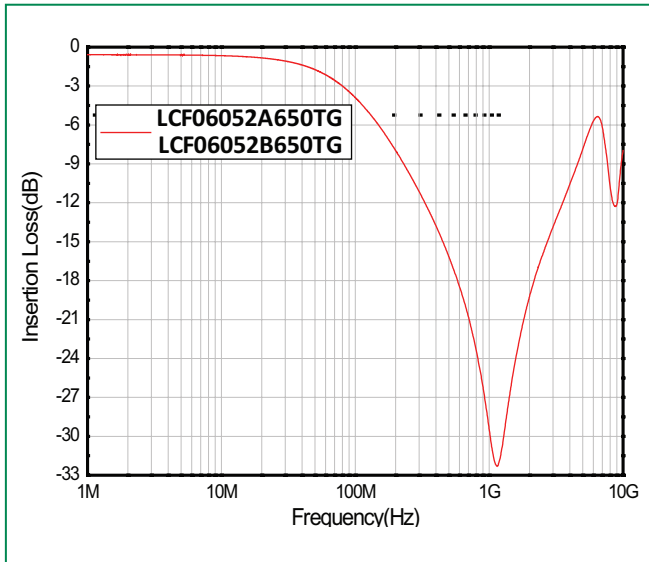
**0605mm size**  
**Impedance Curves (Common Mode)**



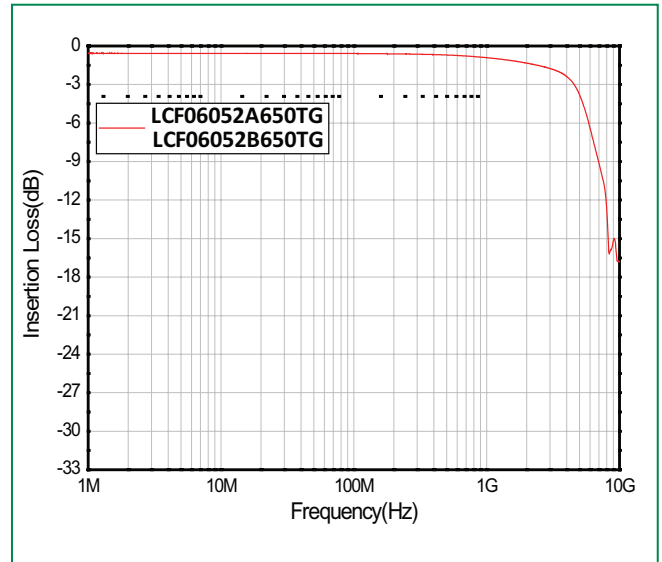
**Impedance Curves (Differential Mode)**



**Transmission Characteristics (S-parameter)**  
**Common Mode S21**

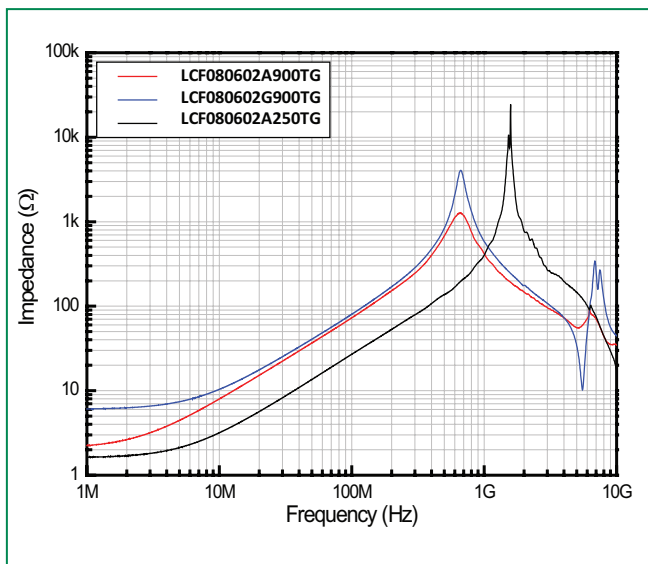


**Differential Mode S21**

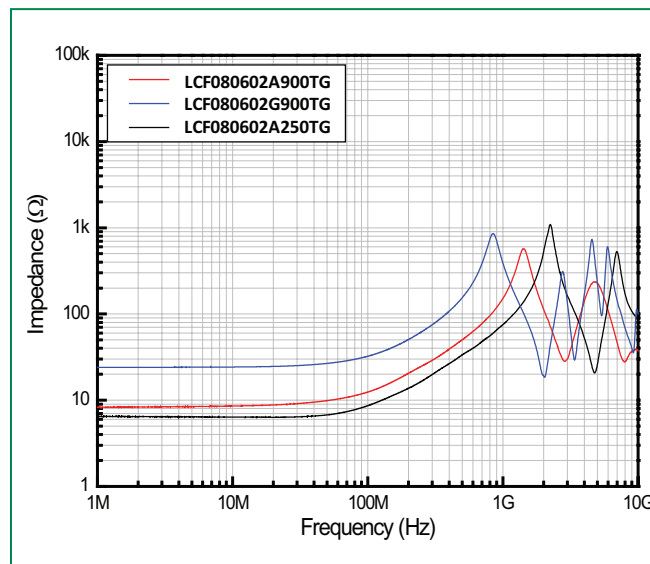


## 0806mm size

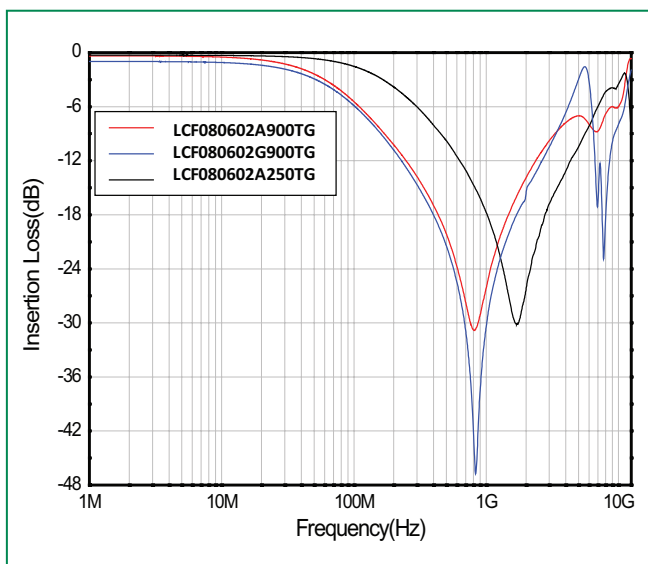
### Impedance Curves (Common Mode)



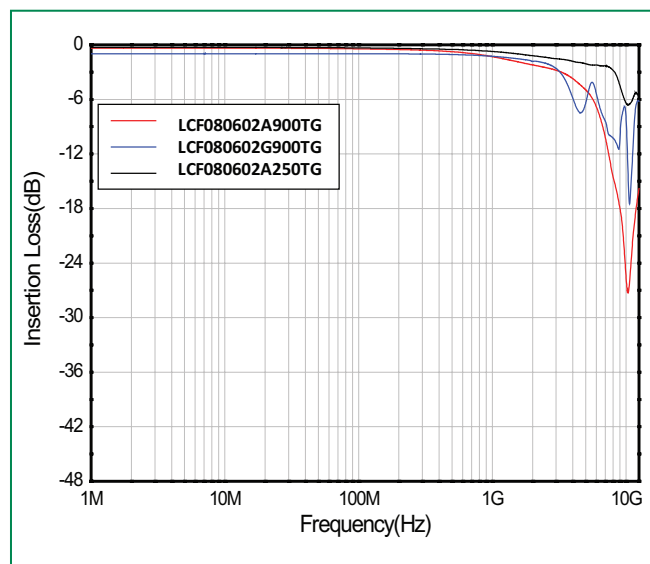
### Impedance Curves (Differential Mode)



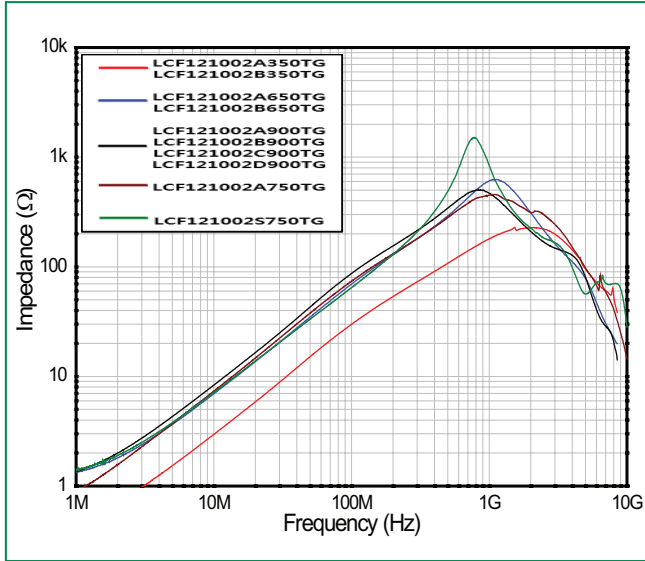
### Transmission Characteristics (S-parameter) Common Mode S21



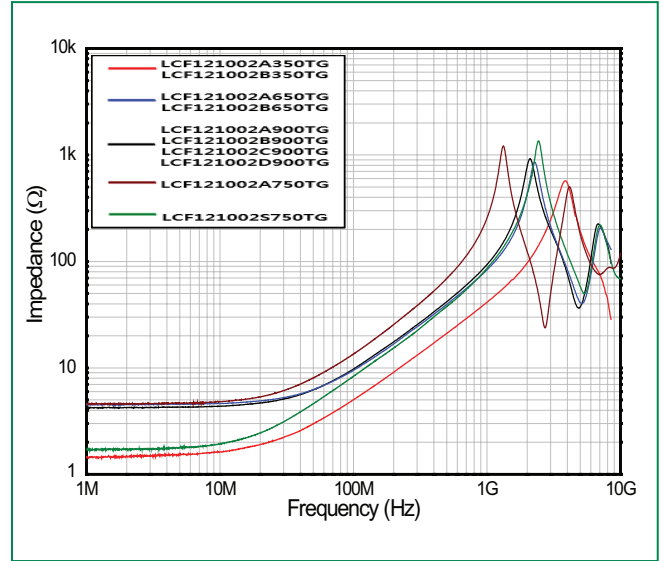
### Differential Mode S21



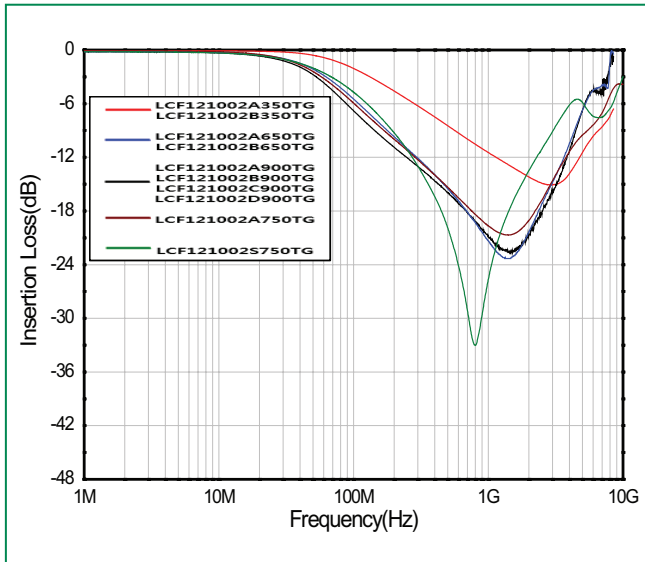
**1210mm size**  
**Impedance Curves (Common Mode)**



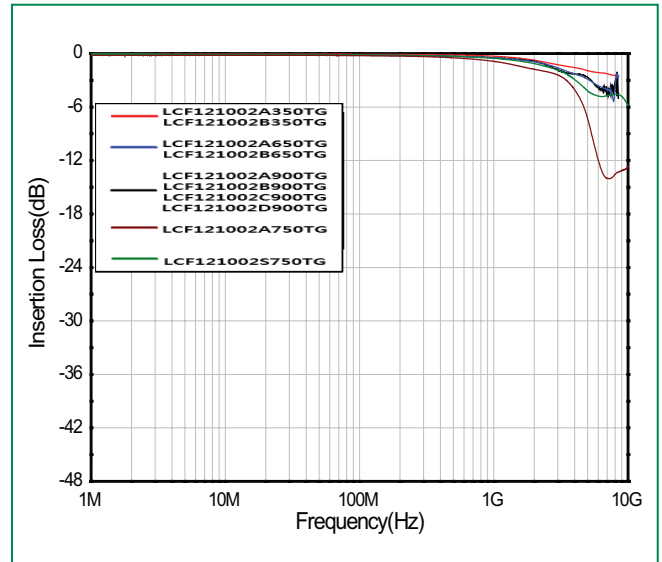
**Impedance Curves (Differential Mode)**



**Transmission Characteristics (S-parameter)**  
**Common Mode S21**

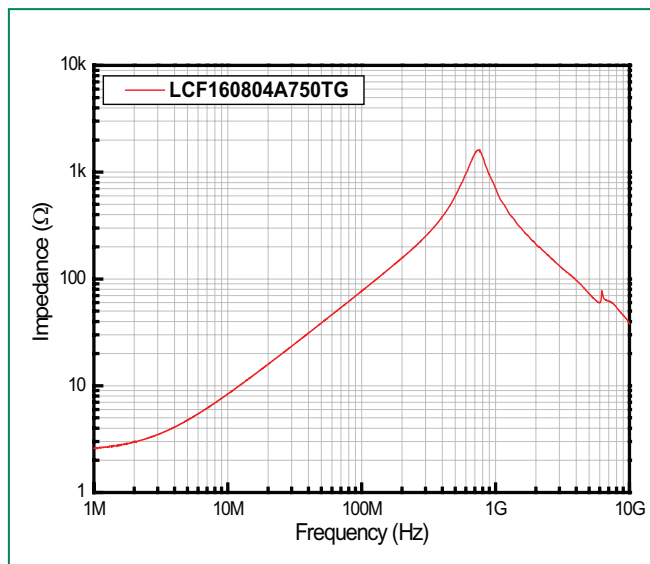


**Differential Mode S21**

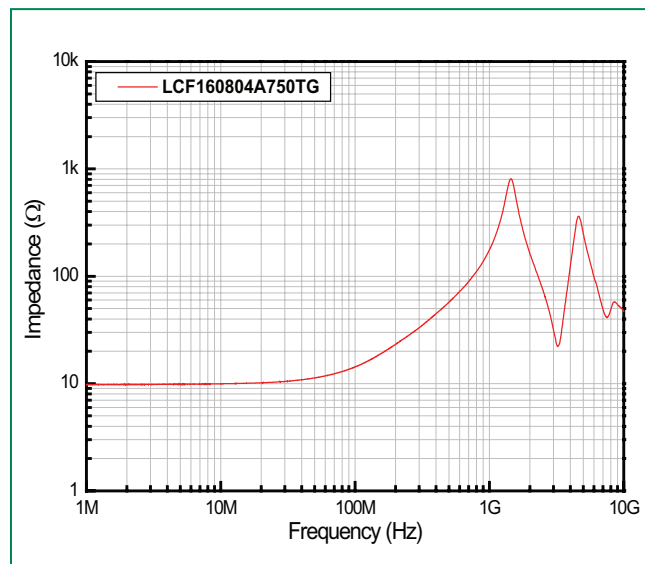


## 1608mm size

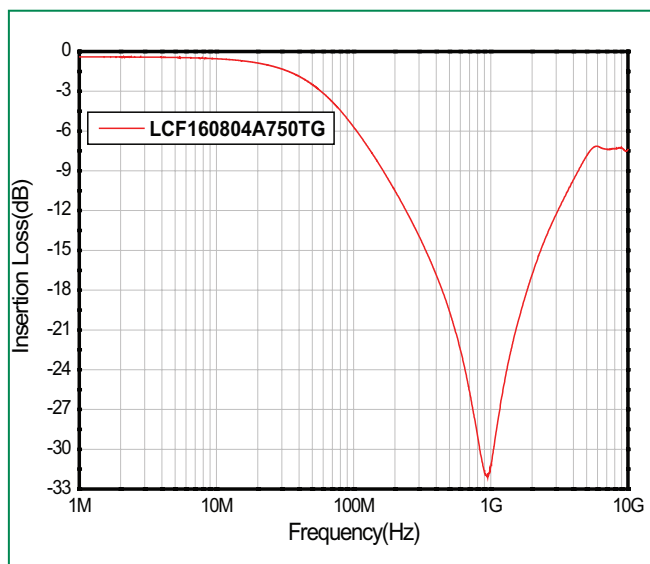
### Impedance Curves (Common Mode)



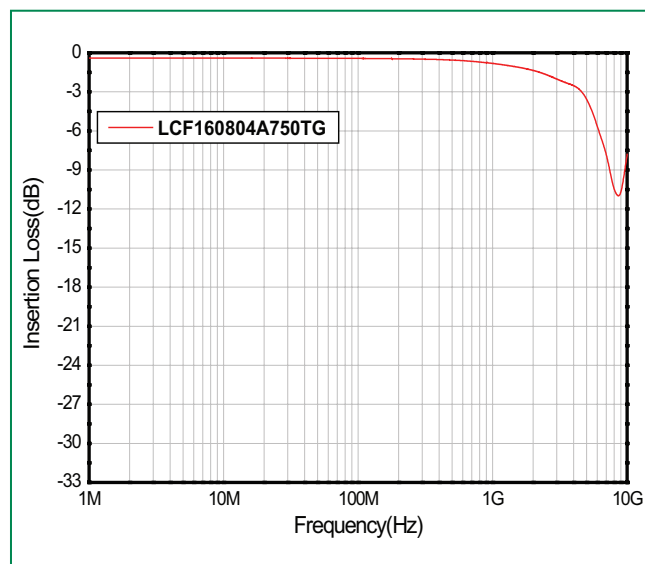
### Impedance Curves (Differential Mode)



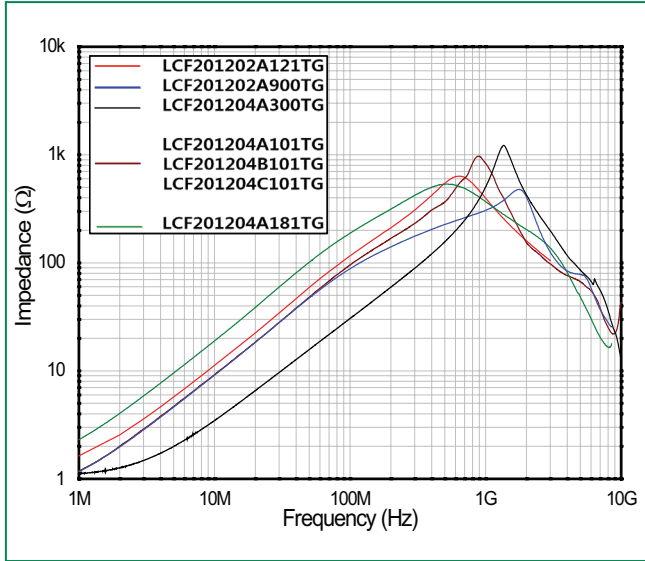
### Transmission Characteristics (S-parameter) Common Mode S21



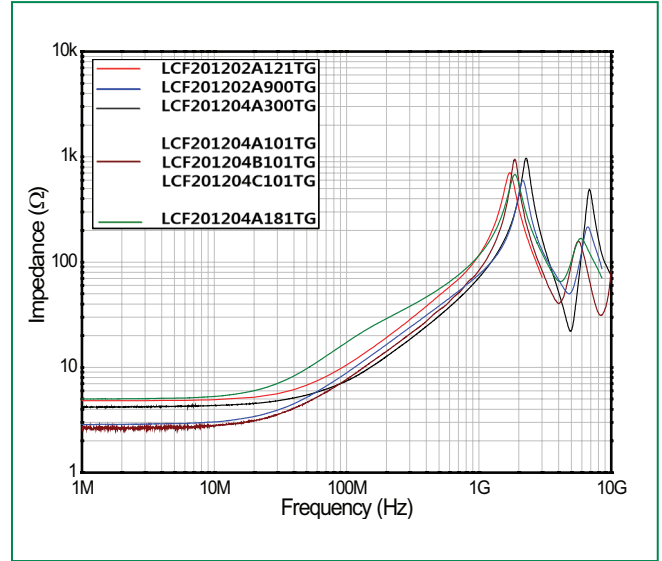
### Differential Mode S21



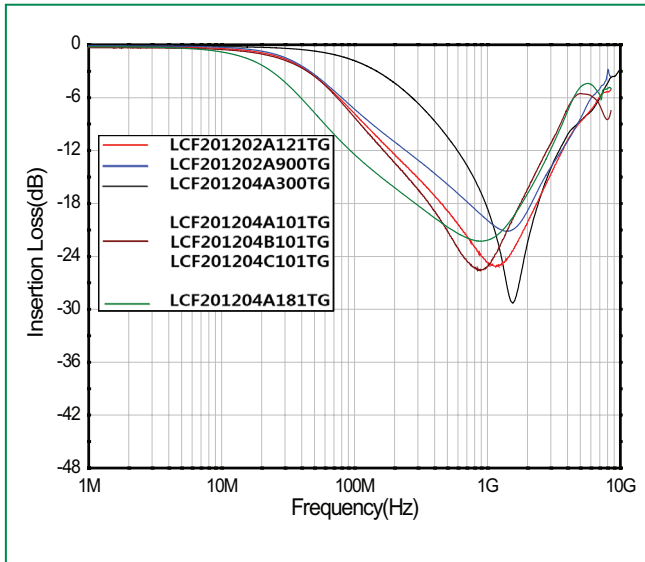
**2012mm size**  
**Impedance Curves (Common Mode)**



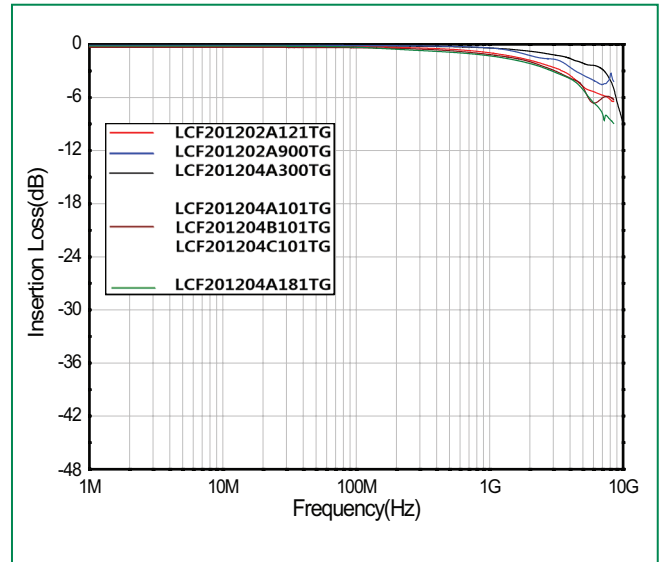
**Impedance Curves (Differential Mode)**



**Transmission Characteristics (S-parameter)**  
**Common Mode S21**

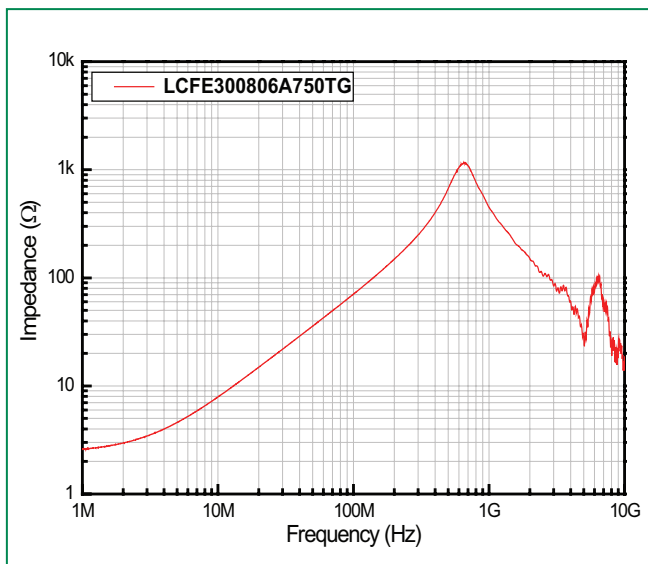


**Differential Mode S21**

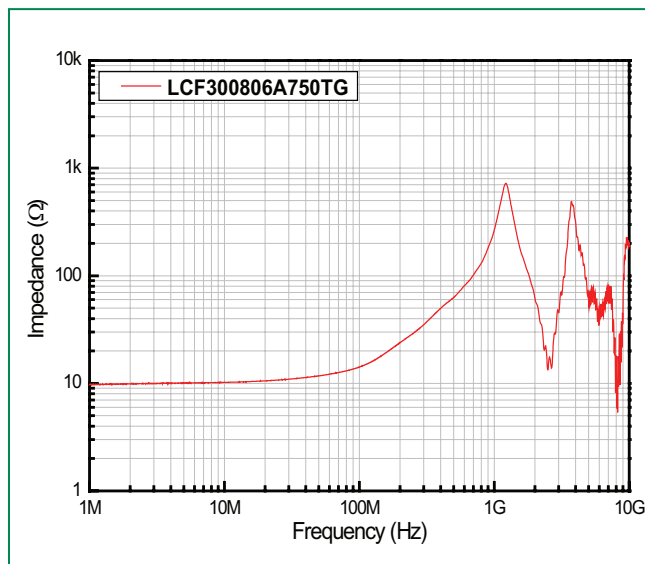


**3008 mm size**

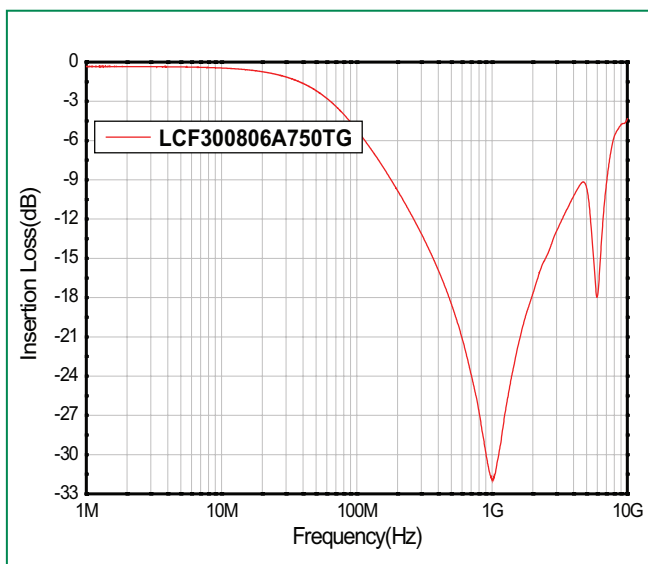
**Impedance Curves (Common Mode)**



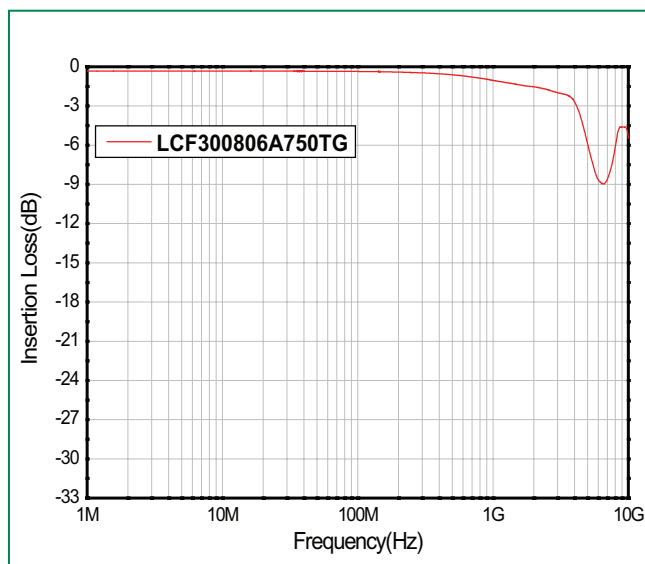
**Impedance Curves (Differential Mode)**



**Transmission Characteristics (S-parameter)  
Common Mode S21**



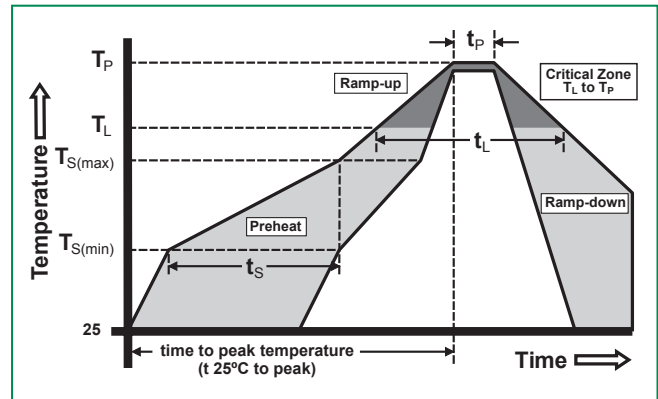
**Differential Mode S21**





### 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 <sup>+0/-5</sup> °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)

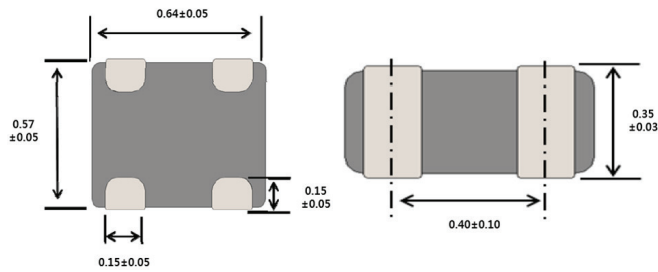
### Product Characteristics

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

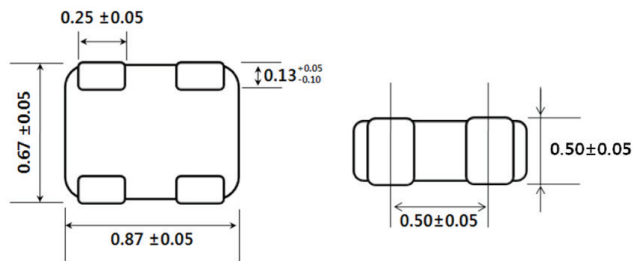
<b>Operating Temperature</b>	-40°C to +85°C (consider re-rating)
<b>Climatic Category</b>	-40°C + 85°C/8 days
<b>Stock Conditions</b>	-10°C + 40°C RH, ≤ 70%
<b>Vibration Resistance</b>	5 g's for 20 minutes, 12 cycles each of three orientations

### Dimensions (Unit = mm)

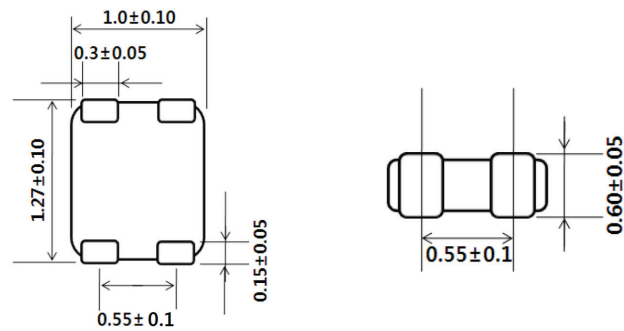
0605mm size



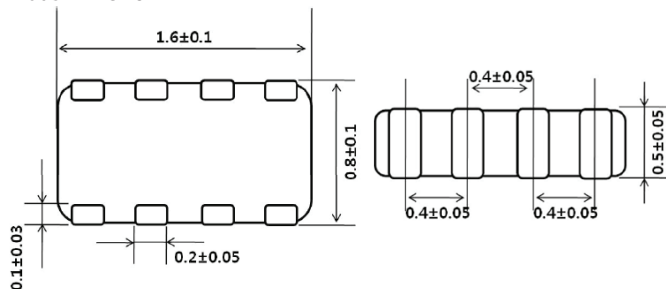
0806mm size



1210mm size



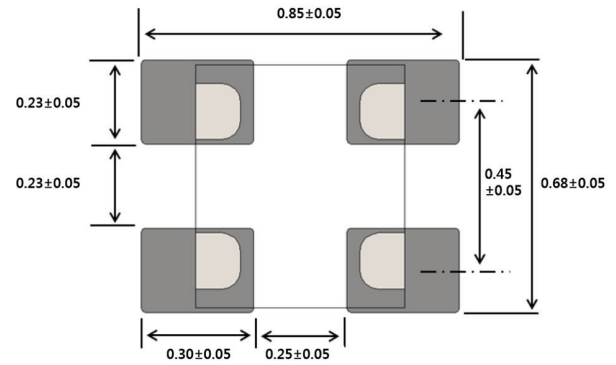
1608mm size



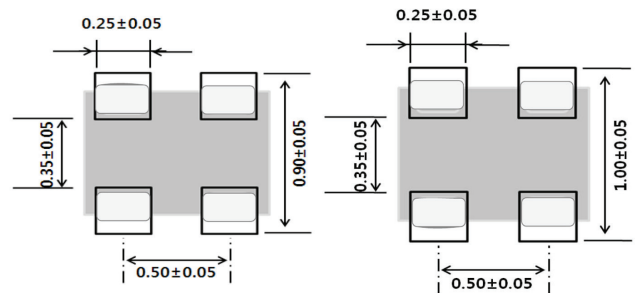
### Recommended Footprint and Stencil Mask

Stencil Mask T = 0.10mm

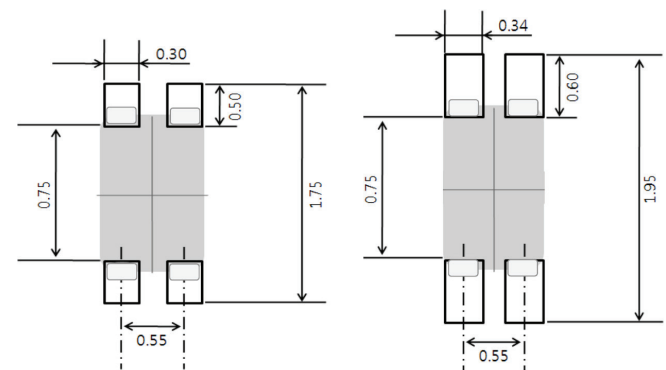
0605mm size



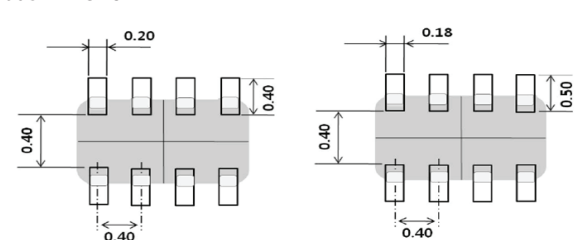
0806mm size



1210mm size



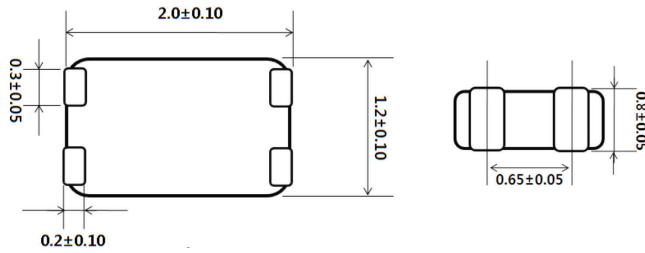
1608mm size



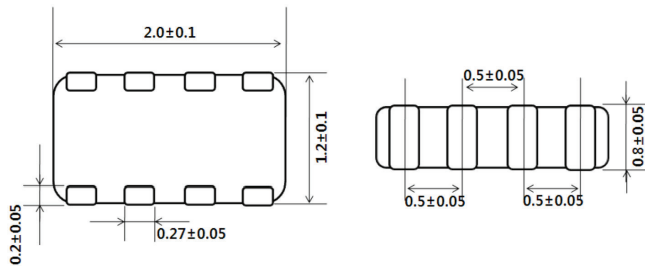
**LCF Series**

**Dimensions (Unit = mm)**

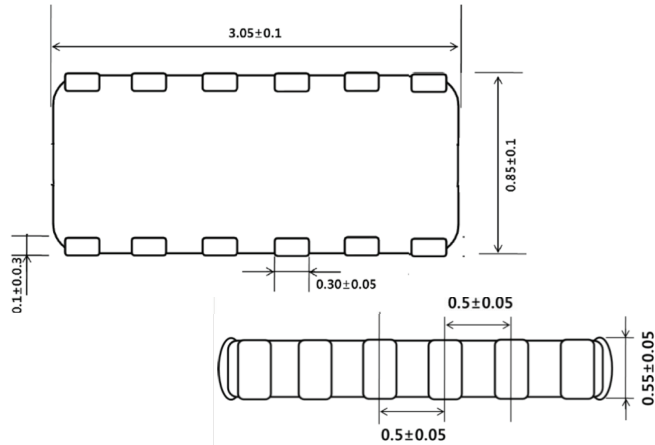
2012mm size (LCF201202A121TG, LCF201202A121TG)



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



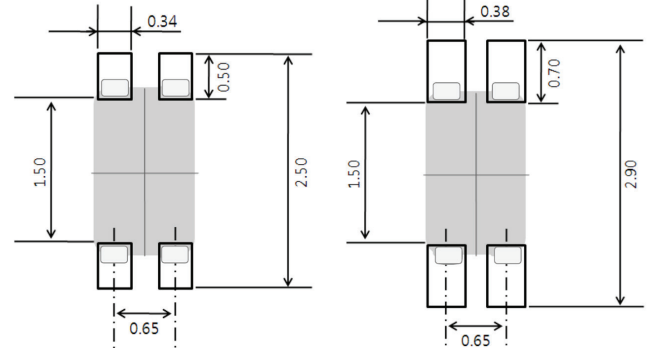
3008mm size



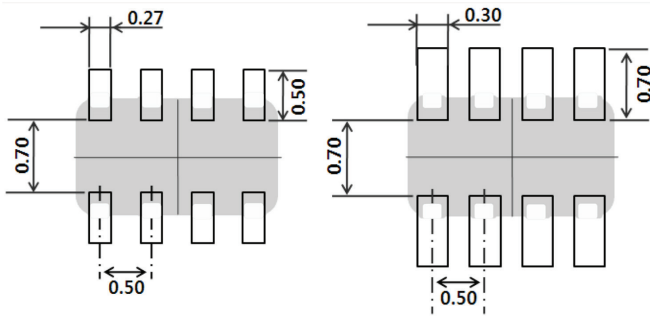
**Recommended Footprint and Stencil Mask**

Stencil Mask T = 0.10mm

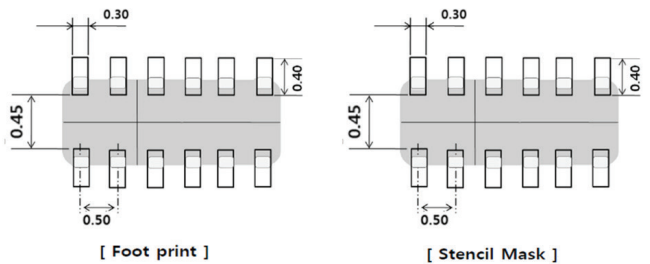
2012mm size (LCF201202A121TG, LCF201202A121TG)



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

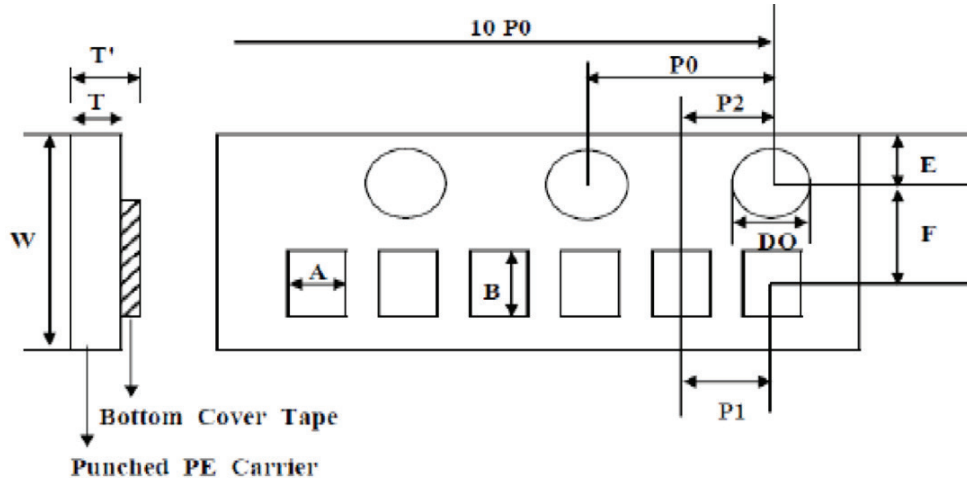


3008mm size



### Carrie Tape Dimensions

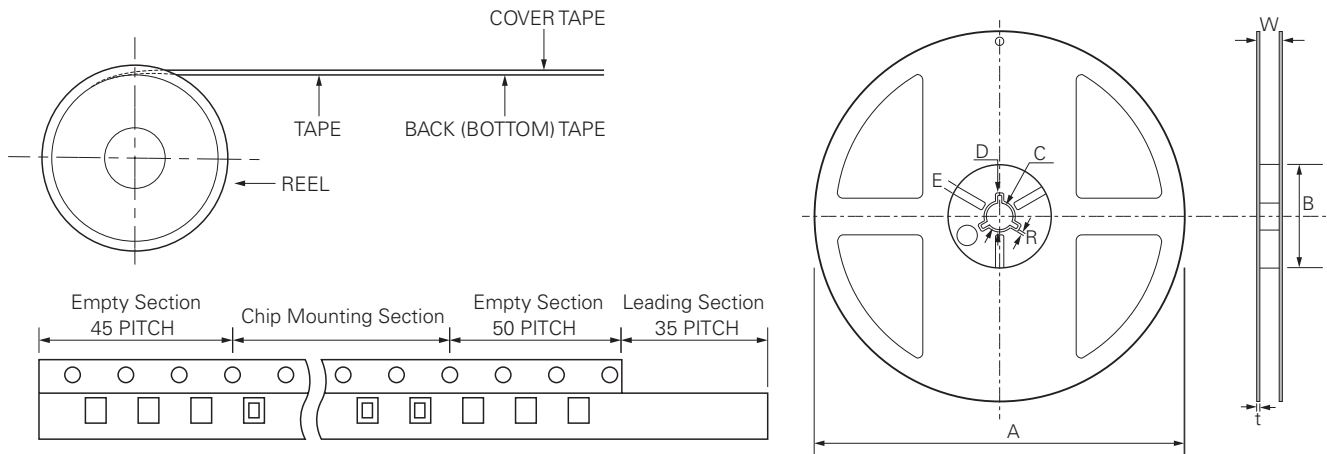
0605mm size



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

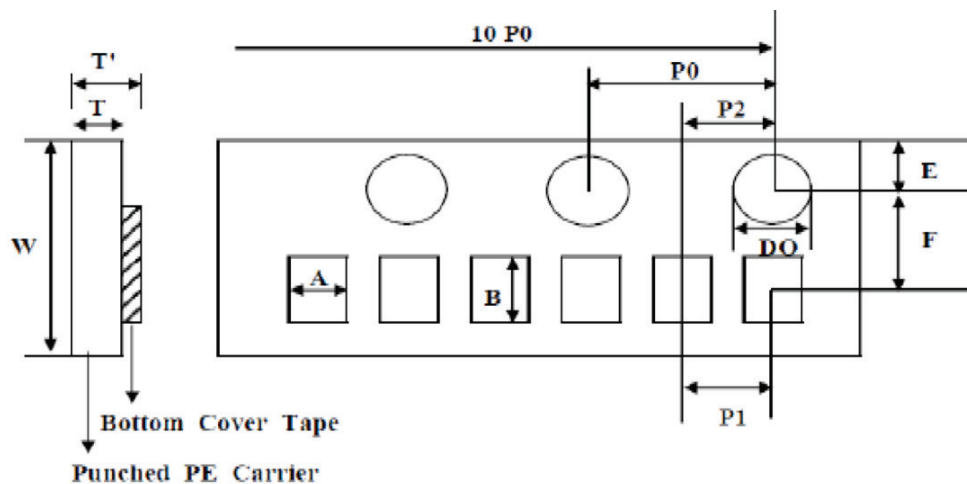


- (1) Reel Materials: Polystyrene (2) Label (3) Taping
- Standard Packing Quantity per Reel (Ø178)
- PE Tape: 10,000pcs

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

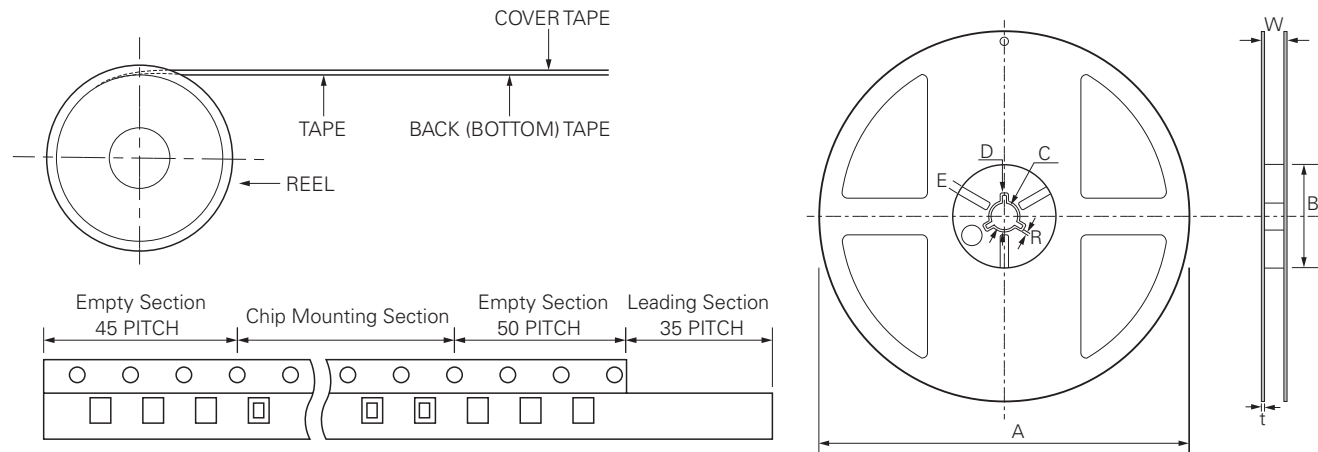
0806mm size



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

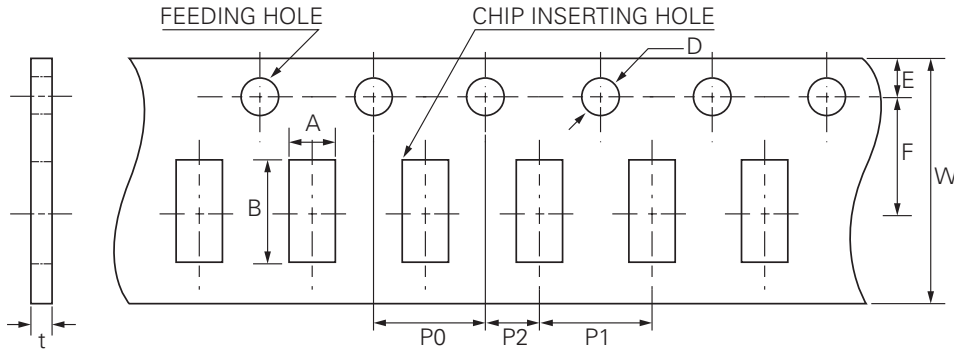


- (1) Reel Materials: Polystyrene (2) Label (3) Taping  
 - Standard Packing Quantity per Reel (Ø178)  
 - PE Tape: 10,000pcs

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

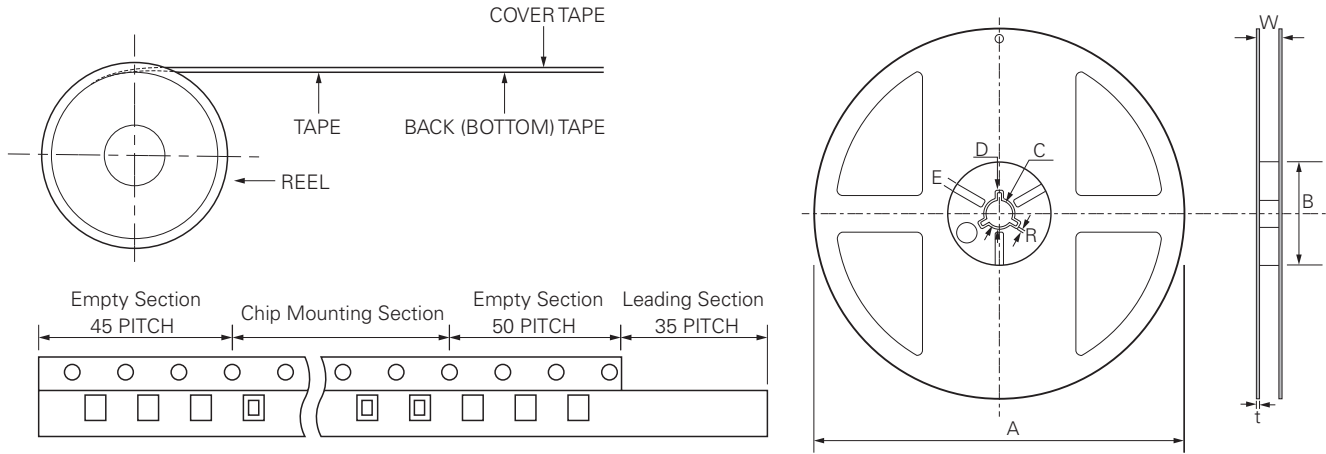
1210mm size



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

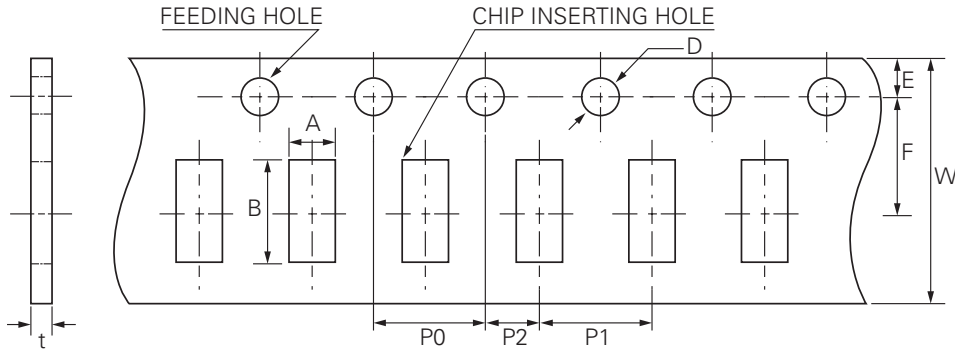


(1) Reel Materials: Polystyrene (2) Label (3) Taping  
 - Standard Packing Quantity per Reel (Ø178)  
 - PE Tape: 4,000pcs

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

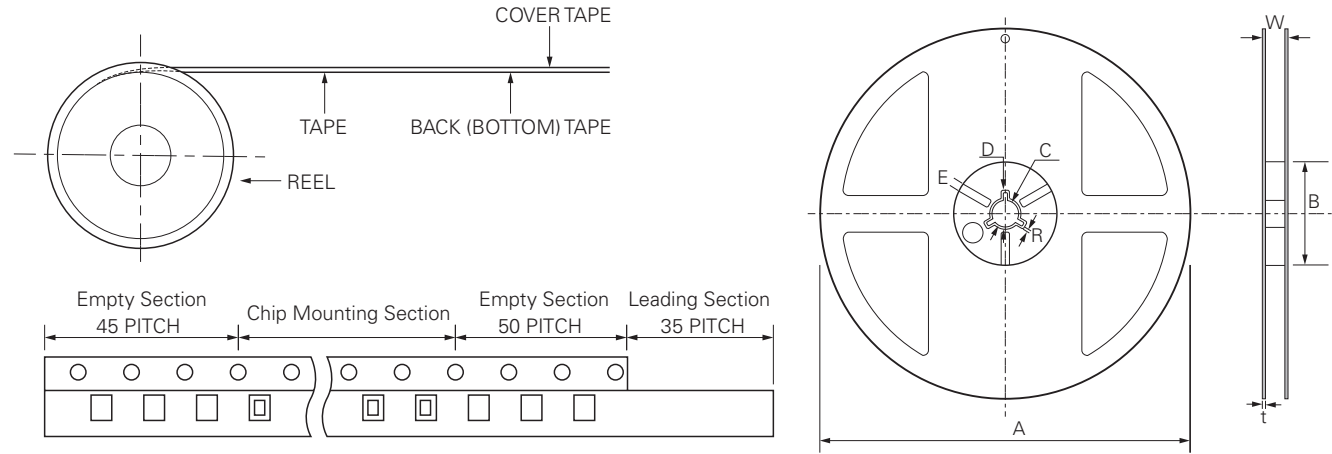
1608mm size



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

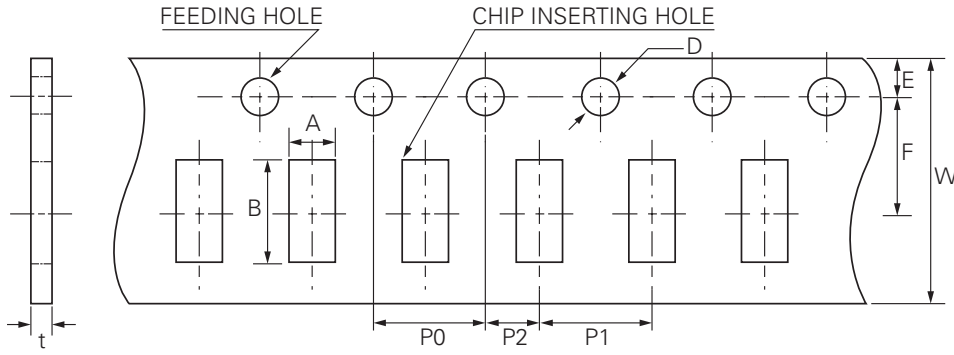


- (1) Reel Materials: Polystyrene (2) Label (3) Taping  
 - Standard Packing Quantity per Reel (Ø178)  
 - PE Tape: 4,000pcs

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

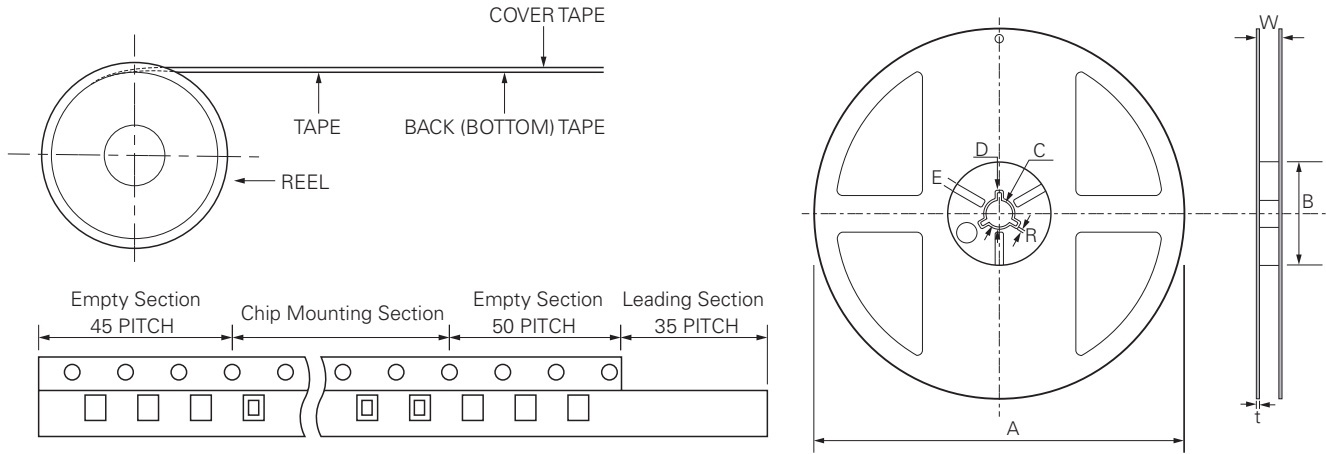
2012mm size



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



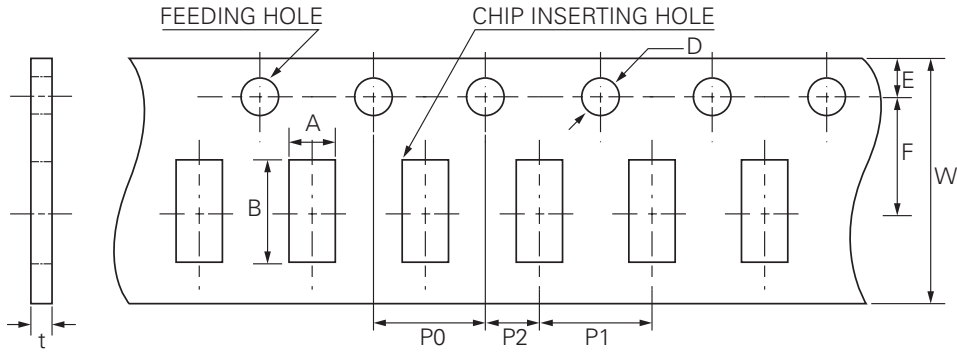
(1) Reel Materials: Polystyrene (2) Label (3) Taping  
- Standard Packing Quantity per Reel (Ø178)  
- PE Tape: 4,000pcs

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

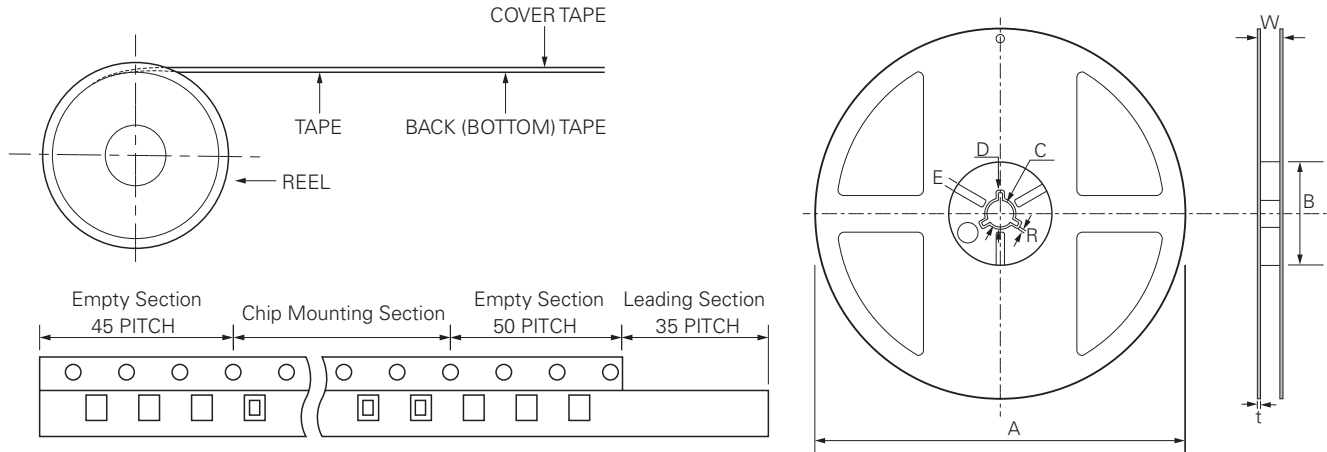
3008mm size



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

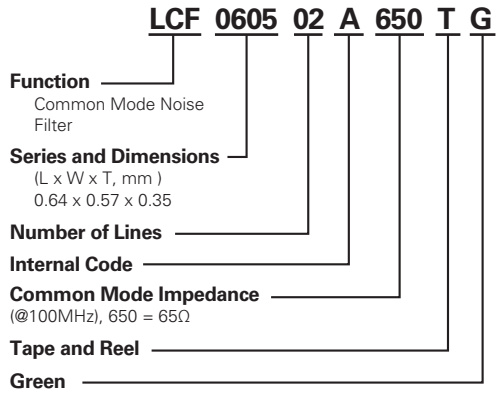
3008mm size



(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
LCF0605xxxxxxx/LCF0806xxxxxxx	10,000
LCF1608xxxxxxx/LCF1210xxxxxxx	4,000
LCF2012xxxxxxx/LCF3008xxxxxxx	