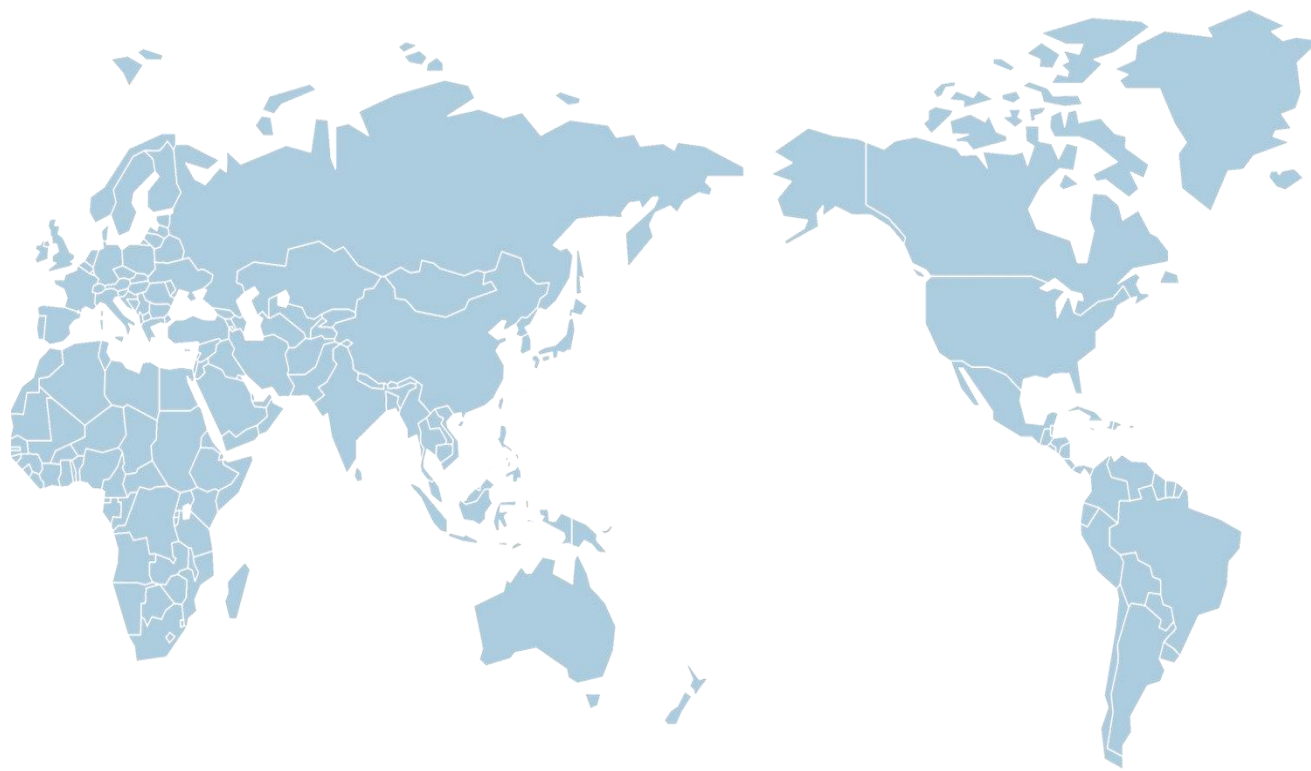


[www.innochips.co.kr](http://www.innochips.co.kr)



A Global Leading Company for EMC Total Solution & Modularity

## ● Moda-Inno Chips's Product Line up



**RF Inductor**



**SMD Type NTC Thermistor**



**Metal Composite Power Inductor [THIN FILM]**



**Common Mode Filter**



**Common Mode ESD Filter**



**C-PHY Filter**



**EMI&ESD FILTER[R-C FILTER]**



**MLCC+ESD Protection [& Shock Current Guard]**



**VARISTOR[Normal, Low Cap]**

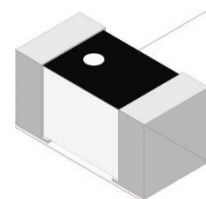




# RF Inductor

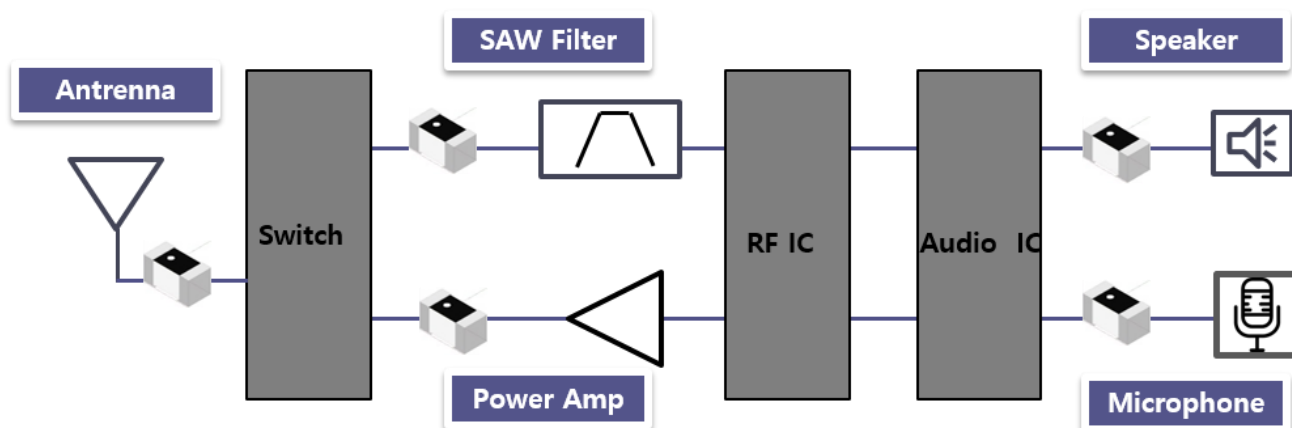
## Features

- Low DC resistance
- High current type
- Completely lead free product



## Application

- RF module, RF circuits for smart phones, smart wearable devices
- Various wireless communication modules (Wi-Fi / Bluetooth)
- Car navigations, Car audios
- Car Body control equipment like wipers, power windows



## Part Numbering

| ①  | ② | ③ | ④  | ⑤   | ⑥ | ⑦ | ⑧ | ⑨ |
|----|---|---|----|-----|---|---|---|---|
| RI | H | 3 | TQ | 3N9 | B | T | F | R |

## ① Product

| Code | Product     |
|------|-------------|
| RI   | RF Inductor |

## ② Structure

| Code | Structure  |
|------|------------|
| H    | Horizontal |

## ③ SIZE (L X W)

| Code | mm        | inch |
|------|-----------|------|
| 3    | 0.6 X 0.3 | 0201 |

## ④ Characteristics

| Code | Characteristics |
|------|-----------------|
| TQ   | Standard Q      |

## ⑤ Inductance @ 500MHz

| Code | Inductance (nH) |
|------|-----------------|
| 0N6  | 0.6             |
| 1N8  | 1.8             |
| 3N3  | 3.3             |
| 3N9  | 3.9             |

## ⑥ Inductance Tolerance

| Code | Tolerance (nH) |
|------|----------------|
| B    | ±0.1           |

## ⑦ Features

| Code | Tolerance |
|------|-----------|
| T    | Standard  |

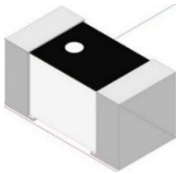
## ⑧ Electrode Type

| Code | Type      |
|------|-----------|
| F    | Lead Free |

## ⑨ Packing Type

| Code | Type        |
|------|-------------|
| R    | Reel Taping |
| B    | Bulk        |

Product Specification



0603 Series

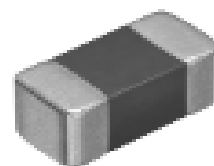
| Part Number   | Inductance<br>@500MHz<br>[nH] | Q<br>@500<br>MHz | DCR [ $\Omega$ ] | Self Resonant<br>Frequency<br>[MHz] |       | Rated Current<br>[mA] |
|---------------|-------------------------------|------------------|------------------|-------------------------------------|-------|-----------------------|
|               |                               | Min              |                  | Min                                 | Typ.  |                       |
| RIH3TQ0N6BTFR | 0.6 $\pm$ 0.1                 | 14               | 0.07             | 20000                               | 20000 | 850                   |
| RIH3TQ1N8BTFR | 1.8 $\pm$ 0.1                 | 14               | 0.15             | 15000                               | 17700 | 600                   |
| RIH3TQ3N3BTFR | 3.3 $\pm$ 0.1                 | 14               | 0.25             | 8000                                | 10900 | 450                   |
| RIH3TQ3N9BTFR | 3.9 $\pm$ 0.1                 | 14               | 0.30             | 5700                                | 7900  | 400                   |



# SMD Type NTC Thermistor

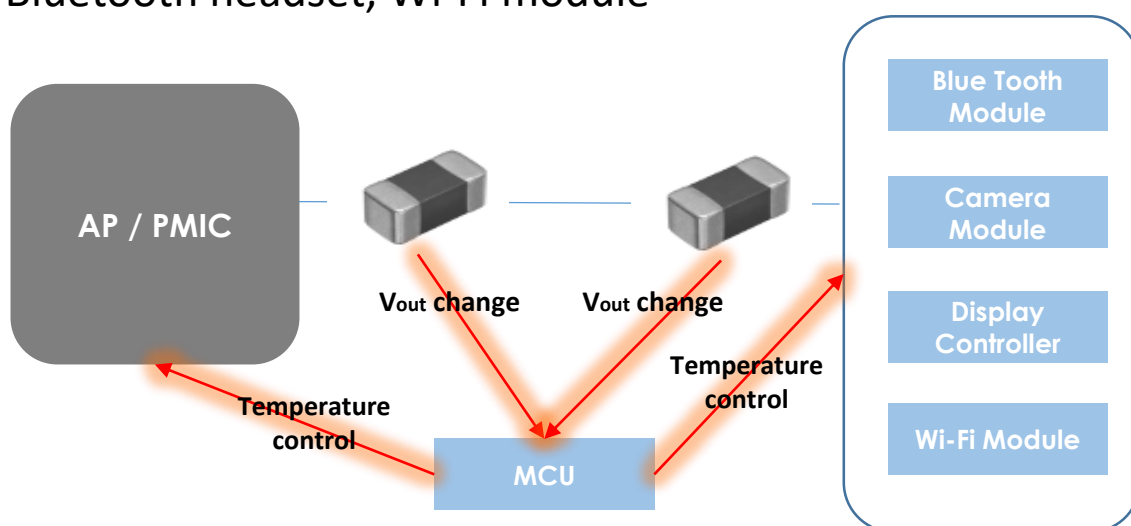
## Features

- Commercial Grade
- High Temperature
- High Reliability
- Operating temperature range:  $-40^{\circ}\text{C} \sim +125^{\circ}\text{C}$



## Application

- Battery pack
- Motherboard, notebook and personal computer device
- Smart phone, LCD
- Bluetooth headset, Wi-Fi module



Part Numbering

|      |     |      |   |     |   |   |   |
|------|-----|------|---|-----|---|---|---|
| ①    | ②   | ③    | ④ | ⑤   | ⑥ | ⑦ | ⑧ |
| ICNT | 03S | 4250 | F | 104 | F | F | R |

① Product

| Code | Product              |
|------|----------------------|
| ICNT | ICT's NTC Thermistor |

⑤ Resistance @ 25°C

| Code | Resistance (Ω) |
|------|----------------|
| 104  | 100,000        |

② SIZE (L X W)

| Code | mm        | inch |
|------|-----------|------|
| 03S  | 0.6 X 0.3 | 0201 |

⑥ Resistance Tolerance

| Code | Tolerance |
|------|-----------|
| F    | ±1        |
| H    | ±3        |
| J    | ±5        |

③ B CONSTANT

| Code | B CONSTANT (K) |
|------|----------------|
| 4250 | 4,250          |

⑦ Electrode Type

| Code | Type      |
|------|-----------|
| F    | Lead Free |

④ B CONSTANT Tolerance

| Code | Tolerance |
|------|-----------|
| F    | ±1        |
| H    | ±3        |
| J    | ±5        |

⑧ Packing Type

| Code | Type        |
|------|-------------|
| R    | Reel Taping |
| B    | Bulk        |

Product Specification

0603 Series



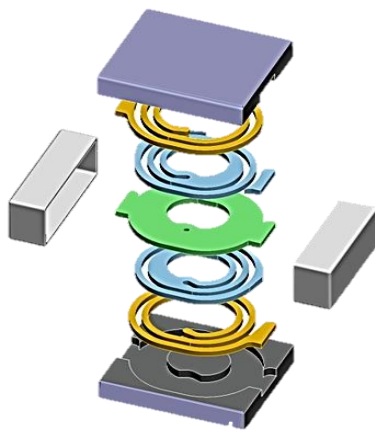
| Part Number        | B Constant [K] | Resistance @ 25°C [Ω] | Thermal Dissipation Constant (25°C) | Permissible Operating Current(25°C) |
|--------------------|----------------|-----------------------|-------------------------------------|-------------------------------------|
| ICNT03S4250F104FFR | 4,250±1%       | 100,000±1%            | 1mW/°C                              | 0.1 mA                              |



# Metal Composite Power Inductor

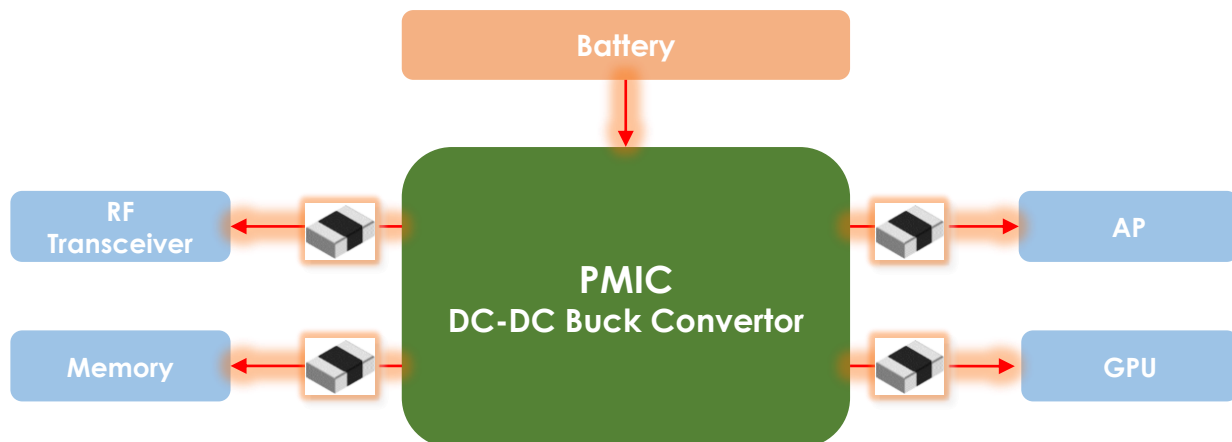
## Features

- Thin Film Type
- High Current Type
- High Efficiency
- Low DC resistance
- AEC-Q200 Standard (MPA for Automotive)



## Application

- DC-DC Converters and Power modules in general use Electronic equipment (Mobile phone , Tablet , PC)



## Part Numbering

| ①  | ②    | ③  | ④ | ⑤   | ⑥ | ⑦ | ⑧ | ⑨ |
|----|------|----|---|-----|---|---|---|---|
| MP | 1608 | 08 | E | R47 | B | M | F | R |

### ① Product

| Code | Product                                       |
|------|-----------------------------------------------|
| MP   | Metal Composite Power Inductor                |
| MPA  | Metal Composite Power Inductor for Automotive |

### ② SIZE (L X W)

| Code | mm        | inch |
|------|-----------|------|
| 1412 | 1.4 X 1.2 | 0605 |
| 1608 | 1.6 x 0.8 | 0603 |
| 2012 | 2.0 x 1.2 | 0805 |
| 2016 | 2.0 x 1.6 | 0806 |
| 2520 | 2.5 x 2.0 | 1008 |

### ③ Thickness (Max)

| Code | Thickness (Max) |
|------|-----------------|
| R6   | 0.65 mm         |
| 08   | 0.80 mm         |
| 10   | 1.00 mm         |

### ④ Characteristic

| Code | Characteristic    |
|------|-------------------|
| S    | Standard          |
| H    | High Current      |
| E    | Excellent Current |
| U    | Ultra Current     |

### ⑤ Inductance

| Code | Inductance |
|------|------------|
| R24  | 0.24 uH    |
| R33  | 0.33 uH    |
| R47  | 0.47 uH    |
| R56  | 0.56 uH    |
| 1R0  | 1.0 uH     |
| 1R5  | 1.5 uH     |
| 2R2  | 2.2 uH     |
| 4R7  | 4.7 uH     |

### ⑥ External Electrode

| Code | Type              |
|------|-------------------|
| N/A  | Ag Epoxy          |
| B    | Cu Plating        |
| L    | L type Cu Plating |

### ⑦ Inductance Tolerance

| Code | Tolerance   |
|------|-------------|
| M    | ± 20%       |
| L    | -10% ~ +30% |

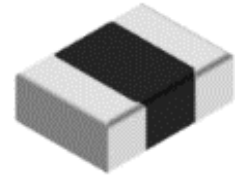
### ⑧ Electrode Type

| Code | Type      |
|------|-----------|
| F    | Lead Free |

### ⑨ Packing Type

| Code | Type        |
|------|-------------|
| R    | Reel Taping |
| B    | Bulk        |

## Product Specification



## 141206 Series

| Part Number      | Inductance<br>[uH] | DCR [mΩ] |     | Rated DC Current [A] |     |         |     |
|------------------|--------------------|----------|-----|----------------------|-----|---------|-----|
|                  |                    | Typical  | Max | Isat                 |     | Irms    |     |
|                  |                    |          |     | Typical              | Max | Typical | Max |
| MP1412R6UR24LMFR | 0.24±20%           | 17       | 21  | 5.5                  | 5.0 | 5.0     | 4.5 |
| MP1412R6UR33LMFR | 0.33±20%           | 21       | 25  | 5.1                  | 4.6 | 4.9     | 4.5 |

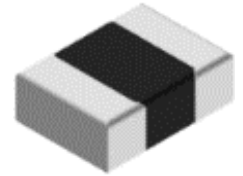
## 160808 Series

| Part Number      | Inductance<br>[uH] | DCR [mΩ] |     | Rated DC Current [A] |     |         |     |
|------------------|--------------------|----------|-----|----------------------|-----|---------|-----|
|                  |                    | Typical  | Max | Isat                 |     | Irms    |     |
|                  |                    |          |     | Typical              | Max | Typical | Max |
| MP160808SR24BMFR | 0.24±20%           | 25       | 30  | 3.5                  | 3.0 | 3.5     | 3.2 |
| MP160808ER47BMFR | 0.47±20%           | 37       | 45  | 3.4                  | 3.1 | 3.2     | 2.9 |
| MP160808E1R0BMFR | 1.00±20%           | 115      | 135 | 2.2                  | 2.0 | 2.0     | 1.7 |

## 201206 Series

| Part Number      | Inductance<br>[uH] | DCR [mΩ] |     | Rated DC Current [A] |     |         |     |
|------------------|--------------------|----------|-----|----------------------|-----|---------|-----|
|                  |                    | Typical  | Max | Isat                 |     | Irms    |     |
|                  |                    |          |     | Typical              | Max | Typical | Max |
| MP2012R6UR33LMFR | 0.33±20%           | 22       | 26  | 5.5                  | 5.0 | 5.1     | 4.6 |

## Product Specification



### 201208 Series

| Part Number      | Inductance<br>[uH] | DCR [mΩ] |     | Rated DC Current [A] |     |         |     |
|------------------|--------------------|----------|-----|----------------------|-----|---------|-----|
|                  |                    | Typical  | Max | Isat                 |     | Irms    |     |
|                  |                    |          |     | Typical              | Max | Typical | Max |
| MP201208ER47LMFR | 0.47±20%           | 25       | 27  | 5.0                  | 4.8 | 4.2     | 4.0 |
| MP201208ER47BMFR | 0.47±20%           | 30       | 35  | 5.0                  | 4.7 | 4.0     | 3.8 |
| MP201208SR47BMFR | 0.47±20%           | 31       | 35  | 4.3                  | 4.1 | 3.9     | 3.7 |
| MP201208SR47BLFR | 0.47<br>-10%,+30%  | 35       | 43  | 4.2                  | 4.0 | 3.2     | 3.0 |
| MP201208SR56BMFR | 0.56±20%           | 40       | 48  | 3.5                  | 3.2 | 3.5     | 3.2 |
| MP201208S1R0BMFR | 1.00±20%           | 48       | 55  | 3.5                  | 3.2 | 3.3     | 3.1 |
| MP201208E1R0BMFR | 1.00±20%           | 60       | 65  | 3.4                  | 3.1 | 3.0     | 2.7 |

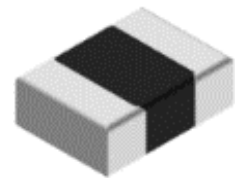
### 201210 Series

| Part Number      | Inductance<br>[uH] | DCR [mΩ] |     | Rated DC Current [A] |     |         |     |
|------------------|--------------------|----------|-----|----------------------|-----|---------|-----|
|                  |                    | Typical  | Max | Isat                 |     | Irms    |     |
|                  |                    |          |     | Typical              | Max | Typical | Max |
| MP201210ER47BMFR | 0.47±20%           | 25       | 33  | 5.4                  | 4.9 | 4.5     | 4.3 |
| MP201210E1R0BMFR | 1.00±20%           | 58       | 63  | 3.4                  | 3.1 | 3.0     | 2.7 |

### 201606 Series

| Part Number      | Inductance<br>[uH] | DCR [mΩ] |     | Rated DC Current [A] |     |         |     |
|------------------|--------------------|----------|-----|----------------------|-----|---------|-----|
|                  |                    | Typical  | Max | Isat                 |     | Irms    |     |
|                  |                    |          |     | Typical              | Max | Typical | Max |
| MP2016R6UR47LMFR | 0.47±20%           | 27       | 31  | 5.5                  | 5.0 | 5.1     | 4.5 |

## Product Specification



### 201610 Series

| Part Number     | Inductance<br>[uH] | DCR [mΩ] |     | Rated DC Current [A] |     |         |     |
|-----------------|--------------------|----------|-----|----------------------|-----|---------|-----|
|                 |                    | Typical  | Max | Isat                 |     | Irms    |     |
|                 |                    |          |     | Typical              | Max | Typical | Max |
| MP201610SR24MFR | 0.24±20%           | 18       | 23  | 5.8                  | 5.3 | 4.4     | 4.0 |
| MP201610ER47MFR | 0.47±20%           | 21       | 27  | 6.0                  | 5.7 | 5.2     | 4.8 |
| MP201610E1R0MFR | 1.00±20%           | 43       | 46  | 4.2                  | 4.0 | 3.5     | 3.2 |
| MP201610H1R5MFR | 1.50±20%           | 85       | 100 | 2.7                  | 2.5 | 2.5     | 2.3 |
| MP201610H2R2MFR | 2.20±20%           | 115      | 135 | 2.7                  | 2.5 | 2.4     | 2.2 |
| MP201610S2R2MFR | 2.20±20%           | 130      | 150 | 2.0                  | 1.6 | 1.9     | 1.5 |

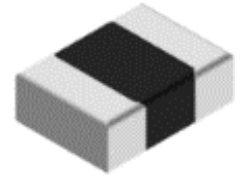
### 252008 Series

| Part Number      | Inductance<br>[uH] | DCR [mΩ] |     | Rated DC Current [A] |     |         |     |
|------------------|--------------------|----------|-----|----------------------|-----|---------|-----|
|                  |                    | Typical  | Max | Isat                 |     | Irms    |     |
|                  |                    |          |     | Typical              | Max | Typical | Max |
| MP252008SR47BMFR | 0.47±20%           | 24       | 29  | 5.5                  | 5.0 | 4.5     | 4.2 |
| MP252008S1R0BMFR | 1.00±20%           | 36       | 43  | 4.3                  | 4.1 | 4.2     | 4.0 |

### 252010 Series

| Part Number     | Inductance<br>[uH] | DCR [mΩ] |     | Rated DC Current [A] |     |         |     |
|-----------------|--------------------|----------|-----|----------------------|-----|---------|-----|
|                 |                    | Typical  | Max | Isat                 |     | Irms    |     |
|                 |                    |          |     | Typical              | Max | Typical | Max |
| MP252010ER47MFR | 0.47±20%           | 21       | 27  | 6.4                  | 6.0 | 5.2     | 4.6 |
| MP252010E1R0MFR | 1.00±20%           | 33       | 36  | 5.0                  | 4.7 | 4.3     | 4.0 |
| MP252010E2R2MFR | 2.20±20%           | 85       | 89  | 3.5                  | 3.1 | 2.5     | 2.3 |
| MP252010S4R7MFR | 4.70±20%           | 230      | 245 | 1.9                  | 1.6 | 1.8     | 1.5 |

## Product Specification



### AEC-Q200 160808 Series

| Part Number       | Inductance<br>[uH] | DCR [mΩ] |     | Rated DC Current [A] |     |         |     |
|-------------------|--------------------|----------|-----|----------------------|-----|---------|-----|
|                   |                    | Typical  | Max | Isat                 |     | Irms    |     |
|                   |                    |          |     | Typical              | Max | Typical | Max |
| MPA160808ER47MFR  | 0.47 ±20%          | 37       | 45  | 3.4                  | 3.1 | 3.2     | 2.9 |
| MPA160808ER56BMFR | 0.56 ±20%          | 55       | 60  | 2.9                  | 2.6 | 2.5     | 2.2 |
| MPA160808E1R0MFR  | 1.00 ±20%          | 115      | 135 | 2.2                  | 2.0 | 2.0     | 1.7 |
| MPA160808S1R0MFR  | 1.00 ±20%          | 130      | 150 | 2.0                  | 1.7 | 2.0     | 1.7 |

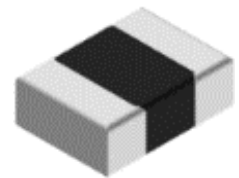
### AEC-Q200 201208 Series

| Part Number      | Inductance<br>[uH] | DCR [mΩ] |     | Rated DC Current [A] |     |         |     |
|------------------|--------------------|----------|-----|----------------------|-----|---------|-----|
|                  |                    | Typical  | Max | Isat                 |     | Irms    |     |
|                  |                    |          |     | Typical              | Max | Typical | Max |
| MPA201208SR47MFR | 0.47 ±20%          | 30       | 35  | 4.2                  | 4.0 | 4.0     | 3.8 |

### AEC-Q200 201210 Series

| Part Number       | Inductance<br>[uH] | DCR [mΩ] |     | Rated DC Current [A] |     |         |     |
|-------------------|--------------------|----------|-----|----------------------|-----|---------|-----|
|                   |                    | Typical  | Max | Isat                 |     | Irms    |     |
|                   |                    |          |     | Typical              | Max | Typical | Max |
| MPA201210ER47BMFR | 0.47 ±20%          | 25       | 33  | 5.4                  | 4.9 | 4.5     | 4.3 |
| MPA201210E1R0BMFR | 1.00 ±20%          | 58       | 6.3 | 3.4                  | 3.1 | 3.0     | 2.7 |
| MPA201210S1R0MFR  | 1.00 ±20%          | 50       | 60  | 3.5                  | 3.2 | 3.0     | 2.7 |

## Product Specification



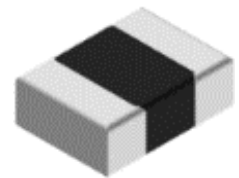
### AEC-Q200 201608 Series

| Part Number      | Inductance<br>[uH] | DCR [mΩ] |     | Rated DC Current [A] |     |         |     |
|------------------|--------------------|----------|-----|----------------------|-----|---------|-----|
|                  |                    | Typical  | Max | Isat                 |     | Irms    |     |
|                  |                    |          |     | Typical              | Max | Typical | Max |
| MPA201608S2R2MFR | 2.20 ±20%          | 130      | 150 | 2.0                  | 1.6 | 1.9     | 1.5 |

### AEC-Q200 201610 Series

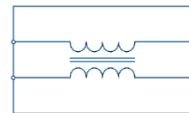
| Part Number      | Inductance<br>[uH] | DCR [mΩ] |     | Rated DC Current [A] |     |         |     |
|------------------|--------------------|----------|-----|----------------------|-----|---------|-----|
|                  |                    | Typical  | Max | Isat                 |     | Irms    |     |
|                  |                    |          |     | Typical              | Max | Typical | Max |
| MPA201610ER47MFR | 0.47 ±20%          | 21       | 24  | 6.0                  | 5.7 | 5.2     | 4.8 |
| MPA201610E1R0MFR | 1.00 ±20%          | 43       | 46  | 4.2                  | 4.0 | 3.5     | 3.2 |
| MPA201610E2R2MFR | 2.20 ±20%          | 117      | 140 | 2.6                  | 2.4 | 2.1     | 1.9 |
| MPA201610HR47MFR | 0.47 ±20%          | 20       | 25  | 5.3                  | 4.8 | 4.2     | 3.6 |
| MPA201610H1R0MFR | 1.00 ±20%          | 40       | 45  | 3.9                  | 3.6 | 3.1     | 2.7 |
| MPA201610H1R5MFR | 1.50 ±20%          | 85       | 100 | 3.2                  | 2.8 | 2.5     | 2.3 |
| MPA201610SR68MFR | 0.68 ±20%          | 48       | 55  | 3.8                  | 3.3 | 3.4     | 3.0 |
| MPA201610S1R0MFR | 1.00 ±20%          | 58       | 65  | 3.2                  | 2.8 | 3.0     | 2.6 |
| MPA201610S2R2MFR | 2.20 ±20%          | 135      | 150 | 2.2                  | 1.8 | 2.3     | 1.9 |

Product Specification



AEC-Q200 252010 Series

| Part Number      | Inductance<br>[uH] | DCR [mΩ] |     | Rated DC Current [A] |     |         |     |
|------------------|--------------------|----------|-----|----------------------|-----|---------|-----|
|                  |                    | Typical  | Max | Isat                 |     | Irms    |     |
|                  |                    |          |     | Typical              | Max | Typical | Max |
| MPA252010E1R0MFR | 1.00 ±20%          | 27       | 32  | 5.0                  | 4.7 | 4.3     | 4.0 |
| MPA252010E2R2MFR | 2.20 ±20%          | 85       | 95  | 3.5                  | 3.1 | 2.5     | 2.3 |
| MPA252010SR33MFR | 0.33 ±20%          | 20       | 25  | 6.2                  | 5.8 | 5.6     | 5.2 |
| MPA252010SR47MFR | 0.47 ±20%          | 25       | 30  | 6.0                  | 5.5 | 4.1     | 3.7 |
| MPA252010S1R0MFR | 1.00 ±20%          | 40       | 50  | 4.2                  | 3.8 | 3.5     | 3.1 |
| MPA252010S1R5MFR | 1.50 ±20%          | 65       | 80  | 3.5                  | 3.1 | 2.8     | 2.5 |
| MPA252010S2R2MFR | 2.20 ±20%          | 100      | 110 | 3.0                  | 2.5 | 2.5     | 2.3 |
| MPA252010S3R3MFR | 3.30 ±20%          | 55       | 170 | 2.2                  | 2.0 | 1.9     | 1.6 |
| MPA252010S4R7MFR | 4.70 ±20%          | 230      | 245 | 1.9                  | 1.6 | 1.8     | 1.5 |



# Common Mode Filter

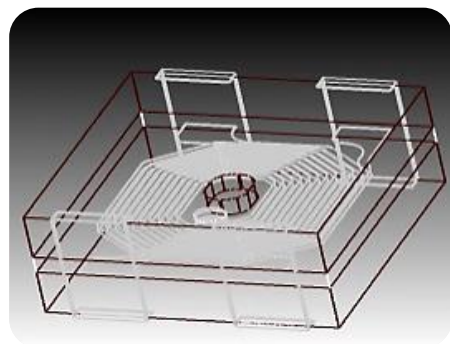
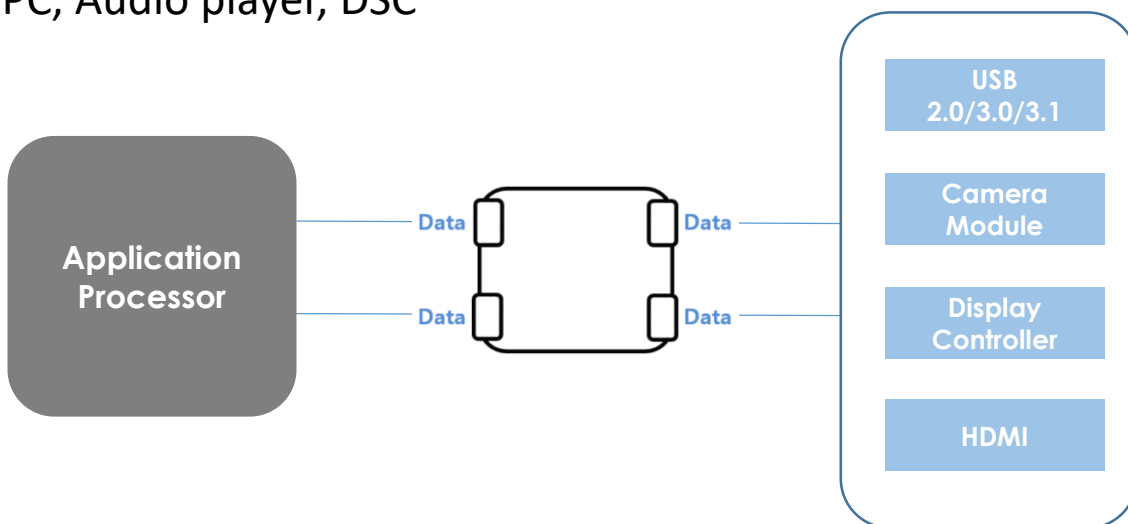
## Features

- Effective for suppressing Common Mode Noise
- Almost no effect for high speed Differential Data Line
- Ultra Low Profile [ 0.05mm]
- For MIPI D-PHY Data Line



## Application

- USB3.1 Gen1, USB3.1 Gen2, USB2.0
- MIPI lines in mobile phones and other devices
- LVDS, DP lines in notebook computers
- IEEE1394, DVI, HDMI lines in PDP, LCD TV, DVD Player, PC, Audio player, DSC



## Part Numbering

| ①    | ②  | ③  | ④   | ⑤ | ⑥ | ⑦ |
|------|----|----|-----|---|---|---|
| ICMF | 05 | 2P | 120 | M | F | R |

### ① Product

| Code  | Product                              |
|-------|--------------------------------------|
| ICMF  | ICT's<br>Common Mode Filter          |
| ICMAF | Common Mode Filter for<br>Automotive |

### ② SIZE (L X W)

| Code | mm          | inch |
|------|-------------|------|
| 05   | 0.64 x 0.57 | 0302 |
| 06   | 0.87 x 0.67 | 0403 |
| 11   | 1.27 x 1.00 | 0504 |
| 21   | 2.00 x 1.20 | 0805 |
| 10   | 1.60 x 0.80 | 0603 |

### ③ Number of Lines(CH)

| Code | CH  |
|------|-----|
| 2P   | 2CH |
| 4P   | 4CH |

### ④ Common Mode Impedance (at 100MHz)

| Code | Impedance |
|------|-----------|
| 120  | 12Ω       |
| 350  | 35Ω       |
| 500  | 50Ω       |
| 650  | 65Ω       |
| 900  | 90Ω       |
| 101  | 100Ω      |

### ⑤ Impedance Tolerance

| Code | Tolerance |
|------|-----------|
| N    | ± 30%     |
| M    | ± 25%     |

### ⑥ Electrode Type

| Code | Type      |
|------|-----------|
| F    | Lead Free |

### ⑦ Packing Type

| Code | Type        |
|------|-------------|
| R    | Reel Taping |
| B    | Bulk        |

Product Specification



052P Series

| Part Number    | Common Mode Impedance | Resistance | Insulation Resistance | Rated Voltage | Rated Current | Cut-off Frequency |
|----------------|-----------------------|------------|-----------------------|---------------|---------------|-------------------|
| ICMF052P120NFR | 12Ω(±30%)             | 1.5Ω(±40%) | Min. 10MΩ             | 5V            | 50mA          | 11.95GHz          |
| ICMF052P350MFR | 35Ω(±25%)             | Max 5.0Ω   | Min. 10MΩ             | 5V            | 50mA          | 7.08GHz           |
| ICMF052P650MFR | 65Ω(±25%)             | Max 10Ω    | Min. 10MΩ             | 5V            | 50mA          | 4.91GHz           |
| ICMF052P900MFR | 90Ω(±25%)             | Max 10Ω    | Min. 10MΩ             | 5V            | 50mA          | 4.50GHz           |

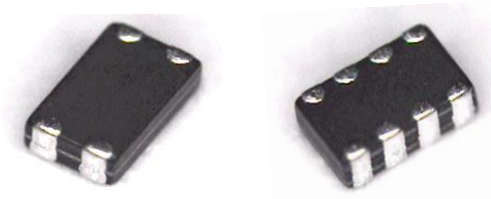
062P Series

| Part Number    | Common Mode Impedance | Resistance | Insulation Resistance | Rated Voltage | Rated Current | Cut-off Frequency |
|----------------|-----------------------|------------|-----------------------|---------------|---------------|-------------------|
| ICMF062P120NFR | 12Ω(±30%)             | 1.3Ω(±30%) | Min. 10MΩ             | 5V            | 100mA         | 9.20GHz           |
| ICMF062P250MFR | 25Ω(±25%)             | Max 5.0Ω   | Min. 10MΩ             | 5V            | 100mA         | 8.28GHz           |
| ICMF062P650MFR | 65Ω(±25%)             | Max 5.0Ω   | Min. 10MΩ             | 5V            | 100mA         | 3.20GHz           |
| ICMF062P900MFR | 90Ω(±25%)             | Max 6.0Ω   | Min. 10MΩ             | 5V            | 100mA         | 3.10GHz           |

112P Series

| Part Number     | Common Mode Impedance | Resistance | Insulation Resistance | Rated Voltage | Rated Current | Cut-off Frequency |
|-----------------|-----------------------|------------|-----------------------|---------------|---------------|-------------------|
| ICMF112P120NFR  | 12Ω(±30%)             | Max 4.0Ω   | Min. 10MΩ             | 5V            | 100mA         | 10.50GHz          |
| ICMF112P350MFR  | 35Ω(±25%)             | Max 4.0Ω   | Min. 10MΩ             | 5V            | 100mA         | 8.72GHz           |
| ICMF112P500MFR  | 50Ω(±25%)             | Max 4.0Ω   | Min. 10MΩ             | 5V            | 100mA         | 6.45GHz           |
| ICMF112P650MFR  | 65Ω(±25%)             | Max 4.0Ω   | Min. 10MΩ             | 5V            | 100mA         | 5.35GHz           |
| ICMFS112P750MFR | 75Ω(±25%)             | Max 2.0Ω   | Min. 10MΩ             | 10V           | 100mA         | 4.00GHz           |
| ICMF112P900MFR  | 90Ω(±25%)             | Max 4.0Ω   | Min. 10MΩ             | 5V            | 100mA         | 4.50GHz           |

Product Specification



104P Series

| Part Number    | Common Mode Impedance | Resistance | Insulation Resistance | Rated Voltage | Rated Current | Cut-off Frequency |
|----------------|-----------------------|------------|-----------------------|---------------|---------------|-------------------|
| ICMF104P750MFR | 75(±25%)              | Max 6.0    | Min. 10MΩ             | 5V            | 100mA         | 4.1GHz            |

212P Series

| Part Number    | Common Mode Impedance | Resistance | Insulation Resistance | Rated Voltage | Rated Current | Cut-off Frequency |
|----------------|-----------------------|------------|-----------------------|---------------|---------------|-------------------|
| ICMF212P121MFR | 120Ω(±25%)            | Max 4.0    | Min. 10MΩ             | 5V            | 100mA         | 3.95GHz           |
| ICMF212P181MFR | 180Ω(±25%)            | Max 4.0    | Min. 10MΩ             | 5V            | 100mA         | 3.46GHz           |
| ICMF212P900MFR | 90Ω(±25%)             | Max 4.0    | Min. 10MΩ             | 5V            | 100mA         | 4.1GHz            |

214P Series

| Part Number    | Common Mode Impedance | Resistance | Insulation Resistance | Rated Voltage | Rated Current | Cut-off Frequency |
|----------------|-----------------------|------------|-----------------------|---------------|---------------|-------------------|
| ICMF214P101MFR | 100Ω(±25%)            | Max 4.0    | Min. 10MΩ             | 5V            | 100mA         | 3.7GHz            |
| ICMF214P181MFR | 180Ω(±25%)            | Max 4.0    | Min. 10MΩ             | 5V            | 100mA         | 4.23GHz           |

AEC-Q200 Series

| Part Number     | Common Mode Impedance | Resistance | Insulation Resistance | Rated Voltage | Rated Current | Cut-off Frequency |
|-----------------|-----------------------|------------|-----------------------|---------------|---------------|-------------------|
| ICMAF112P120MFR | 12Ω(±25%)             | Max 4.0Ω   | Min. 10MΩ             | 5V            | 100mA         | 18.46GHz          |
| ICMAF112P900MFR | 90Ω(±25%)             | Max 4.0Ω   | Min. 10MΩ             | 5V            | 100mA         | 4.65GHz           |
| ICMAF212P900MFR | 90Ω(±25%)             | Max 4.0Ω   | Min. 10MΩ             | 5V            | 100mA         | 3.89GHz           |
| ICMAF214P101MFR | 100Ω(±25%)            | Max 4.0Ω   | Min. 10MΩ             | 5V            | 100mA         | 2.92GHz           |

# Common Mode ESD Filter

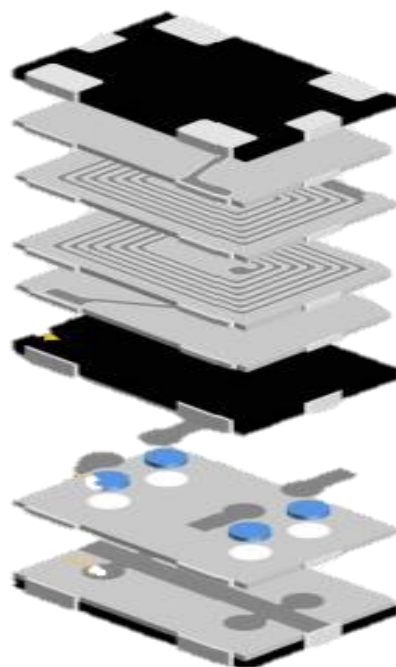
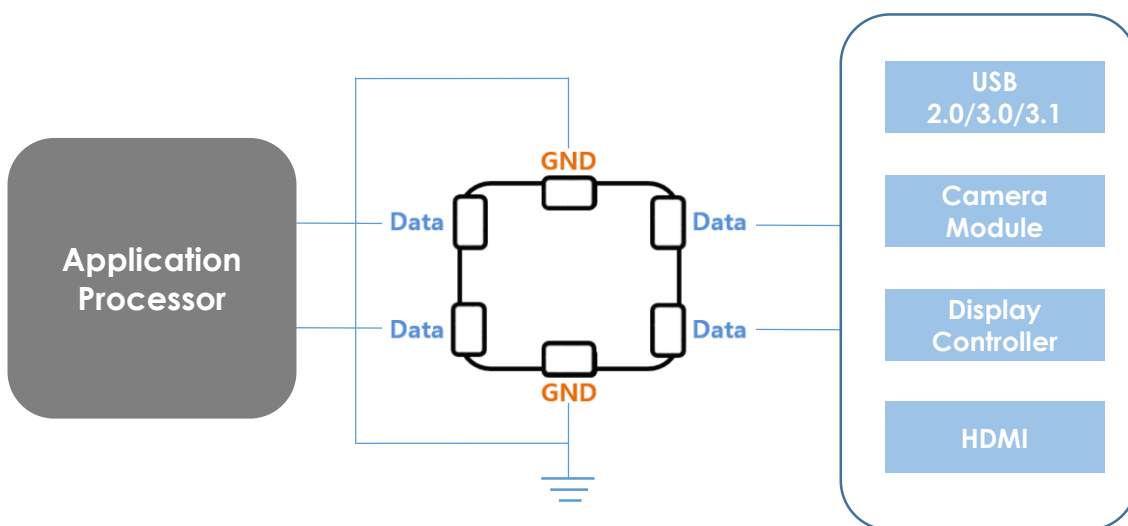
## Features



- Effective for suppressing Common Mode Noise and **ESD**
- Almost no effect for high speed Differential Data Line
- IEC61000-4-2 Level4
- For MIPI D-PHY Data Line

## Application

- LCD Display Controller
- Camera Module
- USB 2.0 / 3.0 / 3.1 , HDMI



## Part Numbering

| ①     | ②  | ③  | ④   | ⑤ | ⑥ | ⑦ |
|-------|----|----|-----|---|---|---|
| ICMEF | 06 | 2P | 120 | N | F | R |

### ① Product

| Code   | Product                                           |
|--------|---------------------------------------------------|
| ICMEF  | ICT's<br>Common Mode ESD Filter                   |
| ICMEAF | ICT's<br>Common Mode ESD Filter for<br>Automotive |

### ② SIZE (L X W)

| Code | mm          | inch |
|------|-------------|------|
| 06   | 0.87 x 0.67 | 0403 |
| 11   | 1.27 x 1.00 | 0504 |
| 21   | 2.00 x 1.20 | 0805 |
| 10   | 1.60 x 0.80 | 0603 |

### ③ Number of Lines(CH)

| Code | CH  |
|------|-----|
| 2P   | 2CH |
| 4P   | 4CH |

### ④ Common Mode Impedance (at 100MHz)

| Code | Impedance |
|------|-----------|
| 120  | 12Ω       |
| 250  | 25Ω       |
| 350  | 35Ω       |
| 500  | 50Ω       |
| 900  | 90Ω       |
| 101  | 100Ω      |

### ⑤ Impedance Tolerance

| Code | Tolerance |
|------|-----------|
| N    | ± 30%     |
| M    | ± 25%     |

### ⑥ Electrode Type

| Code | Type      |
|------|-----------|
| F    | Lead Free |

### ⑦ Packing Type

| Code | Type        |
|------|-------------|
| R    | Reel Taping |
| B    | Bulk        |

Product Specification



062P Series

| Part Number     | Common Mode Impedance | Resistance | Capacitance | Rated Voltage | Rated Current | Cut-off Frequency |
|-----------------|-----------------------|------------|-------------|---------------|---------------|-------------------|
| ICMEF062P120NFR | 12Ω(±30%)             | 1.3Ω(±30%) | Max 1.7pF   | 5V            | 100mA         | 10.35GHz          |
| ICMEF062P250MFR | 25Ω(±25%)             | Max 5.0Ω   | Max 1.7pF   | 5V            | 100mA         | 8.07GHz           |
| ICMEW062P500MFR | 50Ω(±25%)             | Max 7.0Ω   | Max 1.7pF   | 5V            | 100mA         | 3.00GHz           |
| ICMEF062P750MFR | 75Ω(±25%)             | Max 6.0Ω   | Max 1.7pF   | 5V            | 100mA         | 3.50GHz           |
| ICMEF062P900MFR | 90Ω(±25%)             | Max 6.0Ω   | Max 1.7pF   | 5V            | 100mA         | 4.03GHz           |
| ICMEG062P900MFR | 90Ω(±25%)             | Max 8.0Ω   | Max 2.0pF   | 5V            | 100mA         | 3.50GHz           |
| ICMED062P900MFR | 90Ω(±25%)             | Max 8.0Ω   | Max 1.7pF   | 5V            | 100mA         | 3.50GHz           |

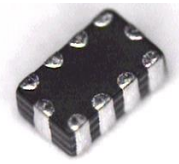
112P Series

| Part Number     | Common Mode Impedance | Resistance | Capacitance | Rated Voltage | Rated Current | Cut-off Frequency |
|-----------------|-----------------------|------------|-------------|---------------|---------------|-------------------|
| ICMEF112P120NFR | 12Ω(±30%)             | Max 4.0Ω   | Max 1.7pF   | 5V            | 100mA         | 10.5GHz           |
| ICMEF112P350MFR | 35Ω(±25%)             | Max 4.0Ω   | Max 1.7pF   | 5V            | 100mA         | 7.1GHz            |
| ICMEF112P500MFR | 50Ω(±25%)             | Max 4.0Ω   | Max 1.7pF   | 5V            | 100mA         | 6.0GHz            |
| ICMEF112P650MFR | 65Ω(±25%)             | Max 4.0Ω   | Max 1.7pF   | 5V            | 100mA         | 3.0GHz            |
| ICMEF112P900MFR | 90Ω(±25%)             | Max 4.0Ω   | Max 1.7pF   | 5V            | 100mA         | 4.0GHz            |

212P Series

| Part Number     | Common Mode Impedance | Resistance | Capacitance | Rated Voltage | Rated Current | Cut-off Frequency |
|-----------------|-----------------------|------------|-------------|---------------|---------------|-------------------|
| ICMEF212P900MFR | 90Ω(±25%)             | Max 4.0    | Max 1.7pF   | 5V            | 100mA         | 3.8GHz            |
| ICMEF212P121MFR | 120Ω(±25%)            | Max 4.0    | Max 1.7pF   | 5V            | 100mA         | 3.62GHz           |

## Product Specification



### 104P Series

| Part Number     | Common Mode Impedance | Resistance | Capacitance | Rated Voltage | Rated Current | Cut-off Frequency |
|-----------------|-----------------------|------------|-------------|---------------|---------------|-------------------|
| CMEF104P180NFR  | 18Ω(±30%)             | Max 6.0    | Max 1.7pF   | 5V            | 100mA         | 10.0GHz           |
| CMEF104P350NFR  | 35Ω(±30%)             | Max 6.0    | Max 1.7pF   | 5V            | 100mA         | 7.0GHz            |
| ICMEF104P750MFR | 75Ω(±25%)             | Max 6.0    | Max 1.7pF   | 5V            | 100mA         | 4.0GHz            |

### 124P / 214P Series

| Part Number     | Common Mode Impedance | Resistance | Capacitance | Rated Voltage | Rated Current | Cut-off Frequency |
|-----------------|-----------------------|------------|-------------|---------------|---------------|-------------------|
| ICMEF124P850MFR | 85Ω(±25%)             | Max 10.0   | Max 1.7pF   | 5V            | 100mA         | 3.0GHz            |
| ICMEF214P101MFR | 100Ω(±25%)            | Max 4.0    | Max 1.7pF   | 5V            | 100mA         | 3.7GHz            |

### 306P Series

| Part Number     | Common Mode Impedance | Resistance | Capacitance | Rated Voltage | Rated Current | Cut-off Frequency |
|-----------------|-----------------------|------------|-------------|---------------|---------------|-------------------|
| ICMEF306P750MFR | 75Ω(±25%)             | Max 6.0    | Max 2.0pF   | 5V            | 100mA         | 4.0GHz            |

### AEC-Q200 Series

| Part Number      | Common Mode Impedance | Resistance | Rated Voltage | Rated Current | Cut-off Frequency |
|------------------|-----------------------|------------|---------------|---------------|-------------------|
| ICMEAF112P350MFR | 35Ω(±25%)             | Max 4.0    | 5V            | 100mA         | 6.38GHz           |
| ICMEAF112P900MFR | 90Ω(±25%)             | Max 4.0    | 5V            | 100mA         | 4.57GHz           |
| ICMEAF214P101MFR | 100Ω(±25%)            | Max 4.0    | 5V            | 100mA         | 4.0GHz            |

# C-PHY Filter

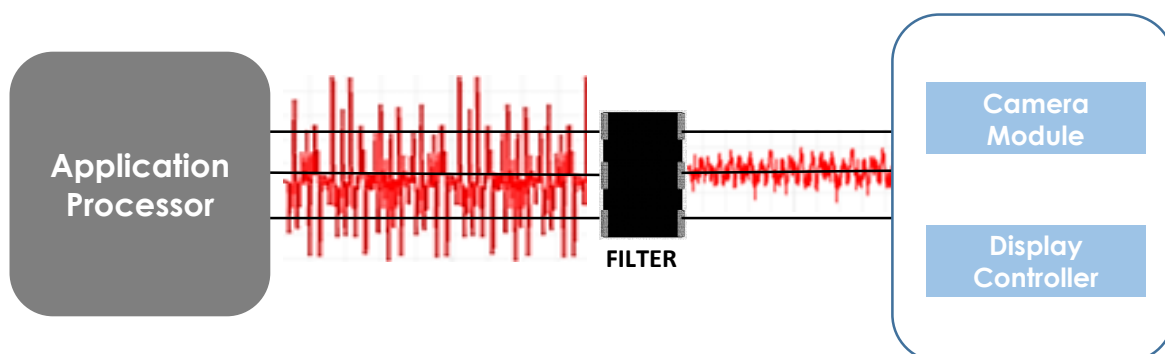
## Features



- Effective for suppressing common mode noise and almost no effect for high speed differential data line
- Ceramic based SMD component
- Non-polarized product
- For MIPI C-PHY data line

## Application

- Camera, LCD MIPI C-PHY data lines (Mobile phone, Automotive)



Part Numbering

|      |    |    |     |   |   |   |
|------|----|----|-----|---|---|---|
| ①    | ②  | ③  | ④   | ⑤ | ⑥ | ⑦ |
| ICPF | 07 | 3P | 250 | M | F | R |

① Product

| Code  | Product                      |
|-------|------------------------------|
| ICPF  | ICT’s C-PHY Filter           |
| ICPWF | ICT’s C-PHY Wide band Filter |

② SIZE (L X W)

| Code | mm         | inch |
|------|------------|------|
| 07   | 0.9 x 0.68 | 0403 |

③ Number of Lines(CH)

| Code | CH  |
|------|-----|
| 3P   | 3CH |

④ Common Mode Impedance (at 100MHz)

| Code | Impedance |
|------|-----------|
| 250  | 25Ω       |
| 350  | 35Ω       |

⑤ Impedance Tolerance

| Code | Tolerance |
|------|-----------|
| N    | ± 30%     |
| M    | ± 25%     |

⑥ Electrode Type

| Code | Type      |
|------|-----------|
| F    | Lead Free |

⑦ Packing Type

| Code | Type        |
|------|-------------|
| R    | Reel Taping |
| B    | Bulk        |

Product Specification

0907 Series



| Part Number     | Common Mode Impedance | Resistance | Rated Voltage | Rated Current | Cut-off Frequency |
|-----------------|-----------------------|------------|---------------|---------------|-------------------|
| ICPF073P250MFR  | 25Ω(±25%)             | Max 5.0    | 5V            | 80mA          | 6.7GHz            |
| ICPF073P350MFR  | 35Ω(±25%)             | Max 8.0    | 5V            | 70mA          | 4.54GHz           |
| ICPWF073P130NFR | 13Ω(±25%)             | Max 5.0    | 5V            | 70mA          | 5.5GHz            |

# EMI / ESD Filter

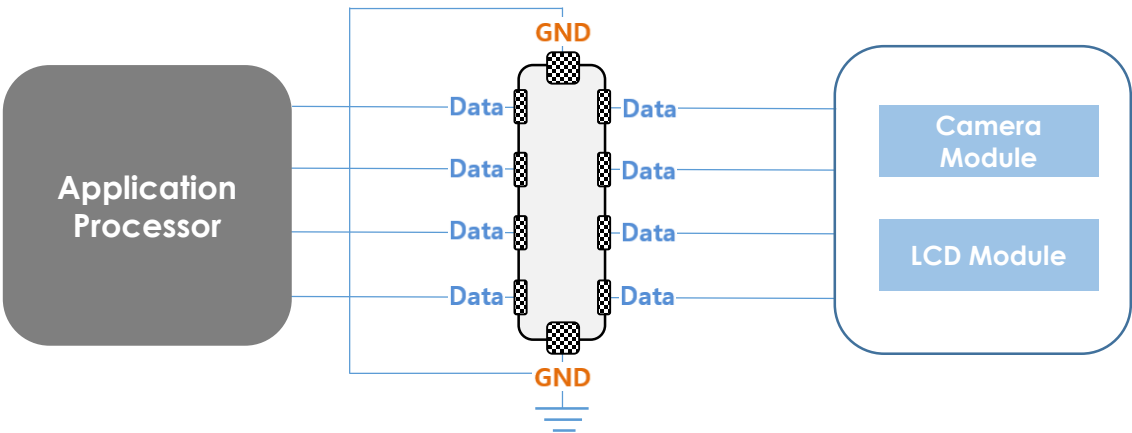
## Features



- RC EMI filter and ESD Protection lines per device
- IEC61000-4-2 Level4
- High attenuation characteristic plot, Highly effective noise Filtering
- Very thin and low space consuming size
- For Parallel data line

## Application

- Mobile Phones, Automotive
- Computers and Systems
- Internet Appliances, PDAs, Laptop Computer



## Part Numbering

| ①    | ②  | ③  | ④  | ⑤   | ⑥    | ⑦ | ⑧ |
|------|----|----|----|-----|------|---|---|
| ICVH | 10 | 18 | 4E | 050 | R100 | F | R |

### ① Product

| Code | Product                          |
|------|----------------------------------|
| ICVH | EMI/ESD FILTER<br>For AUTOMOTIVE |
| ICVE | EMI FILTER Array Chip Varistor   |

### ② SIZE (L X W)

| Code | mm        | inch |
|------|-----------|------|
| 10   | 1.6 x 0.8 | 0603 |
| 21   | 2.0 x 1.2 | 0805 |
| 31   | 3.0 x 1.2 | 1205 |
| 32   | 3.2 x 1.2 | 1305 |

### ③ Working Voltage

| Code | Voltage (Vdc) |
|------|---------------|
| 05   | 5.6           |
| 09   | 9             |
| 14   | 14            |
| 18   | 18            |

### ④ Number of Lines(CH)

| Code | CH  |
|------|-----|
| 1E   | 1CH |
| 4E   | 4CH |
| 6E   | 6CH |
| 8E   | 8CH |

### ⑤ C line Capacitance

| Code | Capacitance @1MHz (pF) |
|------|------------------------|
| 050  | 5                      |
| 070  | 7.5                    |
| 150  | 15                     |
| 250  | 25                     |
| 300  | 30                     |
| 301  | 300                    |
| 401  | 400                    |

### ⑥ Resistance

| Code | Resistance (Ω) |
|------|----------------|
| R100 | 10             |
| R500 | 50             |
| R101 | 100            |
| R201 | 200            |

### ⑦ Electrode Type

| Code | Type      |
|------|-----------|
| F    | Lead Free |

### ⑧ Packing Type

| Code | Type        |
|------|-------------|
| R    | Reel Taping |
| B    | Bulk        |

Product Specification



16084E Series

| Part Number         | Cut-off Frequency | ATT<br>Characteristic<br>(Min-20dB) | Resistance | Capacitance | Varistor Voltage | Clamping Voltage | Peak Current |
|---------------------|-------------------|-------------------------------------|------------|-------------|------------------|------------------|--------------|
| ICVE10054E250R500FR | 110MHz            | 800-2000MHz                         | 50Ω        | 25pF        | 15-25V           | 65V              | 5A           |
| ICVE10054E250R101FR | 110MHz            | 800-2000MHz                         | 100Ω       | 25pF        | 15-25V           | 45V              | 5A           |
| ICVE10054E250R201FR | 110MHz            | 800-2000MHz                         | 200Ω       | 25pF        | 15-25V           | 45V              | 5A           |
| ICVE10054E250R401FR | 110MHz            | 800-2000MHz                         | 400Ω       | 25pF        | 15-25V           | 65V              | 5A           |
| ICVE10184E050R100FR | 700MHz            | 3500-4300MHz                        | 10Ω        | 5pF         | 60-100V          | 130V             | 6A           |
| ICVE10184E050R101FR | 550MHz            | 2200-3400MHz                        | 100Ω       | 5pF         | 60-100V          | 130V             | 6A           |
| ICVE10184E070R100FR | 430MHz            | 2800-3500MHz                        | 10Ω        | 7.5pF       | 55-85V           | 130V             | 6A           |
| ICVE10184E070R500FR | 280MHz            | 1800-2500MHz                        | 50Ω        | 7.5pF       | 55-85V           | 130V             | 5A           |
| ICVE10184E070R101FR | 330MHz            | 1800-2500MHz                        | 100Ω       | 7.5pF       | 55-85V           | 130V             | 6A           |
| ICVE10184E150R500FR | 200MHz            | 900-2000MHz                         | 50Ω        | 15pF        | 24-36V           | 65V              | 5A           |
| ICVE10184E150R101FR | 200MHz            | 900-2000MHz                         | 100Ω       | 15pF        | 24-36V           | 50V              | 10A          |
| ICVE10184E150R201FR | 200MHz            | 900-2000MHz                         | 200Ω       | 15pF        | 24-36V           | 65V              | 5A           |
| ICVE10184E150R401FR | 250MHz            | 900-2000MHz                         | 400Ω       | 15pF        | 24-36V           | 65V              | 5A           |

Product Specification



20124E Series

| Part Number         | Cut-off Frequency | ATT<br>Characteristic<br>(Min-20dB) | Resistance | Capacitance | Varistor Voltage | Clamping Voltage | Peak Current |
|---------------------|-------------------|-------------------------------------|------------|-------------|------------------|------------------|--------------|
| ICVE21054E250R500FR | 110MHz            | 800-2000MHz                         | 50Ω        | 25pF        | 15-25V           | 35V              | 15A          |
| ICVE21054E250R101FR | 110MHz            | 800-2000MHz                         | 100Ω       | 25pF        | 15-25V           | 35V              | 15A          |
| ICVE21054E250R201FR | 120MHz            | 800-2000MHz                         | 200Ω       | 25pF        | 15-25V           | 35V              | 15A          |
| ICVE21054E300R101FR | 95MHz             | 700-1900MHz                         | 100Ω       | 30pF        | 15-25V           | 35V              | 15A          |
| ICVE21144E500R101FR | 55MHz             | 500-1900MHz                         | 100Ω       | 50pF        | 16-26V           | 35V              | 10A          |
| ICVE21184E050R101FR | 550MHz            | 2500-3500MHz                        | 100Ω       | 5pF         | 60-100V          | 130V             | 3A           |
| ICVE21184E070R100FR | 370MHz            | 2500-4000MHz                        | 10Ω        | 7.5pF       | 55-85V           | 130V             | 5A           |
| ICVE21184E070R101FR | 330MHz            | 1800-2500MHz                        | 100Ω       | 7.5pF       | 55-85V           | 130V             | 5A           |
| ICVE21184E150R500FR | 180MHz            | 900-2000MHz                         | 100Ω       | 15pF        | 24-36V           | 50V              | 10A          |
| ICVE21184E150R101FR | 190MHz            | 00-2000MHz                          | 50Ω        | 15pF        | 24-36V           | 50V              | 5A           |

Product Specification



30126E Series

| Part Number         | Cut-off Frequency | ATT Characteristic (Min-20dB) | Resistance | Capacitance | Varistor Voltage | Clamping Voltage | Peak Current |
|---------------------|-------------------|-------------------------------|------------|-------------|------------------|------------------|--------------|
| ICVE31186E070R100FR | 440MHz            | 2500-3000MHz                  | 10Ω        | 7.5pF       | 55-85V           | 130V             | 3A           |
| ICVE31186E150R101FR | 180MHz            | 900-2000MHz                   | 100Ω       | 15pF        | 24-36V           | 50V              | 15A          |

32128E Series

| Part Number         | Cut-off Frequency | ATT Characteristic (Min-20dB) | Resistance | Capacitance | Varistor Voltage | Clamping Voltage | Peak Current |
|---------------------|-------------------|-------------------------------|------------|-------------|------------------|------------------|--------------|
| ICVE32058E250R101FR | 100MHz            | 800-2000MHz                   | 100Ω       | 25pF        | 15-25V           | 45V              | 5A           |
| ICVE32188E070R100FR | 370MHz            | 2500-3000MHz                  | 10Ω        | 7.5pF       | 55-85V           | 130V             | 3A           |
| ICVE32188E070R101FR | 330MHz            | 1800-2500MHz                  | 100Ω       | 7.5pF       | 55-85V           | 130V             | 3A           |
| ICVE32188E150R100FR | 180MHz            | 900-2000MHz                   | 100Ω       | 15pF        | 24-36V           | 50V              | 10A          |

Product Specification



AEC-Q200 16084E Series

| Part Number         | Cut-off Frequency | ATT<br>Characteristic<br>(Min-20dB) | Resistance | Capacitance | Varistor Voltage | Clamping Voltage | Peak Current |
|---------------------|-------------------|-------------------------------------|------------|-------------|------------------|------------------|--------------|
| ICVH10184E050R100FR | 700MHz            | 3500-4300MHz                        | 10Ω        | 5pF         | 60-100V          | 130V             | 6A           |
| ICVH10184E050R101FR | 550MHz            | 2200-3400MHz                        | 100Ω       | 5pF         | 60-100V          | 130V             | 6A           |
| ICVH10184E070R100FR | 430MHz            | 2800-3500MHz                        | 10Ω        | 7.5pF       | 55-85V           | 130V             | 6A           |
| ICVH10184E070R500FR | 280MHz            | 1800-2500MHz                        | 50Ω        | 7.5pF       | 55-85V           | 130V             | 6A           |
| ICVH10184E070R101FR | 330MHz            | 1800-2500MHz                        | 100Ω       | 7.5pF       | 55-85V           | 130V             | 6A           |
| ICVH10184E150R500FR | 200MHz            | 900-2000MHz                         | 50Ω        | 15pF        | 24-36V           | 65V              | 5A           |
| ICVH10184E150R101FR | 200MHz            | 900-2000MHz                         | 100Ω       | 15pF        | 24-36V           | 65V              | 5A           |
| ICVH10184E150R201FR | 200MHz            | 900-2000MHz                         | 200Ω       | 15pF        | 24-36V           | 65V              | 5A           |
| ICVH10054E250R500FR | 100MHz            | 800-2000MHz                         | 50Ω        | 25pF        | 15-25V           | 45V              | 5A           |
| ICVH10054E250R101FR | 100MHz            | 800-2000MHz                         | 100Ω       | 25pF        | 15-25V           | 45V              | 5A           |
| ICVH10054E250R201FR | 100MHz            | 800-2000MHz                         | 200Ω       | 25pF        | 15-25V           | 45V              | 5A           |

AEC-Q200 20124E Series

| Part Number              | Cut-off Frequency | ATT<br>Characteristic<br>(Min-20dB) | Resistance | Capacitance | Varistor Voltage | Clamping Voltage | Peak Current |
|--------------------------|-------------------|-------------------------------------|------------|-------------|------------------|------------------|--------------|
| ICVD21184E070R100FR (ES) | 340MHz            | 1900-3450MHz                        | 10Ω        | 7.5pF       | 24-36V           | 50V              | 5A           |
| ICVH21184E070R100FR      | 370MHz            | 2500-4000MHz                        | 10Ω        | 7.5pF       | 55-85V           | 130V             | 5A           |
| ICVH21184E070R101FR      | 330MHz            | 1800-2500MHz                        | 100Ω       | 7.5pF       | 55-85V           | 130V             | 5A           |
| ICVH21184E150R101FR      | 180MHz            | 900-2000MHz                         | 100Ω       | 15pF        | 24-36V           | 50V              | 10A          |

Product Specification



AEC-Q200 30126E Series

| Part Number         | Cut-off Frequency | ATT Characteristic (Min-20dB) | Resistance | Capacitance | Varistor Voltage | Clamping Voltage | Peak Current |
|---------------------|-------------------|-------------------------------|------------|-------------|------------------|------------------|--------------|
| ICVH31186E070R100FR | 440MHz            | 2500-3000MHz                  | 10Ω        | 7.5pF       | 55-85V           | 130V             | 3A           |
| ICVH31056E250R101FR | 100MHz            | 700-2000MHz                   | 100Ω       | 25pF        | 15-25V           | 35V              | 15A          |

AEC-Q200 32128E Series

| Part Number         | Cut-off Frequency | ATT Characteristic (Min-20dB) | Resistance | Capacitance | Varistor Voltage | Clamping Voltage | Peak Current |
|---------------------|-------------------|-------------------------------|------------|-------------|------------------|------------------|--------------|
| ICVH32188E070R101FR | 330MHz            | 1800-2500MHz                  | 100Ω       | 7.5pF       | 55-85V           | 130V             | 3A           |
| ICVH32058E250R101FR | 100MHz            | 800-2000MHz                   | 100Ω       | 25pF        | 15-25V           | 45V              | 5A           |

# MLCC + ESD Protection

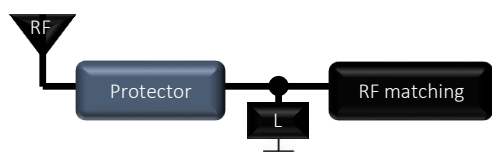
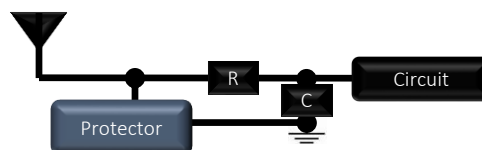
## Features

- Electronic Shock Current & ESD Protection
- Shock Current [IEC 60990 Standard]
- IEC61000-4-2 Level4
- Mobile RF antenna line, High Pass Filtering
- Capacitance 1.5pF ~ 100pF , 0603 ~1005mm



## Application

- Electrostatic ( ESD ) absorption
- Replace the TVS Diode & Capacitor & Varistor combination
- Pulse noise removal
- Electric shock protection devices for metal case



## Part Numbering

| ①   | ②  | ③  | ④    | ⑤    | * | ⑥ | ⑦ |
|-----|----|----|------|------|---|---|---|
| ISG | 03 | 30 | V341 | CR75 | M | F | R |

### ① Product

| Code | Product      |
|------|--------------|
| IMG  | INNO M GUARD |
| ISG  | INNO S GUARD |
| IVG  | INNO V GUARD |

### ⑤ Capacitance

| Code | Capacitance @1MHz (pF) |
|------|------------------------|
| CR75 | 0.75                   |
| 101  | 100                    |
| 390  | 39                     |

### ② SIZE (L X W)

| Code | mm        | inch |
|------|-----------|------|
| 03   | 0.6 x 0.3 | 0201 |
| 05   | 1.0 x 0.5 | 0402 |
| 10   | 1.6 x 0.8 | 0603 |

### \* Capacitance Tolerance

| Code | Tolerance |
|------|-----------|
| J    | ± 5%      |
| M    | ± 15%     |

### ③ Working Voltage

| Code | Voltage (Vdc) |
|------|---------------|
| 18   | 18            |
| 30   | 30            |

### ⑥ Electrode Type

| Code | Type      |
|------|-----------|
| F    | Lead Free |

### ④ Breakdown Voltage

| Code | Voltage (Vdc) |
|------|---------------|
| V181 | 180           |
| V321 | 320           |
| V341 | 340           |

### ⑦ Packing Type

| Code | Type        |
|------|-------------|
| R    | Reel Taping |
| B    | Bulk        |

Product Specification



ISG 0603 Series

| Part Number     | Capacitance | Capacitance Tolerance | Breakdown Voltage | Leakage Current | Shock Current [TA Abnormal Mode] |
|-----------------|-------------|-----------------------|-------------------|-----------------|----------------------------------|
| ISG0330V341CR75 | 0.75pF      | 15%                   | 340V              | <5uA            | Max 50uA                         |
| ISG0330C1R0M    | 1.0pF       | 15%                   | 340V              |                 |                                  |
| ISG0330C2R7J    | 2.7pF       | 5%                    | 340V              |                 |                                  |
| ISG0330C8R2J    | 8.2pF       | 5%                    | 340V              |                 |                                  |
| ISG0330C4R7J    | 4.7pF       | 5%                    | 340V              |                 |                                  |

ISG 1005 Series

| Part Number     | Capacitance | Capacitance Tolerance | Breakdown Voltage | Leakage Current | Shock Current [TA Abnormal Mode] |
|-----------------|-------------|-----------------------|-------------------|-----------------|----------------------------------|
| ISG0530V321C2R0 | 2.0pF       | 15%                   | 320V              | <5uA            | Max 50uA                         |
| ISG0530C1R5M    | 1.5pF       | 15%                   | 340V              |                 |                                  |
| ISG0530C4R7M    | 4.7pF       | 15%                   | 340V              |                 |                                  |
| ISG0530C6R8J    | 6.8pF       | 5%                    | 340V              |                 |                                  |
| ISG0530C8R2J    | 8.2pF       | 5%                    | 340V              |                 |                                  |
| ISG0530C150J    | 15pF        | 5%                    | 340V              |                 |                                  |
| ISG0530C330J    | 33pF        | 5%                    | 340V              |                 |                                  |
| ISG0530C390J    | 39pF        | 5%                    | 340V              |                 |                                  |
| ISG0530C600J    | 60pF        | 5%                    | 340V              |                 |                                  |
| ISG0530C331J    | 330pF       | 5%                    | 340V              |                 |                                  |
| ISG5V321C390J   | 39pF        | 5%                    | 360V              |                 |                                  |
| ISG5V321C101J   | 100pF       | 5%                    | 360V              |                 |                                  |

Product Specification



IMG 0603 Series

| Part Number  | Capacitance | Capacitance Tolerance | Breakdown Voltage | Leakage Current | Shock Current [TA Abnormal Mode] |
|--------------|-------------|-----------------------|-------------------|-----------------|----------------------------------|
| IMG0330C390J | 39pF        | 5%                    | 340V              | <5uA            | Max 50uA                         |
| IMG0330C101J | 100pF       | 5%                    | 340V              |                 |                                  |

IMG 1005 Series

| Part Number     | Capacitance | Capacitance Tolerance | Breakdown Voltage | Leakage Current | Shock Current [TA Abnormal Mode] |
|-----------------|-------------|-----------------------|-------------------|-----------------|----------------------------------|
| IMG0530V181C040 | 4.0pF       | 15%                   | 180V              | <5uA            | Max 50uA                         |
| IMG0530C400     | 39pF        | 15%                   | 340V              |                 |                                  |
| IMG0530C101J    | 100pF       | 5%                    | 340V              |                 |                                  |

Product Specification



AEC-Q200 IVG 1005 Series

| Part Number   | Leakage Current | Breakdown Voltage | Clamping Voltage[V, 8/20us] | Peak Current [A, 8/20us] | Capacitance[pF] |
|---------------|-----------------|-------------------|-----------------------------|--------------------------|-----------------|
| IVG0505101FR  | <20uA           | 7.2~10.8V         | 15.5V                       | 15A                      | 100 @1MHz       |
| IVG0505201FR  | <20uA           | 9~16V             | 20V                         | 20A                      | 200 @1MHz       |
| IVG0505500FR  | <20uA           | 9~16V             | 27.2V                       | 5A                       | 50 @1MHz        |
| IVG0505X150FR | <20uA           | 7.2~10.8V         | 15.5V                       | 20A                      | 360 @1MHz       |
| IVG0518100FR  | <20uA           | 24~36V            | 51.2V                       | 3A                       | 10 @1MHz        |
| IVG0518150FR  | <20uA           | 24~36V            | 50V                         | 3A                       | 15 @1MHz        |

AEC-Q200 IVG 1608 Series

| Part Number  | Leakage Current | Breakdown Voltage | Clamping Voltage[V, 8/20us] | Peak Current [A, 8/20us] | Capacitance[pF] |
|--------------|-----------------|-------------------|-----------------------------|--------------------------|-----------------|
| IVG1018100FR | <20uA           | 24~36V            | 50V                         | 3A                       | 10 @1MHz        |
| IVG1018101FR | <20uA           | 24~36V            | 48V                         | 19A                      | 100 @1MHz       |

# Multilayer Chip Varistor

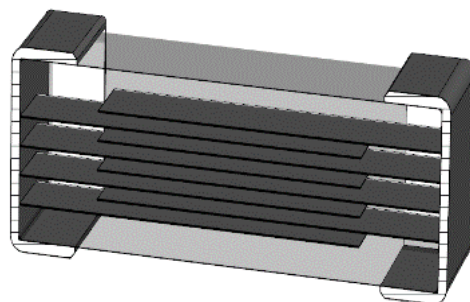
## Features

- ESD Protection
- IEC61000-4-2 Level4
- Ag Terminal Electrode

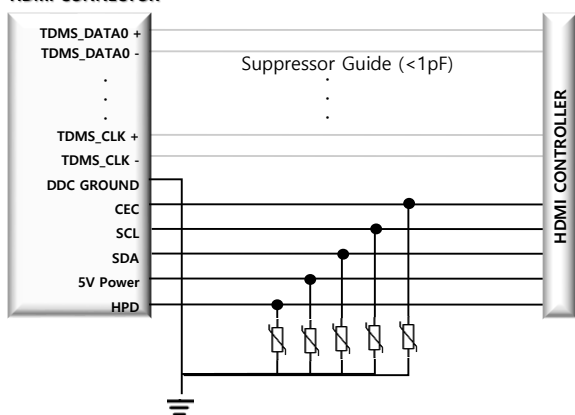


## Application

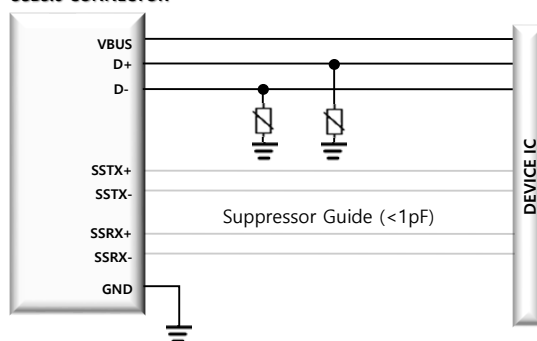
- HDMI
- USB 2.0, 3.0
- Ethernet
- Audio port



HDMI CONNECTOR



USB3.0 CONNECTOR



## Part Numbering

| ①    | ②  | ③  | ④ | ⑤   | ⑥ | ⑦ |
|------|----|----|---|-----|---|---|
| ICVL | 05 | 05 | V | 150 | F | R |

### ① Product

| Code | Product         |
|------|-----------------|
| ICVN | Normal type     |
| ICVS | Special type    |
| ICVL | High speed type |

### ② SIZE (L X W)

| Code | mm        | inch |
|------|-----------|------|
| 03   | 0.6 x 0.3 | 0201 |
| 05   | 1.0 x 0.5 | 0402 |
| 10   | 1.6 x 0.8 | 0603 |
| 21   | 2.0 x 1.2 | 0805 |

### ③ Working Voltage

| Code | Voltage (Vdc) | Code | Voltage (Vdc) |
|------|---------------|------|---------------|
| 03   | 3.3           | 18   | 18            |
| 05   | 5.6           | 26   | 26            |
| 09   | 9.0           | 30   | 30            |
| 12   | 12            | 48   | 48            |
| 14   | 14            | 60   | 60            |

### ④ Energy

| Code | Voltage (Vdc) | Code | Voltage (Vdc) |
|------|---------------|------|---------------|
| A    | 0.1           | H    | 1.2           |
| C    | 0.3           | J    | 1.5           |
| D    | 0.4           | V    | 0.02          |
| F    | 0.7           | X    | 0.05          |
| G    | 0.9           | Y    | 0.005         |

### ⑤ Clamping Voltage

| Code | Voltage (Vdc) | Code | Voltage (Vdc) |
|------|---------------|------|---------------|
| 100  | 10.0          | 500  | 50.0          |
| 150  | 15.5          | 560  | 56.0          |
| 200  | 20.0          | 580  | 58.0          |
| 250  | 25.0          | 620  | 62.0          |
| 300  | 30.0          | 650  | 65.0          |
| 350  | 35.0          | 101  | 100.0         |
| 400  | 40.0          | 121  | 120.0         |

### ⑥ Electrode Type

| Code | Type      |
|------|-----------|
| F    | Lead Free |

### ⑦ Packing Type

| Code | Type        |
|------|-------------|
| R    | Reel Taping |
| B    | Bulk        |

Product Specification



0603 Series

| Part Number | Working Voltage[V] | Varistor Voltage[V] | Clamping Voltage[V, 8/20us] | Peak Current [A, 8/20us] | Capacitance[pF] |
|-------------|--------------------|---------------------|-----------------------------|--------------------------|-----------------|
| ICVS0305330 | 5.6                | 9~16                | 15                          | 10                       | 33 @1kHz        |
| ICVS0305500 | 5.6                | 9~16                | 50                          | 10                       | 50 @1kHz        |
| ICVS0305150 | 5.6                | 9~16                | 40                          | 10                       | 15 @1kHz        |
| ICVS0318100 | 18                 | 24~36               | 45                          | 10                       | 10 @1kHz        |
| ICVS0318150 | 18                 | 24~36               | 45                          | 10                       | 15 @1kHz        |



Product Specification

1005 Series

| Part Number     | Working Voltage[V] | Varistor Voltage[V] | Clamping Voltage[V, 8/20us] | Peak Current [A, 8/20us] | Capacitance[pF] |
|-----------------|--------------------|---------------------|-----------------------------|--------------------------|-----------------|
| ICVS0505481     | 5.6                | 6.8~10.2            | 15.5                        | 20                       | 480@1kHz        |
| ICVL0505101V150 | 5.6                | 7.2~10.8            | 15.5                        | 15                       | 100@1MHz        |
| ICVN0505X150    | 5.6                | 7.2~10.8            | 15.5                        | 20                       | 360@1MHz        |
| ICVS0505531     | 5.6                | 7.2~10.8            | 30                          | 20                       | 530@1kHz        |
| ICVS0505500     | 5.6                | 9~16                | 20                          | 10                       | 50@1kHz         |
| ICVL0505600V150 | 5.6                | 9~16                | 20                          | 15                       | 60@1MHz         |
| ICVS0505201     | 5.6                | 9~16                | 20                          | 20                       | 200@1kHz        |
| ICVL0509101V200 | 9                  | 10.4~15.6           | 20                          | 15                       | 100@1MHz        |
| ICVN0514X300    | 14                 | 16.8~25.2           | 30                          | 20                       | 120@1MHz        |
| ICVS0514X350    | 14                 | 18~24               | 35                          | 20                       | 120@1MHz        |
| ICVL0518100Y500 | 18                 | 24~36               | 50                          | 3                        | 10@1MHz         |
| ICVS0518150     | 18                 | 24~36               | 50                          | 3                        | 15@1kHz         |
| ICVS0518270     | 18                 | 24~36               | 50                          | 15                       | 27@1MHz         |
| ICVL0518400V500 | 18                 | 24~36               | 50                          | 15                       | 40@1MHz         |
| ICVN0518X400    | 18                 | 24~36               | 40                          | 20                       | 90@1MHz         |
| ICVS0518011     | 18                 | 46~65               | 50                          | 3                        | 1.1@1MHz        |
| ICVL0518030     | 18                 | 100~160             | 50                          | 3                        | 3@1MHz          |
| ICVL0518050     | 18                 | 100~160             | 50                          | 3                        | 5@1MHz          |
| ICVS0530450     | 30                 | 36~48               | 50                          | 30                       | 45@1kHz         |

## Product Specification



### 1608 Series

| Part Number     | Working Voltage[V] | Varistor Voltage[V] | Clamping Voltage[V, 8/20us] | Peak Current [A, 8/20us] | Capacitance[pF] |
|-----------------|--------------------|---------------------|-----------------------------|--------------------------|-----------------|
| ICVN1005A150    | 5.6                | 7.2~10.8            | 15.5                        | 30                       | 825@1MHz        |
| ICVS1005201     | 5.6                | 9~16                | 64                          | 25                       | 200@1MHz        |
| ICVS1005330     | 5.6                | 9~16                | 20                          | 10                       | 33@1MHz         |
| ICVN1009A200    | 9                  | 9~16                | 20                          | 30                       | 550@1MHz        |
| ICVN1014A300    | 14                 | 16.8~25.2           | 30                          | 30                       | 424@1MHz        |
| ICVL1018100Y500 | 18                 | 24~36               | 50                          | 3                        | 10@1MHz         |
| ICVL1018101A400 | 18                 | 24~36               | 45                          | 30                       | 100@1MHz        |
| ICVL1018011     | 18                 | 46~65               | 50                          | 3                        | 1.1@1MHz        |
| ICVN1026A580    | 26                 | 31~41               | 45                          | 30                       | 160@1MHz        |
| ICVL1026900A580 | 26                 | 33~41               | 47                          | 30                       | 90@1MHz         |
| ICVS1030100     | 30                 | 40~60               | 65                          | 3                        | 10@1MHz         |

### 2012 Series

| Part Number    | Working Voltage[V] | Varistor Voltage[V] | Clamping Voltage[V, 8/20us] | Peak Current [A, 8/20us] | Capacitance[pF] |
|----------------|--------------------|---------------------|-----------------------------|--------------------------|-----------------|
| ICVN2105A150   | 5.6                | 7.2~10.8            | 15.5                        | 40                       | 860@1MHz        |
| ICVN2109A200   | 9                  | 9~16                | 20                          | 40                       | 585@1MHz        |
| ICVN2112A250FR | 12                 | 18~24               | 25                          | 40                       | 400@1MHz        |
| ICVS2116701FR  | 16                 | 30.0~36.5           | 50                          | 300                      | 550@1KHz        |
| ICVN2126A580FR | 26                 | 31~41               | 58                          | 30                       | 110@1MHz        |

# ESD Suppressor

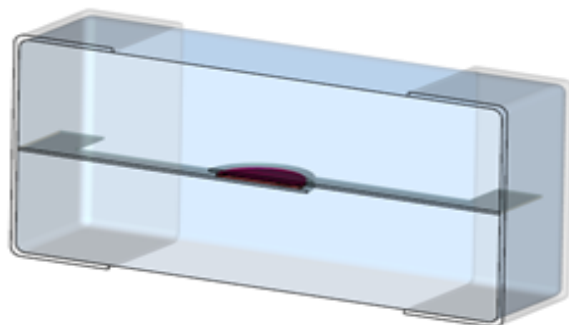
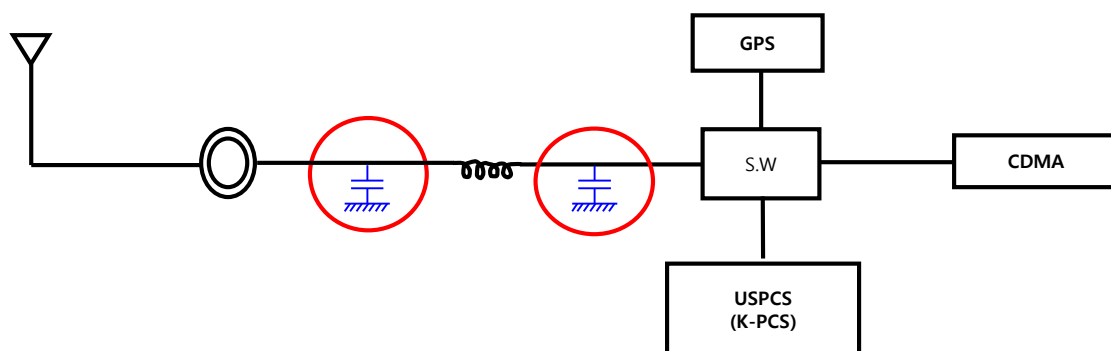
## Features

- Ultra Low Capacitance (0.05pF, 0.15pF)
- Low ESL (Equivalent Series Inductance)
- IEC61000-4-2 Level4



## Application

- Switch in Antenna
- USB port
- High speed data transmission line



## Part Numbering

| ①    | ②  | ③  | ④ | ⑤   | ⑥ | ⑦ |
|------|----|----|---|-----|---|---|
| ULCE | 05 | 05 | C | 015 | F | R |

### ① Product

| Code | Product                              |
|------|--------------------------------------|
| ULCE | Ultra Low Capacitance ESD Suppressor |

### ② SIZE (L X W)

| Code | mm        | inch |
|------|-----------|------|
| 03   | 0.6 x 0.3 | 0201 |
| 05   | 1.0 x 0.5 | 0402 |
| 10   | 1.6 x 0.8 | 0603 |

### ③ Working Voltage

| Code | Voltage (Vdc) |
|------|---------------|
| 05   | 5             |
| 18   | 18            |

### ④ Trigger Voltage

| Code | Voltage |
|------|---------|
| A    | 300V    |
| C    | 1000V   |

### ⑤ Capacitance

| Code | Capacitance |
|------|-------------|
| 005  | 0.05pF      |
| 015  | 0.15pF      |

### ⑥ Electrode Type

| Code | Type      |
|------|-----------|
| F    | Lead Free |

### ⑦ Packing Type

| Code | Type        |
|------|-------------|
| R    | Reel Taping |
| B    | Bulk        |

Product Specification



0603 Series

| Part Number    | Working Voltage[V] | Trigger Voltage[V] | Clamping Voltage [V, 8/20us] | Response time [ns] | Insertion Loss [dB, 0-2GHz] | Capacitance [pF, Typ] |
|----------------|--------------------|--------------------|------------------------------|--------------------|-----------------------------|-----------------------|
| ULCE0305C005FR | 5                  | 1000               | 30                           | 0.6                | 0.05                        | 0.05                  |

1005 Series

| Part Number    | Working Voltage[V] | Trigger Voltage[V] | Clamping Voltage [V, 8/20us] | Response time [ns] | Insertion Loss [dB, 0-2GHz] | Capacitance [pF, Typ] |
|----------------|--------------------|--------------------|------------------------------|--------------------|-----------------------------|-----------------------|
| ULCE0505A015FR | 5                  | 300                | 30                           | 0.6                | 0.05                        | 0.15                  |
| ULCE0505B015FR | 5                  | 500                | 30                           | 0.6                | 0.05                        | 0.15                  |
| ULCE0505C015FR | 5                  | 1000               | 30                           | 0.6                | 0.05                        | 0.15                  |
| ULCE0518A015FR | 18                 | 300                | 30                           | 0.6                | 0.05                        | 0.15                  |
| ULCE0518C015FR | 18                 | 1000               | 30                           | 0.6                | 0.05                        | 0.15                  |

1608 Series

| Part Number    | Working Voltage[V] | Trigger Voltage[V] | Clamping Voltage [V, 8/20us] | Response time [ns] | Insertion Loss [dB, 0-2GHz] | Capacitance [pF, Typ] |
|----------------|--------------------|--------------------|------------------------------|--------------------|-----------------------------|-----------------------|
| ULCE1005A015FR | 5                  | 300                | 30                           | 0.6                | 0.05                        | 0.15                  |
| ULCE1005C015FR | 5                  | 1000               | 30                           | 0.6                | 0.05                        | 0.15                  |

# ESD Clamp

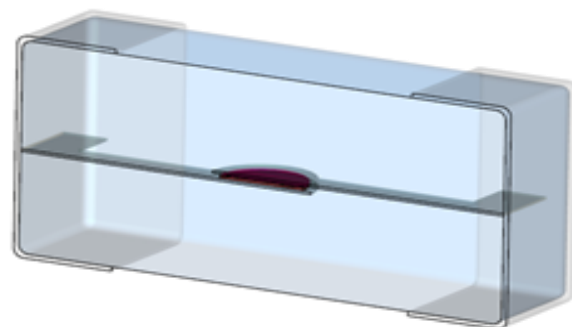
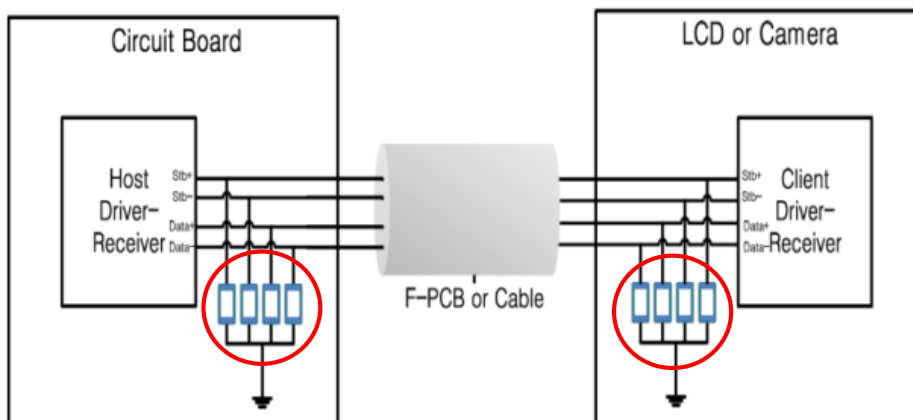
## Features

- Ultra Low Capacitance (0.4pF)
- Low ESL (Equivalent Series Inductance)
- IEC61000-4-2 Level4



## Application

- LVDS Lines in Notebook PC (USB2.0, IEEE1394)
- HDMI (HDTV, STB)
- Computer peripherals  
(Keyboard, Mouse, Printer, Scanner Data line etc.)
- Portable Device using High Speed Data Lines  
(PDA, PMP, Navigation)



Part Numbering

|      |    |    |      |   |   |
|------|----|----|------|---|---|
| ①    | ②  | ③  | ④    | ⑤ | ⑥ |
| IECS | 03 | 05 | C040 | F | R |

① Product

| Code | Product               |
|------|-----------------------|
| IECS | ESD Clamp Single type |

④ Typical Capacitance

| Code | Voltage |
|------|---------|
| C040 | 0.4pF   |

② SIZE (L X W)

| Code | mm        | inch |
|------|-----------|------|
| 03   | 0.6 x 0.3 | 0201 |
| 05   | 1.0 x 0.5 | 0402 |

⑤ Electrode Type

| Code | Type      |
|------|-----------|
| F    | Lead Free |

③ Working Voltage

| Code | Voltage (Vdc) |
|------|---------------|
| 05   | 5             |

⑥ Packing Type

| Code | Type        |
|------|-------------|
| R    | Reel Taping |
| B    | Bulk        |

Product Specification



0603 Series

| Part Number    | Working Voltage[V] | Trigger Voltage[V] | Clamping Voltage [V, 8/20us] | Response time [ns] | Insertion Loss [dB, 0-2GHz] | Capacitance [pF, Typ] |
|----------------|--------------------|--------------------|------------------------------|--------------------|-----------------------------|-----------------------|
| IECS0305C040FR | 5                  | 500                | 30                           | 0.6                | 0.05                        | 0.4                   |

1005 Series

| Part Number    | Working Voltage[V] | Trigger Voltage[V] | Clamping Voltage [V, 8/20us] | Response time [ns] | Insertion Loss [dB, 0-2GHz] | Capacitance [pF, Typ] |
|----------------|--------------------|--------------------|------------------------------|--------------------|-----------------------------|-----------------------|
| IECS0505C040FR | 5                  | 50                 | 30                           | 0.6                | 0.05                        | 0.4                   |