


### HF RoHS MC Series - DO-214



#### Agency Approvals

| Agency  | Agency File Number |
|---|--------------------|
|  | E133083            |

#### Pinout Designation

NOT APPLICABLE

#### Schematic Symbol



#### Description

MC Series DO-214 are low capacitance SIDACTor® devices designed to protect broadband equipment such as VOIP, DSL modems and DSLAMs from damaging overvoltage transients.

The series provides a surface mount solution that enables equipment to comply with global regulatory standards while limiting the impact to broadband signals.

#### Features and Benefits

- Low voltage overshoot
- Low on-state voltage
- Does not degrade with use
- Fails short circuit when surged in excess of ratings
- 40% lower capacitance than our Baseband Protectors, for applications that demand greater signal integrity

#### Applicable Global Standards

- TIA-968-A
- TIA-968-B
- ITU K.20/21 Enhanced Level\*
- ITU K.20/21 Basic Level\*
- GR 1089 Intra-building\*
- IEC 61000-4-5
- YD/T 1082
- YD/T 993
- YD/T 950

\*A-rated parts require series resistance

#### Electrical Characteristics

| Part Number  | Marking | $V_{DRM}$<br>@ $I_{DRM}=5\mu A$ | $V_S$<br>@ 100V/ $\mu s$ | $I_H$  | $I_S$  | $I_T$ | $V_T$<br>@ $I_T=2.2$ Amps | Capacitance<br>@ 1MHz, 2V bias |        |
|--------------|---------|---------------------------------|--------------------------|--------|--------|-------|---------------------------|--------------------------------|--------|
|              |         | V min                           | V max                    | mA min | mA max | A max | V max                     | pF min                         | pF max |
| P0080SAMCLRP | P-8AM   | 6                               | 25                       | 50     | 800    | 2.2   | 4                         | 25                             | 55     |
| P0220SAMCLRP | P02AM   | 15                              | 32                       | 50     | 800    | 2.2   | 4                         | 25                             | 50     |
| P0300SAMCLRP | P03AM   | 25                              | 40                       | 50     | 800    | 2.2   | 4                         | 15                             | 35     |
| P0080SCMCLRP | P-8CM   | 6                               | 25                       | 50     | 800    | 2.2   | 4                         | 25                             | 75     |
| P0220SCMCLRP | P02CM   | 15                              | 32                       | 50     | 800    | 2.2   | 4                         | 30                             | 65     |
| P0300SCMCLRP | P03CM   | 25                              | 40                       | 50     | 800    | 2.2   | 4                         | 25                             | 45     |
| P0640SCMCLRP | P06CM   | 58                              | 77                       | 150    | 800    | 2.2   | 4                         | 55                             | 85     |
| P0720SCMCLRP | P07CM   | 65                              | 88                       | 150    | 800    | 2.2   | 4                         | 50                             | 75     |
| P0900SCMCLRP | P09CM   | 75                              | 98                       | 150    | 800    | 2.2   | 4                         | 45                             | 70     |
| P1100SCMCLRP | P11CM   | 90                              | 130                      | 150    | 800    | 2.2   | 4                         | 45                             | 70     |
| P1300SCMCLRP | P13CM   | 120                             | 160                      | 150    | 800    | 2.2   | 4                         | 40                             | 60     |
| P1500SCMCLRP | P15CM   | 140                             | 180                      | 150    | 800    | 2.2   | 4                         | 35                             | 55     |
| P1800SCMCLRP | P18CM   | 170                             | 220                      | 150    | 800    | 2.2   | 4                         | 35                             | 50     |
| P2100SCMCLRP | P21CM   | 180                             | 240                      | 150    | 800    | 2.2   | 4                         | 30                             | 50     |
| P2300SCMCLRP | P23CM   | 190                             | 260                      | 150    | 800    | 2.2   | 4                         | 30                             | 50     |
| P2600SCMCLRP | P26CM   | 220                             | 300                      | 150    | 800    | 2.2   | 4                         | 30                             | 45     |
| P3100SCMCLRP | P31CM   | 275                             | 350                      | 150    | 800    | 2.2   | 4                         | 30                             | 45     |
| P3500SCMCLRP | P35CM   | 320                             | 400                      | 150    | 800    | 2.2   | 4                         | 25                             | 40     |

Notes:  
 - Absolute maximum ratings measured at  $T_A = 25^\circ C$  (unless otherwise noted).  
 - Electrical characteristics (unless otherwise noted).

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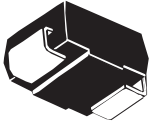
Please refer to [www.littelfuse.com](http://www.littelfuse.com) for current information.

**Surge Ratings**

| Series | $I_{PP}$             |                   |                     |                     |                     |                    |                     |                      |                     |                     | $I_{TSM}$<br>50/60 Hz | di/dt    |
|--------|----------------------|-------------------|---------------------|---------------------|---------------------|--------------------|---------------------|----------------------|---------------------|---------------------|-----------------------|----------|
|        | 0.2x310 <sup>1</sup> | 2x10 <sup>1</sup> | 8x20 <sup>1</sup>   | 10x160 <sup>1</sup> | 10x560 <sup>1</sup> | 5x320 <sup>1</sup> | 10x360 <sup>1</sup> | 10x1000 <sup>1</sup> | 5x310 <sup>1</sup>  | 10x700 <sup>2</sup> |                       |          |
|        | 0.5x700 <sup>2</sup> | 2x10 <sup>2</sup> | 1.2x50 <sup>2</sup> | 10x160 <sup>2</sup> | 10x560 <sup>2</sup> | 9x720 <sup>2</sup> | 10x360 <sup>2</sup> | 10x1000 <sup>2</sup> | 10x700 <sup>2</sup> | 10x700 <sup>2</sup> |                       |          |
|        | A min                | A min             | A min               | A min               | A min               | A min              | A min               | A min                | A min               | A min               | A min                 | A/μs max |
| A      | 20                   | 150               | 150                 | 90                  | 50                  | 75                 | 75                  | 45                   | 75                  | 20                  | 500                   |          |
| C      | 50                   | 500               | 400                 | 200                 | 150                 | 200                | 175                 | 100                  | 200                 | 30                  | 500                   |          |

Notes:  
 - Peak pulse current rating ( $I_{pp}$ ) is repetitive and guaranteed for the life of the product.  
 -  $I_{pp}$  ratings applicable over temperature range of -40°C to +85°C  
 - The device must initially be in thermal equilibrium with -40°C ≤  $T_j$  ≤ +150°C

**Thermal Considerations**

| Package   | Symbol    | Parameter                               | Value       | Unit |
|---|-----------|---|-------------|------|
| DO-214AA<br> | $T_j$     | Operating Junction Temperature Range    | -40 to +150 | °C   |
|   | $T_s$     | Storage Temperature Range               | -65 to +150 | °C   |
|   | $R_{θJA}$ | Thermal Resistance: Junction to Ambient | 90          | °C/W |

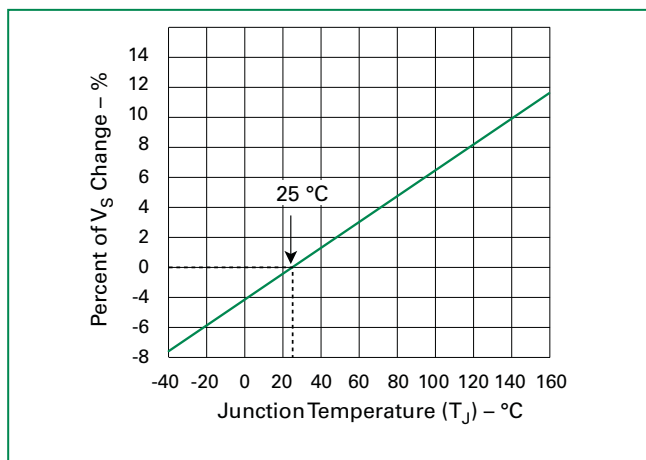
**V-I Characteristics**



**$t_r \times t_d$  Pulse Waveform**



**Normalized  $V_s$  Change vs. Junction Temperature**



**Normalized DC Holding Current vs. Case Temperature**



### Soldering Parameters

|  |                                    |                               |
|--|------------------------------------|-------------------------------|
| Reflow Condition                                       |                                    | Pb-Free assembly (see Fig. 1) |
| Pre Heat   | - Temperature Min ( $T_{s(min)}$ ) | +150°C                        |
|  | - Temperature Max ( $T_{s(max)}$ ) | +200°C                        |
|  | - Time (Min to Max) ( $t_s$ )      | 60-180 secs.                  |
| Average ramp up rate (Liquidus Temp ( $T_L$ ) to peak) |                                    | 3°C/sec. Max.                 |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate                   |                                    | 3°C/sec. Max.                 |
| Reflow   | - Temperature ( $T_L$ ) (Liquidus) | +217°C                        |
|  | - Temperature ( $t_L$ )            | 60-150 secs.                  |
| Peak Temp ( $T_p$ )                                    |                                    | +260(+0/-5)°C                 |
| Time within 5°C of actual Peak Temp ( $t_p$ )          |                                    | 30 secs. Max.                 |
| Ramp-down Rate   |                                    | 6°C/sec. Max.                 |
| Time 25°C to Peak Temp ( $T_p$ )                       |                                    | 8 min. Max.                   |
| Do not exceed  |                                    | +260°C                        |



### Physical Specifications

|                        |   |
|------------------------|---|
| <b>Lead Material</b>   | Copper Alloy  |
| <b>Terminal Finish</b> | 100% Matte-Tin Plated   |
| <b>Body Material</b>   | UL recognized epoxy meeting flammability classification 94V-0 |

### Environmental Specifications

|   |  |
|---|--|
| <b>High Temp Voltage Blocking</b>       | 80% Rated $V_{DRM}$ ( $V_{AC Peak}$ ) +125°C or +150°C, 504 or 1008 hrs. MIL-STD-750 (Method 1040) JEDEC, JESD22-A-101 |
| <b>Temp Cycling</b>                     | -65°C to +150°C, 15 min. dwell, 10 up to 100 cycles. MIL-STD-750 (Method 1051) EIA/JEDEC, JESD22-A-104                 |
| <b>Biased Temp &amp; Humidity</b>       | 52 $V_{DC}$ (+85°C) 85%RH, 504 up to 1008 hrs. EIA/JEDEC, JESD22-A-101   |
| <b>High Temp Storage</b>                | +150°C 1008 hrs. MIL-STD-750 (Method 1031) JEDEC, JESD22-A-101   |
| <b>Low Temp Storage</b>                 | -65°C, 1008 hrs.   |
| <b>Thermal Shock</b>                    | 0°C to +100°C, 5 min. dwell, 10 sec. transfer, 10 cycles. MIL-STD-750 (Method 1056) JEDEC, JESD22-A-106                |
| <b>Autoclave (Pressure Cooker Test)</b> | +121°C, 100%RH, 2atm, 24 up to 168 hrs. EIA/JEDEC, JESD22-A-102  |
| <b>Resistance to Solder Heat</b>        | +260°C, 30 secs. MIL-STD-750 (Method 2031)   |
| <b>Moisture Sensitivity Level</b>       | 85%RH, +85°C, 168 hrs., 3 reflow cycles (+260°C Peak). JEDEC-J-STD-020, Level 1  |

**Dimensions — DO-214AA**

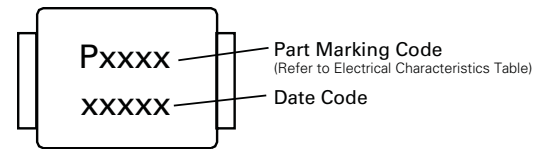


| Dimensions | Inches |       | Millimeters |      |
|------------|--------|-------|-------------|------|
|            | Min    | Max   | Min         | Max  |
| A          | 0.130  | 0.156 | 3.30        | 3.95 |
| B          | 0.201  | 0.220 | 5.10        | 5.60 |
| C          | 0.077  | 0.087 | 1.95        | 2.20 |
| D          | 0.159  | 0.181 | 4.05        | 4.60 |
| E          | 0.030  | 0.063 | 0.75        | 1.60 |
| F          | 0.075  | 0.096 | 1.90        | 2.45 |
| G          | 0.002  | 0.008 | 0.05        | 0.20 |
| H          | 0.077  | 0.104 | 1.95        | 2.65 |
| K          | 0.006  | 0.016 | 0.15        | 0.41 |

**Part Numbering**



**Part Marking**



**Packing Options**

| Package Type | Description                  | Quantity | Added Suffix | Industry Standard |
|--------------|------------------------------|----------|--------------|-------------------|
| S            | DO-214AA<br>Tape & Reel Pack | 2500     | N/A          | EIA-481-D         |

**Tape and Reel Specification — DO-214AA**



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