



**THE DATASHEET OF  
DMP4047SSD-13**



**Product Summary**

| $V_{(BR)DSS}$ | $R_{DS(on)}$                    | $I_D$<br>$T_A = +25^\circ C$ |
|---------------|---------------------------------|------------------------------|
| -40V          | 45m $\Omega$ @ $V_{GS} = -10V$  | -6.5A                        |
|               | 55m $\Omega$ @ $V_{GS} = -4.5V$ | -5.9A                        |

**Description**

This MOSFET has been designed to minimize the on-state resistance ( $R_{DS(ON)}$ ) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

**Applications**

- Backlighting
- DC-DC Converters
- Power Management Functions

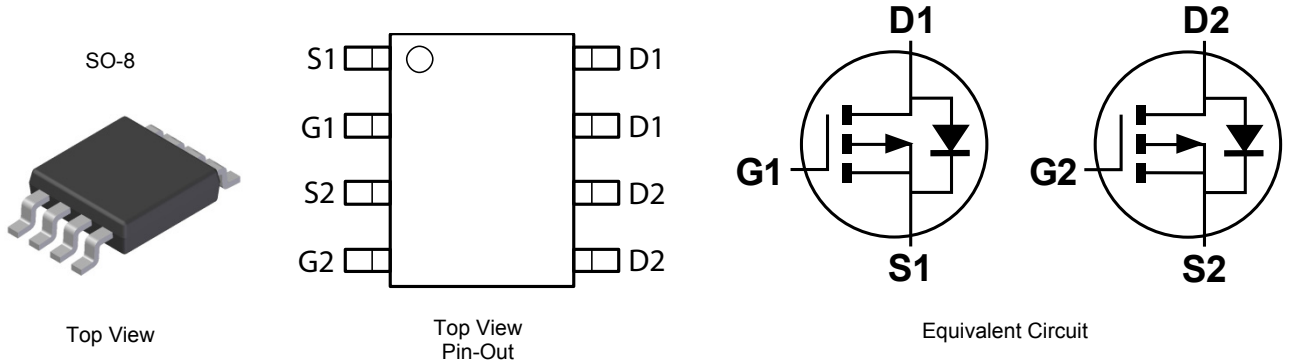
**Features**

- 100% Unclamped Inductive Switch (UIS) test in production
- Low on-resistance
- Fast switching speed
- **Totally Lead-Free & Fully RoHS compliant (Note 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

**Mechanical Data**

- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – Tin Finish annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208 <sup>(63)</sup>
- Weight: 0.074 grams (approximate)

NEW PRODUCT

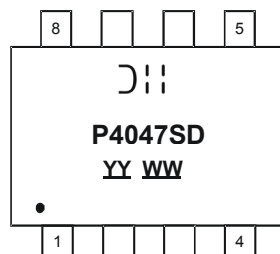


**Ordering Information** (Note 4 & 5)

| Part Number    | Compliance | Case | Packaging         |
|----------------|------------|------|-------------------|
| DMP4047SSD-13  | Standard   | SO-8 | 2,500/Tape & Reel |
| DMP4047SSDQ-13 | Automotive | SO-8 | 2,500/Tape & Reel |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
  3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  4. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to [http://www.diodes.com/quality/product\\_grade\\_definitions/](http://www.diodes.com/quality/product_grade_definitions/).
  5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

**Marking Information**



D11 = Manufacturer's Marking  
P4047SD = Product Type Marking Code  
YYWW = Date Code Marking  
YY = Year (ex: 09 = 2009)  
WW = Week (01 - 53)

**Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic  |              |  | Symbol           | Value        | Units |
|---|--------------|--|------------------|--------------|-------|
| Drain-Source Voltage                                      |              |  | V <sub>DSS</sub> | -40          | V     |
| Gate-Source Voltage                                       |              |  | V <sub>GSS</sub> | ±20          | V     |
| Continuous Drain Current (Note 7) V <sub>GS</sub> = -10V  | Steady State | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | -5.1<br>-4.1 | A     |
|   | t < 10s      | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | -6.5<br>-5.2 | A     |
| Continuous Drain Current (Note 7) V <sub>GS</sub> = -4.5V | Steady State | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | -4.6<br>-3.7 | A     |
|   | t < 10s      | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | -5.9<br>-4.7 | A     |
| Maximum Body Diode Continuous Current                     |              |  | I <sub>S</sub>   | -2.5         | A     |
| Pulsed Drain Current (10µs pulse, duty cycle = 1%)        |              |  | I <sub>DM</sub>  | -40          | A     |

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                                   |                        | Symbol                            | Value       | Units |
|--|------------------------|-----------------------------------|-------------|-------|
| Total Power Dissipation (Note 6)                 | T <sub>A</sub> = +25°C | P <sub>D</sub>                    | 1.3         | W     |
|  | T <sub>A</sub> = +70°C |                                   | 0.8         |       |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady state           | R <sub>θJA</sub>                  | 98          | °C/W  |
|  | t < 10s                |                                   | 59          |       |
| Total Power Dissipation (Note 7)                 | T <sub>A</sub> = +25°C | P <sub>D</sub>                    | 1.8         | W     |
|  | T <sub>A</sub> = +70°C |                                   | 1.1         |       |
| Thermal Resistance, Junction to Ambient (Note 7) | Steady state           | R <sub>θJA</sub>                  | 71          | °C/W  |
|  | t < 10s                |                                   | 43          |       |
| Thermal Resistance, Junction to Case (Note 7)    |                        | R <sub>θJC</sub>                  | 11.8        |       |
| Operating and Storage Temperature Range          |                        | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C    |

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic   | Symbol              | Min  | Typ   | Max  | Unit | Test Condition  |
|--|---------------------|------|-------|------|------|---|
| <b>OFF CHARACTERISTICS</b> (Note 8)                    |                     |      |       |      |      |   |
| Drain-Source Breakdown Voltage                         | BV <sub>DSS</sub>   | -40  | -     | -    | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = -250µA   |
| Zero Gate Voltage Drain Current T <sub>J</sub> = +25°C | I <sub>DSS</sub>    | -    | -     | -1   | µA   | V <sub>DS</sub> = -40V, V <sub>GS</sub> = 0V  |
| Gate-Source Leakage                                    | I <sub>GSS</sub>    | -    | -     | ±100 | nA   | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V  |
| <b>ON CHARACTERISTICS</b> (Note 8)                     |                     |      |       |      |      |   |
| Gate Threshold Voltage                                 | V <sub>GS(th)</sub> | -1.0 | -     | -3.0 | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250µA                                   |
| Static Drain-Source On-Resistance                      | R <sub>DS(on)</sub> | -    | 33    | 45   | mΩ   | V <sub>GS</sub> = -10V, I <sub>D</sub> = -4.4A  |
|  |                     |      | 40    | 55   |      | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -3.7A   |
| Diode Forward Voltage                                  | V <sub>SD</sub>     | -    | -0.75 | -1.2 | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = -3.9A  |
| <b>DYNAMIC CHARACTERISTICS</b> (Note 9)                |                     |      |       |      |      |   |
| Input Capacitance                                      | C <sub>iss</sub>    | -    | 1154  | -    | pF   | V <sub>DS</sub> = -20V, V <sub>GS</sub> = 0V,<br>f = 1.0MHz                                   |
| Output Capacitance                                     | C <sub>oss</sub>    | -    | 84    | -    | pF   |   |
| Reverse Transfer Capacitance                           | C <sub>rss</sub>    | -    | 66    | -    | pF   |   |
| Gate Resistance  | R <sub>G</sub>      | -    | 12.6  | -    | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz  |
| Total Gate Charge (V <sub>GS</sub> = -4.5V)            | Q <sub>g</sub>      | -    | 10.6  | -    | nC   | V <sub>DS</sub> = -20V, I <sub>D</sub> = -4.9A  |
| Total Gate Charge (V <sub>GS</sub> = -10V)             | Q <sub>g</sub>      | -    | 21.5  | -    | nC   |   |
| Gate-Source Charge                                     | Q <sub>gs</sub>     | -    | 2.2   | -    | nC   |   |
| Gate-Drain Charge                                      | Q <sub>gd</sub>     | -    | 3.3   | -    | nC   |   |
| Turn-On Delay Time                                     | t <sub>D(on)</sub>  | -    | 8.7   | -    | ns   | V <sub>DS</sub> = -20V, I <sub>D</sub> = -3.9A<br>V <sub>GS</sub> = 4.5V, R <sub>G</sub> = 1Ω |
| Turn-On Rise Time                                      | t <sub>r</sub>      | -    | 19.6  | -    | ns   |   |
| Turn-Off Delay Time                                    | t <sub>D(off)</sub> | -    | 34.9  | -    | ns   |   |
| Turn-Off Fall Time                                     | t <sub>f</sub>      | -    | 25.5  | -    | ns   |   |
| Body Diode Reverse Recovery Time                       | t <sub>rr</sub>     | -    | 9.61  | -    | ns   | I <sub>F</sub> = -3.9A, di/dt = 100A/µs   |
| Body Diode Reverse Recovery Charge                     | Q <sub>rr</sub>     | -    | 3.3   | -    | nC   |   |

- Notes:
6. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
  7. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
  8. Short duration pulse test used to minimize self-heating effect.
  9. Guaranteed by design. Not subject to product testing.

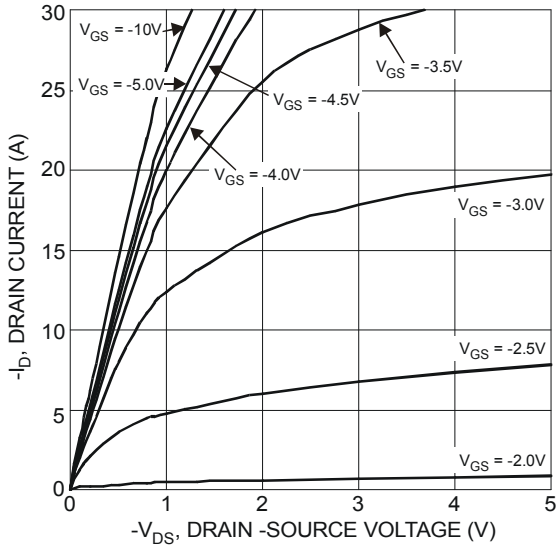


Figure 1 Typical Output Characteristics

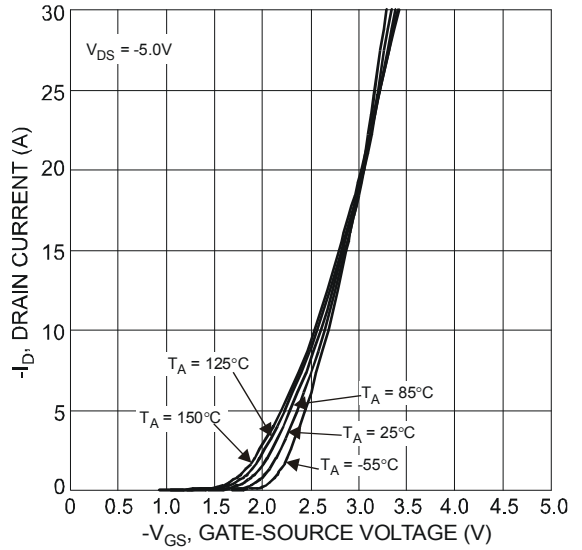


Figure 2 Typical Transfer Characteristics

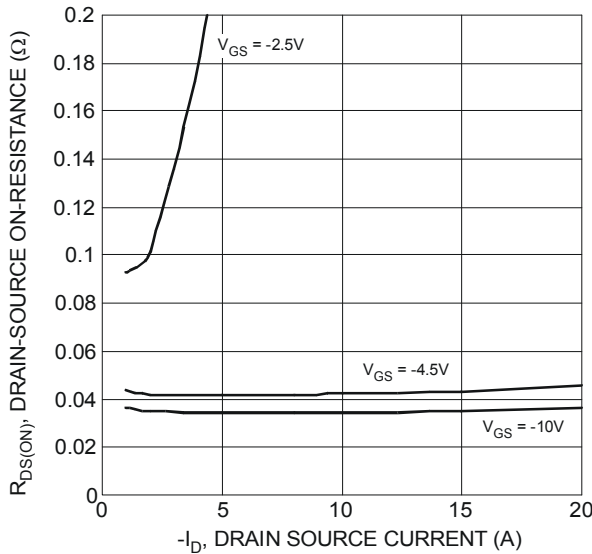


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

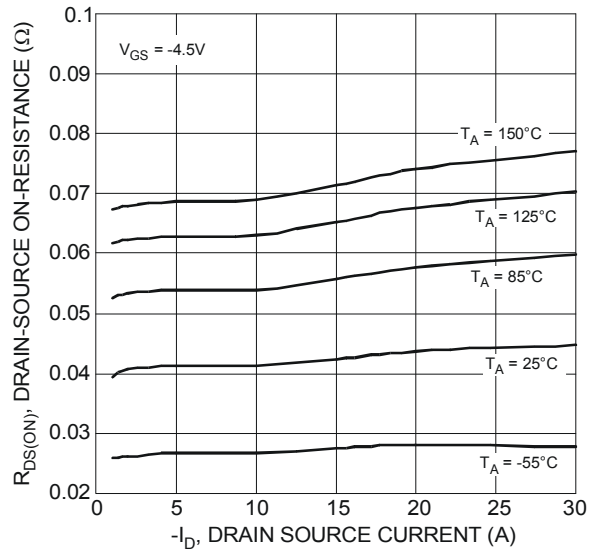


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

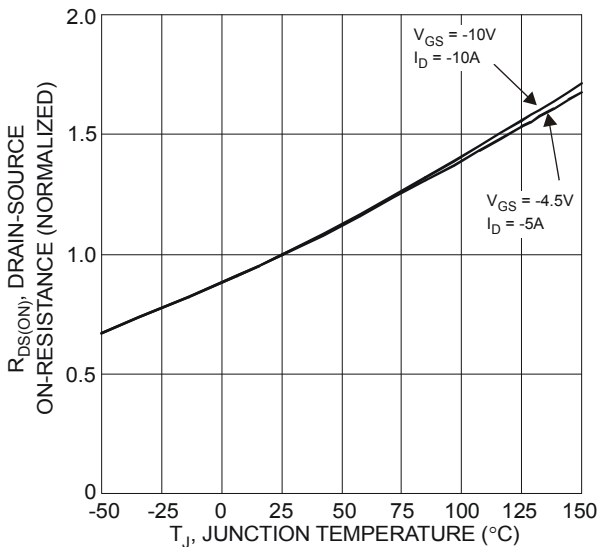


Figure 5 On-Resistance Variation with Temperature

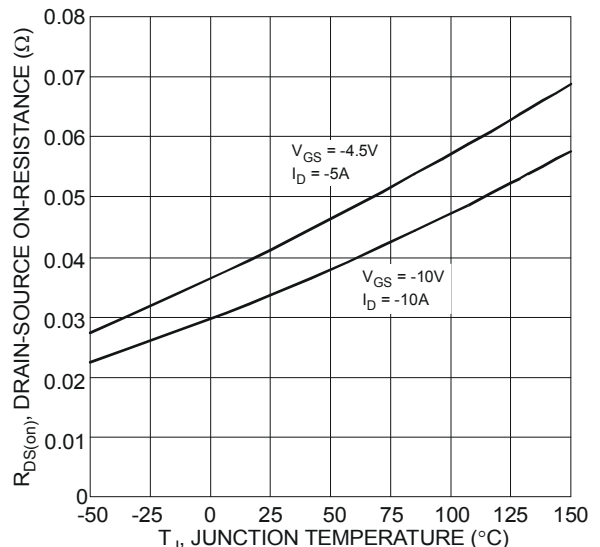


Figure 6 On-Resistance Variation with Temperature

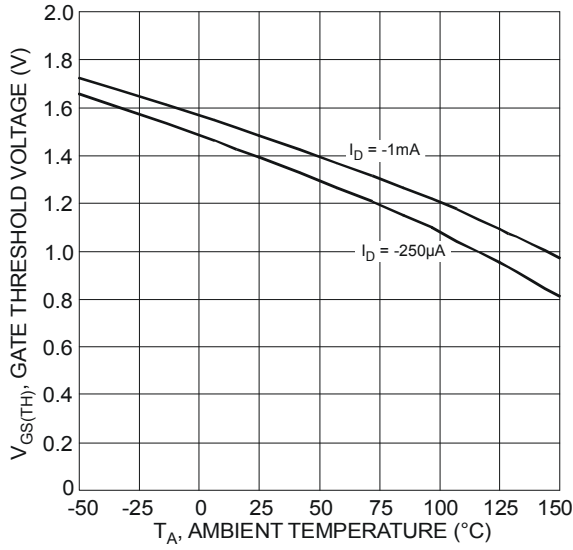


Figure 7 Gate Threshold Variation vs. Ambient Temperature

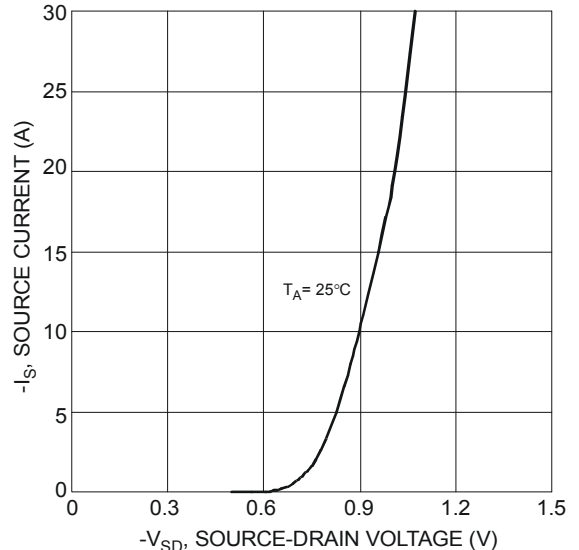


Figure 8 Diode Forward Voltage vs. Current

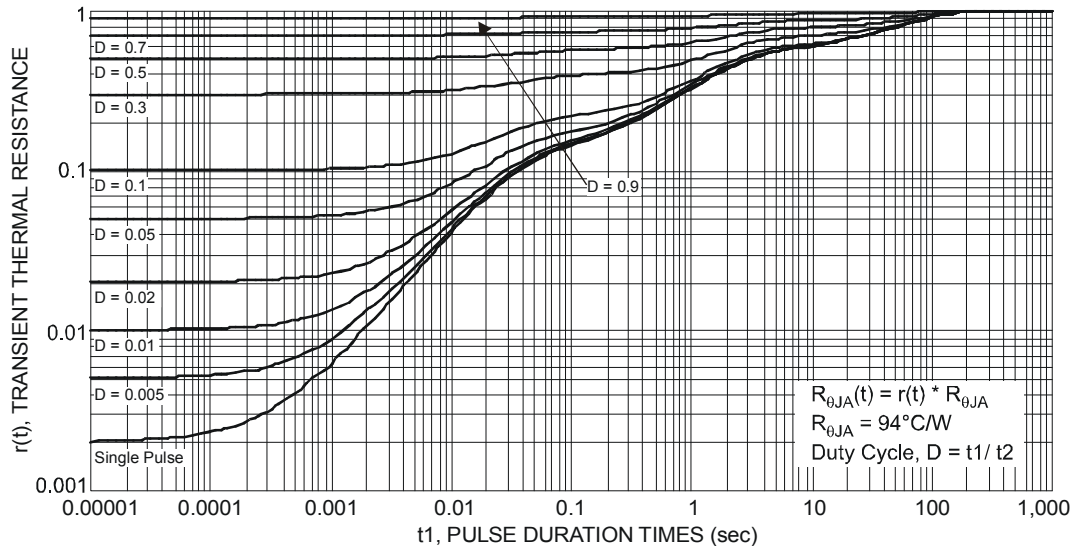
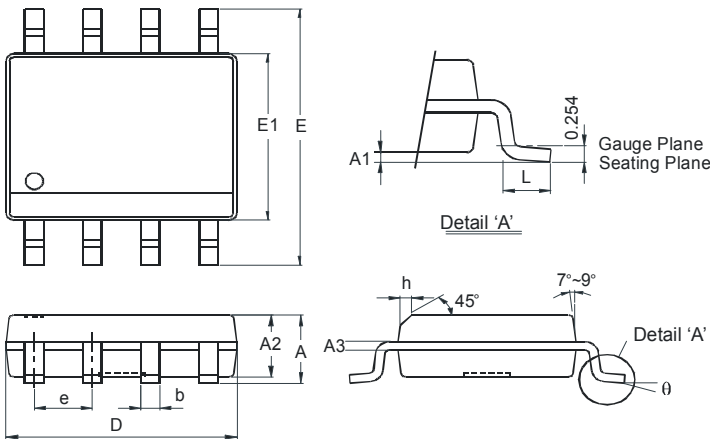


Figure 9 Transient Thermal Resistance

**Package Outline Dimensions**

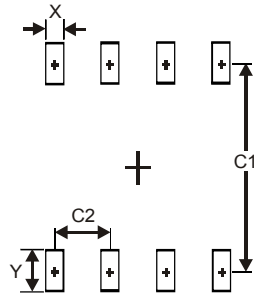
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



| SO-8                 |          |      |
|----------------------|----------|------|
| Dim                  | Min      | Max  |
| A                    | -        | 1.75 |
| A1                   | 0.10     | 0.20 |
| A2                   | 1.30     | 1.50 |
| A3                   | 0.15     | 0.25 |
| b                    | 0.3      | 0.5  |
| D                    | 4.85     | 4.95 |
| E                    | 5.90     | 6.10 |
| E1                   | 3.85     | 3.95 |
| e                    | 1.27 Typ |      |
| h                    | -        | 0.35 |
| L                    | 0.62     | 0.82 |
| θ                    | 0°       | 8°   |
| All Dimensions in mm |          |      |

**Suggested Pad Layout**

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



| Dimensions | Value (in mm) |
|------------|---------------|
| X          | 0.60          |
| Y          | 1.55          |
| C1         | 5.4           |
| C2         | 1.27          |

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