

Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)}$ | I_D $T_A = +25^\circ C$ |
|---------------|----------------------------------|------------------------------|
| -60V | 150m Ω @ $V_{GS} = -10V$ | -3A |
| | 185m Ω @ $V_{GS} = -4.5V$ | -2.7A |

Description

This MOSFET has been designed to minimize the on-state resistance and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

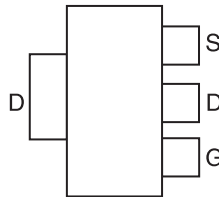
Applications

- Motor Control
- Transformer Driving Switch
- DC-DC Converters
- Power Management Functions
- Uninterrupted Power Supply

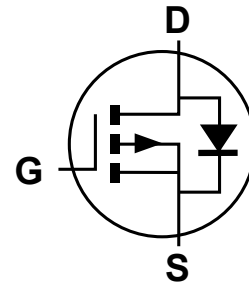
SOT223



Top View



Pin Out - Top View



Equivalent Circuit

Features and Benefits

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

Mechanical Data

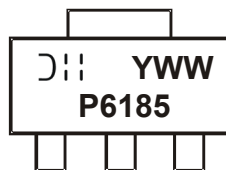
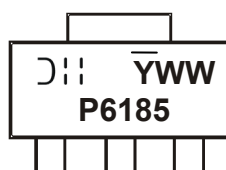
- Case: SOT223
- Case Material: Molded Plastic, "Green" Molding Compound.
UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See diagram below
- Terminals: Finish - Matte Tin annealed over Copper lead frame.
Solderable per MIL-STD-202, Method 208 **e3**
- Weight: 0.112 grams (approximate)

Ordering Information (Note 4)

| Part Number | Qualification | Case | Packaging |
|--------------|---------------|--------|---------------------|
| DMP6185SE-13 | Standard | SOT223 | 2,500 / Tape & Reel |

- Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
 2. See 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. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information



DII = Manufacturer's Marking
P6185 = Marking Code
YWW = Date Code Marking for SAT (Shanghai Assembly/ Test site)
YWW = Date Code Marking for CAT (Chengdu Assembly/ Test site)
Y or Y= Year (ex: 3 = 2013)
WW = Week (01 - 53)

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

| Characteristic | | Symbol | Value | Unit |
|----------------------------------------------------------|------------------------|------------------|-------|------|
| Drain-Source voltage | | V _{DSS} | -60 | V |
| Gate-Source voltage | | V _{GS} | ±20 | V |
| Continuous Drain current (Note 6) V _{GS} = -10V | T _A = +25°C | I _D | -3 | A |
| | T _A = +70°C | | -2.4 | |
| Maximum Body Diode Continuous Current | | I _S | -2 | A |
| Pulsed Drain Current (10µs pulse, duty cycle = 1%) | | I _{DM} | -15 | A |
| Single Pulsed Avalanche Current (Note 7) | | I _{AS} | -16 | A |
| Single Pulsed Avalanche Energy (Note 7) | | E _{AS} | 13 | mJ |

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

| Characteristic | | Symbol | Value | Units |
|--------------------------------------------------|------------------------|-----------------------------------|-------------|-------|
| Total Power Dissipation (Note 5) | T _A = +25°C | P _D | 1.2 | W |
| | T _A = +70°C | | 0.8 | |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady state | R _{θJA} | 104 | °C/W |
| | t<10s | | 51 | |
| Total Power Dissipation (Note 6) | T _A = +25°C | P _D | 2.2 | W |
| | T _A = +70°C | | 1.4 | |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady state | R _{θJA} | 60 | °C/W |
| | t<10s | | 30 | |
| Thermal Resistance, Junction to Case (Note 6) | | R _{θJC} | 7.6 | |
| Operating and Storage Temperature Range | | T _J , T _{STG} | -55 to +150 | °C |

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---------------------------------------------|---------------------|-----|-------|-------|------|----------------------------------------------------------------------------------------------|
| OFF CHARACTERISTICS (Note 8) | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | -60 | — | — | V | V _{GS} = 0V, I _D = -250µA |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | -1 | µA | V _{DS} = -48V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | ±100 | nA | V _{GS} = ±20V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 8) | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | -1 | — | -3 | V | V _{DS} = V _{GS} , I _D = -250µA |
| Static Drain-Source On-Resistance | R _{DS(on)} | — | 110 | 150 | mΩ | V _{GS} = -10V, I _D = -2.2A |
| | | | 130 | 185 | | V _{GS} = -4.5V, I _D = -1.8A |
| Diode Forward Voltage | V _{SD} | — | -0.75 | -0.95 | V | V _{GS} = 0V, I _S = -1A |
| DYNAMIC CHARACTERISTICS (Note 9) | | | | | | |
| Input Capacitance | C _{iss} | — | 708 | — | pF | V _{DS} = -30V, V _{GS} = 0V, f = 1MHz |
| Output Capacitance | C _{oss} | — | 39 | — | pF | |
| Reverse Transfer Capacitance | C _{rss} | — | 32 | — | pF | |
| Gate Resistance | R _g | — | 17 | 28 | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1MHz |
| Total Gate Charge (V _{GS} = -4.5V) | Q _g | — | 6.2 | — | nC | V _{DS} = -30V, I _D = -12A |
| Total Gate Charge (V _{GS} = -10V) | Q _g | — | 14 | — | nC | |
| Gate-Source Charge | Q _{gs} | — | 2.8 | — | nC | |
| Gate-Drain Charge | Q _{gd} | — | 3.1 | — | nC | |
| Turn-On Delay Time | t _{D(on)} | — | 5.2 | — | ns | V _{DS} = -30V, R _L = 2.5Ω V _{GS} = -10V, R _G = 3Ω |
| Turn-On Rise Time | t _r | — | 23 | — | ns | |
| Turn-Off Delay Time | t _{D(off)} | — | 33 | — | ns | |
| Turn-Off Fall Time | t _f | — | 39 | — | ns | |
| Body Diode Reverse Recovery Time | t _{rr} | — | 22 | — | ns | I _F = -12A, di/dt = 100A/µs |
| Body Diode Reverse Recovery Charge | Q _{rr} | — | 17 | — | nC | |

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
 - Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
 - UIS in production with L = 0.1mH, starting T_A = +25°C.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.

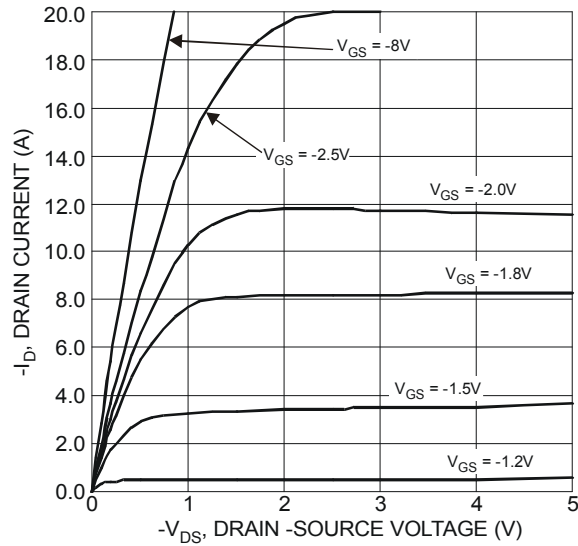


Figure 1 Typical Output Characteristics

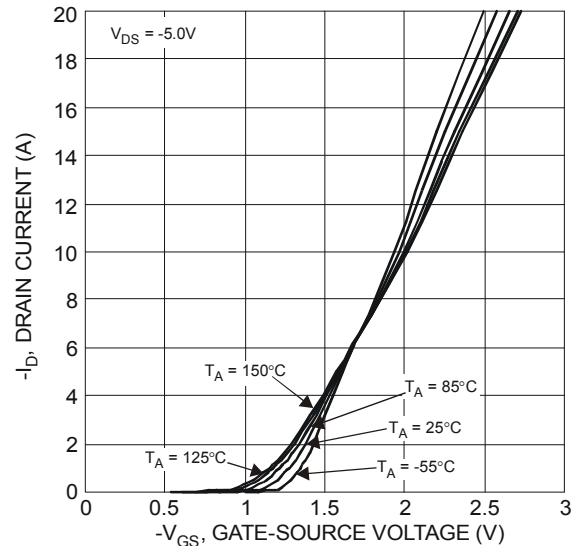


Figure 2 Typical Transfer Characteristics

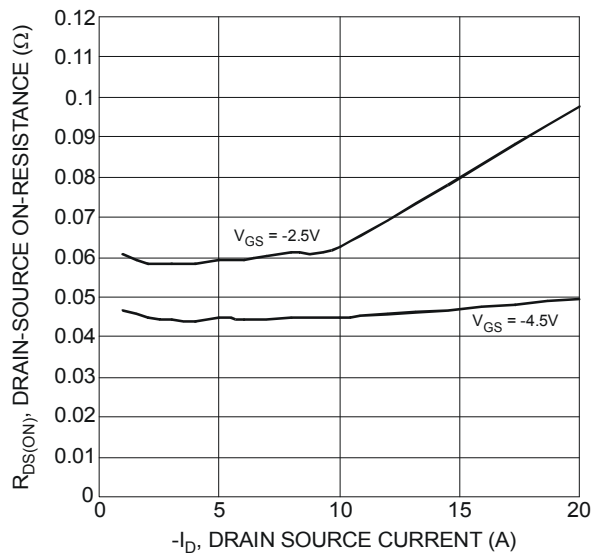


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

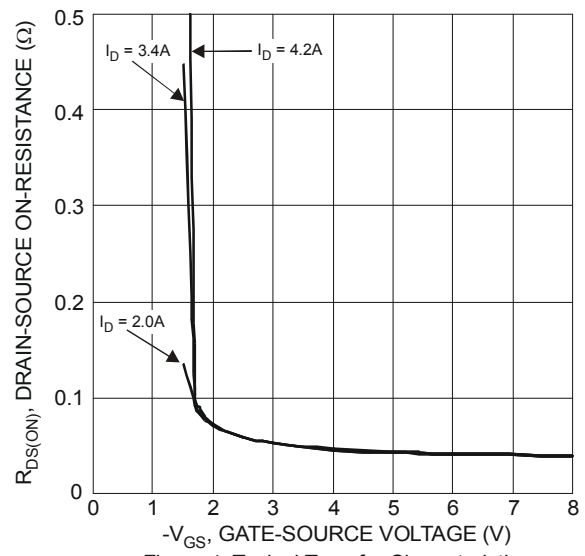


Figure 4 Typical Transfer Characteristics

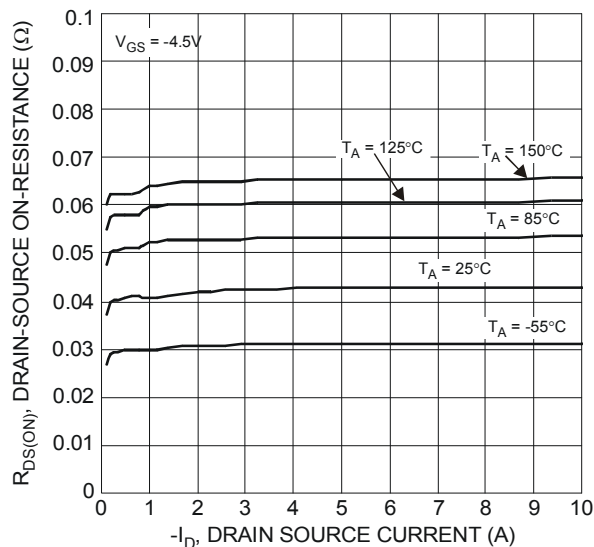


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

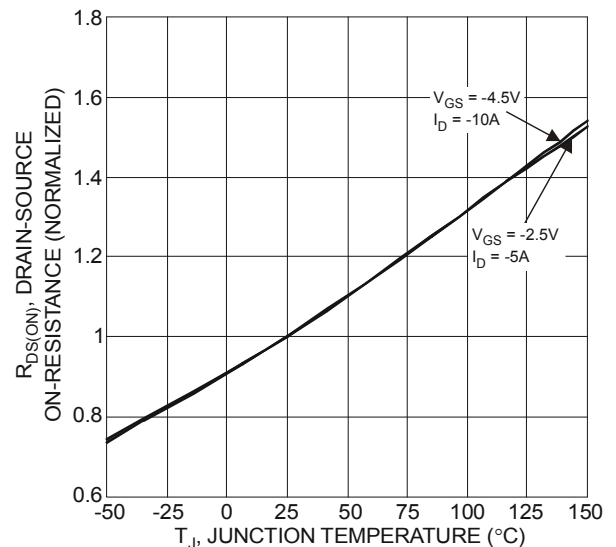


Figure 6 On-Resistance Variation with Temperature

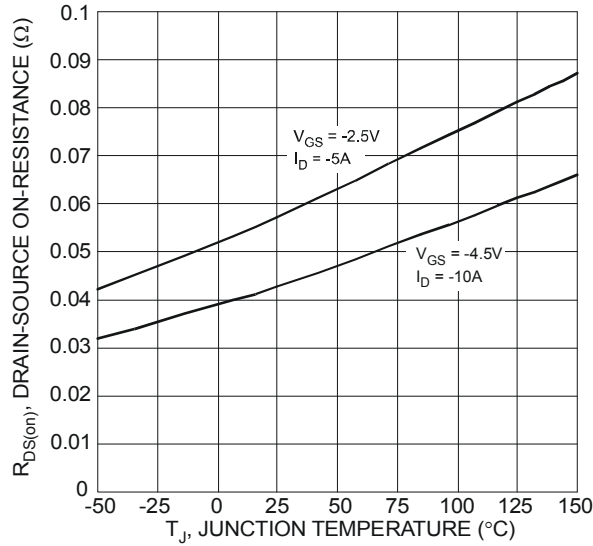


Figure 7 On-Resistance Variation with Temperature

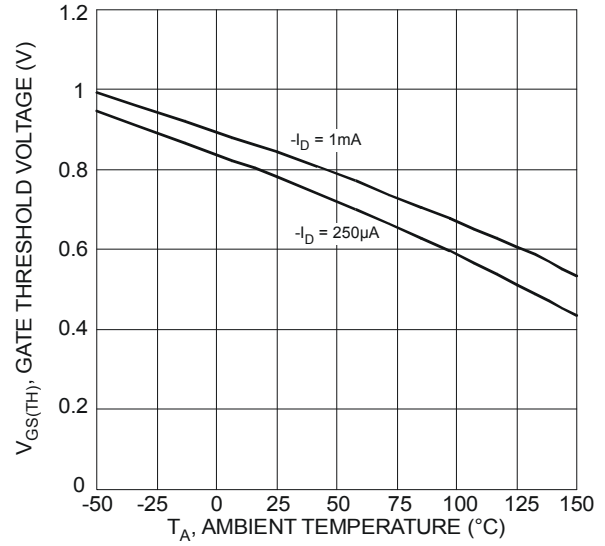


Figure 8 Gate Threshold Variation vs. Ambient Temperature

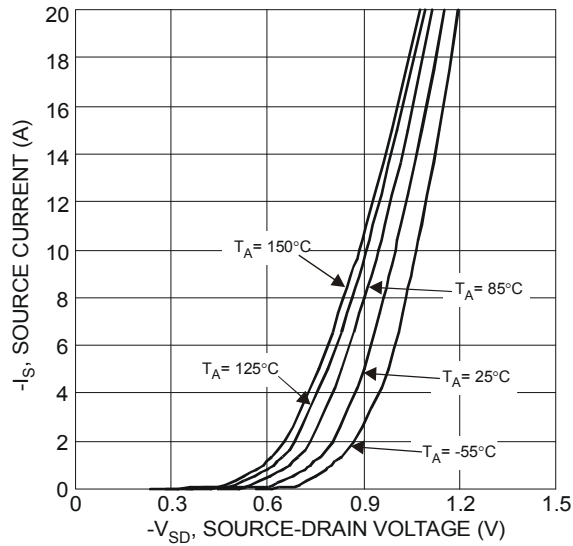


Figure 9 Diode Forward Voltage vs. Current

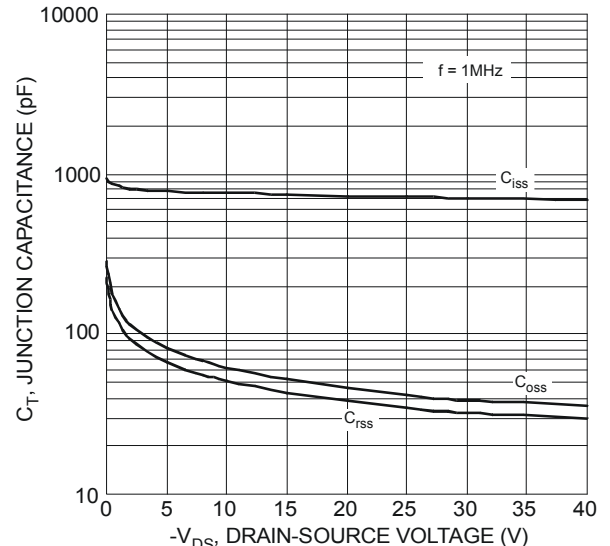


Figure 10 Typical Junction Capacitance

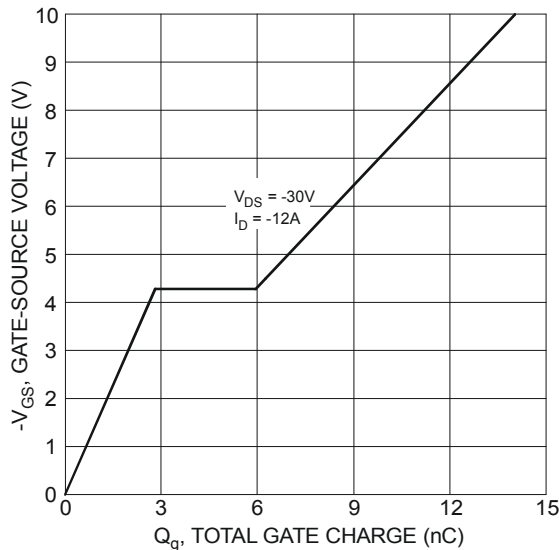
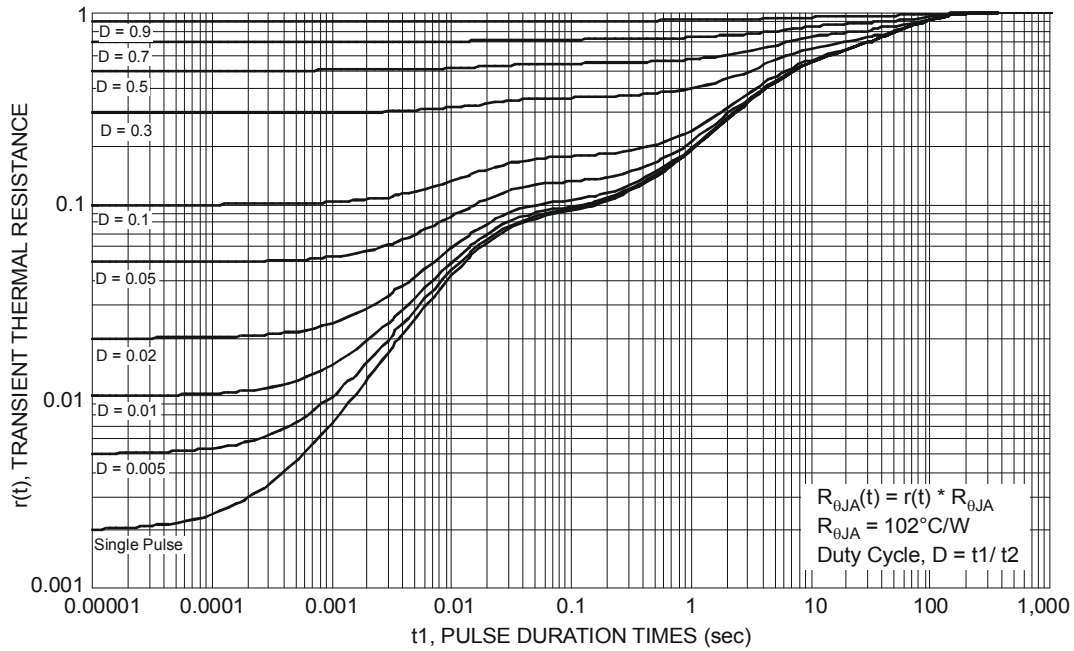
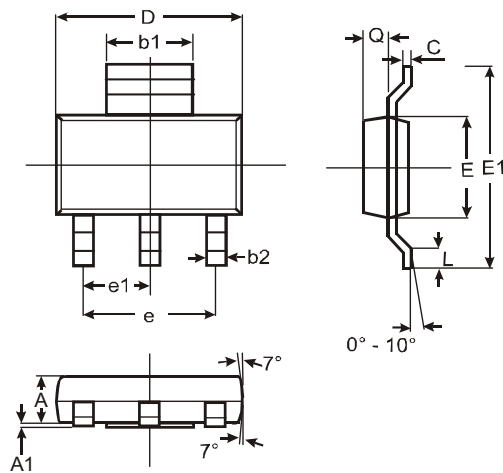


Figure 11 Gate-Charge Characteristics



Package Outline Dimensions

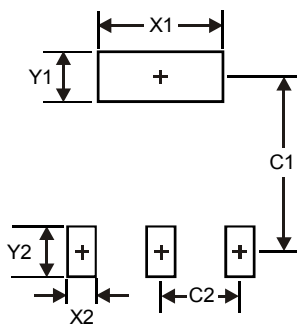
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| SOT223 | | | |
|----------------------|-------|------|------|
| Dim | Min | Max | Typ |
| A | 1.55 | 1.65 | 1.60 |
| A1 | 0.010 | 0.15 | 0.05 |
| b1 | 2.90 | 3.10 | 3.00 |
| b2 | 0.60 | 0.80 | 0.70 |
| C | 0.20 | 0.30 | 0.25 |
| D | 6.45 | 6.55 | 6.50 |
| E | 3.45 | 3.55 | 3.50 |
| E1 | 6.90 | 7.10 | 7.00 |
| e | — | — | 4.60 |
| e1 | — | — | 2.30 |
| L | 0.85 | 1.05 | 0.95 |
| Q | 0.84 | 0.94 | 0.89 |
| 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) |
|------------|---------------|
| X1 | 3.3 |
| X2 | 1.2 |
| Y1 | 1.6 |
| Y2 | 1.6 |
| C1 | 6.4 |
| C2 | 2.3 |

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