

20V N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)}$ | I_D max $T_A = +25^\circ C$ |
|---------------|-------------------------|----------------------------------|
| 20V | 175mΩ @ $V_{GS} = 4.5V$ | 1.30A |
| | 240mΩ @ $V_{GS} = 2.5V$ | 1.11A |
| | 360mΩ @ $V_{GS} = 1.8V$ | 0.91A |

Description and Applications

This MOSFET is 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.

- Load Switch

Features and Benefits

- Footprint of just 0.6mm² – thirteen times smaller than SOT23
- 0.5mm profile – ideal for low profile applications
- On resistance <200mΩ @ $V_{GS} = 4.5V$
- Low Gate Threshold Voltage
- Fast Switching Speed
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **ESD Protected Gate 2KV**
- **Qualified to AEC-Q101 Standards for High Reliability**

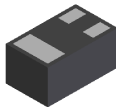
Mechanical Data

- Case: X1-DFN1006-3
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – NiPdAu over Copper Leadframe; Solderable per MIL-STD-202, Method 208@4
- Weight: 0.001 grams (Approximate)

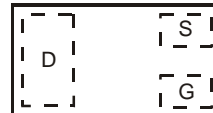


ESD PROTECTED TO 2kV

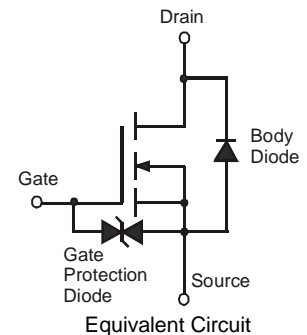
X1-DFN1006-3



Bottom View



Top View
Internal Schematic



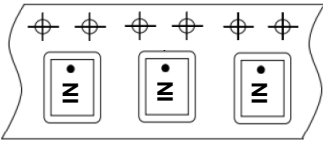
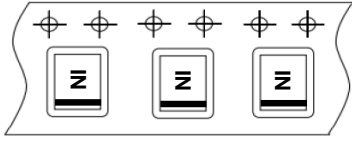



Ordering Information (Note 4)

| Part Number | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---------------|---------|--------------------|-----------------|-------------------|
| DMN2300UFB-7 | NI | 7 | 8 | 3,000 |
| DMN2300UFB-7B | NI | 7 | 8 | 10,000 |

- 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 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

| | |
|-----------------------------|---|
| <p>DMN2300UFB-7</p> | <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  <p>Top View Dot Denotes Drain Side</p> </div> <div style="text-align: center;"> <p>From date code 1527 (YYWW), this changes to:</p>  <p>Top View Bar Denotes Gate and Source Side</p> </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 20px;">   </div> |
| <p>DMN2300UFB-7B</p> | <div style="text-align: center; margin-bottom: 20px;">  <p>Top View Bar Denotes Gate and Source Side</p> </div> <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;">  </div> <div style="text-align: center;"> <p>NI = Part Marking Code</p> </div> </div> |

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

| Characteristic | | | Symbol | Value | Unit |
|-------------------------------|--------------|---------------------------------|------------------|-------|------|
| Drain-Source Voltage | | | V _{DSS} | 20 | V |
| Gate-Source Voltage | | | V _{GSS} | ±8 | V |
| Continuous Drain Current | Steady State | T _A = +25°C (Note 5) | I _D | 1.32 | A |
| | | T _A = +85°C (Note 5) | | 0.94 | |
| | | T _A = +25°C (Note 6) | | 1.78 | |
| Pulsed Drain Current (Note 7) | | | I _{DM} | 8 | A |

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

| Characteristic | | Symbol | Value | Unit |
|--|--|-----------------------------------|-------------|------|
| Power Dissipation (Note 5) | | P _D | 0.468 | W |
| Power Dissipation (Note 6) | | P _D | 1.2 | W |
| Thermal Resistance, Junction to Ambient (Note 5) | | R _{θJA} | 267 | °C/W |
| Thermal Resistance, Junction to Ambient (Note 6) | | R _{θJA} | 104 | °C/W |
| 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} | 20 | - | - | V | V _{GS} = 0V, I _D = 10μA |
| Zero Gate Voltage Drain Current T _J = +25°C | I _{DSS} | - | - | 1 | μA | V _{DS} = 20V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | - | - | 10 | μA | V _{GS} = ±8V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 8) | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | 0.45 | - | 0.95 | V | V _{DS} = V _{GS} , I _D = 250μA |
| Static Drain-Source On-Resistance | R _{DS(on)} | - | - | 175 | mΩ | V _{GS} = 4.5V, I _D = 300mA |
| | | - | - | 240 | | V _{GS} = 2.5V, I _D = 250mA |
| | | - | - | 360 | | V _{GS} = 1.8V, I _D = 100mA |
| Forward Transfer Admittance | Y _{fs} | 40 | - | - | mS | V _{DS} = 3V, I _D = 30mA |
| Diode Forward Voltage | V _{SD} | - | 0.7 | 1.2 | V | V _{GS} = 0V, I _S = 300mA |
| DYNAMIC CHARACTERISTICS | | | | | | |
| Input Capacitance | C _{iss} | - | 67.62 | - | pF | V _{DS} = 20V, V _{GS} = 0V, f = 1.0MHz |
| Output Capacitance | C _{oss} | - | 9.74 | - | pF | |
| Reverse Transfer Capacitance | C _{rss} | - | 7.58 | - | pF | |
| Gate Resistance | R _g | - | 68.51 | - | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1MHz |
| Total Gate Charge | Q _g | - | 0.89 | - | nC | V _{GS} = 4.5V, V _{DS} = 10V, I _D = 1A |
| Gate-Source Charge | Q _{gs} | - | 0.14 | - | nC | |
| Gate-Drain Charge | Q _{gd} | - | 0.16 | - | nC | |
| Turn-On Delay Time | t _{D(on)} | - | 4.92 | - | ns | V _{DS} = 10V, I _D = 1A V _{GS} = 4.5V, R _G = 6Ω |
| Turn-On Rise Time | t _r | - | 6.93 | - | ns | |
| Turn-Off Delay Time | t _{D(off)} | - | 21.71 | - | ns | |
| Turn-Off Fall Time | t _f | - | 10.62 | - | ns | |

- 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 25mm X 25mm square copper plate.
 - Device mounted on minimum recommended pad layout test board, 10μs pulse duty cycle = 1%.
 - Short duration pulse test used to minimize self-heating effect.

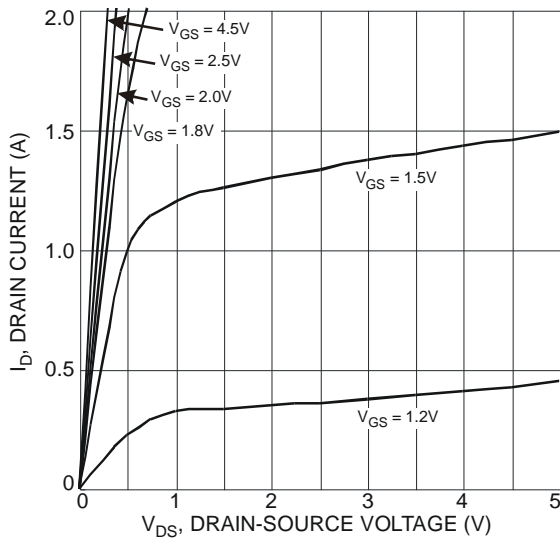


Fig. 1 Typical Output Characteristic

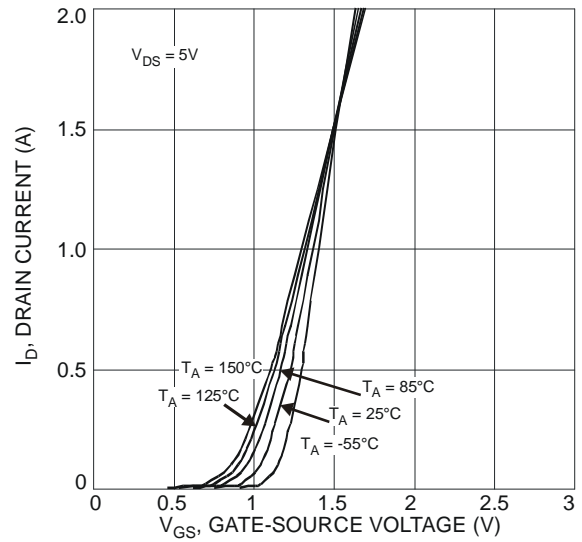


Fig. 2 Typical Transfer Characteristic

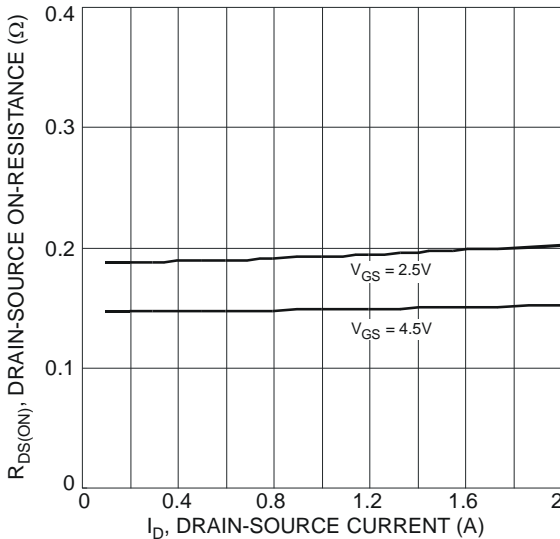


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

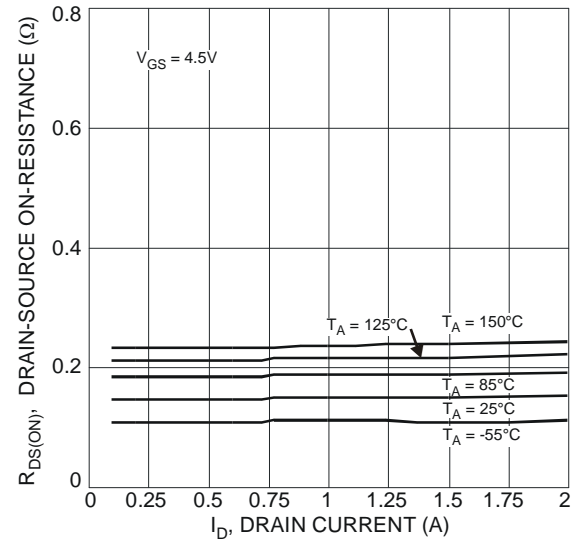


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

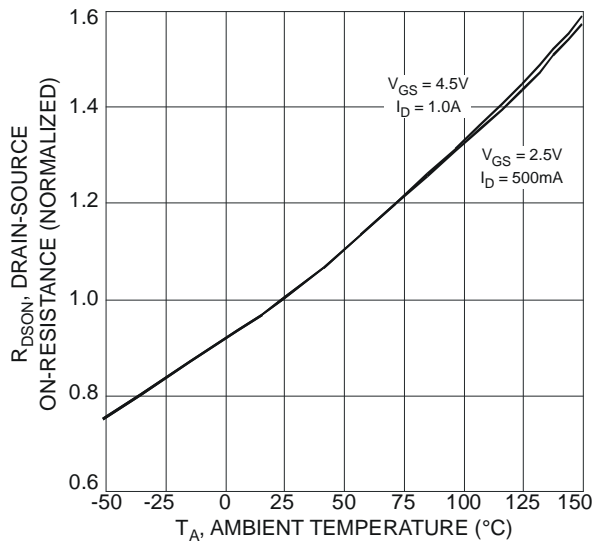


Fig. 5 On-Resistance Variation with Temperature

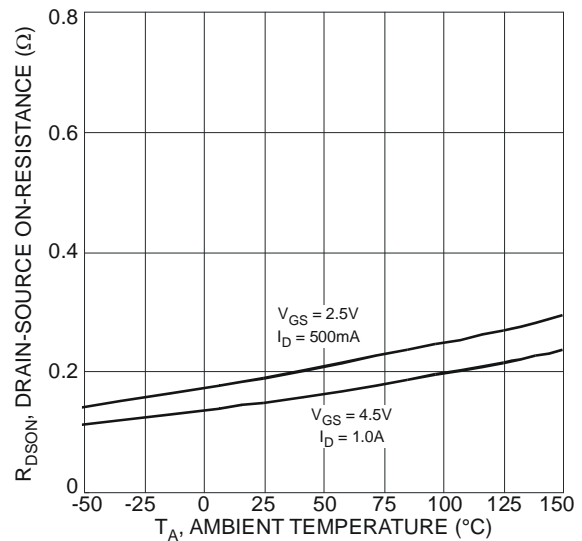


Fig. 6 On-Resistance Variation with Temperature

DMN2300UFB

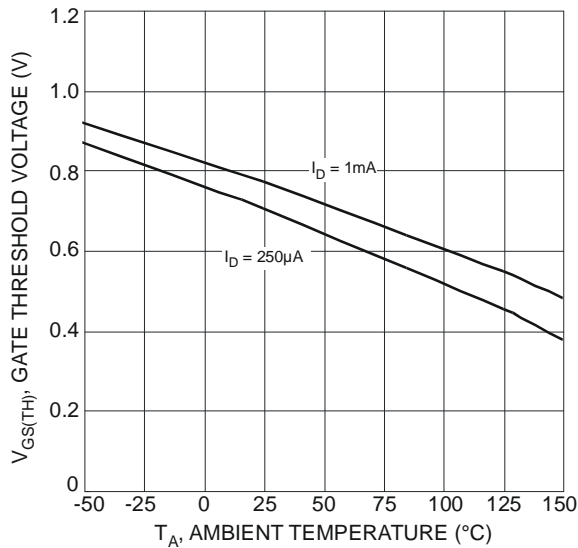


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

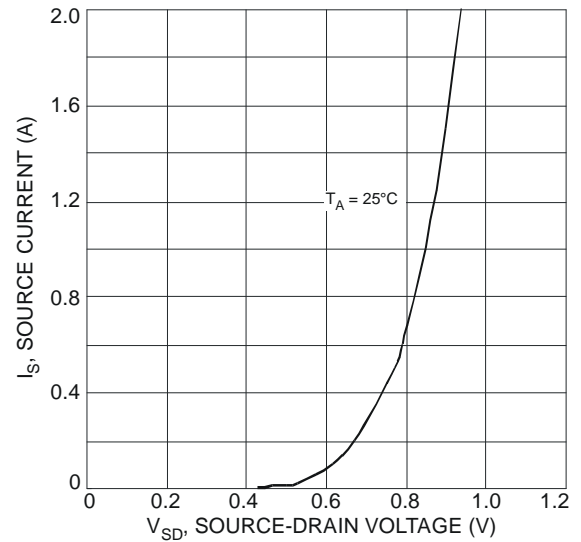


Fig. 8 Diode Forward Voltage vs. Current

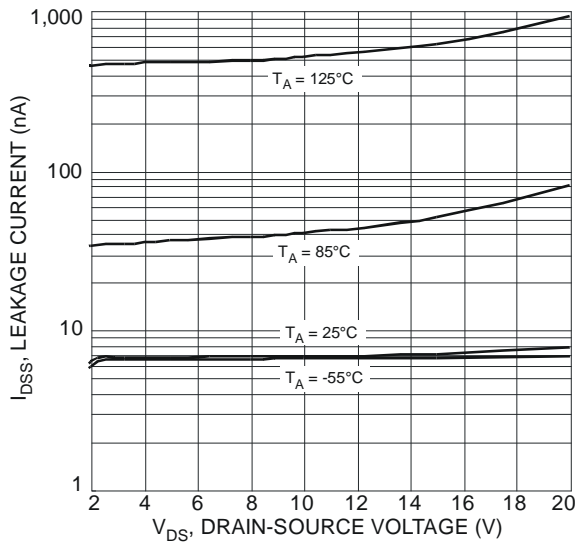


Fig. 9 Typical Leakage Current vs. Drain-Source Voltage

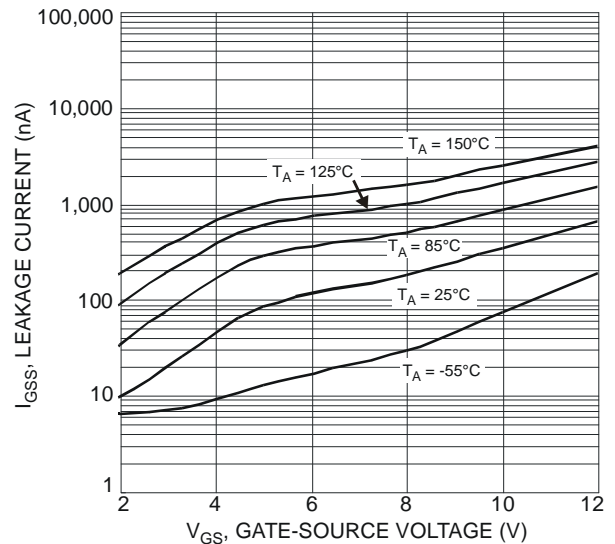


Fig.10 Leakage Current vs. Gate-Source Voltage

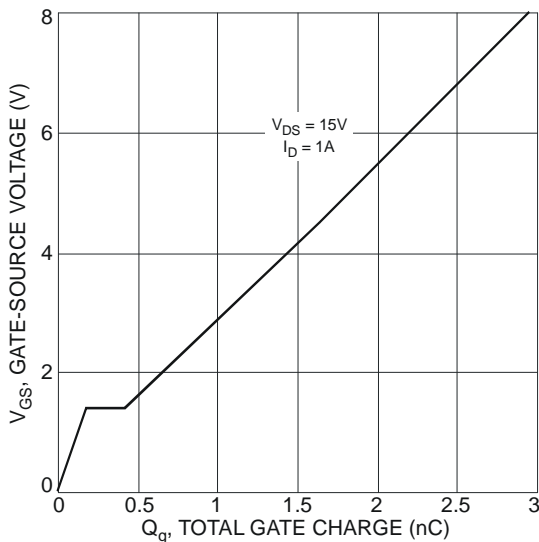


Fig. 11 Gate-Charge Characteristics

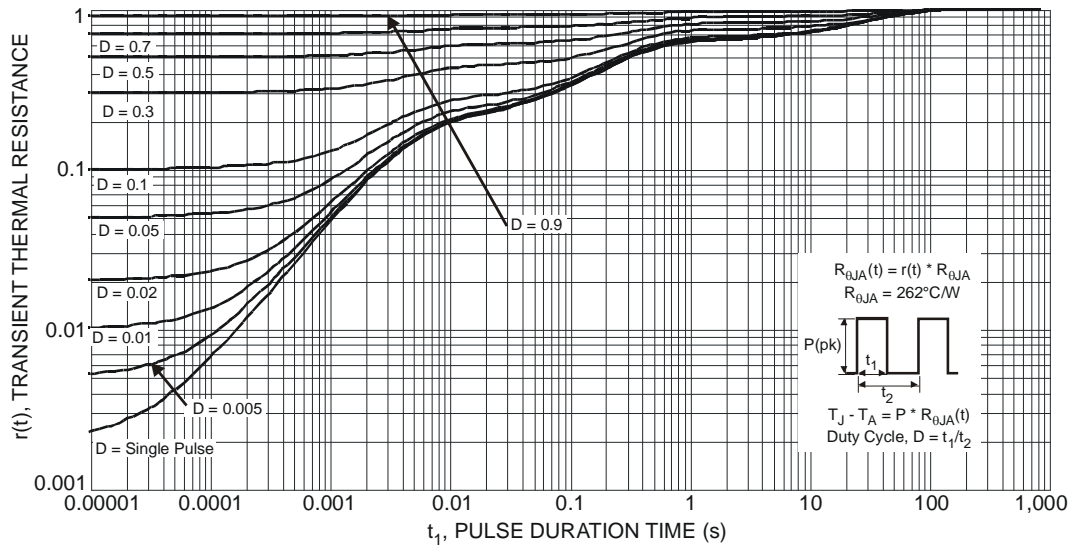
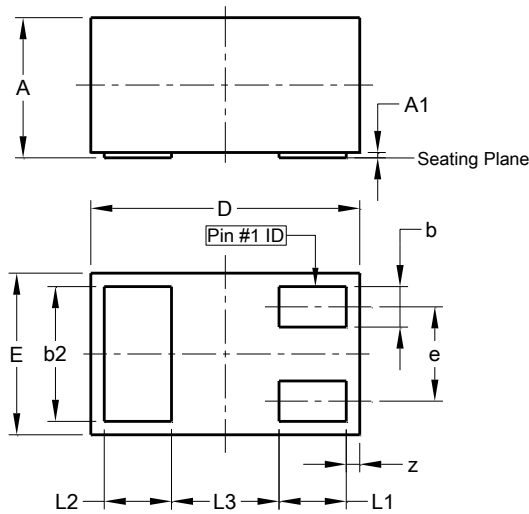


Fig. 12 Transient Thermal Response

Package Outline Dimensions

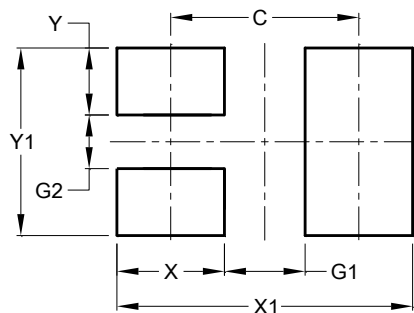
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



| X1-DFN1006-3 | | | |
|----------------------|------|-------|------|
| Dim | Min | Max | Typ |
| A | 0.47 | 0.53 | 0.50 |
| A1 | 0.00 | 0.05 | 0.03 |
| b | 0.10 | 0.20 | 0.15 |
| b2 | 0.45 | 0.55 | 0.50 |
| D | 0.95 | 1.075 | 1.00 |
| E | 0.55 | 0.675 | 0.60 |
| e | - | - | 0.35 |
| L1 | 0.20 | 0.30 | 0.25 |
| L2 | 0.20 | 0.30 | 0.25 |
| L3 | - | - | 0.40 |
| z | 0.02 | 0.08 | 0.05 |
| 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) |
|------------|---------------|
| C | 0.70 |
| G1 | 0.30 |
| G2 | 0.20 |
| X | 0.40 |
| X1 | 1.10 |
| Y | 0.25 |
| Y1 | 0.70 |

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