

DUAL N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON)}$ max | I_D max $T_A = +25^\circ\text{C}$ (Note 5) |
|---------------|---------------------------------------|---|
| 40V | 31m Ω @ $V_{GS} = 10\text{V}$ | 7.0A |
| | 50m Ω @ $V_{GS} = 4.5\text{V}$ | 5.6A |

Description and Applications

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.

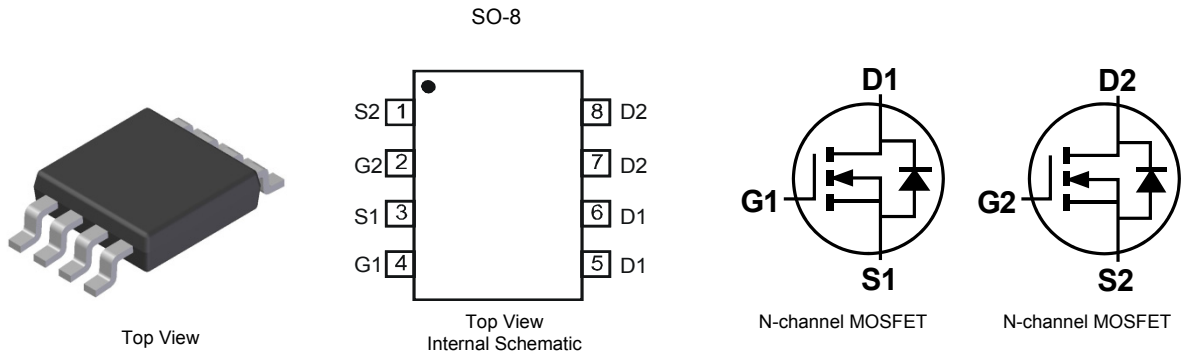
- Motor control
- Backlighting
- Power Management Functions
- DC-DC Converters

Features and Benefits

- Low On-Resistance
- Low Input/Output Leakage
- **Totally Lead-Free & Fully RoHS Compliant (Notes 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 Indicator: See diagram
- Terminals: Finish — Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.072 grams (approximate)

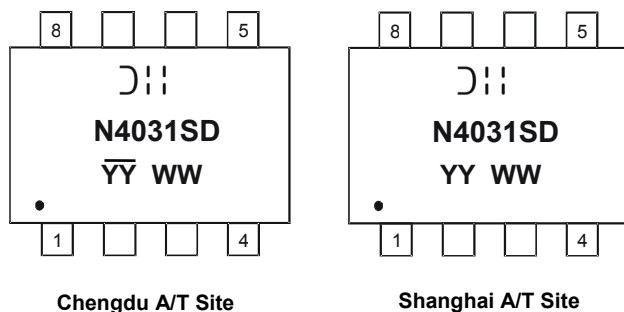


Ordering Information (Note 4)

| Part Number | Case | Packaging |
|---------------|------|-------------------|
| DMN4031SSD-13 | 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 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



☺☺☺ = Manufacturer's Marking
 N4031SD = Product Type Marking Code
 YYWW = Date Code Marking
 YY or YY = Year (ex: 13 = 2013)
 WW = Week (01 - 53)
 YY = Date Code Marking for SAT (Shanghai Assembly/ Test site)
 YY = Date Code Marking for CAT (Chengdu Assembly/ Test site)

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

| Characteristic | | | | Symbol | Value | Units |
|-----------------------------------|------------------------|--------------|------------------------|------------------|-------|-------|
| Drain-Source Voltage | | | | V _{DSS} | 40 | V |
| Gate-Source Voltage | | | | V _{GSS} | ±20 | V |
| Continuous Drain Current (Note 5) | V _{GS} = 10V | Steady State | T _A = +25°C | I _D | 5.2 | A |
| | | | T _A = +70°C | | 4.1 | |
| Continuous Drain Current (Note 5) | V _{GS} = 4.5V | Steady State | T _A = +25°C | I _D | 4.3 | A |
| | | | T _A = +70°C | | 3.4 | |
| Continuous Drain Current (Note 6) | V _{GS} = 10V | Steady State | T _A = +25°C | I _D | 7.0 | A |
| | | | T _A = +70°C | | 5.6 | |
| Continuous Drain Current (Note 6) | V _{GS} = 4.5V | Steady State | T _A = +25°C | I _D | 5.8 | A |
| | | | T _A = +70°C | | 4.7 | |
| Pulsed Drain Current (Note 7) | | | | I _{DM} | 20 | A |

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

| Characteristic | Symbol | Value | Units |
|--|-----------------------------------|-------------|-------|
| Total Power Dissipation (Note 5) | P _D | 1.42 | W |
| Thermal Resistance, Junction to Ambient @T _A = +25°C (Note 5) | R _{θJA} | 88 | °C/W |
| Total Power Dissipation (Note 6) | P _D | 2.6 | W |
| Thermal Resistance, Junction to Ambient @T _A = +25°C (Note 6) | R _{θJA} | 48 | °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} | 40 | — | — | V | V _{GS} = 0V, I _D = 10mA |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | 1 | μA | V _{DS} = 40V, 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)} | 1.6 | 2.4 | 3.0 | V | V _{DS} = V _{GS} , I _D = 250μA |
| On-state drain current | I _{D(ON)} | 20 | — | — | A | V _{GS} = 10V, V _{DS} = 5A |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | 19 | 31 | mΩ | V _{GS} = 10V, I _D = 6A |
| | | — | 44 | 50 | | V _{GS} = 4.5V, I _D = 5A |
| Forward Transfer Admittance | Y _{fs} | — | 11 | — | S | V _{DS} = 5V, I _D = 6A |
| Diode Forward Voltage | V _{SD} | — | 0.74 | 1.0 | V | V _{GS} = 0V, I _S = 1A |
| DYNAMIC CHARACTERISTICS (Note 9) | | | | | | |
| Input Capacitance | C _{iss} | — | 945 | — | pF | V _{DS} = 20V, V _{GS} = 0V, f = 1.0MHz |
| Output Capacitance | C _{oss} | — | 69 | — | pF | |
| Reverse Transfer Capacitance | C _{rss} | — | 58 | — | pF | |
| Gate resistance | R _g | — | 1.45 | — | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1.0MHz |
| Total Gate Charge (V _{GS} = 4.5V) | Q _g | — | 8.4 | — | nC | V _{GS} = 10V, V _{DS} = 20V, I _D = 12A |
| Total Gate Charge (V _{GS} = 10V) | Q _g | — | 18.6 | — | nC | |
| Gate-Source Charge | Q _{gs} | — | 3.3 | — | nC | |
| Gate-Drain Charge | Q _{gd} | — | 2.2 | — | nC | |
| Turn-On Delay Time | T _{D(on)} | — | 6.4 | — | ns | V _{GS} = 10V, V _{DS} = 20V, R _L = 1.6Ω, R _G = 3Ω |
| Turn-On Rise Time | T _r | — | 9.7 | — | ns | |
| Turn-Off Delay Time | T _{D(off)} | — | 19.8 | — | ns | |
| Turn-Off Fall Time | T _f | — | 3.1 | — | ns | |

- Notes:
- Device mounted on FR-4 PCB, with minimum recommended pad layout. The value in any given application depends on user's specific board design
 - Device mounted on 1" x 1" FR-4PCB with high coverage 1 oz. Copper, single sided.
 - Repetitive rating, pulse width limited by junction temperature.
 - Short duration pulse test used to minimize self-heating effect
 - Guaranteed by design. No subject to production testing.

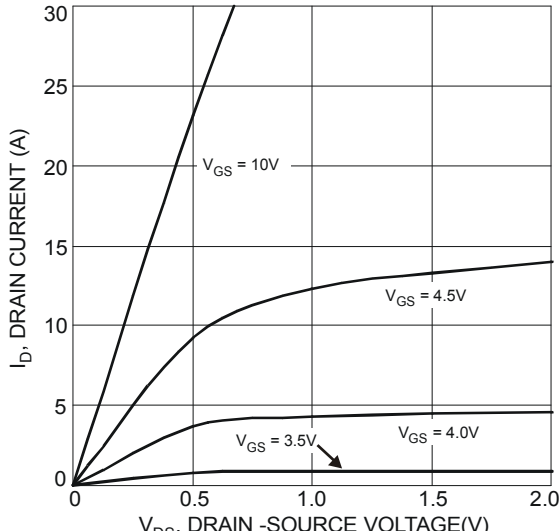


Fig. 1 Typical Output Characteristics

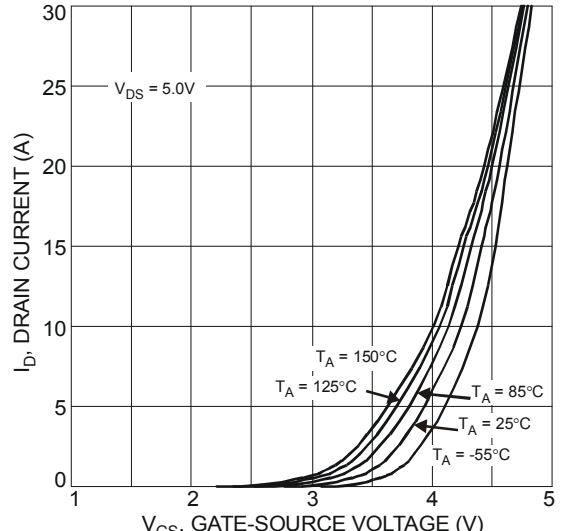


Fig. 2 Typical Transfer Characteristics

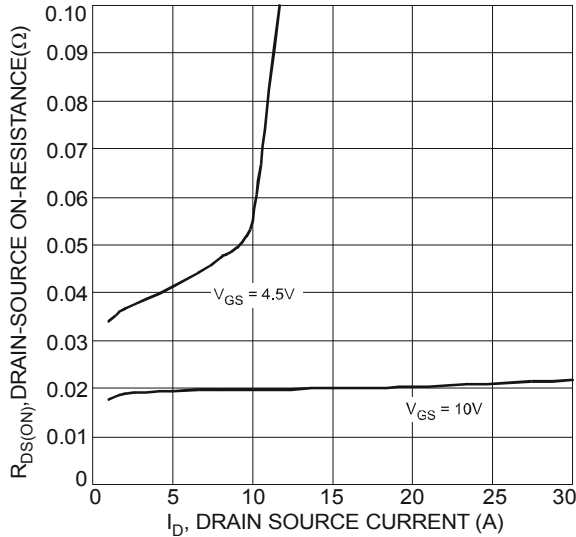


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

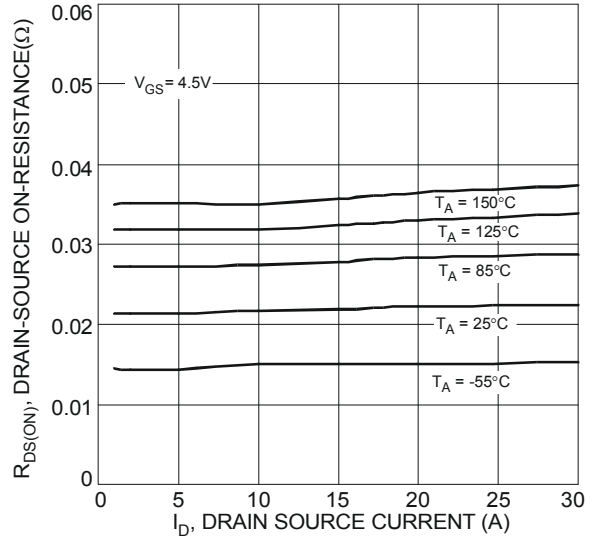


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

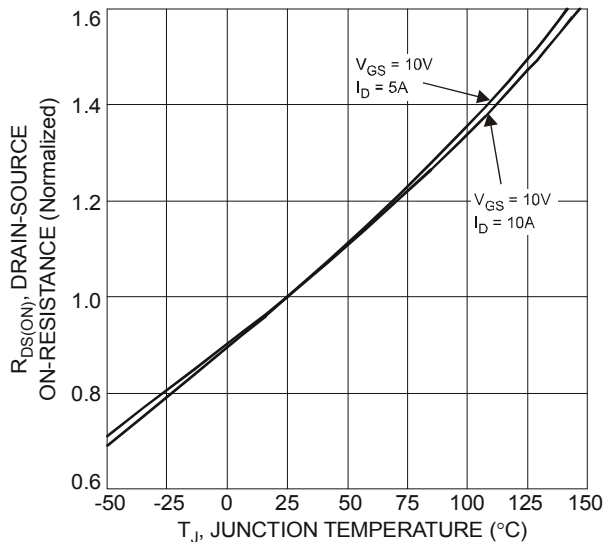


Fig. 5 On-Resistance Variation with Temperature

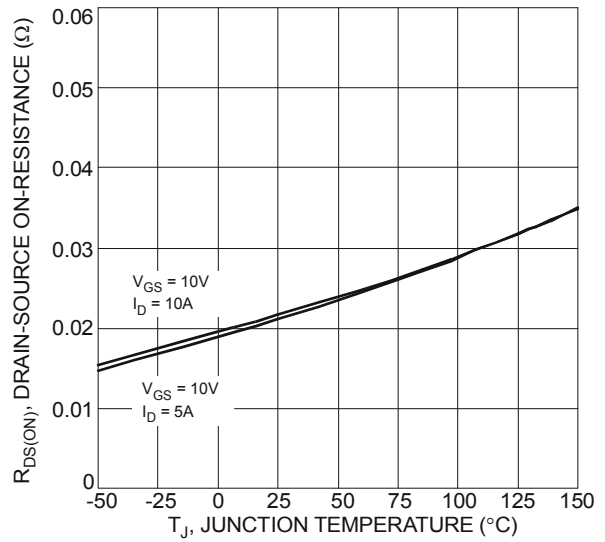


Fig. 6 On-Resistance Variation with Temperature

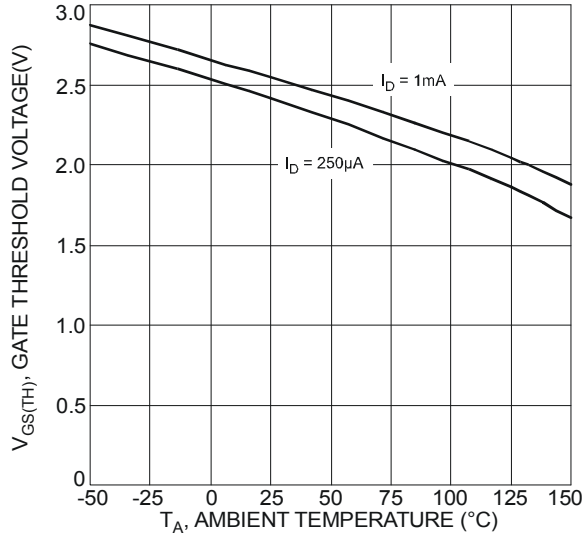


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

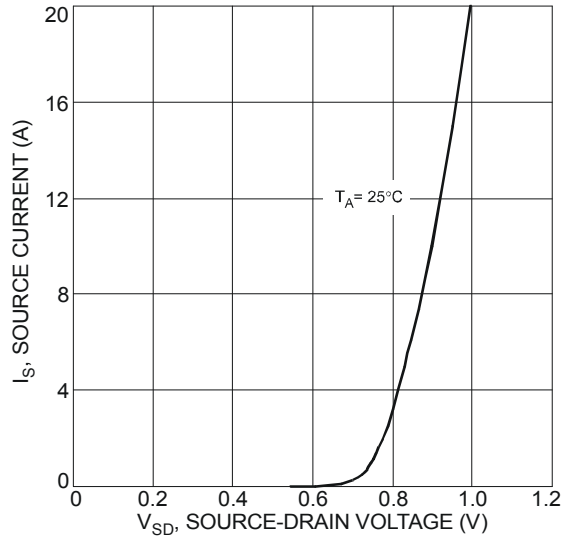


Fig. 8 Diode Forward Voltage vs. Current

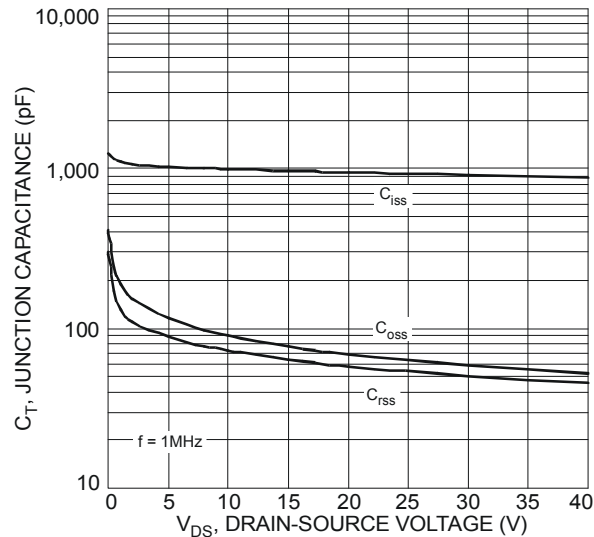


Fig. 9 Typical Junction Capacitance

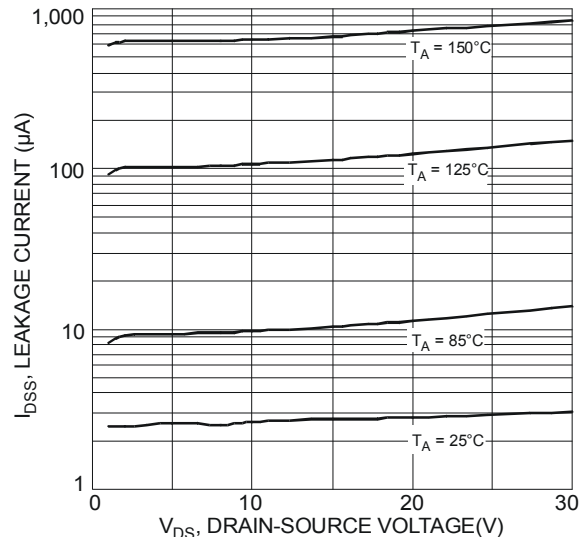


Fig. 10 Typical Drain-Source Leakage Current vs. Voltage

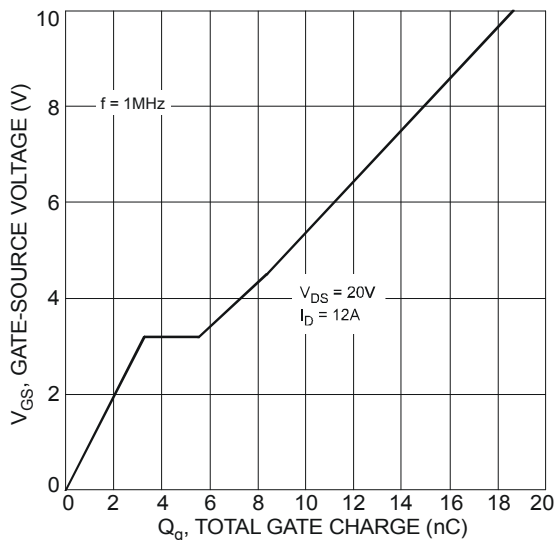


Fig. 11 Gate-Charge Characteristics

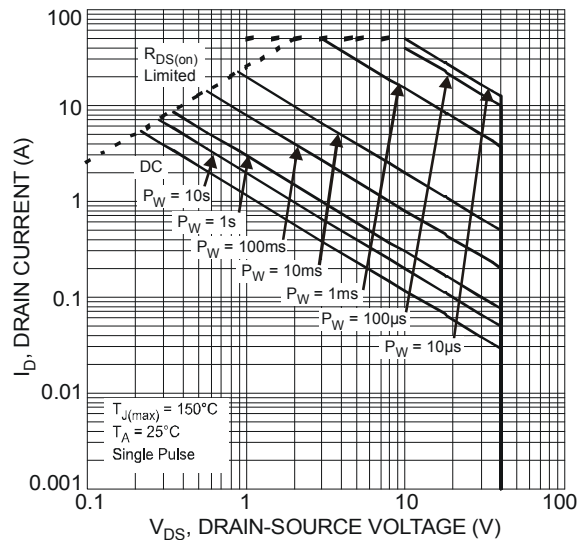
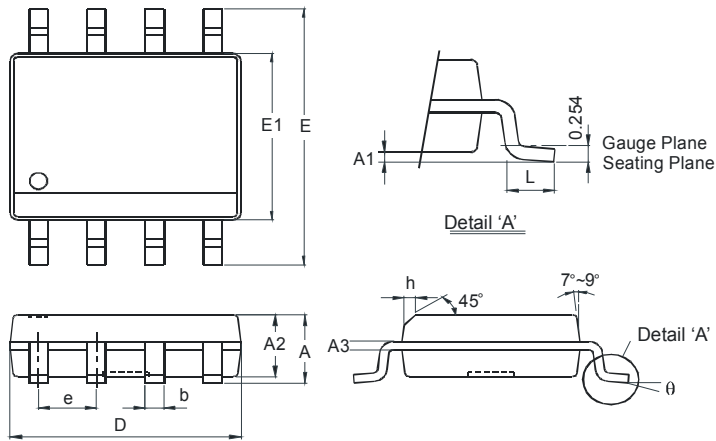


Fig. 12 SOA, Safe Operation Area

Package Outline Dimensions

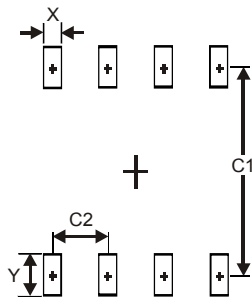
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| 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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