60V DUAL N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ max	I_D max T_A = +25°C
60V	80mΩ @ V_{GS} = 10V	4.1A
	100mΩ @ V_{GS} = 4.5V	3.6A

Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- **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**

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.

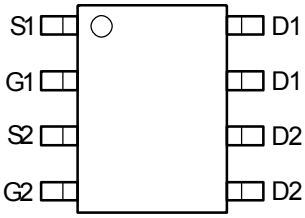
- Backlighting
- Power Management Functions
- DC-DC Converters

Mechanical Data

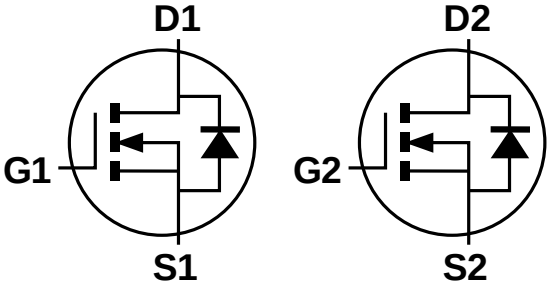
- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See Diagram
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe Solderable per MIL-STD-202, Method 208
- Weight: 0.074 grams (Approximate)

SO-8

Top View



Top View
Pin Configuration



Equivalent Circuit

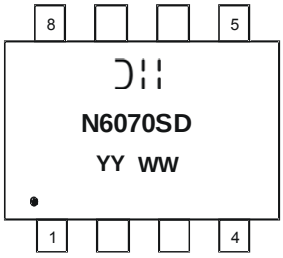
Ordering Information (Note 4)

Part Number	Case	Packaging
DMN6070SSD-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

SO-8



= Manufacturer's Marking
N6070SD = Product Type Marking Code
YYWW = Date Code Marking
YY = Year (ex: 13 = 2013)
WW = Week (01 - 53)

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

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	60	V
Gate-Source Voltage			V_{GSS}	±20	V
Continuous Drain Current (Note 6) V_{GS} = 10V	Steady State	T_A = +25°C T_A = +70°C	I_D	3.3 2.6	A
	t<10s	T_A = +25°C T_A = +70°C	I_D	4.1 3.4	A
Maximum Continuous Body Diode Forward Current (Note 5)			I_S	2.0	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)			I_{DM}	12	A
Avalanche Current (Note 7) L=0.1mH			I_{AS}	10	A
Avalanche Energy (Note 7) L=0.1mH			E_{AS}	5.9	mJ

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

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)		P_D	1.2	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	104	°C/W
	t<10s		61	
Total Power Dissipation (Note 6)		P_D	1.5	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	83	°C/W
	t<10s		50	
Thermal Resistance, Junction to Case		$R_{\theta JC}$	14.5	
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	I_D = 250µA, V_{GS}= 0V
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	µA	V_{DS}= 60V, V_{GS}= 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS}= ±16V, V_{DS}= 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(th)}$	1.0	—	3.0	V	I_D= 250µA, V_{DS}= V_{GS}
Static Drain-Source On-Resistance	$R_{DS\ (ON)}$	—	68	80	mΩ	V_{GS}= 10V, I_D= 4.5A
			70	100		V_{GS}= 4.5V, I_D= 3.5A
Diode Forward Voltage	V_{SD}	—	0.75	1.1	V	I_S= 12A, V_{GS}= 0V
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	588	—	pF	V_{DS}= 30V, V_{GS}= 0V f= 1MHz
Output Capacitance	C_{oss}	—	26.5	—		
Reverse Transfer Capacitance	C_{rss}	—	20	—		
Gate Resistance	R_g	—	1.5	—	Ω	Vgs= 0V, Vds= 0V, f=1MHz,
Total Gate Charge (V_{GS}= 4.5V)	Q_g	—	5.6	—	nC	V_{DS}= 30V, I_D= 3A
Total Gate Charge (V_{GS}= 10V)	Q_g	—	12.3	—		
Gate-Source Charge	Q_{gs}	—	1.7	—		
Gate-Drain Charge	Q_{gd}	—	1.9	—		
Turn-On Delay Time	$t_{D(on)}$	—	3.5	—	nS	V_{DD}= 30V, V_{GS}= 10V $R_L \cong$ 50Ω, $R_G \cong$ 20Ω
Turn-On Rise Time	t_r	—	4.1	—		
Turn-Off Delay Time	$t_{D(off)}$	—	35	—		
Turn-Off Fall Time	t_f	—	11	—		
Body Diode Reverse Recovery Time	trr	—	18	—	nS	I_S = 12A, dI/dt = 100A/µs
Body Diode Reverse Recovery Charge	Qrr	—	12	—	nC	I_S = 12A, dI/dt = 100A/µs

Notes:
5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
7. I_{AS} and E_{AS} rating are based on low frequency and duty cycles to keep T_J = +25°C.
8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

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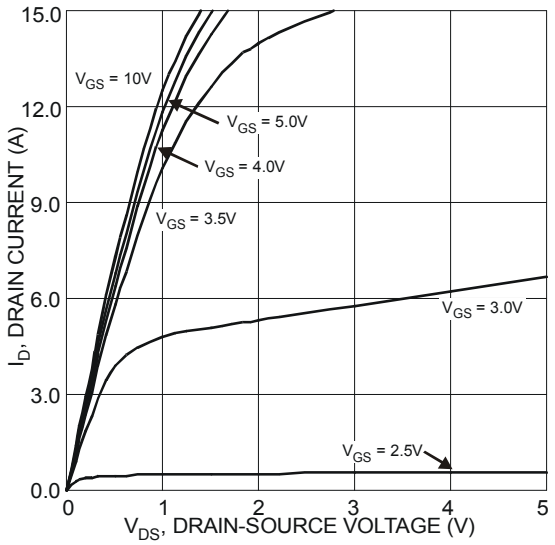

Figure 1 Typical Output Characteristic

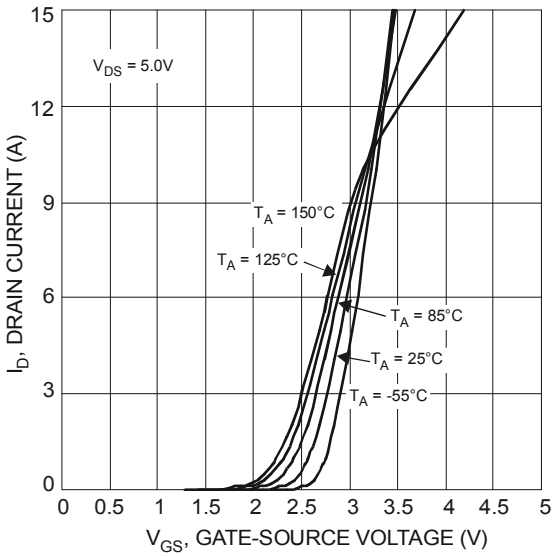

Figure 2 Typical Transfer Characteristics

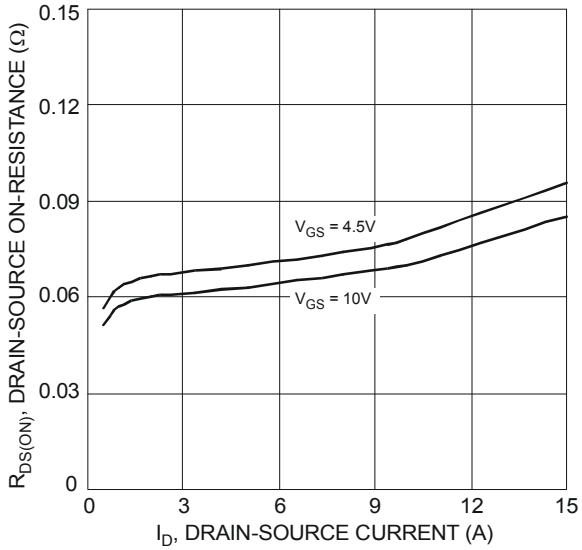

Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

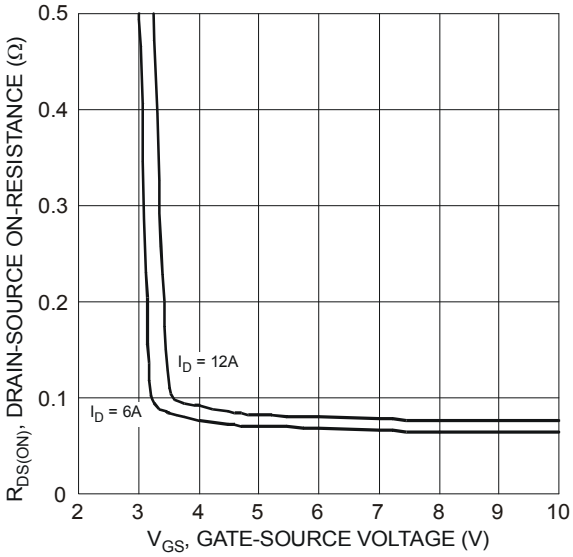

Figure 4 Typical Transfer Characteristics

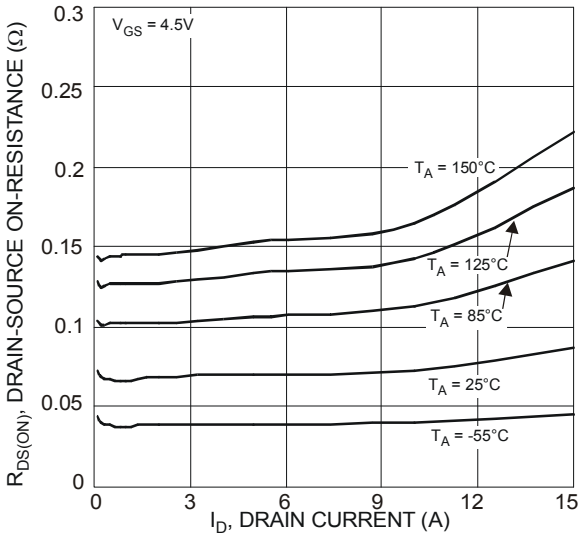

Figure 5 Typical On-Resistance vs. Drain Current and Temperature

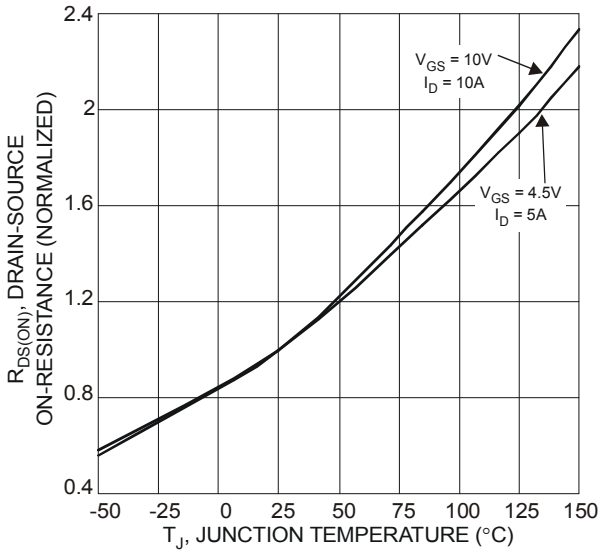

Figure 6 On-Resistance Variation with Temperature

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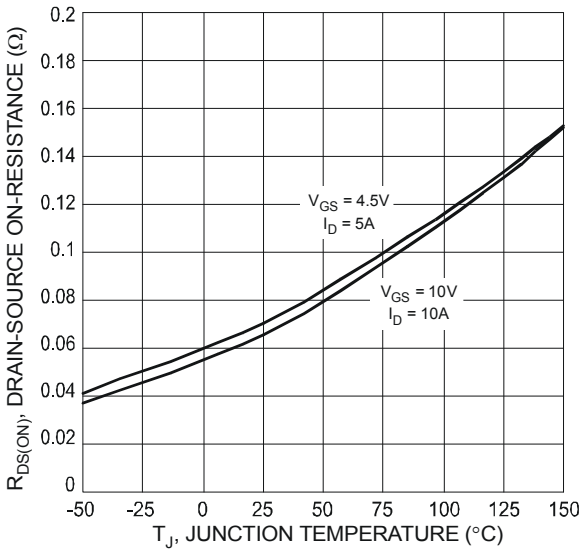

Figure 7 On-Resistance Variation with Temperature

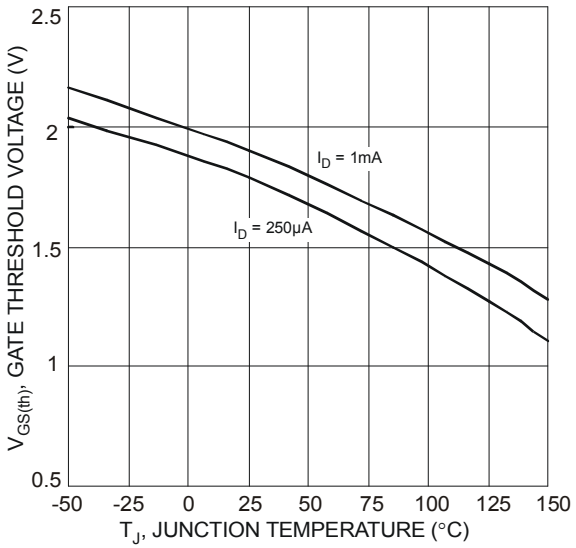

Figure 8 Gate Threshold Variation vs. Ambient Temperature

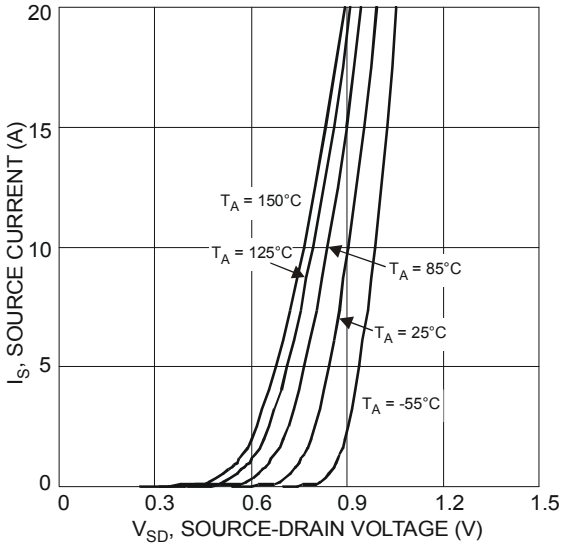

Figure 9 Diode Forward Voltage vs. Current

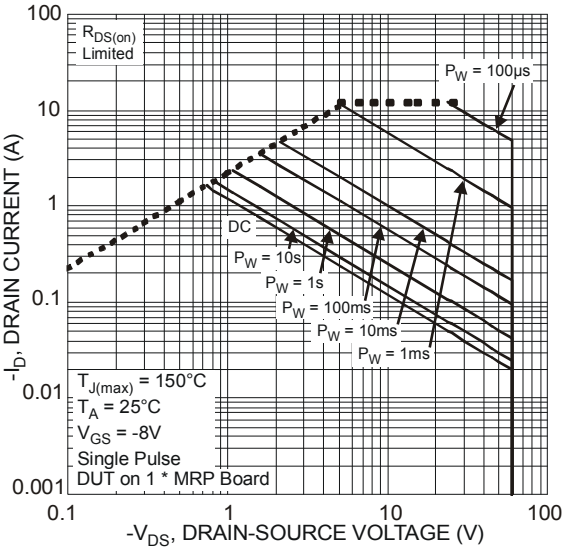

Figure 10 SOA, Safe Operation Area

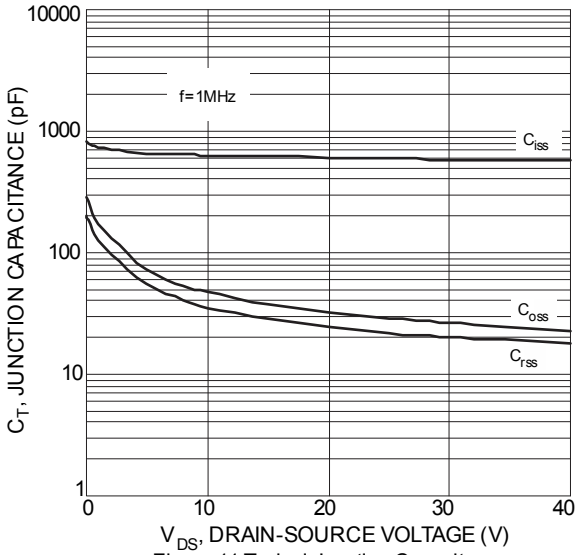

Figure 11 Typical Junction Capacitance

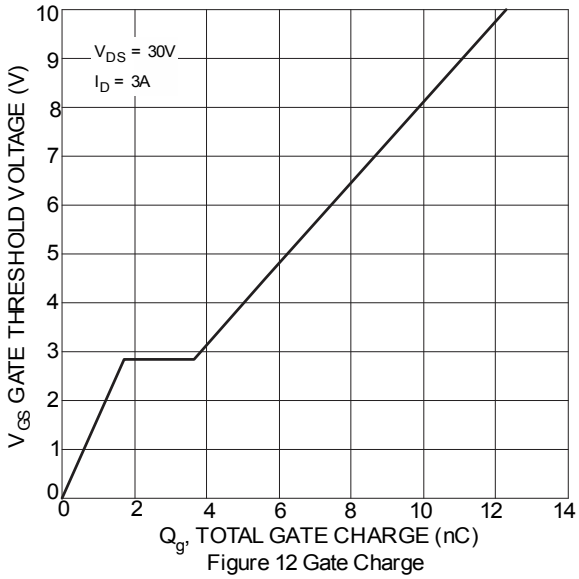

Figure 12 Gate Charge

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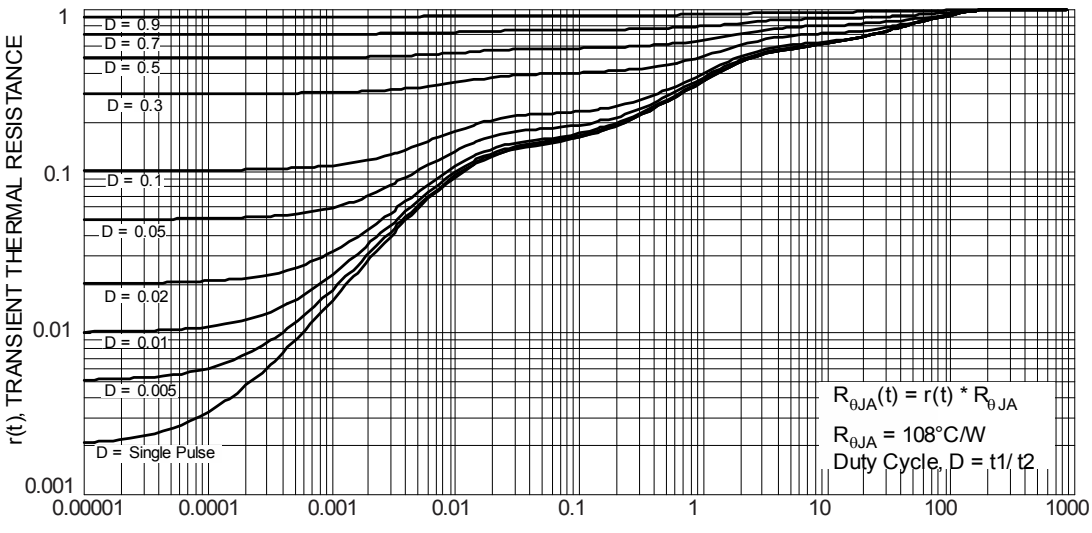
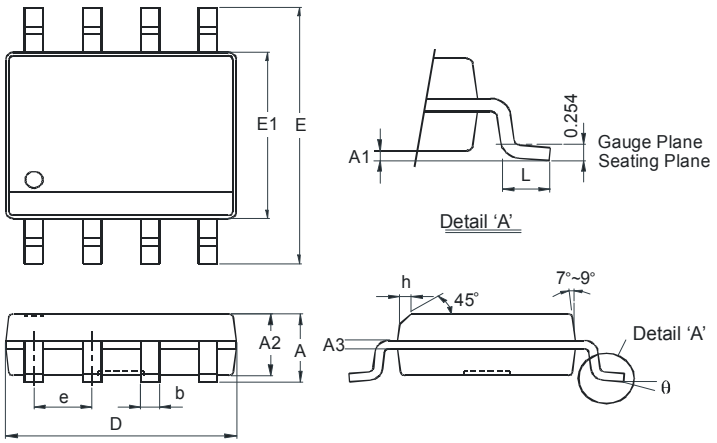


Figure 13 Transient Thermal Resistance

Package Outline Dimensions

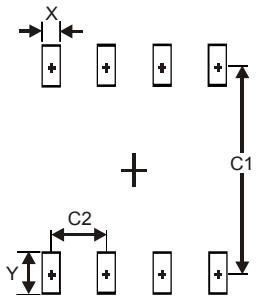
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.



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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