



**40V DUAL N-CHANNEL ENHANCEMENT MODE MOSFET**

**Product Summary**

$V_{(BR)DSS}$	$R_{DS(on) Max}$	$I_D$ $T_A = +25^{\circ}C$
40V	27m $\Omega$ @ $V_{GS} = 10V$	7.1A
	47m $\Omega$ @ $V_{GS} = 4.5V$	5.4A

**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**

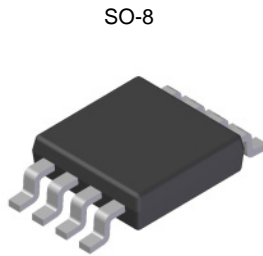
- Motor Control
- Backlighting
- DC-DC Converters
- Power Management Functions

**Features and Benefits**

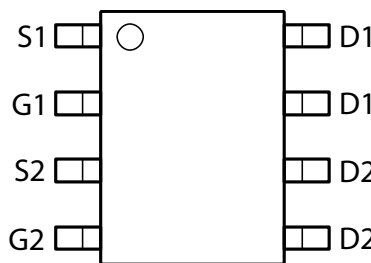
- Low on-resistance
- Fast switching speed
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

**Mechanical Data**

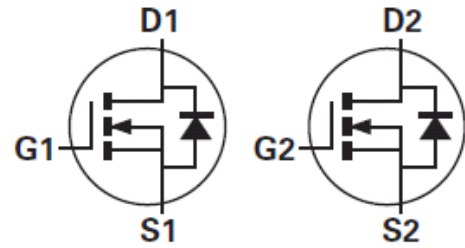
- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See diagram below
- Terminals: Finish - Matte Tin annealed over Copper lead frame. Solderable per MIL-STD-202, Method 208  $\text{e3}$
- Weight: 0.074 grams (approximate)



Top View



Top View



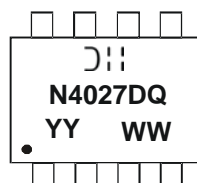
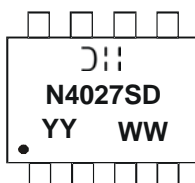
Equivalent Circuit

**Ordering Information** (Note 4)

Part Number	Compliance	Case	Packaging
DMN4027SSD-13	Standard	SO-8	2500 / Tape & Reel
DMN4027SSDQ-13	Automotive	SO-8	2500 / 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. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

**Marking Information**



$\text{D} \parallel \text{I}$  = Manufacturer's Marking  
 N4027SD = Product Type Marking Code for DMN4027SSD-13  
 N4027DQ = Product Type Marking Code for DMN4027SSDQ-13  
 YYWW = Date Code Marking  
 YY = Year (ex: 09 = 2009)  
 WW = Week (01-53)

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

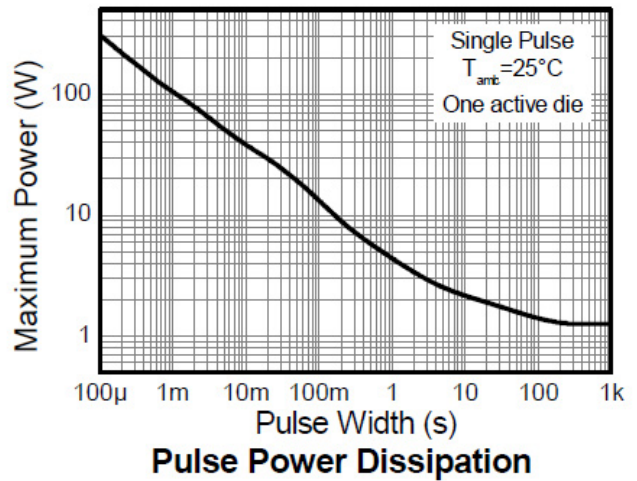
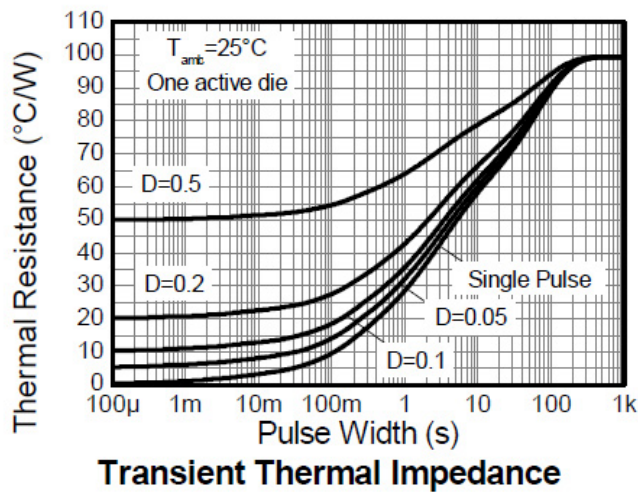
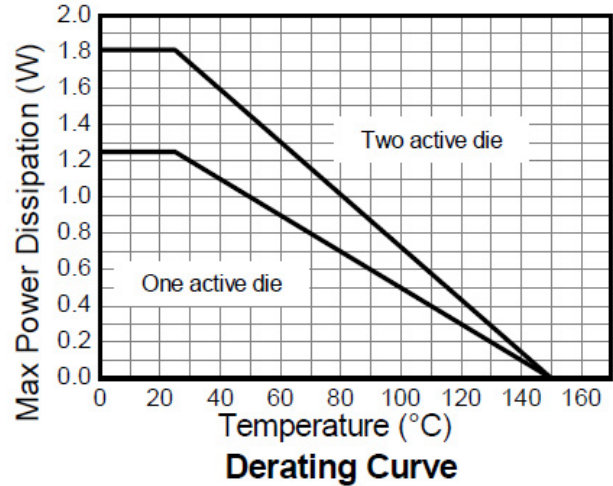
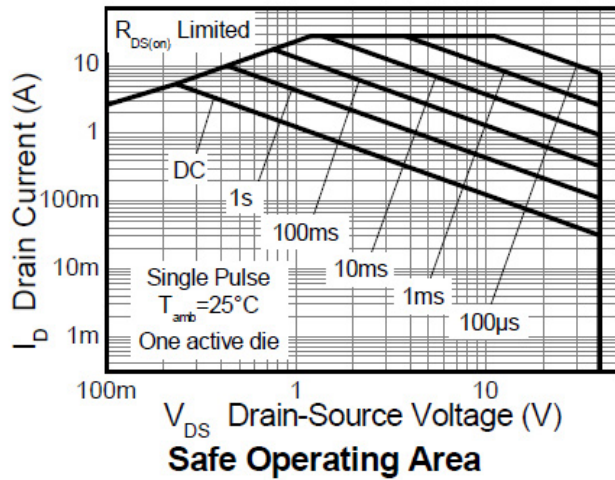
Characteristic		Symbol	Value	Unit	
Drain-Source Voltage		V <sub>DSS</sub>	40	V	
Gate-Source Voltage (Note 5)		V <sub>GS</sub>	±20	V	
Continuous Drain Current	V <sub>GS</sub> = 10V	(Notes 7)	7.1	A	
		T <sub>A</sub> = +70°C (Notes 7)	5.7		
		(Notes 6)	5.4		
Pulsed Drain Current	V <sub>GS</sub> = 10V	(Notes 8)	I <sub>DM</sub>	28.0	A
Continuous Source Current (Body diode)		(Notes 7)	I <sub>S</sub>	3.3	A
Pulsed Source Current (Body diode)		(Notes 8)	I <sub>SM</sub>	28.0	A

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

Characteristic		Symbol	Value	Unit
Power Dissipation Linear Derating Factor	(Notes 6 & 9)	P <sub>D</sub>	1.25	W mW/°C
	(Notes 6 & 10)		10.0	
	(Notes 7 & 9)		1.8	
			14.3	
Thermal Resistance, Junction to Ambient	(Notes 6 & 9)	R <sub>θJA</sub>	2.14	°C/W
	(Notes 6 & 10)		17.2	
	(Notes 7 & 9)		100	
Thermal Resistance, Junction to Lead	(Notes 9 & 11)	R <sub>θJL</sub>	70	°C/W
Operating and Storage Temperature Range	(Notes 9 & 11)	T <sub>J</sub> , T <sub>STG</sub>	58	
			53	°C

- Notes:
5. AEC-Q101 V<sub>GS</sub> maximum is ±16V.
  6. For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
  7. Same as note (3), except the device is measured at t ≤ 10 sec.
  8. Same as note (3), except the device is pulsed with D = 0.02 and pulse width 300µs. The pulse current is limited by the maximum junction temperature.
  9. For a dual device with one active die.
  10. For a device with two active die running at equal power.
  11. Thermal resistance from junction to solder-point (at the end of the drain lead).

**Thermal Characteristics**

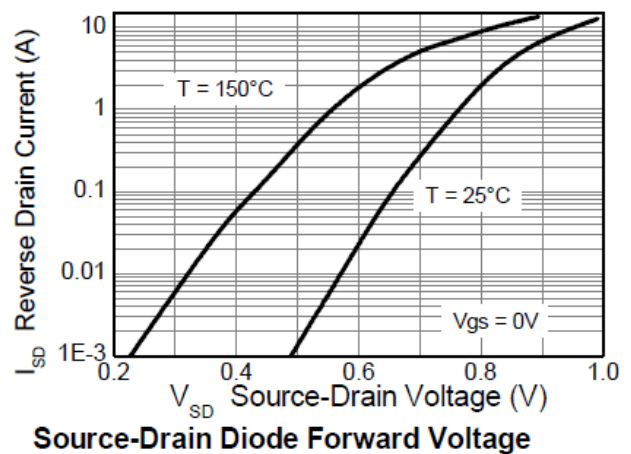
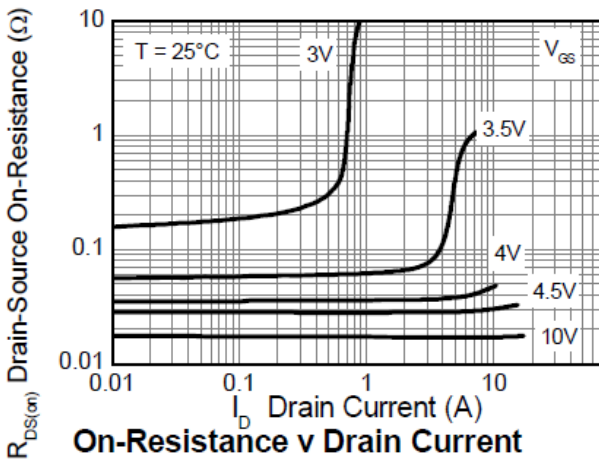
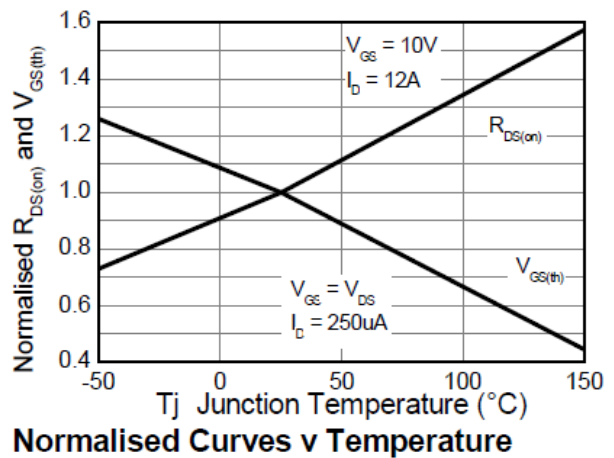
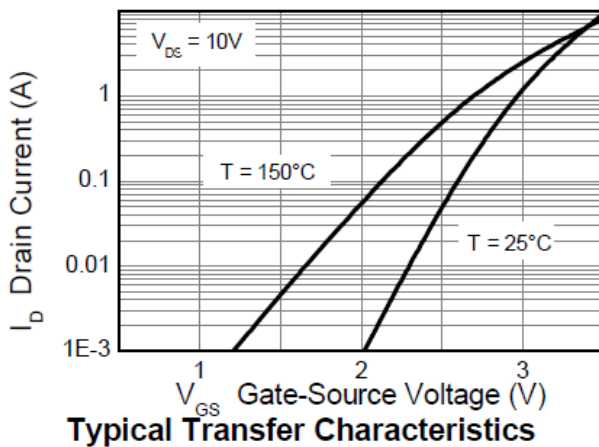
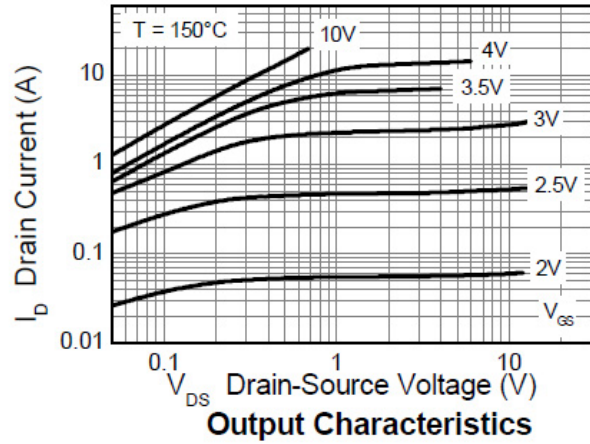
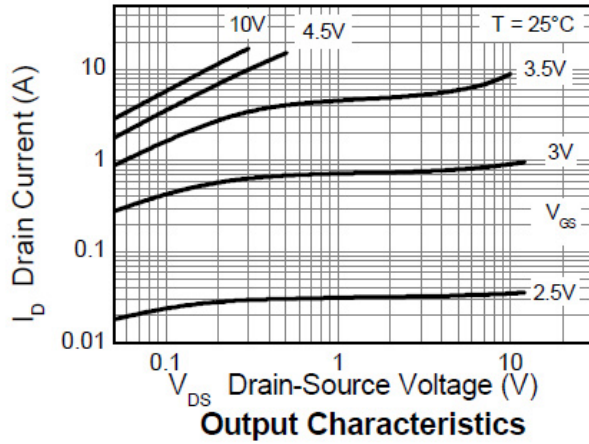


**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

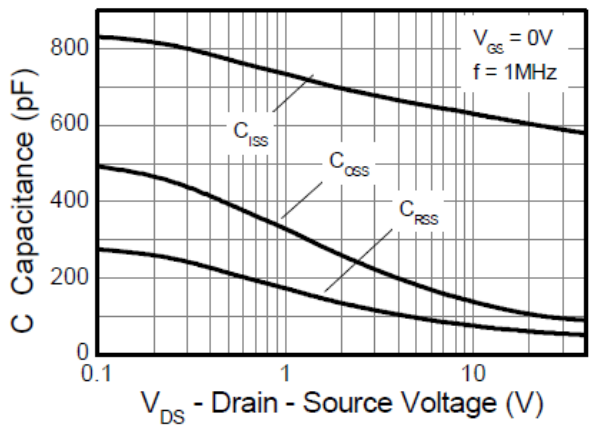
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	40	—	—	V	I <sub>D</sub> = 250μA, V <sub>GS</sub> = 0V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	0.5	μA	V <sub>DS</sub> = 40V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	1.0	—	3.0	V	I <sub>D</sub> = 250μA, V <sub>DS</sub> = V <sub>GS</sub>
Static Drain-Source On-Resistance (Note 12)	R <sub>DS(ON)</sub>	—	0.017	0.027	Ω	V <sub>GS</sub> = 10V, I <sub>D</sub> = 7A
			0.031	0.047		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 6A
Forward Transconductance (Notes 12 & 13)	g <sub>fs</sub>	—	22.8	—	S	V <sub>DS</sub> = 15V, I <sub>D</sub> = 7A
Diode Forward Voltage (Note 12)	V <sub>SD</sub>	—	0.86	1.1	V	I <sub>S</sub> = 7A, V <sub>GS</sub> = 0V
Reverse recovery time (Note 13)	t <sub>rr</sub>	—	12.1	—	ns	I <sub>S</sub> = 2.1A, di/dt = 100A/μs
Reverse recovery charge (Note 13)	Q <sub>rr</sub>	—	5.1	—	nC	
<b>DYNAMIC CHARACTERISTICS (Note 13)</b>						
Input Capacitance	C <sub>iSS</sub>	—	604	—	pF	V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V f = 1MHz
Output Capacitance	C <sub>oSS</sub>	—	106	—	pF	
Reverse Transfer Capacitance	C <sub>rSS</sub>	—	59.6	—	pF	
Total Gate Charge (Note 14)	Q <sub>g</sub>	—	6.3	—	nC	V <sub>GS</sub> = 4.5V
Total Gate Charge Note 14)	Q <sub>g</sub>	—	12.9	—	nC	V <sub>GS</sub> = 10V
Gate-Source Charge Note 14)	Q <sub>gs</sub>	—	2.4	—	nC	
Gate-Drain Charge Note 14)	Q <sub>gd</sub>	—	3.3	—	nC	
Turn-On Delay Time Note 14)	t <sub>D(on)</sub>	—	3.1	—	ns	V <sub>DD</sub> = 20V, V <sub>GS</sub> = 10V I <sub>D</sub> = 1A, R <sub>G</sub> ≅ 6.0Ω
Turn-On Rise Time Note 14)	t <sub>r</sub>	—	3.1	—	ns	
Turn-Off Delay Time (Note 14)	t <sub>D(off)</sub>	—	15.4	—	ns	
Turn-Off Fall Time Note 14)	t <sub>f</sub>	—	7.5	—	ns	

- Notes:
- 12. Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%.
  - 13. For design aid only, not subject to production testing.
  - 14. Switching characteristics are independent of operating junction temperatures.

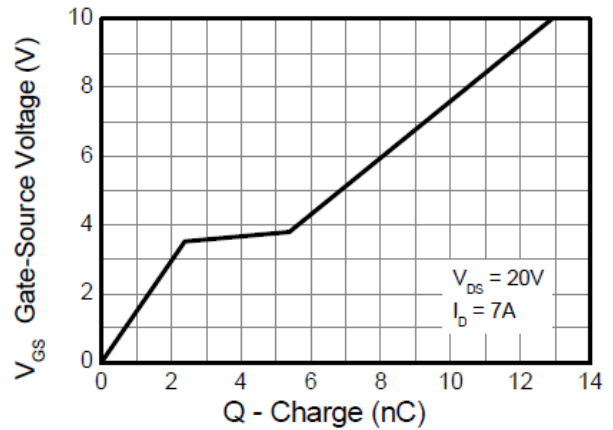
**Typical Characteristics**



**Typical Characteristics (cont.)**

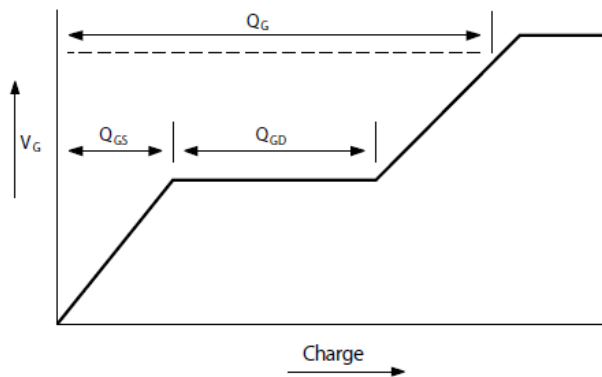


**Capacitance v Drain-Source Voltage**

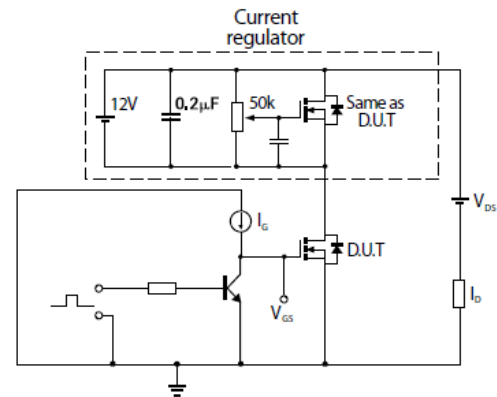


**Gate-Source Voltage v Gate Charge**

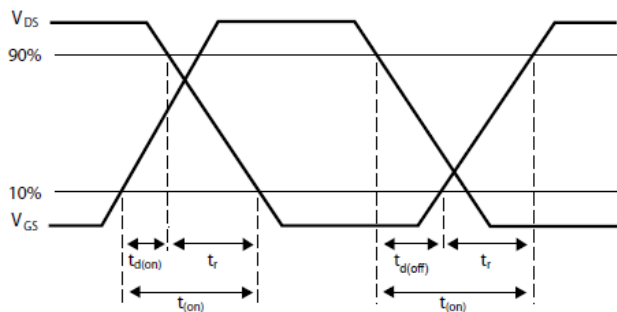
**Test Circuits**



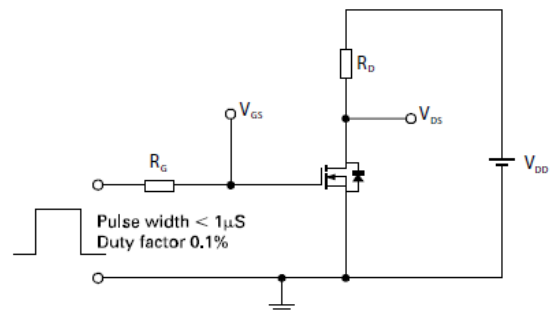
**Basic gate charge waveform**



**Gate charge test circuit**



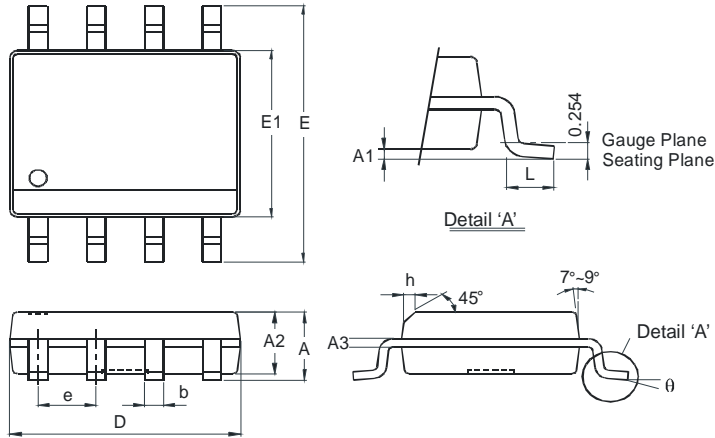
**Switching time waveforms**



**Switching time test circuit**

## Package Outline Dimensions

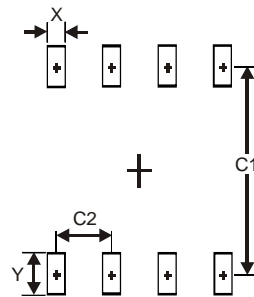
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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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