



**THE DATASHEET OF  
DMN2029USD-13**



## Product Summary

$V_{(BR)DSS}$	$R_{DS(on) \max}$	Package	$I_D$ $T_A = +25^\circ\text{C}$
20V	25m $\Omega$ @ $V_{GS} = 4.5\text{V}$	SO-8	5.8A
	35m $\Omega$ @ $V_{GS} = 2.5\text{V}$		4.8A

## Description

This new generation 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.

## Applications

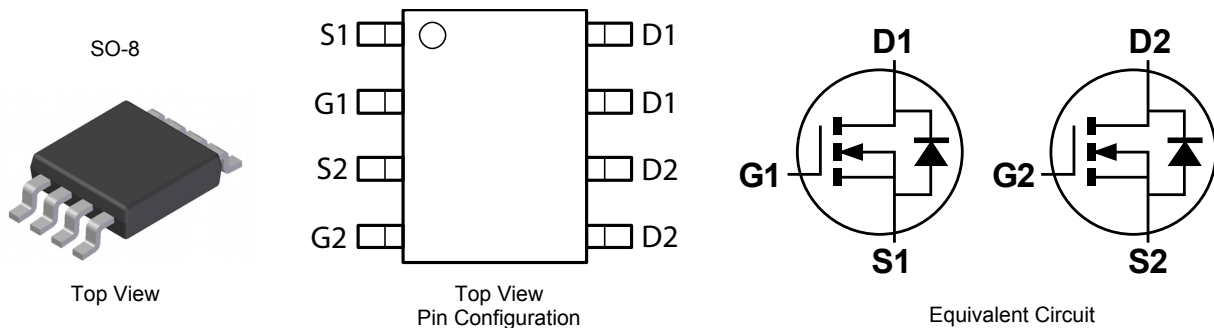
- DC-DC Converters
- Power Management Functions
- Backlighting

## Features

- Low Input Capacitance
- 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
- Terminal Connections: See Diagram
- Terminals: Finish – Tin Finish annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208 <sup>(e3)</sup>
- Weight: 0.074 grams (approximate)

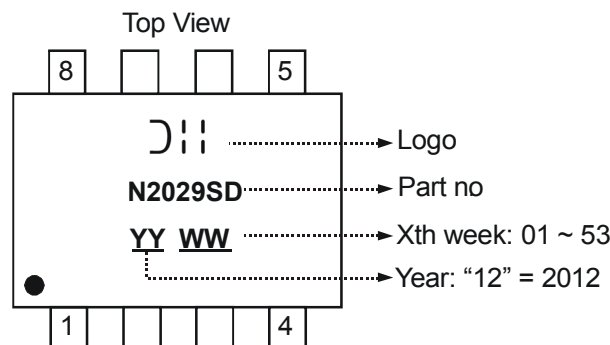


## Ordering Information (Note 4)

Part Number	Case	Packaging
DMN2029USD-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](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



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

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V <sub>DSS</sub>	20	V
Gate-Source Voltage			V <sub>GSS</sub>	±8	V
Continuous Drain Current (Note 6) V <sub>GS</sub> = 4.5V	Steady State	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	5.8 4.7	A
	t < 10s	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	6.9 5.7	A
Maximum Body Diode Forward Current (Note 6)			I <sub>S</sub>	2.1	A
Pulsed Drain Current (10μs pulse, duty cycle = 1%)			I <sub>DM</sub>	30	A
Avalanche Current (Note 7) L = 0.1mH			I <sub>AS</sub>	15	A
Avalanche Energy (Note 7) L = 0.1mH			E <sub>AS</sub>	11.2	mJ

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

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)	T <sub>A</sub> = +25°C	P <sub>D</sub>	1.2	W
	T <sub>A</sub> = +70°C		0.7	
Thermal Resistance, Junction to Ambient (Note 5)	Steady state	R <sub>θJA</sub>	115	°C/W
	t < 10s		70	
Total Power Dissipation (Note 6)	T <sub>A</sub> = +25°C	P <sub>D</sub>	1.4	W
	T <sub>A</sub> = +70°C		0.9	
Thermal Resistance, Junction to Ambient (Note 6)	Steady state	R <sub>θJA</sub>	95	°C/W
	t < 10s		60	
Thermal Resistance, Junction to Case (Note 6)		R <sub>θJC</sub>	14.5	
Operating and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 8)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	20	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	1	μA	V <sub>DS</sub> = 16V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±8V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	0.6	—	1.5	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	—	14	25	mΩ	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 6.5A
		—	19	35		V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 5.4A
Forward Transfer Admittance	Y <sub>fs</sub>	—	10	—	S	V <sub>DS</sub> = 5V, I <sub>D</sub> = 6.5A
Diode Forward Voltage	V <sub>SD</sub>	—	0.7	1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 1.3A
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	C <sub>iss</sub>	—	1171	—	pF	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	133	—		
Reverse Transfer Capacitance	C <sub>rss</sub>	—	110	—		
Gate Resistance	R <sub>G</sub>	—	1.2	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Q <sub>g</sub>	—	10.4	—	nC	V <sub>DS</sub> = 10V, I <sub>D</sub> = 3A
Total Gate Charge (V <sub>GS</sub> = 8V)	Q <sub>g</sub>	—	18.6	—		
Gate-Source Charge	Q <sub>gs</sub>	—	1.9	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	2.3	—		
Turn-On Delay Time	t <sub>D(on)</sub>	—	16.5	—	nS	V <sub>GS</sub> = 4.5V, V <sub>DD</sub> = 10V, R <sub>GEN</sub> = 6Ω, I <sub>D</sub> = 1A
Turn-On Rise Time	t <sub>r</sub>	—	33.3	—		
Turn-Off Delay Time	t <sub>D(off)</sub>	—	119.3	—		
Turn-Off Fall Time	t <sub>f</sub>	—	53.5	—		
Body Diode Reverse Recovery Time	t <sub>rr</sub>	—	7.5	—	nS	I <sub>S</sub> = 6.5A, dI/dt = 100A/μs
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>	—	2.0	—	nC	I <sub>S</sub> = 6.5A, dI/dt = 100A/μs

- 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.
  - I<sub>AR</sub> and E<sub>AR</sub> rating are based on low frequency and duty cycles to keep T<sub>J</sub> = +25°C
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

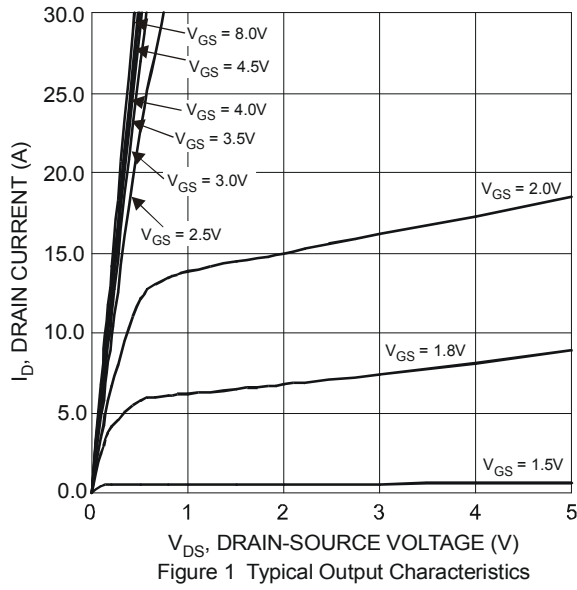


Figure 1 Typical Output Characteristics

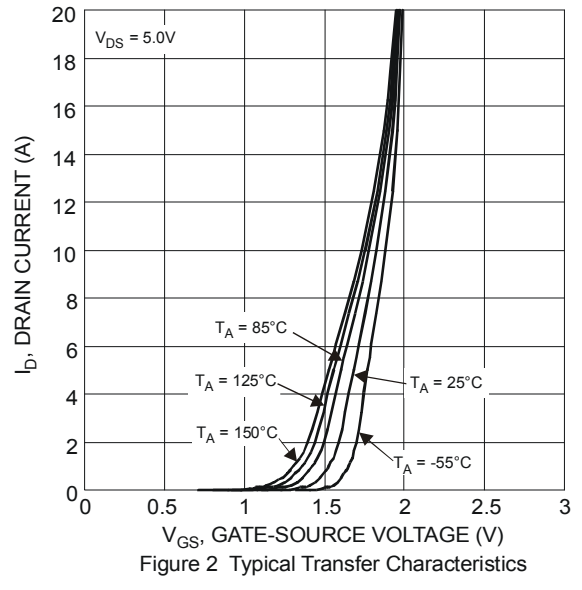


Figure 2 Typical Transfer Characteristics

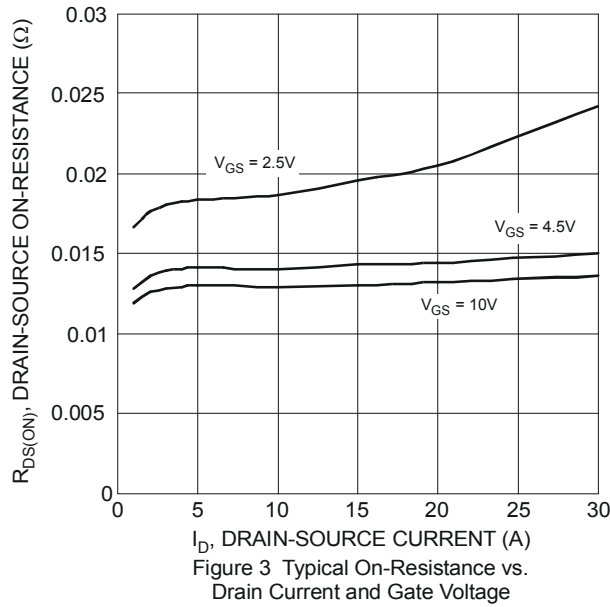


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

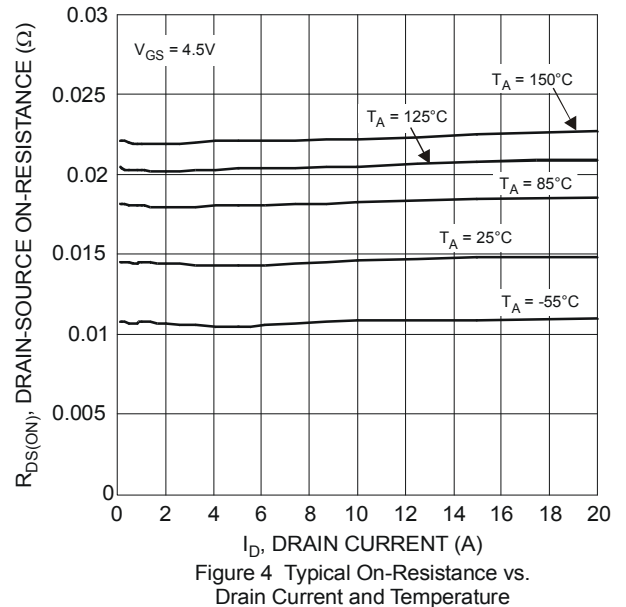


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

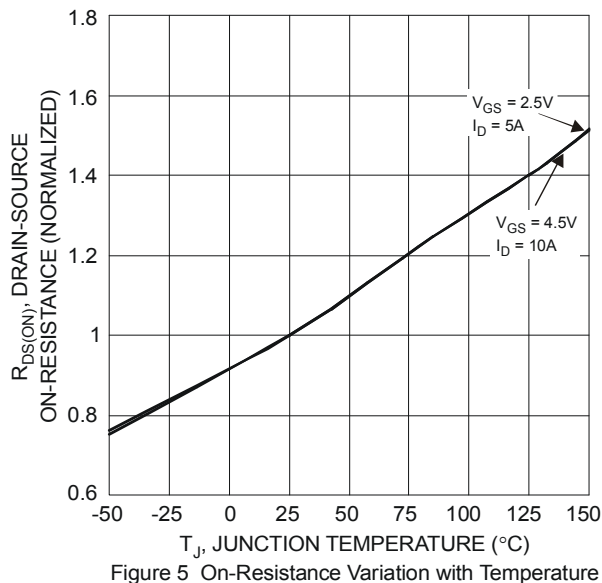


Figure 5 On-Resistance Variation with Temperature

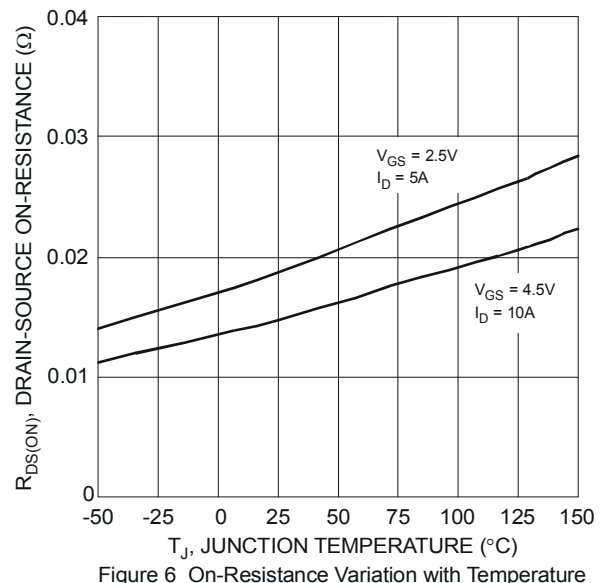


Figure 6 On-Resistance Variation with Temperature

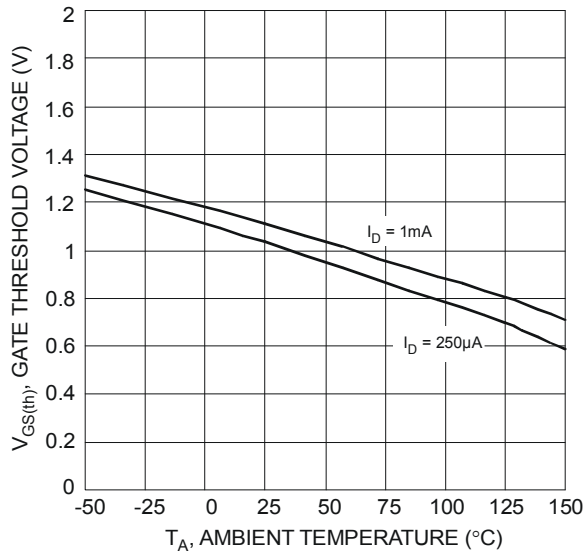


Figure 7 Gate Threshold Variation vs. Ambient Temperature

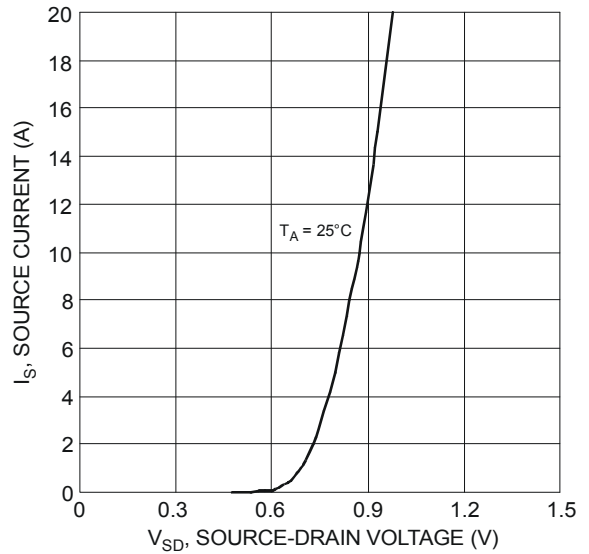


Figure 8 Diode Forward Voltage vs. Current

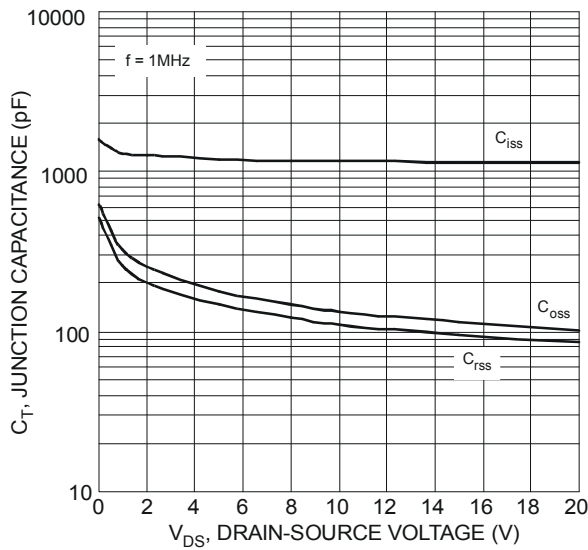


Figure 9 Typical Junction Capacitance

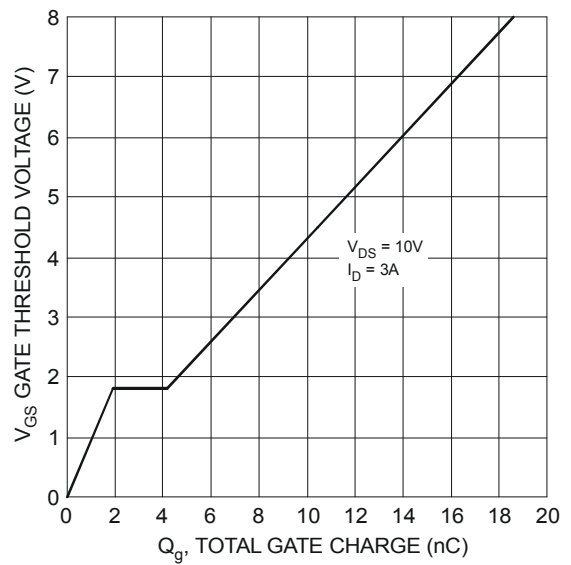


Figure 10 Gate Charge

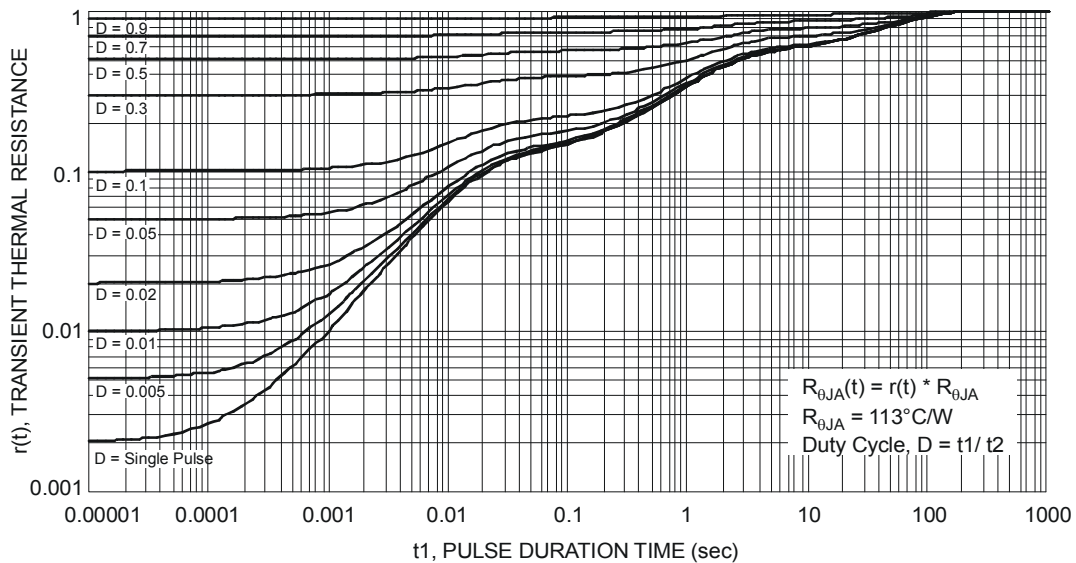


Figure 11 Transient Thermal Resistance

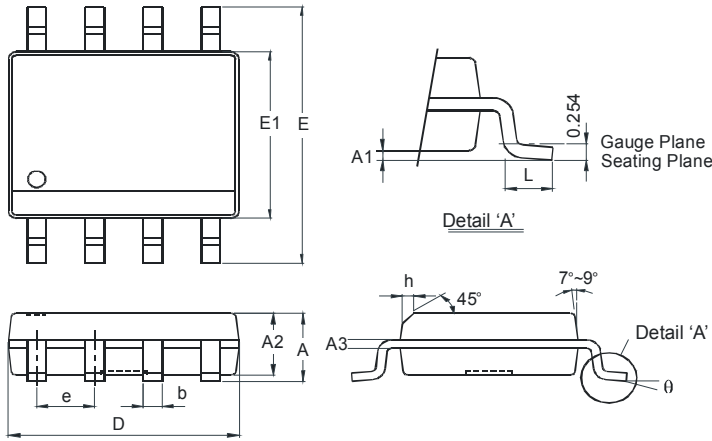
$$R_{\theta JA}(t) = r(t) * R_{\theta JA}$$

$$R_{\theta JA} = 113^{\circ}\text{C/W}$$

$$\text{Duty Cycle, } D = t1 / t2$$

**Package Outline Dimensions**

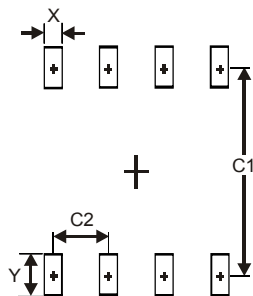
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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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