

**N-CHANNEL ENHANCEMENT MODE MOSFET WITH SCHOTTKY DIODE**

### Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> MAX	I <sub>D</sub> MAX T <sub>A</sub> = +25°C
30V	13mΩ @ V <sub>GS</sub> = 10V	8.9A
	16mΩ @ V <sub>GS</sub> = 4.5V	8.0A

### Description

This MOSFET is designed to minimize the on-state resistance (R<sub>DS(ON)</sub>) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

### Applications

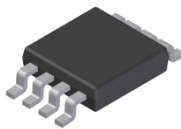
- Backlighting
- Power Management Functions
- DC-DC Converters

### Features

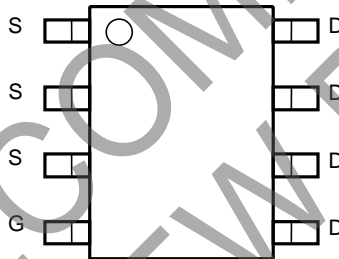
- DIOFET Utilizes a Unique Patented Process to Monolithically Integrate a MOSFET and a Schottky in a Single Die to Deliver:
  - Low R<sub>DS(ON)</sub> - Minimizes Conduction Losses
  - Ultra Low V<sub>SD</sub> - Reduce Losses due to Body Diode Conduction
  - Low Q<sub>rr</sub> - Lower Q<sub>rr</sub> of the Integrated Schottky Reduces Body Diode Switching Losses
  - Low Gate Capacitance (Q<sub>g</sub>/Q<sub>gs</sub>) Ratio – Reduces Risk of Shoot-Through or Cross Conduction Currents at High Frequencies
  - Avalanche Rugged – I<sub>AR</sub> and E<sub>AR</sub> Rated
- **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

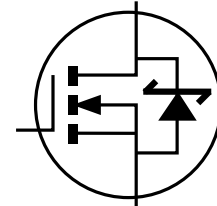
- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See Diagram
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 @3
- Weight: 0.074 grams (Approximate)



Top View



Top View  
Internal Schematic



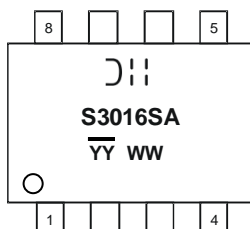
Equivalent circuit

### Ordering Information (Note 4)

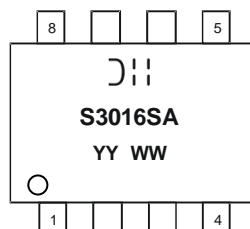
Part Number	Case	Packaging
DMS3016SSSA-13	SO-8	2500 / Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  2. See <https://www.diodes.com/quality/lead-free/> 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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

### Marking Information



Chengdu A/T Site



Shanghai A/T Site

- ⌋|| = Manufacturer's Marking
- S3016SA = Product Type Marking Code
- YYWW = Date Code Marking
- YY or YY = Year (ex: 18 = 2018)
- WW = Week (01 to 53)
- YY = Date Code Marking for SAT (Shanghai Assembly/ Test Site)
- YY = Date Code Marking for CAT (Chengdu Assembly/ Test Site)

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V <sub>DSS</sub>	30	V
Gate-Source Voltage			V <sub>GSS</sub>	±12	V
Continuous Drain Current (Note 5) V <sub>GS</sub> = 4.5V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	8.0	A
		T <sub>A</sub> = +85°C		5.8	
Pulsed Drain Current (Note 6)			I <sub>DM</sub>	90	A
Avalanche Current (Notes 6 & 7)			I <sub>AR</sub>	13	A
Repetitive Avalanche Energy (Notes 6 & 7) L = 0.3mH			E <sub>AR</sub>	25.4	mJ

### Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P <sub>D</sub>	1.54	W
Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C (Note 6)	R <sub>θJA</sub>	81	°C/W
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>	30	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	1.0	mA	V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±12V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	1.0	—	2.3	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	9	13	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 9.8A
		—	11	16		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 9.8A
Forward Transfer Admittance	Y <sub>fs</sub>	—	11	-	s	V <sub>DS</sub> = 5V, I <sub>D</sub> = 9.8A
Diode Forward Voltage	V <sub>SD</sub>	—	0.35	0.6	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 1A
Maximum Body-Diode + Schottky Continuous Current	I <sub>S</sub>	—	—	5	A	-
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	C <sub>iss</sub>	—	1849	—	pF	V <sub>DS</sub> = 15V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	158	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	123	—	pF	
Gate Resistance	R <sub>g</sub>	0.53	2.68	4.82	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz
Total Gate Charge V <sub>GS</sub> = 4.5V	Q <sub>g</sub>	—	18.5	—	nC	V <sub>DS</sub> = 15V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 9.8A
Total Gate Charge V <sub>GS</sub> = 10V	Q <sub>g</sub>	—	43	—	nC	
Gate-Source Charge	Q <sub>gs</sub>	—	4.7	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	4.0	—	nC	
Turn-On Delay Time	t <sub>D(on)</sub>	—	6.62	—	ns	
Turn-On Rise Time	t <sub>r</sub>	—	8.73	—	ns	V <sub>GS</sub> = 10V, V <sub>DS</sub> = 10V, R <sub>g</sub> = 3Ω, R <sub>L</sub> = 1.2Ω
Turn-Off Delay Time	t <sub>D(off)</sub>	—	36.41	—	ns	
Turn-Off Fall Time	t <sub>f</sub>	—	4.69	—	ns	

- Notes:
5. Device mounted on minimum recommended layout. The value in any given application depends on the user's specific board design.
  6. Repetitive rating, pulse width limited by junction temperature.
  7. I<sub>AR</sub> and E<sub>AR</sub> ratings are based on low frequency and duty cycles to keep T<sub>J</sub> = +25°C.
  8. Short duration pulse test used to minimize self-heating effect.
  9. Guaranteed by design. Not subject to production testing.

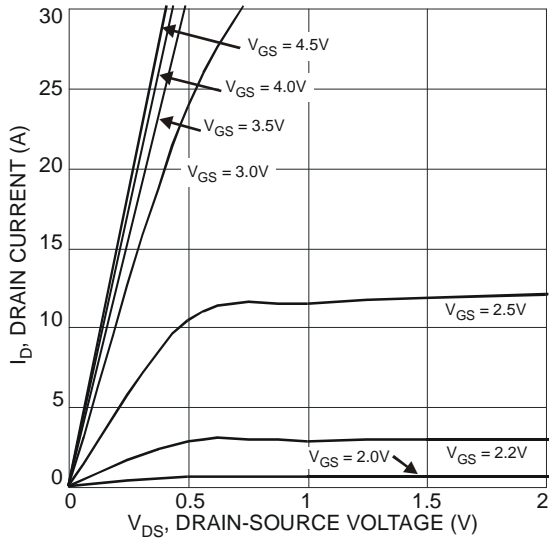


Fig. 1 Typical Output Characteristic

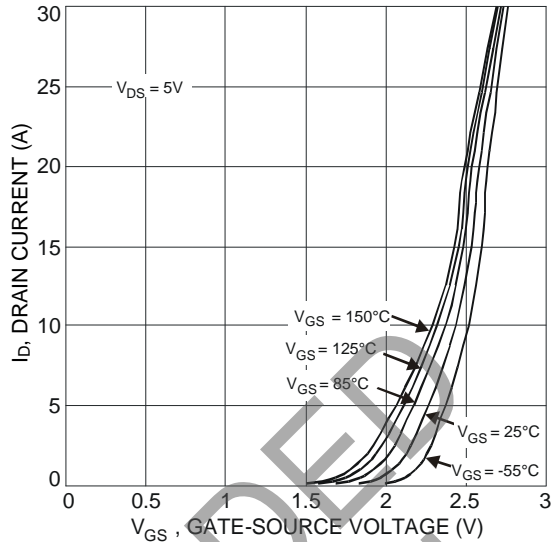


Fig. 2 Typical Transfer Characteristic

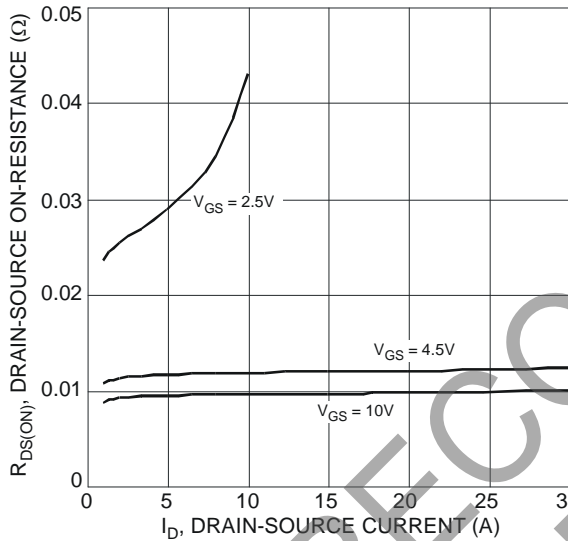


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

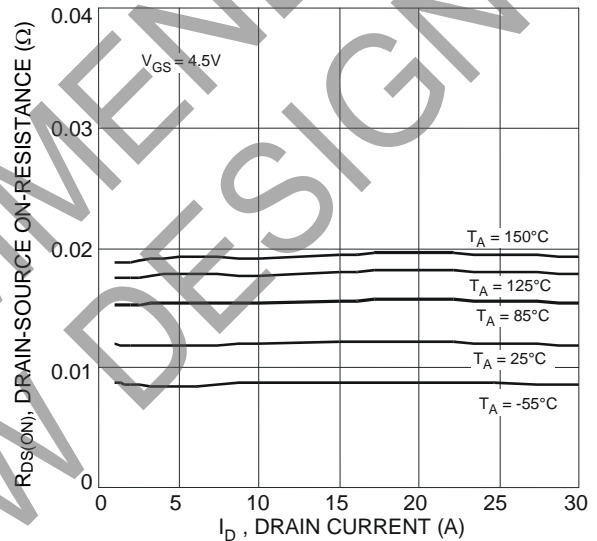


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

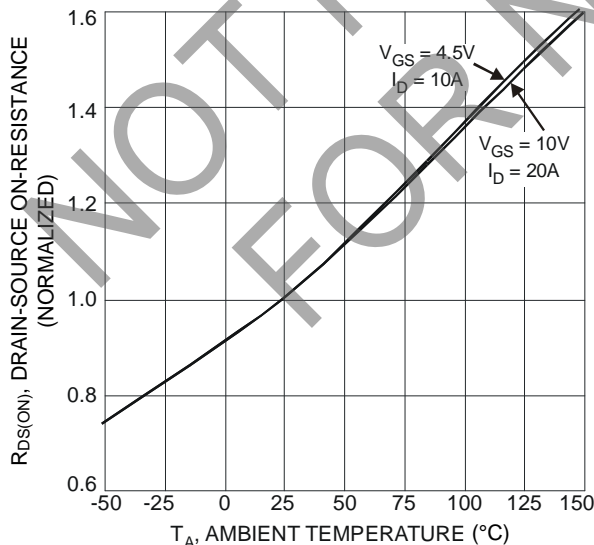


Fig. 5 On-Resistance Variation with Temperature

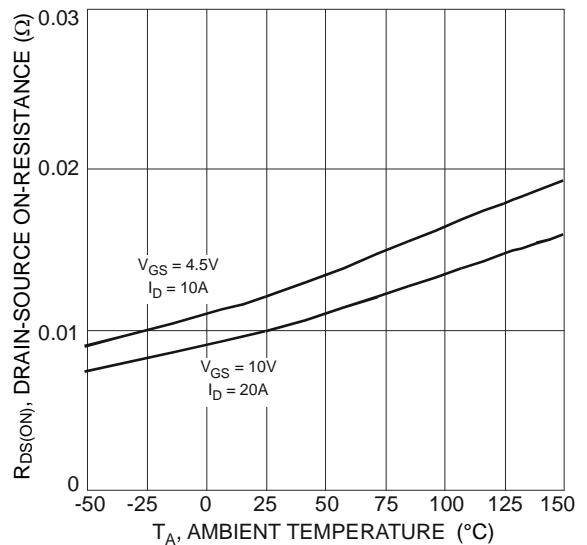


Fig. 6 On-Resistance Variation with Temperature

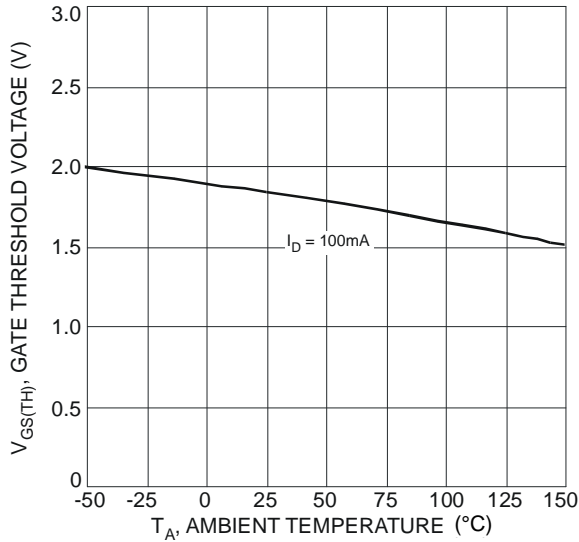


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

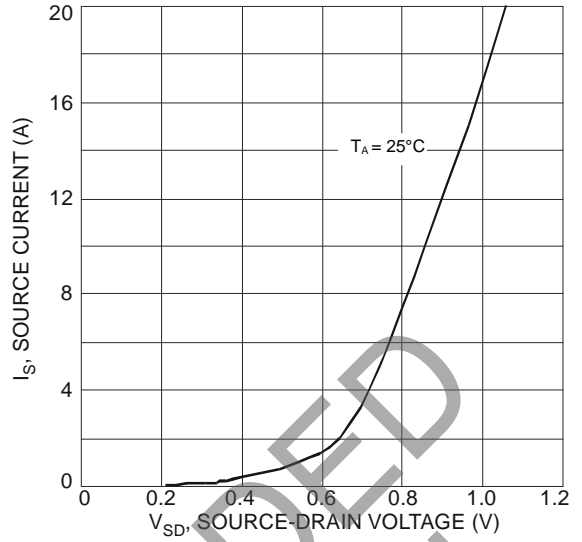


Fig. 8 Diode Forward Voltage vs. Current

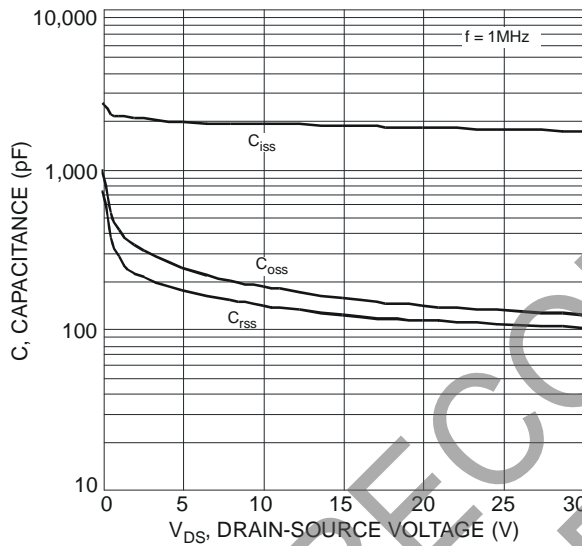


Fig. 9 Typical Total Capacitance

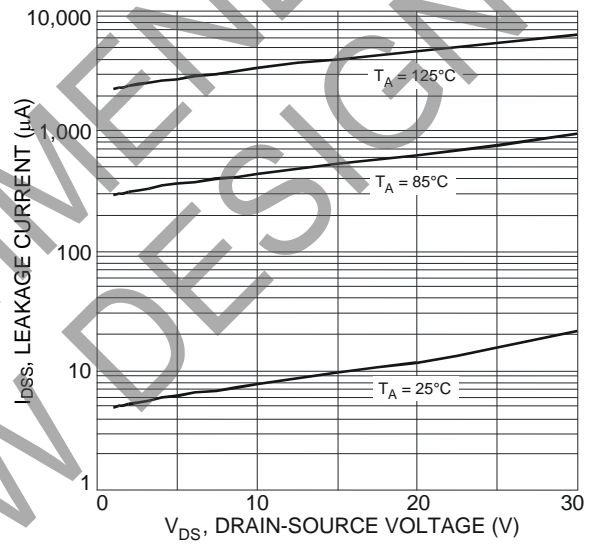


Fig. 10 Typical Leakage Current vs. Drain-Source Voltage

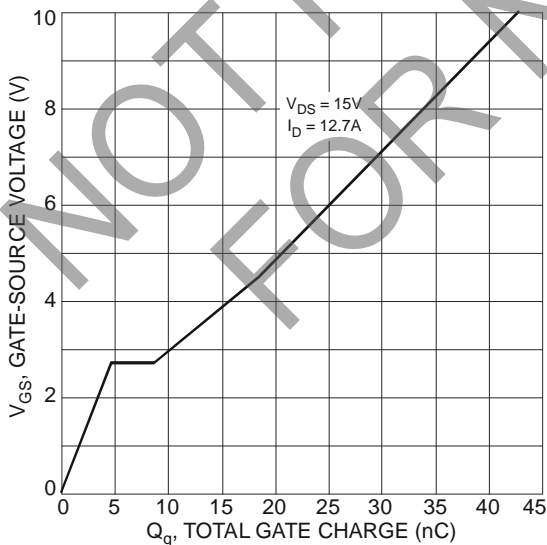


Fig. 11 Gate-Charge Characteristics

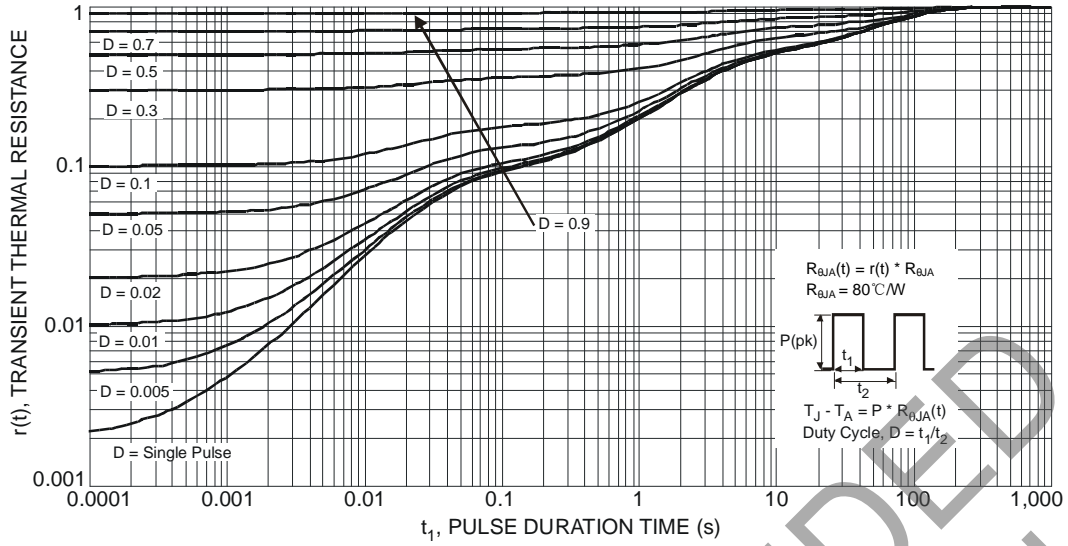


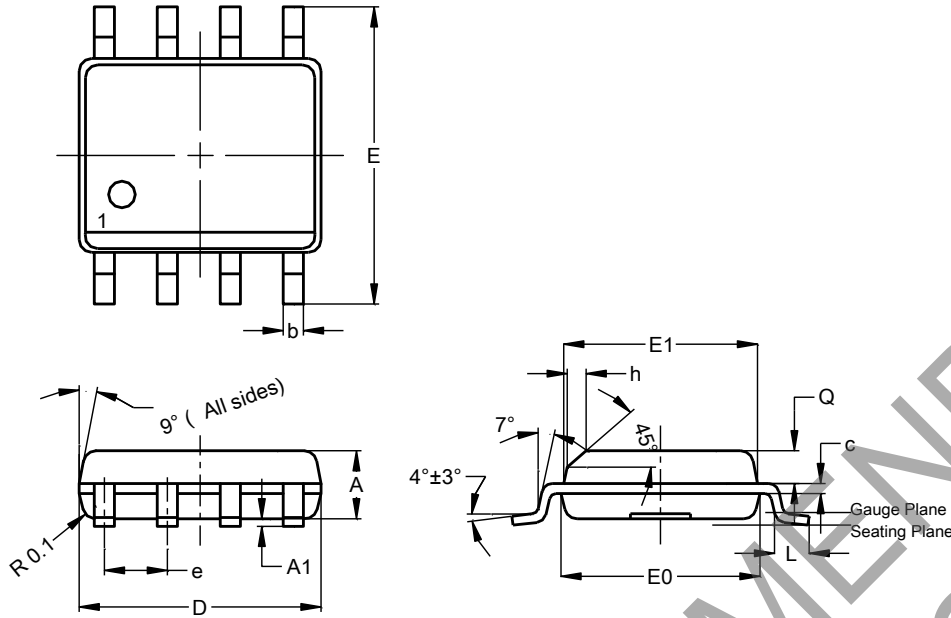
Fig. 12 Transient Thermal Response

NOT RECOMMENDED FOR NEW DESIGN

**Package Outline Dimensions**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**SO-8**

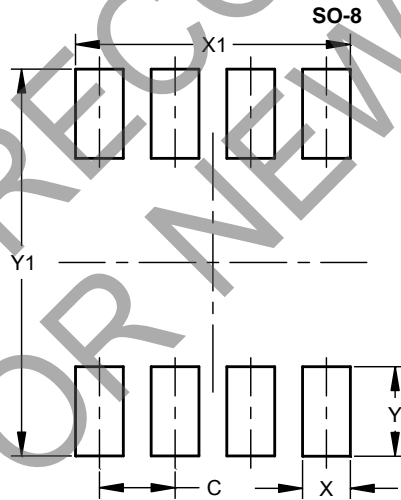


SO-8			
Dim	Min	Max	Typ
A	1.40	1.50	1.45
A1	0.10	0.20	0.15
b	0.30	0.50	0.40
c	0.15	0.25	0.20
D	4.85	4.95	4.90
E	5.90	6.10	6.00
E1	3.80	3.90	3.85
E0	3.85	3.95	3.90
e	--	--	1.27
h	-	--	0.35
L	0.62	0.82	0.72
Q	0.60	0.70	0.65

**All Dimensions in mm**

**Suggested Pad Layout**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.



Dimensions	Value (in mm)
C	1.27
X	0.802
X1	4.612
Y	1.505
Y1	6.50

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