

## Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> T <sub>A</sub> = +25°C
-40V	11mΩ @ V <sub>GS</sub> = -10V	-11.4A
	15mΩ @ V <sub>GS</sub> = -4.5V	-9.8A

## Description and Applications

This MOSFET is designed to meet the stringent requirements of Automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

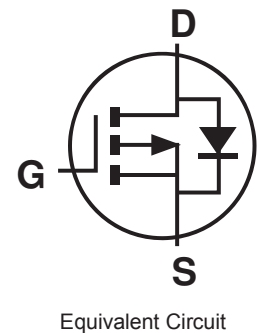
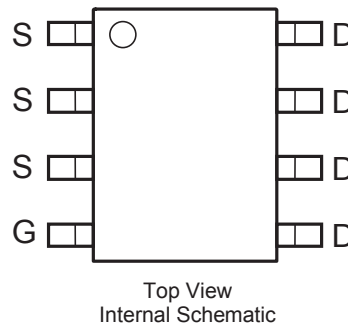
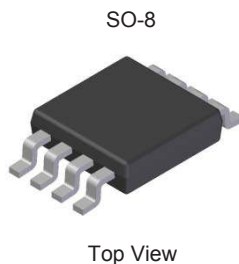
- DC-DC Converters
- Power Management Functions
- Analog Switch

## Features and Benefits

- Rated to +175°C – Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switch (UIS) Test in Production Low On-Resistance
- Low Input Capacitance
- **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**
- **PPAP Capable (Note 4)**

## 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 – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.074 grams (Approximate)

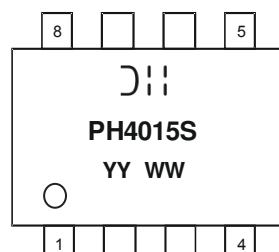


## Ordering Information (Note 5)

Part Number	Case	Packaging
DMPH4015SSSQ-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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to [http://www.diodes.com/product\\_compliance\\_definitions.html](http://www.diodes.com/product_compliance_definitions.html).
  5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



⌋⌋⌋ = Manufacturer's Marking  
 PH4015S = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Year (ex: 16 = 2016)  
 WW = Week (01 to 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	V <sub>GSS</sub>	±25	V	
Continuous Drain Current (Note 7) V <sub>GS</sub> = -10V	I <sub>D</sub>	Steady State	-11.4	A
		T <sub>A</sub> = +25°C T <sub>A</sub> = +100°C	-8.1	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I <sub>DM</sub>	-85	A	
Maximum Body Diode Continuous Current (Note 7)	I <sub>S</sub>	-3	A	
Avalanche Current (Note 8) L = 1mH	I <sub>AS</sub>	-22	A	
Avalanche Energy (Note 8) L = 1mH	E <sub>AS</sub>	260	mJ	

**Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 6)	P <sub>D</sub>	1.4	W
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	90	°C/W
Total Power Dissipation (Note 7)	P <sub>D</sub>	1.8	W
Thermal Resistance, Junction to Ambient (Note 7)	R <sub>θJA</sub>	70	°C/W
Thermal Resistance, Junction to Case (Note 7)	R <sub>θJC</sub>	7.0	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +175	°C

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 9)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-40	—	—	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> = -40V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±25V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 9)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	-1.5	—	-2.5	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250µA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	9	11	mΩ	V <sub>GS</sub> = -10V, I <sub>D</sub> = -9.8A
		—	11	15		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -9.8A
Forward Transfer Admittance	Y <sub>fs</sub>	—	26	—	S	V <sub>DS</sub> = -20V, I <sub>D</sub> = -9.8A
Diode Forward Voltage	V <sub>SD</sub>	—	-0.7	-1	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -1A
<b>DYNAMIC CHARACTERISTICS (Note 10)</b>						
Input Capacitance	C <sub>ISS</sub>	—	4,234	—	pF	V <sub>DS</sub> = -20V, V <sub>GS</sub> = 0V f = 1MHz
Output Capacitance	C <sub>OSS</sub>	—	1,036	—		
Reverse Transfer Capacitance	C <sub>RSS</sub>	—	526	—		
Gate Resistance	R <sub>G</sub>	—	7.8	—	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>	—	42.7	—	nC	V <sub>DS</sub> = -20V, I <sub>D</sub> = -9.8A
Total Gate Charge (V <sub>GS</sub> = -10V)	Q <sub>g</sub>	—	91	—		
Gate-Source Charge	Q <sub>gs</sub>	—	14.2	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	13.5	—		
Turn-On Delay Time	t <sub>D(ON)</sub>	—	13.2	—	ns	V <sub>GS</sub> = -10V, V <sub>DD</sub> = -20V, R <sub>G</sub> = 6Ω, I <sub>D</sub> = -1A, R <sub>L</sub> = 20Ω
Turn-On Rise Time	t <sub>R</sub>	—	10	—		
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	303	—		
Turn-Off Fall Time	t <sub>F</sub>	—	138	—		
Reverse Recovery Time	t <sub>RR</sub>	—	26	—	ns	I <sub>F</sub> = -9.8A, di/dt = -100A/µs
Reverse Recovery Charge	Q <sub>RR</sub>	—	20	—	nC	I <sub>F</sub> = -9.8A, di/dt = -100A/µs

- Notes:
6. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
  7. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
  8. I<sub>AS</sub> and E<sub>AS</sub> ratings are based on low frequency and duty cycles to keep T<sub>J</sub> = +25°C.
  9. Short duration pulse test used to minimize self-heating effect.
  10. Guaranteed by design. Not subject to product testing.

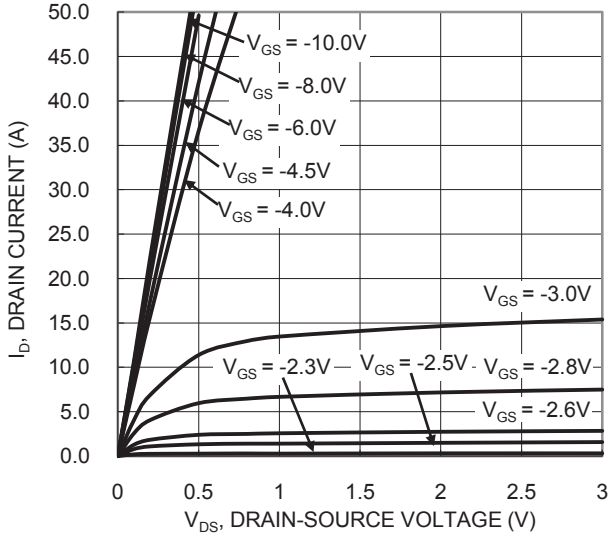


Figure 1. Typical Output Characteristic

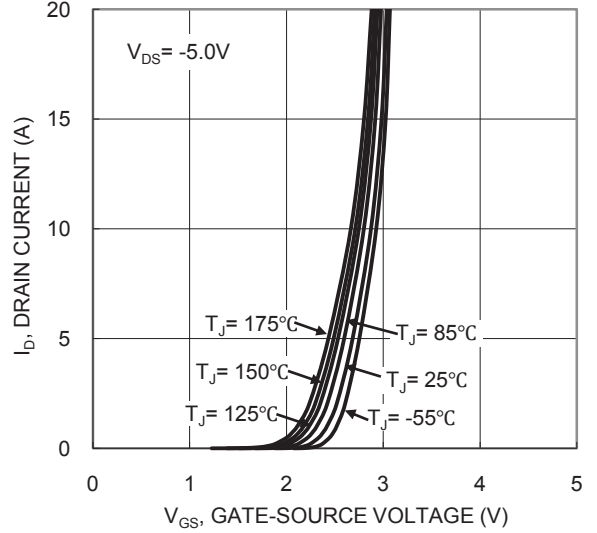


Figure 2. Typical Transfer Characteristic

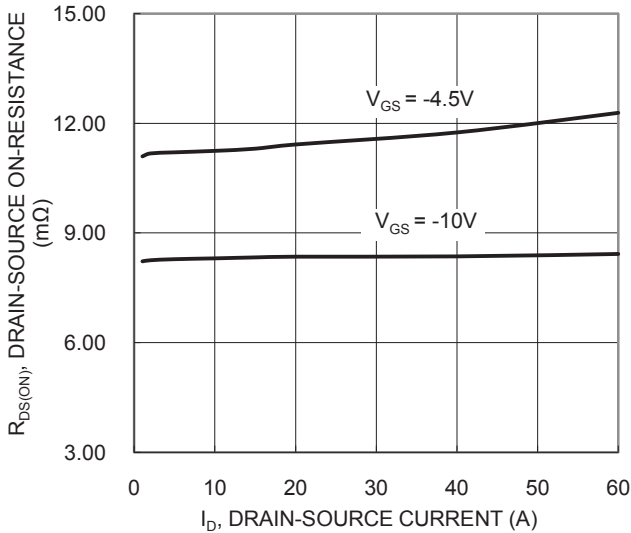


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

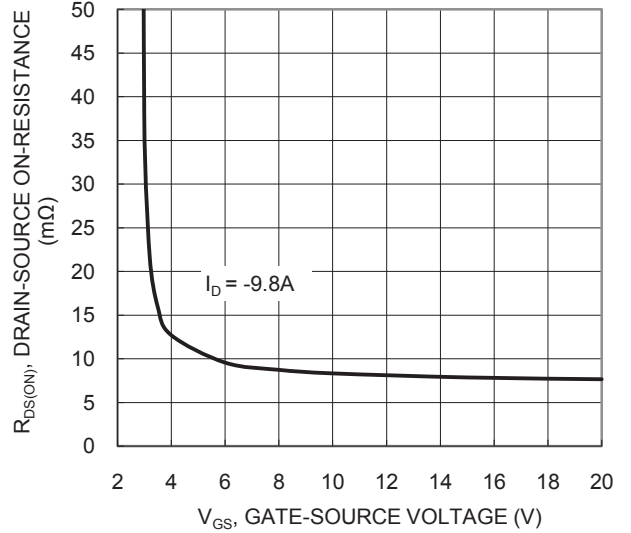


Figure 4. Typical Transfer Characteristic

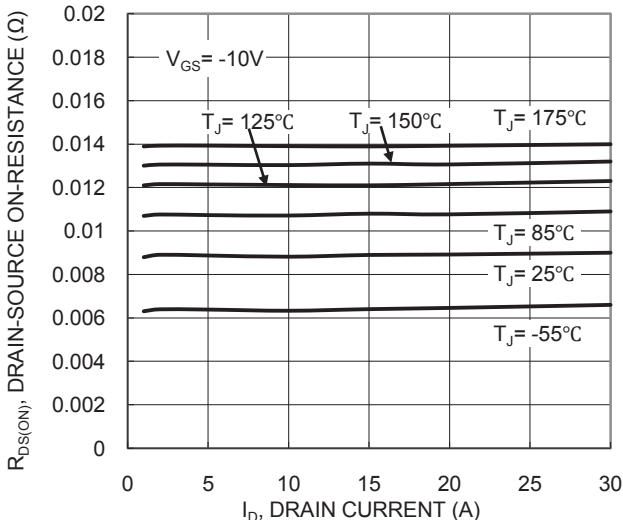


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

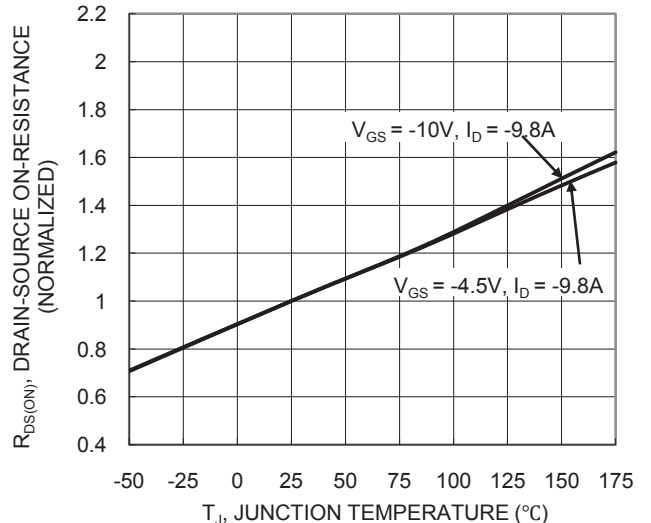
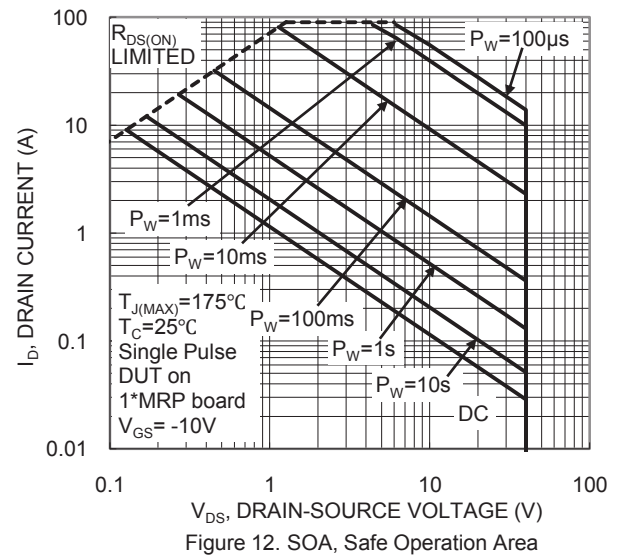
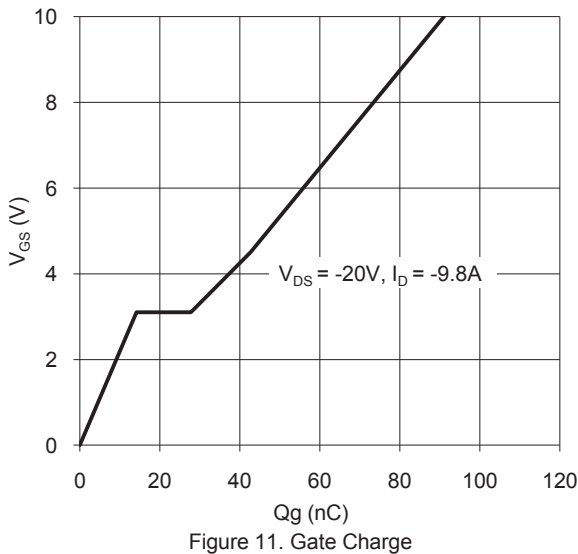
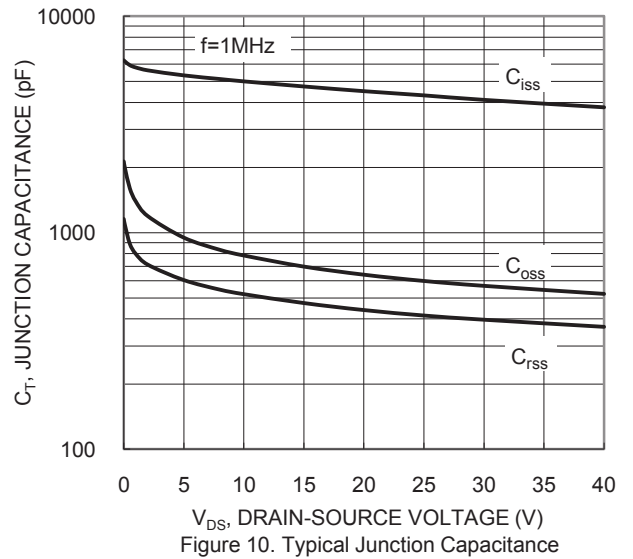
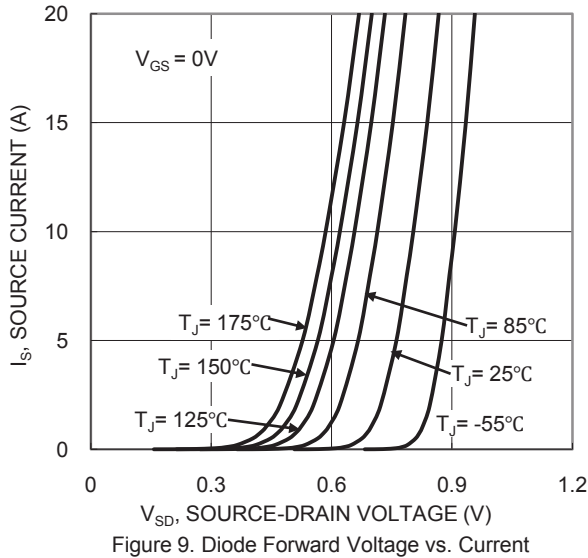
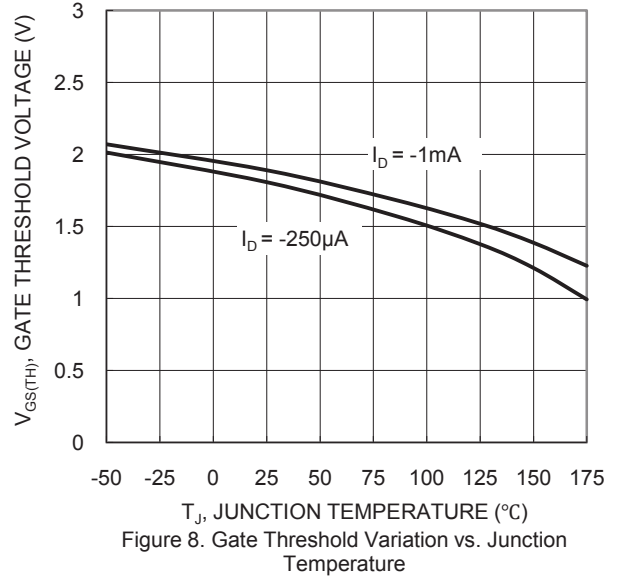
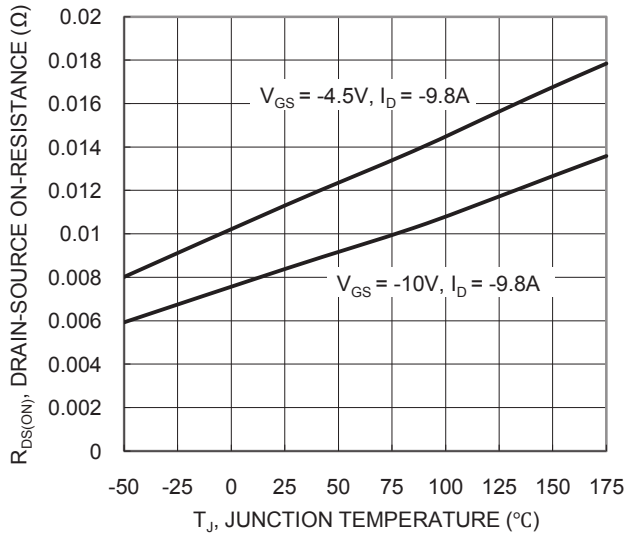


Figure 6. On-Resistance Variation with Temperature



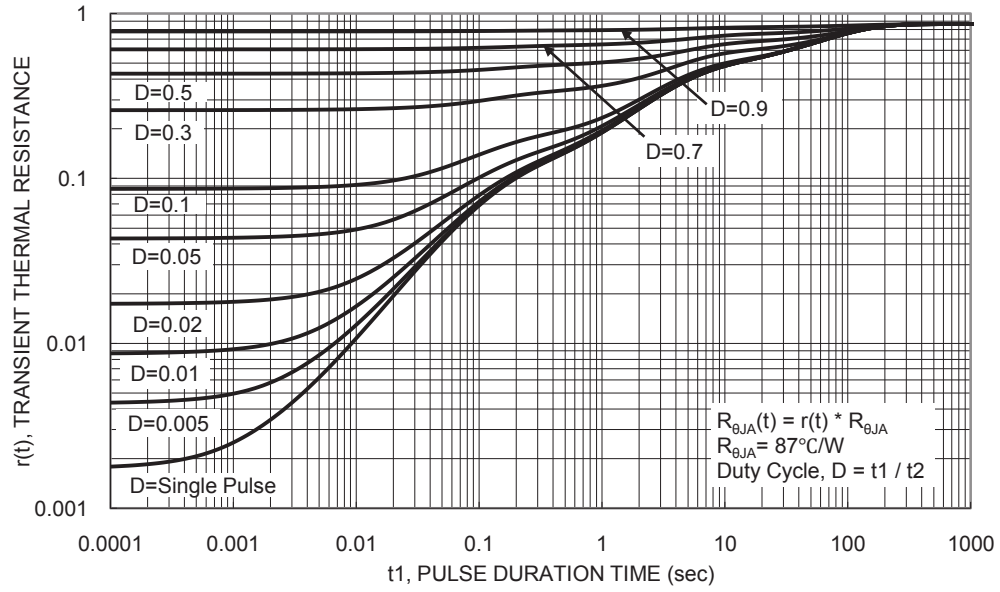
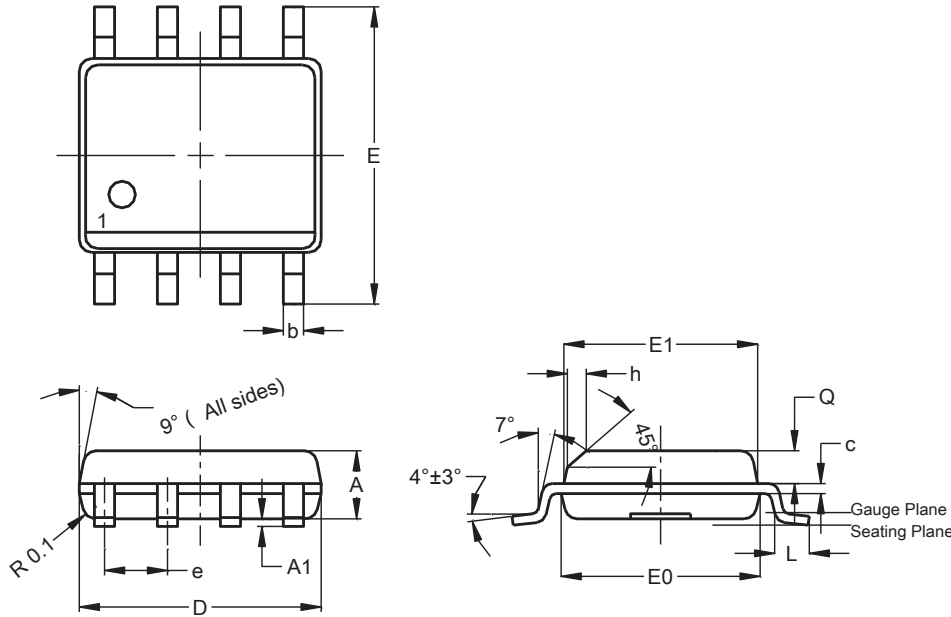


Figure 13. Transient Thermal Resistance

**Package Outline Dimensions**

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

SO-8



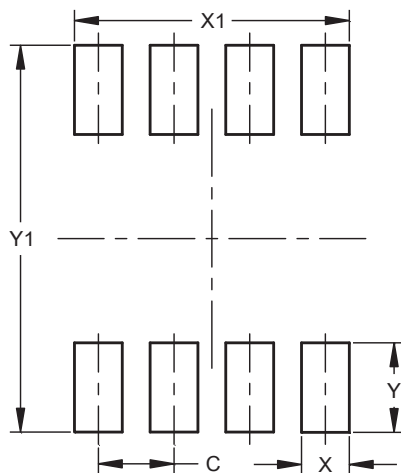
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Dim	Min	Max	Typ
A	1.40	1.50	1.45
A1	0.10	0.20	0.15
b	0.30	0.50	0.40
c	0.15	0.25	0.20
D	4.85	4.95	4.90
E	5.90	6.10	6.00
E1	3.80	3.90	3.85
E0	3.85	3.95	3.90
e	--	--	1.27
h	-	--	0.35
L	0.62	0.82	0.72
Q	0.60	0.70	0.65

**All Dimensions in mm**

**Suggested Pad Layout**

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

SO-8



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

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