

## Product Summary

$BV_{DSS}$	$R_{DS(ON)}$ Max	$I_D$ $T_A = +25^\circ C$
-60V	48m $\Omega$ @ $V_{GS} = -10V$	-5.2A
	60m $\Omega$ @ $V_{GS} = -4.5V$	-4.7A

## Description

This new generation MOSFET is designed to minimize the on-state resistance ( $R_{DS(ON)}$ ), yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

## Applications

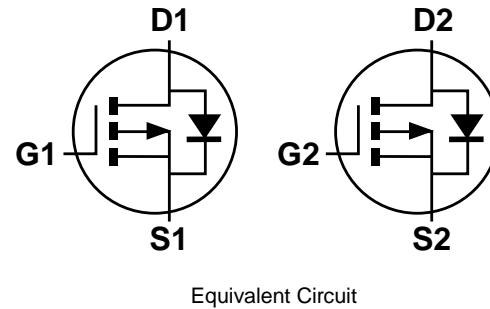
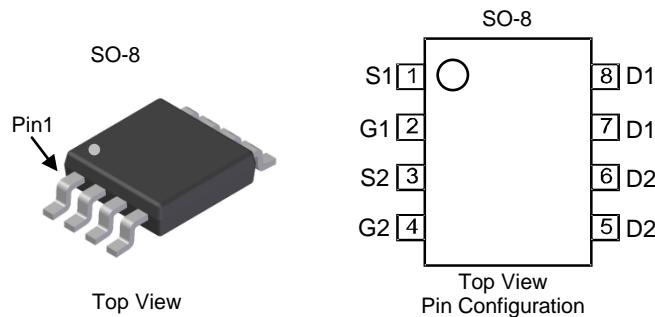
- Engine Management Systems
- Body Control Electronics
- DC-DC Converters

## Features

- Rated to +175°C – ideal for high ambient temperature environments
- 100% Unclamped Inductive Switching – ensures more reliable and robust end application
- Low  $R_{DS(ON)}$  – minimises power losses
- Low  $Q_g$  – minimises switching losses
- **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**
- **An Automotive-Compliant Part is Available Under Separate Datasheet ([DMPH6050SSDQ](#))**

## 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 
- Weight: 0.076 grams (Approximate)



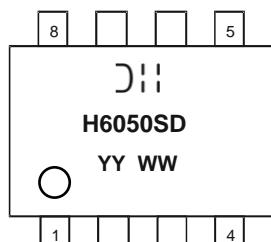
## Ordering Information (Note 4)

Part Number	Case	Packaging
DMPH6050SSD-13	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



D11 = Manufacturer's Marking  
H6050SD = Product Type Marking Code  
YYWW = Date Code Marking  
YY or YY = Year (ex: 16 = 2016)  
WW = Week (01 to 53)

**Maximum Ratings** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			$V_{DSS}$	-60	V
Gate-Source Voltage			$V_{GSS}$	$\pm 20$	V
Continuous Drain Current (Note 6) $V_{GS} = -10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +100^\circ\text{C}$	$I_D$	-5.2 -3.7	A
Pulsed Drain Current (10 $\mu\text{s}$ Pulse, Duty Cycle = 1%)			$I_{DM}$	-35	A
Maximum Continuous Body Diode Forward Current (Note 6)			$I_S$	-2.0	A
Avalanche Current (Note 7) $L = 0.1\text{mH}$			$I_{AS}$	-25	A
Avalanche Energy (Note 7) $L = 0.1\text{mH}$			$E_{AS}$	33	mJ

**Thermal Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	$T_A = +25^\circ\text{C}$	$P_D$	1.5	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady state	$R_{\theta JA}$	103	°C/W
	$t < 10\text{s}$		64	
Total Power Dissipation (Note 6)	$T_A = +25^\circ\text{C}$	$P_D$	2.0	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady state	$R_{\theta JA}$	75	°C/W
	$t < 10\text{s}$		47	
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	13	
Operating and Storage Temperature Range	$T_J, T_{STG}$		-55 to +175	°C

**Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 8)</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	-60	—	—	V	$V_{GS} = 0\text{V}, I_D = -250\mu\text{A}$
Zero Gate Voltage Drain Current $T_J = +25^\circ\text{C}$	$I_{DSS}$	—	—	-1	$\mu\text{A}$	$V_{DS} = -60\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 100$	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	-1.0	—	-3.0	V	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	34	48	$\text{m}\Omega$	$V_{GS} = -10\text{V}, I_D = -5\text{A}$
			44	60		$V_{GS} = -4.5\text{V}, I_D = -4\text{A}$
Diode Forward Voltage	$V_{SD}$	—	-0.7	-1.2	V	$V_{GS} = 0\text{V}, I_S = -1\text{A}$
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	$C_{iss}$	—	1525	—	pF	$V_{DS} = -30\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Output Capacitance	$C_{oss}$	—	90	—	pF	
Reverse Transfer Capacitance	$C_{rss}$	—	70	—	pF	
Gate Resistance	$R_g$	—	16	—	$\Omega$	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Total Gate Charge ( $V_{GS} = -4.5\text{V}$ )	$Q_g$	—	14.5	—	nC	$V_{DS} = -30\text{V}, I_D = -5\text{A}$
Total Gate Charge ( $V_{GS} = -10\text{V}$ )	$Q_g$	—	30.6	—	nC	
Gate-Source Charge	$Q_{gs}$	—	4.9	—	nC	
Gate-Drain Charge	$Q_{gd}$	—	5.2	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	5.3	—	ns	$V_{GS} = -10\text{V}, V_{DS} = -30\text{V}, R_g = 3\Omega, I_D = -5\text{A}$
Turn-On Rise Time	$t_R$	—	15.4	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	79.2	—	ns	
Turn-Off Fall Time	$t_F$	—	45.3	—	ns	
Body Diode Reverse Recovery Time	$t_{RR}$	—	15.2	—	ns	$I_F = -5\text{A}, di/dt = -100\text{A}/\mu\text{s}$
Body Diode Reverse Recovery Charge	$Q_{RR}$	—	9.3	—	nC	$I_F = -5\text{A}, di/dt = -100\text{A}/\mu\text{s}$

Notes:

5. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
7.  $I_{AS}$  and  $E_{AS}$  ratings are based on low frequency and duty cycles to keep  $T_J = +25^\circ\text{C}$ .
8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

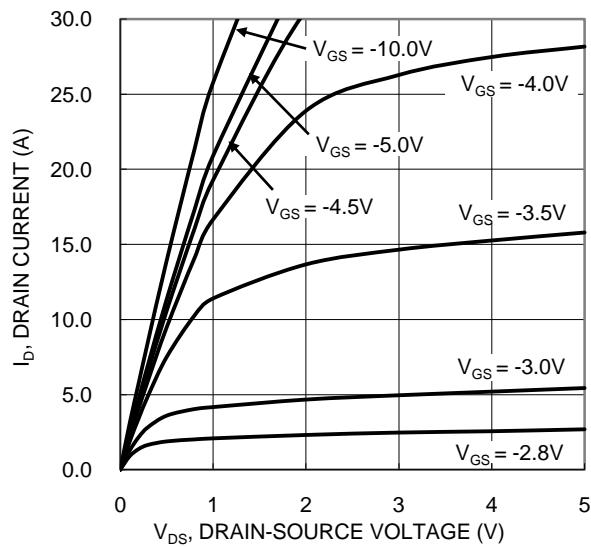


Figure 1. Typical Output Characteristic

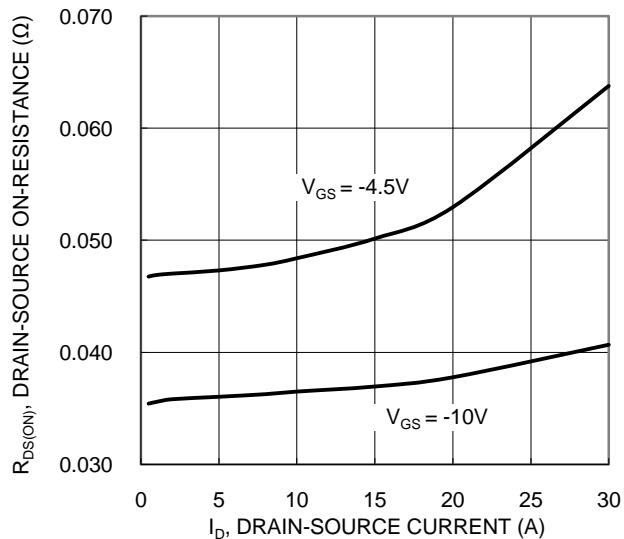


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

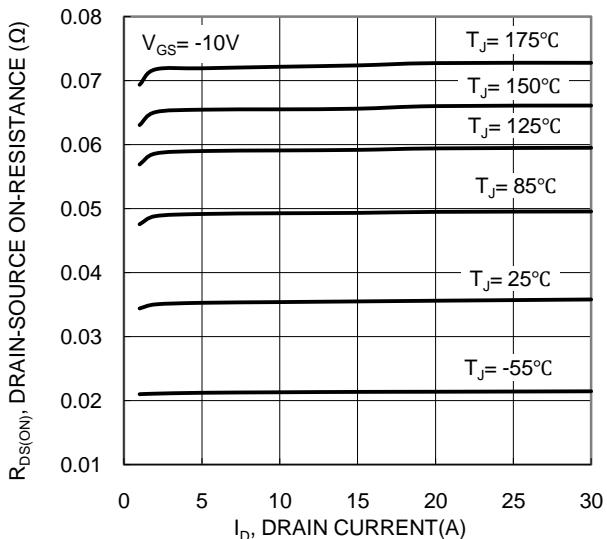


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

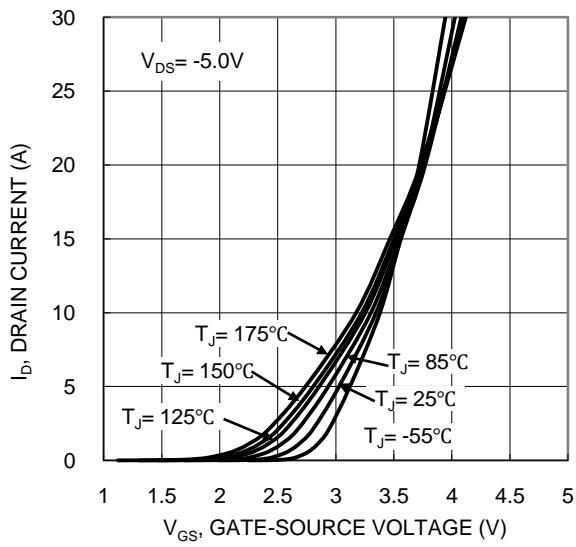


Figure 2. Typical Transfer Characteristic

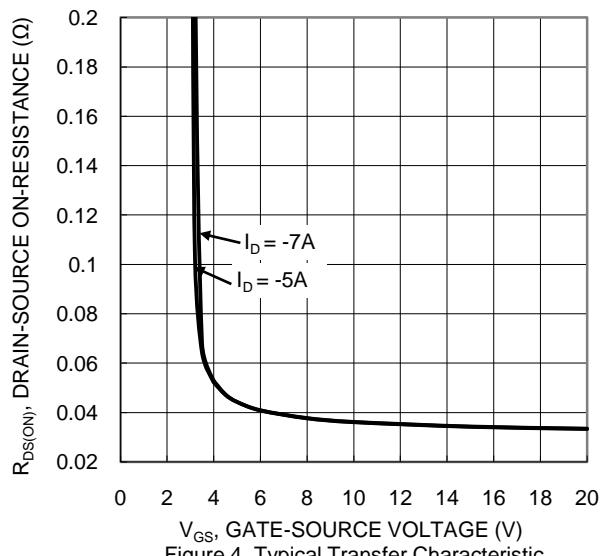


Figure 4. Typical Transfer Characteristic

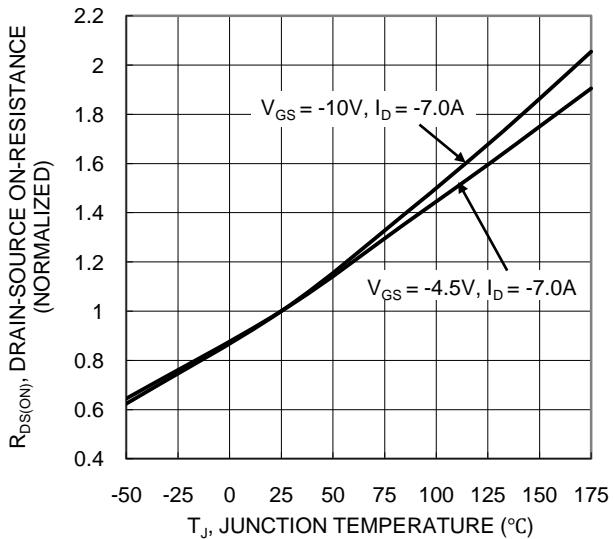
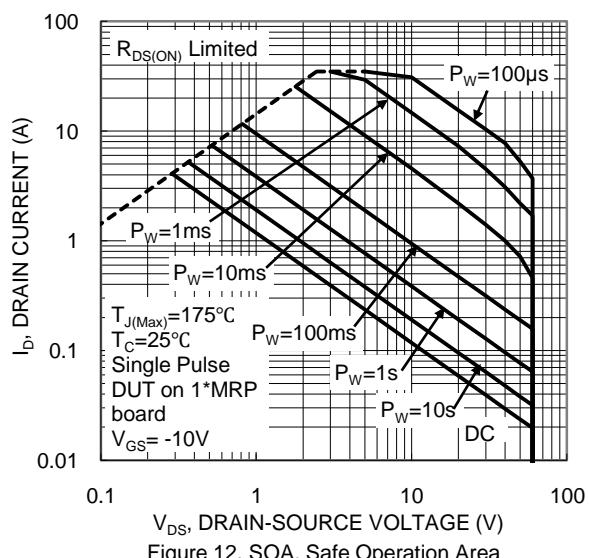
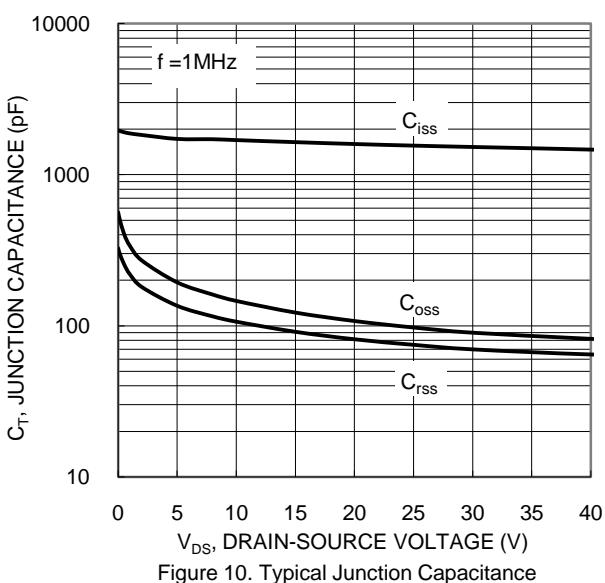
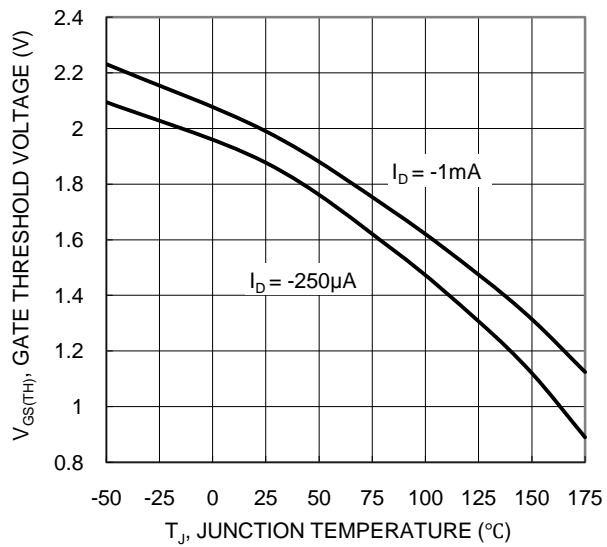
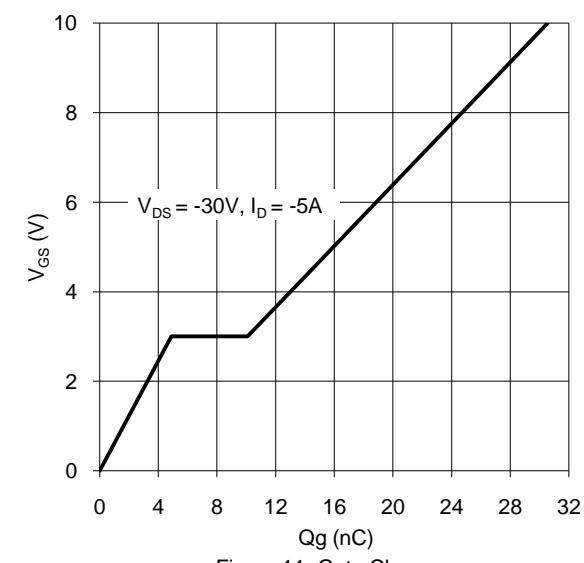
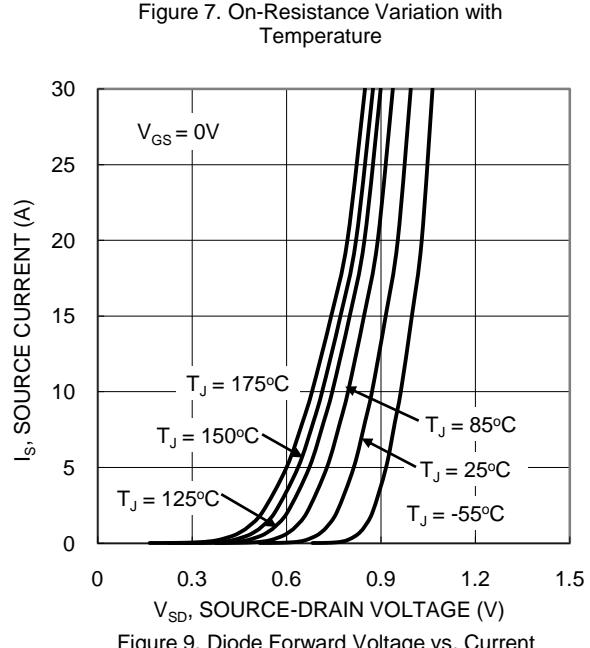
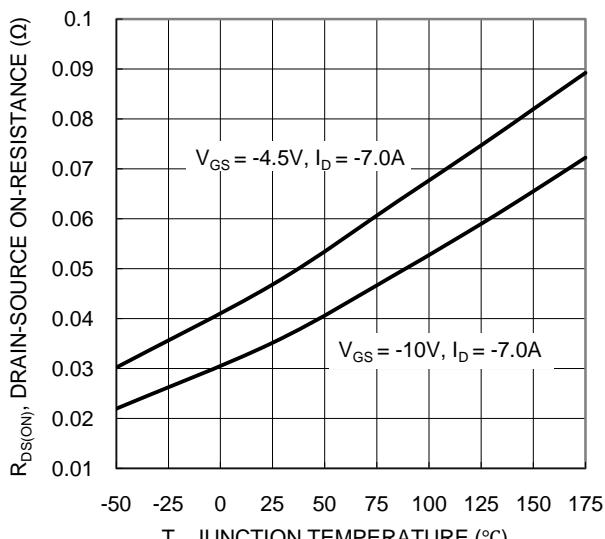


Figure 6. On-Resistance Variation with Temperature



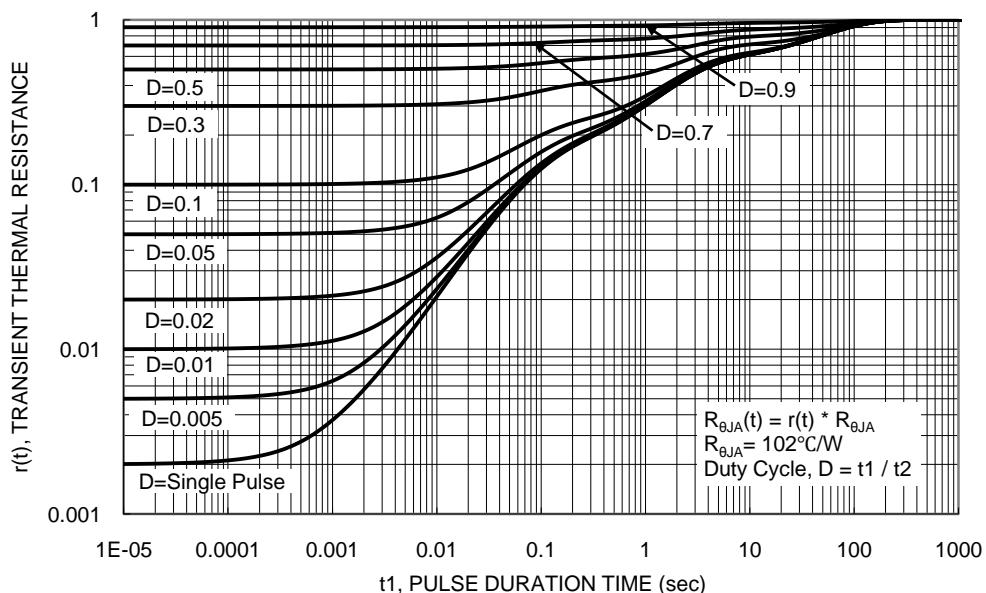
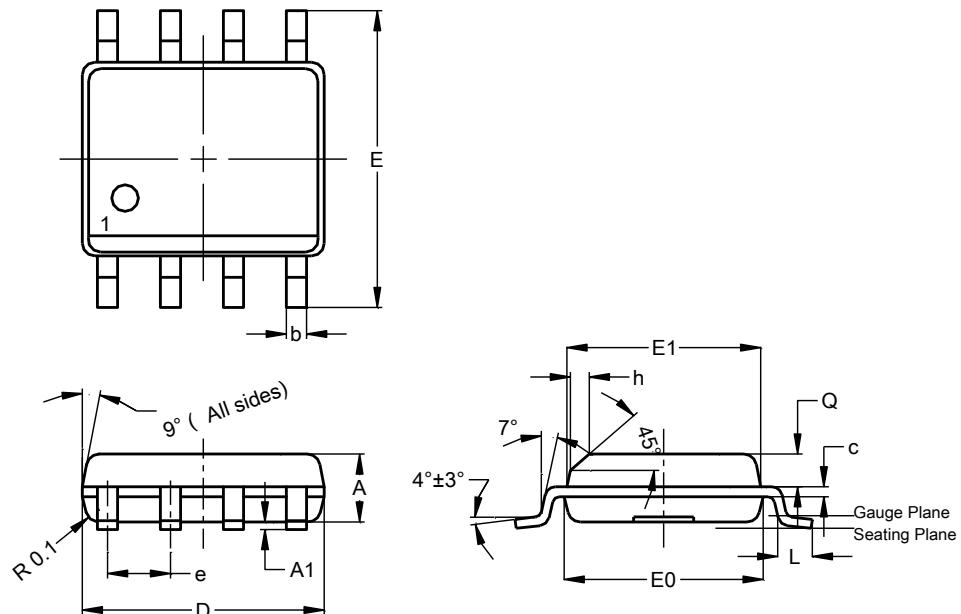


Figure 13. Transient Thermal Resistance

## Package Outline Dimensions

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

SO-8



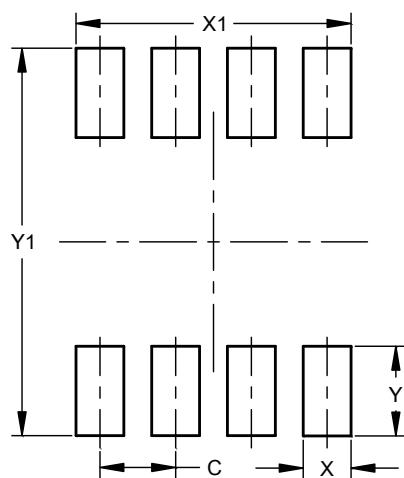
SO-8			
Dim	Min	Max	Typ
<b>A</b>	1.40	1.50	1.45
<b>A1</b>	0.10	0.20	0.15
<b>b</b>	0.30	0.50	0.40
<b>c</b>	0.15	0.25	0.20
<b>D</b>	4.85	4.95	4.90
<b>E</b>	5.90	6.10	6.00
<b>E1</b>	3.80	3.90	3.85
<b>E0</b>	3.85	3.95	3.90
<b>e</b>	--	--	1.27
<b>h</b>	-	--	0.35
<b>L</b>	0.62	0.82	0.72
<b>Q</b>	0.60	0.70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

**All Dimensions in mm**

## Suggested Pad Layout

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

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

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