

Product Summary

BV _{DSS}	R _{DS(ON)} Max	I _D Max T _A = +25°C
-60V	60mΩ @ V _{GS} = -10V	-4.4A
	80mΩ @ V _{GS} = -4.5V	-3.9A

Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability.
<https://www.diodes.com/quality/product-definitions/>
- An automotive-compliant part is available under separate datasheet ([DMPH6051SSSQ](#))

Description and Applications

This 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.

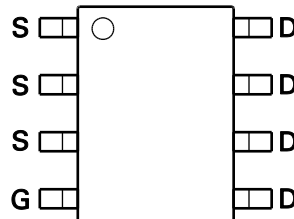
- Backlighting
- Power-management functions
- DC-DC converters

Mechanical Data

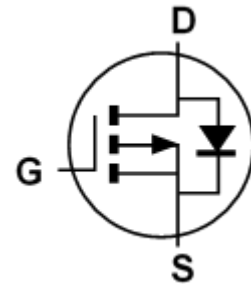
- Package: SO-8
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See Diagram
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208③
- Weight: 0.076 grams (Approximate)



Top View



Top View
Pin Configuration



Equivalent Circuit

Ordering Information (Note 4)

Orderable Part Number	Package	Packing	
		Qty.	Carrier
DMPH6051SSS-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



DII = Manufacturer's Marking
 PH6051SS = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Year (ex: 24 = 2024)
 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}	± 20	V	
Continuous Drain Current (Note 5) $V_{GS} = -10\text{V}$	I_D	$T_A = +25^\circ\text{C}$ $T_A = +100^\circ\text{C}$	-4.4 -3.1	A
Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%)		I_{DM}	-30	A
Maximum Continuous Body Diode Forward Current (Note 5)	I_S	-4.4	A	
Pulsed Source Current (10 μs Pulse, Duty Cycle = 1%)	I_{SM}	-30	A	
Avalanche Current, $L = 0.1\text{mH}$	I_{AS}	-27.4	A	
Avalanche Energy, $L = 0.1\text{mH}$	E_{AS}	37.5	mJ	

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

Characteristic	Symbol	Value	Units	
Total Power Dissipation (Note 6)	P_D	2.1	W	
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	Steady State	73	$^\circ\text{C/W}$
Total Power Dissipation (Note 5)		P_D	2.4	W
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	Steady State	63	$^\circ\text{C/W}$
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +175	$^\circ\text{C}$

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	-60	—	—	V	$V_{GS} = 0\text{V}, I_D = -250\mu\text{A}$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1	μA	$V_{DS} = -60\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 100	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	-1	—	-3	V	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	46	60	m Ω	$V_{GS} = -10\text{V}, I_D = -7\text{A}$
		—	58	80		$V_{GS} = -4.5\text{V}, I_D = -7\text{A}$
Diode Forward Voltage	V_{SD}	—	-0.8	-1.2	V	$V_{GS} = 0\text{V}, I_S = -1\text{A}$
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	2079	—	pF	$V_{DS} = -30\text{V}, V_{GS} = 0\text{V}$ $f = 1\text{MHz}$
Output Capacitance	C_{oss}	—	95	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	78	—	pF	
Gate Resistance	R_g	—	3.4	—	Ω	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Total Gate Charge ($V_{GS} = -4.5\text{V}$)	Q_g	—	17	—	nC	$V_{DS} = -30\text{V}, I_D = -5\text{A}$
Total Gate Charge ($V_{GS} = -10\text{V}$)	Q_g	—	36	—	nC	
Gate-Source Charge	Q_{gs}	—	5.7	—	nC	
Gate-Drain Charge	Q_{gd}	—	6.7	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	6.2	—	ns	$V_{DD} = -30\text{V}, V_{GS} = -10\text{V}$ $R_g = 3\Omega, I_D = -5\text{A}$
Turn-On Rise Time	t_R	—	22	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	39	—	ns	
Turn-Off Fall Time	t_F	—	24.7	—	ns	
Body Diode Reverse Recovery Time	t_{RR}	—	24.5	—	ns	$I_F = -5\text{A}, di/dt = 100\text{A}/\mu\text{s}$
Body Diode Reverse Recovery Charge	Q_{RR}	—	23.4	—	nC	

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
 - Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.

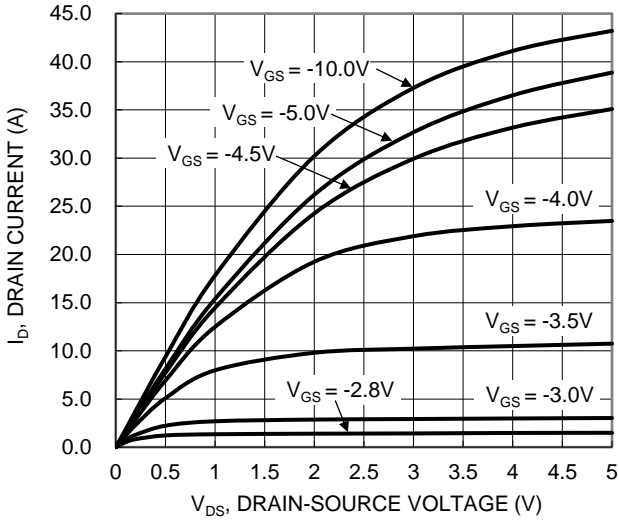


Figure 1. Typical Output Characteristic

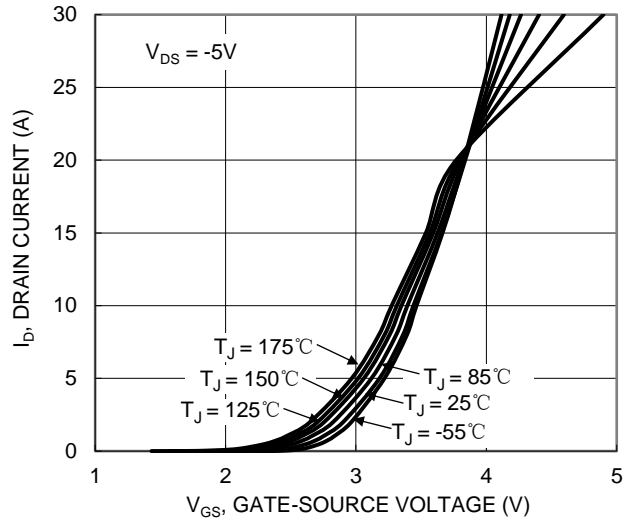


Figure 2. Typical Transfer Characteristic

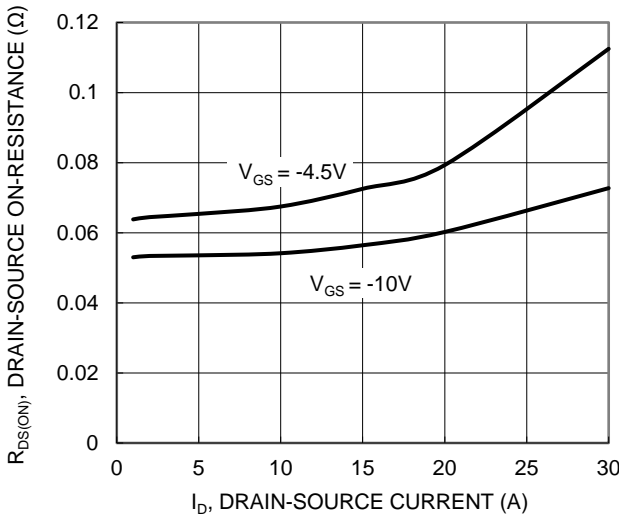


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

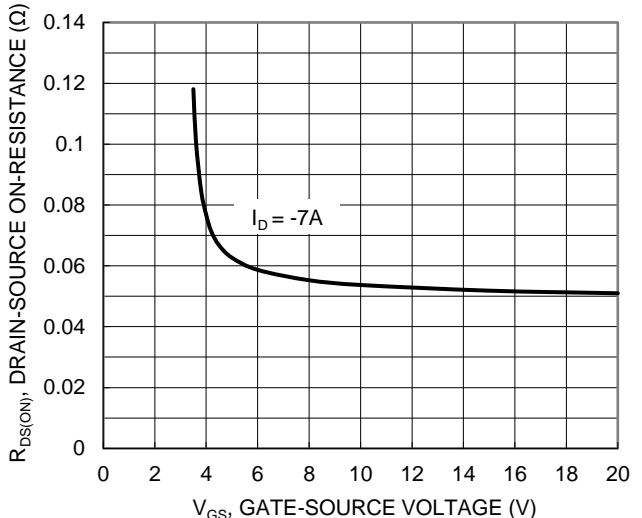


Figure 4. Typical Transfer Characteristic

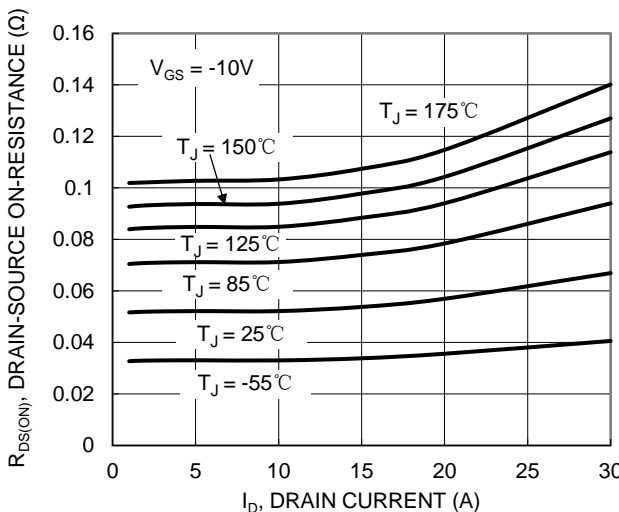


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

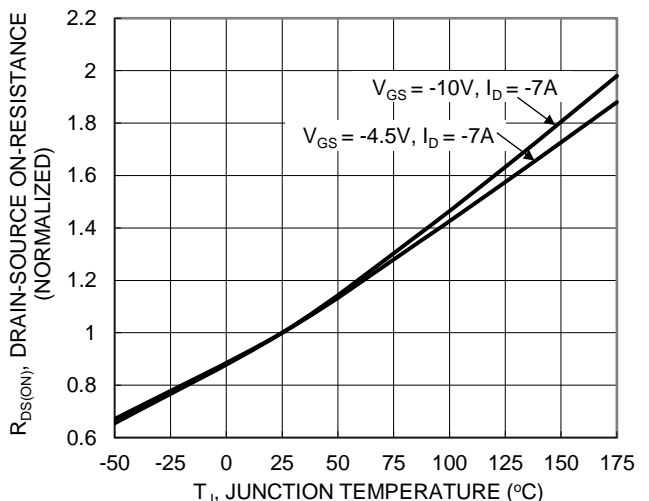


Figure 6. On-Resistance Variation with Junction Temperature

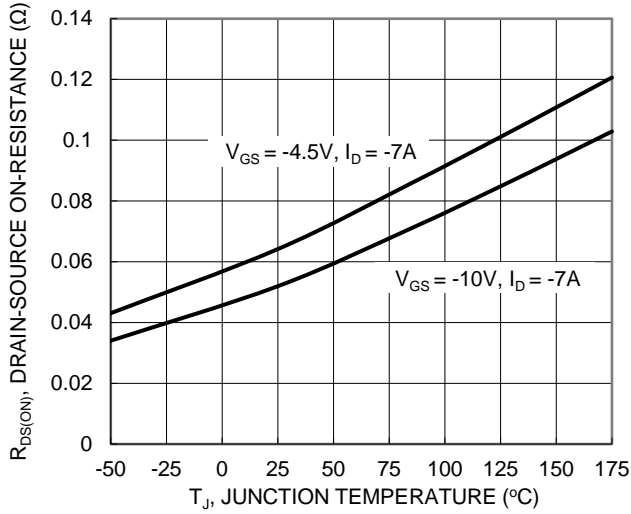


Figure 7. On-Resistance Variation with Junction Temperature

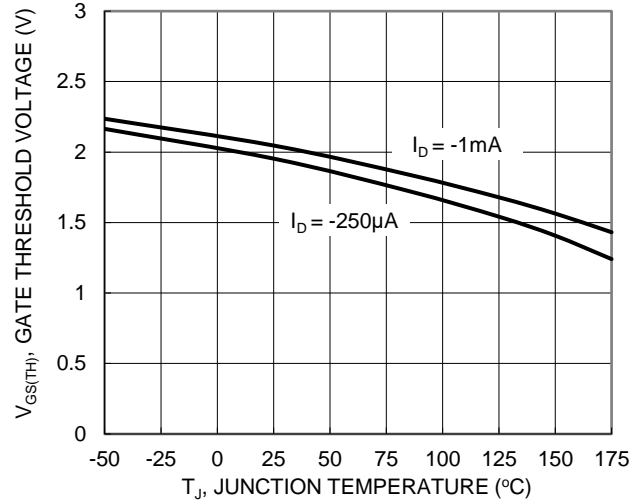


Figure 8. Gate Threshold Variation vs. Junction Temperature

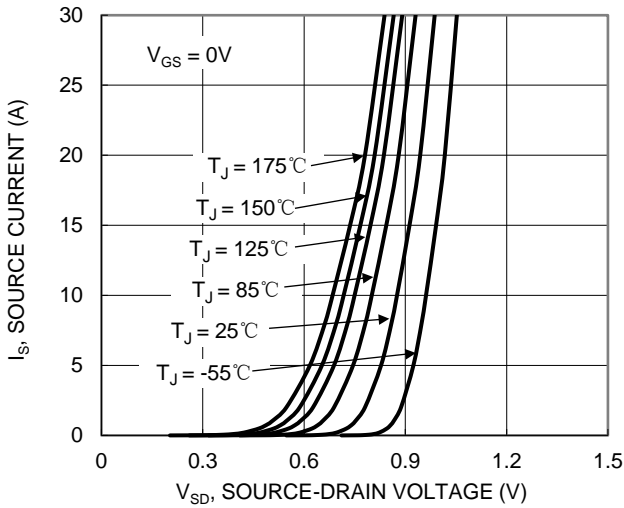


Figure 9. Diode Forward Voltage vs. Current

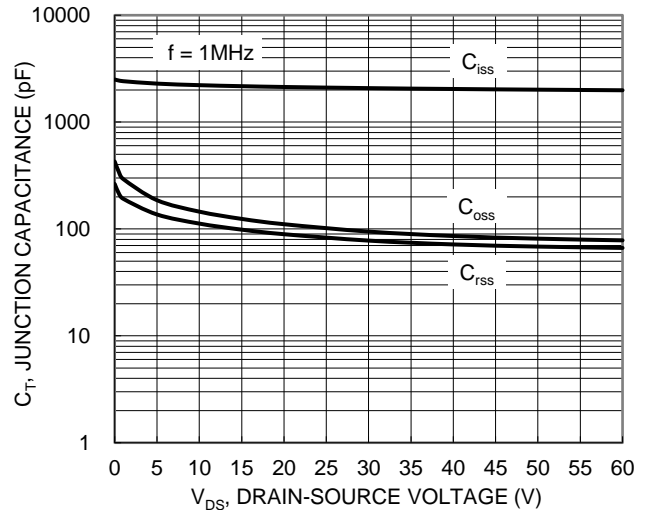


Figure 10. Typical Junction Capacitance

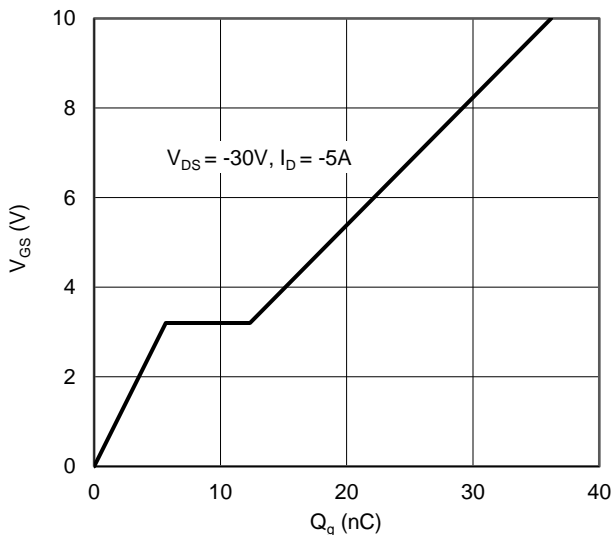


Figure 11. Gate Charge

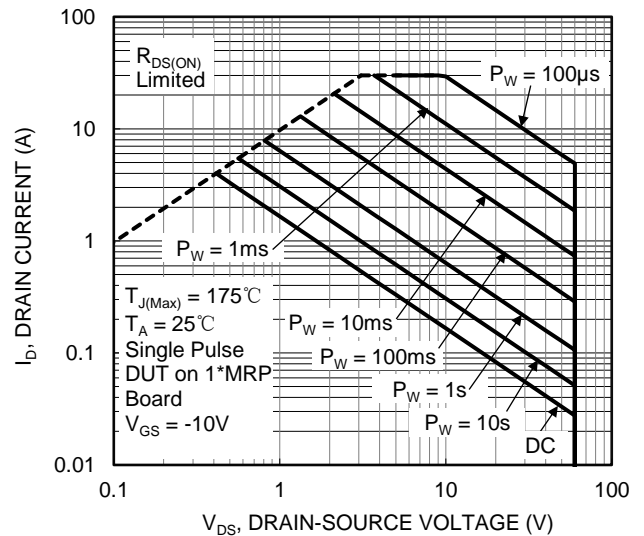


Figure 12. SOA, Safe Operation Area

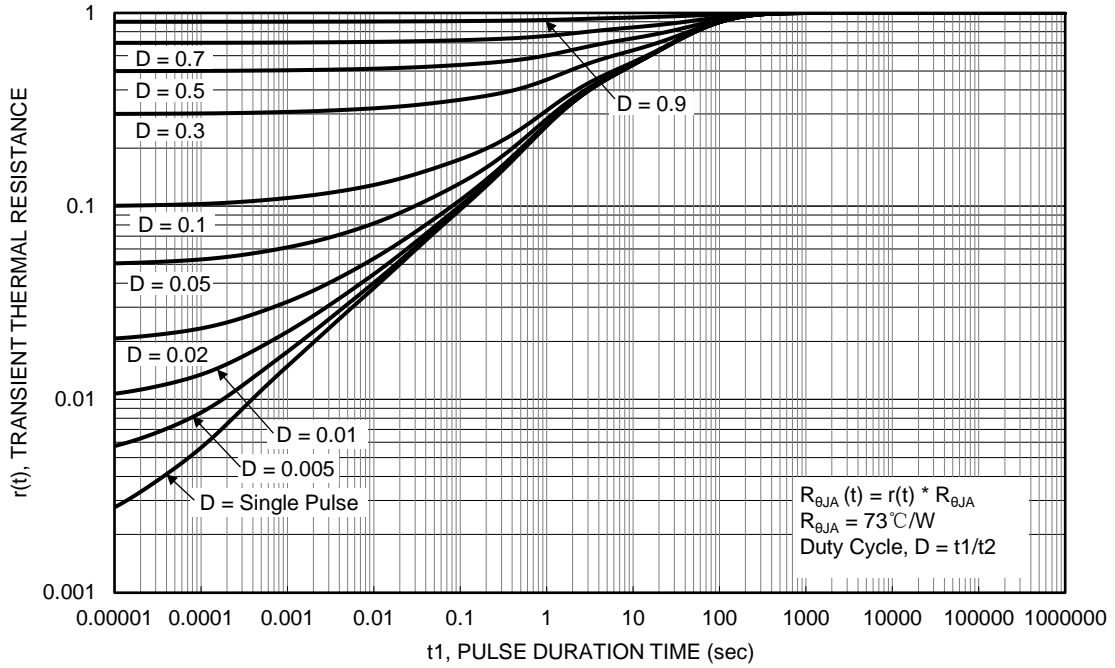
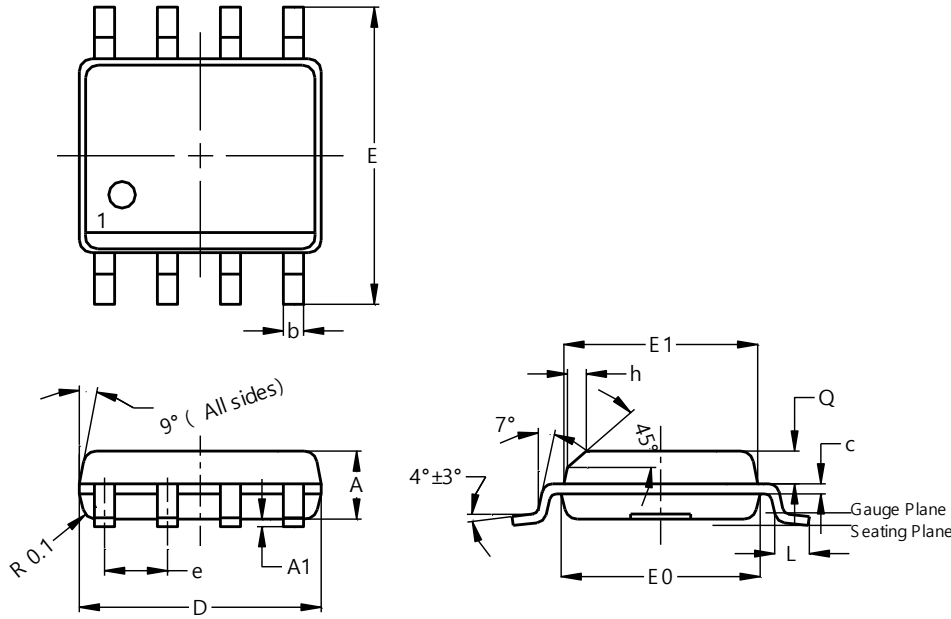


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

SO-8

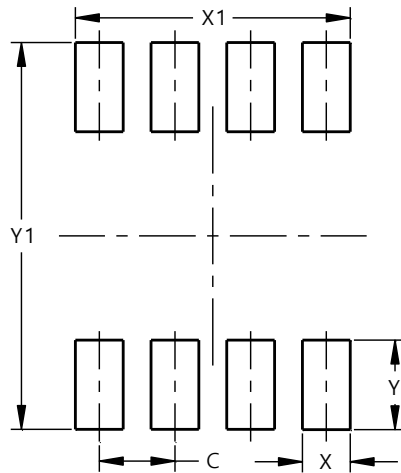


SO-8			
Dim	Min	Max	Typ
A	1.40	1.50	1.45
A1	0.10	0.20	0.15
b	0.30	0.50	0.40
c	0.15	0.25	0.20
D	4.85	4.95	4.90
E	5.90	6.10	6.00
E1	3.80	3.90	3.85
E0	3.85	3.95	3.90
e	--	--	1.27
h	-	--	0.35
L	0.62	0.82	0.72
Q	0.60	0.70	0.65
All Dimensions in mm			

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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