

## Product Summary

$BV_{DSS}$	$R_{DS(ON)}$ Max	$I_D$ $T_A = +25^\circ C$
-60V	105m $\Omega$ @ $V_{GS} = -10V$	-3.3A
	130m $\Omega$ @ $V_{GS} = -4.5V$	-3.0A

## 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:

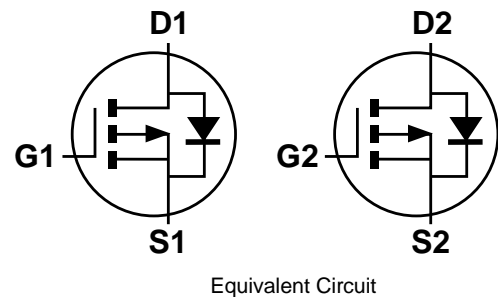
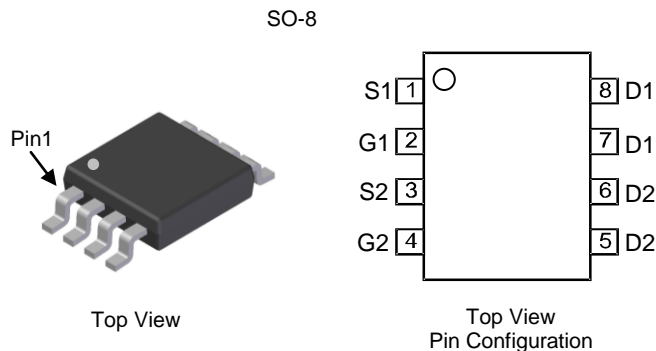
- Engine Management Systems
- Body Control Electronics
- DC-DC Converters

## Features

- 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)**
- **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  $\text{e3}$
- Weight: 0.074 grams (Approximate)

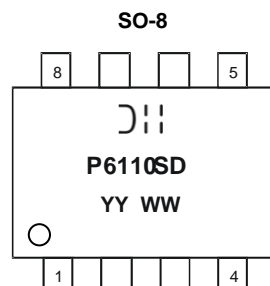


## Ordering Information (Note 5)

Part Number	Case	Packaging
DMP6110SSDQ-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



$\text{D}||$  = Manufacturer's Marking  
 P6110SD = 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>	-60	V
Gate-Source Voltage		V <sub>GSS</sub>	±20	V
Continuous Drain Current (Note 7) V <sub>GS</sub> = -10V	T <sub>C</sub> = +25°C T <sub>C</sub> = +70°C	I <sub>D</sub>	-7.8 -6.3	A
	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	-3.3 -2.7	A
Pulsed Drain Current (380µs Pulse, 1% Duty Cycle)		I <sub>DM</sub>	-24	A
Maximum Continuous Body Diode Forward Current (Note 7)		I <sub>S</sub>	-1.8	A
Avalanche Current (Note 10) L = 0.1mH		I <sub>AS</sub>	-19	A
Avalanche Energy (Note 10) L = 0.1mH		E <sub>AS</sub>	18	mJ

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

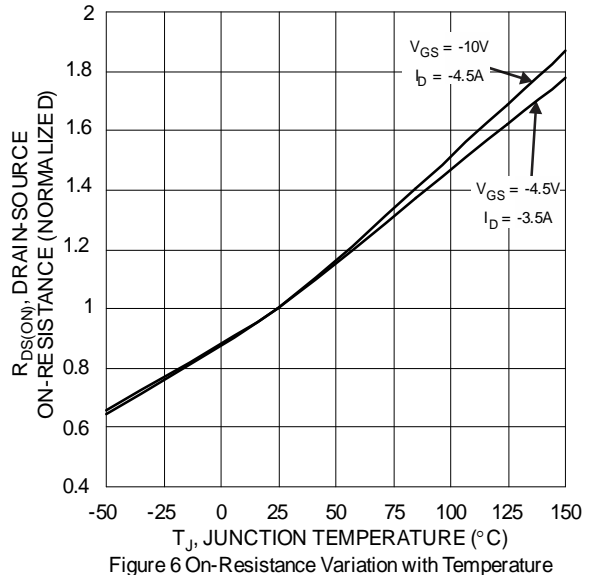
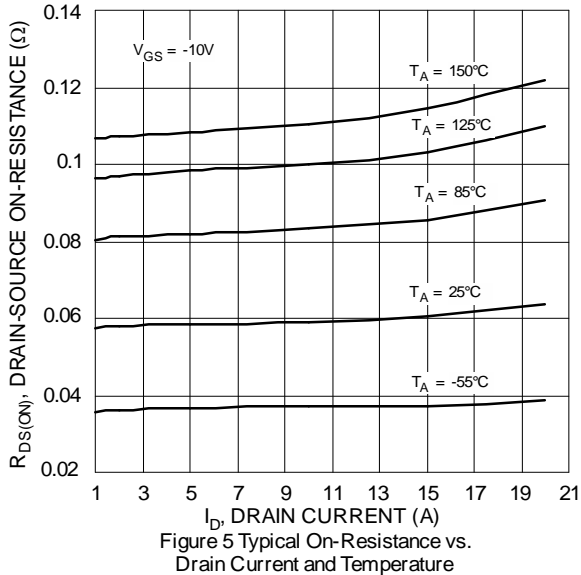
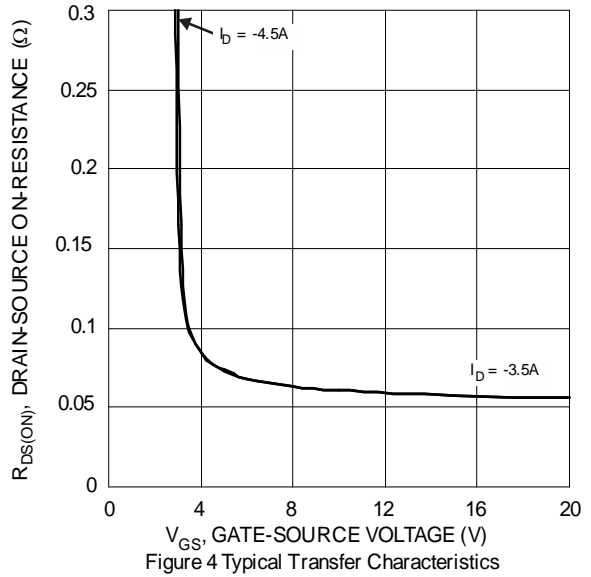
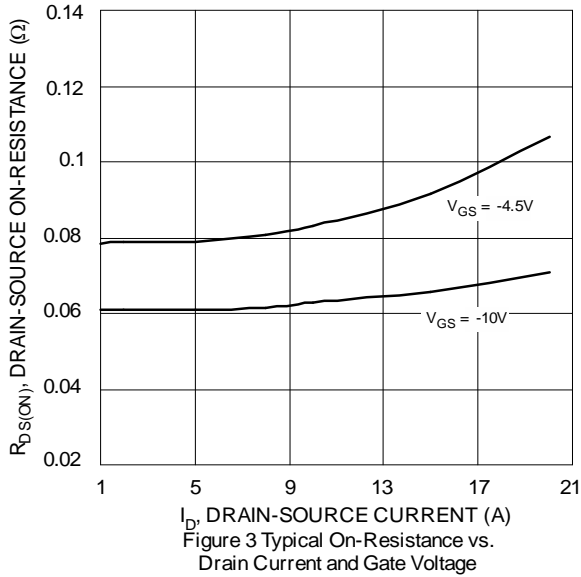
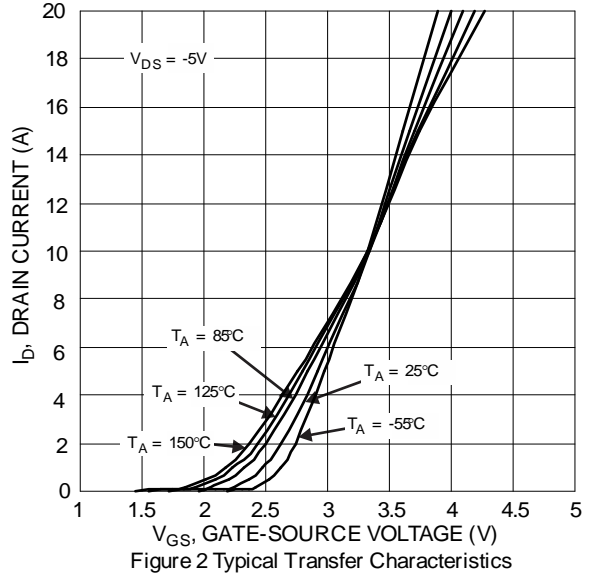
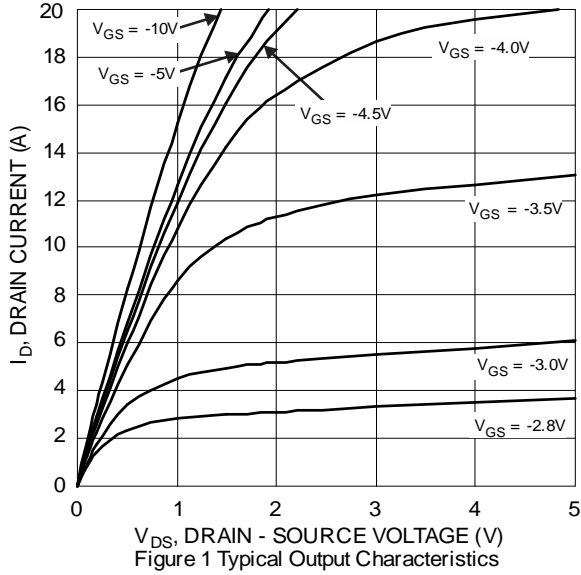
Characteristic		Symbol	Value	Unit
Total Power Dissipation (Notes 6 & 8)	T <sub>A</sub> = +25°C	P <sub>D</sub>	1.2	W
	T <sub>A</sub> = +70°C		0.9	
Total Power Dissipation (Notes 6 & 9)	T <sub>A</sub> = +25°C		1.2	
Thermal Resistance, Junction to Ambient (Notes 6 & 8)	Steady State	R <sub>θJA</sub>	104	°C/W
	t < 10s		45	
Thermal Resistance, Junction to Ambient (Notes 6 & 9)	Steady State		100	
Total Power Dissipation (Notes 7 & 8)	T <sub>A</sub> = +25°C	P <sub>D</sub>	1.7	W
	T <sub>A</sub> = +70°C		1.1	
Total Power Dissipation (Notes 7 & 9)	T <sub>A</sub> = +25°C		1.8	
Thermal Resistance, Junction to Ambient (Notes 7 & 8)	Steady State	R <sub>θJA</sub>	74	°C/W
	t < 10s		37	
Thermal Resistance, Junction to Ambient (Notes 7 & 9)	Steady State		71	
Thermal Resistance, Junction to Case (Notes 7 & 8)		R <sub>θJC</sub>	15	
Operating and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

- Notes:
6. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
  7. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
  8. For a dual device with one active die.
  9. For a device with two active die running at equal power.
  10. 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.

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b> (Note 11)						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-60	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA
Zero Gate Voltage Drain Current T <sub>J</sub> = +25°C	I <sub>DSS</sub>	—	—	-1	μA	V <sub>DS</sub> = -48V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	100	nA	V <sub>GS</sub> = ±16V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS</b> (Note 11)						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	-1	—	-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>	—	80	105	mΩ	V <sub>GS</sub> = -10V, I <sub>D</sub> = -4.5A
		—	95	130		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -3.5A
Diode Forward Voltage	V <sub>SD</sub>	—	-0.7	-1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -1A
<b>DYNAMIC CHARACTERISTICS</b> (Note 12)						
Input Capacitance	C <sub>ISS</sub>	—	969	—	pF	V <sub>DS</sub> = -30V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>OSS</sub>	—	57	—	pF	
Reverse Transfer Capacitance	C <sub>RSS</sub>	—	44	—	pF	
Gate Resistance	R <sub>G</sub>	—	13.7	—	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>	—	8.2	—	nC	V <sub>DS</sub> = -30V, I <sub>D</sub> = -12A
Total Gate Charge (V <sub>GS</sub> = -10V)	Q <sub>G</sub>	—	17.2	—	nC	V <sub>DS</sub> = -30V, I <sub>D</sub> = -12A
Gate-Source Charge	Q <sub>GS</sub>	—	3.0	—	nC	
Gate-Drain Charge	Q <sub>GD</sub>	—	3.1	—	nC	
Turn-On Delay Time	t <sub>D(ON)</sub>	—	4.4	—	ns	V <sub>GS</sub> = -10V, V <sub>DS</sub> = -30V, R <sub>GEN</sub> = 3Ω, I <sub>D</sub> = -12A
Turn-On Rise Time	t <sub>R</sub>	—	23	—	ns	
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	34	—	ns	
Turn-Off Fall Time	t <sub>F</sub>	—	42	—	ns	
Body Diode Reverse Recovery Time	t <sub>RR</sub>	—	13.2	—	ns	I <sub>S</sub> = -12A, di/dt = 100A/μs
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>	—	6.18	—	nC	

Notes: 11. Short duration pulse test used to minimize self-heating effect.  
12. Guaranteed by design. Not subject to product testing.



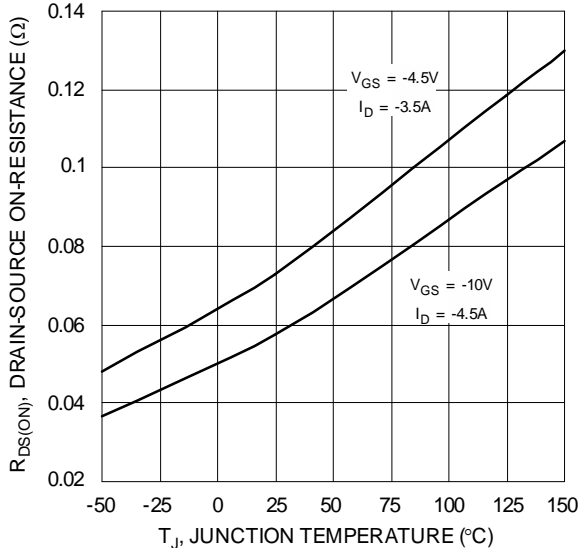


Figure 7 On-Resistance Variation with Temperature

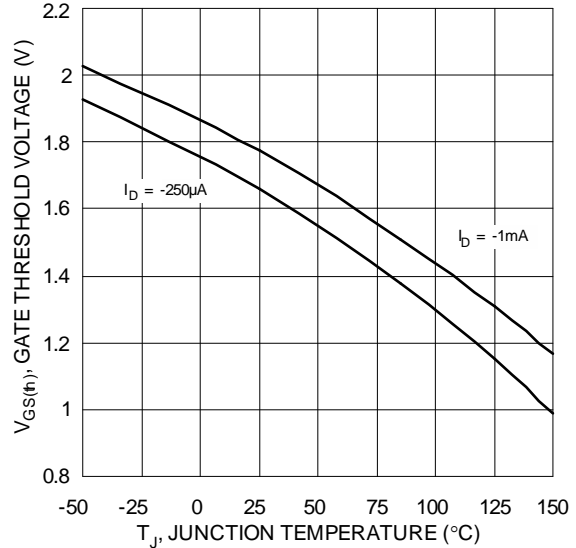


Figure 8 Gate Threshold Variation vs. Junction Temperature

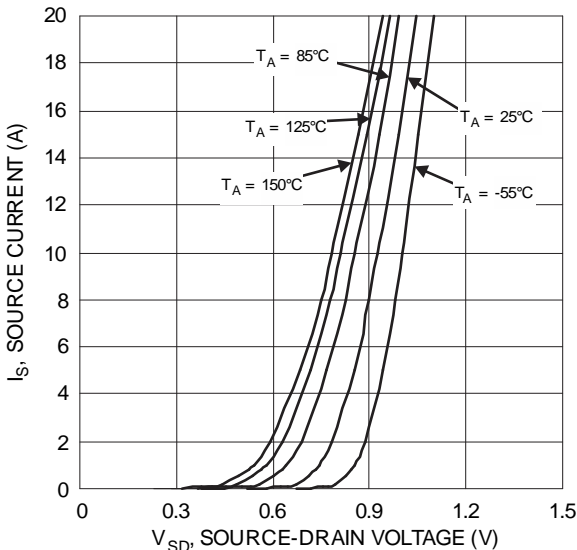


Figure 9 Diode Forward Voltage vs. Current

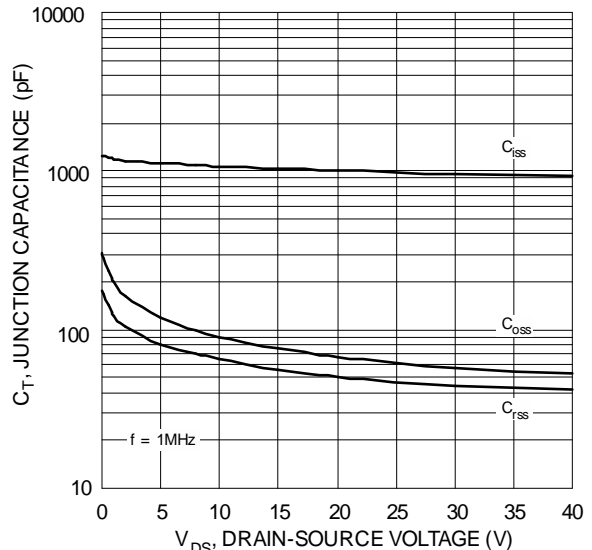


Figure 10 Typical Junction Capacitance

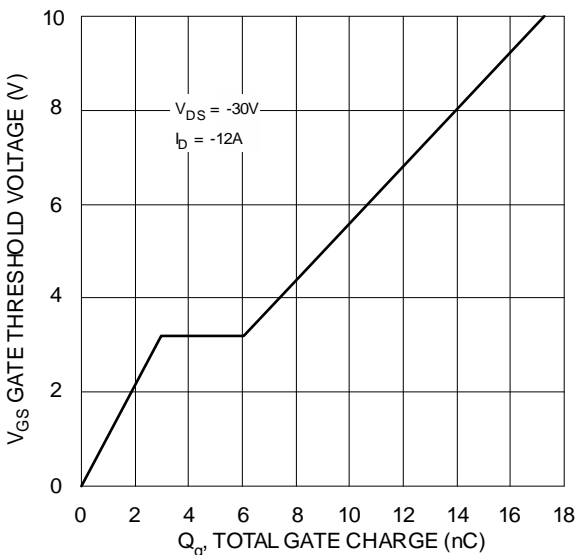


Figure 11 Gate Charge

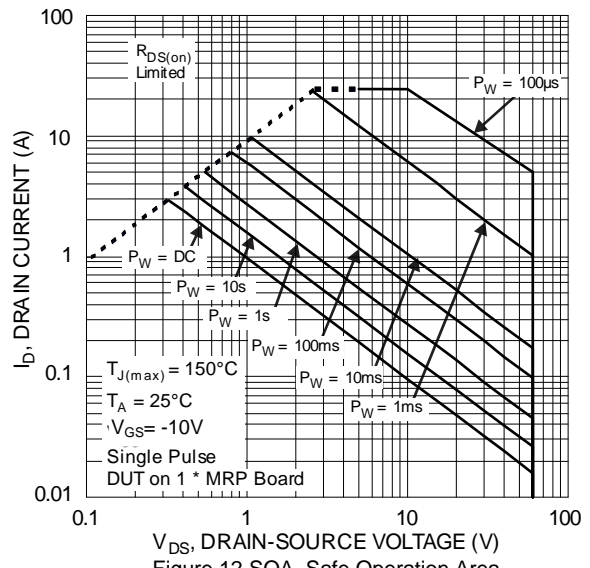


Figure 12 SOA, Safe Operation Area

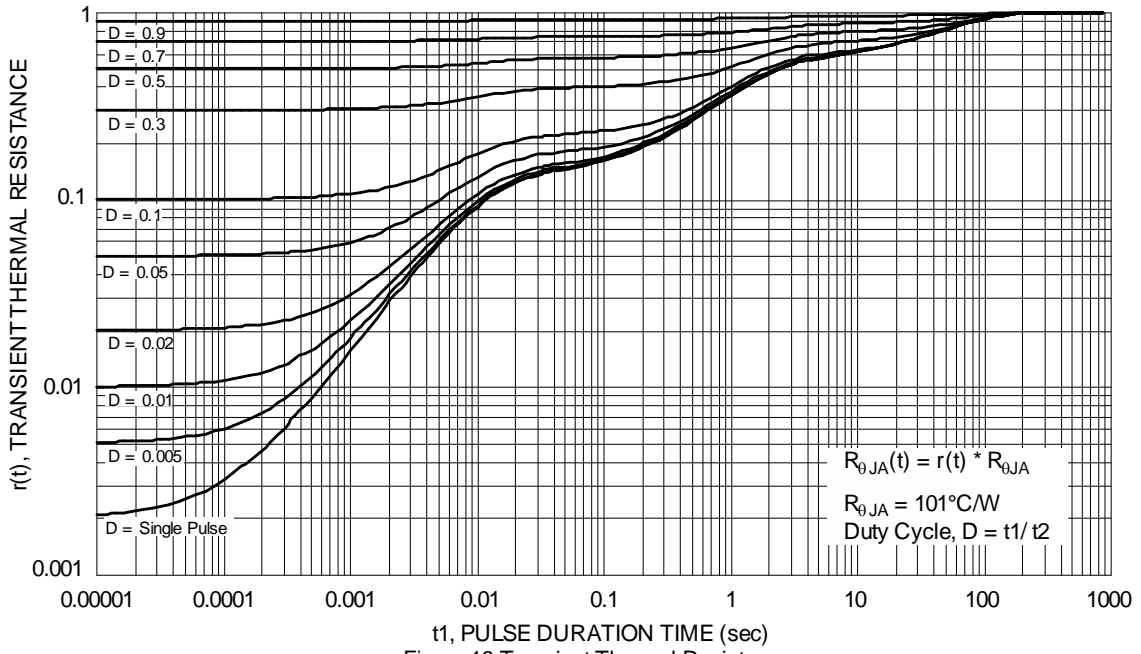
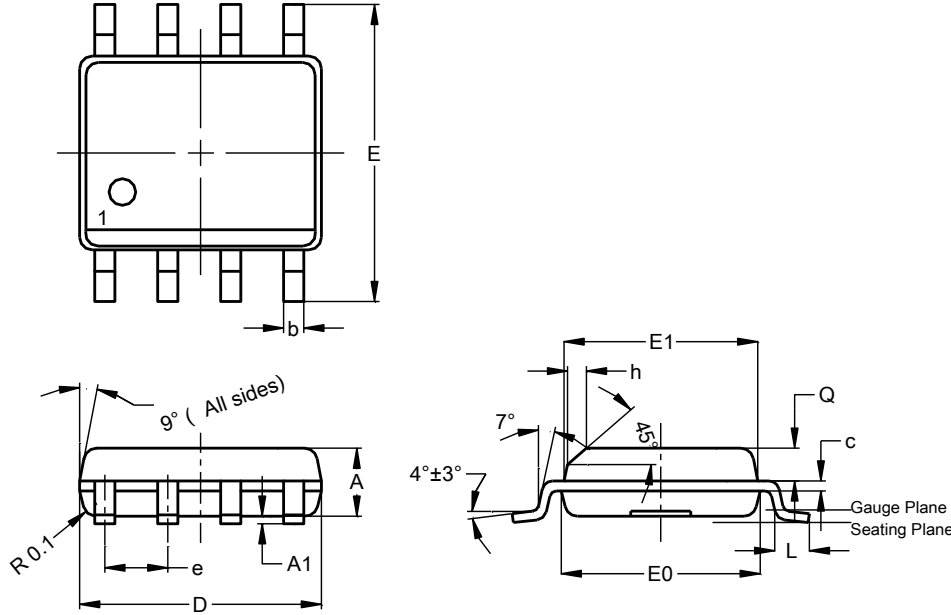


Figure 13 Transient Thermal Resistance

**Package Outline Dimensions**

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

**SO-8**

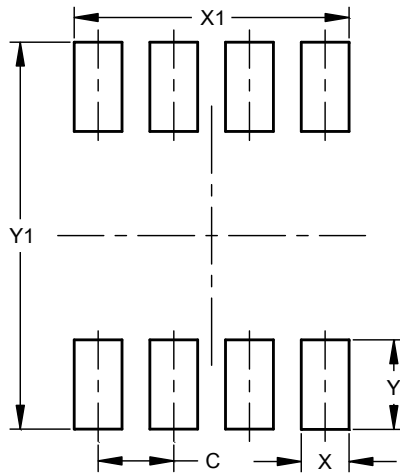


SO-8			
Dim	Min	Max	Typ
A	1.40	1.50	1.45
A1	0.10	0.20	0.15
b	0.30	0.50	0.40
c	0.15	0.25	0.20
D	4.85	4.95	4.90
E	5.90	6.10	6.00
E1	3.80	3.90	3.85
E0	3.85	3.95	3.90
e	--	--	1.27
h	-	--	0.35
L	0.62	0.82	0.72
Q	0.60	0.70	0.65
All Dimensions in mm			

**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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