

**Product Summary**

$BV_{DSS}$	$R_{DS(ON)} \text{ Max}$	$I_D \text{ Max}$ $T_C = +25^\circ\text{C}$
20V	11m $\Omega$ @ $V_{GS} = 4.5\text{V}$	21A
	13m $\Omega$ @ $V_{GS} = 2.5\text{V}$	20A

**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.

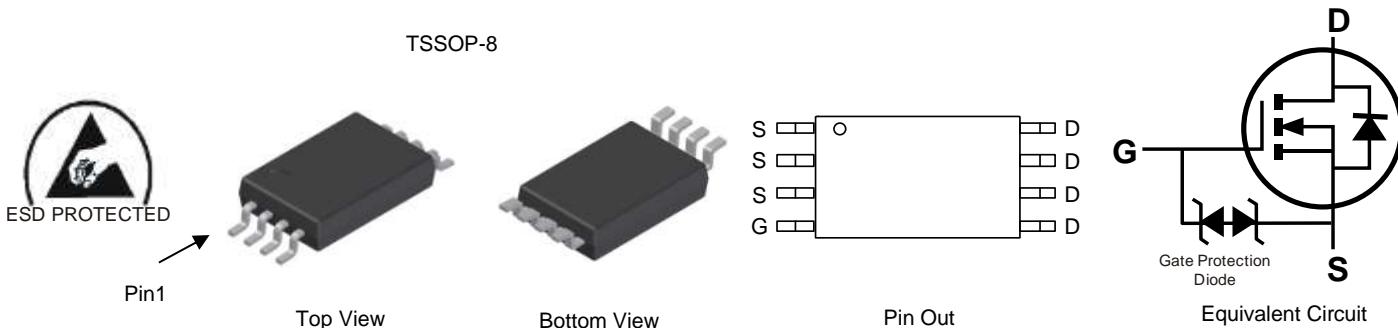
- Battery Management Application
- Power Management Functions
- DC-DC Converters

**Features and Benefits**

- Low Gate Threshold Voltage
- Low On-Resistance
- ESD Protected Gate
- **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: TSSOP-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208<sup>(e3)</sup>
- Weight: 0.039 grams (Approximate)

**Ordering Information** (Note 4)

Part Number	Case	Packaging
DMN2011UTS-13	TSSOP-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. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

**Marking Information**

DII = Manufacturer's Marking  
N2011U = Product Type Marking Code  
YYWW = Date Code Marking  
YY = Year (ex: 17 = 2017)  
WW = Week (01 to 53)

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			$V_{DSS}$	20	V
Gate-Source Voltage			$V_{GSS}$	$\pm 12$	V
Continuous Drain Current (Note 6) $V_{GS} = 4.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	$I_D$	9.0 7.2	A
	Steady State	$T_C = +25^\circ\text{C}$ $T_C = +70^\circ\text{C}$	$I_D$	21 17	A
Pulsed Drain Current (10 $\mu\text{s}$ Pulse, Duty Cycle = 1%)			$I_{DM}$	70	A
Continuous Source-Drain Diode Current (Note 6)			$I_S$	3	A
Pulsed Source-Drain Diode Current (10 $\mu\text{s}$ Pulse, Duty Cycle = 1%)			$I_{SM}$	25	A
Avalanche Current (Note 7) $L = 0.1\text{mH}$			$I_{AS}$	18	A
Avalanche Energy (Note 7) $L = 0.1\text{mH}$			$E_{AS}$	17	mJ

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

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	$P_D$	0.9	W
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	144	$^\circ\text{C}/\text{W}$
Total Power Dissipation (Note 6)	$P_D$	1.3	W
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	93	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Case (Note 6)	$R_{\theta JC}$	16	
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b> (Note 8)						
Drain-Source Breakdown Voltage	$BV_{DSS}$	20	—	—	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	$\mu\text{A}$	$V_{DS} = 16\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 10$	$\mu\text{A}$	$V_{GS} = \pm 10\text{V}, V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS</b> (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	0.4	—	1.0	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	7.2	11	$\text{m}\Omega$	$V_{GS} = 4.5\text{V}, I_D = 7\text{A}$
			9.0	13		$V_{GS} = 2.5\text{V}, I_D = 7\text{A}$
			11.5	25		$V_{GS} = 1.8\text{V}, I_D = 5\text{A}$
			19.1	50		$V_{GS} = 1.5\text{V}, I_D = 3\text{A}$
Diode Forward Voltage	$V_{SD}$	—	0.7	1.2	V	$V_{GS} = 0\text{V}, I_S = 8.5\text{A}$
<b>DYNAMIC CHARACTERISTICS</b> (Note 9)						
Input Capacitance	$C_{ISS}$	—	2,248	—	$\text{pF}$	$V_{DS} = 10\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Output Capacitance	$C_{OSS}$	—	295	—	$\text{pF}$	
Reverse Transfer Capacitance	$C_{RSS}$	—	265	—	$\text{pF}$	
Gate Resistance	$R_G$	—	1.5	—	$\Omega$	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Total Gate Charge ( $V_{GS} = 4.5\text{V}$ )	$Q_G$	—	24	—	$\text{nC}$	$V_{DS} = 10\text{V}, I_D = 8.5\text{A}$
Total Gate Charge ( $V_{GS} = 10\text{V}$ )	$Q_G$	—	56	—	$\text{nC}$	
Gate-Source Charge	$Q_{GS}$	—	3.5	—	$\text{nC}$	
Gate-Drain Charge	$Q_{GD}$	—	5.1	—	$\text{nC}$	$V_{DS} = 10\text{V}, I_D = 8.5\text{A}$ $V_{GS} = 4.5\text{V}, R_G = 1.8\Omega$
Turn-On Delay Time	$t_{D(ON)}$	—	3.6	—	$\text{ns}$	
Turn-On Rise Time	$t_R$	—	2.6	—	$\text{ns}$	
Turn-Off Delay Time	$t_{D(OFF)}$	—	21.6	—	$\text{ns}$	
Turn-Off Fall Time	$t_F$	—	13.5	—	$\text{ns}$	
Reverse Recovery Time	$t_{RR}$	—	12.8	—	$\text{ns}$	$I_F = 8.5\text{A}, di/dt = 210\text{A}/\mu\text{s}$
Reverse Recovery Charge	$Q_{RR}$	—	6.9	—	$\text{nC}$	

Notes:

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

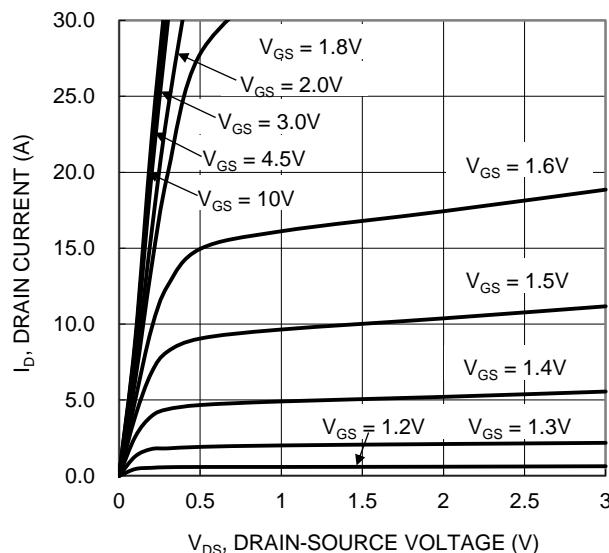


Figure 1. Typical Output Characteristic

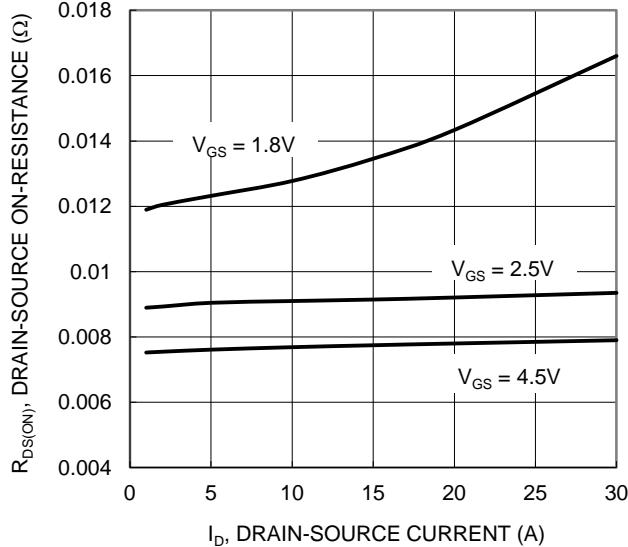


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

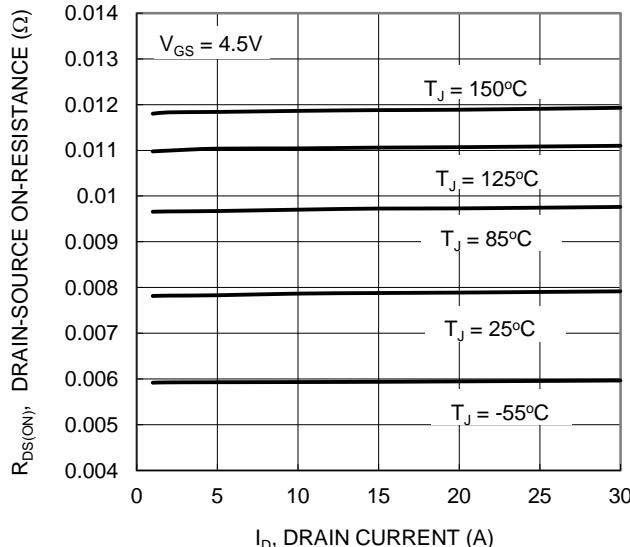


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

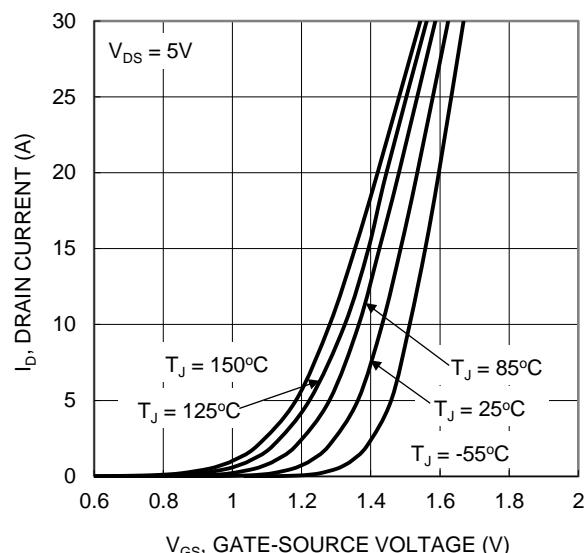


Figure 2. Typical Transfer Characteristic

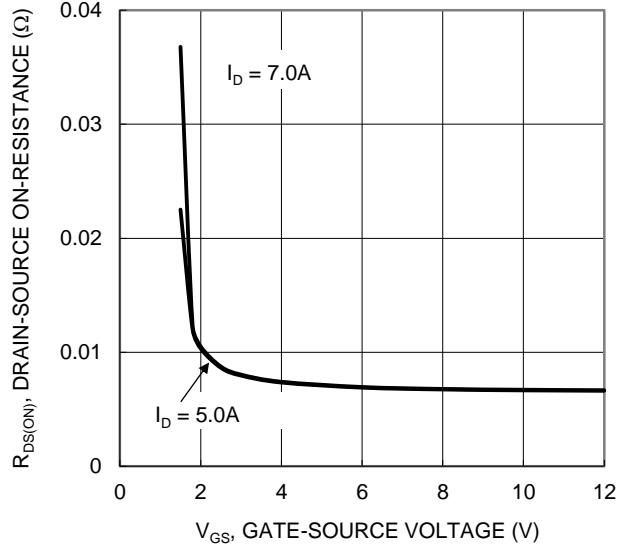


Figure 4. Typical Transfer Characteristic

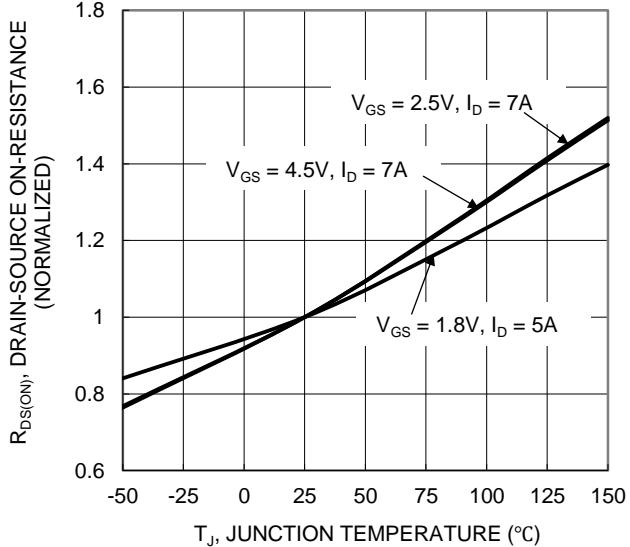
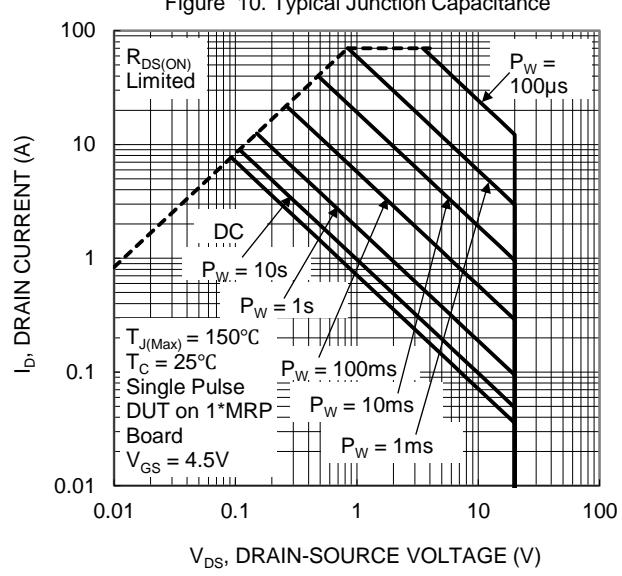
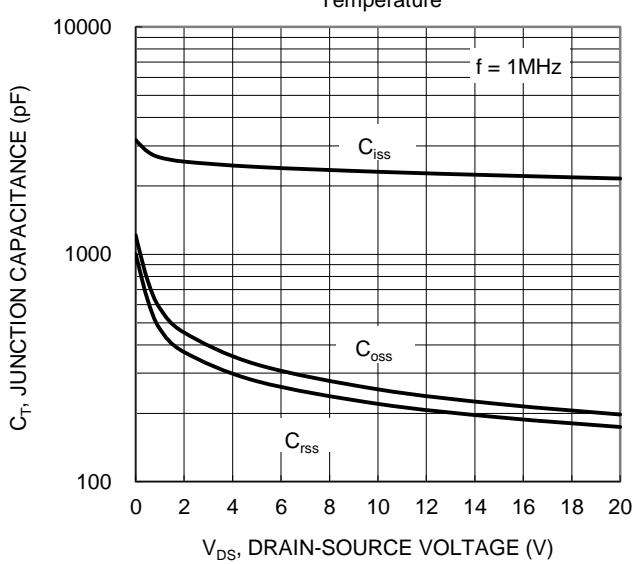
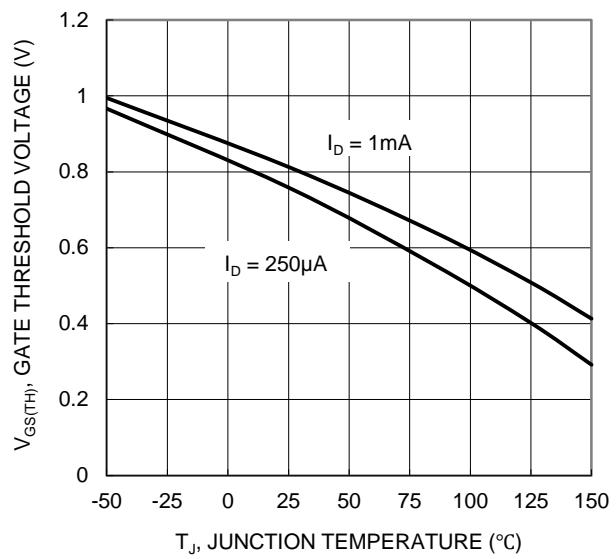
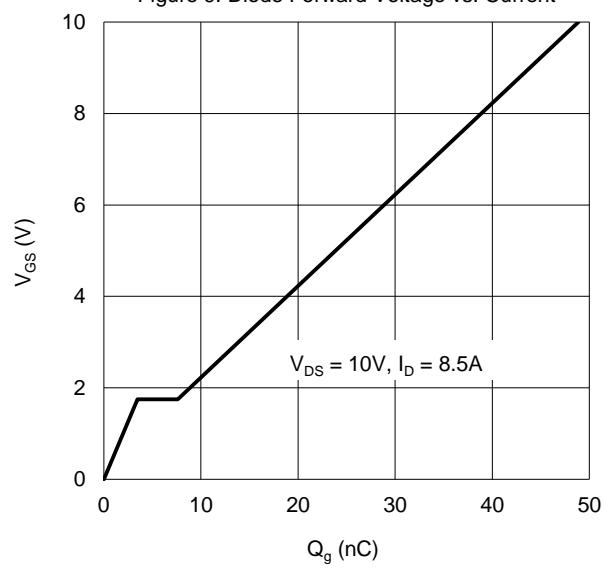
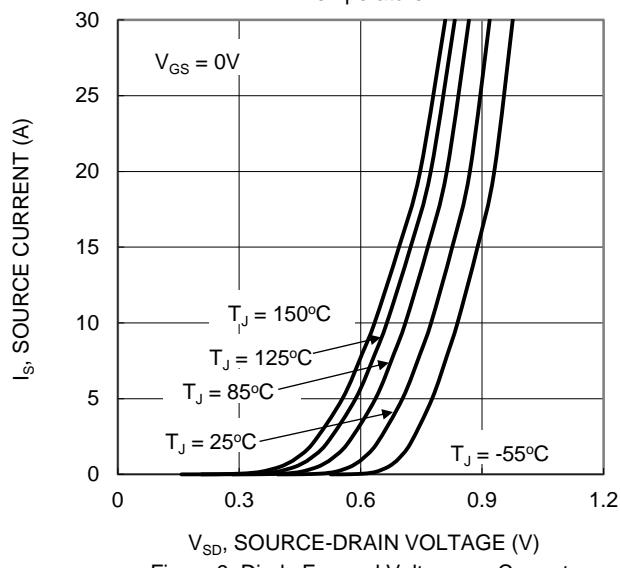
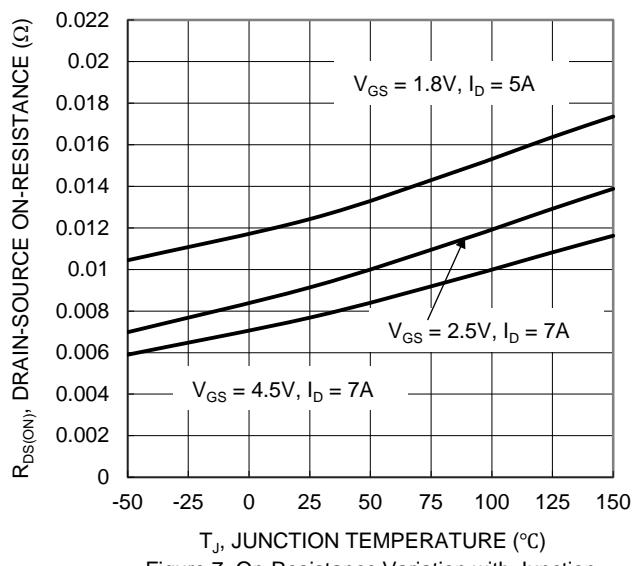


Figure 6. On-Resistance Variation with Junction Temperature



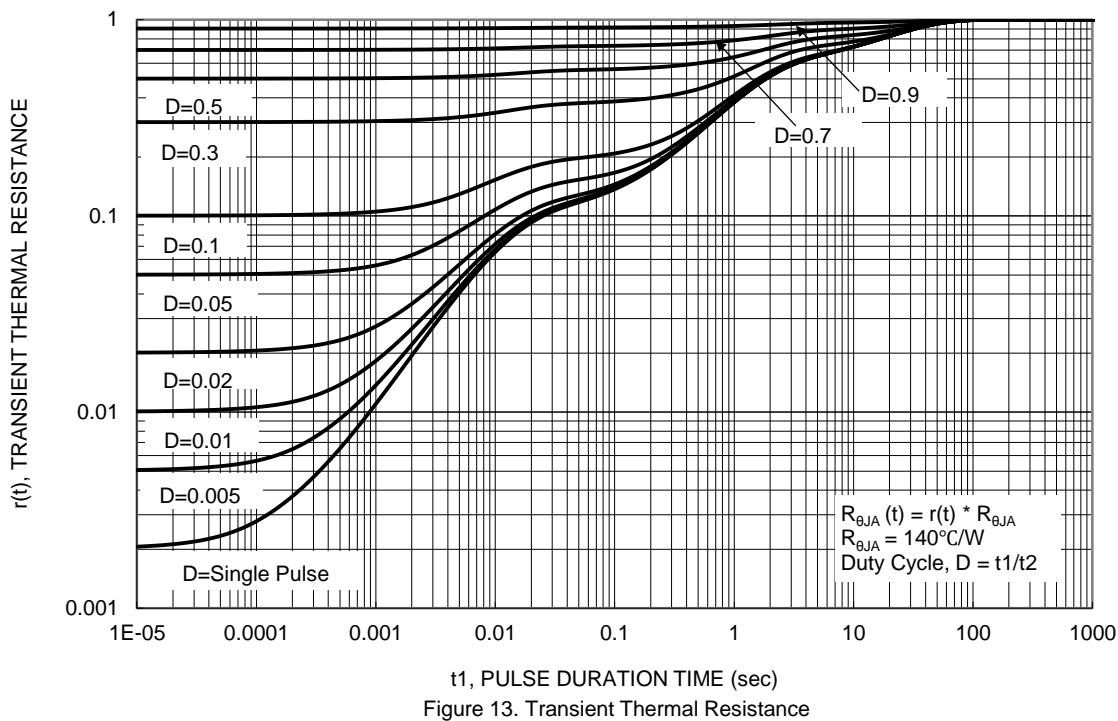
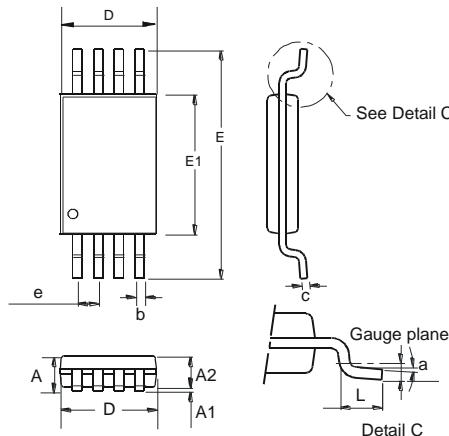


Figure 13. Transient Thermal Resistance

## Package Outline Dimensions

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

TSSOP-8



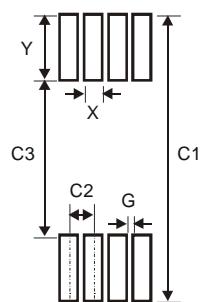
TSSOP-8			
Dim	Min	Max	Typ
<b>a</b>	0.09	—	—
<b>A</b>	—	1.20	—
<b>A1</b>	0.05	0.15	—
<b>A2</b>	0.825	1.025	0.925
<b>b</b>	0.19	0.30	—
<b>c</b>	0.09	0.20	—
<b>D</b>	2.90	3.10	3.025
<b>e</b>	—	—	0.65
<b>E</b>	—	—	6.40
<b>E1</b>	4.30	4.50	4.425
<b>L</b>	0.45	0.75	0.60

**All Dimensions in mm**

## Suggested Pad Layout

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

TSSOP-8



Dimensions	Value (in mm)
<b>X</b>	0.45
<b>Y</b>	1.78
<b>C1</b>	7.72
<b>C2</b>	0.65
<b>C3</b>	4.16
<b>G</b>	0.20

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