

## Product Summary

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

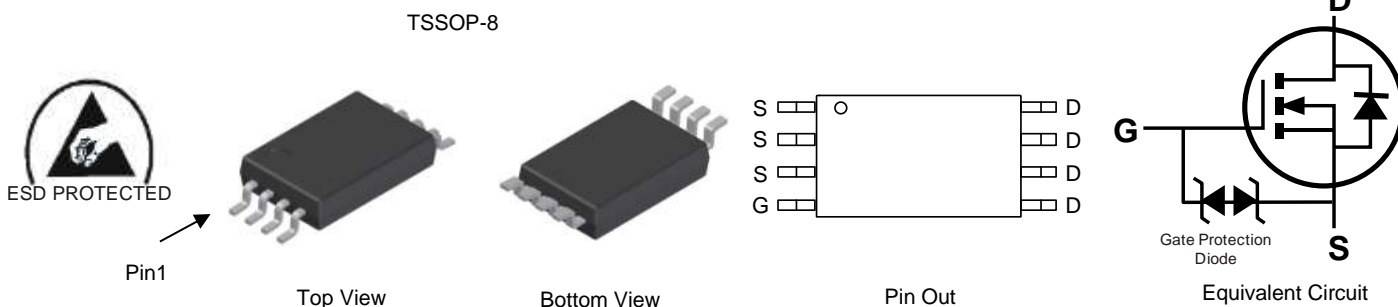
- Battery Management Application
- Power Management Functions
- DC-DC Converters

## 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)

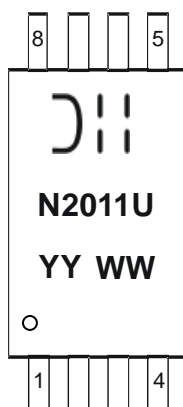



## Ordering Information (Note 4)

Part Number	Case	Packaging
DMN2011UTS-13	TSSOP-8	2,500/Tape & Reel

- Notes:
- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  - 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.
  - Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  - For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



 = 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<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V <sub>DSS</sub>	20	V
Gate-Source Voltage			V <sub>GSS</sub>	±12	V
Continuous Drain Current (Note 6) V <sub>GS</sub> = 4.5V	Steady State	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	9.0 7.2	A
	Steady State	T <sub>C</sub> = +25°C T <sub>C</sub> = +70°C	I <sub>D</sub>	21 17	A
Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)			I <sub>DM</sub>	70	A
Continuous Source-Drain Diode Current (Note 6)			I <sub>S</sub>	3	A
Pulsed Source-Drain Diode Current (10μs Pulse, Duty Cycle = 1%)			I <sub>SM</sub>	25	A
Avalanche Current (Note 7) L = 0.1mH			I <sub>AS</sub>	18	A
Avalanche Energy (Note 7) L = 0.1mH			E <sub>AS</sub>	17	mJ

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T <sub>A</sub> = +25°C	P <sub>D</sub>	0.9	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R <sub>θJA</sub>	144	°C/W
Total Power Dissipation (Note 6)	T <sub>A</sub> = +25°C	P <sub>D</sub>	1.3	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	R <sub>θJA</sub>	93	°C/W
Thermal Resistance, Junction to Case (Note 6)	Steady State	R <sub>θJC</sub>	16	°C/W
Operating and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°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 8)						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	20	—	—	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> = 16V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±10	μA	V <sub>GS</sub> = ±10V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS</b> (Note 8)						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	0.4	—	1.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	7.2	11	mΩ	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 7A
			9.0	13		V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 7A
			11.5	25		V <sub>GS</sub> = 1.8V, I <sub>D</sub> = 5A
			19.1	50		V <sub>GS</sub> = 1.5V, I <sub>D</sub> = 3A
Diode Forward Voltage	V <sub>SD</sub>	—	0.7	1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 8.5A
<b>DYNAMIC CHARACTERISTICS</b> (Note 9)						
Input Capacitance	C <sub>ISS</sub>	—	2,248	—	pF	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>OSS</sub>	—	295	—	pF	
Reverse Transfer Capacitance	C <sub>RSS</sub>	—	265	—	pF	
Gate Resistance	R <sub>G</sub>	—	1.5	—	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>	—	24	—	nC	V <sub>DS</sub> = 10V, I <sub>D</sub> = 8.5A
Total Gate Charge (V <sub>GS</sub> = 10V)	Q <sub>G</sub>	—	56	—	nC	
Gate-Source Charge	Q <sub>GS</sub>	—	3.5	—	nC	
Gate-Drain Charge	Q <sub>GD</sub>	—	5.1	—	nC	
Turn-On Delay Time	t <sub>D(ON)</sub>	—	3.6	—	ns	V <sub>DS</sub> = 10V, I <sub>D</sub> = 8.5A V <sub>GS</sub> = 4.5V, R <sub>G</sub> = 1.8Ω
Turn-On Rise Time	t <sub>R</sub>	—	2.6	—	ns	
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	21.6	—	ns	
Turn-Off Fall Time	t <sub>F</sub>	—	13.5	—	ns	I <sub>F</sub> = 8.5A, di/dt = 210A/μs
Reverse Recovery Time	t <sub>RR</sub>	—	12.8	—	ns	
Reverse Recovery Charge	Q <sub>RR</sub>	—	6.9	—	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<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.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

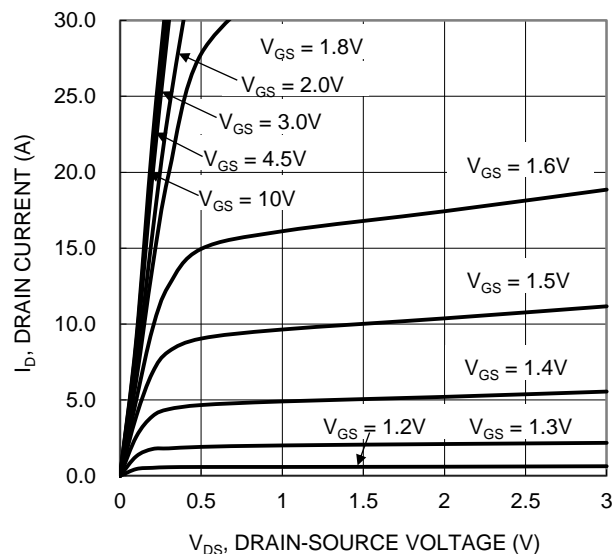


Figure 1. Typical Output Characteristic

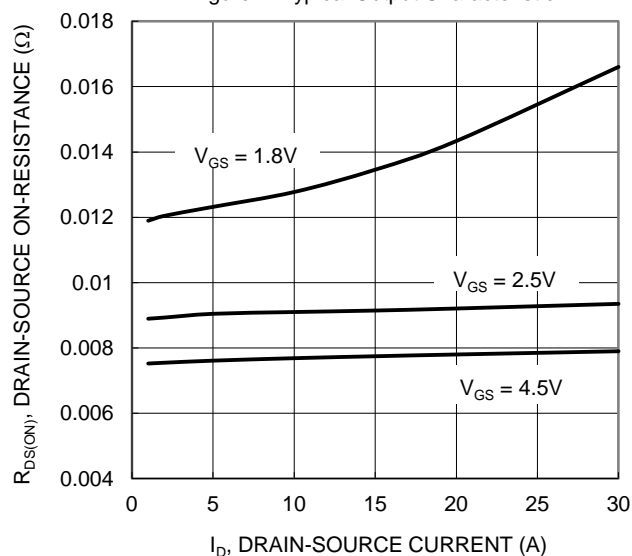


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

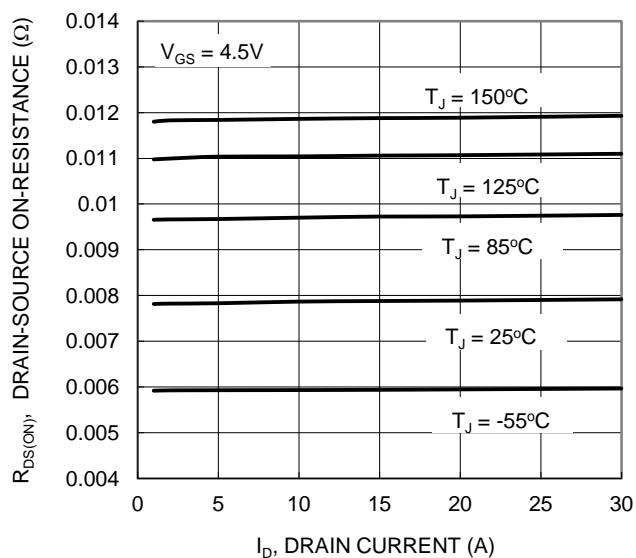


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

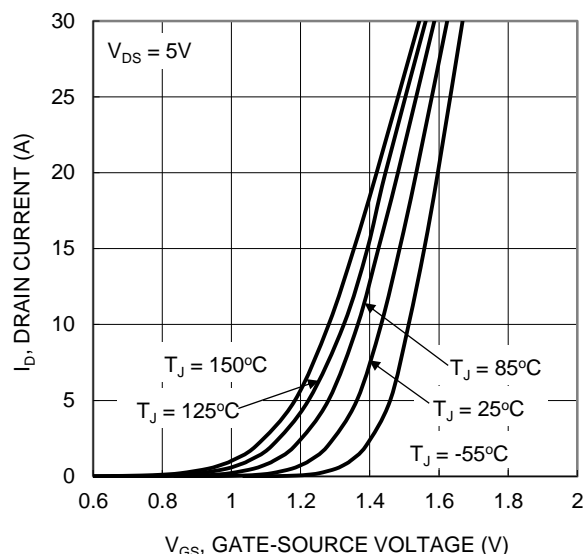


Figure 2. Typical Transfer Characteristic

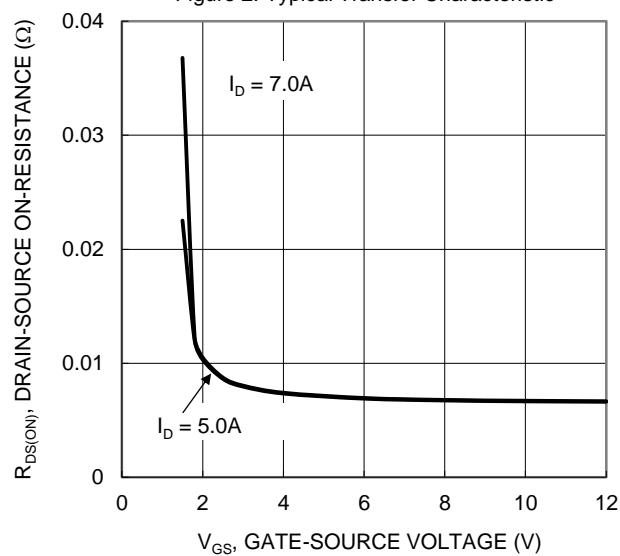


Figure 4. Typical Transfer Characteristic

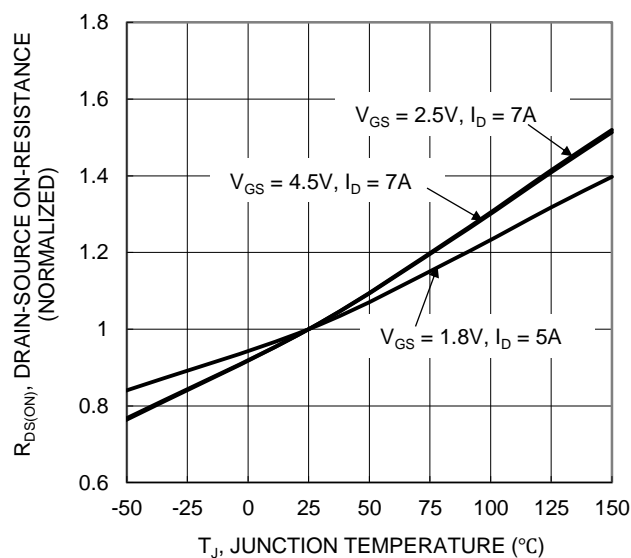
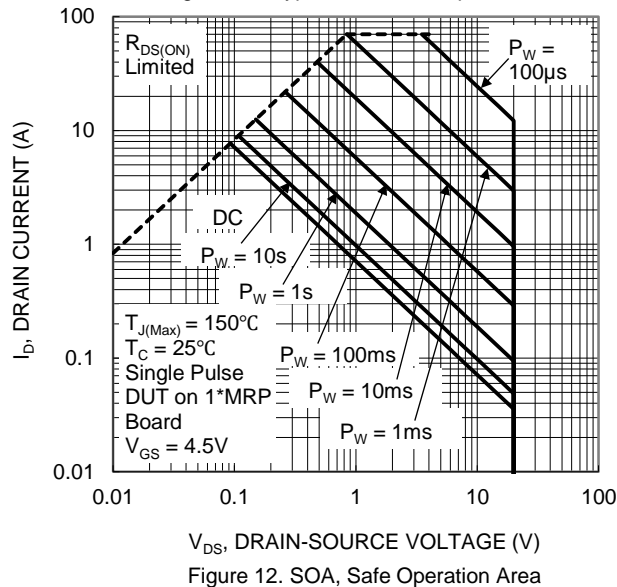
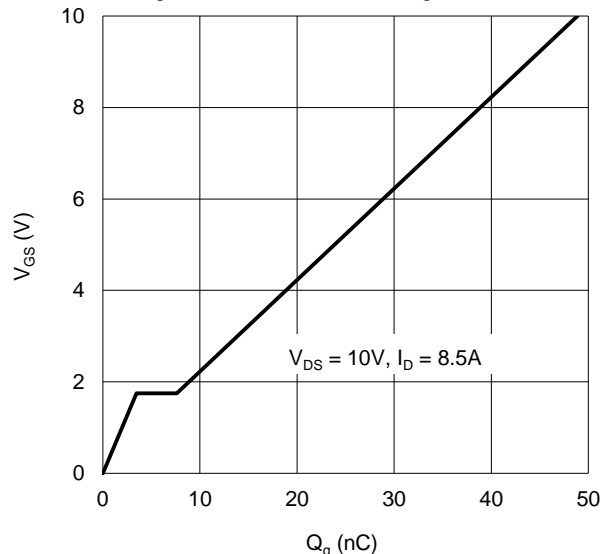
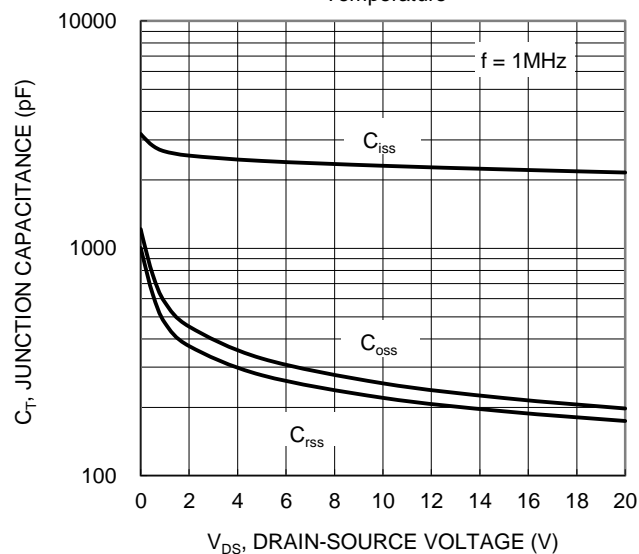
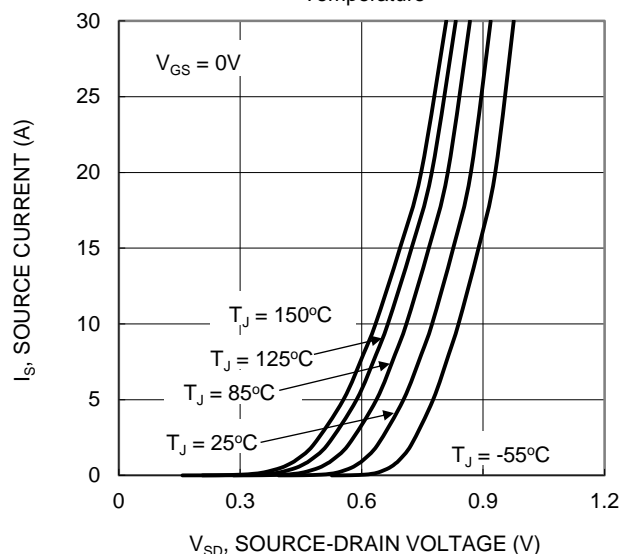
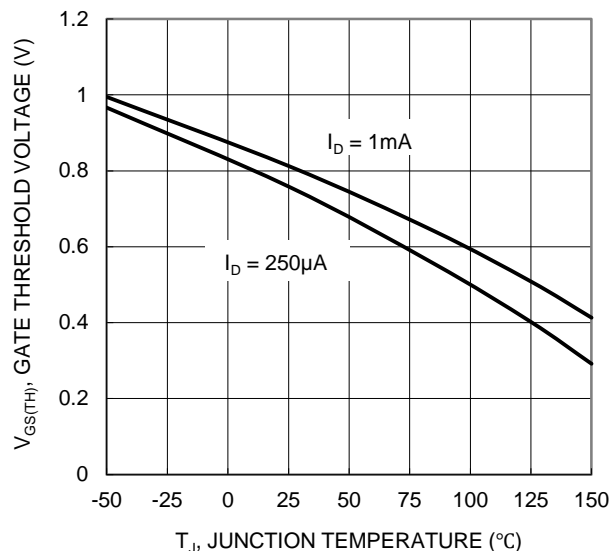
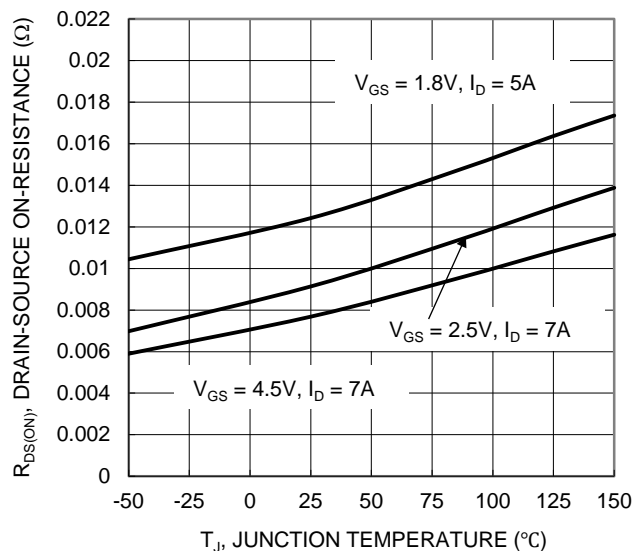
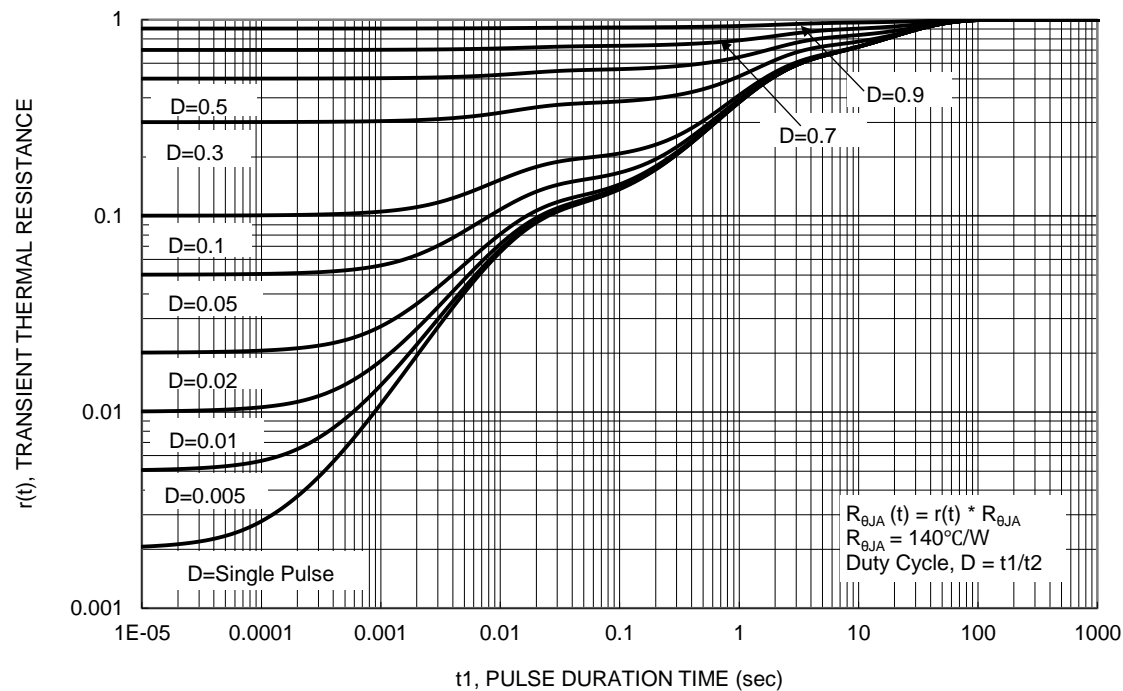


Figure 6. On-Resistance Variation with Junction Temperature

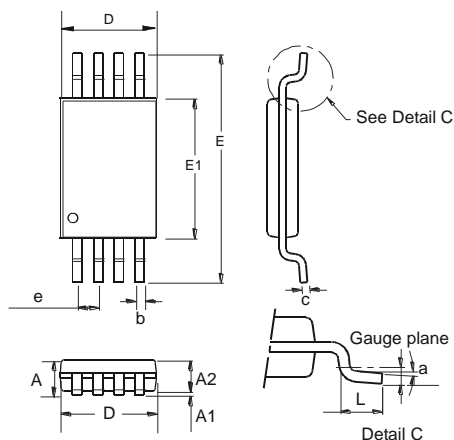




## Package Outline Dimensions

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

### TSSOP-8

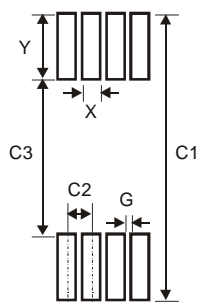


TSSOP-8			
Dim	Min	Max	Typ
a	0.09	—	—
A	—	1.20	—
A1	0.05	0.15	—
A2	0.825	1.025	0.925
b	0.19	0.30	—
c	0.09	0.20	—
D	2.90	3.10	3.025
e	—	—	0.65
E	—	—	6.40
E1	4.30	4.50	4.425
L	0.45	0.75	0.60
All Dimensions in mm			

## Suggested Pad Layout

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

### TSSOP-8



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

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