

Product Summary

BV _{DSS}	R _{DS(ON)} max	I _D max T _C = +25°C
-20V	16mΩ @ V _{GS} = -4.5V	-18A
	22mΩ @ V _{GS} = -2.5V	-15A

Description and Applications

This MOSFET is designed to meet the stringent requirements of Automotive applications. It is qualified to AEC-Q101, supported up by a PPAP and is ideal for use in:

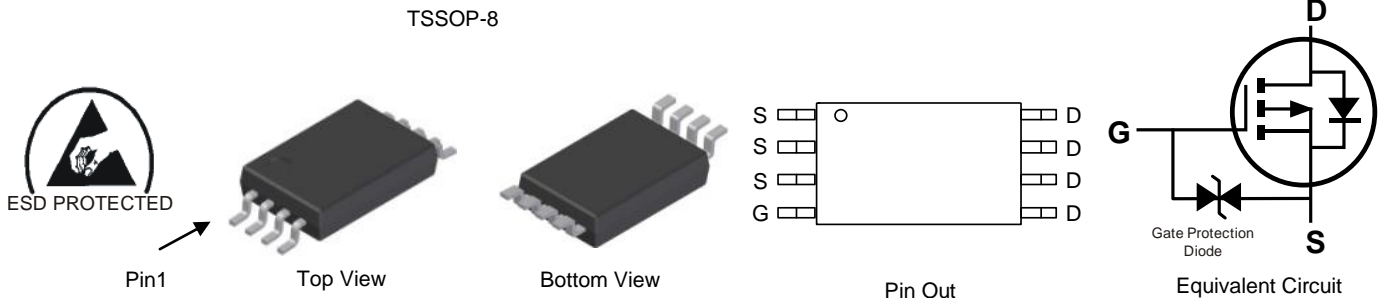
- Battery Management Application
- Power Management Functions
- DC-DC Converters

Features and Benefits

- 100% Unclamped Inductive Switching – Ensures More Reliable and Robust End Application
- 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**
- **PPAP Capable (Note 4)**

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 Lead Frame. Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.039 grams (Approximate)

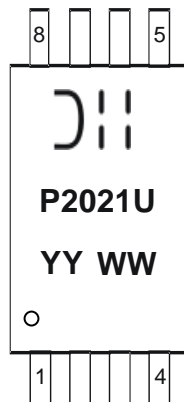


Ordering Information (Notes 4 & 5)

Part Number	Case	Packaging
DMP2021UTSQ-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 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.
 5. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



☺ = Manufacturer's Marking
 P2021U = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Year (ex: 17 = 2017)
 WW = Week (01 to 53)

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V _{DSS}	-20	V
Gate-Source Voltage			V _{GSS}	±10	V
Continuous Drain Current (Note 7) V _{GS} = -4.5V	Steady State	T _A = +25°C T _A = +70°C	I _D	-7.4 -5.9	A
	Steady State	T _C = +25°C T _C = +70°C	I _D	-18 -14	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I _{DM}	-55	A
Continuous Source-Drain Diode Current (Note 7)		T _A = +25°C	I _S	-2	A
Pulsed Source-Drain Diode Current (10µs Pulse, Duty Cycle = 1%)			I _{SM}	-20	A
Avalanche Current (Note 8) L = 0.1mH			I _{AS}	-25	A
Avalanche Energy (Note 8) L = 0.1mH			E _{AS}	32	mJ

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 6)	T _A = +25°C	P _D	0.9	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	R _{θJA}	146	°C/W
Total Power Dissipation (Note 7)	T _A = +25°C	P _D	1.3	W
Thermal Resistance, Junction to Ambient (Note 7)	Steady State	R _{θJA}	95	°C/W
Thermal Resistance, Junction to Case (Note 7)	Steady State	R _{θJC}	16	
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +150	°C

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 9)						
Drain-Source Breakdown Voltage	BV _{DSS}	-20	—	—	V	V _{GS} = 0V, I _D = -250µA
Zero Gate Voltage Drain Current T _J = +25°C	I _{DSS}	—	—	-1	µA	V _{DS} = -20V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±10	µA	V _{GS} = ±8V, V _{DS} = 0V
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	V _{GS(TH)}	-0.35	—	-1.0	V	V _{DS} = V _{GS} , I _D = -250µA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	12	16	mΩ	V _{GS} = -4.5V, I _D = -4.5A
			15	22		V _{GS} = -2.5V, I _D = -4.5A
			19	40		V _{GS} = -1.8V, I _D = -2.5A
Diode Forward Voltage	V _{SD}	—	-0.8	-1.2	V	V _{GS} = 0V, I _S = -1.0A
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C _{iss}	—	2,760	—	pF	V _{DS} = -15V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{oss}	—	262	—		
Reverse Transfer Capacitance	C _{rss}	—	220	—		
Gate Resistance	R _g	—	16	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = -4.5V)	Q _g	—	34	—	nC	V _{DS} = -15V, I _D = -4.0A
Total Gate Charge (V _{GS} = -8V)	Q _g	—	59	—		
Gate-Source Charge	Q _{gs}	—	3.5	—		
Gate-Drain Charge	Q _{gd}	—	8.3	—		
Turn-On Delay Time	t _{D(ON)}	—	7.5	—	ns	V _{DS} = -15V, V _{GS} = -4.5V, R _G = 1Ω, I _D = -4.0A
Turn-On Rise Time	t _R	—	25	—		
Turn-Off Delay Time	t _{D(OFF)}	—	125	—		
Turn-Off Fall Time	t _F	—	96	—		
Reverse Recovery Time	t _{RR}	—	48	—	ns	I _F = -1.0A, di/dt = 100A/µs
Reverse Recovery Charge	Q _{RR}	—	33	—	nC	I _F = -1.0A, di/dt = 100A/µs

- 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. I_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep T_J = +25°C.
 9. Short duration pulse test used to minimize self-heating effect.
 10. Guaranteed by design. Not subject to product testing.

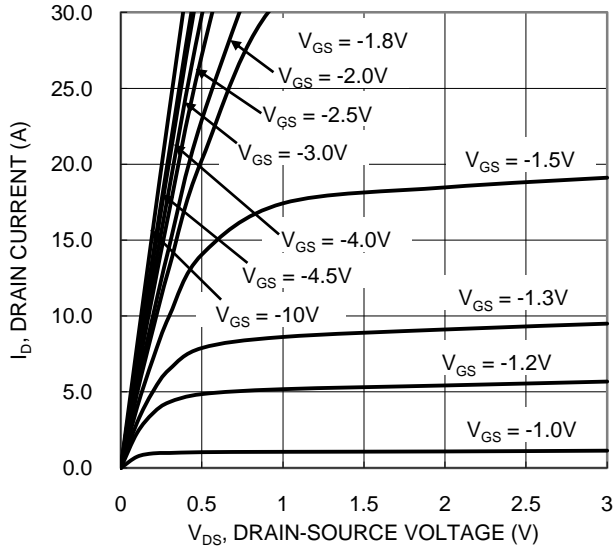


Figure 1. Typical Output Characteristic

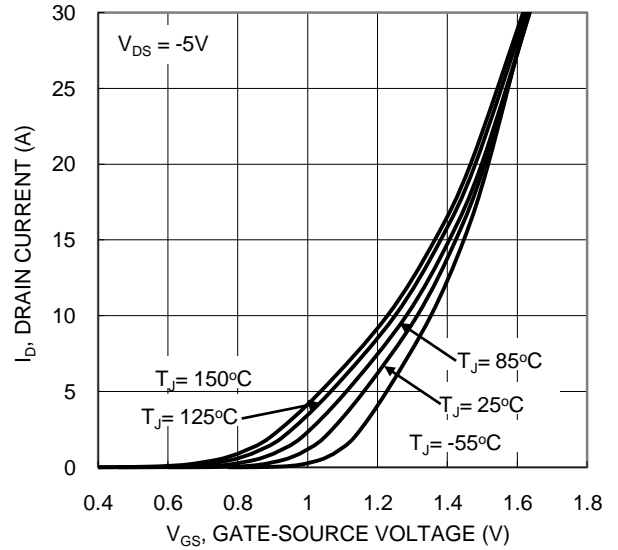


Figure 2. Typical Transfer Characteristic

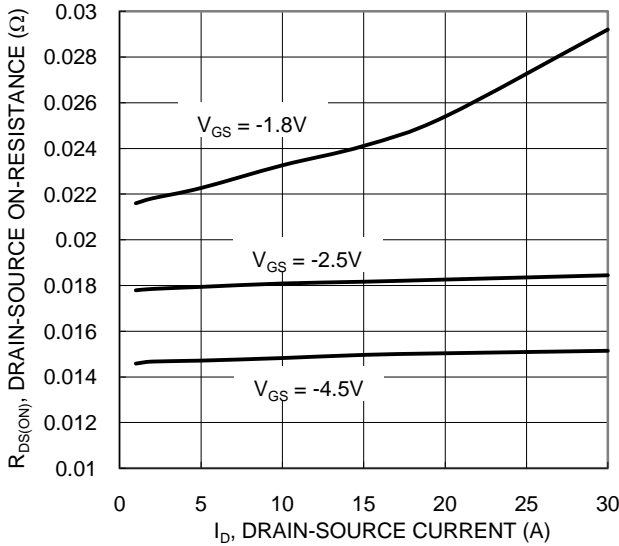


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

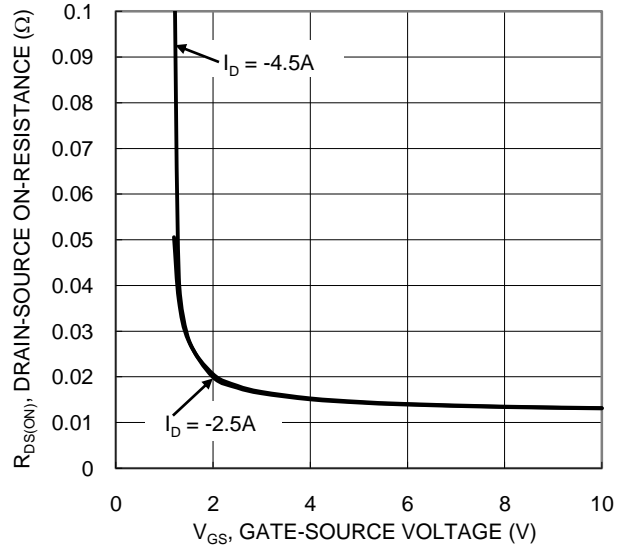


Figure 4. Typical Transfer Characteristic

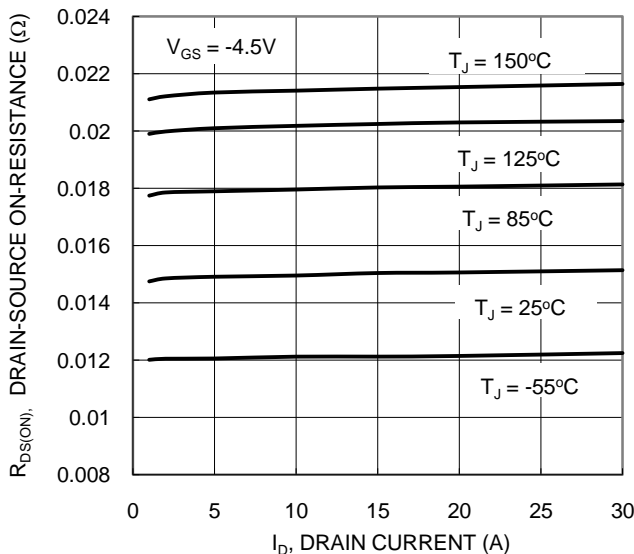


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

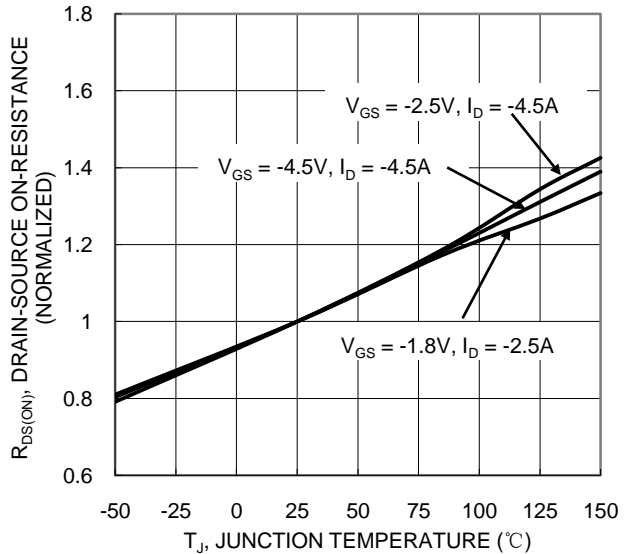


Figure 6. On-Resistance Variation with Junction Temperature

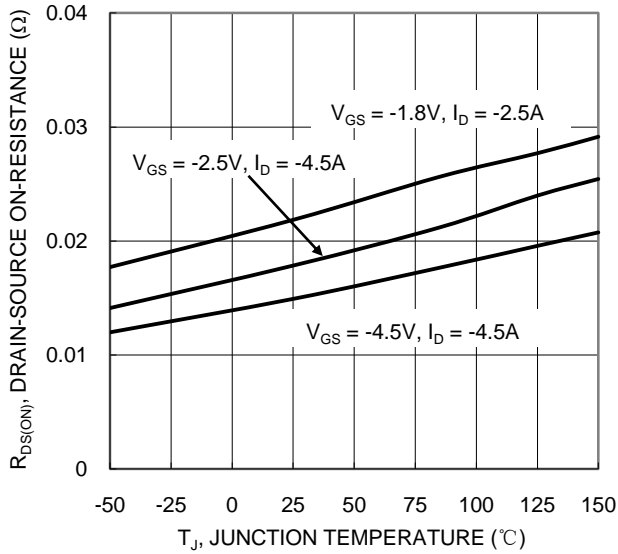


Figure 7. On-Resistance Variation with Junction Temperature

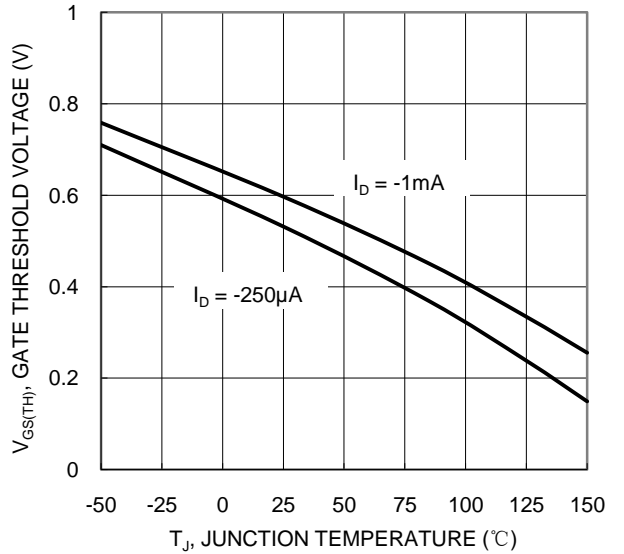


Figure 8. Gate Threshold Variation vs. Junction Temperature

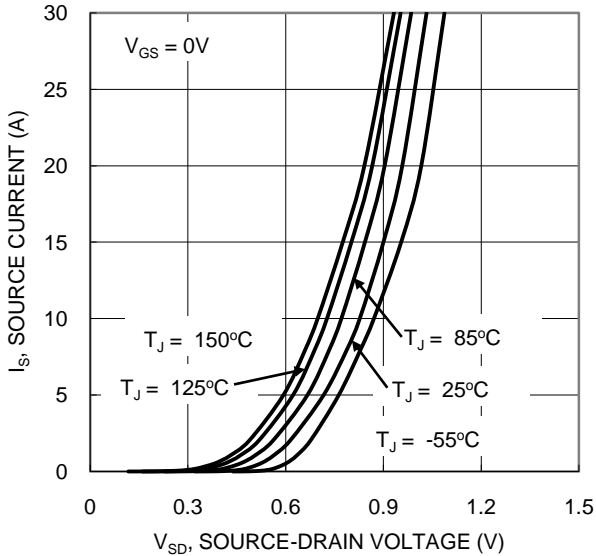


Figure 9. Diode Forward Voltage vs. Current

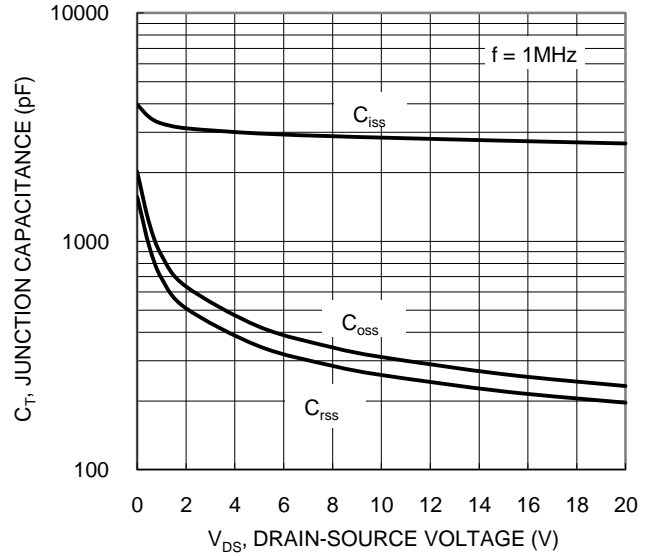


Figure 10. Typical Junction Capacitance

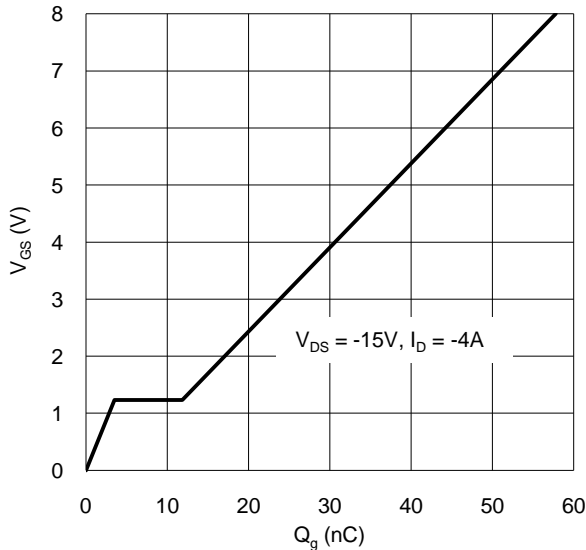


Figure 11. Gate Charge

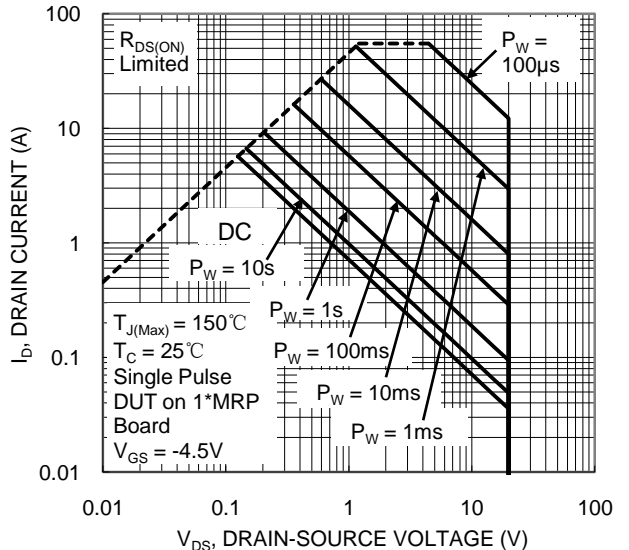


Figure 12. SOA, Safe Operation Area

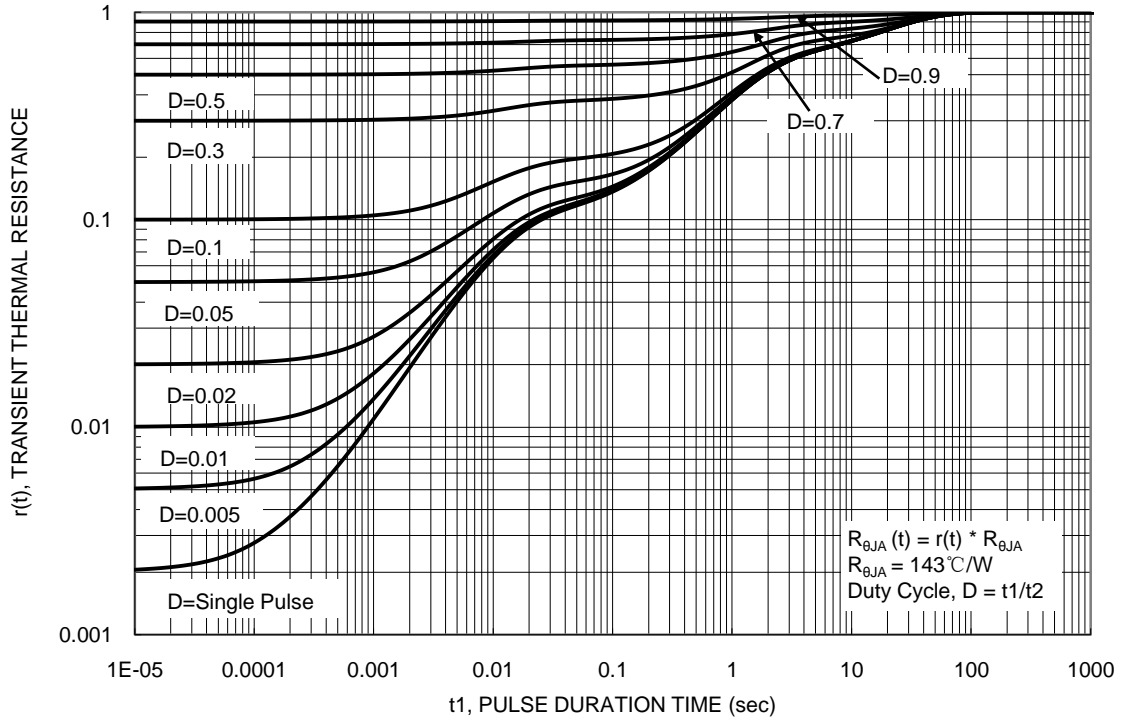
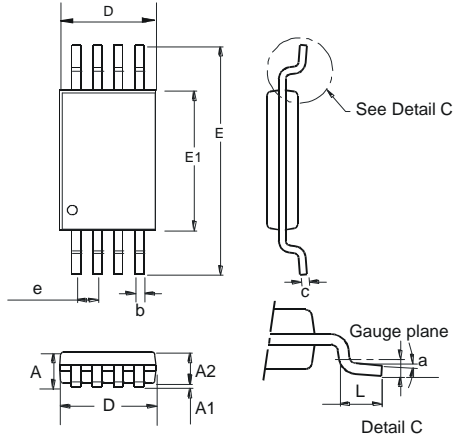


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

TSSOP-8

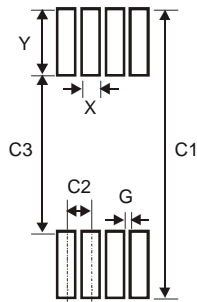


TSSOP-8			
Dim	Min	Max	Typ
a	0.09	–	–
A	–	1.20	–
A1	0.05	0.15	–
A2	0.825	1.025	0.925
b	0.19	0.30	–
c	0.09	0.20	–
D	2.90	3.10	3.025
e	–	–	0.65
E	–	–	6.40
E1	4.30	4.50	4.425
L	0.45	0.75	0.60
All Dimensions in mm			

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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