

Product Summary

BV_{DSS}	$R_{DS(ON)}$ max	I_D max $T_C = +25^\circ C$
30V	5.5m Ω @ $V_{GS} = 10V$	60A
	9.0m Ω @ $V_{GS} = 4.5V$	50A

Features and Benefits

- Low $R_{DS(ON)}$ —Ensures On-State Losses are Minimized
- Small Form Factor Thermally Efficient Package Enables Higher Density End Products
- Occupies Just 33% of the Board Area Occupied by SO-8 Enabling Smaller End Product
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen- and Antimony-Free. "Green" Device (Note 3)**
- **The DMN3009LFVQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**

<https://www.diodes.com/quality/product-definitions/>

Description and Applications

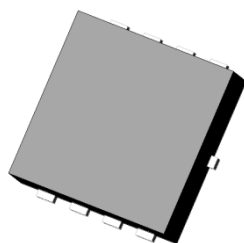
This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP, and is ideal for use in:

- Backlighting
- Power Management Functions
- DC-DC Converters

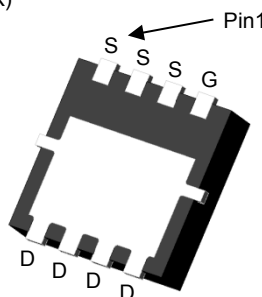
Mechanical Data

- Case: PowerDI[®]3333-8 (Type UX)
- Case 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 Lead-Frame. Solderable per MIL-STD-202, Method 208 [Ⓔ]
- Weight: 0.072 grams (Approximate)

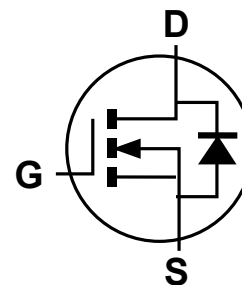
PowerDI3333-8 (Type UX)



Top View



Bottom View



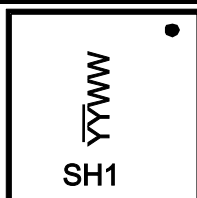
Equivalent Circuit

Ordering Information (Note 4)

Part Number	Case	Packaging
DMN3009LFVQ-7	PowerDI3333-8 (Type UX)	2000/Tape & Reel
DMN3009LFVQ-13	PowerDI3333-8 (Type UX)	3000/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



SH1= Product Type Marking Code
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 20 = 2020)
WW = Week Code (01 to 53)

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

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	30	V
Gate-Source Voltage	V_{GSS}	± 20	V
Continuous Drain Current (Note 7) $V_{GS} = 10\text{V}$	I_D	$T_C = +25^\circ\text{C}$ 60	A
		$T_C = +70^\circ\text{C}$ 50	
Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%)	I_{DM}	90	A
Maximum Continuous Body Diode Forward Current (Note 7)	I_S	60	A
Avalanche Current, $L = 0.1\text{mH}$ (Note 8)	I_{AS}	33	A
Avalanche Energy, $L = 0.1\text{mH}$ (Note 8)	E_{AS}	58	mJ

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

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P_D	1.0	W
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	Steady State	$^\circ\text{C/W}$
		126	
Total Power Dissipation (Note 6)	P_D	2.0	W
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	Steady State	$^\circ\text{C/W}$
		62	
Thermal Resistance, Junction to Case (Note 7)	$R_{\theta JC}$	3.5	$^\circ\text{C/W}$
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
OFF CHARACTERISTICS (Note 9)						
Drain-Source Breakdown Voltage	BV_{DSS}	30	—	—	V	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	μA	$V_{DS} = 24\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 100	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	$V_{GS(TH)}$	1	—	3	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	3.5	5.5	m Ω	$V_{GS} = 10\text{V}, I_D = 30\text{A}$
		—	4.6	9.0		$V_{GS} = 4.5\text{V}, I_D = 15\text{A}$
Diode Forward Voltage	V_{SD}	—	0.7	1.2	V	$V_{GS} = 0\text{V}, I_S = 1\text{A}$
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C_{iss}	—	2,000	—	pF	$V_{DS} = 15\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Output Capacitance	C_{oss}	—	315	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	247	—	pF	
Gate Resistance	R_g	—	2.2	—	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	—	20	—	nC	$V_{DS} = 15\text{V}, I_D = 15\text{A}$
Total Gate Charge ($V_{GS} = 10\text{V}$)	Q_g	—	42	—	nC	
Gate-Source Charge	Q_{gs}	—	4.7	—	nC	
Gate-Drain Charge	Q_{gd}	—	7.4	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	3.9	—	ns	$V_{DD} = 15\text{V}, V_{GS} = 10\text{V}, R_G = 3.3\Omega, I_D = 15\text{A}$
Turn-On Rise Time	t_R	—	4.1	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	31	—	ns	
Turn-Off Fall Time	t_F	—	15	—	ns	
Body Diode Reverse Recovery Time	t_{RR}	—	15	—	ns	$I_F = 15\text{A}, di/dt = 100\text{A}/\mu\text{s}$
Body Diode Reverse Recovery Charge	Q_{RR}	—	6.0	—	nC	

- Notes:
- Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
 - Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1-inch square copper plate.
 - Thermal resistance from junction to soldering point (on the exposed drain pad).
 - 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.

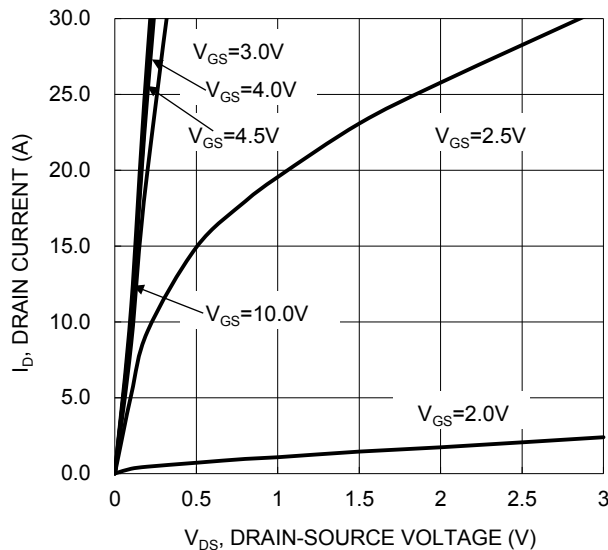


Figure 1. Typical Output Characteristic

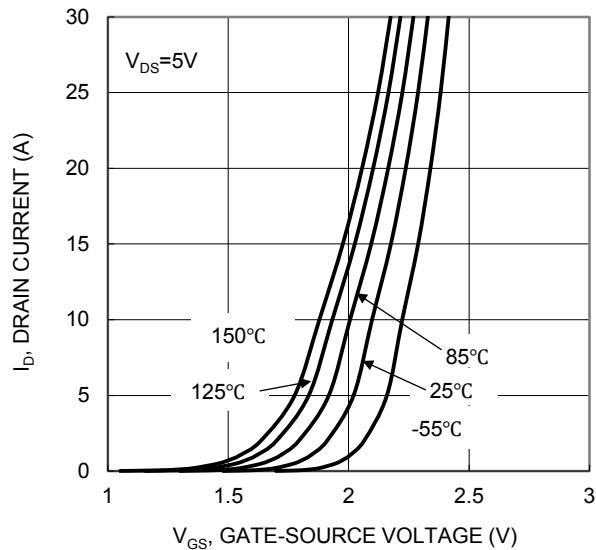


Figure 2. Typical Transfer Characteristic

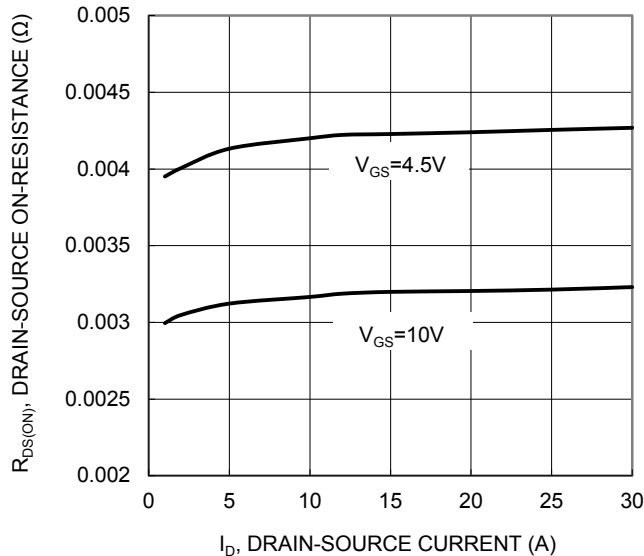


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

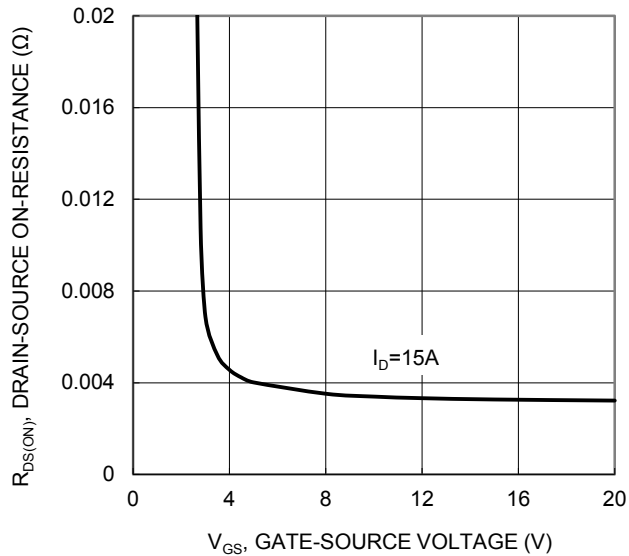


Figure 4. Typical Transfer Characteristic

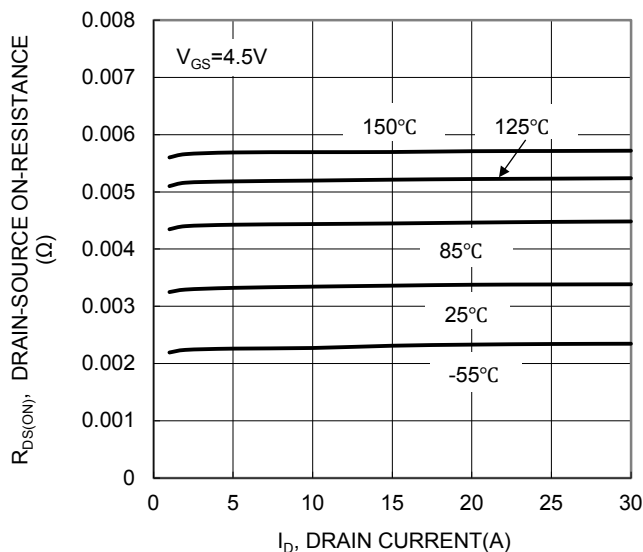


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

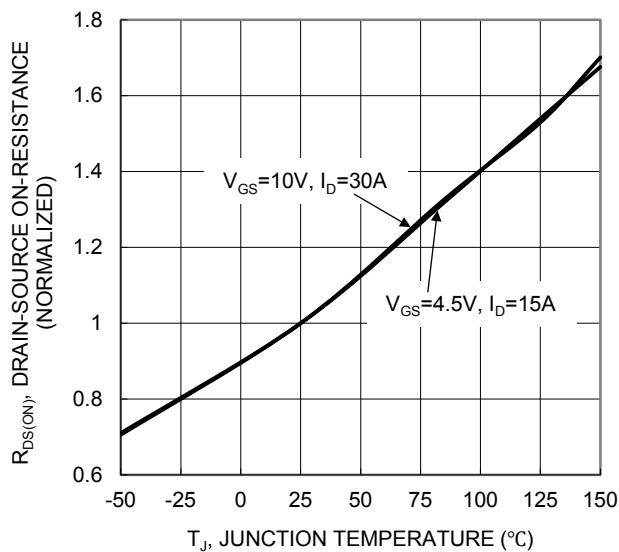


Figure 6. On-Resistance Variation with Temperature

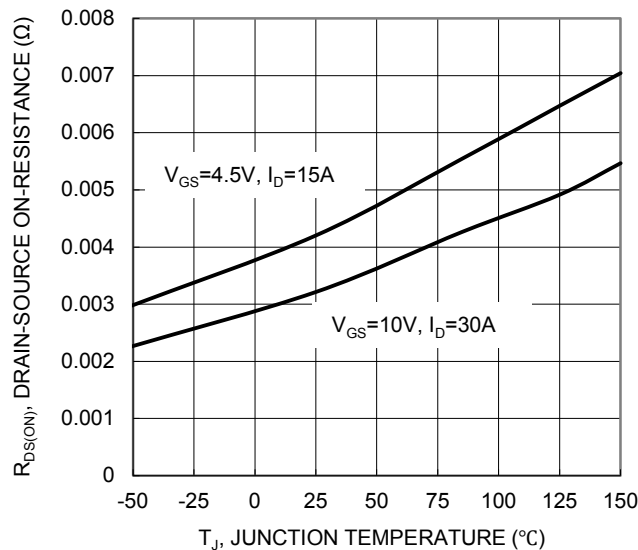


Figure 7. On-Resistance Variation with Temperature

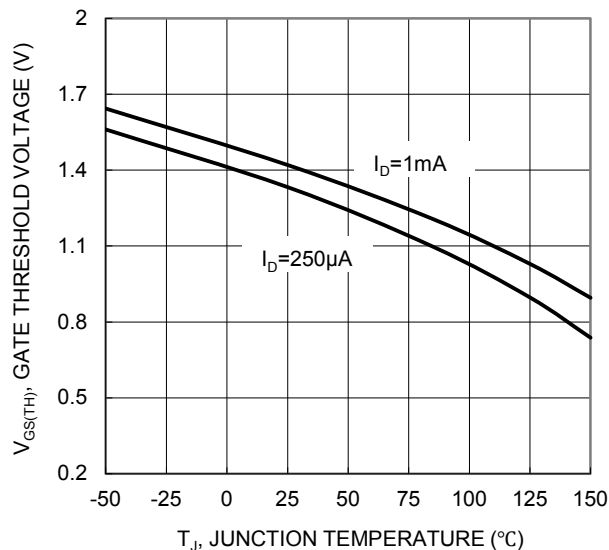


Figure 8. Gate Threshold Variation vs. Junction Temperature

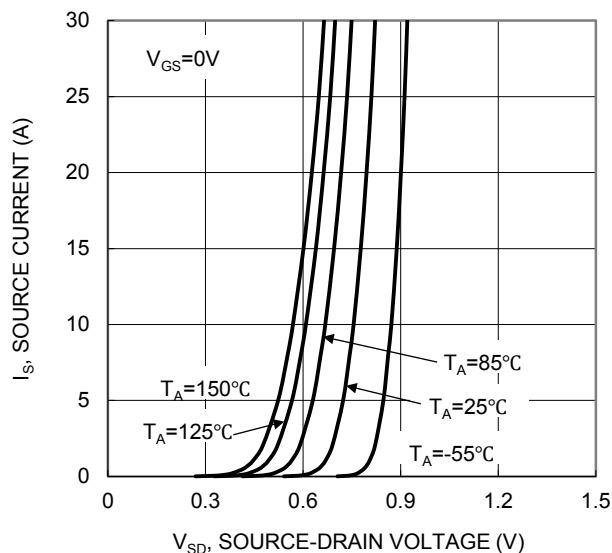


Figure 9. Diode Forward Voltage vs Current

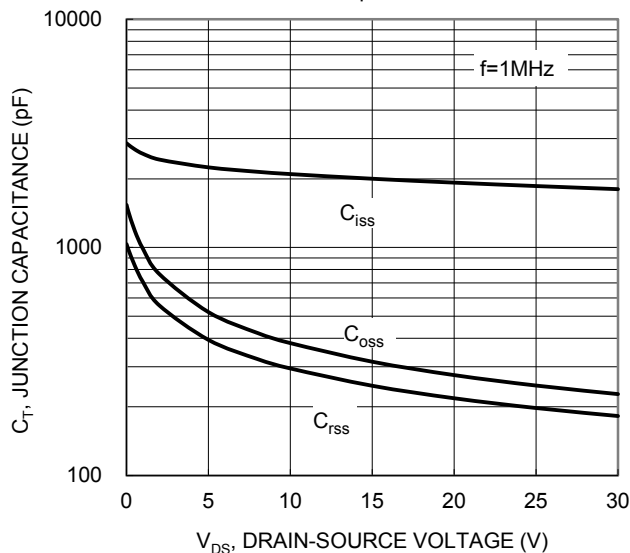


Figure 10. Typical Junction Capacitance

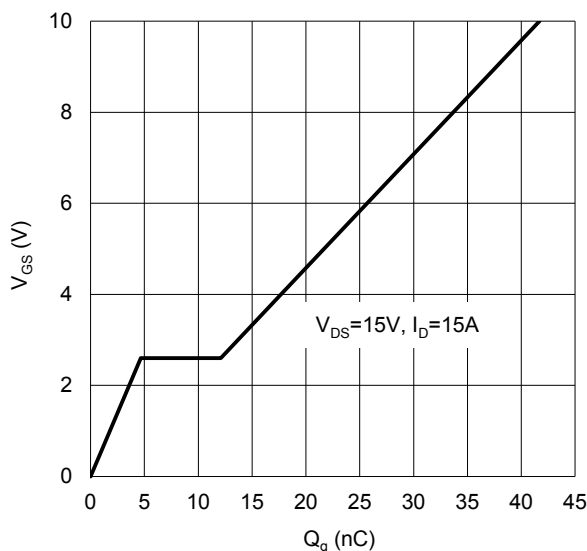


Figure 11. Gate Charge

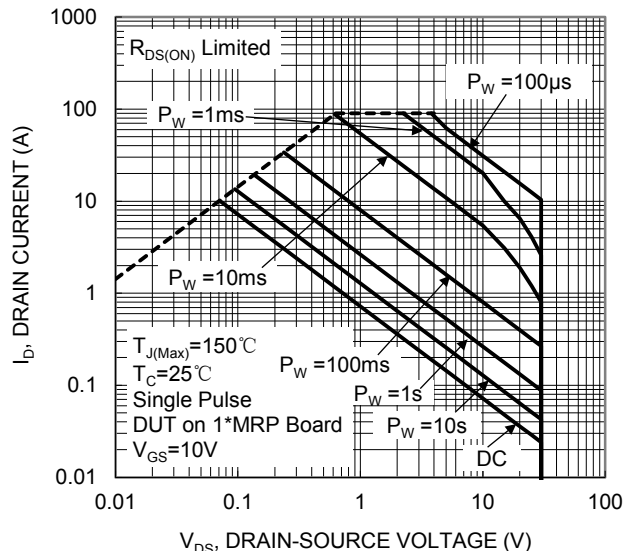


Figure 12. SOA, Safe Operation Area

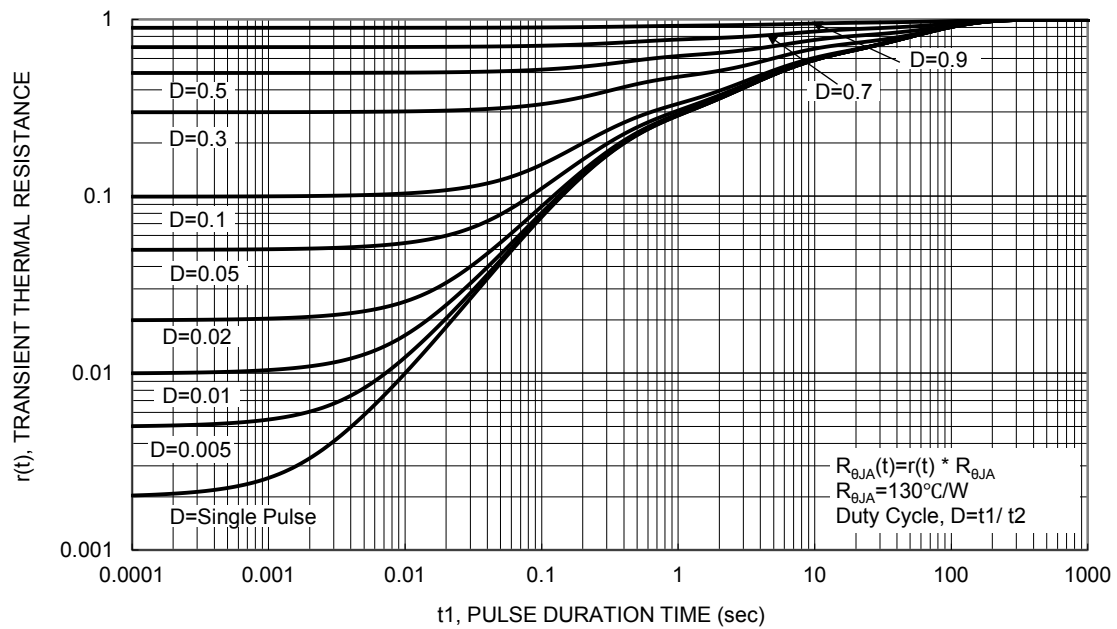
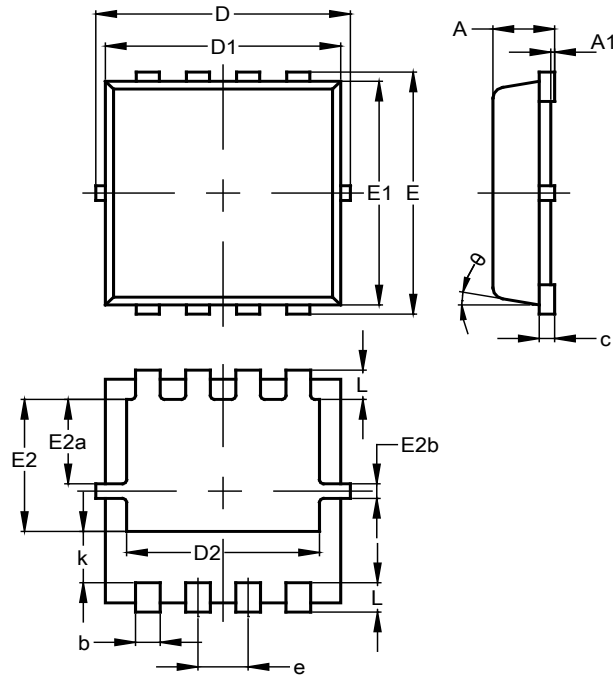


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

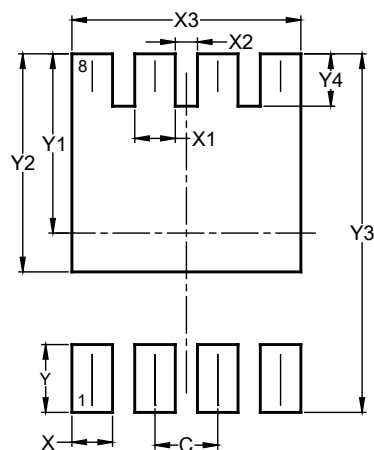
Please see <http://www.diodes.com/package-outlines.html> for the latest version.



PowerDI3333-8 (Type UX)			
Dim	Min	Max	Typ
A	0.75	0.85	0.80
A1	0.00	0.05	--
b	0.25	0.40	0.32
c	0.10	0.25	0.15
D	3.20	3.40	3.30
D1	2.95	3.15	3.05
D2	2.30	2.70	2.50
E	3.20	3.40	3.30
E1	2.95	3.15	3.05
E2	1.60	2.00	1.80
E2a	0.95	1.35	1.15
E2b	0.10	0.30	0.20
e	0.65 BSC		
k	0.50	0.90	0.70
L	0.30	0.50	0.40
θ	0°	12°	10°
All Dimensions in mm			

Suggested Pad Layout

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



Dimensions	Value (in mm)
C	0.650
X	0.420
X1	0.420
X2	0.230
X3	2.370
Y	0.700
Y1	1.850
Y2	2.250
Y3	3.700
Y4	0.540

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