



**THE DATASHEET OF  
DMN3009SFGQ-13**



## Product Summary

BV <sub>DSS</sub>	R <sub>DS(on)</sub> Max	I <sub>D</sub> Max T <sub>C</sub> = +25°C
30V	5.5mΩ @ V <sub>GS</sub> = 10V	45A
	9mΩ @ V <sub>GS</sub> = 4.5V	30A

## Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The DMN3009SFGQ 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/>

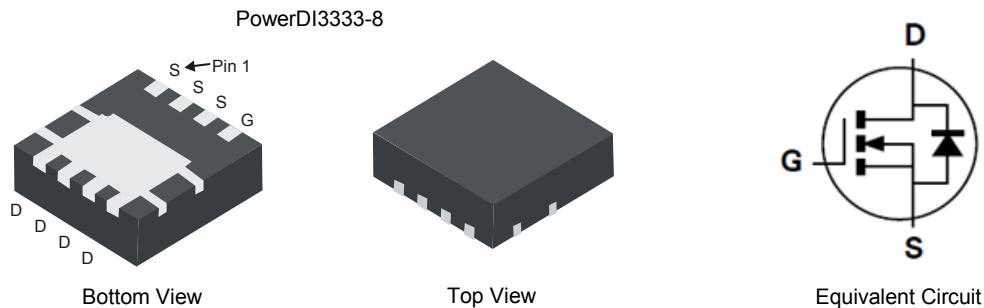
## Description and Applications

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:

- Power Management Functions
- DC-DC Converters
- Batteries

## Mechanical Data

- Case: PowerDI<sup>®</sup> 3333-8
- 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 Leadframe. Solderable per MIL-STD-202, Method 208 Ⓜ3
- Weight: 0.072 grams (Approximate)

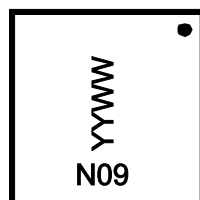


## Ordering Information (Note 4)

Part Number	Case	Packaging
DMN3009SFGQ-7	PowerDI3333-8	2,000/Tape & Reel
DMN3009SFGQ-13	PowerDI3333-8	3,000/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



N09 = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Last Two Digits of Year (ex: 21 = 2021)  
 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	$V_{GSS}$	$\pm 20$	V	
Continuous Drain Current, $V_{GS} = 10\text{V}$ (Note 6)	$I_D$	$T_A = +25^\circ\text{C}$	16	
		$T_A = +70^\circ\text{C}$	13	
	$I_D$	$T_C = +25^\circ\text{C}$	45	A
		$T_C = +70^\circ\text{C}$	35	A
Pulsed Drain Current (380 $\mu\text{s}$ Pulse, Duty Cycle = 1%)	$I_{DM}$	80	A	
Maximum Continuous Body Diode Forward Current (Note 6)	$I_S$	20	A	
Avalanche Current, $L = 0.1\text{mH}$	$I_{AS}$	33	A	
Avalanche Energy, $L = 0.1\text{mH}$	$E_{AS}$	55	mJ	

**Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	$P_D$	$T_A = +25^\circ\text{C}$	0.9
		$T_A = +70^\circ\text{C}$	0.6
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	137	$^\circ\text{C/W}$
Total Power Dissipation (Note 6)	$P_D$	$T_A = +25^\circ\text{C}$	2.1
		$T_A = +70^\circ\text{C}$	1.4
Thermal Resistance, Junction to Ambient (Note 6) Steady State	$R_{\theta JA}$	59	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case (Note 6)	$R_{\theta JC}$	7.8	$^\circ\text{C/W}$
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
<b>OFF CHARACTERISTICS</b> (Note 7)						
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	$\mu\text{A}$	$V_{DS} = 24\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 100$	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS</b> (Note 7)						
Gate Threshold Voltage	$V_{GS(th)}$	1	1.4	2.5	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(on)}$	—	4.0	5.5	m $\Omega$	$V_{GS} = 10\text{V}, I_D = 20\text{A}$
		—	4.9	9		$V_{GS} = 4.5\text{V}, I_D = 16\text{A}$
Diode Forward Voltage	$V_{SD}$	—	0.68	1	V	$V_{GS} = 0\text{V}, I_S = 1\text{A}$
<b>DYNAMIC CHARACTERISTICS</b> (Note 8)						
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	$C_{riss}$	—	248	—	pF	
Gate Resistance	$R_g$	—	2.2	—	$\Omega$	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Total Gate Charge ( $V_{GS} = 4.5\text{V}$ )	$Q_g$	—	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	$t_F$	—	14.6	—	ns	
Reverse Recovery Time	$t_{RR}$	—	15	—	ns	$I_F = 15\text{A}, di/dt = 100\text{A}/\mu\text{s}$
Reverse Recovery Charge	$Q_{RR}$	—	6	—	nC	

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
  - Thermal resistance from junction to soldering point (on the exposed drain pad).
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to production testing.

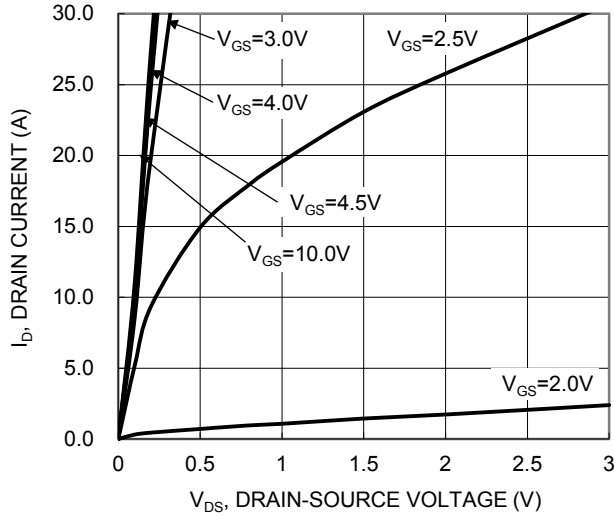


Figure 1. Typical Output Characteristic

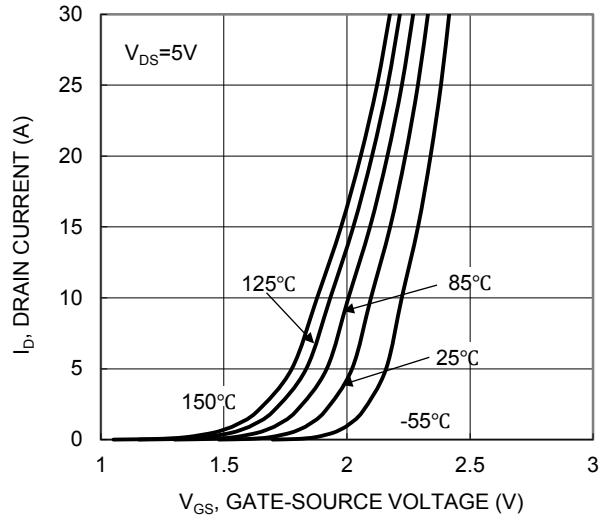


Figure 2. Typical Transfer Characteristic

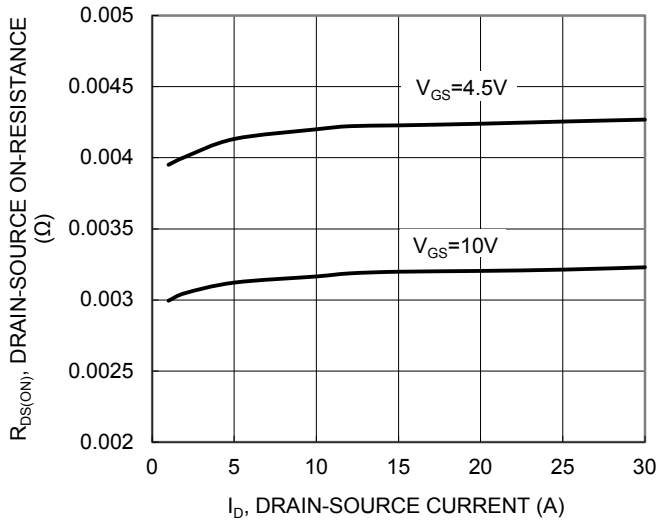


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

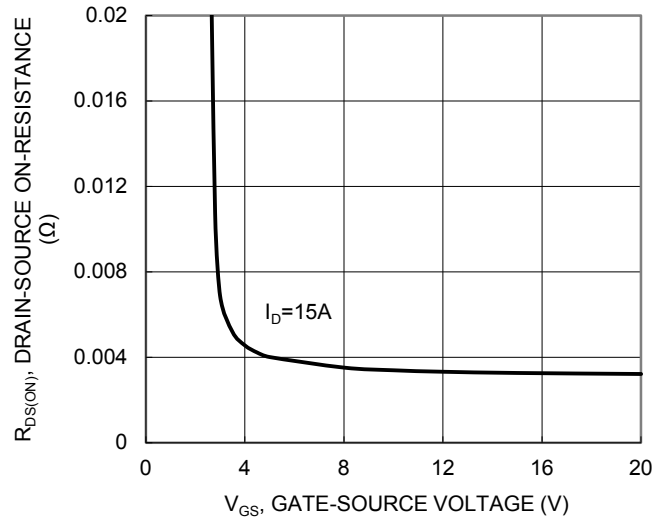


Figure 4. Typical Transfer Characteristic

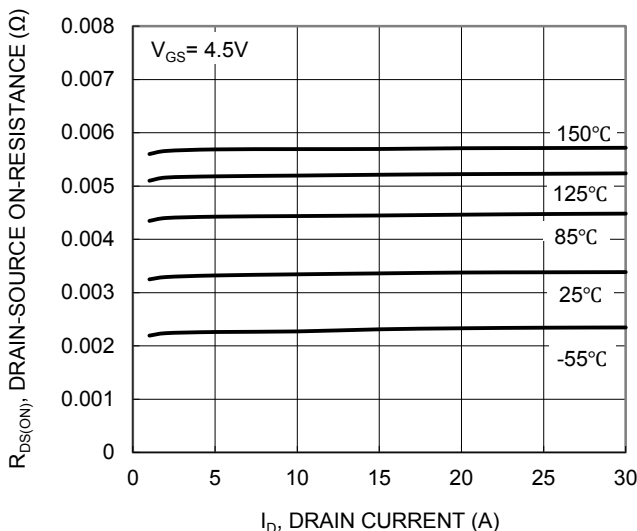


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

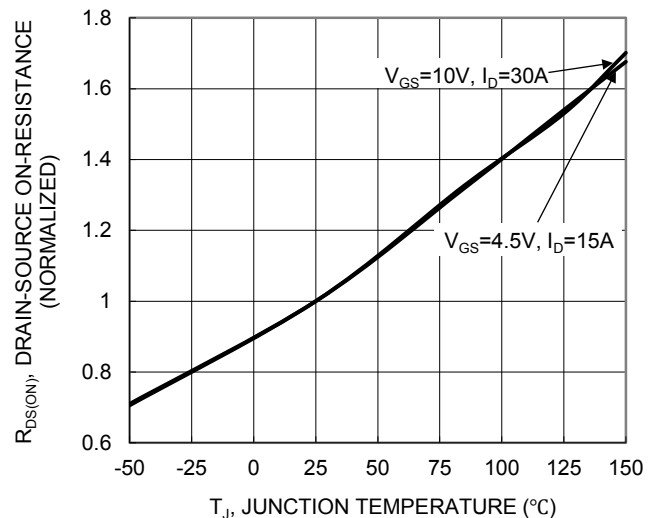


Figure 6. On-Resistance Variation with Temperature

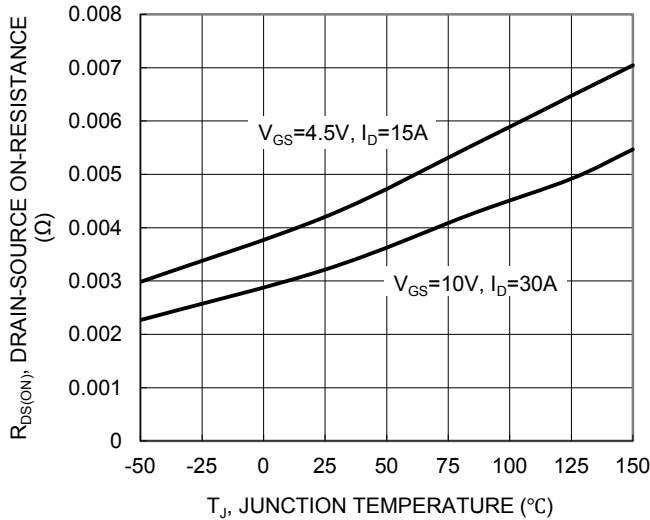


Figure 7. On-Resistance Variation with Temperature

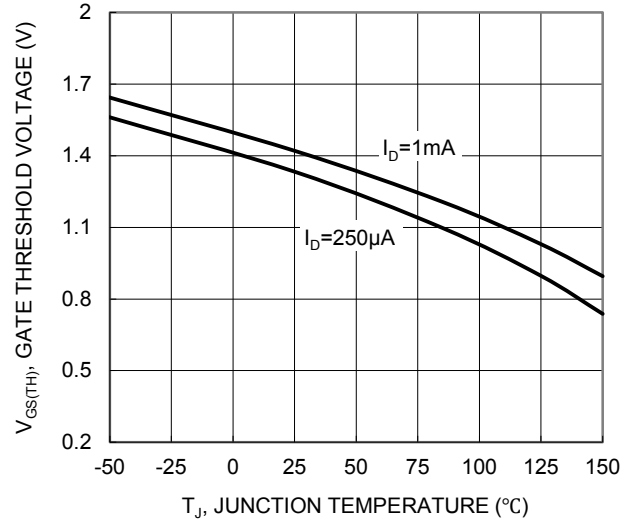


Figure 8. Gate Threshold Variation vs. Junction Temperature

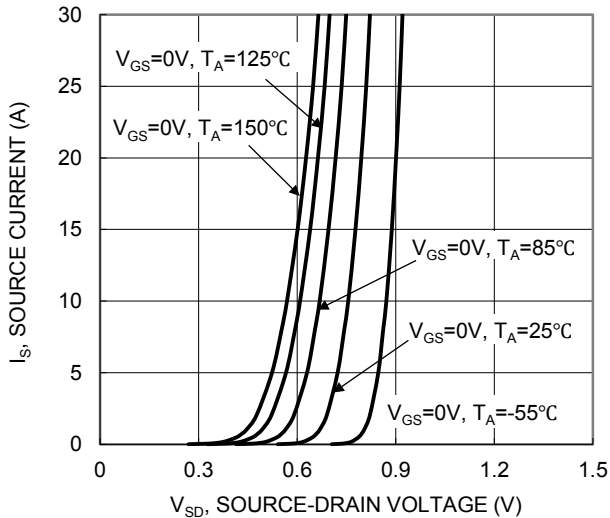


Figure 9. Diode Forward Voltage vs. Current

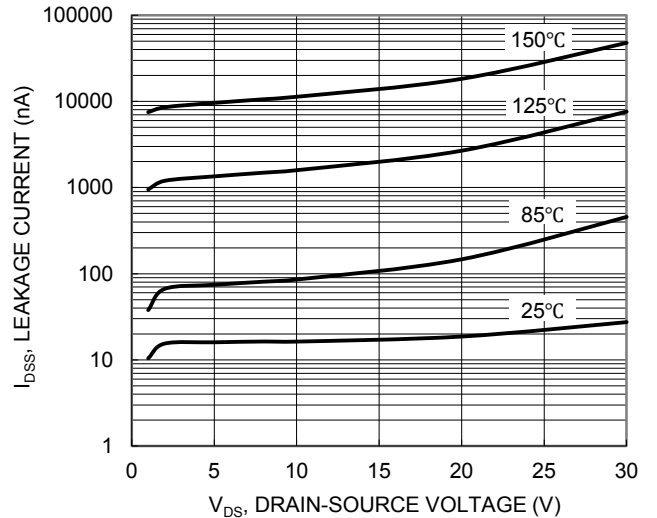


Figure 10. Typical Drain-Source Leakage Current vs. Voltage

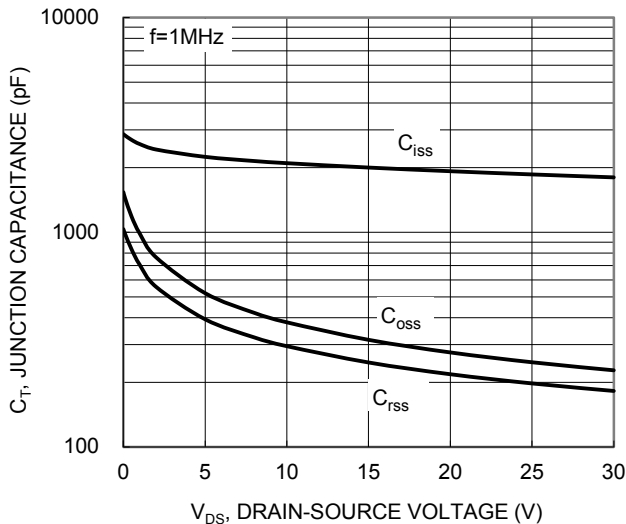


Figure 11. Typical Junction Capacitance

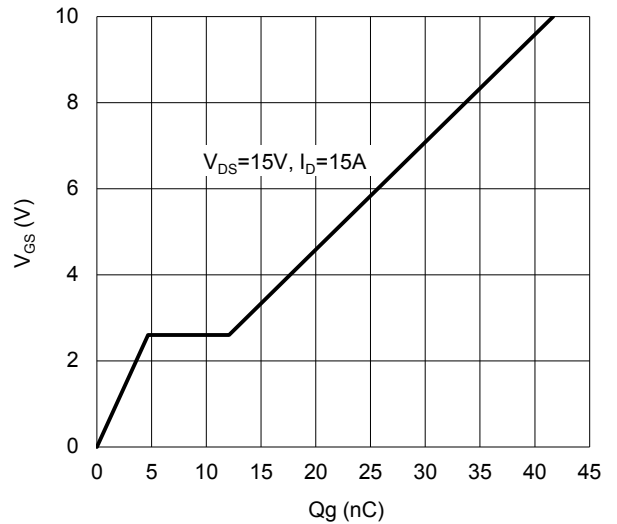
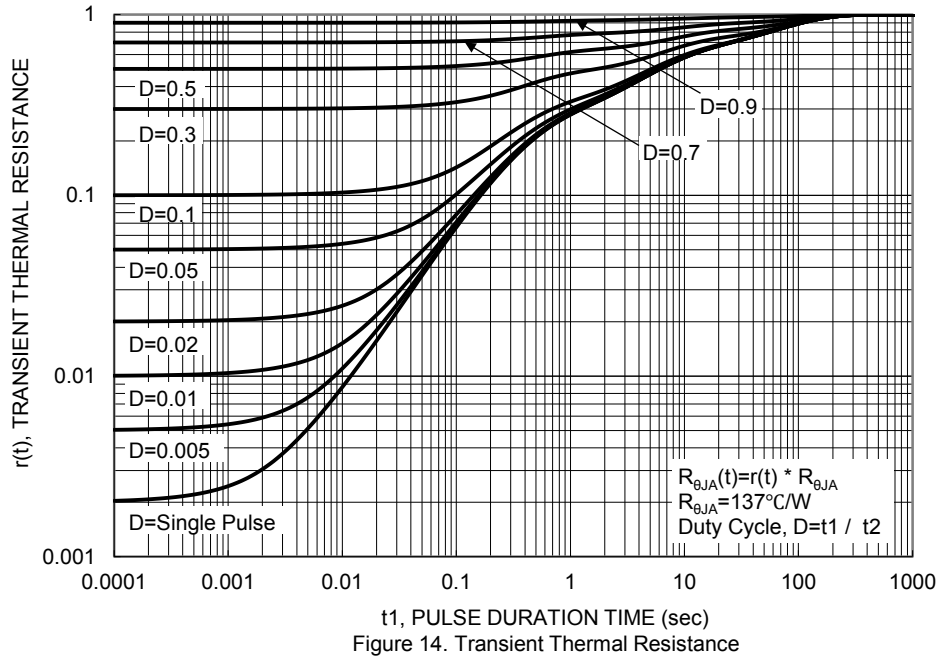
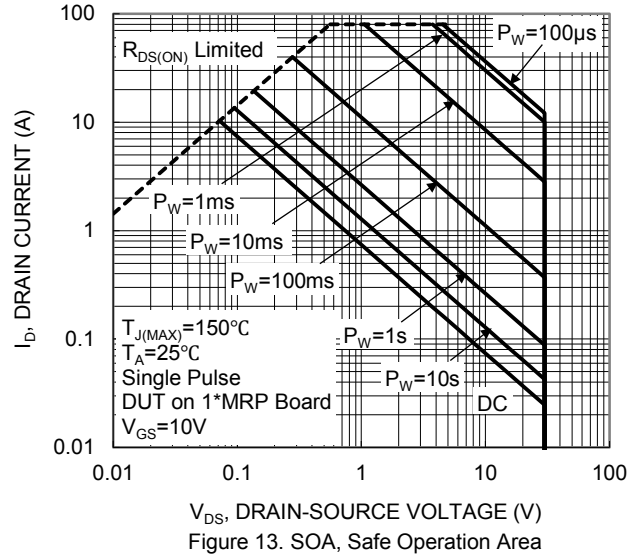


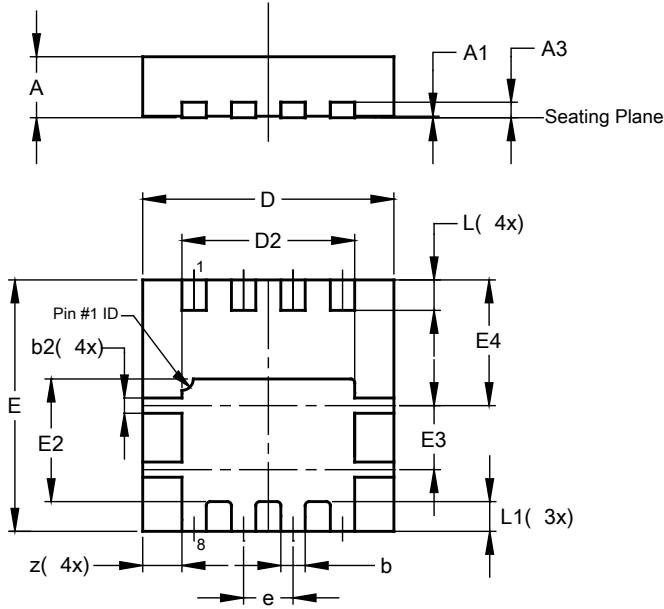
Figure 12. Gate Charge



**Package Outline Dimensions**

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

**PowerDI3333-8**

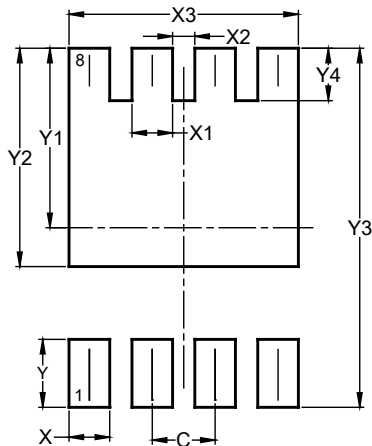


PowerDI3333-8			
Dim	Min	Max	Typ
A	0.75	0.85	0.80
A1	0.00	0.05	0.02
A3	-	-	0.203
b	0.27	0.37	0.32
b2	0.15	0.25	0.20
D	3.25	3.35	3.30
D2	2.22	2.32	2.27
E	3.25	3.35	3.30
E2	1.56	1.66	1.61
E3	0.79	0.89	0.84
E4	1.60	1.70	1.65
e	-	-	0.65
L	0.35	0.45	0.40
L1	-	-	0.39
z	-	-	0.515
All Dimensions in mm			

**Suggested Pad Layout**

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

**PowerDI3333-8**



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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