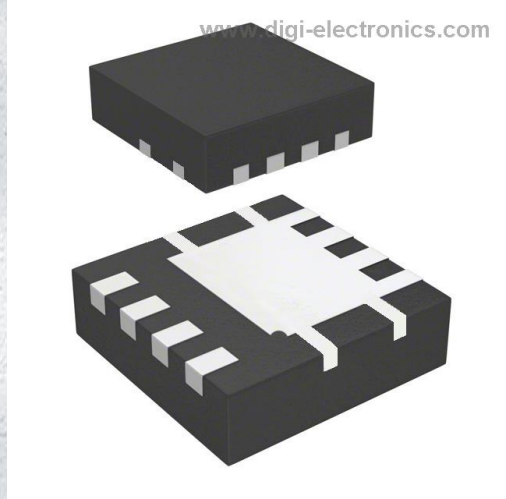
DMN2005UFGQ-7 Datasheet



DiGi Electronics Part Number	DMN2005UFGQ-7-DG
Manufacturer	Diodes Incorporated
Manufacturer Product Number	DMN2005UFGQ-7
Description	MOSFET N-CH 20V 18A PWRDI3333
Detailed Description	N-Channel 20 V 18A (Ta), 50A (Tc) 1.05W (Ta) Surface Mount POWERDI3333-8

https://www.DiGi-Electronics.com

Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
DMN2005UFGQ-7	Diodes Incorporated
Series:	Product Status:
-	Active
FET Type:	Technology:
N-Channel	MOSFET (Metal Oxide)
Drain to Source Voltage (Vdss):	Current - Continuous Drain (Id) @ 25°C:
20 V	18A (Ta), 50A (Tc)
Drive Voltage (Max Rds On, Min Rds On):	Rds On (Max) @ Id, Vgs:
2.5V, 4.5V	4.6mOhm @ 13.5A, 4.5V
Vgs(th) (Max) @ Id:	Gate Charge (Qg) (Max) @ Vgs:
1.2V @ 250µA	164 nC @ 10 V
Vgs (Max):	Input Capacitance (Ciss) (Max) @ Vds:
±12V	6495 pF @ 10 V
FET Feature:	Power Dissipation (Max):
-	1.05W (Ta)
Operating Temperature:	Grade:
-55°C ~ 150°C (TJ)	Automotive
Qualification:	Mounting Type:
AEC-Q101	Surface Mount
Supplier Device Package:	Package / Case:
PowerDI3333-8	8-PowerVDFN
Base Product Number:	
DMN2005	

Environmental & Export classification

RoHS Status:	Moisture Sensitivity Level (MSL):
ROHS3 Compliant	1 (Unlimited)
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	
8541.29.0095	

Lead-free Green

DMN2005UFGQ

20V N-CHANNEL ENHANCEMENT MODE MOSFET
PowerDI3333-8

Product Summary

BV_{DSS}	$R_{DS(ON)}$ Max	I_D Max T_C = +25°C (Note 10)
20V	4.6mΩ @ V_{GS} = 4.5V	50A
	8.7mΩ @ V_{GS} = 2.5V	36A

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 33% of the Board Area Occupied by SO-8 Enabling Smaller End Product
- 100% Unclamped Inductive Switching, Test in Production—Ensures More Reliable And Robust End Application
- **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)**

Description and Applications

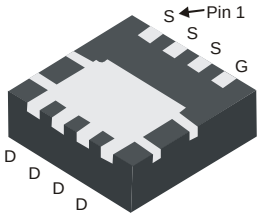
This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP, and is ideal for use in:

- Motor Control
- Load Switch
- DC-DC Converters

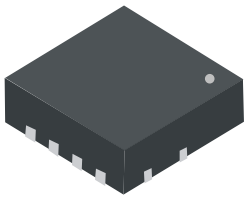
Mechanical Data

- Case: PowerDI®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 e3
- Weight: 0.072 grams (Approximate)

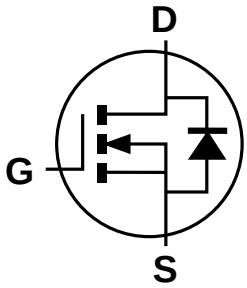
PowerDI3333-8



Bottom View



Top View



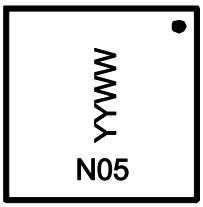
Equivalent Circuit

Ordering Information (Note 5)

Part Number	Case	Packaging
DMN2005UFGQ-7	PowerDI3333-8	2000/Tape & Reel
DMN2005UFGQ-13	PowerDI3333-8	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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to https://www.diodes.com/quality/.
5. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information



N05= Product Type Marking Code
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 19 = 2019)
WW = Week Code (01 to 53)

PowerDI is a registered trademark of Diodes Incorporated.

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}	±12	V
Continuous Drain Current (Notes 7&10) V_{GS} = 4.5V	Steady State	T_C = +25°C T_C = +70°C	I_D	50 40	A
		T_A = +25°C T_A = +70°C	I_D	18 14	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I_{DM}	130	A
Maximum Continuous Body Diode Forward Current (Note 7)			I_S	2.6	A
Avalanche Current , L = 0.2mH			I_{AS}	23.9	A
Repetitive Avalanche Energy, L = 0.2mH			E_{AS}	58.4	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	1.05	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\Theta JA}$	120	°C/W
Total Power Dissipation (Note 7)	T_A = +25°C	P_D	2.27	W
Thermal Resistance, Junction to Ambient (Note 7)	Steady State	$R_{\Theta JA}$	55	°C/W
Thermal Resistance, Junction to Case (Note 7)		$R_{\Theta JC}$	6.1	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Notes: 6. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
7. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
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}	—	—	10	µA	V_{DS} = 20V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±12V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	0.4	0.7	1.2	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	4	4.6	mΩ	V_{GS} = 4.5V, I_D = 13.5A
		—	4.9	8.7		V_{GS} = 2.5V, I_D = 13.5A
Diode Forward Voltage	V_{SD}	—	0.8	1.1	V	V_{GS} = 0V, I_S = 27A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	6,495	—	pF	V_{DS} = 10V, V_{GS} = 0V, f = 1MHz
Output Capacitance	C_{oss}	—	546	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	477	—	pF	
Gate Resistance	R_g	—	0.7	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	68.8	—	nC	V_{DS} = 16V, I_D = 27A
Total Gate Charge (V_{GS} = 10V)	Q_g	—	164	—	nC	
Gate-Source Charge	Q_{gs}	—	10.4	—	nC	
Gate-Drain Charge	Q_{gd}	—	17.4	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	12.4	—	ns	V_{GS} = 5V, V_{DS} = 10V, R_G = 4.7Ω, I_D = 13.5A
Turn-On Rise Time	t_R	—	25.7	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	114	—	ns	
Turn-Off Fall Time	t_F	—	38	—	ns	
Body Diode Reverse Recovery Time	t_{RR}	—	16.1	—	ns	I_F = 13.5A, di/dt = 100A/µs
Body Diode Reverse Recovery Charge	Q_{RR}	—	8.5	—	nC	I_F = 13.5A, di/dt = 100A/µs

Notes: 8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.
10. Limited by package.

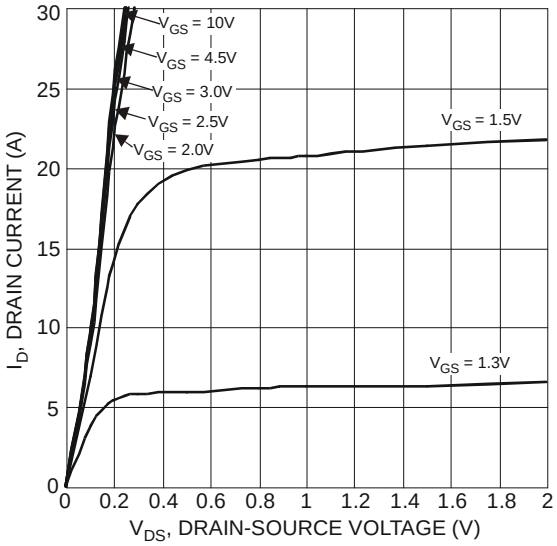


Figure 1 Typical Output Characteristics

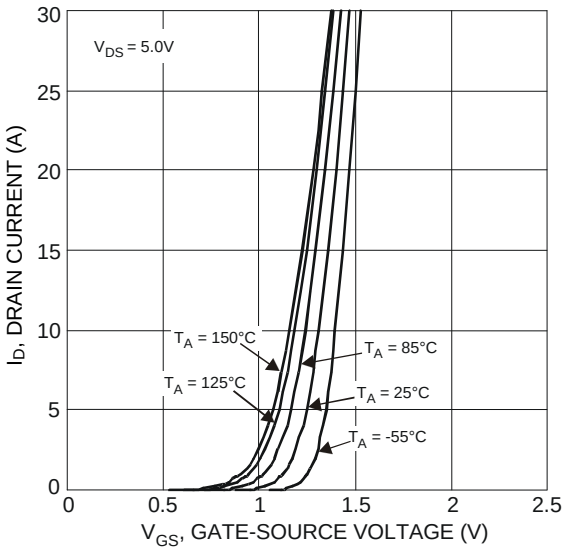


Figure 2 Typical Transfer Characteristics

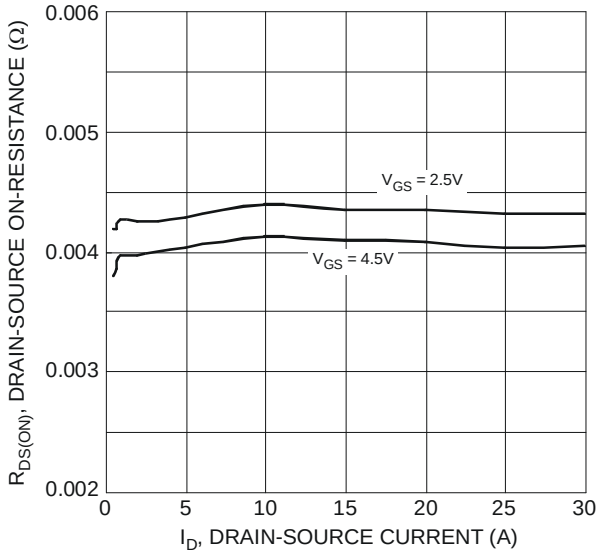


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

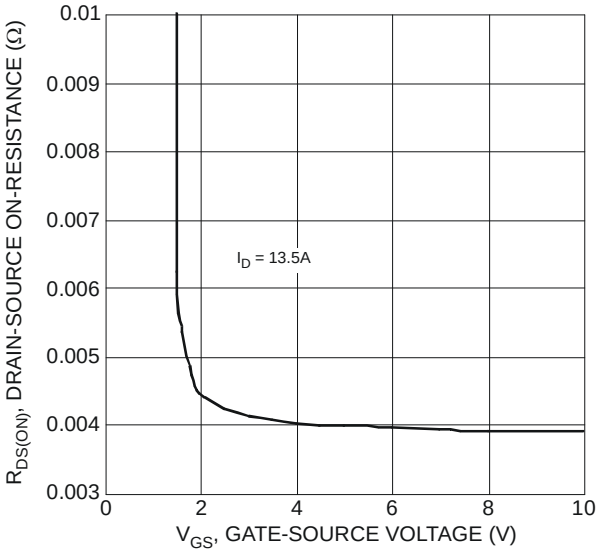


Figure 4 Typical Transfer Characteristic

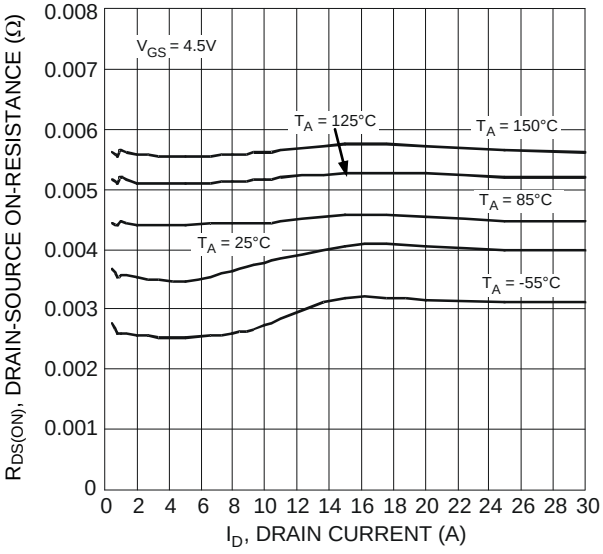


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

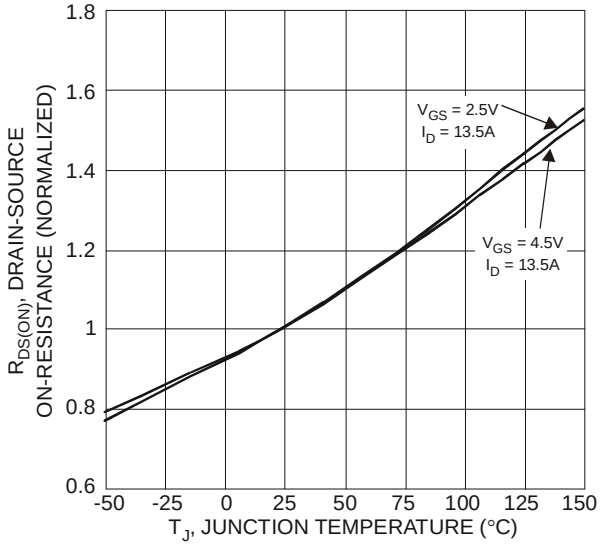


Figure 6 On-Resistance Variation with Temperature

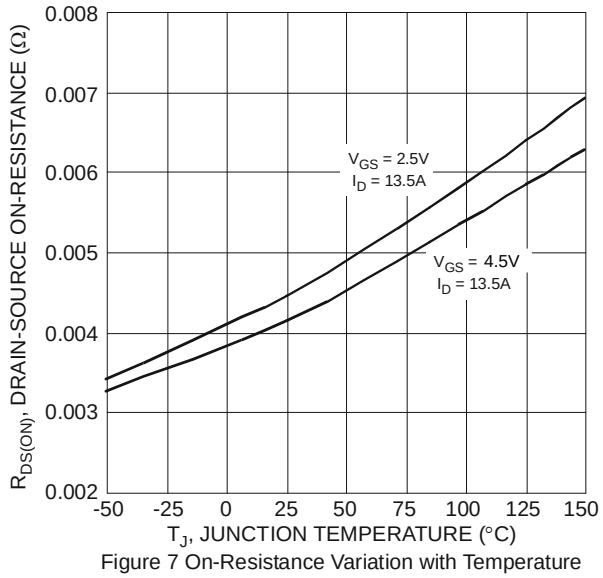


Figure 7 On-Resistance Variation with Temperature

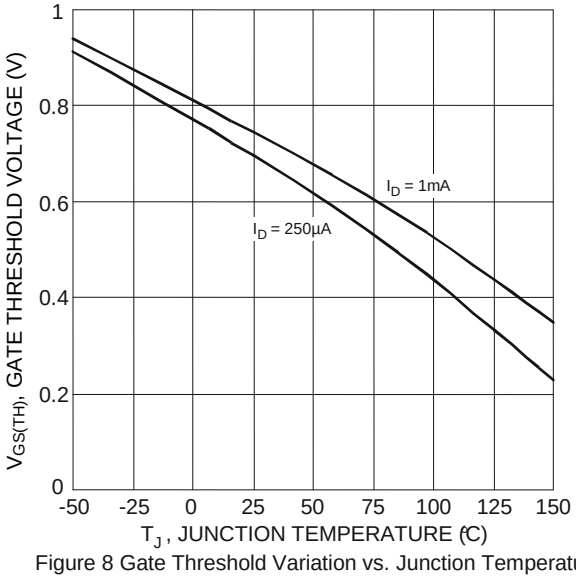


Figure 8 Gate Threshold Variation vs. Junction Temperature

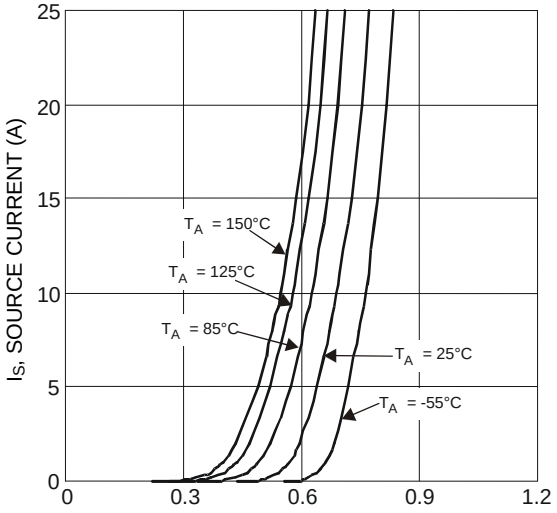


Figure 9 Diode Forward Voltage vs. Current

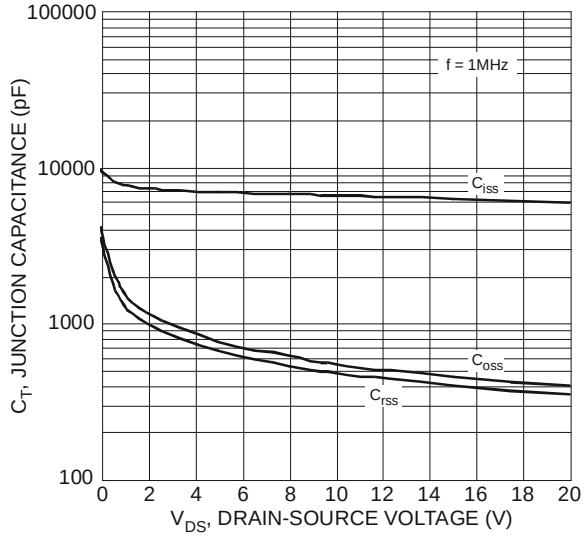


Figure 10 Typical Junction Capacitance

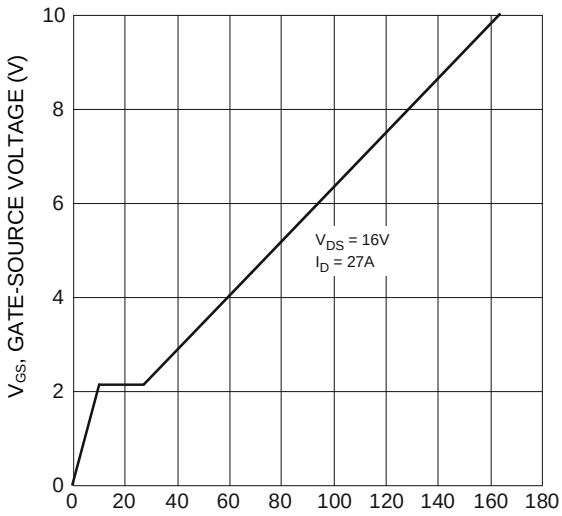


Figure 11 Gate Charge

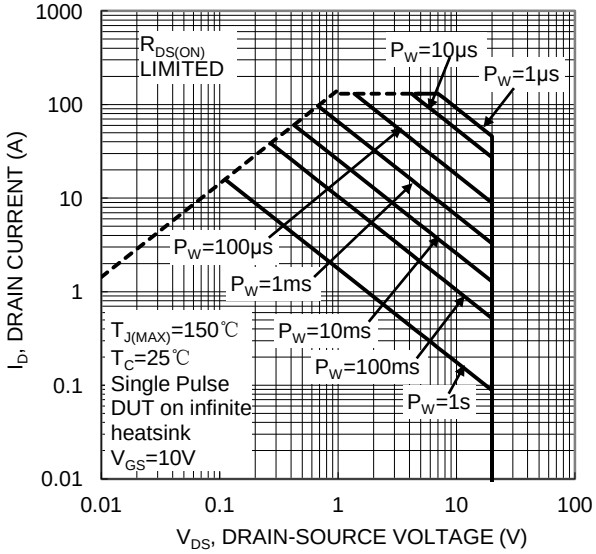


Figure 12. SOA, Safe Operation Area

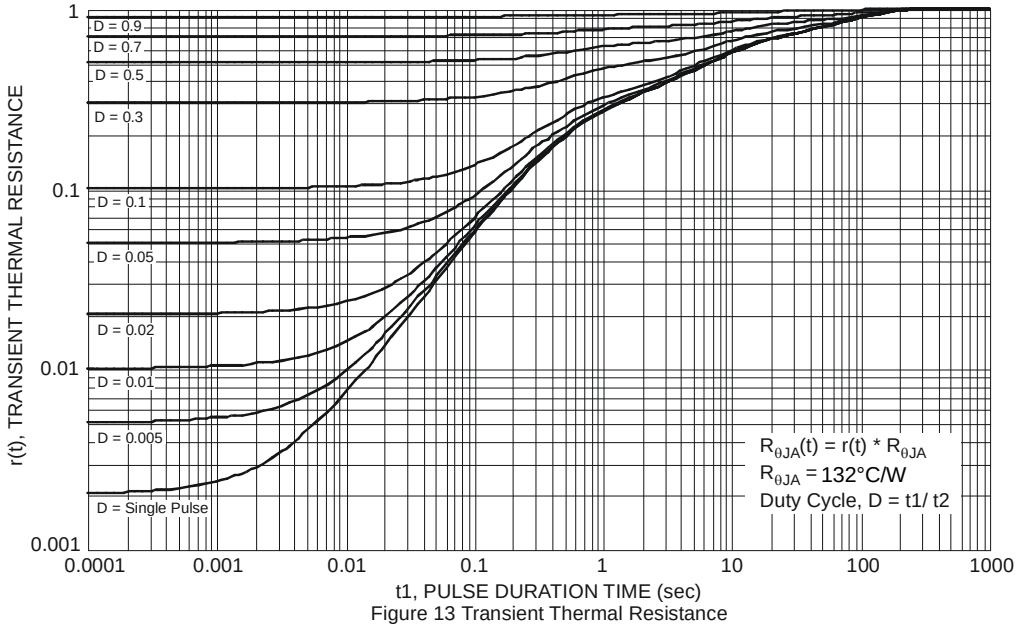
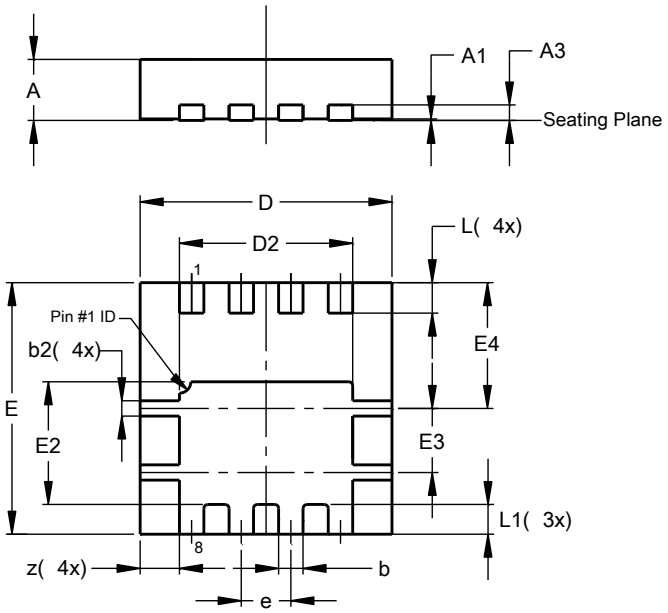


Figure 13 Transient Thermal Resistance

Package Outline Dimensions

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

PowerDI3333-8

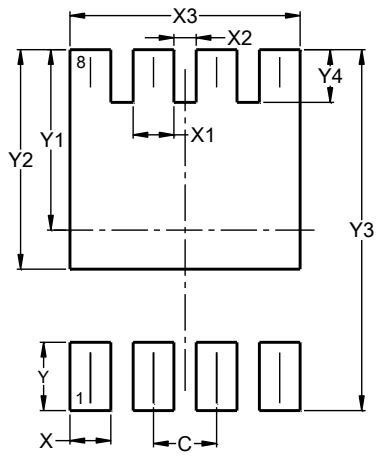


PowerDI3333-8			
Dim	**Min**	**Max**	**Typ**
A	0.75	0.85	0.80
A1	0.00	0.05	0.02
A3	–	–	0.203
b	0.27	0.37	0.32
b2	0.15	0.25	0.20
D	3.25	3.35	3.30
D2	2.22	2.32	2.27
E	3.25	3.35	3.30
E2	1.56	1.66	1.61
E3	0.79	0.89	0.84
E4	1.60	1.70	1.65
e	–	–	0.65
L	0.35	0.45	0.40
L1	–	–	0.39
z	–	–	0.515
All Dimensions 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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1. are intended to implant into the body, or

2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

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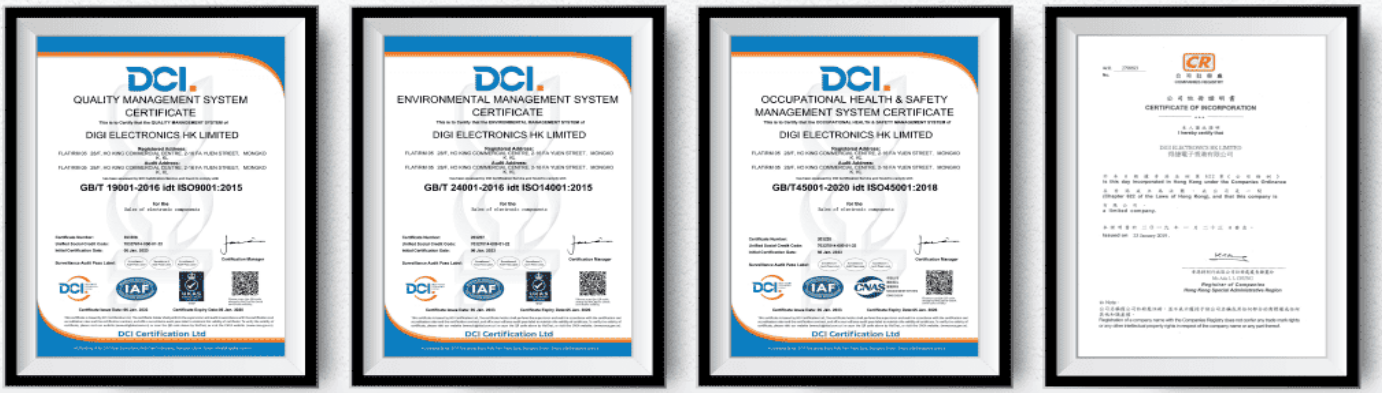

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