Product Summary

BV_{DSS}	$R_{DS(ON)}$ Max	I_D Max T_A = +25°C
-30V	13mΩ @ V_{GS} = -10V	-9.8A
	25mΩ @ V_{GS} = -4.5V	-7.0A

Description

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.

Applications

- Backlighting
- Power management functions
- DC-DC converters

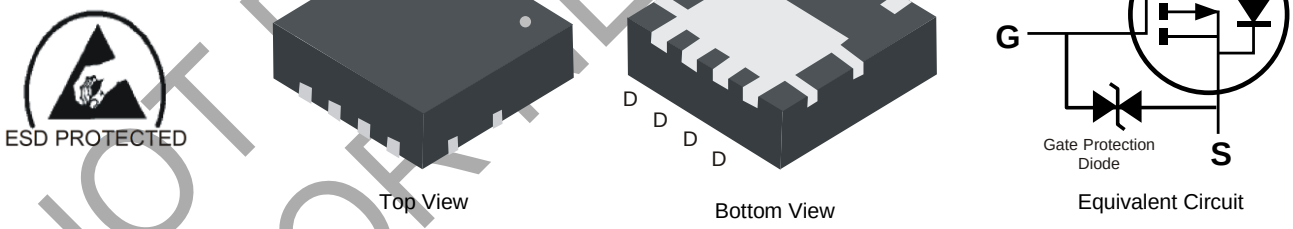
Features and Benefits

- 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 DMG7401SFGQ 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/

Mechanical Data

- Package: PowerDI®3333-8
- Package 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: 0.0174 grams (Approximate)

PowerDI3333-8



Top View | Bottom View | Equivalent Circuit

Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
DMG7401SFGQ-7	PowerDI3333-8	2,000	Tape & Reel
DMG7401SFGQ-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/.

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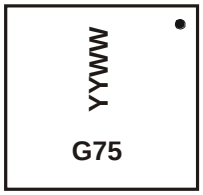

G75 = Product Marking Code
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 22 for 2022)
WW = Week Code (01 to 53)

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	-30	V
Gate-Source Voltage			V_{GSS}	±25	V
Continuous Drain Current (Note 6) V_{GS} = -10V	Steady State	T_A = +25°C T_A = +70°C	I_D	-9.8 -7.7	A
	t<10s	T_A = +25°C T_A = +70°C	I_D	-13.5 -10.8	A
Maximum Continuous Body Diode Forward Current (Note 6)			I_S	-3.0	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I_{DM}	-80	A
Avalanche Current (Notes 7 & 8)			I_{AR}	-14	A
Repetitive Avalanche Energy (Notes 7 & 8) L = 1mH			E_{AR}	104	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T_A = +25°C	P_D	0.94	W
	T_A = +70°C		0.6	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	137	°C/W
	t<10s		82	°C/W
Total Power Dissipation (Note 6)	T_A = +25°C	P_D	2.2	W
	T_A = +70°C		1.3	
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	60	°C/W
	t<10s		36	°C/W
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	3.0	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Notes:
5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate.
7. I_{AR} and E_{AR} ratings are based on low frequency and duty cycles to keep T_J = +25°C.

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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}	-30	—	—	V	V_{GS} = 0V, I_D = -250μA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1	μA	V_{DS} = -30V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±10	μA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	-1.7	—	-3.0	V	V_{DS} = V_{GS}, I_D = -250μA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	9	11	mΩ	V_{GS} = -20V, I_D = -12A
		—	10	13		V_{GS} = -10V, I_D = -9A
		—	17	25		V_{GS} = -4.5V, I_D = -5A
Forward Transfer Admittance	$\|Y_{fs}\|$	—	21	—	S	V_{DS} = -5V, I_D = -10A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	2,246	2,987	pF	V_{DS} = -15V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	352	468	pF	
Reverse Transfer Capacitance	C_{rss}	—	294	391	pF	
Gate Resistance	R_g	—	5.1	10	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz
Total Gate Charge (V_{GS} = -4.5V)	Q_g	—	20.5	30	nC	V_{DS} = -15V, I_D = -12A
Total Gate Charge (V_{GS} = -10V)	Q_g	—	41	58	nC	
Gate-Source Charge	Q_{gs}	—	7.6	—	nC	
Gate-Drain Charge	Q_{gd}	—	8.0	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	11.3	23	ns	V_{DD} = -15V, V_{GS} = -10V, R_L = 1.25Ω, R_G = 3Ω
Turn-On Rise Time	t_R	—	15.4	31	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	38.0	61	ns	
Turn-Off Fall Time	t_F	—	22.0	38	ns	
BODY DIODE CHARACTERISTICS						
Diode Forward Voltage	V_{SD}	—	-0.7	-1.0	V	V_{GS} = 0V, I_S = -1A
Reverse Recovery Time (Note 9)	t_{RR}	—	20	31	ns	I_S = -9.5A, dI/dt = 100A/μs
Reverse Recovery Charge (Note 9)	Q_{RR}	—	9.5	18	nC	

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

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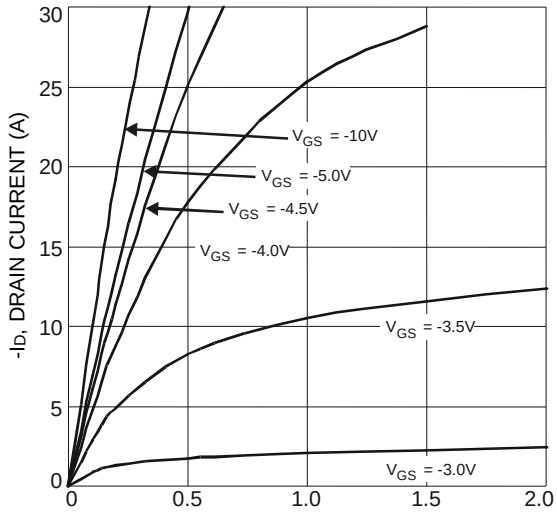

Fig. 1 Typical Output Characteristics

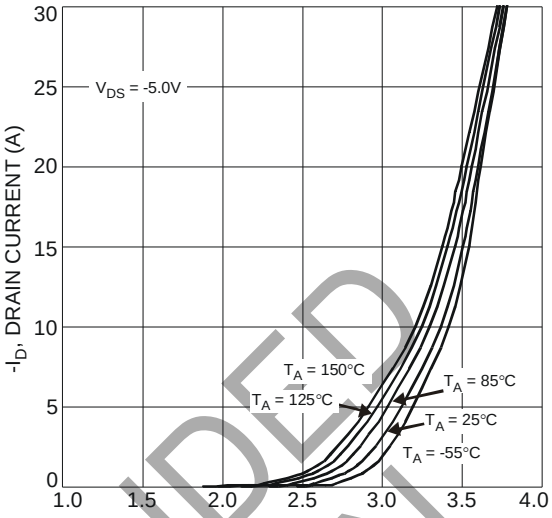

Fig. 2 Typical Transfer Characteristics

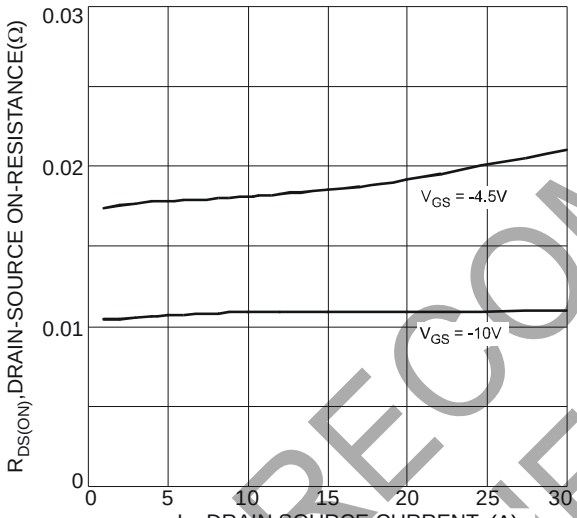

Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

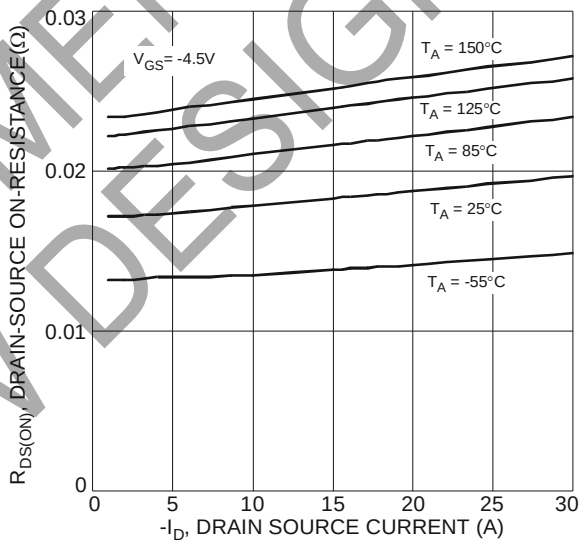

Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

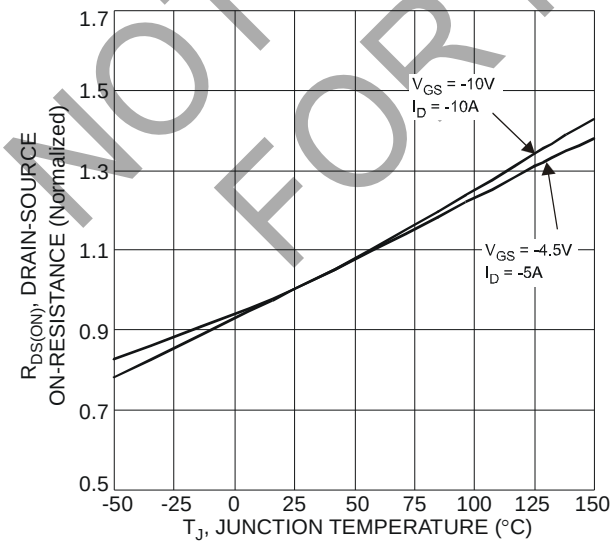

Fig. 5 On-Resistance Variation with Temperature

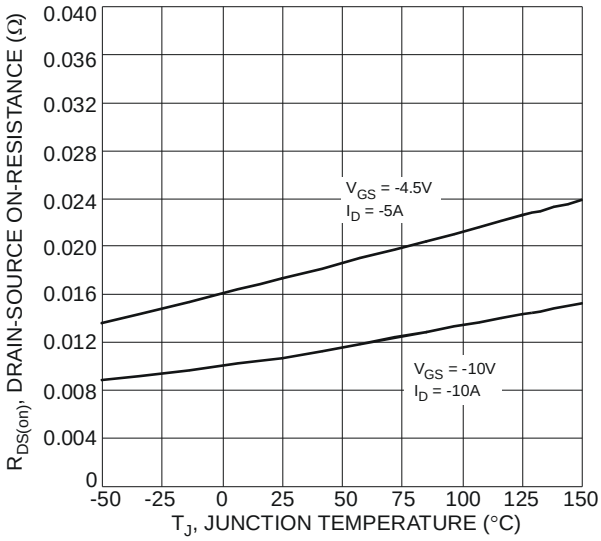

Fig. 6 On-Resistance Variation with Temperature

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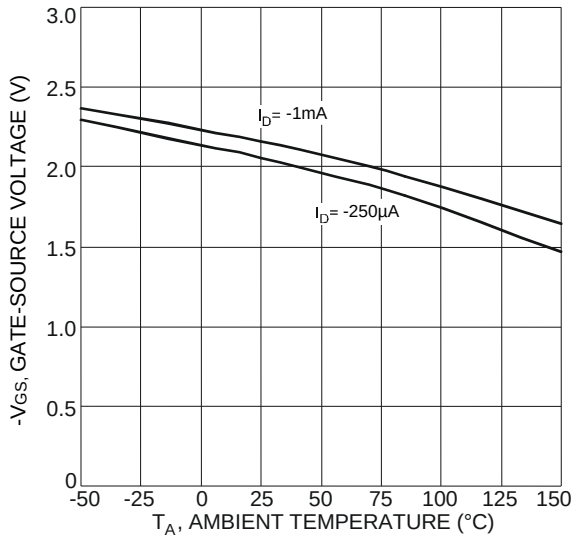

Fig. 7 Gate Threshold Variation vs. Ambient Temperature

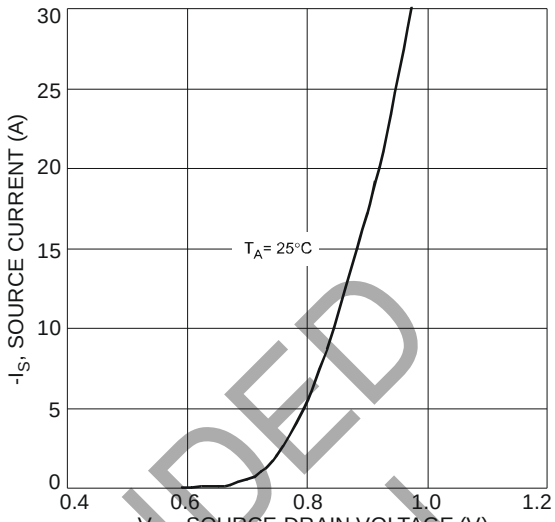

Fig. 8 Diode Forward Voltage vs. Current

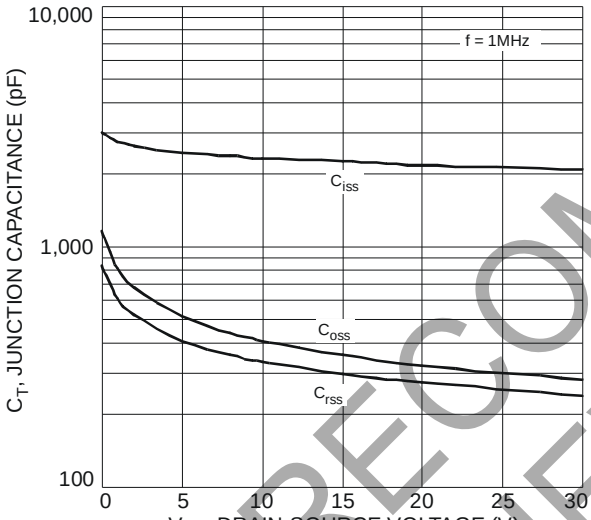

Fig. 9 Typical Junction Capacitance

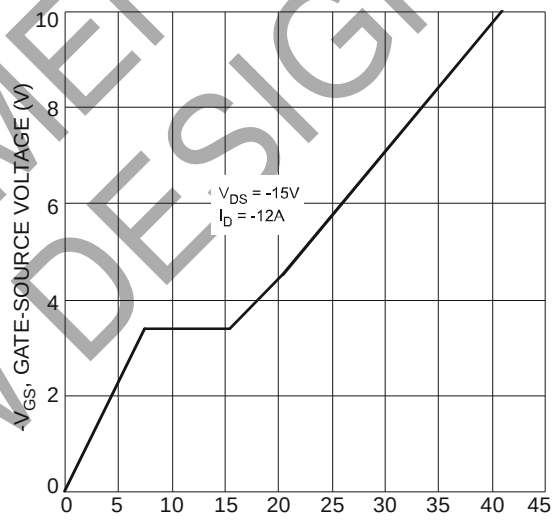

Fig. 10 Gate-Charge Characteristics

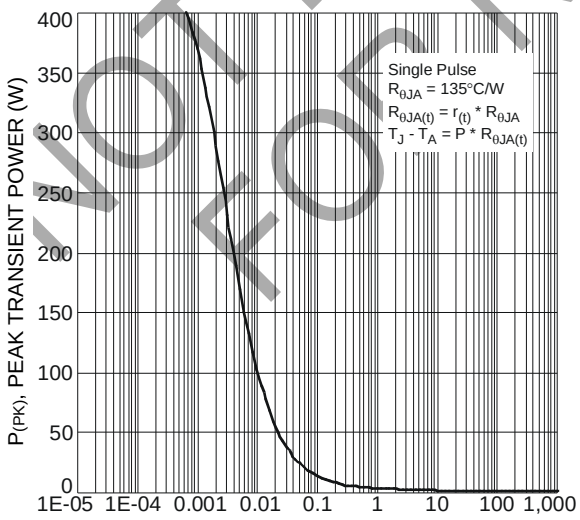

Fig. 11 Single Pulse Maximum Power Dissipation

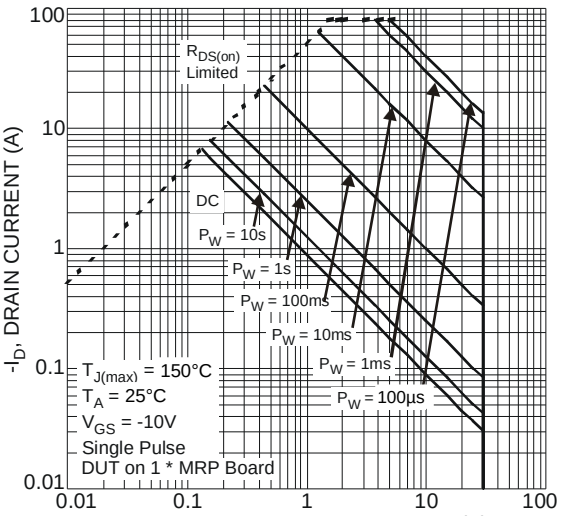

Fig. 12 SOA, Safe Operation Area

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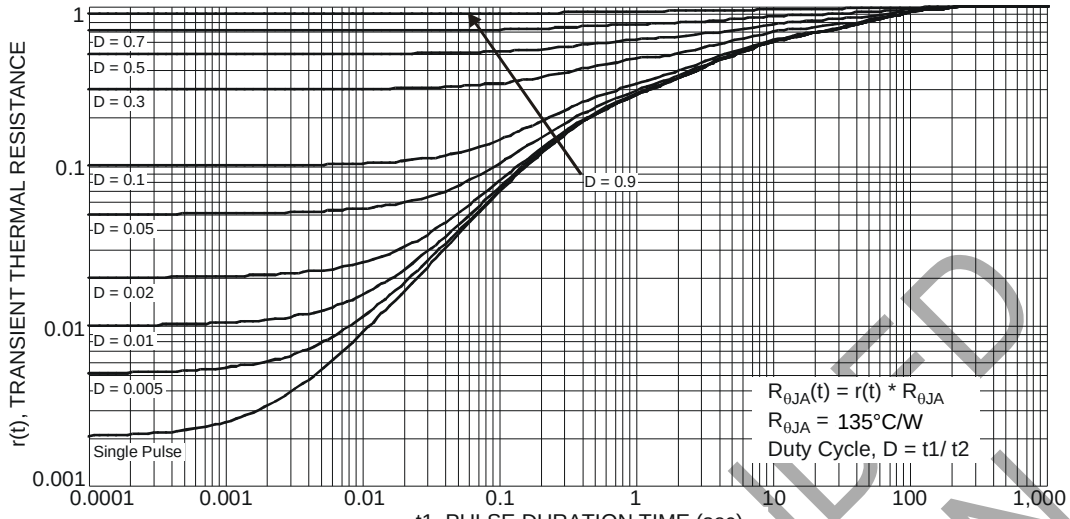

Fig. 13 Transient Thermal Resistance

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Package Outline Dimensions

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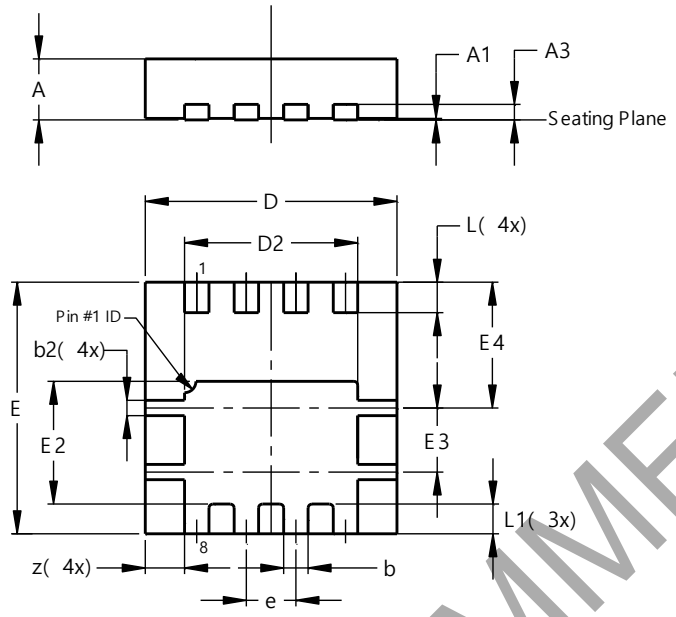

PowerDI3333-8			
Dim	**Min**	**Max**	**Typ**
A	0.75	0.85	0.80
A1	0.00	0.05	0.02
A3	–	–	0.203
b	0.27	0.37	0.32
b2	0.15	0.25	0.20
D	3.25	3.35	3.30
D2	2.22	2.32	2.27
E	3.25	3.35	3.30
E2	1.56	1.66	1.61
E3	0.79	0.89	0.84
E4	1.60	1.70	1.65
e	–	–	0.65
L	0.35	0.45	0.40
L1	–	–	0.39
z	–	–	0.515
All Dimensions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

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Suggested Pad Layout

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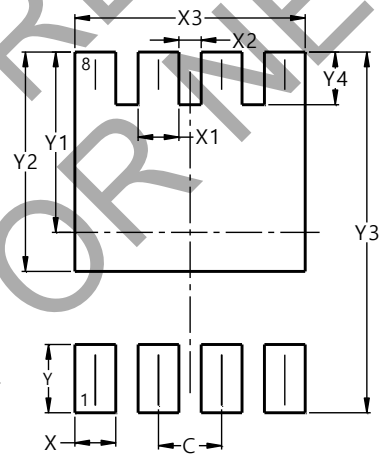
PowerDI3333-8



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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