

**30V N-CHANNEL ENHANCEMENT MODE MOSFET
POWERDI®**

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)} \text{ max}$	$I_D \text{ max}$ $T_A = 25^\circ\text{C}$
30V	23mΩ @ $V_{GS} = 10\text{V}$	7.0A
	33mΩ @ $V_{GS} = 4.5\text{V}$	6.0A

Features and Benefits

- 100% Unclamped Inductive Switch (UIS) test in production
- 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)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Description and Applications

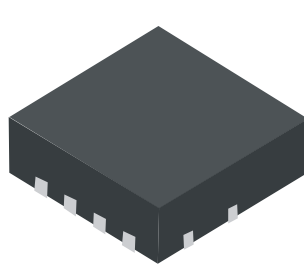
This MOSFET has been designed to minimize the on-state resistance ($R_{DS(on)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- Backlighting
- Power Management Functions
- DC-DC Converters

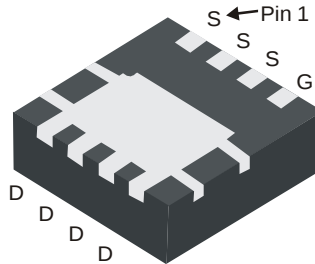
Mechanical Data

- Case: POWERDI3333-8
- 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 
- Weight: 0.008 grams (approximate)

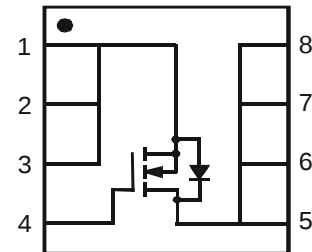
POWERDI3333-8



Top View



Bottom View



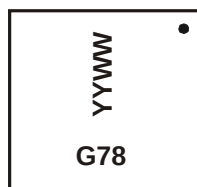
Top View
Internal Schematic

Ordering Information (Note 4)

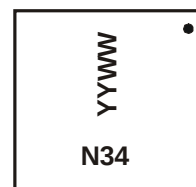
Part Number	Case	Packaging
DMG7408SFG-7	POWERDI3333-8	2000/Tape & Reel
DMG7408SFG-13	POWERDI3333-8	3000/Tape & Reel

- 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> 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 <http://www.diodes.com>.

Marking Information



G78 = Product Type Marking Code
YYWW = Date Code Marking
YY = Last digit of year (ex: 11 = 2011)
WW = Week code (01 ~ 53)



N34 = Product Type Marking Code
YYWW = Date Code Marking
YY = Last digit of year (ex: 11 = 2011)
WW = Week code (01 ~ 53)

Maximum Ratings @T_A = 25°C unless otherwise specified

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V _{DSS}	30	V
Gate-Source Voltage			V _{GSS}	±20	V
Continuous Drain Current (Note 6) V _{GS} = 10V	Steady State	T _A = 25°C T _A = 70°C	I _D	7.0 5.5	A
	t < 10s	T _A = 25°C T _A = 70°C	I _D	9.5 7.5	A
Continuous Drain Current (Note 6) V _{GS} = 4.5V	Steady State	T _A = 25°C T _A = 70°C	I _D	6.0 5.7	A
	t < 10s	T _A = 25°C T _A = 70°C	I _D	8.0 6.3	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)			I _{DM}	66	A
Maximum Continuous Body Diode Forward Current (Note 6)			I _S	3.0	A
Avalanche Current (Note 7)			I _{AS}	9	A
Avalanche Energy (Note 7)			E _{AS}	12	mJ

Thermal Characteristics @T_A = 25°C unless otherwise specified

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)		P _D	1	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady state	R _{θJA}	131	°C/W
	t < 10s		72	°C/W
Total Power Dissipation (Note 6)		P _D	2.1	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady state	R _{θJA}	63	°C/W
	t < 10s		35	°C/W
Thermal Resistance, Junction to Case (Note 6)		R _{θJC}	7.1	°C/W
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 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}	-	-	±100	nA	V _{GS} = ±20V, V _{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	V _{GS(th)}	1.0	1.45	2.4	V	V _{DS} = V _{GS} , I _D = 250µA
Static Drain-Source On-Resistance	R _{DS(ON)}	-	15	23	mΩ	V _{GS} = 10V, I _D = 10A
			25	33		V _{GS} = 4.5V, I _D = 7.5A
Forward Transfer Admittance	Y _{fs}	-	11	-	S	V _{DS} = 5V, I _D = 10A
Diode Forward Voltage	V _{SD}	-	0.72	1	V	V _{GS} = 0V, I _S = 1A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C _{iss}	-	478.9	-	pF	V _{DS} = 15V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{oss}	-	96.7	-	pF	
Reverse Transfer Capacitance	C _{rss}	-	61.4	-	pF	
Gate Resistance	R _g	0.4	1.1	1.6	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = 4.5V)	Q _g	-	5.0	8	nC	V _{DS} = 15V, I _D = 10A
Total Gate Charge (V _{GS} = 10V)	Q _g	-	10.5	17		
Gate-Source Charge	Q _{gs}	-	1.8	-		
Gate-Drain Charge	Q _{gd}	-	1.6	-	nC	V _{GS} = 10V, V _{DS} = 15V, R _G = 3Ω, R _L = 1.5Ω
Turn-On Delay Time	t _{D(on)}	-	2.9	-	ns	
Turn-On Rise Time	t _r	-	7.9	-	ns	
Turn-Off Delay Time	t _{D(off)}	-	14.6	-	ns	
Turn-Off Fall Time	t _f	-	3.1	-	ns	

- Notes:
5. R_{θJA} is determined with the device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate. R
 6. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
 7. UIS in production with L = 0.3mH, T_J = 25°C
 8. Short duration pulse test used to minimize self-heating effect.
 9. Guaranteed by design. Not subject to product testing.

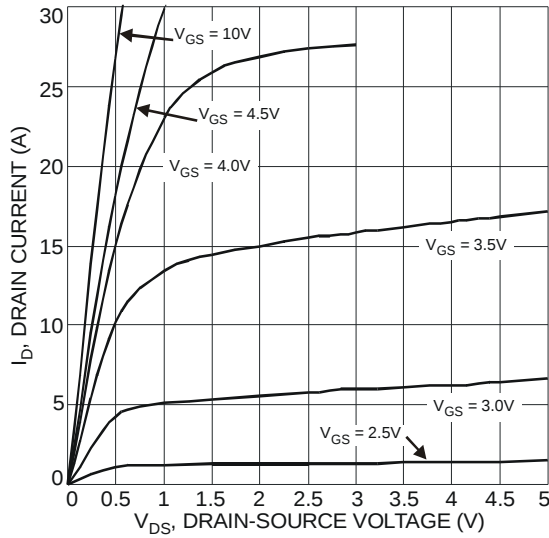


Fig. 1 Typical Output Characteristic

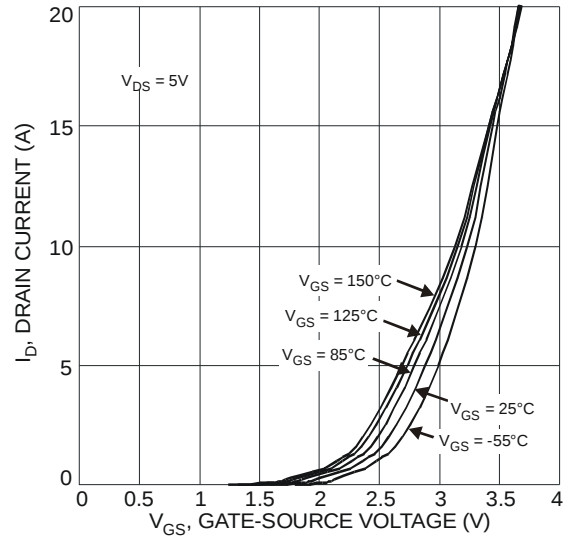


Fig. 2 Typical Transfer Characteristic

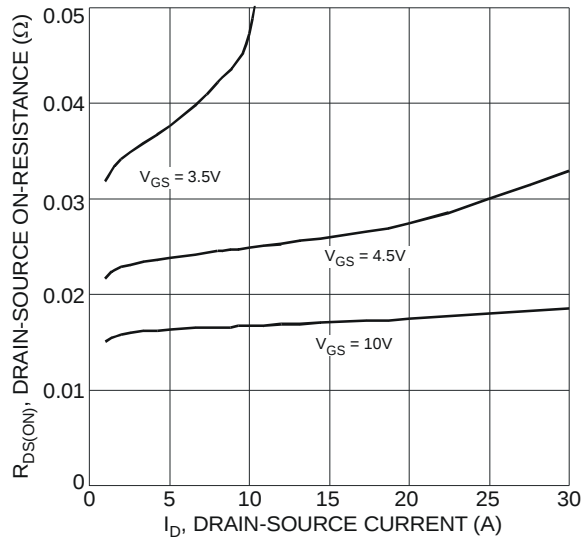


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

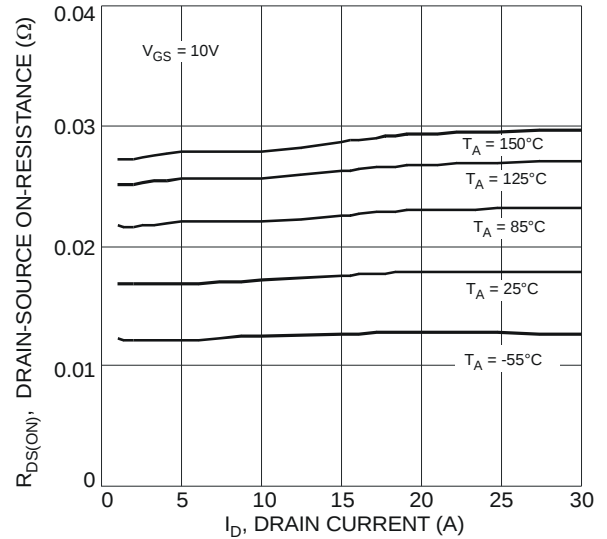


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

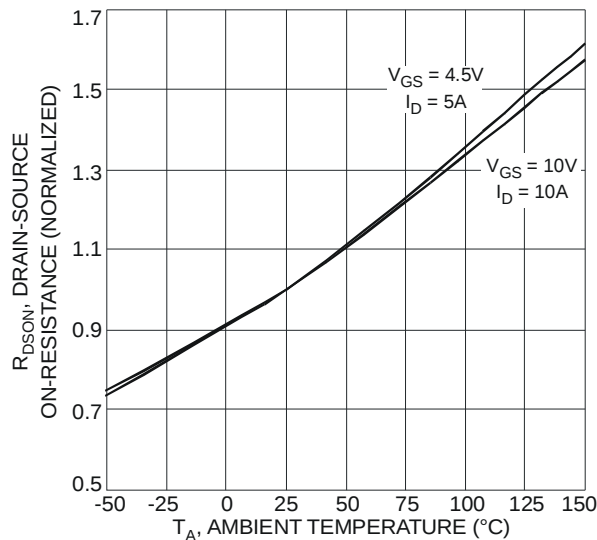


Fig. 5 On-Resistance Variation with Temperature

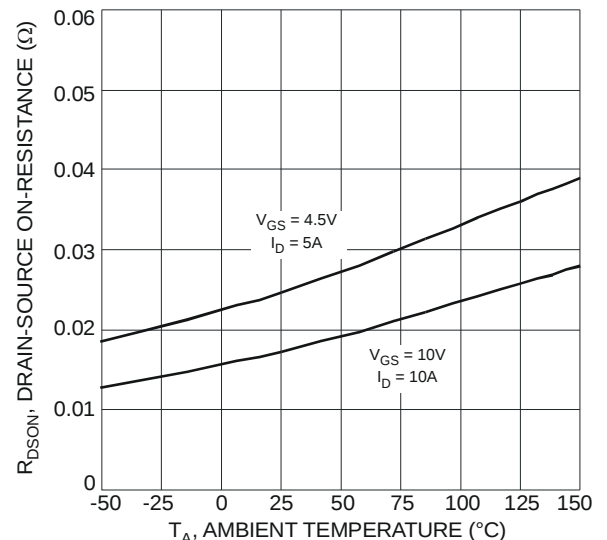


Fig. 6 On-Resistance Variation with Temperature

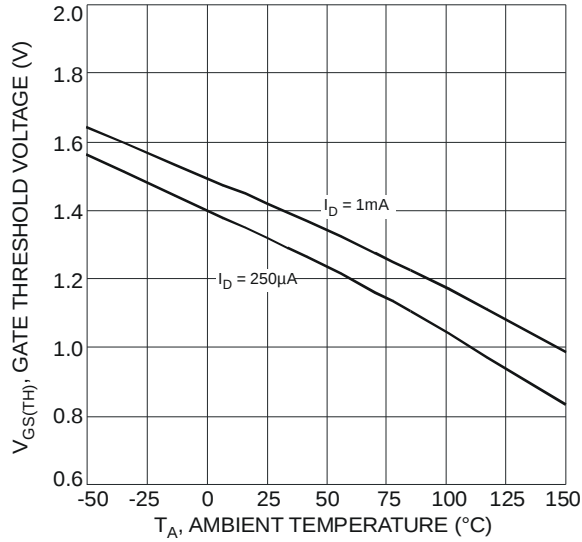


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

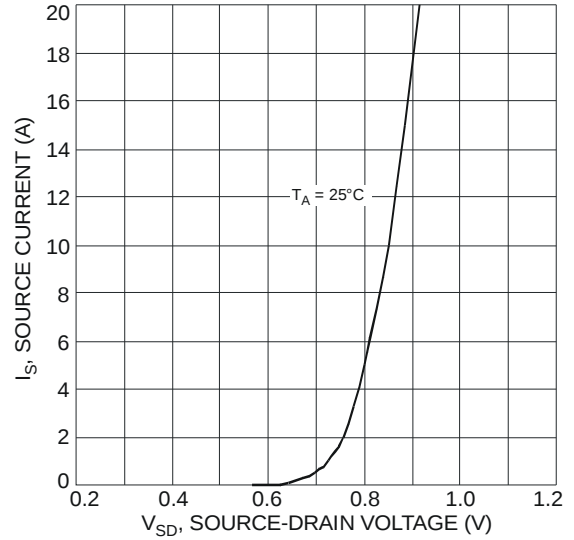


Fig. 8 Diode Forward Voltage vs. Current

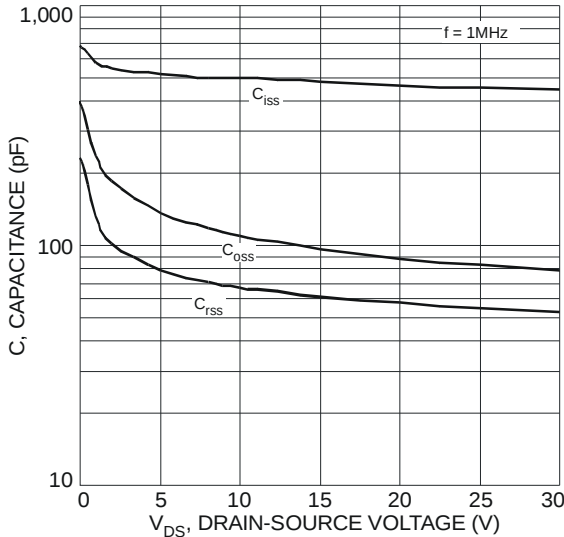


Fig. 9 Typical Total Capacitance

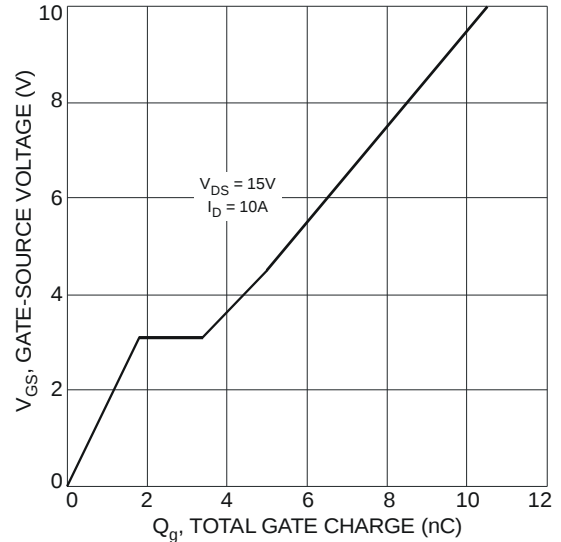


Fig. 10 Gate-Charge Characteristics

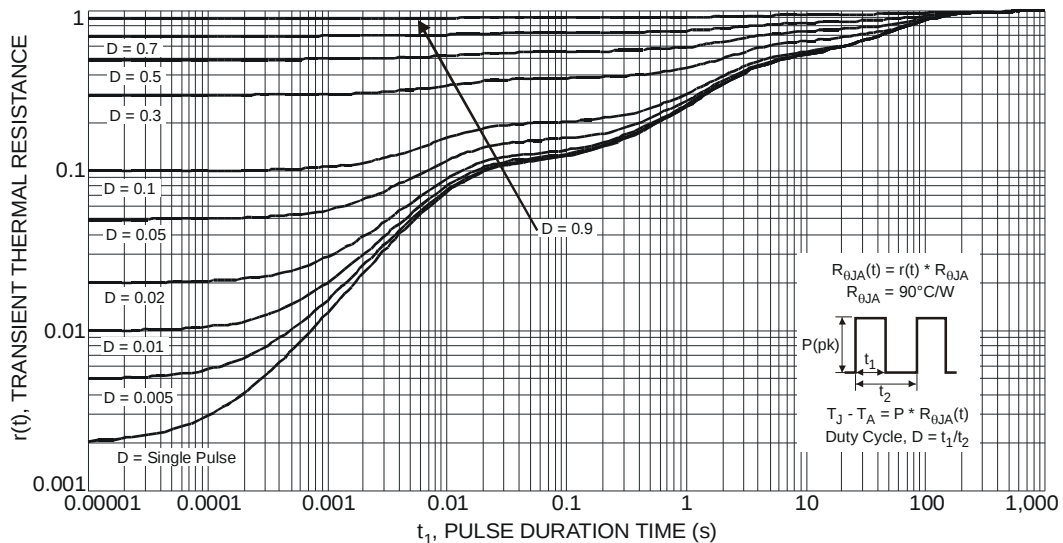
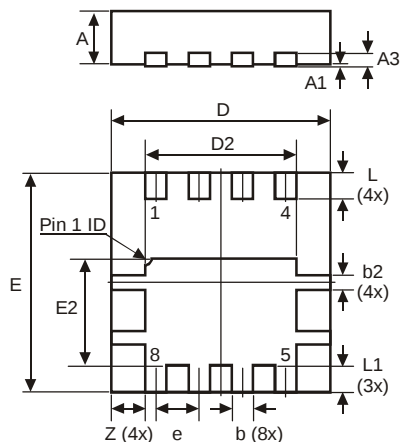


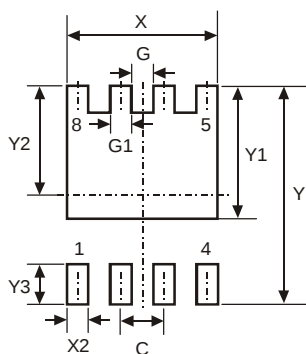
Fig. 11 Transient Thermal Response

Package Outline Dimensions



POWERDI3333-8			
Dim	Min	Max	Typ
D	3.25	3.35	3.30
E	3.25	3.35	3.30
D2	2.22	2.32	2.27
E2	1.56	1.66	1.61
A	0.75	0.85	0.80
A1	0	0.05	0.02
A3	—	—	0.203
b	0.27	0.37	0.32
b2	—	—	0.20
L	0.35	0.45	0.40
L1	—	—	0.39
e	—	—	0.65
Z	—	—	0.515
All Dimensions in mm			

Suggested Pad Layout



Dimensions	Value (in mm)
C	0.650
G	0.230
G1	0.420
Y	3.700
Y1	2.250
Y2	1.850
Y3	0.700
X	2.370
X2	0.420

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