



YOUSHANG SEMICONDUCTOR

设计研发新型功率器件

各类小信号开关

中低压及高压大电流等场效应管

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Product Summary

BV _{DSS}	R _{DS(ON)} Max	I _D Max T _c = +25°C (Note 9)
60V	4.1mΩ @ V _{GS} = 10V	100A
	6.3mΩ @ V _{GS} = 6V	89A
	7mΩ @ V _{GS} = 4.5V	84A

Features and Benefits

- Rated to +175°C — Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching(UIS) Test in Production – Ensures More Reliable And Robust End Application
- 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

Description and Applications

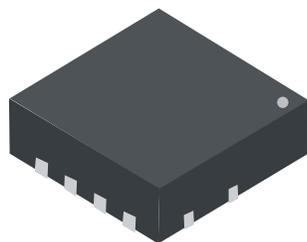
This MOSFET is designed to minimize the on-state resistance (R_{DS(ON)}), yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- Synchronous Rectification
- Motor Control
- DC-DC Converters
- Power Management

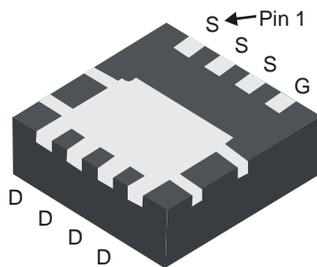
Mechanical Data

- 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 Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208^②
- Weight: 0.029 grams (Approximate)

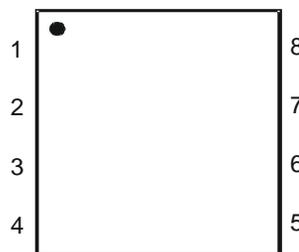
PowerDI3333-8



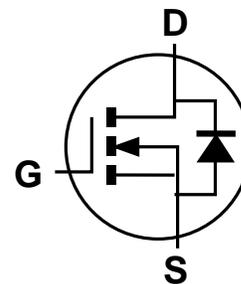
Top View



Bottom View



Top View



Equivalent Circuit

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

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V _{DSS}	60	V
Gate-Source Voltage	V _{GSS}	±20	V
Continuous Drain Current (Notes 6 & 9) V _{GS} = 10V	I _D	T _C = +25°C	100
		T _C = +100°C	78
Continuous Drain Current (Note 5) V _{GS} = 10V	I _D	T _A = +25°C	19.7
		T _A = +100°C	13.9
Maximum Continuous Body Diode Forward Current (Notes 6 & 9)	I _S	100	A
Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)	I _{DM}	400	A
Pulsed Body Diode Forward Current (10μs Pulse, Duty Cycle = 1%)	I _{SM}	400	A
Avalanche Current, L=1mH	I _{AS}	18.5	A
Avalanche Energy, L=1mH	E _{AS}	171	mJ

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P _D	T _A = +25°C	2.38
Thermal Resistance, Junction to Ambient (Note 5)		R _{θJA}	63
Total Power Dissipation (Note 6)	P _D	T _C = +25°C	75
Thermal Resistance, Junction to Case (Note 6)		R _{θJC}	2.0
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +175	°C

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV _{DSS}	60	—	—	V	V _{GS} = 0V, I _D = 1mA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	1	μA	V _{DS} = 48V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±20V, V _{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	V _{GS(TH)}	1	—	2.5	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	3.1	4.1	mΩ	V _{GS} = 10V, I _D = 20A
		—	3.6	6.3	mΩ	V _{GS} = 6V, I _D = 5A
		—	4.4	7	mΩ	V _{GS} = 4.5V, I _D = 5A
Diode Forward Voltage	V _{SD}	—	0.8	1.2	V	V _{GS} = 0V, I _S = 20A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C _{iss}	—	3150	—	pF	V _{DS} = 30V, V _{GS} = 0V, f = 1MHz
Output Capacitance	C _{oss}	—	1036	—		
Reverse Transfer Capacitance	C _{rss}	—	69	—		
Gate Resistance	R _g	—	0.7	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = 10V)	Q _g	—	48.7	—	nC	V _{DD} = 30V, I _D = 50A
Total Gate Charge (V _{GS} = 4.5V)	Q _g	—	23.6	—		
Gate-Source Charge	Q _{gs}	—	7.0	—		
Gate-Drain Charge	Q _{gd}	—	11.2	—		
Turn-On Delay Time	t _{D(ON)}	—	7.3	—	ns	V _{DD} = 30V, V _{GS} = 10V, I _D = 30A, R _G = 3.3Ω
Turn-On Rise Time	t _r	—	11.3	—		
Turn-Off Delay Time	t _{D(OFF)}	—	26.0	—		
Turn-Off Fall Time	t _f	—	11.0	—		
Body Diode Reverse Recovery Time	t _{RR}	—	40.8	—	ns	I _F = 30A, di/dt = 100A/μs
Body Diode Reverse Recovery Charge	Q _{RR}	—	51.5	—	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 product testing.
 - Limited by Package.

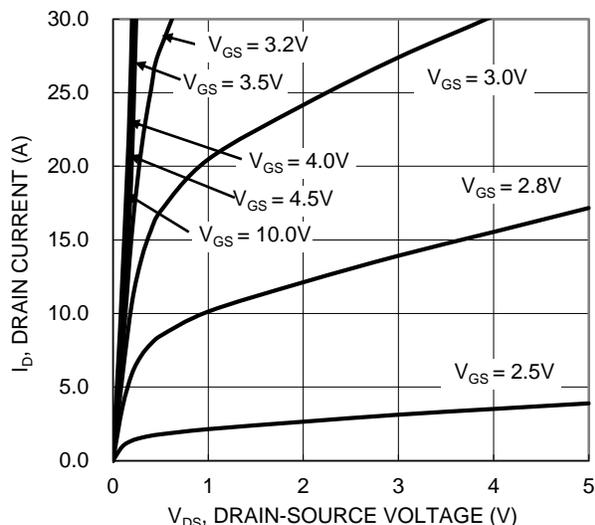


Figure 1. Typical Output Characteristic

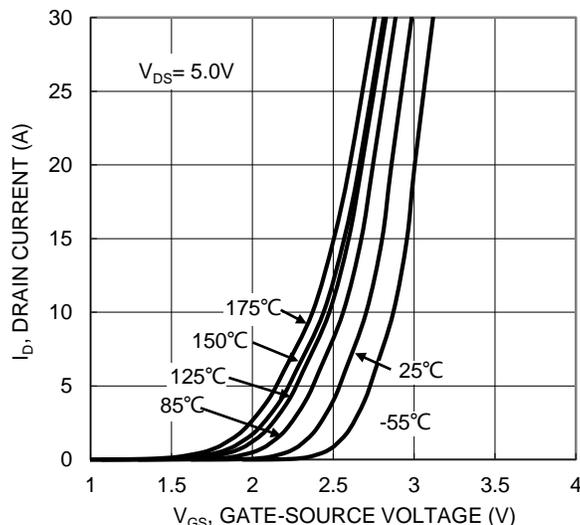


Figure 2. Typical Transfer Characteristic

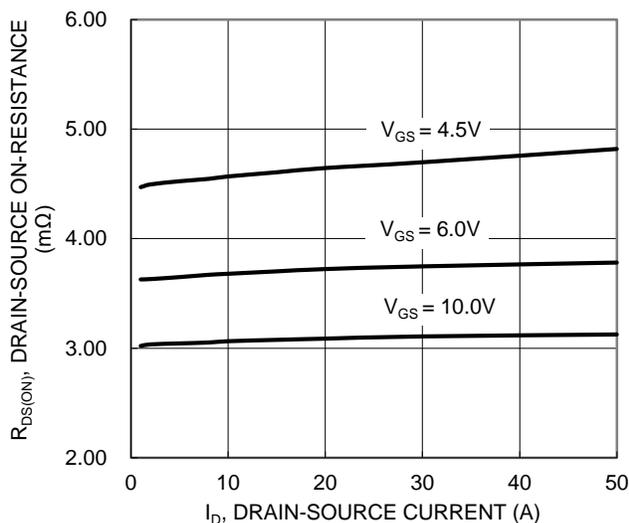


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

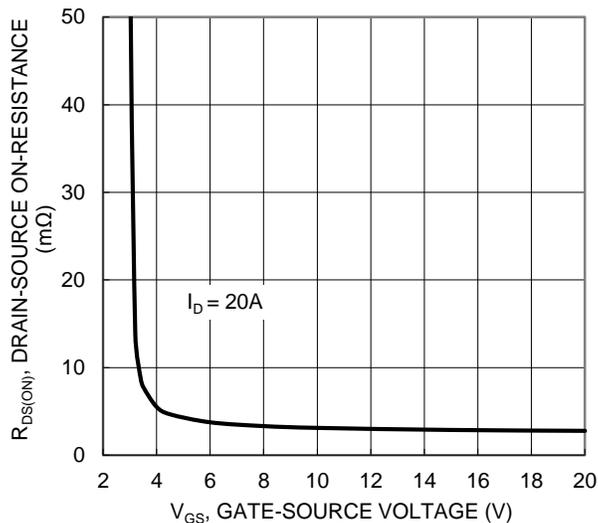


Figure 4. Typical Transfer Characteristic

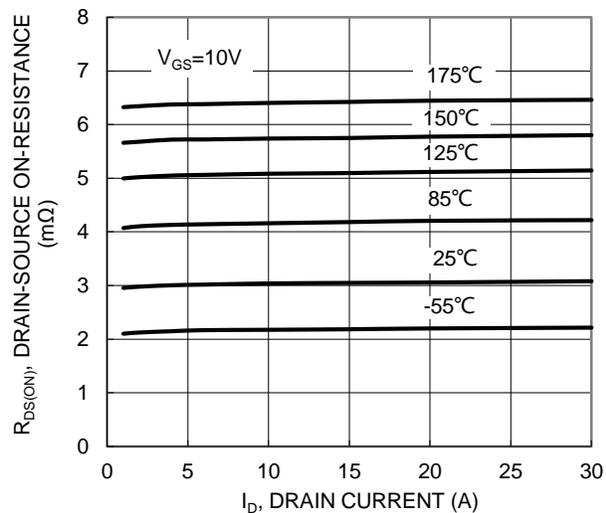


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

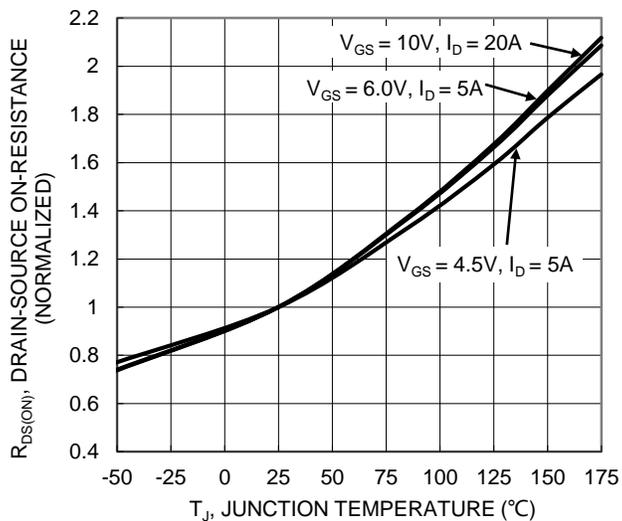


Figure 6. On-Resistance Variation with Temperature

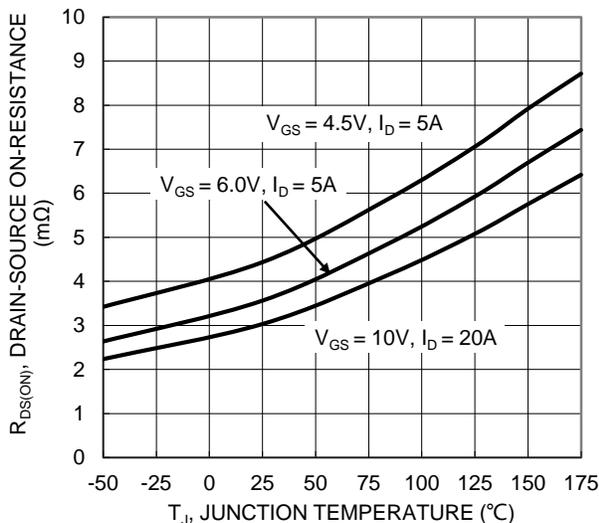


Figure 7. On-Resistance Variation with Temperature

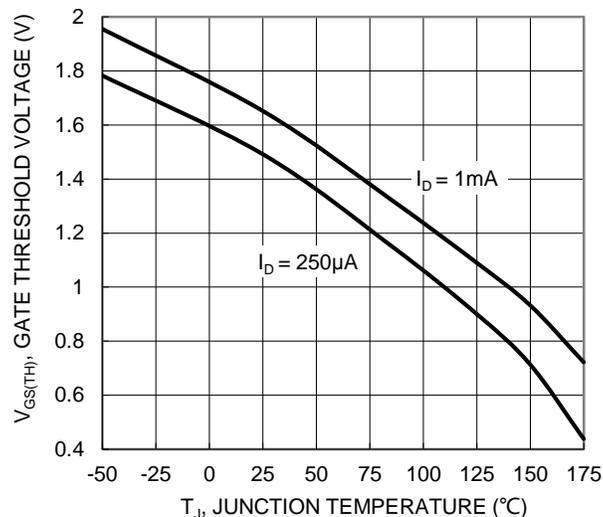


Figure 8. Gate Threshold Variation vs. Junction Temperature

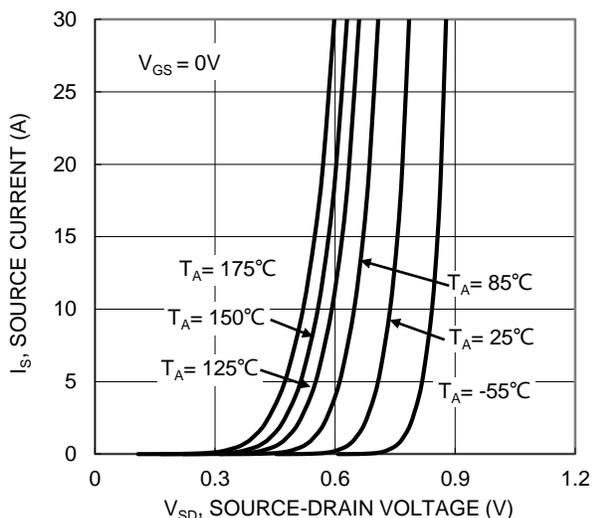


Figure 9. Diode Forward Voltage vs. Current

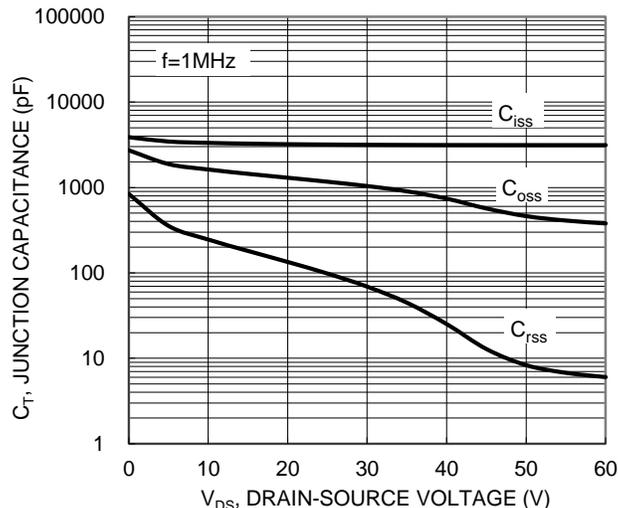


Figure 10. Typical Junction Capacitance

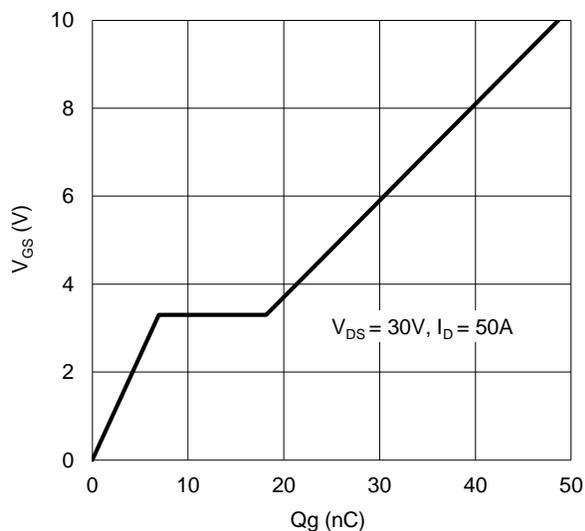


Figure 11. Gate Charge

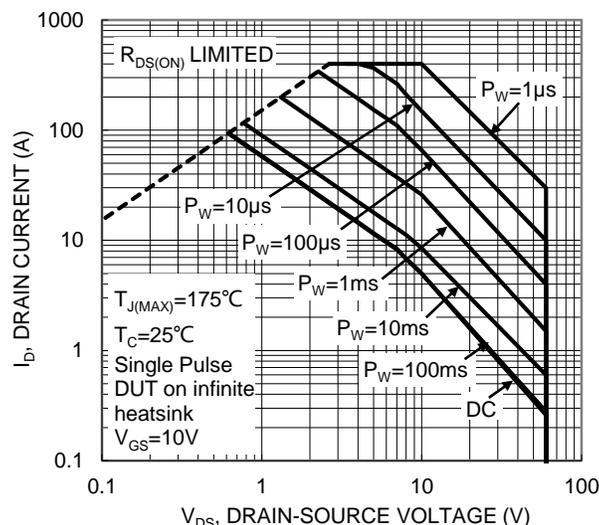


Figure 12. SOA, Safe Operation Area

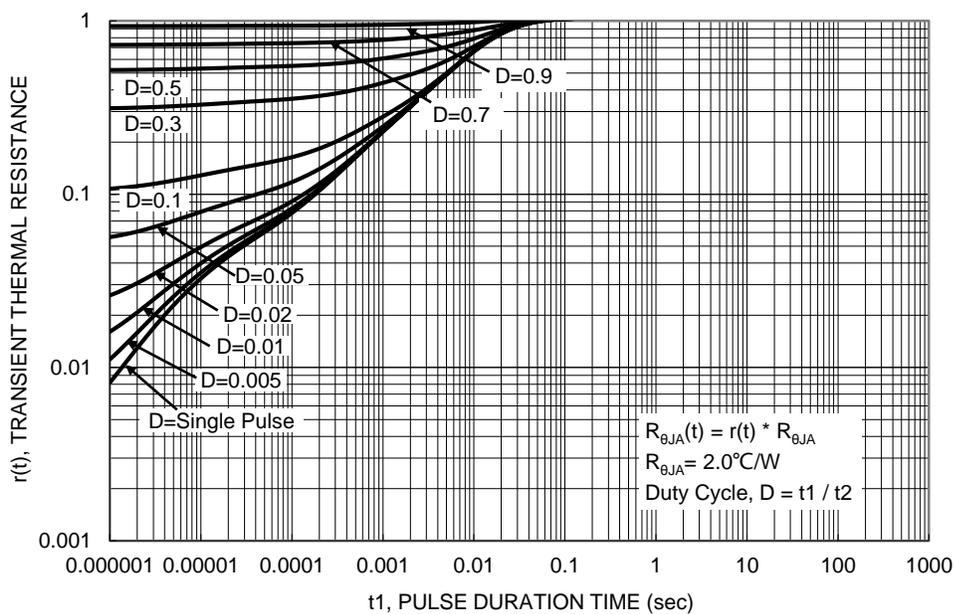
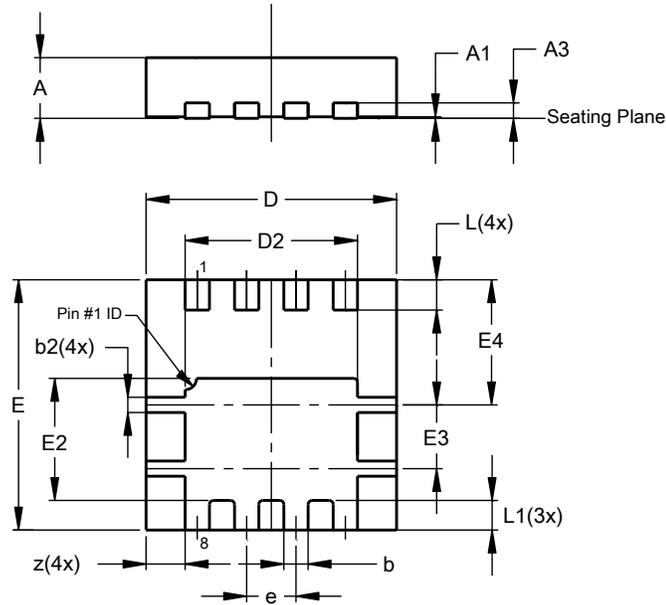


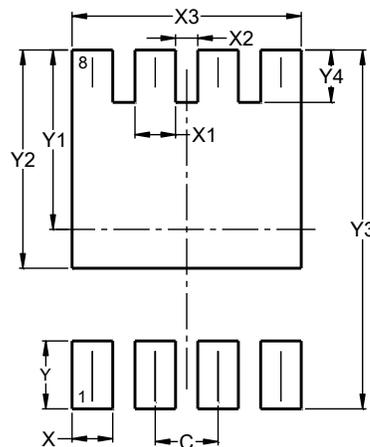
Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

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