优尚

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
40V	11.5mΩ @ V_{GS} = 10V	30A
	17.8mΩ @ V_{GS} = 4.5V	24A

Features and Benefits

- 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
- Excellent Q_{gd} x $R_{DS(ON)}$ Product (FOM)
- Advanced Technology for DC-DC Converters
- Small Form Factor Thermally Efficient Package Enables Higher Density End Products

Description and Applications

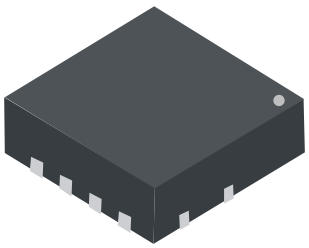
This MOSFET is designed to minimize the on-state resistance ($R_{DS(ON)}$) yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

- Backlighting
- Power Management Functions
- DC-DC Converters

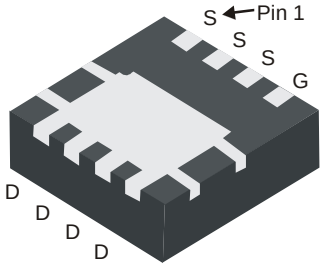
Mechanical Data

- 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 Finish - Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.008 grams (Approximate)

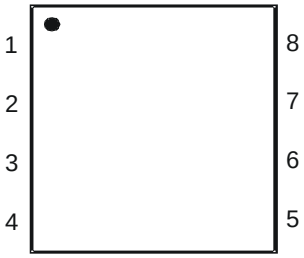
PowerDI3333-8



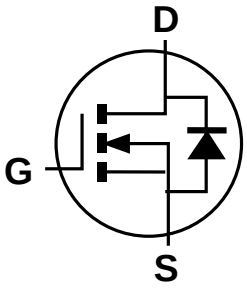
Top View



Bottom View



Top View



Equivalent Circuit

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

Characteristic		Symbol	Value	Unit
Drain-Source Voltage		V_{DSS}	40	V
Gate-Source Voltage		V_{GSS}	+20 -16	V
Continuous Drain Current (Note 5) V_{GS} = 10V	T_C = +25°C T_C = +70°C	I_D	30 24	A
Continuous Drain Current (Note 5) V_{GS} = 10V	T_A = +25°C T_A = +70°C	I_D	10.8 8.6	A
Maximum Continuous Body Diode Forward Current (Note 5)		I_S	2.1	A
Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)		I_{DM}	65	A
Avalanche Current, L=0.3mH		I_{AS}	11.9	A
Avalanche Energy, L=0.3mH		E_{AS}	21.4	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T_A = +25°C	P_D	2	W
Thermal Resistance, Junction to Ambient (Note 5)		$R_{\theta JA}$	62	°C/W
Total Power Dissipation (Note 5)	T_C = +25°C	P_D	15.6	W
Thermal Resistance, Junction to Case (Note 5)		$R_{\theta JC}$	8	°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 6)						
Drain-Source Breakdown Voltage	BV_{DSS}	40	—	—	V	V_{GS} = 0V, I_D = 1mA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	μA	V_{DS} = 32V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	100 -100	nA	V_{GS} = +20V, V_{DS} = 0V V_{GS} = -16V, V_{DS} = 0V
ON CHARACTERISTICS (Note 6)						
Gate Threshold Voltage	$V_{GS(TH)}$	1	—	3	V	V_{DS} = V_{GS}, I_D = 250μA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	9.2	11.5	mΩ	V_{GS} = 10V, I_D = 20A
		—	13.4	17.8		V_{GS} = 4.5V, I_D = 20A
Diode Forward Voltage	V_{SD}	—	—	1.2	V	V_{GS} = 0V, I_S = 20A
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C_{iss}	—	767	—	pF	V_{DS} = 20V, V_{GS} = 0V, f = 1MHz
Output Capacitance	C_{oss}	—	238	—		
Reverse Transfer Capacitance	C_{rss}	—	30.6	—		
Gate Resistance	R_g	—	1	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	7	—	nC	V_{DS} = 20V, I_D = 20A
Total Gate Charge (V_{GS} = 10V)	Q_g	—	15.1	—		
Gate-Source Charge	Q_{gs}	—	2.1	—		
Gate-Drain Charge	Q_{gd}	—	3.2	—		
Turn-On Delay Time	$t_{D(ON)}$	—	3.5	—	ns	V_{DD} = 20V, V_{GS} = 10V, R_G = 1.6Ω, I_D = 20A
Turn-On Rise Time	t_R	—	5.8	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	9.6	—		
Turn-Off Fall Time	t_F	—	2	—		
Body Diode Reverse Recovery Time	t_{RR}	—	9.8	—	ns	I_F = 15A, di/dt = 400A/μs
Body Diode Reverse Recovery Charge	Q_{RR}	—	5.1	—	nC	

Notes:
5. $R_{\theta JA}$ is determined with the device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper pad layout. $R_{\theta JC}$ is guaranteed by design while $R_{\theta JA}$ is determined by the user's board design.
6. Short duration pulse test used to minimize self-heating effect.
7. Guaranteed by design. Not subject to product testing.

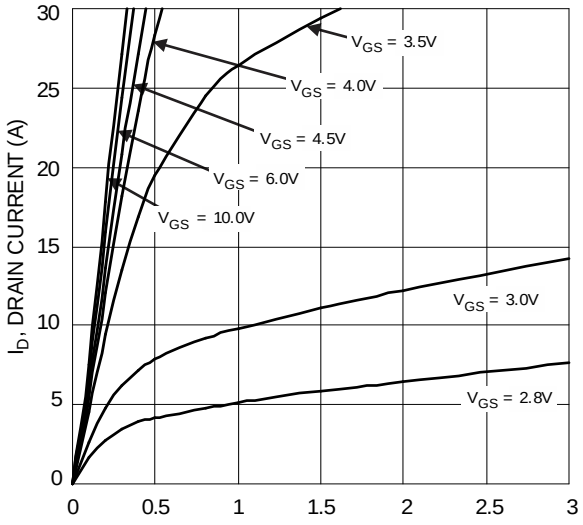


Figure 1 Typical Output Characteristics

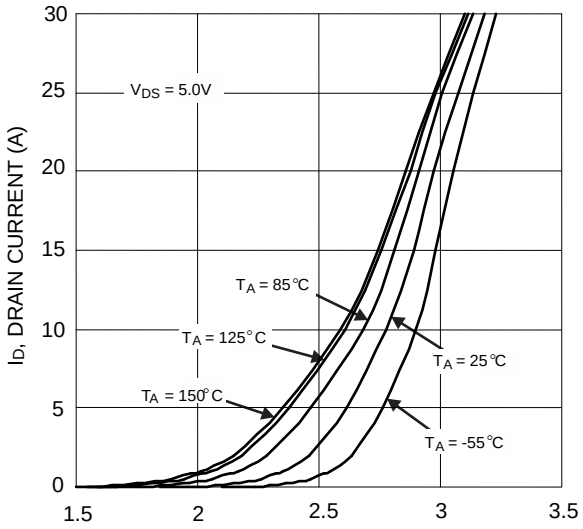


Figure 2 Typical Transfer Characteristics

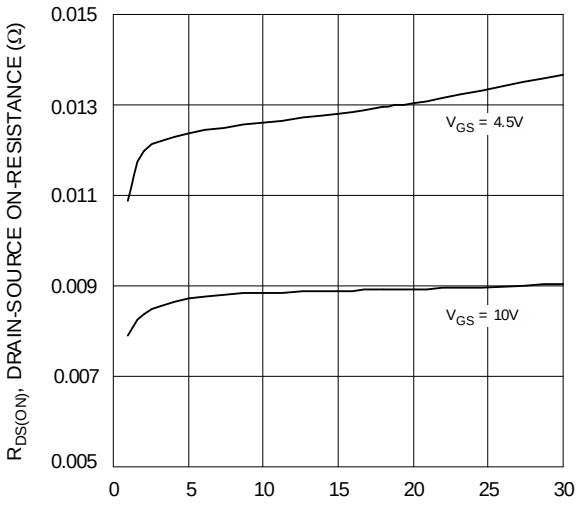


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

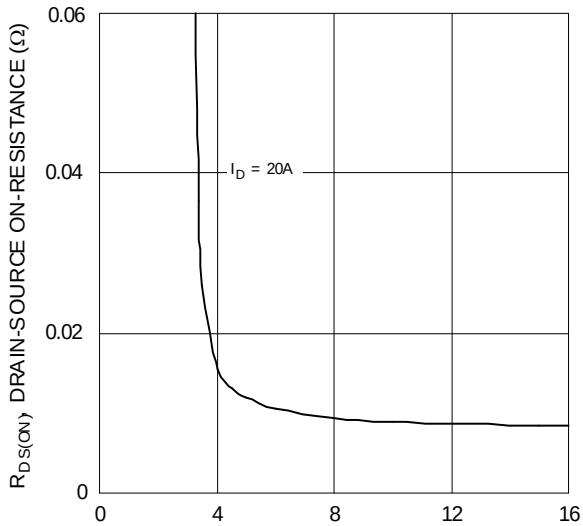


Figure 4 Typical Transfer Characteristics

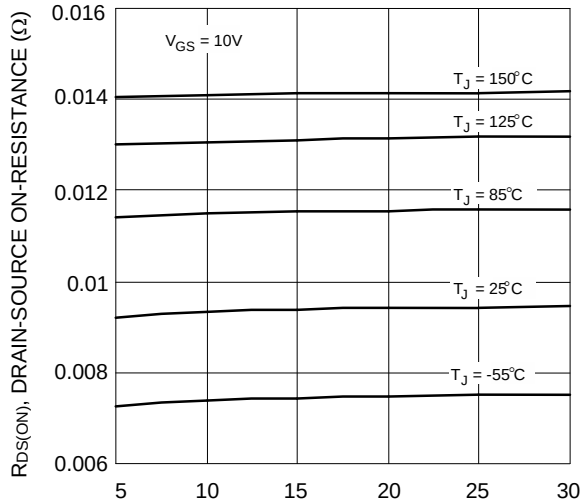


Figure 5 Typical On-Resistance vs. Drain Current and Junction Temperature

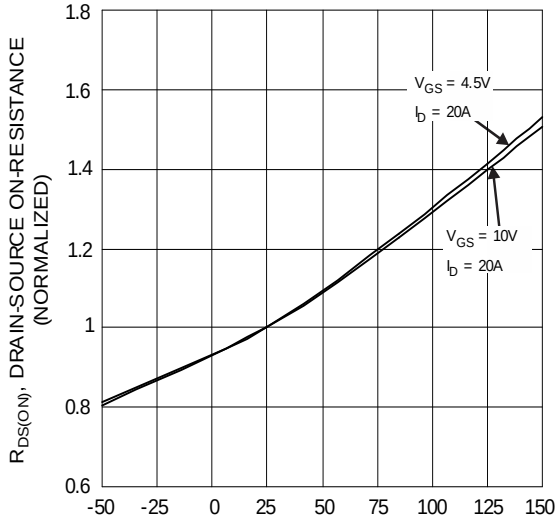


Figure 6 On-Resistance Variation with Junction Temperature

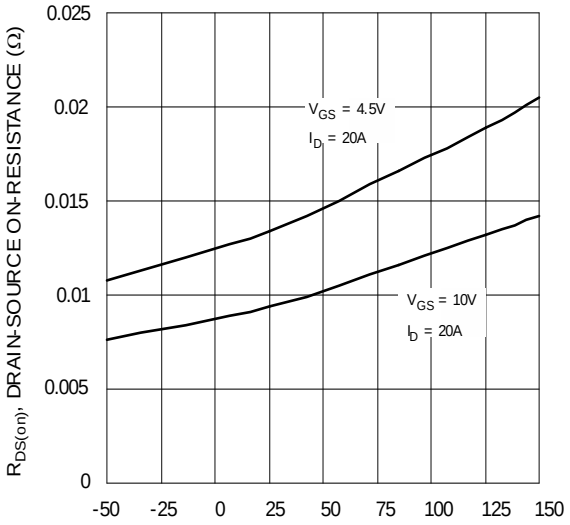


Figure 7 On-Resistance Variation with Junction Temperature

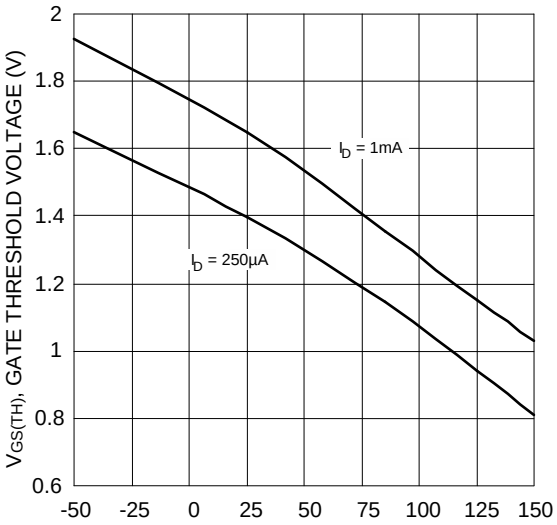


Figure 8 Gate Threshold Variation vs. Junction Temperature

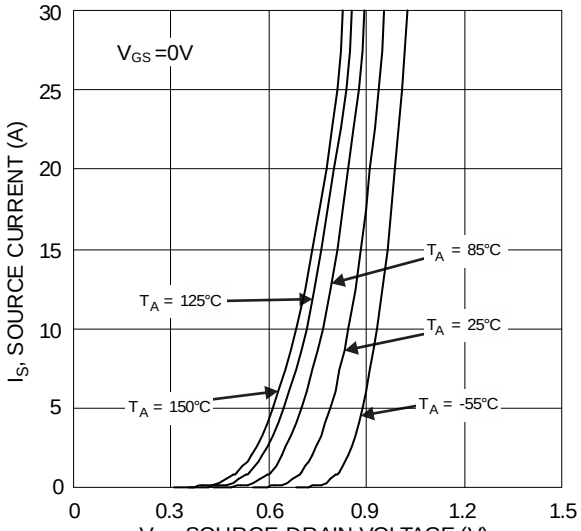


Figure 9 Diode Forward Voltage vs. Current

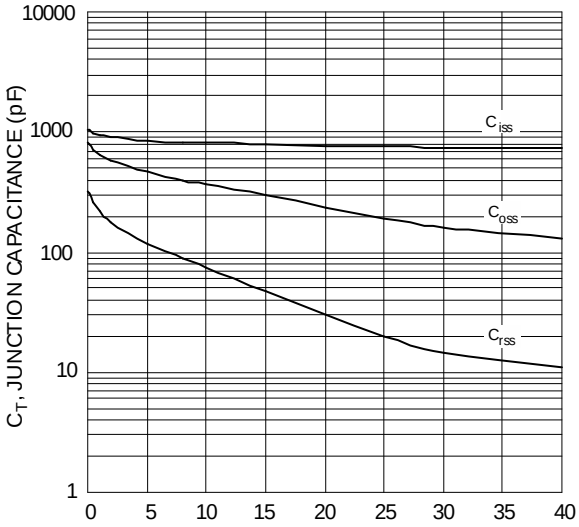


Figure 10 Typical Junction Capacitance

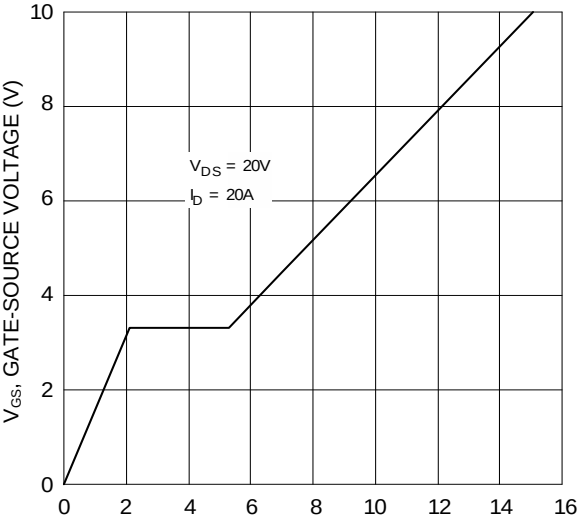


Figure 11 Gate Charge

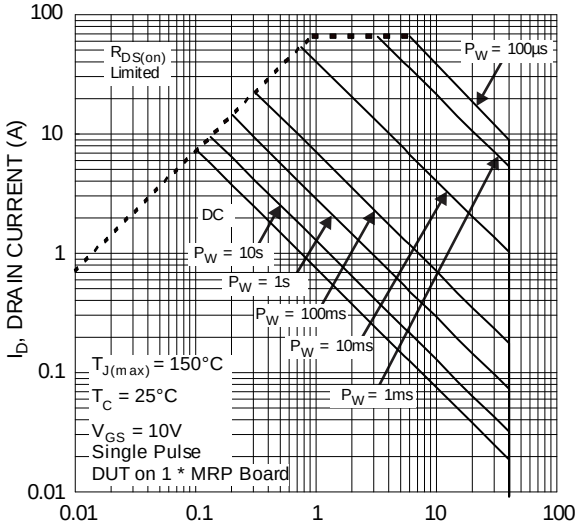


Figure 12 SOA, Safe Operation Area

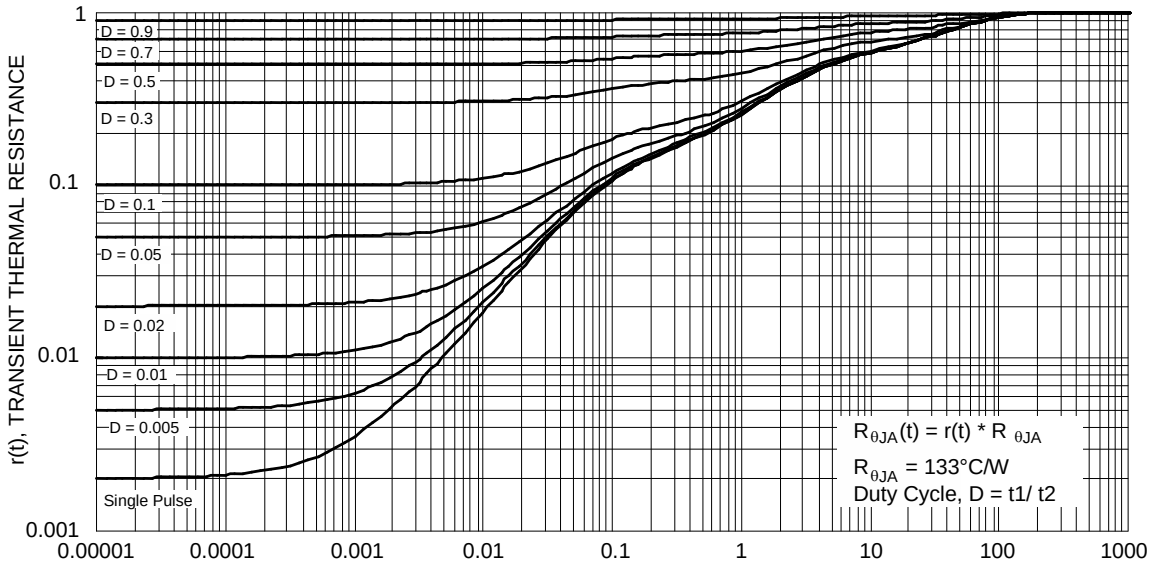
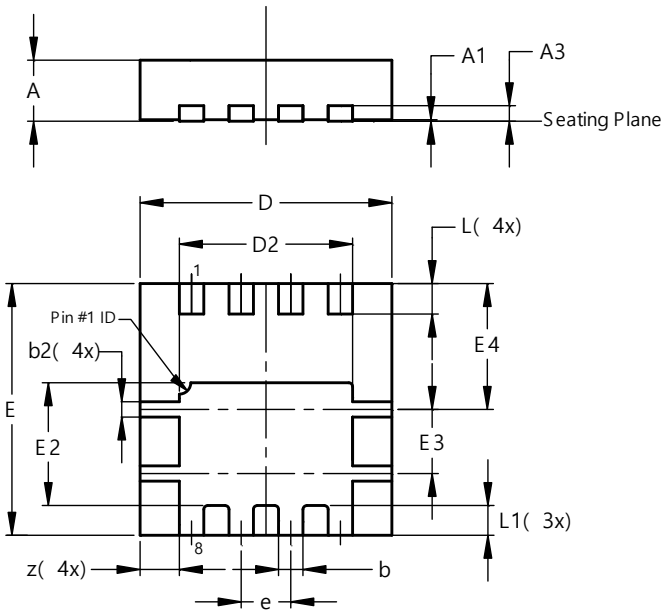


Figure 13 Transient Thermal Resistance

Package Outline Dimensions

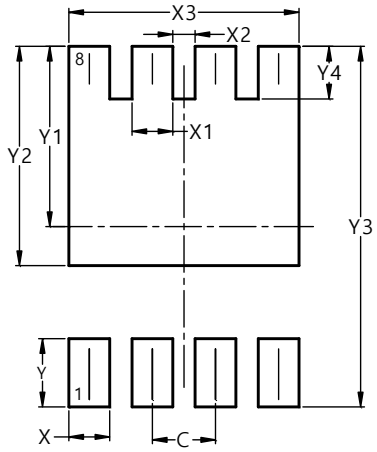
PowerDI3333-8



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