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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企业微信二维码

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Product Summary

Device	BV_{DSS}	$R_{DS(ON)}$ Max	I_D Max $T_A = +25°C$
Q1	25V	6mΩ @ V_{GS} = 10V	11.6A
		7.5mΩ @ V_{GS} = 4.5V	10.4A
Q2	25V	2.0mΩ @ V_{GS} = 10V	20.1A
		3.1mΩ @ V_{GS} = 4.5V	16.1A

Features

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage

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

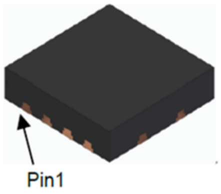
- Power-management functions

Mechanical Data

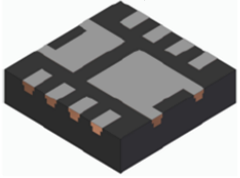
- Package: PowerDI$^{®}$3333-8
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections Indicator: See Diagram
- Terminals: Finish – Matte Tin Annealed over Copper Lead Frame. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.072 grams (Approximate)

PowerDI3333-8 (Type F)

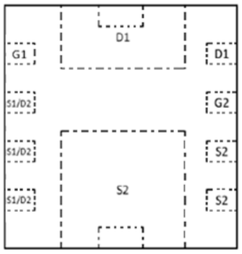
Pin 1



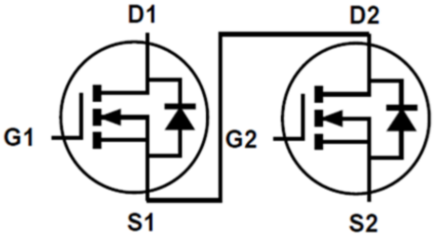
Top View



Bottom View



Transparent Top View



Q1 N-Channel MOSFET Q2 N-Channel MOSFET

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

Characteristic			Symbol	Q1 N-CHANNEL	Q2 N-CHANNEL	Unit
Drain-Source Voltage			V_{DSS}	25	25	V
Gate-Source Voltage			V_{GSS}	±12	±12	V
Continuous Drain Current (Note 5) V_{GS} = 10V	Steady State	T_A = +25°C T_A = +85°C	I_D	11.6 8.4	20.1 14.5	A
Continuous Drain Current (Note 5) V_{GS} = 4.5V	Steady State	T_A = +25°C T_C = +25°C	I_D	10.4 33.8	16.1 52.6	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I_{DM}	77	116	A
Avalanche Current (Note 6) L = 1mH			I_{AS}	6.5	16.5	A
Avalanche Energy (Note 6) L = 1mH			E_{AS}	21	136	mJ

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

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P_D	1.24	W
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	103	°C/W
Thermal Resistance, Junction to Case (Note 7)	$R_{\theta JC}$	9.7	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Notes:
5. Device mounted on FR-4 PCB, with minimum recommended pad layout.
6. I_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep T_J = +25°C.
7. Thermal resistance from junction to soldering point (on the exposed drain pad).

Electrical Characteristics N-CHANNEL – Q1 (@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}	25	—	—	V	V_{GS} = 0V, I_D = 250µA
Zero Gate Voltage Drain Current T_J = +25°C	I_{DSS}	—	—	1.0	µA	V_{DS} = 20V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	100	nA	V_{GS} = 12V, V_{DS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	-100	nA	V_{GS} = -8V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	0.8	—	2.2	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	3.9	6	mΩ	V_{GS} = 10V, I_D = 13A
		—	5.0	7.5		V_{GS} = 4.5V, I_D = 12A
Diode Forward Voltage (Note 8)	V_{SD}	—	0.7	1.0	V	V_{GS} = 0V, I_S = 1A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	1010	—	pF	V_{DS} = 13V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	732	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	47	—	pF	
Gate Resistance	R_g	—	0.65	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	7.2	—	nC	V_{DS} = 13V, I_D = 13A
Total Gate Charge (V_{GS} = 10V)	Q_g	—	15.9	—	nC	
Gate-Source Charge	Q_{gs}	—	2.6	—	nC	
Gate-Drain Charge	Q_{gd}	—	1.5	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	5.6	—	ns	V_{DS} = 13V R_g = 6Ω, I_D = 13A
Turn-On Rise Time	t_R	—	31.7	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	19.9	—	ns	
Turn-Off Fall Time	t_F	—	21.4	—	ns	

Electrical Characteristics N-CHANNEL – Q2 (@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}	25	—	—	V	V_{GS} = 0V, I_D = 250µA
Zero Gate Voltage Drain Current T_J = +25°C	I_{DSS}	—	—	1	µA	V_{DS} = 20V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	100	nA	V_{GS} = 12V, V_{DS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	-100	nA	V_{GS} = -8V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	1.1	—	2.2	V	V_{DS} = V_{GS}, I_D = 1mA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	1.1	2.0	mΩ	V_{GS} = 10V, I_D = 27A
		—	1.5	3.1		V_{GS} = 4.5V, I_D = 24A
Diode Forward Voltage (Note 8)	V_{SD}	—	0.7	1.0	V	V_{GS} = 0V, I_S = 1A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	4016	—	pF	V_{DS} = 13V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	2624	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	135	—	pF	
Gate Resistance	R_g	—	0.49	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	26.7	—	nC	V_{DS} = 13V, I_D = 27A
Total Gate Charge (V_{GS} = 10V)	Q_g	—	57.4	—	nC	
Gate-Source Charge	Q_{gs}	—	8.6	—	nC	
Gate-Drain Charge	Q_{gd}	—	6.9	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	12.4	—	ns	V_{DS} =13V R_G = 6Ω , I_D = 27A
Turn-On Rise Time	t_R	—	37.2	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	62.7	—	ns	
Turn-Off Fall Time	t_F	—	30.8	—	ns	

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

N-CHANNEL – Q1

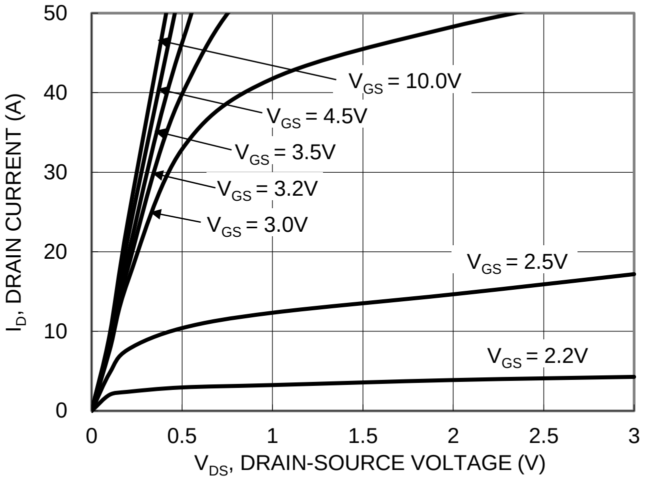


Figure 1. Typical Output Characteristic

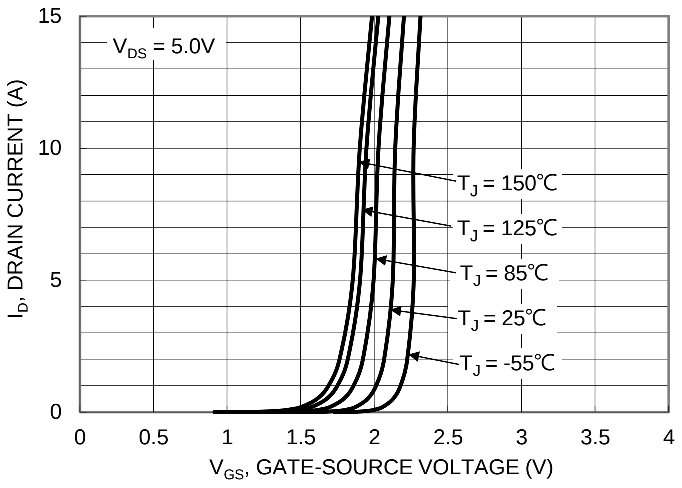


Figure 2. Typical Transfer Characteristic

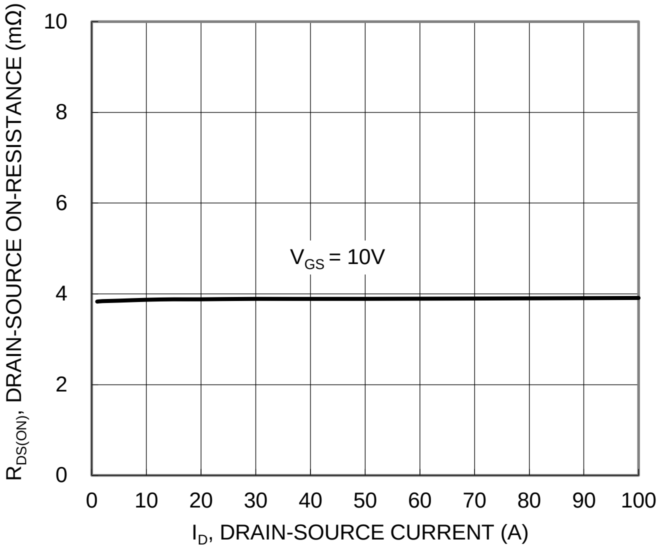


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

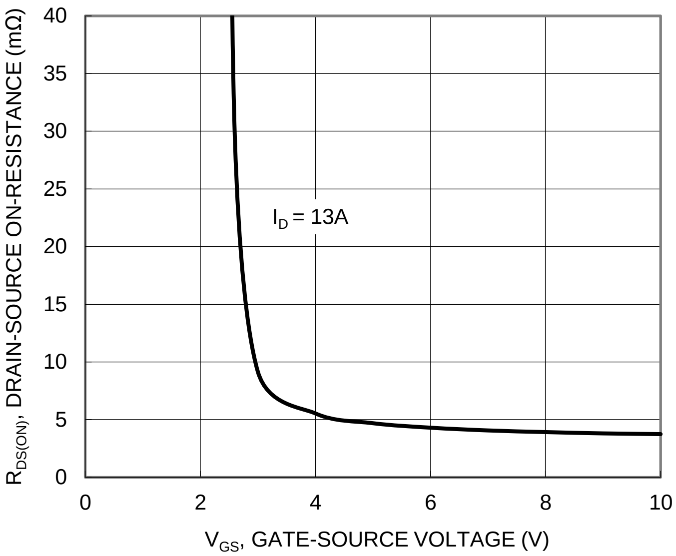


Figure 4. Typical Transfer Characteristic

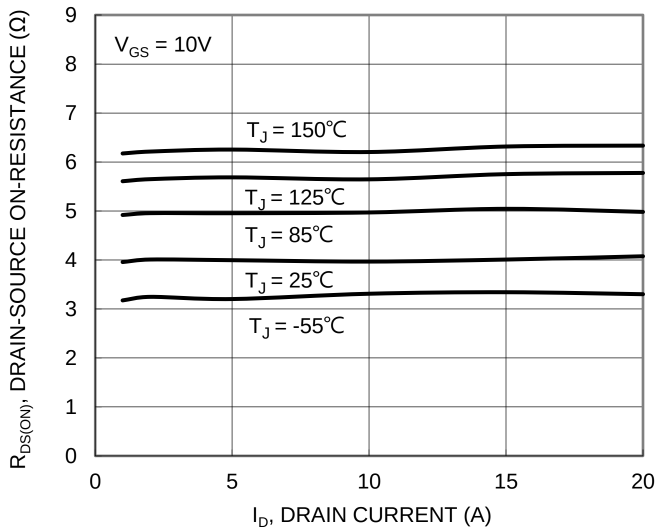


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

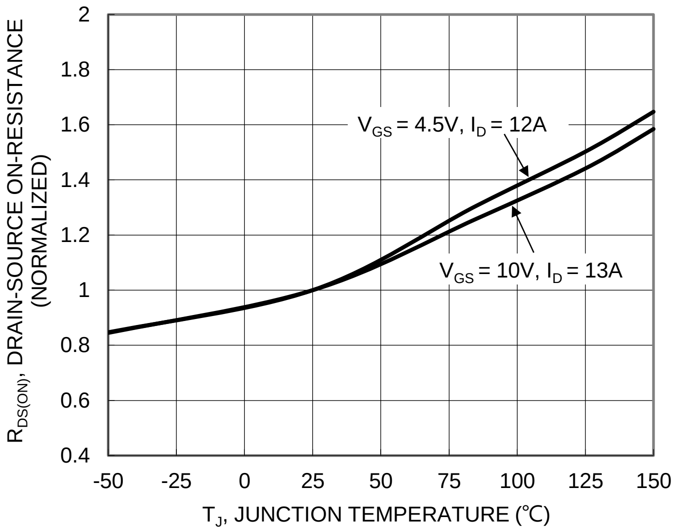


Figure 6. On-Resistance Variation with Temperature

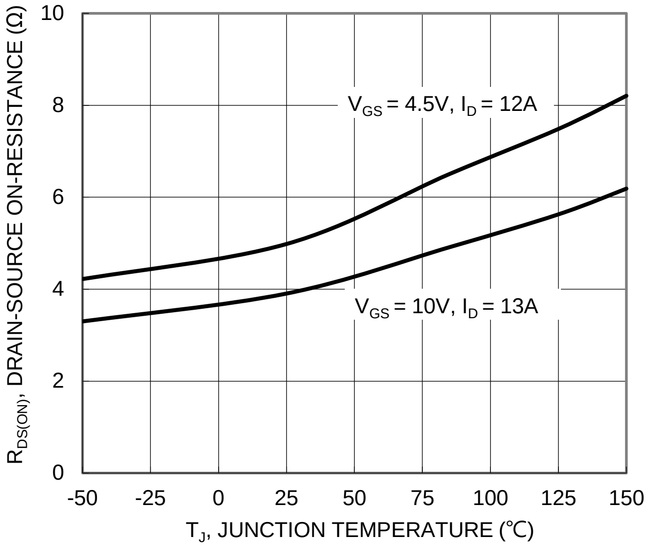


Figure 7. On-Resistance Variation with Temperature

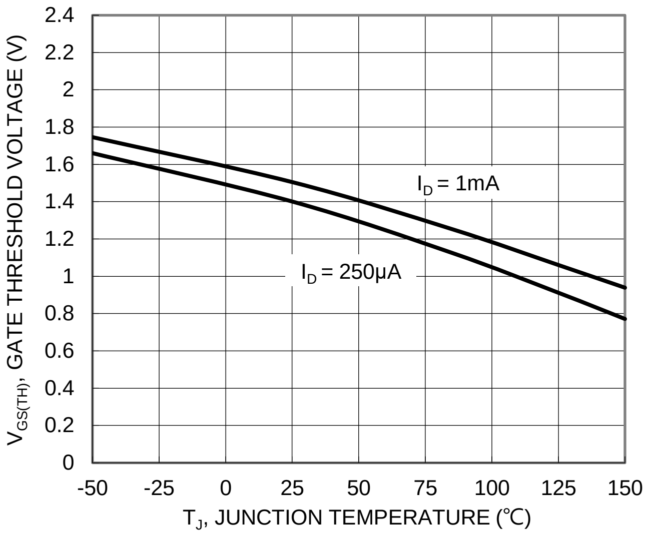


Figure 8. Gate Threshold Variation vs. Junction Temperature

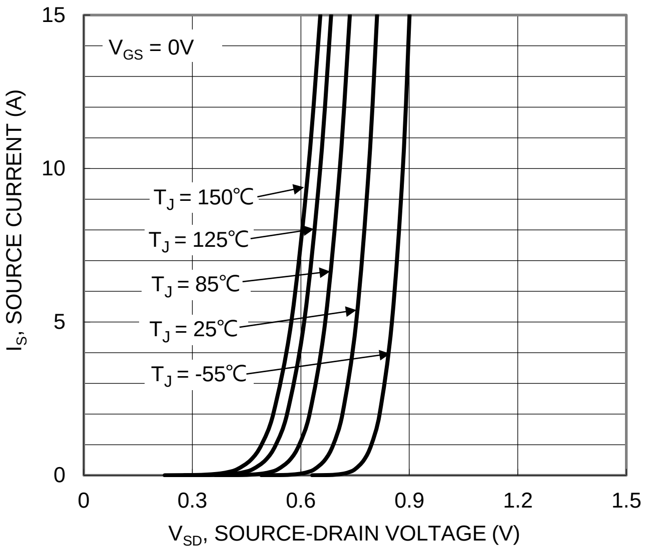


Figure 9. Diode Forward Voltage vs. Current

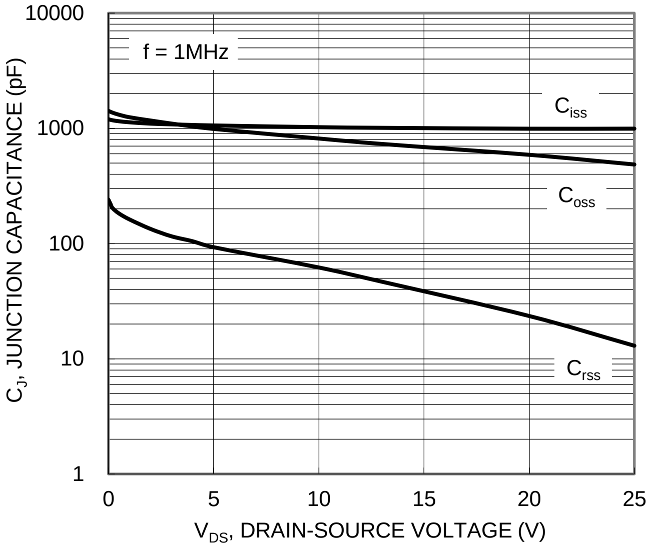


Figure 10. Typical Junction Capacitance

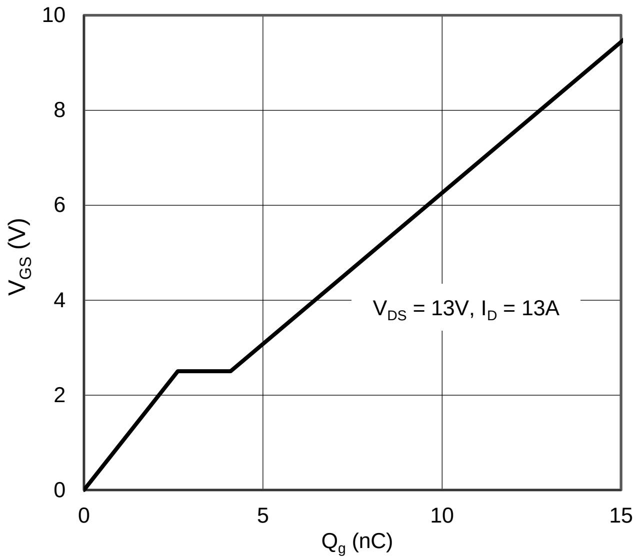


Figure 11. Gate Charge

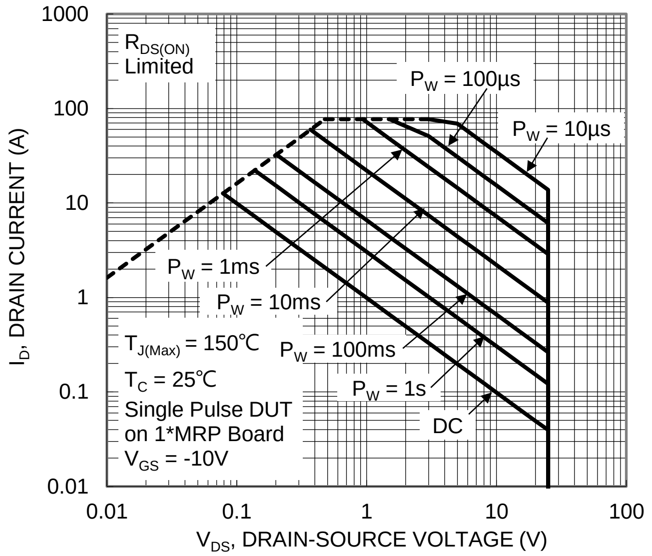


Figure 12. SOA, Safe Operation Area

N-CHANNEL – Q2

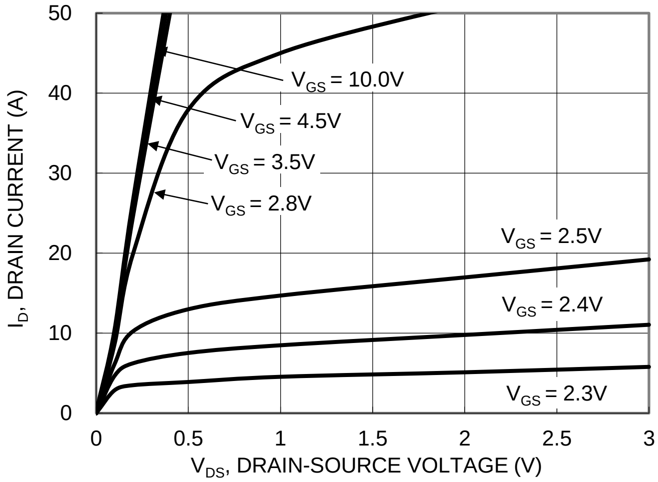


Figure 13. Typical Output Characteristic

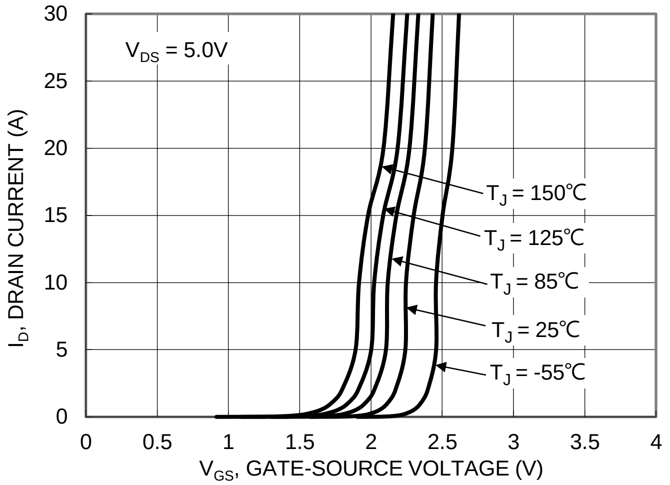


Figure 14. Typical Transfer Characteristic

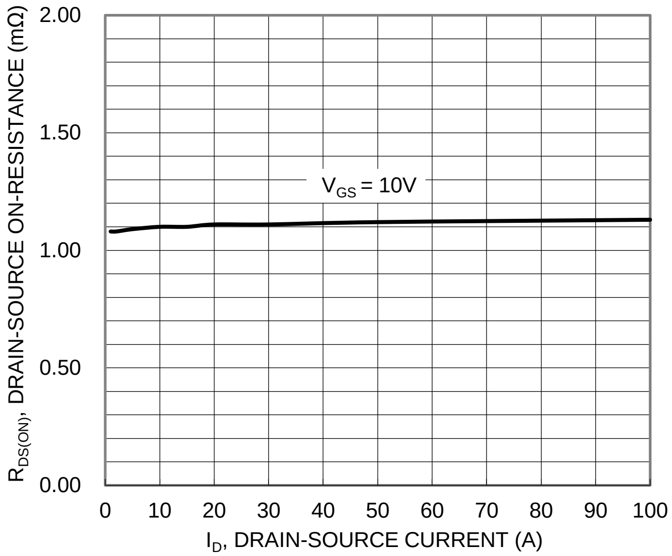


Figure 15. Typical On-Resistance vs. Drain Current and Gate Voltage

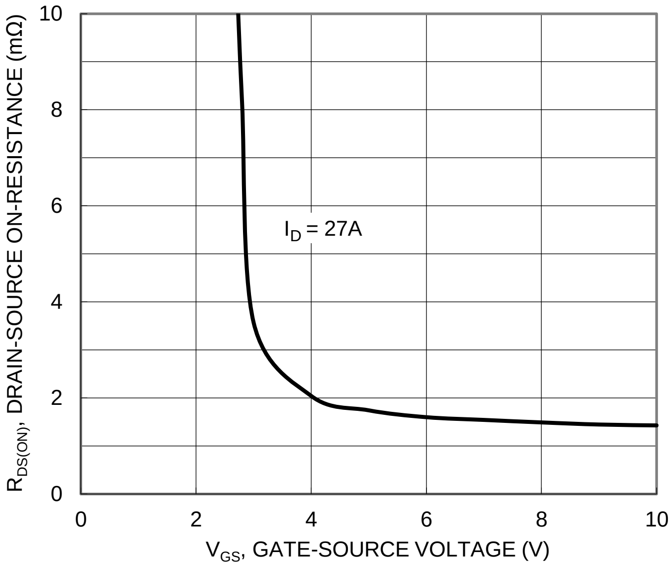


Figure 16. Typical Transfer Characteristic

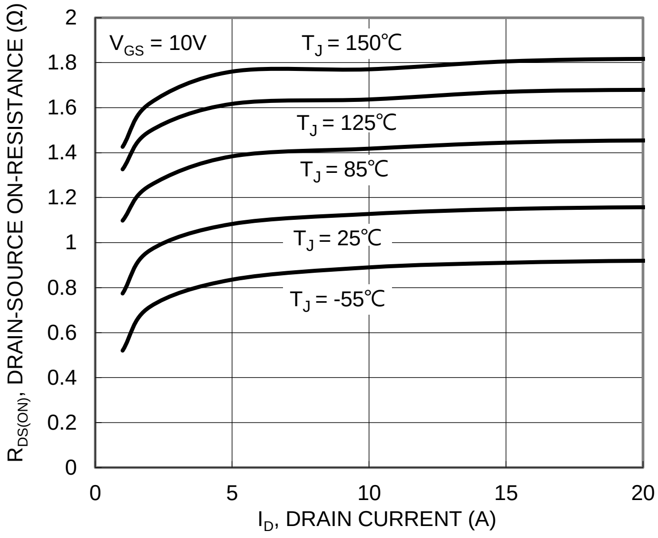


Figure 17. Typical On-Resistance vs. Drain Current and Temperature

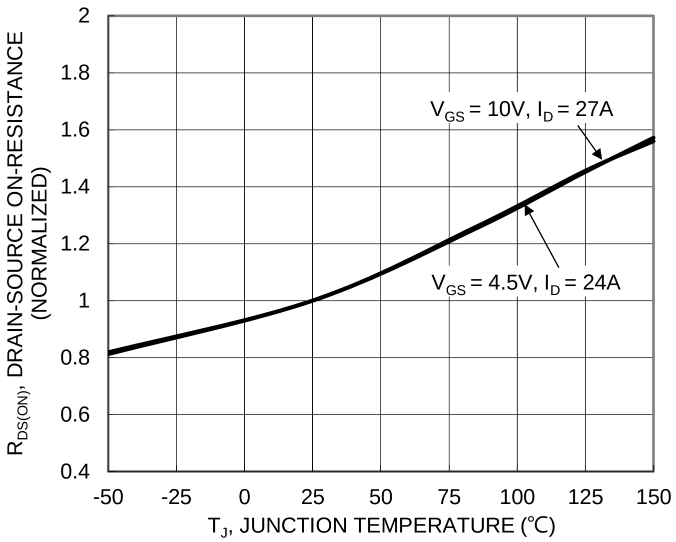


Figure 18. On-Resistance Variation with Temperature

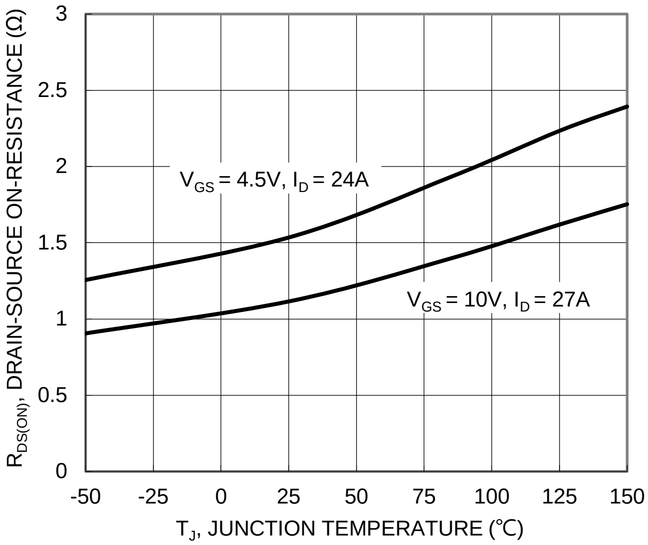


Figure 19. On-Resistance Variation with Temperature

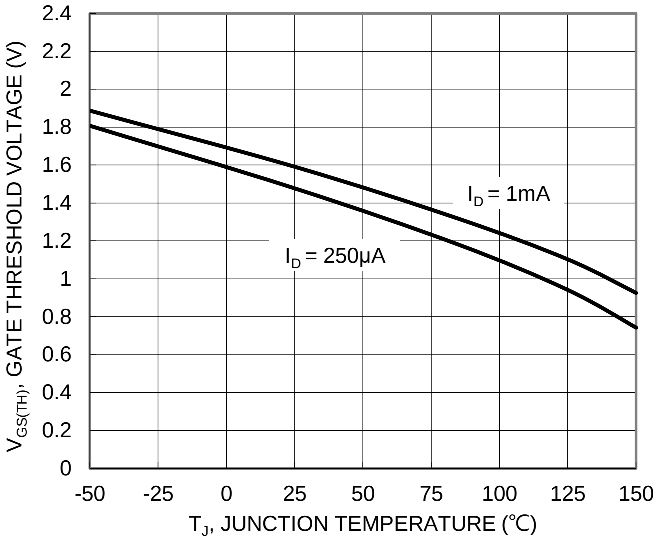


Figure 20. Gate Threshold Variation vs. Junction Temperature

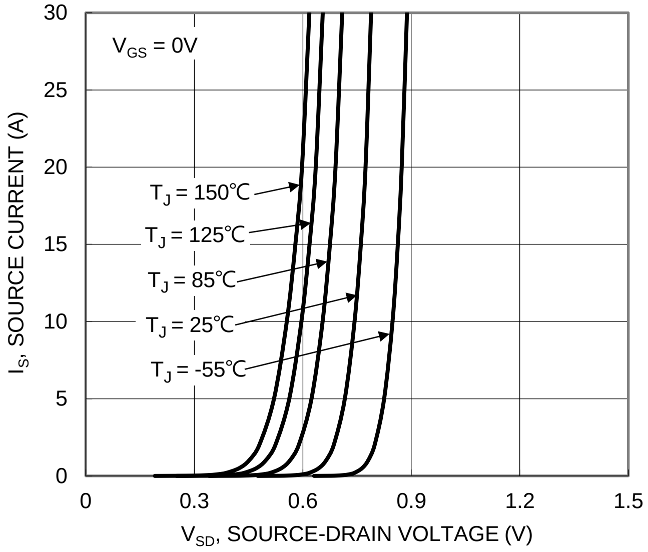


Figure 21. Diode Forward Voltage vs. Current

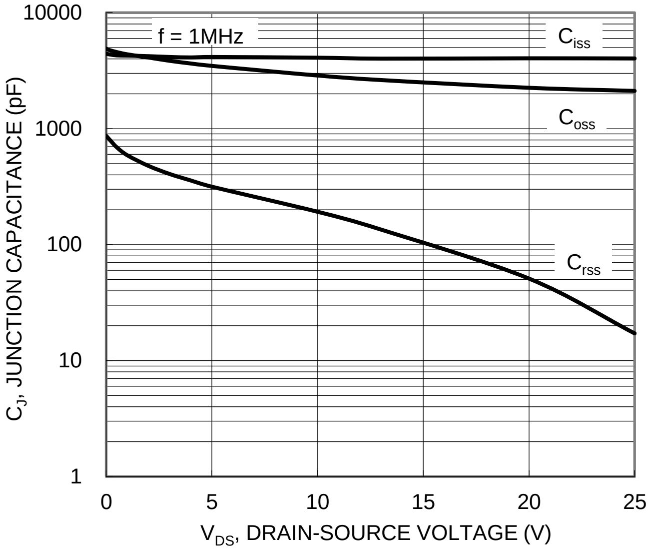


Figure 22. Typical Junction Capacitance

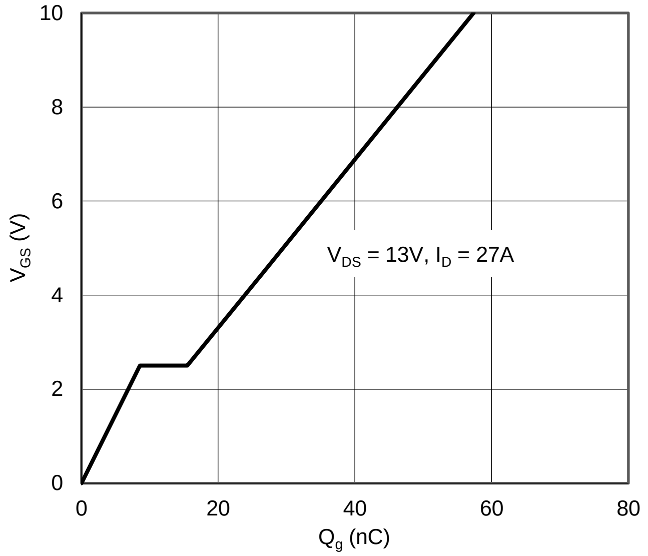


Figure 23. Gate Charge

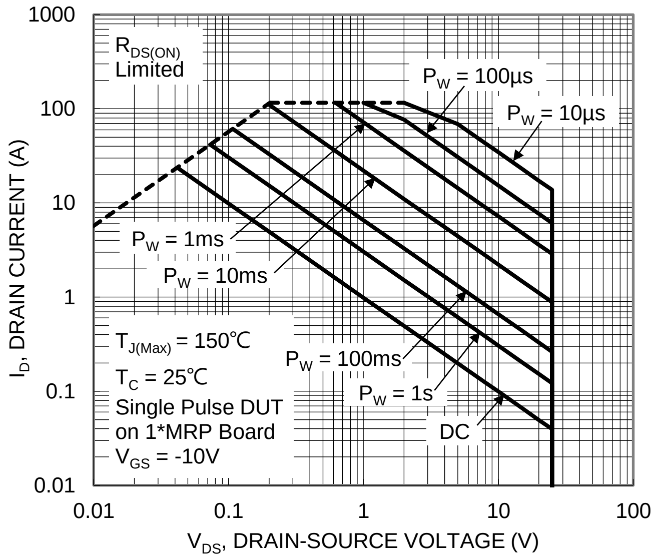


Figure 24. SOA, Safe Operation Area

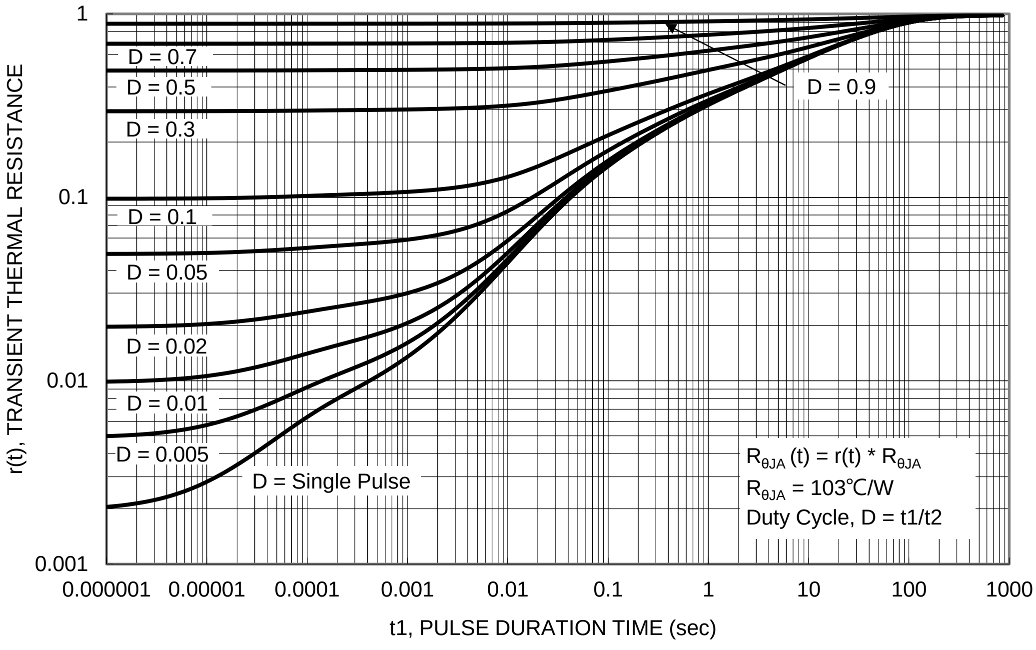
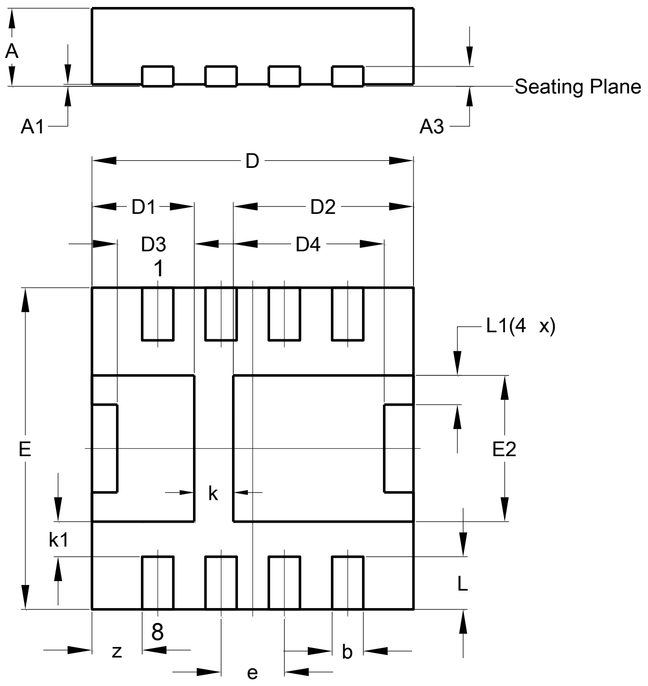


Figure 25. Transient Thermal Resistance

Package Outline Dimensions

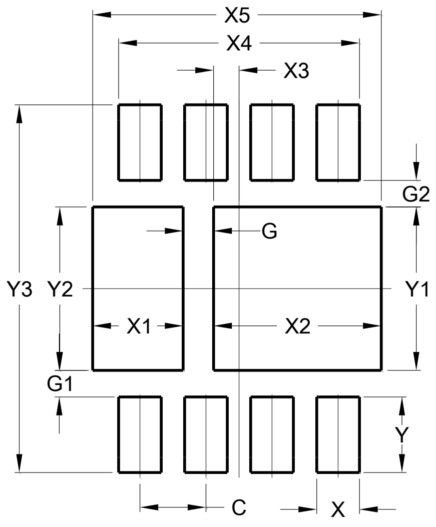
PowerDI3333-8 (Type F)



PowerDI3333-8 (Type F)			
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
D	3.25	3.35	3.30
D1	0.95	1.15	1.05
D2	1.75	1.95	1.85
D3	0.69	0.89	0.79
D4	1.45	1.65	1.55
E	3.25	3.35	3.30
E2	1.40	1.60	1.50
e	0.65BSC		
L	0.49	0.59	0.54
L1	0.20	0.40	0.30
z	--	--	0.515
k	--	--	0.40
k1	--	--	0.36
All Dimensions in mm			

Suggested Pad Layout

PowerDI3333-8 (Type F)



Dimensions	Value (in mm)
C	0.650
G	0.300
G1	0.260
G2	0.260
X	0.420
X1	0.890
X2	1.650
X3	0.250
X4	2.370
X5	2.840
Y	0.740
Y1	1.600
Y2	1.600
Y3	3.600