Product Summary

Device	BV_{DSS}	$R_{DS(ON)}$ Max	I_D Max T_A = +25°C
Q1	30V	4.7mΩ @ V_{GS} = 10V	17.0A
		5.7mΩ @ V_{GS} = 4.5V	15.5A
Q2	30V	5.8mΩ @ V_{GS} = 10V	15.3A
		7.3mΩ @ V_{GS} = 4.5V	13.7A

Description

This MOSFET has been 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

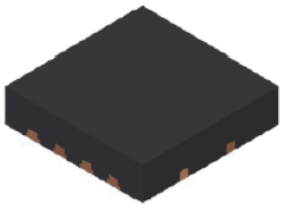
Features

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative. https://www.diodes.com/quality/product-definitions/**

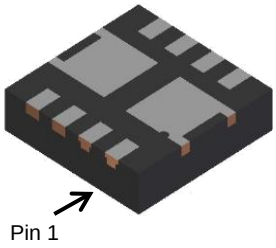
Mechanical Data

- 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
- Terminals Connections Indicator: See Diagram
- Terminals: Finish - Matte Tin Annealed over Copper Lead Frame. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.029 grams (Approximate)

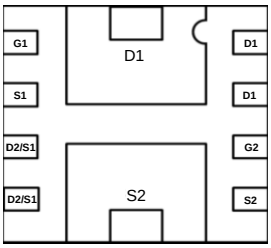
PowerDI3333-8 (Type G)



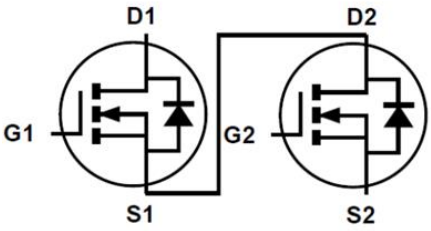
Top View



Bottom View



Bottom View



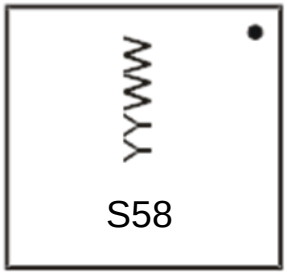
Q1 N-Channel MOSFET Q2 N-Channel MOSFET

Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
DMT35M8LDG-7	PowerDI3333-8 (Type G)	2000	Tape & Reel
DMT35M8LDG-13	PowerDI3333-8 (Type G)	3000	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/.

Marking Information



S58 = Product Type Marking Code
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 22 = 2022)
WW = Week Code (01 to 53)

Maximum Ratings N-CHANNEL – Q1 & Q2 (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Q1 N-CHANNEL	Q2 N-CHANNEL	Unit
Drain-Source Voltage		V_{DSS}	30	30	V
Gate-Source Voltage		V_{GSS}	±12	±12	V
Continuous Drain Current (Note 5) V_{GS} = 10V	T_A = +25°C T_A = +70°C	I_D	17.0 13.6	15.3 12.3	A
Maximum Continuous Body Diode Forward Current (Note 6)		I_S	2.7	2.6	A
Pulsed Drain Current		I_{DM}	90	90	A
Pulsed Body Diode Forward Current (10µs Pulse, Duty Cycle = 1%)		I_{SM}	90	90	A
Avalanche Current (Note 7) L = 0.1mH		I_{AS}	24	18	A
Avalanche Energy (Note 7) L = 0.1mH		E_{AS}	29	18	mJ

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 8)	T_A = +25°C	P_D	0.98	W
Thermal Resistance, Junction to Ambient (Note 8)		$R_{\theta JA}$	129	°C/W
Total Power Dissipation (Note 5)	T_C = +25°C	P_D	2	W
Thermal Resistance, Junction to Ambient (Note 5)		$R_{\theta JA}$	61	°C/W
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	12.1	°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 thermal bias to bottom layer 1-inch square copper plate.
6. Thermal resistance from junction to soldering point (on the exposed drain pad).
7. I_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep T_J = +25°C.
8. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.

Electrical Characteristics N-CHANNEL – Q1 (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 9)						
Drain-Source Breakdown Voltage	BV_{DSS}	30	—	—	V	V_{GS} = 0V, I_D = 250µA
Zero Gate Voltage Drain Current T_J = +25°C	I_{DSS}	—	—	1.0	µA	V_{DS} = 24V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±12V, V_{DS} = 0V
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	$V_{GS(TH)}$	1	—	1.9	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	1.8	4.7	mΩ	V_{GS} = 10V, I_D = 20A
		—	2.5	5.7		V_{GS} = 4.5V, I_D = 20A
Diode Forward Voltage	V_{SD}	—	0.8	1	V	V_{GS} = 0V, I_S = 1A
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C_{iss}	—	1510	—	pF	V_{DS} = 15V, V_{GS} = 0V f = 1.0MHz
Output Capacitance	C_{oss}	—	1006	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	49	—	pF	
Gate Resistance	R_g	—	0.6	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	14.5	—	nC	V_{DS} = 15V, I_D = 20A
Total Gate Charge (V_{GS} = 10V)	Q_g	—	22.7	—	nC	
Gate-Source Charge	Q_{gs}	—	3.2	—	nC	
Gate-Drain Charge	Q_{gd}	—	7.9	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	8.4	—	ns	V_{DS} = 15V R_g = 3Ω, I_D = 18A
Turn-On Rise Time	t_R	—	12.2	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	18.6	—	ns	
Turn-Off Fall Time	t_F	—	3.9	—	ns	
Reverse Recovery Time	t_{RR}	—	24.4	—	ns	I_F = 20A, dI/dt = 400A/µs
Reverse Recovery Charge	Q_{RR}	—	25.3	—	nC	

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

Electrical Characteristics N-CHANNEL – Q2 (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 9)						
Drain-Source Breakdown Voltage	BV_{DSS}	30	—	—	V	V_{GS} = 0V, I_D = 250μA
Zero Gate Voltage Drain Current T_J = +25°C	I_{DSS}	—	—	1.0	μA	V_{DS} = 24V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±12V, V_{DS} = 0V
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	$V_{GS(TH)}$	1	—	1.9	V	V_{DS} = V_{GS}, I_D = 250μA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	3.7	5.8	mΩ	V_{GS} = 10V, I_D = 18A
		—	4.9	7.3		V_{GS} = 4.5V, I_D = 18A
Diode Forward Voltage	V_{SD}	—	0.8	1.2	V	V_{GS} = 0V, I_S = 18A
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C_{iss}	—	1032	—	pF	V_{DS} = 15V, V_{GS} = 0V f = 1.0MHz
Output Capacitance	C_{oss}	—	711	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	38	—	pF	
Gate Resistance	R_g	—	1.3	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	7.5	—	nC	V_{DS} = 15V, I_D = 18A
Total Gate Charge (V_{GS} = 10V)	Q_g	—	16.3	—	nC	
Gate-Source Charge	Q_{gs}	—	2.1	—	nC	
Gate-Drain Charge	Q_{gd}	—	1.7	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	9.6	—	ns	V_{DS} = 15V R_g = 6Ω, I_D = 18A
Turn-On Rise Time	t_R	—	13.4	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	22.4	—	ns	
Turn-Off Fall Time	t_F	—	4.3	—	ns	
Reverse Recovery Time	t_{RR}	—	18.6	—	ns	I_F = 20A, dI/dt = 400A/μs
Reverse Recovery Charge	Q_{RR}	—	16.6	—	nC	

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

N-CHANNEL – Q1

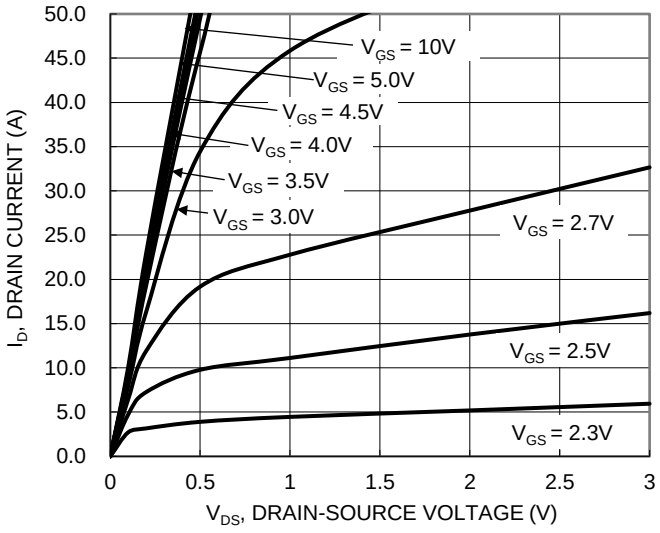


Figure 1. Typical Output Characteristic

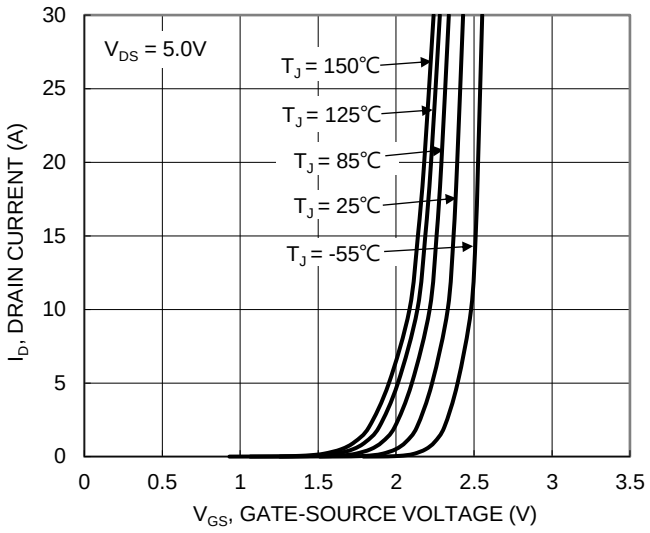


Figure 2. Typical Transfer Characteristic

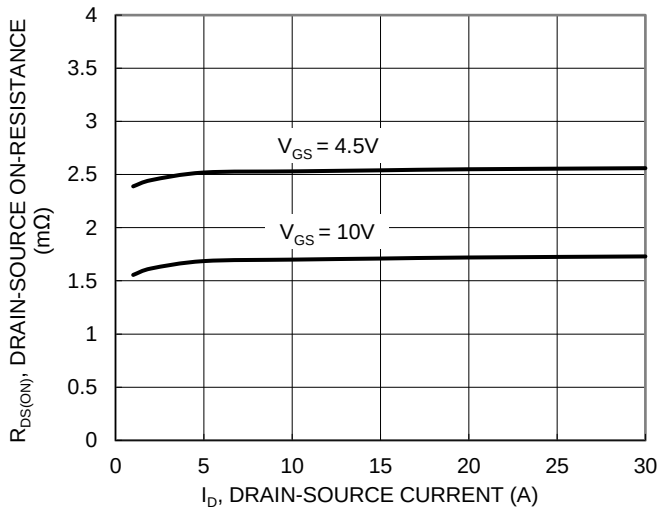


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

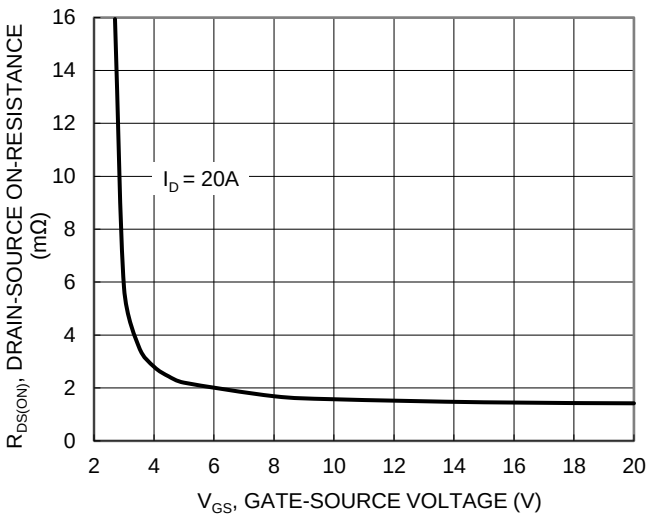


Figure 4. Typical Transfer Characteristic

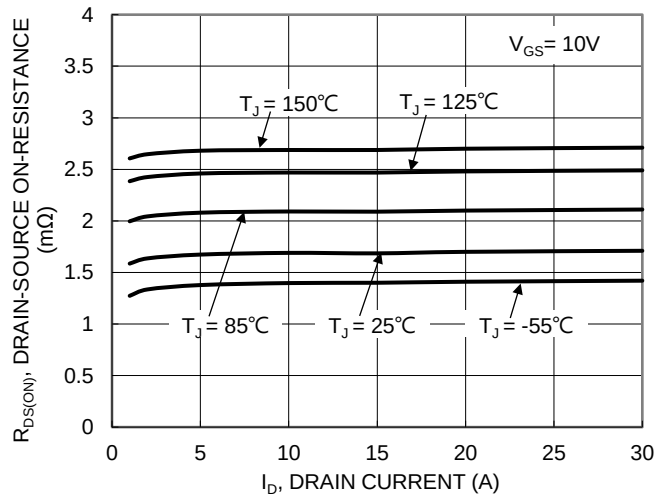


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

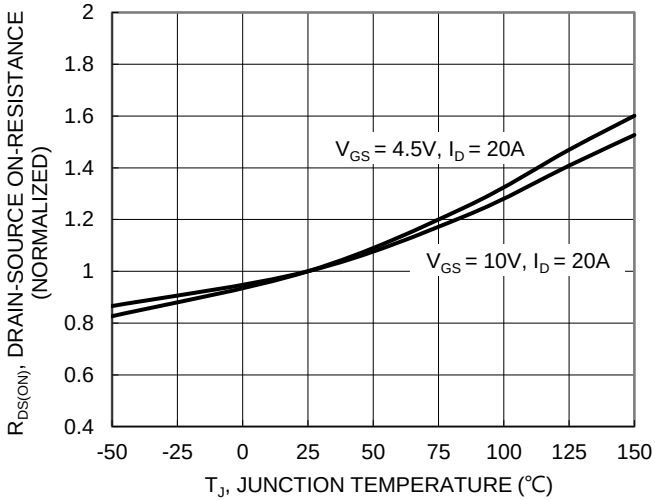


Figure 6. On-Resistance Variation with Temperature

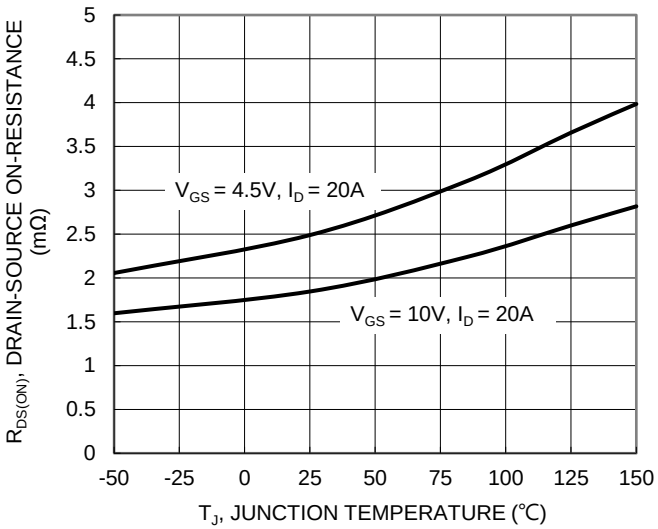


Figure 7. On-Resistance Variation with Temperature

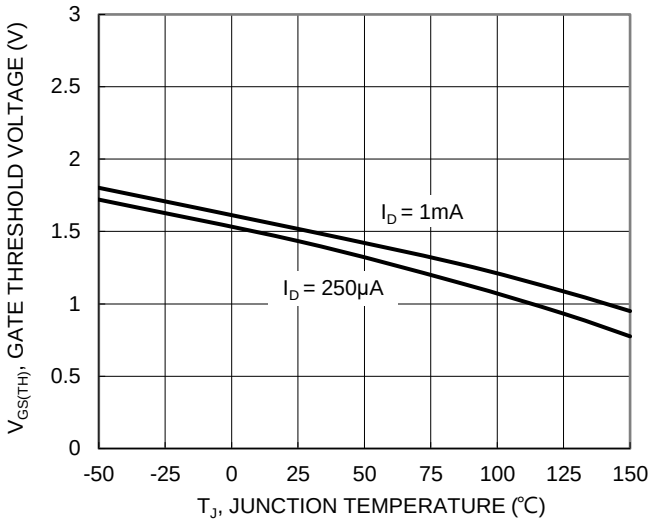


Figure 8. Gate Threshold Variation vs Junction Temperature

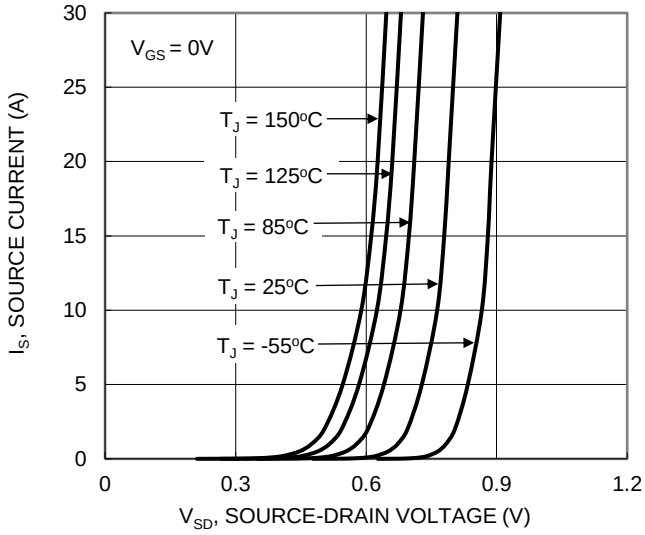


Figure 9. Diode Forward Voltage vs. Current

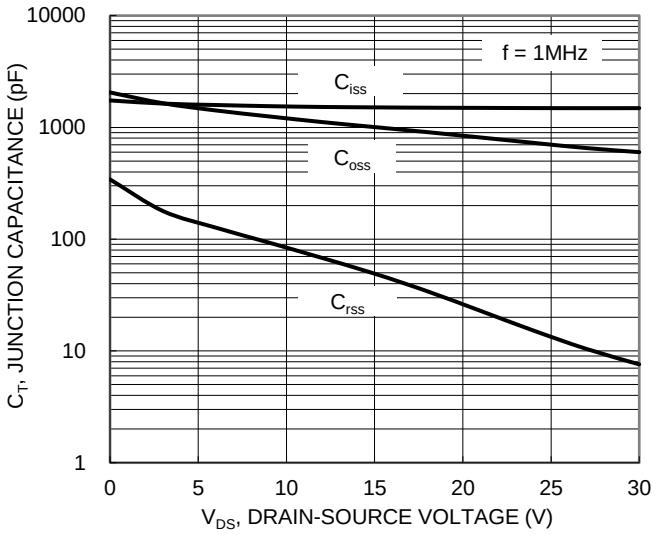


Figure 10. Typical Junction Capacitance

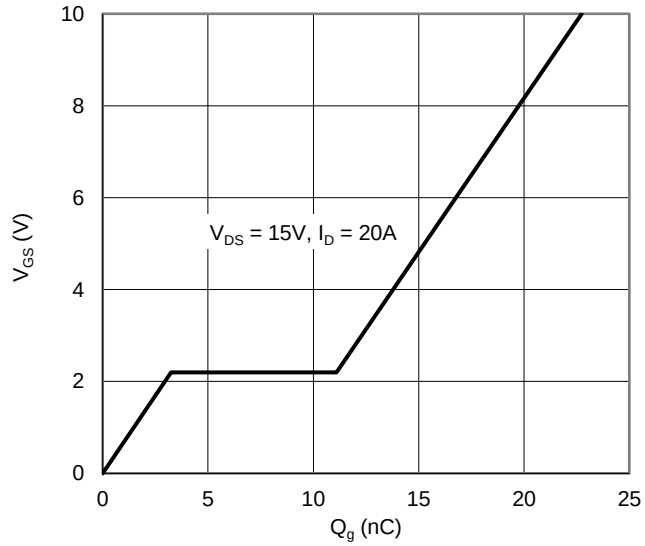


Figure 11. Gate Charge

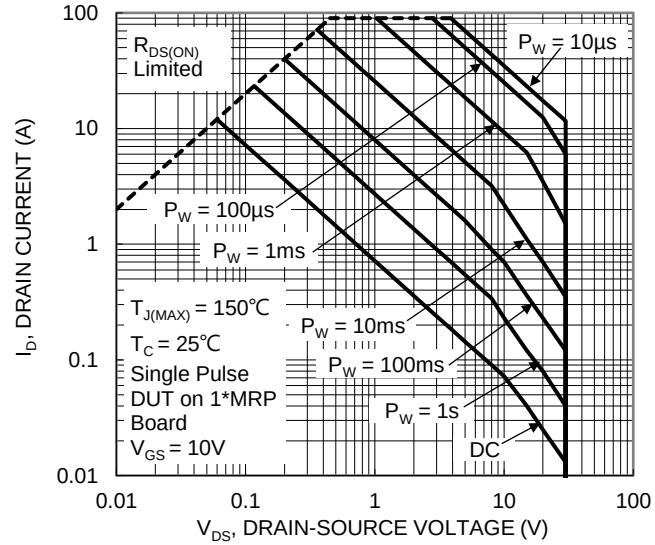


Figure 12. SOA, Safe Operation Area

N-CHANNEL – Q2

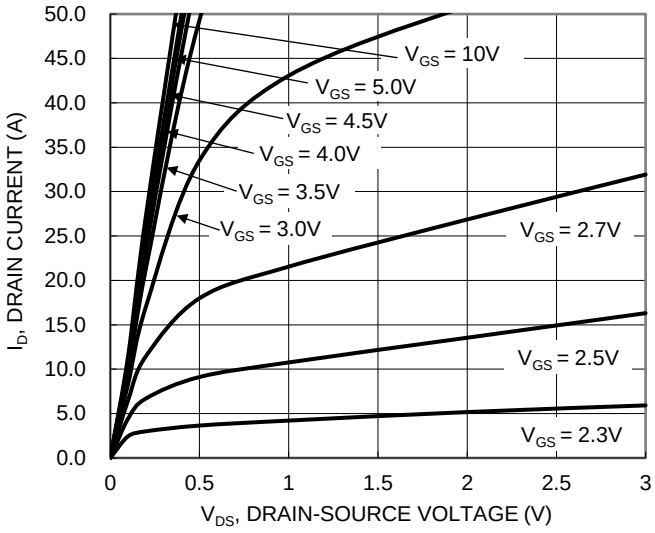


Figure 13. Typical Output Characteristic

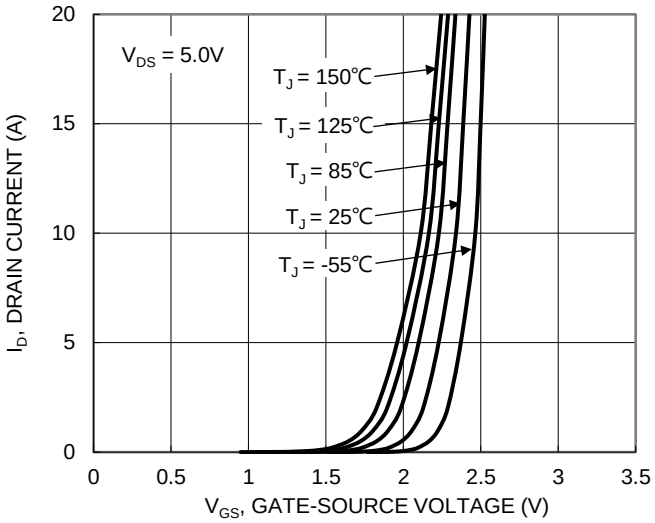


Figure 14. Typical Transfer Characteristic

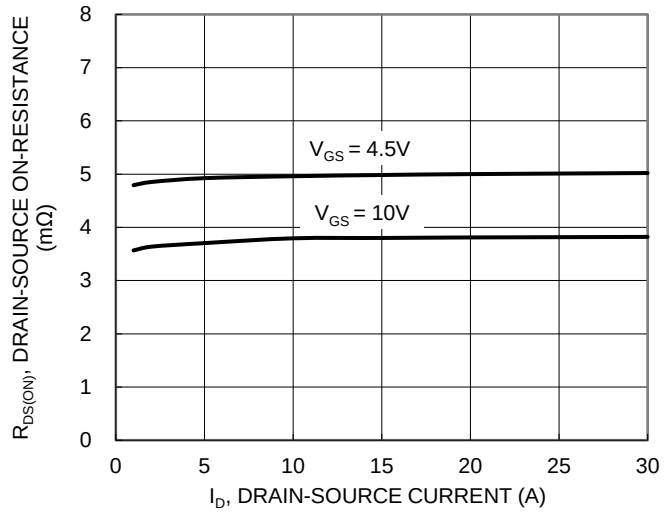


Figure 15. Typical On-Resistance vs. Drain Current and Gate Voltage

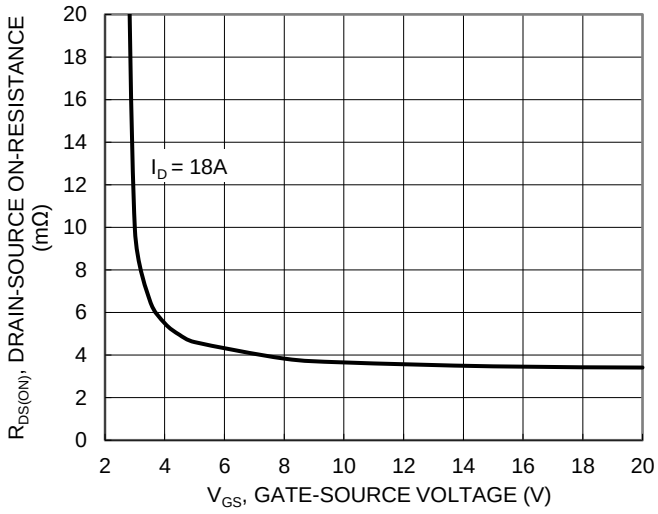


Figure 16. Typical Transfer Characteristic

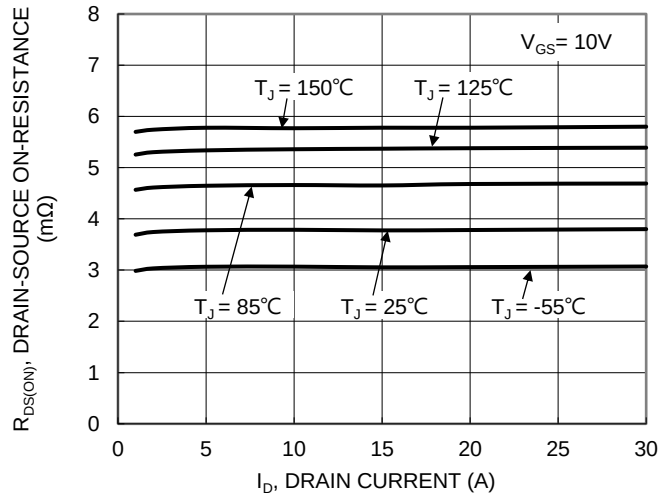


Figure 17. Typical On-Resistance vs. Drain Current and Temperature

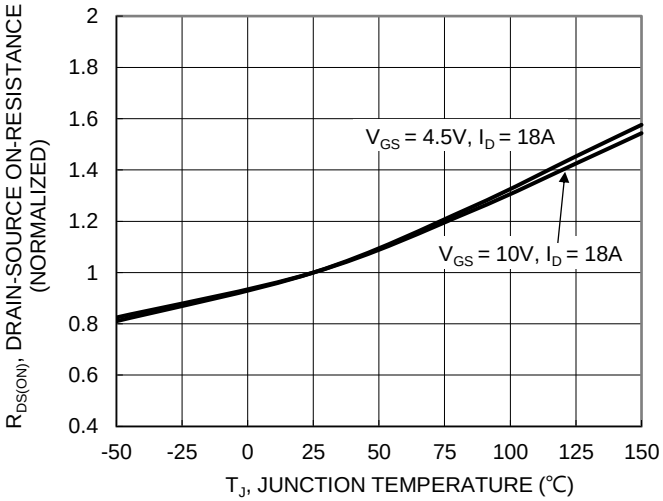


Figure 18. On-Resistance Variation with Temperature

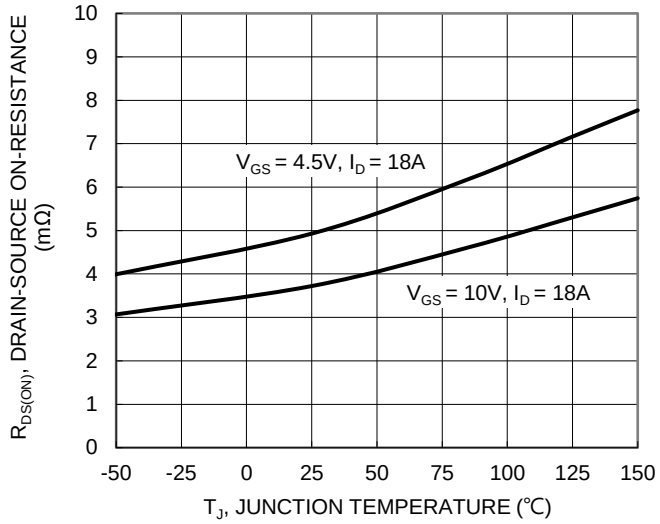


Figure 19. On-Resistance Variation with Temperature

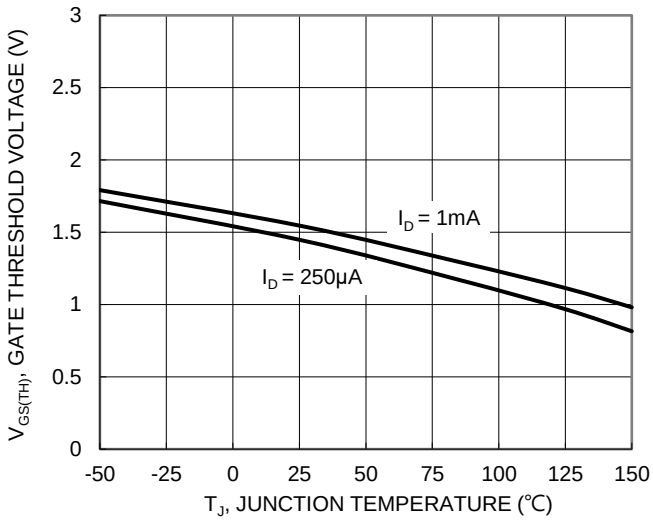


Figure 20. Gate Threshold Variation vs. Junction Temperature

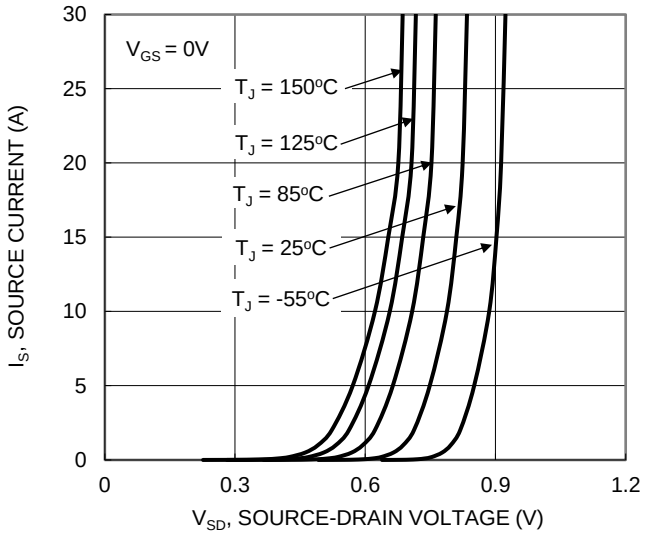


Figure 21. Diode Forward Voltage vs. Current

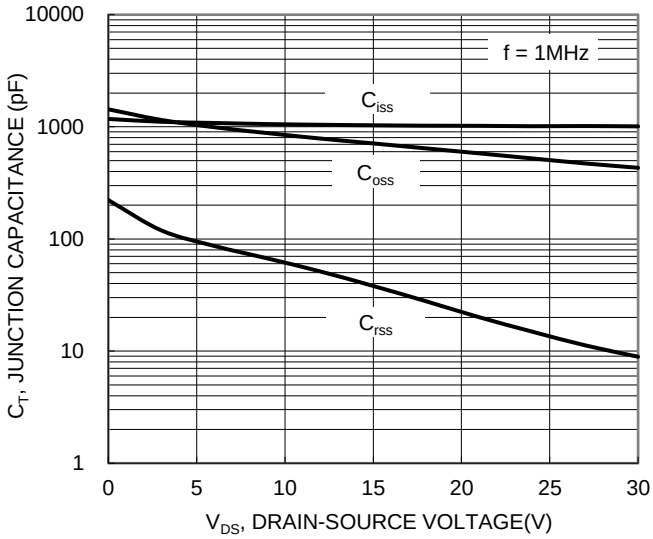


Figure 22. Typical Junction Capacitance

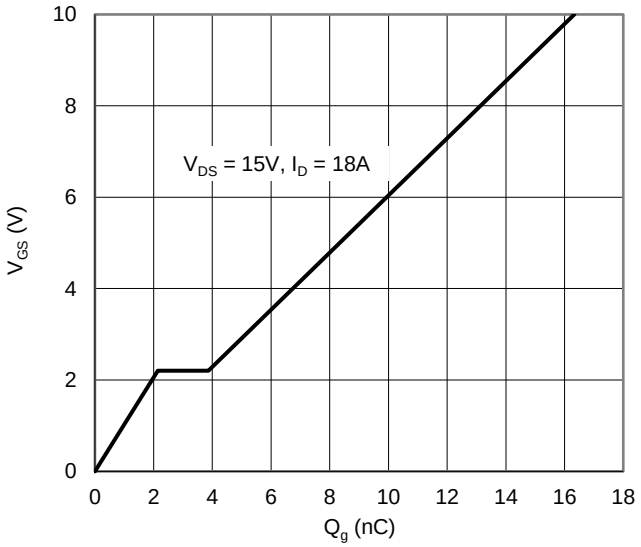


Figure 23. Gate Charge

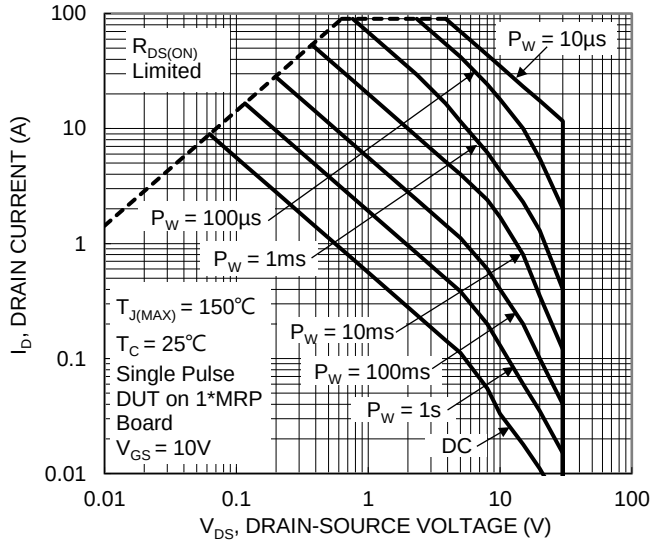


Figure 24. SOA, Safe Operation Area

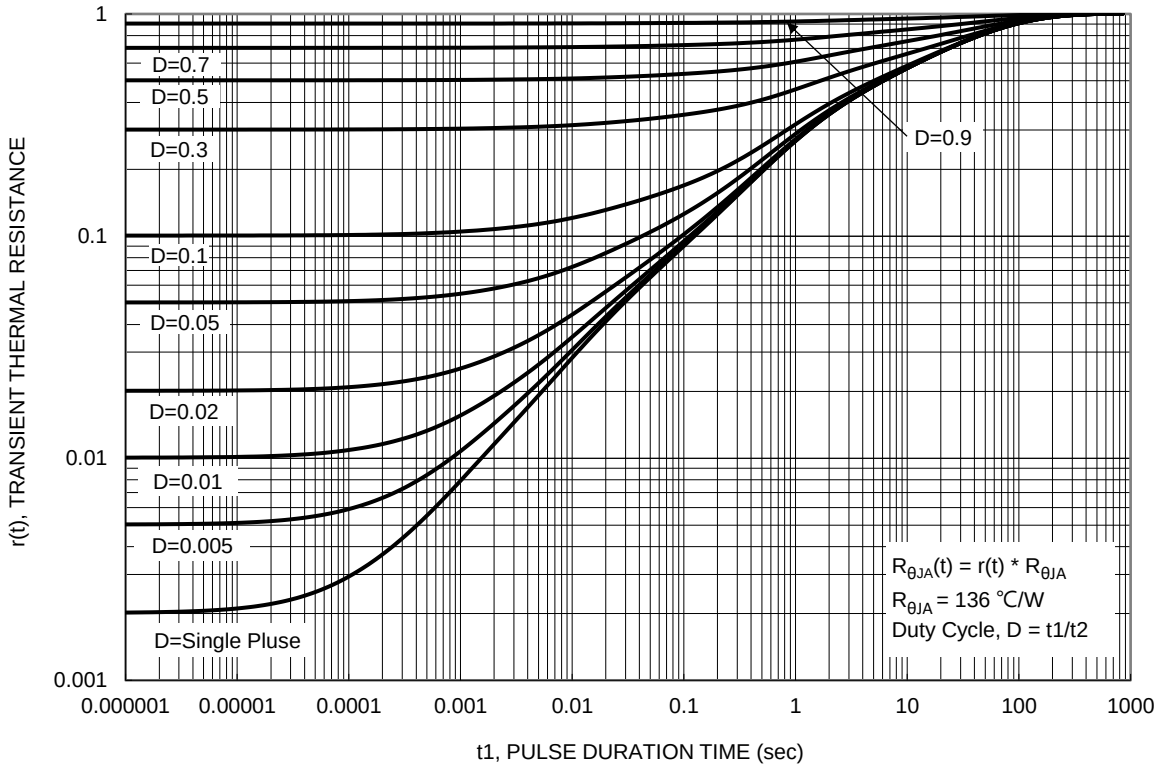
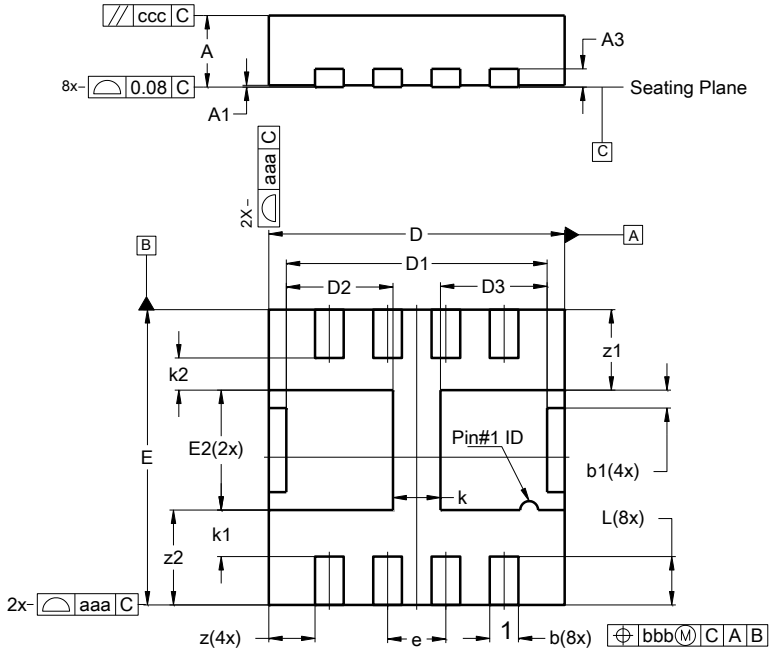


Figure 25. Transient Thermal Resistance

Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.

PowerDI3333-8 (Type G)

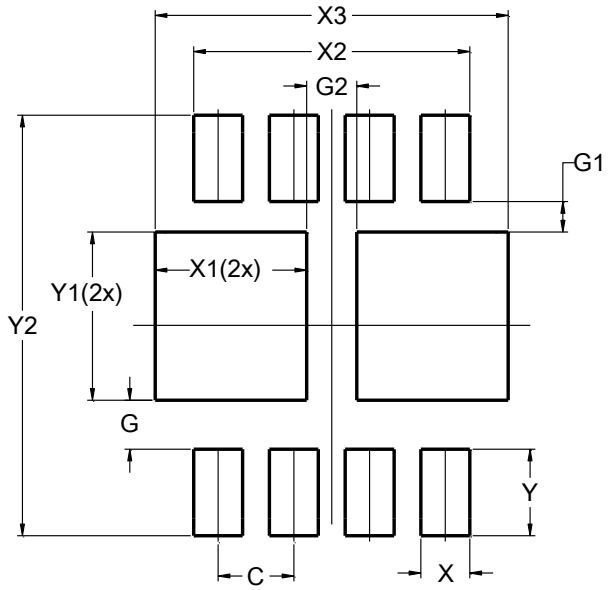


PowerDI3333-8 (Type G)			
Dim	**Min**	**Max**	**Typ**
A	0.75	0.85	0.80
A1	0.00	0.05	0.02
A3	--	--	0.203
b	0.27	0.37	0.32
b1	0.15	0.25	0.20
D	3.25	3.35	3.30
D1	2.81	3.01	2.91
D2	1.09	1.29	1.19
D3	1.09	1.29	1.19
E	3.25	3.35	3.30
E2	1.24	1.44	1.34
e	0.65BSC		
L	0.49	0.59	0.54
k	--	--	0.53
k1	--	--	0.52
k2	--	--	0.36
z	--	--	0.515
z1	--	--	0.90
z2	--	--	1.06
aaa	0.25		
bbb	0.10		
ccc	0.10		
All Dimensions in mm			

Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

PowerDI3333-8 (Type G)



Dimensions	Value (in mm)
C	0.650
G	0.420
G1	0.260
G2	0.430
X	0.420
X1	1.300
X2	2.370
X3	3.030
Y	0.740
Y1	1.440
Y2	3.600

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