

Product Summary

Device	BV _{DSS}	R _{DS(ON)} Max	I _D Max T _A = +25°C
Q1	80V	20mΩ @ V _{GS} = 10V	6.7A
		30mΩ @ V _{GS} = 4.5V	5.8A
Q2	80V	20mΩ @ V _{GS} = 10V	6.7A
		30mΩ @ V _{GS} = 4.5V	5.8A

Description and Applications

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.

- Power-management functions

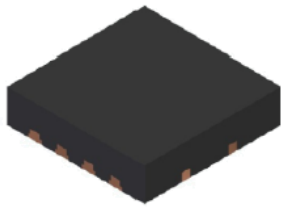
Features and Benefits

- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- 100% Unclamped Inductive Switching (UIS) Test in Production — Ensures More Reliable and Robust End Application
- Lead-Free Finish; 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/>**

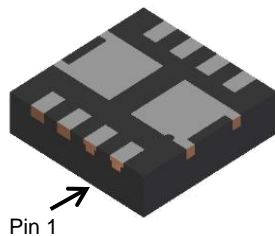
Mechanical Data

- 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 **Ⓔ3**
- Weight: 0.03 grams (Approximate)

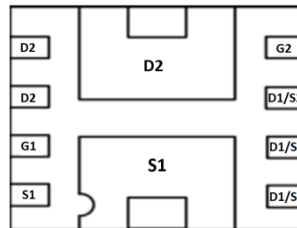
PowerDI3333-8 (Type G)



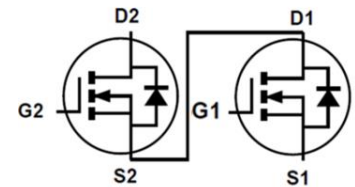
Top View



Bottom View



Bottom View



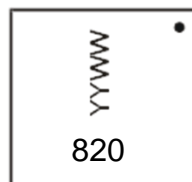
Q2 N-Channel MOSFET Q1 N-Channel MOSFET

Ordering Information (Note 4)

Orderable Part Number	Package	Packing	
		Qty.	Carrier
DMT8020LDG-7	PowerDI3333-8 (Type G)	2000	Tape & Reel
DMT8020LDG-13	PowerDI3333-8 (Type G)	3000	Tape & Reel

- Notes:
- EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
 - 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.
 - Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 - For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



820 = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Last Two Digits of Year (ex: 24 = 2024)
 WW = Week Code (01 to 53)

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V _{DSS}	80	V
Gate-Source Voltage			V _{GSS}	20	V
Continuous Drain Current (Note 5)	Steady State	T _A = +25°C	I _D	6.7	A
		T _A = +70°C		5.4	
Maximum Continuous Body Diode Forward Current (Note 5)			I _S	2.4	A
Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)			I _{DM}	66	A
Pulsed Body Diode Forward Current (10μs Pulse, Duty Cycle = 1%)			I _{SM}	66	A
Avalanche Current, L = 1mH			I _{AS}	10	A
Avalanche Energy, L = 1mH			E _{AS}	50	mJ

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 6)	T _A = +25°C	P _D	1.25	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	R _{θJA}	100	°C/W
Total Power Dissipation (Note 5)	T _A = +25°C	P _D	1.8	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R _{θJA}	70	°C/W
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +150	°C

Electrical Characteristics N-CHANNEL – Q1 (@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}	80	—	—	V	V _{GS} = 0V, I _D = 250μA
Zero Gate Voltage Drain Current T _J = +25°C	I _{DSS}	—	—	1.0	μA	V _{DS} = 64V, 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	1.9	2.5	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	13	20	mΩ	V _{GS} = 10V, I _D = 7.8A
		—	20	30		V _{GS} = 4.5V, I _D = 6.2A
Diode Forward Voltage	V _{SD}	—	0.8	1.5	V	V _{GS} = 0V, I _S = 7.8A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C _{iss}	—	892	—	pF	V _{DS} = 40V, V _{GS} = 0V, f = 1MHz
Output Capacitance	C _{oss}	—	316	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	20	—	pF	
Gate Resistance	R _g	—	0.3	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = 4.5V)	Q _g	—	9	—	nC	V _{DS} = 40V, I _D = 6.2A
Total Gate Charge (V _{GS} = 10V)	Q _g	—	17	—	nC	
Gate-Source Charge	Q _{gs}	—	3	—	nC	
Gate-Drain Charge	Q _{gd}	—	4	—	nC	
Turn-On Delay Time	t _{D(ON)}	—	14	—	ns	V _{DS} = 40V, V _{GS} = 4.5V, R _G = 6Ω, I _D = 6.2A
Turn-On Rise Time	t _R	—	41	—	ns	
Turn-Off Delay Time	t _{D(OFF)}	—	16	—	ns	
Turn-Off Fall Time	t _F	—	17	—	ns	
Reverse-Recovery Time	t _{RR}	—	39	—	ns	I _F = 7.8A, dI/dt = 300A/μs
Reverse-Recovery Charge	Q _{RR}	—	81	—	nC	

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
 - Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
 - Short duration pulse test used to minimize self-heating effect.
 - 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 7)						
Drain-Source Breakdown Voltage	BV _{DSS}	80	—	—	V	V _{GS} = 0V, I _D = 250μA
Zero Gate Voltage Drain Current T _J = +25°C	I _{DSS}	—	—	1.0	μA	V _{DS} = 64V, 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	1.9	2.5	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	13	20	mΩ	V _{GS} = 10V, I _D = 7.8A
		—	20	30		V _{GS} = 4.5V, I _D = 6.2A
Diode Forward Voltage	V _{SD}	—	0.8	1.5	V	V _{GS} = 0V, I _S = 7.8A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C _{iss}	—	875	—	pF	V _{DS} = 40V, V _{GS} = 0V, f = 1MHz
Output Capacitance	C _{oss}	—	316	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	19	—	pF	
Gate Resistance	R _g	—	0.4	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = 4.5V)	Q _g	—	9	—	nC	V _{DS} = 40V, I _D = 6.2A
Total Gate Charge (V _{GS} = 10V)	Q _g	—	18	—	nC	
Gate-Source Charge	Q _{gs}	—	3	—	nC	
Gate-Drain Charge	Q _{gd}	—	5	—	nC	
Turn-On Delay Time	t _{D(ON)}	—	14	—	ns	V _{DS} = 40V, V _{GS} = 4.5V, R _G = 6Ω, I _D = 6.2A
Turn-On Rise Time	t _r	—	35	—	ns	
Turn-Off Delay Time	t _{D(OFF)}	—	22	—	ns	
Turn-Off Fall Time	t _f	—	17	—	ns	
Reverse-Recovery Time	t _{RR}	—	34	—	ns	I _F = 7.8A, dI/dt = 300A/μs
Reverse-Recovery Charge	Q _{RR}	—	83	—	nC	

Notes: 7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to product testing.

Electrical Characteristics N-CHANNEL – Q1

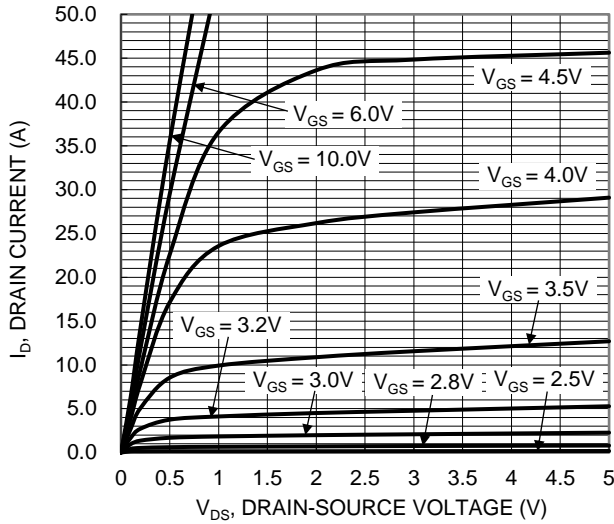


Figure 1. Typical Output Characteristic

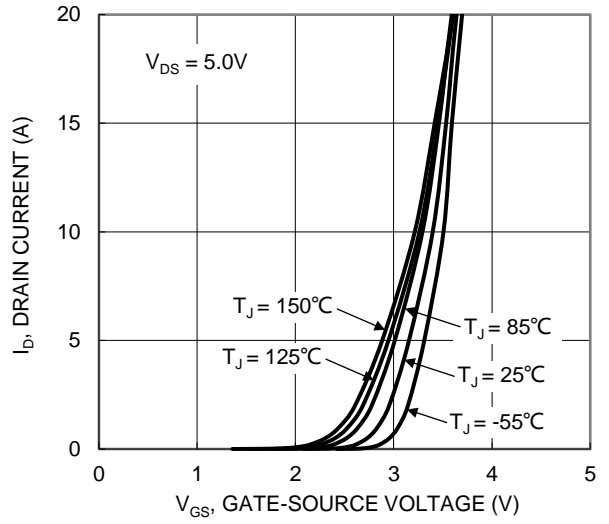


Figure 2. Typical Transfer Characteristic

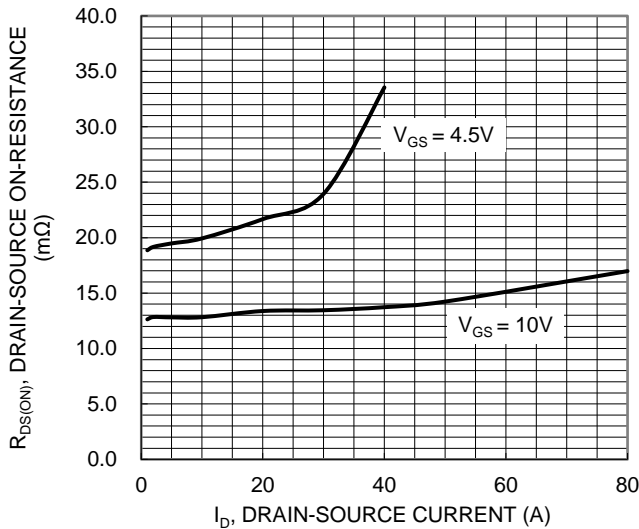


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

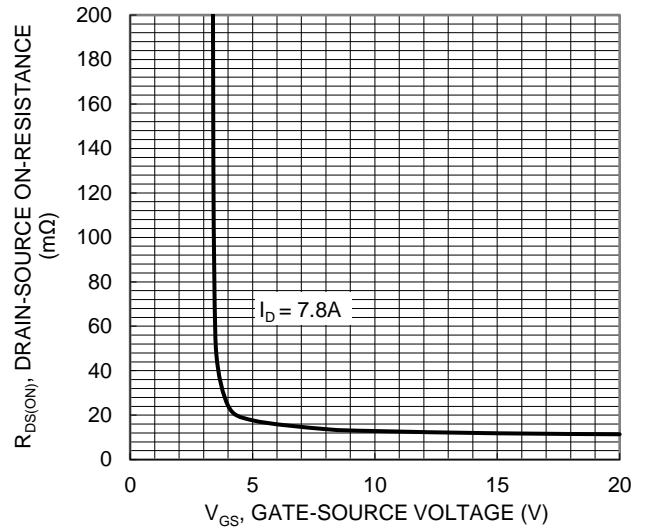


Figure 4. Typical Transfer Characteristic

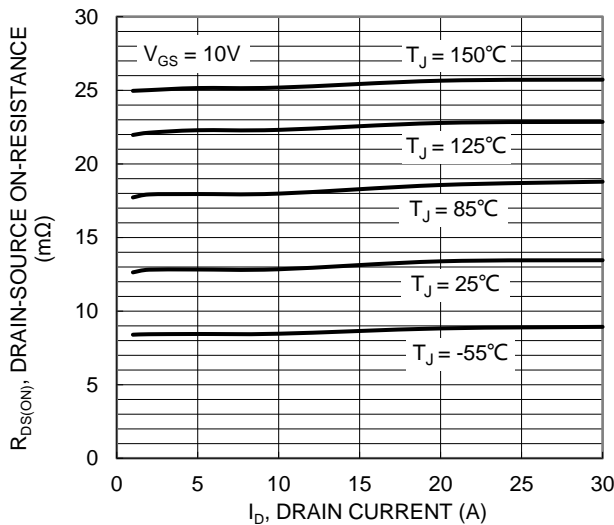


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

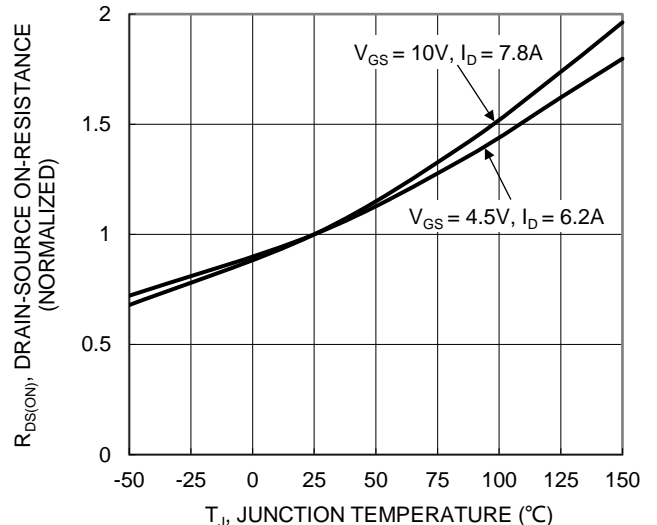


Figure 6. On-Resistance Variation with Temperature

Electrical Characteristics N-CHANNEL – Q1 (continued)

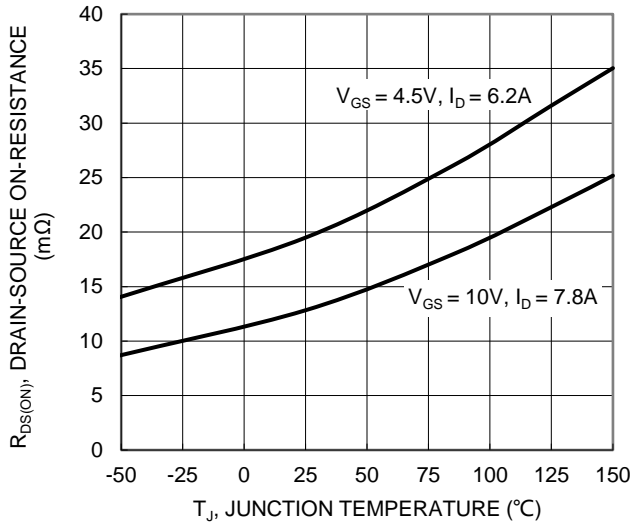


Figure 7. On-Resistance Variation with Temperature

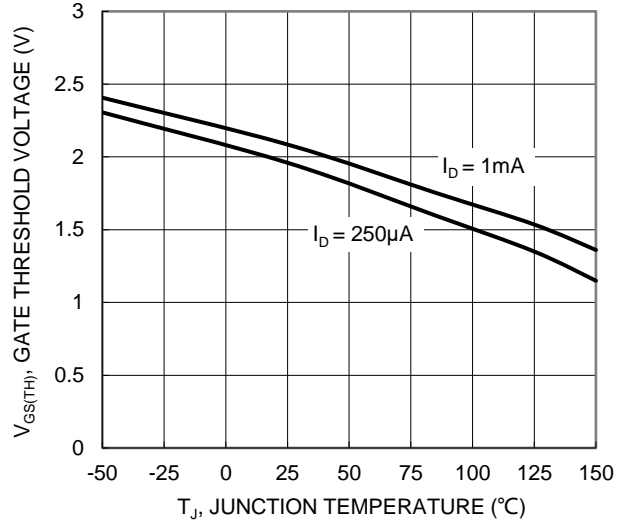


Figure 8. Gate Threshold Variation vs. Junction Temperature

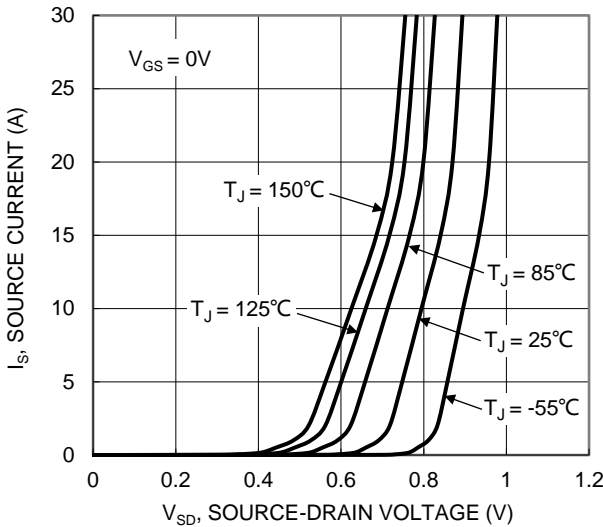


Figure 9. Diode Forward Voltage vs. Current

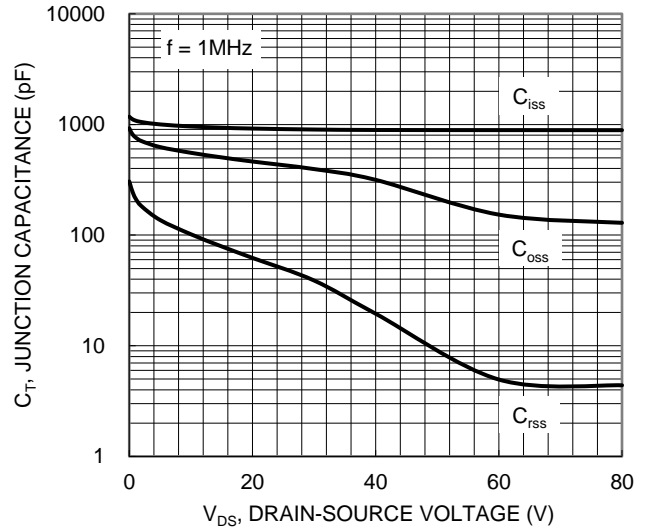


Figure 10. Typical Junction Capacitance

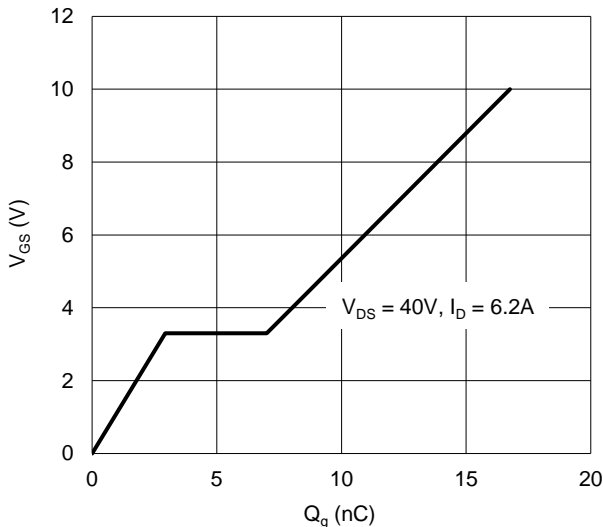


Figure 11. Gate Charge

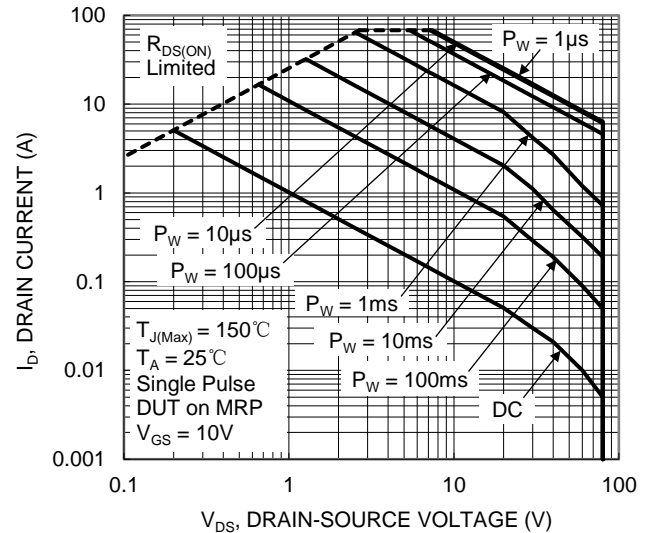


Figure 12. SOA, Safe Operation Area

Electrical Characteristics N-CHANNEL – Q2

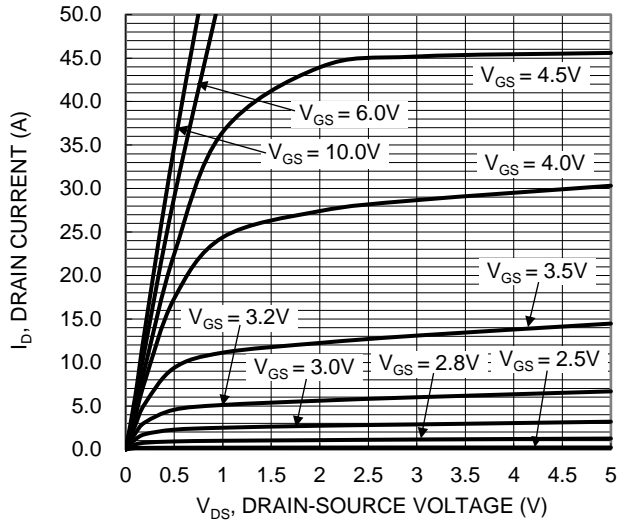


Figure 13. Typical Output Characteristic

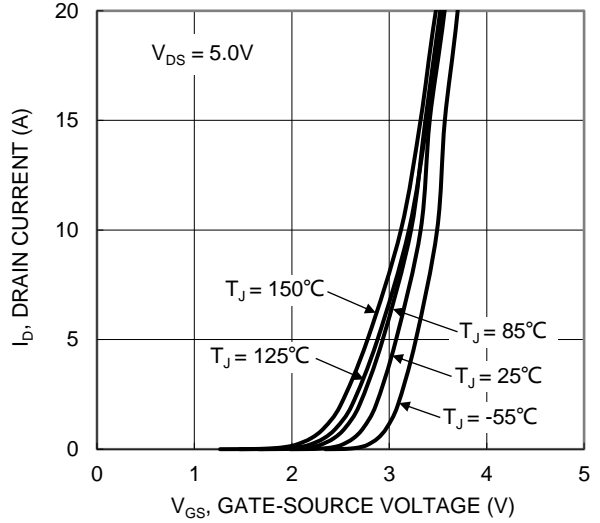


Figure 14. Typical Transfer Characteristic

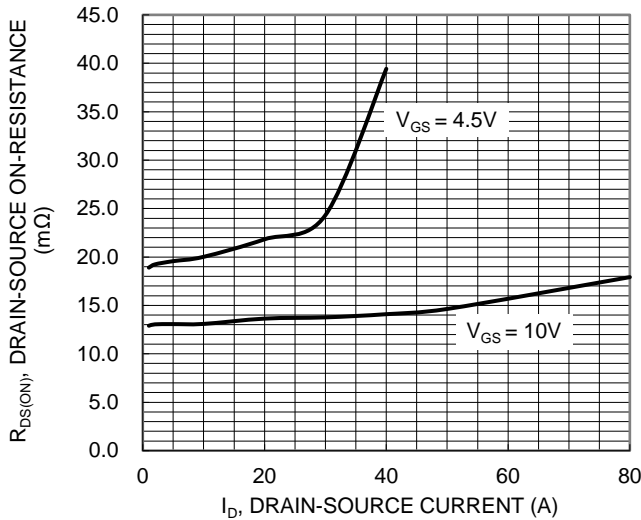


Figure 15. Typical On-Resistance vs. Drain Current and Gate Voltage

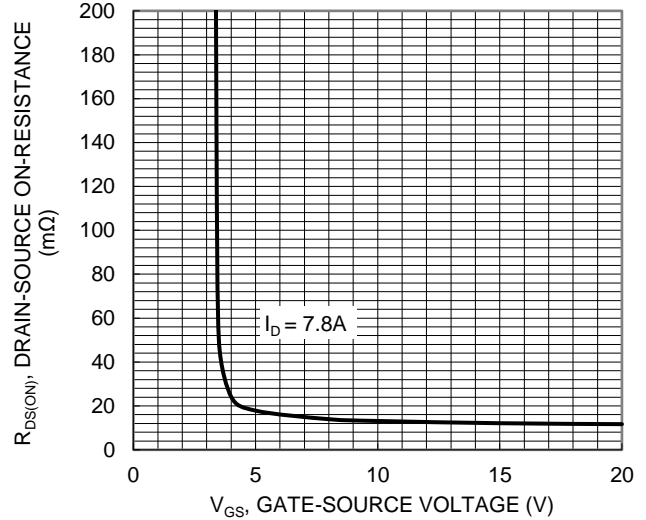


Figure 16. Typical Transfer Characteristic

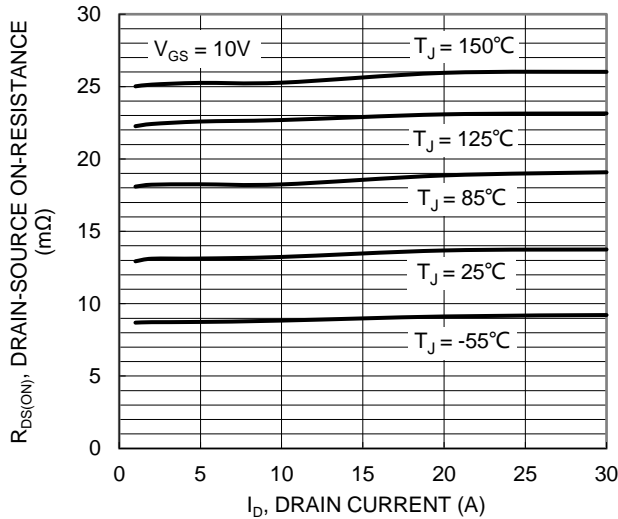


Figure 17. Typical On-Resistance vs. Drain Current and Temperature

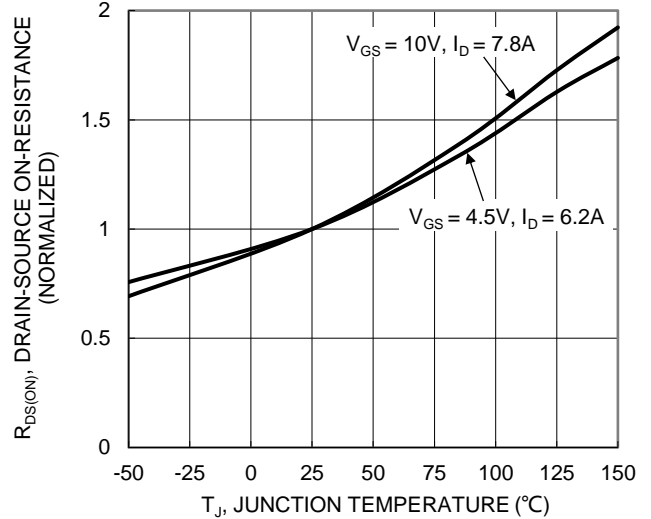


Figure 18. On-Resistance Variation with Temperature

Electrical Characteristics N-CHANNEL – Q2 (continued)

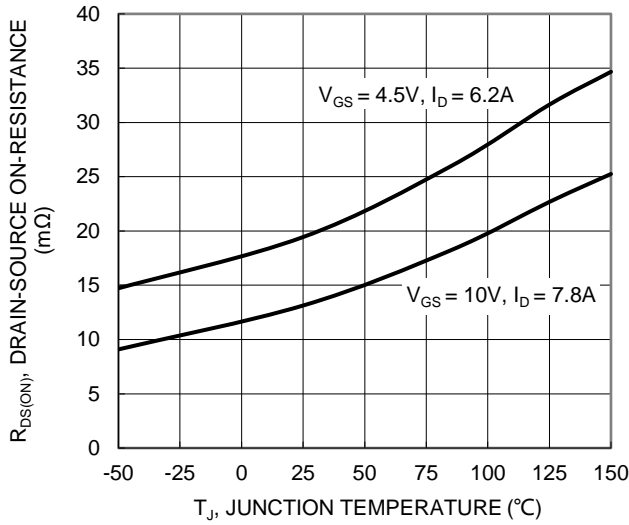


Figure 19. On-Resistance Variation with Temperature

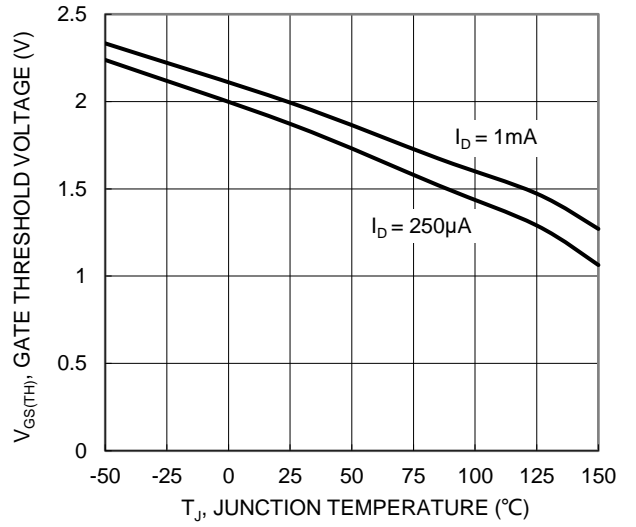


Figure 20. Gate Threshold Variation vs. Junction Temperature

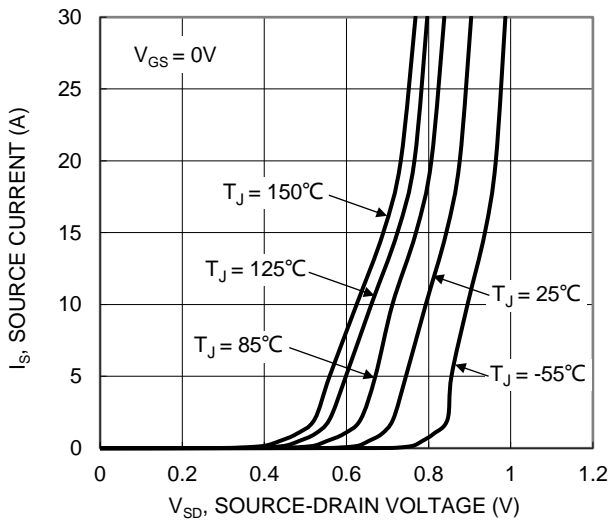


Figure 21. Diode Forward Voltage vs. Current

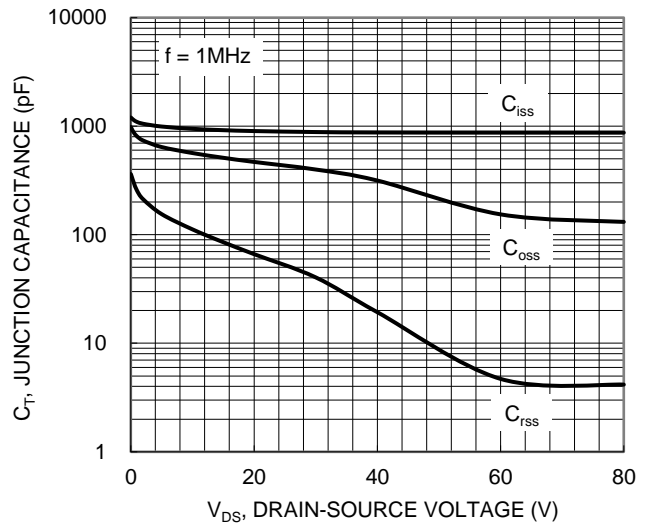


Figure 22. Typical Junction Capacitance

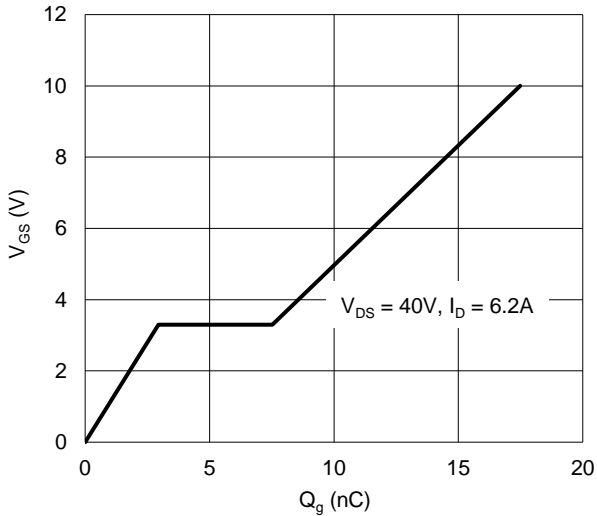


Figure 23. Gate Charge

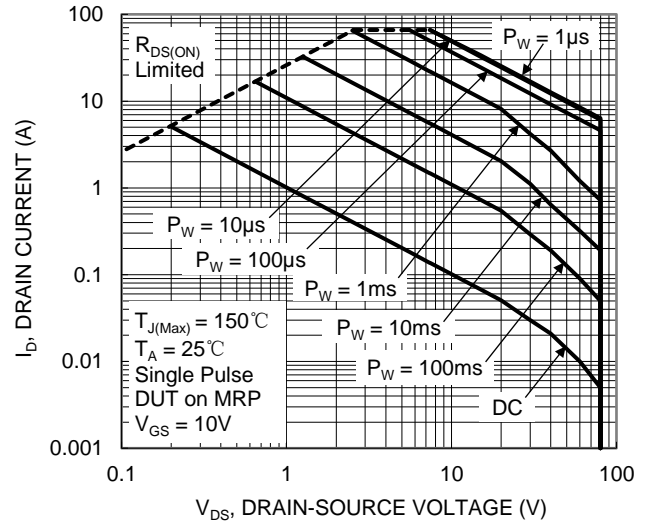


Figure 24. SOA, Safe Operation Area

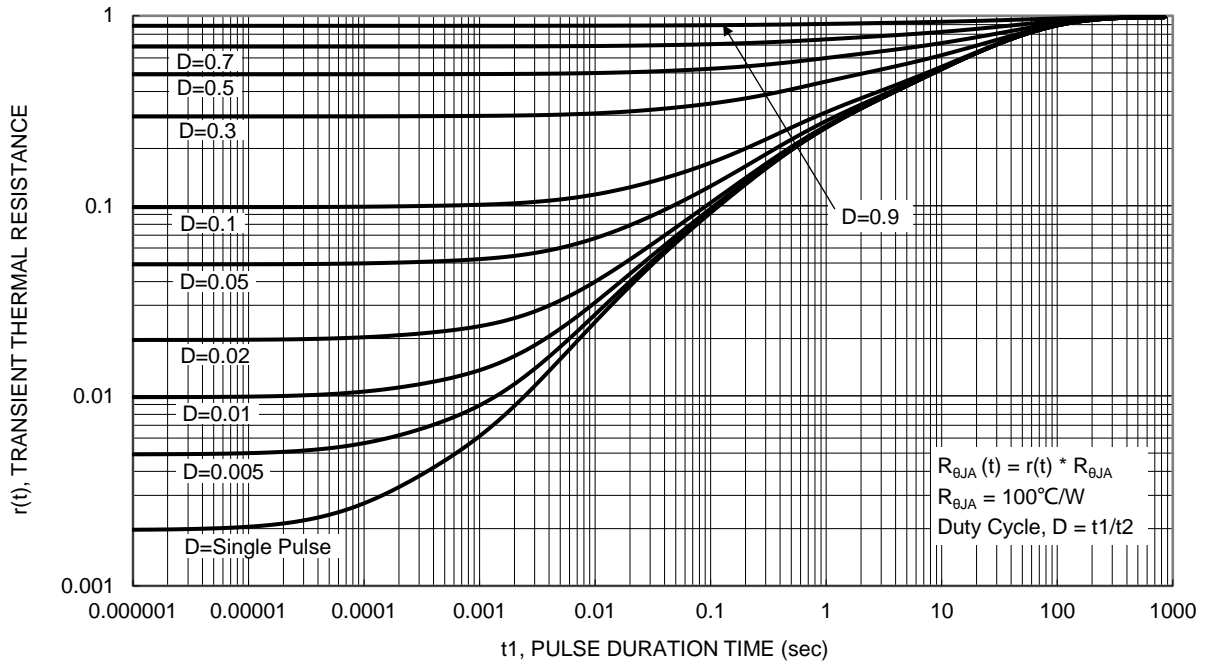
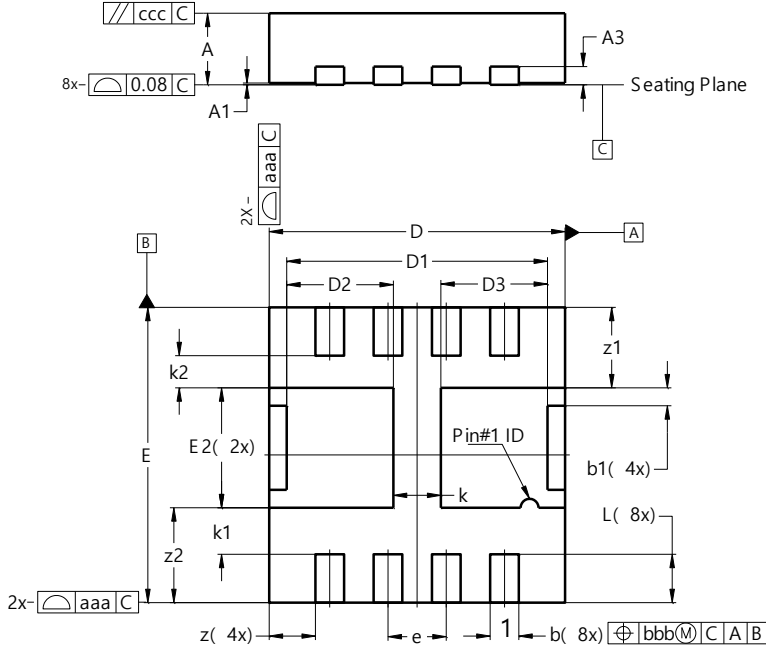


Figure 25. Transient Thermal Resistance

Package Outline Dimensions

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

PowerDI3333-8 (Type G)

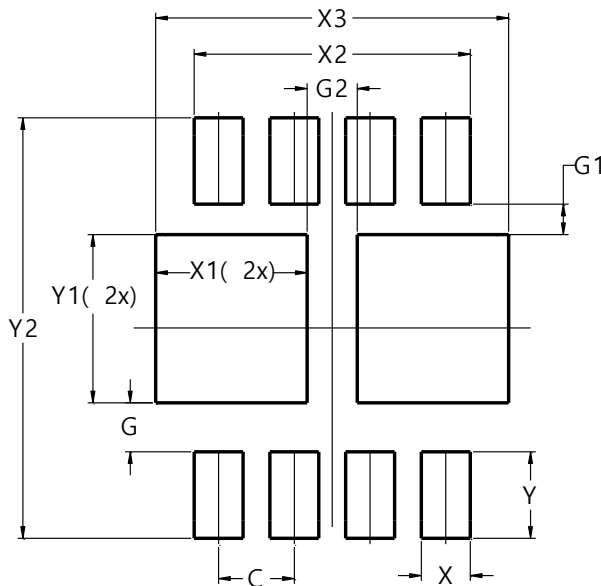


PowerDI3333-8 (Type G)			
Dim	Min	Max	Typ
A	0.75	0.85	0.80
A1	0.00	0.05	0.02
A3	--	--	0.203
b	0.27	0.37	0.32
b1	0.15	0.25	0.20
D	3.25	3.35	3.30
D1	2.81	3.01	2.91
D2	1.09	1.29	1.19
D3	1.09	1.29	1.19
E	3.25	3.35	3.30
E2	1.24	1.44	1.34
e	0.65BSC		
L	0.49	0.59	0.54
k	--	--	0.53
k1	--	--	0.52
k2	--	--	0.36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