

Product Summary

Device	V _{DSS}	R _{DS(ON)} Max	I _D Max T _C = +25°C
Q1	30V	31mΩ @ V _{GS} = 10V	20A
		40mΩ @ V _{GS} = 4.5V	18A
Q2	-30V	42mΩ @ V _{GS} = -10V	-17A
		75mΩ @ V _{GS} = -4.5V	-13A

Description

This new generation 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

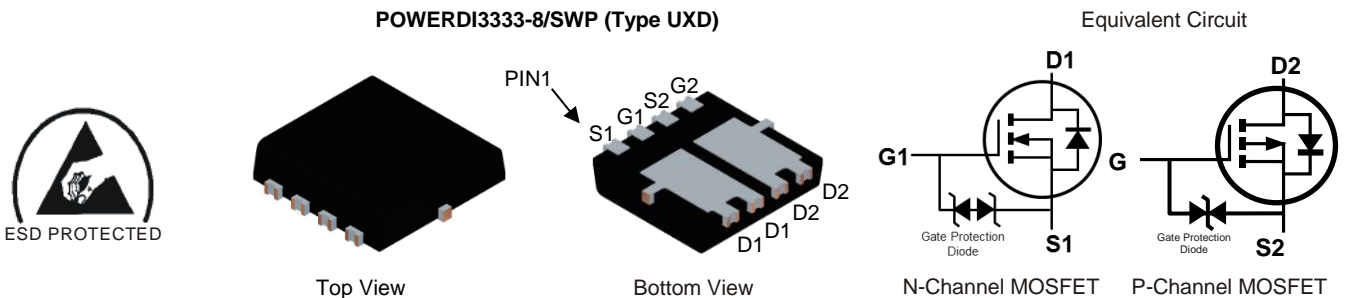
- Power-management functions
- Analog switches

Features

- Rated to +150°C – Ideal for High Ambient Temperature Environments
- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Complementary Pair MOSFET
- Wettable Flank for Improved Optical Inspection
- **ESD Protected Gate**
- **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](mailto:contact@diodes.com) 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
- Terminal Connections Indicator: See Diagram
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 @3
- Weight: 0.072 grams (Approximate)

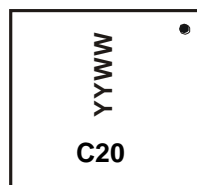


Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
DMC3020UDVW-7	POWERDI3333-8/SWP (Type UXD)	2,000	Tape & Reel
DMC3020UDVW-13	POWERDI3333-8/SWP (Type UXD)	3,000	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



C20 = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Last Two Digits of Year (ex: 23 for 2023)
 WW = Week Code (01 to 53)

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V _{DSS}	30	V
Gate-Source Voltage			V _{GSS}	±12	V
Continuous Drain Current, V _{GS} = 10V (Note 6)	Steady State	T _C = +25°C	I _D	20	A
		T _C = +70°C		16	
Maximum Body Diode Forward Current (Note 6)			I _S	2.2	A
Pulsed Drain Current (380µs Pulse, Duty Cycle = 1%)			I _{DM}	16.7	A
Avalanche Current (L = 0.1mH) (Note 7)			I _{AS}	13.5	A
Avalanche Energy (L = 0.1mH) (Note 7)			E _{AS}	9.1	mJ

Maximum Ratings Q2 – P-Channel (@T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V _{DSS}	-30	V
Gate-Source Voltage			V _{GSS}	±20	V
Continuous Drain Current, V _{GS} = -10V (Note 6)	Steady State	T _C = +25°C	I _D	-17	A
		T _C = +70°C		-14	
Maximum Body Diode Forward Current (Note 6)			I _S	-2.32	A
Pulsed Drain Current (380µs Pulse, Duty Cycle = 1%)			I _{DM}	-22	A
Avalanche Current (L = 0.1mH) (Note 7)			I _{AS}	-19.8	A
Avalanche Energy (L = 0.1mH) (Note 7)			E _{AS}	19.7	mJ

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

Characteristic			Symbol	Value	Unit
Total Power Dissipation (Note 5)			P _D	1.18	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State		R _{θJA}	106	°C/W
Total Power Dissipation (Note 6)			P _D	2.21	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State		R _{θJA}	56.6	°C/W
Thermal Resistance, Junction to Case (Note 6)			R _{θJC}	7	
Operating and Storage Temperature Range			T _J , T _{STG}	-55 to +150	°C

- Notes:
- Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
 - Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1-inch square copper plate.
 - I_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep T_J = +25°C.

Electrical Characteristics Q1 – N-Channel (@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}	30	—	—	V	V _{GS} = 0V, I _D = 250μA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	1.0	μA	V _{DS} = 24V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±10	μA	V _{GS} = ±12V, V _{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	V _{GS(TH)}	0.4	—	1.85	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	15	31	mΩ	V _{GS} = 10V, I _D = 6.0A
			24	40		V _{GS} = 4.5V, I _D = 5.0A
Diode Forward Voltage	V _{SD}	—	0.7	1.2	V	V _{GS} = 0V, I _S = 2A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C _{iss}	—	383	—	pF	V _{DS} = 15V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{oss}	—	186	—		
Reverse Transfer Capacitance	C _{rss}	—	41	—		
Gate Resistance	R _g	—	1.5	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = 10V)	Q _g	—	8.8	—	nC	V _{DS} = 15V, I _D = 6A
Total Gate Charge (V _{GS} = 4.5V)	Q _g	—	4.6	—		
Gate-Source Charge	Q _{gs}	—	2.1	—		
Gate-Drain Charge	Q _{gd}	—	1.6	—		
Turn-On Delay Time	t _{D(ON)}	—	6	—	ns	V _{DD} = 15V, V _{GS} = 10V, I _D = 9A, R _G = 6Ω
Turn-On Rise Time	t _R	—	1	—		
Turn-Off Delay Time	t _{D(OFF)}	—	11	—		
Turn-Off Fall Time	t _F	—	4	—		

Electrical Characteristics Q2 – P-Channel (@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}	-30	—	—	V	V _{GS} = 0V, I _D = -250μA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	-1.0	μA	V _{DS} = -24V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±10	μA	V _{GS} = ±20V, V _{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	V _{GS(TH)}	-1	—	-2.1	V	V _{DS} = V _{GS} , I _D = -250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	31	42	mΩ	V _{GS} = -10V, I _D = -4.9A
			54	75		V _{GS} = -4.5V, I _D = -3.7A
Diode Forward Voltage	V _{SD}	—	-0.7	-1.2	V	V _{GS} = 0V, I _S = -1A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C _{iss}	—	782	—	pF	V _{DS} = -15V, V _{GS} = 0V, f = 1MHz
Output Capacitance	C _{oss}	—	110	—		
Reverse Transfer Capacitance	C _{rss}	—	74	—		
Gate Resistance	R _g	—	10.4	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = -10V)	Q _g	—	13.6	—	nC	V _{DS} = -15V, I _D = -4.9A
Total Gate Charge (V _{GS} = -4.5V)	Q _g	—	6.6	—		
Gate-Source Charge	Q _{gs}	—	2.1	—		
Gate-Drain Charge	Q _{gd}	—	2.7	—		
Turn-On Delay Time	t _{D(ON)}	—	4.1	—	ns	V _{DD} = -15V, V _{GS} = -10V, I _D = -4.9A, R _G = 6Ω
Turn-On Rise Time	t _R	—	6.1	—		
Turn-Off Delay Time	t _{D(OFF)}	—	24.6	—		
Turn-Off Fall Time	t _F	—	13.1	—		

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

Q1 – N-Channel

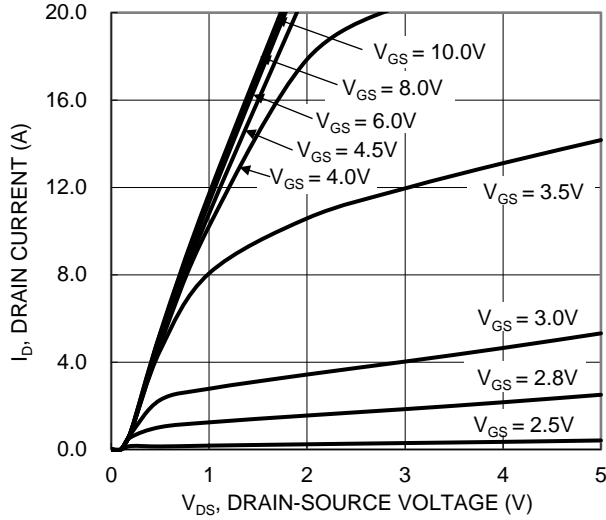


Figure 1. Typical Output Characteristic

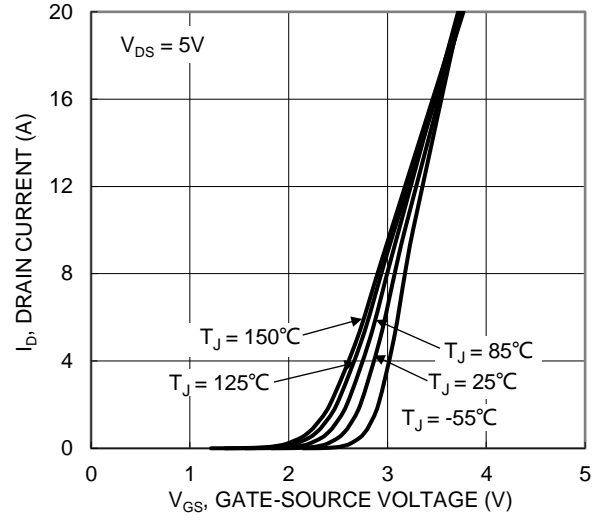


Figure 2. Typical Transfer Characteristic

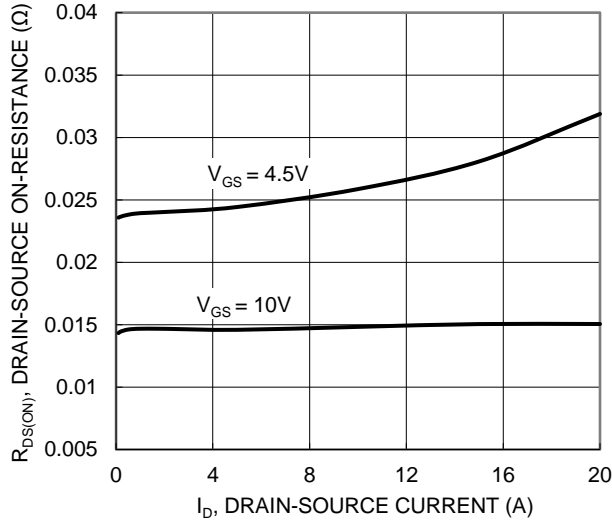


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

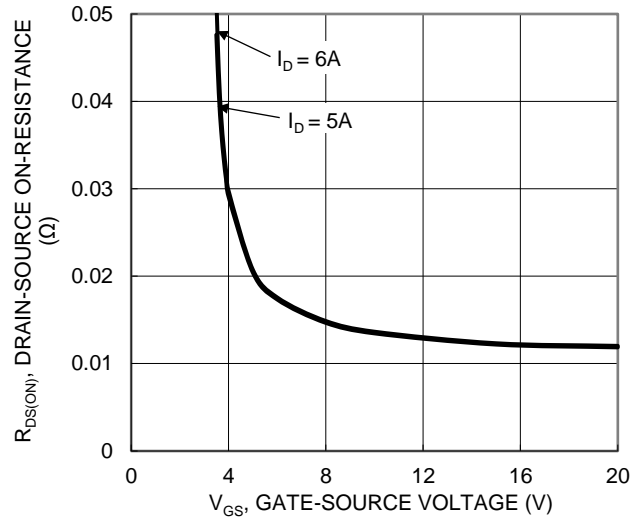


Figure 4. Typical Transfer Characteristic

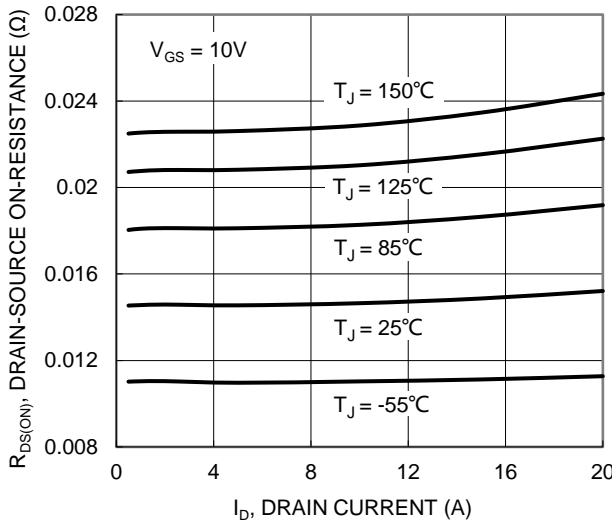


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

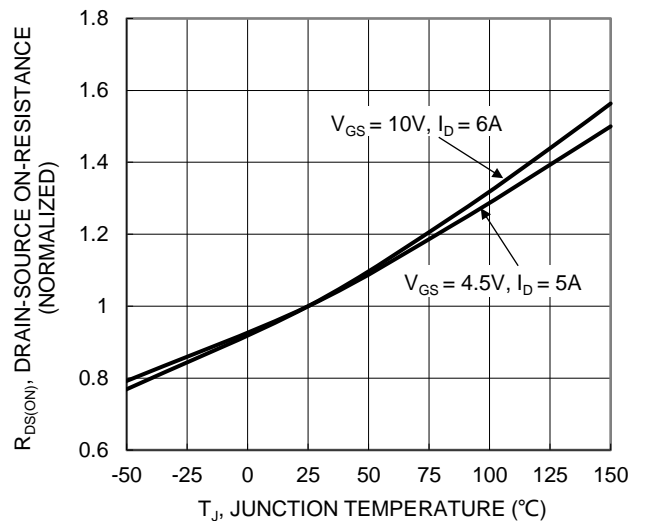


Figure 6. On-Resistance Variation with Junction Temperature

Q1 – N-Channel (continued)

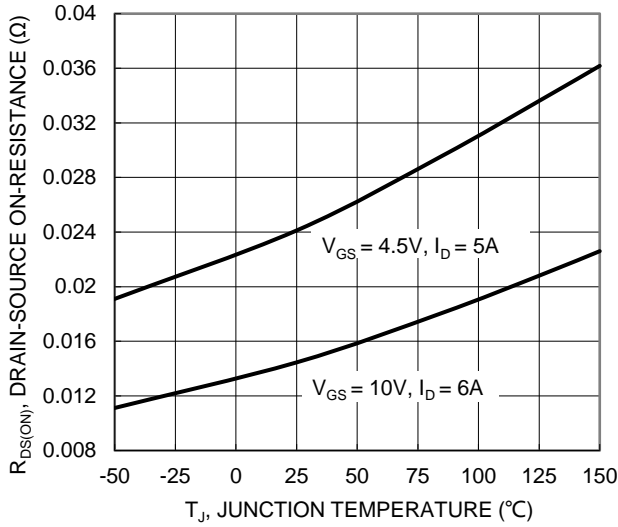


Figure 7. On-Resistance Variation with Junction Temperature

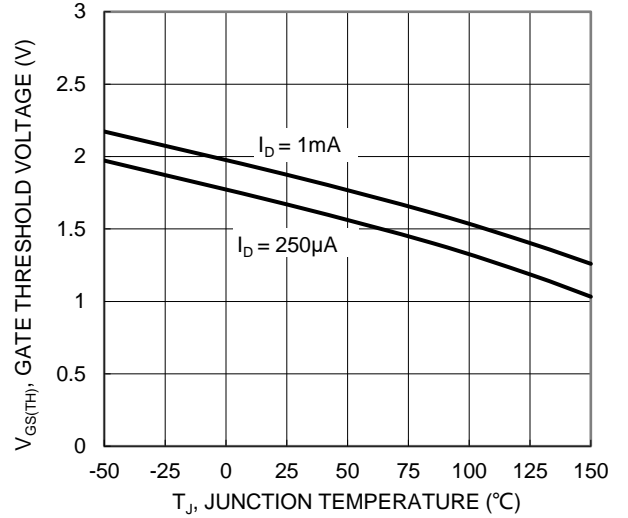


Figure 8. Gate Threshold Variation vs. Junction Temperature

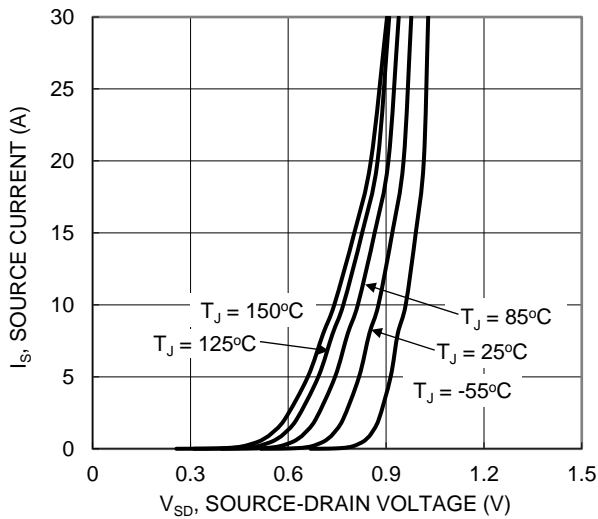


Figure 9. Diode Forward Voltage vs. Current

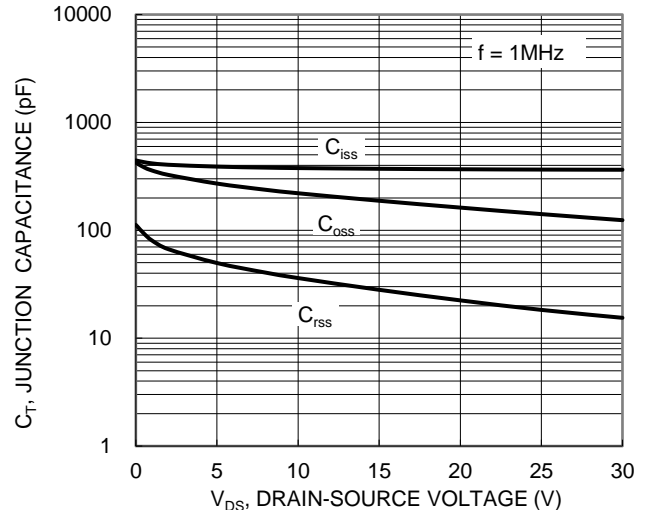


Figure 10. Typical Junction Capacitance

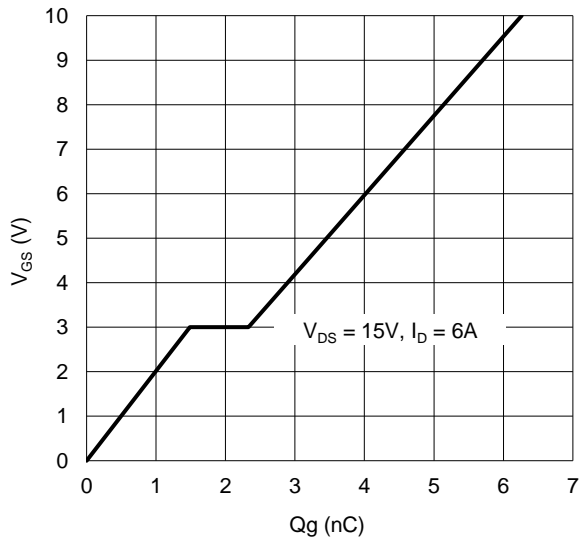


Figure 11. Gate Charge

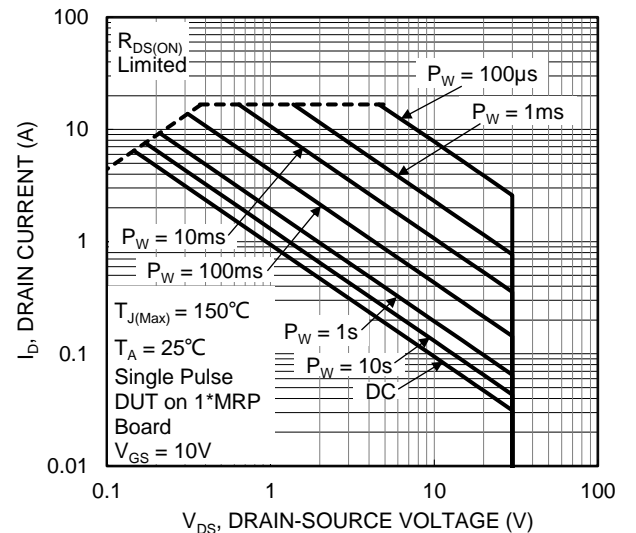


Figure 12. SOA, Safe Operation Area

Q1 – N-Channel (continued)

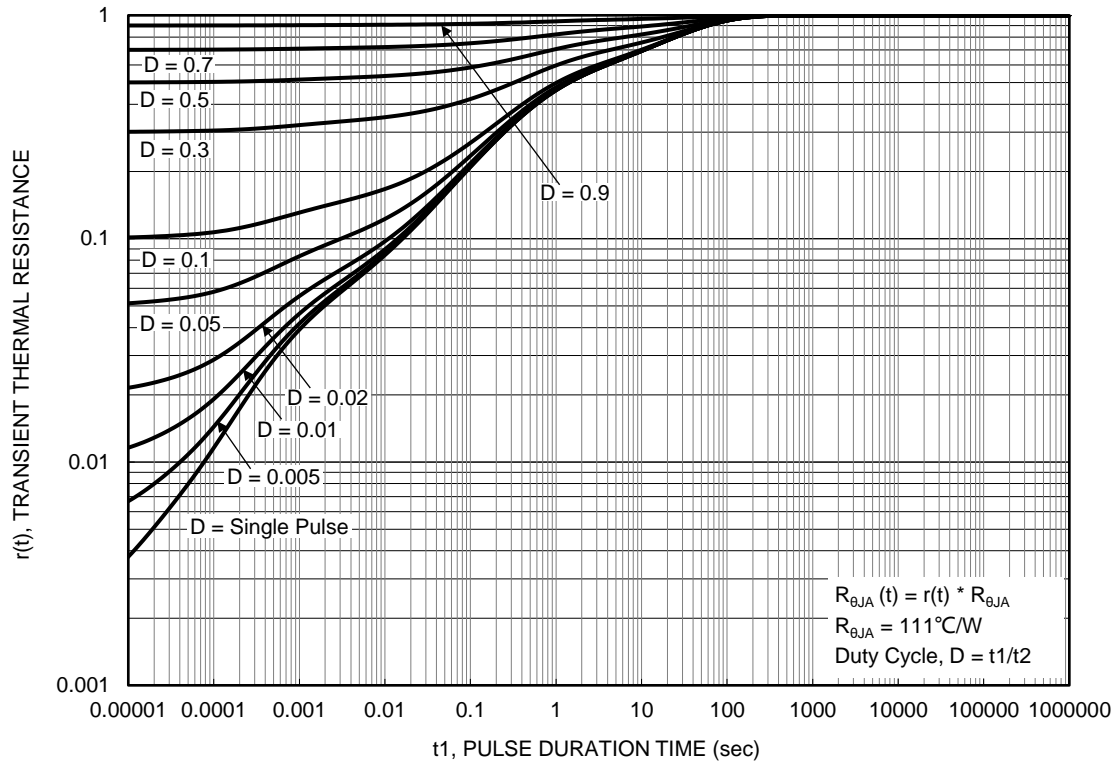


Figure 13. Transient Thermal Resistance

Q2 – P-Channel

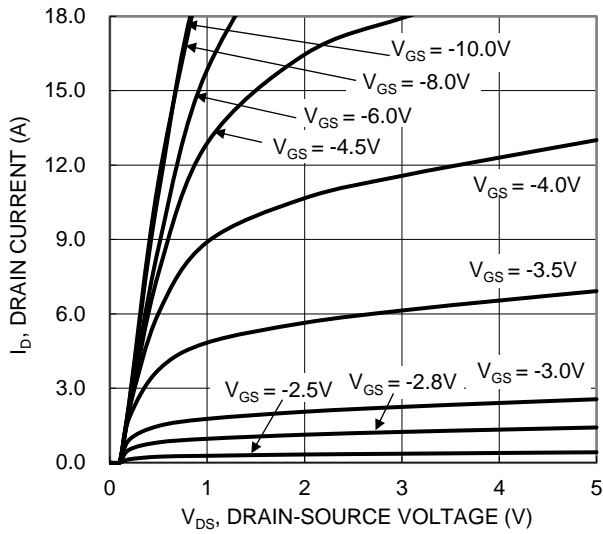


Figure 14. Typical Output Characteristic

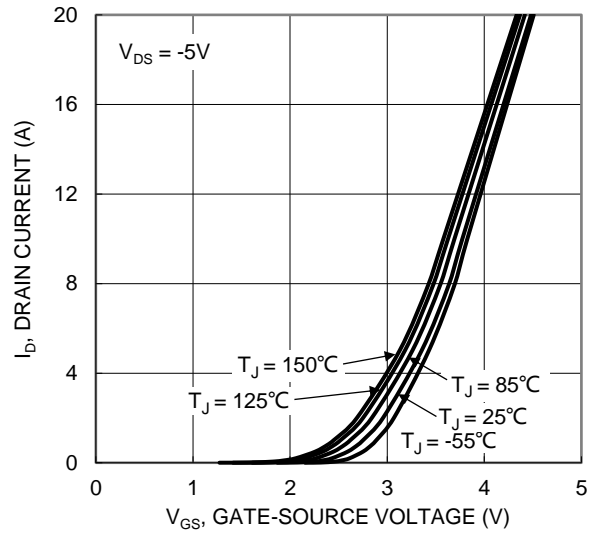


Figure 15. Typical Transfer Characteristic

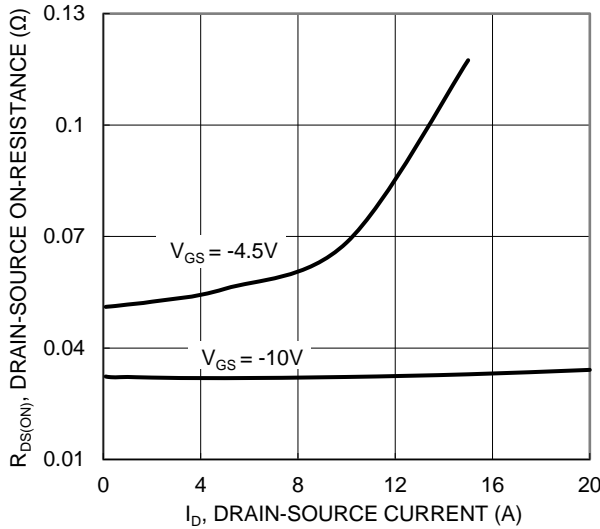


Figure 16. Typical On-Resistance vs. Drain Current and Gate Voltage

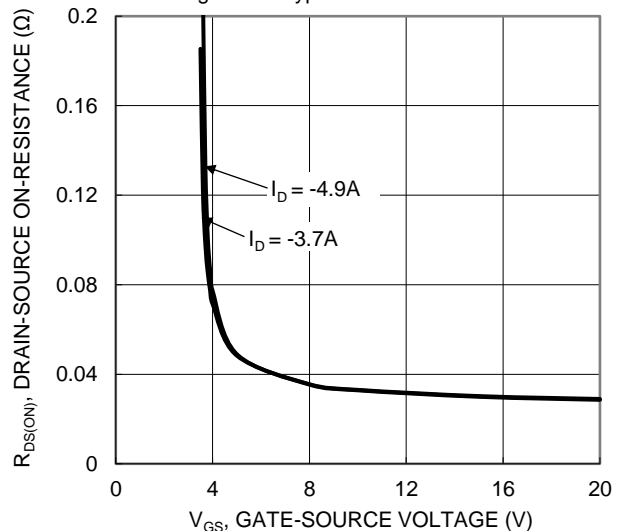


Figure 17. Typical Transfer Characteristic

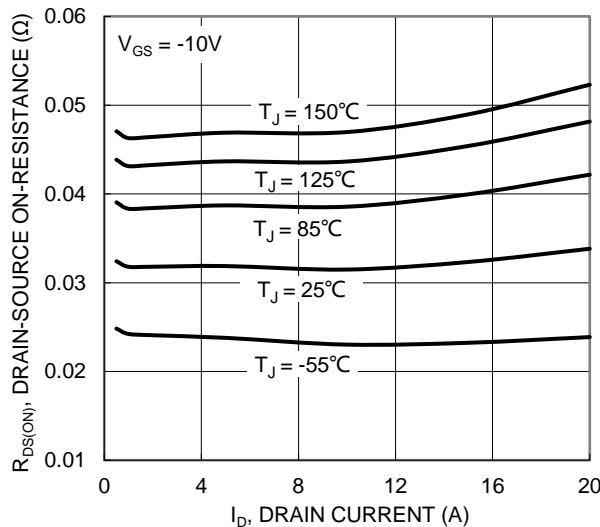


Figure 18. Typical On-Resistance vs. Drain Current and Junction Temperature

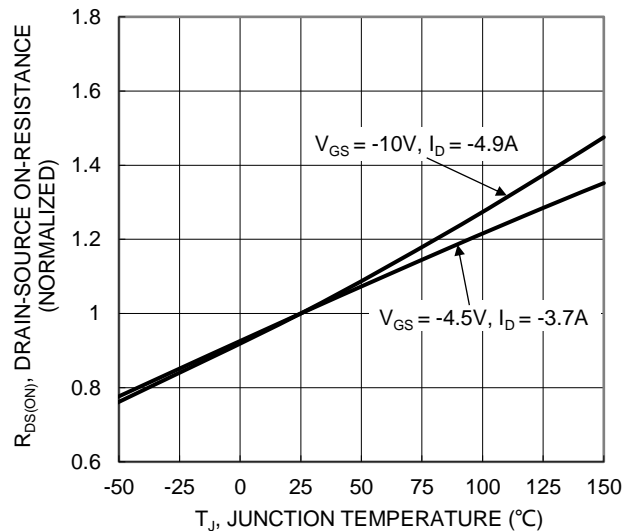


Figure 19. On-Resistance Variation with Junction Temperature

Q2 - P-Channel (continued)

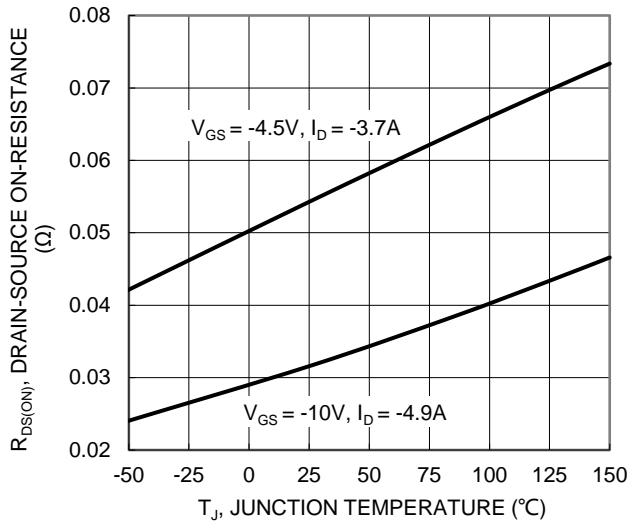


Figure 20. On-Resistance Variation with Junction Temperature

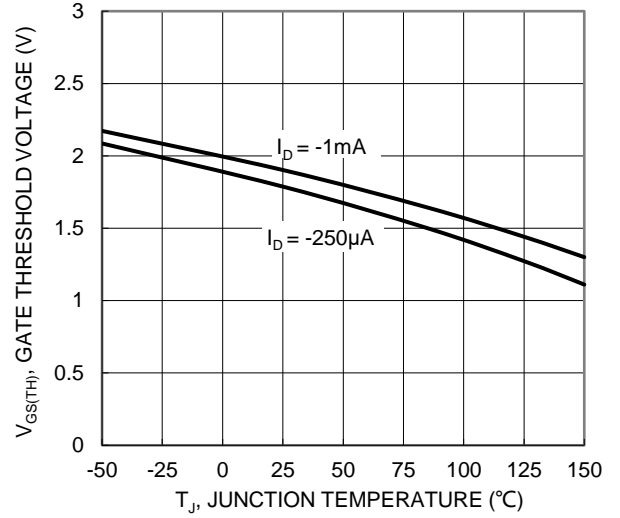


Figure 21. Gate Threshold Variation vs. Junction Temperature

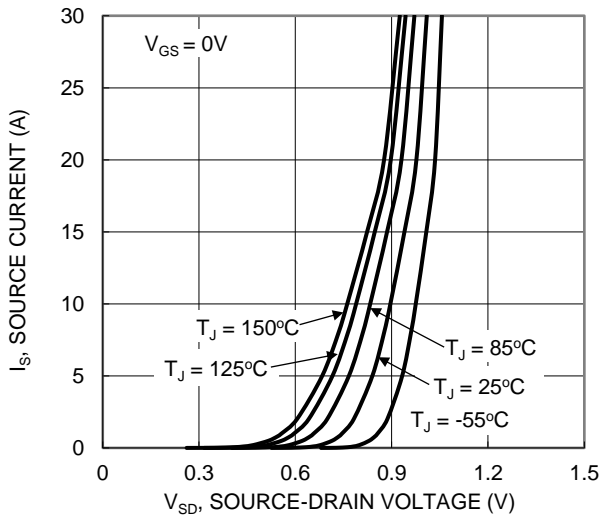


Figure 22. Diode Forward Voltage vs. Current

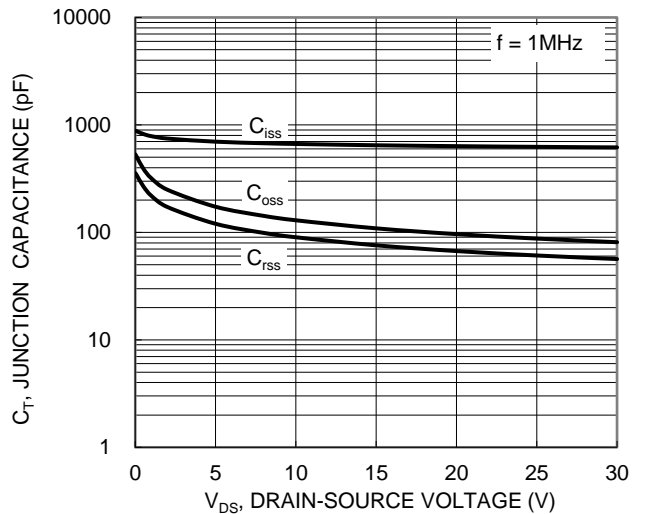


Figure 23. Typical Junction Capacitance

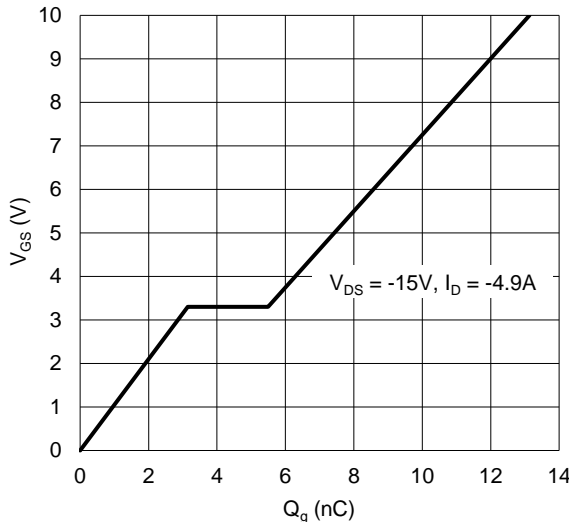


Figure 24. Gate Charge

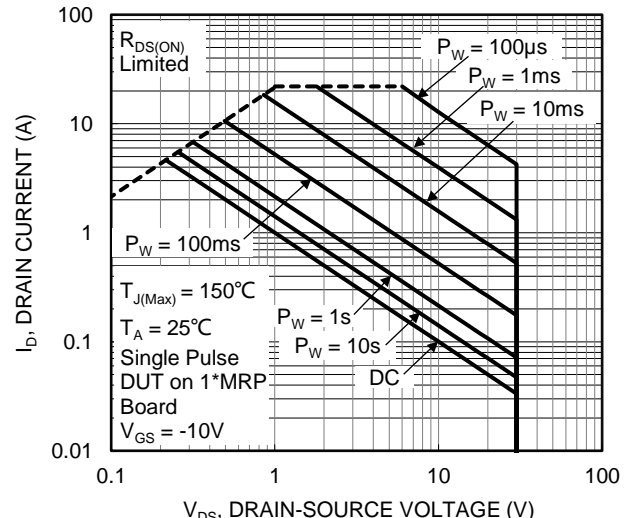


Figure 25. SOA, Safe Operation Area

Q2 – P-Channel (continued)

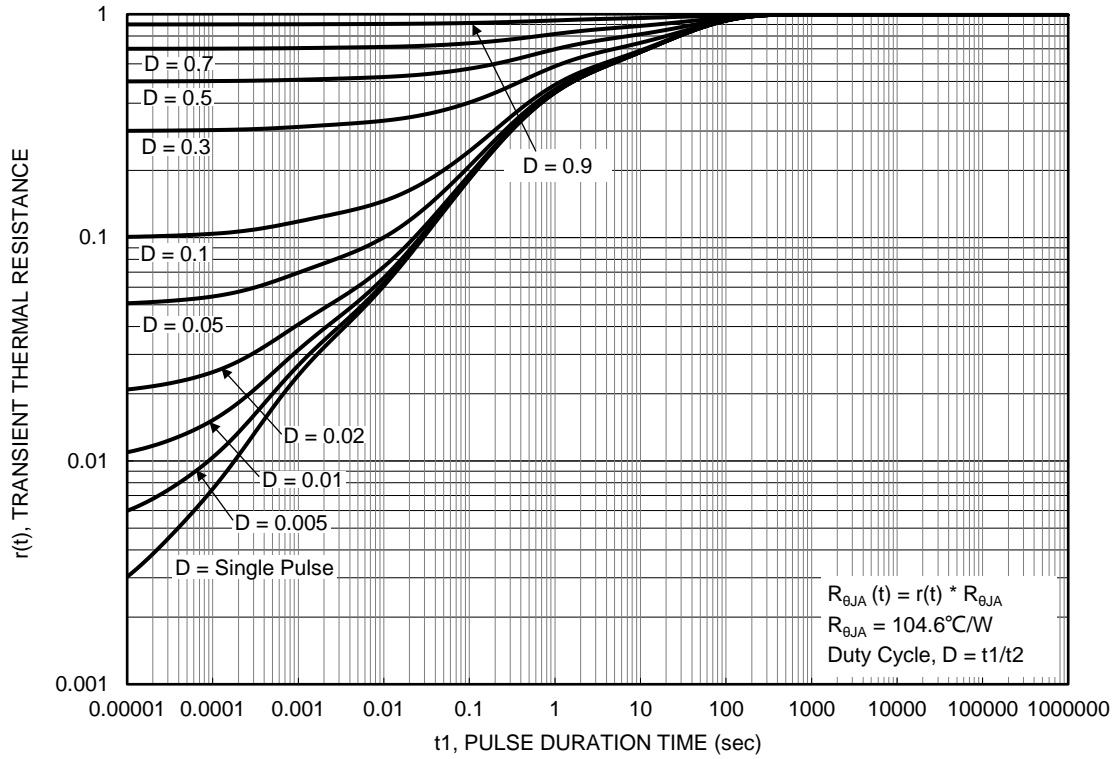
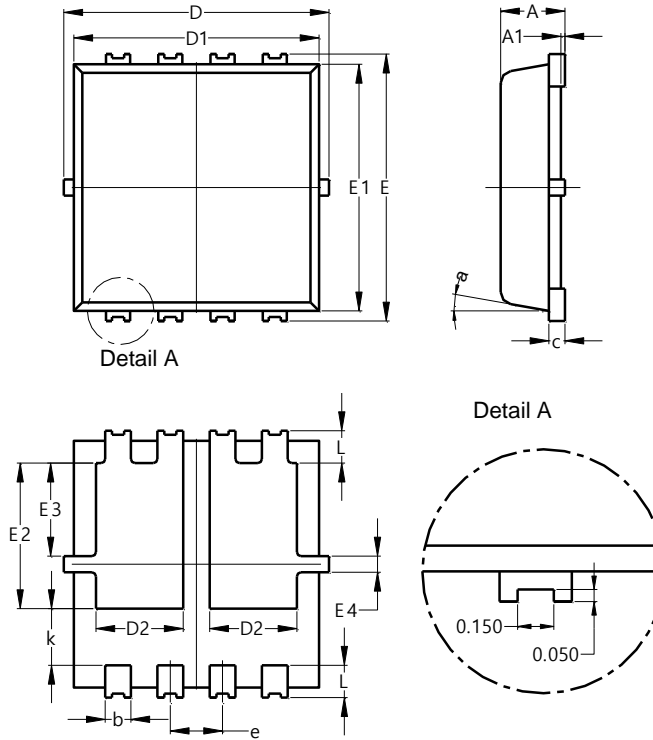


Figure 26. Transient Thermal Resistance

Package Outline Dimensions

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

POWERDI®3333-8/SWP (Type UXD)

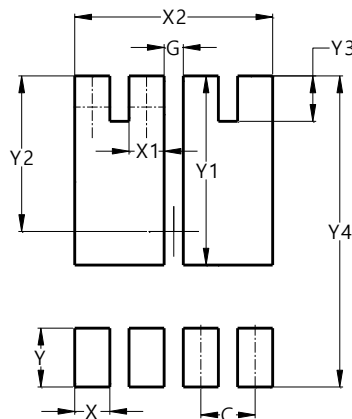


POWERDI®3333-8/SWP (Type UXD)			
Dim	Min	Max	Typ
A	0.75	0.85	0.80
A1	0.00	0.05	--
b	0.25	0.40	0.32
c	0.10	0.25	0.15
D	3.20	3.40	3.30
D1	2.95	3.15	3.05
D2	1.00	1.20	1.10
E	3.20	3.40	3.30
E1	2.95	3.15	3.05
E2	1.60	2.00	1.80
E3	0.95	1.35	1.15
E4	0.10	0.30	0.20
e	--	--	0.65
L	0.30	0.50	0.40
k	0.50	0.90	0.70
a	0°	12°	10°
All Dimensions in mm			

Suggested Pad Layout

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

POWERDI®3333-8/SWP (Type UXD)



Dimensions	Value (in mm)
C	0.650
G	0.230
X	0.420
X1	0.420
X2	2.370
Y	0.700
Y1	2.250
Y2	1.850
Y3	0.540
Y4	3.700

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