

**COMPLEMENTARY PAIR ENHANCEMENT MODE MOSFET
POWERDI®**
Product Summary

Device	V _{(BR)DSS}	R _{DS(ON)} max	I _D max T _A = +25°C
Q1	60V	85mΩ @ V _{GS} = 10V	3.1A
		120mΩ @ V _{GS} = 4.5V	2.7A
Q2	-60V	150mΩ @ V _{GS} = -10V	-2.4A
		250mΩ @ V _{GS} = -4.5V	-1.8A

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 Switch

Features

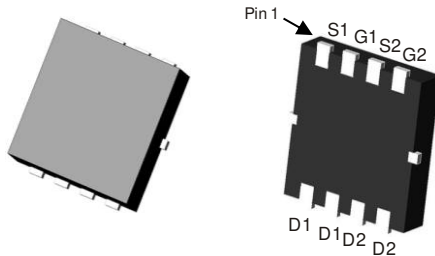
- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Complementary Pair MOSFET
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

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
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe; Solderable per MIL-STD-202, Method 208③
- Weight: 0.072 grams (Approximate)

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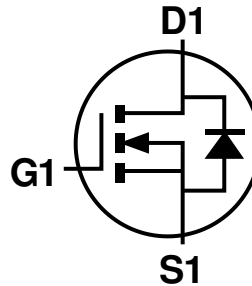
POWERDI3333-8



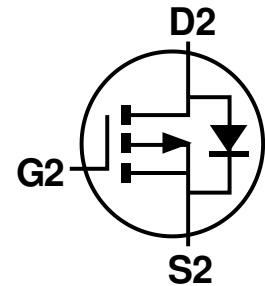
Top View

Bottom View

Equivalent Circuit



N-Channel MOSFET

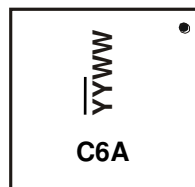


P-Channel MOSFET

Ordering Information (Note 4)

Part Number	Case	Packaging
DMC6070LND-7	POWERDI3333-8	2,000/Tape & Reel
DMC6070LND-13	POWERDI3333-8	3,000/Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 2. See http://www.diodes.com/quality/lead_free.html 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 <http://www.diodes.com/products/packages.html>.

Marking Information


C6A = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Last Two Digits of Year (ex: 15 for 2015)
 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}	60	V
Gate-Source Voltage			V _{GSS}	±20	V
Continuous Drain Current (Note 5) V _{GS} = 10V	Steady State	T _A = +25°C T _A = +70°C	I _D	3.1 2.5	A
	t < 10s	T _A = +25°C T _A = +70°C	I _D	3.9 3.1	A
Maximum Body Diode Forward Current (Note 5)			I _S	2	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I _{DM}	15	A

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V _{DSS}	-60	V
Gate-Source Voltage			V _{GSS}	±20	V
Continuous Drain Current (Note 5) V _{GS} = -10V	Steady State	T _A = +25°C T _A = +70°C	I _D	-2.4 -1.9	A
	t < 10s	T _A = +25°C T _A = +70°C	I _D	-2.9 -2.3	A
Maximum Body Diode Forward Current (Note 5)			I _S	-2	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I _{DM}	-12	A

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)		P _D	1.4	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady state	R _{θJA}	91	°C/W
	t < 10s		60	
Thermal Resistance, Junction to Case (Note 5)		R _{θJC}	32	
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +150	°C

Note: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.

Electrical Characteristics Q1 N-CHANNEL (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 6)						
Drain-Source Breakdown Voltage	BV_{DSS}	60	–	–	V	$V_{GS} = 0V, I_D = 250\mu A$
Zero Gate Voltage Drain Current $T_J = +25^\circ\text{C}$	I_{DSS}	–	–	1	μA	$V_{DS} = 60V, V_{GS} = 0V$
Gate-Source Leakage	I_{GSS}	–	–	± 100	nA	$V_{GS} = \pm 16V, V_{DS} = 0V$
ON CHARACTERISTICS (Note 6)						
Gate Threshold Voltage	$V_{GS(TH)}$	1	–	3	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	–	60	85	m Ω	$V_{GS} = 10V, I_D = 1.5A$
			72	120		$V_{GS} = 4.5V, I_D = 0.5A$
Forward Transfer Admittance	$ Y_{fs} $	–	3.7	–	S	$V_{DS} = 5V, I_D = 1.5A$
Diode Forward Voltage	V_{SD}	–	0.7	1.2	V	$V_{GS} = 0V, I_S = 3A$
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C_{iss}	–	731	–	pF	$V_{DS} = 20V, V_{GS} = 0V,$ $f = 1MHz$
Output Capacitance	C_{oss}	–	34	–	pF	
Reverse Transfer Capacitance	C_{rss}	–	23	–	pF	
Gate Resistance	R_g	–	1.3	–	Ω	$V_{DS} = 0V, V_{GS} = 0V, f = 1MHz$
Total Gate Charge ($V_{GS} = 10V$)	Q_g	–	11.5	–	nC	$V_{DS} = 30V, I_D = 3A$
Total Gate Charge ($V_{GS} = 4.5V$)	Q_g	–	5.2	–	nC	
Gate-Source Charge	Q_{gs}	–	2.1	–	nC	
Gate-Drain Charge	Q_{gd}	–	1.5	–	nC	
Turn-On Delay Time	$t_{D(ON)}$	–	9.6	–	ns	$V_{GS} = 10V, V_{DS} = 30V,$ $R_G = 50\Omega, R_L = 20\Omega$
Turn-On Rise Time	t_R	–	11	–	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	–	61	–	ns	
Turn-Off Fall Time	t_F	–	21	–	ns	

Notes: 6. Short duration pulse test used to minimize self-heating effect.
7. Guaranteed by design. Not subject to production testing.

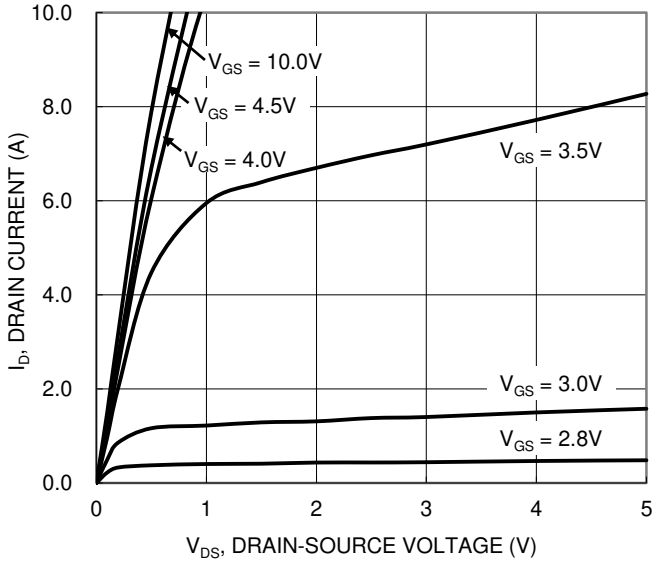


Figure 1. Typical Output Characteristic

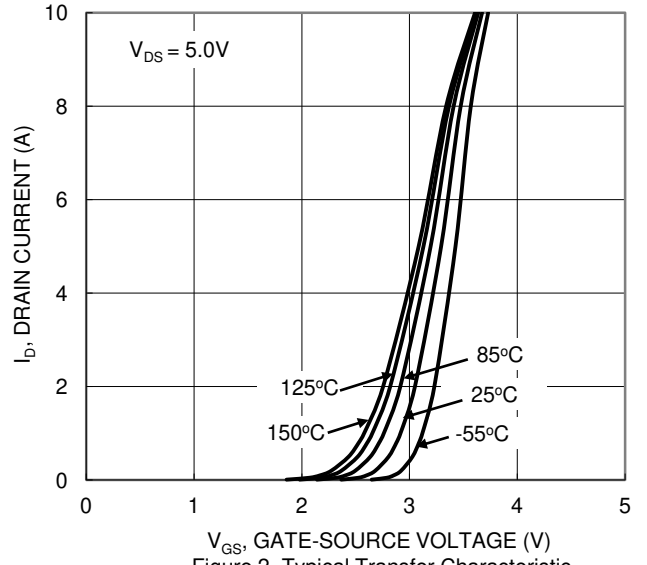


Figure 2. Typical Transfer Characteristic

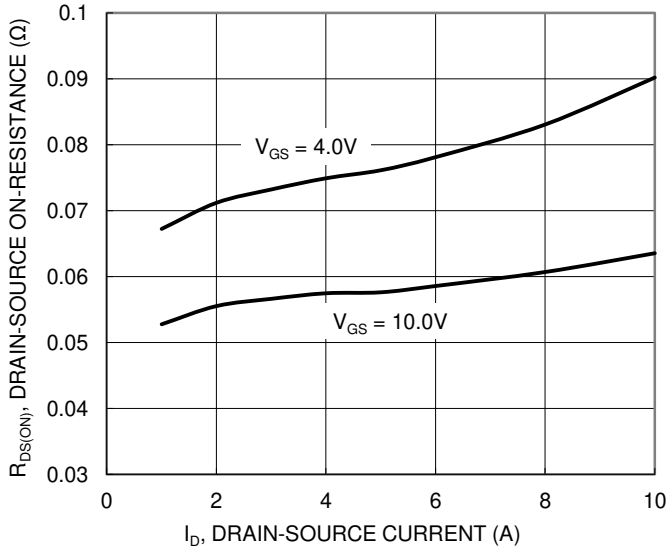


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

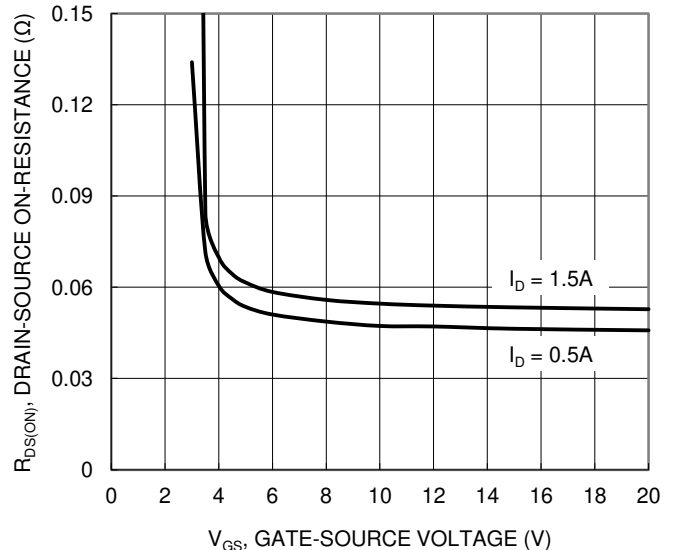


Figure 4. Typical Transfer Characteristic

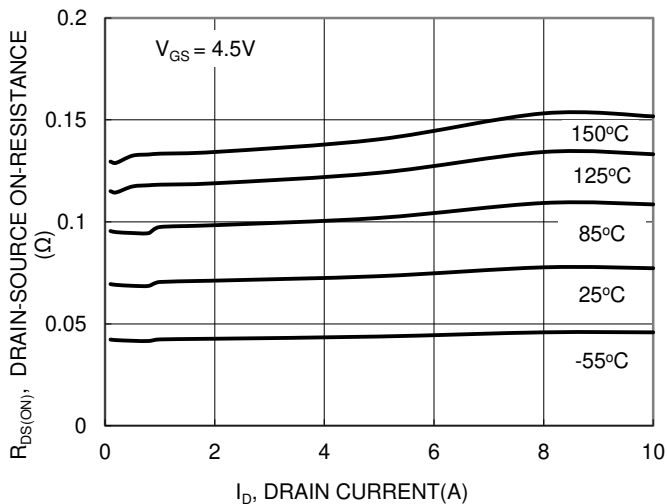


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

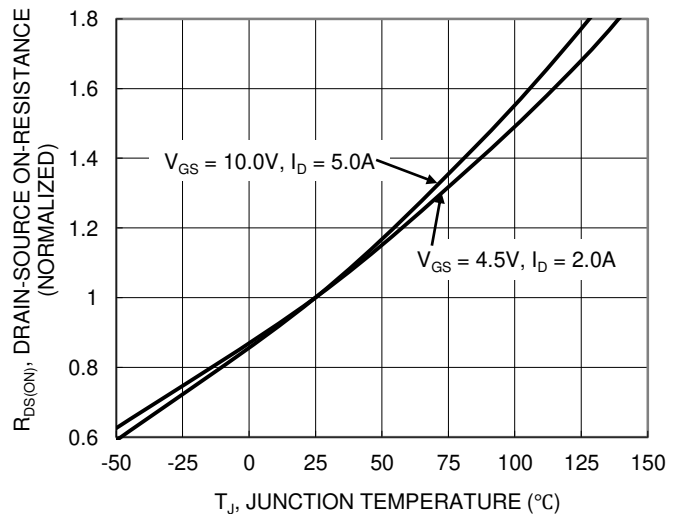


Figure 6. On-Resistance Variation with Temperature

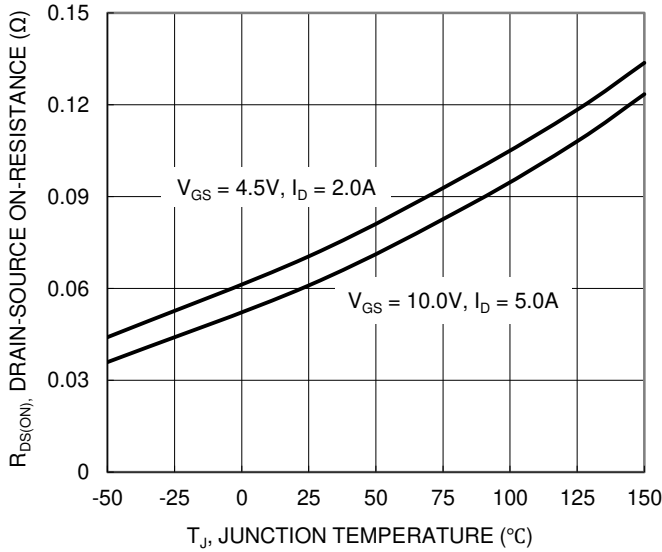


Figure 7. On-Resistance Variation with Temperature

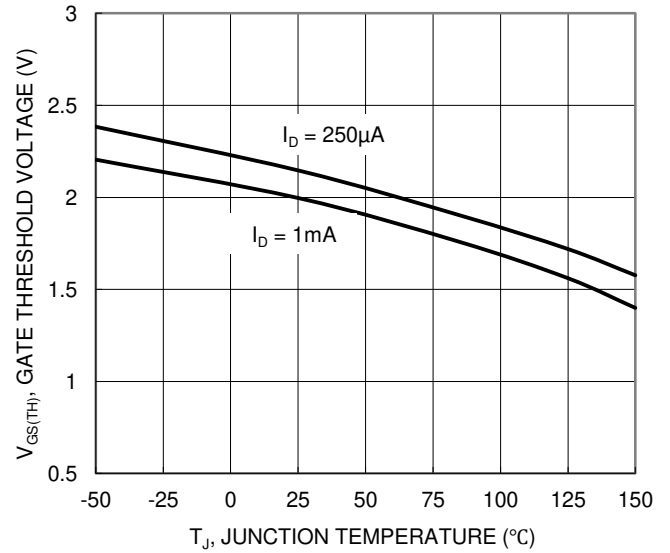


Figure 8. Gate Threshold Variation vs. Junction Temperature

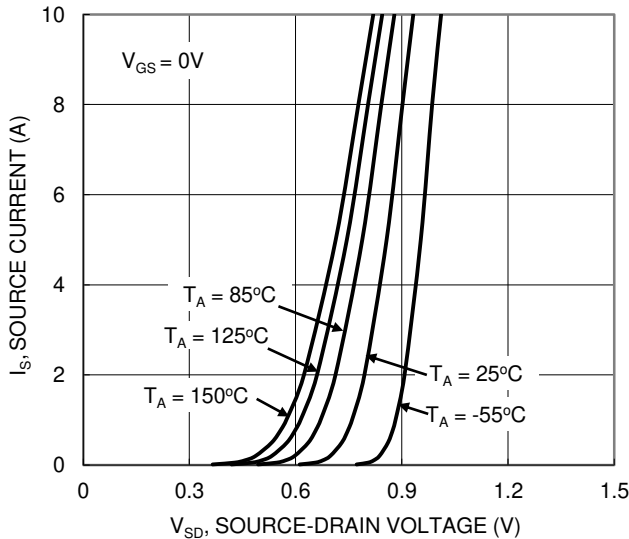


Figure 9. Diode Forward Voltage vs. Current

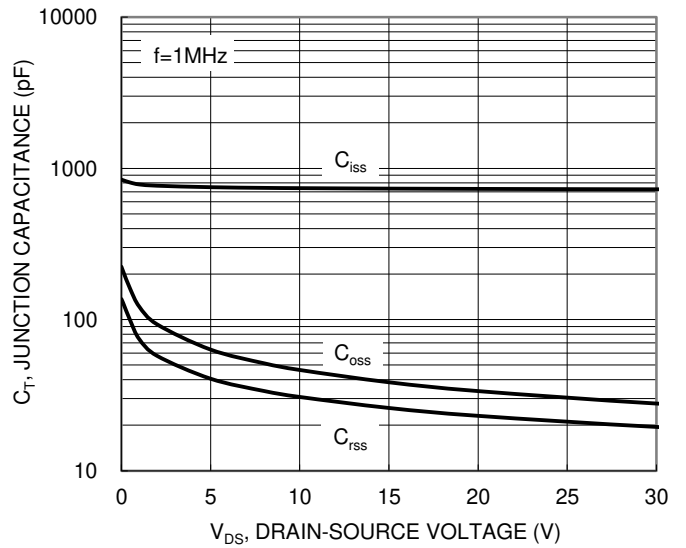


Figure 10. Typical Junction Capacitance

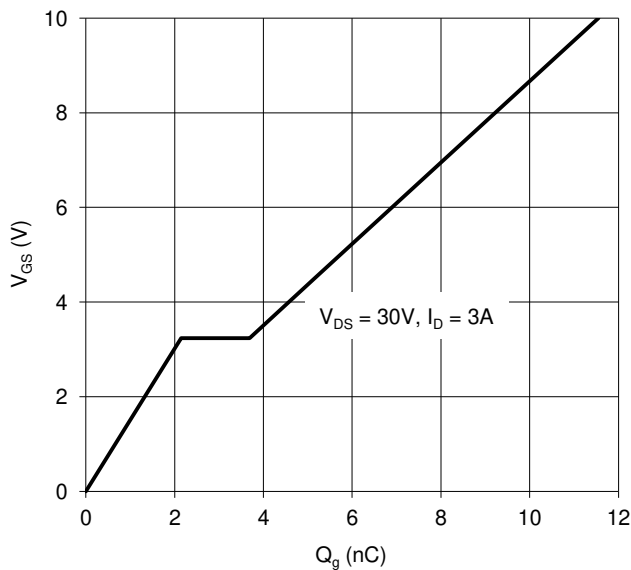


Figure 11. Gate Charge

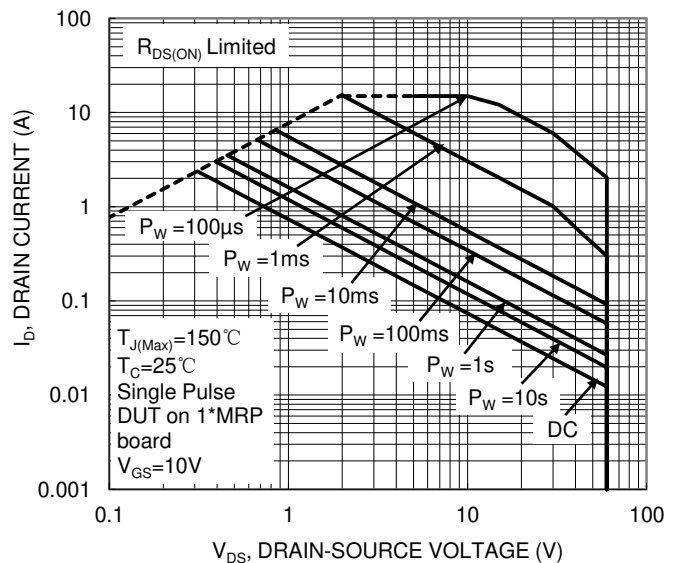


Figure 12. SOA, Safe Operation Area

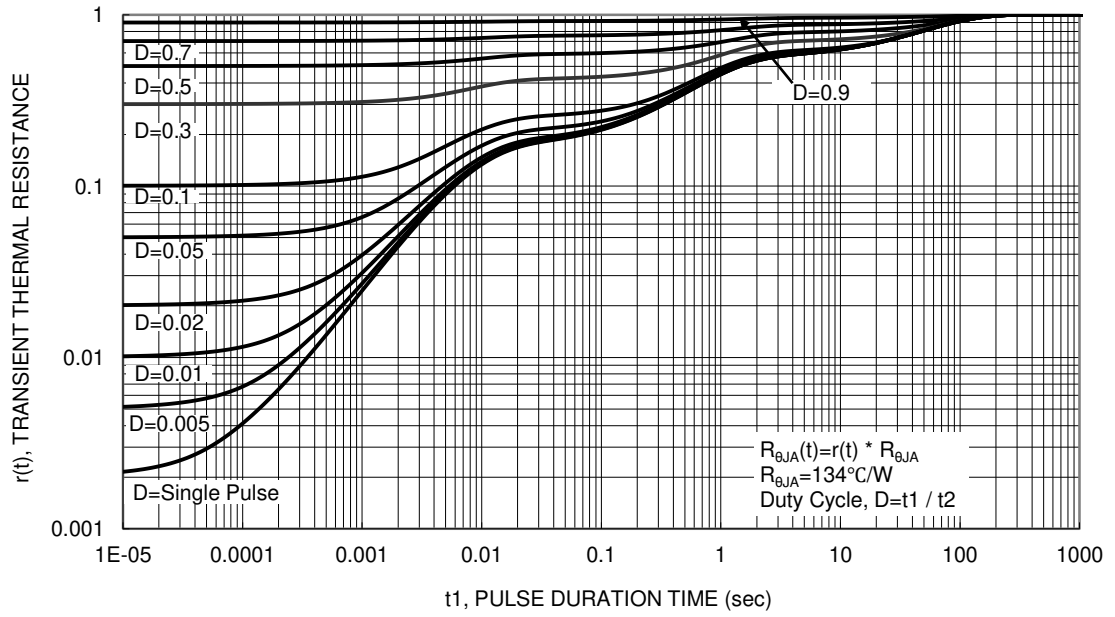


Figure 13. Transient Thermal Resistance

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Electrical Characteristics Q2 P-CHANNEL (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	-60	-	-	V	$V_{GS} = 0V, I_D = -250\mu A$
Zero Gate Voltage Drain Current $T_J = +25^\circ\text{C}$	I_{DSS}	-	-	-1	μA	$V_{DS} = -60V, V_{GS} = 0V$
Gate-Source Leakage	I_{GSS}	-	-	± 100	nA	$V_{GS} = \pm 16V, V_{DS} = 0V$
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	-1	-	-3	V	$V_{DS} = V_{GS}, I_D = -250\mu A$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	-	115	150	m Ω	$V_{GS} = -10V, I_D = -1A$
			170	250		$V_{GS} = -4.5V, I_D = -0.5A$
Forward Transfer Admittance	$ Y_{fs} $	-	2.8	-	S	$V_{DS} = -5V, I_D = -1A$
Diode Forward Voltage	V_{SD}	-	-0.7	-1.2	V	$V_{GS} = 0V, I_S = -2A$
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	-	612	-	pF	$V_{DS} = -20V, V_{GS} = 0V,$ $f = 1MHz$
Output Capacitance	C_{oss}	-	36	-	pF	
Reverse Transfer Capacitance	C_{rss}	-	26	-	pF	
Gate Resistance	R_g	-	13	-	Ω	$V_{DS} = 0V, V_{GS} = 0V, f = 1MHz$
Total Gate Charge ($V_{GS} = -10V$)	Q_g	-	8.9	-	nC	$V_{DS} = -30V, I_D = -2A$
Total Gate Charge ($V_{GS} = -4.5V$)	Q_{g1}	-	4.3	-	nC	
Gate-Source Charge	Q_{gs}	-	1.4	-	nC	
Gate-Drain Charge	Q_{gd}	-	1.7	-	nC	
Turn-On Delay Time	$t_{D(ON)}$	-	7.6	-	ns	$V_{GS} = -10V, V_{DS} = -30V,$ $R_G = 50\Omega, I_D = -1A$
Turn-On Rise Time	t_R	-	11.6	-	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	-	79.8	-	ns	
Turn-Off Fall Time	t_F	-	37.8	-	ns	

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

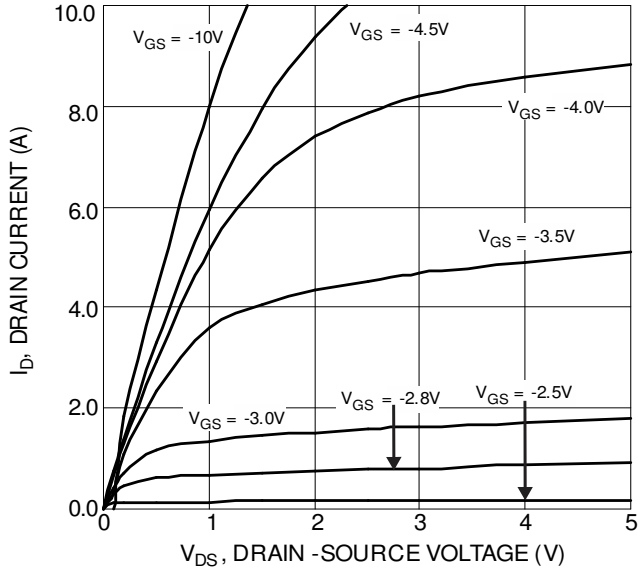


Figure 14 Typical Output Characteristics

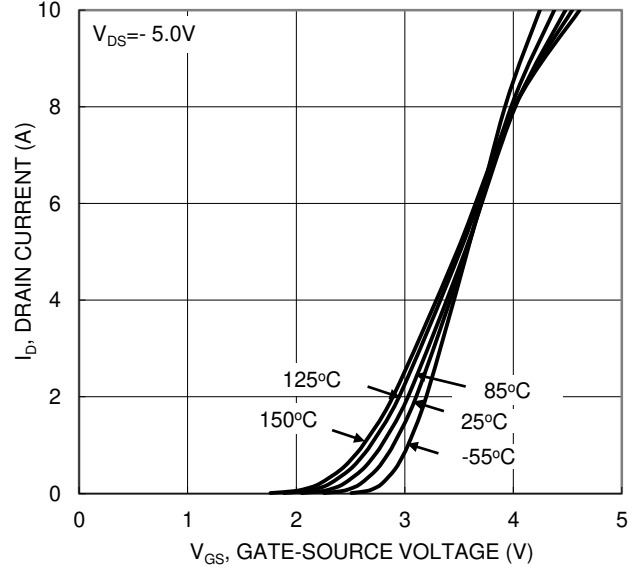


Figure 15. Typical Transfer Characteristic

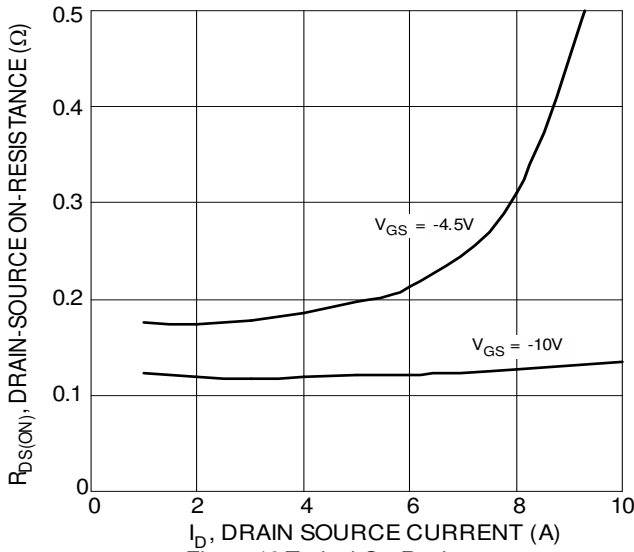


Figure 16 Typical On-Resistance vs. Drain Current and Gate Voltage

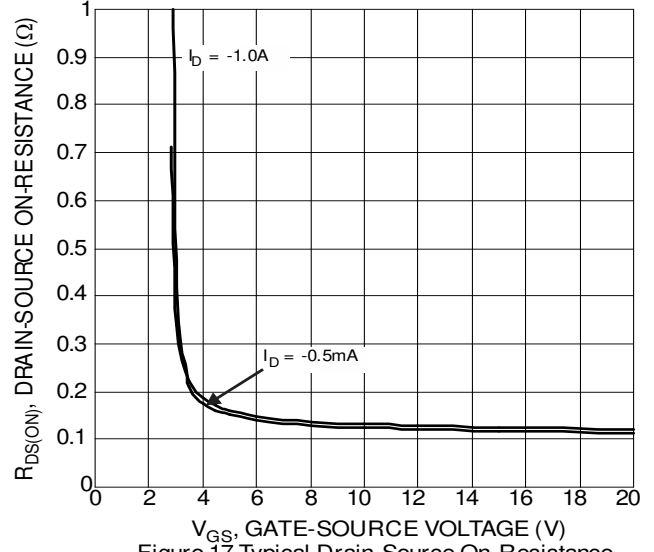


Figure 17 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

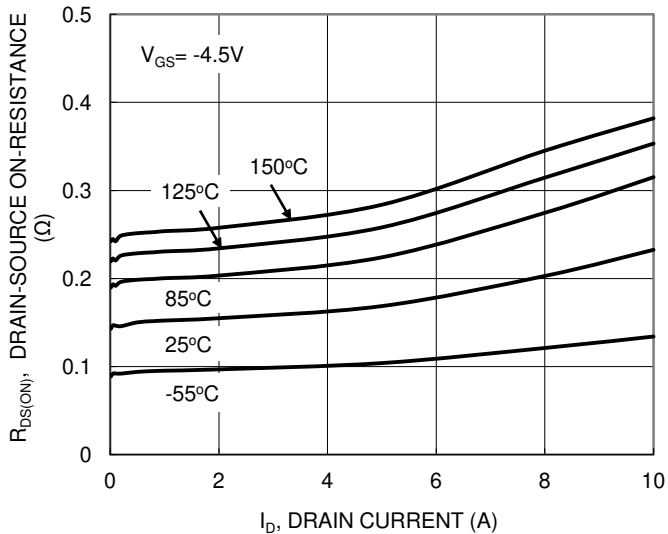


Figure 18. Typical On-Resistance vs. Drain Current and Temperature

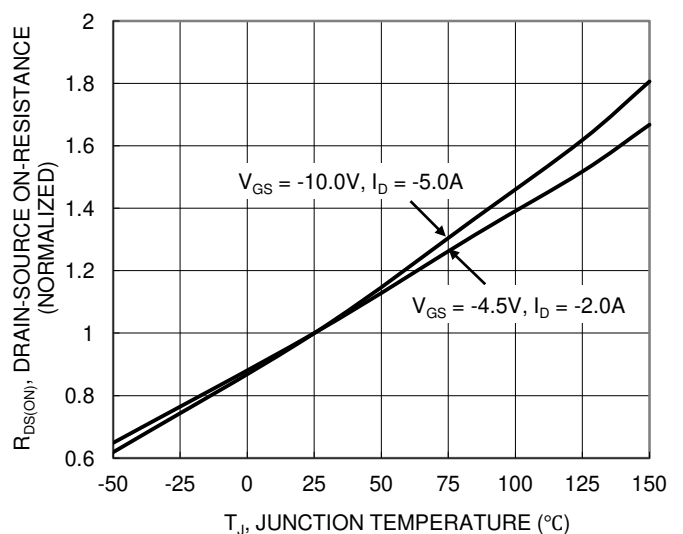
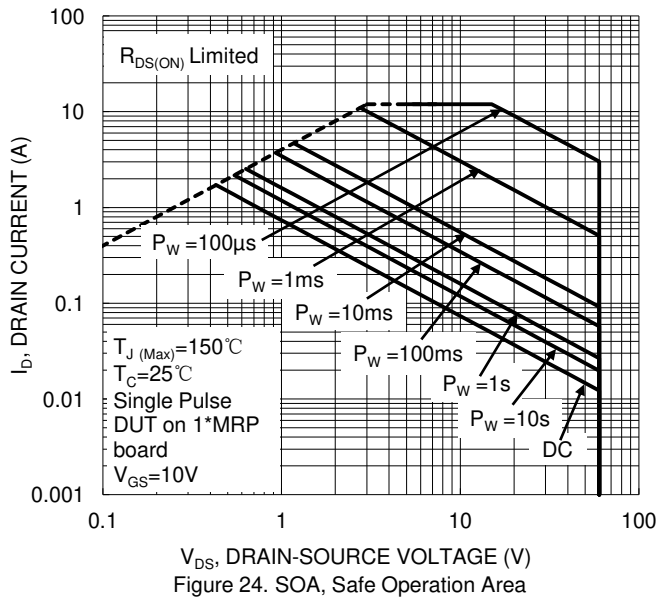
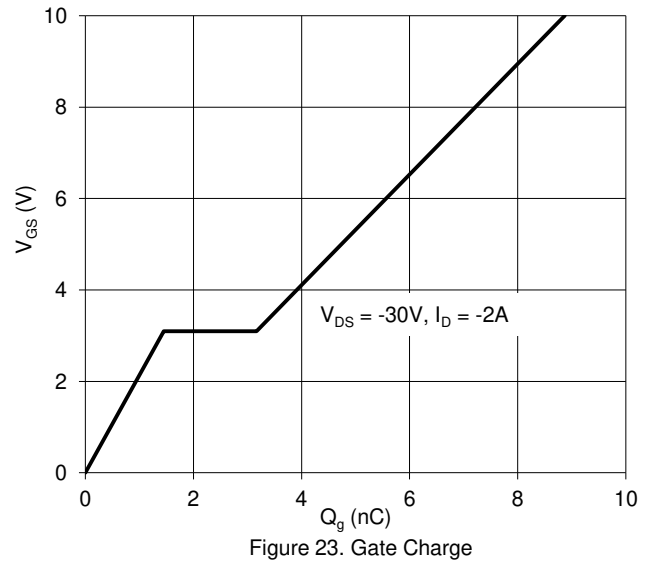
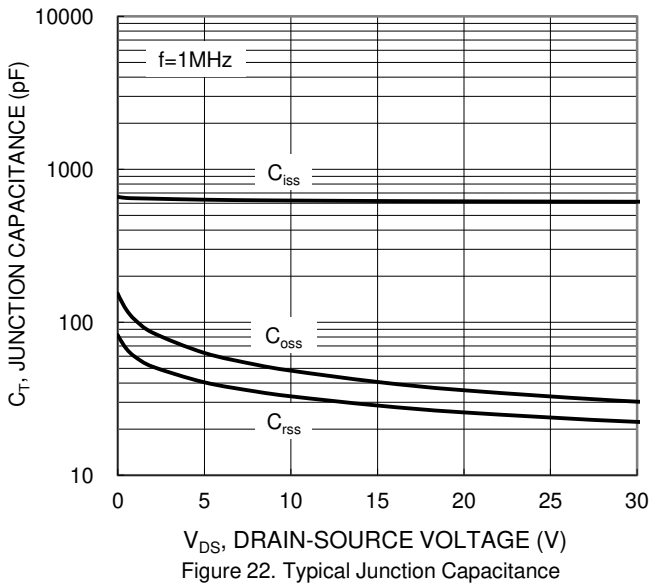
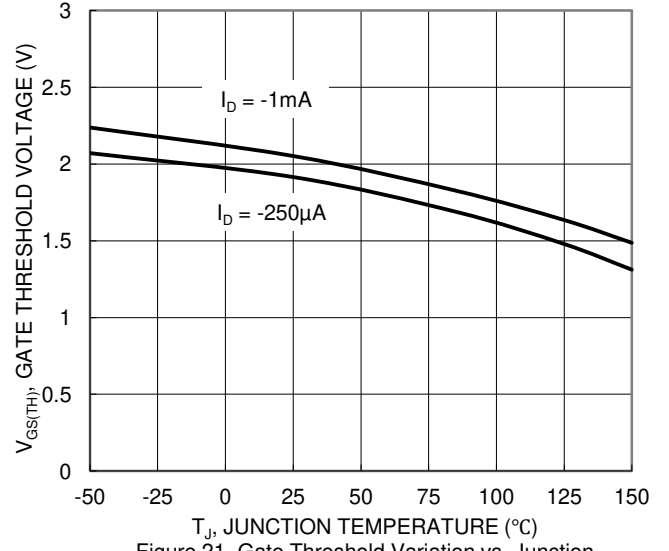
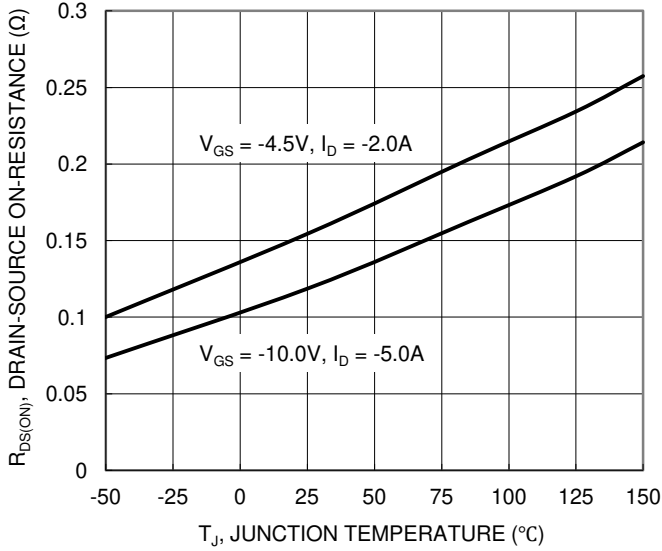
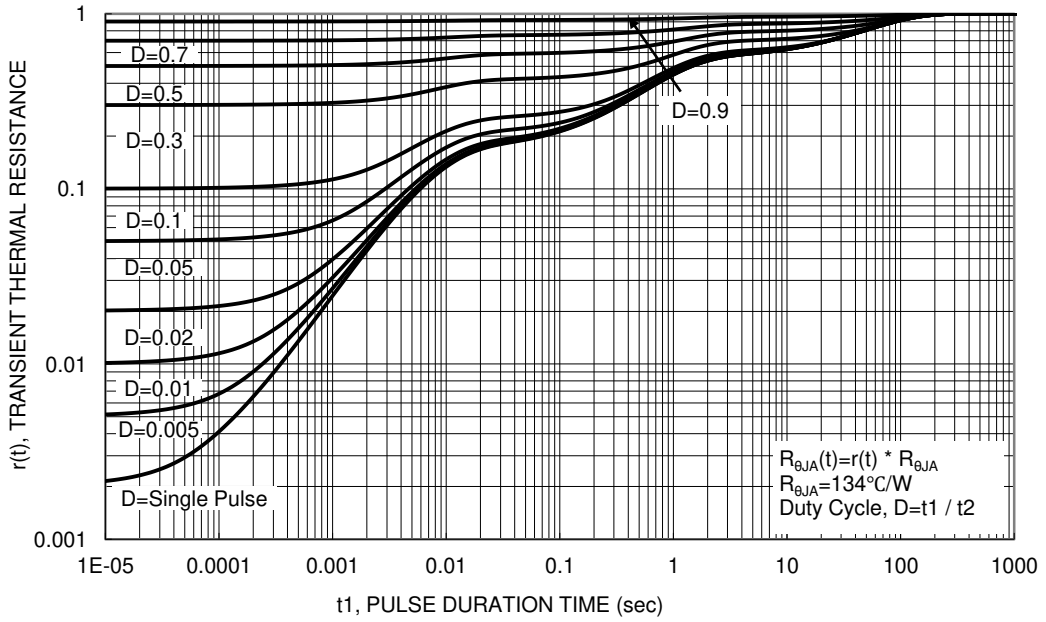


Figure 19. On-Resistance Variation with Temperature



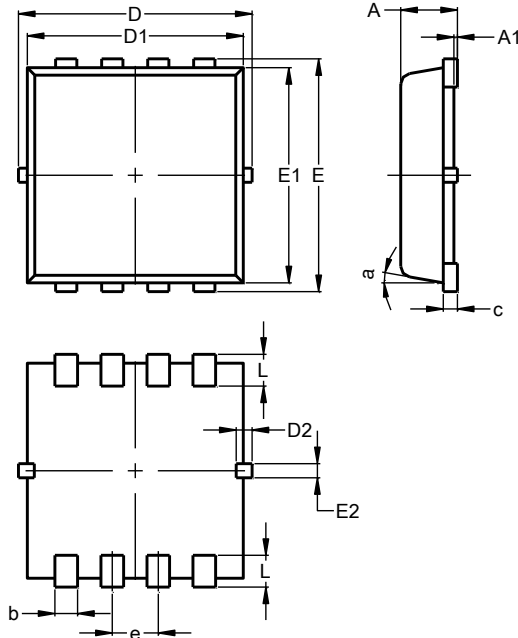


NEW PRODUCT

Package Outline Dimensions

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.

**POWERI3333-8
(Type UXB)**



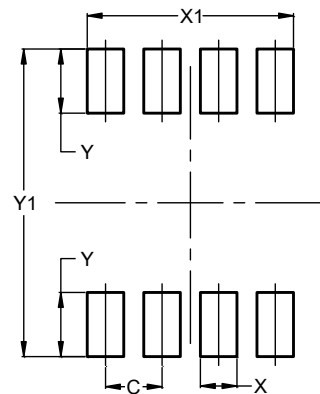
POWERI3333-8 (Type UXB)			
Dim	Min	Max	Typ
A	0.75	0.85	0.80
A1	0.00	0.05	--
b	0.25	0.40	0.32
c	0.10	0.25	0.15
D	3.20	3.40	3.30
D1	2.95	3.15	3.05
D2	0.10	0.35	0.23
E	3.20	3.40	3.30
E1	2.95	3.15	3.05
E2	0.10	0.30	0.20
e	--	--	0.65
L	0.35	0.55	0.45
a	0°	12°	10°
All Dimensions in mm			

NEW PRODUCT

Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.

**POWERI3333-8
(Type UXB)**



Dimensions	Value (in mm)
C	0.650
X	0.420
X1	2.370
Y	0.730
Y1	3.500

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2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

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