

## Product Summary

Device	V <sub>(BR)DSS</sub>	R <sub>DS(ON)</sub> max	I <sub>D</sub> max T <sub>A</sub> = +25°C
Q1	60V	85mΩ @ V <sub>GS</sub> = 10V	3.1A
		120mΩ @ V <sub>GS</sub> = 4.5V	2.7A
Q2	-60V	150mΩ @ V <sub>GS</sub> = -10V	-2.4A
		250mΩ @ V <sub>GS</sub> = -4.5V	-1.8A

## Description

This new generation MOSFET is designed to minimize the on-state resistance (R<sub>DS(ON)</sub>), yet maintain superior switching performance, making it ideal for high efficiency power management applications.

## Applications

- Power Management Functions
- Analog Switch

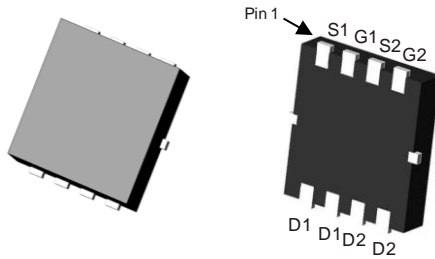
## Features

- 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)

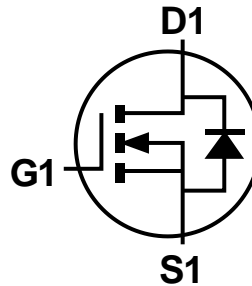
POWERDI3333-8



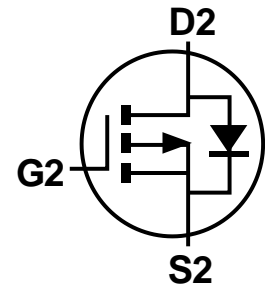
Top View

Bottom View

Equivalent Circuit



N-Channel MOSFET



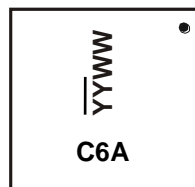
P-Channel MOSFET

## 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](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<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V <sub>DSS</sub>	60	V
Gate-Source Voltage			V <sub>GSS</sub>	±20	V
Continuous Drain Current (Note 5) V <sub>GS</sub> = 10V	Steady State	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	3.1 2.5	A
	t < 10s	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	3.9 3.1	A
Maximum Body Diode Forward Current (Note 5)			I <sub>S</sub>	2	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I <sub>DM</sub>	15	A

**Maximum Ratings Q2 P-CHANNEL** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

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

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)		P <sub>D</sub>	1.4	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady state	R <sub>θJA</sub>	91	°C/W
	t < 10s		60	
Thermal Resistance, Junction to Case (Note 5)		R <sub>θJC</sub>	32	
Operating and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-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
<b>OFF CHARACTERISTICS (Note 6)</b>						
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	$\mu A$	$V_{DS} = 60V, V_{GS} = 0V$
Gate-Source Leakage	$I_{GSS}$	–	–	$\pm 100$	nA	$V_{GS} = \pm 16V, V_{DS} = 0V$
<b>ON CHARACTERISTICS (Note 6)</b>						
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 $\Omega$	$V_{GS} = 10V, I_D = 1.5A$
			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	$V_{GS} = 0V, I_S = 3A$
<b>DYNAMIC CHARACTERISTICS (Note 7)</b>						
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	–	$\Omega$	$V_{DS} = 0V, V_{GS} = 0V, f = 1MHz$
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.

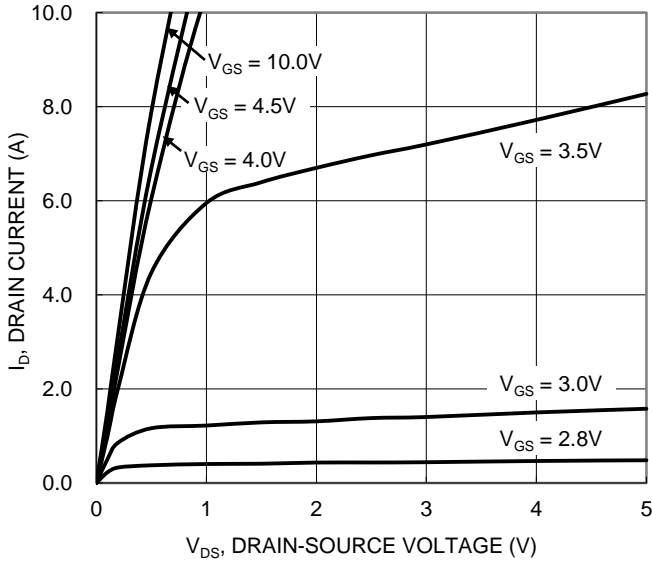


Figure 1. Typical Output Characteristic

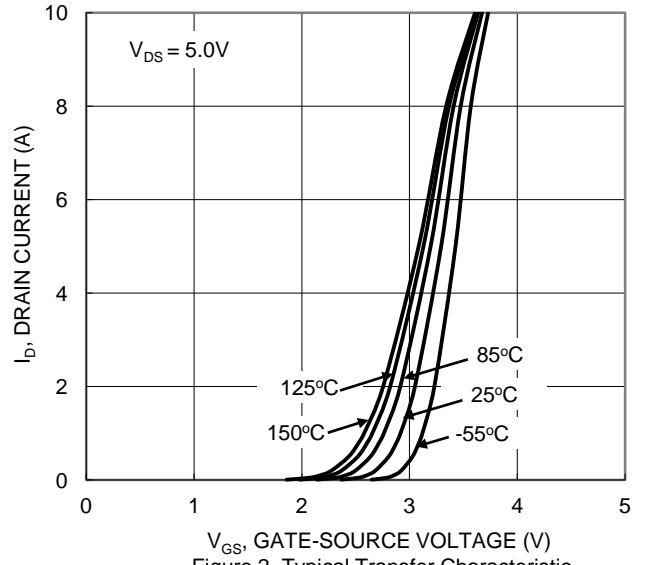


Figure 2. Typical Transfer Characteristic

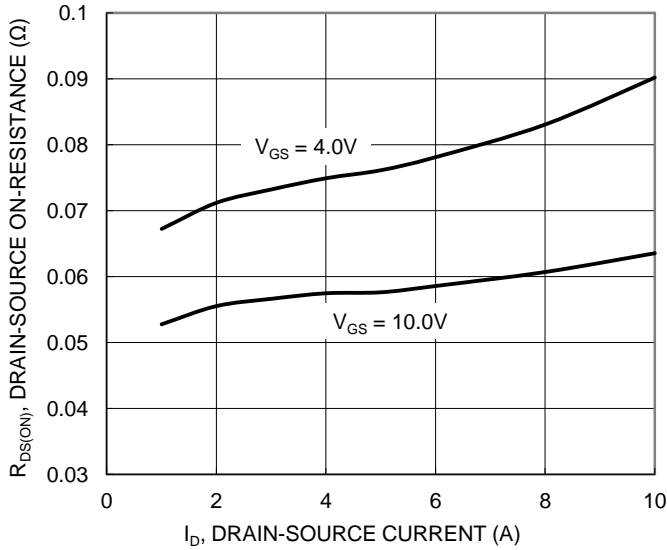


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

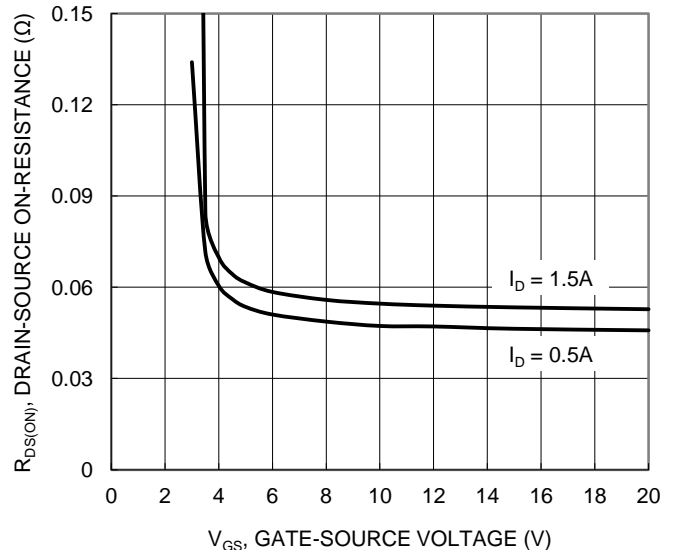


Figure 4. Typical Transfer Characteristic

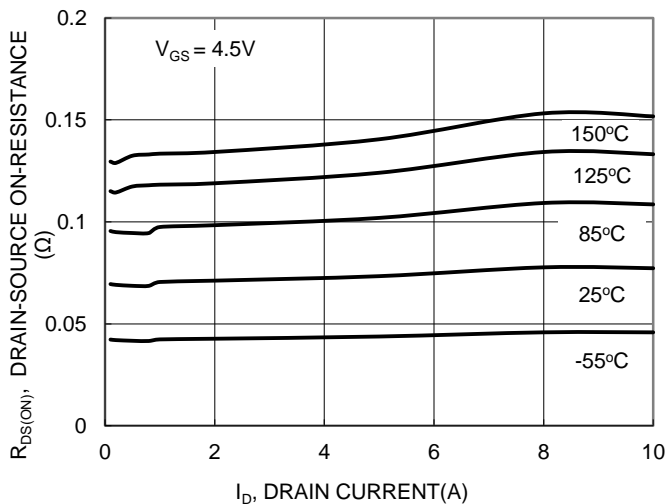


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

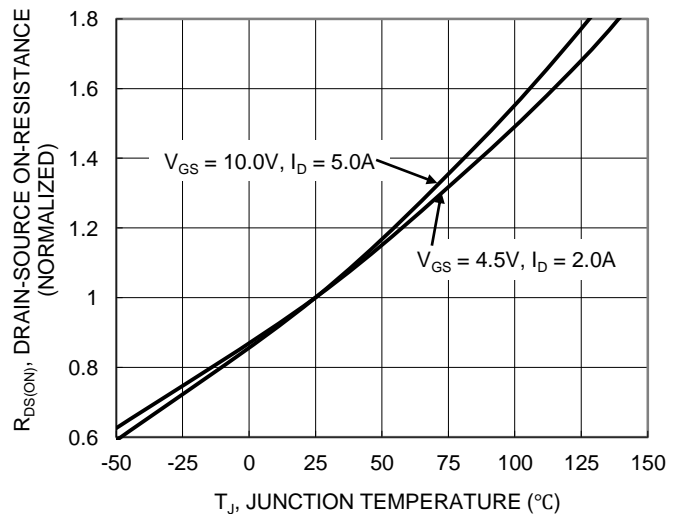


Figure 6. On-Resistance Variation with Temperature

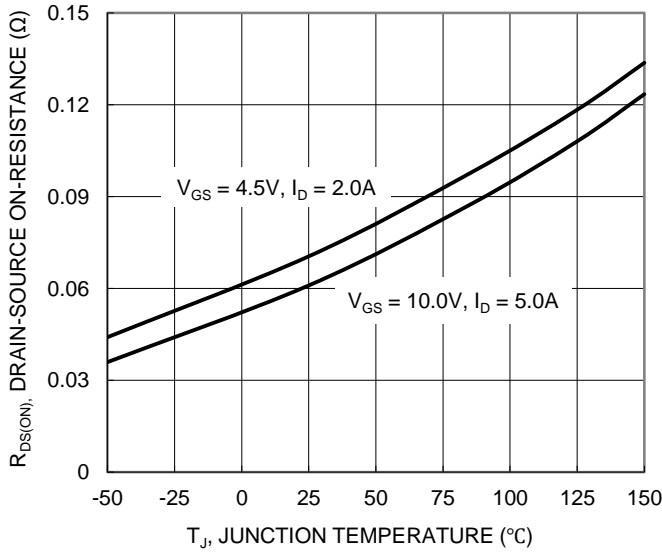


Figure 7. On-Resistance Variation with Temperature

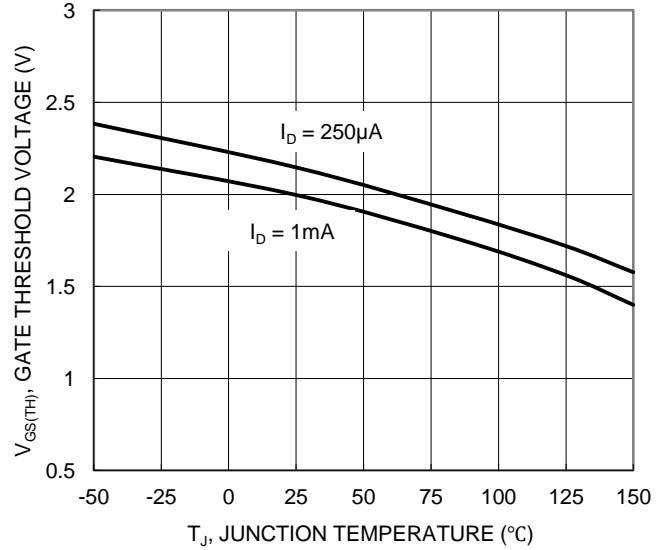


Figure 8. Gate Threshold Variation vs. Junction Temperature

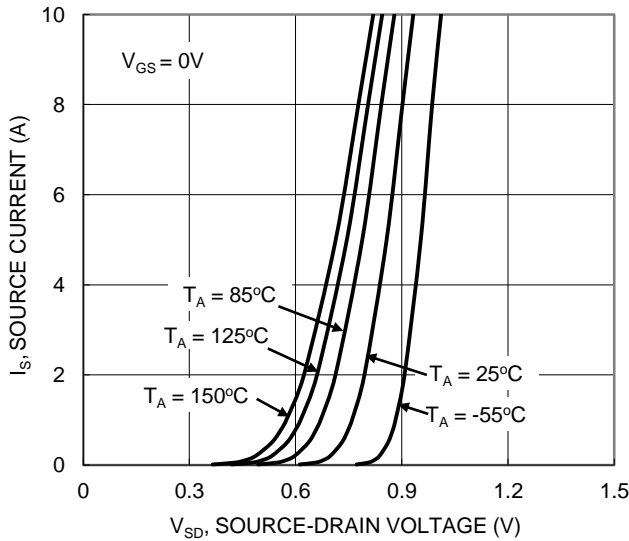


Figure 9. Diode Forward Voltage vs. Current

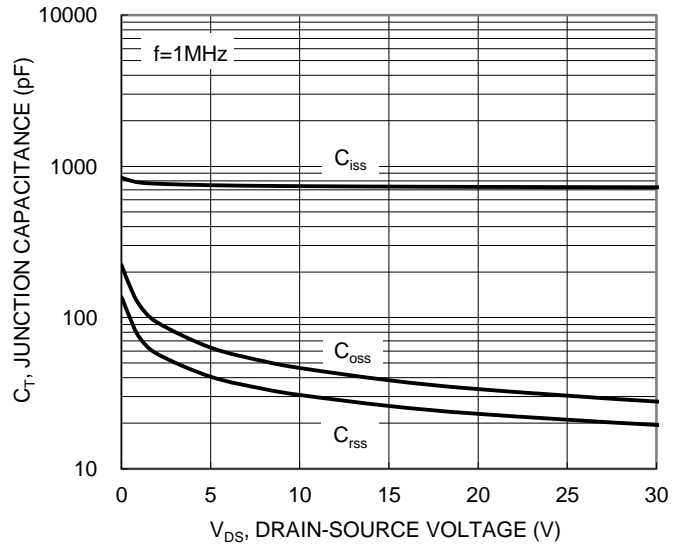


Figure 10. Typical Junction Capacitance

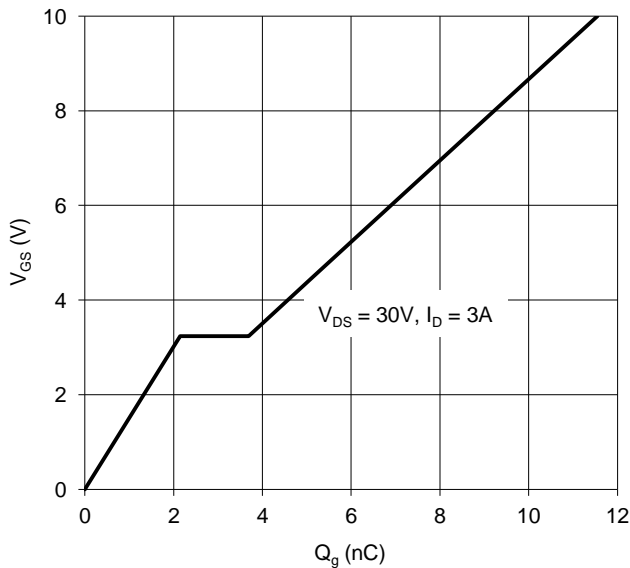


Figure 11. Gate Charge

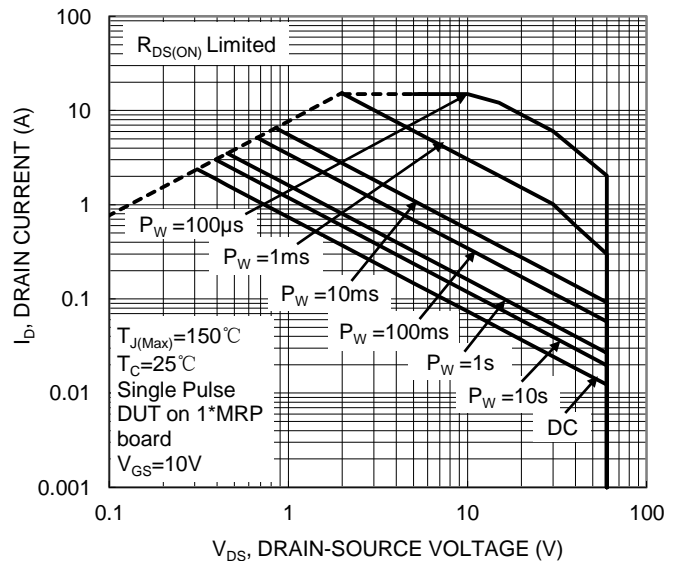


Figure 12. SOA, Safe Operation Area

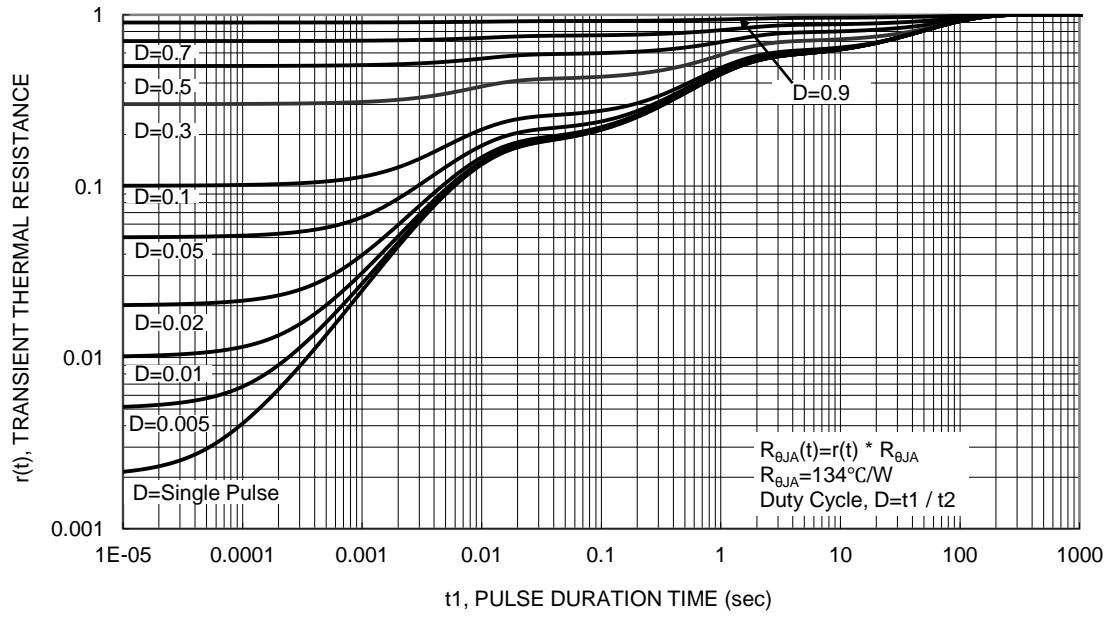


Figure 13. Transient Thermal Resistance

NEW PRODUCT

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 8)</b>						
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	$\mu A$	$V_{DS} = -60V, V_{GS} = 0V$
Gate-Source Leakage	$I_{GSS}$	-	-	$\pm 100$	nA	$V_{GS} = \pm 16V, V_{DS} = 0V$
<b>ON CHARACTERISTICS (Note 8)</b>						
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 $\Omega$	$V_{GS} = -10V, I_D = -1A$
			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	$V_{GS} = 0V, I_S = -2A$
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
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	-	$\Omega$	$V_{DS} = 0V, V_{GS} = 0V, f = 1MHz$
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.

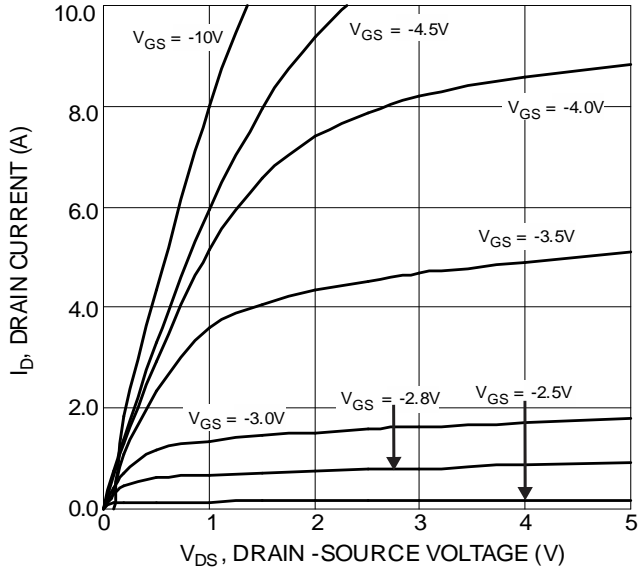


Figure 14 Typical Output Characteristics

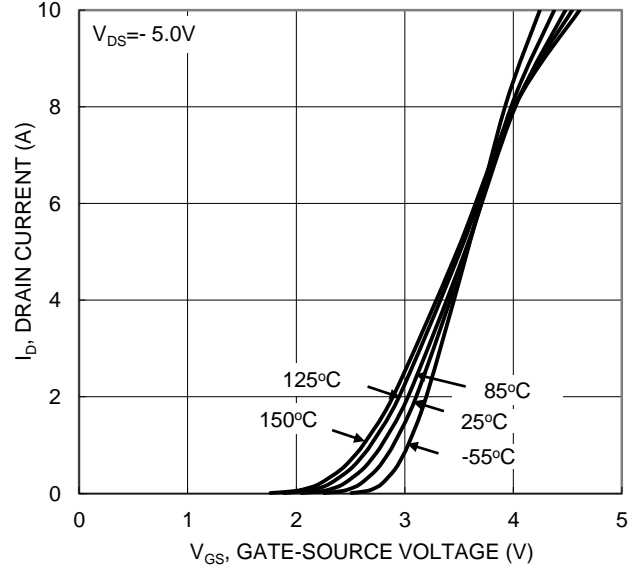


Figure 15. Typical Transfer Characteristic

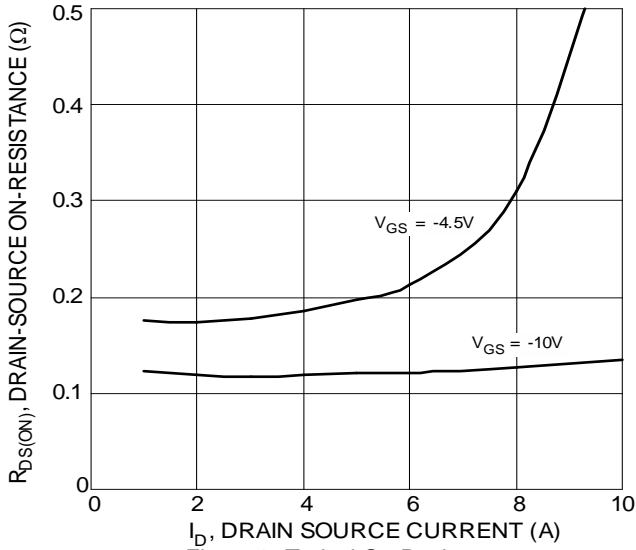


Figure 16 Typical On-Resistance vs. Drain Current and Gate Voltage

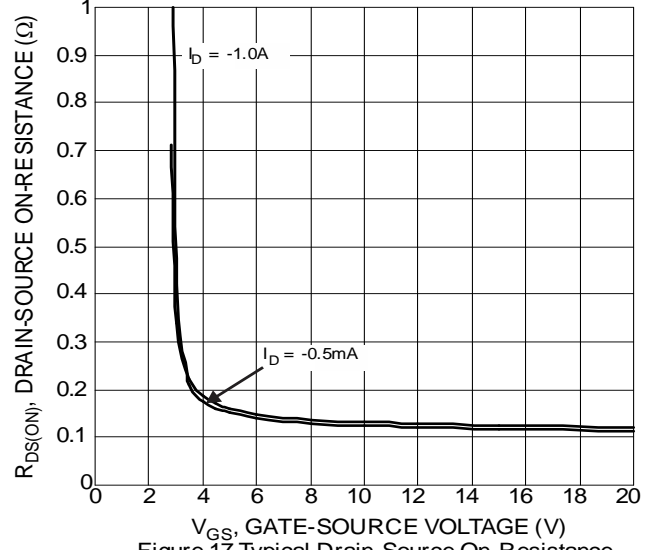


Figure 17 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

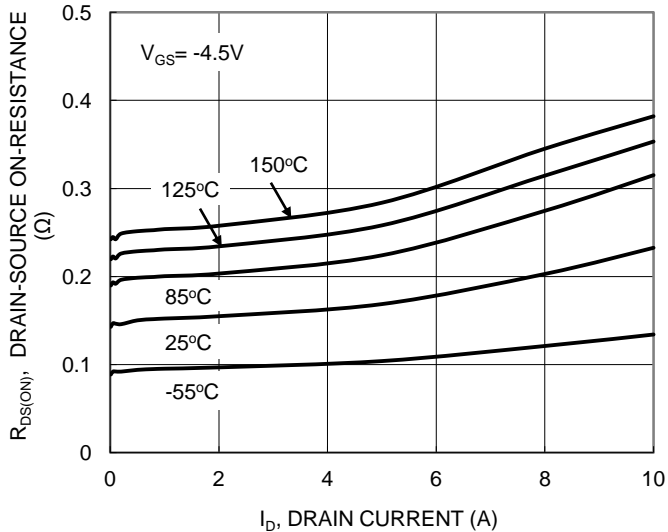


Figure 18. Typical On-Resistance vs. Drain Current and Temperature

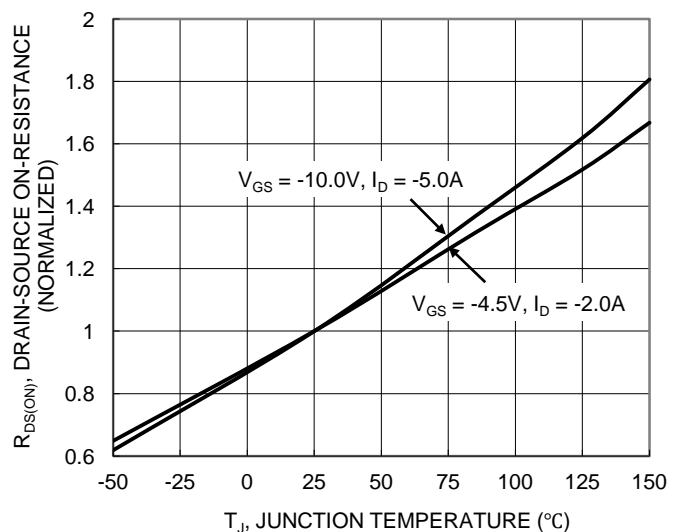
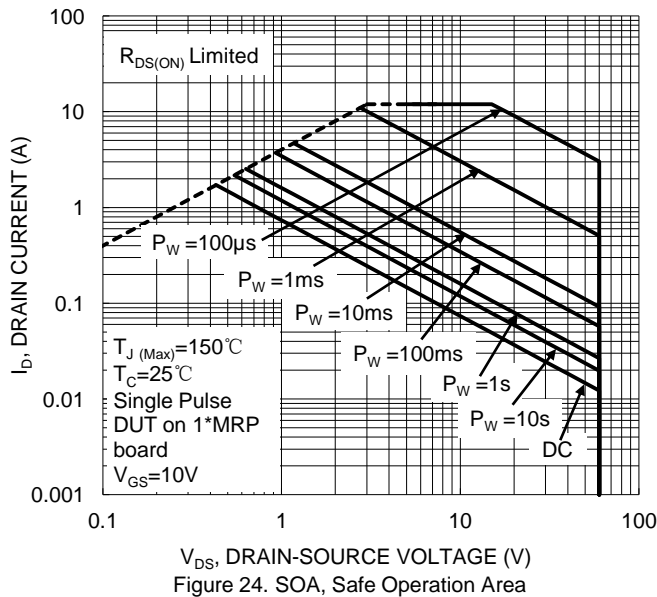
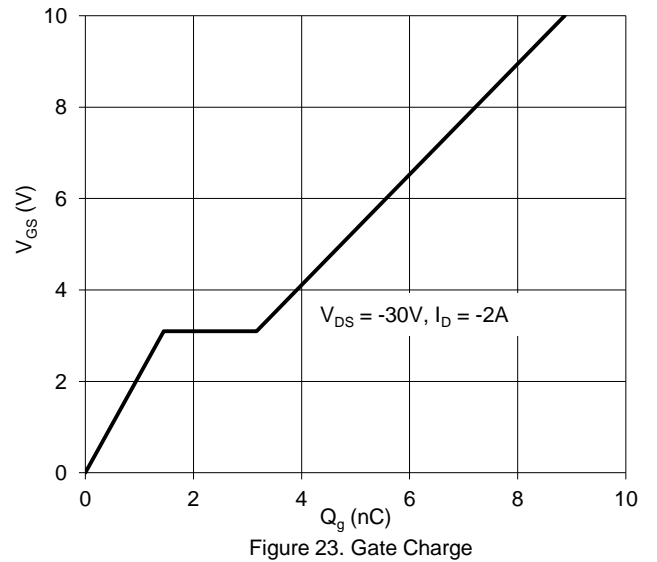
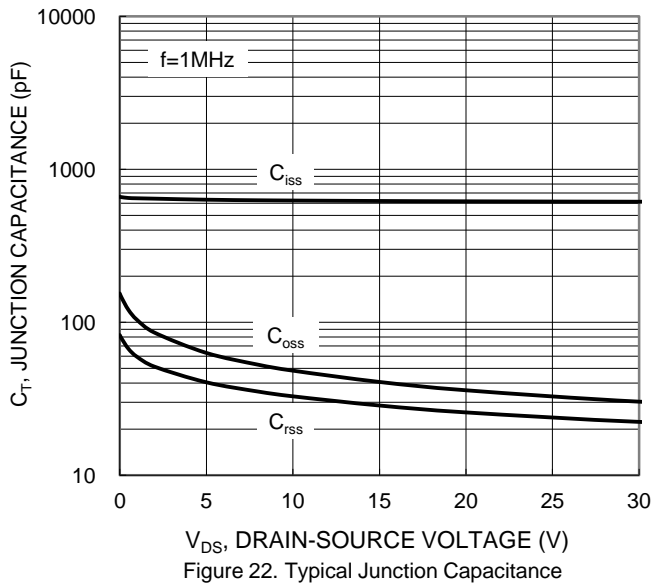
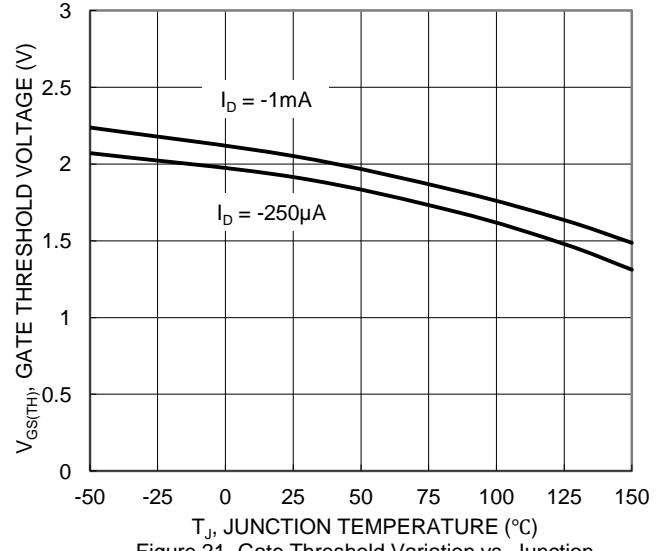
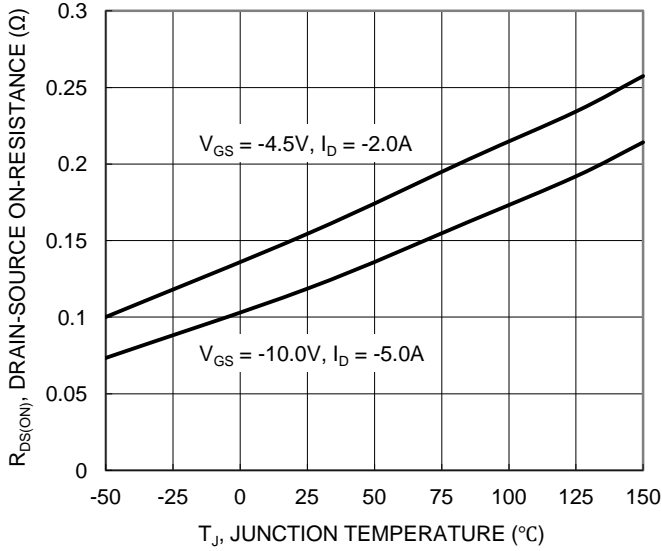


Figure 19. On-Resistance Variation with Temperature





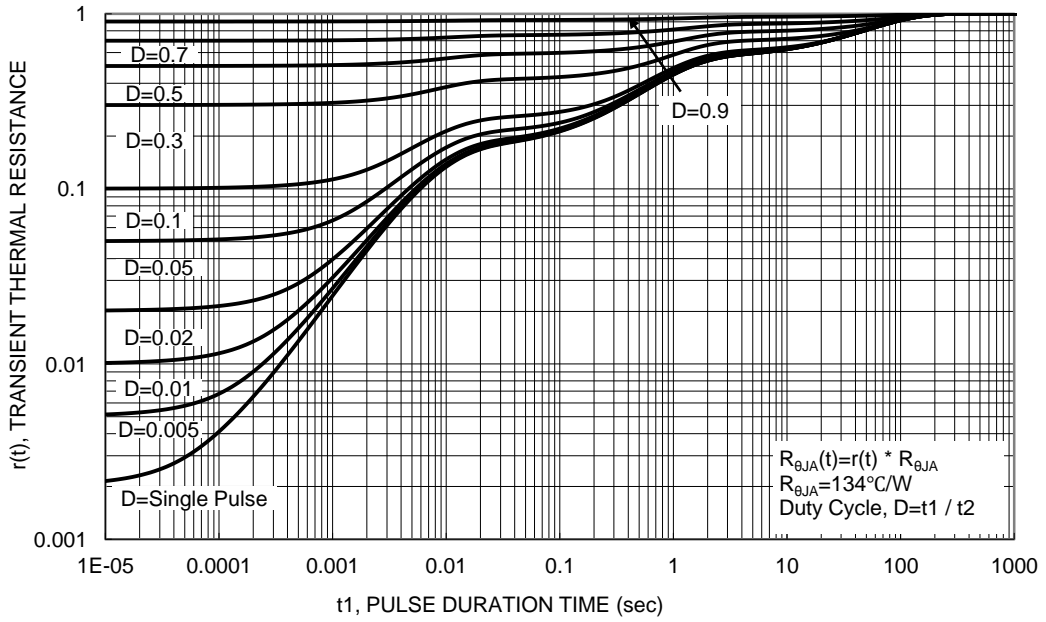


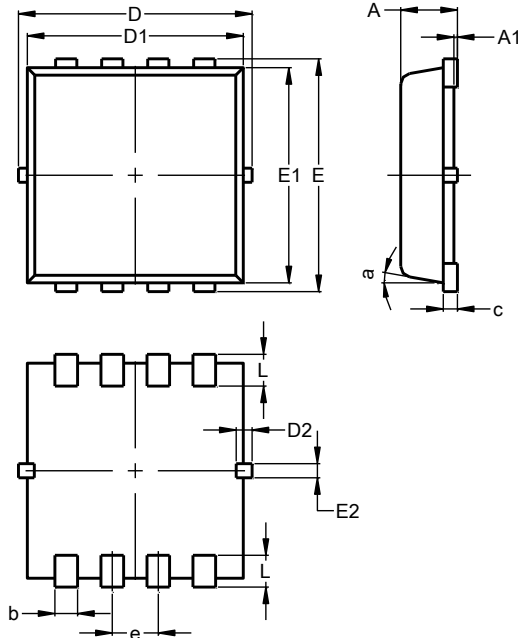
Figure 25. Transient Thermal Resistance

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**Package Outline Dimensions**

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

**POWERDI3333-8  
(Type UXB)**



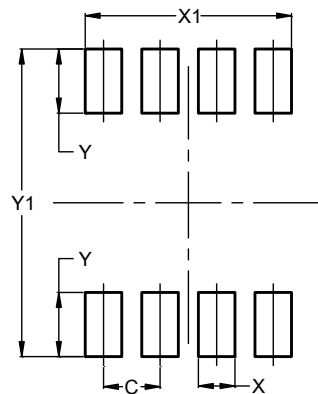
POWERDI3333-8 (Type UXB)			
Dim	Min	Max	Typ
A	0.75	0.85	0.80
A1	0.00	0.05	--
b	0.25	0.40	0.32
c	0.10	0.25	0.15
D	3.20	3.40	3.30
D1	2.95	3.15	3.05
D2	0.10	0.35	0.23
E	3.20	3.40	3.30
E1	2.95	3.15	3.05
E2	0.10	0.30	0.20
e	--	--	0.65
L	0.35	0.55	0.45
a	0°	12°	10°
All Dimensions in mm			

NEW PRODUCT

**Suggested Pad Layout**

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

**POWERDI3333-8  
(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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