

Product Summary

Device	$V_{(BR)DSS}$	$R_{DS(ON)} \text{ max}$	$I_D \text{ max}$ $T_A = +25^\circ\text{C}$
Q1	60V	85mΩ @ $V_{GS} = 10\text{V}$	3.1A
		120mΩ @ $V_{GS} = 4.5\text{V}$	2.7A
Q2	-60V	150mΩ @ $V_{GS} = -10\text{V}$	-2.4A
		250mΩ @ $V_{GS} = -4.5\text{V}$	-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

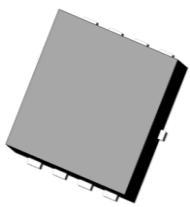
Features

- 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)**

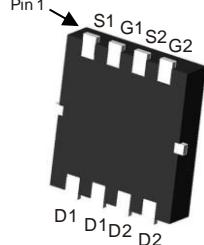
Mechanical Data

- 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 208^(e3)
- Weight: 0.072 grams (Approximate)

POWERDI3333-8

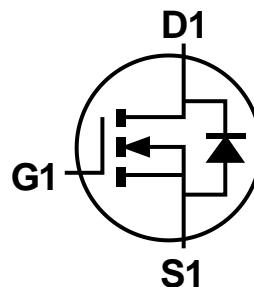


Top View

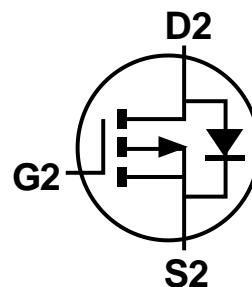


Bottom View

Equivalent Circuit



N-Channel MOSFET



P-Channel MOSFET

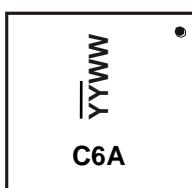
Ordering Information (Note 4)

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

Notes:

- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
- 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.
- 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 <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 (@ $T_A = +25^\circ\text{C}$, 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) $V_{GS} = 10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	3.1 2.5	A
	$t < 10\text{s}$	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	3.9 3.1	A
Maximum Body Diode Forward Current (Note 5)			I_S	2	A
Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%)			I_{DM}	15	A

Maximum Ratings Q2 P-CHANNEL (@ $T_A = +25^\circ\text{C}$, 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) $V_{GS} = -10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	-2.4 -1.9	A
	$t < 10\text{s}$	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	-2.9 -2.3	A
Maximum Body Diode Forward Current (Note 5)			I_S	-2	A
Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%)			I_{DM}	-12	A

Thermal Characteristics (@ $T_A = +25^\circ\text{C}$, 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	$R_{\theta JA}$	91	°C/W
		$t < 10\text{s}$		60	
Thermal Resistance, Junction to Case (Note 5)			$R_{\theta JC}$	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	$\text{V}_{\text{GS}} = 0\text{V}$, $\text{I}_D = 250\mu\text{A}$
Zero Gate Voltage Drain Current $T_J = +25^\circ\text{C}$	I_{DSS}	—	—	1	μA	$\text{V}_{\text{DS}} = 60\text{V}$, $\text{V}_{\text{GS}} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 100	nA	$\text{V}_{\text{GS}} = \pm 16\text{V}$, $\text{V}_{\text{DS}} = 0\text{V}$
ON CHARACTERISTICS (Note 6)						
Gate Threshold Voltage	$\text{V}_{\text{GS(TH)}}$	1	—	3	V	$\text{V}_{\text{DS}} = \text{V}_{\text{GS}}$, $\text{I}_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$\text{R}_{\text{DS(ON)}}$	—	60	85	$\text{m}\Omega$	$\text{V}_{\text{GS}} = 10\text{V}$, $\text{I}_D = 1.5\text{A}$
			72	120		$\text{V}_{\text{GS}} = 4.5\text{V}$, $\text{I}_D = 0.5\text{A}$
Forward Transfer Admittance	$ \text{Y}_{\text{fs} }$	—	3.7	—	S	$\text{V}_{\text{DS}} = 5\text{V}$, $\text{I}_D = 1.5\text{A}$
Diode Forward Voltage	V_{SD}	—	0.7	1.2	V	$\text{V}_{\text{GS}} = 0\text{V}$, $\text{I}_S = 3\text{A}$
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C_{iss}	—	731	—	pF	$\text{V}_{\text{DS}} = 20\text{V}$, $\text{V}_{\text{GS}} = 0\text{V}$, $f = 1\text{MHz}$
Output Capacitance	C_{oss}	—	34	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	23	—	pF	$\text{V}_{\text{DS}} = 0\text{V}$, $\text{V}_{\text{GS}} = 0\text{V}$, $f = 1\text{MHz}$
Gate Resistance	R_{g}	—	1.3	—	Ω	
Total Gate Charge ($\text{V}_{\text{GS}} = 10\text{V}$)	Q_{g}	—	11.5	—	nC	$\text{V}_{\text{DS}} = 30\text{V}$, $\text{I}_D = 3\text{A}$
Total Gate Charge ($\text{V}_{\text{GS}} = 4.5\text{V}$)	Q_{g}	—	5.2	—	nC	
Gate-Source Charge	Q_{gs}	—	2.1	—	nC	$\text{V}_{\text{GS}} = 10\text{V}$, $\text{V}_{\text{DS}} = 30\text{V}$, $\text{R}_G = 50\Omega$, $\text{R}_L = 20\Omega$
Gate-Drain Charge	Q_{gd}	—	1.5	—	nC	
Turn-On Delay Time	$\text{t}_{\text{D(ON)}}$	—	9.6	—	ns	$\text{V}_{\text{GS}} = 10\text{V}$, $\text{V}_{\text{DS}} = 30\text{V}$, $\text{R}_G = 50\Omega$, $\text{R}_L = 20\Omega$
Turn-On Rise Time	t_{R}	—	11	—	ns	
Turn-Off Delay Time	$\text{t}_{\text{D(OFF)}}$	—	61	—	ns	$\text{V}_{\text{GS}} = 10\text{V}$, $\text{V}_{\text{DS}} = 30\text{V}$, $\text{R}_G = 50\Omega$, $\text{R}_L = 20\Omega$
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.

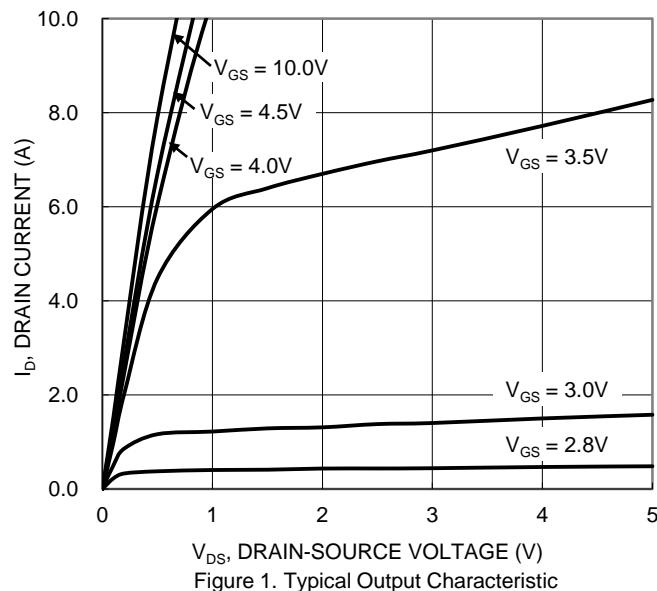


Figure 1. Typical Output Characteristic

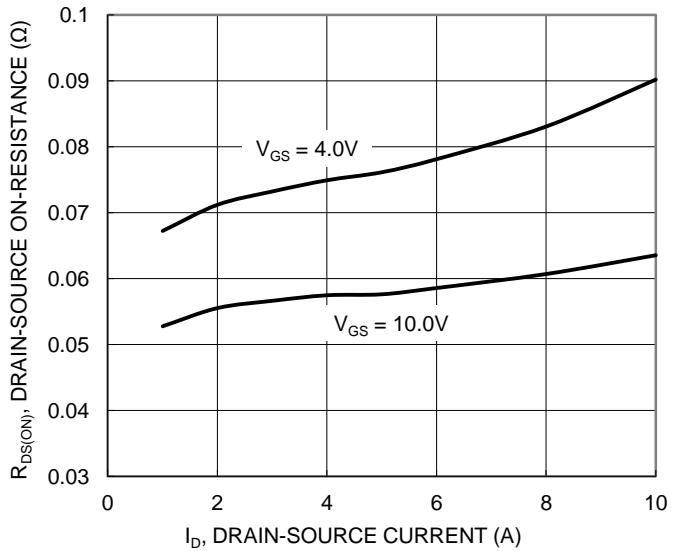


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

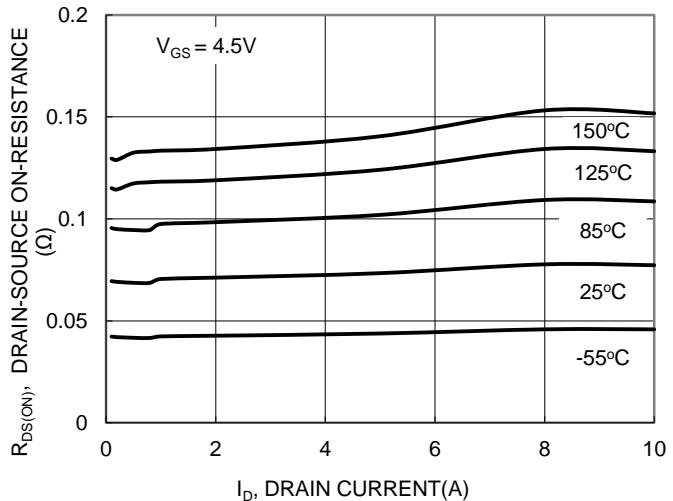


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

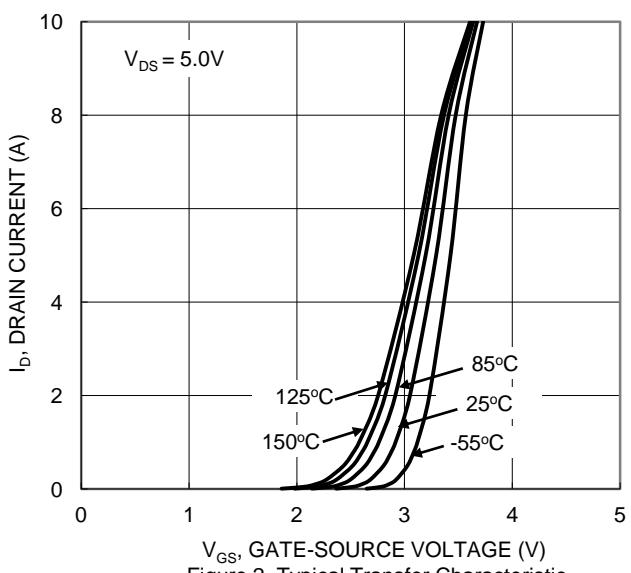


Figure 2. Typical Transfer Characteristic

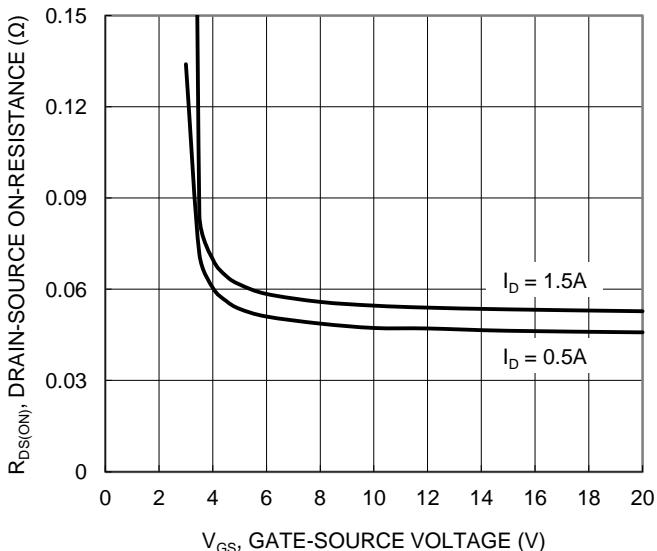


Figure 4. Typical Transfer Characteristic

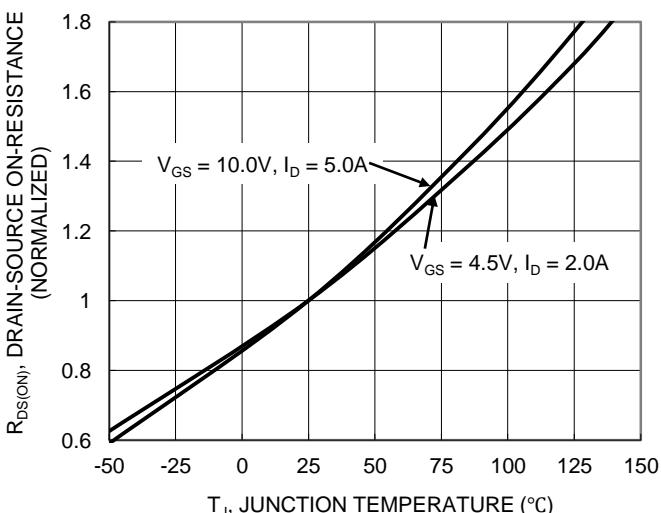
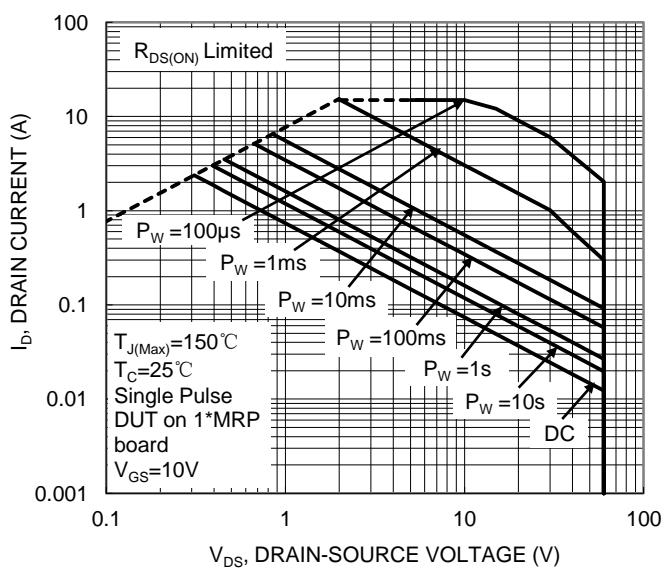
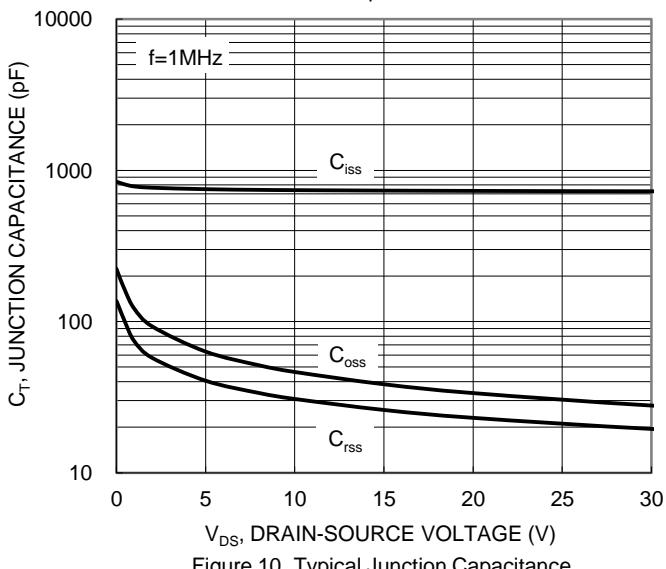
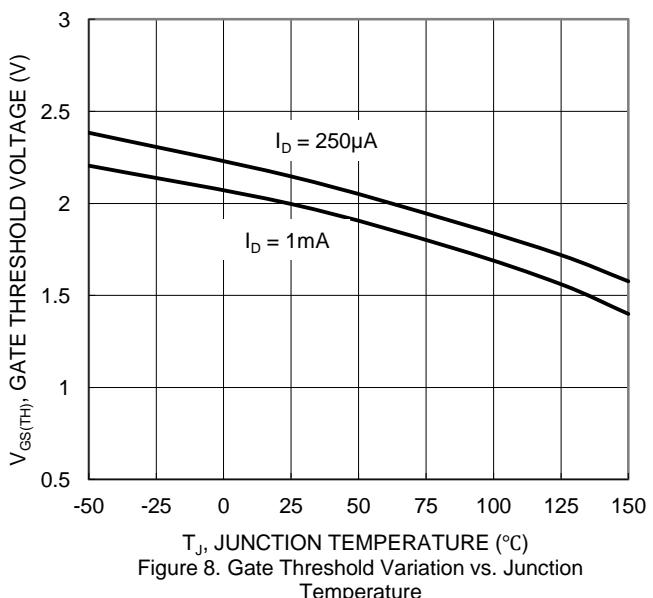
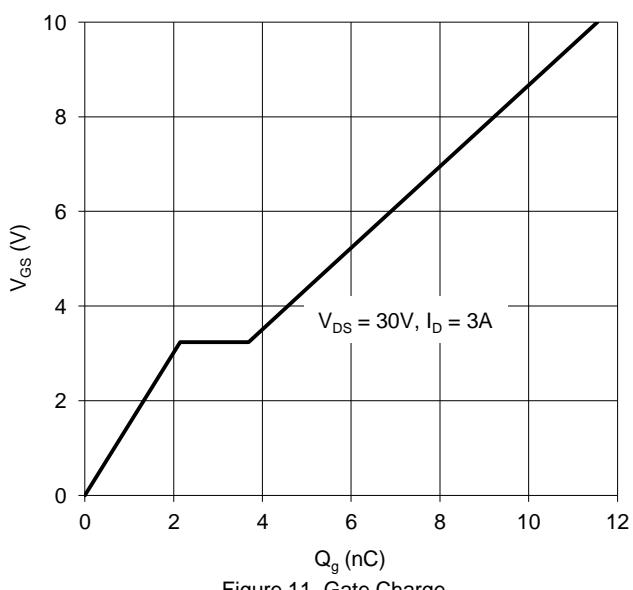
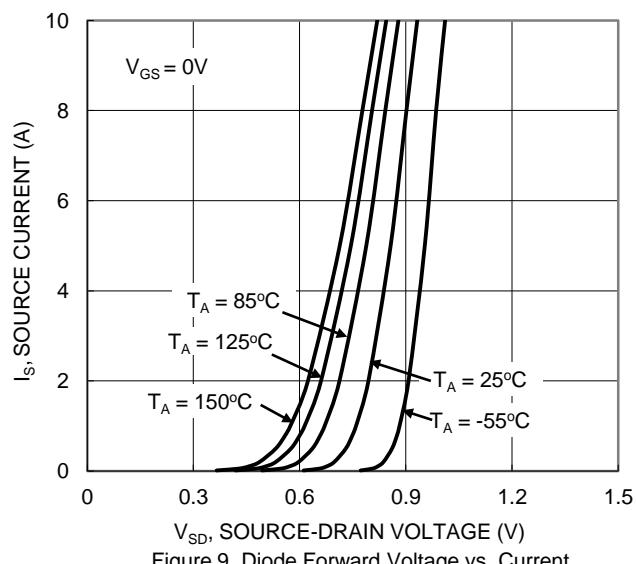
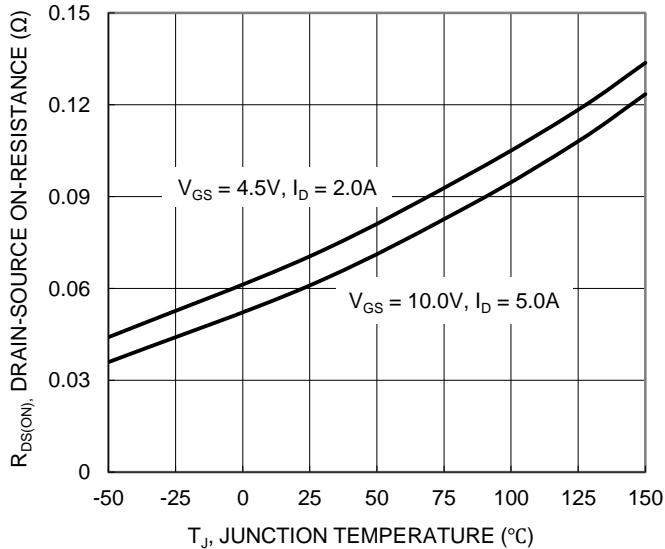


Figure 6. On-Resistance Variation with Temperature



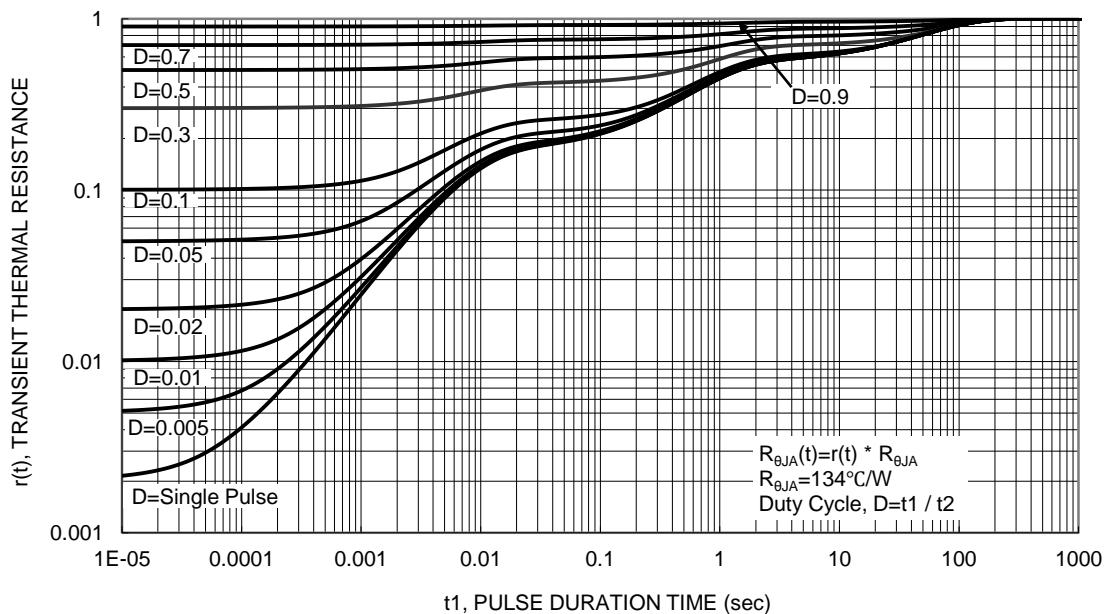


Figure 13. Transient Thermal Resistance

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	$\text{V}_{\text{GS}} = 0\text{V}$, $\text{I}_D = -250\mu\text{A}$
Zero Gate Voltage Drain Current $T_J = +25^\circ\text{C}$	I_{DSS}	—	—	-1	μA	$\text{V}_{\text{DS}} = -60\text{V}$, $\text{V}_{\text{GS}} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 100	nA	$\text{V}_{\text{GS}} = \pm 16\text{V}$, $\text{V}_{\text{DS}} = 0\text{V}$
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$\text{V}_{\text{GS(TH)}}$	-1	—	-3	V	$\text{V}_{\text{DS}} = \text{V}_{\text{GS}}$, $\text{I}_D = -250\mu\text{A}$
Static Drain-Source On-Resistance	$\text{R}_{\text{DS(ON)}}$	—	115	150	$\text{m}\Omega$	$\text{V}_{\text{GS}} = -10\text{V}$, $\text{I}_D = -1\text{A}$
			170	250		$\text{V}_{\text{GS}} = -4.5\text{V}$, $\text{I}_D = -0.5\text{A}$
Forward Transfer Admittance	$ \text{Y}_{\text{fs}} $	—	2.8	—	S	$\text{V}_{\text{DS}} = -5\text{V}$, $\text{I}_D = -1\text{A}$
Diode Forward Voltage	V_{SD}	—	-0.7	-1.2	V	$\text{V}_{\text{GS}} = 0\text{V}$, $\text{I}_S = -2\text{A}$
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	612	—	pF	$\text{V}_{\text{DS}} = -20\text{V}$, $\text{V}_{\text{GS}} = 0\text{V}$, $f = 1\text{MHz}$
Output Capacitance	C_{oss}	—	36	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	26	—	pF	
Gate Resistance	R_g	—	13	—	Ω	
Total Gate Charge ($\text{V}_{\text{GS}} = -10\text{V}$)	Q_g	—	8.9	—	nC	$\text{V}_{\text{DS}} = -30\text{V}$, $\text{I}_D = -2\text{A}$
Total Gate Charge ($\text{V}_{\text{GS}} = -4.5\text{V}$)	Q_g	—	4.3	—	nC	
Gate-Source Charge	Q_{gs}	—	1.4	—	nC	
Gate-Drain Charge	Q_{gd}	—	1.7	—	nC	
Turn-On Delay Time	$\text{t}_{\text{D(ON)}}$	—	7.6	—	ns	$\text{V}_{\text{GS}} = -10\text{V}$, $\text{V}_{\text{DS}} = -30\text{V}$, $\text{R}_G = 50\Omega$, $\text{I}_D = -1\text{A}$
Turn-On Rise Time	t_R	—	11.6	—	ns	
Turn-Off Delay Time	$\text{t}_{\text{D(OFF)}}$	—	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.

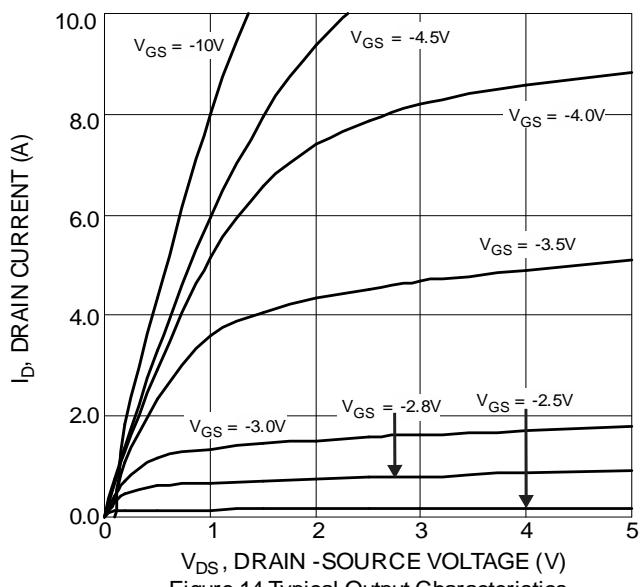


Figure 14. Typical Output Characteristics

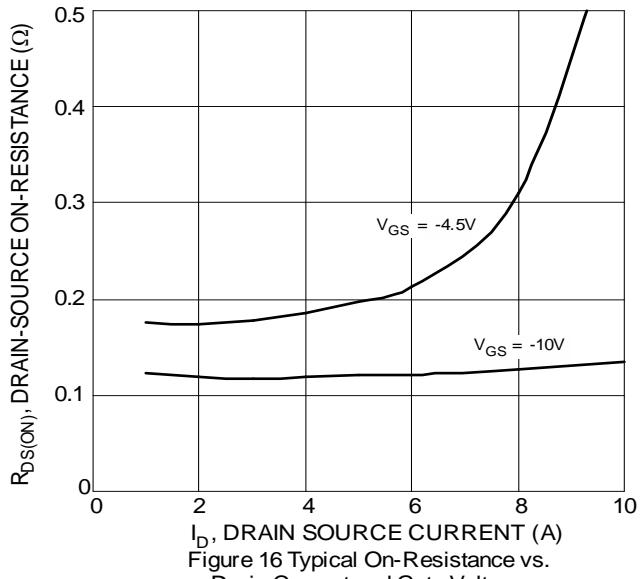


Figure 16. Typical On-Resistance vs.
Drain Current and Gate Voltage

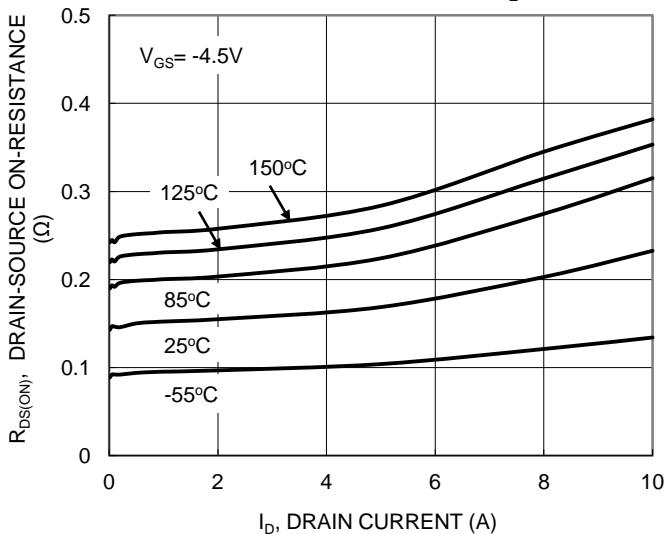


Figure 18. Typical On-Resistance vs. Drain Current and
Temperature

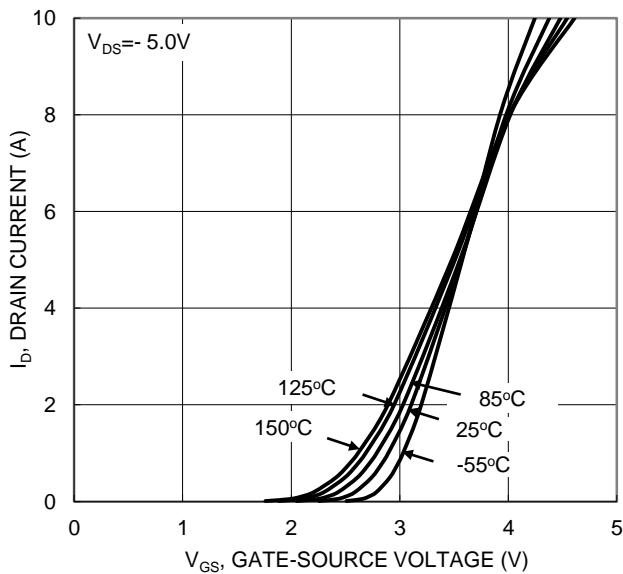


Figure 15. Typical Transfer Characteristic

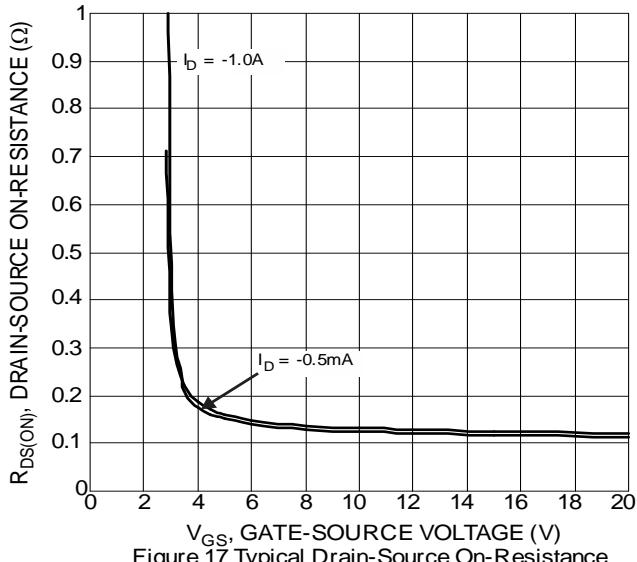


Figure 17. Typical Drain-Source On-Resistance
vs. Gate-Source Voltage

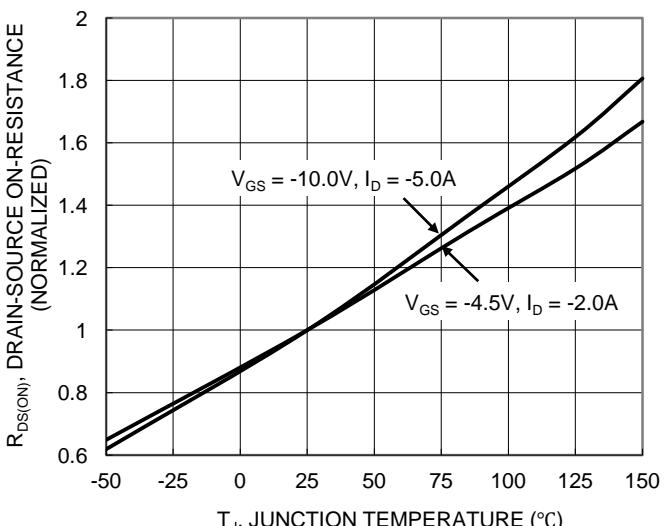
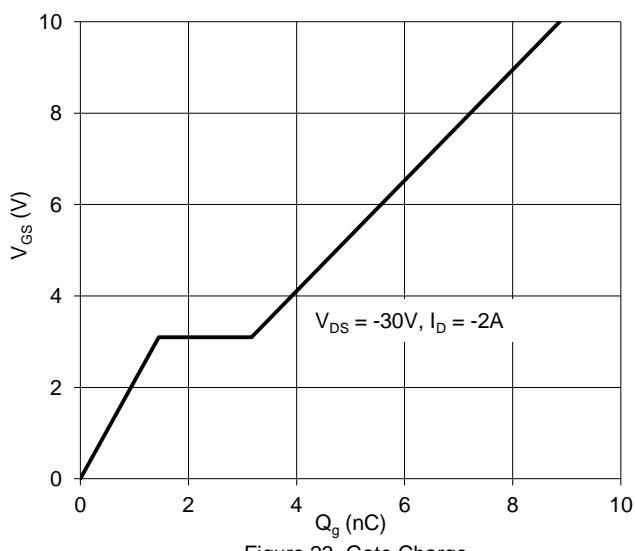
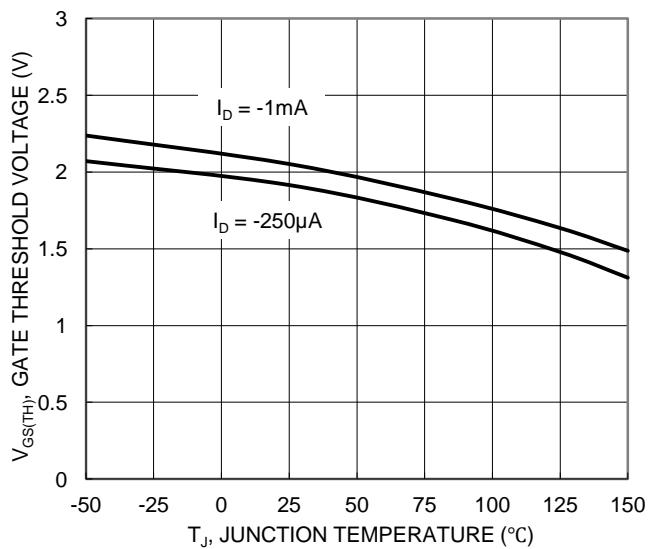
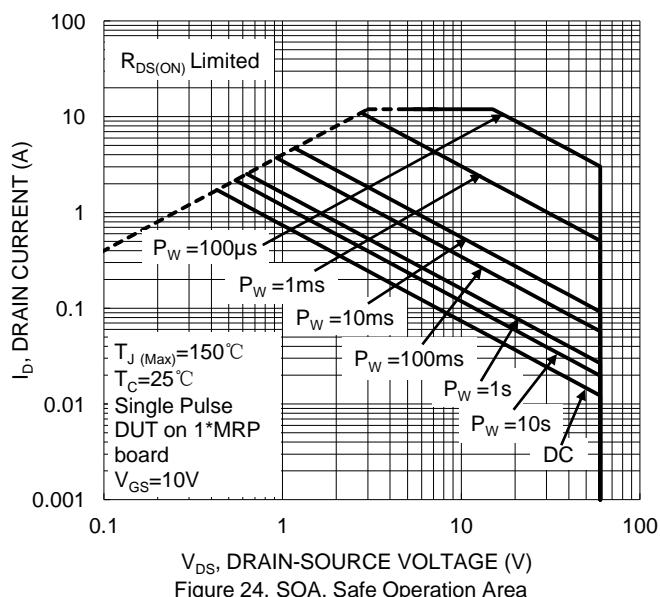
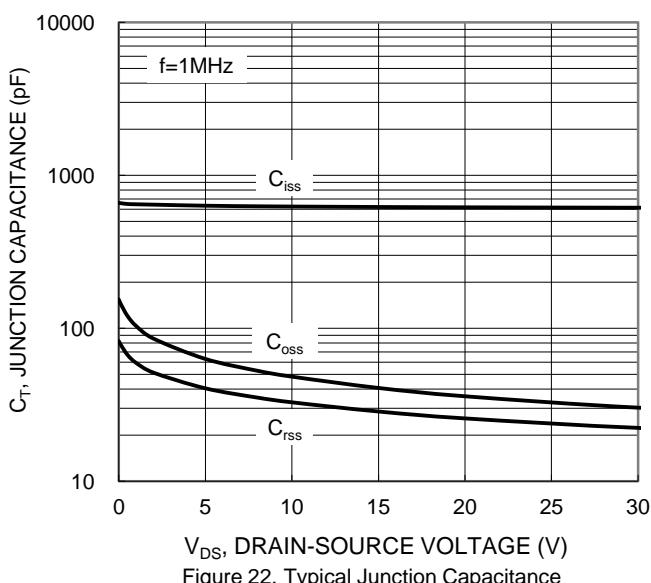
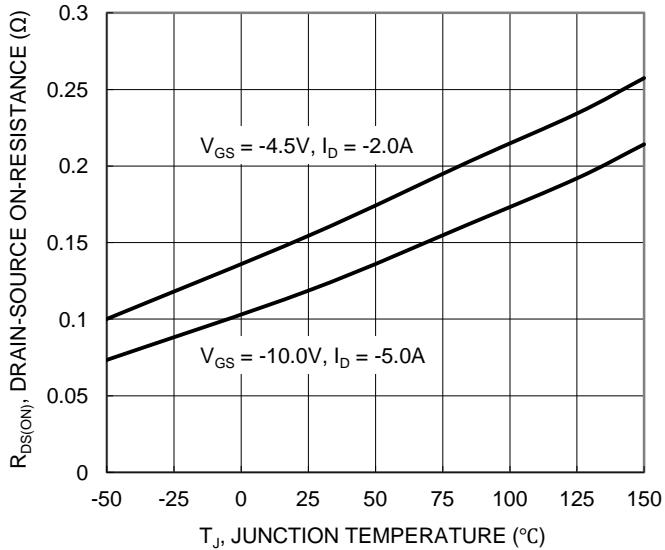


Figure 19. On-Resistance Variation with Temperature



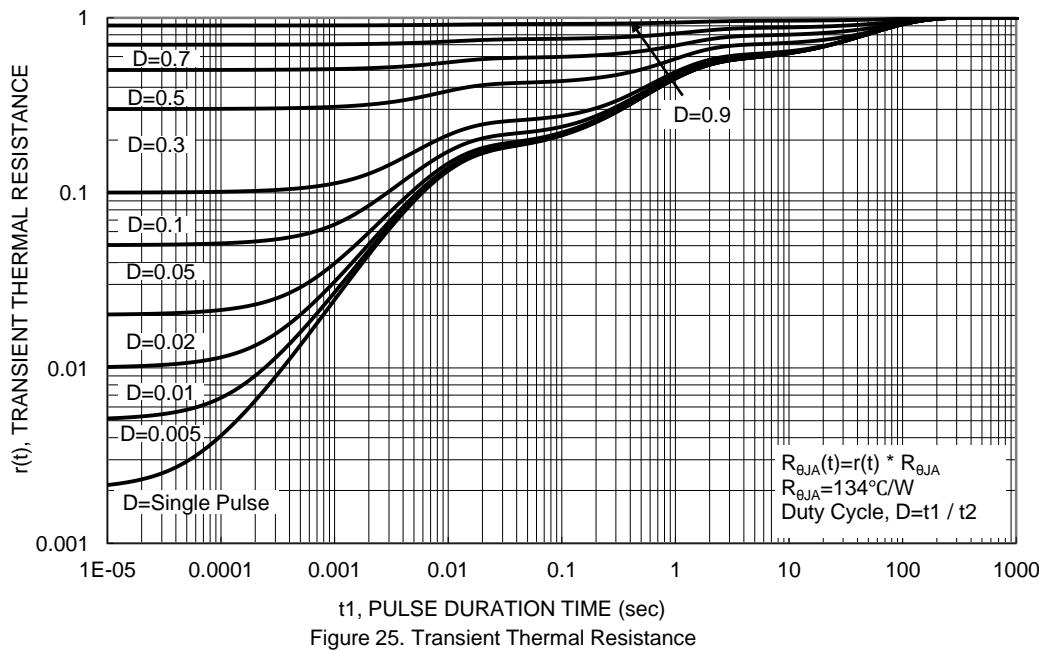
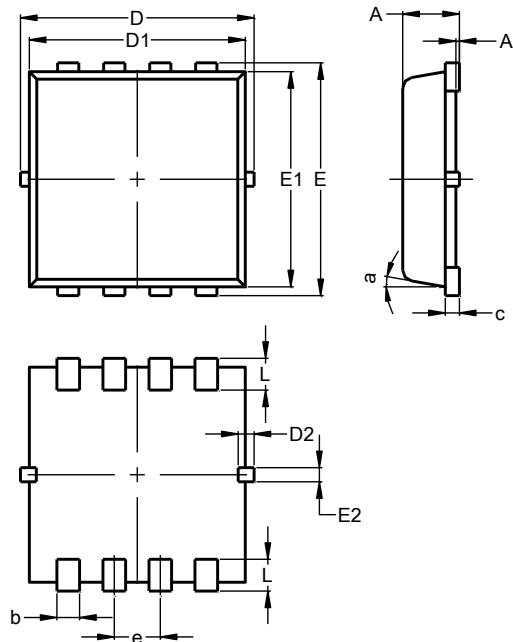


Figure 25. Transient Thermal Resistance

Package Outline Dimensions

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

POWERDI3333-8
(Type UXB)



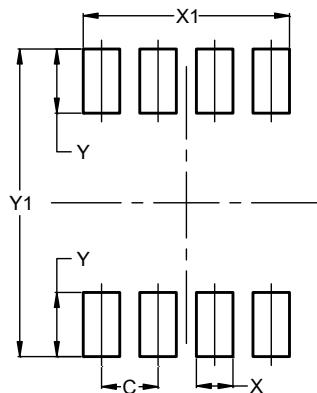
POWERDI3333-8 (Type UXB)			
Dim	Min	Max	Typ
A	0.75	0.85	0.80
A1	0.00	0.05	--
b	0.25	0.40	0.32
c	0.10	0.25	0.15
D	3.20	3.40	3.30
D1	2.95	3.15	3.05
D2	0.10	0.35	0.23
E	3.20	3.40	3.30
E1	2.95	3.15	3.05
E2	0.10	0.30	0.20
e	—	—	0.65
L	0.35	0.55	0.45
a	0°	12°	10°

All Dimensions in mm

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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