

COMPLEMENTARY PAIR ENHANCEMENT MODE MOSFET
PowerDI

Product Summary

Device	$V_{(BR)DSS}$	$R_{DS(ON)}$ Max	I_D Max $T_C = +25^\circ C$
Q1	30V	12m Ω @ $V_{GS} = 10V$	21A
		17m Ω @ $V_{GS} = 4.5V$	18A
Q2	-30V	25m Ω @ $V_{GS} = -10V$	-15A
		38m Ω @ $V_{GS} = -4.5V$	-12A

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

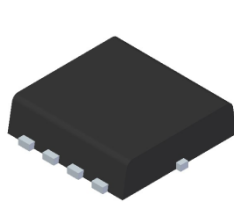
- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Complementary Pair MOSFET
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)**

Mechanical Data

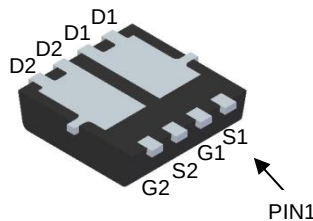
- Case: PowerDI3333-8 (Type UXC)
- Case Material: Molded Plastic, "Green" Molding Compound.
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See Diagram
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.072 grams (Approximate)

PowerDI3333-8 (Type UXC)

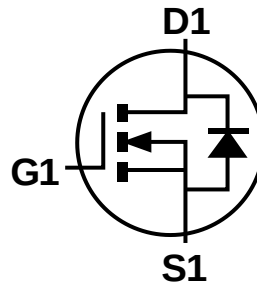
Equivalent Circuit



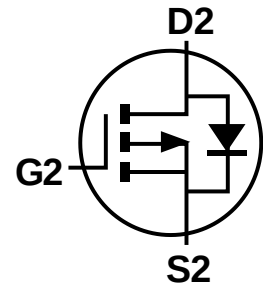
Top View



Bottom View



N-Channel MOSFET



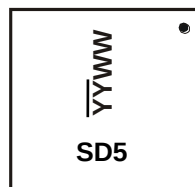
P-Channel MOSFET

Ordering Information (Note 4)

Part Number	Case	Packaging
DMC3016LDV-7	PowerDI3333-8 (Type UXC)	2,000/Tape & Reel
DMC3016LDV-13	PowerDI3333-8 (Type UXC)	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



SD5 = Product Type Marking Code
YYWW = Date Code Marking
YY = Last Digit of Year (ex: 16 for 2016)
WW = Week Code (01 ~ 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}	±20	V
Continuous Drain Current, V _{GS} = 10V (Note 7)	Steady State	T _C = +25°C	I _D	21	A
		T _C = +70°C		17	
Maximum Body Diode Forward Current (Note 6)			I _S	2	A
Pulsed Drain Current (380μs pulse, Duty cycle = 1%)			I _{DM}	70	A
Avalanche Current (L = 0.1mH) (Note 8)			I _{AS}	22	A
Avalanche Energy (L = 0.1mH) (Note 8)			E _{AS}	24	mJ

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

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V _{DSS}	-30	V
Gate-Source Voltage			V _{GSS}	±20	V
Continuous Drain Current, V _{GS} = -10V (Note 7)	Steady State	T _C = +25°C	I _D	-15	A
		T _C = +70°C		-12	
Maximum Body Diode Forward Current (Note 6)			I _S	-2	A
Pulsed Drain Current (380µs Pulse, Duty Cycle = 1%)			I _{DM}	-40	A
Avalanche Current (L = 0.1mH) (Note 8)			I _{AS}	-22	A
Avalanche Energy (L = 0.1mH) (Note 8)			E _{AS}	24	mJ

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)		P _D	0.9	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R _{θJA}	136	°C/W
	t < 10s		78	
Total Power Dissipation (Note 6)		P _D	1.8	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	R _{θJA}	70	°C/W
	t < 10s		41	
Thermal Resistance, Junction to Case (Note 7)		R _{θJC}	15	
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +150	°C

- Notes:
5. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
 6. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1-inch square copper plate.
 7. Thermal resistance from junction to soldering point (on the exposed drain pad).
 8. I_{AS} and E_{AS} rating 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.)

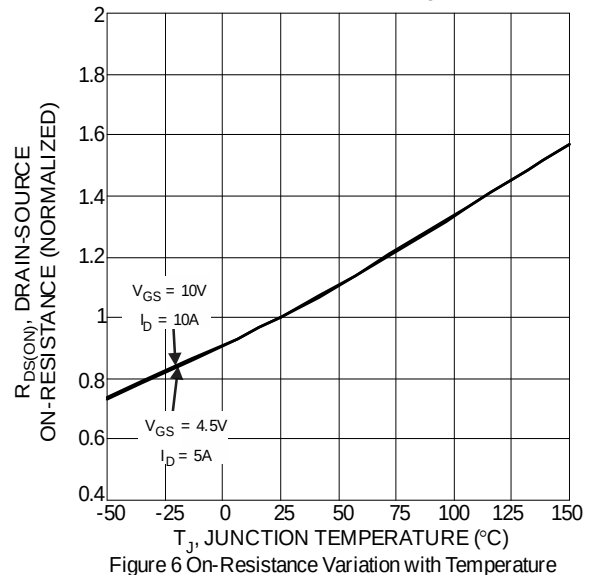
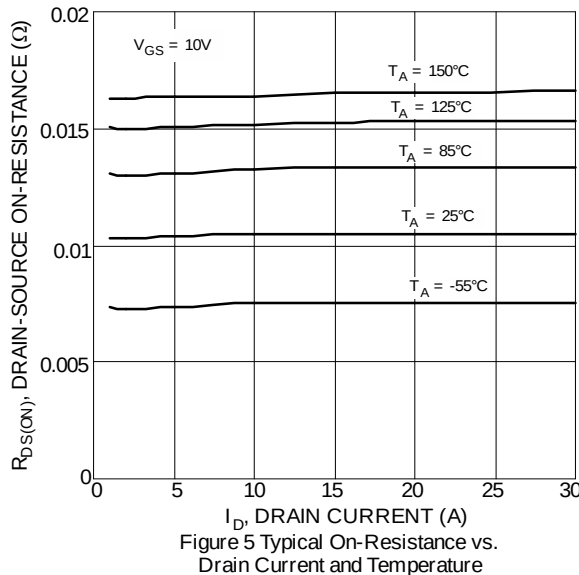
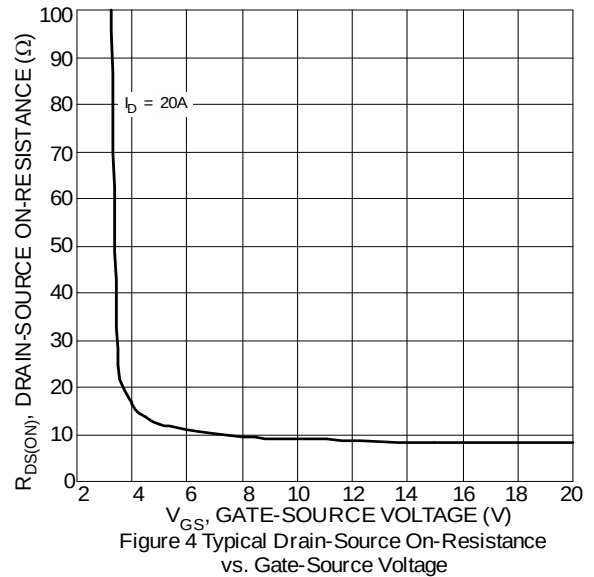
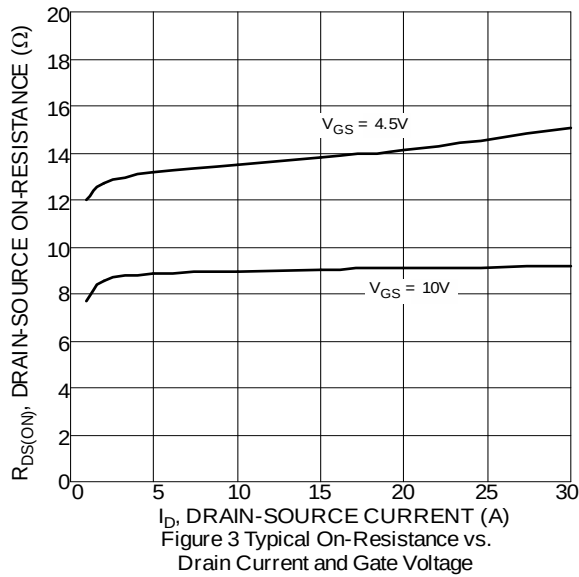
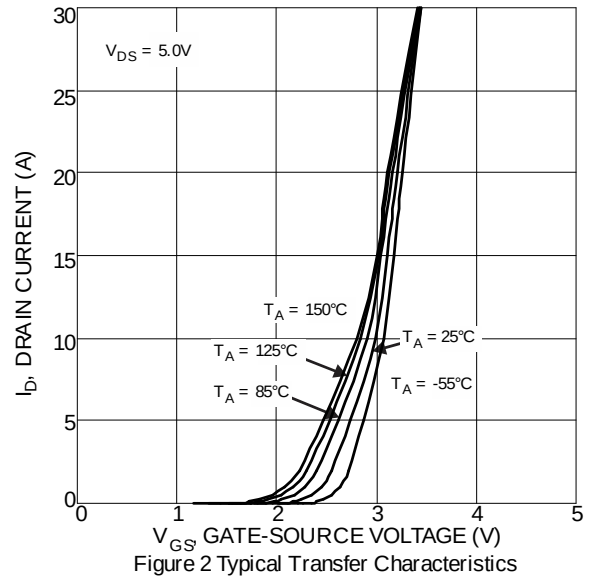
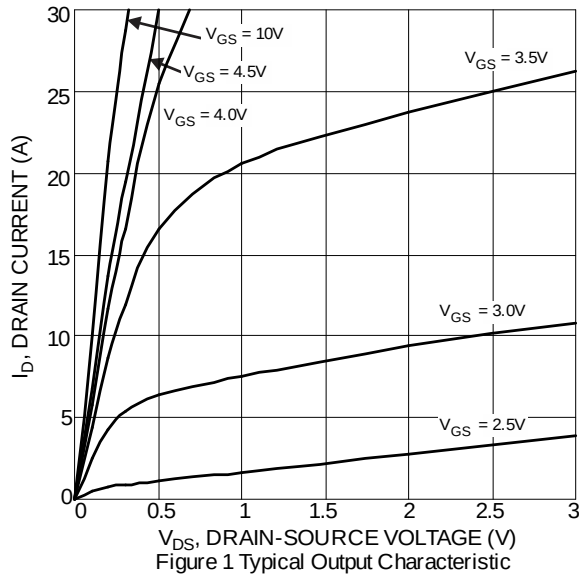
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 9)						
Drain-Source Breakdown Voltage	BV _{DSS}	30	—	—	V	V _{GS} = 0V, I _D = 250μA
Zero Gate Voltage Drain Current T _J = +25°C	I _{DSS}	—	—	1	μA	V _{DS} = 30V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±20V, V _{DS} = 0V
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	V _{GS(TH)}	1.4	—	2.0	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	9.5	12	mΩ	V _{GS} = 10V, I _D = 7A
			14	17		V _{GS} = 4.5V, I _D = 7A
Diode Forward Voltage	V _{SD}	—	0.70	1.0	V	V _{GS} = 0V, I _S = 1A
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C _{ISS}	—	1,184	—	pF	V _{DS} = 15V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{OSS}	—	137	—		
Reverse Transfer Capacitance	C _{RSS}	—	107	—		
Gate Resistance	R _G	—	3.0	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1.0MHz
Total Gate Charge (V _{GS} = 4.5V)	Q _G	—	9.5	—	nC	V _{DS} = 15V, I _D = 12A
Total Gate Charge (V _{GS} = 10V)	Q _G	—	21	—		
Gate-Source Charge	Q _{GS}	—	3.8	—		
Gate-Drain Charge	Q _{GD}	—	4.1	—		
Turn-On Delay Time	t _{D(ON)}	—	4.5	—	ns	V _{DD} = 15V, V _{GS} = 10V, R _L = 1.5Ω, R _G = 3Ω
Turn-On Rise Time	t _R	—	3.3	—		
Turn-Off Delay Time	t _{D(OFF)}	—	14	—		
Turn-Off Fall Time	t _F	—	3.6	—		
Reverse Recovery Time	t _{RR}	—	9.3	—	ns	I _F = 12A, di/dt = 500A/μs
Reverse Recovery Charge	Q _{RR}	—	2.5	—	nC	

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

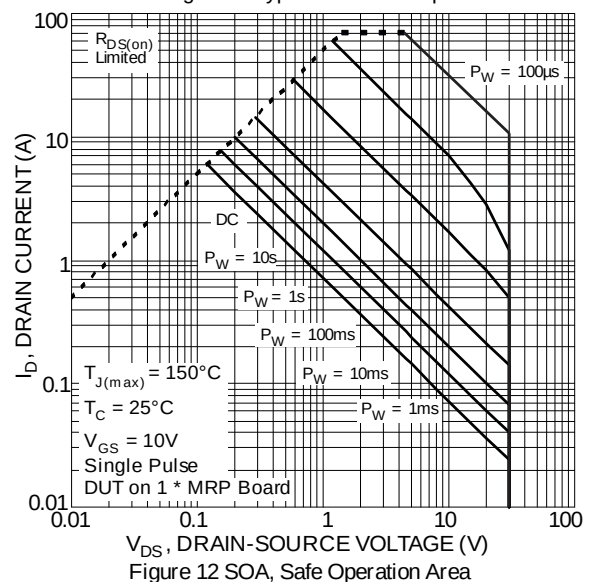
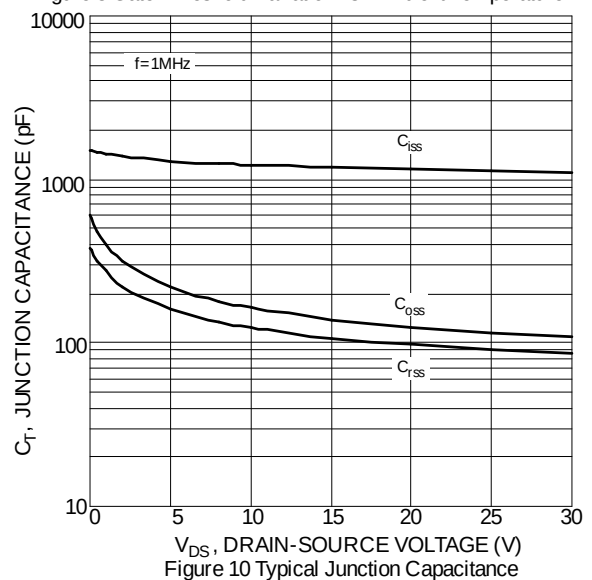
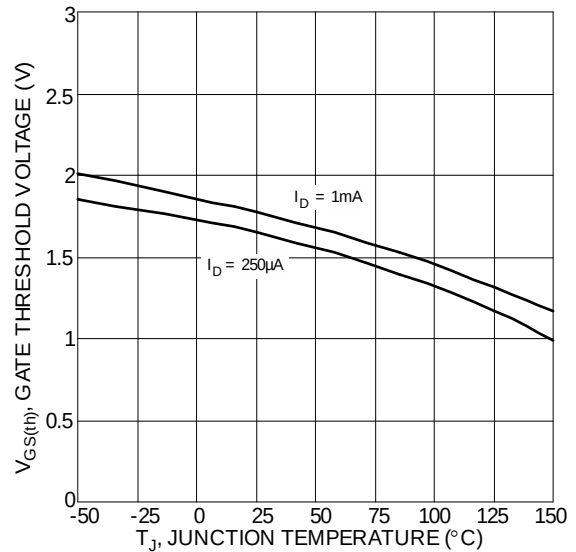
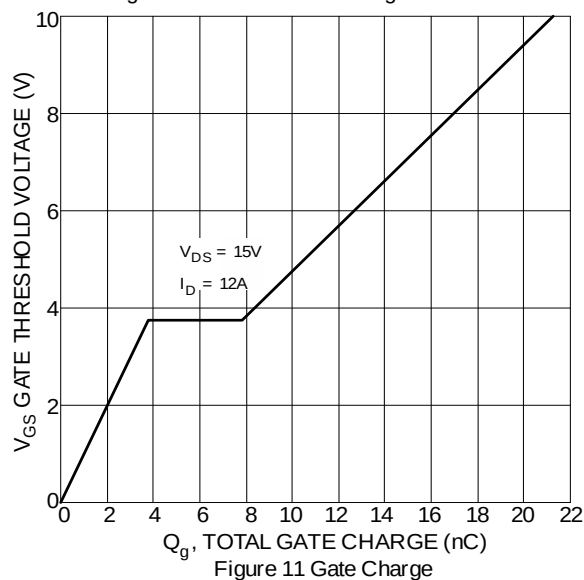
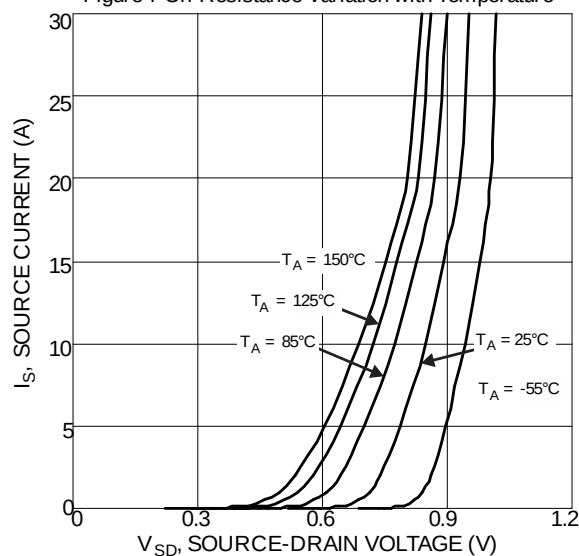
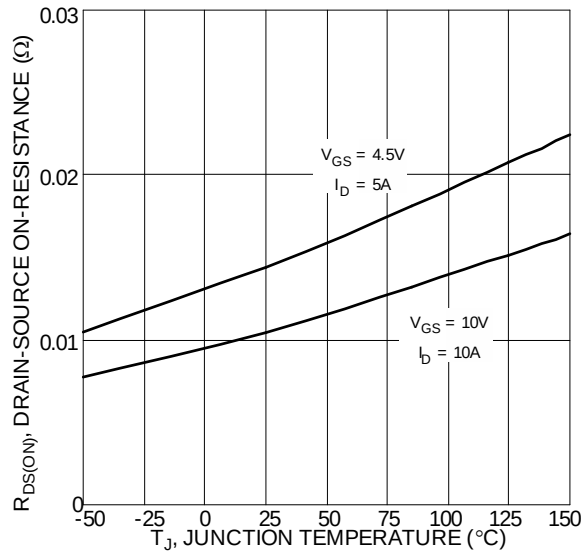
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 9)						
Drain-Source Breakdown Voltage	BV _{DSS}	-30	—	—	V	V _{GS} = 0V, I _D = -250μA
Zero Gate Voltage Drain Current T _J = +25°C	I _{DSS}	—	—	-1	μA	V _{DS} = -30V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±20V, V _{DS} = 0V
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	V _{GS(TH)}	-1.2	—	-2.4	V	V _{DS} = V _{GS} , I _D = -250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	21	25	mΩ	V _{GS} = -10V, I _D = -7A
			31	38		V _{GS} = -4.5V, I _D = -6.2A
Diode Forward Voltage	V _{SD}	—	-0.7	-1.2	V	V _{GS} = 0V, I _S = -2.1A
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C _{ISS}	—	1,188	—	pF	V _{DS} = -15V, V _{GS} = 0V, f = 1MHz
Output Capacitance	C _{OSS}	—	154	—		
Reverse Transfer Capacitance	C _{RSS}	—	116	—		
Gate Resistance	R _G	—	9	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = -4.5V)	Q _G	—	9.5	—	nC	V _{DS} = -15V, I _D = -7A
Total Gate Charge (V _{GS} = -10V)	Q _G	—	19.7	—		
Gate-Source Charge	Q _{GS}	—	3.1	—		
Gate-Drain Charge	Q _{GD}	—	3.2	—		
Turn-On Delay Time	t _{D(ON)}	—	3.7	—	ns	V _{GS} = -10V, V _{DS} = -15V, R _G = 6Ω, I _D = -7A
Turn-On Rise Time	t _R	—	2.6	—		
Turn-Off Delay Time	t _{D(OFF)}	—	36	—		
Turn-Off Fall Time	t _F	—	22	—		
Reverse Recovery Time	t _{RR}	—	10.4	—	ns	I _F = -7A, di/dt = 100A/μs
Reverse Recovery Charge	Q _{RR}	—	3.2	—	nC	

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

Q1 – N-Channel



Q1 – N-Channel (Continued)



Q2 – P-Channel

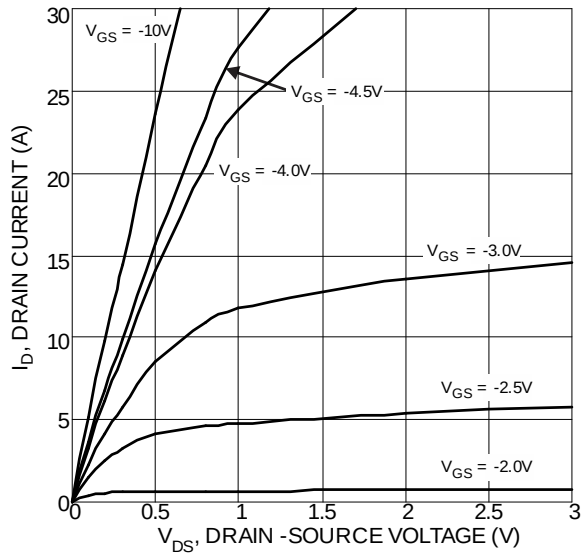


Figure 13 Typical Output Characteristics

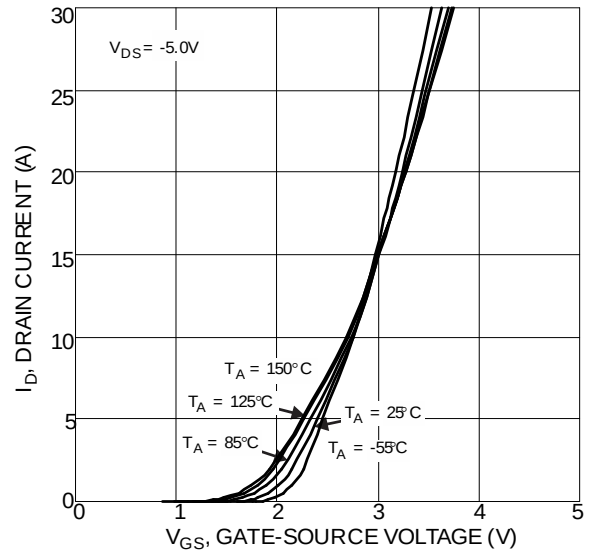


Figure 14 Typical Transfer Characteristics

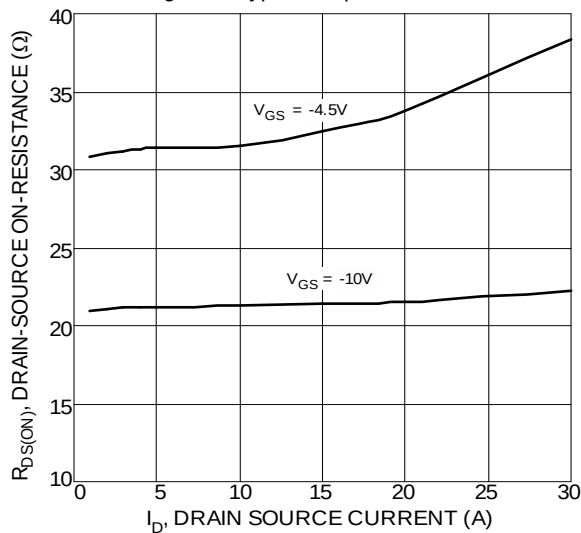


Figure 15 Typical On-Resistance vs. Drain Current and Gate Voltage

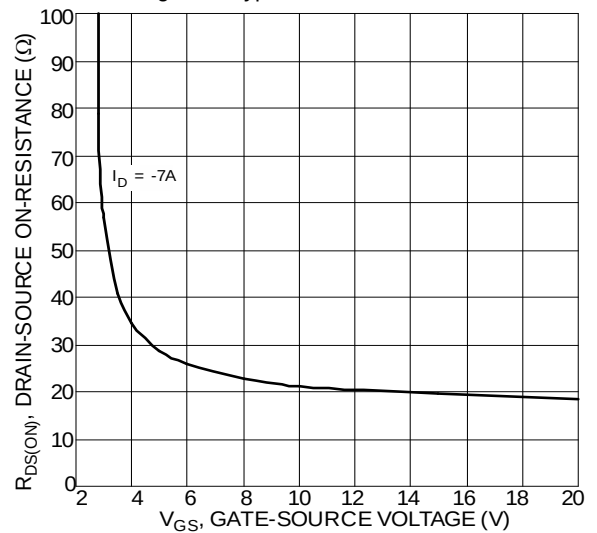


Figure 16 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

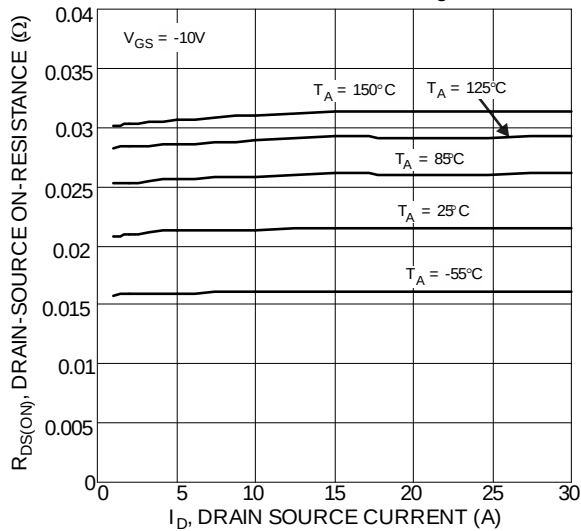


Figure 17 Typical On-Resistance vs. Drain Current and Temperature

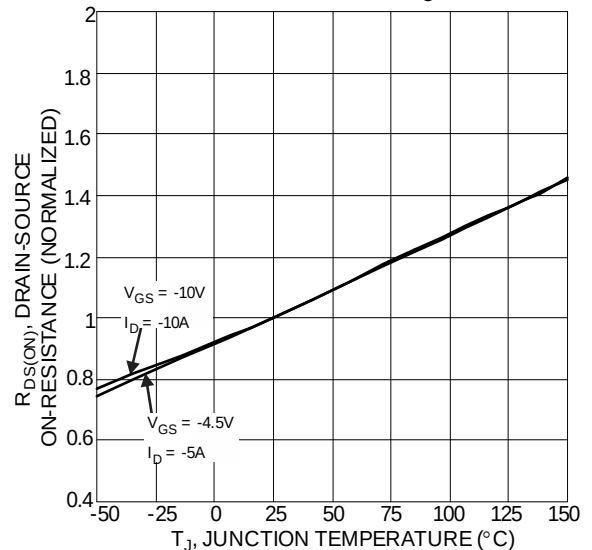
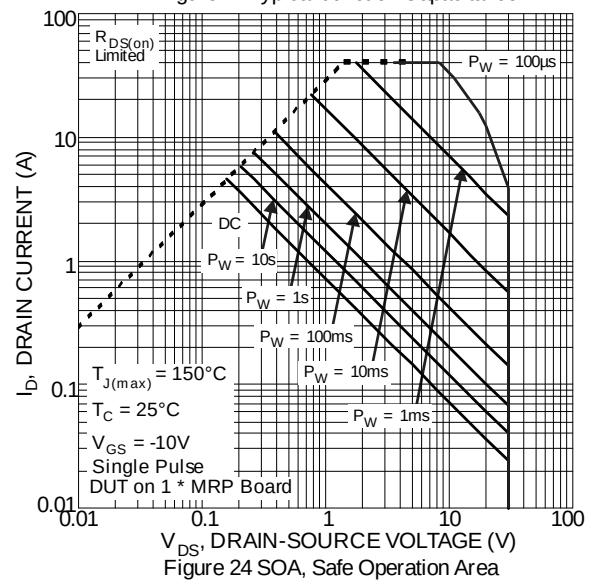
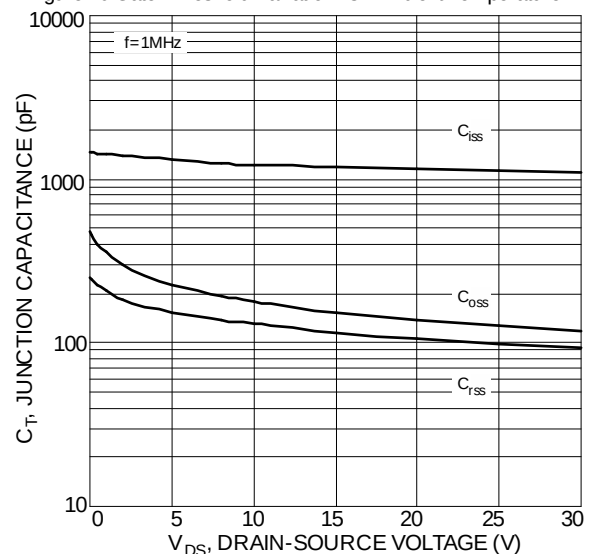
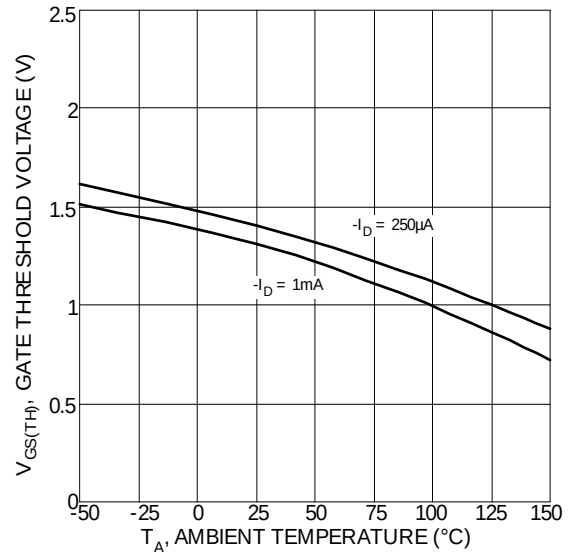
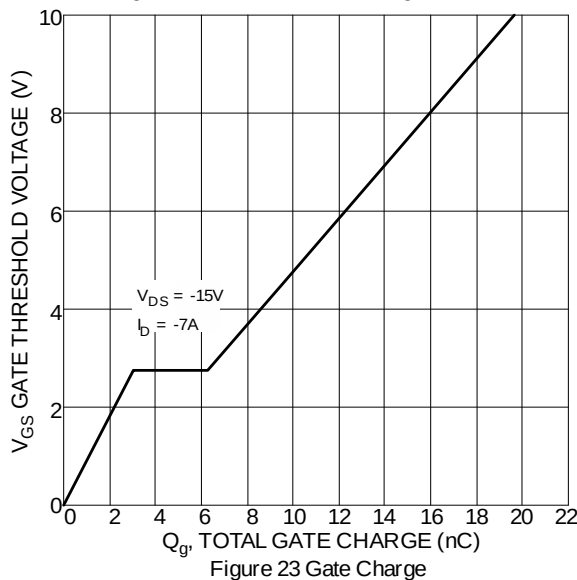
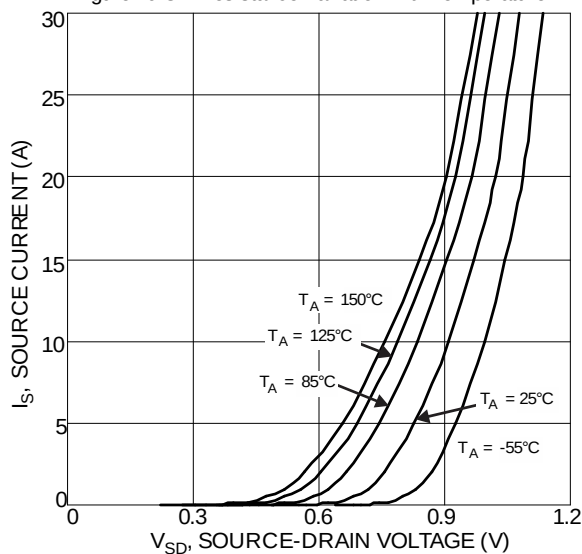
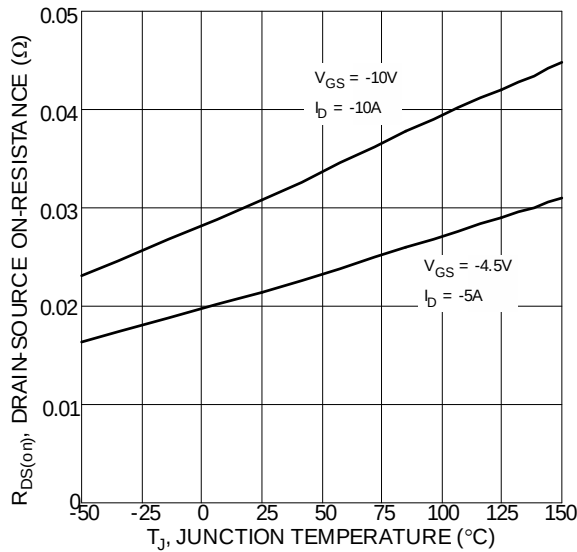
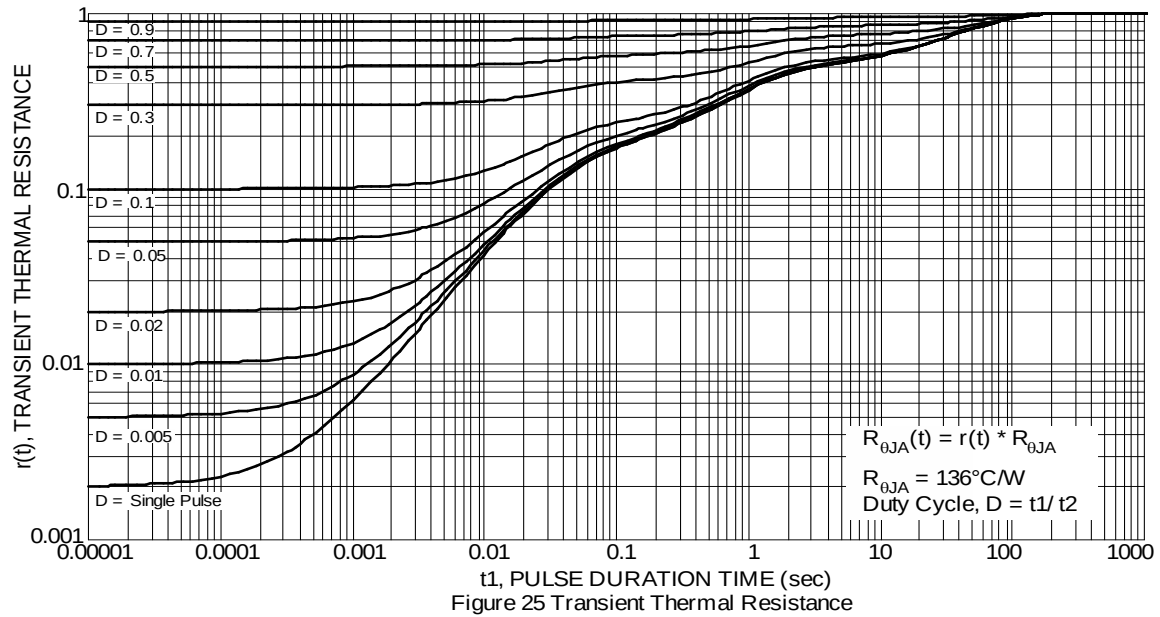


Figure 18 On-Resistance Variation with Temperature

Q2 – P-Channel (Continued)

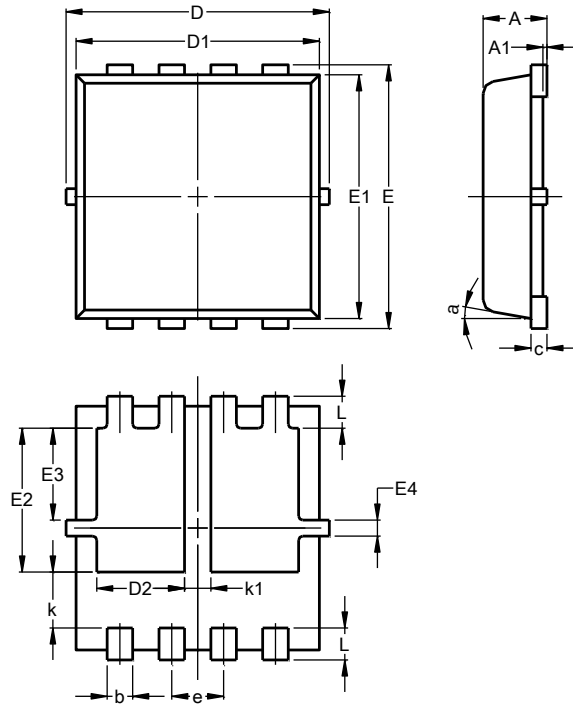




Package Outline Dimensions

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

PowerDI3333-8 (Type UXC)

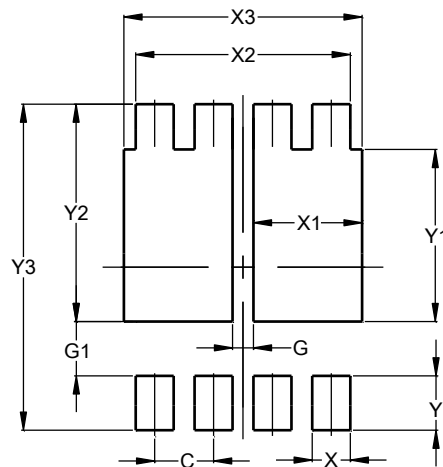


PowerDI3333-8 (Type UXC)			
Dim	Min	Max	Typ
A	0.75	0.85	0.80
A1	0.00	0.05	--
b	0.25	0.40	0.32
c	0.10	0.25	0.15
D	3.20	3.40	3.30
D1	2.95	3.15	3.05
D2	0.90	1.30	1.10
E	3.20	3.40	3.30
E1	2.95	3.15	3.05
E2	1.60	2.00	1.80
E3	0.95	1.35	1.15
E4	0.10	0.30	0.20
e	--	--	0.65
L	0.30	0.50	0.40
k	0.50	0.90	0.70
k1	0.13	0.53	0.33
a	0°	12°	10°
All Dimensions in mm			

Suggested Pad Layout

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

PowerDI3333-8 (Type UXC)



Dimensions	Value (in mm)
C	0.650
G	0.230
G1	0.600
X	0.420
X1	1.200
X2	2.370
X3	2.630
Y	0.600
Y1	1.900
Y2	2.400
Y3	3.600

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