



YOUSHANG SEMICONDUCTOR

设计研发新型功率器件

各类小信号开关

中低压及高压大电流等场效应管

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企业微信二维码



企业QQ二维码

Product Summary

Device	BV _{DSS}	R _{DS(ON)} Max	I _D Max T _A = +25°C
Q1	30V	25mΩ @ V _{GS} = 10V	7.2A
		35mΩ @ V _{GS} = 4.5V	6.1A
Q2	-30V	28mΩ @ V _{GS} = -10V	-6.8A
		38mΩ @ V _{GS} = -4.5V	-5.8A

Description

This new generation MOSFET is designed to minimize the on-state resistance (R_{DS(ON)}) and yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

Applications

- Power Management Functions
- Analog Switch

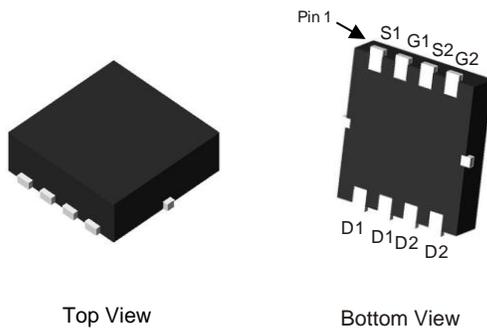
Features

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Complementary Pair MOSFET

Mechanical Data

- Case: POWERDI[®]3333-8 (Type UXB)
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Below Diagram
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 
- Weight: 0.072 grams (Approximate)

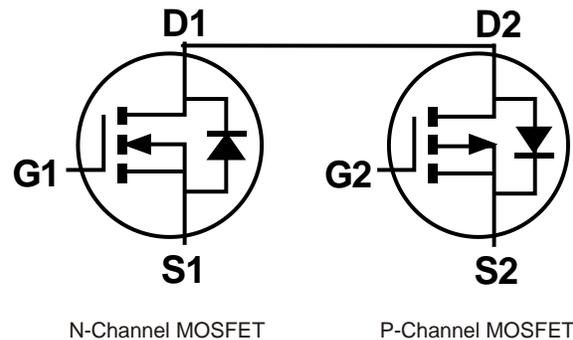
POWERDI[®]3333-8 (Type UXB)



Top View

Bottom View

Equivalent Circuit



N-Channel MOSFET

P-Channel MOSFET

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	30	V
Gate-Source Voltage			V_{GSS}	± 20	V
Continuous Drain Current (Note 6) $V_{GS} = 10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$	I_D	7.2	A
		$T_A = +70^\circ\text{C}$		5.7	
Maximum Body Diode Forward Current (Note 6)			I_S	2	A
Pulsed Drain Current (380 μs Pulse, Duty Cycle = 1%)			I_{DM}	45	A
Avalanche Current (L = 0.1mH) (Note 7)			I_{AS}	14	A
Avalanche Energy (L = 0.1mH) (Note 7)			E_{AS}	9.8	mJ

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	-30	V
Gate-Source Voltage			V_{GSS}	± 20	V
Continuous Drain Current (Note 6) $V_{GS} = -10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$	I_D	-6.8	A
		$T_A = +70^\circ\text{C}$		-5.7	
Maximum Body Diode Forward Current (Note 6)			I_S	-2	A
Pulsed Drain Current (380 μs Pulse, Duty Cycle = 1%)			I_{DM}	-40	A
Avalanche Current (L = 0.1mH) (Note 7)			I_{AS}	-22	A
Avalanche Energy (L = 0.1mH) (Note 7)			E_{AS}	24	mJ

Thermal Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	$T_A = +25^\circ\text{C}$	P_D	1.2	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	105	$^\circ\text{C}/\text{W}$
Total Power Dissipation (Note 6)	$T_A = +25^\circ\text{C}$	P_D	1.8	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	69	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	15	$^\circ\text{C}/\text{W}$
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

- 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} rating are based on low frequency and duty cycles to keep $T_J = +25^\circ\text{C}$.

Electrical Characteristics N-CHANNEL – Q1 (@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 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 8)						
Gate Threshold Voltage	V _{GS(TH)}	1.0	–	2.0	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	–	15	25	mΩ	V _{GS} = 10V, I _D = 7A
			24	35		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 9)						
Input Capacitance	C _{iss}	–	500	–	pF	V _{DS} = 15V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{oss}	–	72	–		
Reverse Transfer Capacitance	C _{rss}	–	57	–		
Gate resistance	R _g	–	1.9	–	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1.0MHz
Total Gate Charge (V _{GS} = 4.5V)	Q _g	–	4.6	–	nC	V _{DS} = 15V, I _D = 10A
Total Gate Charge (V _{GS} = 10V)	Q _g	–	9.8	–		
Gate-Source Charge	Q _{gs}	–	1.6	–		
Gate-Drain Charge	Q _{gd}	–	2.0	–		
Turn-On Delay Time	t _{D(ON)}	–	3.9	–	ns	V _{DD} = 15V, V _{GS} = 10V, R _g = 6Ω, I _D = 1A
Turn-On Rise Time	t _r	–	4.2	–		
Turn-Off Delay Time	t _{D(OFF)}	–	16.6	–		
Turn-Off Fall Time	t _f	–	5.8	–		
Reverse Recovery Time	t _{RR}	–	5.6	–	ns	I _F = 12A, di/dt = 500A/μs
Reverse Recovery Charge	Q _{RR}	–	2.6	–	nC	

Electrical Characteristics P-CHANNEL – Q2 (@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 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 8)						
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)}	–	22	28	mΩ	V _{GS} = -10V, I _D = -7A
			32	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 9)						
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: 8. Short duration pulse test used to minimize self-heating effect.
 9. Guaranteed by design. Not subject to product testing.

Typical Characteristics - N-CHANNEL

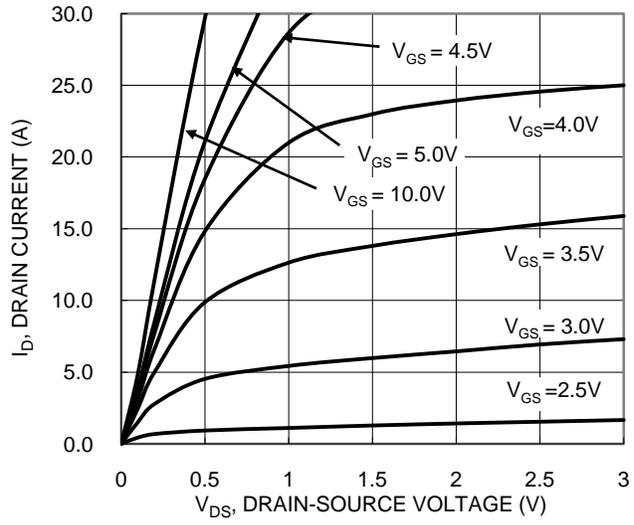


Figure 1. Typical Output Characteristic

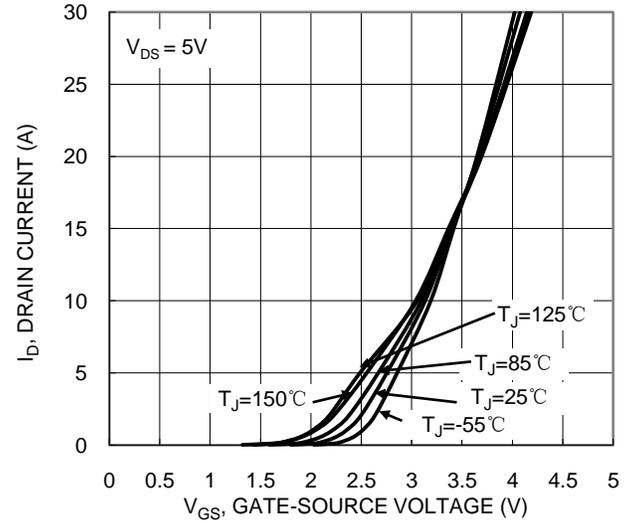


Figure 2. Typical Transfer Characteristic

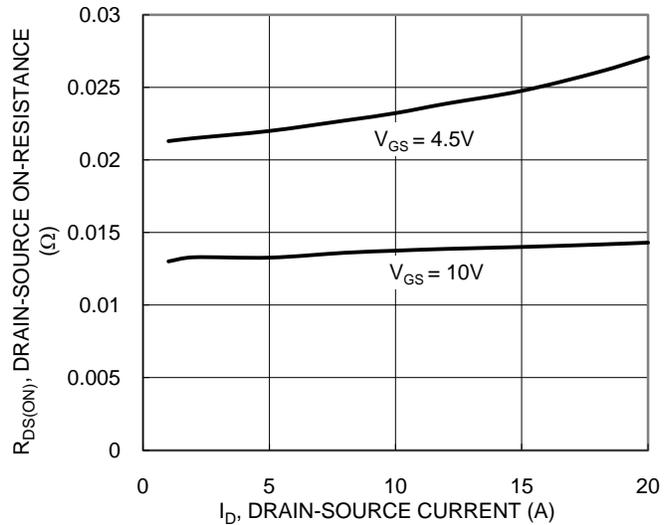


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

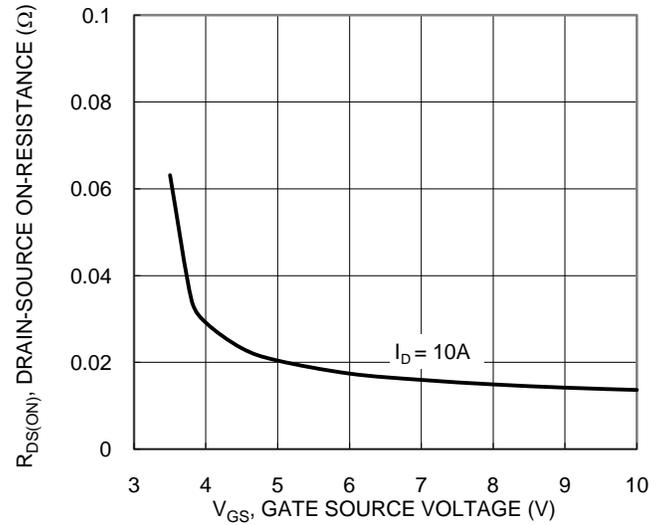


Figure 4. Typical On-Resistance vs. Drain Current and Gate Voltage

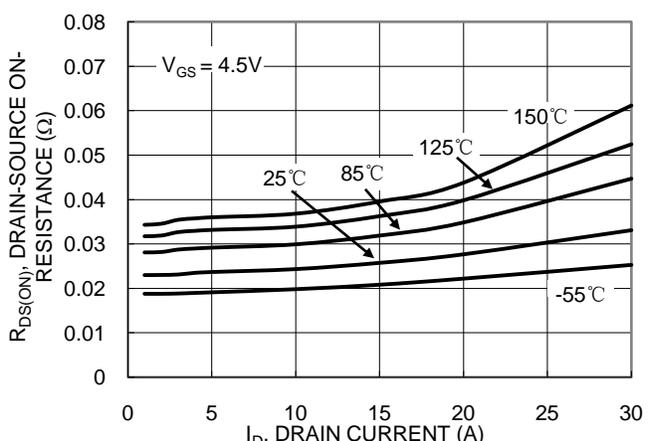


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

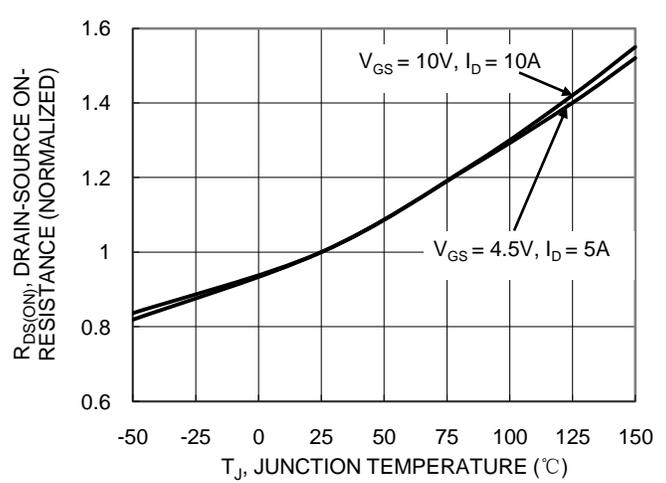
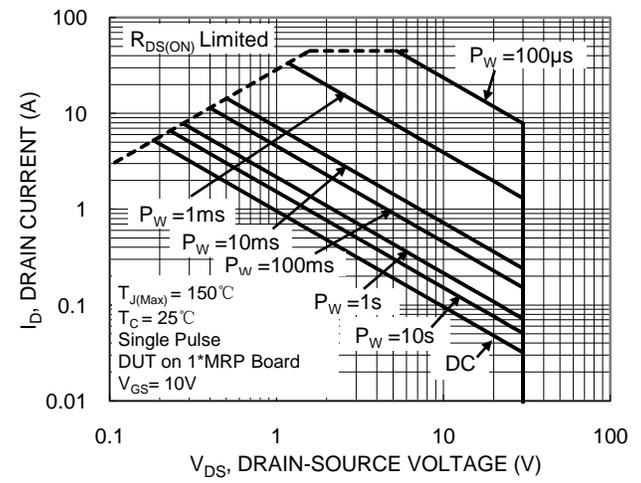
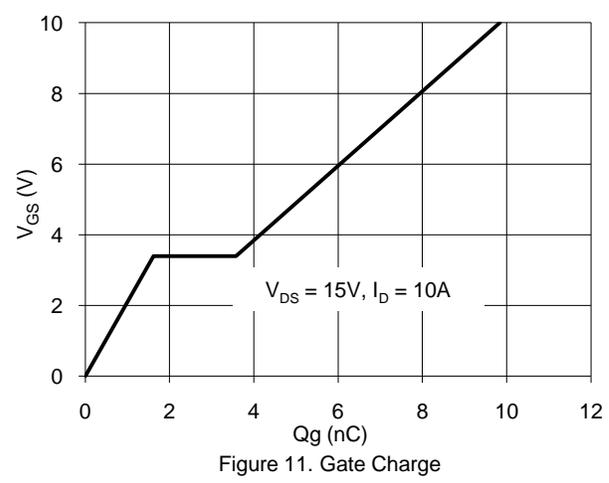
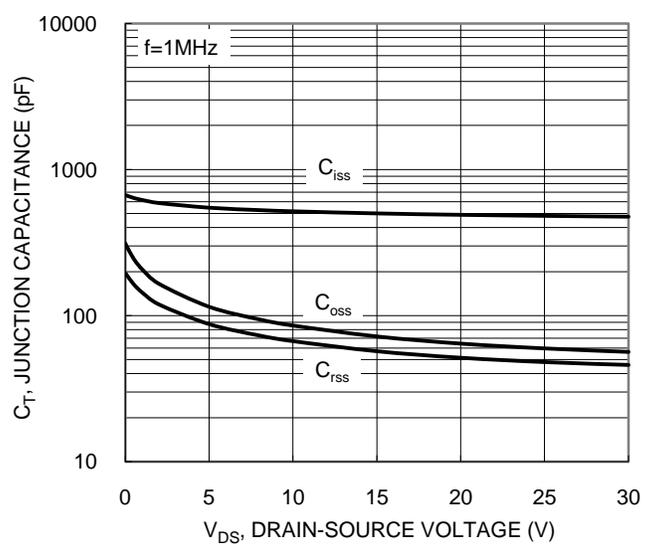
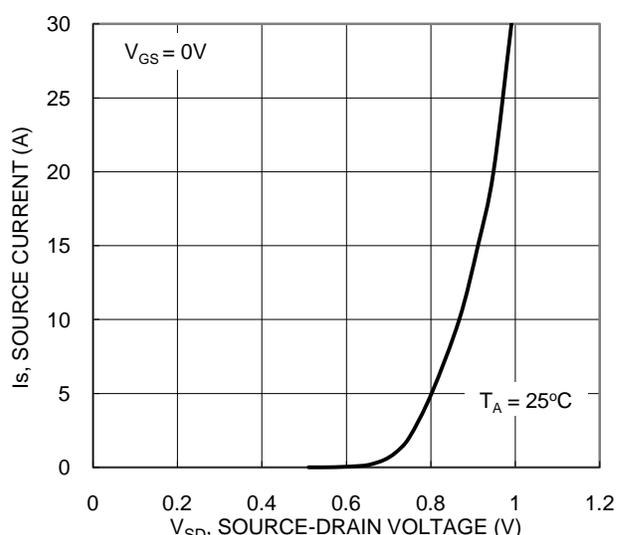
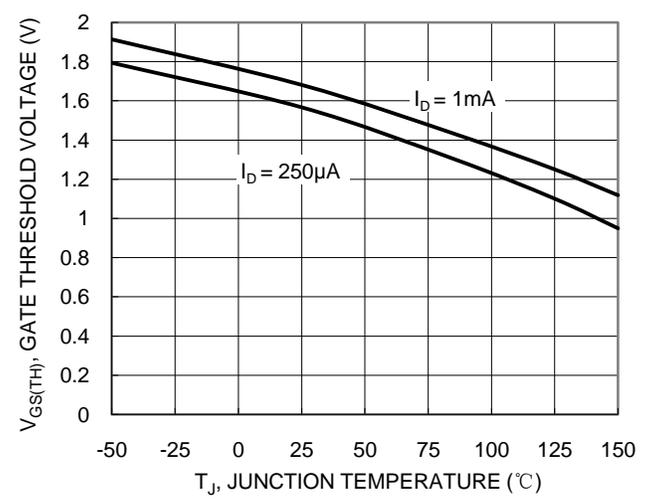
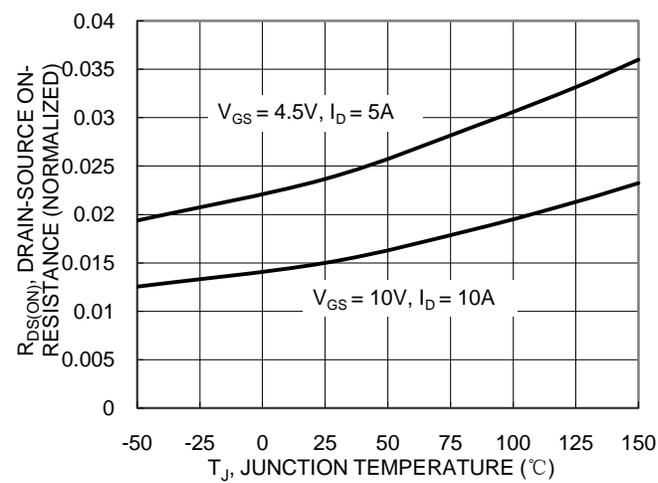


Figure 6. On-Resistance Variation with Temperature

Typical Characteristics - N-CHANNEL (Cont.)



Typical Characteristics - P-CHANNEL

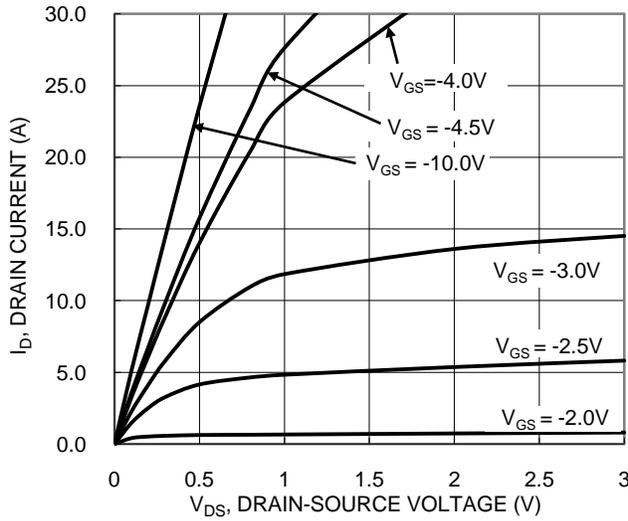


Figure 13. Typical Output Characteristic

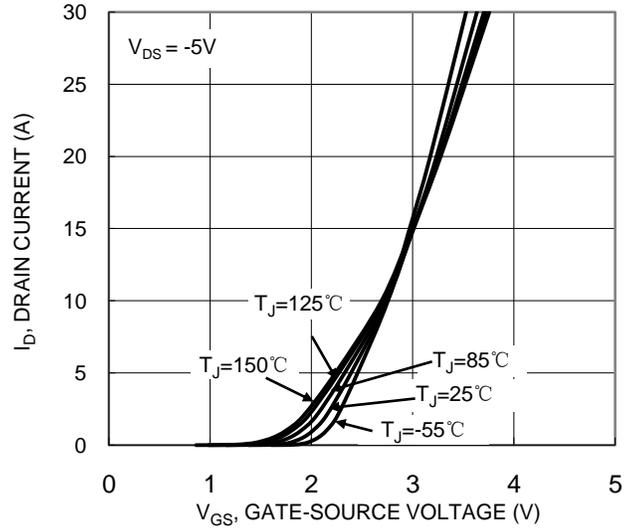


Figure 14. Typical Transfer Characteristic

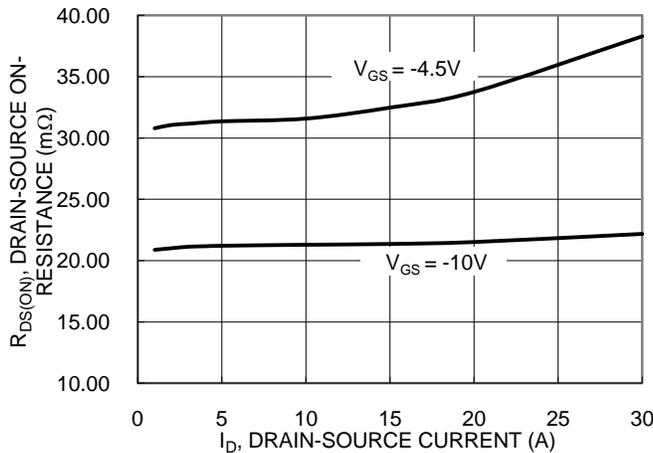


Figure 15. Typical On-Resistance vs. Drain Current and Gate Voltage

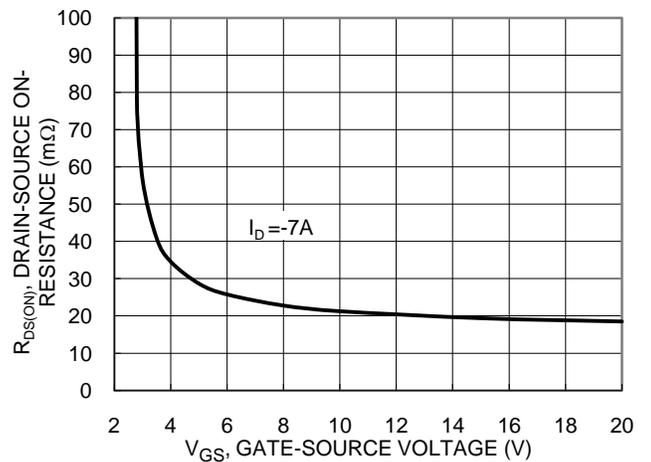


Figure 16. Typical Transfer Characteristic

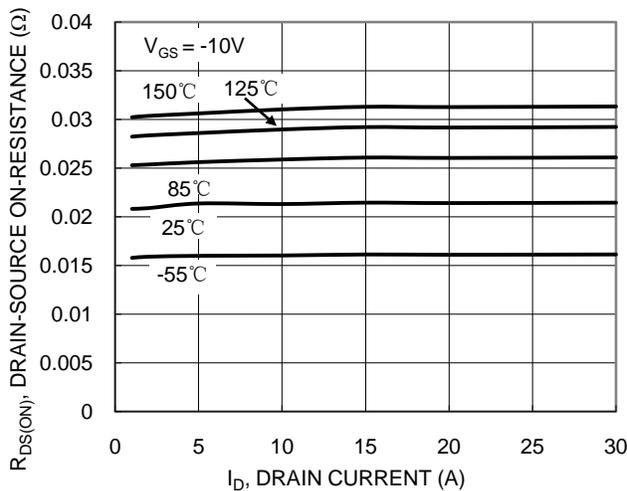


Figure 17. Typical On-Resistance vs. Drain Current and Temperature

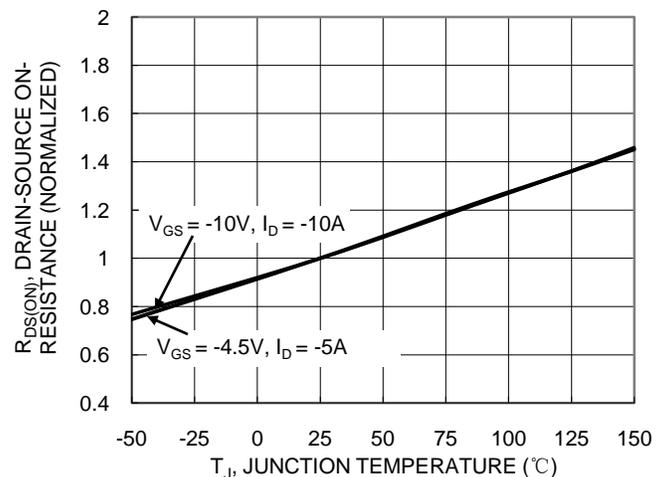


Figure 18. On-Resistance Variation with Temperature

Typical Characteristics - P-CHANNEL (Cont.)

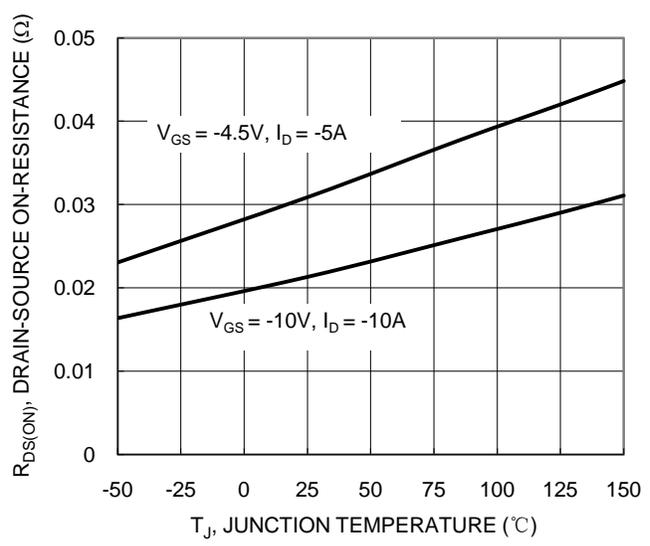


Figure 19. On-Resistance Variation with Temperature

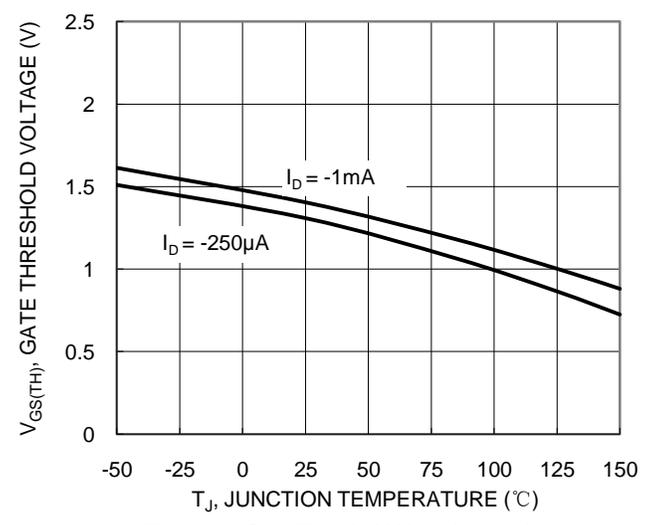


Figure 20. Gate Threshold Variation vs. Junction Temperature

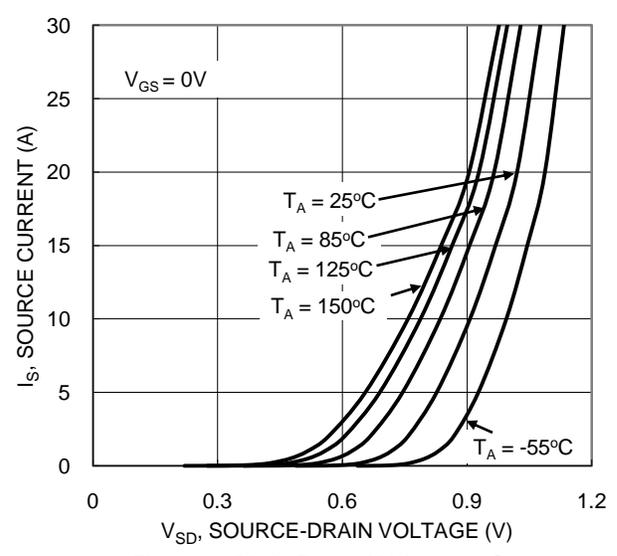


Figure 21. Diode Forward Voltage vs. Current

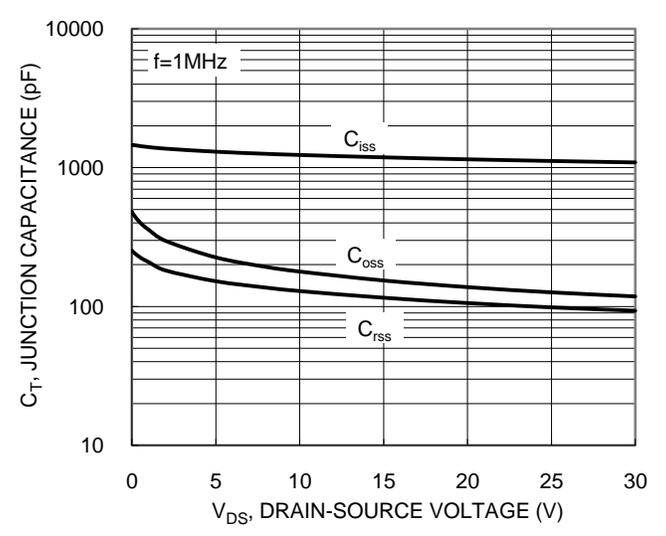


Figure 22. Typical Junction Capacitance

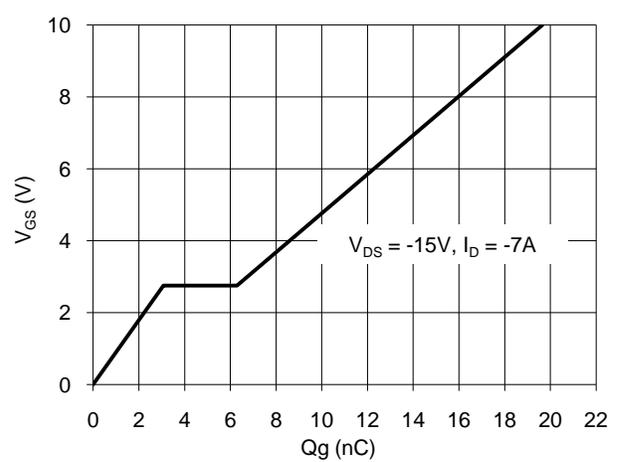


Figure 23. Gate Charge

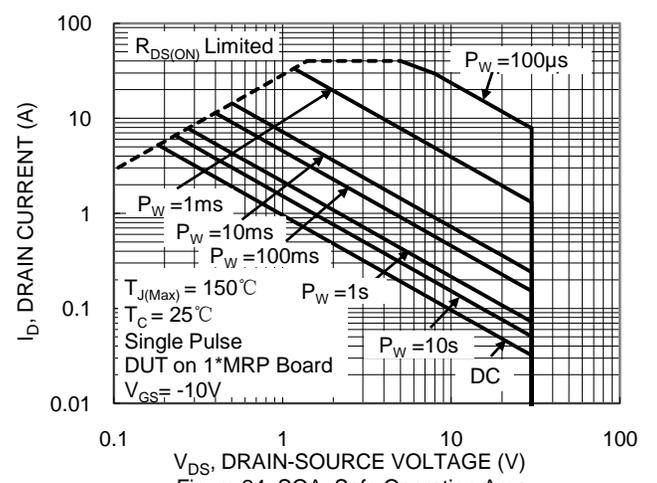


Figure 24. SOA, Safe Operation Area

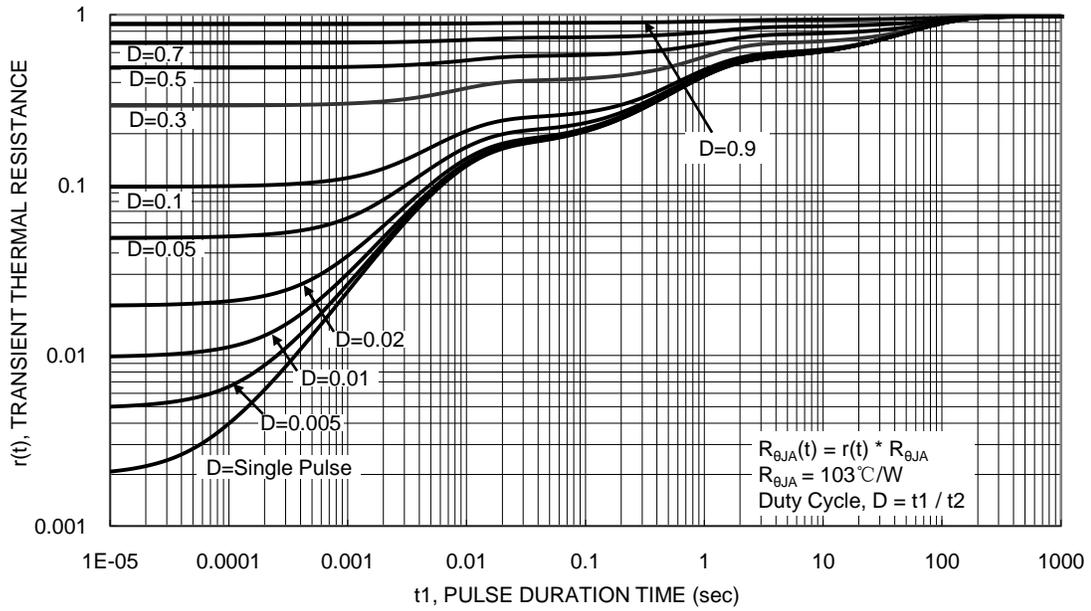
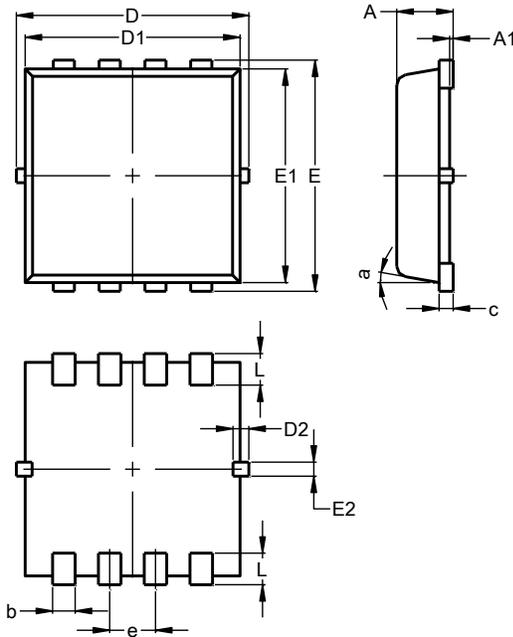


Figure 25. Transient Thermal Resistance

Package Outline Dimensions

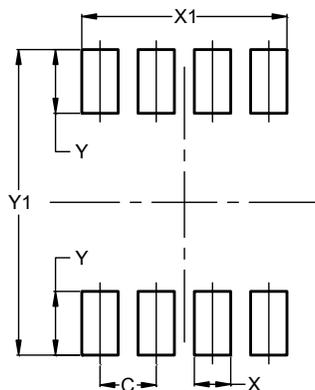
POWERDI[®]3333-8 (Type UXB)



POWERDI [®] 3333-8 (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

POWERDI[®]3333-8 (Type UXB)



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