

N- and P-Channel 20 V (D-S) MOSFET

PRODUCT SUMMARY				
	V _{DS} (V)	R _{DS(on)} (mΩ) (Typ.)	I _D (A) ^a	Q _g (Typ.)
N-Channel	20	9.5 at V _{GS} = 4.5 V	25	11.8 nC
		13 at V _{GS} = 2.5 V		
P-Channel	- 20	16.5 at V _{GS} = - 4.5 V	- 20	15 nC
		20 at V _{GS} = - 2.5 V		

FEATURES

- DT-Trench Power MOSFET
- 100 % R_g and UIS tested
- Low Gate Charge



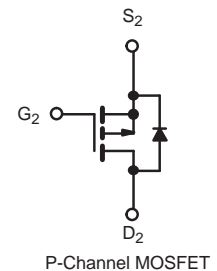
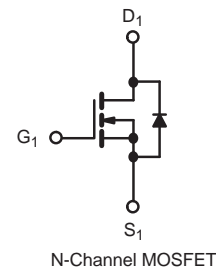
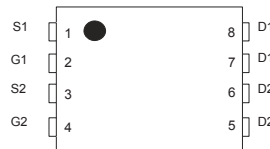
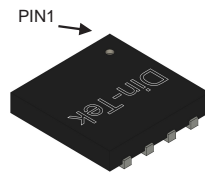
RoHS
COMPLIANT

APPLICATIONS

- Motor Drive
- DC Fan

PDFN3.3X3.3-8L Pin Configuration

Top View



ABSOLUTE MAXIMUM RATINGS (T _C = 25 °C, unless otherwise noted)				
PARAMETER	SYMBOL	N-Channel	P-Channel	UNIT
Drain-Source Voltage	V _{DS}	20	- 20	V
Gate-Source Voltage	V _{GS}	± 12	± 12	
Continuous Drain Current (T _J = 150° C) ^a	I _D	T _C = 25 °C	25	A
		T _C = 100 °C	17	
Pulsed Drain Current ^b	I _{DM}	87	- 70	
Maximum Power Dissipation ^c	P _D	T _C = 25 °C	35	W
		T _C = 100 °C	14	
Operating Junction and Storage Temperature Range	T _J , T _{stg}	-55 to +150		°C

THERMAL RESISTANCE RATINGS				
Parameter	Symbol	N-Channel	P-Channel	Unit
		Max	Max	
Maximum Junction-to-Ambient ^d	R _{thJA}	45	50	°C/W
Maximum Junction-to-Case (Drain)	R _{thJC}	3.57	4.46	

Notes

- Calculated continuous current based on maximum allowable junction temperature.
- Repetitive rating; pulse width limited by max. junction temperature.
- P_D is based on max. junction temperature, using junction-case thermal resistance.
- The value of R_{thJA} is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with T_a=25 °C.

N-Channel Electrical Characteristics ($T_C = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	20	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	0.4	-	1.2	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 12\text{ V}$	-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}$	-	-	1	μA
		$V_{DS} = 16\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$	-	-	100	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	25	-	-	A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 4.5\text{ V}, I_D = 5\text{ A}$	-	9.5	11.5	m Ω
		$V_{GS} = 2.5\text{ V}, I_D = 5\text{ A}$	-	13	17	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 5\text{ V}, I_D = 5\text{ A}$	-	18	-	S
Dynamic ^b						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 10\text{ V}, f = 1\text{ MHz}$	-	841	-	pF
Output Capacitance	C_{oss}		-	147	-	
Reverse Transfer Capacitance	C_{rss}		-	129	-	
Total Gate Charge ^c	Q_g	$V_{DS} = 10\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 5\text{ A}$	-	11.8	-	nC
Gate-Source Charge ^c	Q_{gs}		-	0.65	-	
Gate-Drain Charge ^c	Q_{gd}		-	2.8	-	
Gate Resistance	R_g	$f = 1\text{ MHz}$	-	2.9	-	Ω
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = 10\text{ V}, I_D = 5\text{ A}, R_g = 3\text{ }\Omega$ $V_{GS} = 4.5\text{ V}$	-	18	-	ns
Rise Time ^c	t_r		-	25	-	
Turn-Off Delay Time ^c	$t_{d(off)}$		-	50	-	
Fall Time ^c	t_f		-	32	-	
Drain-Source Body Diode Ratings and Characteristics ^b ($T_C = 25\text{ }^\circ\text{C}$)						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$	-	-	25	A
Pulsed Current	I_{SM}		-	-	87	A
Forward Voltage ^a	V_{SD}	$I_F = 1\text{ A}, V_{GS} = 0\text{ V}$	-	-	1.2	V
Reverse Recovery Time	t_{rr}	$I_F = 5\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$	-	21	-	ns
Reverse Recovery Charge	Q_{rr}		-	12	-	nC

Notes

- Pulse test; pulse width $\leq 400\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

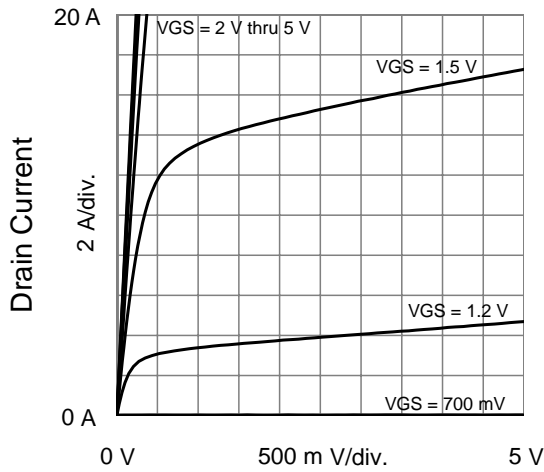
P-Channel Electrical Characteristics ($T_C = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	-20	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	-0.4	-	-1.2	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 12\text{ V}$	-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -20\text{ V}, V_{GS} = 0\text{ V}$	-	-	-1	μA
		$V_{DS} = -16\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$	-	-	-10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq -5\text{ V}, V_{GS} = -10\text{ V}$	-20	-	-	A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}, I_D = -5\text{ A}$	-	16.5	20	m Ω
		$V_{GS} = -2.5\text{ V}, I_D = -4\text{ A}$	-	20	25	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -5\text{ V}, I_D = -5\text{ A}$	-	16	-	S
Dynamic ^b						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = -10\text{ V}, f = 1\text{ MHz}$	-	1840	-	pF
Output Capacitance	C_{oss}		-	212	-	
Reverse Transfer Capacitance	C_{rss}		-	205	-	
Total Gate Charge ^c	Q_g	$V_{DS} = -10\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -5\text{ A}$	-	15	-	nC
Gate-Source Charge ^c	Q_{gs}		-	1.2	-	
Gate-Drain Charge ^c	Q_{gd}		-	3.2	-	
Gate Resistance	R_g	$f = 1\text{ MHz}$	-	7.4	-	Ω
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = -10\text{ V}, R_g = 3\text{ }\Omega,$ $I_D = -5\text{ A}, V_{GS} = -4.5\text{ V}$	-	8.5	-	ns
Rise Time ^c	t_r		-	28	-	
Turn-Off Delay Time ^c	$t_{d(off)}$		-	35	-	
Fall Time ^c	t_f		-	12	-	
Drain-Source Body Diode Ratings and Characteristics ^b ($T_C = 25\text{ }^\circ\text{C}$)						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$	-	-	-20	A
Pulsed Current	I_{SM}		-	-	-70	A
Forward Voltage ^a	V_{SD}	$I_F = -1\text{ A}, V_{GS} = 0\text{ V}$	-	-	-1.2	V
Reverse Recovery Time	t_{rr}	$I_F = -5\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$	-	32	-	ns
Reverse Recovery Charge	Q_{rr}		-	21	-	nC

Notes

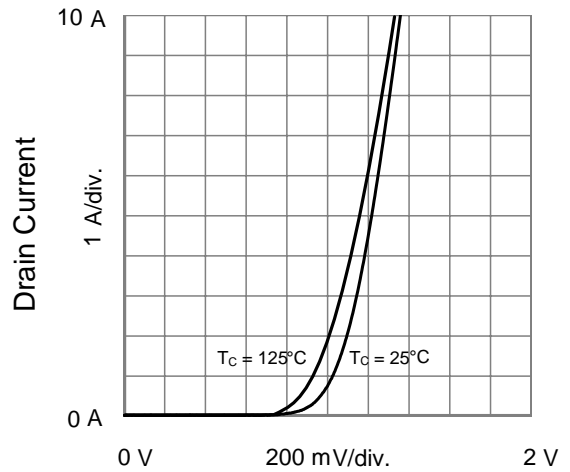
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- Independent of operating temperature.

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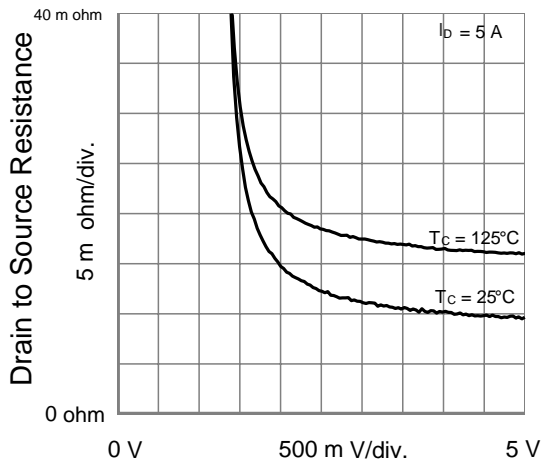
N-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Drain to Source Voltage Output Characteristics

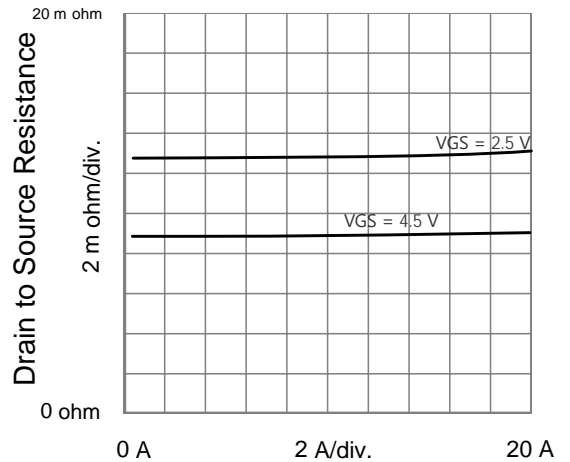


Gate to Source Voltage Transfer Characteristics

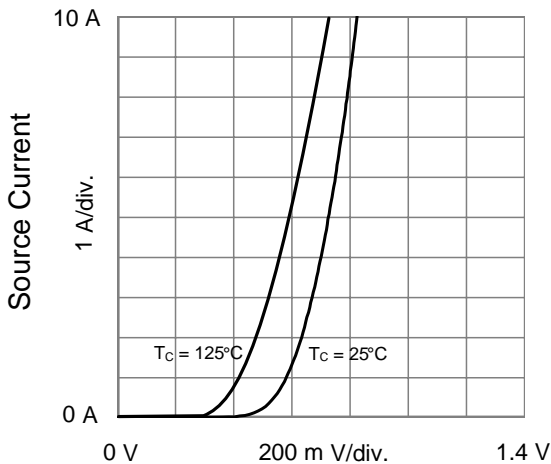


Gate to Source Voltage

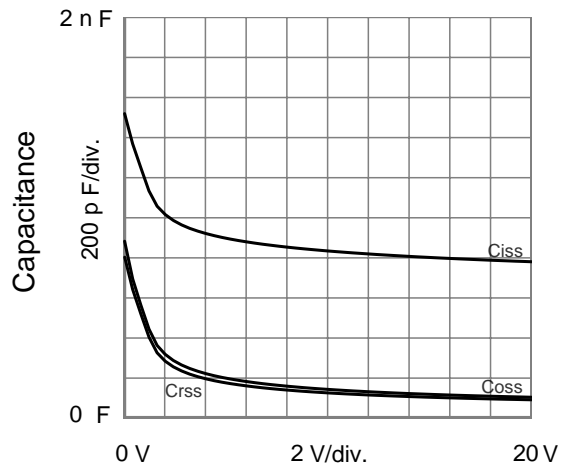
Drain to Source Resistance vs. Gate to Source Voltage



Drain Current

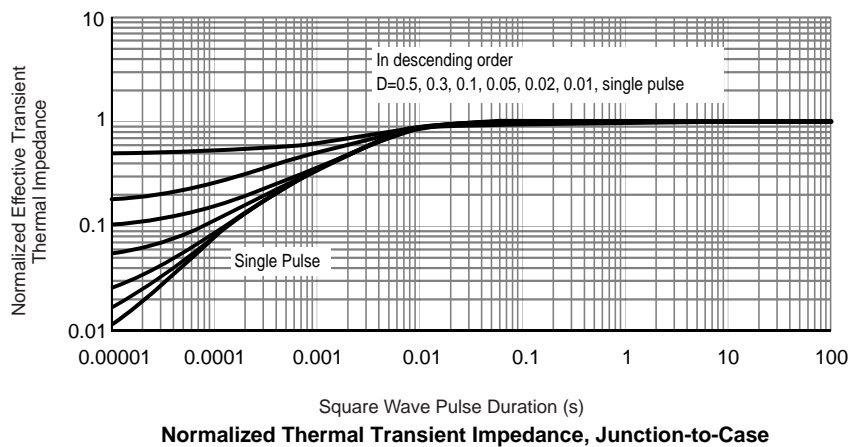
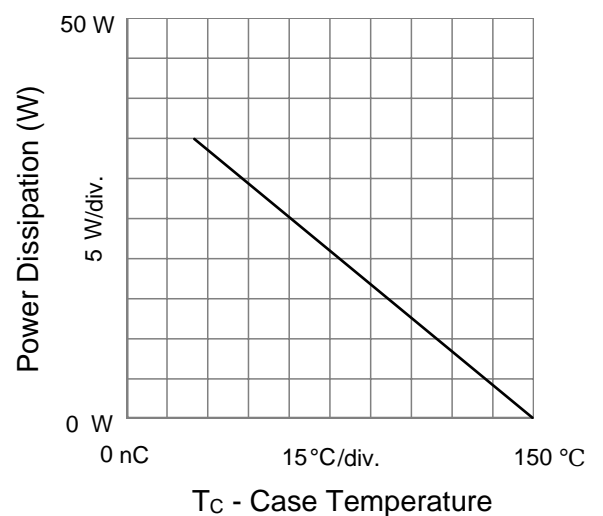
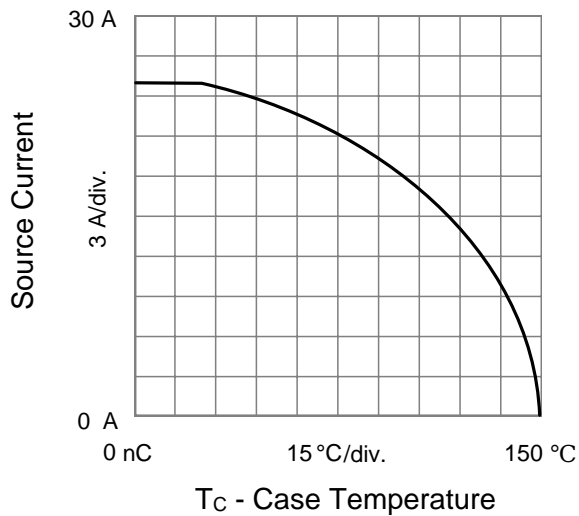
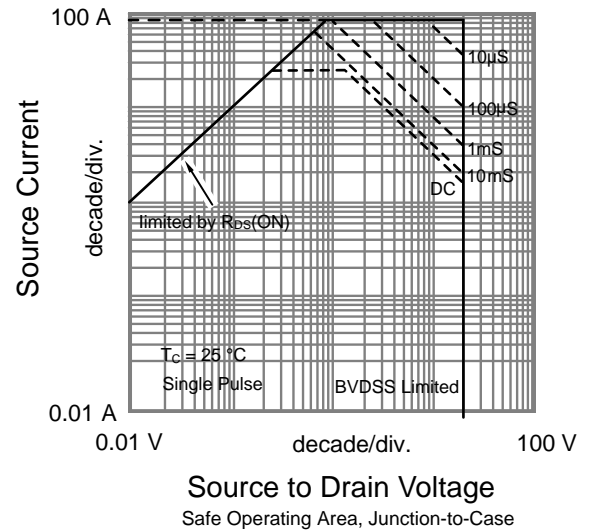
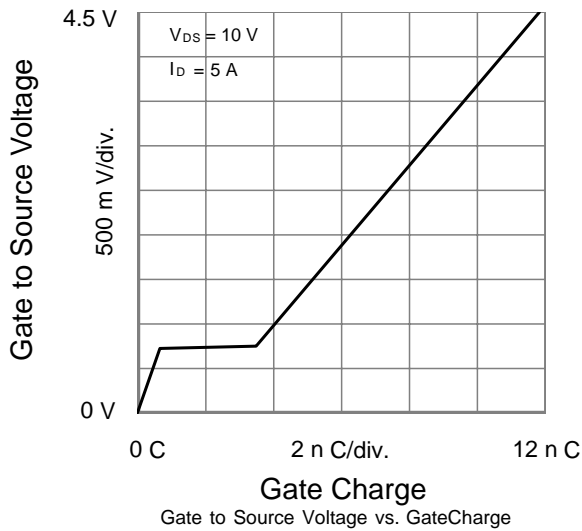


Source to Drain Voltage Body Diode Forward Characteristics

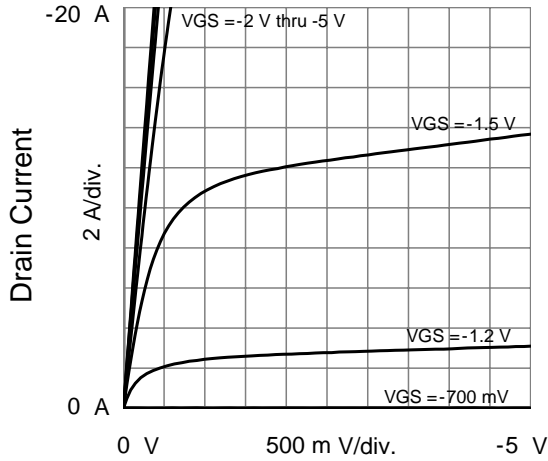


Drain to Source Voltage Capacitances

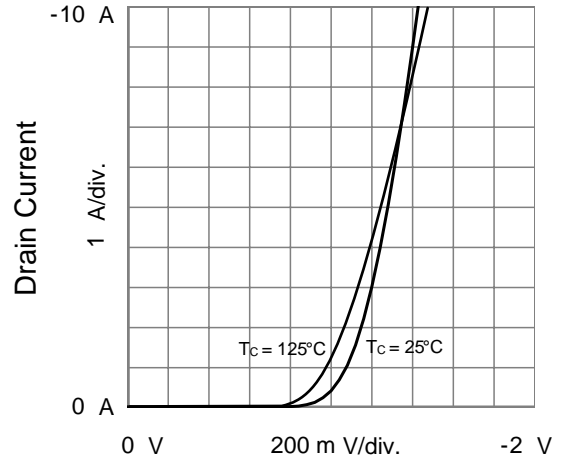
N-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



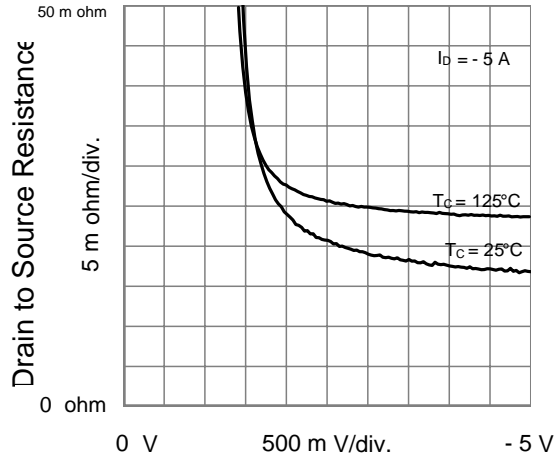
P-CHANNEL TYPICAL CHARACTERISTICS (25°C, unless otherwise noted)



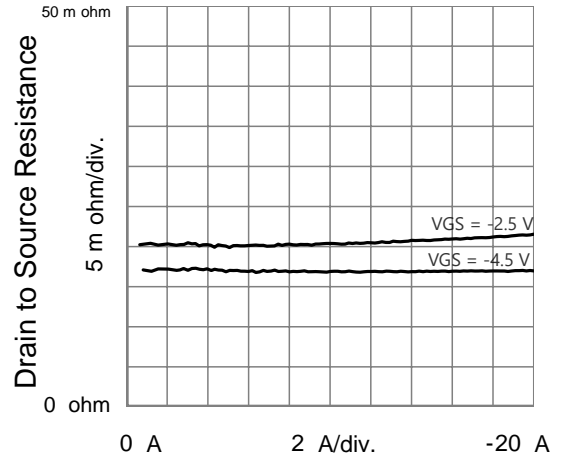
Drain to Source Voltage Output Characteristics



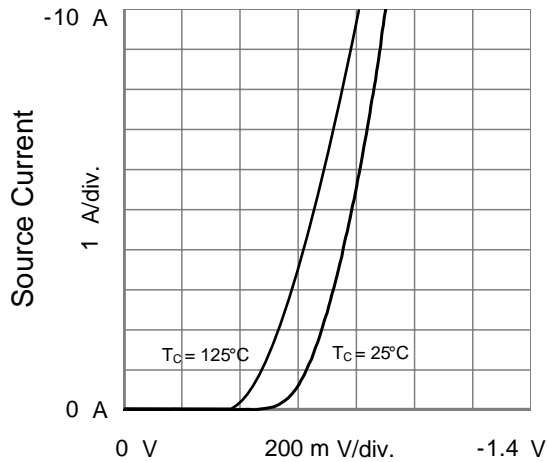
Gate to Source Voltage Transfer Characteristics



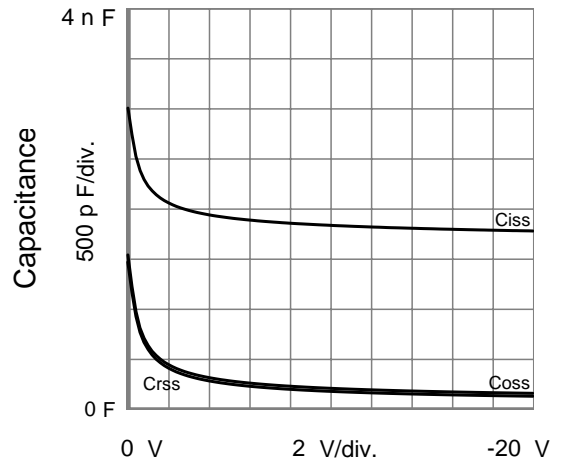
Gate to Source Voltage Drain to Source Resistance vs. Gate to Source Voltage



Drain Current Drain to Source Resistance vs. Drain Current

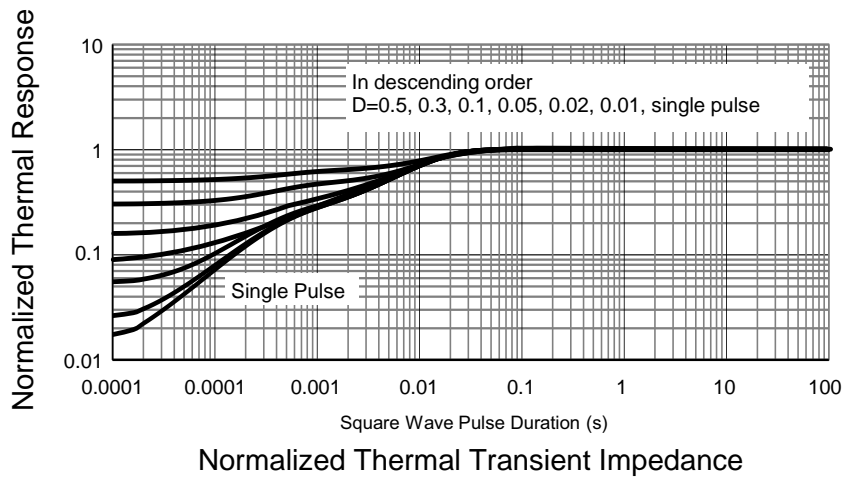
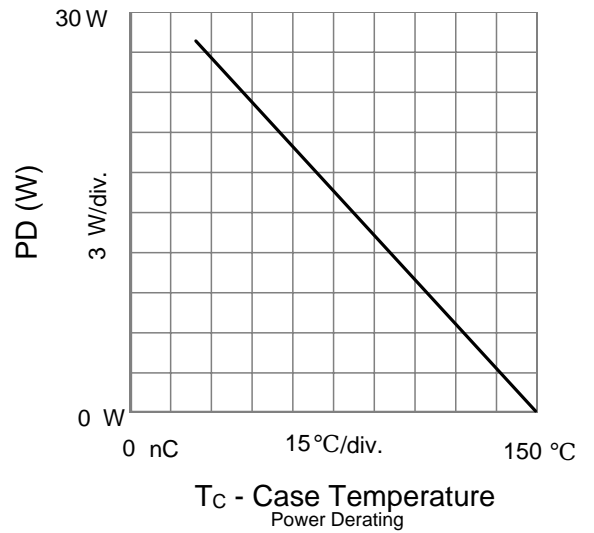
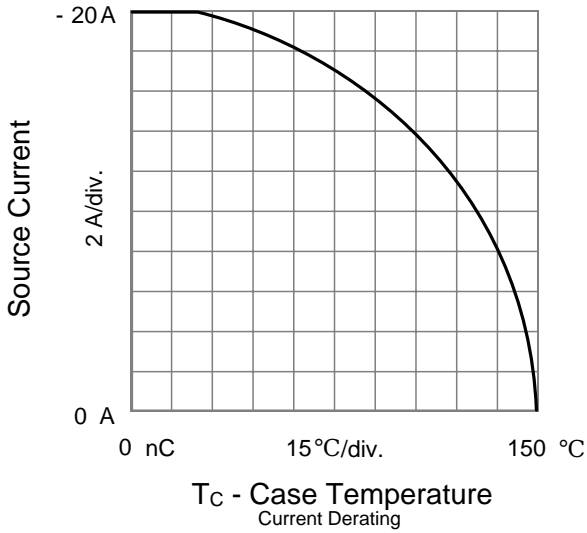
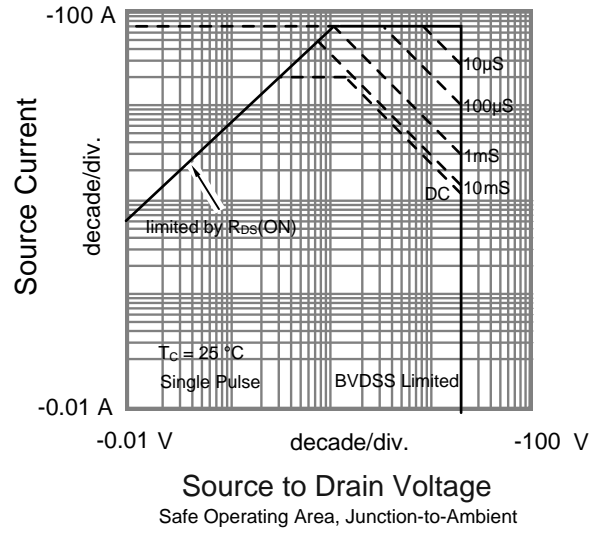
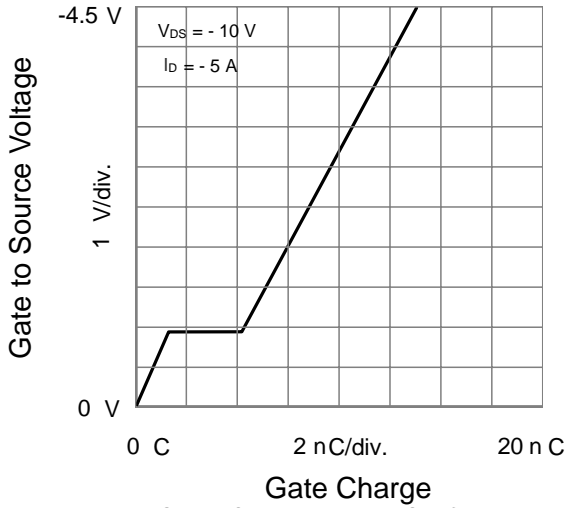


Source to Drain Voltage Body Diode Forward Characteristics

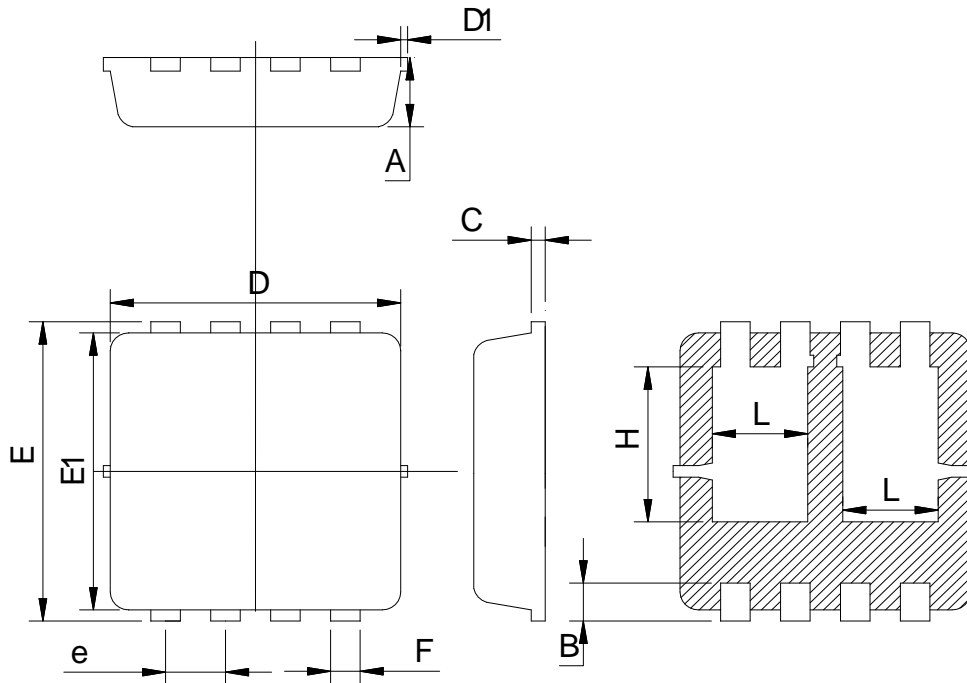


Drain to Source Voltage Capacitances

N-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



PDFN 3.3X3.3-D PACKAGE OUTLINE



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

Symbol	Min	Typ	Max
A	0.680	0.775	0.920
B	0.25	0.38	0.55
C	0.08	0.15	0.25
D	2.95	3.10	3.25
D1			0.12
E	3.20	3.30	3.40
E1	2.85	3.00	3.15
e	0.50	0.65	0.80
F	0.23	0.32	0.41
H	1.53	1.73	1.93
L	0.83	1.03	1.23

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