

## N- and P-Channel 30 V (D-S) MOSFET

PRODUCT SUMMARY				
	V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (mΩ)(Typ.)	I <sub>D</sub> (A) <sup>a</sup>	Q <sub>g</sub> (Typ.)
N-Channel	30	9.5 at V <sub>GS</sub> = 10 V	40	13.7 nC
		16 at V <sub>GS</sub> = 4.5 V		
P-Channel	- 30	12.5 at V <sub>GS</sub> = - 10 V	- 30	28 nC
		16 at V <sub>GS</sub> = - 4.5 V		

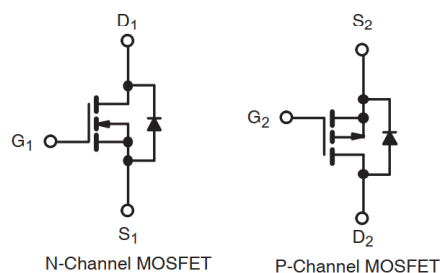
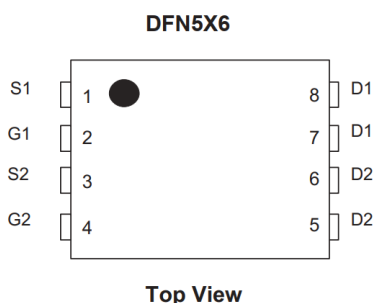
### FEATURES

- DT-Trench Power MOSFET
- 100 % R<sub>g</sub> and UIS tested
- Excellent Thermal Performance
- RoHS and Halogen Free Compliant


**RoHS**  
 COMPLIANT

### APPLICATIONS

- Motor Drive
- DC-FAN



ABSOLUTE MAXIMUM RATINGS (T <sub>C</sub> = 25 °C, unless otherwise noted)					
PARAMETER		SYMBOL	N-Channel	P-Channel	UNIT
Drain-Source Voltage		V <sub>DS</sub>	30	- 30	V
Gate-Source Voltage		V <sub>GS</sub>	± 20	± 20	
Continuous Drain Current (T <sub>J</sub> = 150° C) <sup>a</sup>	T <sub>C</sub> = 25 °C	I <sub>D</sub>	40	- 30	A
	T <sub>C</sub> = 100 °C		25	- 19	
Pulsed Drain Current <sup>b</sup>		I <sub>DM</sub>	140	- 105	
Maximum Power Dissipation <sup>c</sup>	T <sub>C</sub> = 25 °C	P <sub>D</sub>	30	25	W
	T <sub>C</sub> = 100 °C		12	10	
Operating Junction and Storage Temperature Range		T <sub>J</sub> , T <sub>stg</sub>	-55 to +150		°C
Soldering Recommendations (Peak Temperature)			260		

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	N-Channel	P-Channel	Unit
			Max	Max	
Maximum Junction-to-Ambient <sup>d</sup>	t ≤ 10 s	R <sub>thJA</sub>	55	60	°C/W
Maximum Junction-to-Case (Drain)	Steady State	R <sub>thJC</sub>	4.16	5	

### Notes

- Calculated continuous current based on maximum allowable junction temperature.
- Repetitive rating; pulse width limited by max. junction temperature.
- P<sub>D</sub> is based on max. junction temperature, using junction-case thermal resistance.
- The value of R<sub>thJA</sub> is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with T<sub>a</sub>=25 °C.

**N-Channel Electrical Characteristics ( $T_J = 25\text{ }^{\circ}\text{C}$ , unless otherwise noted)**

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	V <sub>DS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	30	-	-	V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	1.0	-	3.0	
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 20 V	-	-	± 100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V	-	-	1	μA
		V <sub>DS</sub> = 24 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55 °C	-	-	10	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> ≥ 5 V, V <sub>GS</sub> = 10 V	40	-	-	A
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 10 A	-	9.5	12	mΩ
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 8 A	-	16	20	
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 5 V, I <sub>D</sub> = 10 A	-	43	-	S
Dynamic <sup>b</sup>						
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 15 V, f = 1 MHz	-	660	-	pF
Output Capacitance	C <sub>oss</sub>		-	100	-	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	85	-	
Total Gate Charge <sup>c</sup>	Q <sub>g</sub>	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 10 A	-	13.7	-	nC
Gate-Source Charge <sup>c</sup>	Q <sub>gs</sub>		-	1.1	-	
Gate-Drain Charge <sup>c</sup>	Q <sub>gd</sub>		-	2.7	-	
Gate Resistance	R <sub>g</sub>	f = 1 MHz	-	3.2	-	Ω
Turn-On Delay Time <sup>c</sup>	t <sub>d(on)</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 10 A, R <sub>g</sub> = 2.5 Ω V <sub>GS</sub> = 10 V	-	6	-	ns
Rise Time <sup>c</sup>	t <sub>r</sub>		-	10	-	
Turn-Off Delay Time <sup>c</sup>	t <sub>d(off)</sub>		-	18	-	
Fall Time <sup>c</sup>	t <sub>f</sub>		-	8	-	
Drain-Source Body Diode Ratings and Characteristics <sup>b</sup> (T <sub>C</sub> = 25 °C)						
Continuous Source-Drain Diode Current	I <sub>S</sub>	T <sub>C</sub> = 25 °C	-	-	40	A
Pulsed Current (t = 100 μs)	I <sub>SM</sub>		-	-	140	A
Forward Voltage <sup>a</sup>	V <sub>SD</sub>	I <sub>F</sub> = 1 A, V <sub>GS</sub> = 0 V	-	-	1.2	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 10 A, di/dt = 100 A/μs	-	7	-	ns
Reverse Recovery Charge	Q <sub>rr</sub>		-	9	-	nC

**Notes**

- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .  
 b. Guaranteed by design, not subject to production testing.  
 c. 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 ( $T_J = 25\text{ }^{\circ}\text{C}$ , unless otherwise noted)**

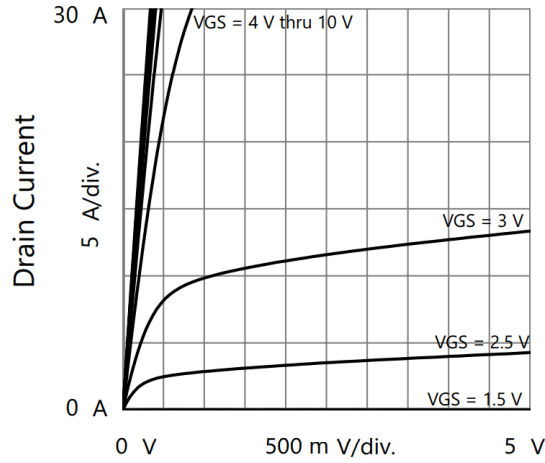
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	V <sub>DS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = - 250 μA	- 30	-	-	V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = - 250 μA	- 1.0	-	- 3.0	
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 20 V	-	-	± 100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = - 30 V, V <sub>GS</sub> = 0 V	-	-	- 1	μA
		V <sub>DS</sub> = - 24 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55 °C	-	-	- 10	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> ≤ -5 , V <sub>GS</sub> = - 10 V	- 30	-	-	A
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = - 10 V, I <sub>D</sub> = - 8 A	-	12.5	16	mΩ
		V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> = - 8 A	-	16	20	
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = - 5 V, I <sub>D</sub> = - 8 A	-	38	-	S
Dynamic <sup>b</sup>						
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = - 15 V, f = 1 MHz	-	2040	-	pF
Output Capacitance	C <sub>oss</sub>		-	250	-	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	237	-	
Total Gate Charge <sup>c</sup>	Q <sub>g</sub>	V <sub>DS</sub> = - 15 V, V <sub>GS</sub> = - 10 V, I <sub>D</sub> = - 8 A	-	28	-	nC
Gate-Source Charge <sup>c</sup>	Q <sub>gs</sub>		-	4.5	-	
Gate-Drain Charge <sup>c</sup>	Q <sub>gd</sub>		-	7.5	-	
Gate Resistance	R <sub>g</sub>	f = 1 MHz	-	6.8	-	Ω
Turn-On Delay Time <sup>c</sup>	t <sub>d(on)</sub>	V <sub>DS</sub> = - 15 V, I <sub>D</sub> = - 8 A, R <sub>g</sub> = 2.5 Ω V <sub>GS</sub> = - 10 V	-	12	-	ns
Rise Time <sup>c</sup>	t <sub>r</sub>		-	8.5	-	
Turn-Off Delay Time <sup>c</sup>	t <sub>d(off)</sub>		-	45	-	
Fall Time <sup>c</sup>	t <sub>f</sub>		-	19	-	
Drain-Source Body Diode Ratings and Characteristics <sup>b</sup> (T <sub>C</sub> = 25 °C)						
Continuous Source-Drain Diode Current	I <sub>S</sub>	T <sub>C</sub> = 25 °C	-	-	- 30	A
Pulsed Current	I <sub>SM</sub>		-	-	- 105	A
Forward Voltage <sup>a</sup>	V <sub>SD</sub>	I <sub>F</sub> = - 1 A, V <sub>GS</sub> = 0 V	-	-	- 1.2	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = - 8 A, di/dt = 100 A/μs	-	14	-	ns
Reverse Recovery Charge	Q <sub>rr</sub>		-	18	-	nC

**Notes**

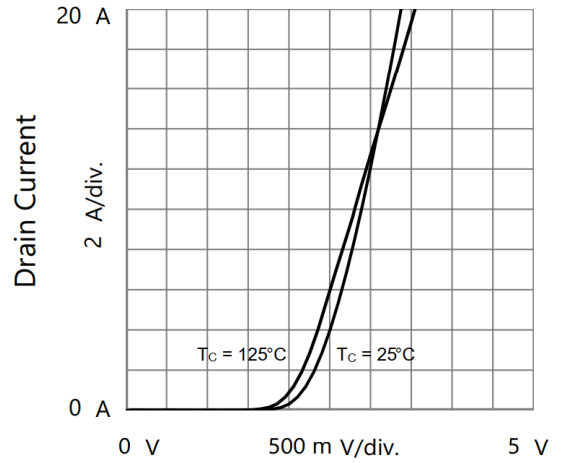
- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .  
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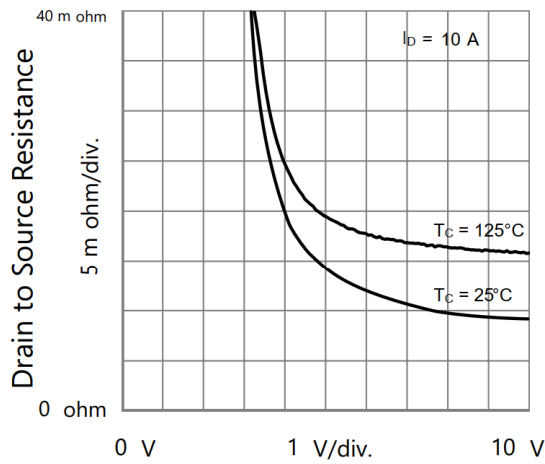
**N-CHANNEL TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



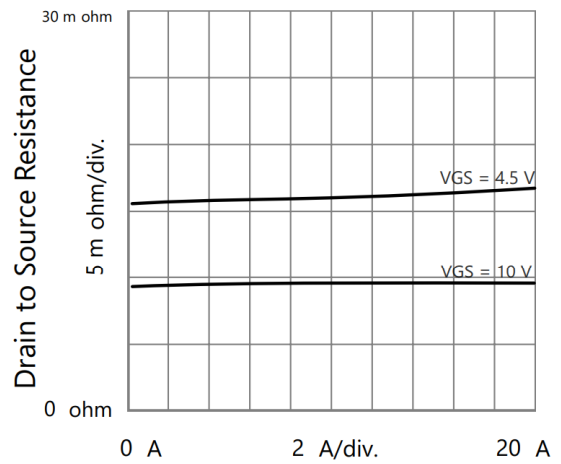
Output Characteristics



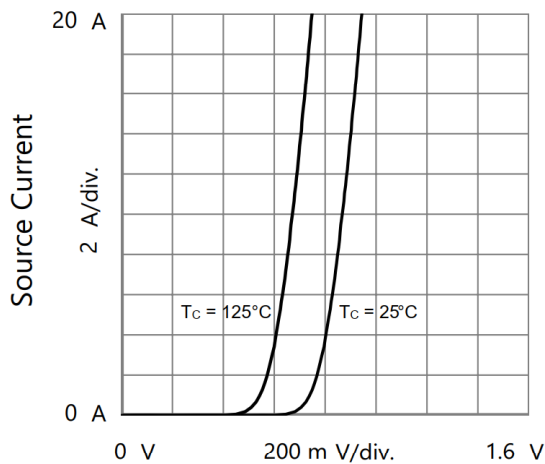
Transfer Characteristics



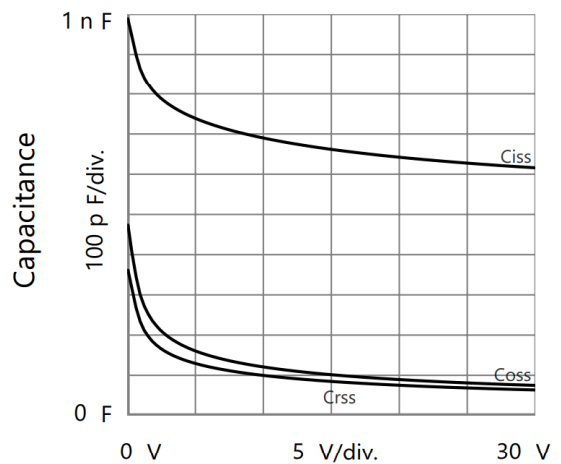
Drain to Source Resistance vs. Gate to Source Voltage



Drain to Source Resistance vs. Drain Current

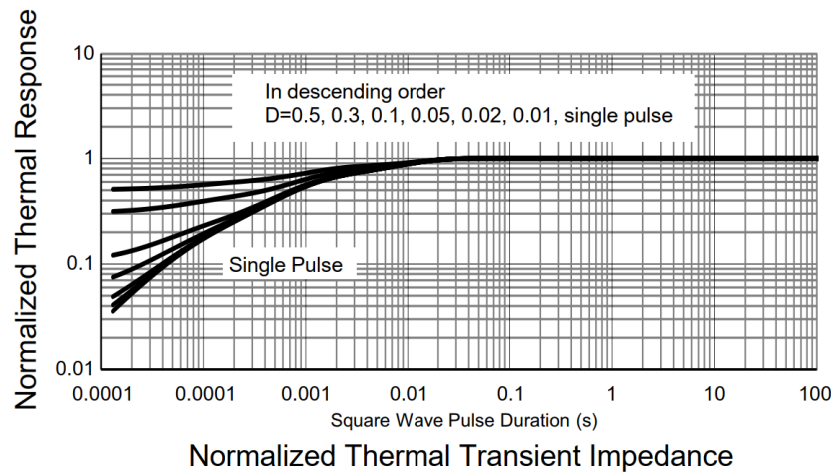
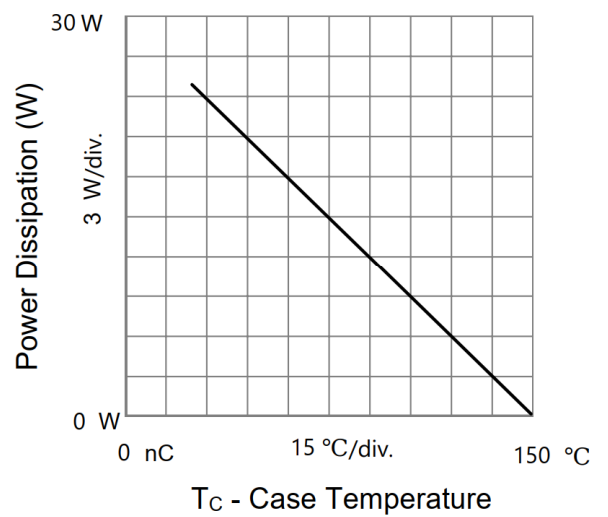
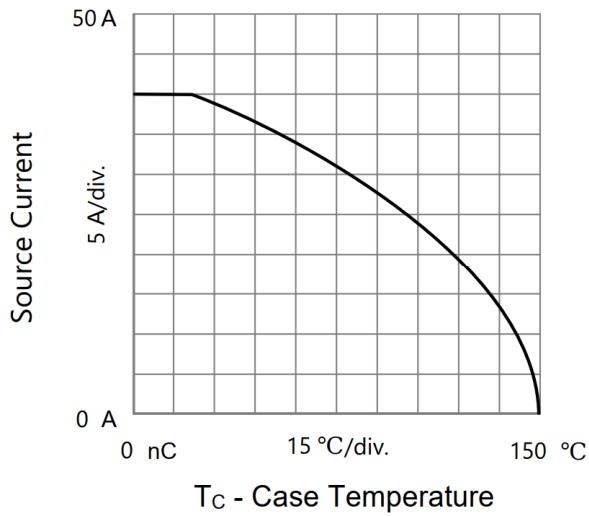
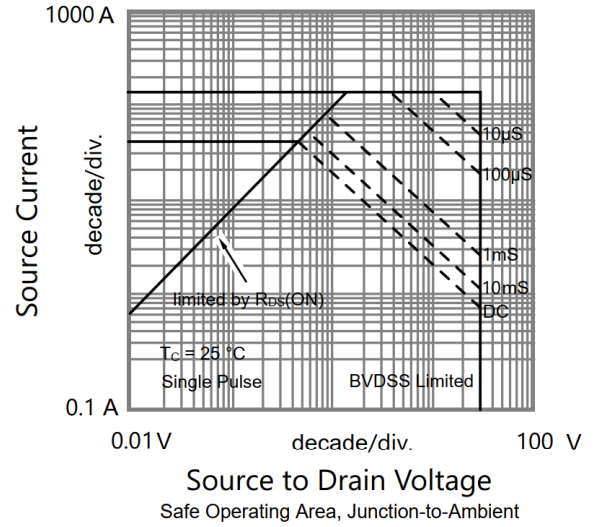
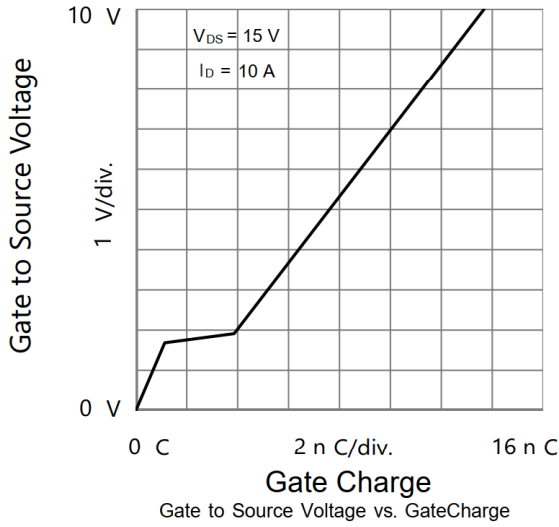


Body Diode Forward Characteristics

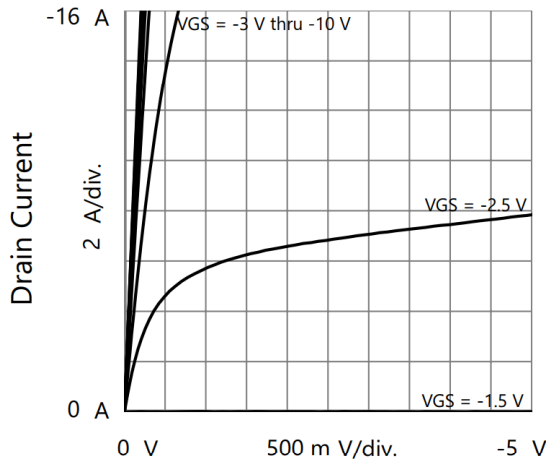


Drain to Source Capacitances

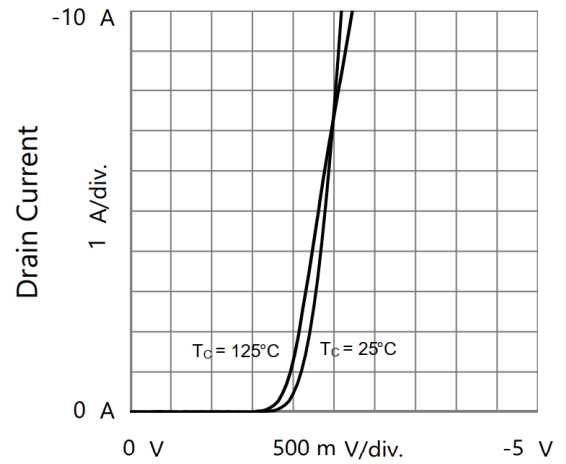
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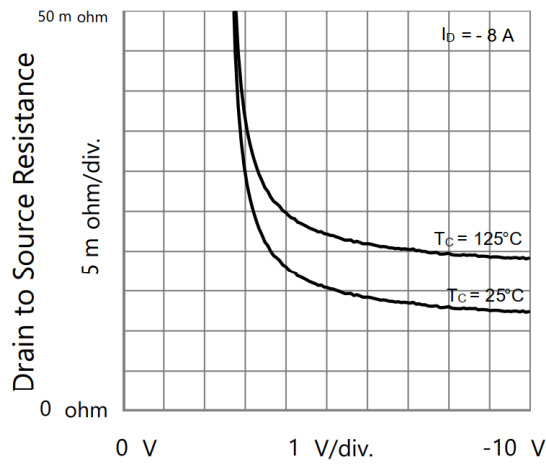
**P-CHANNEL TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



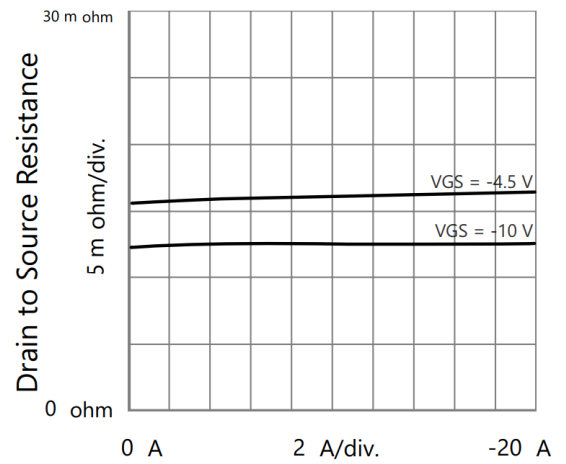
Drain to Source Voltage  
Output Characteristics



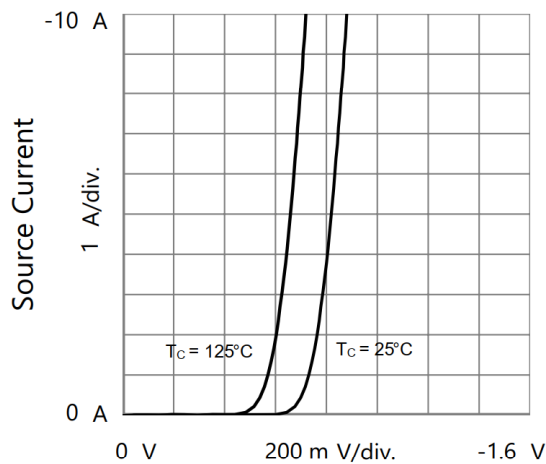
Gate to Source Voltage  
Transfer Characteristics



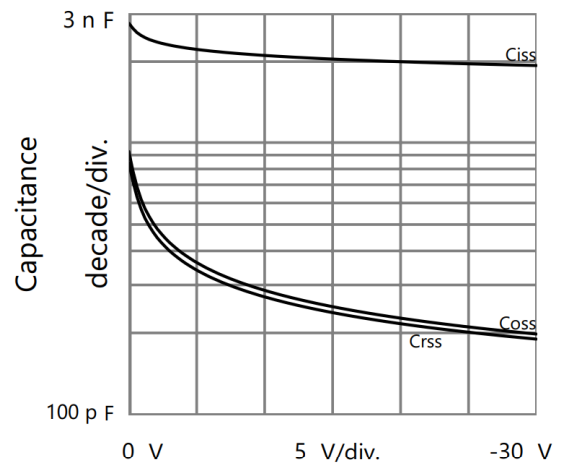
Gate to Source Voltage  
Drain to Source Resistance vs. Gate to Source Voltage



Drain Current  
Drain to Source Resistance vs. Drain Current

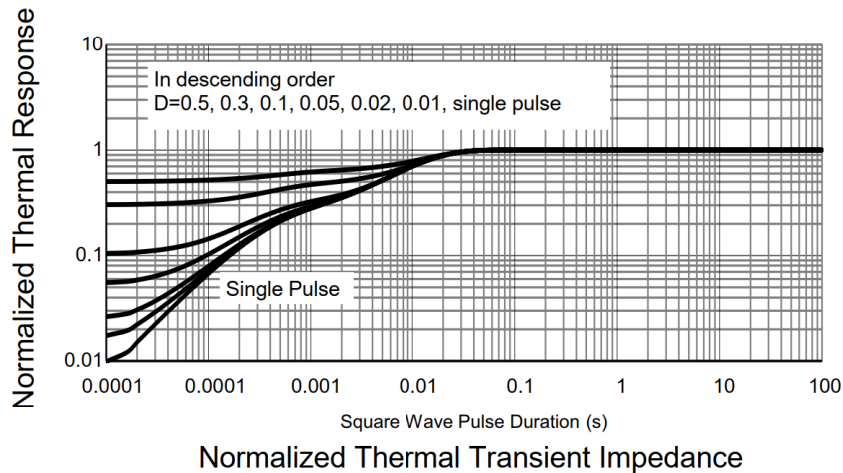
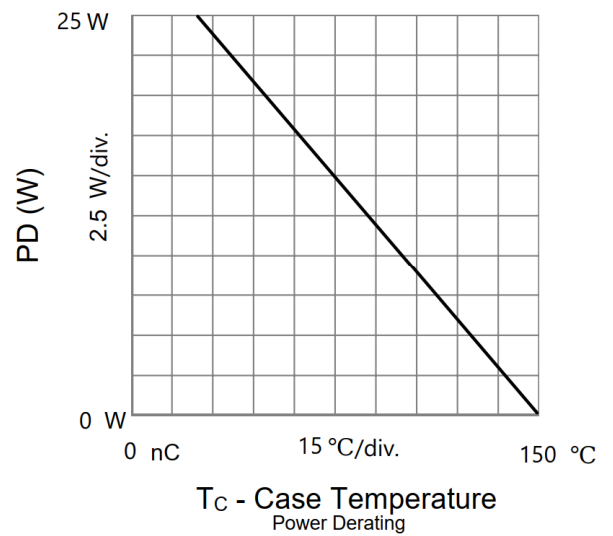
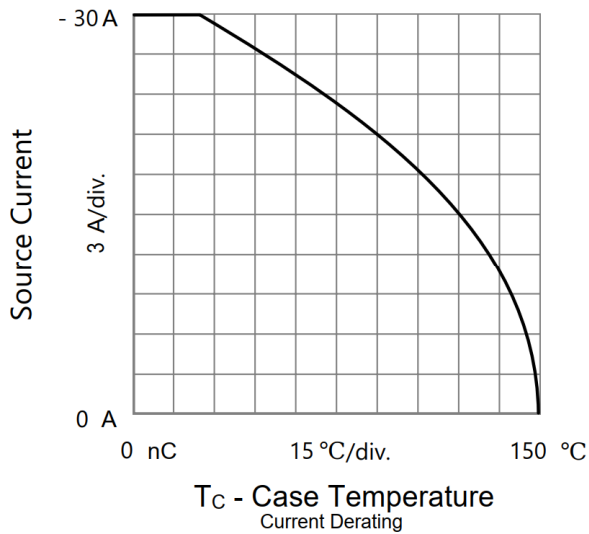
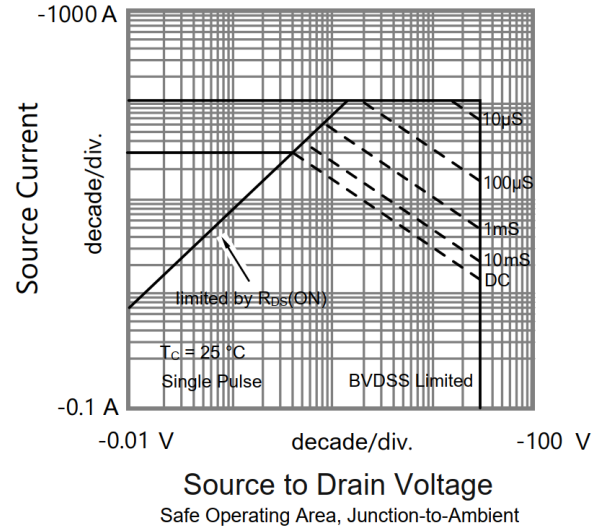
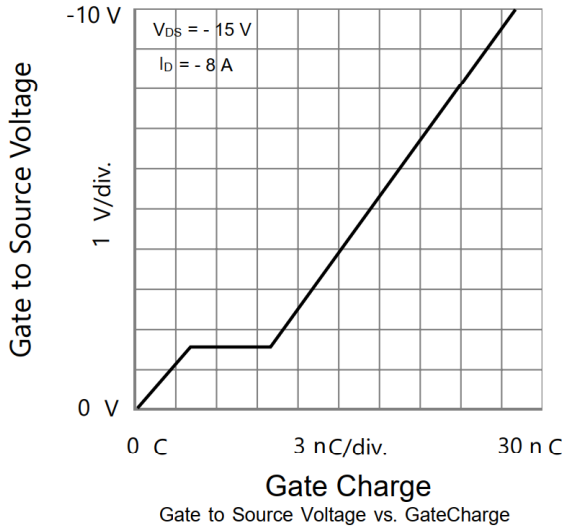


Source to Drain Voltage  
Body Diode Forward Characteristics

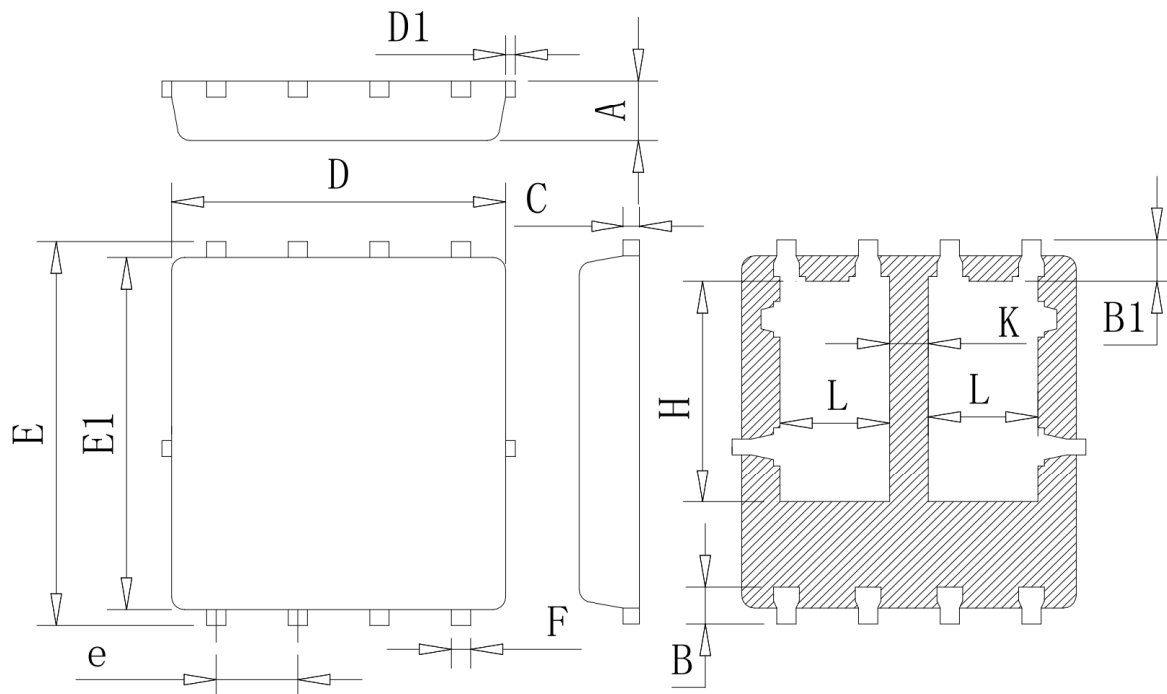


Drain to Source Voltage  
Capacitances

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



# DFN5X6-8L-D PACKAGE OUTLINE



COMMON DIMENSIONS  
(UNITS OF MEASURE=MILLIMETER)

Symbol	Min	Typ	Max
A	0.85	0.95	1.05
B	0.46	0.58	0.73
B1	0.52	0.65	0.78
C	0.18	0.254	0.32
D	4.70	5.20	5.50
D1	-	-	0.18
E	5.75	6.05	6.35
E1	5.35	5.65	5.85
e	1.15	1.27	1.50
F	0.15	0.30	0.50
H	3.15	3.47	3.80
L	1.35	1.70	2.10
K	0.35	0.60	1.00



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