

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

PRODUCT SUMMARY				
	V _{DS} (V)	R _{DS(on)} (mΩ)(Typ.)	I _D (A) ^a	Q _g (Typ.)
N-Channel	30	11 at V _{GS} = 10 V	11	10.3
		14 at V _{GS} = 4.5 V	10	
P-Channel	- 30	21 at V _{GS} = - 10 V	- 10.5	13
		27 at V _{GS} = - 4.5 V	- 9.5	

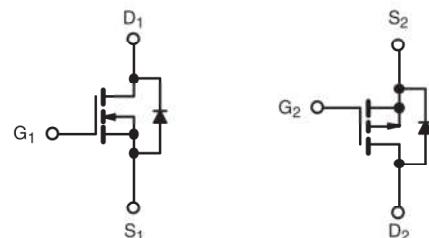
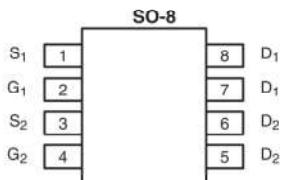
FEATURES

- DT-Trench Power MOSFET
- 100 % R_g and UIS Tested
- Compliant to RoHS Directive 2002/95/EC



APPLICATIONS

- Motor Drive



ABSOLUTE MAXIMUM RATINGS (T _A = 25 °C, unless otherwise noted)				
Parameter	Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage	V _{DS}	30	- 30	V
Gate-Source Voltage	V _{GS}	± 20	± 20	
Continuous Drain Current (T _J = 150 °C)	T _C = 25 °C	I _D	11	A
	T _C = 70 °C		9.8	
	T _A = 25 °C		8.8 ^{b, c}	
	T _A = 70 °C		7.4 ^{b, c}	
Pulsed Drain Current (10 µs Pulse Width)	I _{DM}	43	- 40	
Source-Drain Current Diode Current	T _C = 25 °C	I _S	11	
	T _A = 25 °C		1.6 ^{b, c}	
Pulsed Source-Drain Current	I _{SM}	43	- 40	
Single Pulse Avalanche Current	I _{AS}	20	- 20	mJ
Single Pulse Avalanche Energy	E _{AS}	5	20	
Maximum Power Dissipation	T _C = 25 °C	P _D	6.1	
	T _C = 70 °C		3	
	T _A = 25 °C		3 ^{b, c}	
	T _A = 70 °C		2.28 ^{b, c}	
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to 150		
				°C

THERMAL RESISTANCE RATINGS						
Parameter	Symbol	N-Channel		P-Channel		Unit
		Typ.	Max.	Typ.	Max.	
Maximum Junction-to-Ambient ^{b, d}	t ≤ 10 s	R _{thJA}	20	32.5	27	32.5
Maximum Junction-to-Foot (Drain)	Steady State	R _{thJF}	10	20	19	28

Notes:

- a. Based on T_C = 25 °C.
- b. Surface mounted on 1" x 1" FR4 board.
- c. t = 10 s.
- d. Maximum under steady state conditions is 120 °C/W (n-channel) and 110 °C/W (p-channel).

SPECIFICATIONS ($T_J = 25^\circ\text{C}$, unless otherwise noted)							
Parameter	Symbol	Test Conditions			Min.	Typ. ^a	Max.
Static							
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$	N-Ch	30			V
		$V_{GS} = 0 \text{ V}, I_D = - 250 \mu\text{A}$	P-Ch	- 30			
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250 \mu\text{A}$	N-Ch		30		mV/°C
		$I_D = - 250 \mu\text{A}$	P-Ch		- 24		
$V_{GS(\text{th})}$ Temperature Coefficient	$\Delta V_{GS(\text{th})}/T_J$	$I_D = 250 \mu\text{A}$	N-Ch		- 4.1		
		$I_D = - 250 \mu\text{A}$	P-Ch		5		
Gate Threshold Voltage	$V_{GS(\text{th})}$	$V_{DS} = V_{GS}, I_D = 250 \mu\text{A}$	N-Ch	1		2.2	V
		$V_{DS} = V_{GS}, I_D = - 250 \mu\text{A}$	P-Ch	- 0.9		- 2.5	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$	N-Ch			± 100	nA
		$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$	P-Ch			± 100	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 30 \text{ V}, V_{GS} = 0 \text{ V}$	N-Ch			1	μA
		$V_{DS} = - 30 \text{ V}, V_{GS} = 0 \text{ V}$	P-Ch			- 1	
		$V_{DS} = 24 \text{ V}, V_{GS} = 0 \text{ V}, T_J = 55^\circ\text{C}$	N-Ch			10	
		$V_{DS} = - 24 \text{ V}, V_{GS} = 0 \text{ V}, T_J = 55^\circ\text{C}$	P-Ch			- 10	
On-State Drain Current ^b	$I_{D(on)}$	$V_{DS} = 5 \text{ V}, V_{GS} = 10 \text{ V}$	N-Ch	11			A
		$V_{DS} = - 5 \text{ V}, V_{GS} = - 10 \text{ V}$	P-Ch	-10.5			
Drain-Source On-State Resistance ^b	$R_{DS(on)}$	$V_{GS} = 10 \text{ V}, I_D = 5 \text{ A}$	N-Ch		11	13	mΩ
		$V_{GS} = - 10 \text{ V}, I_D = - 3 \text{ A}$	P-Ch		21	24	
		$V_{GS} = 4.5 \text{ V}, I_D = 4.5 \text{ A}$	N-Ch		14	18	
		$V_{GS} = - 4.5 \text{ V}, I_D = - 2.5 \text{ A}$	P-Ch		27	31	
Forward Transconductance ^b	g_{fs}	$V_{DS} = 15 \text{ V}, I_D = 5 \text{ A}$	N-Ch		37		S
		$V_{DS} = - 15 \text{ V}, I_D = - 3 \text{ A}$	P-Ch		35		
Dynamic^a							
Input Capacitance	C_{iss}	N-Channel $V_{DS} = 15 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$ P-Channel $V_{DS} = - 15 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	N-Ch		436		pF
Output Capacitance	C_{oss}		P-Ch		1190		
Reverse Transfer Capacitance	C_{rss}		N-Ch		67		
Total Gate Charge	Q_g		P-Ch		147		
Gate-Source Charge	Q_{gs}		N-Ch		62		
Gate-Drain Charge	Q_{gd}		P-Ch		137		
Gate Resistance	R_g	$f = 1 \text{ MHz}$	N-Ch		10		nC
			P-Ch		22		
			N-Ch		2		
			P-Ch		6		
			N-Ch		6		
			P-Ch		9		
			N-Ch		2		Ω
			P-Ch		6		

SPECIFICATIONS ($T_J = 25^\circ\text{C}$, unless otherwise noted)

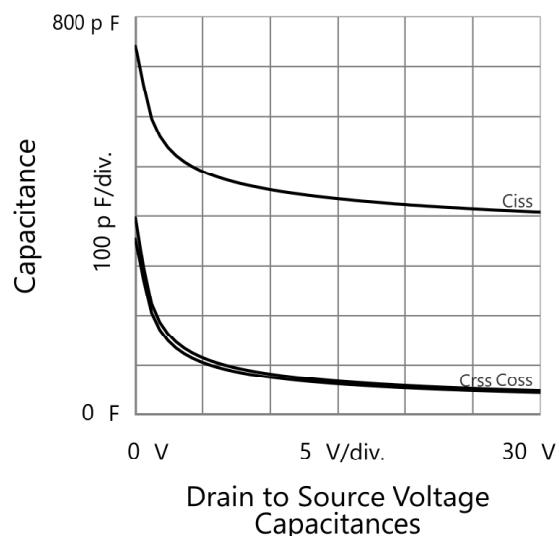
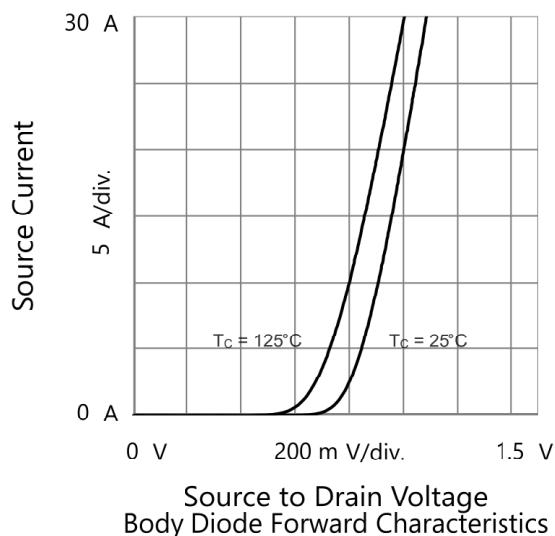
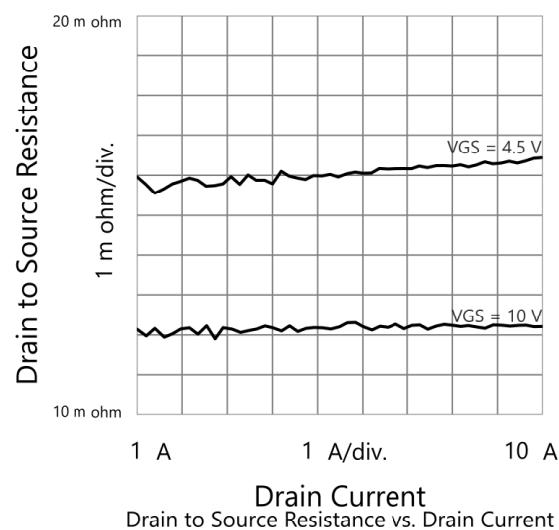
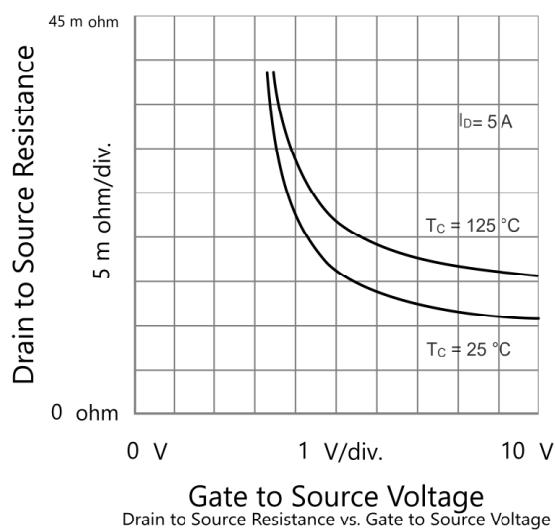
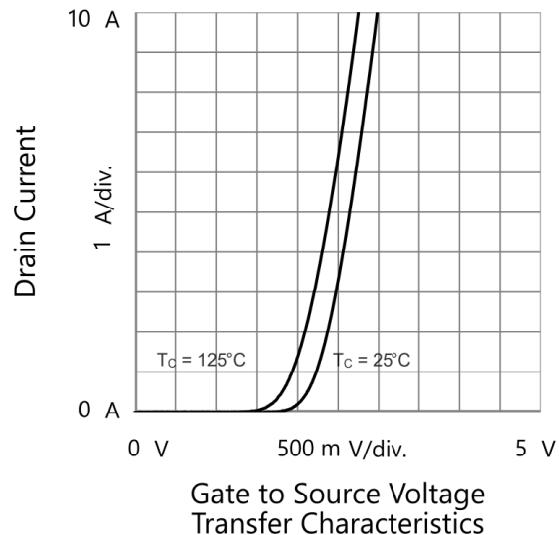
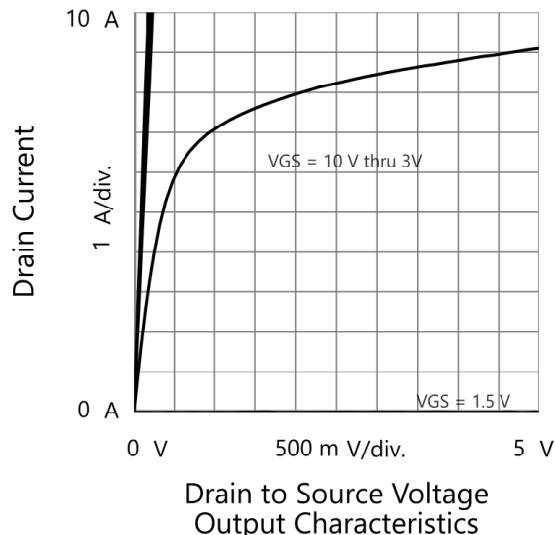
Parameter	Symbol	Test Conditions	Min.	Typ. ^a	Max.	Unit
Dynamic^a						
Turn-On Delay Time	$t_{d(on)}$	N-Channel $V_{DD} = 15 \text{ V}, R_L = 3.7 \Omega$ $I_D \equiv 5 \text{ A}, V_{GEN} = 10 \text{ V}, R_g = 1 \Omega$	N-Ch	5		
Rise Time	t_r		P-Ch	10		
Turn-Off Delay Time	$t_{d(off)}$	P-Channel $V_{DD} = -15 \text{ V}, R_L = 2 \Omega$ $I_D \equiv -3 \text{ A}, V_{GEN} = -10 \text{ V}, R_g = 1 \Omega$	N-Ch	10		
Fall Time	t_f		P-Ch	9		
Turn-On Delay Time	$t_{d(on)}$	N-Channel $V_{DD} = 15 \text{ V}, R_L = 3.7 \Omega$ $I_D \equiv 4.5 \text{ A}, V_{GEN} = 4.5 \text{ V}, R_g = 1 \Omega$	N-Ch	16		
Rise Time	t_r		P-Ch	50		
Turn-Off Delay Time	$t_{d(off)}$	P-Channel $V_{DD} = -15 \text{ V}, R_L = 2 \Omega$ $I_D \equiv -2.5 \text{ A}, V_{GEN} = -4.5 \text{ V}, R_g = 1 \Omega$	N-Ch	7		
Fall Time	t_f		P-Ch	13		
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25^\circ\text{C}$	N-Ch		11	
			P-Ch		- 10.5	
Pulse Diode Forward Current ^a	I_{SM}		N-Ch		43	A
			P-Ch		- 40	
Body Diode Voltage	V_{SD}	$I_S = 5 \text{ A}$	N-Ch	0.81	1.2	V
		$I_S = -3 \text{ A}$	P-Ch	- 0.77	- 1.2	
Body Diode Reverse Recovery Time	t_{rr}		N-Ch	17		ns
			P-Ch	41		
Body Diode Reverse Recovery Charge	Q_{rr}	N-Channel $I_F = 5 \text{ A}, dI/dt = 100 \text{ A}/\mu\text{s}, T_J = 25^\circ\text{C}$	N-Ch	10		nC
			P-Ch	32		
Reverse Recovery Fall Time	t_a	P-Channel $I_F = -3 \text{ A}, dI/dt = -100 \text{ A}/\mu\text{s}, T_J = 25^\circ\text{C}$	N-Ch	10		
			P-Ch	15		
Reverse Recovery Rise Time	t_b		N-Ch	7		ns
			P-Ch	26		

Notes:

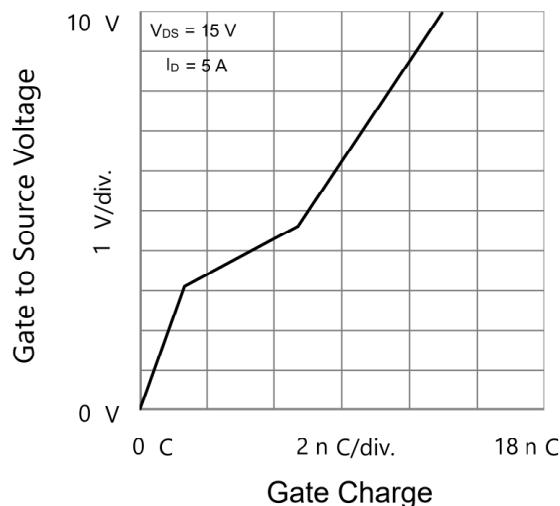
- a. Guaranteed by design, not subject to production testing.
- b. Pulse test; pulse width $\leq 300 \mu\text{s}$, duty cycle $\leq 2\%$.

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.

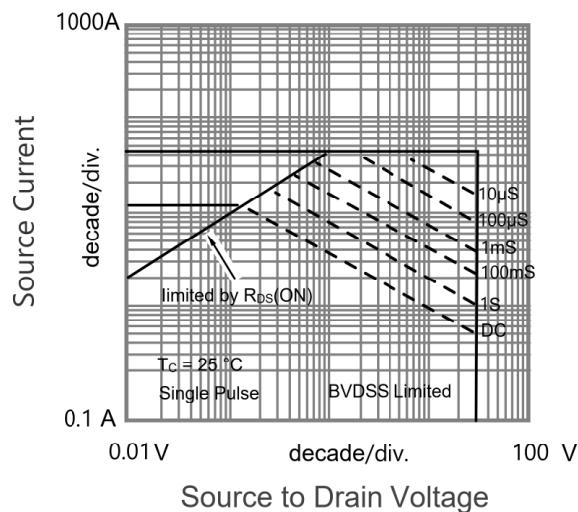
N-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



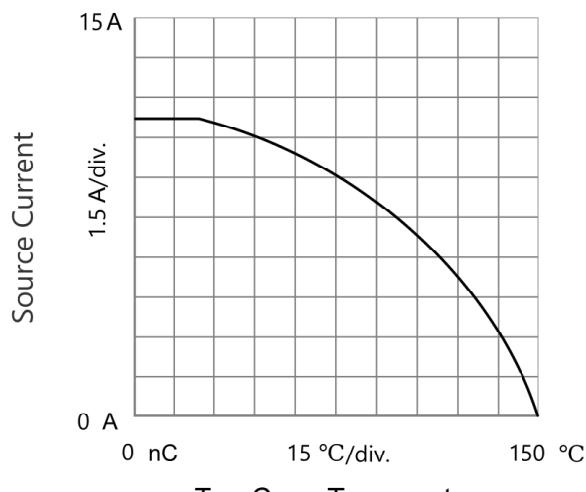
N-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



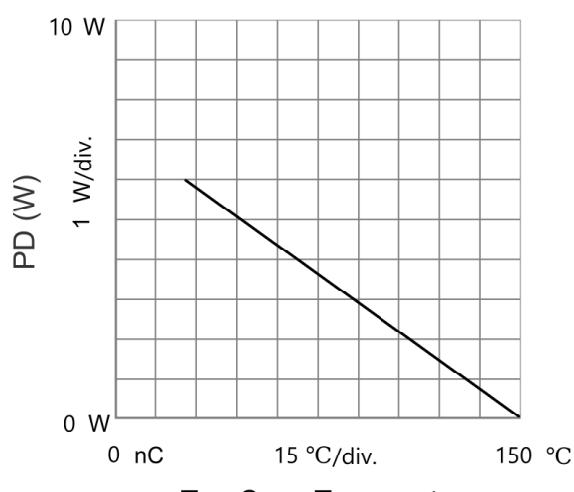
Gate Charge
Gate to Source Voltage vs. Gate Charge



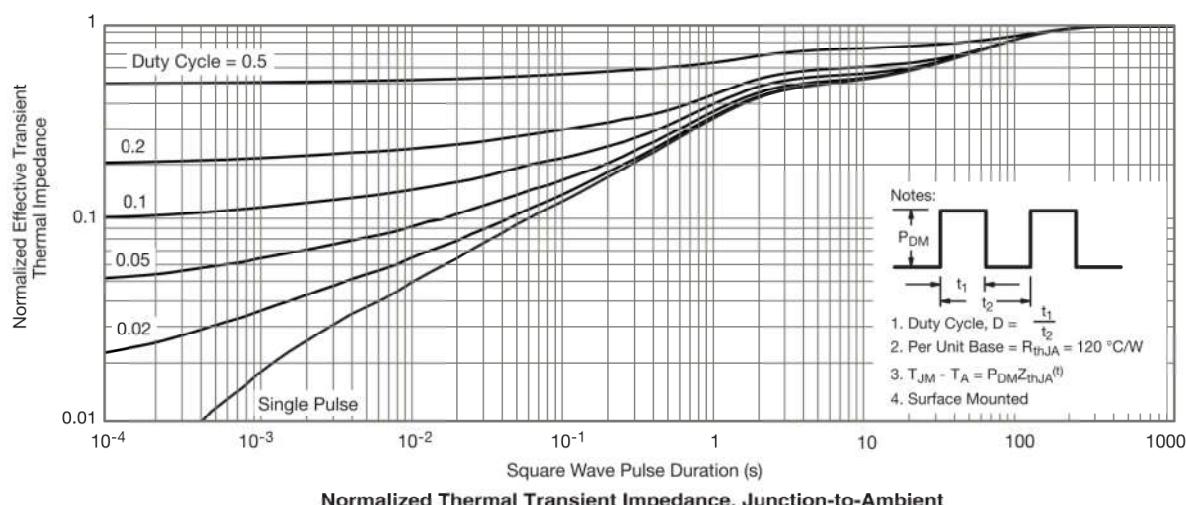
Source to Drain Voltage
Safe Operating Area, Junction-to-Ambient



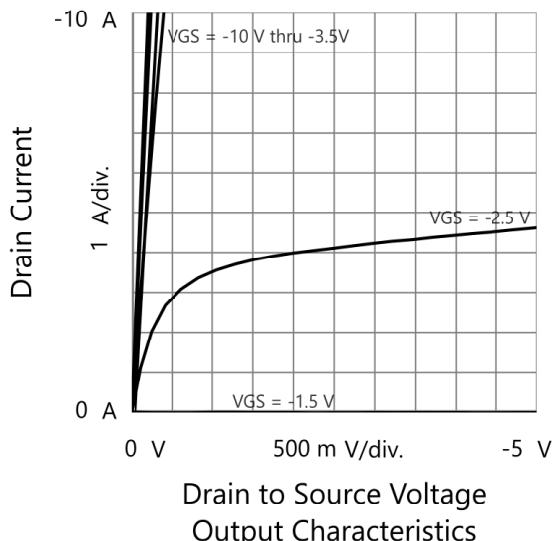
T_C - Case Temperature
Current Derating



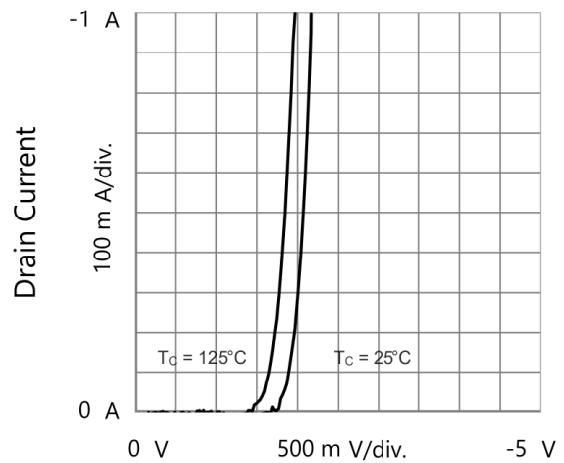
T_C - Case Temperature
Power Derating



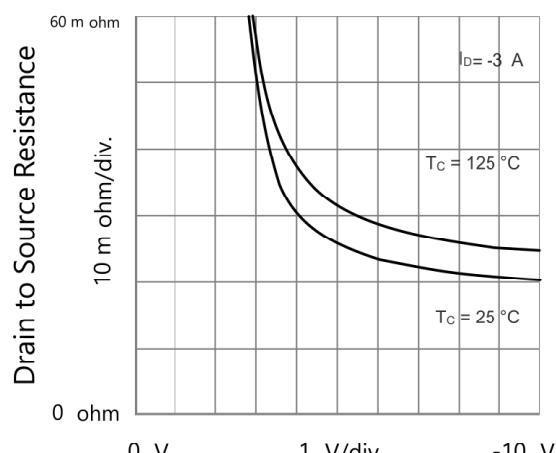
P-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



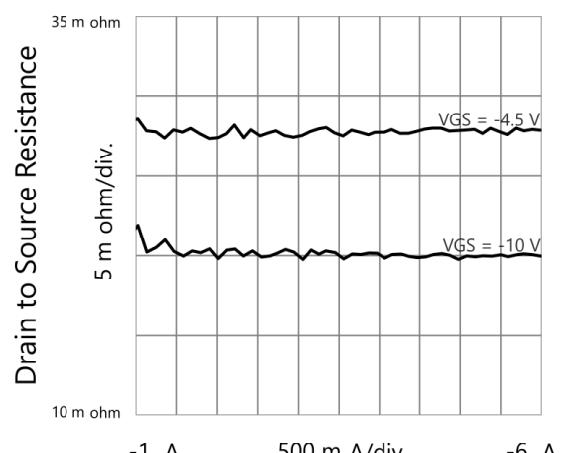
Drain to Source Voltage
Output Characteristics



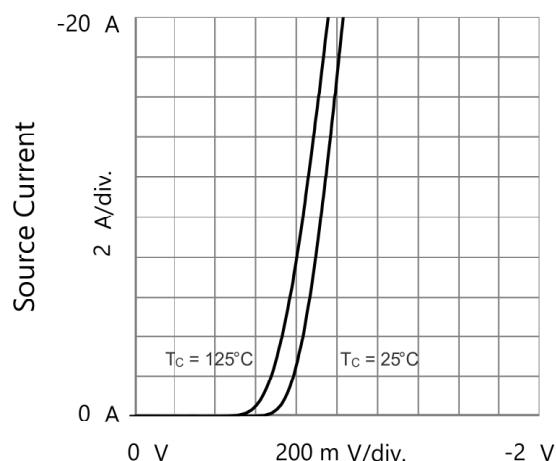
Gate to Source Voltage
Transfer Characteristics



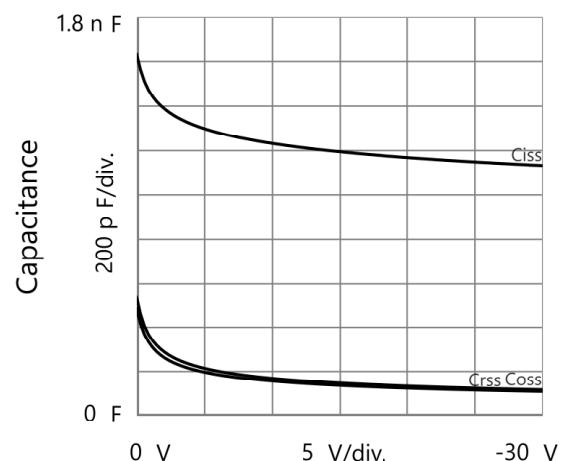
Gate to Source Voltage
Drain to Source Resistance vs. Gate to Source Voltage



Drain Current
Drain to Source Resistance vs. Drain Current

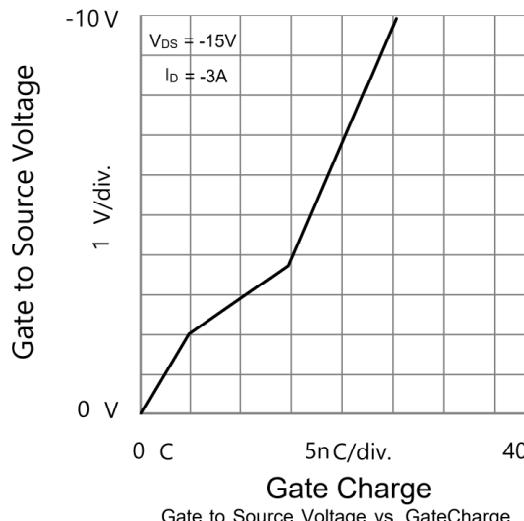


Source to Drain Voltage
Body Diode Forward Characteristics

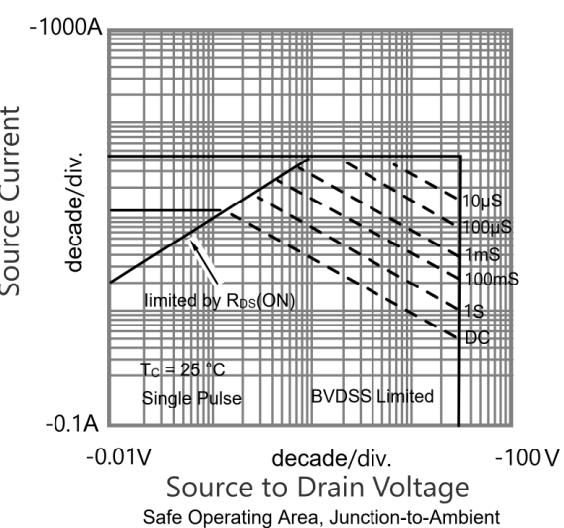


Drain to Source Voltage
Capacitances

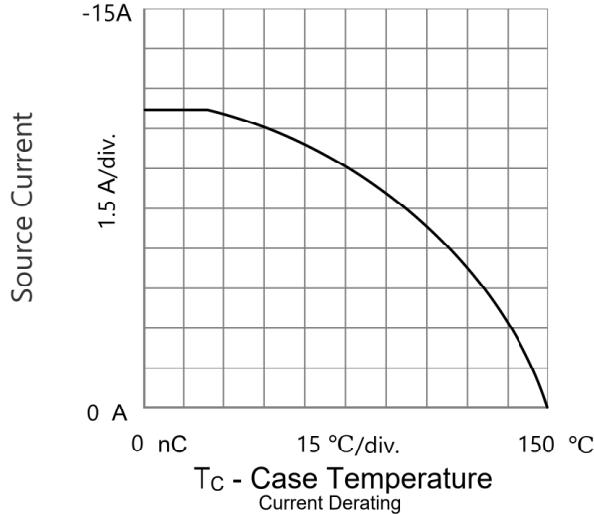
P-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



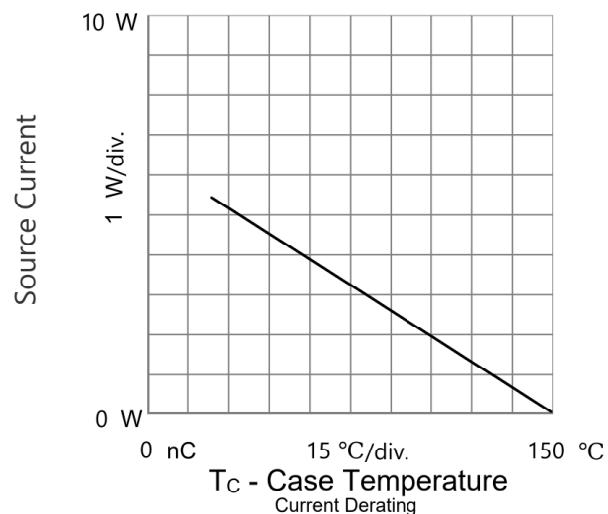
Gate to Source Voltage vs. Gate Charge



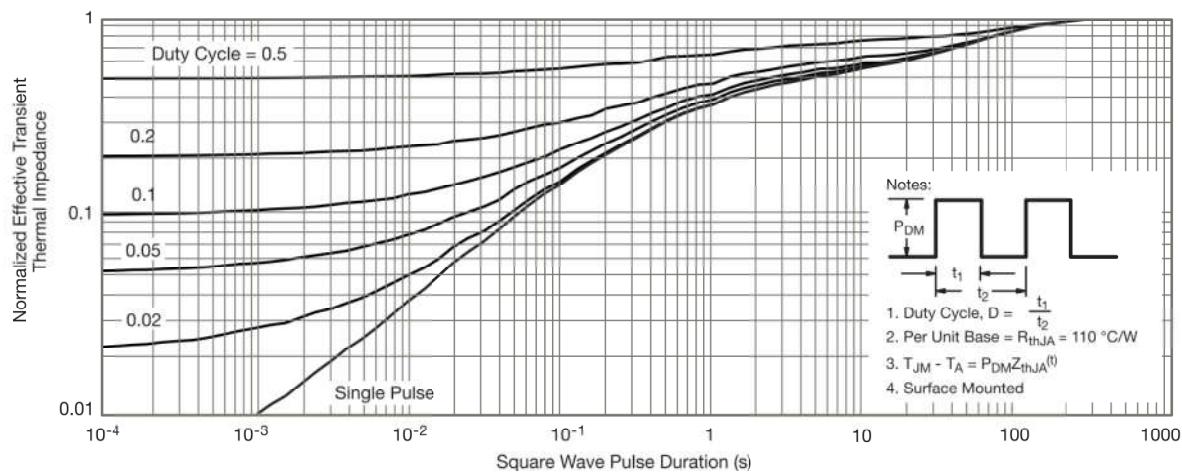
Source Current
Safe Operating Area, Junction-to-Ambient



T_C - Case Temperature
Current Derating



T_C - Case Temperature
Current Derating



Normalized Thermal Transient Impedance, Junction-to-Ambient

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