

N- and P-Channel 40 V (D-S) MOSFET

PRODUCT SUMMARY

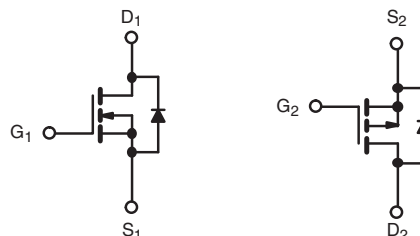
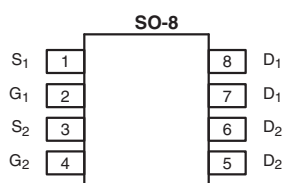
	V _{DS} (V)	R _{DS(on)} (mΩ)(Typ.)	I _D (A) ^a	Q _g (Typ.)
N-Channel	40	16 at V _{GS} = 10 V	6.7	19.5 nC
		24 at V _{GS} = 4.5 V		
P-Channel	- 40	32 at V _{GS} = - 10 V	- 6.1	21 nC
		52 at V _{GS} = - 4.5 V		

FEATURES

- DT-Trench Power MOSFET
- 100 % Rgand UIS Tested

APPLICATIONS

- Backlight Inverter for LCD Display
- Full Bridge Converter


RoHS
 COMPLIANT


ABSOLUTE MAXIMUM RATINGS T_A = 25 °C, unless otherwise noted

Parameter		Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage		V _{DS}	40	- 40	V
Gate-Source Voltage		V _{GS}	± 20		
Continuous Drain Current (T _J = 150 °C)	T _C = 25 °C	I _D	6.7	- 6.1	A
	T _C = 70 °C		5.4	- 4.7	
	T _A = 25 °C		5.6 ^{b, c}	- 4.7 ^{b, c}	
	T _A = 70 °C		4.4 ^{b, c}	- 3.7 ^{b, c}	
Pulsed Drain Current		I _{DM}	20	- 20	
Single Pulse Avalanche Energy		E _{AS}	2.45	5	mJ
Maximum Power Dissipation	T _C = 25 °C	P _D	3.0	3.1	W
	T _C = 70 °C		1.92	1.98	
	T _A = 25 °C		2.0 ^{b, c}	2.0 ^{b, c}	
	T _A = 70 °C		1.28 ^{b, c} 1.28 ^{b, c}		
Operating Junction and Storage Temperature Range		T _J , T _{stg}	- 55 to 150		°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	N-Channel Max.	P-Channel Max.	Unit
Maximum Junction-to-Ambient ^{b, d}	R _{thJA}	62.5	62.5	°C/W
Maximum Junction-to-Foot (Drain)	R _{thJC}	41.6	40.3	

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.

SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted							
Parameter	Symbol	Test Conditions		Min.	Typ. ^a	Max.	Unit
Static							
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	N-Ch	40			V
		$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	P-Ch	-40			
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	N-Ch	1.4		3	V
		$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	P-Ch	-1.2		-2.5	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$	N-Ch P-Ch			100 -100	nA
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	
		$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^{\circ}\text{C}$	N-Ch			10	
		$V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^{\circ}\text{C}$	P-Ch			-10	
On-State Drain Current ^b	$I_{D(on)}$	$V_{DS} = 5\text{ V}, V_{GS} = 10\text{ V}$	N-Ch	10			A
		$V_{DS} = -5\text{ V}, V_{GS} = -10\text{ V}$	P-Ch	-10			
Drain-Source On-State Resistance ^b	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 3\text{ A}$	N-Ch		16	19	m Ω
		$V_{GS} = -10\text{ V}, I_D = -2\text{ A}$	P-Ch		32	39	
		$V_{GS} = 4.5\text{ V}, I_D = 3\text{ A}$	N-Ch		24	28	
		$V_{GS} = -4.5\text{ V}, I_D = -2\text{ A}$	P-Ch		52	58	
Forward Transconductance ^b	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 3\text{ A}$	N-Ch		18		S
		$V_{DS} = -15\text{ V}, I_D = -2\text{ A}$	P-Ch		12		
Dynamic ^a							
Input Capacitance	C_{iss}	N-Channel $V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	N-Ch P-Ch		980 1320		pF
Output Capacitance	C_{oss}		N-Ch P-Ch		73 105		
Reverse Transfer Capacitance	C_{rss}	P-Channel $V_{DS} = -20\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	N-Ch P-Ch		64 94		
Total Gate Charge	Q_g	N-Channel $V_{DS} = 20\text{ V}, V_{GS} = 10\text{ V}, I_D = 3\text{ A}$	N-Ch P-Ch		19.5 21		nC
Gate-Source Charge	Q_{gs}		N-Ch P-Ch		1.8 2.2		
Gate-Drain Charge	Q_{gd}	P-Channel $V_{DS} = -20\text{ V}, V_{GS} = 10\text{ V}, I_D = -2\text{ A}$	N-Ch P-Ch		3.1 3.5		
Gate Resistance	R_g	$f = 1\text{ MHz}$	N-Ch P-Ch		3.5 6.5		Ω

SPECIFICATIONS T _J = 25 °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} = 20 V, R _L = 4 Ω I _D ≅ 5 A, V _{GEN} = 10 V, R _g = 1 Ω	N-Ch		7		ns	
			P-Ch		7			
Rise Time	t _r		N-Ch		10			
			P-Ch		12			
Turn-Off Delay Time	t _{d(off)}	P-Channel V _{DD} = - 20 V, R _L = 4 Ω I _D ≅ - 5 A, V _{GEN} = - 10 V, R _g = 1 Ω	N-Ch		15			
			P-Ch		30			
Fall Time	t _f		N-Ch		9			
			P-Ch		9			
Turn-On Delay Time	t _{d(on)}	N-Channel V _{DD} = 20 V, R _L = 4 Ω I _D ≅ 5 A, V _{GEN} = 4.5 V, R _g = 1 Ω	N-Ch		16			
			P-Ch		44			
Rise Time	t _r		N-Ch		17			
			P-Ch		33			
Turn-Off Delay Time	t _{d(off)}	P-Channel V _{DD} = - 20 V, R _L = 4 Ω I _D ≅ - 5 A, V _{GEN} = - 4.5 V, R _g = 1 Ω	N-Ch		16			
			P-Ch		28			
Fall Time	t _f		N-Ch		10			
			P-Ch		13			
Drain-Source Body Diode Characteristics								
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C	N-Ch			6.7	A	
			P-Ch			- 6.1		
Pulse Diode Forward Current ^a	I _{SM}	T _C = 25 °C	N-Ch			20		
			P-Ch			- 20		
Body Diode Voltage	V _{SD}	I _S = 1 A	N-Ch			1.2	V	
		I _S = - 1 A	P-Ch			- 1.2		
Body Diode Reverse Recovery Time	t _{rr}	N-Channel I _F = 3 A, dI/dt = 100 A/μs, T _J = 25 °C	N-Ch		20	30	ns	
			P-Ch		26	50		
Body Diode Reverse Recovery Charge	Q _{rr}		P-Channel I _F = - 2 A, dI/dt = - 100 A/μs, T _J = 25 °C	N-Ch		15	25	nC
				P-Ch		18.5	35	
Reverse Recovery Fall Time	t _a			N-Ch		14		ns
				P-Ch		12.5		
Reverse Recovery Rise Time	t _b		N-Ch		7			
			P-Ch		13.5			

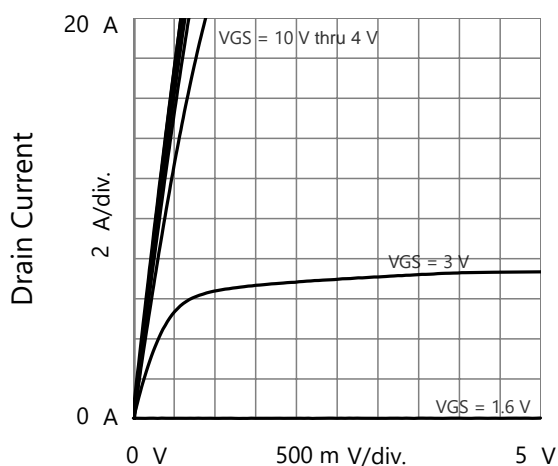
Notes:

a. Guaranteed by design, not subject to production testing.

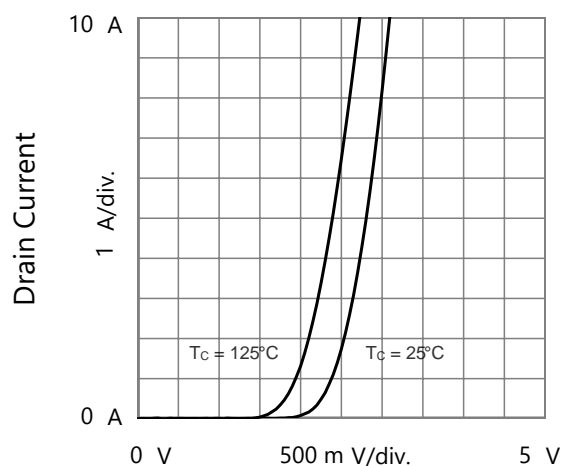
 b. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

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.

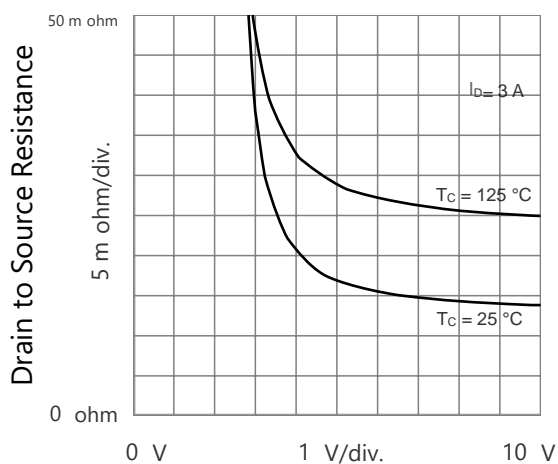
N-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



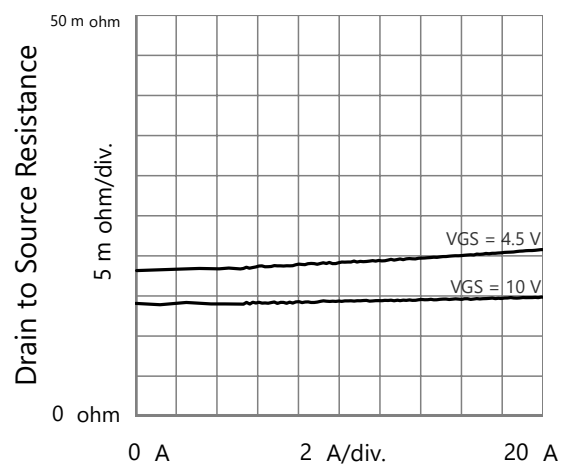
Drain to Source Voltage
Output Characteristics



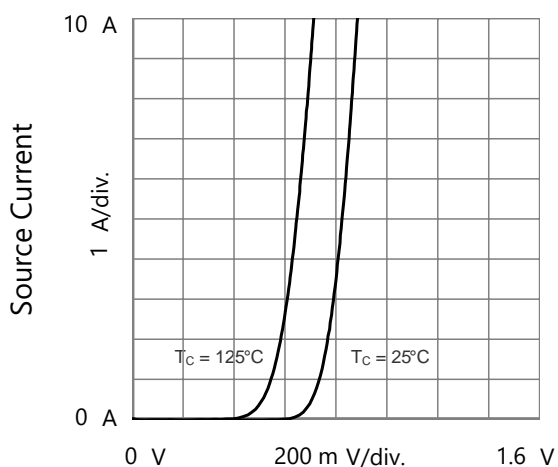
Gate to Source Voltage
Transfer Characteristics



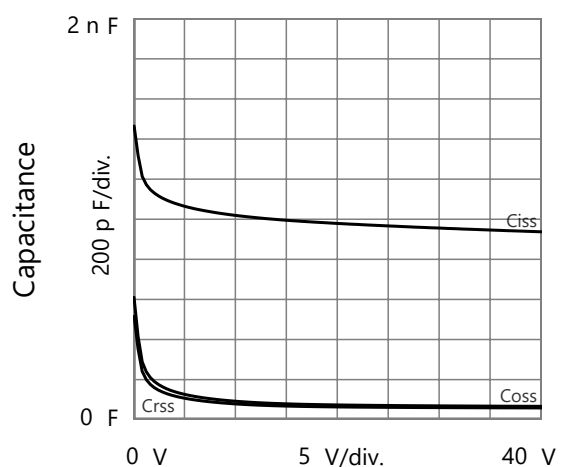
Gate to Source Voltage
Drain to Source Resistance vs. Gate to Source Voltage



Drain Current
Drain to Source Resistance vs. Drain Current

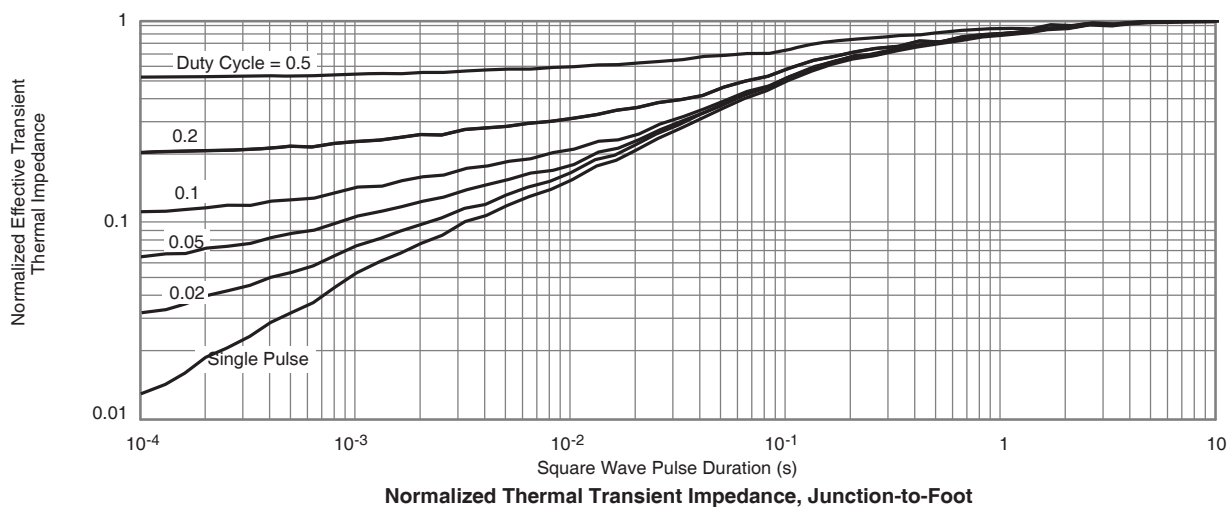
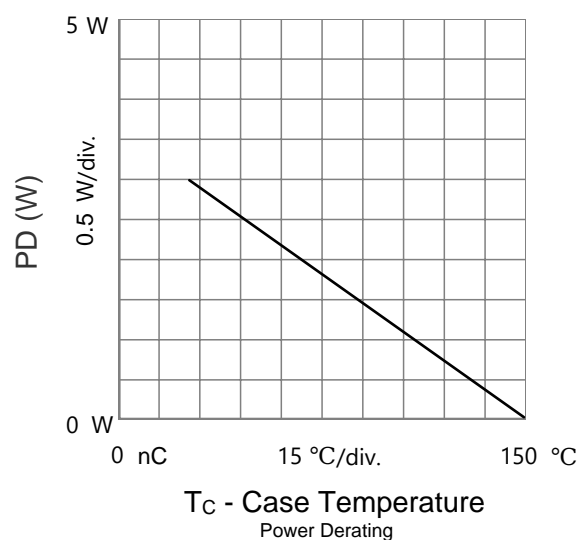
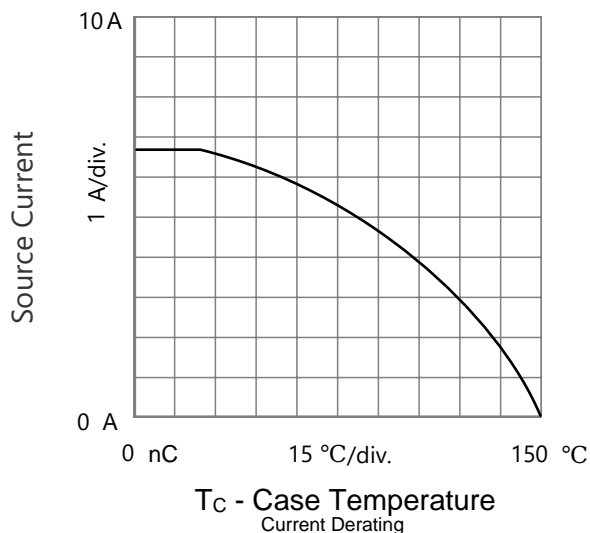
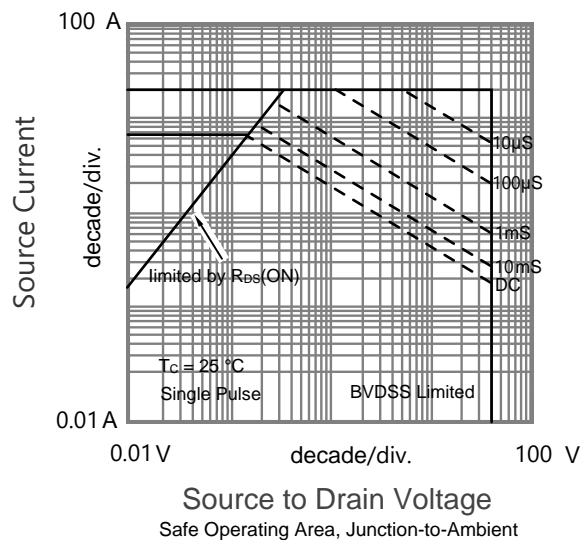
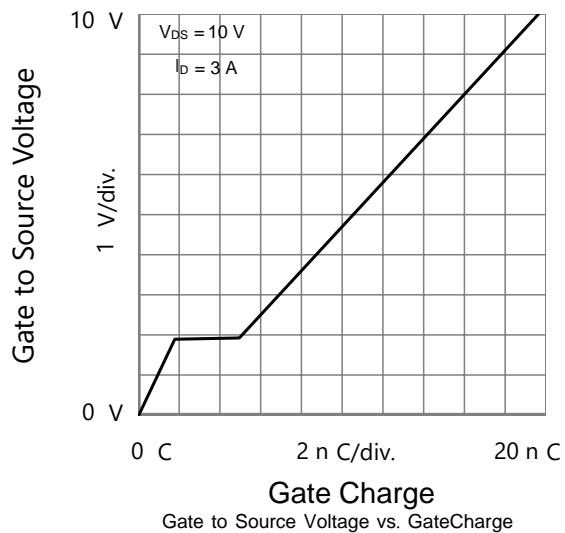


Source to Drain Voltage
Body Diode Forward Characteristics

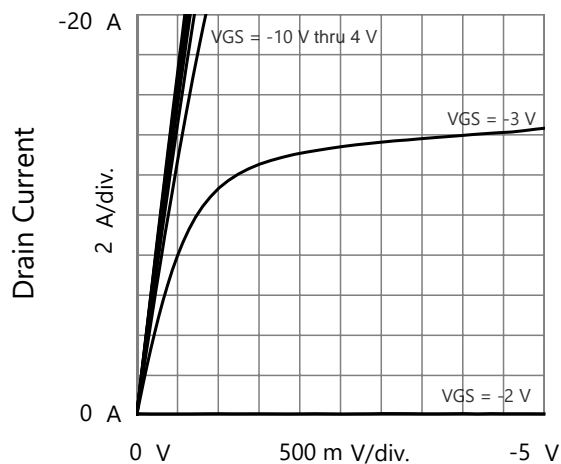


Drain to Source Voltage
Capacitances

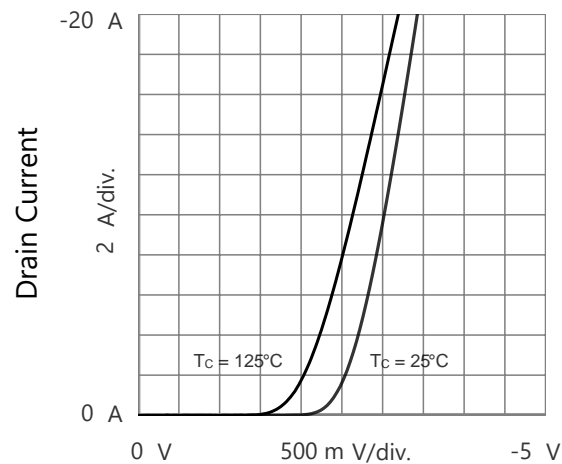
N-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



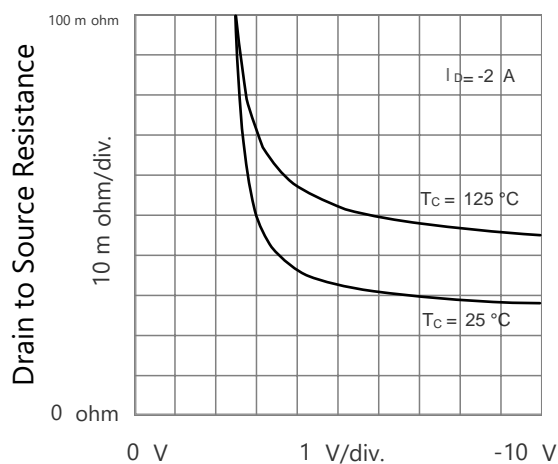
P-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



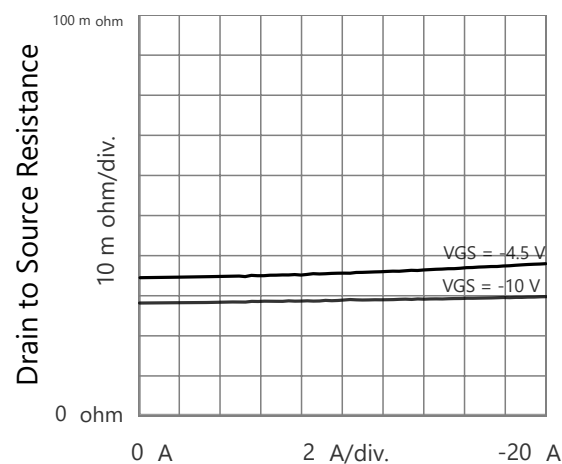
Drain to Source Voltage
Output Characteristics



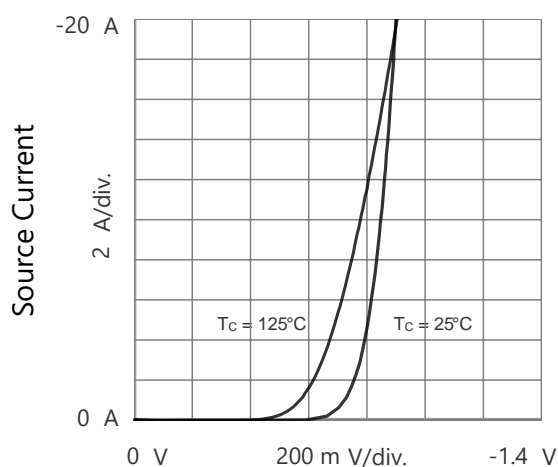
Gate to Source Voltage
Transfer Characteristics



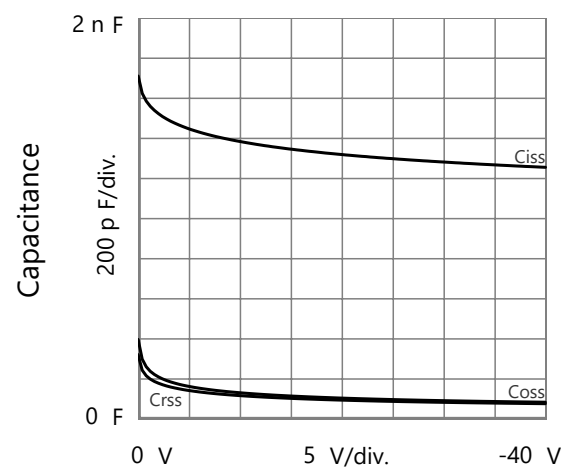
Gate to Source Voltage
Drain to Source Resistance vs. Gate to Source Voltage



Drain Current
Drain to Source Resistance vs. Drain Current

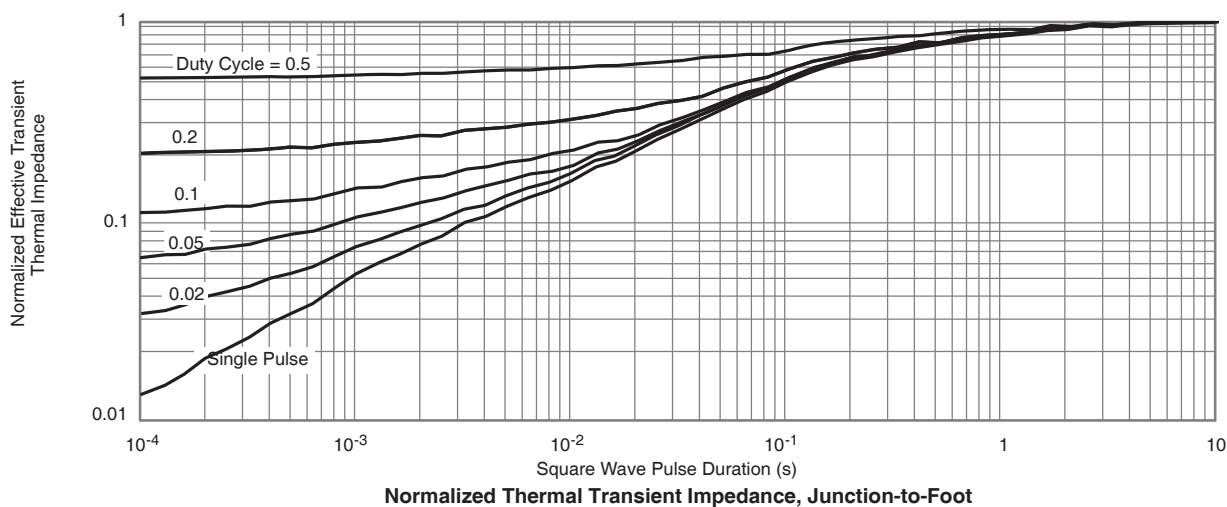
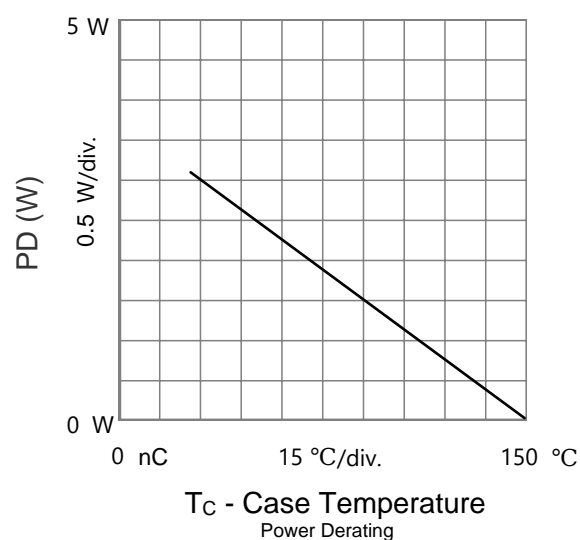
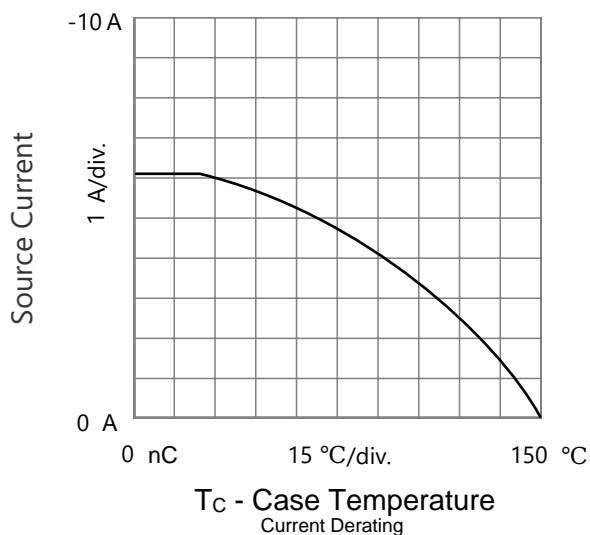
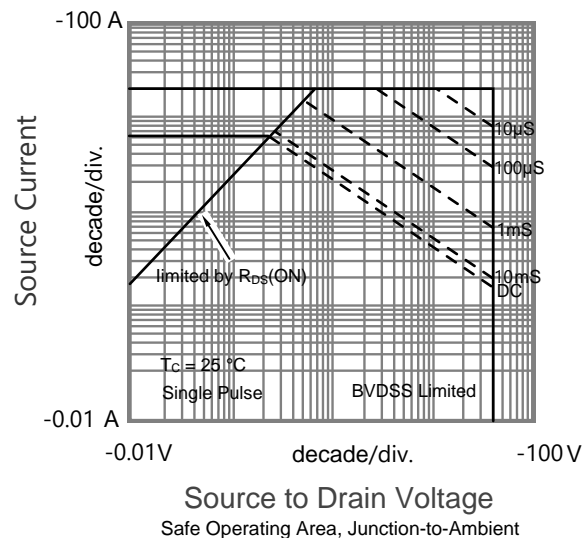
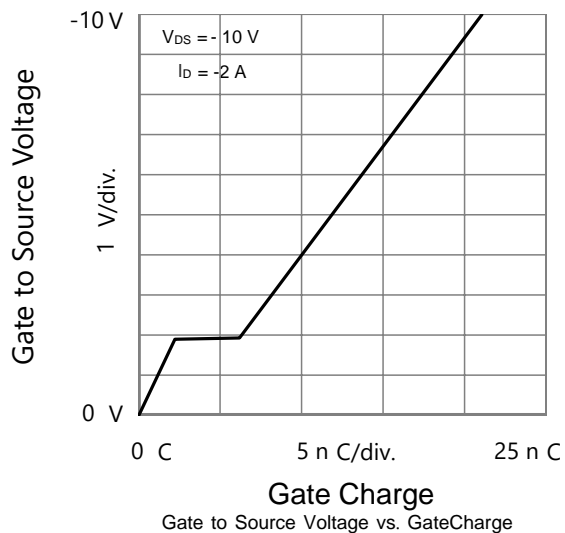


Source to Drain Voltage
Body Diode Forward Characteristics

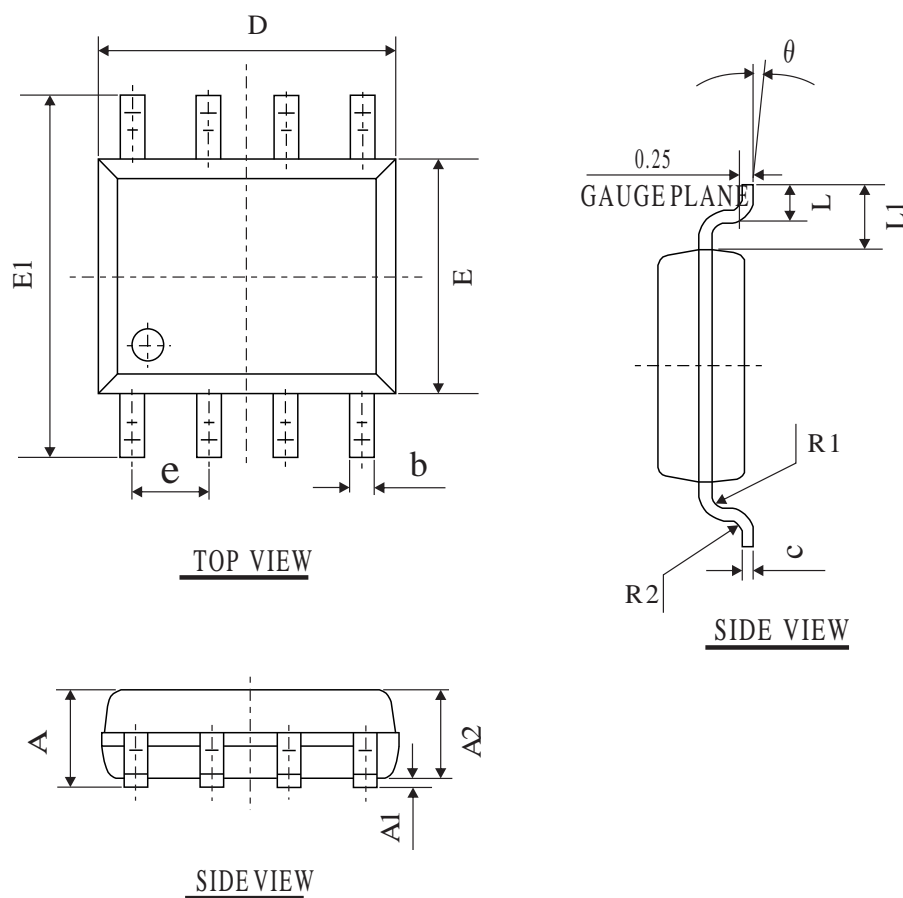


Drain to Source Voltage
Capacitances

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



SOP-8 PACKAGE OUTLINE



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	TYP	MAX
A	1.30	1.60	1.85
A1	0.03	0.15	0.28
A2	1.20	1.45	1.70
b	0.26	0.40	0.54
C	0.132	0.203	0.273
D	4.50	4.90	5.30
E	3.50	3.00	4.30
E1	5.50	6.00	6.50
L	0.30	0.70	1.10
θ	2°	4°	6°
L1	1.04REF		
e	1.27BSC		
R1	0.07TYP		
R2	0.07TYP		

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