

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


RoHS
 COMPLIANT

PRODUCT SUMMARY

	V _{DS} (V)	R _{DS(on)} (mΩ)(Typ.)	I _D (A) ^a	Q _g (Typ.)
N-Channel	40	15 at V _{GS} = 10 V	32	19.6
		19 at V _{GS} = 4.5 V		
P-Channel	- 40	30 at V _{GS} = - 10 V	- 28	25
		36 at V _{GS} = - 4.5 V		

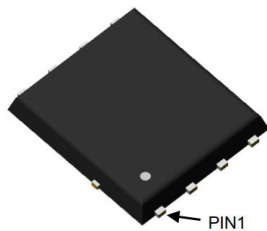
FEATURES

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

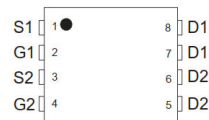
APPLICATIONS

- DC Fan
- Motor Drive Applications

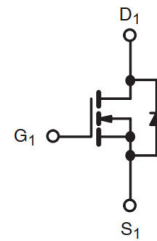
Top View



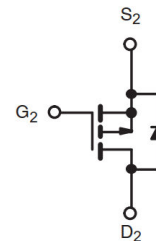
DFN5X6-8L Pin Configuration



Top View



N-Channel MOSFET



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_C = 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	± 20	
Continuous Drain Current (T _J = 175 °C)	T _C = 25 °C	I _D	32	- 28	A
	T _C = 100 °C		20	- 16	
Pulsed Drain Current (t = 100 μs)		I _{DM}	128	- 112	
Single Avalanche Energy ^a	L = 0.5 mH	E _{AS}	45	70	mJ
Maximum Power Dissipation	T _C = 25 °C	P _D	45 ^{b,c}	45 ^{b,c}	W
	T _C = 100 °C		18 ^{b,c}	18 ^{b,c}	
Operating Junction and Storage Temperature Range		T _J , T _{stg}	-55 to +150		°C
Soldering Recommendations (Peak Temperature)			260		

THERMAL RESISTANCE RATINGS

Parameter	Symbol	N-Channel		P-Channel		Unit
		Typ.	Max.	Typ.	Max.	
Maximum Junction-to-Ambient ^{b, d}	R _{thJA}	50	60	50	60	°C/W
Maximum Junction-to-Case (Drain)	R _{thJC}	2.5	2.8	2.5	2.8	

Notes:

 a. T_C = 25 °C.

b. Surface mounted on 1" x 1" FR4 board.

c. t = 10 s.

d. Maximum under steady state conditions is 70 °C/W.

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 _{DS}	V _{GS} = 0 V, I _D = 250 μA	40	-	-	V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	1.0	-	2.5	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V	-	-	± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 40 V, V _{GS} = 0 V	-	-	1	μA
		V _{DS} = 32 V, V _{GS} = 0 V, T _J = 55 °C	-	-	10	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 10 V, V _{GS} = 10 V	32	-	-	A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 10 V, I _D = 12 A	-	15	20	mΩ
		V _{GS} = 4.5 V, I _D = 10 A	-	19	25	
Forward Transconductance ^a	g _{fs}	V _{DS} = 5 V, I _D = 12 A	-	12	-	S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 20 V, f = 1 MHz	-	979	-	pF
Output Capacitance	C _{oss}		-	74	-	
Reverse Transfer Capacitance	C _{rss}		-	64	-	
Total Gate Charge ^c	Q _g	V _{DS} = 20 V, V _{GS} = 10 V, I _D = 12 A	-	19.6	-	nC
Gate-Source Charge ^c	Q _{gs}		-	1.8	-	
Gate-Drain Charge ^c	Q _{gd}		-	3.2	-	
Gate Resistance	R _g	f = 1 MHz	-	3.9	-	Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DS} = 20 V, I _D = 12 A, R _g = 2.5 Ω V _{GS} = 10 V	-	10	-	ns
Rise Time ^c	t _r		-	5	-	
Turn-Off Delay Time ^c	t _{d(off)}		-	44	-	
Fall Time ^c	t _f		-	6	-	
Drain-Source Body Diode Ratings and Characteristics ^b (T _C = 25 °C)						
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C	-	-	32	A
Pulsed Current (t = 100 μs)	I _{SM}		-	-	128	A
Forward Voltage ^a	V _{SD}	I _F = 12 A, V _{GS} = 0 V	-	-	1.2	V
Reverse Recovery Time	t _{rr}	I _F = 12 A, di/dt = 300 A/μs	-	19	-	ns
Reverse Recovery Charge	Q _{rr}		-	14	-	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)

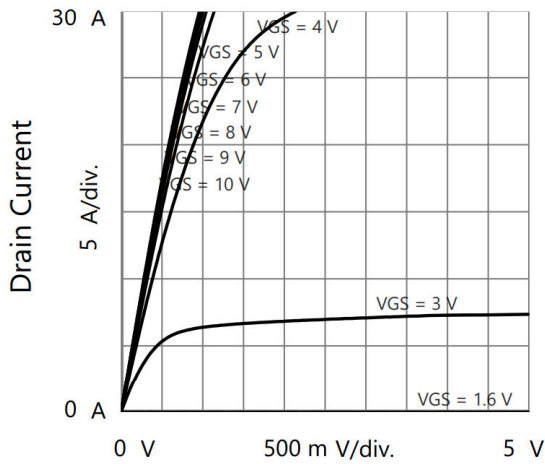
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = - 250 μA	- 40	-	-	V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = - 250 μA	- 1.0	-	- 2.5	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V	-	-	± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = - 40 V, V _{GS} = 0 V	-	-	- 1	μA
		V _{DS} = - 32 V, V _{GS} = 0 V, T _J = 55 °C	-	-	- 10	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≤ - 10 V, V _{GS} = - 10 V	- 28	-	-	A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = - 10 V, I _D = - 8 A	-	30	38	mΩ
		V _{GS} = - 4.5 V, I _D = - 8 A	-	36	50	
Forward Transconductance ^a	g _{fs}	V _{DS} = - 5 V, I _D = - 8 A	-	9	-	S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = - 20 V, f = 1 MHz	-	1320	-	pF
Output Capacitance	C _{oss}		-	105	-	
Reverse Transfer Capacitance	C _{rss}		-	95	-	
Total Gate Charge ^c	Q _g	V _{DS} = - 20 V, V _{GS} = - 10 V, I _D = - 8 A	-	25	-	nC
Gate-Source Charge ^c	Q _{gs}		-	3	-	
Gate-Drain Charge ^c	Q _{gd}		-	5.2	-	
Gate Resistance	R _g	f = 1 MHz	-	6.7	-	Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DS} = - 20 V, I _D = - 8 A, R _g = 2.5 Ω V _{GS} = - 10 V	-	23	-	ns
Rise Time ^c	t _r		-	15	-	
Turn-Off Delay Time ^c	t _{d(off)}		-	50	-	
Fall Time ^c	t _f		-	6	-	
Drain-Source Body Diode Ratings and Characteristics ^b (T _C = 25 °C)						
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C	-	-	- 28	A
Pulsed Current (t = 100 μs)	I _{SM}		-	-	- 112	A
Forward Voltage ^a	V _{SD}	I _F = - 8 A, V _{GS} = 0 V	-	-	- 1.2	V
Reverse Recovery Time	t _{rr}	I _F = - 8 A, di/dt = 300 A/μs	-	26	-	ns
Reverse Recovery Charge	Q _{rr}		-	20	-	nC

Notes

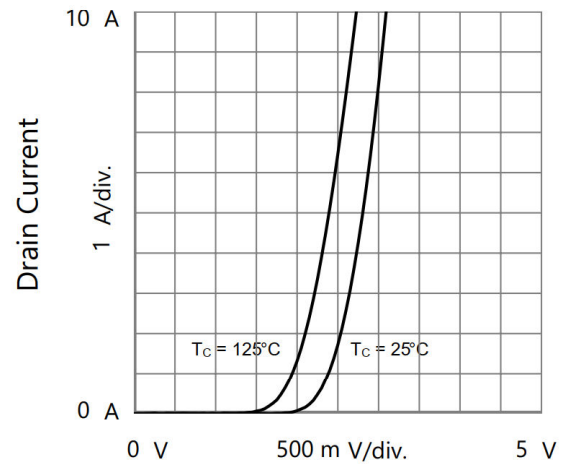
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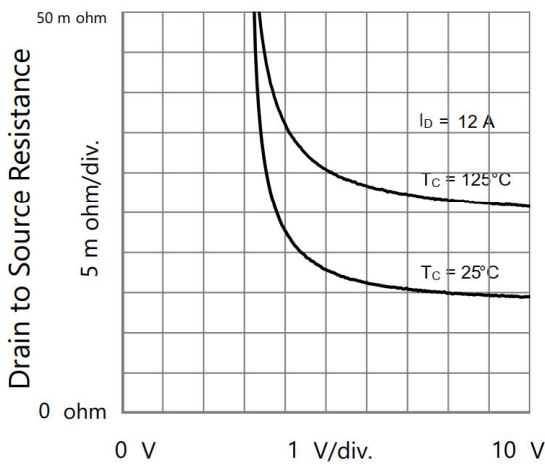
N-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



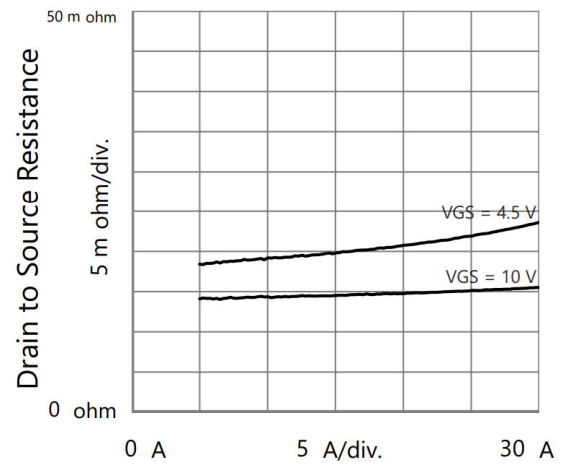
Drain to Source Voltage
Output Characteristics



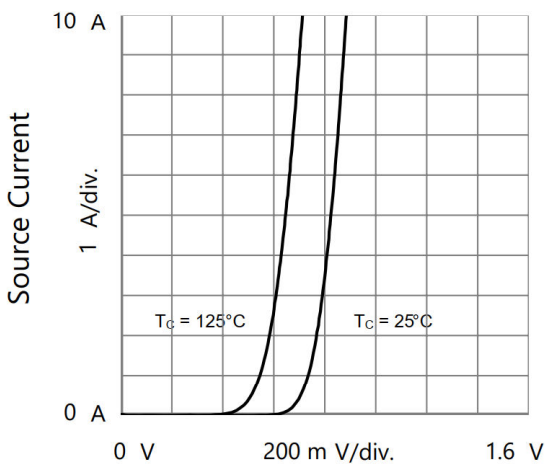
Gate to Source Voltage
Transfer Characteristics



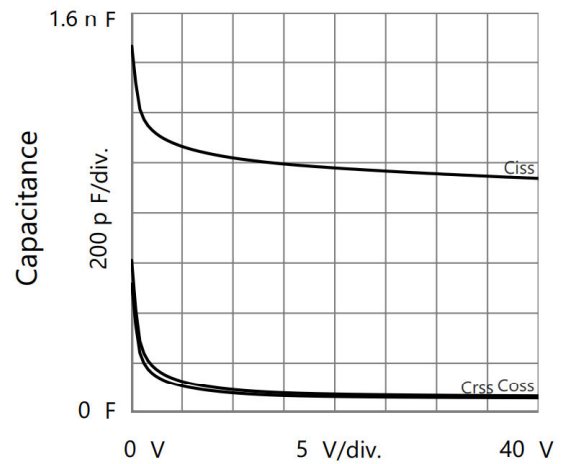
Gate to Source Voltage
Drain to Source Resistance vs. Gate to Source Voltage



Drain Current
Drain to Source Resistance vs. Drain Current

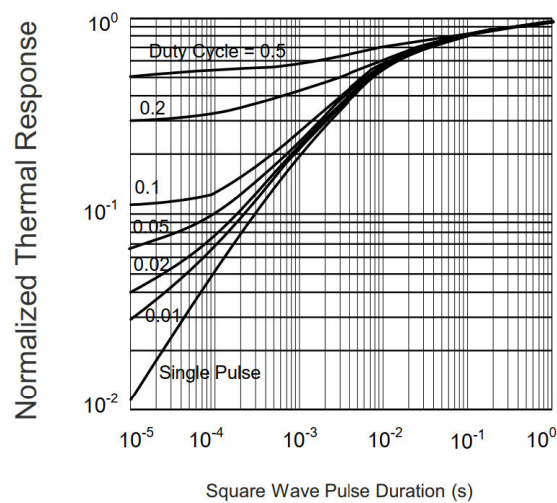
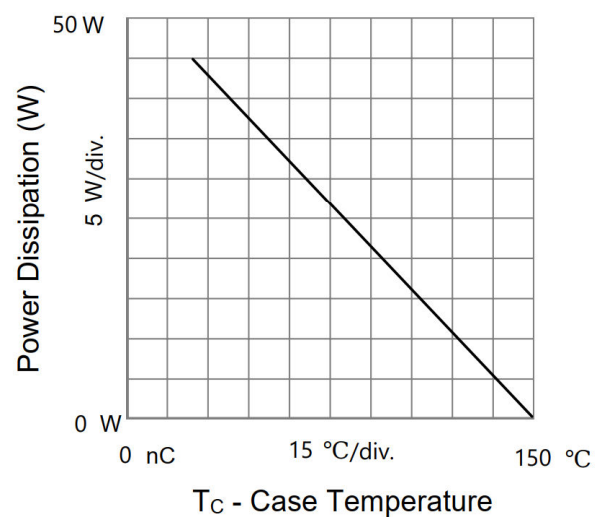
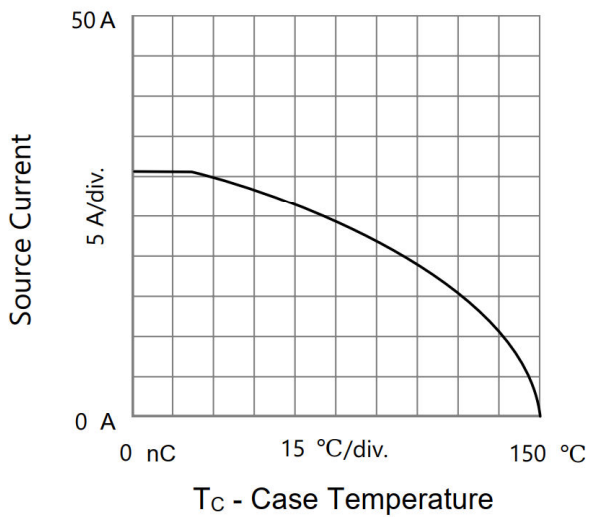
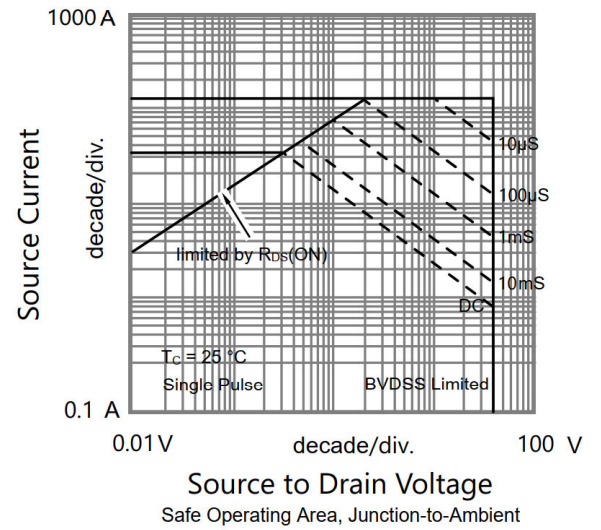
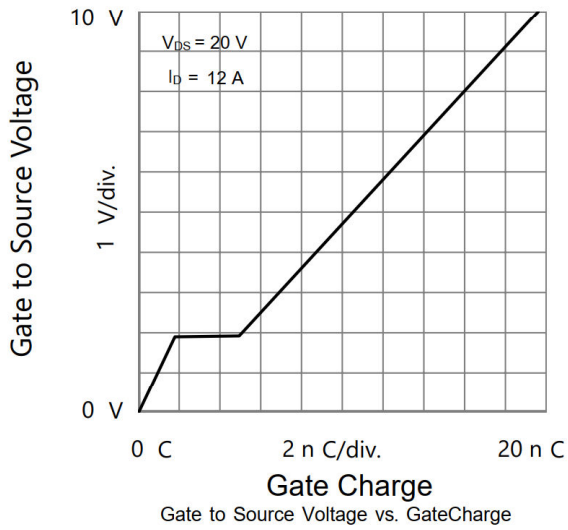


Source to Drain Voltage
Body Diode Forward Characteristics



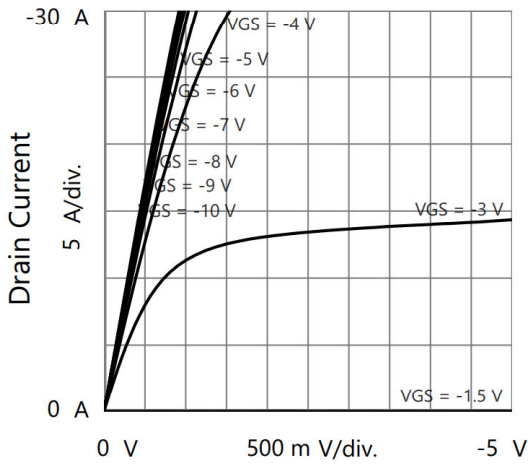
Drain to Source Voltage
Capacitances

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

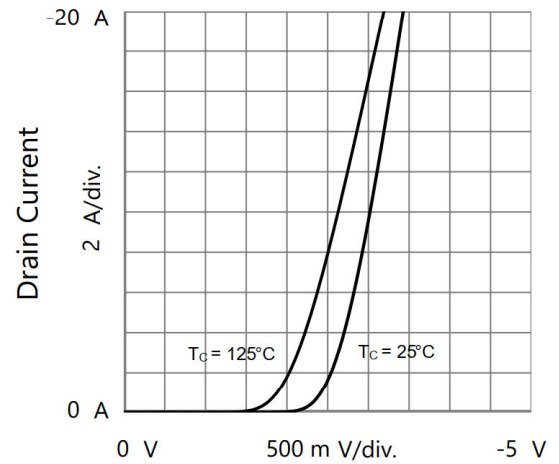


Normalized Thermal Transient Impedance

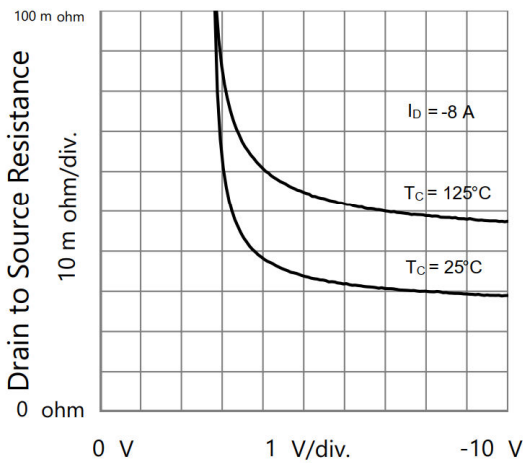
P-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



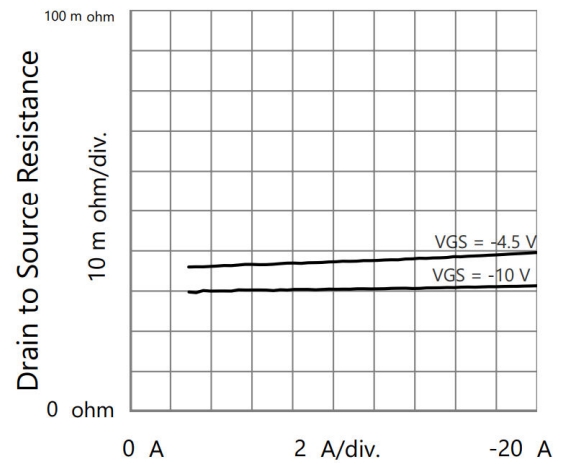
Drain to Source Voltage
Output Characteristics



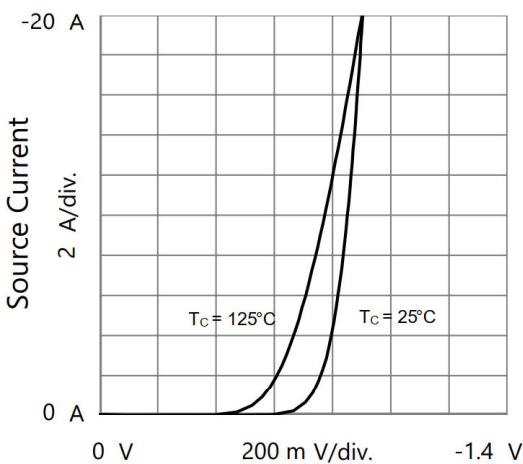
Gate to Source Voltage
Transfer Characteristics



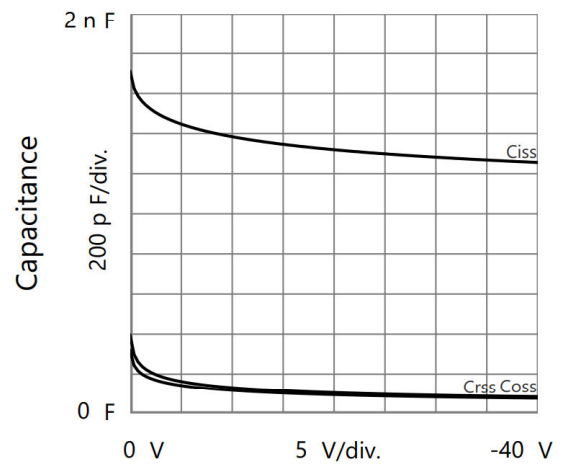
Gate to Source Voltage
Drain to Source Resistance vs. Gate to Source Voltage



Drain Current
Drain to Source Resistance vs. Drain Current

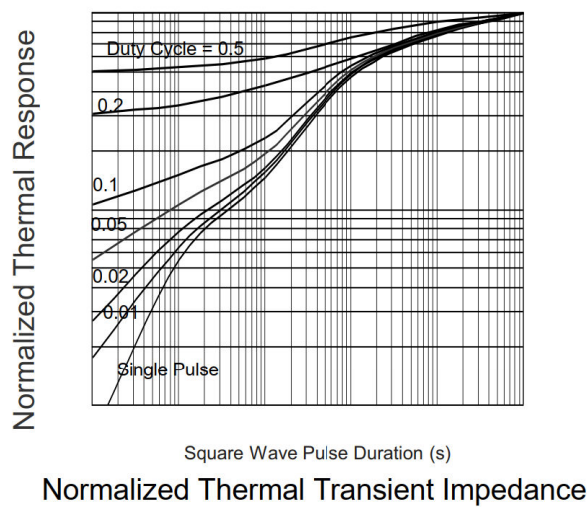
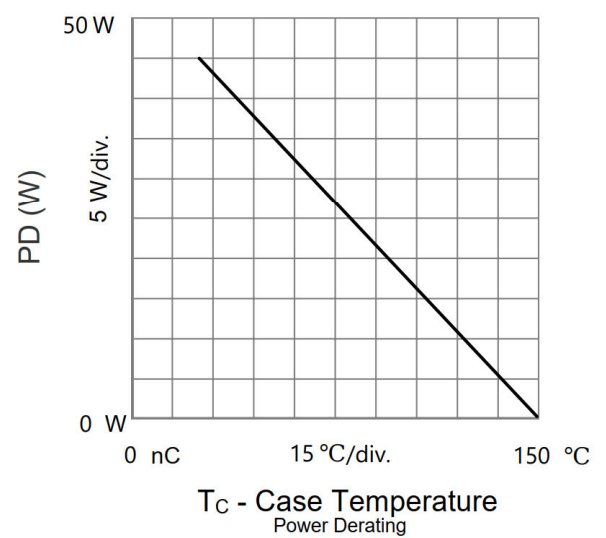
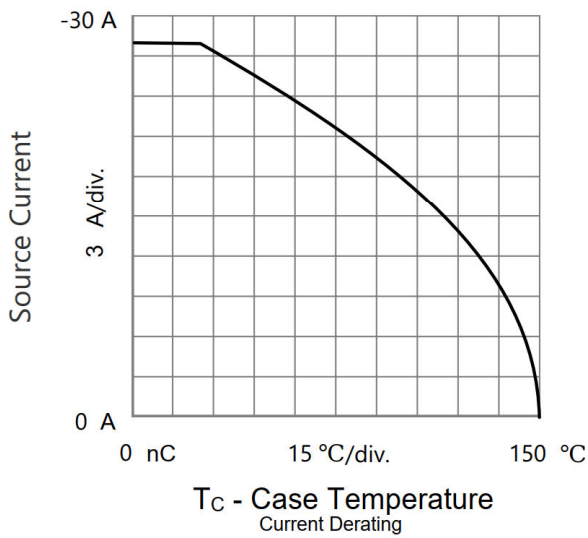
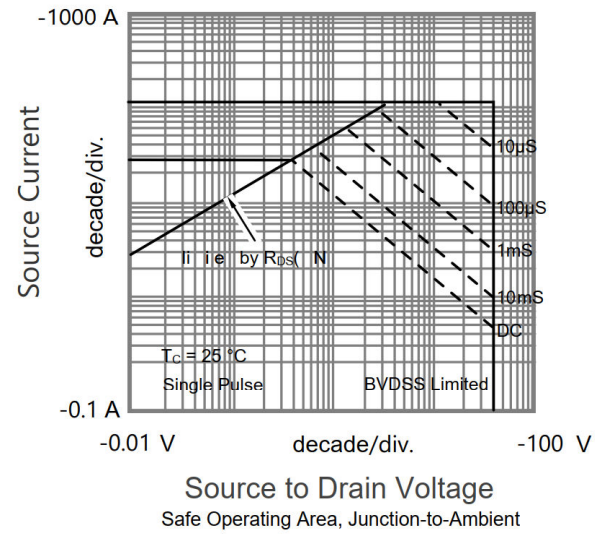
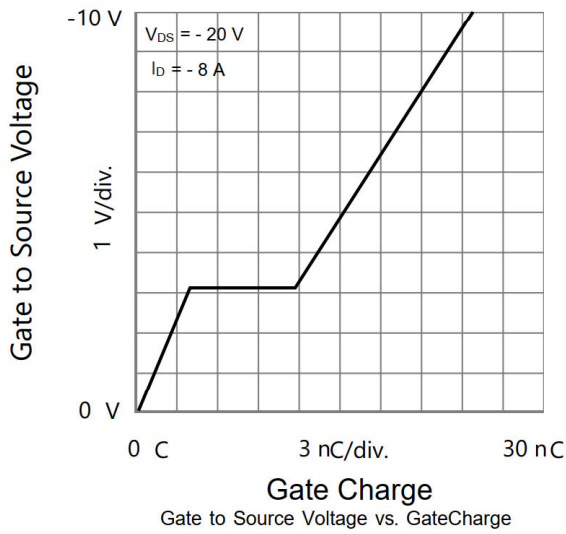


Source to Drain Voltage
Body Diode Forward Characteristics



Drain to Source Voltage
Capacitances

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



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