

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

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

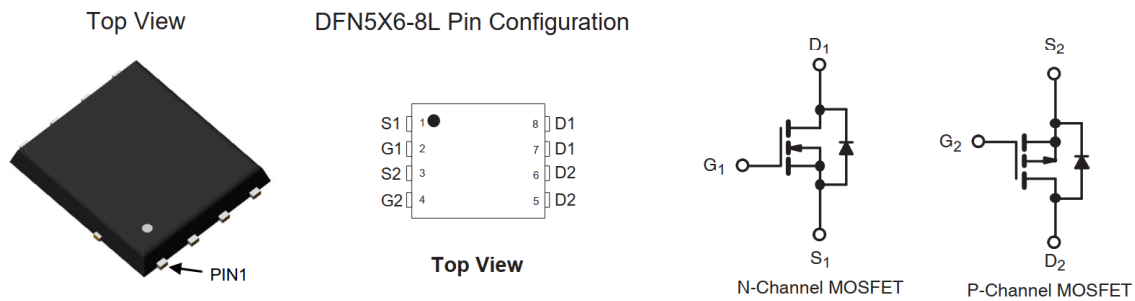
- DT-SJ Power MOSFET
- 100 % R_g and UIS tested
- Low Gate Charge



RoHS
COMPLIANT

APPLICATIONS

- DC Fan
- Motor Drive Applications



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}	t ≤ 10 s	R _{thJA}	50	60	50	60	°C/W
Maximum Junction-to-Case (Drain)	Steady State	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}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	40	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1.0	-	2.5	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$	-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 40\text{ V}, V_{GS} = 0\text{ V}$	-	-	1	μA
		$V_{DS} = 32\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$	-	-	10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 10\text{ V}, V_{GS} = 10\text{ V}$	32	-	-	A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 12\text{ A}$	-	15	20	m Ω
		$V_{GS} = 4.5\text{ V}, I_D = 10\text{ A}$	-	19	25	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 5\text{ V}, I_D = 12\text{ A}$	-	12	-	S
Dynamic ^b						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 20\text{ V}, f = 1\text{ MHz}$	-	979	-	pF
Output Capacitance	C_{oss}		-	74	-	
Reverse Transfer Capacitance	C_{rss}		-	64	-	
Total Gate Charge ^c	Q_g	$V_{DS} = 20\text{ V}, V_{GS} = 10\text{ V}, I_D = 12\text{ A}$	-	19.6	-	nC
Gate-Source Charge ^c	Q_{gs}		-	1.8	-	
Gate-Drain Charge ^c	Q_{gd}		-	3.2	-	
Gate Resistance	R_g	$f = 1\text{ MHz}$	-	3.9	-	Ω
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DS} = 20\text{ V}, I_D = 12\text{ A}, R_g = 2.5\text{ }\Omega$ $V_{GS} = 10\text{ V}$	-	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 ($T_C = 25\text{ }^\circ\text{C}$)						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$	-	-	32	A
Pulsed Current ($t = 100\text{ }\mu\text{s}$)	I_{SM}		-	-	128	A
Forward Voltage ^a	V_{SD}	$I_F = 12\text{ A}, V_{GS} = 0\text{ V}$	-	-	1.2	V
Reverse Recovery Time	t_{rr}	$I_F = 12\text{ A}, di/dt = 300\text{ A}/\mu\text{s}$	-	19	-	ns
Reverse Recovery Charge	Q_{rr}		-	14	-	nC

Notes

- Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, 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.

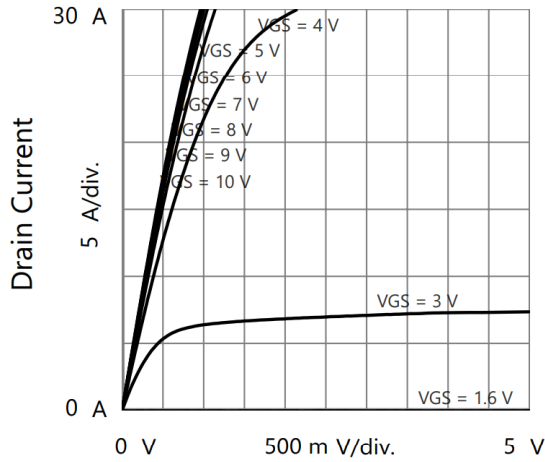
P-Channel Electrical Characteristics ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	-40	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	-1.0	-	-2.5	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$	-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -40\text{ V}, V_{GS} = 0\text{ V}$	-	-	-1	μA
		$V_{DS} = -32\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$	-	-	-10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \leq -10\text{ V}, V_{GS} = -10\text{ V}$	-28	-	-	A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -8\text{ A}$	-	30	38	m Ω
		$V_{GS} = -4.5\text{ V}, I_D = -8\text{ A}$	-	36	50	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -5\text{ V}, I_D = -8\text{ A}$	-	9	-	S
Dynamic ^b						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = -20\text{ V}, f = 1\text{ MHz}$	-	1320	-	pF
Output Capacitance	C_{oss}		-	105	-	
Reverse Transfer Capacitance	C_{rss}		-	95	-	
Total Gate Charge ^c	Q_g	$V_{DS} = -20\text{ V}, V_{GS} = -10\text{ V}, I_D = -8\text{ A}$	-	25	-	nC
Gate-Source Charge ^c	Q_{gs}		-	3	-	
Gate-Drain Charge ^c	Q_{gd}		-	5.2	-	
Gate Resistance	R_g	$f = 1\text{ MHz}$	-	6.7	-	Ω
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DS} = -20\text{ V}, I_D = -8\text{ A}, R_g = 2.5\text{ }\Omega$ $V_{GS} = -10\text{ V}$	-	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 ($T_C = 25\text{ }^\circ\text{C}$)						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$	-	-	-28	A
Pulsed Current ($t = 100\text{ }\mu\text{s}$)	I_{SM}		-	-	-112	A
Forward Voltage ^a	V_{SD}	$I_F = -8\text{ A}, V_{GS} = 0\text{ V}$	-	-	-1.2	V
Reverse Recovery Time	t_{rr}	$I_F = -8\text{ A}, di/dt = 300\text{ A}/\mu\text{s}$	-	26	-	ns
Reverse Recovery Charge	Q_{rr}		-	20	-	nC

Notes

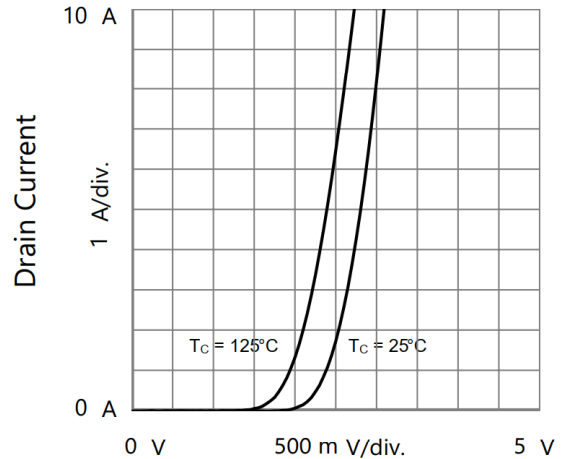
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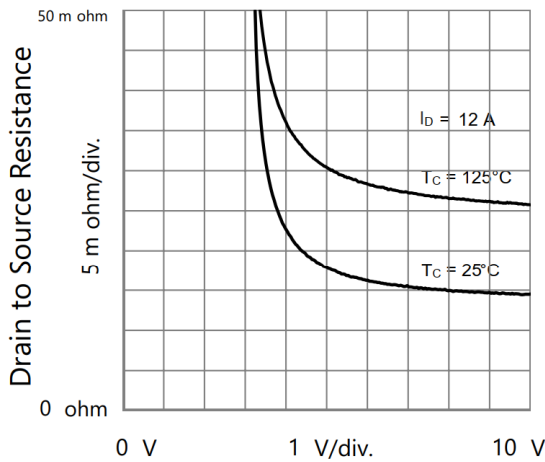
N-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



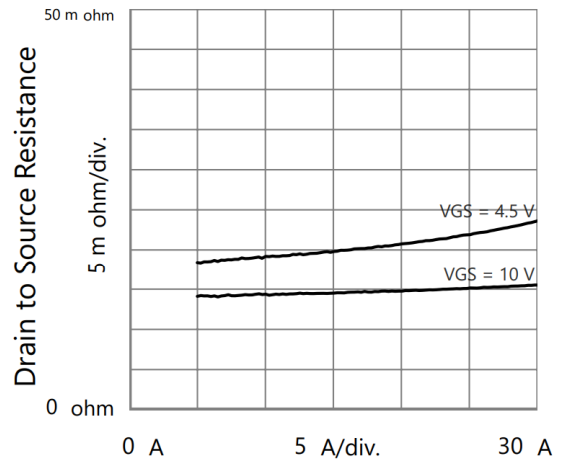
Drain to Source Voltage
Output Characteristics



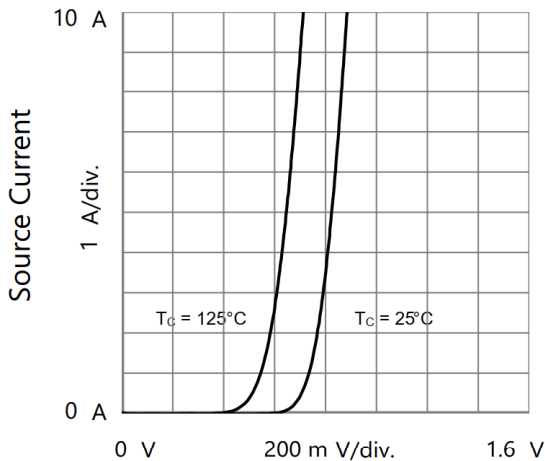
Gate to Source Voltage
Transfer Characteristics



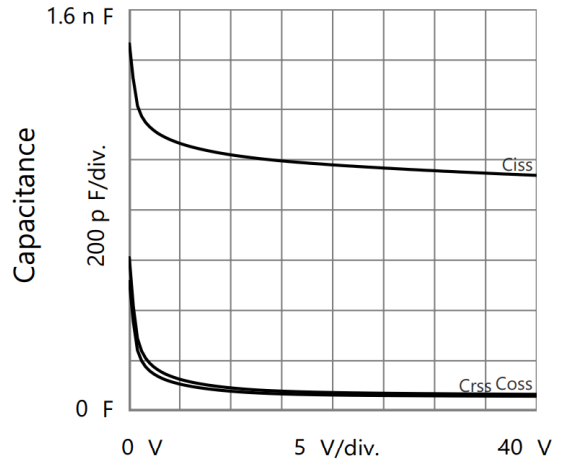
Gate to Source Voltage
Drain to Source Resistance vs. Gate to Source Voltage



Drain Current
Drain to Source Resistance vs. Drain Current

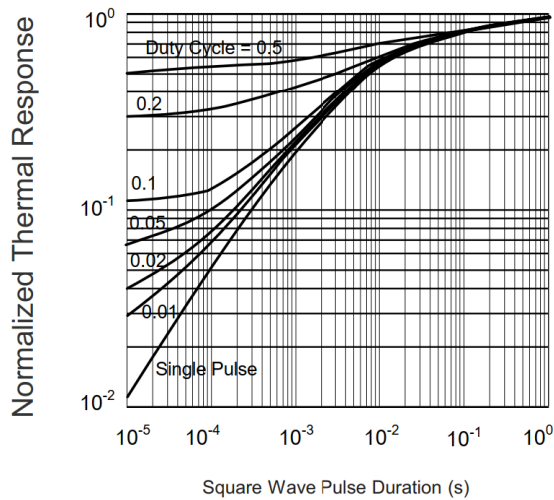
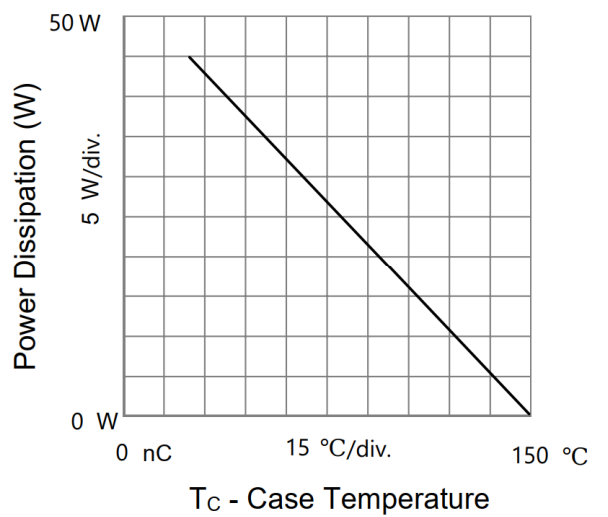
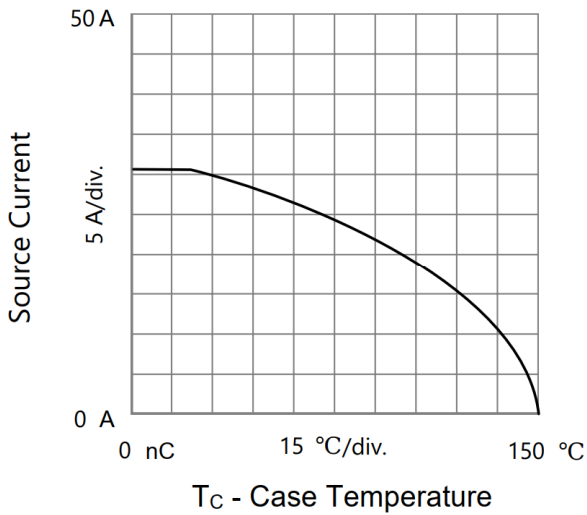
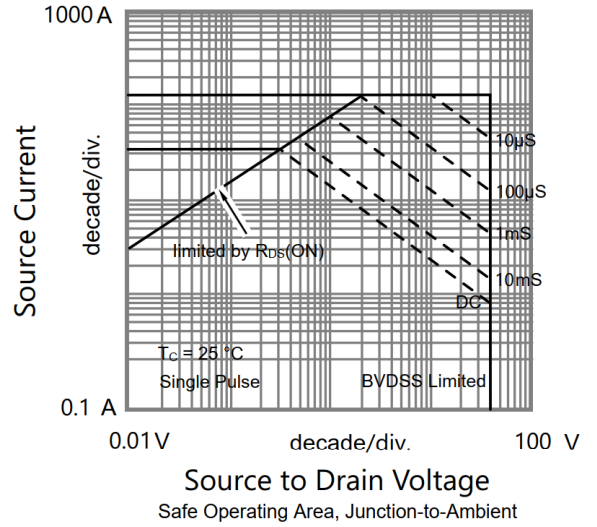
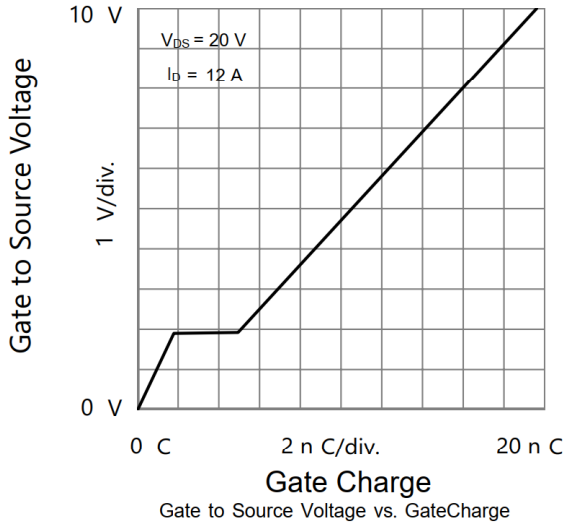


Source to Drain Voltage
Body Diode Forward Characteristics



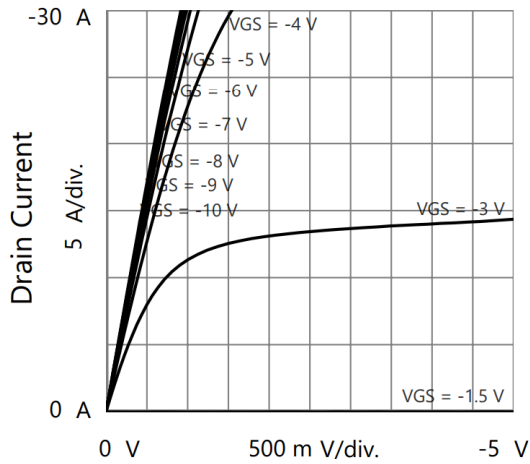
Drain to Source Voltage
Capacitances

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

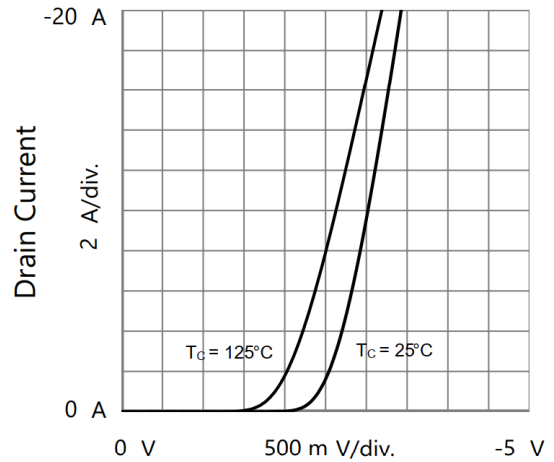


Normalized Thermal Transient Impedance

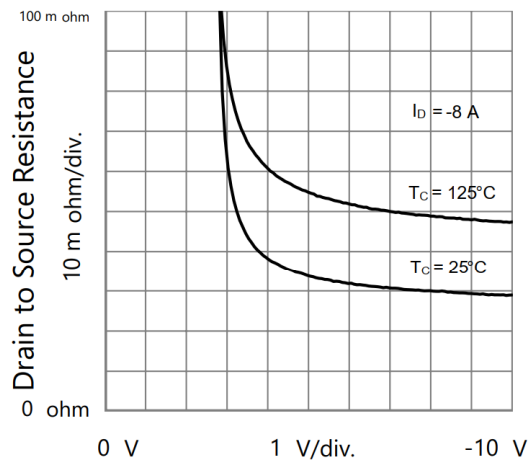
P-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



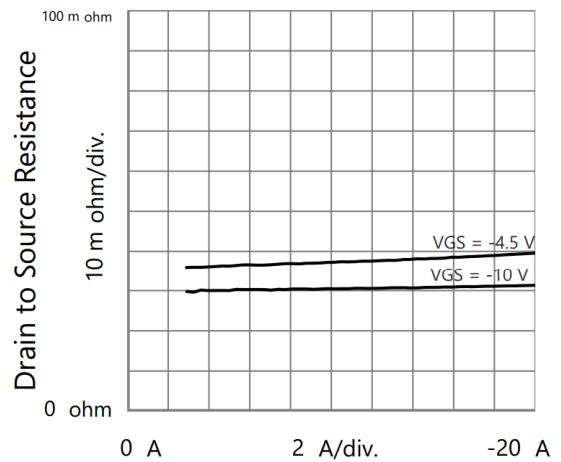
Drain to Source Voltage Output Characteristics



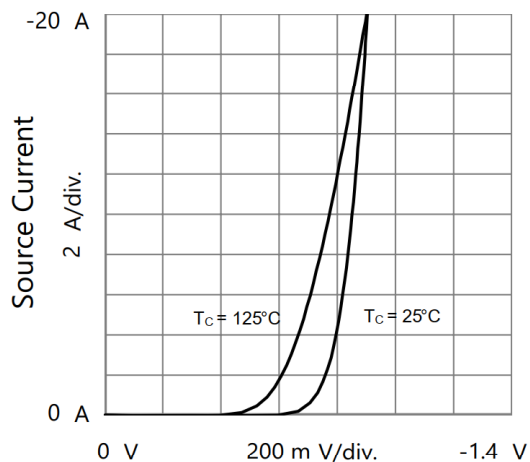
Gate to Source Voltage Transfer Characteristics



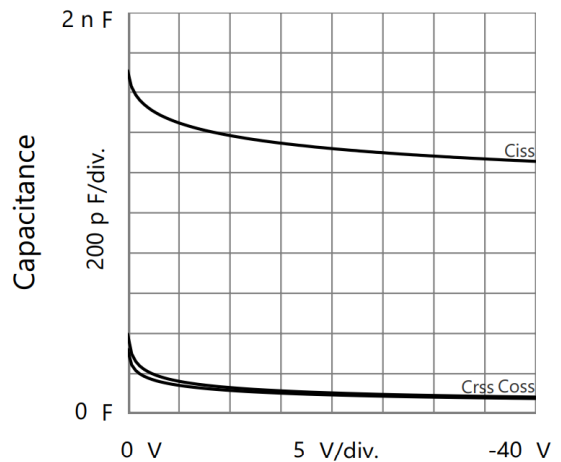
Gate to Source Voltage Drain to Source Resistance vs. Gate to Source Voltage



Drain Current Drain to Source Resistance vs. Drain Current

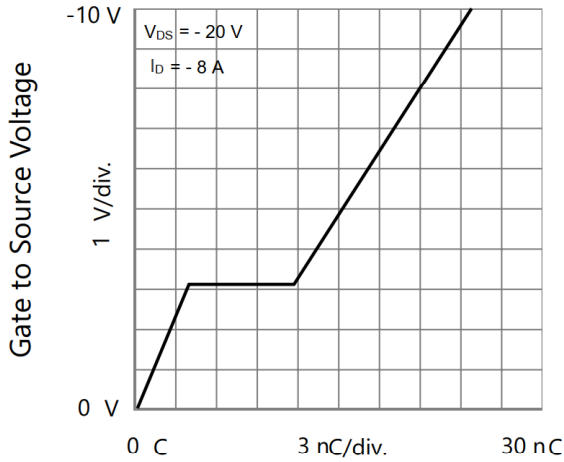


Source to Drain Voltage Body Diode Forward Characteristics

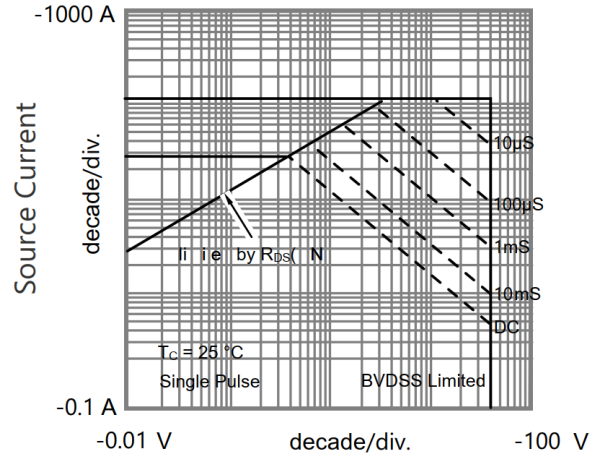


Drain to Source Voltage Capacitances

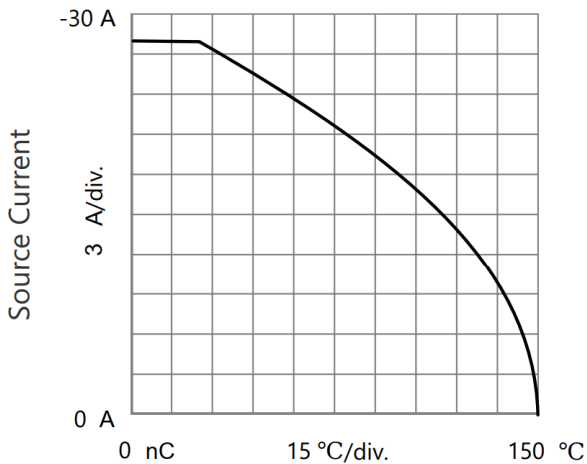
P-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



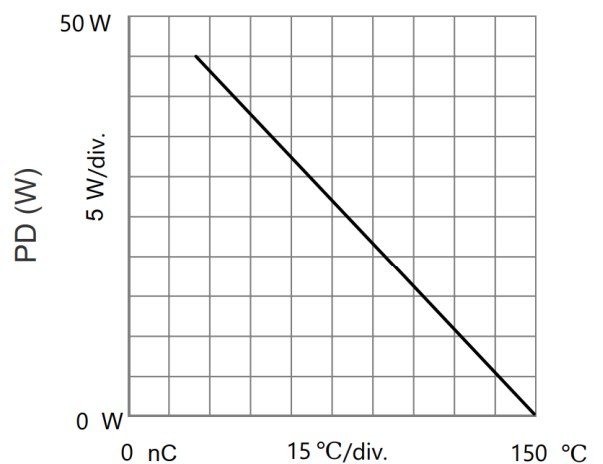
Gate Charge
Gate to Source Voltage vs. Gate Charge



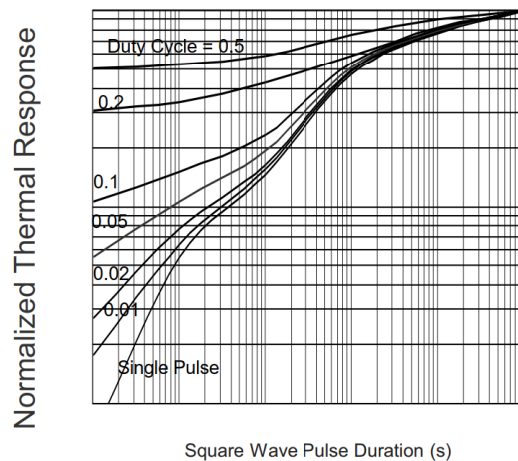
Source to Drain Voltage
Safe Operating Area, Junction-to-Ambient



T_C - Case Temperature
Current Derating

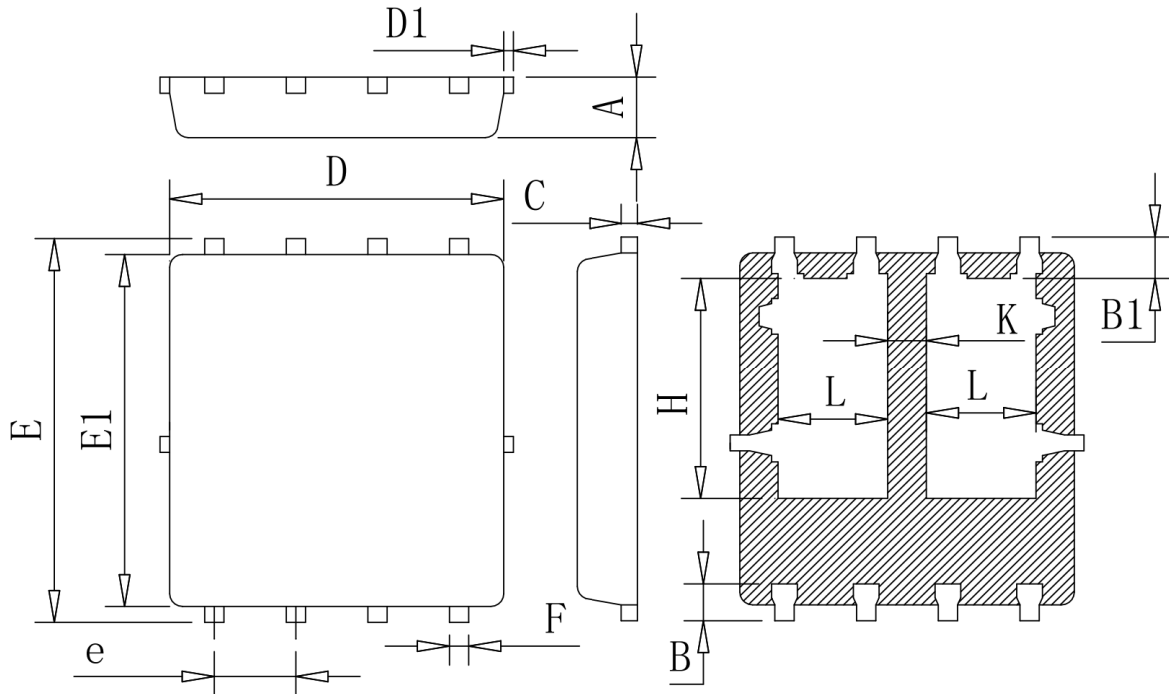


T_C - Case Temperature
Power Derating



Normalized Thermal Transient Impedance

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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