

Dual N-Channel 40-V (D-S) MOSFET

PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (mΩ)(Typ.)	I _D (A) ^a	Q _g (Typ.)
40	7.8 at V _{GS} = 10 V	45	45 nC
	9.6 at V _{GS} = 4.5 V		

FEATURES

- DT-Trench Power MOSFET
- 100 % R_g and UIS Tested

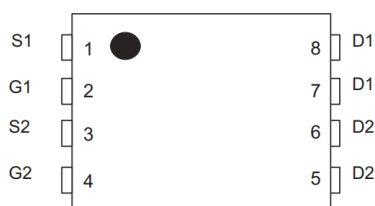


RoHS
COMPLIANT

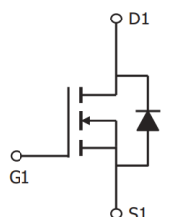
APPLICATIONS

- 12 V Automotive systems
- Motors, lamps and solenoid control
- Transmission control
- Ultra high performance power switching

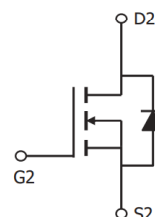
DFN5X6



Top View



N-Channel MOSFET



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS T _A = 25 °C, unless otherwise noted				
Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	V _{DS}	40	V	
Gate-Source Voltage	V _{GS}	± 20		
Continuous Drain Current (T _J = 150 °C)	I _D	T _C = 25 °C	45 ^a	A
		T _C = 70 °C	38	
		T _A = 25 °C	30 ^{b, c}	
		T _A = 70 °C	23 ^{b, c}	
Pulsed Drain Current	I _{DM}	180		
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C	40	
		T _A = 25 °C	25 ^{b, c}	
Avalanche Current	I _{AS}	51	mJ	
Single-Pulse Avalanche Energy	E _{AS}	88		
Maximum Power Dissipation	P _D	T _C = 25 °C	75	W
		T _C = 70 °C	48	
		T _A = 25 °C	55 ^{b, c}	
		T _A = 70 °C	43 ^{b, c}	
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to 150	°C	

THERMAL RESISTANCE RATINGS					
Parameter	Symbol	Typical	Maximum	Unit	
Maximum Junction-to-Ambient ^{b, d}	R _{thJA}	35	45	°C/W	
Maximum Junction-to-Foot (Drain)	R _{thJF}	3	8		

Notes:

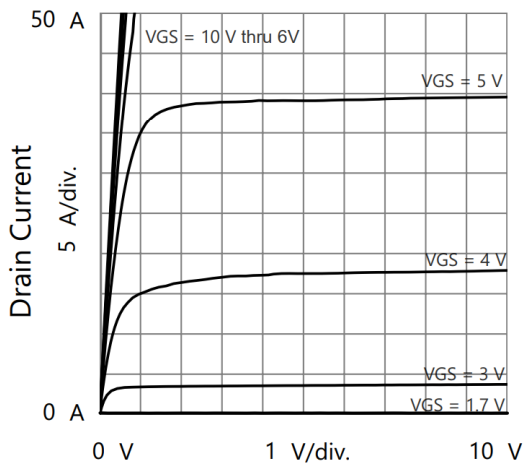
- Package limited.
- Surface mounted on 1" x 1" FR4 board.
- t = 10 s.
- Maximum under Steady State conditions is 85 °C/W.

SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, 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
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		55		mV/ $^\circ\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			-6.3		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1		3	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 32\text{ V}, V_{GS} = 0\text{ V}$			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	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	45			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 10\text{ A}$		7.8	9	m Ω
		$V_{GS} = 4.5\text{ V}, I_D = 5\text{ A}$		9.6	13	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 32\text{ V}, I_D = 10\text{ A}$		50		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = 32\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		2240		μF
Output Capacitance	C_{oss}			175		
Reverse Transfer Capacitance	C_{rss}			160		
Total Gate Charge	Q_g	$V_{DS} = 32\text{ V}, V_{GS} = 10\text{ V}, I_D = 10\text{ A}$		45		nC
Gate-Source Charge	Q_{gs}			4.5		
Gate-Drain Charge	Q_{gd}			11		
Gate Resistance	R_g	$f = 1\text{ MHz}$		2.5		Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 32\text{ V}, R_L = 5.4\text{ }\Omega$ $I_D \cong 5\text{ A}, V_{GEN} = 4.5\text{ V}, R_g = 1\text{ }\Omega$		13		ns
Rise Time	t_r			9		
Turn-Off Delay Time	$t_{d(off)}$			40		
Fall Time	t_f			2		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 32\text{ V}, R_L = 5.4\text{ }\Omega$ $I_D \cong 10\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\text{ }\Omega$		10		
Rise Time	t_r			6		
Turn-Off Delay Time	$t_{d(off)}$			15		
Fall Time	t_f			5		
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$			45	A
Pulse Diode Forward Current ^a	I_{SM}				180	
Body Diode Voltage	V_{SD}	$I_S = 1\text{ A}$		0.6	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 10\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		30	50	ns
Body Diode Reverse Recovery Charge	Q_{rr}			30	50	nC
Reverse Recovery Fall Time	t_a			20		ns
Reverse Recovery Rise Time	t_b			8		

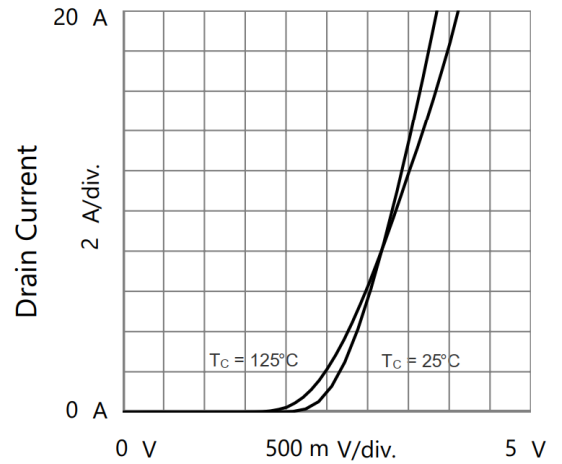
Notes:

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

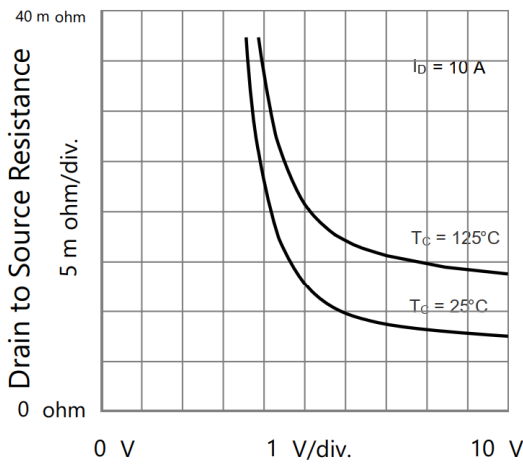
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.



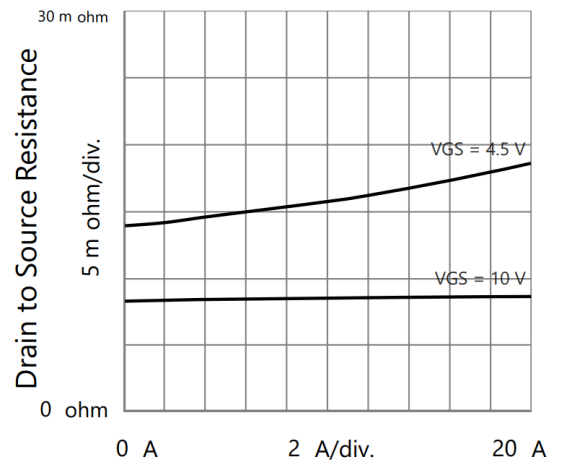
Drain to Source Voltage
Output Characteristics



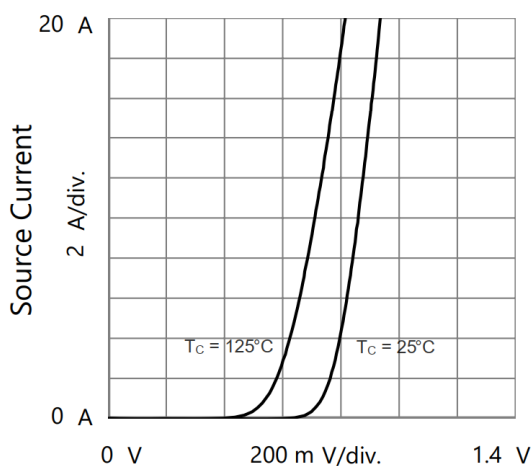
Gate to Source Voltage
Transfer Characteristics



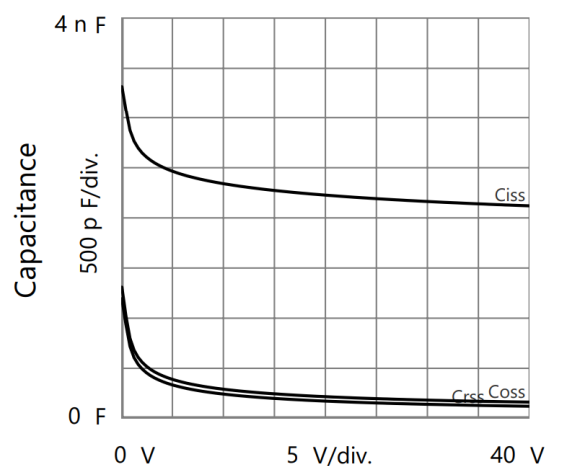
Gate to Source Voltage
Drain to Source Resistance vs. Gate to Source Voltage



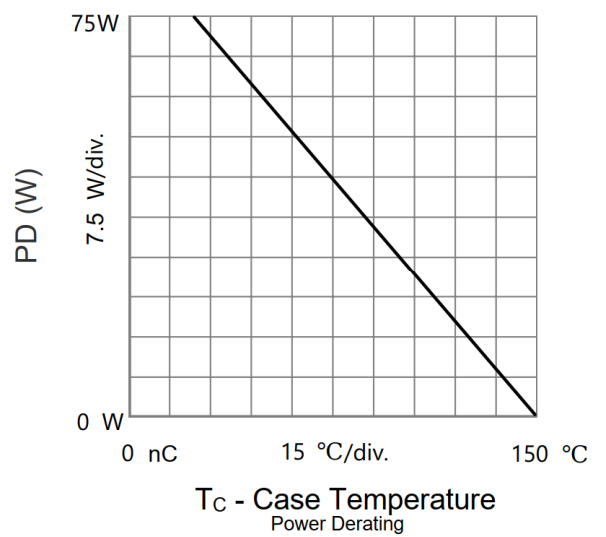
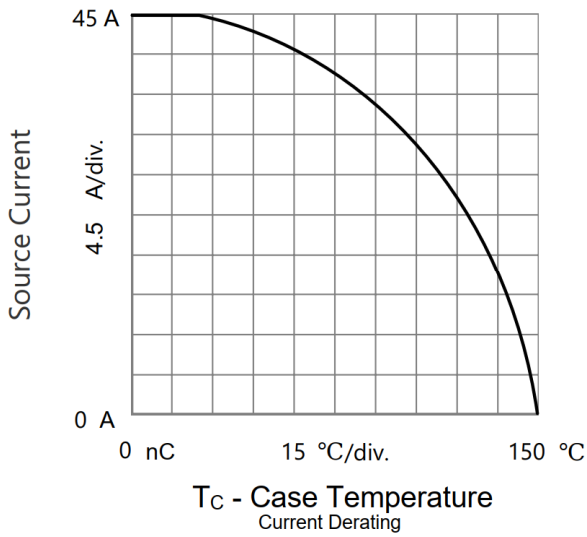
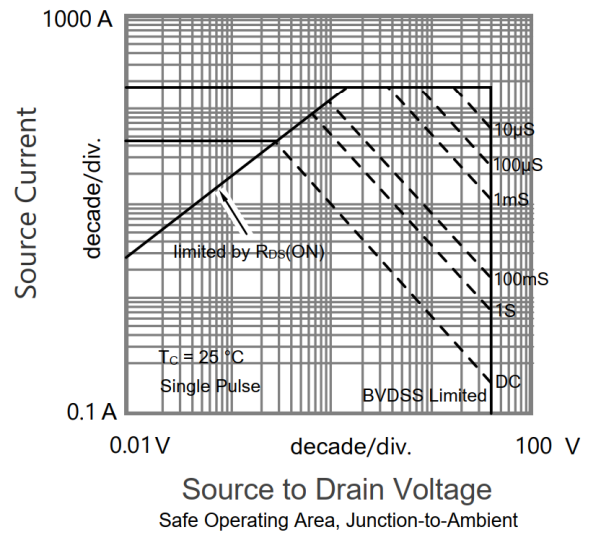
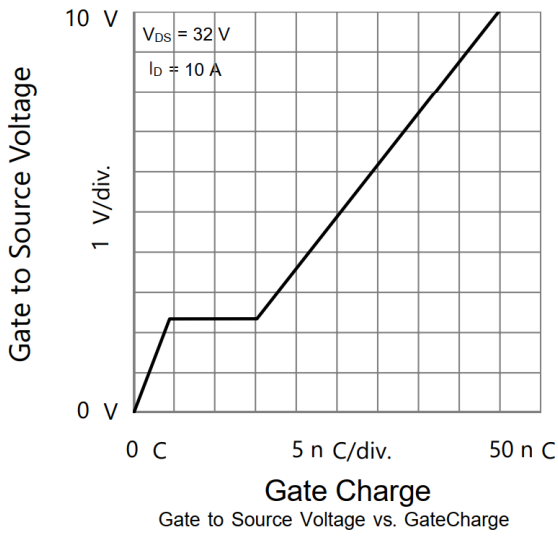
Drain Current
Drain to Source Resistance vs. Drain Current



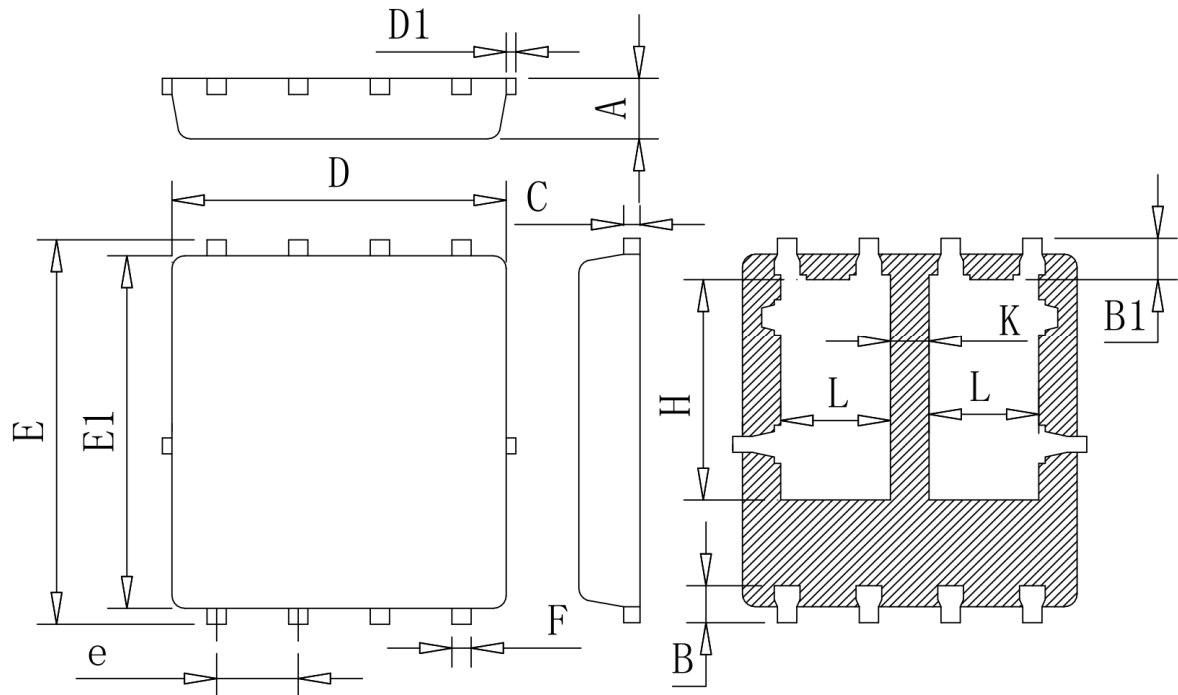
Source to Drain Voltage
Body Diode Forward Characteristics



Drain to Source Voltage
Capacitances



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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