

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

PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (mΩ)(Typ.)	I _D (A) ^{a,e}	Q _g (Typ.)
40	5.6 at V _{GS} = 10 V	60	13 nC
	7.5 at V _{GS} = 4.5 V		

FEATURES

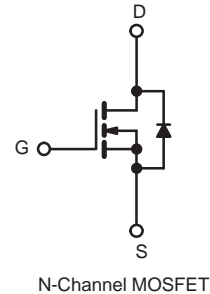
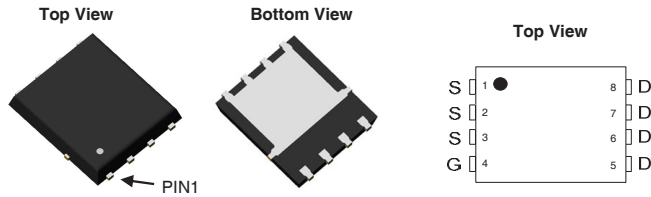
- DT-SJ Power MOSFET
- Low R_{DS(on)}×FOM
- Extremely low switching loss
- Fast switching and soft recovery

APPLICATIONS

- Motor driver
- Switching voltage regulator
- DC-DC convertor



DFN5X6-8L Pin Configuration



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	60
		T _C = 100 °C	42
Pulsed Drain Current (t = 300 μs)	I _{DM}	240	A
Single Pulse Avalanche Energy	E _{AS}	245	mJ
Maximum Power Dissipation	P _D	T _C = 25 °C	55
		T _C = 100 °C	35.2
		T _A = 25 °C	3.7 ^{b, c}
		T _A = 100 °C	2.3 ^{b, c}
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to 150	°C
Soldering Recommendations (Peak Temperature) ^{d, e}		260	

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{b, f}	R _{thJA}	-	35	°C/W
Maximum Junction-to-Case (Drain)	R _{thJC}	-	2.3	

Notes:

- Based on T_C = 25 °C.
- Surface mounted on 1" x 1" FR4 board.
- t = 10 s.
- The DFN5X6 is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.
- Rework conditions: manual soldering with a soldering iron is not recommended for leadless components.
- Maximum under steady state conditions is 70 °C/W.

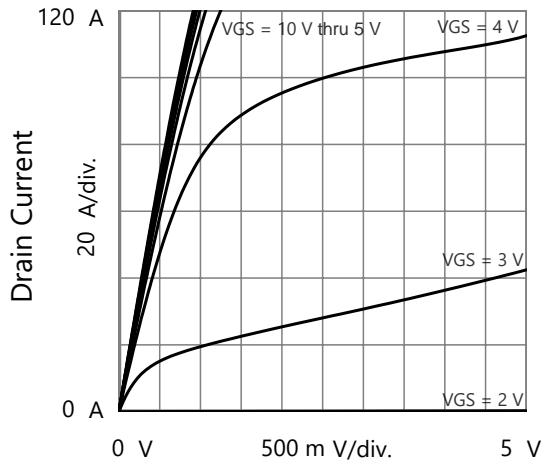
SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0, I_D = 250\text{ }\mu\text{A}$	40			V
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	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}	$V_{DS} = 40\text{ V}, V_{GS} = 0\text{ V}$			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	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	60			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 20\text{ A}$		5.6	7	m Ω
		$V_{GS} = 4.5\text{ V}, I_D = 10\text{ A}$		7.5	10	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 4.5\text{ V}, I_D = 20\text{ A}$		75		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		808		pF
Output Capacitance	C_{oss}			311		
Reverse Transfer Capacitance	C_{rss}			4.5		
Total Gate Charge ^c	Q_g	$V_{DS} = 20\text{ V}, V_{GS} = 10\text{ V}, I_D = 20\text{ A}$		13		nC
Gate-Source Charge ^c	Q_{gs}			1.6		
Gate-Drain Charge ^c	Q_{gd}			2		
Gate Resistance	R_g	$f = 1\text{ MHz}$		3.5		Ω
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = 20\text{ V}, R_L = 0.5\text{ }\Omega$ $I_D \cong 20\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\text{ }\Omega$		22		ns
Rise Time ^c	t_r			10		
Turn-Off Delay Time ^c	$t_{d(off)}$			63		
Fall Time ^c	t_f			11		
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$			60	A
Pulse Diode Forward Current (100 μs)	I_{SM}				240	
Body Diode Voltage	V_{SD}	$I_S = 1\text{ A}$			1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 20\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		44		ns
Body Diode Reverse Recovery Charge	Q_{rr}			60		nC
Reverse Recovery Fall Time	t_a			21		ns
Reverse Recovery Rise Time	t_b			19		

Notes

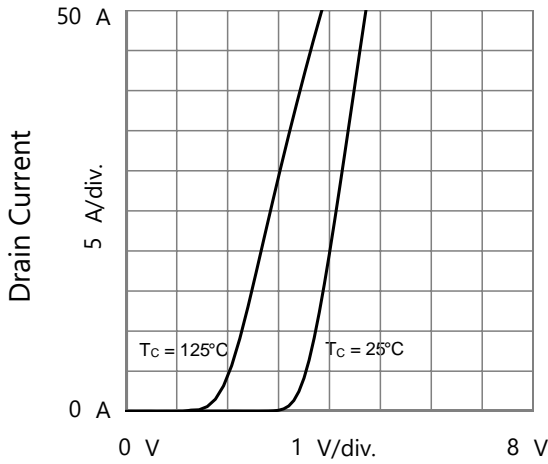
- Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.

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.

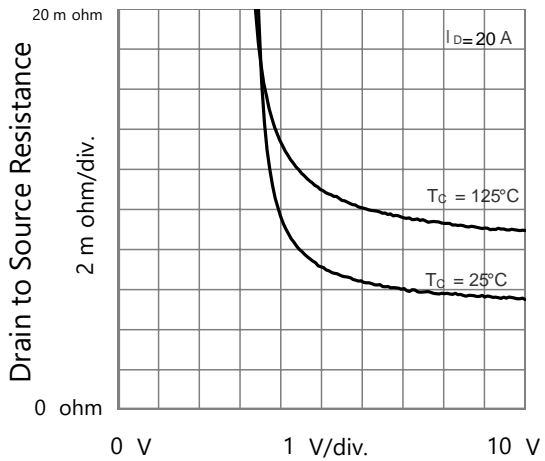
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



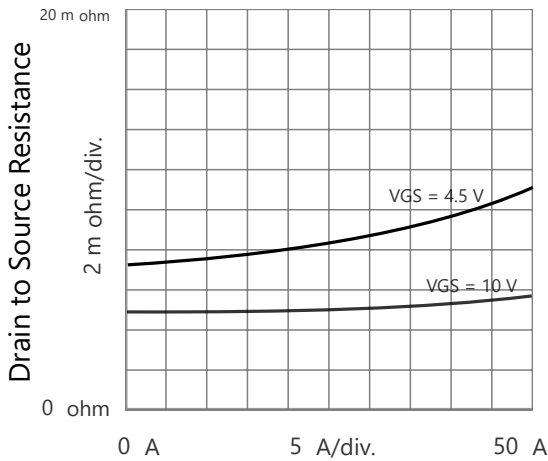
Drain to Source Voltage Output Characteristics



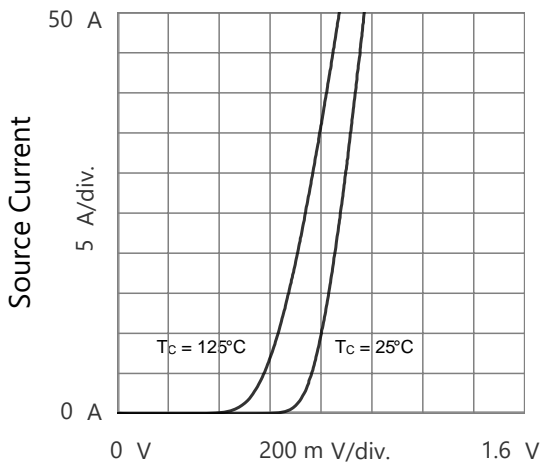
Gate to Source Voltage Transfer Characteristics



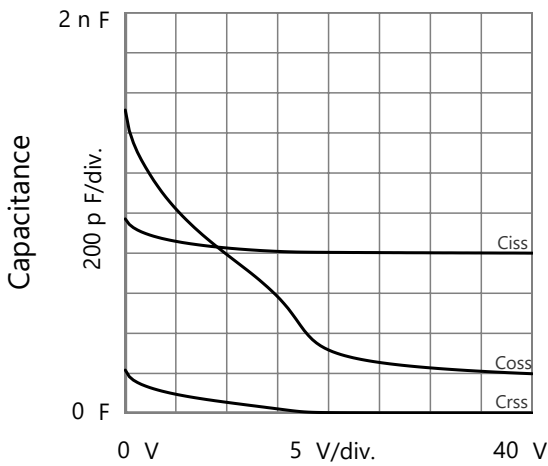
Gate to Source Voltage Drain to Source Resistance vs. Gate to Source Voltage



Drain Current Drain to Source Resistance vs. Drain Current

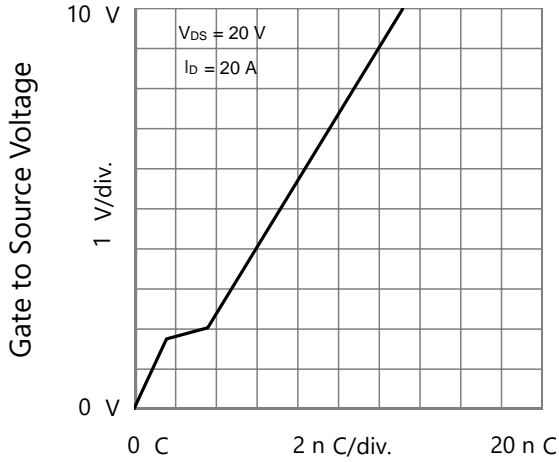


Source to Drain Voltage Body Diode Forward Characteristics

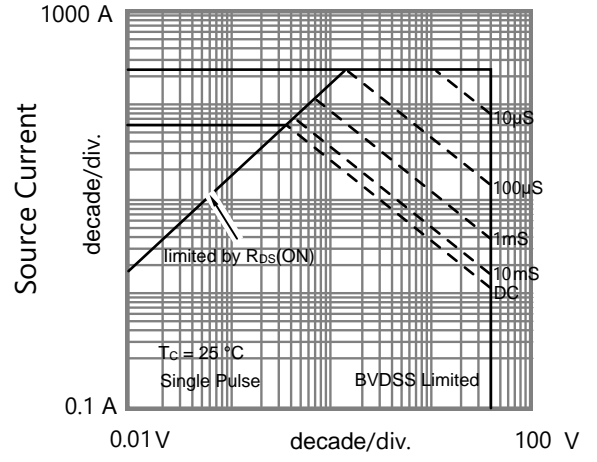


Drain to Source Voltage Capacitances

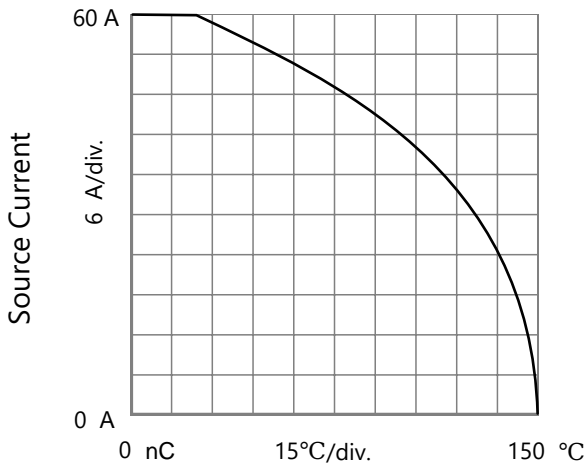
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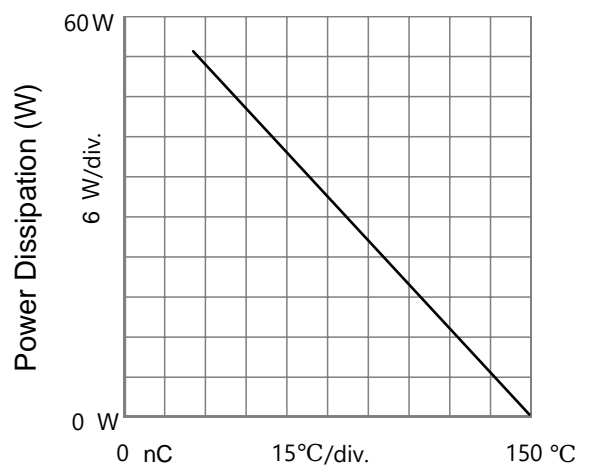
Gate Charge
Gate to Source Voltage vs. Gate Charge



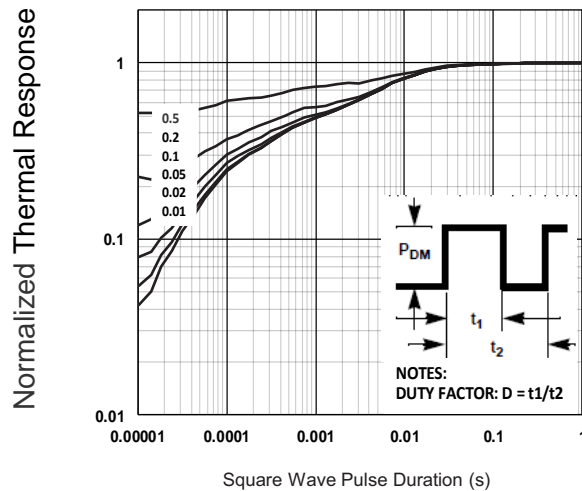
Source to Drain Voltage
Safe Operating Area, Junction-to-Ambient



T_C - Case Temperature

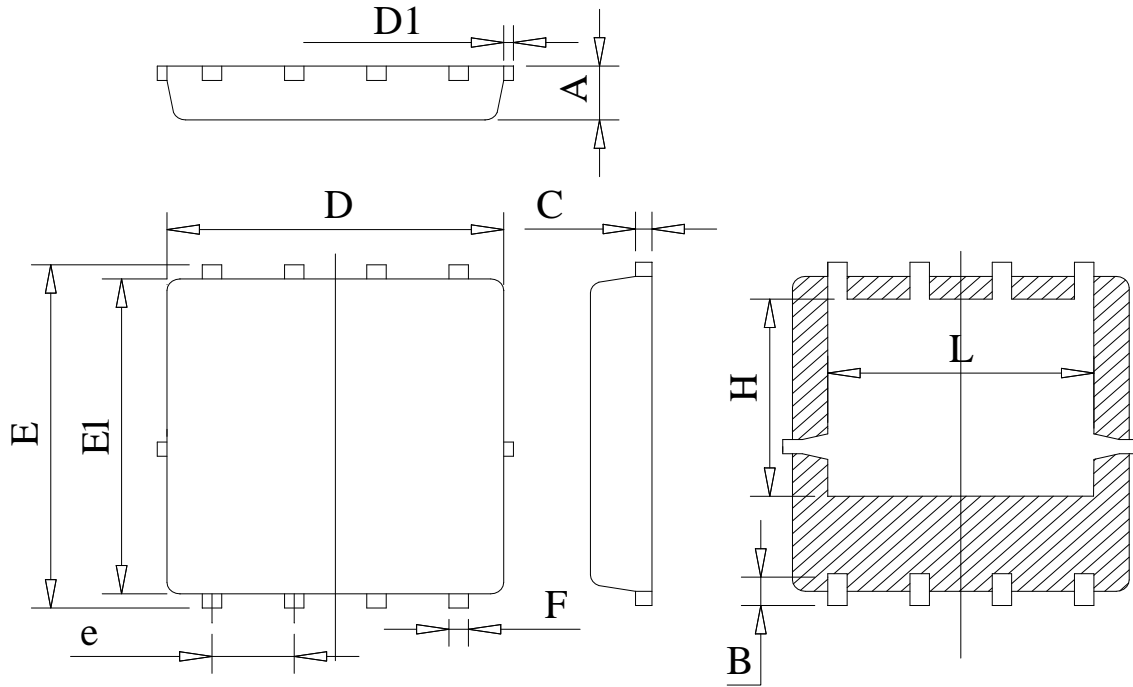


T_C - Case Temperature



Normalized Thermal Transient Impedance, Junction-to-Ambient

DFN5*6-8L PACKAGE OUTLINE



COMMON DIMENSIONS (UNITS OF MEASURE=MILLIMETER)

Unit : mm

Symbol	Min	Typ	Max
A	0.78	0.95	1.12
B	0.45	0.58	0.78
C	0.18	0.254	0.36
D	4.70	5.20	5.45
D1			0.18
E	5.85	6.05	6.25
E1	5.38	5.55	5.98
e	1.15	1.27	1.40
F	0.18	0.30	0.52
H	3.25	3.47	3.70
L	3.75	4.00	4.25

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