

### General Description

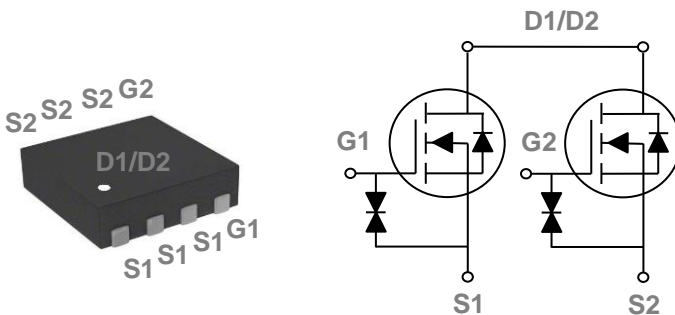
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

BVDSS	RDSON	ID
20V	5.4mΩ	40A

### Features

- 20V,40A,  $R_{DS(ON)} = 5.4m\Omega$  @  $V_{GS} = 4.5V$
- Improved  $dv/dt$  capability
- Fast switching
- G-S ESD Protection Diode Embedded
- Green Device Available

### DFN3x3 Dual Pin Configuration



### Applications

- Handheld Instruments
- POL Applications
- Battery Protection Applications

### Absolute Maximum Ratings $T_c=25^\circ C$ unless otherwise noted

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	20	V
$V_{GS}$	Gate-Source Voltage	$\pm 12$	V
$I_D$	Drain Current – Continuous ( $T_A=25^\circ C$ )	15	A
	Drain Current – Continuous ( $T_A=70^\circ C$ )	12	A
	Drain Current – Continuous ( $T_C=25^\circ C$ )	40	A
	Drain Current – Continuous ( $T_C=100^\circ C$ )	25.3	A
$I_{DM}$	Drain Current – Pulsed <sup>1</sup> ( $T_C=25^\circ C$ )	160	A
$P_D$	Power Dissipation ( $T_A=25^\circ C$ )	2	W
	Power Dissipation – Derate above $25^\circ C$	0.016	W/ $^\circ C$
	Power Dissipation ( $T_C=25^\circ C$ )	15	W
	Power Dissipation – Derate above $25^\circ C$	0.12	W/ $^\circ C$
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$

### Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	62	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	8.2	$^\circ C/W$

**Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)**
**Off Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	20	---	---	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =18V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	μA
		V <sub>DS</sub> =16V, V <sub>GS</sub> =0V, T <sub>J</sub> =70°C	---	---	10	μA
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V	---	---	±10	μA

**On Characteristics**

R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =4.5V, I <sub>D</sub> =3A	3.6	4.5	5.4	mΩ
		V <sub>GS</sub> =4.0V, I <sub>D</sub> =3A	3.7	4.7	5.8	mΩ
		V <sub>GS</sub> =3.8V, I <sub>D</sub> =3A	3.8	4.8	6	mΩ
		V <sub>GS</sub> =3.1V, I <sub>D</sub> =3A	4	5.2	6.6	mΩ
		V <sub>GS</sub> =2.5V, I <sub>D</sub> =3A	4.3	5.9	7.7	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250μA	0.5	0.75	1.5	V

**Dynamic and switching Characteristics<sup>2</sup>**

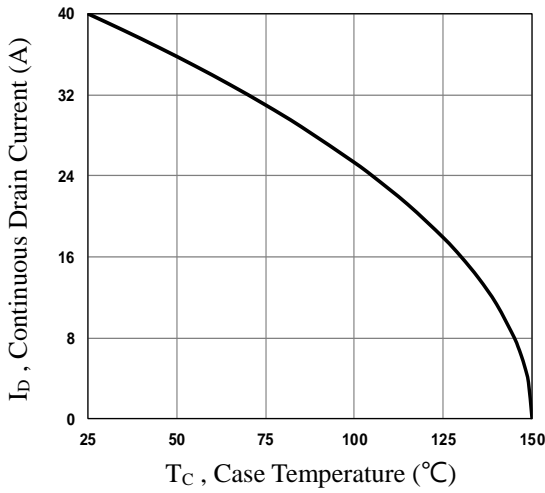
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =10V, V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A	---	19	30	nC
Q <sub>gs</sub>	Gate-Source Charge		---	1.6	5	
Q <sub>gd</sub>	Gate-Drain Charge		---	4.8	10	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =10V, V <sub>GS</sub> =4.5V, R <sub>G</sub> =6Ω I <sub>D</sub> =20A	---	30	50	ns
T <sub>r</sub>	Rise Time		---	70	100	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	80	120	
T <sub>f</sub>	Fall Time		---	105	160	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =10V, V <sub>GS</sub> =0V, F=1MHz	---	440	660	pF
C <sub>oss</sub>	Output Capacitance		---	220	350	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	56	90	

**Drain-Source Diode Characteristics and Maximum Ratings**

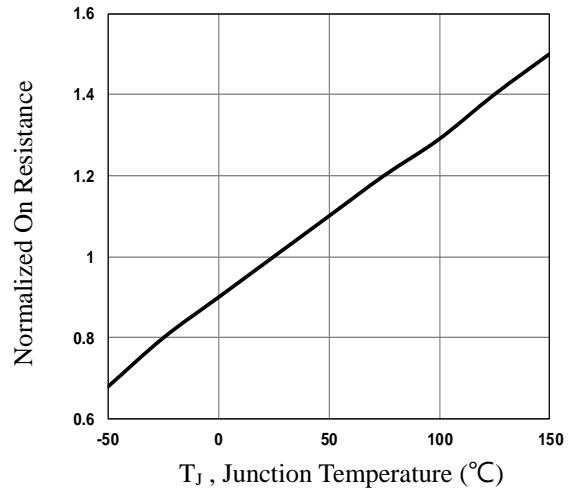
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	40	A
I <sub>SM</sub>	Pulsed Source Current		---	---	80	A
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =1A, T <sub>J</sub> =25°C	---	---	1	V

Note :

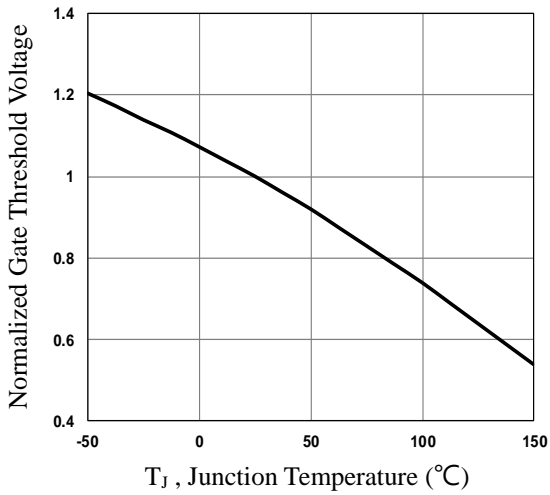
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. Essentially independent of operating temperature.



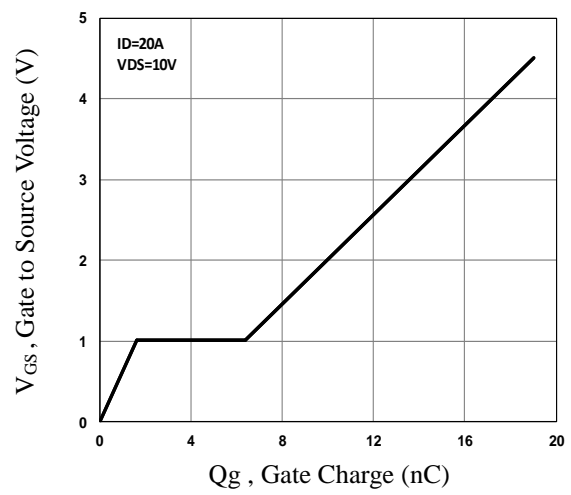
**Fig.1 Continuous Drain Current vs.  $T_c$**



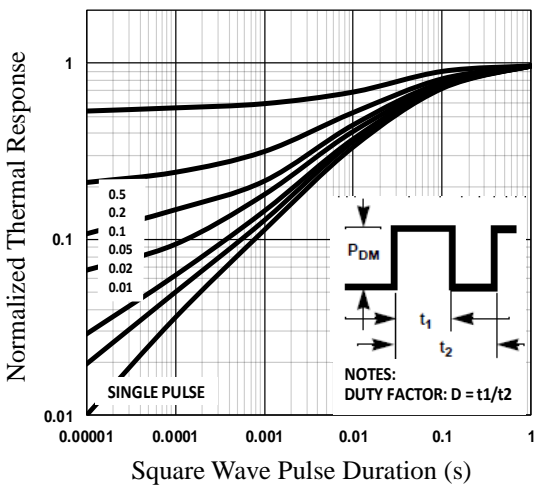
**Fig.2 Normalized  $R_{DS(on)}$  vs.  $T_j$**



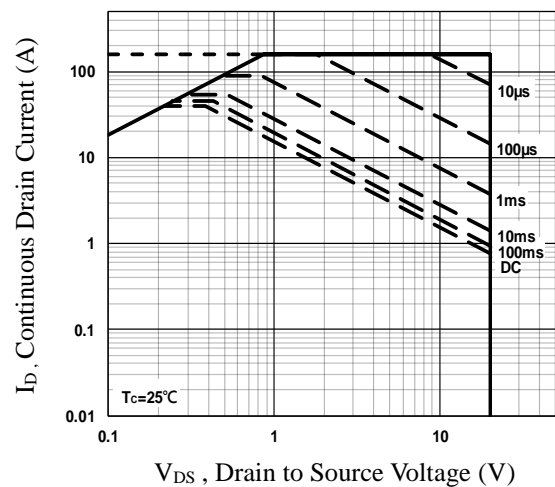
**Fig.3 Normalized  $V_{th}$  vs.  $T_j$**



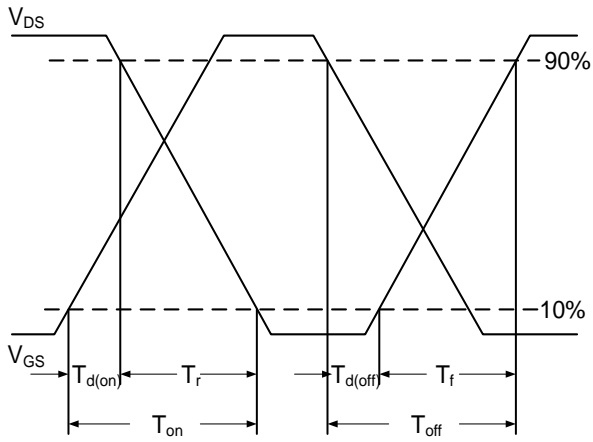
**Fig.4 Gate Charge Waveform**



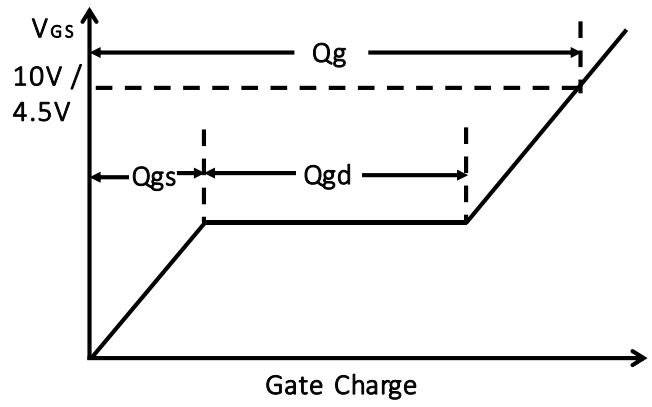
**Fig.5 Normalized Transient Response**



**Fig.6 Maximum Safe Operation Area**

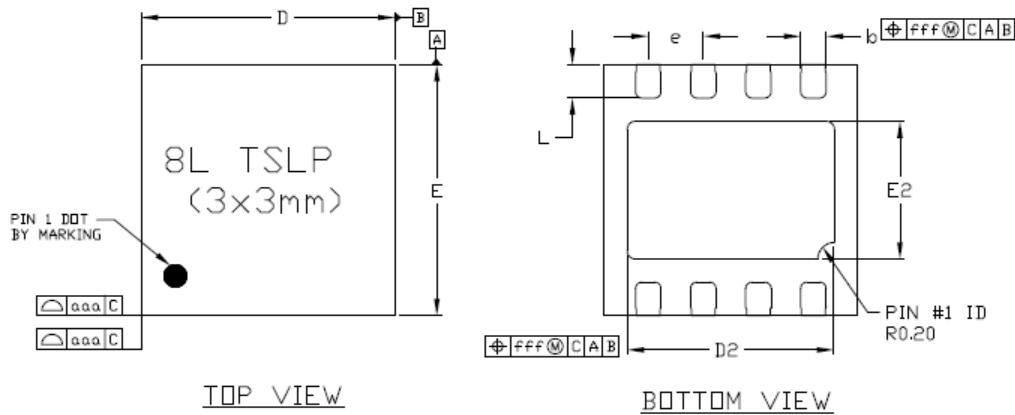


**Fig.7 Switching Time Waveform**



**Fig.8 Gate Charge Waveform**

## DFN3x3 Dual PACKAGE INFORMATION



### Notes

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DIMENSIONING AND TOLERANCING PER JEDEC MO-220.

Symbol	Dimensions In Millimeters		
	Min	Nom	Max
A	0.700	0.750	0.800
A1	-	-	0.050
A3	0.203Ref.		
D	2.950	3.000	3.050
E	2.950	3.000	3.050
D2	2.400	2.450	2.500
E2	1.600	1.650	1.700
b	0.250	0.300	0.350
e	0.650BSC		
L	0.350	0.400	0.450
aaa	0.010		
bbb	0.010		
ccc	0.010		
ddd	0.050		
eee	0.080		
fff	0.100		