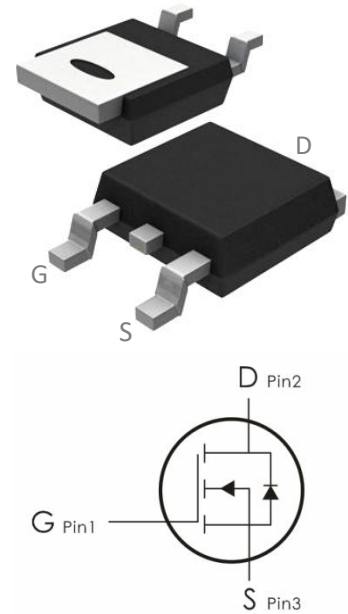


## Description:

This N-Channel MOSFET uses advanced trench technology and design to provide excellent  $R_{DS(on)}$  with low gate charge. It can be used in a wide variety of applications.

## Features:

- 1)  $V_{DS}=60V, I_D=10A, R_{DS(ON)}<90m\ \Omega @V_{GS}=10V$
- 2) Low gate charge.
- 3) Green device available.
- 4) Advanced high cell density trench technology for ultra low  $R_{DS(ON)}$ .
- 5) Excellent package for good heat dissipation.



## Absolute Maximum Ratings: ( $T_A=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Ratings	Units
$V_{DS}$	Drain-Source Voltage	60	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Continuous Drain Current- $T_C=25^\circ\text{C}^1$	10	A
	Continuous Drain Current- $T_C=100^\circ\text{C}^1$	7	
	Continuous Drain Current- $T_A=25^\circ\text{C}^1$	3.4	
	Continuous Drain Current- $T_A=100^\circ\text{C}^1$	2.7	
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	20	A
$P_D$	Power Dissipation- $T_C=25^\circ\text{C}^4$	20.8	W
	Power Dissipation- $T_A=25^\circ\text{C}^4$	2	W
$E_{AS}$	Single pulse avalanche energy <sup>3</sup>	6.3	mJ
$I_{AS}$	Avalanche Current	11.2	A
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ\text{C}$

## Thermal Characteristics:

Symbol	Parameter	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case <sup>1</sup>	6	°C/W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup>	62	

## Electrical Characteristics: ( $T_A=25^\circ\text{C}$ unless otherwise noted)

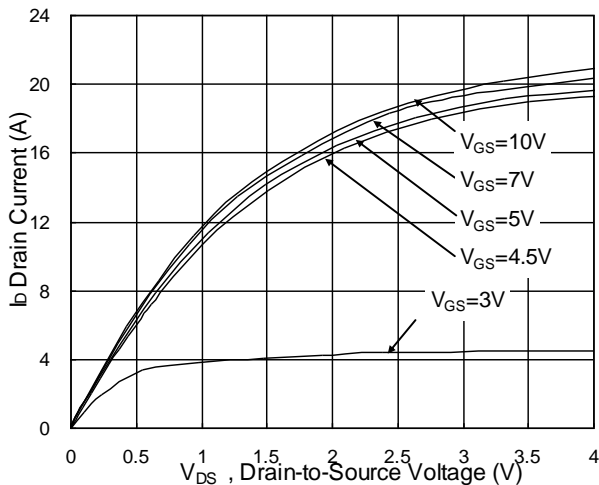
Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>Off Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250 \mu A$	60	---	---	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{GS}=0V, V_{DS}=48V, T_J=25^\circ\text{C}$	---	---	1	$\mu A$
		$V_{GS}=0V, V_{DS}=48V, T_J=55^\circ\text{C}$	---	---	5	$\mu A$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0A$	---	---	$\pm 100$	nA
<b>On Characteristics</b>						
$V_{GS(th)}$	GATE-Source Threshold Voltage	$V_{GS}=V_{DS}, I_D=250 \mu A$	1.2	---	2.5	V
$R_{DS(on)}$	Drain-Source On Resistance <sup>2</sup>	$V_{GS}=10V, I_D=10A$	---	---	90	m $\Omega$
		$V_{GS}=4.5V, I_D=8A$	---	---	100	m $\Omega$
$G_{FS}$	Forward Transconductance	$V_{DS}=5V, I_D=10A$	---	7.6	---	S
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS}=15V, V_{GS}=0V, f=1\text{MHz}$	---	500	---	pF
$C_{oss}$	Output Capacitance		---	35	---	
$C_{rss}$	Reverse Transfer Capacitance		---	23	---	
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-On Delay Time	$V_{GS}=10V, V_{DD}=30V,$ $I_D=10A, R_G=3.3\Omega$	---	1.6	---	ns
$t_r$	Rise Time		---	7.4	---	ns
$t_{d(off)}$	Turn-Off Delay Time		---	17.6	---	ns
$t_f$	Fall Time		---	4	---	ns

<b>Q<sub>g</sub></b>	Total Gate Charge	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =48V, I <sub>D</sub> =10A	---	4.9	---	nC
<b>Q<sub>gs</sub></b>	Gate-Source Charge		---	1.8	---	nC
<b>Q<sub>gd</sub></b>	Gate-Drain "Miller" Charge		---	2.2	---	nC
<b>R<sub>G</sub></b>	Gate Resistance	V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f=1MHz	---	2.2	---	Ω
<b>Drain-Source Diode Characteristics</b>						
<b>I<sub>S</sub></b>	Max. Diode Forward Current <sup>1,5</sup>	V <sub>GS</sub> =V <sub>D</sub> =0V, Force Current	---	---	10	A
<b>I<sub>SM</sub></b>	Pulsed Source Current <sup>2,5</sup>		---	---	20	A
<b>V<sub>SD</sub></b>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =1A, T <sub>J</sub> =25°C	---	---	1.2	V
<b>trr</b>	Reverse Recovery Time	I <sub>F</sub> =10A, T <sub>J</sub> =25°C	---	9.7	---	ns
<b>Qrr</b>	Reverse Recovery Charge	diF/dt=100A/μs	---	6.1	---	nC

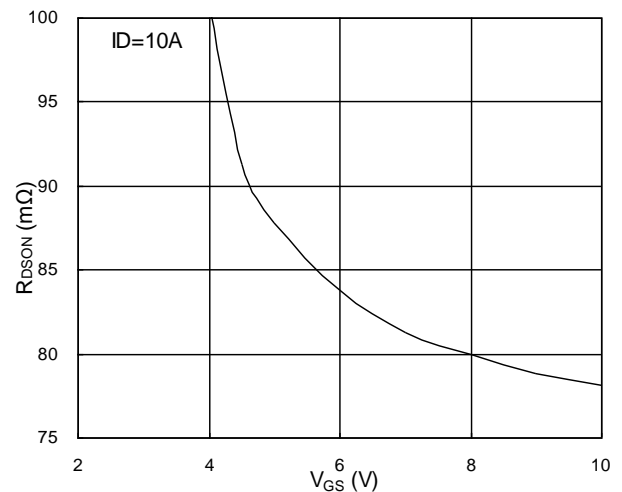
### Notes:

1. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
2. The data tested by pulsed, pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$
3. The EAS data shows Max. rating. The test condition is V<sub>DD</sub>=25V, V<sub>GS</sub>=10V, L=0.1mH, I<sub>AS</sub>=11.2A
4. The power dissipation is limited by 150°C junction temperature
5. The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub>, in real applications, should be limited by total power dissipation.

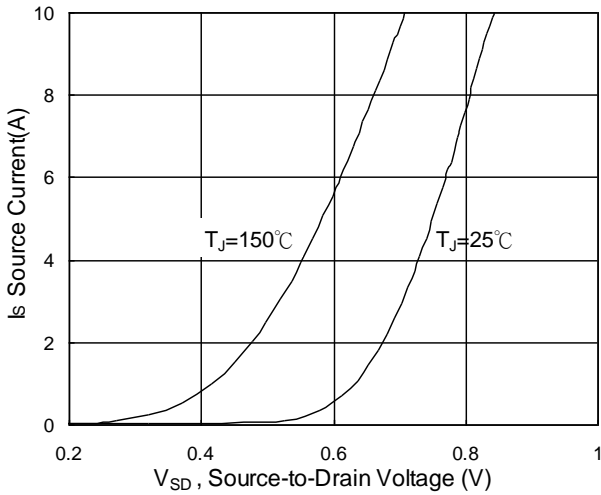
### Typical Characteristics: (T<sub>A</sub>=25°C unless otherwise noted)



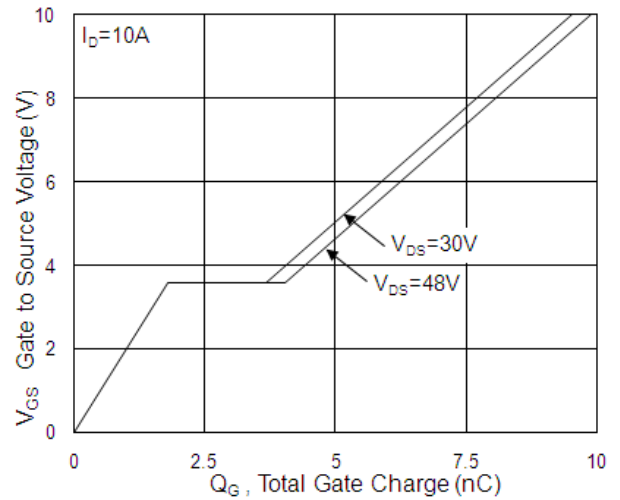
**Fig.1 Typical Output Characteristics**



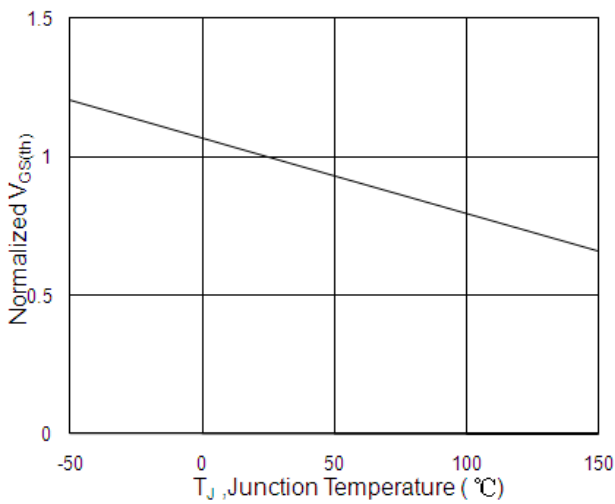
**Fig.2 On-Resistance v.s Gate-Source**



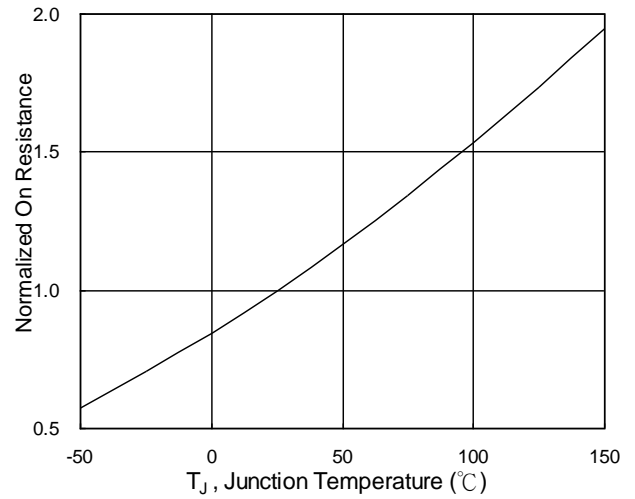
**Fig.3 Forward Characteristics of Reverse**



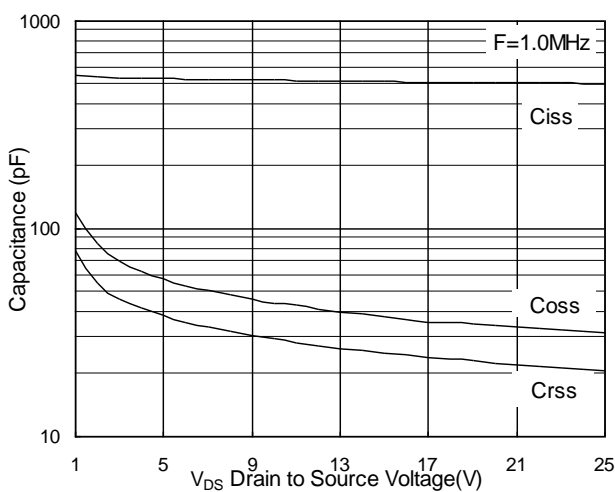
**Fig.4 Gate-Charge Characteristics**



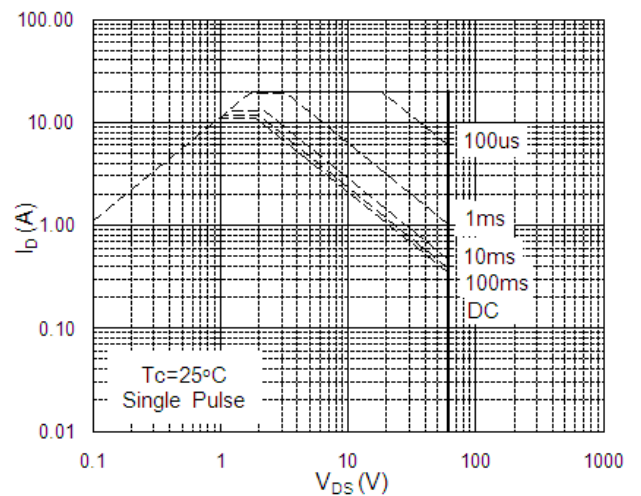
**Fig.5 Normalized  $V_{GS(th)}$  v.s  $T_J$**



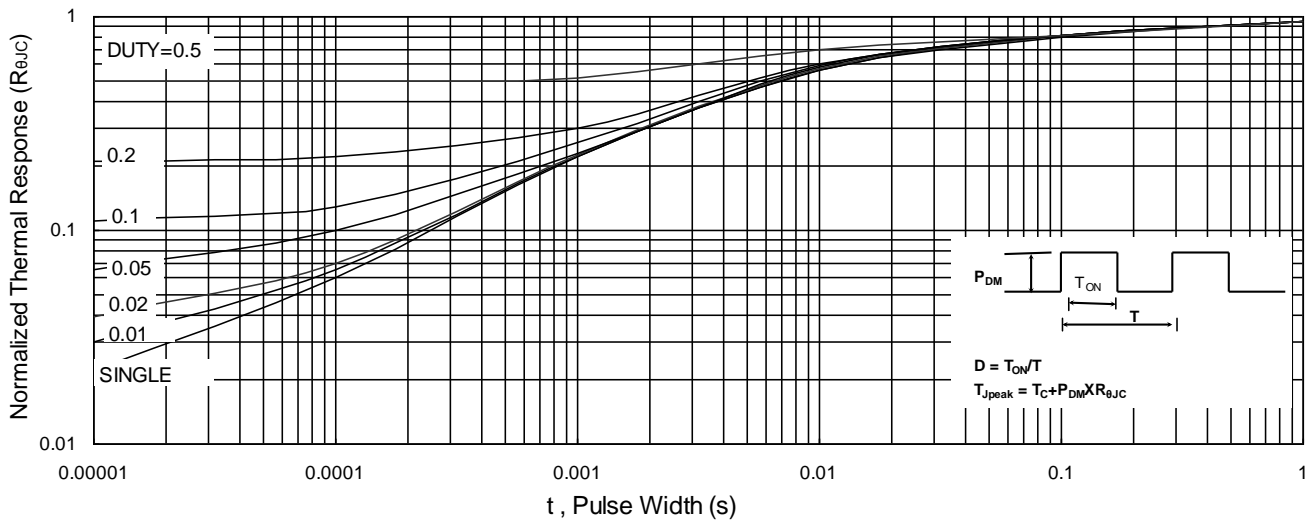
**Fig.6 Normalized  $R_{DS(on)}$  v.s  $T_J$**



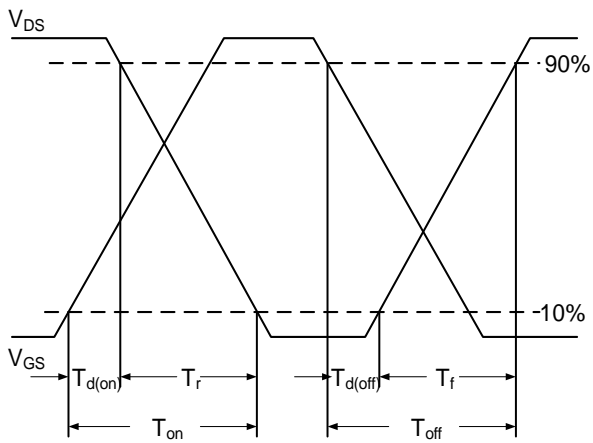
**Fig.7 Capacitance**



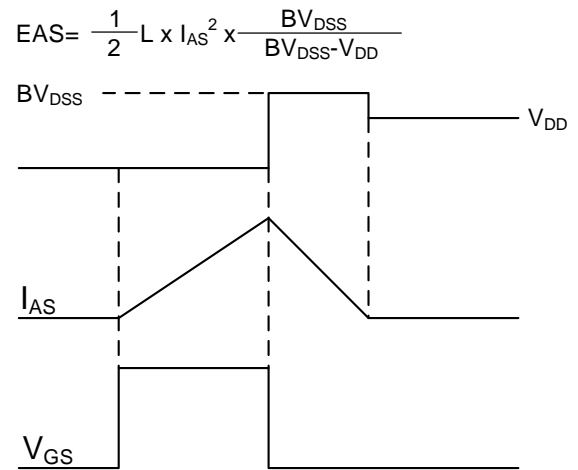
**Fig.8 Safe Operating Area**



**Fig.9 Normalized Maximum Transient Thermal Impedance**



**Fig.10 Switching Time Waveform**



**Fig.11 Unclamped Inductive Switching Waveform**



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