

**Features:**

8.0A, 650V,  $R_{DS(on)}(T_c) = 1.1 \text{ } @V_{GS}=10V$

Low Gate Charge

Low  $C_{iss}$

100% Avalanche Capability

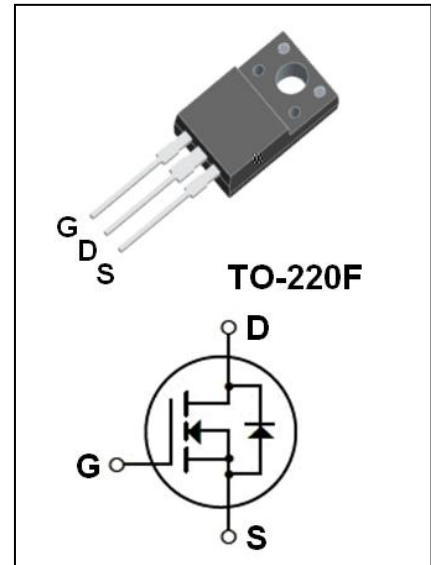
Fast Switching

Low  $R_{\theta(jc)}$  /  $R_{\theta(ja)}$

**Applications:**

High Frequency Switching Mode Power Supplies

Automotive Power Factor Correction



**Absolute Maximum Ratings (T<sub>c</sub> = 25°C)**

Symbol	Parameter	Value	Unit
$V_{DSS}$	Drain-Source Voltage (V <sub>GS</sub> = 0V, I <sub>D</sub> = 0A)	650	V
$I_D$	Drain Current (Continuous, V <sub>GS</sub> = 10V, V <sub>DS</sub> = 0V)	(T <sub>c</sub> = 25°C)	8.0*
		(T <sub>c</sub> = 100°C)	5.1*
$I_{DM}$	Drain Current (Pulse, V <sub>GS</sub> = 10V, V <sub>DS</sub> = 0V)	32*	A
$V_{GSS}$	Gate-Source Voltage	±30	V
$E_{AS}$	Single Pulse Avalanche Energy (I <sub>D</sub> = 8.0A, V <sub>GS</sub> = 0V)	600	J
$I_{AR}$	Average Rectified Current (I <sub>AS</sub> = 15.0A, V <sub>GS</sub> = 0V)	8.0	A
$E_{AR}$	Repetitive Avalanche Energy (I <sub>D</sub> = 8.0A, V <sub>GS</sub> = 0V)	15.0	J
$I_{RM}$	Root Mean Square Current (I <sub>AS</sub> = 15.0A, V <sub>GS</sub> = 0V)	4.5	A
$P_D$	Power Dissipation (T <sub>c</sub> = 25°C)	51	W
		0.41	W/°C
$T_{vj}$	Operating Junction Temperature	150	°C
$T_{stg}$	Storage Temperature Range	-55 ~ +150	°C

\* Data in parentheses is limited by SOA and SOG.

**Thermal Characteristics**

Symbol	Parameter	Value	Unit
$R_{JC}$ <td>Thermal Resistance, Junction to Case</td> <td>2.44</td> <td>°C/W</td>	Thermal Resistance, Junction to Case	2.44	°C/W
$R_{JA}$ <td>Thermal Resistance, Junction to Ambient</td> <td>62.5</td> <td>°C/W</td>	Thermal Resistance, Junction to Ambient	62.5	°C/W

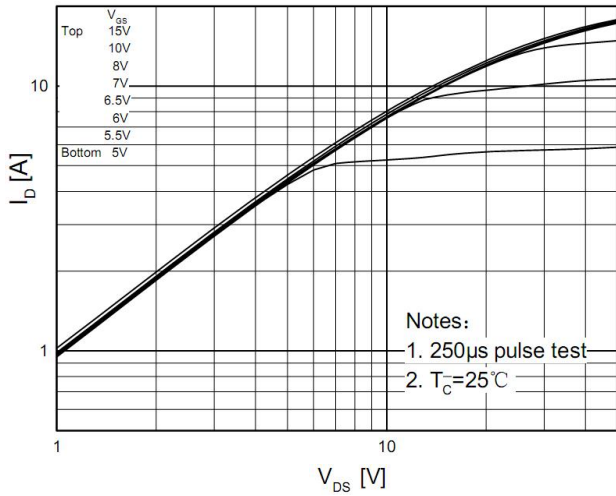
**Electrical Characteristics (T<sub>J</sub> = 25°C)**

S	Parameter	Test Conditions	M	T	Max	Unit
<b>Off Characteristics</b>						
BV <sub>DSS</sub>	Drain-Base Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250 A	650	--	--	V
ΔBV <sub>DSS</sub> / ΔT <sub>J</sub>	Base Voltage Temperature Coefficient	I <sub>D</sub> =250 A (R <sub>θJC</sub> = 25°C)	--	0.7	--	V/°C
I <sub>DSS</sub>	Zener Voltage	V <sub>DS</sub> =650V, V <sub>GS</sub> =0V	--	--	1	A
		V <sub>DS</sub> =520V, T <sub>J</sub> =125°C	--	--	10	A
I <sub>GSSF</sub>	Gate-Base Current, Forward	V <sub>GS</sub> =+30V, V <sub>DS</sub> =0V	--	--	100	A
I <sub>GSSR</sub>	Gate-Base Current, Reverse	V <sub>GS</sub> =-30V, V <sub>DS</sub> =0V	--	--	-100	A
<b>On Characteristics</b>						
V <sub>GS(on)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250 A	2.0	--	4.0	V
R <sub>DS(on)</sub>	Source-Drain Saturation Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =4.0A	--	1.1	1.3	
f <sub>FS</sub>	Fall Time	V <sub>DS</sub> =40V, I <sub>D</sub> =4.0A (N=4)	--	7	--	S
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1.0MHz	--	1400	--	F
	Output Capacitance		--	175	--	F
	Reverse Transfer Capacitance		--	16	--	F
<b>Switching Characteristics</b>						
t <sub>on</sub> ( )	Turn-On Delay Time	V <sub>DD</sub> = 325V, I <sub>D</sub> = 8.0A, R <sub>G</sub> = 25 (N=4,5)	--	13.5	--	
	Turn-On Rise Time		--	105	--	
	Turn-On Delay Time		--	128	--	
	Turn-On Fall Time		--	49	--	
Q <sub>g</sub>	Turn-On Gate Charge	V <sub>DS</sub> = 520V, I <sub>D</sub> = 8.0A, V <sub>GS</sub> = 10V (N=4,5)	--	31	--	C
	Turn-Off Gate Charge		--	6.5	--	C
	Turn-Off Gate Charge		--	14.7	--	C
<b>Dynamic Thermal Characteristics and Maximum Ratings</b>						
I <sub>S</sub>	Maximum Collector-Diode Forward Current		--	--	8.0	A
I <sub>SM</sub>	Maximum Pulsed Diode Forward Current		--	--	32	A
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> = 0V, I <sub>S</sub> = 8.0A	--	--	1.4	V
Q <sub>g</sub>	Reverse Recovery Time	V <sub>GS</sub> = 0V, I <sub>S</sub> = 8.0A, I <sub>F</sub> / I <sub>S</sub> = 100A/ (N=4)	--	325	--	
	Reverse Recovery Charge		--	2.7	--	C

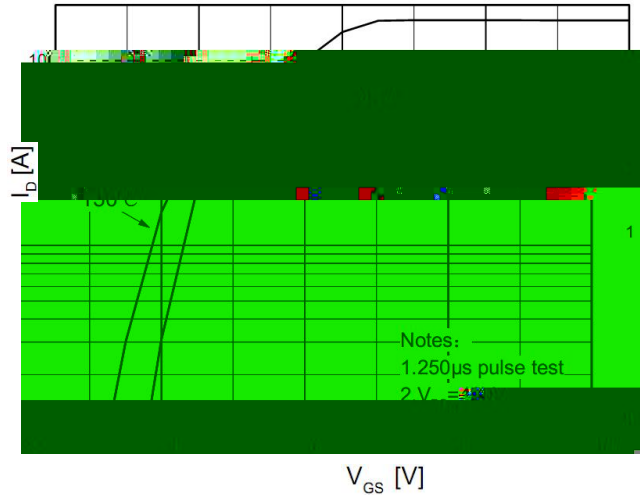
Notes:

- R<sub>θJC</sub>: Power Loss Junction Temperature
- L = 18.5 H, I<sub>AS</sub> = 8.0A, V<sub>DD</sub> = 50V, R<sub>G</sub> = 25 Ω, S<sub>AM</sub> = 100mm<sup>2</sup>, T<sub>J</sub> = 25°C.
- I<sub>SD</sub> 8.0A, I<sub>FS</sub> 200A/μs, V<sub>DD</sub> BV<sub>DSS</sub>, S<sub>AM</sub> = 100mm<sup>2</sup>, T<sub>J</sub> = 25°C.
- P<sub>tot</sub>: Power Loss, D<sub>C</sub> = 2%.
- Electrical Characteristics are typical values.

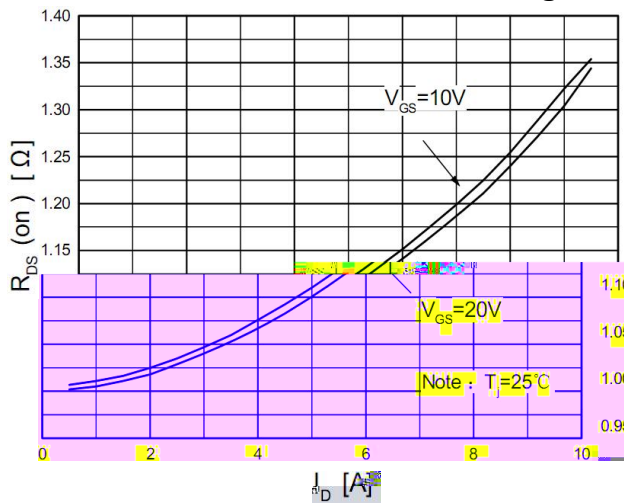
**O -Regi Cha ac e i ic**



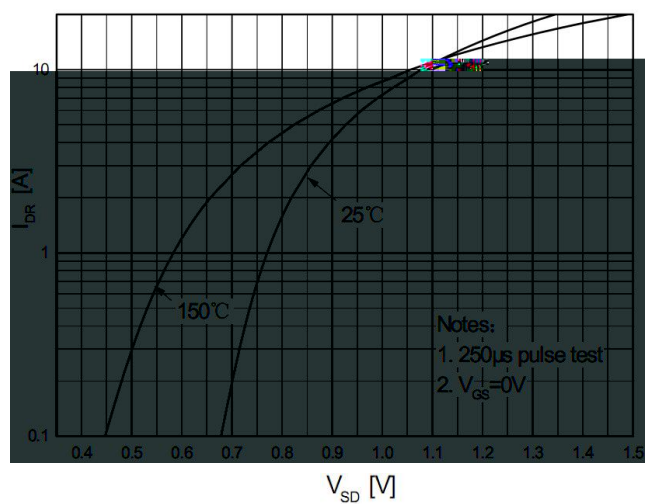
**T a f e Cha ac e i ic**



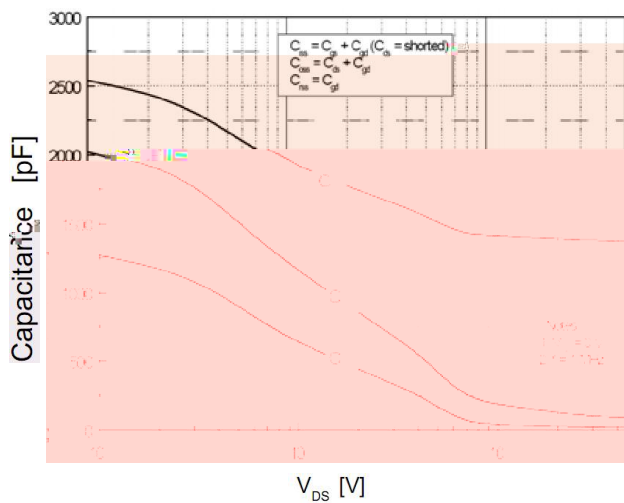
**O -Re i a ce Va i a i .  
D a i C e a d G a e V l a g e**



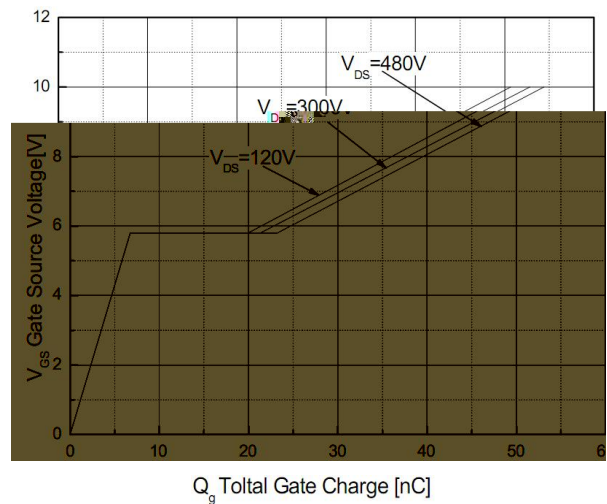
**B d D i d e F a d V l a g e Va i a i .  
. S c e C e a d T e m e a e**



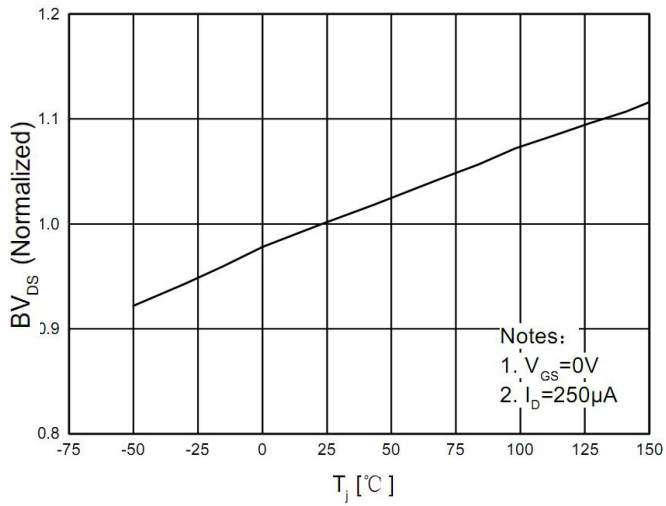
**Ca a c i a c e Cha ac e i ic**



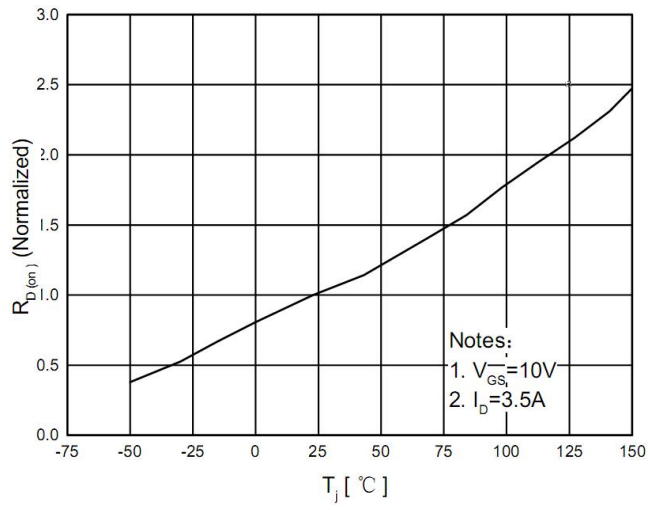
**G a e Cha g e Cha ac e i ic**



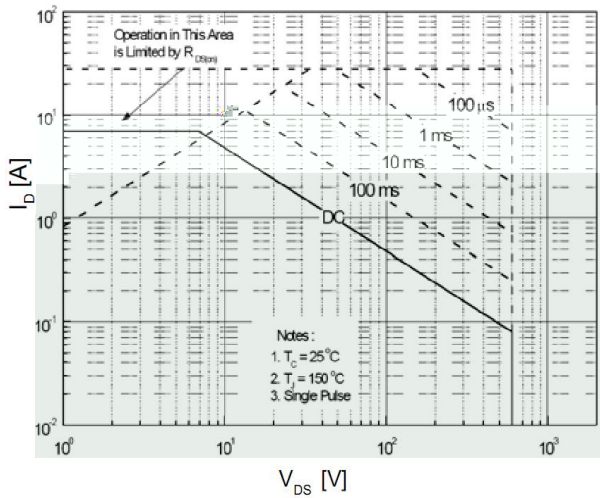
**Breakdown Voltage vs. Temperature**



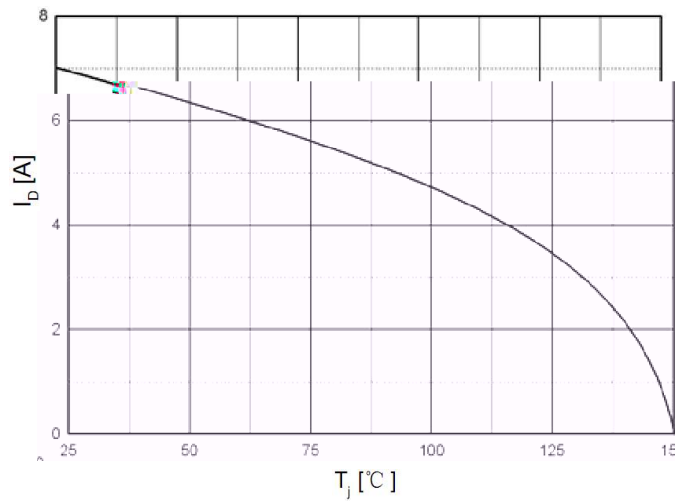
**On-Resistance vs. Temperature**



**Maximum Safe Operating Area**



**Maximum Drain Current vs. Temperature**



## TO-220F Package Dimension

UNIT:           

SYMBOL		a	SYMBOL		a
A	9.80	10.60	D	2.54	
A1	7.00		D1	1.15	1.55
A2	2.90	3.40	D2	0.60	1.00
A3	9.10	9.90	D3	0.20	0.50
B1	15.40	16.40	E	2.24	2.84
B2	4.35	4.95	E1		0.70
B3	6.00	7.40	E2		1.00
C	3.00	3.70	E3	0.35	0.65
C1	15.00	17.00	E4	2.30	3.30
C2	8.80	10.80			30

