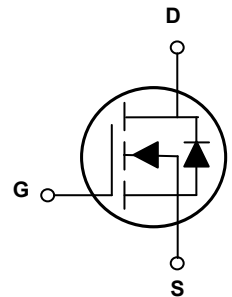


### Main Product Characteristics

$V_{DSS}$	80V
$R_{DS(on)}$	2.6m $\Omega$ (typ.)
$I_D$	200A



TO-220



Schematic Diagram

### Description

The SSF8970 utilizes the latest trench processing techniques to achieve high cell density, low on-resistance and high repetitive avalanche rating. These features make this device extremely efficient and reliable for use in battery protection, power switching and a wide variety of other applications.

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

Parameter	Symbol	Rating	Units
Drain-Source Voltage	$V_{DS}$	80	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current – Continuous ( $T_C=25^\circ\text{C}$ )	$I_D$	200	A
Drain Current – Continuous ( $T_C=100^\circ\text{C}$ )		126	A
Drain Current – Pulsed <sup>1</sup>	$I_{DM}$	800	A
Single Pulse Avalanche Energy <sup>2</sup>	$E_{AS}$	1280	mJ
Single Pulse Avalanche Current <sup>2</sup>	$I_{AS}$	160	A
Power Dissipation ( $T_C=25^\circ\text{C}$ )	$P_D$	208	W
Power Dissipation – Derate above 25 $^\circ\text{C}$		1.66	W/ $^\circ\text{C}$
Storage Temperature Range	$T_{STG}$	-50 to 150	$^\circ\text{C}$
Operating Junction Temperature Range	$T_J$	-50 to 150	$^\circ\text{C}$

### Thermal Characteristics

Parameter	Symbol	Max.	Unit
Thermal Resistance Junction to ambient	$R_{\theta JA}$	62	$^\circ\text{C}/\text{W}$
Thermal Resistance Junction to Case	$R_{\theta JC}$	0.6	$^\circ\text{C}/\text{W}$

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

#### Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$B_{VDSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	80	-	-	V
$B_{VDSS}/T_J$	BVDSS Temperature Coefficient	Reference to $25^{\circ}\text{C}$ , $I_D=1\text{mA}$	-	0.05	-	$V/^{\circ}\text{C}$
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=80V, V_{GS}=0V, T_J=25^{\circ}\text{C}$ $V_{DS}=64V, V_{GS}=0V, T_J=125^{\circ}\text{C}$	-	-	1 10	$\mu\text{A}$ $\mu\text{A}$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 25V, V_{DS}=0V$	-	-	$\pm 100$	nA

#### On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10V, I_D=20A$	-	2	2.6	mW
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	1.5	2.2	3.5	V
$V_{GS(th)}$	VGS(th) Temperature Coefficient		-	-5	-	$\text{mV}/^{\circ}\text{C}$
gfs	Forward Transconductance	$V_{DS}=10V, I_D=3A$	-	18	-	S

#### Dynamic and Switching Characteristics

Qg	Total Gate Charge <sup>3,4</sup>		-	247	360	
Qgs	Gate-Source Charge <sup>3,4</sup>	$V_{DS}=40V, V_{GS}=10V, I_D=10A$	-	63.5	125	nC
Qgd	Gate-Drain Charge <sup>3,4</sup>		-	56	110	
Td(on)	Turn-On Delay Time <sup>3,4</sup>		-	71	140	
Tr	Rise Time <sup>3,4</sup>	$V_{DD}=40V, V_{GS}=10V, R_G=10\Omega, I_D=10A$	-	103	200	
Td(off)	Turn-Off Delay Time <sup>3,4</sup>		-	291	580	ns
Tf	Fall Time <sup>3,4</sup>		-	170	340	
Ciss	Input Capacitance		-	15010	23000	
Coss	Output Capacitance	$V_{DS}=30V, V_{GS}=0V, F=1\text{MHz}$	-	772	1200	pF
Crss	Reverse Transfer Capacitance		-	81	160	
Rg	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	-	1.8	3.6	W

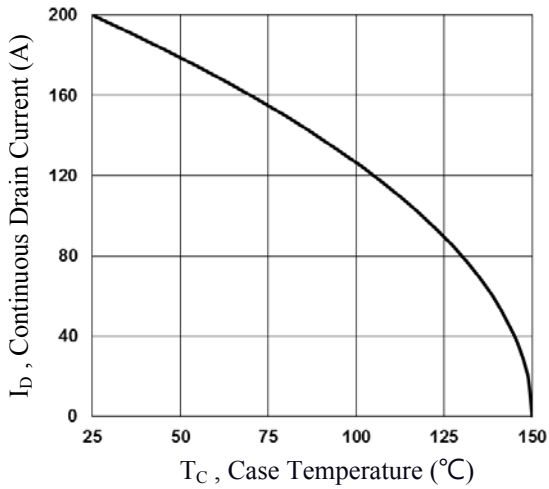
#### Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous Source Current		-	-	200	A
$I_{SM}$	Pulsed Source Current	$V_G=V_D=0V$ , Force Current	-	-	400	A
$V_{SD}$	Diode Forward Voltage	$V_{GS}=0V, I_S=1A, T_J=25^{\circ}\text{C}$	-	-	1	V
trr	Reverse Recovery Time	$V_{GS}=0V, I_S=20A, di/dt=100A/\mu s$	-	54	-	ns
Qrr	Reverse Recovery Charge	$T_J=25^{\circ}\text{C}$	-	78	-	nC

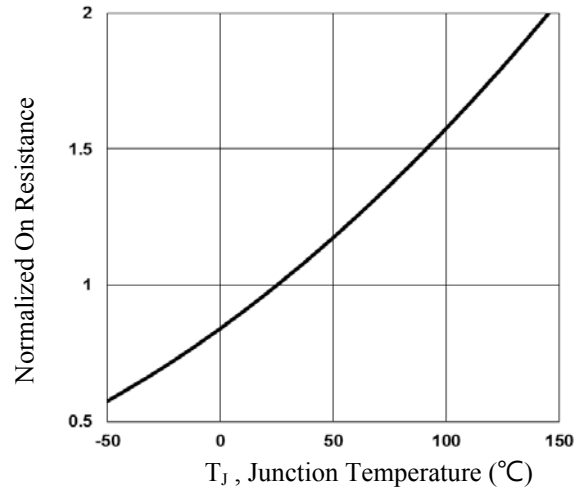
Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2.  $V_{DD}=50V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=160A$ , Starting  $T_J=25^{\circ}\text{C}$
3. The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$ .
4. Essentially independent of operating temperature.

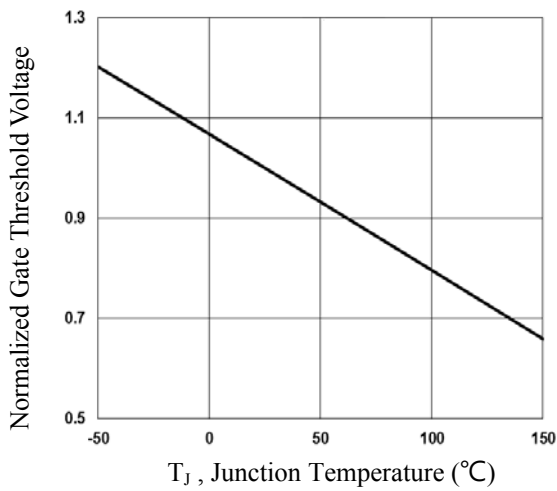
## Typical Electrical and Thermal Characteristics



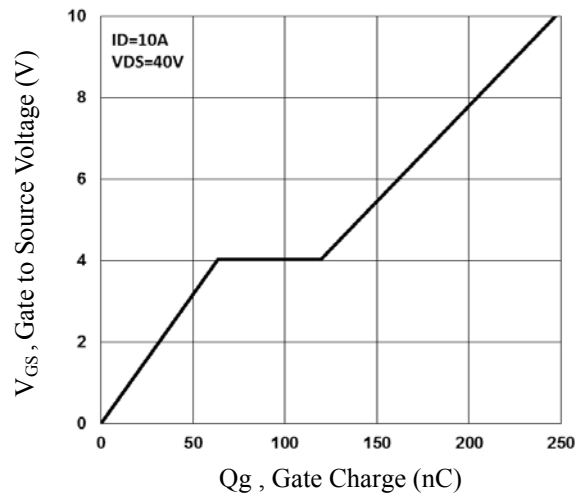
**Fig.1 Continuous Drain Current vs.  $T_C$**



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

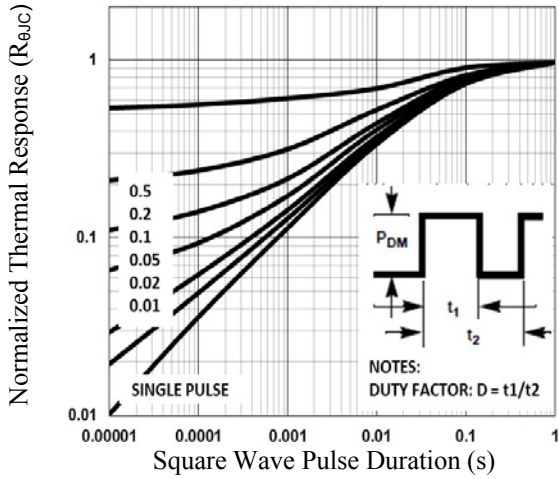


**Fig.3 Normalized  $V_{th}$  vs.  $T_J$**

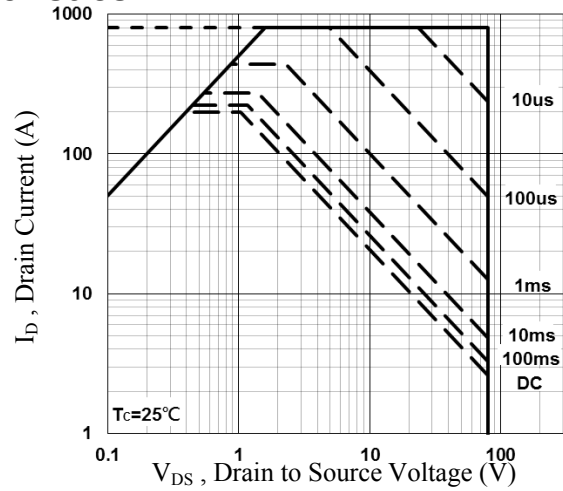


**Fig.4 Gate Charge Characteristics**

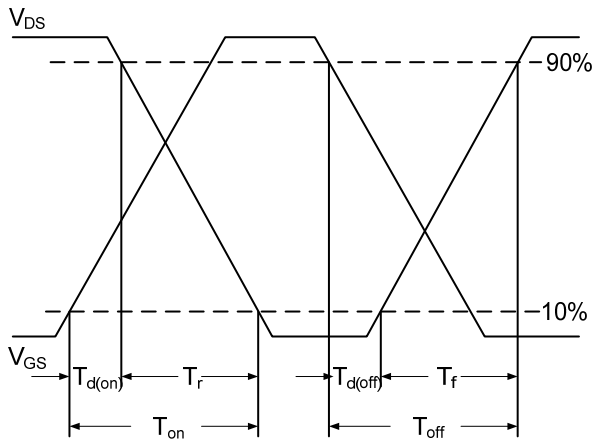
**Typical Electrical and Thermal Characteristics**



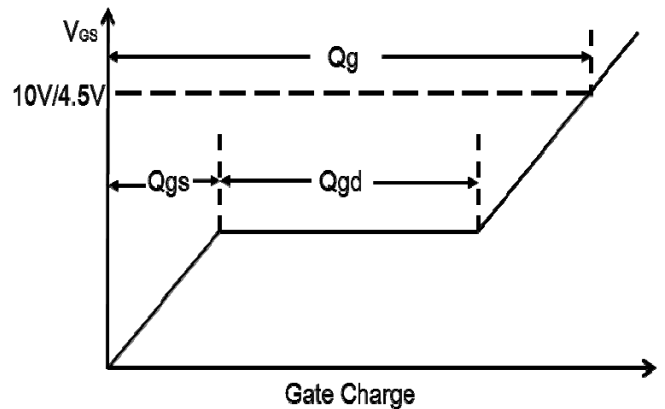
**Fig.5 Normalized Transient Impedance**



**Fig.6 Maximum Safe Operation Area**

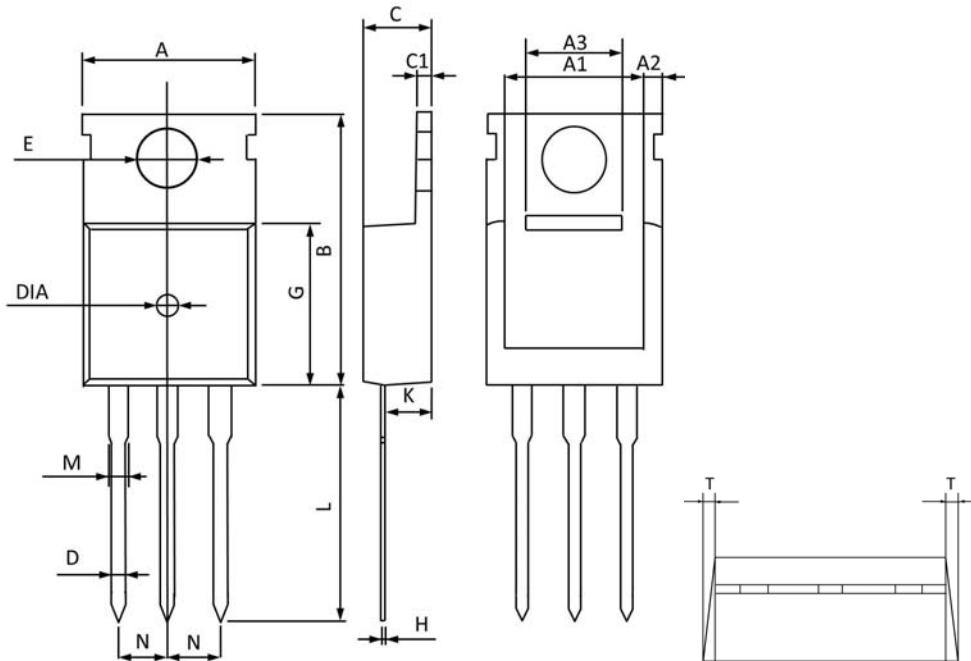


**Fig.7 Switching Time Waveform**



**Fig.8 Gate Charge Waveform**

## Package Outline Dimensions TO-220



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	10.300	9.700	0.406	0.382
A1	8.840	8.440	0.348	0.332
A2	1.250	1.050	0.049	0.041
A3	5.300	5.100	0.209	0.201
B	16.200	15.400	0.638	0.606
C	4.680	4.280	0.184	0.169
C1	1.500	1.100	0.059	0.043
D	1.000	0.600	0.039	0.024
E	3.800	3.400	0.150	0.134
G	9.300	8.700	0.366	0.343
H	0.600	0.400	0.024	0.016
K	2.700	2.100	0.106	0.083
L	13.600	12.800	0.535	0.504
M	1.500	1.100	0.059	0.043
N	2.590	2.490	0.102	0.098
T	W0.35		W0.014	
DIA	Φ1.5 TYP.	deep0.2 TYP.	Φ0.059 TYP.	deep0.008 TYP.