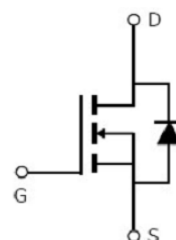


**Main Product Characteristics:**

$V_{DSS}$	700V
$R_{DS(on)}$	0.4Ω (typ.)
$I_D$	11A


**TO-220F**

**Marking and pin Assignment**

**Schematic diagram**
**Features and Benefits:**
**Features:**

- High dv/dt and avalanche capabilities
- 100% avalanche tested
- Low input capacitance and gate charge
- Low gate input resistance


**Description:**

The SSF11NS70UF series MOSFETs is a new technology, which combines an innovative super junction technology and advance process. This new technology achieves low Rdson, energy saving, high reliability and uniformity, superior power density and space saving.

**Absolute max Rating:**

Symbol	Parameter	Max.	Units
$I_D @ TC = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ ①	11	A
$I_D @ TC = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ ①	7	
$I_{DM}$	Pulsed Drain Current②	44	
$P_D @ TC = 25^\circ C$	Power Dissipation③	30.5	W
	Linear Derating Factor	0.24	W/°C
$V_{DS}$	Drain-Source Voltage	700	V
$V_{GS}$	Gate-to-Source Voltage	± 30	V
$E_{AS}$	Single Pulse Avalanche Energy @ L=133mH	307	mJ
$I_{AS}$	Avalanche Current @ L=133mH	2.15	A
$T_J T_{STG}$	Operating Junction and Storage Temperature Range	-55 to +150	°C

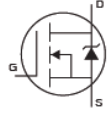
## Thermal Resistance

Symbol	Characterizes	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-case <sup>③</sup>	—	4.1	$^{\circ}C/W$
$R_{\theta JA}$	Junction-to-ambient ( $t \leq 10s$ ) <sup>④</sup>	—	80	$^{\circ}C/W$

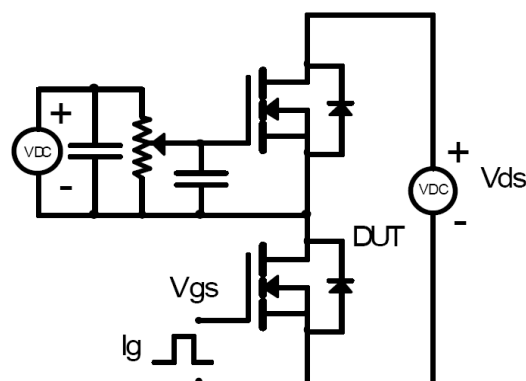
## Electrical Characterizes @ $T_A=25^{\circ}C$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source breakdown voltage	700	—	—	V	$V_{GS} = 0V, I_D = 1mA$
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	0.4	0.45	$\Omega$	$V_{GS}=10V, I_D = 3.2A$
		—	0.99	—		$T_J = 125^{\circ}C$
$V_{GS(th)}$	Gate threshold voltage	2	—	4	V	$V_{DS} = V_{GS}, I_D = 0.32mA$
		—	2.11	—		$T_J = 125^{\circ}C$
$I_{DSS}$	Drain-to-Source leakage current	—	—	1	$\mu A$	$V_{DS} = 650V, V_{GS} = 0V$
		—	—	50		$T_J = 125^{\circ}C$
$I_{GSS}$	Gate-to-Source forward leakage	—	—	100	nA	$V_{GS} = 30V$
		—	—	-100		$V_{GS} = -30V$
$Q_g$	Total gate charge	—	21	—	nC	$I_D = 6A,$
$Q_{gs}$	Gate-to-Source charge	—	4.6	—		$V_{DS} = 200V,$
$Q_{gd}$	Gate-to-Drain("Miller") charge	—	7.1	—		$V_{GS} = 10V$
$t_{d(on)}$	Turn-on delay time	—	11	—	ns	$V_{GS}=10V, V_{DS}=400V,$ $R_L=81.6\Omega, R_{GEN}=3.4\Omega$ $I_D=4.9A$
$t_r$	Rise time	—	6.7	—		
$t_{d(off)}$	Turn-Off delay time	—	27	—		
$t_f$	Fall time	—	6	—		
$C_{iss}$	Input capacitance	—	823	—	pF	$V_{GS} = 0V$
$C_{oss}$	Output capacitance	—	33	—		$V_{DS} = 100V$
$C_{rss}$	Reverse transfer capacitance	—	3.3	—		$f = 600KHz$

## Source-Drain Ratings and Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	11	A	MOSFET symbol showing the integral reverse p-n junction diode. 
$I_{SM}$	Pulsed Source Current (Body Diode)	—	—	44	A	
$V_{SD}$	Diode Forward Voltage	—	0.82	1.2	V	$I_S=4.9A, V_{GS}=0V$
$t_{rr}$	Reverse Recovery Time	—	258	—	ns	$T_J = 25^{\circ}C, I_F = 11A,$ $di/dt = 100A/\mu s$
$Q_{rr}$	Reverse Recovery Charge	—	2.4	—	$\mu C$	

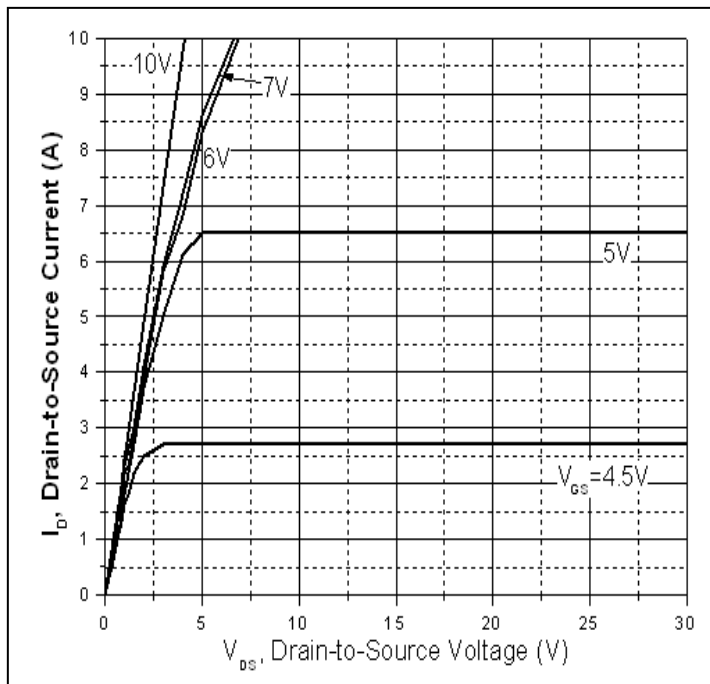
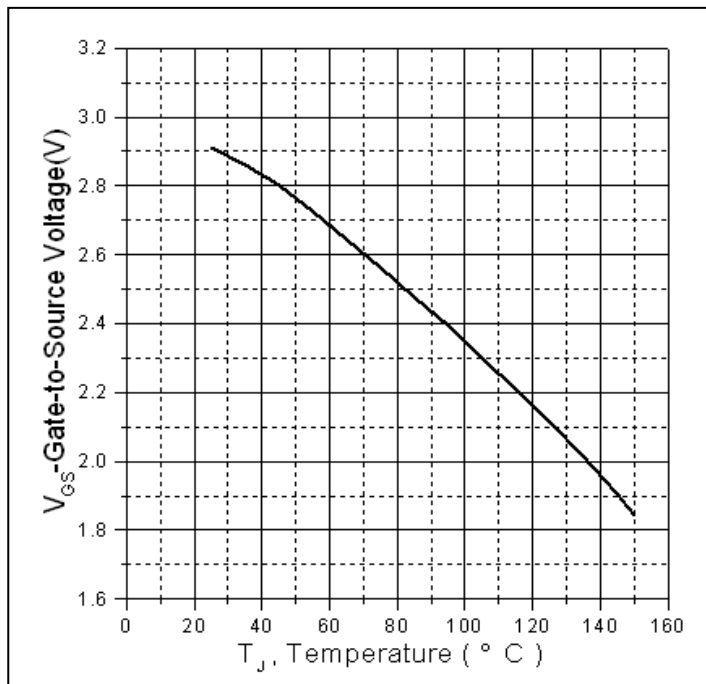
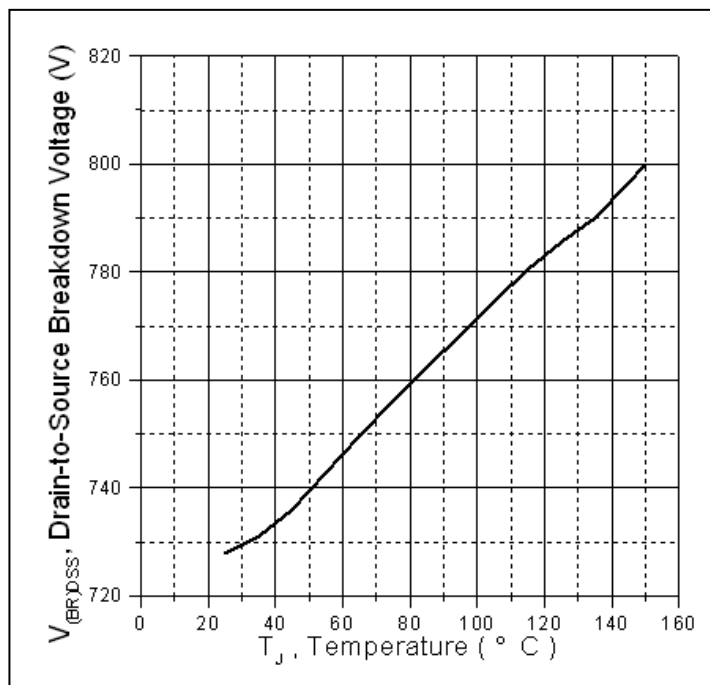
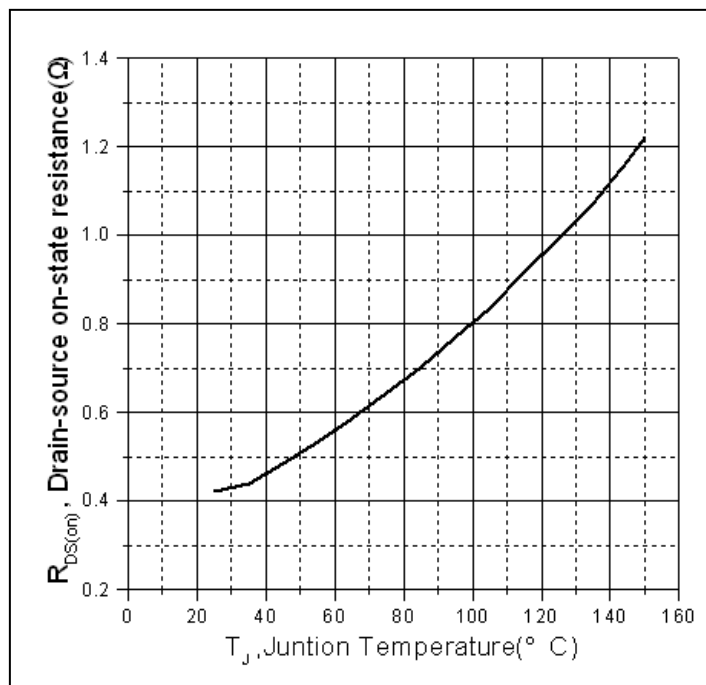
**Test circuits and Waveforms**
**EAS Test Circuit:**

**Gate charge test circuit:**

**Switching Time Test Circuit:**

**Switching Waveforms:**

**Notes:**

- ① Calculated continuous current based on maximum allowable junction temperature.
- ② Repetitive rating; pulse width limited by max. junction temperature.
- ③ The power dissipation PD is based on max. junction temperature, using junction-to-case thermal resistance.
- ④ The value of  $R_{\theta JA}$  is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with  $T_A = 25^\circ\text{C}$

**Typical electrical and thermal characteristics**

**Figure 1: Typical Output Characteristics**

**Figure 2. Gate to source cut-off voltage**

**Figure 3. Drain-to-Source Breakdown Voltage Vs. Case Temperature**

**Figure 4: Normalized On-Resistance Vs. Case Temperature**

Typical electrical and thermal characteristics

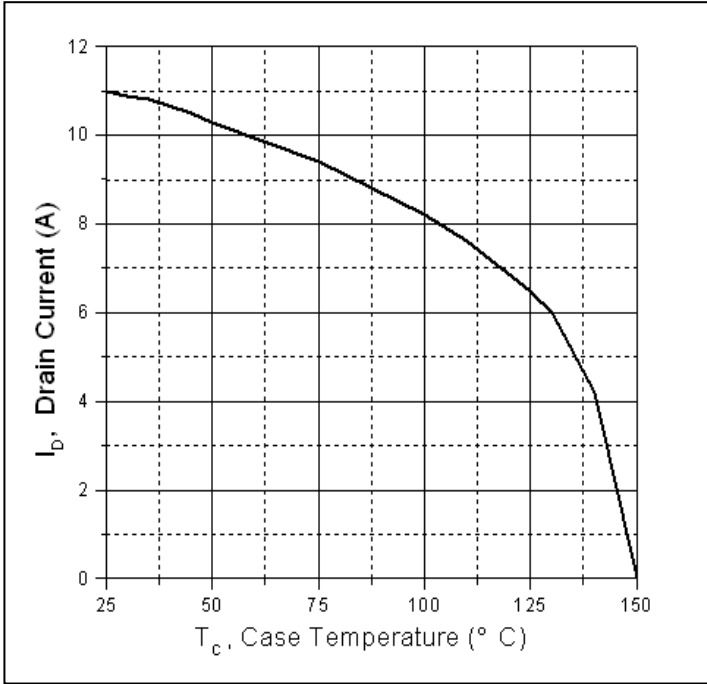


Figure 5. Maximum Drain Current Vs. Case Temperature

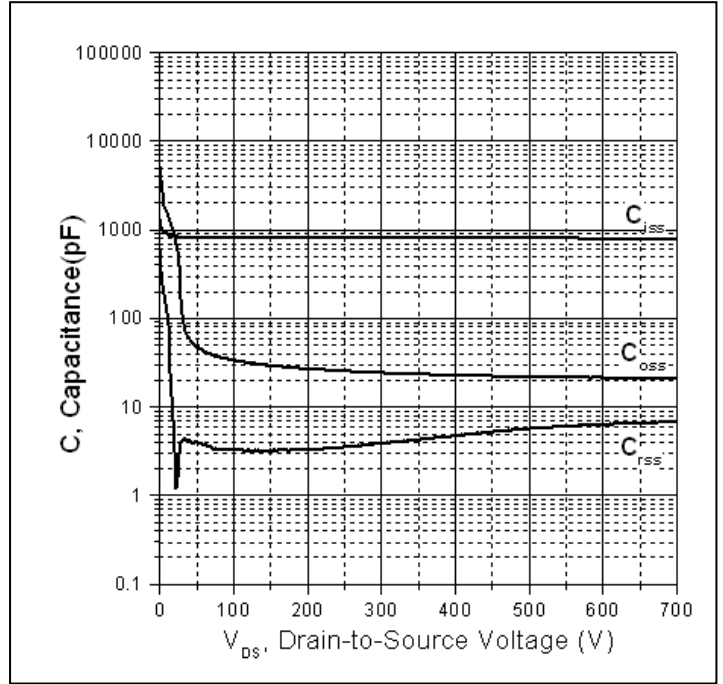


Figure 6. Typical Capacitance Vs. Drain-to-Source Voltage

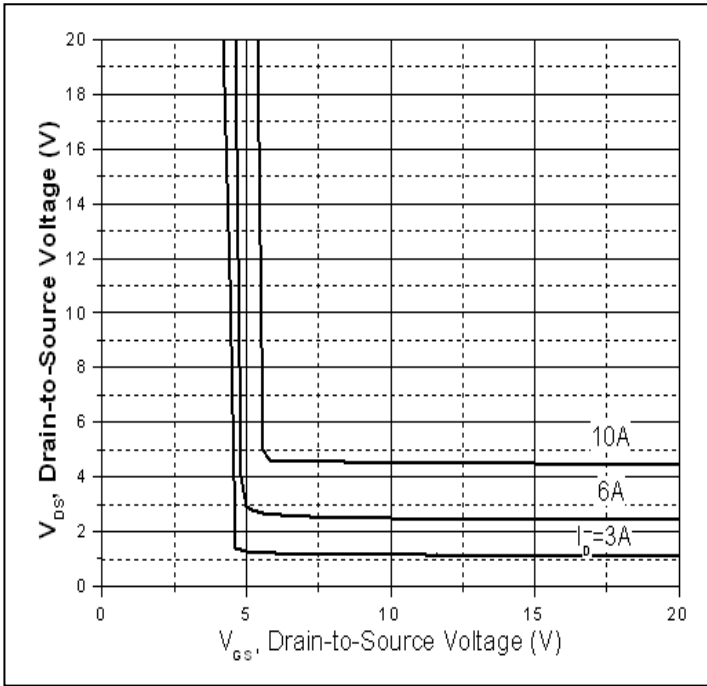


Figure7. Drain-to-Source Voltage Vs. Gate-to-Source Voltage

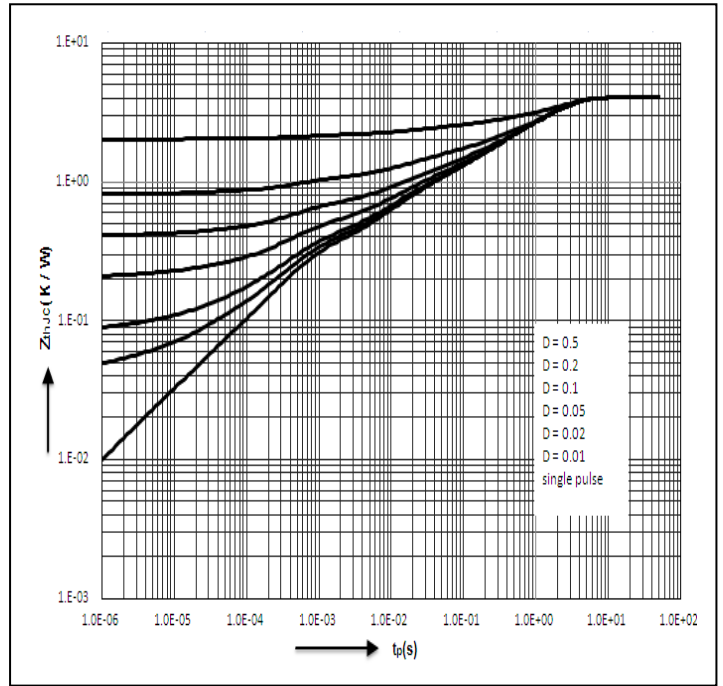
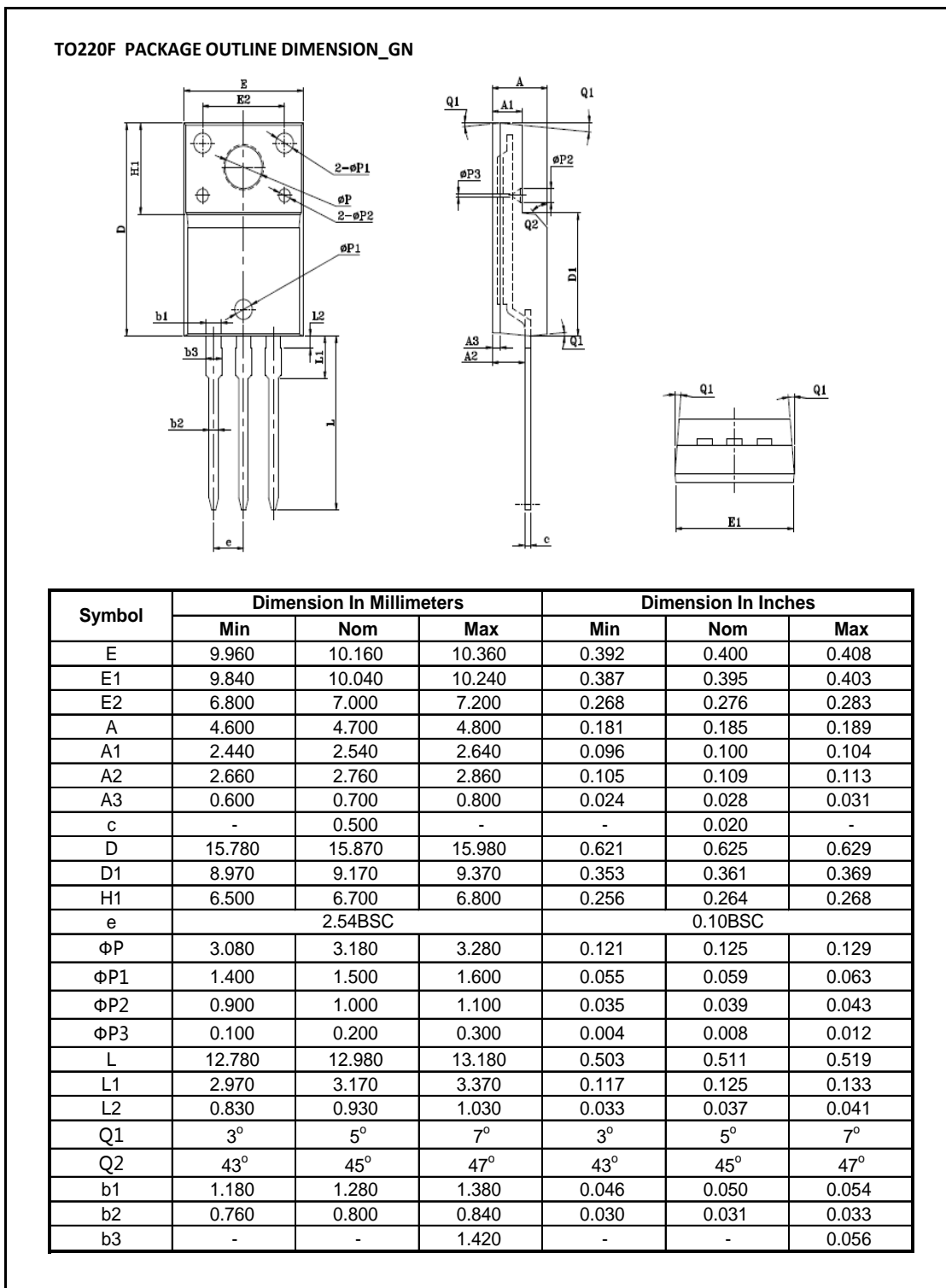


Figure8. Maximum Effective Transient Thermal Impedance, Junction-to-Case

**Mechanical Data:**


**Ordering and Marking Information**

<b>Device Marking: SSF11NS70UF</b> Package (Available) TO-220F Operating Temperature Range C : -55 to 150 °C
--

**Devices per Unit**

Package Type	Units/Tube	Tubes/Inner Box	Units/Inner Box	Inner Boxes/Carton Box	Units/Carton Box
TO220F	50	20	1000	6	6000

**Reliability Test Program**

Test Item	Conditions	Duration	Sample Size
High Temperature Reverse Bias(HTRB)	$T_j=125^{\circ}\text{C}$ to $150^{\circ}\text{C}$ @ 80% of Max $V_{DSS}/V_{CES}/V_R$	168 hours 500 hours 1000 hours	3 lots x 77 devices
High Temperature Gate Bias(HTGB)	$T_j=150^{\circ}\text{C}$ @ 100% of Max $V_{GSS}$	168 hours 500 hours 1000 hours	3 lots x 77 devices

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