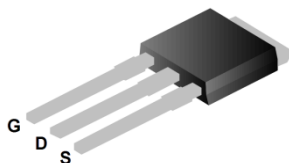
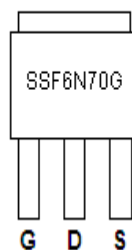
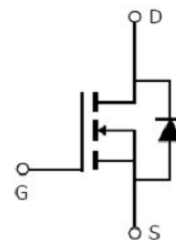


Main Product Characteristics:

V_{DSS}	700V
$R_{DS(on)}$	1.49Ω (typ.)
I_D	6A


TO-251

Marking and pin Assignment

Schematic diagram
Features and Benefits:

- Advanced MOSFET process technology
- Special designed for PWM, load switching and general purpose applications
- Ultra low on-resistance with low gate charge
- Fast switching and reverse body recovery
- 150°C operating temperature


Description:

It utilizes the latest processing techniques to achieve the high cell density and reduces the on-resistance with high repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in power switching application and a wide variety of other applications.

Absolute max Rating:

Symbol	Parameter	Max.	Units
$I_D @ TC = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ ①	6	A
$I_D @ TC = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ ①	3.8	
I_{DM}	Pulsed Drain Current②	24	
$P_D @ TC = 25^\circ C$	Power Dissipation③	113	W
	Linear Derating Factor	0.91	W/°C
V_{DS}	Drain-Source Voltage	700	V
V_{GS}	Gate-to-Source Voltage	± 30	V
E_{AS}	Single Pulse Avalanche Energy @ L=20mH	313	mJ
I_{AS}	Avalanche Current @ L=20mH	5.6	A
$T_J \quad T_{STG}$	Operating Junction and Storage Temperature Range	-55 to +150	°C

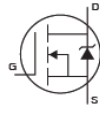
Thermal Resistance

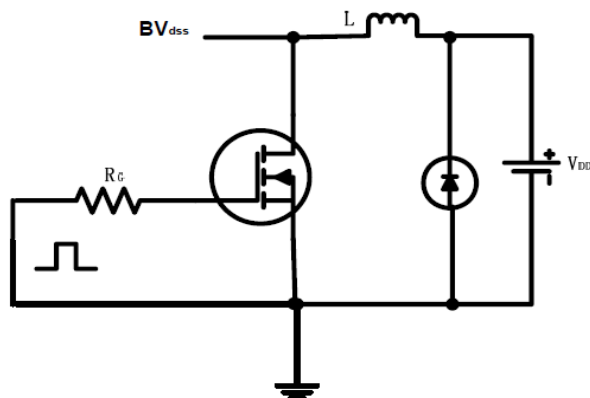
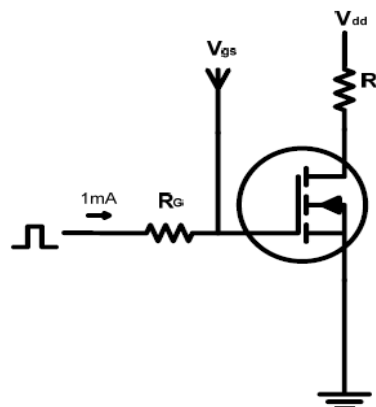
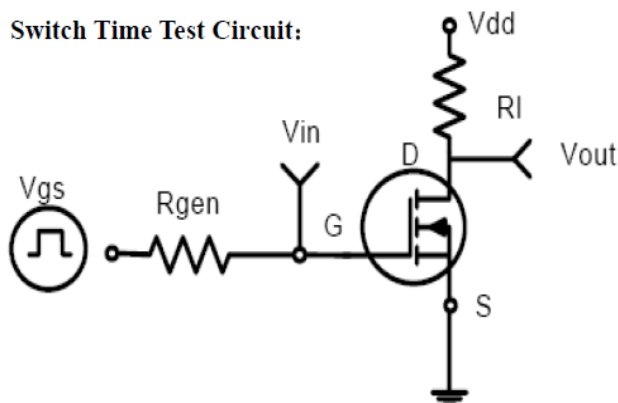
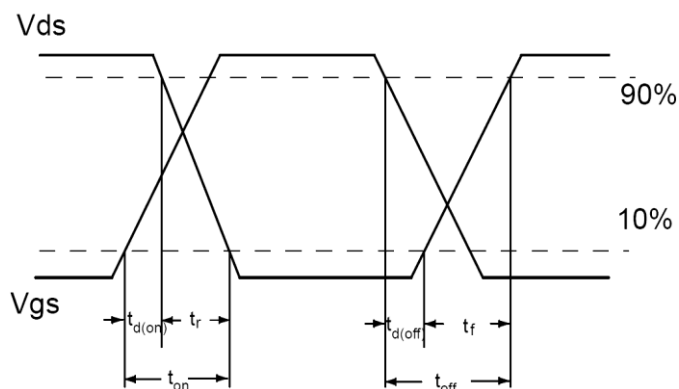
Symbol	Characterizes	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-case ^③	—	1.1	$^{\circ}C/W$
$R_{\theta JA}$	Junction-to-ambient ($t \leq 10s$) ^④	—	110	$^{\circ}C/W$

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

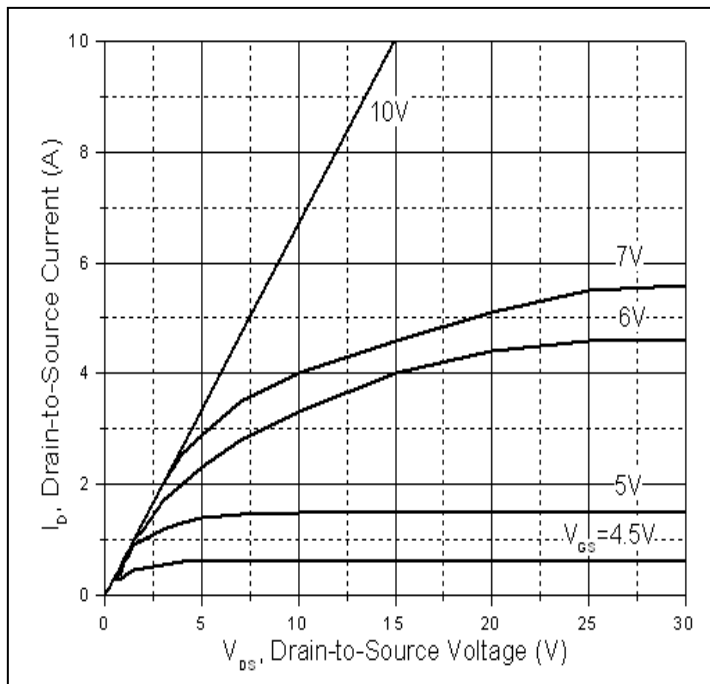
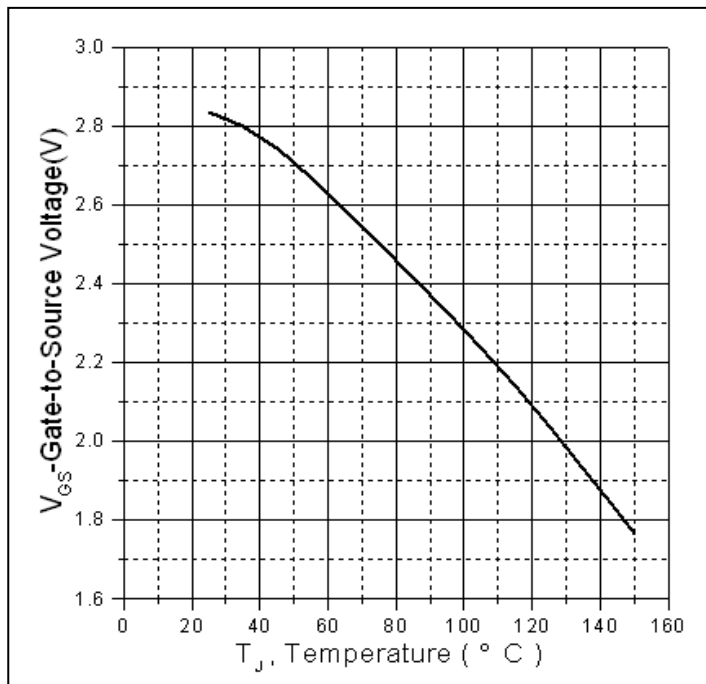
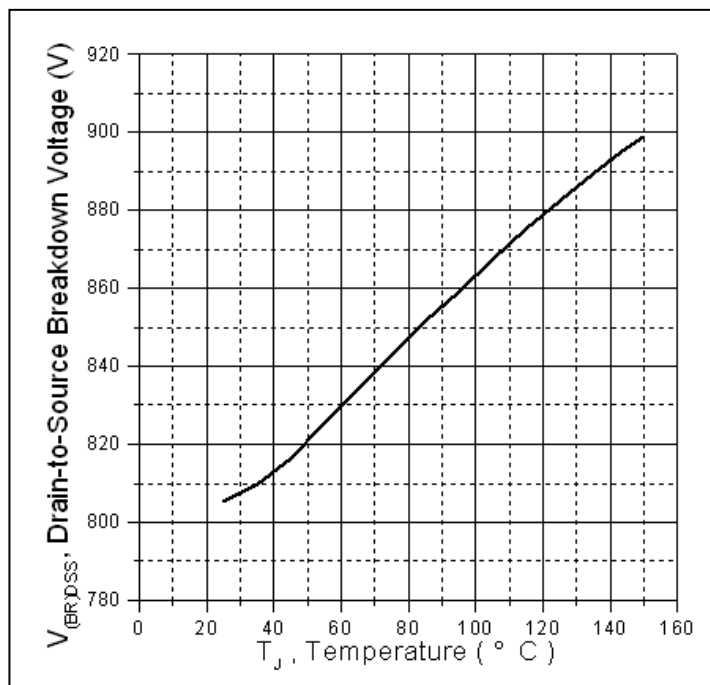
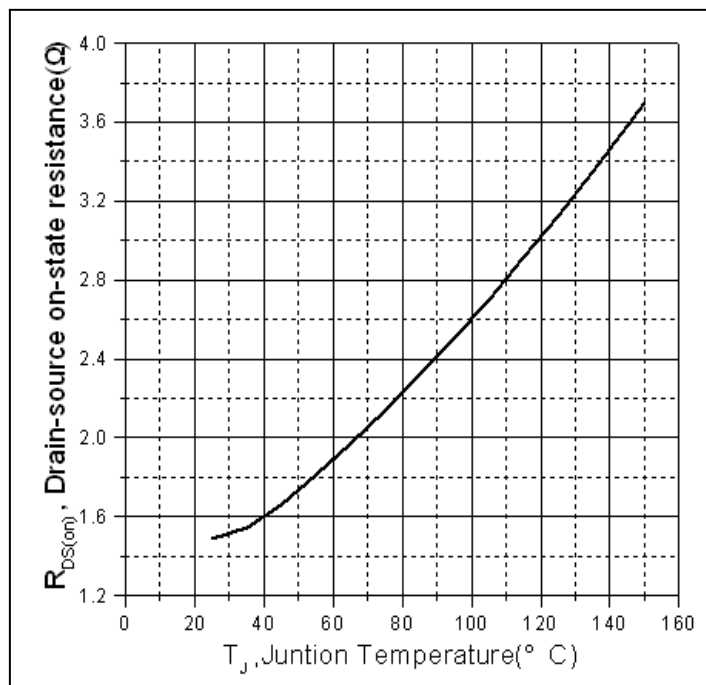
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source breakdown voltage	700	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	1.49	1.7	Ω	$V_{GS}=10V, I_D = 3A$
		—	3.12	—		$T_J = 125^{\circ}C$
$V_{GS(th)}$	Gate threshold voltage	2	—	4	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
		—	2.0	—		$T_J = 125^{\circ}C$
I_{DSS}	Drain-to-Source leakage current	—	—	1	μA	$V_{DS} = 700V, V_{GS} = 0V$
		—	—	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	—	16	—	nC	$I_D = 6A,$ $V_{DS}=400V,$ $V_{GS} = 10V$
Q_{gs}	Gate-to-Source charge	—	5.5	—		
Q_{gd}	Gate-to-Drain("Miller") charge	—	4.6	—		
$t_{d(on)}$	Turn-on delay time	—	15	—	ns	$V_{GS}=10V, V_{DS}=350V,$ $R_{GEN}=25\Omega, I_D=6A$
t_r	Rise time	—	20	—		
$t_{d(off)}$	Turn-Off delay time	—	41	—		
t_f	Fall time	—	24	—		
C_{iss}	Input capacitance	—	881	—	pF	$V_{GS} = 0V$
C_{oss}	Output capacitance	—	91	—		$V_{DS} = 25V$
C_{rss}	Reverse transfer capacitance	—	1.6	—		$f = 1MHz$

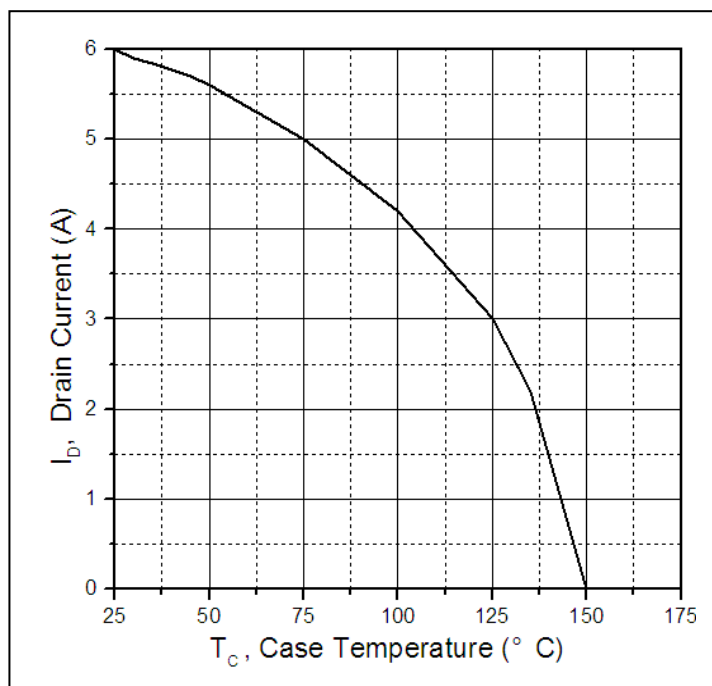
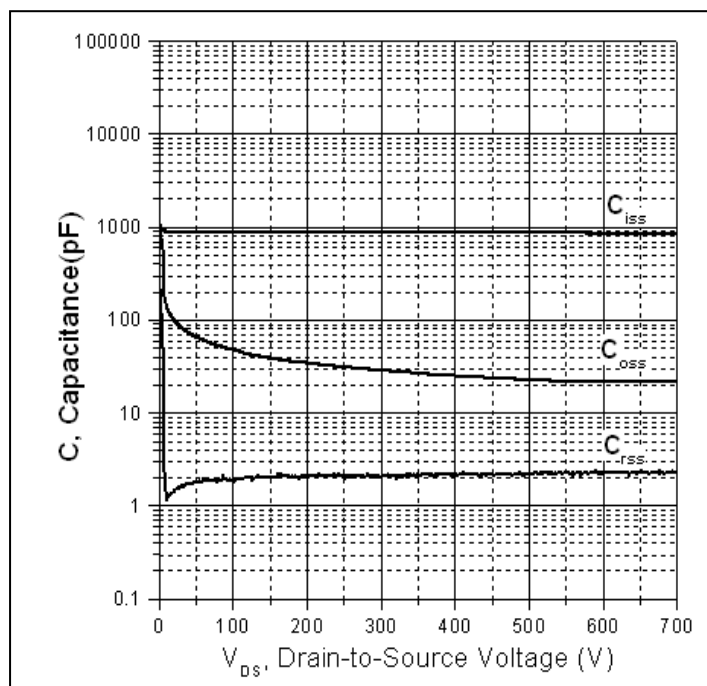
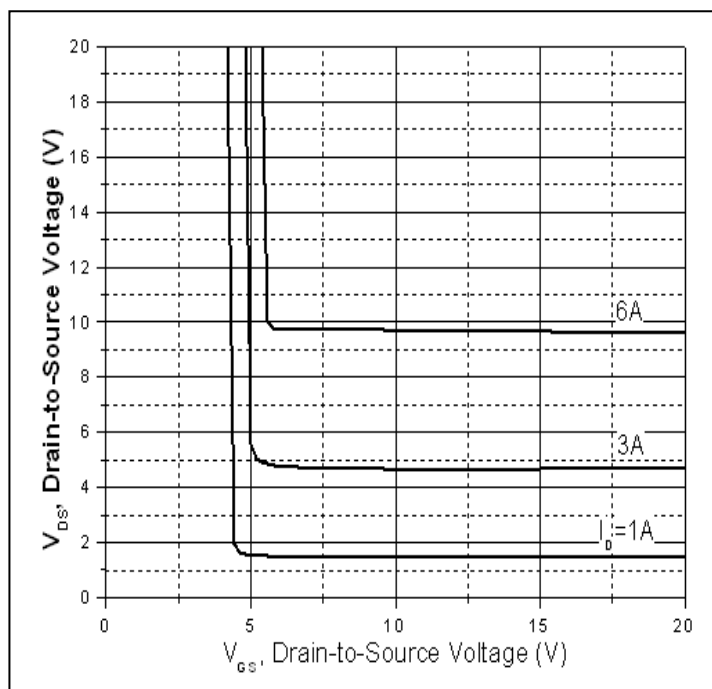
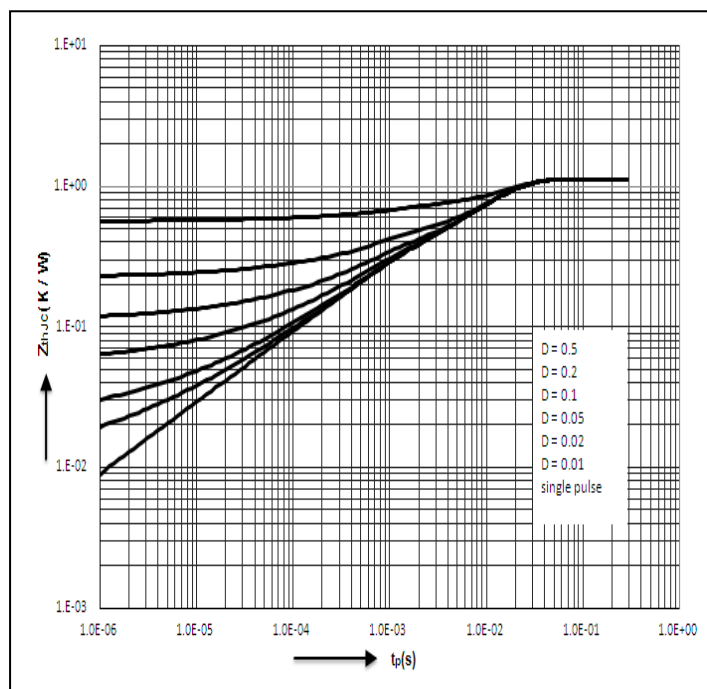
Source-Drain Ratings and Characteristics

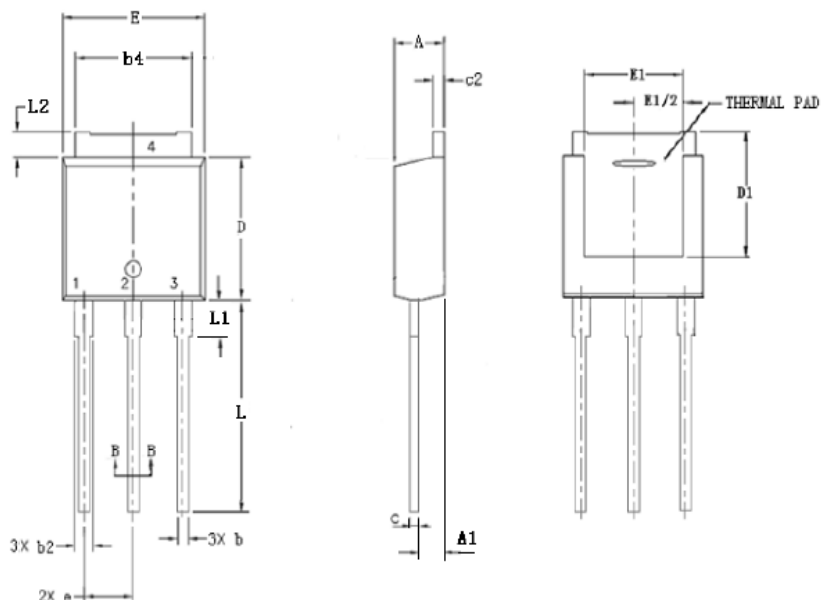
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	6	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode)	—	—	24	A	
V_{SD}	Diode Forward Voltage	—	0.86	1.4	V	$I_S=6A, V_{GS}=0V$
t_{rr}	Reverse Recovery Time	—	589	—	ns	$T_J = 25^{\circ}C, I_F = 6A,$
Q_{rr}	Reverse Recovery Charge	—	3.7	—	μC	$di/dt = 100A/\mu s$

Test circuits and Waveforms
EAS test circuits:

Gate charge test circuit:

Switch Time Test Circuit:

Switch 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 $T_A = 25^\circ C$

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

Figure 7. Drain-to-Source Voltage Vs. Gate-to-Source Voltage

Figure 8. Maximum Effective Transient Thermal Impedance, Junction-to-Case

Mechanical Data:
TO-251 PACKAGE OUTLINE DIMENSION


Symbol	Dimension In Millimeters			Dimension In Inches		
	Min	Nom	Max	Min	Nom	Max
A	2.220	-	2.420	0.087	-	0.095
A1	0.890	-	1.140	0.035	-	0.045
b	0.550	-	0.670	0.022	-	0.026
b1	0.550	-	0.650	0.022	-	0.026
b2	0.760	-	0.960	0.030	-	0.038
b4	5.200	-	5.400	0.205	-	0.213
c	0.460	-	0.570	0.018	-	0.022
c1	0.450	-	0.550	0.018	-	0.022
c2	0.450	-	0.550	0.018	-	0.022
D	5.950	-	6.250	0.234	-	0.246
D1	4.200	-	4.500	0.165	-	0.177
E	6.400	-	6.700	0.252	-	0.264
E1	4.900	-	5.000	0.193	-	0.197
e	2.28BSC			0.090BSC		
L	8.900	-	9.650	0.350	-	0.380
L1	1.900	-	2.290	0.075	-	0.090
L2	0.500	-	0.800	0.020	-	0.031

Ordering and Marking Information
Device Marking: SSF6N70G

Package (Available)
TO-251 (IPAK)
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
TO-251	75	40	3000	5	15000

Reliability Test Program

Test Item	Conditions	Duration	Sample Size
High Temperature Reverse Bias(HTRB)	T _j =125°C to 150°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°C @ 100% of Max V _{GSS}	168 hours 500 hours 1000 hours	3 lots x 77 devices

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