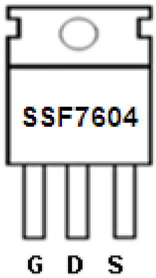
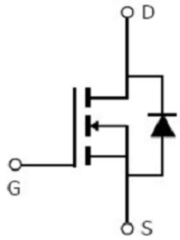
Main Product Characteristics:

V_{DSS}	75V
$R_{DS}(on)$	3.7mΩ(typ.)
I_D	180A ①

TO220



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
- 175℃ 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°C	Continuous Drain Current, V_{GS} @ 10V	180 ①	A
I_D @ TC = 100°C	Continuous Drain Current, V_{GS} @ 10V	130 ①	
I_{DM}	Pulsed Drain Current ②	720	
P_D @TC = 25°C	Power Dissipation ③	330	W
	Linear Derating Factor	2.2	W/°C
V_{DS}	Drain-Source Voltage	75	V
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy @ L=0.3mH	936	mJ
I_{AS}	Avalanche Current @ L=0.3mH	79	A
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 175	°C

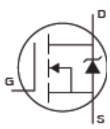
Thermal Resistance

Symbol	Characterizes	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-case ③	—	0.45	℃/W
$R_{\theta JA}$	Junction-to-ambient (t ≤ 10s) ④	—	62	℃/W

Electrical Characterizes @T_A=25℃ unless otherwise specified

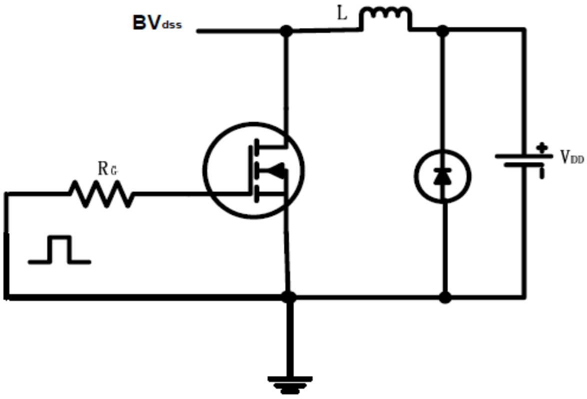
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source breakdown voltage	75	—	—	V	V_{GS} = 0V, ID = 250μA
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	3.7	4	mΩ	V_{GS}=10V,I_D = 40A
		—	6.6	—		T_J = 125℃
$V_{GS(th)}$	Gate threshold voltage	2	—	4	V	V_{DS} = V_{GS}, I_D = 250μA
		—	2.37	—		T_J = 125℃
I_{DSS}	Drain-to-Source leakage current	—	—	1	μA	V_{DS} = 75V,V_{GS} = 0V
		—	—	50		T_J = 125℃
I_{GSS}	Gate-to-Source forward leakage	—	—	100	nA	V_{GS} =20V
		—	—	-100		V_{GS} = -20V
Q_g	Total gate charge	—	244	—	nC	I_D = 75A,
Q_{gs}	Gate-to-Source charge	—	91	—		V_{DS}=38V,
Q_{gd}	Gate-to-Drain("Miller") charge	—	81	—		V_{GS} = 10V
$t_{d(on)}$	Turn-on delay time	—	35	—	ns	V_{GS}=10V, VDS=50V,
t_r	Rise time	—	122	—		R_L=0.67Ω,
$t_{d(off)}$	Turn-Off delay time	—	109	—		R_{GEN}=2.7Ω
t_f	Fall time	—	119	—		
C_{iss}	Input capacitance	—	23733	—	pF	V_{GS} = 0V
C_{oss}	Output capacitance	—	880	—		V_{DS} = 25V
C_{rss}	Reverse transfer capacitance	—	501	—		f = 1MHz

Source-Drain Ratings and Characteristics

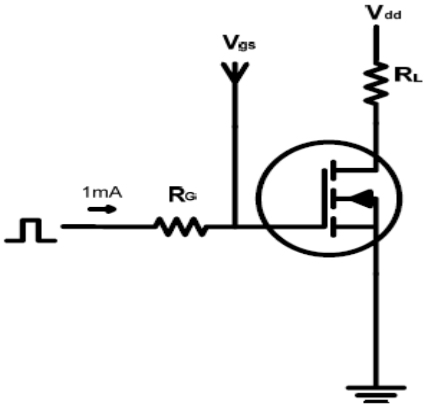
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	180 ①	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode)	—	—	720	A	
V_{SD}	Diode Forward Voltage	—	0.87	1.3	V	I_S=40A, V_{GS}=0V
t_{rr}	Reverse Recovery Time	—	59	—	ns	T_J = 25°C, I_F =75A, di/dt = 100A/μs
Q_{rr}	Reverse Recovery Charge	—	149	—	nC	

Test circuits and Waveforms

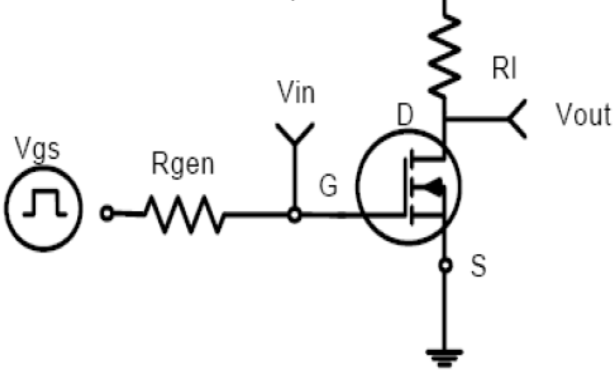
EAS test circuits:



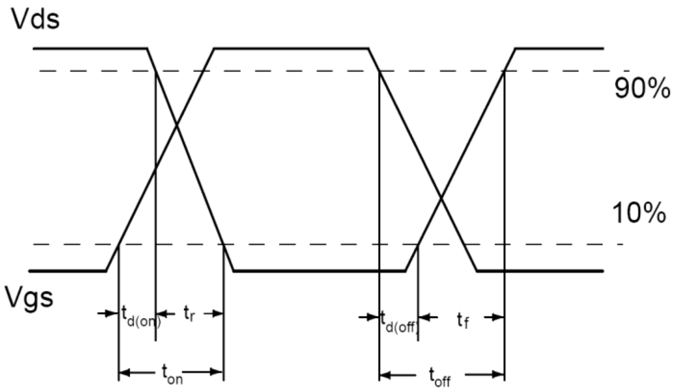
Gate charge test circuit:



Switch Time Test Circuit:



Switch Waveforms:



Notes:

①Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 75A.

②Repetitive rating; pulse width limited by max. junction temperature.

③The power dissipation PD is based on max. junction temperature, using junction-to-case thermal resistance.

④The 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 TA =25°C

⑤These curves are based on the junction-to-case thermal impedence which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}$=175°C.

Typical electrical and thermal characteristics

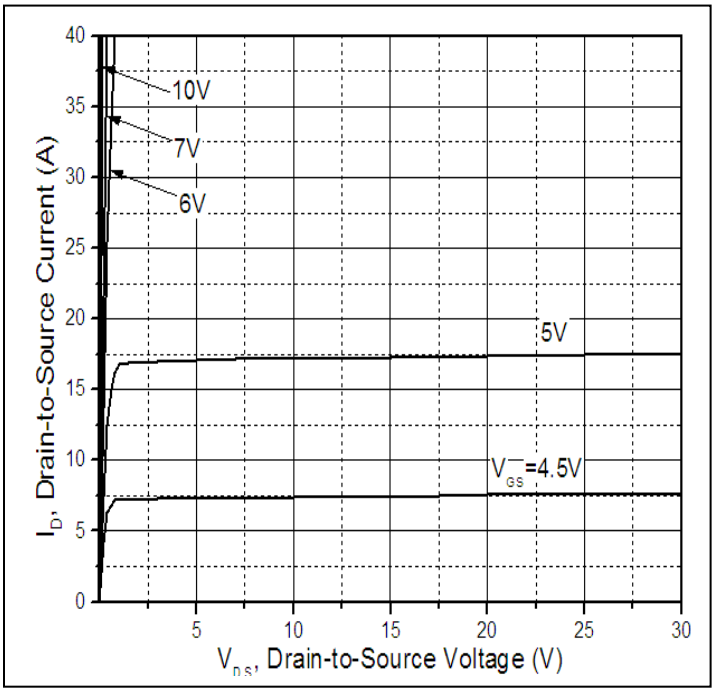


Figure 1: Typical Output Characteristics

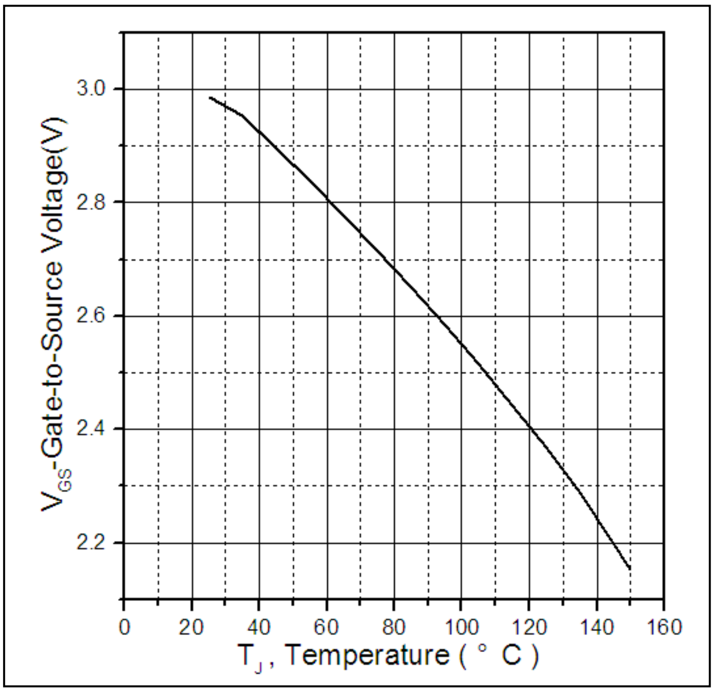


Figure 2. Gate to source cut-off voltage

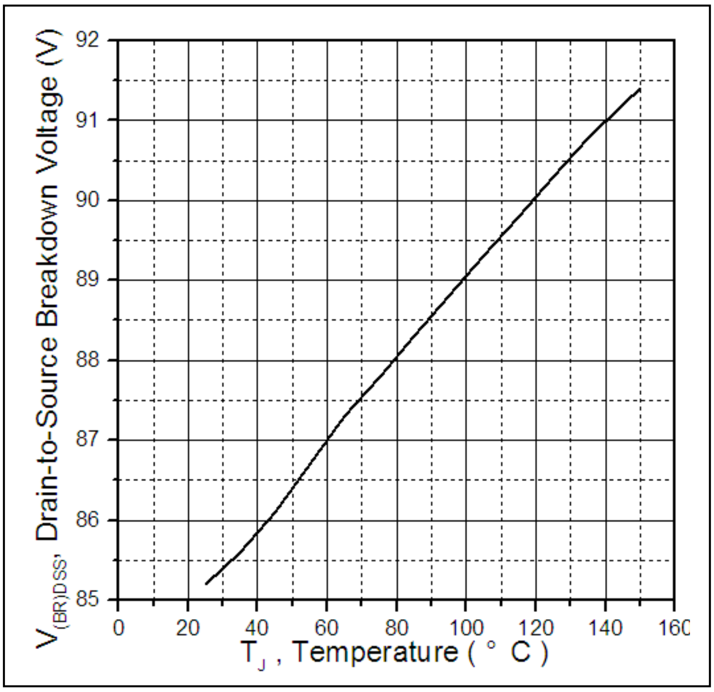


Figure 3. Drain-to-Source Breakdown Voltage Vs. Temperature

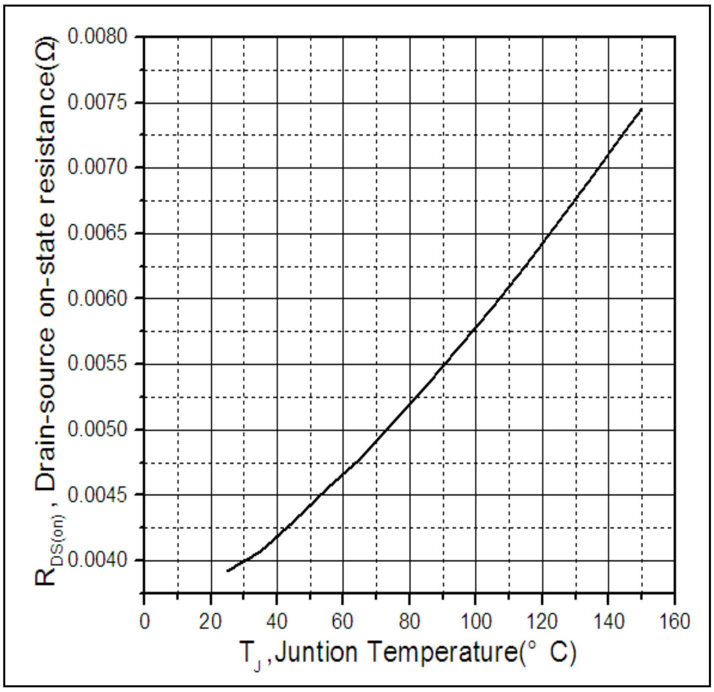


Figure 4: Normalized On-Resistance Vs. Case Temperature

Typical electrical and thermal characteristics

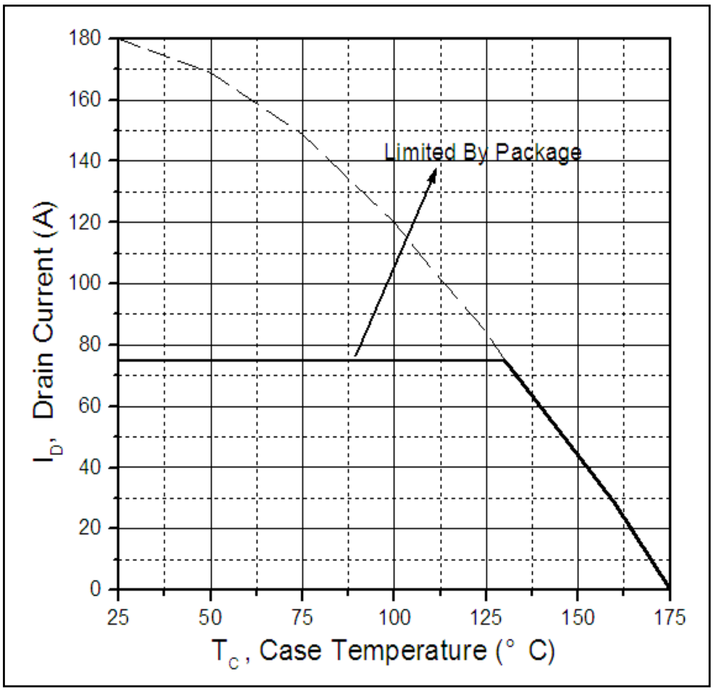


Figure 5. Maximum Drain Current Vs. Case Temperature

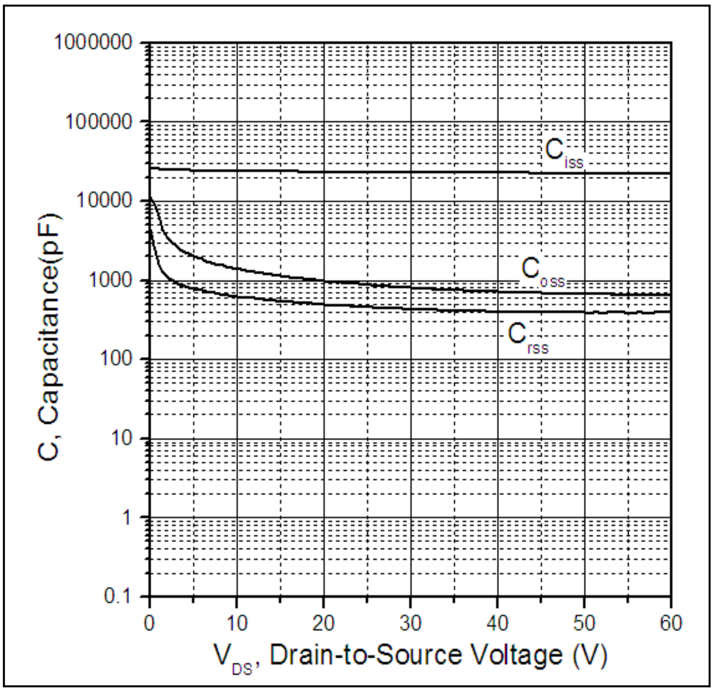
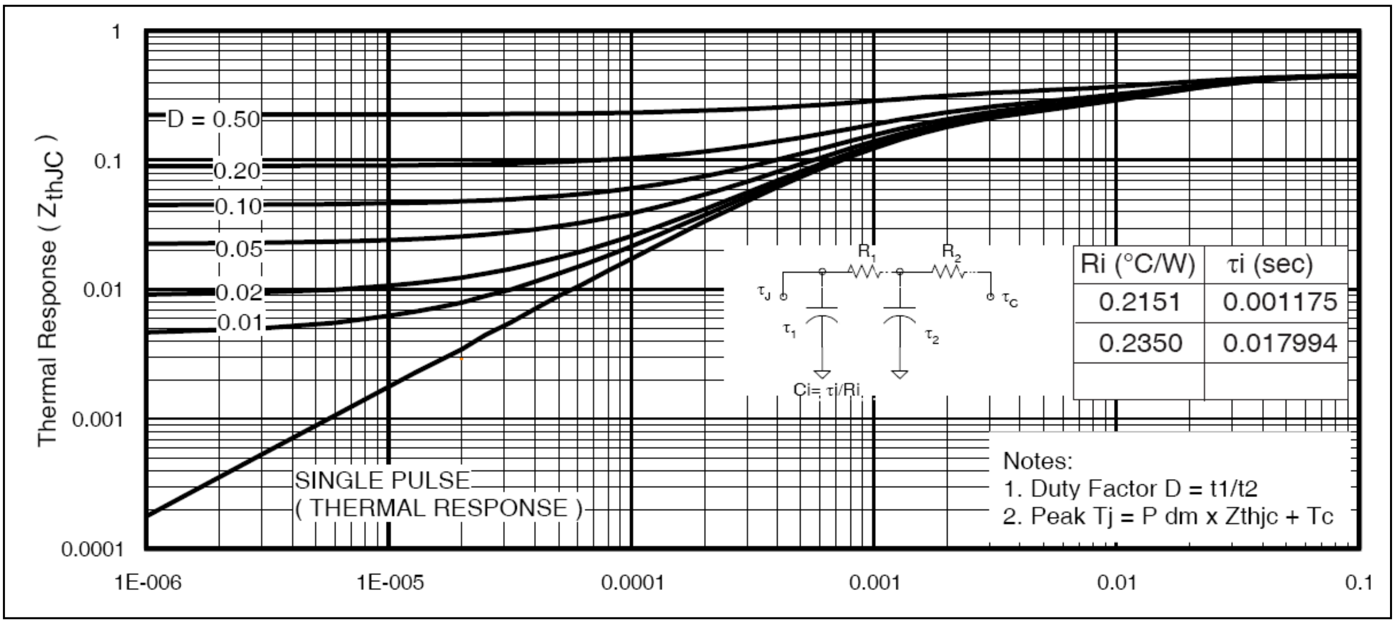


Figure 6.Typical Capacitance Vs. Drain-to-Source Voltage

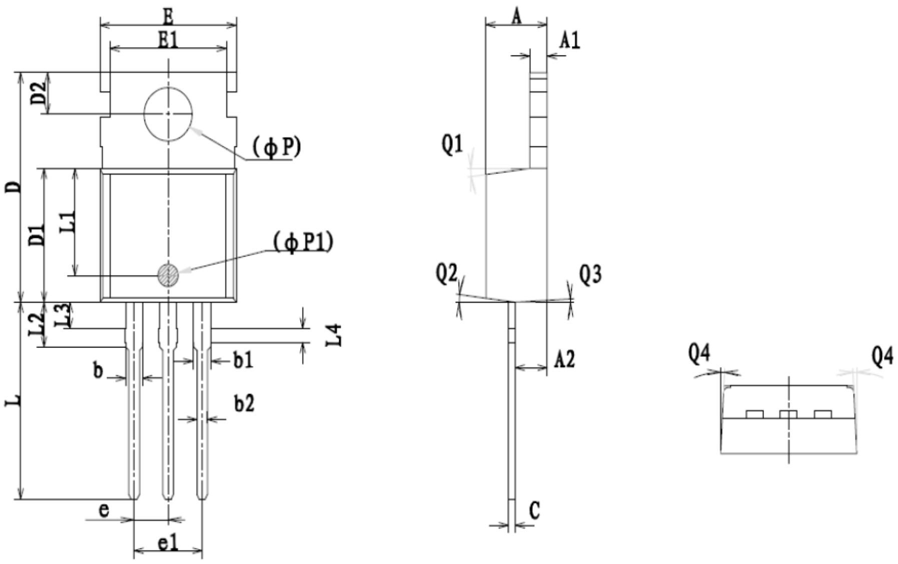


Ri (°C/W)	τi (sec)
0.2151	0.001175
0.2350	0.017994

Figure7. Maximum Effective Transient Thermal Impedance, Junction-to-Case

Mechanical Data：

TO220 PACKAGE OUTLINE DIMENSION_GN



Symbol	Dimension In Millimeters			Dimension In Inches		
	Min	Nom	Max	Min	Nom	Max
A	4.400	4.550	4.700	0.173	0.179	0.185
A1	1.270	1.300	1.330	0.050	0.051	0.052
A2	2.240	2.340	2.440	0.088	0.092	0.096
b	–	1.270	–	-	0.050	-
b1	1.270	1.370	1.470	0.050	0.054	0.058
b2	0.750	0.800	0.850	0.030	0.031	0.033
C	0.480	0.500	0.520	0.019	0.020	0.021
D	15.100	15.400	15.700	0.594	0.606	0.618
D1	8.800	8.900	9.000	0.346	0.350	0.354
D2	2.730	2.800	2.870	0.107	0.110	0.113
E	9.900	10.000	10.100	0.390	0.394	0.398
E1	-	8.700	-	-	0.343	-
ΦP	3.570	3.600	3.630	0.141	0.142	0.143
ΦP1	1.400	1.500	1.600	0.055	0.059	0.063
e	2.54BSC			0.1BSC		
e1	5.08BSC			0.2BSC		
L	13.150	13.360	13.570	0.518	0.526	0.534
L1	7.35REF			0.29REF		
L2	2.900	3.000	3.100	0.114	0.118	0.122
L3	1.650	1.750	1.850	0.065	0.069	0.073
L4	0.900	1.000	1.100	0.035	0.039	0.043
Q1	5^{0}	7^{0}	9^{0}	5^{0}	7^{0}	9^{0}
Q2	5^{0}	7^{0}	9^{0}	5^{0}	7^{0}	9^{0}
Q3	5^{0}	7^{0}	9^{0}	5^{0}	7^{0}	9^{0}
Q4	1^{0}	3^{0}	5^{0}	1^{0}	3^{0}	5^{0}

Ordering and Marking Information

Device Marking: SSF7604 Package (Available) TO220 Operating Temperature Range C : -55 to 175 ºC

Devices per Unit

Package Type	Units/ Tube	Tubes/Inner Box	Units/Inner Box	Inner Boxes/Carton Box	Units/Carton Box
TO220	50	20	1000	6	6000

Reliability Test Program

Test Item	Conditions	Duration	Sample Size
High Temperature Reverse Bias(HTRB)	T_j=125℃ to 175℃ @ 80% of Max V_{DSS}/V_{CES}/VR	168 hours 500 hours 1000 hours	3 lots x 77 devices
High Temperature Gate Bias(HTGB)	T_j=150℃ or 175℃ @ 100% of Max V_{GSS}	168 hours 500 hours 1000 hours	3 lots x 77 devices

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