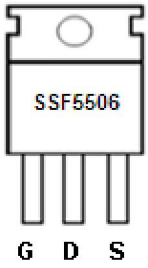
SSF5506

55V N-Channel MOSFET

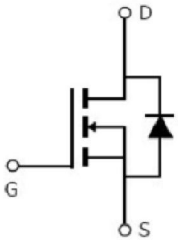
Main Product Characteristics

V_{DSS}	55V
R_{DS}(on)	3.8mohm(typ.)
I_D	140A

TO-220



Marking and Pin Assignment



Schematic Diagram

Features and Benefits

- Advanced trench 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
- Lead free product

Description

It utilizes the latest trench 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} @ 10V①	140	A
I_D @ TC = 100°C	Continuous Drain Current, V_{GS} @ 10V①	100	
I_{DM}	Pulsed Drain Current②	520	
P_D @TC = 25°C	Power Dissipation③	220	W
	Linear Derating Factor	1.5	W/°C
V_{DS}	Drain-Source Voltage	55	V
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy @ L=0.3mH②	735	mJ
I_{AR}	Avalanche Current @ L=0.3mH②	70	A
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 175	°C

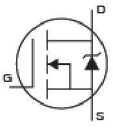
Thermal Resistance

Symbol	Characteristics	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-case③	—	0.68	℃/W
$R_{\theta JA}$	Junction-to-ambient (t ≤ 10s) ④	—	62	℃/W
	Junction-to-Ambient (PCB mounted, steady-state) ④	—	40	℃/W

Electrical Characteristics @T_A=25℃ unless otherwise specified

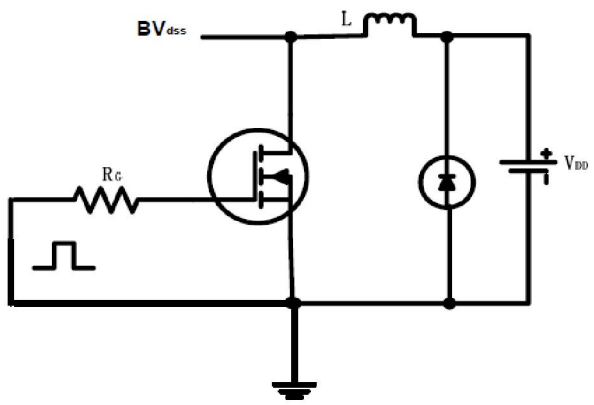
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source breakdown voltage	55	—	—	V	V_{GS} = 0V, ID = 250μA
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	3.8	5	mΩ	V_{GS}=10V,I_D = 75A
		—	6.4	—		T_J = 125℃
$V_{GS(th)}$	Gate threshold voltage	2	—	4	V	V_{DS} = V_{GS}, I_D = 250μA
		—	2.2	—		T_J = 125℃
I_{DSS}	Drain-to-Source leakage current	—	—	1	μA	V_{DS} = 55V,V_{GS} = 0V
		—	—	50		T_J = 125°C
I_{GSS}	Gate-to-Source forward leakage	—	—	100	nA	V_{GS} =20V
		-100	—	—		V_{GS} = -20V
Q_g	Total gate charge	—	150	—	nC	I_D = 101A,
Q_{gs}	Gate-to-Source charge	—	35	—		V_{DS}=44V,
Q_{gd}	Gate-to-Drain("Miller") charge	—	61	—		V_{GS} = 10V
$t_{d(on)}$	Turn-on delay time	—	21	—	ns	V_{GS}=10V,
t_r	Rise time	—	102	—		ID = 110A VDS=38V,
$t_{d(off)}$	Turn-Off delay time	—	52	—		R_G=1.1Ω
t_f	Fall time	—	105	—		
C_{iss}	Input capacitance	—	7684	—	pF	V_{GS} = 0V
C_{oss}	Output capacitance	—	627	—		V_{DS} = 25V
C_{rss}	Reverse transfer capacitance	—	542	—		f = 900KHz

Source-Drain Ratings and Characteristics

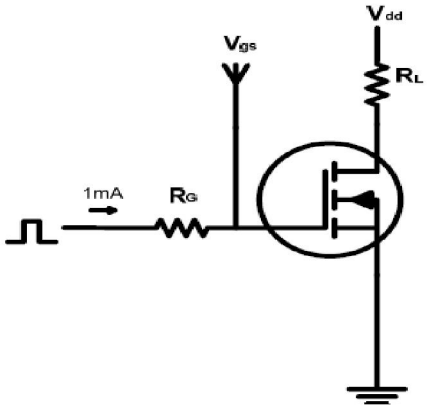
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	140	A	MOSFET symb showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode)	—	—	520	A	
V_{SD}	Diode Forward Voltage	—	0.99	1.3	V	I_S=75A, V_{GS}=0V
t_{rr}	Reverse Recovery Time	—	42	—	ns	T_J = 25°C, I_F =90A, di/dt = 100A/μs
Q_{rr}	Reverse Recovery Charge	—	56	—	nC	

Test Circuits and Waveforms

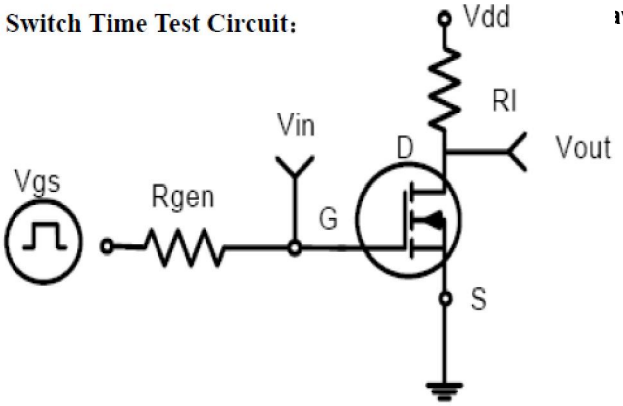
EAS test circuits:



Gate charge test circuit:



Switch Time Test Circuit:



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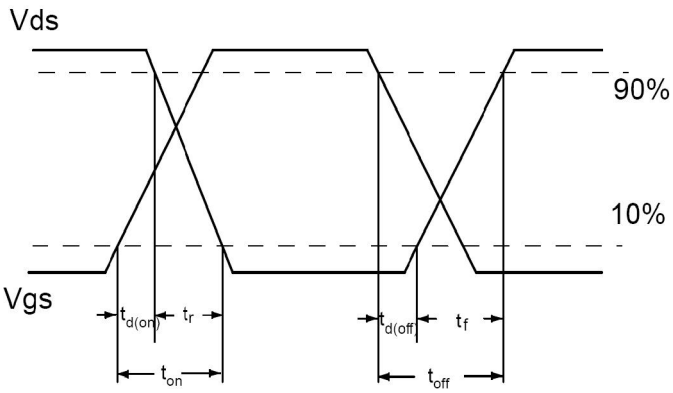


Notes:

①The maximum current rating is limited by bond-wires.
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 1in 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.
⑥ The maximum current rating is limited by bond-wires.

Typical Electrical and Thermal Characteristics

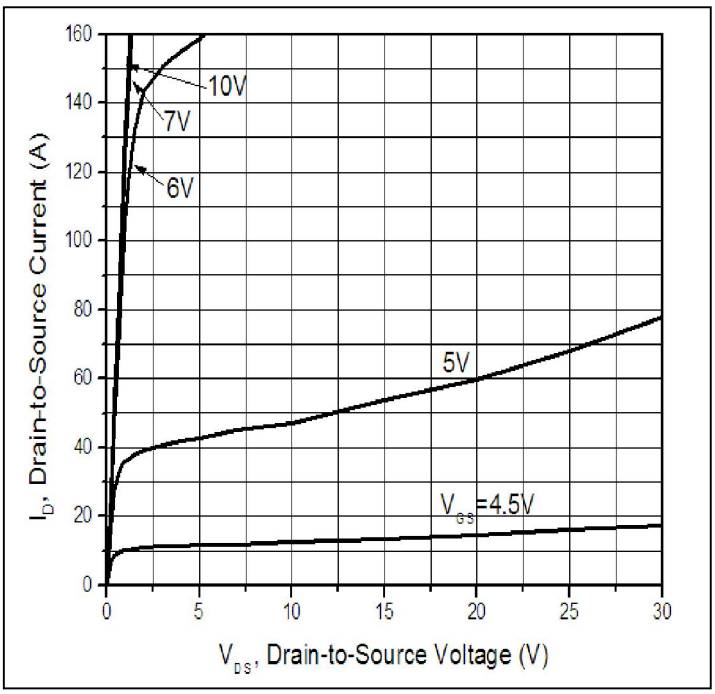


Figure 1: Typical Output Characteristics

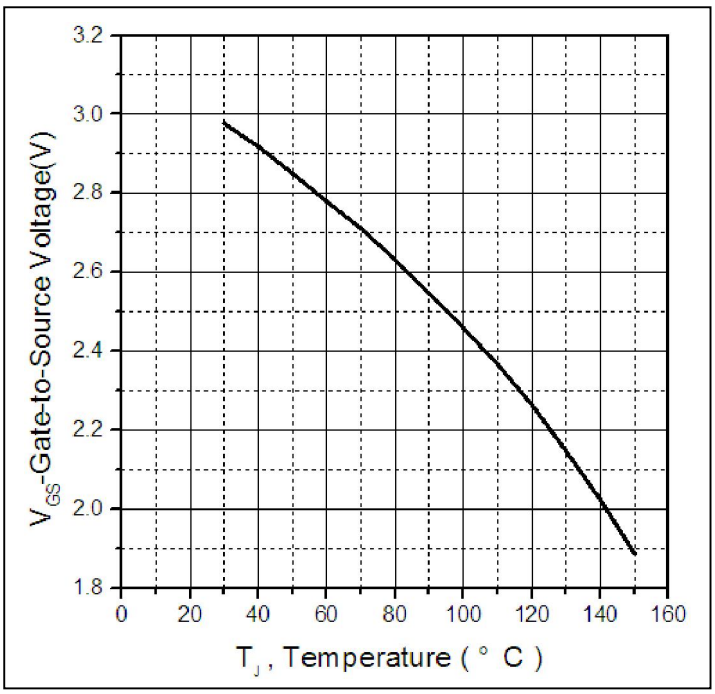


Figure 2. Gate to source cut-off voltage

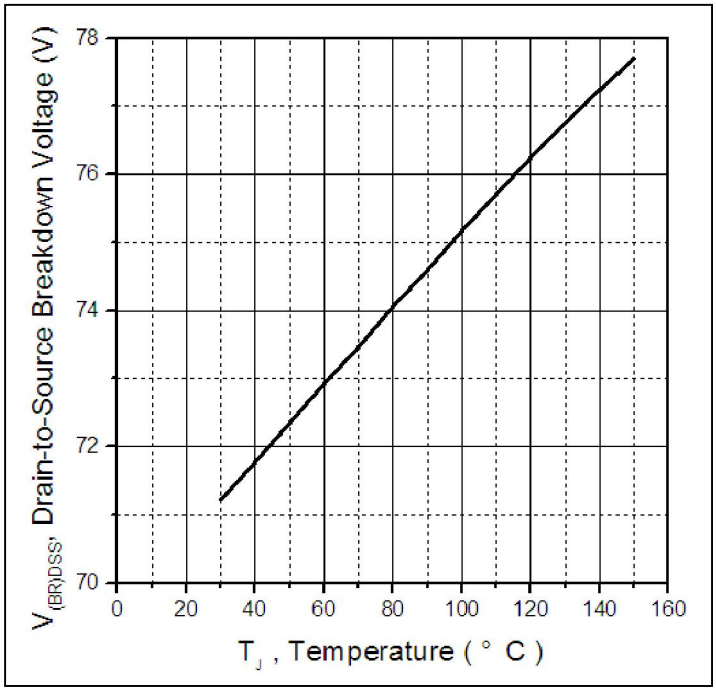


Figure 3. Drain-to-Source Breakdown Voltage vs. Temperature

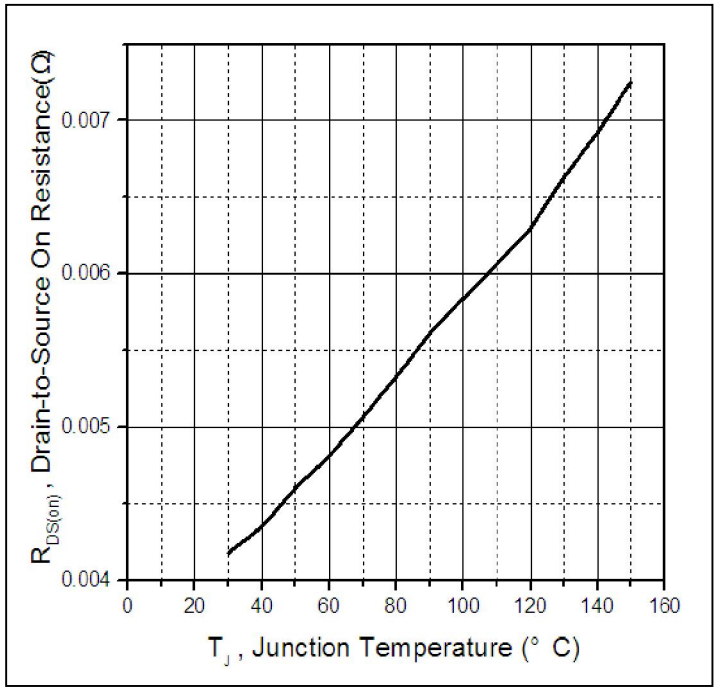


Figure 4: Normalized On-Resistance Vs. Case Temperature

Typical Electrical and Thermal Characteristics

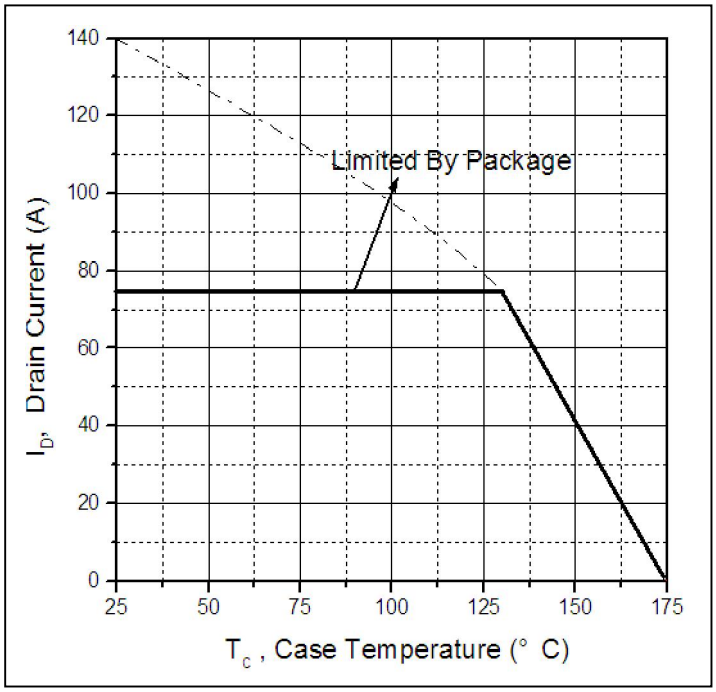


Figure 5. Maximum Drain Current Vs. Case Temperature

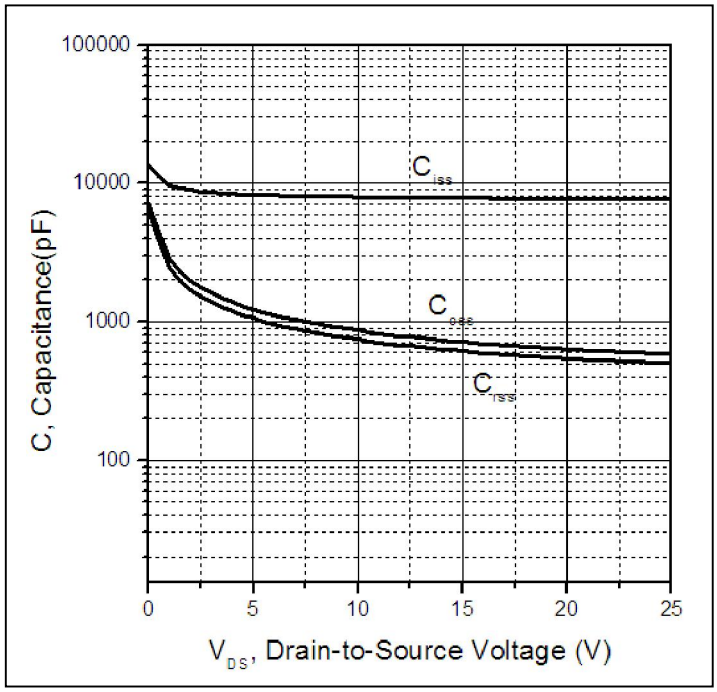


Figure 6.Typical Capacitance Vs. Drain-to-Source Voltage

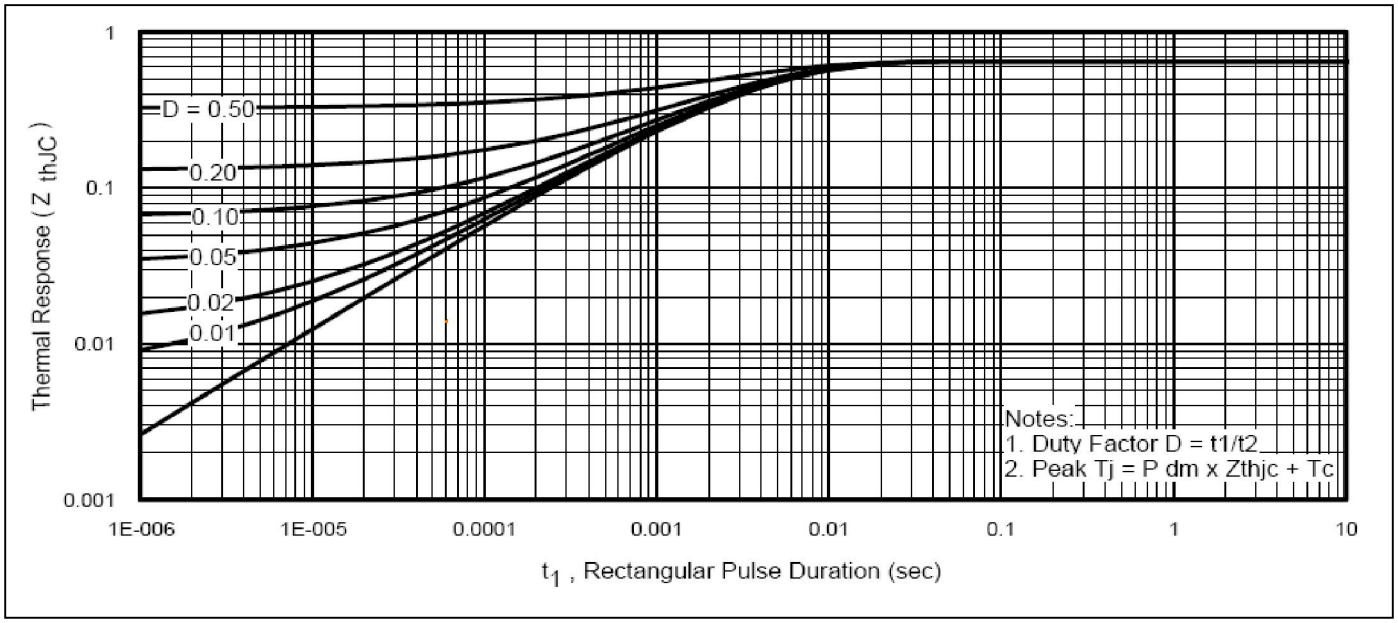
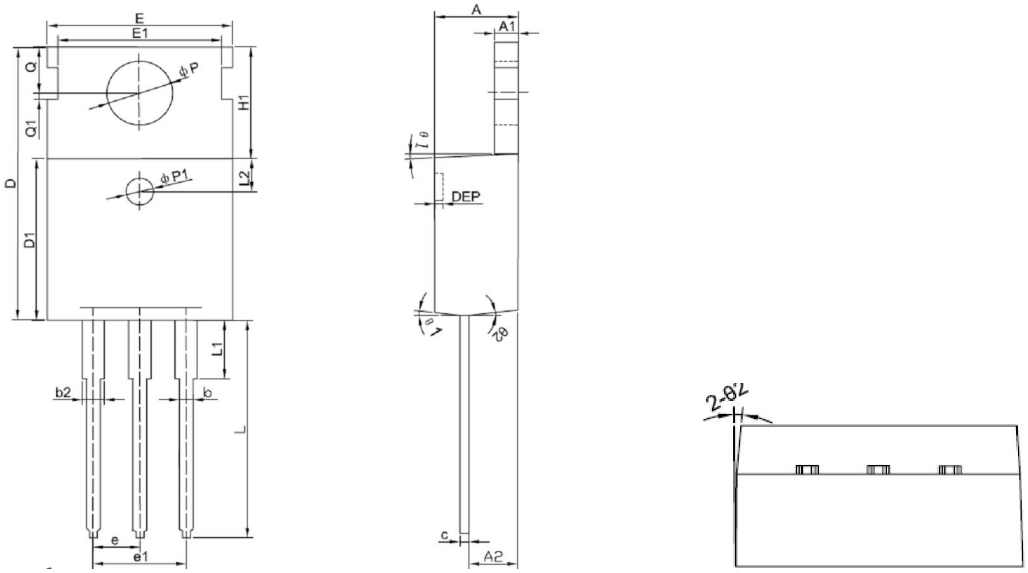


Figure7. Maximum Effective Transient Thermal Impedance, Junction-to-Case

Mechanical Data

TO220 PACKAGE OUTLINE DIMENSION



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	2.590	2.690	2.790	0.102	0.106	0.110
b	0.770	-	0.900	0.030	-	0.035
b2	1.230	-	1.360	0.048	-	0.054
c	0.480	0.500	0.520	0.019	0.020	0.020
D	15.100	15.400	15.700	-	0.606	-
D1	9.000	9.100	9.200	0.354	0.358	0.362
DEP	0.050	0.285	0.520	0.002	0.011	0.020
E	10.060	10.160	10.260	0.396	0.400	0.404
E1	-	8.700	-	-	0.343	-
ΦP1	1.400	1.500	1.600	0.055	0.059	0.063
e	2.54BSC			0.1BSC		
e1	5.08BSC			0.2BSC		
H1	6.100	6.300	6.500	0.240	0.248	0.256
L	12.750	12.960	13.170	0.502	0.510	0.519
L1	-	-	3.950	-	-	0.156
L2	1.85REF			0.073REF		
ΦP	3.570	3.600	3.630	0.141	0.142	0.143
Q	2.730	2.800	2.870	0.107	0.110	0.113
Q1	-	0.200	-	-	0.008	-
□1	5^0	7^0	9^0	5^0	7^0	9^0
□2	1^0	3^0	5^0	1^0	3^0	5^0

Ordering and Marking Information

Device Marking: SSF5506

Package (Available)

TO-220

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