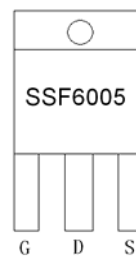


**Main Product Characteristics:**

$V_{DSS}$	60V
$R_{DS(on)}$	2.7mΩ(typ.)
$I_D$	160A


**TO-220**

**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°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	160	A
$I_D @ TC = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ ①	110	
$I_{DM}$	Pulsed Drain Current②	640	
$P_D @ TC = 25^\circ C$	Power Dissipation③	230	W
	Linear Derating Factor	1.5	W/°C
$V_{DS}$	Drain-Source Voltage	60	V
$V_{GS}$	Gate-to-Source Voltage	± 20	V
$E_{AS}$	Single Pulse Avalanche Energy @ $L=0.07mH$ ②	350	mJ
$I_{AS}$	Avalanche Current @ $L=0.07mH$ ②	100	A
$T_J T_{STG}$	Operating Junction and Storage Temperature Range	-55 to + 175	°C

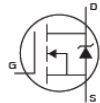
## Thermal Resistance

Symbol	Characterizes	Typ.	Max.	Units
R <sub>θJC</sub>	Junction-to-case <sup>③</sup>	—	0.65	°C/W
R <sub>θJA</sub>	Junction-to-ambient (t ≤ 10s) <sup>④</sup>	—	62	°C/W
	Junction-to-Ambient (PCB mounted, steady-state) <sup>④</sup>	—	40	°C/W

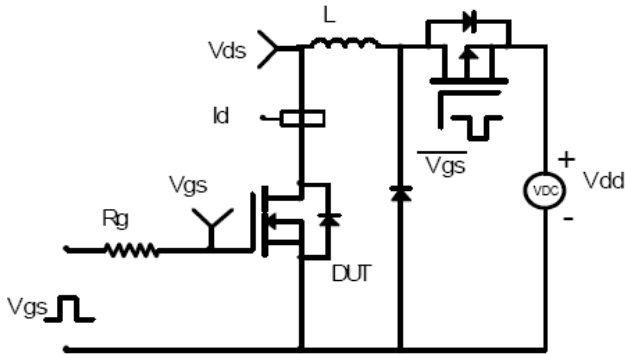
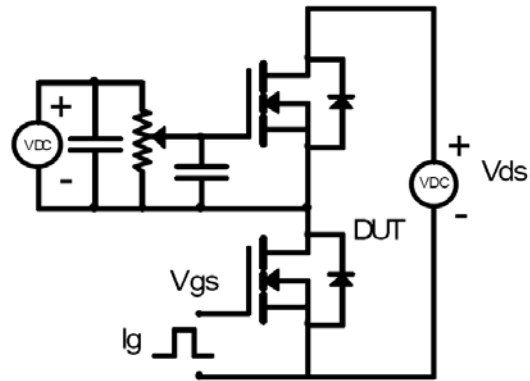
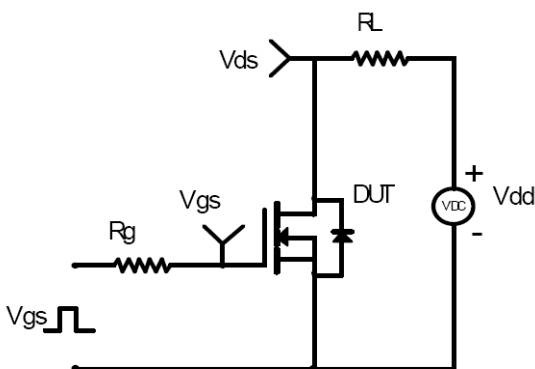
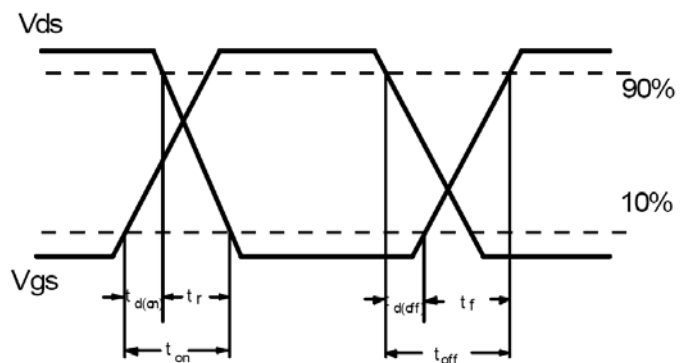
## Electrical Characterizes @T<sub>A</sub>=25°C unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
V <sub>(BR)DSS</sub>	Drain-to-Source breakdown voltage	60	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
R <sub>DSON</sub>	Static Drain-to-Source on-resistance	—	2.7	3.5	mΩ	V <sub>GS</sub> =10V, I <sub>D</sub> = 75A T <sub>J</sub> = 125°C
		—	4.6	—		
V <sub>GS(th)</sub>	Gate threshold voltage	2	—	4	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 150μA T <sub>J</sub> = 125°C
		—	1.98	—		
I <sub>DSS</sub>	Drain-to-Source leakage current	—	—	1	μA	V <sub>DS</sub> = 75V, V <sub>GS</sub> = 0V T <sub>J</sub> = 125°C
		—	—	50		
I <sub>GSS</sub>	Gate-to-Source forward leakage	—	—	100	nA	V <sub>GS</sub> = 20V V <sub>GS</sub> = -20V
		—	—	-100		
Q <sub>g</sub>	Total gate charge	—	179	—	nC	I <sub>D</sub> = 75A, V <sub>DS</sub> =30V, V <sub>GS</sub> = 10V
Q <sub>gs</sub>	Gate-to-Source charge	—	34	—		
Q <sub>gd</sub>	Gate-to-Drain("Miller") charge	—	73	—		
t <sub>d(on)</sub>	Turn-on delay time	—	27	—	ns	V <sub>GS</sub> =10V, V <sub>DS</sub> =35.3V, R <sub>L</sub> =0.47Ω, R <sub>GEN</sub> =2.7Ω I <sub>D</sub> =75A
t <sub>r</sub>	Rise time	—	101	—		
t <sub>d(off)</sub>	Turn-Off delay time	—	83	—		
t <sub>f</sub>	Fall time	—	122	—		
C <sub>iss</sub>	Input capacitance	—	7889	—	pF	V <sub>GS</sub> = 0V V <sub>DS</sub> = 50V f = 700KHz
C <sub>oss</sub>	Output capacitance	—	765	—		
C <sub>rss</sub>	Reverse transfer capacitance	—	623	—		

## Source-Drain Ratings and Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I <sub>S</sub>	Continuous Source Current (Body Diode)	—	—	160	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I <sub>SM</sub>	Pulsed Source Current (Body Diode)	—	—	640	A	
V <sub>SD</sub>	Diode Forward Voltage	—	0.9	1.3	V	I <sub>S</sub> =75A, V <sub>GS</sub> =0V
t <sub>rr</sub>	Reverse Recovery Time	—	36	—	ns	T <sub>J</sub> = 25°C, I <sub>F</sub> = 75A,
Q <sub>rr</sub>	Reverse Recovery Charge	—	44	—	nC	di/dt = 100A/μs

## 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

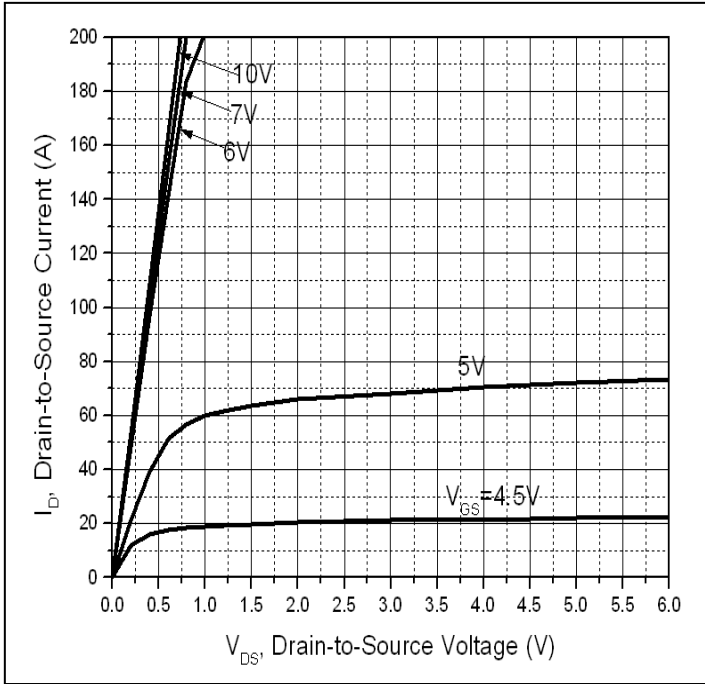


Figure 1: Typical Output Characteristics

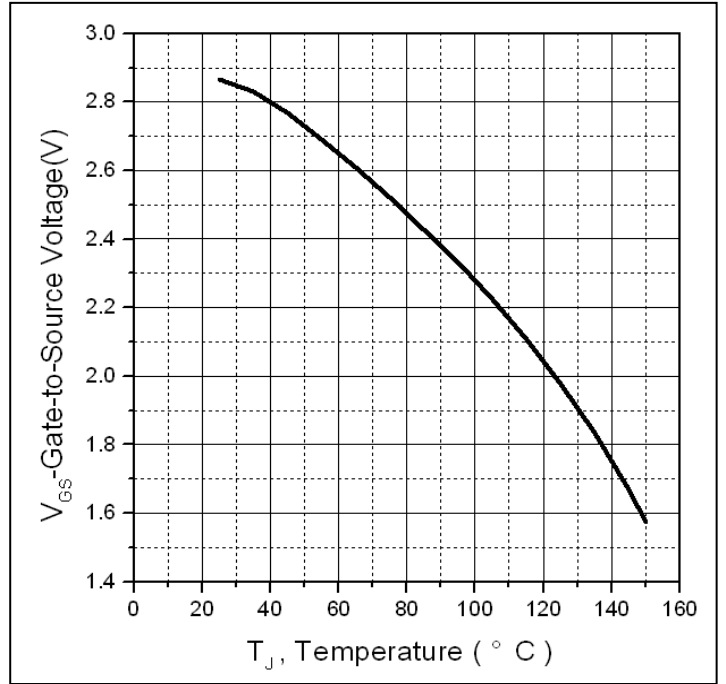


Figure 2. Gate to source cut-off voltage

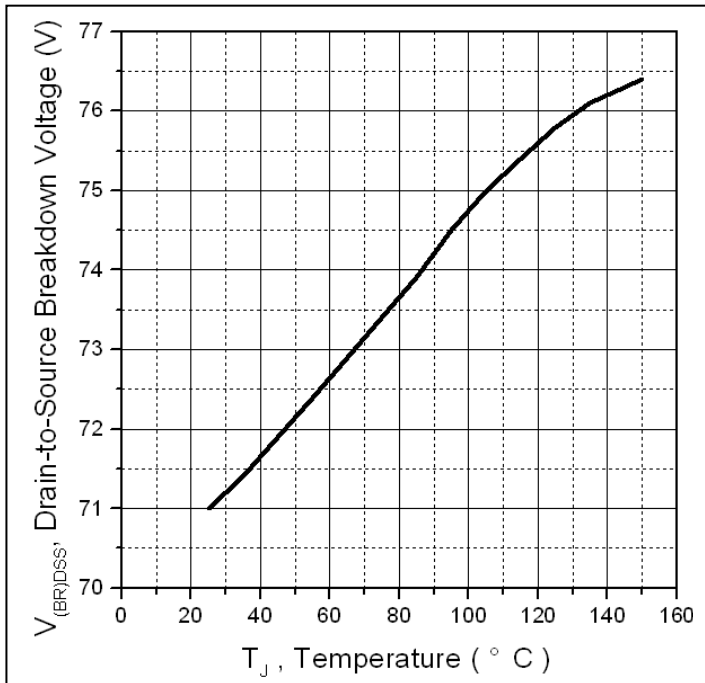


Figure 3. Drain-to-Source Breakdown Voltage vs. Temperature

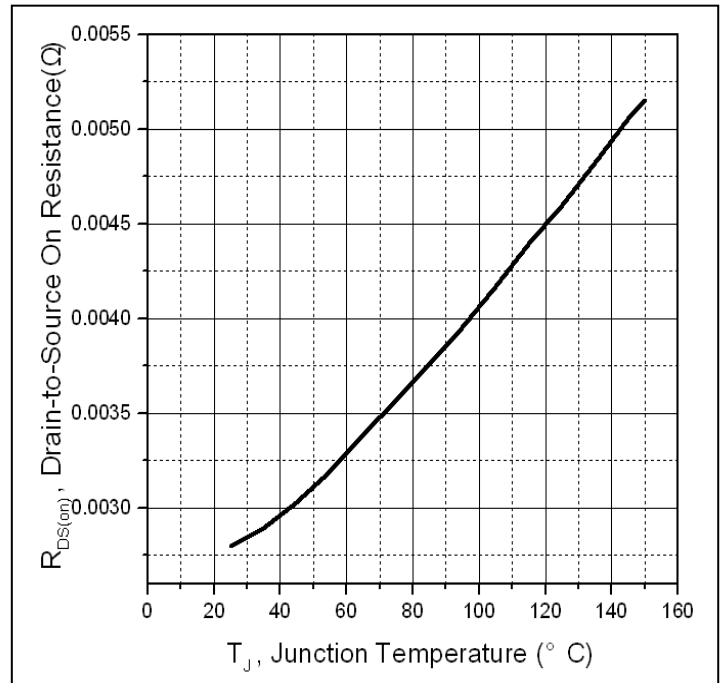


Figure 4: Normalized On-Resistance Vs. Case Temperature

Typical electrical and thermal characteristics

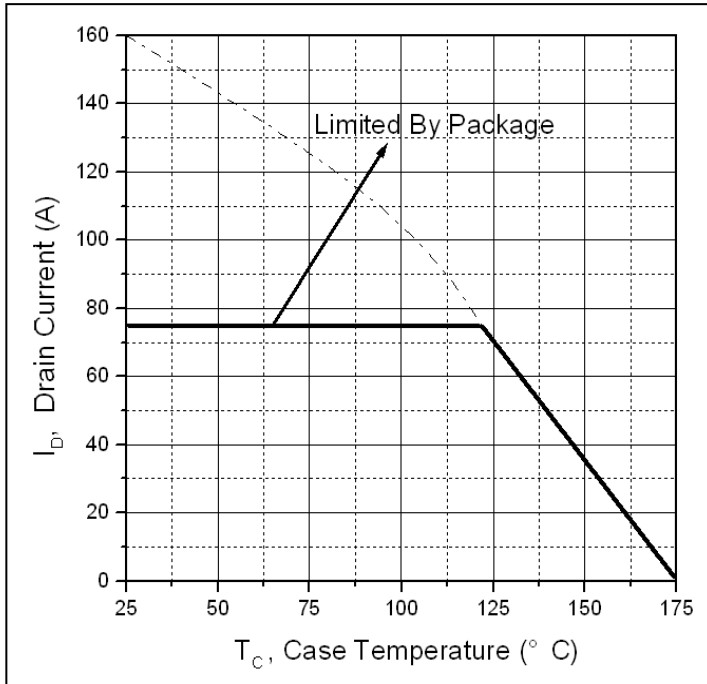


Figure 5. Maximum Drain Current Vs. Case Temperature

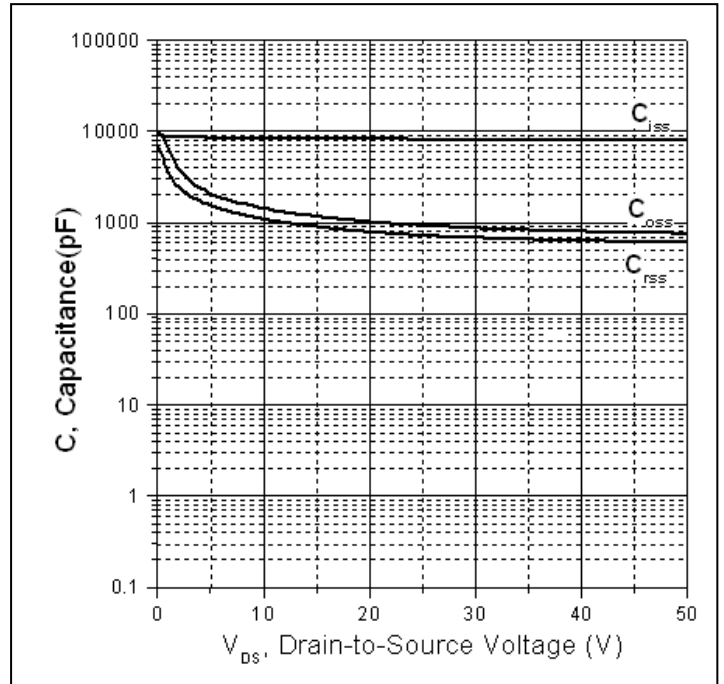


Figure 6. Typical Capacitance Vs. Drain-to-Source Voltage

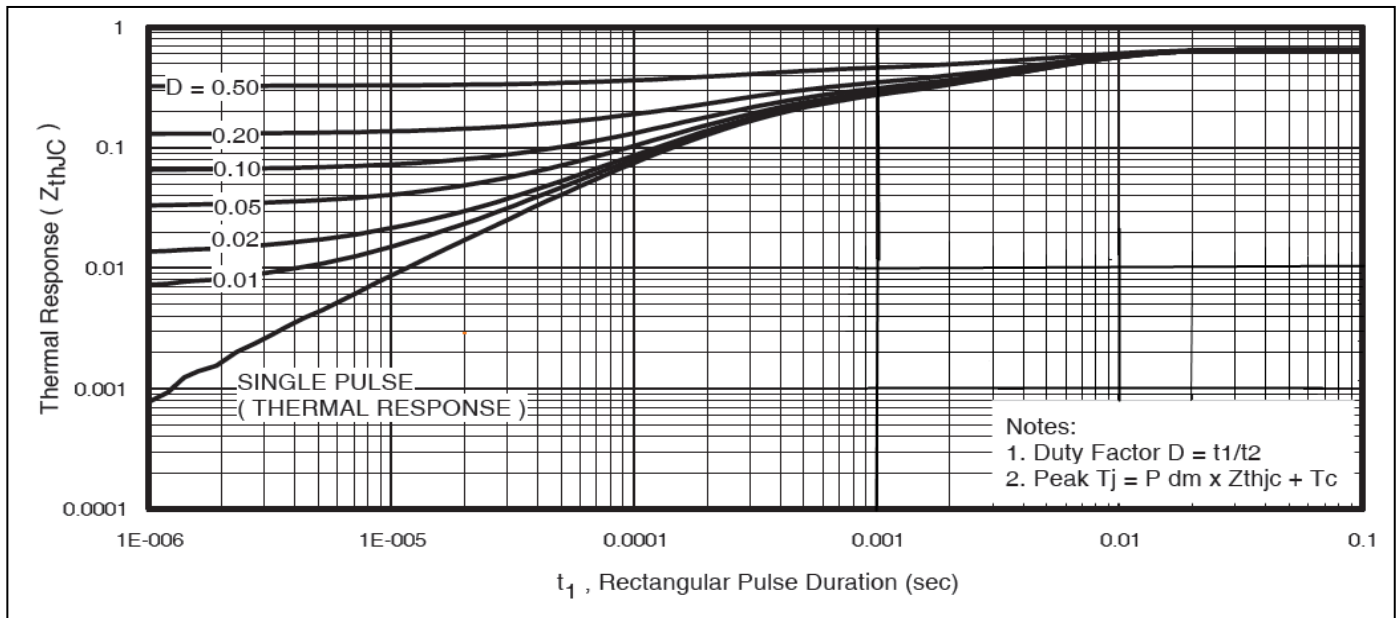
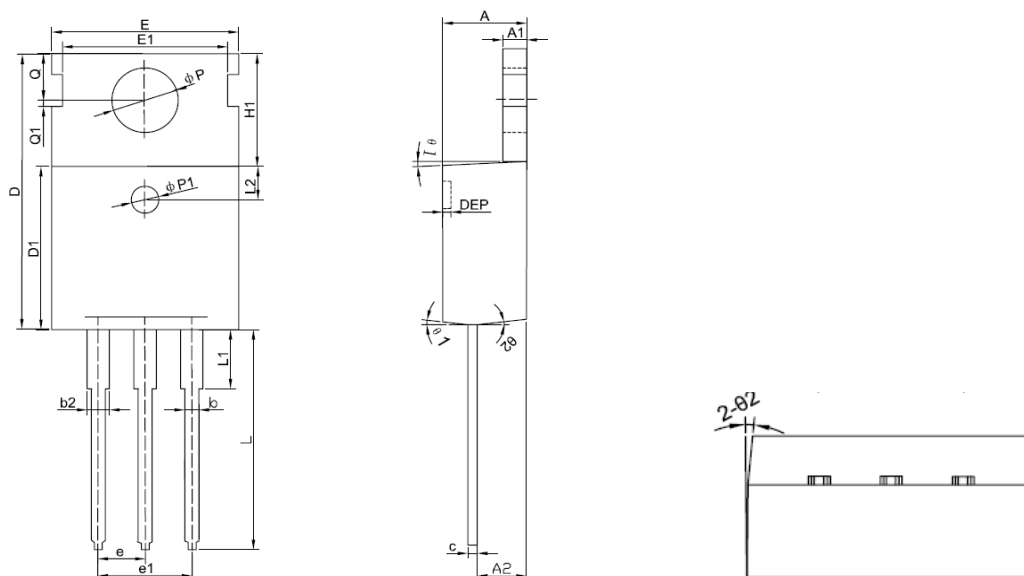


Figure 7. Maximum Effective Transient Thermal Impedance, Junction-to-Case

**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	-
Θ1	5 <sup>0</sup>	7 <sup>0</sup>	9 <sup>0</sup>	5 <sup>0</sup>	7 <sup>0</sup>	9 <sup>0</sup>
Θ2	1 <sup>0</sup>	3 <sup>0</sup>	5 <sup>0</sup>	1 <sup>0</sup>	3 <sup>0</sup>	5 <sup>0</sup>

**Ordering and Marking Information**
**Device Marking: SSF6005**

**Package (Available)**  
**TO-220**  
**Operating Temperature Range**  
**C : -55 to 175 °C**

**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)	$T_j=125^{\circ}\text{C}$ to $175^{\circ}\text{C}$ @ 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)	$T_j=150^{\circ}\text{C}$ or $175^{\circ}\text{C}$ @ 100% of Max $V_{GSS}$	168 hours 500 hours 1000 hours	3 lots x 77 devices

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