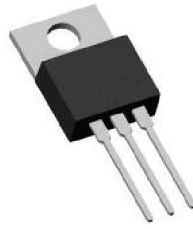


Main Product Characteristics

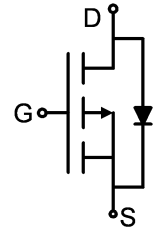
V_{DSS}	-60V
$R_{DS(on)}$	12m Ω (typ.)
I_D	-60A



TO-220



Marking and Pin Assignment



Schematic Diagram

Features and Benefits

- Advanced trench MOSFET process technology
- Ideal for PWM, load switching and general purpose applications
- Ultra low on-resistance with low gate charge
- High power and current handling capability
- Fully avalanche rated



Description

The SSF6025 utilizes the latest processing techniques to achieve high cell density, low on-resistance and high repetitive avalanche rating. These features make this device extremely efficient and reliable for use in power switching and a wide variety of other applications.

Absolute Max Ratings

Symbol	Parameter	Max.	Units
$I_D @ T_C = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$ ①	-60	A
$I_D @ T_C = 100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$ ①	-50	
I_{DM}	Pulsed Drain Current②	-240	
I_{SM}	Pulsed Source Current (Body Diode)②	-240	
$P_D @ T_C = 25^\circ\text{C}$	Power Dissipation③	166	W
V_{DS}	Drain-Source Voltage	-60	V
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy @ $L=1.3\text{mH}$	474	mJ
I_{AS}	Single Pulse Avalanche Current @ $L=1.3\text{mH}$	27	A
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 175	$^\circ\text{C}$

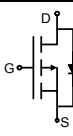
Thermal Resistance

Symbol	Characteristics	Value	Unit
$R_{\theta JA}$	Junction-to-Ambient ($t \leq 10s$) ④	62	°C/W
$R_{\theta JC}$	Maximum Junction-to-Case	0.75	°C/W

Electrical Characteristics ($T_A=25^\circ C$ unless otherwise specified)

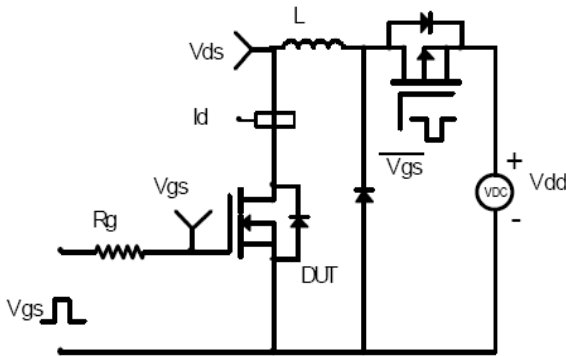
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	-60	—	—	V	$V_{GS} = 0V, I_D = -250\mu A$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	12	25	mΩ	$V_{GS} = -10V,$ $I_D = -23A$
		—	22	—		$T_J = 125^\circ C$
$V_{GS(th)}$	Gate Threshold Voltage	-2	-2.5	-4	V	$V_{DS} = V_{GS}, I_D = -250\mu A$
I_{DSS}	Drain-to-Source Leakage Current	—	—	-1	μA	$V_{DS} = -60V, V_{GS} = 0V$
		—	—	-50		$T_J = 125^\circ C$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -20V$
Q_g	Total Gate Charge	—	—	170	nC	$I_D = -30A,$ $V_{DD} = -40V,$ $V_{GS} = -10V$
Q_{gs}	Gate-to-Source Charge	—	—	30		
Q_{gd}	Gate-to-Drain("Miller") Charge	—	—	70		
$t_{d(on)}$	Turn-On Delay Time	—	15.2	—	ns	$V_{DD} = -30V, I_D = -20A,$ $R_L = 1.50\Omega, R_G = 3.00\Omega,$ $V_{GS} = -10V$
t_r	Rise Time	—	23.7	—		
$t_{d(off)}$	Turn-Off Delay Time	—	53.3	—		
t_f	Fall Time	—	12.7	—		
C_{iss}	Input Capacitance	—	7753	—	pF	$V_{DS} = -25V,$ $V_{GS} = 0V,$ $f = 1MHz$
C_{oss}	Output Capacitance	—	347	—		
C_{rss}	Reverse Transfer Capacitance	—	300	—		

Source-Drain Ratings and Characteristics

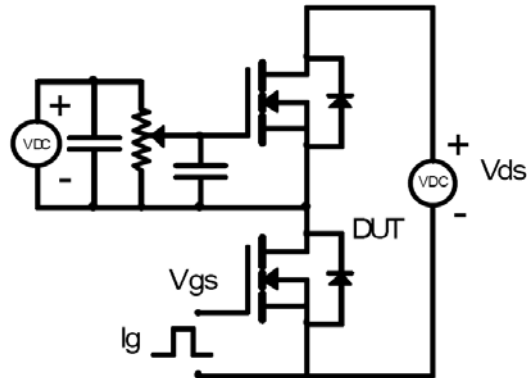
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Maximum Body-Diode Continuous Current	—	-60	—	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Maximum Body-Diode Pulse Current	—	-240	—	A	
V_{SD}	Diode Forward Voltage	—	-0.94	-1.2	V	$T_J = 25^\circ C, I_S = -38A, V_{GS} = 0V$
t_{rr}	Reverse Recovery Time	—	38.2	—	nS	$T_J = 25^\circ C, I_F = -20A, di/dt = 100A/\mu s$
Q_{rr}	Reverse Recovery Charge	—	62.5	—	nC	

Test circuits and Wave forms

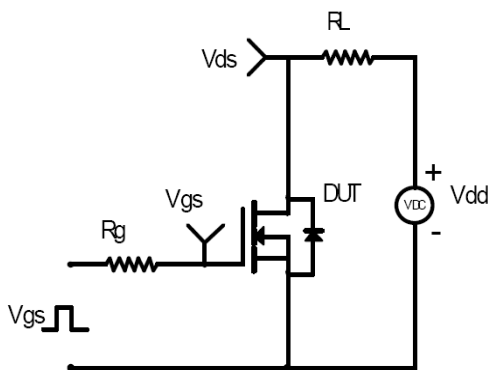
EAS Test Circuit:



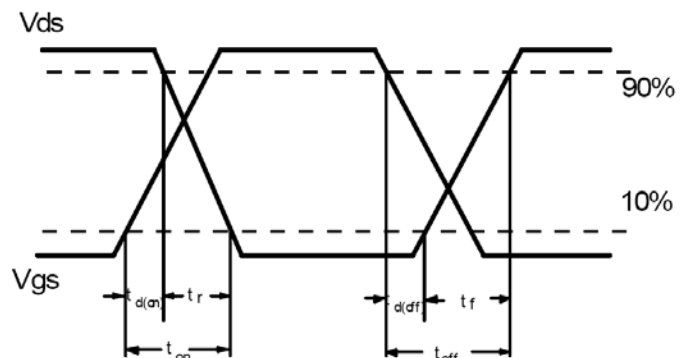
Gate Charge Test Circuit



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 P_D is based on max. junction temperature, using junction-to-case thermal resistance.
- ④ The value of R_{θJA} is measured with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with T_A = 25°C

Typical Electrical and thermal Characteristics

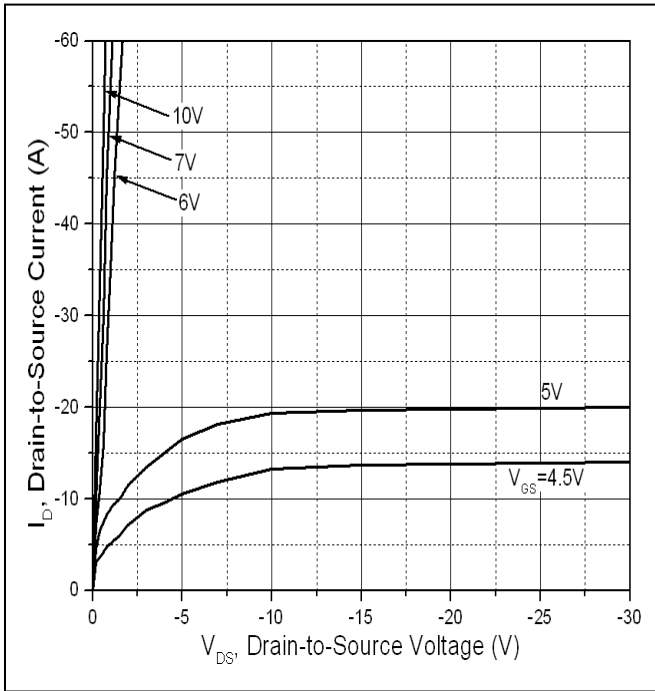


Figure 1. Typical Output Characteristics

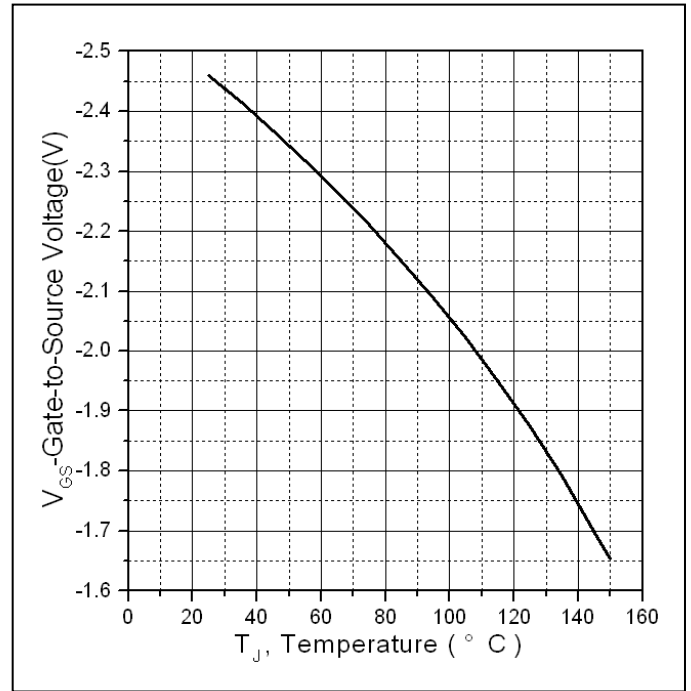


Figure 2. Gate to source Cut-Off Voltage

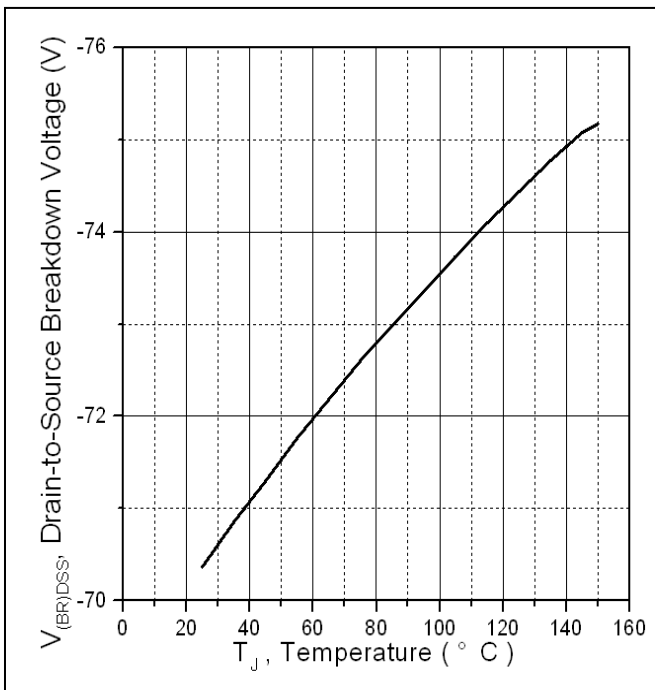


Figure 3. Drain-to-Source Breakdown Voltage vs. Temperature

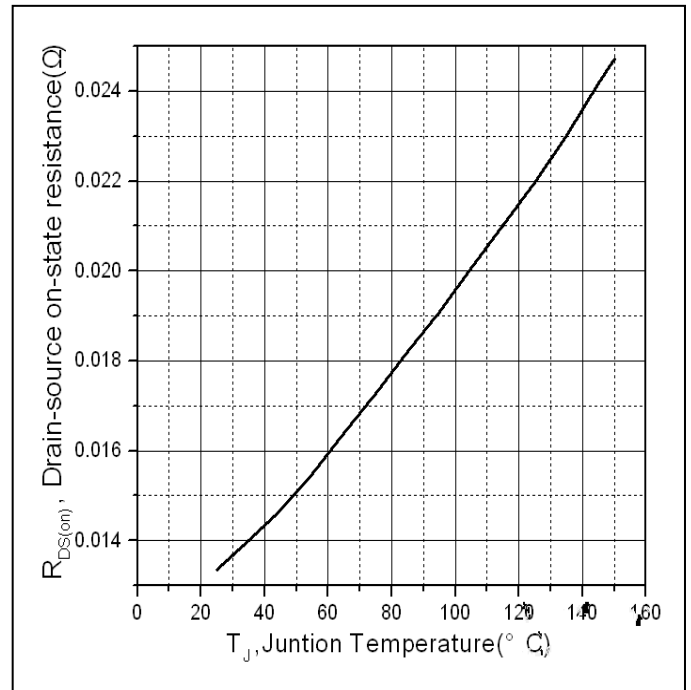


Figure 4. Normalized On-Resistance Vs. Case Temperature

Typical Electrical and Thermal Characteristics

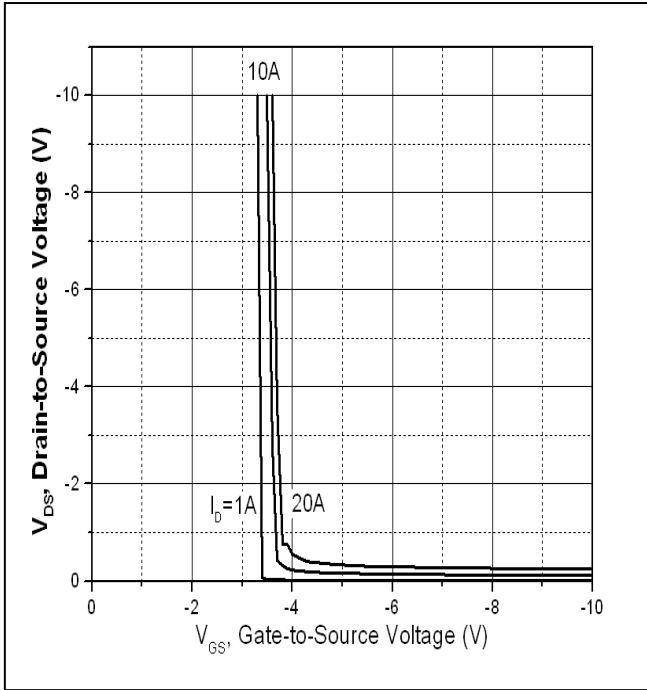


Figure 5. Gate-to-Source Voltage Vs. Drain-to-Source Voltage

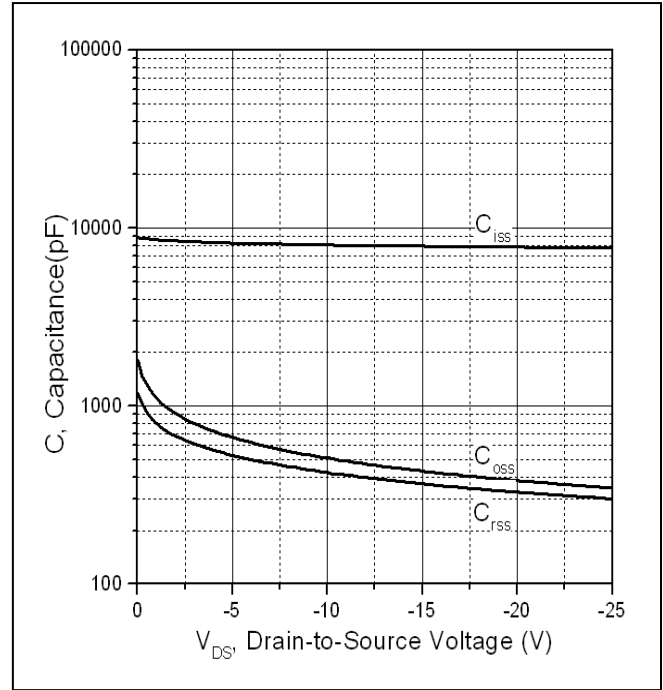


Figure 6. Typical Capacitance Vs. Drain-to-Source Voltage

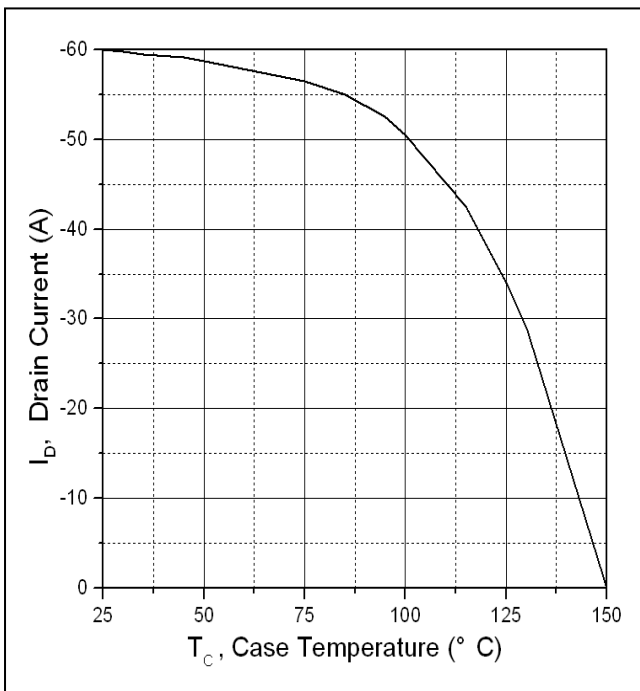


Figure 7. Maximum Drain Current Vs. Case Temperature

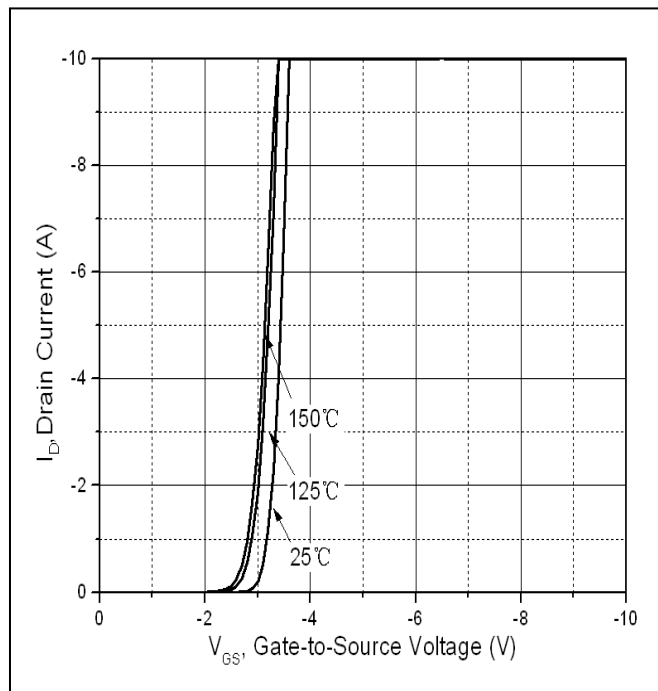


Figure 8. Transfer curve Under Different Temperature

Typical Electrical and Thermal Characteristics

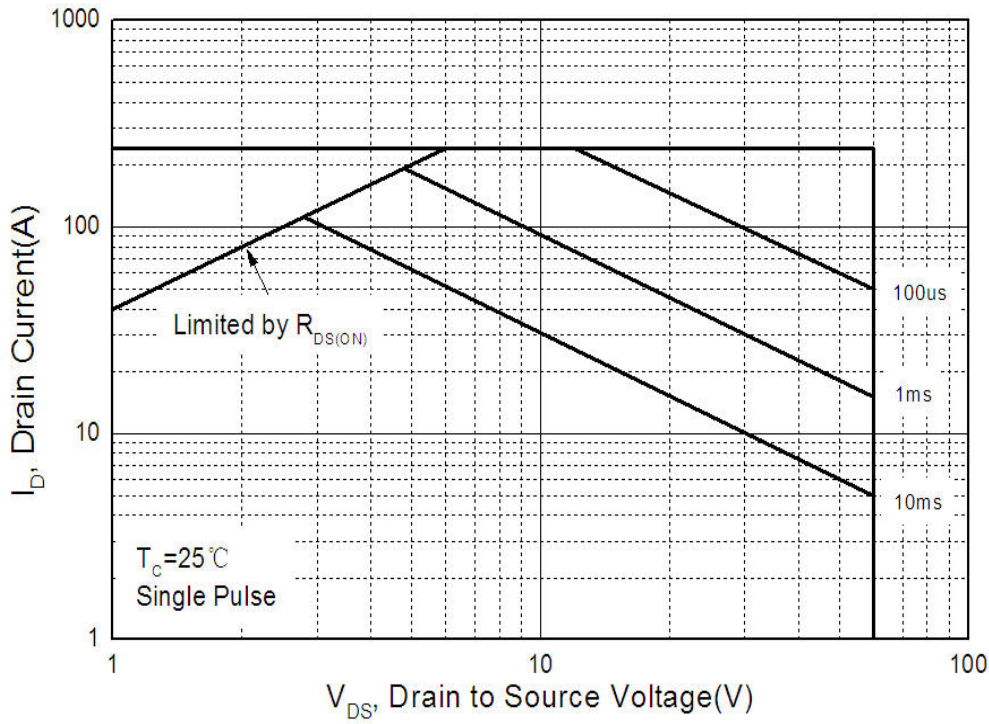
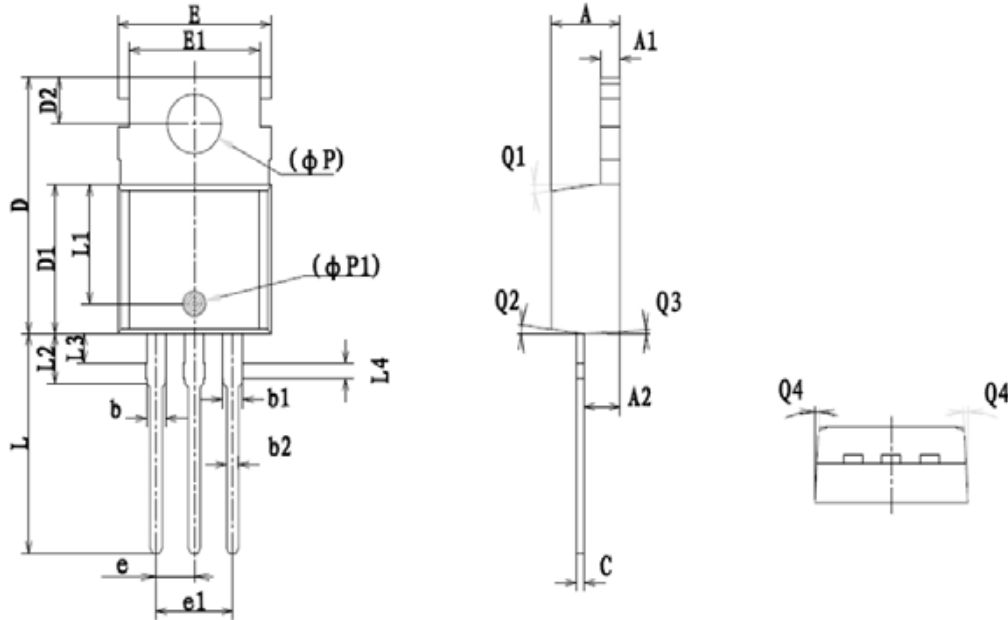


Figure 9. Maximum Safe Operating Area

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	2.240	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°	7°	9°	5°	7°	9°
Q2	5°	7°	9°	5°	7°	9°
Q3	5°	7°	9°	5°	7°	9°
Q4	1°	3°	5°	1°	3°	5°

Ordering and Marking Information

Device Marking: SSF6025

Package (Available)
 TO-220
 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-220	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°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