

### Main Product Characteristics

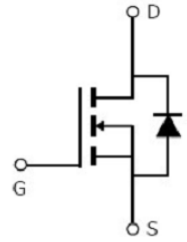
$V_{DSS}$	60V
$R_{DS(on)}$	20m $\Omega$ (typ.)
$I_D$	50A



TO-220



Marking and Pin Assignment



Schematic Diagram

### Features and Benefits

- Advanced Process Technology
- Ideal 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

These N-Channel enhancement mode power field effect transistors are produced using advanced MOSFET technology to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are ideal for high efficiency switch mode power supplies.

### Absolute Max Ratings (T<sub>A</sub>=25°C unless otherwise specified)

Symbol	Parameter	Max.	Units
$I_D @ T_C = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}^{\text{①}}$	50	A
$I_D @ T_C = 100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}^{\text{①}}$	35	
$I_{DM}$	Pulsed Drain Current <sup>②</sup>	200	
$P_D @ T_C = 25^\circ\text{C}$	Power Dissipation <sup>③</sup>	130	W
	Linear Derating Factor	1.0	W/°C
$V_{DS}$	Drain-Source Voltage	60	V
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	V
$E_{AS}$	Single Pulse Avalanche Energy @ L=5.6mH	1010	mJ
$I_{AS}$	Avalanche Current @ L=5.6mH	19	A
$T_J \quad T_{STG}$	Operating Junction and Storage Temperature Range	-55 to + 175	°C

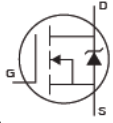
### Thermal Resistance

Symbol	Characteristics	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case <sup>③</sup>	—	1.15	°C/W
$R_{\theta JA}$	Junction-to-Ambient ( $t \leq 10s$ ) <sup>④</sup>	—	62	°C/W
	Junction-to-Ambient (PCB mounted, steady-state) <sup>④</sup>	—	40	°C/W

### Electrical Characteristics ( $T_A=25^\circ\text{C}$ unless otherwise specified)

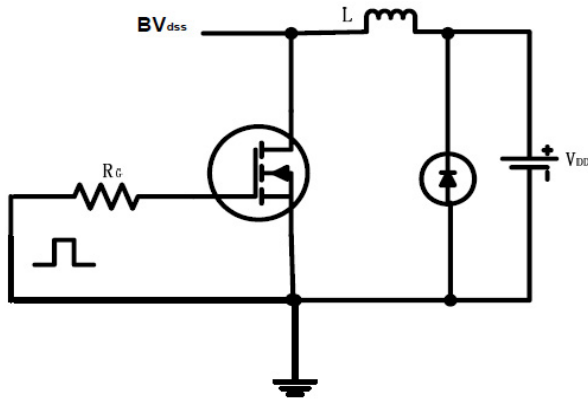
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	60	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$R_{DS(on)}$	Static Drain-to-Source On-resistance	—	20	23	mΩ	$V_{GS}=10V, I_D = 25A$ $T_J = 125^\circ\text{C}$
		—	36	—		
$V_{GS(th)}$	Gate Threshold Voltage	2	—	4	V	$V_{DS} = V_{GS}, I_D = 250\mu A$ $T_J = 125^\circ\text{C}$
		—	2.3	—		
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	1	μA	$V_{DS} = 60V, V_{GS} = 0V$ $T_J = 125^\circ\text{C}$
		—	—	50		
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20V$ $V_{GS} = -20V$
		-100	—	—		
$Q_g$	Total Gate Charge	—	24.6	—	nC	$I_D = 50A,$ $V_{DS}=48V,$ $V_{GS} = 10V$
$Q_{gs}$	Gate-to-Source Charge	—	8.1	—		
$Q_{gd}$	Gate-to-Drain("Miller") Charge	—	6.4	—		
$t_{d(on)}$	Turn-on Delay Time	—	28	—	ns	$V_{GS}=10V, V_{DD}=30V,$ $R_L=1.2\Omega,$ $R_{GEN}=51\Omega$ $I_D=25A$
$t_r$	Rise Time	—	82	—		
$t_{d(off)}$	Turn-Off Delay Time	—	108	—		
$t_f$	Fall Time	—	74	—		
$C_{iss}$	Input Capacitance	—	1302	—	pF	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1MHz$
$C_{oss}$	Output Capacitance	—	308	—		
$C_{rss}$	Reverse Transfer Capacitance	—	10	—		

### Source-Drain Ratings and Characteristics

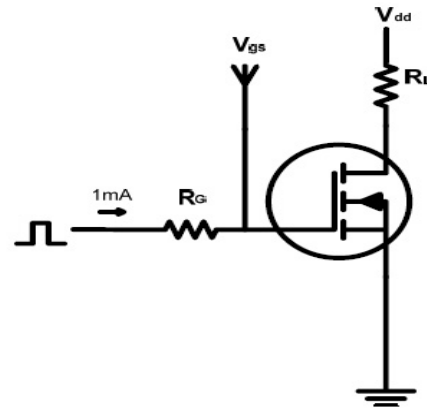
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	50	A	MOSFET symbol showing the integral reverse p-n junction diode. 
$I_{SM}$	Pulsed Source Current (Body Diode)	—	—	200	A	
$V_{SD}$	Diode Forward Voltage	—	0.88	1.5	V	$I_S=50A, V_{GS}=0V, T_J = 25^\circ\text{C}$
$t_{rr}$	Reverse Recovery Time	—	26.6	—	ns	$T_J = 25^\circ\text{C}, I_F = 50A, di/dt = 100A/\mu s$
$Q_{rr}$	Reverse Recovery Charge	—	27.8	—	nC	

## Test Circuits and Waveforms

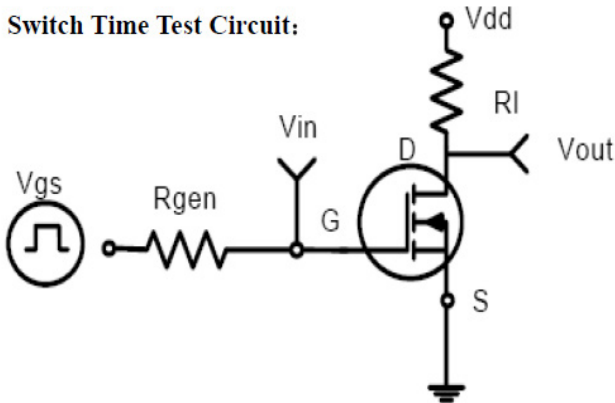
EAS test circuits:



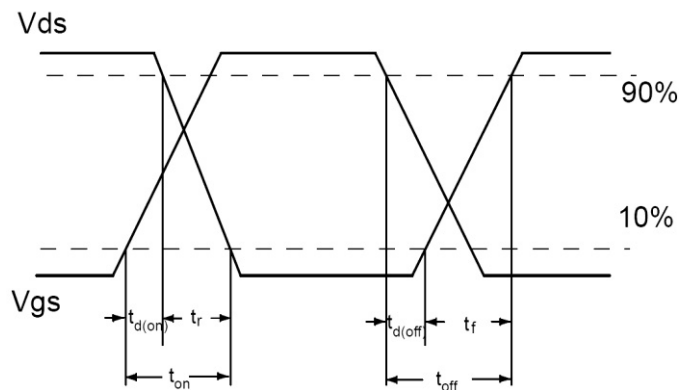
Gate charge test circuit:



Switch Time Test Circuit:



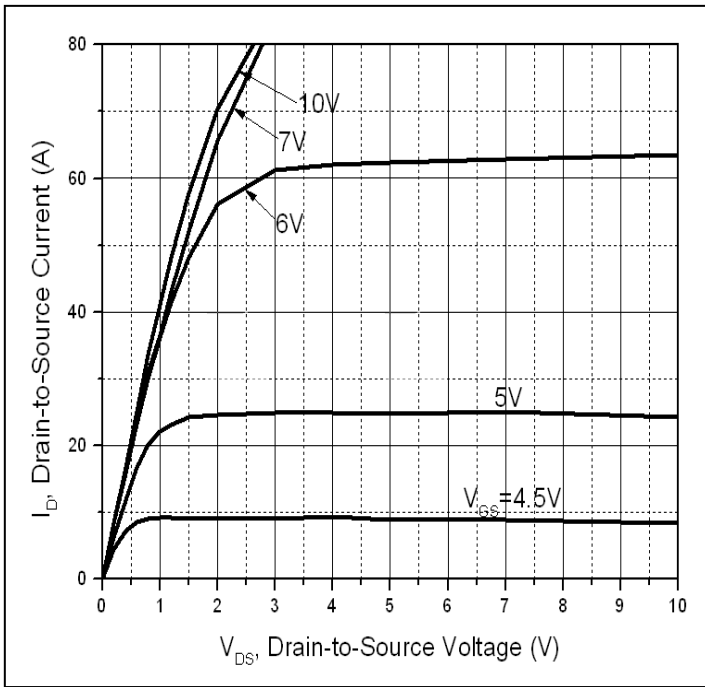
Switching Waveforms:



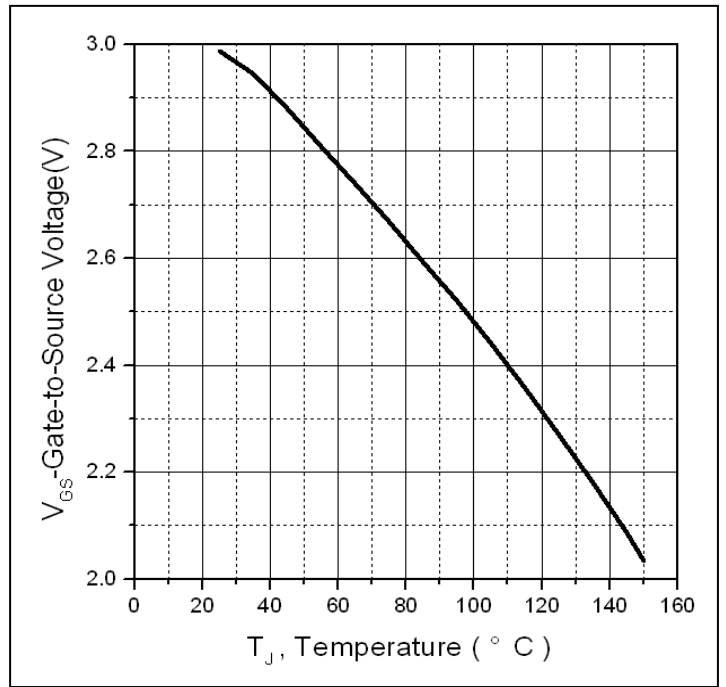
### Notes:

- ① The maximum current rating is limited by bond-wires.
- 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  $R_{\theta JA}$  is measured with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A = 25^\circ\text{C}$ .

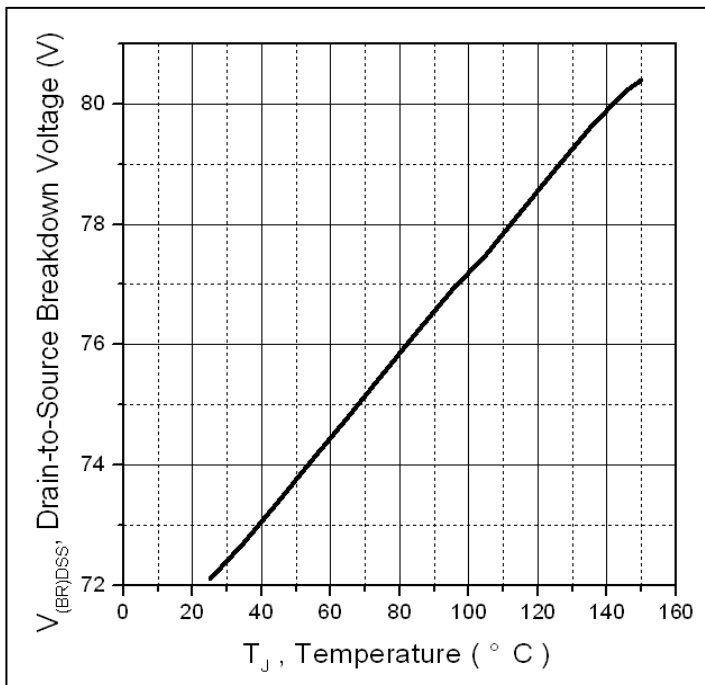
**Typical Electrical and Thermal Characteristics**



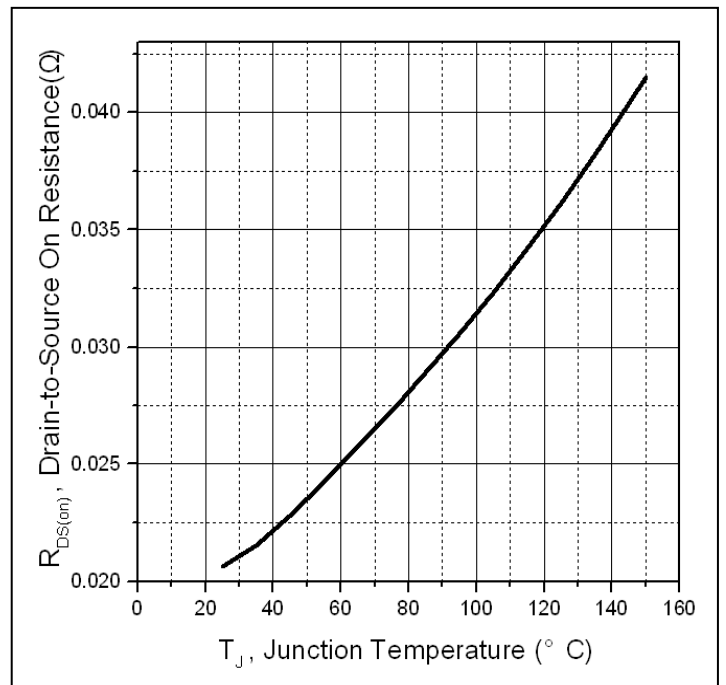
**Figure 1. Typical Output Characteristics**



**Figure 2. Gate to Source Cut-off Voltage**

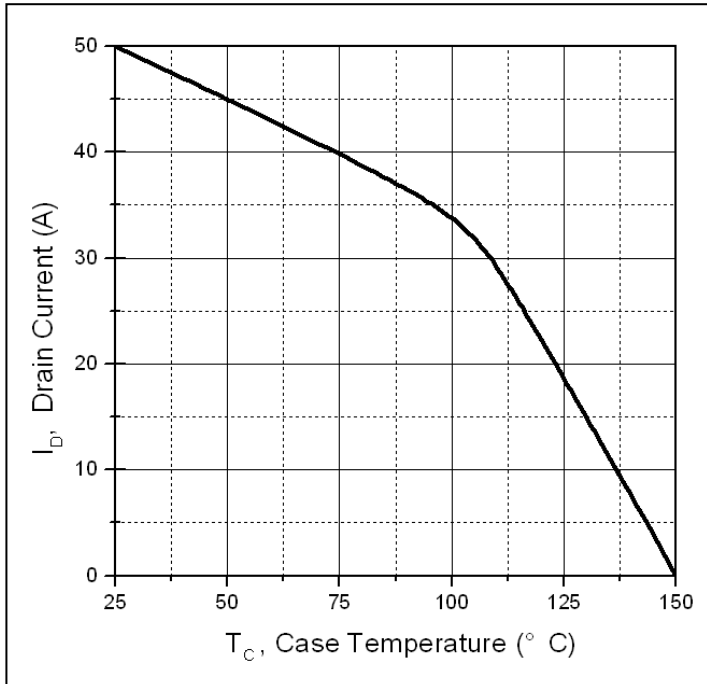


**Figure 3. Drain-to-Source Breakdown Voltage vs. Temperature**

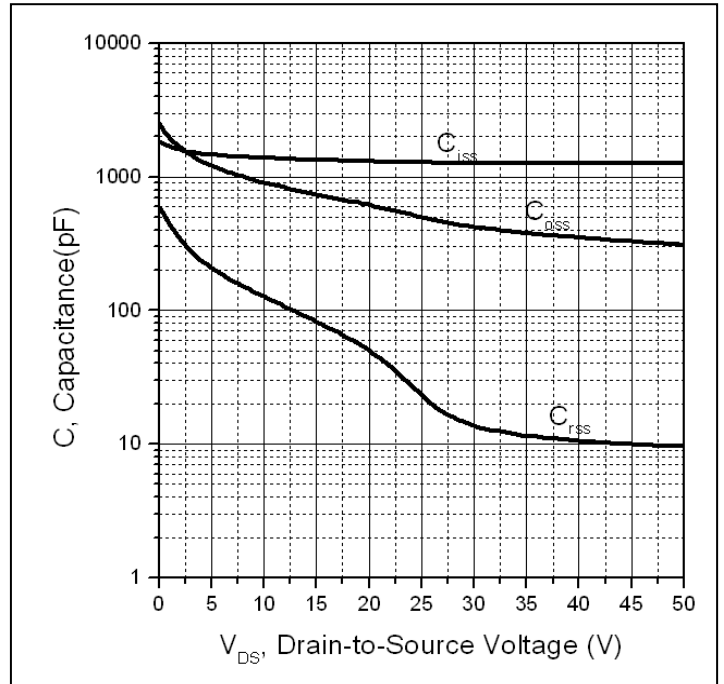


**Figure 4. Normalized On-Resistance Vs. Case Temperature**

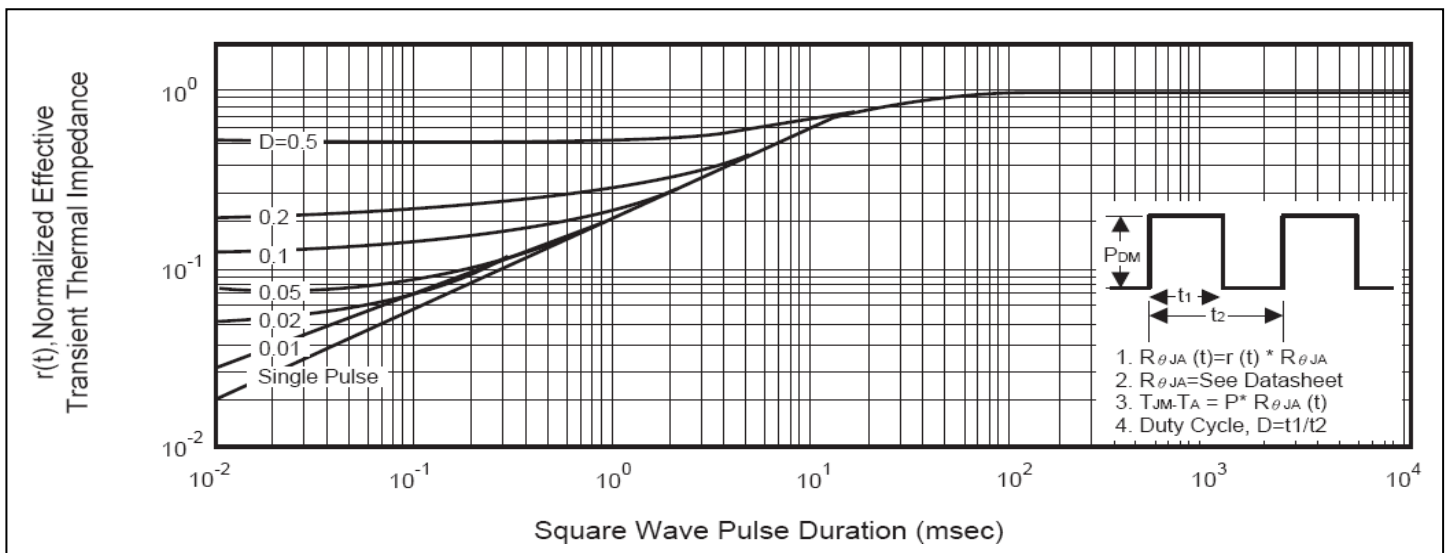
**Typical Electrical and Thermal Characteristics**



**Figure 5. Maximum Drain Current Vs. Case Temperature**



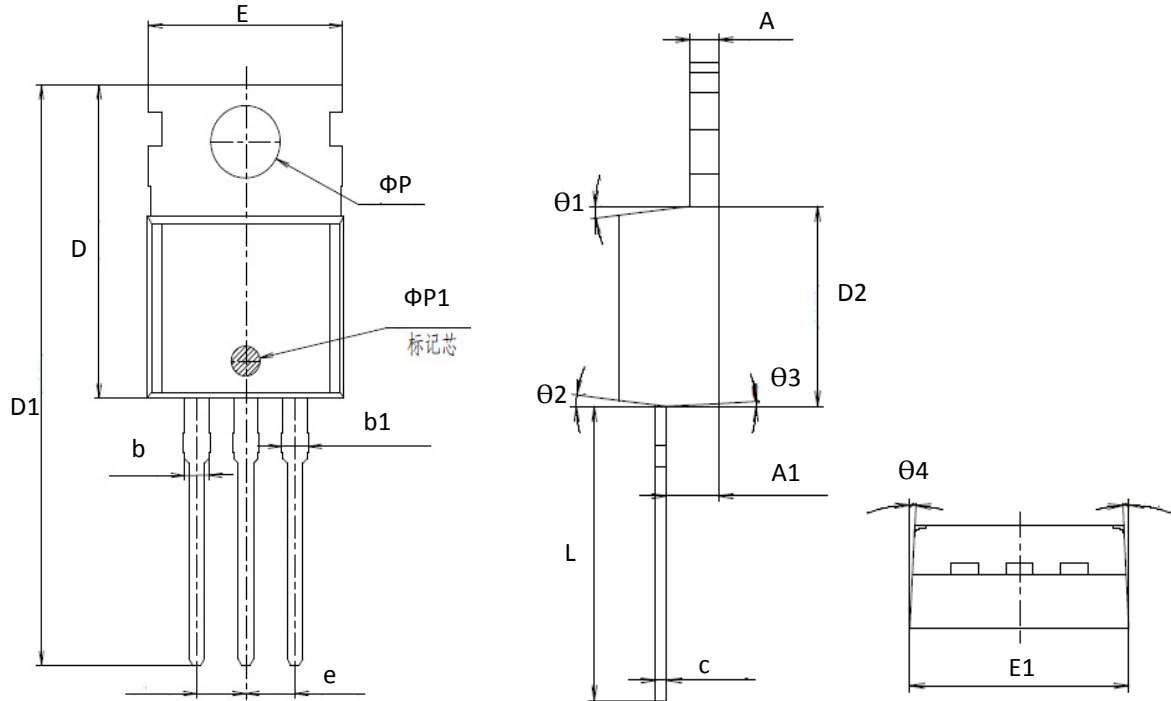
**Figure 6. Typical Capacitance Vs. Drain-to-Source Voltage**



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

Mechanical Data

TO-220 PACKAGE OUTLINE DIMENSION



Symbol	Dimension In Millimeters			Dimension In Inches		
	Min	Nom	Max	Min	Nom	Max
A	-	1.300	-	-	0.051	-
A1	2.200	2.400	2.600	0.087	0.094	0.102
b	-	1.270	-	-	0.050	-
b1	1.270	1.370	1.470	0.050	0.054	0.058
c	-	0.500	-	-	0.020	-
D	-	15.600	-	-	0.614	-
D1	-	28.700	-	-	1.130	-
D2	-	9.150	-	-	0.360	-
E	9.900	10.000	10.100	0.390	0.394	0.398
E1	-	10.160	-	-	0.400	-
ΦP	-	3.600	-	-	0.142	-
ΦP1		1.500			0.059	
e	2.54BSC			0.1BSC		
L	12.900	13.100	13.300	0.508	0.516	0.524
θ1	-	7°	-	-	7°	-
θ2	-	7°	-	-	7°	-
θ3	-	3°	-	5°	7°	9°
θ4	-	3°	-	1°	3°	5°

**Ordering and Marking Information**

**Device Marking: SSPL6022**

**Package (Available)**  
**TO-220**  
**Operating Temperature Range**  
**C : -55 to175 °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	10	10000

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