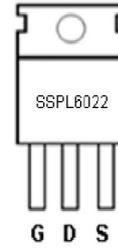


## Main Product Characteristics

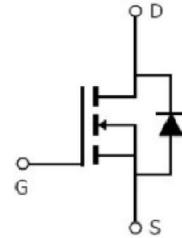
$V_{DSS}$	60V
$R_{DS(on)}$	20mohm(typ.)
$I_D$	50A



TO-220



Marking and Pin Assignment



Schematic Diagram

## Features and Benefits

- Advanced 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
- Lead free product



## Description

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

## Absolute Max Rating

Symbol	Parameter	Max.	Units
$I_D @ TC = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ ①	50	A
$ID @ TC = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ ①	35	
$I_{DM}$	Pulsed Drain Current②	200	
$P_D @ TC = 25^\circ C$	Power Dissipation③	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
$T_J T_{STG}$	Operating Junction and Storage Temperature Range	-55 to + 175	°C

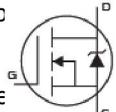
## Thermal Resistance

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

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

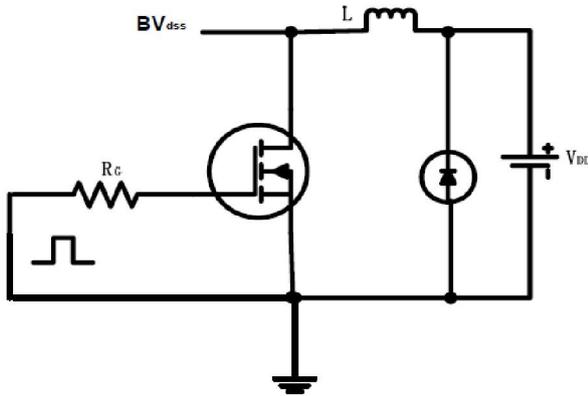
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source breakdown voltage	60	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	20	23	m $\Omega$	$V_{GS}=10V, I_D = 25A$
		—	36	—		$T_J = 125^{\circ}C$
$V_{GS(th)}$	Gate threshold voltage	2	—	4	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
		—	2.3	—		$T_J = 125^{\circ}C$
$I_{DSS}$	Drain-to-Source leakage current	—	—	1	$\mu A$	$V_{DS} = 60V, V_{GS} = 0V$
		—	—	50		$T_J = 125^{\circ}C$
$I_{GSS}$	Gate-to-Source forward leakage	—	—	100	nA	$V_{GS} = 20V$
		-100	—	—		$V_{GS} = -20V$
$Q_g$	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

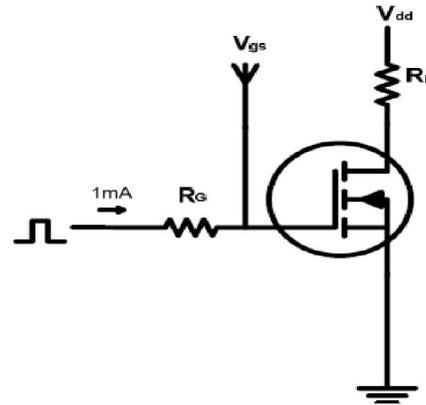
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	50	A	MOSFET symb showing the integral reverse p-n junction diode. 
$I_{SM}$	Pulsed Source Current (Body Diode)	—	—	200	A	
$V_{SD}$	Diode Forward Voltage	—	0.88	1.5	V	$I_S=50A, V_{GS}=0V, T_J = 25^{\circ}C$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

## Test Circuits and Waveforms

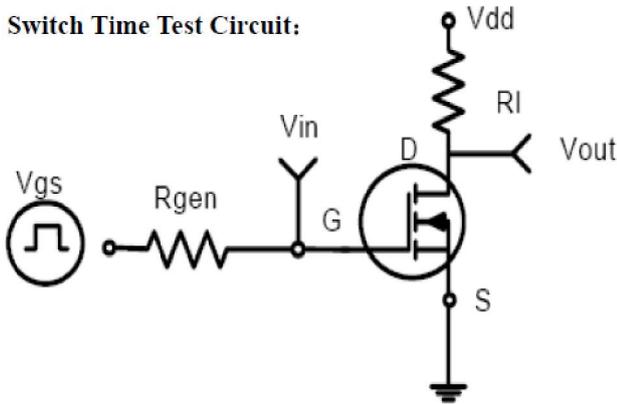
EAS test circuits:



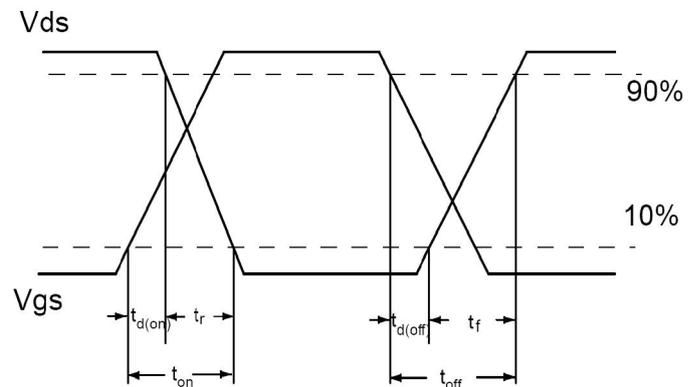
Gate charge test circuit:



Switch Time Test Circuit:



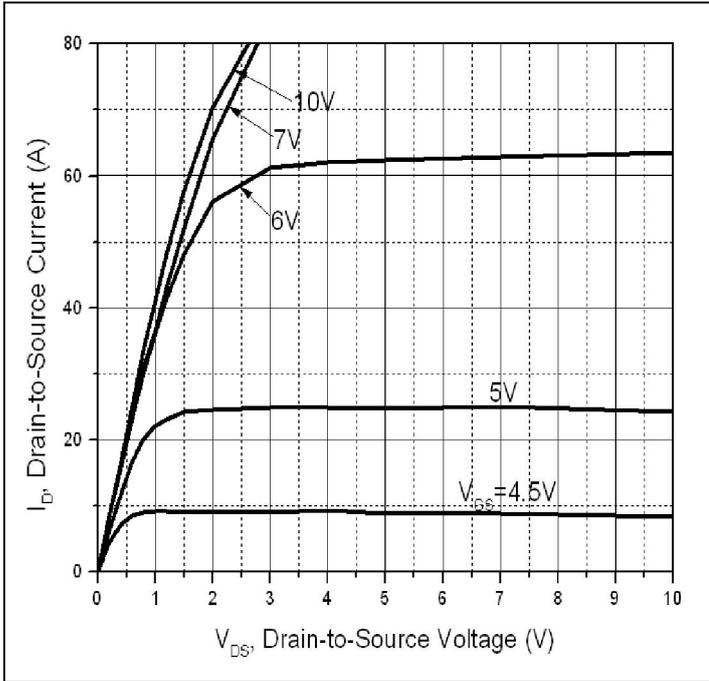
Waveforms:



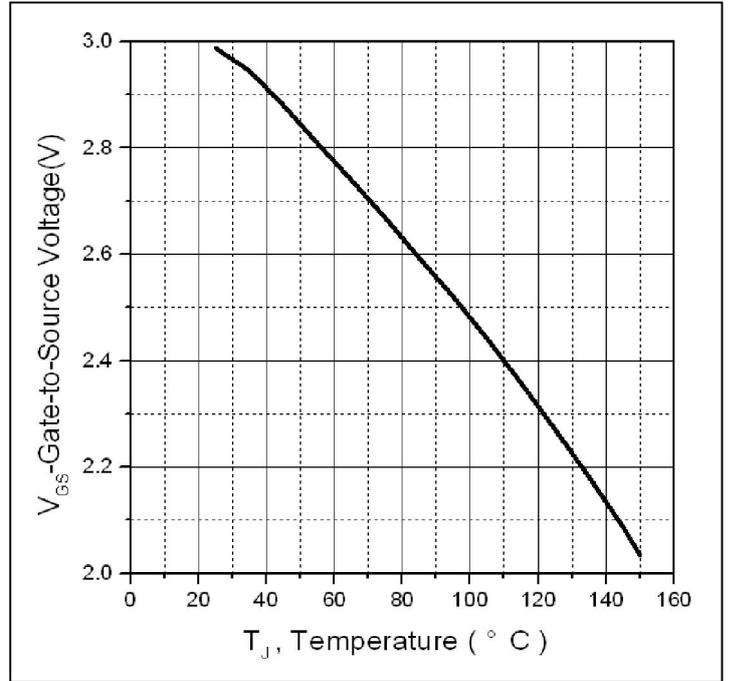
### Notes:

- ① The maximum current rating is limited by bond-wires.
- ② Repetitive rating; pulse width limited by max. junction temperature.
- ③ The power dissipation 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 1in 2 FR-4 board with 2oz. Copper, in a still air environment with  $T_A = 25^\circ\text{C}$
- ⑤ These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of  $T_{J(MAX)} = 175^\circ\text{C}$ .
- ⑥ The maximum current rating is limited by bond-wires.

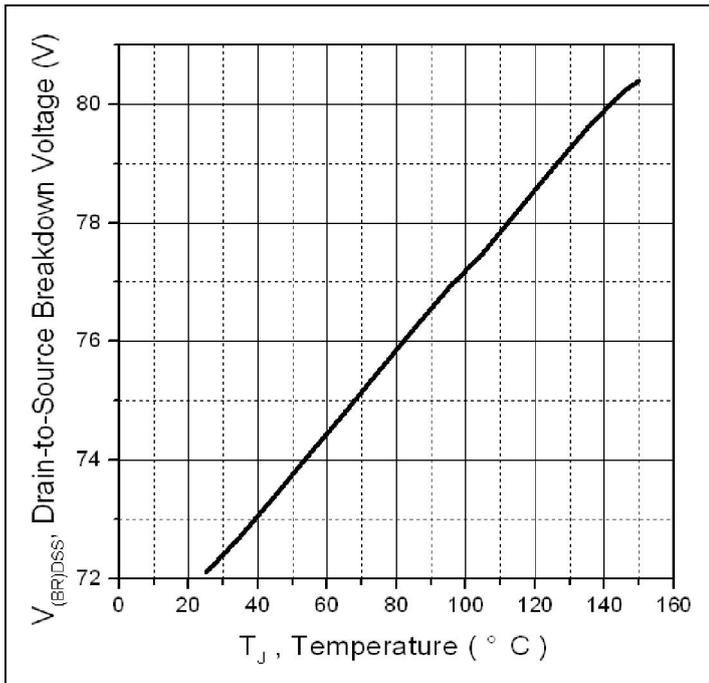
**Typical Electrical and Thermal Characteristics**



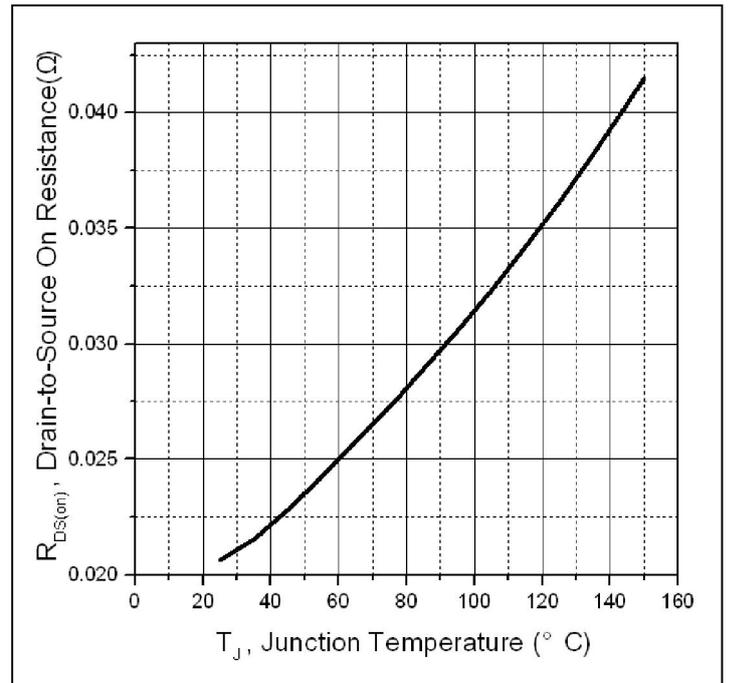
**Figure 1: Typical Output Characteristics**



**Figure 2. Gate to source cut-off voltage**

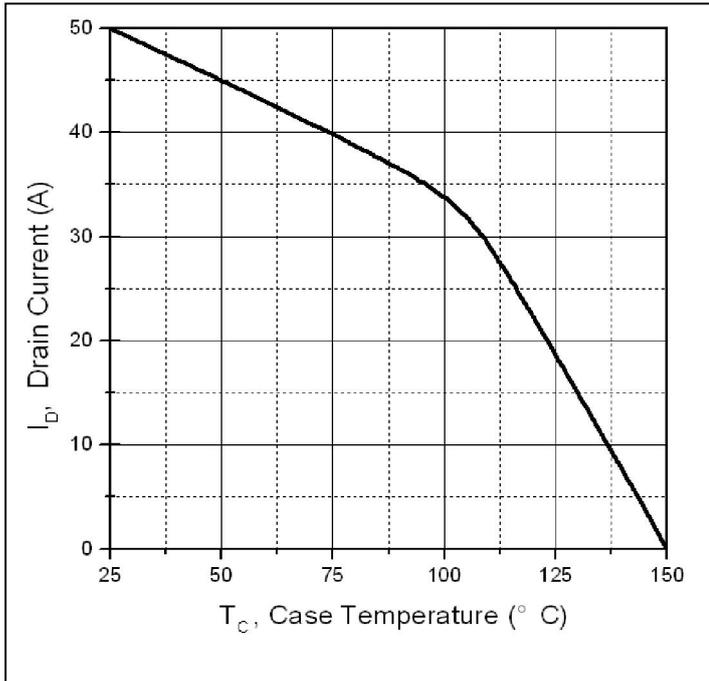


**Figure 3. Drain-to-Source Breakdown Voltage vs. Temperature**

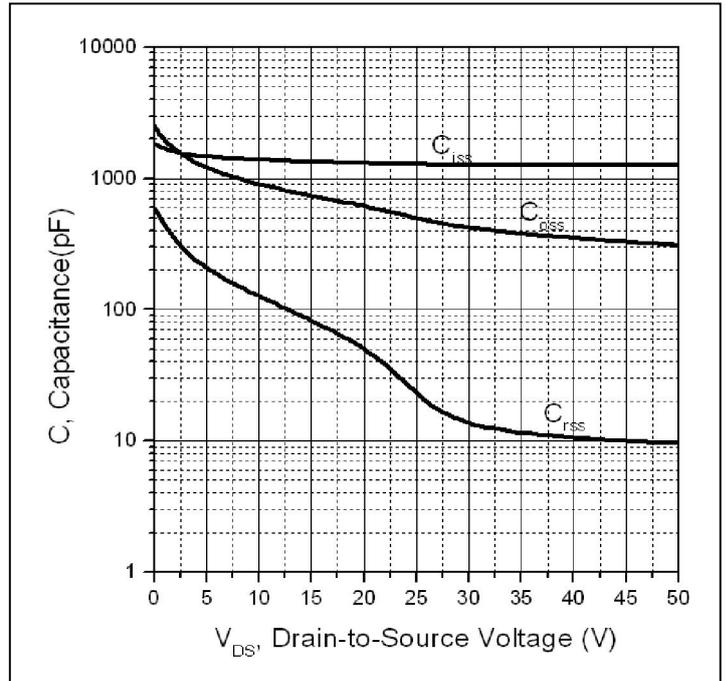


**Figure 4: Normalized On-Resistance Vs. Case Temperature**

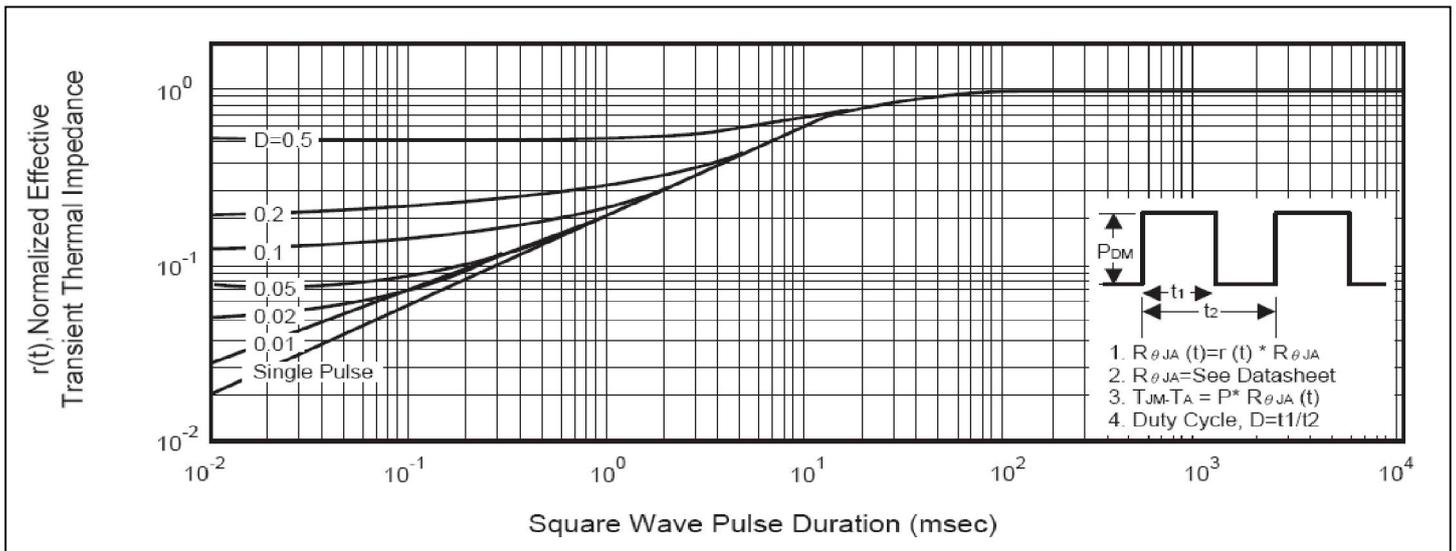
**Typical Electrical and Thermal Characteristics**



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

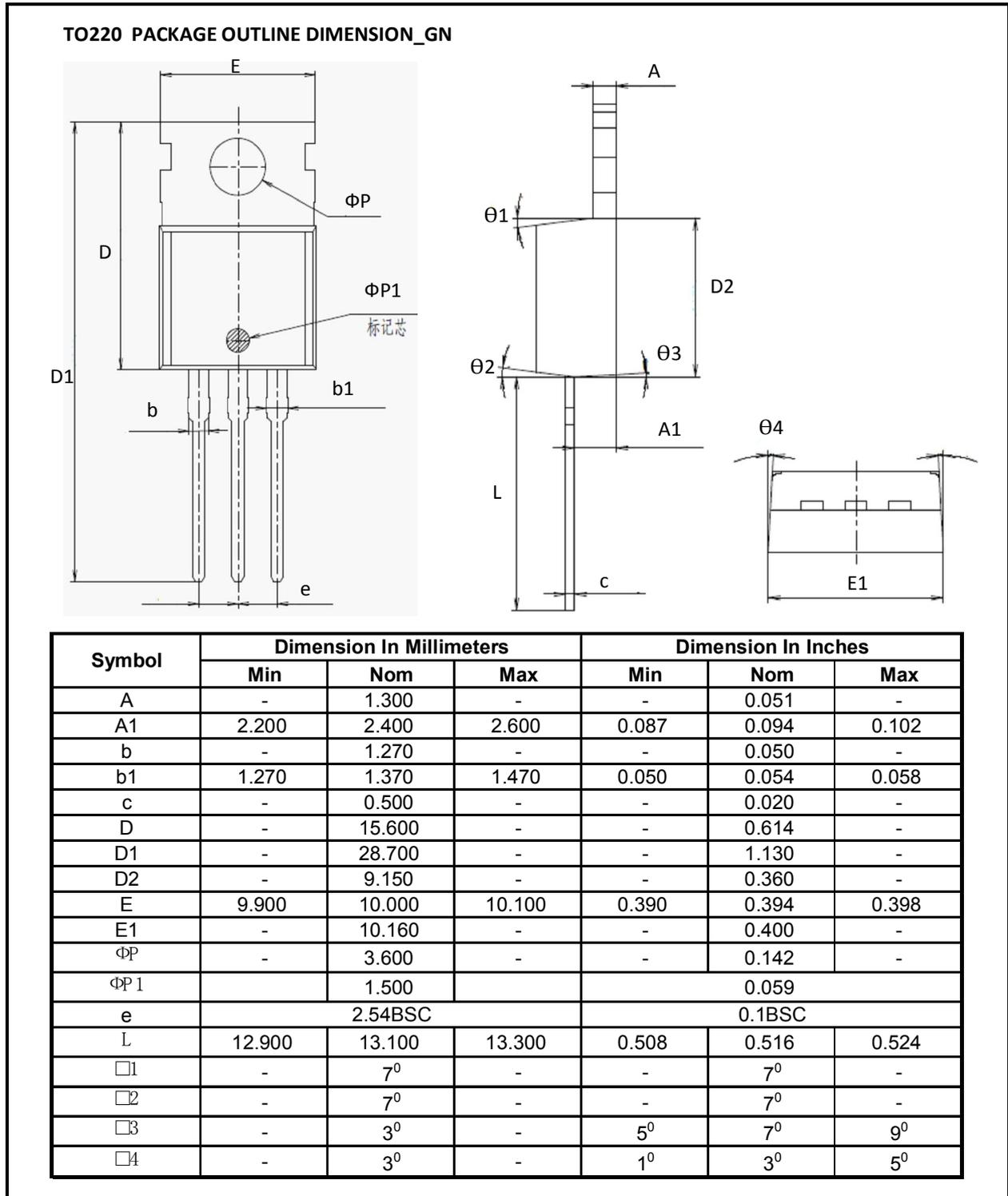


**Figure 6. Typical Capacitance Vs. Drain-to-Source Voltage**



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

**Mechanical Data**





### Ordering and Marking Information

**Device Marking: SSPL6022**

Package (Available)  
TO220  
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
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)	$T_j=125^{\circ}\text{C}$ or $175^{\circ}\text{C}$ @ 100% of Max $V_{GSS}$	168 hours 500 hours 1000 hours	3 lots x 77 devices