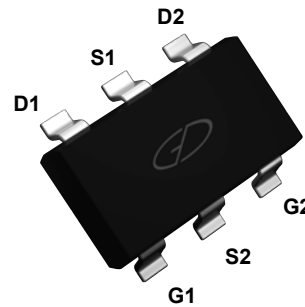
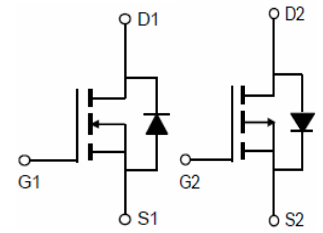


### Main Product Characteristics

$V_{(BR)DSS}$	30V	-30V
$R_{DS(on)MAX}$	58mΩ@10V	100mΩ@-10V
	95mΩ@4.5V	150mΩ@-4.5V
$I_D$	3.5A	-2.7A



SOT-23-6L



Schematic Diagram

### Features and Benefits

- Advanced MOSFET process technology
- Ideal for battery operated systems, load switching, power converters and other general purpose applications
- Low on-resistance with low gate charge
- Fast switching and reverse body recovery



### Description

The SSF6602 utilizes the latest techniques to achieve high cell density and low on-resistance. These features make this device extremely efficient and reliable for use in high efficiency switch mode power supply and a wide variety of other applications.

### Absolute Maximum Ratings ( $T_A=25^\circ\text{C}$ unless otherwise specified)

Parameter		Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage		$V_{DS}$	30	-30	V
Gate-Source Voltage		$V_{GS}$	±20	±20	V
Continuous Drain Current	$T_A=25^\circ\text{C}$	$I_D$	3.5	-2.7	A
	$T_A=70^\circ\text{C}$		3	-2.1	
Pulsed Drain Current <sup>1</sup>		$I_{DM}$	20	-15	A
Maximum Power Dissipation	$T_A=25^\circ\text{C}$	$P_D$	1.2		W
Operating Junction and Storage Temperature Range		$T_J, T_{STG}$	-55 To +150	-55 To +150	°C

### Thermal Characteristics

Thermal Resistance, Junction-to-Ambient <sup>2</sup>	$R_{\theta JA}$	N-Ch	104	°C/W
Thermal Resistance, Junction-to-Ambient <sup>2</sup>	$R_{\theta JA}$	P-Ch	104	°C/W

### N-Channel Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise specified)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	30	33	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V	-	-	1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
<b>On Characteristics<sup>3</sup></b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.2	1.5	2.2	V
Drain-Source On-State Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =3.5A	-	36	58	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =2A	-	60	95	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =5V, I <sub>D</sub> =3.1A	-	4	-	S
<b>Dynamic Characteristics</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, F=1.0MHz	-	210	-	PF
Output Capacitance	C <sub>oss</sub>		-	35	-	PF
Reverse Transfer Capacitance	C <sub>rss</sub>		-	23	-	PF
<b>Switching Characteristics</b>						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =15V, R <sub>L</sub> =3Ω V <sub>GS</sub> =10V, R <sub>GEN</sub> =6Ω	-	4.5	-	nS
Turn-on Rise Time	t <sub>r</sub>		-	1.5	-	nS
Turn-Off Delay Time	t <sub>d(off)</sub>		-	18.5	-	nS
Turn-Off Fall Time	t <sub>f</sub>		-	15.5	-	nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =15V, I <sub>D</sub> =3.5A, V <sub>GS</sub> =10V	-	5	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	0.55	-	nC
Gate-Drain Charge	Q <sub>gd</sub>		-	1	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage <sup>3</sup>	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =3.5A	-	0.8	1.2	V
Diode Forward Current <sup>2</sup>	I <sub>S</sub>		-	-	3.5	A

#### Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.

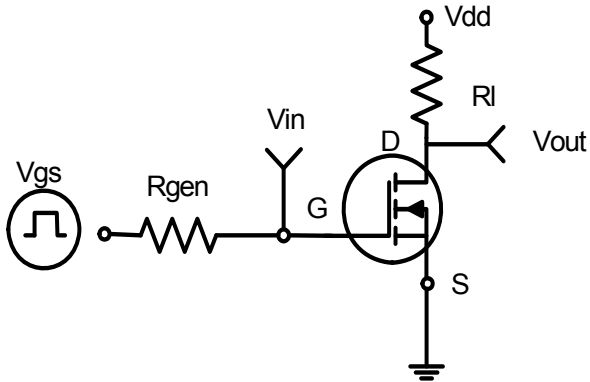

**P-Channel Electrical Characteristics** ( $T_A=25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-30	-33	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-30V, V_{GS}=0V$	-	-	-1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics<sup>3</sup></b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1	-1.6	-2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=-10V, I_D=-2.7A$	-	69	100	m $\Omega$
		$V_{GS}=-4.5V, I_D=-2A$	-	110	150	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=-10V, I_D=-2.7A$		2	-	S
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=-15V, V_{GS}=0V,$ $F=1.0MHz$	-	199	-	PF
Output Capacitance	$C_{oss}$		-	47	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	28	-	PF
<b>Switching Characteristics</b>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=-15V, R_L=15\Omega$ $V_{GS}=-10V, R_{GEN}=6\Omega$	-	8	-	nS
Turn-on Rise Time	$t_r$		-	5	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	12	-	nS
Turn-Off Fall Time	$t_f$		-	4	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=-15V, I_D=-2.7A, V_{GS}=-10V$	-	5	-	nC
Gate-Source Charge	$Q_{gs}$		-	0.7	-	nC
Gate-Drain Charge	$Q_{gd}$		-	1.1	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage <sup>3</sup>	$V_{SD}$	$V_{GS}=0V, I_S=-2.7A$	-	-	-1.2	V

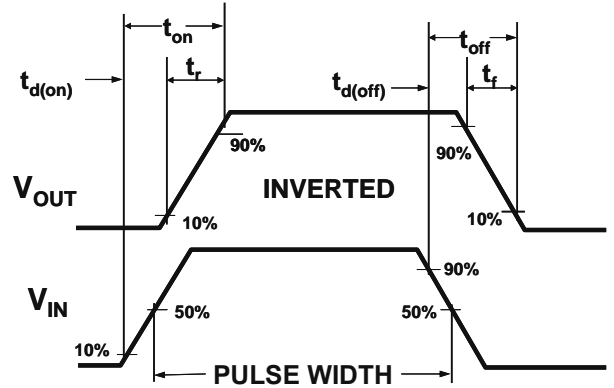
**Notes:**

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .

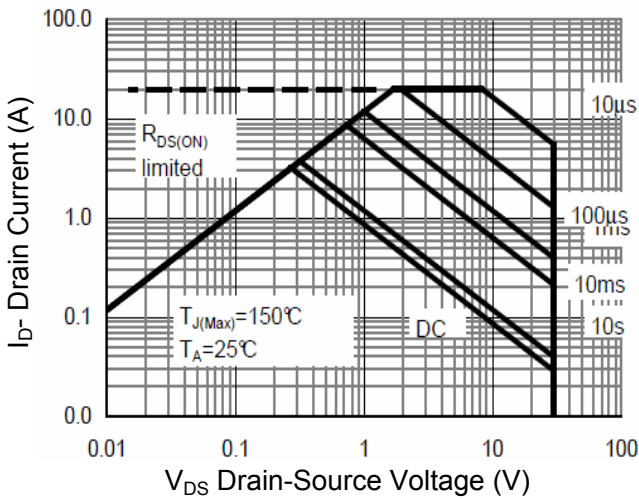
**N-Channel Typical Electrical and Thermal Characteristic Curves**



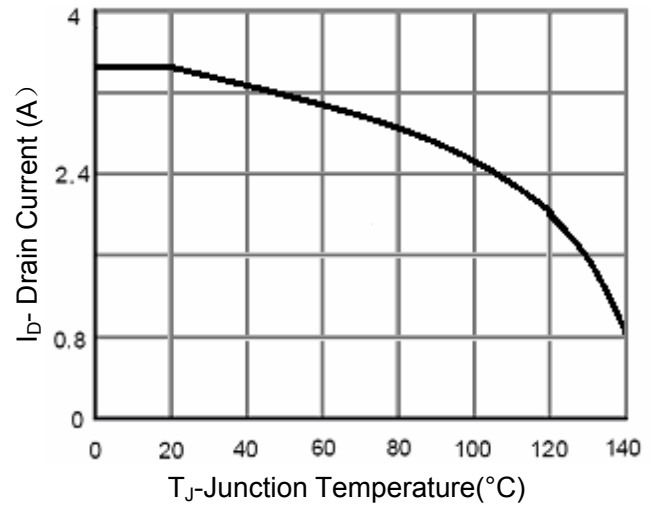
**Figure 1 Switching Test Circuit**



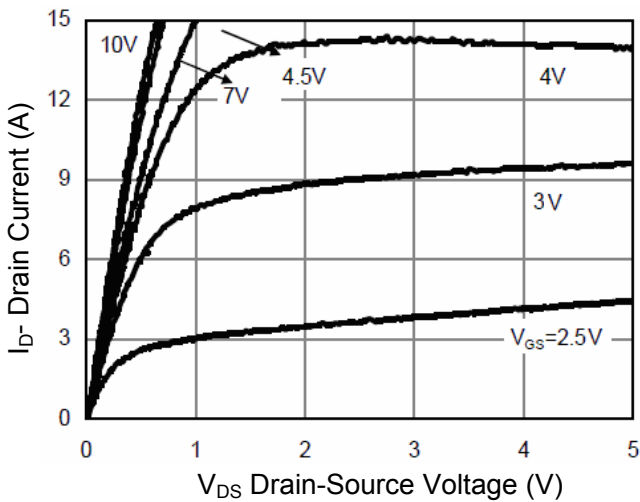
**Figure 2 Switching Waveforms**



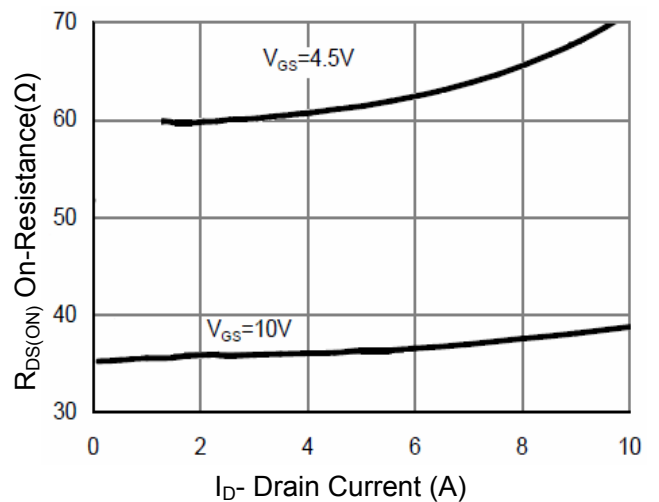
**Figure 3 Safe Operation Area**



**Figure 4 Drain Current**

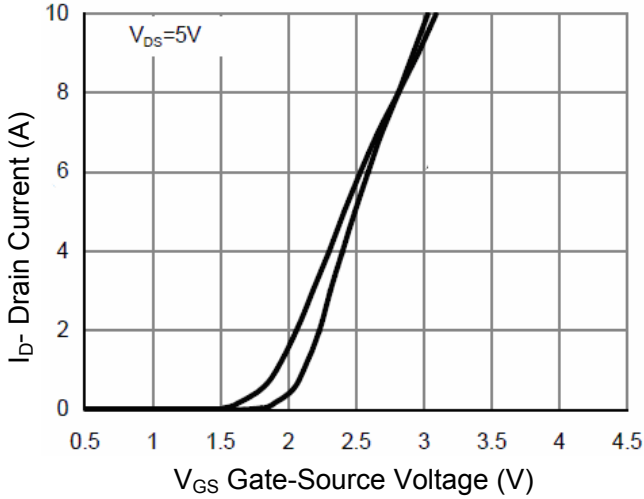


**Figure 5 Output Characteristics**

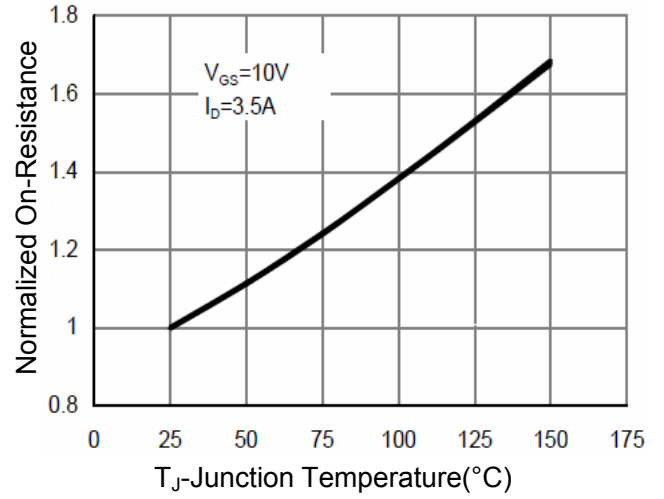


**Figure 6 Drain-Source On-Resistance**

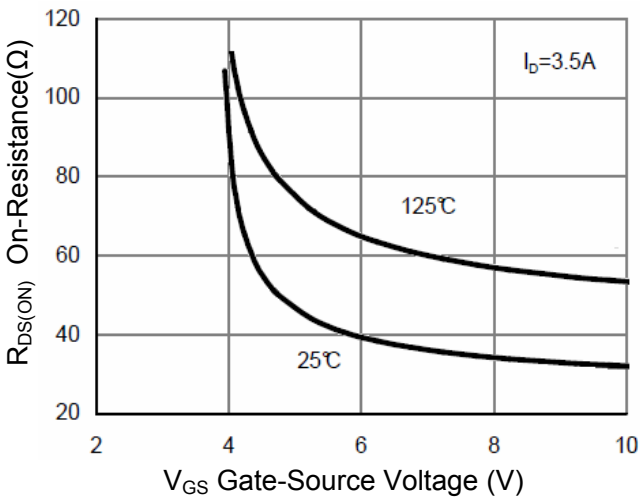
**N-Channel Typical Electrical and Thermal Characteristic Curves**



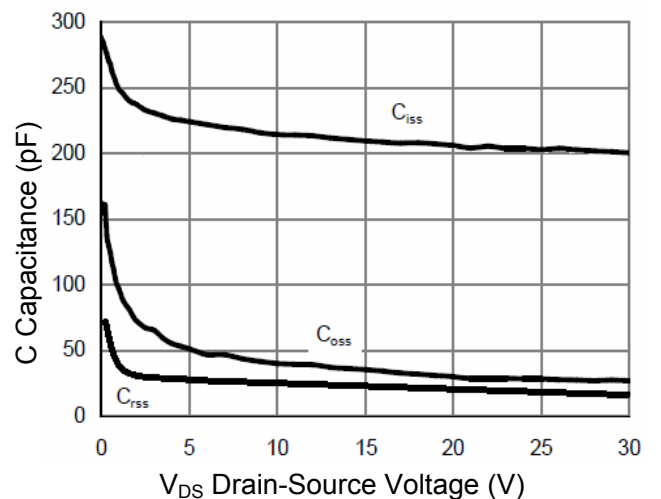
**Figure 7 Transfer Characteristics**



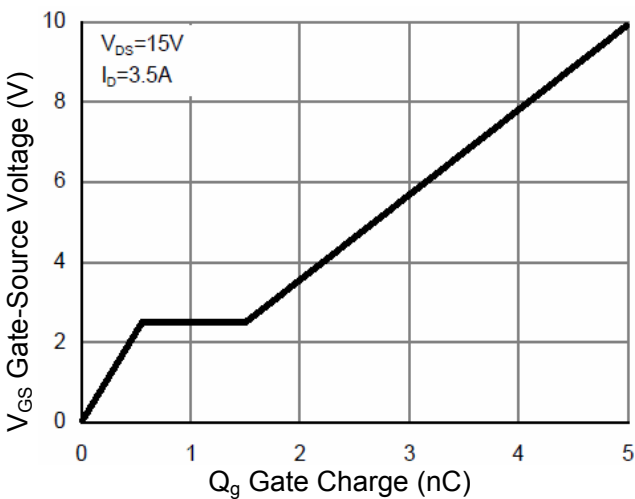
**Figure 8 Drain-Source On-Resistance**



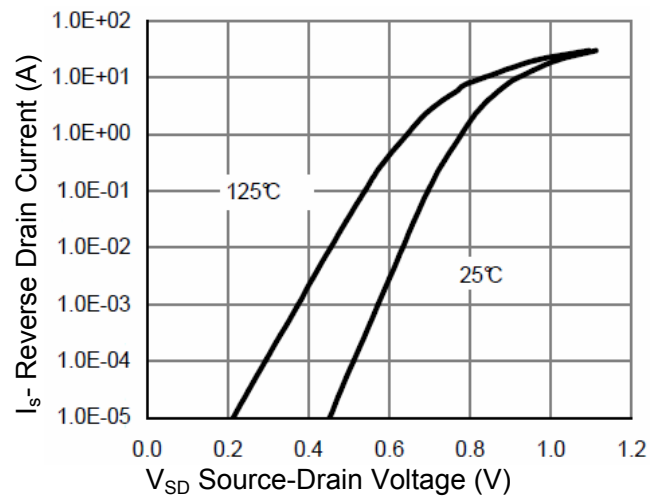
**Figure 9  $R_{DS(ON)}$  vs  $V_{GS}$**



**Figure 10 Capacitance vs  $V_{DS}$**

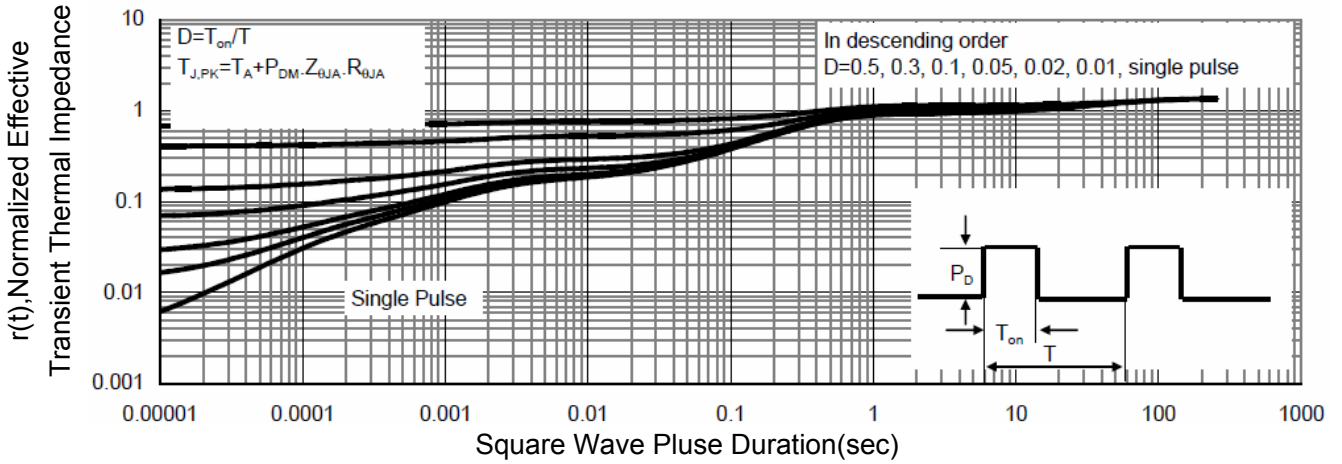


**Figure 11 Gate Charge**



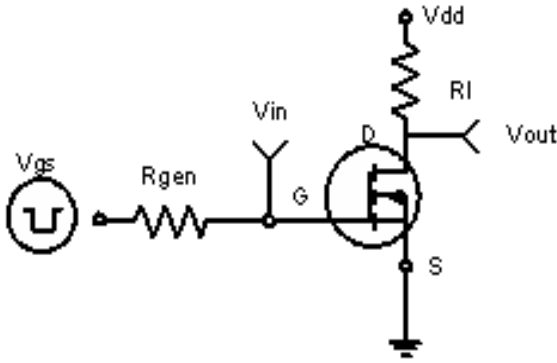
**Figure 12 Source- Drain Diode Forward**

**N-Channel Typical Electrical and Thermal Characteristic Curves**

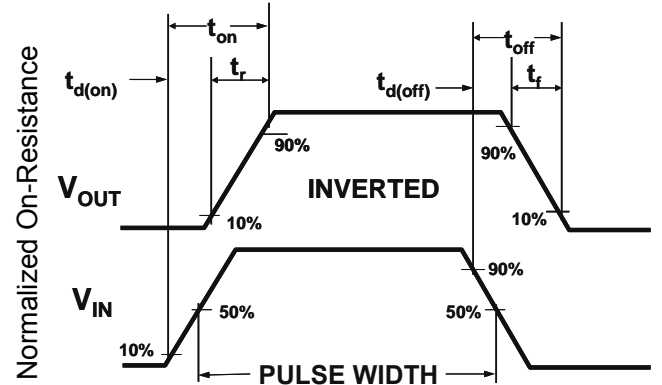


**Figure 13 Normalized Maximum Transient Thermal Impedance**

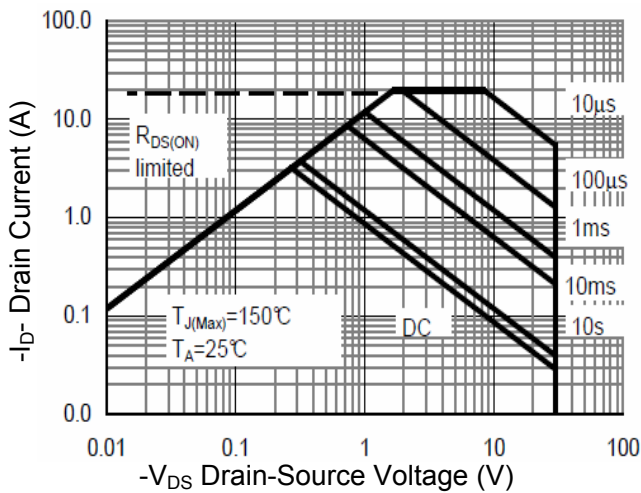
## P-Channel Typical Electrical and Thermal Characteristic Curves



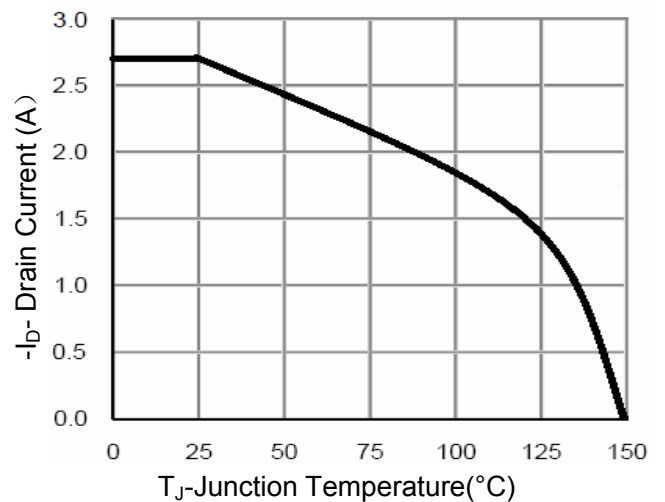
**Figure 1 Switching Test Circuit**



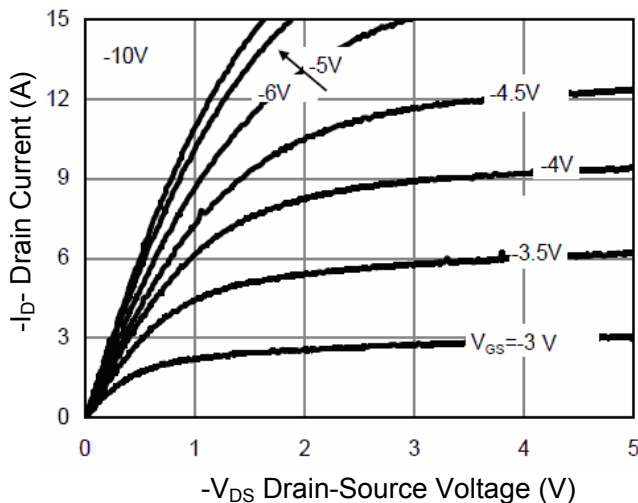
**Figure 2 Switching Waveforms**



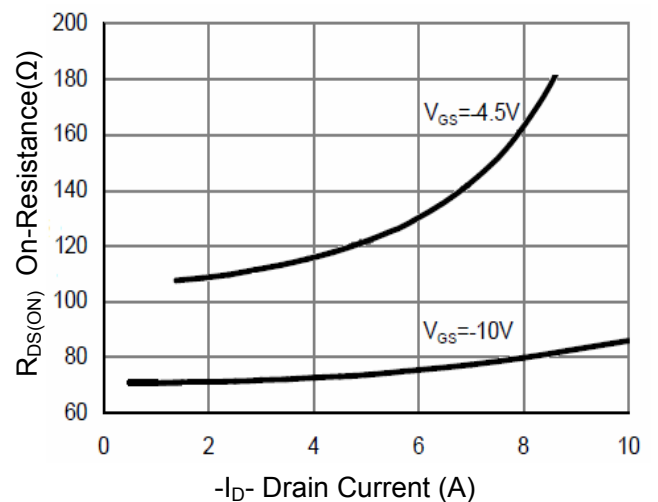
**Figure 3 Safe Operation Area**



**Figure 4 Drain Current**

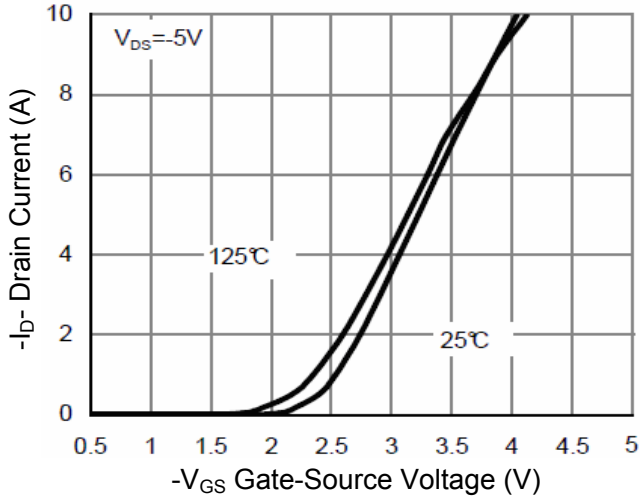


**Figure 5 Output Characteristics**

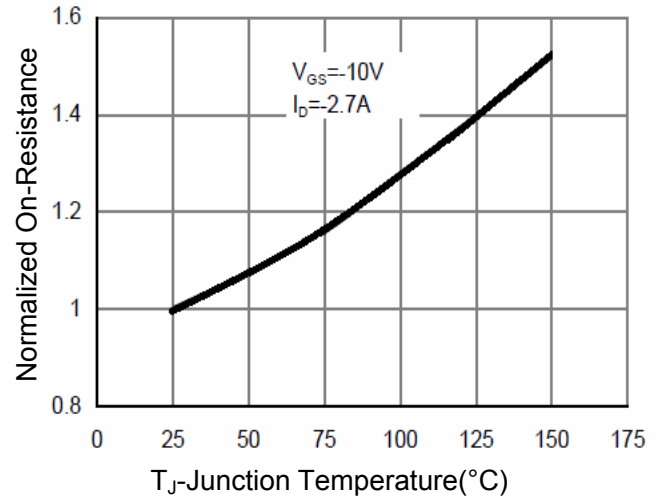


**Figure 6 Drain-Source On-Resistance**

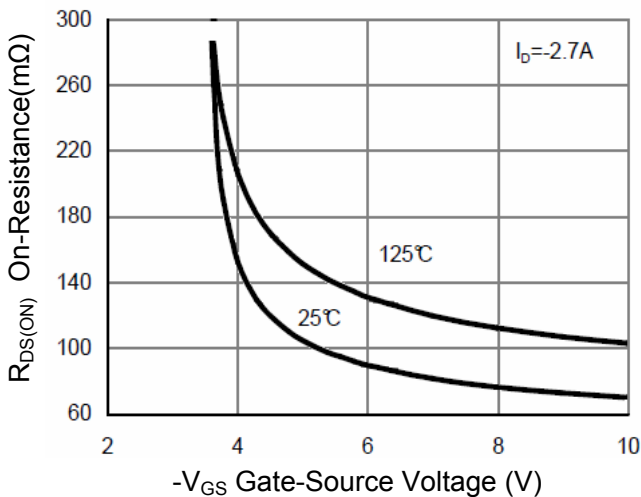
### P-Channel Typical Electrical and Thermal Characteristic Curves



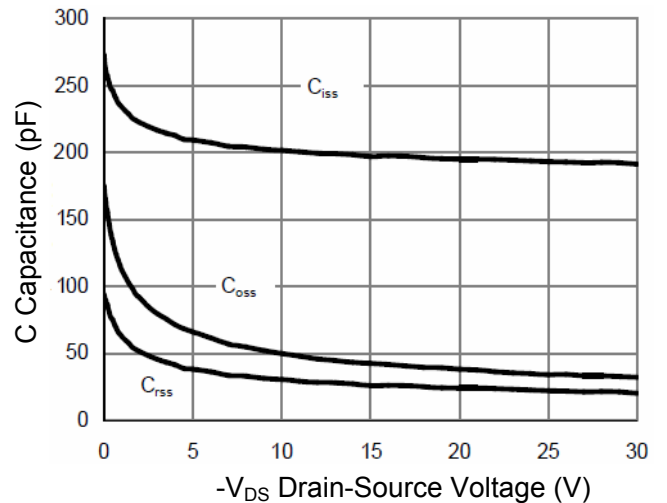
**Figure 7 Transfer Characteristics**



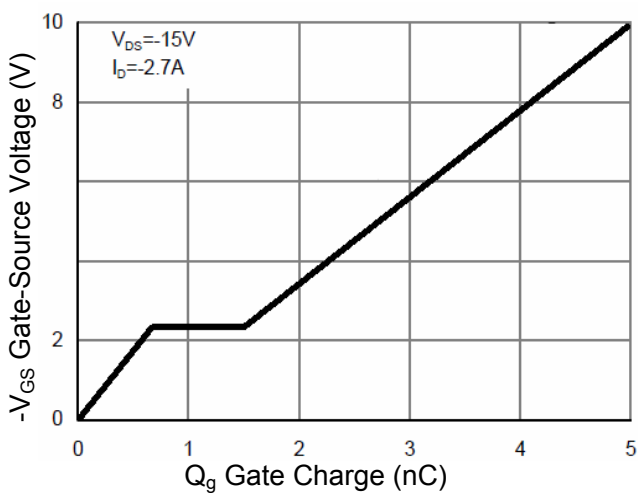
**Figure 8 Drain-Source On-Resistance**



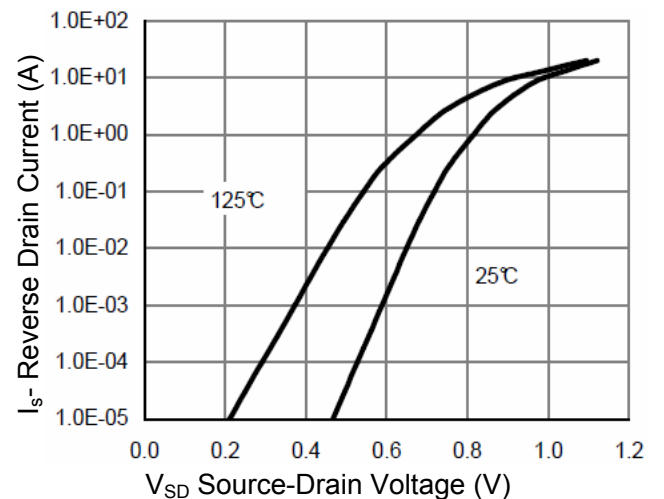
**Figure 9  $R_{DS(ON)}$  vs  $V_{GS}$**



**Figure 10 Capacitance vs  $V_{DS}$**



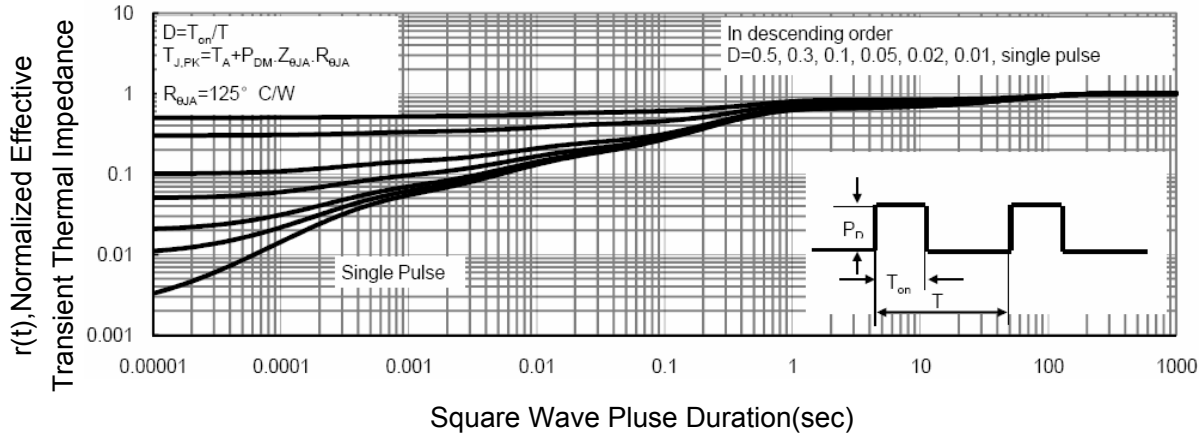
**Figure 11 Gate Charge**



**Figure 12 Source- Drain Diode Forward**



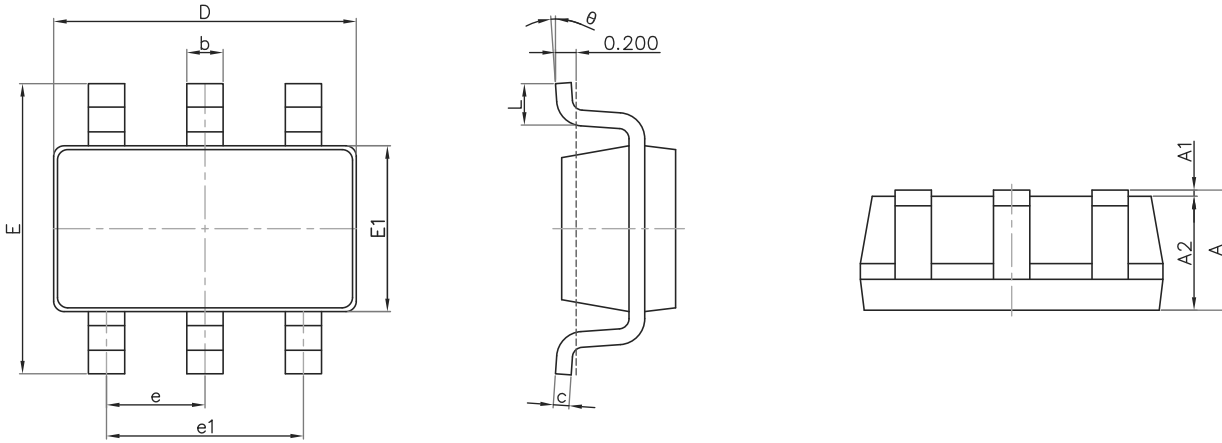
**P-Channel Typical Electrical and Thermal Characteristic Curves**



**Figure 13 Normalized Maximum Transient Thermal Impedance**

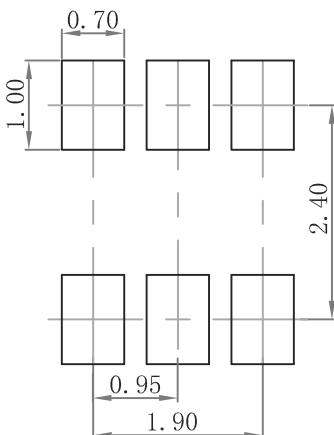
### Package Outline Dimensions

SOT-23-6L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E1	1.500	1.700	0.059	0.067
E	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

### Suggested Pad Layout



Note:

1. Controlling dimension: in millimeters.
2. General tolerance:  $\pm 0.05\text{mm}$ .
3. The pad layout is for reference purposes only.