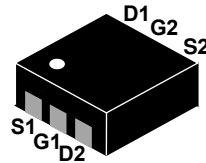
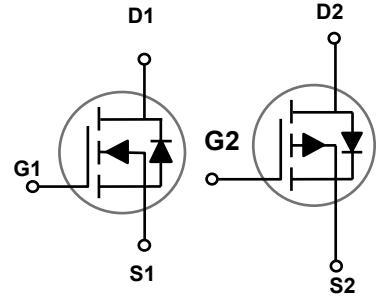


### Main Product Characteristics

Polarity	N-Ch	P-Ch
$V_{DSS}$	12V	-12V
$R_{DS(ON)(Max.)}$	32mΩ@ $V_{GS}=4.5V$	74mΩ@ $V_{GS}=-4.5V$
$I_D$	5.0A	-5.0A



DFN2X2-6L



Schematic Diagram

### Features and Benefits

- Advanced MOSFET process technology
- Ideal for high efficiency switched mode power supplies
- Low on-resistance with low gate charge
- Fast switching and reverse body recovery



### Description

The SSFB12N05 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 ( $T_A=25^\circ C$ unless otherwise specified)

Parameter	Symbol	N-Channel	P-Channel	Unit	
Drain-Source Voltage	$V_{DS}$	12	-12	V	
Gate-Source Voltage	$V_{GS}$	$\pm 12$	$\pm 12$	V	
Continuous Drain Current	$I_D$	$T_A=25^\circ C$	5	-5	A
		$T_A=70^\circ C$	4.5	-3.8	
Pulsed Drain Current <sup>1</sup>	$I_{DM}$	20	-15	A	
Maximum Power Dissipation	$P_D$	1.9	1.9	W	
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	-55 to +150	$^\circ C$	

### Thermal Characteristics

Parameter	Symbol	N-Channel	P-Channel	Unit
Thermal Resistance, Junction-to-Ambient <sup>2</sup>	$R_{\theta JA}$	65	65	$^\circ C/W$

### N-CH 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	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	12	20	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=12V, V_{GS}=0V$	-	-	1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 12V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics<sup>3</sup></b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.4	0.6	1	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=4.5V, I_D=5A$	-	28	32	m $\Omega$
		$V_{GS}=2.5V, I_D=4.6A$	-	36	42	m $\Omega$
		$V_{GS}=1.8V, I_D=4.1A$	-	55	80	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=10V, I_D=5A$	-	20	-	S
<b>Dynamic Characteristics<sup>4</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS}=6V, V_{GS}=0V, F=1.0MHz$	-	495	-	PF
Output Capacitance	$C_{oss}$		-	155	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	95	-	PF
<b>Switching Characteristics<sup>4</sup></b>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=6V, R_L=1.2\Omega, V_{GS}=10V, R_{GEN}=4.5\Omega$	-	7	-	nS
Turn-on Rise Time	$t_r$		-	5	-	
Turn-Off Delay Time	$t_{d(off)}$		-	18	-	
Turn-Off Fall Time	$t_f$		-	6	-	
Total Gate Charge	$Q_g$	$V_{DS}=6V, I_D=5A, V_{GS}=4.5V$	-	6.6	-	nC
Gate-Source Charge	$Q_{gs}$		-	1	-	
Gate-Drain Charge	$Q_{gd}$		-	1.2	-	
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage <sup>3</sup>	$V_{SD}$	$V_{GS}=0V, I_S=5A$	-	-	1.2	V

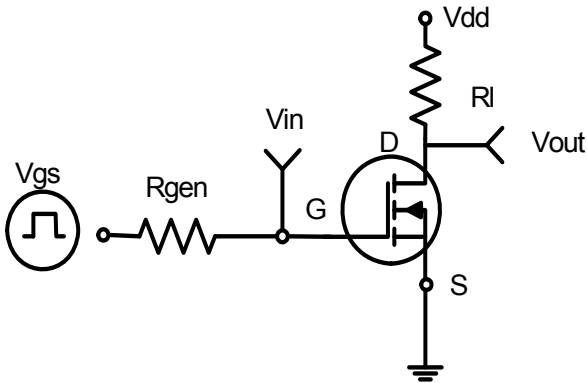

**P-CH Electrical Characteristics** ( $T_A=25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-12	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-12V, V_{GS}=0V$	-	-	-1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 12V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics<sup>3</sup></b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.4	-0.7	-1	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=-4.5V, I_D=-4.5A$	-	60	74	$m\Omega$
		$V_{GS}=-2.5V, I_D=-3.2A$	-	84	110	$m\Omega$
		$V_{GS}=-1.8V, I_D=-1A$	-	130	220	$m\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=-10V, I_D=-5A$	-	10	-	S
<b>Dynamic Characteristics<sup>4</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS}=-6V, V_{GS}=0V, F=1.0MHz$	-	520	-	PF
Output Capacitance	$C_{oss}$		-	100	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	65	-	PF
<b>Switching Characteristics<sup>4</sup></b>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=-6V, R_L=2.3\Omega, V_{GS}=-10V, R_{GEN}=6\Omega$	-	7.5	-	nS
Turn-on Rise Time	$t_r$		-	5.5	-	
Turn-Off Delay Time	$t_{d(off)}$		-	19	-	
Turn-Off Fall Time	$t_f$		-	7	-	
Total Gate Charge	$Q_g$	$V_{DS}=-6V, I_D=-4.5A, V_{GS}=-4.5V$	-	9.2	-	nC
Gate-Source Charge	$Q_{gs}$		-	1.6	-	
Gate-Drain Charge	$Q_{gd}$		-	2.2	-	
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage <sup>3</sup>	$V_{SD}$	$V_{GS}=0V, I_S=-5A$	-	-	-1.2	V

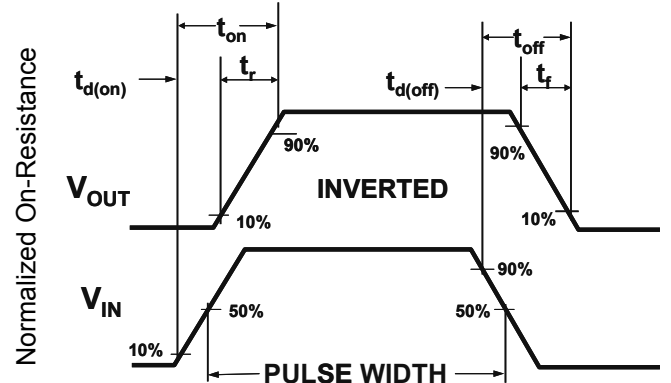
**Notes:**

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  $\leq 2\%$ .
4. Essentially independent of operating temperature.

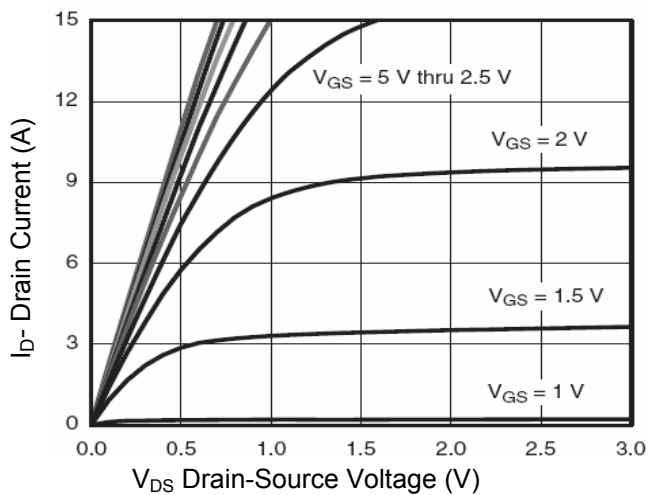
## N-CH Typical Electrical and Thermal Characteristic Curves



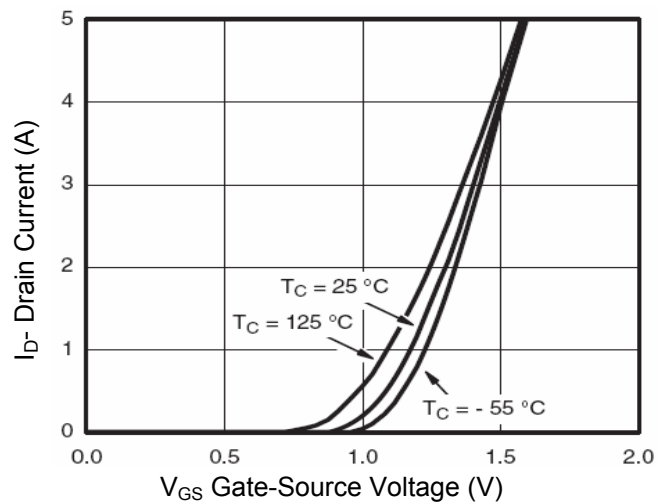
**Fig.1 Switching Test Circuit**



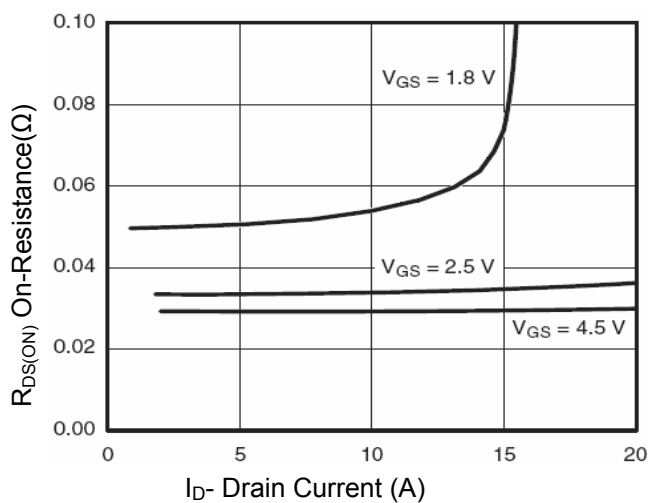
**Fig.2 Switching Waveforms**



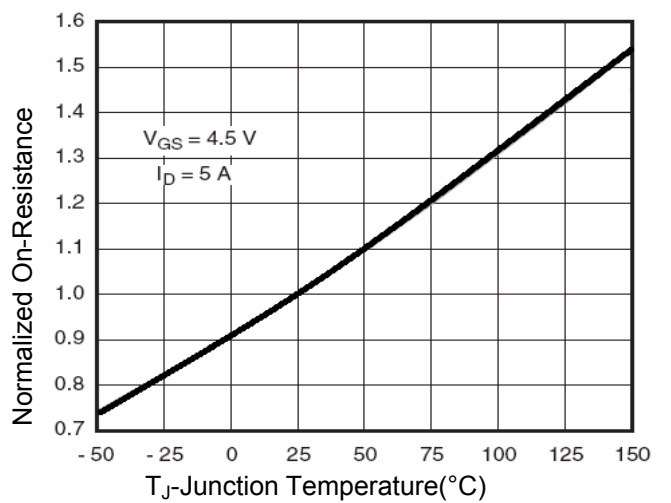
**Fig.3 Output Characteristics**



**Fig.4 Transfer Characteristics**

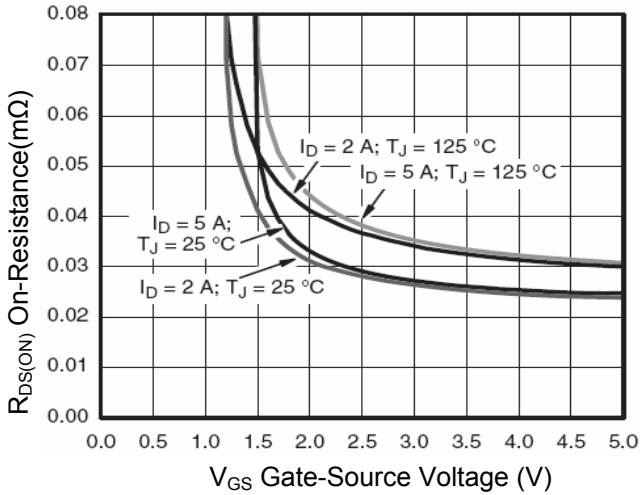


**Fig.5 Drain-Source On-Resistance**

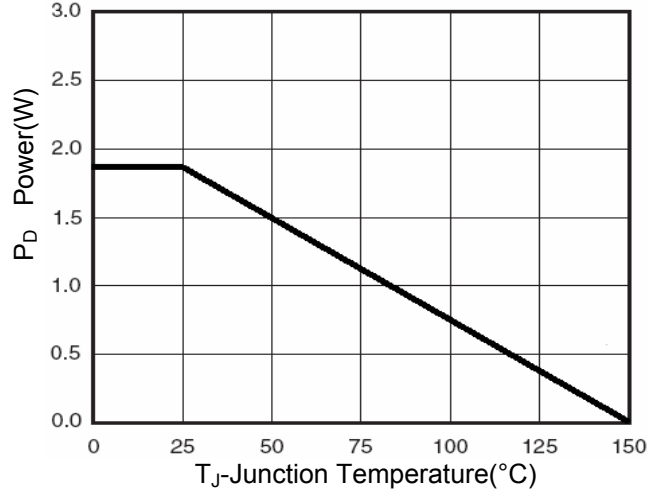


**Fig.6 Drain-Source On-Resistance**

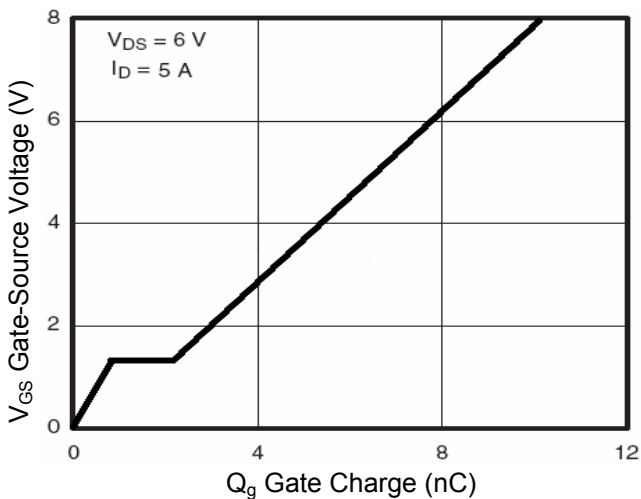
## N-CH Typical Electrical and Thermal Characteristic Curves



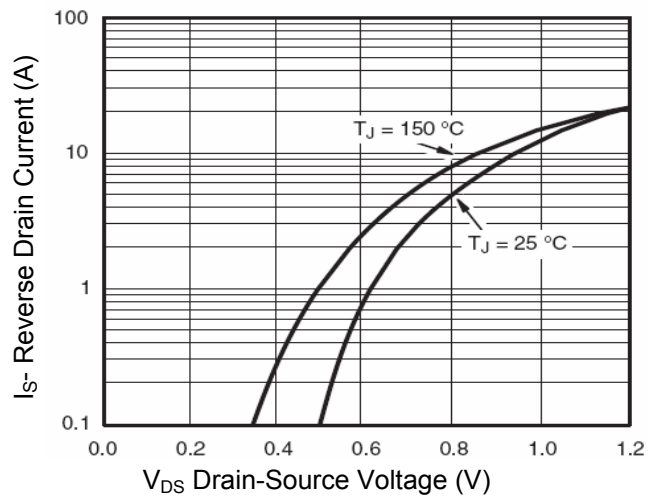
**Fig.7  $R_{DS(on)}$  vs  $V_{GS}$**



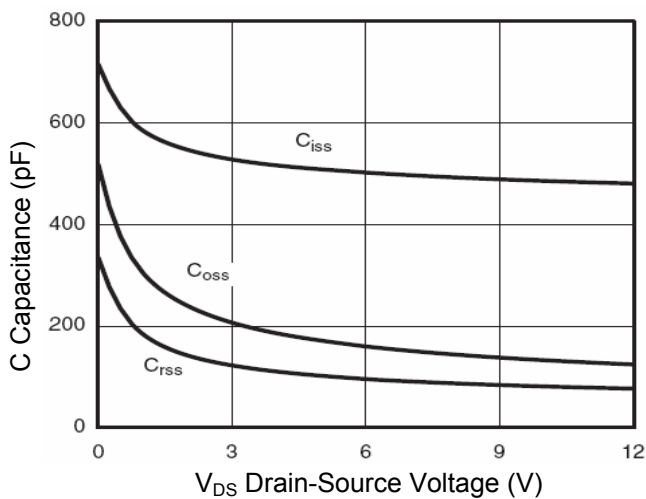
**Fig.8 Power Dissipation**



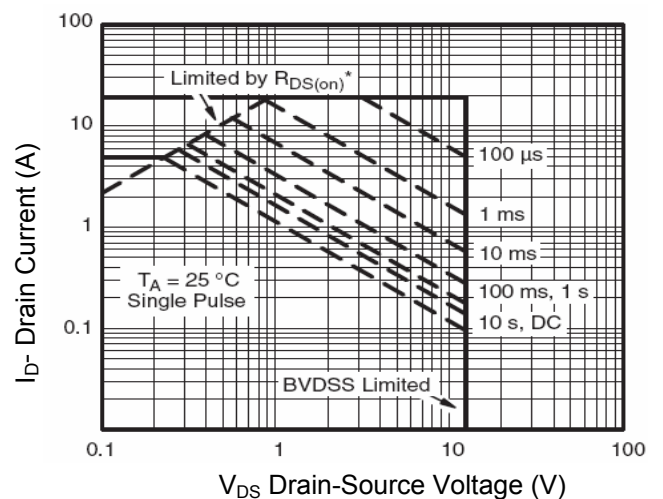
**Fig.9 Gate Charge**



**Fig.10 Source- Drain Diode Forward**

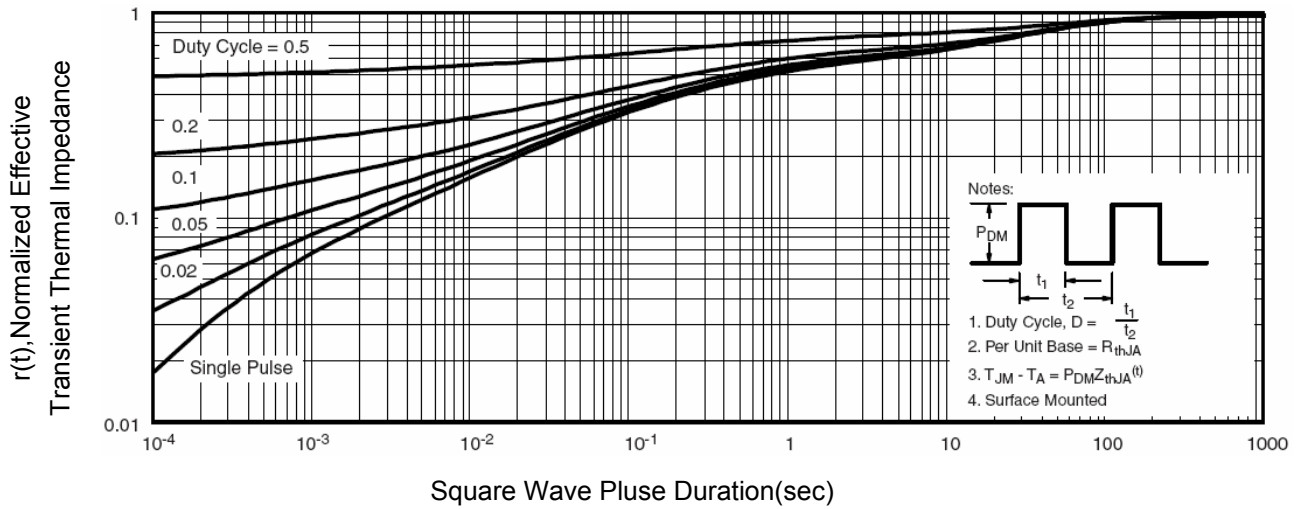


**Fig.11 Capacitance vs  $V_{DS}$**



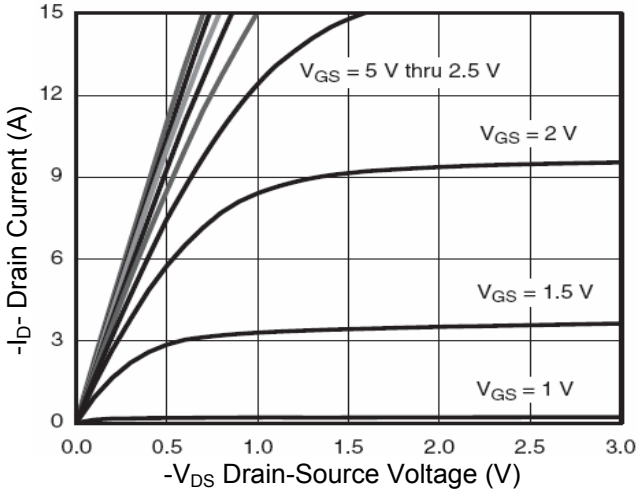
**Fig.12 Safe Operation Area**

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

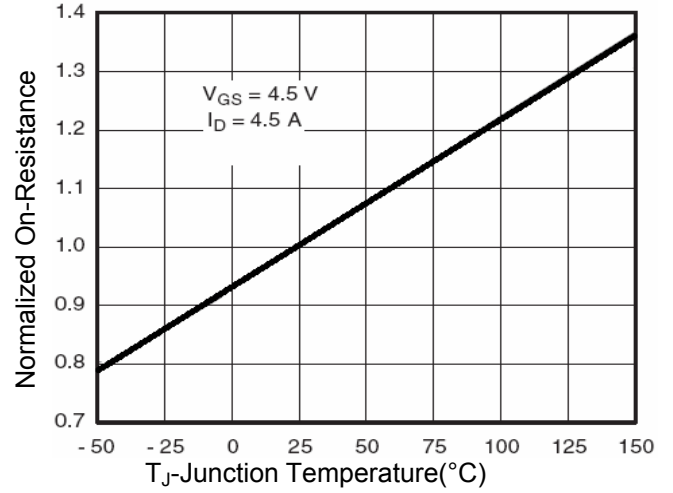


**Fig.13 Normalized Maximum Transient Thermal Impedance**

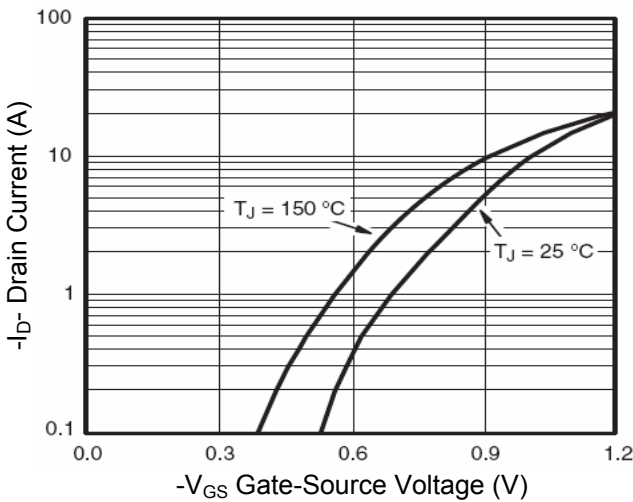
## P-CH Typical Electrical and Thermal Characteristic Curves



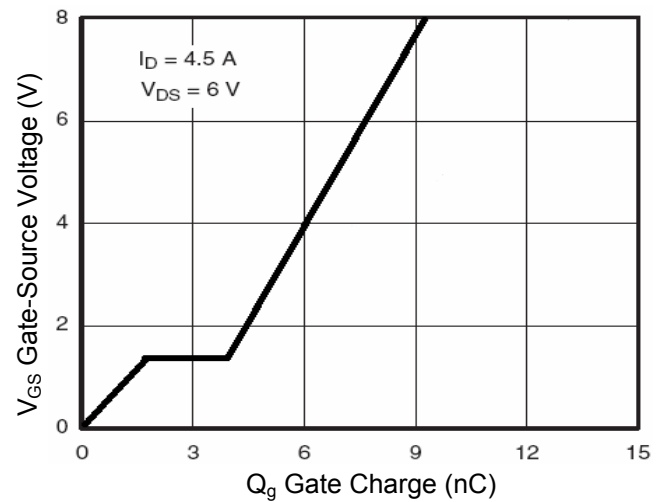
**Fig.14 Output Characteristics**



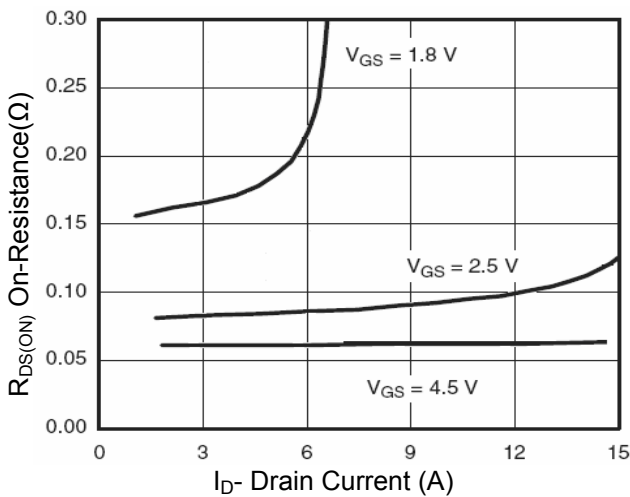
**Fig.15  $R_{DS(ON)}$ -Junction Temperature**



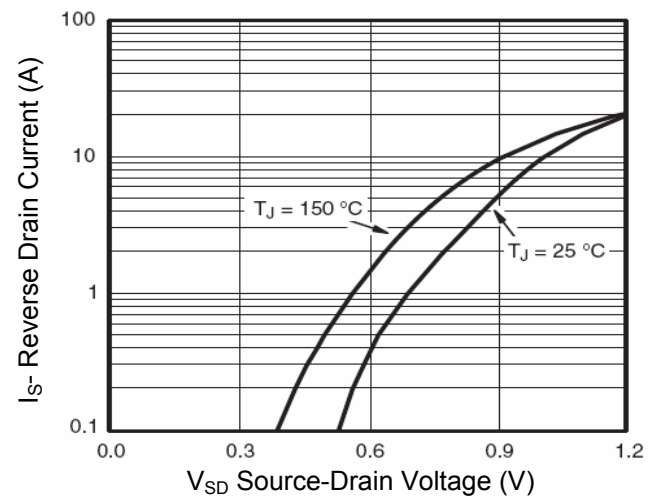
**Fig.16 Transfer Characteristics**



**Fig.17 Gate Charge**

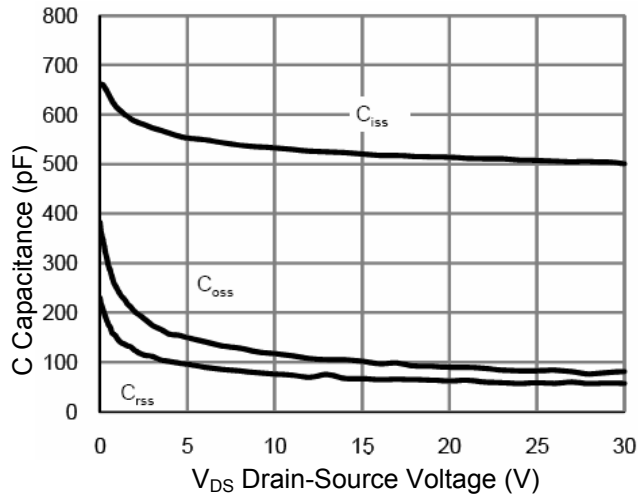


**Fig.18  $R_{DS(ON)}$ - Drain Current**

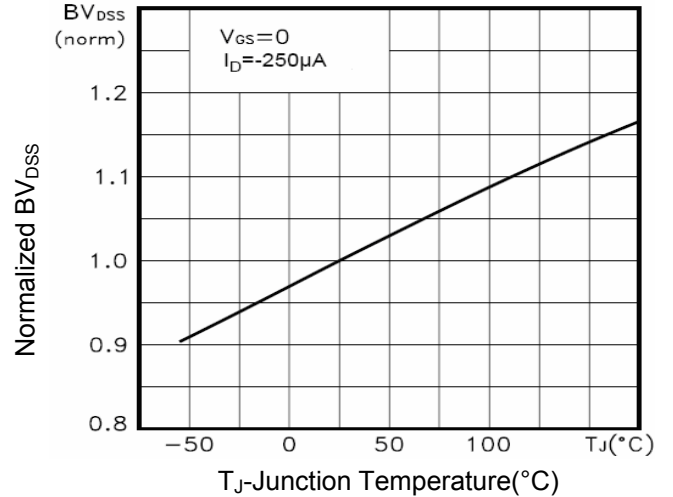


**Fig.19 Source- Drain Diode Forward**

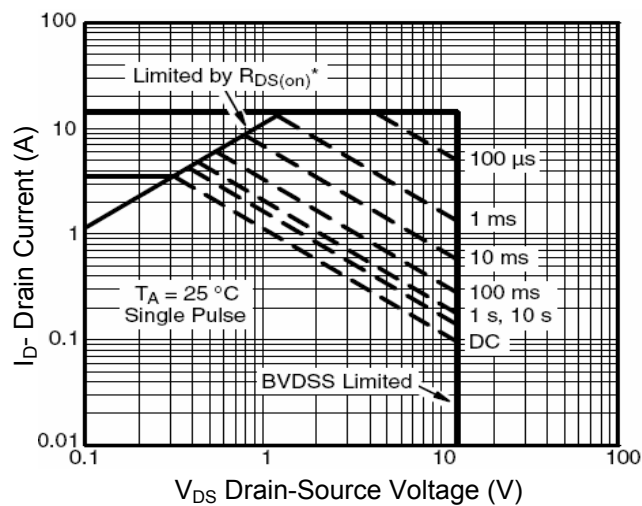
### P-CH Typical Electrical and Thermal Characteristic Curves



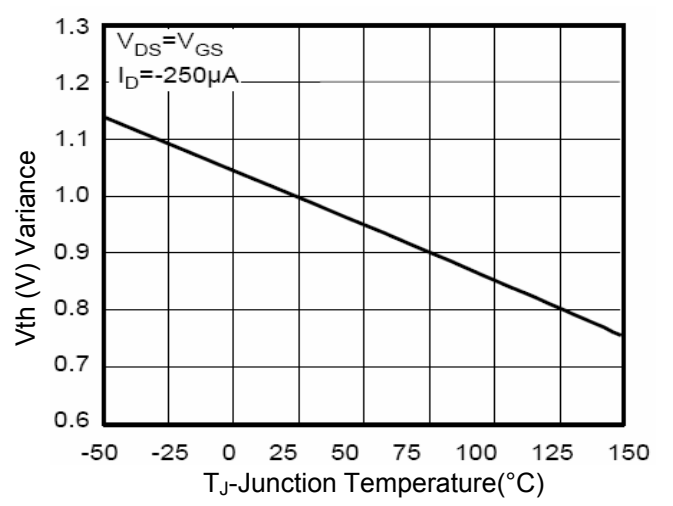
**Fig.20 Capacitance vs  $V_{DS}$**



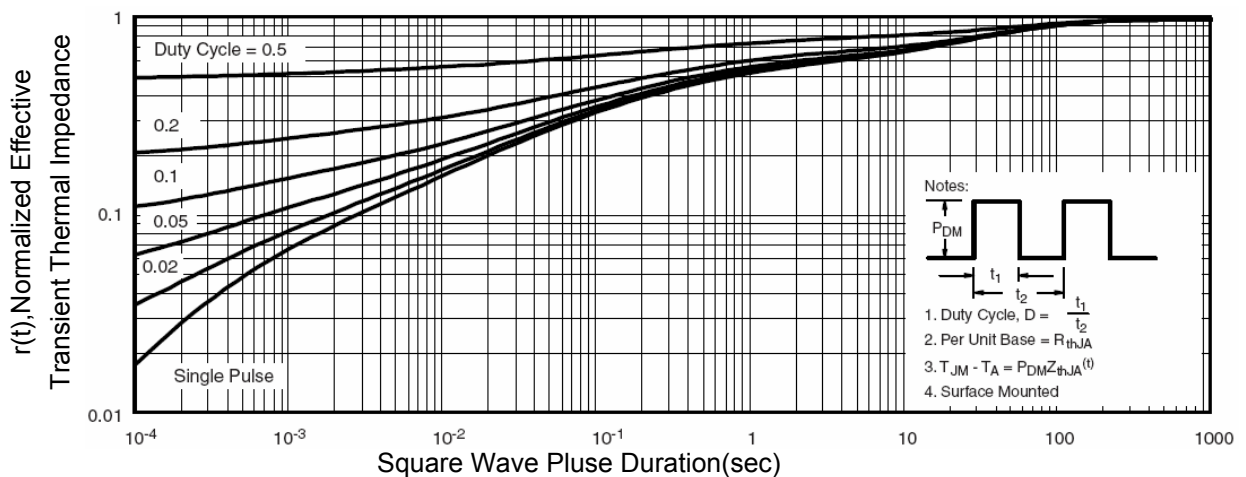
**Fig.21  $BV_{DSS}$  vs Junction Temperature**



**Fig.22 Safe Operation Area**



**Fig.23  $V_{GS(th)}$  vs Junction Temperature**

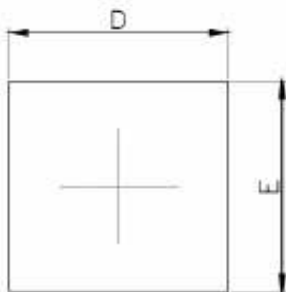


**Fig.24 Normalized Maximum Transient Thermal Impedance**

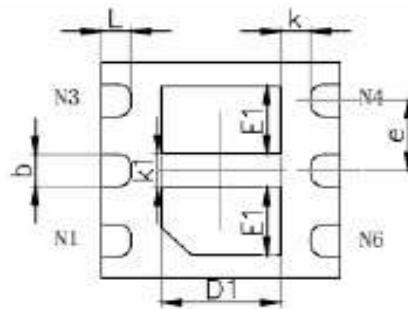


### Package Outline Dimensions

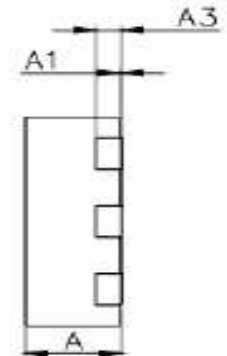
### DFN2X2-6L



Top View



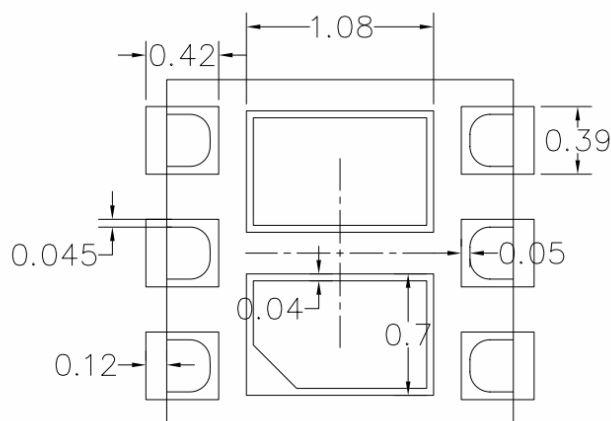
Bottom View



Side View

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN.	MAX.	MIN.	MAX.
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A3	0.203REF.		0.008REF.	
D	1.900	2.100	0.075	0.083
E	1.900	2.100	0.075	0.083
D1	0.900	1.100	0.035	0.043
E1	0.520	0.720	0.020	0.028
b	0.250	0.350	0.010	0.014
e	0.650TYP.		0.026TYP.	
k	0.200MIN.		0.008MIN.	
k1	0.320REF.		0.013REF.	
L	0.200	0.300	0.008	0.012

### Recommended Pad Layout



Note:  
 1. Controlling dimensions in mm.  
 2. Tolerance  $\pm 0.050$ mm.