

**Features:**

- Advanced trench process technology
- Ultra low  $R_{ds(on)}$ , typical 16mohm
- High avalanche energy, 100% test
- Fully characterized avalanche voltage and current

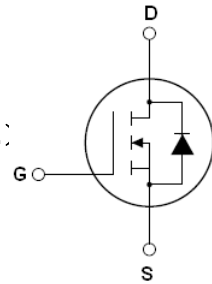
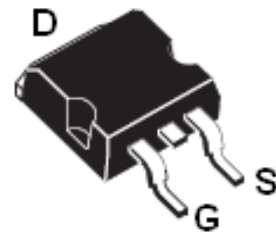
**Description:**

The SSF1020A is a new generation of middle voltage and high current N-Channel enhancement mode trench power MOSFET. This new technology increases the device reliability and electrical parameter repeatability. SSF1020A is assembled in high reliability and qualified assembly house.

**Application:**

- Power switching application

**ID =60A**  
**BV=100V**  
**Rdson=20mΩ (max.)**


**SSF1020A TOP View (D2PAK)**

**Absolute Maximum Ratings**

	Parameter	Max.	Units
$I_D@T_c=25\text{ C}$	Continuous drain current, $V_{GS}@10V$	60	A
$I_D@T_c=100\text{ C}$	Continuous drain current, $V_{GS}@10V$	50	
$I_{DM}$	Pulsed drain current ①	240	
$P_D@T_c=25\text{ C}$	Power dissipation	120	W
	Linear derating factor	2.0	W/ C
$V_{GS}$	Gate-to-Source voltage	$\pm 20$	V
$E_{AS}$	Single pulse avalanche energy ②	240	mJ
$E_{AR}$	Repetitive avalanche energy	TBD	
$T_J$ $T_{STG}$	Operating Junction and Storage Temperature Range	-55 to +175	°C

**Thermal Resistance**

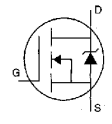
	Parameter	Min.	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-case	—	1.25	—	°C/W
$R_{\theta JA}$	Junction-to-ambient	—	—	62	

**Electrical Characteristics @ $T_J=25\text{ C}$ (unless otherwise specified)**

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$BV_{DSS}$	Drain-to-Source breakdown voltage	100	—	—	V	$V_{GS}=0V, I_D=250\mu A$
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	16	20	mΩ	$V_{GS}=10V, I_D=30A$
$V_{GS(th)}$	Gate threshold voltage	2.0	3.0	4.0	V	$V_{DS}=V_{GS}, I_D=250\mu A$
$g_{fs}$	Forward transconductance	-	58	—	S	$V_{DS}=5V, I_D=30A$
$I_{DSS}$	Drain-to-Source leakage current	—	—	1	μA	$V_{DS}=100V, V_{GS}=0V$
		—	—	10		$V_{DS}=100V, V_{GS}=0V, T_J=150\text{ C}$
$I_{GSS}$	Gate-to-Source forward leakage	—	—	100	nA	$V_{GS}=20V$

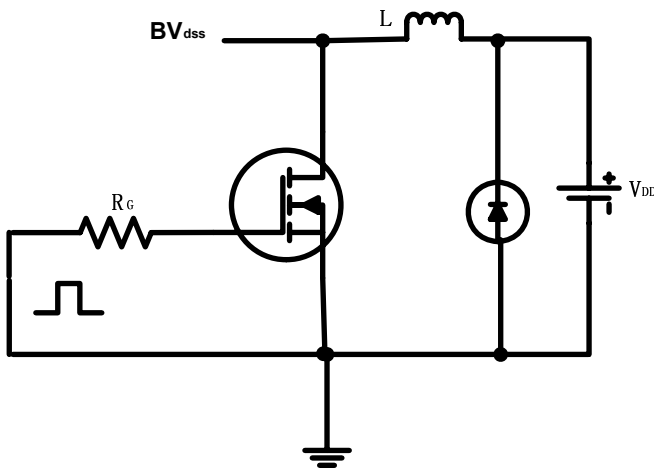
	Gate-to-Source reverse leakage	—	—	-100		$V_{GS}=-20V$
$Q_g$	Total gate charge	—	90	—	nC	$I_D=30A$
$Q_{gs}$	Gate-to-Source charge	—	14	—		$V_{DD}=30V$
$Q_{gd}$	Gate-to-Drain("Miller") charge	—	24	—		$V_{GS}=10V$
$t_{d(on)}$	Turn-on delay time	—	18.2	—	nS	$V_{DD}=30V$
$t_r$	Rise time	—	15.6	—		$I_D=2A, R_L=15\Omega$
$t_{d(off)}$	Turn-Off delay time	—	70.5	—		$R_G=2.5\Omega$
$t_f$	Fall time	—	13.8	—		$V_{GS}=10V$
$C_{iss}$	Input capacitance	—	3150	—	pF	$V_{GS}=0V$
$C_{oss}$	Output capacitance	—	300	—		$V_{DS}=25V$
$C_{rss}$	Reverse transfer capacitance	—	240	—		$f=1.0MHZ$

### Source-Drain Ratings and Characteristics

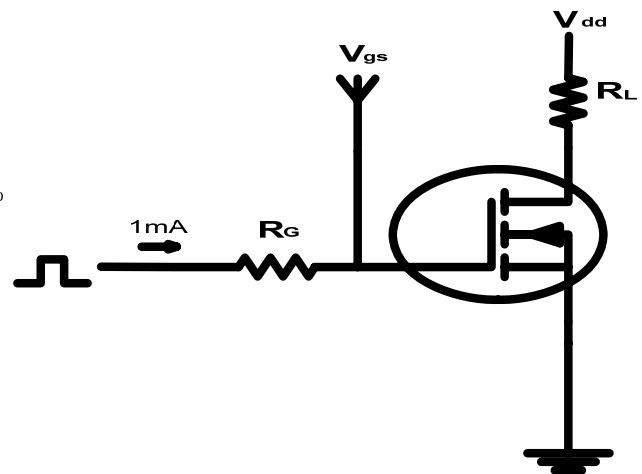
	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	60	A	MOSFET symbol showing the integral reverse p-n junction diode. 
$I_{SM}$	Pulsed Source Current (Body Diode) ①	—	—	240		
$V_{SD}$	Diode Forward Voltage	—	—	1.3	V	$T_J=25C, I_S=30A, V_{GS}=0V$ ③
$t_{rr}$	Reverse Recovery Time	—	57	—	nS	$T_J=25C, I_F=60A$
$Q_{rr}$	Reverse Recovery Charge	—	107	—	nC	$di/dt=100A/\mu s$ ③
$t_{on}$	Forward Turn-on Time	Intrinsic turn-on time is negligible (turn-on is dominated by $L_s + L_D$ )				

#### Notes:

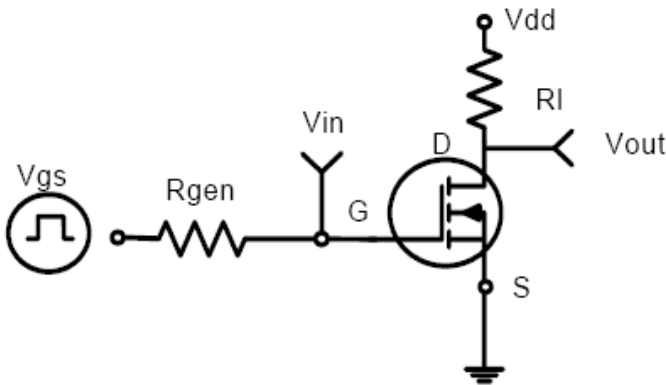
- ① Repetitive rating; pulse width limited by max junction temperature.
- ② Test condition:  $L = 0.3mH, I_D = 40A, V_{DD} = 50V$
- ③ Pulse width  $\leq 300\mu s$ , duty cycle  $\leq 1.5\%$ ;  $R_G = 25\Omega$  Starting  $T_J = 25^\circ C$



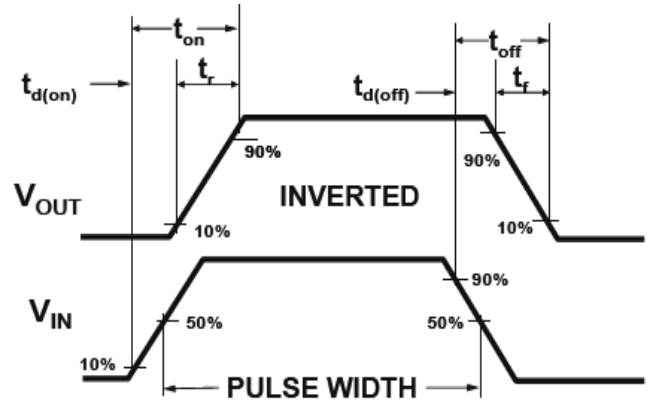
EAS test circuit



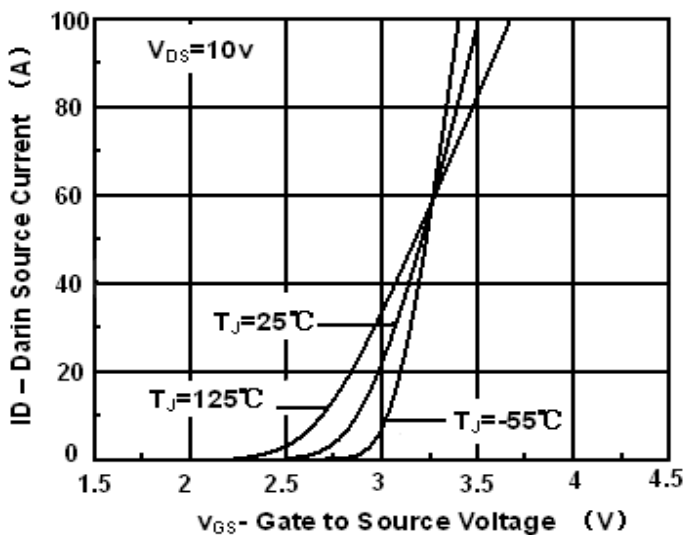
Gate charge test circuit



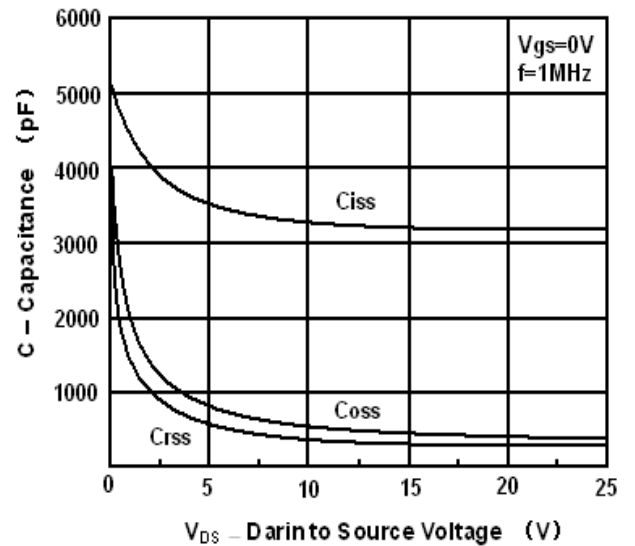
Switch Time Test Circuit:



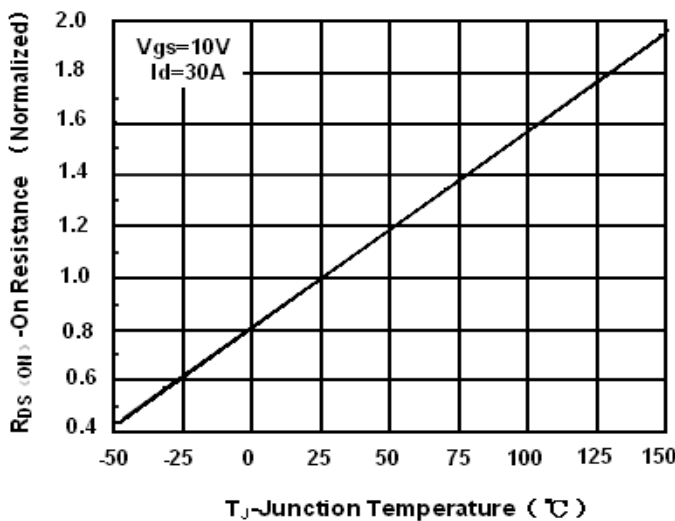
Switch Waveforms:



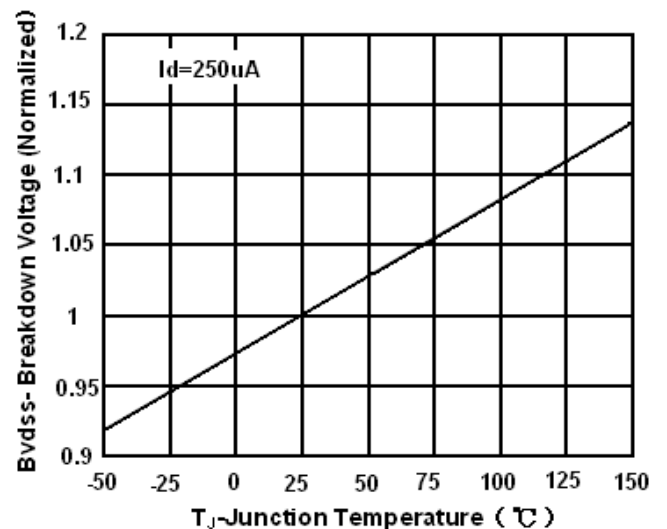
Transfer Characteristic



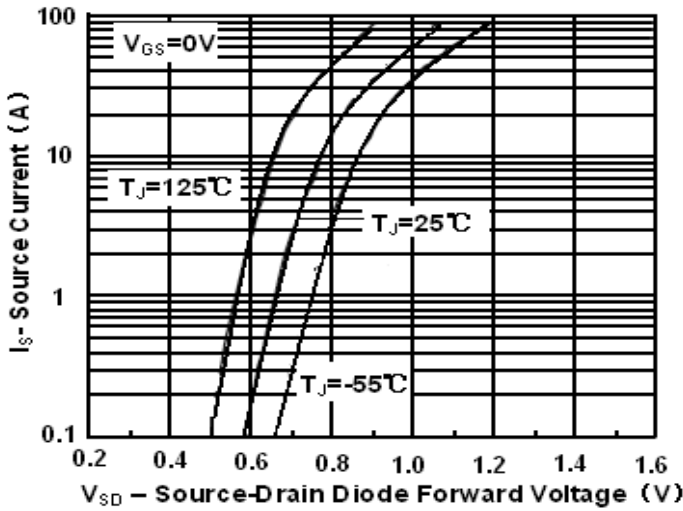
Capacitance:



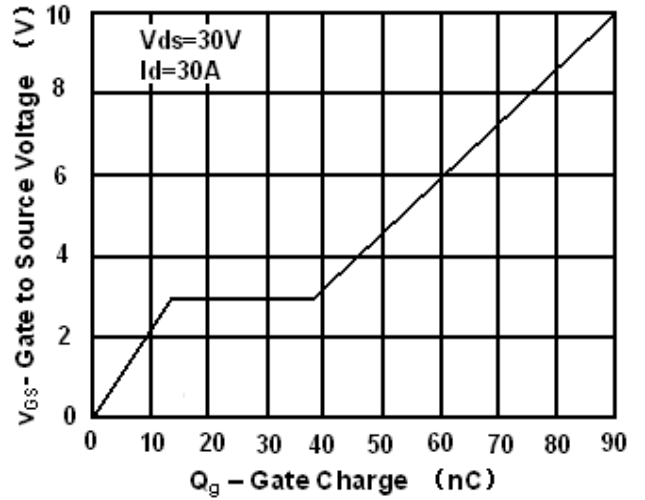
On Resistance vs Junction Temperature



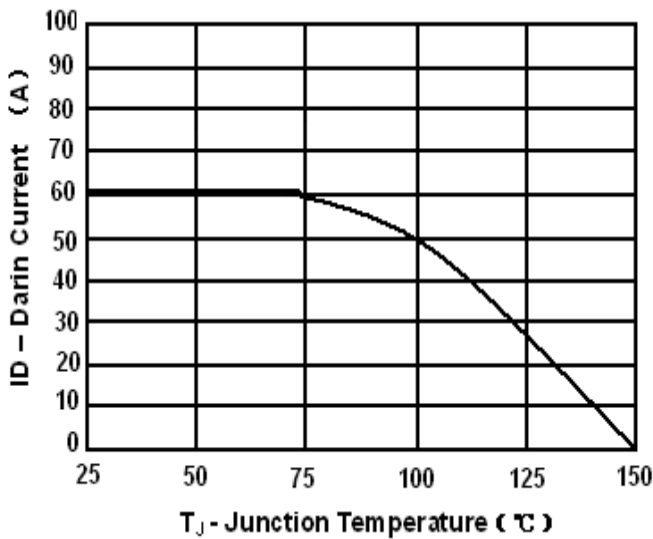
Breakdown Voltage vs Junction Temperature



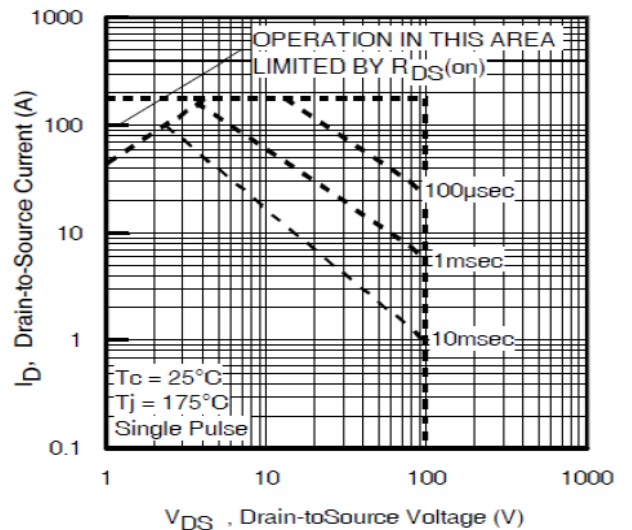
Source-Drain Diode Forward Voltage



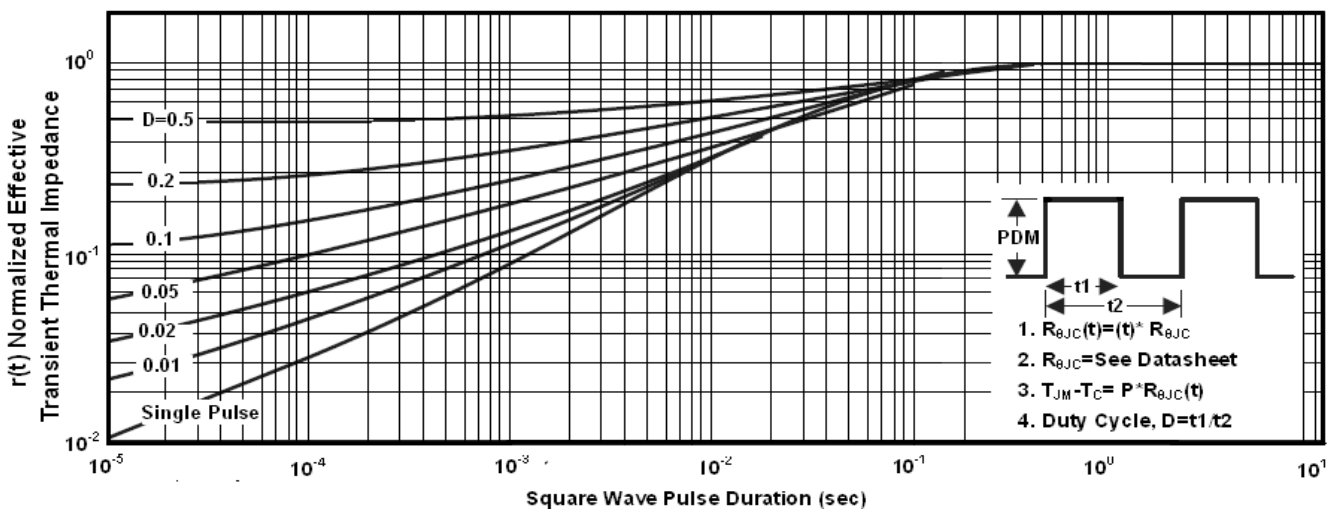
Gate Charge



Max Drain Current vs Junction Temperature



Safe Operation Area



Transient Thermal Impedance Curve

## D2PAK MECHANICAL DATA:

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.4		4.6	0.173		0.181
A1	2.49		2.69	0.098		0.106
A2	0.03		0.23	0.001		0.009
B	0.7		0.93	0.027		0.036
B2	1.14		1.7	0.044		0.067
C	0.45		0.6	0.017		0.023
C2	1.23		1.36	0.048		0.053
D	8.95		9.35	0.352		0.368
D1		8			0.315	
E	10		10.4	0.393		
E1		8.5			0.334	
G	4.88		5.28	0.192		0.208
L	15		15.85	0.590		0.625
L2	1.27		1.4	0.050		0.055
L3	1.4		1.75	0.055		0.068
M	2.4		3.2	0.094		0.126
R		0.4			0.015	
V2	0°		4°			

