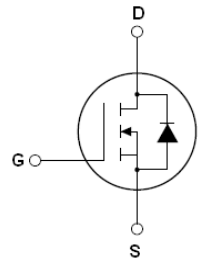


### Features:

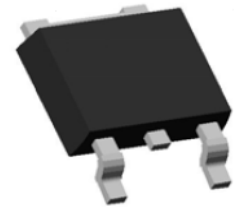
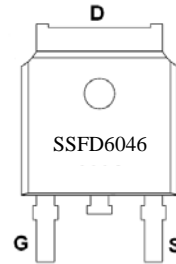
- Advanced trench process technology
- avalanche energy, 100% test
- Fully characterized avalanche voltage and current

**ID =12A**  
**BV=60V**  
**Rdson=50mΩ (max.)**



### Description:

The SSFD6046 is a new generation of middle voltage N-Channel enhancement mode trench power MOSFET. This new technology increases the device reliability and electrical parameter repeatability. SSFD6046 is assembled in high reliability and qualified assembly house.



TOP View (TO252)

Marking and pin Assignment

### Absolute Maximum Ratings

	Parameter	Max.	Units
$I_D@T_c=25^\circ\text{C}$	Continuous drain current, VGS@10V	12	A
$I_D@T_c=100^\circ\text{C}$	Continuous drain current, VGS@10V	9	
$I_{DM}$	Pulsed drain current ①	30	
$P_D@T_c=25^\circ\text{C}$	Power dissipation	20	W
	Linear derating factor	0.12	W/°C
$V_{GS}$	Gate-to-Source voltage	±20	V
$E_{AS}$	Single pulse avalanche energy ②	8	mJ
$E_{AR}$	Repetitive avalanche energy	TBD	
$T_J$ $T_{STG}$	Operating Junction and Storage Temperature Range	-55 to +175	°C

### Thermal Resistance

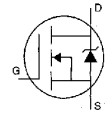
	Parameter	Min.	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-case	—	—	7.5	°C/W
$R_{\theta JA}$	Junction-to-ambient	—	—	60	

### Electrical Characteristics @T<sub>J</sub>=25 °C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$BV_{DSS}$	Drain-to-Source breakdown voltage	60	—	—	V	$V_{GS}=0V, I_D=250\mu A$
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	46	50	mΩ	$V_{GS}=10V, I_D=12A$
$V_{GS(th)}$	Gate threshold voltage	1.0	—	3.0	V	$V_{DS}=V_{GS}, I_D=250\mu A$
$g_{fs}$	Forward transconductance	—	15	—	S	$V_{DS}=5V, I_D=12A$
$I_{DSS}$	Drain-to-Source leakage current	—	—	1	μA	$V_{DS}=60V, V_{GS}=0V$
		—	—	10		$V_{DS}=60V, V_{GS}=0V, T_J=55^\circ\text{C}$
$I_{GSS}$	Gate-to-Source forward leakage	—	—	100	nA	$V_{GS}=20V$
	Gate-to-Source reverse leakage	—	—	-100		$V_{GS}=-20V$

$Q_g$	Total gate charge	—	7.5	—	nC	$I_D=12A$ $V_{DD}=30V$ $V_{GS}=10V$
$Q_{gs}$	Gate-to-Source charge	—	1.2	—		
$Q_{gd}$	Gate-to-Drain("Miller") charge	—	2	—		
$t_{d(on)}$	Turn-on delay time	—	4.5	—	nS	$V_{DD}=30V$ $I_D=2A, R_L=2.5\Omega$ $R_G=3\Omega$ $V_{GS}=10V$
$t_r$	Rise time	—	3.5	—		
$t_{d(off)}$	Turn-Off delay time	—	16	—		
$t_f$	Fall time	—	2	—		
$C_{iss}$	Input capacitance	—	450	—	pF	$V_{GS}=0V$ $V_{DS}=30V$ $f=1.0MHZ$
$C_{oss}$	Output capacitance	—	60	—		
$C_{rss}$	Reverse transfer capacitance	—	25	—		

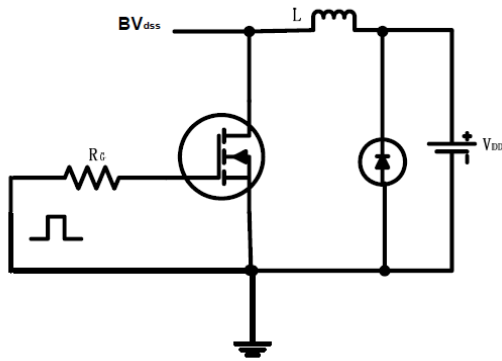
### Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	12	A	MOSFET symbol showing the integral reverse p-n junction diode. 
$I_{SM}$	Pulsed Source Current (Body Diode) ①	—	—	30		
$V_{SD}$	Diode Forward Voltage	—	—	1	V	$T_J=25^\circ C, I_S=1A, V_{GS}=0V$ ③
$t_{rr}$	Reverse Recovery Time	—	25	—	nS	$T_J=25^\circ C, I_F=12A$ $di/dt=100A/\mu s$ ③
$Q_{rr}$	Reverse Recovery Charge	—	30	—	nC	
$t_{on}$	Forward Turn-on Time	Intrinsic turn-on time is negligible (turn-on is dominated by $L_S + L_D$ )				

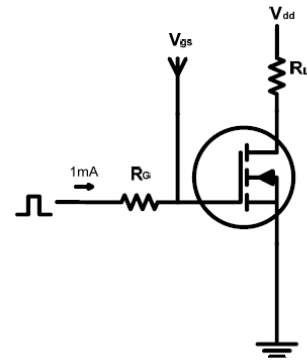
#### Notes:

- ① Repetitive rating; pulse width limited by max junction temperature.
- ② Test condition:  $L = 0.1mH, V_{DD} = 40V, I_D = 10A$
- ③ Pulse width  $\leq 300\mu s$ , duty cycle  $\leq 1.5\%$ ;  $R_G = 25\Omega$  Starting  $T_J = 25^\circ C$

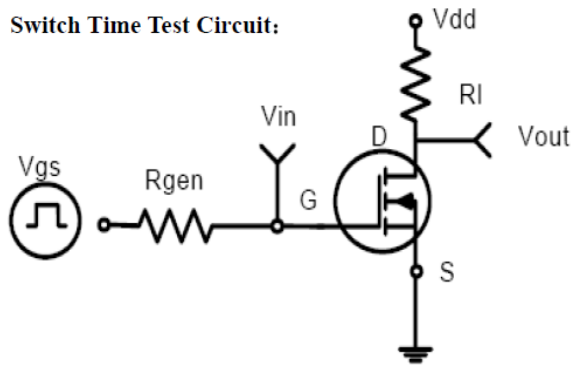
EAS test circuits:



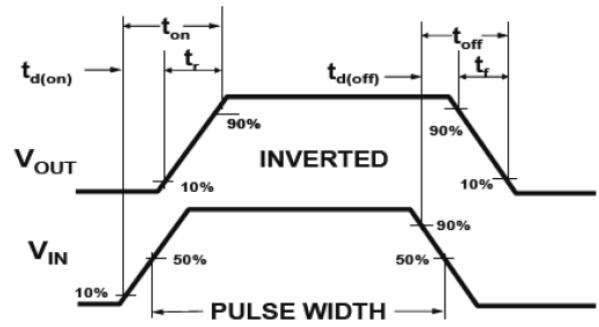
Gate charge test circuit:



Switch Time Test Circuit:



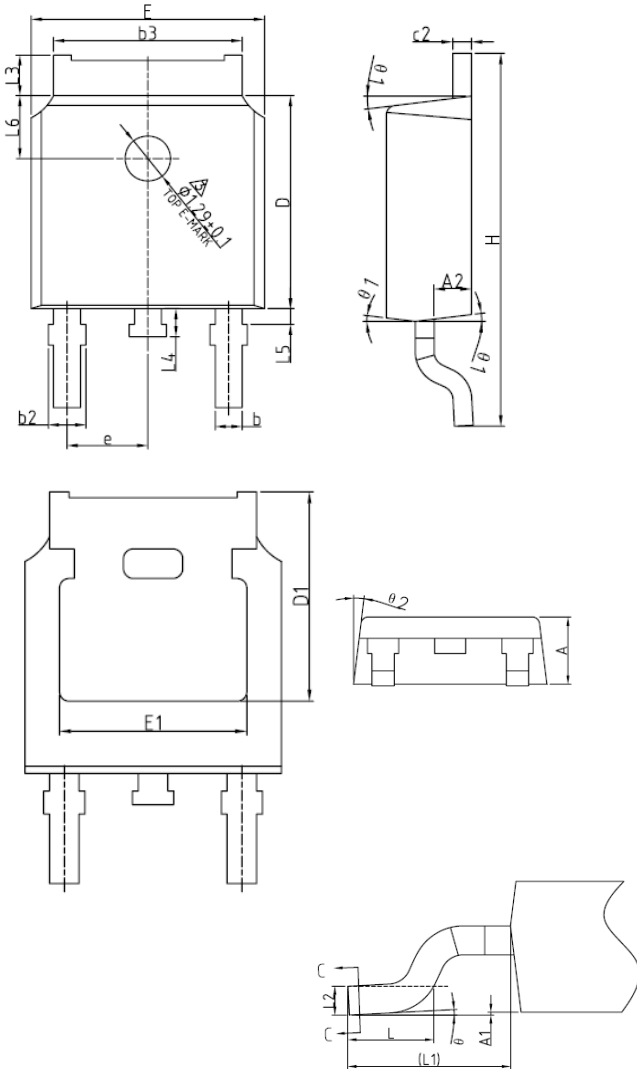
Switch Waveforms:



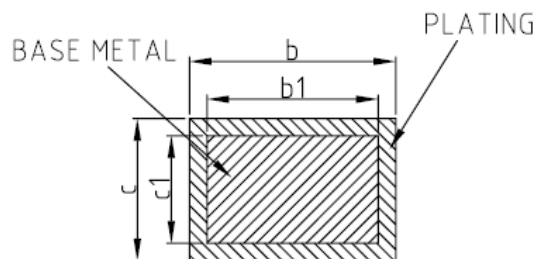
## Mechanical Data:

### TO-252E-2-M PACKAGE INFORMATION

#### Dimensions in Millimeters



SYMBOL	MIN	NOM	MAX
A	2.20	2.30	2.38
A1	0	—	0.10
A2	0.90	1.01	1.10
b	0.72	—	0.85
b1	0.71	0.76	0.81
b2	0.72	—	0.90
b3	5.13	5.33	5.46
c	0.47	—	0.60
c1	0.46	0.51	0.56
c2	0.47	—	0.60
D	6.00	6.10	6.20
D1	5.25	—	—
E	6.50	6.60	6.70
E1	4.70	—	—
e	2.186	2.286	2.386
H	9.80	10.10	10.40
L	1.40	1.50	1.70
L1	2.90REF		
L2	0.51BSC		
L3	0.90	—	1.25
L4	0.60	0.80	1.00
L5	0.15	—	0.75
L6	1.80REF		
θ	0°	—	8°
θ 1	5°	7°	9°
θ 2	5°	7°	9°



#### NOTES:

1. Dimensions are inclusive of plating
2. Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 6 mils.
3. Dimension L is measured in gauge plane.
4. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.