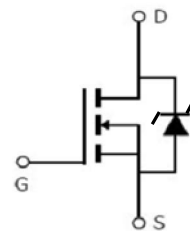


Main Product Characteristics

V_{DS}	30V
$R_{DS(on)}$	5.0mohm(typ.)
I_D	50A



Marking and Pin
Assignment



Schematic Diagram

Features and Benefits

- Advanced trench MOSFET 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

It utilizes the latest FRRMOS (fast reverse recovery MOS) trench processing techniques to achieve the high cell density and reduces the on-resistance, fast switching and soft reverse recovery time. These features combine to make this design an extremely efficient and reliable device for use in power switching application and a wide variety of other applications.

Absolute Max Rating

Symbol	Parameter	Max.	Units
I_D @ TC = 25°C	Continuous Drain Current, V_{GS} @ 10V ^①	50	A
I_D @ TC = 100°C	Continuous Drain Current, V_{GS} @ 10V ^①	40	
I_{DM}	Pulsed Drain Current ^②	200	
P_D @ TC = 25°C	Power Dissipation ^③	100	W
	Linear Derating Factor	0.55	W/°C
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy @ L=0.1mH	100	mJ
I_{AS}	Avalanche Current @ L=0.1mH	44	A
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 175	°C

Thermal Resistance

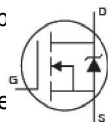
Symbol	Characteristics	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-case ^③	—	1.5	°C/W
$R_{\theta JA}$	Junction-to-ambient ($t \leq 10s$) ^④	—	45	°C/W
	Junction-to-Ambient (PCB mounted, steady-state) ^④	—	20	°C/W

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

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source breakdown voltage	30	36.5	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	5.0	8	m Ω	$V_{GS}=10V, I_D=20A$
		—	7.5	10	m Ω	$V_{GS}=4.5V, I_D=10A$
$V_{GS(th)}$	Gate threshold voltage	1	—	3	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
I_{DSS}	Drain-to-Source leakage current	—	—	10	μA	$V_{DS} = 30V, V_{GS} = 0V$
I_{GSS}	Gate-to-Source forward leakage	—	—	100	nA	$V_{GS} = 20V$
		-100	—	—		$V_{GS} = -20V$
Q_g	Total gate charge	—	35	—	nC	$V_{DS}=15V,$ $I_D=20A,$ $V_{GS}=10V$
Q_{gs}	Gate-to-Source charge	—	7.9	—		
Q_{gd}	Gate-to-Drain("Miller") charge	—	8.7	—		
$t_{d(on)}$	Turn-on delay time	—	11.5	—	ns	$V_{GS}=10V, V_{DS}=15V,$ $R_{GEN}=3\Omega, I_D=20A$
t_r	Rise time	—	46.5	—		
$t_{d(off)}$	Turn-Off delay time	—	25.8	—		
t_f	Fall time	—	6.5	—		
C_{iss}	Input capacitance	—	2055	—	pF	$V_{GS} = 0V$ $V_{DS} = 15V$ $f = 1MHz$
C_{oss}	Output capacitance	—	356	—		
C_{rss}	Reverse transfer capacitance	—	226	—		

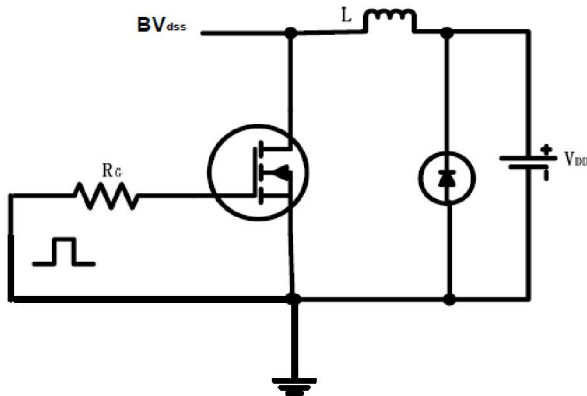
Source-Drain Ratings and Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current	—	—	50	A	MOSFET symt showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current	—	—	200	A	
V_{SD}	Diode Forward Voltage	—	0.5	1.0	V	$I_S=1.0A, V_{GS}=0V$
t_{rr}	Reverse Recovery Time	—	12.4	—	ns	$T_J = 25^\circ\text{C}, I_F = 20A, di/dt = 300A/\mu s$
Q_{rr}	Reverse Recovery Charge	—	11.7	—	nC	

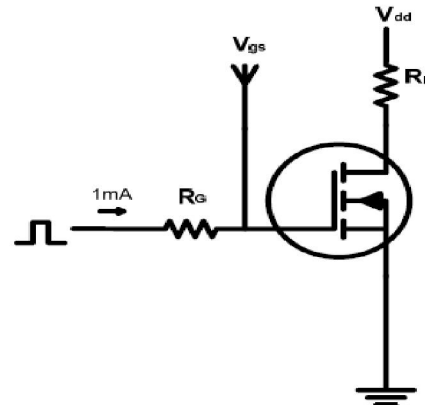


Test Circuits and Waveforms

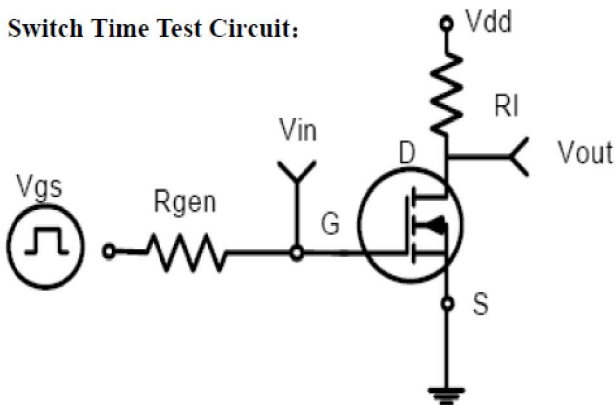
EAS test circuits:



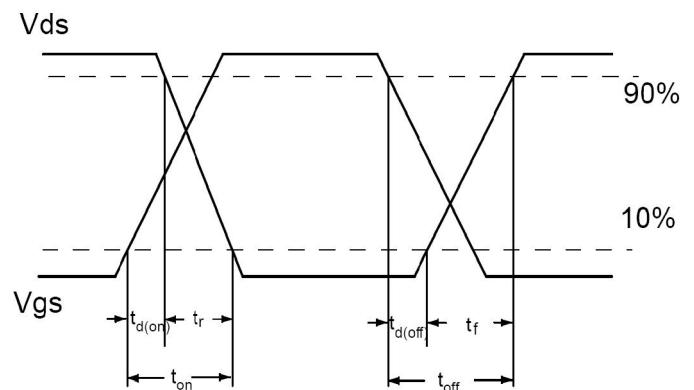
Gate charge test circuit:



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 $T_{J(MAX)} = 175^\circ\text{C}$.

Typical Electrical Characteristics

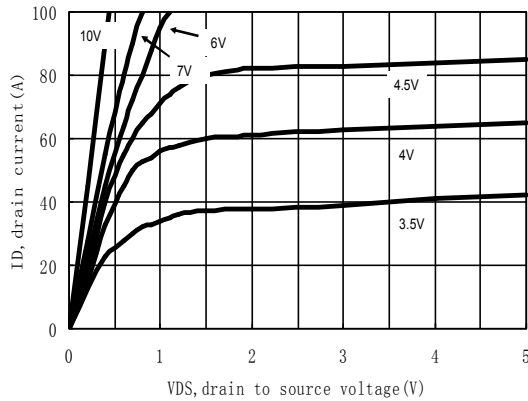


Figure 1: Typical Output Characteristics

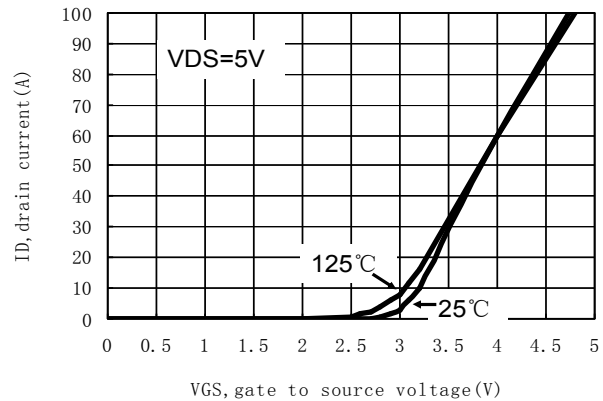


Figure 2: Typical Transfer Characteristics

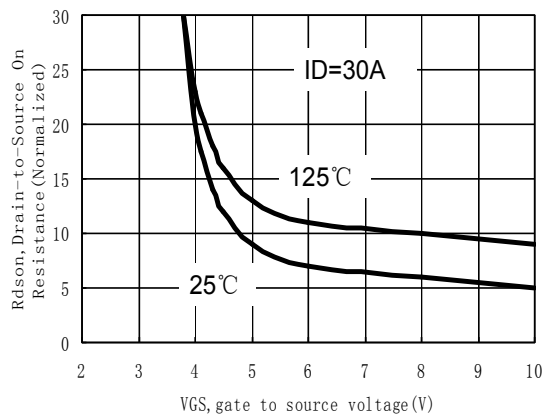


Figure 3: On-Resistance vs. Gate-Source Voltage

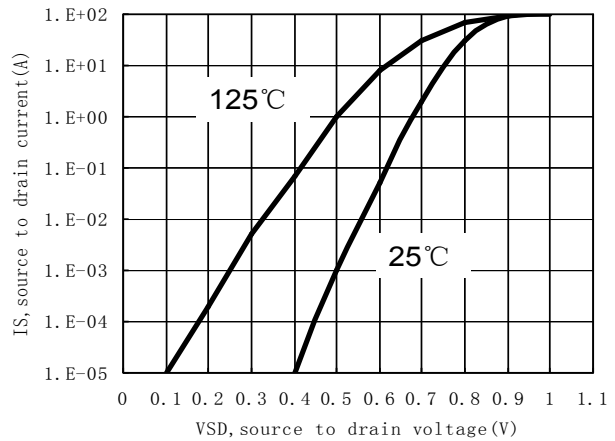


Figure 4: Body-Diode Characteristics

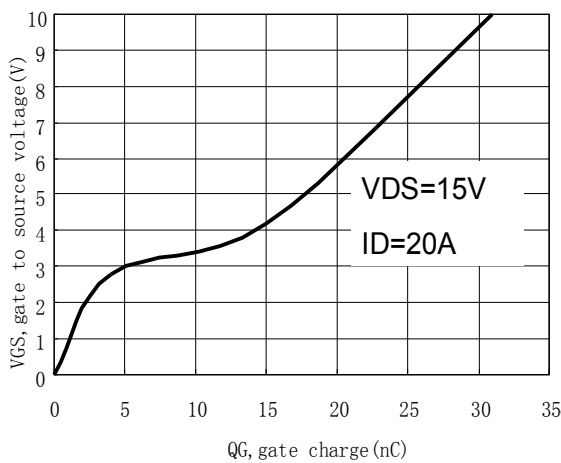


Figure 5: Gate-Charge Characteristics

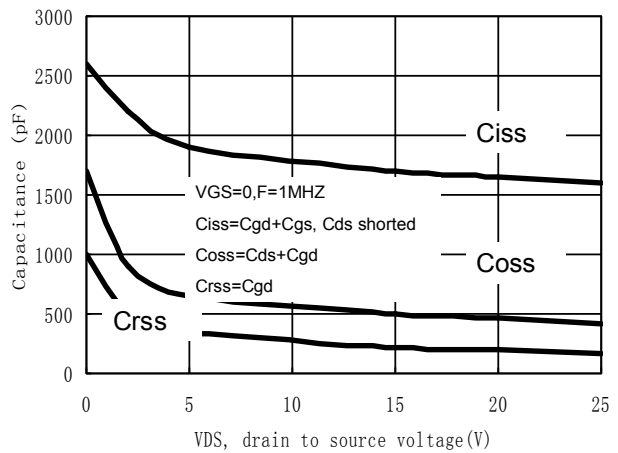


Figure 6: Capacitance Characteristics

Typical Thermal Characteristics

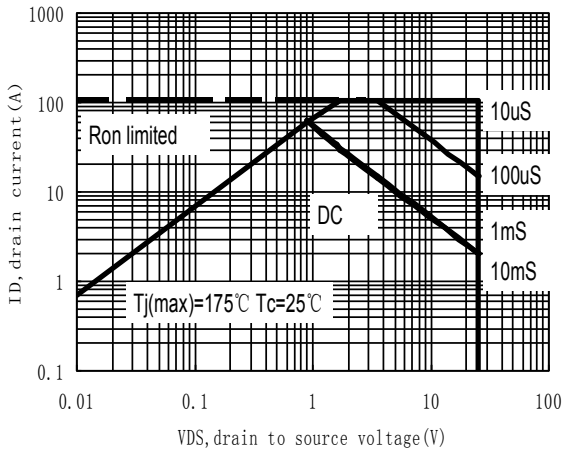


Figure 7: Maximum Forward Biased Safe Operating Area

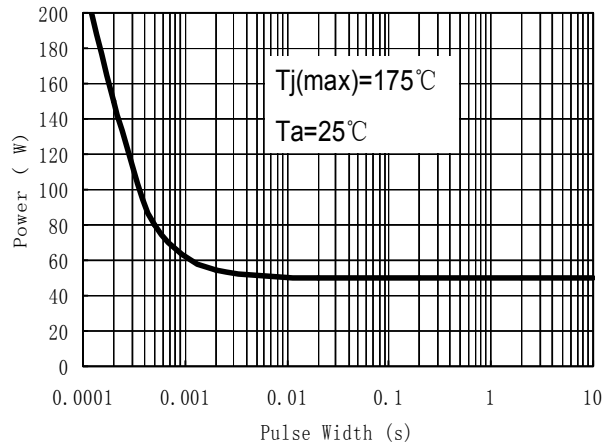


Figure 8: Single Pulse Power Rating Junction-to-Case

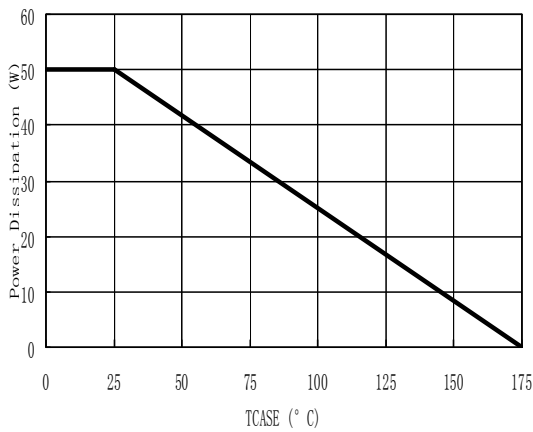


Figure 9: Power De-rating

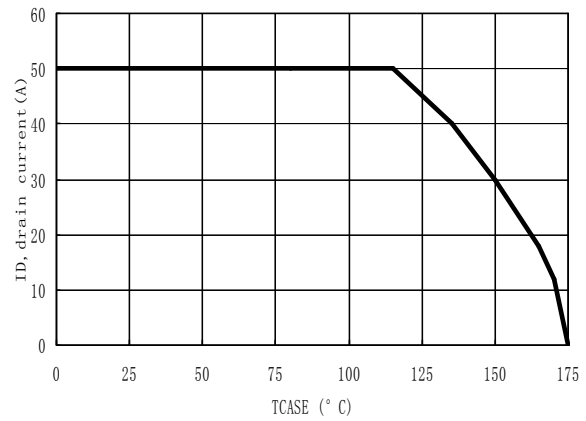


Figure 10: Current De-rating

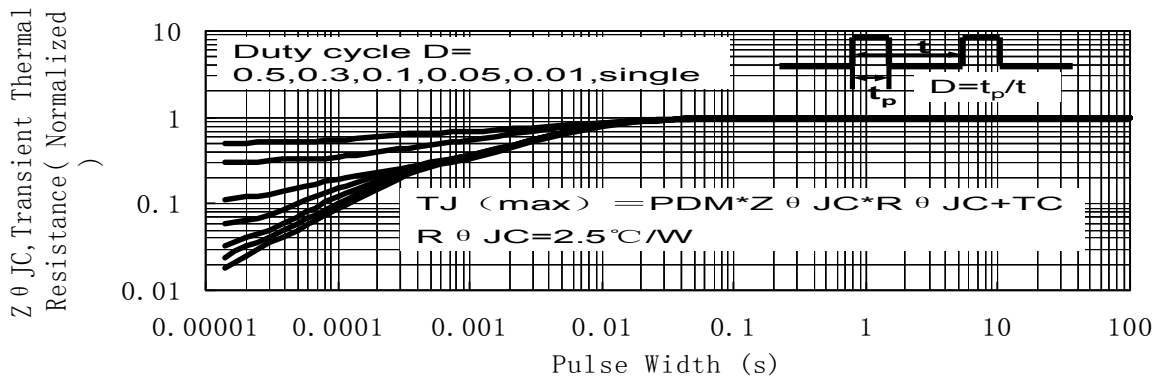
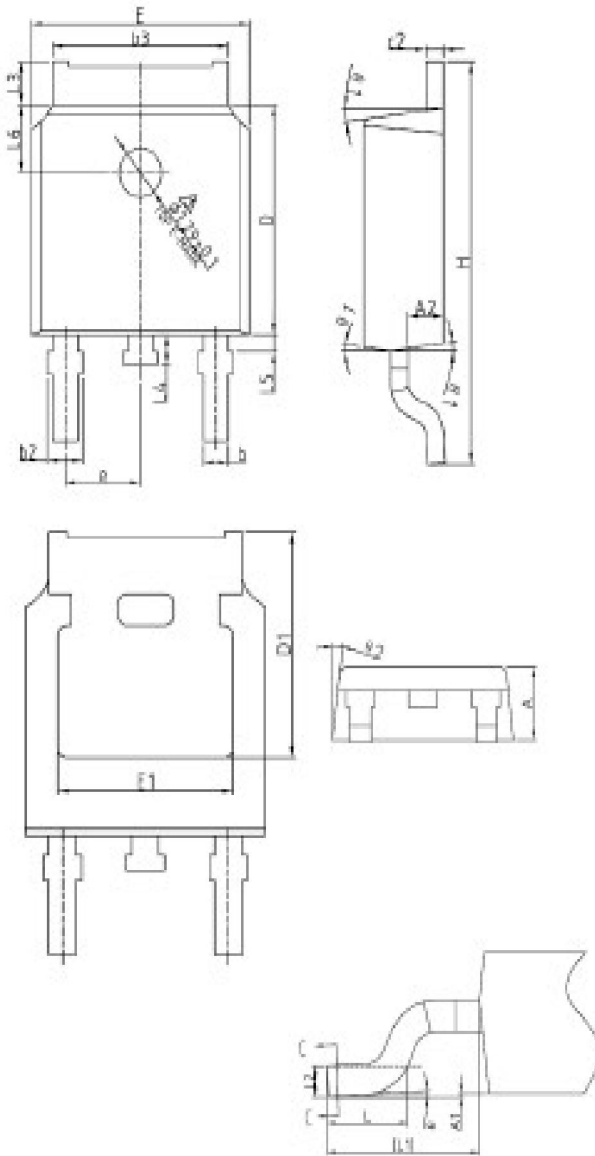


Figure 11: Normalized Thermal transient Impedance Curve

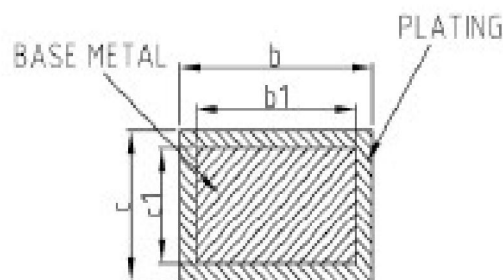
Mechanical Data

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°



Ordering and Marking Information

Device Marking: SSFM3008L

Package (Available)
TO252
Operating Temperature Range
C : -55 to 175 °C

Devices per Unit

Package Type	Units/Tube	Tubes/Inner Box	Units/Inner Box	Inner Boxes/Carton Box	Units/Carton Box
TO-252	80	50	4000	10	40000

Reliability Test Program

Test Item	Conditions	Duration	Sample Size
High Temperature Reverse Bias(HTRB)	$T_j=125^{\circ}\text{C}$ to 175°C @ 80% of Max $V_{\text{DSS}}/V_{\text{CES}}/V_{\text{R}}$	168 hours 500 hours 1000 hours	3 lots x 77 devices
High Temperature Gate Bias(HTGB)	$T_j=125^{\circ}\text{C}$ to 175°C @ 100% of Max V_{GSS}	168 hours 500 hours 1000 hours	3 lots x 77 devices