

Main Product Characteristics:

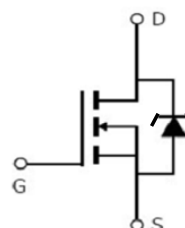
V_{DS}	30V
$R_{DS(on)}$	5.0mohm(typ.)
I_D	50A



TO252



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



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} @ 10V①	50	A
I_D @ TC = 100°C	Continuous Drain Current, V_{GS} @ 10V①	40	
I_{DM}	Pulsed Drain Current②	200	
P_D @ TC = 25°C	Power Dissipation③	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

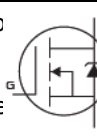
Thermal Resistance

Symbol	Characterizes	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 Characterizes @ $T_A=25^\circ\text{C}$ unless otherwise specified

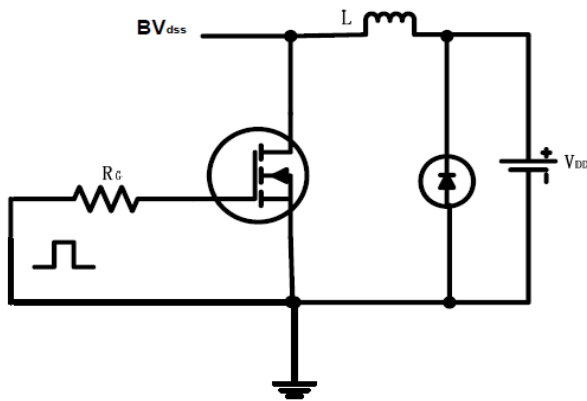
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source breakdown voltage	30	36.5	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	5	8	mΩ	$V_{GS}=10V, I_D=20A$
		—	7.5	10	mΩ	$V_{GS}=4.5V, I_D=10A$
$V_{GS(th)}$	Gate threshold voltage	1	—	3	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
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	—	36	—	nC	$V_{DS}=15V,$ $I_D=20A,$ $V_{GS}=10V$
Q_{gs}	Gate-to-Source charge	—	6.1	—		
Q_{gd}	Gate-to-Drain("Miller") charge	—	9.6	—		
$t_{d(on)}$	Turn-on delay time	—	10.9	—	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	—	27.5	—		
t_f	Fall time	—	7.1	—		
C_{iss}	Input capacitance	—	1862	—	pF	$V_{GS} = 0V$ $V_{DS} = 15V$ $f = 1MHz$
C_{oss}	Output capacitance	—	360	—		
C_{rss}	Reverse transfer capacitance	—	235	—		

Source-Drain Ratings and Characteristics

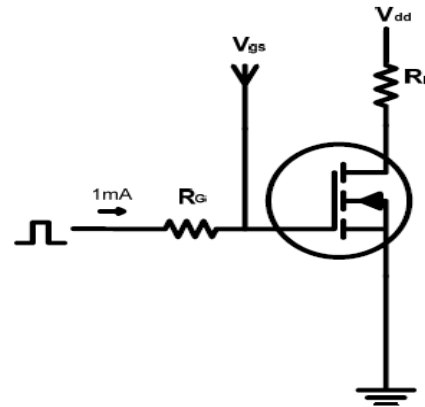
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current	—	—	50	A	MOSFET symb showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current	—	—	200	A	
V_{SD}	Diode Forward Voltage	—	0.65	1.3	V	$I_S=1.0A, V_{GS}=0V$
t_{rr}	Reverse Recovery Time	—	24	—	ns	$T_J = 25^\circ\text{C}, I_F = 20A, di/dt$ $= 350A/\mu s$
Q_{rr}	Reverse Recovery Charge	—	26	—	nC	

Test circuits and Waveforms

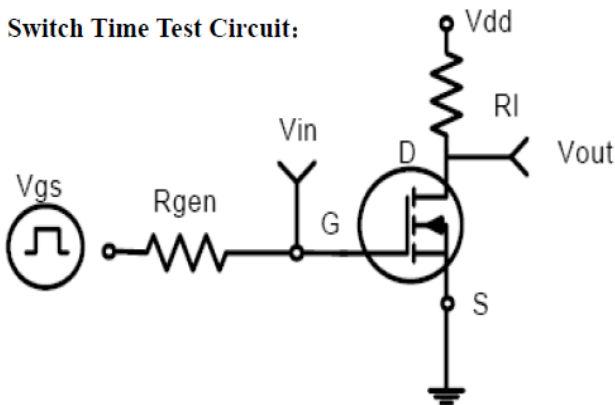
EAS test circuits:



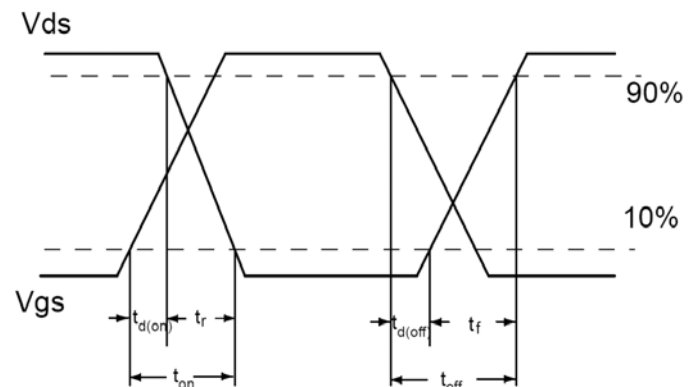
Gate charge test circuit:



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 P_D 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

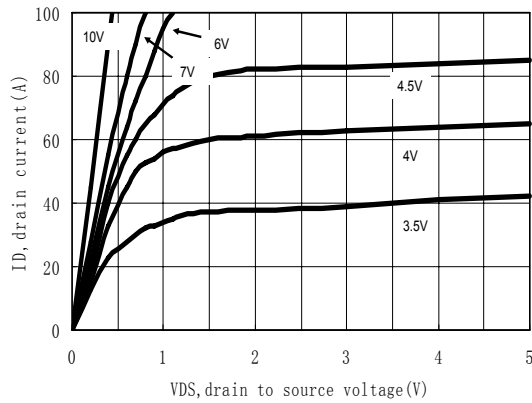


Figure 1: Typical Output Characteristics

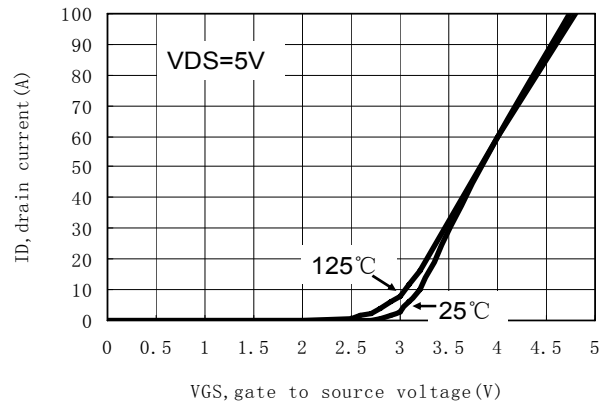


Figure 2: Typical Transfer Characteristics

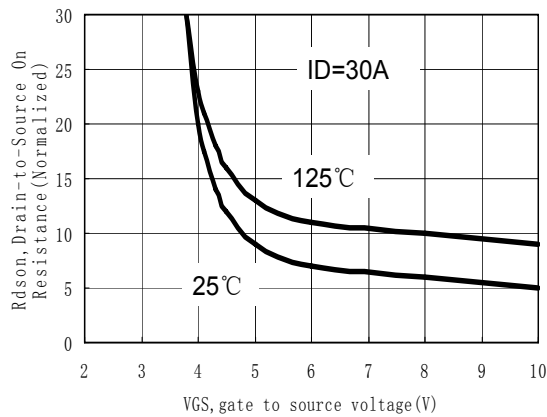


Figure 3: On-Resistance vs. Gate-Source Voltage

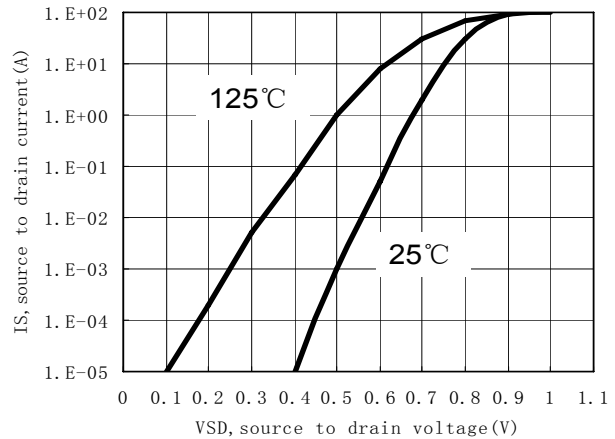


Figure 4: Body-Diode Characteristics

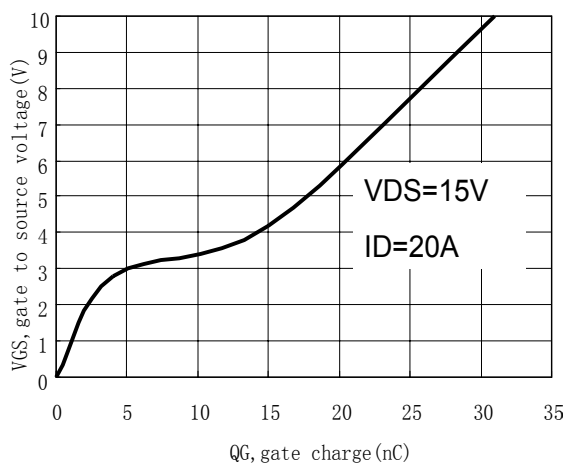


Figure 5: Gate-Charge Characteristics

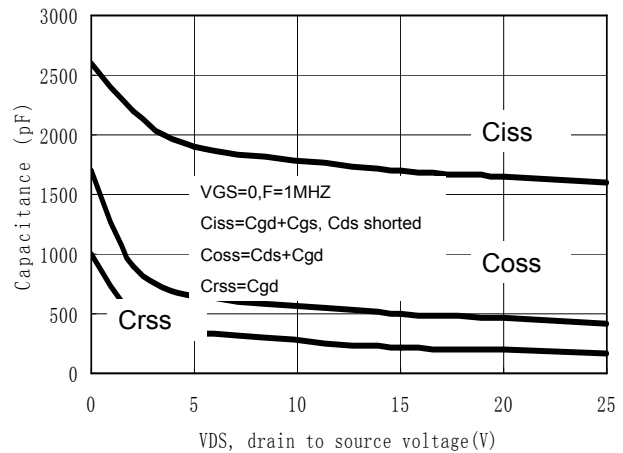


Figure 6: Capacitance Characteristics

Typical thermal characteristics

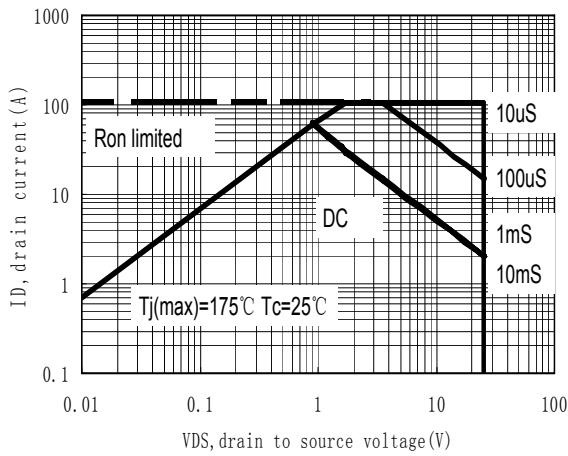


Figure 7: Maximum Forward Biased Safe Operating Area

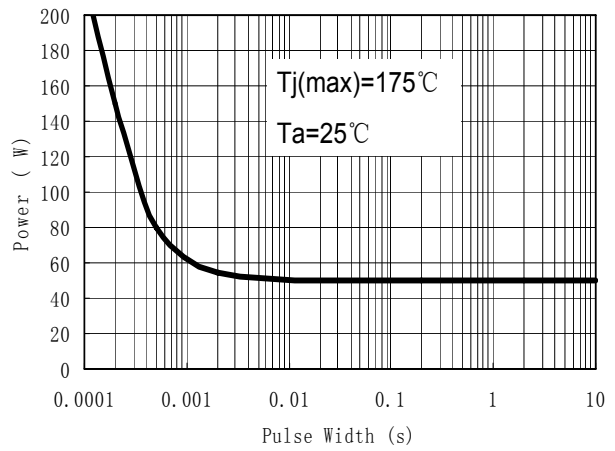


Figure 8: Single Pulse Power Rating Junction-to-Case

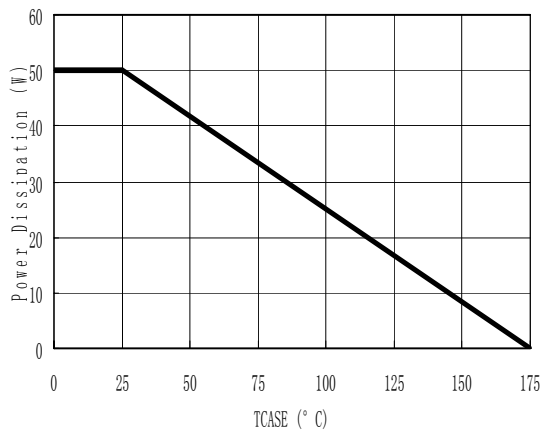


Figure 9: Power De-rating

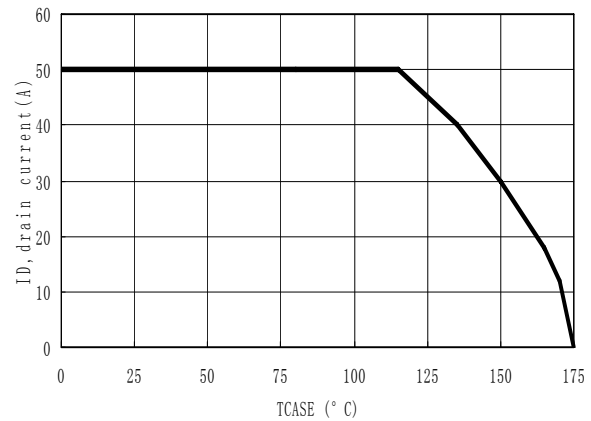


Figure 10: Current De-rating

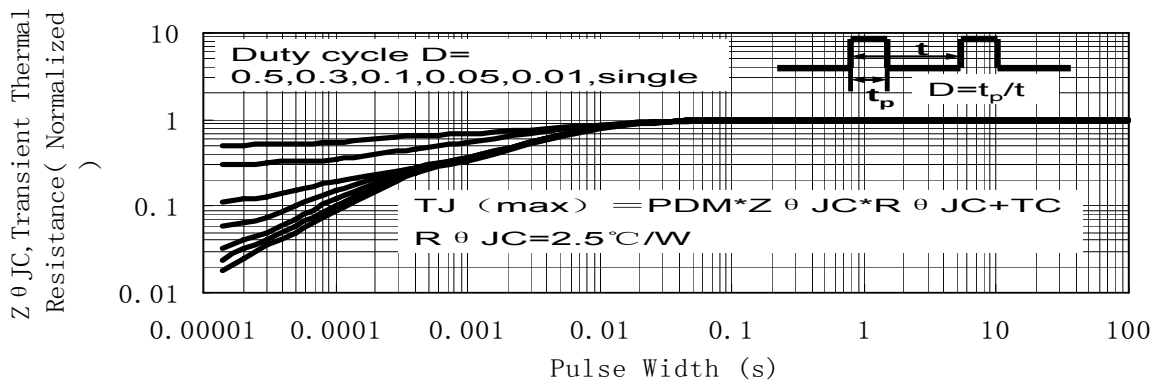
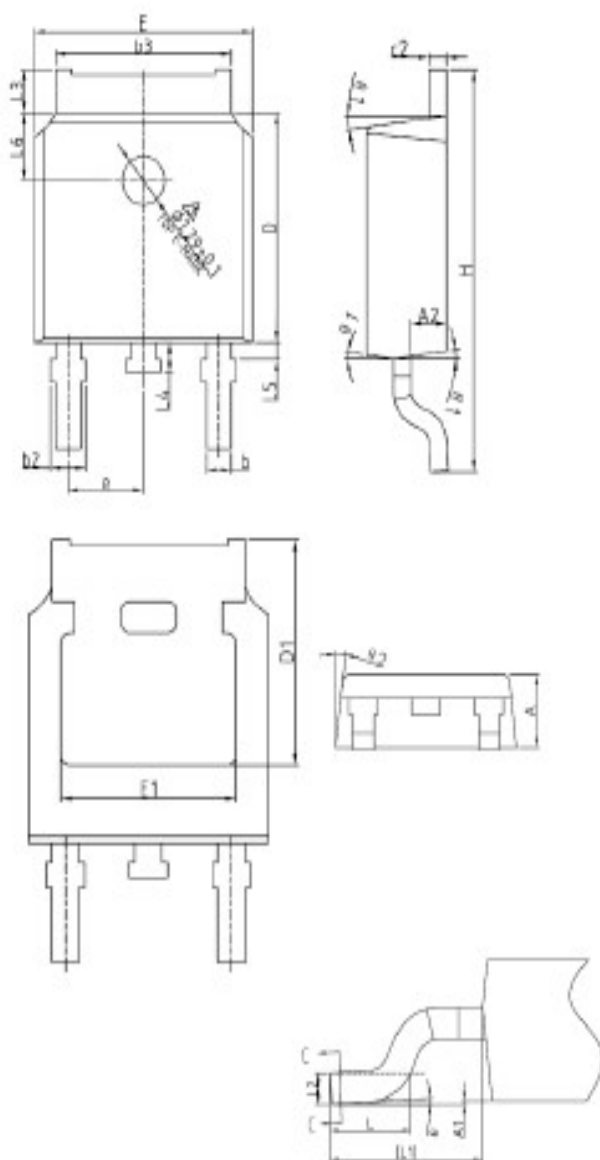
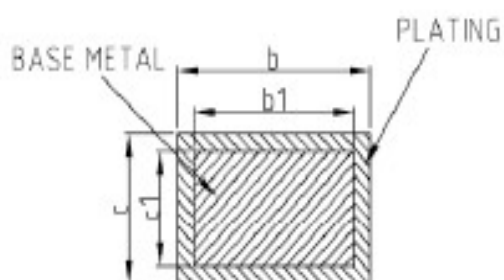


Figure 11: Normalized Thermal transient Impedance Curve

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: SSFM3008****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 $V_{DSS}/V_{CES}/V_R$	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

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