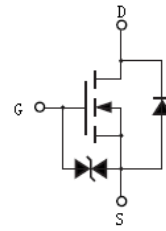


### Features

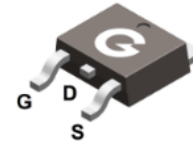
- Low power loss by high speed switching and low on-resistance
- Excellent thermal behavior
- Very low FOM for fast switching efficiency
- Product validation acc. JEDEC Standard
- Integrated ESD protection diode: HBM: JESD22-A114-B: 2
- RoHS compliant with Halogen-free

HF



### Applications

- LED lighting
- Adapters
- Chargers
- Industrial power
- PFC stage



TO-252

### Mechanical Data

- Case: TO-252
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte tin-plated leads; solderability-per MIL-STD-202, Method 208

## Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
SJM90R1K0D	TO-252	80 pcs / Tube & 2500 pcs / Tape & Reel	M90R1K0

## Maximum Ratings (@ T<sub>C</sub> = 25°C unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V <sub>DSS</sub>	900	V
Gate-to-Source Voltage (Static)	V <sub>GSS</sub>	±20	V
Continuous Drain Current (T <sub>C</sub> = 25°C)	I <sub>D</sub>	6.5	A
Continuous Drain Current (T <sub>C</sub> = 100°C)		4.1	A
Pulsed Drain Current (t <sub>p</sub> = 10μs, T <sub>C</sub> = 25°C)	I <sub>DM</sub>	26	A
Single Pulse Avalanche Energy <sup>*3</sup>	E <sub>AS</sub>	120	mJ
Power Dissipation (T <sub>C</sub> = 25°C)	P <sub>D</sub>	78	W
Operating Junction Temperature Range	T <sub>J</sub>	-55 ~ +150	°C
Storage Temperature Range	T <sub>STG</sub>	-55 ~ +150	°C

## Thermal Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance Junction-to-Case	R <sub>θJC</sub>	-	1.2	1.6	°C/W
Thermal Resistance Junction-to-Air <sup>*1</sup>	R <sub>θJA</sub>	-	-	62	°C/W

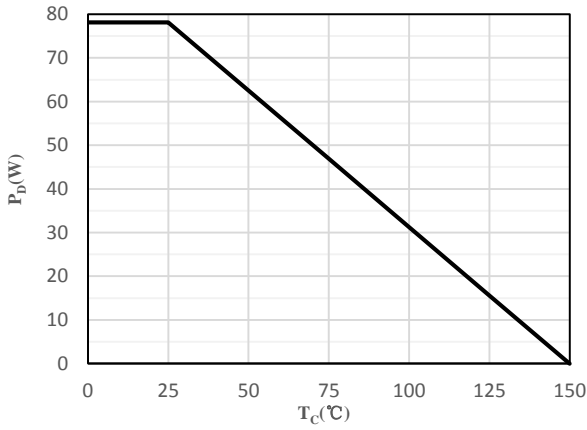
### Electrical Characteristics (@ T<sub>A</sub> = 25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
V <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA	900	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = 900V, V <sub>GS</sub> = 0V	-	-	1	μA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V	-	-	±1	μA
<b>On Characteristics</b>						
R <sub>DS(ON)</sub>	Drain-Source On-resistance *2	V <sub>GS</sub> = 10V, I <sub>D</sub> = 1.5A	-	0.8	1	Ω
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	2	3.2	4	V
R <sub>G</sub>	Gate Resistance	V <sub>GS</sub> = 0V, f = 1MHz	-	6.6	-	Ω
<b>Dynamic Characteristics</b>						
C <sub>ISS</sub>	Input Capacitance	V <sub>GS</sub> = 0V	-	592	-	pF
C <sub>OSS</sub>	Output Capacitance	V <sub>DS</sub> = 40V	-	55	-	
C <sub>RSS</sub>	Reverse Transfer Capacitance	f = 250kHz	-	2.5	-	
<b>Switching Characteristics</b>						
t <sub>d(ON)</sub>	Turn-on Delay Time *4	V <sub>DD</sub> = 450V I <sub>D</sub> = 3A R <sub>G</sub> = 25Ω	-	23	-	ns
t <sub>r</sub>	Turn-on Rise Time *4		-	18	-	
t <sub>d(OFF)</sub>	Turn-Off Delay Time *4		-	74	-	
t <sub>f</sub>	Turn-Off Fall Time *4		-	17	-	
Q <sub>G</sub>	Total Gate-Charge	V <sub>DD</sub> = 720V	-	16.3	-	nC
Q <sub>GS</sub>	Gate to Source Charge	V <sub>GS</sub> = 10V	-	2.4	-	
Q <sub>GD</sub>	Gate to Drain (Miller) Charge	I <sub>D</sub> = 3A	-	9.2	-	
<b>Source-Drain Diode Characteristics</b>						
V <sub>SD</sub>	Diode Forward Voltage *2	I <sub>SD</sub> = 3A, V <sub>GS</sub> = 0V	-	0.84	1.4	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> = 1A, V <sub>R</sub> = 400V	-	200	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge	di/dt = 100A/μs	-	1.1	-	μC

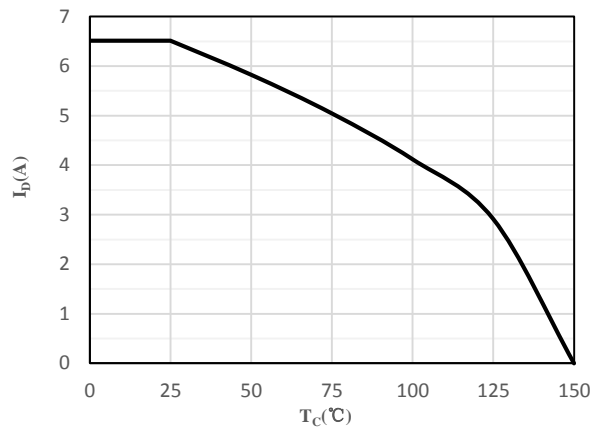
Notes:

1. The data tested by surface mounted on a minimum recommended FR-4 board
2. The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%
3. The E<sub>AS</sub> data shows Max. rating. The test condition is V<sub>DD</sub> = 100V, V<sub>GS</sub> = 10V, L = 50mH
4. Guaranteed by design, not subject to production

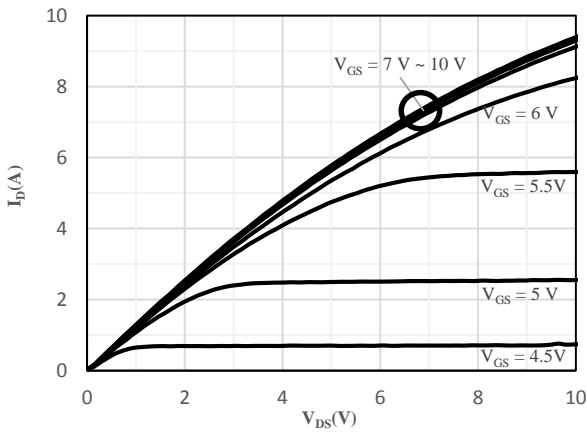
**Ratings and Characteristics Curves** (@  $T_A = 25^\circ\text{C}$  unless otherwise specified)



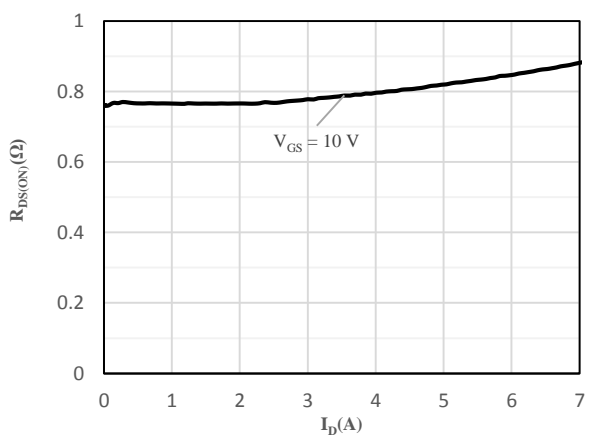
**Fig 1 Power Dissipation**



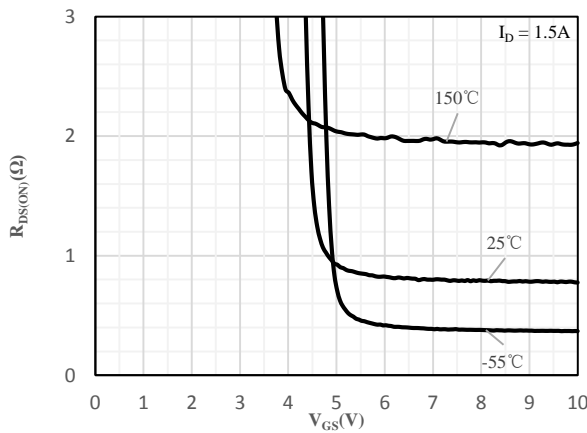
**Fig 2 Drain Current**



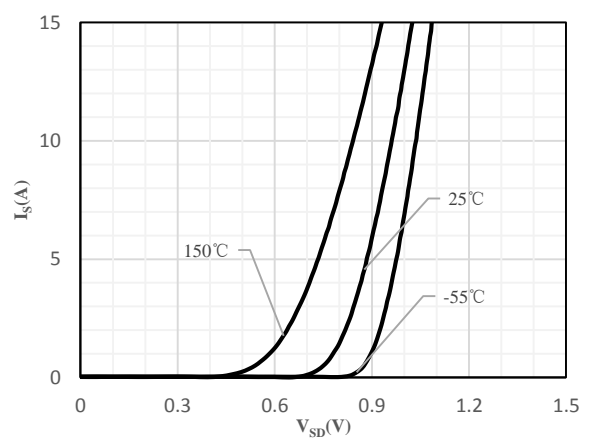
**Fig 3 Typical Output Characteristics**



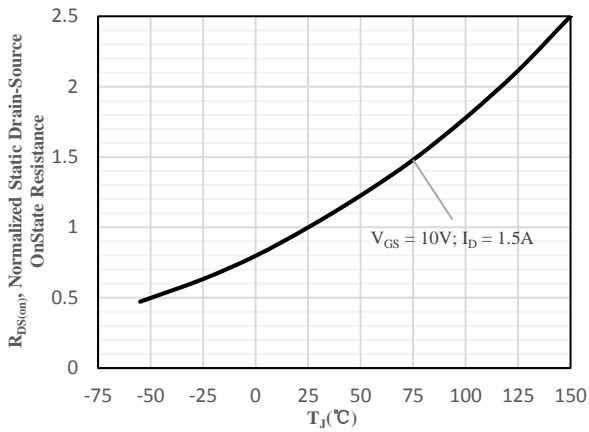
**Fig 4 On-Resistance vs. Drain Current and Gate Voltage**



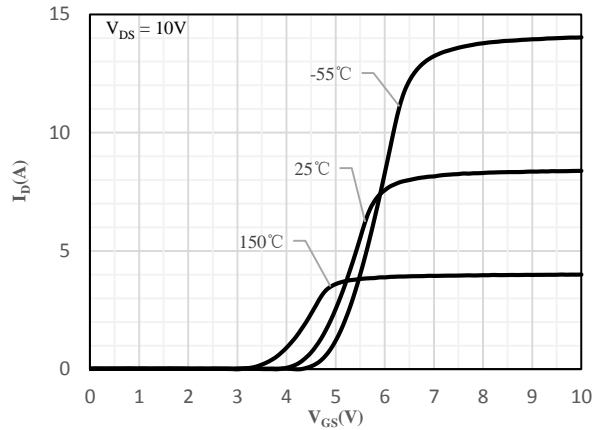
**Fig 5 On-Resistance vs. Gate-Source Voltage**



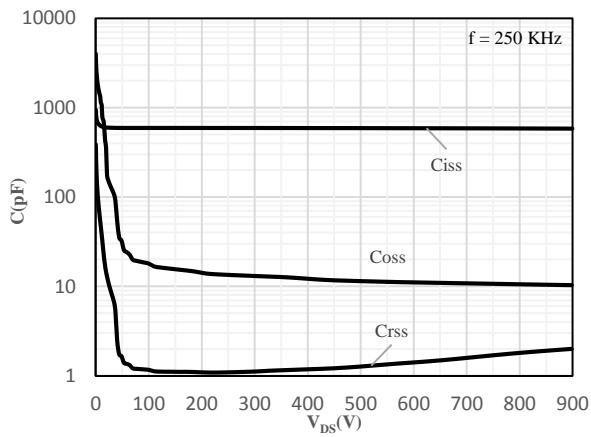
**Fig 6 Body-Diode Characteristics**



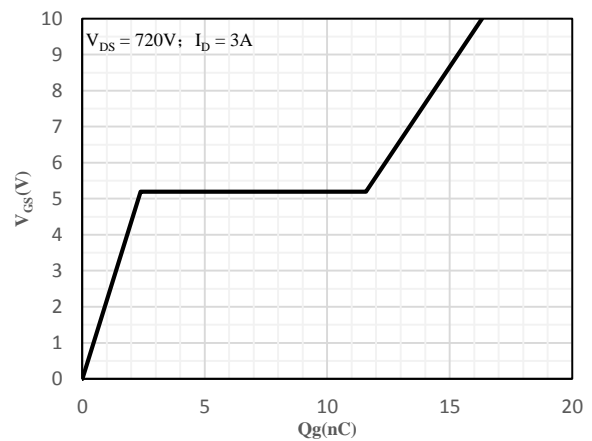
**Fig 7 Normalized On-Resistance vs. Junction Temperature**



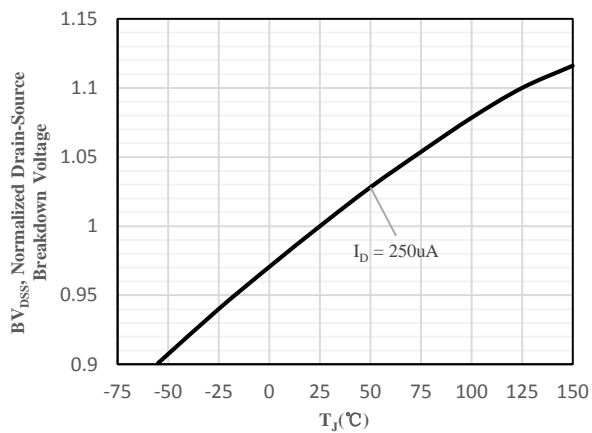
**Fig 8 Transfer Characteristics**



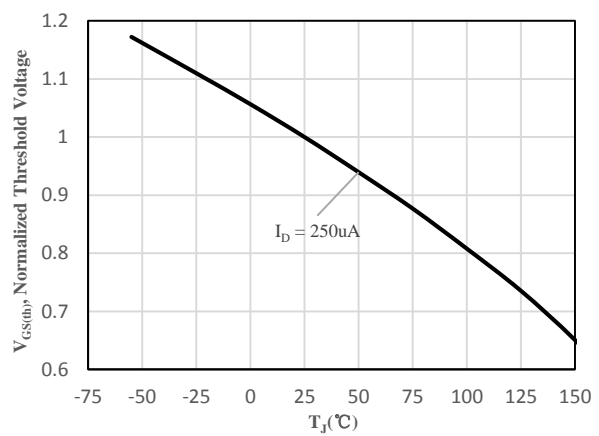
**Fig 9 Capacitance Characteristics**



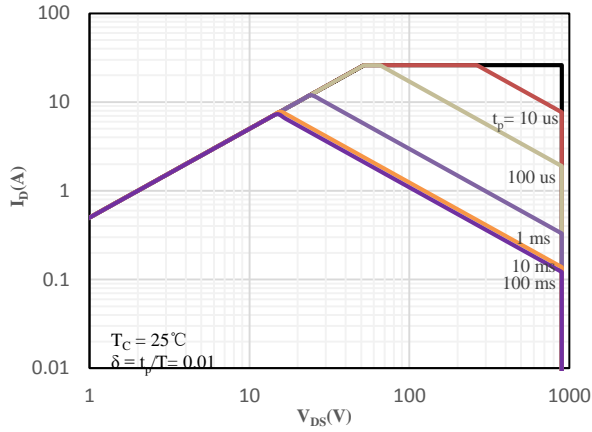
**Fig 10 Gate-Charge Characteristics**



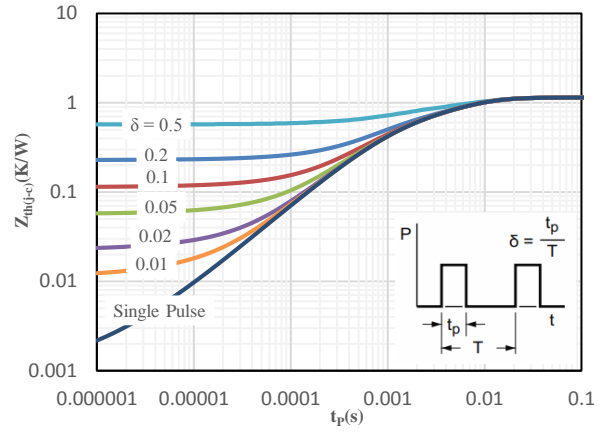
**Fig 11 Normalized Breakdown Voltage vs. Junction Temperature**



**Fig 12 Normalized  $V_{GS(th)}$  vs. Junction Temperature**

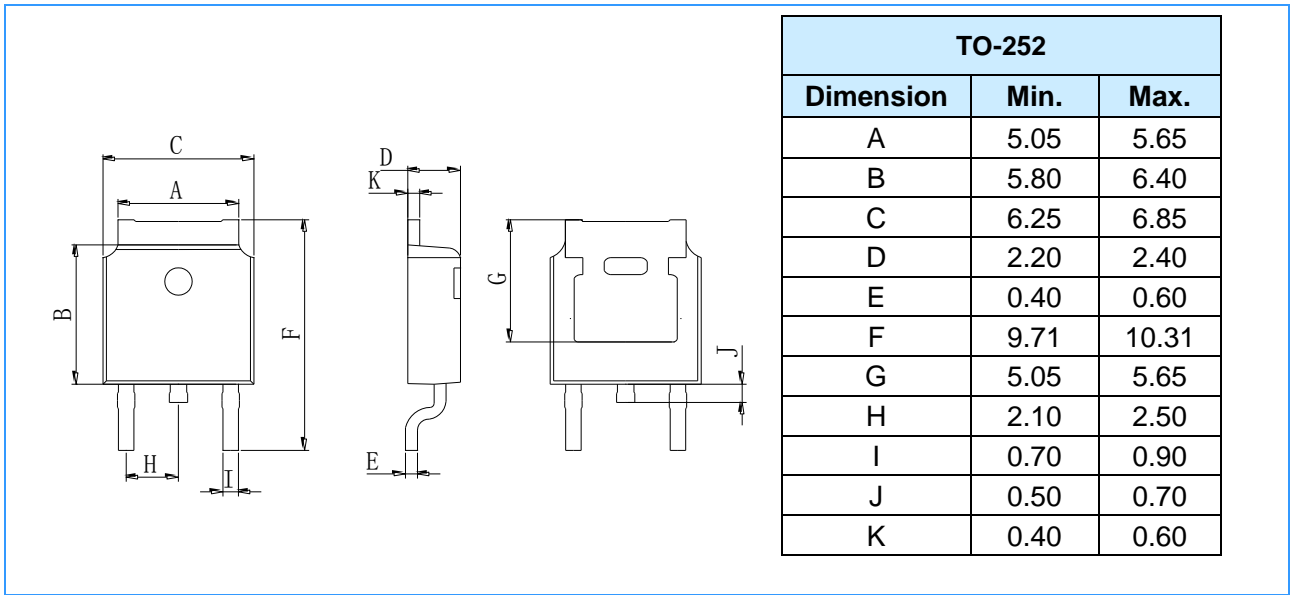


**Fig 13 Safe Operating Area**



**Fig 14 Maximum transient thermal impedance**

Package Outline Dimensions (Unit: mm)



Mounting Pad Layout (Unit: mm)

