

## Features

- Low power loss by high speed switching and low on-resistance
- Excellent thermal behavior
- HBM: JESD22-A114-B: 1C
- Product validation acc. JEDEC Standard

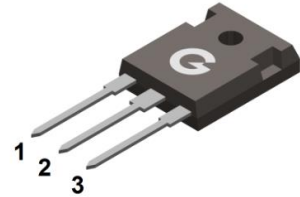
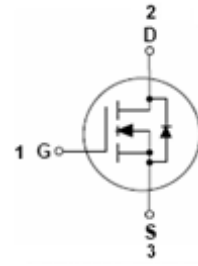
HF

## APPLICATIONS

- PFC power supply stages
- Solar inverter
- Telecom
- Server
- UPS

## Mechanical Data

- Case: TO-247
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte tin-plated leads; solderability-per MIL-STD-202, Method 208



TO-247

## Ordering Information

| Part Number | Package | Shipping Quantity | Marking Code |
|-------------|---------|-------------------|--------------|
| SJM65R190U  | TO-247  | 30 pcs / Tube     | SJM65R190U   |

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

| Parameter                                                           | Symbol           | Value      | Unit |
|---------------------------------------------------------------------|------------------|------------|------|
| Drain-to-Source Voltage                                             | V <sub>DSS</sub> | 650        | V    |
| Gate-to-Source Voltage                                              | V <sub>GSS</sub> | ±30        | V    |
| Continuous Drain Current (T <sub>C</sub> = 25°C)                    | I <sub>D</sub>   | 21         | A    |
| Continuous Drain Current (T <sub>C</sub> = 100°C)                   |                  | 13         | A    |
| Pulsed Drain Current (t <sub>p</sub> = 10μs, T <sub>C</sub> = 25°C) | I <sub>DM</sub>  | 84         | A    |
| Single Pulse Avalanche Energy *2                                    | E <sub>AS</sub>  | 400        | mJ   |
| Power Dissipation (T <sub>C</sub> = 25°C)                           | P <sub>D</sub>   | 208        | 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> | -    | 0.5  | 0.6  | °C/W |
| Thermal Resistance Junction-to-Air  | R <sub>θJA</sub> | -    | -    | 40   | °C/W |

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

| Symbol                             | Parameter                       | Test Condition                                                                                   | Min. | Typ. | Max. | Unit |
|------------------------------------|---------------------------------|--------------------------------------------------------------------------------------------------|------|------|------|------|
| Static Characteristics             |                                 |                                                                                                  |      |      |      |      |
| V <sub>DSS</sub>                   | Drain-Source Breakdown Voltage  | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA                                                     | 650  | -    | -    | V    |
| I <sub>DSS</sub>                   | Zero Gate Voltage Drain Current | V <sub>DS</sub> = 650V, V <sub>GS</sub> = 0V                                                     | -    | -    | 1    | μA   |
| I <sub>GSS</sub>                   | Gate-Body Leakage Current       | V <sub>GS</sub> = ±30V, V <sub>DS</sub> = 0V                                                     | -    | -    | ±100 | nA   |
| On Characteristics                 |                                 |                                                                                                  |      |      |      |      |
| R <sub>DS(ON)</sub>                | Drain-Source On-resistance *1   | V <sub>GS</sub> = 10V, I <sub>D</sub> = 10A                                                      | -    | 0.16 | 0.19 | Ω    |
| V <sub>GS(th)</sub>                | Gate Threshold Voltage          | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                                       | 2.5  | 3.0  | 4.5  | V    |
| R <sub>G</sub>                     | Gate Resistance                 | V <sub>GS</sub> = 0V, f = 1MHz                                                                   | -    | 8.1  | -    | Ω    |
| Dynamic Characteristics            |                                 |                                                                                                  |      |      |      |      |
| C <sub>ISS</sub>                   | Input Capacitance               | V <sub>GS</sub> = 0V<br>V <sub>DS</sub> = 40V<br>f = 250kHz                                      | -    | 1292 | -    | pF   |
| C <sub>OSS</sub>                   | Output Capacitance              |                                                                                                  | -    | 107  | -    |      |
| C <sub>RSS</sub>                   | Reverse Transfer Capacitance    |                                                                                                  | -    | 0.7  | -    |      |
| Switching Characteristics          |                                 |                                                                                                  |      |      |      |      |
| t <sub>d(ON)</sub>                 | Turn-on Delay Time *3           | V <sub>DD</sub> = 400V<br>V <sub>GS</sub> = 10V<br>I <sub>D</sub> = 8.5A<br>R <sub>G</sub> = 10Ω | -    | 15   | -    | ns   |
| t <sub>r</sub>                     | Turn-on Rise Time *3            |                                                                                                  | -    | 11   | -    |      |
| t <sub>d(OFF)</sub>                | Turn-Off Delay Time *3          |                                                                                                  | -    | 71   | -    |      |
| t <sub>f</sub>                     | Turn-Off Fall Time *3           |                                                                                                  | -    | 11   | -    |      |
| Q <sub>G</sub>                     | Total Gate-Charge               | V <sub>DD</sub> = 520V<br>V <sub>GS</sub> = 10V<br>I <sub>D</sub> = 11A                          | -    | 35   | -    | nC   |
| Q <sub>GS</sub>                    | Gate to Source Charge           |                                                                                                  | -    | 7.5  | -    |      |
| Q <sub>GD</sub>                    | Gate to Drain (Miller) Charge   |                                                                                                  | -    | 18   | -    |      |
| Source-Drain Diode Characteristics |                                 |                                                                                                  |      |      |      |      |
| V <sub>SD</sub>                    | Diode Forward Voltage *1        | I <sub>SD</sub> = 10A, V <sub>GS</sub> = 0V                                                      | -    | 0.84 | 1.2  | V    |
| t <sub>rr</sub>                    | Reverse Recovery Time           | I <sub>F</sub> = 10A, V <sub>R</sub> = 400V<br>di/dt = 100A/μs                                   | -    | 310  | -    | ns   |
| Q <sub>rr</sub>                    | Reverse Recovery Charge         |                                                                                                  | -    | 3.8  | -    | μC   |

Notes:

- The data tested by pulsed, pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$
- The  $E_{AS}$  data shows Max. rating. The test condition is  $V_{DD} = 100V, V_{GS} = 15V, L = 50mH$
- Guaranteed by design, not subject to production

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

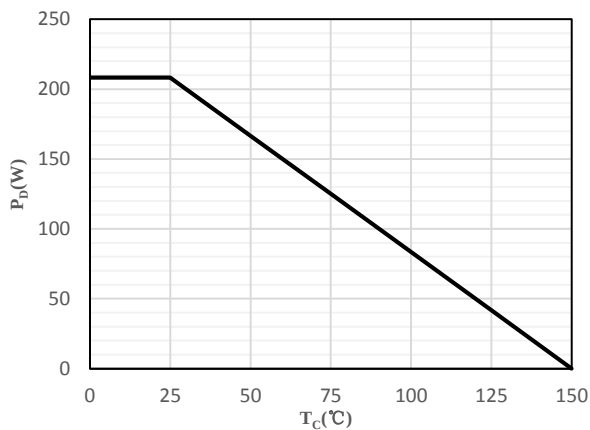


Fig 1 Power Dissipation

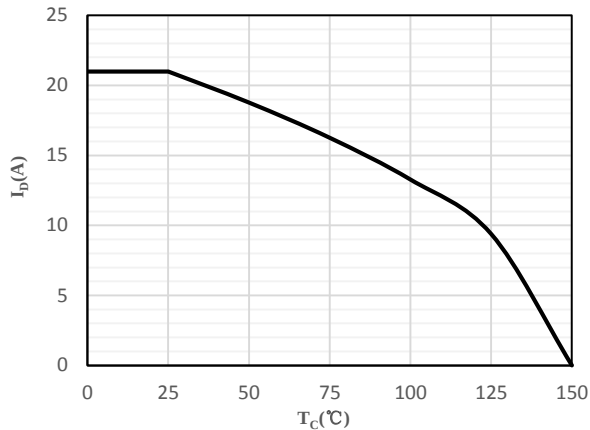


Fig 2 Drain Current

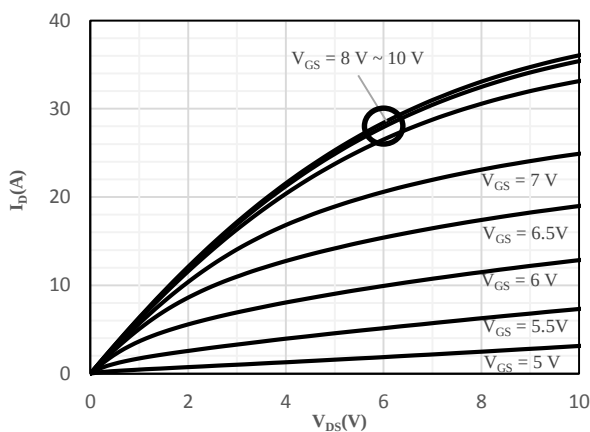


Fig 3 Typical Output Characteristics

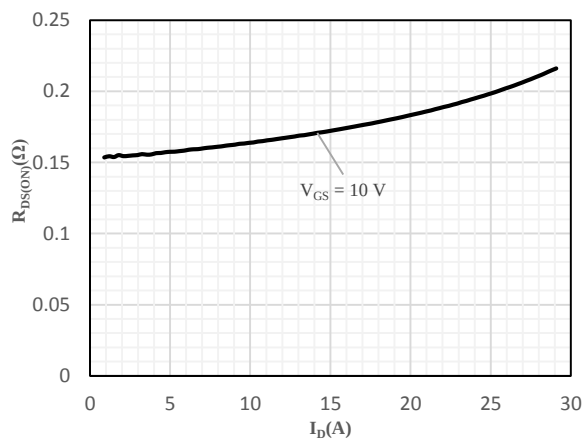


Fig 4 On-Resistance vs. Drain Current  
and Gate Voltage

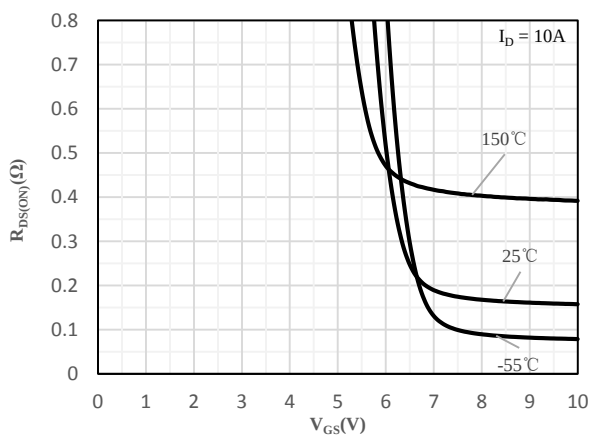


Fig 5 On-Resistance vs. Gate-Source Voltage

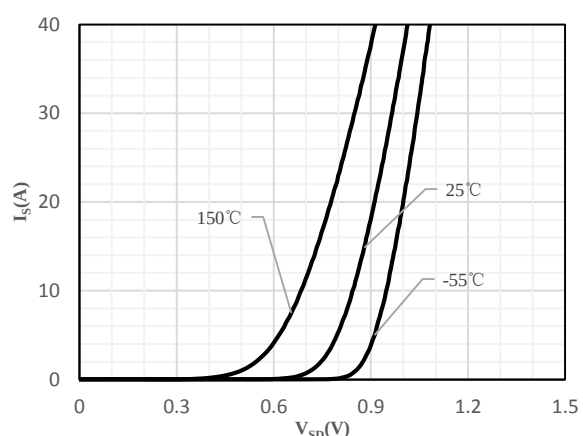


Fig 6 Body-Diode Characteristics

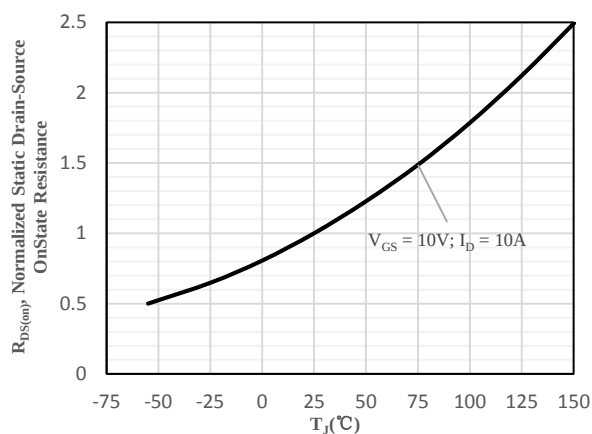


Fig 7 Normalized On-Resistance vs. Junction Temperature

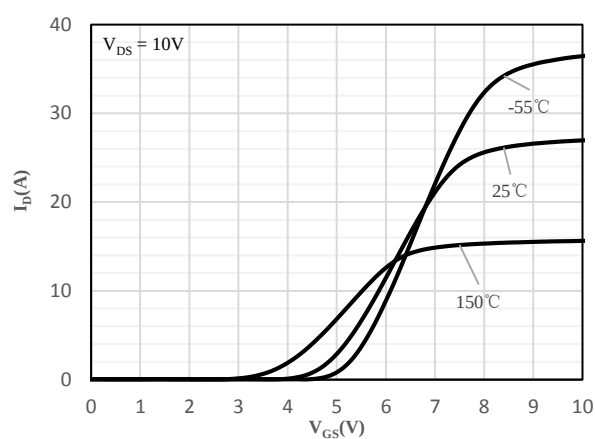


Fig 8 Transfer Characteristics

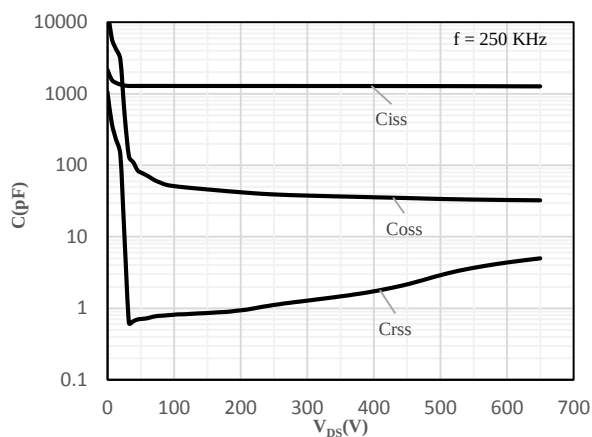


Fig 9 Capacitance Characteristics

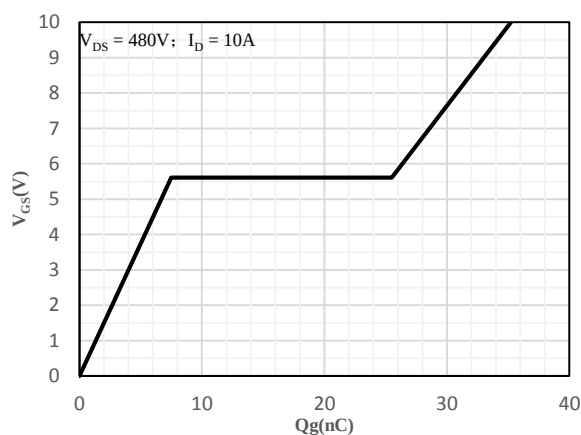


Fig 10 Gate-Charge Characteristics

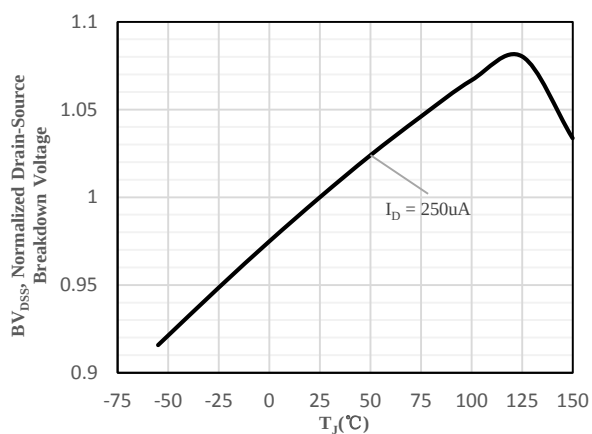


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

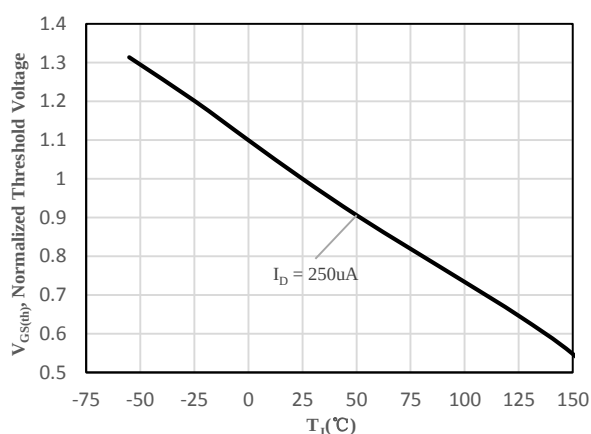


Fig 12 Normalized  $V_{GS(th)}$  vs. Junction Temperature

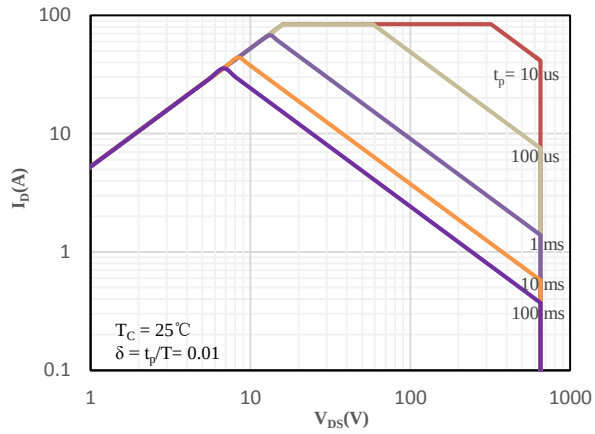


Fig 13 Safe Operation Area

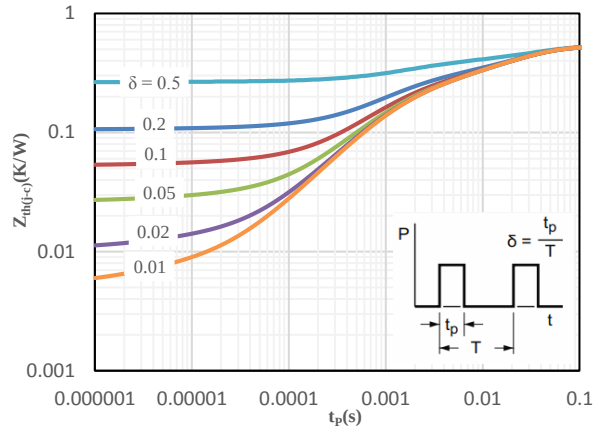
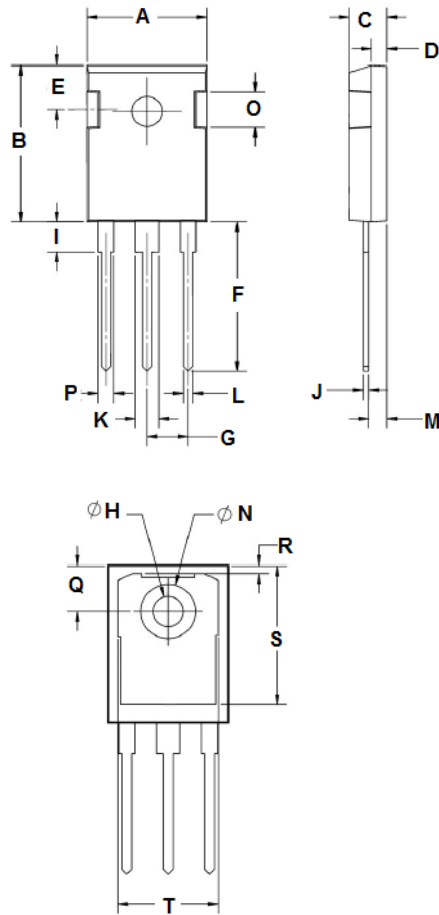


Fig 14 Maximum transient thermal impedance

Package Outline Dimensions (Unit: mm)



| TO-247    |       |       |
|-----------|-------|-------|
| Dimension | Min.  | Max.  |
| A         | 15.50 | 16.10 |
| B         | 20.70 | 21.30 |
| C         | 4.70  | 5.30  |
| D         | 1.80  | 2.20  |
| E         | 5.20  | 5.80  |
| F         | 19.70 | 20.30 |
| G         | 5.20  | 5.60  |
| H         | 3.30  | 3.70  |
| I         | 3.90  | 4.30  |
| J         | 0.50  | 0.70  |
| K         | 2.80  | 3.20  |
| L         | 1.00  | 1.40  |
| M         | 2.20  | 2.60  |
| N         | 7.00  | 7.20  |
| O         | 4.90  | 5.30  |
| P         | 1.80  | 2.20  |
| Q         | 5.70  | 5.90  |
| R         | 0.80  | 1.20  |
| S         | 17.00 | 17.80 |
| T         | 13.60 | 14.20 |

## IMPORTANT NOTICE

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