

### ■ Features

- Wide Bandgap SiC MOSFET Technology.
- Low On-Resistance with High Blocking Voltage.
- Low Capacitances with High-Speed Switching.
- Low Reverse Recovery (Qrr).
- Easy to Parallel and Simple to Drive.
- Robust against Parasitic Turn on Even 0V Turn off Gate Voltage.

### G3 MOSFET Technology

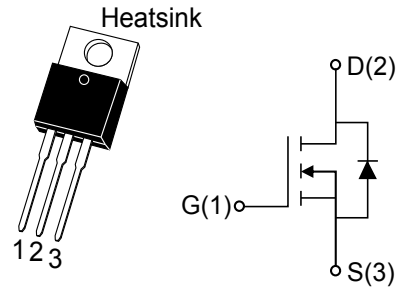
| Parameter                      | Value | Unit |
|--------------------------------|-------|------|
| $V_{DS}$                       | 650   | V    |
| $R_{DS(on)}_{typ@VGS=18V}$     | 100   | mΩ   |
| $I_{D@VGS=18V,TC=25^{\circ}C}$ | 28    | A    |

### ■ Benefits

- Reduced Switching Losses.
- Increased System Switching Frequency.
- Increased Power Density.
- Reduction of Heat Sink Requirements.
- Reduced EMI.

### ■ Application

- Switch Mode Power Supplies.
- High Voltage DC/DC Converters.
- Battery Chargers.
- Motor Drives.
- Pulsed Power Applications.



TO-220AB



### Maximum ratings( $T_j=25^{\circ}C$ , Unless otherwise specified)

| Parameter                                       | Symbol          | Test Condition                     | Value            | Unit        |
|-------------------------------------------------|-----------------|------------------------------------|------------------|-------------|
| Drain to Source Voltage                         | $V_{DS,max}$    | $V_{GS}=0V, I_D=500\mu A$          | 650              | V           |
| Gate to Source Voltage                          | $V_{GS,max}$    | Absolute Maximum Values            | -10/+23          | V           |
| Recommended Operation Voltage of Gate to Source | $V_{GS,op}$     | Recommended Operational Values     | -5...0/+15...+18 | V           |
| Continuous Drain Current                        | $I_D$           | $V_{GS}=15V, TC=25^{\circ}C$       | 25               | A           |
|                                                 |                 | $V_{GS}=15V, TC=100^{\circ}C$      | 18               | A           |
| Continuous Drain Current                        |                 | $V_{GS}=18V, TC=25^{\circ}C$       | 28               | A           |
|                                                 |                 | $V_{GS}=18V, TC=100^{\circ}C$      | 20               | A           |
| Pulsed Drain Current                            | $I_{D(pulsed)}$ | $V_{GS}=15V, TC=25^{\circ}C$       | 64.8             | A           |
| Power Dissipation                               | $P_{tot}$       | $TC=25^{\circ}C, T_j=175^{\circ}C$ | 75               | W           |
| Operating and Storage Temperature               | $T_j, T_{stg}$  | —                                  | -55 to +175      | $^{\circ}C$ |
| Solder Temperature, 1.6mm from case for 10s     | $T_L$           | —                                  | 260              | $^{\circ}C$ |



### Thermal Characteristics

| Parameter                                | Symbol          | Value |     |     | Unit |
|------------------------------------------|-----------------|-------|-----|-----|------|
|                                          |                 | Min   | Typ | Max |      |
| Thermal Resistance from Junction to Case | $R_{\theta JC}$ | —     | 2   | —   | °C/W |

### Electrical Characteristics

#### Static Characteristics

| Parameter                         | Symbol        | Test Condition             | Value |     |      | Unit |
|-----------------------------------|---------------|----------------------------|-------|-----|------|------|
|                                   |               |                            | Min   | Typ | Max  |      |
| Gate Threshold Voltage            | $V_{GS(th)}$  | VGS=VDS, ID=4mA, Tj=25°C   | 2.4   | 3.2 | 4    | V    |
|                                   |               | VGS=VDS, ID=4mA, Tj=175°C  | —     | 2.4 | —    | V    |
| Drain to Source Breakdown Voltage | $V_{(BR)DSS}$ | VGS=0V, ID=500μA           | 650   | —   | —    | V    |
| Zero Gate Voltage Drain Current   | $I_{DSS}$     | VGS=0V, VDS=650V, Tj=25°C  | —     | —   | 10   | μA   |
| Gate to Source Leakage Current    | $I_{GSS+}$    | VGS=23V, VDS=0V, Tj=25°C   | —     | —   | 100  | nA   |
|                                   | $I_{GSS-}$    | VGS=-10V, VDS=0V, Tj=25°C  | —     | —   | -100 | nA   |
| Drain to Source on Resistance     | $R_{DS(on)}$  | VGS=15V, ID=12A, Tj=25°C   | —     | 130 | 200  | mΩ   |
|                                   |               | VGS=15V, ID=12A, Tj=175°C  | —     | 156 | —    | mΩ   |
|                                   |               | VGS=18V, ID=12A, Tj=25°C   | —     | 100 | 150  | mΩ   |
|                                   |               | VGS=18V, ID=12A, Tj=175°C  | —     | 120 | —    | mΩ   |
| Transconductance                  | $g_{fs}$      | VDS=20V, IDS=12A, Tj=25°C  | —     | 9   | —    | S    |
|                                   |               | VDS=20V, IDS=12A, Tj=175°C | —     | 8.2 | —    | S    |



### Electrical Characteristics

#### Dynamic Characteristics

| Parameter                    | Symbol    | Test Condition                                             | Value |      |     | Unit |
|------------------------------|-----------|------------------------------------------------------------|-------|------|-----|------|
|                              |           |                                                            | Min   | Typ  | Max |      |
| Input Capacitance            | $C_{iss}$ | $V_{GS}=0V, V_{DS}=400V,$<br>$f=1MHz, V_{AC}=25mV$         | —     | 522  | —   | pF   |
| Output Capacitance           | $C_{oss}$ |                                                            | —     | 44   | —   | pF   |
| Reverse Transfer Capacitance | $C_{rss}$ |                                                            | —     | 2    | —   | pF   |
| Reverse Transfer Capacitance | $E_{oss}$ |                                                            | —     | 3.5  | —   | μJ   |
| Gate-Source Charge           | $Q_{gs}$  | $V_{GS}=0/15V, V_{DS}=400V,$<br>$I_D=12A, T_j=25^{\circ}C$ | —     | 7    | —   | nC   |
| Gate-Drain Charge            | $Q_{gd}$  |                                                            | —     | 5.7  | —   | nC   |
| Total Gate Charge            | $Q_g$     |                                                            | —     | 18.9 | —   | nC   |
| Gate Resistance              | $R_g$     | $V_{AC}=25mV, f=1MHz$                                      | —     | 5.5  | —   | Ω    |

#### Switching Characteristics

| Parameter                 | Symbol       | Test Condition                                                                     | Value |     |     | Unit |
|---------------------------|--------------|------------------------------------------------------------------------------------|-------|-----|-----|------|
|                           |              |                                                                                    | Min   | Typ | Max |      |
| Turn-On Delay Time        | $t_{d(on)}$  | $V_{GS}=0/15V, V_{DD}=400V,$<br>$I_D=12A, R_{G(ext)}=2.5\Omega,$<br>$R_L=80\Omega$ | —     | 8   | —   | ns   |
| Rise Time                 | $t_r$        |                                                                                    | —     | 12  | —   | ns   |
| Turn-Off Delay Time       | $t_{d(off)}$ |                                                                                    | —     | 20  | —   | ns   |
| Fall Time                 | $t_f$        |                                                                                    | —     | 8   | —   | ns   |
| Turn-On Switching Energy  | $E_{on}$     | $V_{DS}=400V, V_{GS}=0V/15V$                                                       | —     | 35  | —   | μJ   |
| Turn-Off Switching Energy | $E_{off}$    | $I_D=12A, R_{G(ext)}=2.5\Omega, L=100\mu H$                                        | —     | 23  | —   | μJ   |

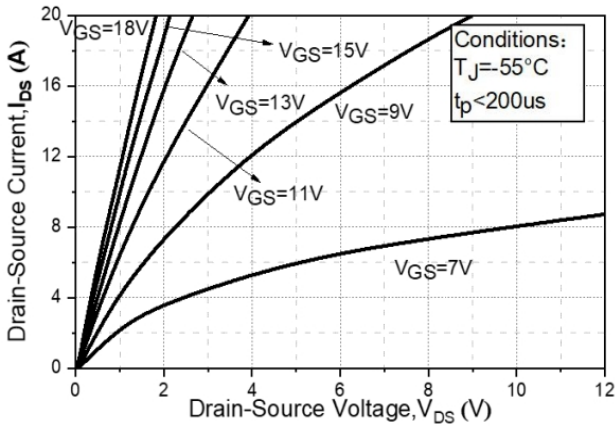
#### Reverse Diode Characteristics

| Parameter                        | Symbol    | Test Condition                                         | Value |     |     | Unit |
|----------------------------------|-----------|--------------------------------------------------------|-------|-----|-----|------|
|                                  |           |                                                        | Min   | Typ | Max |      |
| Diode Forward Voltage            | $V_{SD}$  | $V_{GS}=-5V, I_{SD}=6A,$<br>$T_j=25^{\circ}C$          | —     | 4.2 | —   | V    |
|                                  |           | $V_{GS}=-5V, I_{SD}=6A,$<br>$T_j=175^{\circ}C$         | —     | 3.6 | —   | V    |
| Continuous Diode Forward Current | $I_S$     | $V_{GS}=0V, T_j=25^{\circ}C$                           | —     | —   | 28  | A    |
| Reverse Recovery Time            | $t_{rr}$  | $V_{GS}=0V, I_{SD}=6A,$<br>$V_R=400V, T_j=25^{\circ}C$ | —     | 6   | —   | ns   |
| Reverse Recovery Charge          | $Q_{rr}$  |                                                        | —     | 40  | —   | nC   |
| Peak Reverse Recovery Current    | $I_{rrm}$ |                                                        | —     | 2   | —   | A    |

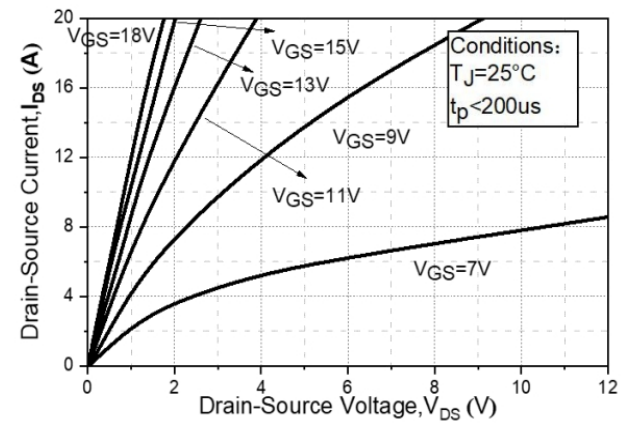


### Typical Performance

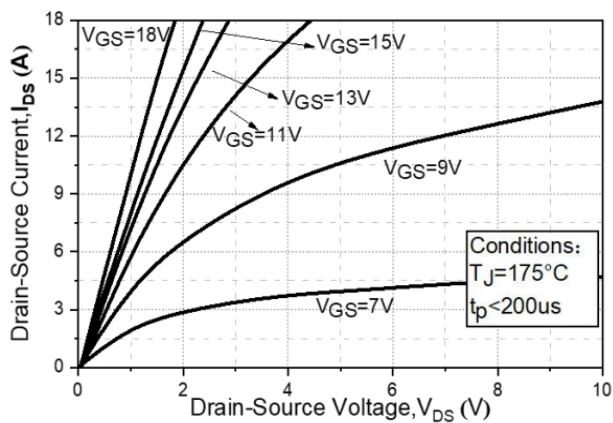
**Fig1. Output Characteristics  $T_J = -55^\circ\text{C}$**



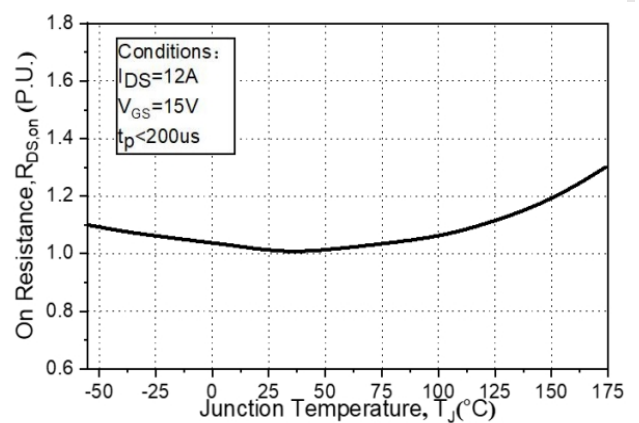
**Fig2. Output Characteristics  $T_J = 25^\circ\text{C}$**



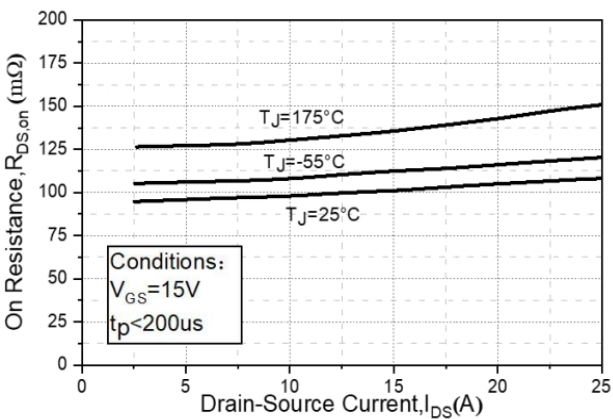
**Fig3. Output Characteristics  $T_J = 175^\circ\text{C}$**



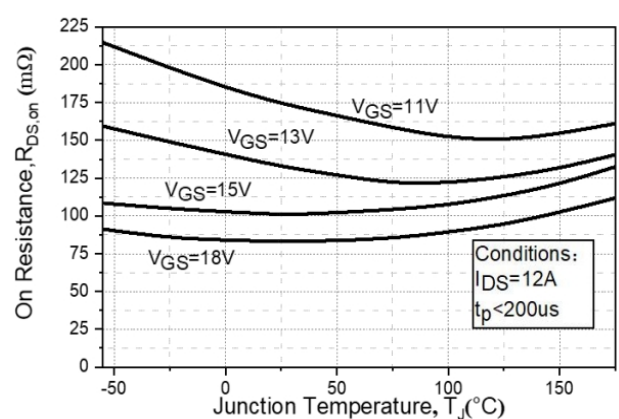
**Fig4. Normalized On-Resistance vs. Temperature**



**Fig5. On-Resistance vs. Drain Current For Various Temperatures**

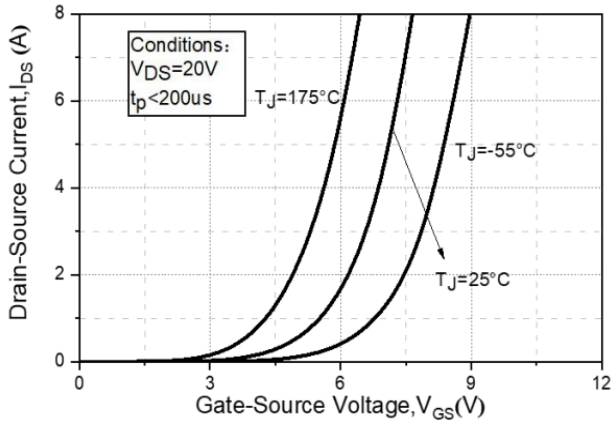


**Fig6. On-Resistance vs. Temperature For Various Gate Voltage**

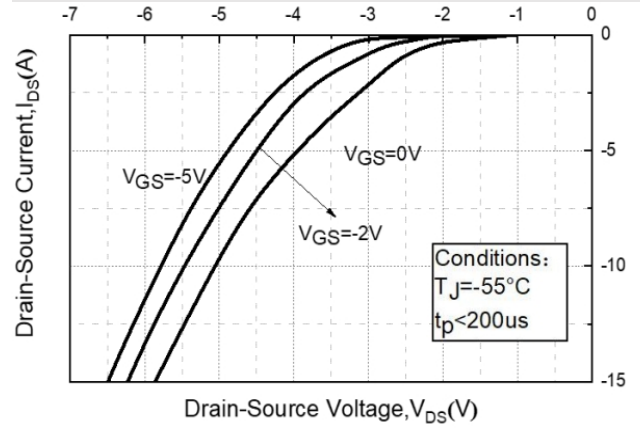


### Typical Performance

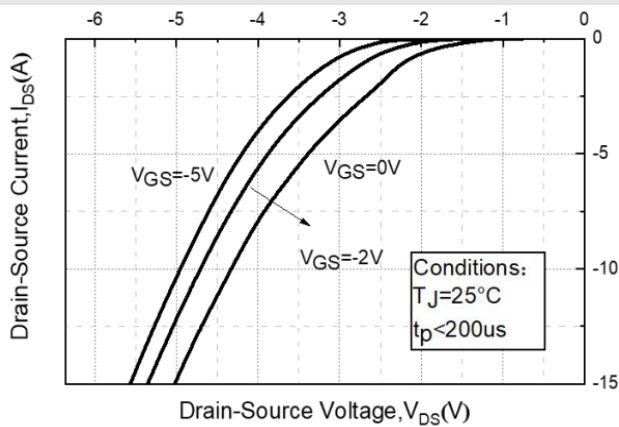
**Fig7. Transfer Characteristic for Various Junction Temperatures**



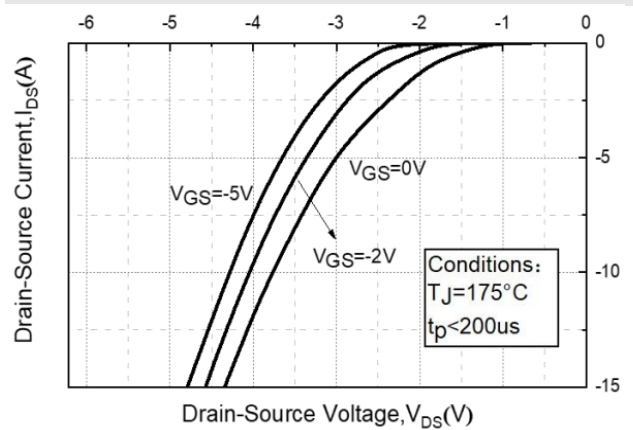
**Fig8. Body Diode Characteristic at -55°C**



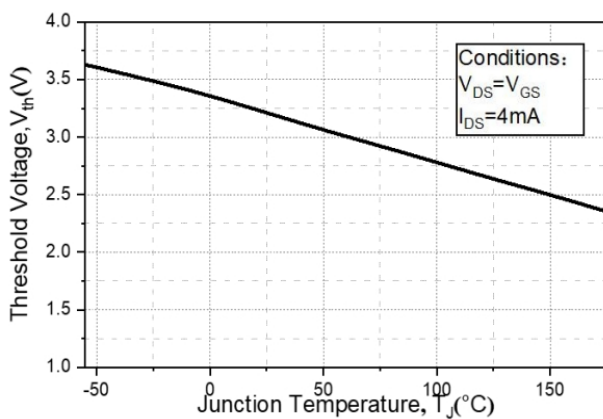
**Fig9. Body Diode Characteristic at 25°C**



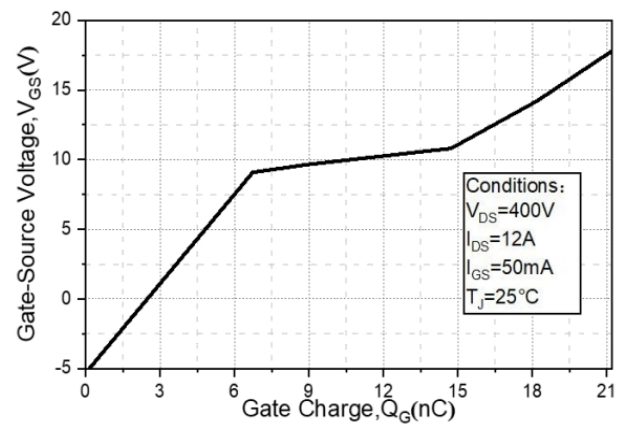
**Fig10. Body Diode Characteristic at 175°C**



**Fig11. Threshold Voltage vs. Temperature**

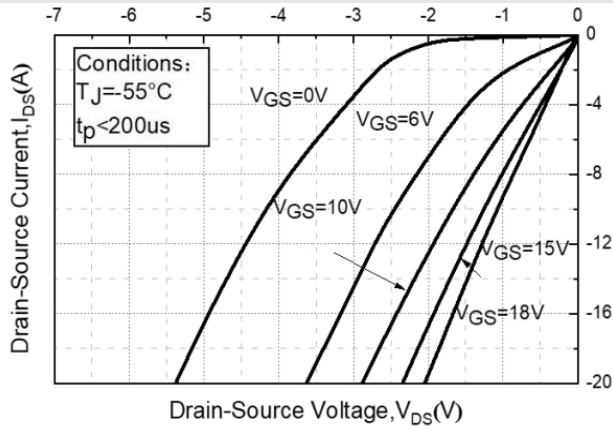


**Fig12. Gate Charge Characteristics**

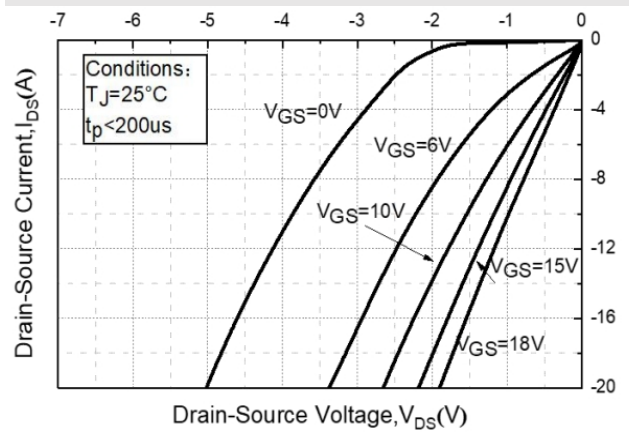


### Typical Performance

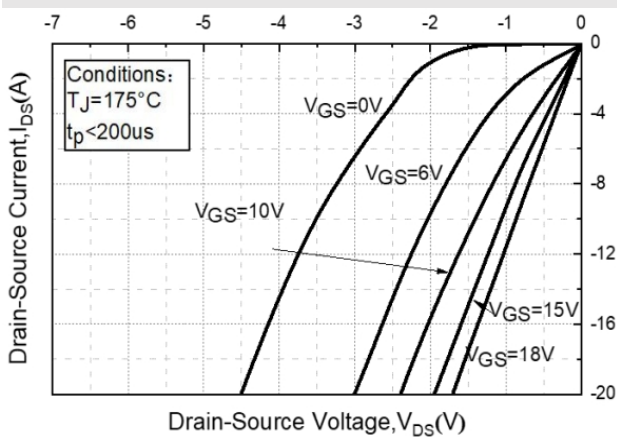
**Fig13. 3rd Quadrant Characteristic at -55°C**



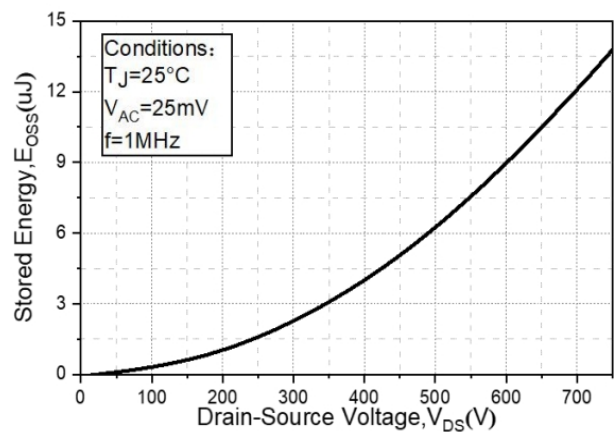
**Fig14. 3rd Quadrant Characteristic at 25°C**



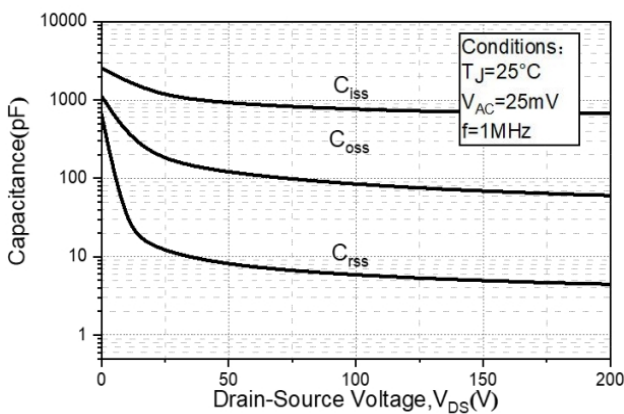
**Fig15. 3rd Quadrant Characteristic at 175°C**



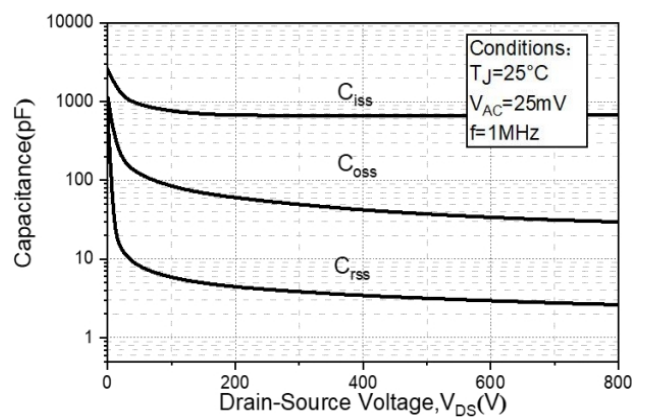
**Fig16. Output Capacitor Stored Energy**



**Fig17. Capacitances vs. Drain-Source Voltage (0-200V)**



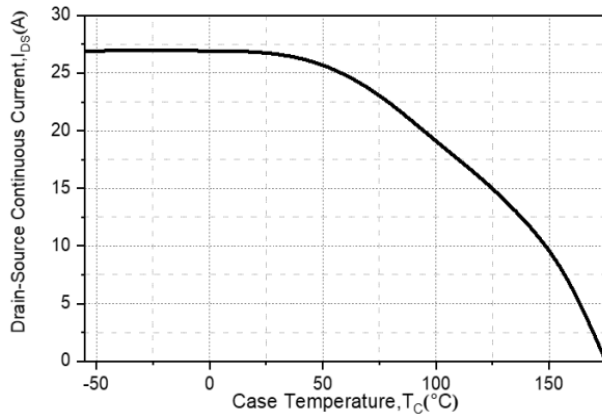
**Fig18. Capacitances vs. Drain-Source Voltage (0-800V)**



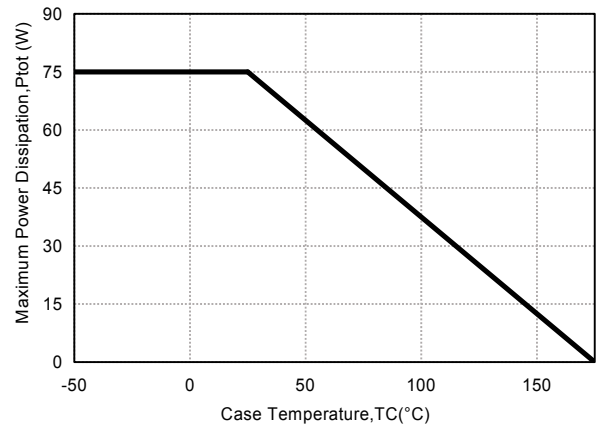


## Typical Performance

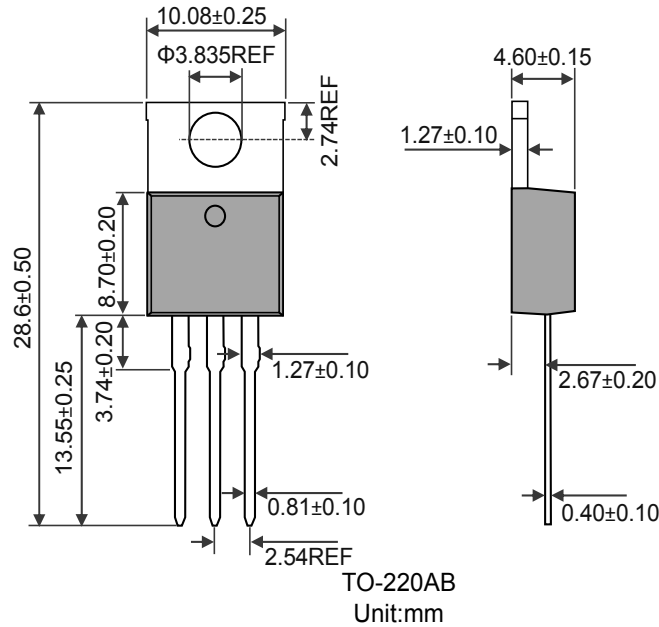
**Fig19. Continuous Drain Current vs. Case Temperature**



**Fig20. Maximum Power Dissipation vs. Case Temperature**



### Package Outline Dimensions



### Marking Information



“MHCHXM”= Product Logo

“Marking Code”= The Following

“XXXX”= Date Code Marking

| Marking Code | Part Number  |
|--------------|--------------|
| C65N100H3    | HXMC65N100H3 |

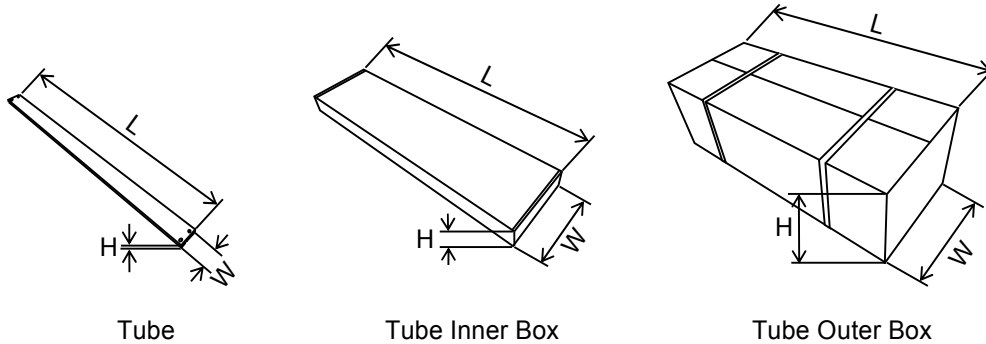




## Packing Information

| Packaging | Part Number | Quantity(pcs) | Size(mm)       |
|-----------|-------------|---------------|----------------|
| Tube      | Tube        | 50            | L534×W33×H7    |
|           | Inner Box   | 1000          | L560×W150×H40  |
|           | Outer Box   | 5000          | L580×W235×H175 |

### Packaging:Tube



## Notes

### Lead Forming

1. During lead frame bending, the lead frame should be bent at a distance more than 3mm from bottom of the epoxy. And the bending degree should not exceed 90°.

Note: The lead frame must be secured and do not touch the epoxy before bending to avoid damage to the transistor. In addition, when using a mold for a large number of lead molding, the structure of the fixed lead must be set, and it should be noted that the lead pressure rod structure cannot exert pressure on the epoxy resin body.

2. Do not bend the lead repeatedly. Do not bend the lead outward



### Heat sink mounting

For power devices, in order to reduce junction temperature, heat dissipation blocks are usually used to disperse heat to the outside, and semiconductor power devices installed on the heat dissipation blocks can effectively dissipate heat without losing the reliability of the semiconductor, so the following matters should be noted when using:

1. Pay attention to the selection of silicone cream

In order to improve the thermal conductivity and heat dissipation effect of the device and the heat dissipation block, generally apply a thin layer of silicone grease evenly on the contact surface of the device and the heat dissipation block. Choose a silicone grease with low oil separation degree. Do not overapply it, otherwise it will attach too much stress to the resin.

2. Optimum torque is required

When using the fastening torque, pay attention not to use too much torque, so as not to damage the epoxy resin body, pay attention to the smooth cooling block body, no file chips and other foreign bodies between the transistor and the cooling block, pay attention to the selection of screws, nuts, gaskets and washers, so as not to cause damage to the transistor due to improper selection.

### Soldering

1. Pay special attention to welding. When welding, the distance between the solder joint and the epoxy ball should be greater than 3mm, and it is recommended to weld it outside the tie rod base.

2. Avoid applying any pressure to the lead frame while the transistor is at high temperatures, especially when welding. Dip welding and manual welding should not be done more than once

### Notes:

For specific precautions, please refer to our company's relevant technical documents or visit our official website at <http://www.jshxm.com>



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