



100V 2.4mΩ N-Ch Power MOSFET

Features

- Ultra-low $R_{DS(ON)}$
- Low Gate Charge
- High Current Capability
- 100% UIS Tested, 100% R_g Tested

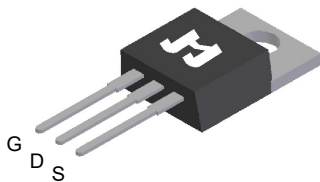
Product Summary

| Parameter | Value | Unit |
|--|-------|------|
| V_{DS} | 100 | V |
| $V_{GS(th)_Typ}$ | 2.8 | V |
| I_D (@ $V_{GS} = 10V$) ⁽¹⁾ | 219 | A |
| $R_{DS(ON)_Typ}$ (@ $V_{GS} = 10V$) | 2.4 | mΩ |

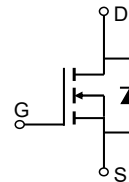
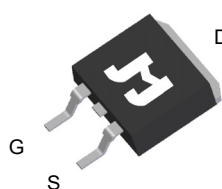
Applications

- Power Management in Telecom., Industrial Automation, CE
- Current Switching in DC/DC & AC/DC (SR) Sub-systems
- Motor Driving in Power Tool, E-vehicle, Robotics

TO-220-3L Top View



TO-263-3L Top View

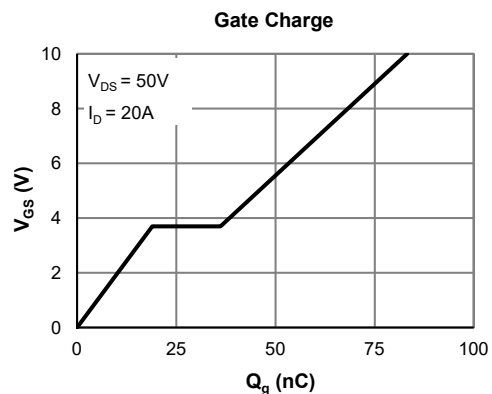
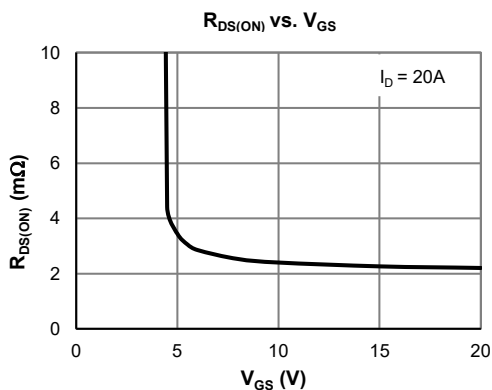


Ordering Information

| Device | Package | # of Pins | Marking | MSL | T_J (°C) | Media | Quantity (pcs) |
|---------------|-----------|-----------|---------|-----|------------|--------------|----------------|
| JMSH1002CC-U | TO-220-3L | 3 | SH1002C | N/A | -55 to 150 | Tube | 50 |
| JMSH1002CE-13 | TO-263-3L | 3 | SH1002C | 1 | -55 to 150 | 13-inch Reel | 800 |

Absolute Maximum Ratings (@ $T_A = 25^\circ C$ unless otherwise specified)

| Parameter | Symbol | Value | Unit |
|---|----------------|---------------------|------|
| Drain-to-Source Voltage | V_{DS} | 100 | V |
| Gate-to-Source Voltage | V_{GS} | ±20 | V |
| Continuous Drain Current ⁽¹⁾ | I_D | $T_C = 25^\circ C$ | 219 |
| | | $T_C = 100^\circ C$ | 139 |
| Continuous Drain Current ⁽⁶⁾ | I_D | 180 | A |
| Pulsed Drain Current ⁽²⁾ | I_{DM} | 878 | A |
| Avalanche Current ⁽³⁾ | I_{AS} | 61 | A |
| Avalanche Energy ⁽³⁾ | E_{AS} | 558 | mJ |
| Power Dissipation ⁽⁴⁾ | P_D | $T_C = 25^\circ C$ | 250 |
| | | $T_C = 100^\circ C$ | 100 |
| Junction & Storage Temperature Range | T_J, T_{STG} | -55 to 150 | °C |





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

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|-----------------------------------|---------------|---|------|------|-----------|------------------|
| STATIC PARAMETERS | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$ | 100 | | | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = 80\text{V}, V_{GS} = 0\text{V}$ $T_J = 55^\circ\text{C}$ | | | 1.0 | μA |
| | | | | | 5.0 | |
| Gate-Body Leakage Current | I_{GSS} | $V_{DS} = 0\text{V}, V_{GS} = \pm 20\text{V}$ | | | ± 100 | nA |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\mu\text{A}$ | 2.0 | 2.8 | 4.0 | V |
| Static Drain-Source ON-Resistance | $R_{DS(ON)}$ | $V_{GS} = 10\text{V}, I_D = 20\text{A}$ | | 2.4 | 2.9 | $\text{m}\Omega$ |
| Static Drain-Source ON-Resistance | $R_{DS(ON)}$ | $V_{GS} = 10\text{V}, I_D = 20\text{A}$ | | 2.6 | 3.1 | $\text{m}\Omega$ |
| Forward Transconductance | g_{FS} | $V_{DS} = 5\text{V}, I_D = 20\text{A}$ | | 51 | | S |
| Diode Forward Voltage | V_{SD} | $I_S = 1\text{A}, V_{GS} = 0\text{V}$ | | 0.70 | 1.0 | V |
| Diode Continuous Current | I_S | $T_C = 25^\circ\text{C}$ | | | 250 | A |

DYNAMIC PARAMETERS ⁽⁵⁾

| | | | | | | |
|------------------------------|-----------|--|--|------|--|----------|
| Input Capacitance | C_{iss} | $V_{GS} = 0\text{V}, V_{DS} = 50\text{V}, f = 1\text{MHz}$ | | 5740 | | pF |
| Output Capacitance | C_{oss} | | | 1193 | | pF |
| Reverse Transfer Capacitance | C_{rss} | | | 7.6 | | pF |
| Gate Resistance | R_g | $V_{GS} = 0\text{V}, V_{DS} = 0\text{V}, f = 1\text{MHz}$ | | 1.1 | | Ω |

SWITCHING PARAMETERS ⁽⁵⁾

| | | | | | | |
|---|--------------|--|---|------|----|----|
| Total Gate Charge (@ $V_{GS} = 10\text{V}$) | Q_g | $V_{GS} = 0 \text{ to } 10\text{V}$ $V_{DS} = 50\text{V}, I_D = 20\text{A}$ | | 83 | | nC |
| Total Gate Charge (@ $V_{GS} = 6.0\text{V}$) | Q_g | | | 53 | | nC |
| Gate Source Charge | Q_{gs} | | | 19.0 | | nC |
| Gate Drain Charge | Q_{gd} | | | 17.2 | | nC |
| Turn-On Delay Time | $t_{D(on)}$ | $V_{GS} = 10\text{V}, V_{DS} = 50\text{V}$ $R_L = 2.5\Omega, R_{GEN} = 6\Omega$ | | 23 | | ns |
| Turn-On Rise Time | t_r | | | 38 | | ns |
| Turn-Off Delay Time | $t_{D(off)}$ | | | 72 | | ns |
| Turn-Off Fall Time | t_f | | | 53 | | ns |
| Body Diode Reverse Recovery Time | t_{rr} | | $I_F = 15\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$ | | 73 | |
| Body Diode Reverse Recovery Charge | Q_{rr} | $I_F = 15\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$ | | 83 | | nC |

Thermal Performance

| Parameter | Symbol | Typ. | Max. | Unit |
|---|-----------------|------|------|---------------------------|
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 54 | 65 | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 0.38 | 0.50 | $^\circ\text{C}/\text{W}$ |

Notes:

1. Computed continuous current assumes the condition of T_{J_Max} while the actual continuous current depends on the thermal & electro-mechanical application board design.
2. This single-pulse measurement was taken under $T_{J_Max} = 150^\circ\text{C}$.
3. This single-pulse measurement was taken under the following condition [$L = 300\text{mH}, V_{GS} = 10\text{V}, V_{DS} = 50\text{V}$] while its value is limited by $T_{J_Max} = 150^\circ\text{C}$.
4. The power dissipation P_D is based on $T_{J_Max} = 150^\circ\text{C}$.
5. This value is guaranteed by design hence it is not included in the production test.
6. Continuous current rating is limited by the package used.

Typical Electrical & Thermal Characteristics

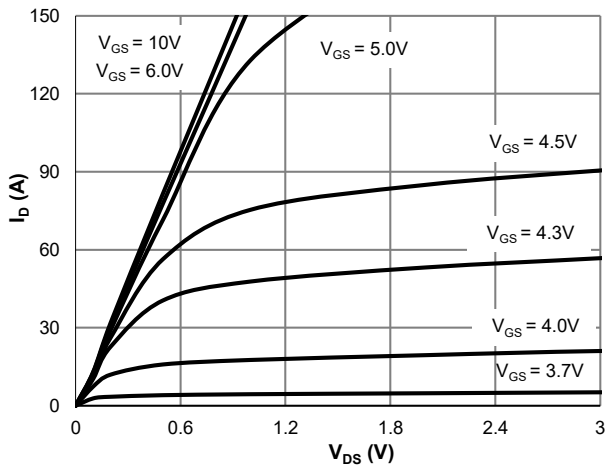


Figure 1: Saturation Characteristics

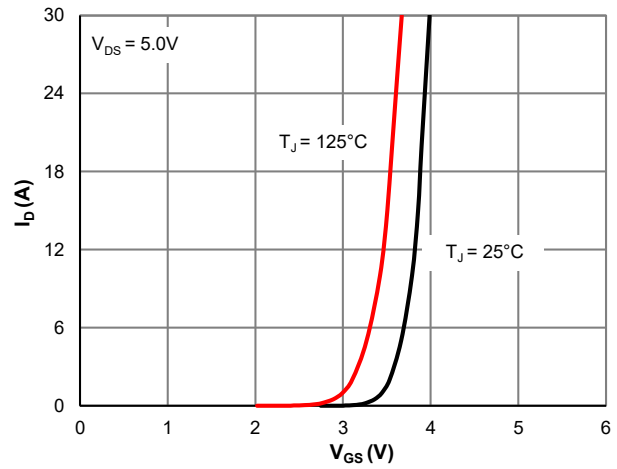


Figure 2: Transfer Characteristics

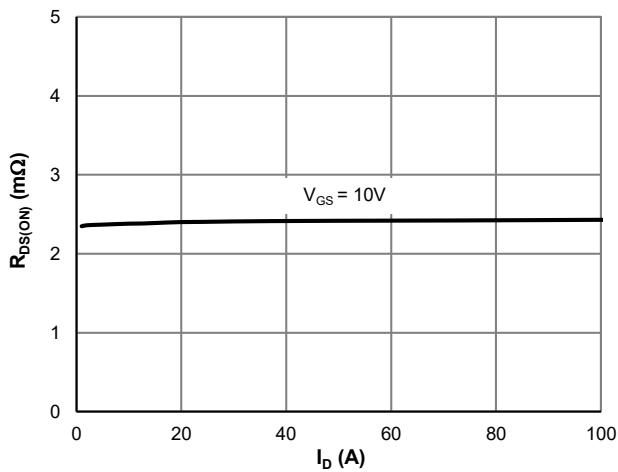


Figure 3: $R_{DS(ON)}$ vs. Drain Current

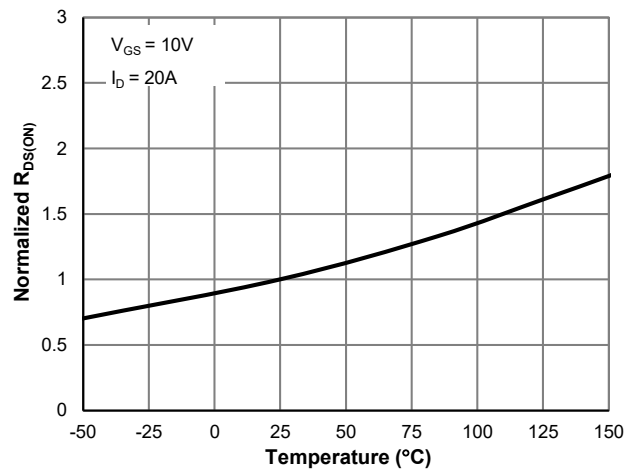


Figure 4: $R_{DS(ON)}$ vs. Junction Temperature

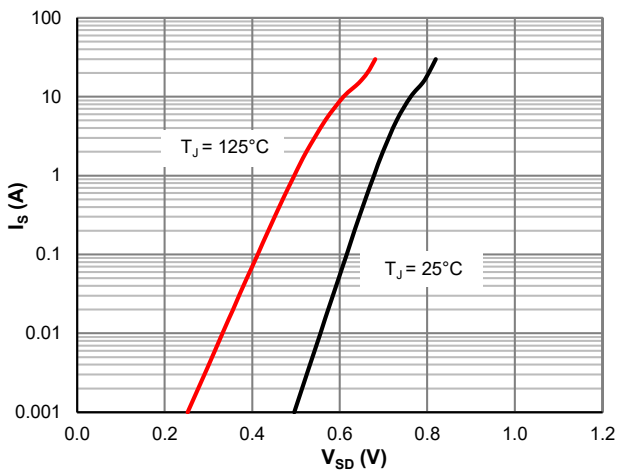


Figure 5: Body-Diode Characteristics

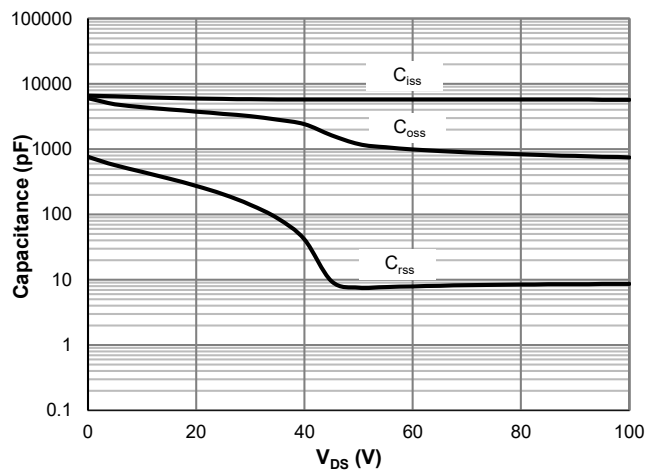


Figure 6: Capacitance Characteristics

Typical Electrical & Thermal Characteristics

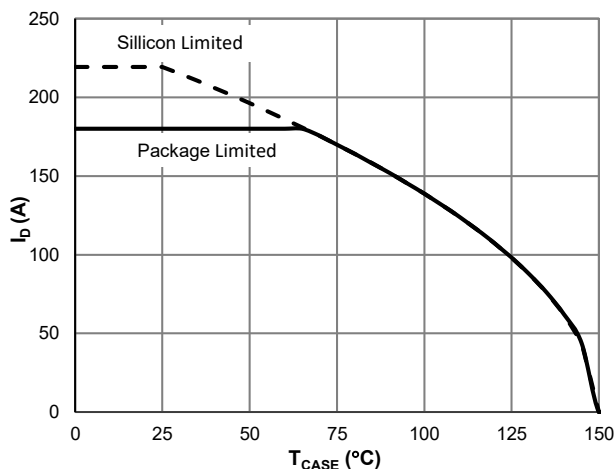


Figure 7: Current De-rating

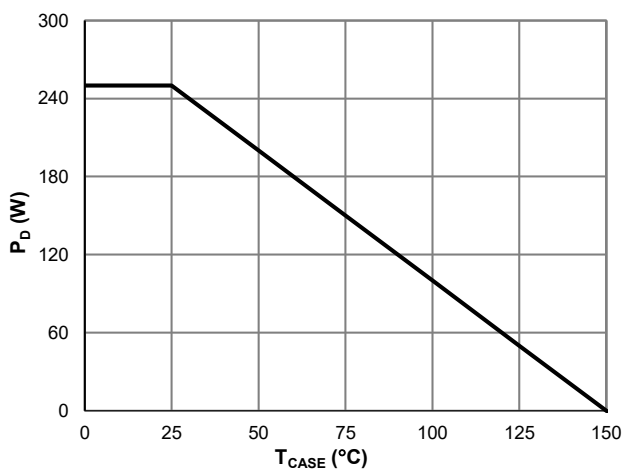


Figure 8: Power De-rating

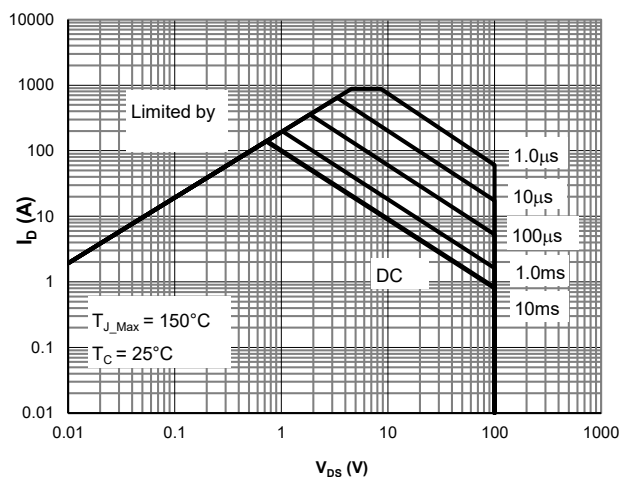


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

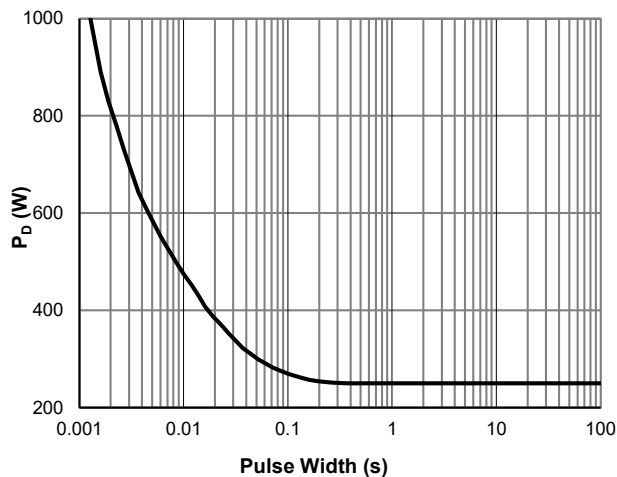


Figure 10: Single Pulse Power Rating, Junction-to-Case

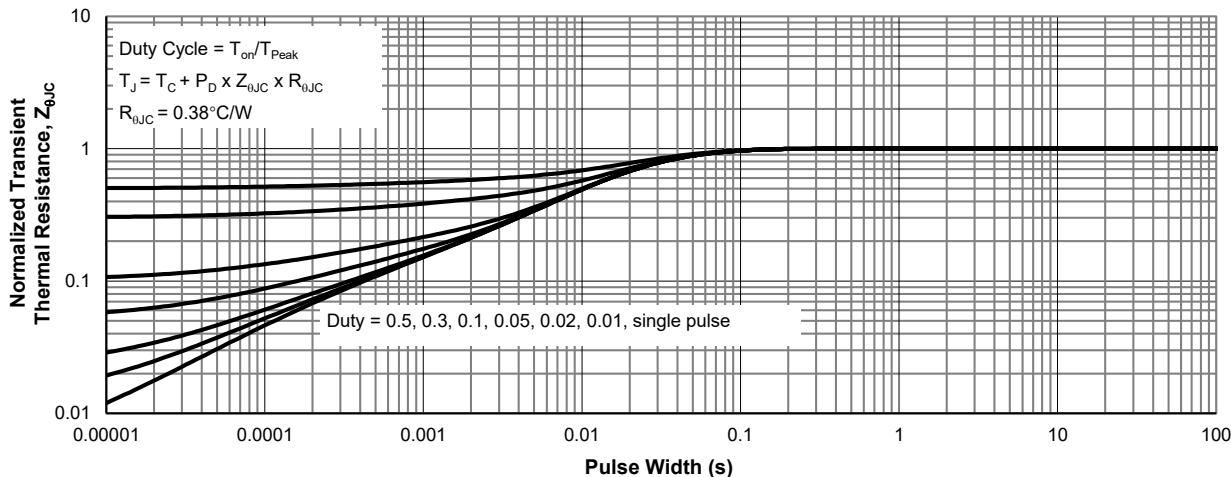
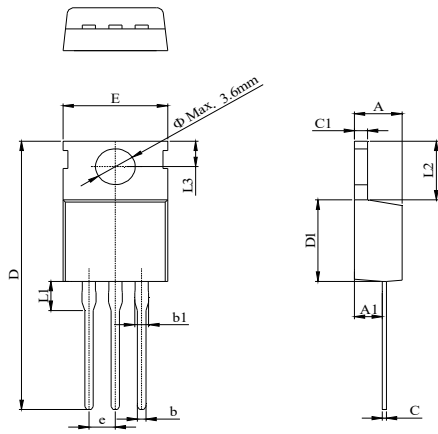


Figure 11: Normalized Maximum Transient Thermal Impedance



TO-220-3L Package Information

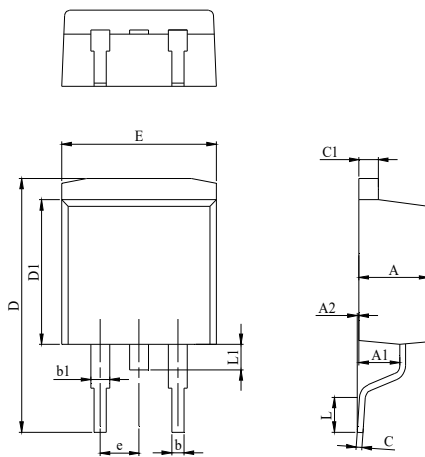
Package Outline



| DIM. | MILLIMETER | | |
|------|------------|----------|-------|
| | MIN. | NOM. | MAX. |
| A | 4.37 | | 4.70 |
| A1 | 2.20 | | 3.00 |
| b | 0.70 | | 0.95 |
| b1 | 1.14 | | 1.70 |
| C | 0.45 | | 0.60 |
| C1 | 1.23 | | 1.40 |
| D | 28.00 | | 29.80 |
| D1 | 8.80 | | 9.90 |
| E | 9.70 | | 10.50 |
| L1 | | | 3.80 |
| L2 | 6.25 | | 6.90 |
| L3 | 2.40 | | 3.00 |
| e | | 2.54 BSC | |

TO-263-3L Package Information

Package Outline



| DIM. | MILLIMETER | | |
|------|------------|------|-------|
| | MIN. | NOM. | MAX. |
| A | 4.37 | | 4.77 |
| A1 | 2.30 | | 2.89 |
| A2 | 0.00 | 0.10 | 0.25 |
| b | 0.70 | | 0.96 |
| b1 | 1.17 | | 1.47 |
| C | 0.30 | | 0.55 |
| C1 | 1.22 | | 1.42 |
| D | 14.10 | | 15.80 |
| D1 | 8.50 | | 9.60 |
| E | 9.86 | | 10.36 |
| L | 2.00 | | 2.60 |
| L1 | | | 1.75 |
| e | | 2.54 | |

Recommended Footprint

