



150V 3.3mΩ TOLL N-Ch Power MOSFET

Features

- Ultra-low $R_{DS(ON)}$
- Low Gate Charge
- 100% UIS Tested, 100% R_g Tested
- Pb-free Lead Plating
- Halogen-free and RoHS-compliant

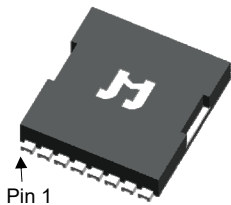
Product Summary

| Parameter | Value | Unit |
|--|-------|------|
| V_{DS} | 150 | V |
| $V_{GS(th_Typ)}$ | 3.2 | V |
| I_D (@ $V_{GS} = 10V$) ⁽¹⁾ | 263 | A |
| $R_{DS(ON)_Typ}$ (@ $V_{GS} = 10V$) | 3.3 | mΩ |

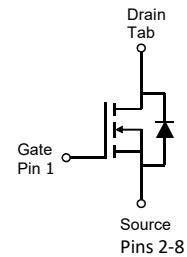
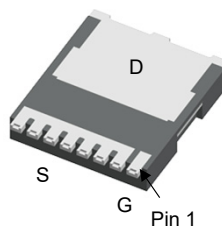
Applications

- 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

PowerJE®10x12 Top



PowerJE®10x12 Bottom



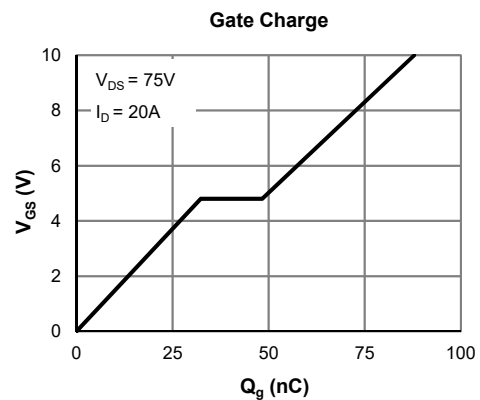
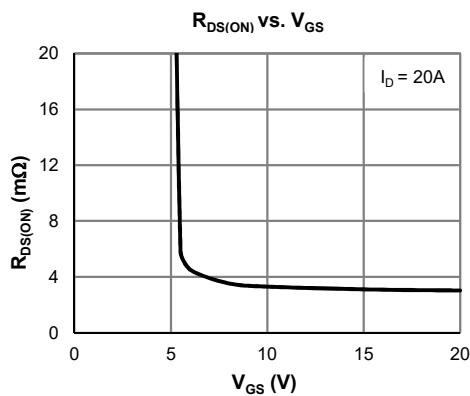
Ordering Information

| Device | Package | # of Pins | Marking | MSL | T_J (°C) | Media | Quantity (pcs) |
|----------------|------------------------------|-----------|---------|-----|------------|--------------|----------------|
| JMSH1504ATL-13 | PowerJE®10x12 ⁽¹⁾ | 8 | SH1504A | 1 | -55 to 175 | 13-inch Reel | 2000 |

Note 1: PowerJE® is a registered trademark of JieJie Micro., its package outline is compatible to that of TO-LeadLess (TOLL).

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

| Parameter | Symbol | Value | Unit |
|---|----------------|---------------------|------|
| Drain-to-Source Voltage | V_{DS} | 150 | V |
| Gate-to-Source Voltage | V_{GS} | ±20 | V |
| Continuous Drain Current ⁽²⁾ | I_D | $T_C = 25^\circ C$ | 263 |
| | | $T_C = 100^\circ C$ | 186 |
| Pulsed Drain Current ⁽³⁾ | I_{DM} | 817 | A |
| Avalanche Current ⁽⁴⁾ | I_{AS} | 49 | A |
| Avalanche Energy ⁽⁴⁾ | E_{AS} | 1201 | mJ |
| Power Dissipation ⁽⁵⁾ | P_D | $T_C = 25^\circ C$ | 600 |
| | | $T_C = 100^\circ C$ | 300 |
| Junction & Storage Temperature Range | T_J, T_{STG} | -55 to 175 | °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 | $V_{(BR)DSS}$ | $I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$ | 150 | | | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = 120\text{V}, V_{GS} = 0\text{V}$ | | | 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 | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\mu\text{A}$ | 2.5 | 3.2 | 4.5 | V |
| Static Drain-Source ON-Resistance | $R_{DS(ON)}$ | $V_{GS} = 10\text{V}, I_D = 20\text{A}$ | | 3.3 | 4.2 | $\text{m}\Omega$ |
| Forward Transconductance | g_{FS} | $V_{DS} = 5\text{V}, I_D = 20\text{A}$ | | 65 | | S |
| Diode Forward Voltage | V_{SD} | $I_S = 1\text{A}, V_{GS} = 0\text{V}$ | | 0.71 | 1.0 | V |
| Diode Continuous Current | I_S | $T_C = 25^\circ\text{C}$ | | | 600 | A |

DYNAMIC PARAMETERS ⁽⁶⁾

| | | | | | | |
|------------------------------|-----------|--|--|------|--|----------|
| Input Capacitance | C_{iss} | $V_{GS} = 0\text{V}, V_{DS} = 75\text{V}, f = 1\text{MHz}$ | | 6540 | | pF |
| Output Capacitance | C_{oss} | | | 772 | | pF |
| Reverse Transfer Capacitance | C_{rss} | | | 6.7 | | pF |
| Gate Resistance | R_g | $V_{GS} = 0\text{V}, V_{DS} = 0\text{V}, f = 1\text{MHz}$ | | 2.4 | | Ω |

SWITCHING PARAMETERS ⁽⁶⁾

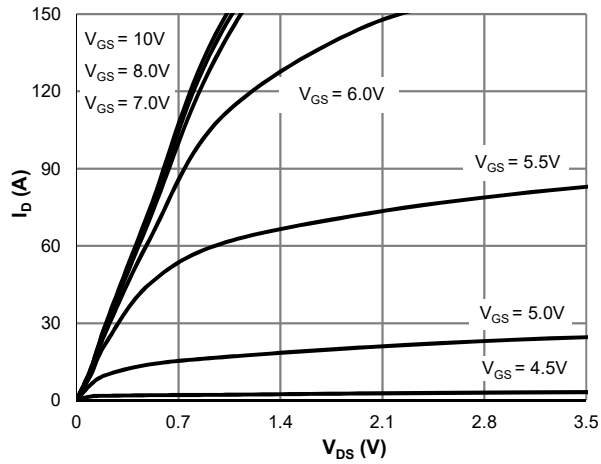
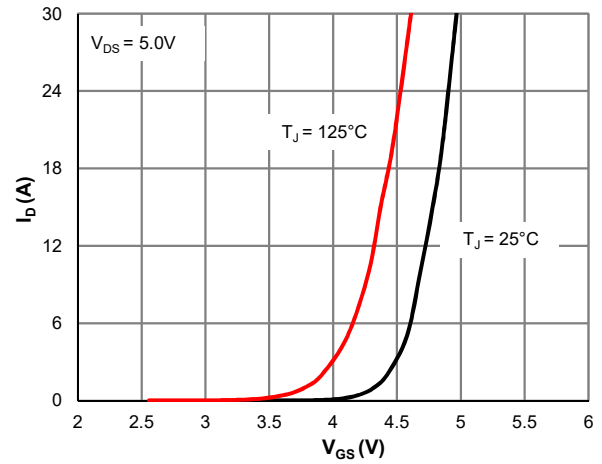
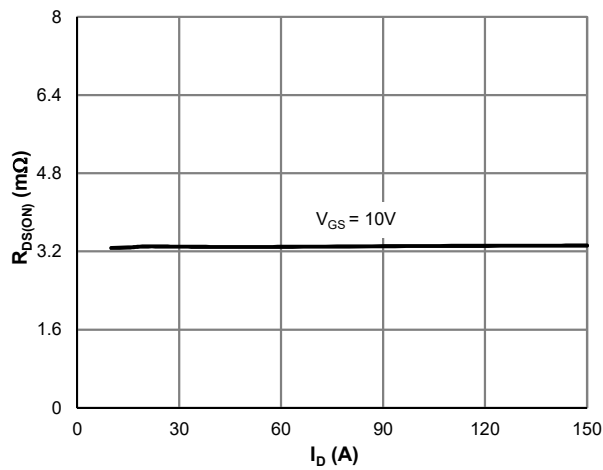
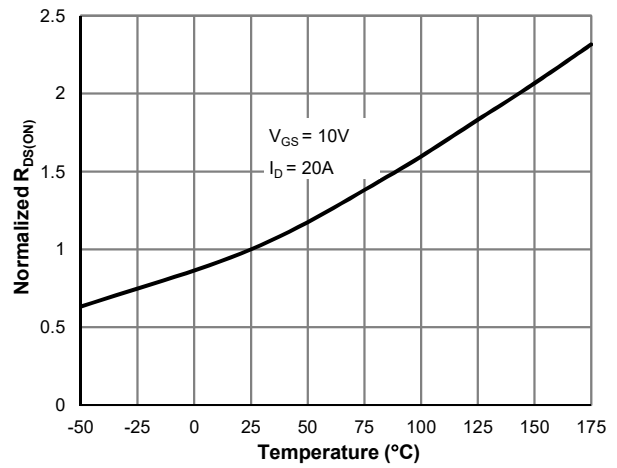
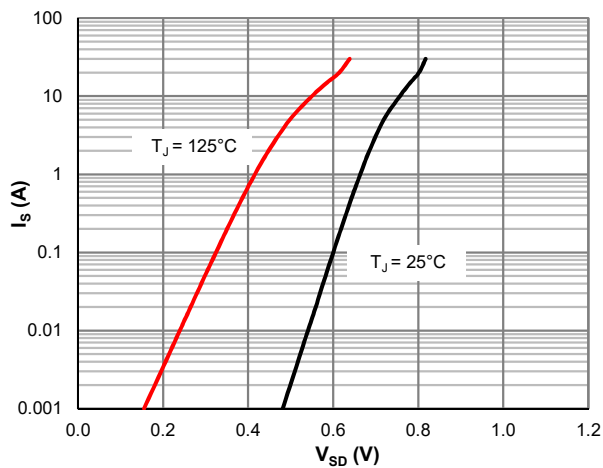
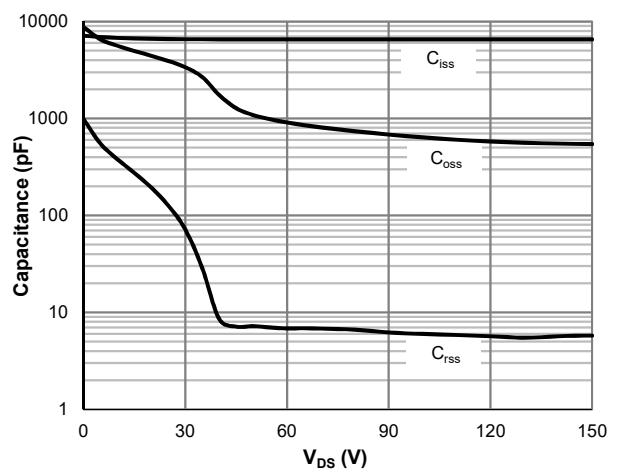
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|---|--------------|---|---|-----|-----|----|
| Total Gate Charge (@ $V_{GS} = 10\text{V}$) | Q_g | $V_{GS} = 0 \text{ to } 10\text{V}$ $V_{DS} = 75\text{V}, I_D = 20\text{A}$ | | 88 | | nC |
| Total Gate Charge (@ $V_{GS} = 6.0\text{V}$) | Q_g | | | 57 | | nC |
| Gate Source Charge | Q_{gs} | | | 32 | | nC |
| Gate Drain Charge | Q_{gd} | | | 16 | | nC |
| Turn-On DelayTime | $t_{D(on)}$ | $V_{GS} = 10\text{V}, V_{DS} = 75\text{V}$ $R_L = 3.75\Omega, R_{GEN} = 6\Omega$ | | 48 | | ns |
| Turn-On Rise Time | t_r | | | 90 | | ns |
| Turn-Off DelayTime | $t_{D(off)}$ | | | 94 | | ns |
| Turn-Off Fall Time | t_f | | | 60 | | ns |
| Body Diode Reverse Recovery Time | t_{rr} | | $I_F = 15\text{A}, di_F/dt = 100\text{A}/\mu\text{S}$ | | 122 | |
| Body Diode Reverse Recovery Charge | Q_{rr} | $I_F = 15\text{A}, di_F/dt = 100\text{A}/\mu\text{S}$ | | 279 | | nC |

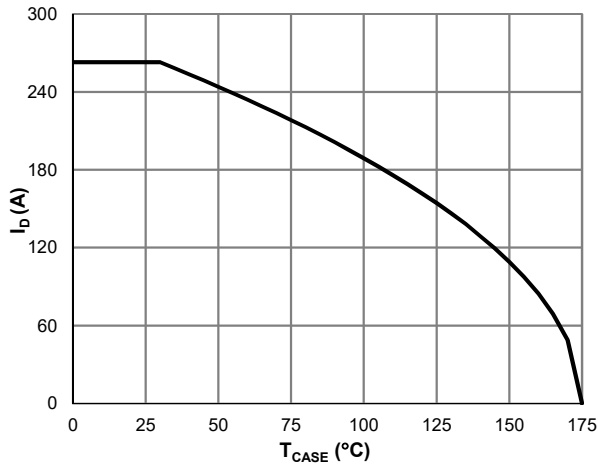
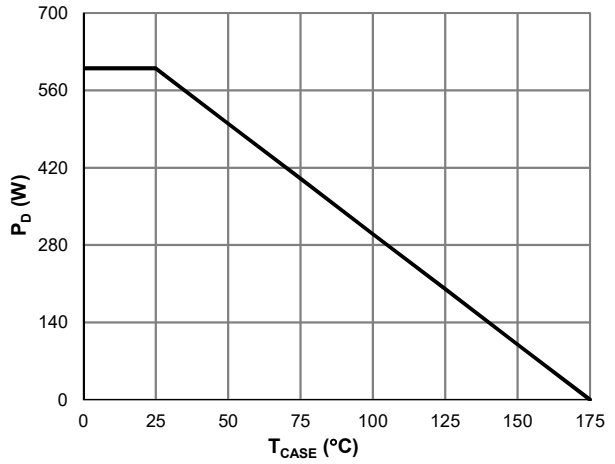
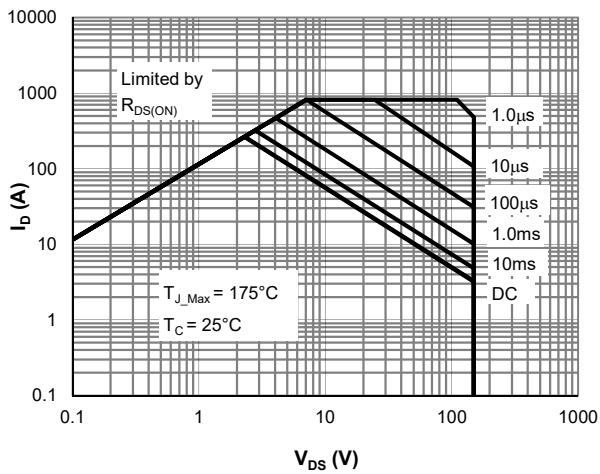
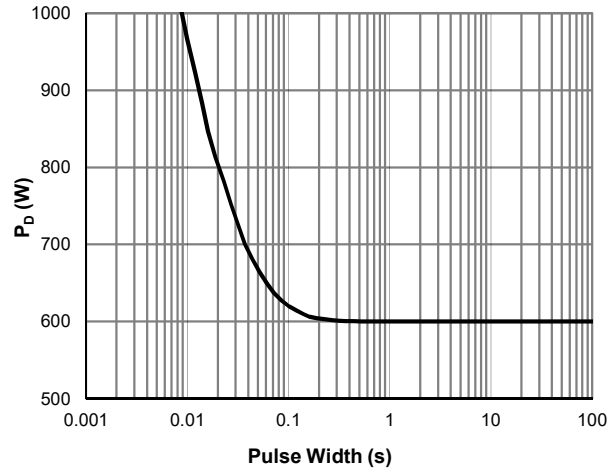
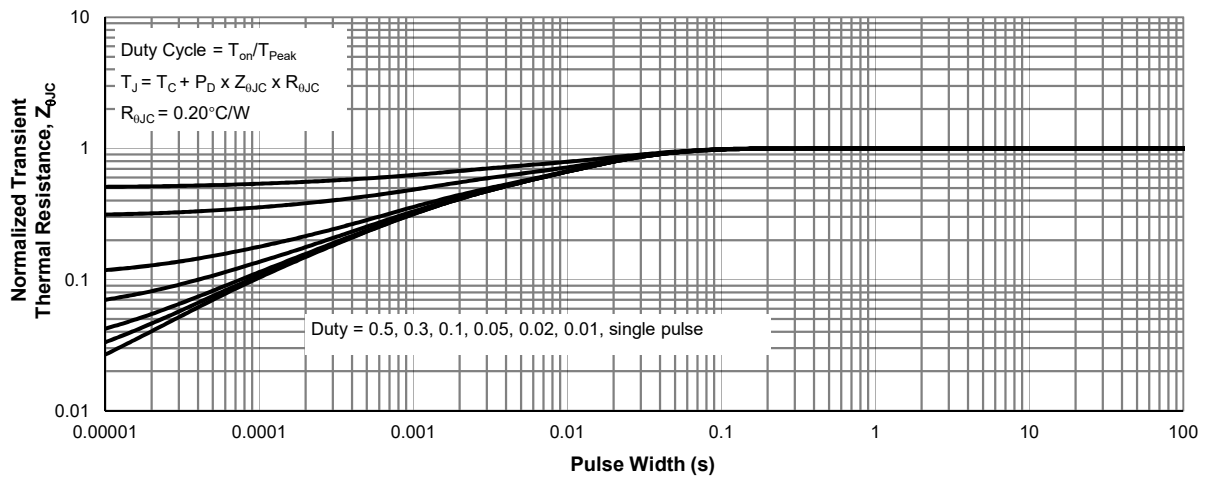
Thermal Performance

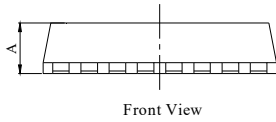
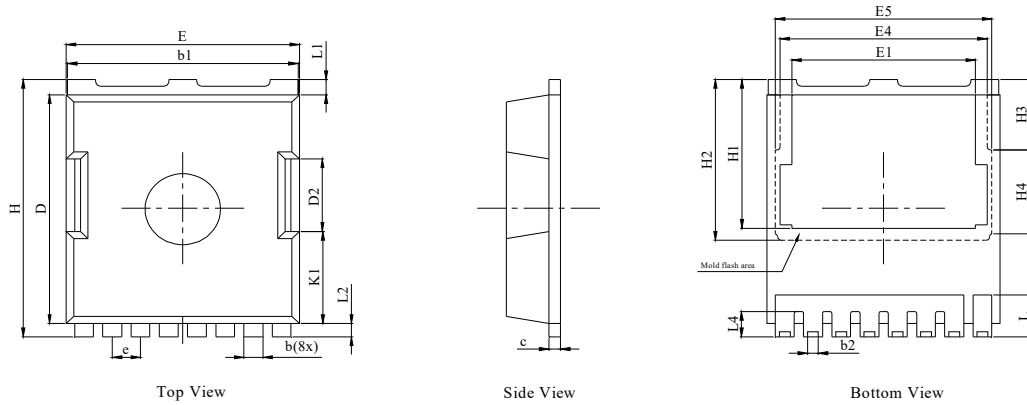
| Parameter | Symbol | Typ. | Max. | Unit |
|---|-----------------|------|------|---------------------------|
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 45 | 55 | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 0.20 | 0.25 | $^\circ\text{C}/\text{W}$ |

Notes:

2. Computed continuous current assumes the condition of T_{J_Max} while the actual continuous current depends on the thermal & electro-mechanical application board design.
3. This single-pulse measurement was taken under $T_{J_Max} = 175^\circ\text{C}$.
4. This single-pulse measurement was taken under the following condition [$L = 1\text{mH}, V_{GS} = 10\text{V}, V_{DS} = 75\text{V}$] while its value is limited by $T_{J_Max} = 175^\circ\text{C}$.
5. The power dissipation P_D is based on $T_{J_Max} = 175^\circ\text{C}$.
6. This value is guaranteed by design hence it is not included in the production test.

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 Safe Operating Area

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

Figure 11: Normalized Maximum Transient Thermal Impedance

PowerJE® 10x12 Package Information
Package Outlines

NOTES:

1. Dimension and tolerance per ASME Y14.5M, 1994.
2. All dimensions in millimeter.
3. Dimensions do not include burrs or mold flash. Mold flash or burrs does not exceed 0.150mm.

| DIM. | MILLIMETER | | |
|------|------------|------------|-------|
| | MIN. | NOM. | MAX. |
| A | 2.20 | 2.30 | 2.40 |
| b | 0.70 | 0.80 | 0.90 |
| b1 | 9.70 | 9.80 | 9.90 |
| b2 | 0.42 | 0.46 | 0.50 |
| c | 0.40 | 0.50 | 0.60 |
| D | 10.28 | 10.38 | 10.58 |
| D2 | | 3.30 | |
| E | 9.70 | 9.90 | 10.10 |
| E1 | | 7.80 | |
| E4 | | 8.80 | |
| E5 | | 9.20 | |
| e | | 1.20 (BSC) | |
| H | 11.48 | 11.68 | 11.88 |
| H1 | 6.55 | 6.75 | 6.85 |
| H2 | | 7.30 | |
| H3 | | 3.20 | |
| H4 | | 3.80 | |
| K1 | | 4.18 | |
| L | 1.70 | 1.90 | 2.10 |
| L1 | | 0.70 | |
| L2 | | 0.60 | |
| L4 | 1.00 | 1.15 | 1.30 |

Recommended Soldering Footprint
