



Description

JMT N-channel Enhancement Mode Power MOSFET

Features

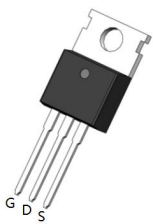
- 40V, 190A
 $R_{DS(ON)} < 2.6m\Omega @ V_{GS} = 10V$
- Advanced Trench Technology
- Provide Excellent $R_{DS(ON)}$ and Low Gate Charge
- Lead free product is acquired

Application

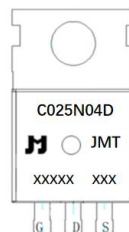
- Load Switch
- PWM Application
- Power management



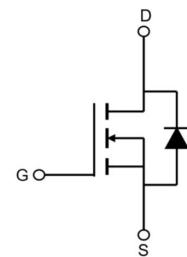
100% UIS TESTED!
100% ΔV_{ds} TESTED!



TO-220C top view



Marking and pin Assignment



Schematic Diagram

Package Marking and Ordering Information

| Device Marking | Device | OUTLINE | Device Package | TUBE (PCS) | Inner Box (PCS) | Per Carton (PCS) |
|----------------|-------------|---------|----------------|------------|-----------------|------------------|
| JMTC025N04D | JMTC025N04D | TUBE | TO-220C | 50 | 1000 | 5000 |

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

| Symbol | Parameter | Max. | Units |
|-----------------|---|---------------------|--------------|
| V_{DSS} | Drain-Source Voltage | 40 | V |
| V_{GSS} | Gate-Source Voltage | ± 25 | V |
| I_D | Continuous Drain Current | $T_C = 25^\circ C$ | 190 |
| | | $T_C = 100^\circ C$ | 124 |
| I_{DM} | Pulsed Drain Current ^{note1} | 760 | A |
| EAS | Single Pulsed Avalanche Energy ^{note2} | 576 | mJ |
| P_D | Power Dissipation | $T_C = 25^\circ C$ | 197 |
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case | 0.76 | $^\circ C/W$ |
| T_J, T_{STG} | Operating and Storage Temperature Range | -55 to +175 | $^\circ C$ |



Electrical Characteristics (T_J=25°C unless otherwise specified)

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Units |
|---|---|---|------|------|------|-------|
| Off Characteristic | | | | | | |
| V _{(BR)DSS} | Drain-Source Breakdown Voltage | V _{GS} =0V, I _D =250μA | 40 | - | - | V |
| I _{DSS} | Zero Gate Voltage Drain Current | V _{DS} =40V, V _{GS} =0V, | - | - | 1.0 | μA |
| I _{GSS} | Gate to Body Leakage Current | V _{DS} =0V, V _{GS} = ±25V | - | - | ±100 | nA |
| On Characteristics | | | | | | |
| V _{GS(th)} | Gate Threshold Voltage | V _{DS} =V _{GS} , I _D =250μA | 2 | - | 4 | V |
| R _{DS(on)} | Static Drain-Source on-Resistance <small>note3</small> | V _{GS} =10V, I _D =30A | - | 1.9 | 2.6 | mΩ |
| Dynamic Characteristics | | | | | | |
| C _{iss} | Input Capacitance | V _{DS} =20V, V _{GS} =0V, f=1.0MHz | - | 9060 | - | pF |
| C _{oss} | Output Capacitance | | - | 1000 | - | pF |
| C _{rss} | Reverse Transfer Capacitance | | - | 666 | - | pF |
| Q _g | Total Gate Charge | V _{DS} =20V, I _D =30A, V _{GS} =10V | - | 145 | - | nC |
| Q _{gs} | Gate-Source Charge | | - | 30 | - | nC |
| Q _{gd} | Gate-Drain("Miller") Charge | | - | 37 | - | nC |
| Switching Characteristics | | | | | | |
| t _{d(on)} | Turn-on Delay Time | V _{DD} =20V, I _D =30A, R _L =1Ω, R _{GEN} =3Ω, V _{GS} =10V | - | 39 | - | ns |
| t _r | Turn-on Rise Time | | - | 56 | - | ns |
| t _{d(off)} | Turn-off Delay Time | | - | 108 | - | ns |
| t _f | Turn-off Fall Time | | - | 71 | - | ns |
| Drain-Source Diode Characteristics and Maximum Ratings | | | | | | |
| I _S | Maximum Continuous Drain to Source Diode Forward Current | | - | - | 190 | A |
| I _{SM} | Maximum Pulsed Drain to Source Diode Forward Current | | - | - | 760 | A |
| V _{SD} | Drain to Source Diode Forward Voltage | V _{GS} =0V, I _S =30A | - | - | 1.2 | V |
| t _{rr} | Body Diode Reverse Recovery Time | T _J =25°C, I _F =20A, di/dt=100A/μs | - | 50 | - | ns |
| Q _{rr} | Body Diode Reverse Recovery Charge | | - | 81 | - | nC |

- Notes: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
 2. EAS condition : T_J=25°C, V_{DD}=50V, V_G=10V, L=0.5mH, R_G=25Ω, I_{AS}=48A
 3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 0.5%



Typical Performance Characteristics

Figure 1: Output Characteristics

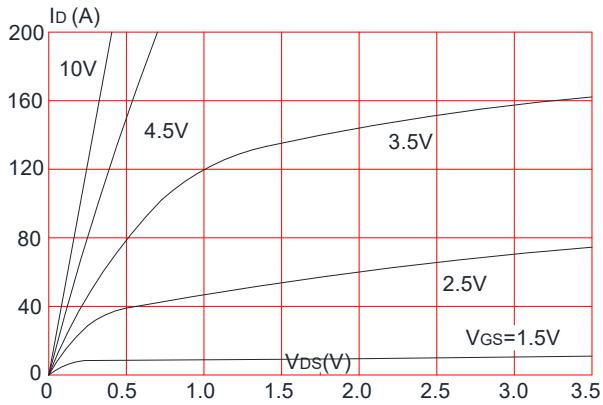


Figure 2: Typical Transfer Characteristics

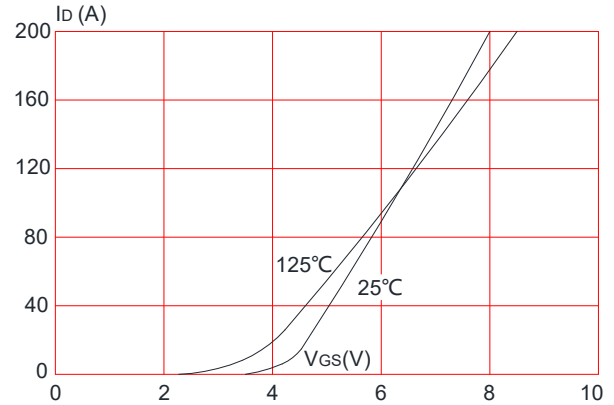


Figure 3: On-resistance vs. Drain Current

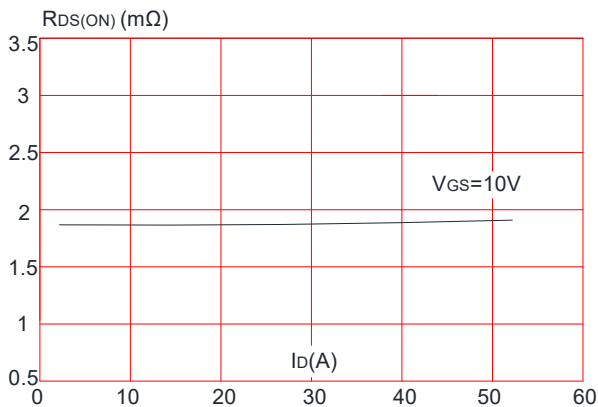


Figure 4: Body Diode Characteristics

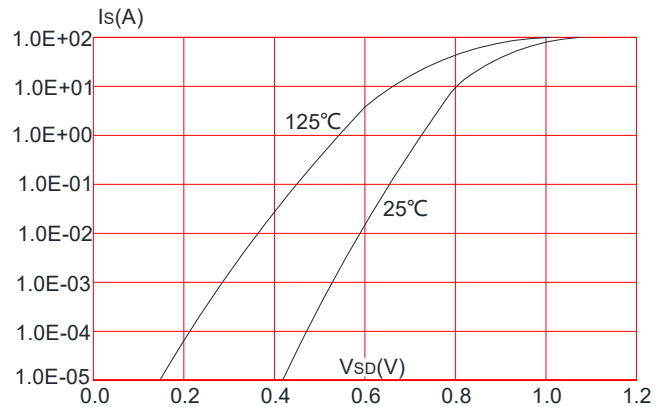


Figure 5: Gate Charge Characteristics

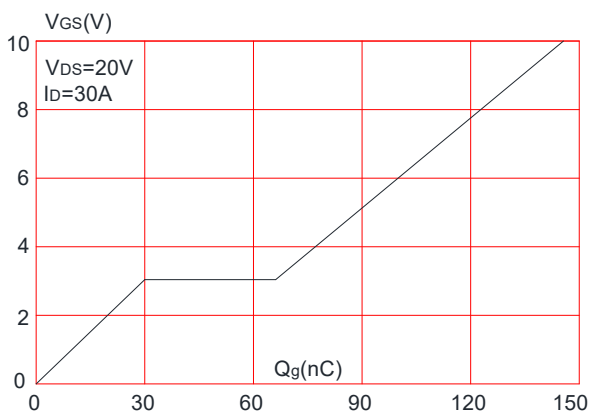
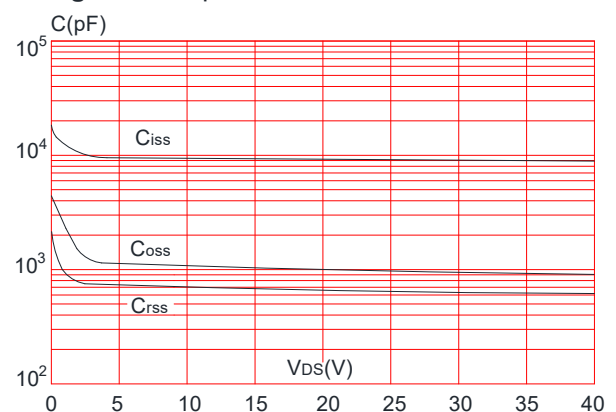


Figure 6: Capacitance Characteristics





JMTC025N04D

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

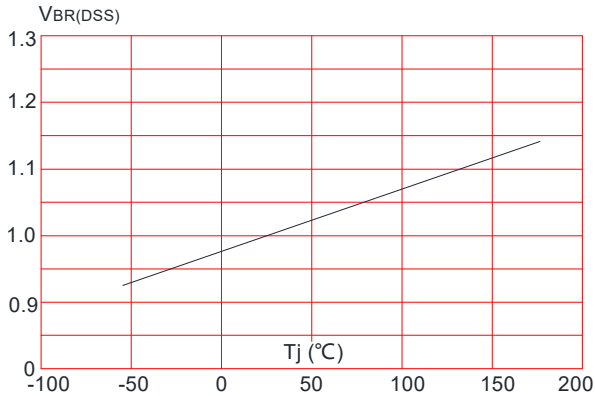


Figure 8: Normalized on Resistance vs. Junction Temperature

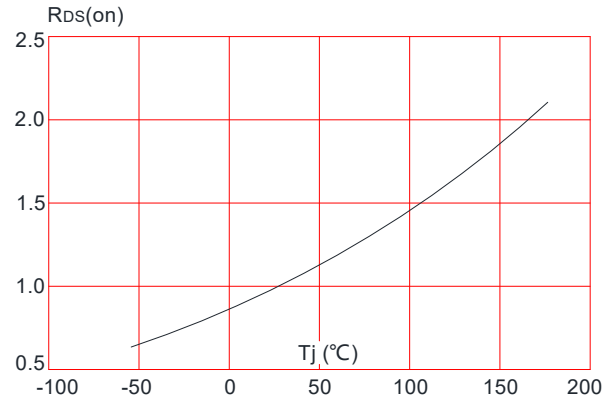


Figure 9: Maximum Safe Operating Area

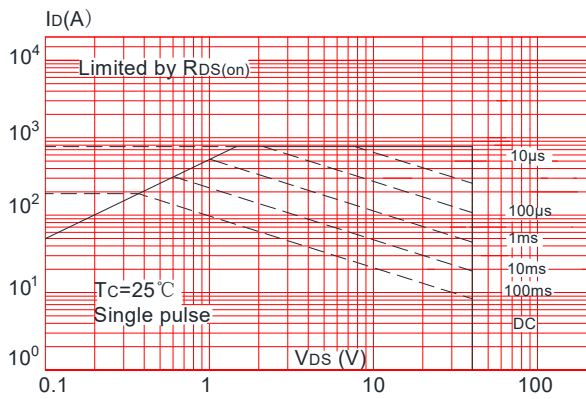


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

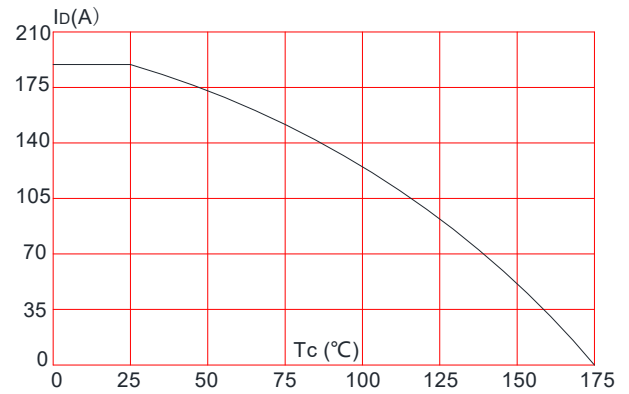
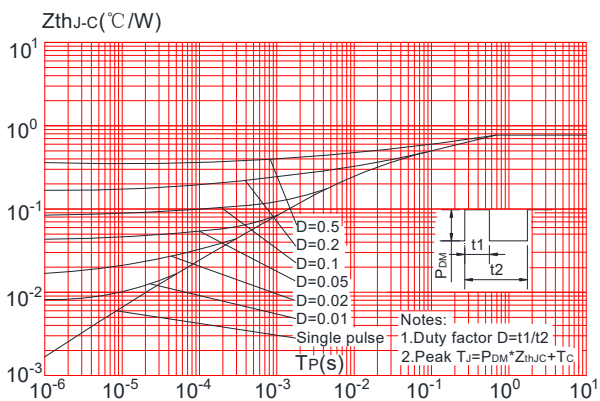


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



Test Circuit

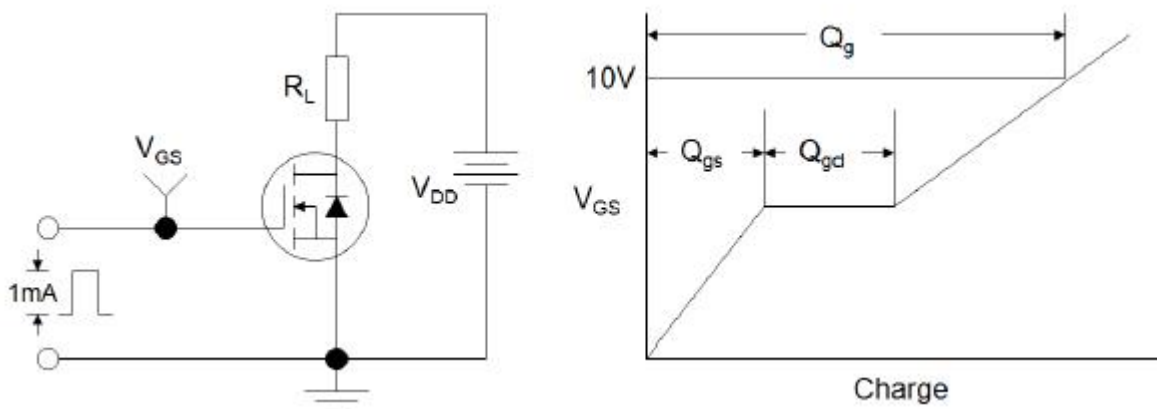


Figure1:Gate Charge Test Circuit & Waveform

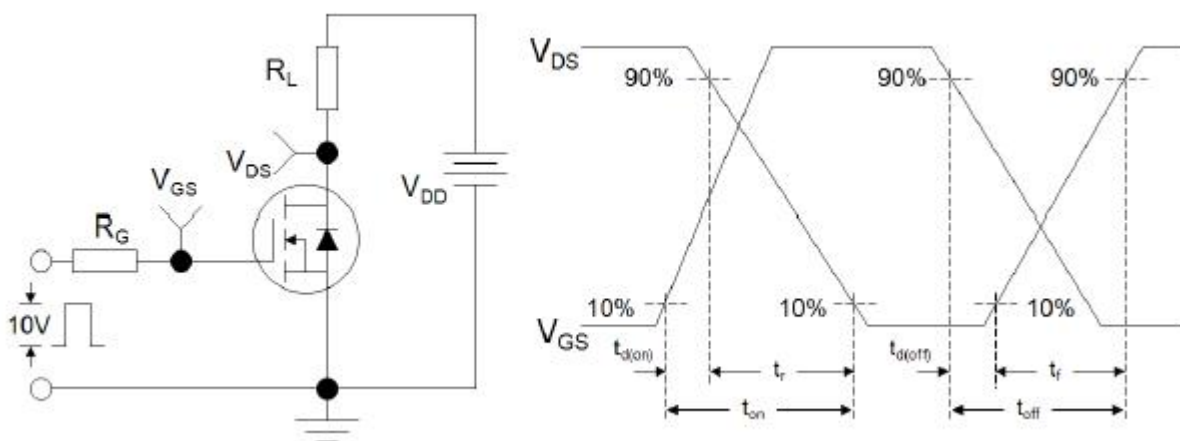


Figure 2: Resistive Switching Test Circuit & Waveforms

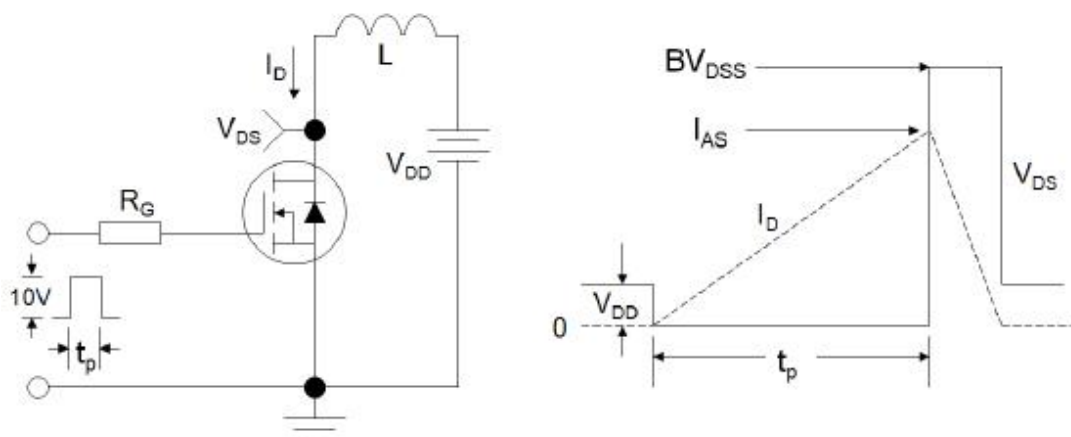
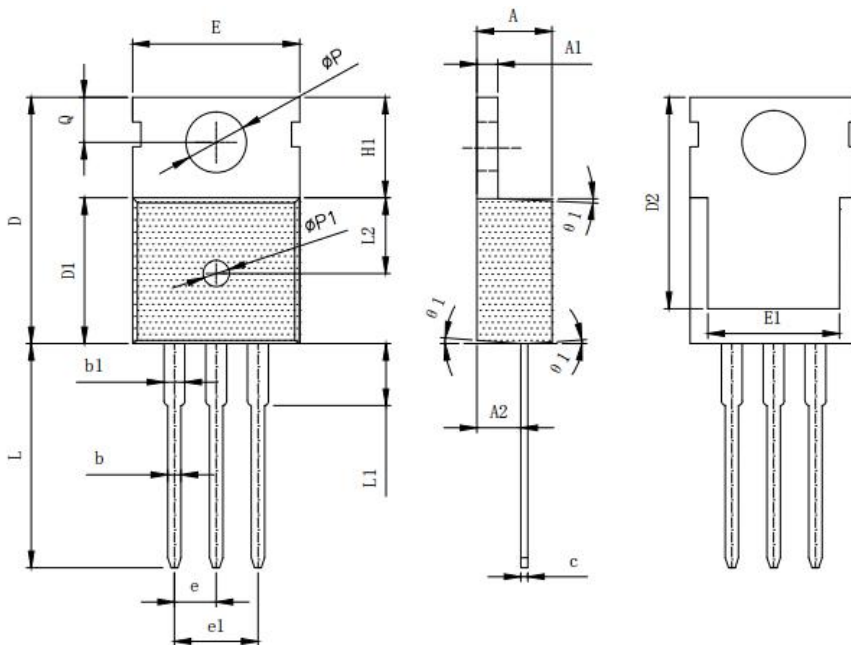


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms



Package Mechanical Data-TO-220C



| SYMBOL | MILLIMETER | | |
|--------|------------|-------|-------|
| | MIN | NOM | MAX |
| A | 4.40 | 4.50 | 4.60 |
| A1 | 1.25 | 1.30 | 1.35 |
| A2 | 2.30 | 2.40 | 2.50 |
| b | 0.70 | 0.80 | 0.90 |
| b1 | 1.25 | 1.35 | 1.45 |
| c | 0.40 | 0.50 | 0.60 |
| D | 15.50 | 15.80 | 16.10 |
| D1 | 9.10 | 9.20 | 9.30 |
| D2 | 12.73 | 12.83 | 12.93 |
| E | 9.70 | 9.90 | 10.20 |
| E1 | 7.60 | 8.00 | 8.40 |
| e | 2.54 (BSC) | | |
| e1 | 5.08 (BSC) | | |
| H1 | 6.30 | 6.50 | 6.80 |
| L | 12.75 | 13.08 | 13.50 |
| L1 | — | — | 3.10 |
| L2 | 4.30 | 4.60 | 4.90 |
| φP | 3.50 | 3.60 | 3.70 |
| φP1 | 1.40 | 1.50 | 1.60 |
| Q | 2.70 | — | 2.90 |
| θ1 | 2° | 4° | 6° |

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