

Description

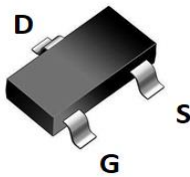
JMT N-channel Enhancement Mode Power MOSFET

Features

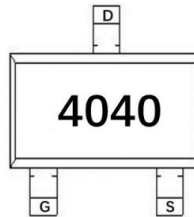
- 40V, 5A
 $R_{DS(ON)} < 39m\Omega @ V_{GS} = 4.5V$
 $R_{DS(ON)} < 52m\Omega @ V_{GS} = 2.5V$
- Advanced Trench Technology
- Excellent $R_{DS(ON)}$ and Low Gate Charge
- Lead Free

Applications

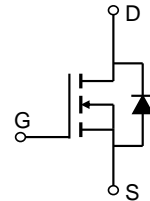
- Load Switch
- PWM Application
- Power Management



SOT-23 Top View



Marking and Pin



Schematic

Package Marking and Ordering Information

| Device Marking | Device | Outline | Package | Reel Size | Reel(pcs) | Per Carton (pcs) |
|----------------|-------------|---------|---------|-----------|-----------|------------------|
| 4040 | JMTL400N04A | TAPING | SOT-23 | 7" | 3000 | 120000 |

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

| Symbol | Parameter | Value | Units |
|-----------------|--|---------------------------|--------------------|
| V_{DS} | Drain-to-Source Voltage | 40 | V |
| V_{GS} | Gate-to-Source Voltage | ± 20 | V |
| I_D | Continuous Drain Current | $T_A = 25^\circ\text{C}$ | 5 |
| | | $T_A = 100^\circ\text{C}$ | 3 |
| I_{DM} | Pulsed Drain Current ⁽¹⁾ | 20 | A |
| P_D | Power Dissipation | $T_A = 25^\circ\text{C}$ | 1.3 |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient ⁽²⁾ | 100 | $^\circ\text{C/W}$ |
| T_J, T_{STG} | Junction & Storage Temperature Range | -55 to 150 | $^\circ\text{C}$ |



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

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|--|--|------|------|------|------|
| Off Characteristics | | | | | | |
| V _{(BR)DSS} | Drain-Source Breakdown Voltage | I _D = 250μA, V _{GS} = 0V | 40 | - | - | V |
| I _{DSS} | Zero Gate Voltage Drain Current | V _{DS} = 40V, V _{GS} = 0V | - | - | 1.0 | μA |
| I _{GSS} | Gate-Body Leakage Current | V _{DS} = 0V, V _{GS} = ±20V | - | - | ±100 | nA |
| On Characteristics | | | | | | |
| V _{GS(th)} | Gate Threshold Voltage | V _{DS} = V _{GS} , I _D = 250μA | 1.0 | 1.9 | 2.5 | V |
| R _{DS(ON)} | Static Drain-Source ON-Resistance ⁽³⁾ | V _{GS} = 10V, I _D = 4A | - | 30 | 39 | mΩ |
| | | V _{GS} = 4.5V, I _D = 3A | - | 40 | 52 | mΩ |
| Dynamic Characteristics | | | | | | |
| C _{iss} | Input Capacitance | V _{GS} = 0V, V _{DS} = 20V, f = 1MHz | - | 536 | - | pF |
| C _{oss} | Output Capacitance | | - | 42 | - | pF |
| C _{rss} | Reverse Transfer Capacitance | | - | 33 | - | pF |
| Q _g | Total Gate Charge | V _{GS} = 0 to 10V V _{DD} = 20V, I _D = 3A | - | 11 | - | nC |
| Q _{gs} | Gate Source Charge | | - | 2 | - | nC |
| Q _{gd} | Gate Drain("Miller") Charge | | - | 2 | - | nC |
| Switching Characteristics | | | | | | |
| t _{d(on)} | Turn-On Delay Time | V _{GS} = 10V, V _{DD} = 20V I _D = 3A, R _{GEN} = 3Ω | - | 4 | - | ns |
| t _r | Turn-On Rise Time | | - | 2 | - | ns |
| t _{d(off)} | Turn-Off Delay Time | | - | 15 | - | ns |
| t _f | Turn-Off Fall Time | | - | 2 | - | ns |
| Drain-Source Diode Characteristics and Max Ratings | | | | | | |
| I _S | Maximum Continuous Drain to Source Diode Forward Current | | - | - | 5 | A |
| I _{SM} | Maximum Pulsed Drain to Source Diode Forward Current | | - | - | 20 | A |
| V _{SD} | Drain to Source Diode Forward Voltage | V _{GS} = 0V, I _S = 5A | - | - | 1.2 | V |
| t _{rr} | Body Diode Reverse Recovery Time | I _F = 3A, di/dt = 100A/us | - | 9 | - | ns |
| Q _{rr} | Body Diode Reverse Recovery Charge | | - | 4 | - | nC |

- Notes:
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
 2. R_{θJA} is measured with the device mounted on a 1inch² pad of 2oz copper FR4 PCB
 3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 0.5%.

Typical Performance Characteristics

Figure 1: Output Characteristics

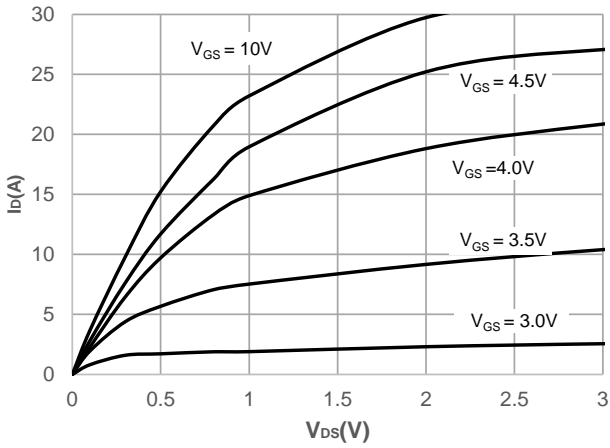


Figure 2: Typical Transfer Characteristics

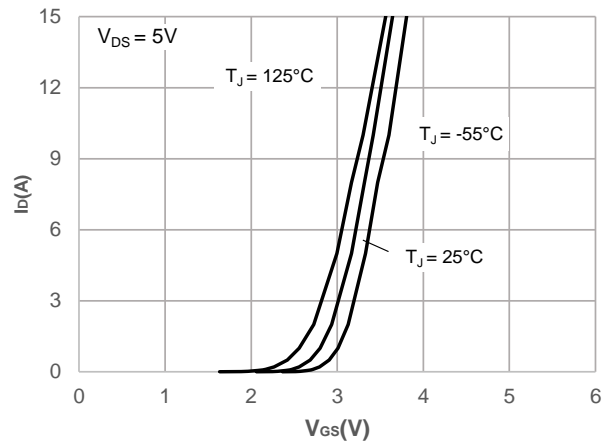


Figure 3: On-resistance vs. Drain Current

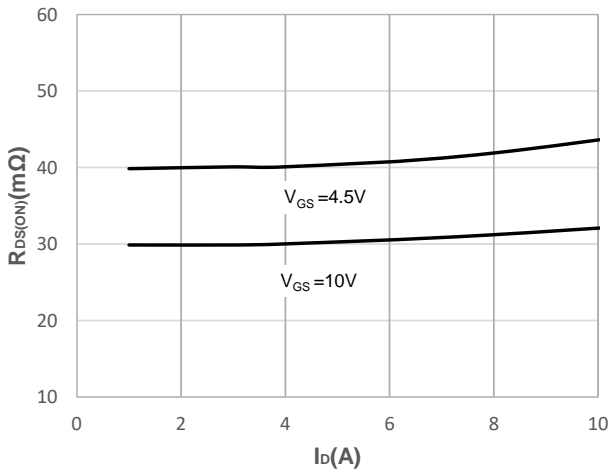


Figure 4: Body Diode Characteristics

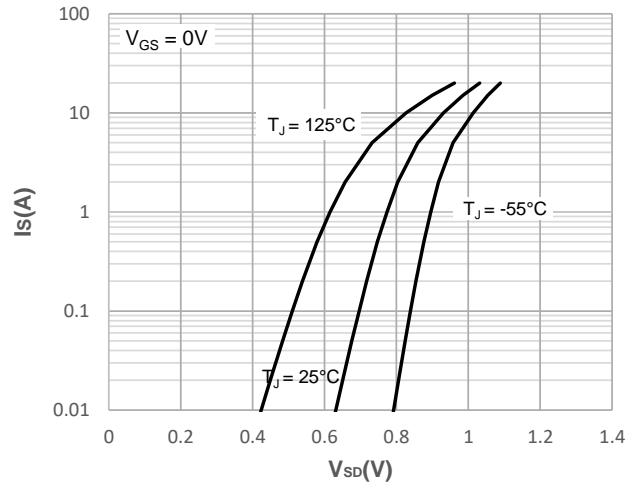


Figure 5: Gate Charge Characteristics

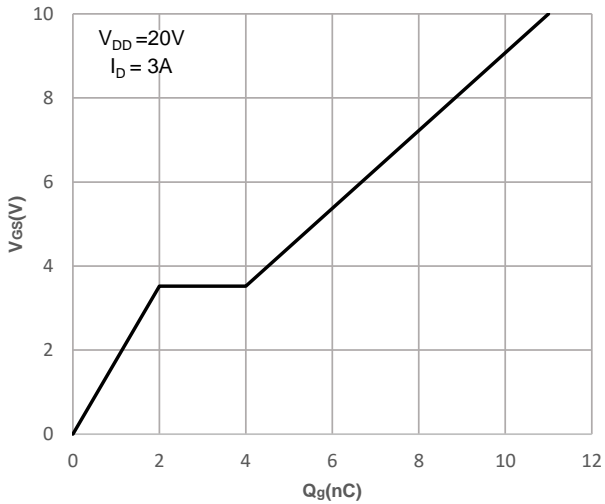
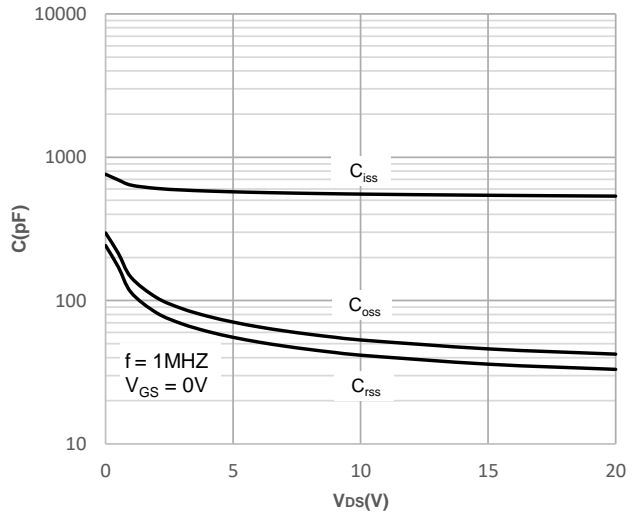


Figure 6: Capacitance Characteristics



Typical Performance Characteristics

Figure 7: Normalized Breakdown voltage vs. Junction Temperature

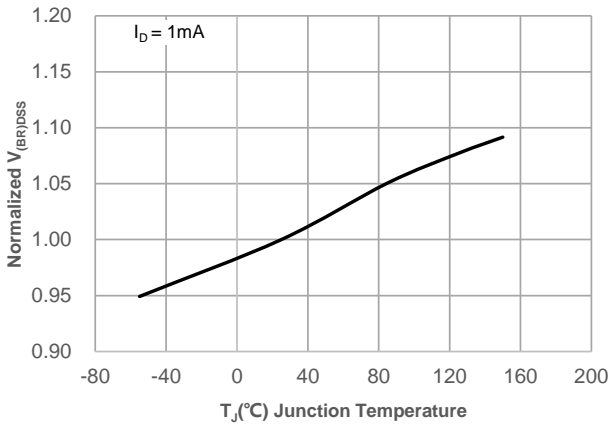


Figure 8: Normalized on Resistance vs. Junction Temperature

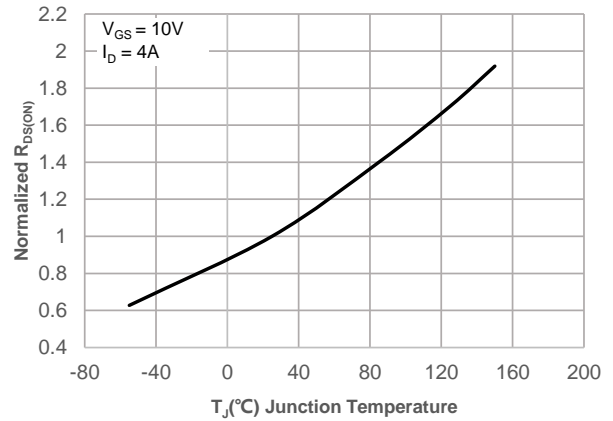


Figure 9: Maximum Safe Operating Area

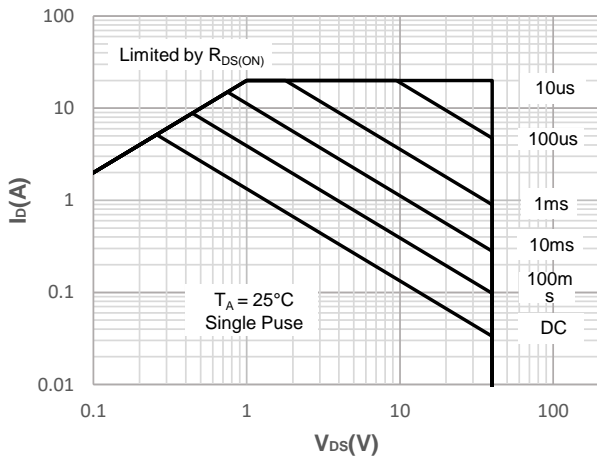


Figure 10: Maximum Continuous Driand Current vs. Ambient Temperature

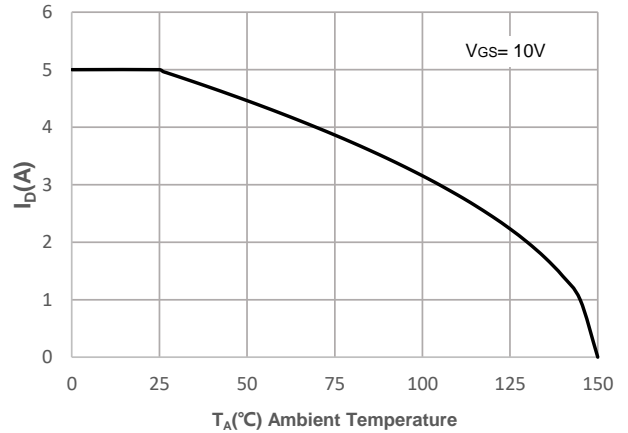


Figure 11: Normalized Maximum Transient Thermal Impedance

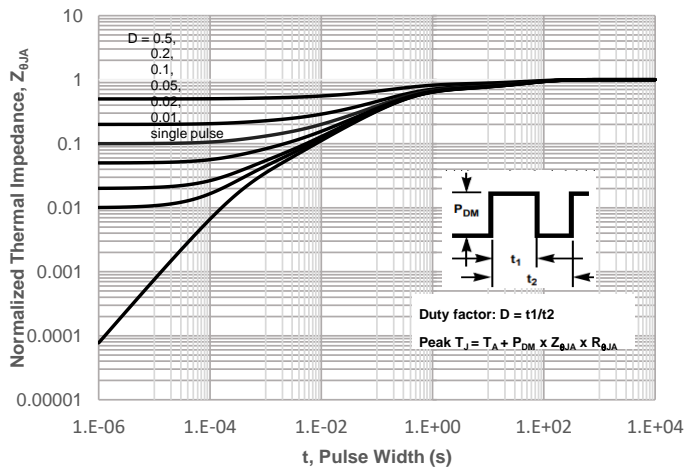
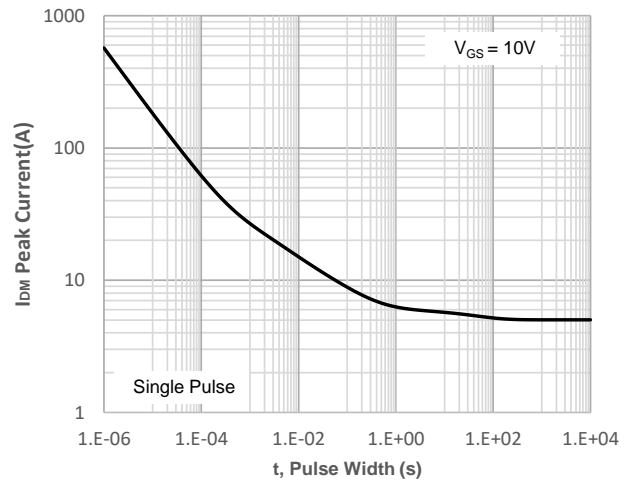


Figure 12: Peak Current Capacity



Test Circuit

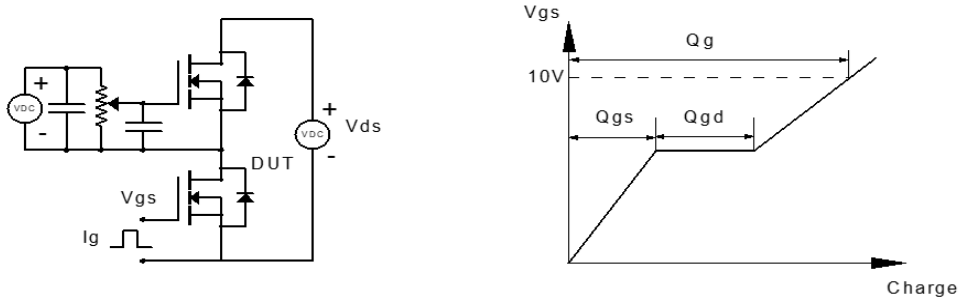


Figure 1: Gate Charge Test Circuit & Waveform

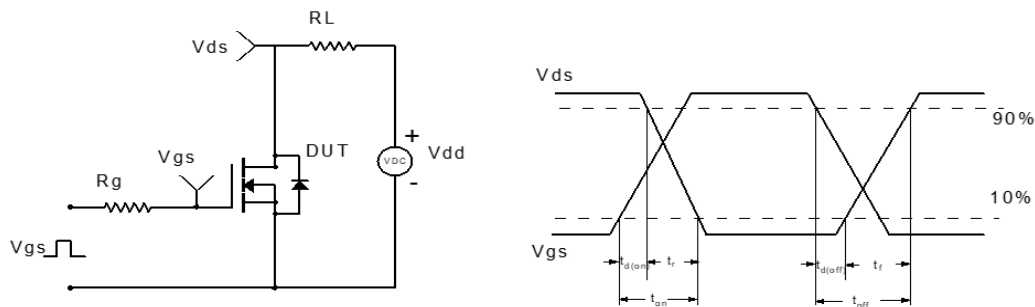


Figure 2: Resistive Switching Test Circuit & Waveform

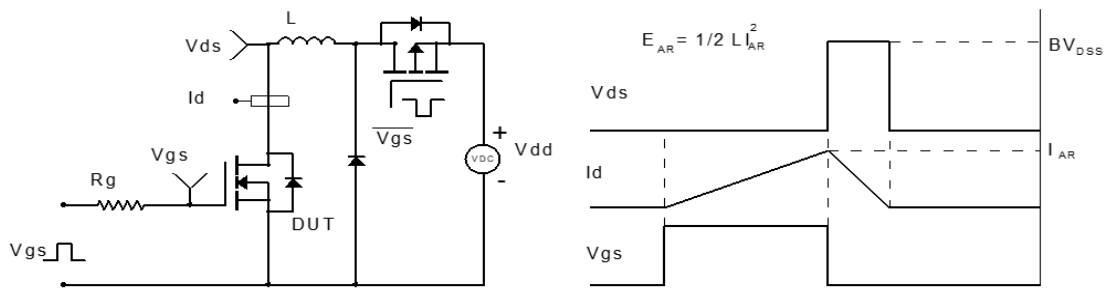


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

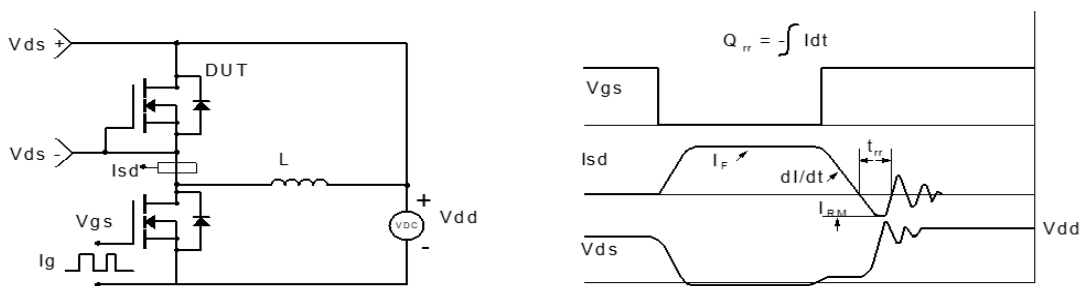
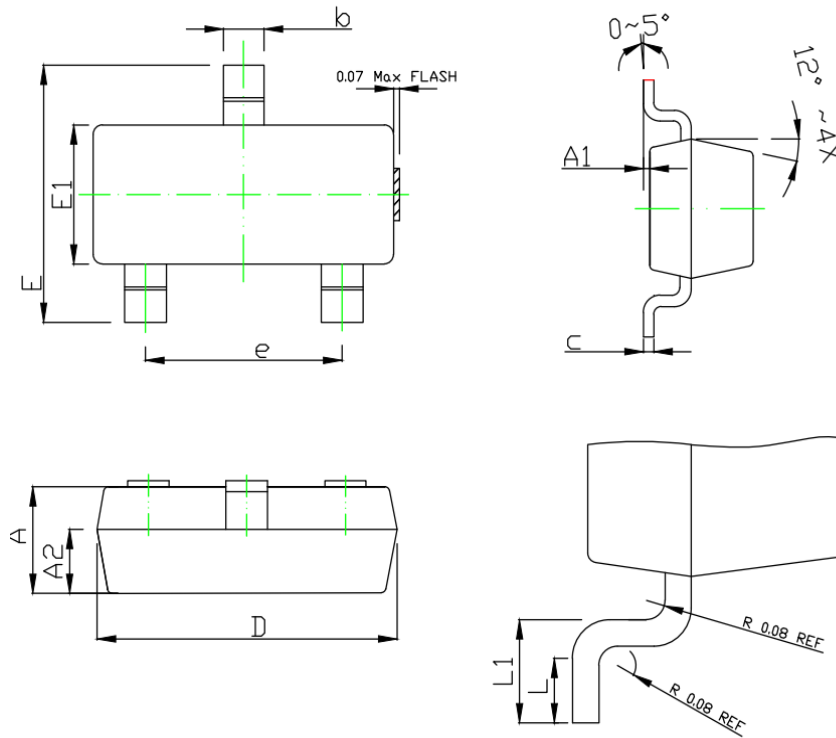


Figure 4: Diode Recovery Test Circuit & Waveform

Package Mechanical Data(SOT-23)



| SYMBOL | MILLIMETER | | |
|--------|------------|------|------|
| | MIN | NOM | MAX |
| A | 0.95 | 1.00 | 1.05 |
| A1 | 0.01 | 0.05 | 0.10 |
| b | 0.35 | 0.40 | 0.45 |
| c | 0.11 BSC | | |
| D | 2.80 | 2.90 | 3.00 |
| E | 2.30 | 2.40 | 2.50 |
| E1 | 1.20 | 1.30 | 1.40 |
| e | 0.95BSC | | |
| L | 0.20 | - | - |
| L1 | 0.30 | 0.40 | 0.50 |
| A2 | 0.60 REF | | |

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