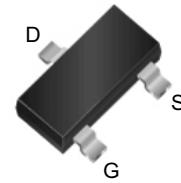
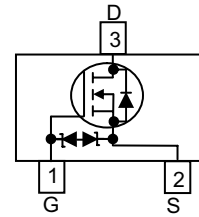


WNM5002
[Http://www.willsemi.com](http://www.willsemi.com)
Small Signal N-Channel, 50V, 0.50A, MOSFET

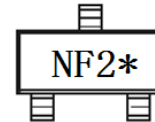
| V _{DS} (V) | Typical R _{ds(on)} (Ω) |
|-----------------------|---------------------------------|
| 50 | 1.3@ V _{GS} =10V |
| | 1.4@ V _{GS} =4.5V |
| | 2.1@ V _{GS} =2.5V |
| ESD Rating: 2000V HBM | |


SOT-23

Pin configuration (Top view)
Descriptions

The WNM5002 is N-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent R_{DS(ON)} with low gate charge. This device is suitable for use in small signal switch. Standard Product WNM5002 is Pb-free and Halogen-free.

Features

- Trench Technology
- Supper high density cell design
- Excellent ON resistance for higher DC current
- HBM ESD protection >2 kV
- Small package SOT-23



NF2 = Device Code

* = Month (A~Z)

Marking
Applications

- Driver: Relay, Solenoid, Lamps, Hammers etc.
- Power supply converters circuit
- Load/Power Switching for potable device

Order information

| Device | Package | Shipping |
|--------------|---------|----------------|
| WNM5002-3/TR | SOT-23 | 3000/Reel&Tape |

Absolute Maximum ratings

| Parameter | | Symbol | 10 S | Steady State | Unit |
|--|------------------------|-----------|------------|--------------|------------------|
| Drain-Source Voltage | | V_{DS} | 50 | | V |
| Gate-Source Voltage | | V_{GS} | ± 20 | | |
| Continuous Drain Current ^{a d} | $T_A=25^\circ\text{C}$ | I_D | 0.50 | 0.44 | A |
| | $T_A=70^\circ\text{C}$ | | 0.40 | 0.35 | |
| Maximum Power Dissipation ^{a d} | $T_A=25^\circ\text{C}$ | P_D | 0.69 | 0.53 | W |
| | $T_A=70^\circ\text{C}$ | | 0.44 | 0.34 | |
| Continuous Drain Current ^{b d} | $T_A=25^\circ\text{C}$ | I_D | 0.47 | 0.42 | A |
| | $T_A=70^\circ\text{C}$ | | 0.38 | 0.33 | |
| Maximum Power Dissipation ^{b d} | $T_A=25^\circ\text{C}$ | P_D | 0.60 | 0.47 | W |
| | $T_A=70^\circ\text{C}$ | | 0.39 | 0.30 | |
| Pulsed Drain Current ^c | | I_{DM} | 1.2 | | A |
| Operating Junction Temperature | | T_J | -55 to 150 | | $^\circ\text{C}$ |
| Lead Temperature | | T_L | 260 | | $^\circ\text{C}$ |
| Storage Temperature Range | | T_{stg} | -55 to 150 | | $^\circ\text{C}$ |

Thermal resistance ratings

| Parameter | | Symbol | Typical | Maximum | Unit |
|---|-----------------------|-----------------|---------|---------|--------------------|
| Junction-to-Ambient Thermal Resistance ^a | $t \leq 10 \text{ s}$ | $R_{\theta JA}$ | 140 | 180 | $^\circ\text{C/W}$ |
| | Steady State | | 176 | 232 | |
| Junction-to-Ambient Thermal Resistance ^b | $t \leq 10 \text{ s}$ | $R_{\theta JA}$ | 165 | 205 | |
| | Steady State | | 198 | 261 | |
| Junction-to-Case Thermal Resistance | | $R_{\theta JC}$ | 100 | 120 | |

a Surface mounted on FR-4 Board using 1 square inch pad size, 1oz copper

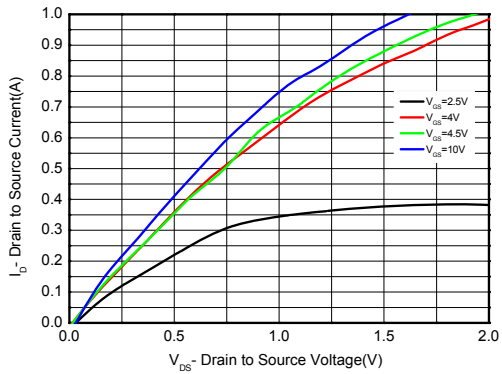
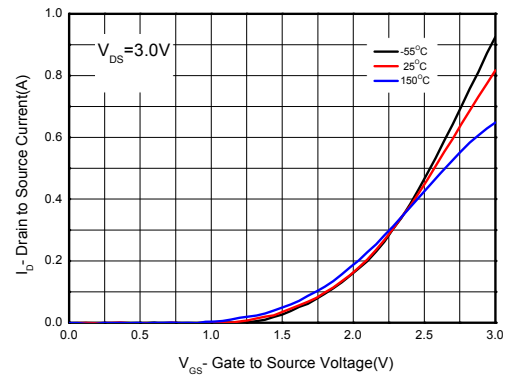
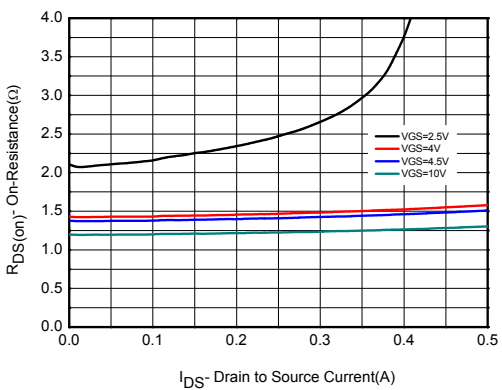
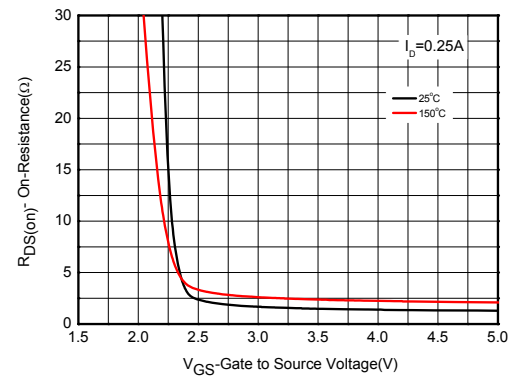
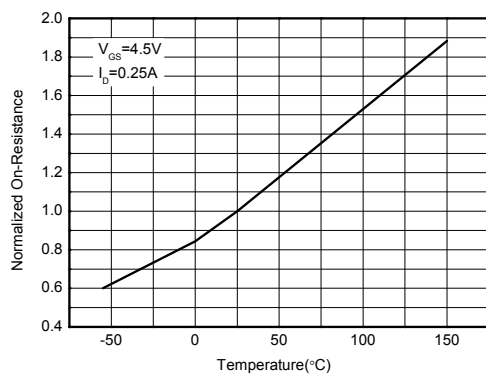
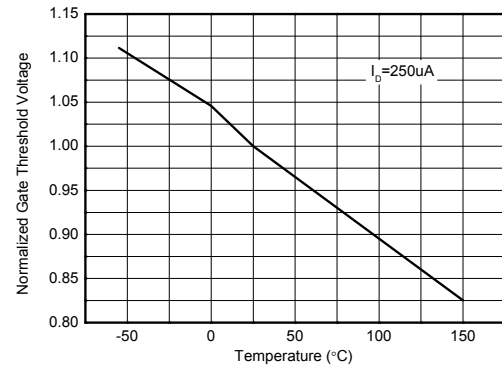
b Surface mounted on FR-4 board using minimum pad size, 1oz copper

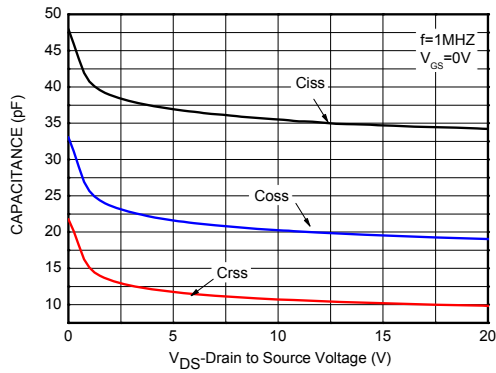
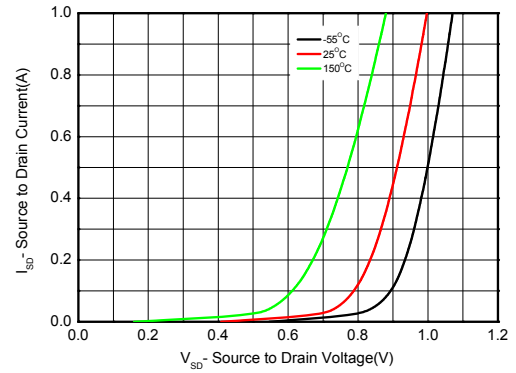
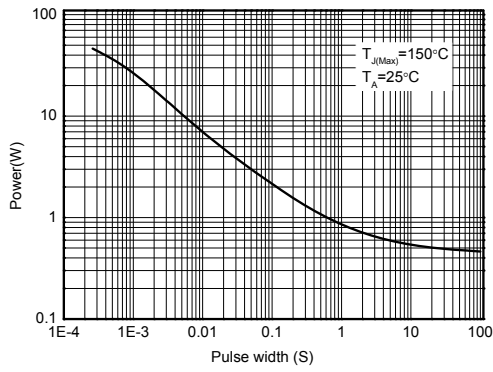
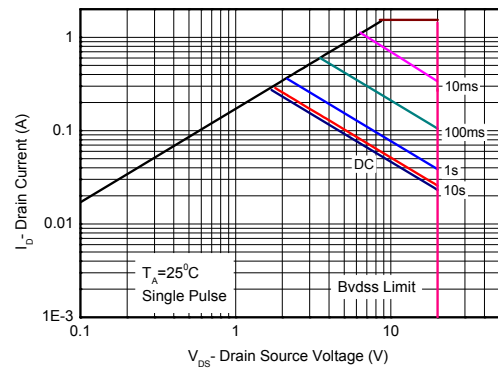
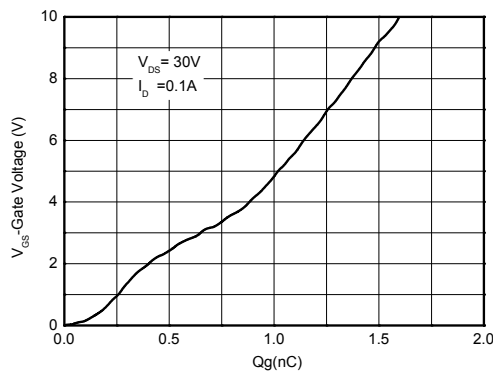
c Pulse width < 380 μs , Duty Cycle < 2%

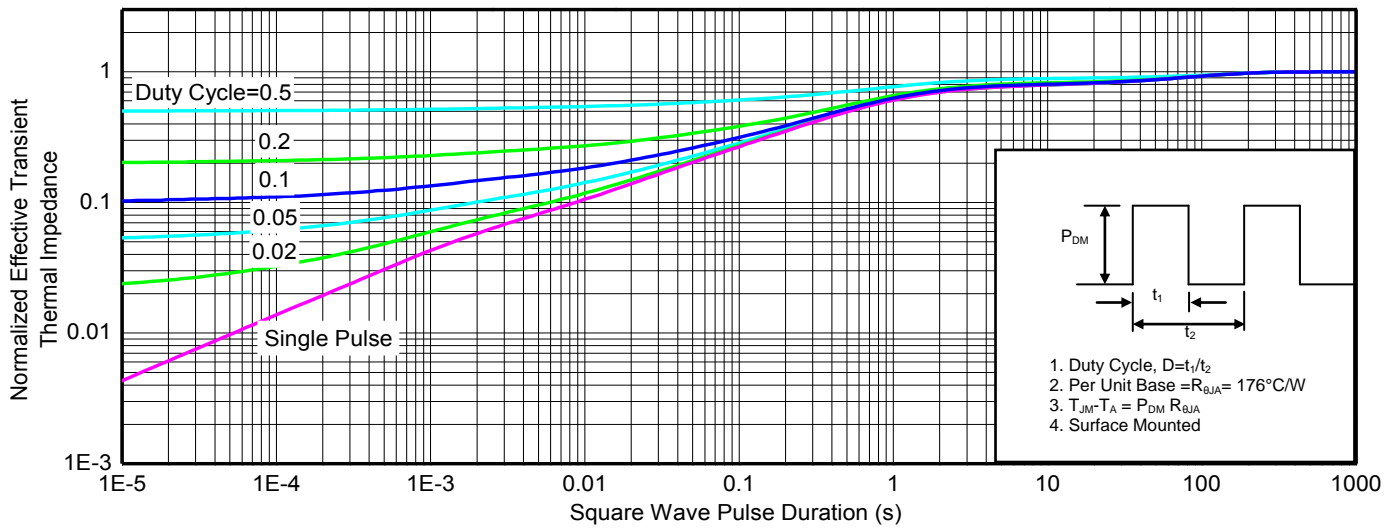
d Maximum junction temperature $T_J=150^\circ\text{C}$.

Electronics Characteristics (Ta=25°C, unless otherwise noted)

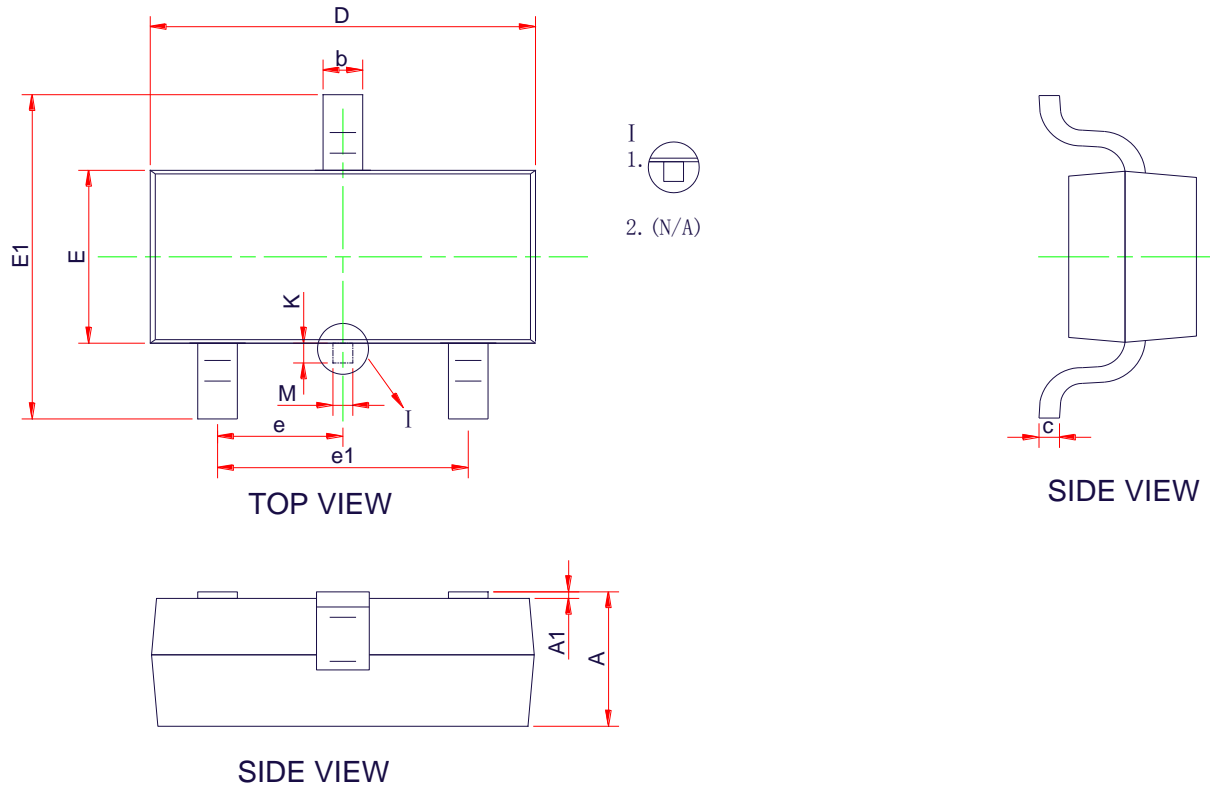
| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|--------------|--|-----|------|---------|----------|
| OFF CHARACTERISTICS | | | | | | |
| Drain-to-Source Breakdown Voltage | BV_{DSS} | $V_{GS} = 0V, I_D = 250\mu A$ | 50 | | | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = 50V, V_{GS} = 0V$ | | | 1 | μA |
| Gate-to-source Leakage Current | I_{GSS} | $V_{DS} = 0V, V_{GS} = \pm 20V$ | | | ± 5 | μA |
| ON CHARACTERISTICS | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS} = V_{DS}, I_D = 250\mu A$ | 0.8 | 1.0 | 1.5 | V |
| Drain-to-source On-resistance ^{b, c} | $R_{DS(on)}$ | $V_{GS} = 10V, I_D = 0.45A$ | | 1.3 | 3 | Ω |
| | | $V_{GS} = 4.5V, I_D = 0.25A$ | | 1.4 | 4 | |
| | | $V_{GS} = 4.0V, I_D = 0.25A$ | | 1.5 | 4 | |
| | | $V_{GS} = 2.5V, I_D = 0.01A$ | | 2.1 | 6 | |
| Forward Trans conductance | g_{fs} | $V_{DS} = 15V, I_D = 0.1A$ | | 0.5 | | S |
| CAPACITANCES, CHARGES | | | | | | |
| Input Capacitance | C_{ISS} | $V_{GS} = 0V,$ $F = 1.0\text{ MHz},$ $V_{DS} = 5V$ | | 36 | | pF |
| Output Capacitance | C_{OSS} | | | 22 | | |
| Reverse Transfer Capacitance | C_{RSS} | | | 12 | | |
| Total Gate Charge | $Q_{G(TOT)}$ | $V_{GS} = 10V,$ $V_{DD} = 30V,$ $I_D = 0.1A$ | | 1.6 | | nC |
| Threshold Gate Charge | $Q_{G(TH)}$ | | | 0.25 | | |
| Gate-to-Source Charge | Q_{GS} | | | 0.4 | | |
| Gate-to-Drain Charge | Q_{GD} | | | 0.45 | | |
| SWITCHING CHARACTERISTICS | | | | | | |
| Turn-On Delay Time | $t_d(ON)$ | $V_{GS} = 5V,$ $V_{DD} = 5V,$ $R_L = 500\Omega,$ $R_G = 10\Omega, I_D = 10mA$ | | 8.6 | | ns |
| Rise Time | t_r | | | 4 | | |
| Turn-Off Delay Time | $t_d(OFF)$ | | | 23.8 | | |
| Fall Time | t_f | | | 14.2 | | |
| BODY DIODE CHARACTERISTICS | | | | | | |
| Forward Voltage | V_{SD} | $V_{GS} = 0V, I_S = 0.25A$ | | 0.8 | 1.5 | V |

Typical Characteristics (Ta=25°C, unless otherwise noted)

Output characteristics

Transfer characteristics

On-Resistance vs. Drain current

On-Resistance vs. Gate-to-Source voltage

On-Resistance vs. Junction temperature

Threshold voltage vs. Temperature

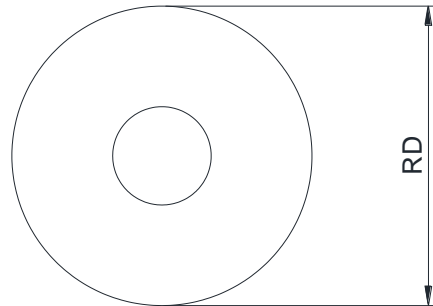
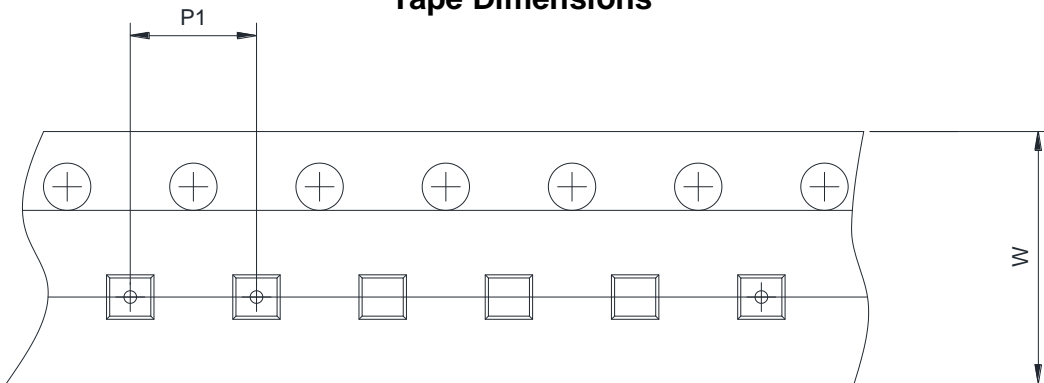
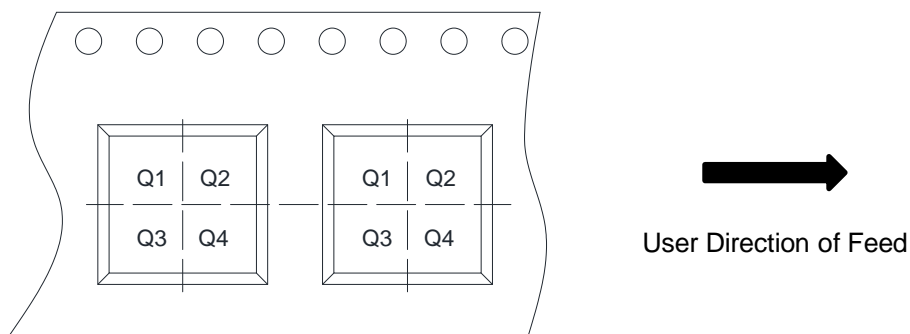

Capacitance

Body diode forward voltage

Single pulse power

Safe operating power

Gate charge Characteristics



Transient thermal response (Junction-to-Ambient)

PACKAGE OUTLINE DIMENSIONS
SOT-23


| Symbol | Dimensions in Millimeters | | |
|--------|---------------------------|------|------|
| | Min. | Typ. | Max. |
| A | 0.89 | 1.10 | 1.30 |
| A1 | 0.00 | - | 0.10 |
| b | 0.30 | 0.43 | 0.55 |
| c | 0.05 | - | 0.20 |
| D | 2.70 | 2.90 | 3.10 |
| E | 1.15 | 1.33 | 1.50 |
| E1 | 2.10 | 2.40 | 2.70 |
| e | 0.95 Typ. | | |
| e1 | 1.70 | 1.90 | 2.10 |
| K | 0.00 | - | 0.25 |
| M | 0.10 | 0.15 | 0.25 |

TAPE AND REEL INFORMATION
Reel Dimensions

Tape Dimensions

Quadrant Assignments For PIN1 Orientation In Tape


| | | | |
|------|---|---|--|
| RD | Reel Dimension | <input checked="" type="checkbox"/> 7inch | <input type="checkbox"/> 13inch |
| W | Overall width of the carrier tape | <input checked="" type="checkbox"/> 8mm | <input type="checkbox"/> 12mm <input type="checkbox"/> 16mm |
| P1 | Pitch between successive cavity centers | <input type="checkbox"/> 2mm | <input checked="" type="checkbox"/> 4mm <input type="checkbox"/> 8mm |
| Pin1 | Pin1 Quadrant | <input type="checkbox"/> Q1 | <input type="checkbox"/> Q2 <input checked="" type="checkbox"/> Q3 <input type="checkbox"/> Q4 |