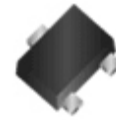
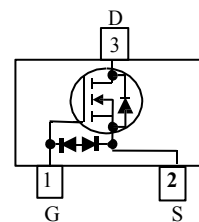


**WNM2077**
**Single N-Channel, 20V, 0.54A, Power MOSFET**
[Http://www.willsemi.com](http://www.willsemi.com)

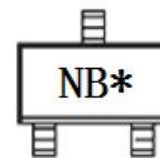
| V <sub>DS</sub> (V) | R <sub>ds(on)</sub> (Ω)      |
|---------------------|------------------------------|
| 20                  | 0.420@ V <sub>GS</sub> =4.5V |
|                     | 0.580@ V <sub>GS</sub> =2.5V |
|                     | 0.840@ V <sub>GS</sub> =1.8V |
| ESD Protected       |                              |


**SOT-723**
**Descriptions**

The WNM2077 is N-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent R<sub>DS(ON)</sub> with low gate charge. This device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product WNM2077 is Pb-free.


**Pin configuration (Top view)**
**Features**

- Trench Technology
- Supper high density cell design
- Excellent ON resistance for higher DC current
- Extremely Low Threshold Voltage
- Small package SOT-723



NB = Device Code  
\* = Month (A~Z)

**Marking**
**Applications**

- Driver for Relay, Solenoid, Motor, LED etc.
- DC-DC converter circuit
- Power Switch
- Load Switch
- Charging

**Order information**

| Device       | Package | Shipping       |
|--------------|---------|----------------|
| WNM2077-3/TR | SOT-723 | 8000/Reel&Tape |

**Absolute Maximum ratings**

| Parameter                               |                        | Symbol    | 10 S       | Steady State | Unit             |
|---|------------------------|-----------|------------|--------------|------------------|
| Drain-Source Voltage                    |                        | $V_{DS}$  | 20         |              | V                |
| Gate-Source Voltage                     |                        | $V_{GS}$  | $\pm 10$   |              |                  |
| Continuous Drain Current <sup>ad</sup>  | $T_A=25^\circ\text{C}$ | $I_D$     | 0.54       | 0.51         | A                |
|   | $T_A=70^\circ\text{C}$ |           | 0.43       | 0.41         |                  |
| Maximum Power Dissipation <sup>ad</sup> | $T_A=25^\circ\text{C}$ | $P_D$     | 0.36       | 0.31         | W                |
|   | $T_A=70^\circ\text{C}$ |           | 0.23       | 0.20         |                  |
| Continuous Drain Current <sup>bd</sup>  | $T_A=25^\circ\text{C}$ | $I_D$     | 0.49       | 0.44         | A                |
|   | $T_A=70^\circ\text{C}$ |           | 0.39       | 0.35         |                  |
| Maximum Power Dissipation <sup>bd</sup> | $T_A=25^\circ\text{C}$ | $P_D$     | 0.29       | 0.23         | W                |
|   | $T_A=70^\circ\text{C}$ |           | 0.18       | 0.14         |                  |
| Pulsed Drain Current <sup>c</sup>       |                        | $I_{DM}$  | 0.9        |              | A                |
| Operating Junction Temperature          |                        | $T_J$     | 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 <sup>a</sup> | $t \leq 10 \text{ s}$ | $R_{\theta JA}$ | 255     | 345     | $^\circ\text{C/W}$ |
|   | Steady State          |                 | 325     | 395     |                    |
| Junction-to-Ambient Thermal Resistance <sup>b</sup> | $t \leq 10 \text{ s}$ | $R_{\theta JA}$ | 375     | 430     |                    |
|   | Steady State          |                 | 445     | 535     |                    |
| Junction-to-Case Thermal Resistance                 |                       | $R_{\theta JC}$ | 220     | 300     |                    |

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

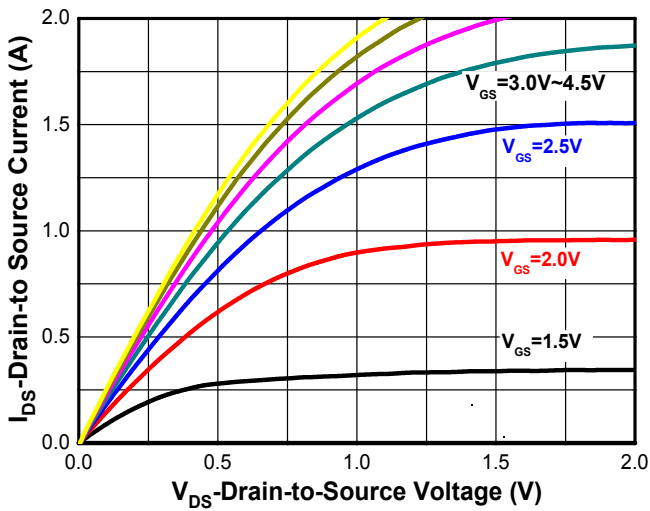
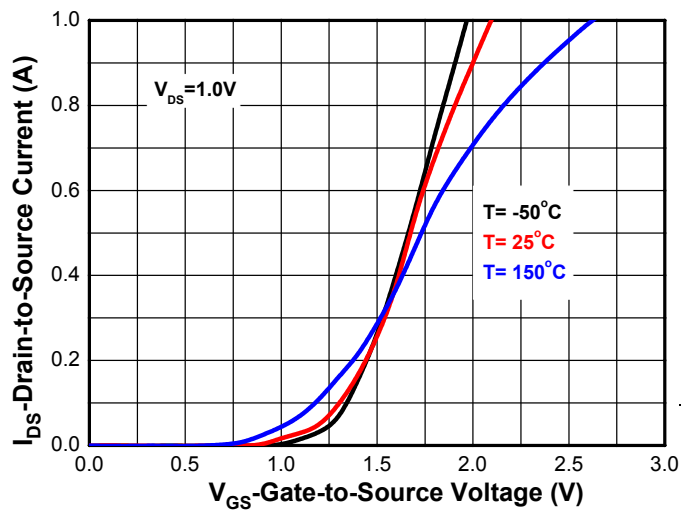
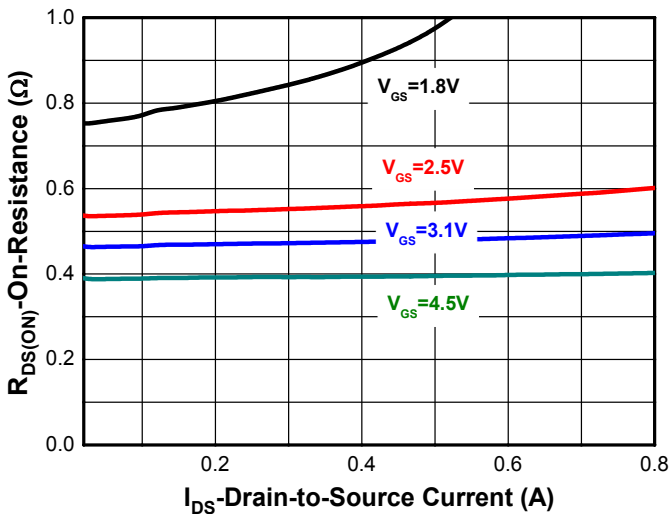
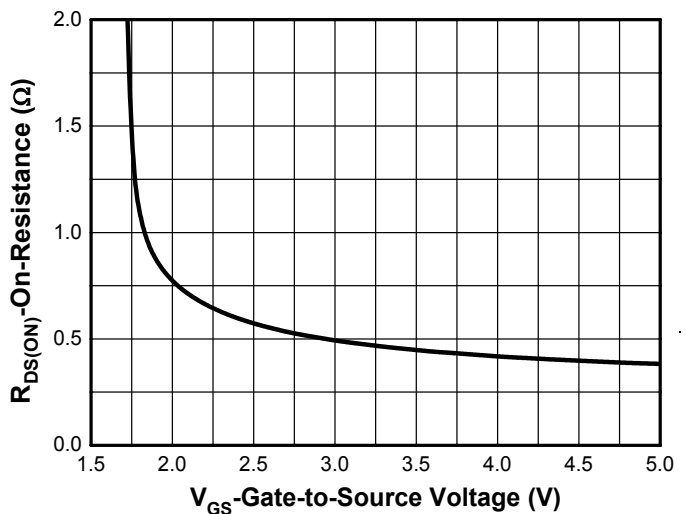
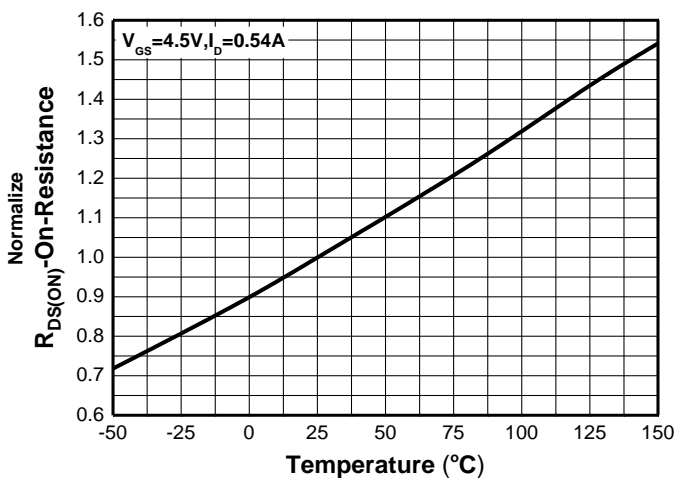
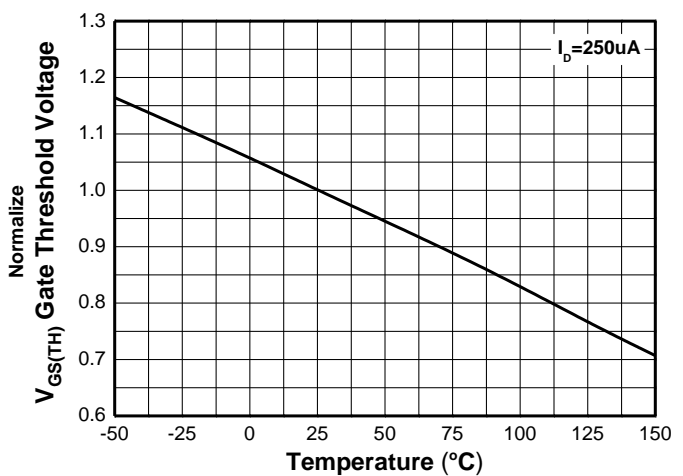
b Surface mounted on FR-4 board using minimum pad size, 1oz copper

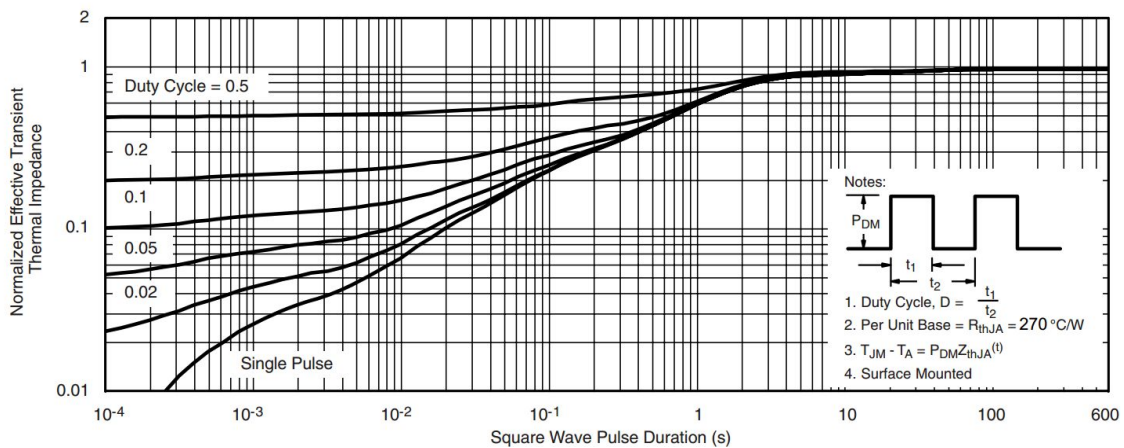
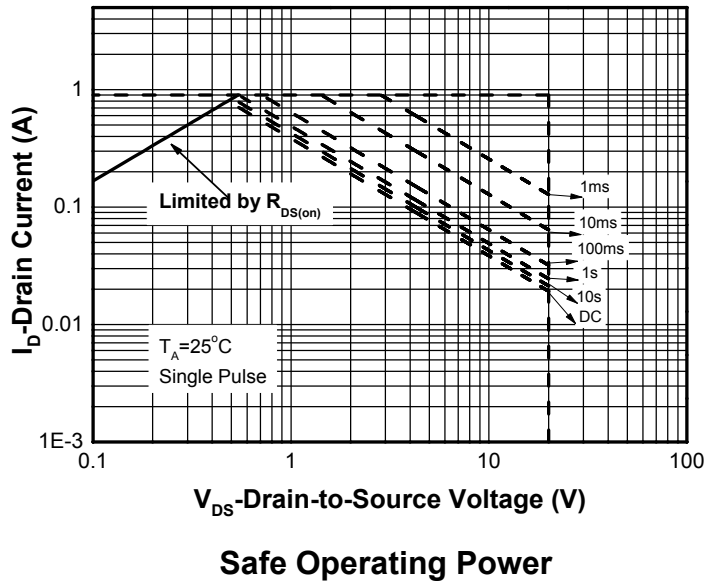
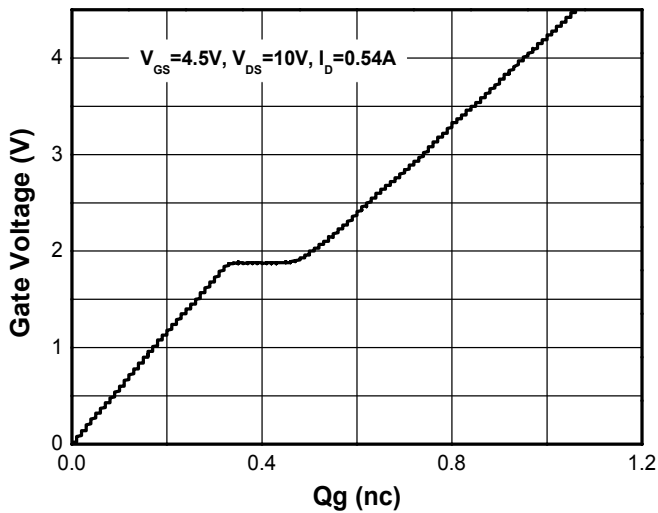
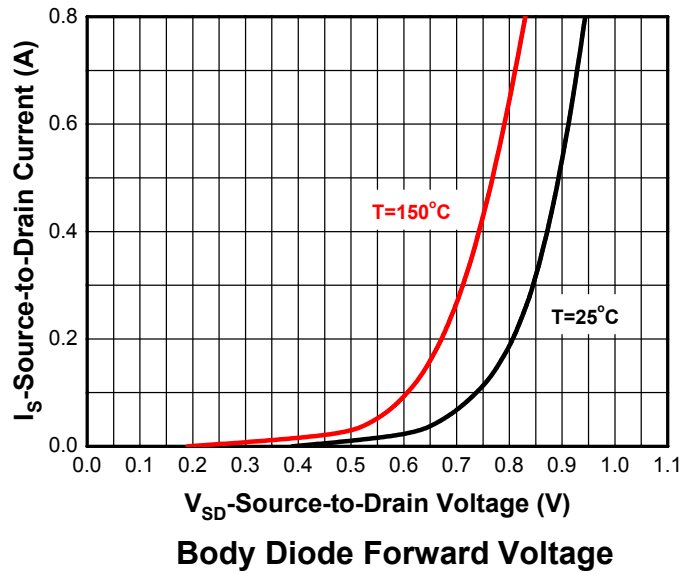
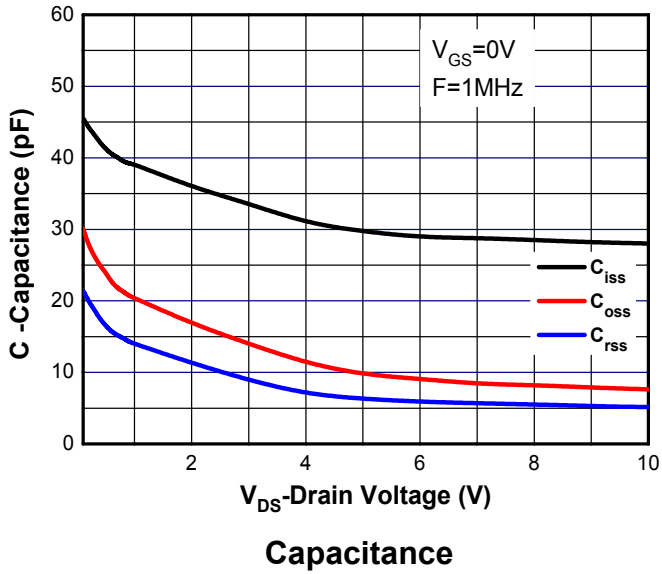
c Pulse width < 380 $\mu\text{s}$ , Duty Cycle < 2%

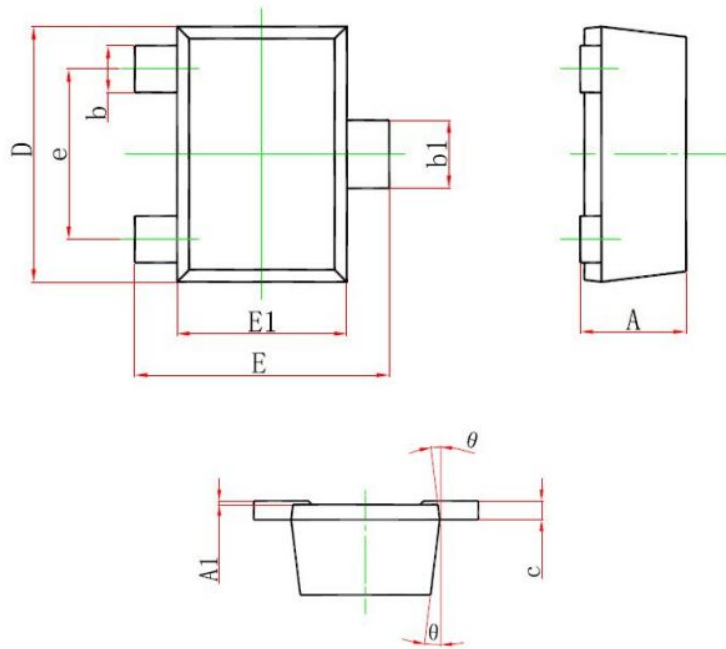
d Maximum junction temperature  $T_J=150^\circ\text{C}$ .

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

| Parameter                                     | Symbol       | Test Conditions  | Min  | Typ  | Max     | Unit          |
|---|--------------|--|------|------|---------|---------------|
| <b>OFF CHARACTERISTICS</b>                    |              |  |      |      |         |               |
| Drain-to-Source Breakdown Voltage             | $BV_{DSS}$   | $V_{GS} = 0\text{ V}, I_D = 250\mu\text{A}$  | 20   |      |         | V             |
| Zero Gate Voltage Drain Current               | $I_{DSS}$    | $V_{DS} = 16\text{V}, V_{GS} = 0\text{V}$  |      |      | 1       | $\mu\text{A}$ |
| Gate-to-source Leakage Current                | $I_{GSS}$    | $V_{DS} = 0\text{ V}, V_{GS} = \pm 10\text{V}$   |      |      | $\pm 5$ | $\mu\text{A}$ |
| <b>ON CHARACTERISTICS</b>                     |              |  |      |      |         |               |
| Gate Threshold Voltage                        | $V_{GS(TH)}$ | $V_{GS} = V_{DS}, I_D = 250\mu\text{A}$  | 0.45 | 0.70 | 1.0     | V             |
| Forward Transconductance                      | $g_{FS}$     | $V_{DS} = 10\text{V}, I_D = 0.35\text{A}$  |      | 0.85 |         | S             |
| Drain-to-source On-resistance <sup>b, c</sup> | $R_{DS(on)}$ | $V_{GS} = 4.5\text{V}, I_D = 0.35\text{A}$   |      | 420  | 600     | m $\Omega$    |
|   |              | $V_{GS} = 3.1\text{V}, I_D = 0.20\text{A}$   |      | 500  | 700     |               |
|   |              | $V_{GS} = 2.5\text{V}, I_D = 0.20\text{A}$   |      | 580  | 800     |               |
|   |              | $V_{GS} = 1.8\text{V}, I_D = 0.20\text{A}$   |      | 840  | 1300    |               |
|   |              | $V_{GS} = 1.5\text{V}, I_D = 0.04\text{A}$   |      | 1100 | 1600    |               |
| <b>CAPACITANCES, CHARGES</b>                  |              |  |      |      |         |               |
| Input Capacitance                             | $C_{ISS}$    | $V_{GS} = 0\text{ V},$<br>$f = 1\text{MHz},$<br>$V_{DS} = 10\text{ V}$                             |      | 30   |         | pF            |
| Output Capacitance                            | $C_{OSS}$    |  |      | 7    |         |               |
| Reverse Transfer Capacitance                  | $C_{RSS}$    |  |      | 5    |         |               |
| Total Gate Charge                             | $Q_{G(TOT)}$ | $V_{GS} = 4.5\text{ V},$<br>$V_{DS} = 10\text{ V},$<br>$I_D = 0.54\text{A}$                        |      | 1.07 |         | nC            |
| Threshold Gate Charge                         | $Q_{G(TH)}$  |  |      | 0.12 |         |               |
| Gate-to-Source Charge                         | $Q_{GS}$     |  |      | 0.32 |         |               |
| Gate-to-Drain Charge                          | $Q_{GD}$     |  |      | 0.14 |         |               |
| <b>SWITCHING CHARACTERISTICS</b>              |              |  |      |      |         |               |
| Turn-On Delay Time                            | $t_d(ON)$    | $V_{GS} = 4.5\text{ V},$<br>$V_{DD} = 10\text{ V},$<br>$I_D = 0.54\text{ A},$<br>$R_G = 6\ \Omega$ |      | 7.2  |         | ns            |
| Rise Time                                     | $t_r$        |  |      | 9.5  |         |               |
| Turn-Off Delay Time                           | $t_d(OFF)$   |  |      | 19.6 |         |               |
| Fall Time                                     | $t_f$        |  |      | 4.6  |         |               |
| <b>BODY DIODE CHARACTERISTICS</b>             |              |  |      |      |         |               |
| Forward Voltage                               | $V_{SD}$     | $V_{GS} = 0\text{ V}, I_S = 0.3\text{A}$   |      | 0.85 | 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**



**SOT-723**


| Symbol | Dimension in Millimeters |       |
|--------|--------------------------|-------|
|        | Min.                     | Max.  |
| A      |                          | 0.500 |
| A1     | 0.000                    | 0.050 |
| b      | 0.170                    | 0.270 |
| b1     | 0.270                    | 0.370 |
| c      |                          | 0.150 |
| D      | 1.150                    | 1.250 |
| E      | 1.150                    | 1.250 |
| E1     | 0.750                    | 0.850 |
| e      | 0.800 TYP                |       |
| θ      | 7° REF.                  |       |