



## Description

The DMN601K uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

## General Features

$V_{DS} = 60V$   $I_D = 0.3A$

$R_{DS(ON)} < 2\Omega$  @  $V_{GS}=10V$

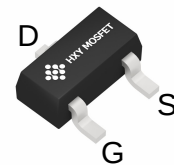
ESD Rating: HBM  $\geq 2000V$

## Application

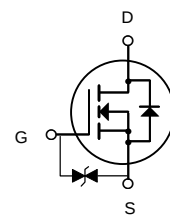
Battery protection

Load switch

Uninterruptible power supply



SOT-23



N-Channel MOSFET

## Ordering Information

| Product ID | Pack   | Brand      | Qty(PCS) |
|------------|--------|------------|----------|
| DMN601K    | SOT-23 | HXY MOSFET | 3000     |

## Absolute Maximum Ratings ( $T_C=25^\circ\text{C}$ unless otherwise noted)

| Symbol          | Parameter                                              |                           | Limit      | Unit               |
|-----------------|--------------------------------------------------------|---------------------------|------------|--------------------|
| $V_{DS}$        | Drain-Source Voltage                                   |                           | 60         | V                  |
| $V_{GS}$        | Gate-Source Voltage                                    |                           | $\pm 20$   | V                  |
| $I_D$           | Continuous Drain Current ( $T_J = 150^\circ\text{C}$ ) | $T_A = 25^\circ\text{C}$  | 0.3        | A                  |
|                 |                                                        | $T_A = 100^\circ\text{C}$ | 0.19       |                    |
| $I_{DM}$        | Drain Current-Pulsed (Note 1)                          |                           | 0.8        | A                  |
| $P_D$           | Maximum Power Dissipation                              |                           | 0.35       | W                  |
| $T_J, T_{STG}$  | Operating Junction and Storage Temperature Range       |                           | -55 To 150 | $^\circ\text{C}$   |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient (Note 2)       |                           | 350        | $^\circ\text{C/W}$ |



**Electrical Characteristics ( $T_A=25^{\circ}\text{C}$  unless otherwise noted)**

| Parameter                                 | Symbol       | Condition                                                | Min | Typ       | Max       | Unit     |
|-------------------------------------------|--------------|----------------------------------------------------------|-----|-----------|-----------|----------|
| Drain-Source Breakdown Voltage            | $BV_{DSS}$   | $V_{GS}=0V, I_D=250\mu A$                                | 60  | 68        | -         | V        |
| Zero Gate Voltage Drain Current           | $I_{DSS}$    | $V_{DS}=60V, V_{GS}=0V$                                  | -   | -         | 1         | $\mu A$  |
| Gate-Body Leakage Current                 | $I_{GSS}$    | $V_{GS}=\pm 10V, V_{DS}=0V$                              | -   | $\pm 100$ | $\pm 500$ | nA       |
|                                           |              | $V_{GS}=\pm 20V, V_{DS}=0V$                              | -   | $\pm 4$   | $\pm 10$  | $\mu A$  |
| Gate Threshold Voltage                    | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$                            | 0.7 | 1.2       | 1.9       | V        |
| Drain-Source On-State Resistance          | $R_{DS(ON)}$ | $V_{GS}=5V, I_D=0.1A$                                    | -   | 1.3       | 3         | $\Omega$ |
|                                           |              | $V_{GS}=10V, I_D=0.1A$                                   | -   | 1         | 2         | $\Omega$ |
| Forward Transconductance                  | $g_{FS}$     | $V_{DS}=10V, I_D=0.2A$                                   | 0.1 | -         | -         | S        |
| Input Capacitance                         | $C_{iss}$    | $V_{DS}=25V, V_{GS}=0V,$<br>$F=1.0MHz$                   | -   | 21        | 50        | PF       |
| Output Capacitance                        | $C_{oss}$    |                                                          | -   | 11        | 25        | PF       |
| Reverse Transfer Capacitance              | $C_{rss}$    |                                                          | -   | 4.2       | 5         | PF       |
| Turn-on Delay Time                        | $t_{d(on)}$  | $V_{DD}=30V, I_D=0.2A$<br>$V_{GS}=10V, R_{GEN}=10\Omega$ | -   | 10        | -         | nS       |
| Turn-on Rise Time                         | $t_r$        |                                                          | -   | 50        | -         | nS       |
| Turn-Off Delay Time                       | $t_{d(off)}$ |                                                          | -   | 17        | -         | nS       |
| Turn-Off Fall Time                        | $t_f$        |                                                          | -   | 10        | -         | nS       |
| Total Gate Charge                         | $Q_g$        | $V_{DS}=10V, I_D=0.3A,$<br>$V_{GS}=4.5V$                 | -   | 1.7       | 3         | nC       |
| Diode Forward Voltage <sup>(Note 3)</sup> | $V_{SD}$     | $V_{GS}=0V, I_S=0.2A$                                    | -   | -         | 1.2       | V        |
| Diode Forward Current <sup>(Note 2)</sup> | $I_S$        |                                                          | -   | -         | 0.3       | A        |

**Notes:**

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production



## Typical Electrical And Thermal Characteristics

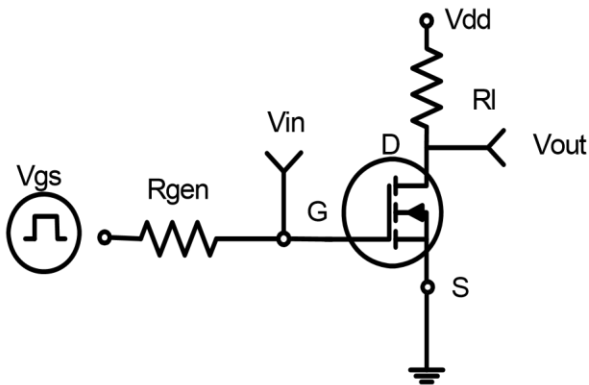


Figure 1: Switching Test Circuit

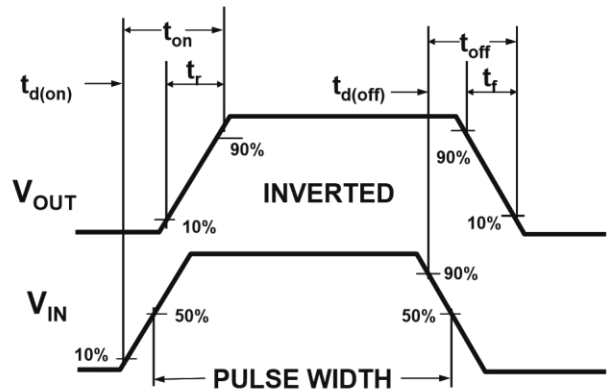


Figure 2: Switching Waveforms

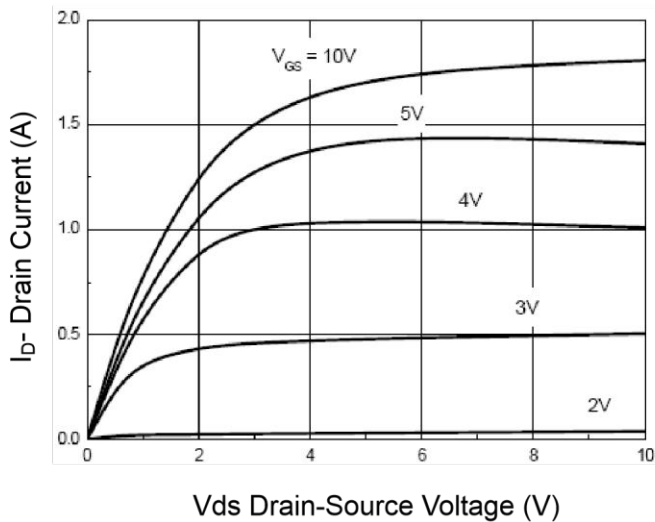


Figure 3 Output Characteristics

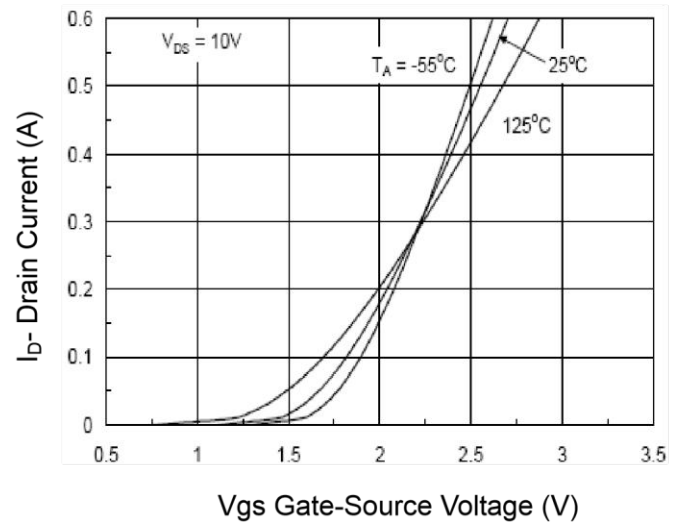


Figure 4 Transfer Characteristics

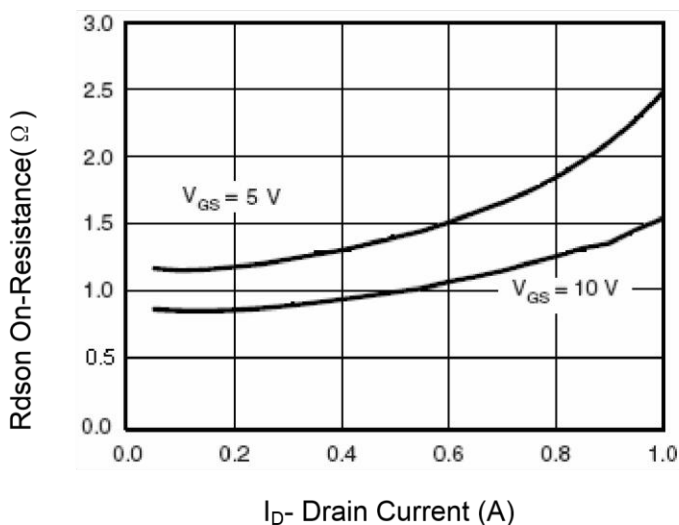


Figure 5 Drain-Source On-Resistance

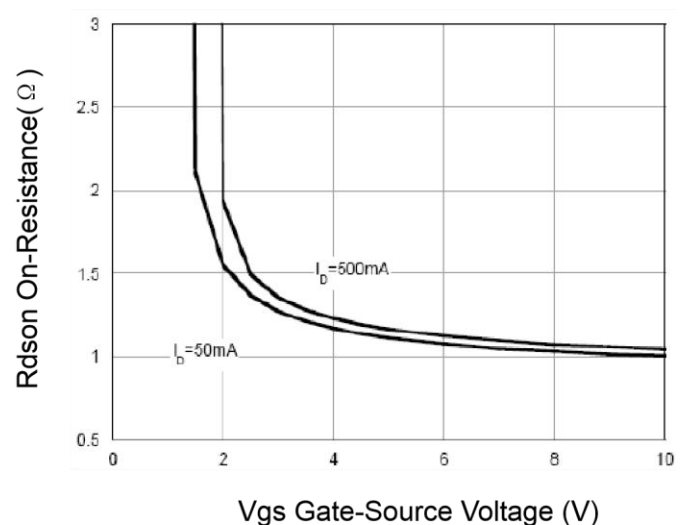
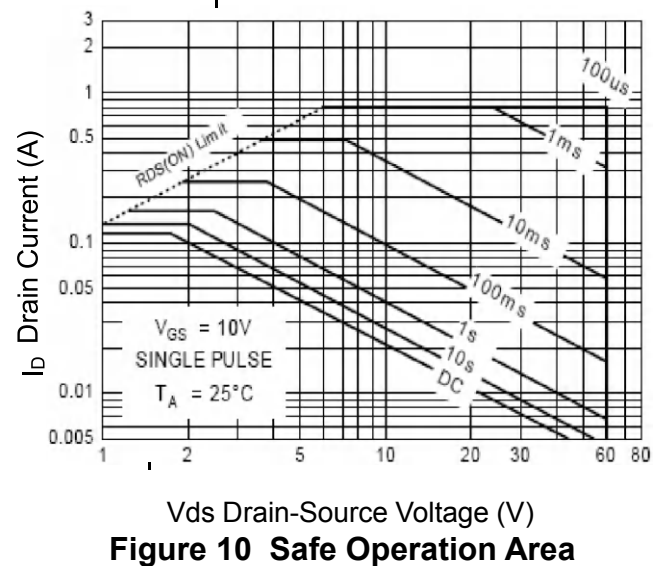
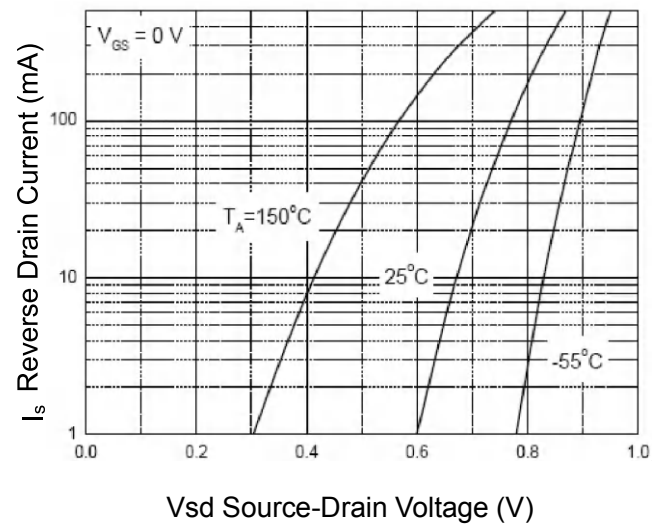
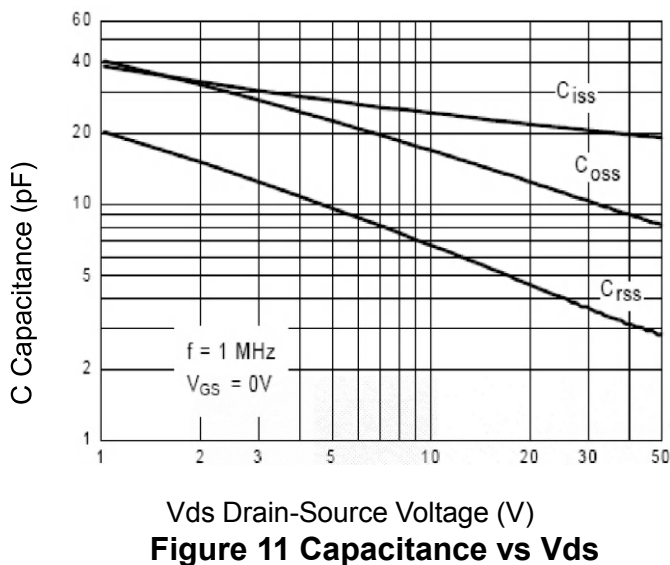
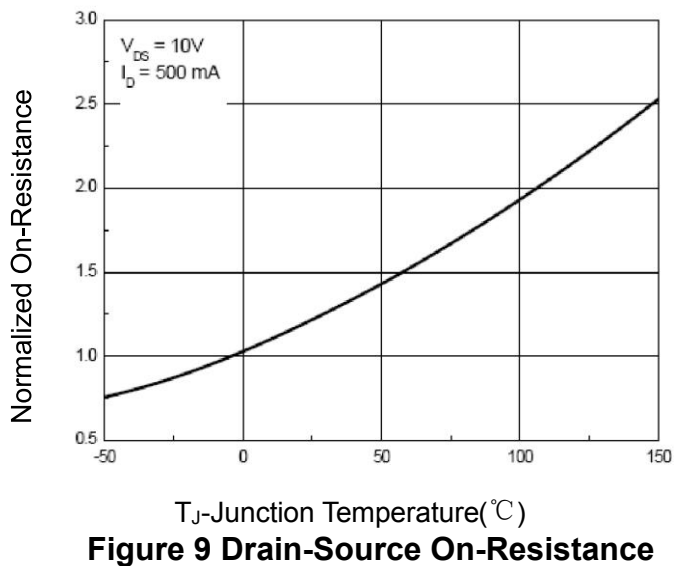
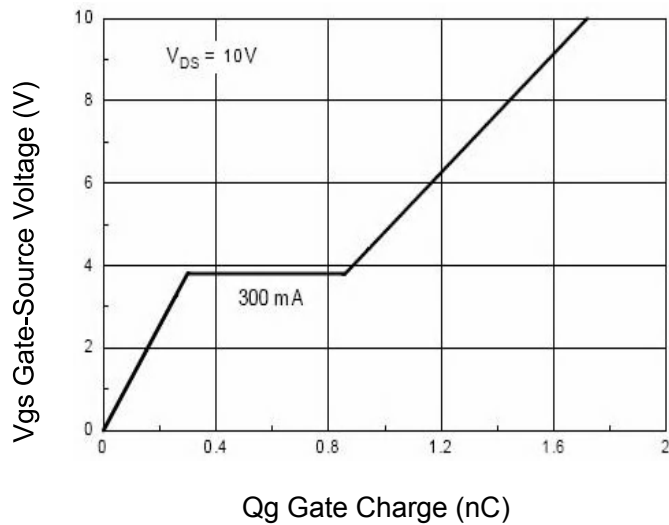


Figure 6 R\_DS(on) vs V\_GS



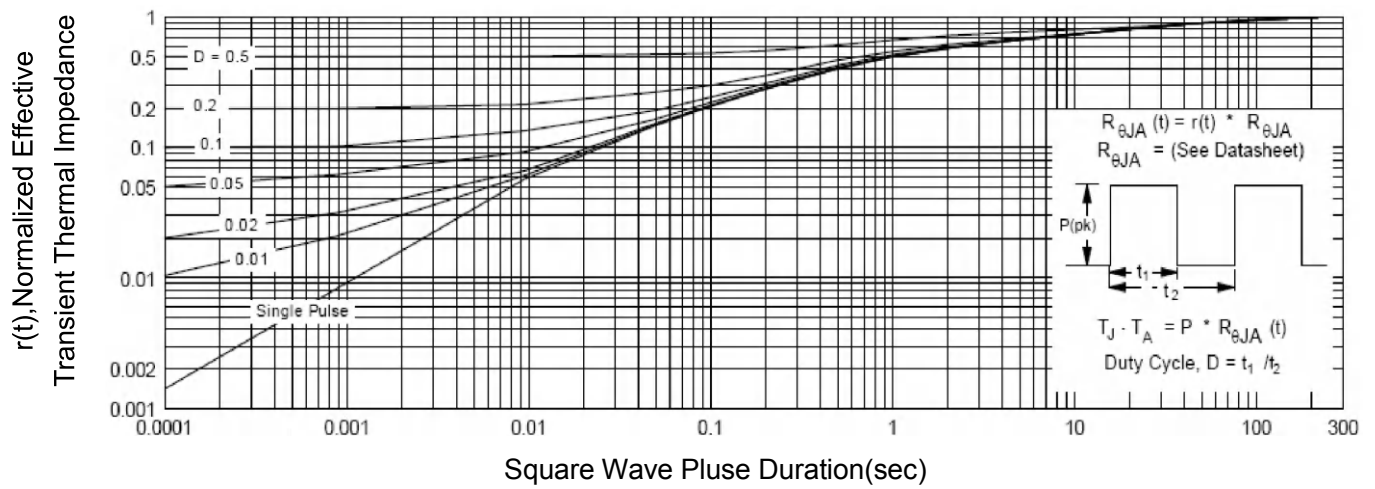


Figure 12 Normalized Maximum Transient Thermal Impedance



## SOT-23 Package Outline Dimensions



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 0.900                     | 1.150 | 0.035                | 0.045 |
| A1     | 0.000                     | 0.100 | 0.000                | 0.004 |
| A2     | 0.900                     | 1.050 | 0.035                | 0.041 |
| b      | 0.300                     | 0.500 | 0.012                | 0.020 |
| c      | 0.080                     | 0.150 | 0.003                | 0.006 |
| D      | 2.800                     | 3.000 | 0.110                | 0.118 |
| E      | 1.200                     | 1.400 | 0.047                | 0.055 |
| E1     | 2.250                     | 2.550 | 0.089                | 0.100 |
| e      | 0.950 TYP                 |       | 0.037 TYP            |       |
| e1     | 1.800                     | 2.000 | 0.071                | 0.079 |
| L      | 0.550 REF                 |       | 0.022 REF            |       |
| L1     | 0.300                     | 0.500 | 0.012                | 0.020 |
| θ      | 0°                        | 8°    | 0°                   | 8°    |

## SOT-23 Suggested Pad Layout



Note:  
1. Controlling dimension: in millimeters.  
2. General tolerance:  $\pm 0.05\text{mm}$ .  
3. The pad layout is for reference purposes only.



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