



## Description

The DMN6068LK3 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

$V_{DS} = 60V$   $I_D = 20A$

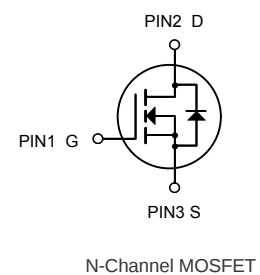
$R_{DS(ON)} < 32m\Omega$  @  $V_{GS}=10V$

## Application

Battery protection

Load switch

Uninterruptible power supply



## Package Marking and Ordering Information

| Product ID | Pack                      | Brand      | Qty(PCS) |
|------------|---------------------------|------------|----------|
| DMN6068LK3 | TO-252-2L(TO-252-2(DPAK)) | HXY MOSFET | 2500     |

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

| Symbol                 | Parameter                                             | Rating     | Units       |
|------------------------|-------------------------------------------------------|------------|-------------|
| $V_{DS}$               | Drain-Source Voltage                                  | 60         | V           |
| $V_{GS}$               | Gate-Source Voltage                                   | $\pm 20$   | V           |
| $I_D@T_C=25^{\circ}C$  | Continuous Drain Current, $V_{GS}$ @ 10V <sup>1</sup> | 20         | A           |
| $I_D@T_C=100^{\circ}C$ | Continuous Drain Current, $V_{GS}$ @ 10V <sup>1</sup> | 10         | A           |
| $I_{DM}$               | Pulsed Drain Current <sup>2</sup>                     | 80         | A           |
| EAS                    | Single Pulse Avalanche Energy <sup>3</sup>            | 38         | mJ          |
| $P_D@T_C=25^{\circ}C$  | Total Power Dissipation <sup>4</sup>                  | 34.7       | W           |
| $T_{STG}$              | Storage Temperature Range                             | -55 to 150 | $^{\circ}C$ |
| $T_J$                  | Operating Junction Temperature Range                  | -55 to 150 | $^{\circ}C$ |



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

| Parameter                               |                     | Symbol        | Test Conditions                                        | Min. | Typ. | Max.      | Unit       |
|-----------------------------------------|---------------------|---------------|--------------------------------------------------------|------|------|-----------|------------|
| Static Characteristics                  |                     |               |                                                        |      |      |           |            |
| Drain-Source Breakdown Voltage          |                     | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = 250\mu A$                          | 60   | -    | -         | V          |
| Gate-Body Leakage Current               |                     | $I_{GSS}$     | $V_{DS} = 0V, V_{GS} = \pm 20V$                        | -    | -    | $\pm 100$ | nA         |
| Zero Gate Voltage Drain Current         | $T_J=25^{\circ}C$   | $I_{DSS}$     | $V_{DS} = 60V, V_{GS} = 0V$                            | -    | -    | 1         | $\mu A$    |
|                                         | $T_J=100^{\circ}C$  |               |                                                        | -    | -    | 100       |            |
| Gate-Threshold Voltage                  |                     | $V_{GS(th)}$  | $V_{DS} = V_{GS}, I_D = 250\mu A$                      | 1.2  | 1.7  | 2.5       | V          |
| Drain-Source on-Resistance <sup>4</sup> |                     | $R_{DS(on)}$  | $V_{GS} = 10V, I_D = 10A$                              | -    | 25   | 32        | m $\Omega$ |
|                                         |                     |               | $V_{GS} = 4.5V, I_D = 5A$                              | -    | 31.5 | 40        |            |
| Forward Transconductance <sup>4</sup>   |                     | $g_{fs}$      | $V_{DS} = 5V, I_D = 10A$                               | -    | 15.5 | -         | S          |
| Dynamic Characteristics <sup>5</sup>    |                     |               |                                                        |      |      |           |            |
| Input Capacitance                       |                     | $C_{iss}$     | $V_{DS} = 30V, V_{GS} = 0V, f = 1MHz$                  | -    | 1355 | -         | pF         |
| Output Capacitance                      |                     | $C_{oss}$     |                                                        | -    | 60   | -         |            |
| Reverse Transfer Capacitance            |                     | $C_{rss}$     |                                                        | -    | 49   | -         |            |
| Gate Resistance                         |                     | $R_G$         | $f = 1MHz$                                             | -    | 1.2  | -         | $\Omega$   |
| Switching Characteristics <sup>5</sup>  |                     |               |                                                        |      |      |           |            |
| Total Gate Charge                       |                     | $Q_g$         | $V_{GS} = 10V, V_{DD} = 30V, I_D = 10A$                | -    | 22   | -         | nC         |
| Gate-Source Charge                      |                     | $Q_{gs}$      |                                                        | -    | 4.2  | -         |            |
| Gate-Drain Charge                       |                     | $Q_{gd}$      |                                                        | -    | 6.9  | -         |            |
| Turn-on Delay Time                      |                     | $t_{d(on)}$   | $V_{GS} = 10V, V_{DD} = 30V, R_G = 3\Omega, I_D = 10A$ | -    | 6.4  | -         | ns         |
| Rise Time                               |                     | $t_r$         |                                                        | -    | 15.3 | -         |            |
| Turn-off Delay Time                     |                     | $t_{d(off)}$  |                                                        | -    | 25   | -         |            |
| Fall Time                               |                     | $t_f$         |                                                        | -    | 7.6  | -         |            |
| Body Diode Reverse Recovery Time        |                     | $t_{rr}$      | $I_F = 10A, dI_F/dt = 100A/\mu s$                      | -    | 26   | -         | ns         |
| Body Diode Reverse Recovery Charge      |                     | $Q_{rr}$      |                                                        | -    | 45   | -         | nC         |
| Drain-Source Body Diode Characteristics |                     |               |                                                        |      |      |           |            |
| Diode Forward Voltage <sup>4</sup>      |                     | $V_{SD}$      | $I_S = 10A, V_{GS} = 0V$                               | -    | -    | 1.2       | V          |
| Continuous Source Current               | $T_C = 25^{\circ}C$ | $I_S$         | -                                                      | -    | -    | 20        | A          |

Notes:

1. Repetitive rating, pulse width limited by junction temperature  $T_{J(MAX)}=150^\circ\text{C}$
2. The EAS data shows Max. rating . The test condition is  $V_{DD}=25V, V_{GS}=10V, L=0.4mH, I_{AS}=14A$
3. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$ .
5. This value is guaranteed by design hence it is not included in the production test.



## Typical Characteristics

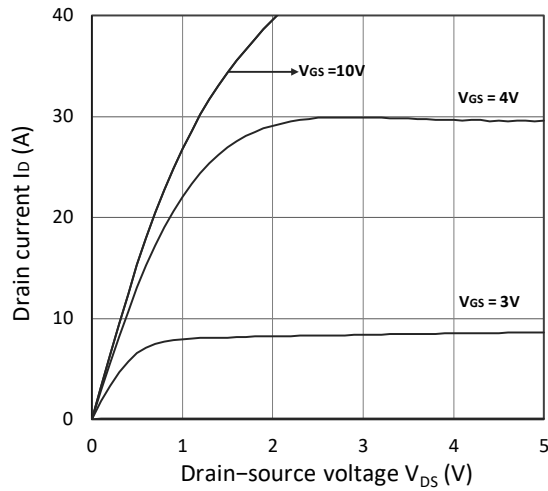


Figure 1. Output Characteristics

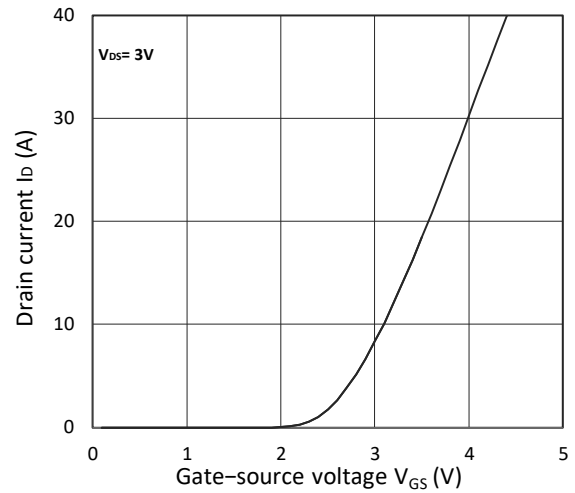


Figure 2. Transfer Characteristics

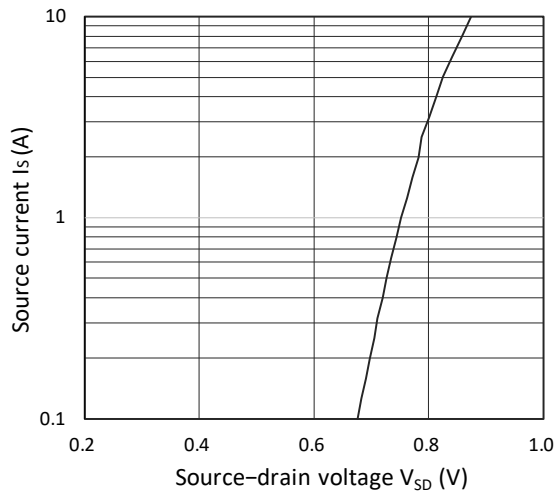


Figure 3. Forward Characteristics of Reverse

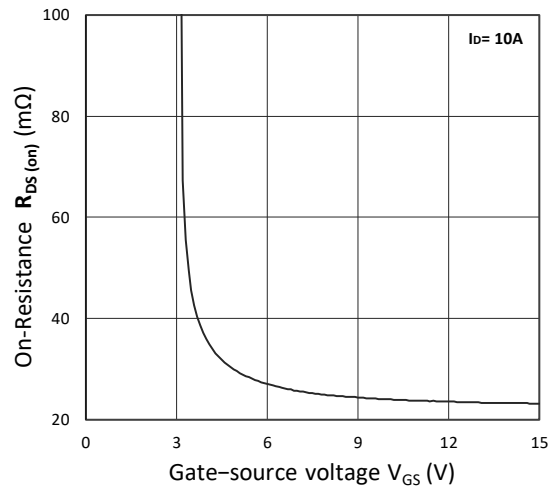


Figure 4.  $R_{DS(ON)}$  vs.  $V_{GS}$

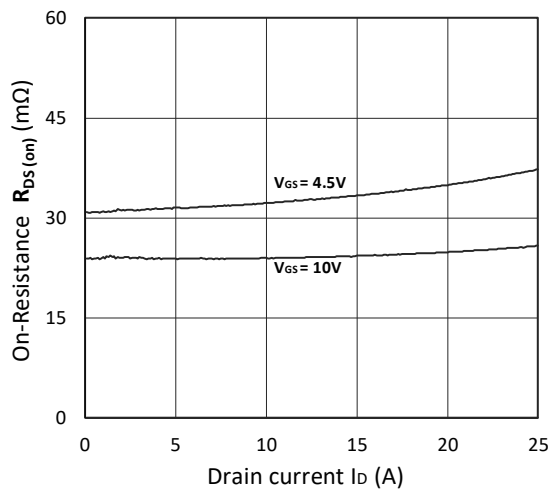


Figure 5.  $R_{DS(ON)}$  vs.  $I_D$

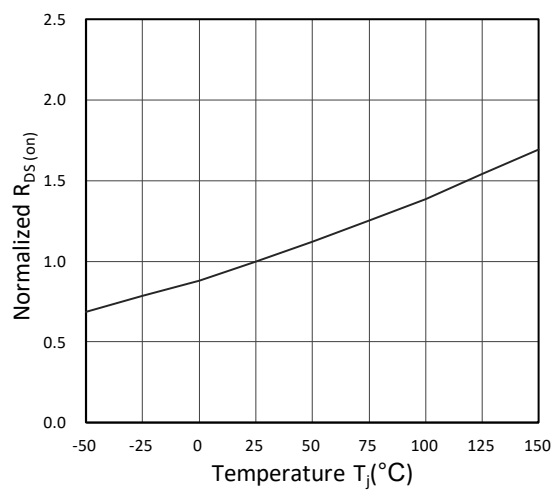


Figure 6. Normalized  $R_{DS(ON)}$  vs. Temperature

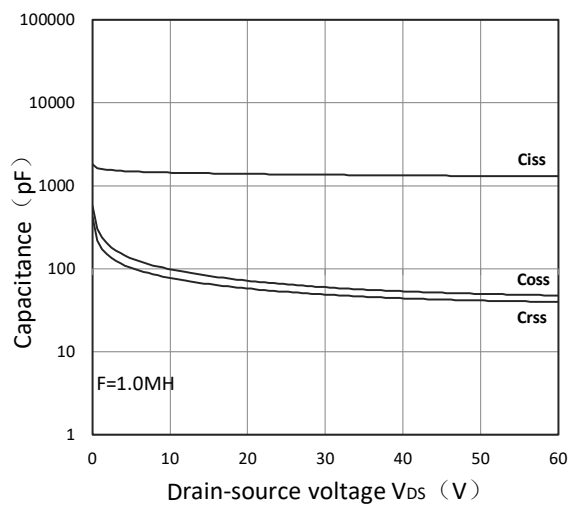


Figure 7. Capacitance Characteristics

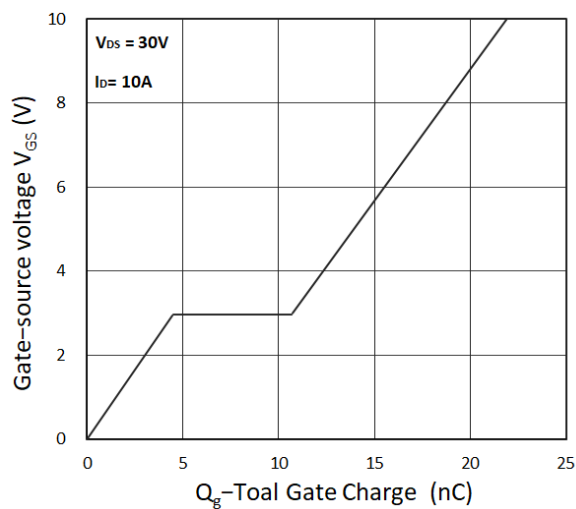


Figure 8. Gate Charge Characteristics

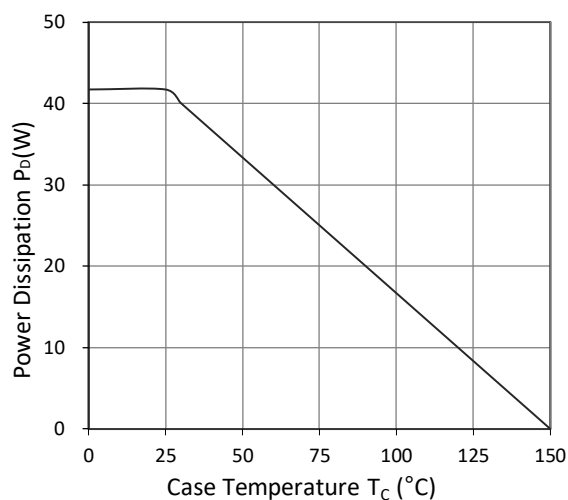


Figure 9. Power Dissipation

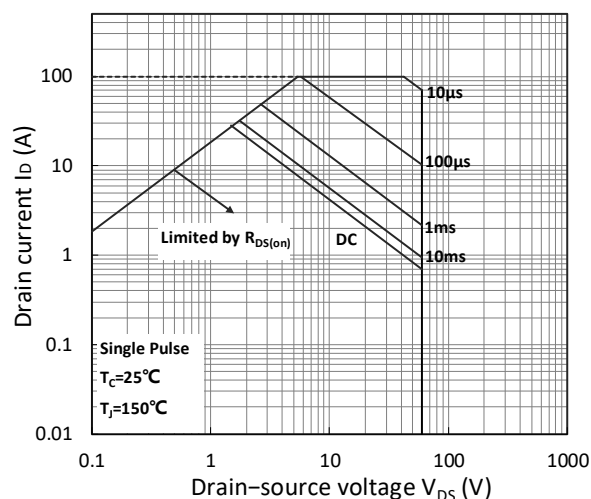


Figure 10. Safe Operating Area

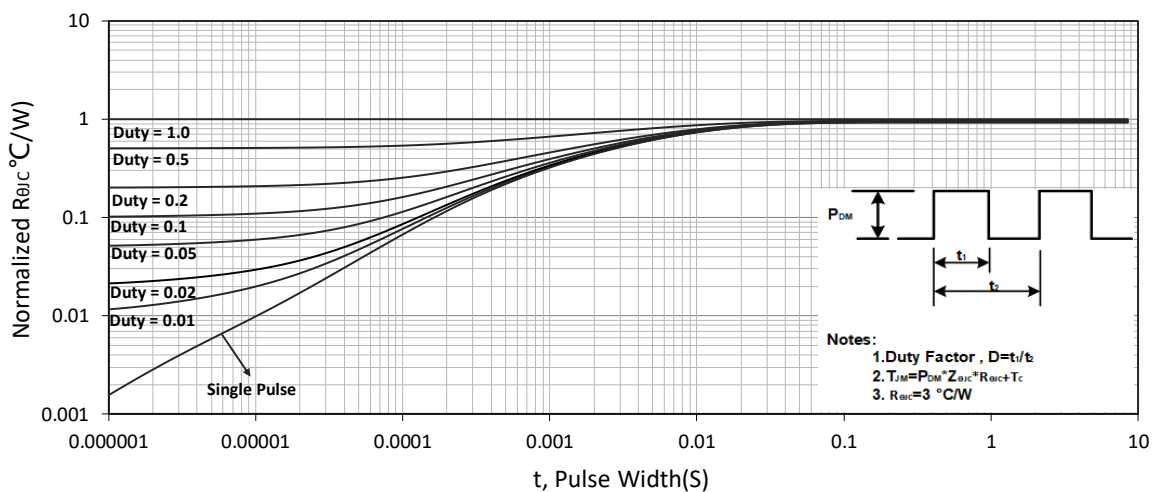


Figure 11. Normalized Maximum Transient Thermal Impedance



## N-Channel Enhancement Mode MOSFET

| Symbol | Dimensions In Millimeters |        | Dimensions In Inches |       |
|--------|---------------------------|--------|----------------------|-------|
|        | Min.                      | Max.   | Min.                 | Max.  |
| A      | 2.200                     | 2.400  | 0.087                | 0.094 |
| A1     | 0.000                     | 0.127  | 0.000                | 0.005 |
| b      | 0.660                     | 0.860  | 0.026                | 0.034 |
| c      | 0.460                     | 0.580  | 0.018                | 0.023 |
| D      | 6.500                     | 6.700  | 0.256                | 0.264 |
| D1     | 5.100                     | 5.460  | 0.201                | 0.215 |
| D2     | 0.483 TYP.                |        | 0.190 TYP.           |       |
| E      | 6.000                     | 6.200  | 0.236                | 0.244 |
| e      | 2.186                     | 2.386  | 0.086                | 0.094 |
| L      | 9.800                     | 10.400 | 0.386                | 0.409 |
| L1     | 2.900 TYP.                |        | 0.114 TYP.           |       |
| L2     | 1.400                     | 1.700  | 0.055                | 0.067 |
| L3     | 1.600 TYP.                |        | 0.063 TYP.           |       |
| L4     | 0.600                     | 1.000  | 0.024                | 0.039 |
| Φ      | 1.100                     | 1.300  | 0.043                | 0.051 |
| θ      | 0°                        | 8°     | 0°                   | 8°    |
| h      | 0.000                     | 0.300  | 0.000                | 0.012 |
| V      | 5.350 TYP.                |        | 0.211 TYP.           |       |



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