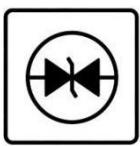


ESD



TVS



TSS



MOV



GDT



PLED

## **MSK20P80GNF**

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### **Product specification**

## Description

The MSK20P80GNF 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.

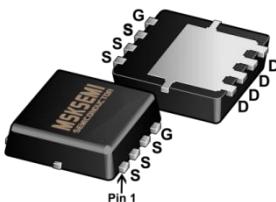
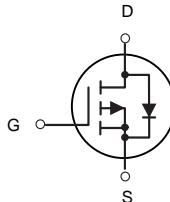
## General Features

- $V_{DS} = -18V$   $I_D = -80A$
- $R_{DS(ON)} < 3\text{ m}\Omega$   $V_{GS} = -10V$

## Application

- Battery protection
- Load switch
- Uninterruptible power supply

## Reference News

| PACKAGE OUTLINE   | P-Channel MOSFET   | Marking  |
|---|--|--|
| <br>DFN5X6-8L |  |  |

## Absolute Maximum Ratings (TC=25°C unless otherwise noted)

| Symbol                   | Parameter   | Rating     | Units |
|--------------------------|---|------------|-------|
| $V_{DS}$                 | Drain-Source Voltage                                  | -18        | V     |
| $V_{GS}$                 | Gate-Source Voltage                                   | $\pm 12$   | V     |
| $I_D @ T_c = 25^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V$ <sup>1</sup> | -80        | A     |
| $I_{DM}$                 | Pulsed Drain Current <sup>2</sup>                     | -360       | A     |
| $P_D @ T_c = 25^\circ C$ | Total Power Dissipation <sup>4</sup>                  | 41.67      | W     |
| $T_{STG}$                | Storage Temperature Range                             | -55 to 150 | °C    |
| $T_J$                    | Operating Junction Temperature Range                  | -55 to 150 | °C    |
| $R_{\theta JA}$          | Thermal Resistance Junction-Ambient <sup>1</sup>      | 62         | °C/W  |
| $R_{\theta JC}$          | Thermal Resistance Junction-Case <sup>1</sup>         | 3          | °C/W  |

**Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)**
**Off Characteristics**

| Symbol                              | Parameter                                 | Conditions  | Min. | Typ.   | Max. | Unit |
|-------------------------------------|---|---|------|--------|------|------|
| BV <sub>DSS</sub>                   | Drain-Source Breakdown Voltage            | V <sub>GS</sub> =0V, I <sub>D</sub> =-250uA                       | -18  | ---    | ---  | V    |
| △BV <sub>DSS</sub> /△T <sub>J</sub> | BV <sub>DSS</sub> Temperature Coefficient | Reference to 25°C, I <sub>D</sub> =-1mA                           | ---  | -0.008 | ---  | V/°C |
| I <sub>DSS</sub>                    | Drain-Source Leakage Current              | V <sub>DS</sub> =-20V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C  | ---  | ---    | -1   | uA   |
|                                     |   | V <sub>DS</sub> =-16V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C | ---  | ---    | -30  | uA   |
| I <sub>GSS</sub>                    | Gate-Source Leakage Current               | V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V                        | ---  | ---    | ±500 | nA   |

**On Characteristics**

|                     |                                   |   |      |       |      |       |
|---------------------|-----------------------------------|---|------|-------|------|-------|
| R <sub>DSON</sub>   | Static Drain-Source On-Resistance |   |      |       |      |       |
|                     |                                   | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-20A              | ---  | 2.5   | 3.0  | mΩ    |
| V <sub>GS(th)</sub> | Gate Threshold Voltage            | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =-250uA | -0.4 | -0.6  | -1.0 | V     |
|                     |                                   |   | ---  | -3.44 | ---  | mV/°C |
| g <sub>fs</sub>     | Forward Transconductance          | V <sub>DS</sub> =-10V, I <sub>S</sub> =-3A                | ---  | 30    | ---  | S     |

**Dynamic and switching Characteristics**

|                     |                                     |  |     |       |       |    |
|---------------------|-------------------------------------|--|-----|-------|-------|----|
| Q <sub>g</sub>      | Total Gate Charge <sup>2, 3</sup>   | V <sub>DS</sub> =-16V, V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-5A                     | --- | 149   | 225   | nC |
| Q <sub>gs</sub>     | Gate-Source Charge <sup>2, 3</sup>  |  | --- | 14.4  | 22    |    |
| Q <sub>gd</sub>     | Gate-Drain Charge <sup>2, 3</sup>   |  | --- | 42.8  | 65    |    |
| T <sub>d(on)</sub>  | Turn-On Delay Time <sup>2, 3</sup>  | V <sub>DD</sub> =-15V, V <sub>GS</sub> =-4.5V, R <sub>G</sub> =25Ω I <sub>D</sub> =-1A | --- | 21.2  | 42    | nS |
| T <sub>r</sub>      | Rise Time <sup>2, 3</sup>           |  | --- | 20.6  | 40    |    |
| T <sub>d(off)</sub> | Turn-Off Delay Time <sup>2, 3</sup> |  | --- | 26    | 52    |    |
| T <sub>f</sub>      | Fall Time <sup>2, 3</sup>           |  | --- | 400   | 600   |    |
| C <sub>iss</sub>    | Input Capacitance                   | V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V, F=1MHz                                     | --- | 12000 | 16000 | pF |
| C <sub>oss</sub>    | Output Capacitance                  |  | --- | 1670  | 2500  |    |
| C <sub>rss</sub>    | Reverse Transfer Capacitance        |  | --- | 730   | 1100  |    |
| R <sub>g</sub>      | Gate resistance                     | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz                                       | --- | 2.6   | ---   | Ω  |

**Drain-Source Diode Characteristics and Maximum Ratings**

| Symbol          | Parameter                 | Conditions   | Min. | Typ. | Max. | Unit |
|-----------------|---------------------------|--|------|------|------|------|
| I <sub>S</sub>  | Continuous Source Current | V <sub>G</sub> =V <sub>D</sub> =0V, Force Current              | ---  | ---  | -85  | A    |
| I <sub>SM</sub> | Pulsed Source Current     |  | ---  | ---  | -190 | A    |
| V <sub>SD</sub> | Diode Forward Voltage     | V <sub>GS</sub> =0V, I <sub>S</sub> =-1A, T <sub>J</sub> =25°C | ---  | ---  | -1   | V    |

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
3. Essentially independent of operating temperature.

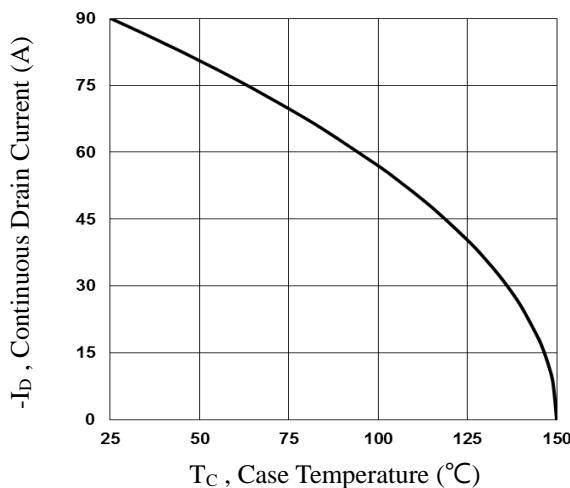


Fig.1 Continuous Drain Current vs.  $T_C$

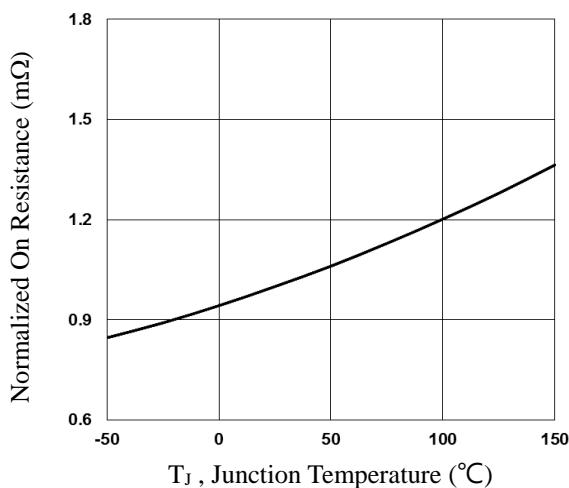


Fig.2 Normalized RDS(on) vs.  $T_J$

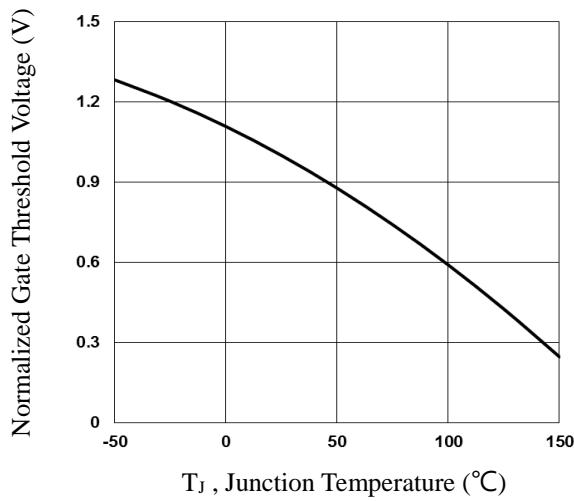


Fig.3 Normalized  $V_{th}$  vs.  $T_J$

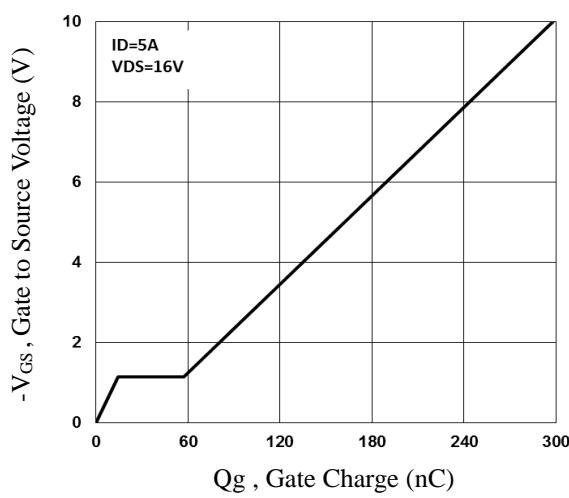


Fig.4 Gate Charge Waveform

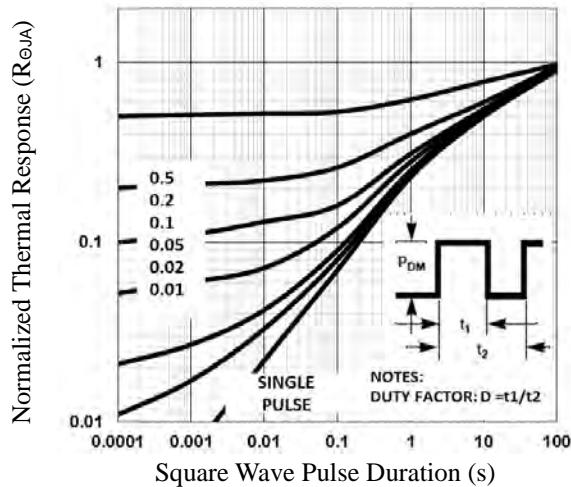


Fig.5 Normalized Transient Response

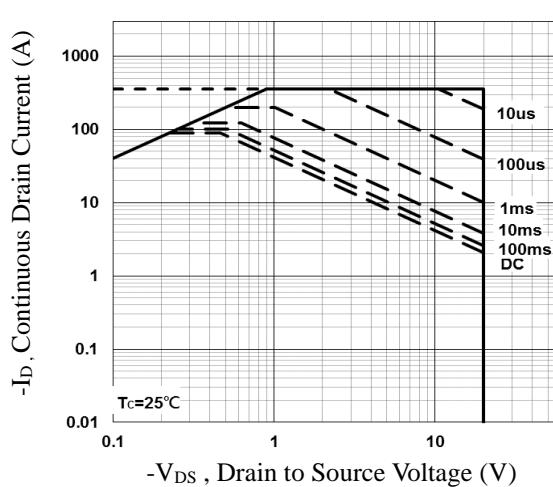


Fig.6 Maximum Safe Operation Area

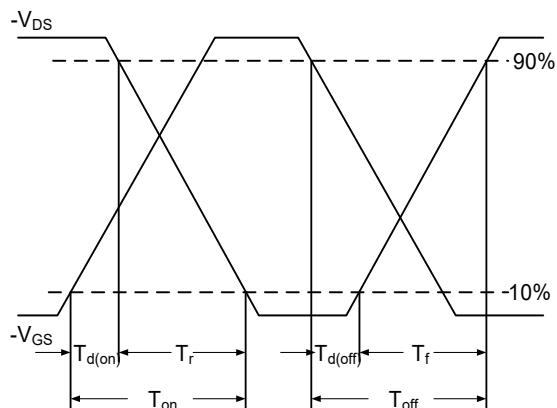


Fig.7 Switching Time Waveform

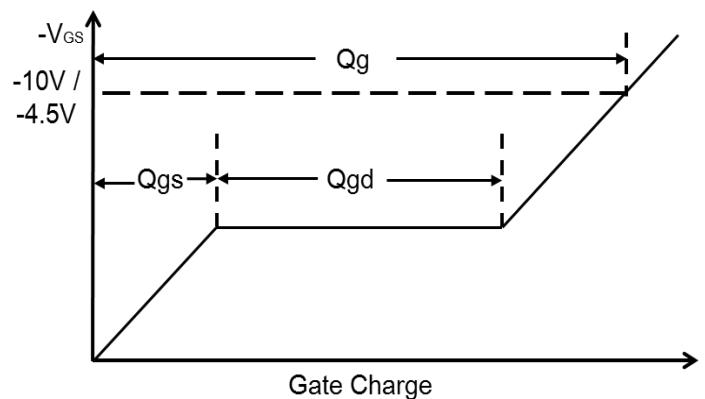
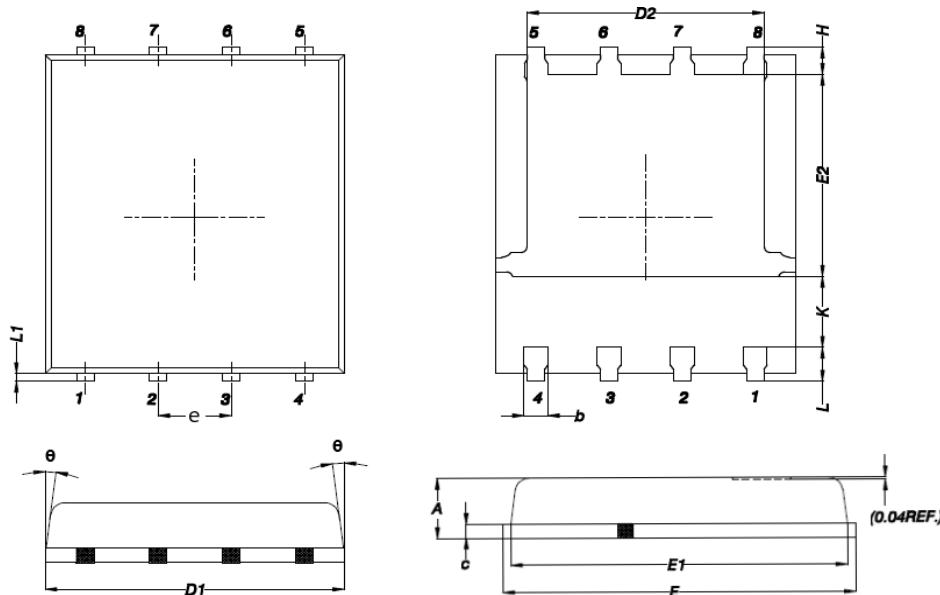


Fig.8 Gate Charge Waveform

## PACKAGE INFORMATION



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | MAX                       | MIN   | MAX                  | MIN   |
| A      | 1.200                     | 0.850 | 0.047                | 0.031 |
| b      | 0.510                     | 0.300 | 0.020                | 0.012 |
| C      | 0.300                     | 0.200 | 0.012                | 0.008 |
| D1     | 5.400                     | 4.800 | 0.212                | 0.189 |
| D2     | 4.310                     | 3.610 | 0.170                | 0.142 |
| E      | 6.300                     | 5.850 | 0.248                | 0.230 |
| E1     | 5.960                     | 5.450 | 0.235                | 0.215 |
| E2     | 3.920                     | 3.300 | 0.154                | 0.130 |
| e      | 1.27BSC                   |       | 0.05BSC              |       |
| H      | 0.650                     | 0.380 | 0.026                | 0.015 |
| K      | ---                       | 1.100 | ---                  | 0.043 |
| L      | 0.710                     | 0.380 | 0.028                | 0.015 |
| L1     | 0.250                     | 0.050 | 0.009                | 0.002 |
| θ      | 12°                       | 0°    | 12°                  | 0°    |

## REEL SPECIFICATION

| P/N         | PKG       | QTY  |
|-------------|-----------|------|
| MSK20P80GNF | DFN5X6-8L | 5000 |

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