



## Description

The DMP6180SK3-13 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

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

$R_{DS(ON)} < 58m\Omega @ V_{GS} = -10V$

$R_{DS(ON)} < 67m\Omega @ V_{GS} = -4.5V$

## Application

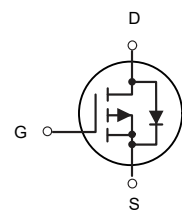
PWM applications

Load switch

Power management



TO-252-2L  
(TO-252(DPAK))



P-Channel MOSFET

## Package Marking and Ordering Information

| Product ID    | Pack                    | Brand      | Qty(PCS) |
|---------------|-------------------------|------------|----------|
| DMP6180SK3-13 | TO-252-2L(TO-252(DPAK)) | HXY MOSFET | 2500     |

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

| Symbol   | Parameter                                         | Limit      | Unit |
|----------|---------------------------------------------------|------------|------|
| VDS      | Drain-Source Voltage                              | -60        | V    |
| VGS      | Gate-Source Voltage                               | ±20        | V    |
| ID(25°C) | Drain Current-Continuous@ Current-Pulsed (Note 1) | -20        | A    |
| ID(70°C) |                                                   | -12        | A    |
| IDM      |                                                   | -30        | A    |
| Pd       | Maximum Power Dissipation                         | 25         | W    |
| TJ,TSTG  | Operating Junction and Storage Temperature Range  | -55 To 175 | °C   |
| RθJA     | Thermal Resistance,Junction-to-Ambient (Note 2)   | 65         | °C/W |



**Electrical Characteristics (TA=25°C unless otherwise noted)**

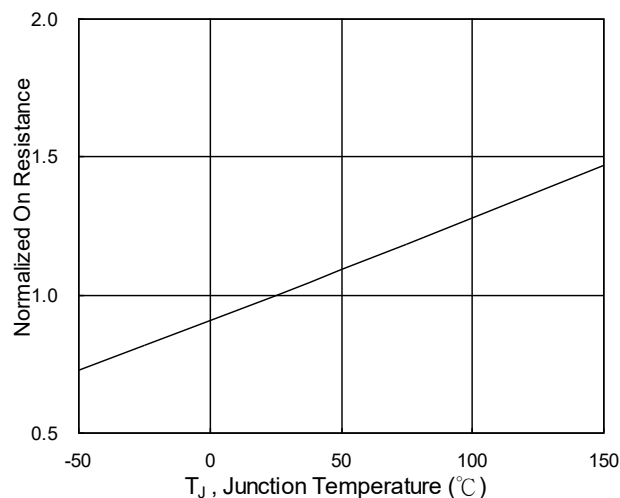
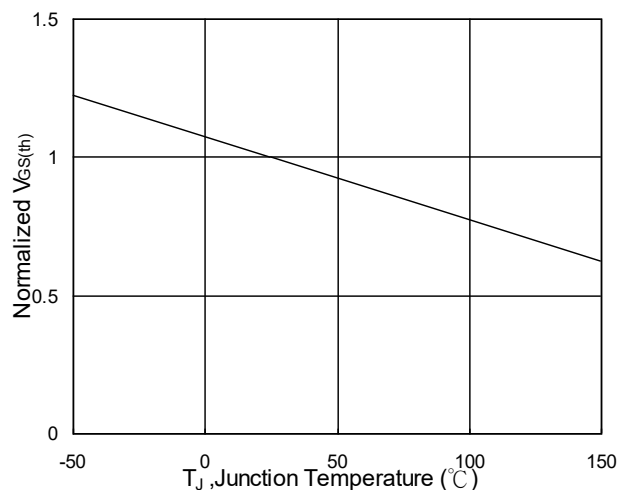
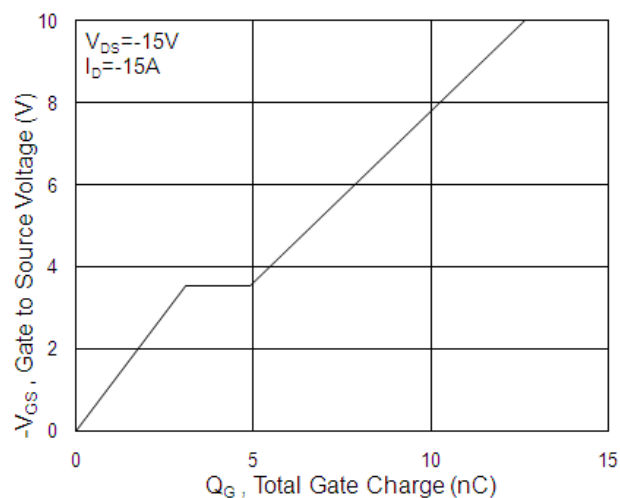
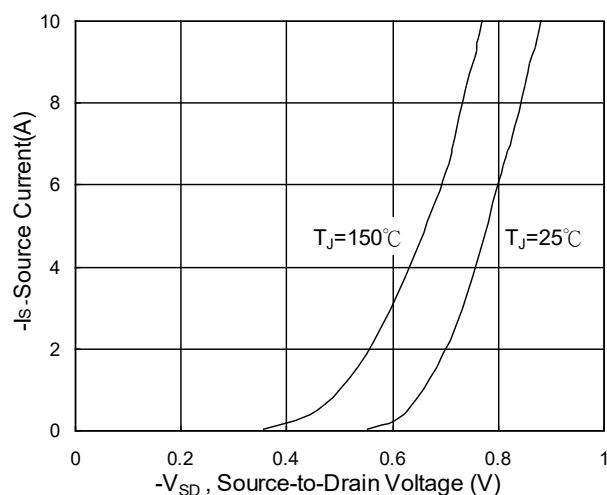
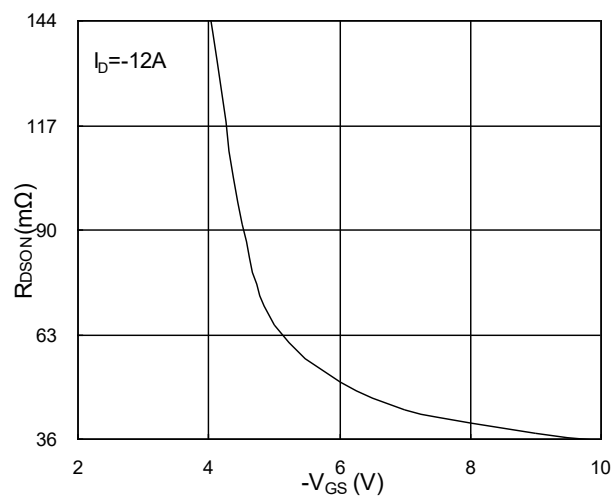
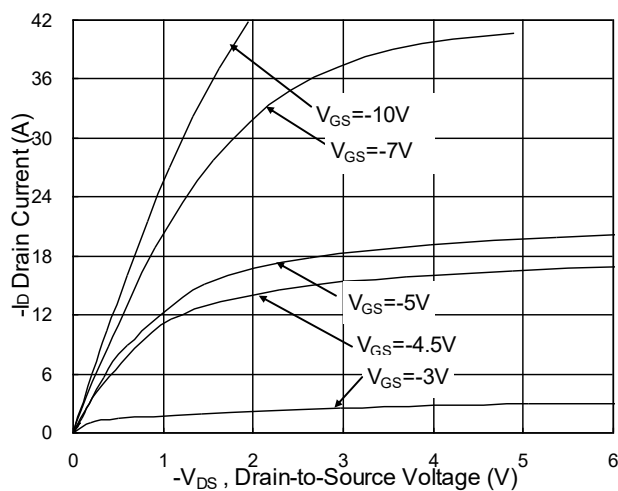
| Symbol                       | Parameter                                      | Conditions                                                                                  | Min. | Typ.   | Max. | Unit  |
|------------------------------|------------------------------------------------|---------------------------------------------------------------------------------------------|------|--------|------|-------|
| BV <sub>DSS</sub>            | Drain-Source Breakdown Voltage                 | V <sub>GS</sub> =0V, I <sub>D</sub> =-250uA                                                 | -60  | ---    | ---  | V     |
| $\Delta BV_{DSS}/\Delta T_J$ | BV <sub>DSS</sub> Temperature Coefficient      | Reference to 25°C, I <sub>D</sub> =-1mA                                                     | ---  | -0.023 | ---  | V/°C  |
| R <sub>DS(ON)</sub>          | Static Drain-Source On-Resistance <sup>2</sup> | V <sub>GS</sub> =-10V, I <sub>D</sub> =-10A                                                 | ---  | 48     | 58   | mΩ    |
|                              |                                                | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-6A                                                 | ---  | 56     | 67   |       |
| V <sub>GS(th)</sub>          | Gate Threshold Voltage                         | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =-250uA                                   | -1.2 | ---    | -2.5 | V     |
| $\Delta V_{GS(th)}$          | V <sub>GS(th)</sub> Temperature Coefficient    |                                                                                             | ---  | 4      | ---  | mV/°C |
| I <sub>DSS</sub>             | Drain-Source Leakage Current                   | V <sub>DS</sub> =-24V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C                            | ---  | ---    | -1   | uA    |
|                              |                                                | V <sub>DS</sub> =-24V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C                            | ---  | ---    | -5   |       |
| I <sub>GSS</sub>             | Gate-Source Leakage Current                    | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                                                  | ---  | ---    | ±100 | nA    |
| g <sub>fs</sub>              | Forward Transconductance                       | V <sub>DS</sub> =-5V, I <sub>D</sub> =-15A                                                  | ---  | 12     | ---  | S     |
| Q <sub>g</sub>               | Total Gate Charge (-4.5V)                      | V <sub>DS</sub> =-15V, V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-15A                         | ---  | 6.1    | ---  | nC    |
| Q <sub>gs</sub>              | Gate-Source Charge                             |                                                                                             | ---  | 3.1    | ---  |       |
| Q <sub>gd</sub>              | Gate-Drain Charge                              |                                                                                             | ---  | 1.8    | ---  |       |
| T <sub>d(on)</sub>           | Turn-On Delay Time                             | V <sub>DD</sub> =-15V, V <sub>GS</sub> =-10V, R <sub>G</sub> =3.3Ω,<br>I <sub>D</sub> =-15A | ---  | 2.6    | ---  | ns    |
| T <sub>r</sub>               | Rise Time                                      |                                                                                             | ---  | 8.6    | ---  |       |
| T <sub>d(off)</sub>          | Turn-Off Delay Time                            |                                                                                             | ---  | 33.6   | ---  |       |
| T <sub>f</sub>               | Fall Time                                      |                                                                                             | ---  | 6      | ---  |       |
| C <sub>iss</sub>             | Input Capacitance                              | V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V, f=1MHz                                          | ---  | 585    | ---  | pF    |
| C <sub>oss</sub>             | Output Capacitance                             |                                                                                             | ---  | 100    | ---  |       |
| C <sub>rss</sub>             | Reverse Transfer Capacitance                   |                                                                                             | ---  | 85     | ---  |       |
| I <sub>S</sub>               | Continuous Source Current <sup>1,5</sup>       | V <sub>G</sub> =V <sub>D</sub> =0V, Force Current                                           | ---  | ---    | -20  | A     |
| I <sub>SM</sub>              | Pulsed Source Current <sup>2,5</sup>           |                                                                                             | ---  | ---    | -30  | A     |
| V <sub>SD</sub>              | Diode Forward Voltage <sup>2</sup>             | V <sub>GS</sub> =0V, I <sub>S</sub> =-1A, T <sub>J</sub> =25°C                              | ---  | ---    | -1.2 | V     |
| t <sub>rr</sub>              | Reverse Recovery Time                          | I <sub>F</sub> =-15A, dI/dt=100A/μs,                                                        | ---  | 6.1    | ---  | nS    |
| Q <sub>rr</sub>              | Reverse Recovery Charge                        | T <sub>J</sub> =25°C                                                                        | ---  | 1.4    | ---  | nC    |

**Note :**

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 20Z copper.
- 2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3.The EAS data shows Max. rating . The test condition is V<sub>DD</sub>=-25V, V<sub>GS</sub>=-10V, L=0.1mH, I<sub>AS</sub>=-19A
- 4.The power dissipation is limited by 150°C junction temperature
- 5.The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub> , in real applications , should be limited by total power dissipation.



## Typical Electrical And Thermal Characteristics



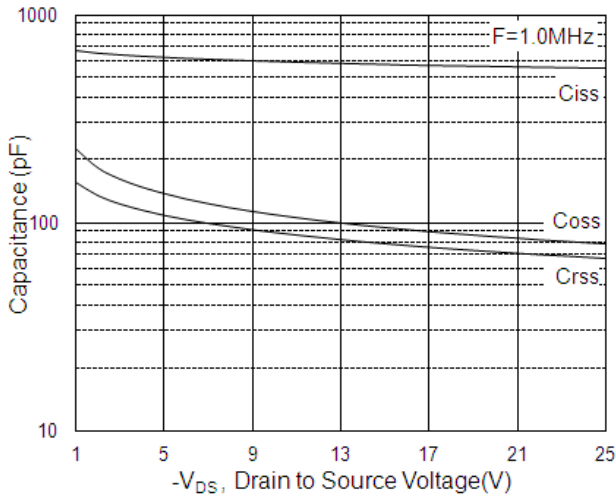


Fig.7 Capacitance

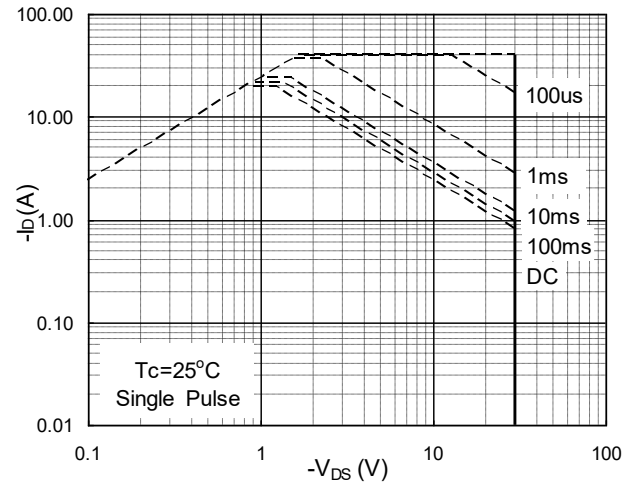


Fig.8 Safe Operating Area

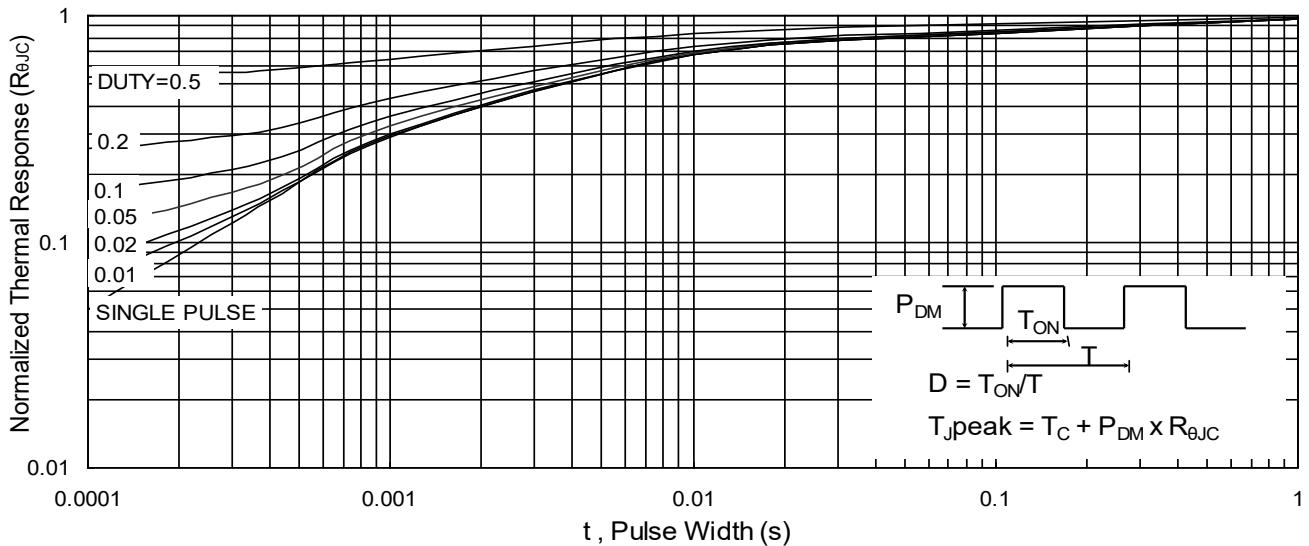


Fig.9 Normalized Maximum Transient Thermal Impedance

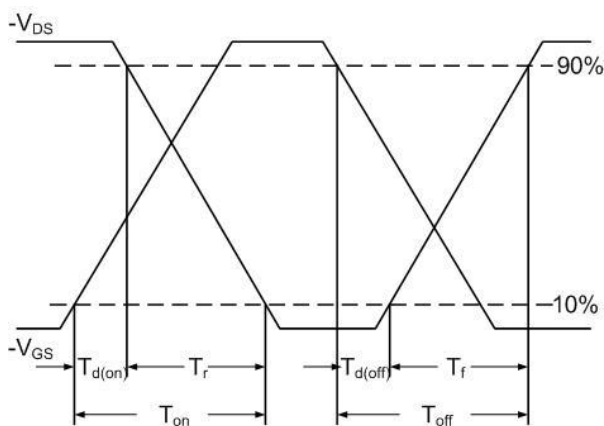


Fig.10 Switching Time Waveform

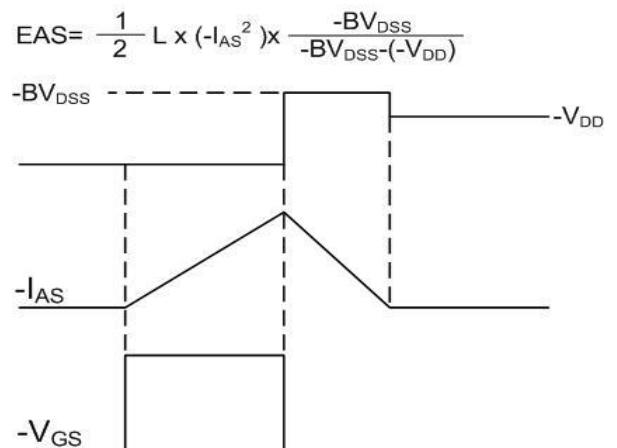
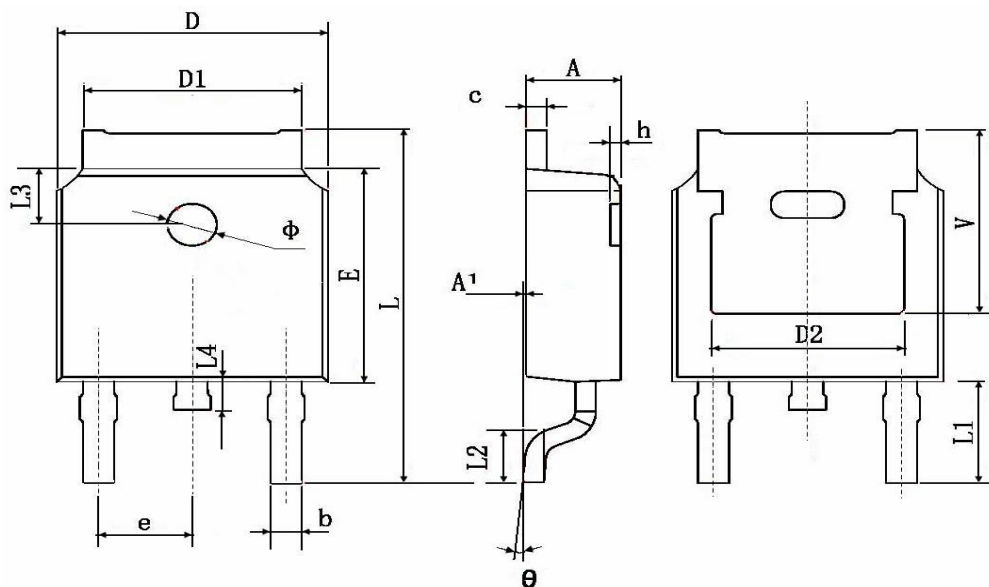


Fig.11 Unclamped Inductive Switching Waveform



## TO-252-2L(TO-252(DPAK)) Package Information



| 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     | 4.830 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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