



## Description

The SI8810-TP uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 2.5V.

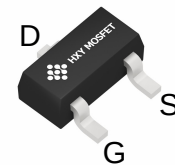
This device is suitable for use as a Battery protection or in other Switching application.

## General Features

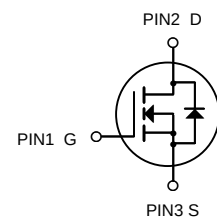
$V_{DS} = 20V, I_D = 7A$

$R_{DS(ON)} < 17m\Omega @ V_{GS}=4.5V$

$R_{DS(ON)} < 25m\Omega @ V_{GS}=2.5V$



SOT-23



N-Channel MOSFET

## Application

High power and current handing capability

Lead free product is acquired

Surface mount package

PWM applications

## Package Marking and Ordering Information

| Product ID | Pack   | Marking | Qty(PCS) |
|------------|--------|---------|----------|
| SI8810-TP  | SOT-23 | 2320    | 3000PCS  |

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

| Symbol          | Parameter                                        | Limit      | Unit          |
|-----------------|--------------------------------------------------|------------|---------------|
| $V_{DS}$        | Drain-Source Voltage                             | 20         | V             |
| $V_{GS}$        | Gate-Source Voltage                              | $\pm 12$   | V             |
| $I_D$           | Drain Current-Continuous                         | 7          | A             |
| $I_{DM}$        | Drain Current-Pulsed (Note 1)                    | 32         | A             |
| $P_D$           | Maximum Power Dissipation                        | 2          | W             |
| $T_J, T_{STG}$  | Operating Junction and Storage Temperature Range | -55 To 150 | $^{\circ}C$   |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient (Note 2) | 120        | $^{\circ}C/W$ |



## Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise specified)

| Symbol                                                 | Parameter                                                 | Test Condition                                                                              | Min. | Typ. | Max. | Units |
|--------------------------------------------------------|-----------------------------------------------------------|---------------------------------------------------------------------------------------------|------|------|------|-------|
| Off Characteristic                                     |                                                           |                                                                                             |      |      |      |       |
| V <sub>(BR)DSS</sub>                                   | Drain-Source Breakdown Voltage                            | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA                                                  | 20   | -    | -    | V     |
| I <sub>DSS</sub>                                       | Zero Gate Voltage Drain Current                           | V <sub>DS</sub> =20V, V <sub>GS</sub> =0V,                                                  | -    | -    | 1.0  | μA    |
| I <sub>GSS</sub>                                       | Gate to Body Leakage Current                              | V <sub>DS</sub> =0V, V <sub>GS</sub> =±12V                                                  | -    | -    | ±100 | nA    |
| On Characteristics                                     |                                                           |                                                                                             |      |      |      |       |
| V <sub>GS(th)</sub>                                    | Gate Threshold Voltage                                    | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                    | 0.5  | 0.75 | 1.2  | V     |
| R <sub>DS(on)</sub>                                    | Static Drain-Source on-Resistance<br><small>note2</small> | V <sub>GS</sub> =4.5V, I <sub>D</sub> =7A                                                   | -    | 15   | 17   | mΩ    |
|                                                        |                                                           | V <sub>GS</sub> =2.5V, I <sub>D</sub> =5A                                                   | -    | 19   | 25   |       |
| Dynamic Characteristics                                |                                                           |                                                                                             |      |      |      |       |
| C <sub>iss</sub>                                       | Input Capacitance                                         | V <sub>DS</sub> =10V, V <sub>GS</sub> =0V,<br>f=1.0MHz                                      | -    | 700  | -    | pF    |
| C <sub>oss</sub>                                       | Output Capacitance                                        |                                                                                             | -    | 132  | -    | pF    |
| C <sub>rss</sub>                                       | Reverse Transfer Capacitance                              |                                                                                             | -    | 114  | -    | pF    |
| Q <sub>g</sub>                                         | Total Gate Charge                                         | V <sub>DS</sub> =10V, I <sub>D</sub> =4A,<br>V <sub>GS</sub> =4.5V                          | -    | 15   | -    | nC    |
| Q <sub>gs</sub>                                        | Gate-Source Charge                                        |                                                                                             | -    | 2    | -    | nC    |
| Q <sub>gd</sub>                                        | Gate-Drain(“Miller”) Charge                               |                                                                                             | -    | 5.2  | -    | nC    |
| Switching Characteristics                              |                                                           |                                                                                             |      |      |      |       |
| t <sub>d(on)</sub>                                     | Turn-on Delay Time                                        | V <sub>DS</sub> =10V,<br>I <sub>D</sub> =4A, R <sub>GEN</sub> =3Ω,<br>V <sub>GS</sub> =4.5V | -    | 9    | -    | ns    |
| t <sub>r</sub>                                         | Turn-on Rise Time                                         |                                                                                             | -    | 25   | -    | ns    |
| t <sub>d(off)</sub>                                    | Turn-off Delay Time                                       |                                                                                             | -    | 37   | -    | ns    |
| t <sub>f</sub>                                         | Turn-off Fall Time                                        |                                                                                             | -    | 14   | -    | ns    |
| Drain-Source Diode Characteristics and Maximum Ratings |                                                           |                                                                                             |      |      |      |       |
| I <sub>S</sub>                                         | Maximum Continuous Drain to Source Diode Forward Current  |                                                                                             | -    | -    | 7.5  | A     |
| I <sub>SM</sub>                                        | Maximum Pulsed Drain to Source Diode Forward Current      |                                                                                             | -    | -    | 32   | A     |
| V <sub>SD</sub>                                        | Drain to Source Diode Forward Voltage                     | V <sub>GS</sub> =0V, I <sub>S</sub> =8A                                                     | -    | -    | 1.2  | V     |

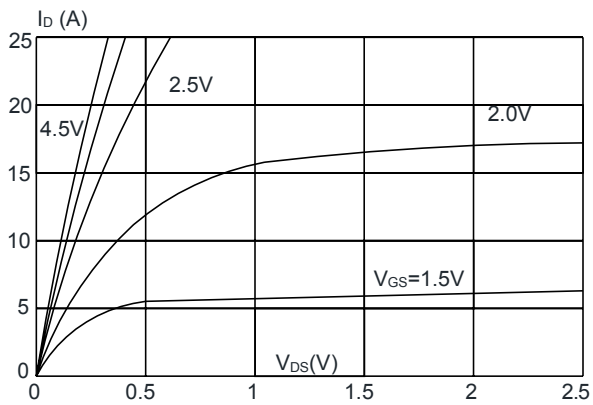
Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

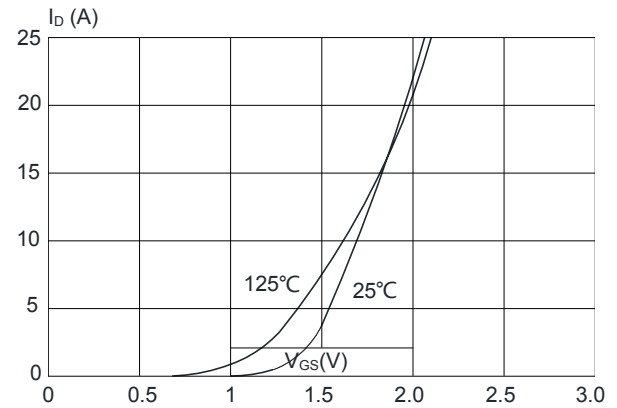


## Typical Performance Characteristics

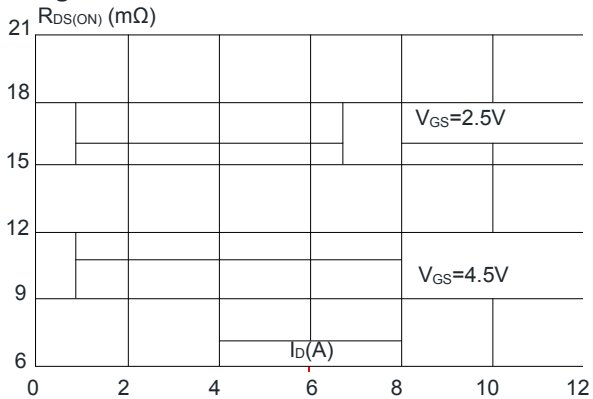
**Figure1:** Output Characteristics



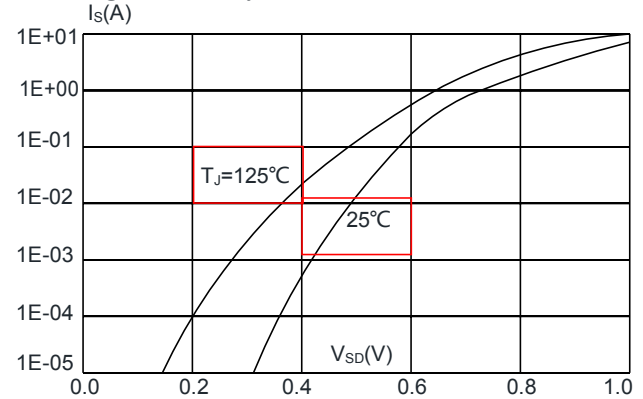
**Figure 2:** Typical Transfer Characteristics



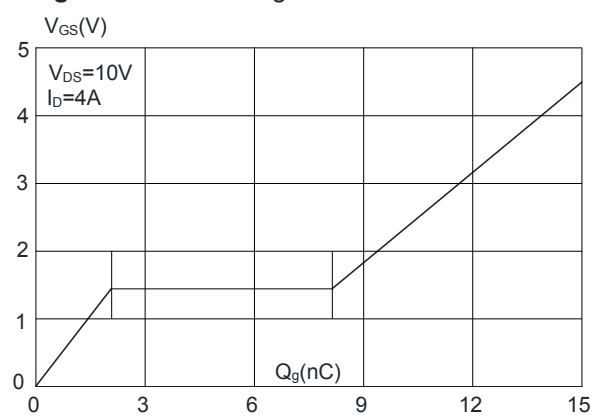
**Figure 3:** On-resistance vs. Drain Current



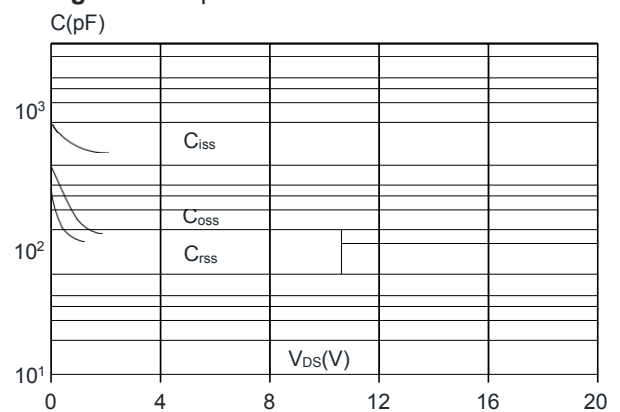
**Figure 4:** Body Diode Characteristics



**Figure 5:** Gate Charge Characteristics

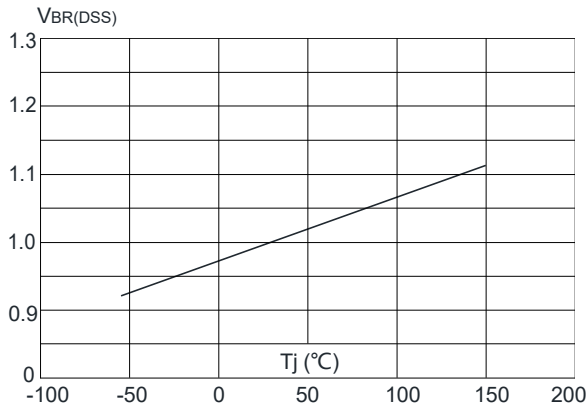


**Figure 6:** Capacitance Characteristics

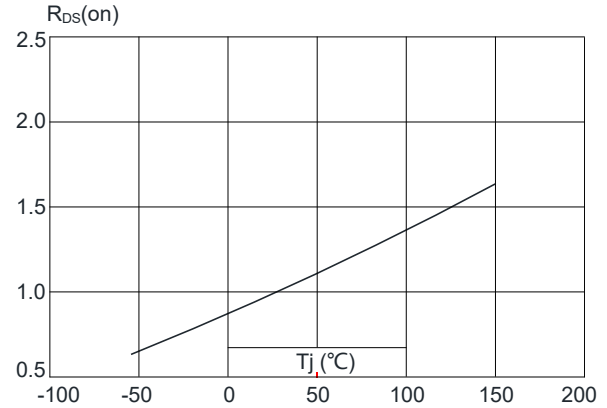




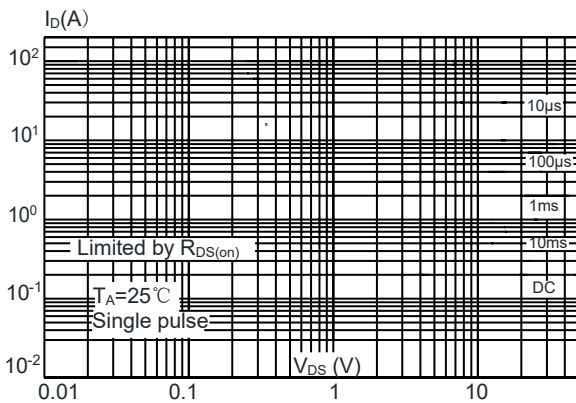
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



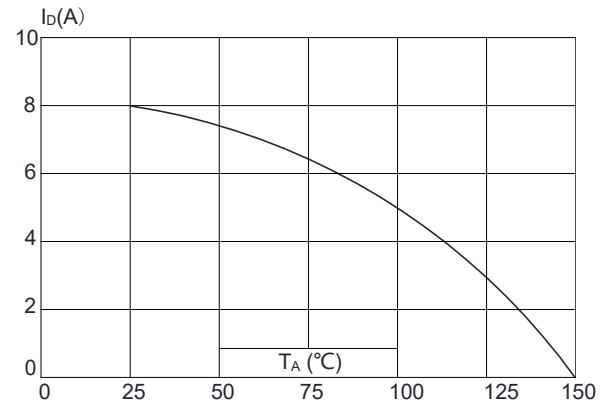
**Figure 8:** Normalized on Resistance vs. Junction Temperature



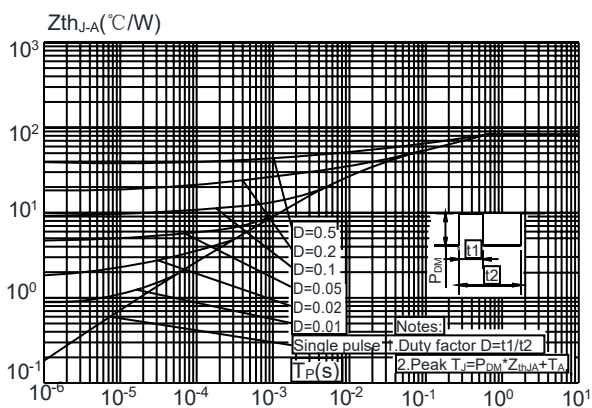
**Figure 9:** Maximum Safe Operating Area



**Figure 10:** Maximum Continuous Drain Current vs. Ambient Temperature

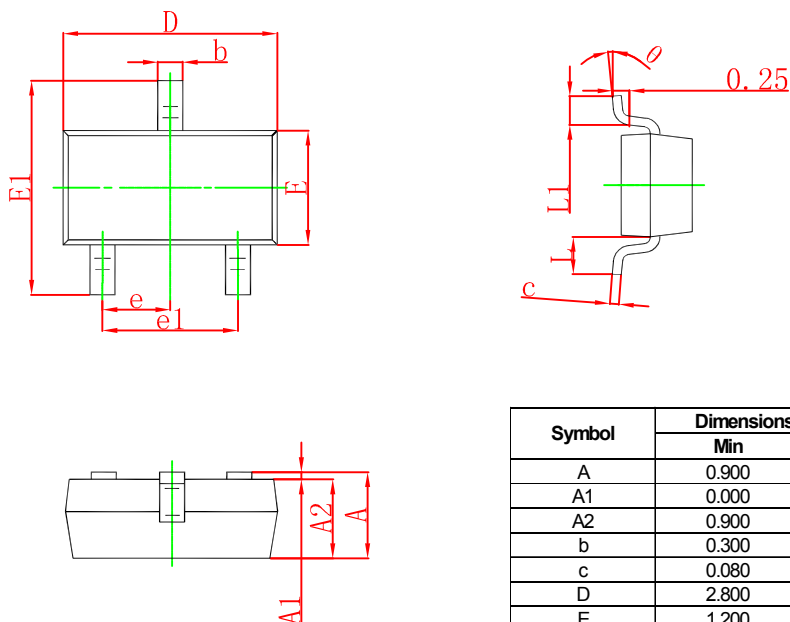


**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



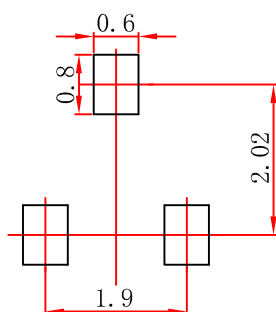


## SOT-23 Package Outline Dimensions



| 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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