



## Description

The TPCC8093,L1Q(M 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

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

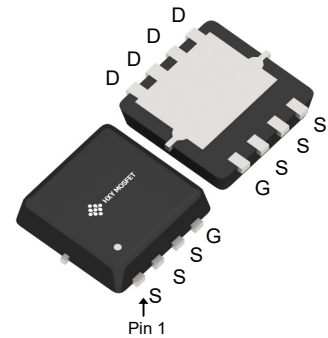
$R_{DS(ON)} < 5m\Omega$  @  $V_{GS} = 4.5V$

## Application

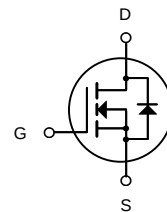
Battery protection

Load switch

Uninterruptible power supply



DFN3X3-8L  
(TSON-8(3.1x3.1))



N-Channel MOSFET

## Package Marking and Ordering Information

| Product ID     | Pack                       | Brand      | Qty(PCS) |
|----------------|----------------------------|------------|----------|
| TPCC8093,L1Q(M | DFN3X3-8L(TSON-8(3.1x3.3)) | HXY MOSFET | 5000     |

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

| Symbol                    | Parameter                                        | Rating     | Units |
|---------------------------|--------------------------------------------------|------------|-------|
| $V_{DS}$                  | Drain-Source Voltage                             | 20         | V     |
| $V_{GS}$                  | Gate-Source Voltage                              | $\pm 12$   | V     |
| $I_D @ T_C = 25^\circ C$  | Continuous Drain Current, $V_{GS} @ 10V^1$       | 60         | A     |
| $I_D @ T_C = 100^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V^1$       | 33         | A     |
| $I_{DM}$                  | Pulsed Drain Current <sup>2</sup>                | 220        | A     |
| EAS                       | Single Pulse Avalanche Energy <sup>3</sup>       | 46         | mJ    |
| $I_{AS}$                  | Avalanche Current                                | 25         | A     |
| $P_D @ T_C = 25^\circ C$  | Total Power Dissipation <sup>4</sup>             | 15         | 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>    | 4.5        | °C/W  |



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

| Symbol        | Parameter                                                 | Test Condition                                                | Min. | Typ. | Max.      | Units      |
|---------------|-----------------------------------------------------------|---------------------------------------------------------------|------|------|-----------|------------|
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage                            | $V_{GS}=0V, I_D=250\mu A$                                     | 20   | -    | -         | V          |
| $I_{DSS}$     | Zero Gate Voltage Drain Current                           | $V_{DS}=20V, V_{GS}=0V,$                                      | -    | -    | 1.0       | $\mu A$    |
| $I_{GSS}$     | Gate to Body Leakage Current                              | $V_{DS}=0V, V_{GS}=\pm 12V$                                   | -    | -    | $\pm 100$ | nA         |
| $V_{GS(th)}$  | Gate Threshold Voltage                                    | $V_{DS}=V_{GS}, I_D=250\mu A$                                 | 0.4  | 0.7  | 1.1       | V          |
| $R_{DS(on)}$  | Static Drain-Source on-Resistance<br><small>note3</small> | $V_{GS}=4.5V, I_D=30A$                                        | -    | 4.0  | 5         | m $\Omega$ |
|               |                                                           | $V_{GS}=2.5V, I_D=20A$                                        | -    | 6.0  | 9         |            |
| $C_{iss}$     | Input Capacitance                                         | $V_{DS}=10V, V_{GS}=0V,$<br>$f = 1.0MHz$                      | -    | 2500 | -         | pF         |
| $C_{oss}$     | Output Capacitance                                        |                                                               | -    | 407  | -         | pF         |
| $C_{rss}$     | Reverse Transfer Capacitance                              |                                                               | -    | 386  | -         | pF         |
| $Q_g$         | Total Gate Charge                                         | $V_{DS}=10V, I_D=30A,$<br>$V_{GS}=4.5V$                       | -    | 32   | -         | nC         |
| $Q_{gs}$      | Gate-Source Charge                                        |                                                               | -    | 3    | -         | nC         |
| $Q_{gd}$      | Gate-Drain("Miller") Charge                               |                                                               | -    | 11   | -         | nC         |
| $t_{d(on)}$   | Turn-on Delay Time                                        | $V_{DS}=10V,$<br>$I_D=30A, R_{GEN}=3\Omega,$<br>$V_{GS}=4.5V$ | -    | 17   | -         | ns         |
| $t_r$         | Turn-on Rise Time                                         |                                                               | -    | 49   | -         | ns         |
| $t_{d(off)}$  | Turn-off Delay Time                                       |                                                               | -    | 74   | -         | ns         |
| $t_f$         | Turn-off Fall Time                                        |                                                               | -    | 26   | -         | ns         |
| $I_S$         | Maximum Continuous Drain to Source Diode Forward Current  |                                                               | -    | -    | 75        | A          |
| $I_{SM}$      | Maximum Pulsed Drain to Source Diode Forward Current      |                                                               | -    | -    | 300       | A          |
| $V_{SD}$      | Drain to Source Diode Forward Voltage                     | $V_{GS} = 0V, I_S=30A$                                        | -    | -    | 1.2       | V          |

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

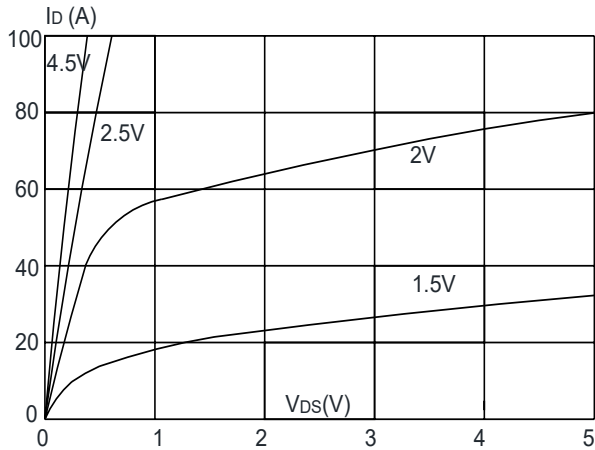
2. EAS condition:  $T_J=25^{\circ}\text{C}$ ,  $V_{DD}=10V$ ,  $V_G=4.5V$ ,  $L=0.5mH$ ,  $R_G=25\Omega$ ,  $I_{AS}=15A$

3. Pulse Test: Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 0.5\%$

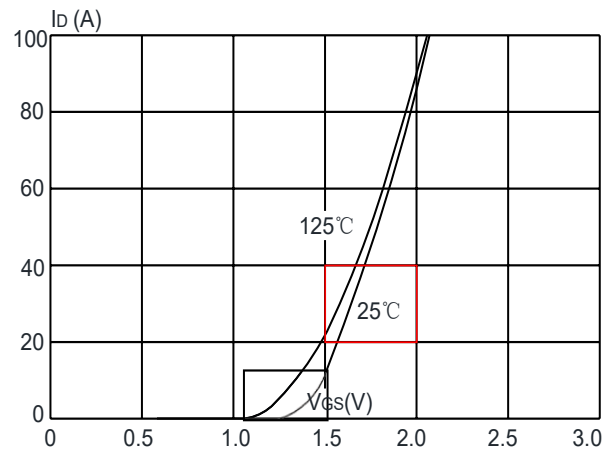


## Typical Performance Characteristics

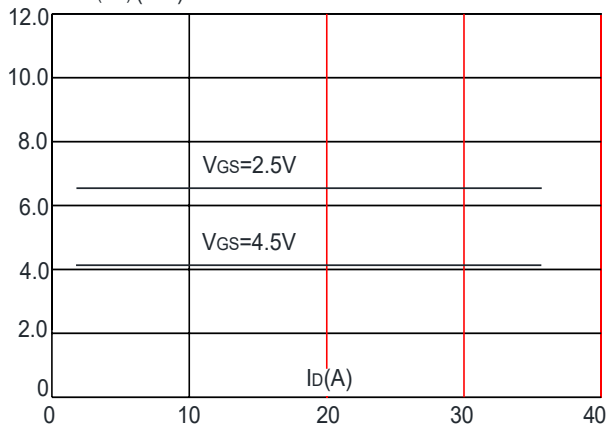
**Figure1:** Output Characteristics



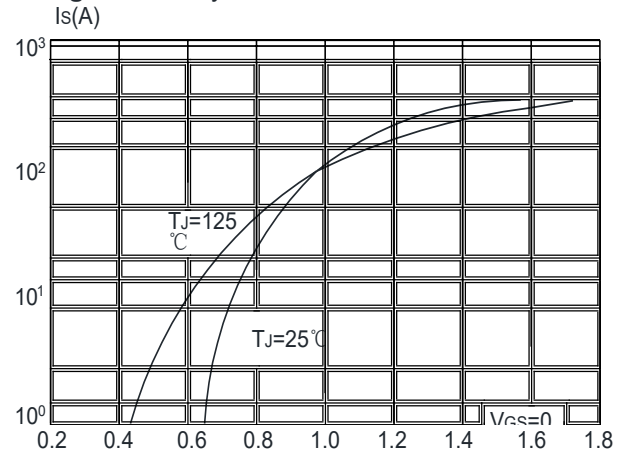
**Figure 2:** Typical Transfer Characteristics



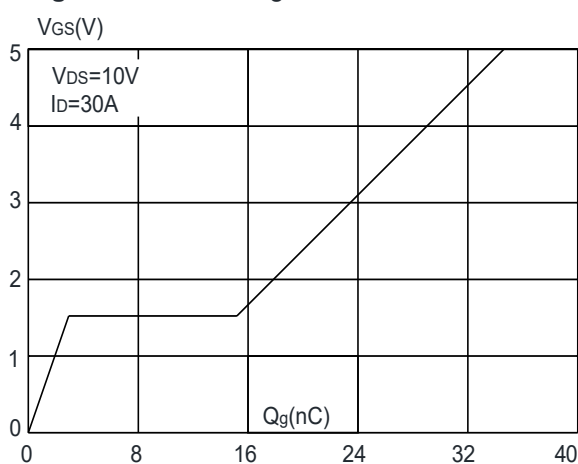
**Figure 3:** On-resistance vs. Drain Current



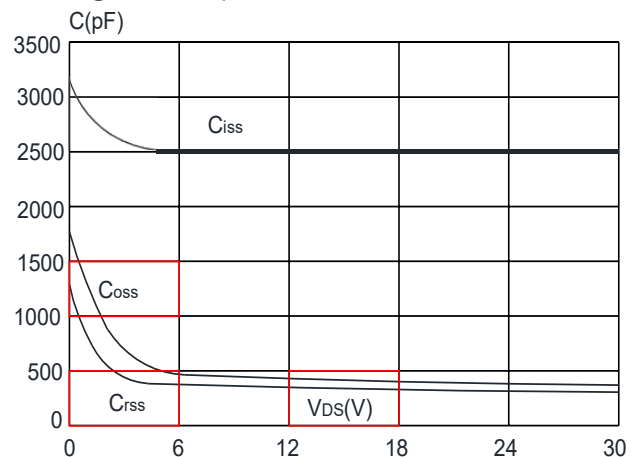
**Figure 4:** Body Diode Characteristics



**Figure 5:** Gate Charge Characteristics

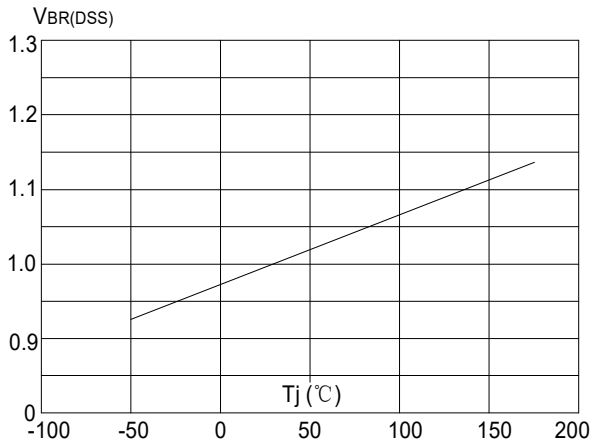


**Figure 6:** Capacitance Characteristics

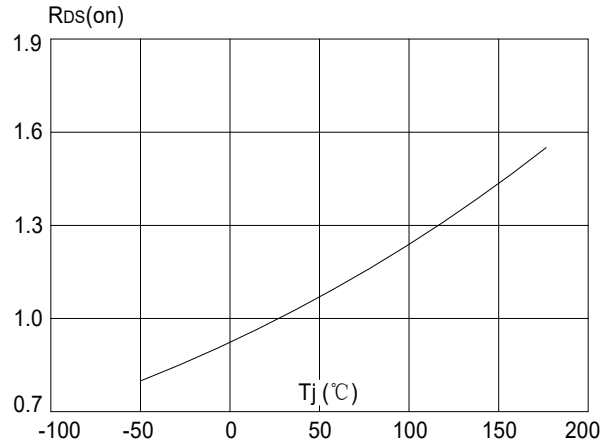




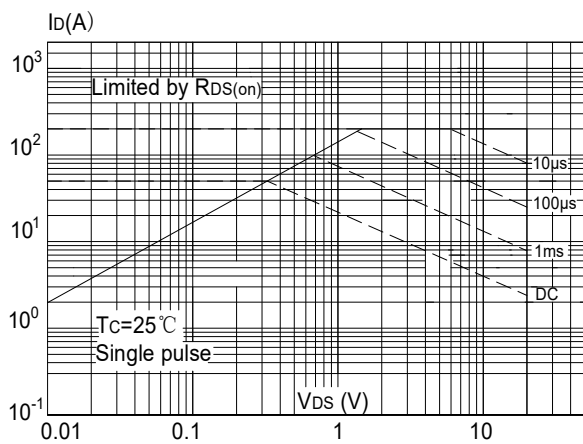
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



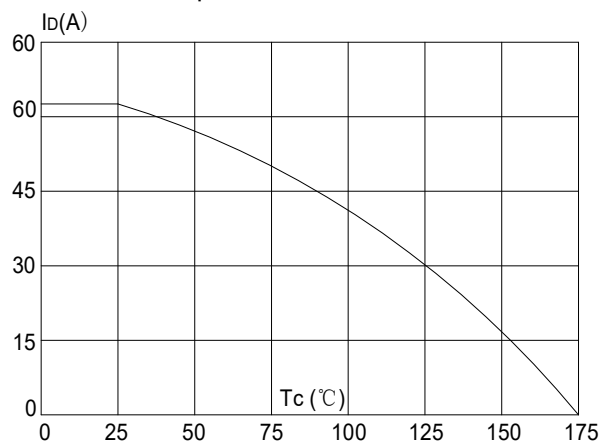
**Figure 8:** Normalized on Resistance vs. Junction Temperature



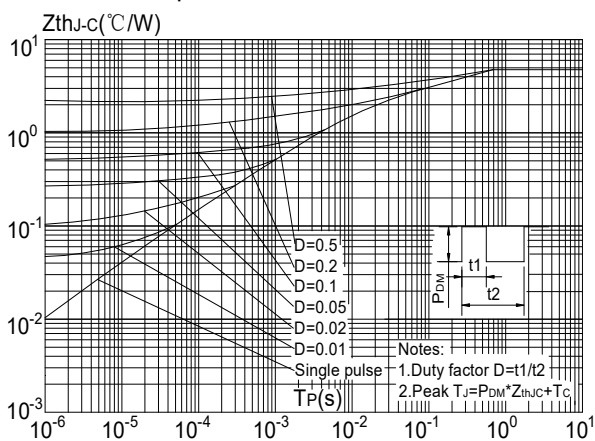
**Figure 9:** Maximum Safe Operating Area



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



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





## DFN3X3-8L(TSON-8(3.1x3.1)) Package Information



| Symbol | Dimensions In Millimeters |      |      |
|--------|---------------------------|------|------|
|        | Min.                      | Nom. | Max. |
| A      | 0.70                      | 0.75 | 0.80 |
| b      | 0.25                      | 0.30 | 0.35 |
| c      | 0.10                      | 0.15 | 0.25 |
| D      | 3.25                      | 3.35 | 3.45 |
| D1     | 3.00                      | 3.10 | 3.20 |
| D2     | 1.48                      | 1.58 | 1.68 |
| D3     | -                         | 0.13 | -    |
| E      | 3.20                      | 3.30 | 3.40 |
| E1     | 3.00                      | 3.15 | 3.20 |
| E2     | 2.39                      | 2.49 | 2.59 |
| e      | 0.65BSC                   |      |      |
| H      | 0.30                      | 0.39 | 0.50 |
| L      | 0.30                      | 0.40 | 0.50 |
| L1     | -                         | 0.13 | -    |
| M      | *                         | *    | 0.15 |
| θ      |                           | 10°  | 12°  |



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