



## Description

The CSD17577Q3A 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

$V_{DS} = 30V$   $I_D = 60A$

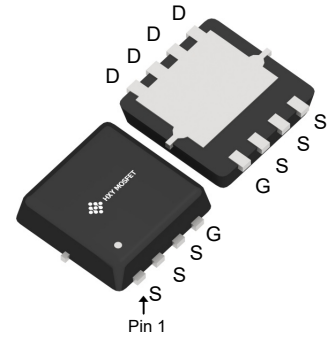
$R_{DS(ON)} < 5.5m\Omega @ V_{GS}=10V$

## Application

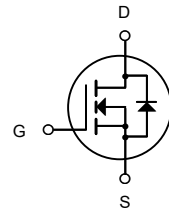
Battery protection

Load switch

Uninterruptible power supply



DFN3X3-8L



N-Channel MOSFET

## Ordering Information

| Product ID  | Pack      | Brand      | Qty(PCS) |
|-------------|-----------|------------|----------|
| CSD17577Q3A | DFN3X3-8L | HXY MOSFET | 5000     |

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

| Symbol                  | Parameter  | Rating     | Units |
|-------------------------|--|------------|-------|
| $V_{DS}$                | Drain-Source Voltage                             | 30         | V     |
| $V_{GS}$                | Gate-Source Voltage                              | $\pm 20$   | 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, $V_{GS} @ 10V^1$       | 42         | A     |
| $I_{DM}$                | Pulsed Drain Current <sup>2</sup>                | 192        | A     |
| EAS                     | Single Pulse Avalanche Energy <sup>3</sup>       | 144.7      | mJ    |
| $I_{AS}$                | Avalanche Current                                | 53.8       | A     |
| $P_D @ T_C=25^\circ C$  | Total Power Dissipation <sup>4</sup>             | 62.5       | W     |
| $P_D @ T_A=25^\circ C$  | Total Power Dissipation <sup>4</sup>             | 4.5        | 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>    | 2.4        | °C/W  |



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

| Symbol                              | Parameter                                      | Conditions   | Min. | Typ.   | Max. | Unit  |
|-------------------------------------|--|--|------|--------|------|-------|
| B <sub>V</sub> DSS                  | Drain-Source Breakdown Voltage                 | V <sub>GS</sub> =0V, I <sub>D</sub> =250uA                       | 30   | ---    | ---  | V     |
| ΔB <sub>V</sub> DSS/ΔT <sub>J</sub> | BVDSS Temperature Coefficient                  | Reference to 25°C, I <sub>D</sub> =1mA                           | ---  | 0.0213 | ---  | V/°C  |
| R <sub>DS(ON)</sub>                 | Static Drain-Source On-Resistance <sup>2</sup> | V <sub>GS</sub> =10V, I <sub>D</sub> =30A                        | ---  | 4      | 5.5  | mΩ    |
|                                     |  | V <sub>GS</sub> =4.5V, I <sub>D</sub> =15A                       |      | 5.2    | 6    |       |
| V <sub>GS(th)</sub>                 | Gate Threshold Voltage                         |  | 1.0  | ---    | 2.5  | V     |
| ΔV <sub>GS(th)</sub>                | V <sub>GS(th)</sub> Temperature Coefficient    | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA         | ---  | -5.8   | ---  | 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> =30A                         | ---  | 26.5   | ---  | S     |
| R <sub>g</sub>                      | Gate Resistance                                | V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f=1MHz                 | ---  | 1.4    | ---  | Ω     |
| Q <sub>g</sub>                      | Total Gate Charge (4.5V)                       |  | ---  | 31.6   | ---  | nC    |
| Q <sub>gs</sub>                     | Gate-Source Charge                             | V <sub>DS</sub> =15V, V <sub>GS</sub> =4.5V, I <sub>D</sub> =15A | ---  | 8.6    | ---  |       |
| Q <sub>gd</sub>                     | Gate-Drain Charge                              |  | ---  | 11.7   | ---  |       |
| T <sub>d(on)</sub>                  | Turn-On Delay Time                             |  | ---  | 9      | ---  | ns    |
| T <sub>r</sub>                      | Rise Time                                      | V <sub>DD</sub> =15V, V <sub>GS</sub> =10V, R <sub>G</sub> =3.3Ω | ---  | 19     | ---  |       |
| T <sub>d(off)</sub>                 | Turn-Off Delay Time                            | I <sub>D</sub> =15A  | ---  | 58     | ---  |       |
| T <sub>f</sub>                      | Fall Time                                      |  | ---  | 15.2   | ---  |       |
| C <sub>iss</sub>                    | Input Capacitance                              |  | ---  | 3075   | ---  | pF    |
| C <sub>oss</sub>                    | Output Capacitance                             | V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz                | ---  | 400    | ---  |       |
| C <sub>rss</sub>                    | Reverse Transfer Capacitance                   |  | ---  | 315    | ---  |       |
| I <sub>S</sub>                      | Continuous Source Current <sup>1,6</sup>       | V <sub>G</sub> =V <sub>D</sub> =0V, Force Current                | ---  | ---    | 60   | A     |
| I <sub>SM</sub>                     | Pulsed Source Current <sup>2,6</sup>           |  | ---  | ---    | 192  | 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    | V     |

**Diode Characteristics**

Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ 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>=34A
- 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 Characteristics

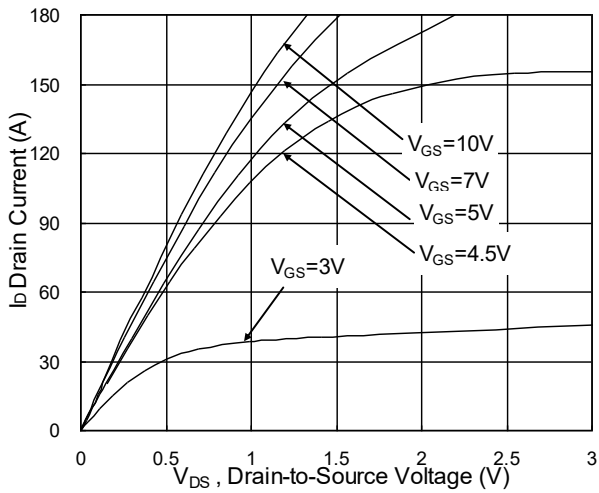


Fig.1 Typical Output Characteristics



Fig.2 On-Resistance vs. G-S Voltage



Fig.3 Forward Characteristics of Reverse



Fig.4 Gate-Charge Characteristics

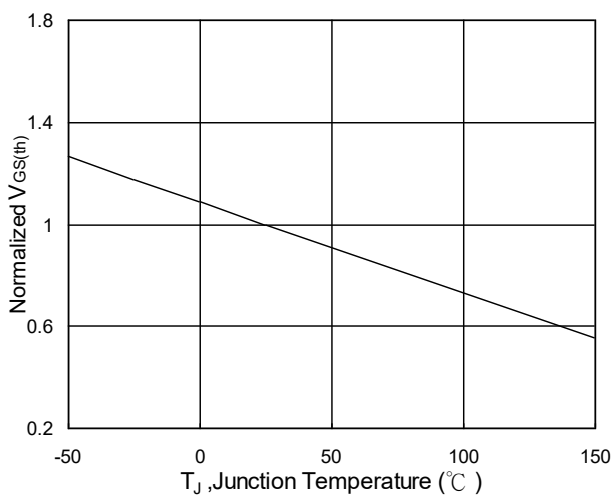


Fig.5 Normalized V<sub>GS(th)</sub> vs. T<sub>J</sub>

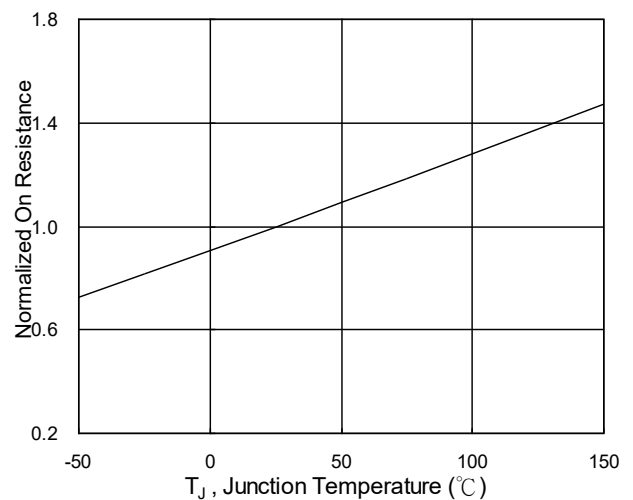


Fig.6 Normalized R<sub>DS(on)</sub> vs. T<sub>J</sub>

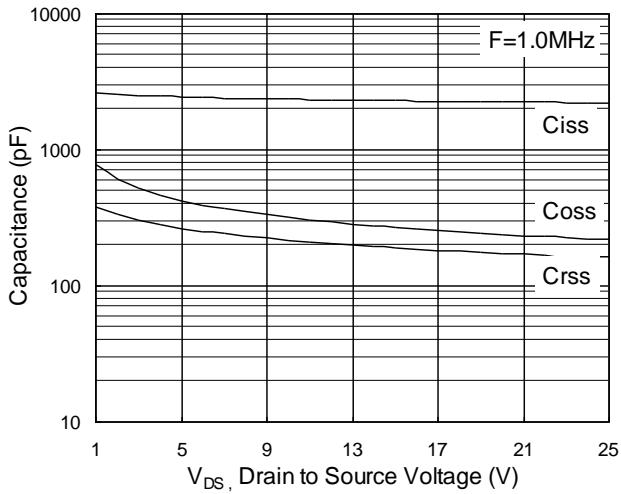


Fig.7 Capacitance

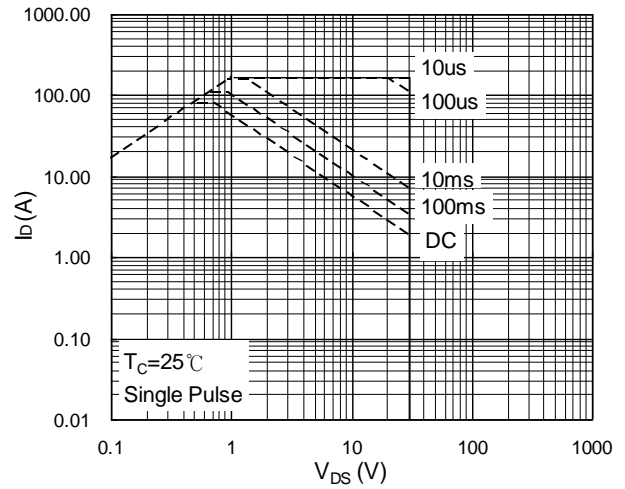


Fig.8 Safe Operating Area



Fig.9 Normalized Maximum Transient Thermal Impedance

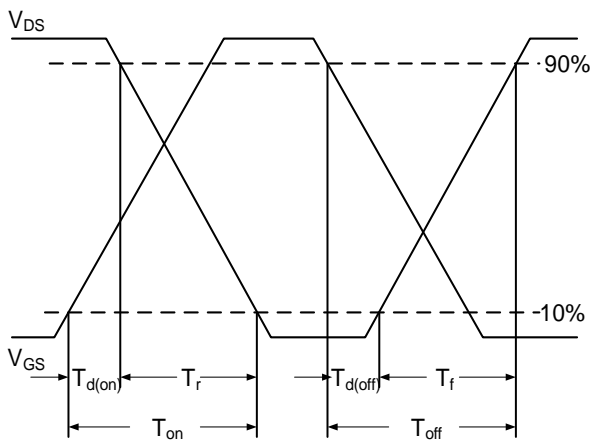


Fig.10 Switching Time Waveform

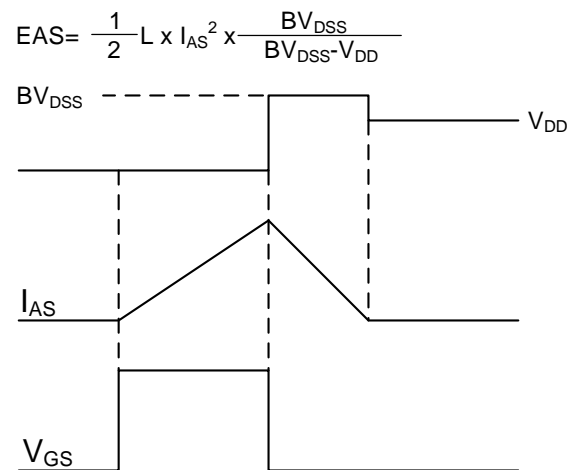
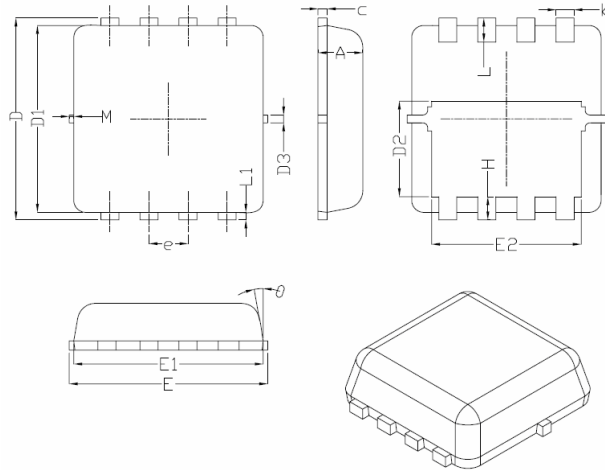


Fig.11 Unclamped Inductive Switching Waveform



### DFN3X3-8L 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 |
| $\theta$ |                           | 10°  | 12°  |



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