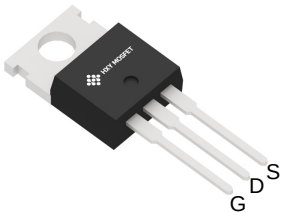
# SUP85N10-10-E3

N-SGT Enhancement Mode MOSFET

## Description

The SUP85N10-10-E3 use advanced SGT MOSFET technology to provide low RDS(ON), low gate charge, fast switching and excellent avalanche characteristics. This device is specially designed to get better ruggedness and suitable.

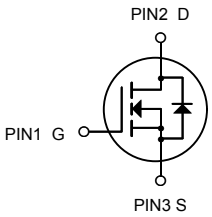



**TO-220C**

## General Features

$V_{DS}$ = 100V $I_D$ = 70A

$R_{DS(ON)}$ < 10.5mΩ @ $V_{GS}$=10V




N-Channel MOSFET

## Application

Battery protection

Load switch

Uninterruptible power supply

## Ordering Information

| Product ID | Pack | Brand | Qty(PCS) |
|---|---|---|---|
| SUP85N10-10-E3 | TO-220C | HXY MOSFET | 50 |

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

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 100 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$ | Continuous Drain Current@Tc=25°C | 70 | A |
| $I_{DM}$ | Puled Drain Current [1] | 280 | A |
| EAS | Single Pulse Avalanche Energy [3] | 110 | mJ |
| $P_D$@$T_C$=25°C | Total Power Dissipation [4] | 100 | 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 [1] | 64 | °C/W |
| $R_{\theta JC}$ | Thermal Resistance Junction-Ambient [1] | 1.25 | °C/W |

## Electrical Characteristics ($T_J$=25°C, unless otherwise noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V , $I_D$=250uA | 100 | --- | --- | V |
| $\triangle BV_{DSS}/\triangle T_J$ | BVDSS Temperature Coefficient | Reference to 25°C , $I_D$=1mA | --- | 0.098 | --- | V/°C |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance[2] | $V_{GS}$=10V , $I_D$=20A | --- | 8.5 | 10.5 | mΩ |
| | | $V_{GS}$=4.5V , $I_D$=15A | --- | 9.5 | 15 | mΩ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$=$V_{DS}$ , $I_D$ =250uA | 1.0 | --- | 2.5 | V |
| $\triangle V_{GS(th)}$ | $V_{GS(th)}$ Temperature Coefficient | | --- | -4.57 | --- | mV/°C |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=80V , $V_{GS}$=0V , $T_J$=25°C | --- | --- | 1 | uA |
| | | $V_{DS}$=80V , $V_{GS}$=0V , $T_J$=55°C | --- | --- | 5 | |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$=±20V , $V_{DS}$=0V | --- | --- | ±100 | nA |
| $R_g$ | Gate Resistance | $V_{DS}$=0V , $V_{GS}$=0V , f=1MHz | --- | 0.48 | --- | Ω |
| $Q_g$ | Total Gate Charge (10V) | $V_{DS}$=50V , $V_{GS}$=50V , $I_D$=10A | --- | 31.3 | --- | nC |
| $Q_{gs}$ | Gate-Source Charge | | --- | 3.49 | --- | |
| $Q_{gd}$ | Gate-Drain Charge | | --- | 7.63 | --- | |
| $T_{d(on)}$ | Turn-On Delay Time | $V_{DD}$=50V , $V_{GS}$=10V , $R_G$=4Ω $I_D$=10A | --- | 16 | --- | ns |
| $T_r$ | Rise Time | | --- | 10 | --- | |
| $T_{d(off)}$ | Turn-Off Delay Time | | --- | 40 | --- | |
| $T_f$ | Fall Time | | --- | 6 | --- | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=50V , $V_{GS}$=0V , f=1MHz | --- | 1368 | --- | pF |
| $C_{oss}$ | Output Capacitance | | --- | 451 | --- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 12.9 | --- | |
| $I_S$ | Continuous Source Current[1,5] | $V_G$=$V_D$=0V , Force Current | --- | --- | 70 | A |
| $I_{SM}$ | Pulsed Source Current[2,5] | | --- | --- | 280 | A |
| $V_{SD}$ | Diode Forward Voltage[2] | $V_{GS}$=0V , $I_S$=1A , $T_J$=25°C | --- | --- | 1.2 | V |
| $t_{rr}$ | Reverse Recovery Time | $I_F$=10A,dI/dt=100A/μs, $T_J$=25°C | --- | 103 | --- | nS |
| $Q_{rr}$ | Reverse Recovery Charge | | --- | 187 | --- | nC |

Note :

1.The data tested by surface mounted on a 1 inch$^2$ FR-4 board with 2OZ copper.

2.The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%

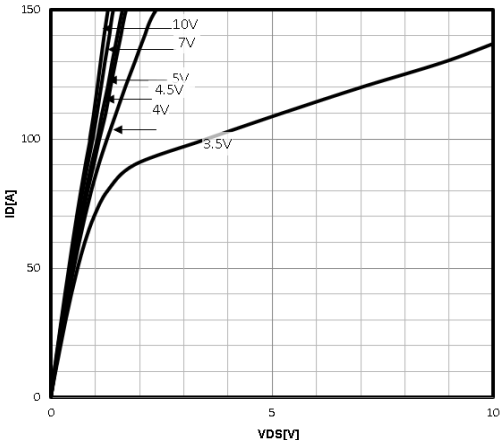
3.The EAS data shows Max. rating . The test condition is $V_{DD}$=25V,$V_{GS}$=10V,L=0.1mH,$I_{AS}$=11A

4.The power dissipation is limited by 150℃ junction temperature

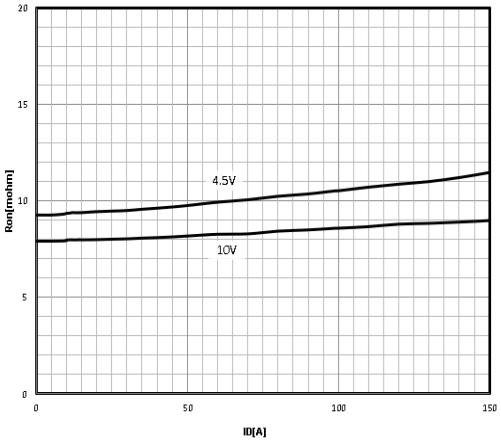
5 .The data is theoretically the same as $I_D$ and $I_{DM}$ , in real applications , should be limited by total power dissipation.

## Typical Characteristics

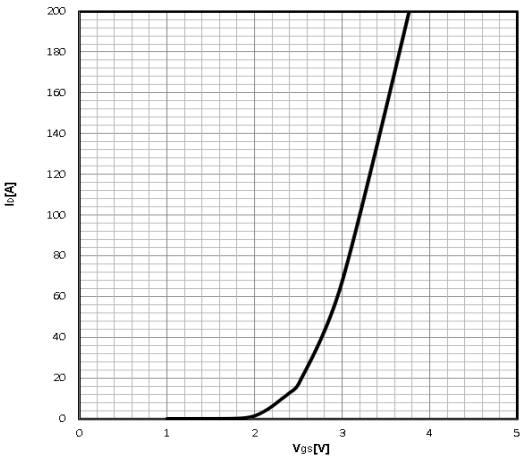
### Typ. output characteristics
$I_D=f(V_{DS})$



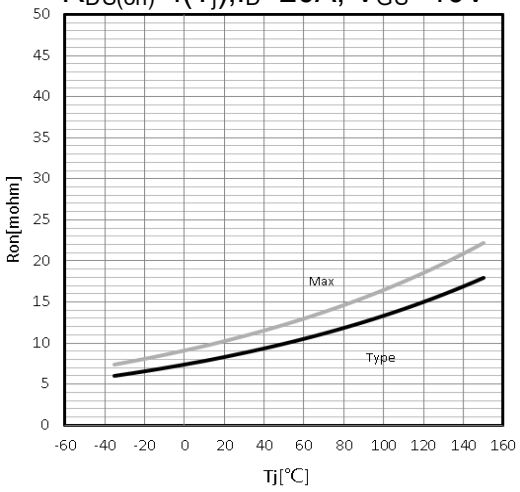

### Typ. drain-source on resistance
$R_{DS(on)}=f(I_D)$



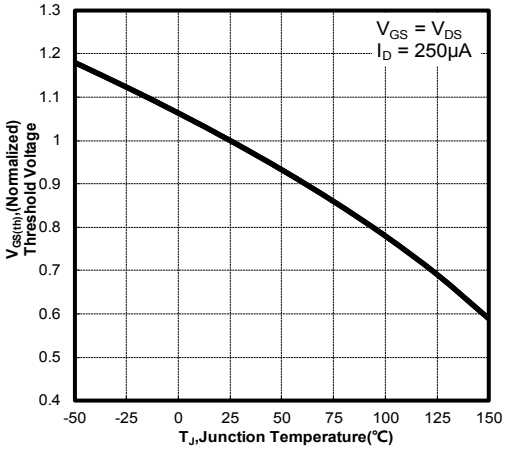

### Typ. transfer characteristics
$I_D=f(V_{GS})$



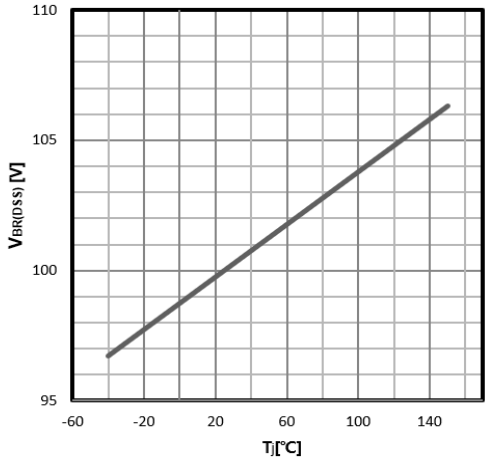

### Drain-source on-state resistance
$R_{DS(on)}=f(T_j);I_D=20A;\ V_{GS}=10V$




### Gate Threshold Voltage
$V_{TH}=f(T_j);\ I_D=250uA$

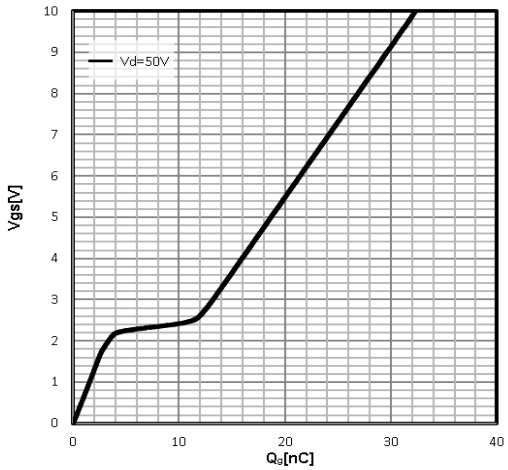



### Drain-source breakdown voltage
$V_{BR(DSS)}=f(T_j);\ I_D=250uA$



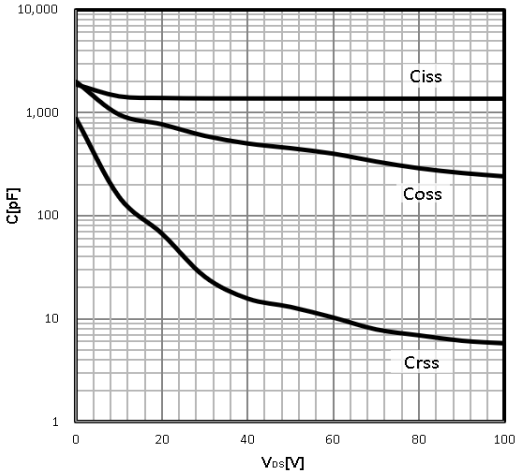
**Typ. gate charge**

$V_{GS}=f(Q_g)$ ; $I_D=10A$



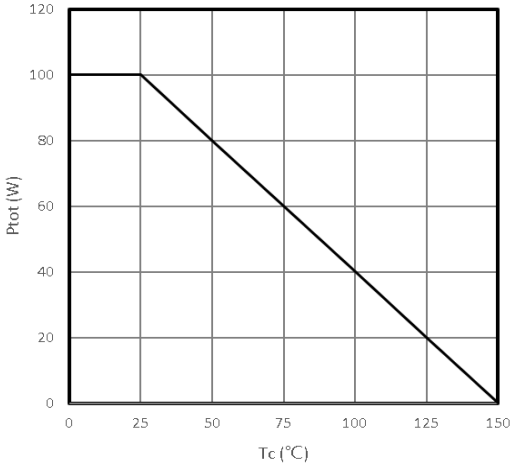

**Typ. capacitances**

$C=f(V_{DS})$; $V_{GS}=0V$; $f=1MHz$



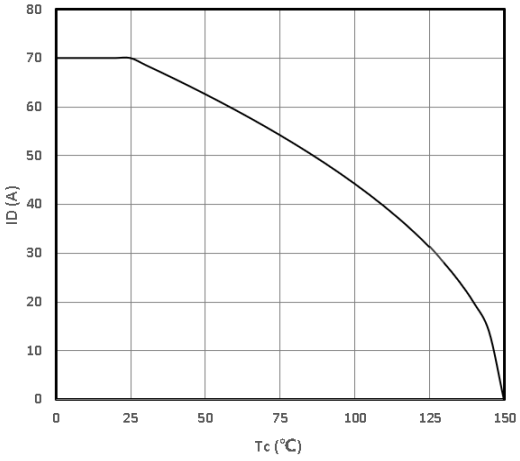

**Power Dissipation**

$P_{tot}=f(T_C)$



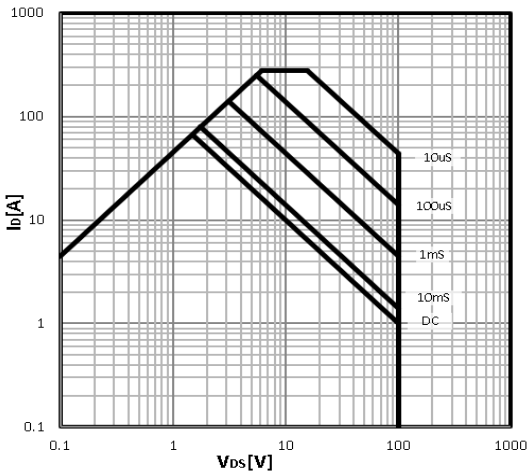

**Maximum Drain Current**

$I_D=f(T_C)$



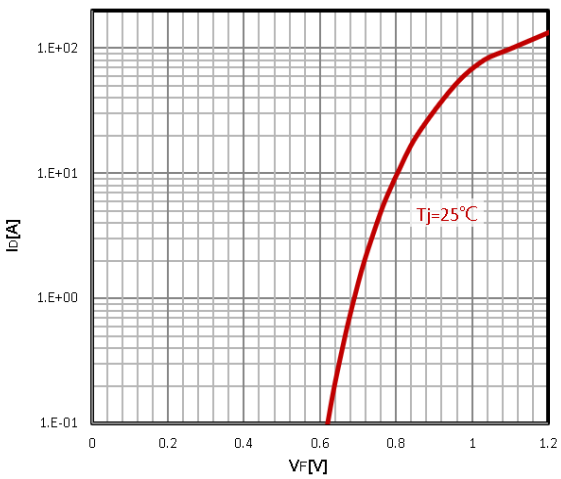

**Safe operating area**

$I_D=f(V_{DS})$



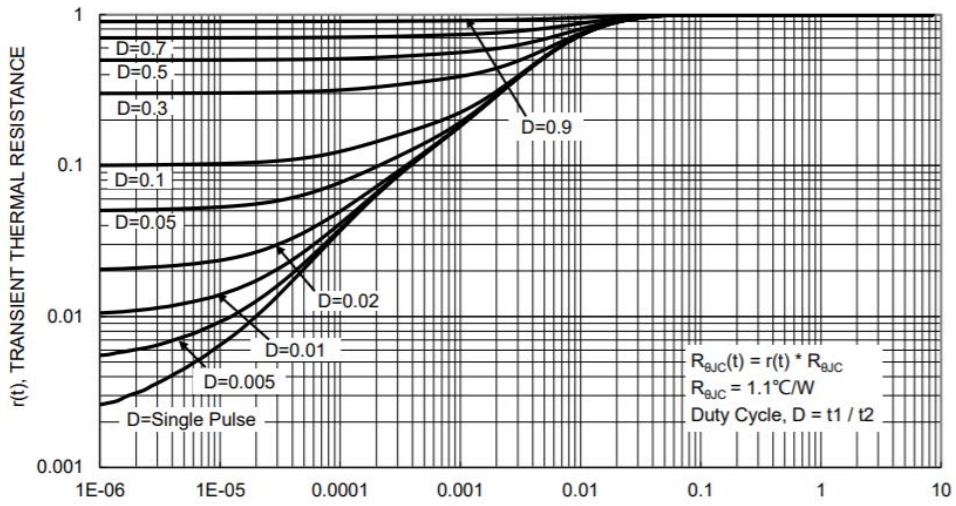

**Body Diode Forward Voltage Variation**

$I_F=f(V_{GS})$



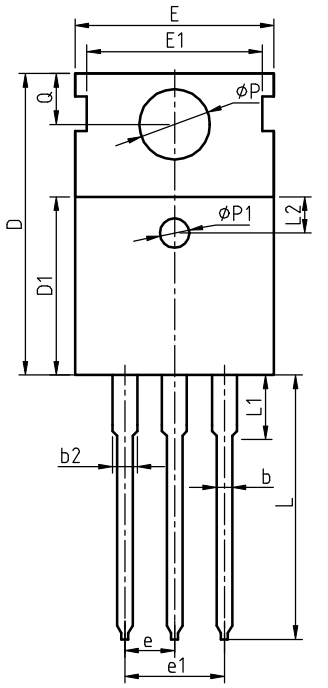
**Max. transient thermal impedance**

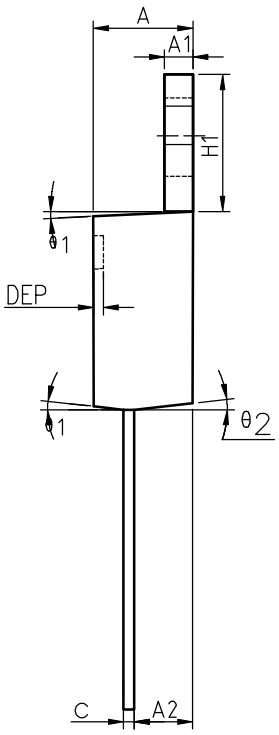
$Z_{thJC}=f(t_p)$

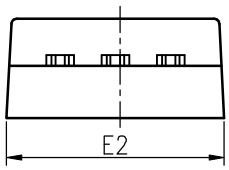


## Package Information

### TO-220C




COMMON DIMENSIONS

| SYMBOL | MIN | NOM | MAX | MIN | NOM | MAX |
|---|---|---|---|---|---|---|
| A | 4.40 | 4.57 | 4.70 | 0.173 | 0.180 | 0.185 |
| A1 | 1.27 | 1.30 | 1.33 | 0.050 | 0.051 | 0.052 |
| A2 | 2.35 | 2.40 | 2.50 | 0.093 | 0.094 | 0.098 |
| b | 0.77 | 0.80 | 0.90 | 0.030 | 0.031 | 0.035 |
| b2 | 1.17 | 1.27 | 1.36 | 0.046 | 0.050 | 0.054 |
| c | 0.48 | 0.50 | 0.56 | 0.019 | 0.020 | 0.022 |
| D | 15.40 | 15.60 | 15.80 | 0.606 | 0.614 | 0.622 |
| D1 | 9.00 | 9.10 | 9.20 | 0.354 | 0.358 | 0.362 |
| DEP | 0.05 | 0.10 | 0.20 | 0.002 | 0.004 | 0.008 |
| E | 9.80 | 10.00 | 10.20 | 0.386 | 0.394 | 0.402 |
| E1 | - | 8.70 | - | - | 0.343 | - |
| E2 | 9.80 | 10.00 | 10.20 | 0.386 | 0.394 | 0.402 |
| e | | 2.54 | BSC | | 0.100 | BSC |
| e1 | | 5.08 | BSC | | 0.200 | BSC |
| H1 | 6.40 | 6.50 | 6.60 | 0.252 | 0.256 | 0.260 |
| L | 12.75 | 13.50 | 13.65 | 0.502 | 0.531 | 0.537 |
| L1 | - | 3.10 | 3.30 | - | 0.122 | 0.130 |
| L2 | | 2.50 | REF | | 0.098 | REF |
| P | 3.50 | 3.60 | 3.63 | 0.138 | 0.142 | 0.143 |
| P1 | 3.50 | 3.60 | 3.63 | 0.138 | 0.142 | 0.143 |
| Q | 2.73 | 2.80 | 2.87 | 0.107 | 0.110 | 0.113 |
| θ 1 | 5° | 7° | 9° | 5° | 7° | 9° |
| θ 2 | 1° | 3° | 5° | 1° | 3° | 5° |
| θ 3 | 1° | 3° | 5° | 1° | 3° | 5° |

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