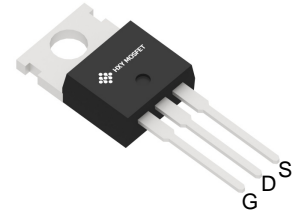




### Description

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

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

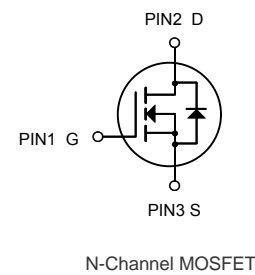
$R_{DS(ON)} < 10.5m\Omega @ V_{GS}=10V$

### Application

Battery protection

Load switch

Uninterruptible power supply



### Package Marking and Ordering Information

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

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

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	100	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Continuous Drain Current@ $T_C=25^\circ C$	70	A
$I_{DM}$	Puled Drain Current <sup>1</sup>	280	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	110	mJ
$P_D@T_C=25^\circ C$	Total Power Dissipation <sup>4</sup>	100	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup>	64	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Ambient <sup>1</sup>	1.25	$^\circ C/W$



**Electrical Characteristics (T<sub>J</sub>=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	100	---	---	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BVDSS Temperature Coefficient	Reference to 25°C , I <sub>D</sub> =1mA	---	0.098	---	V/°C
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V , I <sub>D</sub> =20A	---	8.5	10.5	mΩ
		V <sub>GS</sub> =4.5V , I <sub>D</sub> =15A	---	9.5	15	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	1.0	---	2.5	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	-4.57	---	mV/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =80V , V <sub>GS</sub> =0V , T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =80V , 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
R <sub>g</sub>	Gate Resistance	V <sub>DS</sub> =0V , V <sub>GS</sub> =0V , f=1MHz	---	0.48	---	Ω
Q <sub>g</sub>	Total Gate Charge (10V)		---	31.3	---	nC
Q <sub>gs</sub>	Gate-Source Charge	V <sub>DS</sub> =50V , V <sub>GS</sub> =50V , I <sub>D</sub> =10A	---	3.49	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	7.63	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =50V , V <sub>GS</sub> =10V , R <sub>G</sub> =4Ω I <sub>D</sub> =10A	---	16	---	ns
T <sub>r</sub>	Rise Time		---	10	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	40	---	
T <sub>f</sub>	Fall Time		---	6	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =50V , V <sub>GS</sub> =0V , f=1MHz	---	1368	---	pF
C <sub>oss</sub>	Output Capacitance		---	451	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	12.9	---	
I <sub>S</sub>	Continuous Source Current <sup>1,5</sup>	V <sub>G</sub> =V <sub>D</sub> =0V , Force Current	---	---	70	A
I <sub>SM</sub>	Pulsed Source Current <sup>2,5</sup>		---	---	280	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> =10A,dI/dt=100A/μs, T <sub>J</sub> =25°C	---	103	---	nS
Q <sub>rr</sub>	Reverse Recovery Charge		---	187	---	nC

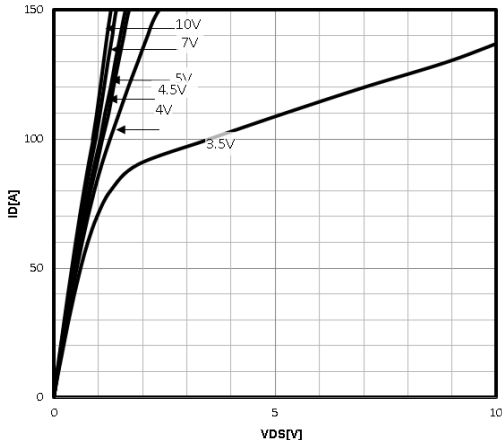
**Note :**

- 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>=11A
- 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.

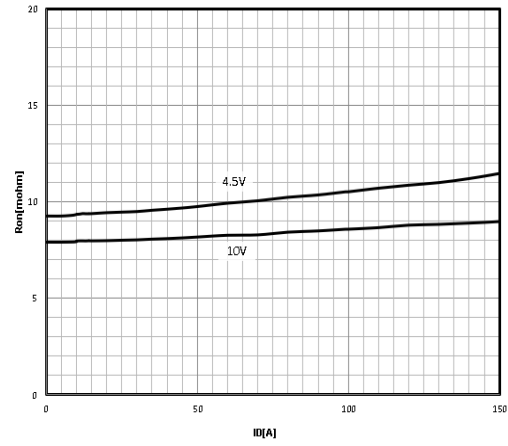


### Typical Characteristics

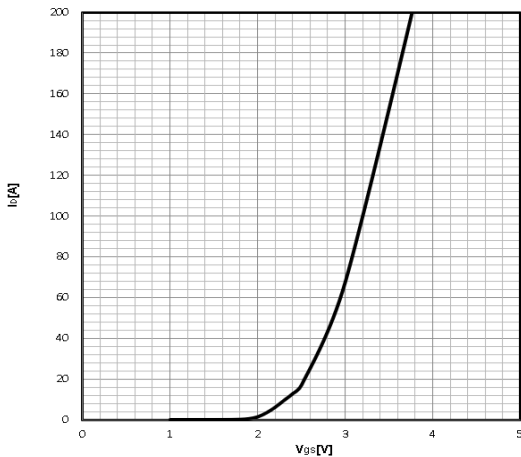
Typ. output characteristics  
 $I_D = f(V_{DS})$



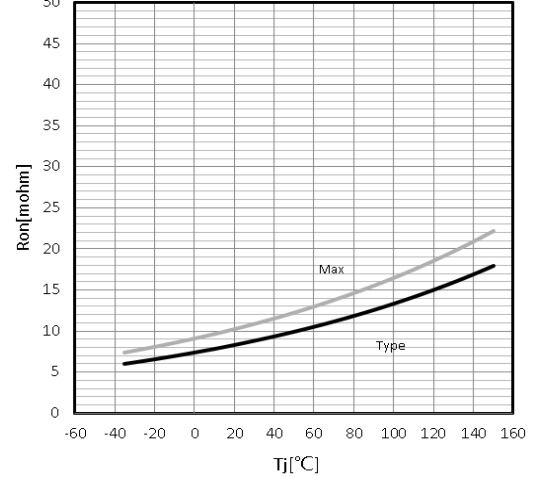
Typ. drain-source on resistance  
 $R_{DS(on)} = f(I_D)$



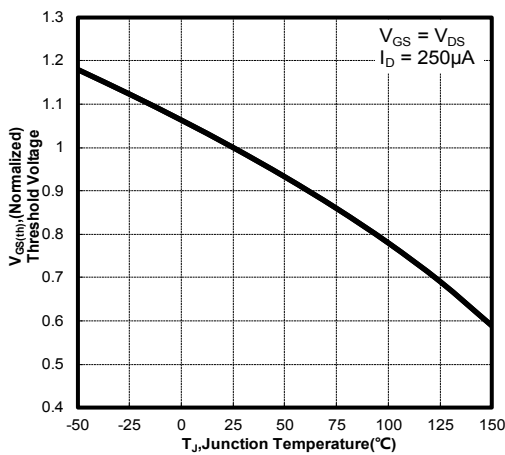
Typ. transfer characteristics  
 $I_D = f(V_{GS})$



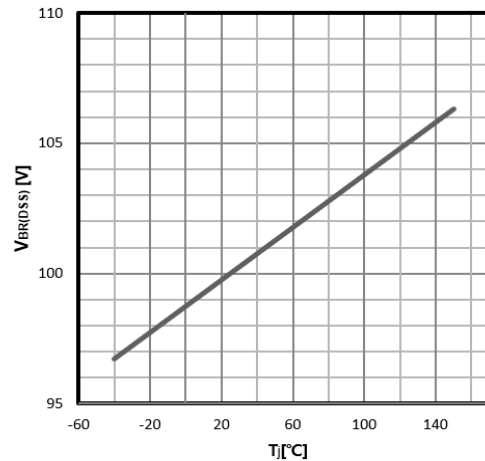
Drain-source on-state resistance  
 $R_{DS(on)} = f(T_j); I_D = 20A; V_{GS} = 10V$



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

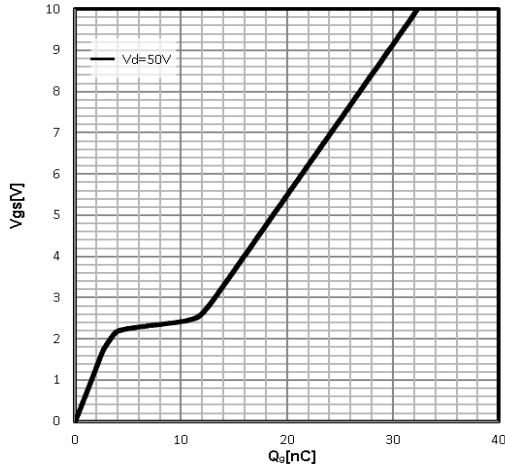


Drain-source breakdown voltage  
 $V_{BR(DSS)} = f(T_j); I_D = 250\mu A$

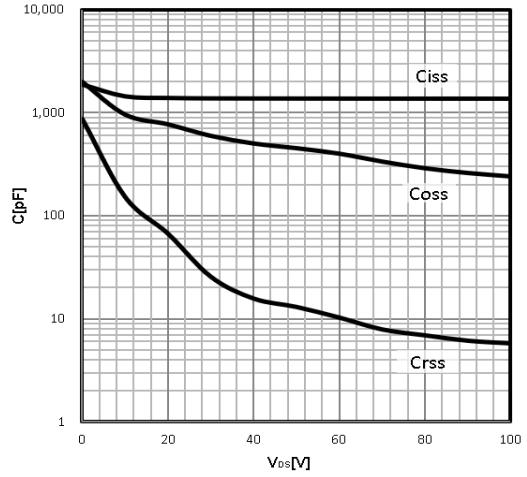




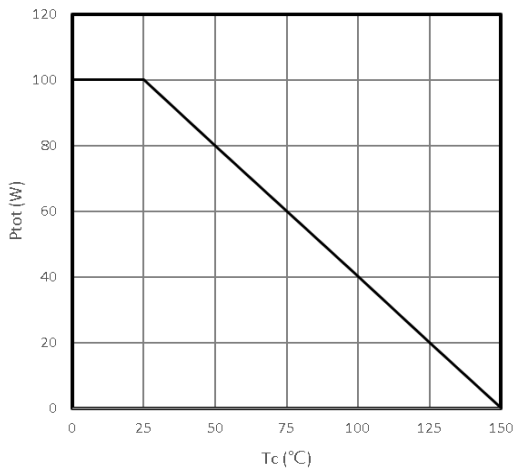
**Typ. gate charge**  
 $V_{GS}=f(Q_g)$ ;  $I_D=10A$



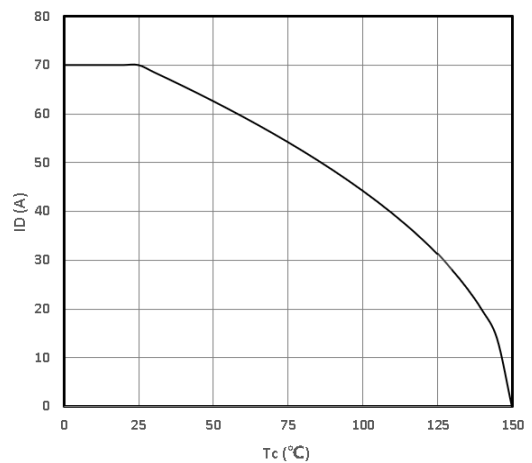
**Typ. capacitances**  
 $C=f(V_{DS})$ ;  $V_{GS}=0V$ ;  $f=1MHz$



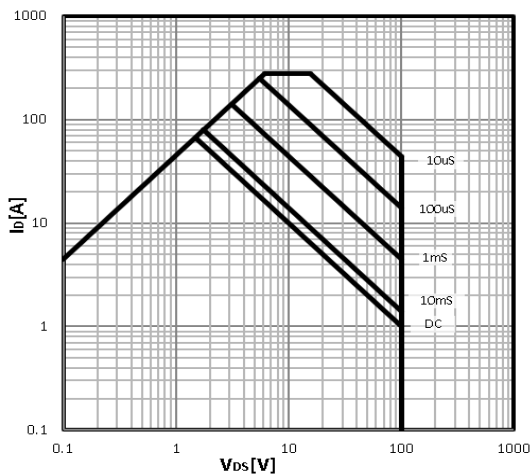
**Power Dissipation**  
 $P_{tot}=f(T_c)$



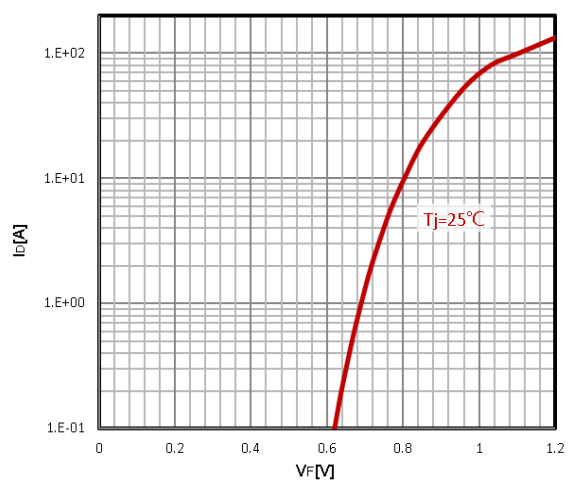
**Maximum Drain Current**  
 $I_D=f(T_c)$



**Safe operating area**  
 $I_D=f(V_{DS})$



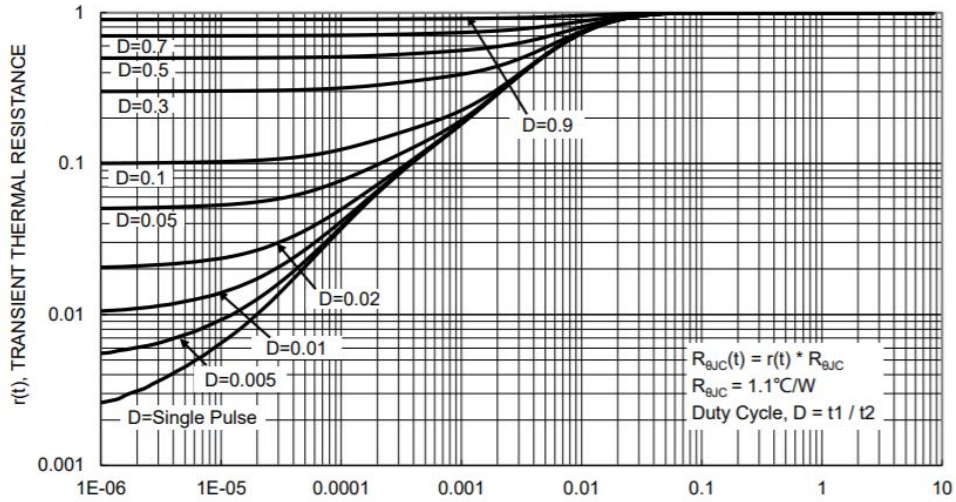
**Body Diode Forward Voltage Variation**  
 $I_F=f(V_{GS})$





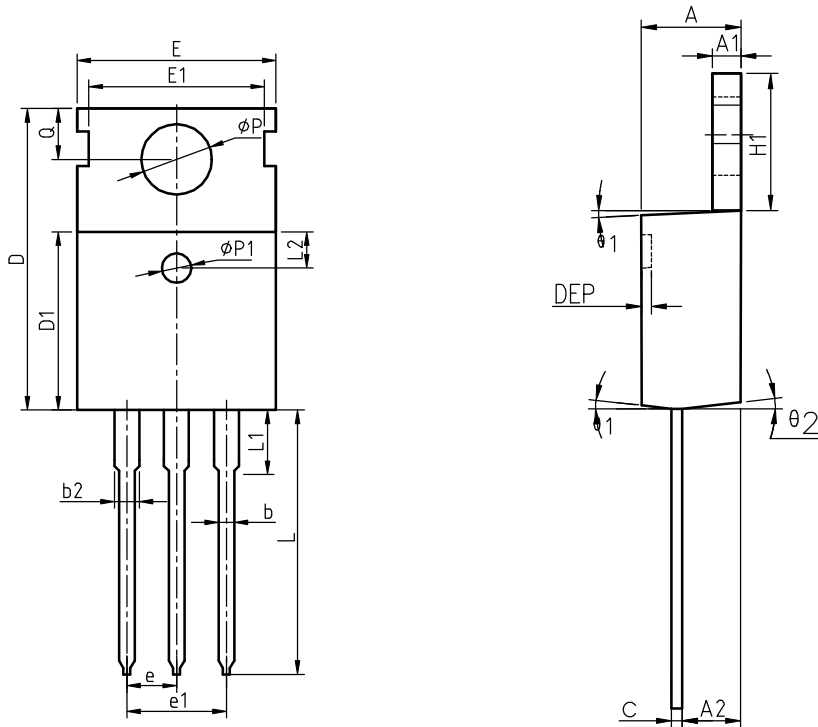
Max. transient thermal impedance

$$Z_{thJC} = f(t_p)$$



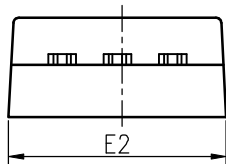


**Package Information**  
**TO-220C**



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
theta 1	5°	7°	9°	5°	7°	9°
theta 2	1°	3°	5°	1°	3°	5°
theta 3	1°	3°	5°	1°	3°	5°





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