HMM130N120T

1200V/18.5mΩ SiC MOSFET Discrete Device

Description

The HMM130N120T is a SiC MOSFET discrete device. It uses a TO247-3 package integrates high performance SiC MOSFET chips designed for the applications such as EV Motor drives and charging station.

Features

- Blocking voltage:1200V
- $R_{DS(on)}$ =18.5mΩ
- I_{DS}@25°C=130A/ I_{DS}@100°C=100A
- High speed switching
- Easier paralleling

Applications

- EV motor drives
- EV/HEV charging station
- Induction heating and welding
- High voltage DC-DC converters
- Solar inverter Systems
- UPS applications

Circuit diagram

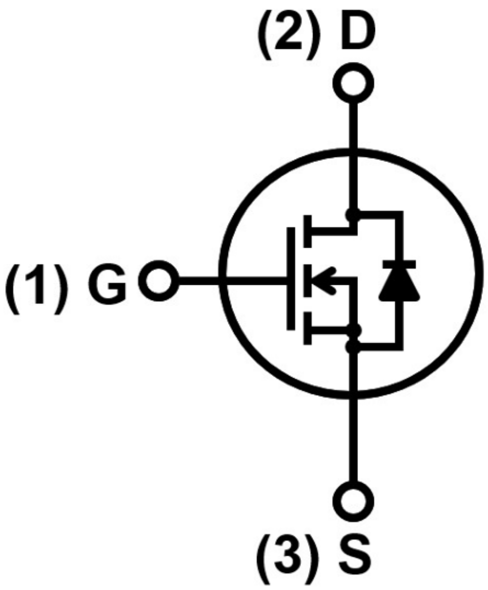
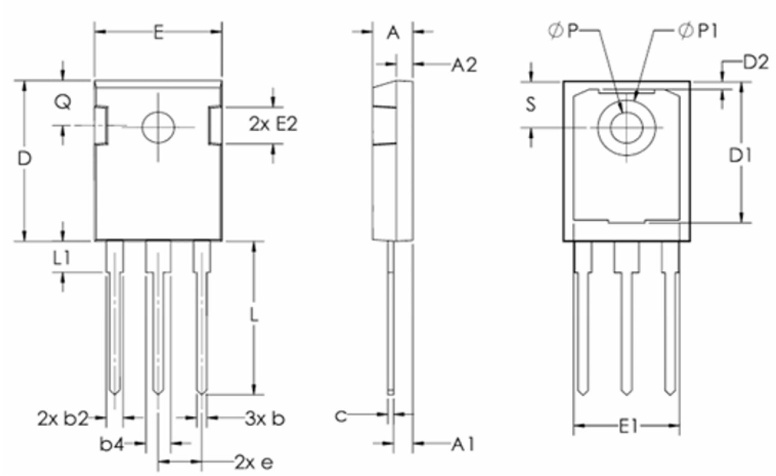


Figure 1. Out drawing & circuit diagram for HMM130N120T

Package Dimensions



Sym	Millimeters		Inches	
	Min	Max	Min	Max
A	4.70	5.31	0.185	0.209
A1	2.21	2.59	0.087	0.102
A2	1.50	2.49	0.059	0.098
b	0.99	1.40	0.039	0.055
b2	1.65	2.39	0.065	0.094
b4	2.59	3.43	0.102	0.135
c	0.38	0.89	0.015	0.035
D	20.80	21.46	0.819	0.845
D1	13.08	17.65	0.515	0.695
D2	0.51	1.35	0.020	0.053
E	15.49	16.26	0.610	0.640
E1	13.46	14.16	0.530	0.557
E2	3.43	5.49	0.135	0.216
e	5.44 BSC		0.214 BSC	
L	19.81	20.32	0.780	0.800
L1	4.10	4.50	0.161	0.177
ØP	3.56	3.66	0.140	0.144
ØP1	7.06	7.39	0.278	0.291
Q	5.39	6.20	0.212	0.244
S	6.04	6.30	0.238	0.248

Figure 2. Package Dimensions

Maximum Ratings (T_j =25°C unless otherwise specified)

Symbol	Parameter	Condition	Ratings	Unit
V_{DSS}	Drain-Source Voltage	G-S Short, I_D=1µA	1200	V
V_{GSS}	Gate-Sourse Voltage dynamic	D-S Short, AC frequency ≥1Hz	-10/25	V
V_{GSSOP}	Gate-Sourse Voltage static	-	-5/20	
I_{DS}	DC Continuous Drain Current	T_C =25°C, Tj=175 °C, V_{GS} =20V	130	A
		T_C =100°C, Tj=175 °C, V_{GS} =20V	100	
I_{DP}	Pulse Drain Current	T_C =25°C	320	A
P_{tot}	Total Power Dissipation	T_C=25°C		W
T_{jop}	operating Junction Temperature	-	-55 to 175	°C
T_{stg}	Storage Temperature	-	-55 to 175	°C

MOSFET Electrical characteristics (T_j =25°C unless otherwise specified, chip)

Symbol	Item	Condition		Value Min.	Value Typ.	Value Max	Unit
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS} =0V, I_D =2mA		1200	-	-	V
I_{DSS}	Zero gate voltage drain Current	V_{DS} =1200V, V_{GS} =0V	T_j =25°C	-	0.2	2	μA
			T_j =175°C	-	2	-	
$V_{GS(th)}$	Gate-source threshold Voltage	I_D =20mA, V_{DS} =V_{GS}	T_j =25°C	2.0	2.4	4.0	V
			T_j =125°C	-	1.8	-	
			T_j =175°C	-	1.6	-	
I_{GSS+}	Gate-Source Leakage Current	V_{GS} =20V, V_{DS} =0V	T_j =25°C	-	20	200	nA
I_{GSS-}		V_{GS} =-5V, V_{DS} =0V		-200	-20	-	
$R_{DS(on)}$ (Chip)	Static drain-source On-state resistance	I_D =80A V_{GS} =20V	T_j =25°C	-	18.5	26	mΩ
			T_j =125°C	-	28	-	
			T_j =175°C	-	36.5	-	
C_{iss}	Input Capacitance	V_D =1000V, V_{GS} =0V f =200kHz, V_{AC} =25mV		-	6384	-	pF
C_{oss}	Output Capacitance			-	264	-	
C_{rss}	Reverse transfer Capacitance			-	14	-	
R_{Gint}	Internal gate resistor	f =1MHz, I_D=0A		-	0.95	-	Ω
Q_g	Total gate charge	V_{DD} =800V, I_D =40A, V_{GS} =-5/+20V		-	236	-	nC
Q_{gs}	Gate-source charge			-	106	-	
Q_{gd}	Gate-drain charge			-	20	-	
$t_{d(on)}$	Turn-on delay time	V_{DD} =600V I_D =130A V_{GS} =-5/+20V R_{gon}/R_{goff} =10Ω/10Ω Inductive load switching operation	T_j =25°C	-	-	-	ns
t_r	Rise time		T_j =25°C	-	-	-	
$t_{d(off)}$	Turn-off delay time		T_j =25°C	-	-	-	
t_f	Fall time		T_j =25°C	-	-	-	
E_{on}	Turn-on power dissipation		T_j =25°C	-	-	-	μJ
E_{off}	Turn-off power dissipation		T_j =25°C	-	-	-	

Body Diode Electrical characteristics (T_j =25°C unless otherwise specified, chip)

Symbol	Item	Condition		Value			Unit
				Min.	Typ.	Max	
V_{SD}	Diode Forward Voltage	I_{SD}=40A, V_{GS} =-5V	T_j =25°C	-	3.8	-	V
I_S	Continuous Diode Forward Current	V_{GS} =-4V	T_j =25°C	-	148	-	A
t_{rr}	Reverse Recovery Time	V_{DD}=800V I_{SD}=40A V_{GS}=+20V/-5V R_{gon}/R_{goff}=10Ω/10Ω Inductive load switching operation	T_j =25°C		24		ns
I_{rrm}	Reverse recovery Current		T_j =25°C	-	42	-	A
Q_{rr}	Recovered charge		T_j=25°C	-	594	-	nC

Test Conditions

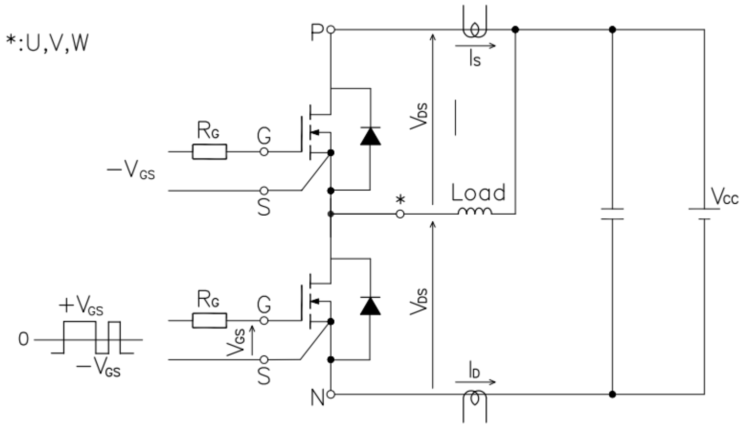


Figure 3. Switching time measure circuit

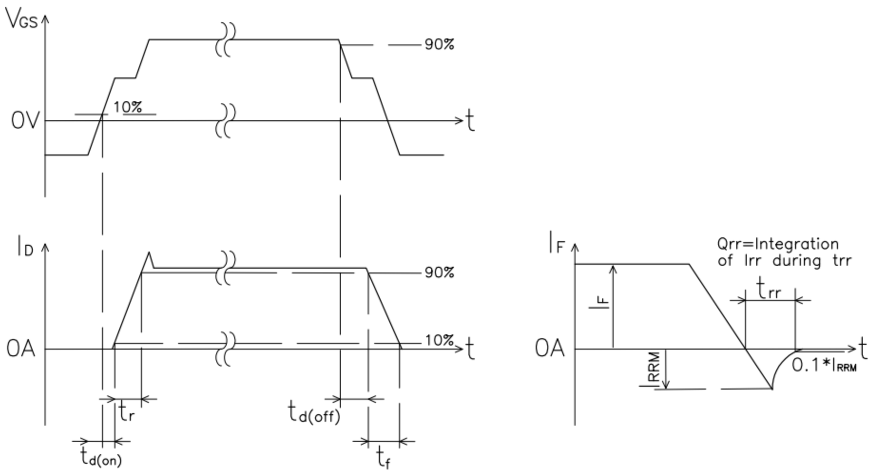


Figure 4. Switching time definition

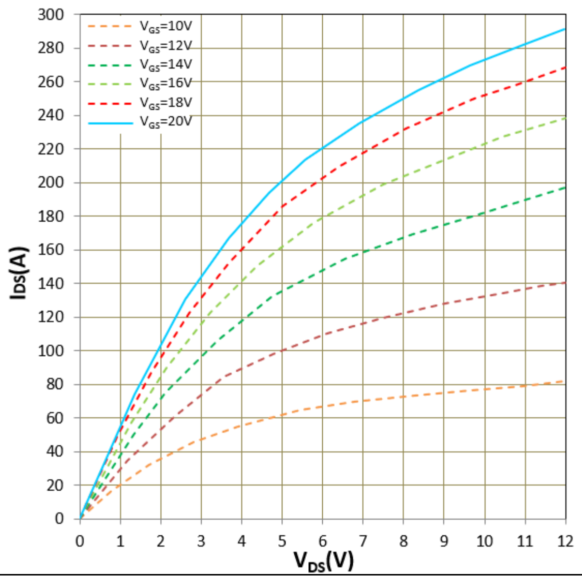


Figure 5. I_{DS} VS V_{DS}

T_j=25℃

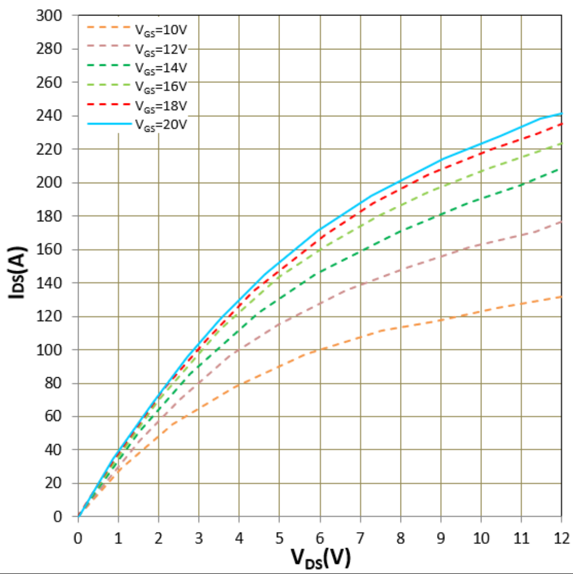


Figure 6. I_{DS} VS V_{GS}

T_j=125℃

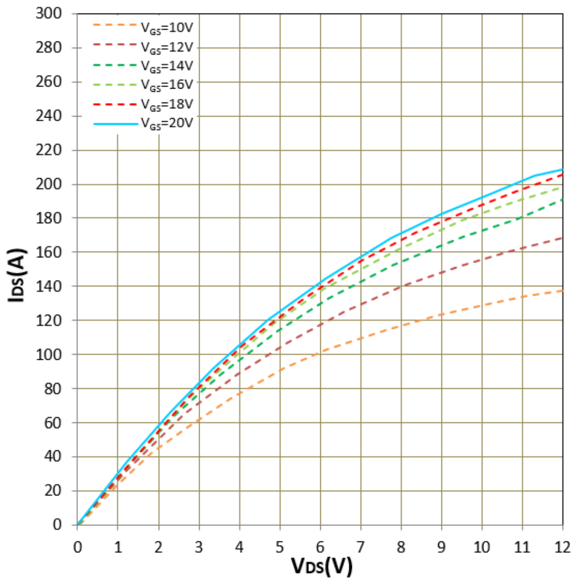


Figure 7. I_{DS} VS V_{DS}

T_j=175℃

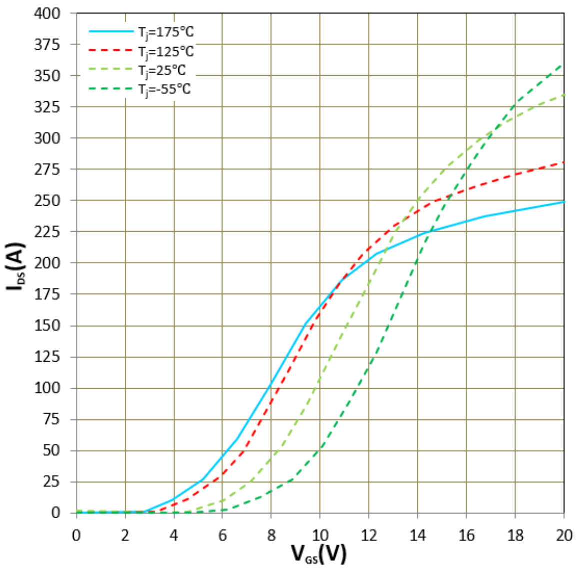


Figure 8. I_{DS} VS V_{GS}

V_{DS}=20V

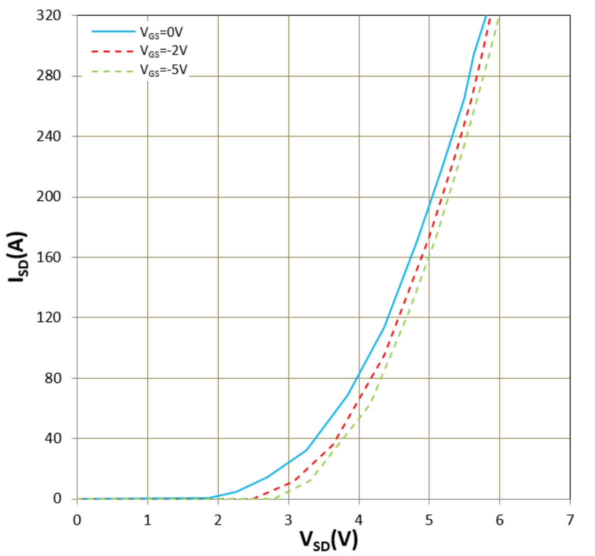


Figure 9. I_{SD} VS V_{SD}

T_j=25℃

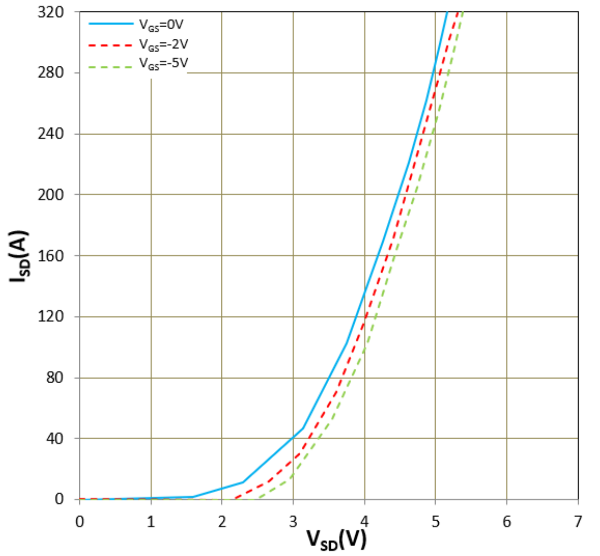


Figure 10. I_{SD} VS V_{SD}

T_j=175℃

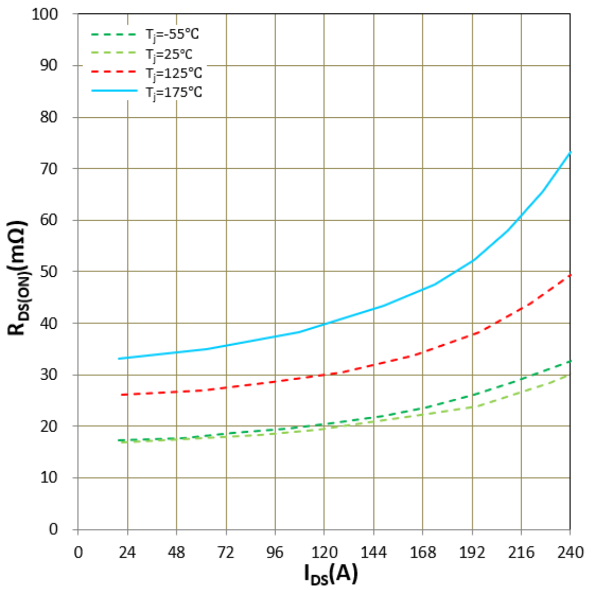


Figure 11. $R_{DS(ON)}$ VS I_{DS}

V_{GS}=20V

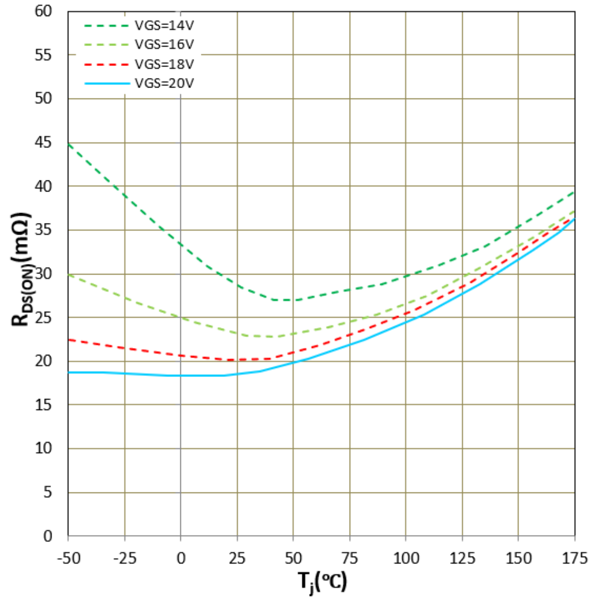


Figure 12 $R_{DS(ON)}$ VS I_{DS}

I_{DS}=80A

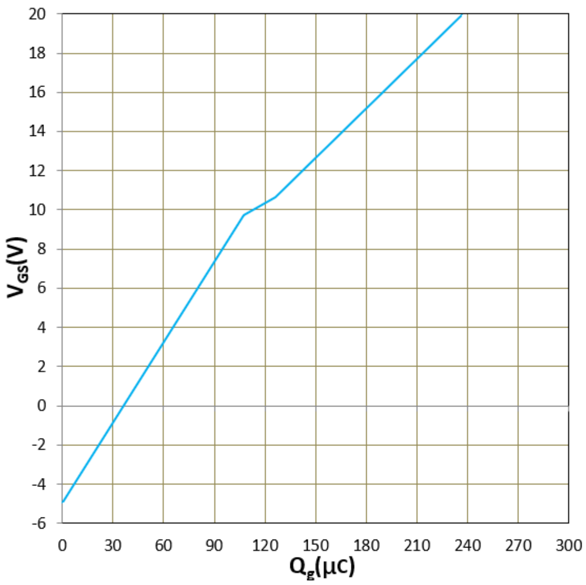
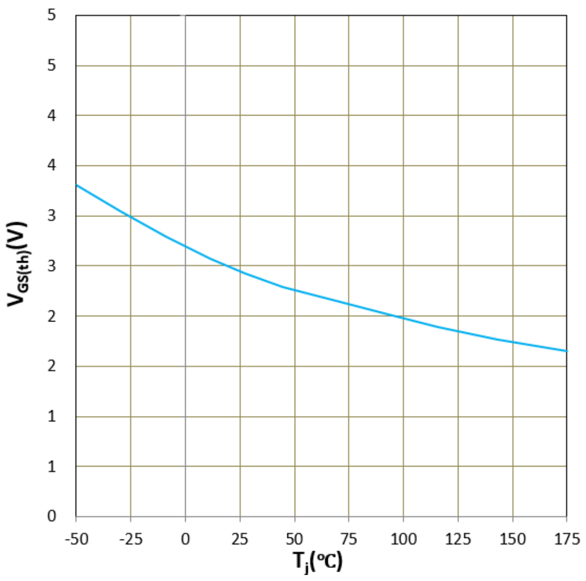
	

Figure 13. V_{GS} VS Q_g V_{DD}=800V, I_{DS}=80A	Figure 14. $V_{GS(th)}$ VS T_j V_{DS}=$V_{GS,}$ I_{DS}=20mA