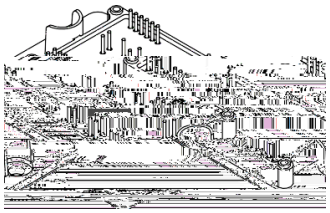
Si/SiC Hybrid Module – EliteSiC, Split T-Type NPC Inverter, Q2 Package

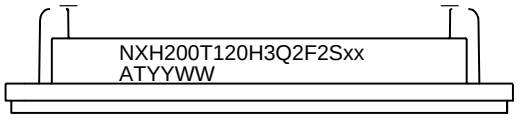
NXH200T120H3Q2F2SG, NXH200T120H3Q2F2STG



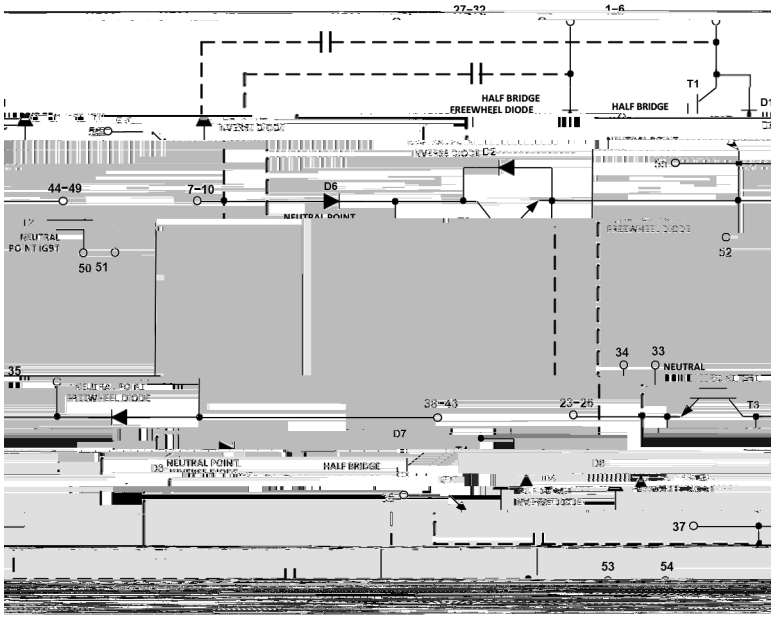
The NXH200T120H3Q2F2SG is a power module containing a split T−type neutral point clamped three−level inverter. The integrated field stop trench IGBTs and SiC Diodes provide lower conduction losses and switching losses, enabling designers to achieve high efficiency and superior reliability. NXH200T120H3Q2F2STG is Pre−applied Thermal Interface Material (TIM) module.

- Split T−type Neutral Point Clamped Three−level Inverter Module
- 1200 V Ultra Field Stop IGBTs & 650 V FS4 IGBTs
- 650 V SiC Diodes
- Low Inductive Layout
- Solderable Pins
- Thermistor
- Pre−applied Thermal Interface Material (TIM)

- Solar Inverters
- Uninterruptible Power Supplies



NXH200T120H3Q2F2SG, NXH200T120H3Q2F2STG	= Device Code
YYWW	= Year and Work Week Code
A	= Assembly Site Code
T	= Test Side Code
G	= Pb−Free Package



See detailed ordering and shipping information on page 6 of this data sheet.

Publication Order Number:

(Note 1) T_J = 25°

(Note 1) T_J = 25°C unless otherwise noted

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Turn−on Delay Time	T_J = 125°C V_{CE} = 350 V, I_C = 170 A V_{GE} = −5/+15 V, R_G = 10 Ω	$t_{d(on)}$	–	276	–	ns
Rise Time		t_r	–	97	–	
Turn−off Delay Time		$t_{d(off)}$	–	997	–	
Fall Time		t_f	–	99	–	
Turn−on Switching Loss per Pulse		E_{on}	–	5.4	–	mJ
Turn−off Switching Loss per Pulse		E_{off}	–	7.9	–	
Input Capacitance	V_{CE} = 25 V. V_{GE} = 0 V f = 100 kHz	C_{ies}	–	35615	–	pF
Output Capacitance		C_{oes}	–	700	–	
Reverse Transfer Capacitance		C_{res}	–	530	–	
Total Gate Charge	V_{CE} = 600 V, I_C = 200 A, V_{GE} = 15 V	Q_g	–	1706.4	–	nC
Thermal Resistance − chip−to−heatsink	Thermal grease, Thickness < 100 μm, λ = 2.87 W/mK	R_{thJH}	–	0.24	–	°C/W
Thermal Resistance − chip−to−case		R_{thJC}	–	0.13	–	°C/W

Diode Reverse Leakage Current	V_R = 650 V	I_R	–	–	100	μA
Diode Forward Voltage	I_F = 100 A, T_J = 25°C	V_F	1.2	1.48	2.7	V
	I_F = 100 A, T_J = 175°C		–	1.90	–	
Reverse Recovery Time	T_J = 25°C V_{CE} = 350 V, I_C = 170 A V_{GE} = −5/+15 V, R_G = 10 Ω	t_{rr}	–	26.6	–	ns
Reverse Recovery Charge		Q_{rr}	–	308	–	nC
Peak Reverse Recovery Current		I_{RRM}	–	16.8	–	A
Peak Rate of Fall of Recovery Current		di/dt	–	1659	–	A/μs
Reverse Recovery Energy		E_{rr}	–	34.5	–	μJ
Reverse Recovery Time	T_J = 125°C V_{CE} = 350 V, I_C = 170 A V_{GE} = −5/+15V, R_G = 10 Ω	t_{rr}	–	25.8	–	ns
Reverse Recovery Charge		Q_{rr}	–	294	–	nC
Peak Reverse Recovery Current		I_{RRM}	–	18.0	–	A
Peak Rate of Fall of Recovery Current		di/dt	–	1672	–	A/μs
Reverse Recovery Energy		E_{rr}	–	35.2	–	μJ
Thermal Resistance − chip−to−heatsink	Thermal grease, Thickness < 100 μm, λ = 2.87 W/mK	R_{thJH}	–	0.54	–	°C/W
Thermal Resistance − chip−to−case		R_{thJC}	–	0.43	–	°C/W

Collector−Emitter Cutoff Current	V_{GE} = 0 V, V_{CE} = 650 V	I_{CES}	–	–	300	μA
Collector−Emitter Saturation Voltage	V_{GE} = 15 V, I_C = 150 A, T_J = 25°C	$V_{CE(sat)}$	0.8	1.36	2.05	V
	V_{GE} = 15 V, I_C = 150 A, T_J = 175°C					

T_J = 25°C unless otherwise noted

Turn−on Delay Time	T_J = 25°C V_{CE} = 350 V, I_C = 170 A V_{GE} = −5/+15 V, R_G = 10 Ω	$t_{d(on)}$	–	94	–	ns
Rise Time		t_r	–	45	–	
Turn−off Delay Time		$t_{d(off)}$	–	224	–	
Fall Time		t_f	–	22	–	
Turn−on Switching Loss per Pulse		E_{on}	–	3.1	–	mJ
Turn off Switching Loss per Pulse		E_{off}	–	2.4	–	
Turn−on Delay Time	T_J = 125°C V_{CE} = 350 V, I_C = 170 A V_{GE} = −5/+15 V, R_G = 10 Ω	$t_{d(on)}$	–	92	–	ns
Rise Time		t_r	–	51	–	
Turn−off Delay Time		$t_{d(off)}$	–	244	–	
Fall Time		t_f	–	19	–	
Turn−on Switching Loss per Pulse		E_{on}	–	4.7	–	mJ
Turn off Switching Loss per Pulse		E_{off}	–	3.0	–	
Input Capacitance	V_{CE} = 25 V, V_{GE} = 0 V, f = 100 kHz	C_{ies}	–	9316	–	pF
Output Capacitance		C_{oes}	–	249	–	
Reverse Transfer Capacitance		C_{res}	–	34	–	
Total Gate Charge	V_{CE} = 480 V, I_C = 80 A, V_{GE} = 15 V	Q_g	–	300.9	–	nC
Thermal Resistance − chip−to−heatsink	Thermal grease, Thickness < 100 μm, λ = 2.87 W/mK	R_{thJH}	–	0.50	–	°C/W
Thermal Resistance − chip−to−case		R_{thJC}	–	0.36	–	°C/W

Diode Reverse Leakage Current	V_R = 1200 V	I_R	–	–	100	μA
	I_F =150 A, T_J = 25°C	V_F	1.6	2.71	3.6	V
	I_F = 150 A, T_J = 175°C		–	2.00	–	
	T_J = 25°C V_{CE} = 350 V, I_C = 170 A V_{GE} = −5/+15 V, R_G = 10 Ω					

T_J = 25°C unless otherwise noted

Diode Forward Voltage	I_F = 7 A, T_J = 25°C	V_F	1.05	1.93	2.80	V
	I_F = 7 A, T_J = 175°C		–	1.29	–	
Thermal Resistance − chip−to−heatsink	Thermal grease, Thickness < 100 μm, λ = 2.87 W/mK	R_{thJH}	–	1.71	–	°C/W

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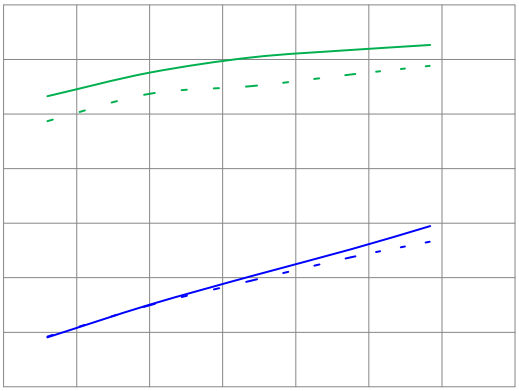
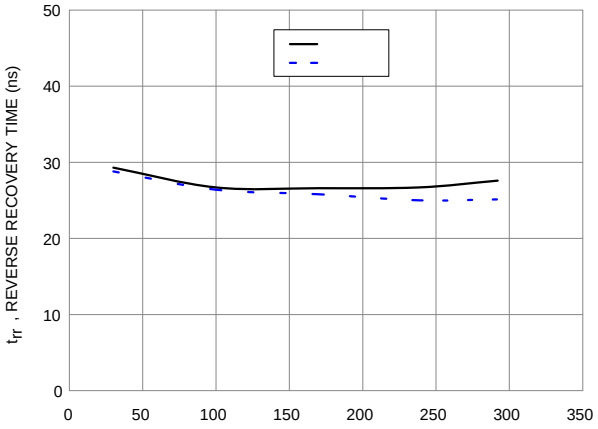
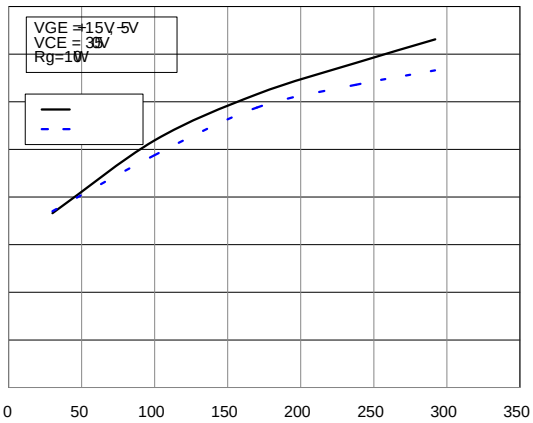



50
40
30
20
10
0
0
50
100
150
200
250
300
350
t_{rr} , REVERSE RECOVERY TIME (ns)


VGE = ±15V -5V
VCE = 35V
Rg=10Ω
0
50
100
150
200
250
300
350

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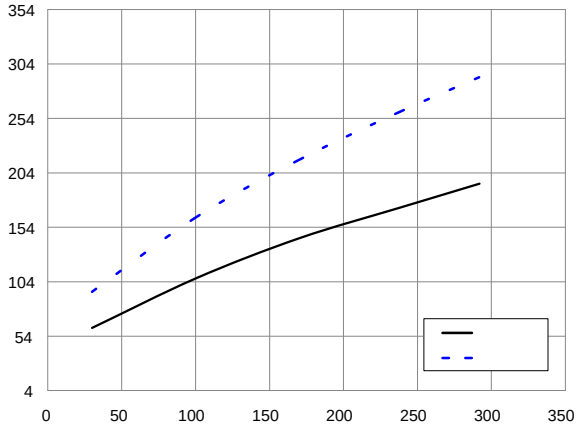
–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154
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4
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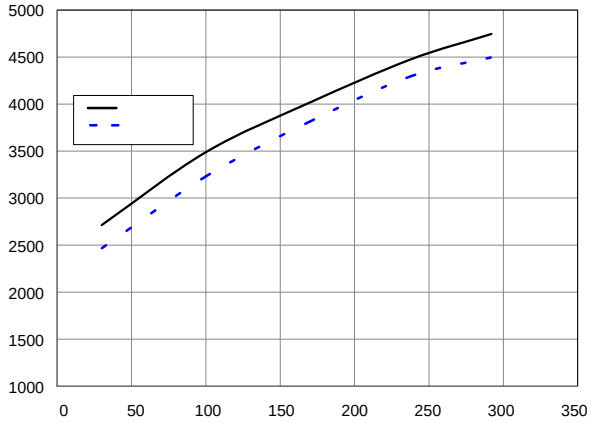
250
300
350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3000
2500
2000
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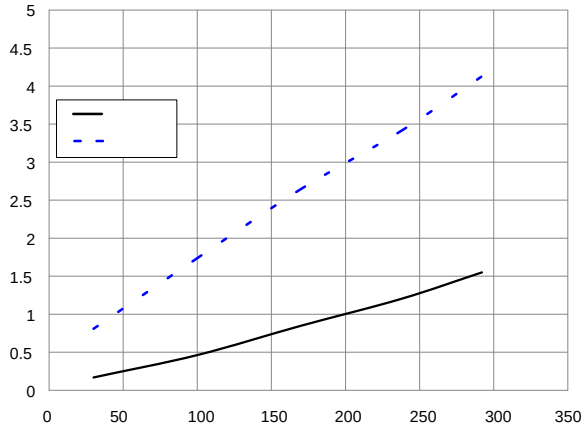
0
50
100
150
200
250
300
350


5
4.5
4
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1
0.5
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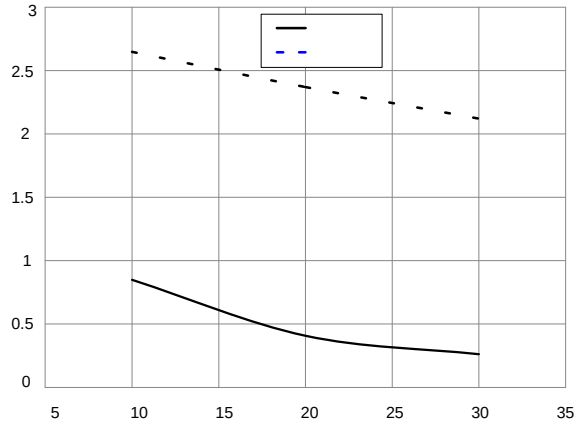
0
50
100
150
200
250
300
350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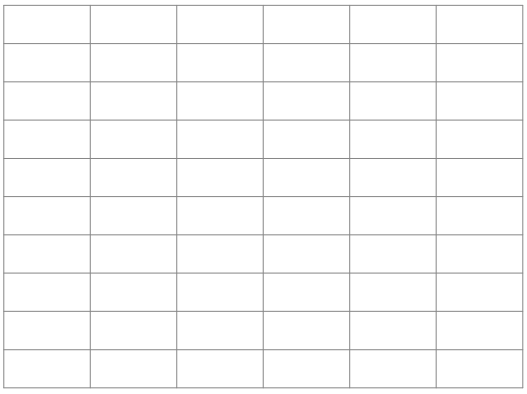
5
10
15
20
25
30
35



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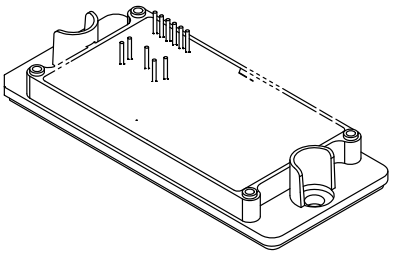

PIM56, 93x47 (SOLDER PIN)