



flowMNPC 1

1200 V / 160 A

Topology features

- Kelvin Emitter for improved switching performance
- Mixed Voltage Neutral Point Clamped Topology (T-Type)
- Temperature sensor

Component features

- 5 μ s short circuit withstand time
- High speed switching
- Minimized tail current

Housing features

- Base isolation: Al₂O₃
- Convex shaped substrate for superior thermal contact
- Thermo-mechanical push-and-pull force relief
- Press-fit pin
- Reliable cold welding connection

Target applications

- Energy Storage Systems
- Solar Inverters
- UPS

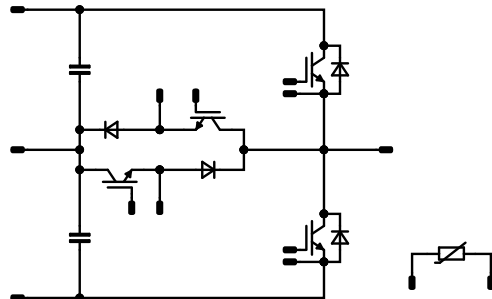
Types

- 10-PY12NMA160SH10-M820F08Y

flow 1 12 mm housing



Schematic





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10-PY12NMA160SH10-M820F08Y
target datasheet

Maximum Ratings

$T_j = 25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Buck Switch				
Collector-emitter voltage	V_{CES}		1200	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	165	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	480	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	307	W
Gate-emitter voltage	V_{GES}		± 20	V
Short circuit ratings	t_{SC}	$V_{GE} = 15\text{ V}$, $V_{CC} = 600\text{ V}$ $T_j = 150\text{ °C}$	5	μs
Maximum junction temperature	T_{jmax}		175	$^{\circ}\text{C}$

Buck Diode

Peak repetitive reverse voltage	V_{RRM}		650	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	124	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, $t_p = 10\text{ ms}$ $T_j = 25\text{ °C}$	660	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	138	W
Maximum junction temperature	T_{jmax}		175	$^{\circ}\text{C}$

Boost Switch

Collector-emitter voltage	V_{CES}		650	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	106	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	450	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	142	W
Gate-emitter voltage	V_{GES}		± 20	V
Maximum junction temperature	T_{jmax}		175	$^{\circ}\text{C}$



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target datasheet

Maximum Ratings

$T_j = 25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Boost Diode				
Peak repetitive reverse voltage	V_{RRM}		1200	V
Forward current (DC current) ⁽²⁾	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	77	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, $t_p = 10\text{ ms}$ $T_j = 25\text{ °C}$	360	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	132	W
Maximum junction temperature	T_{jmax}		175	°C

⁽¹⁾Calculation based on chip supplier datasheet at $T_j=175\text{°C}$

Capacitor (DC)

Maximum DC voltage	V_{MAX}		630	V
Operation Temperature	T_{op}		-55 ... 125	°C

Module Properties

Thermal Properties

Storage temperature	T_{stg}		-40...+125	°C
Operation temperature under switching condition	T_{jop}		-40...+($T_{jmax} - 25$)	°C

Isolation Properties

Isolation voltage	V_{isol}	DC Test Voltage $t_p = 2\text{ s}$	6000	V
Isolation voltage	V_{isol}	AC Voltage $t_p = 1\text{ min}$	2500	V
Creepage distance			>12,7	mm
Clearance			7,88	mm
Comparative Tracking Index	CTI		≥ 200	



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10-PY12NMA160SH10-M820F08Y
target datasheet

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
		V_{GS} [V]	V_{GE} [V]	V_{DS} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	

Buck Switch

Static

Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,008	25	5	6	7	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		160	25		2,1	2,6	V
Collector-emitter cut-off current	I_{CES}		20	0		25			100	μA
Gate-emitter leakage current	I_{GES}		20	0		25			1000	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}							12800		pF
Output capacitance	C_{oes}	$f = 1 \text{ Mhz}$	0	25		25		880		pF
Reverse transfer capacitance	C_{res}							320		pF
Gate charge	Q_g	$V_{CC} = 960 \text{ V}$	0/15		160	25		632		nC

Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4 \text{ W/mK}$ (PSX)						0,31		K/W
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Buck Diode

Static

Forward voltage	V_F				150	25 150		1,9 1,5	2,65 2,05	V
Reverse leakage current	I_R	$V_r = 650 \text{ V}$				25 150		160	40 1600	μA

Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4 \text{ W/mK}$ (PSX)						0,69		K/W
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Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
		V_{GS} [V]	V_{GE} [V]	V_{DS} [V]	I_C [A] I_D [A]	I_F [A]	T_j [°C]	Min	Typ	

Boost Switch

Static

Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,002	25	5	6	7	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		150	25		1,55	2	V
Collector-emitter cut-off current	I_{CES}		0	650		25			50	μA
Gate-emitter leakage current	I_{GES}		20	0		25	-500		500	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}							8714		pF
Output capacitance	C_{oes}	$f = 1$ Mhz	0	25		25		528		pF
Reverse transfer capacitance	C_{res}							234		pF
Gate charge	Q_g	$V_{CC} = 520$ V	0/15		150	25		414		nC

Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,67		K/W
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Boost Diode

Static

Forward voltage	V_F				80	25 150		2,7 1,9	3,8 2,65	V
Reverse leakage current	I_R	$V_r = 1200$ V				25 150		160	40 1600	μA

Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,72		K/W
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Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
		V_{GS} [V]	V_{GE} [V]	V_{DS} [V]	V_{CE} [V]	T_j [°C]	Min	Typ	Max	

Capacitor (DC)

Static

Capacitance	C	DC bias voltage = 0 V				25		100		nF
Tolerance							-10		10	%

Thermistor

Static

Rated resistance	R					25		22		kΩ
Deviation of R100	$\Delta_{R/R}$	$R_{100} = 1484 \Omega$				100	-5		5	%
Power dissipation	P					25		130		mW
Power dissipation constant	d					25		1,5		mW/K
B-value	$B_{(25/50)}$	Tol. $\pm 1 \%$						3962		K
B-value	$B_{(25/100)}$	Tol. $\pm 1 \%$						4000		K
Vincotech Thermistor Reference									I	



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10-PY12NMA160SH10-M820F08Y
target datasheet

Ordering Code	
Version	Ordering Code
Without thermal paste	10-PY12NMA160SH10-M820F08Y
With thermal paste (5,2 W/mK, PTM6000HV)	10-PY12NMA160SH10-M820F08Y-7/
With thermal paste (3,4 W/mK, PSX-P7)	10-PY12NMA160SH10-M820F08Y-3/

Marking						
	Text	Name NN-NNNNNNNNNNNNNN- TTTTTIVV	Date code WWYY	UL & VIN UL VIN	Lot LLLLL	Serial SSSS
	Datamatrix	Type&Ver TTTTTIVV	Lot number LLLLL	Serial SSSS	Date code WWYY	

Outline			
Pin table [mm]			
Pin	X	Y	Function
1	34,8	2,95	G12
2	34,8	0	S12
3	32,3	0	DC-
4	29,8	0	DC-
5	27,3	0	DC-
6	24,8	0	DC-
7	15,45	2,95	GND2
8	15,45	0	GND2
9	0	0	G13
10	0	2,95	S13
11	0	8,45	Therm2
12	0	11,45	Therm1
13	0	26,05	S14
14	0	29	G14
15	18,7	26,05	GND1
16	18,7	29	GND1
17	28,1	29	DC+
18	30,6	29	DC+
19	33,1	29	DC+
20	35,6	29	DC+
21	40,1	18,9	G11
22	40,1	15,95	S11
23	50,3	16,3	Ph1
24	53	16,55	Ph1
25	50,3	13,8	Ph1
26	53	13,55	Ph1
27	50,5	9,2	Ph2
28	53	9,2	Ph2
29	50,5	6,2	Ph2
30	53	6,2	Ph2

center of press-fit pinhead
for connection parameter see the handling instruction

12,99-0,11
0,2-0,05

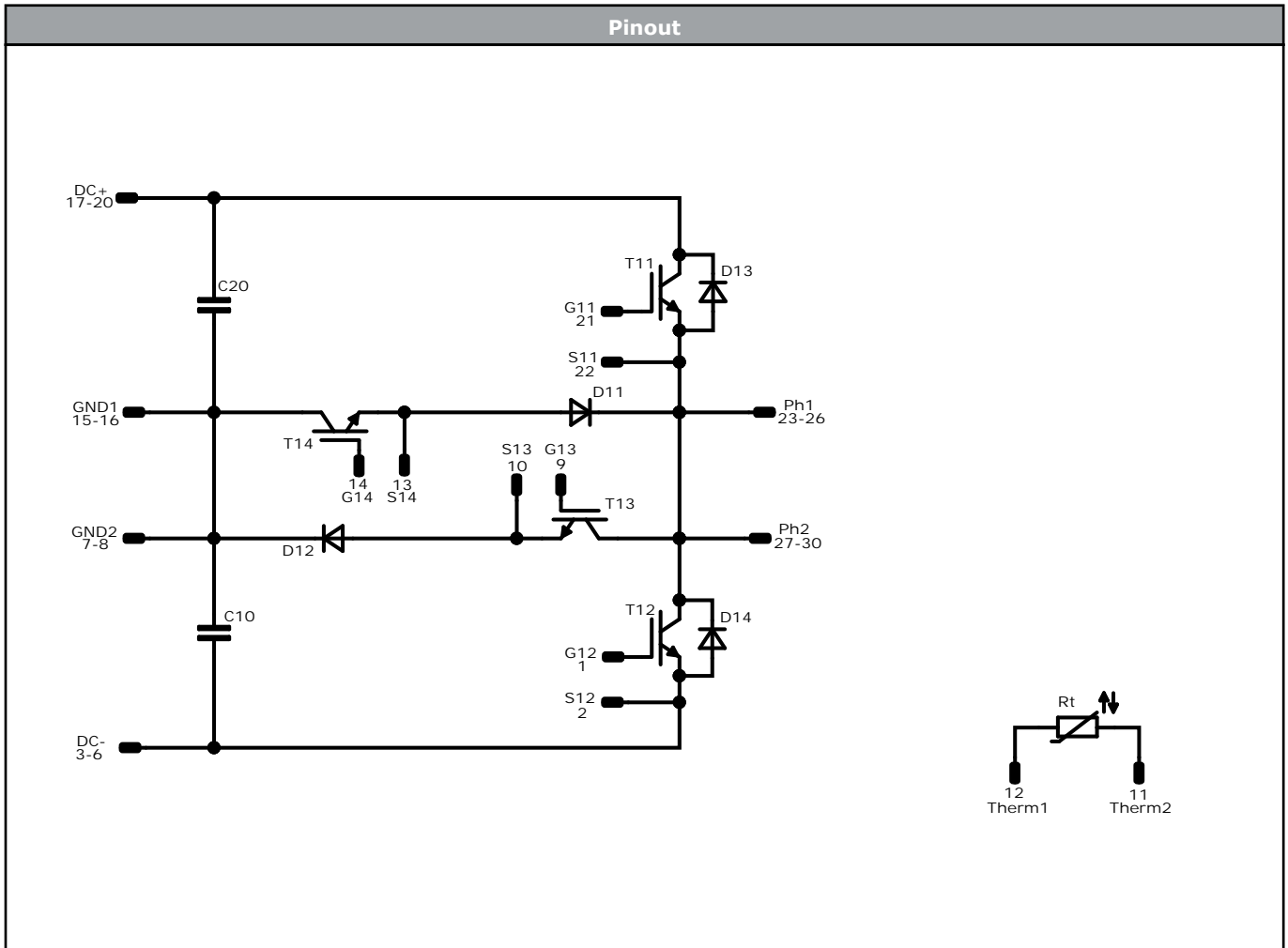
14,51

28,5

Tolerance of pinposition: ±0,5mm at the end of pins
Dimension of coordinate axis is only offset without tolerance



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Identification					
ID	Component	Voltage	Current	Function	Comment
T11, T12	IGBT	1200 V	160 A	Buck Switch	
D11, D12	FWD	650 V	150 A	Buck Diode	
T13, T14	IGBT	650 V	150 A	Boost Switch	
D13, D14	FWD	1200 V	80 A	Boost Diode	
C10, C20	Capacitor	630 V		Capacitor (DC)	
Rt	Thermistor			Thermistor	




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Packaging instruction				
Standard packaging quantity (SPQ) 100	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for <i>flow 1</i> packages see vincotech.com website.

Package data
Package data for <i>flow 1</i> packages see vincotech.com website.

Vincotech thermistor reference
See Vincotech thermistor reference table at vincotech.com website.

UL recognition and file number
This device is certified according to UL 1557 standard, UL file number E192116. For more information see vincotech.com website. 

Document No.:	Date:	Modification:	Pages
10-PY12NMA160SH10-M820F08Y-T1-14	10 Mar. 2023		

Product status definition		
Datasheet Status	Product Status	Definition
Target	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice. The data contained is exclusively intended for technically trained staff.

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