

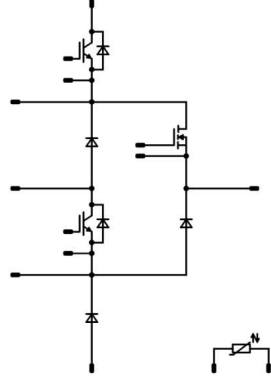
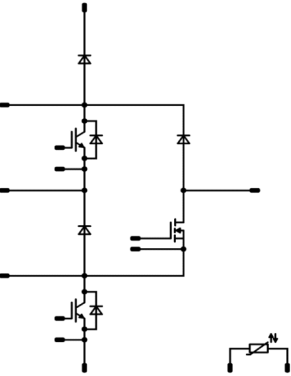




# Vincotech

<i>flow</i> ANPC 1 Split	1200 V / 8 mΩ
<div style="background-color: #eee; padding: 2px; margin-bottom: 5px;"><b>Features</b></div> <ul style="list-style-type: none"> <li>Split Advanced NPC topology</li> <li>Ultra-high switching frequency with SiC MOSFETs</li> <li>Split topology for better thermal performance</li> <li>No x-conduction at high frequencies</li> </ul>	<div style="background-color: #eee; padding: 2px; margin-bottom: 5px;"><b>flow 1 12mm housing</b></div> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>10-PG12NAB008MR02-LC59F18T</p>  </div> <div style="text-align: center;"> <p>10-PG12NAC008MR02-LC69F18T</p>  </div> </div>
<div style="background-color: #eee; padding: 2px; margin-bottom: 5px;"><b>Target applications</b></div> <ul style="list-style-type: none"> <li>Solar Inverters</li> </ul>	<div style="background-color: #eee; padding: 2px; margin-bottom: 5px;"><b>Schematic</b></div> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>10-PG12NAB008MR02-LC59F18T</p>  </div> <div style="text-align: center;"> <p>10-PG12NAC008MR02-LC69F18T</p>  </div> </div>
<div style="background-color: #eee; padding: 2px; margin-bottom: 5px;"><b>Types</b></div> <ul style="list-style-type: none"> <li>10-PG12NAB008MR02-LC59F18T</li> <li>10-PG12NAC008MR02-LC69F18T</li> </ul>	

## Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
<b>DC-Link Switch</b>				
Collector-emitter voltage	$V_{CES}$		1200	V
Collector current	$I_C$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	115	A
Repetitive peak collector current	$I_{CRM}$	$t_p$ limited by $T_{jmax}$	300	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	190	W
Gate-emitter voltage	$V_{GES}$		±20	V
Maximum junction temperature	$T_{jmax}$		175	°C



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## Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
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### DC-Link Switch Prot. Diode

Peak repetitive reverse voltage	$V_{RRM}$		1200	V
Continuous (direct) forward current	$I_F$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	72	A
Repetitive peak forward current	$I_{FRM}$		200	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	121	W
Maximum junction temperature	$T_{jmax}$		175	°C

### DC-Link Diode

Peak repetitive reverse voltage	$V_{RRM}$		1200	V
Continuous (direct) forward current	$I_F$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	72	A
Repetitive peak forward current	$I_{FRM}$		200	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	121	W
Maximum junction temperature	$T_{jmax}$		175	°C

### Neutral Point Switch

Collector-emitter voltage	$V_{CES}$		1200	V
Collector current	$I_C$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	115	A
Repetitive peak collector current	$I_{CRM}$	$t_p$ limited by $T_{jmax}$	300	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	190	W
Gate-emitter voltage	$V_{GES}$		±20	V
Maximum junction temperature	$T_{jmax}$		175	°C

### Neutral Point Switch Prot. Diode

Peak Repetitive Reverse Voltage	$V_{RRM}$		1200	V
Continuous (direct) forward current	$I_F$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	21	A
Surge (non-repetitive) forward current	$I_{FSM}$	50 Hz Single Half Sine Wave $t_p = 10\text{ ms}$ $T_j = 150\text{ °C}$	65	A
Surge current capability	$I_{t}$		21	A <sup>2</sup> s
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	64	W
Maximum Junction Temperature	$T_{jmax}$		175	°C



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## Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
<b>Neutral Point Diode</b>				
Peak Repetitive Reverse Voltage	$V_{RRM}$		1200	V
Continuous (direct) forward current	$I_F$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	101	A
Repetitive peak forward current	$I_{FRM}$		300	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	145	W
Maximum Junction Temperature	$T_{jmax}$		175	°C
<b>Half-Bridge Switch</b>				
Drain-source voltage	$V_{DSS}$		1200	V
Drain current	$I_D$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	152	A
Peak drain current	$I_{DM}$	$t_p$ limited by $T_{jmax}$	685	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	186	W
Gate-source voltage	$V_{GSS}$		-4/22	V
Maximum Junction Temperature	$T_{jmax}$		175	°C
<b>Half-Bridge Diode</b>				
Peak repetitive reverse voltage	$V_{RRM}$		1200	V
Continuous (direct) forward current	$I_F$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	68	A
Repetitive peak forward current	$I_{FRM}$		252	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	142	W
Maximum junction temperature	$T_{jmax}$		175	°C
<b>Module Properties</b>				
<b>Thermal Properties</b>				
Storage temperature	$T_{stg}$		-40...+125	°C
Operation temperature under switching condition	$T_{jop}$		-40...( $T_{jmax} - 25$ )	°C
<b>Isolation Properties</b>				
Isolation voltage	$V_{isol}$	DC Test Voltage $t_p = 2\text{ s}$	4000	V
Creepage distance			min. 12,7	mm
Clearance			8,14	mm
Comparative Tracking Index	CTI		> 200	



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## Characteristic Values

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

### DC-Link Switch

#### Static

Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,015	25	5,4	6	6,6	V
Collector-emitter saturation voltage	$V_{CESat}$		15		150	25 125 150		1,55 1,75 1,80	2,05	V
Collector-emitter cut-off current	$I_{CES}$		0	1200		25			160	μA
Gate-emitter leakage current	$I_{GES}$		20	0		25			500	nA
Internal gate resistance	$r_g$							3		Ω
Input capacitance	$C_{ies}$							30000		pF
Output capacitance	$C_{oes}$		0	10		25		880		
Reverse transfer capacitance	$C_{res}$							320		
Gate charge	$Q_g$		15	600	150	25		1000		nC

#### Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material $\lambda = 3,4$ W/mK						0,50		K/W
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### DC-Link Switch Prot. Diode

#### Static

Forward voltage	$V_F$				100	25 125 150		1,82 1,96 1,97	2,1	V
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#### Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material $\lambda = 3,4$ W/mK						0,79		K/W
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### DC-Link Diode

#### Static

Forward voltage	$V_F$				100	25 125 150		1,82 1,96 1,97	2,1	V
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#### Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material $\lambda = 3,4$ W/mK						0,79		K/W
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## Characteristic Values

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

### Neutral Point Switch

#### Static

Parameter	Symbol	$V_{GE} = V_{CE}$	$V_{GS}$ [V]	$V_{CE}$ [V]	$I_C$ [A]	$T_j$ [°C]	Min	Typ	Max	Unit
Gate-emitter threshold voltage	$V_{GE(th)}$				0,015	25	5,4	6	6,6	V
Collector-emitter saturation voltage	$V_{CESat}$		15		150	25 125 150		1,55 1,75 1,80	2,05	V
Collector-emitter cut-off current	$I_{CES}$		0	1200		25			160	μA
Gate-emitter leakage current	$I_{GES}$		20	0		25			500	nA
Internal gate resistance	$r_g$							3		Ω
Input capacitance	$C_{ies}$							30000		pF
Output capacitance	$C_{oes}$		0	10		25		880		
Reverse transfer capacitance	$C_{res}$							320		
Gate charge	$Q_g$		15	600	150	25		1000		nC

#### Thermal

Parameter	Symbol	Material	$\lambda$ [W/mK]	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material	$\lambda = 3,4$ W/mK	K/W

### Neutral Point Switch Prot. Diode

#### Static

Parameter	Symbol	$I_F$ [A]	$T_j$ [°C]	Min	Typ	Max	Unit
Forward voltage	$V_F$	15	25 125		2,37 2,47	2,71	V
Reverse leakage current	$I_r$	1200	25 150			60 1800	μA

#### Thermal

Parameter	Symbol	Material	$\lambda$ [W/mK]	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material	$\lambda = 3,4$ W/mK	K/W



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## Characteristic Values

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

### Neutral Point Diode

#### Static

Forward voltage	$V_F$			150	25 125 150		1,60 1,65 1,65	2,1	V
Reverse leakage current	$I_r$		1200		25			90	μA

#### Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material $\lambda = 3,4$ W/mK					0,66		K/W
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### Half-Bridge Switch

#### Static

Drain-source on-state resistance	$r_{DS(on)}$		18		100	25 125	8 12	10	mΩ
Gate-source threshold voltage	$V_{GS(th)}$	$V_{GS} = V_{DS}$			0,05	25	2,7	5,6	V
Gate to Source Leakage Current	$I_{GSS}$		-4/22	0		25		±500	nA
Zero Gate Voltage Drain Current	$I_{DSS}$		0	1200		25		50	μA
Internal gate resistance	$r_g$						1,4		Ω
Gate charge	$Q_g$						535		nC
Gate to source charge	$Q_{GS}$		18	600	100	25	110		
Gate to drain charge	$Q_{GD}$						205		
Short-circuit input capacitance	$C_{ISS}$						6685		pF
Short-circuit output capacitance	$C_{OSS}$	$f = 1$ MHz	0	800		25	380		
Reverse transfer capacitance	$C_{RSS}$						135		

#### Body Diode Static

Forward voltage	$V_F$		0		100	25	3,2		V
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#### Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material $\lambda = 3,4$ W/mK					0,51		K/W
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## Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
		$V_{GE}$ [V]	$V_{CE}$ [V]	$I_C$ [A]	$T_j$ [°C]	Min	Typ	Max		

### Half-Bridge Diode

#### Static

Parameter	Symbol	$V_{GS}$ [V]	$V_{DS}$ [V]	$I_D$ [A]	$I_F$ [A]	$T_j$ [°C]	Min	Typ	Max	Unit
Forward voltage	$V_F$			60		25 125		1,40 1,80	1,6	V
Reverse leakage current	$I_R$		1200			25 150			1200	μA

#### Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material $\lambda = 3,4$ W/mK						0,67		K/W
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### Thermistor

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

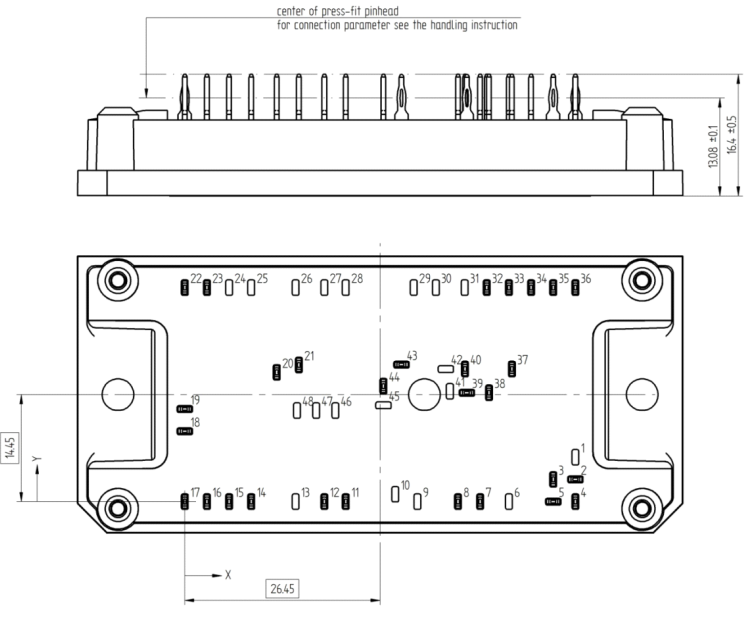


**10-PG12NA\*008MR02-LC\*9F18T**  
target datasheet

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Ordering Code & Marking						
Version				Ordering Code		
without thermal paste 12mm housing with Press-fit pins				10-PG12NAB008MR02-LC59F18T		
						
Text	Name		Date code	UL & VIN	Lot	Serial
	NN-NNNNNNNNNNNNNNN-TTTTIVV		WWYY	UL VIN	LLLLL	SSSS
	Datamatrix	Type&Ver	Lot number	Serial	Date code	
	TTTTTIVV	LLLLL	SSSS	WWYY		

Outline							
Pin table [mm]				Pin table [mm]			
Pin	X	Y	Function	Pin	X	Y	Function
1			Not assembled	30			Not assembled
2	52,9	3	DC-1	31			Not assembled
3	49,9	3	DC-1	32	40,9	28,9	Ph1
4	52,9	0	DC-1	33	43,9	28,9	Ph1
5	49,9	0	DC-1	34	46,9	28,9	Ph1
6			Not assembled	35	49,9	28,9	Ph1
7	40	0	GND1	36	52,9	28,9	Ph1
8	37	0	GND1	37	44,3	17,9	N1
9			Not assembled	38	41,2	14,7	S15
10			Not assembled	39	38,2	14,7	G15
11	21,8	0	GND1	40	37,95	17,9	N1
12	18,9	0	GND1	41			Not assembled
13			Not assembled	42			Not assembled
14	9	0	DC+1	43	29,35	18,5	P1
15	6	0	DC+1	44	26,9	15,6	P1
16	3	0	DC+1	45			Not assembled
17	0	0	DC+1	46			Not assembled
18	0	9,5	G11	47			Not assembled
19	0	12,5	S11	48			Not assembled
20	12,45	17,45	G13				
21	15,45	18,45	S13				
22	0	28,9	Therm11				
23	3	28,9	Therm12				
24			Not assembled				
25			Not assembled				
26			Not assembled				
27			Not assembled				
28			Not assembled				
29			Not assembled				

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

13,08 ±0,1  
6,4 ±0,05

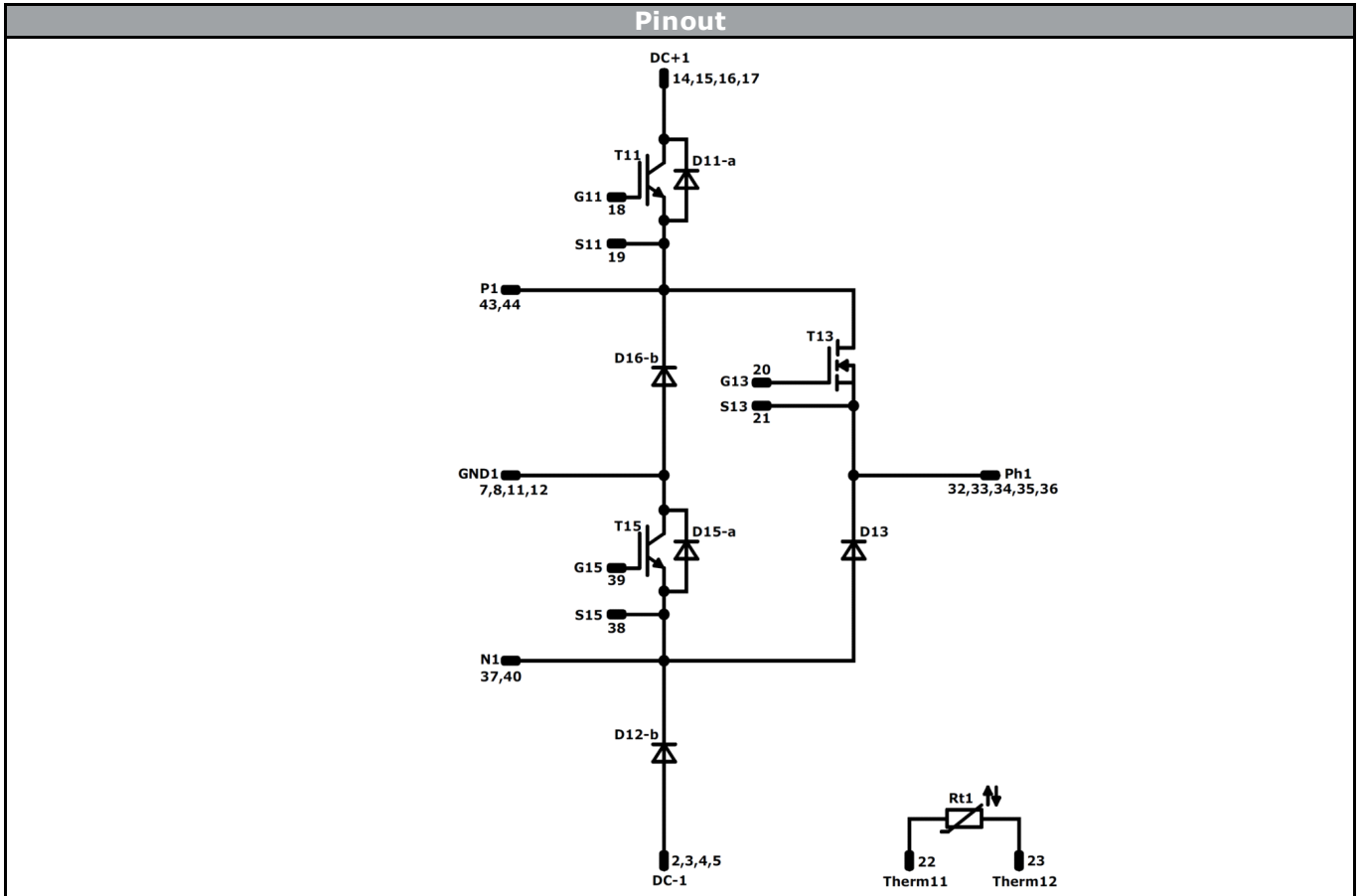
14,45  
26,45

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





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<b>Identification</b>					
<b>ID</b>	<b>Component</b>	<b>Voltage</b>	<b>Current</b>	<b>Function</b>	<b>Comment</b>
T11	IGBT	1200 V	150 A	DC-Link Switch	
D11-a	FWD	1200 V	100 A	DC-Link Switch Prot. Diode	
D12-b	FWD	1200 V	100 A	DC-Link Diode	
T15	IGBT	1200 V	150 A	Neutral Point Switch	
D15-a	FWD	1200 V	15 A	Neutral Point Switch Prot. Diode	
D16-b	FWD	1200 V	150 A	Neutral Point Diode	
T13	MOSFET	1200 V	8 mΩ	Half-Bridge Switch	
D13	FWD	1200 V	60 A	Half-Bridge Diode	
Rt1	Thermistor			Thermistor	



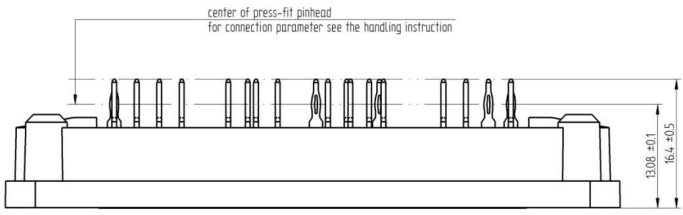
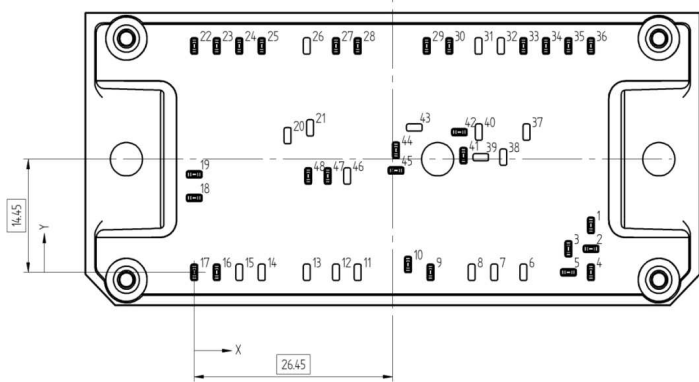
# 10-PG12NA\*008MR02-LC\*9F18T

target datasheet

Vincotech

Ordering Code & Marking						
Version				Ordering Code		
without thermal paste 12mm housing with Press-fit pins				10-PG12NAC008MR02-LC69F18T		
						
Text	Name		Date code	UL & VIN	Lot	Serial
	NN-NNNNNNNNNNNNNN-TTTTTV		WWYY	UL VIN	LLLLL	SSSS
	Datamatrix	Type&Ver	Lot number	Serial	Date code	
	TTTTTTTV	LLLLL	SSSS	WWYY		

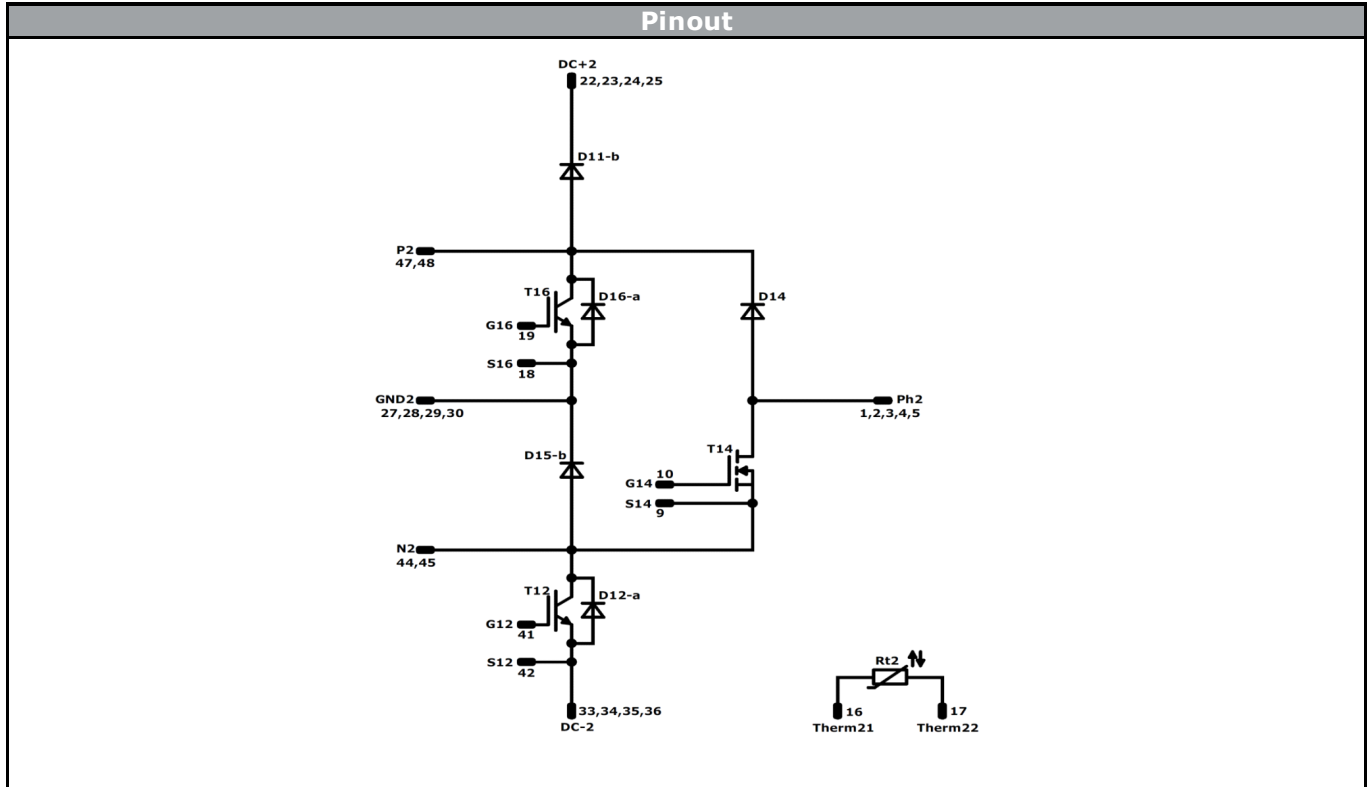
Outline							
Pin table [mm]				Pin table [mm]			
Pin	X	Y	Function	Pin	X	Y	Function
1	52,9	6	Ph2	30	34	28,9	GND2
2	52,9	3	Ph2	31	Not assembled		
3	49,9	3	Ph2	32	Not assembled		
4	52,9	0	Ph2	33	43,9	28,9	DC-2
5	49,9	0	Ph2	34	46,9	28,9	DC-2
6	Not assembled			35	49,9	28,9	DC-2
7	Not assembled			36	52,9	28,9	DC-2
8	Not assembled			37	Not assembled		
9	31,5	0	S14	38	Not assembled		
10	28,5	1	G14	39	Not assembled		
11	Not assembled			40	Not assembled		
12	Not assembled			41	35,9	14,9	G12
13	Not assembled			42	35,35	17,9	S12
14	Not assembled			43	Not assembled		
15	Not assembled			44	26,9	15,6	N2
16	3	0	Therm21	45	26,9	13	N2
17	0	0	Therm22	46	Not assembled		
18	0	9,5	S16	47	17,8	12,3	P2
19	0	12,5	G16	48	15,2	12,3	P2
20	Not assembled						
21	Not assembled						
22	0	28,9	DC+2				
23	3	28,9	DC+2				
24	6	28,9	DC+2				
25	9	28,9	DC+2				
26	Not assembled						
27	18,9	28,9	GND2				
28	21,8	28,9	GND2				
29	31	28,9	GND2				

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



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<b>Identification</b>					
<b>ID</b>	<b>Component</b>	<b>Voltage</b>	<b>Current</b>	<b>Function</b>	<b>Comment</b>
T12	IGBT	1200 V	150 A	DC-Link Switch	
D12-a	FWD	1200 V	100 A	DC-Link Switch Prot. Diode	
D11-b	FWD	1200 V	100 A	DC-Link Diode	
T16	IGBT	1200 V	150 A	Neutral Point Switch	
D16-a	FWD	1200 V	15 A	Neutral Point Switch Prot. Diode	
D15-b	FWD	1200 V	150 A	Neutral Point Diode	
T14	MOSFET	1200 V	8 mΩ	Half-Bridge Switch	
D14	FWD	1200 V	60 A	Half-Bridge Diode	
Rt2	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.

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-PG12NAX008MR02-LCx9F18T-T1-14	06 Jan. 2017		

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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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.