



**flowPIM 1 + PFC**

**650 V / 20 A**

**Topology features**

- Integrated temperature sensor

**Component features**

- Easy paralleling
- Low collector emitter saturation voltage
- Low turn-off losses
- Positive temperature coefficient

**Housing features**

- Base isolation: Al<sub>2</sub>O<sub>3</sub>
- Convex shaped substrate for superior thermal contact
- Solder pin
- Thermo-mechanical push-and-pull force relief

**Target applications**

- Embedded Drives
- Heat Pumps
- HVAC
- Industrial Drives

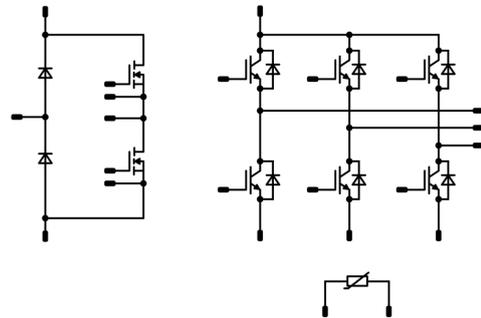
**Types**

- 10-FE07PPA020I7-LK23B23Z

**flow 1 12 mm housing**



**Schematic**





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**10-FE07PPA020I7-LK23B23Z**  
target datasheet

## Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
<b>Inverter Switch</b>				
Collector-emitter voltage	$V_{CES}$		650	V
Collector current (DC current)	$I_C$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	31	A
Repetitive peak collector current	$I_{CRM}$	$t_p$ limited by $T_{jmax}$	60	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	57	W
Gate-emitter voltage	$V_{GES}$		$\pm 20$	V
Short circuit ratings	$t_{SC}$	$V_{GE} = 15\text{ V}$ , $V_{CC} = 400\text{ V}$ $T_j = 150\text{ °C}$	3	$\mu\text{s}$
Maximum junction temperature	$T_{jmax}$		175	$^{\circ}\text{C}$

## Inverter Diode

Peak repetitive reverse voltage	$V_{RRM}$		650	V
Forward current (DC current)	$I_F$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	28	A
Repetitive peak forward current	$I_{FRM}$	$t_p$ limited by $T_{jmax}$	60	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	48	W
Maximum junction temperature	$T_{jmax}$		175	$^{\circ}\text{C}$

## PFC Switch

Drain-source voltage	$V_{DSS}$		750	V
Drain current (DC current) <sup>(2)</sup>	$I_D$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	19	A
Peak drain current	$I_{DM}$	$t_p$ limited by $T_{jmax}$	58	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	46	W
Gate-source voltage	$V_{GSS}$	static	-4 / 21	V
		dynamic	-4 / 23	V
Maximum Junction Temperature	$T_{jmax}$		175	$^{\circ}\text{C}$

<sup>(1)</sup>Calculation based on chip supplier datasheet at  $T_j=175^{\circ}\text{C}$



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**10-FE07PPA020I7-LK23B23Z**  
target datasheet

## Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
<b>Rectifier Diode</b>				
Peak repetitive reverse voltage	$V_{RRM}$		1600	V
Forward current (DC current)	$I_F$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	76	A
Surge (non-repetitive) forward current	$I_{FSM}$	Single Half Sine Wave, $t_p = 10\text{ ms}$ $T_j = 150\text{ °C}$	400	A
Surge current capability	$I^2t$		800	A <sup>2</sup> s
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	99	W
Maximum junction temperature	$T_{jmax}$		175	°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
Creepage distance			>12,7	mm
Clearance			8,17	mm
Comparative Tracking Index	CTI		≥ 600	



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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]	$T_j$ [°C]	Min	Typ	Max	

#### Inverter Switch

##### Static

Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0002	25	4,35	5	5,65	V
Collector-emitter saturation voltage	$V_{CEsat}$		15		20	25		1,35	1,65	V
Collector-emitter cut-off current	$I_{CES}$		0	650		25			20	μA
Gate-emitter leakage current	$I_{GES}$		20	0		25			100	nA
Internal gate resistance	$r_g$							None		Ω
Input capacitance	$C_{ies}$							1310		pF
Output capacitance	$C_{oes}$	$f = 1$ Mhz	0	25		25		42		pF
Reverse transfer capacitance	$C_{res}$							13		pF
Gate charge	$Q_g$	$V_{CC} = 520$ V	15		20	25		128		nC

##### Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 5,2$ W/mK (PTM)						1,66		K/W
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#### Inverter Diode

##### Static

Forward voltage	$V_F$				20	25		1,65	2	V
Reverse leakage current	$I_R$	$V_r = 650$ V				25			20	μA

##### Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 5,2$ W/mK (PTM)						1,97		K/W
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### Characteristic Values

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

#### PFC Switch

##### Static

Drain-source on-state resistance	$r_{DS(on)}$		18		12	25 150		65 111	82	mΩ
Gate-source threshold voltage	$V_{GS(th)}$				0,00615	25	2,8	3,5	4,8	V
Gate to Source Leakage Current	$I_{GSS}$		21	0		25	-100		100	nA
Zero Gate Voltage Drain Current	$I_{DSS}$		0	750		25		1	80	μA
Internal gate resistance	$r_g$							4		Ω
Gate charge	$Q_g$							48		nC
Gate to source charge	$Q_{GS}$		18	500	12	25		13		
Gate to drain charge	$Q_{GD}$							15		
Short-circuit input capacitance	$C_{iss}$							1066		pF
Short-circuit output capacitance	$C_{oss}$	$f = 1 \text{ Mhz}$	0	500	0	25		65		
Reverse transfer capacitance	$C_{rss}$							7		
Diode forward voltage	$V_{SD}$		0		12	25		3,3		V

##### Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{\text{paste}} = 5,2 \text{ W/mK}$ (PTM)						2,08		K/W
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#### Rectifier Diode

##### Static

Forward voltage	$V_F$				35	25		1	1,5	V
Reverse leakage current	$I_R$	$V_r = 1600 \text{ V}$				25 150			50 1000	μA

##### Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{\text{paste}} = 5,2 \text{ W/mK}$ (PTM)						0,96		K/W
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### Characteristic Values

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

### Thermistor

#### Static

Rated resistance	$R$				25		22		kΩ
Deviation of R100	$A_{R/R}$	$R_{100} = 1484 \Omega$			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	



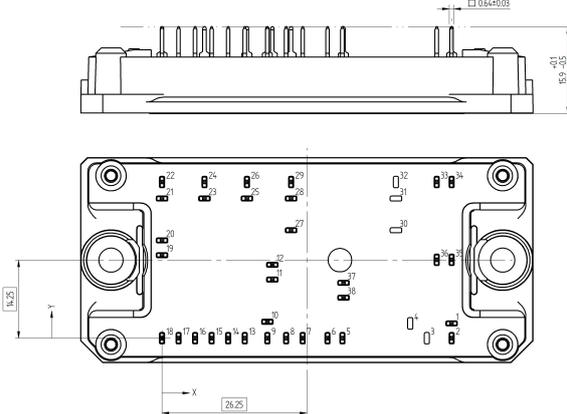
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**10-FE07PPA020I7-LK23B23Z**  
target datasheet

Ordering Code	
<b>Version</b>	<b>Ordering Code</b>
Without thermal paste	10-FE07PPA020I7-LK23B23Z
With thermal paste (5,2 W/mK, PTM6000HV)	10-FE07PPA020I7-LK23B23Z-/7/

Marking						
	<b>Text</b>	<b>Name</b> NN-NNNNNNNNNNNNNN- TTTTTVV	<b>Date code</b> WWYY	<b>UL &amp; VIN</b> UL VIN	<b>Lot</b> LLLLL	<b>Serial</b> SSSS
	<b>Datamatrix</b>	<b>Type&amp;Ver</b> TTTTTTTV	<b>Lot number</b> LLLLL	<b>Serial</b> SSSS	<b>Date code</b> WWYY	

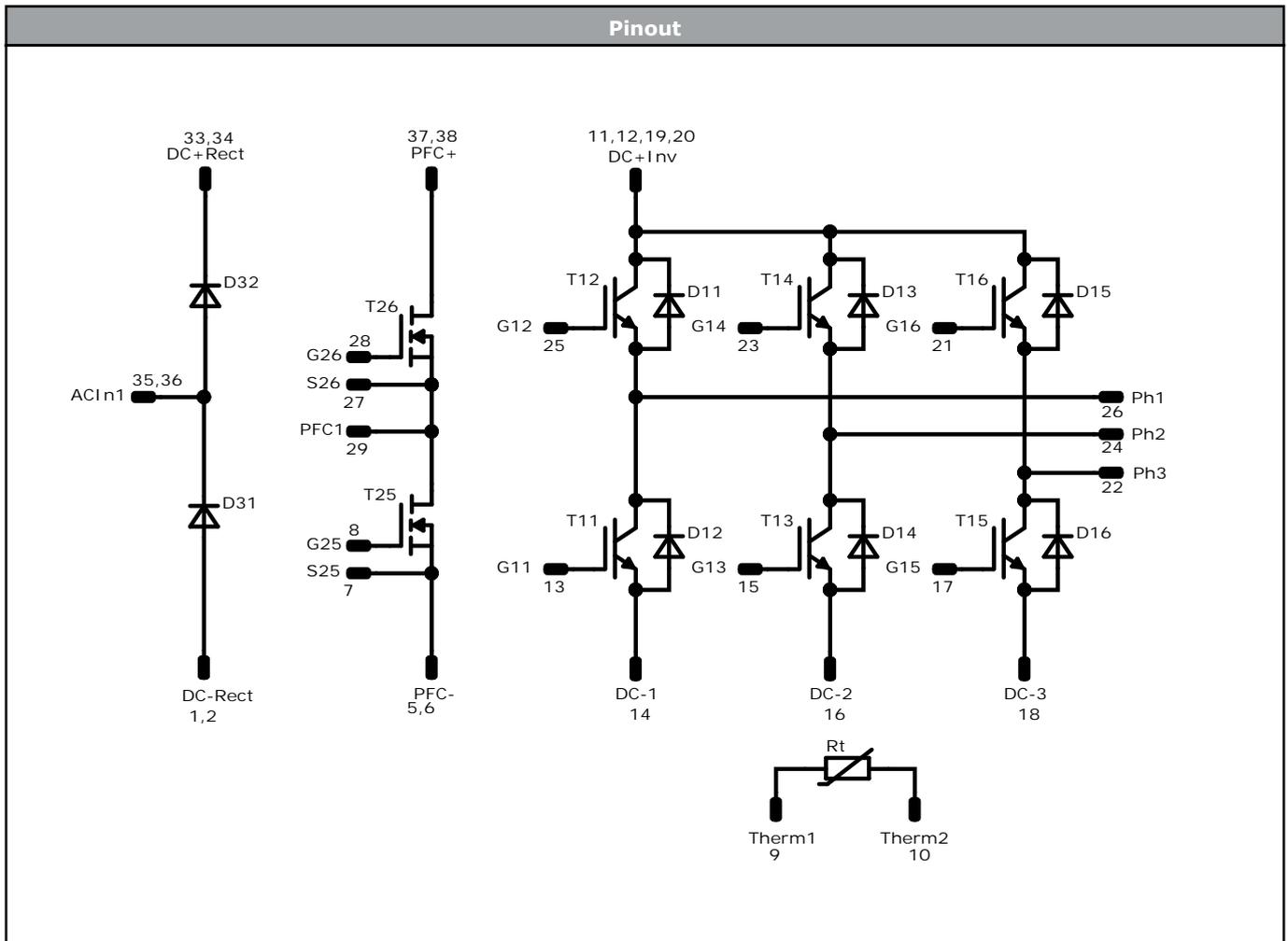
Outline			
Pin table [mm]			
Pin	X	Y	Function
1	52,5	2,7	DC-Rect
2	52,5	0	DC-Rect
3	not assembled		
4	not assembled		
5	32,7	0	PFC-
6	30	0	PFC-
7	25,5	0	S25
8	22,5	0	G25
9	19,1	0	Therm1
10	19,1	3	Therm2
11	20	10,7	DC+Inv
12	20	13,4	DC+Inv
13	15	0	G11
14	12	0	DC-1
15	9	0	G13
16	6	0	DC-2
17	3	0	G15
18	0	0	DC-3
19	0	15,15	DC+Inv
20	0	17,85	DC+Inv
21	0	25,5	G16
22	0	28,5	Ph3
23	7,7	25,5	G14
24	7,7	28,5	Ph2
25	15,4	25,5	G12
26	15,4	28,5	Ph1
27	23,4	19,7	S26
28	23,4	25,5	G26
29	23,4	28,5	PFC1
30	not assembled		
31	not assembled		
32	not assembled		
33	49,8	28,5	DC+Rect
34	52,5	28,5	DC+Rect
35	52,5	14,3	ACIn1
36	49,8	14,3	ACIn1
37	32,9	10,1	PFC+
38	32,9	7,4	PFC+



Tolerance of pinpositions: +0.4mm 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, T13, T14, T15, T16	IGBT	650 V	20 A	Inverter Switch	
D11, D12, D13, D14, D15, D16	FWD	650 V	20 A	Inverter Diode	
T25, T26	MOSFET	750 V	65 mΩ	PFC Switch	
D31, D32	Rectifier	1600 V	35 A	Rectifier Diode	
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 UL 1557 recognized under E192116 up to a junction temperature under switching condition $T_{j,op}=175^{\circ}\text{C}$ and up to 3500VAC/1min isolation voltage. For more information see vincotech.com website.



Document No.:	Date:	Modification:	Pages
10-FE07PPA020I7-LK23B23Z-T1-14	8 Mar. 2026	Initial Release	
10-FE07PPA020I7-LK23B23Z-T1-14	8 Mar. 2026	Initial Release	

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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