



Vincotech

# 10-PY166RA050RW-LR56H08Y

datasheet

flowCON 1

1600 V / 50 A

## Topology features

- Temperature sensor
- Three-phase Rectifier

## Component features

- High inrush current capability

## Housing features

- Base isolation:  $\text{Al}_2\text{O}_3$
- Convex shaped substrate for superior thermal contact
- Thermo-mechanical push-and-pull force relief
- Press-fit pin
- Reliable cold welding connection

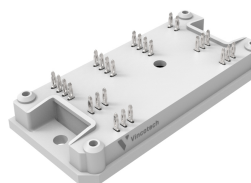
## Target applications

- Embedded Drives
- Heat Pumps
- HVAC
- Industrial Drives

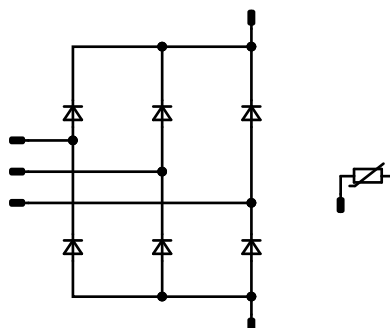
## Types

- 10-PY166RA050RW-LR56H08Y

## flow 1 12 mm housing



## Schematic





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## 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)	$I_F$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	83	A
Surge (non-repetitive) forward current	$I_{FSM}$	Single Half Sine Wave, $t_p = 10\text{ ms}$ $T_j = 150\text{ °C}$	600	A
Surge current capability	$I_{t}$		1800	A <sup>2</sup> s
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	91	W
Maximum junction temperature	$T_{jmax}$		150	°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			8,69	mm
Comparative Tracking Index	CTI		≥ 600	

\*100 % tested in production



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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	

### Rectifier Diode

#### Static

Forward voltage	$V_F$				50	25 125 150		1,06 0,984 0,964	1,5 <sup>(1)</sup>		V
Reverse leakage current	$I_R$	$V_i = 1600$ V				25 150			100 2		µA

#### Thermal

Thermal resistance junction to sink <sup>(2)</sup>	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,77			K/W
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### Thermistor

#### Static

Rated resistance	$R$					25		22			kΩ
Deviation of $R_{100}$	$\Delta_{R/R}$	$R_{100} = 1484$ Ω				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
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<sup>(1)</sup> Value at chip level

<sup>(2)</sup> Only valid with pre-applied Vincotech thermal interface material.



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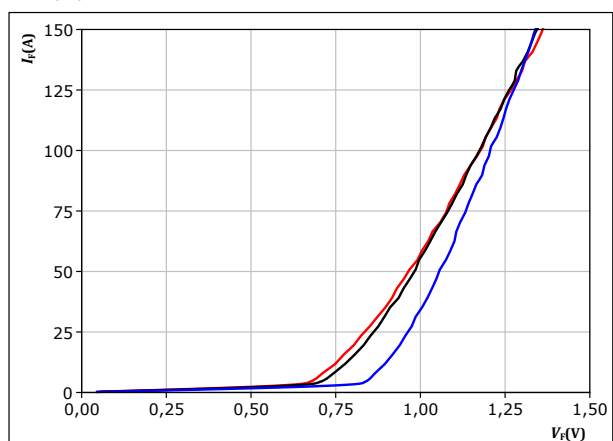
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## Rectifier Diode Characteristics

figure 1. Rectifier

Typical forward characteristics

$$I_F = f(V_F)$$



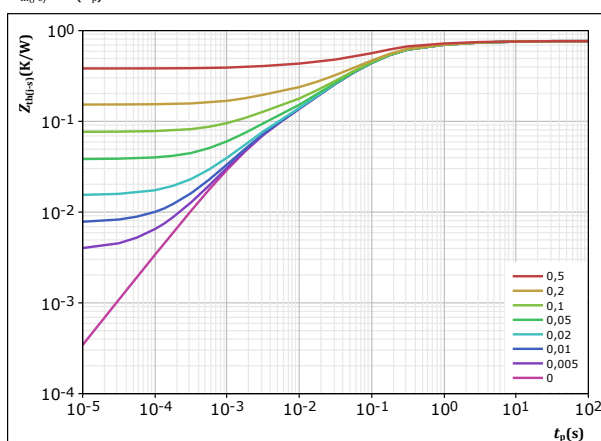
$t_p = 250 \mu s$

$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C

figure 2. Rectifier

Transient thermal impedance as a function of pulse width

$$Z_{th(j-s)} = f(t_p)$$



$D = t_p / T$   
 $R_{th(j-s)} = 0,766 \text{ K/W}$   
Rectifier thermal model values  

$R \text{ (K/W)}$	$\tau \text{ (s)}$
3,39E-02	7,71E+00
1,18E-01	8,79E-01
4,14E-01	1,24E-01
1,45E-01	2,34E-02
5,44E-02	2,21E-03



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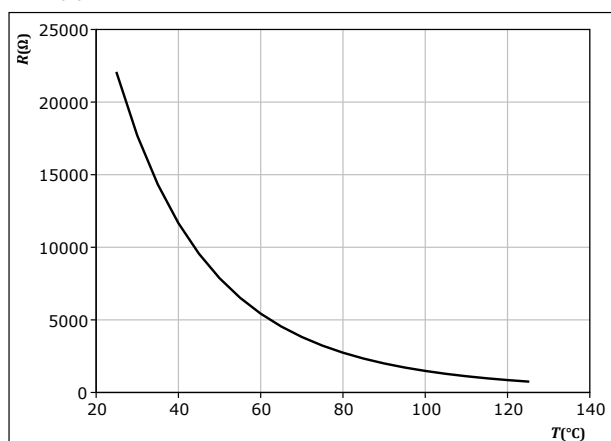
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## Thermistor Characteristics

**figure 3.** Thermistor

Typical NTC characteristic as function of temperature


$$R_T = f(T)$$





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Ordering Code	
Version	Ordering Code
Without thermal paste	10-PY166RA050RW-LR56H08Y
With thermal paste (5,2 W/mK, PTM6000HV)	10-PY166RA050RW-LR56H08Y-/7/
With thermal paste (3,4 W/mK, PSX-P7)	10-PY166RA050RW-LR56H08Y-/3/

Marking							
 <p>1000 2000 3000 4000 5000</p> <p>NN-NNNNNNNNNNNNNNNN TTTTTIVVWWYY UL VIN LLLLL SSSS</p>	Text	Name		Date code	UL & VIN	Lot	Serial
		NN-NNNNNNNNNNNNNNNN TTTTTIVV		WWYY	UL VIN	LLLLL	SSSS
	Datamatrix	Type&Ver	Lot number	Serial	Date code		
	TTTTTIVV	LLLLL	SSSS	WWYY			

### Outline

center of press-fit pin head  
pin head type "Y", PCB plated through-hole Ø1.65 mm  $\pm 0.09$  /  $\pm 0.06$   
for further PCB design rules refer to the latest handling instruction

1.6 ± 0.1  
Ø0.8 ± 0.06

26.1  
16.1

Pin	X	Y	Function
1	52,2	0	DC-Rect
2	49,5	0	DC-Rect
3	46,8	0	DC-Rect
4	5,4	0	DC-Rect
5	2,7	0	DC-Rect
6	0	0	DC-Rect
7	52,2	10,9	DC+Rect
8	49,5	10,9	DC+Rect
9	46,8	10,9	DC+Rect
10	5,4	10,9	DC+Rect
11	2,7	10,9	DC+Rect
12	0	10,9	DC+Rect
13	52,2	25	Therm1
14	52,2	28,2	Therm2
15	34	20,1	ACIn3
16	34	22,8	ACIn3
17	34	25,5	ACIn3
18	34	28,2	ACIn3
19	17	20,1	ACIn2
20	17	22,8	ACIn2
21	17	25,5	ACIn2
22	17	28,2	ACIn2
23	0	20,1	ACIn1
24	0	22,8	ACIn1
25	0	25,5	ACIn1
26	0	28,2	ACIn1

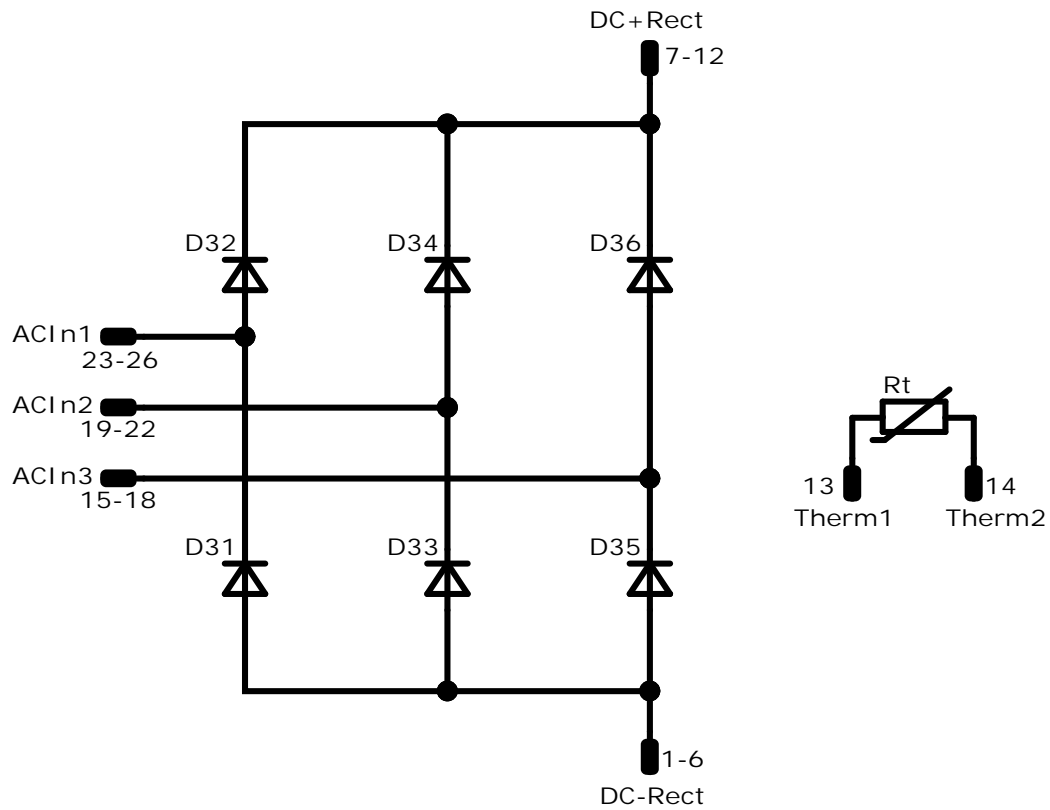
Tolerance of prepositions  $\pm 0.5$ mm at the end of pins  
Dimension of coordinate axis is only offset without tolerance



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Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
D31, D32, D33, D34, D35, D36	Rectifier	1600 V	50 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 certified according to UL 1557 standard, UL file number E192116. For more information see vincotech.com website.



Document No.:	Date:	Modification:	Pages
10-PY166RA050RW-LR56H08Y-D1-14	8 Aug. 2022		

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