



flowCON 0

1600 V / 34 A

Topology features

- Three-phase Half Controlled Converter

Component features

- High inrush current capability

Housing features

- Base isolation: Al₂O₃
- Clip-in, reliable mechanical connection, qualified for wave soldering
- Convex shaped substrate for superior thermal contact
- Thermo-mechanical push-and-pull force relief
- Solder pin

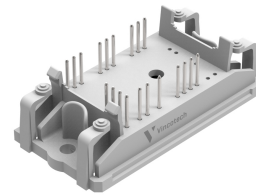
Target applications

- Industrial Drives
- Embedded Drives
- UPS

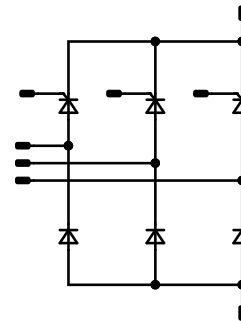
Types

- V23990-P649-H10-PM

flow 0 17 mm housing



Schematic



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

Parameter	Symbol	Conditions	Value	Unit
Rectifier Thyristor				
Repetitive peak reverse voltage	V_{RRM}		1600	V
Maximum RMS on-state current	I_{TRMSM}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	45	A
Surge on-state current	I_{TSM}	Single Half Sine Wave, $t_p = 10\text{ ms}$ $T_j = 130\text{ °C}$	280	A
I2t value	I^2t	Single Half Sine Wave, $t_p = 10\text{ ms}$ $T_j = 130\text{ °C}$	390	A ² s
Mean total power loss	$P_{tot(AV)}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	53	W
Maximum Junction Temperature	T_{jmax}		130	°C

Rectifier Diode

Peak repetitive reverse voltage	V_{RRM}		1600	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	63	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, $t_p = 10\text{ ms}$ $T_j = 150\text{ °C}$	520	A
Surge current capability	I^2t		1350	A ² s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	73	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
Isolation voltage	V_{isol}	AC Voltage $t_p = 1\text{ min}$	2500	V
Creepage distance			>12,7	mm
Clearance			>12,7	mm
Comparative Tracking Index	CTI		≥ 200	

*100 % tested in production



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 Thyristor

Static

Direct reverse current	I_{RD}	$V_T = 1600$ V				25			200	μ A
Holding current	I_H	$I_T = A$				25			165	mA
Latching current	I_L	$t_p = \mu$ s $I_G = A$ $di_G/dt = A/\mu$ s				25			330	mA
Gate trigger voltage	V_{GT}					25			1,98	V
Gate trigger current	I_{GT}					25			100	mA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)							0,94	K/W
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Rectifier Diode

Static

Forward voltage	V_F				80	25 125 150		1,27 1,27	1,33 ⁽¹⁾ 1,31 ⁽¹⁾	V
Reverse leakage current	I_R	$V_T = 1600$ V				25 150			20 1500	μ A

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)							0,96	K/W
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⁽¹⁾ Value at chip level

⁽²⁾ Only valid with pre-applied Vincotech thermal interface material.



Rectifier Thyristor Characteristics

figure 1. Thyristor

Typical forward characteristics

$$I_F = f(V_F)$$

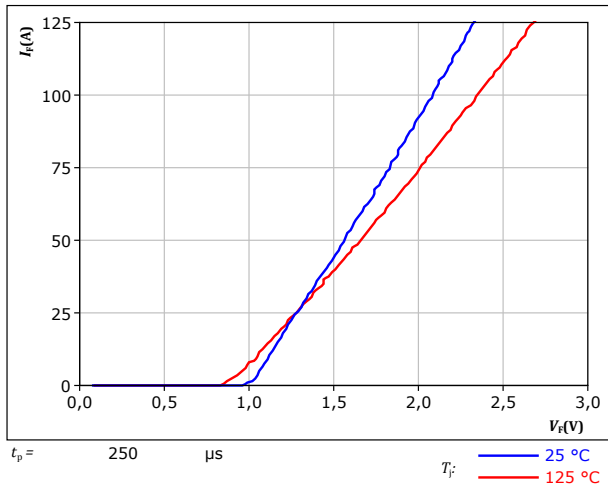
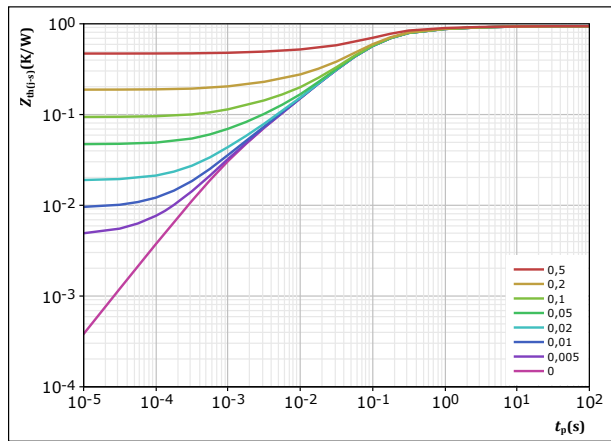


figure 2. Thyristor

Transient thermal impedance as a function of pulse width

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



$$D = \frac{t_p}{T}$$

$$R_{th(j-s)} = 0,94 \text{ K/W}$$

Thyristor thermal model values

R (K/W)	τ (s)
4,51E-02	5,18E+00
1,19E-01	6,51E-01
5,11E-01	1,13E-01
1,92E-01	3,82E-02
4,55E-02	7,12E-03
2,73E-02	1,23E-03



Rectifier Diode Characteristics

figure 3. Rectifier

Typical forward characteristics

$$I_F = f(V_F)$$

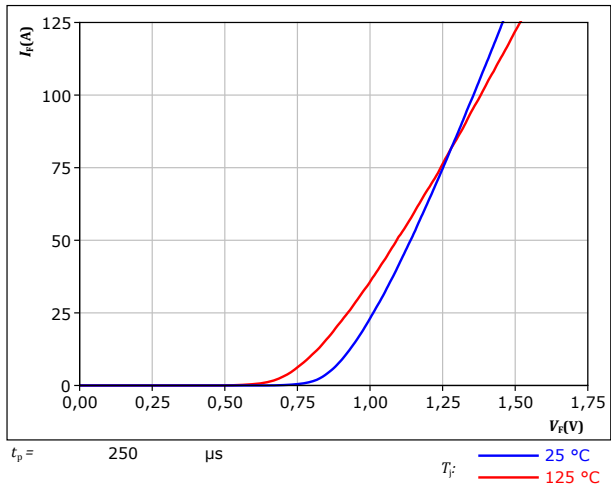
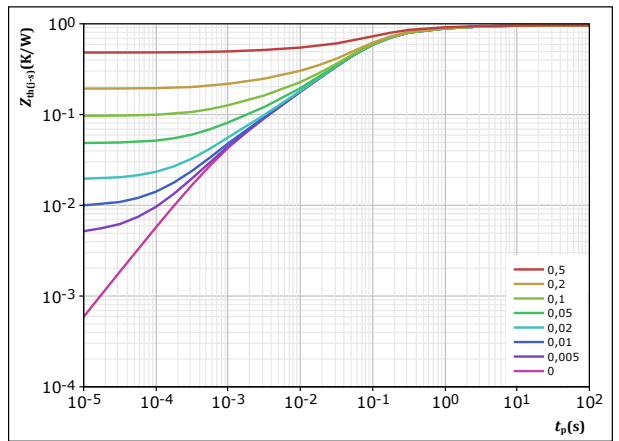


figure 4. Rectifier

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 0,965 \text{ K/W}$

Rectifier thermal model values

R (K/W)	τ (s)
3,98E-02	7,88E+00
1,29E-01	8,64E-01
4,20E-01	1,32E-01
2,76E-01	4,24E-02
6,63E-02	5,80E-03
3,37E-02	8,90E-04

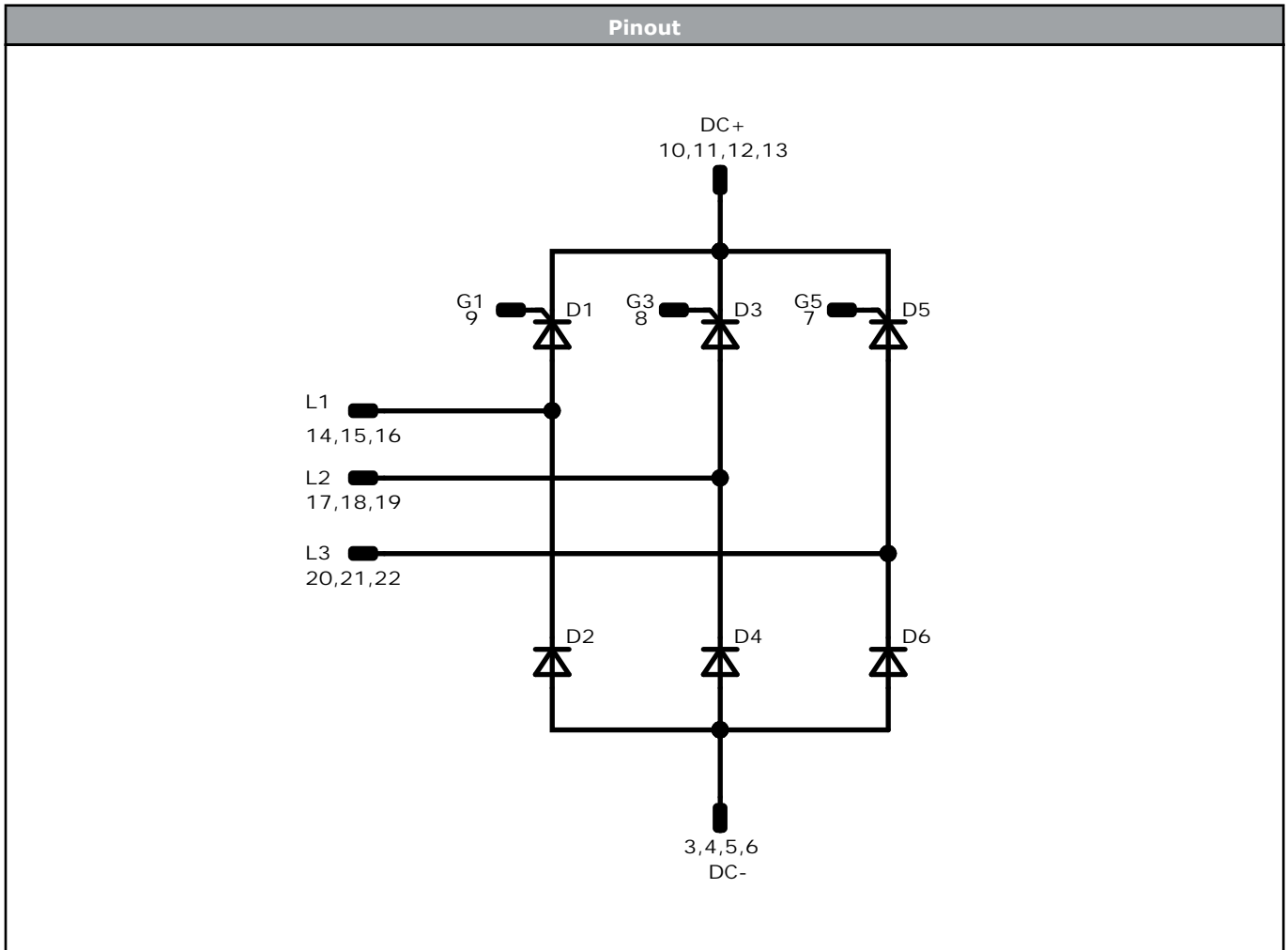


Ordering Code	
Version	Ordering Code
Without thermal paste	V23990-P649-H10-PM
With thermal paste (5,2 W/mK, PTM6000HV)	V23990-P649-H10-/7/-PM
With thermal paste (3,4 W/mK, PSX-P7)	V23990-P649-H10-/3/-PM

Marking							
	Text	VIN	Date code	Type&Ver	UL	Lot	Serial
		VIN	WWYY	TTTTITVV	UL	LLLLL	SSSS
	Datamatrix	Type&Ver	Lot number	Serial	Date code		
		TTTTITVV	LLLLL	SSSS	WWYY		

Outline				
Pin table [mm]				
Pin	X	Y	Function	
1			not assembled	
2			not assembled	
3	26,4	0	DC-	
4	23,9	0	DC-	
5	21,4	0	DC-	
6	18,9	0	DC-	
7	11,9	0	G5	
8	7,5	0	G3	
9	4,7	0	G1	
10	0	0	DC+	
11	0	2,5	DC+	
12	0	5	DC+	
13	0	7,5	DC+	
14	0	22,5	L1	
15	2,5	22,5	L1	
16	5	22,5	L1	
17	12	22,5	L2	
18	14,5	22,5	L2	
19	17	22,5	L2	
20	24	22,5	L3	
21	26,5	22,5	L3	
22	29	22,5	L3	
23			not assembled	
24			not assembled	
25			not assembled	

Tolerance of pinpositions: ±0.5mm at the end of pins
Dimension of coordinate axis is only offset without tolerance



Identification					
ID	Component	Voltage	Current	Function	Comment
D1, D3, D5	Thyristor	1600 V	45 A	Rectifier Thyristor	
D2, D4, D6	Rectifier	1600 V	42 A	Rectifier Diode	




Packaging instruction				
Standard packaging quantity (SPQ) 135	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for <i>flow 0</i> packages see vincotech.com website.

Package data
Package data for <i>flow 0</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
V23990-P649-H10-PM-D2-14	7 May. 2023	New Datasheet format, module is unchanged Updated Rectifier Thyristor characteristic	

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