



Vincotech

10-EZ166BA050MS03-PS10G28T

datasheet

flowCON E1

1600 V / 50 A

Topology features

- Temperature sensor
- Brake Chopper
- Three-phase Rectifier
- SiC

Component features

- High inrush current capability

Housing features

- Base isolation: Al_2O_3
- Convex shaped substrate for superior thermal contact
- Compact housing
- CTI600 housing material
- Thermo-mechanical push-and-pull force relief
- Press-fit pin
- Reliable cold welding connection

Target applications

- Embedded Drives
- HVAC
- Industrial Drives

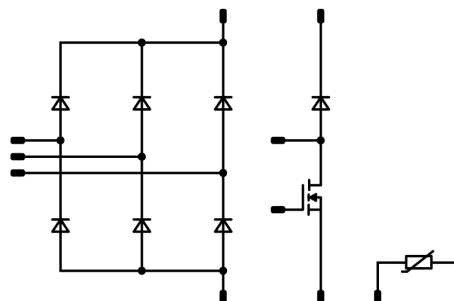
Types

- 10-EZ166BA050MS03-PS10G28T

flow E1 12 mm housing



Schematic





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Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
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Brake Switch

Drain-source voltage	V_{DS}		1200	V
Drain current (DC current)	I_D	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	42	A
Peak drain current	I_{DM}	t_p limited by T_{jmax}	160	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	85	W
Gate-source voltage	V_{GS}	static	-5 / 18	V
		dynamic	-10 / 22	V
Maximum Junction Temperature	T_{jmax}		175	°C

Brake Diode

Peak repetitive reverse voltage	V_{RRM}		1700	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	29	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, $t_p = 8,3\text{ ms}$ $T_j = 25\text{ °C}$	95	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	88	W
Maximum junction temperature	T_{jmax}		175	°C

Rectifier Diode

Peak repetitive reverse voltage	V_{RRM}		1600	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	106	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^2t		1800	A²s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	129	W
Maximum junction temperature	T_{jmax}		175	°C



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Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
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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			9,21	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	

Brake Switch

Static

Drain-source on-state resistance	$r_{DS(on)}$		18		40	25 125 150		33,2 41,4 45,7	45 ⁽¹⁾	mΩ
Gate-source threshold voltage	$V_{GS(th)}$				0,004	25	1,7	2,25	2,75	V
Gate to Source Leakage Current	I_{GSS}		22	0		25			100	nA
Zero Gate Voltage Drain Current	I_{DSS}		0	1200		25			10	μA
Internal gate resistance	r_g							2		Ω
Gate charge	Q_g		-5/18	800	40	25		108		nC
Short-circuit input capacitance	C_{iss}	$f = 500$ kHz	0	800	0	25		2600		pF
Short-circuit output capacitance	C_{oss}							135		
Reverse transfer capacitance	C_{rss}							6		
Diode forward voltage	V_{SD}		0		40	25		4,1		V

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 5,2$ W/mK (PTM)						1,12		K/W
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Brake Diode

Static

Forward voltage	V_F				25	25 125 150		1,59 2,27 2,53	1,95 ⁽¹⁾	V
Reverse leakage current	I_R	$V_i = 1700$ V				25		2,5	150	μA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 5,2$ W/mK (PTM)						1,08		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	

Rectifier Diode

Static

Forward voltage	V_F			50	25 125 150			1,06 0,991 0,977	1,5 ⁽¹⁾	V
Reverse leakage current	I_R	$V_r = 1600$ V			25 150				50 1500	µA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 5,2$ W/mK (PTM)						0,74		K/W
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Thermistor

Static

Rated resistance	R				25			22		kΩ
Deviation of R100	$\Delta_{R/R}$	$R_{100} = 1484$ 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. ± 1 %						3962		K
B-value	$B_{(25/100)}$	Tol. ± 1 %						4000		K
Vincotech Thermistor Reference									I	

⁽¹⁾ Value at chip level

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



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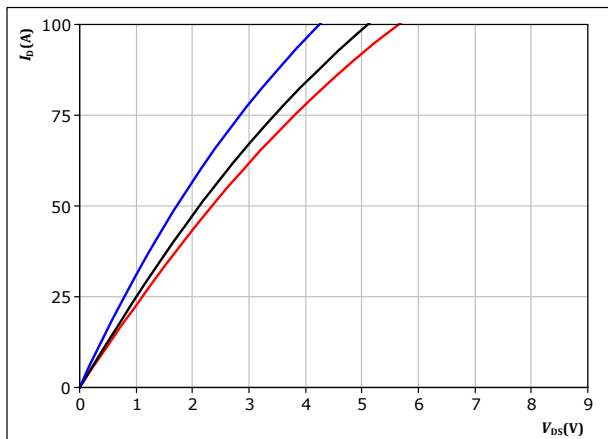
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Brake Switch Characteristics

figure 1. MOSFET

Typical output characteristics

$$I_D = f(V_{DS})$$



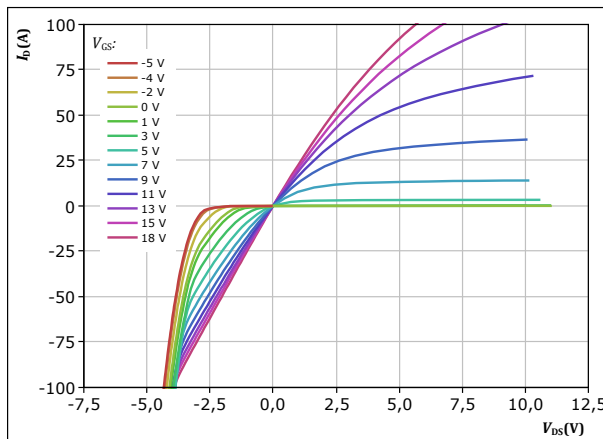
$t_p = 250 \mu s$
 $V_{GS} = 18 V$

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 2. MOSFET

Typical output characteristics

$$I_D = f(V_{DS})$$

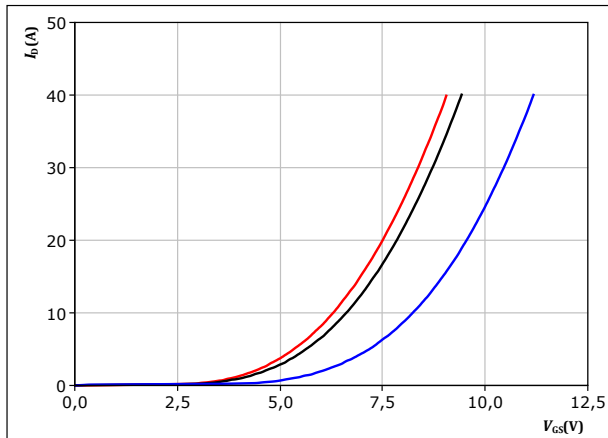


$t_p = 250 \mu s$
 $T_j = 150 ^\circ C$
 V_{GS} from -5 V to 18 V in steps of 1 V

figure 3. MOSFET

Typical transfer characteristics

$$I_D = f(V_{GS})$$



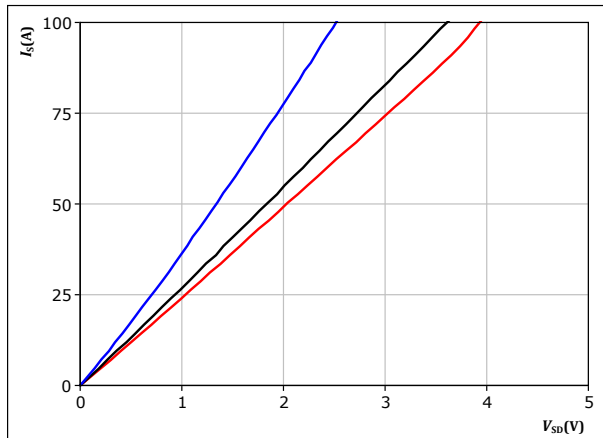
$t_p = 250 \mu s$
 $V_{DS} = 10 V$

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 4. MOSFET

Typical reverse drain current characteristics

$$I_{SD} = f(V_{SD})$$



$t_p = 250 \mu s$
 $V_{GS} = 18 V$

T_j :
— 25 °C
— 125 °C
— 150 °C

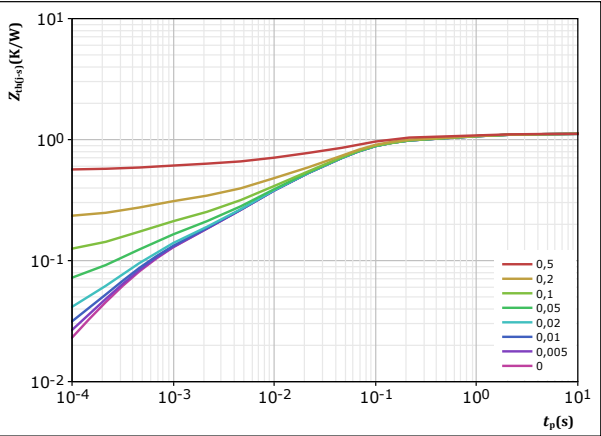


Brake Switch Characteristics

figure 5. MOSFET

Transient thermal impedance as a function of pulse width

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

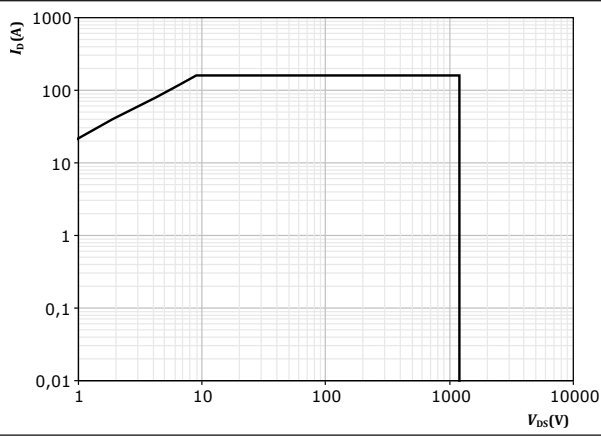


$D =$	t_p / T
$R_{th(j-a)} =$	1,117 K/W
MOSFET thermal model values	
R (K/W)	τ (s)
2,40E-02	6,63E+00
1,44E-01	6,82E-01
6,46E-01	5,06E-02
2,09E-01	6,56E-03
9,87E-02	4,77E-04

figure 6. MOSFET

Safe operating area

$I_D = f(V_{DS})$



$D =$	single pulse
$T_s =$	80 °C
$V_{GS} =$	18 V
$T_j =$	T_{jmax}



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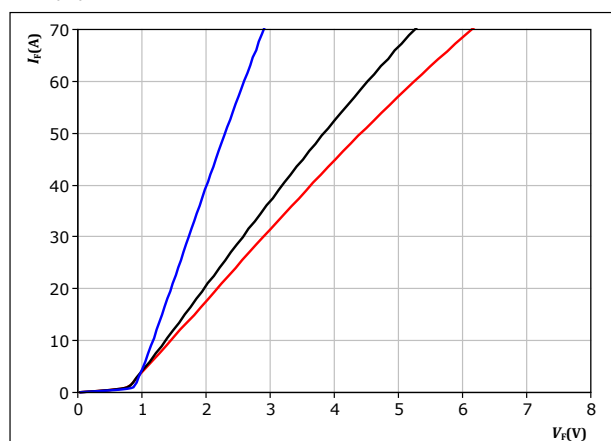
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Brake Diode Characteristics

figure 7. FWD

Typical forward characteristics

$$I_F = f(V_F)$$



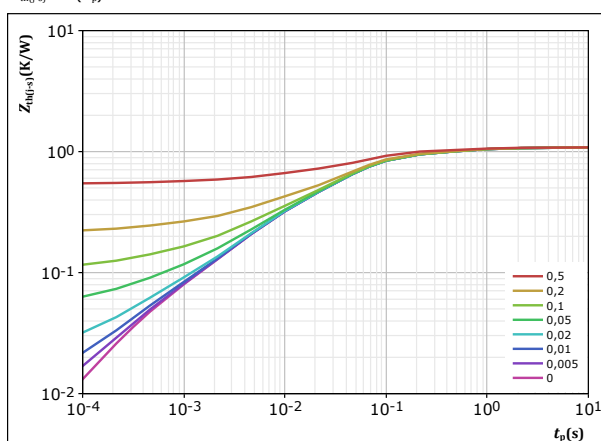
$t_p = 250 \mu s$

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 8. FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 1,083 \text{ K/W}$
FWD thermal model values

R (K/W)	τ (s)
2,41E-02	5,70E+00
1,75E-01	4,44E-01
6,75E-01	4,76E-02
1,76E-01	4,96E-03
3,61E-02	3,90E-04



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Rectifier Diode Characteristics

figure 9. Rectifier

Typical forward characteristics

$$I_F = f(V_F)$$

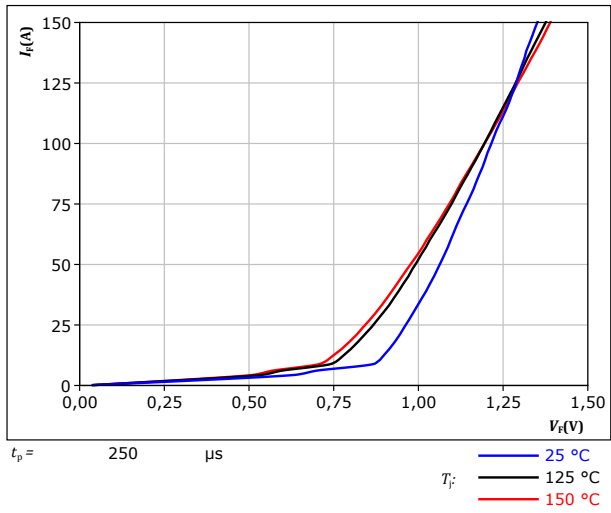
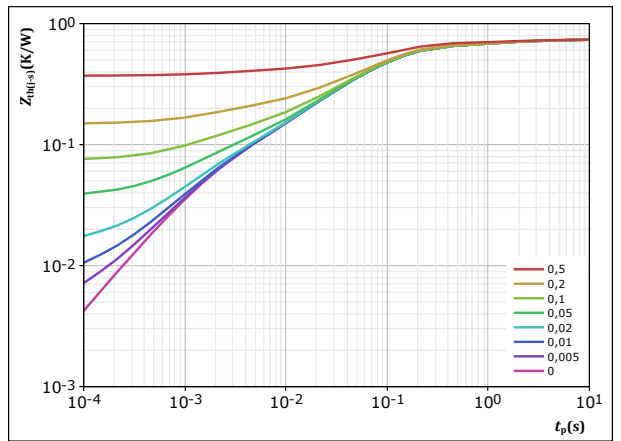


figure 10. Rectifier

Transient thermal impedance as a function of pulse width

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



$D =$	t_p / T
$R_{th(j-s)} =$	0,736 K/W
Rectifier thermal model values	
R (K/W)	τ (s)
2,25E-02	6,62E+00
9,23E-02	1,12E+00
4,58E-01	9,31E-02
1,13E-01	1,76E-02
5,39E-02	1,70E-03



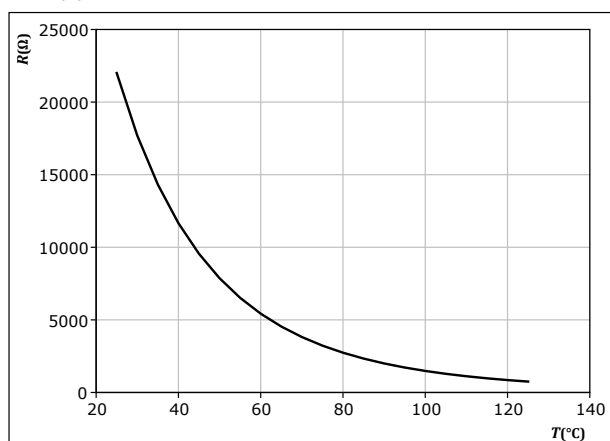
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Thermistor Characteristics

figure 11. 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-EZ166BA050MS03-PS10G28T
With thermal paste (5.2 W/mK. PTM6000HV)	10-EZ166BA050MS03-PS10G28T-/7/

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

Pin table [mm]

Pin	X	Y	Function
1	32	0	G27
2	28,8	0	DC-Br
3	25,6	0	DC-Br
4	19,2	0	DC-Rect
5	16	0	DC-Rect
6	9,6	0	Therm1
7	6,4	0	Therm2
8	0	3,2	DC+Rect
9	0	6,4	DC+Rect
10	0	9,6	DC+Rect
11	0	25,6	ACIn1
12	3,2	25,6	ACIn1
13	6,4	25,6	ACIn1
14	12,8	25,6	ACIn2
15	16	25,6	ACIn2
16	19,2	25,6	ACIn2
17	25,6	25,6	ACIn3
18	28,8	25,6	ACIn3
19	32	25,6	ACIn3
20	28,8	19,2	DC+Br
21	32	19,2	DC+Br
22	32	12,8	Br
23	32	9,6	Br

Technical drawing of the PCB showing top and bottom views with dimensions and pin locations.

Top view dimensions: 108 ±1.1, 84 ±0.5.

Bottom view dimensions: 108, 84.

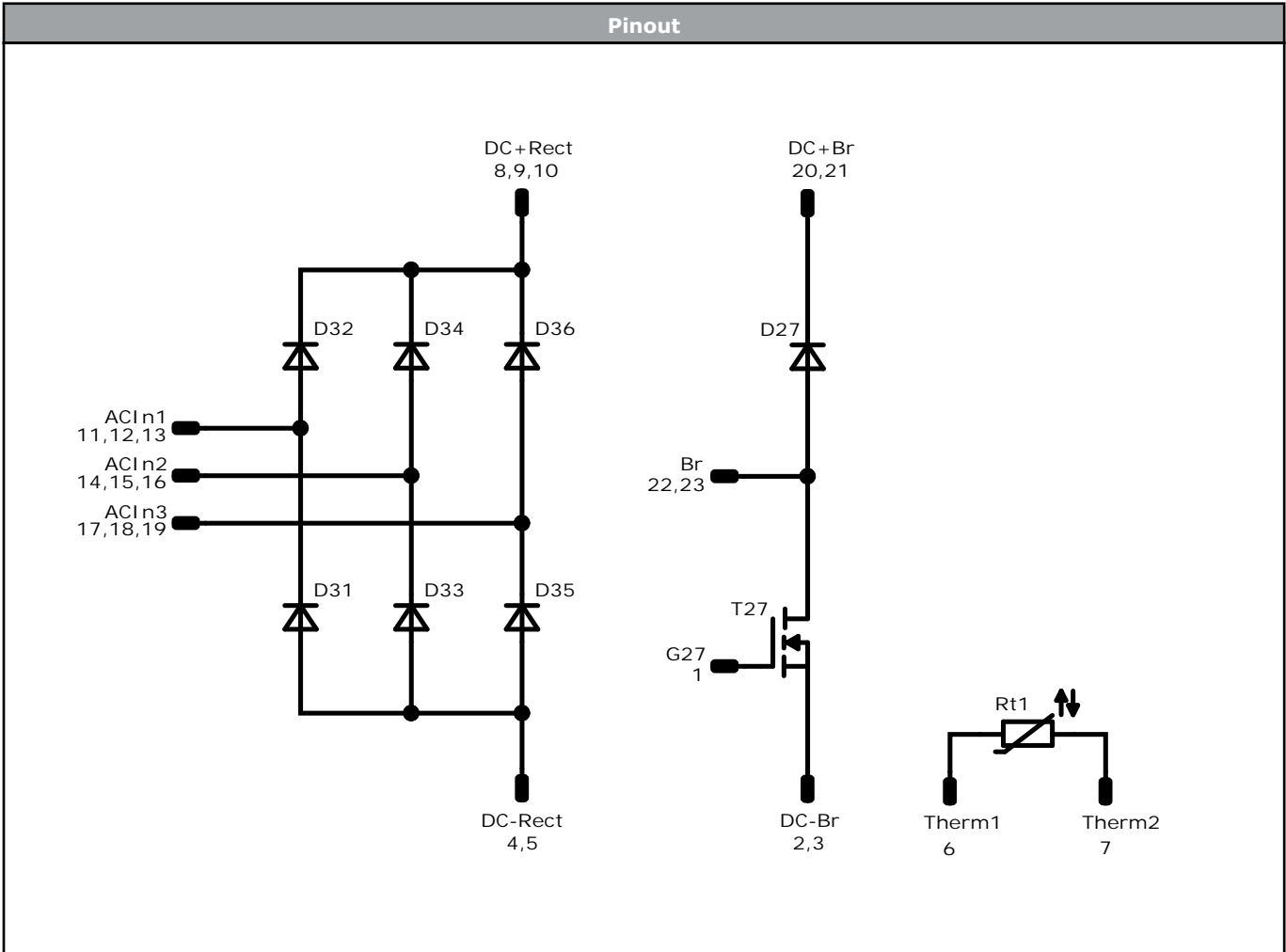
Pin locations are marked with numbers 1 through 23.

Notes: center of press-fit pin head, pin head type T, PCB plated through-hole $\Phi 1\text{ mm } +0.09 / -0.06$, for further PCB design rules refer to the latest loading instruction.



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Identification					
ID	Component	Voltage	Current	Function	Comment
T27	MOSFET	1200 V	30 mΩ	Brake Switch	
D27	FWD	1700 V	25 A	Brake Diode	
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</i> E1 packages see vincotech.com website.				
Package data				
Package data for <i>flow</i> E1 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 $T_{j,sp}=175^{\circ}\text{C}$ and up to 3500VAC/1min isolation voltage. For more information see vincotech.com website.				

Document No.:	Date:	Modification:	Pages
10-EZ166BA050MS03-PS10G28T-D1-14	7 Nov. 2025	Initial Release	

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