



Vincotech

B0-SP12ORA080RO-LM90J48T

datasheet

fastPACK S3 SiC

1200 V / 80 A

Topology features

- Temperature sensor
- Ultrafast output rectifier

Component features

- No diode recovery losses
- Very fast switching

Housing features

- Base isolation: Al_2O_3
- CTI600 housing material
- Compact, baseplate-less housing
- VINcoPress Technology
- Thermo-mechanical push-and-pull force relief
- Press-fit pin
- Reliable cold welding connection

Target applications

- Charging Stations

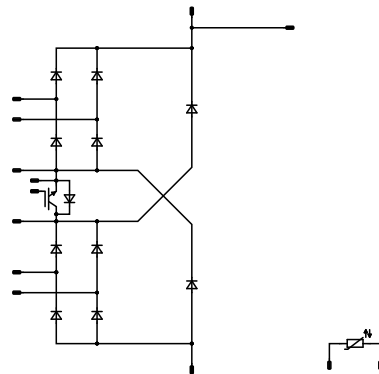
Types

- B0-SP12ORA080RO-LM90J48T

flow S3 12 mm housing



Schematic





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Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
Rectifier Switch				
Collector-emitter voltage	V_{CES}		1200	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	263	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	600	A
Turn off safe operating area		$T_j = 150\text{ °C}$, $V_{CE} = 1200\text{ V}$	600	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	467	W
Gate-emitter voltage	V_{GES}		± 20	V
Short circuit ratings	t_{SC}	$V_{GE} = 15\text{ V}$, $V_{CC} = 800\text{ V}$ $T_j = 175\text{ °C}$	7	μs
Maximum junction temperature	T_{jmax}		175	$^{\circ}\text{C}$

Rectifier Sw. Protection Diode

Peak repetitive reverse voltage	V_{RRM}		1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	77	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	150	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	134	W
Maximum junction temperature	T_{jmax}		175	$^{\circ}\text{C}$

Rectifier Diode

Peak repetitive reverse voltage	V_{RRM}		1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	91	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, $t_p = 10\text{ ms}$ $T_j = 150\text{ °C}$	572	A
Surge current capability	I^2t		1632	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	185	W
Maximum junction temperature	T_{jmax}		175	$^{\circ}\text{C}$



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Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
ByPass Diode				
Peak repetitive reverse voltage	V_{RRM}		1600	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_a = 80\text{ °C}$	110	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, $t_p = 10\text{ ms}$ $T_j = 150\text{ °C}$	890	A
Surge current capability	I^2t		3960	A ² s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_a = 80\text{ °C}$	125	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			>12,7	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 Switch

Static

Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,007	25	5,15	5,8	6,45	V
Collector-emitter saturation voltage	V_{CEsat}		15		300	25 125 150		1,62 1,8 1,86	1,7 ⁽¹⁾	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			22	µA
Gate-emitter leakage current	I_{GES}		20	0		25			200	nA
Internal gate resistance	r_g							0,5		Ω
Input capacitance	C_{ies}	$f = 100 \text{ kHz}$	0	25		25		60000		pF
Reverse transfer capacitance	C_{res}							210		pF
Gate charge	Q_g	$V_{CC} = 600 \text{ V}$	±15		300	25		5000		nC

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 5,2 \text{ W/mK}$ (PTM)						0,2		K/W
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Rectifier Sw. Protection Diode

Static

Forward voltage	V_F				75	25 150	1,35	1,75 1,72	2,05 ⁽¹⁾	V
Reverse leakage current	I_R	$V_r = 1200 \text{ V}$				25			14	µA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 5,2 \text{ W/mK}$ (PTM)						0,71		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				80	25 125 150		1,44 1,71 1,81	1,6 ⁽¹⁾	V
Reverse leakage current	I_R	$V_r = 1200$ V				25 150		0,8 56	320	μA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 5,2$ W/mK (PTM)						0,51		K/W
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ByPass Diode

Static

Forward voltage	V_F				60	25 125 150		1,04 0,973 0,956	1,5 ⁽¹⁾	V
Reverse leakage current	I_R	$V_r = 1600$ V				25 150			100 2000	μA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 5,2$ W/mK (PTM)						0,56		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	$\Delta_{R/R}$	$R_{100} = 1484 \Omega$				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	

⁽¹⁾ Value at chip level

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



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Rectifier Switch Characteristics

figure 1. IGBT

Typical output characteristics

$$I_C = f(V_{CE})$$

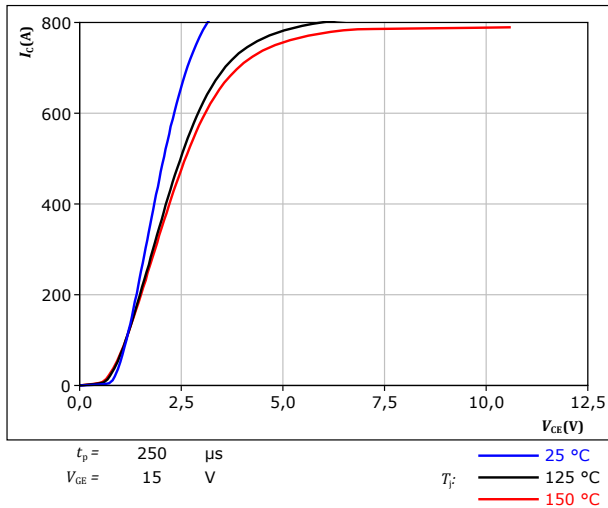


figure 2. IGBT

Typical output characteristics

$$I_C = f(V_{CE})$$

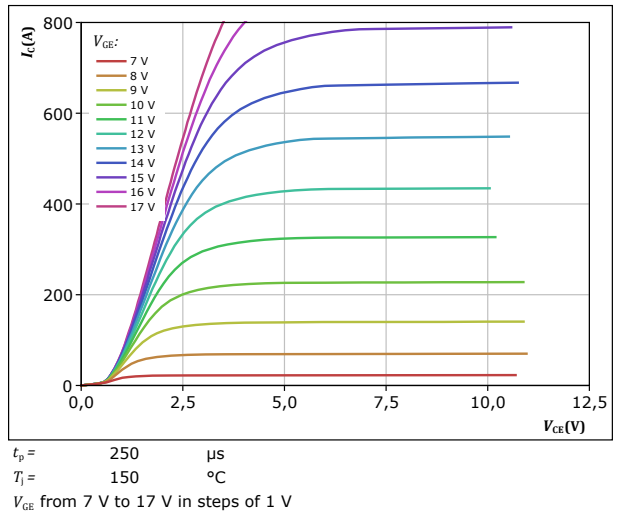


figure 3. IGBT

Typical transfer characteristics

$$I_C = f(V_{GE})$$

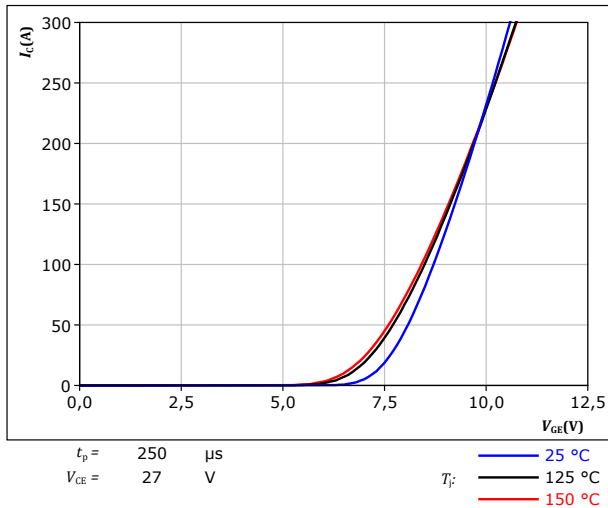
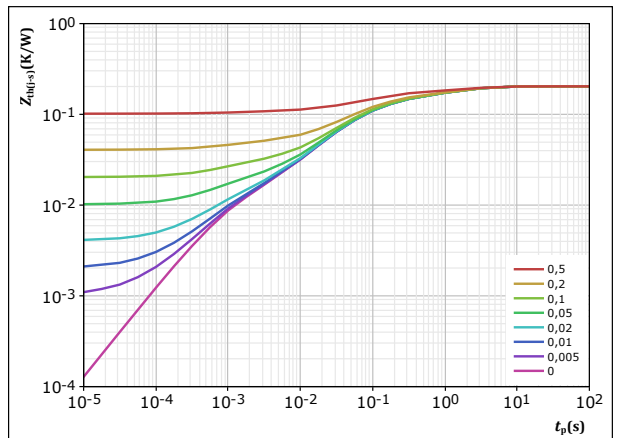


figure 4. IGBT

Transient thermal impedance as a function of pulse width

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



IGBT thermal model values	
R (K/W)	τ (s)
3,41E-02	2,44E+00
3,99E-02	6,07E-01
8,87E-02	8,34E-02
3,17E-02	2,13E-02
9,14E-03	8,98E-04



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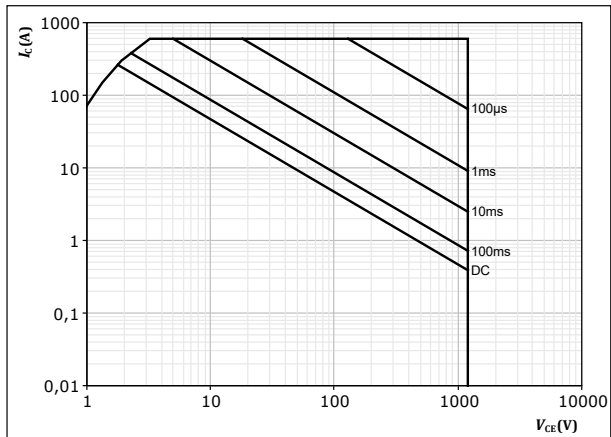
Rectifier Switch Characteristics

figure 5.

IGBT

Safe operating area

$$I_C = f(V_{CE})$$



$D = \text{single pulse}$

$T_s = 80 \text{ } ^\circ\text{C}$

$V_{GE} = 15 \text{ V}$

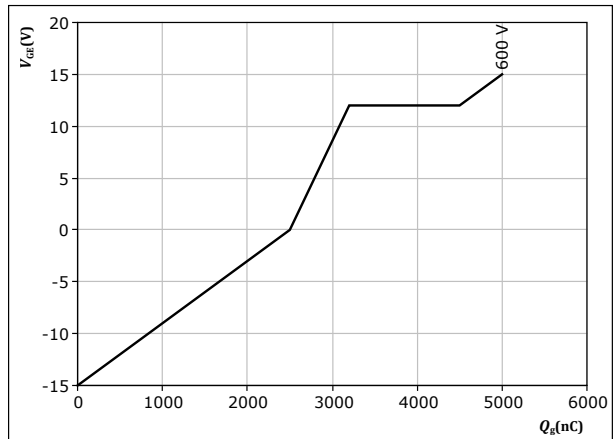
$T_j = T_{jmax}$

figure 6.

IGBT

Gate voltage vs gate charge

$$V_{GE} = f(Q_g)$$



$I_C = 150 \text{ A}$

$T_j = 25 \text{ } ^\circ\text{C}$



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Rectifier Sw. Protection Diode Characteristics

figure 7. FWD

Typical forward characteristics
 $I_F = f(V_F)$

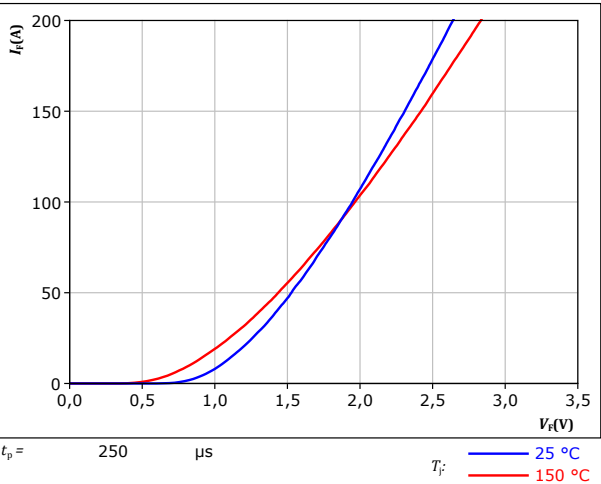
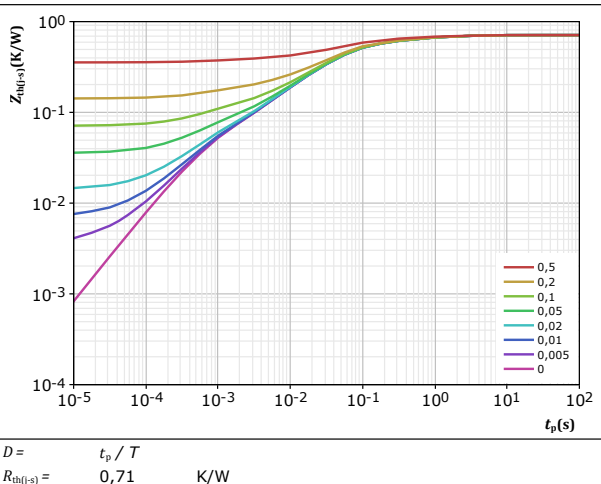


figure 8. FWD

Transient thermal impedance as a function of pulse width
 $Z_{th(j-s)} = f(t_p)$



$D =$	t_p / T	
$R_{th(j-s)} =$	0,71	K/W
FWD thermal model values		
R (K/W)	τ (s)	
5,40E-02	2,21E+00	
1,22E-01	3,44E-01	
3,81E-01	4,97E-02	
1,09E-01	9,39E-03	
4,37E-02	6,89E-04	



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Rectifier Diode Characteristics

figure 9.

FWD

Typical forward characteristics

$$I_F = f(V_F)$$

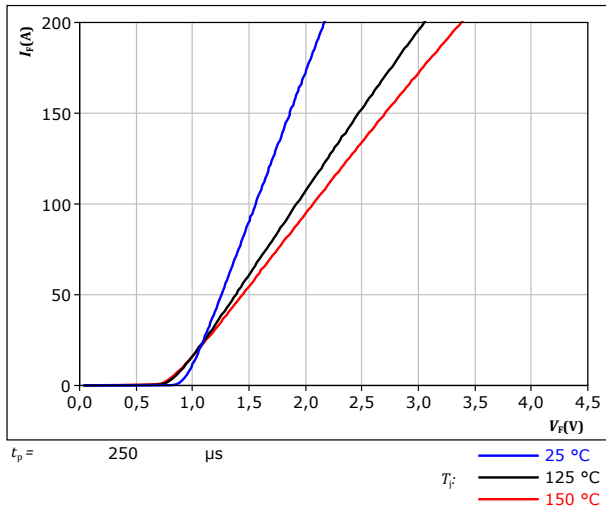
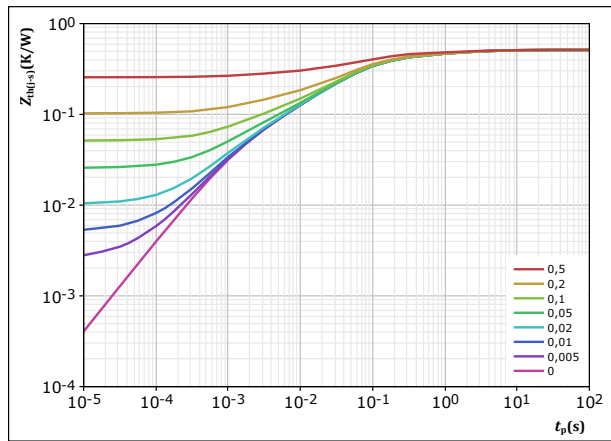


figure 10.

FWD

Transient thermal impedance as a function of pulse width

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





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ByPass Diode Characteristics

figure 11.

Rectifier

Typical forward characteristics

$$I_F = f(V_F)$$

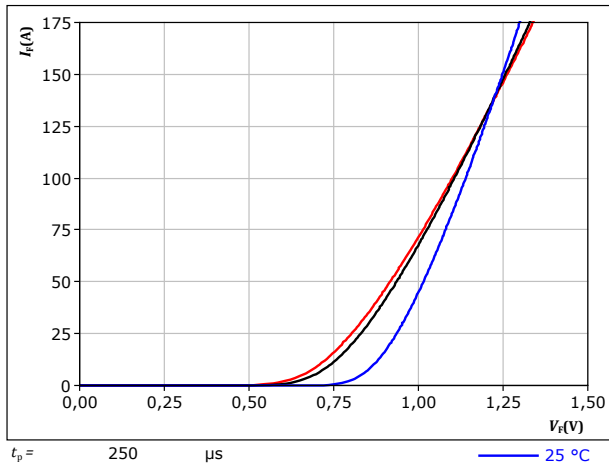
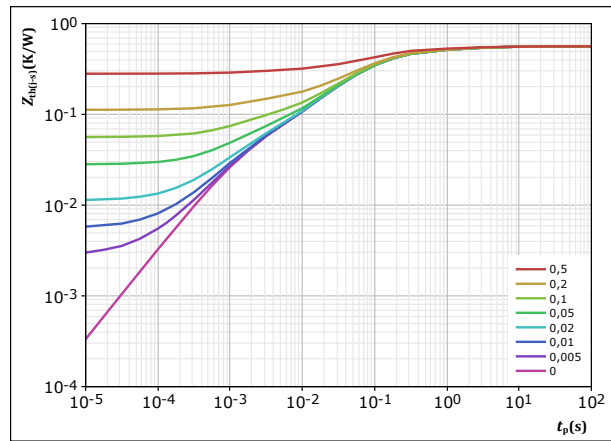


figure 12.

Rectifier

Transient thermal impedance as a function of pulse width

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





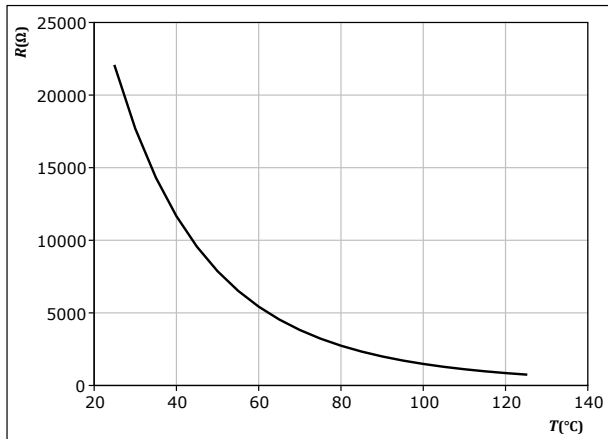
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Thermistor Characteristics

figure 13. Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$






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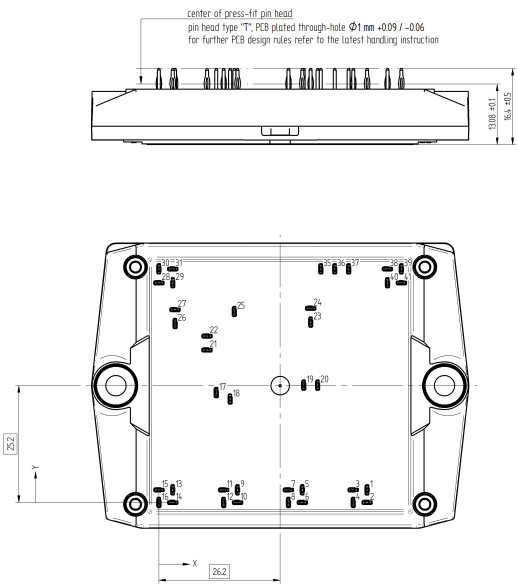
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Ordering Code	
Version	Ordering Code
Without thermal paste	B0-SP12ORA080RO-LM90J48T
With thermal paste (5,2 W/mK, PTM6000HV)	B0-SP12ORA080RO-LM90J48T-/7/
With thermal paste (5,2 W/mK, PTM6000HV) and Protection Foil	B0-SP12ORA080RO-LM90J48T-/7F/

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

Outline			
Pin table [mm]			
Pin	X	Y	Function
1	45	2,7	ACIn11
2	45	0	ACIn11
3	42	2,7	ACIn11
4	42	0	ACIn11
5	31	2,7	ACIn12
6	31	0	ACIn12
7	28	2,7	ACIn12
8	28	0	ACIn12
9	17	2,7	ACIn21
10	17	0	ACIn21
11	14	2,7	ACIn21
12	14	0	ACIn21
13	3	2,7	ACIn22
14	3	0	ACIn22
15	0	2,7	ACIn22
16	0	0	ACIn22
17	12,4	23,7	C25
18	15,4	22,3	C25
19	31,3	25,3	E25
20	34,3	25,3	E25
21	10,4	32,9	Therm1
22	10,4	35,9	Therm2
23	32,8	38,9	S25
24	32,8	41,9	G25
25	16,3	41,2	C27
26	3,5	38,6	G27
27	3,5	41,6	S27
28	0	47,4	DC-Rect
29	3	47,4	DC-Rect
30	0	50,4	DC-Rect
31	3	50,4	DC-Rect
32	not assembled		
33	not assembled		
34	not assembled		
35	35	50,4	DC+Block
36	38	50,4	DC+Block
37	41	50,4	DC+Block
38	49,4	50,4	DC+Rect
39	52,4	50,4	DC+Rect
40	49,4	47,4	DC+Rect
41	52,4	47,4	DC+Rect



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

Tolerance of pinpositions: $\pm 0.5\text{ mm}$ at the end of pins.
Dimension of coordinate axis is only offset without tolerance

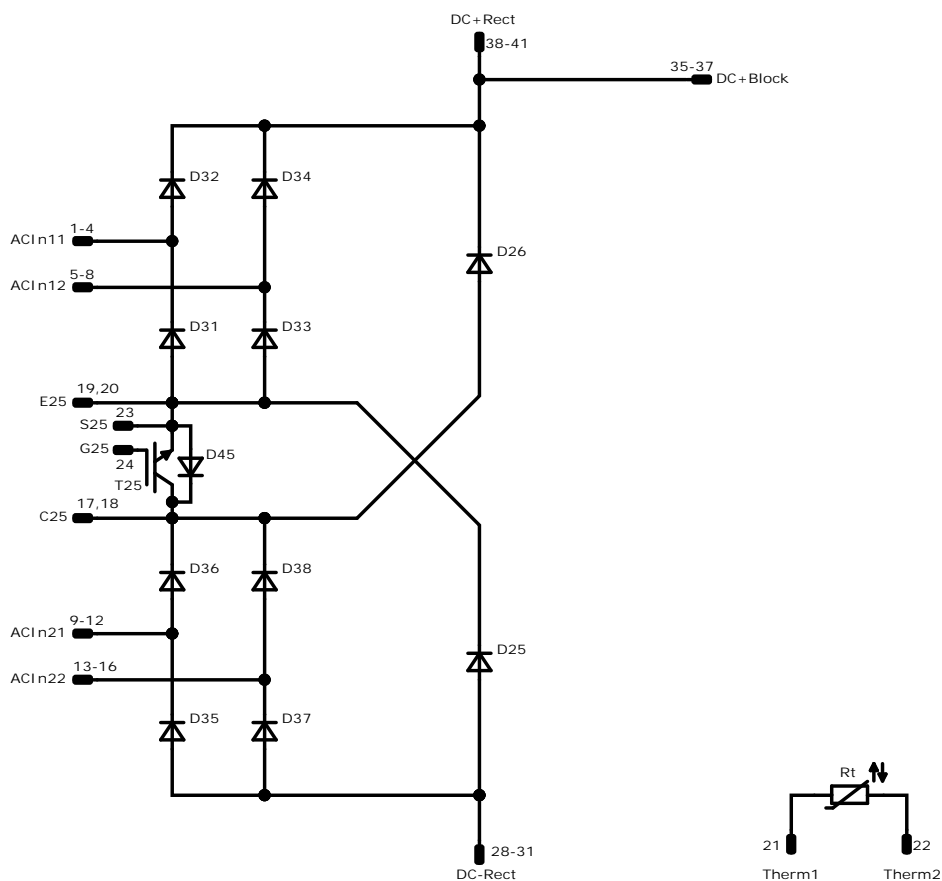


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Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T25	IGBT	1200 V	300 A	Rectifier Switch	
D45	FWD	1200 V	75 A	Rectifier Sw. Protection Diode	
D31, D32, D33, D34, D35, D36, D37, D38	FWD	1200 V	80 A	Rectifier Diode	
D25, D26	Rectifier	1600 V	60 A	ByPass Diode	
Rt	Thermistor			Thermistor	



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Packaging instruction				
Standard packaging quantity (SPQ) 45	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for <i>flow</i> S3 packages see vincotech.com website.

Package data
Package data for <i>flow</i> S3 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 $T_{j,sp}=150^{\circ}\text{C}$ and up to 4000VAC/1min isolation voltage. For more information see vincotech.com website.



Document No.:	Date:	Modification:	Pages
B0-SP12ORA080RO-LM90J48T-D2-14	15 May. 2024	Updated subtopology	

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