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

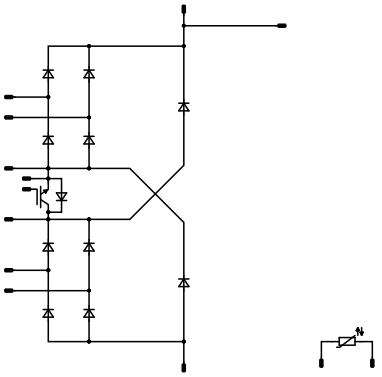
- Charging Stations

Types

- B0-SP12ORA080RO-LM90J48T

flow S3 12 mm housing

Schematic



Maximum Ratings

T_j = 25 °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 °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°C, V_{CE} = 1200 V	600	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	467	W
Gate-emitter voltage	V_{GES}		±20	V
Short circuit ratings	t_{SC}	V_{GE} = 15 V, V_{CC} = 800 V T_j = 175 °C	7	µs
Maximum junction temperature	T_{jmax}		175	°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 °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 °C	134	W
Maximum junction temperature	T_{jmax}		175	°C
Rectifier Diode				
Peak repetitive reverse voltage	V_{RRM}		1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ T_s = 80 °C	91	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms T_j = 150 °C	572	A
Surge current capability	I^2t		1632	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	185	W
Maximum junction temperature	T_{jmax}		175	°C

Maximum Ratings

T_j = 25 °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_s = 80 °C	110	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms, T_j = 150 °C	890	A
Surge current capability	I^2t		3960	A^2s
Total power dissipation	P_{tot}	T_j = T_{jmax}, T_s = 80 °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 s	6000	V
Creepage distance			>12,7	mm
Clearance			>12,7	mm
Comparative Tracking Index	CTI		≥ 600	

*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 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 kHz	0	25		25		60000		pF
Reverse transfer capacitance	C_{res}							210		pF
Gate charge	Q_g	V_{CC} = 600 V	±15		300	25		5000		nC
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,2		K/W
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 V				25			14	µA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,71		K/W

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)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,51		K/W
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)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,56		K/W

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 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	

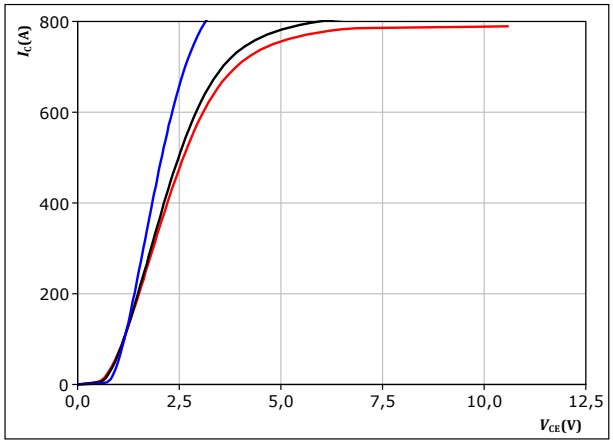
(1) Value at chip level
(2) Only valid with pre-applied Vincotech thermal interface material.

Rectifier Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

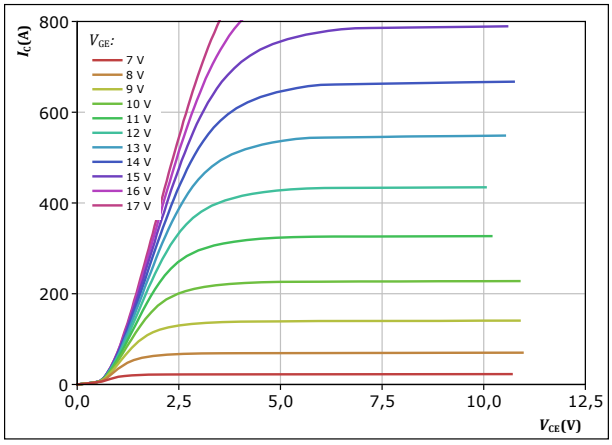


t_p =	250	µs		
V_{GE} =	15	V	T_j:	25 °C
				125 °C
				150 °C

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$



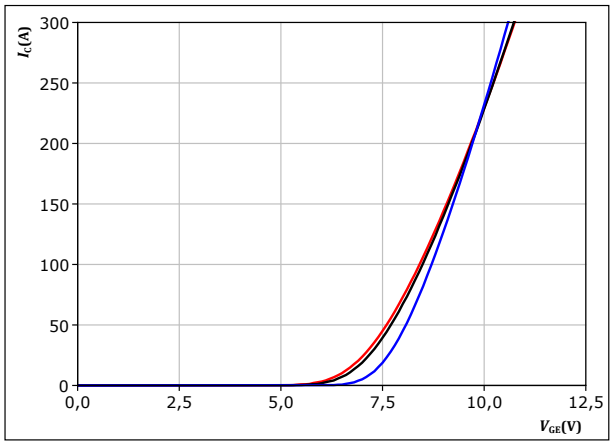
t_p =	250	µs
T_j =	150	°C

V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

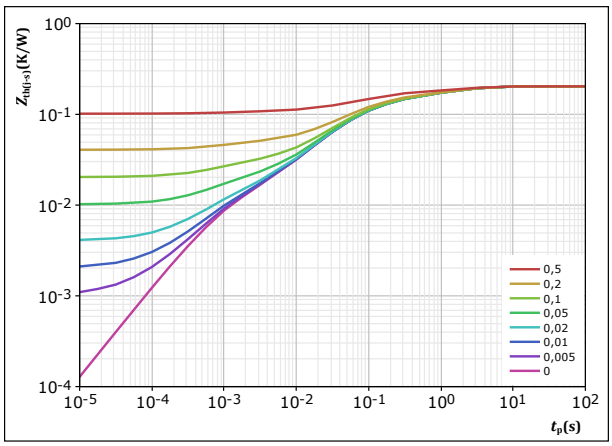


t_p =	250	µs		
V_{CE} =	27	V	T_j:	25 °C
				125 °C
				150 °C

figure 4. **IGBT**

Transient thermal impedance as a function of pulse width

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



D =	t_p / T	
$R_{th(j-s)}$ =	0,203	K/W

IGBT thermal model values

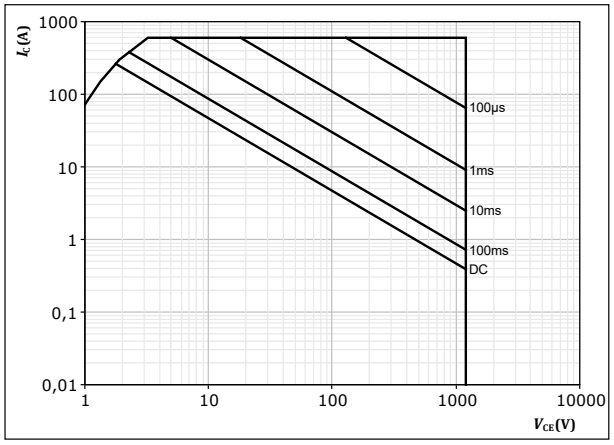
R (K/W)	τ (s)
3,41E-02	2,44E+00
3,99E-02	6,07E-01
8,87E-02	8,34E-02
3,17E-02	2,13E-02
9,14E-03	8,98E-04

Rectifier Switch Characteristics

figure 5. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



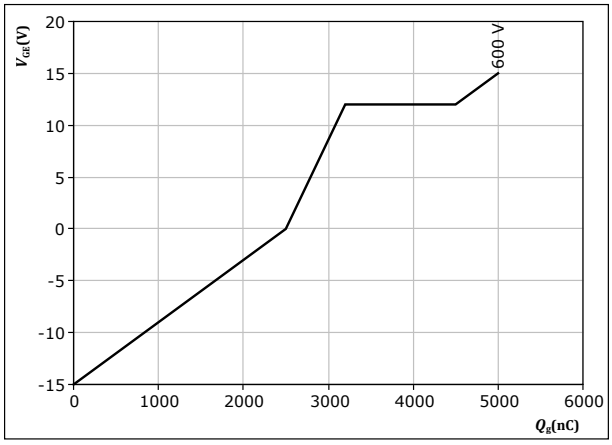
$D =$ single pulse

$T_s =$	80	°C
$V_{GE} =$	15	V
$T_j =$	T_{jmax}	

figure 6. **IGBT**

Gate voltage vs gate charge

$V_{GE} = f(Q_g)$



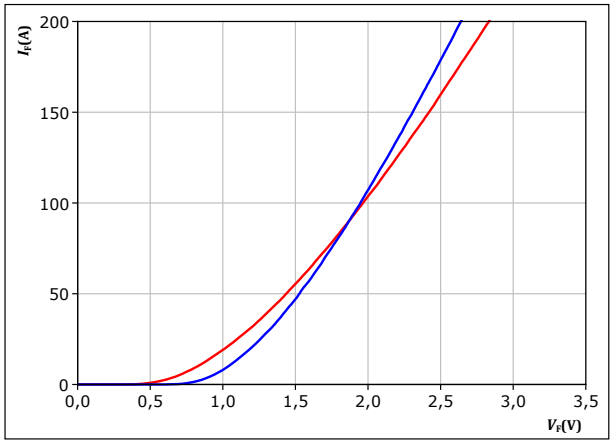
$I_C =$	150	A
$T_j =$	25	°C

Rectifier Sw. Protection Diode Characteristics

figure 7. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



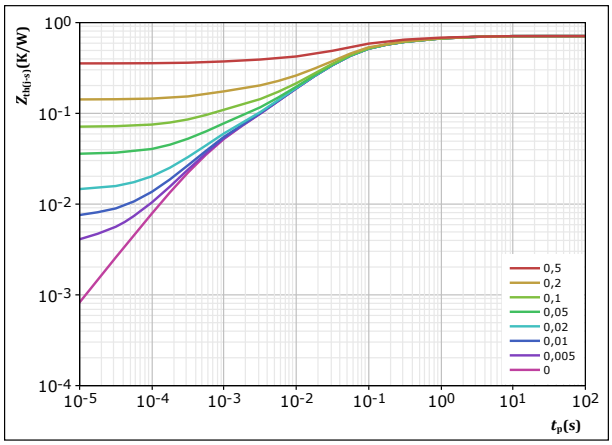
t_p = 250 µs

T_j: 25 °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

$R_{th(j-s)}$ = 0,71 K/W

FWD thermal model values

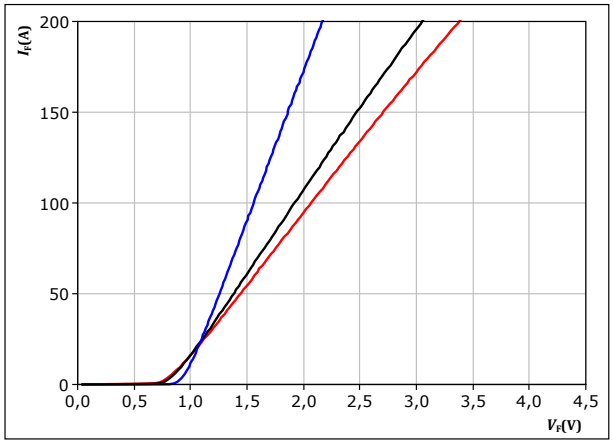
R (K/W)	τ (s)
5,40E-02	2,21E+00
1,22E-01	3,44E-01
3,81E-01	4,97E-02
1,09E-01	9,39E-03
4,37E-02	6,89E-04

Rectifier Diode Characteristics

figure 9. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



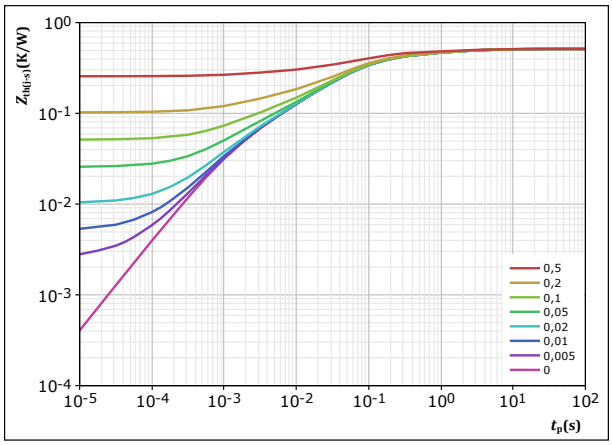
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 10. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 0,512 K/W

FWD thermal model values

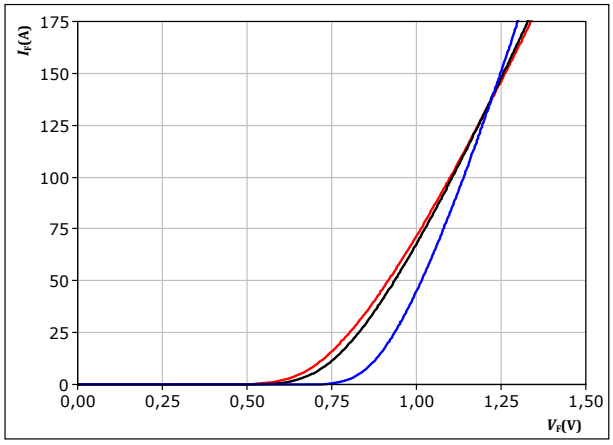
R (K/W)	τ (s)
3,45E-02	4,17E+00
8,47E-02	6,53E-01
2,73E-01	7,03E-02
8,34E-02	1,03E-02
3,72E-02	1,31E-03

ByPass Diode Characteristics

figure 11. **Rectifier**

Typical forward characteristics

$I_F = f(V_F)$



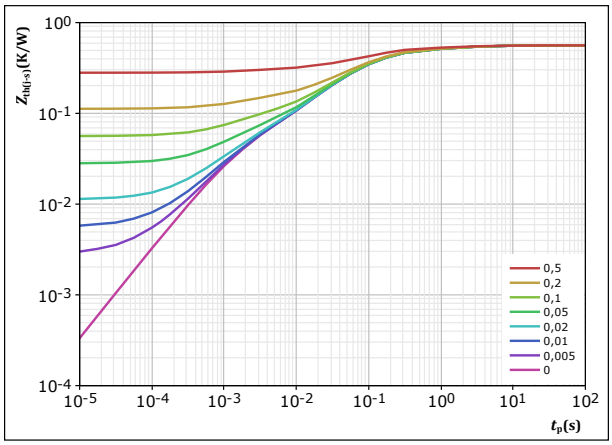
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 12. **Rectifier**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 0,561 K/W

Rectifier thermal model values

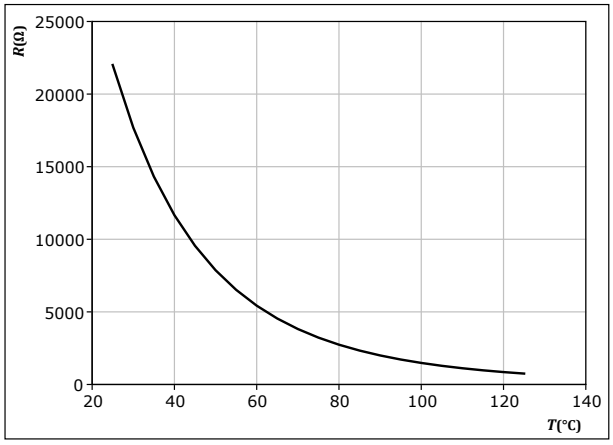
R (K/W)	τ (s)
3,37E-02	4,48E+00
8,84E-02	6,54E-01
3,02E-01	9,39E-02
1,00E-01	2,07E-02
3,73E-02	1,48E-03

Thermistor Characteristics

figure 13. **Thermistor**

Typical NTC characteristic as function of temperature

$R_T = f(T)$



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/

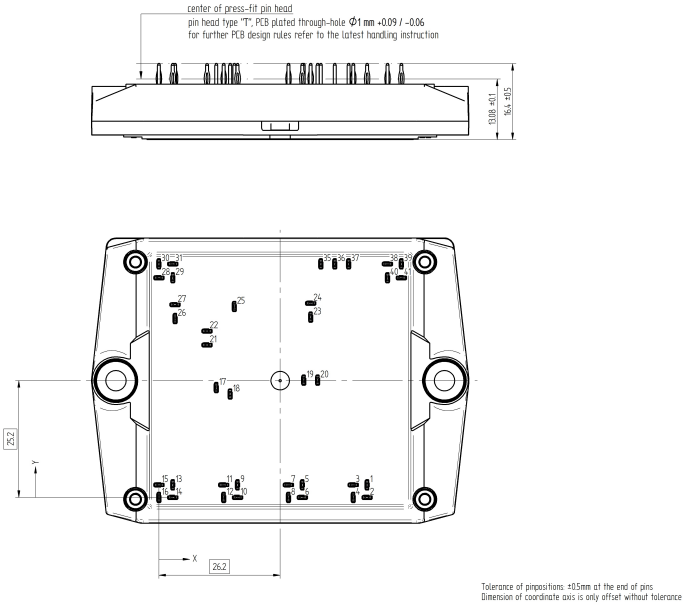
Marking

	Name		Date code	UL & VIN	Lot	Serial
Text	NN-NNNNNNNNNNNNN-TTTTTTVV		WWYY	UL VIN	LLLLL	SSSS
Datamatrix	**Type&Ver**	**Lot number**	**Serial**	**Date code**		
	TTTTTTTVV	LLLLL	SSSS	WWYY		

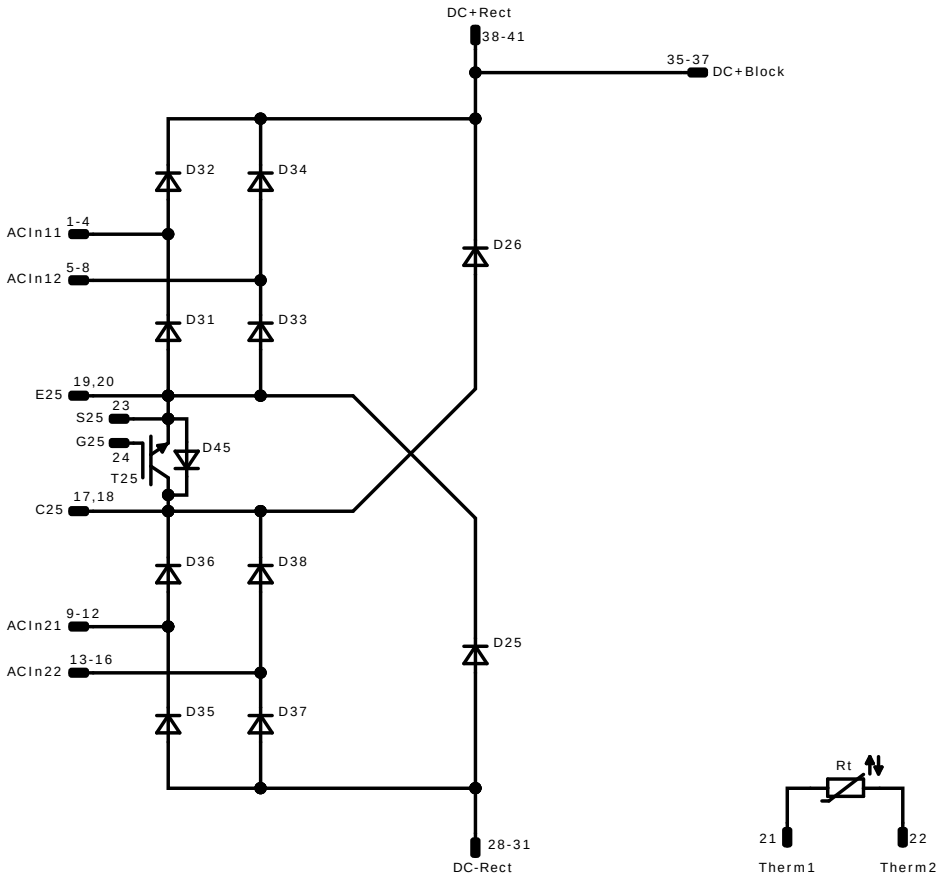
Outline

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



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	

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

Handling instruction
Handling instructions for *flow* S3 packages see vincotech.com website.

Package data
Package data for *flow* 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 $T_{j,op}$=150°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	