B0-SP126PA200M7-LR40F78T
datasheet

***flow*PACK S3**	**1200 V / 200 A**

Topology features

- Inverter
- Kelvin Emitter for improved switching performance
- Open Emitter configuration
- Temperature sensor

Component features

- Easy paralleling
- Low turn-off losses
- Low collector emitter saturation voltage
- Positive temperature coefficient
- Short tail current
- Switching optimized for EMC

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

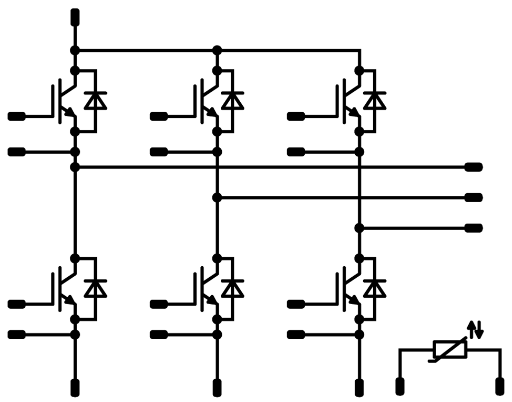
- Embedded Drives
- Industrial Drives

Types

- B0-SP126PA200M7-LR40F78T

flow S3 12 mm housing

Schematic



Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		Value	Unit
Inverter Switch					
Collector-emitter voltage	V_{CES}			1200	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$	T_s = 80 °C	154	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		400	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	268	W
Gate-emitter voltage	V_{GES}			±20	V
Short circuit ratings	t_{SC}	V_{GE} = 15 V, V_{CC} = 800 V	T_j = 150 °C	9,5	µs
Maximum junction temperature	T_{jmax}			175	°C
Inverter Diode					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	116	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		400	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	184	W
Maximum junction temperature	T_{jmax}			175	°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				10,07	mm
Clearance				8,2	mm
Comparative Tracking Index	CTI			≥ 600	

*100 % tested in production

Characteristic Values

Parameter	Symbol	Conditions	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	Unit
Inverter Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$			10	0,02	25	5,4	6	6,6	V
Collector-emitter saturation voltage	V_{CEsat}		15		200	25 125 150		1,69 1,88 1,93	1,85(1)	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			100	µA
Gate-emitter leakage current	I_{GES}		20	0		25			500	nA
Internal gate resistance	r_g							2		Ω
Input capacitance	C_{ies}							37000		pF
Output capacitance	C_{oes}		0	10		25		1100		pF
Reverse transfer capacitance	C_{res}							420		pF
Gate charge	Q_g	V_{CC} = 600 V	0/15		200	25		1200		nC
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,35		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 4 Ω R_{goff} = 4 Ω	±15	600	200	25 125 150		461 468 469		ns
Rise time	t_r					25 125 150		107 122 127		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		318 357 367		ns
Fall time	t_f					25 125 150		91,6 125 136		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=15,1 µC Q_{rFWD}=23,7 µC Q_{rFWD}=26,1 µC				25 125 150		29,5 36,6 38,8		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		15,2 21,7 23,4		mWs

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	
Inverter Diode										
Static										
Forward voltage	V_F				200	25 125 150		1,86 1,99 1,98	2,1[1]	V
Reverse leakage current	I_R	V_r = 1200 V				25			40	µA
Thermal										
Thermal resistance junction to sink[2]	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,52		K/W
Dynamic										
Peak recovery current	I_{RM}	di/dt=1580 A/µs di/dt=1360 A/µs di/dt=1330 A/µs	±15	600	200	25 125 150		75,42 84,36 87,8		A
Reverse recovery time	t_{rr}					25 125 150		371 498 539		ns
Recovered charge	Q_r					25 125 150		15,1 23,7 26,1		µC
Reverse recovered energy	E_{rec}					25 125 150		4,59 7,82 8,65		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		476 298 275		A/µs

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

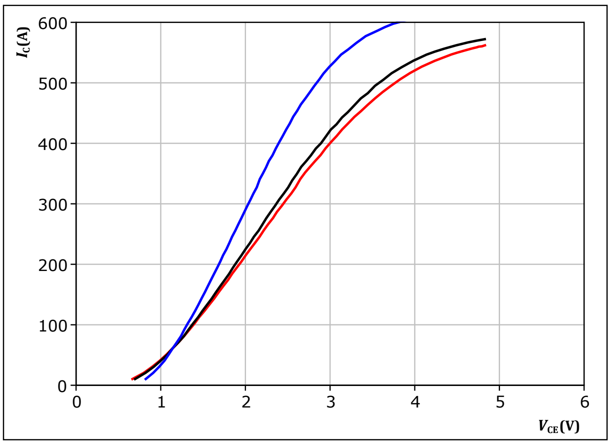
(2) Only valid with pre-applied Vincotech thermal interface material.

Inverter Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

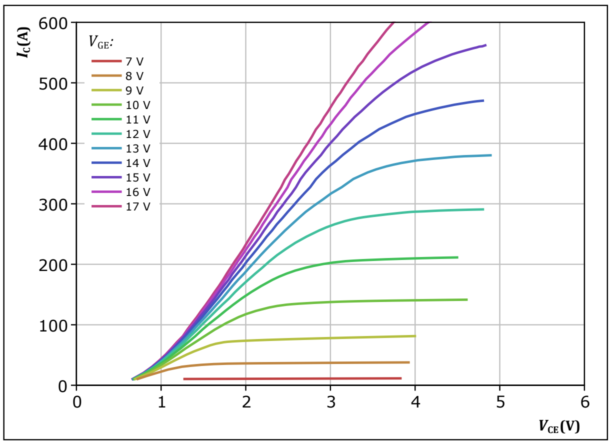


t_p =	250	μs		25 °C
V_{GE} =	15	V	T_j:	125 °C
				150 °C

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$



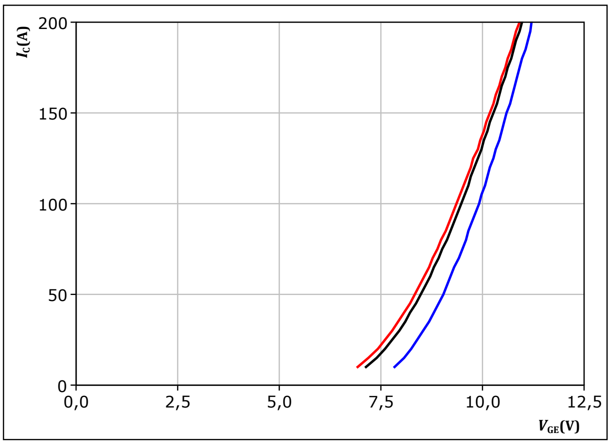
t_p =	250	μs
T_j =	150	°C

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

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

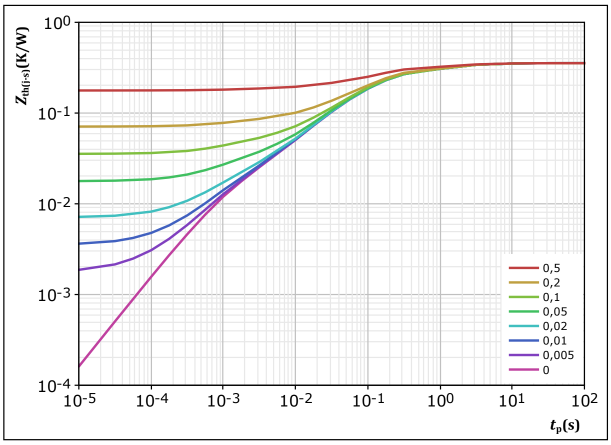


t_p =	250	μs		25 °C
V_{CE} =	10	V	T_j:	125 °C
				150 °C

figure 4. **IGBT**

Transient thermal impedance as a function of pulse width

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



D =	t_p / T	
$R_{th(j-s)}$ =	0,355	K/W

IGBT thermal model values

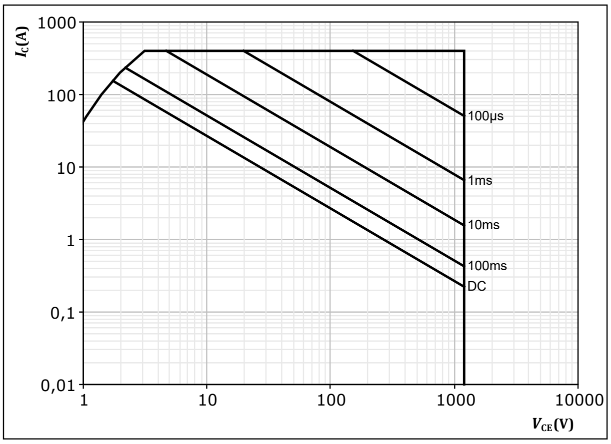
R (K/W)	τ (s)
1,02E-02	7,91E+00
8,22E-02	1,32E+00
2,03E-01	1,11E-01
4,63E-02	1,77E-02
1,25E-02	1,08E-03

Inverter Switch Characteristics

figure 5. **IGBT**

Safe operating area

I_C = f(V_{CE})

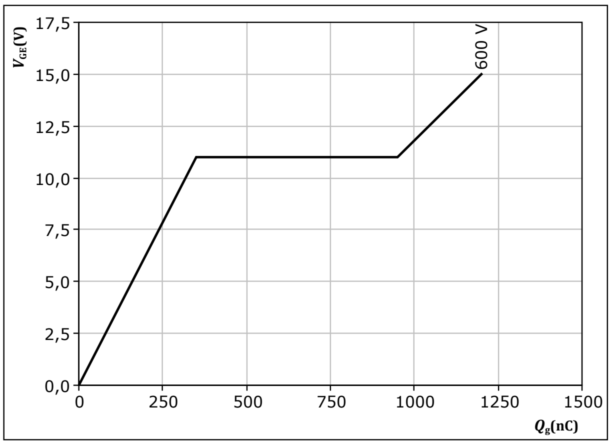


D =	single pulse	
T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

figure 6. **IGBT**

Gate voltage vs gate charge

V_{GE} = f(Q_g)



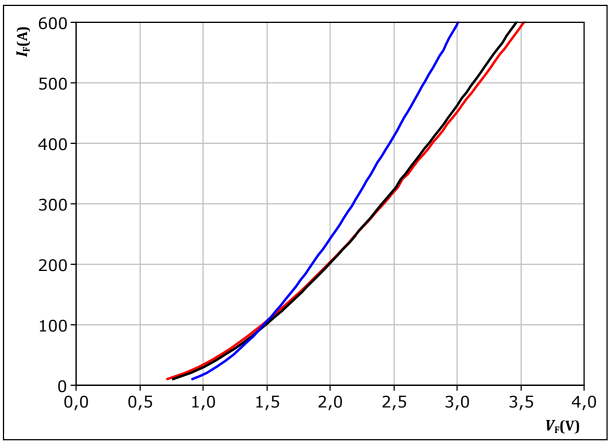
I_C =	200	A
T_j =	25	°C

Inverter Diode Characteristics

figure 7. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



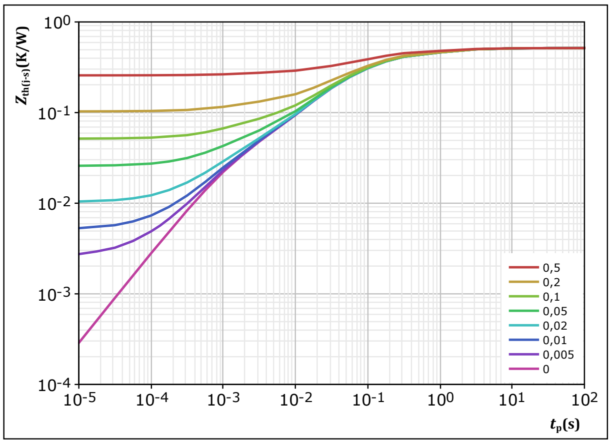
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 8. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 0,515 K/W

FWD thermal model values

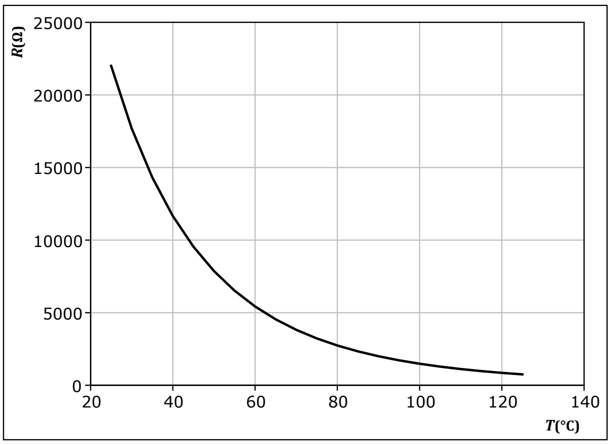
R (K/W)	τ (s)
1,11E-02	9,73E+00
9,80E-02	1,24E+00
2,54E-01	1,11E-01
1,26E-01	2,22E-02
2,60E-02	1,25E-03

Thermistor Characteristics

figure 9.	Thermistor

Typical NTC characteristic as function of temperature

R_T = f(T)

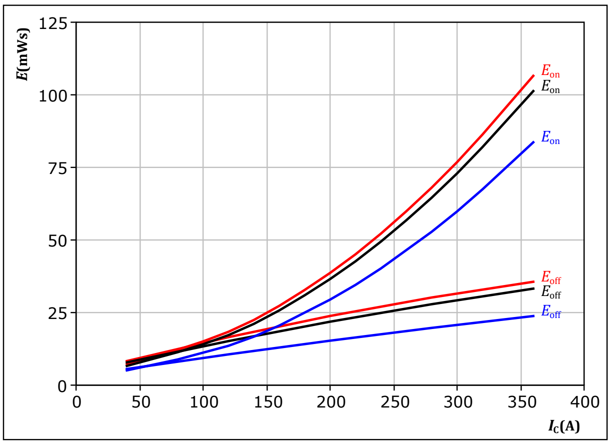


Inverter Switching Characteristics

figure 10. **IGBT**

Typical switching energy losses as a function of collector current

E = f(I_C)



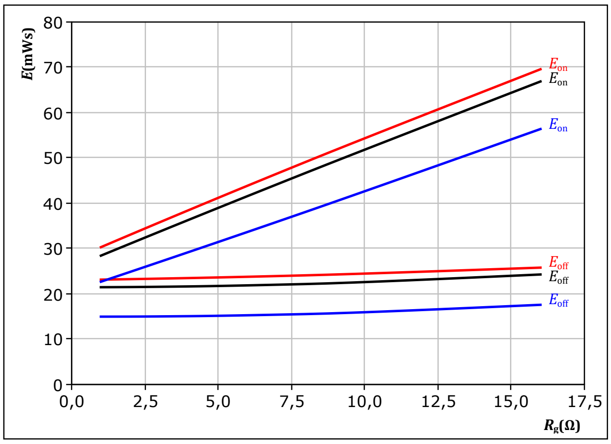
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	4	Ω		150 °C
R_{goff} =	4	Ω		

figure 11. **IGBT**

Typical switching energy losses as a function of IGBT turn on gate resistor

E = f(R_g)



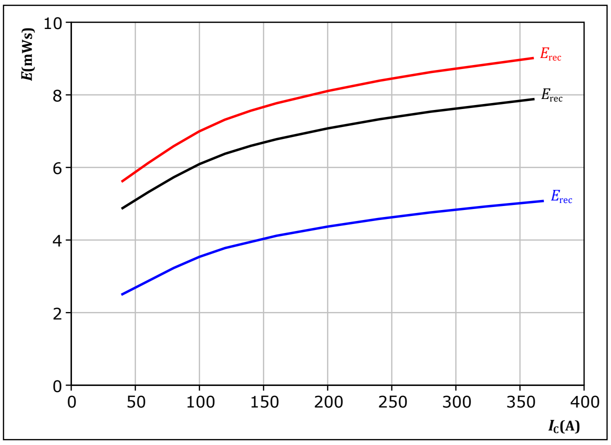
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	200	A		150 °C

figure 12. **FWD**

Typical reverse recovered energy loss as a function of collector current

E_{rec} = f(I_C)



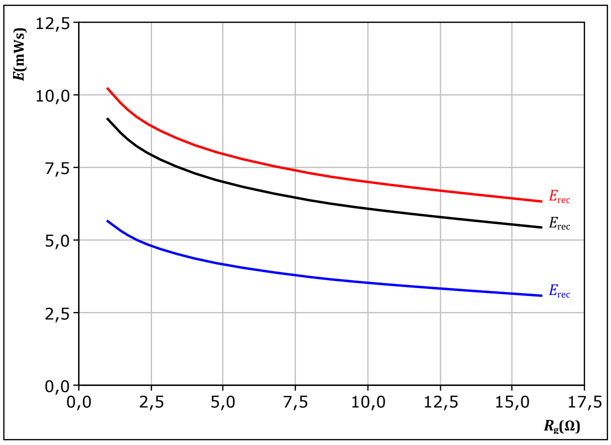
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	4	Ω		150 °C

figure 13. **FWD**

Typical reverse recovered energy loss as a function of IGBT turn on gate resistor

E_{rec} = f(R_g)



With an inductive load at

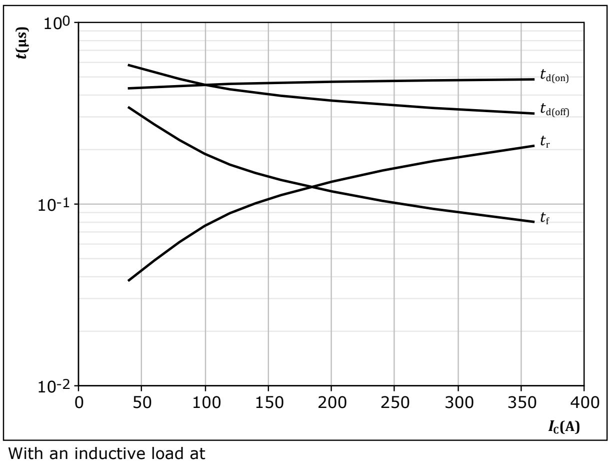
V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	200	A		150 °C

Inverter Switching Characteristics

figure 14. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



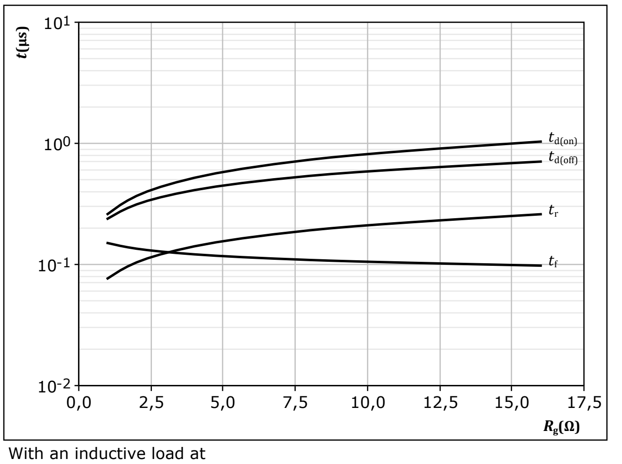
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

figure 15. **IGBT**

Typical switching times as a function of IGBT turn on gate resistor

$t = f(R_g)$



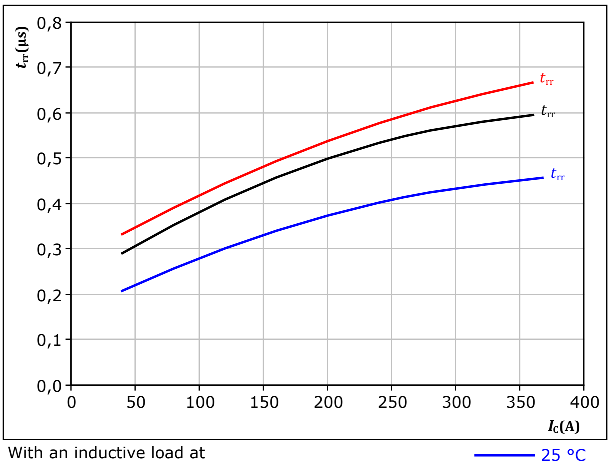
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	200	A

figure 16. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



With an inductive load at

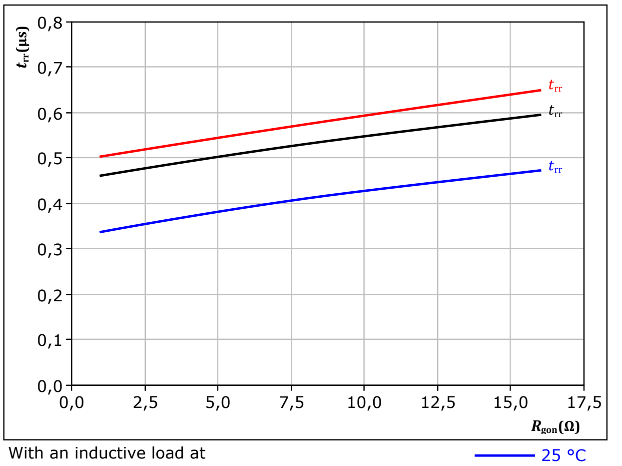
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	4	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 17. **FWD**

Typical reverse recovery time as a function of IGBT turn on gate resistor

$t_{rr} = f(R_{gon})$



With an inductive load at

V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	200	A

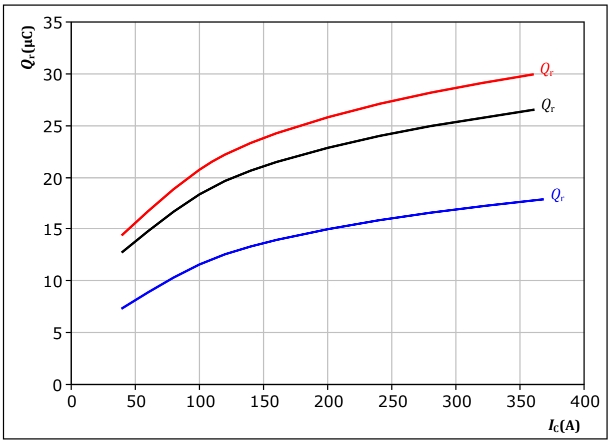
T_j: 25 °C, 125 °C, 150 °C

Inverter Switching Characteristics

figure 18. FWD

Typical recovered charge as a function of collector current

Q_r = f(I_C)



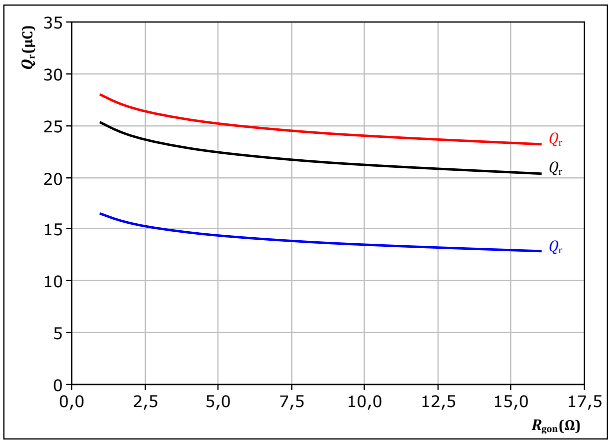
With an inductive load at

V_{CE} =	600	V	T_j: 25 °C / 125 °C / 150 °C
V_{GE} =	±15	V	
R_{gon} =	4	Ω	

figure 19. FWD

Typical recovered charge as a function of IGBT turn on gate resistor

Q_r = f(R_{gon})



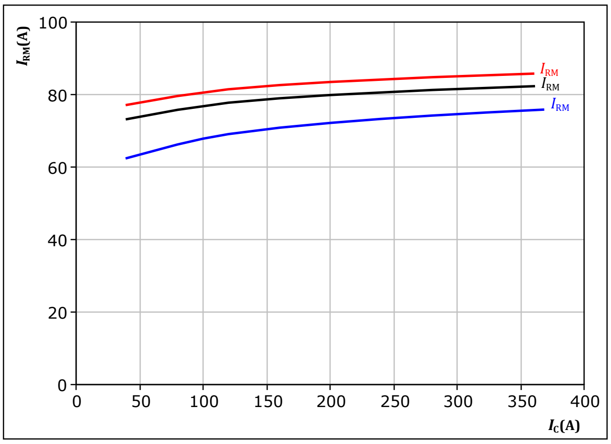
With an inductive load at

V_{CE} =	600	V	T_j: 25 °C / 125 °C / 150 °C
V_{GE} =	±15	V	
I_C =	200	A	

figure 20. FWD

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)



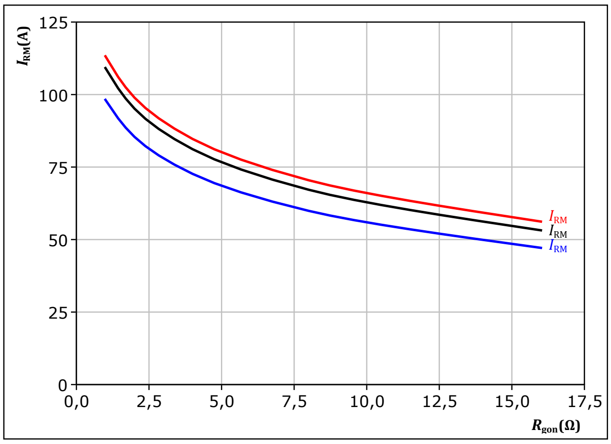
With an inductive load at

V_{CE} =	600	V	T_j: 25 °C / 125 °C / 150 °C
V_{GE} =	±15	V	
R_{gon} =	4	Ω	

figure 21. FWD

Typical peak reverse recovery current as a function of IGBT turn on gate resistor

I_{RM} = f(R_{gon})



With an inductive load at

V_{CE} =	600	V	T_j: 25 °C / 125 °C / 150 °C
V_{GE} =	±15	V	
I_C =	200	A	

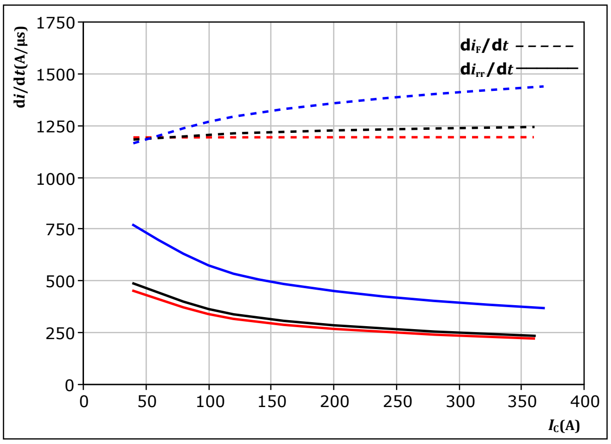
Vincotech

Inverter Switching Characteristics

figure 22. **FWD**

Typical rate of fall of forward and reverse recovery current as a function of collector current

di_F/dt, di_{rr}/dt = f(I_C)



With an inductive load at

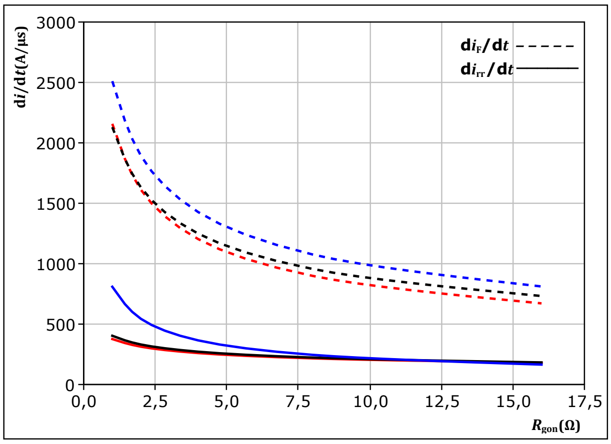
V_{CE} =	600	V	
V_{GE} =	±15	V	
R_{gon} =	4	Ω	

T_j: 25 °C, 125 °C, 150 °C

figure 23. **FWD**

Typical rate of fall of forward and reverse recovery current as a function of turn on gate resistor

di_F/dt, di_{rr}/dt = f(R_{gon})



With an inductive load at

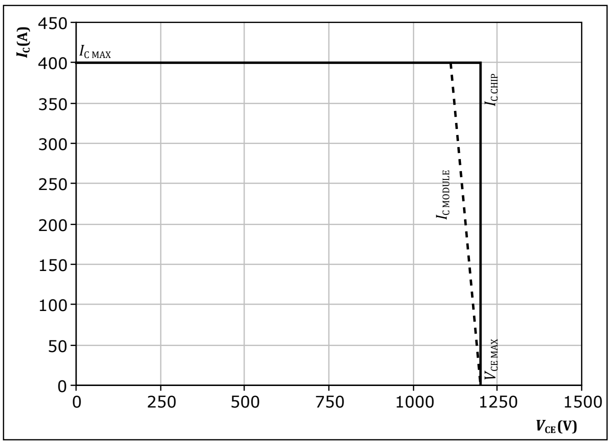
V_{CE} =	600	V	
V_{GE} =	±15	V	
I_C =	200	A	

T_j: 25 °C, 125 °C, 150 °C

figure 24. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



At

T_j =	150	°C
R_{gon} =	4	Ω
R_{goff} =	4	Ω

Inverter Switching Definitions

figure 25. **IGBT**

Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{tEoff} **= integrating time for** E_{off})

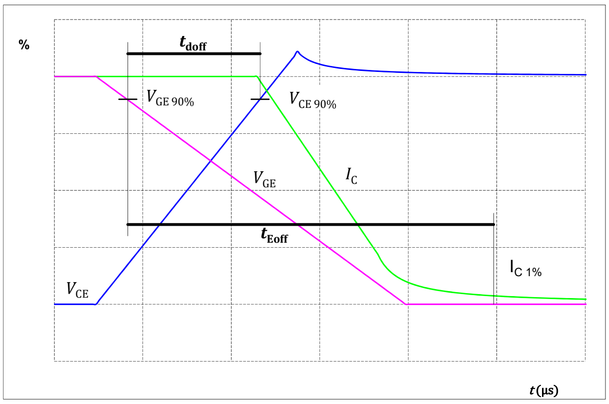


figure 26. **IGBT**

Turn-off Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} **= integrating time for** E_{on})

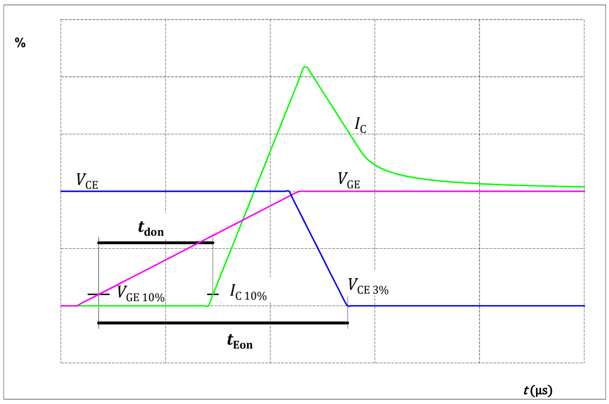


figure 27. **IGBT**

Turn-off Switching Waveforms & definition of t_f

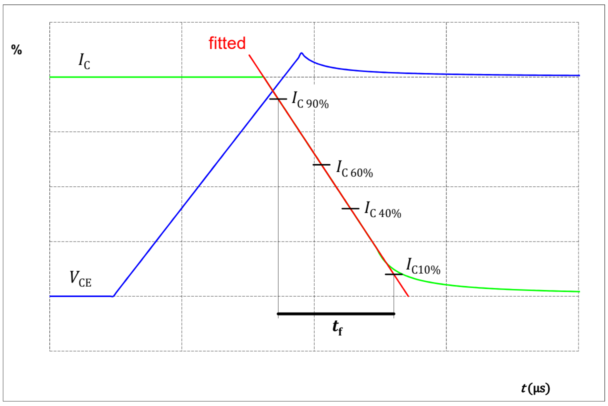
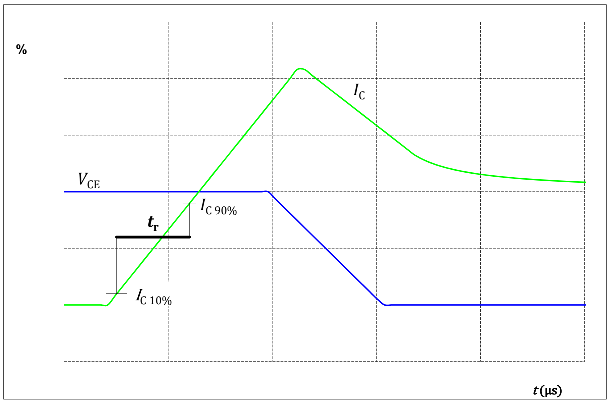


figure 28. **IGBT**

Turn-on Switching Waveforms & definition of t_r



Inverter Switching Definitions

figure 29. **FWD**

Turn-off Switching Waveforms & definition of t_{rr}

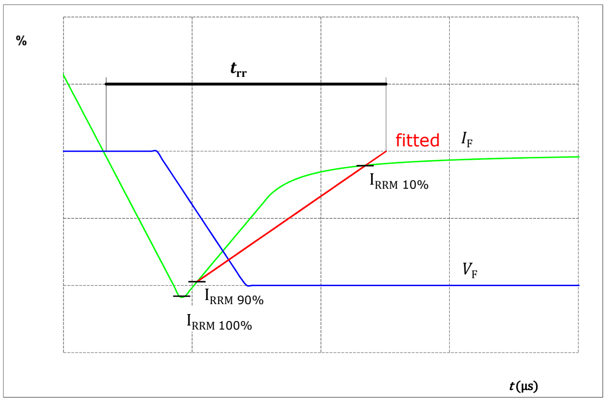
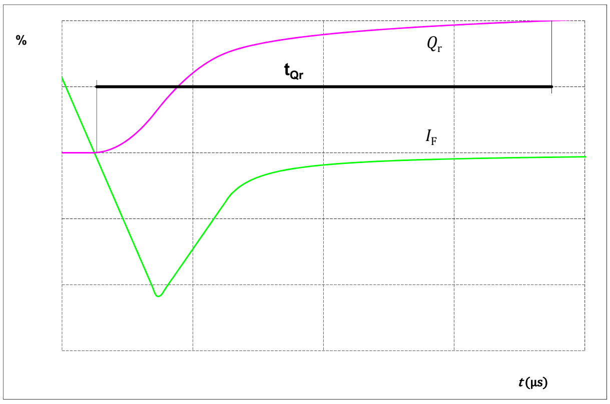


figure 30. **FWD**

Turn-on Switching Waveforms & definition of t_{Qr} **(**t_{Qr} **= integrating time for** Q_r**)**



B0-SP126PA200M7-LR40F78T
datasheet

Ordering Code

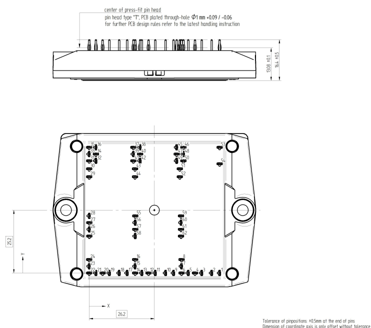
Version	Ordering Code
Without thermal paste	B0-SP126PA200M7-LR40F78T
With thermal paste (5,2 W/mK, PTM6000HV)	B0-SP126PA200M7-LR40F78T-/7/
With thermal paste (5,2 W/mK, PTM6000HV) and Protection Foil	B0-SP126PA200M7-LR40F78T-/7F/

Marking

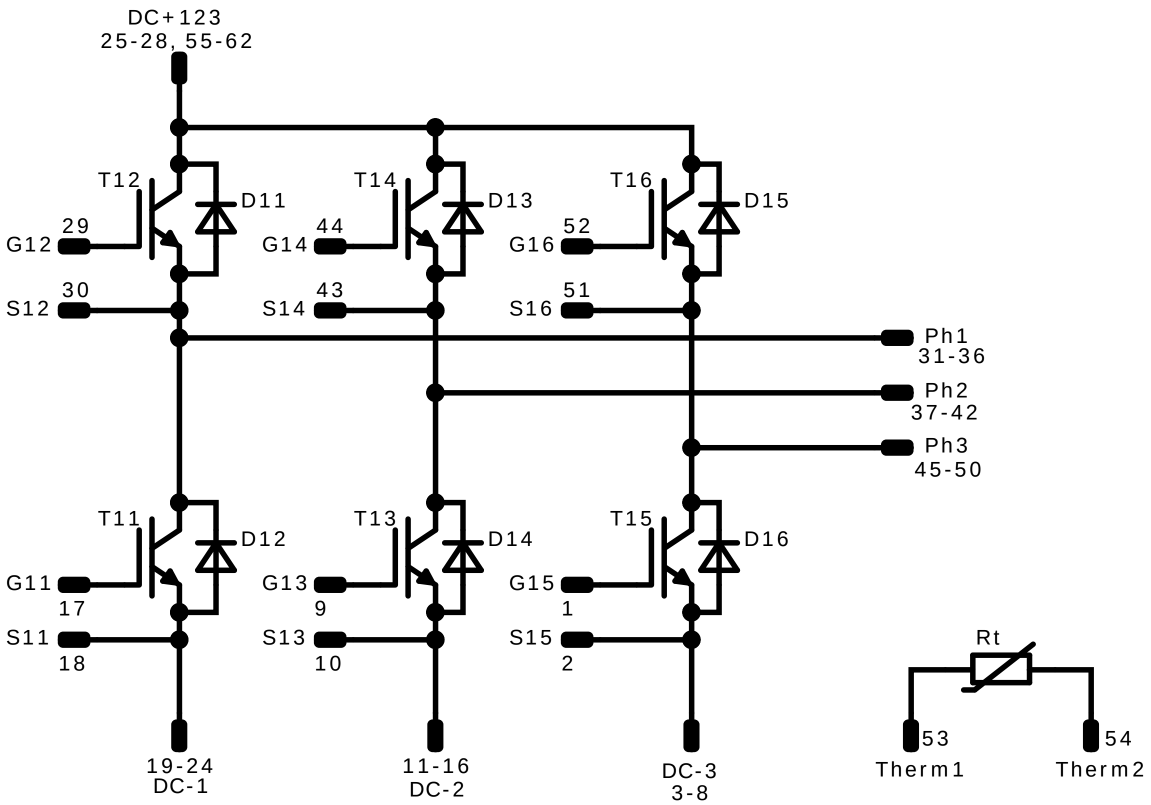
	**Text**	**Name**		**Date code**	**UL & VIN**	**Lot**	**Serial**
		NN-NNNNNNNNNNNNNN-TTTTTTVV		WWYY	UL VIN	LLLLL	SSSS
	Datamatrix	**Type&Ver**	**Lot number**	**Serial**	**Date code**		
		TTTTTTTVV	LLLLL	SSSS	WWYY		

Outline

Pin table [mm]							
Pin	X	Y	Function	32	2,7	45	Ph1
1	52,4	0	G15	33	0	47,7	Ph1
2	49,2	0	S15	34	2,7	47,7	Ph1
3	45,2	0	DC-3	35	0	50,4	Ph1
4	42,5	0	DC-3	36	2,7	50,4	Ph1
5	39,8	0	DC-3	37	17,75	50,4	Ph2
6	37,1	0	DC-3	38	20,45	50,4	Ph2
7	37,1	2,7	DC-3	39	17,75	47,7	Ph2
8	37,1	5,4	DC-3	40	20,45	47,7	Ph2
9	33,9	0	G13	41	17,75	45	Ph2
10	30,7	0	S13	42	20,45	45	Ph2
11	26,55	0	DC-2	43	18,4	41,8	S14
12	23,85	0	DC-2	44	18,4	38,6	G14
13	21,15	0	DC-2	45	35,15	50,4	Ph3
14	18,45	0	DC-2	46	37,85	50,4	Ph3
15	18,45	2,7	DC-2	47	35,15	47,7	Ph3
16	18,45	5,4	DC-2	48	37,85	47,7	Ph3
17	15,25	0	G11	49	35,15	45	Ph3
18	12,05	0	S11	50	37,85	45	Ph3
19	8,1	0	DC-1	51	36,4	41,8	S16
20	5,4	0	DC-1	52	36,4	38,6	G16
21	2,7	0	DC-1	53	52,4	50,4	Therm1
22	0	0	DC-1	54	52,4	43,8	Therm2
23	0	2,7	DC-1	55	18,5	22,9	DC+
24	0	5,4	DC-1	56	18,5	20,2	DC+
25	0,05	14,8	DC+	57	18,5	17,5	DC+
26	0,05	17,5	DC+	58	18,5	14,8	DC+
27	0,05	20,2	DC+	59	36,9	22,9	DC+
28	0,05	22,9	DC+	60	36,9	20,2	DC+
29	0	38,6	G12	61	36,9	17,5	DC+
30	0	41,8	S12	62	36,9	14,8	DC+
31	0	45	Ph1				



Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T11, T12, T13, T14, T15, T16	IGBT	1200 V	200 A	Inverter Switch	
D11, D12, D13, D14, D15, D16	FWD	1200 V	200 A	Inverter 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 3500VAC/1min isolation voltage. For more information see vincotech.com website.

Document No.:	Date:	Modification:	Pages
B0-SP126PA200M7-LR40F78T-D3-14	11 May. 2025	Housing changed according to PCN-2024-006	