



flowBOOST 2 dual

950 V / 200 A

Features

- Dual Booster
- High Performance Flying Capacitor Topology
- Optimized for 1500 V applications
- Latest Si Technology
- Integrated flying snubber capacitor
- Integrated NTC
- Low Inductance Design

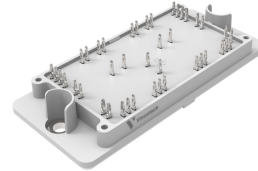
Target applications

- Energy Storage Systems
- Solar Inverters

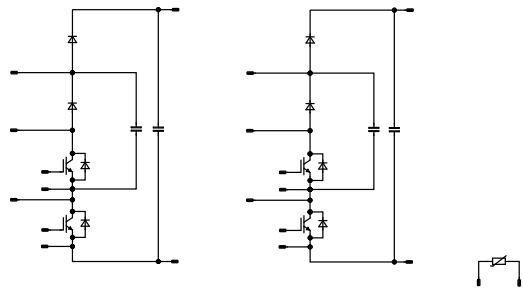
Types

- 30-PT10B2A200S706-PA79L98Y

flow 2 12 mm housing



Schematic





Vincotech

30-PT10B2A200S706-PA79L98Y
datasheet

Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
Boost Switch				
Collector-emitter voltage	V_{CES}		950	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	139	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	400	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	261	W
Gate-emitter voltage	V_{GES}		± 20	V
Maximum junction temperature	T_{jmax}		175	°C
Boost Diode				
Peak repetitive reverse voltage	V_{RRM}		950	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	110	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	400	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	198	W
Maximum junction temperature	T_{jmax}		175	°C
Boost Sw. Protection Diode				
Peak repetitive reverse voltage	V_{RRM}		1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	52	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	100	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	96	W
Maximum junction temperature	T_{jmax}		175	°C
Flying Capacitor				
Maximum DC voltage	V_{MAX}		1000	V
Operation Temperature	T_{op}		-55 ... 125	°C



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datasheet

Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
Capacitor (DC)				
Maximum DC voltage	V_{MAX}		1500	V
Operation Temperature	T_{op}		-55 ... 125	°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_{GS} [V]	V_{GE} [V]	V_{DS} [V]	I_D [A]	T_j [°C]	Min	Typ	Max	

Boost Switch

Static

Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,00334	25	4,35	5,1	5,85	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		200	25 125 150		1,83 2,06 2,11	2,35 ⁽¹⁾	V
Collector-emitter cut-off current	I_{CES}		0	950		25			4	μA
Gate-emitter leakage current	I_{GES}		20	0		25			200	nA
Internal gate resistance	r_g							0,75		Ω
Input capacitance	C_{ies}							13000		pF
Output capacitance	C_{oes}	$f = 100$ kHz	0	25		25		278		pF
Reverse transfer capacitance	C_{res}							40		pF
Gate charge	Q_g		15		0	25		460		nC

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,36		K/W
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Dynamic

Turn-on delay time	$t_{d(on)}$					25 125 150		259,85 258,71 258,39		ns
Rise time	t_r					25 125 150		25,63 28,06 29,12		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		182,5 208,82 216,26		ns
Fall time	t_f					25 125 150		21,26 42,49 47,76		ns
Turn-on energy (per pulse)	E_{on}	$Q_{tFWD} = 4,18$ μC $Q_{tFWD} = 9,83$ μC $Q_{tFWD} = 11,69$ μC				25 125 150		10,16 11,99 12,42		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		4,1 6,62 7,38		mWs



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datasheet

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		
Boost Diode										
Static										
Forward voltage	V_F				200	25 125 150	2,1	2,64 2,44 2,36	2,8 ⁽¹⁾	V
Reverse leakage current	I_R	$V_r = 950$ V				25			8	μA
Thermal										
Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,48		K/W
Dynamic										
Peak recovery current	I_{RRM}					25 125 150		103,93 145,58 159,43		A
Reverse recovery time	t_{rr}					25 125 150		125,49 183,62 197,84		ns
Recovered charge	Q_r	$di/dt=6201$ A/μs $di/dt=5610$ A/μs $di/dt=5882$ A/μs	±15	600	170	25 125 150		4,18 9,83 11,69		μC
Reverse recovered energy	E_{rec}					25 125 150		0,936 2,71 3,37		mWs
Peak rate of fall of recovery current	$(di_r/dt)_{max}$					25 125 150		6221,25 4201,78 4090,98		A/μs



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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		

Boost Sw. Protection Diode

Static

Forward voltage	V_F			50	25 125 150		1,66 1,78 1,79	2,1 ⁽¹⁾	V
Reverse leakage current	I_R	$V_r = 1200$ V			25			40	μA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)					0,99		K/W
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Flying Capacitor

Static

Capacitance	C	DC bias voltage = 0 V			25		100		nF
Tolerance						-10		10	%
Dissipation factor		$f = 1$ kHz			25		2,5		%

Capacitor (DC)

Static

Capacitance	C	DC bias voltage = 0 V			25		33		nF
Tolerance						-10		10	%
Dissipation factor		$f = 1$ kHz			25		2,5		%



Vincotech

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
		V_{GS} [V]	V_{GE} [V]	V_{DS} [V]	V_{CE} [V]	T_j [°C]	Min	Typ	Max	

Thermistor

Static

Rated resistance	R					25		22		kΩ
Deviation of R_{100}	$A_{R/R}$	$R_{100} = 1484 \Omega$				100	-5		5	%
Power dissipation	P							5		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.

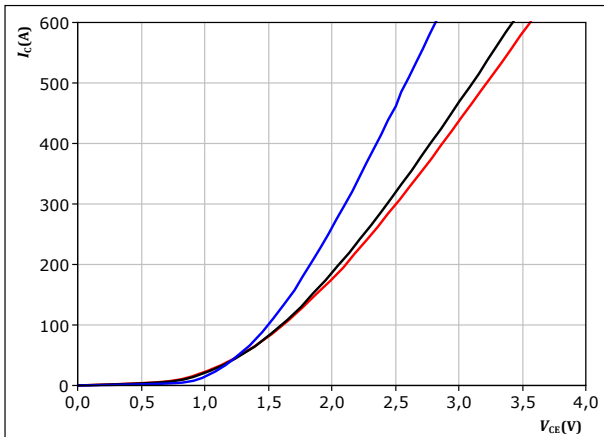


Boost Switch Characteristics

figure 1. IGBT

Typical output characteristics

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

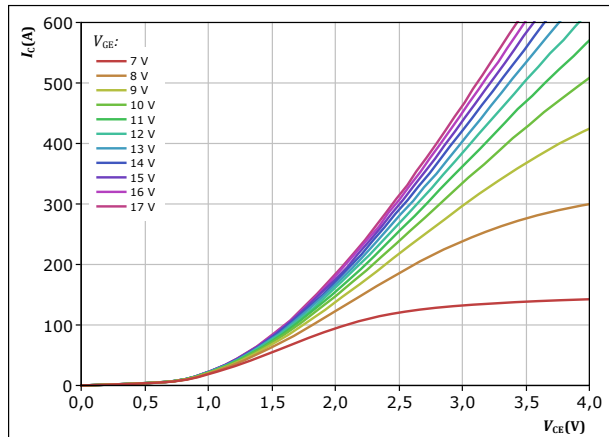


$t_p = 250 \mu\text{s}$
 $V_{GE} = 15 \text{ V}$
 $T_j:$ — 25 °C
— 125 °C
— 150 °C

figure 2. IGBT

Typical output characteristics

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

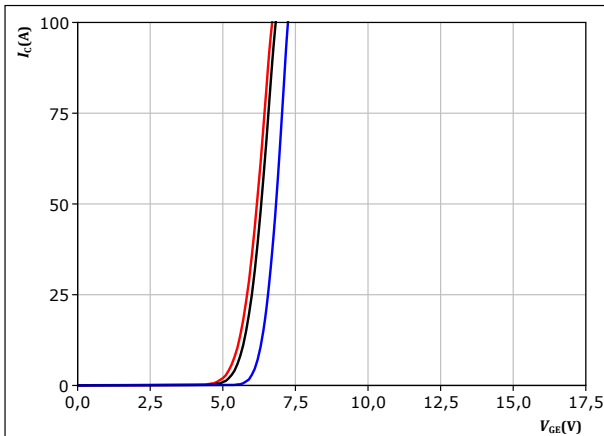


$t_p = 250 \mu\text{s}$
 $T_j = 150^\circ\text{C}$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. IGBT

Typical transfer characteristics

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

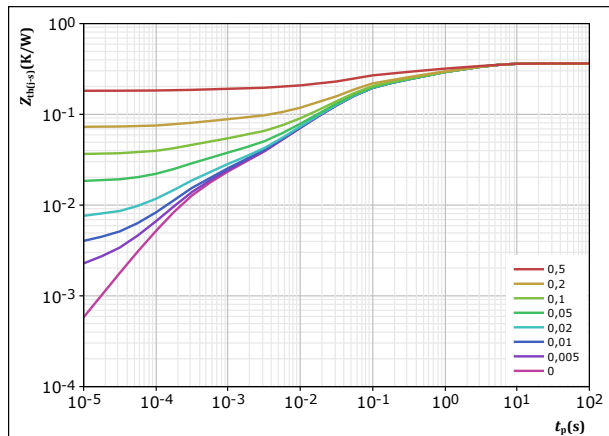


$t_p = 250 \mu\text{s}$
 $V_{CE} = 8 \text{ V}$
 $T_j:$ — 25 °C
— 125 °C
— 150 °C

figure 4. IGBT

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 0,363 \text{ K/W}$
IGBT thermal model values

R (K/W)	τ (s)
9,25E-02	2,69E+00
8,12E-02	4,10E-01
1,47E-01	4,37E-02
2,64E-02	5,33E-03
1,62E-02	3,22E-04

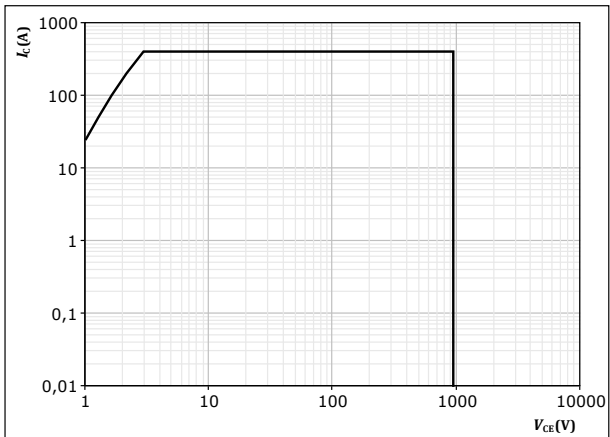


Boost Switch Characteristics

figure 5. IGBT

Safe operating area

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



$D = \text{single pulse}$
 $T_s = 80 \text{ } ^\circ\text{C}$
 $V_{CE} = 15 \text{ V}$
 $T_j = T_{jmax}$



Boost Diode Characteristics

figure 6. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

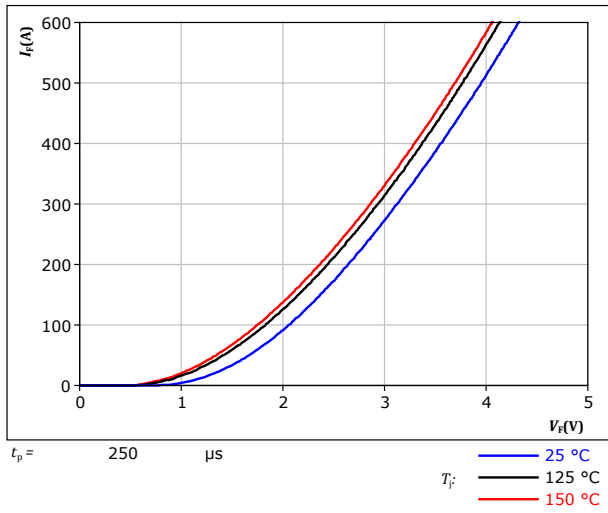
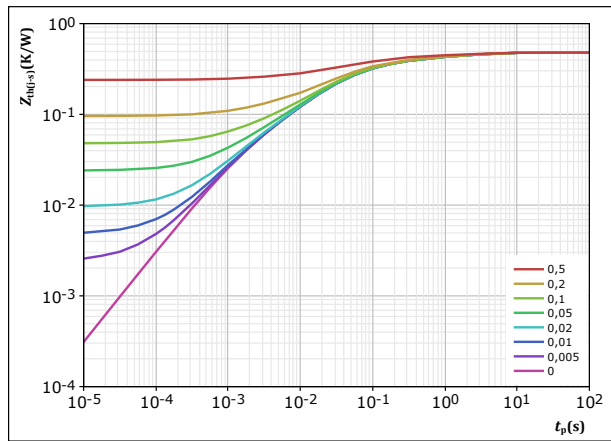


figure 7. FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 0,479 \text{ K/W}$
 FWD thermal model values

R (K/W)	τ (s)
5,14E-02	3,38E+00
7,77E-02	5,08E-01
2,04E-01	6,60E-02
1,19E-01	1,31E-02
2,76E-02	1,47E-03



Boost Sw. Protection Diode Characteristics

figure 8. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

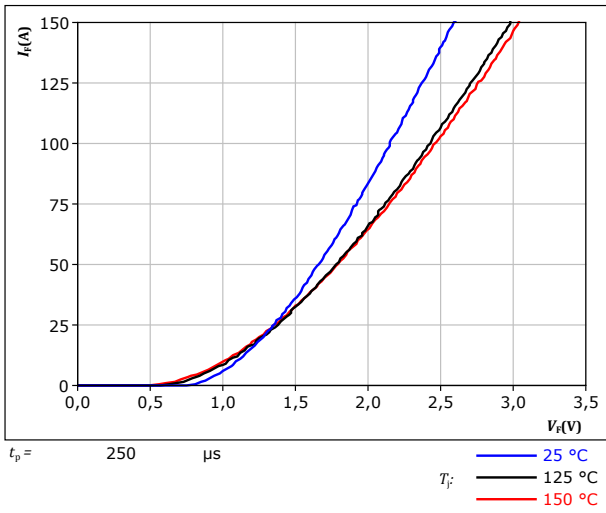
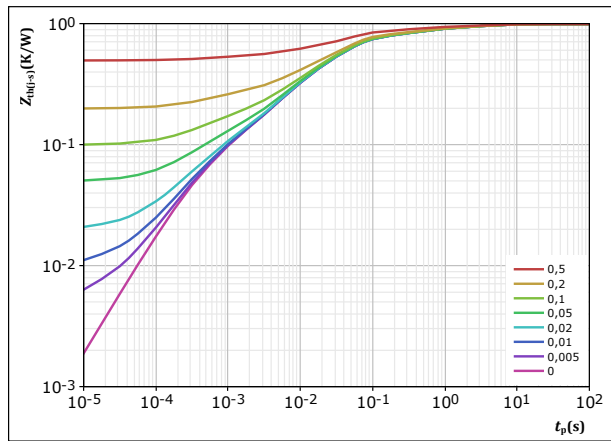


figure 9. FWD

Transient thermal impedance as a function of pulse width

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



$D = \frac{t_p}{T}$
 $R_{th(j-s)} = 0,991 \text{ K/W}$
 FWD thermal model values

R (K/W)	τ (s)
9,66E-02	3,26E+00
1,54E-01	3,87E-01
5,19E-01	3,68E-02
1,59E-01	5,49E-03
6,34E-02	4,34E-04

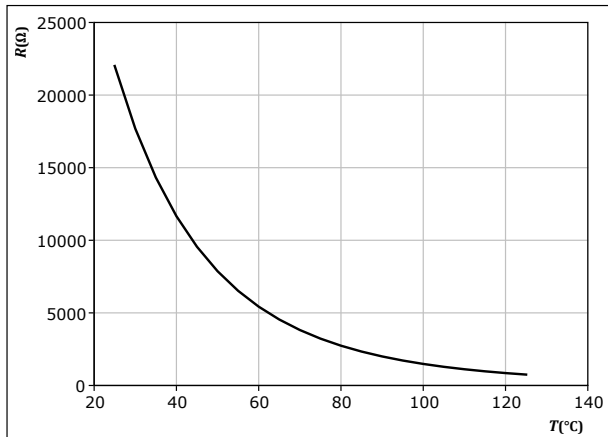


Thermistor Characteristics

figure 10. Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$

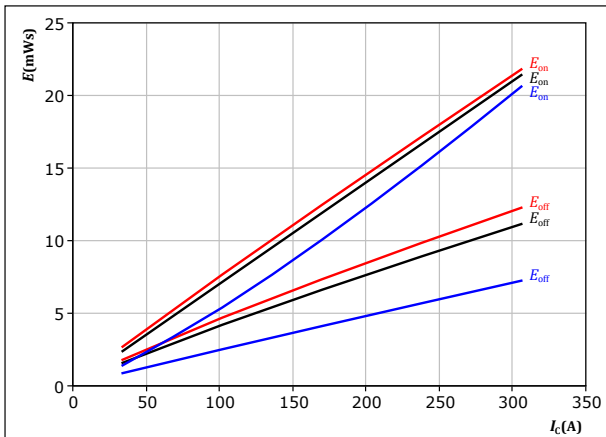




Boost Switching Characteristics

figure 11. IGBT

Typical switching energy losses as a function of collector current
 $E = f(I_C)$

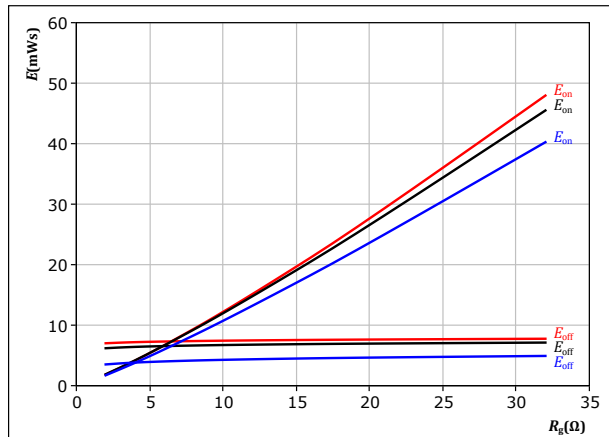


With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 8$ Ω
 $R_{goff} = 8$ Ω

T_j : 25 °C (blue), 125 °C (black), 150 °C (red)

figure 12. IGBT

Typical switching energy losses as a function of gate resistor
 $E = f(R_g)$

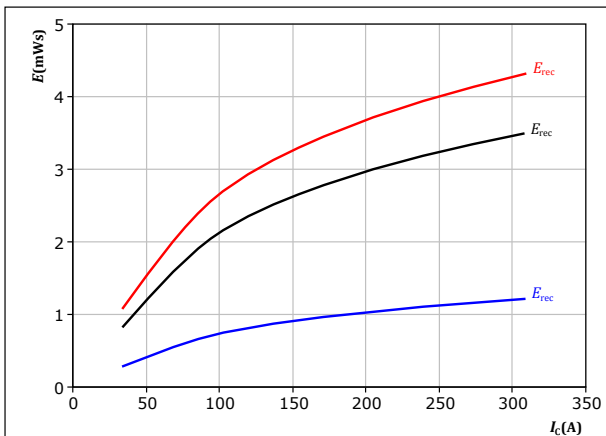


With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 170$ A

T_j : 25 °C (blue), 125 °C (black), 150 °C (red)

figure 13. FWD

Typical reverse recovered energy loss as a function of collector current
 $E_{rec} = f(I_C)$

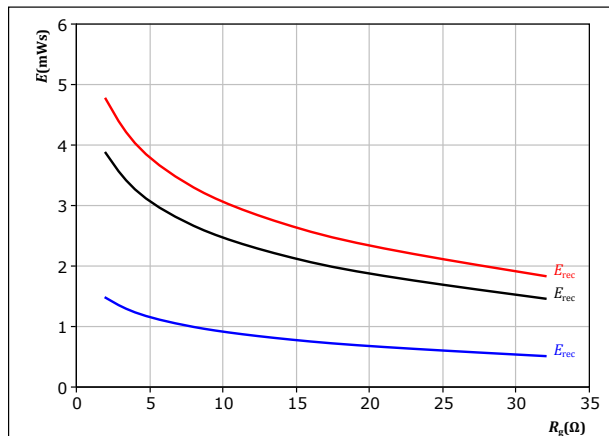


With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 8$ Ω

T_j : 25 °C (blue), 125 °C (black), 150 °C (red)

figure 14. FWD

Typical reverse recovered energy loss as a function of gate resistor
 $E_{rec} = f(R_g)$



With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 170$ A

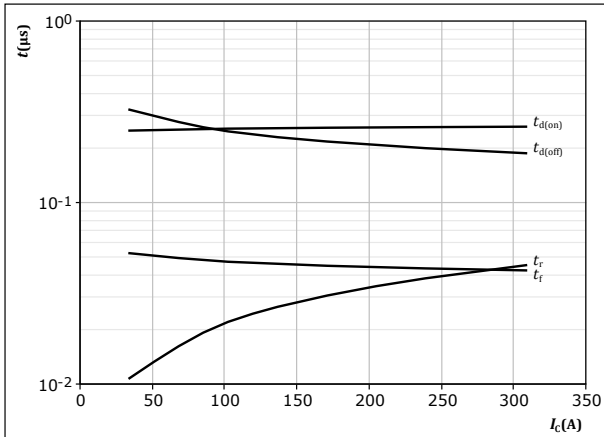
T_j : 25 °C (blue), 125 °C (black), 150 °C (red)



Boost Switching Characteristics

figure 15. IGBT

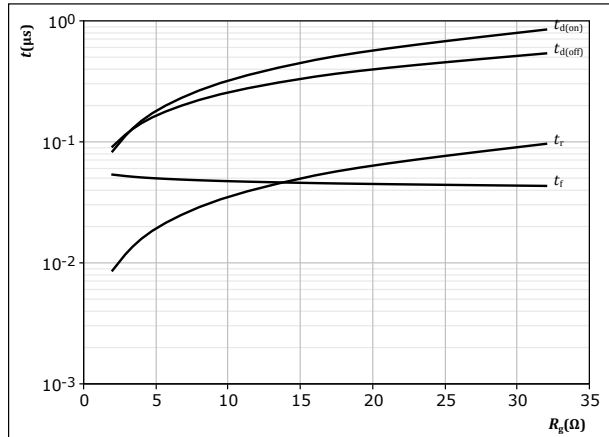
Typical switching times as a function of collector current
 $t = f(I_c)$



With an inductive load at
 $T_j = 150$ °C
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{g(on)} = 8$ Ω
 $R_{g(off)} = 8$ Ω

figure 16. IGBT

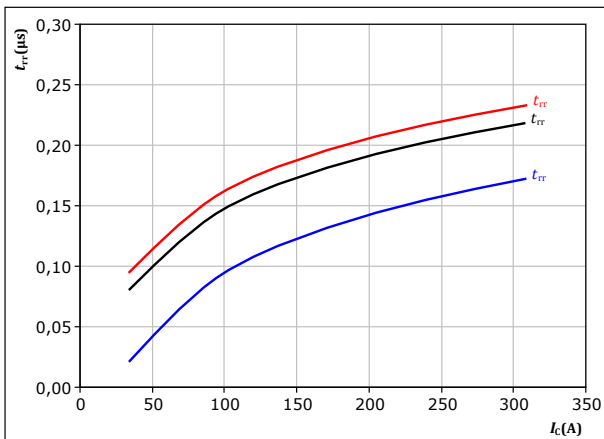
Typical switching times as a function of gate resistor
 $t = f(R_g)$



With an inductive load at
 $T_j = 150$ °C
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_c = 170$ A

figure 17. FWD

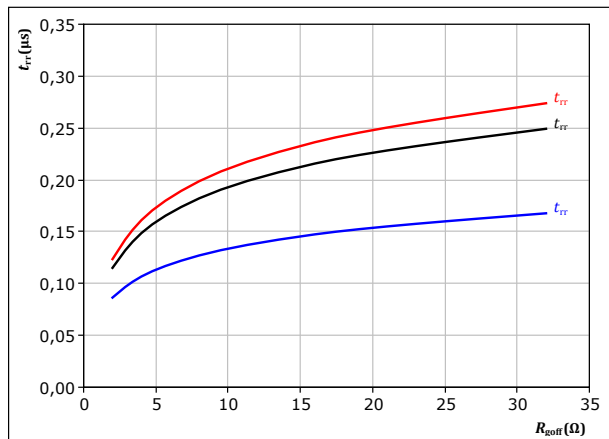
Typical reverse recovery time as a function of collector current
 $t_{rr} = f(I_c)$



With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{g(on)} = 8$ Ω
 T_j : — 25 °C
— 125 °C
— 150 °C

figure 18. FWD

Typical reverse recovery time as a function of IGBT turn off gate resistor
 $t_{rr} = f(R_{g(off)})$



With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_c = 170$ A
 T_j : — 25 °C
— 125 °C
— 150 °C

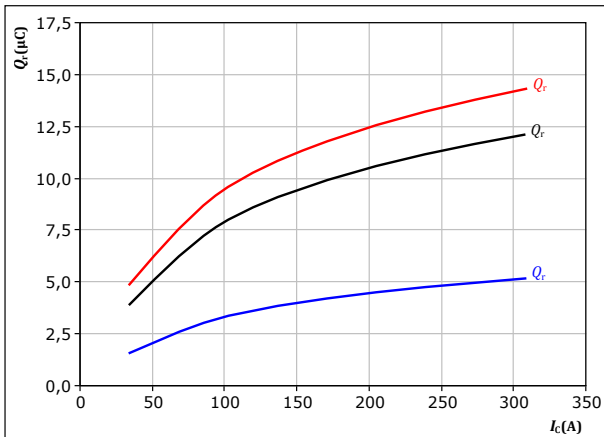


Boost Switching Characteristics

figure 19. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$



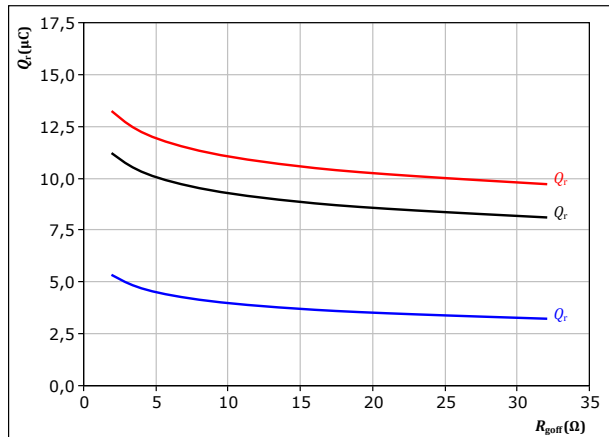
With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{goff} = 8$ Ω
 T_j : 25 °C (blue), 125 °C (black), 150 °C (red)

figure 20. FWD

Typical recovered charge as a function of turn off gate resistor

$$Q_r = f(R_{goff})$$



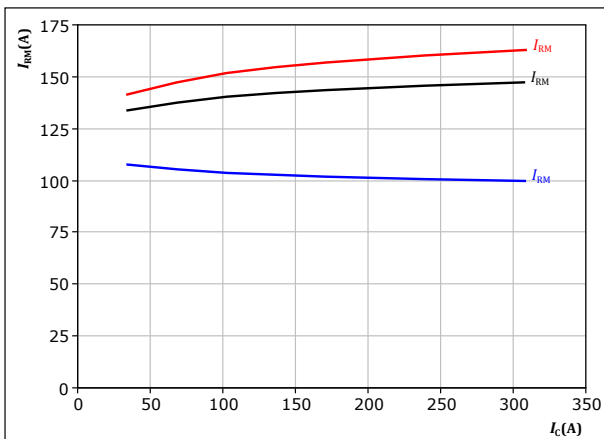
With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_c = 170$ A
 T_j : 25 °C (blue), 125 °C (black), 150 °C (red)

figure 21. FWD

Typical peak reverse recovery current as a function of collector current

$$I_{RM} = f(I_c)$$



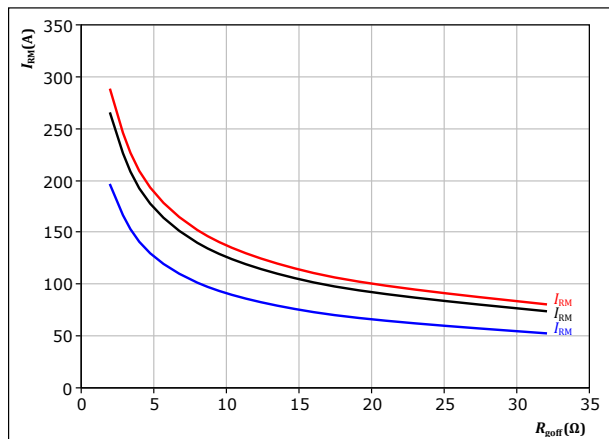
With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{goff} = 8$ Ω
 T_j : 25 °C (blue), 125 °C (black), 150 °C (red)

figure 22. FWD

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

$$I_{RM} = f(R_{goff})$$



With an inductive load at

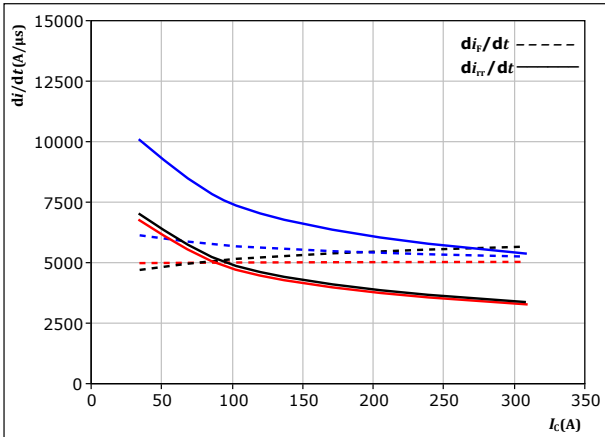
$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_c = 170$ A
 T_j : 25 °C (blue), 125 °C (black), 150 °C (red)



Boost Switching Characteristics

figure 23. FWD

Typical rate of fall of forward and reverse recovery current as a function of collector current
 $di_f/dt, di_r/dt = f(I_c)$

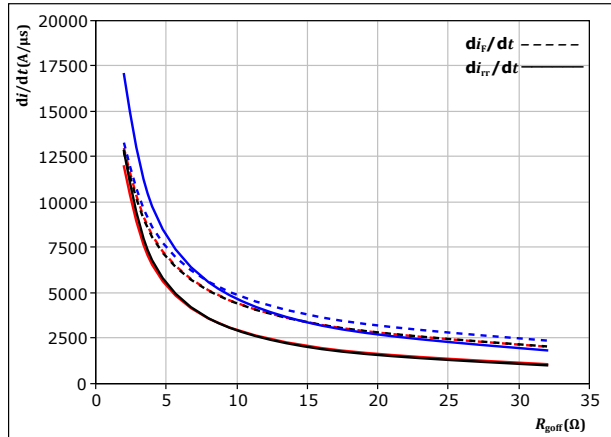


With an inductive load at

$V_{CE} = 600$ V	$T_j = 25$ °C
$V_{GE} = \pm 15$ V	$T_j = 125$ °C
$R_{goff} = 8$ Ω	$T_j = 150$ °C

figure 24. FWD

Typical rate of fall of forward and reverse recovery current as a function of turn off gate resistor
 $di_f/dt, di_r/dt = f(R_{goff})$

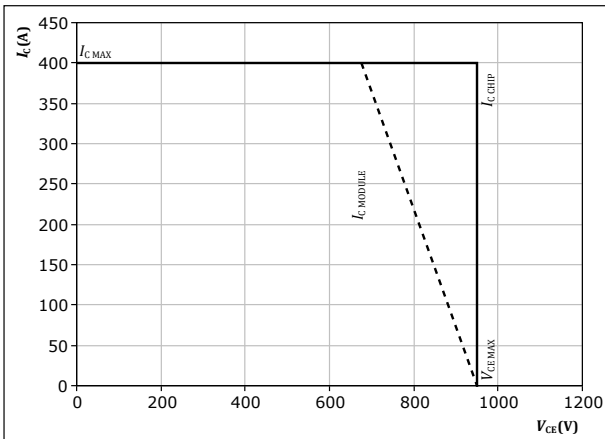


With an inductive load at

$V_{CE} = 600$ V	$T_j = 25$ °C
$V_{GE} = \pm 15$ V	$T_j = 125$ °C
$I_c = 170$ A	$T_j = 150$ °C

figure 25. IGBT

Reverse bias safe operating area
 $I_c = f(V_{CE})$



At $T_j = 150$ °C
 $R_{goff} = 8$ Ω
 $R_{goff} = 8$ Ω



Boost Switching Definitions

figure 26. IGBT

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

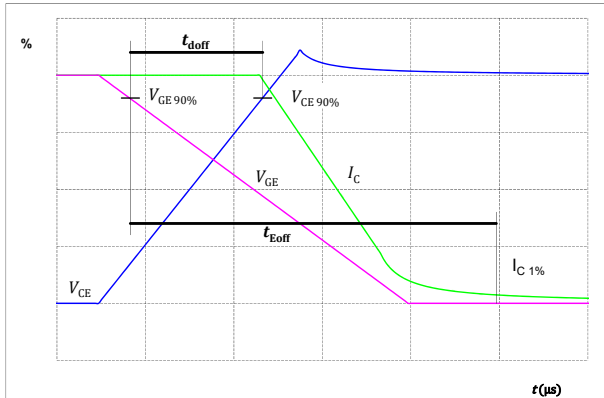


figure 27. IGBT

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

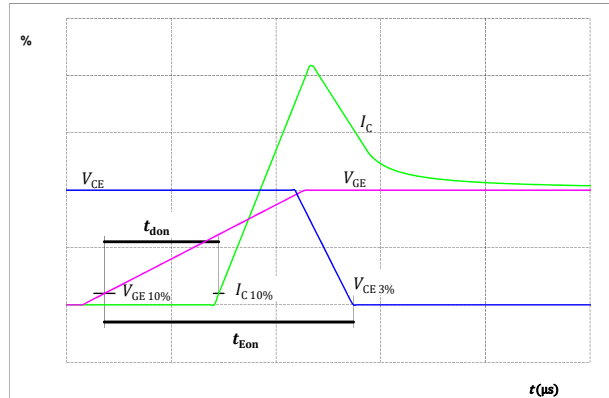


figure 28. IGBT

Turn-off Switching Waveforms & definition of t_f

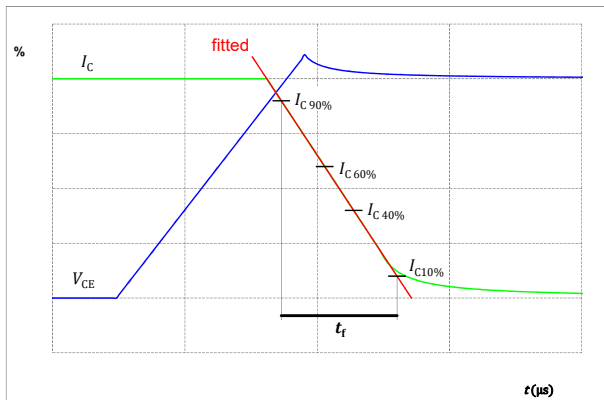
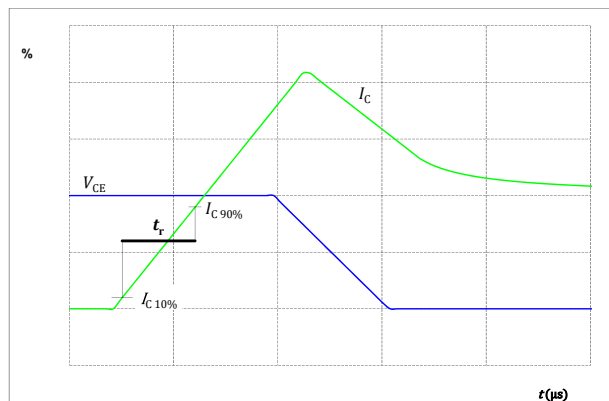


figure 29. IGBT

Turn-on Switching Waveforms & definition of t_r





Boost Switching Definitions

figure 30. FWD

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

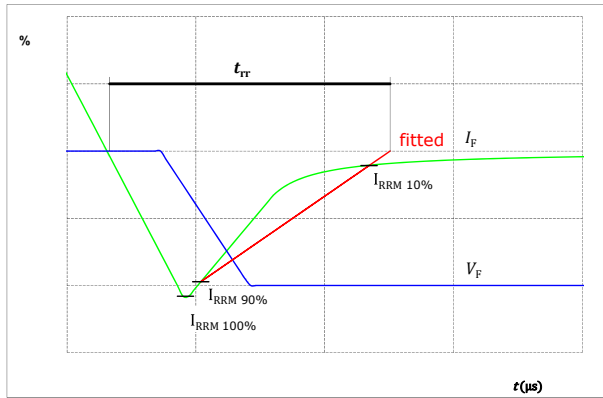
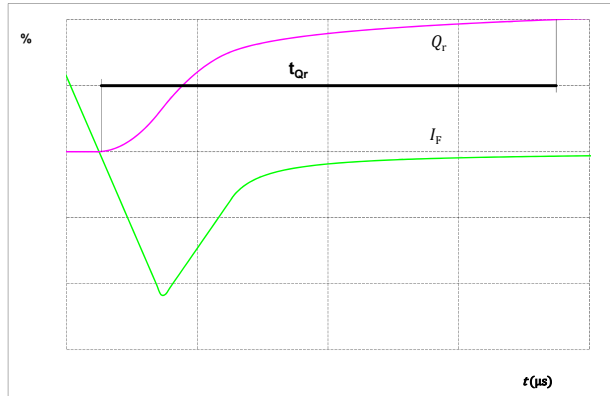


figure 31. FWD

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






30-PT10B2A200S706-PA79L98Y

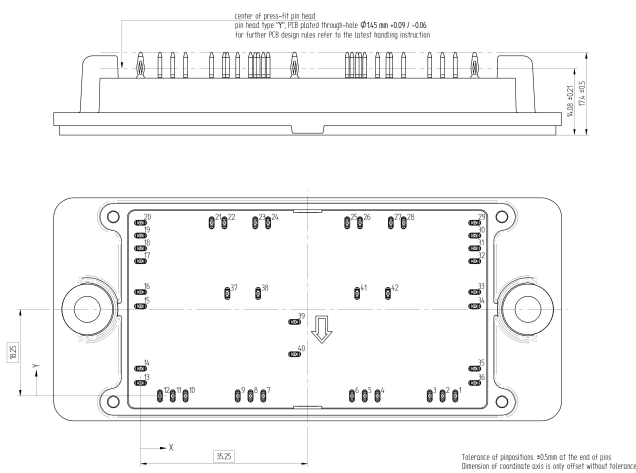
datasheet

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Ordering Code	
Version	Ordering Code
Without thermal paste	30-PT10B2A200S706-PA79L98Y
With thermal paste (3,4 W/mK, PSX-P7)	30-PT10B2A200S706-PA79L98Y-/3/

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

Pin table [mm]				Outline
Pin	X	Y	Function	
1	66,4	0	DC-Boost2	
2	63,7	0	DC-Boost2	
3	61	0	DC-Boost2	
4	50	0	DC+Boost2	
5	47,3	0	DC+Boost2	
6	44,6	0	DC+Boost2	
7	25,9	0	DC+Boost1	
8	23,2	0	DC+Boost1	
9	20,5	0	DC+Boost1	
10	9,5	0	DC-Boost1	
11	6,8	0	DC-Boost1	
12	4,1	0	DC-Boost1	
13	0	2,75	S17	
14	0	5,75	G17	
15	0	18,9	S15	
16	0	21,9	G15	
17	0	28,4	Boost1	
18	0	31,1	Boost1	
19	0	33,8	Boost1	
20	0	36,5	Boost1	
21	15	36,5	C12	
22	17,7	36,5	C12	
23	24,2	36,5	C11	
24	26,9	36,5	C11	
25	43,6	36,5	C21	
26	46,3	36,5	C21	
27	52,8	36,5	C22	
28	55,5	36,5	C22	
29	70,5	36,5	Boost2	
30	70,5	33,8	Boost2	
31	70,5	31,1	Boost2	
32	70,5	28,4	Boost2	
33	70,5	21,9	G25	
34	70,5	18,9	S25	
35	70,5	5,75	G27	
36	70,5	2,75	S27	
37	18,3	21,6	C12	
38	24,8	21,6	C11	
39	32,5	15,6	Therm1	
40	32,5	8,8	Therm2	
41	45,7	21,6	C21	
42	52,2	21,6	C22	

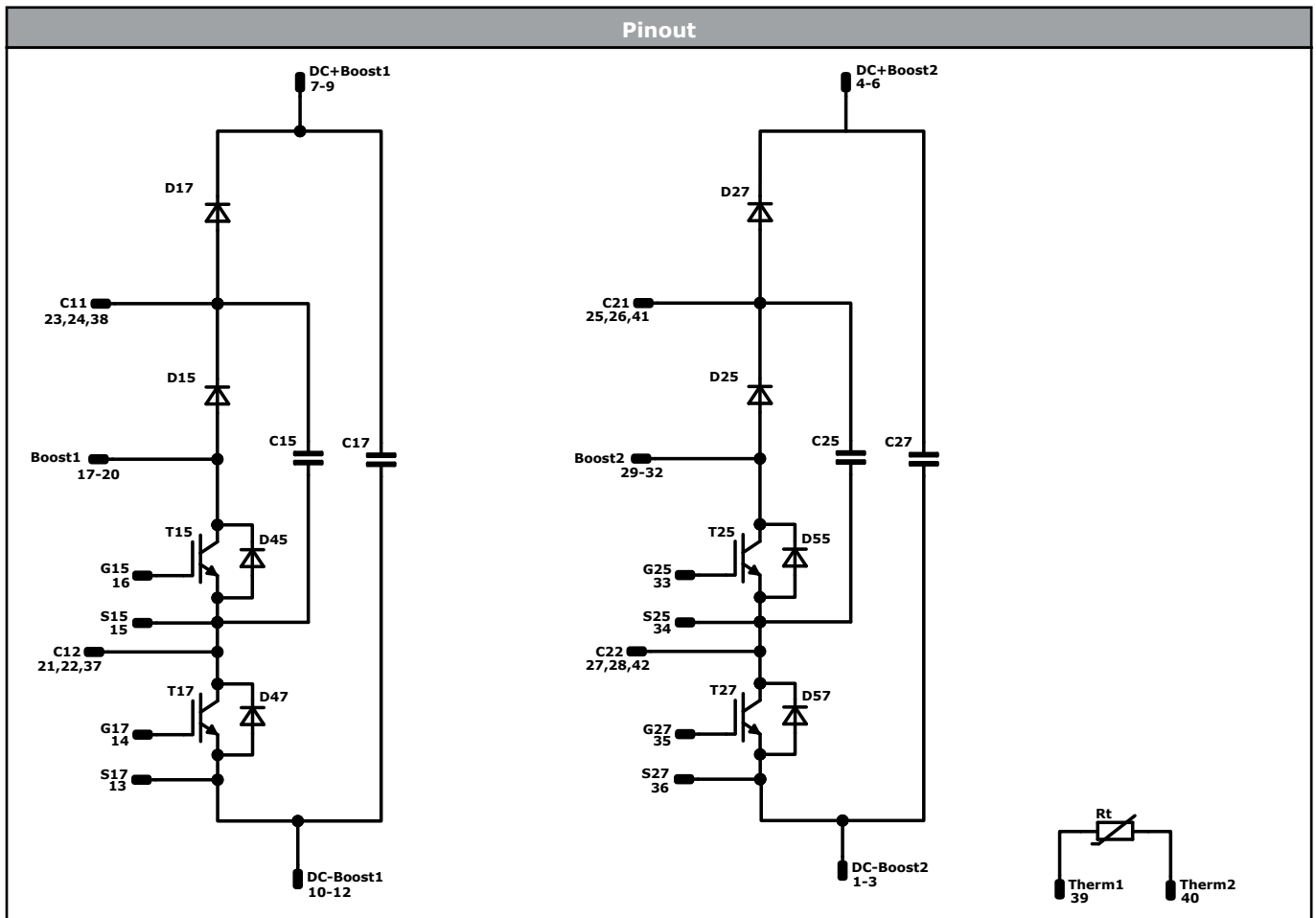


center of press-fit pin head
pin head type "Y" PCB plated through-hole $\phi 145 \text{ mm} \pm 0.09 \text{ J} - 0.06$
for further PCB design rules refer to the latest handling instruction

Tolerance of pinoffsets $\pm 0.5 \text{ mm}$ at the end of pins
Dimension of conductive axis is only offset without tolerance



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Identification					
ID	Component	Voltage	Current	Function	Comment
T15, T17, T25, T27	IGBT	950 V	200 A	Boost Switch	
D15, D17, D25, D27	FWD	950 V	200 A	Boost Diode	
D45, D47, D55, D57	FWD	1200 V	50 A	Boost Sw. Protection Diode	
C15, C25	Capacitor	1000 V		Flying Capacitor	
C17, C27	Capacitor	1500 V		Capacitor (DC)	
Rt	Thermistor			Thermistor	




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Packaging instruction				
Standard packaging quantity (SPQ) 36	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for <i>flow 2</i> packages see vincotech.com website.

Package data
Package data for <i>flow 2</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
30-PT10B2A200S706-PA79L98Y-D1-14	26 Oct. 2021	Initial Release	

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