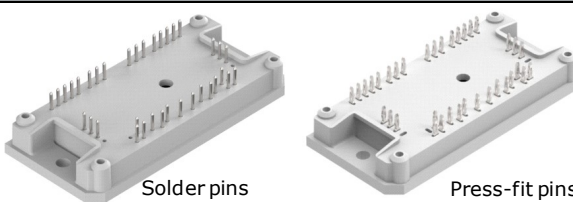
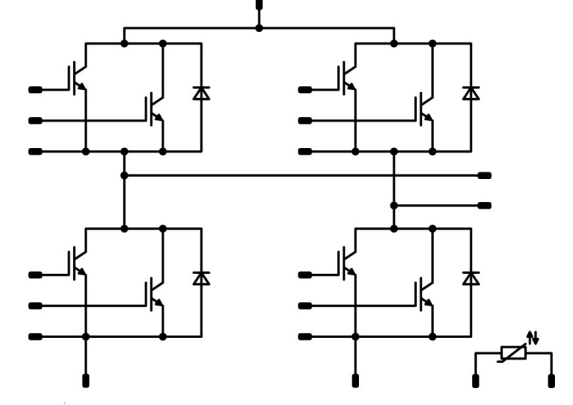




Vincotech

10-FY124PA080FV-L589F88
10-PY124PA080FV-L589F88Y
 datasheet

flow PACK 1 H		1200 V / 80 A
Features • High speed IGBT • Fast, soft reverse Diode • Open emitter topology • Integrated thermistor		flow 1 12 mm housing  Solder pins Press-fit pins
Target applications • Charging Stations • Power Supply • Solar Inverters • Welding & Cutting		Schematic 
Types • 10-FY124PA080FV-L589F88 • 10-PY124PA080FV-L589F88Y		

Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
H-Bridge Switch - Lo side / H-Bridge Switch - Hi side				
Collector-emitter voltage	V_{CES}		1200	V
Collector current	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	92	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	320	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	179	W
Gate-emitter voltage	V_{GES}		± 20	V
Maximum junction temperature	T_{jmax}		175	°C



Vincotech

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 datasheet

Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
H-Bridge Diode - Lo side / H-Bridge Diode - Hi side				
Peak repetitive reverse voltage	V_{RRM}		1200	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	46	A
Surge (non-repetitive) forward current	I_{FSM}	50 Hz Single Half Sine Wave $t_p = 8,3\text{ ms}$ $T_j = 150\text{ °C}$	270	A
Surge current capability	I^2t		365	A ² s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	94	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* $t_p = 2\text{ s}$	6000	V
		AC Voltage $t_p = 1\text{ min}$	2500	V
Creepage distance		Press-fit pins / Solder pins	min. 12,7	mm
Clearance		Press-fit pins	7,92	mm
		Solder pins	8,1	mm
Comparative Tracking Index	CTI		> 200	

*100 % tested in production



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 datasheet

Characteristic Values

Parameter	Symbol	Conditions					Value			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	

H-Bridge Switch - Lo side / H-Bridge Switch - Hi side

Static

Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,08	25	5	6,2	7,3	V
Collector-emitter saturation voltage	V_{CEsat}		15		80	25 125 150	1,5	1,65 1,77 1,79	2,5	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			100	µA
Gate-emitter leakage current	I_{GES}		25	0		25			500	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}	$f = 1 \text{ MHz}$	0	30	25			8600		pF
Output capacitance	C_{oes}							360		
Reverse transfer capacitance	C_{res}							200		
Gate charge	Q_g		15	600	80	25		740		nC

Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4 \text{ W/mK (PSX)}$						0,53		K/W
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Dynamic

Turn-on delay time	$t_{d(on)}$	$R_{goff} = 4 \Omega$ $R_{gon} = 4 \Omega$	± 15	600	80	25 125 150		148 149 148		ns
Rise time	t_r					25 125 150		24 30 32		
Turn-off delay time	$t_{d(off)}$					25 125 150		215 264 279		
Fall time	t_f					25 125 150		10 27 30		
Turn-on energy (per pulse)	E_{on}					25 125 150		4,25 6,67 7,34		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		1,97 3,97 4,65		



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 datasheet

Characteristic Values

Parameter	Symbol	Conditions					Value			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	

H-Bridge Diode - Lo side / H-Bridge Diode - Hi side

Static

Forward voltage	V_F				50	25 125 150		2,21 2,31 2,22	2,54	V
Reverse leakage current	I_R			1200		25 150			60 8800	μA

Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4 \text{ W/mK (PSX)}$						1,02		K/W
-------------------------------------	---------------	--	--	--	--	--	--	------	--	-----

Dynamic

Peak recovery current	I_{RRM}	$di/dt = 3891 \text{ A/}\mu\text{s}$ $di/dt = 1748 \text{ A/}\mu\text{s}$ $di/dt = 1648 \text{ A/}\mu\text{s}$	± 15	600	80	25 125 150		59 61 63		A
Reverse recovery time	t_{rr}					25 125 150		249 474 555		ns
Recovered charge	Q_r					25 125 150		4,93 9,37 11,31		μC
Reverse recovered energy	E_{rec}					25 125 150		1,83 3,75 4,57		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 125 150		1170 575 489		A/μs

Thermistor

Rated resistance	R					25		22		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	$R_{100} = 1484 \Omega$				100	-5		5	%
Power dissipation	P					25		5		mW
Power dissipation constant						25		1,5		mW/K
B-value	$B_{(25/50)}$	Tol. $\pm 1 \%$				25		3962		K
B-value	$B_{(25/100)}$	Tol. $\pm 1 \%$				25		4000		K
Vincotech NTC Reference									I	



Vincotech

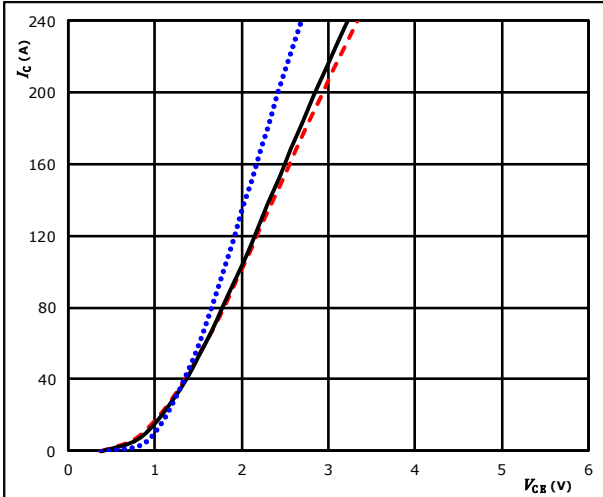
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10-PY124PA080FV-L589F88Y
datasheet

H-Bridge Switch - Lo side / H-Bridge Switch - Hi side Characteristics

figure 1. IGBT

Typical output characteristics

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

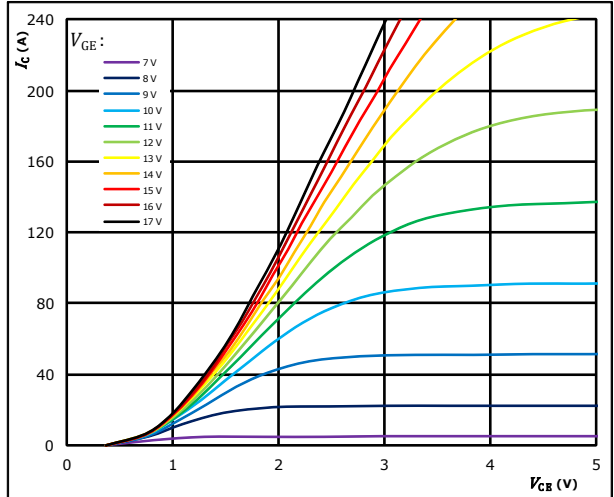


$t_p = 250 \mu s$
 $V_{GE} = 15 V$
 $T_j: 25 \text{ } ^\circ C$ (blue dotted line)
 $125 \text{ } ^\circ C$ (black solid line)
 $150 \text{ } ^\circ C$ (red dashed line)

figure 2. IGBT

Typical output characteristics

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

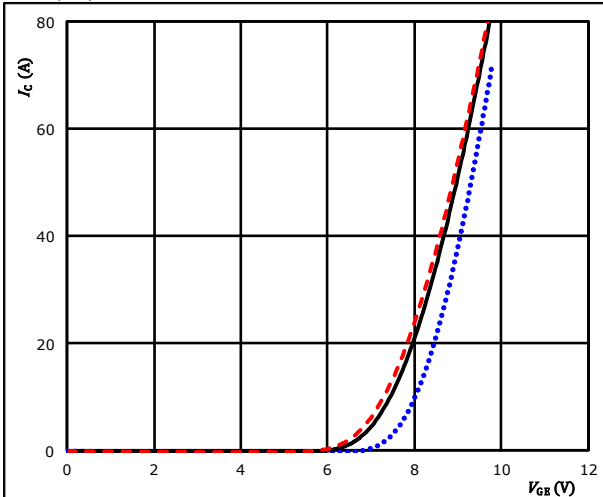


$t_p = 250 \mu s$
 $T_j = 150 \text{ } ^\circ C$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. IGBT

Typical transfer characteristics

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

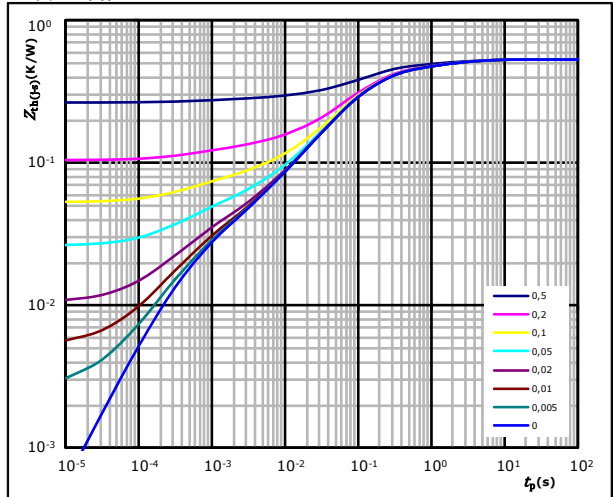


$t_p = 100 \mu s$
 $V_{CE} = 10 V$
 $T_j: 25 \text{ } ^\circ C$ (blue dotted line)
 $125 \text{ } ^\circ C$ (black solid line)
 $150 \text{ } ^\circ C$ (red dashed line)

figure 4. IGBT

Transient thermal impedance as function of pulse duration

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



$D = t_p / T$
 $R_{th(j-s)} = 0,53 \text{ K/W}$
IGBT thermal model values

$R \text{ (K/W)}$	$\tau \text{ (s)}$
6,58E-02	2,46E+00
9,27E-02	4,63E-01
2,62E-01	1,02E-01
6,13E-02	3,27E-02
2,32E-02	6,17E-03
1,53E-02	9,03E-04
9,83E-03	3,05E-04



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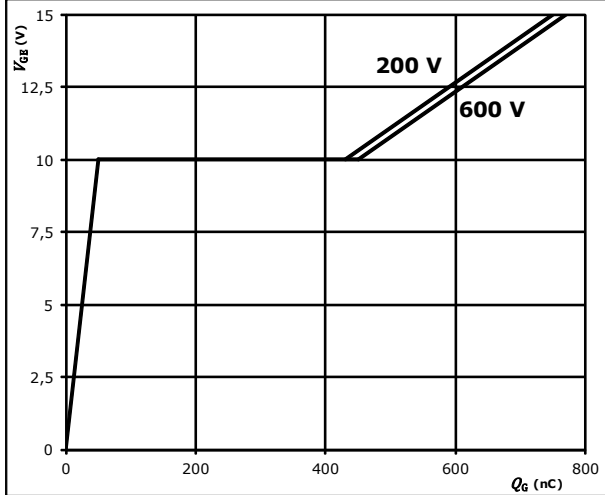
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10-PY124PA080FV-L589F88Y
 datasheet

H-Bridge Switch - Lo side / H-Bridge Switch - Hi side Characteristics

figure 5. IGBT

Gate voltage vs gate charge

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

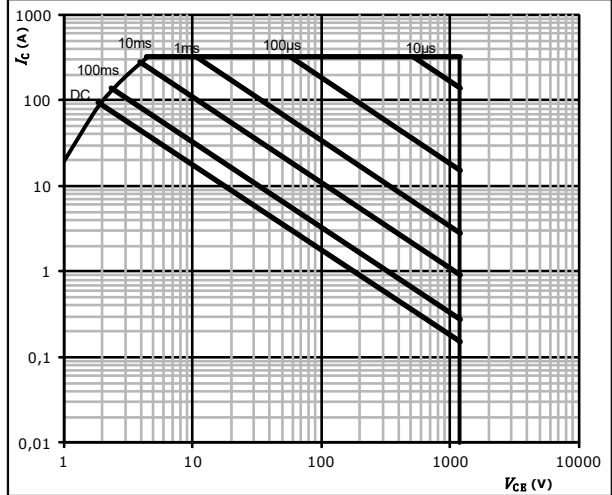


$I_C = 80$ A

figure 6. IGBT

Safe operating area

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



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



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 datasheet

H-Bridge Diode - Lo side / H-Bridge Diode - Hi side Characteristics

figure 1. FWD

Typical forward characteristics

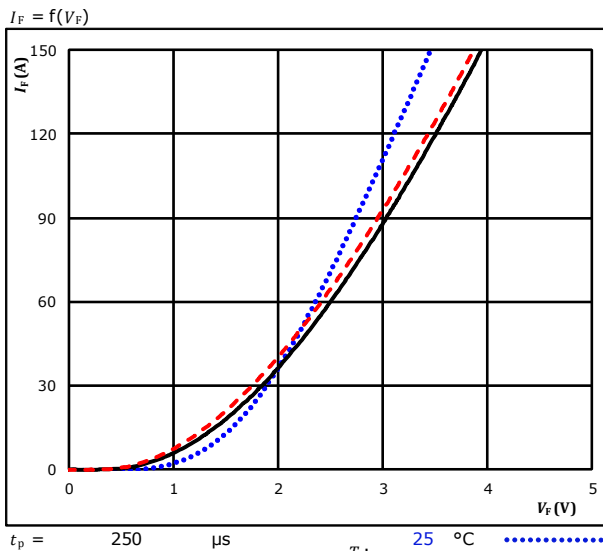
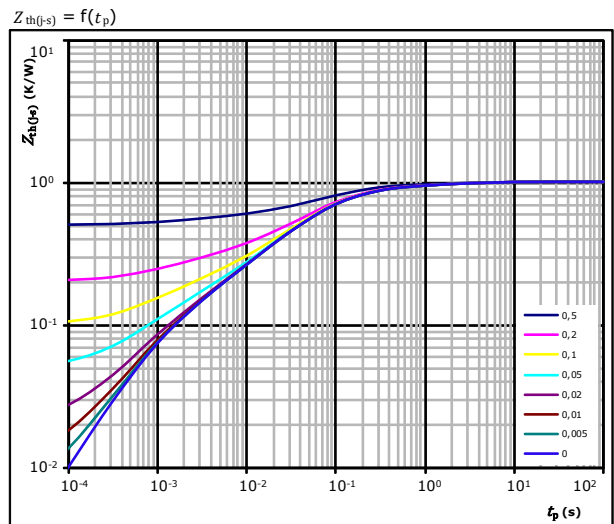


figure 2. FWD

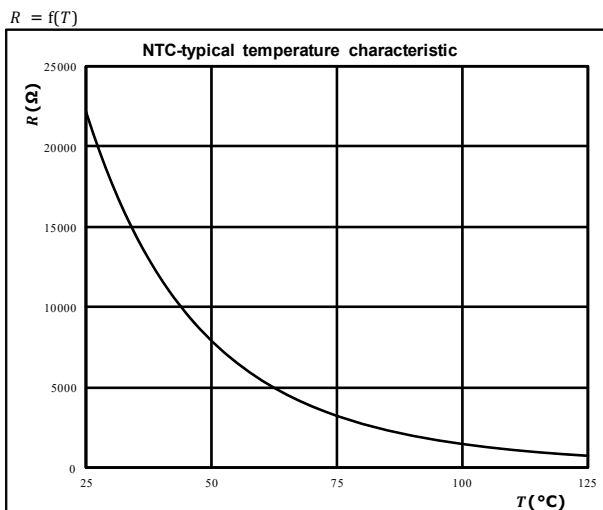
Transient thermal impedance as a function of pulse width



Thermistor Characteristics

figure 1. Thermistor

Typical NTC characteristic as a function of temperature





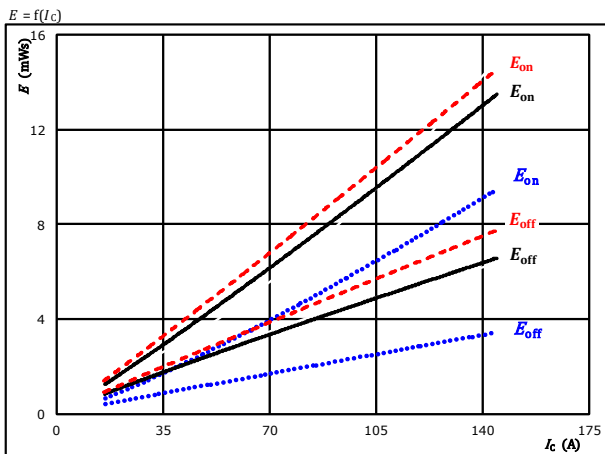
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 datasheet

H-Bridge Switch - Lo side / H-Bridge Switch - Hi side Characteristics

figure 1. IGBT

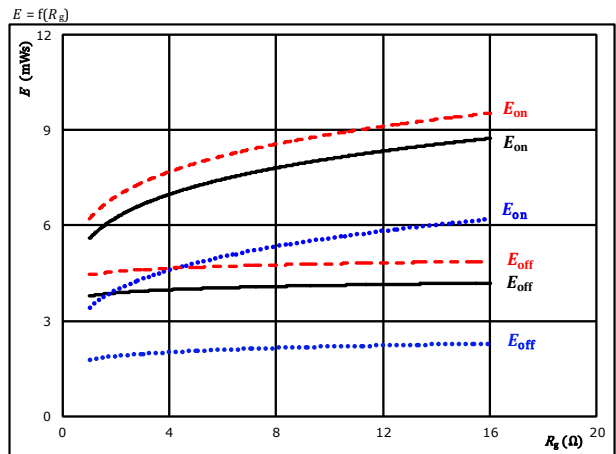
Typical switching energy losses as a function of collector current



With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 4$ Ω
 $R_{goff} = 4$ Ω
 T_J : 25 °C (blue dotted), 125 °C (black solid), 150 °C (red dashed)

figure 2. IGBT

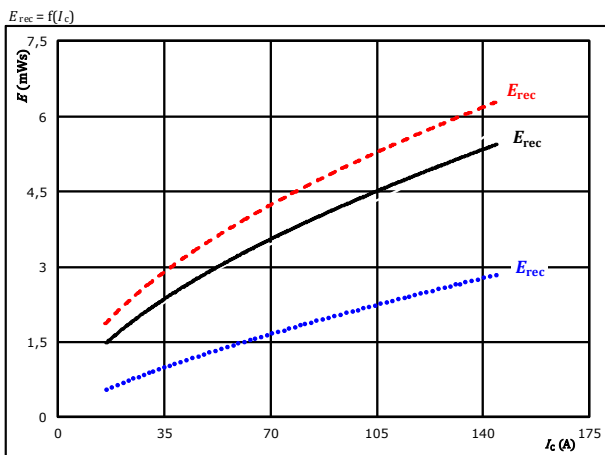
Typical switching energy losses as a function of gate resistor



With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 80$ A
 T_J : 25 °C (blue dotted), 125 °C (black solid), 150 °C (red dashed)

figure 3. FWD

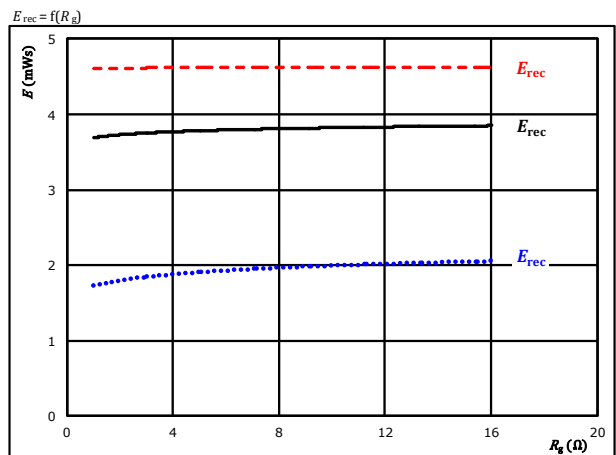
Typical reverse recovered energy loss as a function of collector current



With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 4$ Ω
 T_J : 25 °C (blue dotted), 125 °C (black solid), 150 °C (red dashed)

figure 4. FWD

Typical reverse recovered energy loss as a function of gate resistor



With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 80$ A
 T_J : 25 °C (blue dotted), 125 °C (black solid), 150 °C (red dashed)



Vincotech

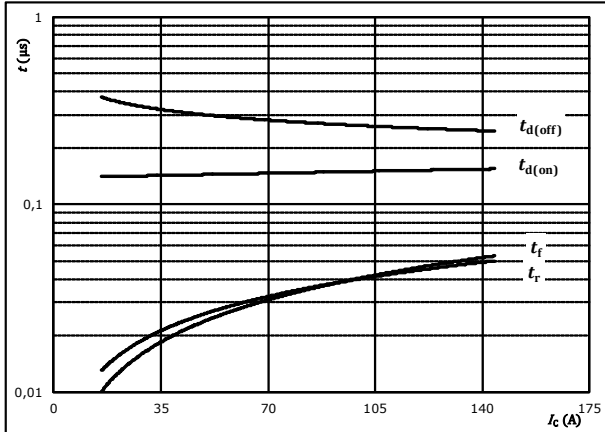
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datasheet

H-Bridge Switch - Lo side / H-Bridge Switch - Hi side Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$$t = f(I_C)$$



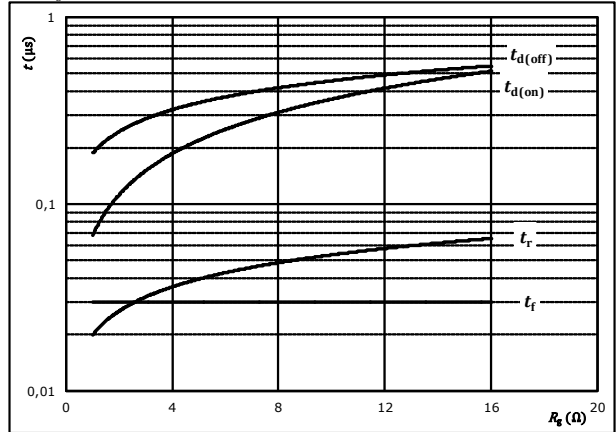
With an inductive load at

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

figure 6. IGBT

Typical switching times as a function of gate resistor

$$t = f(R_g)$$



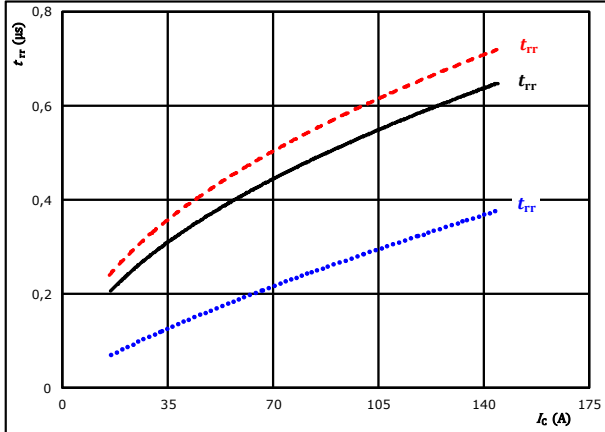
With an inductive load at

$T_j =$	150	°C
$V_{CE} =$	600	V
$V_{GE} =$	±15	V
$I_C =$	80	A

figure 7. FWD

Typical reverse recovery time as a function of collector current

$$t_{rr} = f(I_C)$$

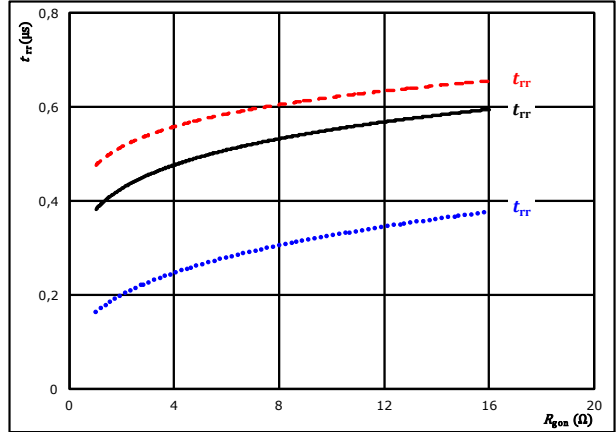


At	$V_{CE} =$	600	V	$T_j:$	25 °C	
	$V_{GE} =$	±15	V		125 °C	————
	$R_{gon} =$	4	Ω		150 °C	-----

figure 8. FWD

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

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



At	$V_{CE} =$	600	V	$T_j:$	25 °C	
	$V_{GE} =$	±15	V		125 °C	————
	$I_C =$	80	A		150 °C	-----



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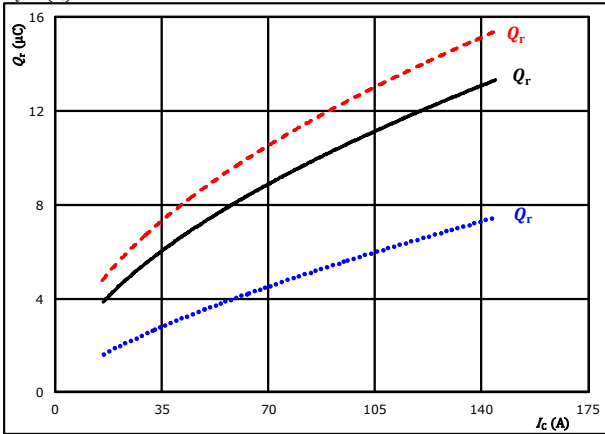
10-FY124PA080FV-L589F88
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 datasheet

H-Bridge Switch - Lo side / H-Bridge Switch - Hi side Characteristics

figure 9. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_C)$$

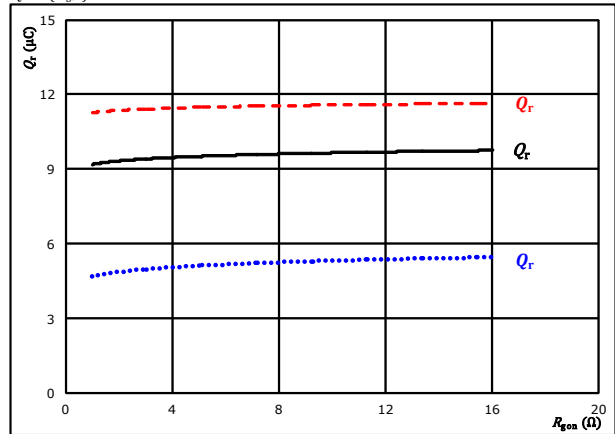


At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 4$ Ω
 T_j : 25 °C (dotted blue), 125 °C (solid black), 150 °C (dashed red)

figure 10. FWD

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

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

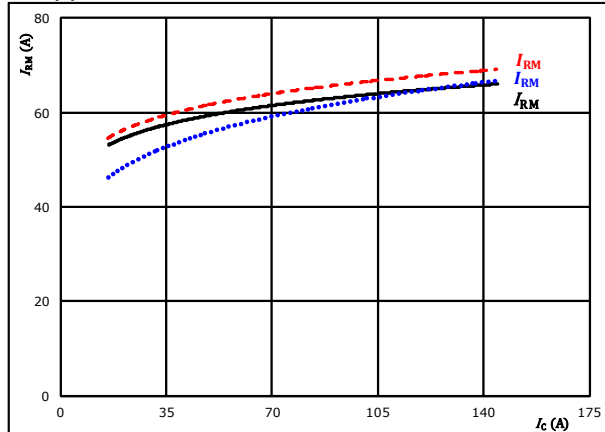


At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 80$ A
 T_j : 25 °C (dotted blue), 125 °C (solid black), 150 °C (dashed red)

figure 11. FWD

Typical peak reverse recovery current as a function of collector current

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

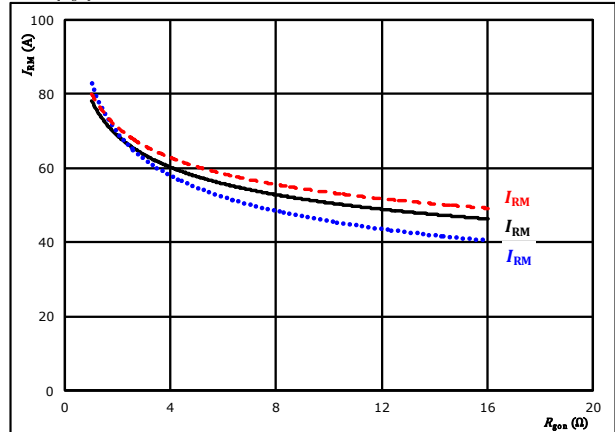


At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 4$ Ω
 T_j : 25 °C (dotted blue), 125 °C (solid black), 150 °C (dashed red)

figure 12. FWD

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

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



At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 80$ A
 T_j : 25 °C (dotted blue), 125 °C (solid black), 150 °C (dashed red)



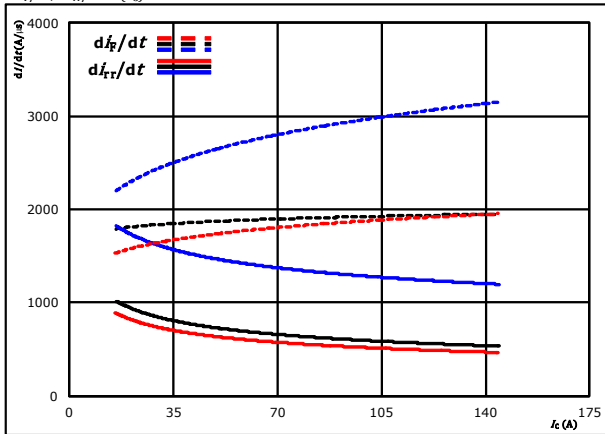
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 datasheet

H-Bridge Switch - Lo side / H-Bridge Switch - Hi side Characteristics

figure 13. FWD

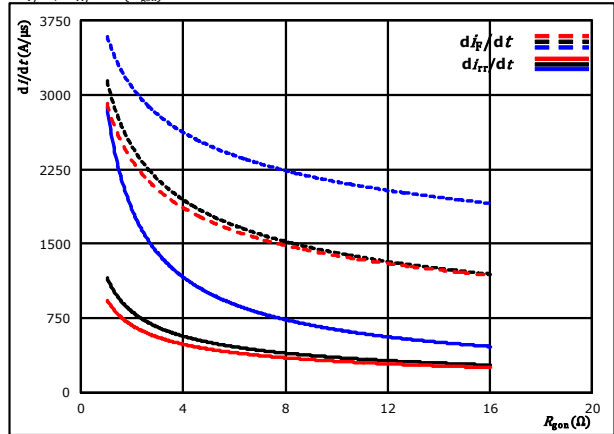
Typical rate of fall of forward and reverse recovery current as a function of collector current
 $di_F/dt, di_{rr}/dt = f(I_C)$



At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{g0n} = 4$ Ω
 $T_J = 25$ °C (blue dotted)
 $T_J = 125$ °C (black solid)
 $T_J = 150$ °C (red dashed)

figure 14. FWD

Typical rate of fall of forward and reverse recovery current as a function of IGBT turn on gate resistor
 $di_F/dt, di_{rr}/dt = f(R_{g0n})$

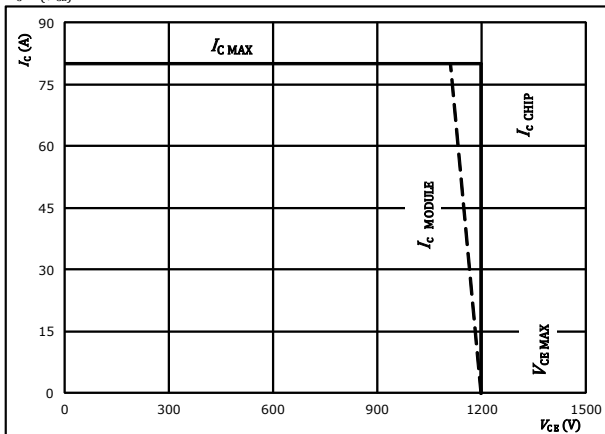


At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 80$ A
 $T_J = 25$ °C (blue dotted)
 $T_J = 125$ °C (black solid)
 $T_J = 150$ °C (red dashed)

figure 15. IGBT

Reverse bias safe operating area

$I_C = f(V_{CE})$



At $T_J = 175$ °C
 $R_{g0n} = 4$ Ω
 $R_{g0ff} = 4$ Ω



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 datasheet

H-Bridge Switch - Lo side / H-Bridge Switch - Hi side Characteristics

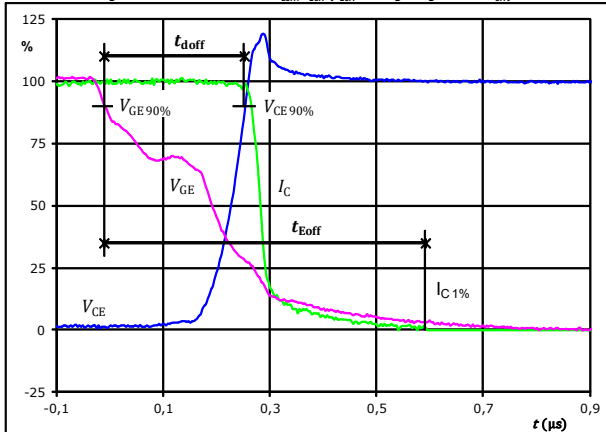
General conditions

T_j	=	125 °C
R_{gon}	=	4 Ω
R_{goff}	=	4 Ω

figure 1.

IGBT

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

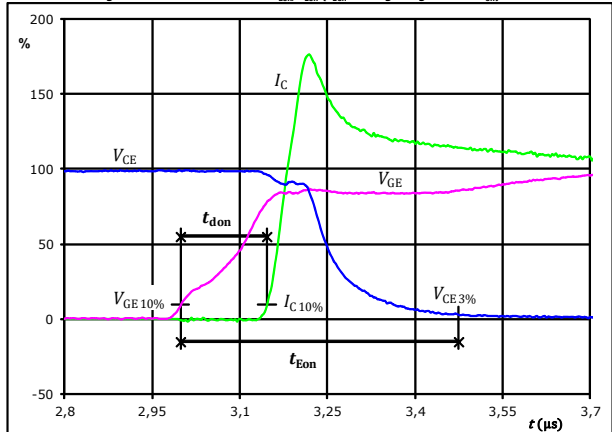


$V_{GE}(0\%) =$	-15	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	600	V
$I_C(100\%) =$	80	A
$t_{doff} =$	0,264	μs
$t_{Eoff} =$	0,603	μs

figure 2.

IGBT

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

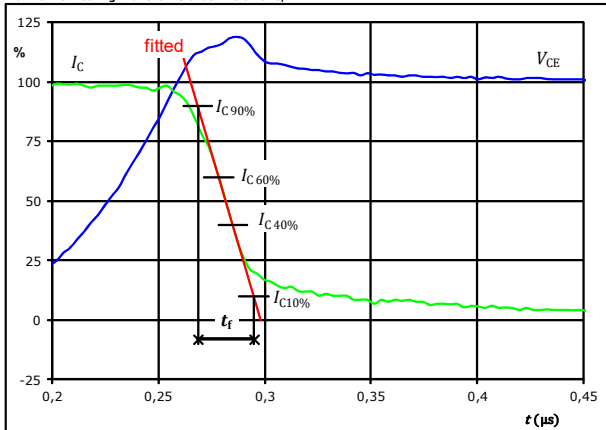


$V_{GE}(0\%) =$	-15	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	600	V
$I_C(100\%) =$	80	A
$t_{don} =$	0,149	μs
$t_{Eon} =$	0,476	μs

figure 3.

IGBT

Turn-off Switching Waveforms & definition of t_f

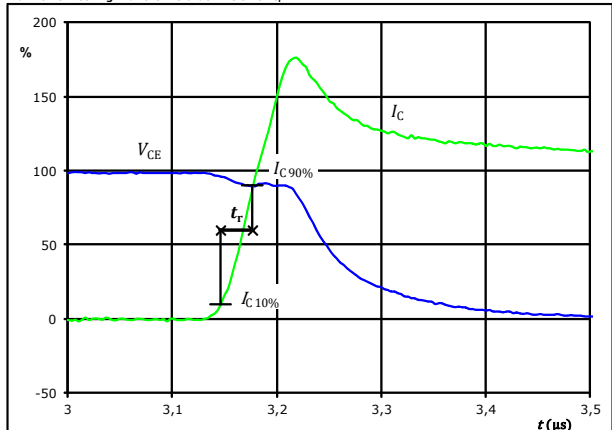


$V_C(100\%) =$	600	V
$I_C(100\%) =$	80	A
$t_f =$	0,027	μs

figure 4.

IGBT

Turn-on Switching Waveforms & definition of t_r



$V_C(100\%) =$	600	V
$I_C(100\%) =$	80	A
$t_r =$	0,030	μs



Vincotech

10-FY124PA080FV-L589F88 10-PY124PA080FV-L589F88Y datasheet

H-Bridge Switch - Lo side / H-Bridge Switch - Hi side Characteristics

figure 5. IGBT

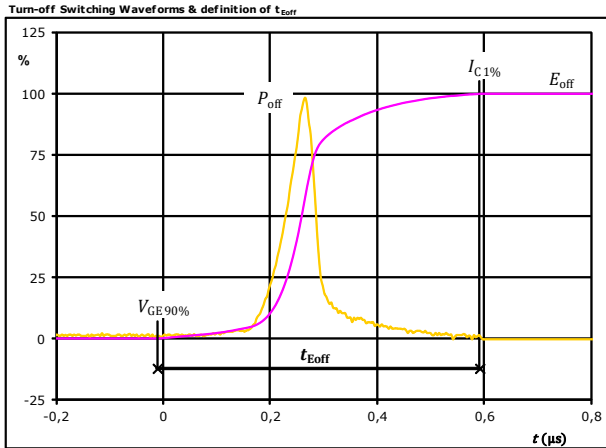


figure 6. IGBT

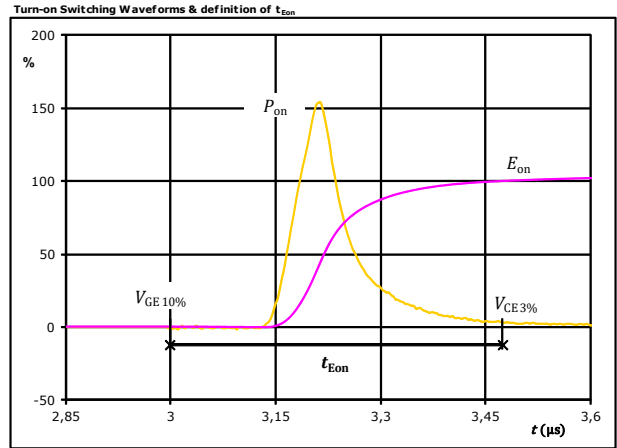
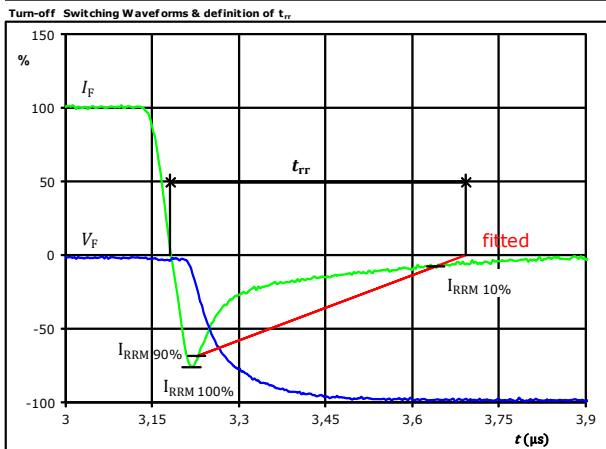


figure 7. FWD



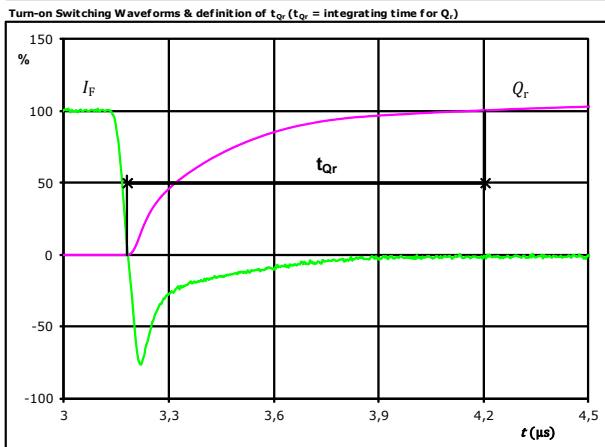


Vincotech

10-FY124PA080FV-L589F88
10-PY124PA080FV-L589F88Y
datasheet

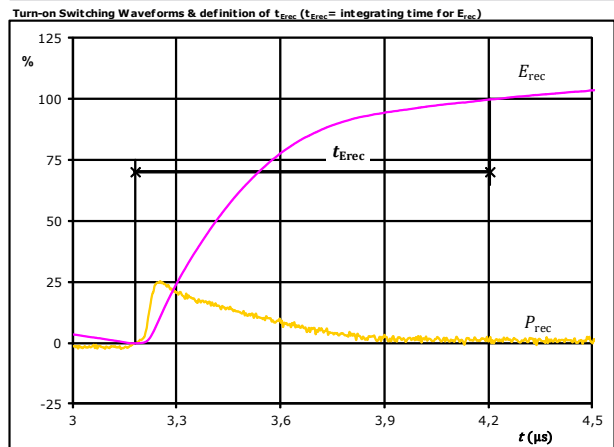
H-Bridge Switch - Lo side / H-Bridge Switch - Hi side Characteristics

figure 8. FWD



I_F (100%) = 80 A
 Q_r (100%) = 9,37 μ C
 t_{Qr} = 1,02 μ s

figure 9. FWD



P_{rec} (100%) = 48,24 kW
 E_{rec} (100%) = 3,75 mJ
 t_{Erec} = 1,02 μ s



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Ordering Code & Marking							
Version				Ordering Code			
without thermal paste 12 mm housing with solder pins				10-FY124PA080FV-L589F88			
without thermal paste 12 mm housing with solder pins and Press-fit pins				10-PY124PA080FV-L589F88Y			
with thermal paste 12 mm housing with solder pins				10-FY124PA080FV-L589F88-/3/			
with thermal paste 12 mm housing with Press-fit pins				10-PY124PA080FV-L589F88Y-/3/			
	Text	Name		Date code	UL & VIN	Lot	Serial
		NN-NNNNNNNNNNNN-TTTTTWW		WWYY	UL VIN	LLLLL	SSSS
	Datamatrix	Type&Ver	Lot number	Serial	Date code		
		TTTTTWW	LLLLL	SSSS	WWYY		

Pin table			
Pin	X	Y	Function
1	Not assembled		
2	46,3	0	DC-2
3	43,6	2,7	DC-2
4	43,6	0	DC-2
5	39,2	1	G13-a
6	36,2	0	S13
7	33,2	1	G13-b
8	28,8	0	Therm2
9	23,8	0	Therm1
10	19,4	1	G11-b
11	16,4	0	S11
12	13,4	1	G11-a
13	9	2,7	DC-1
14	9	0	DC-1
15	Not assembled		
16	6,3	0	DC-1
17	Not assembled		
18	0	9,5	DC+
19	0	12,2	DC+
20	0	14,9	DC+
21	0	28,6	Ph1
22	2,7	28,6	Ph1
23	5,4	28,6	Ph1
24	8,1	28,6	Ph1
25	10,8	28,6	Ph1
26	15,25	28,6	G12-a
27	18,25	28,6	S12
28	21,25	28,6	G12-b
29	31,35	28,6	G14-b
30	34,35	28,6	S14
31	37,35	28,6	G14-a
32	41,8	28,6	Ph2
33	44,5	28,6	Ph2
34	47,2	28,6	Ph2
35	49,9	28,6	Ph2
36	52,6	28,6	Ph2
37	52,6	14,9	DC+
38	52,6	12,2	DC+
39	52,6	9,5	DC+
40	Not assembled		

Solder pins

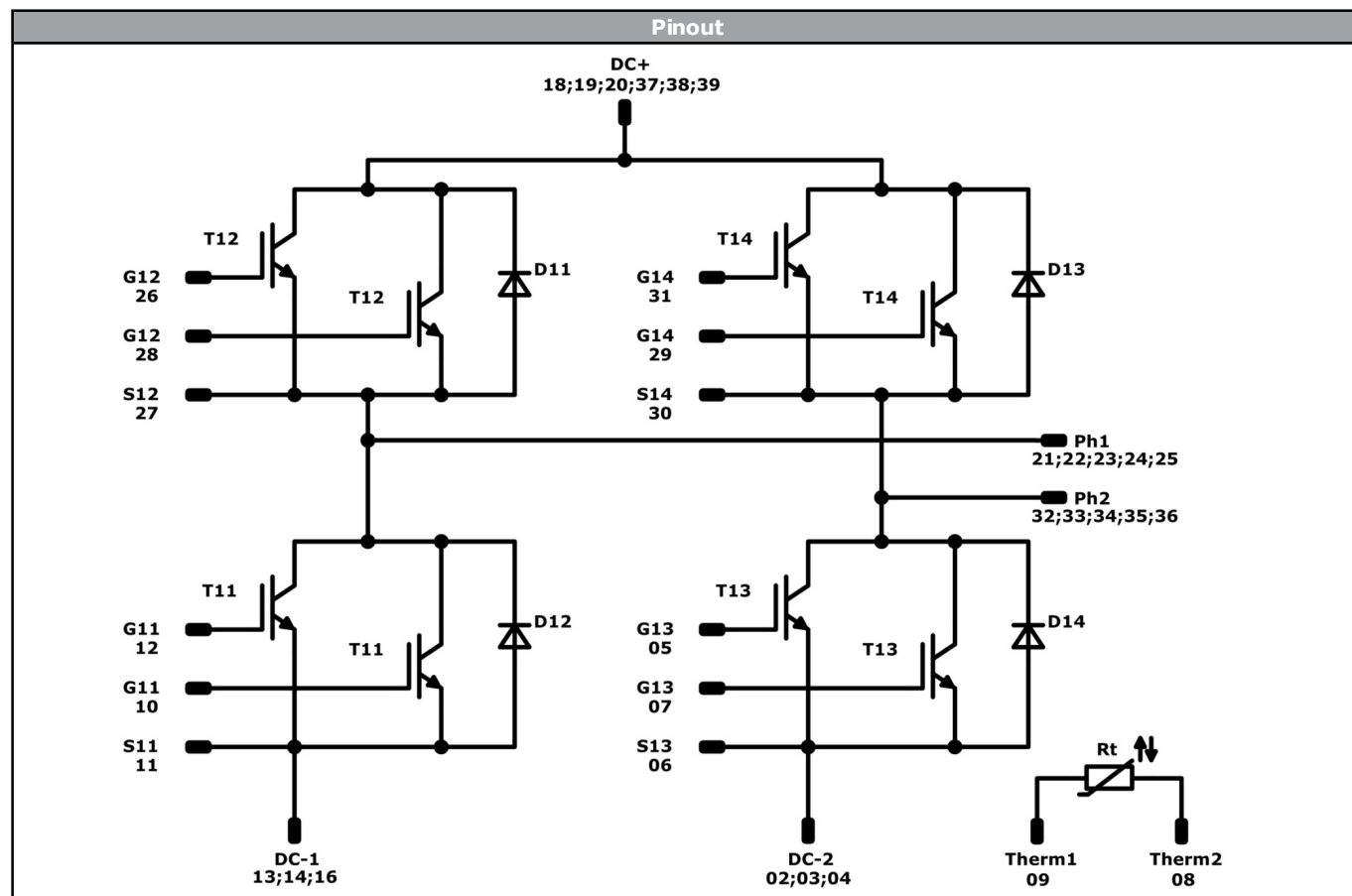
Press-fit pins

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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Identification					
ID	Component	Voltage	Current	Function	Comment
T11, T13	IGBT	1200 V	80 A	H-Bridge Switch - Lo side	Parallel devices with separate control. Values apply to complete device.
D12, D14	FWD	1200 V	50 A	H-Bridge Diode - Lo side	
T12, T14	IGBT	1200 V	80 A	H-Bridge Switch - Hi side	Parallel devices with separate control. Values apply to complete device.
D11, D13	FWD	1200 V	50 A	H-Bridge Diode - Hi side	
Rt	NTC			Thermistor	



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Packaging instruction			
Standard packaging quantity (SPQ) 100	>SPQ	Standard	<SPQ Sample

Handling instruction
Handling instructions for <i>flow 1</i> packages see vincotech.com website.

Package data
Package data for <i>flow 1</i> packages see 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
10-XY124PA080FV-L589F88x-D3-14	12 Mar. 2019	Correction of I_c/I_f values	1

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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.