



Vincotech

fastPACK 1 H C
650 V / 100 A

Features

- High-efficient H-Bridge
- Open emitter topology
- Integrated capacitors
- Integrated thermistor

Target applications

- Power Supply

Types

- 10-FY074PA100RG02-L583F88
- 10-PY074PA100RG02-L583F88Y

flow 1 12 mm housing

Solder pins
Press-fit pins

Schematic

Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
H-Bridge Switch				
Collector-emitter voltage	V_{CES}		650	V
Collector current	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	78	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	400	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	125	W
Gate-emitter voltage	V_{GES}		± 30	V
Maximum junction temperature	T_{jmax}		175	°C



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Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
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H-Bridge Diode

Peak repetitive reverse voltage	V_{RRM}		650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	57	A
Repetitive peak forward current	I_{FRM}		320	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	80	W
Maximum junction temperature	T_{jmax}		175	°C

Capacitor (DC)

Maximum DC voltage	V_{MAX}		630	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
		AC Voltage $t_p = 1\text{ min}$	2500	V
Creepage distance			min. 12,7	mm
Clearance		Solder pin / Press-fit pin	7,66 / 7,92	mm
Comparative Tracking Index	CTI		> 200	

*100 % tested in production



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10-FY074PA100RG02-L583F88
10-PY074PA100RG02-L583F88Y
 datasheet

Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
		V_{GS} [V]	V_{GE} [V]	V_{DS} [V]	I_D [A]	T_j [°C]	Min	Typ	Max	

H-Bridge Switch

Static

Parameter	Symbol	V_{GS} [V]	V_{GE} [V]	V_{DS} [V]	I_D [A]	T_j [°C]	Min	Typ	Max	Unit
Gate-emitter threshold voltage	$V_{GE(th)}$	5			0,066	25	5	6	7	V
Collector-emitter saturation voltage	V_{CESat}	15			100	25 125 150		1,50 1,65 1,69	1,9	V
Collector-emitter cut-off current	I_{CES}	0	650			25			20	μA
Gate-emitter leakage current	I_{GES}	30	0			25			400	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}							8400		pF
Output capacitance	C_{oes}	$f = 1$ Mhz	0	30		25		208		
Reverse transfer capacitance	C_{res}							158		
Gate charge	Q_g	15	400	100		25		282		nC

Thermal

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)				0,76 K/W

Dynamic

Parameter	Symbol	Conditions	25	125	150	Unit	
Turn-on delay time	$t_{d(on)}$	$R_{gon} = 4 \Omega$ $R_{goff} = 4 \Omega$	46	46	47	ns	
Rise time	t_r		9	9	9		
Turn-off delay time	$t_{d(off)}$		133	138	142		
Fall time	t_f		21	53	52		
Turn-on energy (per pulse)	E_{on}		0,607	0,688	0,753		mWs
Turn-off energy (per pulse)	E_{off}		1,306	1,698	1,818		



Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
		V_{GS} [V]	V_{GE} [V]	V_{DS} [V]	I_D [A]	T_j [°C]	Min	Typ	Max	

H-Bridge Diode

Static

Forward voltage	V_F				80	25 125 150		1,55 1,62 1,62	1,9	V
Reverse leakage current	I_R			650		25			10	μA

Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						1,18		K/W
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Dynamic

Peak recovery current	I_{RRM}					25 125 150		212 219 224		A
Reverse recovery time	t_{rr}					25 125 150		34 44 46		ns
Recovered charge	Q_r	$di/dt = 15510$ A/ μs $di/dt = 14137$ A/ μs $di/dt = 13715$ A/ μs	-5 / 15	350	100	25 125 150		4,003 5,474 5,974		μC
Reverse recovered energy	E_{rec}					25 125 150		0,939 1,406 1,528		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 125 150		16066 13355 12729		A/μs

Capacitor (DC)

Capacitance	C							200		nF
Tolerance								-10	+10	%
Dissipation factor		$f = 1$ kHz					25		2,5	%

Thermistor

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

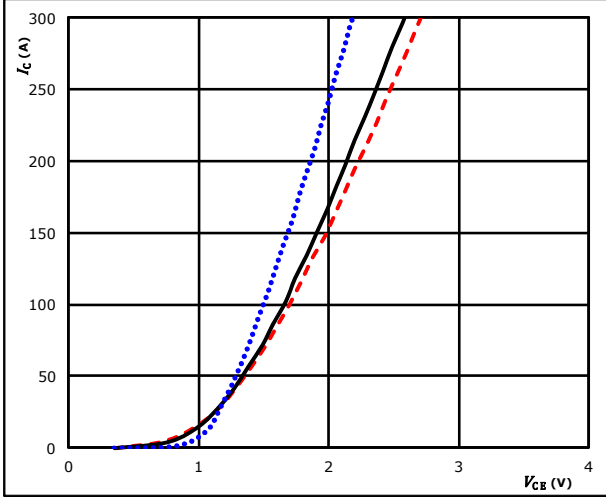


H-Bridge Switch Characteristics

figure 1. IGBT

Typical output characteristics

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

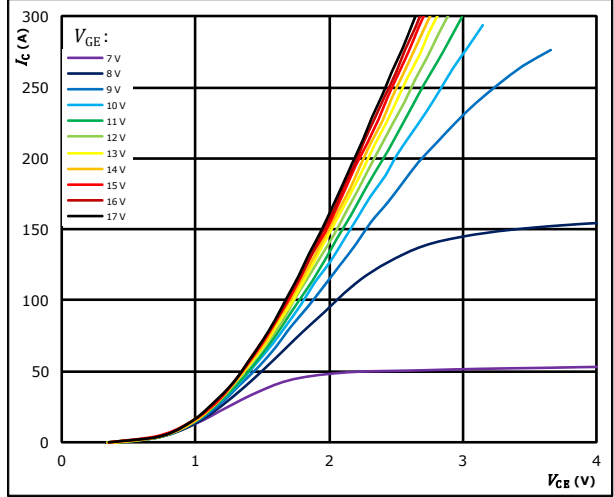


$t_p = 250 \mu\text{s}$ $T_j: 25 \text{ }^\circ\text{C}$ (blue dotted line)
 $V_{GE} = 15 \text{ V}$ $T_j: 125 \text{ }^\circ\text{C}$ (black solid line)
 $T_j: 150 \text{ }^\circ\text{C}$ (red dashed line)

figure 2. IGBT

Typical output characteristics

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

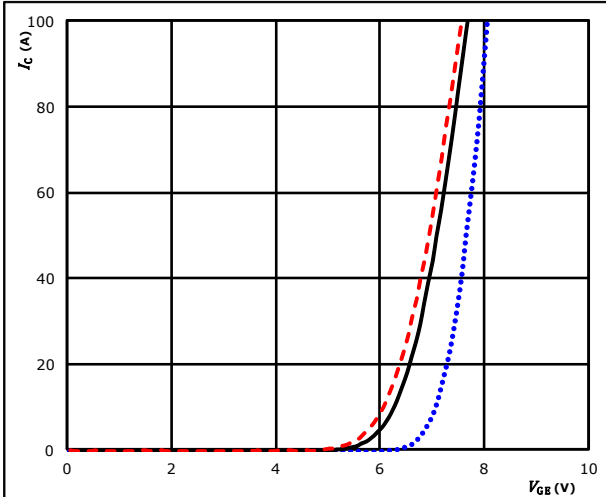


$t_p = 250 \mu\text{s}$ $T_j = 150 \text{ }^\circ\text{C}$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. IGBT

Typical transfer characteristics

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

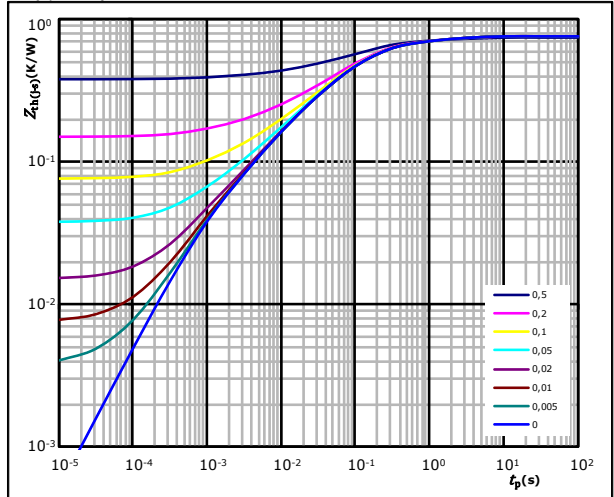


$t_p = 100 \mu\text{s}$ $T_j: 25 \text{ }^\circ\text{C}$ (blue dotted line)
 $V_{CE} = 10 \text{ V}$ $T_j: 125 \text{ }^\circ\text{C}$ (black solid line)
 $T_j: 150 \text{ }^\circ\text{C}$ (red dashed line)

figure 4. IGBT

Transient thermal impedance as function of pulse duration

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



$D = t_p / T$
 $R_{th(j-s)} = 0,76 \text{ K/W}$

IGBT thermal model values

R (K/W)	τ (s)
7,01E-02	2,40E+00
8,88E-02	4,83E-01
3,18E-01	1,19E-01
1,48E-01	3,97E-02
1,01E-01	8,48E-03
3,25E-02	9,92E-04



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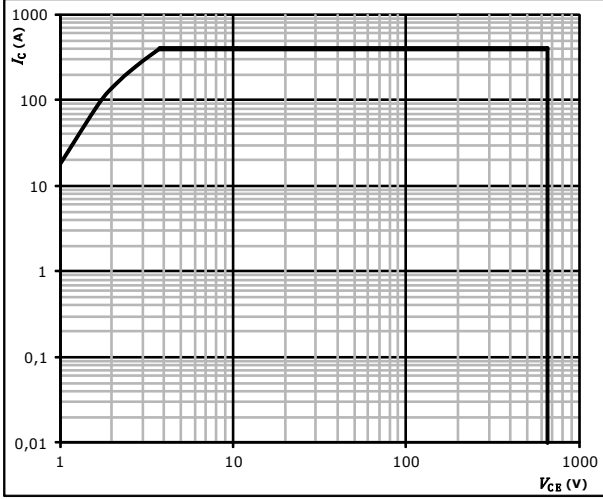
10-FY074PA100RG02-L583F88
10-PY074PA100RG02-L583F88Y
datasheet

H-Bridge Switch Characteristics

figure 5. IGBT

Safe operating area

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



$D =$ single pulse
 $T_s =$ 80 °C
 $V_{GE} =$ 0 V
 $T_j = T_{jmax}$

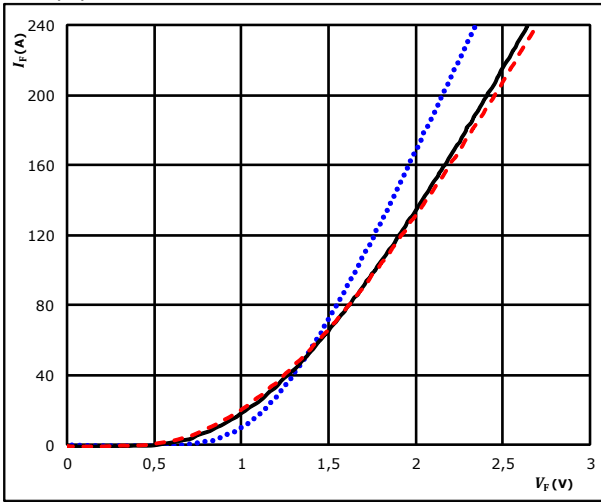


H-Bridge Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$$I_F = f(V_F)$$

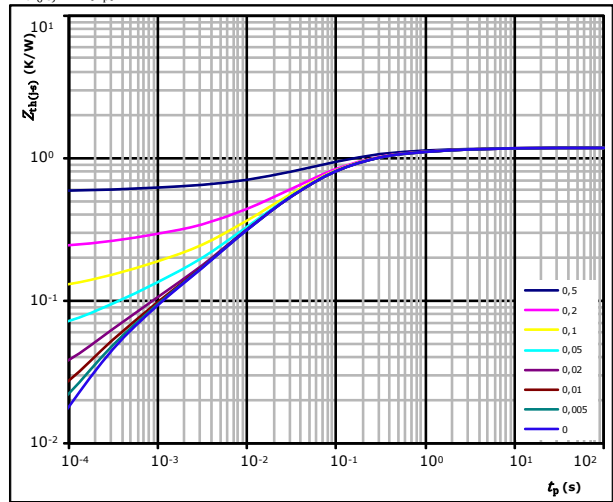


$t_p = 250 \mu s$
 T_j : 25 °C
 125 °C ———
 150 °C - - - -

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 1,18 \text{ K/W}$
 FWD thermal model values

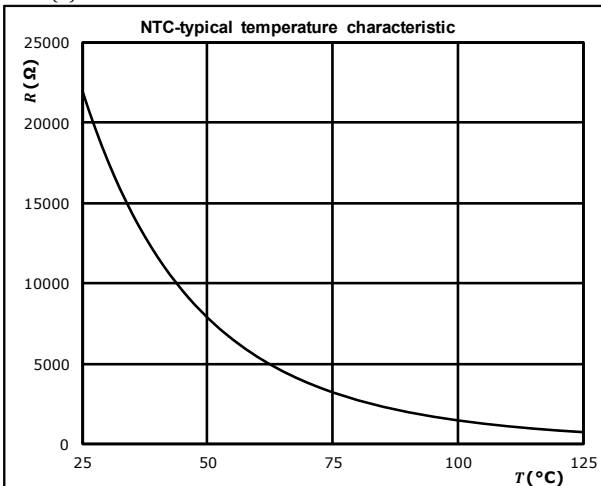
R (K/W)	τ (s)
5,19E-02	4,24E+00
1,00E-01	8,40E-01
2,79E-01	1,75E-01
4,49E-01	5,33E-02
2,02E-01	1,09E-02
5,43E-02	2,23E-03
4,85E-02	3,26E-04

Thermistor Characteristics

figure 1. **Thermistor**

Typical NTC characteristic as a function of temperature

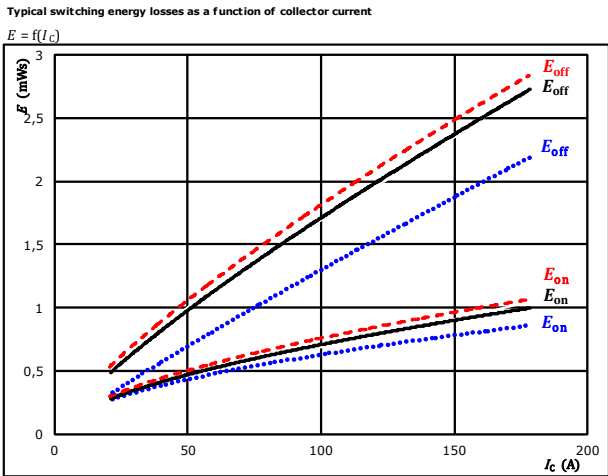
$$R = f(T)$$





H-Bridge Switching Characteristics

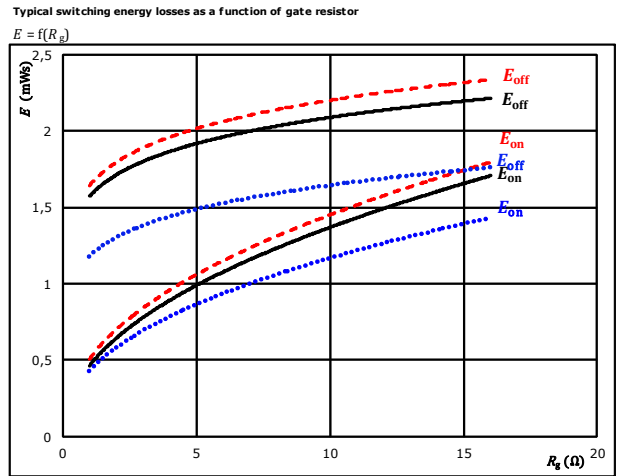
figure 1. IGBT



With an inductive load at
 $V_{CE} = 350$ V
 $V_{GE} = -5 / 15$ V
 $R_{gon} = 4$ Ω
 $R_{goff} = 4$ Ω

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

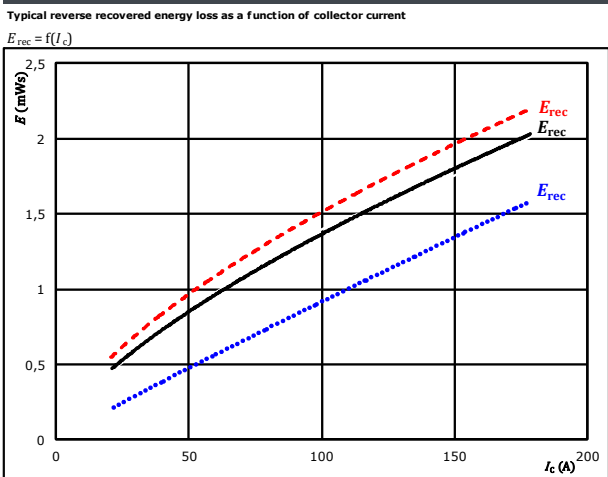
figure 2. IGBT



With an inductive load at
 $V_{CE} = 350$ V
 $V_{GE} = -5 / 15$ V
 $I_c = 100$ A

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

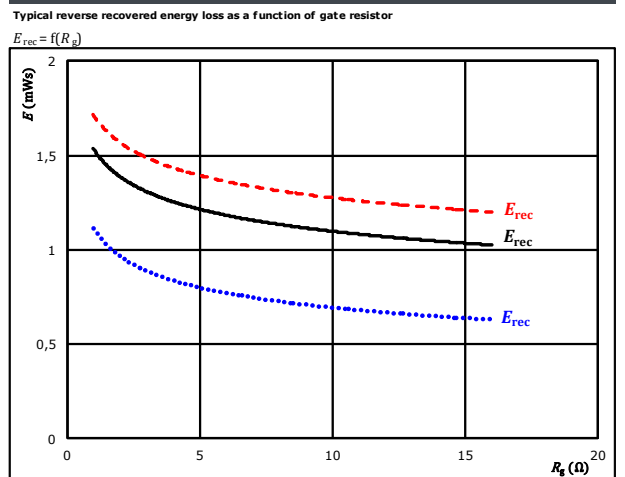
figure 3. FWD



With an inductive load at
 $V_{CE} = 350$ V
 $V_{GE} = -5 / 15$ V
 $R_{gon} = 4$ Ω

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

figure 4. FWD



With an inductive load at
 $V_{CE} = 350$ V
 $V_{GE} = -5 / 15$ V
 $I_c = 100$ A

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

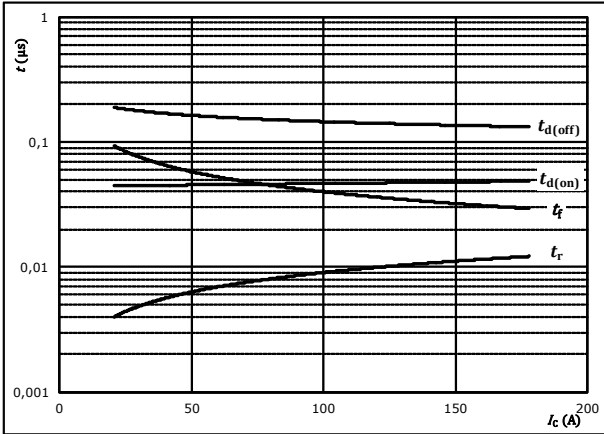


H-Bridge Switching Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$$t = f(I_C)$$



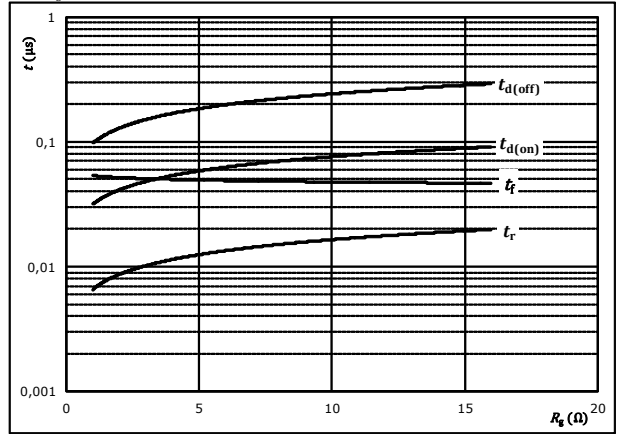
With an inductive load at

- $T_j = 150$ °C
- $V_{CE} = 350$ V
- $V_{GE} = -5 / 15$ V
- $R_{gon} = 4$ Ω
- $R_{goff} = 4$ Ω

figure 6. IGBT

Typical switching times as a function of gate resistor

$$t = f(R_g)$$



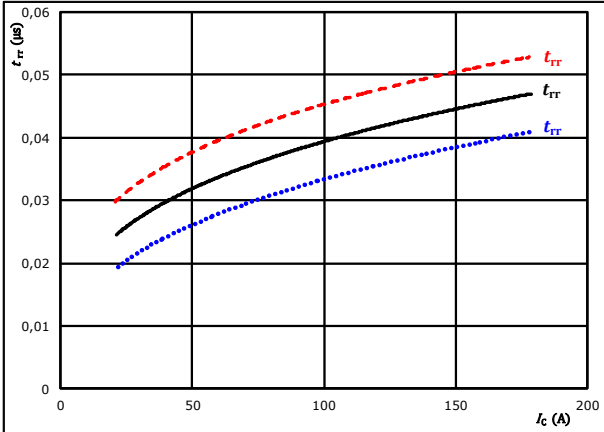
With an inductive load at

- $T_j = 150$ °C
- $V_{CE} = 350$ V
- $V_{GE} = -5 / 15$ V
- $I_C = 100$ A

figure 7. FWD

Typical reverse recovery time as a function of collector current

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



With an inductive load at

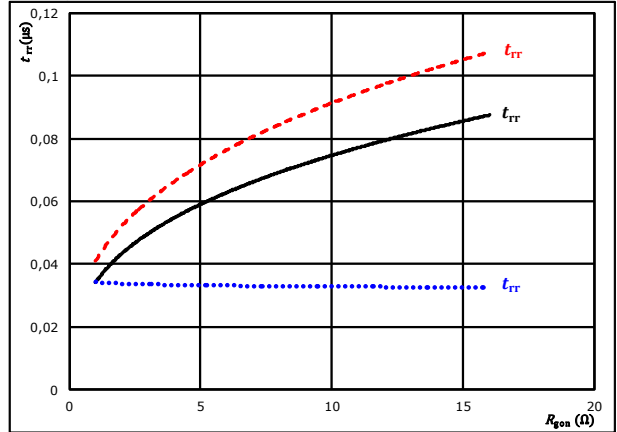
- $V_{CE} = 350$ V
- $V_{GE} = -5 / 15$ V
- $R_{gon} = 4$ Ω

- $T_j: 25$ °C (dotted blue)
- 125 °C (solid black)
- 150 °C (dashed red)

figure 8. FWD

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

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



With an inductive load at

- $V_{CE} = 350$ V
- $V_{GE} = -5 / 15$ V
- $I_C = 100$ A

- $T_j: 25$ °C (dotted blue)
- 125 °C (solid black)
- 150 °C (dashed red)

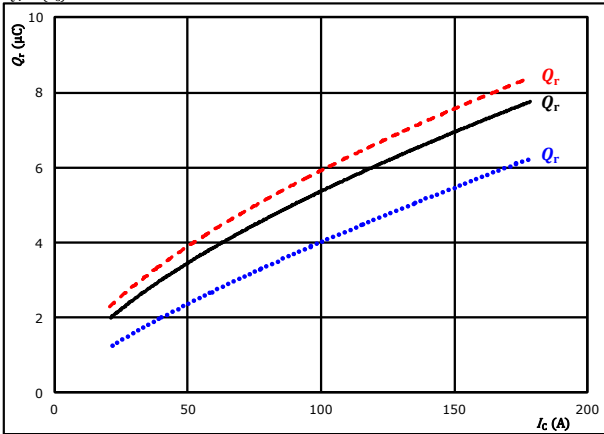


H-Bridge Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$



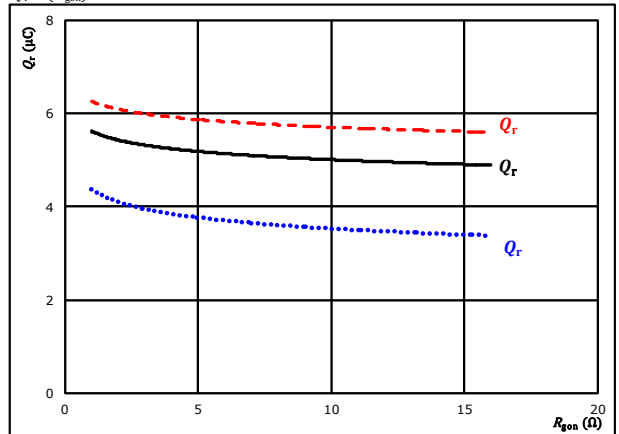
With an inductive load at
 $V_{CE} = 350$ V
 $V_{GE} = -5 / 15$ V
 $R_{gon} = 4$ Ω

T_j : 25 °C (blue dotted line)
 125 °C (black solid line)
 150 °C (red dashed line)

figure 10. FWD

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

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



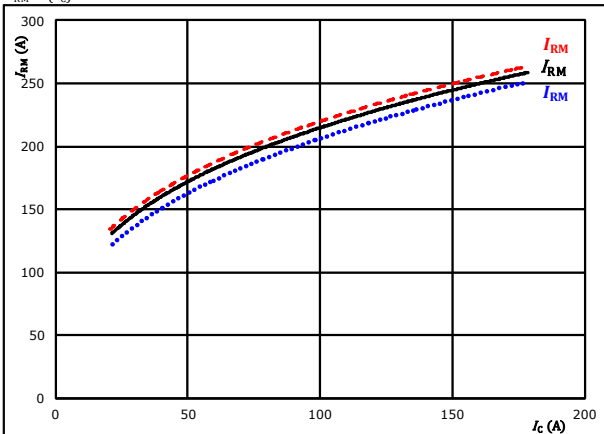
With an inductive load at
 $V_{CE} = 350$ V
 $V_{GE} = -5 / 15$ V
 $I_c = 100$ A

T_j : 25 °C (blue dotted line)
 125 °C (black solid line)
 150 °C (red dashed line)

figure 11. FWD

Typical peak reverse recovery current current as a function of collector current

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



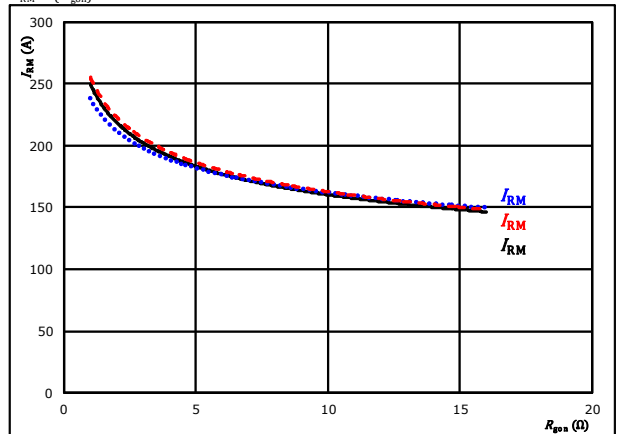
With an inductive load at
 $V_{CE} = 350$ V
 $V_{GE} = -5 / 15$ V
 $R_{gon} = 4$ Ω

T_j : 25 °C (blue dotted line)
 125 °C (black solid line)
 150 °C (red dashed line)

figure 12. FWD

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

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



With an inductive load at
 $V_{CE} = 350$ V
 $V_{GE} = -5 / 15$ V
 $I_c = 100$ A

T_j : 25 °C (blue dotted line)
 125 °C (black solid line)
 150 °C (red dashed line)

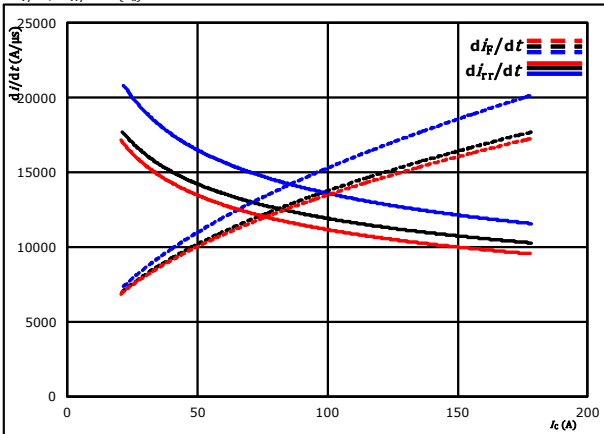


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H-Bridge Switching Characteristics

figure 13. FWD

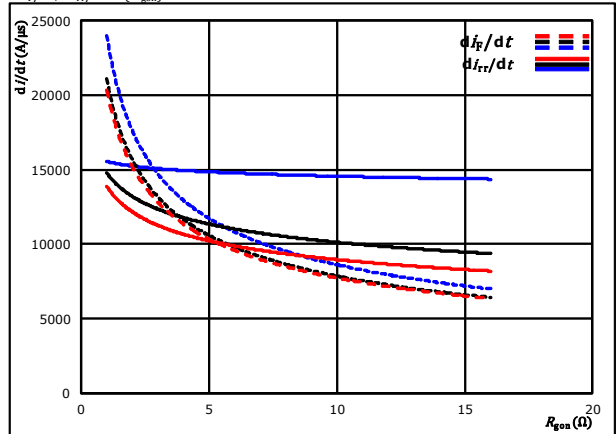
Typical rate of fall of forward and reverse recovery current as a function of collector current
 $di_f/dt, di_{rr}/dt = f(I_c)$



With an inductive load at
 $V_{CE} = 350$ V $T_j = 25$ °C
 $V_{GE} = -5 / 15$ V $T_j = 125$ °C
 $R_{gon} = 4$ Ω $T_j = 150$ °C

figure 14. FWD

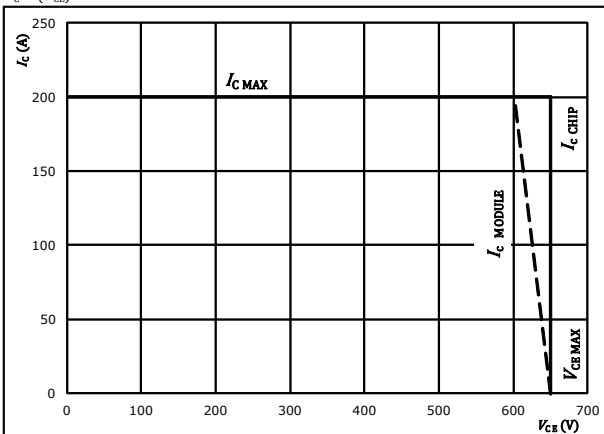
Typical rate of fall of forward and reverse recovery current as a function of IGBT turn on gate resistor
 $di_f/dt, di_{rr}/dt = f(R_{gon})$



With an inductive load at
 $V_{CE} = 350$ V $T_j = 25$ °C
 $V_{GE} = -5 / 15$ V $T_j = 125$ °C
 $I_c = 100$ A $T_j = 150$ °C

figure 15. IGBT

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



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



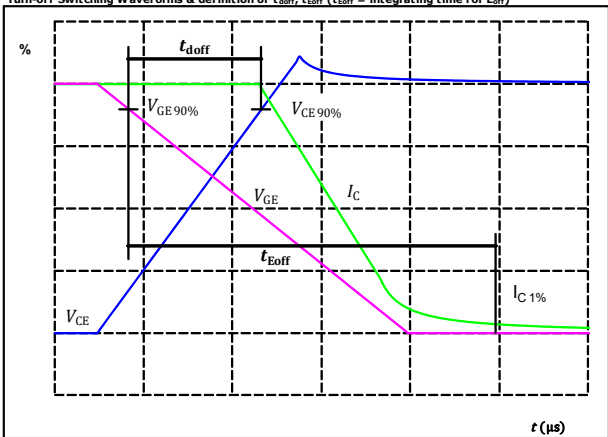
H-Bridge Switching Definitions

General conditions

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

figure 1. IGBT

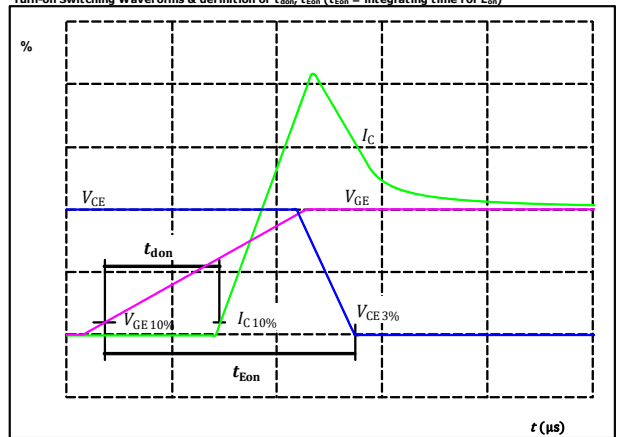
Turn-off Switching Waveforms & definition of t_{doff} , t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{CE}(0\%) =$	-5	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	350	V
$I_C(100\%) =$	100	A
$t_{doff} =$	138	ns

figure 2. IGBT

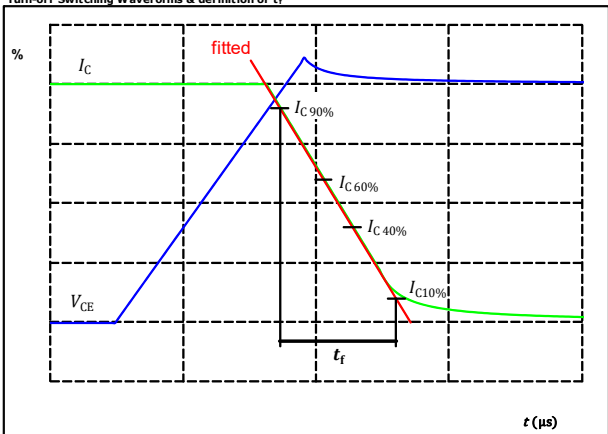
Turn-on Switching Waveforms & definition of t_{don} , t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{CE}(0\%) =$	-5	V
$V_{CE}(100\%) =$	15	V
$V_C(100\%) =$	350	V
$I_C(100\%) =$	100	A
$t_{don} =$	46	ns

figure 3. IGBT

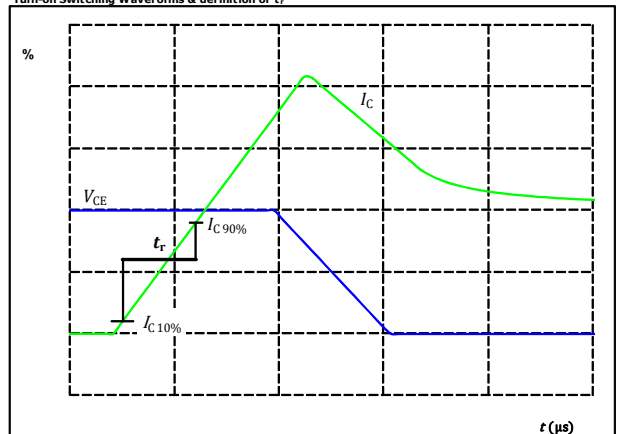
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%) =$	350	V
$I_C(100\%) =$	100	A
$t_f =$	53	ns

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r



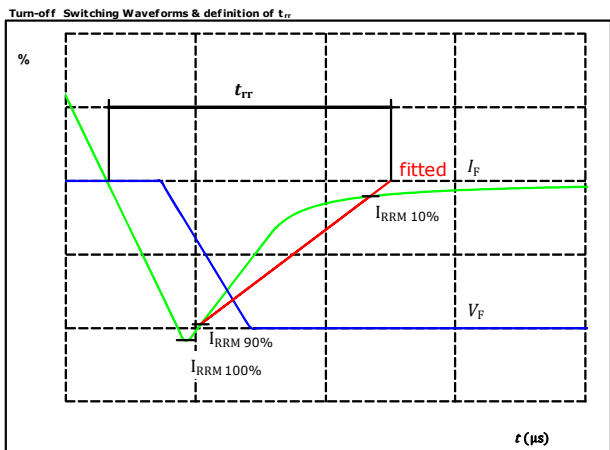
$V_C(100\%) =$	350	V
$I_C(100\%) =$	100	A
$t_r =$	9	ns



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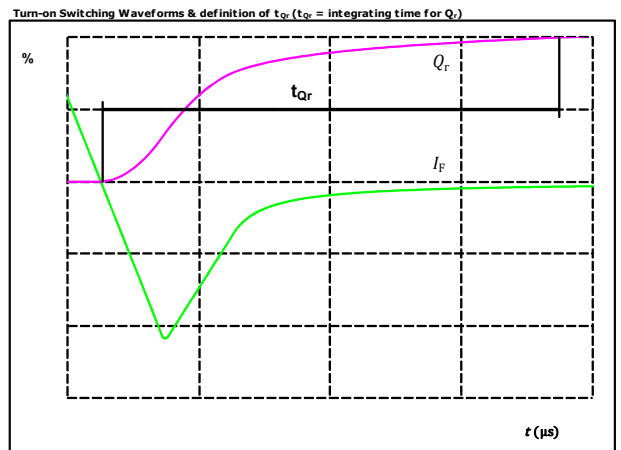
H-Bridge Switching Characteristics

figure 5. FWD



$V_F(100\%) =$	350	V
$I_F(100\%) =$	100	A
$I_{RRM}(100\%) =$	219	A
$t_{rr} =$	44	ns

figure 6. FWD



$I_F(100\%) =$	100	A
$Q_r(100\%) =$	0	μC



10-FY074PA100RG02-L583F88
10-PY074PA100RG02-L583F88Y
 datasheet

Vincotech

Ordering Code & Marking									
Version			Ordering Code						
without thermal paste 12 mm housing with solder pins			10-FY074PA100RG02-L583F88						
with thermal paste 12 mm housing with solder pins			10-FY074PA100RG02-L583F88-/3/						
without thermal paste 12 mm housing with Press-fit pins			10-PY074PA100RG02-L583F88Y						
with thermal paste 12 mm housing with Press-fit pins			10-PY074PA100RG02-L583F88Y-/3/						
NN-NNNNNNNNNNNN TTTTIV WWYY UL VIN LLLL SSSS			Text	Name		Date code	UL & VIN	Lot	Serial
				NN-NNNNNNNNNNNN-TTTTIV		WWYY	UL VIN	LLLLL	SSSS
			Datamatrix	Type&Ver	Lot number	Serial	Date code		
TTTTIV	LLLLL	SSSS		WWYY					

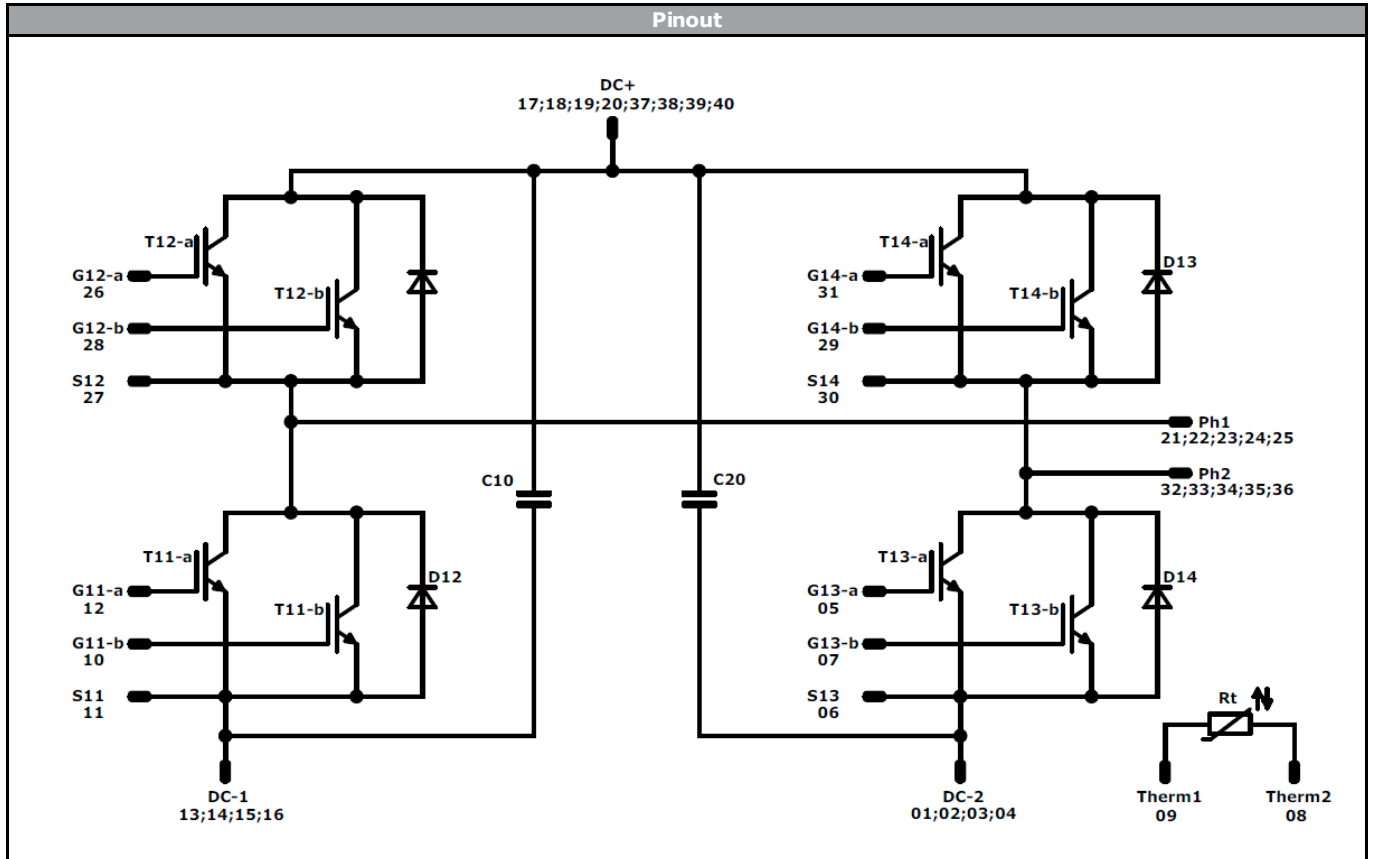
Pin table				Outline	
Pin	X	Y	Function		
1	46,3	2,7	DC-2		L583F88
2	46,3	0	DC-2		
3	43,6	2,7	DC-2		
4	43,6	0	DC-2		
5	39,2	1	G13-a		
6	36,2	0	S13		
7	33,2	1	G13-b		
8	28,8	0	Therm2		
9	23,8	0	Therm1		
10	19,4	1	G11-b		
11	16,4	0	S11		
12	13,4	1	G11-a		
13	9	2,7	DC-1		
14	9	0	DC-1		
15	6,3	2,7	DC-1		
16	6,3	0	DC-1		
17	0	6,8	DC+		
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	52,6	6,8	DC+		

L583F88Y	
	L583F88Y

Tolerance of pinpositions: ±0.5mm 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-a, T11-b, T12-a, T12-b, T13-a, T13-b, T14-a, T14-b	IGBT	650 V	100 A	H-Bridge Switch	Parallel devices with separate control. Values apply to complete device.
D11, D12, D13, D14	FWD	650 V	80 A	H-Bridge Diode	
C10, C20	Capacitor	630 V		Capacitor (DC)	
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-xY074PA100RG02-L583F88x-D1-14	25 Jan. 2019		

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1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in labelling can be reasonably expected to result in significant injury to the user.
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.