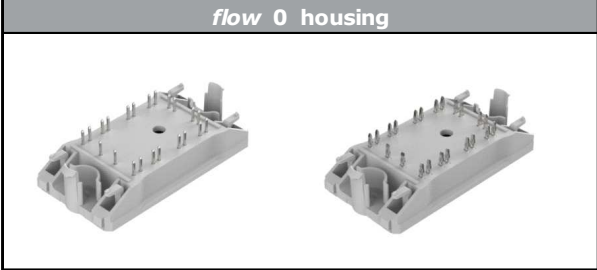
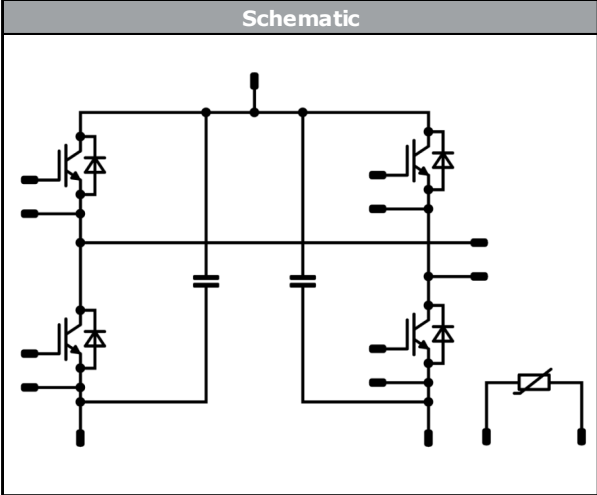




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fast PACK 0 H C	650 V / 30 A
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p style="text-align: center; background-color: #ccc; margin: 0;"><b>Features</b></p> <ul style="list-style-type: none"> <li>High speed H-Bridge</li> <li>High efficiency IGBT H5</li> <li>Full current fast FWD</li> <li>Integrated capacitors</li> <li>Thermistor</li> </ul> </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p style="text-align: center; background-color: #ccc; margin: 0;"><b>Target applications</b></p> <ul style="list-style-type: none"> <li>Power Supply</li> <li>Solar Inverters</li> <li>UPS</li> <li>Welding &amp; Cutting</li> </ul> </div> <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center; background-color: #ccc; margin: 0;"><b>Types</b></p> <ul style="list-style-type: none"> <li>10-FZ074PA030SM-L623F08</li> <li>10-PZ074PA030SM-L623F08Y</li> </ul> </div>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p style="text-align: center; background-color: #ccc; margin: 0;"><b>flow 0 housing</b></p>  </div> <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center; background-color: #ccc; margin: 0;"><b>Schematic</b></p>  </div>

## Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
<b>H-Bridge Switch</b>				
Collector-emitter voltage	$V_{CES}$		650	V
Collector current	$I_C$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	31	A
Repetitive peak collector current	$I_{CRM}$	$t_p$ limited by $T_{jmax}$	90	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	60	W
Gate-emitter voltage	$V_{GES}$		±20	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
-----------	--------	-----------	-------	------

### H-Bridge Diode

Peak Repetitive Reverse Voltage	$V_{RRM}$		650	V
Continuous (direct) forward current	$I_F$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	33	A
Repetitive peak forward current	$I_{FRM}$		60	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	50	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		with solder pins / with press-fit pins	9,55 / 9,57	mm
Comparative Tracking Index	CTI		> 200	

\*100 % tested in production



## 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	Conditions	$V_{GS}$ [V]	$V_{GE}$ [V]	$V_{DS}$ [V]	$I_D$ [A]	$T_j$ [°C]	Min	Typ	Max	Unit
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$				0,0003	25	3,3	4	4,7	V
Collector-emitter saturation voltage	$V_{CEsat}$		15			30	25 125 150		1,67 1,80 1,84	2,22	V
Collector-emitter cut-off current	$I_{CES}$		0	650			25			40	μA
Gate-emitter leakage current	$I_{GES}$		20	0			25			120	nA
Internal gate resistance	$R_g$								none		Ω
Input capacitance	$C_{ies}$	$f = 1\text{ MHz}$	0	25			25		2100		pF
Reverse transfer capacitance	$C_{res}$								7,7		
Gate charge	$Q_g$		15	520	30	25			70		nC

#### Thermal

Parameter	Symbol	Conditions	$V_{GS}$ [V]	$V_{GE}$ [V]	$V_{DS}$ [V]	$I_D$ [A]	$T_j$ [°C]	Min	Typ	Max	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4\text{ W/mK}$ (PSX)							1,57		K/W

#### Dynamic

Parameter	Symbol	Conditions	$V_{GS}$ [V]	$V_{GE}$ [V]	$V_{DS}$ [V]	$I_D$ [A]	$T_j$ [°C]	Min	Typ	Max	Unit	
Turn-on delay time	$t_{d(on)}$	$R_{g(off)} = 16\ \Omega$ $R_{g(on)} = 16\ \Omega$	±15	350		30	25 125 150		67		ns	
Rise time	$t_r$								8 9 10			
Turn-off delay time	$t_{d(off)}$								71 83 88			
Fall time	$t_f$								6 7 8			
Turn-on energy (per pulse)	$E_{on}$								$Q_{rFWD} = 1,1\ \mu\text{C}$ $Q_{rFWD} = 1,9\ \mu\text{C}$ $Q_{rFWD} = 2,3\ \mu\text{C}$			0,575 0,645 0,742
Turn-off energy (per pulse)	$E_{off}$											0,117 0,280 0,267
												mWs



### Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
		$V_{GE}$ [V]	$V_{CE}$ [V]	$I_C$ [A]	$T_j$ [°C]	Min	Typ	Max		

#### H-Bridge Diode

##### Static

Parameter	Symbol	$V_{GS}$ [V]	$V_{DS}$ [V]	$I_D$ [A]	$I_F$ [A]	$T_j$ [°C]	Min	Typ	Max	Unit
Forward voltage	$V_F$			30		25 125 150		1,52 1,46 1,44	1,92	V
Reverse leakage current	$I_r$		650			25			1,6	μA

##### Thermal

Parameter	Symbol	Conditions	Value	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)	1,92	K/W

##### Dynamic

Parameter	Symbol	$di/dt$	$V_{GS}$	$V_{DS}$	$I_D$	$I_F$	$T_j$	Min	Typ	Max	Unit
Peak recovery current	$I_{RRM}$						25 125 150		18 28 31		A
Reverse recovery time	$t_{rr}$						25 125 150		92 115 125		ns
Recovered charge	$Q_r$	$di/dt = 3056$ A/μs $di/dt = 2584$ A/μs $di/dt = 2520$ A/μs	±15	350	30		25 125 150		1,09 1,94 2,27		μC
Reverse recovered energy	$E_{rec}$						25 125 150		0,204 0,435 0,485		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$						25 125 150		619 311 272		A/μs

#### Capacitor (DC)

Parameter	Symbol	Conditions	Value	Unit	
Capacitance	C		150	nF	
Tolerance			-10	+10	%
Dissipation factor		$f = 1$ kHz		2,5	%

#### Thermistor

Parameter	Symbol	Conditions	Value	Unit		
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		

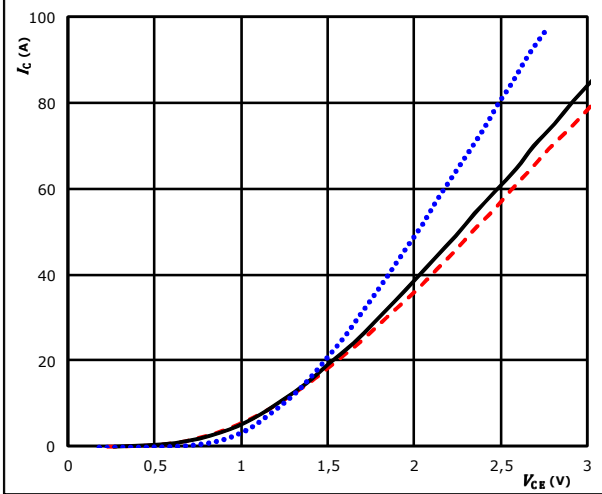


## H-Bridge Switch Characteristics

**figure 1.** IGBT

**Typical output characteristics**

$I_C = f(V_{CE})$

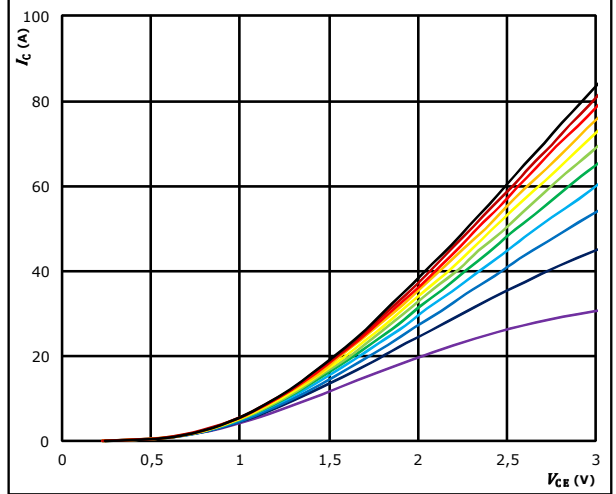


$t_p = 250 \mu s$   
 $V_{GE} = 15 V$   
 $T_j: 25 \text{ }^\circ C$  (dotted blue)  
 $125 \text{ }^\circ C$  (solid black)  
 $150 \text{ }^\circ C$  (dashed red)

**figure 2.** IGBT

**Typical output characteristics**

$I_C = f(V_{CE})$

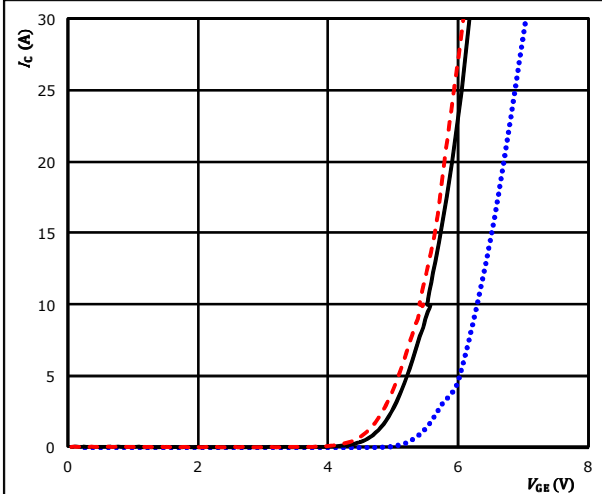


$t_p = 250 \mu s$   
 $T_j = 150 \text{ }^\circ C$   
 $V_{GE}$  from 7 V to 17 V in steps of 1 V

**figure 3.** IGBT

**Typical transfer characteristics**

$I_C = f(V_{GE})$

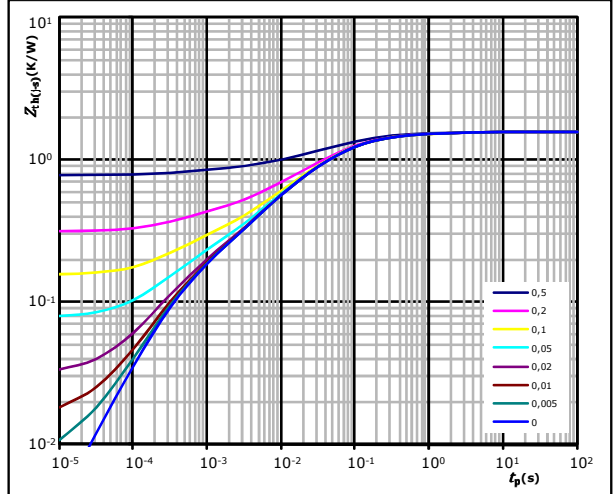


$t_p = 100 \mu s$   
 $V_{CE} = 10 V$   
 $T_j: 25 \text{ }^\circ C$  (dotted blue)  
 $125 \text{ }^\circ C$  (solid black)  
 $150 \text{ }^\circ C$  (dashed red)

**figure 4.** IGBT

**Transient Thermal Impedance as function of Pulse duration**

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



$D = t_p / T$   
 $R_{th(j-s)} = 1,57 \text{ K/W}$   
 IGBT thermal model values

R (K/W)	$\tau$ (s)
7,66E-02	1,73E+00
2,00E-01	2,58E-01
6,54E-01	5,93E-02
3,77E-01	1,31E-02
1,51E-01	2,99E-03
1,13E-01	3,69E-04

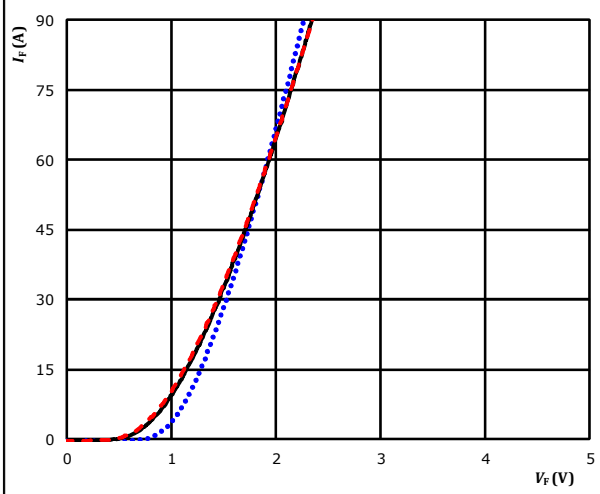


## H-Bridge Diode Characteristics

**figure 1.** FWD

**Typical forward characteristics**

$I_F = f(V_F)$



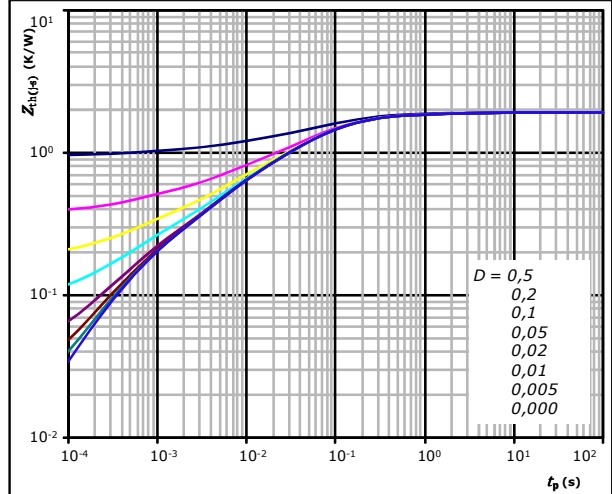
$t_p = 250 \mu s$

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

**figure 2.** FWD

**Transient thermal impedance as a function of pulse width**

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



$D = t_p / T$

$R_{th(j-s)} = 1,92 \text{ K/W}$

FWD thermal model values

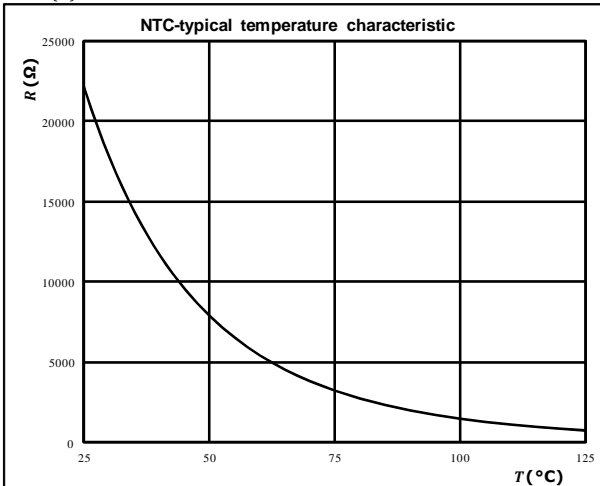
$R$ (K/W)	$\tau$ (s)
9,41E-02	2,25E+00
3,44E-01	2,12E-01
8,56E-01	5,84E-02
3,61E-01	9,83E-03
1,37E-01	2,89E-03
1,27E-01	4,79E-04

## Thermistor Characteristics

**figure 1.** Thermistor

**Typical NTC characteristic as a function of temperature**

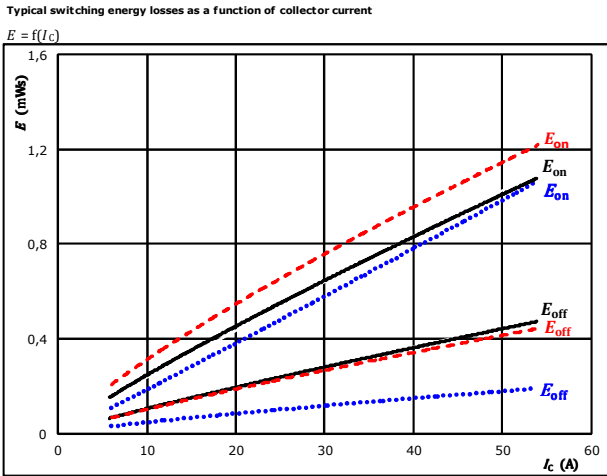
$R = f(T)$





## H-Bridge Switching Characteristics

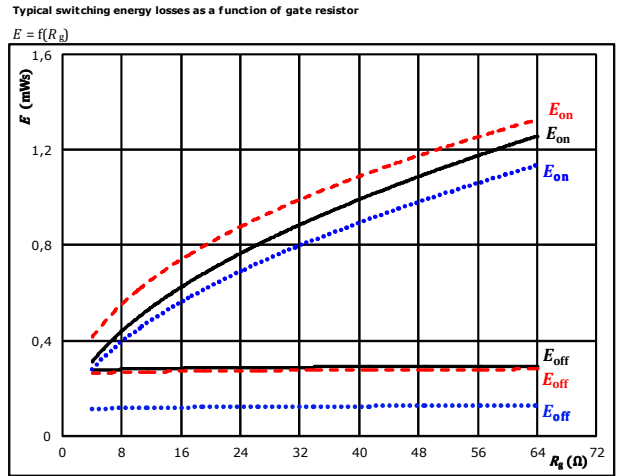
**figure 1.** IGBT



With an inductive load at

$V_{CE} = 350$ V	$T_j: 25$ °C	.....
$V_{GE} = \pm 15$ V	$125$ °C	————
$R_{gon} = 16$ Ω	$150$ °C	-----
$R_{goff} = 16$ Ω		

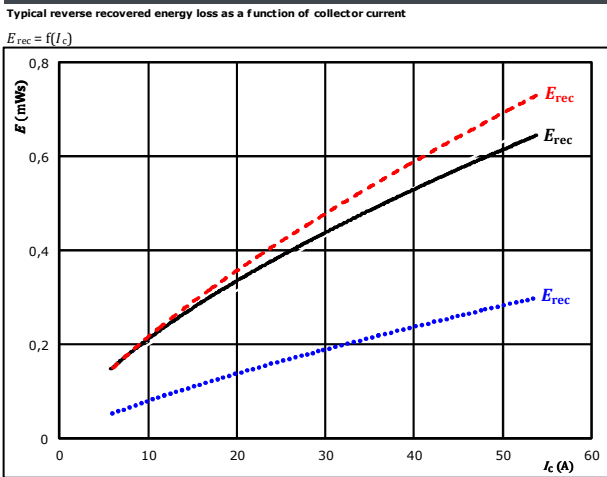
**figure 2.** IGBT



With an inductive load at

$V_{CE} = 350$ V	$T_j: 25$ °C	.....
$V_{GE} = \pm 15$ V	$125$ °C	————
$I_c = 30$ A	$150$ °C	-----

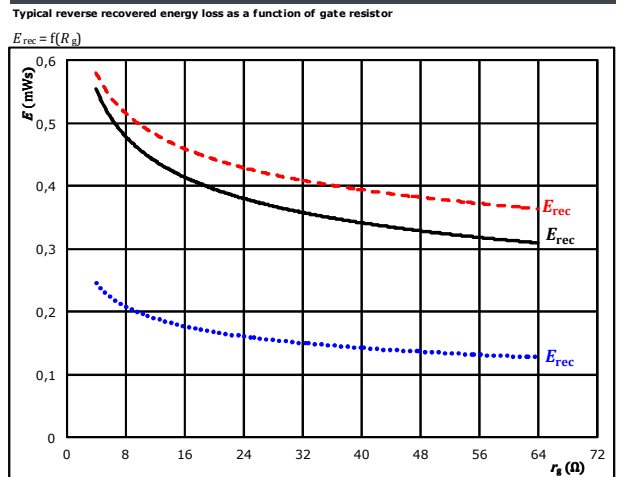
**figure 3.** FWD



With an inductive load at

$V_{CE} = 350$ V	$T_j: 25$ °C	.....
$V_{GE} = \pm 15$ V	$125$ °C	————
$R_{gon} = 16$ Ω	$150$ °C	-----

**figure 4.** FWD



With an inductive load at

$V_{CE} = 350$ V	$T_j: 25$ °C	.....
$V_{GE} = \pm 15$ V	$125$ °C	————
$I_c = 30$ A	$150$ °C	-----



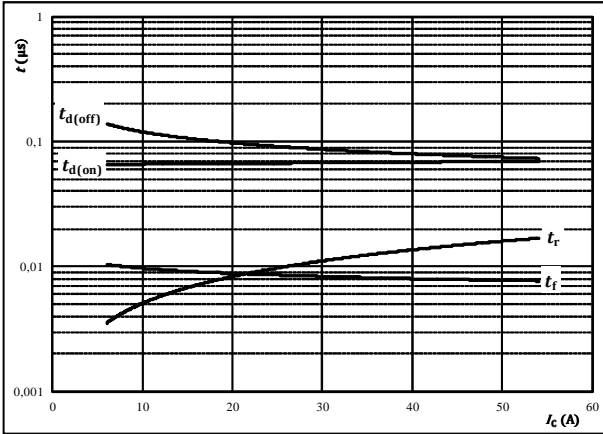
Vincotech

## H-Bridge Switching Characteristics

**figure 5.** IGBT

Typical switching times as a function of collector current

$$t = f(I_C)$$



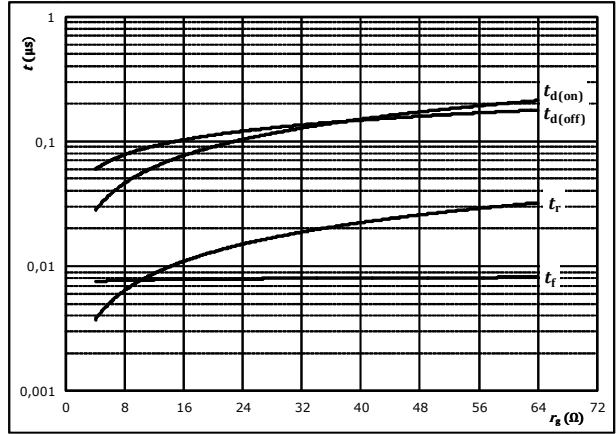
With an inductive load at

$T_j =$	150	°C
$V_{CE} =$	350	V
$V_{GE} =$	±15	V
$R_{gon} =$	16	Ω
$R_{goff} =$	16	Ω

**figure 6.** IGBT

Typical switching times as a function of gate resistor

$$t = f(R_g)$$



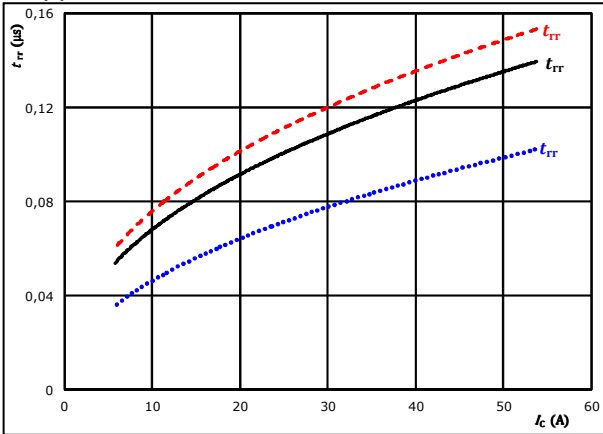
With an inductive load at

$T_j =$	150	°C
$V_{CE} =$	350	V
$V_{GE} =$	±15	V
$I_C =$	30	A

**figure 7.** FWD

Typical reverse recovery time as a function of collector current

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

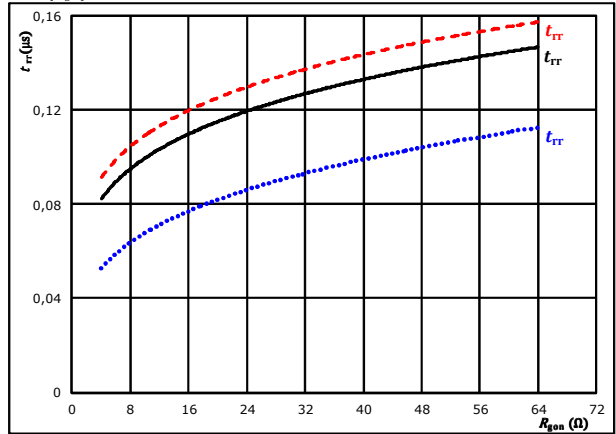


At	$V_{CE} =$	350	V	$T_j:$	25 °C	.....
	$V_{GE} =$	±15	V		125 °C	————
	$R_{gon} =$	16	Ω		150 °C	- - - -

**figure 8.** FWD

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

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



At	$V_{CE} =$	350	V	$T_j:$	25 °C	.....
	$V_{GE} =$	±15	V		125 °C	————
	$I_C =$	30	A		150 °C	- - - -



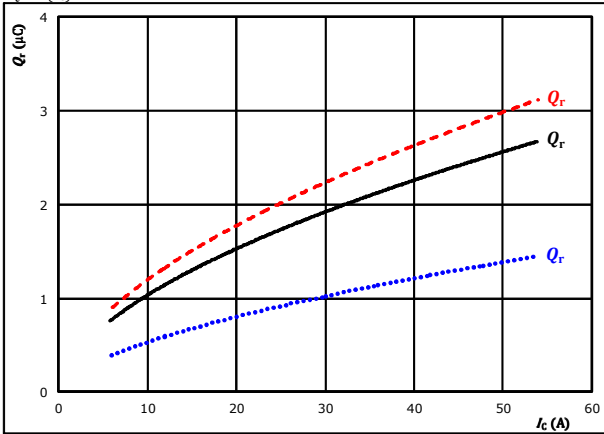


## H-Bridge Switching Characteristics

**figure 9.** FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$

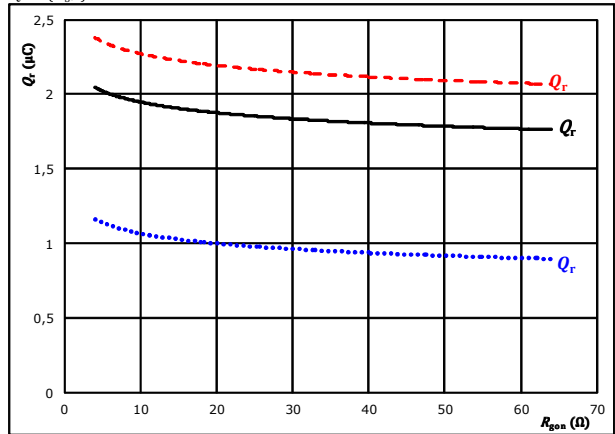


At  $V_{CE} = 350$  V  $T_j = 25$  °C (dotted blue)  
 $V_{GE} = \pm 15$  V  $T_j = 125$  °C (solid black)  
 $R_{gpn} = 16$  Ω  $T_j = 150$  °C (dashed red)

**figure 10.** FWD

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

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

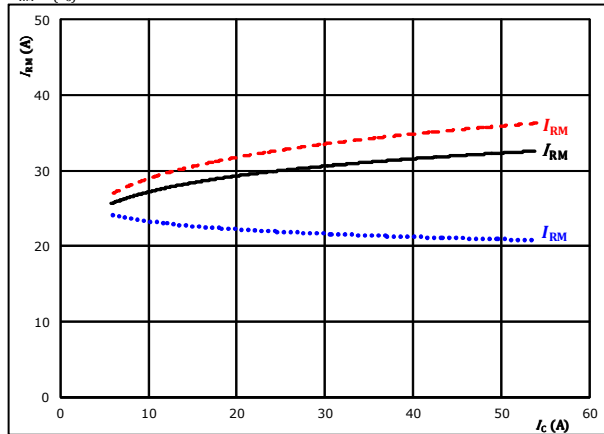


At  $V_{CE} = 350$  V  $T_j = 25$  °C (dotted blue)  
 $V_{GE} = \pm 15$  V  $T_j = 125$  °C (solid black)  
 $I_c = 30$  A  $T_j = 150$  °C (dashed red)

**figure 11.** FWD

Typical peak reverse recovery current as a function of collector current

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

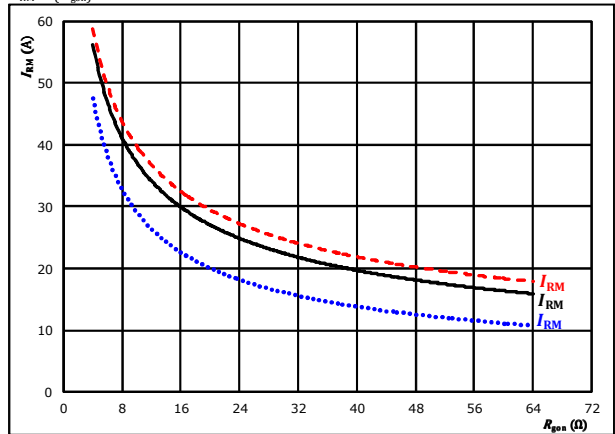


At  $V_{CE} = 350$  V  $T_j = 25$  °C (dotted blue)  
 $V_{GE} = \pm 15$  V  $T_j = 125$  °C (solid black)  
 $R_{gpn} = 16$  Ω  $T_j = 150$  °C (dashed red)

**figure 12.** FWD

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

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



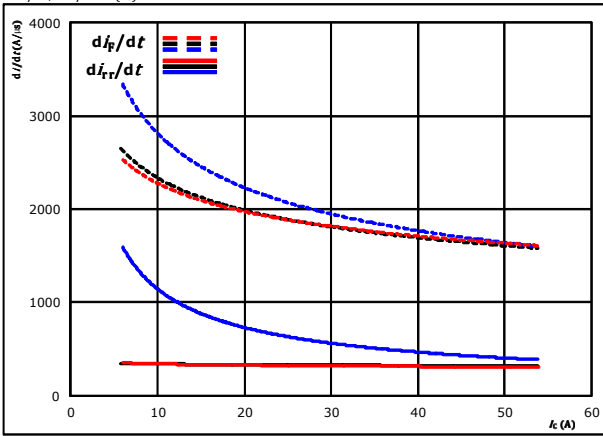
At  $V_{CE} = 350$  V  $T_j = 25$  °C (dotted blue)  
 $V_{GE} = \pm 15$  V  $T_j = 125$  °C (solid black)  
 $I_c = 30$  A  $T_j = 150$  °C (dashed red)



## H-Bridge Switching Characteristics

**figure 13.** FWD

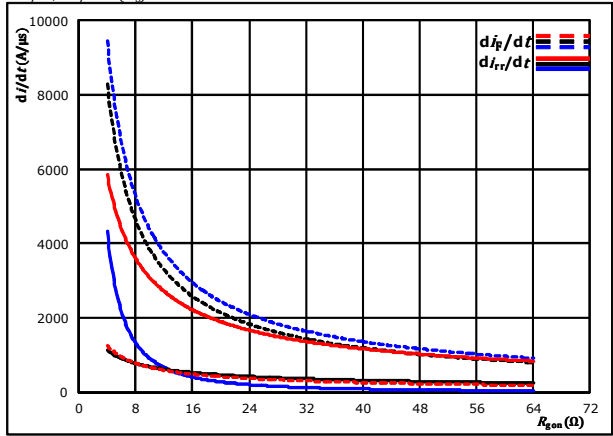
Typical rate of fall of forward and reverse recovery current as a function of collector current  
 $di_f/dt, di_{rr}/dt = f(I_c)$



At  $V_{CE} = 350$  V  $T_j = 25$  °C .....  
 $V_{GE} = \pm 15$  V  $T_j = 125$  °C ———  
 $R_{g(on)} = 16$  Ω  $T_j = 150$  °C - - - - -

**figure 14.** FWD

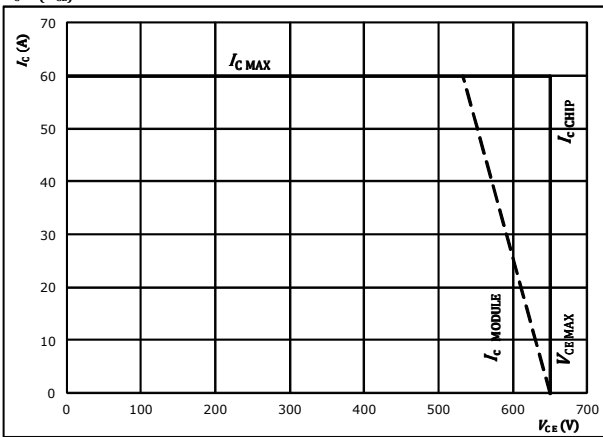
Typical rate of fall of forward and reverse recovery current as a function of IGBT turn on gate resistor  
 $di_f/dt, di_{rr}/dt = f(R_{g(on)})$



At  $V_{CE} = 350$  V  $T_j = 25$  °C .....  
 $V_{GE} = \pm 15$  V  $T_j = 125$  °C ———  
 $I_c = 30$  A  $T_j = 150$  °C - - - - -

**figure 15.** IGBT

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



At  $T_j = 175$  °C  
 $R_{g(on)} = 16$  Ω  
 $R_{g(off)} = 16$  Ω



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**10-FZ074PA030SM-L623F08**  
**10-PZ074PA030SM-L623F08Y**  
 datasheet

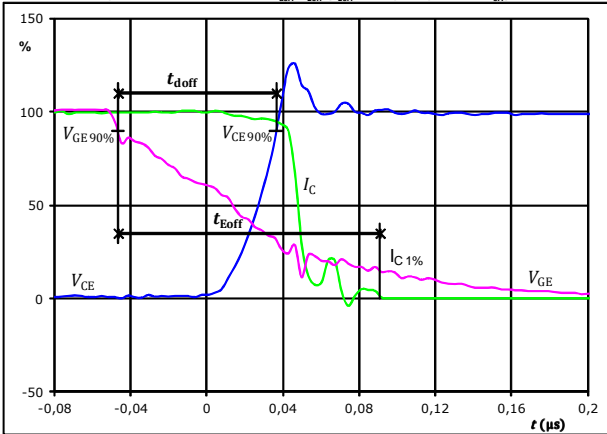
## H-Bridge Switching Definitions

### General conditions

$T_j$	=	125 °C
$R_{gon}$	=	16 $\Omega$
$R_{goff}$	=	16 $\Omega$

**figure 1.** IGBT

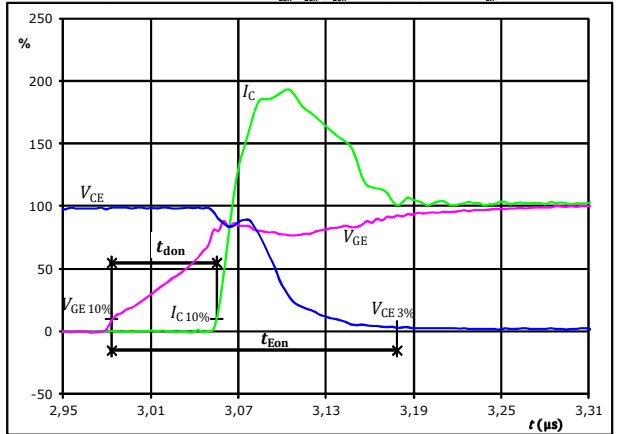
Turn-off Switching Waveforms & definition of  $t_{doff}$ ,  $t_{Eoff}$  ( $t_{Eoff}$  = integrating time for  $E_{off}$ )



$V_{CE}(0\%) =$	-15	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	350	V
$I_C(100\%) =$	30	A
$t_{doff} =$	0,083	$\mu s$
$t_{Eoff} =$	0,137	$\mu s$

**figure 2.** IGBT

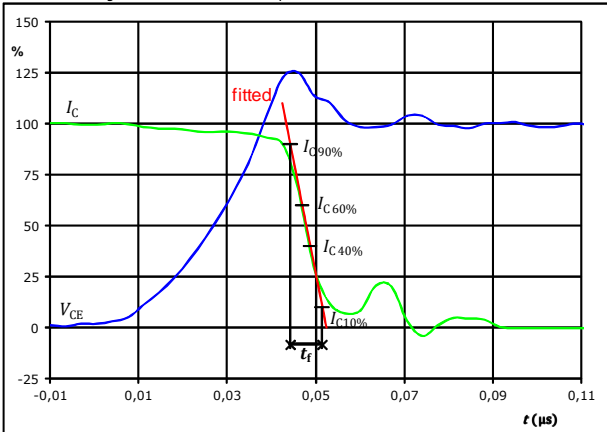
Turn-on Switching Waveforms & definition of  $t_{don}$ ,  $t_{Eon}$  ( $t_{Eon}$  = integrating time for  $E_{on}$ )



$V_{CE}(0\%) =$	-15	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	350	V
$I_C(100\%) =$	30	A
$t_{don} =$	0,072	$\mu s$
$t_{Eon} =$	0,195	$\mu s$

**figure 3.** IGBT

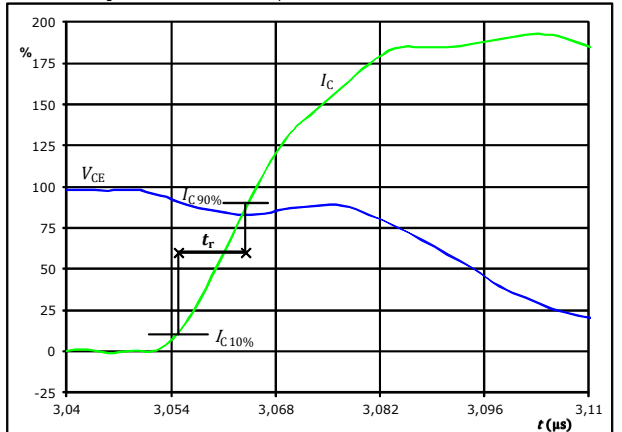
Turn-off Switching Waveforms & definition of  $t_f$



$V_C(100\%) =$	350	V
$I_C(100\%) =$	30	A
$t_f =$	0,007	$\mu s$

**figure 4.** IGBT

Turn-on Switching Waveforms & definition of  $t_r$



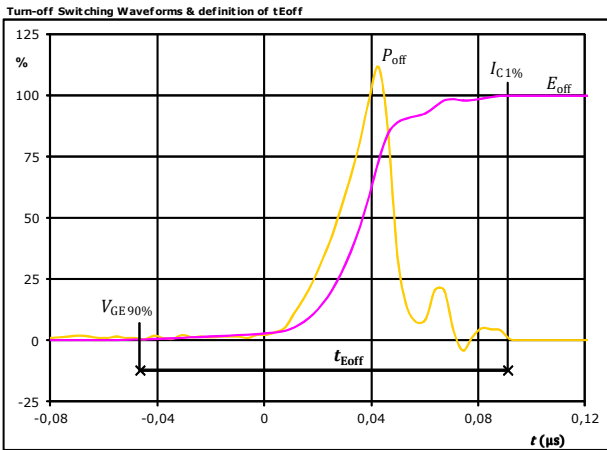
$V_C(100\%) =$	350	V
$I_C(100\%) =$	30	A
$t_r =$	0,009	$\mu s$



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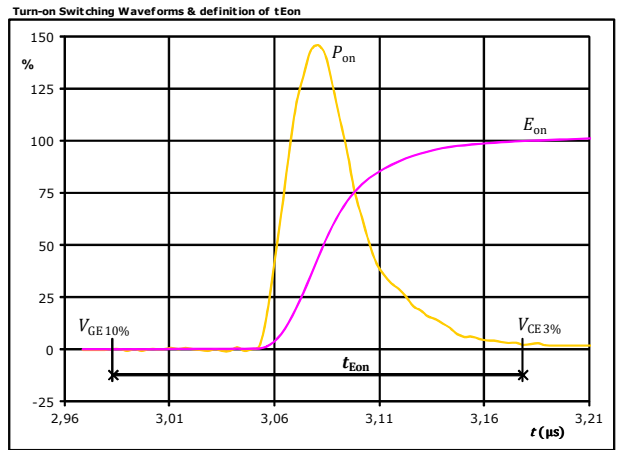
## H-Bridge Switching Characteristics

figure 5. IGBT



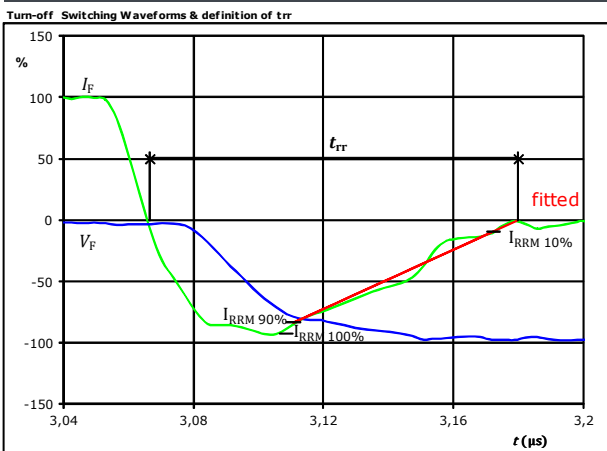
$P_{off}(100\%) = 10,55$  kW  
 $E_{off}(100\%) = 0,28$  mJ  
 $t_{Eoff} = 0,14$  µs

figure 6. IGBT



$P_{on}(100\%) = 10,55$  kW  
 $E_{on}(100\%) = 0,65$  mJ  
 $t_{Eon} = 0,20$  µs

figure 7. FWD



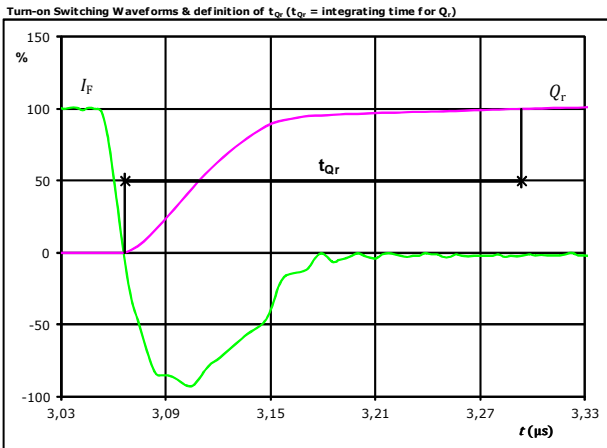
$V_F(100\%) = 350$  V  
 $I_F(100\%) = 30$  A  
 $I_{RRM}(100\%) = -28$  A  
 $t_{rr} = 0,115$  µs



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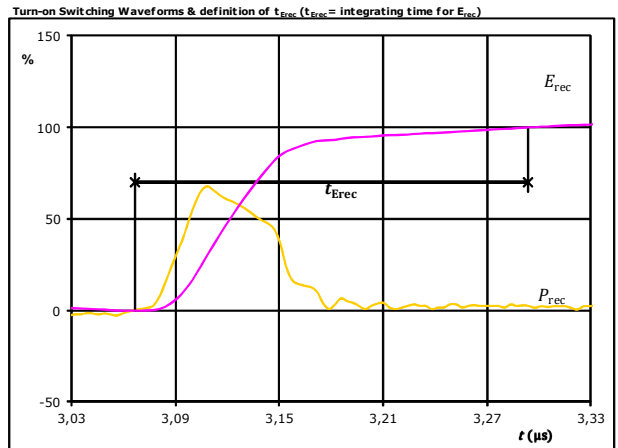
## H-Bridge Switching Characteristics

**figure 8.** FWD



$I_F$ (100%) =	30	A
$Q_r$ (100%) =	1,94	$\mu\text{C}$
$t_{Qr}$ =	0,23	$\mu\text{s}$

**figure 9.** FWD




$P_{rec}$ (100%) =	10,55	kW
$E_{rec}$ (100%) =	0,43	mJ
$t_{Erec}$ =	0,23	$\mu\text{s}$



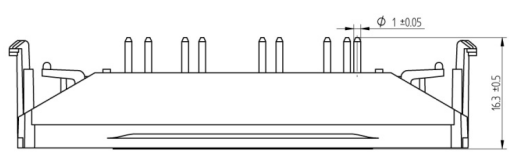
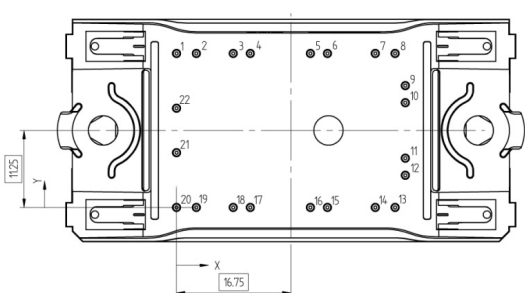
**10-FZ074PA030SM-L623F08**  
**10-PZ074PA030SM-L623F08Y**  
 datasheet

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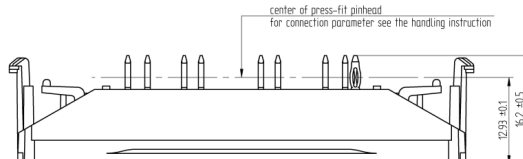
Ordering Code & Marking						
Version			Ordering Code			
without thermal paste 12 mm housing with solder pins			10-FZ074PA030SM-L623F08			
without thermal paste 12 mm housing with press-fit pins			10-PZ074PA030SM-L623F08Y			
NN-NNNNNNNNNNNN TTTTUVWWYY UL VIN LLLL SSSS						
Text	Name		Date code	UL & VIN	Lot	Serial
	NN-NNNNNNNNNNNN-TTTTUV		WWYY	UL VIN	LLLL	SSSS
Datamatrix	Type&Ver	Lot number	Serial	Date code		
	TTTTTUV	LLLL	SSSS	WWYY		

Pin table [mm]			
Pin	X	Y	Function
1	0	22,5	G11
2	2,9	22,5	S11
3	8,3	22,5	DC-1
4	10,8	22,5	DC-1
5	19,6	22,5	DC+
6	22,1	22,5	DC+
7	29,1	22,5	S12
8	32	22,5	G12
9	33,5	17,8	Ph1
10	33,5	15,3	Ph1
11	33,5	7,2	Ph2
12	33,5	4,7	Ph2
13	32	0	G14
14	29,1	0	S14
15	22,1	0	DC+
16	19,6	0	DC+
17	10,8	0	DC-2
18	8,3	0	DC-2
19	2,9	0	S13
20	0	0	G13
21	0	8	Therm1
22	0	14,5	Therm2

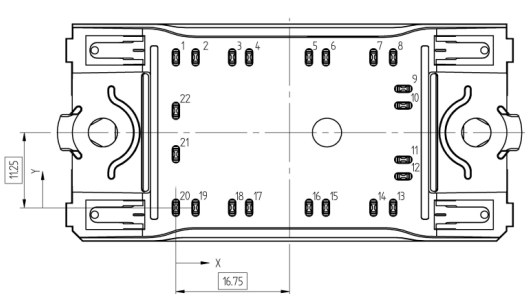
### Outline

Tolerance of pinpositions: ±0.5mm at the end of pins  
 Dimension of coordinate axis is only offset without tolerance



center of press-fit pinhead  
 for connection parameter see the handling instruction

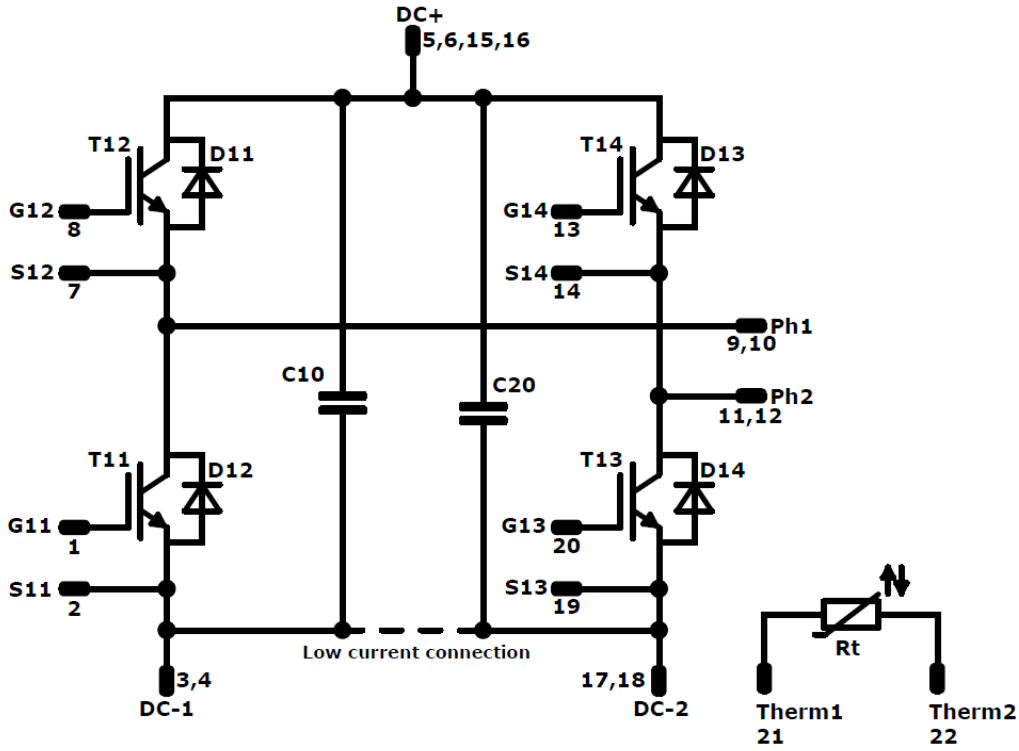


Tolerance of pinpositions: ±0.5mm at the end of pins  
 Dimension of coordinate axis is only offset without tolerance



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Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T11-T14	IGBT	650 V	30 A	H-Bridge Switch	
D11-D14	FWD	650 V	30 A	H-Bridge Diode	
C10, C20	Capacitor	630 V		Capacitor (DC)	
Rt	NTC			Thermistor	




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Packaging instruction			
Standard packaging quantity (SPQ) 135	>SPQ	Standard	<SPQ Sample

Handling instruction
Handling instructions for <i>flow 0</i> packages see vincotech.com website.

Package data
Package data for <i>flow 0</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-xZ074PA030SM-L623F08x-D2-14	18 Oct 2017		

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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.



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