10-FZ074PA030SM-L623F08
10-PZ074PA030SM-L623F08Y
datasheet

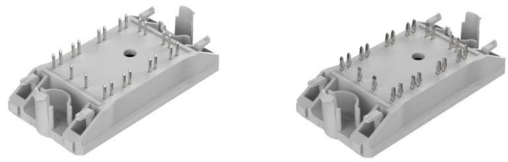
Vincotech

***fast*PACK 0 H C** **650 V / 30 A**

Features

- High speed H-Bridge
- High efficiency IGBT H5
- Full current fast FWD
- Integrated capacitors
- Thermistor

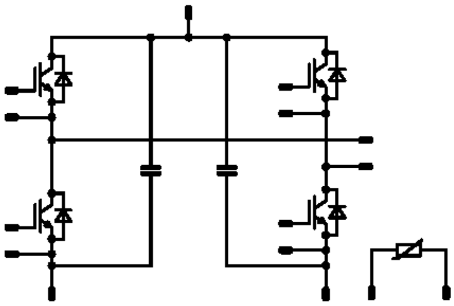
***flow* 0 housing**



Target applications

- Power Supply
- Solar Inverters
- UPS
- Welding & Cutting

Schematic



Types

- 10-FZ074PA030SM-L623F08
- 10-PZ074PA030SM-L623F08Y

Maximum Ratings

T_j = 25 °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 °C	29	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 °C	60	W
Gate-emitter voltage	V_{GES}			±20	V
Maximum Junction Temperature	T_{jmax}			175	°C

Maximum Ratings

T_j = 25 °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 °C	38	A
Repetitive peak forward current	I_{FRM}			60	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	60	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 s	6000	V
		AC Voltage	t_p = 1 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_{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										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}$			0,0003	25 125	3,3	4	4,7	V
Collector-emitter saturation voltage	V_{CEsat}		15		30	25 125 150		1,69 1,92	2,22	V
Collector-emitter cut-off current	I_{CES}		0	650		25 125			40	µA
Gate-emitter leakage current	I_{GES}		20	0		25 125			120	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}	f=1MHz	0	25		25		2100		pF
Reverse transfer capacitance	C_{res}	f=1MHz	0	25		25		7,7		pF
Gate charge	Q_g		15	520	30	25		70		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						1,57		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{goff} = 16 Ω R_{gon} = 16 Ω	±15	350	30	25 125 150		67 72 68		ns
Rise time	t_r					25 125 150		8 9 10		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		71 83 88		ns
Fall time	t_f					25 125 150		6 7 8		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 1,1 µC Q_{rFWD} = 1,9 µC Q_{rFWD} = 2,3 µC				25 125 150		0,575 0,645 0,742		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,117 0,280 0,267		mWs

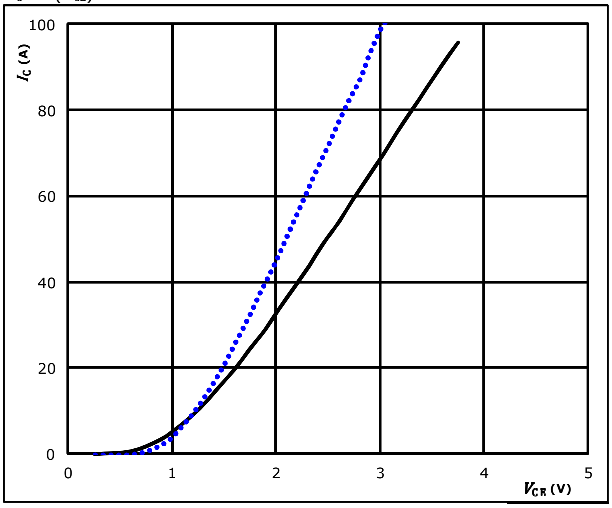
Characteristic Values

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										
Static										
Forward voltage	V_F				30	25		1,52	1,7	V
Reverse leakage current	I_r			650		25			1,6	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						1,60		K/W
Dynamic										
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	$(di_{rf}/dt)_{max}$					25 125 150		619 311 272		A/µs
Capacitor (DC)										
Capacitance	C							150		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

Typical output characteristics **IGBT**

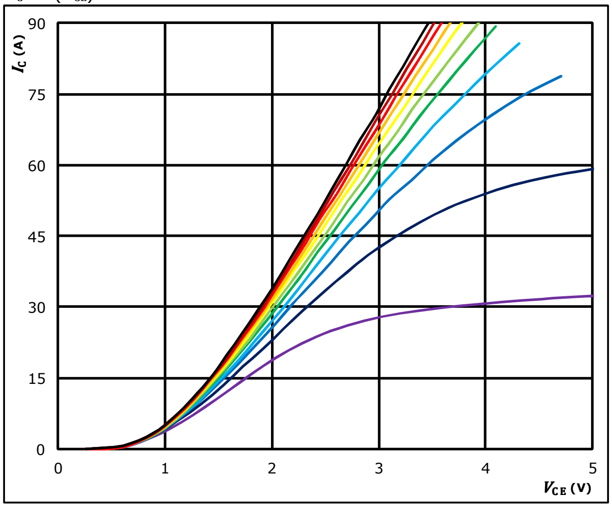
$I_C = f(V_{CE})$



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

Typical output characteristics **IGBT**

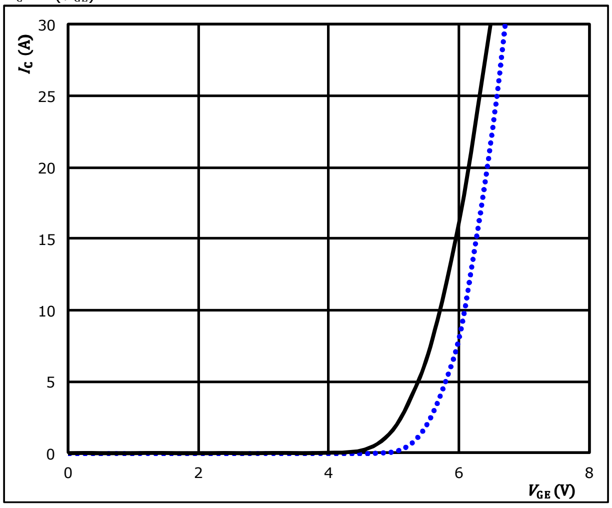
$I_C = f(V_{CE})$



t_p = 250 µs
T_j = 125 °C
V_{GE} from 7 V to 17 V in steps of 1 V

Typical transfer characteristics **IGBT**

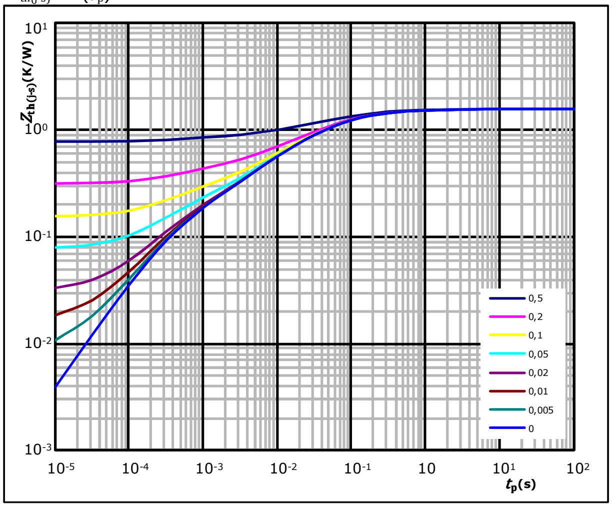
$I_C = f(V_{GE})$



t_p =	100	µs		25 °C	dotted
V_{CE} =	10	V	T_j:	125 °C	solid

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

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



D = t_p / T
$R_{th(j-s)}$ = 1,57 K/W

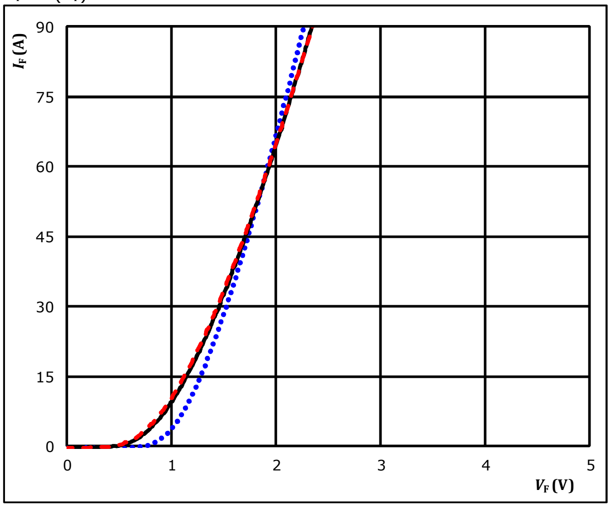
IGBT thermal model values

R_{th} (K/W)	τ (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

Typical forward characteristics

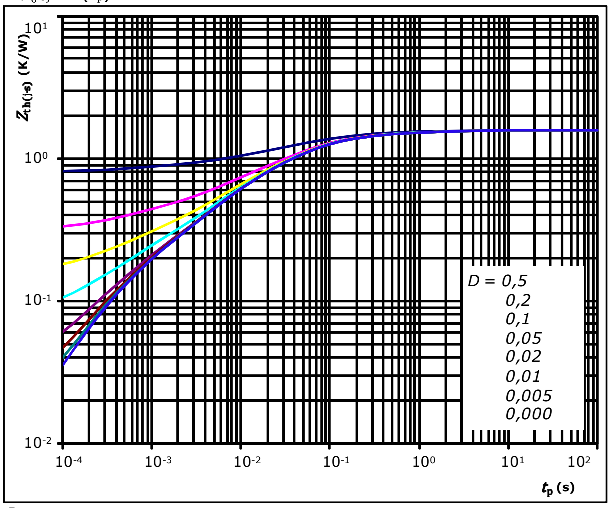
$I_F = f(V_F)$



t_p =	250	μs	
	T_j:	25 °C	dotted
		125 °C	solid
		150 °C	dashed

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j\text{-}s)}$ = 1,60 K/W

FWD thermal model values

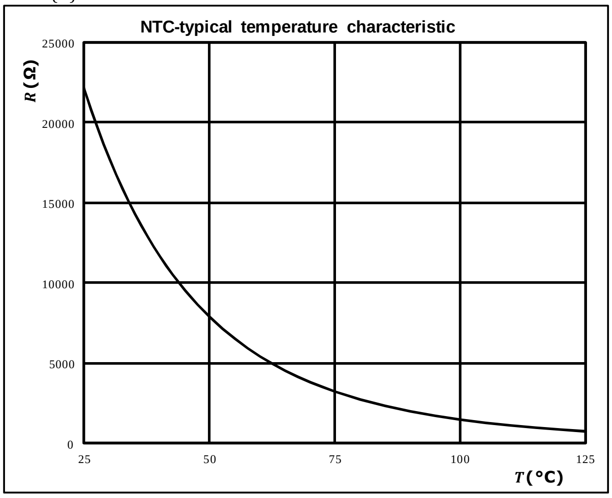
R (K/W)	τ (s)
8,02E-02	2,85E+00
2,08E-01	2,77E-01
6,38E-01	5,42E-02
3,85E-01	1,18E-02
1,74E-01	2,90E-03
1,12E-01	3,98E-04

Thermistor Characteristics

figure 1. **Thermistor**

Typical NTC characteristic
as a function of temperature

$R = f(T)$

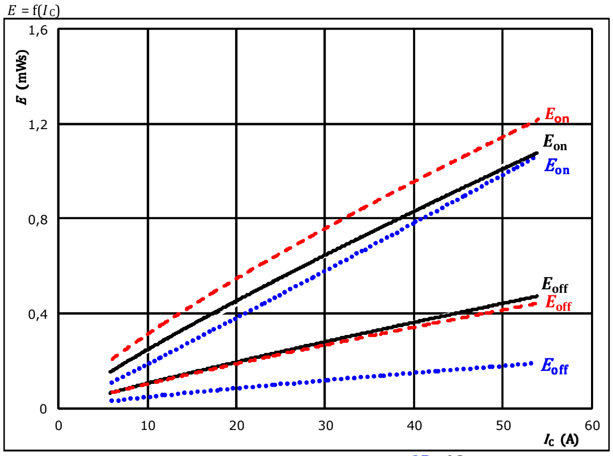


H-Bridge Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



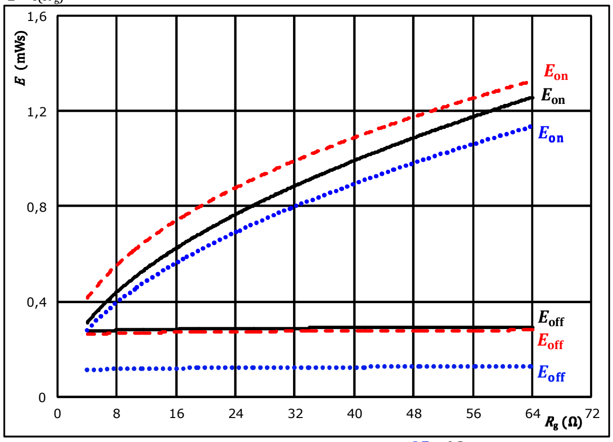
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	dotted (blue)
V_{GE} =	±15	V		125 °C	solid (black)
R_{gon} =	16	Ω		150 °C	dashed (red)
R_{goff} =	16	Ω			

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



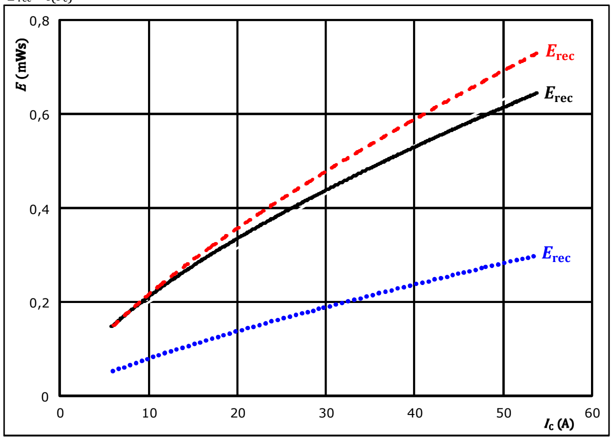
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	dotted (blue)
V_{GE} =	±15	V		125 °C	solid (black)
I_C =	30	A		150 °C	dashed (red)

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



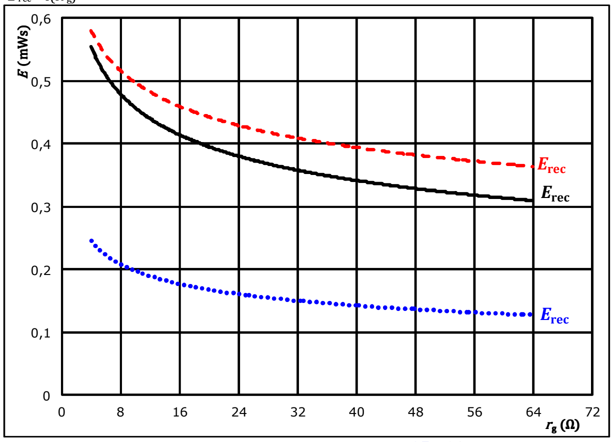
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	dotted (blue)
V_{GE} =	±15	V		125 °C	solid (black)
R_{gon} =	16	Ω		150 °C	dashed (red)

figure 4. **FWD**

Typical reverse recovered energy loss as a function of gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

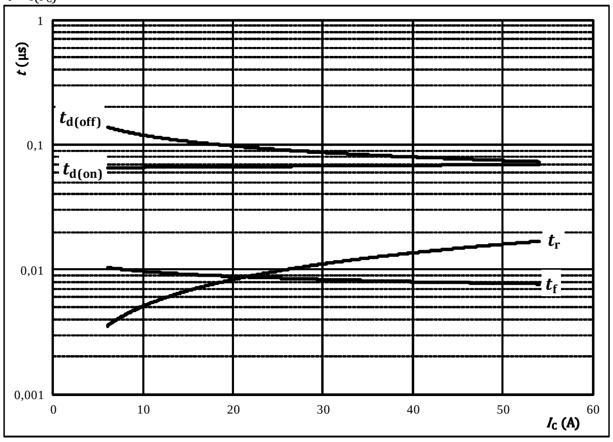
V_{CE} =	350	V	T_j:	25 °C	dotted (blue)
V_{GE} =	±15	V		125 °C	solid (black)
I_C =	30	A		150 °C	dashed (red)

H-Bridge Switching Characteristics

figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



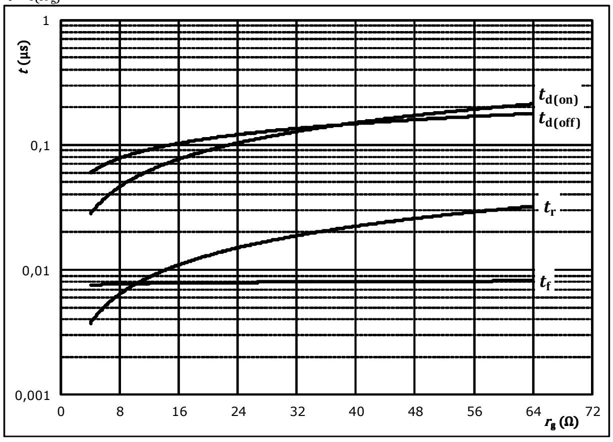
With an inductive load at

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

$t = f(R_g)$



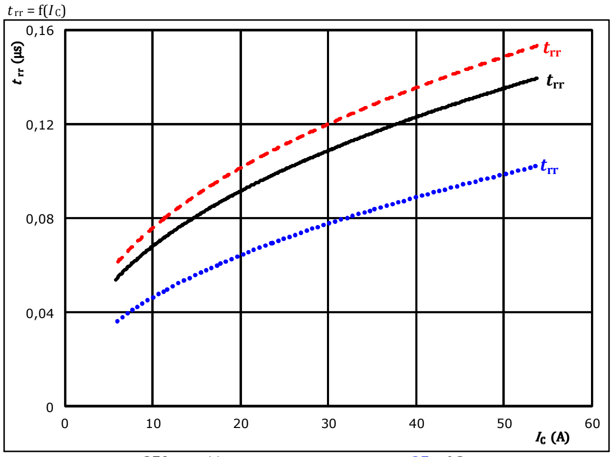
With an inductive load at

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

$t_{rr} = f(I_C)$

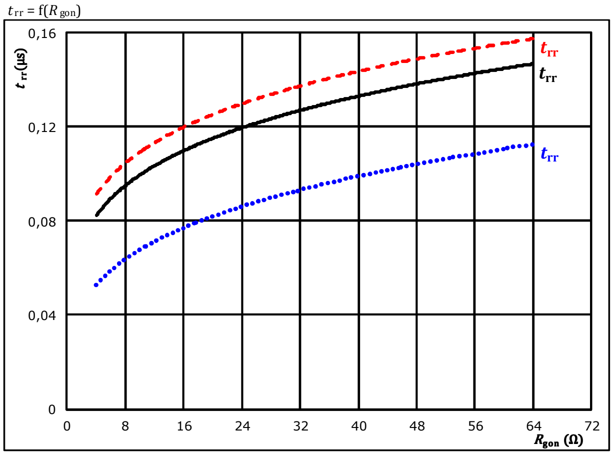


At					
V_{CE} =	350	V		25 °C	·············
V_{GE} =	±15	V	T_j:	125 °C	————
R_{gon} =	16	Ω		150 °C	— — —

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		25 °C	·············
V_{GE} =	±15	V	T_j:	125 °C	————
I_C =	30	A		150 °C	— — —

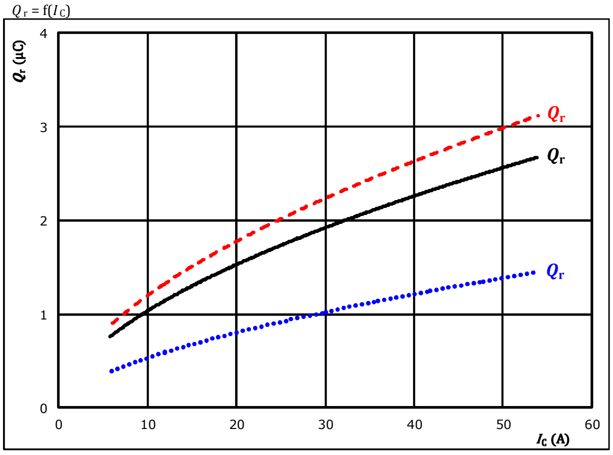
Vincotech

H-Bridge Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

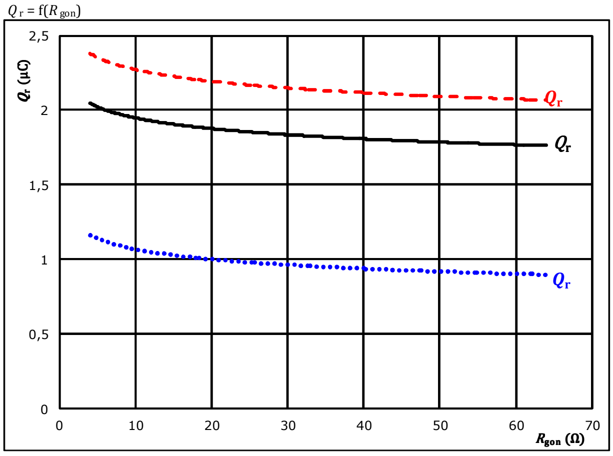


At					
V_{CE} =	350	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
R_{gon} =	16	Ω		150 °C	dashed

figure 10. **FWD**

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

$Q_r = f(R_{gon})$

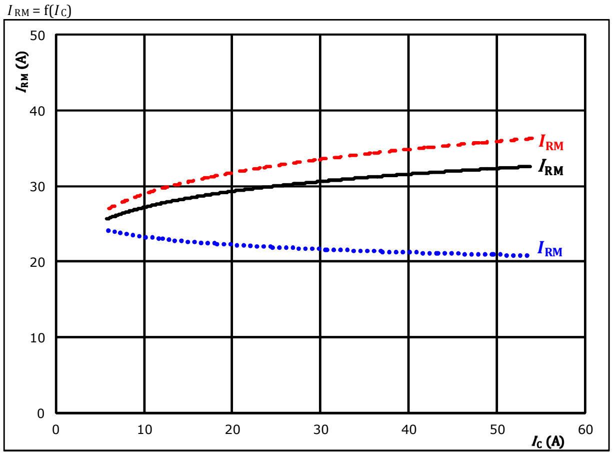


At					
V_{CE}=	350	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
I_C=	30	A		150 °C	dashed

figure 11. **FWD**

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

$I_{RM} = f(I_C)$

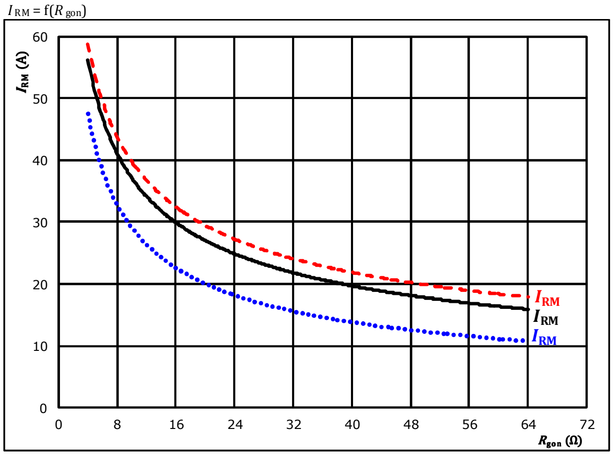


At					
V_{CE}:	350	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
R_{gon} =	16	Ω		150 °C	dashed

figure 12. **FWD**

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

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



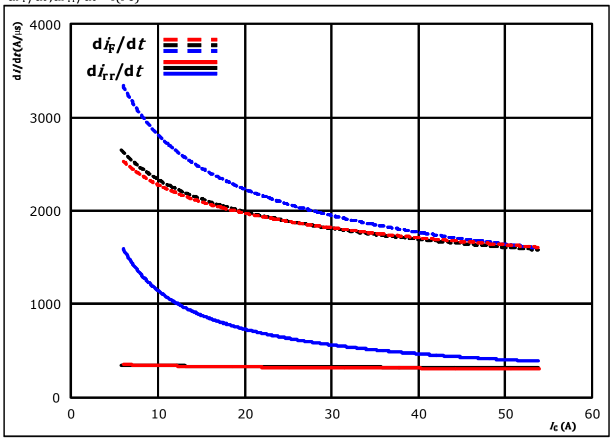
At					
V_{CE} =	350	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
I_C =	30	A		150 °C	dashed

H-Bridge Switching Characteristics

figure 13. **FWD**

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

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

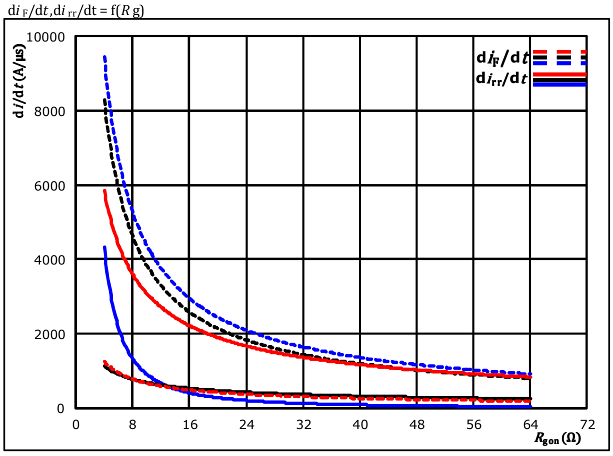


At					
V_{CE} =	350	V	T_j:	25 °C	··········
V_{GE} =	±15	V		125 °C	——
R_{gon} =	16	Ω		150 °C	– – –

figure 14. **FWD**

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

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

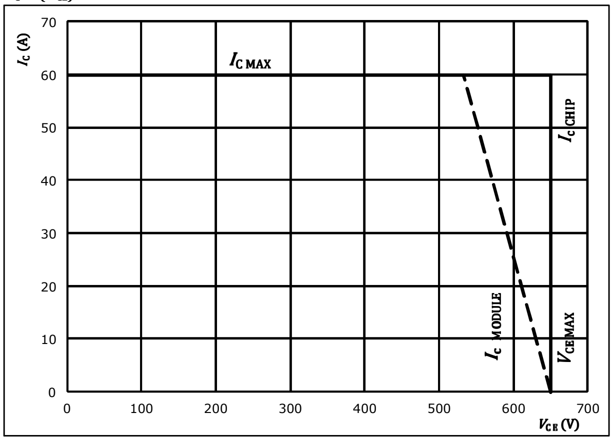


At					
V_{CE} =	350	V	T_j:	25 °C	··········
V_{GE} =	±15	V		125 °C	——
I_C =	30	A		150 °C	– – –

figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At		
T_j =	175	°C
R_{gon} =	16	Ω
R_{goff} =	16	Ω

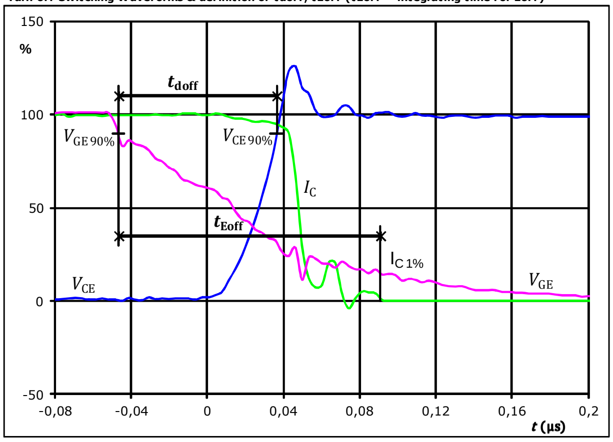
H-Bridge Switching Definitions

General conditions

T_j	=	125 °C
R_{gon}	=	16 Ω
R_{goff}	=	16 Ω

figure 1. IGBT

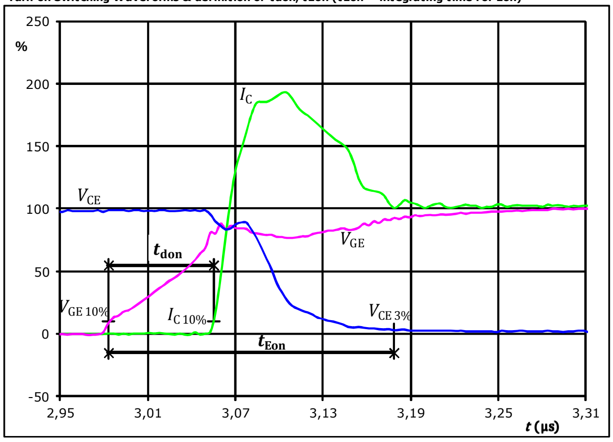
Turn-off Switching Waveforms & definition of tdoff, tEoff (tEoff = integrating time for Eoff)



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

figure 2. IGBT

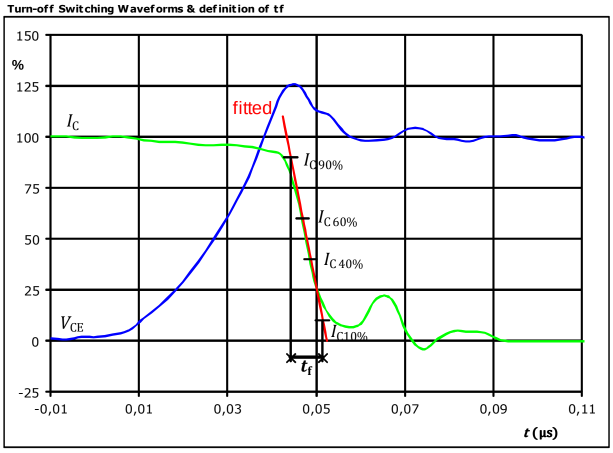
Turn-on Switching Waveforms & definition of tdon, tEon (tEon = integrating time for Eon)



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

figure 3. IGBT

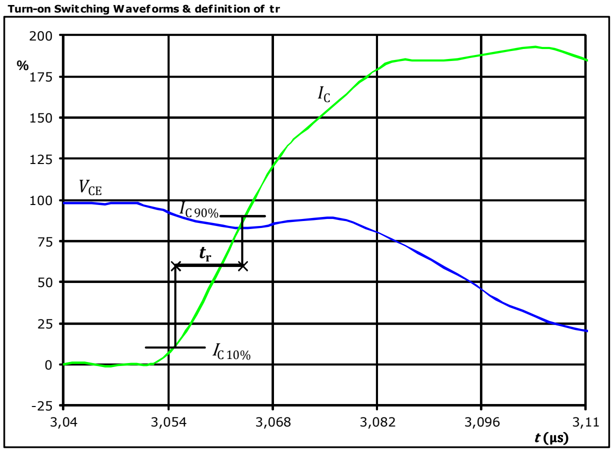
Turn-off Switching Waveforms & definition of tf



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

figure 4. IGBT

Turn-on Switching Waveforms & definition of tr

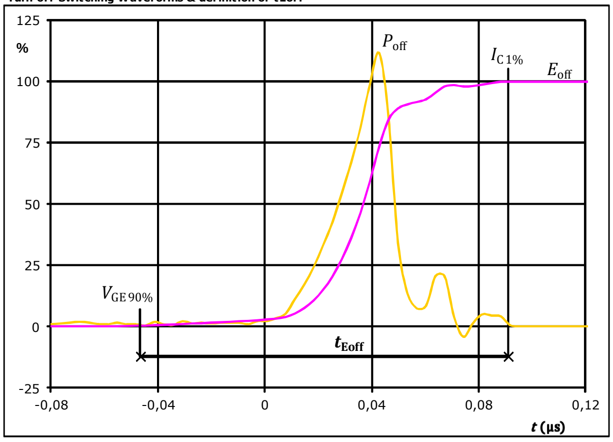


$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	30	A
t_r =	0,009	μs

H-Bridge Switching Characteristics

figure 5. IGBT

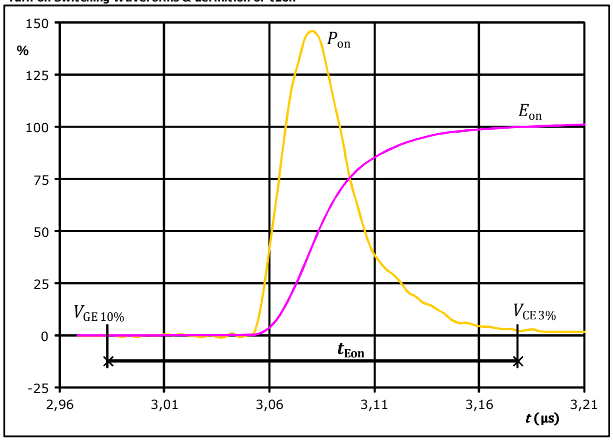
Turn-off Switching Waveforms & definition of tEoff



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

figure 6. IGBT

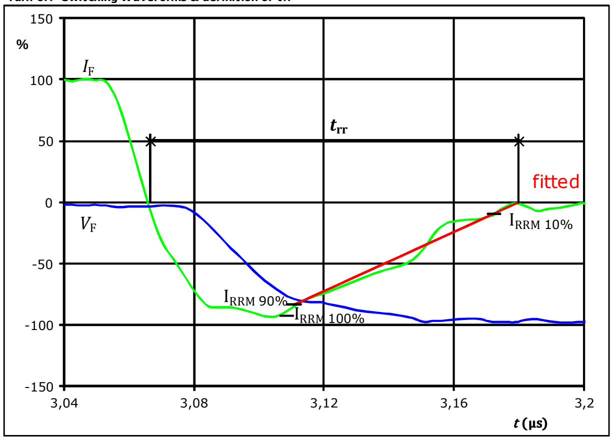
Turn-on Switching Waveforms & definition of tEon



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

figure 7. FWD

Turn-off Switching Waveforms & definition of trr

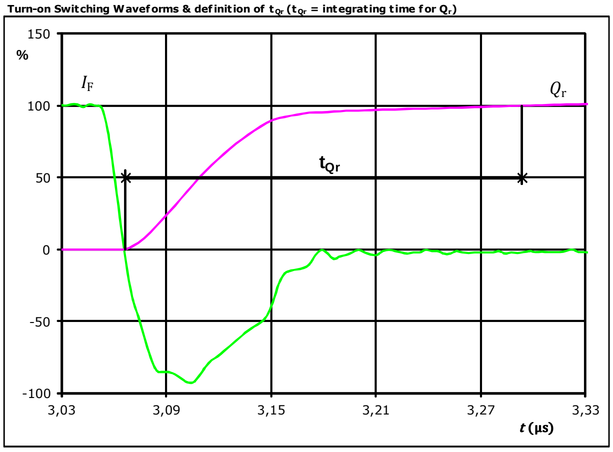


V_F (100%) =	350	V
I_F (100%) =	30	A
I_{RRM} (100%) =	-28	A
t_{rr} =	0,115	µs

H-Bridge Switching Characteristics

figure 8. **FWD**

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

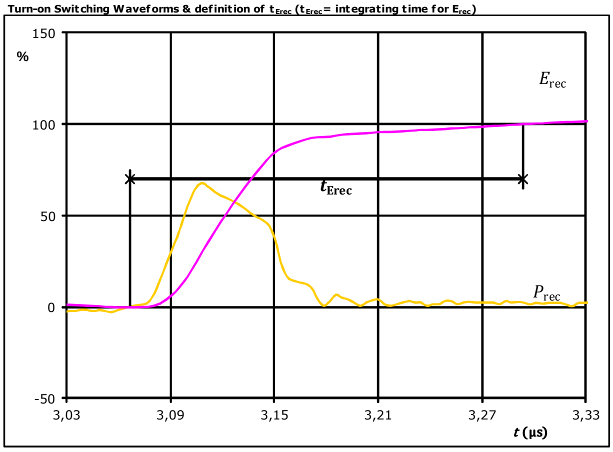


I_F (100%) =	30	A
Q_r (100%) =	1,94	µC
t_{Qr} =	0,23	µs

160

figure 9. **FWD**

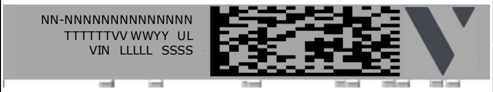
Turn-on Switching Waveforms & definition of t_{Erec} (t_{Erec} = integrating time for E_{rec})



P_{rec} (100%) =	10,55	kW
E_{rec} (100%) =	0,43	mJ
t_{Erec} =	0,23	µs

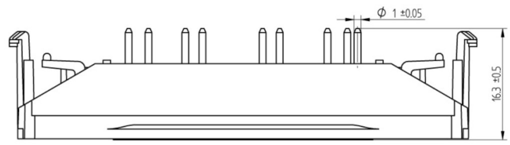
Ordering Code & Marking

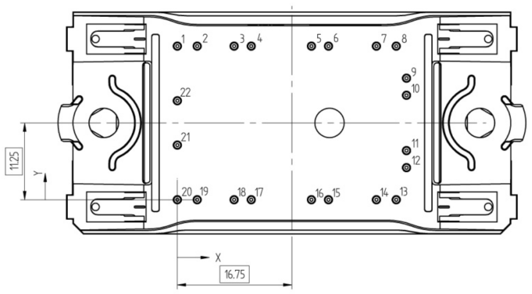
Version	Ordering Code
without thermal paste with solder pins 12 mm housing	10-FZ074PA030SM-L623F08
without thermal paste with press-fit pins 12 mm housing	10-PZ074PA030SM-L623F08Y

	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		

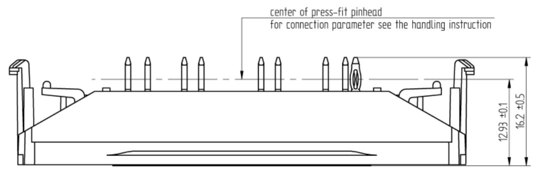
Outline

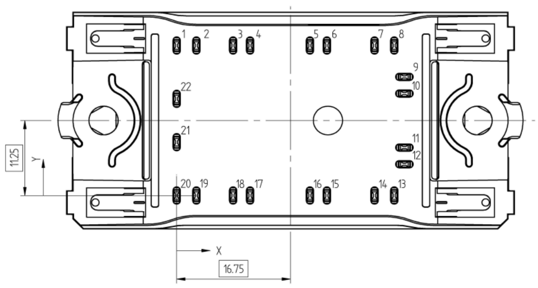
Pin table [mm]			
Pin	X	Y	Function
1	0	22,5	G11
2	2,9	22,5	S11
3	8,3	22,5	DC-1
4	10,8	22,5	DC-1
5	19,6	22,5	DC+
6	22,1	22,5	DC+
7	29,1	22,5	S12
8	32	22,5	G12
9	33,5	17,8	Ph1
10	33,5	15,3	Ph1
11	33,5	7,2	Ph2
12	33,5	4,7	Ph2
13	32	0	G14
14	29,1	0	S14
15	22,1	0	DC+
16	19,6	0	DC+
17	10,8	0	DC-2
18	8,3	0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





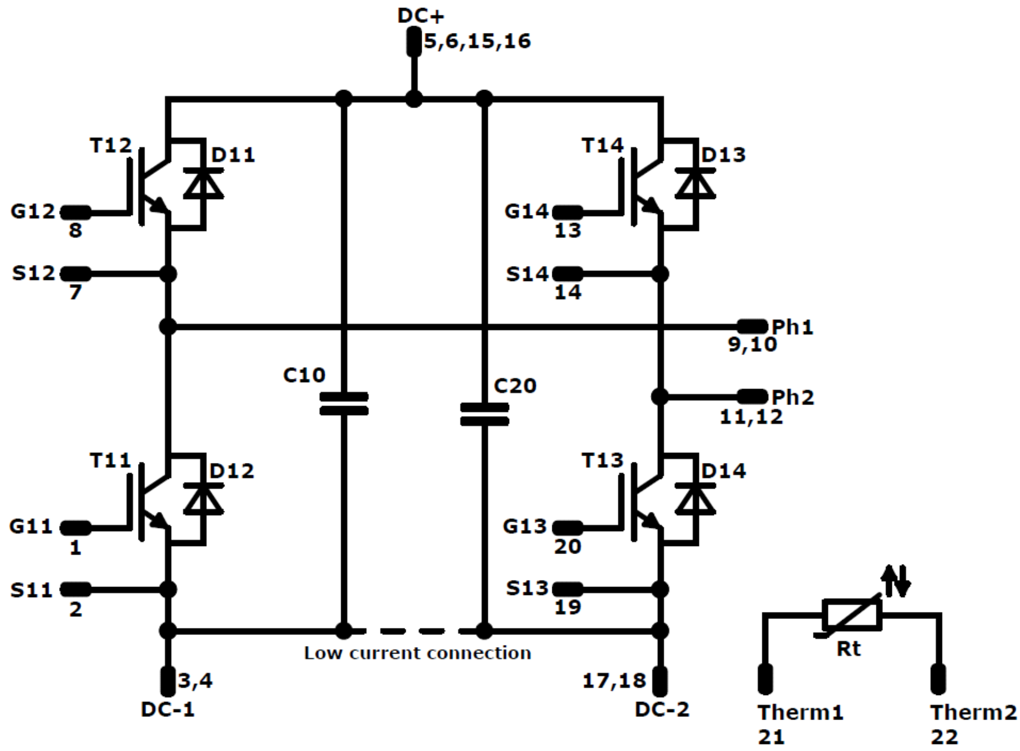
Tolerance of pinpositions: ±0,5mm at the end of pins
Dimension of coordinate axis is only offset without tolerance





Tolerance of pinpositions: ±0,5mm at the end of pins
Dimension of coordinate axis is only offset without tolerance

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	Thermistor			Thermistor	

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

Handling instruction
Handling instructions for *flow* 0 packages see vincotech.com website.

Package data
Package data for *flow* 0 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-D1-14	29 May 2017		