10-FZ074PA050SM-L624F08
10-PZ074PA050SM-L624F08Y
datasheet

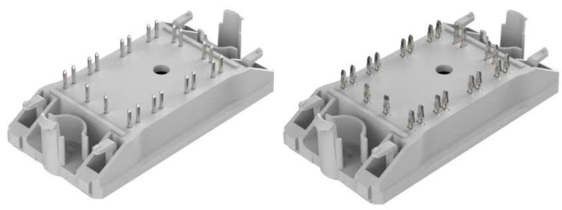
Vincotech

***fast*PACK 0 H C** | **650 V / 50 A**

Features

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

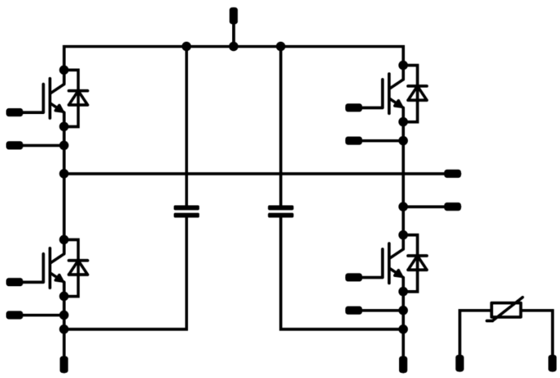
***flow* 0 housing**



Target applications

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

Schematic



Types

- 10-FZ074PA050SM-L624F08
- 10-PZ074PA050SM-L624F08Y

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	41	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		150	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	78	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	47	A
Repetitive peak forward current	I_{FRM}			100	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	63	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

10-FZ074PA050SM-L624F08
10-PZ074PA050SM-L624F08Y
datasheet

Vincotech

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	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,0005	25	3,3	4	4,7	V
Collector-emitter saturation voltage	V_{CEsat}		15		50	25 125		1,82 2,00	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 MHz	0	25		25		3000		pF
Output capacitance	C_{oes}							50		
Reverse transfer capacitance	C_{res}							11		
Gate charge	Q_g		15	520	50	25		120		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,22		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{goff} = 8 Ω R_{gon} = 8 Ω	-5 / 15	350	50	25 125 150		35 36 36		ns
Rise time	t_r					25 125 150		9 11 11		
Turn-off delay time	$t_{d(off)}$					25 125 150		97 109 117		
Fall time	t_f					25 125 150		4 7 9		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 1,8 µC Q_{rFWD} = 3,3 µC Q_{rFWD} = 3,8 µC				25 125 150		1,028 1,159 1,278		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,238 0,394 0,437		

Characteristic Values

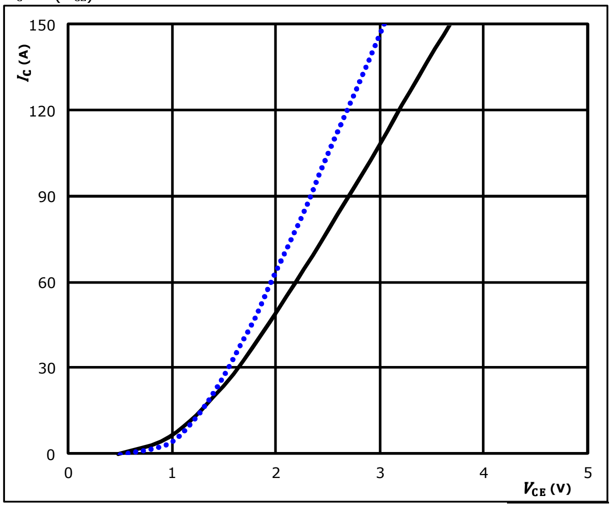
Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
H-Bridge Diode										
Static										
Forward voltage	V_F				50	25 125		1,50 1,44	1,9	V
Reverse leakage current	I_R			650		25			2,65	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,50		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 4061 A/µs di/dt = 5418 A/µs di/dt = 3990 A/µs	-5 / 15	350	50	25 125 150		39 52 58		A
Reverse recovery time	t_{rr}					25 125 150		86 109 121		ns
Recovered charge	Q_r					25 125 150		1,787 3,294 3,823		µC
Reverse recovered energy	E_{rec}					25 125 150		0,346 0,699 0,831		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		301 451 472		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

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

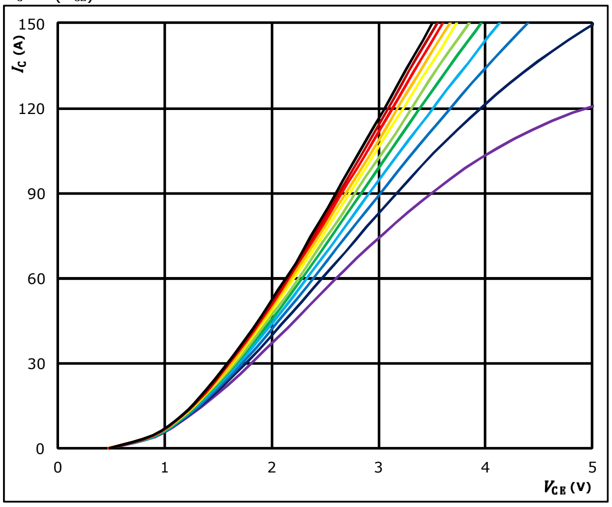


t_p =	250	µs	25 °C	···········
V_{GE} =	15	V	T_j: 125 °C	———

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

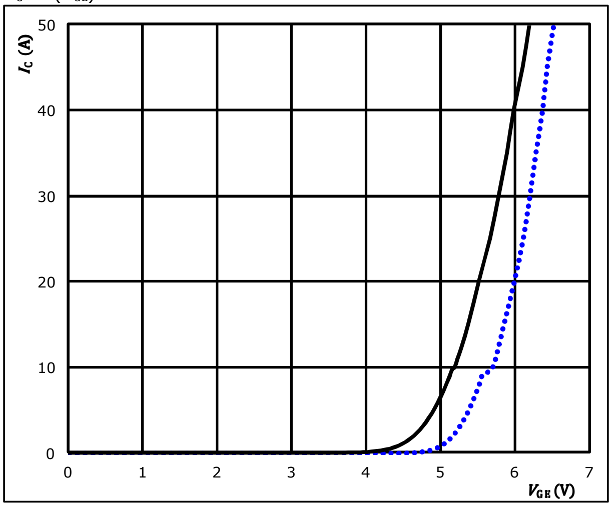


t_p =	250	µs
T_j =	125	°C
V_{GE} from	8 V to 18 V in steps of 1 V	

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

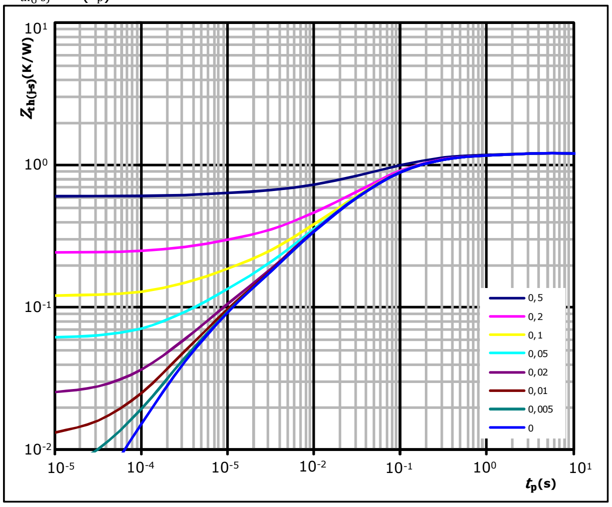


t_p =	100	µs	25 °C	···········
V_{CE} =	10	V	T_j: 125 °C	———

figure 4. **IGBT**

Transient Thermal Impedance as function of Pulse duration

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



D = t_p / T

$R_{th(j-s)}$ = 1,22 K/W

IGBT thermal model values

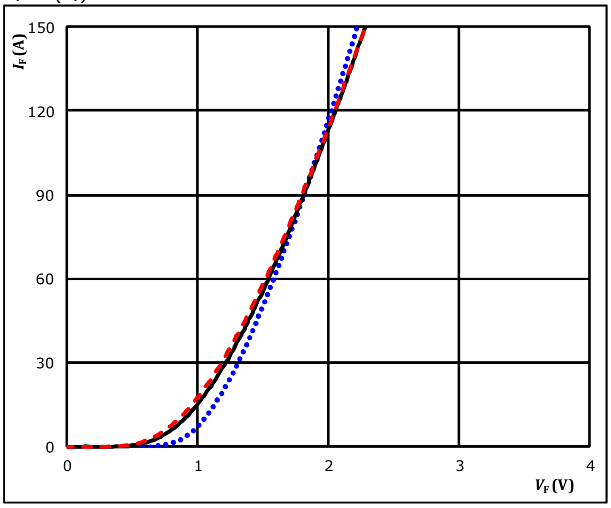
R (K/W)	τ (s)
4,40E-01	1,12E-01
3,96E-01	3,56E-02
1,75E-01	7,55E-03
3,44E-02	1,97E-03
4,80E-02	4,33E-04

H-Bridge Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



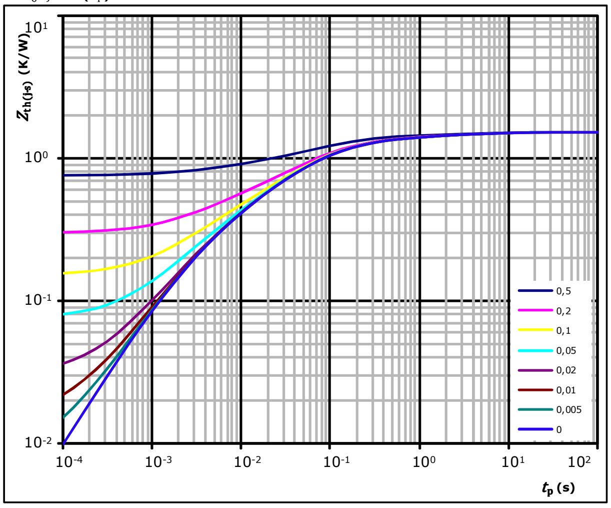
t_p = 250 μs

T_j: 25 °C, 125 °C, 150 °C

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 1,50 K/W

FWD thermal model values

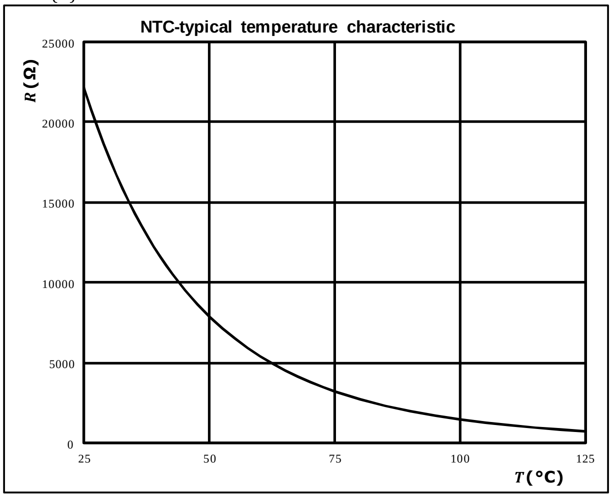
R (K/W)	τ (s)
1,03E-01	4,73E+00
2,05E-01	5,53E-01
6,39E-01	8,31E-02
3,39E-01	2,02E-02
1,71E-01	4,42E-03
4,45E-02	1,30E-03

Thermistor Characteristics

figure 1. **Thermistor**

Typical NTC characteristic as a function of temperature

$R = f(T)$

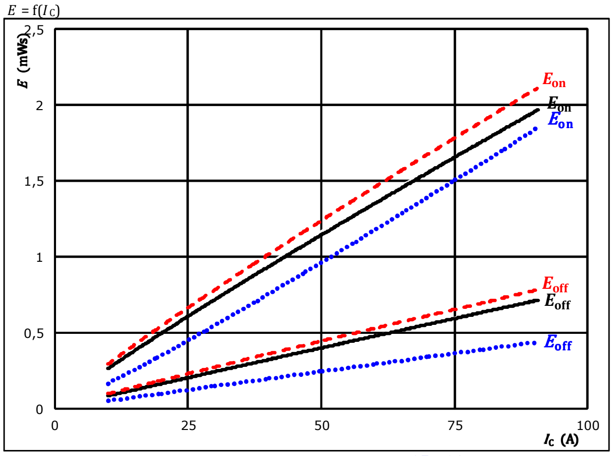


H-Bridge Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



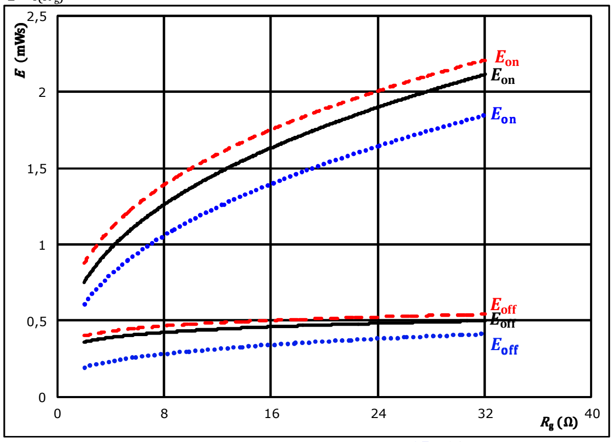
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	··········
V_{GE} =	-5 / 15	V		125 °C	———
R_{gon} =	8	Ω		150 °C	– – –
R_{goff} =	8	Ω			

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



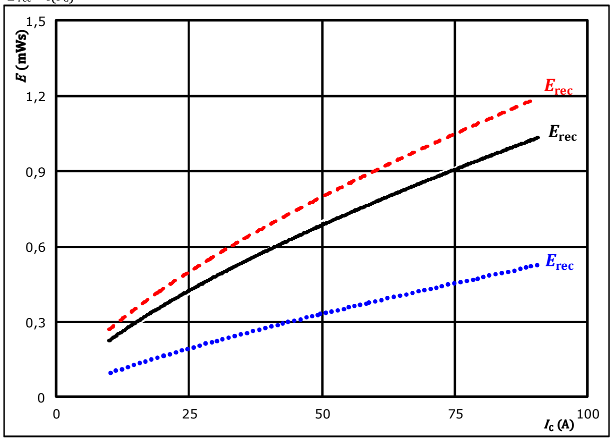
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	··········
V_{GE} =	-5 / 15	V		125 °C	———
I_C =	50	A		150 °C	– – –

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



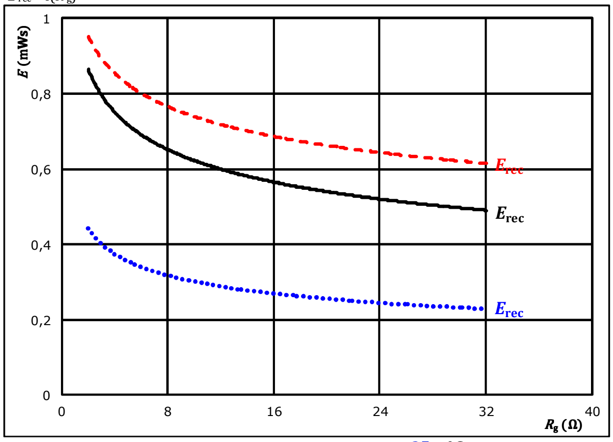
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	··········
V_{GE} =	-5 / 15	V		125 °C	———
R_{gon} =	8	Ω		150 °C	– – –

figure 4. **FWD**

Typical reverse recovered energy loss as a function of gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

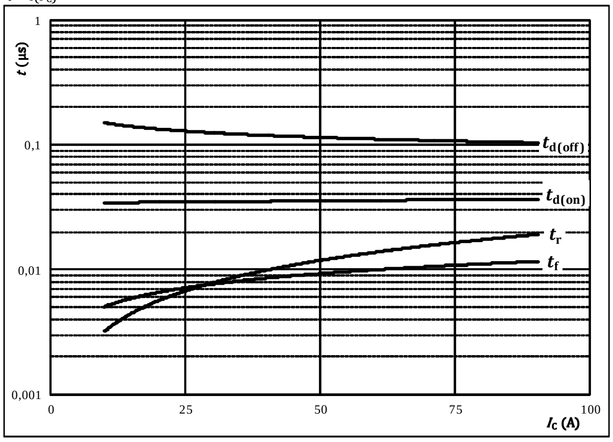
V_{CE} =	350	V	T_j:	25 °C	··········
V_{GE} =	-5 / 15	V		125 °C	———
I_C =	50	A		150 °C	– – –

H-Bridge Switching Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$t = f(I_C)$



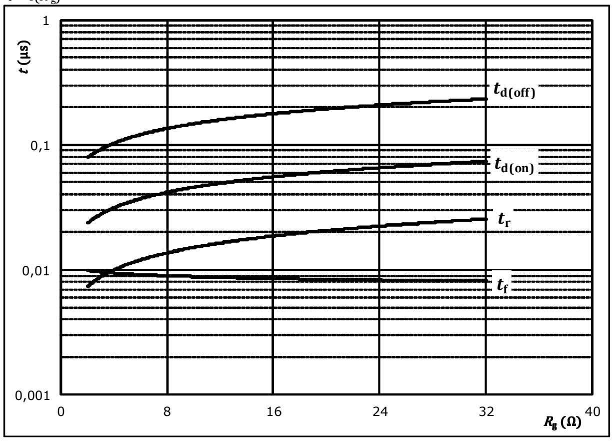
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	-5 / 15	V
R_{gon} =	8	Ω
R_{goff} =	8	Ω

figure 6. IGBT

Typical switching times as a function of gate resistor

$t = f(R_g)$



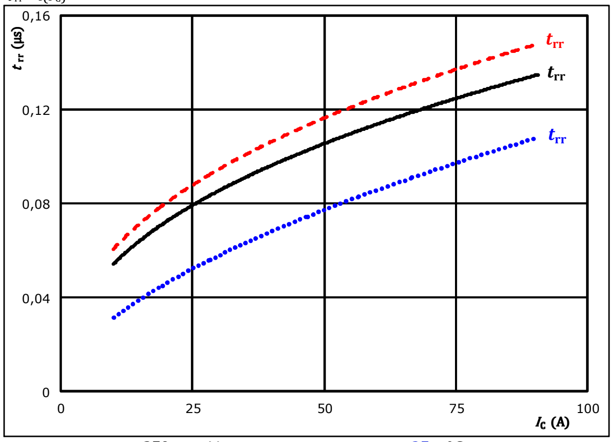
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	-5 / 15	V
I_C =	50	A

figure 7. FWD

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

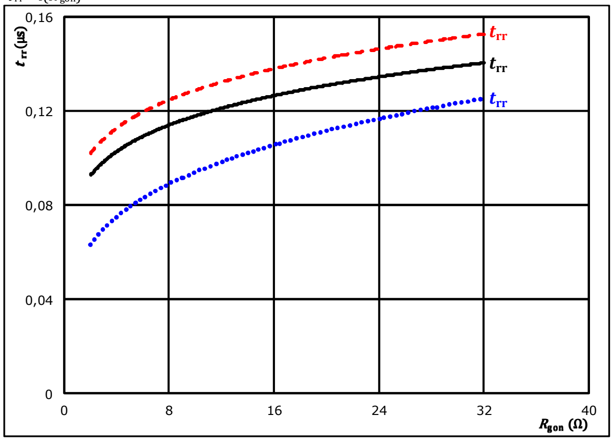


At					
V_{CE} =	350	V		25 °C	•••••••••••
V_{GE} =	-5 / 15	V	T_j:	125 °C	———
R_{gon} =	8	Ω		150 °C	– – –

figure 8. FWD

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

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



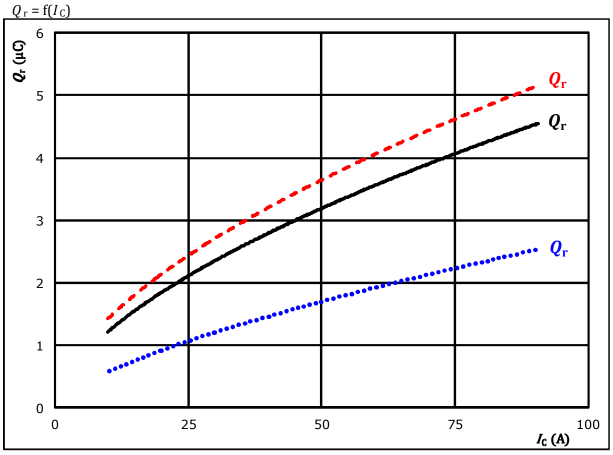
At					
V_{CE} =	350	V		25 °C	•••••••••••
V_{GE} =	-5 / 15	V	T_j:	125 °C	———
I_C =	50	A		150 °C	– – –

H-Bridge Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

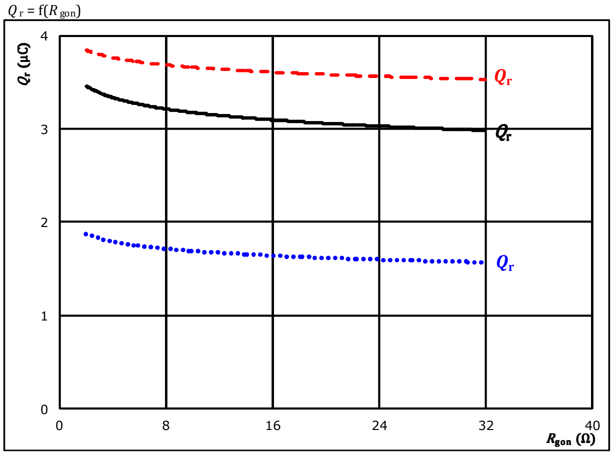


At						
V_{CE} =	350	V		25	°C	···········
V_{GE} =	-5 / 15	V	T_j:	125	°C	———
R_{gon} =	8	Ω		150	°C	– – –

figure 10. **FWD**

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

$Q_r = f(R_{gon})$

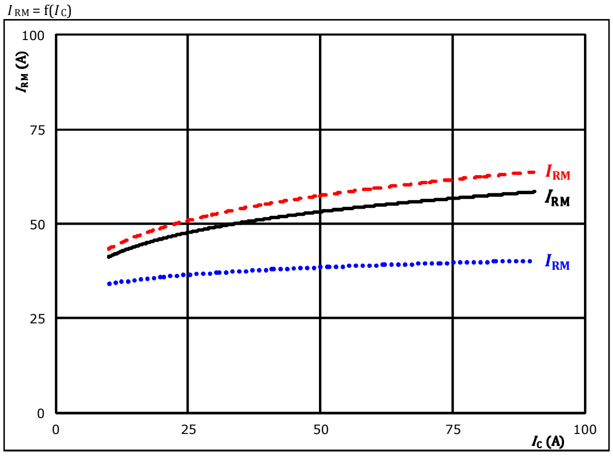


At						
V_{CE}=	350	V		25	°C	···········
V_{GE} =	-5 / 15	V	T_j:	125	°C	———
I_C=	50	A		150	°C	– – –

figure 11. **FWD**

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

$I_{RM} = f(I_C)$

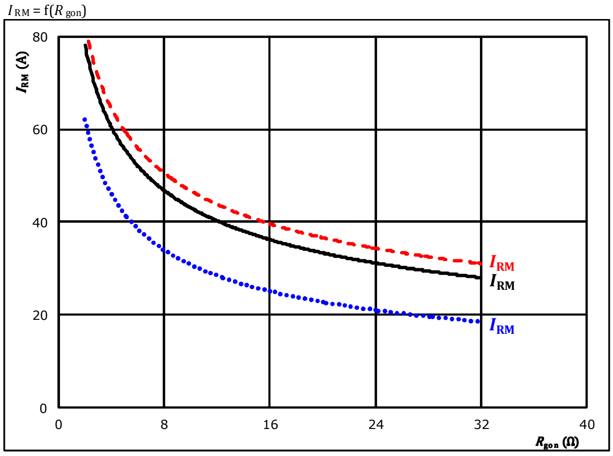


At						
V_{CE}:	350	V		25	°C	···········
V_{GE} =	-5 / 15	V	T_j:	125	°C	———
R_{gon} =	8	Ω		150	°C	– – –

figure 12. **FWD**

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

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



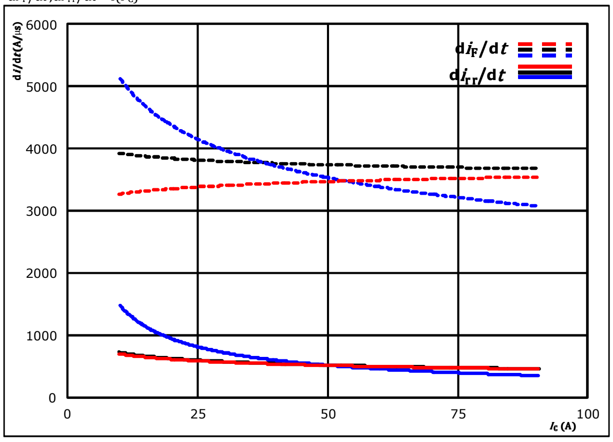
At						
V_{CE} =	350	V		25	°C	···········
V_{GE} =	-5 / 15	V	T_j:	125	°C	———
I_C =	50	A		150	°C	– – –

H-Bridge Switching Characteristics

figure 13. **FWD**

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

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



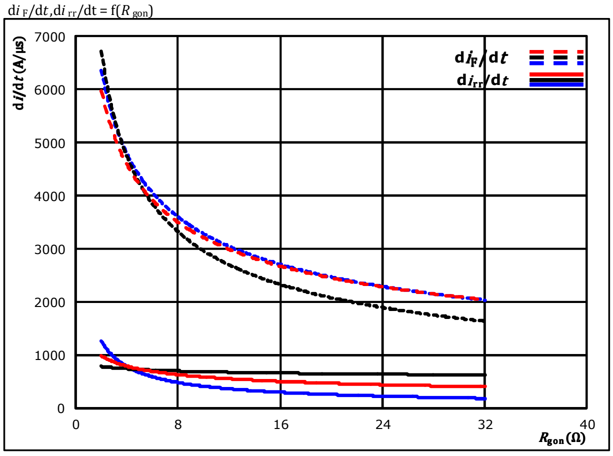
At

V_{CE} =	350	V	T_j:	25 °C	dotted
V_{GE} =	-5 / 15	V		125 °C	solid
R_{gon} =	8	Ω		150 °C	dashed

figure 14. **FWD**

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

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



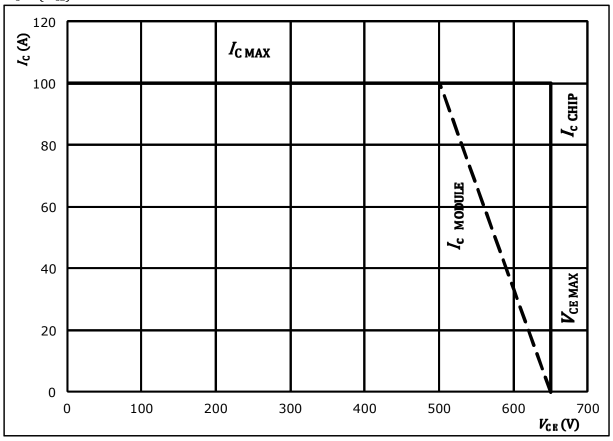
At

V_{CE} =	350	V	T_j:	25 °C	dotted
V_{GE} =	-5 / 15	V		125 °C	solid
I_C=	50	A		150 °C	dashed

figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

T_j =	175	°C
R_{gon} =	8	Ω
R_{goff} =	8	Ω

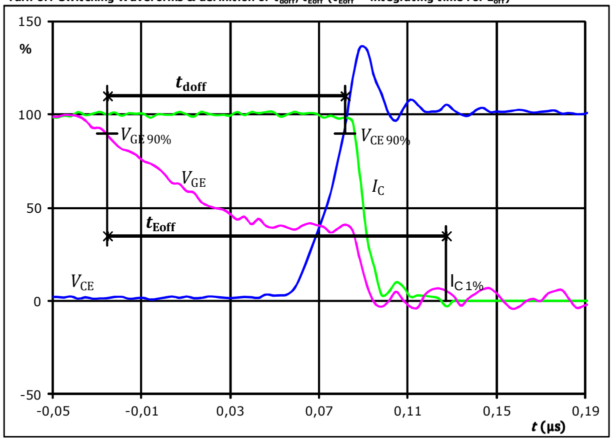
H-Bridge Switching Definitions

General conditions

T_j	=	125 °C
R_{gon}	=	8 Ω
R_{goff}	=	8 Ω

figure 1. **IGBT**

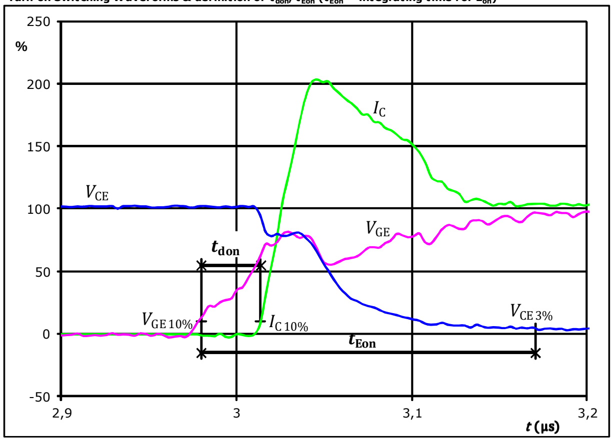
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%)$ =	-5	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	50	A
t_{doff} =	0,109	µs
t_{Eoff} =	0,152	µs

figure 2. **IGBT**

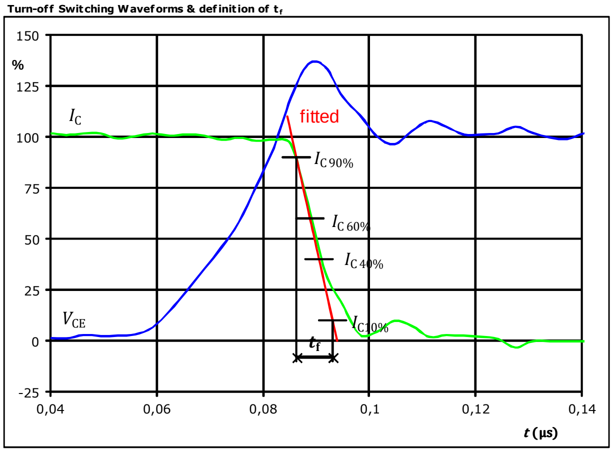
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%)$ =	-5	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	50	A
t_{don} =	0,036	µs
t_{Eon} =	0,191	µs

figure 3. **IGBT**

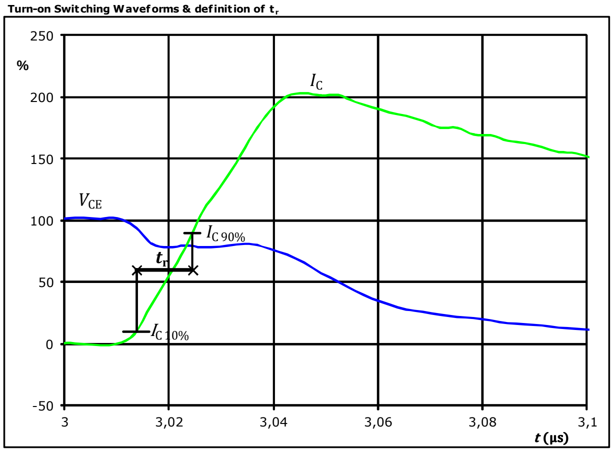
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	50	A
t_f =	0,007	µs

figure 4. **IGBT**

Turn-on Switching Waveforms & definition of t_r

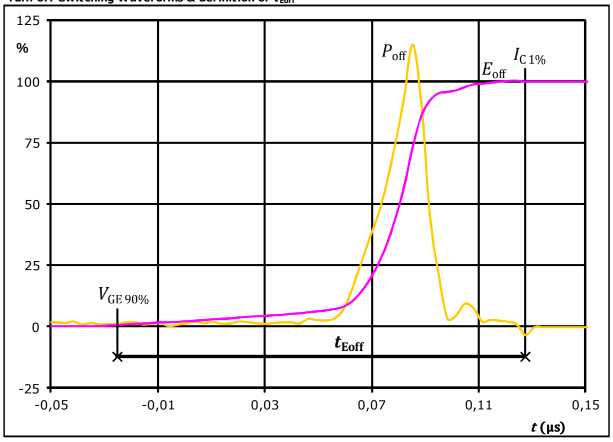


$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	50	A
t_r =	0,011	µs

H-Bridge Switching Characteristics

figure 5.	IGBT

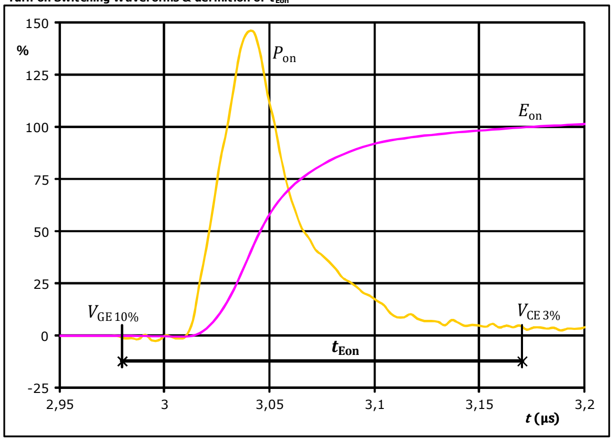
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	17,40	kW
E_{off} (100%) =	0,39	mJ
t_{Eoff} =	0,15	µs

figure 6.	IGBT

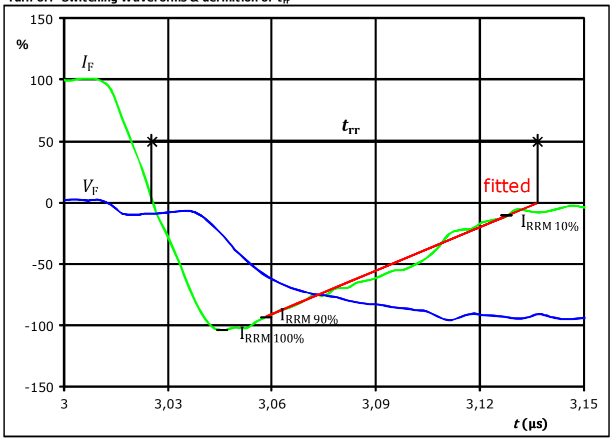
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	17,40	kW
E_{on} (100%) =	1,16	mJ
t_{Eon} =	0,19	µs

figure 7.	FWD

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

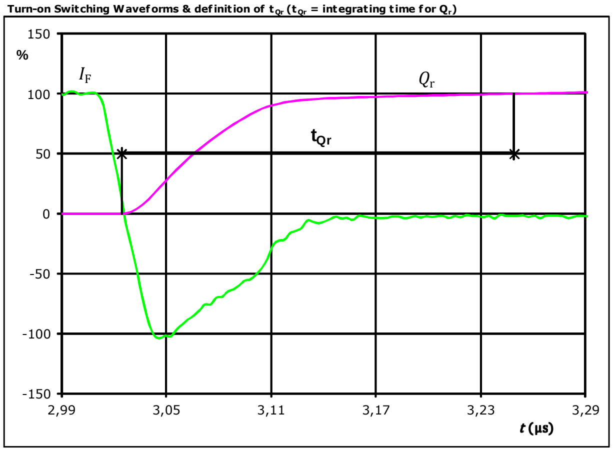


V_F (100%) =	350	V
I_F (100%) =	50	A
I_{RRM} (100%) =	-52	A
t_{rr} =	0,109	µs

H-Bridge Switching Characteristics

figure 8. **FWD**

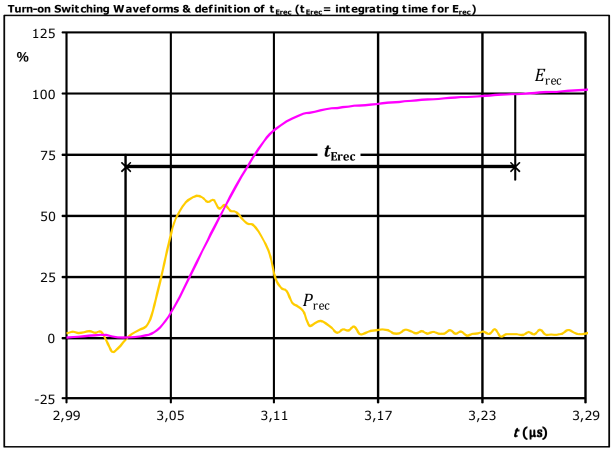
Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)



I_F (100%) =	50	A
Q_r (100%) =	3,29	µC
t_{Qr} =	0,22	µs

figure 9. **FWD**

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



P_{rec} (100%) =	17,40	kW
E_{rec} (100%) =	0,70	mJ
t_{Erec} =	0,22	µs

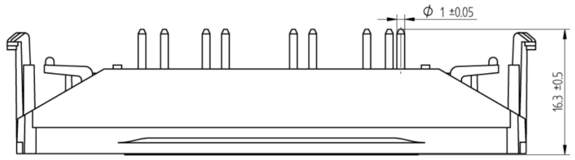
Ordering Code & Marking

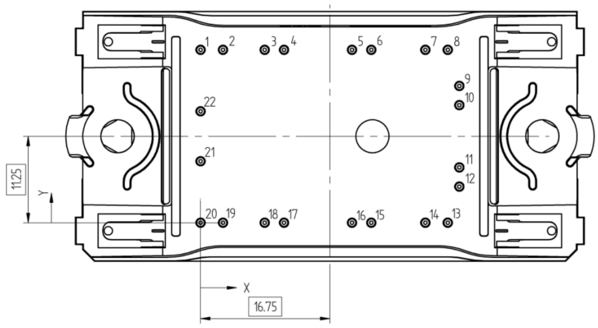
Version	Ordering Code
without thermal paste 12 mm housing with solder pins	10-FZ074PA050SM-L624F08
without thermal paste 12 mm housing with press-fit pins	10-PZ074PA050SM-L624F08Y

	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		

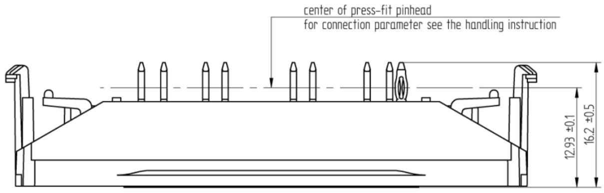
Outline

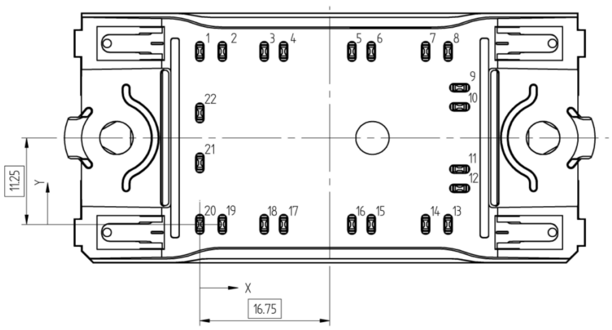
Pin table [mm]			
Pin	X	Y	Function
1	0	22,5	G11
2	2,9	22,5	S11
3	8,3	22,5	DC-1
4	10,8	22,5	DC-1
5	19,6	22,5	DC+
6	22,1	22,5	DC+
7	29,1	22,5	S12
8	32	22,5	G12
9	33,5	17,8	Ph1
10	33,5	15,3	Ph1
11	33,5	7,2	Ph2
12	33,5	4,7	Ph2
13	32	0	G14
14	29,1	0	S14
15	22,1	0	DC+
16	19,6	0	DC+
17	10,8	0	DC-2
18	8,3	0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



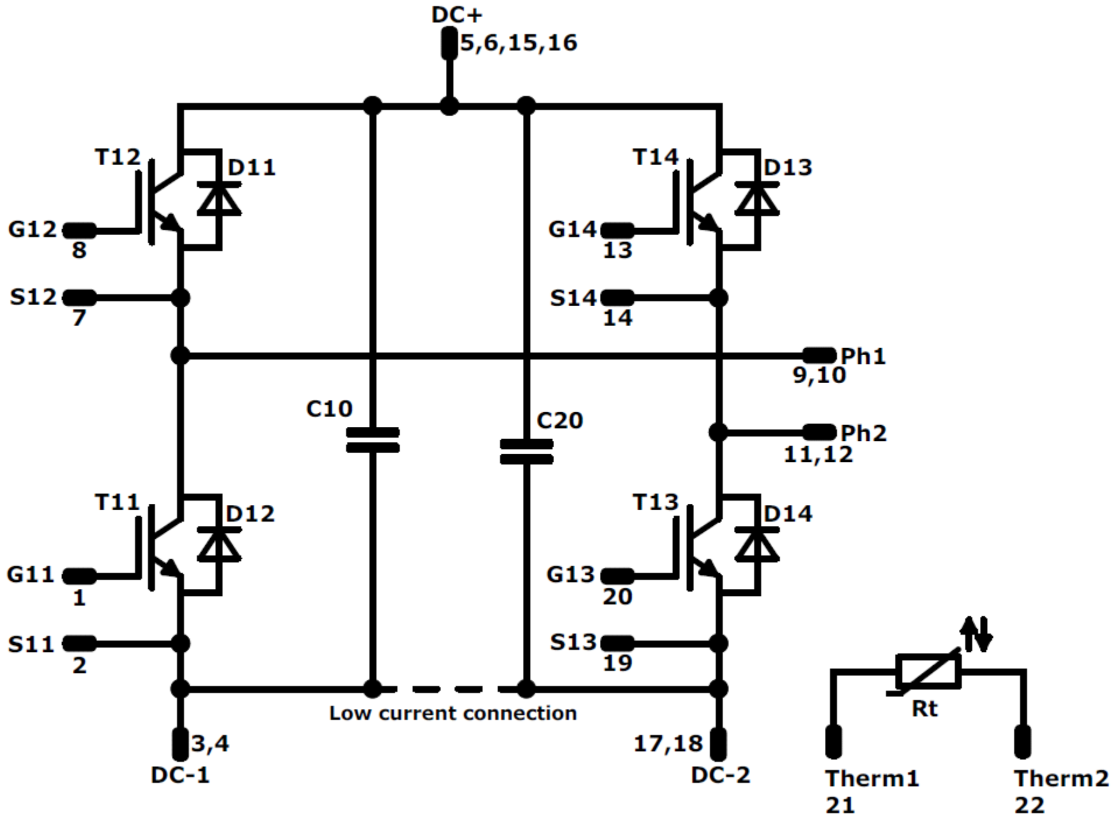


Tolerance of pinpositions: ±0,5mm at the end of pins
Dimension of coordinate axis is only offset without tolerance

Vincotech

10-FZ074PA050SM-L624F08
10-PZ074PA050SM-L624F08Y
datasheet

Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T11-T14	IGBT	650 V	50 A	H-Bridge Switch	
D11-D14	FWD	650 V	50 A	H-Bridge Diode	
C10, C20	Capacitor	630 V		Capacitor (DC)	
Rt	NTC			Thermistor	

Vincotech

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-xZ074PA050SM-L624F08x-D2-14	18 Oct. 2017		