Vincotech

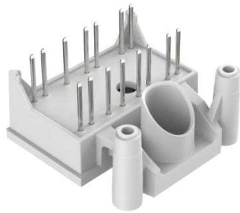
10-0B066PA030SB-M996F09
datasheet

***flow*PACK 0B** | **600 V / 30 A**

Features

- IGBT3 (600 V) technology
- Open emitter topology
- New ultra-compact housing
- Single-screw heat sink mounting

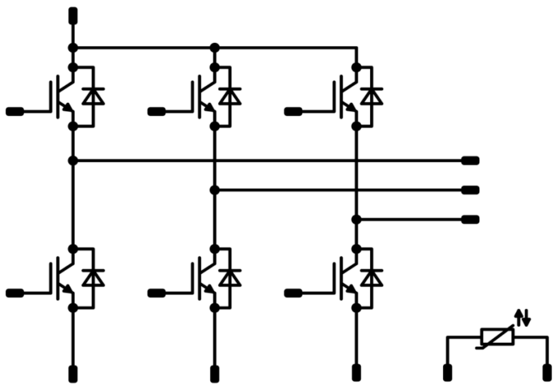
flow 0 B 17mm housing



Target applications

- Dedicated design for motor drive

Schematic



Types

- 10-0B066PA030SB-M996F09

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Inverter Switch					
Collector-emitter voltage	V_{CES}			600	V
Collector current	I_C	$T_j = T_{jmax}$	T_s = 80 °C	34	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		90	A
Turn off safe operating area		T_j ≤ 150°C, V_{CE} ≤ 1200 V		90	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	68	W
Gate-emitter voltage	V_{GES}			±20	V
Short circuit ratings	t_{SC} V_{CC}	T_j ≤ 150 °C V_{GE} = 15 V		6 360	μs V
Maximum junction temperature	T_{jmax}			175	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Inverter Diode					
Peak repetitive reverse voltage	V_{RRM}			600	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C	32	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	53	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 s	4000	V
Creepage distance				min. 12,7	mm
Clearance				min. 12,7	mm
Comparative Tracking Index	CTI			> 200	

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	
Inverter Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,00043	25	5	5,8	6,5	V
Collector-emitter saturation voltage	V_{CEsat}		15		30	25 125	1,1	1,51 1,71	1,9	V
Collector-emitter cut-off current	I_{CES}		0	600		25			1,6	µA
Gate-emitter leakage current	I_{GES}		20	0		25			300	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}	f = 1 MHz	0	25		25		1630		pF
Output capacitance	C_{oes}							108		
Reverse transfer capacitance	C_{res}							50		
Gate charge	Q_g		15	400	30	25		167		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	Thermal grease thickness ≤ 50 µm λ = 1 W/mK						1,41		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{goff} = 16 Ω R_{gon} = 16 Ω	±15	300	30	25 150		106 104		ns
Rise time	t_r					25 150		14 20		
Turn-off delay time	$t_{d(off)}$					25 150		146 171		
Fall time	t_f					25 150		92 112		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 1,3 µC Q_{rFWD} = 2,7 µC				25 150		0,475 0,665		mWs
Turn-off energy (per pulse)	E_{off}					25 150		0,675 0,913		

Characteristic Values

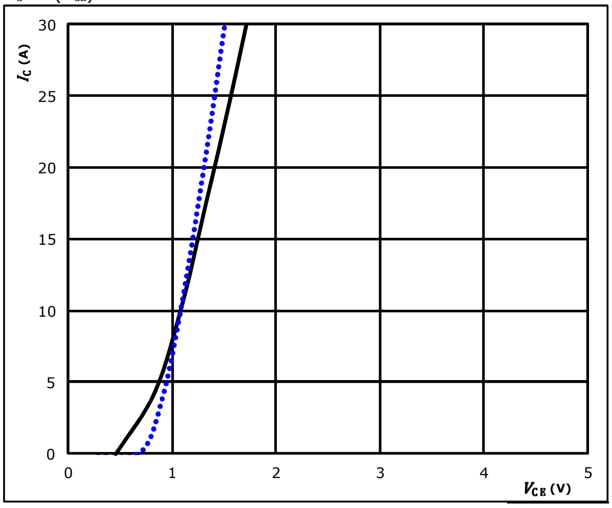
Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Inverter Diode										
Static										
Forward voltage	V_F				30	25 125		1,65 1,62	1,95	V
Reverse leakage current	I_R			600		25			27	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	Thermal grease thickness ≤ 50 µm λ = 1 W/mK						1,80		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 2285 A/µs di/dt = 1902 A/µs	±15	300	30	25 150		27 34		A
Reverse recovery time	t_{rr}					25 150		146 253		ns
Recovered charge	Q_r					25 150		1,338 2,654		µC
Reverse recovered energy	E_{rec}					25 150		0,290 0,568		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 150		1752 815		A/µs
Thermistor										
Rated resistance	R					25		21,5		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	R_{100} = 1486 Ω				100	-4,5		+4,5	%
Power dissipation	P					25		210		mW
Power dissipation constant						25		3,5		mW/K
B-value	$B_{(25/50)}$					25		3884		K
B-value	$B_{(25/100)}$					25		3964		K
Vincotech NTC Reference									F	

Inverter Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

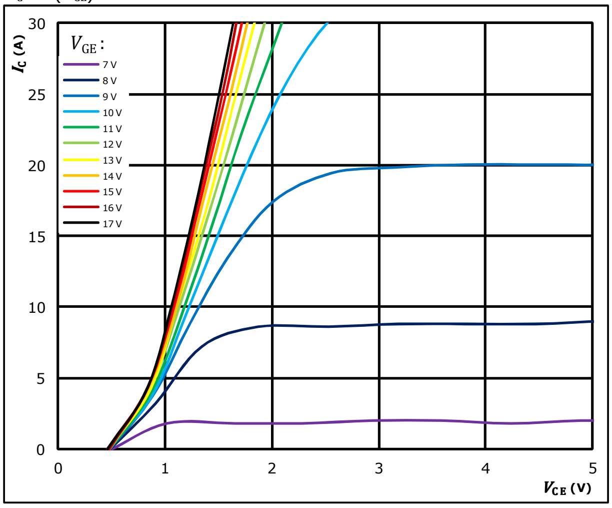


t_p =	250	µs	T_j:	25 °C	dotted blue line
V_{GE} =	15	V		125 °C	solid black line

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

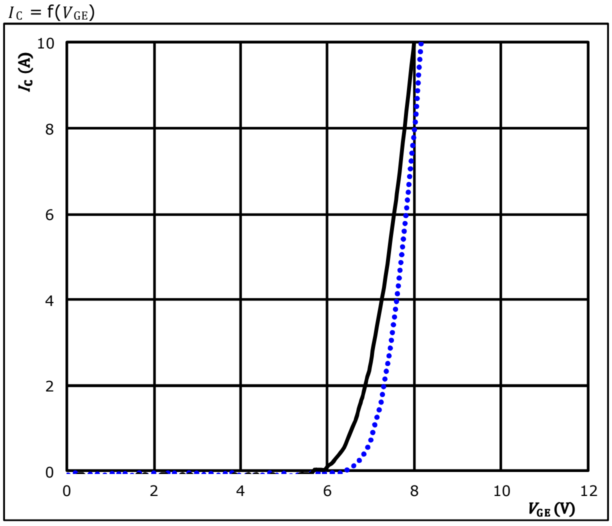


t_p = 250 µs
T_j = 125 °C
V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

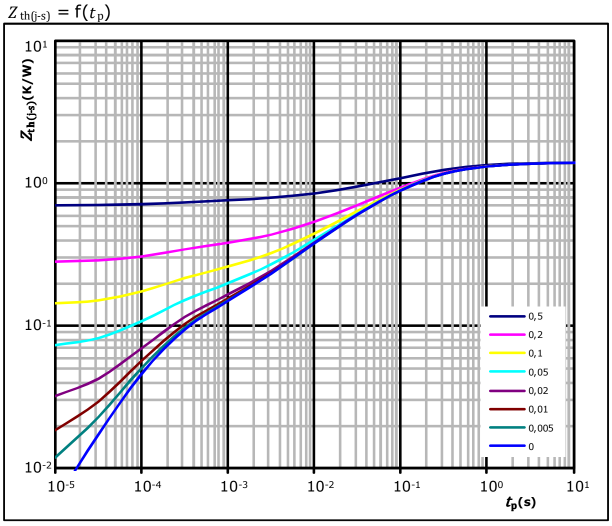


t_p =	100	µs	T_j:	25 °C	dotted blue line
V_{CE} =	10	V		125 °C	solid black line

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D = t_p / T
$R_{th(j-s)}$ = 1,41 K/W

IGBT thermal model values

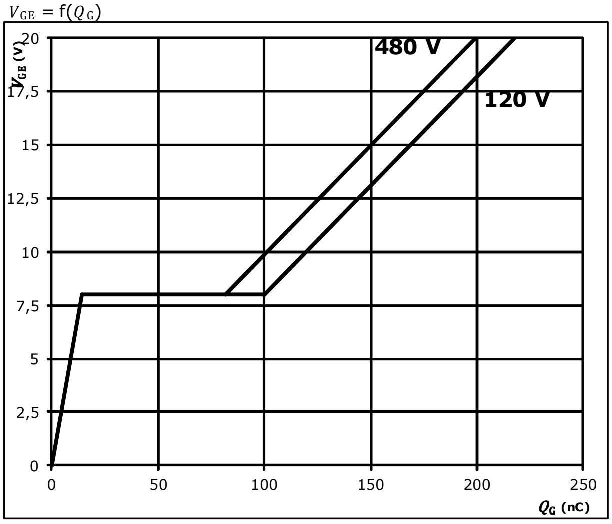
R (K/W)	τ (s)
3,67E-02	9,82E+00
1,46E-01	1,04E+00
5,44E-01	1,78E-01
3,36E-01	4,31E-02
2,08E-01	8,55E-03
6,31E-02	9,19E-04
7,45E-02	1,51E-04

Inverter Switch Characteristics

figure 5. **IGBT**

Gate voltage vs gate charge

$V_{GE} = f(Q_G)$

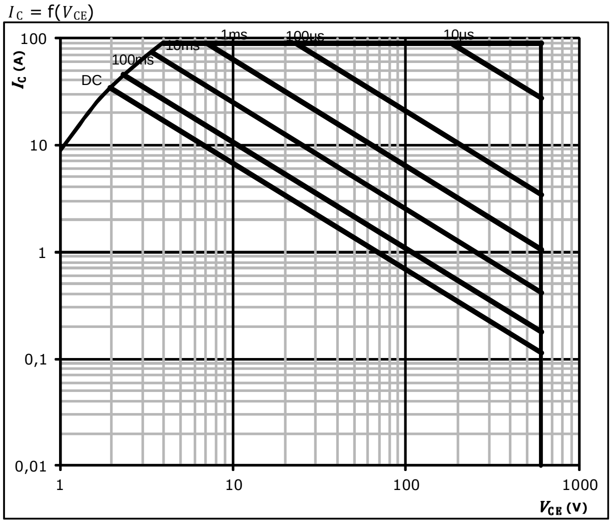


I_C= 30 A

figure 6. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



D = single pulse

T_s = 80 ºC

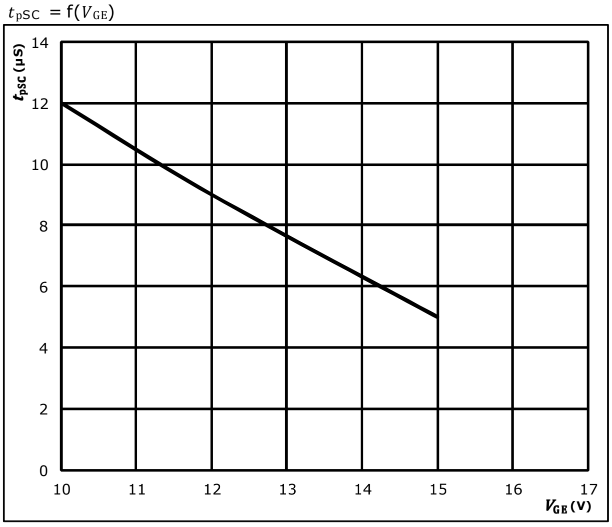
V_{GE} = ±15 V

T_j = T_{jmax} ºC

figure 7. **IGBT**

Short circuit duration as a function of V_{GE}

$t_{pSC} = f(V_{GE})$



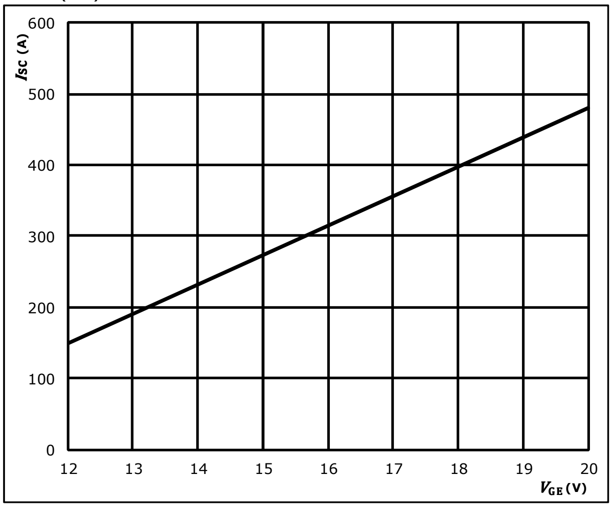
V_{CE} = 400 V

T_j ≤ 150 ºC

figure 8. **IGBT**

Typical short circuit current as a function of V_{GE}

$I_{SC} = f(V_{GE})$



V_{CE} ≤ 400 V

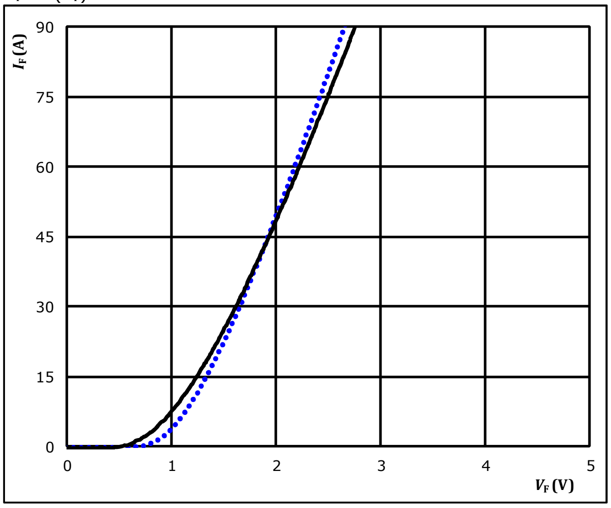
T_j ≤ 150 ºC

Inverter Diode Characteristics

figure 1.	**FWD**

Typical forward characteristics

$I_F = f(V_F)$



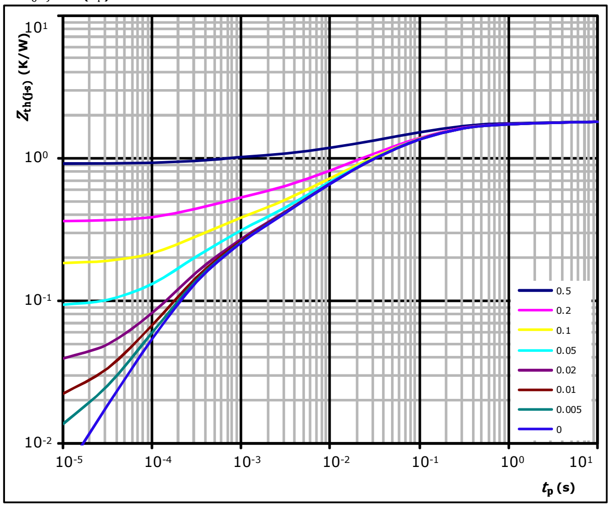
t_p = 250 µs

T_j: 25 °C ············
125 °C ———

figure 2.	**FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 1,80 K/W

FWD thermal model values

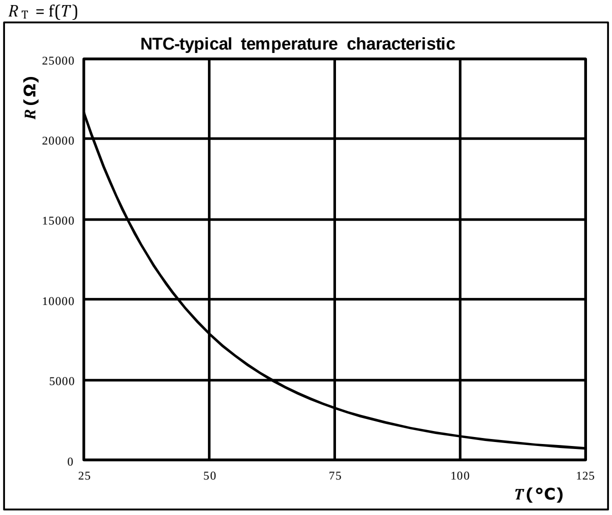
R (K/W)	τ (s)
7,95E-02	3,72E+00
2,06E-01	4,02E-01
7,04E-01	8,35E-02
4,39E-01	1,56E-02
2,12E-01	2,93E-03
1,68E-01	3,31E-04

Thermistor Characteristics

Thermistor typical temperature characteristic

Typical NTC characteristic
as a function of temperature

$R_T = f(T)$

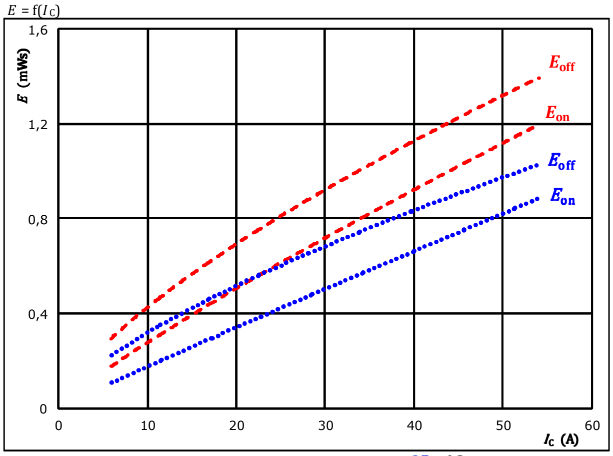


Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



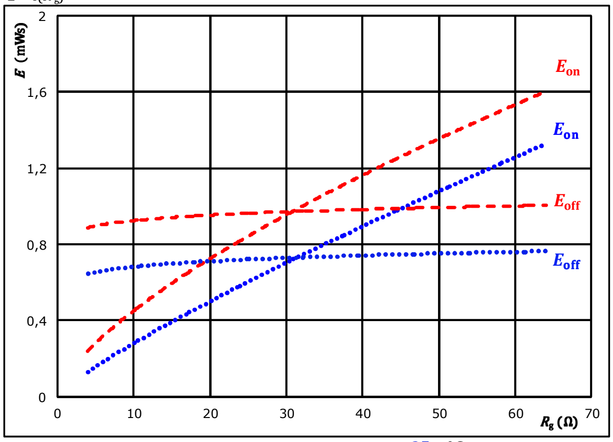
With an inductive load at

V_{CE} =	300	V	T_j:	25 °C	············
V_{GE} =	±15	V		150 °C	– – – –
R_{gon} =	16	Ω			
R_{goff} =	16	Ω			

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



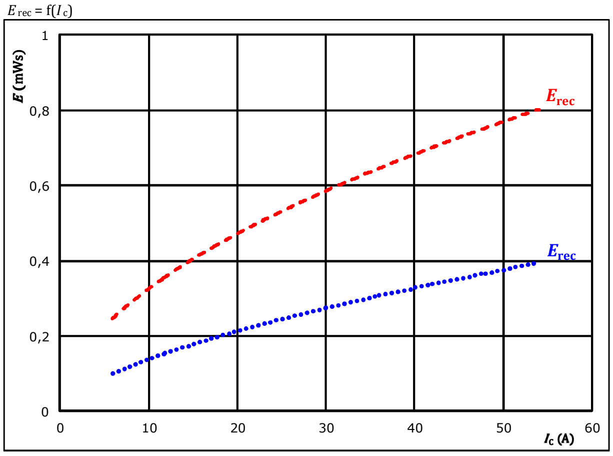
With an inductive load at

V_{CE} =	300	V	T_j:	25 °C	············
V_{GE} =	±15	V		150 °C	– – – –
I_C =	30	A			

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



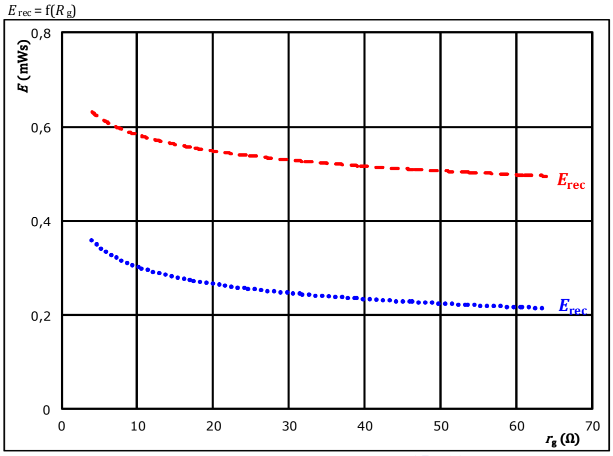
With an inductive load at

V_{CE} =	300	V	T_j:	25 °C	············
V_{GE} =	±15	V		150 °C	– – – –
R_{gon} =	16	Ω			

figure 4. **FWD**

Typical reverse recovered energy loss as a function of gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

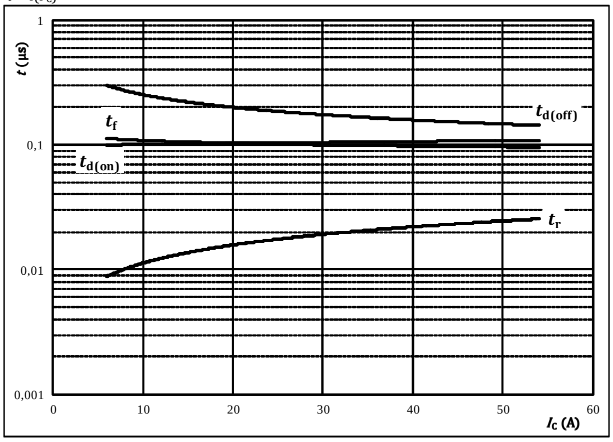
V_{CE} =	300	V	T_j:	25 °C	············
V_{GE} =	±15	V		150 °C	– – – –
I_C =	30	A			

Switching Characteristics

figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



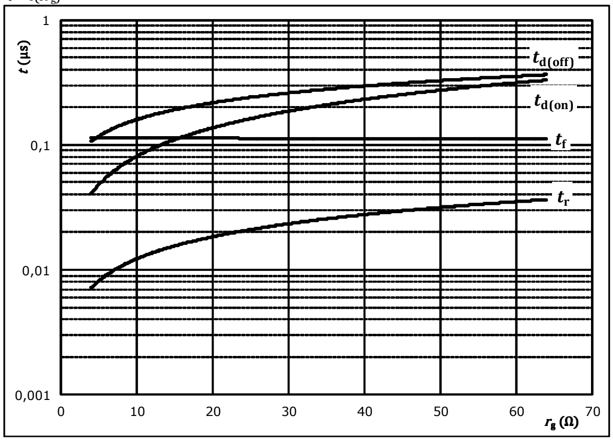
With an inductive load at

T_j =	150	°C
V_{CE} =	300	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

$t = f(R_g)$



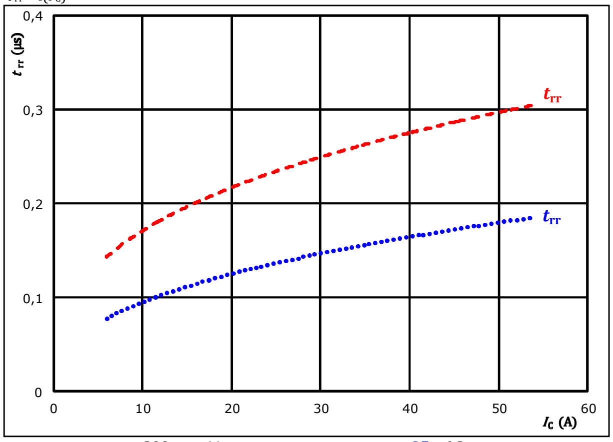
With an inductive load at

T_j =	150	°C
V_{CE} =	300	V
V_{GE} =	±15	V
I_C =	30	A

figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

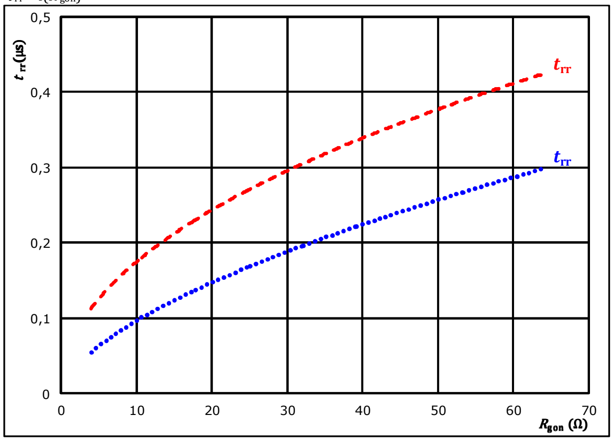


At	V_{CE} =	300	V		25	°C
	V_{GE} =	±15	V	T_j:	150	°C
	R_{gon} =	16	Ω			

figure 8. **FWD**

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

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



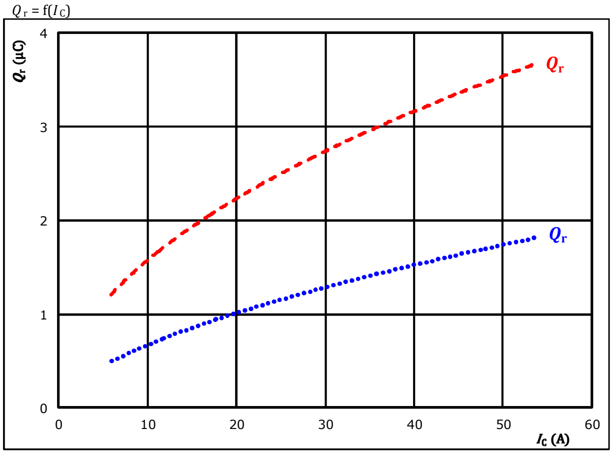
At	V_{CE} =	300	V		25	°C
	V_{GE} =	±15	V	T_j:	150	°C
	I_C =	30	A			

Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

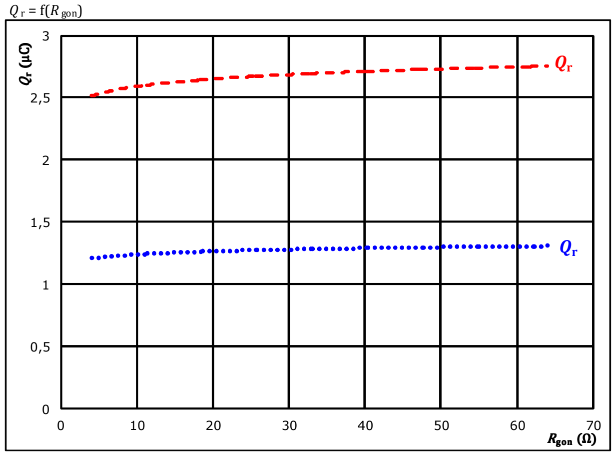


At						
	V_{CE} =	300	V		25	°C
	V_{GE} =	±15	V	T_j:	150	°C
	R_{gon} =	16	Ω			

figure 10. FWD

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

$Q_r = f(R_{gon})$

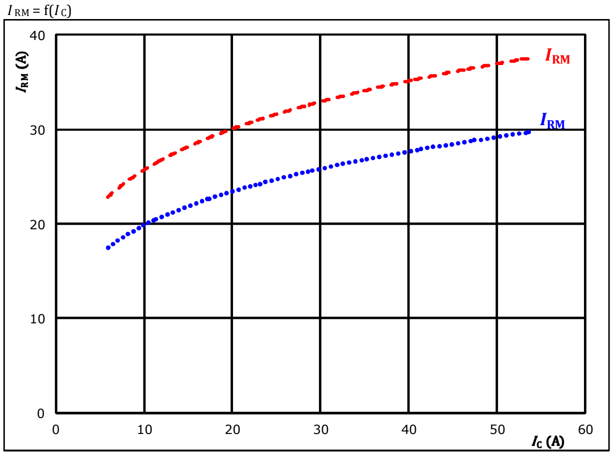


At						
	V_{CE}=	300	V		25	°C
	V_{GE} =	±15	V	T_j:	150	°C
	I_C=	30	A			

figure 11. FWD

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

$I_{RM} = f(I_C)$

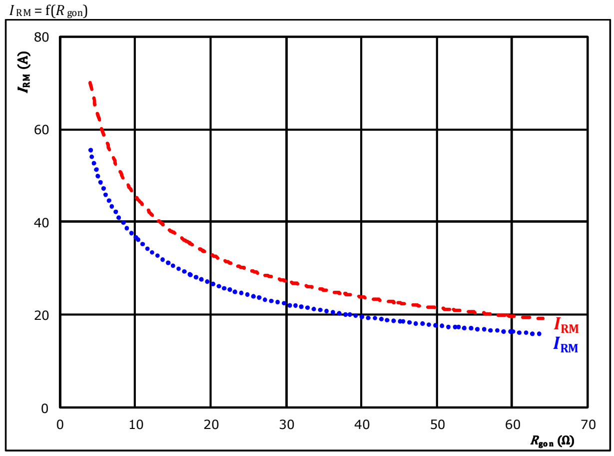


At						
	V_{CE} :	300	V		25	°C
	V_{GE} =	±15	V	T_j:	150	°C
	R_{gon} =	16	Ω			

figure 12. FWD

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

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



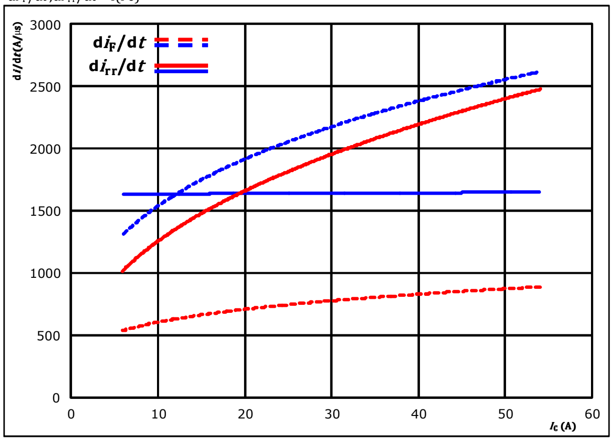
At						
	V_{CE} =	300	V		25	°C
	V_{GE} =	±15	V	T_j:	150	°C
	I_C =	30	A			

Switching Characteristics

figure 13. **FWD**

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

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

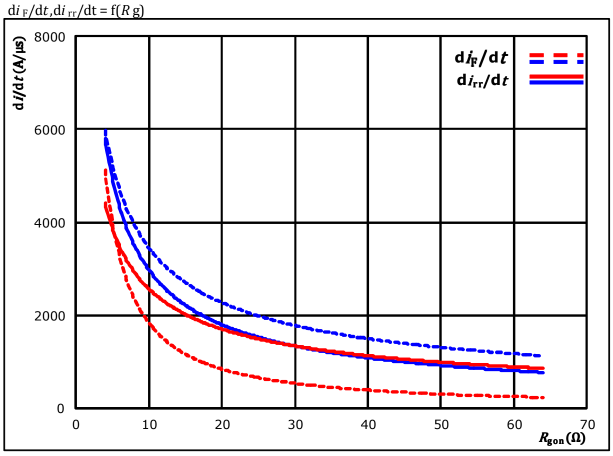


At					
V_{CE} =	300	V	T_j:	25 °C	·············
V_{GE} =	±15	V		150 °C	– – – –
R_{gon} =	16	Ω			

figure 14. **FWD**

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

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

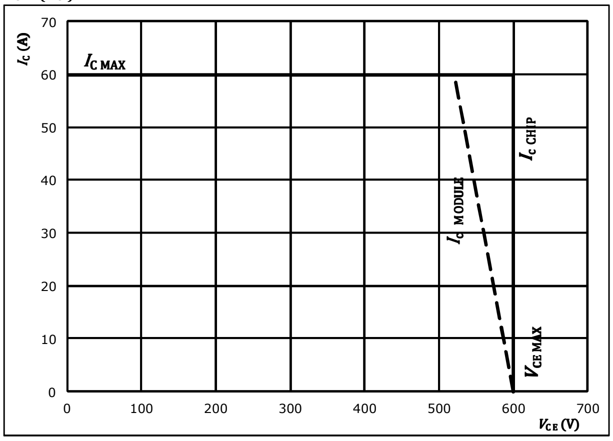


At					
V_{CE} =	300	V	T_j:	25 °C	·············
V_{GE} =	±15	V		150 °C	– – – –
I_C =	30	A			

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

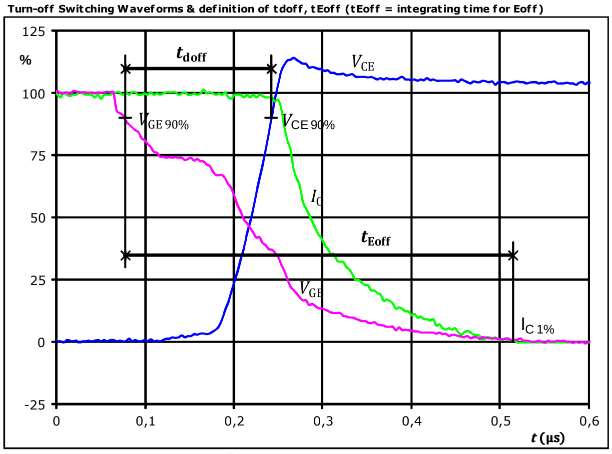
Switching Characteristics

General conditions

T_j	=	**150 °C**
R_{gon}	=	**16 Ω**
R_{goff}	=	**16 Ω**

figure 1. **IGBT**

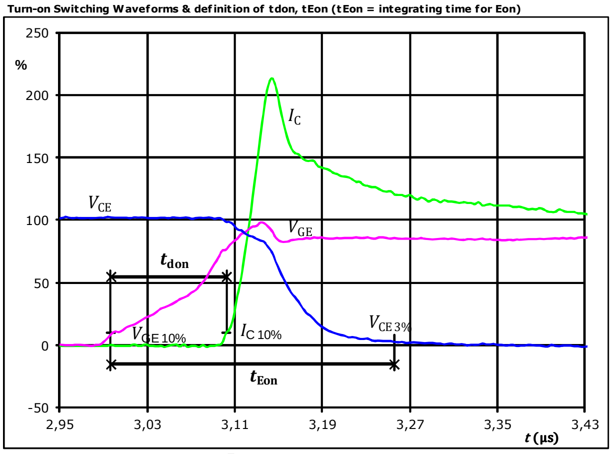
Turn-off Switching Waveforms & definition of tdoff, tEoff (tEoff = integrating time for Eoff)



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	300	V
$I_C(100\%)$ =	30	A
t_{doff} =	0,171	µs
t_{Eoff} =	0,437	µs

figure 2. **IGBT**

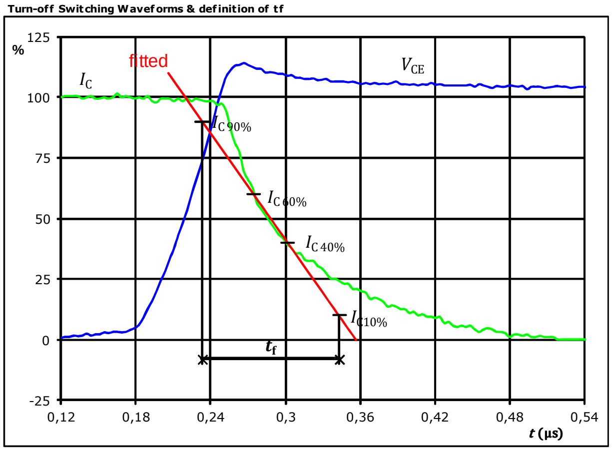
Turn-on Switching Waveforms & definition of tdon, tEon (tEon = integrating time for Eon)



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	300	V
$I_C(100\%)$ =	30	A
t_{don} =	0,104	µs
t_{Eon} =	0,259	µs

figure 3. **IGBT**

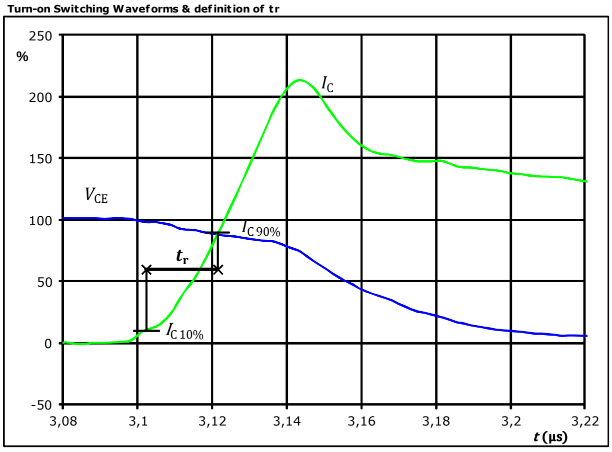
Turn-off Switching Waveforms & definition of tf



$V_C(100\%)$ =	300	V
$I_C(100\%)$ =	30	A
t_f =	0,112	µs

figure 4. **IGBT**

Turn-on Switching Waveforms & definition of tr

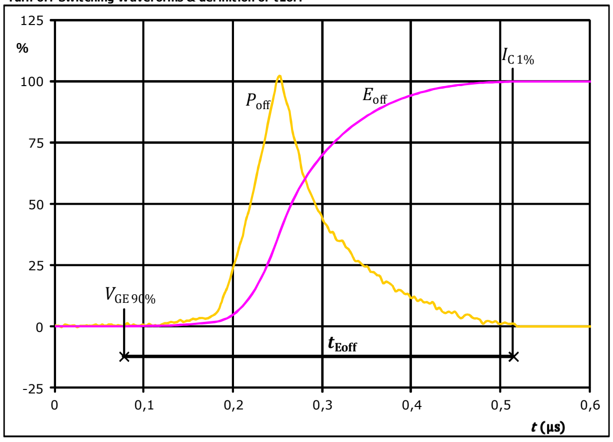


$V_C(100\%)$ =	300	V
$I_C(100\%)$ =	30	A
t_r =	0,020	µs

Switching Characteristics

figure 5. **IGBT**

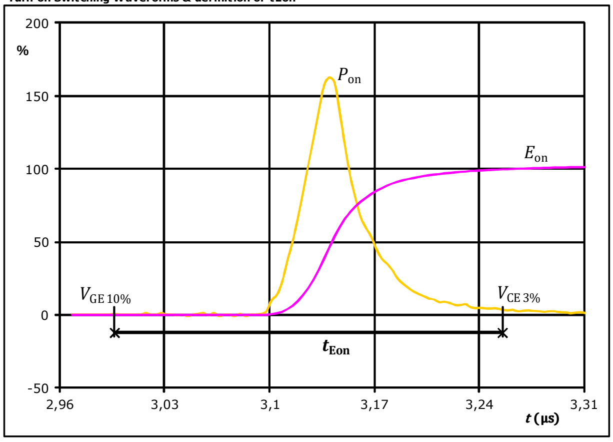
Turn-off Switching Waveforms & definition of tEoff



P_{off} (100%) =	9,01	kW
E_{off} (100%) =	0,91	mJ
t_{Eoff} =	0,44	µs

figure 6. **IGBT**

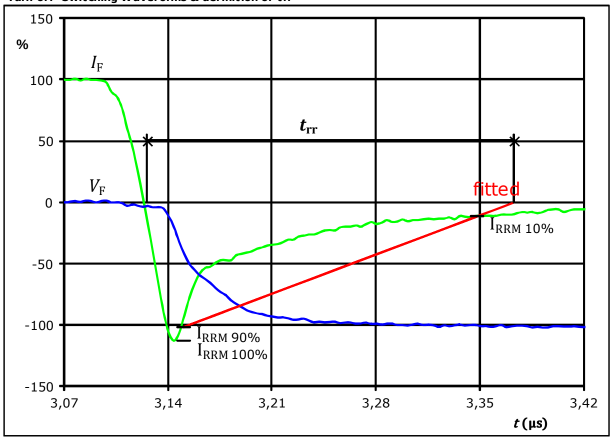
Turn-on Switching Waveforms & definition of tEon



P_{on} (100%) =	9,01	kW
E_{on} (100%) =	0,67	mJ
t_{Eon} =	0,26	µs

figure 7. **FWD**

Turn-off Switching Waveforms & definition of trr

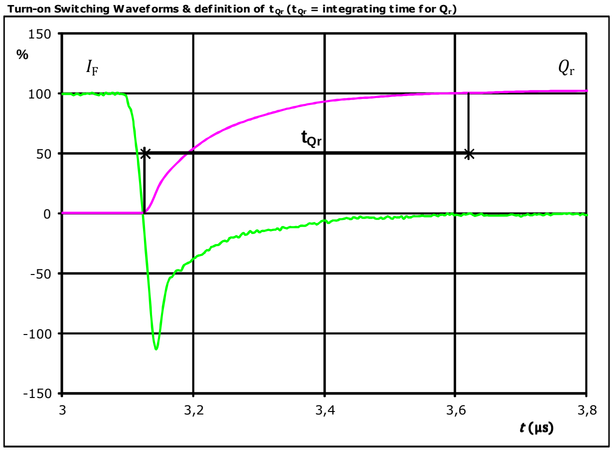


V_F (100%) =	300	V
I_F (100%) =	30	A
I_{RRM} (100%) =	-34	A
t_{rr} =	0,253	µs

Switching Characteristics

figure 8. **FWD**

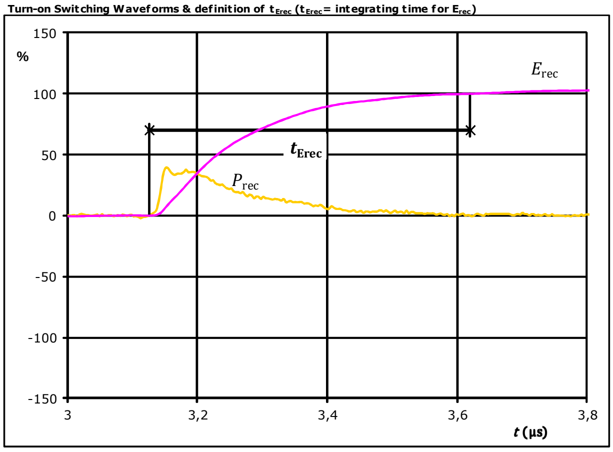
Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)



I_F (100%) =	30	A
Q_r (100%) =	2,65	µC
t_{Qr} =	0,49	µs

figure 9. **FWD**

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



P_{rec} (100%) =	9,01	kW
E_{rec} (100%) =	0,57	mJ
t_{Erec} =	0,49	µs

Ordering Code & Marking

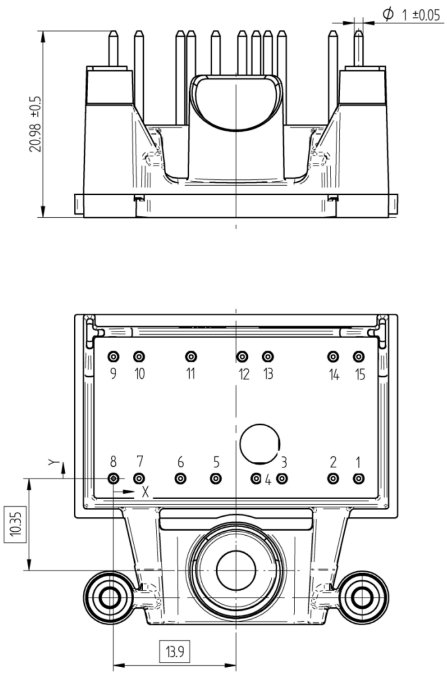
Version	Ordering Code
without thermal paste 17mm housing with solder pins	10-0B066PA030SB-M996F09

	Name		Date code	UL & VIN	Lot	Serial
Text	NN-NNNNNNNNNNNNNN-TTTTTTVV		WWYY	UL VIN	LLLLL	SSSS
	Type&Ver	**Lot number**	**Serial**	**Date code**		
Datamatrix	TTTTTTTVV	LLLLL	SSSS	WWYY		

Outline

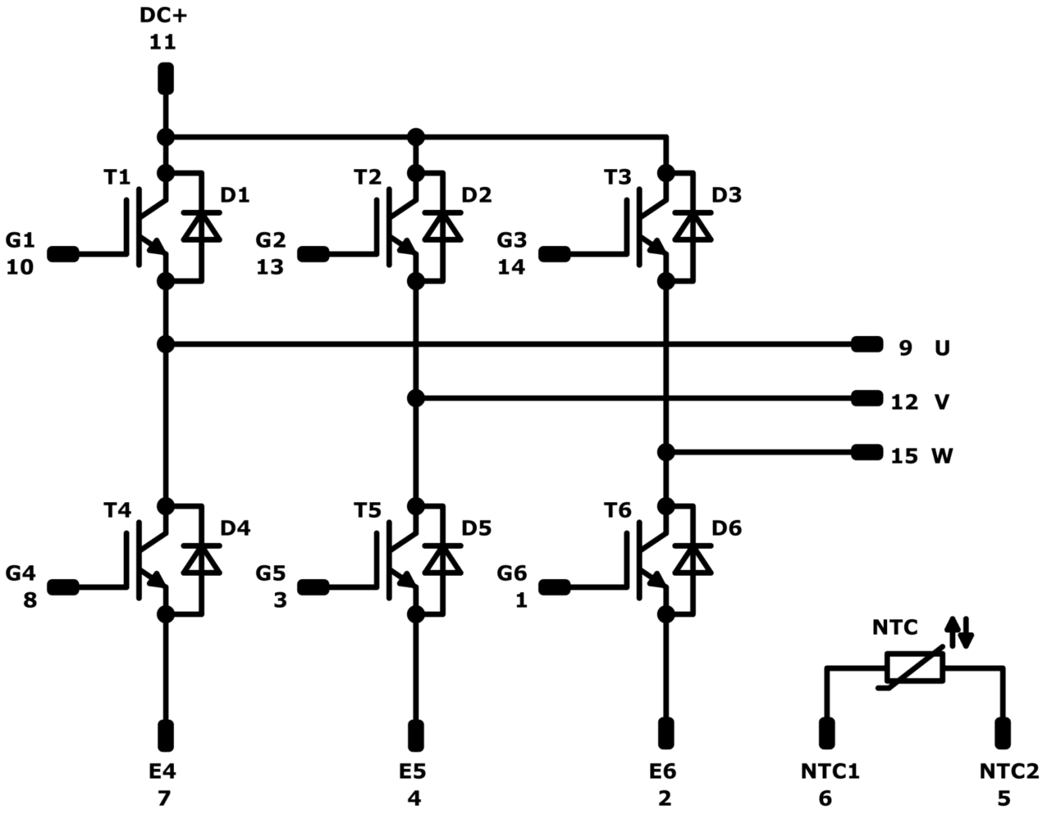
Pin table [mm]

Pin	X	Y	Function
1	27,8	0	G6
2	24,9	0	E6
3	19,1	0	G5
4	16,2	0	E5
5	11,6	0	NTC2
6	7,6	0	NTC1
7	2,9	0	E4
8	0	0	G4
9	0	13,7	U
10	2,9	13,7	G1
11	8,8	13,7	DC+
12	14,6	13,7	V
13	17,5	13,7	G2
14	24,9	13,7	G3
15	27,8	13,7	W



Tolerance of pinpositions: ±0,5mm at the end of pins
Dimension of coordinate axis is only offset without tolerance
PCB cutouts and holes see in handling instruction document

Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T1-T6	IGBT	600 V	30 A	Inverter Switch	
D1-D6	FWD	600 V	30 A	Inverter Diode	
NTC	Thermistor			Thermistor	

Packaging instruction				
Standard packaging quantity (SPQ) 200	>SPQ	Standard	<SPQ	Sample

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

Package data
Package data for *flow*0 B 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
10-0B066PA030SB-M996F09-D2-14	29 Jun. 2016		