Vincotech

10-FZ07NBA075SM-P916L58
datasheet

flow BOOST 0 symmetric — 650 V / 75 A

Features

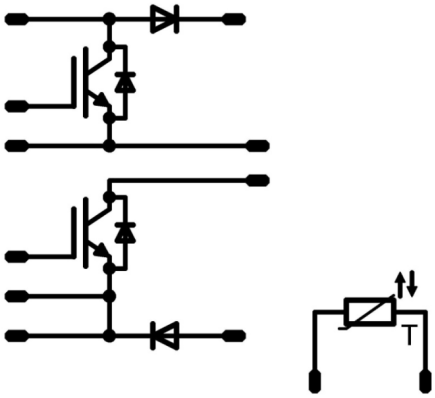
- High efficiency symmetric boost
- Ultra high switching frequency
- Clip-In PCB mounting
- Low Inductance Layout

flow 0 12mm housing

Target applications

- Solar inverters
- UPS
- Power supplies

Schematic



Types

- 10-FZ07NBA075SM-P916L58

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
Boost Switch				
Collector-emitter voltage	V_{CES}		650	V
Collector current	I_C	$T_j = T_{jmax}$ T_s = 80 °C	57	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	225	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	97	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
Boost Diode				
Peak Repetitive Reverse Voltage	V_{RRM}		650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ T_s = 80°C	59	A
Repetitive peak forward current	I_{FRM}		150	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80°C	78	W
Maximum Junction Temperature	T_{jmax}		175	°C
Boost Inverse Diode				
Peak Repetitive Reverse Voltage	V_{RRM}		650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ T_s = 80°C	36	A
Repetitive peak forward current	I_{FRM}		60	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80°C	61	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 Voltage t_p = 2 s	4000	V
Creepage distance			min. 12,7	mm
Clearance			9,53	mm
Comparative Tracking Index	CTI		> 200	

Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{GS} [V] V_r [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Boost Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,00075	25	3,3	4	4,7	V
Collector-emitter saturation voltage	V_{CEsat}		15		75	25 125 150		1,67 1,84 1,89	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		4300		pF
Output capacitance	C_{oes}							75		
Reverse transfer capacitance	C_{res}							16		
Gate charge	Q_g		15	520	75	25		166		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						0,98		K/W
IGBT Switching										
Turn-on delay time	$t_{d(on)}$	R_{goff} = 4 Ω R_{gon} = 4 Ω	15/0	350	75	25 125 150		23 23 23		ns
Rise time	t_r					25 125 150		14 15 16		
Turn-off delay time	$t_{d(off)}$					25 125 150		116 131 135		
Fall time	t_f					25 125 150		4 8 10		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 2,4 µC Q_{rFWD} = 4,6 µC Q_{rFWD} = 5,3 µC				25 125 150		1,058 1,486 1,591		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,277 0,481 0,527		

Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{GS} [V] V_r [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Boost Diode										
Static										
Forward voltage	V_F				75	25 125 150		1,53 1,49 1,47	1,77	V
Reverse leakage current	I_r			650		25			3,8	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						1,23		K/W
FWD Switching										
Peak recovery current	I_{RRM}	di/dt = 5120 A/µs di/dt = 4804 A/µs di/dt = 5399 A/µs	15/0	350	75	25 125 150		51 69 74		A
Reverse recovery time	t_{rr}					25 125 150		84 109 123		ns
Recovered charge	Q_r					25 125 150		2,383 4,616 5,343		µC
Reverse recovered energy	E_{rec}					25 125 150		0,511 1,036 1,222		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		750 682 570		A/µs
Boost Inverse Diode										
Static										
Forward voltage	V_F				30	25 150		1,64 1,56	1,87	V
Reverse leakage current	I_r			650		25			0,36	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						1,56		K/W

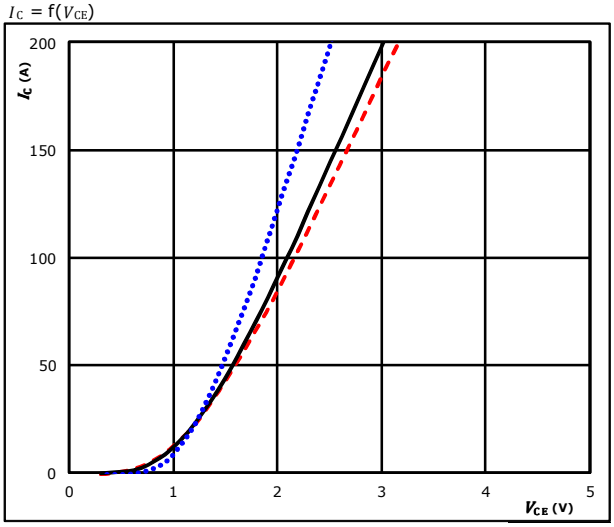
Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{GS} [V] V_r [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Thermistor										
Rated resistance	R					25		22		kΩ
Deviation of R100	$\Delta_{R/R}$	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	

Boost Switch Characteristics

Typical output characteristics **IGBT**

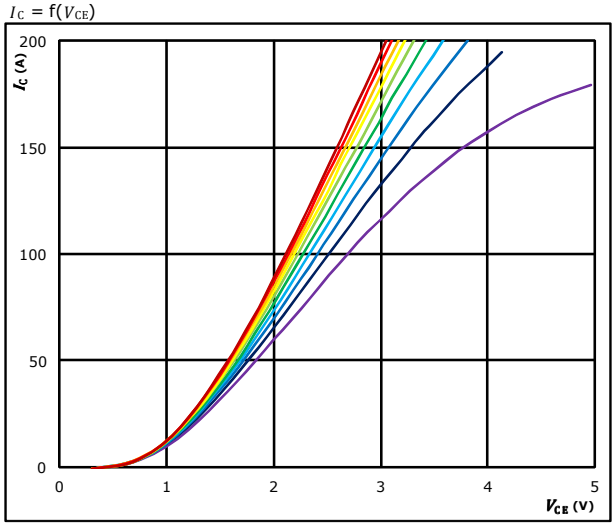
$I_C = f(V_{CE})$



t_p =	250	µs		25 °C	
V_{GE} =	15	V	T_j:	125 °C	
				150 °C	

Typical output characteristics **IGBT**

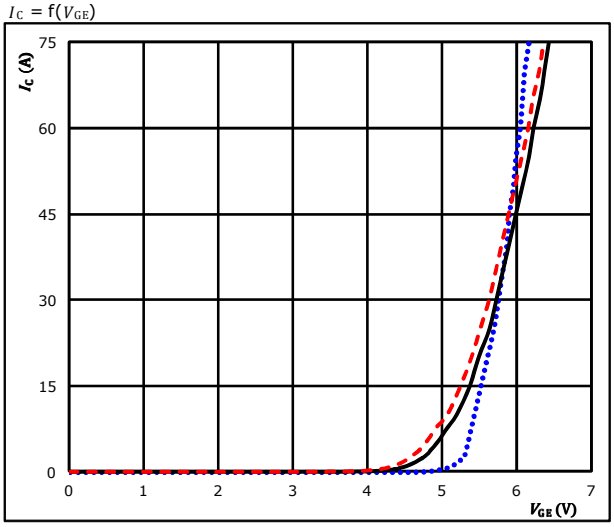
$I_C = f(V_{CE})$



t_p =	250	µs
T_j =	150	°C
V_{GE} from	8 V to 17 V in steps of 1 V	

Typical transfer characteristics **IGBT**

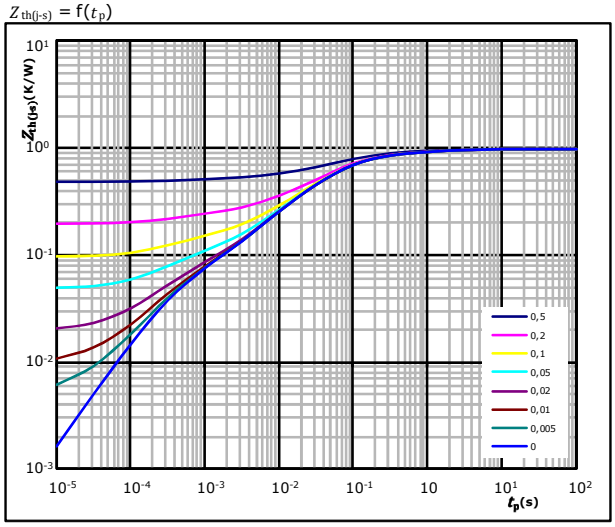
$I_C = f(V_{GE})$



t_p =	100	µs		25 °C	
V_{CE} =	10	V	T_j:	125 °C	
				150 °C	

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

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



D =	t_p / T	
$R_{th(j-s)}$ =	0,98	K/W

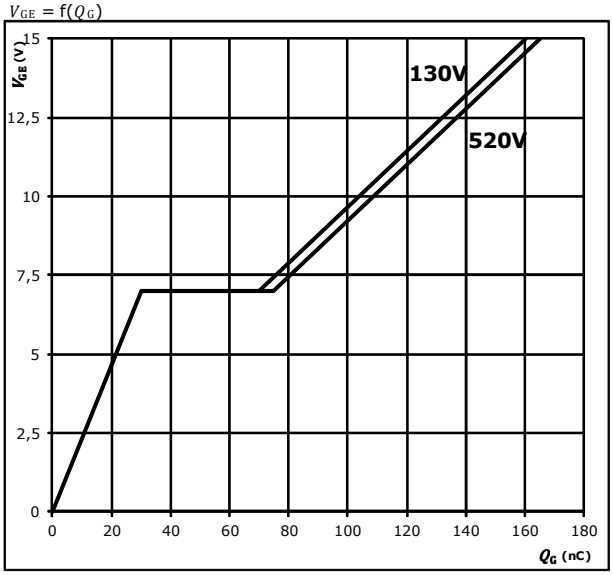
IGBT thermal model values

R (K/W)	τ (s)
7,21E-02	2,25E+00
1,46E-01	3,32E-01
4,74E-01	6,42E-02
1,76E-01	1,63E-02
6,17E-02	3,99E-03
4,63E-02	3,57E-04

Boost Switch Characteristics

Gate voltage vs Gate charge **IGBT**

$V_{GE} = f(Q_G)$

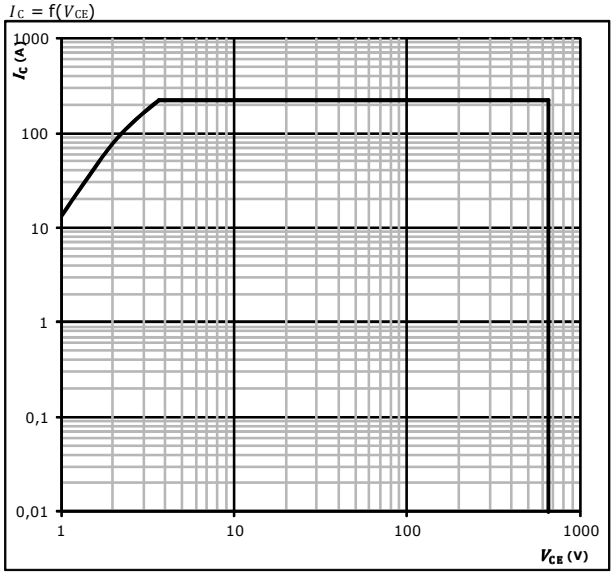


At

I_C= 75 A

Safe operating area **IGBT**

$I_C = f(V_{CE})$

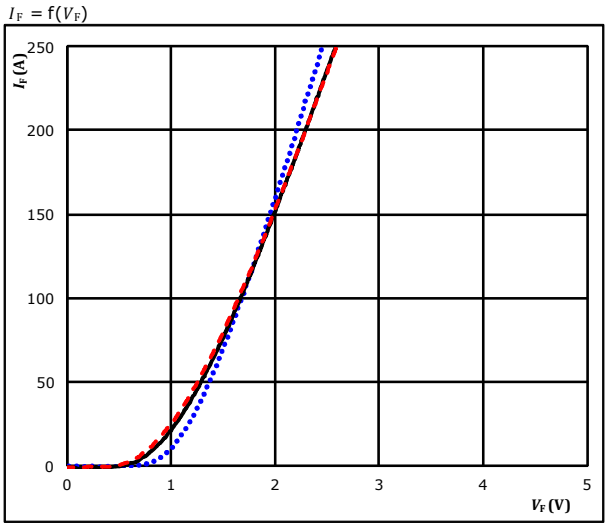


At

D =	single pulse	
T_h =	80	°C
V_{GE} =	±15	V
T_j =	T_{jmax}	°C

Boost Diode Characteristics

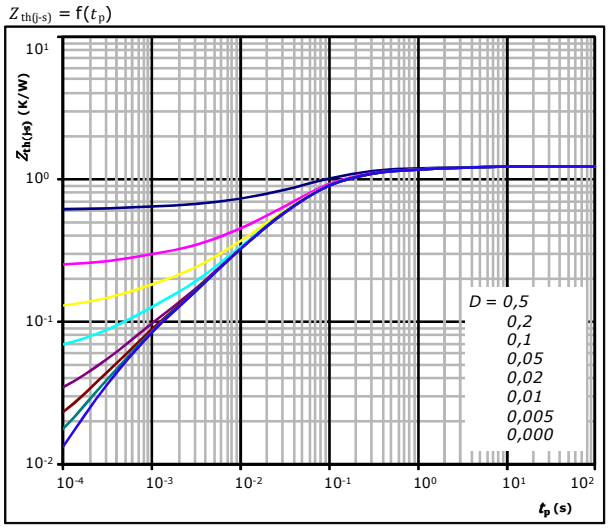
Typical forward characteristics **FWD**



t_p = 250 µs

T_j: 25 °C
125 °C
150 °C

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



D = t_p / T

$R_{th(j-s)}$ = 1,23 K/W

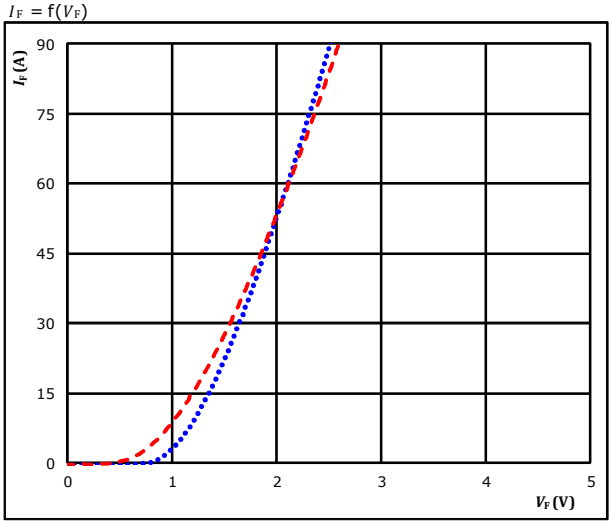
FWD thermal model values

R (K/W)	τ (s)
8,04E-02	2,68E+00
1,74E-01	2,85E-01
6,28E-01	6,23E-02
2,05E-01	1,65E-02
8,90E-02	4,15E-03
4,76E-02	4,96E-04

Boost Inverse Diode Characteristics

Typical forward characteristics **FWD**

$I_F = f(V_F)$



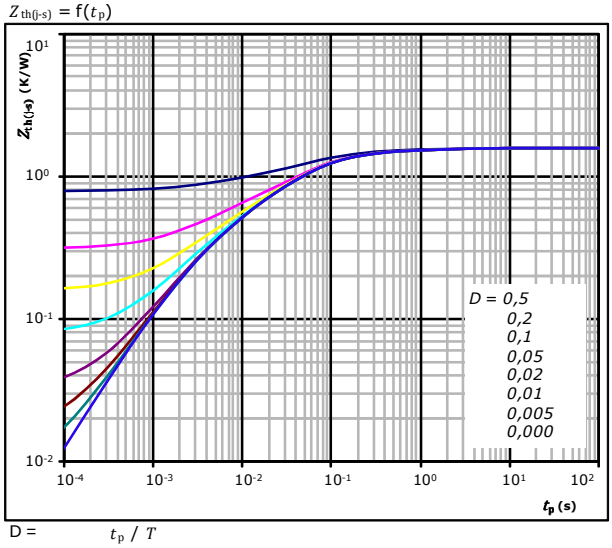
t_p = 250 µs

T_j: 25 °C

150 °C

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

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



D = t_p / T

$R_{th(j-s)}$ = 1,56 K/W

FWD thermal model values

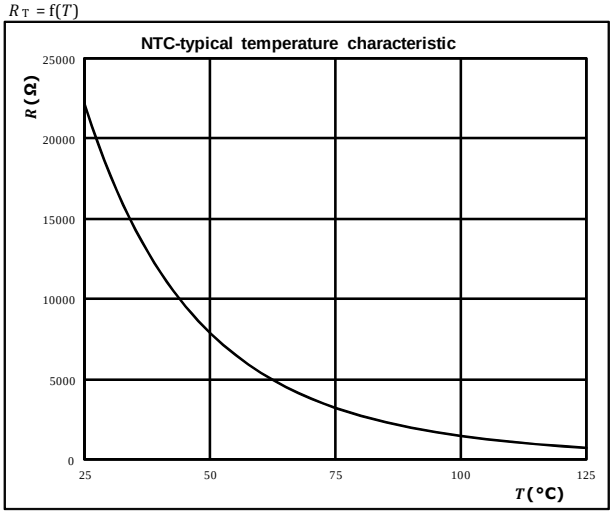
R (K/W)	τ (s)
9,10E-02	2,00E+00
3,45E-01	1,68E-01
7,17E-01	4,13E-02
2,97E-01	7,43E-03
1,15E-01	1,80E-03

Thermistor Characteristics

Thermistor typical temperature characteristic

Typical NTC characteristic
as a function of temperature

$R_T = f(T)$

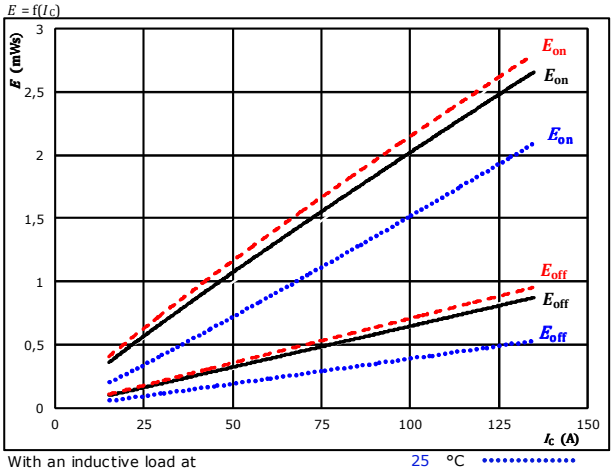


Boost Switching Characteristics

Figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



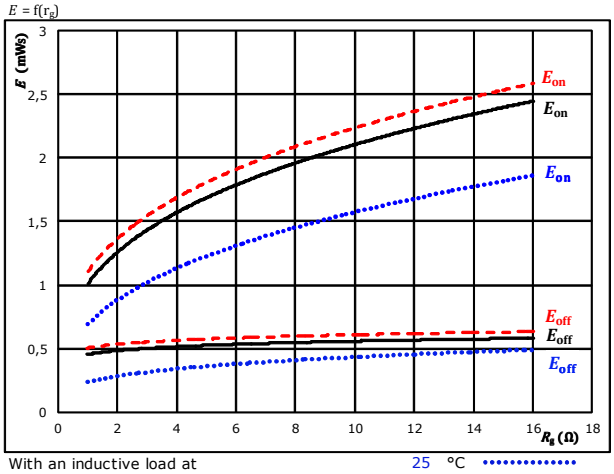
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	·····
V_{GE} =	15/0	V		125 °C	———
R_{gon} =	4	Ω		150 °C	– – –
R_{goff} =	4	Ω			

Figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(r_g)$



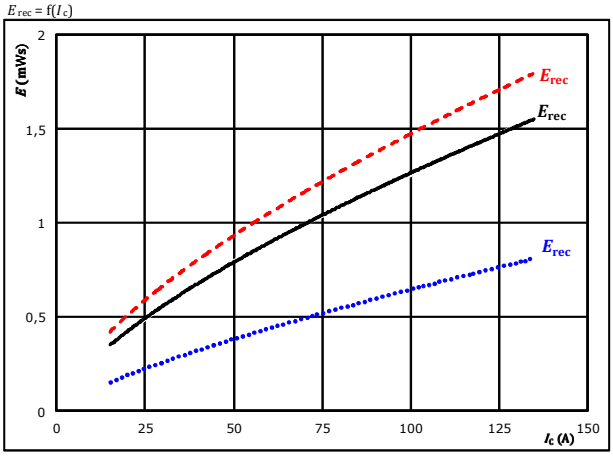
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	·····
V_{GE} =	15/0	V		125 °C	———
I_C =	75	A		150 °C	– – –

Figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



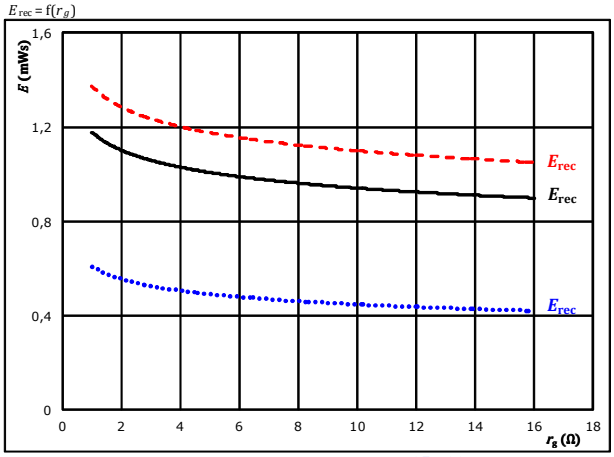
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	·····
V_{GE} =	15/0	V		125 °C	———
R_{gon} =	4	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

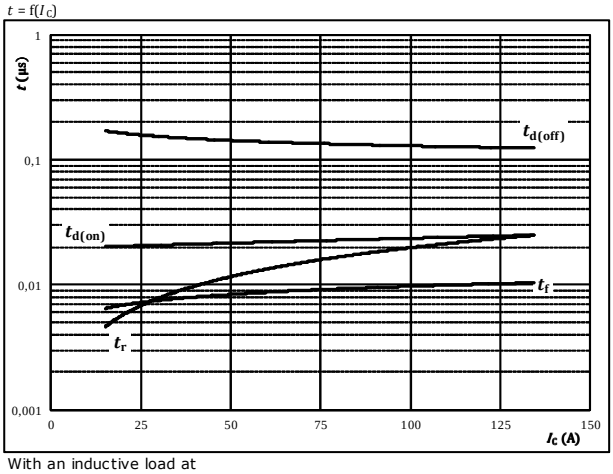
V_{CE} =	350	V	T_j:	25 °C	·····
V_{GE} =	15/0	V		125 °C	———
I_C =	75	A		150 °C	– – –

Boost Switching Characteristics

Figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



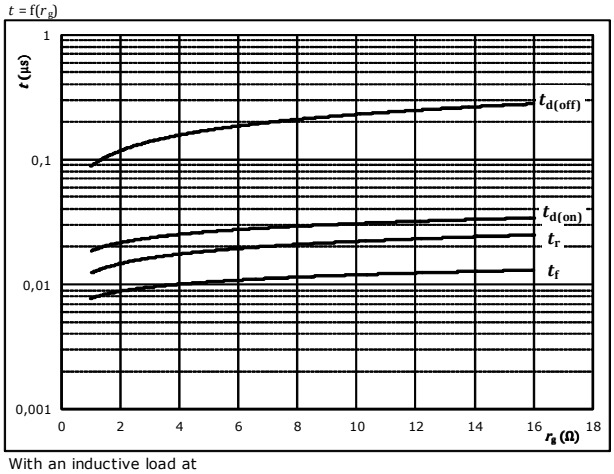
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	15/0	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

Figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(r_g)$



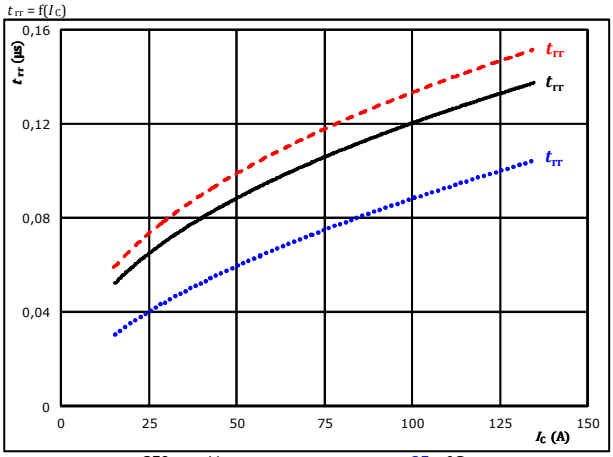
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	15/0	V
I_C =	75	A

Figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

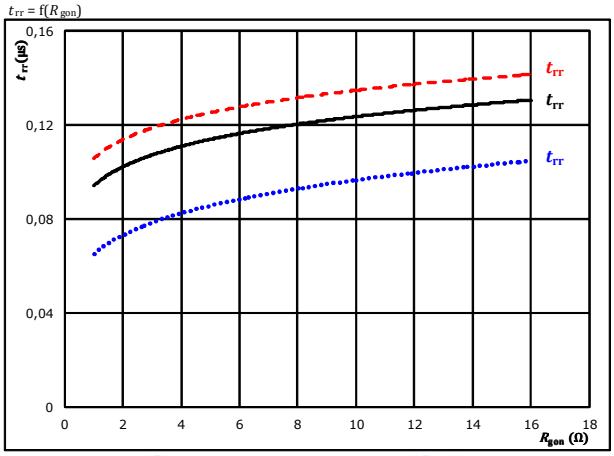


At	V_{CE}=	350	V		25 °C
	V_{GE} =	15/0	V	T_j:	125 °C
	R_{gon} =	4	Ω		150 °C

Figure 8. **FWD**

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

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



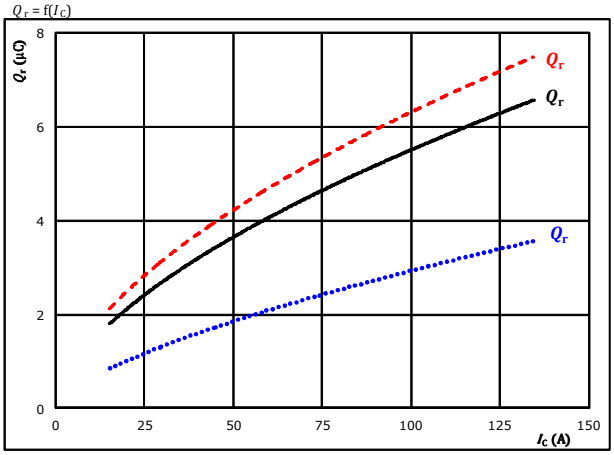
At	V_{CE} =	350	V		25 °C
	V_{GE} =	15/0	V	T_j:	125 °C
	I_C =	75	A		150 °C

Boost Switching Characteristics

Figure 9. FWD

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

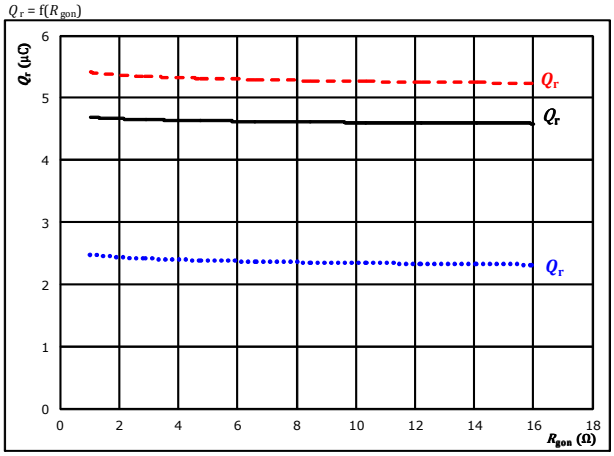


At						
	V_{CE} =	350	V		25 °C	·····
	V_{GE} =	15/0	V	T_j:	125 °C	———
	R_{gon} =	4	Ω		150 °C	– – –

Figure 10. FWD

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

$Q_r = f(R_{gon})$

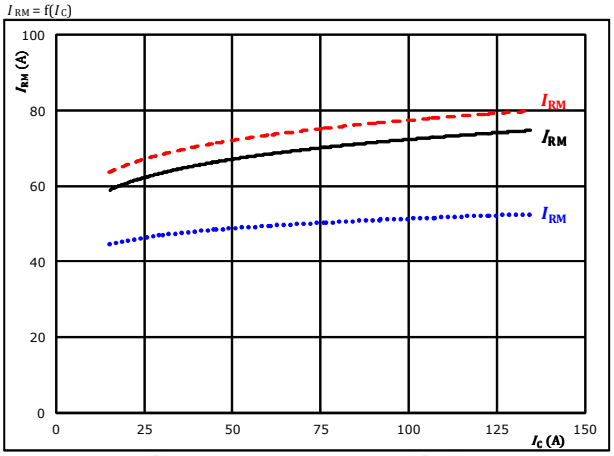


At						
	V_{CE}=	350	V		25 °C	·····
	V_{GE} =	15/0	V	T_j:	125 °C	———
	I_C=	75	A		150 °C	– – –

Figure 11. FWD

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

$I_{RM} = f(I_C)$

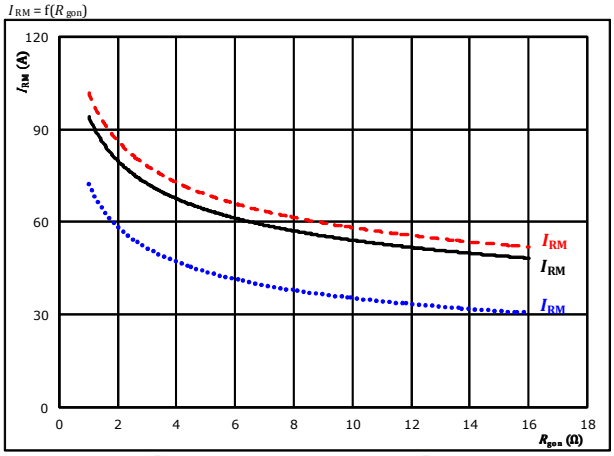


At						
	V_{CE} =	350	V		25 °C	·····
	V_{GE} =	15/0	V	T_j:	125 °C	———
	R_{gon} =	4	Ω		150 °C	– – –

Figure 12. FWD

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

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



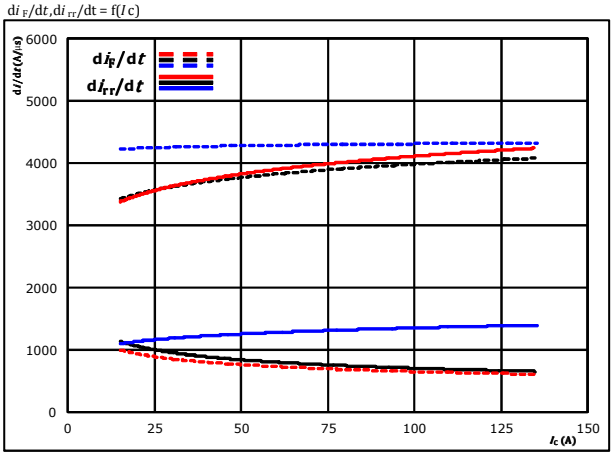
At						
	V_{CE} =	350	V		25 °C	·····
	V_{GE} =	15/0	V	T_j:	125 °C	———
	I_C =	75	A		150 °C	– – –

Boost Switching Characteristics

Figure 13. **FWD**

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

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

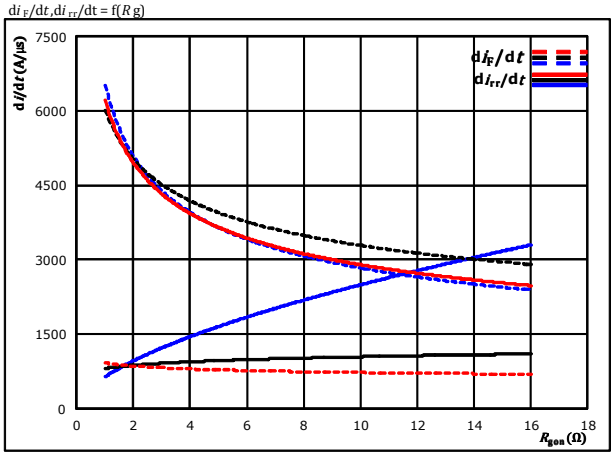


At					
V_{CE} =	350	V		25 °C	
V_{GE} =	15/0	V	T_j:	125 °C	
R_{gon} =	4	Ω		150 °C	

Figure 14. **FWD**

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

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

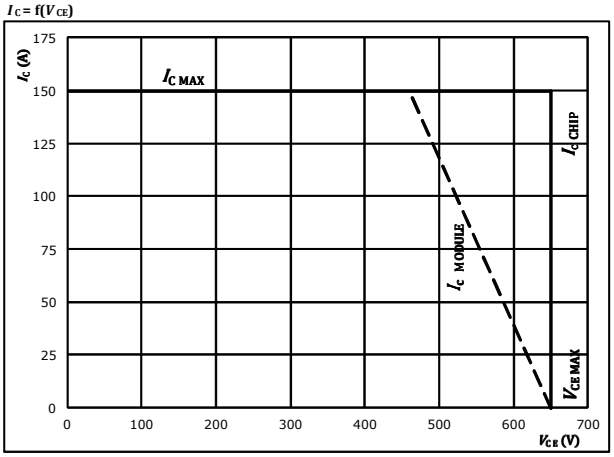


At					
V_{CE} =	350	V		25 °C	
V_{GE} =	15/0	V	T_j:	125 °C	
I_C =	75	A		150 °C	

Figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

T_j =	175	°C
R_{gon} =	4	Ω
R_{goff} =	4	Ω

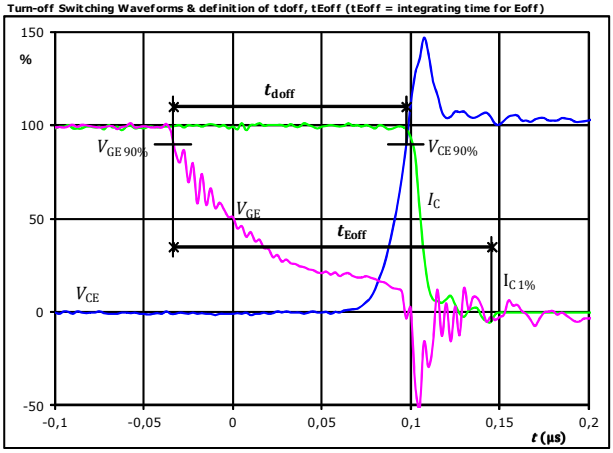
Boost Switching Definitions

General conditions

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

Figure 1. **IGBT**

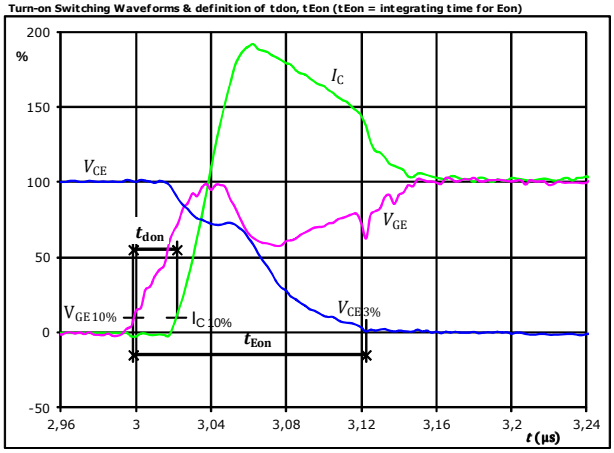
Turn-off Switching Waveforms & definition of tdoff, tEoff (tEoff = integrating time for Eoff)



$V_{GE}(0\%)$ =	0	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	75	A
t_{doff} =	0,131	µs
t_{Eoff} =	0,179	µs

Figure 2. **IGBT**

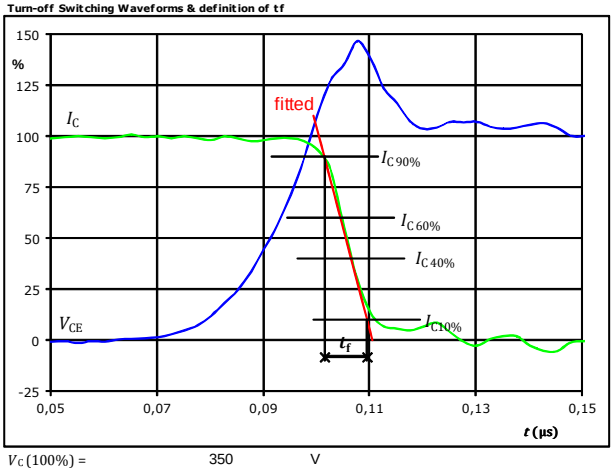
Turn-on Switching Waveforms & definition of tdon, tEon (tEon = integrating time for Eon)



$V_{GE}(0\%)$ =	0	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	75	A
t_{don} =	0,023	µs
t_{Eon} =	0,124	µs

Figure 3. **IGBT**

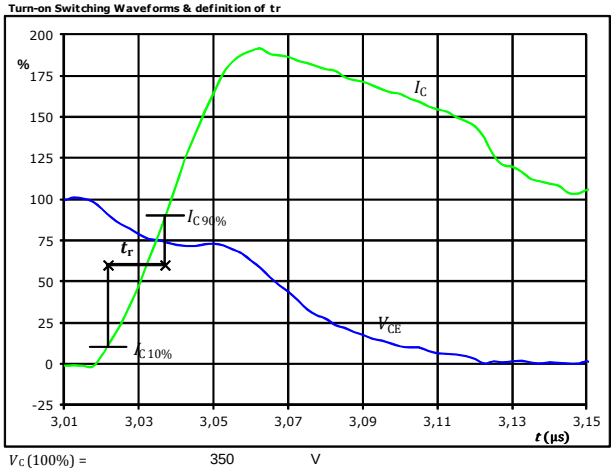
Turn-off Switching Waveforms & definition of tf



$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	75	A
t_f =	0,008	µs

Figure 4. **IGBT**

Turn-on Switching Waveforms & definition of tr

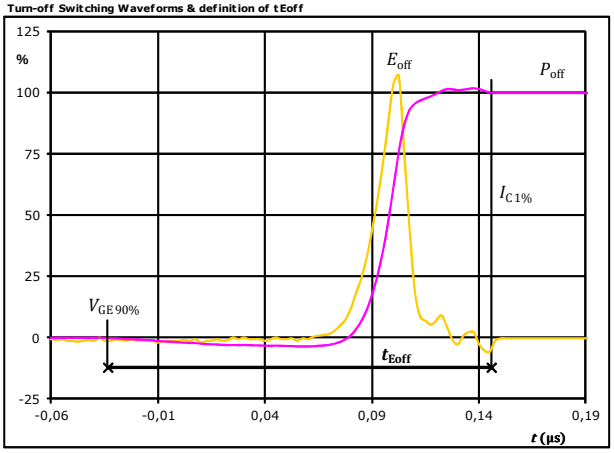


$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	75	A
t_r =	0,015	µs

Boost Switching Definitions

Figure 5. **IGBT**

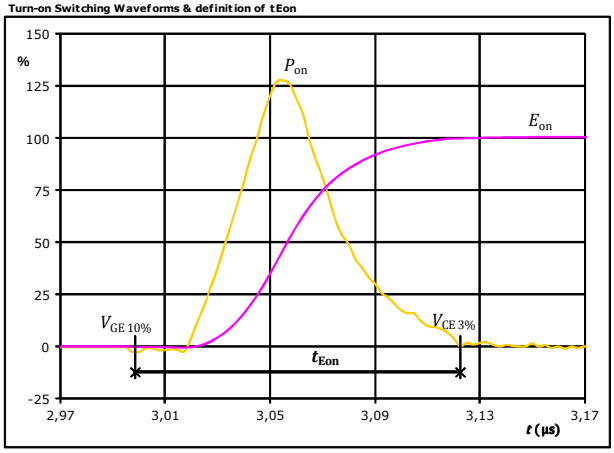
Turn-off Switching Waveforms & definition of tEoff



$P_{off}(100\%)$ =	26,34	kW
$E_{off}(100\%)$ =	0,48	mJ
t_{Eoff} =	0,18	µs

Figure 6. **IGBT**

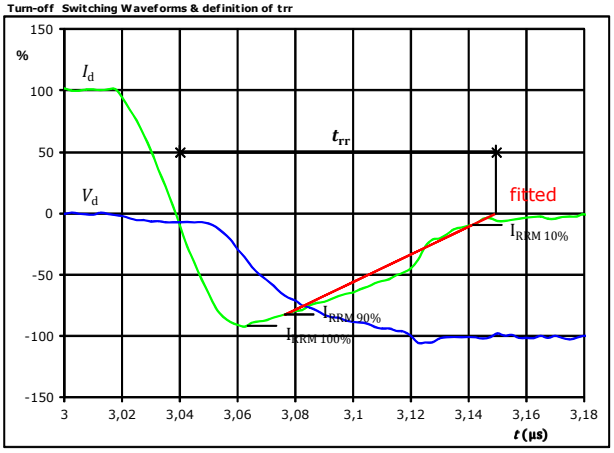
Turn-on Switching Waveforms & definition of tEon



$P_{on}(100\%)$ =	26,34	kW
$E_{on}(100\%)$ =	1,49	mJ
t_{Eon} =	0,12	µs

Figure 7. **FWD**

Turn-off Switching Waveforms & definition of trr

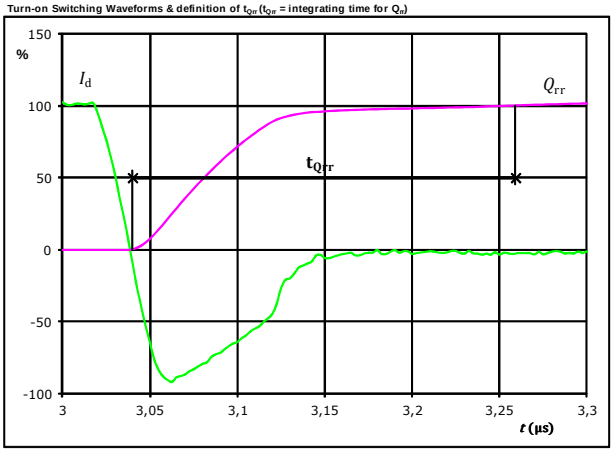


$V_d(100\%)$ =	350	V
$I_d(100\%)$ =	75	A
$I_{RRM}(100\%)$ =	-69	A
t_{rr} =	0,109	µs

Boost Switching Definitions

Figure 8. **FWD**

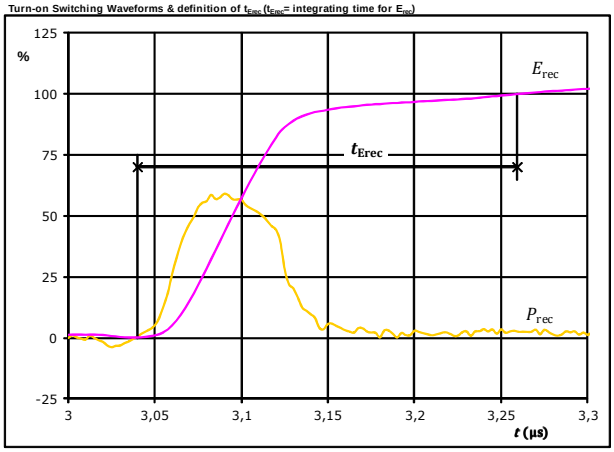
Turn-on Switching Waveforms & definition of t_{Qrr} (t_{Qrr} = integrating time for Q_{rr})



I_d (100%) =	75	A
Q_{rr} (100%) =	4,62	µC
t_{Qrr} =	0,22	µs

Figure 9. **FWD**

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



P_{rec} (100%) =	26,34	kW
E_{rec} (100%) =	1,04	mJ
t_{Erec} =	0,22	µs

Vincotech

Ordering Code & Marking

Version	Ordering Code
without thermal paste 12mm housing with solder pins	10-FZ07NBA075SM-P916L58

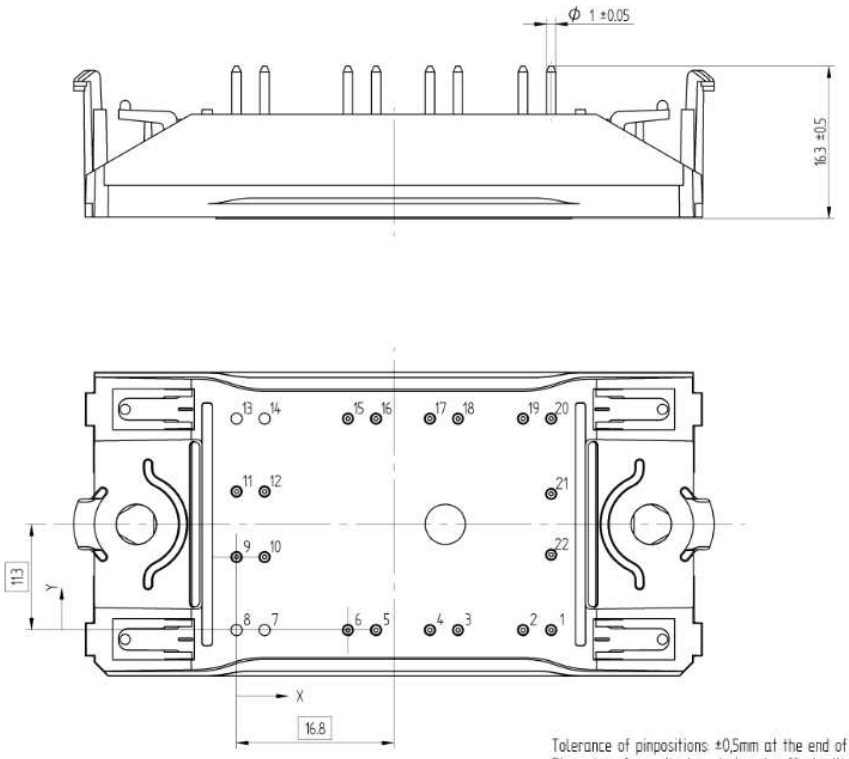
	Name	Date code	UL & Vinco	Lot	Serial
Text	NN-NNNNNNNNNNNNN-TTTTTTVV	WWYY	UL Vinco	LLLLL	SSSS

	Type&Ver	Lot number	Serial	Date code		
Datamatrix	TTTTTTVV	LLLLL	SSSS	WWYY		

Outline

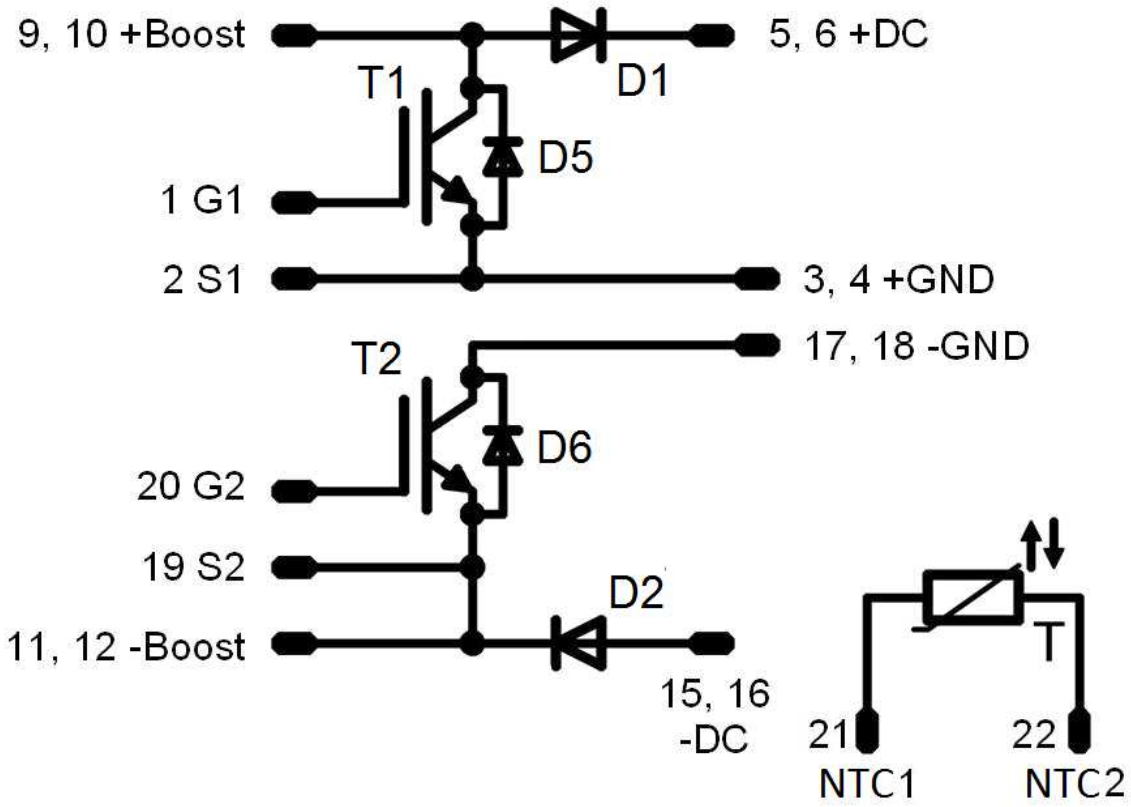
Pin table

Pin	X	Y	Function
1	33,6	0	G1
2	30,6	0	S1
3	23,65	0	+GND
4	20,65	0	+GND
5	14,9	0	+DC
6	11,9	0	+DC
7	Not assembled		
8	Not assembled		
9	0	7,8	+Boost
10	3	7,8	+Boost
11	0	14,8	-Boost
12	3	14,8	-Boost
13	Not assembled		
14	Not assembled		
15	11,9	22,6	-DC
16	14,9	22,6	-DC
17	20,65	22,6	-GND
18	23,65	22,6	-GND
19	30,6	22,6	S2
20	33,6	22,6	G2
21	33,6	14,55	NTC1
22	33,6	8,05	NTC2



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
T1,T2	IGBT	650 V	75 A	Boost Switch	
D1,D2	FWD	650 V	75 A	Boost Diode	
D5,D6	FWD	650 V	30 A	Boost Inverse Diode	
T	NTC			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.

Document No.:	Date:	Modification:	Pages
10-FZ07NBA075SM-P916L58-D1-14	22 Feb. 2016		