



Vincotech

flow BOOST 0 symmetric

650 V / 75 A

Features

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

Target applications

- Solar inverters
- UPS
- Power supplies

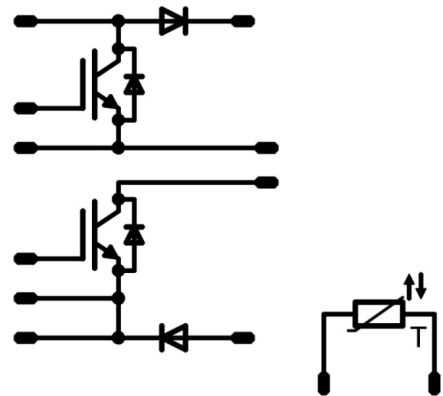
Types

- 10-FZ07NBA075SM-P916L58

flow0 12mm housing



Schematic



Maximum Ratings

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

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



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Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{GS} [V] V_F [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
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IGBT Switching

Turn-on delay time	$t_{d(on)}$	$R_{goff} = 4 \Omega$ $R_{gon} = 4 \Omega$	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}	$Q_{rFWD} = 2,4 \mu C$ $Q_{rFWD} = 4,6 \mu C$ $Q_{rFWD} = 5,3 \mu C$				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		



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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 $\lambda = 3,4$ W/mK						1,23			K/W
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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	$(di_{rr}/dt)_{max}$					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 $\lambda = 3,4$ W/mK						1,56			K/W
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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	$\Delta_{R/R}$	$R_{100} = 1484 \Omega$				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	



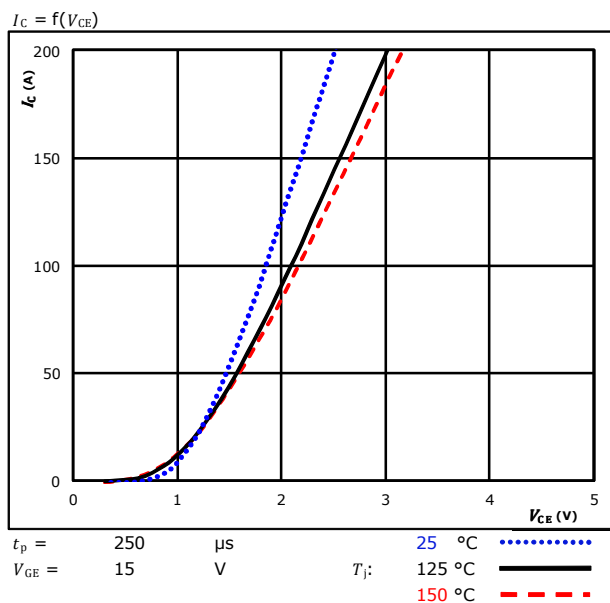
Vincotech

10-FZ07NBA075SM-P916L58 datasheet

Boost Switch Characteristics

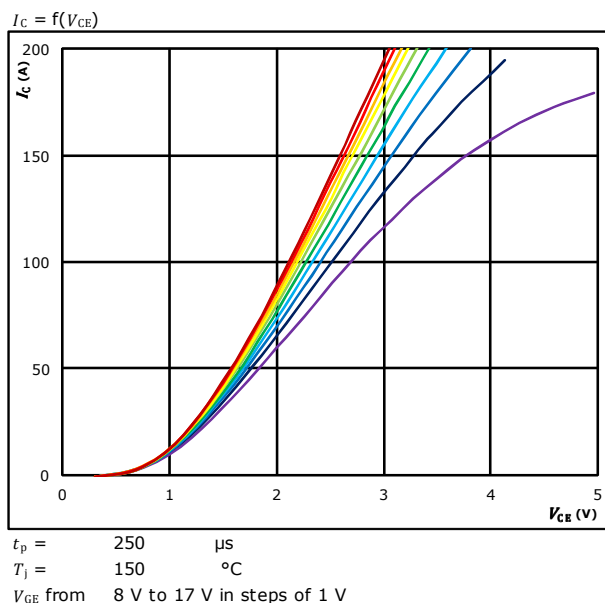
Typical output characteristics

IGBT



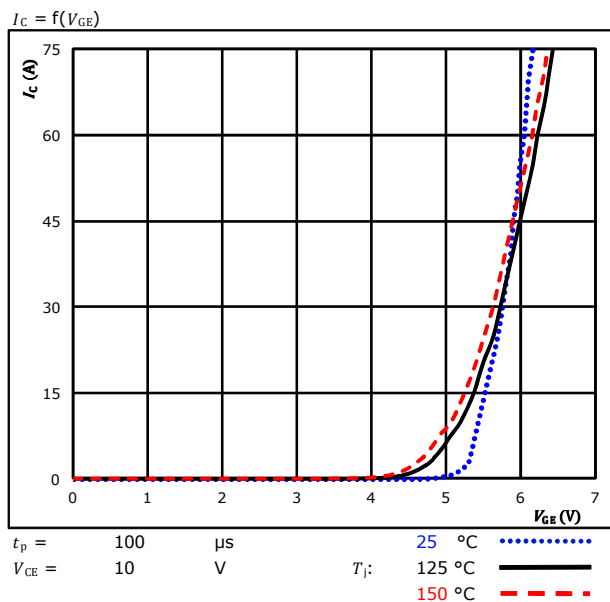
Typical output characteristics

IGBT



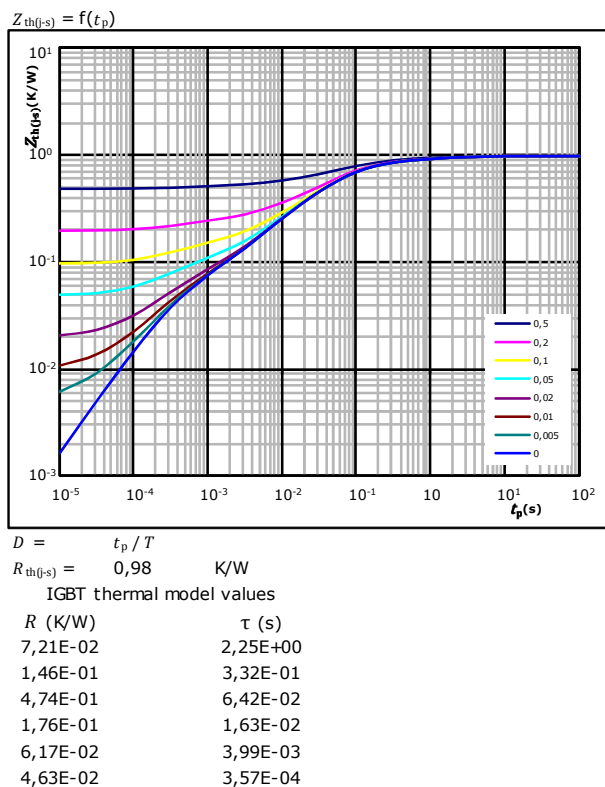
Typical transfer characteristics

IGBT



Transient Thermal Impedance as function of Pulse duration

IGBT





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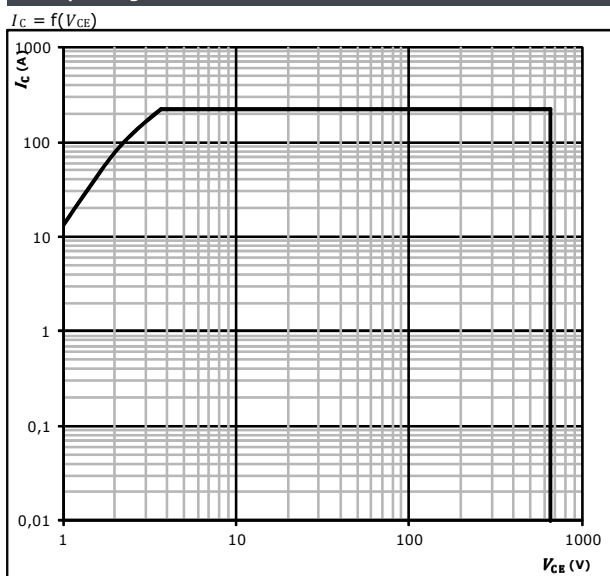
Boost Switch Characteristics

Gate voltage vs Gate charge IGBT



At
 $I_C = 75 \text{ A}$

Safe operating area IGBT



At
 $D =$ single pulse
 $T_h = 80 \text{ } ^\circ\text{C}$
 $V_{GE} = \pm 15 \text{ V}$
 $T_j = T_{jmax} \text{ } ^\circ\text{C}$

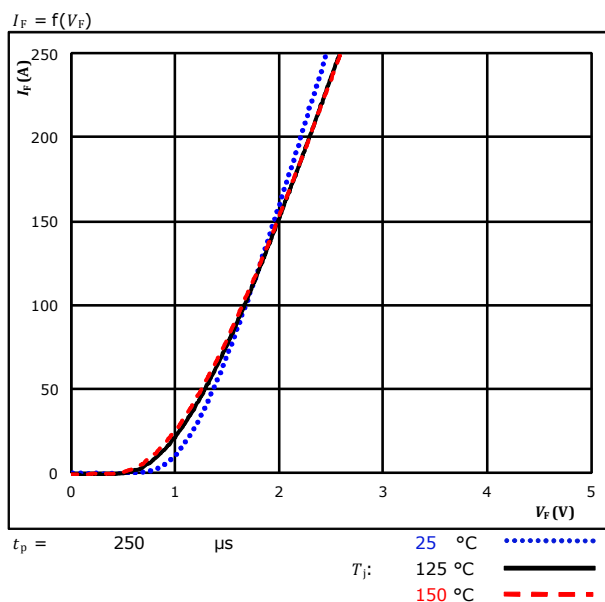


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Boost Diode Characteristics

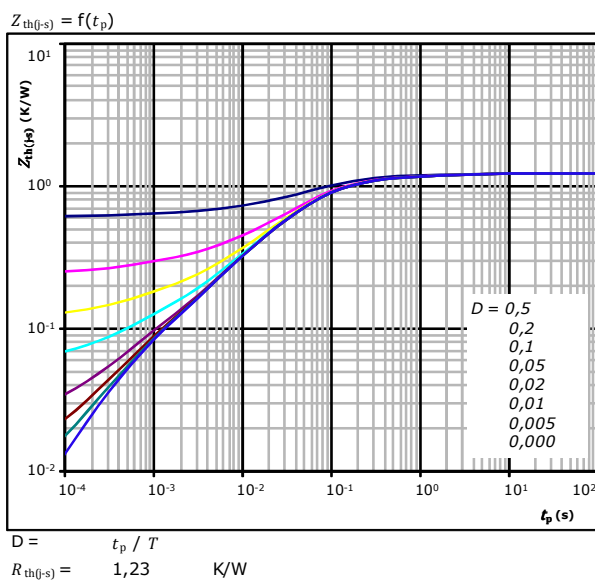
Typical forward characteristics

FWD



Transient thermal impedance as a function of pulse width

FWD



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

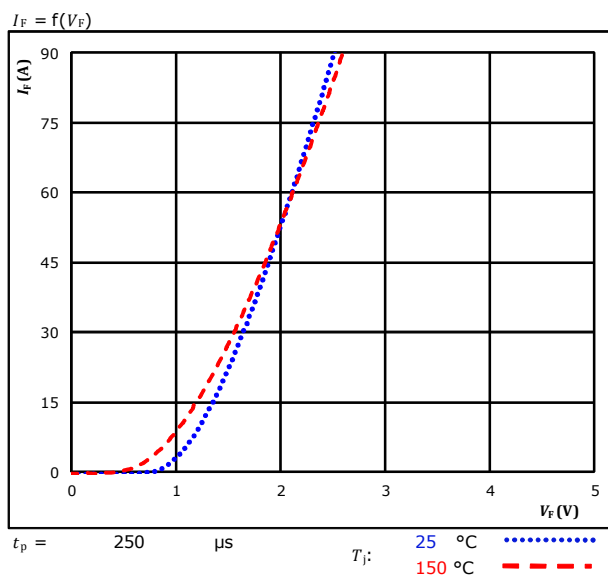


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Boost Inverse Diode Characteristics

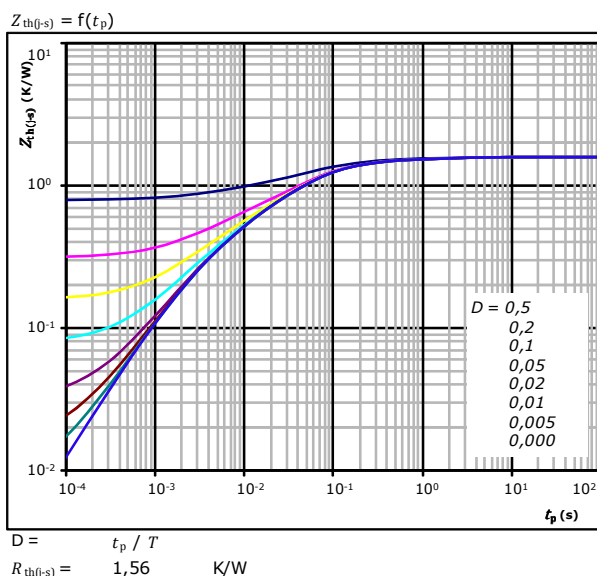
Typical forward characteristics

FWD



Transient thermal impedance as a function of pulse width

FWD



FWD thermal model values

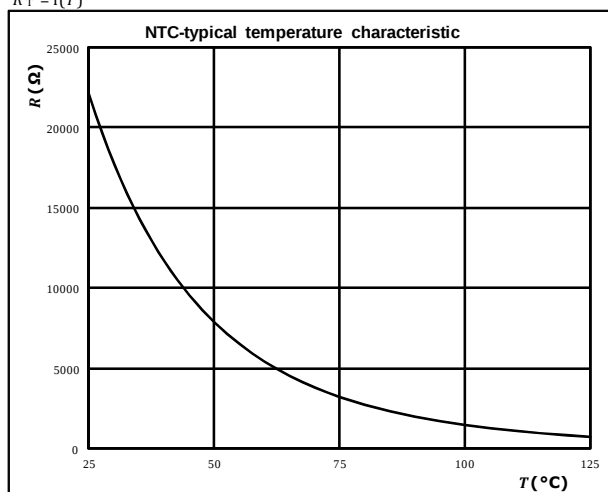
R (K/W)	τ (s)
9,10E-02	2,00E+00
3,45E-01	1,68E-01
7,17E-01	4,13E-02
2,97E-01	7,43E-03
1,15E-01	1,80E-03

Thermistor Characteristics

Thermistor typical temperature characteristic

Typical NTC characteristic
as a function of temperature

$R_T = f(T)$





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Boost Switching Characteristics

Figure 1. IGBT
Typical switching energy losses as a function of collector current

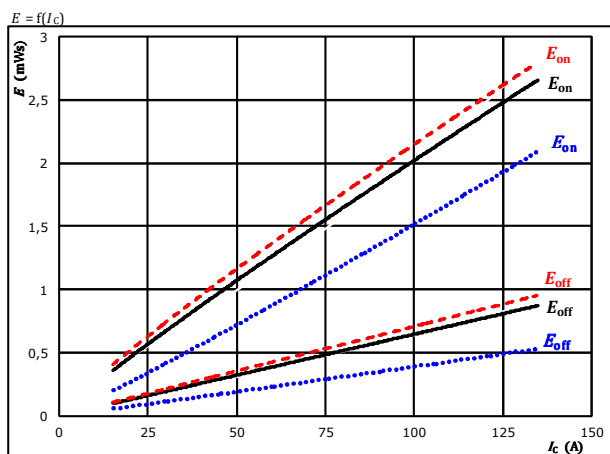


Figure 2. IGBT
Typical switching energy losses as a function of gate resistor

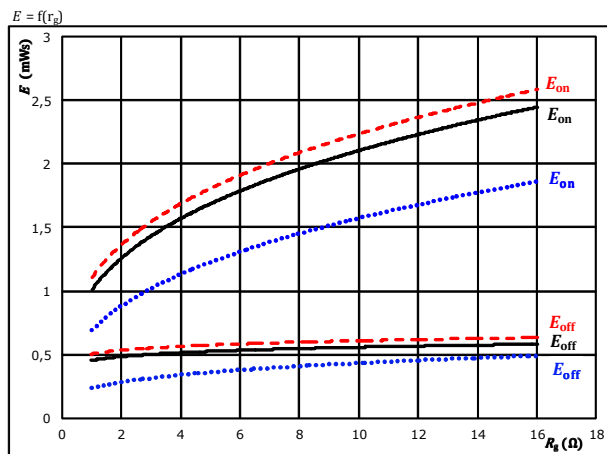


Figure 3. FWD
Typical reverse recovered energy loss as a function of collector current

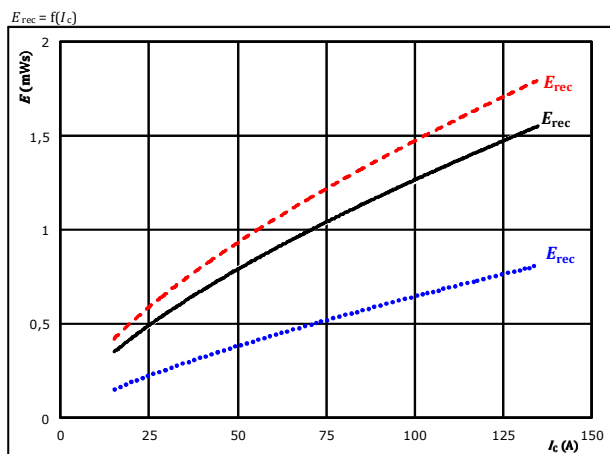
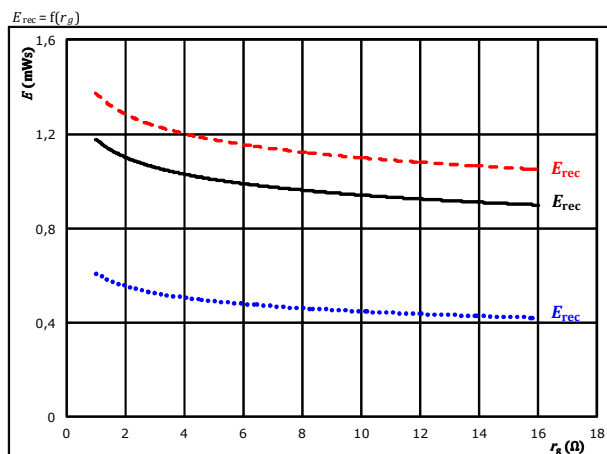


Figure 4. FWD
Typical reverse recovered energy loss as a function of gate resistor





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Boost Switching Characteristics

Figure 5. IGBT

Typical switching times as a function of collector current

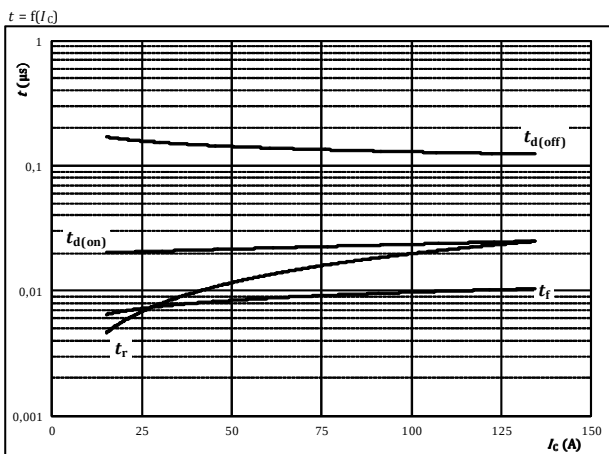


Figure 6. IGBT

Typical switching times as a function of gate resistor

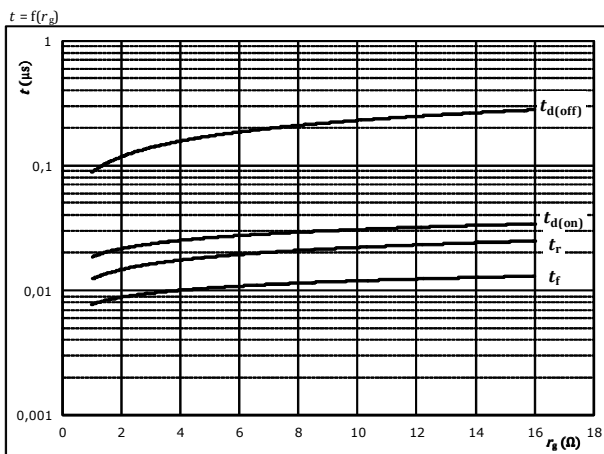


Figure 7. FWD

Typical reverse recovery time as a function of collector current

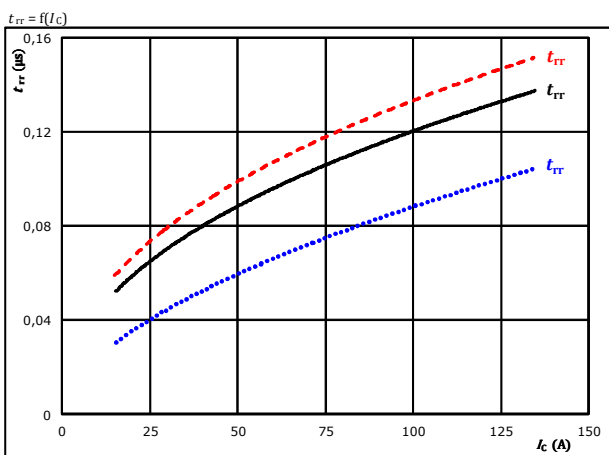
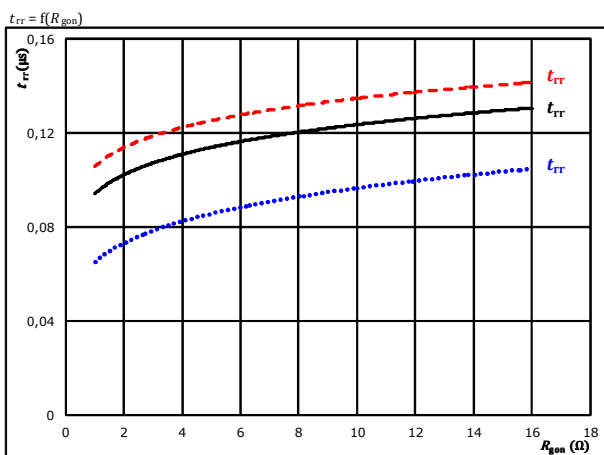


Figure 8. FWD

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





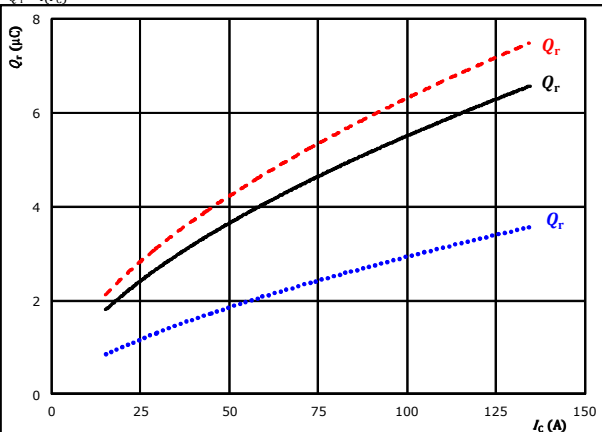
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Boost Switching Characteristics

Figure 9. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$

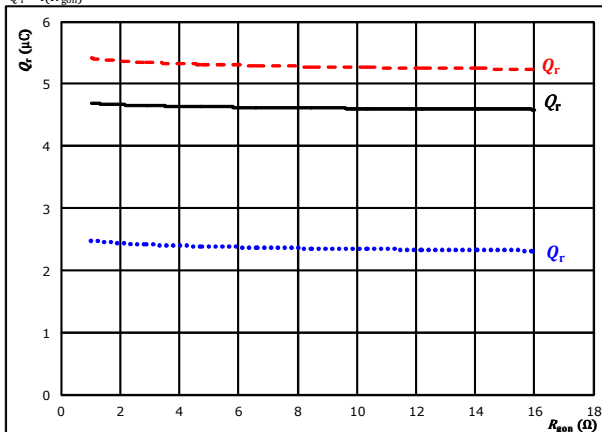


At $V_{CE} = 350$ V
 $V_{GE} = 15/0$ V
 $R_{gon} = 4$ Ω
 T_j : 25 °C (dotted blue)
125 °C (solid black)
150 °C (dashed red)

Figure 10. FWD

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

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

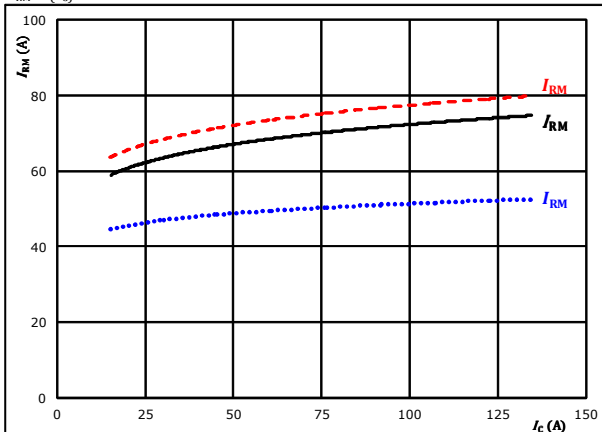


At $V_{CE} = 350$ V
 $V_{GE} = 15/0$ V
 $I_c = 75$ A
 T_j : 25 °C (dotted blue)
125 °C (solid black)
150 °C (dashed red)

Figure 11. FWD

Typical peak reverse recovery current as a function of collector current

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

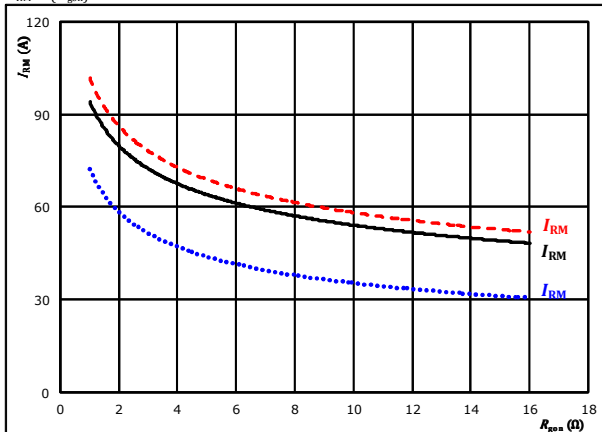


At $V_{CE} = 350$ V
 $V_{GE} = 15/0$ V
 $R_{gon} = 4$ Ω
 T_j : 25 °C (dotted blue)
125 °C (solid black)
150 °C (dashed red)

Figure 12. FWD

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

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



At $V_{CE} = 350$ V
 $V_{GE} = 15/0$ V
 $I_c = 75$ A
 T_j : 25 °C (dotted blue)
125 °C (solid black)
150 °C (dashed red)



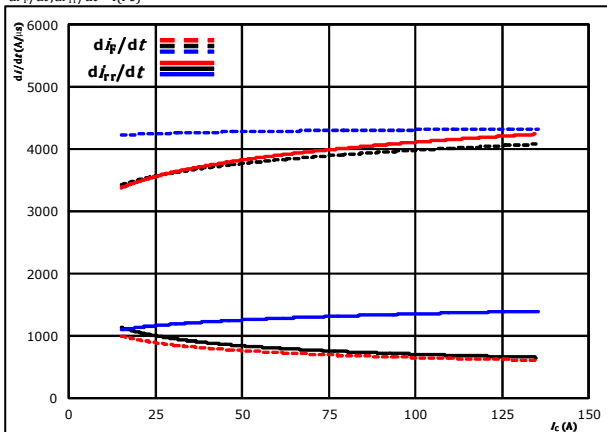
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Boost Switching Characteristics

Figure 13. FWD

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

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

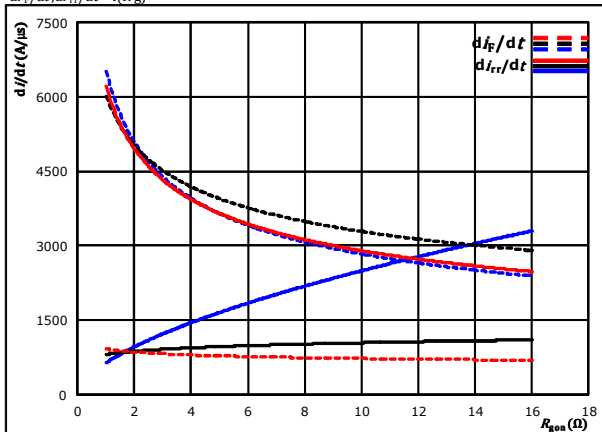


At $V_{CE} = 350$ V
 $V_{GE} = 15/0$ V
 $R_{gon} = 4$ Ω
 $T_J = 25$ °C
 125 °C
 150 °C

Figure 14. FWD

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

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

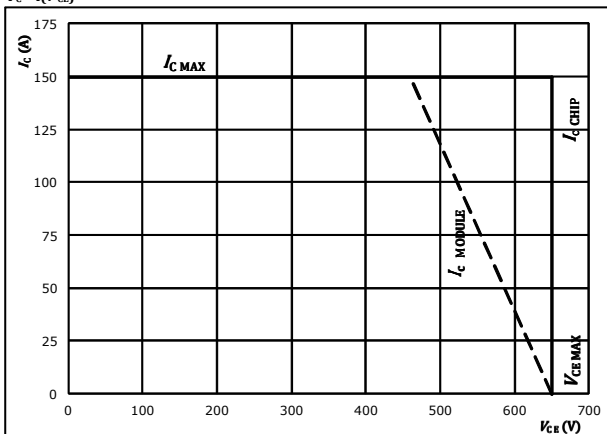


At $V_{CE} = 350$ V
 $V_{GE} = 15/0$ V
 $I_C = 75$ A
 $T_J = 25$ °C
 125 °C
 150 °C

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



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10-FZ07NBA075SM-P916L58
datasheet

Boost Switching Definitions

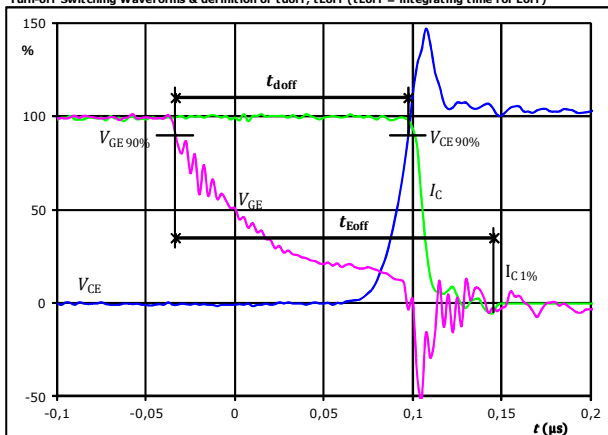
General conditions

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

Figure 1.

IGBT

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

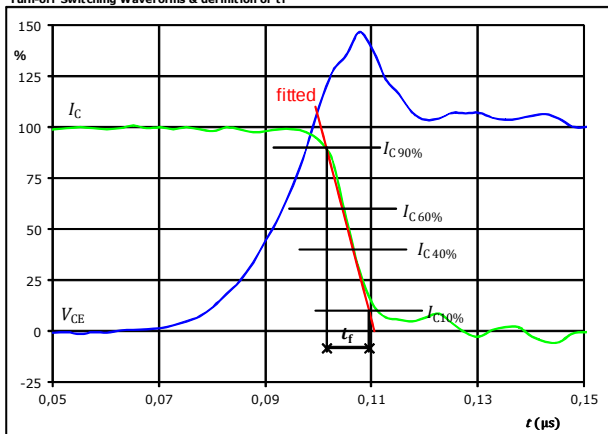


$V_{GE}(0\%) =$	0	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	350	V
$I_C(100\%) =$	75	A
$t_{doff} =$	0,131	μs
$t_{Eoff} =$	0,179	μs

Figure 3.

IGBT

Turn-off Switching Waveforms & definition of t_f

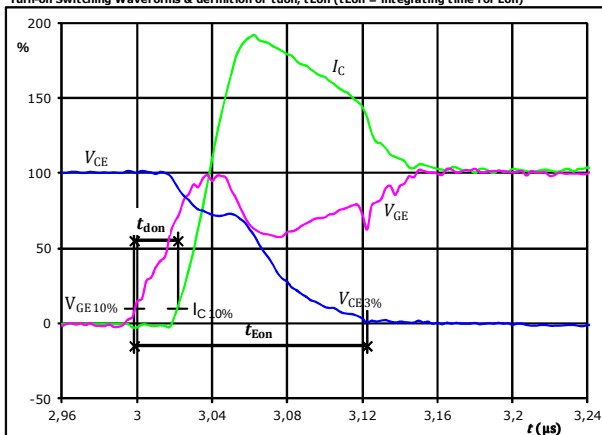


$V_C(100\%) =$	350	V
$I_C(100\%) =$	75	A
$t_f =$	0,008	μs

Figure 2.

IGBT

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

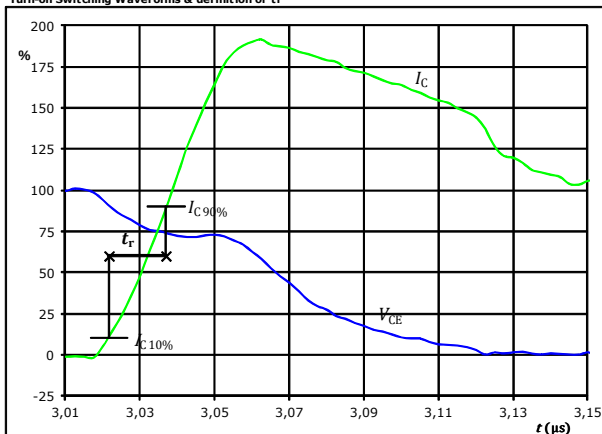


$V_{GE}(0\%) =$	0	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	350	V
$I_C(100\%) =$	75	A
$t_{don} =$	0,023	μs
$t_{Eon} =$	0,124	μs

Figure 4.

IGBT

Turn-on Switching Waveforms & definition of t_r



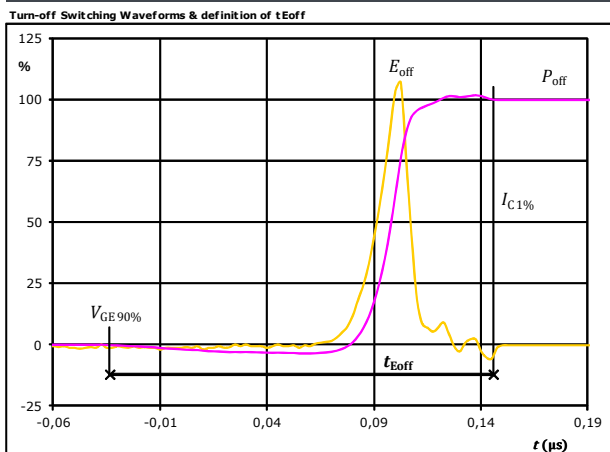
$V_C(100\%) =$	350	V
$I_C(100\%) =$	75	A
$t_r =$	0,015	μs



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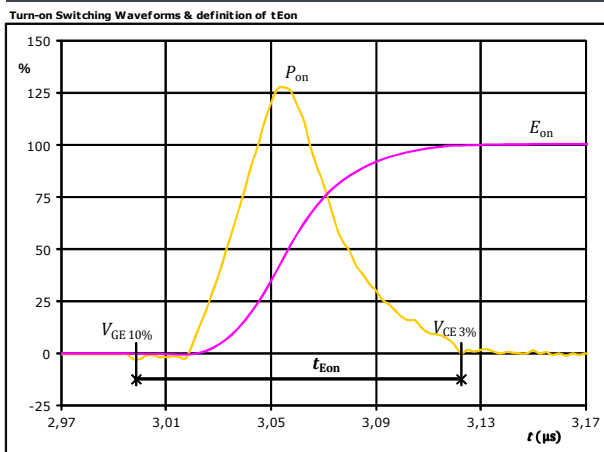
Boost Switching Definitions

Figure 5. IGBT



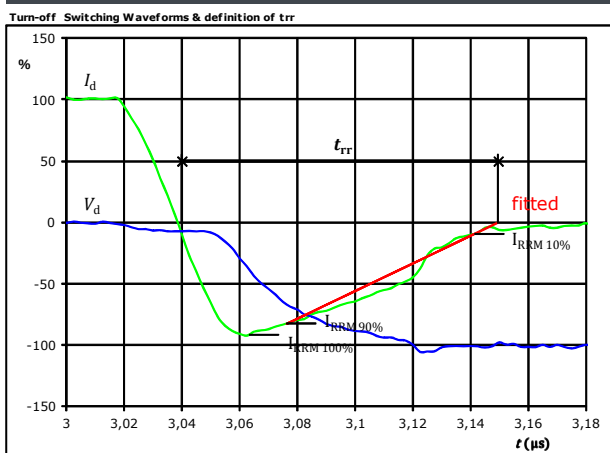
$P_{off}(100\%) = 26,34$ kW
 $E_{off}(100\%) = 0,48$ mJ
 $t_{Eoff} = 0,18$ μs

Figure 6. IGBT



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

Figure 7. FWD



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



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Boost Switching Definitions

Figure 8. FWD

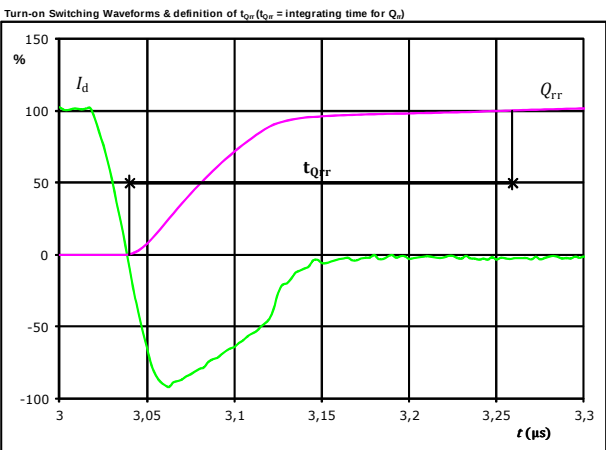
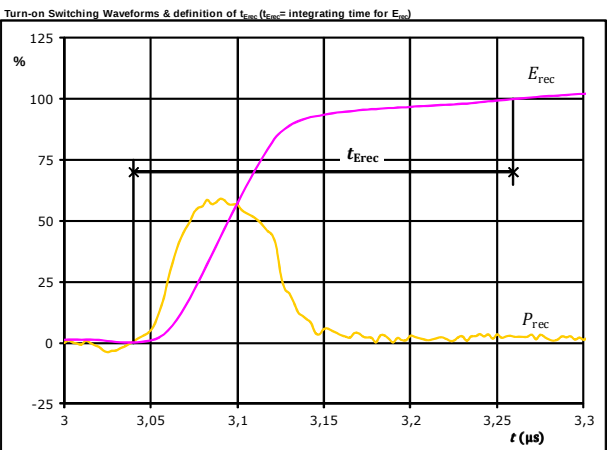


Figure 9. FWD





10-FZ07NBA075SM-P916L58

datasheet

Vincotech

Ordering Code & Marking						
Version			Ordering Code			
without thermal paste 12mm housing with solder pins			10-FZ07NBA075SM-P916L58			
	Text	Name	Date code	UL & Vinco	Lot	Serial
		NN-NNNNNNNNNNNNNN-TTTTTVV	WWYY	UL Vinco	LLLLL	SSSS
	Datamatrix	Type&Ver TTTTTVV	Lot number LLLLL	Serial SSSS	Date code 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

The figure shows two views of a component: a top view and a bottom view. The top view is a perspective drawing showing the component's profile with a width of 16.3 ± 0.5 mm and a pin diameter of φ 1 ± 0.05 mm. The bottom view is a top-down perspective drawing showing the component's footprint with a width of 16.8 mm and a height of 11.3 mm. The component has 22 pins, numbered 1 through 22, arranged in a grid. The pins are located at the following coordinates (X, Y):

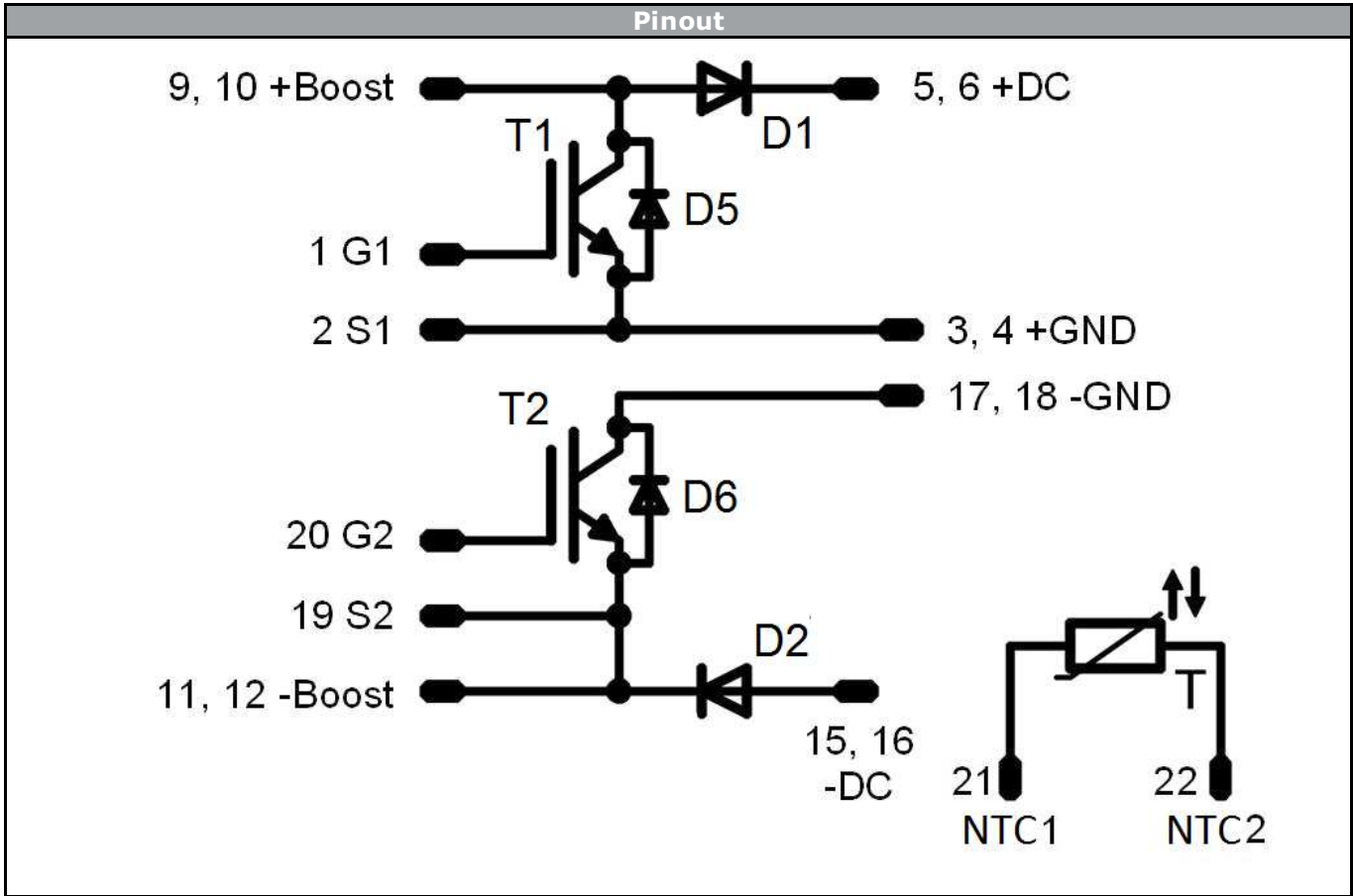
- Pin 1: (33.6, 0)
- Pin 2: (30.6, 0)
- Pin 3: (23.65, 0)
- Pin 4: (20.65, 0)
- Pin 5: (14.9, 0)
- Pin 6: (11.9, 0)
- Pin 7: (0, 0)
- Pin 8: (3, 0)
- Pin 9: (0, 7.8)
- Pin 10: (3, 7.8)
- Pin 11: (0, 14.8)
- Pin 12: (3, 14.8)
- Pin 13: (0, 22.6)
- Pin 14: (3, 22.6)
- Pin 15: (11.9, 22.6)
- Pin 16: (14.9, 22.6)
- Pin 17: (20.65, 22.6)
- Pin 18: (23.65, 22.6)
- Pin 19: (30.6, 22.6)
- Pin 20: (33.6, 22.6)
- Pin 21: (33.6, 14.55)
- Pin 22: (33.6, 8.05)

The coordinate system is defined with X and Y axes. The X-axis is horizontal and the Y-axis is vertical. The origin (0,0) is at the bottom-left corner of the component's footprint.

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



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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	



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10-FZ07NBA075SM-P916L58
datasheet

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

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

Package data
Package data for <i>flow</i> 0 packages see vincotech.com website.

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

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