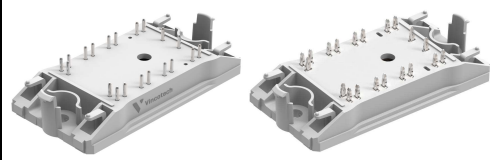
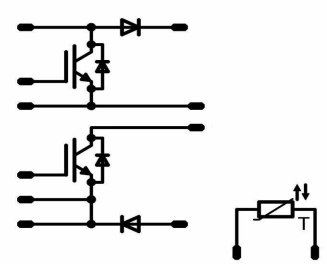




flow BOOST 0		650 V / 100 A	
Features <ul style="list-style-type: none"> • Symmetric booster • Ultra high switching frequency • Low inductance layout 		flow 0 12 mm housing 	
Target Applications <ul style="list-style-type: none"> • Solar Inverter • UPS 		Schematic 	
Types <ul style="list-style-type: none"> • 10-FZ07NBA100SM10-M305L68 • 10-PZ07NBA100SM10-M305L68Y 			

Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
Boost IGBT (T2, T4)				
Collector-emitter break down voltage	V_{CES}		650	V
DC collector current	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	80	A
Pulsed collector current	I_{CRM}	t_p limited by T_{jmax}	300	A
Turn off safe operating area		$T_j \leq 150\text{ °C}$ $V_{CE} \leq V_{CES}$	200	A
Power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	136	W
Gate-emitter peak voltage	V_{GE}		± 20	V
Maximum Junction Temperature	T_{jmax}		175	°C
Boost Inverse Diode (D20, D40)				
Peak Repetitive Reverse Voltage	V_{RRM}		650	V
Forward average current	I_{FAV}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	18	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	20	A
Power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	33	W
Maximum Junction Temperature	T_{jmax}		175	°C



Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
Boost FWD (D1, D2)				
Peak Repetitive Reverse Voltage	V_{RRM}		650	V
Forward average current	I_{FAV}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	70	A
Surge forward current	I_{FSM}	$t_p = 10\text{ ms}$	700	A
I^2t value	I^2t		2450	A ² s
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	200	A
Power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	102	W
Maximum Junction Temperature	T_{jmax}		175	°C

Thermal Properties

Storage temperature	T_{stg}		-40...+125	°C
Operation temperature under switching condition	T_{op}		-40...+($T_{jmax} - 25$)	°C

Isolation Properties

Insulation voltage	V_{isol}	DC Test Voltage* $t_p = 2\text{ s}$	6000	V
		AC Voltage $t_p = 1\text{ min}$	2500	V
Creepage distance			min 12,7	mm
Clearance			9,54	mm
Comparative Tracking Index	CTI		>200	

*100% tested in production

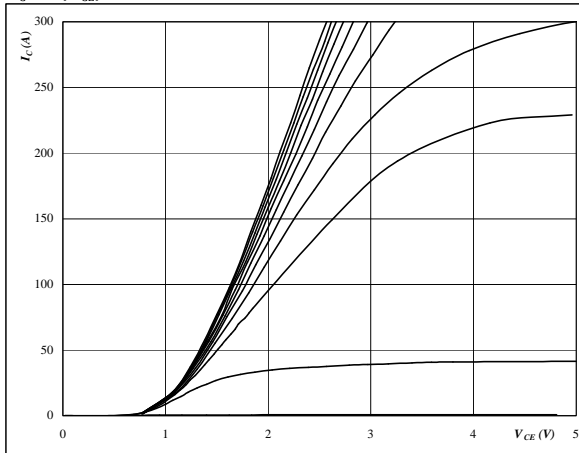


Characteristic Values

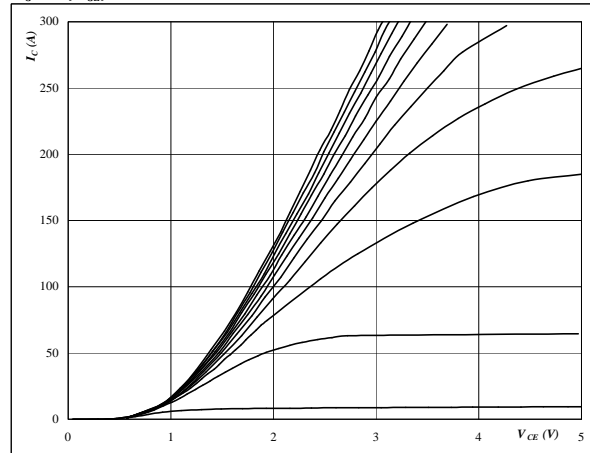
Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_r [V] V_{CE} [V] V_{DS} [V]	I_C [A] I_F [A] I_D [A]	T_j [°C]	Min	Typ	Max	
Boost IGBT (T2, T4)										
Gate emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,001	25	3,3	4	4,7	V
Collector-emitter saturation voltage	V_{CEsat}		15		100	25 125	1	1,63 1,78	2,5	V
Collector-emitter cut-off incl diode	I_{CES}		0	650		25			0,080	mA
Gate-emitter leakage current	I_{GES}		20	0		25			40	nA
Integrated Gate resistor	R_{gint}							none		Ω
Turn-on delay time	$t_{d(on)}$	$R_{gon} = 4\ \Omega$ $R_{goff} = 4\ \Omega$	±15	350	70	25 125		24 23		ns
Rise time	t_r					25 125		10 11		
Turn-off delay time	$t_{d(off)}$					25 125		135 156		
Fall time	t_f					25 125		5 9		
Turn-on energy loss per pulse	E_{on}					25 125		0,700 1,160		mWs
Turn-off energy loss per pulse	E_{off}					25 125		0,310 0,560		
Input capacitance	C_{ies}					$f = 1\text{ MHz}$	0	25	25	
Output capacitance	C_{oss}		100							
Reverse transfer capacitance	C_{rss}		22							
Gate charge	Q_G		15	520	100	25		240		nC
Thermal resistance chip to heatsink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4\text{ W/mK (PSX)}$						0,70		K/W
Boost Inverse Diode (D20, D40)										
Diode forward voltage	V_F				20	25 125		1,73 1,60		V
Thermal resistance chip to heatsink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4\text{ W/mK (PSX)}$						2,87		K/W
Boost FWD (D1, D2)										
Diode forward voltage	V_F				100	25 125	1,5	2,29 1,69	2,5	V
Reverse leakage current	I_r			650		25			20	μA
Peak reverse recovery current	I_{RRM}	$R_{gon} = 4\ \Omega$	±15	350	70	25 125		73 121		A
Reverse recovery time	t_{rr}					25 125		26,4 68,4		ns
Reverse recovered charge	Q_{rr}					25 125		1,3 3,9		μC
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 125		10424 5304		A/μs
Reverse recovery energy	E_{rec}					25 125		0,23 0,79		mWs
Thermal resistance chip to heatsink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4\text{ W/mK (PSX)}$						0,93		K/W
Thermistor										
Rated resistance	R					25		22000		Ω
Deviation of R_{100}	$\Delta_{R/R}$	$R_{100} = 1486\ \Omega$				100	-12		+12	%
Power dissipation	P					25		200		mW
Power dissipation constant						25		2		mW/K
B-value	$B_{(25/50)}$	Tol. ±3%				25		3884		K
B-value	$B_{(25/100)}$	Tol. ±3%				25		3964		K
Vincotech NTC Reference									B	

**Boost IGBT (T2, T4) / Boost FWD (D1, D2)****figure 1. T2, T4****Typical output characteristics**

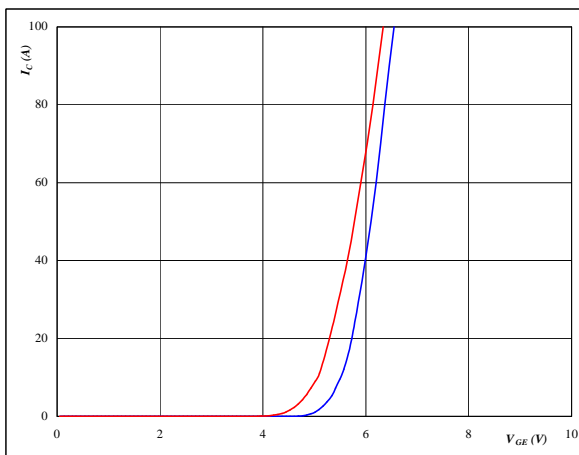
$$I_C = f(V_{CE})$$

**At** $t_p = 250 \mu s$
 $T_j = 25 ^\circ C$
 V_{GE} from 5 V to 15 V in steps of 1 V**figure 2. T2, T4****Typical output characteristics**

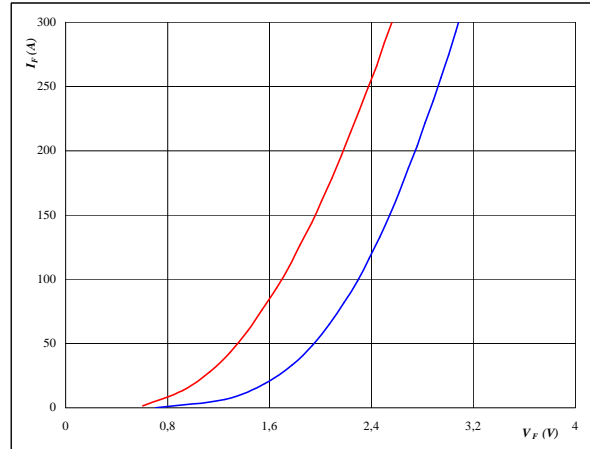
$$I_C = f(V_{CE})$$

**At** $t_p = 250 \mu s$
 $T_j = 125 ^\circ C$
 V_{GE} from 5 V to 15 V in steps of 1 V**figure 3. T2, T4****Typical transfer characteristics**

$$I_C = f(V_{GE})$$

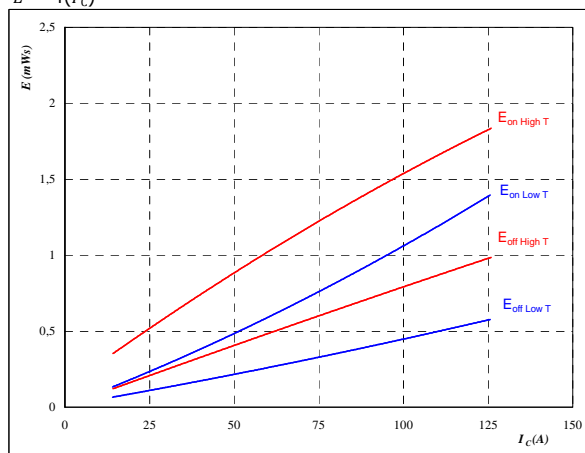
**At** $T_j = 25/125 ^\circ C$
 $t_p = 250 \mu s$
 $V_{CE} = 10 V$ **figure 4. D1, D2****Typical diode forward current as a function of forward voltage**

$$I_F = f(V_F)$$

**At** $T_j = 25/125 ^\circ C$
 $t_p = 250 \mu s$

**Boost IGBT (T2, T4) / Boost FWD (D1, D2)****figure 5.** T2, T4**Typical switching energy losses
as a function of collector current**

$$E = f(I_C)$$



With an inductive load at

$T_j = 25/125\ ^\circ\text{C}$

$V_{CE} = 350\ \text{V}$

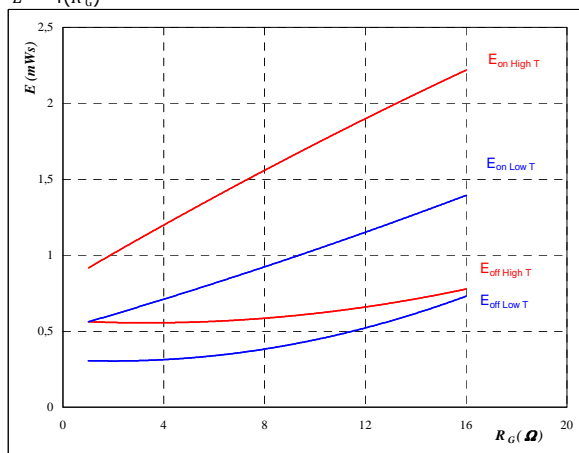
$V_{GE} = 15\ \text{V}$

$R_{gon} = 4\ \Omega$

$R_{goff} = 4\ \Omega$

figure 6. T2, T4**Typical switching energy losses
as a function of gate resistor**

$$E = f(R_G)$$



With an inductive load at

$T_j = 25/125\ ^\circ\text{C}$

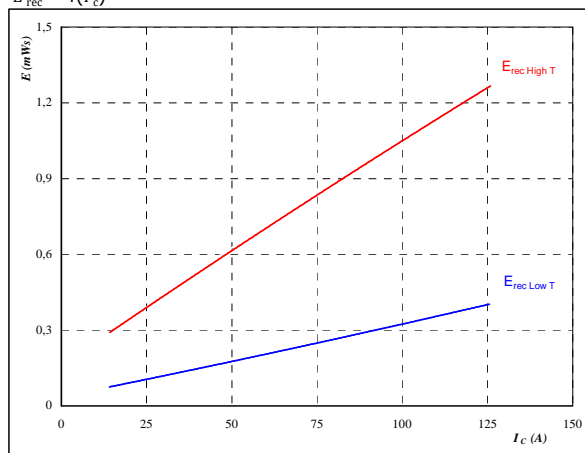
$V_{CE} = 350\ \text{V}$

$V_{GE} = 15\ \text{V}$

$I_C = 70\ \text{A}$

figure 7. D1, D2**Typical reverse recovery energy loss
as a function of collector current**

$$E_{rec} = f(I_C)$$



With an inductive load at

$T_j = 25/125\ ^\circ\text{C}$

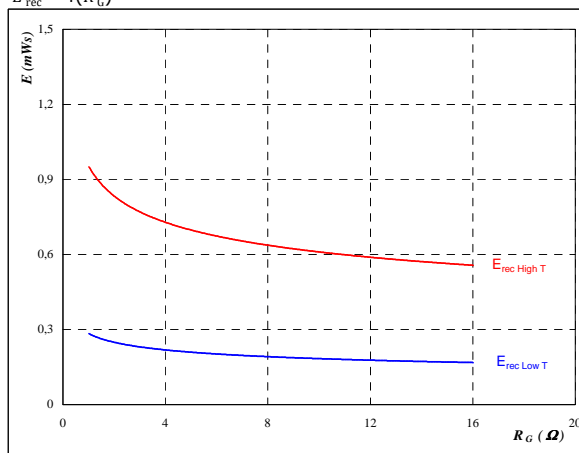
$V_{CE} = 350\ \text{V}$

$V_{GE} = 15\ \text{V}$

$R_{gon} = 4\ \Omega$

figure 8. D1, D2**Typical reverse recovery energy loss
as a function of gate resistor**

$$E_{rec} = f(R_G)$$



With an inductive load at

$T_j = 25/125\ ^\circ\text{C}$

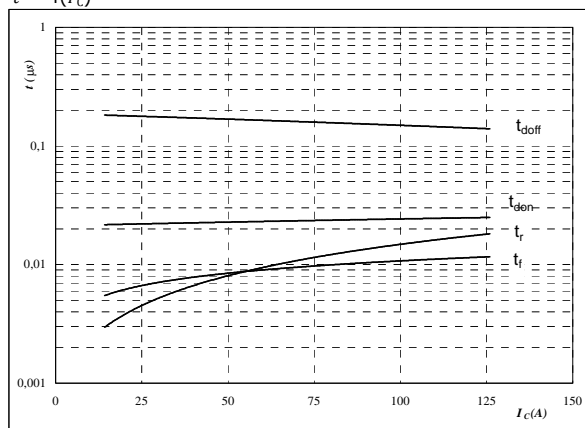
$V_{CE} = 350\ \text{V}$

$V_{GE} = 15\ \text{V}$

$I_C = 70\ \text{A}$

**Boost IGBT (T2, T4) / Boost FWD (D1, D2)****figure 9.** T2, T4**Typical switching times as a function of collector current**

$$t = f(I_C)$$

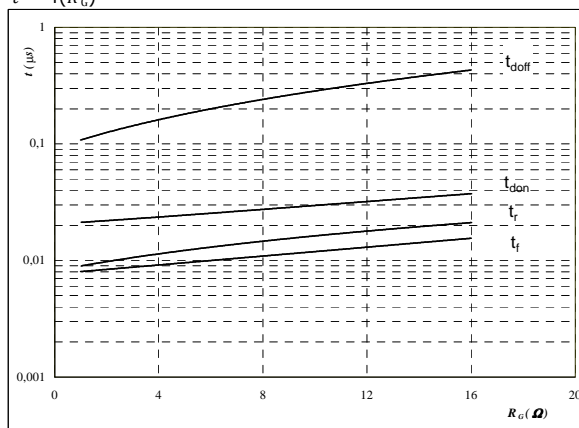


With an inductive load at

$$\begin{aligned}
 T_j &= 125 && ^\circ\text{C} \\
 V_{CE} &= 350 && \text{V} \\
 V_{GE} &= 15 && \text{V} \\
 R_{gon} &= 4 && \Omega \\
 R_{goff} &= 4 && \Omega
 \end{aligned}$$

figure 10. T2, T4**Typical switching times as a function of gate resistor**

$$t = f(R_G)$$

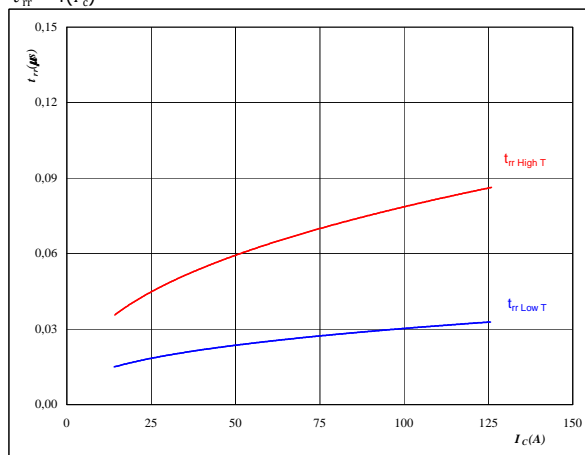


With an inductive load at

$$\begin{aligned}
 T_j &= 125 && ^\circ\text{C} \\
 V_{CE} &= 350 && \text{V} \\
 V_{GE} &= 15 && \text{V} \\
 I_C &= 70 && \text{A}
 \end{aligned}$$

figure 11. D1, D2**Typical reverse recovery time as a function of collector current**

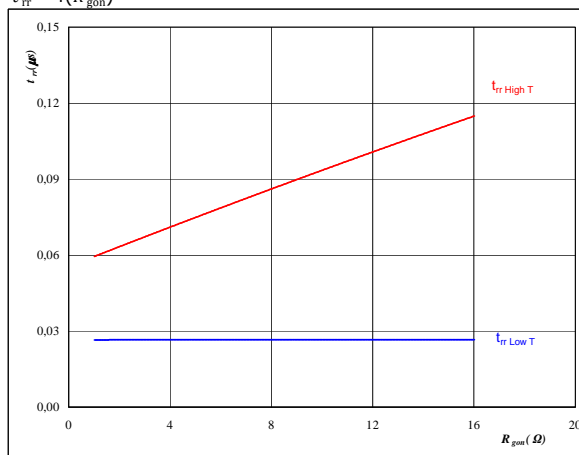
$$t_{rr} = f(I_C)$$

**At**

$$\begin{aligned}
 T_j &= 25/125 && ^\circ\text{C} \\
 V_{CE} &= 350 && \text{V} \\
 V_{GE} &= 15 && \text{V} \\
 R_{gon} &= 4 && \Omega
 \end{aligned}$$

figure 12. D1, D2**Typical reverse recovery time as a function of IGBT turn on gate resistor**

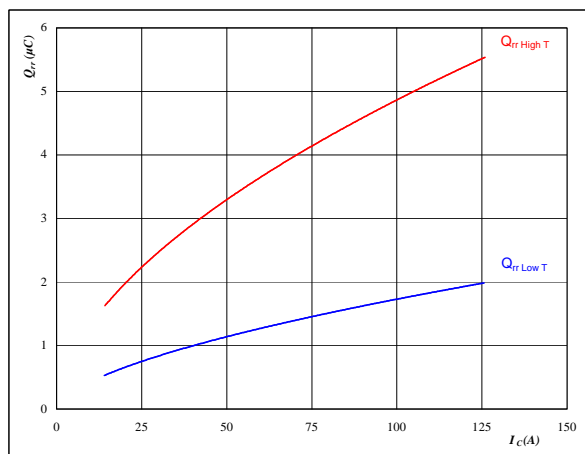
$$t_{rr} = f(R_{gon})$$

**At**

$$\begin{aligned}
 T_j &= 25/125 && ^\circ\text{C} \\
 V_R &= 350 && \text{V} \\
 I_F &= 70 && \text{A} \\
 V_{GE} &= 15 && \text{V}
 \end{aligned}$$

**Boost IGBT (T2, T4) / Boost FWD (D1, D2)****figure 13.** D1, D2**Typical reverse recovery charge as a function of collector current**

$$Q_{rr} = f(I_C)$$

**At**

$$T_j = 25/125 \text{ } ^\circ C$$

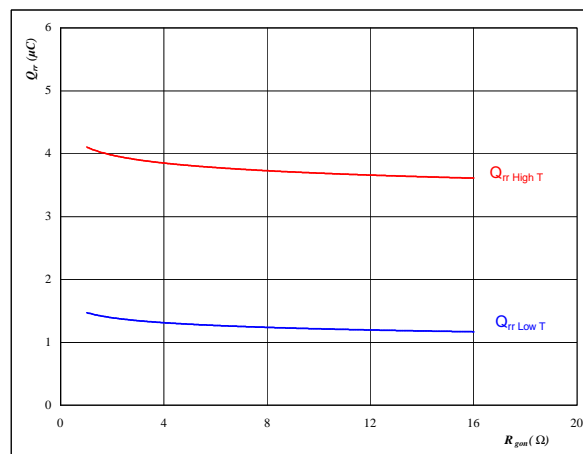
$$V_{CE} = 350 \text{ V}$$

$$V_{GE} = 15 \text{ V}$$

$$R_{gon} = 4 \text{ } \Omega$$

figure 14. D1, D2**Typical reverse recovery charge as a function of IGBT turn on gate resistor**

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

**At**

$$T_j = 25/125 \text{ } ^\circ C$$

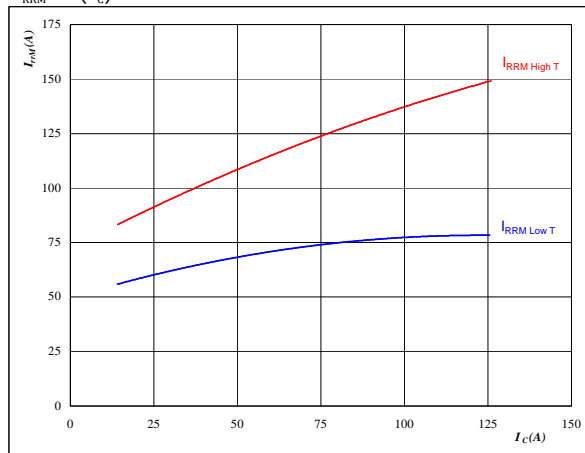
$$V_R = 350 \text{ V}$$

$$I_F = 70 \text{ A}$$

$$V_{GE} = 15 \text{ V}$$

figure 15. D1, D2**Typical reverse recovery current as a function of collector current**

$$I_{RRM} = f(I_C)$$

**At**

$$T_j = 25/125 \text{ } ^\circ C$$

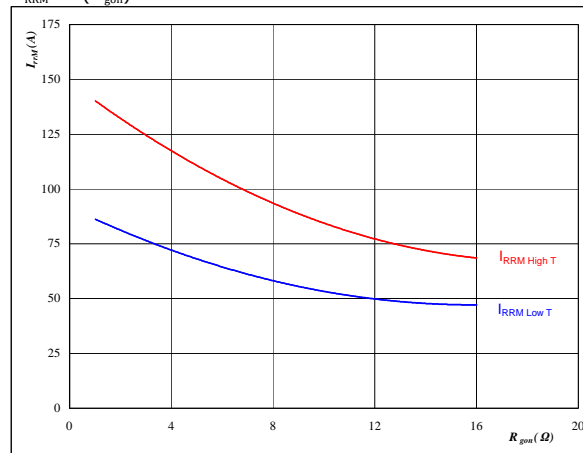
$$V_{CE} = 350 \text{ V}$$

$$V_{GE} = 15 \text{ V}$$

$$R_{gon} = 4 \text{ } \Omega$$

figure 16. D1, D2**Typical reverse recovery current as a function of IGBT turn on gate resistor**

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

**At**

$$T_j = 25/125 \text{ } ^\circ C$$

$$V_R = 350 \text{ V}$$

$$I_F = 70 \text{ A}$$

$$V_{GE} = 15 \text{ V}$$

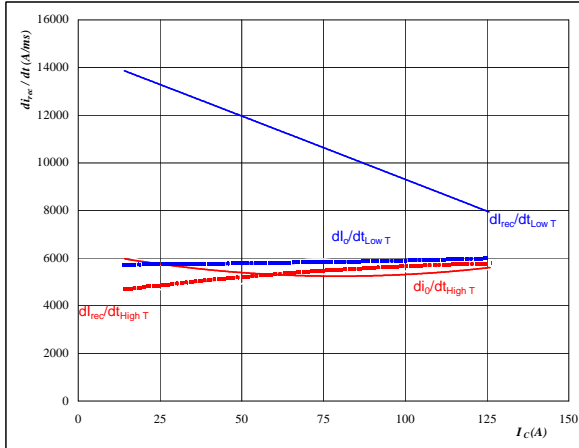


Boost IGBT (T2, T4) / Boost FWD (D1, D2)

figure 17. **D1, D2**

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

$$dI_0/dt, dI_{rec}/dt = f(I_C)$$



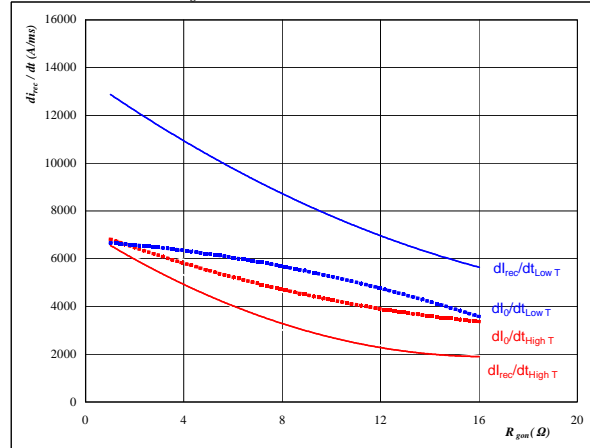
At

$$\begin{aligned} T_j &= 25/125 \text{ } ^\circ\text{C} \\ V_{CE} &= 350 \text{ V} \\ V_{GE} &= 15 \text{ V} \\ R_{gon} &= 4 \text{ } \Omega \end{aligned}$$

figure 18. **D1, D2**

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

$$dI_0/dt, dI_{rec}/dt = f(R_{gon})$$



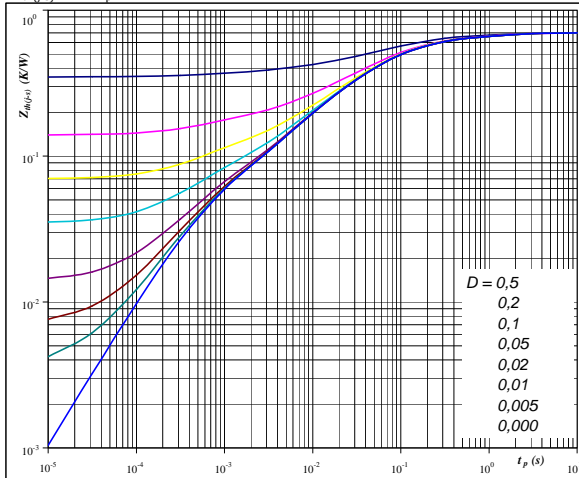
At

$$\begin{aligned} T_j &= 25/125 \text{ } ^\circ\text{C} \\ V_R &= 350 \text{ V} \\ I_F &= 70 \text{ A} \\ V_{GE} &= 15 \text{ V} \end{aligned}$$

figure 19. **T2, T4**

IGBT transient thermal impedance
as a function of pulse width

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



At

$$\begin{aligned} D &= t_p / T \\ R_{th(j-s)} &= 0,70 \text{ K/W} \end{aligned}$$

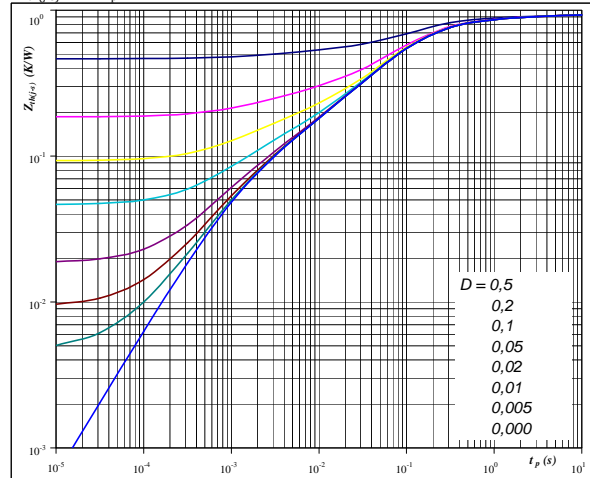
IGBT thermal model values

R (K/W)	Tau (s)
6,67E-02	1,43E+00
1,15E-01	2,44E-01
2,87E-01	6,53E-02
1,30E-01	1,67E-02
5,73E-02	4,56E-03
4,15E-02	5,21E-04

figure 20. **D1, D2**

FWD transient thermal impedance
as a function of pulse width

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



At

$$\begin{aligned} D &= t_p / T \\ R_{th(j-s)} &= 0,93 \text{ K/W} \end{aligned}$$

FWD thermal model values

R (K/W)	Tau (s)
6,93E-02	3,04E+00
1,64E-01	4,75E-01
5,02E-01	9,73E-02
8,20E-02	2,48E-02
6,58E-02	4,90E-03
4,43E-02	1,04E-03

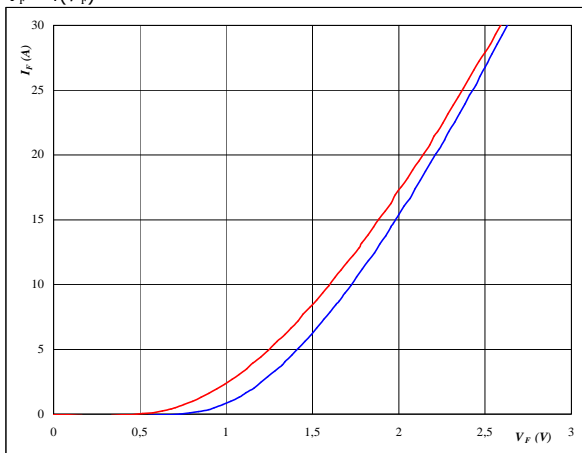


Boost Inverse Diode (D20, D40)

figure 21. D20, D40

Typical diode forward current as
a function of forward voltage

$$I_F = f(V_F)$$



At

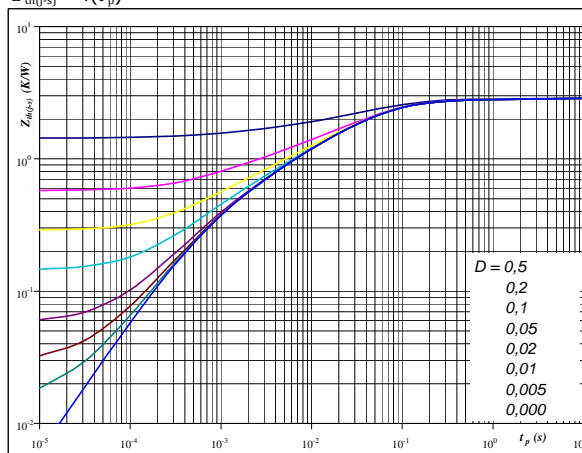
$$T_j = 25/125 \text{ } ^\circ\text{C}$$

$$t_p = 250 \text{ } \mu\text{s}$$

figure 22. D20, D40

Diode transient thermal impedance
as a function of pulse width

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



At

$$D = t_p / T$$

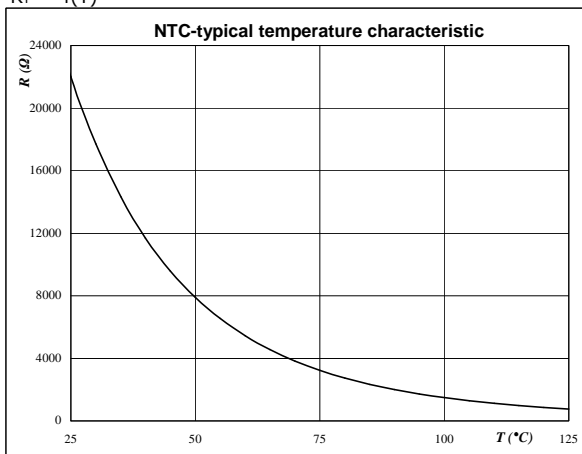
$$R_{th(j-s)} = 2,87 \text{ K/W}$$

Thermistor

figure 23. NTC

Typical NTC characteristic
as a function of temperature

$$R_T = f(T)$$





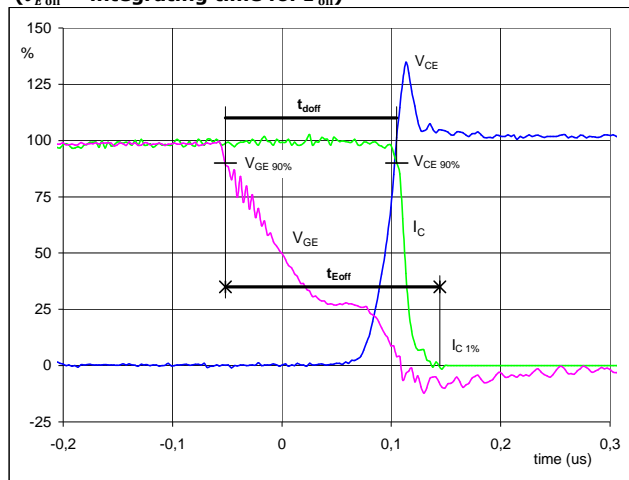
Switching Definitions

General conditions

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

figure 1. T2, T4

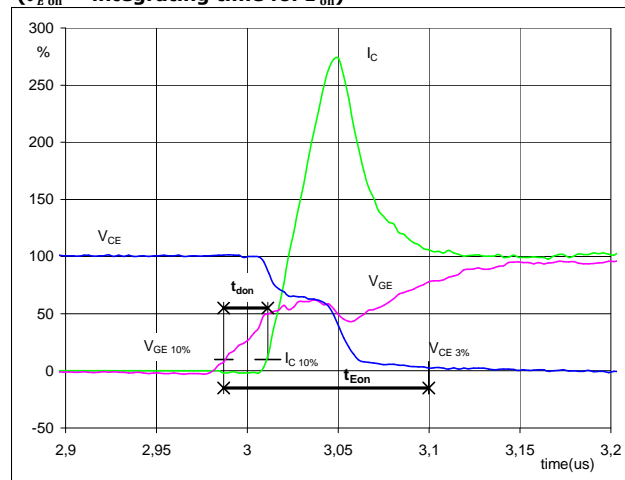
Turn-off Switching Waveforms & definition of t_{doff} t_{Eoff}
 (t_{Eoff} = integrating time for E_{off})



V_{GE} (0%) =	0	V
V_{GE} (100%) =	15	V
V_C (100%) =	350	V
I_C (100%) =	75	A
t_{doff} =	0,16	μ s
t_{Eoff} =	0,20	μ s

figure 2. T2, T4

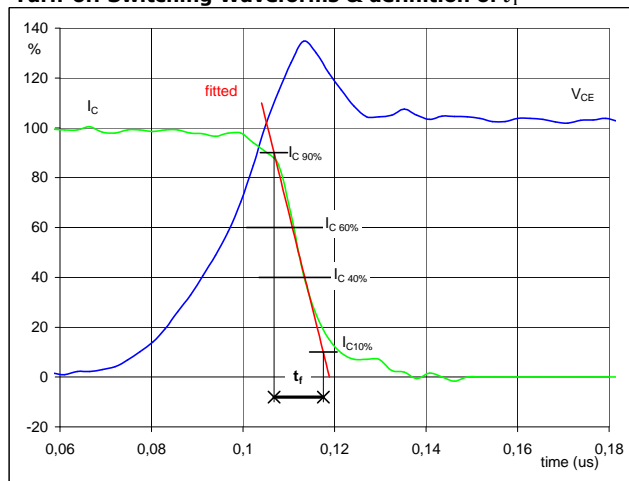
Turn-on Switching Waveforms & definition of t_{donr} t_{Eon}
 (t_{Eon} = integrating time for E_{on})



V_{GE} (0%) =	0	V
V_{GE} (100%) =	15	V
V_C (100%) =	350	V
I_C (100%) =	75	A
t_{donr} =	0,02	μ s
t_{Eon} =	0,11	μ s

figure 3. T2, T4

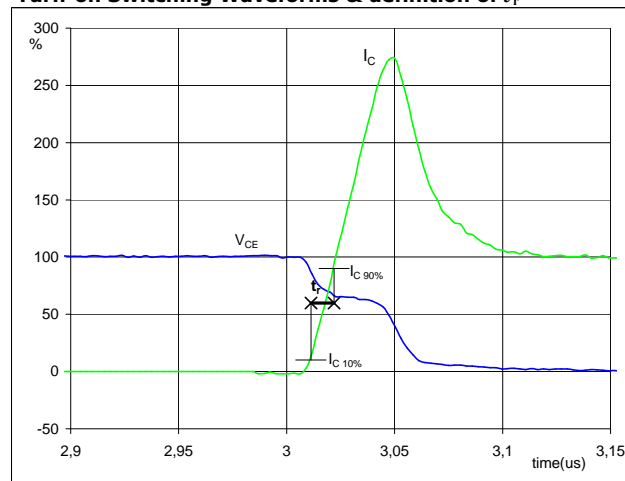
Turn-off Switching Waveforms & definition of t_f



V_C (100%) =	350	V
I_C (100%) =	75	A
t_f =	0,009	μ s

figure 4. T2, T4

Turn-on Switching Waveforms & definition of t_r

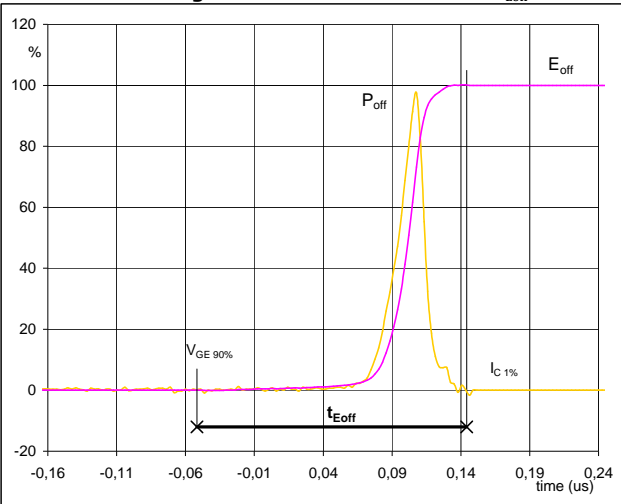


V_C (100%) =	350	V
I_C (100%) =	75	A
t_r =	0,011	μ s



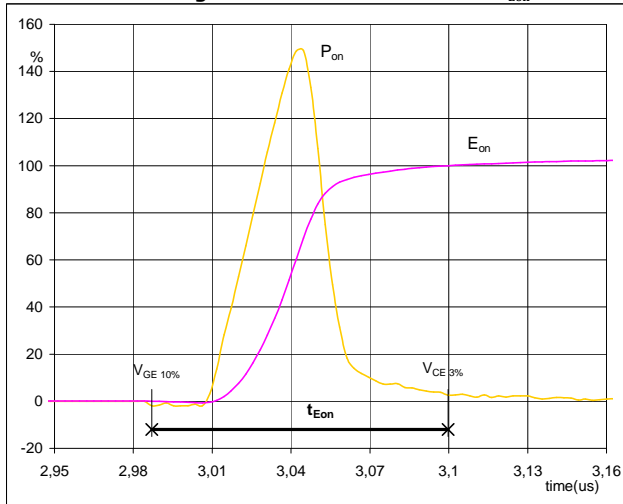
Switching Definitions

figure 5. T2, T4

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


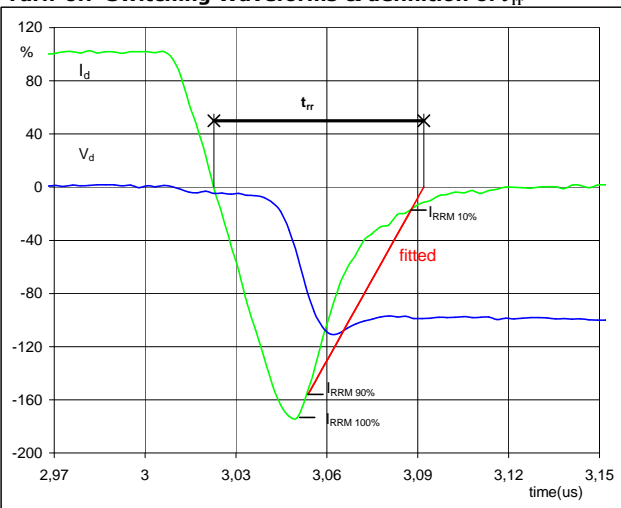
$P_{off} (100\%) = 26,25 \text{ kW}$
 $E_{off} (100\%) = 0,56 \text{ mJ}$
 $t_{Eoff} = 0,20 \text{ }\mu\text{s}$

figure 6. T2, T4

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


$P_{on} (100\%) = 26,25 \text{ kW}$
 $E_{on} (100\%) = 1,16 \text{ mJ}$
 $t_{Eon} = 0,11 \text{ }\mu\text{s}$

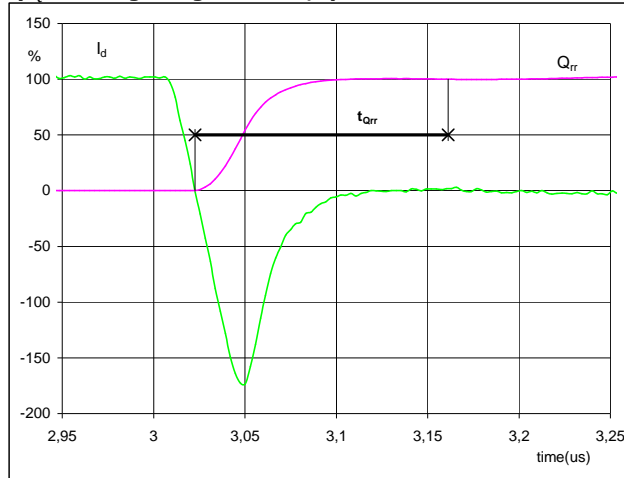
figure 7. D1, D2

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


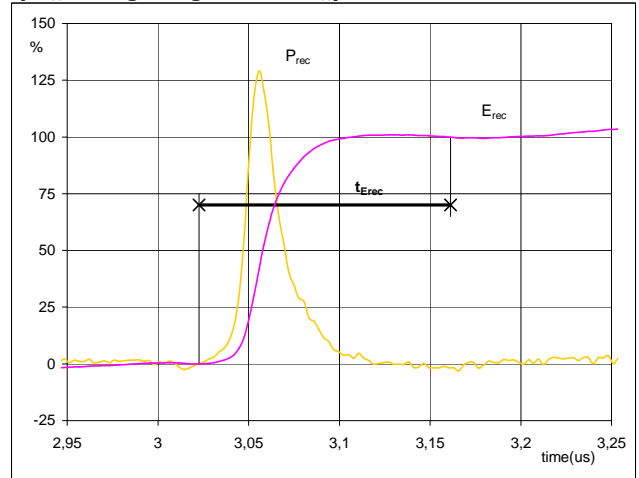
$V_d (100\%) = 350 \text{ V}$
 $I_d (100\%) = 75 \text{ A}$
 $I_{RRM} (100\%) = -121 \text{ A}$
 $t_{rr} = 0,07 \text{ }\mu\text{s}$





Switching Definitions

figure 8. D1, D2**Turn-on Switching Waveforms & definition of t_{Qrr}** **(t_{Qrr} = integrating time for Q_{rr})**

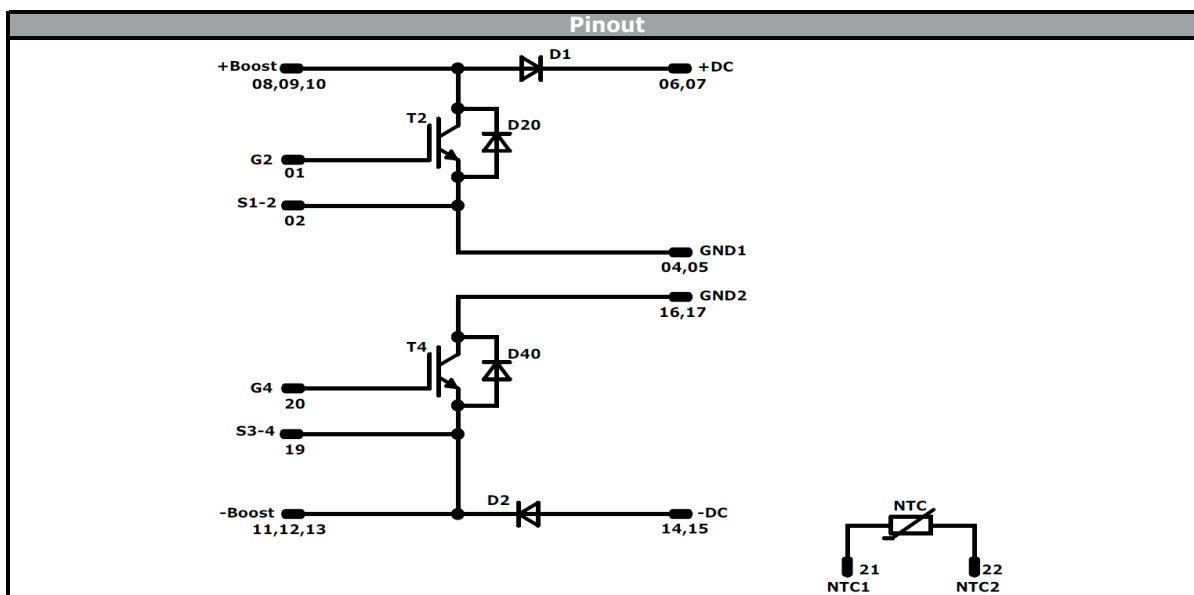
I_d (100%) =	75	A
Q_{rr} (100%) =	3,91	μC
t_{Qrr} =	0,14	μs

figure 9. D1, D2**Turn-on Switching Waveforms & definition of t_{Erec}** **(t_{Erec} = integrating time for E_{rec})**

P_{rr} (100%) =	26,25	kW
E_{rec} (100%) =	0,79	mJ
t_{Erec} =	0,14	μs

Ordering Code & Marking										
Version				Ordering Code						
without thermal paste 12 mm housing press-fit pins				10-PZ07NBA100SM10-M305L68Y						
without thermal paste 12 mm housing solder pins				10-FZ07NBA100SM10-M305L68						
<div><div>NN-NNNNNNNNNNNNNN TTTTTUV WWYY UL VIN LLLL SSSS</div><div></div><div></div></div>				Text	Name		Date code	UL & VIN	Lot	Serial
					NN-NNNNNNNNNNNN-TTTTTUV		WWYY	UL VIN	LLLL	SSSS
				Datamatrix	Type&Ver	Lot number	Serial	Date code		
					TTTTTUV	LLLL	SSSS	WWYY		

Pin table [mm]			
Pin	X	Y	Function
1	33,6	0	G2
2	30,7	0	S1-2
3	Not assembled		
4	21,8	0	GND1
5	18,9	0	GND1
6	12,4	0	+DC
7	9,5	0	+DC
8	2,9	0	+Boost
9	0	0	+Boost
10	0	2,9	+Boost
11	0	19,7	-Boost
12	0	22,6	-Boost
13	2,9	22,6	-Boost
14	9,5	22,6	-DC
15	12,4	22,6	-DC
16	18,9	22,6	GND2
17	21,8	22,6	GND2
18	Not assembled		
19	30,7	22,6	S3-4
20	33,6	22,6	G4
21	33,6	14,6	NTC1
22	33,6	8	NTC2



Identification					
ID	Component	Voltage	Current	Function	Comment
T2, T4	IGBT	650 V	100 A	Boost Switch	
D1, D2	FWD	650 V	100 A	Boost Diode	Parallel devices. Values apply to complete device
D20, D40	Diode	650 V	10 A	Boost Inverse Diode	
NTC	Thermistor			Thermistor	



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.

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-xZ07NBA100SM10-M305L68x-D3k1-14	21 Mar. 2018	IGBT short circuit time removed	1

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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.