10-FZ07NBA100SM10-M305L68
10-PZ07NBA100SM10-M305L68Y

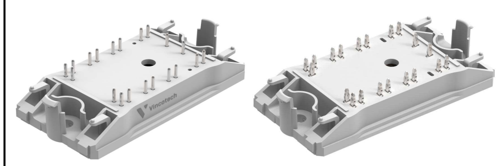
datasheet

flow **BOOST 0** **650 V / 100 A**

Features

- Symmetric booster
- Ultra high switching frequency
- Low inductance layout

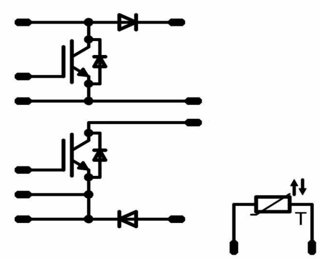
flow 0 12 mm housing



Target Applications

- Solar Inverter
- UPS

Schematic



Types

- 10-FZ07NBA100SM10-M305L68
- 10-PZ07NBA100SM10-M305L68Y

Maximum Ratings

T_j = 25 °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 °C	80	A
Pulsed collector current	I_{CRM}	t_p limited by T_{jmax}		300	A
Turn off safe operating area		T_j ≤ 150 °C $V_{CE} \le V_{CES}$		200	A
Power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °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 °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 °C	33	W
Maximum Junction Temperature	T_{jmax}			175	°C

Maximum Ratings

T_j = 25 °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 °C	70	A
Surge forward current	I_{FSM}	t_p = 10 ms		700	A
I^2t value	I^2t			2450	A^2s
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 °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 s	6000	V
		AC Voltage	t_p = 1 min	2500	V
Creepage distance				min 12,7	mm
Clearance				9,54	mm
Comparative Tracking Index	CTI			>200	

*100% tested in production

Characteristic Values

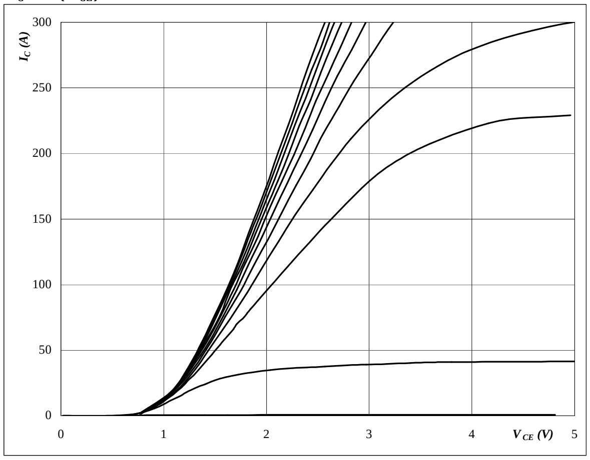
Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_r [V] V_{CE} [V] V_{DS} [V]	I_C [A] I_F [A] I_D [A]	T_j [°C]	Min	Typ	Max	
Boost IGBT (T2, T4)										
Gate emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,001	25	3,3	4	4,7	V
Collector-emitter saturation voltage	V_{CEsat}		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_{goff} = 4 Ω R_{gon} = 4 Ω	±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 MHz	0	25		25		6000		pF
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	$R_{th(j-s)}$	λ_{paste} = 3,4 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	$R_{th(j-s)}$	λ_{paste} = 3,4 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 Ω	±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	$(di_{rf}/dt)_{max}$					25 125		10424 5304		A/μs
Reverse recovery energy	E_{rec}					25 125		0,23 0,79		mWs
Thermal resistance chip to heatsink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,93		K/W
Thermistor										
Rated resistance	R					25		22000		Ω
Deviation of R_{100}	$\Delta_{R/R}$	R_{100} = 1486 Ω				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

$I_C = f(V_{CE})$



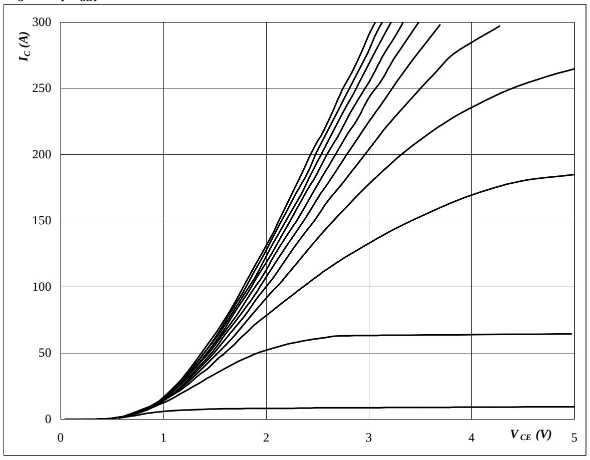
At

t_p =	250	μs
T_j =	25	°C
V_{GE} from	5 V to 15 V in steps of 1 V	

figure 2. **T2, T4**

Typical output characteristics

$I_C = f(V_{CE})$



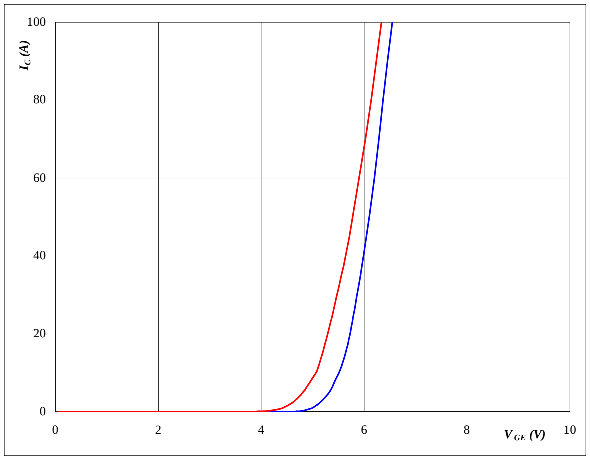
At

t_p =	250	μs
T_j =	125	°C
V_{GE} from	5 V to 15 V in steps of 1 V	

figure 3. **T2, T4**

Typical transfer characteristics

$I_C = f(V_{GE})$



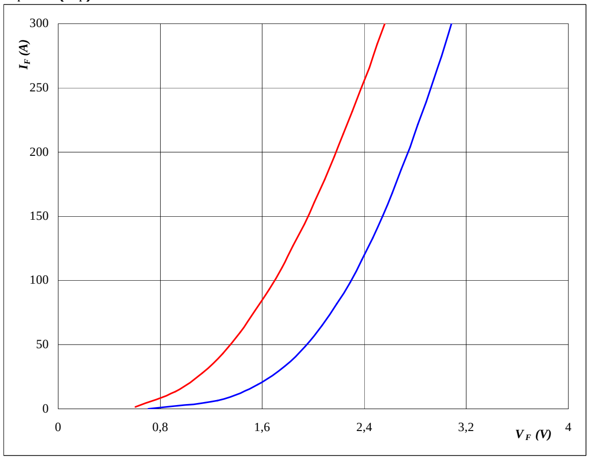
At

T_j =	25/125	°C
t_p =	250	μs
V_{CE} =	10	V

figure 4. **D1, D2**

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



At

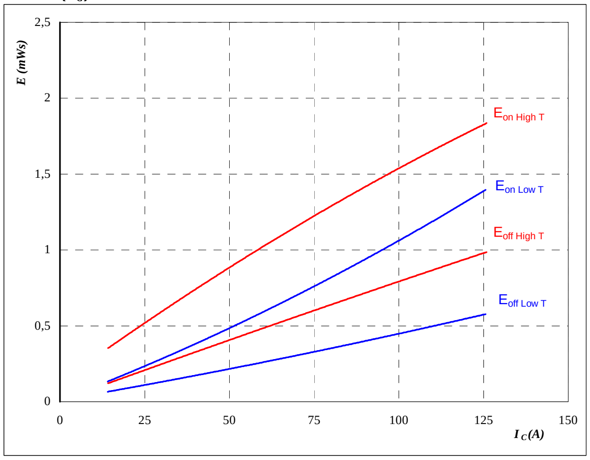
T_j =	25/125	°C
t_p =	250	μs

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

figure 5. **T2, T4**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



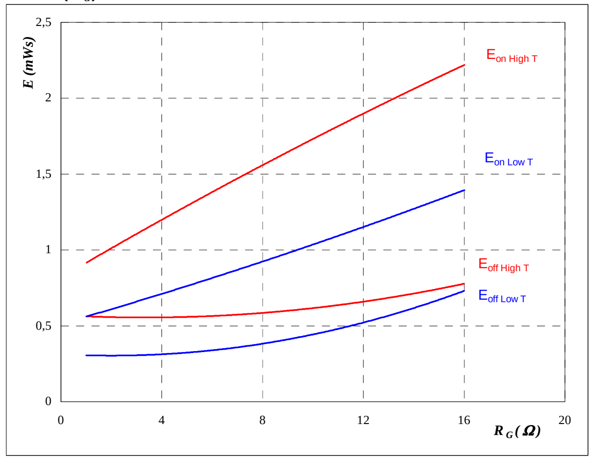
With an inductive load at

T_j =	25/125	°C
V_{CE} =	350	V
V_{GE} =	15	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

figure 6. **T2, T4**

Typical switching energy losses as a function of gate resistor

$E = f(R_G)$



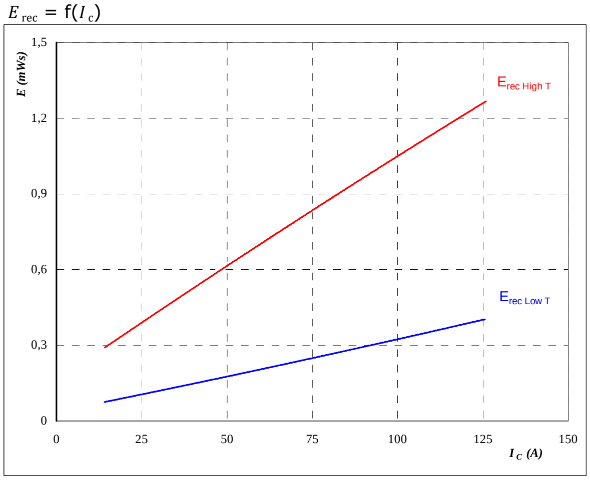
With an inductive load at

T_j =	25/125	°C
V_{CE} =	350	V
V_{GE} =	15	V
I_C =	70	A

figure 7. **D1, D2**

Typical reverse recovery energy loss as a function of collector current

$E_{rec} = f(I_c)$



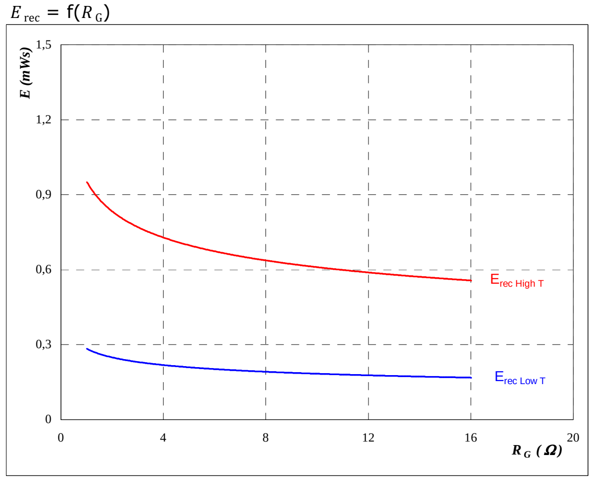
With an inductive load at

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

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

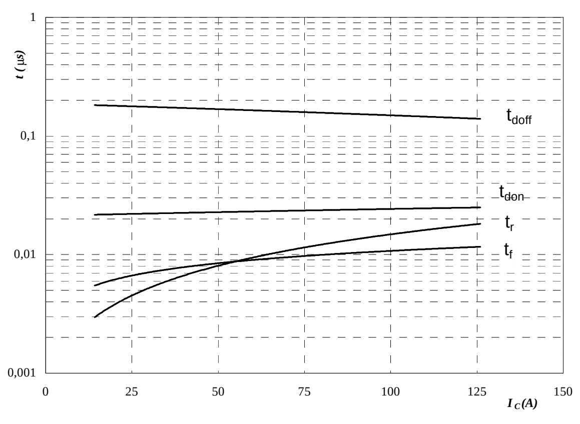
T_j =	25/125	°C
V_{CE} =	350	V
V_{GE} =	15	V
I_C =	70	A

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

figure 9. **T2, T4**

Typical switching times as a function of collector current

$t = f(I_C)$



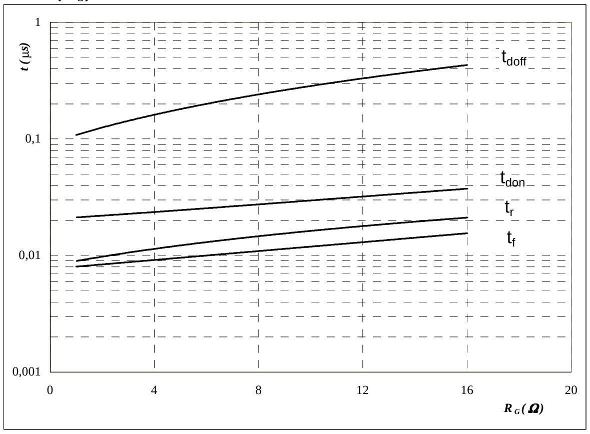
With an inductive load at

T_j =	125	°C
V_{CE} =	350	V
V_{GE} =	15	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

figure 10. **T2, T4**

Typical switching times as a function of gate resistor

$t = f(R_G)$



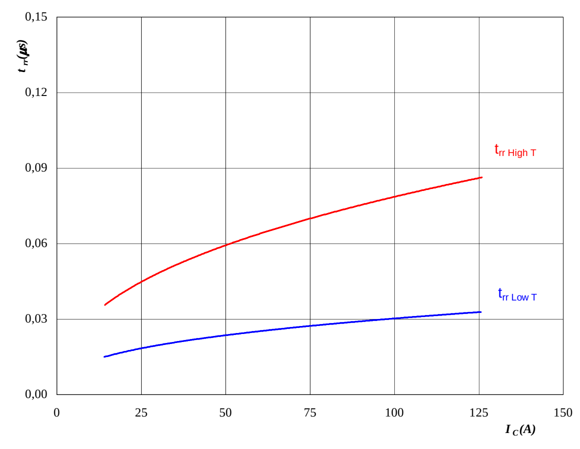
With an inductive load at

T_j =	125	°C
V_{CE} =	350	V
V_{GE} =	15	V
I_C =	70	A

figure 11. **D1, D2**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



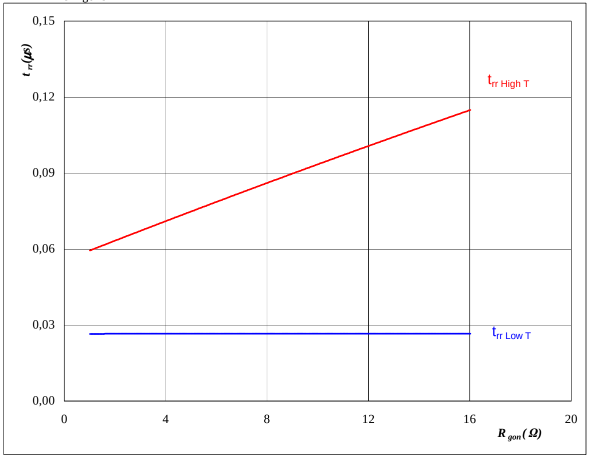
At

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

figure 12. **D1, D2**

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

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



At

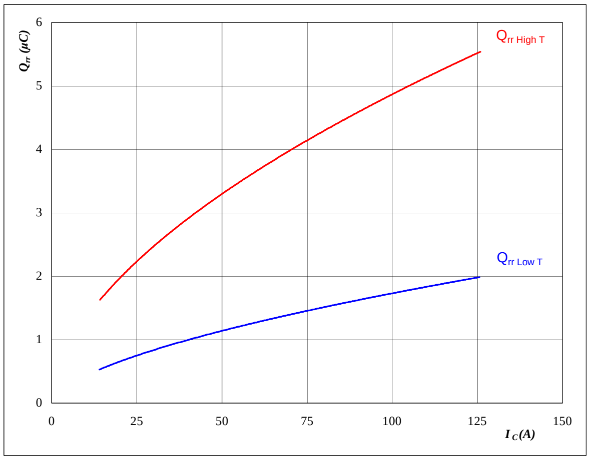
T_j =	25/125	°C
V_R =	350	V
I_F =	70	A
V_{GE} =	15	V

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

figure 13. **D1, D2**

Typical reverse recovery charge as a function of collector current

$Q_{rr} = f(I_C)$



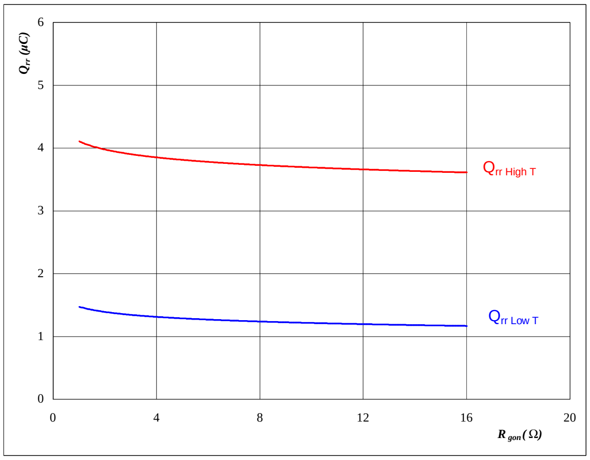
At

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

figure 14. **D1, D2**

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

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



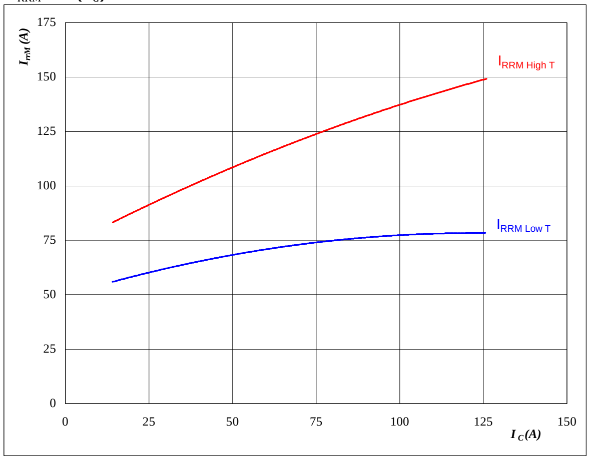
At

T_j =	25/125	°C
V_R =	350	V
I_F =	70	A
V_{GE} =	15	V

figure 15. **D1, D2**

Typical reverse recovery current as a function of collector current

$I_{RRM} = f(I_C)$



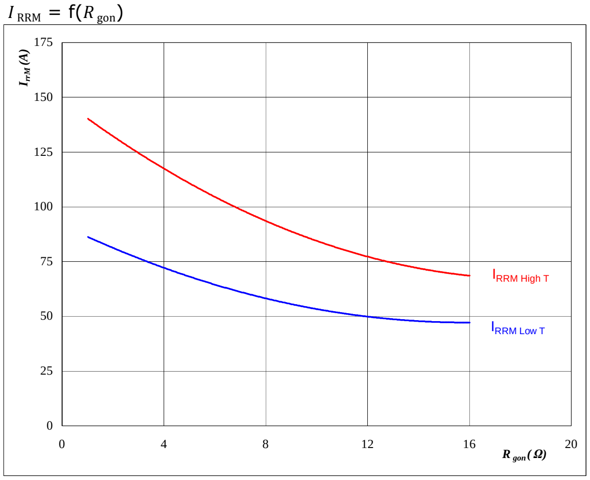
At

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

figure 16. **D1, D2**

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

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



At

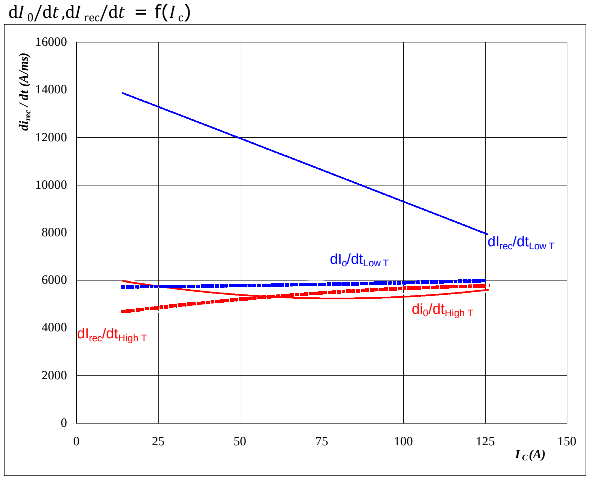
T_j =	25/125	°C
V_R =	350	V
I_F =	70	A
V_{GE} =	15	V

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

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



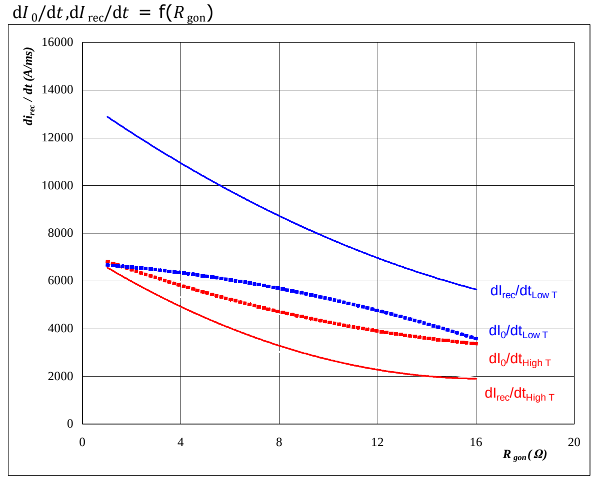
At

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

figure 18. **D1, D2**

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

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



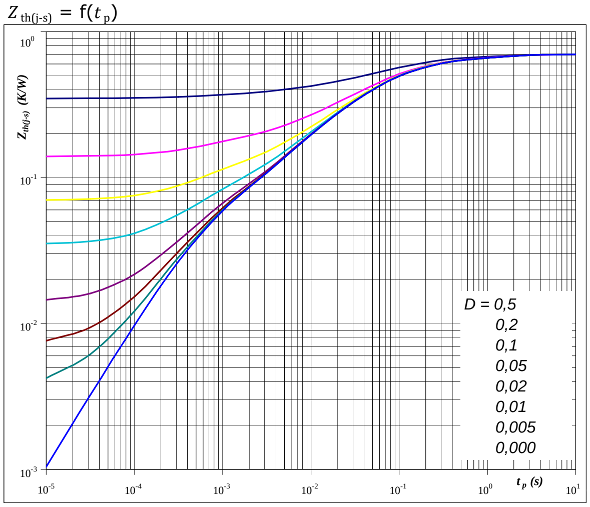
At

T_j =	25/125	°C
V_R =	350	V
I_F =	70	A
V_{GE} =	15	V

figure 19. **T2, T4**

IGBT transient thermal impedance as a function of pulse width

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



At

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

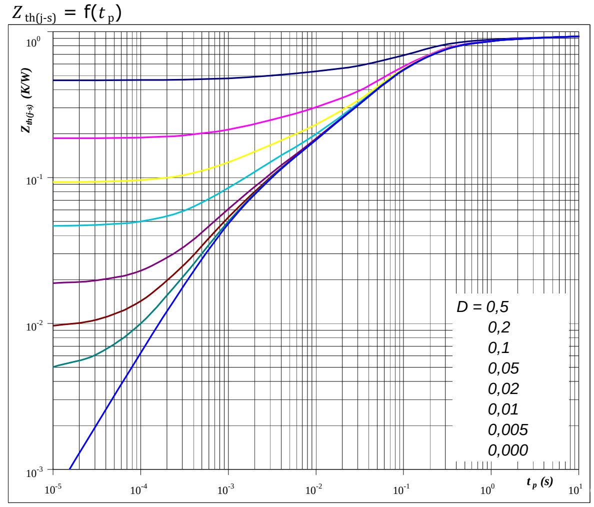
IGBT thermal model values

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

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



At

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

FWD thermal model values

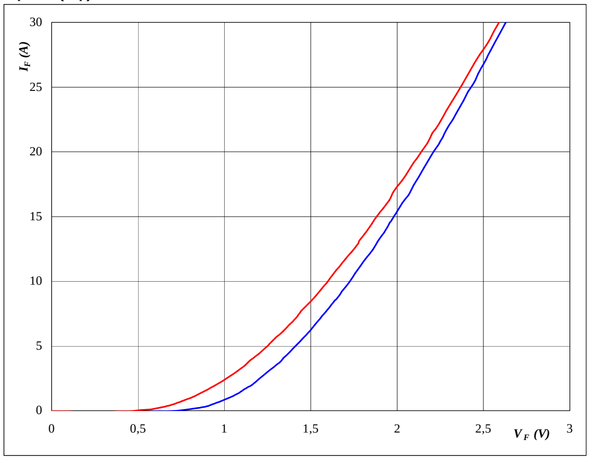
R (K/W)	Tau (s)
6,93E-02	3,04E+00
1,64E-01	4,75E-01
5,02E-01	9,73E-02
8,20E-02	2,48E-02
6,58E-02	4,90E-03
4,43E-02	1,04E-03

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

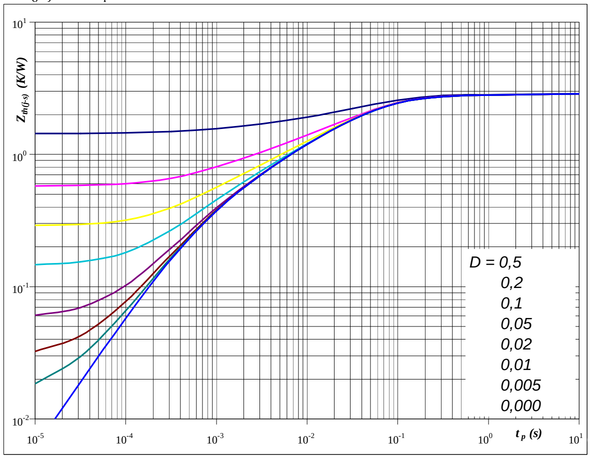
T_j = 25/125 °C

t_p = 250 μs

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

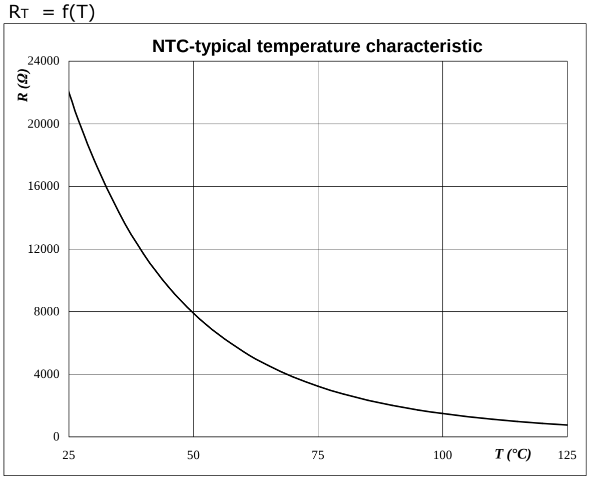
$R_{th(j-s)}$ = 2,87 K/W

Thermistor

figure 23. **NTC**

Typical NTC characteristic as a function of temperature

$R_T = f(T)$



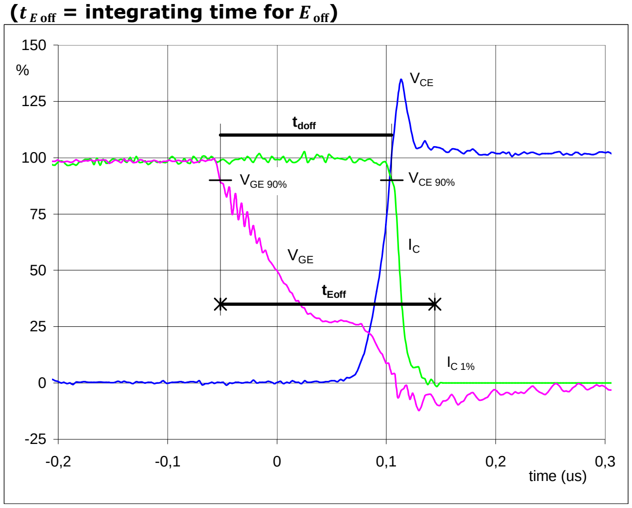
Switching Definitions

General conditions

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

figure 1. **T2, T4**

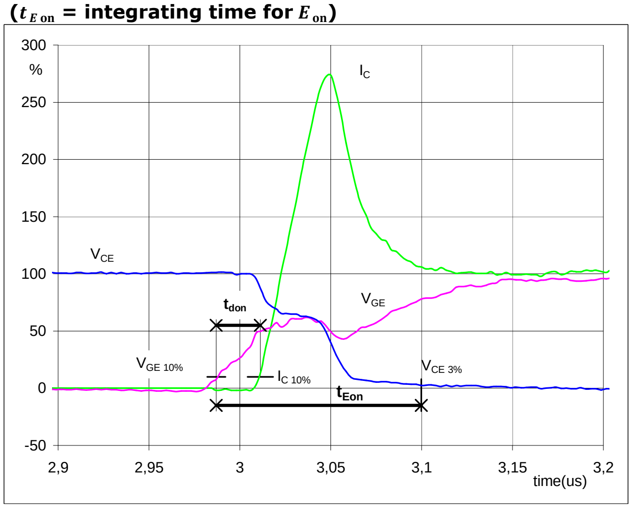
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff}
($t_{E\,off}$ = integrating time for E_{off})



V_{GE} (0%) =	0	V
V_{GE} (100%) =	15	V
V_C (100%) =	350	V
I_C (100%) =	75	A
t_{doff} =	0,16	μs
$t_{E\,off}$ =	0,20	μs

figure 2. **T2, T4**

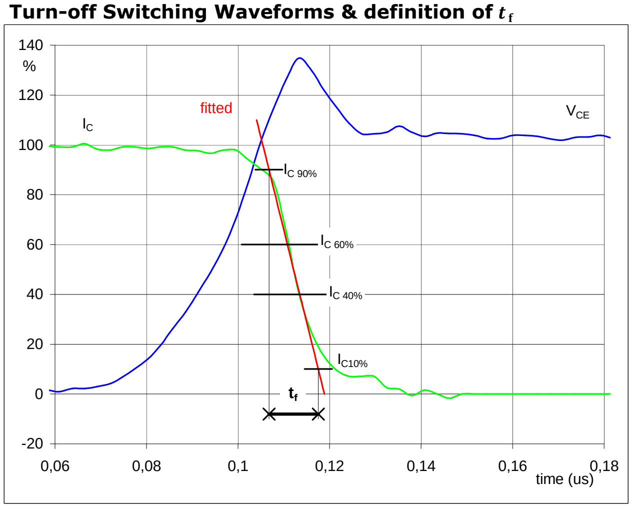
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon}
($t_{E\,on}$ = integrating time for E_{on})



V_{GE} (0%) =	0	V
V_{GE} (100%) =	15	V
V_C (100%) =	350	V
I_C (100%) =	75	A
t_{don} =	0,02	μs
$t_{E\,on}$ =	0,11	μs

figure 3. **T2, T4**

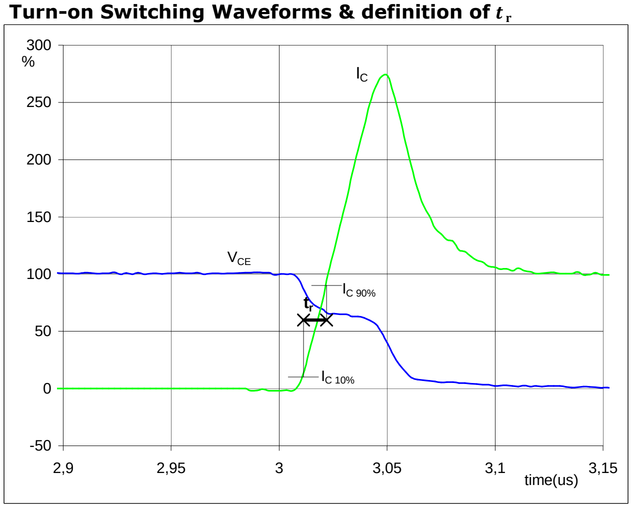
Turn-off Switching Waveforms & definition of t_f



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

figure 4. **T2, T4**

Turn-on Switching Waveforms & definition of t_r

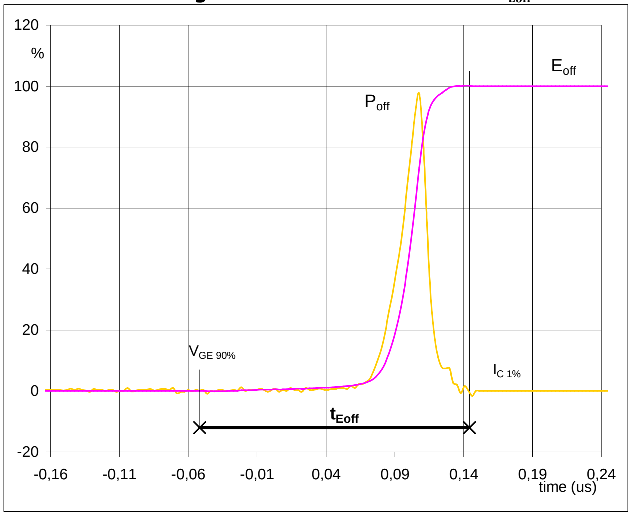


V_C (100%) =	350	V
I_C (100%) =	75	A
t_r =	0,011	μs

Switching Definitions

figure 5. **T2, T4**

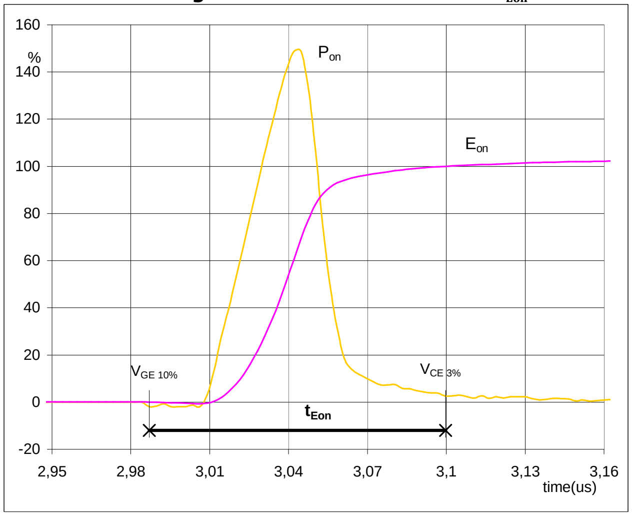
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) = 26,25 kW
E_{off} (100%) = 0,56 mJ
$t_{E\,off}$ = 0,20 µs

figure 6. **T2, T4**

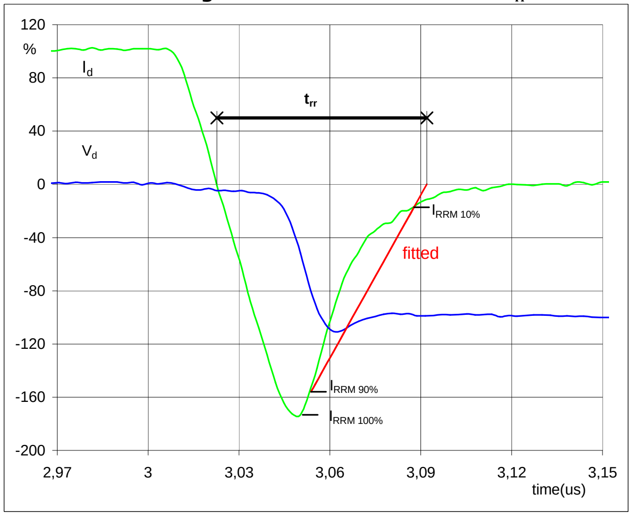
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) = 26,25 kW
E_{on} (100%) = 1,16 mJ
$t_{E\,on}$ = 0,11 µs

figure 7. **D1, D2**

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

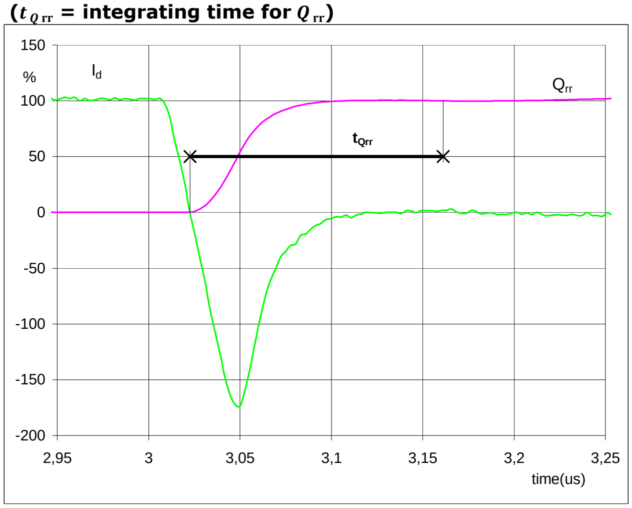


V_d (100%) = 350 V
I_d (100%) = 75 A
I_{RRM} (100%) = -121 A
t_{rr} = 0,07 µs

Switching Definitions

figure 8. **D1, D2**

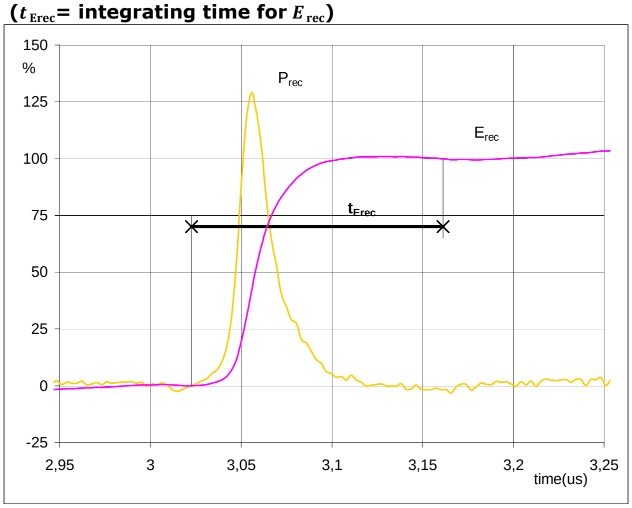
Turn-on Switching Waveforms & definition of t_{Qrr}
($t_{Q\,rr}$ = integrating time for Q_{rr})



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

figure 9. **D1, D2**

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



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

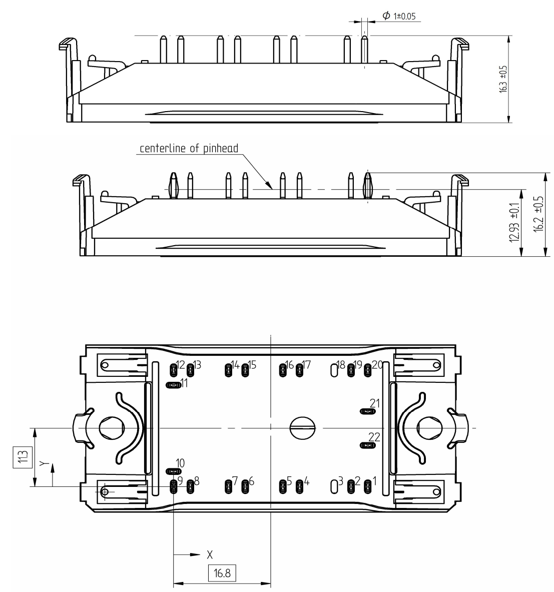
Ordering Code & Marking

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

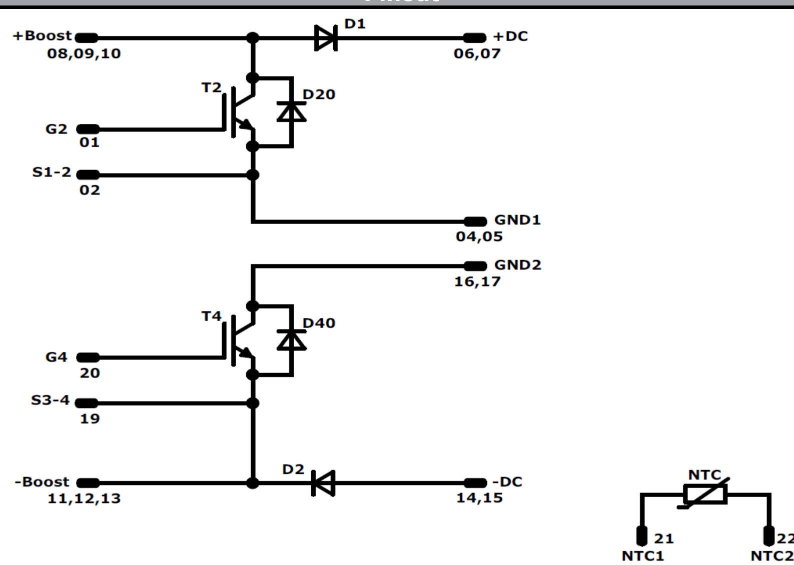
Text	Name		Date code	UL & VIN	Lot	Serial
	NN-NNNNNNNNNNNNNN-TTTTTTVV		WWYY	UL VIN	LLLLL	SSSS
Datamatrix	Type&Ver	Lot number	Serial	Date code		
	TTTTTTTVV	LLLLL	SSSS	WWYY		

Outline

Pin	X	Y	Function
Pin table [mm]			
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



Pinout



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