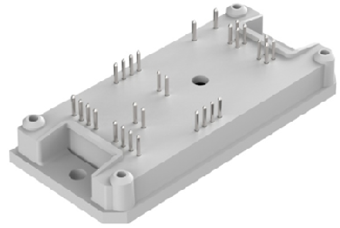
10-FY07NBA225S502-M507L98
datasheet

_flow_BOOST 1 symmetric — **650 V / 225 A**

Features

- High efficient and compact symmetric booster
- High switching frequency and low inductive design
- Low losses with TRENCHSTOP™ 5 IGBT
- Integrated temperature sensor

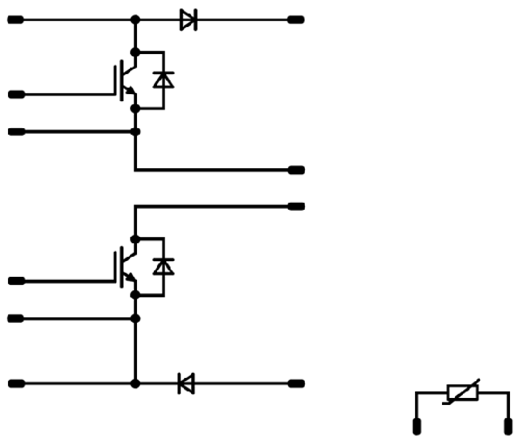
flow 1 12 mm housing



Target applications

- Power Supply
- Solar Inverters

Schematic



Types

- 10-FY07NBA225S502-M507L98

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	147	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		675	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	197	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	145	A
Repetitive peak forward current	I_{FRM}			450	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	178	W
Maximum junction temperature	T_{jmax}			175	°C
Boost Sw. Protection Diode					
Peak Repetitive Reverse Voltage	V_{RRM}			650	V
Continuous (direct) forward current	I_F			30	A
Repetitive peak forward current	I_{FRM}			60	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	6000	V
		AC Voltage	t_p = 1 min	2500	V
Creepage distance				min. 12,7	mm
Clearance				8,44	mm
Comparative Tracking Index	CTI			> 200	

*100 % tested in production

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	
Boost Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,00225	25	3,2	4	4,8	V
Collector-emitter saturation voltage	V_{CEsat}		15		225	25 125 150		1,43 1,52 1,55	1,75	V
Collector-emitter cut-off current	I_{CES}		0	650		25			150	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		13500		pF
Output capacitance	C_{oes}							390		
Reverse transfer capacitance	C_{res}							51		
Gate charge	Q_g		15	520	225	25		492		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,48		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{goff} = 2 Ω R_{gon} = 2 Ω	15/0	350	226	25 125 150		43 42 43		ns
Rise time	t_r					25 125 150		40 39 40		
Turn-off delay time	$t_{d(off)}$					25 125 150		178 198 203		
Fall time	t_f					25 125 150		29 33 40		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 5 µC Q_{rFWD} = 10,9 µC Q_{rFWD} = 12,9 µC				25 125 150		3,357 3,931 3,864		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		3,402 4,373 4,868		

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	
Boost Diode										
Static										
Forward voltage	V_F				225	25 125		1,53 1,49	1,92	V
Reverse leakage current	I_R			650		25			11,4	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,53		K/W
Dynamic										
Peak recovery current	I_{RRM}					25 125 150		110 178 194		A
Reverse recovery time	t_{rr}					25 125 150		65 91 103		ns
Recovered charge	Q_r	di/dt = 4532 A/µs di/dt = 5576 A/µs di/dt = 5500 A/µs	15/0	350	226	25 125 150		5,047 10,868 12,852		µC
Reverse recovered energy	E_{rec}					25 125 150		1,109 2,571 3,270		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		4953 4124 3409		A/µs
Boost Sw. Protection 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	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,80		K/W

Characteristic Values

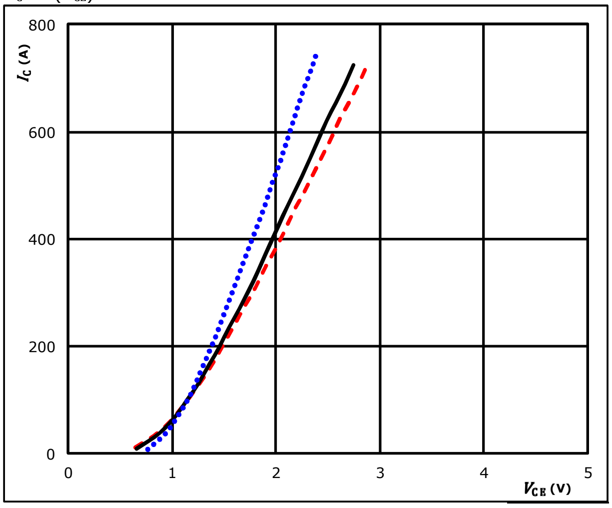
Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Thermistor										
Rated resistance	R					25		22		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	R_{100} = 1484 Ω				100	-5		5	%
Power dissipation	P					25		5		mW
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

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

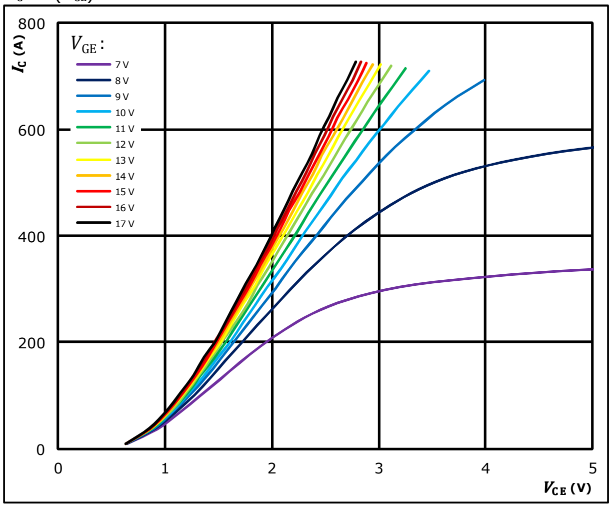


t_p =	250	µs		25 °C	dotted
V_{GE} =	15	V	T_j:	125 °C	solid
				150 °C	dashed

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

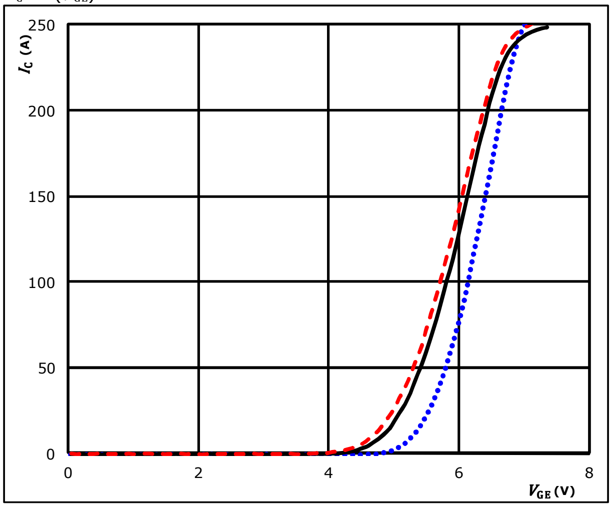


t_p =	250	µs
T_j =	150	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

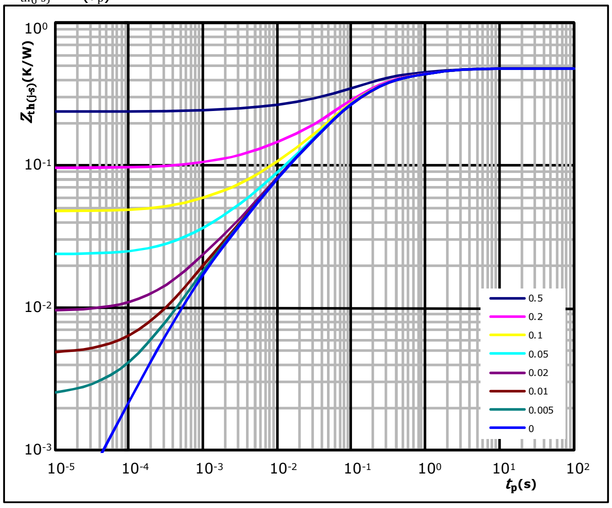


t_p =	100	µs		25 °C	dotted
V_{CE} =	10	V	T_j:	125 °C	solid
				150 °C	dashed

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D = t_p / T

$R_{th(j-s)}$ = 0,48 K/W

IGBT thermal model values

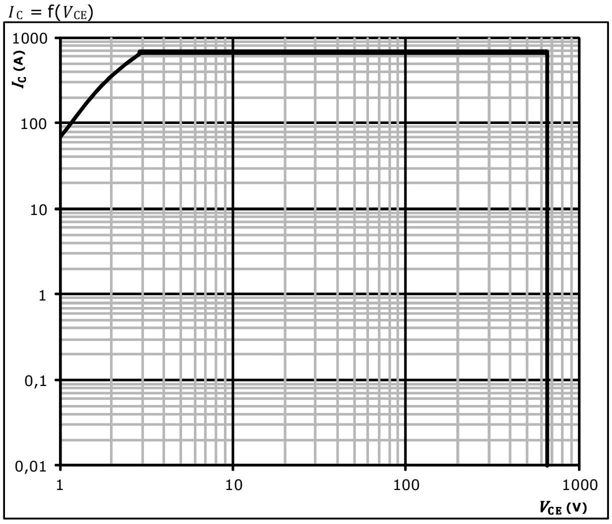
R (K/W)	τ (s)
7,81E-02	1,39E+00
1,59E-01	2,02E-01
1,84E-01	6,55E-02
4,95E-02	8,05E-03
1,20E-02	9,13E-04

Boost Switch Characteristics

figure 5. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



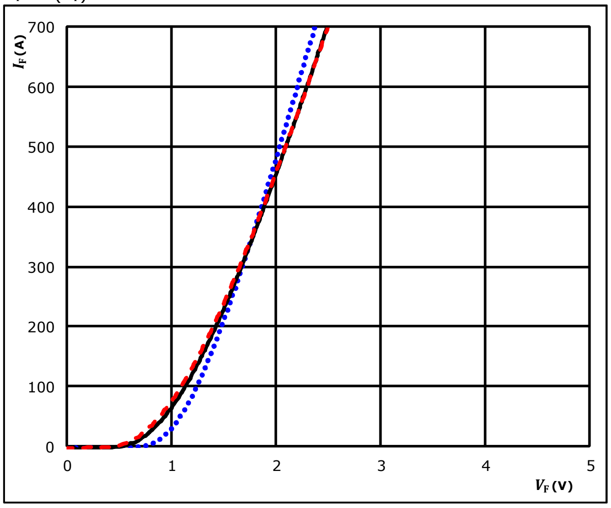
D =	single pulse	
T_s =	80	ºC
V_{GE} =	±15	V
T_j =	T_{jmax}	

Boost Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



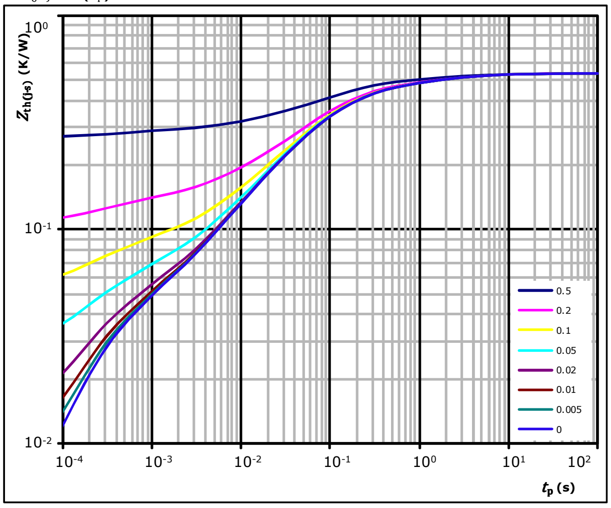
t_p = 250 µs

T_j: 25 °C (dotted blue); 125 °C (solid black); 150 °C (dashed red)

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j\text{-}s)}$ = 0,53 K/W

FWD thermal model values

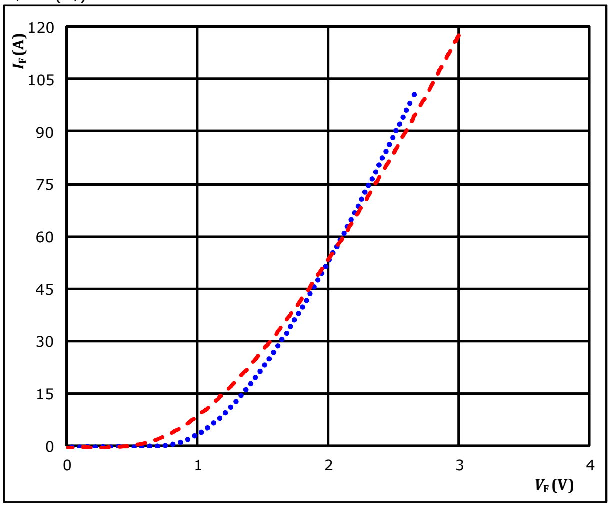
R (K/W)	τ (s)
2,95E-02	6,11E+00
6,80E-02	1,06E+00
1,21E-01	1,89E-01
1,90E-01	5,96E-02
7,57E-02	1,12E-02
1,82E-02	2,22E-03
3,27E-02	2,71E-04

Boost Sw. Protection Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



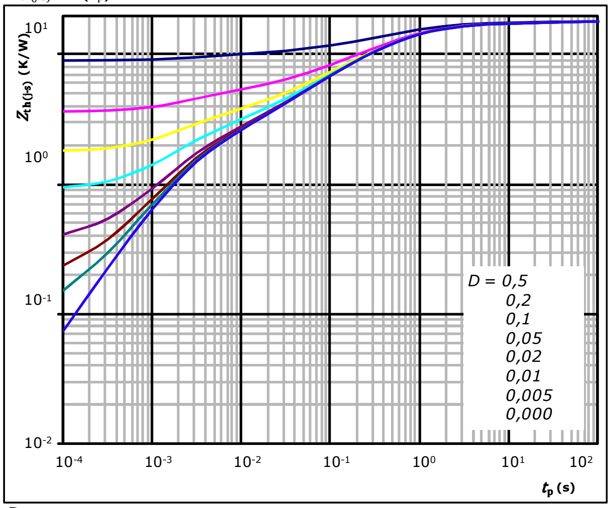
t_p = 250 µs

T_j: 25 °C (dotted), 150 °C (dashed)

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

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

FWD thermal model values

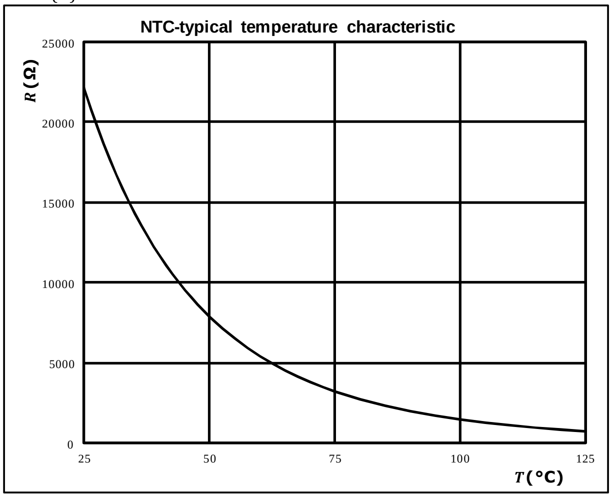
R (K/W)	τ (s)
5,88E-02	5,09E+00
1,26E-01	6,40E-01
5,91E-01	8,94E-02
5,13E-01	2,64E-02
2,57E-01	6,46E-03
1,01E-01	1,53E-03

Thermistor Characteristics

figure 1.	Thermistor

Typical NTC characteristic as a function of temperature

$R = f(T)$

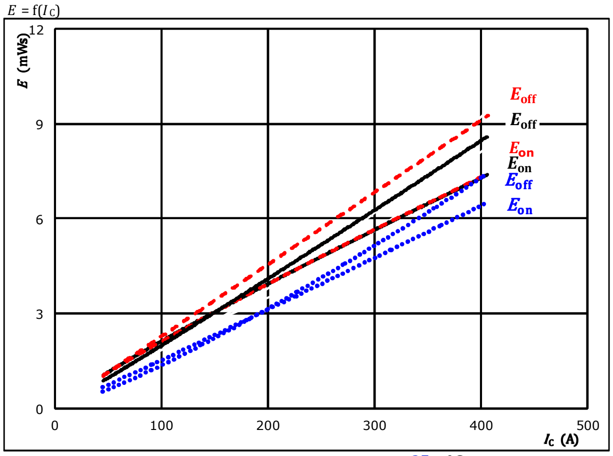


Boost Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



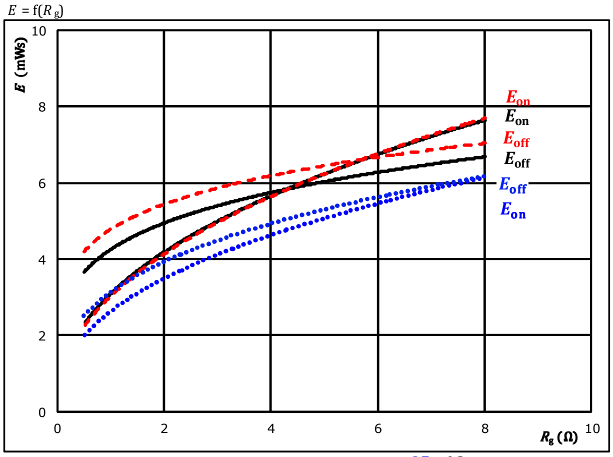
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	···········
V_{GE} =	15/0	V		125 °C	———
R_{gon} =	2	Ω		150 °C	– – –
R_{goff} =	2	Ω			

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



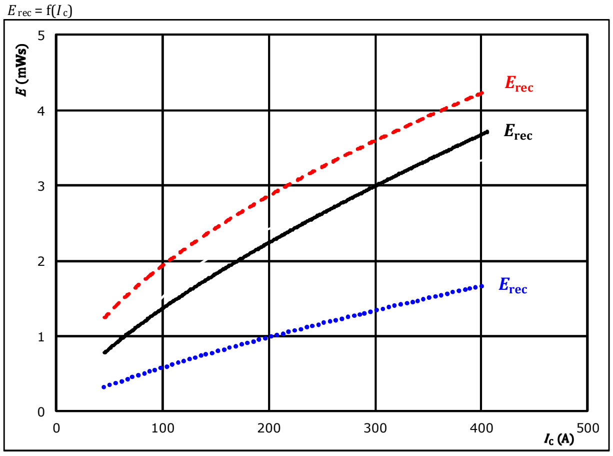
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	···········
V_{GE} =	15/0	V		125 °C	———
I_C =	226	A		150 °C	– – –

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



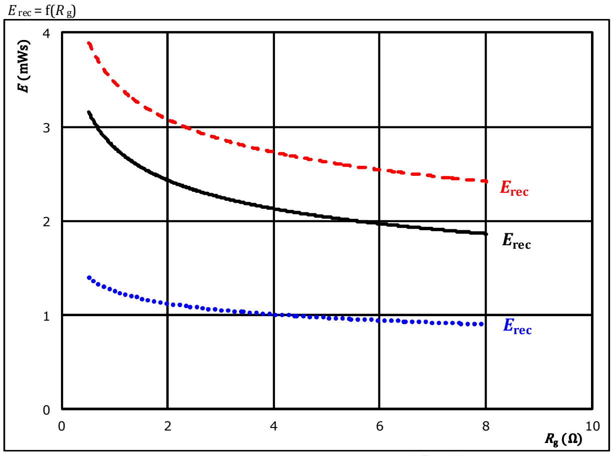
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	···········
V_{GE} =	15/0	V		125 °C	———
R_{gon} =	2	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

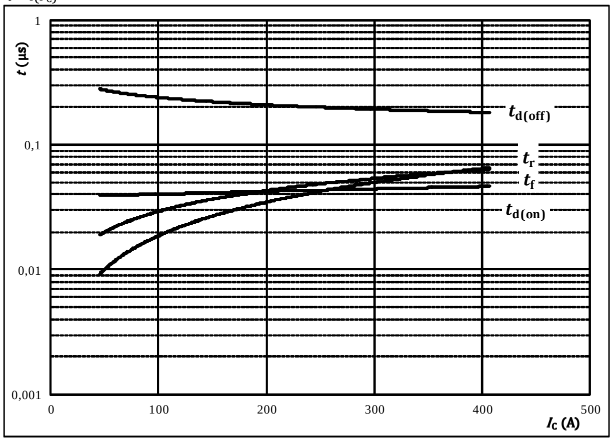
V_{CE} =	350	V	T_j:	25 °C	···········
V_{GE} =	15/0	V		125 °C	———
I_C =	226	A		150 °C	– – –

Boost Switching Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$t = f(I_C)$



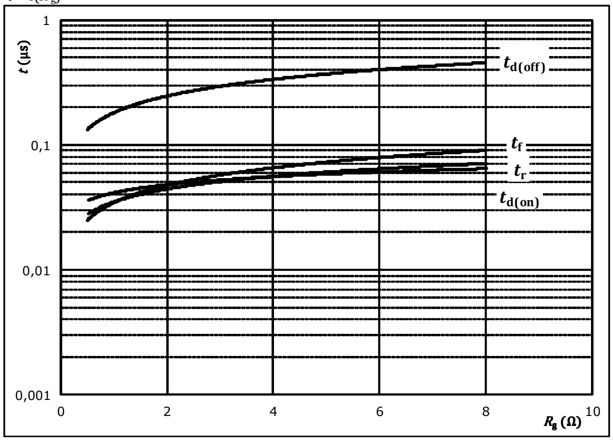
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	15/0	V
R_{gon} =	2	Ω
R_{goff} =	2	Ω

figure 6. IGBT

Typical switching times as a function of gate resistor

$t = f(R_g)$



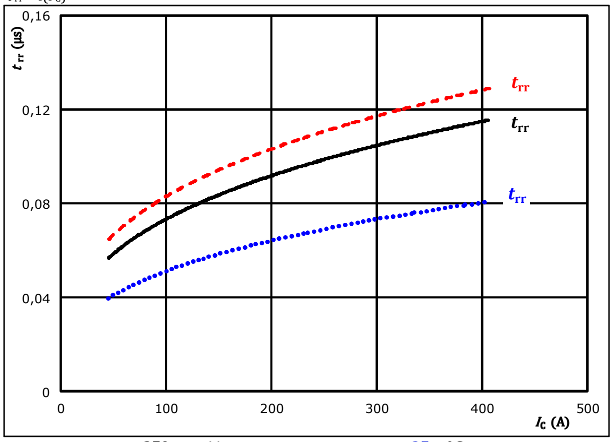
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	15/0	V
I_C =	226	A

figure 7. FWD

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

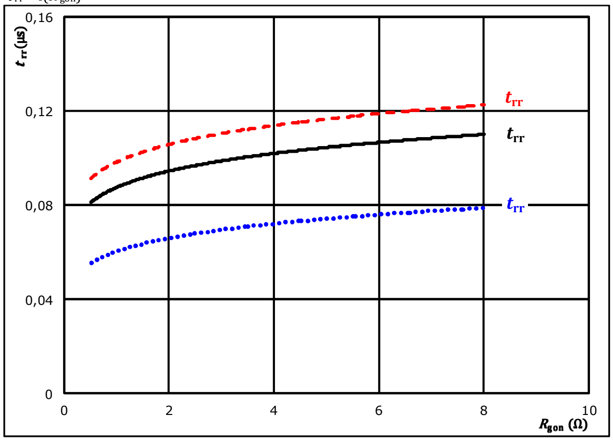


At					
V_{CE} =	350	V		25 °C	··········
V_{GE} =	15/0	V	T_j:	125 °C	———
R_{gon} =	2	Ω		150 °C	– – –

figure 8. FWD

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

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



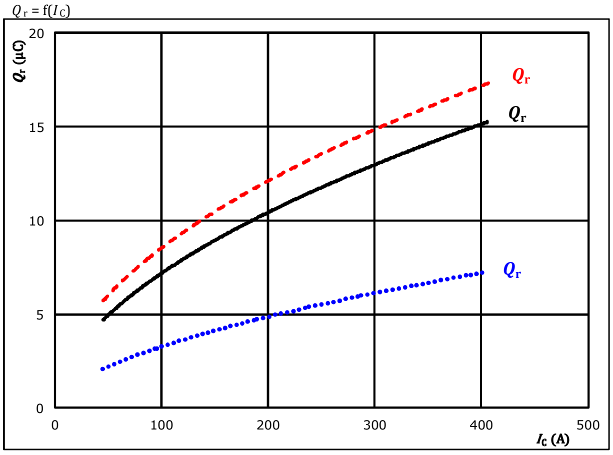
At					
V_{CE} =	350	V		25 °C	··········
V_{GE} =	15/0	V	T_j:	125 °C	———
I_C =	226	A		150 °C	– – –

Boost Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

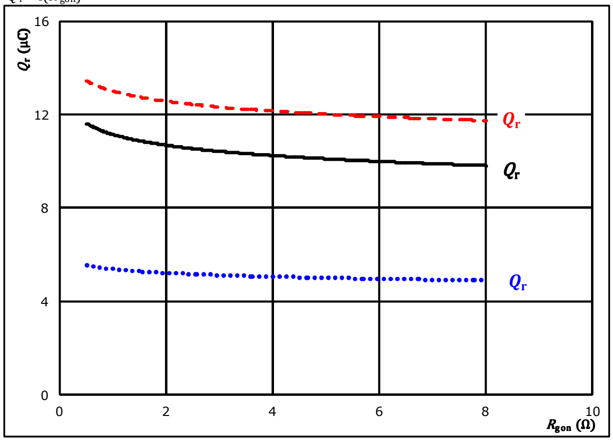


At	V_{CE} =	350	V		25 °C	··············
	V_{GE} =	15/0	V	T_j:	125 °C	————
	R_{gon} =	2	Ω		150 °C	– – – –

figure 10. FWD

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

$Q_r = f(R_{gon})$

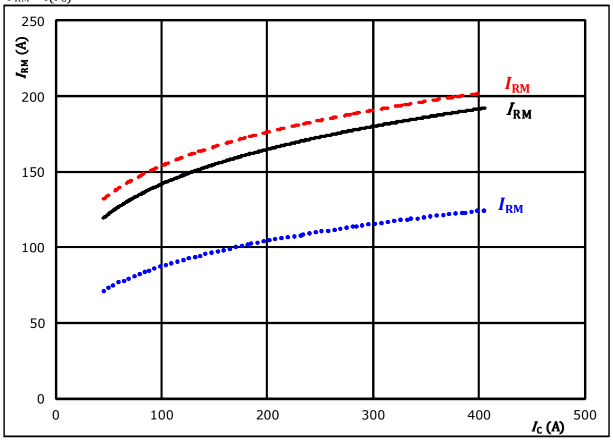


At	V_{CE}=	350	V		25 °C	··············
	V_{GE} =	15/0	V	T_j:	125 °C	————
	I_C=	226	A		150 °C	– – – –

figure 11. FWD

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

$I_{RM} = f(I_C)$

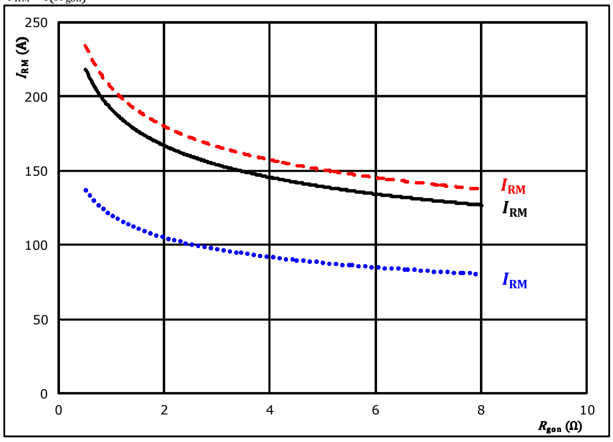


At	V_{CE}:	350	V		25 °C	··············
	V_{GE} =	15/0	V	T_j:	125 °C	————
	R_{gon} =	2	Ω		150 °C	– – – –

figure 12. FWD

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

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



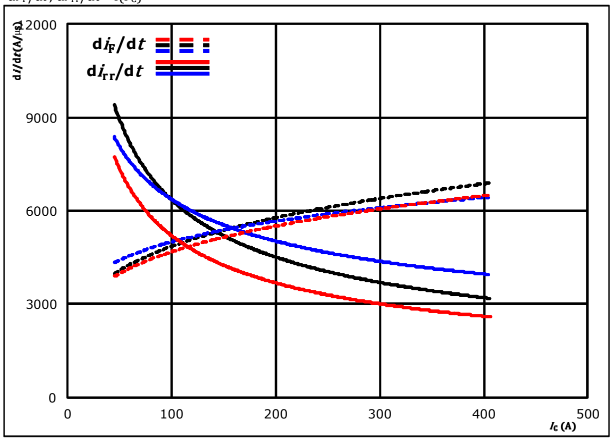
At	V_{CE} =	350	V		25 °C	··············
	V_{GE} =	15/0	V	T_j:	125 °C	————
	I_C =	226	A		150 °C	– – – –

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

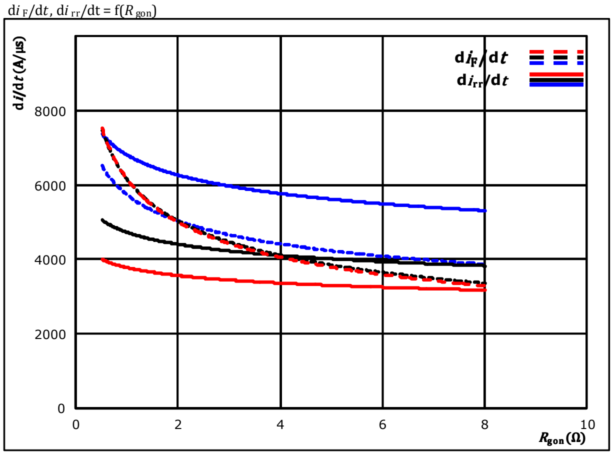


At					
V_{CE} =	350	V	T_j:	25 °C	•••••••••••••
V_{GE} =	15/0	V		125 °C	———
R_{gon} =	2	Ω		150 °C	– – – –

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, $di_{rr}/dt = f(R_{gon})$

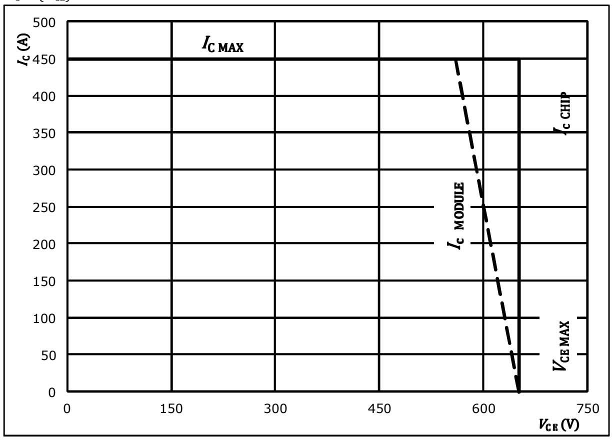


At					
V_{CE} =	350	V	T_j:	25 °C	•••••••••••••
V_{GE} =	15/0	V		125 °C	———
I_C=	226	A		150 °C	– – – –

figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At		
T_j =	175	°C
R_{gon} =	2	Ω
R_{goff} =	2	Ω

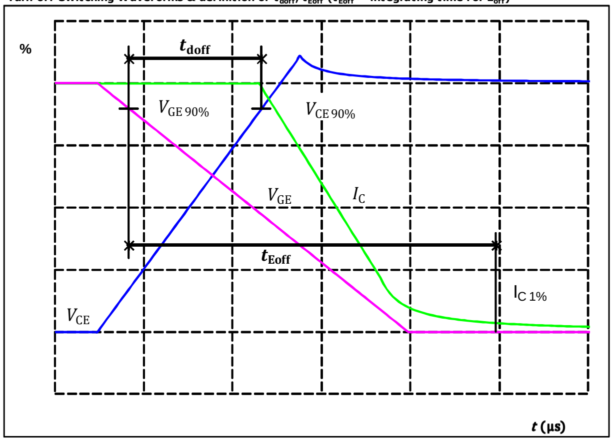
Boost Switching Definitions

General conditions

T_j	=	125 °C
R_{gon}	=	2 Ω
R_{goff}	=	2 Ω

figure 1. **IGBT**

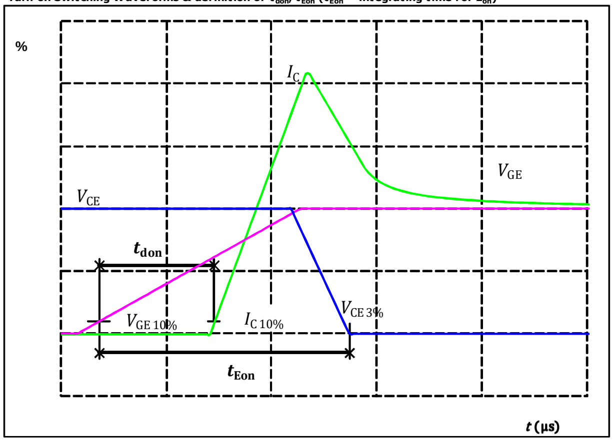
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%)$ =	0	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	226	A
t_{doff} =	198	ns

figure 2. **IGBT**

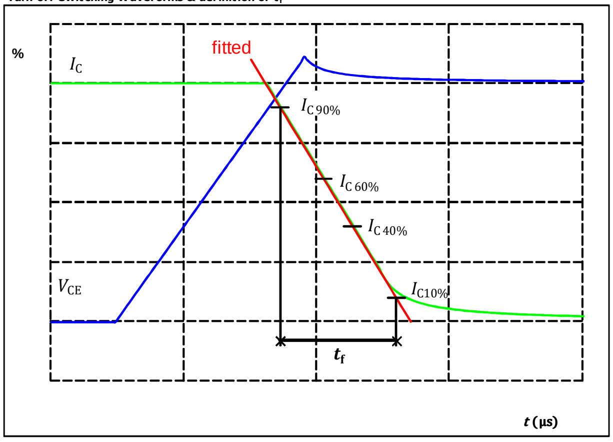
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%)$ =	0	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	226	A
t_{don} =	42	ns

figure 3. **IGBT**

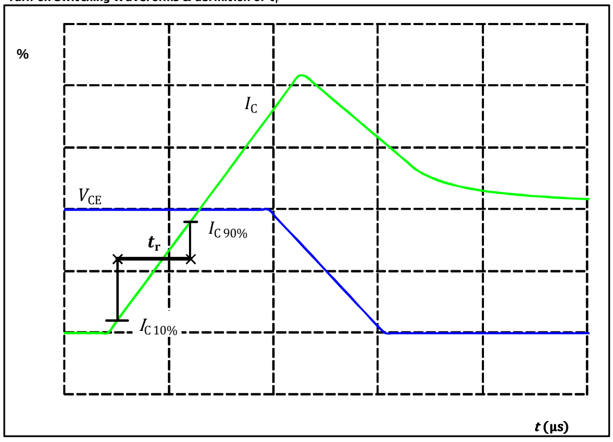
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	226	A
t_f =	33	ns

figure 4. **IGBT**

Turn-on Switching Waveforms & definition of t_r

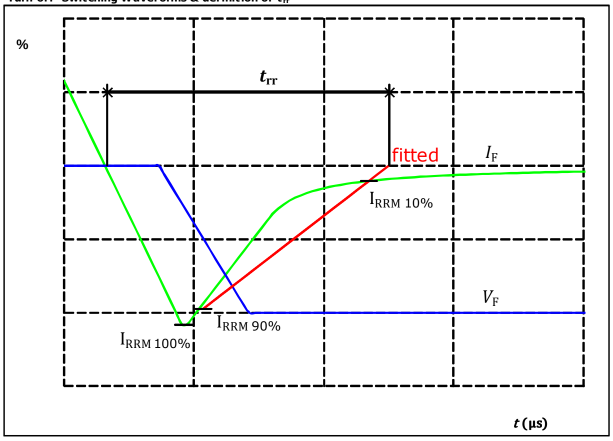


$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	226	A
t_r =	39	ns

Boost Switching Characteristics

figure 5.	FWD

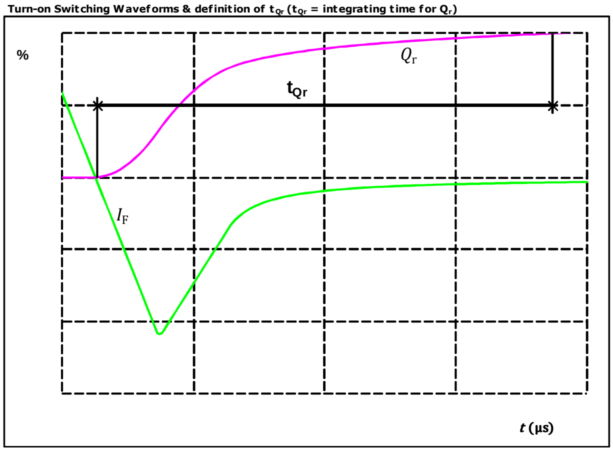
Turn-off Switching Waveforms & definition of t_{rr}



V_F (100%) =	350	V
I_F (100%) =	226	A
I_{RRM} (100%) =	178	A
t_{rr} =	91	ns

figure 6.	FWD

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



I_F (100%) =	226	A
Q_r (100%) =	10,87	µC

Ordering Code & Marking

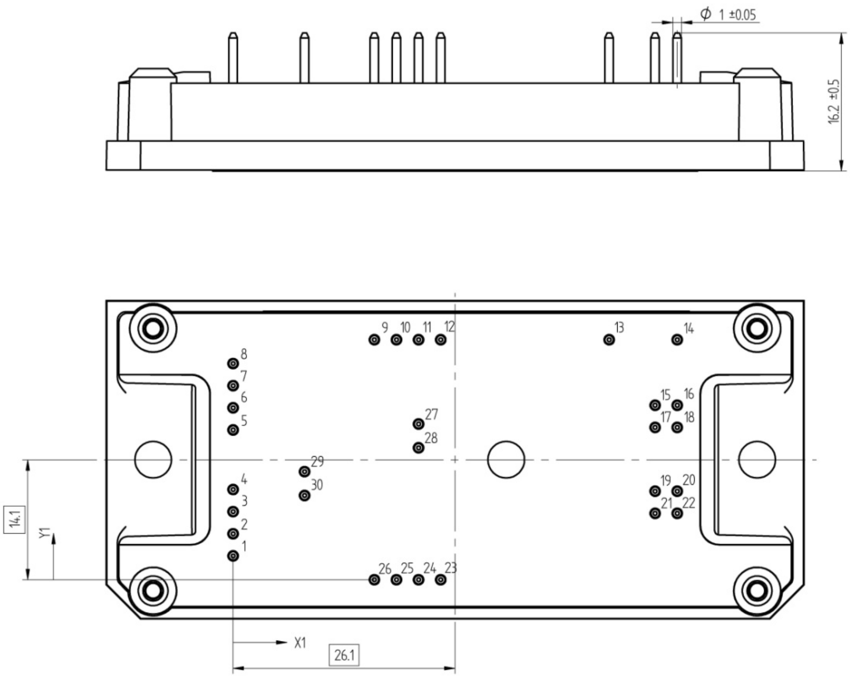
Version	Ordering Code
without thermal paste 12 mm housing with solder pins	10-FY07NBA225S502-M507L98

	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

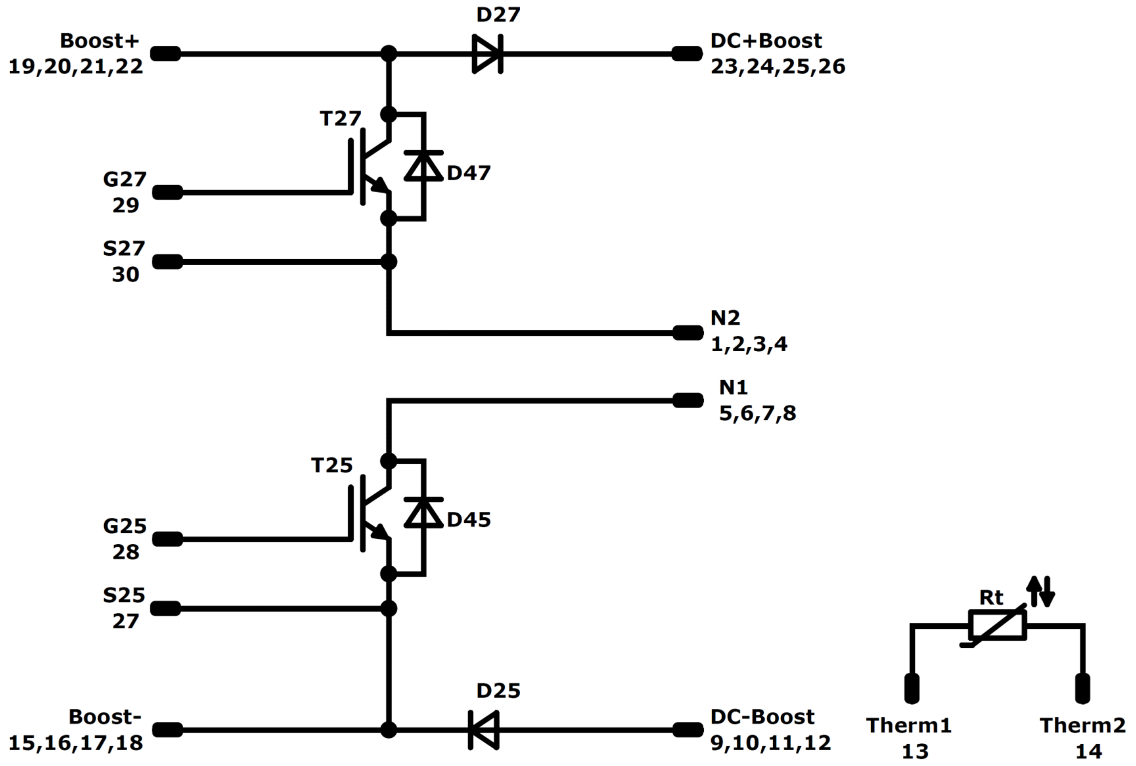
Pin table

Pin	X	Y	Function
1	0	2,8	N2
2	0	5,4	N2
3	0	8	N2
4	0	10,6	N2
5	0	17,6	N1
6	0	20,2	N1
7	0	22,8	N1
8	0	25,4	N1
9	16,6	28,2	DC-Boost
10	19,2	28,2	DC-Boost
11	21,8	28,2	DC-Boost
12	24,4	28,2	DC-Boost
13	44,2	28,2	Therm1
14	52,2	28,2	Therm2
15	49,6	20,5	Boost-
16	52,2	20,5	Boost-
17	49,6	17,9	Boost-
18	52,2	17,9	Boost-
19	49,6	10,4	Boost+
20	52,2	10,4	Boost+
21	49,6	7,8	Boost+
22	52,2	7,8	Boost+
23	24,4	0	DC+Boost
24	21,8	0	DC+Boost
25	19,2	0	DC+Boost
26	16,6	0	DC+Boost
27	21,8	18,3	S25
28	21,8	15,5	G25
29	8,4	12,7	G27
30	8,4	9,9	S27



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
T25, T27	IGBT	650 V	225 A	Boost Switch	
D25, D27	FWD	650 V	225 A	Boost Diode	
D45, D47	FWD	650 V	30 A	Boost Sw. Protection Diode	
Rt	NTC			Thermistor	

Packaging instruction				
Standard packaging quantity (SPQ) 100	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for *flow* 1 packages see vincotech.com website.

Package data
Package data for *flow* 1 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-FY07NBA225S502-M507L98-D1-14	24 Jan. 2018		

单击下面可查看定价，库存，交付和生命周期等信息

[>>Vincotech(威科)]