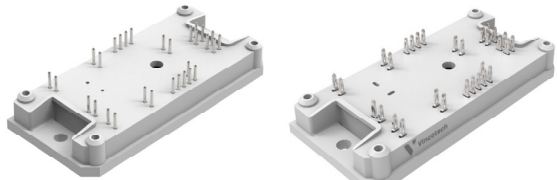
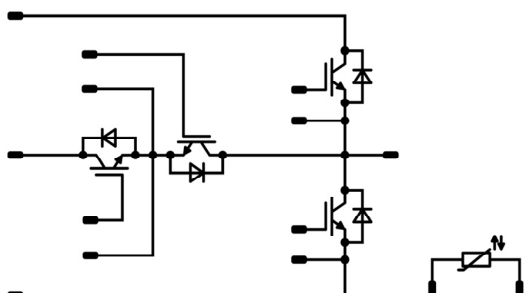




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datasheet

flow MNPC 1		650 V / 150 A
<div>Features</div> <ul style="list-style-type: none">• Special for 110V AC• 4 quadrant operation <div>Target applications</div> <ul style="list-style-type: none">• Solar Inverters <div>Types</div> <ul style="list-style-type: none">• 10-FY07NMA150S5-M824F58• 10-PY07NMA150S5-M824F58Y	<div>flow 1 12 mm housing</div> <div><div>with solder pins with Press-fit pins</div></div> <div>Schematic</div> <div></div>	

Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
Buck/Boost Switch				
Collector-emitter voltage	V_{CES}		650	V
Collector current	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ }^{\circ}\text{C}$	104	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	450	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ }^{\circ}\text{C}$	145	W
Gate-emitter voltage	V_{GES}		± 20	V
Maximum junction temperature	T_{jmax}		175	$^{\circ}\text{C}$



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datasheet

Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
Buck/Boost Diode				
Peak Repetitive Reverse Voltage	V_{RRM}		650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	101	A
Repetitive peak forward current	I_{FRM}		300	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	127	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* $t_p = 2\text{ s}$	6000	V
		AC Voltage $t_p = 1\text{ min}$	2500	V
Creepage distance		with press-fit pins	min. 12,7	mm
		with solder pins	min. 12,7	mm
Clearance		with press-fit pins	7,2	mm
		with solder pins	7,48	mm
Comparative Tracking Index	CTI		> 200	

*100 % tested in production



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 datasheet

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	

Buck/Boost Switch

Static

Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,0015	25	3,2	4	4,8	V
Collector-emitter saturation voltage	V_{CEsat}		15		150	25 125 150		1,43 1,52 1,55	1,75	V
Collector-emitter cut-off current	I_{CES}		0	650		25			100	μA
Gate-emitter leakage current	I_{GES}		20	0		25			200	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}	$f = 1 \text{ MHz}$	0	25	25			9000		pF
Output capacitance	C_{oes}							260		
Reverse transfer capacitance	C_{res}							34		
Gate charge	Q_g		15	520	150	25		328		nC

Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material $\lambda = 3,4 \text{ W/mK}$						0,65		K/W
-------------------------------------	---------------	---	--	--	--	--	--	------	--	-----

Dynamic

Turn-on delay time	$t_{d(on)}$	$R_{goff} = 8 \Omega$ $R_{gon} = 8 \Omega$	± 15	150	152	25 125 150		160 158 158		ns
Rise time	t_r					25 125 150		61 61 63		
Turn-off delay time	$t_{d(off)}$					25 125 150		132 137 145		
Fall time	t_f					25 125 150		29 30 37		
Turn-on energy (per pulse)	E_{on}	$Q_{tFWD} = 3,8 \mu\text{C}$ $Q_{tFWD} = 7,7 \mu\text{C}$ $Q_{tFWD} = 9 \mu\text{C}$				25 125 150		0,741 0,767 0,948		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,898 1,368 1,512		



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 datasheet

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	

Buck/Boost Diode

Static

Forward voltage	V_F				150	25 125 150		1,56 1,50 1,48	1,92	V
Reverse leakage current	I_r			650		25			7,6	µA

Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material $\lambda = 3,4$ W/mK						0,75		K/W
-------------------------------------	---------------	---	--	--	--	--	--	------	--	-----

Dynamic

Peak recovery current	I_{RRM}	$di/dt = 1547$ A/µs $di/dt = 2604$ A/µs $di/dt = 2356$ A/µs	±15	150	152	25 125 150		47 78 83		A
Reverse recovery time	t_{rr}					25 125 150		132 182 210		ns
Recovered charge	Q_r					25 125 150		3,768 7,658 9,015		µC
Reverse recovered energy	E_{rec}					25 125 150		0,390 0,833 0,992		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 125 150		439 710 724		A/µs

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	



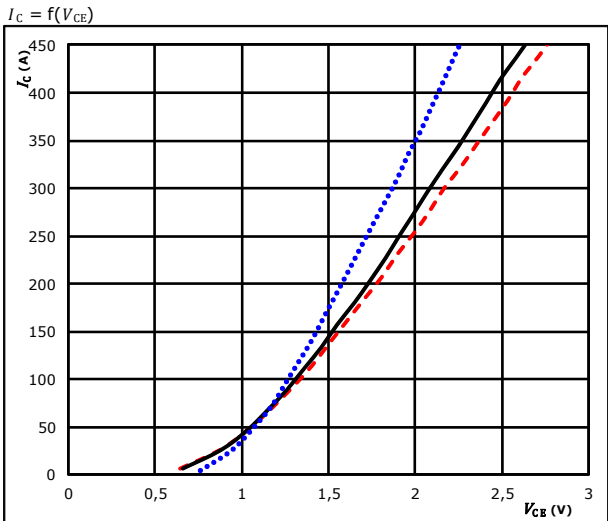
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Buck/Boost Switch Characteristics

figure 1. IGBT

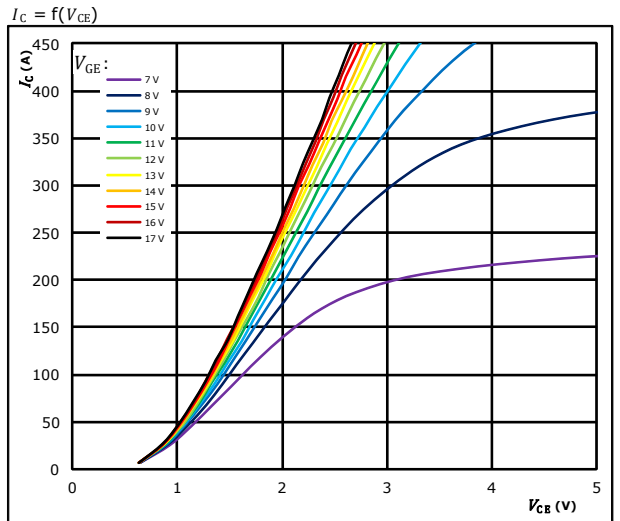
Typical output characteristics



$t_p = 250 \mu s$
 $V_{GE} = 15 V$
 $T_j: 25 \text{ } ^\circ C$ (blue dotted)
 $125 \text{ } ^\circ C$ (black solid)
 $150 \text{ } ^\circ C$ (red dashed)

figure 2. IGBT

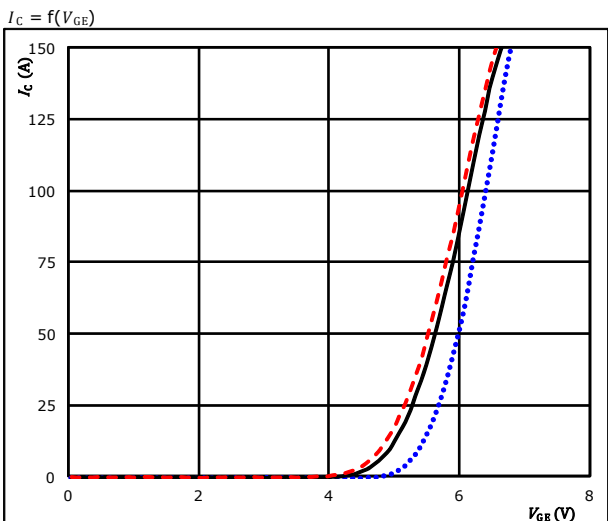
Typical output characteristics



$t_p = 250 \mu s$
 $T_j = 150 \text{ } ^\circ C$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. IGBT

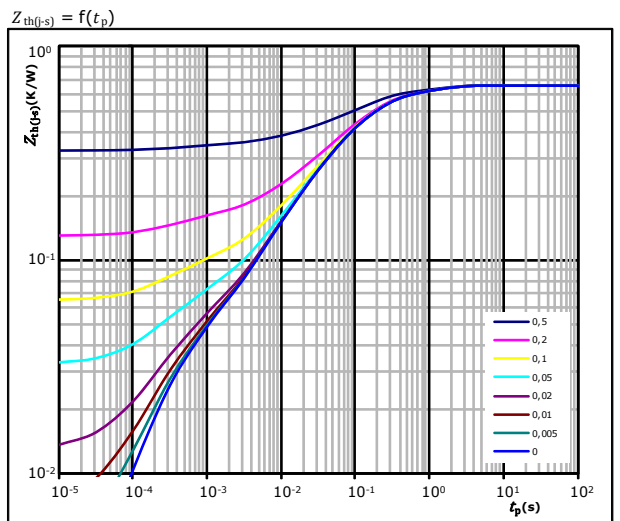
Typical transfer characteristics



$t_p = 100 \mu s$
 $V_{CE} = 10 V$
 $T_j: 25 \text{ } ^\circ C$ (blue dotted)
 $125 \text{ } ^\circ C$ (black solid)
 $150 \text{ } ^\circ C$ (red dashed)

figure 4. IGBT

Transient thermal impedance as function of pulse duration



$D = t_p / T$
 $R_{th(j-s)} = 0,65 \text{ K/W}$
IGBT thermal model values

$R \text{ (K/W)}$	$\tau \text{ (s)}$
1,13E-01	8,46E-01
2,91E-01	1,23E-01
1,38E-01	3,33E-02
6,68E-02	8,32E-03
1,32E-02	2,63E-03
3,21E-02	3,23E-04



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 datasheet

Buck/Boost Switch Characteristics

figure 5. IGBT
 Gate voltage vs gate charge

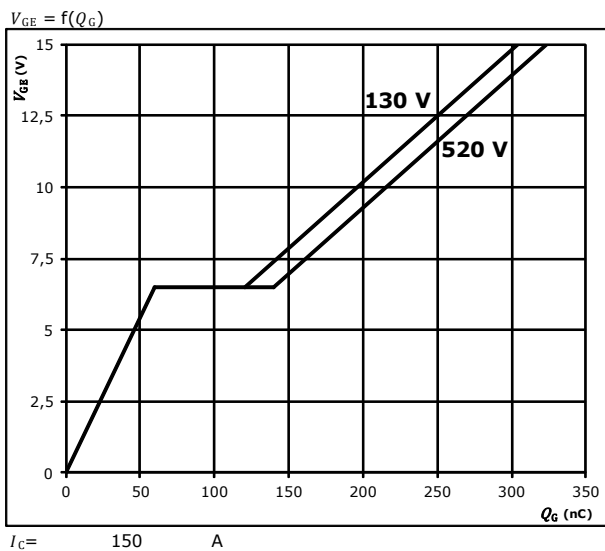
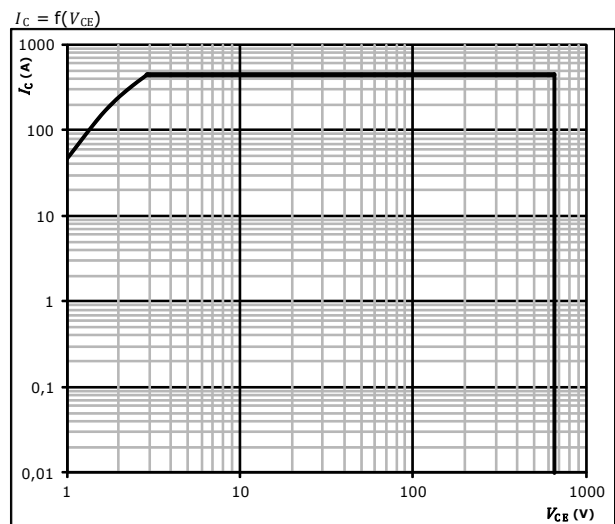


figure 6. IGBT
 Safe operating area



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

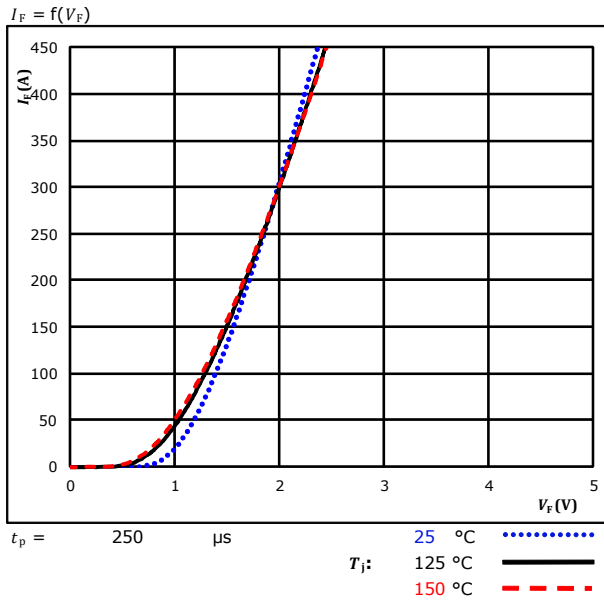


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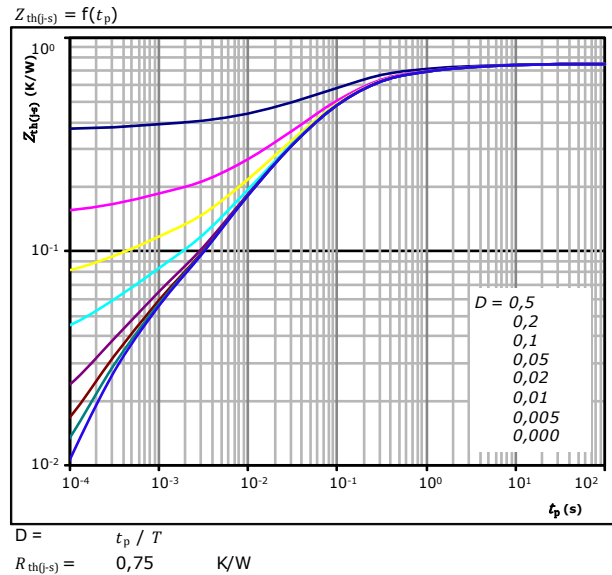
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 datasheet

Buck/Boost Diode Characteristics

Typical forward characteristics



Transient thermal impedance as a function of pulse width



FWD thermal model values

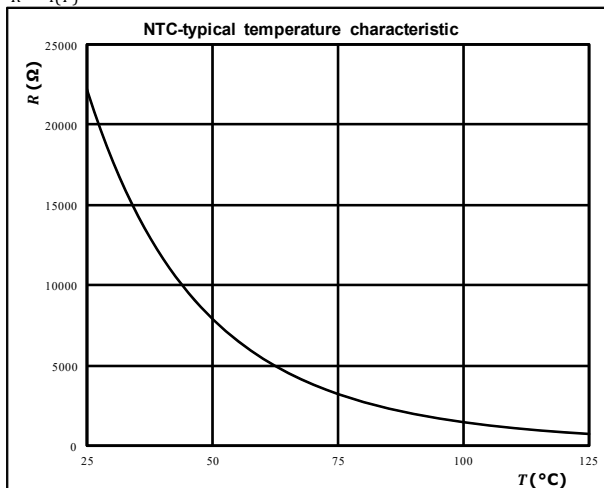
$R \text{ (K/W)}$	$\tau \text{ (s)}$
2,88E-02	7,46E+00
7,02E-02	1,27E+00
1,95E-01	2,04E-01
2,65E-01	6,33E-02
1,21E-01	1,27E-02
3,39E-02	3,05E-03

Thermistor Characteristics

figure 1. Thermistor

Typical NTC characteristic
 as a function of temperature

$R = f(T)$



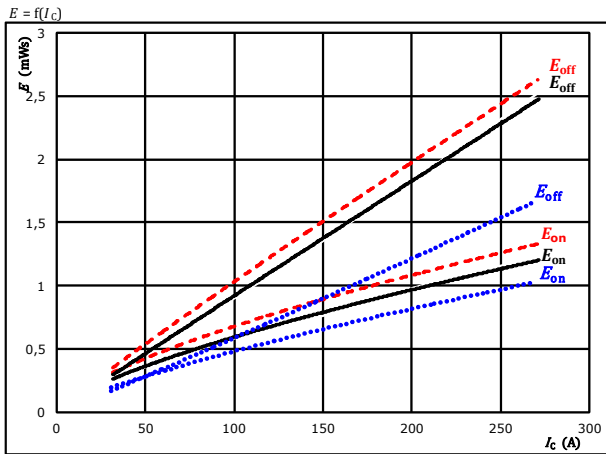


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Boost/Buck Switching Characteristics

figure 1. IGBT

Typical switching energy losses as a function of collector current



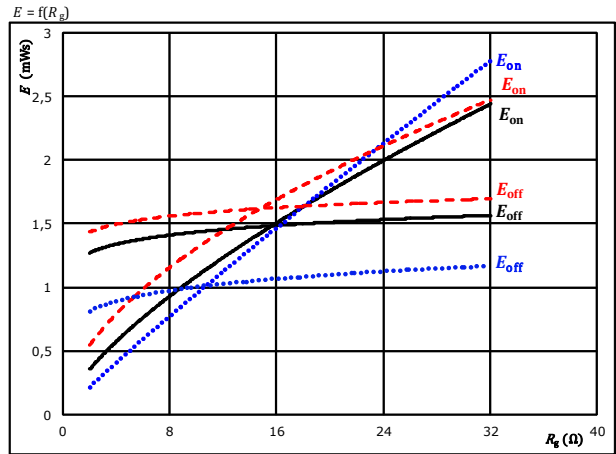
With an inductive load at

$V_{CE} = 150$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 8$ Ω
 $R_{goff} = 8$ Ω

T_j : 25 °C (dotted)
 125 °C (solid)
 150 °C (dashed)

figure 2. IGBT

Typical switching energy losses as a function of gate resistor



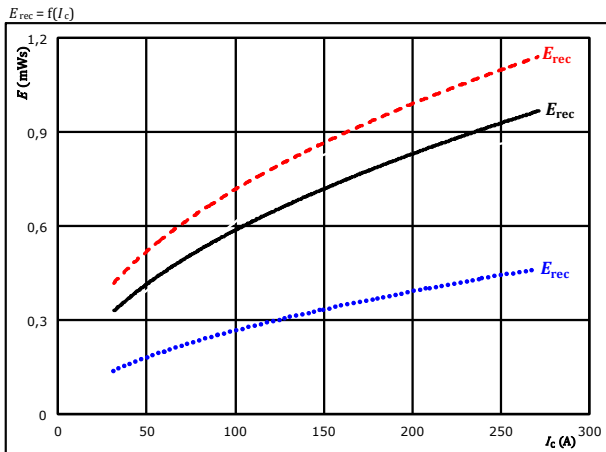
With an inductive load at

$V_{CE} = 150$ V
 $V_{GE} = \pm 15$ V
 $I_C = 152$ A

T_j : 25 °C (dotted)
 125 °C (solid)
 150 °C (dashed)

figure 3. FWD

Typical reverse recovered energy loss as a function of collector current



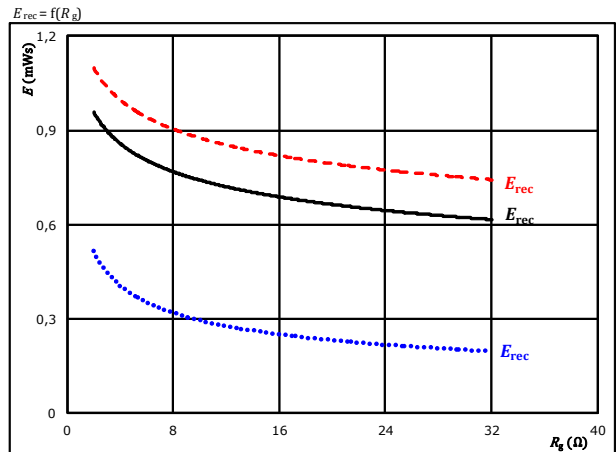
With an inductive load at

$V_{CE} = 150$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 8$ Ω

T_j : 25 °C (dotted)
 125 °C (solid)
 150 °C (dashed)

figure 4. FWD

Typical reverse recovered energy loss as a function of gate resistor



With an inductive load at

$V_{CE} = 150$ V
 $V_{GE} = \pm 15$ V
 $I_C = 152$ A

T_j : 25 °C (dotted)
 125 °C (solid)
 150 °C (dashed)



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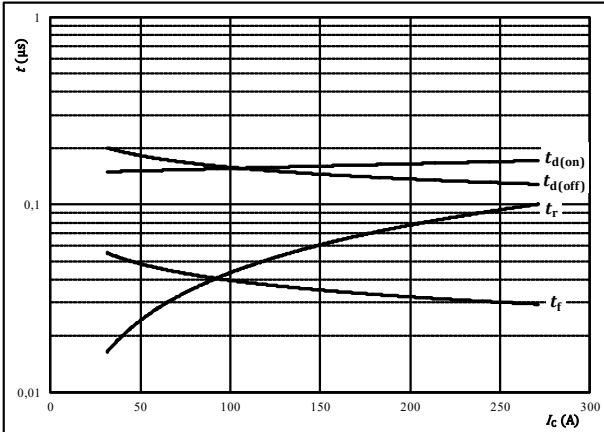
datasheet

Boost/Buck Switching Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$$t = f(I_C)$$



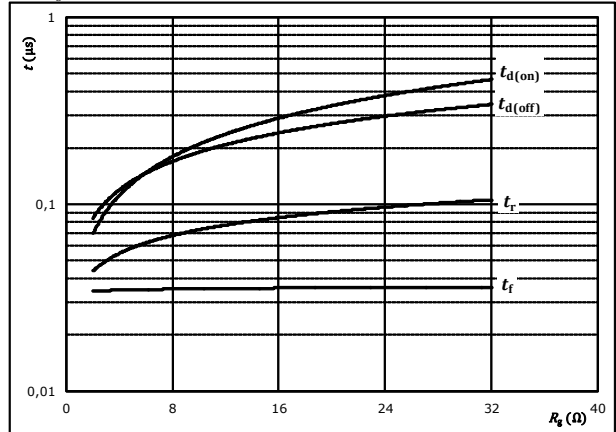
With an inductive load at

$T_j = 150$ °C
 $V_{CE} = 150$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 8$ Ω
 $R_{goff} = 8$ Ω

figure 6. IGBT

Typical switching times as a function of gate resistor

$$t = f(R_g)$$



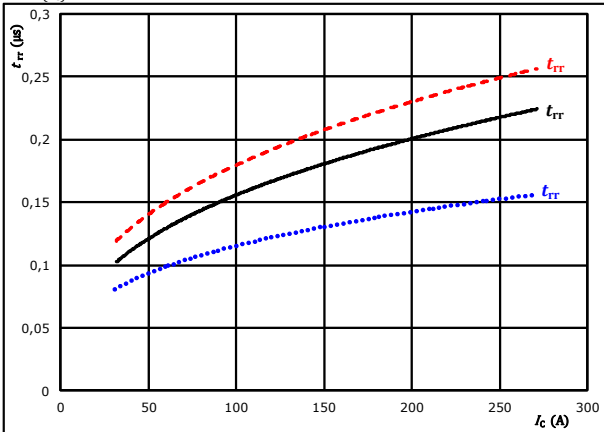
With an inductive load at

$T_j = 150$ °C
 $V_{CE} = 150$ V
 $V_{GE} = \pm 15$ V
 $I_C = 152$ A

figure 7. FWD

Typical reverse recovery time as a function of collector current

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

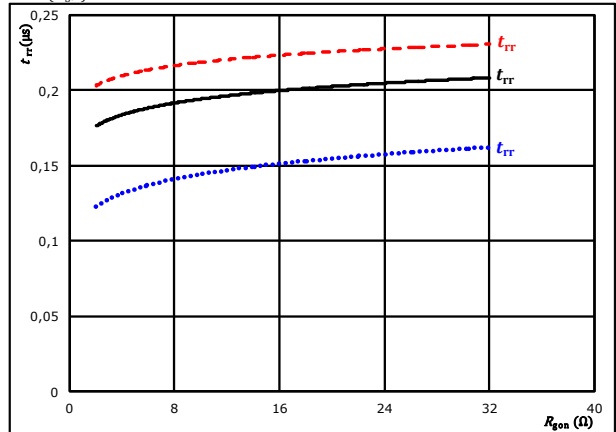


At $V_{CE} = 150$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 8$ Ω
 T_j : 25 °C
125 °C ———
150 °C - - - - -

figure 8. FWD

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

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



At $V_{CE} = 150$ V
 $V_{GE} = \pm 15$ V
 $I_C = 152$ A
 T_j : 25 °C
125 °C ———
150 °C - - - - -



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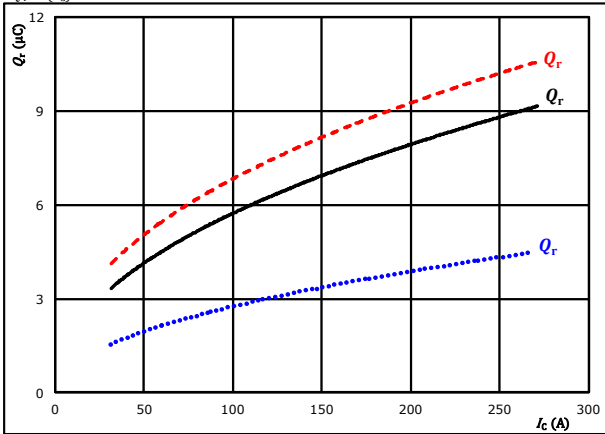
10-FY07NMA150S5-M824F58
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 datasheet

Boost/Buck Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_C)$$

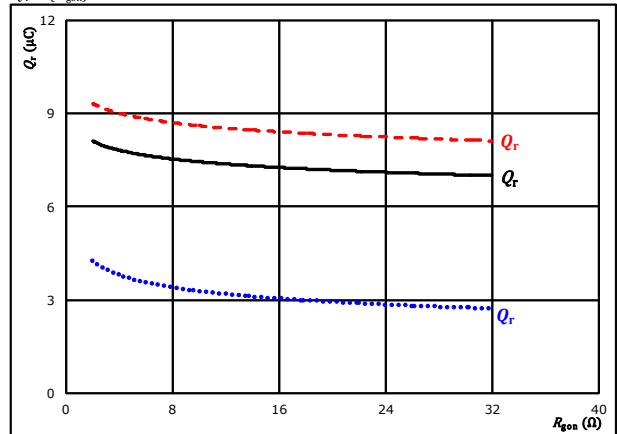


At $V_{CE} = 150$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 8$ Ω
 T_j : 25 °C (dotted blue)
 125 °C (solid black)
 150 °C (dashed red)

figure 10. FWD

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

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

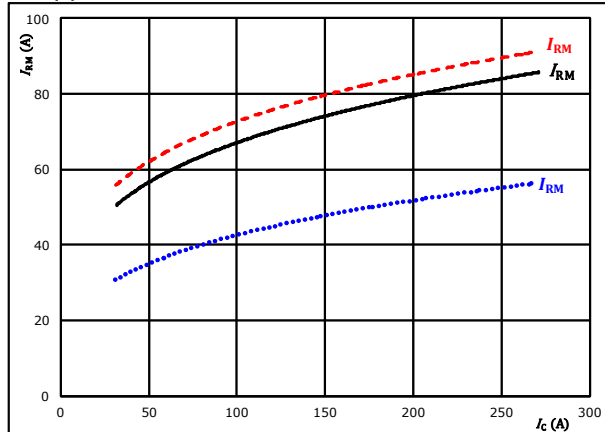


At $V_{CE} = 150$ V
 $V_{GE} = \pm 15$ V
 $I_C = 152$ A
 T_j : 25 °C (dotted blue)
 125 °C (solid black)
 150 °C (dashed red)

figure 11. FWD

Typical peak reverse recovery current as a function of collector current

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

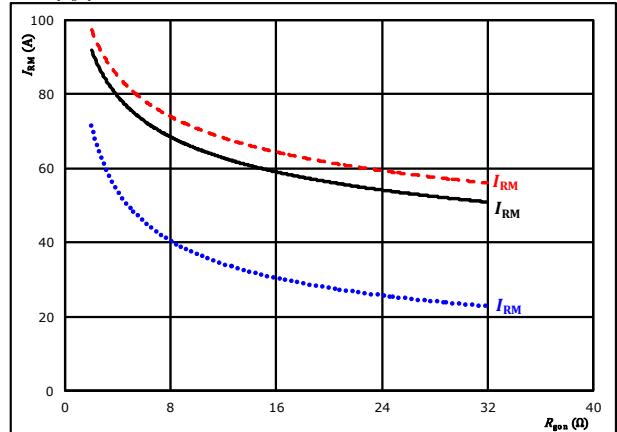


At $V_{CE} = 150$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 8$ Ω
 T_j : 25 °C (dotted blue)
 125 °C (solid black)
 150 °C (dashed red)

figure 12. FWD

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

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



At $V_{CE} = 150$ V
 $V_{GE} = \pm 15$ V
 $I_C = 152$ A
 T_j : 25 °C (dotted blue)
 125 °C (solid black)
 150 °C (dashed red)



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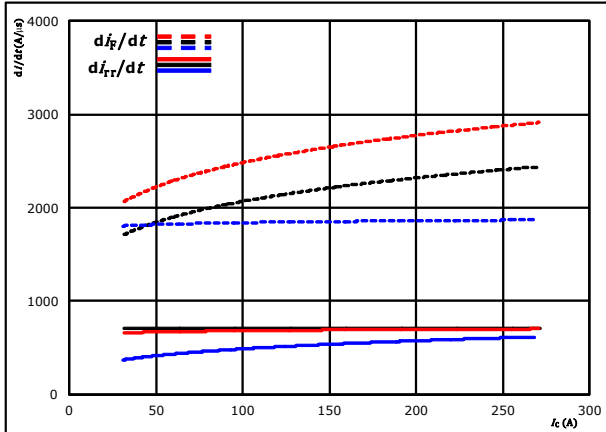
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 datasheet

Boost/Buck Switching Characteristics

figure 13. FWD

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

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

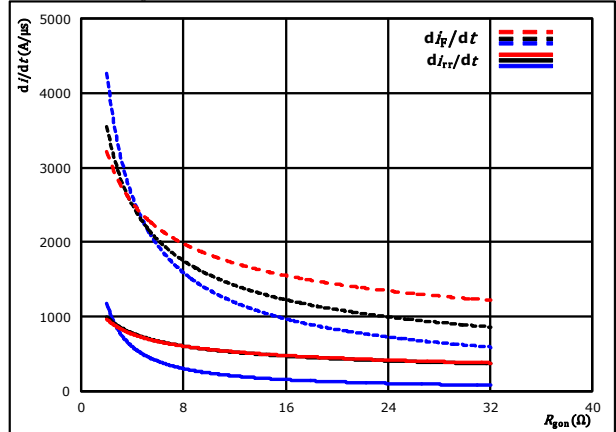


At $V_{CE} = 150$ V
 $V_{GE} = \pm 15$ V
 $R_{g0n} = 8$ Ω
 T_j : 25 °C (dotted blue), 125 °C (solid black), 150 °C (dashed red)

figure 14. FWD

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

$$di_F/dt, di_{rr}/dt = f(R_{g0n})$$

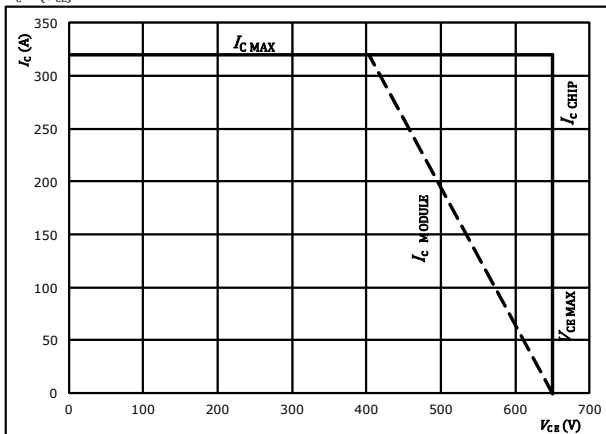


At $V_{CE} = 150$ V
 $V_{GE} = \pm 15$ V
 $I_C = 152$ A
 T_j : 25 °C (dotted blue), 125 °C (solid black), 150 °C (dashed red)

figure 15. IGBT

Reverse bias safe operating area

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



At $T_j = 175$ °C
 $R_{g0n} = 8$ Ω
 $R_{g0ff} = 8$ Ω



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 datasheet

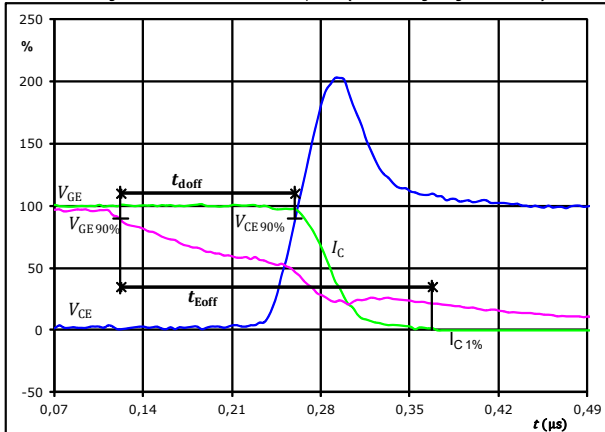
Boost/Buck Switching Definitions

General conditions

T_j	=	125 °C
R_{gon}	=	8 Ω
R_{goff}	=	8 Ω

figure 1. IGBT

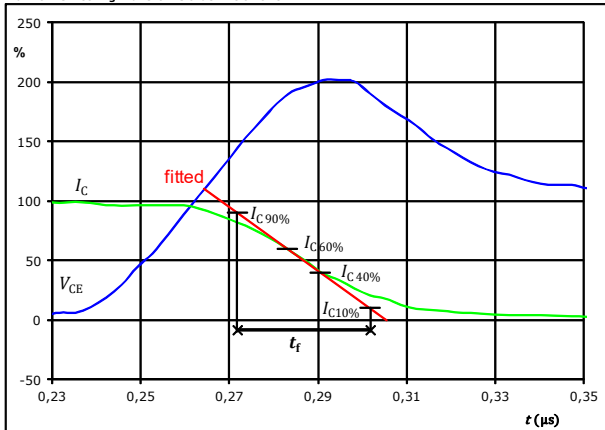
Turn-off Switching Waveforms & definition of t_{doff} , t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%) =$	-15	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	150	V
$I_C(100\%) =$	152	A
$t_{doff} =$	0,137	μs
$t_{Eoff} =$	0,245	μs

figure 3. IGBT

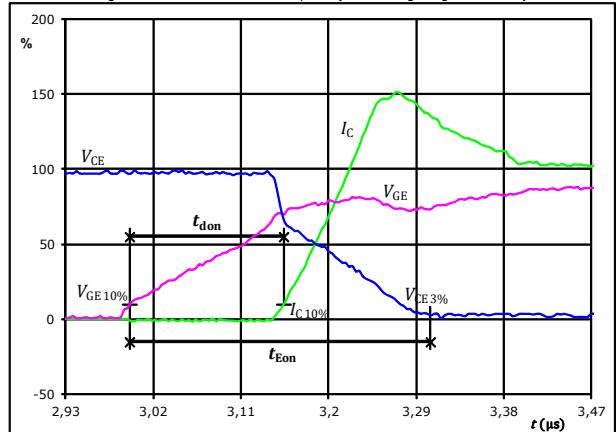
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%) =$	150	V
$I_C(100\%) =$	152	A
$t_f =$	0,030	μs

figure 2. IGBT

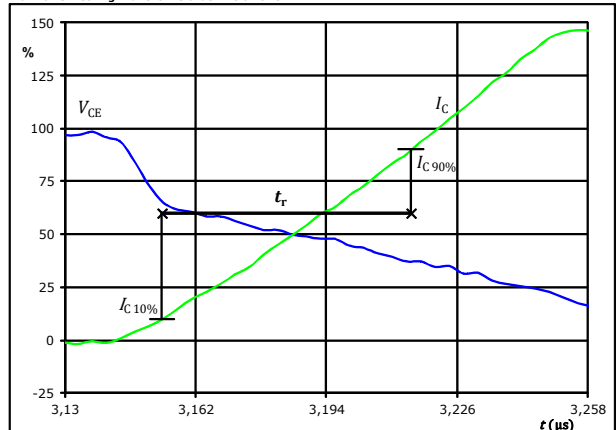
Turn-on Switching Waveforms & definition of t_{don} , t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%) =$	-15	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	150	V
$I_C(100\%) =$	152	A
$t_{don} =$	0,158	μs
$t_{Eon} =$	0,309	μs

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r



$V_C(100\%) =$	150	V
$I_C(100\%) =$	152	A
$t_r =$	0,061	μs



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datasheet

Boost/Buck Switching Characteristics

figure 5. IGBT

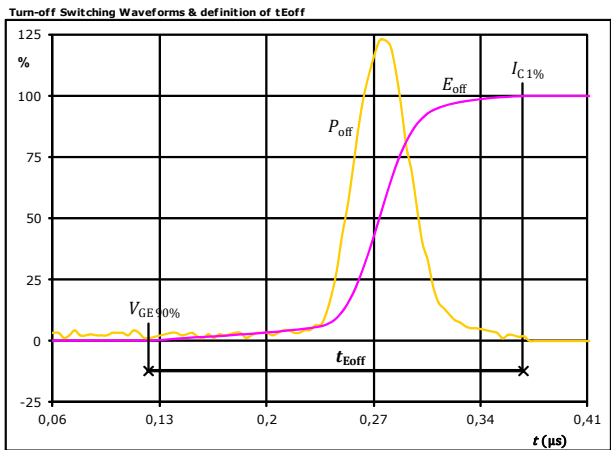


figure 6. IGBT

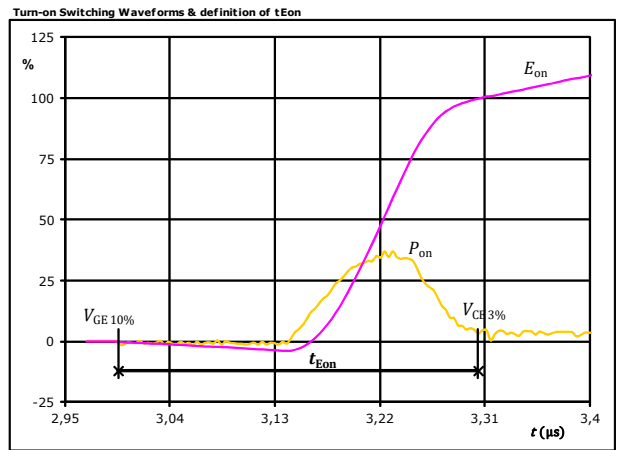
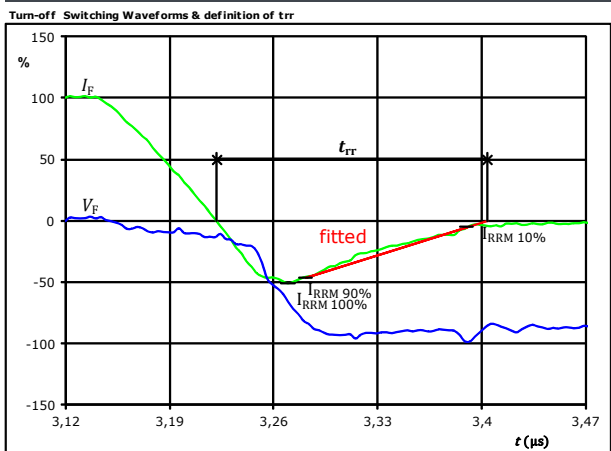


figure 7. FWD





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 datasheet

Boost/Buck Switching Characteristics

figure 8. FWD

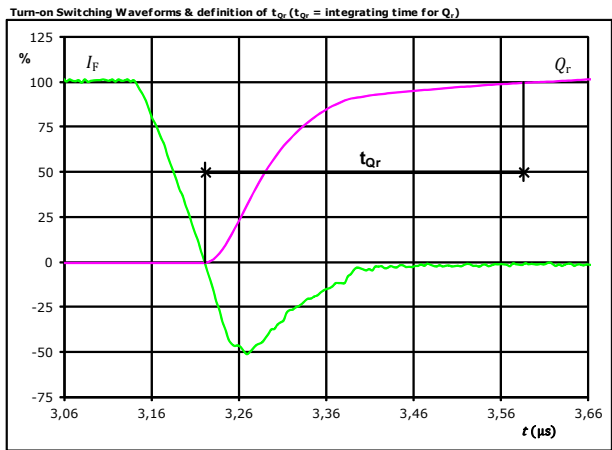
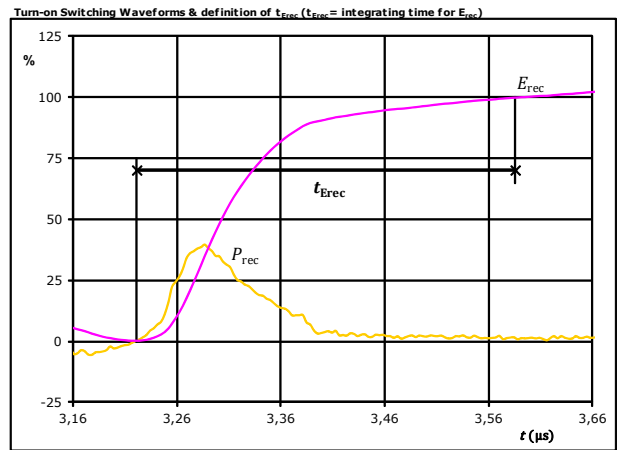



figure 9. FWD





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10-FY07NMA150S5-M824F58
10-PY07NMA150S5-M824F58Y
datasheet

Ordering Code & Marking								
Version				Ordering Code				
without thermal paste 12 mm housing with solder pins				10-FY07NMA150S5-M824F58				
with thermal paste 12 mm housing with solder pins				10-FY07NMA150S5-M824F58-/3/				
without thermal paste 12 mm housing with Press-fit pins				10-PY07NMA150S5-M824F58Y				
with thermal paste 12 mm housing with Press-fit pins				10-PY07NMA150S5-M824F58Y-/3/				
<div>NN-NNNNNNNNNNNNNN TTTTTUV WWYY UL VIN LLLLL SSSS</div> 		Text	Name		Date code	UL & VIN	Lot	Serial
			NN-NNNNNNNNNNNNNN-TTTTTTUV		WWYY	UL VIN	LLLLL	SSSS
		Datamatrix	Type&Ver	Lot number	Serial	Date code		
TTTTTTUV	LLLLL		SSSS	WWYY				

Pin table			
Pin	X	Y	Function
1	34,8	2,95	G12
2	34,8	0	S12
3	32,3	0	DC-
4	29,8	0	DC-
5	27,3	0	DC-
6	24,8	0	DC-
7	15,45	2,95	GND
8	15,45	0	GND
9	0	0	G13
10	0	2,95	S13
11	0	8,45	Therm2
12	0	11,45	Therm1
13	0	26,05	S14
14	0	29	G14
15	18,7	26,05	GND
16	18,7	29	GND
17	28,1	29	DC+
18	30,6	29	DC+
19	33,1	29	DC+
20	35,6	29	DC+
21	40,1	18,9	G11
22	40,1	15,95	S11
23	50,3	16,3	Ph
24	53	16,55	Ph
25	50,3	13,8	Ph
26	53	13,55	Ph
27	50,5	9,2	Ph
28	53	9,2	Ph
29	50,5	6,2	Ph
30	53	6,2	Ph
31	Not assembled		
32	Not assembled		

Outline

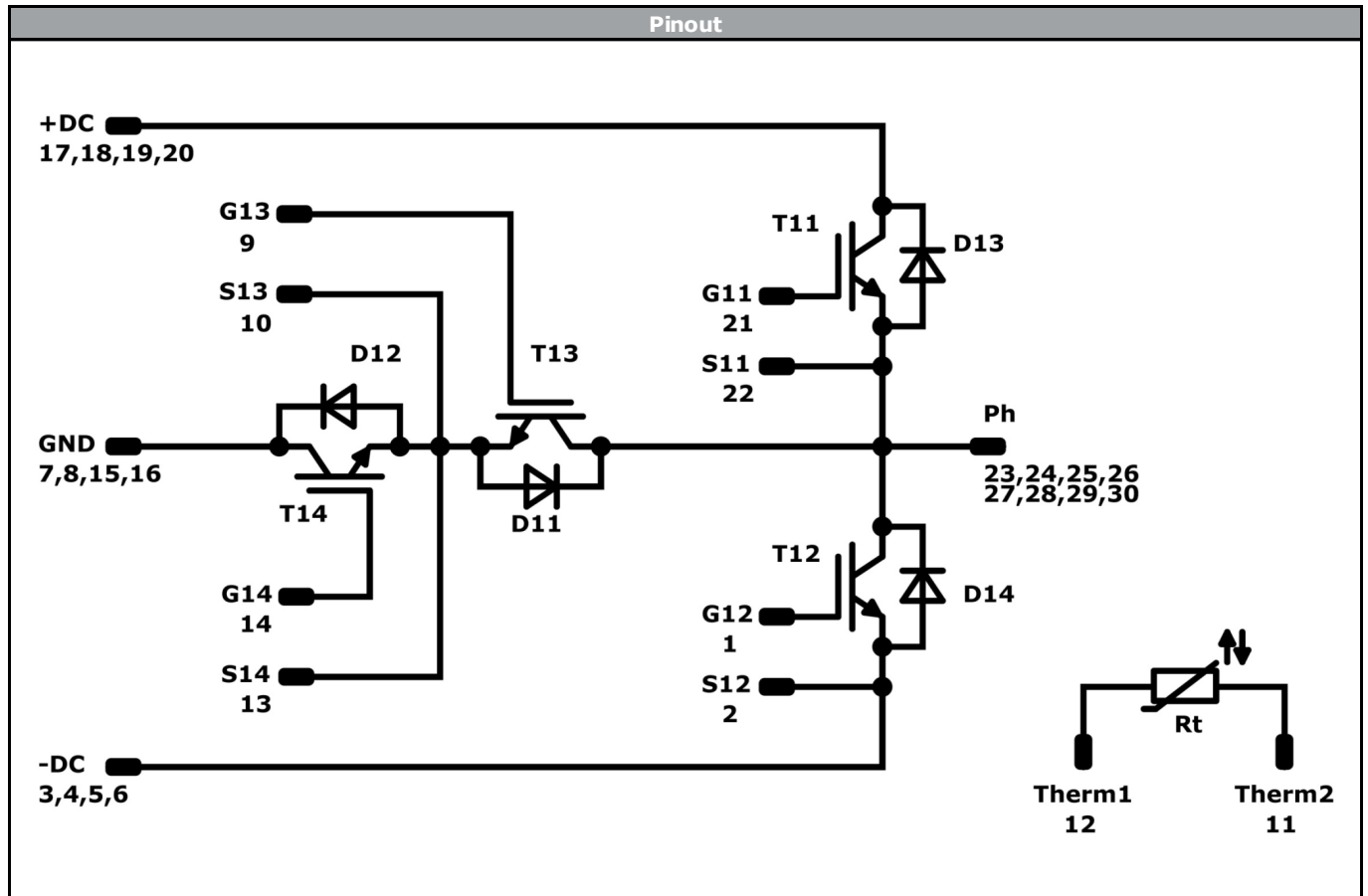
The technical drawing illustrates the component's geometry and pin configuration. The top view shows a rectangular footprint with a width of 26.5 and a height of 16.5. The side views show a height of 16.2 ± 0.5. The bottom view shows the pin locations, with pins 1 through 30 numbered and labeled. Pins 31 and 32 are marked as 'Not assembled'. The drawing also includes a note about the center of the press-fit pinhead and a reference to the handling instruction for connection parameters.

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



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datasheet



Identification					
ID	Component	Voltage	Current	Function	Comment
T11 , T12	IGBT	650 V	150 A	Buck Switch	
D11 , D12	FWD	650 V	150 A	Buck Diode	
T13 , T14	IGBT	650 V	150 A	Boost Switch	
D13 , D14	FWD	650 V	150 A	Boost Diode	
Rt	NTC			Thermistor	




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datasheet

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

Handling instruction
Handling instructions for <i>flow 1</i> packages see vincotech.com website.

Package data
Package data for <i>flow 1</i> 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-xY07NMA150S5-M824F58x-D2-14	24 Sept. 2018	Press-fit version added	

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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.