Vincotech

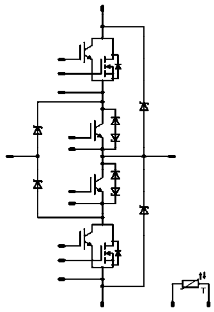
10-FZ06NRA084FP02-P969F68
10-PZ06NRA084FP02-P969F68Y
target datasheet

flowNPC 0	600V/75A & 99mΩ PS*

Features
- PS*: parallel switch for high speed and efficiency
- neutral point clamped inverter
- reactive power and LVRT capability
- SiC buck diode
- low inductance layout

flow0 12mm / flow0 Press-fit

Target Applications
- Solar
- UPS

Schematic


Types
- 10-FZ06NRA084FP02-P969F68
- 10-PZ06NRA084FP02-P969F68Y

Maximum Ratings

Tj=25℃, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Buck IGBT					
Collector-emitter break down voltage	V_{CE}			600	V
DC collector current	I_C	$T_j=T_j$max	T_h=80℃ T_c=80℃	57 76	A
Repetitive peak collector current	I_{Cpulse}	t_p limited by $T_j$max		225	A
Power dissipation per IGBT	P_{tot}	$T_j=T_j$max	T_h=80℃ T_c=80℃	112 169	W
Gate-emitter peak voltage	V_{GE}			±20	V
Short circuit ratings	t_{SC} V_{CC}	T_j≤125℃ V_{GE}=15V		9 360	μs V
Maximum Junction Temperature	$T_j$max			175	℃
Buck Diode					
Peak Repetitive Reverse Voltage	V_{RRM}	T_j=25℃		600	V
DC forward current	I_F	$T_j=T_j$max	T_h=80℃ T_c=80℃	19 25	A
Repetitive peak forward current	I_{FRM}	t_p limited by $T_j$max	T_c=100℃	99	A
Power dissipation per Diode	P_{tot}	$T_j=T_j$max	T_h=80℃ T_c=80℃	37 56	W
Maximum Junction Temperature	$T_j$max			150	℃

Maximum Ratings

Tj=25℃, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Buck MOSFET					
Drain to source breakdown voltage	V_{DS}			600	V
DC drain current	I_D	$T_j=T_j$max	T_h=80℃ T_c=80℃	15 19	A
Pulsed drain current	I_{Dpulse}	t_p limited by $T_j$max	Tc=25℃	112	A
Power dissipation	P_{tot}	$T_j=T_j$max	T_h=80℃ T_c=80℃	62 93	W
Gate-source peak voltage	Vgs			±20	V
Maximum Junction Temperature	$T_j$max			150	℃
Boost IGBT					
Collector-emitter break down voltage	V_{CE}			600	V
DC collector current	I_C	$T_j=T_j$max	T_h=80℃ T_c=80℃	50 50	A
Repetitive peak collector current	I_{Cpuls}	t_p limited by $T_j$max		225	A
Power dissipation per IGBT	P_{tot}	$T_j=T_j$max	T_h=80℃ T_c=80℃	85 129	W
Gate-emitter peak voltage	V_{GE}			±20	V
Short circuit ratings	t_{SC} V_{CC}	T_j≤150℃ V_{GE}=15V		6 360	μs V
Maximum Junction Temperature	$T_j$max			175	℃
Boost Inverse Diode					
Peak Repetitive Reverse Voltage	V_{RRM}	T_c=25℃		600	V
DC forward current	I_F	$T_j=T_j$max	T_h=80℃ T_c=80℃	16 20	A
Power dissipation per Diode	P_{tot}	$T_j=T_j$max	T_h=80℃ T_c=80℃	32 49	W
Maximum Junction Temperature	$T_j$max			175	℃
Boost Diode					
Peak Repetitive Reverse Voltage	V_{RRM}	T_j=25℃		1200	V
DC forward current	I_F	$T_j=T_j$max	T_h=80℃ T_c=80℃	20 28	A
Repetitive peak forward current	I_{FRM}	t_p limited by $T_j$max		70	A
Power dissipation per Diode	P_{tot}	$T_j=T_j$max	T_h=80℃ T_c=80℃	34 52	W
Maximum Junction Temperature	$T_j$max			150	℃

Maximum Ratings

Tj=25℃, unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
Thermal Properties				
Storage temperature	T_{stg}		-40…+125	℃
Operation temperature under switching condition	T_{op}		-40…+(Tjmax - 25)	℃
Insulation Properties				
Insulation voltage	V_{is}	t=2s DC voltage	4000	V
Creepage distance			min 12,7	mm
Clearance			min 12,7	mm

Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] or V_{GS} [V]	V_r [V] or V_{CE} [V] or V_{DS} [V]	I_C [A] or I_F [A] or I_D [A]	T_j	Min	Typ	Max	
Buck IGBT *										
Gate emitter threshold voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}$			0,00025	Tj=25℃ Tj=150℃	3,5	4,5	6	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		75	Tj=25℃ Tj=150℃		1,9 2,1	2,5	V
Collector-emitter cut-off current incl. Diode	I_{CES}		0	600		Tj=25℃ Tj=150℃			0,25	mA
Gate-emitter leakage current	I_{GES}		20	0		Tj=25℃ Tj=150℃			400	nA
Integrated Gate resistor	R_{gint}							None		Ω
Input capacitance	C_{ies}	f=1MHz	0	30		Tj=25℃		4000		nF
Output capacitance	C_{oss}							400		pF
Reverse transfer capacitance	C_{rss}							115		
Gate charge	Q_{Gate}		±15	400	75	Tj=25℃		94		nC
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness≤50um λ = 1 W/mK						0,85		K/W

* see dynamic characteristic at **Buck MosFET**
******additional value stands for built-in capacitor

Parameter	Symbol	Conditions					Min	Typ	Max	Unit
Buck Diode										
Diode forward voltage	V_F				24	Tj=25℃ Tj=125℃		1,50 1,82	1,7	V
Peak reverse recovery current	I_{RRM}	diF/dt=tbd A/us	±15	300	75	Tj=25℃ Tj=125℃		tbd		A
Reverse recovery time	t_{rr}					Tj=25℃ Tj=125℃		tbd		ns
Reverse recovered charge	Q_{rr}					Tj=25℃ Tj=125℃		tbd		µC
Peak rate of fall of recovery current	di(rec)max /dt					Tj=25℃ Tj=125℃		tbd		A/µs
Reverse recovered energy	Erec					Tj=25℃ Tj=125℃		tbd		mWs
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness≤50um λ = 1 W/mK						1,91		K/W

Parameter	Symbol	Conditions					Min	Typ	Max	Unit
Buck MOSFET										
Static drain to source ON resistance	$R_{ds(on)}$		10		18	Tj=25℃ Tj=125℃		90		mΩ
Gate threshold voltage	$V_{(GS)th}$	$V_{DS}=V_{GS}$			0,0012	Tj=25℃ Tj=125℃	2,4	3	3,5	V
Gate to Source Leakage Current	I_{gss}		20	0		Tj=25℃ Tj=125℃			100	nA
Zero Gate Voltage Drain Current	I_{dss}		0	600		Tj=25℃ Tj=125℃			5000	uA
Turn On Delay Time	$t_{d(ON)}$	Rgon=X Ω Rgoff=X Ω	±15	300	75	Tj=25℃ Tj=125℃		tbd. tbd.		ns
Rise Time	t_r					Tj=25℃ Tj=125℃		tbd. tbd.		
Turn off delay time	$t_{d(OFF)}$					Tj=25℃ Tj=125℃		tbd. tbd.		
Fall time	t_f					Tj=25℃ Tj=125℃		tbd. tbd.		
Turn-on energy loss per pulse	E_{on}					Tj=25℃ Tj=125℃		tbd. tbd.		mWs
Turn-off energy loss per pulse	E_{off}					Tj=25℃ Tj=125℃		tbd. tbd.		
Total gate charge	Q_g		10	480	18	Tj=25℃		119		nC
Gate to source charge	Q_{gs}							14		
Gate to drain charge	Q_{gd}							61		
Input capacitance	C_{iss}	f=1MHz	0	25		Tj=25℃		2660		pF
Output capacitance	C_{oss}							154		
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness≤50um λ = 1 W/mK						1,29		K/W

** see schematic of the Gate-complex at characteristic figures

Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] or V_{GS} [V]	V_r [V] or V_{CE} [V] or V_{DS} [V]	I_C [A] or I_F [A] or I_D [A]	T_j	Min	Typ	Max	
Boost IGBT										
Gate emitter threshold voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}$			0,0012	Tj=25℃ Tj=150℃	5	5,8	6,5	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		45	Tj=25℃ Tj=150℃	1	1,28 1,31	1,9	V
Collector-emitter cut-off incl diode	I_{CES}		0	600		Tj=25℃ Tj=150℃			0,0038	mA
Gate-emitter leakage current	I_{GES}		20	0		Tj=25℃ Tj=150℃			600	nA
Integrated Gate resistor	R_{gint}							none		Ω
Turn-on delay time	$t_{d(on)}$					Tj=25℃ Tj=150℃		tbd. tbd.		
Rise time	t_r					Tj=25℃ Tj=150℃		tbd. tbd.		ns
Turn-off delay time	$t_{d(off)}$	Rgon=X Ω Rgoff=X Ω	±15	300	75	Tj=25℃ Tj=150℃		tbd. tbd.		
Fall time	t_f					Tj=25℃ Tj=150℃		tbd. tbd.		
Turn-on energy loss per pulse	E_{on}					Tj=25℃ Tj=150℃		tbd. tbd.		mWs
Turn-off energy loss per pulse	E_{off}					Tj=25℃ Tj=150℃		tbd. tbd.		
Input capacitance	C_{ies}							4620		
Output capacitance	C_{oss}	f=1MHz	0	25		Tj=25℃		288		pF
Reverse transfer capacitance	C_{rss}							137		
Gate charge	Q_{Gate}					Tj=25℃		470		nC
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness≤50um λ = 1 W/mK						1,11		K/W
Boost Inverse Diode										
Diode forward voltage	V_F				20	Tj=25℃ Tj=125℃	1,25	1,68 1,63	1,95	V
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness≤50um λ = 1 W/mK						2,94		K/W
Boost Diode										
Diode forward voltage	V_F				30	Tj=25℃ Tj=125℃	1,5	2,44 2,01	3,5	V
Reverse leakage current	I_r			1200		Tj=25℃ Tj=125℃			100	μA
Peak reverse recovery current	I_{RRM}					Tj=25℃ Tj=125℃		tbd. tbd.		A
Reverse recovery time	t_{rr}					Tj=25℃ Tj=125℃		tbd. tbd.		ns
Reverse recovered charge	Q_{rr}	Rgon=X Ω		350	40	Tj=25℃ Tj=125℃		tbd. tbd.		μC
Peak rate of fall of recovery current	di(rec)max /dt					Tj=25℃ Tj=125℃		tbd. tbd.		A/μs
Reverse recovery energy	E_{rec}					Tj=25℃ Tj=125℃		tbd. tbd.		mWs
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness≤50um λ = 1 W/mK						2,04		K/W
Thermistor										
Rated resistance	R					Tj=25℃		22		KΩ
Deviation of R100	ΔR/R	R100=1486 Ω				Tc=100℃	-5		5	%
Power dissipation	P					Tc=100℃		210		mW
Power dissipation constant						Tj=25℃		3,5		mW/K
B-value	$B_{(25/50)}$	Tol. ±3%				Tj=25℃				K
B-value	$B_{(25/100)}$	Tol. ±3%				Tj=25℃		4000		K
Vincotech PTC Reference						Tj=25℃			A	

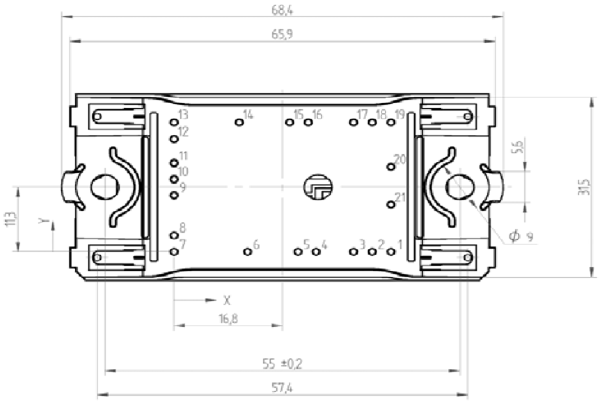
Ordering Code and Marking - Outline - Pinout

Ordering Code & Marking

Version	Ordering Code	in DataMatrix as	in packaging barcode as
without thermal paste 12mm housing	10-FZ06NRA084FP02-P969F68	P969F68	P969F68
without thermal paste 12mm Press-fit housing	10-PZ06NRA084FP02-P969F69Y	P969F68Y	P969F68Y

Outline

Pin table		
Pin	X	Y
1	33,6	0
2	30,7	0
3	27,8	0
4	22	0
5	19,2	0
6	11,4	0
7	0	0
8	0	2,9
9	0	9,9
10	0	12,7
11	0	15,5
12	0	19,7
13	0	22,6
14	10,1	22,6
15	17,9	22,6
16	20,8	22,6
17	27,8	22,6
18	30,7	22,6
19	33,6	22,6
20	33,6	14,8
21	33,6	8,2



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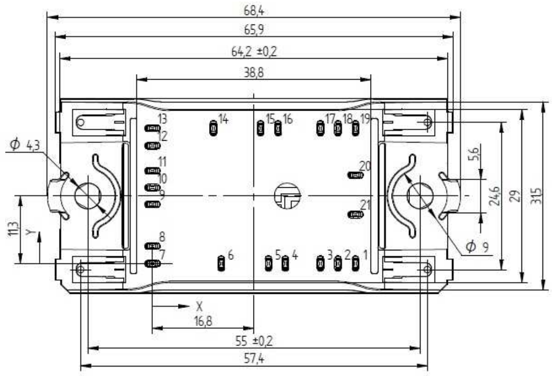

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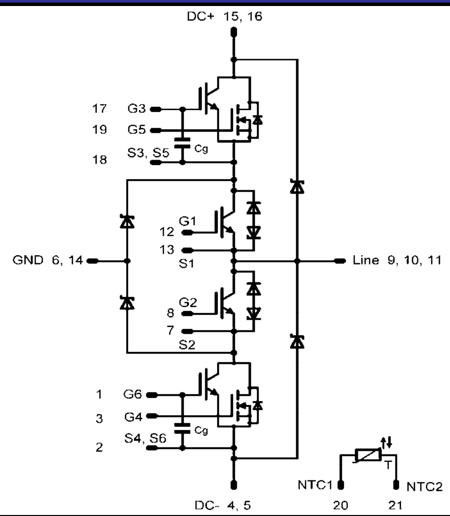
Pinout



PRODUCT STATUS DEFINITIONS

Datasheet Status	Product Status	Definition
Target	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice. The data contained is exclusively intended for technically trained staff.
Preliminary	First Production	This datasheet contains preliminary data, and supplementary data may be published at a later date. Vincotech reserves the right to make changes at any time without notice in order to improve design. The data contained is exclusively intended for technically trained staff.
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