Vincotech

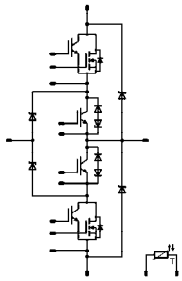
10-FZ06NRA069FP02-P967F68
10-PZ06NRA069FP02-P967F68Y
target datasheet

flowNPC 0 — **600V/60A & 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 inverter
- UPS

Schematic


Types
- 10-FZ06NRA069FP02-P967F68
- 10-PZ06NRA069FP02-P967F68Y

Maximum Ratings

Tj=25℃, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Buck IGBT					
Collector-emitter break down voltage	V_{CE}			650	V
DC collector current	I_C	T_j=$T_j$max	T_h=80℃ T_c=80℃	50 69	A
Repetitive peak collector current	I_{Cpulse}	t_p limited by $T_j$max		180	A
Power dissipation per IGBT	P_{tot}	T_j=$T_j$max	T_h=80℃ T_c=80℃	95 144	W
Gate-emitter peak voltage	V_{GE}			±20	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℃	22 28	A
Repetitive peak forward current	I_{FRM}	t_p limited by $T_j$max	T_c=100℃	66	A
Power dissipation per Diode	P_{tot}	T_j=$T_j$max	T_h=80℃ T_c=80℃	44 66	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℃	49 63	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℃	93 141	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
Repetitive peak forward current	I_{FRM}	t_p limited by $T_j max$		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℃	16 22	A
Repetitive peak forward current	I_{FRM}	t_p limited by $T_j max$		36	A
Power dissipation per Diode	P_{tot}	$T_j=T_j max$	T_h=80℃ T_c=80℃	31 47	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		60	Tj=25℃ Tc=175℃		1,9 2,1	2,5	V
Collector-emitter cut-off current incl. Diode	I_{CES}		0	650		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℃		2915		pF
Output capacitance	C_{oss}							270		pF
Reverse transfer capacitance	C_{rss}							90		
Gate charge	Q_{Gate}		±15	400	60	Tj=25℃		189	284	nC
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness≤50um λ = 1 W/mK						1,10		K/W
Buck Diode										
Diode forward voltage	V_F				16	Tj=25℃ Tj=125℃		1,50 1,82	1,7	V
Peak reverse recovery current	I_{RRM}	Rgon=X Ω	±15	300	60	Tj=25℃ Tj=125℃		tbd. tbd.		A
Reverse recovery time	t_{rr}					Tj=25℃ Tj=125℃		tbd. tbd.		ns
Reverse recovered charge	Q_{rr}					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 recovered energy	Erec					Tj=25℃ Tj=125℃		tbd. tbd.		mWs
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness≤50um λ = 1 W/mK						2,18		K/W
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	3,6	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	60	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		10/0	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	100		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 dynamic characteristic at **Buck MosFET**
**additional value stands for built-in capacitor

** 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=125℃	5,0	5,8	6,5	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		45	Tj=25℃ Tj=125℃	1,0	1,28 1,31	1,9	V
Collector-emitter cut-off incl diode	I_{CES}		0	600		Tj=25℃ Tj=125℃			0,03	mA
Gate-emitter leakage current	I_{GES}		20	0		Tj=25℃ Tj=125℃			600	nA
Integrated Gate resistor	R_{gint}							none		Ω
Turn-on delay time	$t_{d(on)}$	Rgon=X Ω Rgoff=X Ω				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.		
Input capacitance	C_{ies}	f=1MHz	0	25		Tj=25℃		4620		pF
Output capacitance	C_{oss}							288		
Reverse transfer capacitance	C_{rss}							137		
Gate charge	Q_{Gate}		15	480	75	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				10	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				18	Tj=25℃ Tj=125℃	1,5	2,61 2,16	3,5	V
Reverse leakage current	I_r			1200		Tj=25℃ Tj=125℃			100	µA
Peak reverse recovery current	I_{RRM}	Rgon=X Ω	±15	600	60	Tj=25℃ Tj=125℃		tbd. tbd.		A
Reverse recovery time	t_{rr}					Tj=25℃ Tj=125℃		tbd. tbd.		ns
Reverse recovered charge	Q_{rr}					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						2,32		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-PZ06NRA069FP02-P967F68	P967F68	P967F68
without thermal paste 12mm Press-fit housing	10-PZ06NRA069FP02-P967F68Y	P967F68Y	P967F68Y

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
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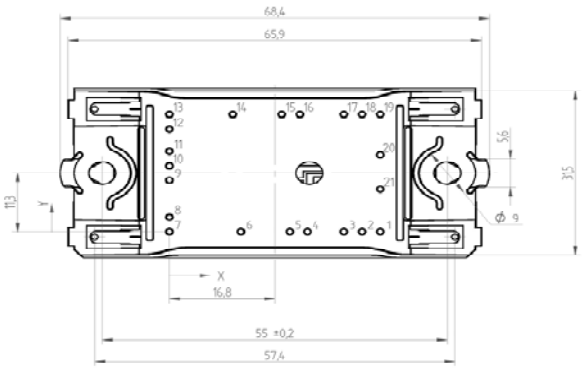
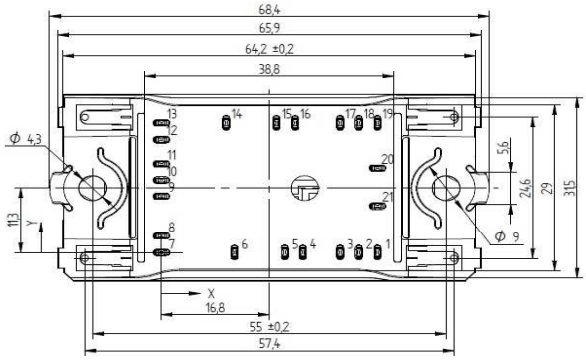
18	30,7	22,6
19	33,6	22,6
20	33,6	14,8
21	33,6	8,2

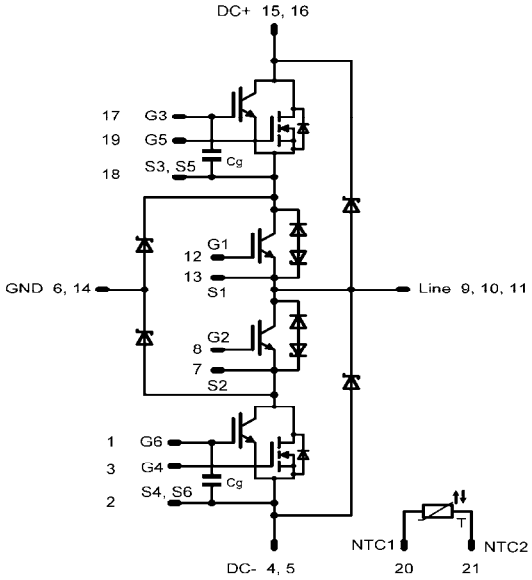


P967-F68



P967-F68Y

Pinout



PRODUCT STATUS DEFINITIONS

Datasheet Status	Product Status	Definition
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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