

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

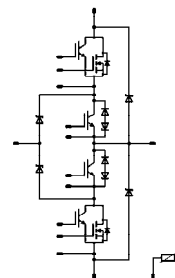
Target Applications

- solar inverter
- UPS

Types

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

flow0 12mm
flow0 Press-fit

Schematic


Maximum Ratings

T_J=25°C, unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
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Buck IGBT

Collector-emitter break down voltage	V _{CE}		650	V
DC collector current	I _C	T _J =T _{Jmax} T _h =80°C T _c =80°C	50 69	A
Repetitive peak collector current	I _{Cpulse}	t _p limited by T _{Jmax}	180	A
Power dissipation per IGBT	P _{tot}	T _J =T _{Jmax} T _h =80°C T _c =80°C	95 144	W
Gate-emitter peak voltage	V _{GE}		±20	V
Maximum Junction Temperature	T _{Jmax}		175	°C

Buck Diode

Peak Repetitive Reverse Voltage	V _{RRM}	T _J =25°C	600	V
DC forward current	I _F	T _J =T _{Jmax} T _h =80°C T _c =80°C	22 28	A
Repetitive peak forward current	I _{FRM}	t _p limited by T _{Jmax} T _c =100°C	66	A
Power dissipation per Diode	P _{tot}	T _J =T _{Jmax} T _h =80°C T _c =80°C	44 66	W
Maximum Junction Temperature	T _{Jmax}		150	°C

Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
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Buck MOSFET

Drain to source breakdown voltage	V_{DS}		600	V
DC drain current	I_D	$T_j=T_{jmax}$ $T_h=80^{\circ}\text{C}$ $T_c=80^{\circ}\text{C}$	15 19	A
Pulsed drain current	I_{Dpulse}	t_p limited by T_{jmax} $T_c=25^{\circ}\text{C}$	112	A
Power dissipation	P_{tot}	$T_j=T_{jmax}$ $T_h=80^{\circ}\text{C}$ $T_c=80^{\circ}\text{C}$	62 93	W
Gate-source peak voltage	V_{gs}		± 20	V
Maximum Junction Temperature	T_{jmax}		150	$^{\circ}\text{C}$

Boost IGBT

Collector-emitter break down voltage	V_{CE}		600	V
DC collector current	I_C	$T_j=T_{jmax}$ $T_h=80^{\circ}\text{C}$ $T_c=80^{\circ}\text{C}$	49 63	A
Repetitive peak collector current	I_{Cpuls}	t_p limited by T_{jmax}	225	A
Power dissipation per IGBT	P_{tot}	$T_j=T_{jmax}$ $T_h=80^{\circ}\text{C}$ $T_c=80^{\circ}\text{C}$	93 141	W
Gate-emitter peak voltage	V_{GE}		± 20	V
Short circuit ratings	t_{SC} V_{CC}	$T_j \leq 150^{\circ}\text{C}$ $V_{GE}=15\text{V}$	6 360	μs V
Maximum Junction Temperature	T_{jmax}		175	$^{\circ}\text{C}$

Boost Inverse Diode

Peak Repetitive Reverse Voltage	V_{RRM}	$T_c=25^{\circ}\text{C}$	600	V
DC forward current	I_F	$T_j=T_{jmax}$ $T_h=80^{\circ}\text{C}$ $T_c=80^{\circ}\text{C}$	16 20	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	20	A
Power dissipation per Diode	P_{tot}	$T_j=T_{jmax}$ $T_h=80^{\circ}\text{C}$ $T_c=80^{\circ}\text{C}$	32 49	W
Maximum Junction Temperature	T_{jmax}		175	$^{\circ}\text{C}$

Boost Diode

Peak Repetitive Reverse Voltage	V_{RRM}	$T_j=25^{\circ}\text{C}$	1200	V
DC forward current	I_F	$T_j=T_{jmax}$ $T_h=80^{\circ}\text{C}$ $T_c=80^{\circ}\text{C}$	16 22	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	36	A
Power dissipation per Diode	P_{tot}	$T_j=T_{jmax}$ $T_h=80^{\circ}\text{C}$ $T_c=80^{\circ}\text{C}$	31 47	W
Maximum Junction Temperature	T_{jmax}		150	$^{\circ}\text{C}$

Maximum Ratings

T_j=25°C, unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
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Thermal Properties

Storage temperature	T _{stg}		-40...+125	°C
Operation temperature under switching condition	T _{op}		-40...+(T _{jmax} - 25)	°C

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 _b [A]	T _j	Min	Typ	Max	
Buck IGBT *										
Gate emitter threshold voltage	V _{GE(th)}	V _{CE} =V _{GE}			0,00025	T _j =25°C T _j =150°C	3,5	4,5	6	V
Collector-emitter saturation voltage	V _{CE(sat)}		15		60	T _j =25°C T _c =175°C		1,9 2,1	2,5	V
Collector-emitter cut-off current incl. Diode	I _{CES}		0	650		T _j =25°C T _j =150°C			0,25	mA
Gate-emitter leakage current	I _{GES}		20	0		T _j =25°C T _j =150°C			400	nA
Integrated Gate resistor	R _{gint}							none		Ω
Input capacitance	C _{ies}	f=1MHz	0	30		T _j =25°C		2915		pF
Output capacitance	C _{oss}							270		pF
Reverse transfer capacitance	C _{rss}							90		
Gate charge	Q _{Gate}		±15	400	60	T _j =25°C		189	284	nC
Thermal resistance chip to heatsink per chip	R _{thJH}	Thermal grease thickness≤50um λ = 1 W/mK						1,10		K/W

* see dynamic characteristic at **Buck MosFET**

**additional value stands for built-in capacitor

Buck Diode

Diode forward voltage	V_F				16	$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$		1,50 1,82	1,7	V
Peak reverse recovery current	I_{RRM}	$R_{gon}=X \Omega$	± 15	300	60	$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$		tbd. tbd.		A
Reverse recovery time	t_{rr}					$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$		tbd. tbd.		ns
Reverse recovered charge	Q_{rr}					$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$		tbd. tbd.		μC
Peak rate of fall of recovery current	$di(rec)_{max}/dt$					$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$		tbd. tbd.		A/ μs
Reverse recovered energy	E_{rec}					$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$		tbd. tbd.		mWs
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness $\leq 50\mu\text{m}$ $\lambda = 1 \text{ W/mK}$						2,18		K/W

Buck MOSFET

Static drain to source ON resistance	$R_{ds(on)}$		10		18	$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$		90		m Ω
Gate threshold voltage	$V_{(GS)th}$	$V_{DS}=V_{GS}$			0,0012	$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$	2,4	3	3,6	V
Gate to Source Leakage Current	I_{gss}		20	0		$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$			100	nA
Zero Gate Voltage Drain Current	I_{dss}		0	600		$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$			5000	μA
Turn On Delay Time	$t_{d(ON)}$	$R_{gon}=X \Omega$ $R_{goff}=X \Omega$	± 15	300	60	$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$		tbd. tbd.		ns
Rise Time	t_r					$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$		tbd. tbd.		
Turn off delay time	$t_{d(OFF)}$					$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$		tbd. tbd.		
Fall time	t_f					$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$		tbd. tbd.		
Turn-on energy loss per pulse	E_{on}					$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$		tbd. tbd.		mWs
Turn-off energy loss per pulse	E_{off}					$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$		tbd. tbd.		
Total gate charge	Q_g		10/0	480	18	$T_j=25^\circ\text{C}$		119		nC
Gate to source charge	Q_{gs}							14		
Gate to drain charge	Q_{gd}							61		
Input capacitance	C_{iss}	f=1MHz	0	100		$T_j=25^\circ\text{C}$		2660		pF
Output capacitance	C_{oss}							154		
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness $\leq 50\mu\text{m}$ $\lambda = 1 \text{ W/mK}$						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_b [A]	T_j	Min	Typ	Max	
Boost IGBT										
Gate emitter threshold voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}$			0,0012	$T_j=25^{\circ}\text{C}$ $T_j=125^{\circ}\text{C}$	5,0	5,8	6,5	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		45	$T_j=25^{\circ}\text{C}$ $T_j=125^{\circ}\text{C}$	1,0	1,28 1,31	1,9	V
Collector-emitter cut-off incl diode	I_{CES}		0	600		$T_j=25^{\circ}\text{C}$ $T_j=125^{\circ}\text{C}$			0,03	mA
Gate-emitter leakage current	I_{GES}		20	0		$T_j=25^{\circ}\text{C}$ $T_j=125^{\circ}\text{C}$			600	nA
Integrated Gate resistor	R_{gint}							none		Ω
Turn-on delay time	$t_{d(on)}$	$R_{gon}=X\ \Omega$ $R_{goff}=X\ \Omega$				$T_j=25^{\circ}\text{C}$ $T_j=125^{\circ}\text{C}$		tbd. tbd.		ns
Rise time	t_r					$T_j=25^{\circ}\text{C}$ $T_j=125^{\circ}\text{C}$		tbd. tbd.		
Turn-off delay time	$t_{d(off)}$					$T_j=25^{\circ}\text{C}$ $T_j=125^{\circ}\text{C}$		tbd. tbd.		
Fall time	t_f					$T_j=25^{\circ}\text{C}$ $T_j=125^{\circ}\text{C}$		tbd. tbd.		
Turn-on energy loss per pulse	E_{on}	$f=1\text{MHz}$	0	25		$T_j=25^{\circ}\text{C}$ $T_j=125^{\circ}\text{C}$		tbd. tbd.		mWs
Turn-off energy loss per pulse	E_{off}					$T_j=25^{\circ}\text{C}$ $T_j=125^{\circ}\text{C}$		tbd. tbd.		
Input capacitance	C_{ies}					$T_j=25^{\circ}\text{C}$		4620		pF
Output capacitance	C_{oss}							288		
Reverse transfer capacitance	C_{rss}							137		
Gate charge	Q_{Gate}		15	480	75	$T_j=25^{\circ}\text{C}$		470		nC
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness $\leq 50\mu\text{m}$ $\lambda = 1\text{ W/mK}$						1,11		K/W
Boost Inverse Diode										
Diode forward voltage	V_F				10	$T_j=25^{\circ}\text{C}$ $T_j=125^{\circ}\text{C}$	1,25	1,68 1,63	1,95	V
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness $\leq 50\mu\text{m}$ $\lambda = 1\text{ W/mK}$						2,94		K/W
Boost Diode										
Diode forward voltage	V_F				18	$T_j=25^{\circ}\text{C}$ $T_j=125^{\circ}\text{C}$	1,5	2,61 2,16	3,5	V
Reverse leakage current	I_r			1200		$T_j=25^{\circ}\text{C}$ $T_j=125^{\circ}\text{C}$			100	μA
Peak reverse recovery current	I_{RRM}	$R_{gon}=X\ \Omega$	± 15	600	60	$T_j=25^{\circ}\text{C}$ $T_j=125^{\circ}\text{C}$		tbd. tbd.		A
Reverse recovery time	t_{rr}					$T_j=25^{\circ}\text{C}$ $T_j=125^{\circ}\text{C}$		tbd. tbd.		ns
Reverse recovered charge	Q_{rr}					$T_j=25^{\circ}\text{C}$ $T_j=125^{\circ}\text{C}$		tbd. tbd.		μC
Peak rate of fall of recovery current	$di(rec)_{max}/dt$					$T_j=25^{\circ}\text{C}$ $T_j=125^{\circ}\text{C}$		tbd. tbd.		A/ μs
Reverse recovery energy	E_{rec}					$T_j=25^{\circ}\text{C}$ $T_j=125^{\circ}\text{C}$		tbd. tbd.		mWs
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness $\leq 50\mu\text{m}$ $\lambda = 1\text{ W/mK}$						2,32		K/W
Thermistor										
Rated resistance	R					$T_j=25^{\circ}\text{C}$		22		K Ω
Deviation of R100	$\Delta R/R$	R100=1486 Ω				$T_c=100^{\circ}\text{C}$	-5		5	%
Power dissipation	P					$T_c=100^{\circ}\text{C}$		210		mW
Power dissipation constant						$T_j=25^{\circ}\text{C}$		3,5		mW/K
B-value	$B_{(25/50)}$	Tol. $\pm 3\%$				$T_j=25^{\circ}\text{C}$				K
B-value	$B_{(25/100)}$	Tol. $\pm 3\%$				$T_j=25^{\circ}\text{C}$		4000		K
Vincotech PTC Reference						$T_j=25^{\circ}\text{C}$			A	

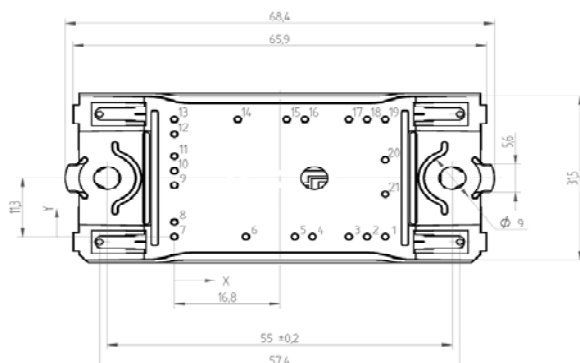
Ordering Code and Marking - Outline - Pinout

Ordering Code & Marking

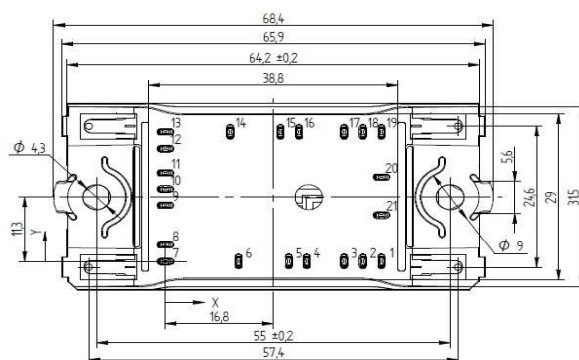
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without thermal paste 12mm Press-fit housing	10-PZ06NRA069FP02-P967F68Y	P967F68Y	P967F68Y

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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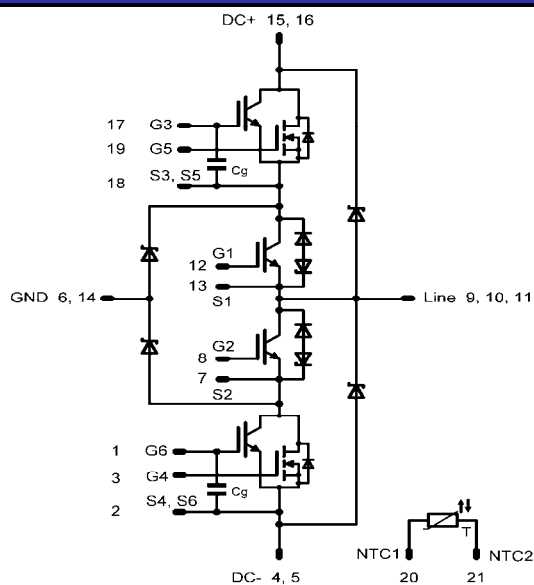


P967-F68



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.
Final	Full Production	This datasheet contains final specifications. 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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