flow **IPM 1B** | **600 V / 6 A**

Features

- Input Rectifier, PFC-Boost with integrated DC-Capacitor, PFC-Shunt and PFC-gate driver
- 3 phase inverter with integrated DC Shunt, gate driver circuit incl. bootstrap circuit and over current protection
- Sense output of DC-current
- Temperature sensor
- Conclusive Power Flow, all power connections on one side, no input output X-ing

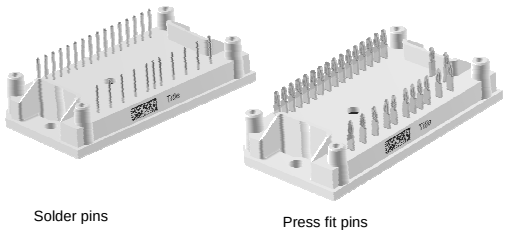
Target Applications

- Low Power Industrial Drives
- Motor Integrated Fans and Pumps
- AirCon
- Electrical Tools

Types

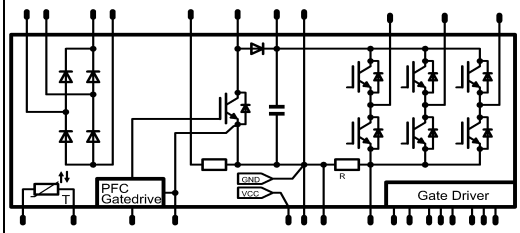
- 20-1B06IPB006RC01-P953A45
- 20-PB06IPB006RC01-P953A45Y

flow 1B housing



Solder pins | Press fit pins

Schematic



Maximum Ratings

T_j=25℃, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Input Rectifier Diode					
Repetitive peak reverse voltage	V_{RRM}			1600	V
DC forward current	I_{FAV}	T_j=$T_j$max	T_h=80℃ T_c=80℃	12 16	A
Surge forward current	I_{FSM}	t_p=10ms 50 Hz half sine wave	T_j=25℃	150	A
I2t-value	I^2t			110	A^2s
Power dissipation	P_{tot}	T_j=$T_j$max	T_h=80℃ T_c=80℃	20 30	W
Maximum Junction Temperature	$T_j$max			150	℃
PFC 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℃	17 23	A
Pulsed collector current	I_{Cpulse}	t_p limited by $T_j$max		45	A
Turn off safe operating area		V_{CE} ≤ 650V, T_j ≤ $T_{op\ max}$		45	A
Power dissipation	P_{tot}	T_j=$T_j$max	T_h=80℃ T_c=80℃	30 45	W
Maximum Junction Temperature	$T_j$max			175	℃

Maximum Ratings

T_j=25℃, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
PFC Inverse Diode					
Peak Repetitive Reverse Voltage	V_{RRM}			650	V
DC forward current	I_F	T_j=$T_j$max	T_h=80℃ T_c=80℃	9 12	A
Repetitive peak forward current	I_{FRM}	t_p limited by $T_j$max		12	A
Power dissipation	P_{tot}	T_j=$T_j$max	T_h=80℃ T_c=80℃	16 24	W
Maximum Junction Temperature	$T_j$max			175	℃
PFC Diode					
Peak Repetitive Reverse Voltage	V_{RRM}			650	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		30	A
Power dissipation	P_{tot}	T_j=$T_j$max	T_h=80℃ T_c=80℃	29 44	W
Maximum Junction Temperature	$T_j$max			175	℃
Inverter Transistor					
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℃	7 10	A
Pulsed collector current	I_{Cpulse}	t_p limited by $T_j$max		18	A
Turn off safe operating area		V_{CE} ≤ 600V, Tj ≤125℃		18	A
Power dissipation	P_{tot}	T_j=$T_j$max	T_h=80℃ T_c=80℃	27 41	W
Short circuit ratings	t_{SC} V_{CC}	T_j≤125℃ V_{GE}=15V		5 400	µs V
Maximum Junction Temperature	$T_j$max			175	℃
Inverter Diode					
Peak Repetitive Reverse Voltage	V_{RRM}			600	V
DC forward current	I_F	T_j=$T_j$max	T_h=80℃ T_c=80℃	4 5	A
Repetitive peak forward current	I_{FRM}	t_p limited by $T_j$max		8	A
Power dissipation	P_{tot}	T_j=$T_j$max	T_h=80℃ T_c=80℃	8 12	W
Maximum Junction Temperature	$T_j$max			175	℃

Maximum Ratings

T_j=25℃, unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
PFC Driver*				
Collector-emitter voltage	V_{CEO}		45	V
Collector current	I_C		500	mA
Peak collector current	I_{CM}	t_P≤10 ms	1000	
Base current	I_B		100	
Peak base current	I_{BM}		200	
Maximum Junction Temperature	$T_j$max		150	℃
* for more information see infineon's datasheet BC817				
DC - Shunt				
Power dissipation	P_{tot}	T_c=25℃	3,2	W
PFC Shunt				
DC forward current	I_F	T_c=25℃	10	A
Power dissipation	P_{tot}	T_c=25℃	9	W
DC link Capacitor				
Max.DC voltage	V_{MAX}	T_c=25℃	500	V
Gate Driver*				
Supply voltage	V_{CC}	V_{CC} common with PFC controller	20	V
Input voltage (LIN, HIN, EN)	U_{IN}		10	V
Output voltage (FAULT)	U_{OUT}		VCC + 0.5	V
* for more information see infineon's datasheet 6ED003L02-F2				
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
Comparative tracking index	CTI		>200	

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	
Input Rectifier Diode										
Forward voltage *	V_F				12	Tj=25℃ Tj=125℃	0,8	1,15 1,10	1,4	V
Threshold voltage (for power loss calc. only)	V_{to}				12	Tj=25℃ Tj=125℃		0,90 0,79		V
Slope resistance (for power loss calc. only)	r_t				12	Tj=25℃ Tj=125℃		20 26		mΩ
Reverse current	I_r			1500		Tj=25℃ Tj=125℃			0,7	mA
Thermal resistance chip to heatsink	R_{thJH}	Phase-Change Material λ=3,4W/mK						3,54		K/W
* chip data										
PFC IGBT										
Gate emitter threshold voltage	$V_{GE(th)}$	V_{GE}=V_{CE}			0,0004	Tj=25℃ Tj=150℃	3,3	4	4,7	V
Collector-emitter saturation voltage*	$V_{CE(sat)}$			15	15	Tj=25℃ Tj=150℃		1,6	2,2	V
Collector-emitter cut-off	I_{CES}		0	650		Tj=25℃ Tj=150℃			0,04	mA
Gate-emitter leakage current	I_{GES}		20	0		Tj=25℃ Tj=150℃			120	nA
Integrated Gate resistor	R_{gint}							none		Ω
Gate resistor	R_{Gate}							10		Ω
Input capacitance	C_{ies}	f=1MHz	0	25		Tj=25℃		9300		pF
Output capacitance	C_{oss}							24		
Reverse transfer capacitance	C_{rss}							4		
Gate charge	Q_{Gate}		±15	520	15	Tj=25℃		38		nC
Thermal resistance chip to heatsink	R_{thJH}	Phase-Change Material λ=3,4W/mK						3,18		K/W
* chip data										
PFC Inverse Diode										
Diode forward voltage	V_F				6	Tj=25℃ Tj=125℃	1,23	1,55	1,87	V
Thermal resistance chip to heatsink	R_{thJH}	Phase-Change Material λ=3,4W/mK						3,70		K/W
PFC Diode										
Forward voltage *	V_F				15	Tj=25℃ Tj=150℃		1,35	1,77	V
Reverse leakage current	I_{rm}			650		Tj=25℃ Tj=150℃			0,94	µA
Thermal resistance chip to heatsink	R_{thJH}	Phase-Change Material λ=3,4W/mK						3,27		K/W
* chip data										
PFC Shunt										
R1 value	R							69		mΩ

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	
Inverter Transistor										
Collector-emitter saturation voltage*	$V_{CE(sat)}$		0		6	Tj=25℃ Tj=150℃	1,88	2,10	2,42	V
Collector-emitter cut-off current incl. Diode	I_{CES}		0	600		Tj=25℃ Tj=150℃			0,002	mA
Gate-emitter leakage current	I_{GES}		20	0		Tj=25℃ Tj=150℃			120	nA
Input capacitance	C_{ies}	f=1MHz	0	25		Tj=25℃		470		pF
Output capacitance	C_{oss}							24		
Reverse transfer capacitance	C_{rss}							14		
Thermal resistance chip to heatsink	R_{thJH}	Phase-Change Material λ=3,4W/mK						3,55		K/W
* chip data										
Inverter Diode										
Diode forward voltage *	V_F				4	Tj=25℃ Tj=150℃	1	1,97 1,94	2,6	V
Peak reverse recovery current	I_{RRM}	Rgon=0 Ω	15	400	5	Tj=25℃ Tj=150℃		3 4		A
Reverse recovery time	t_{rr}					Tj=25℃ Tj=150℃		222 335		ns
Reverse recovered charge	Q_{rr}					Tj=25℃ Tj=150℃		0,23 0,46		nC
Peak rate of fall of recovery current	di(rec)max /dt					Tj=25℃ Tj=150℃		453 180		A/µs
Reverse recovered energy	Erec					Tj=25℃ Tj=150℃		0,07 0,13		mWs
Thermal resistance chip to heatsink	R_{thJH}	Phase-Change Material λ=3,4W/mK						12,20		K/W
* chip data										
DC - Shunt										
R2 value	R					Tj=25℃		35		mΩ
DC link Capacitor										
C value	C							100		nF

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	
Gate Driver										
Supply voltage	V_{CC}					Tj=25℃ Tj=125℃	13	15	17,5	V
Quiescent Vcc supply current	I_{QCC}	V_{LIN}=0V; V_{HIN}=3,3V				Tj=25℃ Tj=125℃		1,3	2	mA
Input voltage (LIN, HIN, EN)	V_{IN}	V_{CC} = 15V				Tj=25℃ Tj=125℃	0		5	V
Input voltage (GATE)	V_{GATE}					Tj=25℃ Tj=125℃	0		15	
Logic "0" input voltage (LIN, HIN)	V_{IH}					Tj=25℃ Tj=125℃	1,7	2,1	2,4	
Logic "1" input voltage (LIN, HIN)	V_{IL}					Tj=25℃ Tj=125℃	0,7	0,9	1,1	
Positive going threshold voltage (EN)	$V_{EN, TH+}$					Tj=25℃ Tj=125℃	1,9	2,1	2,3	
Negative going threshold voltage (EN)	$V_{EN, TH-}$					Tj=25℃ Tj=125℃	1,1	1,3	1,5	
Input clamp voltage (LIN, HIN, EN)	$V_{IN, CLAMP}$	I_{IN} = 4mA				Tj=25℃ Tj=125℃	9	10,3	12	
ITRIP positive going threshold	$V_{IT, TH+}$					Tj=25℃ Tj=125℃	380	445	510	mV
Input bias current LIN high	I_{LIN+}	V_{LIN} = 3,3V				Tj=25℃ Tj=125℃		70	100	µA
Input bias current LIN low	I_{LIN-}	V_{LIN} = 0V				Tj=25℃ Tj=125℃		110	200	
Input bias current HIN high	I_{HIN+}	V_{HIN} = 3,3V				Tj=25℃ Tj=125℃		70	100	
Input bias current HIN low	I_{HIN-}	V_{HIN} = 0V				Tj=25℃ Tj=125℃		110	200	
Input bias current EN high	I_{EN+}	V_{HIN} = 3,3V				Tj=25℃ Tj=125℃		45	120	
Output voltage (FAULT)	V_{FLT}					Tj=25℃ Tj=125℃	0		V_{CC}	V
Low on resistor of pull down trans. (FAULT)	$R_{ON, FLT}$	V_{FAULT}=0.5 V				Tj=25℃ Tj=125℃		45	100	Ω
Pulse width for ON or OFF	t_{IN}					Tj=25℃ Tj=125℃	1			µs
Turn-on propagation delay (LIN, HIN)	t_{ON}	$V_{LIN/HIN}$ = 0V or 3,3V				Tj=25℃ Tj=125℃	400	530	800	ns
Turn-off propagation delay (LIN, HIN)	t_{OFF}	$V_{LIN/HIN}$ = 0V or 3,3V				Tj=25℃ Tj=125℃	360	490	760	
FAULT reset time	t_{RST}					Tj=25℃ Tj=125℃		4		ms
Fixed deadtime between high and low side	t_{DT}	$V_{LIN/HIN}$ = 0V & 3,3V				Tj=25℃ Tj=125℃	150	310		ns
Thermistor										
Rated resistance	R					Tj=25℃		22000		Ω
Deviation of R25	ΔR/R					Tc=100℃	-5		5	%
Power dissipation	P					Tc=100℃		200		mW
Power dissipation constant						Tj=25℃		2		mW/K
B-value	$B_{(25/50)}$	Tol. ±3%				Tj=25℃		3950		K
B-value	$B_{(25/100)}$	Tol. ±3%				Tj=25℃		3998		K
Vincotech NTC Reference						Tj=25℃			B	
PFC Driver										
Base resistor	R_b							100		Ω
Base pull down resistor	R_{bpd}							2,7		KΩ
Thermal Resistance Junction - heat sink	R_{thJS}							≤105		K/W
DC Characteristics										
DC current gain	h_{FE}	I_C=100 mA, V_{CE}=1 V				Tj=25℃	160	250	400	
		I_C=300 mA, V_{CE}=1 V					100			
Collector-emitter saturation voltage	V_{CEsat}	I_C=500 mA, I_B=50 mA							0,7	V
Base emitter saturation voltage	V_{BEsat}								1,2	
AC Characteristics										
Transition frequency	f_T	I_C=50 mA, V_{CE}=5 V, f=100 MHz				Tj=25℃		170		MHz
Collector-base capacitance	C_{cb}	f=1 Mhz, V_{BE}=10 V						6		pF
Emitter-base capacitance	C_{eb}	V_{EB}= 0,5 V, f=1 MHz						60		

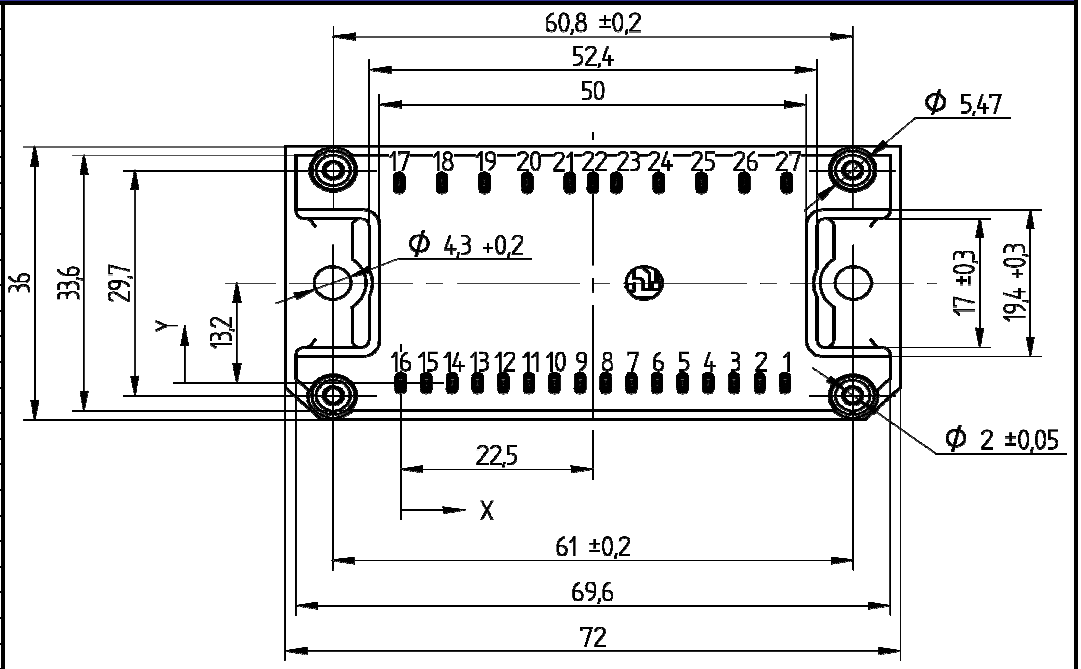
Ordering Code and Marking - Outline - Pinout

Ordering Code & Marking

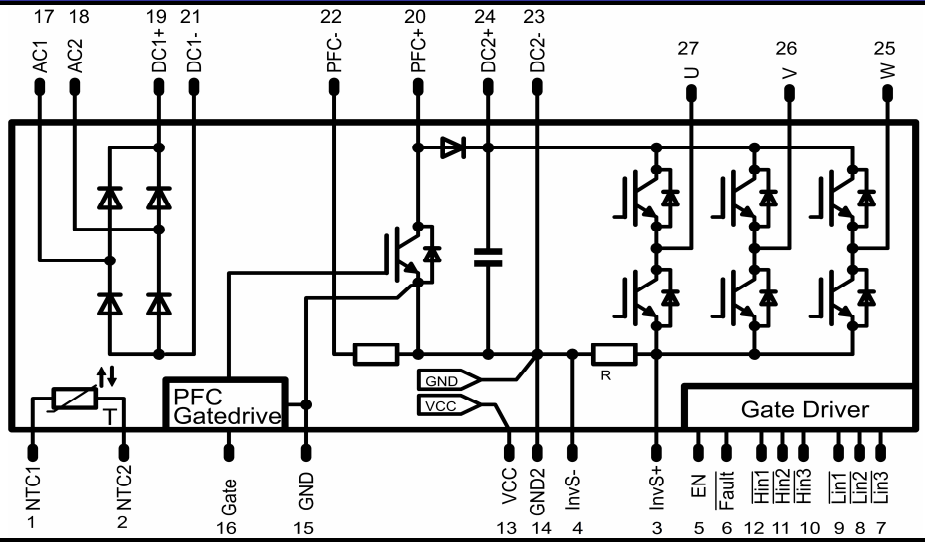
Version	Ordering Code	in DataMatrix as	in packaging barcode as
without thermal paste 17mm housing	20-1B06IPB006RC01-P953A45	P953A45	P953A45
without thermal paste 17mm housing pressfit pins	20-PB06IPB006RC01-P953A45Y	P953A45Y	P953A45Y

Outline

Pin table		
Pin	X	Y
1	45	0
2	42	0
3	39	0
4	36	0
5	33	0
6	30	0
7	27	0
8	24	0
9	21	0
10	18	0
11	15	0
12	12	0
13	9	0
14	6	0
15	3	0
16	0	0
17	-0,2	26,4
18	4,8	26,4
19	9,8	26,4
20	14,8	26,4
21	19,8	26,4
22	22,5	26,4
23	25,2	26,4
24	30,2	26,4
25	35,2	26,4
26	40,2	26,4
27	45,2	26,4



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.

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