

flowSOL 0 BI
600V/18A
Features

- High efficiency
- Ultra fast switching frequency
- Low inductive design
- SiC in boost and H bridge

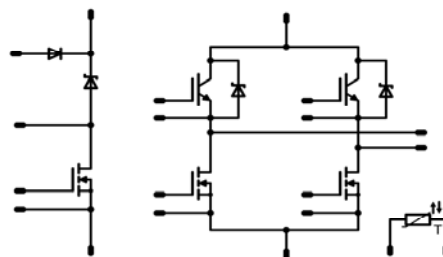
Target Applications

- Transformerless solar inverters

Types

- FZ06BIA099FS

flow0 housing

Schematic


Maximum Ratings

 T_j=25°C, unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
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Bypass Diode

Repetitive peak reverse voltage	V _{RRM}		1600	V
Forward current per diode	I _{FAV}	DC current T _h =80°C T _c =80°C	28 38	A
Surge forward current	I _{FSM}	t _p =10ms T _j =25°C	220	A
I ² t-value	I ² t		220	A ² s
Power dissipation per Diode	P _{tot}	T _j =T _{jmax} T _h =80°C T _c =80°C	33 50	W
Maximum Junction Temperature	T _{jmax}		150	°C

Input Boost MOSFET

Drain to source breakdown voltage	V _{DS}		600	V
DC drain current	I _D	T _j =T _{jmax} T _h =80°C T _c =80°C	16 22	A
Pulsed drain current	I _{Dpulse}	t _p limited by T _{jmax}	112	A
Power dissipation	P _{tot}	T _j =T _{jmax} T _h =80°C T _c =80°C	54 96	W
Gate-source peak voltage	V _{GS}		±20	V
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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Input Boost Diode

Peak Repetitive Reverse Voltage	V_{RRM}	$T_j=25^{\circ}\text{C}$	600	V
DC forward current	I_F	$T_j=T_{jmax}$ $T_h=80^{\circ}\text{C}$ $T_c=80^{\circ}\text{C}$	12 17	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax} $T_c=110^{\circ}\text{C}$	34	A
Power dissipation	P_{tot}	$T_j=T_{jmax}$ $T_h=80^{\circ}\text{C}$ $T_c=80^{\circ}\text{C}$	23 41	W
Maximum Junction Temperature	T_{jmax}		175	$^{\circ}\text{C}$

Buck Diode

Peak Repetitive Reverse Voltage	V_{RRM}	$T_j=25^{\circ}\text{C}$	600	V
DC forward current	I_F	$T_j=T_{jmax}$ $T_h=80^{\circ}\text{C}$ $T_c=80^{\circ}\text{C}$	8 11	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax} $T_c=110^{\circ}\text{C}$	17	A
Power dissipation per Diode	P_{tot}	$T_j=T_{jmax}$ $T_h=80^{\circ}\text{C}$ $T_c=80^{\circ}\text{C}$	17 31	W
Maximum Junction Temperature	T_{jmax}		175	$^{\circ}\text{C}$

Buck MOSFET

Drain to source breakdown voltage	V_{DS}		600	V
DC drain current	I_D	$T_j=T_{jmax}$ $T_h=80^{\circ}\text{C}$ $T_c=80^{\circ}\text{C}$	16 22	A
Pulsed drain current	I_{Dpulse}	t_p limited by T_{jmax} $T_c=25^{\circ}\text{C}$	112	A
Power dissipation	P_{tot}	$T_j=T_{jmax}$ $T_h=80^{\circ}\text{C}$ $T_c=80^{\circ}\text{C}$	54 96	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	$T_j=T_{jmax}$ $T_h=80^{\circ}\text{C}$ $T_c=80^{\circ}\text{C}$	22 27	A
Repetitive peak collector current	I_{Cpuls}	t_p limited by T_{jmax}	60	A
Power dissipation per IGBT	P_{tot}	$T_j=T_{jmax}$ $T_h=80^{\circ}\text{C}$ $T_c=80^{\circ}\text{C}$	50 75	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	$^{\circ}\text{C}$

Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
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Thermal Properties

Storage temperature	T_{stg}		-40...+125	$^{\circ}\text{C}$
Operation temperature under switching condition	T_{op}		-40...+($T_{j\text{max}}$ - 25)	$^{\circ}\text{C}$

Insulation Properties

Insulation voltage	V_{is}	$t=2\text{s}$ 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 $V_{GS}[V]$	$V_i[V]$ or $V_{CE}[V]$ or $V_{DS}[V]$	$I_c[A]$ or $I_F[A]$ or $I_D[A]$	T_j	Min	Typ	Max	
Bypass Diode										
Forward voltage	V_{sol}	inverted			10	$T_j=25^{\circ}C$ $T_j=125^{\circ}C$	0,7	1,06 0,99	1,3	V
Threshold voltage (for power loss calc. only)	V_{th}					$T_j=25^{\circ}C$ $T_j=125^{\circ}C$		0,90 0,75		V
Slope resistance (for power loss calc. only)	r_t					$T_j=25^{\circ}C$ $T_j=125^{\circ}C$		0,01 0,02		Ω
Reverse current	I_r			1200		$T_j=25^{\circ}C$ $T_j=125^{\circ}C$			0,05	mA
Thermal resistance chip to heatsink per chip	R_{thJA}	Thermal grease thickness $\leq 50\mu m$ $\lambda = 1 W/mK$						2,12		K/W
Input Boost MOSFET										
Static drain to source ON resistance	$R_{DS(on)}$		10		18	$T_j=25^{\circ}C$ $T_j=125^{\circ}C$		0,09 0,2		Ω
Gate threshold voltage	$V_{(GS)th}$	$V_{GS}=V_{DS}$			0,0012	$T_j=25^{\circ}C$ $T_j=125^{\circ}C$	2,5	3	3,5	V
Gate to Source Leakage Current	I_{gss}		20	0		$T_j=25^{\circ}C$ $T_j=125^{\circ}C$			200	nA
Zero Gate Voltage Drain Current	I_{dss}		0	600		$T_j=25^{\circ}C$ $T_j=125^{\circ}C$			25000	nA
Turn On Delay Time	$t_{d(ON)}$	$R_{goff}=1,7 \Omega$ $R_{gon}=1,7 \Omega$	13	400	18	$T_j=25^{\circ}C$ $T_j=125^{\circ}C$		15		ns
Rise Time	t_r					$T_j=25^{\circ}C$ $T_j=125^{\circ}C$		12		
Turn off delay time	$t_{d(OFF)}$					$T_j=25^{\circ}C$ $T_j=125^{\circ}C$		75		
Fall time	t_f					$T_j=25^{\circ}C$ $T_j=125^{\circ}C$		6		
Turn-on energy loss per pulse	E_{on}	$R_{gon}=1,7 \Omega$	10	480	18	$T_j=25^{\circ}C$ $T_j=125^{\circ}C$		tbd		mWs
Turn-off energy loss per pulse	E_{off}					$T_j=25^{\circ}C$ $T_j=125^{\circ}C$		tbd		
Total gate charge	Q_g					$T_j=25^{\circ}C$ $T_j=125^{\circ}C$		119		
Gate to source charge	Q_{gs}					$T_j=25^{\circ}C$ $T_j=125^{\circ}C$		14		
Gate to drain charge	Q_{gd}					$T_j=25^{\circ}C$ $T_j=125^{\circ}C$		61		nC
Input capacitance	C_{iss}	$f=1MHz$	0	100		$T_j=25^{\circ}C$		2660		pF
Output capacitance	C_{oss}							154		
Reverse transfer capacitance	C_{rss}							100		
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness $\leq 50\mu m$ $\lambda = 1 W/mK$						1,3		K/W
Input Boost Diode										
Forward voltage	V_F				8	$T_j=25^{\circ}C$ $T_j=150^{\circ}C$		1,6 1,9		V
Reverse leakage current	I_{rm}		10	480	8	$T_j=25^{\circ}C$ $T_j=150^{\circ}C$			400	μA
Peak recovery current	I_{RRM}	$R_{gon}=1,7 \Omega$	10	480	8	$T_j=25^{\circ}C$ $T_j=150^{\circ}C$		tbd		A
Reverse recovery time	t_{rr}					$T_j=25^{\circ}C$ $T_j=150^{\circ}C$		tbd		ns
Reverse recovery charge	Q_{rr}					$T_j=25^{\circ}C$ $T_j=150^{\circ}C$		tbd		μC
Reverse recovered energy	E_{rec}					$T_j=25^{\circ}C$ $T_j=150^{\circ}C$		tbd		mWs
Peak rate of fall of recovery current	$di(rec)_{max}/dt$					$T_j=25^{\circ}C$ $T_j=150^{\circ}C$		tbd		A/ μs
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness $\leq 50\mu m$ $\lambda = 1 W/mK$						3,00		K/W

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 Diode										
Diode forward voltage	V_F				4	$T_j=25^{\circ}C$ $T_j=150^{\circ}C$		1,60 1,90		V
Peak reverse recovery current	I_{RRM}	$R_{gon}=1,7 \Omega$	10	480	4	$T_j=25^{\circ}C$ $T_j=150^{\circ}C$		tbd		A
Reverse recovery time	t_{rr}					$T_j=25^{\circ}C$ $T_j=150^{\circ}C$		tbd		ns
Reverse recovered charge	Q_{rr}					$T_j=25^{\circ}C$ $T_j=150^{\circ}C$		tbd		μC
Peak rate of fall of recovery current	$di(rec)_{max}/dt$					$T_j=25^{\circ}C$ $T_j=150^{\circ}C$		tbd		A/ μs
Reverse recovered energy	E_{rec}					$T_j=25^{\circ}C$ $T_j=150^{\circ}C$		tbd		mWs
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness $\leq 50\mu m$ $\lambda = 1 W/mK$						4		K/W
Buck MOSFET										
Static drain to source ON resistance	$R_{ds(on)}$		10		18	$T_j=25^{\circ}C$ $T_j=125^{\circ}C$		90 200		m Ω
Gate threshold voltage	$V_{(GS)th}$			$V_{DS}=V_{GS}$	0,0012	$T_j=25^{\circ}C$ $T_j=125^{\circ}C$	2,5	3	3,5	V
Gate to Source Leakage Current	I_{gss}		20	0		$T_j=25^{\circ}C$ $T_j=125^{\circ}C$			200	nA
Zero Gate Voltage Drain Current	I_{dss}		0	600		$T_j=25^{\circ}C$ $T_j=125^{\circ}C$			25000	nA
Turn On Delay Time	$t_{d(ON)}$	$R_{goff}=1,7 \Omega$ $R_{gon}=1,7 \Omega$	13	400	18	$T_j=25^{\circ}C$ $T_j=125^{\circ}C$		15		ns
Rise Time	t_r					$T_j=25^{\circ}C$ $T_j=125^{\circ}C$		12		
Turn off delay time	$t_{d(OFF)}$					$T_j=25^{\circ}C$ $T_j=125^{\circ}C$		75		
Fall time	t_f					$T_j=25^{\circ}C$ $T_j=125^{\circ}C$		6		
Turn-on energy loss per pulse	E_{on}					$T_j=25^{\circ}C$ $T_j=125^{\circ}C$		tbd		mWs
Turn-off energy loss per pulse	E_{off}					$T_j=25^{\circ}C$ $T_j=125^{\circ}C$		tbd		
Total gate charge	Q_g		10	480	18	$T_j=25^{\circ}C$		119		nC
Gate to source charge	Q_{gs}							14		
Gate to drain charge	Q_{gd}							61		
Input capacitance	C_{iss}	$f=1MHz$	0	100		$T_j=25^{\circ}C$		2660		pF
Output capacitance	C_{oss}							154		
Reverse transfer capacitance	C_{rss}							100		
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness $\leq 50\mu m$ $\lambda = 1 W/mK$						1,30		K/W

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	$V_{GE(th)}$	$V_{CE}=V_{GE}$			0,0029	$T_j=25^{\circ}C$ $T_j=150^{\circ}C$	5	5,8	6,5	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		7	$T_j=25^{\circ}C$ $T_j=150^{\circ}C$		1,20 1,25		V
Collector-emitter cut-off incl diode	I_{CES}		0	600		$T_j=25^{\circ}C$ $T_j=150^{\circ}C$			0,14	mA
Gate-emitter leakage current	I_{GES}		20	0		$T_j=25^{\circ}C$ $T_j=150^{\circ}C$			350	nA
Integrated Gate resistor	R_{gint}							none		Ω
Input capacitance	C_{ies}	$f=1MHz$	0	25		$T_j=25^{\circ}C$		1100		pF
Output capacitance	C_{oss}							71		
Reverse transfer capacitance	C_{rss}							32		
Gate charge	Q_{Gate}		15	480	20	$T_j=25^{\circ}C$		120		nC
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness $\leq 50\mu m$ $\lambda = 1 W/mK$						1,92		K/W
Note: For the Boost IGBT only LF switching allowed										
Thermistor										
Rated resistance*	R_{25}	Tol. $\pm 5\%$				$T_j=25^{\circ}C$	20,9	22	23,1	k Ω
	R_{100}					$T_j=100^{\circ}C$		1486		Ω
Power dissipation	P					$T_j=25^{\circ}C$		200		mW
B-value	$B_{(25/100)}$	Tol. $\pm 3\%$				$T_j=25^{\circ}C$		3998		K

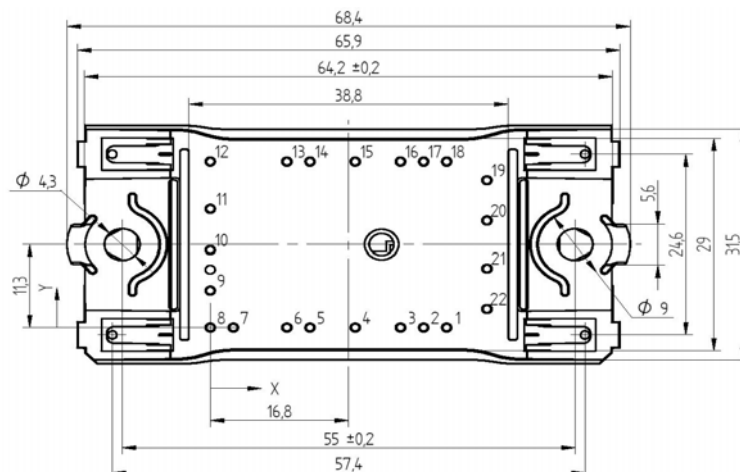
Ordering Code and Marking - Outline - Pinout

Ordering Code & Marking

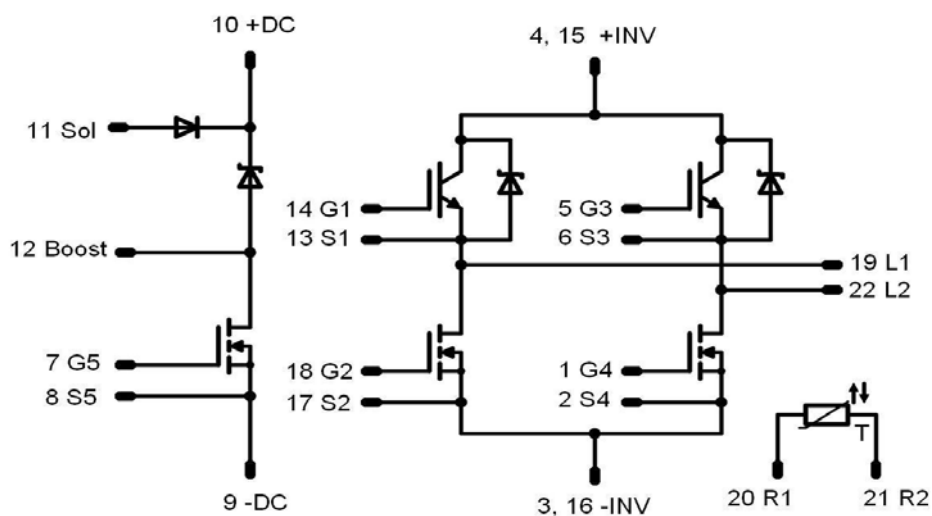
	Ordering Code	in DataMatrix as	in packaging barcode as
without thermal paste 12mm housing	10-FZ06BIA099FS-P893E	P893E	P893E

Outline

Pin table		
Pin	X	Y
1	28,7	0
2	25,9	0
3	23,1	0
4	17,6	0
5	12,1	0
6	9,3	0
7	2,8	0
8	0	0
9	0	5,05
10	0	10,55
11	0	16,15
12	0	22,6
13	9,3	22,6
14	12,1	22,6
15	17,6	22,6
16	23,1	22,6
17	25,9	22,6
18	28,7	22,6
19	33,6	20,05
20	33,6	14,55
21	33,6	8,05
22	33,6	2,55



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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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.