

flow90CON 1

1600V/35A

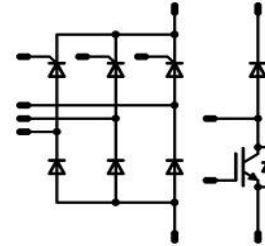
Features

- 3- phase input rectifier with or without BRC
- *optional half controlled
- Compatible with flow 90PACK 1
- Support designs with 90° mounting angle between heatsink and PCB
- Clip-in PCB mounting

flow90 housing

Target Applications

- Motor drives
- Servo drives

Schematic

Types

- V23990-P717-G-PM
- V23990-P717-GXX-PM half controlled

Maximum Ratings

 T_j=25°C, unless otherwise specified

Parameter	Symbol	Condition	Value	Unit	
Input Rectifier 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	39 53	A
Surge forward current	I _{FSM}	t _p =10ms	T _j =45°C	600	A
I ² t-value	I ² t			1800	A ² s
Power dissipation per Diode	P _{tot}	T _j =T _{jmax}	T _h =80°C T _c =80°C	44 67	W
Maximum Junction Temperature	T _{jmax}			150	°C

Input Rectifier Thyristor

Repetitive peak reverse voltage	V _{RRM}			1600	V
Forward average current	I _{FAV}	sine, d=0.5 T _j =T _{jmax}	T _h =80°C T _c =80°C	36 48	A
Surge forward current	I _{FSM}	t _p =10ms	T _j =45°C	360	A
I ² t-value	I ² t			650	A ² s
Power dissipation per Thyristor	P _{tot}	T _j =T _{jmax}	T _h =80°C T _c =80°C	56 84	W
Maximum Junction Temperature	T _{jmax}			150	°C

Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit	
Brc Transistor					
Collector-emitter break down voltage	V_{CE}		1200	V	
DC collector current	I_C	$T_j=T_{jmax}$	$T_h=80^{\circ}\text{C}$	18	A
			$T_c=80^{\circ}\text{C}$	23	
Repetitive peak collector current	I_{Cpuls}	t_p limited by T_{jmax}	75	A	
Power dissipation per IGBT	P_{tot}	$T_j=T_{jmax}$	$T_h=80^{\circ}\text{C}$	47	W
			$T_c=80^{\circ}\text{C}$	66	
Gate-emitter peak voltage	V_{GE}		± 20	V	
Short circuit ratings	t_{SC}	$T_j \leq 150^{\circ}\text{C}$	10	μs	
	V_{CC}	$V_{GE}=15\text{V}$	1200	V	
Maximum Junction Temperature	T_{jmax}		150	$^{\circ}\text{C}$	

Brc. Inverse Diode

Peak Repetitive Reverse Voltage	V_{RRM}	$T_c=25^{\circ}\text{C}$	1200	V	
DC forward current	I_F	$T_j=T_{jmax}$	$T_h=80^{\circ}\text{C}$	8	A
			$T_c=80^{\circ}\text{C}$	8	
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	6	A	
Brc. Inverse Diode	P_{tot}	$T_j=T_{jmax}$	$T_h=80^{\circ}\text{C}$	20	W
			$T_c=80^{\circ}\text{C}$	30	
Maximum Junction Temperature	T_{jmax}		150	$^{\circ}\text{C}$	

Brc. Diode

Peak Repetitive Reverse Voltage	V_{RRM}	$T_j=25^{\circ}\text{C}$	1200	V	
DC forward current	I_F	$T_j=T_{jmax}$	$T_h=80^{\circ}\text{C}$	13	A
			$T_c=80^{\circ}\text{C}$	17	
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	15	A	
Power dissipation per Diode	P_{tot}	$T_j=T_{jmax}$	$T_h=80^{\circ}\text{C}$	26	W
			$T_c=80^{\circ}\text{C}$	40	
Maximum Junction Temperature	T_{jmax}		150	$^{\circ}\text{C}$	

Thermal Properties

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

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

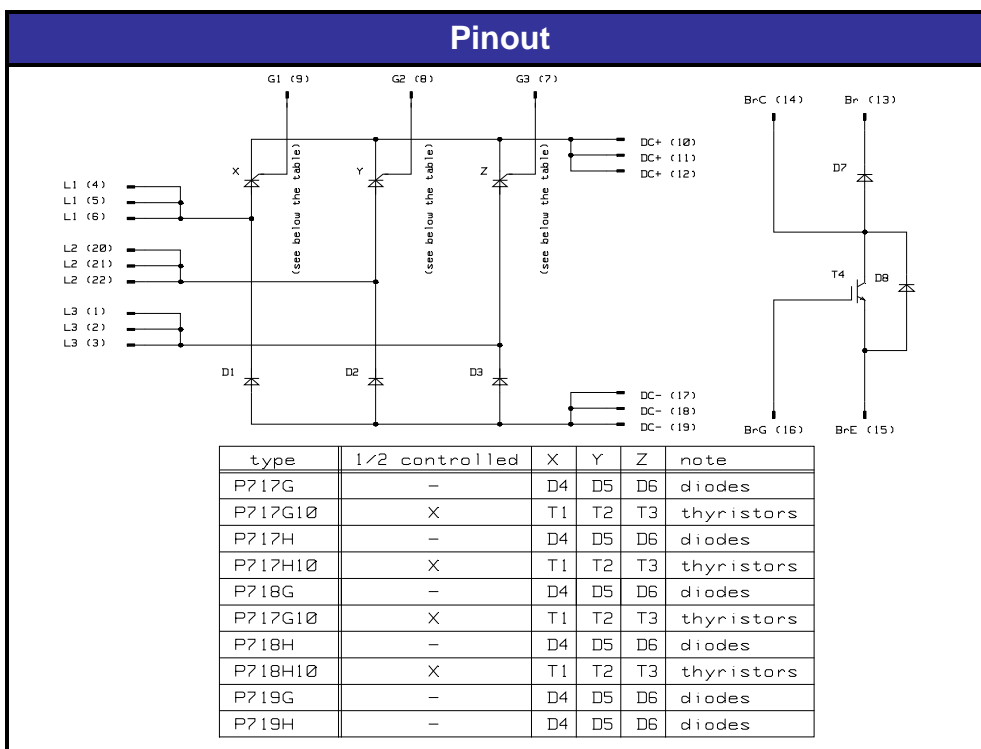
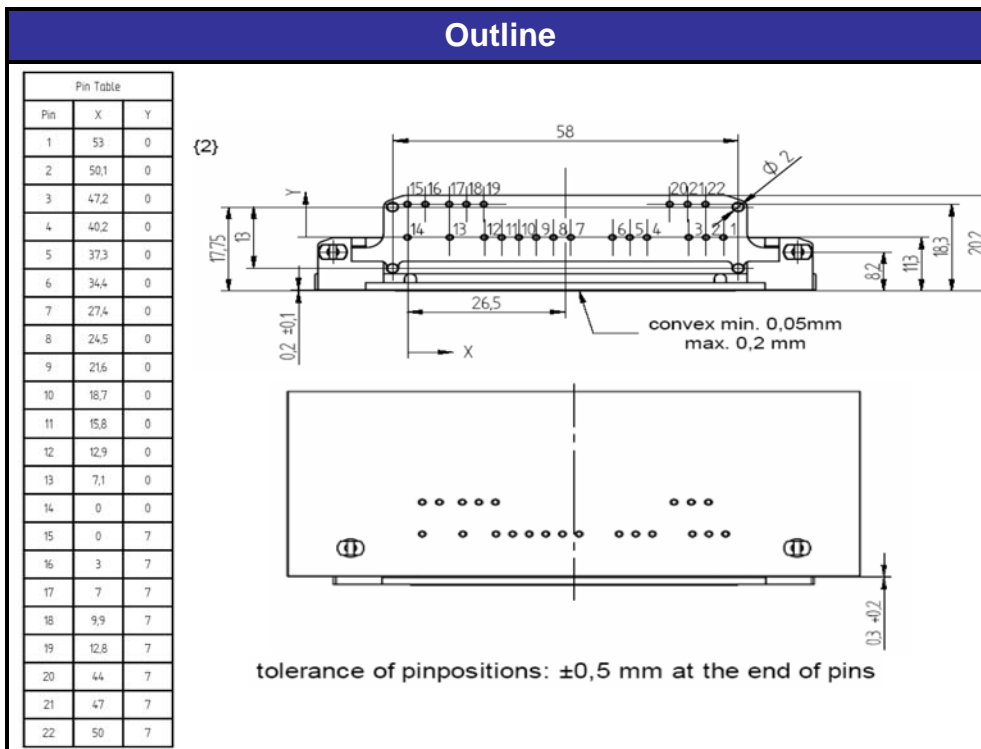
Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
		V_{GE} [V] or V_{GS} [V]	V_r [V] or V_{CE} [V] or V_{DS} [V]	I_c [A] or I_f [A] or I_o [A]	T_j	Min	Typ	Max		
Input Rectifier Diode										
Forward voltage	V_F				42	$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$	0,8	1,21 1,18	1,5	V
Threshold voltage (for power loss calc. only)	V_{to}				42	$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$		0,92 0,82		V
Slope resistance (for power loss calc. only)	r_t				42	$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$		0,01 0,01		Ω
Reverse current	I_r			1600		$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$			0,02	mA
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness \leq 50um $\lambda = 0,61$ W/mK						1,58		K/W
Thermal resistance chip to case per chip	R_{thJC}							1,04		
Input Rectifier Thyristor										
Forward voltage	V_F				35	$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$	1	1,41 1,48	1,8	V
Threshold voltage (for power loss calc. only)	V_{to}		VD=6 V		35	$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$		0,97 0,85		V
Slope resistance (for power loss calc. only)	r_t				35	$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$		12,49 17,85		m Ω
Reverse current	I_r			1200		$T_j=25^\circ\text{C}$ $T_j=150^\circ\text{C}$			0,05 8	mA
Gate controlled delay time	t_{GD}	IG=0,5A VD=1/2 VDRM				$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$			2	μs
Gate controlled rise time	t_{GR}					$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$		tbd.		μs
Critical rate of rise of off-state voltage	(dv/dt) _{cr}	VD=2/3 VDRM linear voltage rise				$T_j=150^\circ\text{C}$			1000	V/ μs
Critical rate of rise of on-state current	(di/dt) _{cr}	VD=2/3 VDRM IG=0,3A; f=50Hz	tp=200 μs		40	$T_j=150^\circ\text{C}$			500	A/ μs
Circuit commutated turn-off time	t_q	VD=2/3 VDRM	tp=200 μs	100	27	$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$		200		μs
Holding current	I_H		VD=6 V			$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$			100	mA
Latching current	I_L	IG=0,3A tp=10 μs				$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$			150	mA
Gate trigger voltage	V_{GT}		VD=6			$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$			1,5	V
Gate trigger current	I_{GT}		VD=6			$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$			55	mA
Gate non-trigger voltage	V_{GD}	VD=2/3 VDRM				$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$			0,2	V
Gate non-trigger current	I_{GD}	VD=2/3 VDRM				$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$			3	mA
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness \leq 50um $\lambda = 0,61$ W/mK						1,26		K/W
Thermal resistance chip to case per chip	R_{thJC}							0,83		
Brc Transistor										
Gate emitter threshold voltage	$V_{GE(th)}$	VCE=VGE			0,001	$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$	5	5,8	6,5	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		25	$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$	1,3	2,17 2,65	2,2	V
Collector-emitter cut-off incl diode	I_{CES}		0	1200		$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$			0,25	mA
Gate-emitter leakage current	I_{GES}		20	0		$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$			650	nA
Integrated Gate resistor	R_{gint}							8		Ω
Turn-on delay time	$t_{d(on)}$	Rgon=32 Ω Rgoff=16 Ω	± 15	600	25	$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$		20,8 25,2		ns
Rise time	t_r					$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$		16,7 18		
Turn-off delay time	$t_{d(off)}$					$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$		193 335		
Fall time	t_f					$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$		112 170		
Turn-on energy loss per pulse	E_{on}					$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$		1,80 1,16		
Turn-off energy loss per pulse	E_{off}					$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$		1,77 1,52		
Input capacitance	C_{ies}									
Output capacitance	C_{oss}	f=1MHz	0	25		$T_j=25^\circ\text{C}$		95		pF
Reverse transfer capacitance	C_{rss}							82		
Gate charge	Q_{gate}		15	960	25	$T_j=25^\circ\text{C}$		155		nC
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness \leq 50um $\lambda = 0,61$ W/mK						1,6		K/W
Thermal resistance chip to case per chip	R_{thJC}							1,06		

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		
Brc. Inverse Diode										
Diode forward voltage	V_F				3	$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$	1	1,6 1,57	2,2	V
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness \leq 50 μm						3,49		K/W
Thermal resistance chip to case per chip	R_{thJC}	$\lambda = 0,61 \text{ W/mK}$						2,30		K/W
Brc. Diode										
Diode forward voltage	V_F				7,5	$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$	1	1,62 1,67	2,2	V
Reverse leakage current	I_r		± 15	300	7,5	$T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$			250	μA
Peak reverse recovery current	I_{RRM}	Rgon=32 Ω Rgon=32 Ω	± 15	300	7,5	$T_j=25^\circ\text{C}$		17		A
Reverse recovery time	t_{rr}					$T_j=125^\circ\text{C}$		17		ns
Reverse recovered charge	Q_{rr}					$T_j=25^\circ\text{C}$		332		
						$T_j=125^\circ\text{C}$		505		
Peak rate of fall of recovery current	$di(\text{rec})_{\text{max}}/dt$					$T_j=25^\circ\text{C}$		1,79		μC
						$T_j=125^\circ\text{C}$		2,78		
Reverse recovery energy	E_{rec}					$T_j=25^\circ\text{C}$		495		A/ μs
						$T_j=125^\circ\text{C}$		210		
						$T_j=25^\circ\text{C}$		1,79		mWs
						$T_j=125^\circ\text{C}$		2,78		
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness \leq 50 μm						2,65		K/W
Thermal resistance chip to case per chip	R_{thJC}	$\lambda = 0,61 \text{ W/mK}$						1,75		

Package Outline and Pinout



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