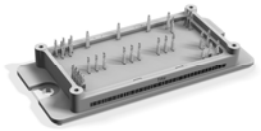
flowCON 2 **1200V/150A**

Features

- Input rectifier with brake
- With flowPACK 2 up to 30 kW inverters
- Press-fir pins for easy assembly

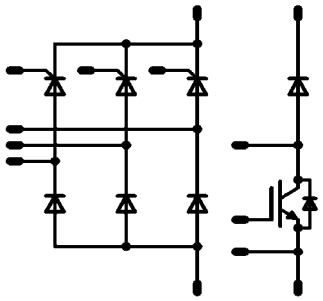
Flow 2 housing



Target Applications

- Motor Drive
- Power Generation

Schematic



Types

- V23990-P690-G12-PM

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℃	174 160	A
Surge forward current	I_{FSM}	t_p=10ms	T_j=25℃	2000	A
I2t-value	I^2t			13600	A^2s
Power dissipation per Diode	P_{tot}	T_j=$T_j$max	T_h=80℃ T_c=80℃	209 317	W
Maximum Junction Temperature	$T_j$max			150	℃
Input Rectifier Thyristor					
Repetitive peak reverse voltage	V_{RRM}			1600	V
Forward average current	I_{FAV}	sine,d=0.5 T_j=$T_j$max	T_h=80℃ T_c=80℃	150 180	A
Surge forward current	I_{FSM}	t_p=10ms	T_j=25℃	1250	A
I2t-value	I^2t			7810	A^2s
Power dissipation per Thyristor	P_{tot}	T_j=$T_j$max	T_h=80℃ T_c=80℃	198 300	W
Maximum Junction Temperature	$T_j$max			130	℃

Maximum Ratings

T_j=25℃, unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
Brake Transistor				
Collector-emitter break down voltage	V_{CE}		1200	V
DC collector current	I_C	T_j=$T_j$max; T_h=80℃	114	A
		T_c=80℃	120	
Repetitive peak collector current	I_{Cpuls}	t_p limited by $T_j$max	300	A
Turn off safe operating area		VCE ≤ 1200V, Tj ≤ Top max	200	A
Power dissipation per IGBT	P_{tot}	T_j=$T_j$max; T_h=80℃	245	W
		T_c=80℃	372	
Gate-emitter peak voltage	V_{GE}		±20	V
Short circuit ratings	t_{SC}	T_j≤150℃	10	µs
	V_{CC}	V_{GE}=15V	360	V
Maximum Junction Temperature	$T_j$max		175	℃
Brake Inverse Diode				
Peak Repetitive Reverse Voltage	V_{RRM}	T_c=25℃	1200	V
DC forward current	I_F	T_j=$T_j$max; T_h=80℃	12	A
		T_c=80℃	12	
Repetitive peak forward current	I_{FRM}	t_p limited by $T_j$max	15	A
Brake Inverse Diode	P_{tot}	T_j=$T_j$max; T_h=80℃	38	W
		T_c=80℃	58	
Maximum Junction Temperature	$T_j$max		150	℃
Brake 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℃	58	A
		T_c=80℃	77	
Repetitive peak forward current	I_{FRM}	t_p limited by $T_j$max	100	A
Power dissipation per Diode	P_{tot}	T_j=$T_j$max; T_h=80℃	109	W
		T_c=80℃	165	
Maximum Junction Temperature	$T_j$max		175	℃
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				106	Tj=25℃ Tj=125℃		1,24 1,20		V
Threshold voltage (for power loss calc. only)	V_{to}					Tj=25℃ Tj=125℃		0,95 0,78		V
Slope resistance (for power loss calc. only)	r_t					Tj=25℃ Tj=125℃		1,70 2,49		mΩ
Reverse current	I_r			1600		Tj=25℃ Tj=125℃		0,1		mA
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness≤50um λ = 1 W/mK						0,33		K/W
Thermal resistance chip to heatsink per chip	R_{thJC}							0,22		
Input Rectifier Thyristor										
Forward voltage	V_F	Ig=100mA			125	Tj=25℃ Tj=125℃	0,8	1,32 1,27	1,55	V
Threshold voltage (for power loss calc. only)	V_{to}				125	Tj=25℃ Tj=125℃		1,08 0,98		V
Slope resistance (for power loss calc. only)	r_t				125	Tj=25℃ Tj=125℃		0,0020 0,0023		mΩ
Reverse current	I_r			1500		Tj=25℃ Tj=125℃			450	mA
Gate controlled delay time	t_{GD}	Ig=1A; dIg/dt=1A/u		1072		Tj=25℃ Tj=125℃		1		µs
Gate controlled rise time	t_{GR}					Tj=25℃ Tj=125℃		2		µs
Critical rate of rise of off-state voltage	(dv/dt)cr					Tj=25℃ Tj=125℃			200	V/µs
Critical rate of rise of on-state current	(di/dt)cr					Tj=25℃ Tj=125℃			1000	A/µs
Circuit commutated turn-off time	t_q					Tj=25℃ Tj=125℃		157		µs
Holding current	I_H					Tj=25℃ Tj=125℃		150		mA
Latching current	I_L	Rg=33Ω				Tj=25℃ Tj=125℃		300		mA
Gate trigger voltage	V_{GT}					Tj=25℃ Tj=125℃	2			V
Gate trigger current	I_{GT}					Tj=25℃ Tj=125℃	150			mA
Gate non-trigger voltage	V_{GD}					Tj=25℃ Tj=125℃			0,25	V
Gate non-trigger current	I_{GD}					Tj=25℃ Tj=125℃			10	mA
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness≤50um λ = 1 W/mK						0,25		K/W
Thermal resistance chip to case per chip	R_{thJC}							0,17		

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	
Brake Transistor										
Gate emitter threshold voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}$			0,004	Tj=25℃ Tj=150℃	5	5,8	6,5	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		100	Tj=25℃ Tj=150℃		2,20 2,75		V
Collector-emitter cut-off incl diode	I_{CES}		0	1200		Tj=25℃ Tj=150℃			13,4	µA
Gate-emitter leakage current	I_{GES}		20	0		Tj=25℃ Tj=150℃			600	nA
Integrated Gate resistor	R_{gint}							7,5		Ω
Turn-on delay time	$t_{d(on)}$	Rgoff=X Ω Rgon=X Ω	±15	600	100	Tj=25℃ Tj=150℃		tbd		ns
Rise time	t_r					Tj=25℃ Tj=150℃		tbd		
Turn-off delay time	$t_{d(off)}$					Tj=25℃ Tj=150℃		tbd		
Fall time	t_f					Tj=25℃ Tj=150℃		tbd		
Turn-on energy loss per pulse	E_{on}					Tj=25℃ Tj=150℃		tbd		mWs
Turn-off energy loss per pulse	E_{off}					Tj=25℃ Tj=150℃		tbd		
Input capacitance	C_{ies}	f=1MHz	0	25		Tj=25℃		7210		pF
Output capacitance	C_{oss}							377		
Reverse transfer capacitance	C_{rss}							327		
Gate charge	Q_{Gate}					Tj=25℃		800		nC
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness≤50um λ = 1 W/mK						0,39		K/W
Thermal resistance chip to case per chip	R_{thJC}							0,26		
Brake Inverse Diode										
Diode forward voltage	V_F				10	Tj=25℃ Tj=125℃	1	1,59 1,54	2,3	V
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness≤50um λ = 1 W/mK						1,83		K/W
Thermal resistance chip to case per chip	R_{thJC}							1,20		
Brake Diode										
Diode forward voltage	V_F				50	Tj=25℃ Tj=150℃	1	1,69 1,71	2,3	V
Reverse leakage current	I_r	Rgon=X Ω		1200		Tj=25℃ Tj=150℃			250	µA
Peak reverse recovery current	I_{RRM}	Rgon=X Ω Rgon=0 Ω	15	300	20	Tj=25℃ Tj=150℃		tbd		A
Reverse recovery time	t_{rr}					Tj=25℃ Tj=150℃		tbd		ns
Reverse recovered charge	Q_{rr}					Tj=25℃ Tj=150℃		tbd		µC
Peak rate of fall of recovery current	di(rec)max /dt					Tj=25℃ Tj=150℃		tbd		A/µs
Reverse recovery energy	E_{rec}					Tj=25℃ Tj=150℃		tbd		mWs
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness≤50um λ = 1 W/mK						0,87		K/W
Thermal resistance chip to case per chip	R_{thJC}							0,58		

Ordering Code and Marking - Outline - Pinout

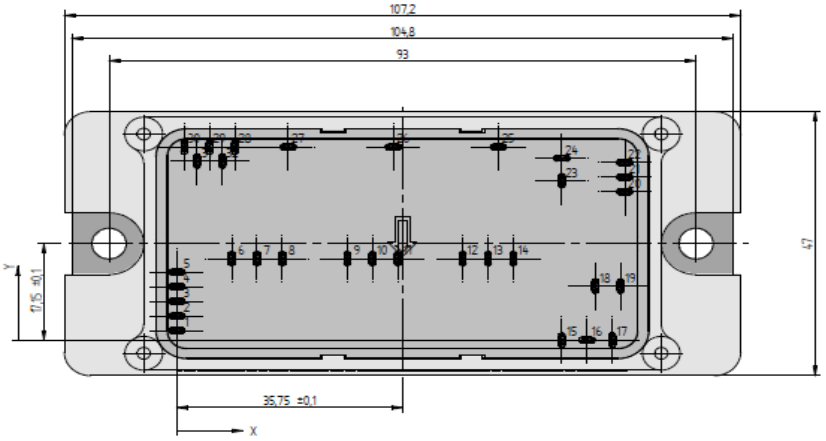
Ordering Code & Marking

Version	Ordering Code	in DataMatrix as	in packaging barcode as
without thermal paste 17mm housing	V23990-P690-G12-PM	P690G12	P690G12

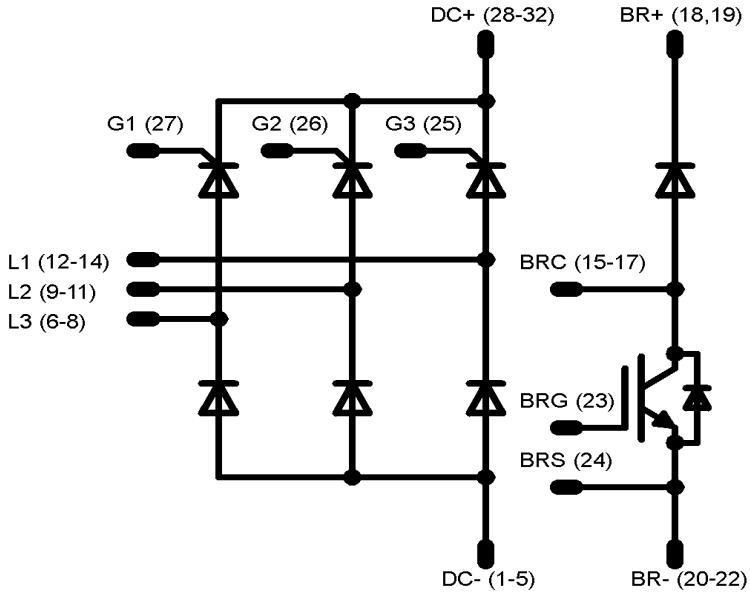
Outline

Pin table		
Pin	X	Y
1	0	1,7
2	0	4,3
3	0	6,9
4	0	9,5
5	0	12,1
6	8,7	14,5
7	12,7	14,5
8	16,7	14,5
9	27	14,5
10	31	14,5
11	35	14,5
12	45,3	14,5
13	49,3	14,5
14	53,3	14,5
15	61	0
16	65	0

Pin table		
Pin	X	Y
17	69	0
18	66,3	9,6
19	70,3	9,6
20	70,95	26,4
21	70,95	29
22	70,95	31,6
23	61	28,35
24	61	32,35
25	50,95	34,35
26	34,3	34,35
27	17,65	34,35
28	9,2	34,35
29	5,2	34,35
30	1,2	34,35
31	3,2	31,85
32	7,2	31,85



Pinout



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