

SX6800M Series Surface-Mount, Built-in Overcurrent Protection, Thermal Shutdown, and Overcurrent Limiting Circuits

Features

- A package of 6 MOSFET units for 3-phase bridge and pre-drive (HVIC, LVIC)
- Best for driving the fan motor (built-in motor) of air conditioner, etc.
- Built-in boot diode with limited resistance
- Built-in undervoltage lock out (UVLO) circuit
- Built-in overcurrent protection circuit (OCP)
- Built-in Thermal Shut Down (TSD) function
- Built-in current limiter function (OCL)
- Error (FO) terminal with shutdown input function
- 7.5V regulator output function (35mA max.)

Absolute Maximum Ratings

(Ta=25°C)

Parameter	Symbol	Ratings			Unit	Conditions
		SX68001M	SX68002M	SX68003M		
MOSFET Output Breakdown Voltage	V _{DSS}	250	500	500	V	V _{CC} =15V, V _{IN} =0V
Control Supply Voltage	V _{CC}	20	20	20	V	Between V _{CC} and COM
Control Supply Voltage (Bootstrap)	V _{BS}	20	20	20	V	Between V _B and HS (U, V, W)
Output Current (continuous)	I _O	2.0	1.5	2.5	A	
Output Current (pulse)	I _{OP}	3.0	2.25	3.75	A	PW≤100μs, duty=1%
Input Voltage	V _{IN}	-0.5 to +7	-0.5 to +7	-0.5 to +7	V	
Power Dissipation ¹	P _D	3	3	3	W	T _a =25°C
Thermal Resistance (Junction to Case)	θ _{JC}	15	15	15	°C/W	All element operation
Thermal Resistance (Junction to Ambient Air)	θ _{JA}	41.7	41.7	41.7	°C/W	All element operation
Operating Case Temperature	T _{OP}	-20 to +100	-20 to +100	-20 to +100	°C	
Junction Temperature (Power part)	T _{CH}	+150	+150	+150	°C	
Storage Temperature	T _{STG}	-40 to +150	-40 to +150	-40 to +150	°C	

¹: When mounted on a board (1.6 mm, 35μm copper layer, CEM-3, moldless, natural air cooling)

Recommended Operating Conditions

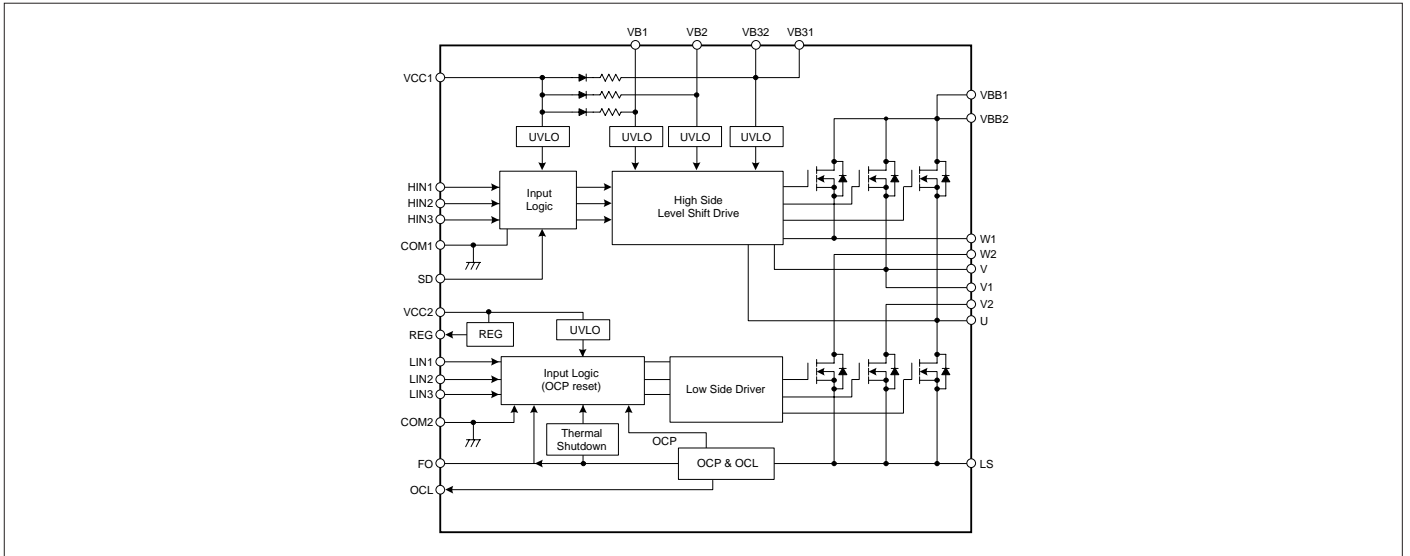
Parameter	Symbol	Ratings									Unit	Conditions
		SX68001M			SX68002M			SX68003M				
		min.	typ.	max.	min.	typ.	max.	min.	typ.	max.		
Main Supply Voltage	V _{BS}	-	150	200	-	300	400	-	300	400	V	Between V _{BS} and LS
Control Supply Voltage	V _{CC}	13.5	-	16.5	13.5	-	16.5	13.5	-	16.5	V	Between V _{CC} and COM
Input Signal Dead Time	t _{dead}	1.5	-	-	1.5	-	-	1.5	-	-	μs	
Minimum Input Pulse Width	t _w	0.5	-	-	0.5	-	-	0.5	-	-	μs	
Junction Temperature	T _J	-	-	125	-	-	125	-	-	125	°C	

Electrical Characteristics

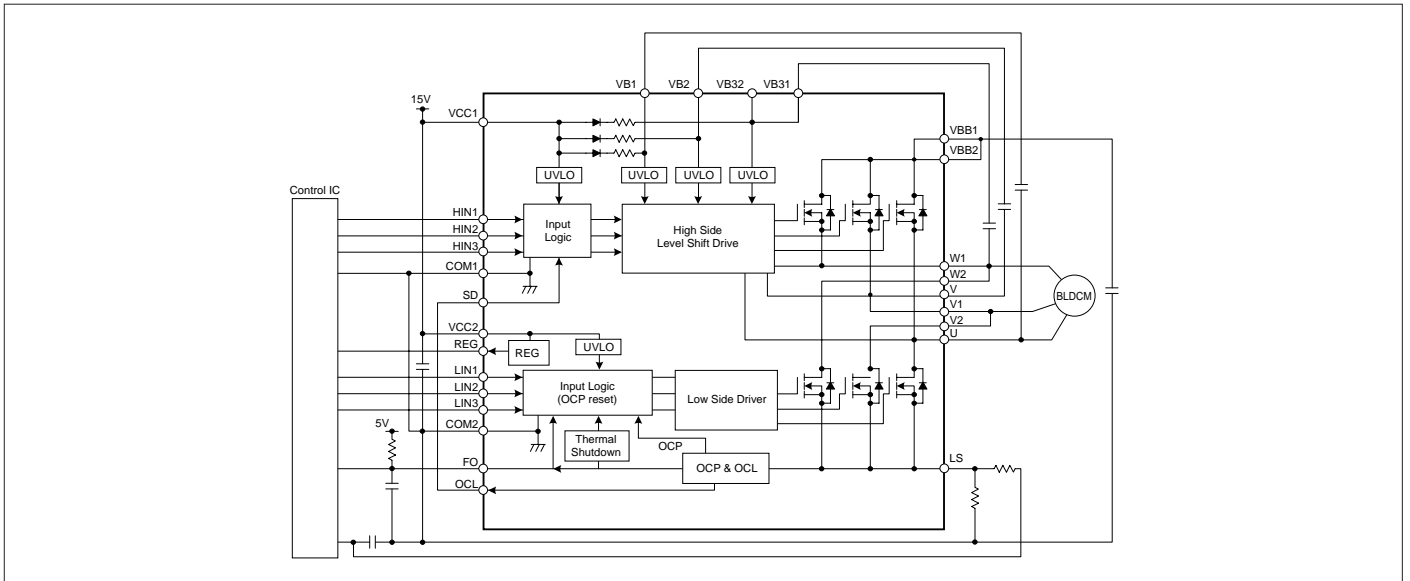
(Ta=25°C)

Parameter	Symbol	Ratings									Unit	Conditions
		SX68001M			SX68002M			SX68003M				
		min.	typ.	max.	min.	typ.	max.	min.	typ.	max.		
Control Supply Current	I _{CC}	-	4.6	7.4	-	4.6	7.4	-	4.6	7.4	mA	V _{CC1,2} =15V
Boot Supply Current	I _{BS}	-	140	280	-	140	280	-	140	280	μA	V _B +HS=15V
Input Voltage	V _{IH}	-	2.0	2.5	-	2.0	2.5	-	2.0	2.5	V	V _{CC} =15V, Output:ON
	V _{IL}	1.0	1.5	-	1.0	1.5	-	1.0	1.5	-	V	V _{CC} =15V, Output:OFF
Input Voltage Hysteresis Width	V _H	-	0.5	-	-	0.5	-	-	0.5	-	V	V _{CC} =15V
Input Current	I _{IH}	-	230	500	-	230	500	-	230	500	μA	V _{CC} =15V, V _{IN} =5V
Undervoltage Lock Out (high side)	V _{UVHL}	9.0	-	11.0	9.0	-	11.0	9.0	-	11.0	V	V _{CC} =15V
	V _{UVHH}	9.5	-	11.5	9.5	-	11.5	9.5	-	11.5	V	
Undervoltage Lock Out (low side)	V _{UVLL}	10.0	-	12.0	10.0	-	12.0	10.0	-	12.0	V	
FO Terminal Output Voltage	V _{FOL}	-	-	0.5	-	-	0.5	-	-	0.5	V	V _{CC} =15V, V _{FO} =5V, R _{FO} =10kΩ
	V _{FOH}	4.8	-	-	4.8	-	-	4.8	-	-	V	
OCL Output Voltage	V _{OCLL}	-	-	0.5	-	-	0.5	-	-	0.5	V	V _{CC} =15V
	V _{OCLH}	4.5	-	5.5	4.5	-	5.5	4.5	-	5.5	V	
Current Limiter Reference Voltage	V _{LIM}	0.6175	0.65	0.6825	0.6175	0.65	0.6825	0.6175	0.65	0.6825	V	V _{CC} =15V
Overcurrent Protection Trip Voltage	V _{TRIP}	0.9	1.0	1.1	0.9	1.0	1.1	0.9	1.0	1.1	V	V _{CC} =15V
Overcurrent Protection Retention Time	t _p	20	25	-	20	25	-	20	25	-	μs	V _{CC} =15V
OCP Blanking Time	t _{bk(ocp)}	-	2	-	-	2	-	-	2	-	μs	V _{CC} =15V
SD Terminal Blanking Time	t _{bk(ocl)}	-	3.3	-	-	3.3	-	-	3.3	-	μs	V _{CC} =15V
Thermal Protection and Release Threshold	T _{DH}	135	150	165	135	150	165	135	150	165	°C	V _{CC} =15V
	T _{DL}	105	120	135	105	120	135	105	120	135	°C	
	T _{Dhys}	-	30	-	-	30	-	-	30	-	°C	
Regulator Output Voltage	V _{REG}	6.75	7.5	8.25	6.75	7.5	8.25	6.75	7.5	8.25	V	I _{REG} =35mA
MOSFET Output Breakdown Voltage	V _{DSS}	250	-	-	500	-	-	500	-	-	V	V _{CC} =15V, I _D =100μA, V _{IN} =0V
MOSFET Output Leakage Current	I _{DSS}	-	-	100	-	-	100	-	-	100	μA	V _{CC} =15V, V _{DS} =500V(250 V for SX68001M), V _{IN} =0V
MOSFET DC ON Resistance	R _{DS(ON)}	-	1.25	1.5	-	3.2	4.0	-	2.0	2.4	Ω	V _{CC} =15V, I _D =1A(0.75 A for SX68002M or 1.25 A for SX68003M), V _{IN} =5V
Diode Forward Voltage	V _{SD}	-	1.1	1.5	-	1.0	1.5	-	1.0	1.5	V	V _{CC} =15V, I _{SD} =1A(0.75 A for SX68002M or 1.25 A for SX68003M), V _{IN} =0V
Boot Diode Leakage Current	I _{IB}	-	-	10	-	-	10	-	-	10	μA	V _B =500V(250 V for SX68001M)
Boot Diode Forward Voltage	V _{FB}	-	1.0	1.3	-	1.0	1.3	-	1.0	1.3	V	I _F =0.15A
Boot Diode Reverse Recovery Time	t _{rr}	-	70	-	-	70	-	-	70	-	ns	I _F /I _{RRP} =100mA/100mA
Boot Diode Series Resistance	R _B	-	60	-	-	60	-	-	60	-	Ω	
High Side Switching Time	t _{d(on)}	-	800	-	-	810	-	-	940	-	ns	V _{CC} =300V(150V for SX68001M), V _{CC} =15V, I _D =1A(0.75 A for SX68002M or 1.25 A for SX68003M), H _{IN} =0 to 5V, Inductive load
	t _r	-	45	-	-	60	-	-	100	-		
	t _{trr}	-	75	-	-	120	-	-	135	-		
	t _{d(off)}	-	720	-	-	815	-	-	975	-		
	t _f	-	40	-	-	40	-	-	45	-		
Low Side Switching Time	t _{d(on)}	-	750	-	-	760	-	-	900	-	ns	
	t _r	-	55	-	-	60	-	-	105	-		
	t _{trr}	-	70	-	-	110	-	-	135	-		
	t _{d(off)}	-	660	-	-	750	-	-	905	-		
	t _f	-	20	-	-	30	-	-	35	-		

Internal Block Diagram



Typical Connection Diagram



External Dimensions (SOP27)

(Unit : mm)

