

# SPI-6631M

## Features

- Power supply voltages,  $V_{BB}$ : 13 V to 33 V
- Signal power supply configuration
- Output current  $I_{out}$ : 3 A (max)... repetitive current (normal-operation current)
- Built-in current recirculation diode
- Built-in UVLO, TSD and OCP protection
- Built-in dead time function that prevents through current upon phase switching
- Built-in error sense flag output
- HSOP16-pin package

## Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit	Conditions
Main Supply Voltage	$V_{BB}$	35	V	
MOSFET Output Breakdown Voltage	$V_{DSS}$	35	V	DutyCycle=100%*
Output Current	$I_{out}$	±3	A	
Input Voltage	$V_{IN}$	-0.3 to 6.5	V	
S Terminal Voltage	$V_{SEN}$	-2 to 2	V	
Alarm Terminal Voltage	$V_{ALARM}$	6.5	V	
Alarm Input Current	$I_{ALARM}$	1	mA	
Power Dissipation	$P_D$	2.6	W	When using a Sanken evaluation board
Junction Temperature	$T_J$	150	°C	
Storage Temperature	$T_{STG}$	-30 to 150	°C	
Operating Ambient Temperature	$T_A$	-20 to 85	°C	

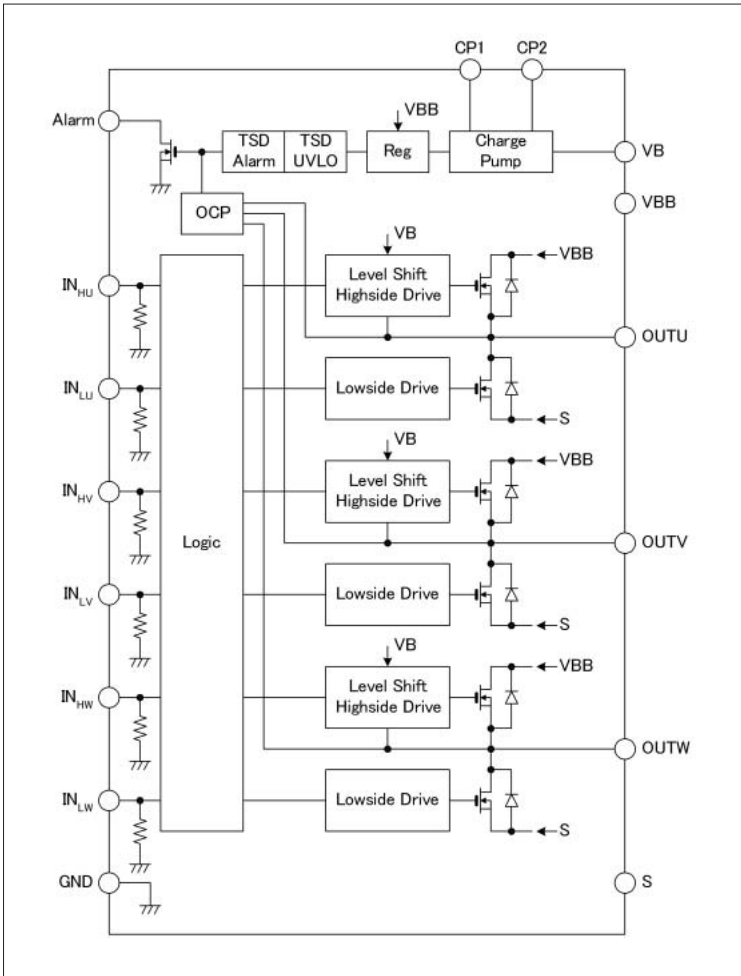
\*: Output current value may be limited, depending on the duty ratio, ambient temperature, and heating conditions. Do not exceed the rated current or maximum junction temperature ( $T_J = 150^\circ\text{C}$ ).

## Electrical Characteristics

( $T_A=25^\circ\text{C}$ ,  $V_{BB}=24\text{V}$ , unless otherwise specified)

Parameter	Symbol	Ratings			Unit	Conditions
		min.	typ.	max.		
Main Supply Voltage	$V_{BB}$	13	-	33	V	In operation
Main Supply Current	$I_{BB}$	-	-	23	mA	
Maximum Clock Pulse Width	$t_w$	-	-	3	$\mu\text{s}$	
Input Voltage	$V_{IL}$	-	-	0.8	V	
	$V_{IH}$	2.0	-	-	V	
Input Current	$I_{IL}$	-	±8	-	$\mu\text{A}$	$V_{IN(0)}$ , $V_{IN}=0.8\text{V}$
	$I_{IH}$	-	±20	-	$\mu\text{A}$	$V_{IN(1)}$ , $V_{IN}=2.0\text{V}$
Crossover Dead Time	$T_{delay}$	100	500	1200	ns	
VB Terminal Breakdown Voltage	$V_B$	-	$V_{BB}+5$	-	V	Breakdown voltage between VB and GND
VB-OUT Breakdown Voltage	$V_{B-OUT}$	-	5	-	V	
VB Terminal Current	$I_B$	-	-	3	mA	$V_{B-OUT}=5\text{V}$
Output Leakage Current	$I_{DSS}$	-	-	800	$\mu\text{A}$	$V_{OUT}=V_{BB}=35\text{V}$
		-800	-	-	$\mu\text{A}$	$V_{OUT}=0\text{V}$
MOSFET ON Resistance	$R_{DS(ON)}$	-	0.4	0.7	$\Omega$	$I_{OUT}=-1\text{A}$ , Between $V_{BB}$ and OUT $I_{OUT}=1\text{A}$ , Between OUT and S
MOSFET Diode Forward Voltage	$V_{SD}$	-	-	2.2	V	$I_{SD}=1\text{A}$
Overcurrent Sense Current	$I_{OCP}$	7	-	-	A	Short between Out and Out
Overcurrent Protection Blank Time	$t_{blank}$	0.7	1.2	4	$\mu\text{s}$	
Overcurrent Protection Delay Time	$t_{ocp}$	0.5	1	2.2	ms	
Thermal Protection Operation Temperature	$T_J$	-	170	-	°C	
Thermal Protection Hysteresis	$\Delta T_J$	-	15	-	°C	
Low Voltage Protection Operation Voltage	UVLO	4.0	4.5	5.0	V	$V_{BB}$ voltage
Low Voltage Protection Hysteresis	$\Delta\text{UVLO}$	0.4	0.45	0.5	V	
Alarm Output Voltage	$V_{ALARM}$	-	-	0.5	V	$I=1\text{mA}$

Internal Block Diagram



Pin Assignment

Pin No.	Symbol	Function
1	CP2	Capacitor terminal for charge pump 2
2	CP1	Capacitor terminal for charge pump 1
3	OUTU	DMOSFET phase U output
4	S	Sense terminal (lower arm source output)
5	OUTV	DMOSFET phase V output
6	OUTW	DMOSFET phase W output
7	Alarm	Alarm output
8	GND	Ground
9	IN <sub>LW</sub>	Phase W lower arm input
10	IN <sub>HW</sub>	Phase W upper arm input
11	IN <sub>LV</sub>	Phase V lower arm input
12	IN <sub>HV</sub>	Phase V upper arm input
13	VBB	Driver supply terminal
14	IN <sub>LU</sub>	Phase U lower arm input
15	IN <sub>HU</sub>	Phase U upper arm input
16	VB	Capacitor terminal for charging up charge pump

External Dimensions (HSOP16)

(Unit : mm)

