Ordering number : ENA1117

SANYO Semiconductors
DATA SHEET

LV5710V — Bi-CMOS LSI For camera sensor Power supply for charge pump

Overview

The LV5710V is power supply for charge pump for camera sensor.

Functions

- Regulating the 5V input by boosting it three-fold with the charge pump to the specified voltage.
- Output voltage variable with external resistor.
- Soft start function incorporated, which reduces the rush current at start of charge pump.
- Timer-latch type short-circuit protective function incorporated.

Specifications

Absolute Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{DD} max		6.0	V
Allowable power dissipation	Pd max	with specified substrate *	0.55	W
Operating temperature	Topr		-20 to +80	°C
Storage temperature	Tstg		-40 to +125	°C

* : Specified substrate : 114.3mm×76.1mm×1.6mm, glass epoxy board

Allowable Operating Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Supply voltage	V_{DD}		4.5		5.5	V
Input “H” voltage	$V_{IN}H$	EN pin	1.5		V_{DD}	V
Input “L” voltage	$V_{IN}L$	EN pin	-0.1		0.4	V

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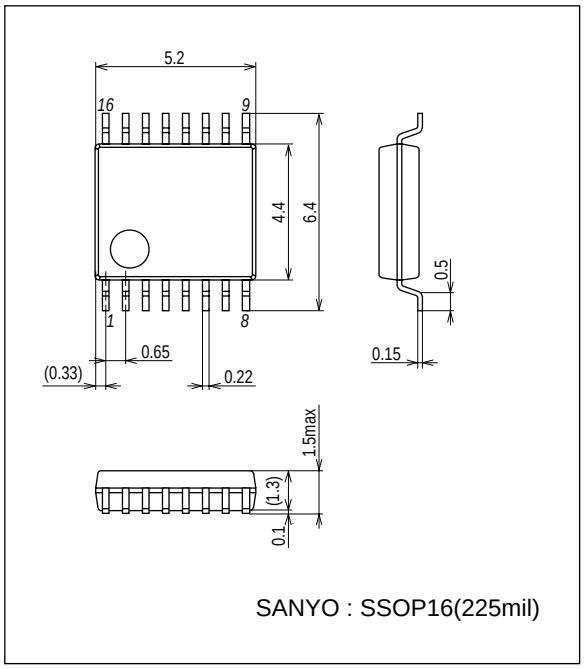
Electrical Characteristics at Ta = 25°C, V_{DD} = 5V, I_{OUT} = 30mA, S0 = L, S1 = L, Unless otherwise specified

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Circuit current drain	$I_{DD}1$	EN = L			1	μA
	$I_{DD}2$	EN = H No load		12	18	mA
Output load current	I_O ave	At V_{OUT} = 12V setting			30	mA
Reference voltage	VREF	V_{DD} = 4.5 to 5.5V	1.285	1.305	1.325	V
		Ta = -20°C to +80°C, Design value	1.279		1.331	V
Output voltage at OFF	V_{OFF}	After capacitive discharge	-50	0	50	mV
Protective circuit masking time	Tmask	Masking time from detection of short-circuit to IC OFF		18	33	ms
Short-circuit protective current	I_{lim}		35	50	65	mA
Short-circuit protective voltage	V_{lim}		82.5	87.5	92.5	%
SS end time	T_{SSEND}	Time from EN = H to regulator SS OFF Ta = -20°C to +80°C Design value			10	ms
RO load regulation	ΔRO	Load 1mA → 30mA		30	40	mV
Input pin current	Iin	Pins EN	30	40	50	μA
		S0 and S1 pins			1	μA
Power efficiency	Peff	CP+regulator		70		%
Rush current	Irush	No load			300	mA
Oscillation frequency	f clk		1.4	1.8	2.3	MHz

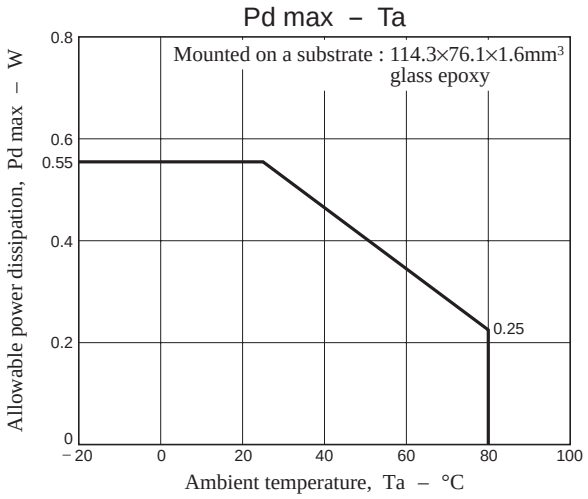
Package Dimensions

unit : mm (typ)

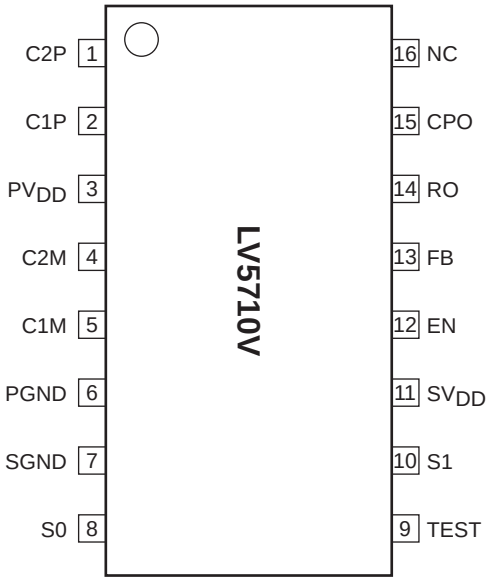
3178B



SANYO : SSOP16(225mil)



Pin Assignment

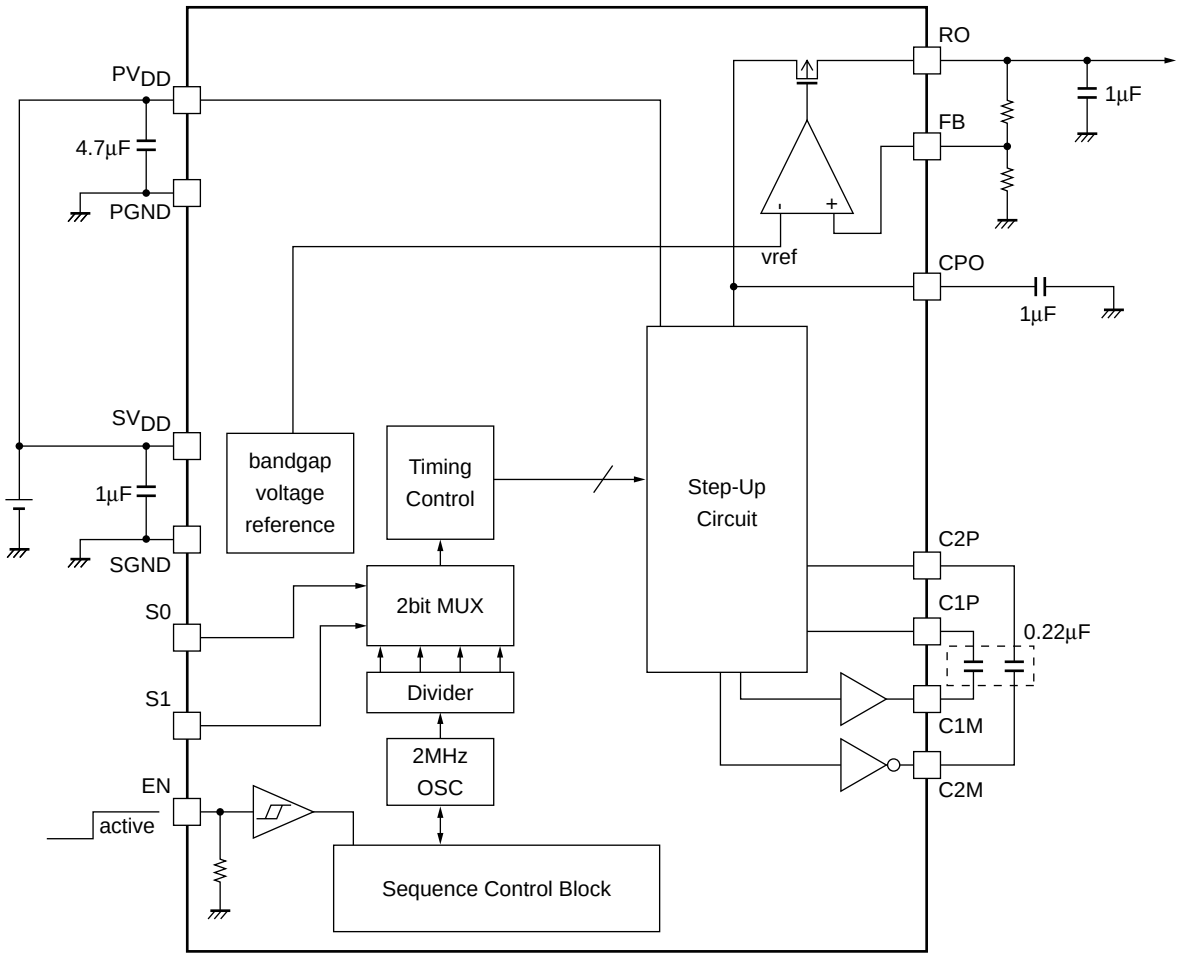


Top view

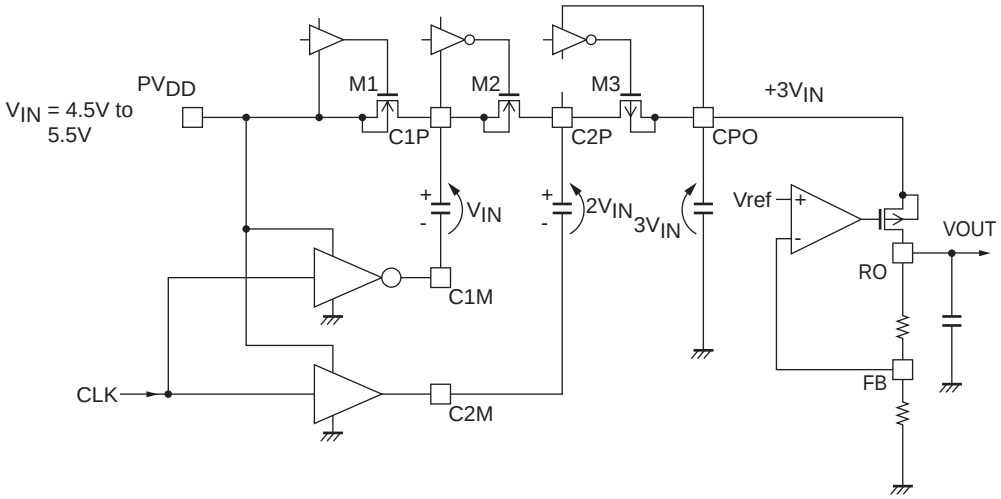
Pin Function

Pin No.	Name	Function
1	C2P	Boost capacitor connection pin (charge transfer side)
2	C1P	Boost capacitor connection pin (charge transfer side)
3	PV_{DD}	Power system V_{DD} pin
4	C2M	Boost capacitor connection pin (driver side)
5	C1M	Boost capacitor connection pin (driver side)
6	PGND	Power GND pin for the charge pump
7	SGND	Small signal system GND pin
8	S0	Charge pump frequency changeover pin
9	TEST	Test pin (open or short-circuited to GND)
10	S1	Charge pump frequency changeover pin
11	SV_{DD}	Small signal system V_{DD} pin
12	EN	System enable pin (Hi active)
13	FB	Regulator FB pin
14	RO	Regulator output pin
15	CPO	Boost voltage output ($3V_{DD}$)
16	NC	

Block Diagram



Equivalent Circuit Diagram

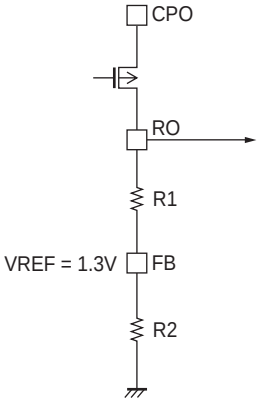


Output Voltage Setting Method

The output voltage of IC-incorporated LDO can be determined as follows :

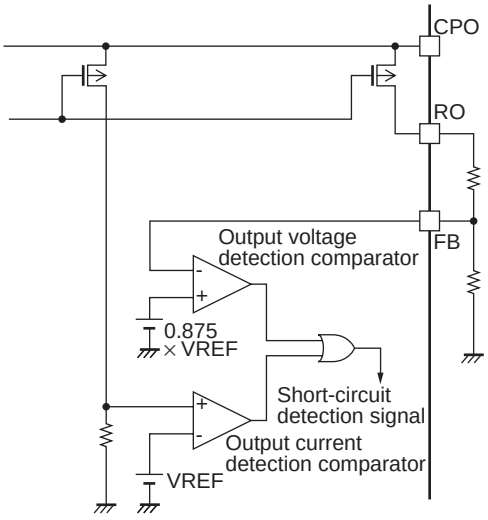
$$VH = \frac{R1+R2}{R2} \times VREF$$

For example, to set the output voltage to 12V, set the resistance
Value to R1 = 1070kΩ/R2 = 130kΩ.



Short-circuit Protective Operation

The RO output pin has the short-circuit protective function.
The over-current detector circuit outputs the detection signal when the output current of 50mA (typ) or more flows or when the output voltage drops below 87.5% (typ). When this detection signal is output continuously for 18ms (typ) or more, IC determines that there is over-current and stops the output. To reset from the stop state, set the EN pin to “L”, then set the EN pin to “H” again.



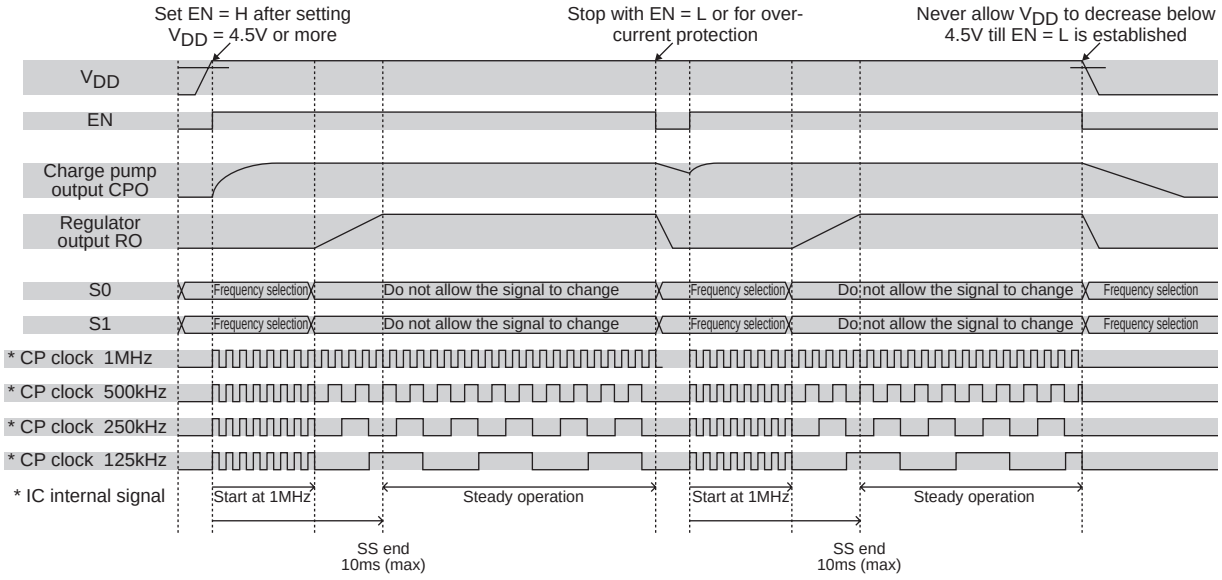
Equivalent circuit of the over-current detection circuit

Selecting the Frequency

According to the logic of S0 and S1, the charge pump operation frequency can be changed.
In the case of light load, the reactive power can be reduced by decreasing the operating frequency.

S0	S1	CP operating frequency
L	L	1MHz
H	L	500kHz
L	H	250kHz
H	H	125kHz

Startup sequence



EN Pin and V_{DD}

The sequence operation is made at startup. However, startup is not made when the internal circuit has not been reset. To reset the internal circuit, keep the EN pin to "L" till V_{DD} becomes 4.5V or more.
Note that V_{DD} and EN pin cannot be short-circuited for this purpose.