EPSON
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S1F81210M0B
Technical Manual

SEIKO EPSON CORPORATION

Rev.1.0

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1. OVERVIEW

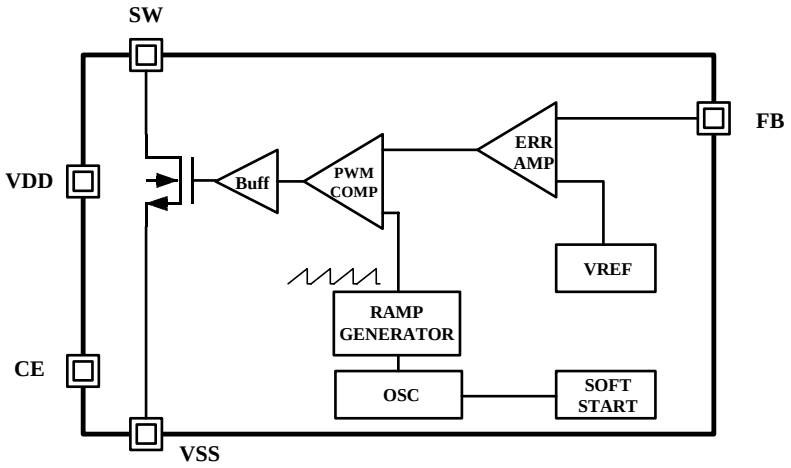
The S1F81210M0B is a high efficiency step-up DC-DC converter. Due to high voltage CMOS process realizing 25V output supply as maximum value, white LED of 2–6 lights connected in series can be lighted. By connecting in series, current variation among LED is eliminated. Current value sent to white LED can be set by external resistors.

In addition, brightness can also be adjusted by PWM control to CE (chip enable) pin.

2. FEATURES

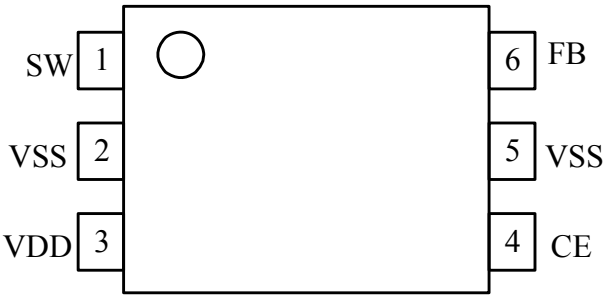
- White LED of 2-6 lights (connected in series) lighted
- Output current value can be set by external resistors (51Ω:9.8mA, 33Ω:15.2mA, 24Ω:20.8mA)
- Brightness adjustable by PWM control of CE pin
- Current variation among LED decreased by high precision
- High efficient drive by step-up model
- Small package (SON-6P)
- Supply voltage range 2.3 to 5.5V
- Maximum output voltage 25V
- Quiescent current 400μA (Typ.)
- Standby current 1.0μA (Max.)
- R_{ON} (Switching MOS-Tr) 2Ω(typ)
- Switching frequency 1.0MHz (typ)
- Output current detection accuracy ±2%

3. BLOCK DIAGRAM



4. PINOUT

TOP VIEW



SON-6P

5. PIN DESCRIPTION

Number	Name	I/O	Description
1	SW	O	Coil switching
2	VSS	—	GND
3	VDD	I	Power supply
4	CE	Ip*	Chip enable (High active)
5	VSS	—	GND
6	FB		Feed back (Output current detection)

Ip* Input with built-in pull-down resistor

6. ABSOLUTE MAXIMUM RATINGS

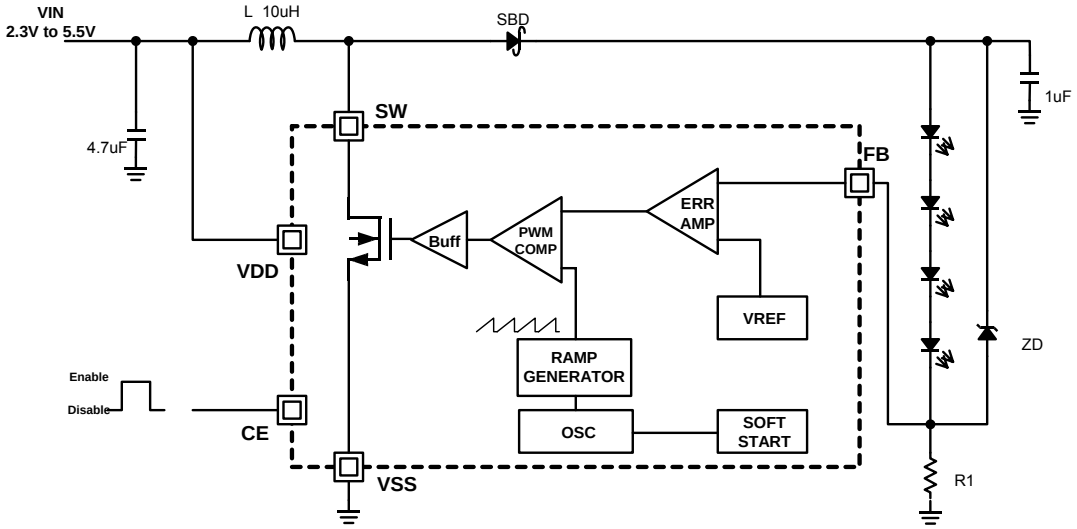
Parameter	Symbol	Rating	Unit
Supply voltage range	V_{DD}	-0.3 to 6.5	V
Input voltage range	V_{IN}	Vss-0.3 to V_{DD}+0.3	V
SW output voltage range	V_{SW}	-0.3 to 27	V
SW input current	I_{SW}	500	mA
Power dissipation	P_D	250 (Ta=25[°C])	mW
Operating temperature range	T_{opr}	-40 to 85	°C
Storage temperature range	T_{stg}	-55 to 125	°C

7. ELECTRICAL CHARACTERISTICS

(Ta=25[°C],VDD=3.6[V],VSS=0[V] unless otherwise noted)

Parameter	Pin	Symbol	Conditions	min	typ	max	Unit
Supply voltage	VDD	V_{DD}		2.3	3.6	5.5	V
Maximum output voltage	SW	V_{OUT}		—	—	25	V
Standby current	VDD	I_{STB}	V_{CE}=0[V]	—	—	1.0	µA
Quiescent current	VDD	I_{DD}	V_{FB}=1.0[V]	—	150	300	µA
			V_{FB}=0[V]	—	400	800	µA
SW-Tr ON resister	SW	R_{ON}	I_{SW}=100[mA],V_{DD}=3.6[V]	—	2.0	3.0	Ω
SW-Tr leak current	SW	I_{LEAK}	V_{SW}=V_{DD}	—	—	1.0	µA
Maximum oscillator frequency	SW	f_{OSC}	V_{FB}=0[V]	0.9	1.0	1.1	MHz
Maximum Duty	SW	Duty	V_{FB}=0[V]	65	75	85	%
Input voltage	CE	V_{IH}		2.0	—	—	V
		V_{IL}		—	—	0.6	V
Input current	CE	I_{CE}	V_{CE}=3.6[V]	—	5.0	10	µA
	FB	I_{FB}	V_{FB}=0.5[V]	-1.0	—	1.0	µA
Soft-start time	SW	T_{SS}		—	500	—	µs
FB voltage	FB	V_{FB}		0.49	0.50	0.51	V
Coil inductance	SW	L_{sw}		—	—	10	µH

8. TYPICAL APPLICATIONS



9. OPERATION DESCRIPTION

The S1F81210 can be light white LEDs of 2 to 6 in series by boosting up the input voltage using a switching regulator method. The LED current is controlled by resistor connected between FB pin and VSS pin. The range of switching duty is 0 to 75%. In case of light load (approximately 1mA), the duty is 0% and S1F81210 tends to skip pulses.

● Adjustment Method of LED current

The LED current is controlled by resistor (R1 in "TYPICAL APPLICATIONS") connected between FB pin and VSS pin. The feedback reference is controlled at 0.5V. The LED current is shown below.

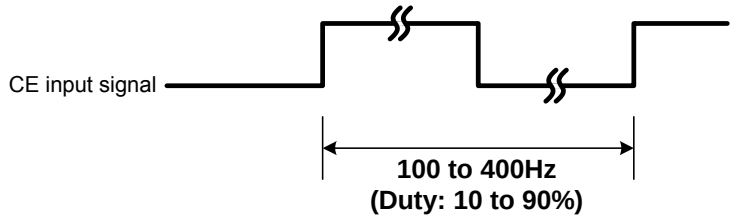
I_{LED}=0.5/R1

● Soft-start

The S1F81210 has soft start function while approximately 500µsec after starting operation.
The maximum duty is limited to 50% during soft start, although it's 75% at normal operation.

● Brightness Adjustment Using CE pin

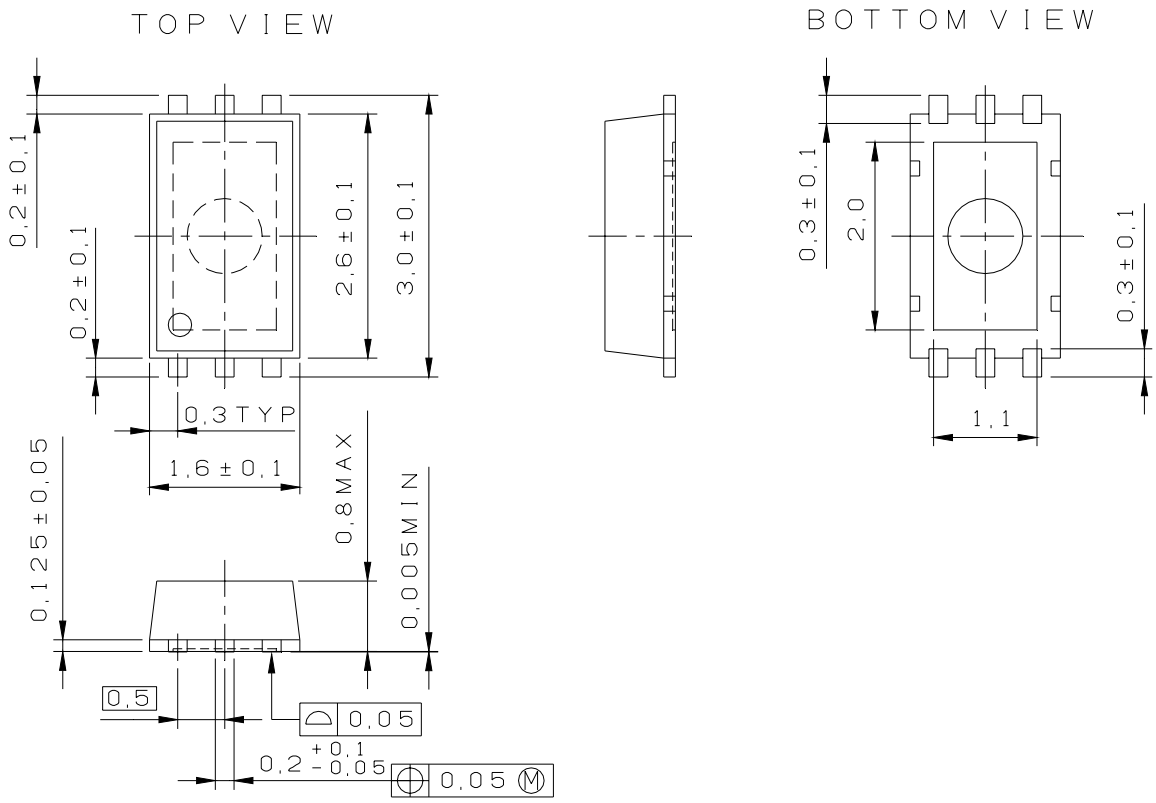
The S1F81210 is able to adjust the mean current of LED by the clock signal duty input to CE pin.
The recommended frequency range is 100 to 400Hz and the duty is 10 to 90%, when the clock signal is input to CE pin.



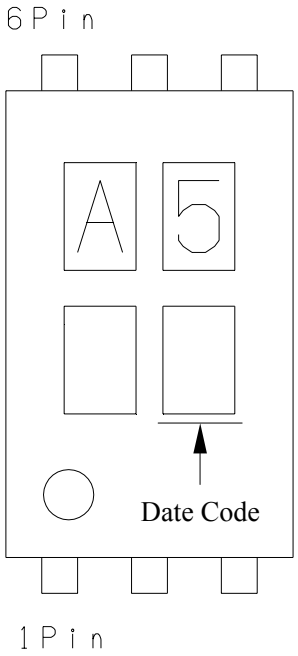
10. PACKAGE DIMENSIONS

(Weight: 0.08g)

(Plate of PIN: Sn-Ag)
[Unit : mm]



11. MARKINGS



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Document Code: 410464500
First Issue October 2005