EPSON
EXCEED YOUR VISION

S1F81300M0A
Technical Manual

SEIKO EPSON CORPORATION

Rev.1.0

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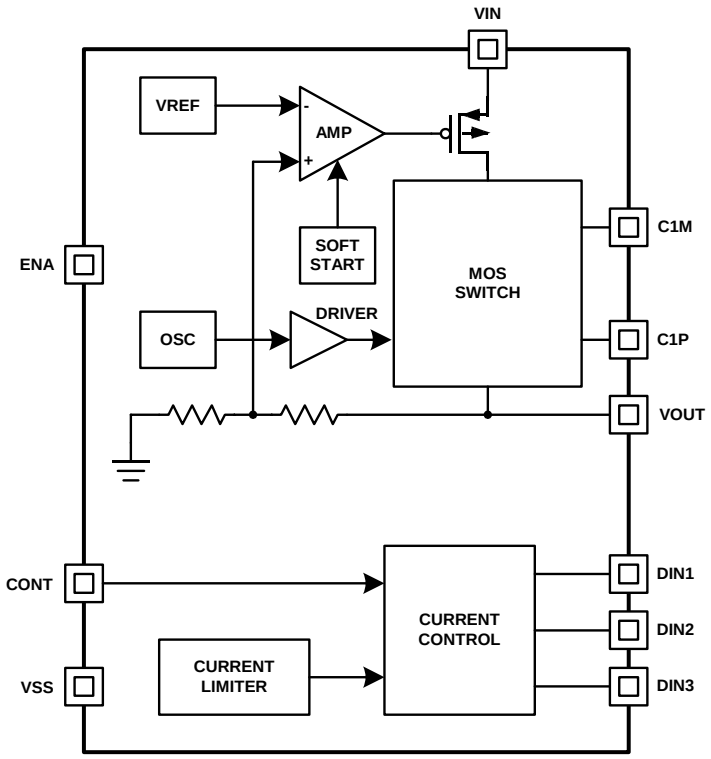
1. OVERVIEW

The S1F8130 is a Doubler Charge Pump DC-DC Converter with built-in constant current circuit (Independent 3ch.). Stable output supply can be realized by an input series regulator and an output side charge pump. White LED of 1-3 lights connected in parallel can be lighted. Current variation among LED is reduced due to the independent 3ch constant circuit. Current value sent to white LED can be set by supply level of CONT pin. In addition, brightness can also be adjusted by controlling of CONT pin from D/A converter output etc.

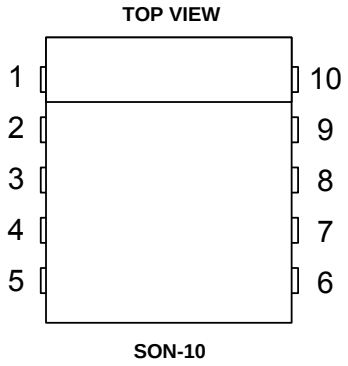
2. FEATURES

- White LED of 1-3 lights (connected in parallel) lighted.
- Output current value can be set by CONT pin supply
- Low noise charge pump circuits.
- Output excess current protection function
- Soft start circuit to reduce inrush current at starting up.
- Regulated LED current with 3% matching between any two outputs.
- Small package (SON10)
- Supply voltage range 2.7 to 4.6V
- Maximum output voltage 5.0V
- Shutdown current 1.0μA (Max.)
- Quiescent current 3.5mA (Typ.)
- Switching frequency 500kHz (Typ.)
- LED limit current 15 to 30mA (trimming)

3. BLOCK DIAGRAM



4. PINOUT



5. PIN DESCRIPTION

No	Pin	I/O	Function
1	CONT	I	LED driving current control voltage input pin
2	ENA	Ip*	Chip enable (High active)
3	C1M	—	Charge pump capacitor connection pin #1
4	VIN	—	Power supply
5	C1P	—	Charge pump capacitor connection pin #2
6	VOUT	O	LED driving voltage output pin
7	VSS	—	GND
8	DIN1	O	LED driving current control pin #1
9	DIN2	O	LED driving current control pin #2
10	DIN3	O	LED driving current control pin #3

Ip* Input with built-in pull-down resistor

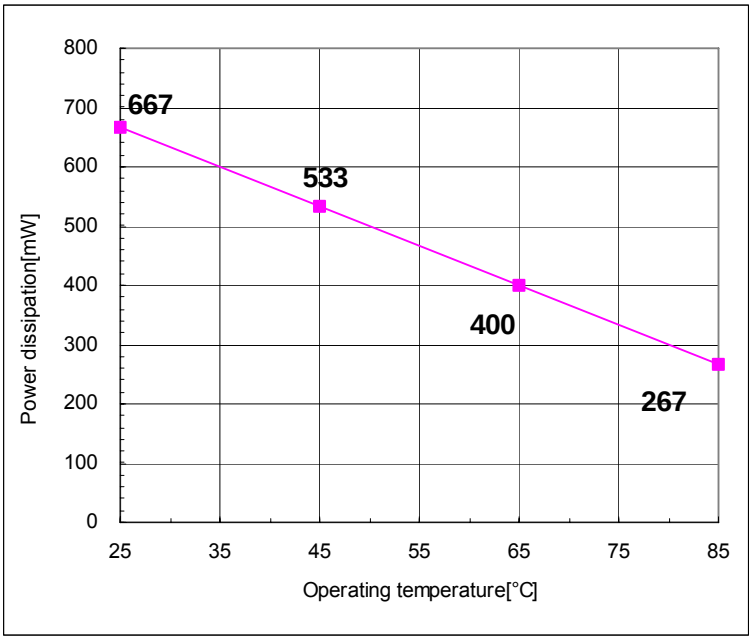
6. ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Rating	Unit
Supply voltage range	V_{IN}	-0.3 to 6.5	V
Input voltage range	V_{ENA},V_{CONT}	V_{SS}-0.3 to V_{IN}+0.3	V
Output voltage range	$V_{DIN1\ to\ 3}$	V_{SS}-0.3 to V_{IN}+0.3	V
	V_{OUT}	6.5	V
Power dissipation	P_D	667(Ta=25°C) (Note1)	mW
Operating temperature range	Ta	-30 to +85	°C
Storage temperature range	T_{stg}	-55 to +125	°C

(Note1) When mounted on a 23x32x1.6mm glass epoxy substrate, the relation of power dissipation and operating temperature see below.

- Power dissipation : P_D [mW]
- Junction temperature : T_{MAX} =125[°C]
- Operating temperature : Ta[°C]
- Thermal resistance : θ_J=150[°C /W]

$$P_D = (T_{MAX} - Ta) / \theta_J$$



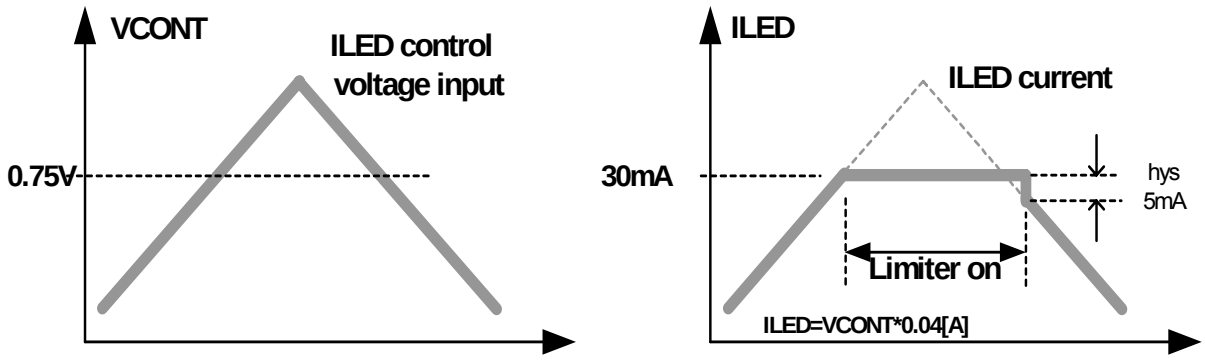
7. ELECTRICAL CHARACTERISTICS

Ta=25[°C], VIN=3.6[V], GND=0[V] unless otherwise noted

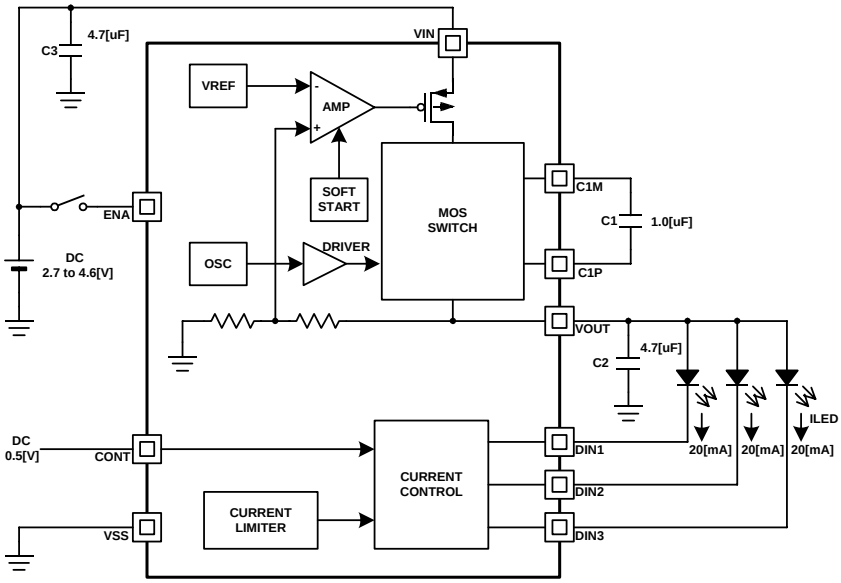
Parameter	Pin	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply voltage	V_{IN}	V_{IN}		2.7	3.6	4.6	V
Standby current	V_{IN}	I_{STB}	V_{ENA}=0[V]	—	0.01	1.0	µA
Quiescent current	V_{IN}	I_{DD}	I_{LOAD}=0[mA]	—	3.5	5.0	mA
Output voltage	V_{OUT}	V_{OUT}	I_{OUT}=60[mA]	4.8	5.0	5.2	V
Maximum output current	V_{OUT}	I_{OUT}	V_{OUT}=5.0[V]	—	—	100	mA
Oscillator frequency	C1M,C1P	f_{OSC}		450	500	550	kHz
Soft start time	DIN1 to 3	T_{SS}			1.0	2.0	ms
Offset current	DIN1 to 3	$I_{OFFSET1\ to\ 3}$	V_{CONT}=0[V]		0.3	1.5	mA
LED current	DIN1 to 3	$I_{LED1\ to\ 3}$	V_{CONT}=0.5[V]	19.4	20.0	20.6	mA
Limit current	DIN1 to 3	$I_{LIMIT1\ to\ 3}$	V_{CONT}=1.0V	27.0	30.0	33.0	mA
Leak current	DIN1 to 3	I_{LEAk}	V_{ENA}=0[V] $V_{DIN1\ to\ 3}$=5.0[V]			1.0	µA
Input voltage	ENA	V_{IH}		1.8			V
		V_{IL}				0.6	V
Input current	ENA	I_{IH}	V_{ENA}=3.6[V]		10.0	20.0	µA
	CONT	I_{CONTL}	V_{CONT}=0[V]			1.0	µA
		I_{CONTH}	V_{CONT}=V_{IN}			1.0	µA

8. FUNCTION

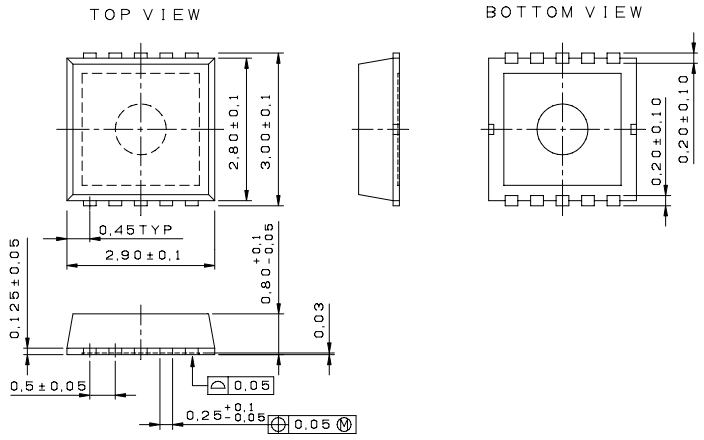
LED driving current is able to control by CONT input voltage. The relation between V_CONT and ILED is ILED[A] = 0.04 * CONT[V]. If V_CONT is over the limit value, the LED current limiter turns on to keep ILED at a constant limit current. By the CONT input hysteresis, V_CONT-ILED relation has a **discontinuity** area at limiter turning off.



9. TYPICAL APPLICATIONS

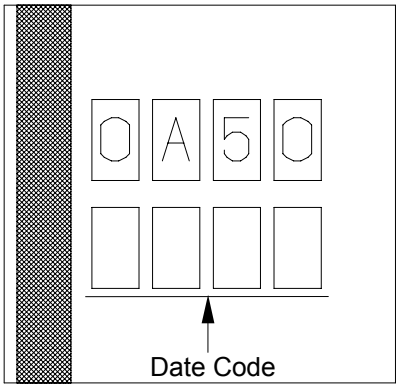


10. PACKAGE DIMENSIONS



Unit (mm)
(Weight: 0.017g)
(Plate of PIN: Sn-Ag)

11. MARKINGS



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