Data Sheet

BIT3267S

High Performance PWM Controller

Version: A05

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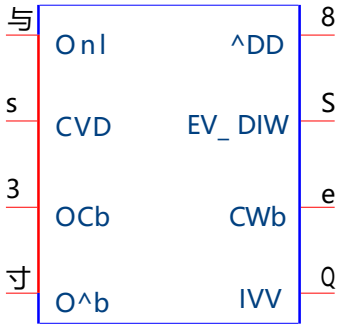
Features:

- CnLLeu! 山oqe cou!Lol guq \!xeq \Ledneuc入 obeLg!!ou
- 8^) s8^ obeLg!!ou ^ol!g?e (***Note 1***)
- lu!eLugl 山!u!山nl山 o\\ !!山e
- lu!eLugl eo\!-e!gL!
- O^eL ^ol!g?e bLo!ec!!ou, O^b
- 「ogq epoL! bLo!ec!!ou, 「eb
- ecpo!!k入 epoL! bLo!ec!!ou, eeb
- ecpo!!k入 obeu bLo!ec!!ou
- 「ED cg!poqe epoL! bLo!ec!!ou, 「Ceb
- O^eL !e山beLg!nLe bLo!ec!!ou, Olb
- luqnc!oL epoL! bLo!ec!!ou
- lu!eLugl nuqeL ^ol!g?e lock on!, n^ 「O
- lo!e山 bole on!bn!
- eOb-8 bgckg?e

Pin Layout:



BIT3267S

General Description:

lpe BII3seSe !e g DC-DC cou^eL!eL M!!p CnLLeu!-Woqe cou!Lol guq !pLee ob!!ougl obeLg!!ou bMW \Ledneuc!ee. 「oM 0.s与^ \eeqpgck ^ol!g?e, O^eL ^ol!g?e bLo!ec!!ou, O^eL CnLLeu! bLo!ec!!ou, ecpo!!k入 q!oqe obeu\epoL! bLo!ec!!ou guq !uqnc!oL-epoL!eq bLo!ec!!ou 山gke BII3seSe !o pe gu !qegl cou!LolleL \oL 「ED pgckl!?p! qL!^eL. lu!eLugl eo\! e!gL! \nuc!!ou cgu g^o!q !uLnep cnLLeu! pgbbeueq !u !pe e!gL!-nb beL!oq. Yqq!!!ougl O^eL-le山beLg!nLe-bLo!ec!!ou guq n^ 「O 山gke e入e!e山 山oLe Lel!gple. CWOe bLoceee ?Leg!l入 Leqncee !pe obeLg!!u? cnLLeu! Mpeu co山bgL!u? !o e!山!lgL bLoqnc!e.

Recommended Operating Condition:

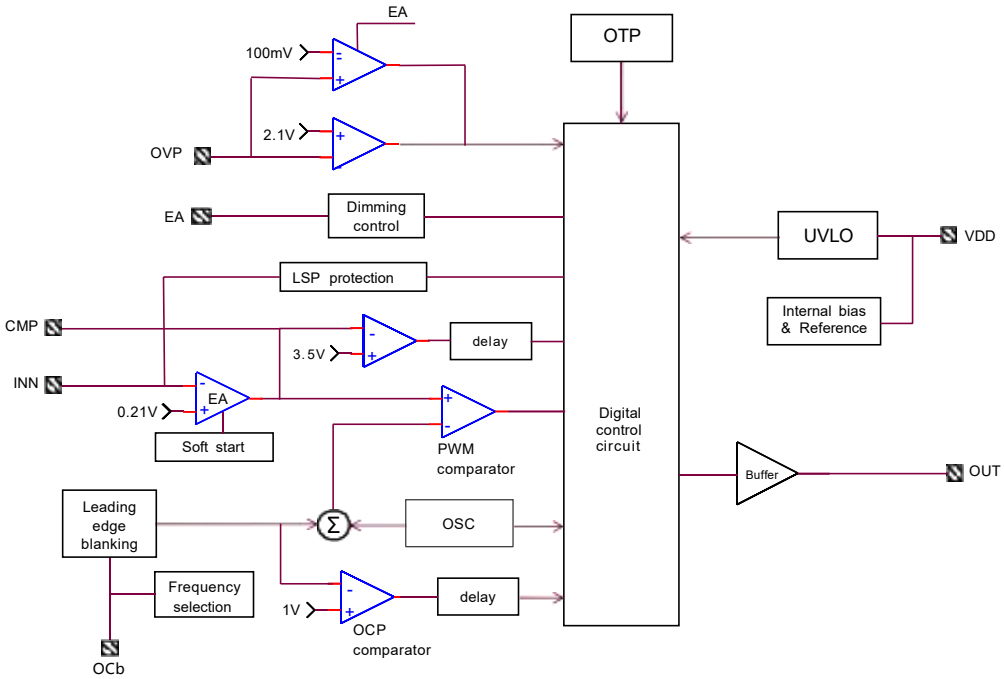
enbbl入 ^ol!g?e····· 8^) s8^ (***Note 1***)
ObeLg!!u? \Ledneuc入····· 与与0kHS\ss0kHS
ObeLg!!u? g山p!eu! !e山beLg!nLe… …-寸0 C) +8Q C

Absolute ratings

^DD…… … ……-0.3) +s8^ (***Note 1***)
CVD…… .. …… . ……干0.3 ^
lubn! ^ol!g?e…… . …… . …… ..-0.3) ^DD+0.3 ^
ObeLg!!u? g山p!eu! !e山beLg!nLe…… … -寸0 C) +8Q C
ObeLg!!u?)nuc!!ou !e山beLg!nLe… .. … . -寸0 C) +与Q0 C
e!oLg?e !e山beLg!nLe…… .. …… .-QQC) +与Q0 C

Note 1: If VDD > 20V, the external Boost MOS V_{GS} (Gate to Source Voltage) has to be used ± 30V (V_{GS}± 30V).

Functional block diagram:



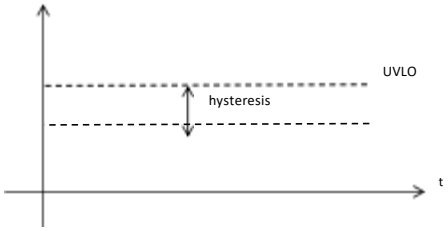
Pin description:

Pin No.	Symbol	Descriptions
1	OUT	Output pin
2	GND	Ground pin
3	OCP	Over Current Protection and Frequency Selection
4	OVP	Over Voltage Protection
5	INN	The inverting input of the error amplifier
6	CMP	Output of the error amplifier
7	EN_DIM	Enable and PWM Dimming input
8	VDD	Power supply

Functional Description:

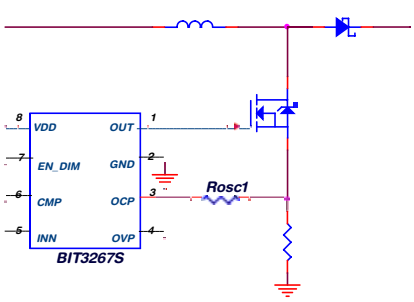
Under Voltage Locked Out, UVLO:

To avoid the abnormal condition happened when the input voltage drops to low voltage, it is needed to set a low voltage operation point. Please refer following figure, when the input voltage is below the low voltage operation point, the under voltage lockout (UVLO) function will turn-off its output and most of its internal functions. The recovery hysteresis voltage is about 1V.



Frequency selection

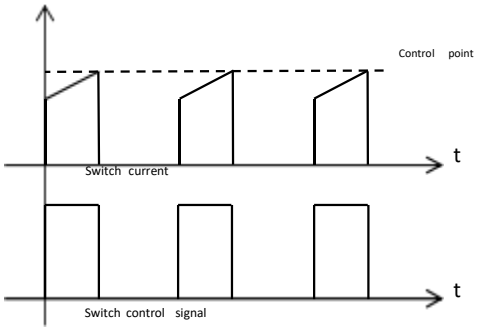
In the initial state, BIT3267S frequency can be selectable by an external resistor connected in OCP pin. Please refer R1 as following figure and selection table for frequency selection.



R_{OSC1}	Frequency
≤ 1KΩ	110KHz
22KΩ	220KHz

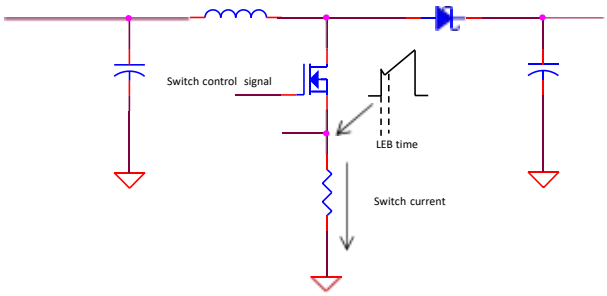
Current mode control and slope compensation

For the Boost converter operation, peak current mode controls power switch according inductor current. It detects the rising inductor current and turns off power switch when the inductor current reaches the control level. In addition, BIT3267S built-in slope compensation is used to avoid sub-harmonic oscillation when the duty cycle is larger than 50% for the peak current operation. Some advantages of current mode control is fast response on line and load regulation, it is also easily been compensated for stability requirement.



Leading edge blanking and current limit

For the turn on of power switch, please refer following figure, the current spike will be happened in the rising edge. The leading edge blanking (LEB) time was built-in the pin of OCP to prevent the false-trigger from the current spike. In addition, BIT3267S limits the maximum current flowing through the external MOSFET.

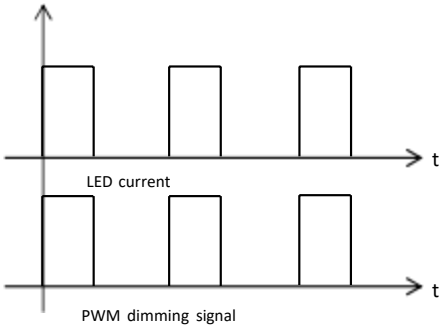


Soft start

To avoid inrush current happened in the start-up period, the soft-start circuit is needed. It can reduce current overshoot happened in the start-up period and used components suffer less over stress and better lifecycle. BIT3267S with long soft-start time makes system reliable and can be used in many different applications.

PWM dimming and EA control

For the LED backlight application, the dimming function is needed to adjust backlight brightness. Normally, it is directly to control LED current for kinds of brightness. BIT3267S can accept PWM signal for the function of PWM positive dimming. Following figure shows PWM dimming signal vs. LED current.



The LED dimming function is controlled by the PWM signal at EA pin. This EA can accept an external PWM signal in the range of 100Hz to 1kHz with the level of 0V and higher than 2.5V and 1%~100% dimming range.

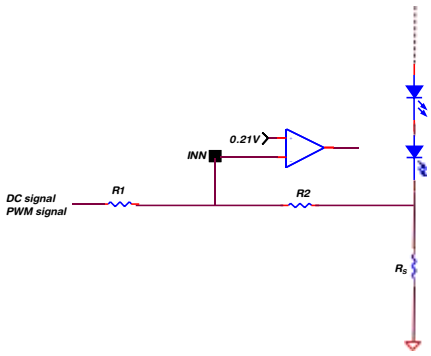
LED current regulation and DC dimming

To stabilize the LED current, BIT3267S senses LED current and adjust PWM duty cycle for the purpose. The average LED current is approximated by following equation,

$$I_{LED} = \frac{0.21}{Rs}$$

Where, 0.21V is BIT3267S internal reference voltage.

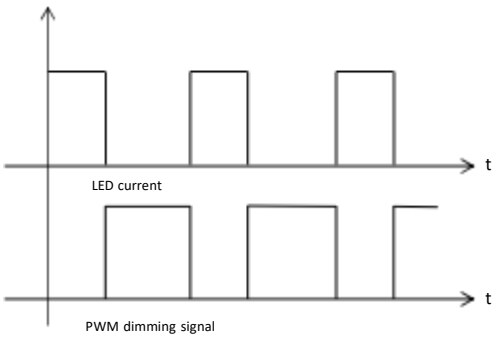
In addition, the DC dimming can also been applied in this feedback loop. Please check following figure for detailed.



The LED current is controlled as negative dimming, and LED current is approximated by following equation,

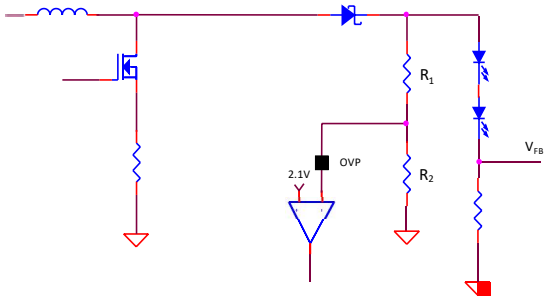
$$I_{LED} = \frac{0.21 - \frac{R2}{R1}(DC - 0.21)}{Rs}$$

For the negative PWM dimming, following figure shows PWM dimming signal vs. LED current.



Over voltage protection, OVP:

When LED is fault or open status, the feedback loop of LED current is open and result the maximum duty happened. This maximum duty cycle will cause the output voltage to a very high level of the converter output. BIT3267S monitors this high voltage level in its OVP pin and latch-off its output. It can be released from VDD or EA.

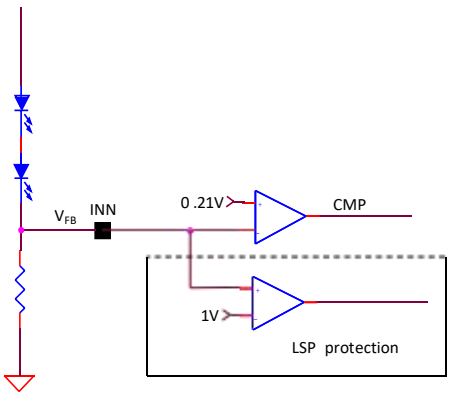


The OVP voltage is as following

$$OVP = \frac{R_2}{R_1 + R_2} V_{OVP}$$

Load short protection, LSP

When some of a series LED are short suddenly, LSP function will be enabled to latch-off its output immediately. Please refer following figure, the INN pin monitors LED current for feedback regulation and LSP function. When all the LEDs are connected in series but some of them are short suddenly, this fault condition will cause a higher voltage signal in INN pin. When INN pin detects a high voltage in this pin, BIT3267S will latch-off its output.



LED cathode short protection, LCSP

One LED fault condition is its cathode short to ground. This fault condition will cause no feedback signal and maximum duty. When maximum duty is happened and delay in a moment, BIT3267S will latch-off its output.

Schottky short protection

Normally, BIT3267S is operated in boost converter usually constructed by inductor, power switch and Schottky diode. Schottky diode short is one fault condition to cause a large current flowed from output capacitor to power MOS. When OCP pin detects this large current and confirm this fault condition in a delay time, BIT3267S will latch-off its output.

Schottky open protection

In the boost converter operation, Schottky diode open is one fault condition to cause no feedback signal. When Schottky diode is opened, there will be maximum duty and abnormal current in its input and power MOS.

When Schottky diode is opened, there will be no output voltage been detected in the OVP pin of BIT3267S. OVP pin receives a very low voltage and confirm this fault condition in a delay time, BIT3267S will latch-off its output.

Inductor short protection

In the boost converter operation, inductor short is one fault condition to cause large current in the input and power MOS. When OCP pin detects this large current and confirm this fault condition in a delay time, BIT3267S will latch-off its output.

Over Temperature Protection, OTP

BIT3267S provides over temperature protection that is more reliable for system protection. When the operation temperature is too high, BIT3267S will shut off its output. When the temperature drops below the threshold, BIT3267S will automatically recover to work again.

DC/AC Characteristics: T_A=25℃ unless otherwise specified.

Note 2. Only guaranteed by simulation or sampled evaluation during –40 C ~+85 C. Not 100% tested.

Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Supply voltages					
Pin VDD input	Note 1	8		28	V
Under voltage look out					
Positive Going Threshold		6	7	8	V
Hysteresis	Note 2	0.5	1	1.5	V
Chip consumed current	No Load	1	2	4	mA
Enable control					
ON		2		VDD	V
OFF		0		0.8	V
Error amplifier reference voltage					
Non-Inverting input of the error amplifier		203	210	217	mV
Operating frequency and DIM frequency					
Operating frequency	VDD=12V, Rosc=1KΩ	99	110	121	KHz
	VDD=12V, Rosc=22KΩ	198	220	242	kHz
DIM frequency		100		1,000	Hz
Error amplifier					
Open loop gain	Note 2	50	70	90	dB
Over current protection, OCP and over voltage protection, OVP					
OCP Current-Sense (CS) Voltage			0.3		V
OCP Shutdown Protection Voltage			1		V
OVP voltage		2.0	2.1	2.2	V
Load short protection, LSP					
LSP voltage		0.8	1	1.2	V
Over temperature protection, OTP					
Over temperature protection, OTP	Note 2		180		C
hysteresis	Note 2.		50		C
Soft start and minimum output off time					
Soft start time	Note 2		30		ms
Minimum off time		300	450	600	ns
Output drive					
OUT voltage	VDD=10V ~ 28V (Note 1)	0		VDD	V
Rising Time	VDD=12V, 1000pF load Note 2		30		ns
Falling Time			25		ns

SolpaJin6 in}oJme}ion

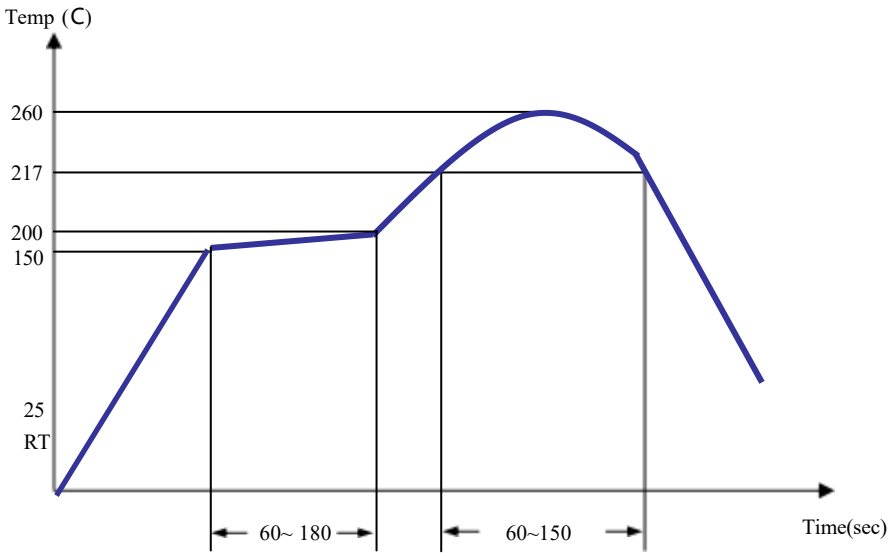
Reflow soldering:

The choice of heating method may be influenced by plastic QFP package). If infrared or vapor phase heating is used and the package is not absolutely dry (less than 0.1% moisture content by weight), vaporization of the small amount of moisture in them can cause cracking of the plastic body. Preheating is necessary to dry the paste and evaporate the binding agent. Preheating duration: 45 minutes at 45 °C.

Reflow soldering requires solder paste (a suspension of fine solder particles, flux and binding agent) to be applied to the printed-circuit board by screen printing, stenciling or pressure-syringe dispensing before package placement. Several methods exist for reflowing; for example, convection or convection/infrared heating in a conveyor type oven. Throughput times (preheating, soldering and cooling) vary between 100 and 200 seconds depending on heating method.

Typical reflow peak temperatures range from 215 to 270 °C depending on solder paste material. The top-surface temperature of the packages should preferable be kept below 245 °C for thick/large packages (packages with a thickness ≧ 2.5 mm or with a volume ≧ 350 mm^3 so called thick/large packages). The top-surface temperature of the packages should preferable be kept below 260 °C for thin/small packages (packages with a thickness < 2.5 mm and a volume < 350 mm^3 so called thin/small packages).

Stage	Condition	Duration
1'st Ram Up Rate	max3.0+/-2C/sec	-
Preheat	150C~200C	60~180 sec
2'nd Ram Up	max3.0+/-2C/sec	-
Solder Joint	217C above	60~150 sec
Peak Temp	260 +0/-5C	20~40 sec
Ram Down rate	6C/sec max	-



Wave soldering:

Conventional single wave soldering is not recommended for surface mount devices (SMDs) or printed-circuit boards with a high component density, as solder bridging and non-wetting can present major problems.

Manual soldering:

Fix the component by first soldering two diagonally-opposite end leads. Use a low voltage (24 V or less) soldering iron applied to the flat part of the lead. Contact time must be limited to 10 seconds at up to 300 °C. When using a dedicated tool, all other leads can be soldered in one operation within 2 to 5 seconds between 270 and 320 °C.

Order information:

BIT3267S-SO

- *SO: SOP*
- *Part number*
- *Beyond Innovation Technology Co., Ltd.*

Package information :

Unit: mm

SOP type :