LGS6304X

Rev.A V1.0 Jul,2022

60V Boost, Buck, Buck-Boost LED Constant Current Driver

Check for Samples: LGS6304X

characteristic

ÿ Wide input/output voltage range: 3.0V-60V

ÿ Support PWM dimming and analog dimming

ÿ Built-in 60V/350mÿ low-side MOSFET

Body tube

ÿ 1.2MHz fixed operating frequency

ÿ Cycle-by-cycle peak current limiting protection

ÿ SKIP mode provides extremely high light load efficiency

ÿ Provide ultra-small package SOT23 package and enhanced heat dissipation package

ESOP8 package

ÿ Built-in soft start circuit to prevent current overshoot

ÿ Thermal shutdown protection

ÿ Input undervoltage protection

ÿ Overvoltage protection can provide LED open circuit protection

ÿ Internal loop compensation helps reduce solution size and cost

and design complexity

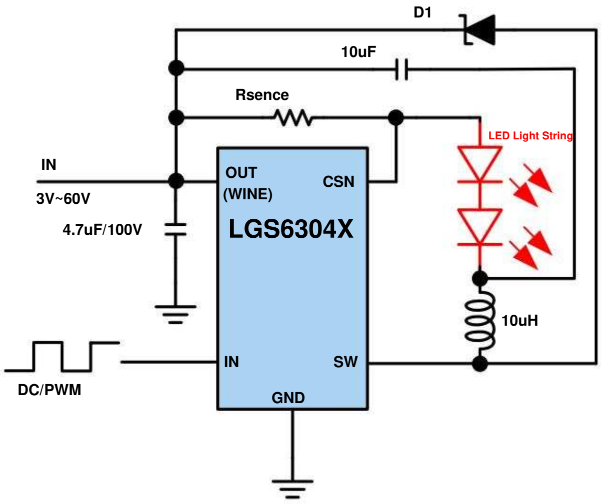
ÿ ±2000V (HBM) ESD protection on all ports ÿ Junction temperature range

is -40ÿ to +125ÿ

application

ÿ Intelligent dimming LED light

ÿ Wide range LED lamp driver



Typical Buck Application Topology in Multimode

describe

The LGS6304X is a multi-operating mode, wide input

Output DC-DC LED driver chip with wide input range from 3V to 60V

Voltage range.

The LGS6304X has an integrated 350mÿ power switch that provides at least

1.5A input peak current capability, the output current can be externally sourced

Sample resistance adjustment.

LGS6304X adopts current mode control to have excellent response speed

It has SKIP control mode, which makes loop compensation simpler.

The low quiescent current combined with the high switching frequency allows for high

Achieve high efficiency within the range.

Additional features include: soft start, thermal shutdown protection, input undervoltage protection,

Output overvoltage protection, cycle-by-cycle current limiting protection.

LGS6304X can be realized by selecting different resistance values of sampling resistor RSence

High-precision digital and analog regulation of output current is now available, including two specific

Models LGS63040 and LGS63042:

ÿ LGS63040 supports DC regulation of analog input (0.6V~1.2V)

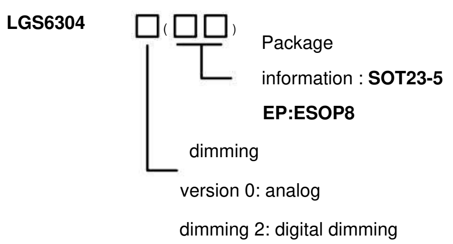
PWM dimming by light and digital input (100HZ~1KHZ)

ÿ LGS63042 supports digital input (100HZ~100KHZ)

PWM dimming, no screen flicker under high frequency PWM input.

The PWM frequency is up to 25000:1 at 100HZ.

Procurement Information



serial number	Encapsulation	Top logo
LGS63040	SOT23-5	6304A
LGS63040EP ESOP8		6304A
LGS63042	SOT23-5	63042
LGS63042EP ESOP8		63042

Absolute Maximum Ratings (†)

Table 3.1

parameter	scope
Pin to GND voltage (OUT, SW) -0.3V~60V	
Pin to GND voltage (EN, OVP)	-0.3V~6V
Pin to GND Voltage (CSN)	VIN-6~VIN+0.3V
Maximum current of switch tube	3A
Storage temperature	-65ÿ to 150ÿ
Operating temperature	-40ÿ to 125ÿ
ESD Rating (HBM)	±2KV
ESD Rating (CDM)	±500V

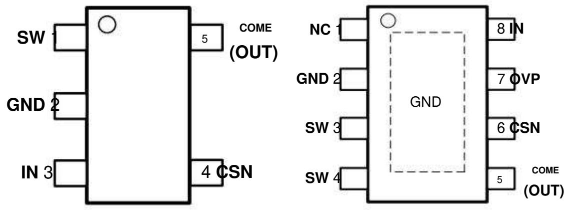
† Notice: Stresses above those listed under "Absolute Maximum Ratings" may cause the device to permanently

These are only stress ratings and it is not recommended that the device be used at or above these limits.

Working under extreme conditions for a long time may affect the reliability of the device.

Pinout

Top View



SOT23-5 *ESOP8*

Package and Pinout

ESD Warning

ESD (electrostatic discharge) sensitive devices.

Charged components and circuit boards may discharge without you noticing.

This product has patented or proprietary protection circuits, but it will not work when exposed to high energy ESD.

Therefore, appropriate ESD precautions should be taken.

measures to avoid device performance degradation or loss of function.

Table 3.2 Pin Function Description

Pin Number		Pin Name	illustrate
SOT23-5	ESOP8		
1	3,4	SW	Internal power switch node. Externally connected power inductor and Schottky diode.
2	2	GND	Ground pin.
3	8	IN	Dimming input pin, DC and PWM square wave can be input for dimming, see "Dimming set up".
4	6	CSN	LED current detection pin. Connect external LED current sampling resistor RSence . Output The current is ( ) ÿ and can be set by the following formula: = ÿ ( ) ÿ ÿ ( )ÿ
5	5	COME (OUT)	Output voltage detection point or input voltage connection point, connect the LED current sampling resistor to CSN terminal. As a step-down circuit, as an input voltage detection point, as a step-up and step-down Used as output voltage connection point in applications.
-	1	NC	does not require external devices, please ensure that this pin is left floating.
-	7	OVP	Overvoltage protection pin, connected to the voltage divider resistor between the output pin and ground.

Technical specifications

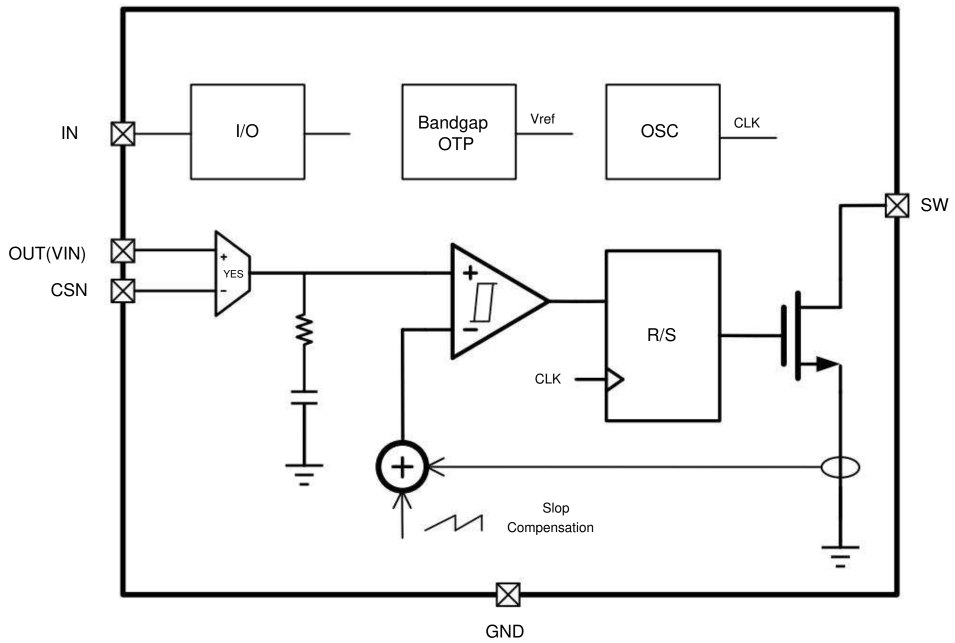
Unless otherwise specified, the limits apply over the operating junction temperature (TJ) range of -40°C to +125°C. Minimum and maximum limits are determined by testing, verification and statistical analysis.

The typical values represent the most likely parameter specifications at TJ=25ÿ and are for reference only. All voltages are relative to GND.

surface3.

parameter	Test conditions	Min	Typ	Max	Unit
Input characteristics					
COME Recommended input voltage range		3.0		60	In
VUVLO Input Undervoltage Lockout Rising Edge	Rising		3.0		In
Falling edge	Falling		2.6		In
IQ Static operating current	No loadÿNo switch,IN=12V		180		a
Isd Shutdown current	EN=0,IN=12V		10		a
Switching Characteristics					
RDSON MOS tube RDSON	TJ= 25ÿ	330	350	410	mÿ
VOUT-VCSN LED current sampling voltage		0.195	0.2	0.205V	
FSW Switching frequency	PWM Operation	1.05	1.2	1.35 MHZ	
FSW_FB Switching frequency during soft start	IN=12VÿEN=1		1ÿ4		MHZ
Tonmin Minimum on-time of built-in switch			120		ns
ILIMIT.SW(Peak) SW current limit ISW.LKG		1.5	1.7	2.1	A
SW leakage current				4	a
Enable/Dimming (3VÿVINÿ60V)					
VEN_min analog dimming lower limit voltage 63040	3VÿINÿ60V	0.6	0.62	0.65	In
VEN_max analog dimming upper limit voltage 63040	3VÿINÿ60V	1.2	1.22	1.25V	
VEN_H digital dimming rising edge 63040	EN=0 EN=1		0.6		In
VEN_L Digital dimming falling edge 63040	EN=1 EN=0		0.35		In
VEN_H digital dimming rising edge 63042	EN=0 EN=1	0.31	0.5	0.54V	
VEN_L Digital dimming falling edge 63042	EN=1 EN=0	0.25	0.35	0.38V	
ONE EN Input Current	VEN=5V	5		10	a
fEN PWM dimming frequency range 63040		100		1K	HZ
PWM dimming frequency range 63042		100		100K HZ	
Global thermal protection feature					
TOTP-R Over Temperature Protection	TJ Rising		150		ÿ
TOTP-F over temperature protection release	TJ Falling		120		ÿ
Thermal resistance					
ÿJA Thermal resistance from silicon core to surrounding air	0 LFPM Air Flow		173		ÿ/W
ÿJB Thermal resistance from silicon core to PCB surface			33.2		ÿ/W
ÿJCtop Thermal resistance from silicon core to package top surface			116		ÿ/W
ÿJB Thermal resistance from silicon core to PCB surface			30		ÿ/W

Functional Block Diagram



picture Internal Function Block Diagram

Application Information: Typical Application Circuit

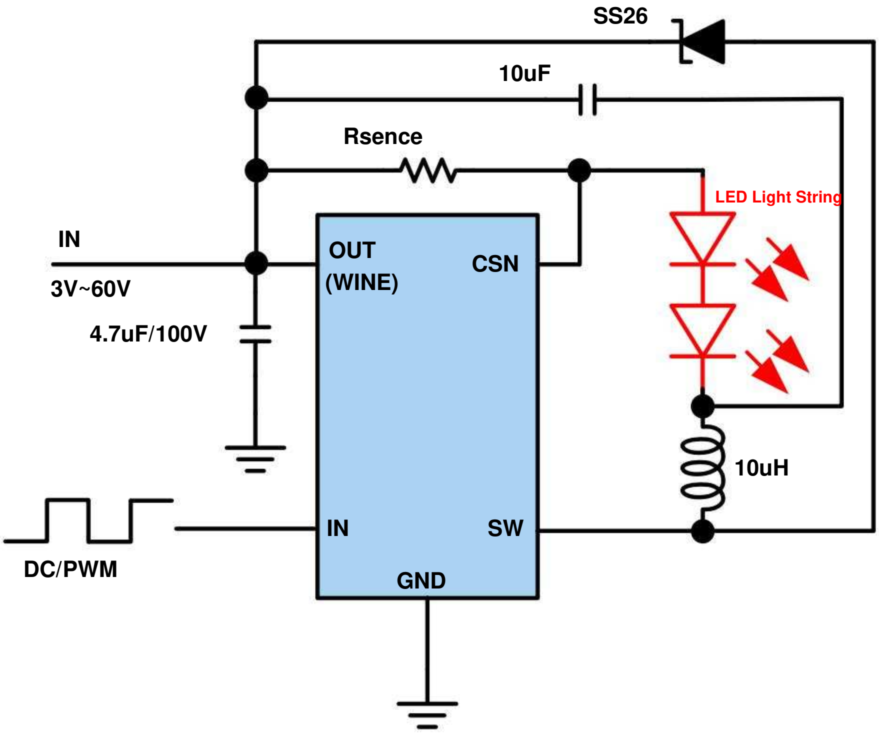


Figure 6.a LGS6304X buck mode typical application topology (VIN>VLED)

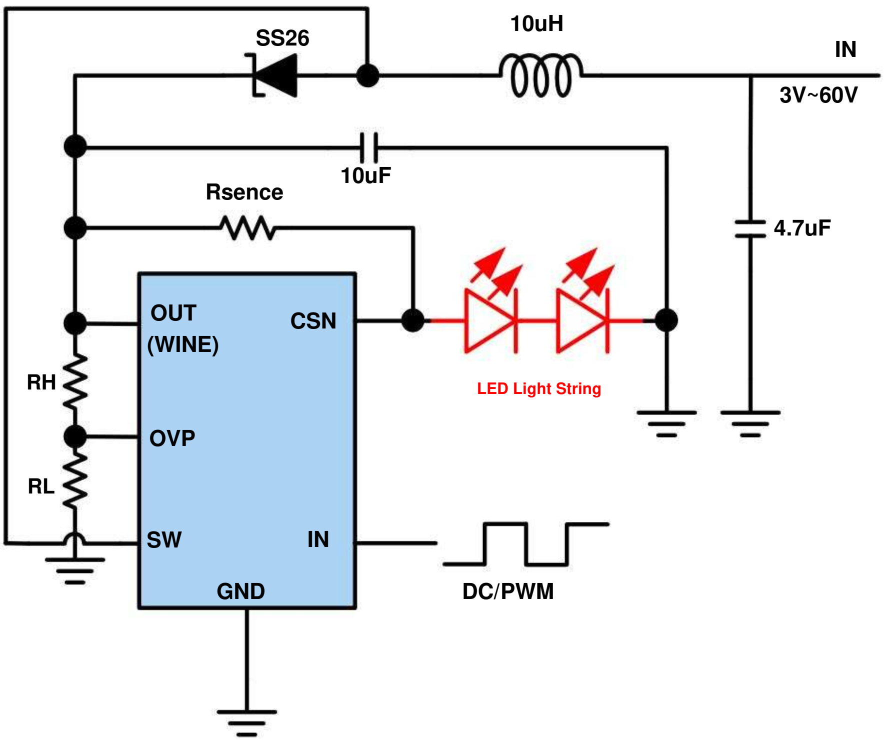


Figure 6.b LGS6304X boost mode typical application topology (VIN < VLED)

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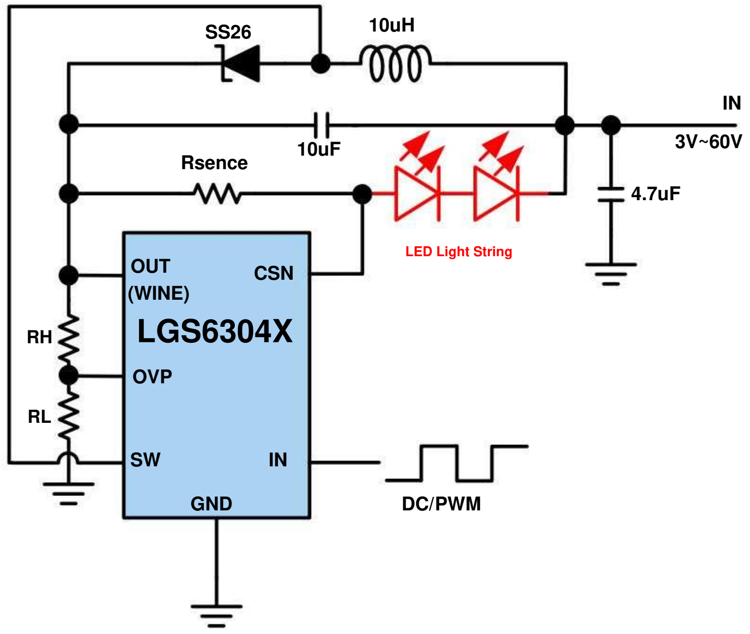


Figure 6.c LGS6304X buck/boost mode typical application topology (VIN<VLED or VIN>VLED)

NOTEÿ

ÿ CSN pin, connected to the external LED sampling resistor. The output constant current value can be set. ( ) ÿ and decision, which can be determined by

This formula is set: = ÿ ( ) ÿ ÿ ÿ ( )ÿ

ÿ It is recommended to use a 10ÿF X7R or X5R ceramic capacitor for input capacitance and place it as close to the power input pin and GND pin as possible.

ÿ In boost and buck-boost applications, it is recommended to use the ESOP8 package version of LGS6304X. This package chip has an OVP pin that can be used when the LED lamp is open circuit.

protection circuit under certain conditions.

Application Information: Multi-Mode Constant Current LED Driver (Overview)

Overview

LGS6304X is a multi-operating mode, wide input/output DC-DC LED driver chip with integrated power switch. It has a wide input voltage range of 3V to 60V.

The LGS6304X has an integrated 350mÿ power switch that can provide at least 1.5A input peak current capability. The output current can be sensed by an external sampling resistor.

LGS6304X adopts current mode control to achieve excellent response speed and make loop compensation simpler. It has SKIP control mode to adjust the low quiescent current.

The low-state current combined with high switching frequency enables high efficiency over a wide range of load currents.

Additional features include: soft start, thermal shutdown protection, input undervoltage protection, output overvoltage protection, and cycle-by-cycle current limit protection.

Set output current

The output current of LGS6304X can be adjusted by external sampling resistor.

The output current can be based on ( ) ÿ and selected

RSence to calculate the output current value, ( ) ÿ The typical value is 0.2V,

The recommended output current values are shown in the table below. :

= ( ) ÿ ÿ

surface8. **Output current setting quick configuration**

IOUT	RSENCE	Setting error (1)
10mA 20ÿ 10mA 20mA 10ÿ 20mA		0%
2ÿ 100mA 100mA 1ÿ 200mA 200mA		0%
400mA	0.5ÿ 400mA	0%
	800mA 0.25ÿ 800mA	0%
		0%
		0%

(1) Other sampling resistors and high-precision resistors can also be selected to achieve higher setting accuracy.

SKIP Pulse skipping mode

LGS6304X has a built-in pulse skipping circuit; when the load is light, the circuit is turned on;

Switching only when necessary keeps the output voltage within regulation.

This reduces switching losses and allows the driver to maintain high efficiency under light load conditions.

In pulse skipping mode . When the output voltage drops below the specified value

When the LGS6304X enters PWM mode, it stays for several oscillator cycles.

The output voltage rises to the specified range. During the waiting time between burst pulses,

The power switch is turned off and the output capacitor provides all the load current.

The voltage will drop and recover from time to time, so the output voltage in this mode

The ripple is larger than that in PWM operation mode.

Input undervoltage protection (VULO)

The device contains an internal undervoltage lockout circuit on the VIN pin.

When the voltage is lower than the falling threshold of UVLO, the UVLO protection will be triggered and the

The rising threshold of the UVLO is approximately 3.0V, and VIN reaches

After UVLO is removed above this voltage, the controller enters the soft-start process.

Soft-Start

The soft start of LGS6304X can prevent the converter from inputting voltage during startup.

When the chip starts, the internal circuit generates a soft start

The switching voltage (SS) is reduced to 1/4 of the maximum switching frequency.

During the soft start period, the output voltage will increase at a fixed rate.

Ratio tracks internal node voltage ramps.

When it is less than the internal reference (REF), SS overrides REF, so the error is reduced.

The amplifier uses SS as a reference. When SS exceeds REF, REF recovers.

During the entire startup phase, the switch current limit is still effective and can be

It is very reliable to avoid short circuit when power is on.

When the output has a very large capacitance (such as 2200uf or even larger), the input

The output voltage rise speed will be slower than SS, limited by the maximum switch current limit, and the startup

The time to reach the target voltage setting value will be extended.

Thermal shutdown protection

Thermal shutdown protection circuitry limits the junction temperature to below 150°C (typ.).

Under extreme conditions (i.e. high ambient temperature and/or high power dissipation), when the junction temperature starts to rise

When the temperature exceeds 150ÿ, the over-temperature protection is activated and the system will be forced to shut down.

The regulator output (if EN is enabled). When the junction temperature drops to 130°C

When the OTP state is unlocked, the regulator output is turned on again, and the output

The current returns to normal operating value.

The device is guaranteed to operate over the -40°C to 125°C junction temperature range.

The working life will be reduced; when the junction temperature is higher than 125°C for a long time, the device life will be

Note that the maximum ambient temperature consistent with these specifications depends on the

The overall operating conditions as well as the circuit board layout, rated package thermal resistance, and other environmental factors

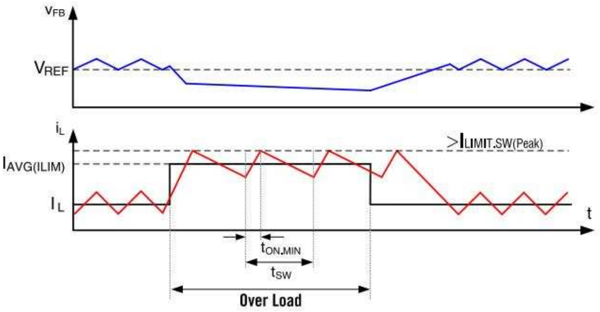
white.

Application Information: Multi-Mode Constant Current LED Driver (Overview)

Switch current limiting protection

The regulator output has a cycle-by-cycle overcurrent limit.

I LIMIT.SW(Peak), the LGS6304X output will enter the cycle-by-cycle current limiting state.



picture9. LGS6304X Output overcurrent protection Behavior Description

ILIMIT.SW(Peak) is related to the inductance and input voltage difference.

is the reference minimum value. When there is overcurrent or short circuit for a long time, it may trigger the whole

Bureau OTP protection.

EN dimming instructions

EN is the enable input pin of the chip. This pin has two independent thresholds.

When the rising threshold is greater than 0.5V, the output is enabled, and when it drops below 0.4V, the output is turned off.

This pin has an internal

800K pull-down.

An external logic signal can also be used to drive the EN input for system sequencing

Because the internal pull-down is weak, an external pull-down can be used if reliable shutdown is required.

It is not recommended to leave this pin floating.

Table 9. Pinout *IN* Working status

Pinout	Direction pin	status	Function
EN Input		high	Chip output on
		Low	Chip output off

Analog dimming of LGS63040

LGS63040 is a module that supports LED by multiplexing the EN pin.

Simulated dimming (0.6V~1.2V) and PWM modulation (100HZ~1KHZ)

To achieve analog dimming through DC voltage, a

The DC voltage VEN is used to adjust the LED output current.

The current is determined by the sampling resistor, and the LED analog dimming real-time average output current meter

Calculation formula:

$$= \frac{0.2 \times (ÿ\ 0.6)}{0.6 \times} \quad (0.6\ ÿ\ ÿ\ 1.2)$$

When VEN is greater than 1.2V and less than the withstand voltage of 6V, the LED current remains at 100%

Equal to the maximum average current of the LED set

LGS6304X PWM dimming

Both LGS63040 and LGS63042 support PWM dimming.

Dimming, the LED output current can be changed from 0% to 100%.

The brightness of the LED is determined by the duty cycle of the PWM signal.

For a 25% duty cycle, the average LED current is 25% of (0.2/RSence).

It is recommended to set the PWM dimming frequency above 120Hz to avoid human interference.

The eyes can see the flickering of LEDs. Advantages of PWM dimming over analog dimming

The advantage is that the chromaticity of the LED is not changed. The two chips specifically support EN adjustment

The light range is:

ÿ LGS63040 supports digital input (100HZ~1KHZ)

PWM dimming

ÿ LGS63042 supports digital input (100HZ~100KHZ)

PWM dimming, no screen flicker under high frequency PWM input.

The PWM frequency is up to 25000:1 at 100HZ.

By comparison, it can be seen that the dimming frequency support range of LGS63042 is wider.

Wide, up to 100KHZ, higher dimming ratio, PWM dimming required

It is more recommended to choose LGS63042.

Real-time average output current calculation for PWM dimming of LGS63040

official:

If EN is high and above 1.2V, then

$$= \frac{0.2 \times}{} \quad ÿ0\%\ ÿ\ ÿ\ 100\% 1.2\ ÿ\ ÿ^{ÿ}6\ ÿ$$

If the EN high level is less than 1.2V, then

$$= \frac{(ÿ\ 0.6) \times 0.2 \times \times 0.6}{}$$

$$ÿ0\%\ ÿ\ ÿ\ 100\% \quad ÿ\ 0.6\ ÿ \quad ÿ\ 1.2\ ÿ$$

Real-time average output current calculation for PWM dimming of LGS63042

official:

$$= \frac{0.2 \times}{} \quad ÿ0\%\ ÿ\ ÿ\ 100\% 0.6\ ÿ\ ÿ^{ÿ}6\ ÿ$$

in:

D is the duty cycle of PWM.

Application Information: Multi-Mode Constant Current LED Driver (Overview)

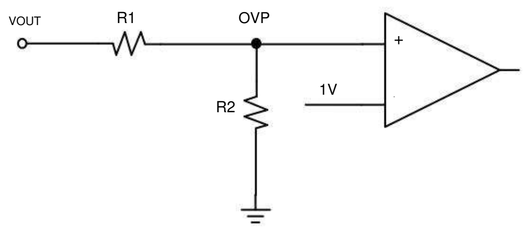
Output Overvoltage Protection (OVP)

The output overvoltage protection circuit prevents the LED lamp bead from disconnecting and damaging the chip.

According to the actual number of LED lamp beads, the ratio of the external circuit is set

The OVP trigger voltage is typically 1V and the recovery voltage is

The voltage is 0.9V.



picture*10* set up *OVP* Voltage

The overvoltage protection threshold can be calculated according to the following formula:

$$= ÿ1 + \frac{1}{2} ÿ \times 1 \quad ÿ ÿ$$

It is recommended that the overvoltage protection threshold be set at 1.3~1.5 times the normal output voltage.

Input Capacitor CIN

The typical input capacitance is 4.7ÿF.

ripple, a larger capacitor can be selected. The capacitance of the input capacitor at the switching frequency is

The impedance needs to be as small as possible, and it is recommended to use X5R or X7R ceramic capacitors.

To minimize potential input noise problems, place this ceramic resistor

Place the capacitor close to the IN and GND pins to reduce the voltage between CIN and IN/GND.

The loop area formed by the pins.

Output capacitor COUT

Select the output capacitor to handle the output current ripple noise for best performance

It is recommended to use a 10ÿF capacitor made of X5R or X7R ceramic.

If the chip needs to use PWM dimming mode,

To solve the howling problem caused by the piezoelectric effect of the output capacitor in this case,

There are two ways to reduce this problem:

(1) It is recommended to use tantalum capacitors, film capacitors, etc. that do not have piezoelectric effect.

Capacitors or ceramic plug-in capacitors replace ceramic capacitors. This method abandons

MLCC has the advantage of being thin and light, so in practical applications, it is necessary to consider the volume and space.

time, reliability and cost.

(2) It is recommended to use PWM dimming in scenarios where PWM dimming is required.

LGS63042, this chip can use a higher dimming frequency to avoid

The human ear recognition range is achieved to eliminate the capacitor howling.

Output diode D

The LGS6304X requires an external freewheeling current between the SW pin and the output

The reverse voltage rating of the selected diode must be greater than

VINMAX, the peak current rating of the diode must be greater than the maximum inductor current

Since Schottky diodes have lower forward voltage drop and faster

switching speed, so a Schottky diode is recommended for best efficiency.

Output inductor L

The selection of inductor needs to consider the following aspects:

(1) Select an inductor that provides the required current ripple. It is recommended to select a current ripple of

It is about 40% of the current maximum output current. The inductance calculation formula is as follows:

$$= \frac{\times ÿ1 ÿ / \quad ÿ}{\times \quad (\quad \times)}$$

Where is the switching frequency, ( ) is the LED current, constant

is the percentage of the inductor current ripple.

For LGS6304X, BUCK topology in typical application circuit

The best choice of inductor is between 10µH and 47µH for the best loop

Stability and efficiency curves, recommended inductance value is 10µH.

(2) To ensure circuit safety, the saturation current rating of the inductor must be selected

It is recommended to select an inductor with a saturation current greater than the peak current under full load conditions.

During normal operation, the inductor current peak is 30%-40%.

It can be calculated according to the following formula:

$$(\quad) = (\quad) + \frac{\times ÿ1 ÿ / \quad ÿ}{2 \times \times}$$

Application Information: Typical Application Characteristics

If there is no special instructions, ***L=10ÿH*** ÿ ***COUT=10ÿF*** ÿ ***TA=25ÿÿ*** ***Buck Application Circuit***

Figure 10.1 Efficiency vs Input Voltage

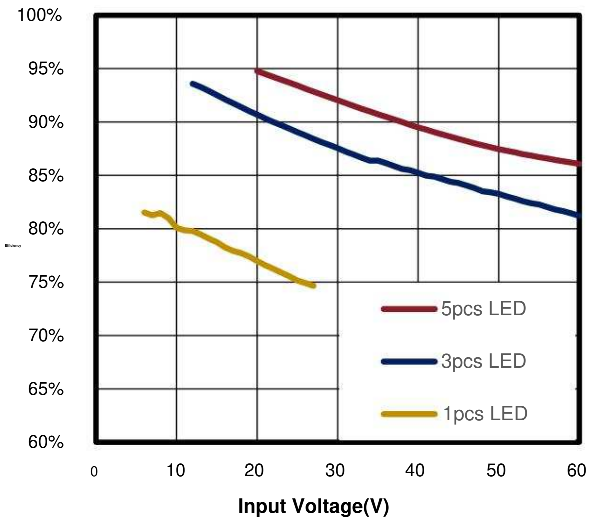


Figure 10.1.a IOUT=400mA

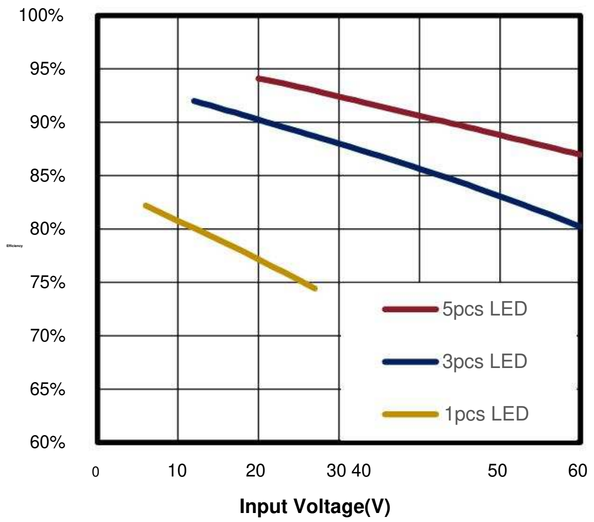


Figure 10.1.b IOUT=800mA

Figure 10.2 LED Current vs Input Voltage

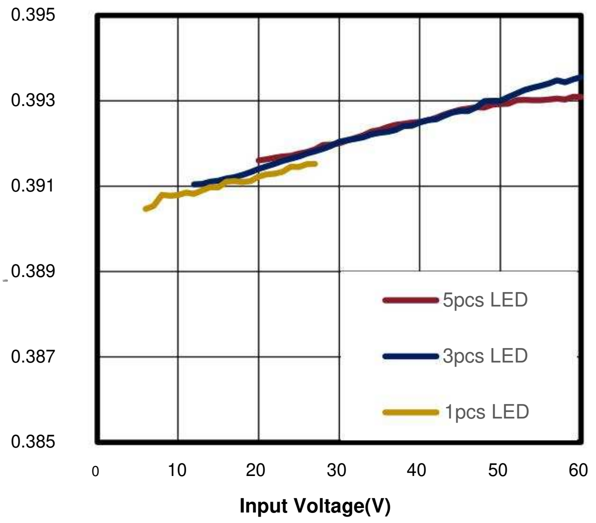


Figure 10.2.a IOUT=400mA

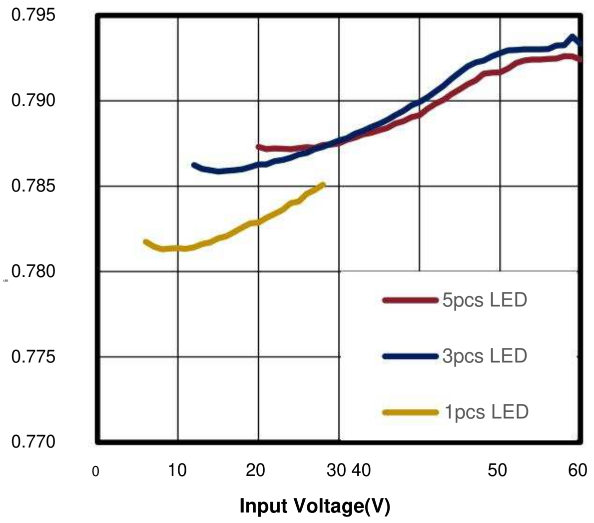


Figure 10.2.a IOUT=800mA

Application Information: Typical Application Characteristics

If there is no special instructions, ***L=10ÿH ÿ COUT=10ÿFÿ TA=25ÿÿ Buck Application Circuit***

Figure 11.1 Analog Dimming Curve

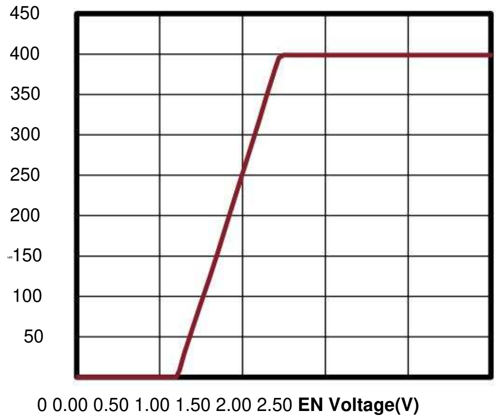


Figure 11.1.a LGS63040, VIN=30V,3pcs LED Series

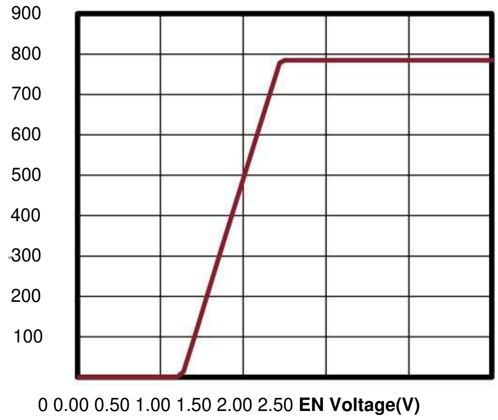


Figure 11.1.b LGS63040, VIN=30V,3pcs LED Series

Figure 11.2 PWM Dimming Curve

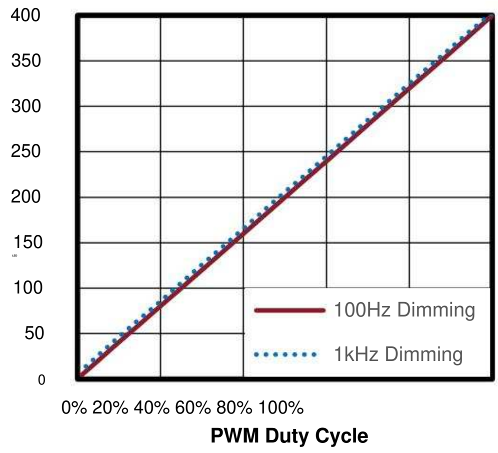


Figure 11.2.a LGS63040, VIN=30V,3pcs LED Series

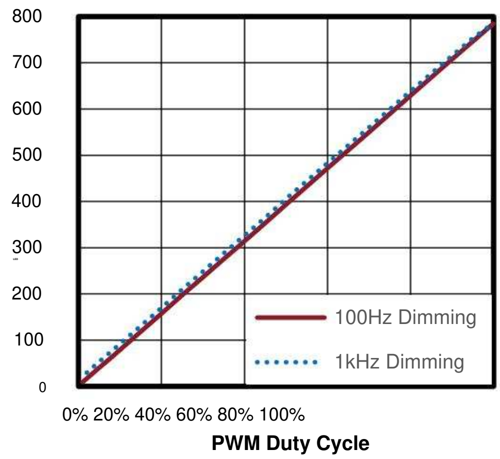


Figure 11.2.b LGS63040, VIN=30V,3pcs LED Series

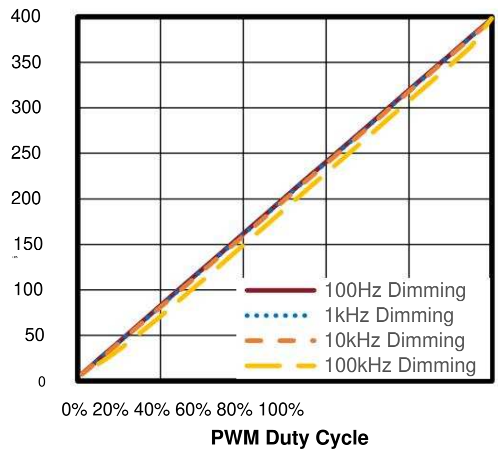


Figure 11.2.c LGS63042,VIN=30V,3pcs LED Series

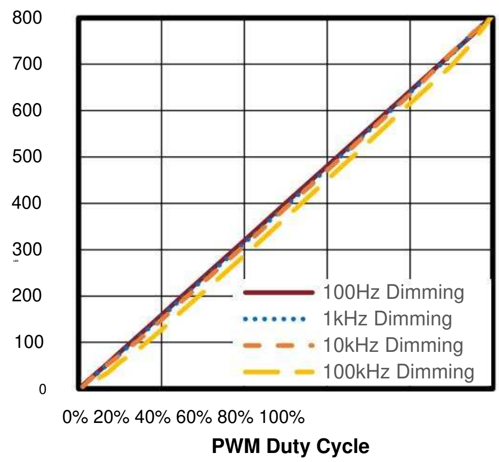


Figure 11.2.d LGS63042,VIN=30V,3pcs LED Series

Application Information: Typical Application Characteristics

If there is no special instructions, ***L=10ÿH ÿ COUT=10ÿFÿ TA=25ÿÿ Buck Application Circuit***

Figure 12.1 Start-Up/ Shut-down Waveforms

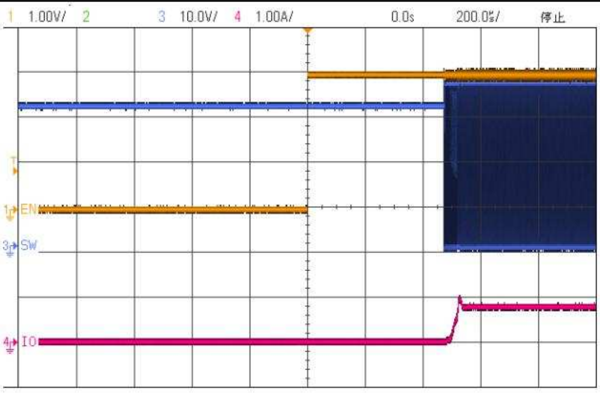


Figure 12.1.a VIN=36V, IOUT=800mA, 3pcs LED Series

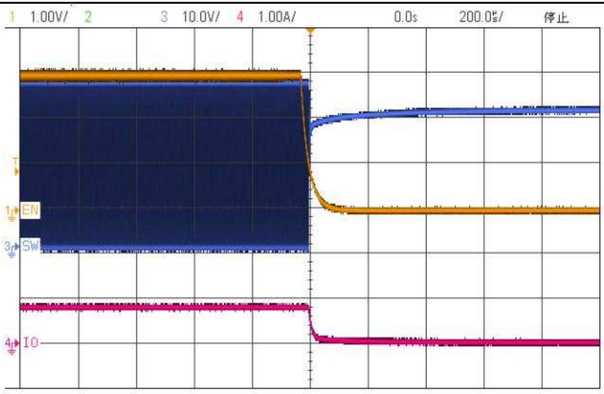


Figure 12.1.b VIN=36V, IOUT=800mA, 3pcs LED Series

Figure 12.2 PWM Dimming Transient

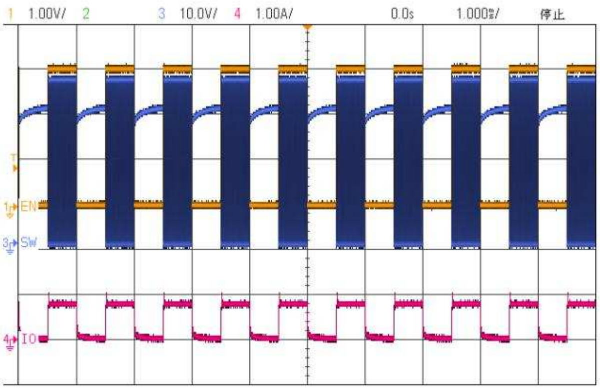


Figure 12.2.a LGS63040, VIN=36V, IOUT=800mA, 3pcs LED Series

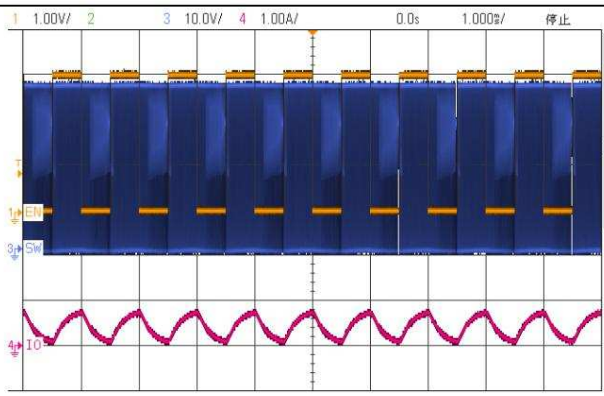


Figure 12.2.b LGS63042, VIN=36V, IOUT=800mA, 3pcs LED Series

Figure 12.3 OTP Waveforms

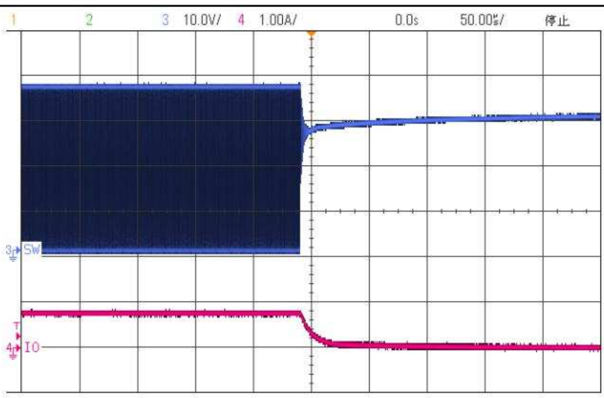


Figure 12.3.a VIN=36V, IOUT=800mA, 3pcs LED Series

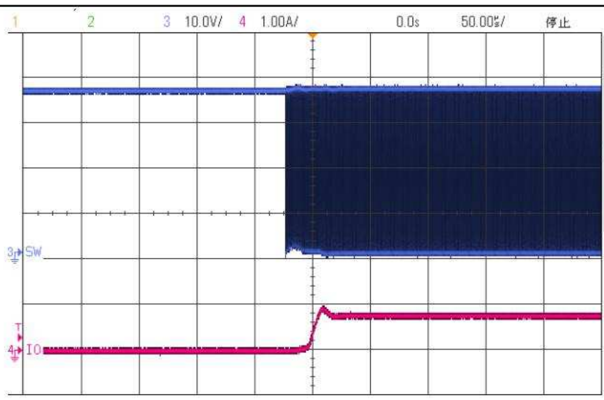


Figure 12.3.b VIN=36V, IOUT=800mA, 3pcs LED Series

Application Information: Typical Application Characteristics

If there is no special instructions, ***L=10ÿH ÿ COUT=10ÿFÿ TA=25ÿÿ Buck Application Circuit***

Figure 13.1 Start-Up/ Shut-down Waveforms

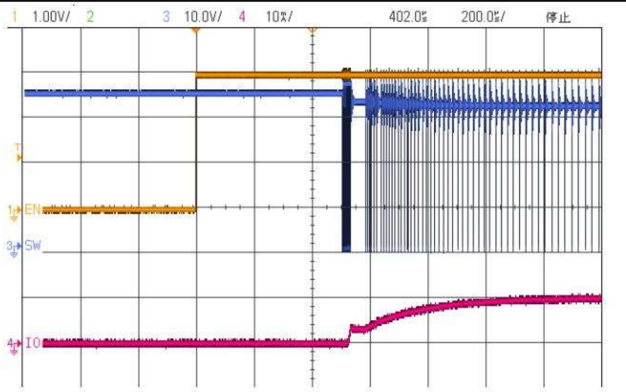


Figure 13.1.a VIN=36V, IOUT=10mA, 3pcs LED Series

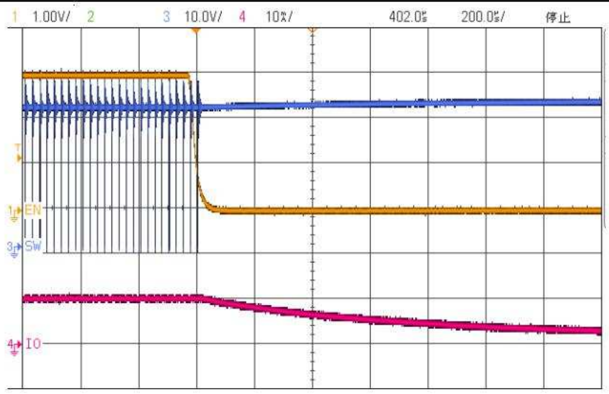


Figure 13.1.b VIN=36V, IOUT=10mA, 3pcs LED Series

Figure 13.2 PWM Dimming Transient

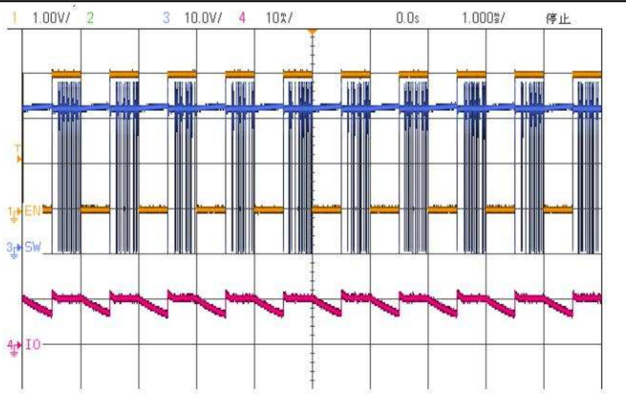


Figure 13.2.a LGS63040, VIN=36V, IOUT=10mA, 3pcs LED Series

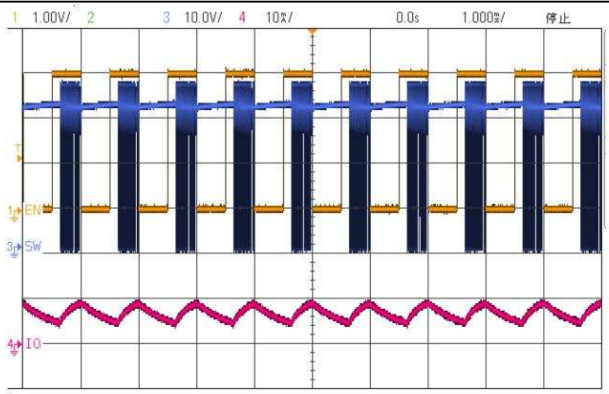


Figure 13.2.b LGS63042, VIN=36V, IOUT=10mA, 3pcs LED Series

Figure 13.3 Switching Waveforms

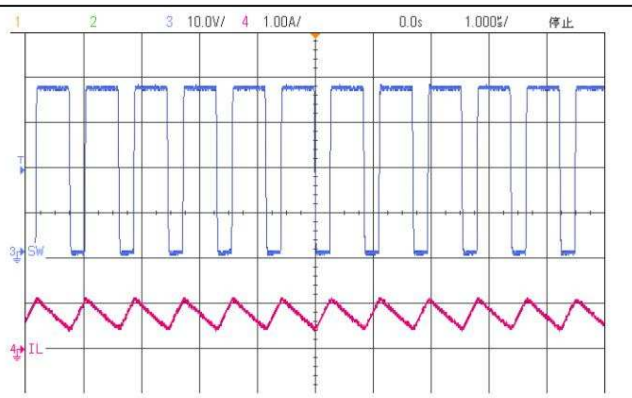


Figure 13.3.a VIN=36V, IOUT=800mA, 3pcs LED Series, CCM Mode

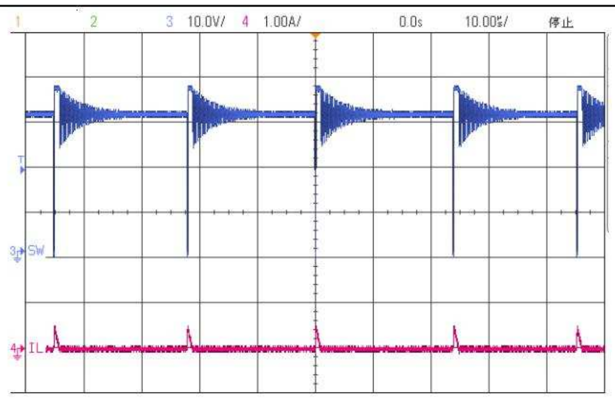


Figure 13.3.b VIN=36V, IOUT=10mA, 3pcs LED Series, Pulse Skip Mode

Application Information: Reference Layout

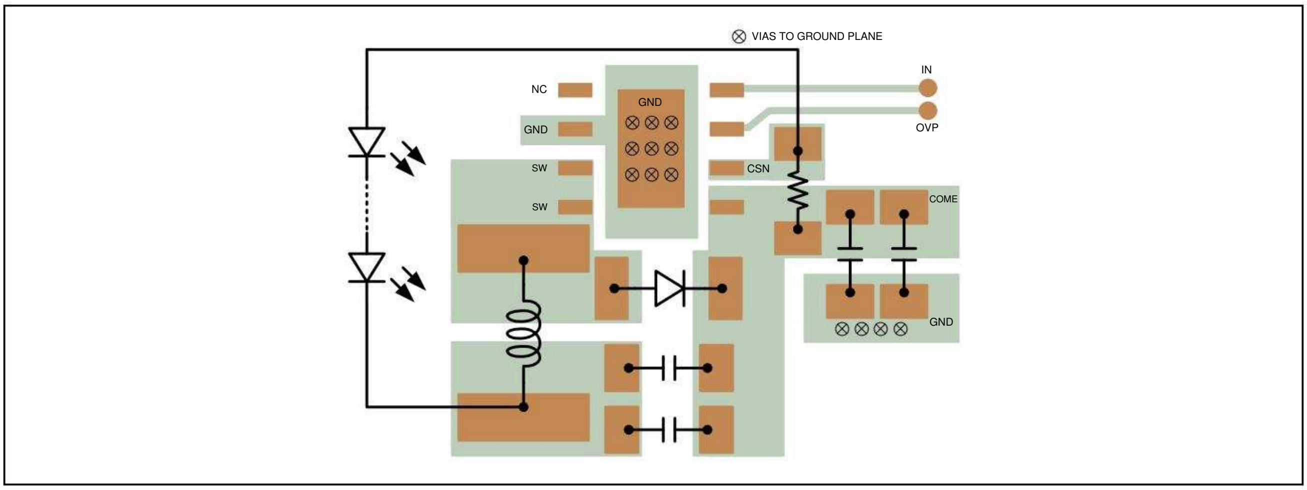
Overview

The high integration of LGS6304X makes PCB layout very simple and easy. Poor layout will affect the performance of LGS6304X, causing electromagnetic interference (EMI),

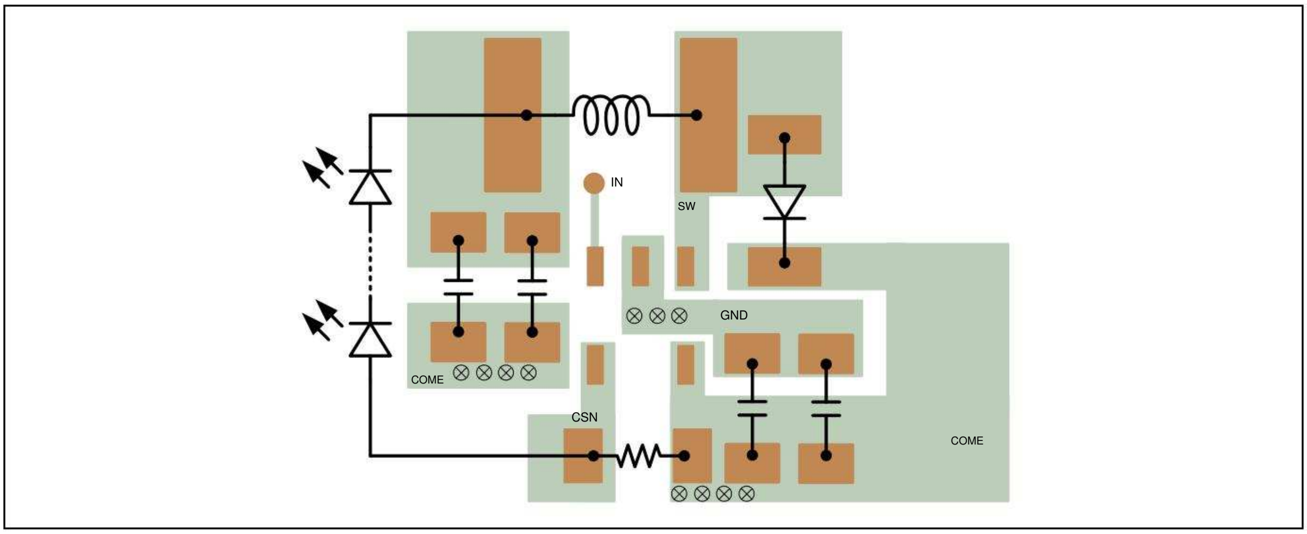
Poor electromagnetic compatibility (EMC), ground bounce, and voltage loss can affect voltage regulation and stability. To optimize electrical and thermal performance, the following rules should be applied:

Implement good PCB layout to ensure optimal performance:

- ÿ The high-frequency ceramic input capacitor CIN must be placed as close as possible to Next to the VIN and GND pins to minimize high frequency noise.
- ÿ The PCB copper area related to the SW pin must be reduced to avoid Avoid potential noise interference problems.
- ÿ Use larger PCB copper areas for high current paths, including GND pin. This helps minimize PCB conduction losses and thermal stress.
- ÿ To minimize via conduction losses and reduce module thermal stress, use Multiple vias to connect the top layer to other power or ground layers interconnection.
- ÿ The CSN pin has high impedance, so the lead trace should be as short as possible and away from Noisy LX nodes should be shielded.
- ÿ The heat dissipation pad at the bottom of the ESOP8 package chip plus the via opening helps Chip heat dissipation improves efficiency.



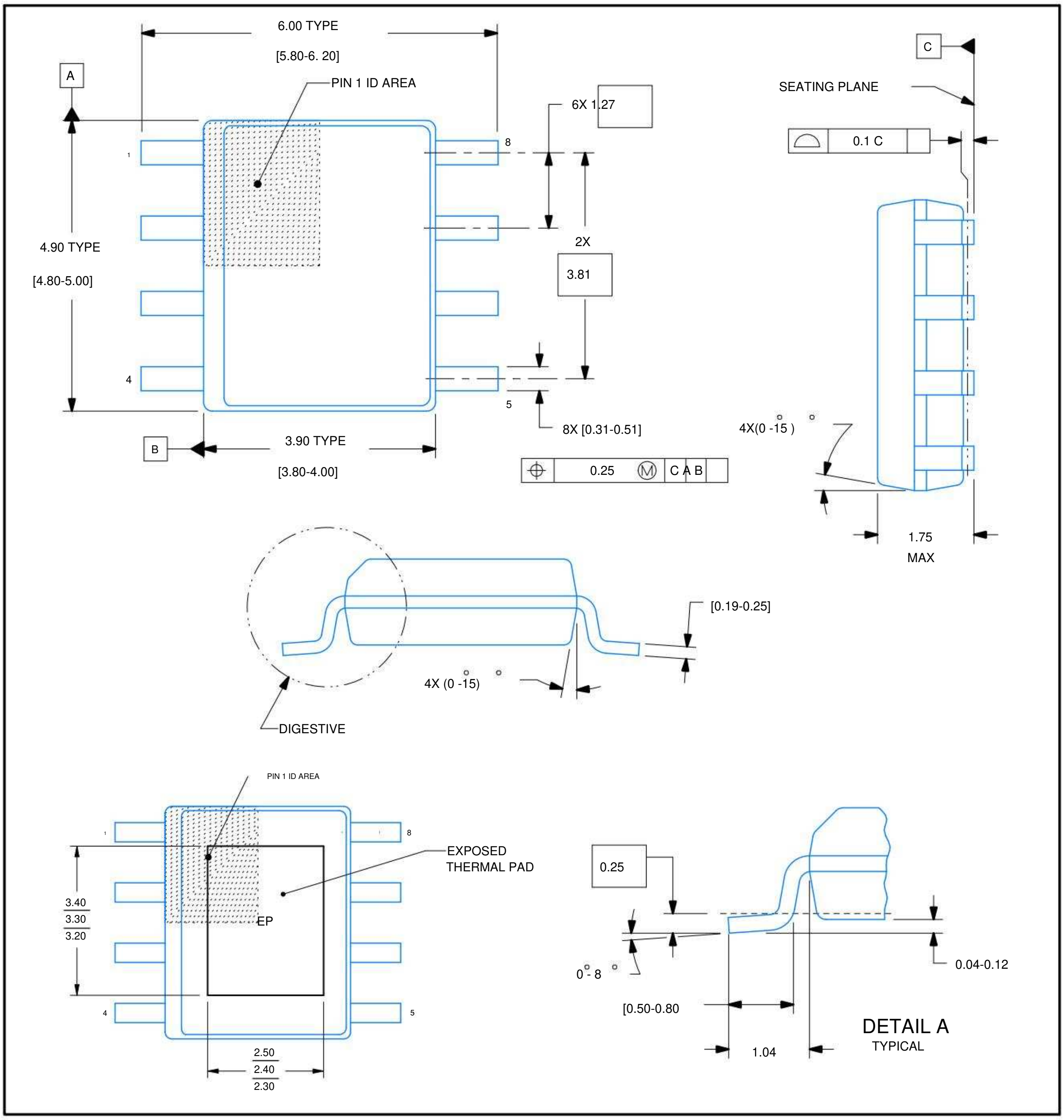
picture 14. 1 BUCK Type ESOP8 Typical packaging applications PCB Reference Layout



picture 14.2 BUCK Type SOT23-5 Typical packaging applications PCB Reference Layout

Package Description (ESOP8)

8-Lead Plastic SOIC with Bottom EPAD



Note:

(1) All data units are millimeters. Any dimensions in brackets are for reference only.

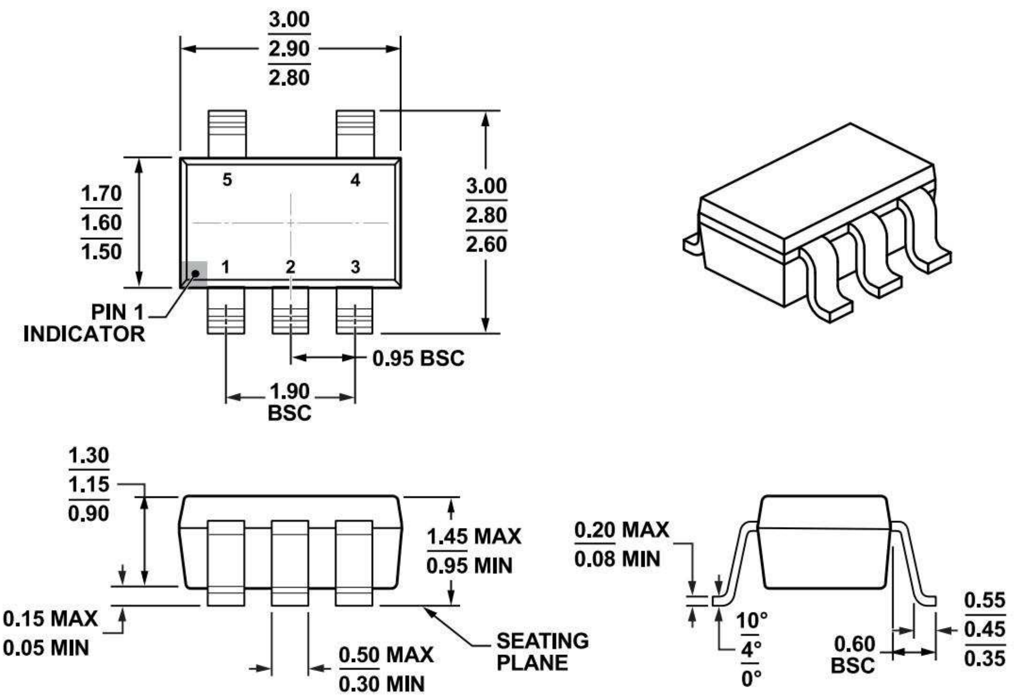
(2) This diagram is subject to change without prior notice.

(3) This dimension does not include mold flash, protrusions, or sprue burrs.

(4) This dimension does not include mold flash.

Package Description

1.45mm height 5-pin SOT-23 plastic SOIC



Note:

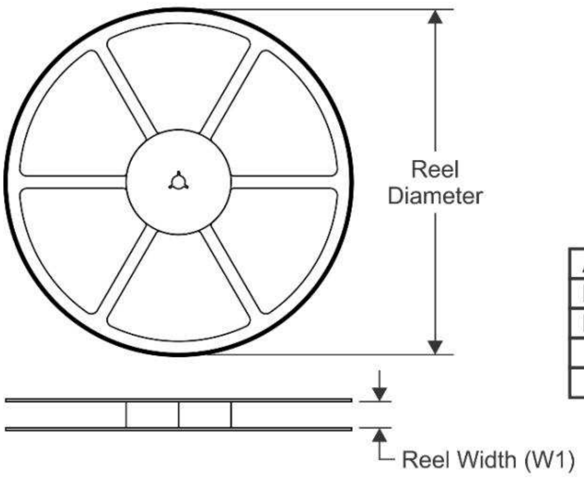
(1) All data units are millimeters. Any dimensions in brackets are for reference only.

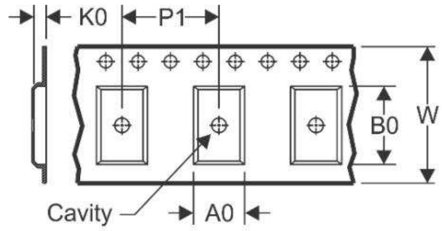
(2) This diagram is subject to change without prior notice.

(3) This dimension does not include mold flash, protrusions, or sprue burrs.

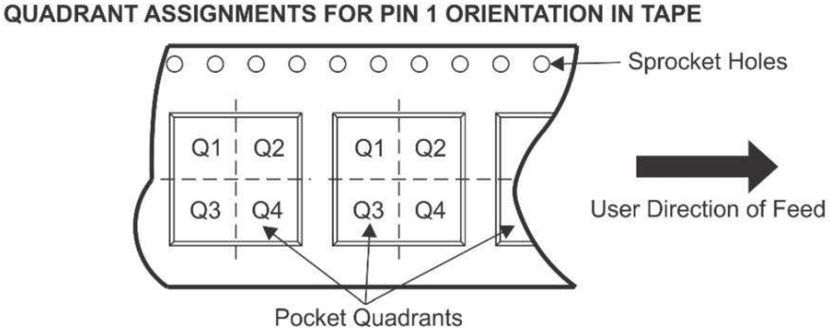
(4) This dimension does not include mold flash.

TAPE AND REEL INFORMALEGEND-SION





A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers



*ALL dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ		Reel Width W1(mm)	Pin1 Quadrant
LGS63040	SOT23-5	B5	5	3000	180.0		Q3
LGS63042	SOT23-5	B5	5	3000	180.0		Q3
LGS63040	ESOP8	EP	8	4000		330	Q1
LGS63042	ESOP8	EP	8	4000		330	Q1

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