上海贝岭 SHANGHAI BELLING

BLL2740

42V, 100% Duty Cycle CC&CV Buck Converter

DESCRIPTION

BLL2740 has an optimum input voltage, step-down converter that operates in either CV (Constant Output Voltage) mode or CC (Constant Output Current) mode. The maximum input voltage is up to 42V and the operation input voltage from 8.5V to 32V.

MOSFET, what build in 55mΩ high-side and 30mΩ low-side, could deliver up to 3.5A of continuous output current and the output current accurate to within ±7%.

No external compensation component requirement. The line compensation and the constant current can be set by an external resistance.

Independent output voltage protection suits for BC1.2 and QC2.0/3.0 dual channel output voltage.

In conclusion, BLL2740 is a full function and high performance, high reliability buck DC-DC converter.

FEATURES

- 100% duty cycle car charge scheme
- Build in high-side and low-side MOSFET
- Max output current: 3.5A
- Adjustable output voltage, V_{FB}=1V
- Excellent constant current accurate: ±7%
- Constant voltage accurate: ±2%
- No external compensation needed
- Jitter function
- Efficiency: up to 95%
- Adjustable line compensation
- Short circuit protection
- Over voltage protection
- Thermal shutdown protection
- Under voltage lock-out
- Available in SOP-8 package
- ESD HBM >5KV

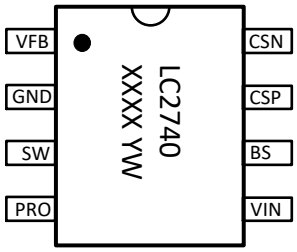
APPLICATIONS

- Car DVD
- Black box
- Car charger
- Industry application

ORDERING INFORMATION

Part No.	Package	Tape&Reel
BLL2740CD8TR	SOP-8	4000/Reel

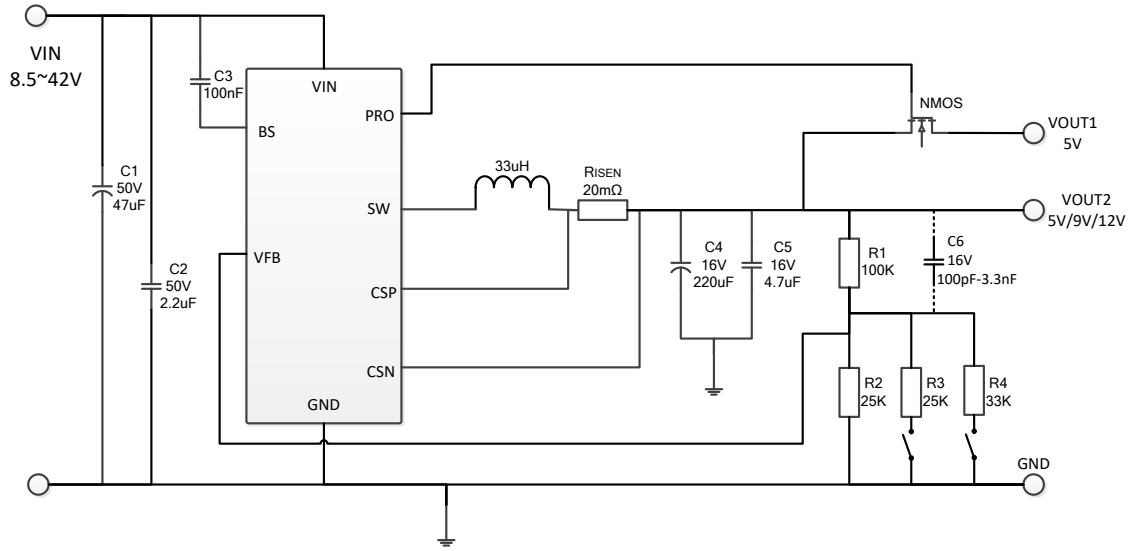
PIN OUT & MARKING



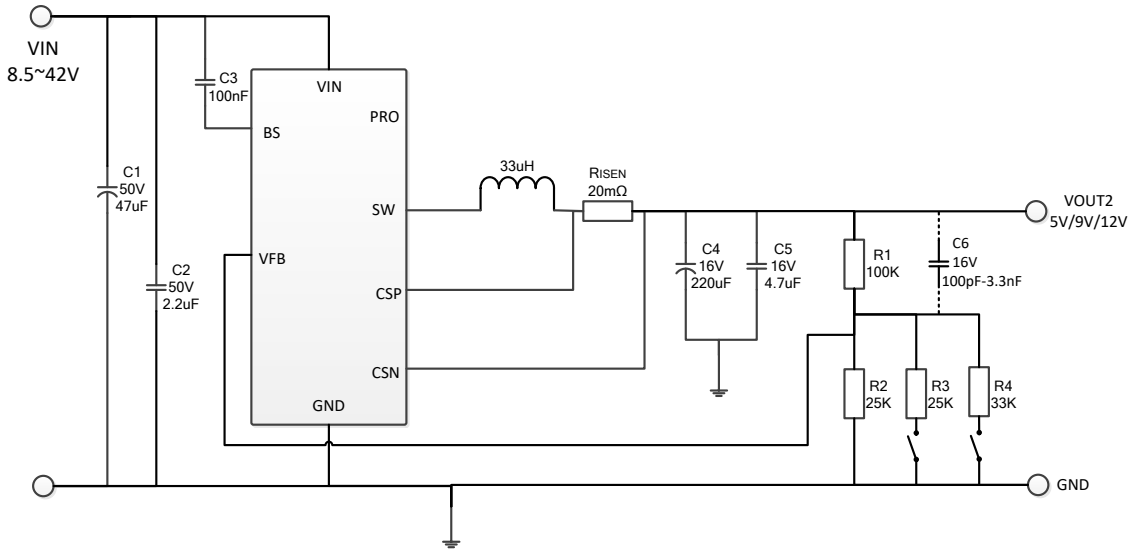
SOP-8

LC2740: Product code
XXXX: Lot No.
YW: Date code (Year & Week)

TYPICAL APPLICATION



Dual channel application



Single channel application

Note: *1) It is recommended to use C1 and C4 as high-frequency low-ESR capacitors for Rubycon and Wurth.*
2) The inductor core is recommended for the iron silicone Aluminum ring.
3) Pin PRO is float in single channel application.

PIN DESCRIPTION

Pin #	Name	Description
1	VFB	Feedback voltage
2	GND	Ground
3	SW	Power switching output connect to external inductor
4	PRO	Protection for over output voltage
5	VIN	Power supply input. Place a 2.2µF ceramic capacitor between VIN and GND as close as possible
6	BS	Power to the internal high-side MOSFET gate driver. Connect a 100nF capacitor from BS to VIN
7	CSP	Current sense Input_P
8	CSN	Current sense Input_N

ABSOLUTE MAXIMUM RATING

Parameter		Value
VIN to GND		-0.3 to 43 V
SW to GND		-0.3 to 34 V
BS to GND		-0.3 to 43V
CSP, CSN, PRO to GND		-0.3 to 25 V
VFB to GND		-0.3 to 6 V
Max operating junction temperature(T_J)		150°C
Ambient temperature(T_A)		-40°C to 85°C
Package thermal resistance (θ_{JC})	SOP-8	45°C/W
Storage temperature(T_S)		-40°C to 150°C
Lead temperature & time		260°C, 10S
ESD (HBM)		>5000V

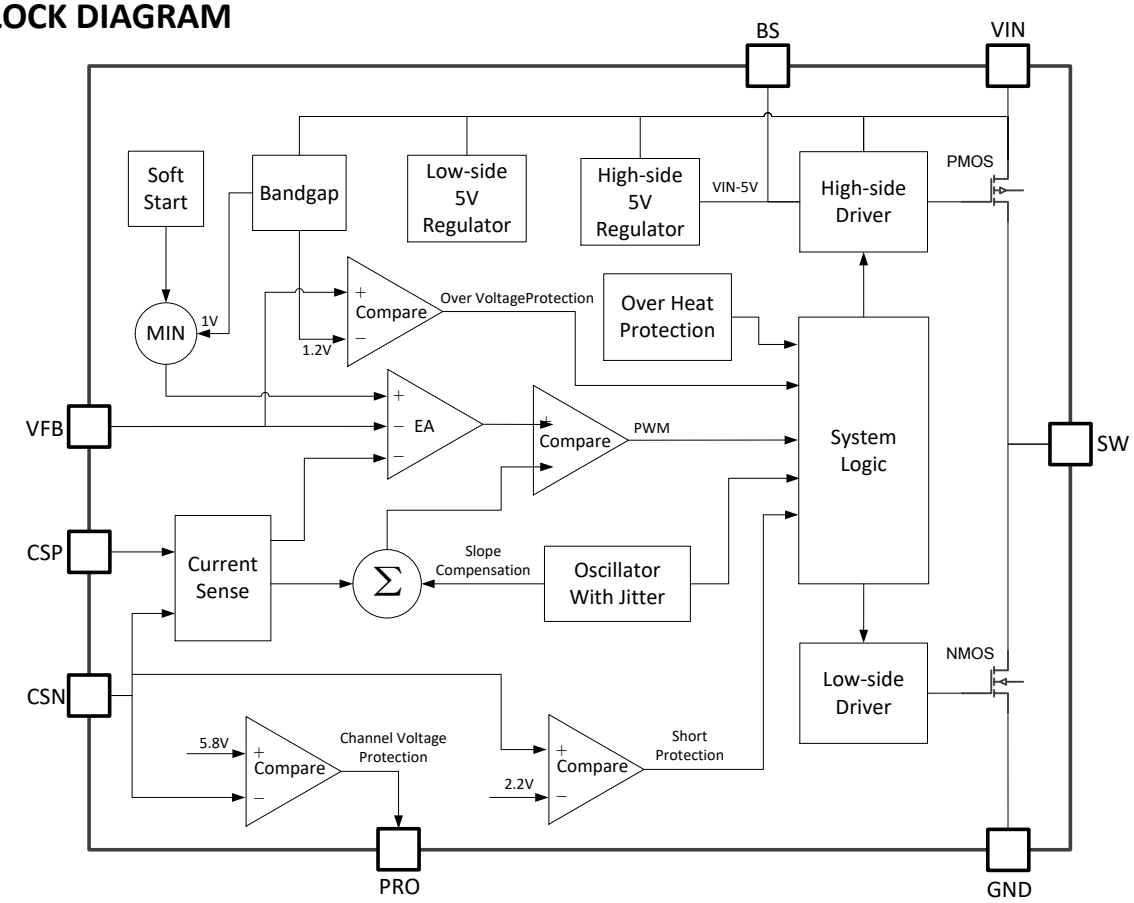
Note: *Exceed these limits to damage to the device. Exposure to absolute maximum rating conditions may affect device reliability.*

ELECTRICAL CHARACTERISTICS

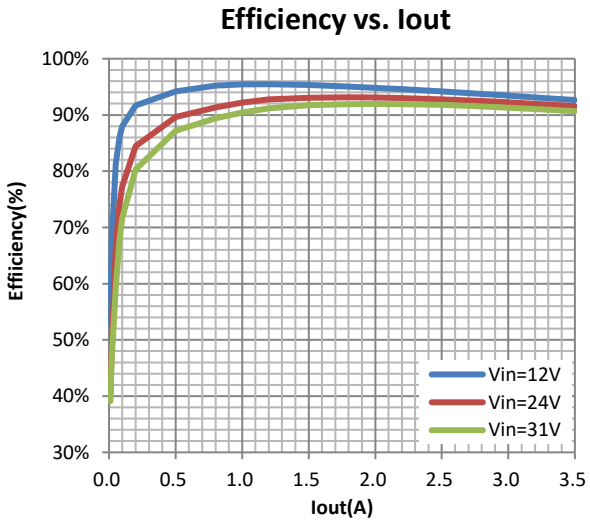
(V_{IN}=12V, T_A=25°C, unless otherwise stated)

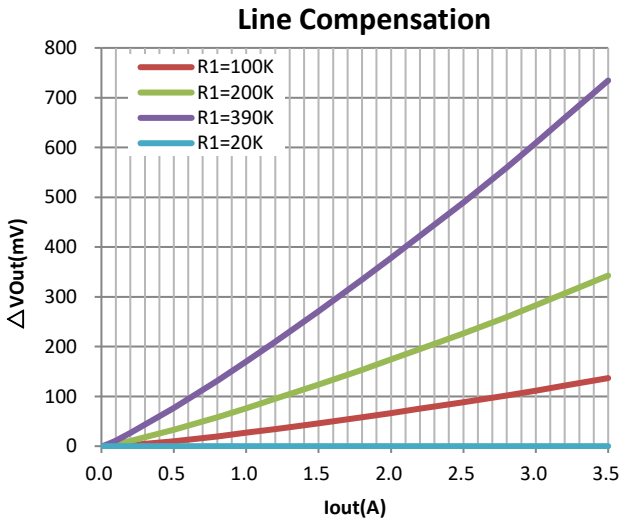
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{IN}	Input voltage		8.5	-	42	V
$V_{OVP-VIN}$	Input OVP threshold		31	32	33	V
V_{UVLO}	UVLO voltage		7	8.5	9	V
	UVLO hysteresis		-	1	-	V
I_{CCQ}	Quiescent current	V_{FB} = 1.5V, force driver off.	-	1.5	2.5	mA
I_{SB}	Standby current	No load, V_{IN}>8.5V	-	1.6	3	mA
V_{FB}	Feedback voltage		0.98	1	1.02	V
V_{OVP}	FB OVP detect voltage	Internal define	-	1.2	-	V
F_{SW}	Switching frequency	I_{OUT}=1A	-	135	-	KHz
D_{MAX}	Maximum duty cycle		-	100	-	%
	Minimum on-time		-	250	-	ns
Reference of CSP-CSN	Reference voltage of constant current	0.4V<V_{FB}<0.95V, V_{CSN}>2.6V	46.5	50	53.5	mV
V_{CSN}	$V_{OUT-SHORT}$		2.2	2.4	2.6	V
High side	R_{DSON} of power MOS	I_{OUT}=1A	-	55	75	mΩ
Low side		I_{OUT}=1A	-	30	45	mΩ
T_{SD}	Thermal shutdown temp		-	155	-	°C
T_{SH}	Thermal shutdown hysteresis		-	30	-	°C

BLOCK DIAGRAM

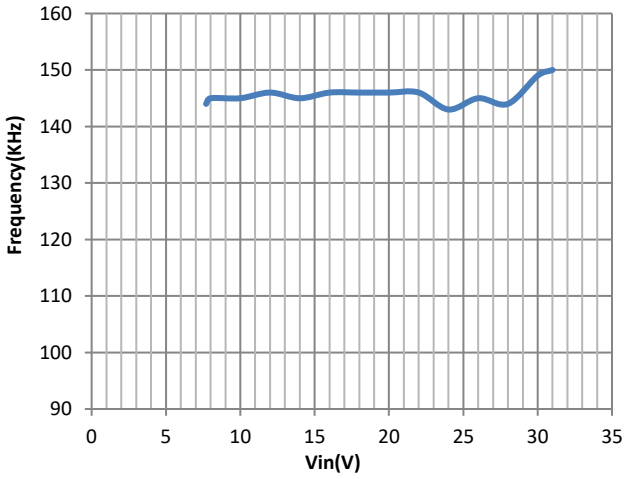


TYPICAL PERFORMANCE CHARACTERISTICS

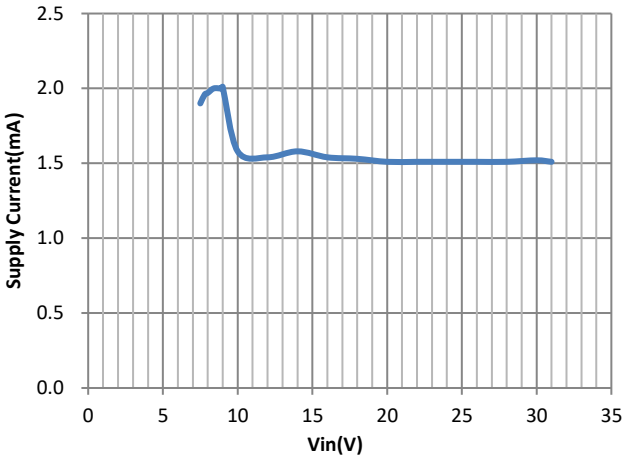




Switch Frequency vs. Input Voltage

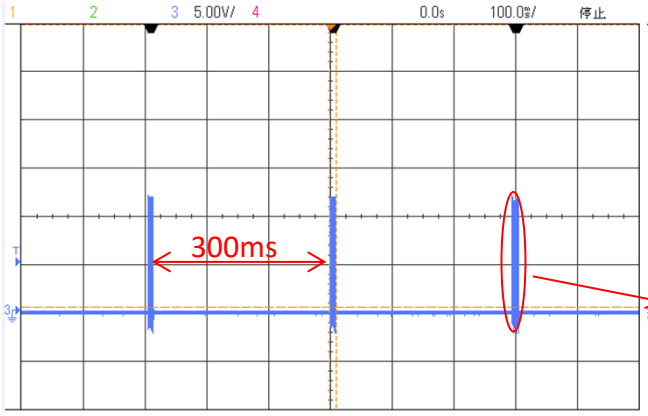


Supply Current vs. Input Voltage



Short Circuit

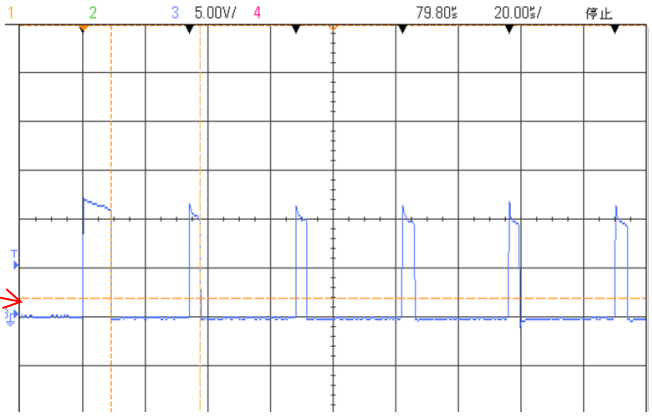
Vin=12V, Freq=3.3Hz



CH3: SW

Short Circuit

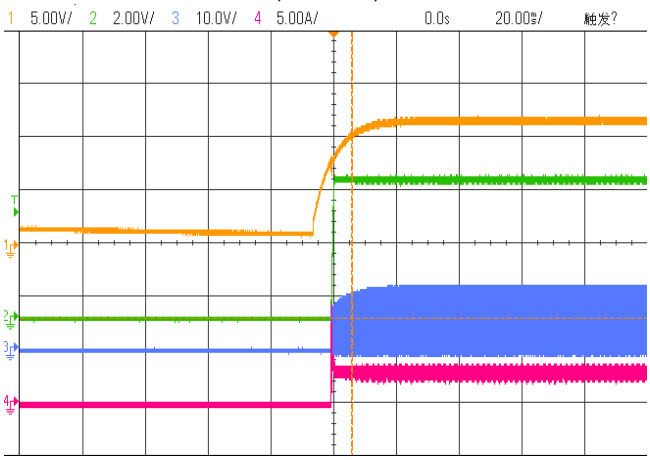
Vin=12V, Freq=34kHz



CH3: SW

Power On

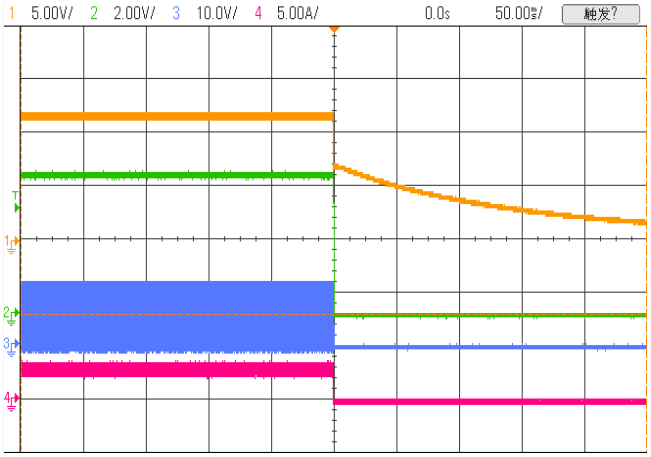
Vin=12V, Vout=5V, Iout=3A



CH1: Vin, CH2: Vout, CH3: SW, CH4: Isw

Power Off

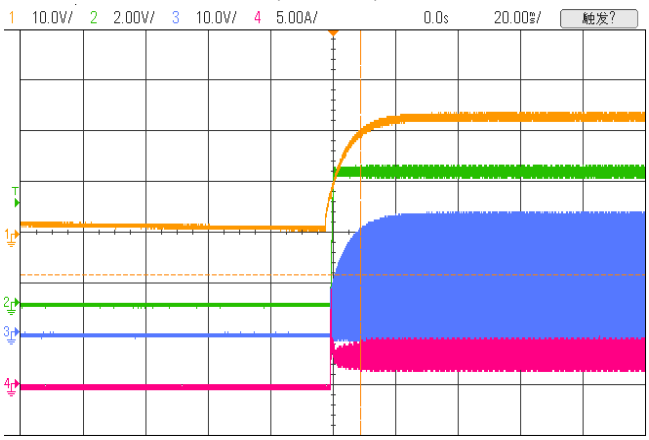
Vin=12V, Vout=5V, Iout=3A



CH1: Vin, CH2: Vout, CH3: SW, CH4: Isw

Power On

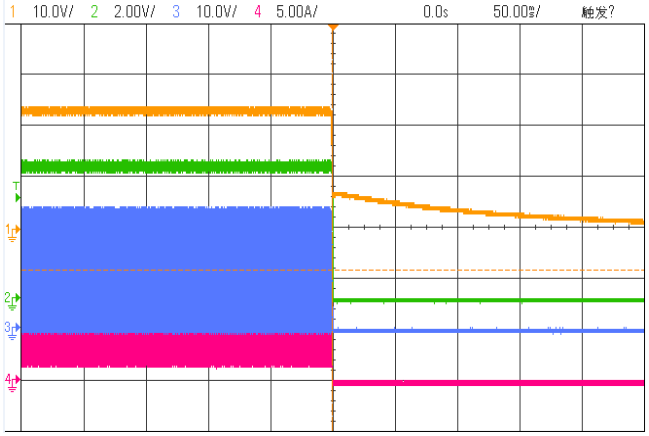
Vin=24V, Vout=5V, Iout=3A



CH1: Vin, CH2: Vout, CH3: SW, CH4: Isw

Power Off

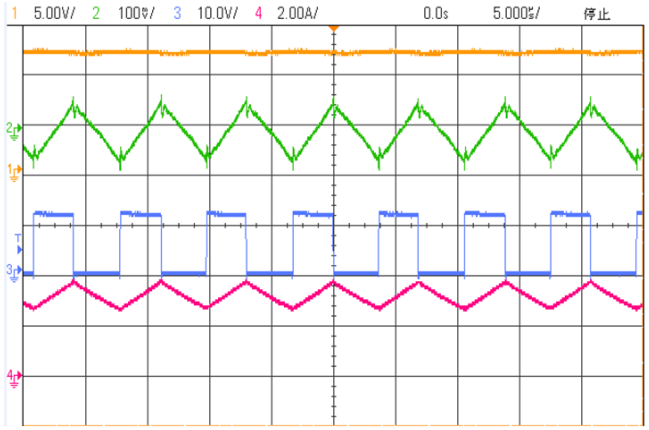
Vin=24V, Vout=5V, Iout=3A



CH1: Vin, CH2: Vout, CH3: SW, CH4: Isw

Output Voltage Ripple

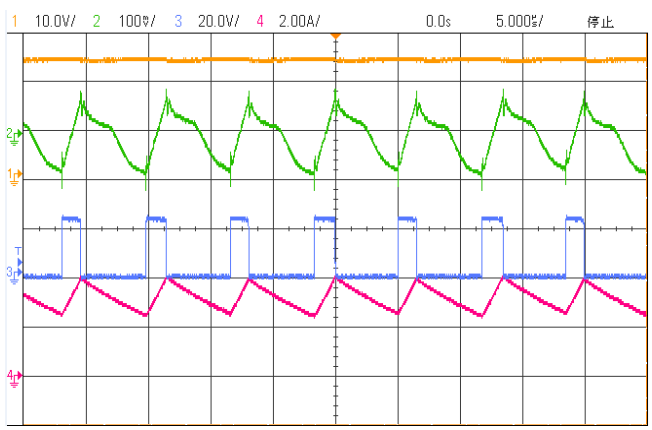
Vin=12V, Vout=5V, Iout=3A



CH1: Vin, CH2: Vout, CH3: SW, CH4: Isw

Output Voltage Ripple

Vin=24V, Vout=5V, Iout=3A



CH1: Vin, CH2: Vout, CH3: SW, CH4: Isw

DETAILED DESCRIPTION

Input Under Voltage Protection

BLL2740 provides an input voltage up to 42V and operates from an input voltage range of 8.5V to 32V. If VIN drops below 7.5V, the UVLO circuit inhibits switching. Once VIN rises above 8.5V, the UVLO clears, and the soft-start sequence activates.

Input Over Voltage Protection

If VIN rises above 32V, the UVLO circuit inhibits switching. BLL2740 will not be damaged until the voltage exceeds 42V. Once VIN drops below 30V, the UVLO clears, and the soft-start sequence activates.

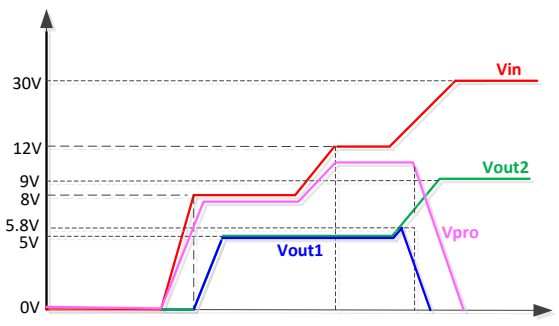
Soft-start

BLL2740 has an internal soft-start circuitry to reduce supply inrush current during startup conditions. When the device exits under-voltage lockout (UVLO), shutdown mode, or restarts following a thermal-overload event, the soft-start circuitry slowly ramps up current available after 300us.

Constant Voltage Output

BLL2740 presets the V_{FB} voltage to 1V. The Output Voltage can be set by extra resistance.

Output Channel Protection



Output Over Voltage Protection

Once V_{FB} rises above 1.2V, BLL2740 shuts down to avoid damage caused by abnormal use of electrical equipment.

Constant Current Output

BLL2740 senses the current by sampling the voltage difference between the CSP and the CSN, and adjusts the output current to the default value by the loop.

$$I_{OUT} = \frac{50mV}{R_{ISEN}}$$

Constant current operates normally when CSN is higher than 2.4V. When CSN is below 2.2V causing by overload, BLL2740 will enter short circuit protection mode.

Short Circuit Protection

When CSN drops below 2.2V since too heavy load, BLL2740 will enter short circuit protection function, and the system will enter hit-cup mode, and frequency drop to 34KHz per cycle and stop switching for 300mS.

Line Compensation

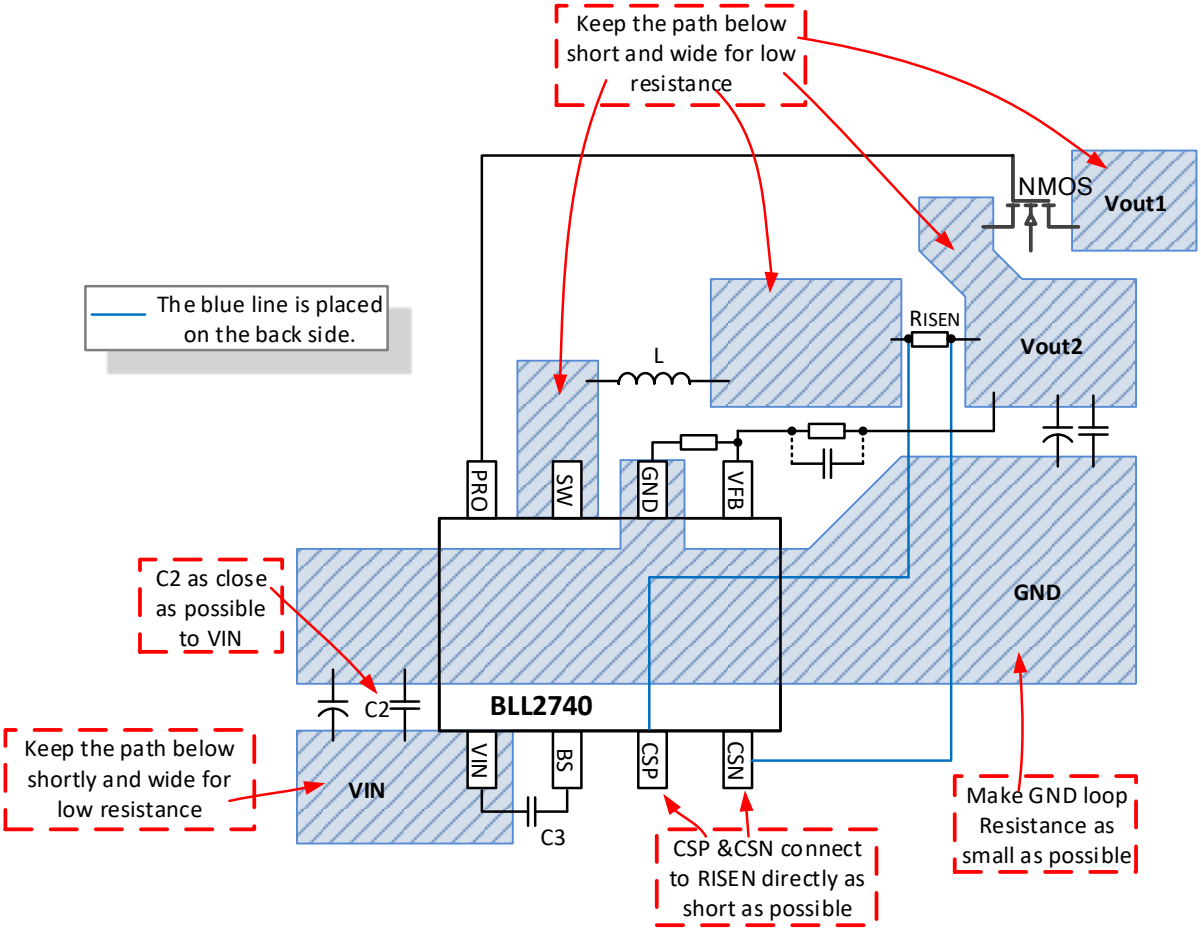
When users use different cables, it will produce different voltage drop, the users can set their own cable compensation voltage according to the need:

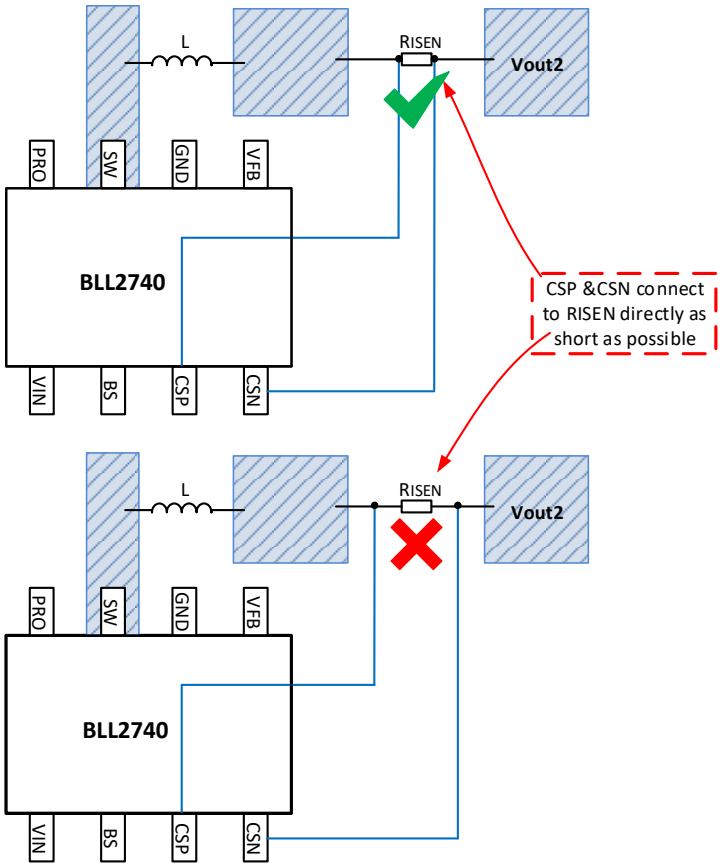
$$V_{cable\ compensation} = 1.6uA * R1 * \frac{V_{CSP} - V_{CSN}}{50mV}$$

Thermal Shutdown

The junction temperature of the IC is monitored internally. If the junction temperature exceeds the threshold value (typically 155°C), the converter shuts off. This is non-latch protection. There is about 30°C hysteresis. Once the junction temperature drops around 125°C, it initiates a Soft-start.

LAYOUT GUIDE

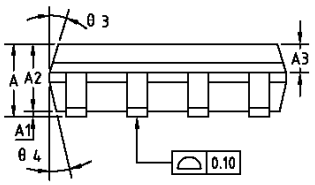


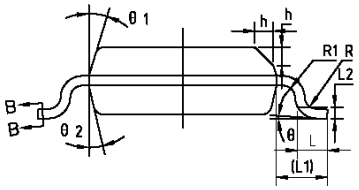


PACKAGE OUTLINE

Package	SOP-8	Devices per reel	4000pcs

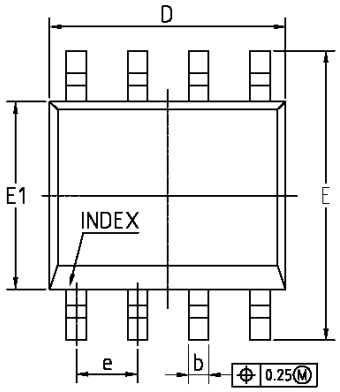
Package specification:

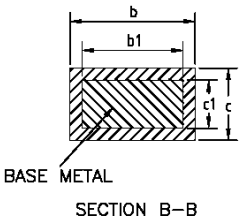




COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	1.35	1.55	1.75
A1	0.10	0.15	0.25
A2	1.25	1.40	1.65
A3	0.50	0.60	0.70
b	0.38	–	0.51
b1	0.37	0.42	0.47
c	0.17	–	0.25
c1	0.17	0.20	0.23
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27BSC		
L	0.45	0.60	0.80
L1	1.04REF		
L2	0.25BSC		
R	0.07	–	–
R1	0.07	–	–
h	0.30	0.40	0.50
θ	0°	–	8°
θ 1	15°	17°	19°
θ 2	11°	13°	15°
θ 3	15°	17°	19°
θ 4	11°	13°	15°





Unit: mm