Highly-Integrated 6-Channel DC/DC Power Management IC

REV：02

General Description

The LD7242 is a high-efficiency complete solution for power supply of digital video cameras (DVCs). With six internal MOSFET DC-DC converters, it provides a maximum efficiency of 95% and generates all the critical power suppliers in DV systems. The LD7242 includes 6 channels of converter and 3 LDOs and Power-Good flag. See the description as below.

6 Channel DC/DC Converters:

CH1 is a synchronous boost converter for motor control and HDMI.
CH2 is a selectable synchronous buck/boost converter for DSC system I/O power.
CH3 is a synchronous buck converter for DSP core or external memory.
CH4 is a synchronous buck converter for DSP core or external memory.
CH5 is a selectable high-voltage boost converter/ current source for white LEDs display.
CH6 is an asynchronous boost converter for micro projector power.

LDOs：
LDO25 is a LDO regulator with ultra-low noise, high PSRR and soft start function for PLL.
HVLDO is a high voltage input LDO regulator with ultra-low noise, high PSRR and soft start function for HDMI.
RTC_LDO is LDO regulator with low quiescent current and high output voltage accuracy for Real Time Clock.

The LD7242 also features internal compensation to minimize external component count. For the complete protection, the LD7242 provides over current protection, over/under voltage protection, and thermal shutdown protection.

The LD7242 can operate in 1-cell lithium-ion (Li+) or dual-battery (2AA) designs. It is available in a compact 32-Pin, 4mm x 4 mm WQFN package.

+Patented

Features

- Supply Voltage Range：1.5V to 5.5V
- Integrated Power MOSFET Switch
- Synchronous Buck Converter
  -Up to 95% Efficiency
  -Up to 100% Duty Cycle
- Synchronous Boost Converter
  - Up to 95% Efficiency
  - All Boost Converters with OVP
  -True Shutdown function
- Built-in with CH1, CH2, CH3, CH4 and LDO25 Power ON/OFF Sequence Control Pin
- Boost Mode LED Driver for WLED
  -PWM Dimming
  -LED Open Protection
  -Regulated Current for up to 5 White LEDs
- Current Source Mode LED Driver for WLED
  -PWM Dimming
  -Up to 25mA Output Current
- Built-in RTC LDO , HVLDO(100mA), LDO25(300mA) and System Power-Good flag
- Fixed 1MHz Operating Frequency with CH1 to CH6
- Operating Ambient Temperature Range: -30°C to 85°C

Applications

- Digital Video Cameras (DVCs)
- Portable Electronic Equipment

Typical Application for Li-ion

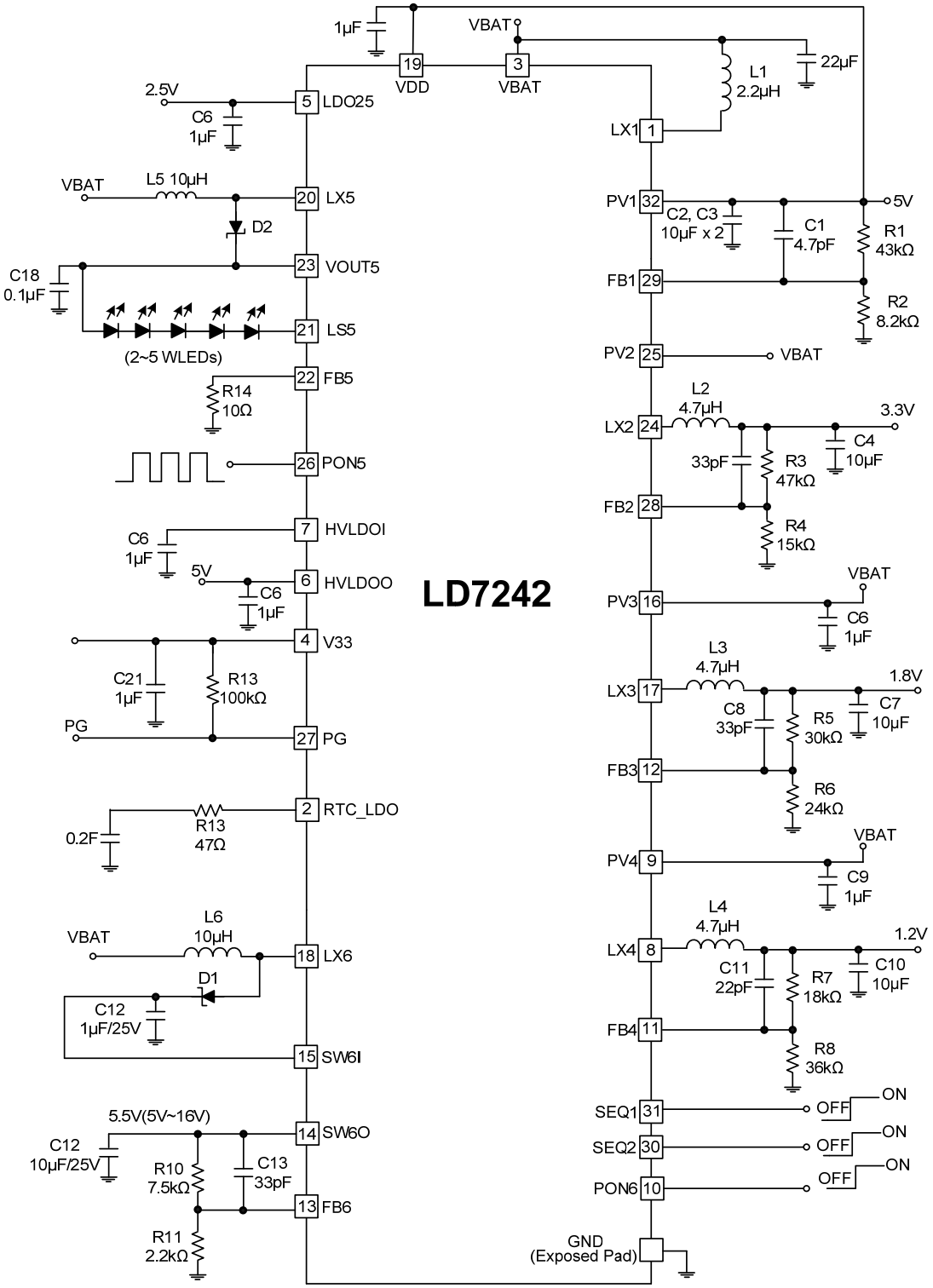


Fig. 1 Typical application circuit for Li-ion

Typical Application for 2AA

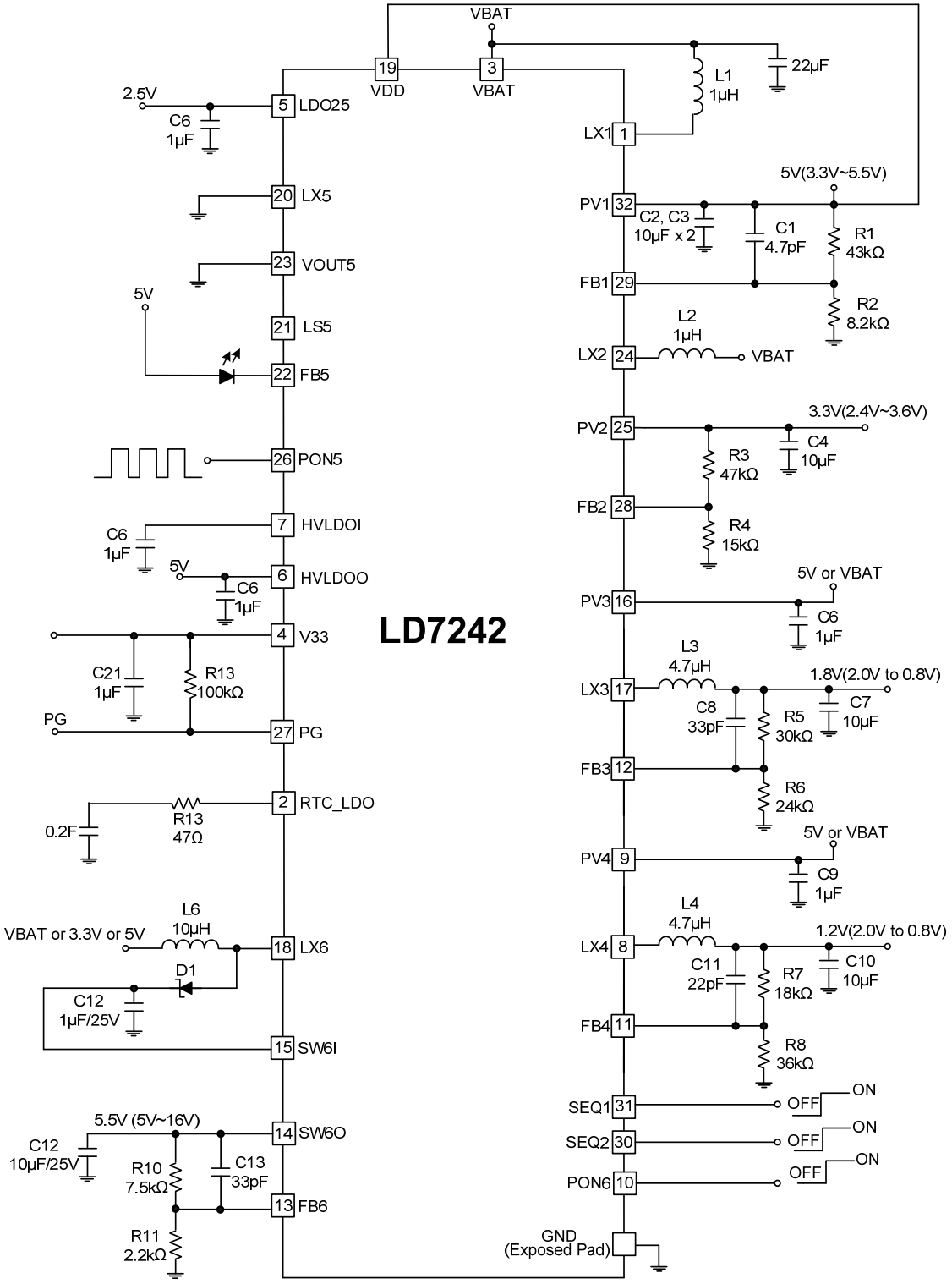
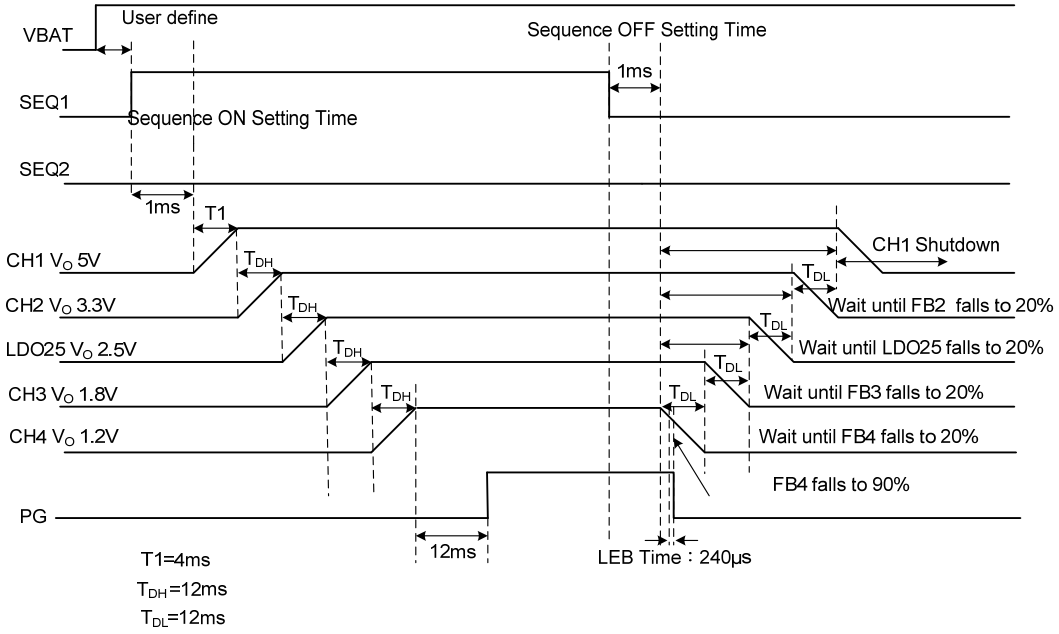


Fig. 2 Typical application circuit for 2AA

Timing Diagram：A2 (SEQ1=1, SEQ2=0)

Power On Sequence：CH1 Boost → CH2 Buck → LDO25 → CH3 Buck → CH4 Buck

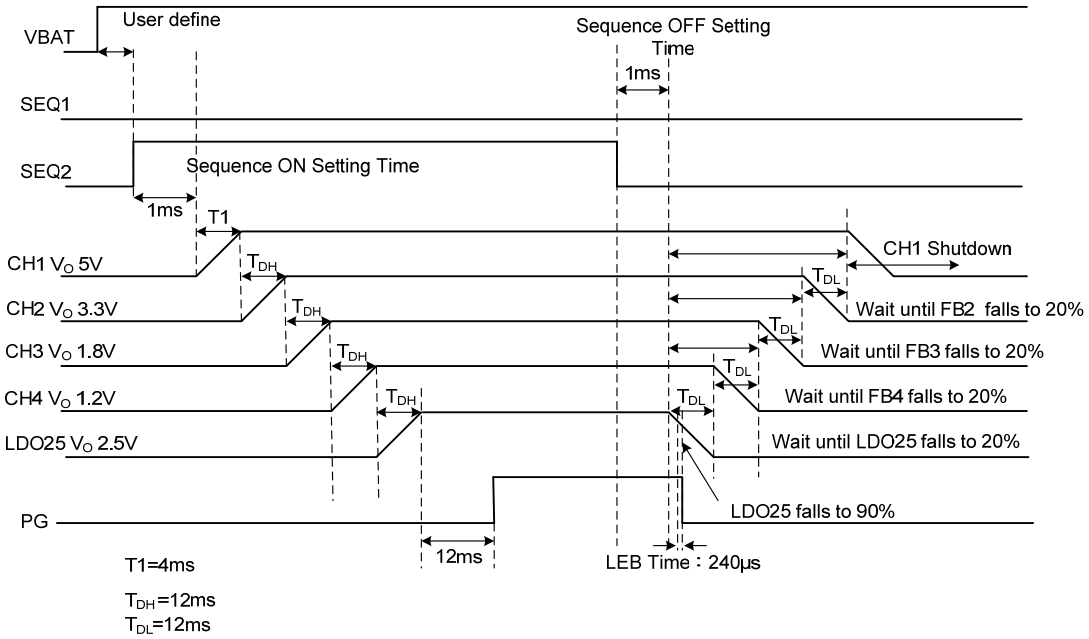
Power Off Sequence：CH4 Buck → CH3 Buck → LDO25 → CH2 Buck → CH1 Boost



Timing Diagram：A5 (SEQ1=0, SEQ2=1)

Power On Sequence：CH1 Boost → CH2 Buck → CH3 Buck → CH4 Buck → LDO25

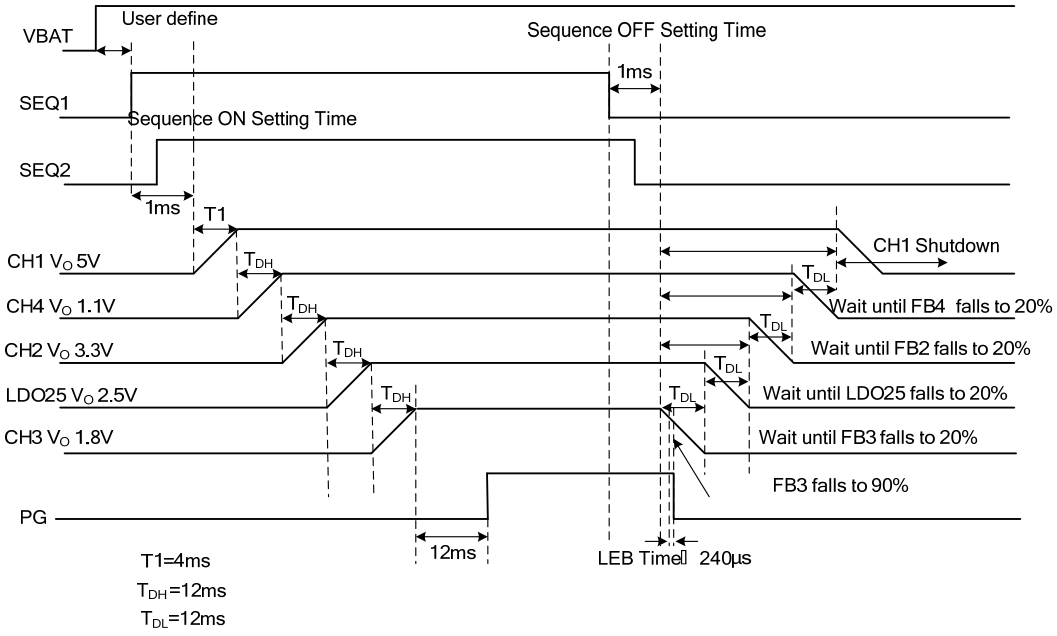
Power Off Sequence：LDO25 → CH4 Buck → CH3 Buck → CH2 Buck → CH1 Boost



Timing Diagram：A7 (SEQ1=1, SEQ2=1)

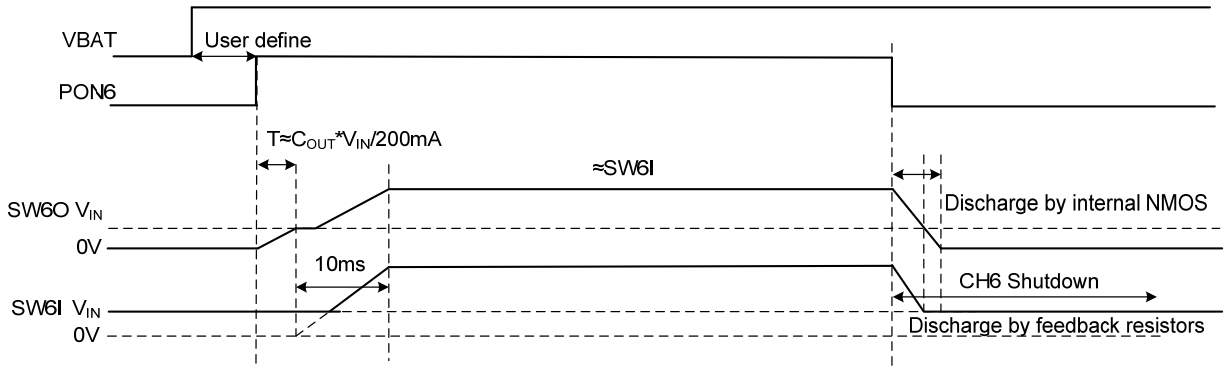
Power On Sequence：CH1 Boost → CH4 Buck → CH2 Buck → LDO25 → CH3 Buck

Power Off Sequence：CH3 Buck → LDO25 → CH2 Buck → CH4 Buck→ CH1 Boost

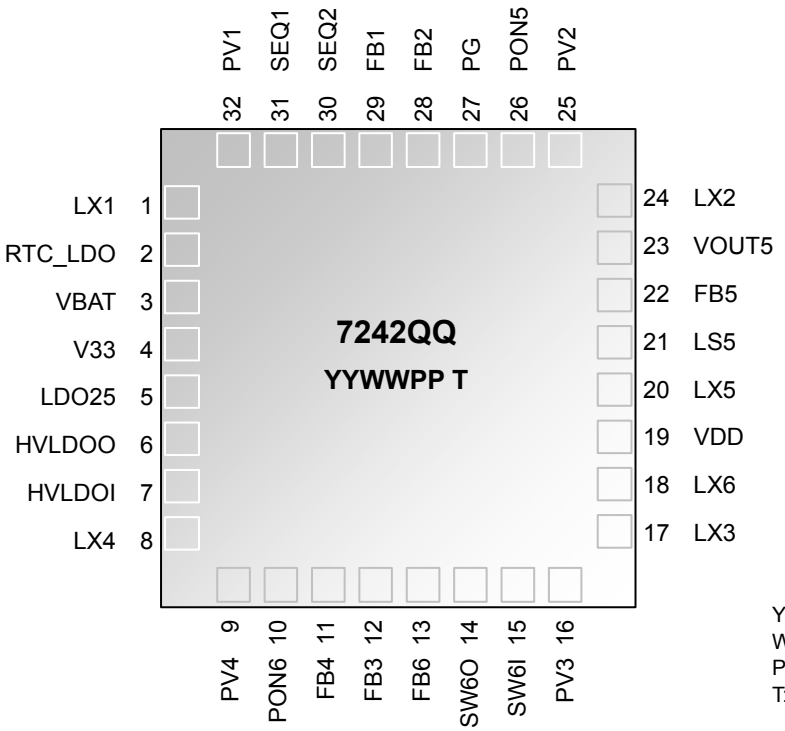


Timing Diagram

CH6 Timing Diagram



Pin Configuration



YY: Year code
WW: Week code
PP: Production code
T: Thickness
V: 0.85~0.9mm
W: 0.75mm (normal)
U: 0.55mm
X: 0.4mm

Ordering Information

Part number	Package	TOP MARK	Shipping
LD7242 GQQW	WQFN -32 (4mm*4mm)	7242QQ(W)	2500 /tape & reel

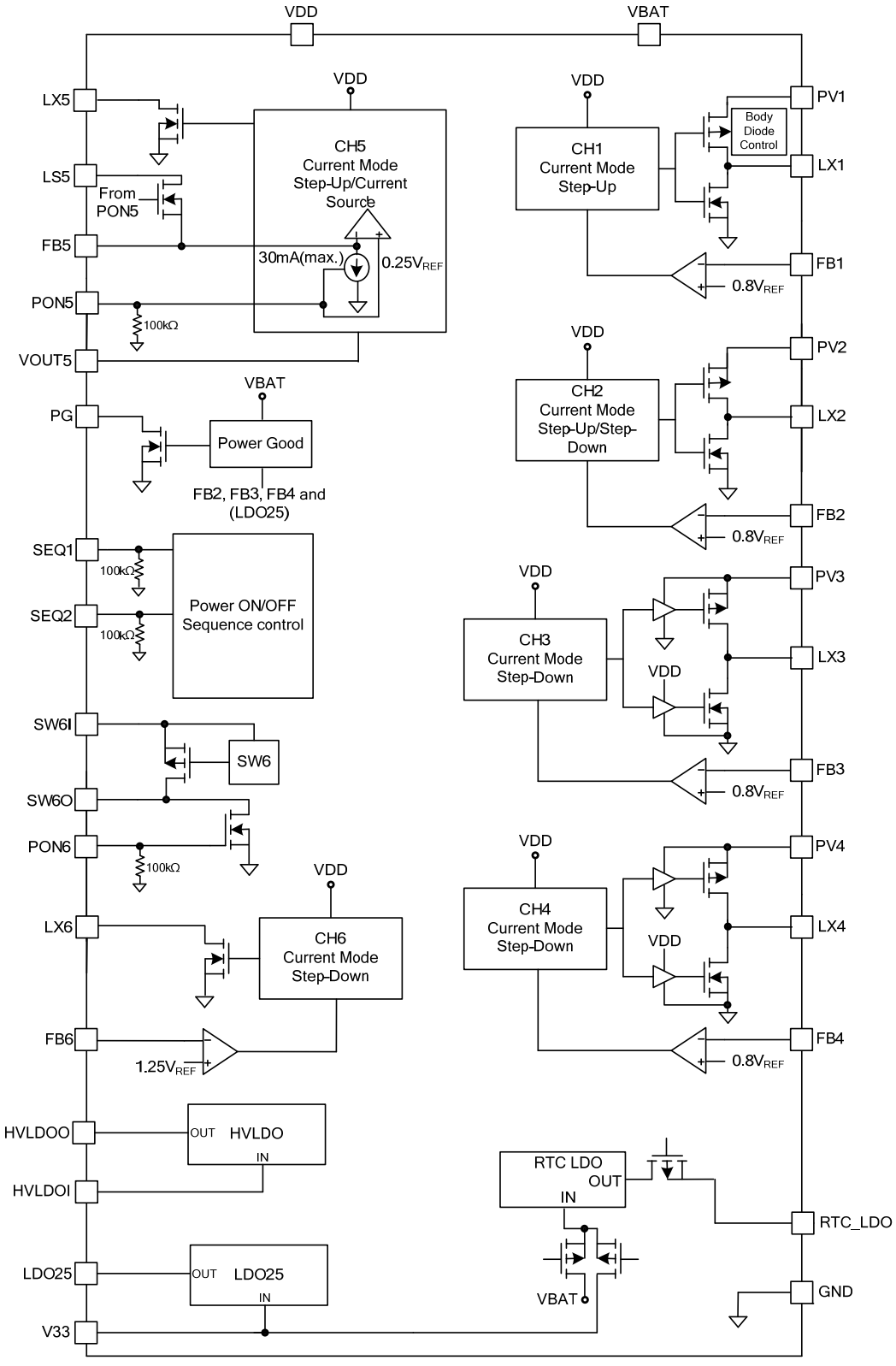
The LD7242 is Green Packaged.

Pin Descriptions

PIN	NAME	FUNCTION
1	LX1	Switch Node of CH1. High impedance in shutdown mode.
2	RTC_LDO	RTC_LDO Output Pin.
3	VBAT	Battery Power Input Pin. Bypass VBAT to GND with a ceramic capacitor of at least 22μF.
4	V33	3.3V input Power Pin. High impedance in shutdown mode.
5	LDO25	2.5V LDO Output Pin. High impedance in shutdown mode.
6	HVLDOO	HV LDO Output Pin.
7	HVLDOI	HV LDO Input Pin.
8	LX4	Switch Node of CH4. High impedance in shutdown mode.
9	PV4	Power Input Pin of CH4
10	PON6	Enable/Disable Pin of CH6.
11	FB4	Feedback Input Pin of CH4. High impedance in shutdown mode.
12	FB3	Feedback Input Pin of CH3. High impedance in shutdown mode.
13	FB6	Feedback Input Pin of CH6. High impedance in shutdown mode.
14	SW6O	Output Pin of CH6 Load Disconnect.
15	SW6I	Input Pin of CH6 Load Disconnect.
16	PV3	Power Input Pin of CH3.
17	LX3	Switch Node of CH3. High impedance in shutdown mode.
18	LX6	Switch Node of CH6. High impedance in shutdown mode.
19	VDD	IC Input Power Pin. Bypass VDD to GND with a ceramic capacitor of at least 22μF.
20	LX5	Switch Node of CH5. High impedance in shutdown mode.
21	LS5	Input terminal of load SW for current feedback.
22	FB5	Feedback Input Pin of CH5. High impedance in shutdown mode.
23	VOUT5	Output Sense Pin for CH5 in Boost Mode and Current Source Mode Selection Pin.
24	LX2	Switch Node of CH2. High impedance in shutdown mode.
25	PV2	Power Input Pin of CH2.
26	PON5	Enable/Disable Pin of CH5.
27	PG	Power Good Output Pin.
28	FB2	Feedback Input Pin of CH2. High impedance in shutdown mode.
29	FB1	Feedback Input Pin of CH1. High impedance in shutdown mode.

PIN	NAME	FUNCTION
30	SEQ2	Enable/Disable Pin of CH1, CH2, CH3, CH4 and LDO25. Meet the spec of A2, A5 and A7 of Ambarella DSP. Use SEQ1 and SEQ2 to control the power ON/OFF sequence. See Table 1 for the description of the operation. Do not leave SEQ1 or SEQ2 unconnected to ensure proper operation.
31	SEQ1	
32	PV1	Power Input Pin of CH1.
EP	GND	Exposed Metal Pad (IC GND).

Block Diagram



Absolute Maximum Ratings

VBAT	-0.3V to 7V
VDD	-0.3V to 7V
VBAT and VDD < 200ns	-0.3V to 8V
LX1, LX2, LX3, LX4	-0.3V to 7V
PV1, PV2, PV3, PV4	-0.3V to 7V
LX5, VOUT5, LS5, LX6, SW6I, SW6O HVLDOI, HVLDOO	-0.3V to 20V
FB5	-0.3V to 5V
The Other Pins	-0.3V to 7V
Power Dissipation, P_D @Ta=25°C	2W
Package Thermal Resistance, θJA	50°C/W
Package Thermal Resistance, θJC	7°C/W
Operating Junction Temperature	125°C
Maximum Junction Temperature	150°C
Lead Temperature (Soldering, 10sec)	260 °C
Storage Temperature Range	-40°C to 150°C
Ambient Operating Temperature Range	-30°C to 85°C
ESD Level (Human Body Model)	2kV
ESD Level (Machine Model)	200V

Note: If IC is in OFF-state, those pins rating can be up to 8V. When VBAT pin is over 6.25V, IC can not be turned on.

Caution:

Stresses beyond the ratings specified in “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

Electrical Characteristics

(T_A = +25°C, VDD=3.3V unless otherwise stated)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Input Power					
Operating Voltage VBAT		1.5		5.5	V
VBAT Over Voltage Protection		5.75	6.25	6.75	V
VBAT Over Voltage Protection De-bounce Time			2		ms
Operating Voltage VDD		2.7		5.5	V
Supply Current					
VDD Shutdown Current,	All PON=0		1	5	μA
VBAT Shutdown Current	All PON=0		6.5	11.5	μA
CH1 (Syn-Boost) Supply Current into VDD, I_{Q1}	Non Switching, SEQ1≠L, SEQ2≠L			800	μA
CH2 (Syn-Boost or Syn-Buck) Supply Current into VDD, I_{Q2}	Non Switching, SEQ1≠L, SEQ2≠L			800	μA
CH3 (Syn-Buck) Supply Current into VDD, I_{Q3}	Non Switching, SEQ1≠L, SEQ2≠L			800	μA
CH4 (Syn-Buck) Supply Current into VDD, I_{Q4}	Non Switching, SEQ1≠L, SEQ2≠L			800	μA
CH5 (WLED) in Boost Mode：Supply Current into VDD, I_{Q5-BL}	Non Switching, PON5=H VOUT5=1.0V			800	μA
CH5 (WLED) in Current Source Mode：Supply Current into VDD, I_{Q5-CS}	Non Switching, PON5=H VOUT5=0V			600	μA
CH6 (Asyn-Boost) Supply Current into VDD, I_{Q6}	Non Switching, PON6=H			800	μA
Internal Oscillator					
CH1 to CH6 Operating Frequency, f_s		0.9	1.0	1.1	MHz
Maximum Duty Cycle					
CH1 (Boost)	V_{FB1}=0.75V	90	93	96	%
CH2 (Boost)	V_{FB1}=0.75V	90	93	96	%
CH2 (Buck)	V_{FB2}=0.75V			100	%
CH3 (Buck)	V_{FB3}=0.75V			100	%
CH4 (Buck)	V_{FB4}=0.75V			100	%

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
CH5 (Boost)	V_{FB5}=0.15V, V_{OUT5}=1V	90	93	96	%
CH6 (Boost)	V_{FB6}=1V,	90	93	96	%
Feedback Regulation Voltage					
Feedback Regulation Voltage of FB1, FB2, FB3 and FB4		0.788	0.8	0.812	V
Feedback Regulation Voltage of FB5(Boost Mode)		0.238	0.25	0.262	V
Current Source of FB5(Current Source Mode)	V_{OUT5}=0V, 100% Setting	28.75	30	31.25	mA
Dropout Voltage of FB5 (Current Source Mode)	V_{OUT5}=0V,			0.2	V
Feedback Regulation Voltage of FB6		1.23	1.25	1.268	V
Power Switch					
CH1 Switch On-Resistance, $R_{DS(ON)}$	PMOS, PV1=3.3V		200	250	mΩ
	NMOS, PV1=3.3V		150	200	mΩ
CH1 Current Limit		3	3.75	4.5	A
CH2 Switch On-Resistance, $R_{DS(ON)}$	PMOS, PV2=3.3V		200	250	mΩ
	NMOS, PV2=3.3V		150	200	mΩ
CH2 Current Limit (Buck)		1.2	1.5	1.95	A
CH2 Current Limit (Boost)		2.4	3.0	3.75	A
CH3 Switch On-Resistance, $R_{DS(ON)}$	PMOS, PV3=3.3V		300	350	mΩ
	NMOS, PV3=3.3V		175	220	mΩ
CH3 Current Limit		1.7	2.13	2.56	A
CH4 Switch On-Resistance, $R_{DS(ON)}$	PMOS, PV4=3.3V		300		mΩ
	NMOS, PV4=3.3V		175	220	mΩ
CH4 Current Limit		1.7	2.13	2.56	A
CH5 Switch On-Resistance, $R_{DS(ON)}$	NMOS, VOUT5=1V		0.5		Ω
CH5 Current Limit		0.6	0.8	1.0	A
CH6 Switch On-Resistance, $R_{DS(ON)}$	NMOS		0.5	0.7	Ω
CH6 Switch Internal Discharge On-Resistance, $R_{DS(ON)}$	NMOS		150		Ω
CH6 Current Limit		1.4	1.6	1.8	A
CH6 On-Resistance of Load Disconnect MOSFET	PMOS, SW6I=3.3V		1.2		Ω

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Pulse Skipping Mode					
Pulse Skipping Mode Trip Level of CH5 and CH6			5		mA
Protection					
PV1 and PV2 Over-Voltage Protection		6.0	6.25	6.5	V
VBAT Over-Voltage Protection		5.75	6.25	6.75	V
V_{OUT5}, SW6I Over-Voltage Protection		19	19.5	20	V
Current Limit Delay Time			100		ms
ON/OFF Control					
SEQ1, SEQ2,PON5, PON6	Enable	1.3			V
	Disable			0.4	V
Mode Selection for CH2	VBAT-VLX2>0.5V→Buck Mode	0.5			V
	VBAT-VLX2<0.5V→Boost Mode			0.5	V
CH5 Mode Selection	V_{OUT5}=High to select Boost Mode	0.7			V
	V_{OUT5}=Low to select current source mode			0.3	V
Duration Low Status of Off-Time to Shutdown, T_{SD}	P_{ON5}=Low	256			µs
PWM Dimming Frequency		25		100	kHz
System Power Good					
FB2~FB4 Shutdown Threshold	For PG go Low	0.709	0.72	0.731	V
FB2~FB4 Hysteresis			72		mV
LDO25 Shutdown Threshold	For PG go Low	88	90	92	%
LDO25 Hysteresis		93	95	97	%
PG Fault Protection LEB Time	V_{DD}=2.7V~5.5V. FB2, FB3 or FB4 (LDO25)< 90%		240		µs
PG Fault Protection Delay Time		60	75	90	ms
PG Flag Power ON Delay Time	CH1 to CH4 (LDO25) are ready	10.8	12	13.2	ms
PG Sink Capability	VDD=3.3V, PG=0.5V	4			mA

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
RTC LDO (keep on once battery is installed.)					
Input Voltage Range(VBAT and V33)		1.5		5.5	V
Standby Current			4	7	μA
RTC_LDO Output Voltage	I_O=0mA	3.234	3.3	3.366	V
Dropout Voltage	I_O=50mA, V_{IN}>3.3V,		500	700	mV
	I_O=10mA, V_{IN}>3.3V,		100	120	mV
Output Current Limit		105		150	mA
RTC_LDO Output Switch Resistance			3		Ω
RTC_LDO Input Switch Resistance			3		Ω
LDO25 (Enable after V33 ready), COUT=1μF					
V33 Input Voltage Range		3.0		5.5	V
Supply Current into VDD, I_{QLDO25}	Non Switching, SEQ1=H, SEQ2=L or SEQ1=L, SEQ2=H I_O=0mA		80	105	μA
Dropout Voltage	I_{OUT}=300mA, 3.0V≤V_{IN}≤5.5V		220	300	mV
LDO25 Output Voltage	3.3V≤V_{IN}≤5.5V	2.45	2.5	2.55	V
Output Current Limit		330	380		mA
Ripple Rejection	F=100Hz,E_{IN}=1Vrms, I_{OUT}=10mA		65		dB
	F=10kHz,E_{IN}=1Vrms, I_{OUT}=10mA		45		dB
Output Noise Voltage	V_{OUT}=2.5V,I_{OUT}=0mA	-	70	-	μVrms
Soft-Start Time		10.8	12	13.2	ms
HV LDO					
Input Voltage Range		5.7		19	V
Internal soft start			4		ms
Supply Current	I_O=0mA，Input Voltage：5.7V~19V		35	65	μA
HV LDO Output Voltage	5.7V V≤VIN≤19V	4.9	5.0	5.1	V
Dropout Voltage	IOUT=100mA, 5V≤VIN≤19V,		500	600	mV
Output Current Limit		120		150	mA
Ripple Rejection	F=100Hz, EIN=1Vrms, IOUT=10mA		70		dB
	F=10kHz, EIN=1Vrms, IOUT=10mA		65		dB
	F=1MHz, EIN=1Vrms, IOUT=10mA, COUT=10μF		65		dB

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Output Noise Voltage	V_{OUT}=5V, I_{OUT}=0mA	-	100	-	μVrms
Over Temperature Protection					
Thermal Shutdown			145		°C
Impedance to GND					
SEQ1, SEQ2, PON5, PON6 Pin to GND			100k		Ω

Note: All devices are 100% production tested at +25°C. Limits over temperature are guaranteed by design.

Typical Performance Characteristics

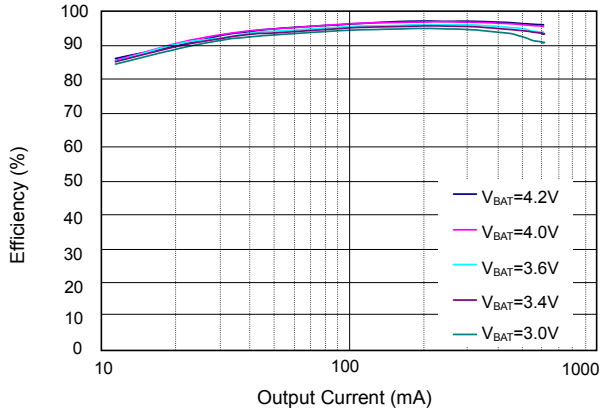


Fig. 2 CH1 Boost Efficiency vs. Output Current

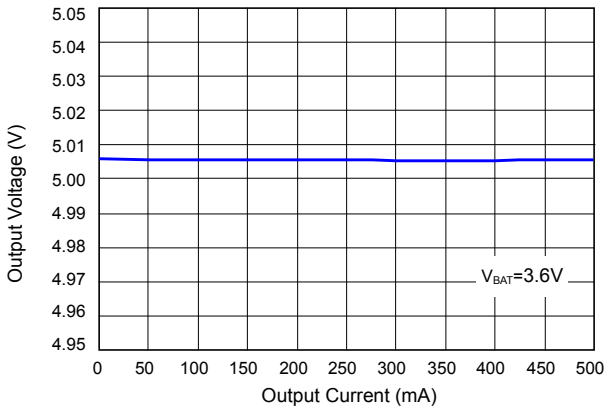


Fig. 3 CH1 Boost Output Voltage vs. Output Current

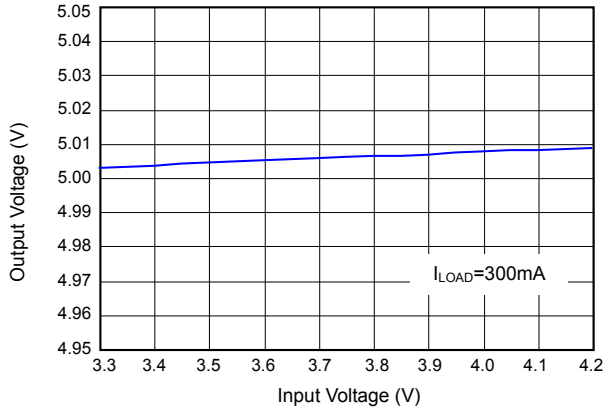


Fig. 4 CH1 Boost Output Voltage vs. Input Voltage

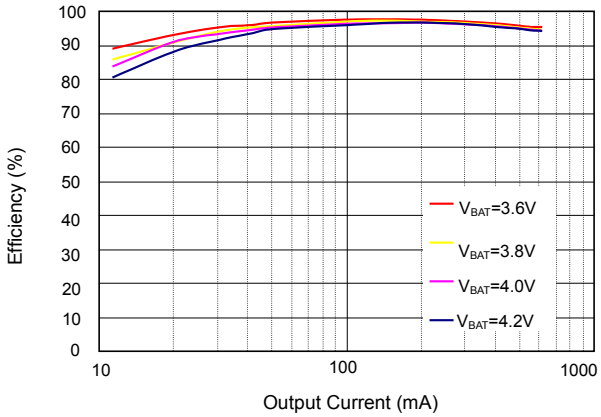


Fig. 5 CH2 Buck Efficiency vs. Output Current

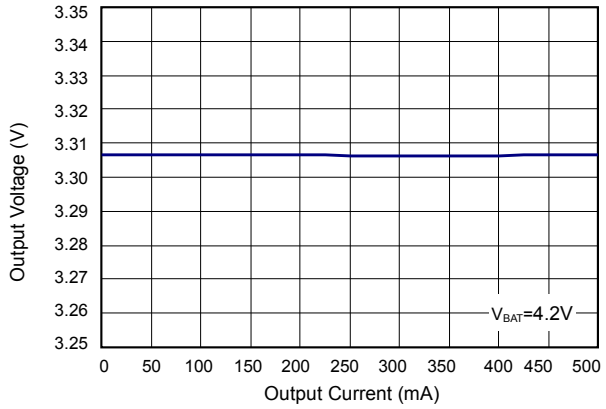


Fig. 6 CH2 Buck Output Voltage vs. Output Current

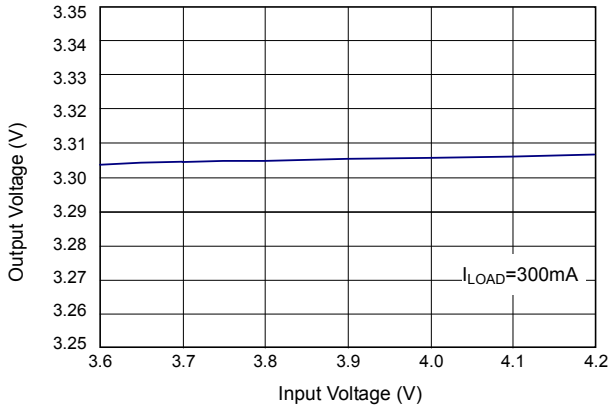


Fig. 7 CH2 Buck Input Voltage vs. Output Voltage

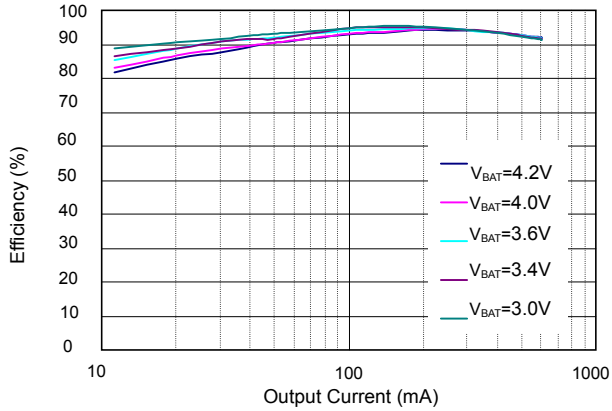


Fig. 8 CH3 Buck Efficiency vs. Output Current

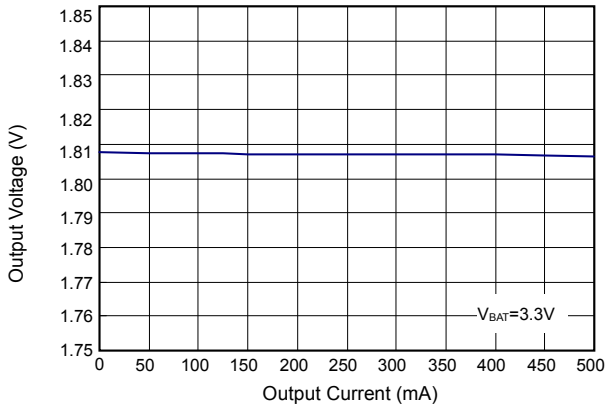


Fig. 9 CH3 Buck Output Voltage vs. Output Current

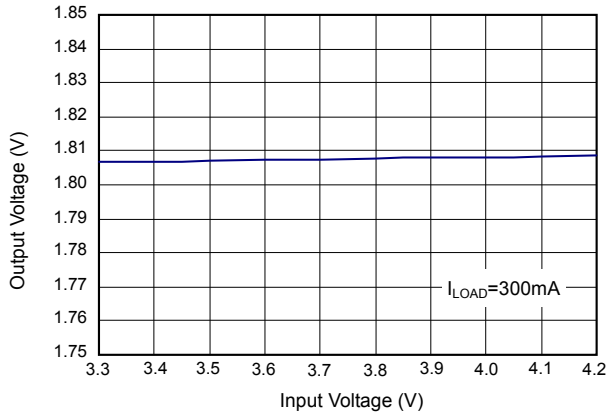


Fig. 10 CH3 Buck Output Voltage vs. Input Voltage

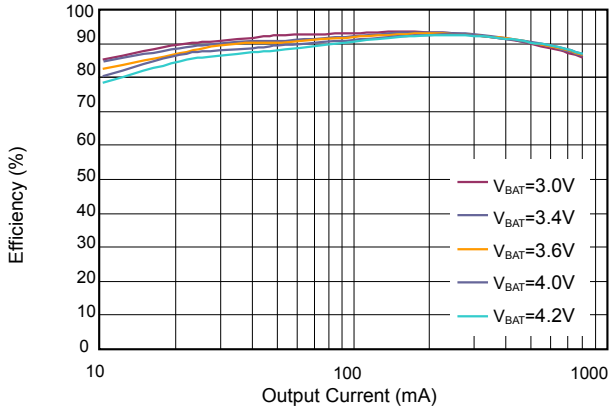


Fig. 11 CH4 Buck Efficiency vs. Output Current

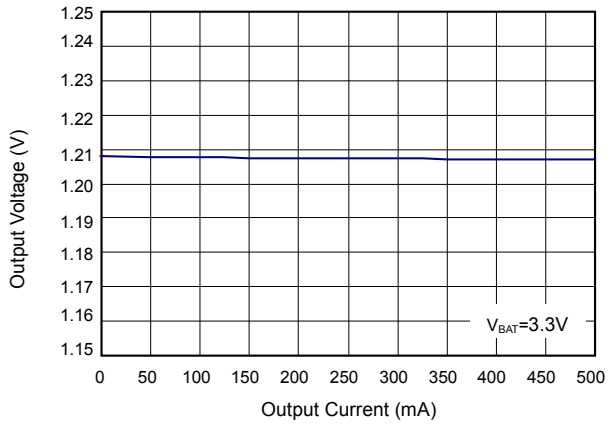


Fig. 12 CH4 Buck Output Voltage vs. Output Current

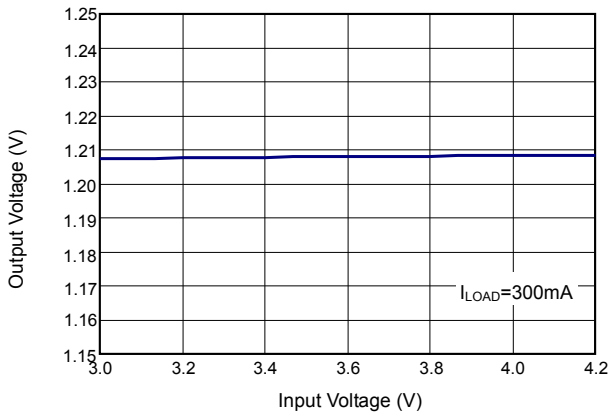


Fig. 13 CH4 Buck Output Voltage vs. Input Voltage

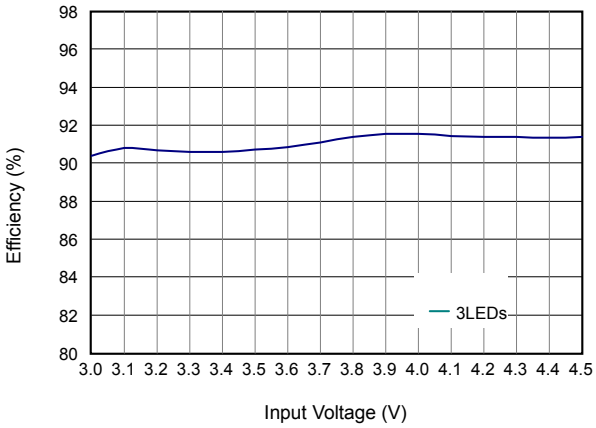


Fig. 14 CH5 Efficiency vs. Input Voltage

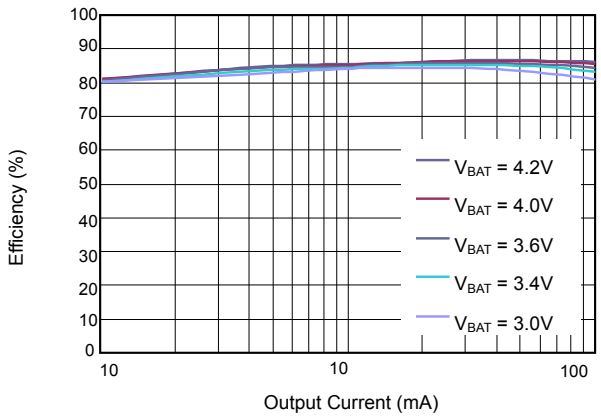


Fig. 15 CH6 Boost Efficiency vs. Output Current

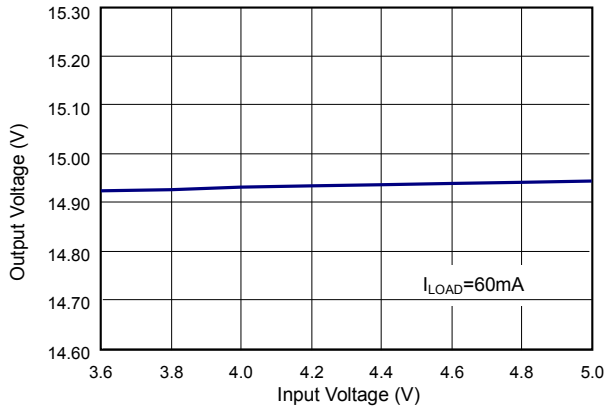


Fig. 16 CH6 Boost Input Voltage vs. Output Voltage

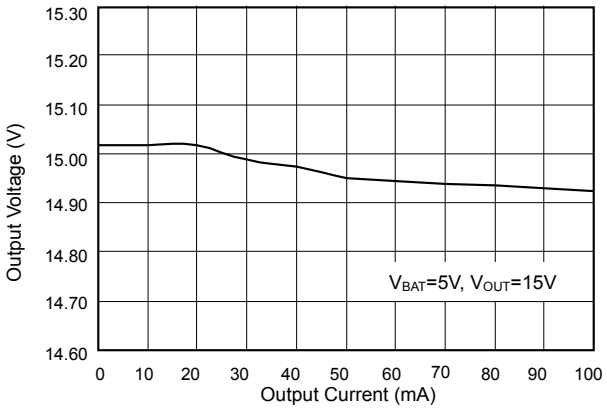


Fig. 17 CH6 Boost Ouput Voltage vs. Output Current

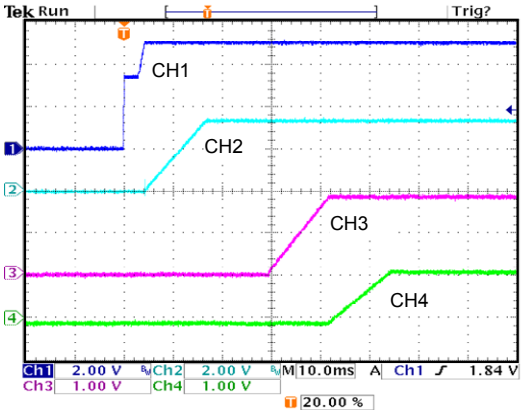


Fig. 18 Power ON SEQ1=1 SEQ2=0

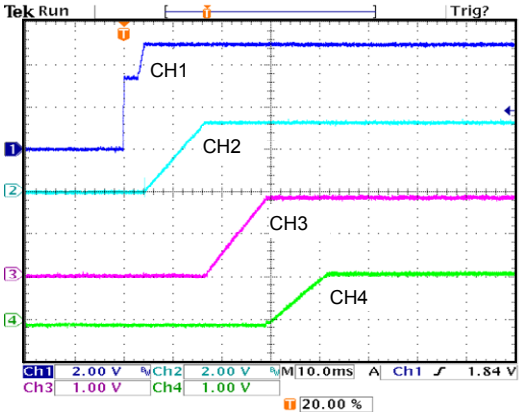


Fig. 19 Power ON SEQ1=0 SEQ2=1

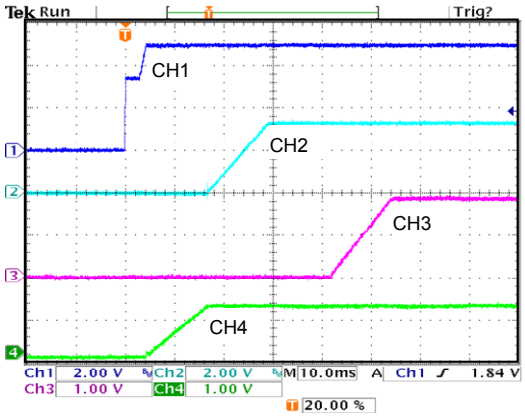
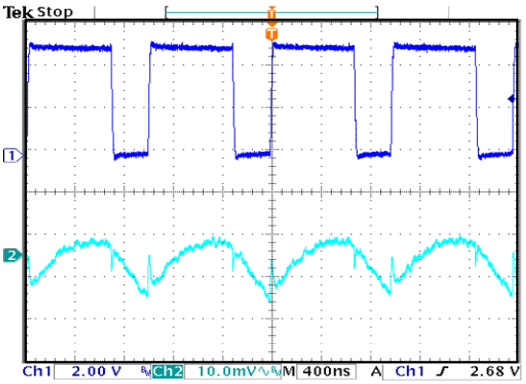
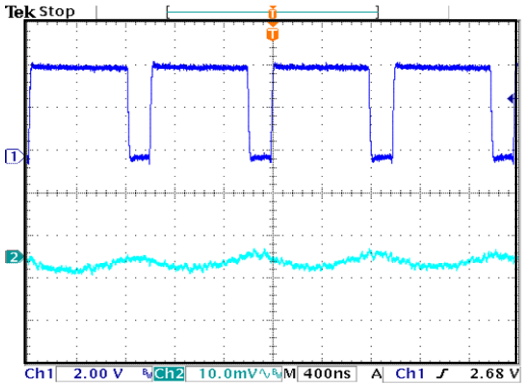


Fig. 20 Power ON SEQ1=1 SEQ2=1



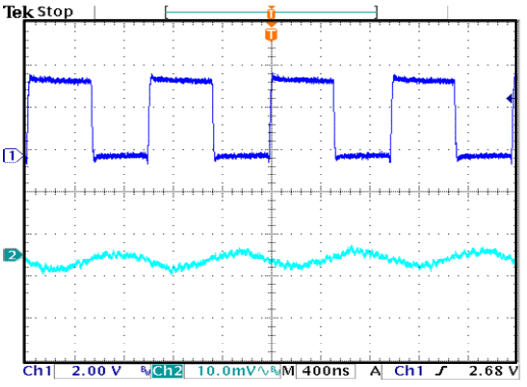
V_{BAT}=3.6V, V_{OUT}=5V, I_{OUT}=300mA, L=2.2uH, C_{OUT}=20µF

Fig. 21 CH1 Output Ripple



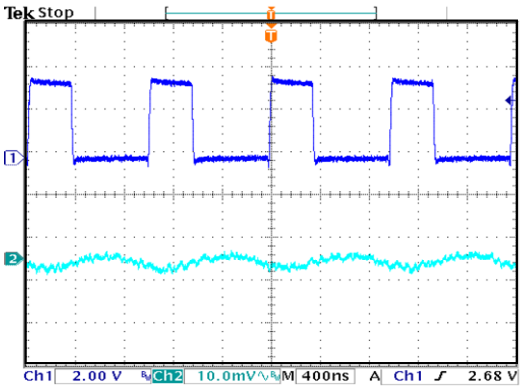
V_{BAT}=4.2V, V_{OUT}=3.3V, I_{OUT}=300mA, L=4.7µH, C_{OUT}=10uF

Fig. 22 CH2 Output Ripple



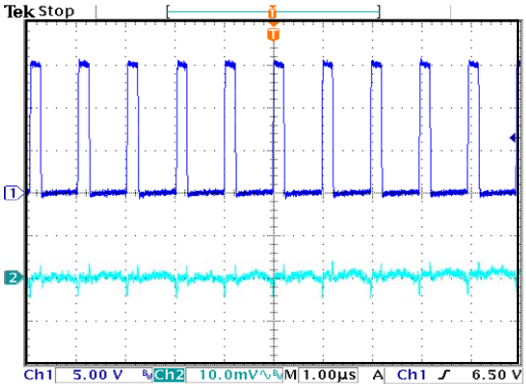
V_{BAT}=3.6V,V_{OUT}=1.8V,I_{OUT}=300mA, L=4.7µH, C_{OUT}=10µF

Fig. 23 CH3 Output Ripple



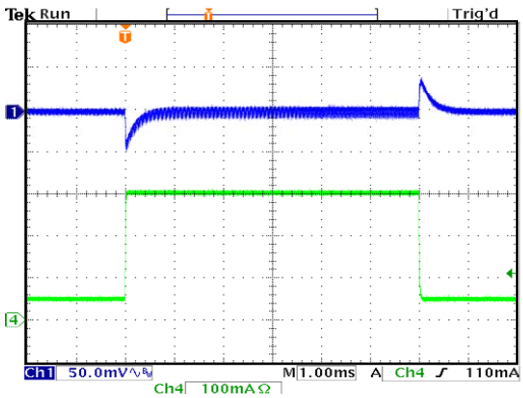
V_{BAT}=3.6V,V_{OUT}=1.2V, I_{OUT}=300mA, L=4.7μH, C_{OUT}=10μF

Fig. 24 CH4 Output Ripple



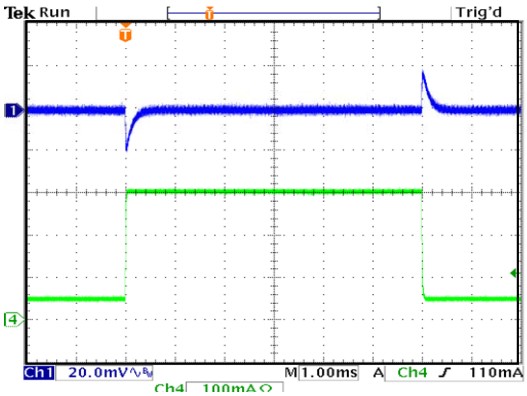
V_{BAT}=3.6V, V_{OUT}=15V, I_{OUT}=60mA, L=10μH, C_{OUT}=10μF

Fig. 25 CH6 Output Ripple



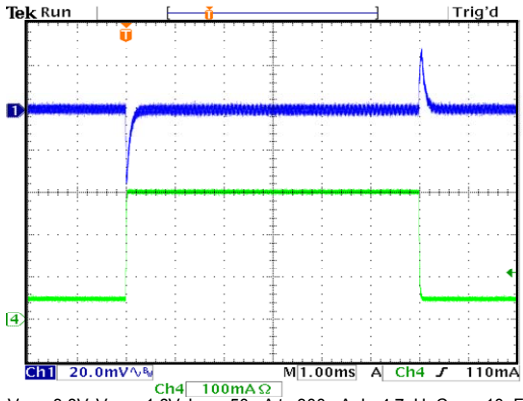
V_{BAT}=3.8V, V_{OUT}=5V, I_{OUT}=50mA ~300mA, L=2.2uH, C_{OUT}=20μF

Fig. 26 CH1 Load Transient Response



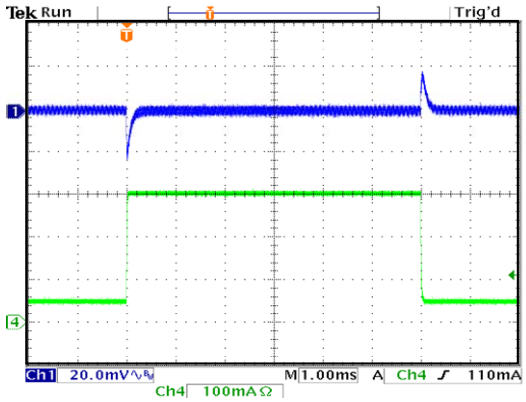
V_{BAT}=3.8V,V_{OUT}=3.3V, I_{OUT}=50mA to 300mA, L=4.7μH, C_{OUT}=10μF

Fig. 27 CH2



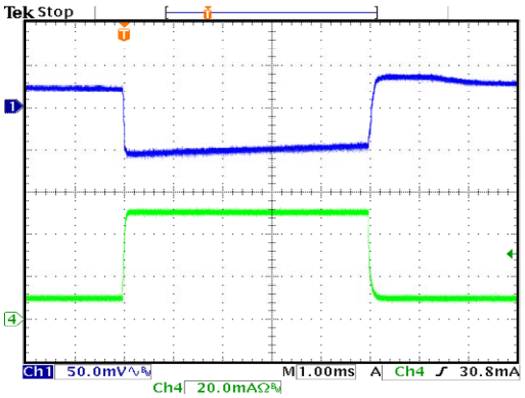
V_{BAT}=3.8V, V_{OUT}=1.8V, I_{OUT}=50mA to 300mA, L=4.7uH, C_{OUT}=10uF

Fig. 28 CH3



V_{BAT}=3.8V, V_{OUT}=1.2V, I_{OUT}=50mA to 300mA, L=4.7uH, C_{OUT}=10uF

Fig. 29 CH4



V_{BAT}=3.7V, V_{OUT}=15V, I_{OUT}=10mA to 50mA, L=10μH, C_{OUT}=10μF

Fig. 30 CH6 Load Transient Response

Application Information

Operating Overview

The LD7242 provides a complete power supply solution for Digital Video Camera application.

For Li-ion battery applications:

CH1. Synchronous Boost Converter with on-chip MOSFET. It typically supplies 5V for Motor power and HDMI.

CH2. Synchronous Buck Converter with on-chip MOSFET. It typically supplies 3.3V for system I/O power.

CH3. Synchronous Buck Converter with on-chip MOSFET. It typically supplies 1.8V for DDR.

CH4. Synchronous Buck Converter with on-chip MOSFET. It typically supplies 1.2V for Core power.

CH5. Asynchronous Boost Converter/Current Source. It typically supplies constant current for WLED.

CH6. Asynchronous Boost Converter for micro projector.

LDO25: Low noise and high PSRR for PLL power.

HVLDO: High voltage input LDO for HDMI.

RTC_LDO: Low quiescent current with high output voltage accuracy for Real Time Clock.

Power Good Flag: Accurate voltage detector for each channels power.

For 2AA battery applications:

CH1. Synchronous Boost Converter with on-chip MOSFET. It typically supplies 5V for Motor power and HDMI.

CH2. Synchronous Boost Converter with on-chip MOSFET-It typically supplies 3.3V for system I/O power.

CH3. Synchronous Buck Converter with on-chip MOSFET. It typically supplies 1.8V for DDR.

CH4. Synchronous Buck Converter with on-chip MOSFET. It typically supplies 1.2V for Core power.

CH5. Asynchronous Boost Converter/Current Source. It typically supplies constant current for WLED.

CH6. Asynchronous Boost Converter for micro projector.

LDO25: Low noise and high PSRR for PLL power.

HVLDO: High voltage input LDO for HDMI.

RTC_LDO: Low quiescent current with high output voltage accuracy for Real Time Clock.

Power Good Flag: Accurate voltage detector for each channels power.

CH1 Boost Converter

The converter operates at fixed 1MHz frequency PWM mode. It supports internal automatic PSM mode to improve the efficiency at light load and to extend the battery life. This converter also is integrated with power MOSFET and synchronous rectifier for up to 95% conversion efficiency.

CH2 Selectable Boost/Buck Converter

The CH2 mode setting is selected by LX2 pin voltage level (SEL pin status). Please refer to the Table1.

Table1. CH2 Mode Setting:

LX2 Pin Voltage Level	CH2 Mode
VBAT-VLX2>0.5V	Buck
VBAT-VLX2<0.5V	Boost

Boost Converter:

The converter operates at fixed 1MHz frequency PWM mode. This channel also integrated power MOSFET and synchronous rectifier for up to 95% conversion efficiency.

Buck Converter:

The converter operates at fixed 1MHz frequency PWM mode. This channel also integrated power MOSFET and synchronous rectifier for up to 95% conversion efficiency. While the input voltage is close to the output voltage, the converter enters low dropout mode. 100% duty cycle operation is provided to extend battery life.

CH3 Buck Converter

The converter operates in a fixed 1MHz frequency PWM mode. This channel is also integrated with power MOSFET and synchronous rectifier for up to 95% conversion efficiency. While the input voltage is close to the output voltage, the converter enters low dropout mode with low output ripple. 100% duty cycle operation is provided to extend battery life.

CH4 Buck Converter

The converter operates at fixed 1MHz frequency PWM mode. This channel also integrated power MOSFET and synchronous rectifier for up to 95% conversion efficiency. While the input voltage is close to the output voltage, the converter enters low dropout mode with low output ripple. 100% duty cycle operation is provided to extend battery life.

CH5 Selectable Boost Converter /Current Source

This channel is a selectable boost converter or current source for WLED, depending on the VOUT5 voltage level. When this channel works in boost mode, the converter will support output voltage up to 17.75V and the control LED current by the feedback resistor of FB5.If this channel works in current source mode (VOUT5<0.3V), it will provide LED a accuracy current.

In above two WLED driving modes of CH5, the dimming is controlled by the PWM duty cycle of PON5.

CH6 High Voltage Asyn- Boost Converter

The converter operates in a fixed 1MHz frequency PWM mode. It supports internal automatic PSM mode to improve the efficiency at light load. This channel also integrates power MOSFET and matches with an external schottky diode to provide power for micro projector. The converters will not activate until the soft start procedure of SW6 is completed. This SW6 provides load disconnect function to limit the inrush current during start-up.

SW6

SW6 is an internal switch which is enabled by PON6. It features a load disconnection for SW6O and also soft start, over voltage (for SW6I) and under voltage (for SW6O) protection functions.

LDO25

The LD7242 provides a fixed 2.5V output LDO with low noise, high PSRR and very low output voltage drop during load transient. That is suitable for power supply of PLL.

RTC LDO

The LD7242 provides a RTC LDO with low quiescent current (5μA) and high output voltage accuracy for real time clock. This LDO is running all over the time, even at system shutdown.

HV LDO

The LD7242 is integrated with a high voltage input LDO which provides a fixed 5V output and it features low noise, high PSRR and internal soft start. That is suitable for power supply of HDMI.

Power Good

The LD7242 provides a system voltage detector to monitor system power status through FB2, FB3, FB4 and LDO25 pin. If any of the power levels is below 90% setting, the PG pin will pull down. Once all the power levels ramp up to 95% setting, PG will go high in 12ms later. If the PG remains at low level for more than 75ms, the device will be shutdown.

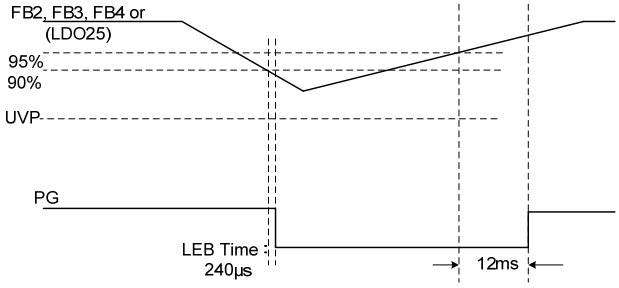


Fig.4-1 Timing Chart of PG Flag

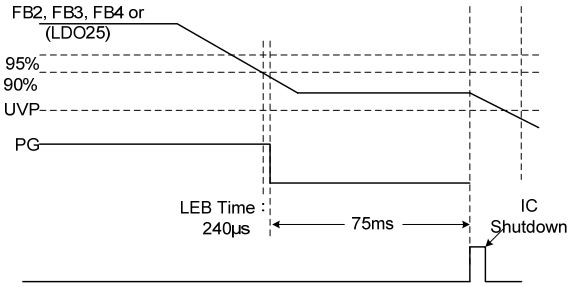


Fig.4-2 Timing Chart of PG Flag

CH5 WLED Mode Setting

The CH5 has two modes for WLED. That is a selectable boost converter or current source for WLED, depending on the VOUT5 voltage level. Please refer to the Table3 for the mode setting of CH5.

Table3. CH5 Mode Setting

VOUT5 Pin Voltage Level	CH5 Mode
VOUT5<0.3V	Current Source
VOUT5>0.7V	Boost Mode

CH5 Boost Mode/Current Source Mode Dimming Control

Either CH5 works in boost mode or current source mode, the dimming is controlled by the PWM duty cycle of PON5.

Inductor Selection

CH1 to CH6 are incorporated with internal loop compensation. For stable operation, please choose the inductance as shown in Table 4. Note that the peak current should be less than the saturation current of the inductor.

Table4. CH1 to CH5 Inductor Selection:

Channel	Inductance
CH1	2.2μH
CH2	4.7μH
CH3	4.7μH
CH4	4.7μH
CH5	10μH
CH6	10μH

Output Capacitor Selection

CH1 to CH6 are incorporated with internal loop compensation. For stable operation, please choose the minimum C_{OUT} according to Table 5.

Table5. CH1 to CH6 Output Capacitor Selection

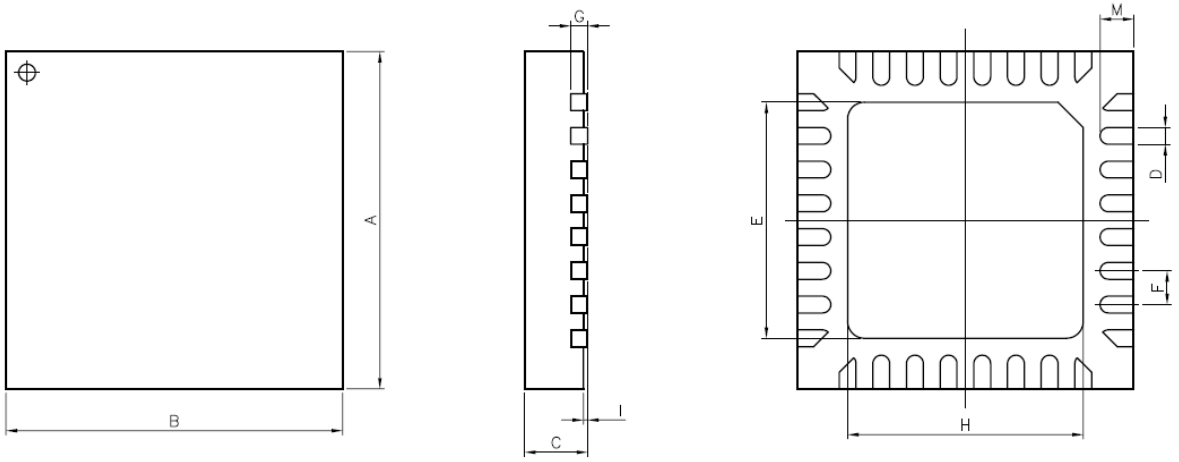
Channel	Capacitance
CH1	10μF x 2
CH2	10μF
CH3	10μF
CH4	10μF
CH5	0.1μF
CH6	10μF

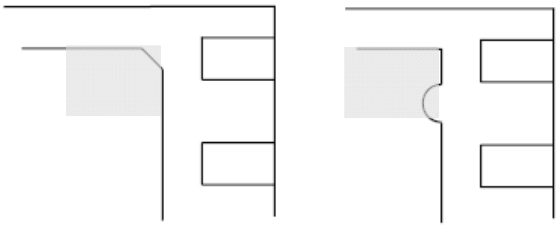
Protection Summary

	Protection Type	Threshold	Protection Method	IC Shutdown Delay Time
CH1 Boost Converter	Current Limit	NMOS Current > 3.75A	IC Shutdown	100ms
	PV1 UVP	FB1 < 0.4V	IC Shutdown	2ms
	PV1 OVP	PV1 > 6.25V	IC Shutdown	No-delay
CH2 Buck Converter	Current Limit	PMOS Current > 1.5A	IC Shutdown	100ms
	UVP	FB2 < 0.4V	IC Shutdown	2ms
CH3 Buck Converter	Current Limit	PMOS Current > 2.13A	IC Shutdown	100ms
	UVP	FB3 < 0.4V	IC Shutdown	2ms
CH4 Buck Converter	Current Limit	PMOS Current > 2.13A	IC Shutdown	100ms
	UVP	FB4 < 0.4V	IC Shutdown	2ms
CH5 Asyn-Boost Converter	Current Limit	NMOS Current > 0.8A	IC Shutdown	100ms
	OVP	VOUT5 > 20V	CH5 Shutdown	No-delay
CH6 Asyn-Boost Converter	Current Limit	NMOS Current > 1.6A	IC Shutdown	100ms
	OVP	SW6I > 20V	IC Shutdown	No-delay
	UVP	SW6O < 0.4V	IC Shutdown	2ms
HVLDO	Current Limit	PMOS>120mA	HV LDO Channel Shutdown	Auto Recovery
LDO25	Current Limit	PMOS>380mA	IC Shutdown	100ms
Thermal	Thermal Shutdown	>145^{0}C	IC Shutdown	No-delay
PG	Power good	PG keeps low	IC Shutdown	75ms

Package Information

WQFN-32L 4mm*4mm





DETAIL X
THE CONFIGURATION OF THE PIN 1
IDENTIFIER IS OPTIONAL AS ABOVE.

Symbol	Dimension in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	3.900	4.100	0.154	0.161
B	3.900	4.100	0.154	0.161
C	0.700	0.800	0.028	0.031
D	0.150	0.250	0.006	0.010
E	2.650	2.850	0.104	0.112
F	0.4 TYP.		0.016 TYP.	
G	0.2 TYP.		0.008 TYP.	
H	2.650	2.850	0.104	0.112
I	0.000	0.050	0.000	0.002
M	0.250	0.450	0.010	0.018

Important Notice

Leadtrend Technology Inc. reserves the right to make changes or corrections to its products at any time without notice. Customers should verify the datasheets are current and complete before placing order.

Revision History

Rev.	Date	Change Notice
00	11/15/2010	Original Specification.
01	04/05/2011	Enhanced the efficiency of CH3 and CH4.
02	3/5/2012	Package thermal resistance updated