DESCRIPTION

The A7340 is a monolithic step-down DC/DC converter designed to provide low EMI performance and deliver up to 4 A of output current without requiring an external power transistor, helping to reduce board space. It supports 100% duty-cycle operation for low-dropout applications. An internal soft-start function minimizes inrush current during startup, extending battery life in portable systems. For enhanced reliability, the A7340 integrates cycle-by-cycle peak current limiting, short-circuit protection, thermal shutdown protection, and undervoltage lockout (UVLO).

The device is available in a 8-pin small profile SOP8 package.

FEATURES

- Wide input voltage Range: 4V~30V
- Adjustable Output Voltage from 0.8V to V_{IN}
- Low $R_{DS(ON)}$ Switches 57mΩ / 43mΩ
- 520KHz Typical Switching Frequency
- Internal Power-Save Mode (PFM/PWM)
- Duty Cycle up to 100%
- COT Mode
- Short Circuit Protection
- Over Current Protection
- Internal Soft Startup
- Thermal Shutdown Protection

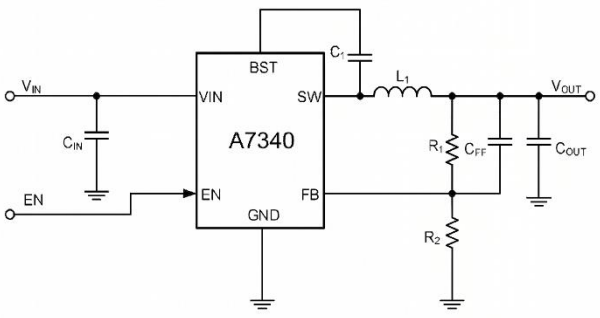
APPLICATION

- LCD Monitor and LCDTV
- Battery-powered Equipment
- Digital Home Appliances: Digital TVs
- ADSL Modem Portable Instruments

ORDERING INFORMATION

Package Type	Part Number	
SOP8 SPQ:4,000pcs/Reel	M8	A7340M8R
		A7340M8VR
Note	V: Halogen free Package R: Tape & Reel	
AiT provides all RoHS products		

TYPICAL APPLICATION

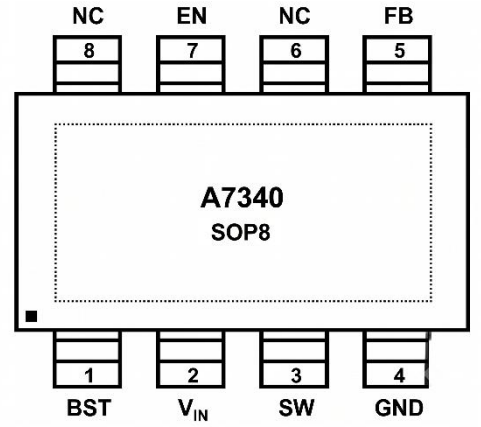


V_{IN} =30V ; V_{OUT}=3.3V/ 4A, **L1=WSL06040-6R8M (6.8uH)**

V_{IN} =30V ; V_{OUT}=5.0V/ 4A, **L1=WSL06040-6R8M (6.8uH)**

V_{IN} =30V ; V_{OUT}=12V/ 4A, **L1= WSL12040-120M (12uH)**
or WSL10040-150M (15uH)

PIN DESCRIPTION



SOP8, M8

Top View

PIN#	Symbol	Function
1	BST	Bootstrap. A capacitor connected between SW and BST pins is required to form a floating supply across the high-side switch driver.
2	V_{IN}	Power supply voltage input.
3	SW	Switch pin connected to the internal FET switches and inductor terminal. Connect the inductor of the output filter to this pin.
4	GND	Ground pin.
5	FB	Feedback pin for the internal control loop. Connect this pin to an external feedback divider.
6, 8	NC	Non function Pin
7	EN	Device enable logic input. Logic high enables the device, logic low disables the device and turns it into shutdown.

ABSOLUTE MAXIMUM RATINGS

Over operating free-air temperature range (unless otherwise noted)

V_{IN}, and EN pin Voltage	-0.3V ~ 36V
BST, Voltage	V_{SW} +5V
SW (less than 10ns) , Voltage	-0.3V ~ V_{IN} +0.5V
FB, Voltage	- 0.3V ~ +6.5V
T_J , Operating Junction Temperature	-40°C ~ +150°C
T_{STG}, Storage Temperature	-65°C ~ +150°C
$R_{\theta JA}$, Junction-to-Ambient Thermal Resistance	48.4°C/W
$R_{\theta JC}$(top), Junction-to-Case (Top) Thermal Resistance	52.5°C/W

Stresses above may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated in the Electrical Characteristics are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

RECOMMENDED OPERATING CONFITIONS

T_C= 25°C, unless otherwise specified.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Operating Junction Temperature	-	-	-40	-	125	°C
Operating temperature range	-	-	-40	-	85	°C
Input Voltage	V_{IN}	-	4.5	-	30	V
Output Voltage	-	-	0	-	4	A

ELECTRICAL CHARACTERISTICS

V_{IN} =12V, unless otherwise specified. Typical values are at T_A = 25℃

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Units
Input voltage range	V_{IN}	-	4	-	30	V
Non switching quiescent current	I_Q	EN = 5V	200	240	300	μA
Shutdown current	I_{OFF}	EN = GND	-	1	3	μA
Regulated Feedback Voltage	V_{FB}	-	785	800	815	mV
V_{IN} under voltage lockout	$V_{IN(UVLO)}$	-	-	3.2	-	V
V_{IN} under voltage lockout Hysteresis		-	-	380	-	mV
ENABLE (EN PIN)						
Enable threshold	$V_{(EN\_RISING)}$	Rising	1.2	-	-	V
	$V_{(EN\_FALLING)}$	Falling	-	-	0.4	V
Threshold Hysteresis	$V_{(EN\_HYS)}$	-	-	120	-	mV
POWER STAGE						
High-side FET on resistance	$R_{(HSD)}$	I_{SW}=1000mA	-	57	-	mΩ
Low-side FET on resistance	$R_{(LSD)}$	I_{SW}=-1000mA	-	43	-	mΩ
CURRENT LIMIT						
FET current limit	$I_{(LIM\_HS)}$	FB=90%	-	7	-	A
OSCILLATOR						
Centre switching frequency	F_{SW}	-	450	520	600	KHz
OVER TEMPERATURE PROTECTION						
Rising temperature	Thermal	-	-	160	-	°C
Hysteresis	Shutdown	-	-	30	-	°C
Soft start	-	-	-	3	-	ms

TYPICAL PERFORMANCE CHARACTERISTICS

Fig 1. Load Transient Response

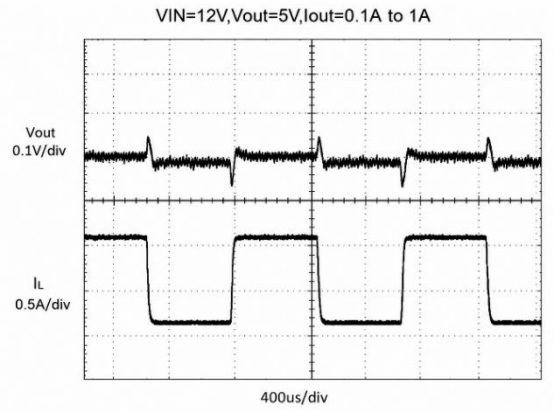


Fig 2. Load Transient Response

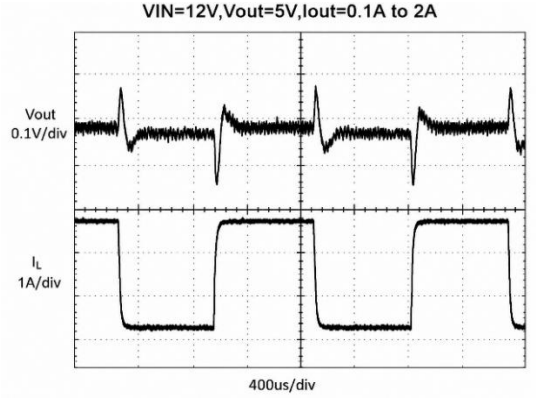


Fig 3. Load Transient Response

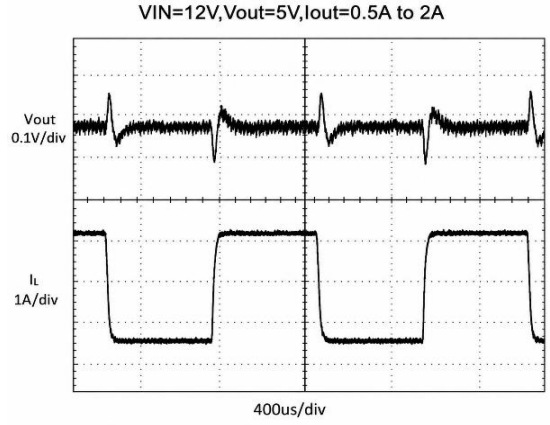


Fig 4. Load Transient Response

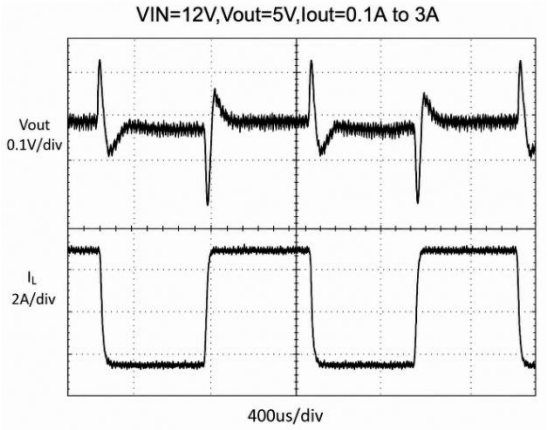


Fig 5. Load Transient Response

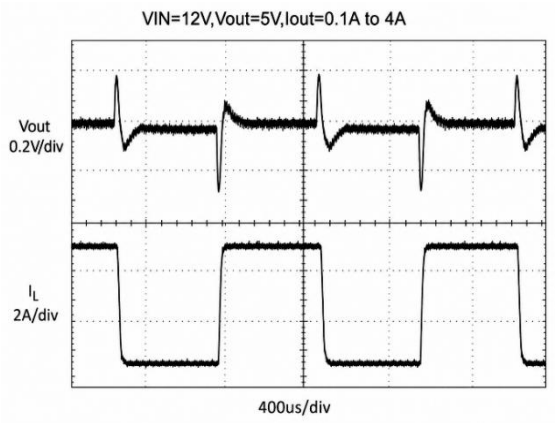


Fig 6. Load Transient Response

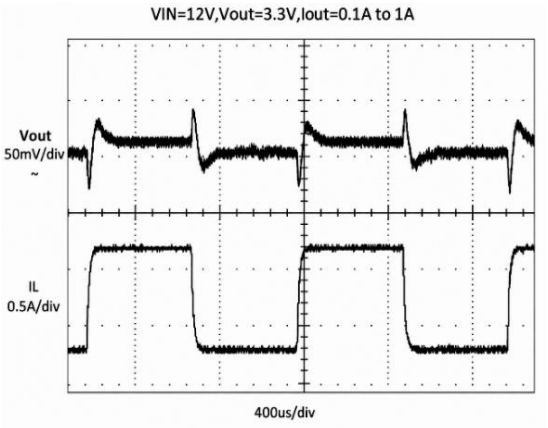


Fig 7. Load Transient Response

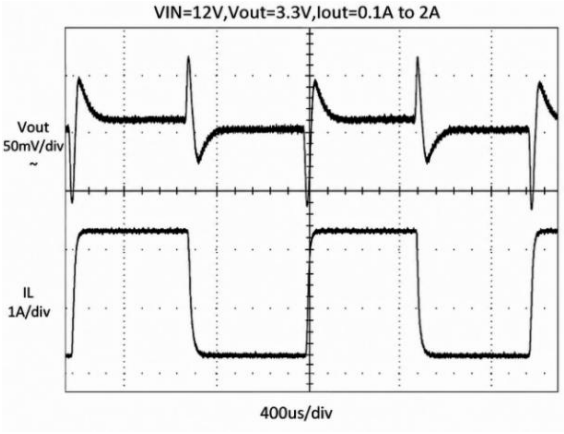


Fig 8. Load Transient Response

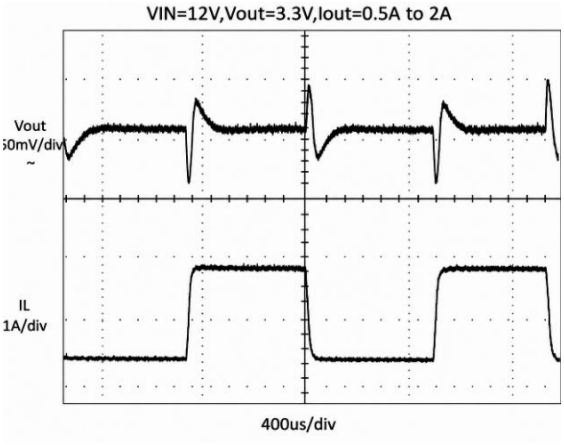


Fig 9. Load Transient Response

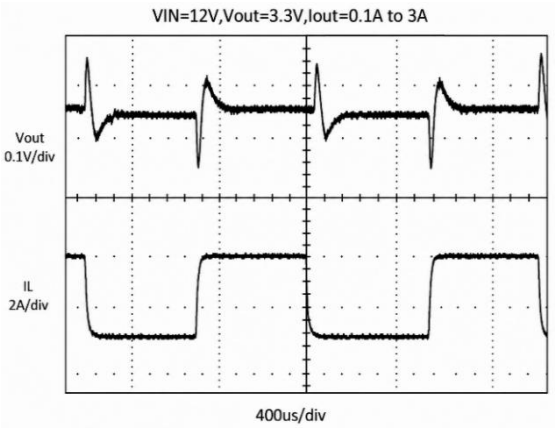


Fig 10. Load Transient Response

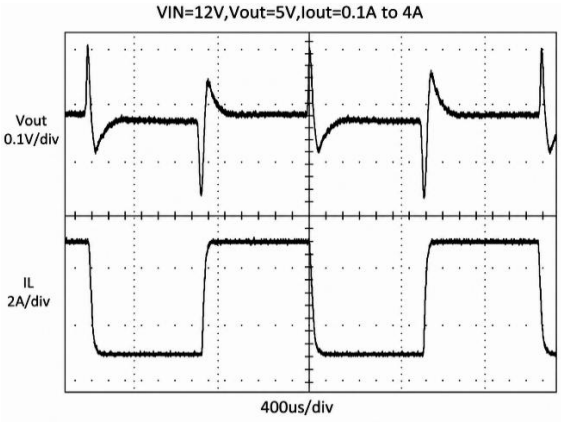


Fig 11. Steady State Test

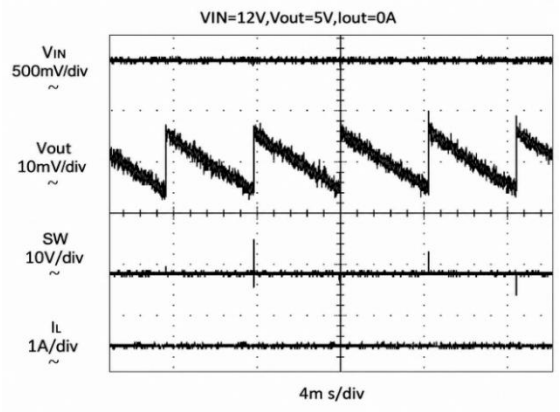


Fig 12. Steady State Test

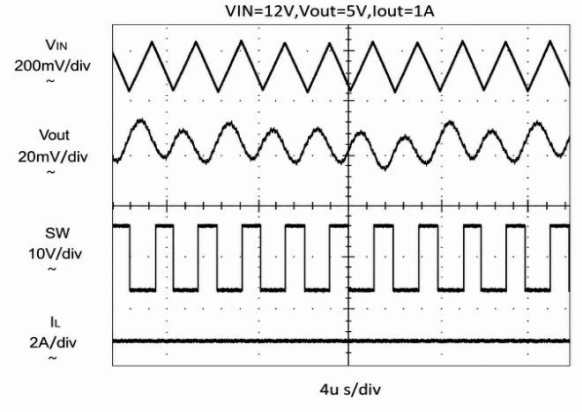


Fig 13. Steady State Test

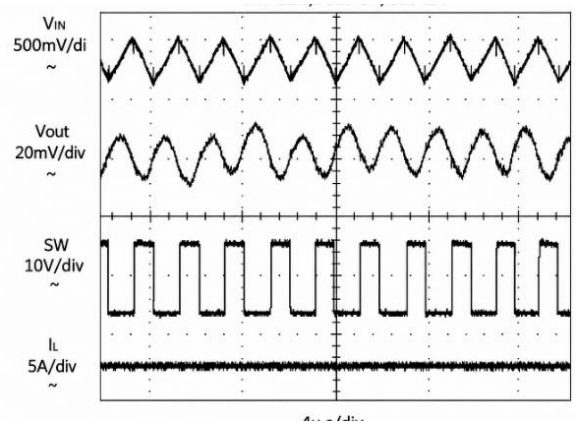


Fig 14. Steady State Test

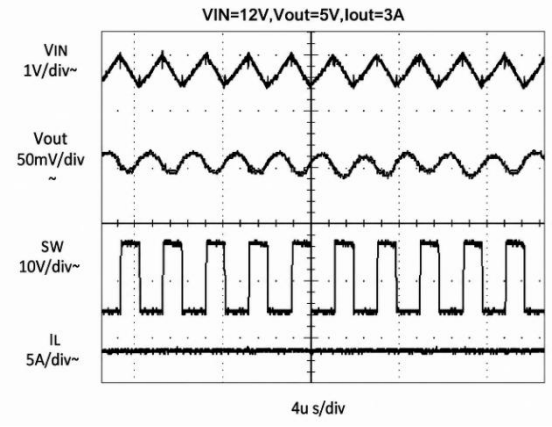


Fig 15. Steady State Test

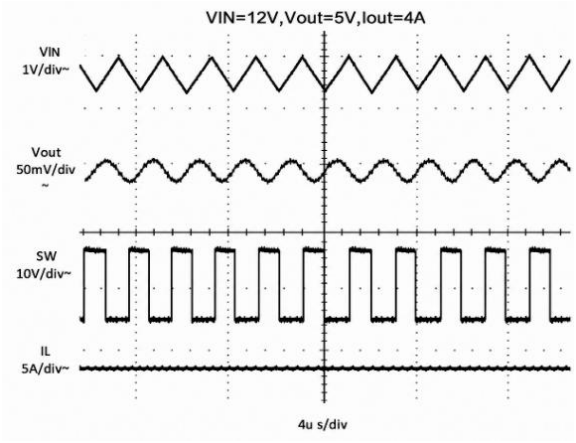


Fig 16. Steady State Test

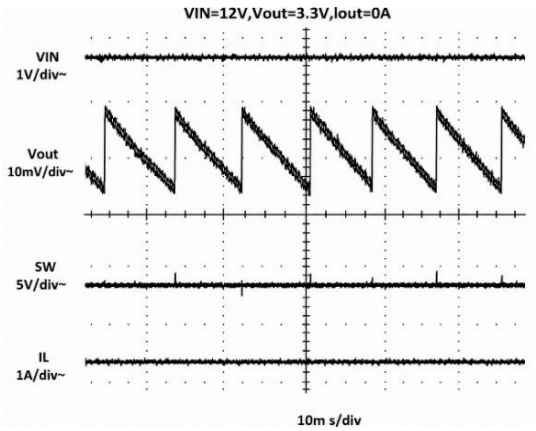


Fig 17. Steady State Test

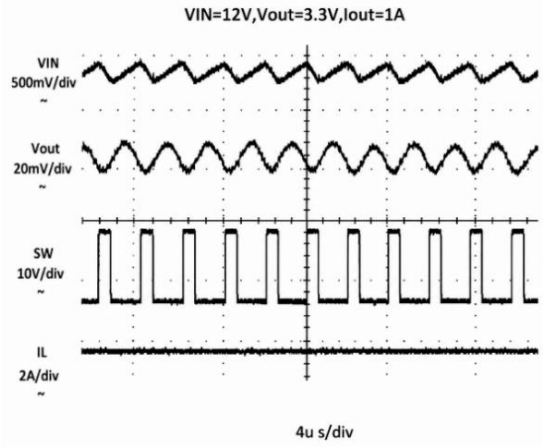


Fig 18. Steady State Test

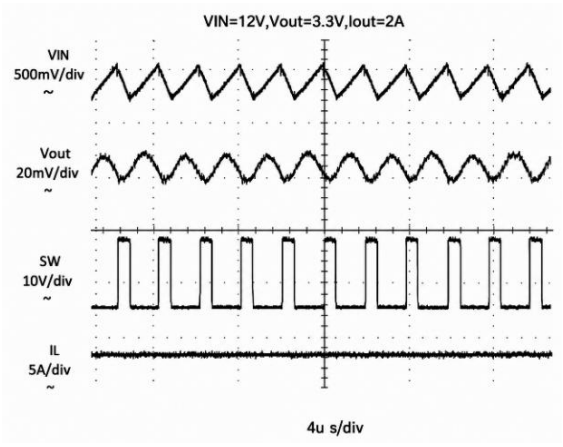


Fig 19. Steady State Test

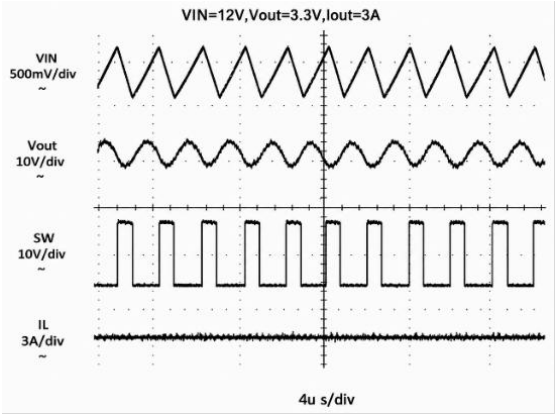


Fig 20. Steady State Test

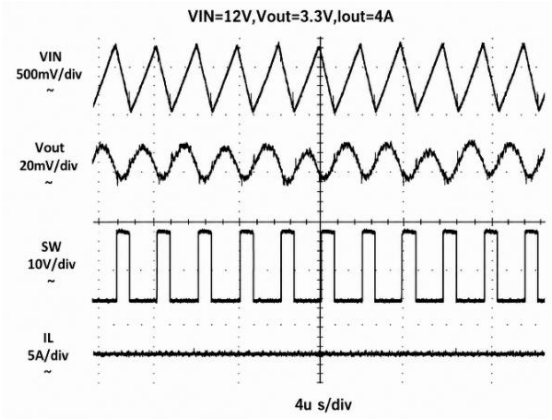


Fig 21. Short Circuit Entry

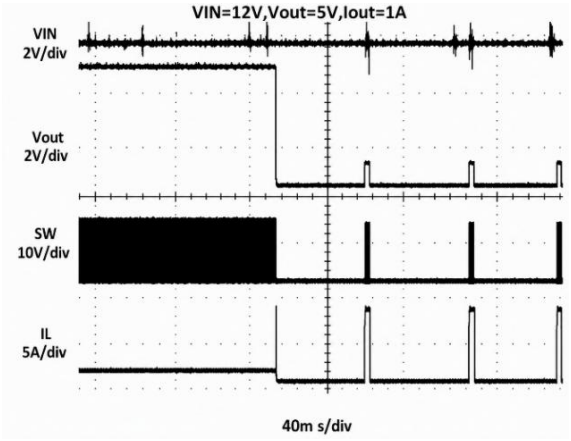


Fig 22. Short Circuit Exit

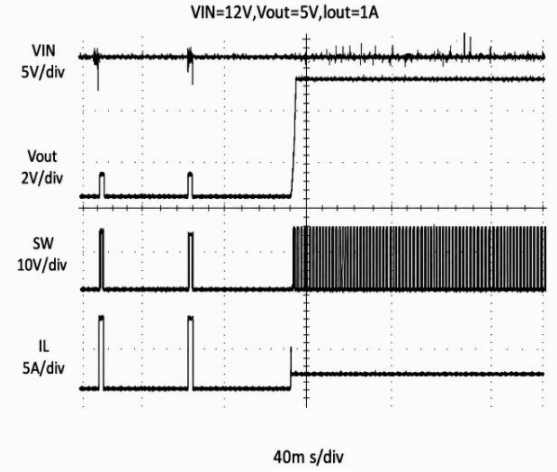


Fig 23. Short Circuit Steady

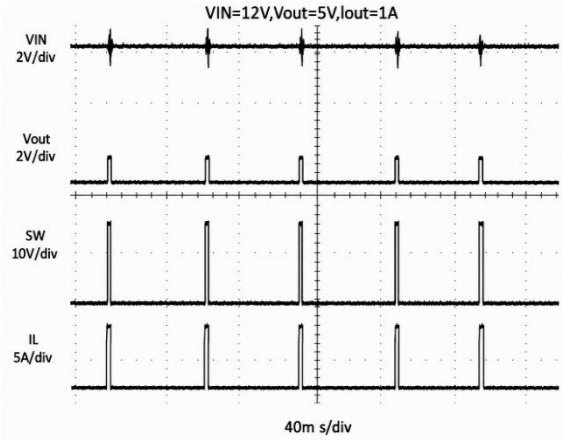


Fig 24. Vin Power On

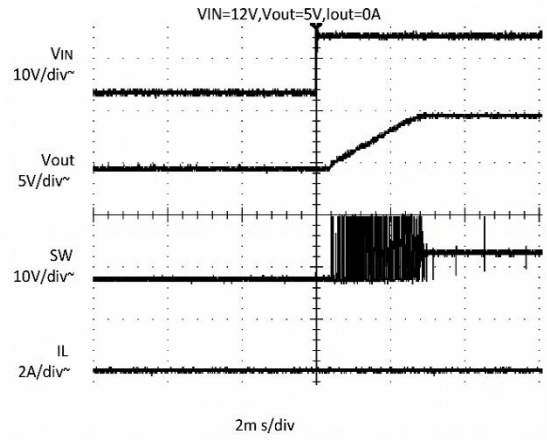


Fig 25. Vin Power On

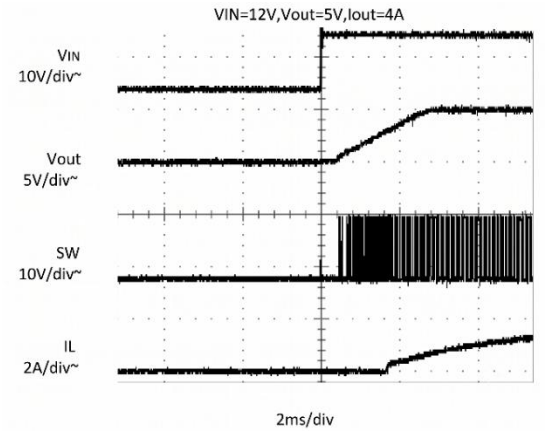


Fig 26. Vin Power Off

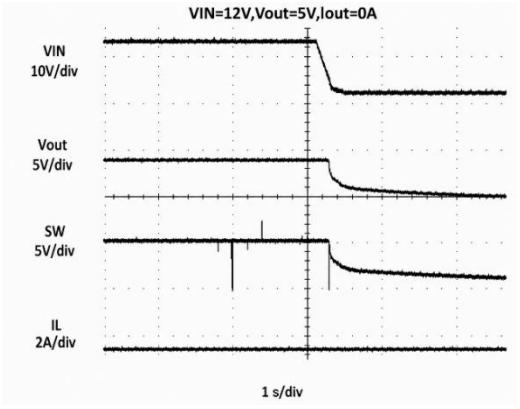


Fig 27. Vin Power Off

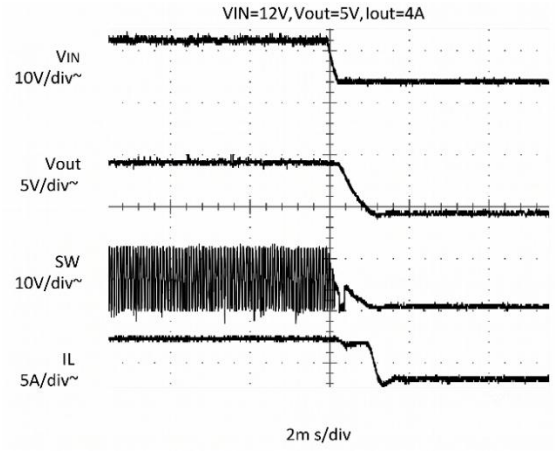


Fig 28. Vin Power On

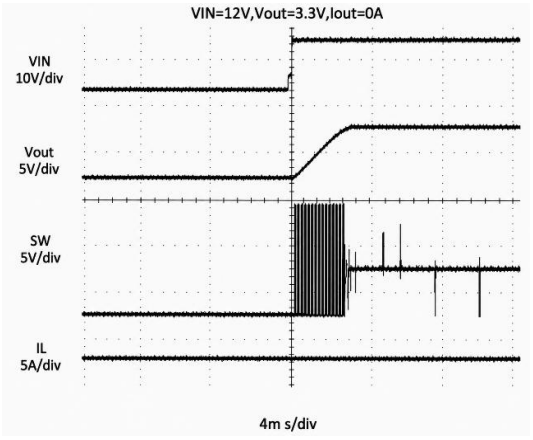


Fig 29. Vin Power On

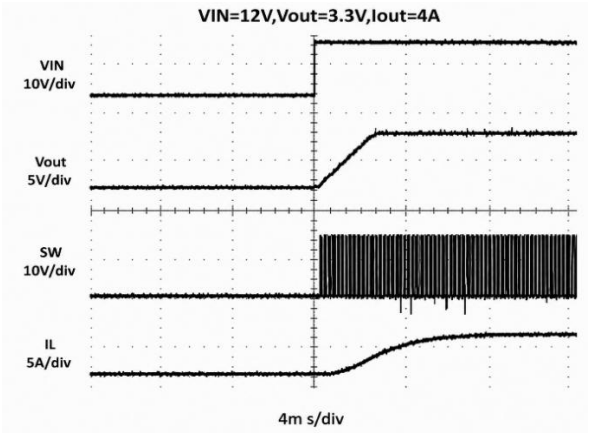


Fig 30. Vin Power Off

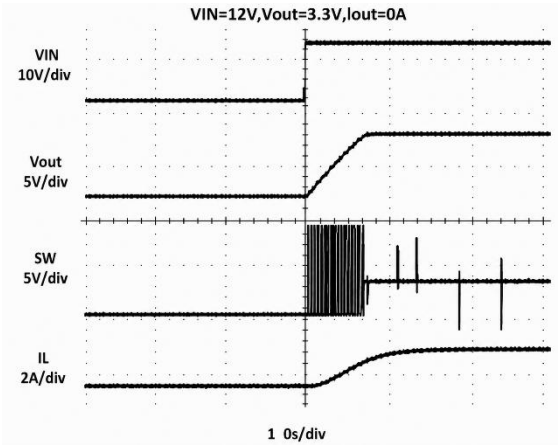


Fig 31. Vin Power Off

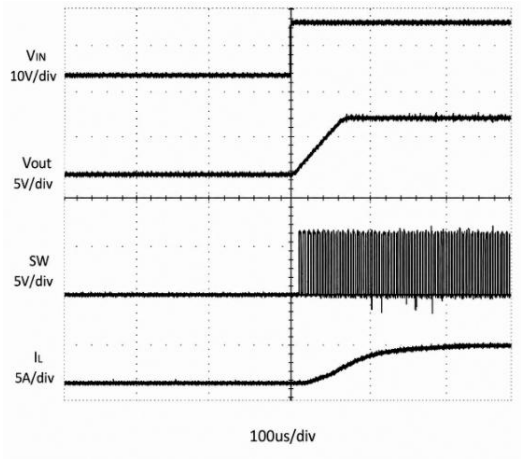


Fig 32. EN ON

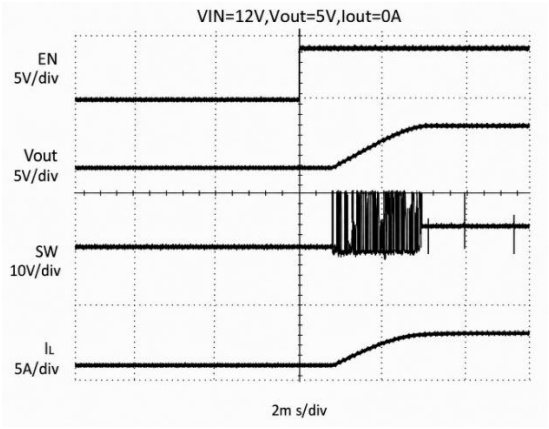


Fig 33. EN ON

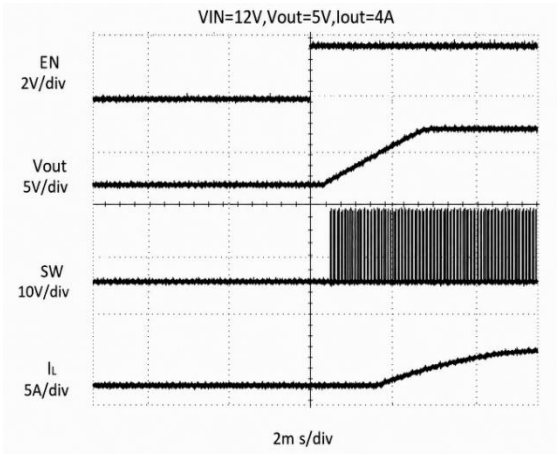


Fig 34. EN OFF

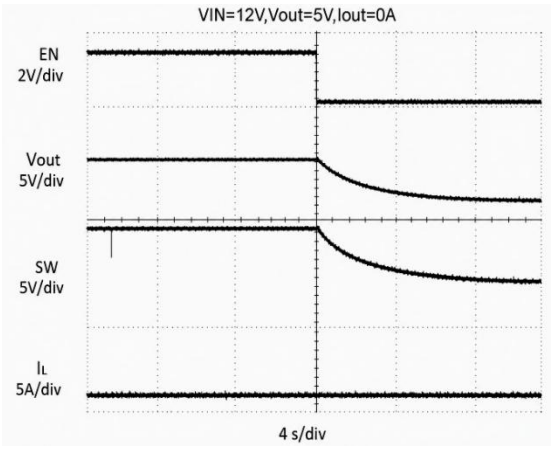


Fig 35. EN OFF

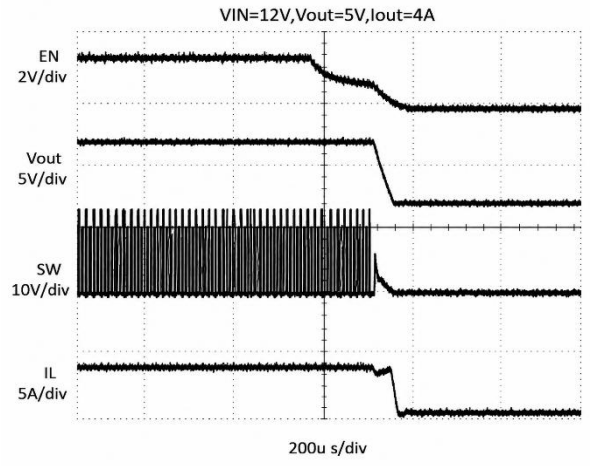


Fig 36. EN ON

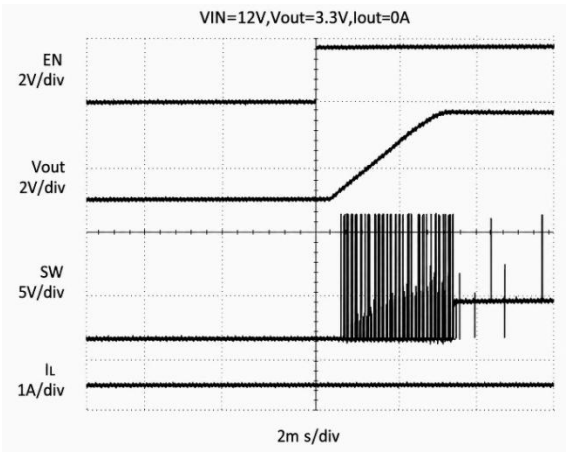


Fig 37. EN ON

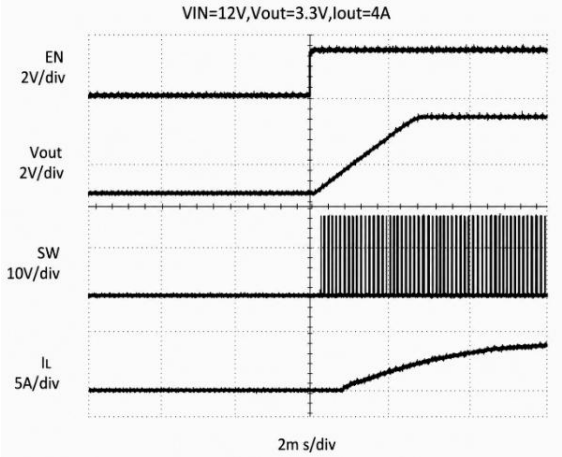


Fig 38. EN OFF

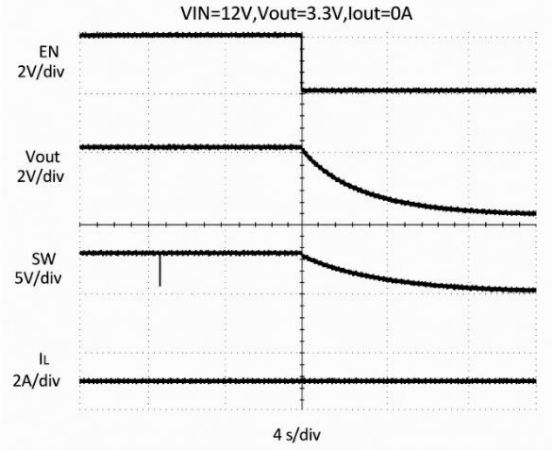
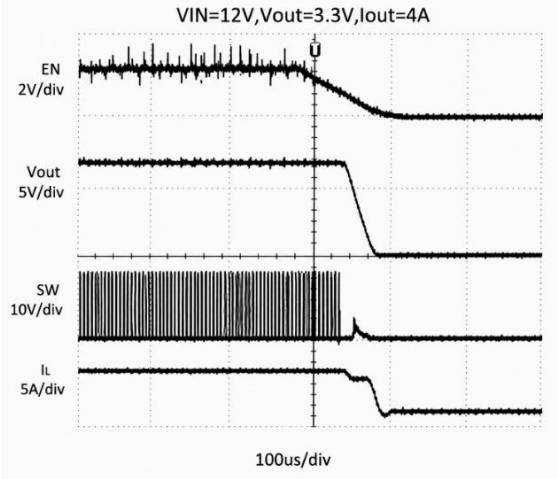
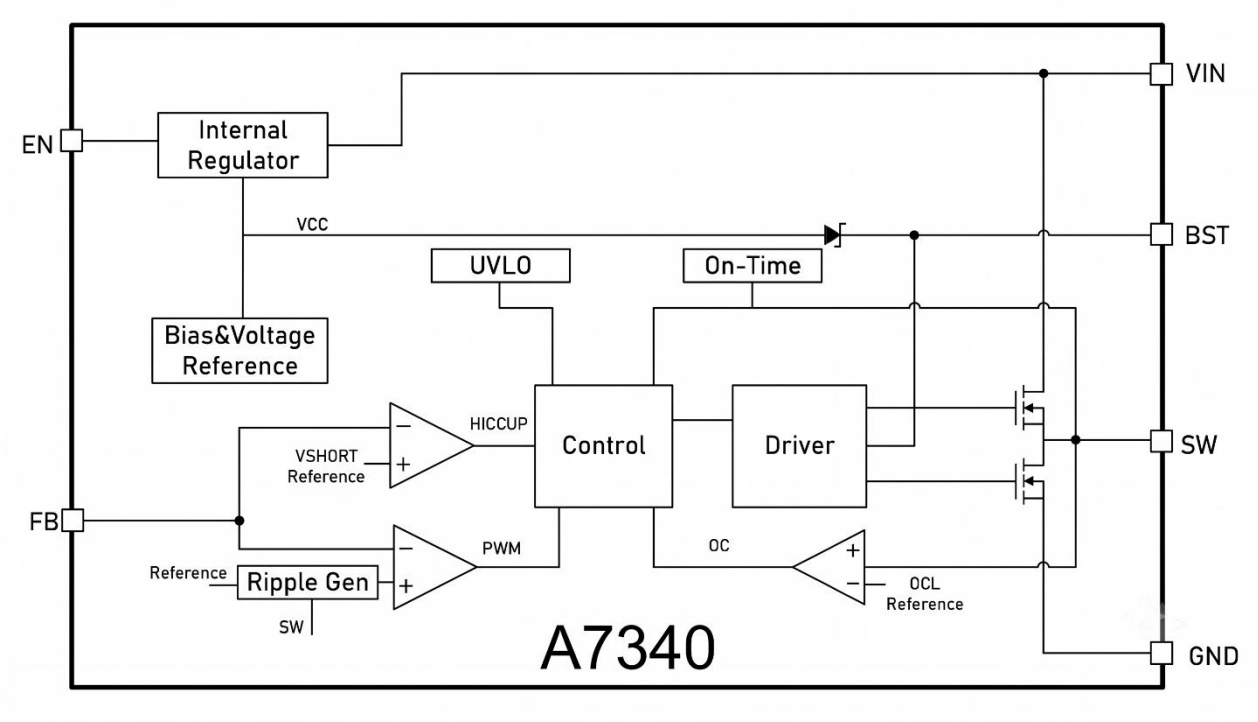


Fig 39. EN OFF



BLOCK DIAGRAM



DETAILED INFORMATION

Overview

The A7340 is a high-output-current monolithic step-down DC/DC converter capable of delivering up to 4 A of continuous output current from an input voltage range of 4 V to 30 V. The device operates at a fixed switching frequency of 520 kHz and employs a slope-compensated current-mode control architecture to provide excellent line and load regulation. The EN (Enable) pin allows the device to be controlled by standard logic signals, enabling low-power standby operation when disabled. Internal loop compensation eliminates the need for external compensation components, simplifying circuit design. For enhanced reliability, the A7340 integrates cycle-by-cycle current limiting, thermal shutdown protection, and frequency foldback under short-circuit conditions. When the current limit is triggered and the feedback voltage (VFB) falls below 0.8 V, the switching frequency is automatically reduced to minimize power dissipation and improve short-circuit protection.

Application information

The A7340 is a high-performance, monolithic step-down DC/DC converter featuring a wide input voltage range of 4 V to 30 V and capable of delivering up to 4 A of continuous output current. Operating at a fixed switching frequency of 520 kHz, the A7340 requires only a few external components, including an input capacitor (C_{IN}), an output capacitor (C_{OUT}), and an inductor (L1), enabling a compact and cost-effective power supply design. The output voltage is adjustable from 0.8 V up to V_{IN} through an external resistor divider.

$$V_{OUT} = 0.8 \times \frac{R_1 + R_2}{R_2}$$

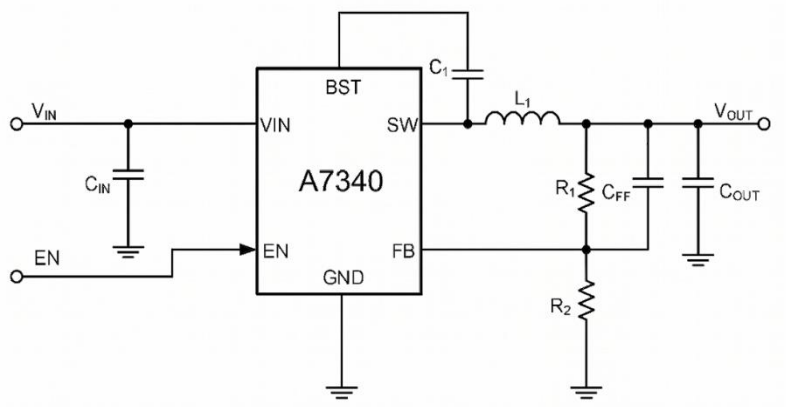


Table 1. Recommended Component Values

V_{OUT} (V)	L1 (μH)	C1(μF)	C_{IN}(μF)	C_{OUT}(μF)	C_{FF} Opt.(pF)	R1 (kΩ)	R2 (kΩ)
3.3	1.5 ~ 10	0.1	22	22+22	10 ~ 100	100	32
5	2.2 ~ 10	0.1	22	22+22	10 ~ 100	100	19.1
12	6.8 ~ 15	0.1	22	22+22	10 ~ 100	180	13

Note : Recommended Inductor Selection and it for reference, the inductor value should be determined according to the specific circuit design requirements.

1. V_{IN} =30V ; V_{OUT}=3.3V/ 4A, **L1=WSL06040-6R8M (6.8uH)**
2. V_{IN} =30V ; V_{OUT}=5.0V/ 4A, **L1=WSL06040-6R8M (6.8uH)**
3. V_{IN} =30V ; V_{OUT}=12V/ 4A, **L1= WSL12040-120M (12uH), WSL10040-150M (15uH)**

Power Supply Recommendations

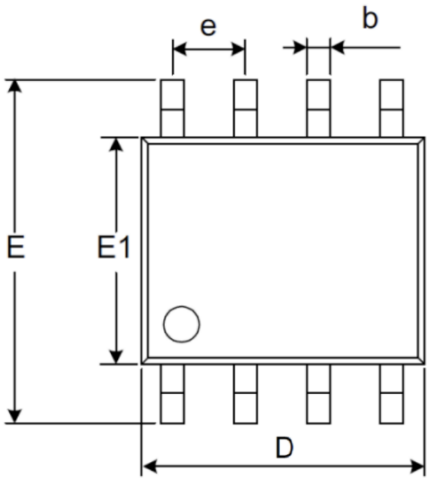
The A7340 designed to operate from an input voltage supply range between 4V and 30V. This input supply must be well regulated. If the input supply is located more than a few inches from the device or converter, additional bulk capacitance may be required in addition to the ceramic bypass capacitors. An electrolytic capacitor with a value of 47 μF is a typical choice.

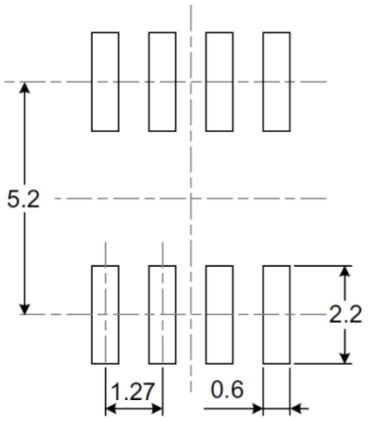
Layout Guidelines

- V_{IN} and GND traces should be as wide as possible to reduce trace impedance. The wide areas are also of advantage from the viewpoint of heat dissipation.
- The input capacitor and output capacitor should be placed as close to the device as possible to minimize trace impedance.
- Provide sufficient vias for the input capacitor and output capacitor.
- Keep the SW trace as physically short and wide as practical to minimize radiated emissions.
- Do not allow switching current to flow under the device.
- A separate V_{OUT} path should be connected to the upper feedback resistor.
- Make a Kelvin connection to the GND pin for the feedback path.
- Voltage feedback loop should be placed away from the high-voltage switching trace, and preferably has ground shield.
- The trace of the VFB node should be as small as possible to avoid noise coupling.
- The GND trace between the output capacitor and the GND pin should be as wide as possible to minimize its trace impedance.

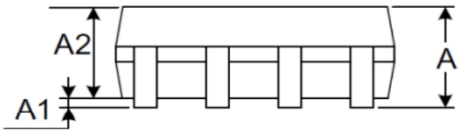
PACKAGE INFORMATION

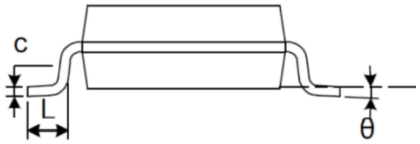
Dimension in SOP8 (Unit: mm):





RECOMMEND LAND PATTERN





Symbol	Millimeters	
	Min	Max
A	1.350	1.750
A1	0.100	0.250
A2	1.350	1.550
b	0.330	0.510
c	0.170	0.250
D	4.800	5.000
E	5.800	6.200
E1	3.800	4.000
e	1.270 BSC	
L	0.400	1.270
θ	0°	8°

IMPORTANT NOTICE

AiT Semiconductor Inc. (AiT) reserves the right to make changes to any its product, specifications, to discontinue any integrated circuit product or service without notice, and advises its customers to obtain the latest version of relevant information to verify, before placing orders, that the information being relied on is current.

AiT Semiconductor Inc. integrated circuit products are not designed, intended, authorized, or warranted to be suitable for use in life support applications, devices or systems or other critical applications. Use of AiT products in such applications is understood to be fully at the risk of the customer. As used herein may involve potential risks of death, personal injury, or server property, or environmental damage. In order to minimize risks associated with the customer's applications, the customer should provide adequate design and operating safeguards.

AiT Semiconductor Inc. assumes to no liability to customer product design or application support. AiT warrants the performance of its products of the specifications applicable at the time of sale.