



DESCRIPTION

The A7360 is a monolithic IC designed for a step down DC/DC converter with low EMI signature, and own the ability of driving a 6A load without additional transistor. It saves board space. The A7360 also can run at 100% duty cycle for low dropout operation, and Internal soft-start results in small inrush current extending battery life in portable systems. As a protection function, it has cycle by cycle peak current limit function, short protection function, thermal shutdown function and UVLO.

The device is available in a 8-pin small profile PSOP8 package.

ORDERING INFORMATION

Package Type	Part Number	
PSOP8 SPQ:4,000pcs/Reel	MP8	A7360MP8R
		A7360MP8VR
Note	V: Halogen free Package R: Tape & Reel	
AiT provides all RoHS products		

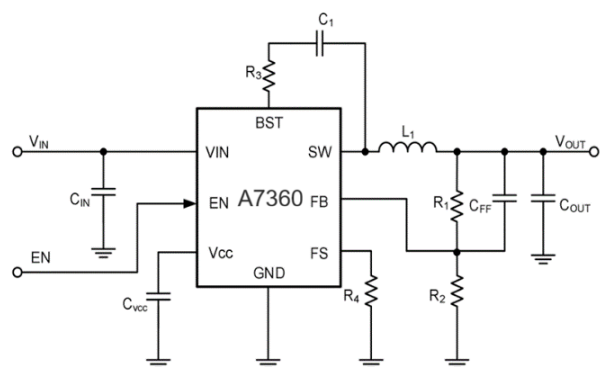
FEATURES

- Wide input voltage Range: 4V~30V
- Adjustable Output Voltage from 0.8V to V_{IN}
- Low RDS(ON)Switches 22mΩ /12 m Ω
- Switching Frequency ADJ
- PFM and Forced PWM Mode Selectable
- Duty Cycle up to 100%
- Short Circuit Protection
- Over Current Protection
- Internal Soft Startup
- Thermal Shutdown Protection

Application

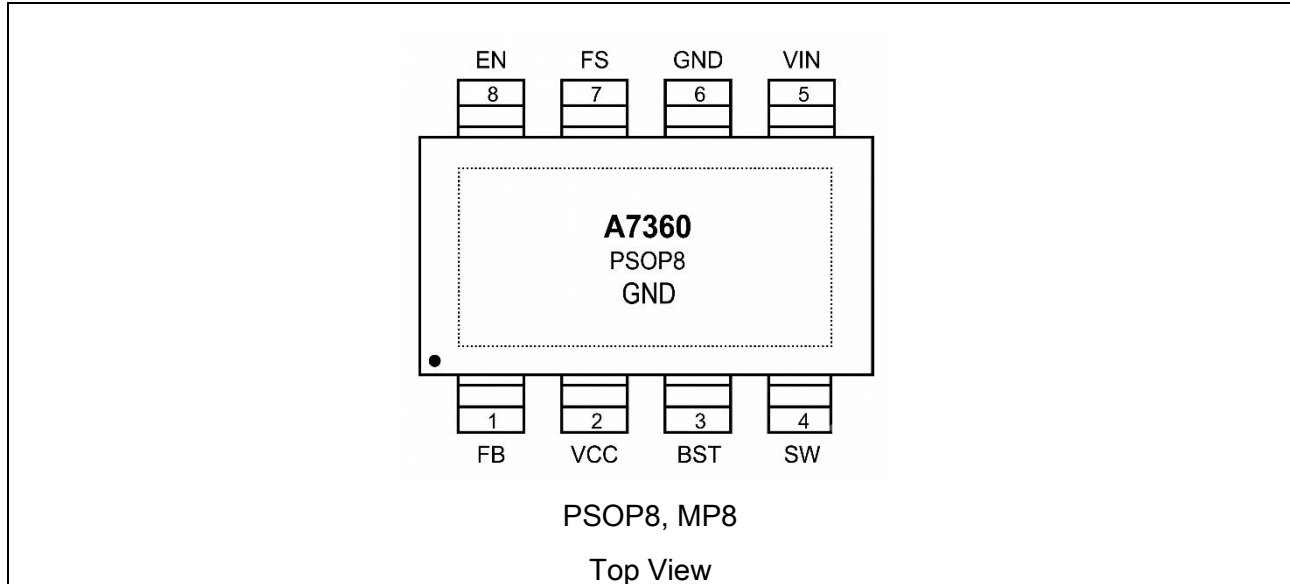
- Car Charger
- Rechargeable Portable Devices
- Type-C Docks/Adapters
- General Purpose Point-of-Load (POL)

TYPICAL APPLICATION





PIN DESCRIPTION



PIN#	Symbol	Function
1	FB	Feedback pin for the internal control loop. Connect this pin to an external feedback divider.
2	VCC	1.0uF/6.3V capacitor connected between VCC and GND
3	BST	Bootstrap. A capacitor connected between SW and BS pins is required to form a floating supply across the high-side switch driver.
4	SW	Switch pin connected to the internal FET switches and inductor terminal. Connect the Inductor of the output filter to this pin.
5	VIN	Power supply voltage input.
6	EPAD(GND)	Ground pin
7	FS	Switching Frequency Set
8	EN	Device enable logic input. Logic high enables the device, logic low disables the device and turns it into shutdown. Do not leave floating.

**ABSOLUTE MAXIMUM RATINGS**

Over operating temperature range(25°C) (unless otherwise noted)(1)

V _{IN} , and EN	-0.3V ~ 33V
BST, Voltage	- 0.3V ~ 6V
SW (less than 10ns) , Voltage	-0.7V ~ V _{IN} +0.7V
FB, Voltage	- 0.3V ~ 6V
T _J , Operating Junction Temperature	-40 ~ 150°C
T _{STG} , Storage Temperature	-65 ~ 150°C

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.

- (1) All voltage values are with respect to network ground terminal.
(2) While switching.

RECOMMENDED OPERATING CONFITIONST_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	-	6.0	A

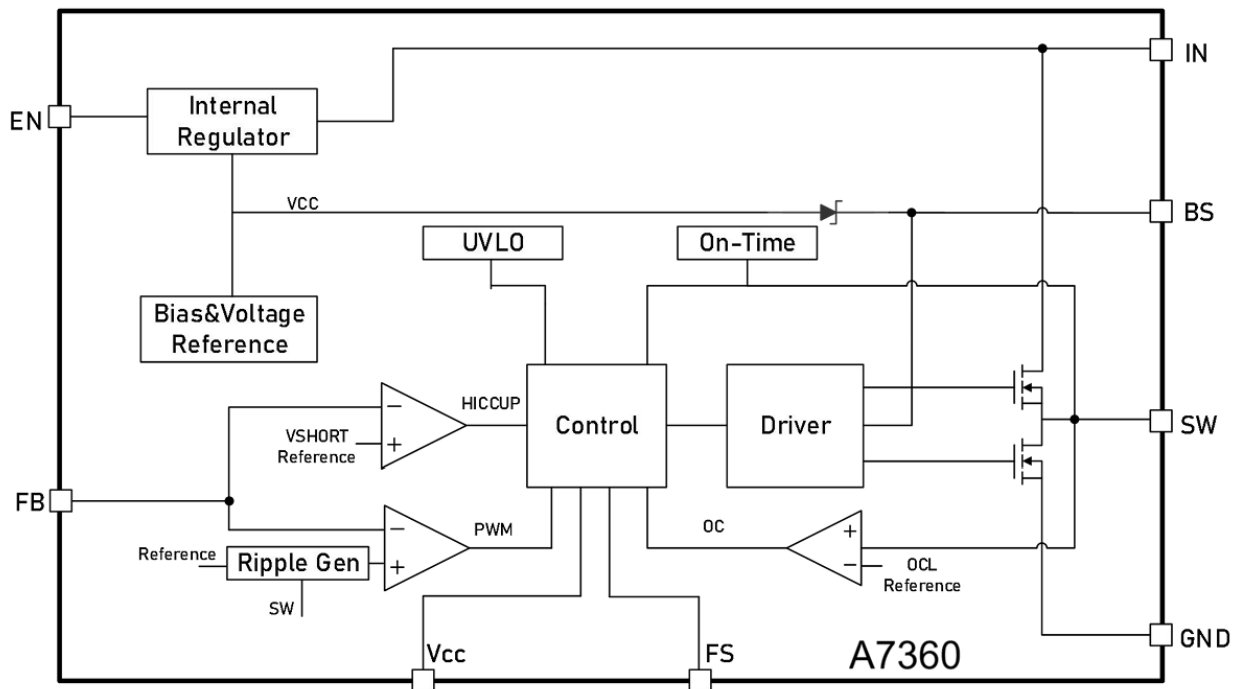
**ELECTRICAL CHARACTERISTICS**V_{IN} =12V, T_A=25°C, unless otherwise specified.

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Units
Input voltage range	V _{IN}	-	40	-	30	V
Quiescent current into VIN pin/CCM	I _Q		-	15	29	mA
Quiescent current into VIN pin/PFM			-	350	430	μA
Shutdown current	I _{OFF}	EN = GND	-		3	μA
Regulated Feedback Voltage	V _{FB}	-	788	800	812	mV
Feedback leakage	I _{LK_FB}	V _{EN} =1V, V _{FB} =2V	-	-	0.1	μA
V _{IN} under voltage lockout	V _{IN(UVLO)}	-	-	3.3	-	V
V _{IN} under voltage lockout Hysteresis		-	-	400	-	mV
ENABLE (EN PIN)						
Enable threshold	V _(EN_RISING)	Rising	1.2	-	-	V
	V _(EN_FALLING)	Falling	-	-	0.8	V
Threshold Hysteresis	V _(EN_HYS)	-	-	200	-	mV
POWER STAGE						
High-side FET on resistance	R _(HSD)	I _{sw} =1000mA	-	22	-	mΩ
Low-side FET on resistance	R _(LSD)	I _{sw} =-1000mA	-	12	-	mΩ
	R _(DISCHARGE)			200		Ω
VCC REGULATOR						
VCC regulator	V _{CC}	V _{IN} >5.2V	-	5	-	V
VCC current limit	I _{VCC}	High to low	20	-	-	mA
CURRENT LIMIT						
High side FET current limit	I _(LIM_HS)	-	-	7	-	A
Low side FET current limit	I _(LIM_LS)	-	-	8	-	A
OSCILLATOR						
Frequency & Mode set	F _{sw}	FS=PGND, PFM	-	250	-	KHz
		FS=30K, PFM	-	300	-	KHz
		FS=75K, PFM	-	400	-	KHz
		FS=150K, CCM	-	400	-	KHz
		FS=270K, CCM	-	300	-	KHz
		FS= Float, CCM	-	250	-	KHz



BUCK OUTPUT OVP AND UVP						
Output OVP rising threshold	$O_{VP_rising_th}$	-	115%	-	V_{FB}	
Output OVP falling threshold	$O_{VP_falling_th}$	-	105%	-	V_{FB}	
UVP falling threshold	$U_{VP_falling_th}$	-	75%	-	V_{FB}	
UVP rising threshold	$U_{VP_rising_th}$	-	85%	-	V_{FB}	
OVER TEMPERATURE PROTECTION						
Rising temperature	Thermal	-	-	160	-	°C
Hysteresis	Shutdown	-	-	30	-	°C
Soft start time	T_{SS}	-	3	6	10	ms
Soft-start current	I_{SS}	-	-	10	-	μA
Minimum switch on time	T_{ON_MIN}	-	-	70	-	ns
Minimum switch off time	T_{OFF_MIN}	-	-	150	-	ns

BLOCK DIAGRAM





DETAILED INFORMATION

Overview

The A7360 DC/DC converter is designed to provide up to a 6A output from an input voltage source of 4V to 30V. The A7360 is a high output current monolithic switch-mode step-down DC-DC converter. The internal compensation makes feedback control having good line and load regulation without external design. Regarding protected function, thermal shutdown is to prevent over temperature operating from damage, and current limit is against over current operating of the output switch. If current limit function occurs and VFB is down below 0.8V, the switching frequency will be reduced.

Application information

The A7360 is a 4V to 30V wide input voltage range, high performance with 6A output current. The A7360 requires few external power components (C_{IN}, C_{OUT} and L₁). The output voltage can be programmed with external feedback to any voltage, ranging from 0.8V to the input voltage.

$$V_{OUT} = 0.8 \times \frac{R1 + R2}{R2}$$

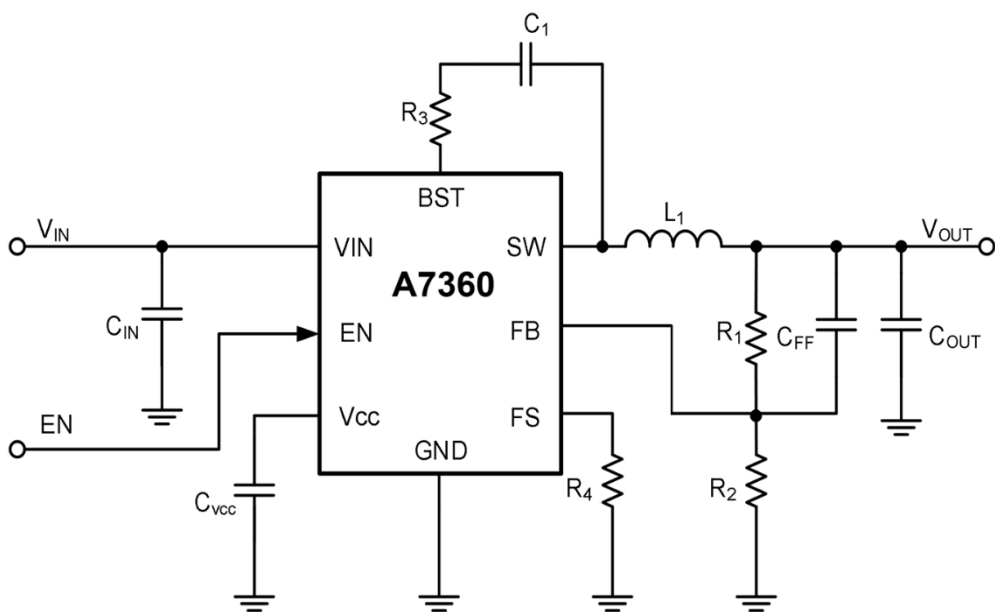




Table - Recommended Component Values

VIN (V)	VOUT (V)	L1 (μH)	C1(μF)	Cvcc (μF)	CIN(μF)	COUt(μF)	CFF Opt.(pF)	CSS(μF)	R1 (kΩ)	R2 (kΩ)
12	3.3	4.7	0.1	1	22	47+47	10 ~ 100	10-100	47	15
12	5	6.8	0.1	1	22	47+47	10 ~ 100	10-100	43	8.2
12	9	6.8	0.1	1	22	47+47	10 ~ 100	10-100	44	4.3
12	12	6.8	0.1	1	22	47+47	10 ~ 100	10-100	43	3.0
24	3.3	10	0.1	1	22	47+47	10 ~ 100	10-100	47	15
24	5	10	0.1	1	22	47+47	10 ~ 100	47	43	8.2
24	9	10	0.1	1	22	47+47	10 ~ 100	47	44	4.3
24	12	10	0.1	1	22	47+47	10 ~ 100	47	43	3.0
24	15	10	0.1	1	22	47+47	10 ~ 100	47	110	6.2
24	20	10	0.1	1	22	47+47	10 ~ 100	47	240	10

Note: For reference

1. R3 default= 0Ω, CFF: Optional; CSS: Optional
2. VIN=12V, VOUT= 3.3V/5.0V/ 9.0V with 6A: **WSL08050-6R8M (6.8uH)**
3. VIN=24V, VOUT= 3.3V/ 5.0V with 6A: **WSL10050-100M (10uH)**
4. VIN=24V, VOUT=9.0V/ 12.0V/ 15.0V with 6 A: **WSL12050-150M (15uH)**

R4 default= NC (250KHz Mode=CCM) Frequency set

Frequency & Mode set	FS=PGND, PFM 250KHz	250	KHz
	FS=30K, PFM 300KHz	300	KHz
	FS=75K, PFM 400KHz	400	KHz
	FS=150K, CCM 400KHz	400	KHz
	FS=270K, CCM 300KHz	300	KHz
	FS=Float, CCM 250KHz	250	KHz



Power Supply Recommendations

The A7360 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 A7360 or converter, additional bulk capacitance may be required in addition to the ceramic bypass capacitors. An electrolytic capacitor with a value of 47 μ F is a typical choice.

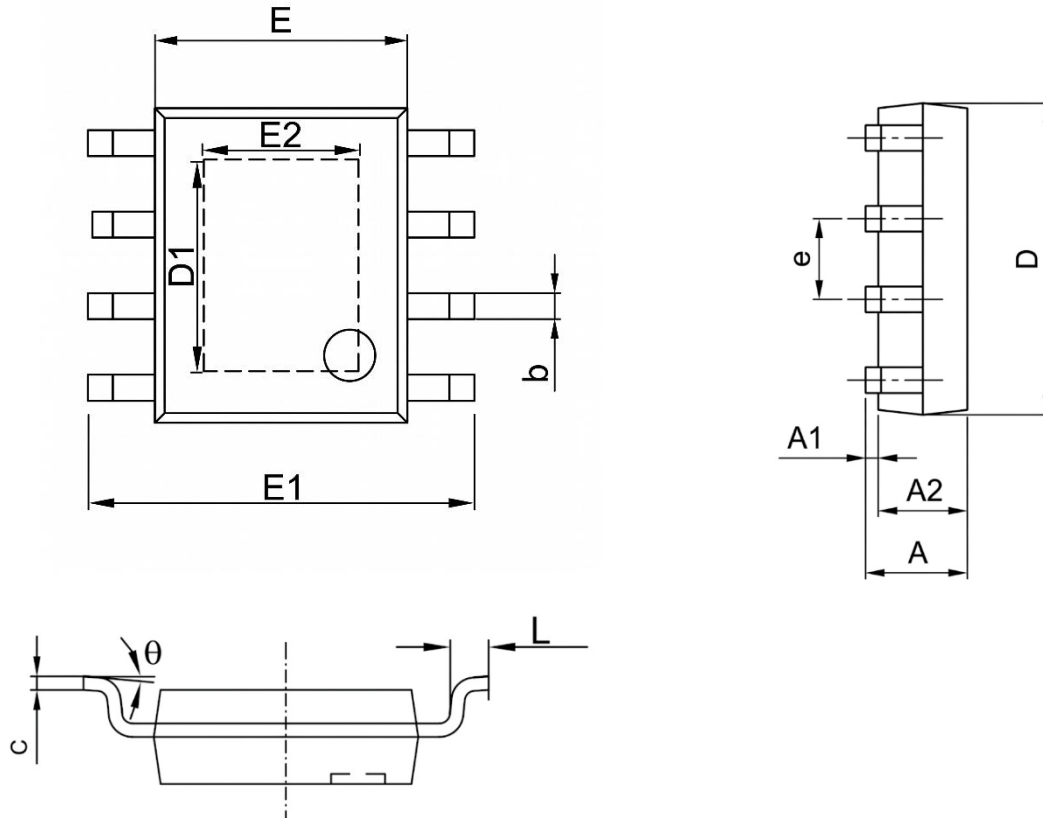
Layout Guidelines

- 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 VOUT 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 V_{FB} 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 PSOP8 (Unit: mm):



Symbol	Millimeters	
	Min	Max
A	1.400	1.700
A1	0.050	0.150
A2	1.350	1.550
b	0.330	0.510
c	0.170	0.250
D	4.700	5.100
E	3.800	4.000
E1	5.800	6.200
E2	2.313	2.513
e	1.270 BSC	
L	0.400	1.270
theta	0°	8°



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