DESCRIPTION

A7435 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 $55m\Omega$ High-Side and $30m\Omega$ Low-Side, could deliver up to 3.5A of continuous output current and the output current accurate to within $\pm 7\%$.

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, A7435 is a full function and high performance, high reliability buck DC-DC converter.

The A7435 is available in SOP8 package.

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 SOP8 package
- ESD HBM >5KV

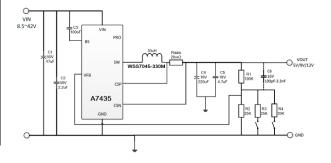
APPLICATION

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

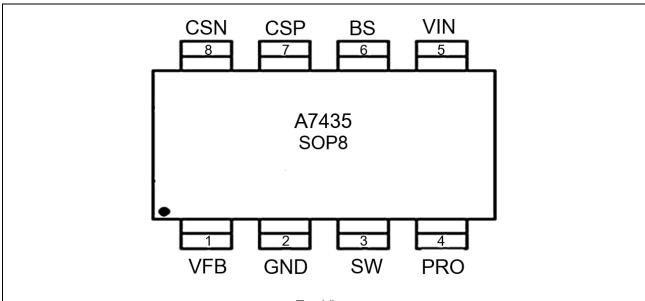
ORDERING INFORMATION

Package Type	Part Number		
SOP8	M8	A7435M8R	
SPQ: 4,000pcs/Reel	IVIO	A7435M8VR	
Note	V: Halogen free Package		
Note	R: Tape & Reel		
AiT provides all RoHS products			

TYPICAL APPLICATION



PIN DESCRIPTION



Top View

Pin#	Symbol	Function
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
5	VIIN	as possible
6	BS	Power to the internal high-side MOSFET gate driver. Connect a 100nF capacitor from
0	0 65	BS to VIN
7	CSP	Current sense Input_P
8	CSN	Current sense Input_N

ABSOLUTE MAXIMUM RATINGS

Parameter	Value	Unit	
VIN to GND		-0.3 to 43	V
SW to GND	-0.3 to 34	V	
BS to GND	-0.3 to 43	V	
CSP, CSN, PRO to GND	-0.3 to 25	V	
V _{FB} to GND	-0.3 to 6	V	
Max operating junction temperature (TJ)		150	°C
Ambient temperature (TA)		-40 to 85	°C
Package thermal resistance (θJC)	45	°C/W	
Storage temperature (TS)	-40 to 150	°C	
Lead Temperature & Time		260, 10	°C, Sec
ESD (HBM)		>5000	V

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.

Parameter	Symbol	Conditions	Min.	Тур.	Max.	Unit
Input Voltage	V _{IN}		8.5	-	42	V
Input OVP threshold	V _{OVP-VIN}		31	32	33	V
UVLO voltage	Vuvlo		7	8.5	9	V
UVLO hysteresis			-	1	-	V
Quiescent current	Iccq	V _{FB} =1.5V, force driver off.	-	1.5	2.5	mA
Standby current	IsB	No Load, VIN>8.5V	-	1.6	3	mA
Feedback voltage	V _{FB}		0.98	1	1.02	V
FB OVP detect voltage	V _{OVP}	Internal define	-	1.2	-	V
Switching frequency	Fsw	I _{OUT} =1A	-	135	-	KHz
Maximum duty cycle	D _{MAX}		-	100	-	%
Minimum on-time			-	250	-	ns
Reference voltage of constant current	Reference of CSP-CSN	0.4V <v<sub>FB<0.95V, V_{CSN}>2.6V</v<sub>	46.5	50	53.5	mV
Vout-short	Vcsn		2.2	2.4	2.6	V
D	High side	I _{OUT} =1A	-	55	75	mΩ
R _{DSON} of power MOS	Low side	I _{OUT} =1A	-	30	45	mΩ
Thermal shutdown temp	T _{SD}		-	155	-	°C
Thermal shutdown hysteresis	Тѕн		-	30	-	°C

TYPICAL PERFORMANCE CHARACTERISTICS

Fig1. Efficiency & Iout(%)

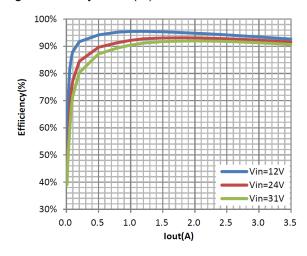


Fig2. Line Compensation

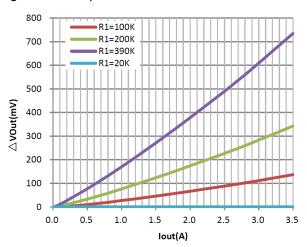


Fig3. Switch Frequency vs. Input Voltage

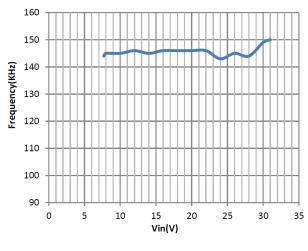


Fig4. Supply Current vs. Input Voltage

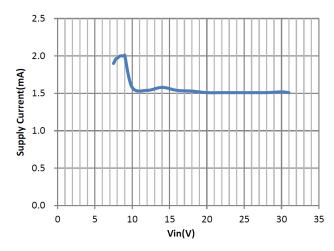
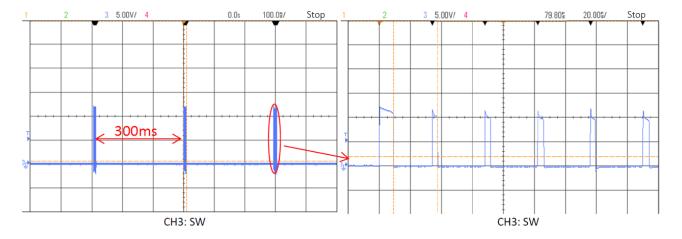
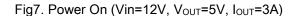


Fig5. Short Circuit (Vin=12V, Freq=3.3Hz)







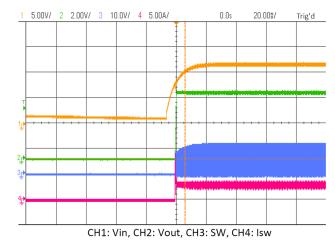


Fig8. Power Off (Vin=12V, V_{OUT}=5V, I_{OUT}=3A)

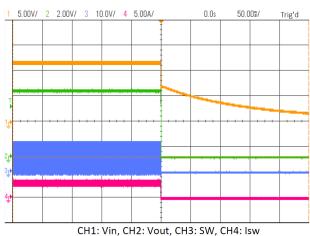


Fig9. Power On (Vin=24V, Vout=5V, Iout=3A)



Fig10. Power Off (Vin=24V, Vout=5V, Iout=3A)

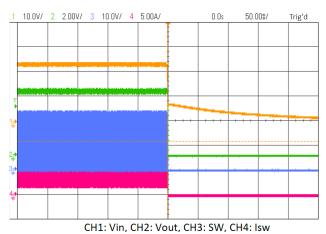


Fig11. Load Transient Response

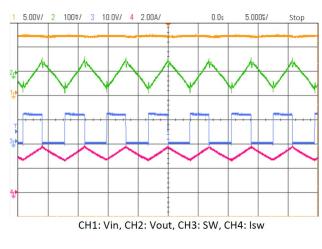
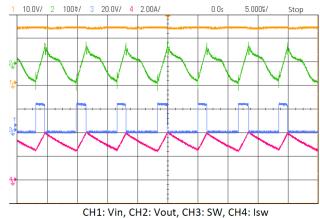
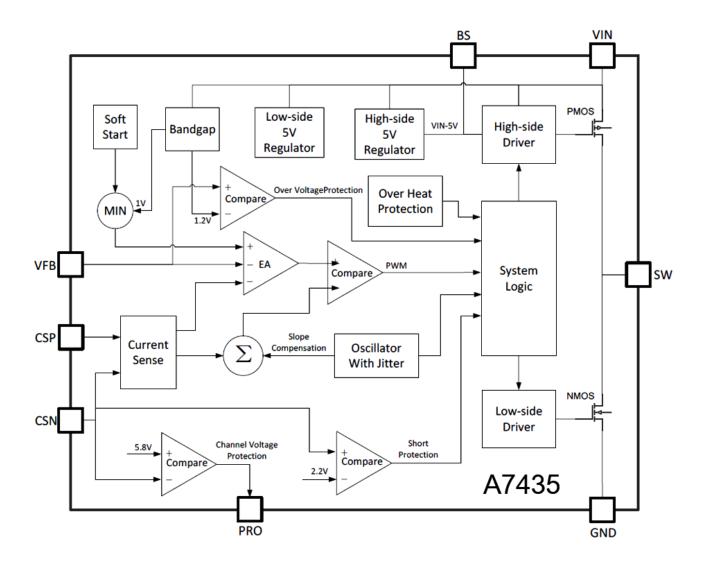


Fig12. Load Transient Response



BLOCK DIAGRAM



DETAILED INFORMATION

Input Under Voltage Protection

A7435 provides an input voltage up to 42V and operates from an input voltage range of 8.5V to 32V. If V_{IN} drops below 7.5V, the UVLO circuit inhibits switching. Once V_{IN} rises above 8.5V, the UVLO clears, and the soft-start sequence activates.

Input Over Voltage Protection

If V_{IN} rises above 32V, the UVLO circuit inhibits switching. A7435 will not be damaged until the voltage exceeds 42V. Once V_{IN} drops below 30V, the UVLO clears, and the soft-start sequence activates.

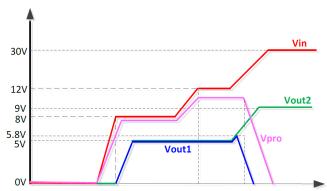
Soft-start

A7435 has an internal soft-start circuitry to reduce supply inrush current during startup conditions. When the A7435 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

A7435 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, A7435 shuts down to avoid damage caused by abnormal use of electrical equipment.

A7435
DC-DC CONVERTER BUCK (STEP-DOWN)
40V, 3.5A, 100% Duty Cycle CC&CV MODE

Constant Current Output

A7435 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, A7435 will enter short circuit protection mode.

Short Circuit Protection

When CSN drops below 2.2V since too heavy load, A7435 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

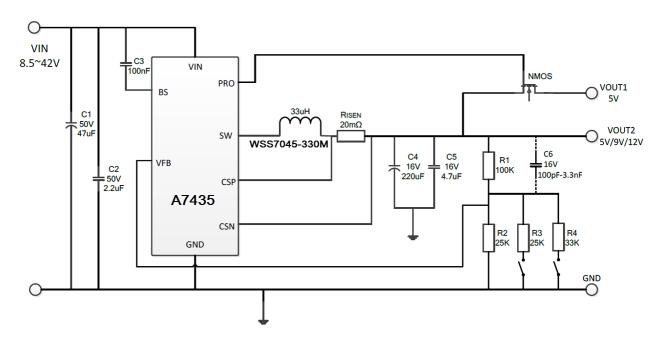
When users use different cables, it will produce different voltage drop, the users can set their own cable compensation voltage according to the need:

$$V_{cable\; compensation} = 1.6 \mu A \times R1 \times \frac{V_{CSP} - V_{CSN}}{50 mV}$$

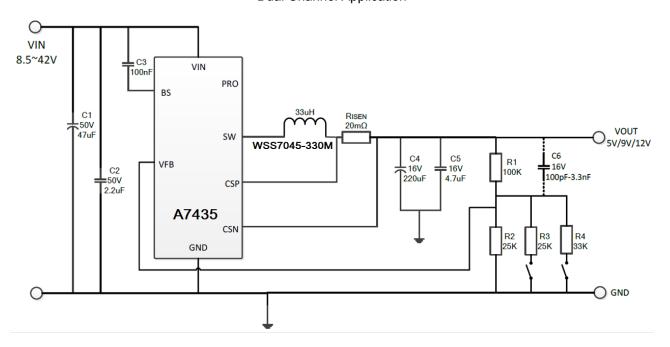
Thermal Shutdown

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.

TYPICAL APPLICATION



Dual Channel Application

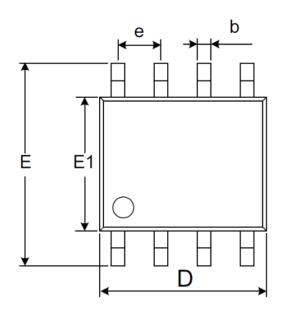


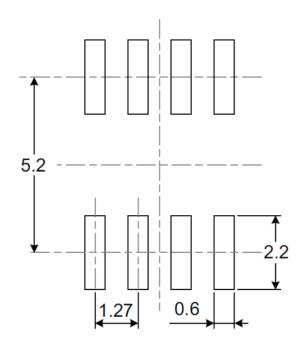
Single Channel Application

- 2) The inductor core is recommended AiT Semi's WSS7045-330M.
- 3) Pin PRO is float in single channel application.

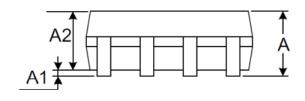
PACKAGE INFORMATION

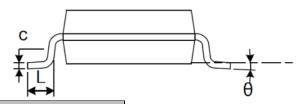
Dimension in SOP8 (Unit: mm)





RECOMMENDED LAND PATTERN (Unit: mm)





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

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