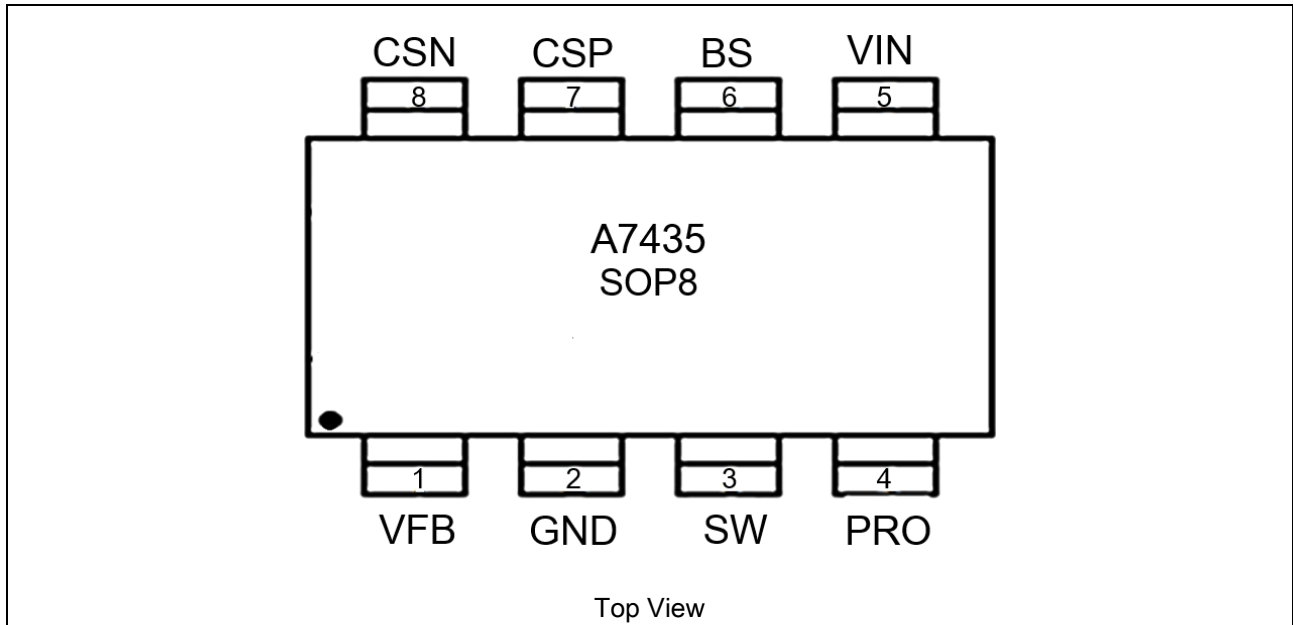




PIN DESCRIPTION



| 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 2.2 μ F 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 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 |
| VFB 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) | SOP-8 | 45 |
| 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

VIN = 12V, TA = 25°C, unless otherwise stated.

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---------------------------------------|----------------------|-----------------------------|------|------|------|------|
| Input Voltage | VIN | | 8.5 | - | 42 | V |
| Input OVP threshold | VOVP-VIN | | 31 | 32 | 33 | V |
| UVLO voltage | VUVLO | | 7 | 8.5 | 9 | V |
| UVLO hysteresis | | | - | 1 | - | V |
| Quiescent current | ICCQ | VFB=1.5V, force driver off. | - | 1.5 | 2.5 | mA |
| Standby current | ISB | No Load, VIN>8.5V | - | 1.6 | 3 | mA |
| Feedback voltage | VFB | | 0.98 | 1 | 1.02 | V |
| FB OVP detect voltage | VOVP | Internal define | - | 1.2 | - | V |
| Switching frequency | F _{SW} | 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<VFB<0.95V, VCSN>2.6V | 46.5 | 50 | 53.5 | mV |
| V _{OUT-SHORT} | V _{CSN} | | 2.2 | 2.4 | 2.6 | V |
| R _{DS(on)} of power MOS | High side | I _{OUT} =1A | - | 55 | 75 | mΩ |
| | Low side | I _{OUT} =1A | - | 30 | 45 | mΩ |
| Thermal shutdown temp | T _{SD} | | - | 155 | - | °C |
| Thermal shutdown hysteresis | T _{SH} | | - | 30 | - | °C |



TYPICAL PERFORMANCE CHARACTERISTICS

Fig1. Efficiency & Iout(%)

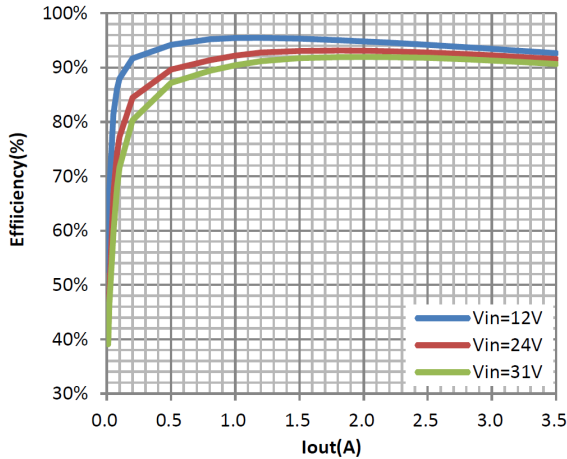


Fig2. Line Compensation

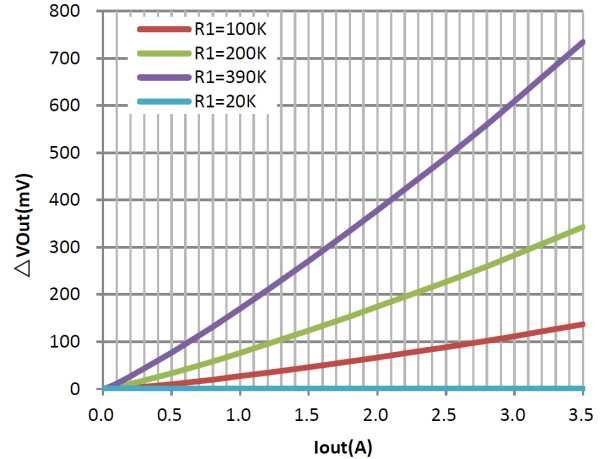


Fig3. Switch Frequency vs. Input Voltage

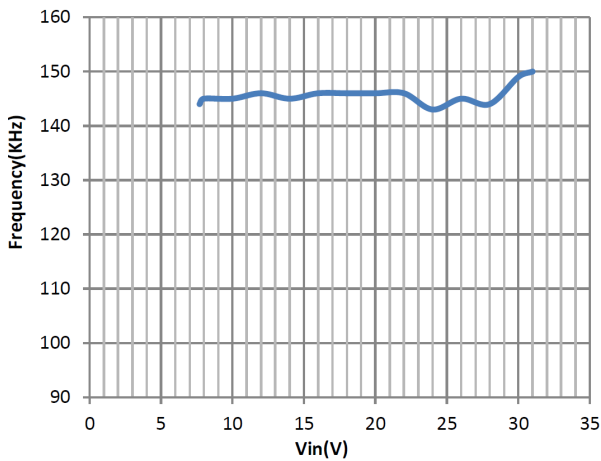


Fig4. Supply Current vs. Input Voltage

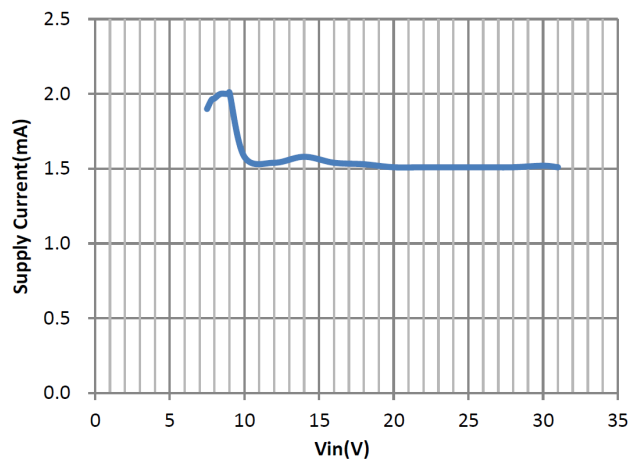


Fig5. Short Circuit (Vin=12V, Freq=3.3Hz)

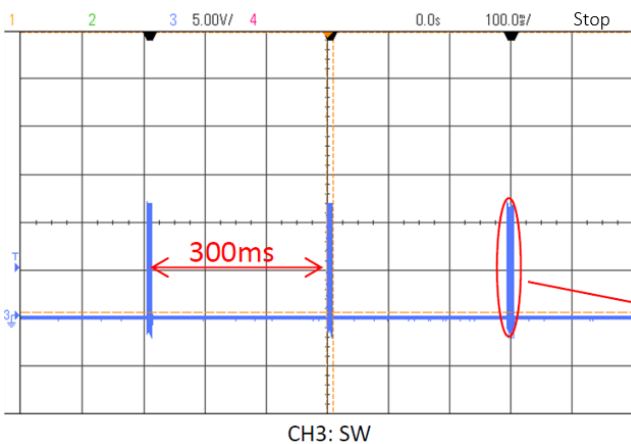


Fig6. Short Circuit (Vin=12V, Freq=34kHz)

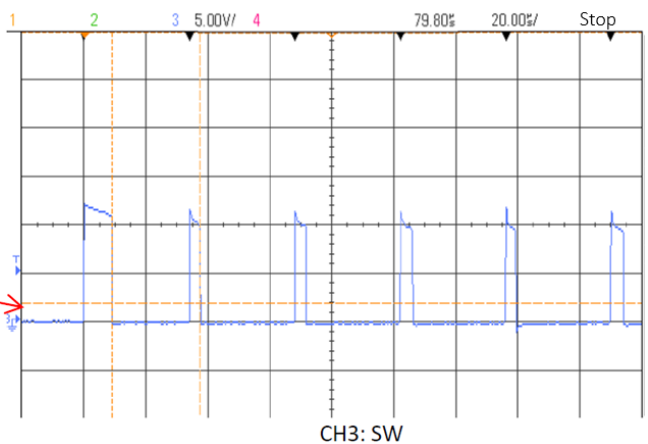




Fig7. Power On ($V_{in}=12V$, $V_{OUT}=5V$, $I_{OUT}=3A$)

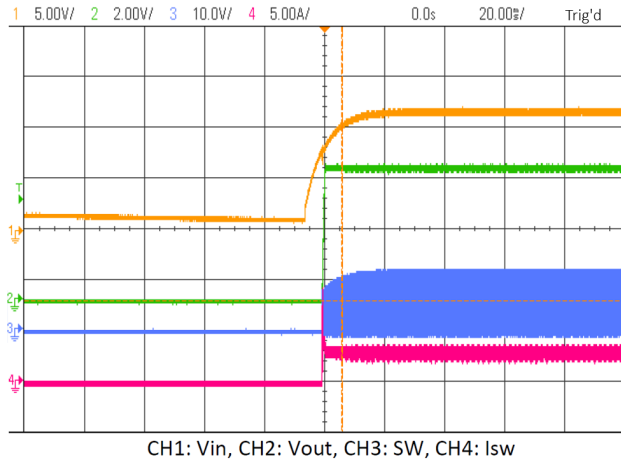


Fig8. Power Off ($V_{in}=12V$, $V_{OUT}=5V$, $I_{OUT}=3A$)

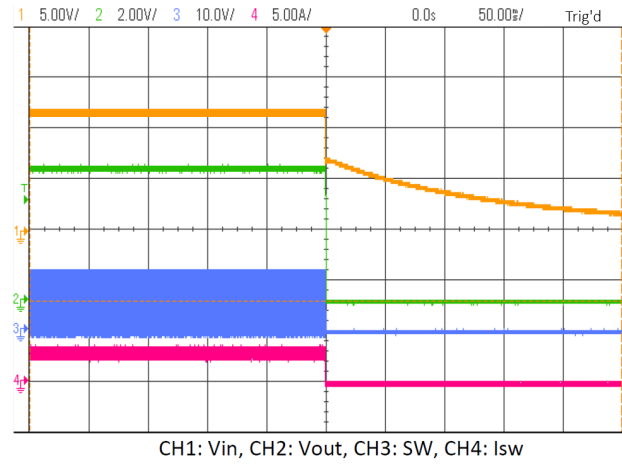


Fig9. Power On ($V_{in}=24V$, $V_{OUT}=5V$, $I_{OUT}=3A$)

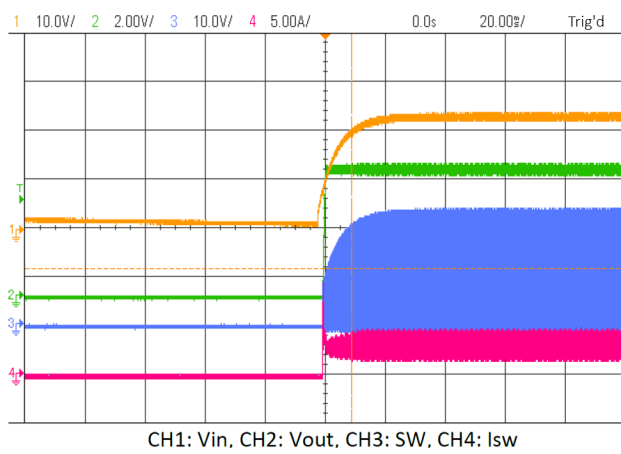


Fig10. Power Off ($V_{in}=24V$, $V_{OUT}=5V$, $I_{OUT}=3A$)

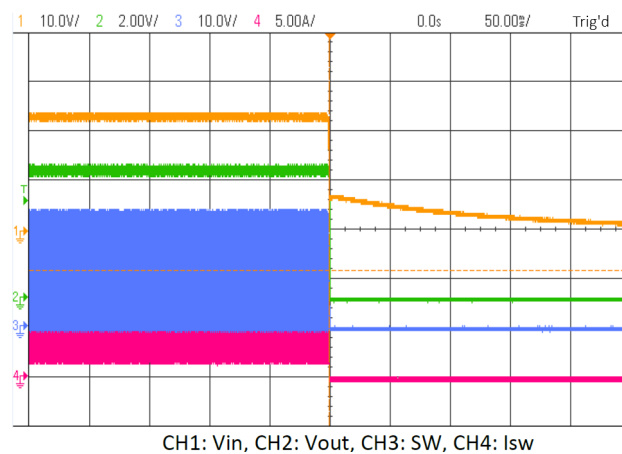


Fig11. Load Transient Response

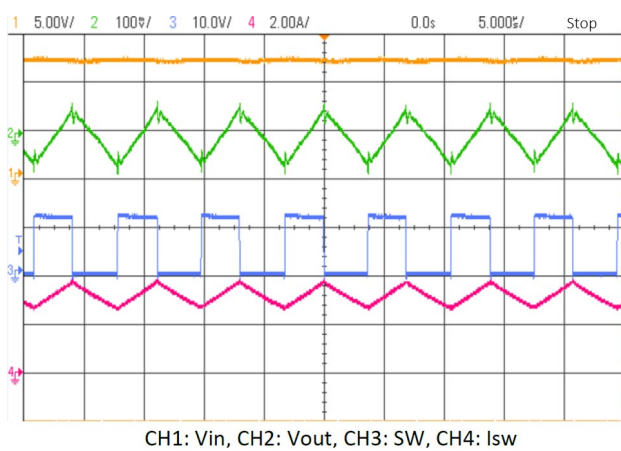
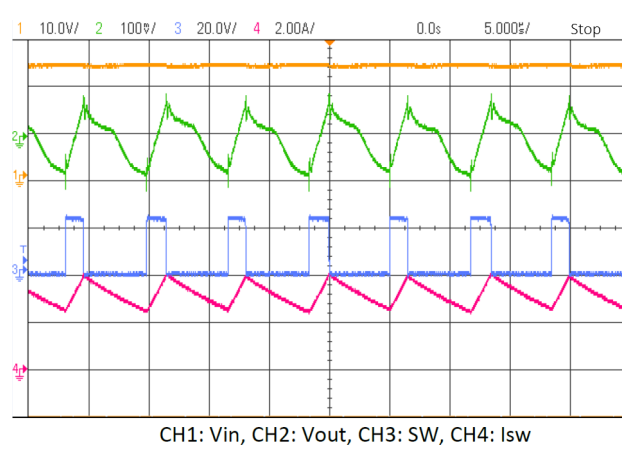
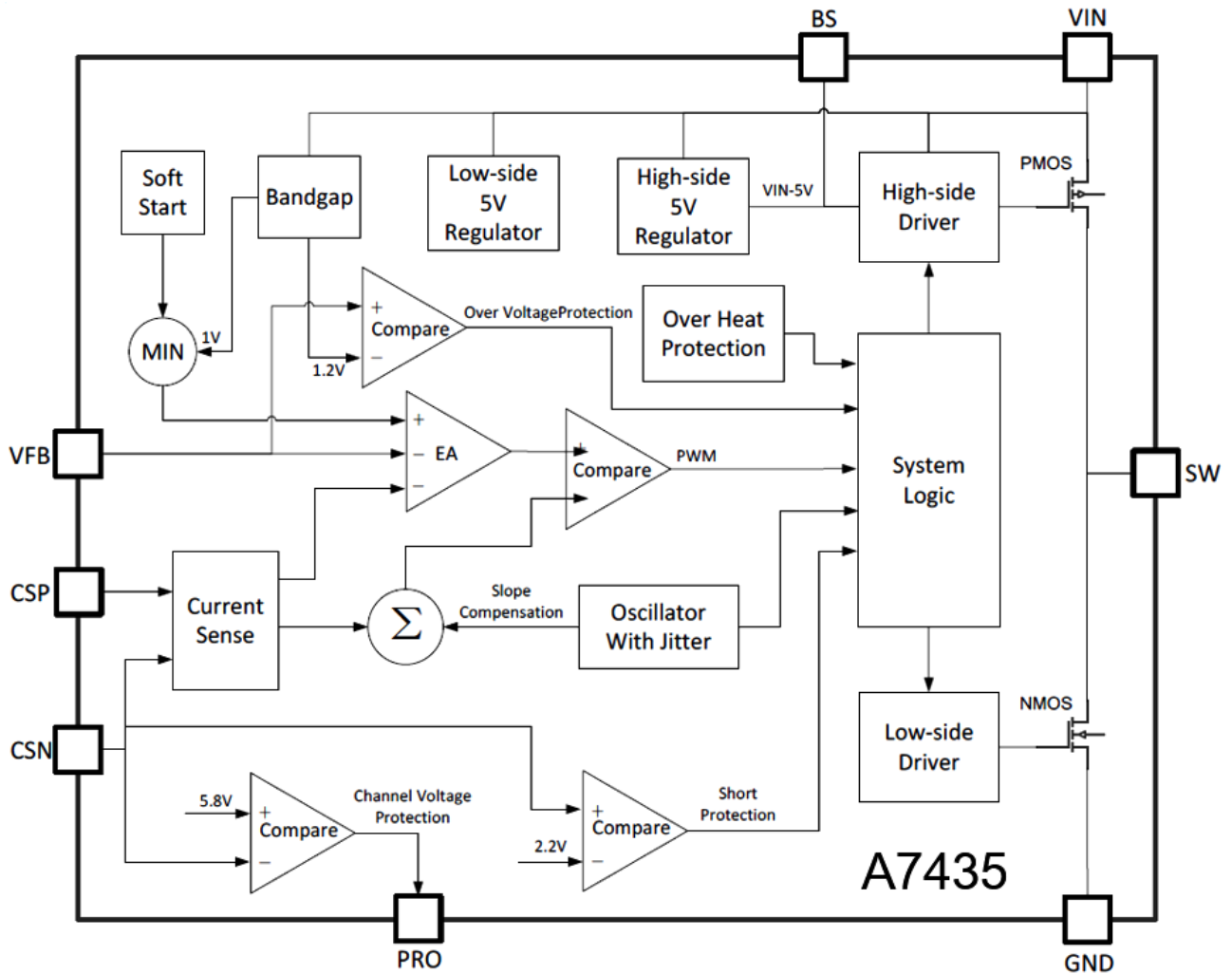


Fig12. Load Transient Response





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.

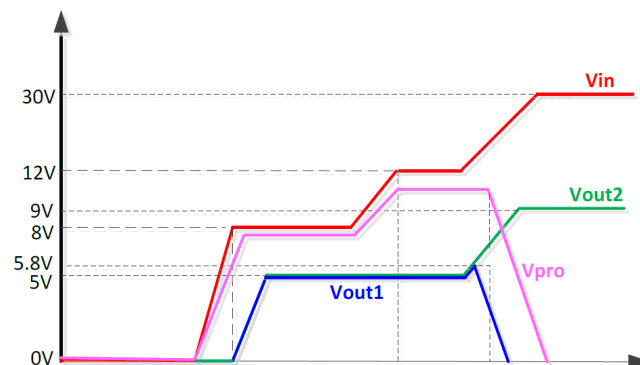
Soft-start

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.



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:

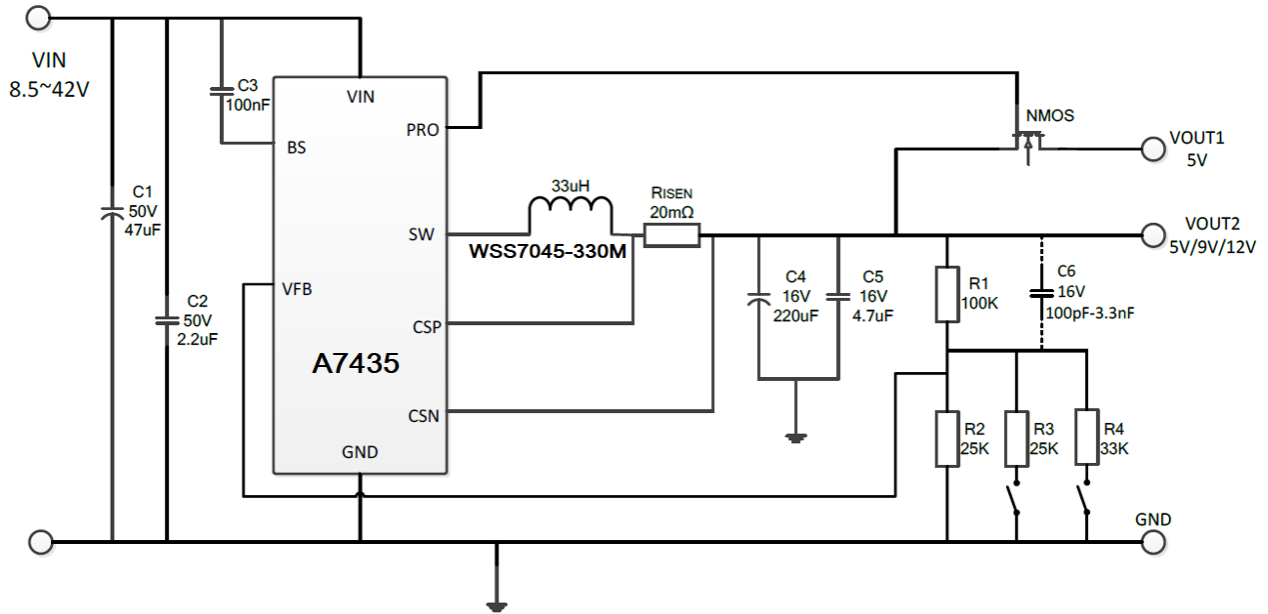
$$V_{\text{cable compensation}} = 1.6\mu A \times R1 \times \frac{V_{CSP} - V_{CSN}}{50mV}$$

Thermal Shutdown

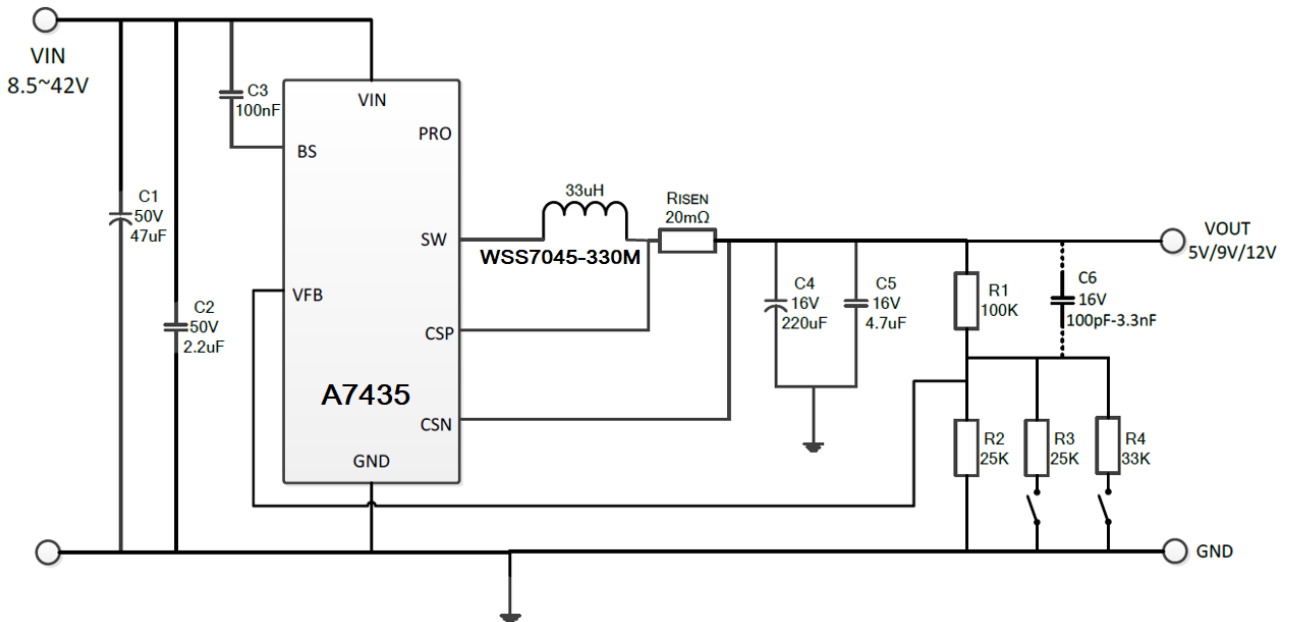
The junction temperature of the IC is monitored internally. If the junction temperature exceeds the threshold value (typically 155°C), the converter shuts off. This is non-latch protection. There is about 30°C hysteresis. Once the junction temperature drops around 125°C, it initiates a Soft-start.



TYPICAL APPLICATION



Dual Channel Application



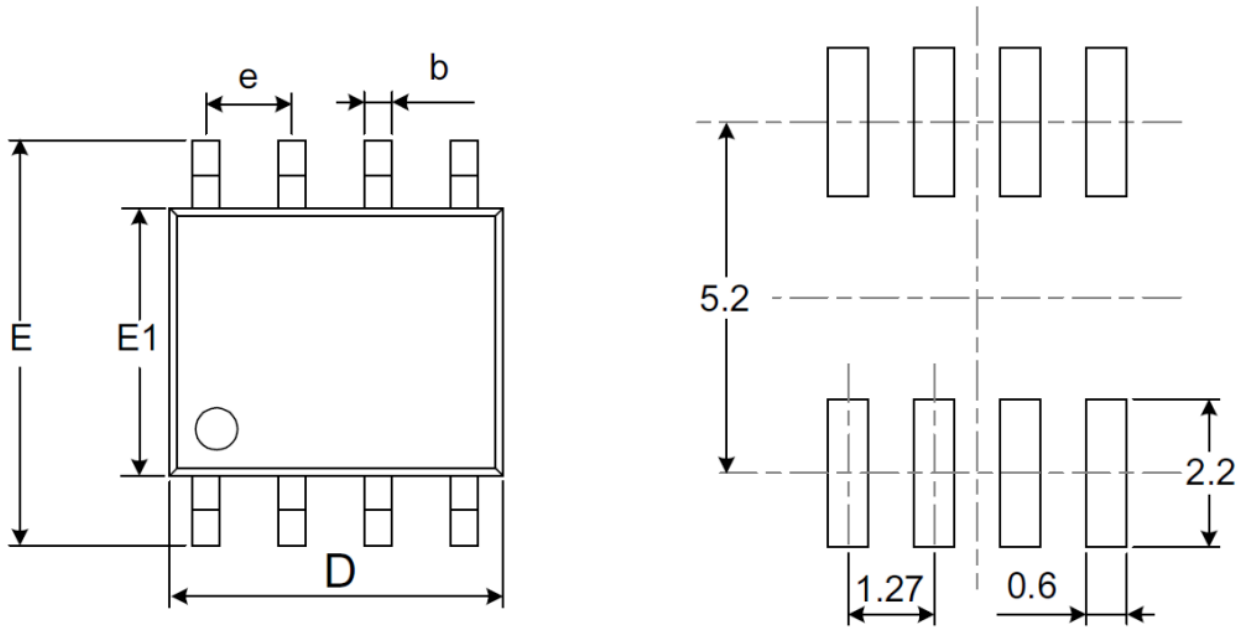
Single Channel Application

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

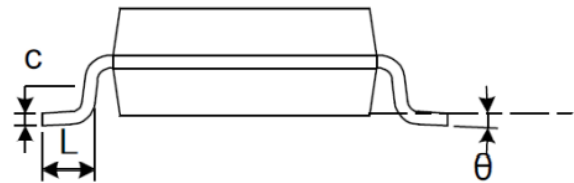
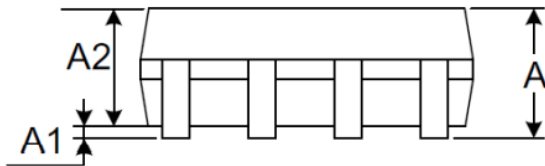


PACKAGE INFORMATION

Dimension in SOP8 (Unit: mm)



RECOMMENDED LAND PATTERN (Unit: mm)



| Symbol | Millimeters | |
|--------|-------------|-------|
| | 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 | 1.270 BSC | |
| E | 5.800 | 6.200 |
| E1 | 3.800 | 4.000 |
| L | 0.400 | 1.270 |
| θ | 0° | 8° |



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