

500mA Dual Linear Regulator with V_{AUX} Driver**■ FEATURES**

- Continuous 3.3V Output from Three Inputs.
- Complete Power Management Solution.
- V_{CC} , V_{SBY} Regulator Supplies 500mA Output.
- Built-in Hysteresis When Selecting Input Supplies.
- Drive Control Signal for External V_{AUX} Switch.
- Output can be Forced Higher than Input (Off-State).

■ APPLICATIONS

- Desktop Computers.
- PCI Adapter Cards with Wake-On-LAN.
- Network Interface Cards (NICs).
- Multi Power System.
- System with Standby Capabilities.

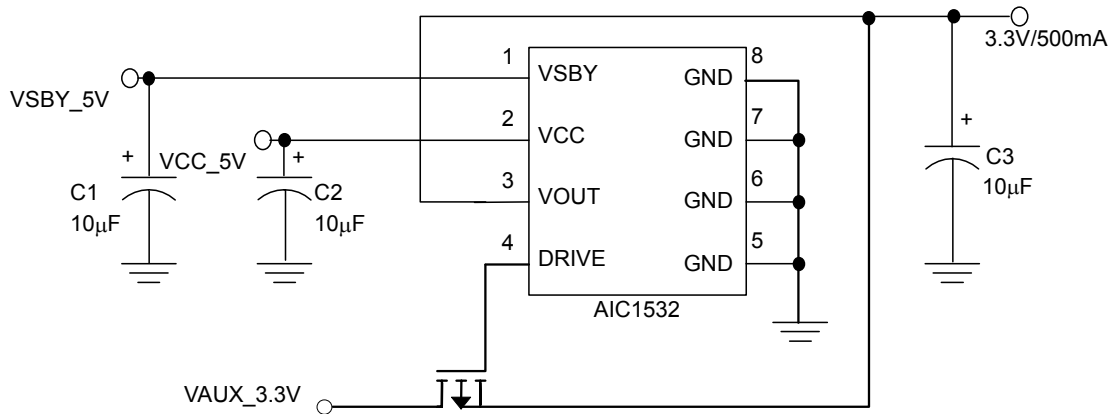
■ DESCRIPTION

AIC1532 is a dual input regulator with V_{AUX} drive control capable of delivering 3.3V/500mA continuously. The output power is provided from three independent input voltage sources on a prioritized basis. Power is always taken in priority using the following order V_{CC} , V_{SBY} , and V_{AUX} .

AIC1532 meets Intel's "Instantly Available" power requirements which follows the "Advanced Configuration and Power Interface" (ACPI) standards. When either V_{CC} or V_{SBY} is present, the device automatically enables the regulator and produces a stable 3.3V output V_{OUT} . When only V_{AUX} (3.3V) is present, the drive control output will turn-on an external PMOS switch from an auxiliary 3.3V supply V_{AUX} to V_{OUT} .

The IC also prevents excessive current from flowing V_{OUT} to either input voltage or ground when the output voltage is bigger than the input voltage.

All the necessary control circuitry needed to provide a smooth and automatic transition between all the three supplies has been incorporated. This allows both V_{CC} and V_{SBY} to be dynamically switched without loss of output voltage.

■ TYPICAL APPLICATION CIRCUIT

Dual Input Regulator with Auxiliary Driver
■ ORDERING INFORMATION

AIC1532XXXX

PACKING TYPE
 TR: TAPE & REEL
 TB: TUBE

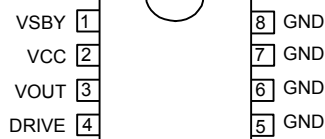
PACKAGING TYPE
 N: PLASTIC DIP
 S: SMALL OUTLINE

C: COMMERCIAL
P: LEAD FREE COMMERCIAL
PIN CONFIGURATION

DIP-8 (CN&PN)

SO-8 (CS&PS)

TOP VIEW



Example: AIC1532CSTR

→ in SO-8 Package & Taping & Reel Packing Type
 (CN is not available in Tape & Reel packing type.)

AIC1532PSTR

→ in SO-8 Lead Free Package & Taping & Reel
 Packing Type

■ ABSOLUTE MAXIMUM RATINGS

V _{CC} , V _{SBY} Input Voltage	7.0V
V _{AUX} Input Voltage	4.0V
V _{OUT} Output Voltage	5.0V
Operating Temperature Range	-40°C ~ 85°C
Junction Temperature	125°C
Storage Temperature Range	-65°C ~ 150°C
Lead Temperature (soldering, 10sec.)	260°C

Absolute Maximum Ratings are those values beyond which the life of a device may be Impaired.

■ TEST CIRCUIT

Refer to TYPICAL APPLICATION CIRCUIT

■ ELECTRICAL CHARACTERISTICS
(V_{IN}= 5V, T_A=25°C, unless otherwise specified.) (Note 1)

PARAMETERS	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Regulated Output Voltage	0mA < I _{LOAD} < 500mA	3.135	3.300	3.465	V
Regulated Output Current		500			mA
Output Voltage Load Regulation	V _{CC} selected I _{LOAD} =50mA ~ 500mA		20		mV
	V _{SBY} selected I _{LOAD} =50mA ~ 500mA		20		
Output Voltage Line Regulation	V _{CC} =4.5V~5.5V, I _{LOAD} =5mA V _{SBY} =4.5V~5.5V, I _{LOAD} =5mA		2		mV
V _{CC} Select Voltage	V _{SBY} > V _{SBYDES} or V _{AUX} present		4.50	4.60	V
V _{CC} Deselect Voltage	V _{CC} < V _{CCDES}	3.90	4.20		
V _{SBY} Select Voltage	V _{AUX} present		4.50	4.60	V
V _{SBY} Deselect Voltage	V _{SBY} < V _{SBYDES}	3.90	4.20		
Hysteresis Voltage			0.30		V
Short Circuit Current	V _{CC} /S _{BY} =5V, V _{OUT} =0V		1000		mA
V _{CC} Pin Reverse Leakage	V _{CC} = 0V , V _{SBY} = 5V		5	50	μA
V _{SBY} Pin Reverse Leakage	V _{CC} = 5V , V _{SBY} = 0V		5	50	
Ground Current	V _{CC} /S _{BY} =5V , I _{LOAD} = 0mA		100	500	μA
	V _{CC} /S _{BY} =5V , I _{LOAD} = 500mA		100	500	
Short Circuit Current	V _{CC} /S _{BY} =5V, V _{OUT} =0V		1000		mA
V _{DRIVE} High Voltage	V _{CC} or V _{SBY} selected	3.75	4.00		V
Drive delay	Drive High Delay		5.0		μS
	Drive Low Delay		0.5		
Drive Pin Current limit	V _{DRIVE} =1V, V _{CC} =5V	0.5	6.0	25.0	mA
Thermal Shutdown Hysteresis	Guaranteed by design		10		°C

Note 1 : Specifications are production tested at T_A = 25°C. Specifications over the -40°C to 85°C operating Temperature range are assured by design, characterization and correlation with Statistical Quality Controls (SQC).

TYPICAL PERFORMANCE CHARACTERISTICS

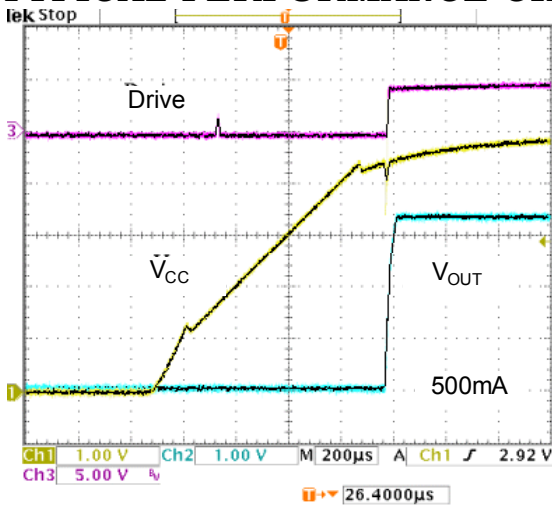


Fig. 1 V_{CC} Cold Start

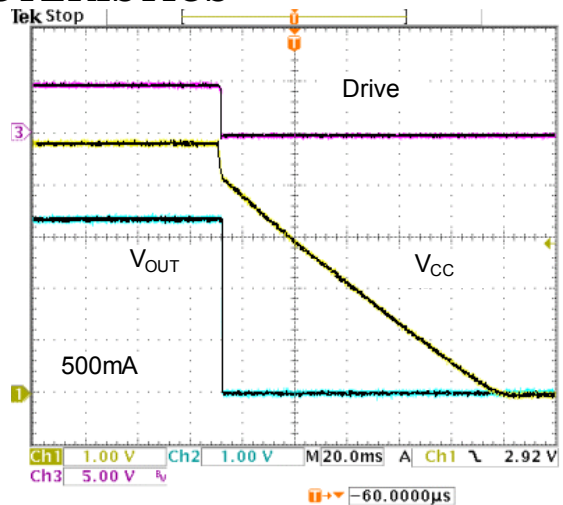


Fig. 2 V_{CC} Full Power Down

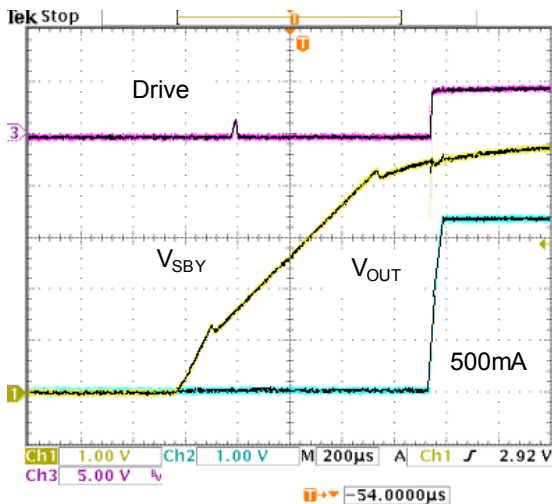


Fig. 3 V_{SBY} Cold Start

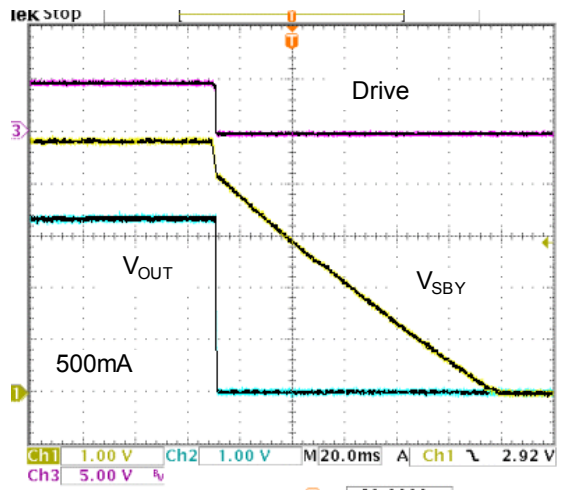


Fig. 4 V_{SBY} full power down

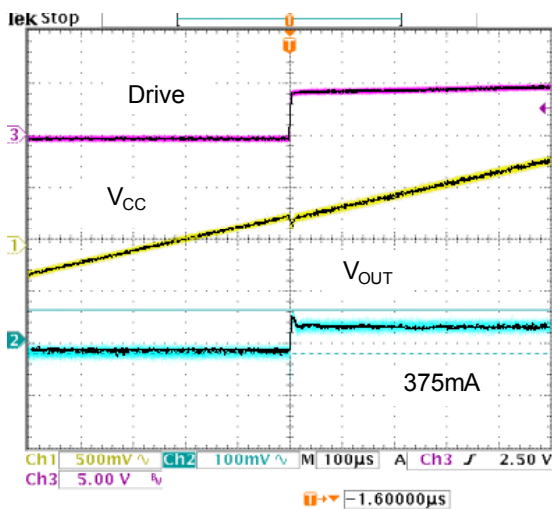


Fig. 5 V_{CC} Power-Up

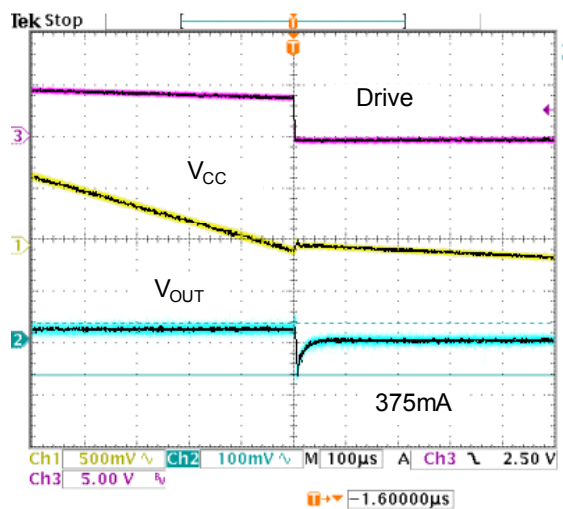


Fig. 6 V_{CC} power-down

■ TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

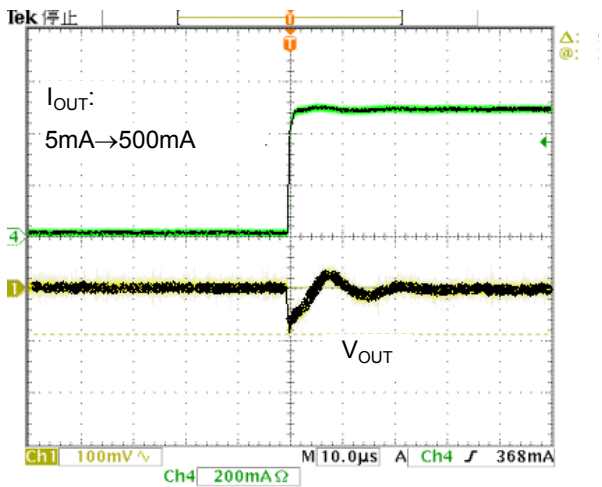


Fig. 7 V_{CC} Load Transient Rising

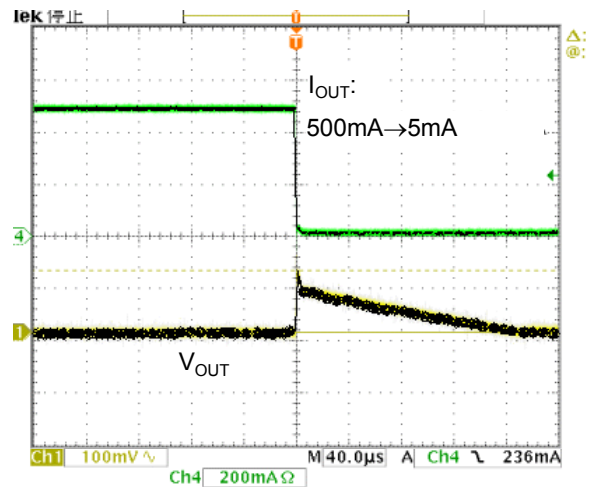


Fig. 8 V_{CC} Load Transient Falling

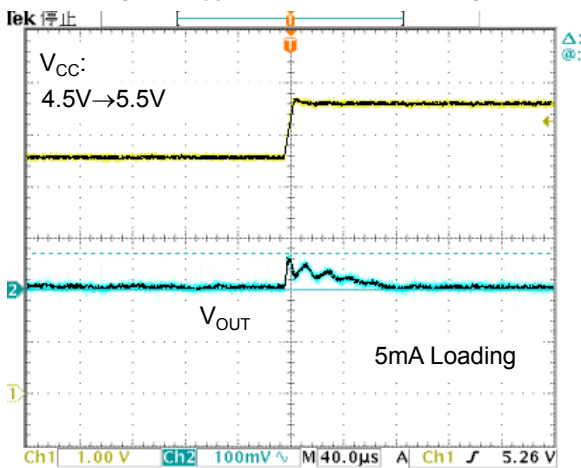


Fig. 9 V_{CC} Line Transient Rising

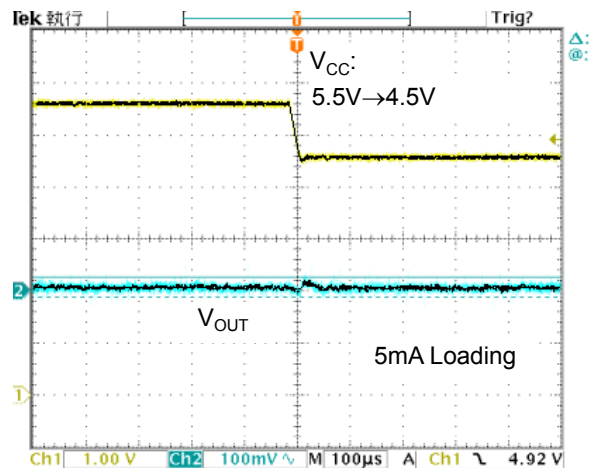


Fig. 10 V_{CC} Line Transient Falling

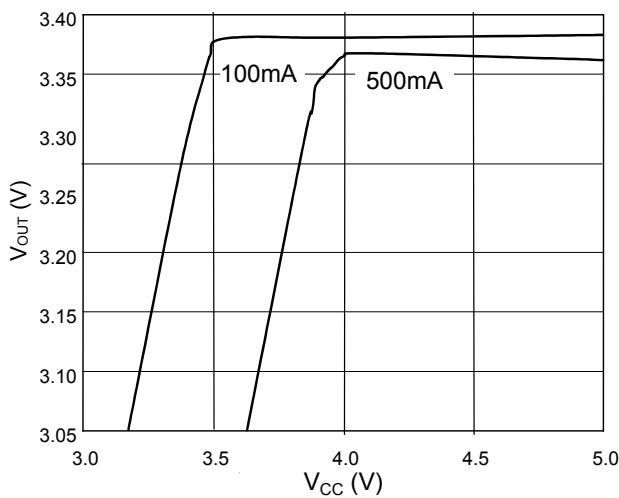


Fig. 11 V_{CC} Line Regulation

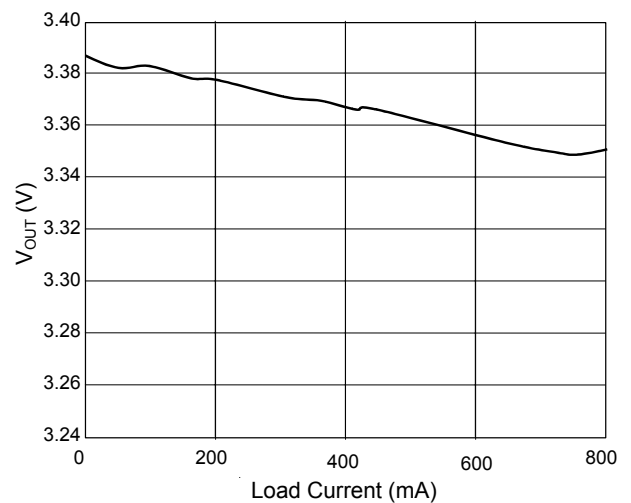


Fig. 12 V_{CC} Load Regulation

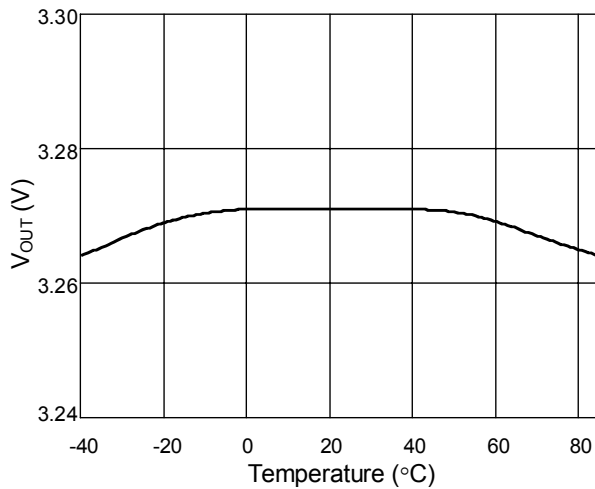
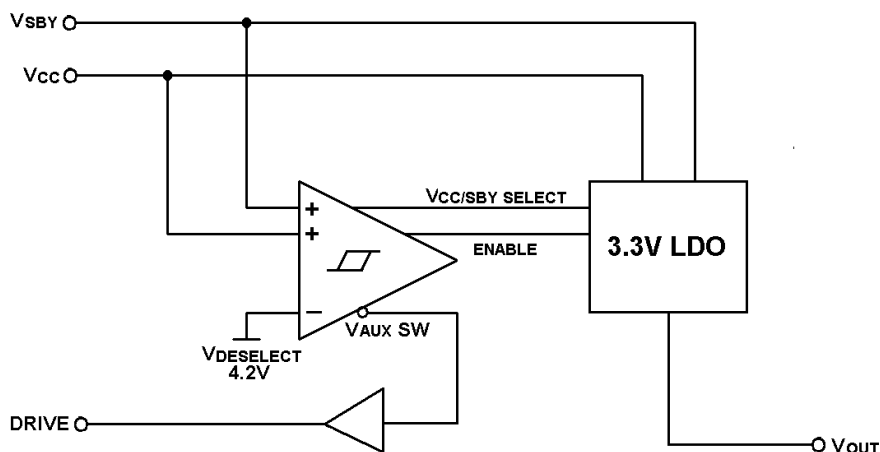
■ TYPICAL PERFORMANCE CHARACTERISTICS (Continued)


Fig. 13 Output Voltage vs. Temperature

■ BLOCK DIAGRAM

■ PIN DESCRIPTION

- PIN 1: VSBY - Standby supply voltage (5V) input for 3.3V regulator when VCC falls below VCCDES. Some NICs that operate in "Wake-On-LAN" mode get a 5V standby through a cable that connects directly to a specific header on the Motherboard.
- PIN 2: VCC - Primary supply voltage (5V) input for 3.3V regulator.
- PIN 3: VOUT - 3.3V regulated output voltage when either VCC or VSBY is present. When only VAUX (3.3V) is present, VOUT voltage comes from VAUX through an internal low impedance switch.
- PIN 4: DRIVE - Signal for controlling external auxiliary switch. Active Low when internal regulator is disabled.
- PIN 5-8: GND - Negative reference for all voltages.

■ APPLICATIONS INFORMATION

The Requirement for External Capacitors

The selection of the output capacitor is based on two requirements: LDO compensation and the transition between power sources. During the takeover between sources, the output capacitor provides the loading. Therefore a larger output capacitor can improve the transition. And since the output capacitor plays the important role in the compensation of LDO, a 10 μ F Tantalum capacitor or larger is recommended.

The input capacitor is required to be as close to the IC as possible. The input capacitor can reduce the parasitic effect formed by the power supply output impedance or the trace. A 10 μ F Tantalum capacitor is a good choice. Additional ceramic capacitor can be placed close to input and output to reduce the high frequency noise. A 0.1 μ F is recommended.

The layout and Thermal Considerations

The AIC1532 is housed in a thermally enhanced package where the GND pins (Pin5 to Pin8) are integrated to the leadframe. Generally, heat sinks are not available for most surface-mounted devices. Instead, they rely on the printed-circuit

board to provide the thermal path. When the AIC1532 operates normally, the maximum power dissipation is

$$P_D = (V_{IN} - V_{OUT}) \times I_{OUT} = (5 - 3.3) \times 0.5 = 0.85W$$

At the maximum operation temperature, the thermal resistance seen by the device, or the combination of all the thermal paths, should be

$$R_{JA} < \frac{165 - 85}{0.85} = 94^{\circ}C/W .$$

When the device is mounted on a double-sided printed circuit board, the ground plane is the most used thermal path. To make sure the thermal resistance small enough and the shutdown function work normally, the thermal resistance between GND pins to GND plane should be as small as possible by means of adding more vias. And the GND plane should be at least 1 square centimeters of copper.

The layout of AIC1532 is shown in Fig.14. In Fig. 21, the thermal resistance R_{JA} is 70.36 $^{\circ}C/W$ where the AIC1532 is mounted on the double-sided PCB and measured under forced-air thermal chamber.

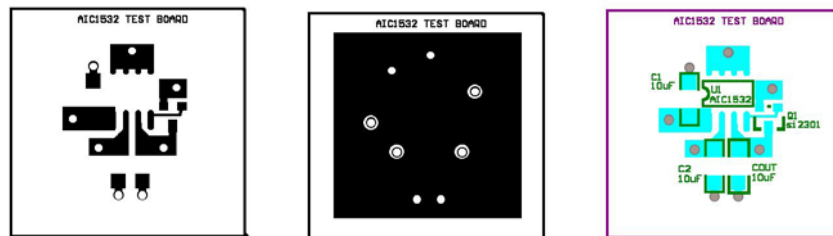


Fig.14 The layout of AIC1532

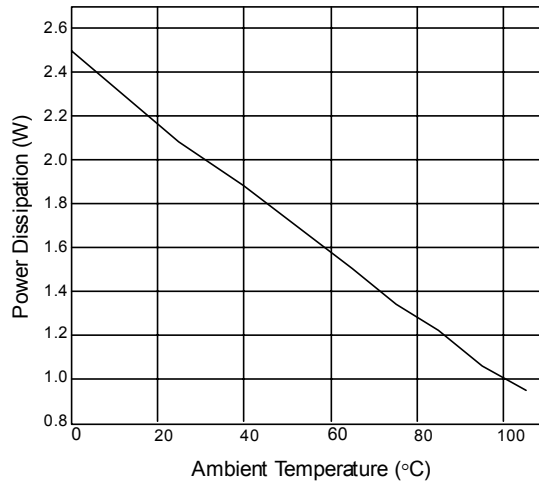


Fig.15 The thermal shutdown power dissipation vs. ambient temperature where R_{JA} is $70.36^{\circ}\text{C}/\text{W}$ in the forced-air thermal chamber

APPLICATIONS CIRCUIT

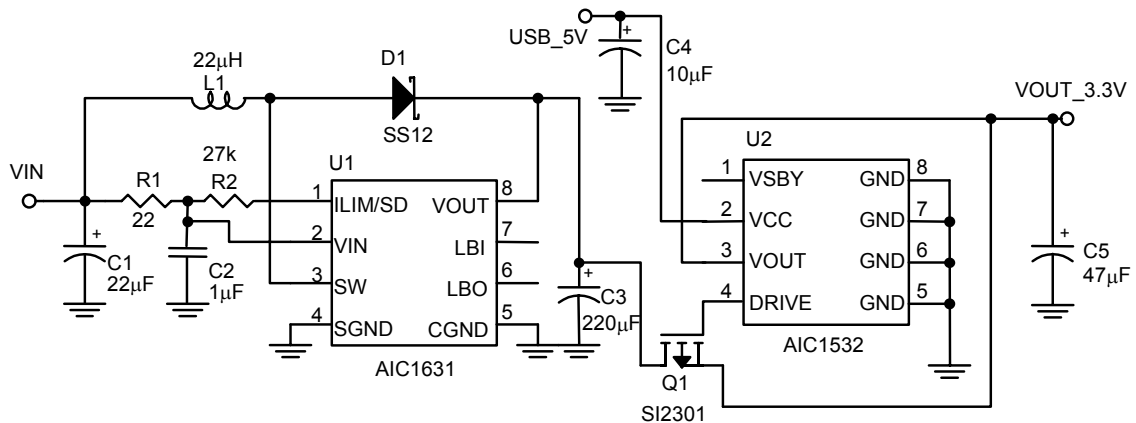


Fig. 16 The Step Up converter with OR function for dual power system

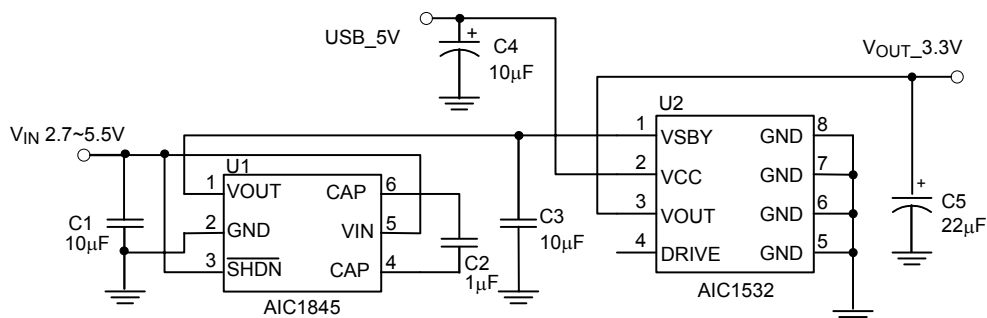
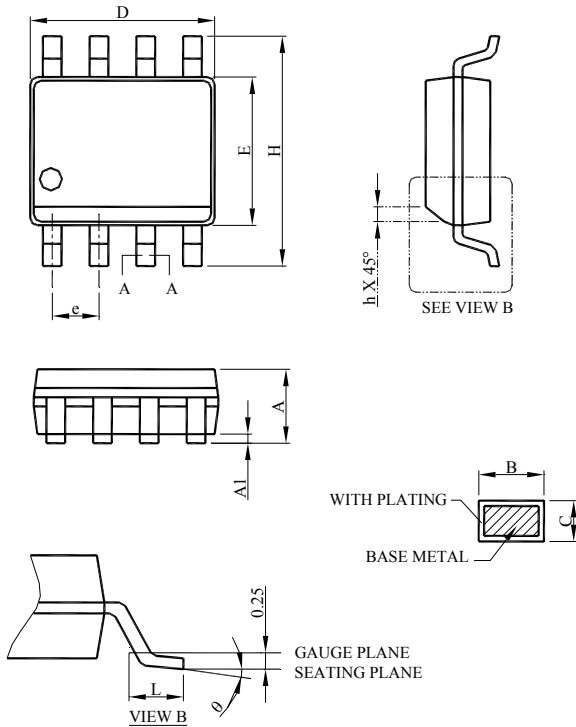


Fig. 17 The Step Up/Down converter with OR function for dual power system

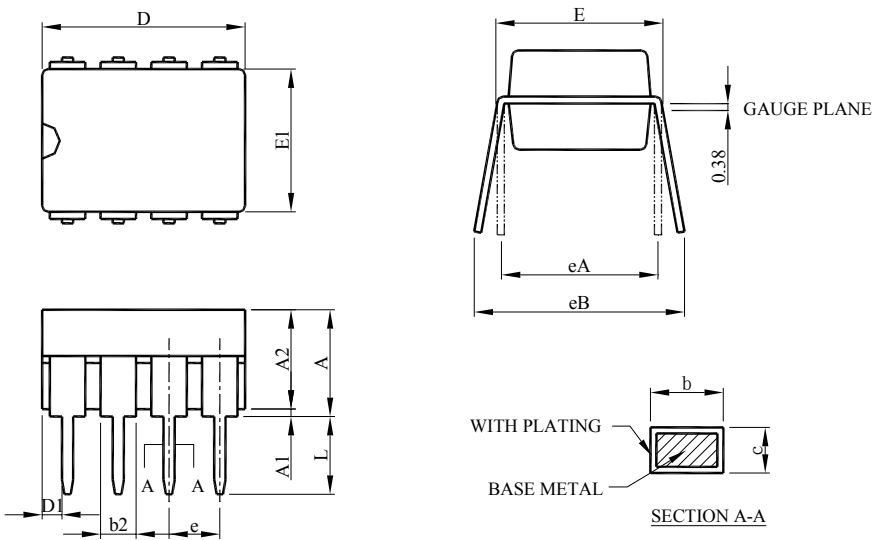
■ PHYSICAL DIMENSIONS (unit: mm)

● 8 LEAD PLASTIC SO



SYMBOL	SOP-8	
	MILLIMETERS	
	MIN.	MAX.
A	1.35	1.75
A1	0.10	0.25
B	0.33	0.51
C	0.19	0.25
D	4.80	5.00
E	3.80	4.00
e	1.27 BSC	
H	5.80	6.20
h	0.25	0.50
L	0.40	1.27
θ	0°	8°

● 8 LEAD PLASTIC DIP



SYMBOL	DIP-8	
	MILLIMETERS	
	MIN.	MAX.
A		5.33
A1	0.38	
A2	2.92	4.95
b	0.36	0.56
b2	1.14	1.78
c	0.20	0.35
D	9.01	10.16
D1	0.13	
E	7.62	8.26
E1	6.10	7.11
e	2.54 BSC	
eA	7.62 BSC	
eB		10.92
L	2.92	3.81

Note:

Information provided by AIC is believed to be accurate and reliable. However, we cannot assume responsibility for use of any circuitry other than circuitry entirely embodied in an AIC product; nor for any infringement of patents or other rights of third parties that may result from its use. We reserve the right to change the circuitry and specifications without notice.

Life Support Policy: AIC does not authorize any AIC product for use in life support devices and/or systems. Life support devices or systems are devices or systems which, (i) are intended for surgical implant into the body or (ii) support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.