400mA Low Dropout Linear Regulator with Voltage Detector Function

FEATURES

- Including MOSFET for V_{OUT1}, LDO for V_{OUT2}, voltage detector, and shutdown control
- Low Dropout Voltage of 550mV(Typ.) at 400mA Output Current (V_{OUT2}).
- Guaranteed 700mA Output Current for V_{OUT1} and 400mA for V_{OUT2}.
- Low Ground Current at 120μA.
- 2% Accuracy Output Voltage of V_{OUT2}.
- Current Limit Function.
- Built in Voltage Detector
- Shutdown Control for V_{OUT1} and V_{OUT2}

APPLICATIONS

- Voltage Regulator for DVD-ROM and CD-ROM Drivers.
- Voltage Regulator for HDD and Floppy Drivers.
- Voltage Regulator for circuits with Stepping Motor or Servo Motor.

DESCRIPTION

The AIC1729 is a low dropout linear regulator with voltage detection function.

It can be divided into 4 main function blocks, including MOSFET for V_{OUT1}, LDO for V_{OUT2} ,voltage detector, and two shutdown controls.

Voltage detector can be use to detect Vcc. The detecting voltage of the voltage detector is from 3.0V to 4.6V with 0.1V step. And the output (DOUT) of detecting voltage for Vcc with delay time adjustment function to indicate V_{CC} low. User only adds one external capacitor to finish it. When V_{CC} pin is under the set detection voltage. D_{OUT} pin is logic low.

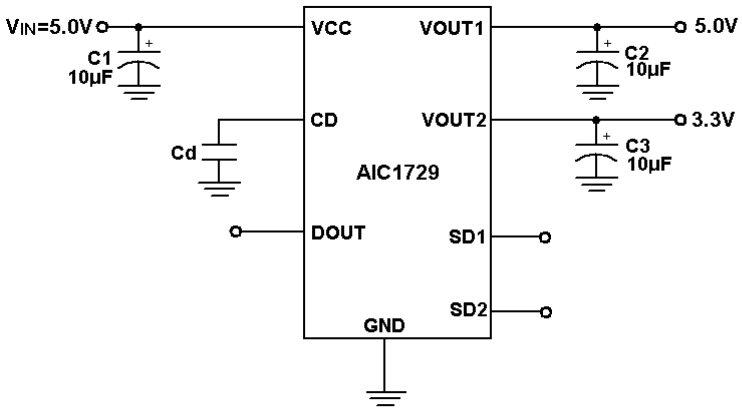
V_{OUT1} is controlled by SD1 pin. When SD1 is logic high, the internal MOSFET for V_{OUT1} will be switched off, vice versa.

The LDO output voltage (V_{OUT2}) is from 1.8V to 4.0V with 0.1V step for different application. It is also controlled by SD2 pin. When SD2 is logic high, the internal LDO for V_{OUT2} will be shutdown, vice versa.

The superior characteristics of the AIC1729 include very low dropout voltage, and 2% accuracy output voltage. Typical ground current remains 120 μ A, from no load to maximum loading conditions. Dropout voltage of V_{OUT2} is 550mV at 400mA output current. Output current limiting is provided at V_{OUT1} and V_{OUT2}.

AIC1729 comes in the popular SO8 package.

TYPICAL APPLICATION CIRCUIT



Power Source for CD-drivers and DVD-drivers

ORDERING INFORMATION

AIC1729-XX XXCXXX

PACKING TYPE
TB: TUBE
TR: TAPE & REEL (not available for CN package)

PACKAGE TYPE
N: PLASTIC DIP
S: SMALL OUTLINE

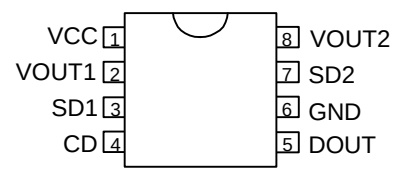
LDO OUTPUT VOLTAGE
18: 1.8V
:
:
40: 4.0V

VOLTAGE DETECTOR VOLTAGE
30: 3.0V
:
:
46: 4.6V

* LDO Output Voltage and Voltage Detector voltage with every 0.1V a step.

PIN CONFIGURATION

TOP VIEW



Example: AIC1729-3018CN

→ 3.0V Voltage Detector Voltage, 1.8V LDO Output Voltage, in DIP-8 Package Type

ABSOLUTE MAXIMUM RATINGS

Input Supply Voltage ..... -0.3~8V

Operating Ambient Temperature Range ..... -40°C~ 85°C

Storage Temperature Range ..... -65°C~150°C

Thermal Resistance θ_{JA}

SOIC Package ..... 100°C/W

SOIC Package (with 3 square inches of Copper)..... 90°C/W

ELECTRICAL CHARACTERISTICS (TA=25°C, V_{IN}=5.0V, I_{OUT1}=I_{OUT2} =400mA, SD1=SD2=Low, unless otherwise specified.)

PARAMETER	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Ground Current	I_{OUT1}=0.1mA~700mA I_{OUT2}=0.1mA~400mA V_{IN}= 4.0V~8.0V		120	200	μA
Output Voltage Temperature Coefficiency	(Note 1)		100		PPM/°C
VOUT1					
Output MOSFET Resistance	V_{IN}= 5.0V		370	450	mΩ
Current Limit(Note 3)		700	950		mA
Output Turn-on Rise Delay			100		μS
Output Turn-on Rise Time			1000		μS
SD1 Pin Voltage	V_{SD}=Logic"0"			0.8	V
	V_{SD}=Logic"1"	2.4			
VOUT2 (1.8V ~ 4.0V with 0.1V step)					
LDO Output Voltage	No Load	V_{SET} × 0.98	V_{SET}	V_{SET} × 1.02	V
Line Regulation	I_L=1mA,V_{IN}=4.0V~8.0V		3	10	mV
Load Regulation (Note 2)	V_{IN}=5V,I_L=0.1mA~400mA		50	90	mV
Current Limit (Note 3)		400	650		mA

ELECTRICAL CHARACTERISTICS (Continued)

PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Dropout Voltage (Note 4)	$V_{OUT} \geq 3.3V$	I_L=100mA		140	200	mV
		I_L=200mA		280	350	
		I_L=300mA		420	500	
		I_L=400mA		550	700	
	$2.5V \leq V_{OUT} < 3.3V$	I_L=100mA		250	300	
		I_L=200mA		420	500	
		I_L=300mA		600	700	
		I_L=400mA		780	900	
	$V_{OUT} < 2.5V$	I_L=100mA		700	800	
		I_L=200mA		880	950	
		I_L=300mA		1050	1150	
		I_L=400mA		1220	1400	
SD2 Pin Voltage	V_{SD}=Logic"0"				0.8	V
	V_{SD}=Logic"1"		2.4			
Voltage Detector (3.0V ~ 4.6V with 0.1V step)						
Detect Voltage(V_{DET})			$V_{DSET} \times 0.98$	V_{DSET}	$V_{DSET} \times 1.02$	V
Detect Threshold Hysteresis				$V_{DET} \times 1.05$		V
V_{DOUT}	When V_{DET} is Detected				0.6	V
	When V_{DET} is not Detected		1.65			
Delay Time	CD Pin Open			1	3	mS

Note 1: Guaranteed by design.
Note 2: Regulation is measured at constant junction temperature, using pulse testing with a low ON time.
Note 3: Current limit is measured by pulsing a short time.
Note 4: Dropout voltage is defined as the input to output differential at which the output voltage drops 100mV below the value measured with a 1V differential.

TYPICAL PERFORMANCE CHARACTERISTICS

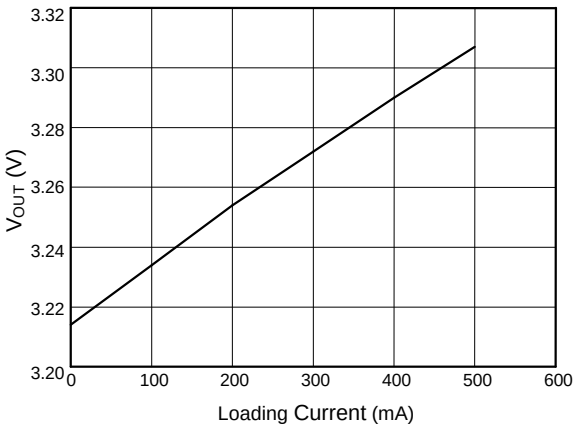


Fig. 1 Output voltage vs. Loading Current

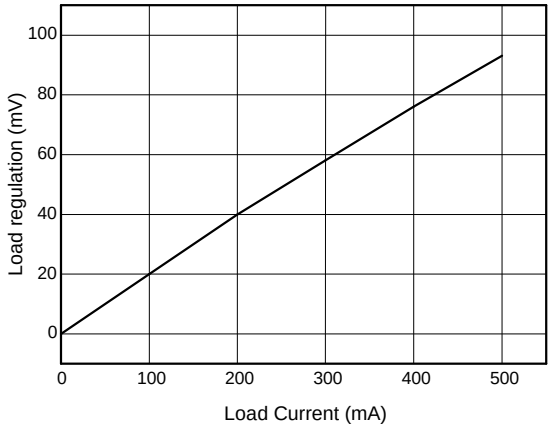


Fig. 2 Load Regulation

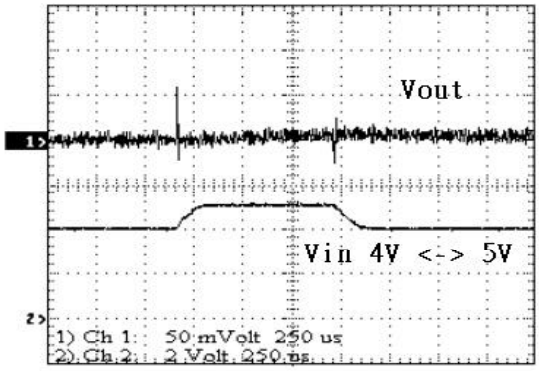


Fig. 3 Line Transient

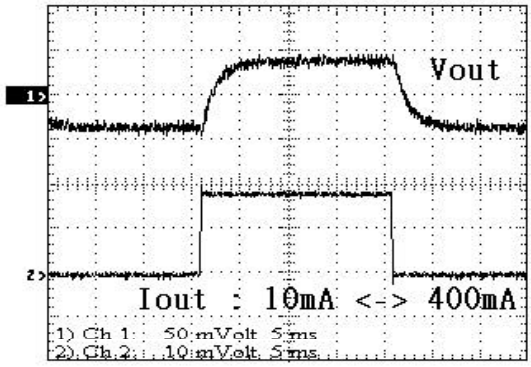


Fig. 4 Load Transient

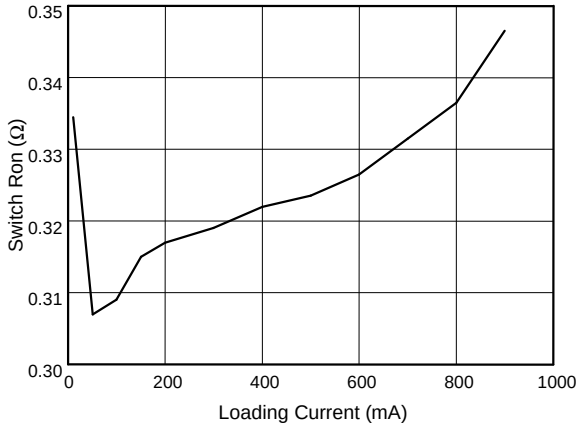


Fig. 5 Switch Ron vs. Loading current (mA)

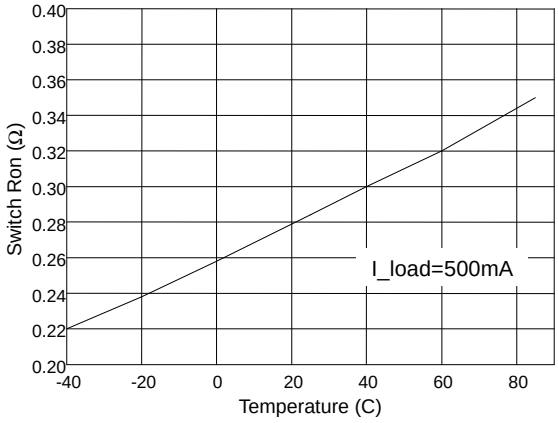


Fig. 6 Switch Ron vs. Temperature

TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

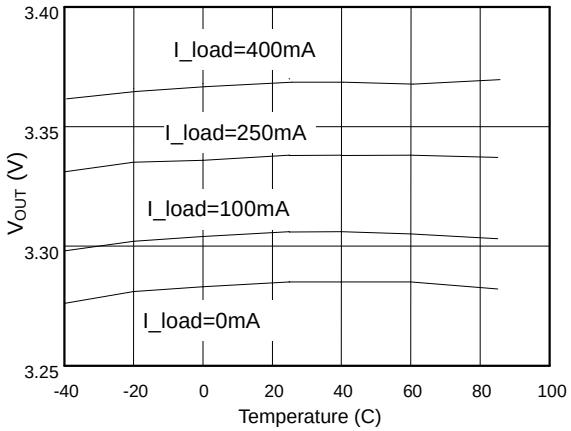


Fig. 7 Output voltage vs. Temperature

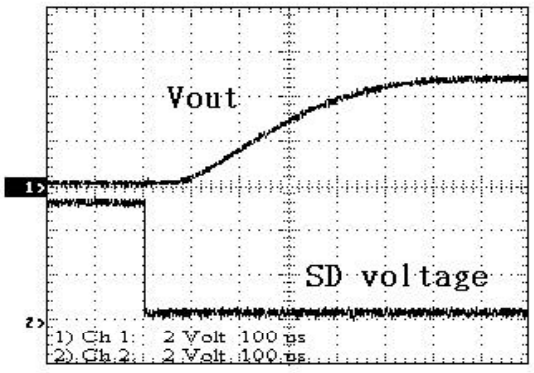


Fig. 8 Output Turn-on Rise Time

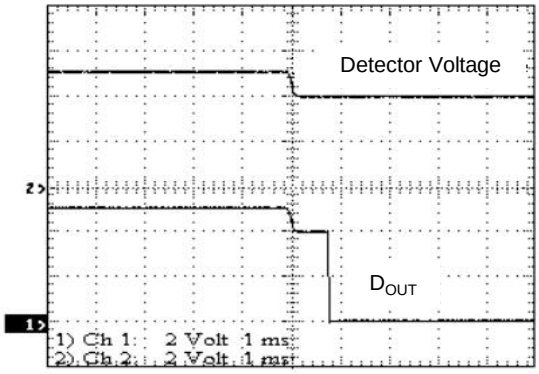


Fig. 9 Built-in Delay Time Waveform

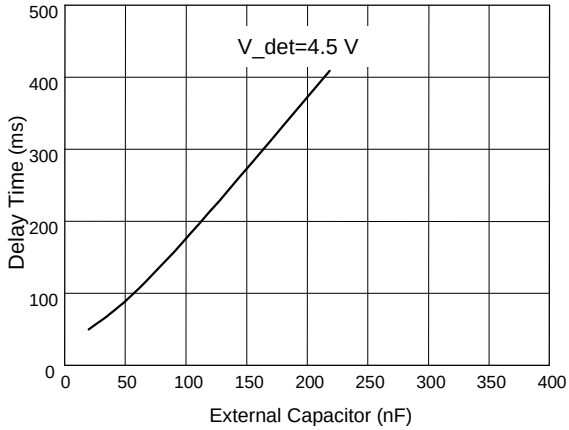
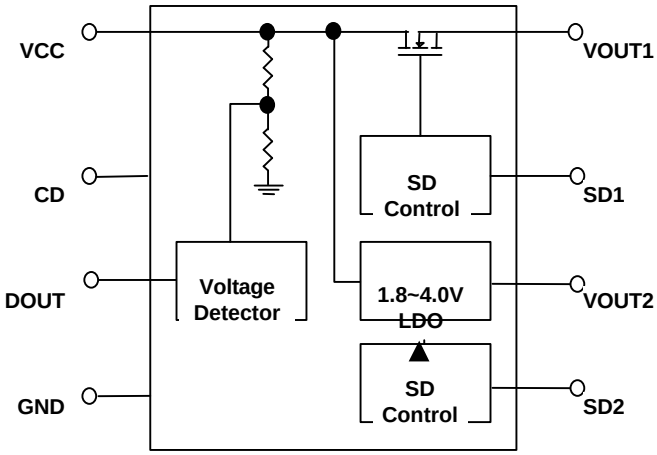


Fig. 10 Delay Time vs. External Capacitor

BLOCK DIAGRAM



PIN DESCRIPTION

PIN 1: VCC- This pin is the main input supply for the IC, normally 5V

PIN 2: VOUT1- This pin is the voltage output which is connected to Vcc directly via internal MOSFET switch, normally 5V

PIN 3: SD1- VOUT1 shutdown pin. Logic high input for disabling the internal MOS Switch.

PIN 4: CD- This pin is to determine delay time by attaching a capacitor

PIN 5: DOUT- This pin is voltage detector output, pulled low when V_{IN} detected

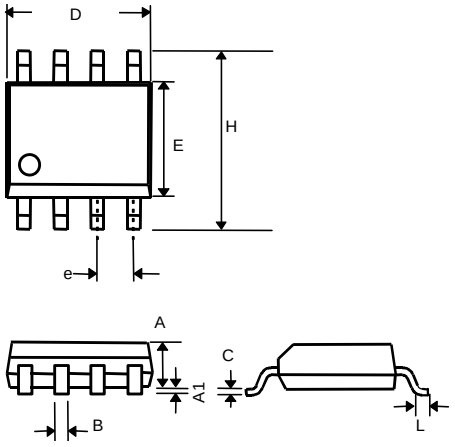
PIN 6: GND- IC ground pin

PIN 7: SD2- VOUT2 shutdown pin. Logic high input for disabling LDO output.

PIN 8: VOUT2- This pin is 3.3V LDO voltage output

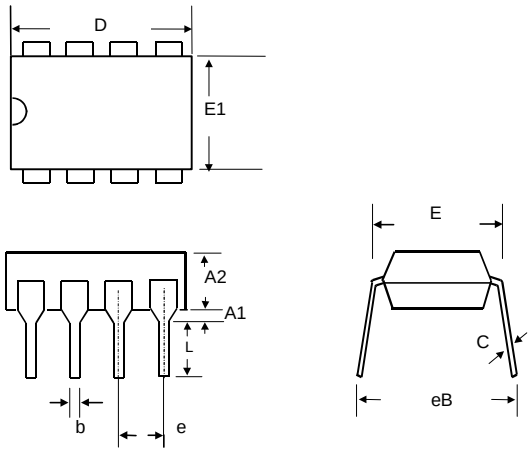
PHYSICAL DIMENSIONS

- **8 LEAD PLASTIC SO (unit: mm)**



SYMBOL	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(TYP)	
H	5.80	6.20
L	0.40	1.27

- **8 LEAD PLASTIC DIP (unit: mm)**



SYMBOL	MIN	MAX
A1	0.381	—
A2	2.92	4.96
b	0.35	0.56
C	0.20	0.36
D	9.01	10.16
E	7.62	8.26
E1	6.09	7.12
e	2.54 (TYP)	
eB	—	10.92
L	2.92	3.81

Note: