

AK2001

Data Sheet

Rev. 1.0

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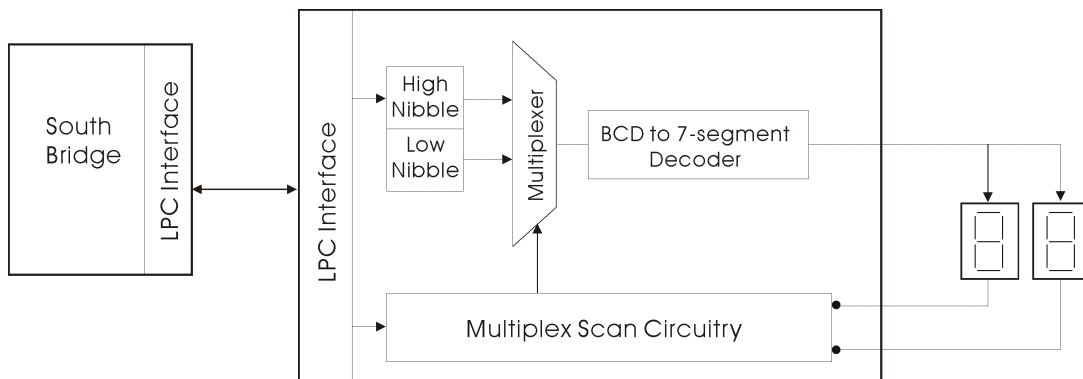
1 Introduction

1.1 General Description

The AK2001 functions as a debug port on the motherboard. It features a new LPC host interface, built-in BCD to 7-segment decoders, time-multiplexed LED drivers and scanning control. With a minimal pin count of 20 in SSOP package, the AK2001 provides all the circuitry required to interface a motherboard to two hexadecimal digit seven-segment LEDs.

The AK2001's debug port function allows real time display of POST codes during system boot. The LED display is able to reflect the system health status so as to provide the cue about what really happened in case of the system failure, which makes the task of firmware debugging and hardware troubleshooting much easier. For both end users and technical support staff, the debug port function proves to be a valuable companion to motherboard and the AK2001 provides an easy-to-implement, cost-effective, and PCB space saving solution.

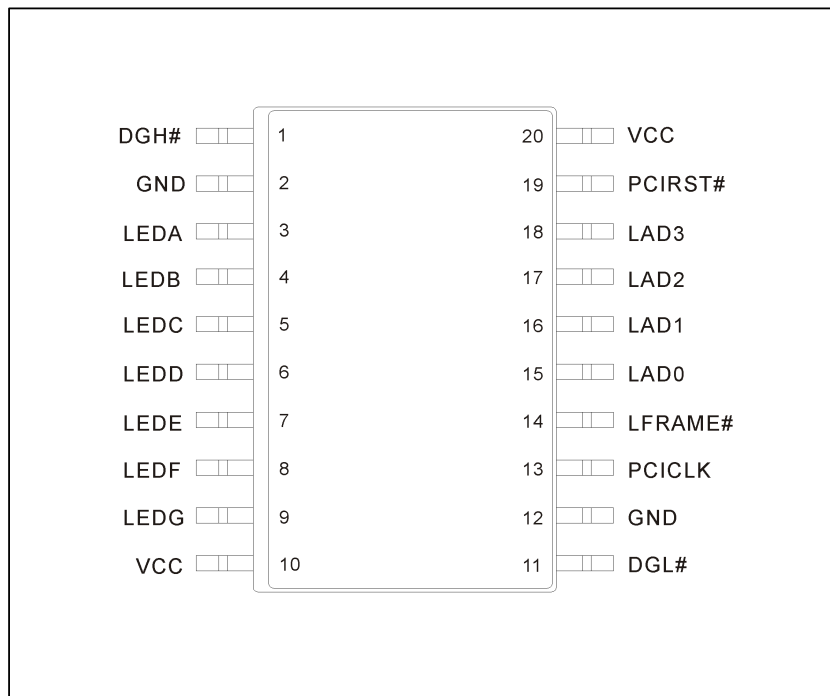
1.2 Block Diagram



1.3 Features

- Debug port built in with BCD-to-7 segment decoders/drivers
- Directly interfaces with common cathode LED display
- Multiscan shared drivers to display two digits with minimum pins
- Inter-digit blanking provided to avoid display ghosting
- Low Pin Count (LPC) interface with reduced pin count requirement
- Available in a 20-pin SSOP package

2 Pin Configuration



3 Signal Description

Table 3-1 Signal Type Definition

TYPE	NAME	DESCRIPTION
IN	Input	The input pin is a standard input.
OUT	Output	The output pin is a standard output.
T/S	Tri-State	The tri-state pin is a bi-directional, input/output pin.
O/D	Open Drain	The open drain pin allows multiple devices to share this signal as a wired-OR.
NC	No Connect	No connection.

Note: “#” indicates active low.

Table 3-2 LPC Interface

NAME	PIN NO.	TYPE	DESCRIPTION
PCICLK	13	IN	PCI Clock. The device requires a PCI clock signal for normal LPC operation.
PCIRST#	19	IN	PCI Reset. Chip reset. Same as PCI Reset on the host.
LFRAME#	14	IN	LPC Frame. Indicates start of a new cycle, termination of broken cycle.
LAD[3:0]	18,17,16,15	T/S	LPC Address Data. Bidirectional, multiplexed command, address and data.

Table 3-3 Debug Port

NAME	PIN NO.	TYPE	DESCRIPTION
LED[A:G]	3,4,5,6,7,8,9	OUT	Seven segment drivers, 6mA source each.
DGH#	1	O/D	High digit display enable, common cathode multi-scan driver, 48mA sink.
DGL#	11	O/D	Low digit display enable, common cathode multi-scan driver, 48mA sink.

Table 3-4 Power Pins

NAME	PIN NO.	TYPE	DESCRIPTION
VCC	10,20	PWR	3.3V Dedicated Power Pin.
GND	2,12	PWR	Dedicated Ground Pin.

4 Electrical Parameter Ratings

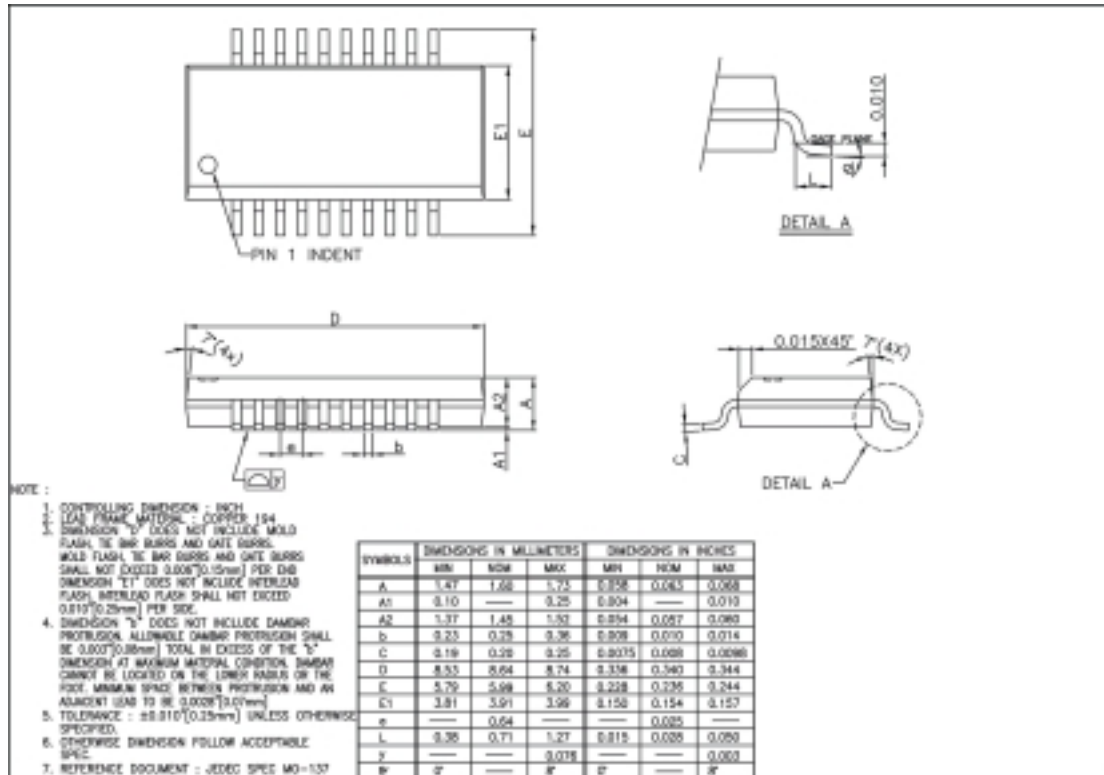
4.1 Absolute Maximum Ratings

Symbol	Description	Value	Units
V_{CC}	Supply voltage relative to GND	-0.3 to 4.5	V
V_{IN}	Input voltage relative to GND	-0.3 to $V_{CC}+0.3$	V
T_{STG}	Storage temperature	-40 to +125	°C
T_J	Junction temperature	+115	°C

4.2 Recommended Operation Conditions

Symbol	Parameter	Test Conditions	Min	TYPE	Max	Units
V_{CC}	Supply Voltage for internal logic and input buffers	$T_A = 0^{\circ}\text{C}$ to 70°C	3.0	3.3	3.6	V
V_{IH}	High-level input voltage		$0.7V_{CC}$			V
V_{IL}	Low-level input voltage				$0.3V_{CC}$	V
V_{OH}	High-level output voltage		2.4			V
V_{OL}	Low-level output voltage (for 7-segment output)	6mA			0.4	V
V_{OL}	Low-level output voltage (for LPC bus output)	3mA			0.4	V
I_{IH}	High-level input current	$V_{IN} = V_{CC}$	-10		10	uA
I_{IL}	Low-level input current	$V_{IN} = \text{GND}$	-10		10	uA
I_{OZ}	Tri-state output leakage input current	$V_{OUT} = V_{CC}$ or GND	-10		10	uA
I_{LED}	Seven segment anode drive source current	$V_{CC} = 3.3\text{V}$		-6		mA
I_{DG}	Seven segment cathode drive sink current	$V_{CC} = 3.3\text{V}$		48		mA
f_{DS}	Display scan rate			2K		Hz

5 20-pin SSOP Package Dimension



6 AK2001 Circuit Diagram

