AU9216
USB Hub Controller
Technical Reference Manual

Revision 1.01

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Contact Information

USA Headquarters
Alcor Micro, Inc.
155-A Moffett Park Drive, Suite 240
Sunnyvale CA, 94089
Phone: (408) 541-9700
Fax: (408) 541-0378

Los Angeles
Alcor Micro, Inc.
 9400 Seventh St., Bldg. A2
Rancho Cucamonga, CA 91730
Phone: (909) 483-9900
Fax: (909) 944-0464

Taiwan
Alcor Micro Inc. Taiwan
7F, No 279, Sec. 4, Hsin-I Road,
Taipei, Taiwan R.O.C.
Phone: 886-22-325-9512
Fax: 886-22-702-6030

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1.0 Introduction

1.1. Description

The AU9216 is an integrated single chip USB hub controller. It is designed to support the emerging industry Universal Serial Bus (USB) standard. The AU9216 can support up to six USB downstream ports. Each downstream port supports separated enable LED, power control and over-current sensing. Single chip integration makes the AU9216 the most cost effective stand-alone USB hub solution available in the market. USB vendor ID and Device ID can be customized via external EEPROM. Downstream ports can be used to connect various USB peripheral devices, such as USB printers, modems, scanners, cameras, mice, or joysticks, to the system without adding external glue logic.
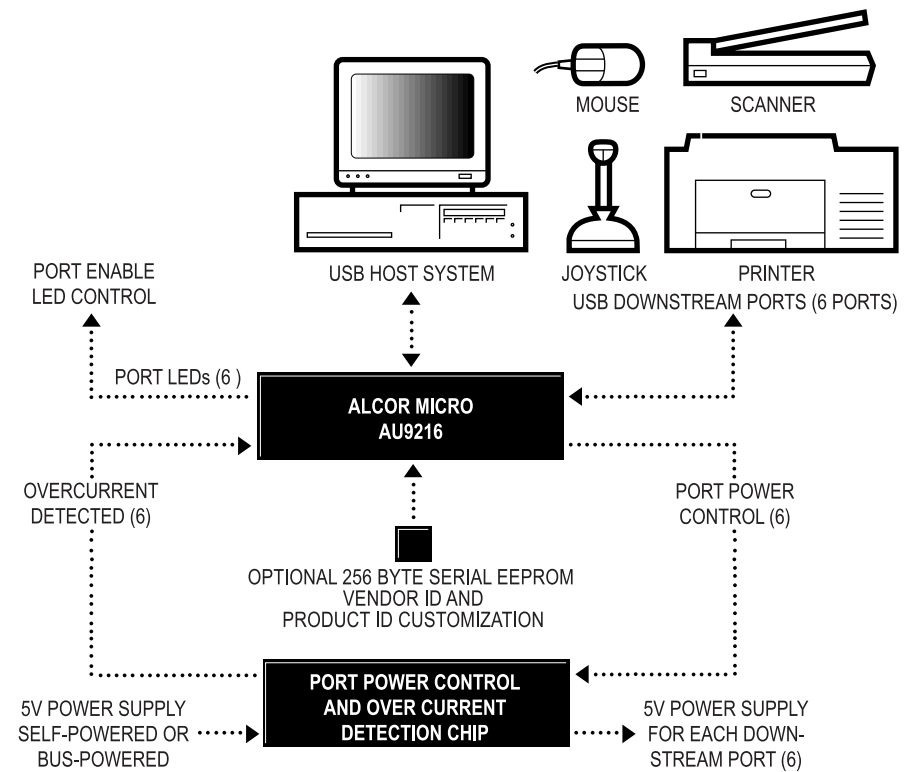
1.2. Features

- Fully compliant with the Universal Serial Bus Specification, version 1.0
- USB hub design is compliant with Universal Serial Bus Hub Specification, revision 1.1
- Single chip integrated USB hub controller with embedded proprietary processor
- Supports six bus-powered or self-powered downstream ports
- Supports individual port power control, LED and over-current detection
- USB vendor and device ID can be customized via external EEPROM
- Built-in default vendor ID provides cost saving if customization is not required
- Built-in 3.3v voltage regulator allows single +5V operating voltage drawing directly from USB bus. This results in reduced overall system cost.
- Runs at 12Mhz frequency
- Available in 48-pin DIP and 52-pin QFP

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2.0 Application Block Diagram

The AU9216 is a single chip 6-port USB hub controller. The upstream port is connected to the USB system. The downstream ports can be used for a mouse, joystick, scanner, printer or other device.

MOUSE   SCANNER

USB HOST SYSTEM   JOYSTICK   PRINTER
USB DOWNSTREAM PORTS (6 PORTS)

PORT ENABLE
LED CONTROL

PORT LEDs (6)

**ALCOR MICRO
AU9216**

OVERCURRENT
DETECTED (6)

PORT POWER
CONTROL (6)

OPTIONAL 256 BYTE SERIAL EEPROM
VENDOR ID AND
PRODUCT ID CUSTOMIZATION

**PORT POWER CONTROL
AND OVER CURRENT
DETECTION CHIP**

5V POWER SUPPLY
SELF-POWERED OR
BUS-POWERED

5V POWER SUPPLY
FOR EACH DOWN-
STREAM PORT (6)

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3.0 Pin Assignment

The AU9216 is packaged both as a 52-pin quad flat pack (QFP) and as a 48-pin dual inline package (DIP). The following figures show the signal names for each of the pins on the chip. The tables on the following pages describe each of the pin signals
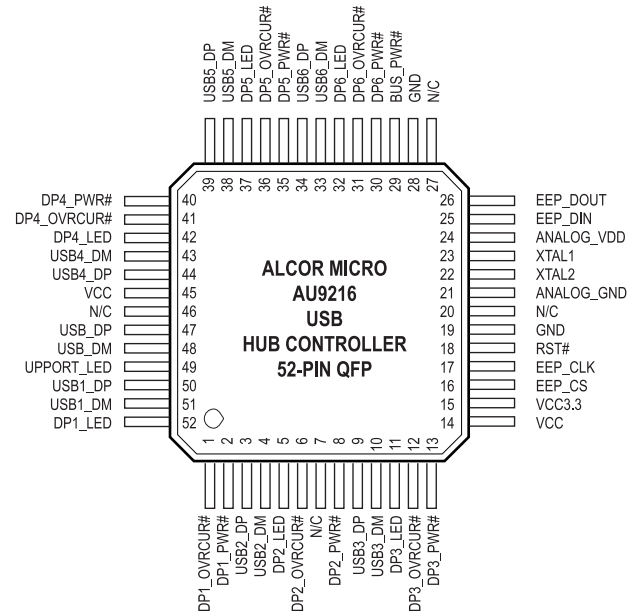
Pin diagram labels:

Top (left to right): USB5_DP, USB5_DM, DP5_LED, DP5_OVRCUR#, DP5_PWR#, USB6_DP, USB6_DM, DP6_LED, DP6_OVRCUR#, DP6_PWR#, BUS_PWR#, GND, N/C

Left side:
DP4_PWR# 40
DP4_OVRCUR# 41
DP4_LED 42
USB4_DM 43
USB4_DP 44
VCC 45
N/C 46
USB_DP 47
USB_DM 48
UPPORT_LED 49
USB1_DP 50
USB1_DM 51
DP1_LED 52

Right side:
26 EEP_DOUT
25 EEP_DIN
24 ANALOG_VDD
23 XTAL1
22 XTAL2
21 ANALOG_GND
20 N/C
19 GND
18 RST#
17 EEP_CLK
16 EEP_CS
15 VCC3.3
14 VCC

Center: ALCOR MICRO AU9216 USB HUB CONTROLLER 52-PIN QFP

Bottom (left to right): DP1_OVRCUR#, DP1_PWR#, USB2_DP, USB2_DM, DP2_LED, DP2_OVRCUR#, N/C, DP2_PWR#, USB3_DP, USB3_DM, DP3_LED, DP3_OVRCUR#, DP3_PWR#

Table 3-1. Pin Descriptions for the 52-pin QFP

Pin #	Pin Name	I/O	Description
1	DP1_OVRCUR#	I	Downstream port 1 over-current indicator. Active low.
2	DP1_PWR#	O	Downstream port 1 power on. Active low.
3	USB2_DP	I/O	USB D+ for downstream port 2, add 15KΩ pull-down to ground.
4	USB2_DM	I/O	USB D- for downstream port 2, add 15KΩ pull-down to ground.

Table 3-2 (continued). Pin Descriptions for the 52-pin QFP

Pin #	Pin Name	I/O	Description
5	DP2_LED	O	Downstream port 2 LED. Active low when port 2 enabled.
6	DP2_OVRCUR#	I	Downstream port 2 over-current indicator. Active low.
7	N/C	-	No connection.
8	DP2_PWR#	O	Downstream port 2 power on. Active low.
9	USB3_DP	I/O	USB D+ for downstream port 3, add 15KΩ pull-down to ground.
10	USB3_DM	I/O	USB D- for downstream port 3, add 15KΩ pull-down to ground.
11	DP3_LED	O	Downstream port 3 LED. Active low when port 3 enabled.
12	DP3_OVRCUR#	I	Downstream port 3 over-current indicator. Active low.
13	DP3_PWR#	O	Downstream port 3 power on. Active low.
14	VCC	PWR	+5V power supply.
15	VCC3.3	O	+3.3V power. Add 1.5K pull-up on USB_DP.
16	EEP_CS	O	EEPROM chip select.
17	EEP_CLK	O	Clock for EEPROM.

Table 3-2 (continued). Pin Descriptions for the 52-pin QFP

Pin #	Pin Name	I/O	Description
18	RST#	I	Reset. Active low.
19	GND	PWR	Ground.
20	N/C	-	No connection.
21	ANALOG_GND	PWR	Analog ground.
22	XTAL2	O	Crystal, XTAL-out.
23	XTAL1	I	Crystal, XTAL-in.
24	ANALOG_VDD	PWR	Analog power, connect to +5V.
25	EEP_DIN	O	connect to EEPROM D_{in} pin.
26	EEP_DOUT	I	Connect to EEPROM D_{out} pin.
27	N/C	-	No connection.
28	GND	PWR	Ground.
29	BUS_PWR#	I	Bus power. One indicates bus-powered.
30	DP6_PWR#	O	Downstream port 6 power on. Active low.
31	DP6_OVRCUR#	I	Downstream port 6 over-current indicator. Active low.
32	DP6_LED	O	Downstream port 6 LED. Active low when port 6 enabled.

Table 3-2 (continued). Pin Descriptions for the 52-pin QFP

Pin #	Pin Name	I/O	Description
33	USB6_DM	I/O	USB D- for downstream port 6, add 15KΩ pull-down to ground.
34	USB6_DP	I/O	USB D+ for downstream port 6, add 15KΩ pull-down to ground.
35	DP5_PWR#	O	Downstream port 5 power on. Active low.
36	DP5_OVRCUR#	I	Downstream port 5 over-current indicator. Active low.
37	DP5_LED	O	Downstream port 5 LED. Active low when port 5 enabled.
38	USB5_DM	I/O	USB D- for downstream port 5, add 15KΩ pull-down to ground.
39	USB5_DP	I/O	USB D+ for downstream port 5, add 15KΩ pull-down to ground.
40	DP4_PWR#	O	Downstream port 4 power on. Active low.
41	DP4_OVRCUR#	I	Downstream port 4 over-current indicator. Active low.
42	DP4_LED	O	Downstream port 4 LED. Active low when port 4 enabled.
43	USB4_DM	I/O	USB D- for downstream port 4, add 15KΩ pull-down to ground.
44	USB4_DP	I/O	USB D+ for downstream port 4, add 15KΩ pull-down to ground.

Table 3-2 (continued). Pin Descriptions for the 52-pin QFP

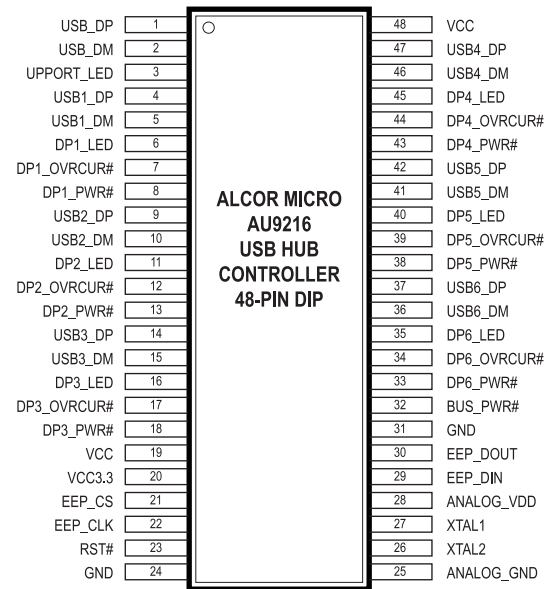| Pin #	Pin Name	I/O	Description
45	VCC	PWR	+5V power supply.
46	N/C	-	No connection.
47	USB_DP	I/O	USB D+ for upstream port. Need external 1.5KΩ pull-up to 3.3V.
48	USB_DM	I/O	USB D- for upstream port.
49	UPPORT_LED	O	Upstream port LED. Active low when upstream port enabled.
50	USB1_DP	I/O	USB D+ for downstream port 1, add 15KΩ pull-down to ground.
51	USB1_DM	I/O	USB D- for downstream port 1, add 15KΩ pull-down to ground.
52	DP1_LED	O	Downstream port 1 LED. Active low when port 1 enabled.

```
USB_DP        1  ○            48  VCC
USB_DM        2               47  USB4_DP
UPPORT_LED    3               46  USB4_DM
USB1_DP       4               45  DP4_LED
USB1_DM       5               44  DP4_OVRCUR#
DP1_LED       6               43  DP4_PWR#
DP1_OVRCUR#   7               42  USB5_DP
DP1_PWR#      8   ALCOR MICRO 41  USB5_DM
USB2_DP       9     AU9216    40  DP5_LED
USB2_DM      10    USB HUB    39  DP5_OVRCUR#
DP2_LED      11   CONTROLLER  38  DP5_PWR#
DP2_OVRCUR#  12   48-PIN DIP  37  USB6_DP
DP2_PWR#     13               36  USB6_DM
USB3_DP      14               35  DP6_LED
USB3_DM      15               34  DP6_OVRCUR#
DP3_LED      16               33  DP6_PWR#
DP3_OVRCUR#  17               32  BUS_PWR#
DP3_PWR#     18               31  GND
VCC          19               30  EEP_DOUT
VCC3.3       20               29  EEP_DIN
EEP_CS       21               28  ANALOG_VDD
EEP_CLK      22               27  XTAL1
RST#         23               26  XTAL2
GND          24               25  ANALOG_GND
```

Table 3-2. Pin Descriptions for the 48-pin DIP

Pin #	Pin Name	I/O	Description
1	USB_DP	I/O	USB D+ for upstream port. Need external 1.5KΩ pull-up to 3.3V.
2	USB_DM	I/O	USB D- for upstream port.
3	UPPORT_LED	O	Upstream port LED. Active low when upstream port enabled.
4	USB1_DP	I/O	USB D+ for downstream port 1, add 15KΩ pull-down to ground.

Table 3-2 (continued). Pin Descriptions for the 48-pin DIP

Pin #	Pin Name	I/O	Description
5	USB1_DM	I/O	USB D- for downstream port 1, add 15KΩ pull-down to ground.
6	DP1_LED	O	Downstream port 1 LED. Active low when port1 enabled.
7	DP1_OVRCUR#	I	Downstream port 1 over-current indicator. Active low.
8	DP1_PWR#	O	Downstream port 1 power on. Active low.
9	USB2_DP	I/O	USB D+ for downstream port 2, add 15KΩ pull-down to ground.
10	USB2_DM	I/O	USB D- for downstream port 2, add 15KΩ pull-down to ground.
11	DP2_LED	O	Downstream port 2 LED. Active low when port 2 enabled.
12	DP2_OVRCUR#	I	Downstream port 2 over-current indicator. Active low.
13	DP2_PWR#	O	Downstream port 2 power on. Active low.
14	USB3_DP	I/O	USB D+ for downstream port 3, add 15KΩ pull-down to ground.
15	USB3_DM	I/O	USB D- for downstream port 3, add 15KΩ pull-down to ground.
16	DP3_LED	O	Downstream port 3 LED. Active low when port 3 enabled.
17	DP3_OVRCUR#	I	Downstream port 3 over-current indicator. Active low.
18	DP3_PWR#	O	Downstream port 3 power on. Active low.

Table 3-2 (continued). Pin Descriptions for the 48-pin DIP

| Pin #	Pin Name	I/O	Description
19	VCC	PWR	+5V power supply.
20	VCC3.3	O	+3.3V power. Add 1.5K pull-up on USB_DP.
21	EEP_CS	O	EEPROM chip select.
22	EEP_CLK	O	Clock for EEPROM.
23	RST#	I	Reset. Active low.
24	GND	PWR	Ground.
25	ANALOG_GND	PWR	Analog ground.
26	XTAL2	O	Crystal, XTAL-out.
27	XTAL1	I	Crystal, XTAL-in.
28	ANALOG_VDD	PWR	Analog power, connect to +5V.
29	EEP_DIN	O	connect to EEPROM D_{in} pin.
30	EEP_DOUT	I	Connect to EEPROM D_{out} pin.
31	GND	PWR	Ground.
32	BUS_PWR#	I	Bus power. One indicates bus-powered.
33	DP6_PWR#	O	Downstream port 6 power on. Active low.
34	DP6_OVRCUR#	I	Downstream port 6 over-current indicator. Active low.

Table 3-2 (continued). Pin Descriptions for the 48-pin DIP

Pin #	Pin Name	I/O	Description
35	DP6_LED	O	Downstream port 6 LED. Active low when port 6 enabled.
36	USB6_DM	I/O	USB D- for downstream port 6, add 15KΩ pull-down to ground.
37	USB6_DP	I/O	USB D+ for downstream port 6, add 15KΩ pull-down to ground.
38	DP5_PWR#	O	Downstream port 5 power on. Active low.
39	DP5_OVRCUR#	I	Downstream port 5 over-current indicator. Active low.
40	DP5_LED	O	Downstream port 5 LED. Active low when port 5 enabled.
41	USB5_DM	I/O	USB D- for downstream port 5, add 15KΩ pull-down to ground.
42	USB5_DP	I/O	USB D+ for downstream port 5, add 15KΩ pull-down to ground.
43	DP4_PWR#	O	Downstream port 4 power on. Active low.
44	DP4_OVRCUR#	I	Downstream port 4 over-current indicator. Active low.
45	DP4_LED	O	Downstream port 4 LED. Active low when port 4 enabled.
46	USB4_DM	I/O	USB D- for downstream port 4, add 15KΩ pull-down to ground.
47	USB4_DP	I/O	USB D+ for downstream port 4, add 15KΩ pull-down to ground.

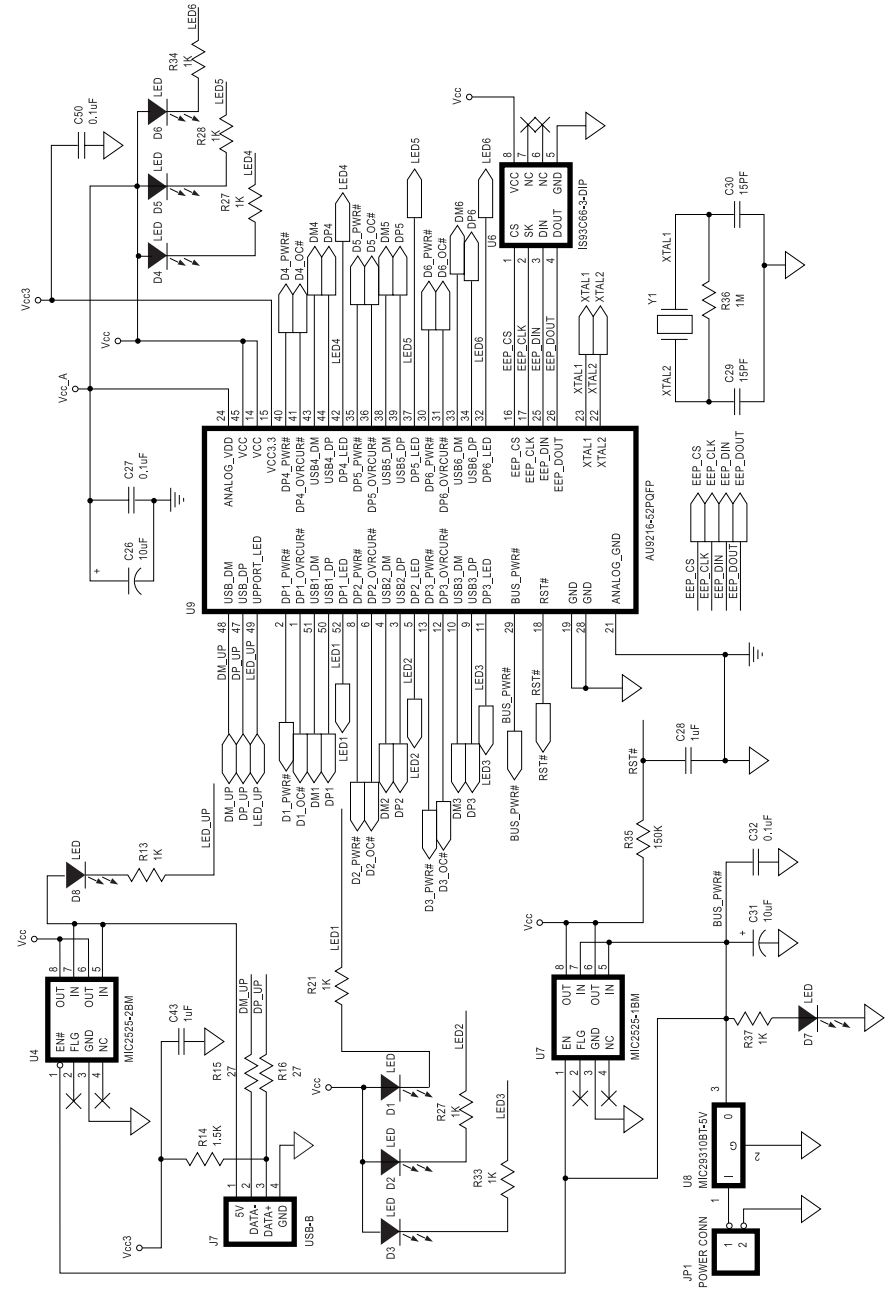**Table 3-2 (continued). Pin Descriptions for the 48-pin DIP**

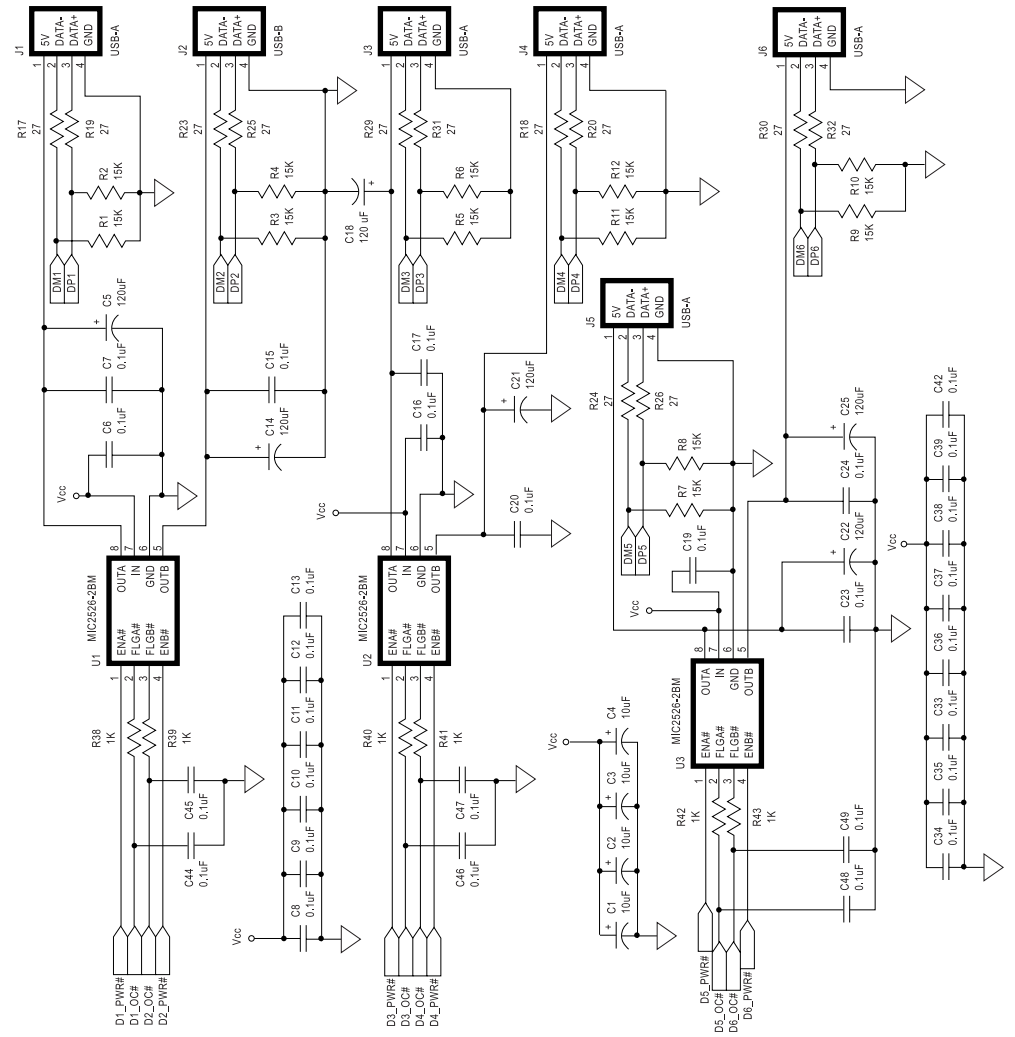| Pin #	Pin Name	I/O	Description
48	VCC	PWR	+5V power supply.

4.0 System Architecture and Reference Design

4.1. AU9216 Block Diagram
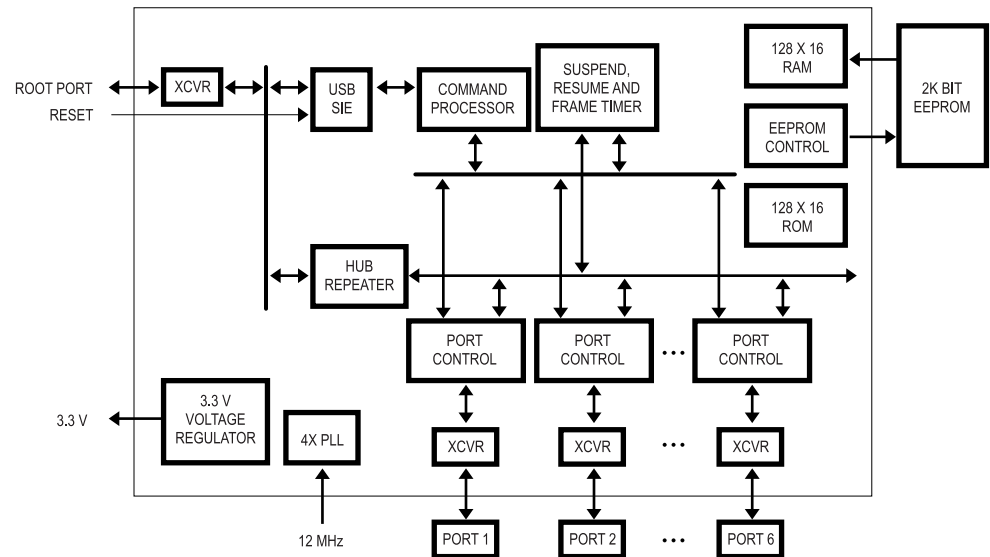
4.2. Sample Schematics

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5.0 Electrical Characteristics

5.1. Maximum Ratings

Absolute Maximum Ratings

PARAMETER	VALUES	
	MIN	MAX
Ambient Operating Temperatures	0˚C	70˚C
Storage Temperature	-40˚C	185˚C
Supply Voltage (Vdd)	-0.3V	7.0V

5.2. Recommended Operating Conditions

The following table gives the recommended operating conditions for integrated circuits developed with the pad libraries:

Symbol	Param.	Min	Max	V_{DD}	Note
V_{IL}	Low level input voltage	-0.5V	0.8V	4.5V to 5.5V	Guaranteed Input Low Voltage
V_{IH}	High level input voltage	2.0V	V_{DD}+0.5V	4.5V to 5.5V	Guaranteed Input High Voltage
V_{OL}	Low level output voltage		0.4V	4.5V	I_{OL}, 2 to 24 mA(TTL), depending on Cell
V_{OH}	High level output voltage	2.4V		4.5V	I_{OH}, 2 to 24mA(TTL) depending on Cell
I_{CC}	Supply current	20 mA	25 mA	4.5V to 5.5V	

5.3. Crystal Oscillator Circuit Setup for Characterization

The following setup was used to measure the open loop voltage gain for crystal oscillator circuits. The feedback resistor serves to bias the circuit at its quiescent operating point and the AC coupling capacitor, Cs, is much larger than C1 and C2.
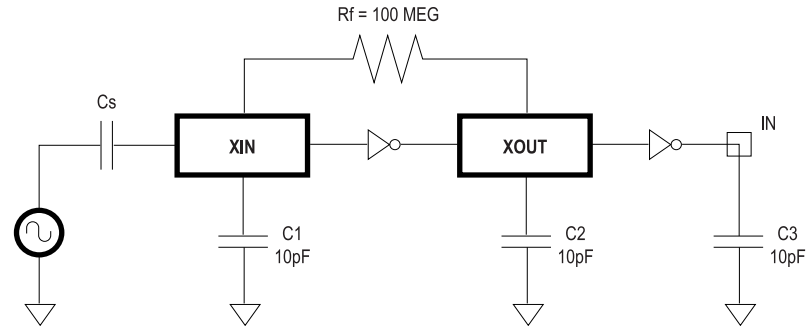
5.4. USB Transceiver Characteristics

RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	CONDITIONS	LIMITS		UNIT
			MIN	MAX	
V_{CC}	DC supply voltage		3.0	3.5	V
V_I	DC input voltage range		0	5.5	V
$V_{I/O}$	DC input range for I/Os		0	V_{CC}	V
V_O	DC output voltage range		0	V_{CC}	V
T_{AMB}	Operating ambient temperature range in free air	See DC and AC characteristics for individual device	0	70	˚C

ABSOLUTE MAXIMUM RATINGS 1,2

In accordance with the Absoute Maximum Rating System, Voltages are referenced to GND (Ground=0v)

SYMBOL	PARAMETER	CONDITIONS	LIMITS		UNIT
			MIN	MAX	
V_{cc}	DC supply voltage		-0.5	+6.5	V
V_{IK}	DC input diode current	Vi<0		-50	mA
V_{I}	DC input voltage	Note 3	-0.5	+5.5	V
$V_{I/O}$	DC input voltage range for I/Os		-0.5	Vcc +0.5	V
V_{OK}	DC output diode current	Vo> Vcc or Vo<0		+/-50	mA
V_{o}	DC output voltage	Note 3	-0.5	Vcc +0.5	V
V_{o}	DC output source sink current for VP/VM and RCV pins	Vo=0 to Vcc		+/-15	mA
V_{o}	DC output source or sink current for D+/D- pins	Vo= 0 to Vcc		+/-50	mA
I_{GND}, I_{GND}	DC Vcc or GND current			+/-100	mA
T_{STG}	Storage temperature range		-60	+/-150	˙C
P_{TOT}	Power dissipation per package				mW

NOTES:
1. Stresses beyond those listed may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicted under "Recommended Operating Conditions" is not implied. Exposure to absolute maximum rated conditions for extended periods may affect device reliability.
2. The performance capability of a high performance integrated circuit in conjunction with its thermal environment can create junction temperatures which are detrimental to reliability. The maximum junction temperature of this integrated circuit should not exceed 150˙C.
3. The input and output voltage ratings may be exceeded if the input and output clamp current ratings are observed.

DC ELECTRICAL CHARACTERISTICS

Over recommended operating conditions. Voltages are referenced to GND (Ground=0V).

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS -40°C to +86°C			UNIT
			MIN	TYP	MAX	
VHYS	Hysteresis on inputs	Vcc=3.0V to 3.6V	5.2	4.3	50.4	V
VIH	HIGH level input	Vcc=3.0V to 3.6V		15	20	V
VIL	LOW level input	Vcc=3.0V to 3.6V	0.5	11		V
RoH	Output impedance (HIGH state)	Note 2	28	34	43	ohm
RoL	Output impedance (LOW state)	Note 2	28	35	43	ohm
VOH	HIGH level output	Vcc=3.0V Io=6mA Vcc=3.0V Io=4mA Vcc=3.0V Io=100µA	2.2 2.4 2.8	2.7		V
VOL	LOW level output	Vcc=3.0V Io=6mA Vcc=3.0V Io=4mA Vcc=3.0V Io=100µA		0.3	0.7 0.4 0.2	V
IQ	Quiecient supply current	Vcc=3.6V VI=Vcc or GND Io=0		330	600	µA
Isup	Supply current in suspend	Vcc=3.6V VI=Vcc or GND Io=0			70	µA
IFS	Active supply current (Full Speed)	Vcc=3.3V		9	14	mA
ILS	Active supply current (Low Speed)	Vcc=3.3V		2		mA
ILeak	Imput leakage current	Vcc=3.6V VI=5.5V or GND, not for I/O Pins		+/-0.1	+/-0.5	µA
IOFF	3-state output OFF-state current	VI=VIN or VII, Vo=Vcc or GND			+/-1-	µA

NOTES:
1. All typical values are at Vcc=3.3V and Tamb=25°C.
2. This value includes an external resistor of 24 ohm +/-1%.   See "Load D+ and D-" diagram for testing details.
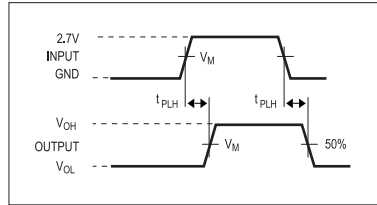3. All signals except D+ and D-.

AC ELECTRICAL CHARACTERISTICS

GND=0V, Is = IS=3.0 C=50pf, RL=500ohms

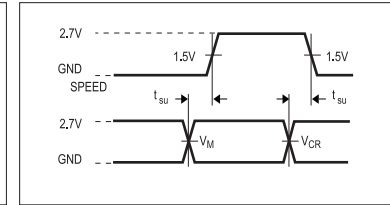| SYMBOL	PARAMETER	WAVFORM	LIMITS					UNIT
			-40˚C to +86˚C			-40˚C to +86˚C		
			MIN	TYP	MAX	MIN	MAX	
tpLH tpHL	VMO/VPO to D+/D- Full Speed	1	0 0		12 12	0 0	14 14	ns
trise tfall	Rise and Fall Times Full Speed	2	4 4	9 9	20 20	4 4	20 20	ns
tRFM	Rise and Fall Time Matching Full Speed		90		110	90	110	%
tpLH tpHL	VMO/VPO to D+/D- Low Speed	1		120 120	300 300		300 300	ns
trise tfall	Rise and Fall Times Low Speed	2	75 75		300 200	75 75	300 200	ns
tRFM	Rise and Fall Time Matching Low Speed		70		130	70	130	%
tpLH tpHL	D+/D- to RCV	3		9 9	16 16		16 16	ns
tpLH tpHL	D+/D- to VP/VM	1		4 4	8 8		8 8	ns
tpHZ tpZH tpLZ tpZL	OE# to D+/D- RL = 500ohm	4			12 12 10 10		12 12 10 10	ns
	Setup for SPEED	5	0					ns
Vcp	Crossover point¹	3	1.3		2.0	1.3	2.0	V

NOTES:
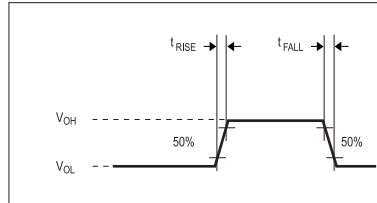1. The crossover point is in the range of 1.3V to 2.5V for the low speed mode with a 5Cpf capacitance.
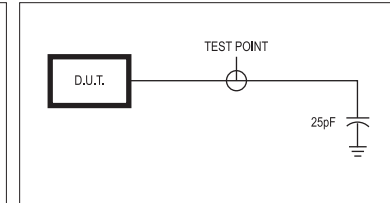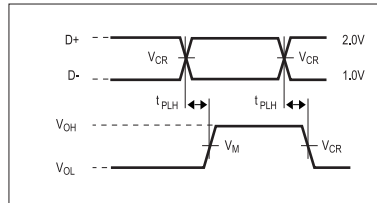
WAVEFORM 1.
D+/D- TO VP/VM OR VPO/VMO TO D+/D-

2.7V
INPUT
GND

V_M

t_{PLH} t_{PLH}

V_{OH}
OUTPUT
V_{OL}

V_M 50%

WAVEFORM 2.
D+/D- TO VP/VM OR VPO/VMO TO D+/D-

t_{RISE} t_{FALL}

V_{OH}
50%   50%
V_{OL}

WAVEFORM 3.
D+/D- TO RCV

D+
D-

V_{CR} V_{CR} 2.0V
1.0V

t_{PLH} t_{PLH}

V_{OH}
V_{OL}

V_M V_{CR}

WAVEFORM 4.
OE# TO D/+/D-

D+
D-
OE#

1.5V   1.5V

t_{PZH} t_{PHZ}
t_{PZL} t_{PLZ}

V_{OH}
0.5V $_{CC}$ V_M V_{OH} + 0.3   0.5V $_{CC}$
V_{OH} + 0.3
V_{OL}
D+/D-

WAVEFORM 5.
SETUP FOR SPEED

2.7V
GND
SPEED

1.5V   1.5V

t_{su} t_{su}

2.7V
GND

V_M V_{CR}

LOAD FOR VM/VP AND RCV

TEST POINT

D.U.T.

25pF

LOAD FOR ENABLE AND DISABLE TIMES

TEST POINT

D.U.T.   24W   500W

50pF   V

V = 0 FOR t_{PZH}, t_{PHZ}
V = V$_{CC}$ FOR t_{PZL}, t_{PLZ}

LOAD FOR D+/D-

2.8V
TEST POINT   1.5W*
D.U.T.   24W   S1

15kW

TEST	S1
D-/LS	CLOSE
D+/LS	OPEN
D-/FS	OPEN
D+/FS	CLOSE

C_L = 50pF, FULL SPEED
C_L = 50pF, LOW SPEED (MIN TIMING)
C_L = 350pF, LOW SPEED (MAX TIMING)
* 1.5KW ON D- (LOW SPEED) OR D+ (FULL SPEED) ONLY
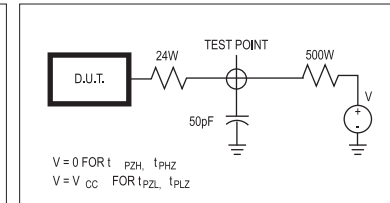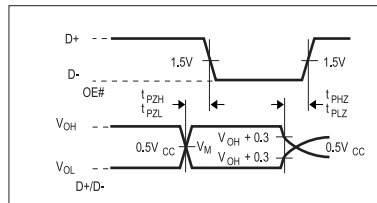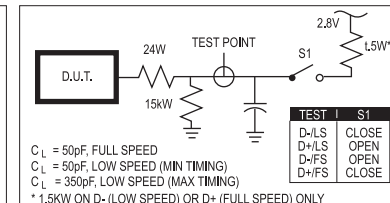
5.5. ESD Test Results

Test Description: ESD Testing was performed on a Zapmaster system using the Human-Body-Model (HBM) and Machine-Model (MM), according to MIL-STD 883 and EIAJ IC-121 respectively.

- Human-Body-Model stresses devices by sudden application of a high voltage supplied by a 100pF capacitor through 1.5k-ohm resistance.
- Machine-Model stresses devices by sudden application of a high voltage supplied by a 200pF capacitor through very low (0 ohm) resistance.

Test Circuit & Condition
- Zap Interval: 1 second
- Number of Zaps: 3 positive and 3 negative at room temperature
- Criteria: I-V Curve Tracing

ESD Data

Model	Mode	S/S	Target	Results
HBM	Vdd, Vss, I/C	15	2000V	PASS
MM	Vdd, Vss, I/C	15	200V	PASS

5.6. Latch-Up Test Results

Test Description: Latch-Up testing was performed at room ambient using an IMCS-4600 system which applies a stepped voltage to one pin per device with all other pins open except Vdd and Vss which were biased to 5Volts and ground respectively.

Testing was started at 5.0V (Positive) or 0V (Negative), and the DUT was biased for 0.5 seconds.

If neither the PUT current supply nor the device current supply reached the predefined limit (DUT=00mA, Icc=100mA), then the voltage was increased by 0.1Volts and the pin was tested again.
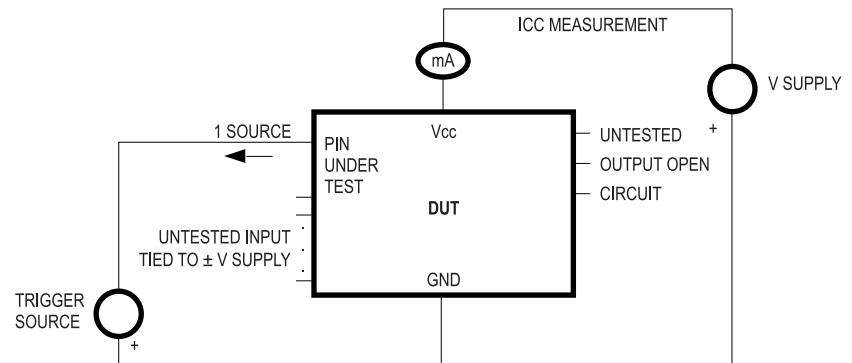
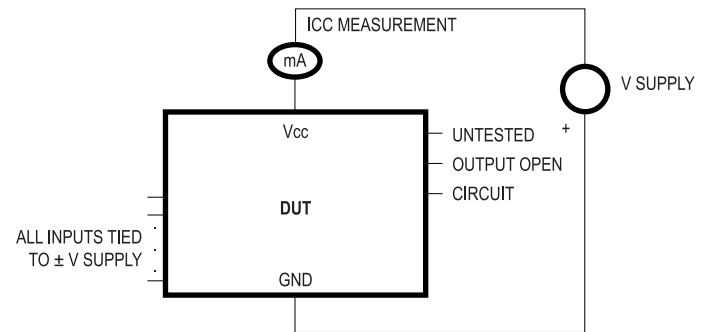This procedure was recommended by the JEDEC JC-40.2 CMOS Logic standardization committee.

Notes:
1. DUT: The device under test.
2. PUT: The pin under test.
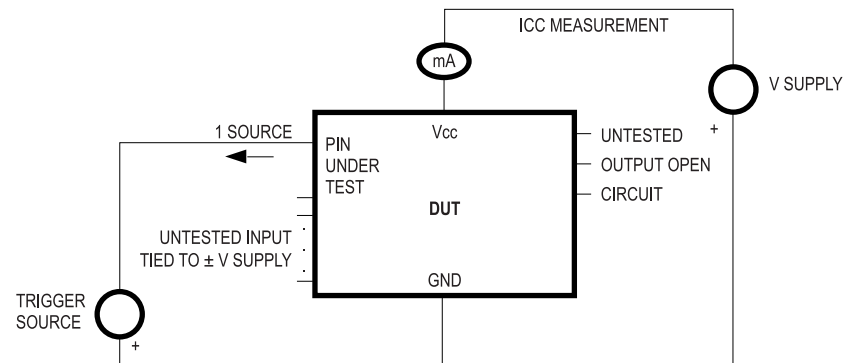
Test Circuit: Positive Input/Output Overvoltage/Overcurrent

Test Circuit: Negative Input/Output Overvoltage/Overcurrent

Supply Overvoltage Test

Latch-Up Data

Mode		Voltage (V)/Current (mA)	S/S	Results
Voltage	+	11.0	5	Pass
	-	11.0	5	Pass
Current	+	200	5	Pass
	-	200	5	Pass
Vdd - Vxx		9.0	5	Pass

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6.0 Mechanical Information

Following diagrams show the dimensions of the AU9216 52-pin QFP and the 48-pin DIP packages. Measurements are in millimeters; measurements in parenthesis are in inches.

ALCOR MICRO
AU9216
USB
HUB CONTROLLER

13.20 BSC
10.00 BSC
10.00 BSC
13.20 BSC

UNITS = mm

2.35 MAX
0.38
0.22
0.65 BSC

2.10
1.95
0.25
0.10
0.95
0.65
1.60 REF
0 - 7

ALCOR MICRO
AU9216
48-PIN DIP

13.97 (0.550)

15.88 (0.625)

61.72 (2.430)

1.91 (0.075)

4.82 (0.190)

4.06 (0.160)

BASE PLANE

SEATING PLANE

1.65 (0.065)   1.27 (0.050)   0.46 (0.018)   2.54 (0.100) BSC

13.71 (0.540)

15.23 (0.600) BSC

.25 (0.010)

0° to 15°