Aveo Technology Corp.

AV316H

Datasheet

Jun. 2010

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Revision History

Version	Modification	Date
1.0	Initiation.	04/02/2010
1.1	Add reference design	05/10/2010
1.2	Modify general feature and IC current	06/02/2010

1. General Description

1.1. About AV3xx family

AV3xx family PC Camera Controller provides a cost-effective solution for USB 2.0 video/image process application. This ASIC supports various CCD or CMOS image sensor interface, image capture, processing and USB High Speed transmission, which integrates certified USB_IF UTMI PHY in HS/FS mode and Turbo 8051 microcontroller. The hi-speed USB 2.0 Plug & Play and USB 1.1 backward compatible ASIC design provides OEM with the ability to customize product specification. AV3xx family products offer high value and performance video imaging controller design due to the flexible architecture and compatibility.

In addition to superior quality, AV3xx family products offer competitive advantages by allowing customization of numerous product functions. The flexible design capability allows for multiple product developments all with a single core, reducing both time to markets and product costs.

1.2. Applications

- PC Camera

2. General Features

4 sensors built-in chip

- 4 sensors OV7670, GC0307,BF3603,OV7675 built-in chip

Image Data Input

- Support CCD and CMOS image sensor.
- OmniVision, Aptina,Samsung, SET , Siliconfile, Pixelplus, Gcoreinc, BYD etc.
- CMOS 8bit ITU-601 YUV422/YCbCr422 sensor input, or 8bit compressed data
- Resolution up to 2048*1536 YUV422/YCbCr422
- Digital video YUV capture speed: XGA15fps; VGA 30fps; QVGA 60fps; QQVGA 60fps
- MJPEG bypass mode speed: OV2640/MI2010 15fps@2M (Limited by sensor output speed)

USB Interface

- Up to 480Mb/s High speed USB 2.0 compliant device.
- ISO video high-speed high bandwidth endpoint for 24MB/s transfer.
- USB video class 1.1 Compliance.(For YUV sensor inputs only, N/A for sensor raw inputs)

Power Supply

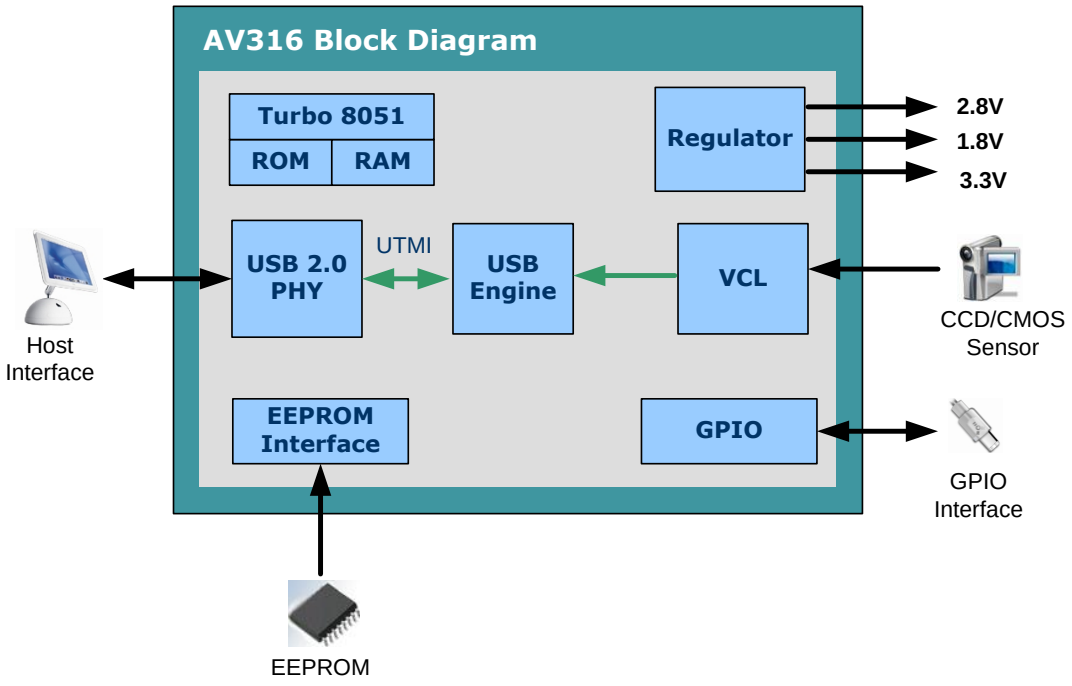
- Single 5.0V operating voltage
- Build in 3.3V, 2.8V and 1.8V regulator

Miscellaneous

- Turbo 8051 interface for video data control.
- 256byte EEPROM is enough for modifying sensor default image effect, such as brightness, saturation etc.
- 1KB EEPROM is enough for adding special effect. Use one button to switch the effect.
- 2K EEPROM is enough for VGA sensor full function tuning
- 4KB EEPROM is enough for 2M sensor full function tuning
- 8KB EEPROM is enough for 3M sensor full function tuning
- External E2PROM code downloads through USB
- Programmable Vendor and Product ID through EEPROM.
- Clock up to 30MHz.

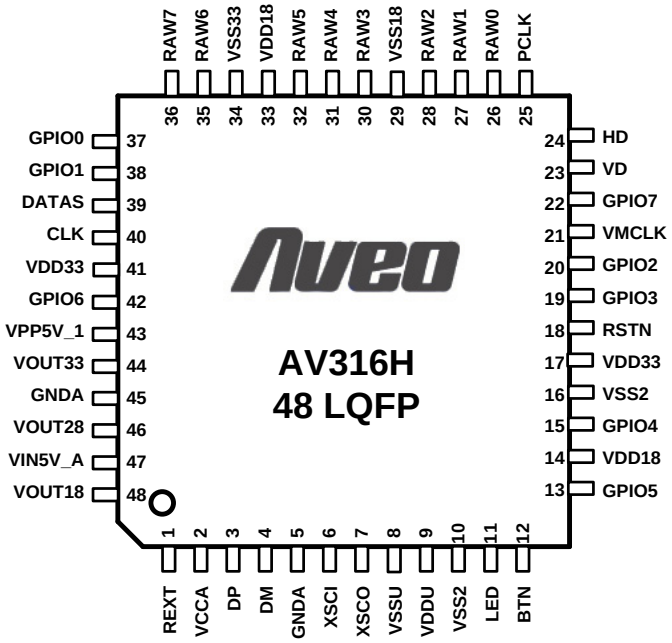
3. Block Descriptions

3.1. Block Diagram



4. Pin Assignment

4.1. Pin-out Diagram



4.2. Pin Description

Pin No.	Symbol	Dir.	Attribute	Description
1	REXT			Analog reference input (need external resistor 330 ~400 OHM to analog GND). When330 has the best compatibility from the real test case. The purpose of REXT is to provide a reference for the current source of the high-speed driver.
2	VCCA			Analog 3.3V Power, USB/PHY analog power
3	DP	BI		USB2.0 data in data positive pin
4	DM	BI		USB2.0 data in data negative pin
5	GNDA			Analog Ground, USB/PHY analog ground
6	XSCI	IN		Analog input. Crystal oscillator input (12 MHz)
7	XSCO	OUT		Analog output. Crystal oscillator output (12 MHz)
8	VSSU			Digital Ground, USB/PHY Core Ground
9	VDDU			Digital 1.8V Power, USB/PHY Core power
10	VSS2			Digital Ground, IO and core Ground
11	LED	BI/ INPD	POR_IN INIT_UC SP_Low	LED ON/GPIO
12	BTN	BI	POR_IN Schmit_In	Video Capture Button, can be used as general purpose IO pins
13	GPIO5	IN	POR_Low INIT_Hi SP_Low	General purpose I/O
14	VDD18			Digital 1.8V Power, suggest connect to pin VOUT18
15	GPIO4	IN	POR_Low INIT_Hi SP_Low	General purpose I/O
16	VSS2			Digital Ground, IO and core Ground
17	VDD33			Digital 3.3V Power
18	RSTN	IN	Schmit_In	Hardware reset, low active
19	GPIO3	IN	POR_Low INIT_Hi SP_Low	General purpose I/O, used as sensor I2C data.

Pin No.	Symbol	Dir.	Attribute	Description
20	GPIO2	IN	POR_Low INIT_Hi SP_Low	General purpose I/O, used as sensor I2C clock.
21	VMCLK	OUT	12mA POR_Low INIT_Low SP_UC	Video master clock
22	GPIO7	IN	POR_Low INIT_Hi SP_Low	General purpose I/O
23	VD	BI	POR_IN	Vertical Sync
24	HD	BI	POR_IN	Horizontal Sync
25	PCLK	IN		Video pixel clock
26	RAW0	IN		RAW Sensor/YUV Data0
27	RAW1			RAW Sensor/YUV Data1
28	RAW2			RAW Sensor/YUV Data2
29	VSS18			Digital Ground
30	RAW3			RAW Sensor/YUV Data3
31	RAW4			RAW Sensor/YUV Data4
32	RAW5			RAW Sensor/YUV Data5
33	VDD18			Digital 1.8V Power, core power
34	VSS33			Digital Ground
35	RAW6	IN		RAW Sensor/YUV Data6
36	RAW7	IN		RAW Sensor/YUV Data7
37	GPIO0	IN	POR_Low INIT_High SP_Low	General purpose I/O
38	GPIO1	IN	POR_Low INIT_High	General purpose I/O

Pin No.	Symbol	Dir.	Attribute	Description
			SP_Low	
39	DATAS	BI	POR_Hi INIT_UC SP_Low	EEPROM Serial Bus Data
40	CLKS	OUT	12mA POR_Hi INIT_UC SP_Low	EEPROM Serial Bus Clock
41	VDD33			Digital 3.3V Power, I/O power
42	GPIO6	IN	POR_Low INIT_High SP_Low	General purpose I/O
43	VPP5V_1			5V input for built-in LDO
44	VOUT33			3.3V output of built-in LDO (Max Drive 60mA)
45	GNDA			Analog Ground
46	VOUT28			2.8V output of built-in LDO (Max Drive 60mA)
47	VIN5V_A			5V/3.3V input for built-in LDO
48	VOUT18			1.8V output of built-in LDO (Max Drive 60mA)

Note:

1) INPU: input with pull-up resistor

INPD: input with pull-down resistor.

SP_ {Hi, Low, In, UC}: When USB suspend, this pin is in the state of Output High, Low, Input or UC (Unchanged and stay the same value).

POR_ {Hi, Low, in}: After Power on reset, this pin is in the state of High, Low, and Input.

INIT_{HiI,Low,In,UC}: After Firmware Initialization, this pin is in the state of High, Output Low，Input, UC (Un-changed and stay as same value).

Schmit_In: Schmitt trigger input.

2) All other pads except mentioned above imply 4 mA current.

5. Electrical Characteristics

5.1. DC Operating Condition

5.1.1. Absolute Maximum Ratings

Rating	Symbol	Value	Unit
DC supply voltage	V_{CC}	-0.3 to +4.0	V
Voltage, any pin to ground	V	-0.3 to VCC+0.3	V
DC current drain per pin(excluding VDD,VSS)	I	±10	mA
Operating temperature range	T_A	0 to + 70	^oC
Storage temperature	Tstg	-40 t0 150	^oC

Note: Permanent device damage may occur if absolute maximum ratings are exceeded. Functional operation should be restricted to the conditions as detailed in the optional sections of this datasheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

5.1.2. Recommended Operating Conditions

Symbol	Parameter	Min	Type	Max	Unit
VDD18	Core and Sensor power supply	1.62	1.8	1.98	V
VDD33	Power supply of 3.3V I/O	2.97	3.3	3.63	V
VOUT28	Power supply of 2.8V Sensor	2.52	2.8	3.08	V
VIN3	Input voltage of 3.3V I/O with 5V tolerance	0	3.3	5.25	V
Tj	Commercial junction operating temperature	-40	25	80	^oC
Iccu	USB Unconfigured state current		37.3		mA
	core VDD VCC3O AVCC		27.8 0.5 10.6		
Icc	Operation supply current		46.2		mA
	core VDD VCC3O AVCC		28.9 1.7 16.2		
Iccs	Suspend supply current		270		uA
	core VDD VCC3O AVCC		30 0 120		

Note: VDD is connected to pin VOUT18, output of the built-in 1.8V regulator.

5.1.3. Leakage Current and Capacitance

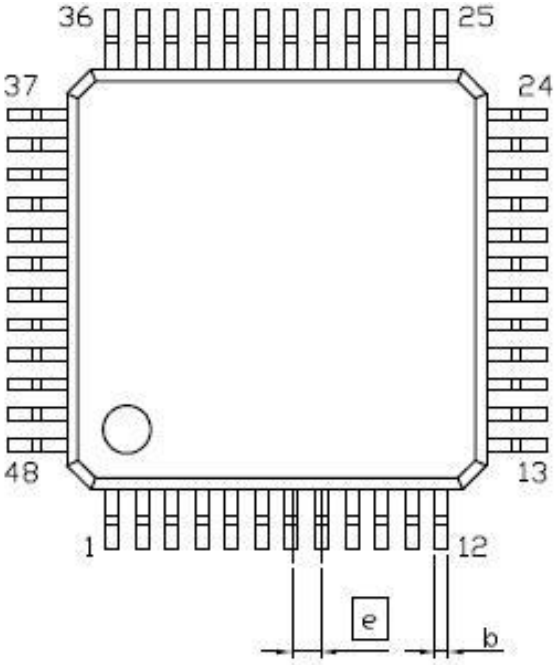
Symbol	Parameter	Condition	Min	Type	Max	Unit
I_{in}	Input current	No pull-up or pull-down	-10	--	10	uA
IOZ	Tir-state leakage current		-10	--	10	uA
CIN	Input capacitance			2.8		pF
Cout	Output capacitance			2.8		pF
CBID	Bi-directional buffer capacitance			2.8		pF

Note: The capacitance listed above does not include pad capacitance and package capacitance. One can estimate pin capacitance by adding a pad capacitance of about 0.5pF and the package capacitance.

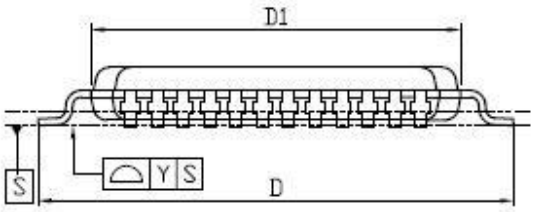
5.1.4. DC Characteristics of 3.3V I/O Cells (Temp = 25 °C)

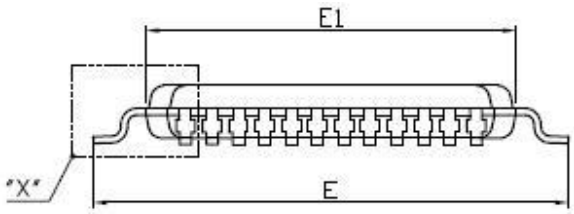
Symbol	Parameter	Condition	Min	Type	Max	Unit
VDD	Core and Sensor power supply	Core area	1.62	1.8	1.98	V
VDD33	Power supply of 3.3V I/O		2.97	3.3	3.63	V
VOUT28	Power supply of sensor		2.52	2.8	3.08	V
Temp	Junction temperature		0	25	125	°C
V_{il}	CMOS Input low voltage	LVTTL			0.8	V
	Schmitt trigger low voltage		0.8		1.2	
V_{ih}	CMOS Input high voltage		2.0			V
	Schmitt trigger high voltage		1.4		2.0	
V_{t-}	Schmitt trigger Hysteresis		0.6		0.9	V
V_{ol}	Output low voltage	|Iol|=2,4,8,16 ,24mA			0.4	V
V_{oh}	Output high voltage	|Ioh|=-2,-4,-8 ,-16, -24mA	2.4			V
I_{in}	Input leakage current	VCC3O=MAX, 0V<=Vin<=5.5V	-10		10	μA
	Input current with 40kΩ pull down	Vin=VCC3O	40		160	μA
	Input current with 40kΩ pull up	Vin=0	-160		40	μA

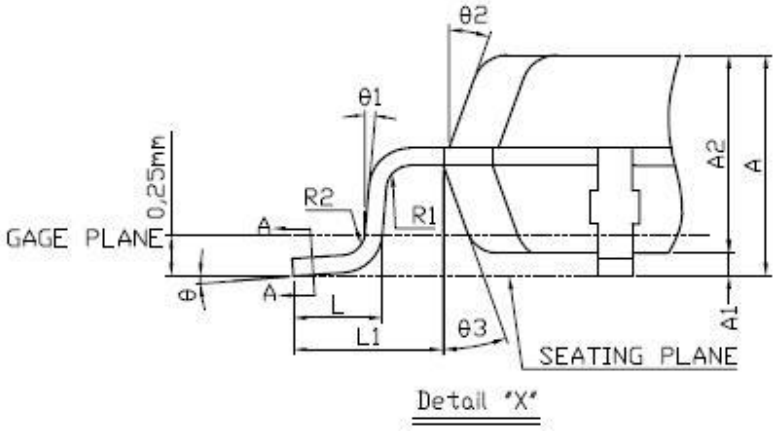
6. Package Information

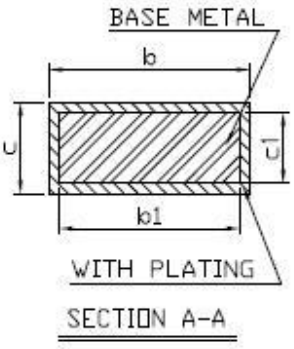


SYMBOL	DIMENSION (MM)			DIMENSION (MIL)		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A			1.60			63
A1	0.05		0.15	2		6
A2	1.35	1.40	1.45	53	55	57
b	0.17	0.22	0.27	7	9	11
b1	0.17	0.20	0.23	7	8	12
c	0.09		0.20	4		8
c1	0.09		0.16	4		6
D	9.00 BSC			354 BSC		
D1	7.00 BSC			276 BSC		
E	9.00 BSC			354 BSC		
E1	7.00 BSC			276 BSC		
e	0.50 BSC			20 BSC		
L	0.45	0.60	0.75	18	24	30
L1	1.00 REF			39 REF		
R1	0.08			3		
R2	0.08		0.20	3		8
Y			0.075			3
θ	0°	3.5°	7°	0°	3.5°	7°
θ1	0°			0°		
θ2	11°	12°	13°	11°	12°	13°
θ3	11°	12°	13°	11°	12°	13°



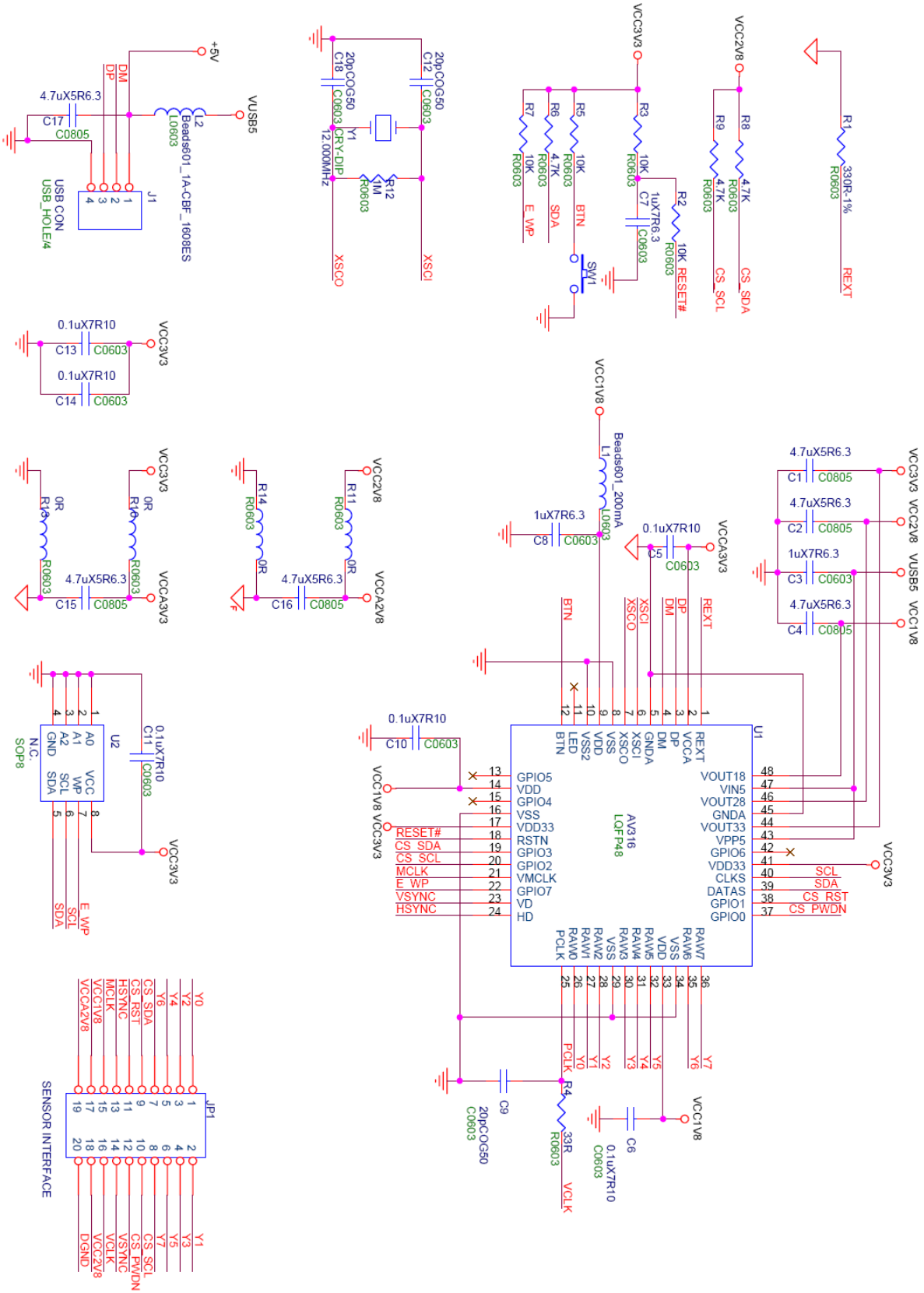






AV316H (LQFP)

7. Reference Design



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Note:

This catalog provides information as of the revision and publication data. Specifications and information herein are subject to change without notice.

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