

EM2700/2800 Datasheet

www.datasheet4u.com April 17, 2003

Document Rev B



EM2700/2800 USB2.0 Video Controller is a highly integrated VLSI that provides a cost-effective solution for video capture application. As illustrated in the system block diagram, a PC-camera subsystem requires only three chips: CMOS imager, EM2700 and AC 97 codec. Application of such a system can be video phone, video mail. A video capture solution requires three chips only: Video decoder, EM2800 and AC 97 codec. Application of such a system can be TV on PC, Camcorder video capture and editing.

As shown in the functional block diagram, the EMPIA-2700/2800 consists of 6 main blocks

- Video/Audio Input Port
- USB 2.0 Transceiver
- Compression Engine
- GPIO, Two Wire Serial Bus, AC 97 Interface
- USB 2.0 Serial Interface Engine
- Color Enhancement

Index	
1. Features.....	P.02
2. Block Diagram.....	P.03
3. Pin Description.....	P.04
4. Pin Configuration.....	P.06
5. Electronics Specification.....	P.07
5. Physical Dimensions.....	P.08

EMPIA Technology reserves the right to make changes in the device data identified in this publication without further notice. EMPIA Technology advises its customers to obtain the latest version of all device data to verify that any information being relied upon by the customer is current and accurate.

EMPIA Technology does not assume any liability arising out of or associated with the application or use of any product or integrated circuit or component described herein. EMPIA Technology does not convey any license under its patent rights or the patent rights of others described herein. In the absence of a written or prior stated agreement to the contrary, the terms and conditions stated on the back of the EMPIA Technology order acknowledgment obtain.

EMPIA Technology makes no warranty of any kind with regard to this material, including, but not limited to the implied warranties of merchantability and fitness for a particular purpose.

EMPIA Technology products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any nuclear facility application, or for any other application in which the failure of the EMPIA Technology product(s) could create a situation where personal injury or death may occur. EMPIA Technology will not knowingly sell its products for use in such applications, and the buyer shall indemnify and hold harm-less EMPIA Technology and its officers, employees, subsidiaries, affiliates, representatives, and distributors against all claims, costs, damages, expenses, tort, and attorney fees arising out of directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that EMPIA Technology was negligent regarding the design or manufacture of the part.

©2003 EMPIA Technology Incorporation Copyright all reserved.

Features

www.datasheet4u.com

No external memory required, No external USB 2.0 PHY required

Flexible Video Input Port

- 8-bit video input port
- Bayer RGB
- Interlace and non-interlace video (For EM2800 only)
- CCIR-601 4:2:2 YUV (For EM2800 only)
- CCIR-656 YUV with embedded sync and field ID (For EM2800 only)
- Field/Frame drop control (For EM2800 only)

Bayer RGB Color Processor

- Auto black clamping and user-defined black clamping
- Gamma correction
- Bayer pattern filtering
- Gain and offset control in YUV space
- Random ratio down scaling
- Auto exposure and white balance

YUV Color Processor (For EM2800 only)

- Gain and offset control in YUV space
- Random ratio down scaling
- 2, 3, 4-tap horizontal filtering
- 2, 3-tap vertical filtering

Up to 30fps @ 720 x 480 size for video processor and compression

- Proprietary compression algorithm for both still image and motion-video for USB 1.1
- Auto-adjust compression ratio for USB 1.1
- USB 1.1 support 30fps @ 320 x 240 resolution
- USB 2.0 support 30fps @ 720 x 480 resolution

USB Port

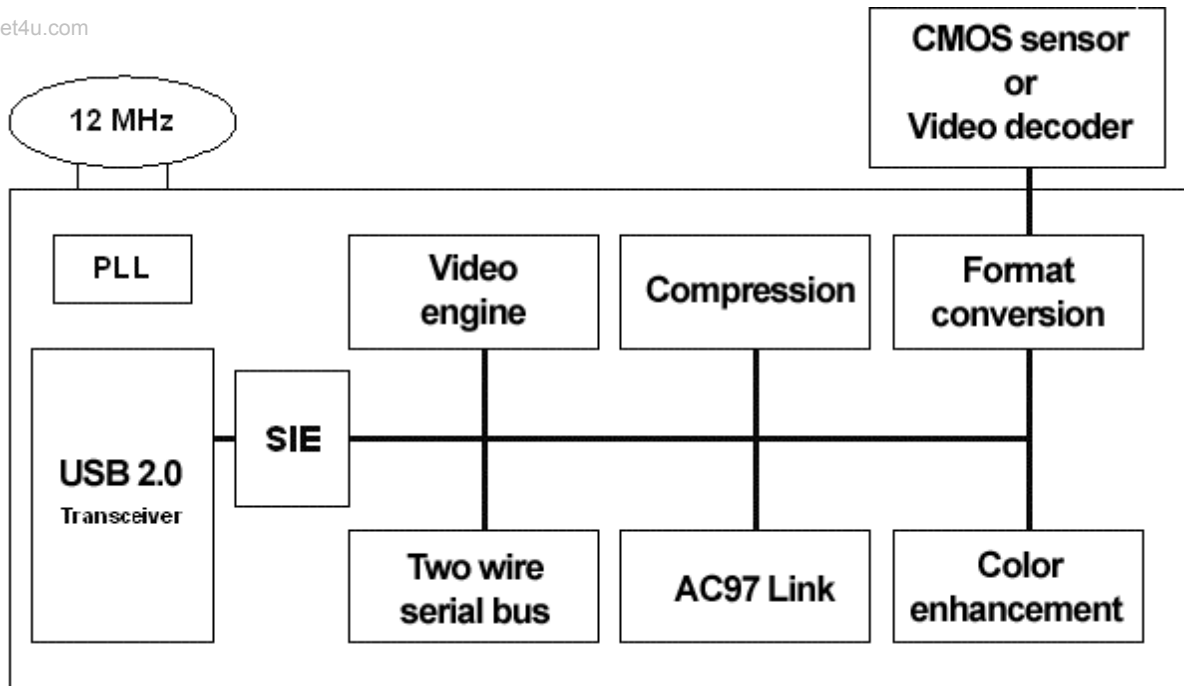
- On-chip USB Transceiver with High/Full speed compliant
- USB 2.0 Isochronous Video pipe up to 24Mb/sec
- USB 2.0 Isochronous Audio CD quality pipe up to 1.4Mb/sec
- USB Audio Class compliant

Miscellaneous

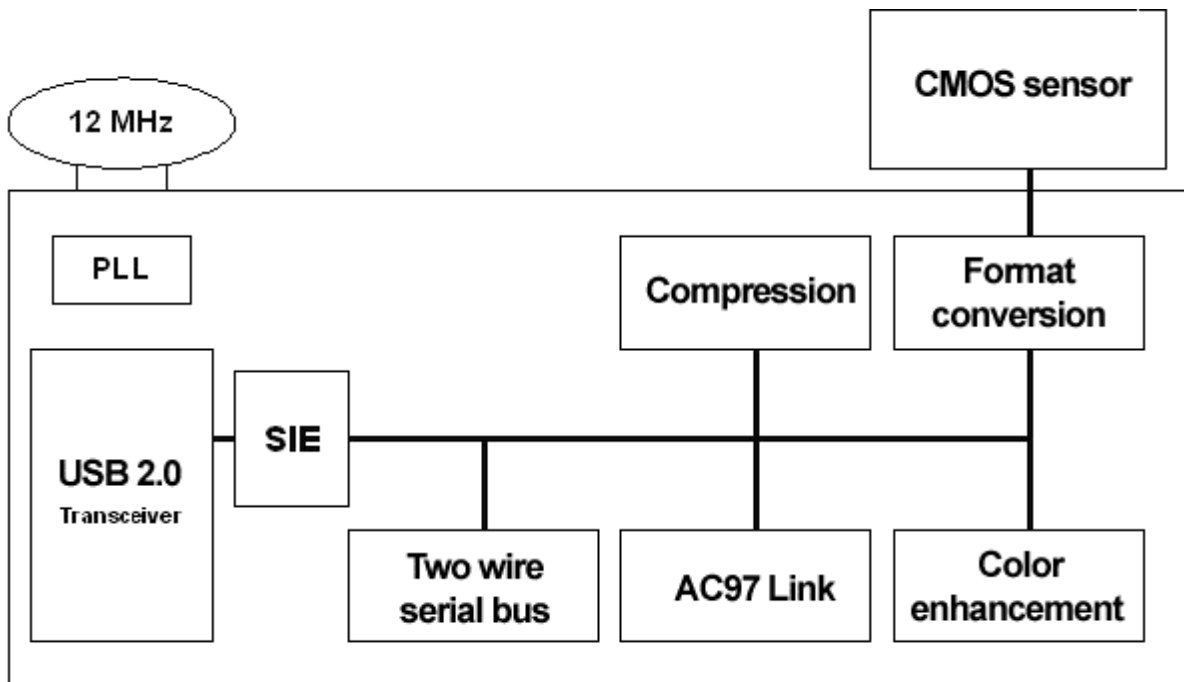
- Two wire serial bus to program front end video devices
- 4 General I/O ports and 2 dedicated I/O port
- AC97 link interface
- 2.5/3.3V Low power Technology
- 64-pin LQFP package

Block Diagram

www.datasheet4u.com



EM2800 Block Diagram



EM2700 Block Diagram

Pin Description

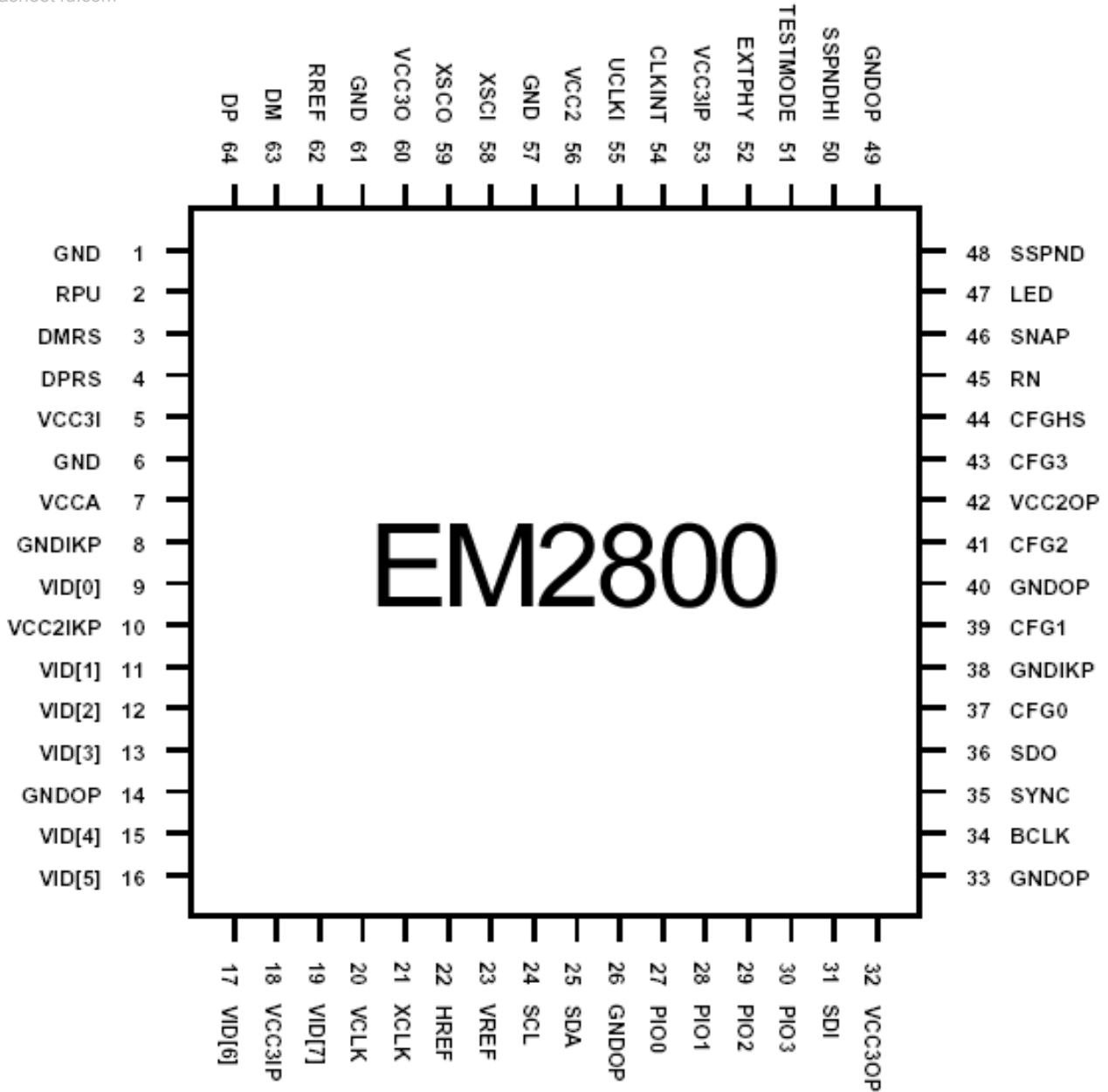
SYMBOL	PIN	I/O	DESCRIPTION
USB PORT			
RPU	2	I	
DMRS	3	B	
DPRS	4	B	
DM	63	B	
DP	64	B	
VIDEO			
VID[0]	9	I	VID[0] ~ VID[7] , Digital video data bus
VID[1]	11	I	
VID[2]	12	I	
VID[3]	13	I	
VID[4]	15	I	
VID[5]	16	I	
VID[6]	17	I	
VID[7]	19	I	
VCLK	20	I	Video reference clock from video source
HREF	22	I	Horizontal lock indicator
VREF	23	I	Vertical lock indicator
XCLK	21	O	Video synchronous clock output
AC97 LINK			
SDI	31	I	Serial TDM AC'97 input
BCLK	34	I	Bit clock output
SYNC	35	O	Sample Sync
SDO	36	O	Serial TDM AC'97 output
TWO WIRE SERIAL BUS CONTROL INTERFACE			
SCL	24	B	Serial bus clock, require 2K pull up resistor
SDA	25	B	Serial data, require 2K pull up resistor
GPIO PORT			
PIO0	27	B	GPIO Port bit 0
PIO1	28	B	GPIO Port bit 1
PIO2	29	B	GPIO Port bit 2
PIO3	30	B	GPIO Port bit 3
CONFIGURATION			
CFG0	37	I	Power on configuration bit 0
CFG1	39	I	Power on configuration bit 1
CFG2	41	I	Power on configuration bit 2
CFG3	43	I	Pull up enable USB audio, Pull down enable external audio
CFGHS	44	I	Connect to GND
RN	45	I	Chip Reset active Low
SNAP	46	I	Snap shutter active Low
LED	47	O	LED indicator
SSPND	48	O	Suspend HI
SSPNDHI	50	I	Pull up SSPND active HI (default), Pull down SSPND active Low
XSCI	58	I	Crystal input (12MHZ)
XSCO	59	O	Crystal output pad
RREF	62	O	With 12K 1% resistor to GND
CLKINT	54	I	Connect to 3.3V
UCLKI	55	I	Connect to GND
TESTMODE	51	I	Connect to GND
EXEPHY	52	I	Connect to GND

OPERATION VOLTAGE

VCC3I	5		DC 3.3V
VCC3IP	18		
VCC3OP	32		
VCC3I	53		
VCC3O	60		
AVDD	7		
VCKK	10		DC 2.5V
VCKKP	42		
VCC	56		
GND	1,6		GND
GNDIK	8		
GND0	14		
GNDOP	26,33,38		
GNDIKP	40		
GND0	49		

Pin Configuration

www.datasheet4u.com



EM2700/2800 Pin Configuration

Section 4 – Electrical Specifications

Absolute Maximum Ratings

Parameter	Min	Max	Unit
Power Supply Voltage	-0.5	3.6	V
Voltage on any input	-0.5	3.6	V
Operating Temperature (Ambient)	0	70	°C
Storage Temperature	-65	150	°C

Note:

1. Stress beyond those listed may cause permanent damage to the device.
2. Input pins are 5V tolerant.

DC Characteristics

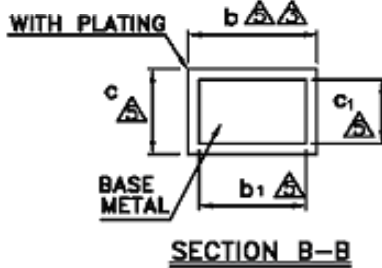
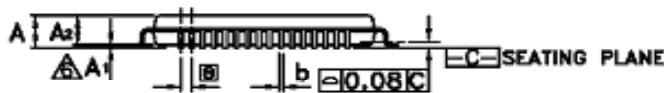
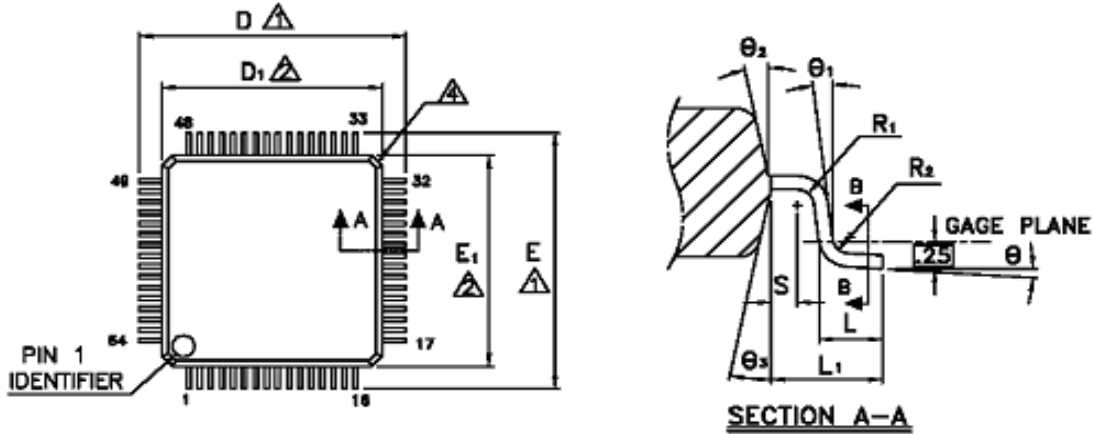
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CC}	Supply Voltage		3.0	3.3	3.6	V
V_{IH}	Input High Voltage	$V_{CC} = 3.3V$	2.0			V
V_{IL}	Input Low Voltage	$V_{CC} = 3.3V$			0.8	V
V_{OH}	Output High Voltage		2.4			V
V_{OL}	Output Low Voltage				0.4	V
I_{CC}	Supply Current	$V_{CC} = 3.3V$			70	mA
C_{IN}	Input Capacitance				7	pF
C_{OUT}	Output Capacitance				7	pF

AC Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
F_{XTAL}	Crystal Frequency (at XIN and XOUT pins)			12.000		MHz

Section 5 - Packaging Information

www.datasheet4u.com



Symbol	Dimension in mm			Dimension in inch		
	Min	Nom	Max	Min	Nom	Max
A	—	—	1.60	—	—	0.063
A ₁	0.05	—	0.15	0.002	—	0.006
A ₂	1.35	1.40	1.45	0.053	0.055	0.057
b	0.17	0.22	0.27	0.012	0.015	0.018
b ₁	0.17	0.20	0.23	0.012	0.014	0.016
c	0.09	—	0.20	0.004	—	0.008
c ₁	0.09	—	0.16	0.004	—	0.006
D	12.00 BSC			0.472 BSC		
D ₁	10.00 BSC			0.394 BSC		
E	12.00 BSC			0.472 BSC		
E ₁	10.00 BSC			0.394 BSC		
⊠	0.50 BSC			0.020 BSC		
L	0.45	0.60	0.75	0.018	0.024	0.030
L ₁	1.00 REF			0.039 REF		
R ₁	0.08	—	—	0.003	—	—
R ₂	0.08	—	0.20	0.003	—	0.008
S	0.20	—	—	0.008	—	—
θ	0°	3.5°	7°	0°	3.5°	7°
θ ₁	0°	—	—	0°	—	—
θ ₂	12° TYP			12° TYP		
θ ₃	12° TYP			12° TYP		