CH7104B HDMI to HDTV/VGA Converter

FEATURES

- HDMI Receiver compliant with HDMI 1.4 specification
- Support multiple output formats:
  - HDTV format (YPbPr output) for 480p, 576p, 720p, 1080i and 1080P
  - Analog RGB output for VGA with Triple 9-bit DAC up to 200MHz pixel rate. Sync signals can be provided in separated or composite manner. Support VESA and CEA timing standards up to UXGA and 1920x1080@60Hz
- On-chip Audio encoder which support 2 channel IIS/ S/PDIF audio output
- VGA output is compliant with VESA VSIS v1r2 specification
- MCU embedded to handle the control logic
- Support device boot up by automatically loading firmware from on-chip flash
- Integrated EDID Buffer
- Crystal Free architecture
- TV/VGA connection detection supported
- HDMI input detection supported
- Support Auto Power Saving mode and low stand-by current
- Support RGB to YCC conversion in ITU-R BT.601 and 709 color space
- IIC slave interface and HDMI DDC interface are available for debug and firmware update.
- Low power architecture
- RoHS compliant and Halogen free package
- Offered in 40-Pin QFN package (5 x 5 mm)

APPLICATION

- HDMI to YPbPr/VGA Adapter/Docking Station
- Car Infotainment Device
- IPC
- Handheld/Portable Device
- Digital Video Systems

GENERAL DESCRIPTION

Chrontel's CH7104B is a low-cost, low-power semiconductor device that consists of HDMI receiver, three separate 9-bit video Digital-to-Analog Converters (DACs), HDTV encoder, and audio encoder, which can convert HDMI signals into HDTV/VGA outputs with IIS or SPDIF audio output.

The HDMI Receiver integrated is compliant with HDMI 1.4b. With sophisticated MCU and the on-chip flash, CH7104B supports auto-boot and EDID buffer. Leveraging the firmware auto loaded from the embedded flash, CH7104B can support HDMI input detection, DAC connection detection and determine to enter into Power saving mode automatically.

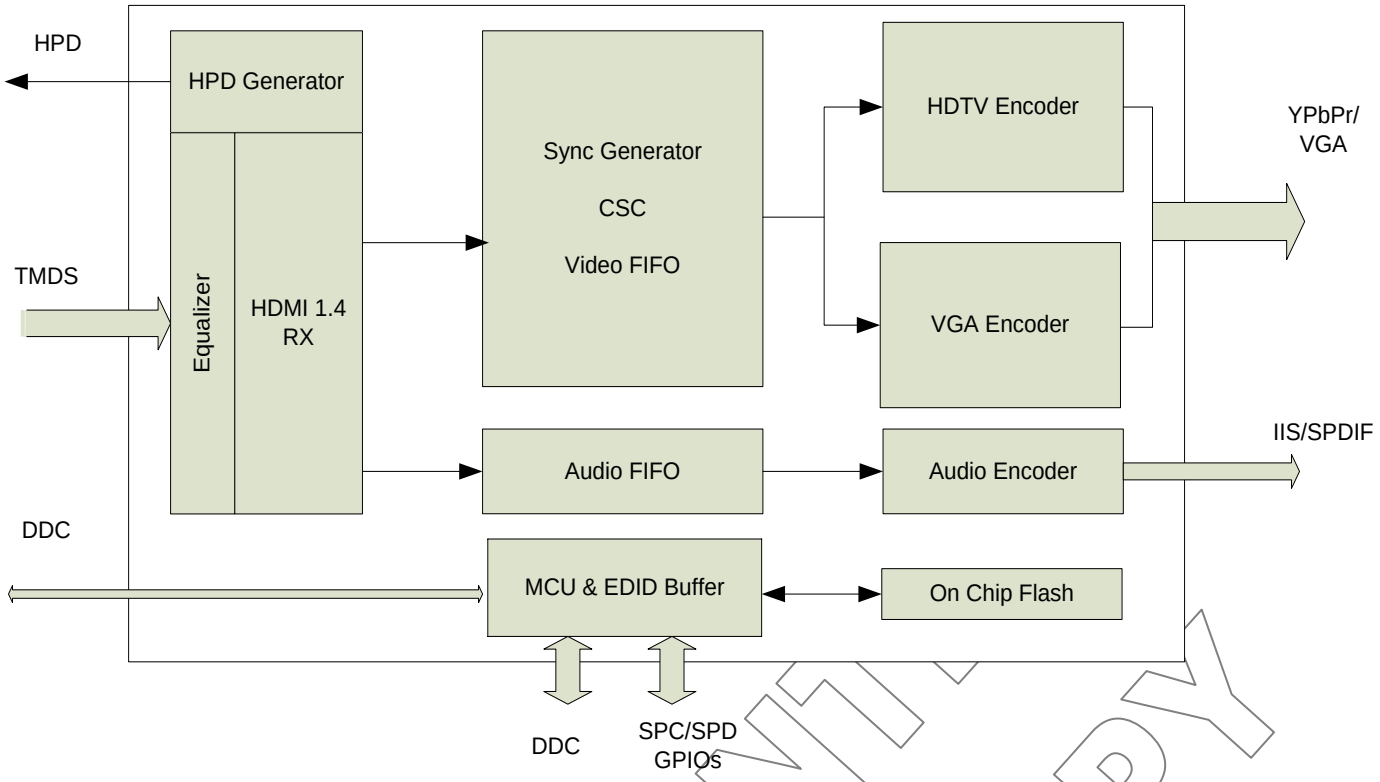

Figure 1: CH7104B Functional Block Diagram

1.0 PIN-OUT

1.1 Package Diagram

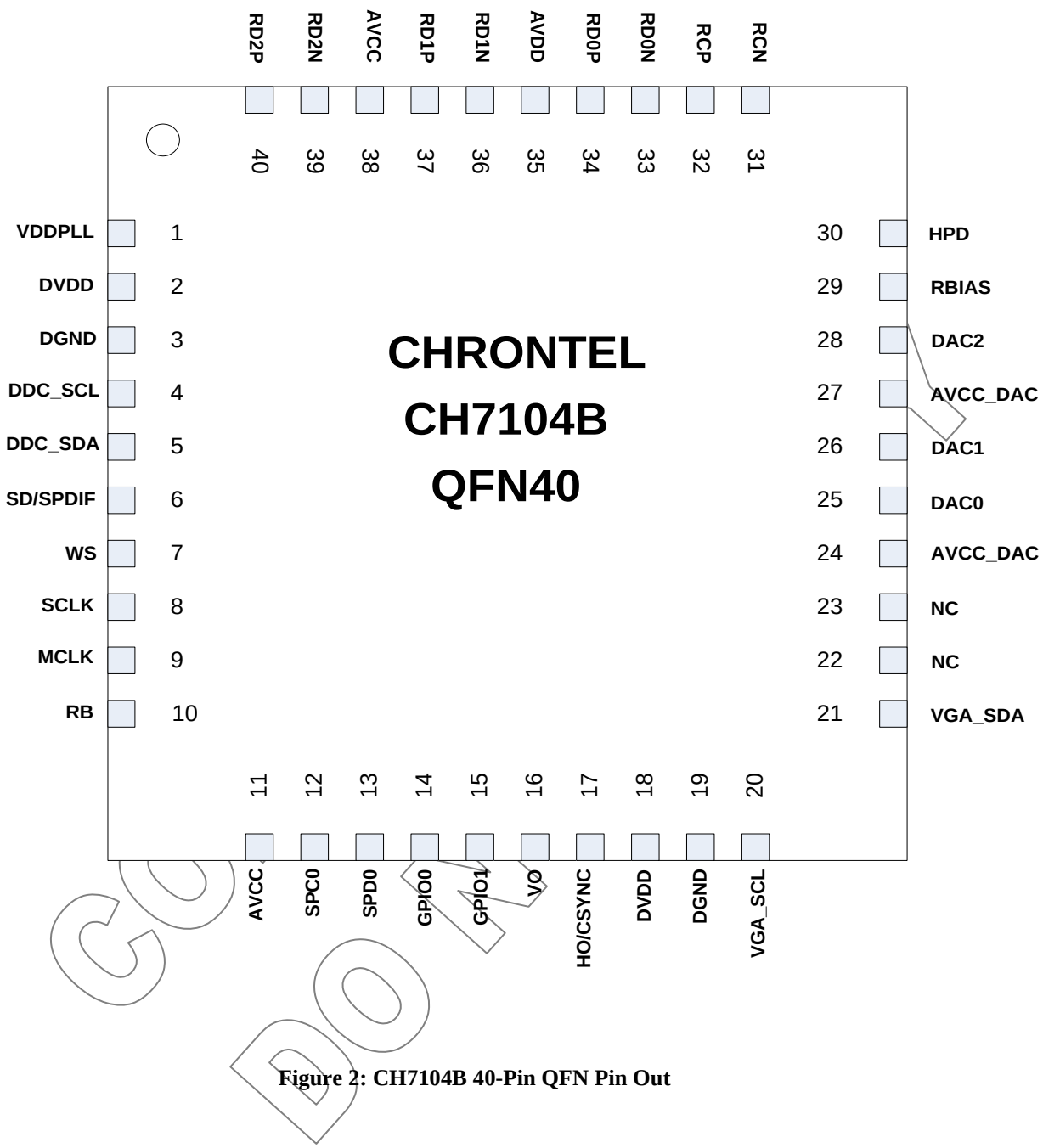

Figure 2: CH7104B 40-Pin QFN Pin Out

1.2 Pin Description

Table 1: Pin Name Descriptions

Pin #	Type	Symbol	Description
4	In	DDC_SCL	**Serial Port Clock to HDMI/DVI Transmitter** This pin functions as the clock bus of the serial port to HDMI or DVI DDC transmitter. This pin requires a pull-up 47 kΩ resistor to the desired voltage level.
5	In/out	DDC_SDA	**Serial Port Data to HDMI/DVI Transmitter** This pin functions as the data bus of the serial port to HDMI or DVI DDC transmitter. This pin requires a pull-up 47 kΩ resistor to the desired voltage level.
6	Out	SD/SPDIF	**I2S Serial Data or SPDIF Output**
7	Out	WS	**I2S Word Select**
8	Out	SCLK	**I2S Continuous Serial Clock**
9	Out	MCLK	**I2S System Clock**
10	In	RB	**Chip Reset** Low to 0V for reset. Typical High level is 3.3V
12	In	SPC0	**Serial Port Clock Input** This pin functions as the clock pin of the serial port. External pull-up 6.8 KΩ resister is required
13	In/out	SPD0	**Serial Port Data Input / Output** This pin functions as the bi-directional data pin of the serial port. External pull-up 6.8 KΩ resister is required
14,15	In/Out	GPIO	**General Purpose Input/Output**
16	Out	VO	**Vertical Sync Signal Output** The amplitude of this pin is from 0 to AVCC
17	Out	HO/CSYNC	**Horizontal Sync Signal Output** The amplitude of this pin is from 0 to AVCC It also functions as a Composite sync output
20	Out	VGA_SCL	**Serial Port Clock Output to VGA Receiver** The pin should be connected to clock signal of VGA DDC. This pin requires a pull-up 10 kΩ resistor to the desired voltage level
21	In/Out	VGA_SDA	**Serial Port Data to VGA Receiver** The pin should be connected to data signal of VGA DDC. This pin requires a pull-up 10 kΩ resistor to the desired voltage level
22,23	NC	NC	**Not Connected**
25	Out	DAC0	**VGA Blue Component/HDTV Pb Component DAC output**
26	Out	DAC1	**VGA Green Component/HDTV Y Component DAC output**
28	Out	DAC2	**VGA Red Component/HDTV Pr Component DAC output**
29	In	RBIAS	**Current Set Resistor Input** This pin sets the DAC current. A 10 KΩ, 1% tolerance resistor should be connected between this pin and AVSS using short and wide traces
30	Out	HPD	**HDMI Receiver Hot Plug output**
31,32,33, 34,36,37 39,40	In	RD[2:0]P/N RCP/N	**HDMI TMDS Input** HDMI differential clock and data input pairs
1	Power	VDDPLL	**PLL Power Supply (1.2V)**
2,18	Power	DVDD	**Digital IO Power Supply (1.2V)**

3,19	Power	DGND	**Digital Ground**
11, 38	Power	AVCC	**Analog Power Supply (3.3V)**
24,27	Power	AVCC_DAC	**Analog DAC Power Supply (3.3V)**
35	Power	AVDD	**HDMI Receiver Analog Power Supply (1.2V)**
Pad	Power	GND	**Power Supply Ground**

2.0 PACKAGE DIMENSION

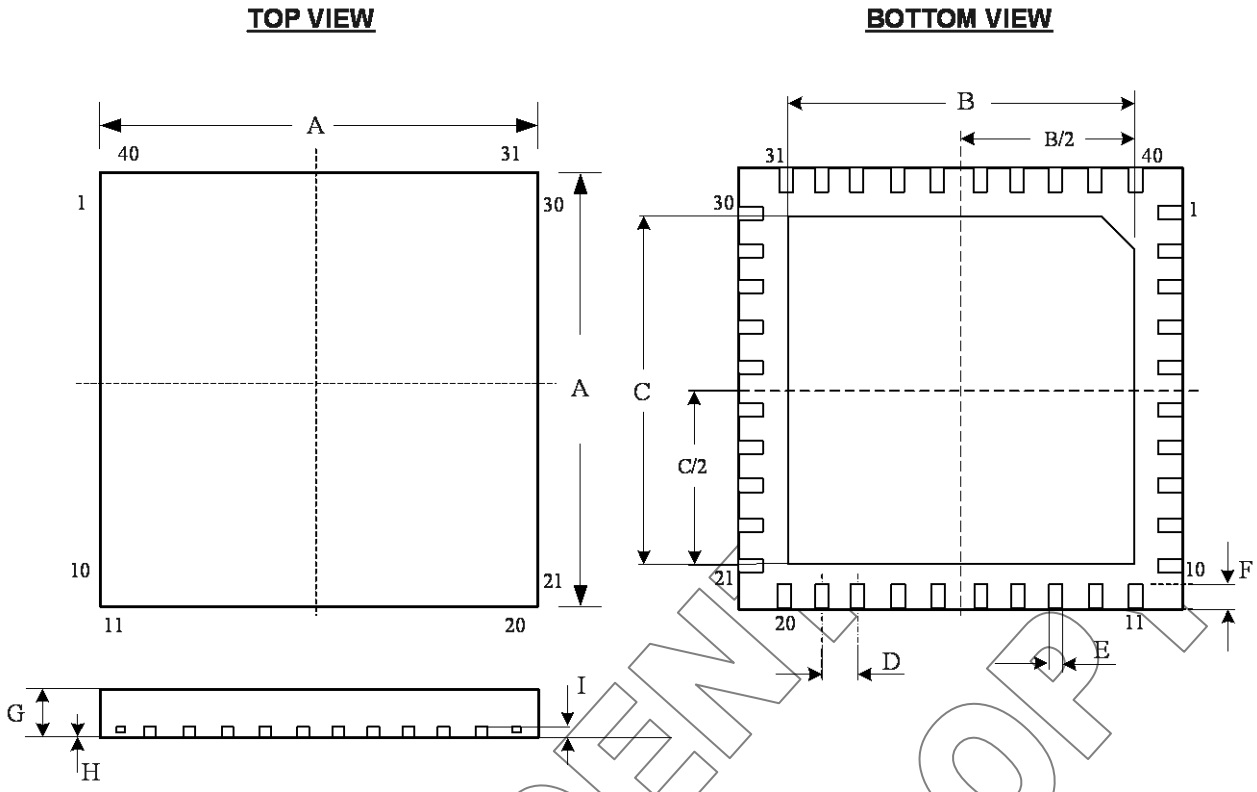

Figure 3: 40 Pin QFN Package

Table 2: Table of Dimensions

No. of Leads		SYMBOL								
40 (5 X 5 mm)		A	B	C	D	E	F	G	H	I
Milli-meters	MIN	4.90	3.20	3.20	0.4	0.15	0.35	0.8	0	0.203 REF
	MAX	5.10	3.40	3.40		0.25	0.45	0.9	0.05	

Notes:

1. Conforms to JEDEC standard JESD-30 MO-220.

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ORDERING INFORMATION

Part Number	Package Type	Operating Temperature Range	Minimum Order Quantity
CH7104B-BF	40 QFN, Lead-free	Commercial: 0 to 70°C	490/Tray
CH7104B-BFI	40 QFN, Lead-free	Industrial: -40 to 85°C	490/Tray

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