

RTD2668
LCD TV/Monitor Controller

Revision 1.00

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Content

1. GENERAL DESCRIPTION	3
2. FEATURE	4
3. SYSTEM APPLICATION	6
3.1. LQFP128	6
4. PIN	8
4.1. LQFP128 PIN OUTLINE.....	8

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1. General Description

RTD2668 LCDTV controller is a highly integrated SoC for TV application. With embedded IF demodulator, video decoder and audio decoder, the BOM cost and PCB complication are greatly reduced.

In video input, it supports various graphic and video sources input such as CVBS, S-video, VGA, HDMI, DVI, YPbPr, SCART, ITU-R BT.656 etc. In audio input/output, analog stereo audio input/output, SPDIF input/output and headphone output are supported. In the panel interface, LVDS, RSDS and TTL interfaces are designed for different applications.

With Realtek advanced image processing functions, excellent image quality and/or customer's specific image quality can be achieved. Ultra-Zoom™ II is designed for linear and non-linear scaling. The PixelComposer™ II performs high quality cross color suppression, de-interlace and noise reduction. Through the Vivid-Color™ II engine, user's can easily adjust color to suit their preferences. Various display formats such as PIP, POP, Multi-Picture are also supported.

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2. Feature

Analog TV IF demodulator

- ✓ Support NTSC / PAL / SECAM IF demodulator
- ✓ 108MHz 12bit ADCx1 input
- ✓ Digital VIF 12 bits output
- ✓ Digital SIF 12 bits output

Analog TV Video decoder

- ✓ Support NTSC/PAL/SECAM decode :
 - NTSC-M, NTSC-443.
 - PAL-BDGHI, PAL-M, PAL-N, PAL-60, PAL-CN
 - SECAM.
- ✓ 2 x 10bit 27MHz analog ADC
- ✓ Support up to 2x CVBS input
- ✓ Support up to 1x S-video input
- ✓ 2D comb filter for NTSC / PAL
- ✓ 2D/1D comb filter for NTSC/PAL and SECAM
- ✓ Support Macrovision
- ✓ Support color and video process function
 - Luminance Brightness/Contrast.
 - Luminance Peaking and Coring.
 - Simple NEC White Balance Function

TV audio-in standard

- ✓ Supports multi-standard TV broadcasting includes : FM-Mono (from NICAM), AM-Mono (from NICAM) and BTSC
- ✓ Digital dbx Noise Reduction for BTSC stereo and SAP
- ✓ Automatic Standard Sound Detection
- ✓ One FM demodulator, one AM demodulator and one BTSC demodulator inside.
- ✓ If the audio format is FM-A2, just supports one of the FM-A2 channel. And plays as mono sound.
- ✓ BTSC is supported.

Analog RGB/YPbPr Input Interface

- ✓ 2A input for YpbPr and VGA
- ✓ YPbPr input up to 1080p which is shared with VGA RGB input up to SXGA
- ✓ Support Sync-On-Green(SOG) and Composite-Sync(CS) mode
- ✓ Support YPrPb video input up to 1080i/1080p with Sync-Processor
- ✓ On-chip high-performance PLLs
- ✓ High resolution 128 phase APLL

European SCART Interface

- ✓ Support 1 full SCART with composite video and RGB
- ✓ Support 1 half SCART with composite video and S-video
- ✓ Support SCART RGB fast-blank

Digital Video Input Interface

- ✓ 1x video-8 input is supported

HDMI 1.3 Compliant Digital Input Interface

- ✓ **1 x HDMI RX port with D-switch is supported**
- ✓ HDMI RX input which is shared as DVI input
- ✓ Single link on-chip TMDS receiver
- ✓ Long cable support to 3.4GHz Direct connect to HDMI compliant TMDS transmitters
- ✓ High-Bandwidth Digital Content Protection (HDCP) 1.1 compliant
- ✓ Enhanced protection of HDCP secret key
- ✓ Support long-cable
- ✓ Support Hot-Plug function
- ✓ Support CEC
- ✓ EIA/CEA-861B

Digital Video Output Interface

- ✓ Built-in fully programmable display timing generator
- ✓ Integrated dual 8-bit LVDS transmitter
- ✓ Support single 6-bit RSDS interface with programmable TCON
- ✓ Support single 6-bit TTL output interface
- ✓ Support up to 170MHz (up to WUXGA 1920x1080p@60Hz)
- ✓ Integrated high-quality Spread-Spectrum Display PLL

Audio IO

- ✓ Two channel (Stereo) DAC support 32KHz, 44.1KHz, 48KHz, 96KHz, 192KHz sample rate
- ✓ Headphone power
 - 35mW into 32Ω @1kHz and 1% THD+N
 - 65mW into 16Ω @1kHz and 1% THD+N
- ✓ Support output sampling rate from 32k, 44.1k, 48kHz
- ✓ Support 2 times sampling rate up-conversion for low sampling rate audio format
- ✓ Support 16-bit, 20-bit, 24-bit PCM data
- ✓ Support S/PDIF output for stereo PCM data
- ✓ 48KHz baseband ADC Sample rate
- ✓ One SPDIF_In support 32KHz, 44.1KHz, 48KHz, 96KHz, 192KHz sample rate.
- ✓ Support 32KHz, 44.1KHz, 48KHz, 96KHz, 192KHz. for HDMI Audio in (6Ch)
- ✓ Embedded Realtek sound effect
- ✓ SRS / BBE software post processing is supported

Smart-Fit™

- ✓ Input format detection
- ✓ Compatibility with standard VESA mode and support user-defined mode
- ✓ Smart engine for Phase and Image position calibration
- ✓ Video brightness/contrast/saturation calibration
- ✓ Frame-Lock display to keep smooth motion

High-Quality Video Processor

- ✓ Clean-Picture™ II for spatial and Mosquito noise reduction

Ultra-Zoom™

- ✓ Fully programmable zoom ratios
- ✓ Independent horizontal/vertical scaling
- ✓ High-quality zoom algorithm

- ✓ Programmable Sharpness/Smooth enhancement
- ✓ Support “Anamorphic” and “Panoramic” scaling

Vivid-Color™

- ✓ Up to 10 bit processing
- ✓ Input color space conversion
- ✓ Support YUV/YCrCb/YPrPb to RGB color-space conversion
- ✓ Digital hue and saturation adjustments
- ✓ Digital brightness and contrast adjustments
- ✓ Support DLTI/DCTI video-quality improvement
- ✓ ICM for 6 Independent Color Manager
- ✓ Support Black/White Level Expansion
- ✓ Support Y peaking filter and coring
- ✓ Support DCC
- ✓ sRGB compliance
- ✓ Support dual R/G/B 10-bit Gamma correction
- ✓ 3Dither™ serves as advanced dithering function

Embedded OSD

- ✓ Embedded 16.5K SRAM dynamically stores OSD command and fonts
- ✓ Support multi-color RAM font, 1, 2 and 4-bit per pixel
- ✓ 64 color palette
- ✓ Maximum-10 window with alpha-blending/gradient / gradient target color / gradient reversed color/ dynamic fade-in/fade-out, bordering/shadow/3D window type OSD-made internal pattern generator for factory mode
- ✓ Rotary 90,180,270 degree
- ✓ Independent row shadowing/bordering
- ✓ Programmable blinking effects for each character
- ✓ OSD-made internal pattern generator for factory mode
- ✓ Support 12x18~4x18 proportional font
- ✓ Hardware decompression for OSD font
- ✓ Support OSD scrolling
- ✓ Support 2 independent font based OSD

Memory Interface

- ✓ Support external serial FLASH with 256Kbyte and 512Kbyte

CPU and System

- ✓ Industrial standard 8051 core with external serial flash

Peripheral IO

- ✓ Support two 16550 UARTs, each has 16-byte FIFO.
- ✓ Support one IrDA Rx interface, which complies with NEC, SHARP, Sony SIRC protocol I, and Philips RC-5.
- ✓ Support 2 x I2C master interfaces to access tuner, demodulator, or LCD TV controller and any other I2C slave compliant modules.
- ✓ Support 1x I2C slave interface
- ✓ Support up to 16 PWM output.
- ✓ Support 3 Timers/Counters for CPU and 1 watchdog timer
- ✓ Embedded DDC support DDC1, DDC2B, DDC/CI
- ✓ Support GPIO with digital output
- ✓ Support 4x low speed 8 bit ADC

VBI part

- ✓ CC : CC1, 2, 3 and 4, Text 1, 2, 3 and 4, XDS (eXtension Data Service), V Chip
- ✓ WSS : ETSI EN 300 294, ITU-R BT.119 method, IEC-61880 method, CC-XDS method
- ✓ CGMS : ETSI EN 300 294, ITU-R BT.119 method, IEC-61880 method, CC-XDS method

Teletext

- ✓ Support Teletext 1.5 and capable of 10 page navigation.
- ✓ Support TOP/FLOF/FASTTEXT navigation
- ✓ Support Subtitle and News Flash
- ✓ Support timecode display and rolling header
- ✓ Support Multi-Language display

Others

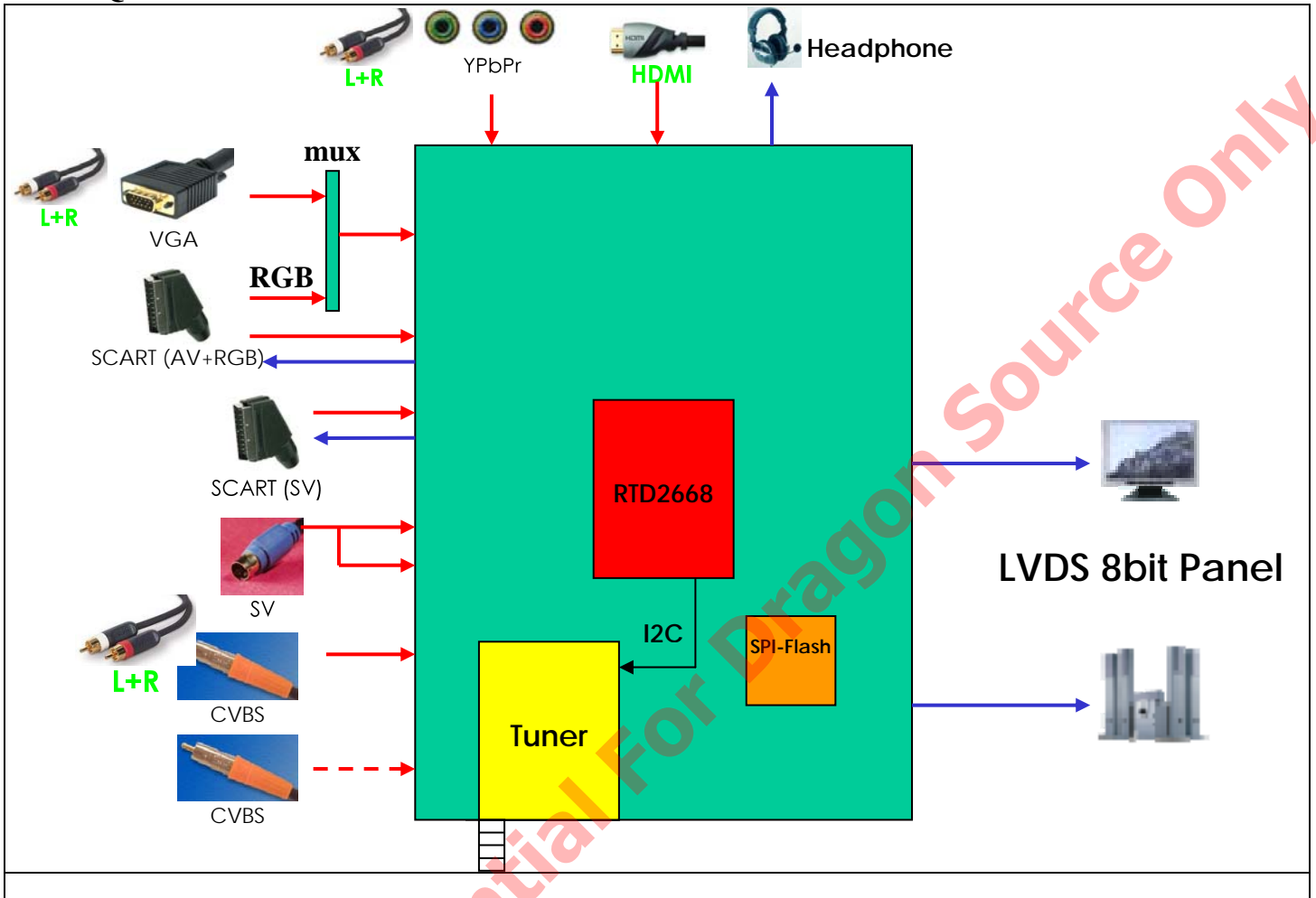
- ✓ Support Frame-Sync on MAIN-channel
- ✓ Support PWM output
- ✓ Support low-voltage-reset output
- ✓ Support crystal output

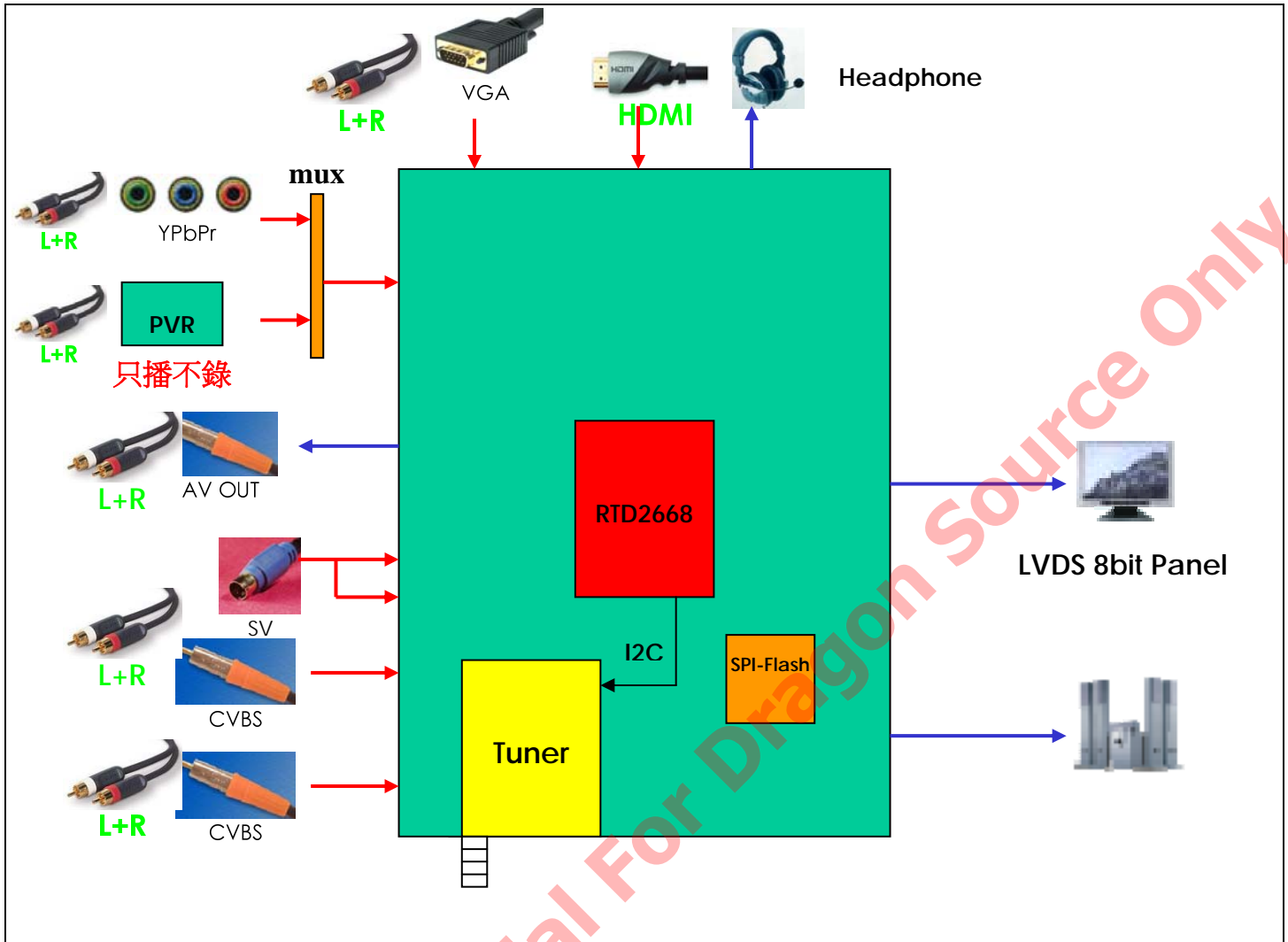
Power & Technology

- ✓ 3.3V/1.2V power supplier
- ✓ 128-pin LQFP package

3. System Application

3.1. LQFP128

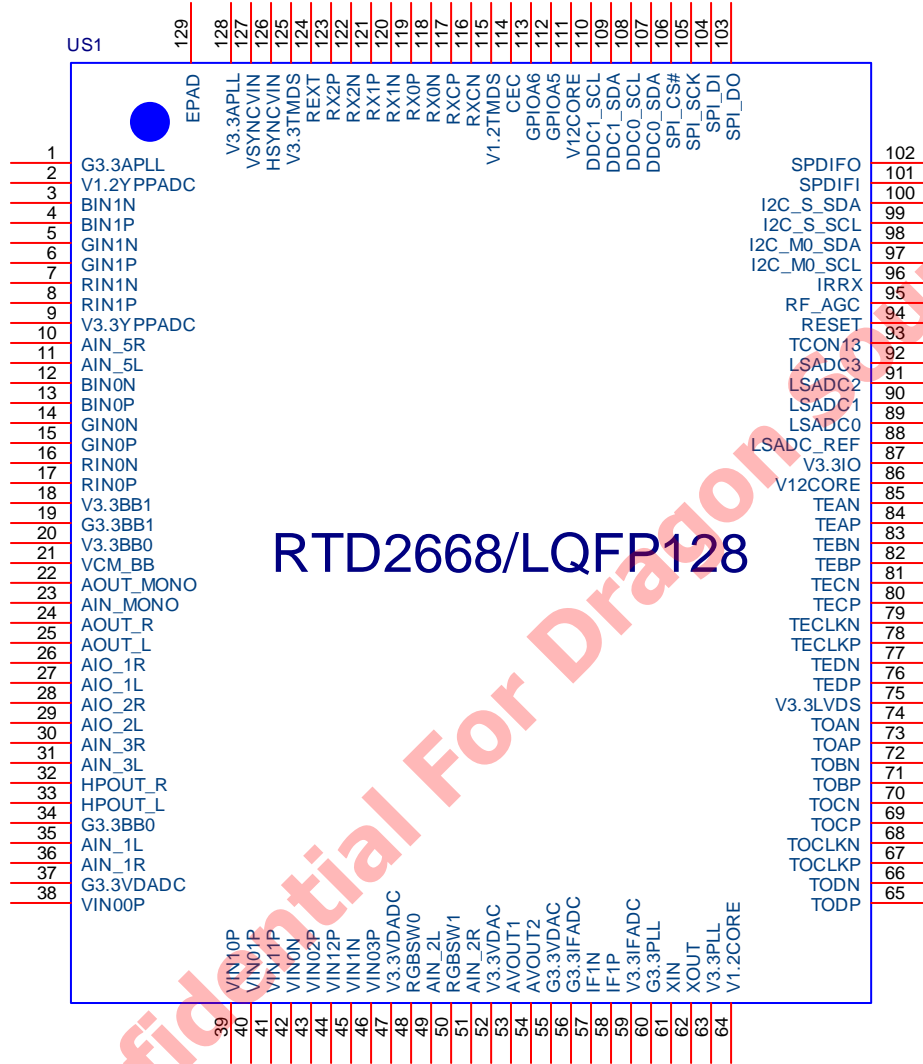




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4. Pin Assignment

4.1. LQFP128 Pin Layout



4.2. Pin Description

Pin NO	Pin Name	Type	Description	Note
1	G3.3APLL	AP	APLL Ground	
2	V1.2YPPADC	AP	1.2V YPbPr ADC Power	
3	BIN1N	AI	B channel 1 -	
4	BIN1P	AI	B channel 1 +	
5	GIN1N	AI	G channel 1 -	
6	GIN1P	AI	G channel 1 +	
7	RIN1N	AI	R channel 1 -	
8	RIN1P	AI	R channel 1 +	
9	V3.3YPPADC	AP	3.3V YPbPr ADC Power	
10	AIN_5R	AO	Audio R ADC input 5	
11	AIN_5L	AO	Audio L ADC input 5	
12	BIN0N	AI	B channel 0 -	
13	BIN0P	AI	B channel 0 +	
14	GIN0N	AI	G channel 0 -	
15	GIN0P	AI	G channel 0 +	
16	RIN0N	AI	R channel 0 -	
17	RIN0P	AI	R channel 0 +	
18	V3.3BB1	IO	3.3V BaseBand Audio Power1	
19	G3.3BB1	AP	BaseBand Audio ADC/DAC Ground1	
20	V3.3BB0	IO	3.3V BaseBand Audio Power0	
21	VCM_BB	AO	BaseBand Audio ADC Common mode voltage	1uF to G3.3BB
22	AOUT_MONO	AO	Audio mono output	
23	AIN_MONO	AO	Audio mono input	
24	AOUT_R	P	Audio R DAC output	
25	AOUT_L	P	Audio L DAC output	
26	AIO_1R	AIO	Audio R ADC input 1/DAC output1	
27	AIO_1L	AIO	Audio L ADC input 1/DAC output1	
28	AIO_2R	AIO	Audio R ADC input 2/DAC output2	
29	AIO_2L	AIO	Audio L ADC input 2/DAC output2	
30	AIN_3R	AO	Audio R ADC input 3	
31	AIN_3L	AO	Audio L ADC input 3	
32	HPOUT_R	IO	HeadPhone output R	
33	HPOUT_L	IO	HeadPhone output L	
34	G3.3BB0	AP	BaseBand Audio ADC/DAC Ground0	
35	AIN_1R	AO	Audio R ADC input 1	
36	AIN_1L	AO	Audio L ADC input 1	
37	G3.3VDADC	AP	Video Decoder ADC Ground	
38	VIN00P	AI	VideoDecoder ADC0 input 0 +	
39	VIN10P	AI	VideoDecoder ADC1 input 0 +	
40	VIN01P	AI	VideoDecoder ADC0 input 1 +	
41	VIN11P	AI	VideoDecoder ADC1 input 1 +	
42	VIN0N	AI	VideoDecoder ADC0 input -	
43	VIN02P	AI	VideoDecoder ADC0 input 2 +	
44	VIN12P	AI	VideoDecoder ADC1 input 2 +	
45	VIN1N	AI	VideoDecoder ADC1 input -	
46	VIN03P	AI	VideoDecoder ADC0 input 3 +	
47	V3.3VDADC	AP	3.3V Video Decoder ADC Power	
48	RGBSW0	AI	SCART-RGB Fast-Switch 0	
49	AIN_2L	AO	Audio L ADC input 2	
50	RGBSW1	AI	SCART-RGB Fast-Switch 1	
51	AIN_2R	AO	Audio R ADC input 2	
52	V3.3VDAC	AP	3.3V Video DAC Power	
53	AVOUT1	AO	CVBS output1	
54	AVOUT2	AO	CVBS output2	
55	G3.3VDAC	AP	VideoDAC Ground	
56	G3.3IFADC	AP	IF ADC Ground	
57	IF1P	AI	IF input +	
58	IF1N	AI	IF input -	
59	V3.3IFADC	AP	3.3V IF ADC Power	
60	G3.3PLL	AP	PLL Ground	
61	XIN	AI	XTALI	
62	XOUT	AO	XTALO	
63	V3.3PLL	AP	3.3V PLL Power	
64	V1.2CORE	P	1.2V Core Power	
65	TODP	AIO	LVDS Odd port D+	
66	TODN	AIO	LVDS Odd port D-	
67	TOCLKP	AIO	LVDS Odd port CLK+	
68	TOCLKN	AIO	LVDS Odd port CLK-	
69	TOCP	AIO	LVDS Odd port C+	
70	TOCN	AIO	LVDS Odd port C-	

71	TOBP	AIO	LVDS Odd port B+	
72	TOBN	AIO	LVDS Odd port B-	
73	TOAP	AIO	LVDS Odd port A+	
74	TOAN	AIO	LVDS Odd port A-	
75	V3.3LVDS	AP	3.3V LVDS Power	
76	TEDP	AO	LVDS Even port D+	
77	TEDN	AO	LVDS Even port D-	
78	TECLKP	AO	LVDS Even port CLK+	
79	TECLKN	AO	LVDS Even port CLK-	
80	TECP	AO	LVDS Even port C+	
81	TECN	AO	LVDS Even port C-	
82	TEBP	AO	LVDS Even port B+	
83	TEBN	AO	LVDS Even port B-	
84	TEAP	AO	LVDS Even port A+	
85	TEAN	AO	LVDS Even port A-	
86	V1.2CORE	P	1.2V Core Power	
87	V3.3IO	P	3.3V IO Power	
88	LSADC REF	AP	LSADC Reference Voltage	10K to G3.3LSADC
89	LSADC0	AI	LSADC input 0	
90	LSADC1	AI	LSADC input 1	
91	LSADC2	AI	LSADC input 2	
92	LSADC3	AI	LSADC input 3	
93	TCON13	IO	TCON13 output	
94	RESET#	AI	Reset# input	
95	RF_AGC	O	RF AGC control pin	
96	IRRX	IO	IrDA Receiver data	
97	I2C_M0_SCL	IO	I2C Master 0 Serial Clock	
98	I2C_M0_SDA	IO	I2C Master 0 Serial Data	
99	I2C_S_SCL	IO	I2C Slave Serial Clock	
100	I2C_S_SDA	IO	I2C Slave Serial Data	
101	SPDIFI	IO	SPDIF Input	
102	SPDIFO	IO	SPDIF Output	
103	SPI_DO	O	SPI FLASH Serial Data Output	
104	SPI_DI	I	SPI FLASH Serial Data Input	
105	SPI_SCK	O	SPI FLASH Serial Clock Output	
106	SPI_CS#	O	SPI FLASH Chip Select	
107	DDC0_SDA	IO	DDC 0 Serial Data	
108	DDC0_SCL	IO	DDC 0 Serial Clock	
109	DDC1_SDA	IO	DDC 1 Serial Data	
110	DDC1_SCL	IO	DDC 1 Serial Clock	
111	V1.2CORE	P	1.2V Core Power	
112	GPIOA5	IO	General Purpose Input/Output port	
113	GPIOA6	IO	General Purpose Input/Output port	
114	CEC	AIO	Consumer Electronic Channel	
115	V1.2TMDS	AP	1.2V TMDS Power	
116	RXCN	AI	TMDS RX Clock-	
117	RXCP	AI	TMDS RX Clock+	
118	RX0N	AI	TMDS RX Data 0-	
119	RX0P	AI	TMDS RX Data 0+	
120	RX1N	AI	TMDS RX Data 1-	
121	RX1P	AI	TMDS RX Data 1+	
122	RX2N	AI	TMDS RX Data 2-	
123	RX2P	AI	TMDS RX Data 2+	
124	HDMI_REXT	AI	TMDS External Resistor	1K to V3.3TMDS
125	V3.3TMDS	AP	3.3V TMDS Power	
126	HSYNCVIN	I	Hsync Input	
127	VSYNCVIN	IO	Vsync Input	
128	V3.3APLL	AP	3.3V APLL Power	
Note	1. AP : Analog Power/Ground 2. AI : Analog Input 3. AO : Analog Output 4. AIO : Analog Input/Output 5. P : Digital Power/Ground 6. I : Digital Input 7. O : Digital Output 8. IO : Digital Input/Output			

4.3. Pin Share Table

QFP128	Pin Name	alternative 1	alternative 2	alternative 3	alternative 4	alternative 5	alternative 6	alternative 7
10	AIN_5R	AGPO						
11	AIN_5L	AGPO						
28	AIO_2R	AGPO						
29	AIO_2L	AGPO						
38	VIN00P	AGPO						
39	VIN10P	AGPO						
40	VIN01P	AGPO						
41	VIN11P	AGPO						
42	VIN0N	AGPO						
43	VIN02P	AGPO						
44	VIN12P	AGPO						
45	VIN1N	AGPO						
46	VIN03P	AGPO						
48	RGBSW0	AGPO						
49	AIN_2L	AGPO						
50	RGBSW1	AGPO						
51	AIN_2R	AGPO						
54	AVOUT2	AGPO						
65	TODP		B_R0P	TTL_BLU9	TOAP			
66	TODN		B_R0N	TTL_BLU8	TOAN			
67	TOCLKP		B_R1P	TTL_BLU7	TOBP			
68	TOCLKN		B_R1N	TTL_BLU6	TOBN			
69	TOCP		B_R2P	TTL_BLU5	TOCP			
70	TOCN		B_R2N	TTL_BLU4	TOCN			
71	TOBP		B_CLKP	TTL_CLK	TOCLKP			
72	TOBN		B_CLKN	TTL_DHS	TOCLKN			
73	TOAP		B_G0P	TTL_GRN9	TODP			
74	TOAN		B_G0N	TTL_GRN8	TODN			
76	TEDP		B_G1P	TTL_GRN7	TEAP			
77	TEDN		B_G1N	TTL_GRN6	TEAN			
78	TECLKP	GPIOD[0]	B_G2P	TTL_GRN5	TEBP			
79	TECLKN	GPIOD[1]	B_G2N	TTL_GRN4	TEBN			
80	TECP		B_B0P	TTL_RED9	TECP			
81	TECN		B_B0N	TTL_RED8	TECN			
82	TEBP		B_B1P	TTL_RED7	TECLKP			
83	TEBN		B_B1N	TTL_RED6	TECLKN			

84	TEAP		B_B2P	TTL_RED5	TEDP			
85	TEAN		B_B2N	TTL_RED4	TEDN			
89	LSADC0	AGPO						
90	LSADC1	AGPO						
91	LSADC2	AGPO						
92	LSADC3	AGPO						
93	TCON13	GPIOA[7]/PWM	IRQ_OUT	IRRX	V8_DATA7	XTAL_OUT	IF_AGC	
95	RF_AGC	GPIOC[3]/PWM	TCON10					
96	IRRX	GPIOC[2]/PWM	TCON11	XTAL_OUT	V8_CLK			
97	I2C_M0_SCL	GPIOC[1]/PWM	TCON12		UART0_TX	I2C_S_SCL		
98	I2C_M0_SDA	GPIOC[0]/PWM	TCON13		UART0_RX	I2C_S_SDA		
99	I2C_S_SCL	GPIOA[4]/PWM	TCON0	XTAL_OUT	V8_DATA4	I2S_O_DATA2	I2C_M1_SCL	I2S_I_DATA2
100	I2C_S_SDA	GPIOA[3]/PWM	TCON1	SPDIFO	V8_DATA3	I2S_O_DATA1	I2C_M1_SDA	I2S_I_DATA1
101	SPDIFI	GPIOA[2]/PWM	TCON2	TTL_DEN	V8_DATA2	I2S_O_DATA0		I2S_I_DATA0
102	SPDIFO	GPIOA[1]/PWM	TCON3	TTL_DVS	V8_DATA1	I2S_O_MCLK		I2S_I_MCLK
103	SPI_DO	GPIOB[7]/PWM						
104	SPI_DI	GPIOB[6]/PWM						
105	SPI_SCK	GPIOB[5]/PWM						
106	SPI_CS#	GPIOB[4]/PWM						
107	DDC0_SDA	GPIOB[3]/PWM	TCON8	I2C_S_SDA	V8_DATA0	UART0_TX	UART1_TX	I2C_M1_SDA
108	DDC0_SCL	GPIOB[2]/PWM	TCON9	I2C_S_SCL	V8_CLK	UART0_RX	UART1_RX	I2C_M1_SCL
109	DDC1_SDA	GPIOB[1]/PWM	UART0_TX	UART1_TX	TCON6			
110	DDC1_SCL	GPIOB[0]/PWM	UART0_RX	UART1_RX	TCON4			
112	GPIOA5	GPIOA[5]/PWM	TCON5	IF_AGC	V8_DATA5	I2S_O_WS	UART1_RX	I2S_I_WS
113	GPIOA6	GPIOA[6]/PWM	TCON7	IRQ_OUT	V8_DATA6	I2S_O_SCLK	UART1_TX	I2S_I_SCLK
126	HSYNVIN	GPIOC[5]						
127	VSYNVIN	GPIOC[4]/PWM						

4.4. Package connection for EuroSCART and China standard

Pin NO	Pin Name	Euro SCART	China Standard
3	BININ	VGA BIN-	VGA BIN-
4	BINIP	VGA BIN+	VGA BIN+
5	GININ	VGA GIN-	VGA GIN-
6	GINIP	VGA GIN+	VGA GIN+
7	RININ	VGA RIN-	VGA RIN-
8	RINIP	VGA RIN+	VGA RIN+
10	AIN_5R	VGA Audio in R	VGA Audio in R
11	AIN_5L	VGA Audio in L	VGA Audio in L
12	BIN0N	Component Pb- /SCART BIN-	Component Pb-
13	BIN0P	Component Pb+ /SCART BIN+ by video mux	Component Pb+
14	GIN0N	Component Y- /SCART GIN-	Component Y-
15	GIN0P	Component Y+ /SCART GIN+ by video mux	Component Y+
16	RIN0N	Component Pr- /SCART RIN-	Component Pr-
17	RIN0P	Component Pr+ /SCART RIN+ by video mux	Component Pr+

22	AOUT_MONO	Stereo in(Component/Full SCART RGB)	Stereo in of Component
23	AIN_MONO	Stereo in(Component/Full SCART RGB)	Stereo in of Component
24	AOUT_R	Speaker	Speaker
25	AOUT_L	Speaker	Speaker
26	AIO_1R	Full SCART Audio DAC out R	DAC out R
27	AIO_1L	Full SCART Audio DAC out L	DAC out L
28	AIO_2R	Half SCART Audio DAC out R	Can be GPO
29	AIO_2L	Half SCART Audio DAC out L	Can be GPO
30	AIN_3R	Full SCART Audio in R	Audio of SV in R
31	AIN_3L	Full SCART Audio in L	Audio of SV in L
32	HPOUT_R	Head phone	Head Phone
33	HPOUT_L	Head phone	Head Phone
35	AIN_1R	Half SCART Audio in R	Audio in of CVBS0 R
36	AIN_1L	Half SCART Audio in L	Audio in of CVBS0 L
38	VIN00P	SV_Y+	CVBS0+
39	VIN10P	SV_C+	CVBS1+
40	VIN01P	CVBS0+	SV_Y+
41	VIN11P	CVBS1+	SV_C+
42	VIN0N	ADC0 negative	ADC0 negative
43	VIN02P	Half SCART SV_Y+	Can be GPO
44	VIN12P	Half SCART SV_C+	Can be GPO
45	VIN1N	ADC1 negative	ADC1 negative
46	VIN03P	Full SCART CVBS+	Can be GPO
48	RGBSW0	Full SCART	Can be GPO
49	AIN_2L	Audio in of SV/CVBS L	Can be GPO
50	RGBSW1	Can be GPO	Can be GPO
51	AIN_2R	Audio in of SV/CVBS R	Can be GPO
53	AVOUT1	Full SCART AVOUT	AVOUT
54	AVOUT2	Half SCART AVOUT	Can be GPO

4.5. Package Identification

Green package is indicated by a 'G' in the location marked 'T'.

5. Electrical Characteristics

5.1. Absolute Maximum Ratings

WARNING : Absolute maximum ratings are limits beyond which permanent damage may be caused to the device, or device reliability will be affected. All voltages are specified reference to GND unless otherwise specified.

Parameter		Min	Max	Units
IO Supply Voltage (V3.3IO)		-0.5	4	V
Core Supply Voltage (V1.2CORE)		-0.5		V
Analog Supply Voltage (V1.2YPbPrADC)		-0.5		V
Analog Supply Voltage	V3.3TMDS	-0.5	4	V
	V3.3LSADC			
	V3.3YPbPrADC			
	V3.3VDADC			
	V3.3IFADC			
	V3.3VDAC			
	V3.3PLL			
	V3.3LVDS			
	3.3AVDD_ADAC			
Short circuit current		-		mA
Storage Temperature		-55	+125	°C
Power Dissipation				W

5.2. Recommended Operating Conditions

Parameter		Min	Typ	Max	Units
IO Supply Voltage (V3.3IO)		3.0	3.3	3.6	V
Core Supply Voltage (V1.2CORE)		1.2	1.3	1.4	V
Analog Supply Voltage (V1.2YPPADC)		1.2	1.3	1.4	V
Analog Supply Voltage	V3.3TMDS	3.0	3.3	3.6	V
	V3.3LSADC				
	V3.3YPPADC				
	V3.3VDADC				

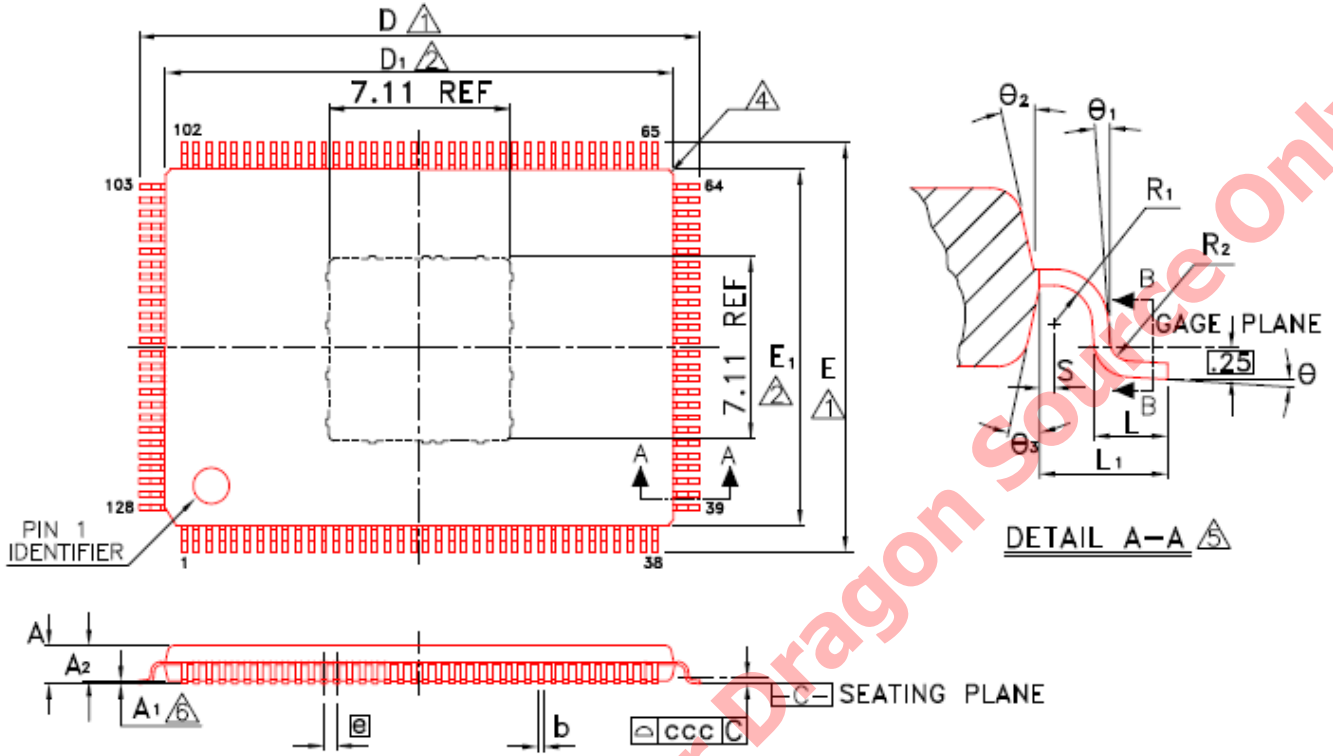
	V3.3IFADC				
	V3.3VDAC				
	V3.3PLL				
	V3.3LVDS				
	V3.3BB				
Ambient Temperature		0		70	°C
Maximum Junction Temperature				+125	°C

5.3. Crystal Condition

Parameter	Min	Typ	Max	Units
Crystal reference frequency, fundamental mode		27		MHz
Stability	-30		+30	ppm
Tolerance	-30		+30	ppm
Duty Cycle		40	60	%
Load Capacitance		20		pF

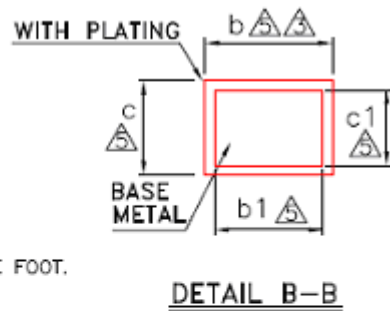
6. Mechanical Dimensions

6.1. 128 LQFP(14X20X1.4mm)



NOTE :

- △ TO BE DETERMINED AT SEATING PLANE \square .
- △ DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD PROTRUSION. D1 AND E1 ARE MAXIMUM PLASTIC BODY SIZE DIMENSIONS INCLUDING MOLD MISMATCH.
- △ DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. DAMBAR CAN NOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT.
- △ EXACT SHAPE OF EACH CORNER IS OPTIONAL.
- △ THESE DIMENSIONS APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN 0.10 mm AND 0.25 mm FROM THE LEAD TIP.
- △ A1 IS DEFINED AS THE DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT OF THE PACKAGE BODY.
- 7. CONTROLLING DIMENSION : MILLIMETER.
- 8. REFERENCE DOCUMENT : JEDEC MS-026
- 9. SPECIAL CHARACTERISTICS C CLASS: ccc



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	0.007	0.009	0.011
b ₁	0.17	0.20	0.23	0.007	0.008	0.009
c	0.09	—	0.20	0.004	—	0.008
c ₁	0.09	—	0.16	0.004	—	0.006
D	21.90	22.00	22.10	0.862	0.866	0.870
D ₁	19.90	20.00	20.10	0.783	0.787	0.791
E	15.90	16.00	16.10	0.626	0.630	0.634
E ₁	13.90	14.00	14.10	0.547	0.551	0.555
Ⓜ	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	4° TYP			4° TYP		
θ ₂	12° TYP			12° TYP		
θ ₃	12° TYP			12° TYP		
ccc	0.08			0.003		

7. Ordering Information

Table 1. Ordering Information

Part Number	Package	Status
RTD2668	EPAD LQFP-128 'Green' Package	Production

8.

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