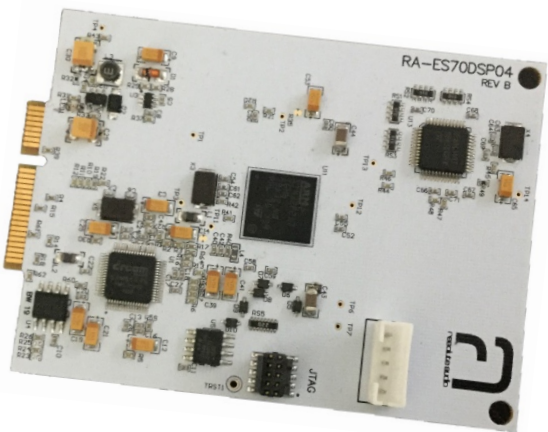


6x audio-in, 8x audio-out DSP module with AES70 remote control and on-board web user interface

Applications

- *Networked Speakers*
- *Pro-audio Amplifiers*
- *Distribution Amplifiers*
- *Conference Systems*
- *Networked Microphones*
- *Networked Effects Gear*



Revision History

Version	Date	Description
0.01	01/05/2020	Draft datasheet

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General Description

The RA-ES70DSP04 is a professional audio DSP module with built in open standard (AES70) remote control functionality. The DSP module includes the AES70 device model so that any compliant controller can control its functionality, as well as an on-board web-based user interface.

The audio processing is separate from the control processor, so there is no performance degradation with control complexity. The dedicated DREAM DSP has a vast library of algorithms to select, including:

Crossover Filters: Bessel, Butterworth, Linkwitz-Riley

Parametric Equalisation (up to 31 bands)

Compressor, Limiter and Noise Gate

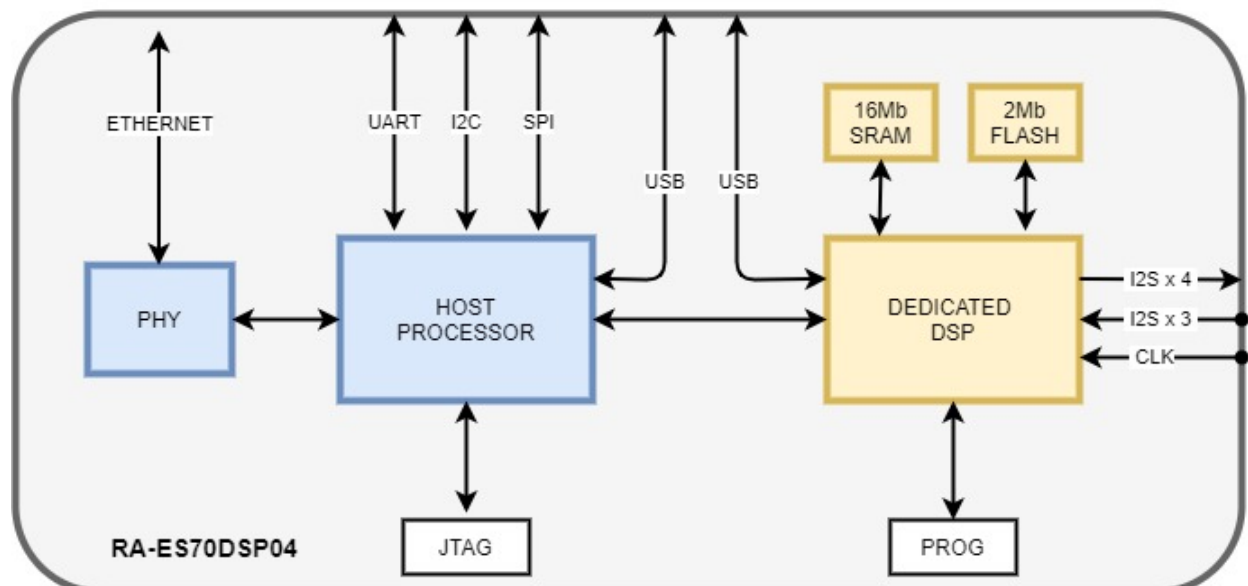
Delay (time alignment)

Mixing, Gain, Peak Level

Vocal Reverb, Spring Reverb and other effects

The RA-ES70DSP04 has 3 x I²S inputs and 4 x I²S outputs for connection to audio sources such as converters, SPDIF interfaces or AoIP processors.

Block Diagram



Pin Description

Edge connector P2

Pin	Net	Pin Description
1,2,3,4	5VD	+5V supply
5,6,7,8	GND	0V ground
9	MCU_SPI_NCS0	SPI interface. The SPI can run in slave and master modes in full-duplex and simplex communication modes. It can communicate at up to 15 Mbit/s. The 3-bit prescaler gives 8 master mode frequencies and the frame is configurable to 8 bits or 16 bits. The SPI interface can be configured to operate in TI mode for communications in master mode and slave mode.
10	RXD0	Receive pin of universal synchronous/asynchronous receiver transmitter(USART). Supports up to 7.5Mbit/s.
11	MCU_SPI_SCK	SPI Interface see pin 9
12	TXD0	Transmit pin of universal synchronous/asynchronous receiver transmitter(USART). Supports up to 7.5Mbit/s.
13	MCU_SPI_MOSI	SPI Interface see pin 9
14	RESET_MOD	Configurable GPIO
15	MCU_SPI_MISO	SPI Interface see pin 9
16	AUDIO_OUT_3	I2S output
17	GPIO(DAC_MUTE)	Configurable GPIO pin PH14 on MCU. (Used for DAC_MUTE on the RA-ES70DSP04-EVM board)
18	RA_ETH_RD_P	Ethernet PHY differential receive input (PMD Input Pair). These differential inputs are automatically configured to accept either 100BASE-TX or 10BASE-T signaling.
19	RESET_RA	Reset pin. When pulled low it will reset host processor, DSP, PHY and the JTAG.
20	RA_ETH_RD_N	Ethernet PHY signal requiring external magnetics. See pin 18
21	GPIO(NRESET_CODEEC)	Configurable GPIO pin PH12 on MCU. (Used for NRESET_CODEEC on the RA-ES70DSP04-EVM board)
22	RA_ETH_TD_P	Ethernet PHY differential common driver transmit output (PMD Output Pair). These different outputs are automatically configured to either 10BASE-T or 100BASE-TX signalling.
23	I2C_SCL	I2C Clock pin. The interface can operate in multimaster and slave modes, and can support the Standard- and Fast-modes. Supports

		the 7/10-bit addressing mode and the 7-bit dual addressing mode (as slave). A hardware CRC generation/verification is embedded.
24	RA_ETH_TD_N	Ethernet PHY signal requiring external magnetics. See pin 22
25	I2C_SDA	I2C Data pin. See pin 23
26	GND	0V ground
27	DREAM_MCLK	DSP master clock output.
28	RA_ETH_LED_A	LINK LED: This pin indicates the status of the LINK. The LED will be ON when Link is good.
29	AUDIO_OUT_1	I2S output
30	RA_ETH_LED_B	ACTIVITY LED: This pin is the Activity LED which is ON when activity is present on either Transmit or Receive.
31	AUDIO_IN_1	I2S input
32	IO_INT	Configurable GPIO from pin PI2 on MCU. Nominally programmed as GPIO expander interrupt
33	AUDIO_OUT_2	I2S output
34	OTG_FS_ID	Universal serial bus on-the-go full-speed (OTG_FS) from MCU. USB OTG full-speed device/host/OTG peripheral with integrated transceivers. The USB OTG FS peripheral is compliant with the USB 2.0 specification and with the OTG 1.0 specification. It has software-configurable endpoint setting and supports suspend/resume.
35,36	GND	0V ground
37	SDATAIN	I2S Input
38	DREAM_USB_P	USB 2.0 High-Speed port from DSP. It can be used as Device, Host or Dual Role
39	GPIO	Configurable GPIO pin(Used in bootloader during startup to use B8 on the RA-ES70DSP04-EVM)
40	DREAM_USB_N	USB 2.0 High-Speed port from DSP. It can be used as Device, Host or Dual Role
41	SDATAOUT	I2S Output
42	OTG_FS_USB_P	USB on-the-go full-speed (OTG_FS) from MCU. See pin 34
43	AUDIO_IN_2	I2S input
44	OTG_FS_USB_N	USB on-the-go full-speed (OTG_FS) from MCU. See pin 34
45,46	GND	0V ground
47	MCLK	Incoming Master Clock to synchronise the DSP to I2S audio streams
48	OTG_FS_OverCurrent	USB on-the-go full-speed (OTG_FS) from MCU. See pin 34

49	DREAM_SCLK	DSP bit clock output for I2S Note: FS1 Pin sensed at power up. FS1 FS0 allows boot ROM code to know operating freq. on oscillator OSC1 as follows: 00->12MHz(Default) 01->9.6MHz, 10->11.2896MHz, 11->12.288MHz
50	OTG_FS_PowerSwitchOn	Universal serial bus on-the-go full-speed (OTG_FS) from MCU. See pin 34
51	LRCK	DSP word clock. Output by default. Input if external device used. Note: FS0 Sensed at power up. FS1 FS0 allows boot ROM code to know operating freq on OSC1 (see FS1)
52	VBUS_FS	VBUS for USB Full-Speed(FS) On-The-Go(OTG) port

Application

Bootloader mode. The ES70DSP04 comes pre-installed with a bootloader enabling the user to upgrade the firmware using Trivial File Transfer Protocol(TFTP). To enter bootloader mode, hold GPIO pin 39 low during startup.

Using the RA-ES70DSP04-EVM board this is achieved using a jumper cable between pin 5 of X5 and pin 9 of P30. Button B8 can then be used to hold the GPIO pin low during startup. The jumper cable may then be removed.

The default static IP address for the bootloader and Application is 192.168.1.10.

Electrical Characteristics

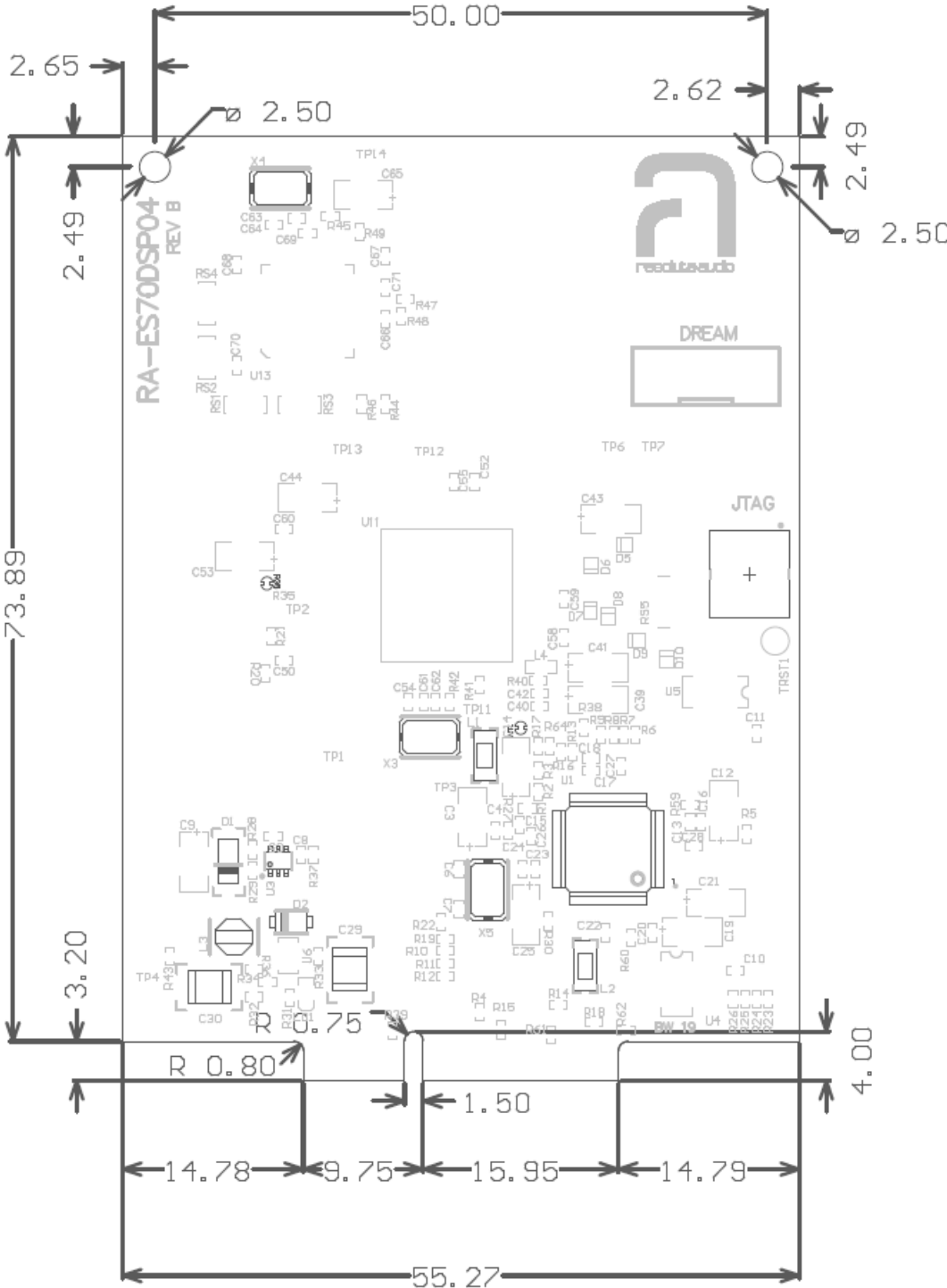
Measured at ambient temperature 25°C

<i>SYMBOL</i>	<i>PARAMETER</i>	<i>CONDITIONS</i>	<i>Min.</i>	<i>Typ.</i>	<i>Max.</i>	<i>Units</i>
V_s	Input Voltage		4.5	5.0	5.5	V
I_{typ}	Input Current	No Ethernet		60		mA
I_H	Input Current	High load		110	120	mA
t_d	Start-up Delay			4		ms
t_r	Reset Delay					ms
V_R	PSU Ripple +3.3V	BW 175MHz		45		mV
I_R	3.3V Ripple Current	BW 120MHz		4		mA

Start-up Profile

Layout Considerations

Physical Dimensions(mm)



Additional Information