TECHNICAL DATASHEET

Enhanced Audio Compact Relay rev 1.0

EACRv1

DeviceFab

Highlights & Features

- Module OUT will follow AUDIO balanced signal on audio input
- Up to 8925 impulses memory and up to 322 [h] tape long sequence
- Signal comparator programing up to 128 levels
- 1 pole DIN rail compact size
- Embedded impulse sequence 'tape player' with auto-rewind mode
- Tape with 35 records in EEPROM memory, each can play self in loop up to 255 times
- One record include loop and impulse ON/OFF definitions
- 1 external input (PLAY function)
- Embedded isolated USB-UART adapter
- VIN/GND 2500VAC isolation to AUDIO and USB block
- 6db audio input gain potentiometer on front
- 1 output relay 4xSPDT 2A 240VAC rated
- Wide range supply 7... 30 VDC
- 6 detachable connectors
- 3 signaling led on top of module
- Reverse / Overcurrent / Over Temperature / ESD Protections

Model Family: EACR1

Unit Weight: 92 g

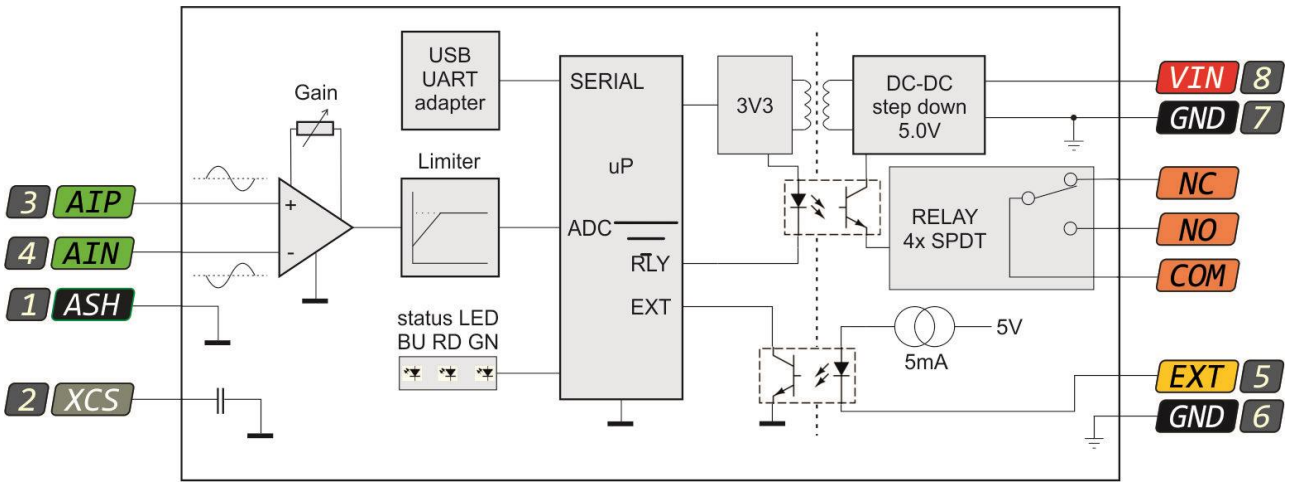
Dimensions (L x W x D): 67 x 18 x 108 mm (with connectors)

General Description

The ultra-compact and competitively priced EACR is DIN rail montage compatible, sound triggered relay, designed for applications requiring high power multi-contact relay output within a tight montage space. The EACR operates with wide range DC supply input and balanced (XLR) audio signal. Each module has embedded USB mini to serial adapter with simple shell terminal to set parameters, define sequence of impulses and has live log preview.

All models in the series put on user, to make their own certification, according to IEC/EN/UL 60950-1 Information Technology Equipment (ITE) and UL 508 Industrial Control Equipment (ICE). The series is fully compliant with RoHS Directive 2011/65/EU for environmental protection. However relays inside have PN-EN 60335-1 compliance and certifications

Functional block diagram



Absolute maximum ratings

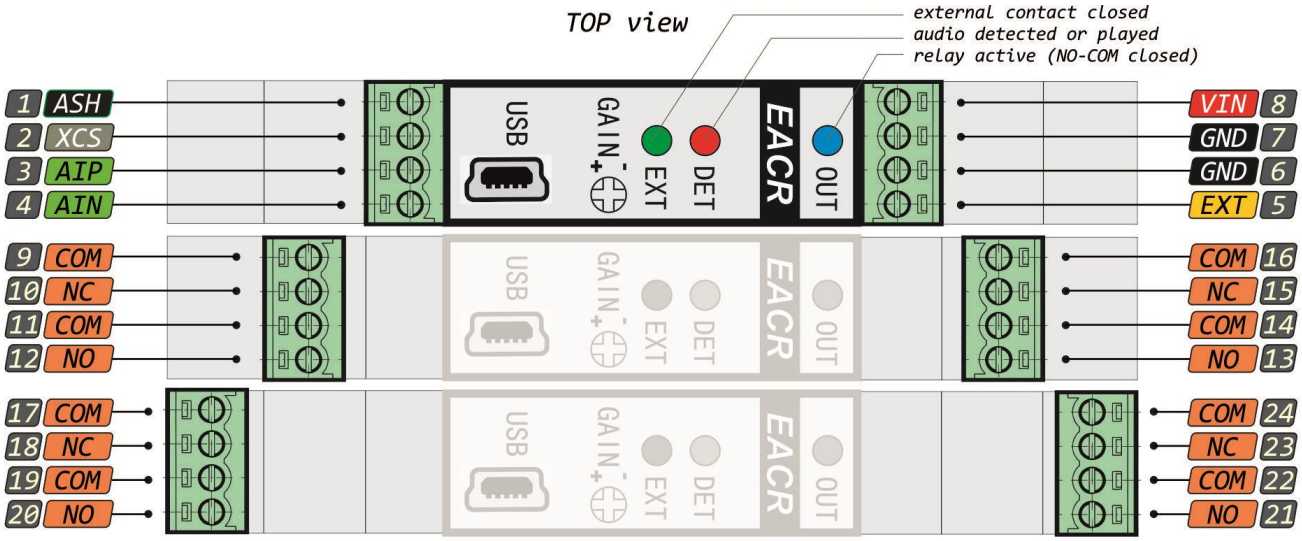
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Input Voltage Range	VIN	margin 300mV to transil SMB33A clump V	6.3	24.0	31.3	Vdc
Audio Input Range	AIP,AIN	Audio input Positive and Negative each ->	-	-	3.0	Vpp
Load Current		<1s ON > 10s OFF (period 11s duty 10%)	0.01		8.0	A

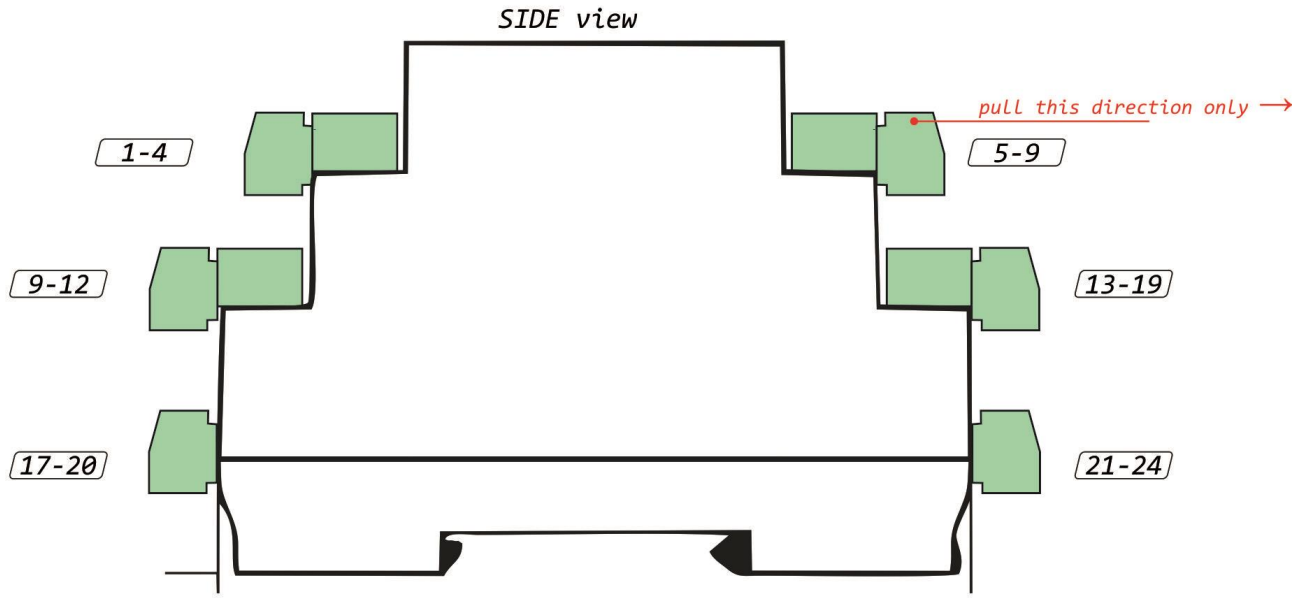
Specifications

Parameter	PIN	Test Condition	Min	Typ	Max	Unit
Supply						
Input Voltage Range recommended	VIN	DC voltage source	7.0	24.0	28.0	Vdc
Supply Current		Vin = 7.0 V (RELAY,EXT,LEDS all ON)	-	250	-	mA
		Vin = 24.0 V	-	70	-	mA
External Input						
Input Current		Contact resistance <1 ohm		5.0		mA
Required Close Time to Detection			75	-	-	ms
Audio Input						
Peak Voltage Positive input	AIP		-0.2	2.0	2.8	Vpp
Peak Voltage Negative input	AIN		0.2	-2.0	-2.8	Vpp
Voltage to ADC full range		Gain 50..100%	0.6	2.0	2.8	Vpp
Frequency Input		s=50 r=50 n=40 m=0	0.1	1.0	22	kHz
Audio Input Calculation						
Vpp			0.61	2.00	2.8	Vpp
Vrms			0.22	0.71	1.0	Vrms
dBu			-11	-0.77	2.2	dBu
dBV			-13	-3.00	0.0	dBV
Output						
Load current Continuous		250VAC rated	0.01	1.0	2.0	A
Load Current Impulse		< 1s ON then > 10s OFF	0.01		8.0	A
Delay Time Relay Contacts		Detector parameter S=1 (measured time)	6.4			ms
		Detector parameter S=250			24.6	ms
USB-UART adapter						
Comunication speed	USB	8N1 -> 8 bit , No parity, 1 bit stop		19200		bps
Receive buffer size		max cmd '–t 123x 65535/65535>23'		23		char
Detector						
ADC resolution				10		bits
Sampling period				100		us
General						
Ambient temperature			0		+60	°C
Insulation pollution degree				3		

Pinout

RM84.pdf





Power
Control Input
GND
Analog Input
Analog SHield
eXtra Cap Shield
240VAC rated

VIN 8 -Power input +7..+30 V
GND 7

EXT 5 -External contact (PLAY). Close to GND to PLAY. Connect to VIN if function is not used.

-High voltage 240VAC rated contacts. Specification for other voltage look in RELPOL model RM84.pdf EACH group of PINs (9-12,17-20) or (13-16,21-24) must be used for same type of voltage. Isolation!

- Analog input for balanced audio signal. Connect common to ASH and optional shield to XCS. If cable has only 3 wires: Positive (AIP), Negative (AIN) and SHIELD then connect SHIELD to (ASH)

USB terminal connection

1) Most of laptops has direct connection USB->GND to EARTH in power supply (middle PIN power cord). EACR USB-GND is connected to PIN1 (ASH) but is galvanic separated from PIN 6,7 (POWER GND). To avoid unwanted ground current from AUDIO GND (ASH) to EARTH, what could damage AUDIO system OUTPUT, use laptop in battery mode (power supply not connected) or detach AUDIO connector from module EACR but live log will be off or partial empty (ADC values 0).
2) Module connected for the first time may require install FTDI driver : http://www.ftdichip.com/Drivers/VCP.htm
3) Find COM number of detected module.
4) Open any terminal application (like Ralterm ,ZOC etc) on this COM with 19200 8N1 connection.

Shell commands

Each command always begin with char '-' [minus], TOKEN, ARGUMENTS and ENTER (mean CR or LF char). If after token are no arguments, EACR go in VIEW mode. If after token is space ' ' there should be also arguments (WRITE mode). If parser detect error in command line, module will print '?'. Except first required space after TOKEN any other are omitted but in arguments like numbers between digits, spaces are prohibited. All char must be lowercase.

Command	Concerns	action and arguments description	Min	Typ	Max	Unit
-t -t ExH/L>R	tape	List tape records from 1 to first with repeat = 0. On record with repeat = 0 tape PLAY jump to record 1. (rewind)				
		Write new impulse definition where arguments are: (after each proper write module will respond with >R)				
		r**E**peat impulse	0		250	x
		time period **H**i (Relay ON) value for impulse	0		65535	ms
		time period **L**o (Relay OFF) value for impulse	0		65535	ms
		Record number on tape	1		35	
		Example : 6 impulses 300 ms ON, 700ms OFF (pause) **-t 6x 300/700>12** Example : end of tape program in record 20 **-t 0x 1/1>20** Example : long pause 5s in record 19 **-t 1x 0/5000>19**				
-m -m xx	max	This value is added to filter when 's' limit is reached. This is overhead to skip small pauses in signal (one direction hysteresis). xx – write and store new value for max	0	0	100	
-n -n xx	noise	Signal noise level. All samples below are dropped. Samples level ADC is in scale 0..127. Recommended real signal noise level must be < 20 to get best results with typical n=40 value. xx – write and store new value for noise level	0	40	100	
-r -r xx	relay	'bzzzt' protection. Minimum hold time before change state. This parameter do not include additional mechanical time to change state from : OFF -> ON : 7ms ON -> OFF : 3ms xx – write and store new value for relay hold time	1	50	255	ms

-s -s xx	samples	Filter limit value. Because of ADC sampling rate 0.1ms S samples does not mean [ms] direct. It mean how many samples must be > than noise level to integrate filter value *4 up to S level. Use equation: 20*0.1ms/4=500us to detect signal and send command change RELAY to ON. From this moment consider mechanical 7ms to real contact close state. xx – write and store new value for samples	1	50	250	
-l	Log	Log period is 0.33s . Each numeric value is peak value in this window. Bit values ‘p’ ‘e’ ‘t’ are much faster and if change occur before log sampling engine their value may be not seen properly. Signals must be longer than 0.33s to view real change value in log. Log will consist of all important state of module : p – play button, e - EXT signal, t- tape Hi level where ‘ ‘ mean OFF and 1 mean ON then is ‘.’ but only when a>n mean (audio level) > (noise) , on end is **f** (filter value). Log line: p e t . n a f Example log : p e1 t1. 40 127 100 p e1 t . 40 127 105 p e1 t1. 40 127 109				
-!	RESET	Forse RESET like power ON/OFF sequence. Typical after RESET module will return program version with some few garbage chars before. Example: ^@1 where only last char are important and mean firmware version.				
-p	Play	This is simulation of EXT signal to force PLAY without EXT. Command flip play button state. If is ON make OFF and vice versa.				

Special functions

AUTO-OFF Timer 60s

(-l) Log or (–p) play button starts timer 60 seconds and will be automatic OFF. If you need view log longer, repeat command (-l).

BLINK-OFF Timer 10s

Red LED is used to signal processor standby by short blink every 0.5s but also to signal AUDIO > noise mean high level on AUDIO input. After signal detecting blinking is OFF for 10s timer.

AUDIO over TAPE player priority timer

Audio signal has always priority over Tape player regardless EXT signal or Play button. If AUDIO is detected TAPE player is blocked for 10s.

TAPE on restart timer

After RESET (power on reset or (-!)) TAPE player is bloked for 2s even if EXT is active.

Hold USB connection

Power OFF or RESET do not affect USB conection. USB adapter is powered from USB.

Parameter tuning

Gain

Use live log to see actual audio level. Put ON signal audio on module input and use GAIN potentiometer to achieve 120 value (a) column on log. Then turn OFF signal and check level now (should be below 20). Set minimum 50% higher than this noise level.

Relay out

Use normal changing audio signal and set (-s) parameter to good follow reaction without false reactions. If speed is crucial increase (-m) with smaller (-s). There are 3 ways to observe reactions :

- Log '.' Column and value of audio level in (a) column
- LED BLUE
- Hear 'click' of output relay

Model Numbering

EACR1-	8	W	A
ACR1 family	8A relay heavy contacts	Wurth electronic connectors	AC supply

Available 02.2017, place orders on **www.devicefab.com** or **devicefab@elpis.com.pl**

Precautions

Ensure that the parameters of the product described in its specification provide a safety margin for the appropriate operatipon of the device or system and never use the product in circumstances which exceed the parameters of the product. [/] Never touch any live parts of the device. [/] Ensure that the product has been connected correctly. An incorrect connection may cause malfunction, excessive heating or risk of fire. [/] In case of any risk of any serious material loss or death or injuries of humans or animals, the devices or systems shall be designed so to equip them with double safety system to guarantee their reliable operation. [/] Devices provided by DEVICEFAB are for special or educational use only and are used on your own risk.

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