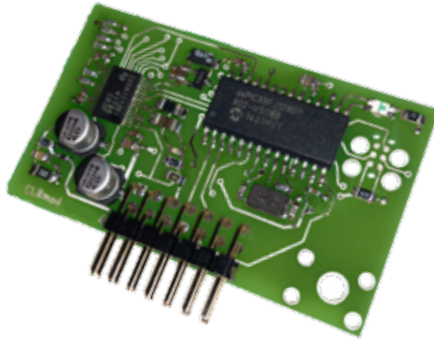


CLRmodule ClearSpeech[®] ***Digital Signal Processor*** ***Noise Reduction Board***



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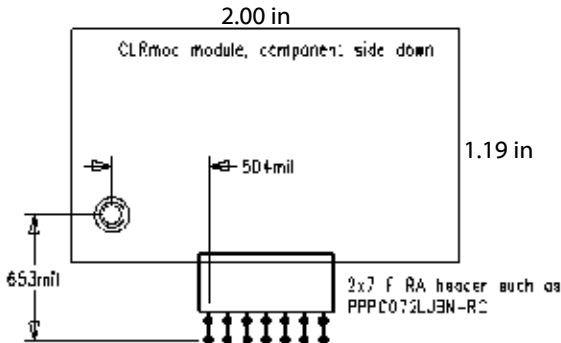
Thank you for choosing the CLRmodule ClearSpeech® Digital Signal Processor Noise Reduction Board. The CLRmodule unit connects directly to the radio. The unit is extremely effective in improving communication clarity. QSO's will be more enjoyable without the fatigue of background noise. In many cases, there will be a noticeable improvement in understanding weaker signals, making contacts, and general listening.

CLRmodule is ideal for mobile radio operation as noise reduction is superb due to the Digital Signal Processor (DSP) passing voice and CW sounds, while attenuating noise, such as atmospheric noise, hum, hiss, whistles, and static. It effectively removes heterodynes, ignition noise, lightning crashes and power line noise. The process is dynamic and changes with the interference and the signal, but the effect is rewarding. Mobile voice operation is more fun without all of the background noise. The DSP recognizes the intermittent nature of CW and allows it to pass noise free.

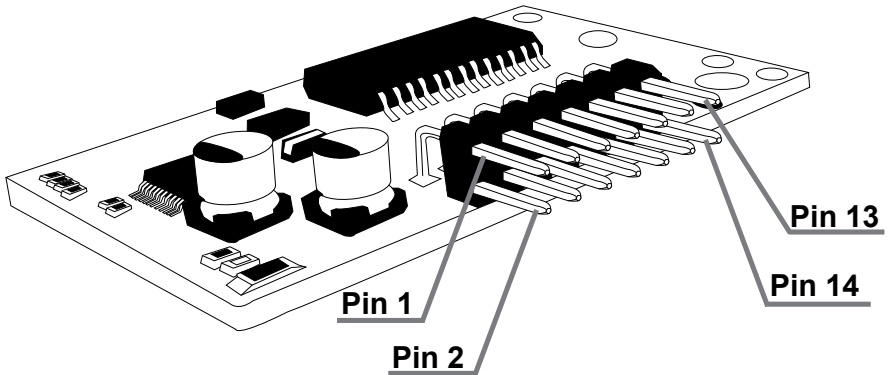
Mechanical Mounting

Horizontal: Mount with 4-40 hardware. Include a 0.2" (or 5mm) spacer between CLRmodule and your PCB.

Vertical: Solder a Keystone 8190 bracket onto the CLRmodule. Then use a 4-40 bolt to attach CLRmodule to a 0.75" F-F standoff on your PCB. For the electrical connector use a 2x7 F straight connector.



Electrical Connections



1	Not Used	NC
2	Power	Regulated +3.3VDC, 98mA typical
3	Power	Digital Ground
4	Power	Analog Ground. For proper operation, Analog Ground must connect to Digital Ground on your PCB
5	In	Audio Signal In. Maximum signal level (volume control fully clockwise) 40mVpp
6	Out	Audio Signal Out. Maximum signal level: 2Vpp into a high impedance load, 560mVpp into 8 Ohms
7	In Optional	Filter control pot wiper (0-3.3V)
8	In Optional	Tone control pot wiper (0-3.3V)
9	In Optional	Volume control pot wiper (0-3.3V)
10	Out Optional	Clip LED control - 0 or 3.3V - Requires external limiting resistor. Hi output indicates clipping.
11	In Optional	Serial interface (CLRmodule RX) 0-3.3V
12	Out Optional	Serial interface (CLRmodule TX) 0-3.3V
13	In Optional	PTT signal (0-15VDC) - Active lo
14	In Optional	Reset - Active Low (may be left unconnected)

Potentiometer Controls

As shipped, the CLRmodule will expect three potentiometers (1K to 10K) for the volume, filter and tone to be connected. Using the serial interface, the module may be configured to ignore any of these inputs, making digital controls over the serial interface the only way to change the settings. Once configured, the settings remain in effect even after power is removed.

Serial Interface

This interface is a 115.2K baud 0-3.3V, no parity asynchronous serial communication port.

The message format for commands is:

Start of Message	Length	Command	Data
4	Count of bytes not including the 4	See Table	See Table
1 byte	1 byte	1 byte	0-66 Bytes

Example to read CLRmodule State:

Send three bytes: 04 02 03

Receive: 04 03 03 00

Length and Command	Description	Response
02 01	Report Firmware Version	04 05 01 xx yy zz xx Major Version, yy Minor Version, zz Serial Interface Version
02 02	Report Friendly Name	02 xx 02 dd... dd string is text name

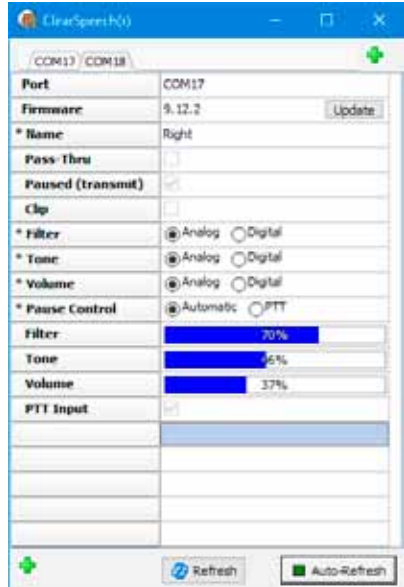
02 03	Report State	04 03 03 xx xx bit 0 - Filtering off xx bit 1 - Transmit Mode xx bit 2 - Clipping xx bit 7 - PTT input active
02 04	Report Configuration	04 03 04 xx xx bit 0 - Volume POT off xx bit 1 - Filter POT off xx bit 2 - Tone POT off xx bit 3 - PTT is hardwired
02 08	Read Volume Setting	04 04 08 ll hh hhll - Volume 00-FF
02 09	Read Filter Setting	04 04 09 ll hh hhll - Filter 0000-FFFF
02 0A	Read Tone Setting	04 04 0A ll hh hhll - Tone 0000-FFFF
05 3D nn ll hh	Read CLRmodule memory, nn bytes at address hhll	04 ss 3D dd... hhll - Tone 0000-FFFF
nn 42 dd...	Assign friendly name nn number of bytes in name +2 dd name in ASCII	02 xx 02 dd... dd string is text name
03 44 xx	Write Configuration	Same as cmd 04
04 48 ll hh	Set Volume to hhll	Same as cmd 08
04 49 ll hh	Set Filter to hhll	Same as cmd 09
04 4A ll hh	Set Tone to hhll	Same as cmd 0A
xx 7D nn ll hh dd...	Write CLRmodule memory, nn bytes at address hhll. xx is nn+5	Same as cmd 3D
xx C2 xx...	Update Firmware. Use the PC utility to update firmware	
Other	Invalid	3F

PC Utility

When connected to a PC, a COM port will appear at the PC. If one does not appear (usually due to an older version of Windows) you will need to install the WMR drivers. The USB drivers can be installed by using the WMR Device Diagnostic Utility. This utility can be found on the West Mountain Radio website under Support > Downloads (www.westmountainradio.com/content.php?page=wmr-downloads)

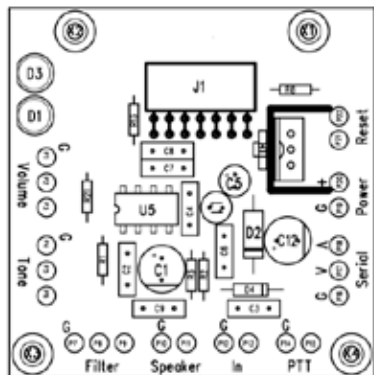
The CLRmod PC Utility program can be downloaded from the aforementioned download page to monitor and control the CLRmodule. A hardware interface must be provided to interface the 0-3.3V signals on the CLRmodule to the PC RS232 port or a USB port.

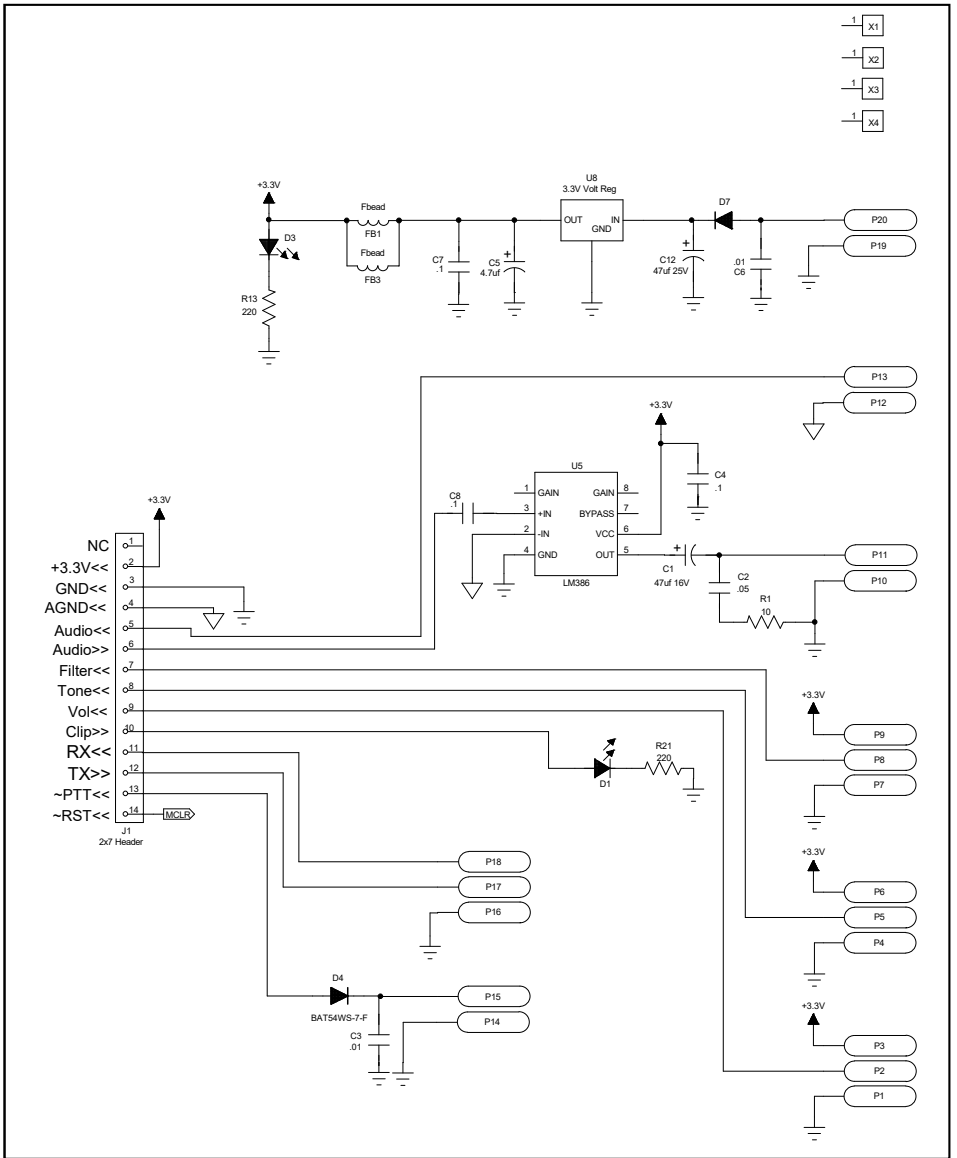
The CLRstereo has two CLRmodules inside and it has a USB interface connected to those modules. This provides an easy-to-use development platform for the CLRmodule.



Hardware Development Tools

West Mountain Radio offers the **CLRmodule Development Board (Sku #58413-1770)**. This is a bare PCB that can be used to aid in development. The PCB layout is image to the right and schematic on the following page.





CLRmodule Warranty

CLRmodule is warranted against failure due to defects in workmanship or materials for one year after the date of purchase from West Mountain Radio. Warranty does not cover damage caused by abuse, accident, misuse, improper or abnormal usage, failure to follow instructions, improper installation, alteration, lightning, or other incidence of excessive voltage or current. If failure occurs within this period, return the *CLRmodule* or accessory to West Mountain Radio at your shipping expense. The device or accessory will be repaired or replaced, at our option, without charge, and returned to you at our shipping expense. Repaired or replaced items are warranted for the remainder of the original warranty period. You will be charged for repair or replacement of the *CLRmodule* or accessory made after the expiration of the warranty period.

West Mountain Radio shall have no liability or responsibility to customer or any other person or entity with respect to any liability, loss, or damage caused directly or indirectly by use or performance of the products or arising out of any breach of this warranty, including, but not limited to, any damages resulting from inconvenience, loss of time, data, property, revenue, or profit, or any indirect, special incidental, or consequential damages, even if West Mountain Radio has been advised of such damages.

Except as provided herein, West Mountain Radio makes no express warranties and any implied warranties, including fitness for a particular purpose, are limited in duration to the stated duration provided herein.



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