

MFJ-8709 ATV Transmitter Module

Introduction

The MFJ-8709 is a very high performance amateur radio ATV transmitter module. The MFJ-8709 design is based on a custom mixed signal ASIC (Application specific Integrated circuit) solution, minimizing size without compromising performance. The MFJ-8709 is designed as a module, that can be integrated as a standalone or sub-circuit for various amateur radio projects. The transmitter is mounted on an aluminum plate. This plate serves as a heat sink for low power operation (Output less than 0.5W). For high power operation (output >0.5W) the MFJ-8709 needs additional heat sinking, therefore the MFJ-8709 will have to be mounted on an external heat sink.

Frequency control is provided by means of a digital integer-N, phase locked loop. Dual PLL's provide a frequency locked video carrier and an audio sub-carrier. Based on customer requirements, the MFJ-8709 can be programmed for operation outside the US, for PAL and SECAM video standards. The transmit frequency is selected via a four position dip switch. Four standard US ATV frequencies are provided.

Video modulation is accomplished via a 12 bit digitally controlled DAC-digital to analog controller. A specially embedded software algorithm controls the modulation depth and pre-distortion level to deliver an ultra clean video signal to the final RF amplifier. The result is a near broadcast quality signal with minimum distortion and Sync signal interference with the audio carrier. A built in video and audio test signal generator is provided for testing purposes.

RF power output is controlled via an analog potentiometer. The RF power output can be controlled from near zero RF output, to about 4.5W maximum output. The current draw varies with the power level selected. The MFJ-8709 is set at 1W output at the factory. The user may change this to the desired level.

MFJ recommends that the MFJ-8709 be mounted to an external heat sink. If transmitting without an external heat sink, limit the power to no more than 0.5W output, and avoid long key down periods. When provided with an external heat sink, the MFJ-8709 can be used for extended key down operation. To avoid damage to the MFJ-8709, do not operate the MFJ-8709 without proper heat sinking. The MFJ-8709 should be only warm to the touch.

Application Diagram

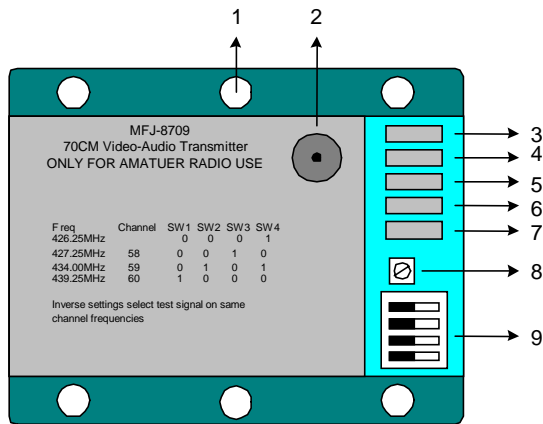


Fig. 1

1. Mounting hole – Hole diameter 0.125 Use the six holes to mount the MFJ-8709 to an external heat sink.
2. Antenna connector – SMA antenna connector, 50 ohm impedance. Connect this to an external matched antenna or 50 ohm dummy load before powering unit.
3. External 12-13.5V in – Positive Solder terminal
4. External 12-13.5V in – Negative Solder terminal
5. Audio In, Solder terminal – Line level audio in. Connect an audio signal (line level, 200 – 250mV RMS)
6. Ground Solder terminal – Audio / Video Ground terminal
7. Video In, Solder terminal– Composite NTSC video in (1V P-P)
8. RF output control – Full CCW for minimum RF output – Full CW for maximum RF output
9. Dip switch frequency select. See chart on next page for settings.

Video Connection

Supply a composite video signal between this terminal and GND. See Fig.2 on how to build a video cable with a female RCA connector.

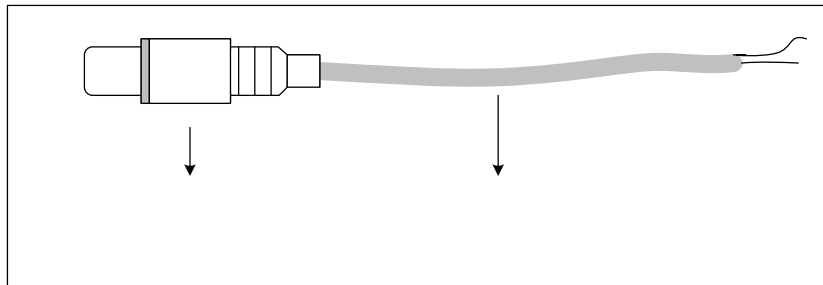


Fig.2

Audio Connection

Supply a line level (200mV -250mV) RMS audio signal to this terminal and GND. See Fig.2 on how to build a RCA female audio cable.

See Fig.3 on how to supply an adjustable audio signal to this terminal

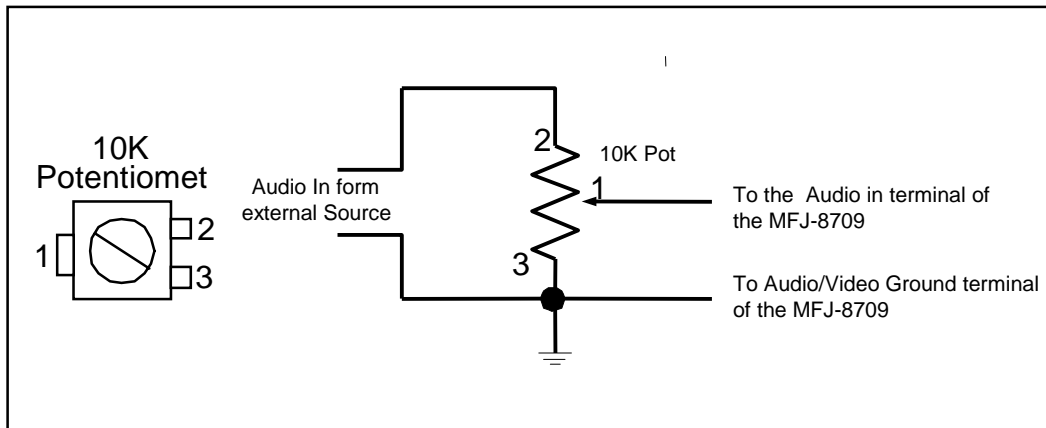


Fig.3

Antenna

- Antenna performance is crucial for range performance of the any transmitting system. This is especially critical for video transmitters, since the RF energy is spread across a large bandwidth. High gain antennas specifically designed for ATV work very well. It is important to note that the antenna bandwidth is of considerable importance. Ensure that the antenna used has a wide enough bandwidth centered at the transmitting frequency.
- See Fig.4 for a simple ground plane antenna design.
- The key to attaining best range is to use high gain antennas for both receive and transmit. Use low loss coax to keep losses at a minimum

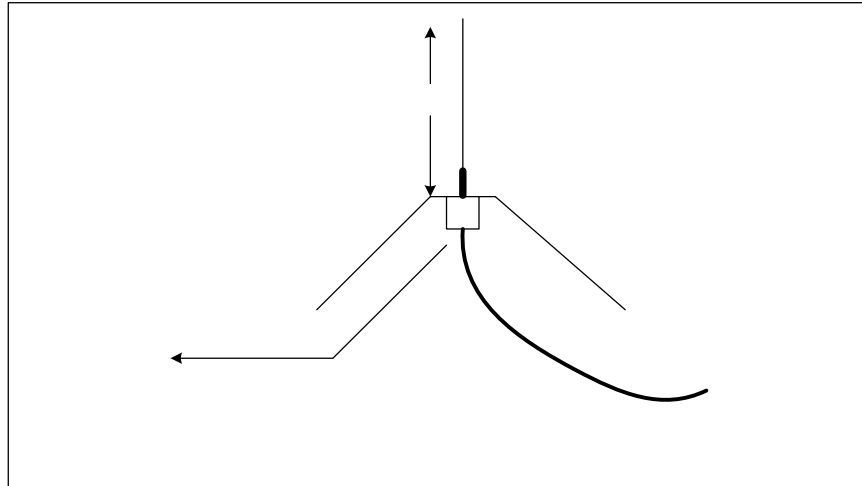


Fig. 4

Frequency Selection

Frequency	Channel	SW1	SW2	SW3	SW4	Function
426.25MHz		0	1	1	1	Normal Operation
427.25MHz	Cable 58	1	0	1	1	Normal Operation
434.00MHz	Cable 59	1	1	0	1	Normal Operation
439.25MHz	Cable 60	1	1	1	0	Normal Operation
426.25MHz		1	0	0	0	Test signal Enabled
427.25MHz	Cable 58	0	1	0	0	Test signal Enabled
434.00MHz	Cable 59	0	0	1	0	Test signal Enabled
439.25MHz	Cable 60	0	0	0	1	Test signal Enabled
All other settings are reserved and will disable the RF carrier						

DC power requirements

The DC input voltage is between 12 to 13.5V (+/- 100mV). Reverse polarity protection is provided. The current draw at maximum output is about 2A.

BNC or N Bulk-head connector

Heat Sink

This is perhaps the most crucial requirement. For high power operation (greater than 500mW or a current draw of greater than 700mA), the MFJ-8709 should be mounted to an external heat sink. A general rule of thumb is, if the MFJ-8709 is too hot to the touch, then, additional heat sinking is required. An inexpensive but effective heat sink can be a Pentium class – CPU with a fan, used inside PC’s.

Electrical Characteristics

RF Power output	4.5W Maximum, un-modulated Clean Carrier, 50 Ohm
Audio Sub-carrier	4.5MHz
Spurious Outputs	Better than -40dBc
Phase noise performance	-75dBc/Hz at 500KHz offset
DC power in	12 – 13.5V Max (+/-100mV)
Current Draw	Max 2.2A
Frequency Control	XTAL reference to 4MHz
Frequency Stability	+/- 20PPM
Video In	Composite Video NTSC 1V P-P
Audio In	Line Level 200 -250mV RMS
Operating temperature	-20 to +85 degrees Celsius
Size	2.35"W X 2.8"L X 0.75"H