Rosen Entertainment Systems
Wireless FM Transmitter
Part# 9100458

User Guide

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General Description

Rosen's FMT module, part# 9100458 is a 12-channel FM transmitter designed to transmit audio signals over the FM frequency band to enable users to listen to audio from an independent video system over the existing car audio system via the radio.

Architectural Overview

The FMT transmitter is designed around the BH1417 from Rohm. Refer to the datasheet for details on this part. The module runs off a 5VDC supply, left and right audio signals should be at 1V RMS to achieve maximum volume.

A 74HC161 counter is used to control the channel selection of the FM transmitter. The interface to the counter is accomplished by way of a 3-wire communication bus consisting of CLOCK, CLEAR and GROUND lines. A 5V pulse on the CLOCK line will step to the next channel. A 5V pulse on the CLEAR line will reset back to the default channel.

FM transmission can be switched on and off by applying and removing the 5VDC supply to the module itself.

Notice : The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

THIS DEVICE COMPLIES WITH PART 15 OF THE FCCRULES. OPERATIONS IS SUBJECT TO THE FOLLOWING TWO CONDITIONS: (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFEERENCE THAT MAY CAUSE UNDESRIED OPERATION

Block Diagram

The block diagram below shows the main components of the FMT module and how they are interconnected.
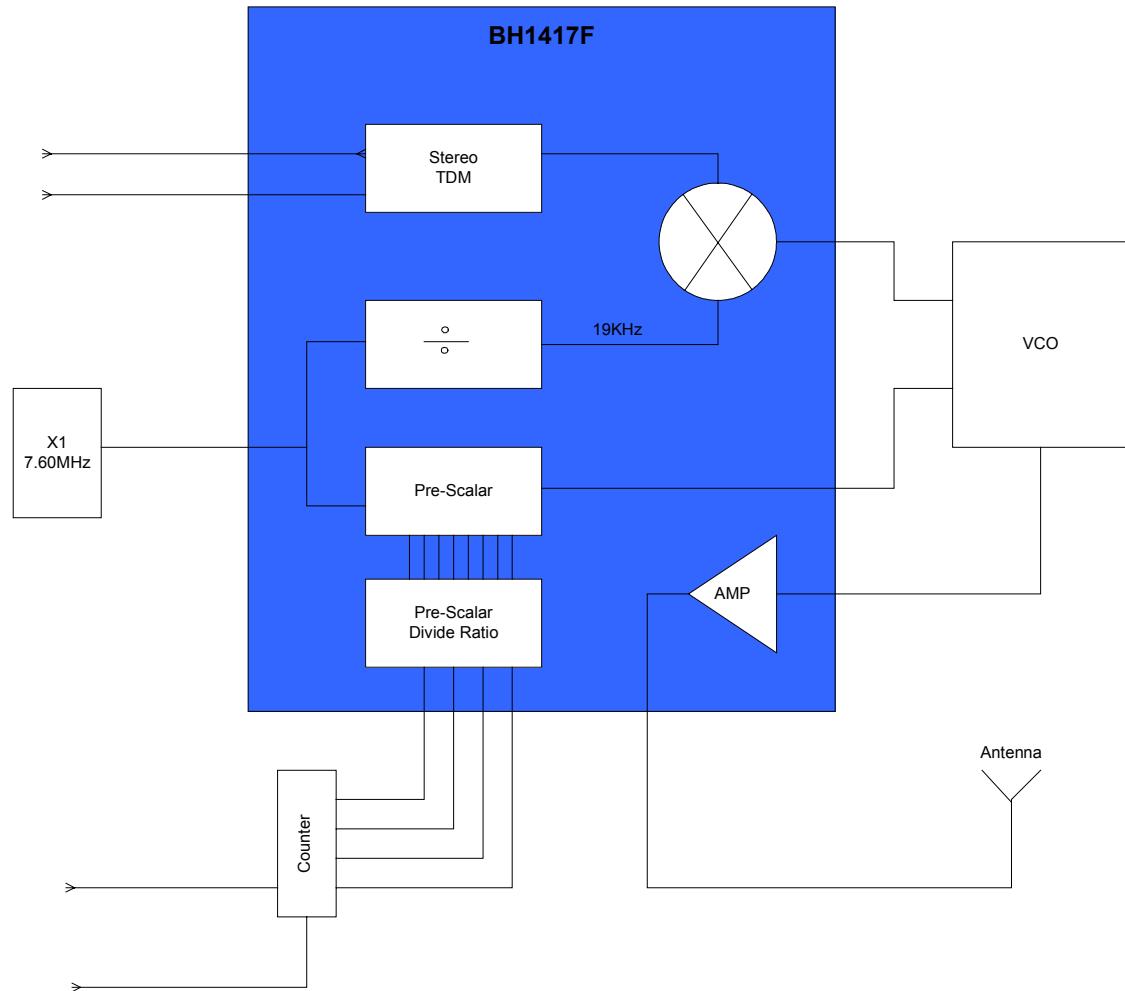
Operating Guide

Using the supplied interface board you are able to test the operation of the FMT.

To test your FMT setup as follows:

Connect the interface board to the FMT using the supplied 9-pin harness.
Connect the power wires on the interface board to a voltage supply between 4.8 & 5.2V DC. The red wire should connect to +ve and black should connect to Gnd.
Connect a stereo audio source with a maximum 1V RMS signal to *Audio_R* and *Audio_L* connectors.
Tune your radio receiver to 88.1Mhz. Audio should be heard.
To step to the next FM transmission frequency press the *channel select* switch located on the interface board once. Re-tune your radio to the next frequency and audio should once again be heard at this frequency.
Repeat steps 4 & 5 through all the 12 available FM transmission frequencies. For full details see appendix 1
To stop FM transmission, switch off the +5VDC supply.

Interface board wiring diagram
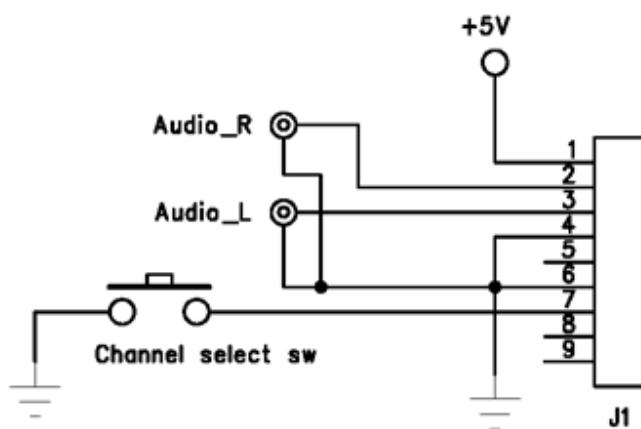
Interface / Pinout Definition

All control and audio is interfaced via a single connector JP1. It is intended to connect to a control board allowing firmware to control the channels selection as well as the power.

See the following table for a pin description and definition:

FMT JP1 Pin Definitions		
Pin #	Signal Name	Function/Description
1	+5V	This is the power to the FMT
2	AR_A	Right audio input
3	AL_A	Left Audio Input
4	GND	FMT Ground Reference
5	Load	Not used; held low
6	GND	FMT Ground Reference
7	SEL2_A	Counter clock; sets the output of the counter
8	SEL1_A	Counter Clear; resets the counter to 0
9	ANT	Not Used; for test purpose only.

Design considerations

- The module is intended to interface to a control board that will send the required command to select the desired channel. This can be achieved using a simple push button switch interface however the architecture of the interface enables the interface to be controlled by a micro controller. Ideally you should develop an interface that will provide feedback to the user, possibly by way of an OSD, to indicate which channel the transmitter is currently set to.
- In order to disable the FM transmission as well as removing the 5VDC supply, the data lines (SEL2_A, SEL1_A, and Load) should be held low.

<u>**Appendix 1: Frequency Table**</u>

The frequency table below shows the value of the 74HC161 counter as well as the corresponding FM transmission frequency

```
2:     88.1 MHz
3:     88.3 MHz
4:     88.5 MHz
5:     88.7 MHz
6:     88.9 MHz
7:     < no setting >     { 7 is a meaningless value }
8:     106.7 MHz
9:     106.9 MHz
10:    107.1 MHz
11:    107.3 MHz
12:    107.5 MHz
13:    107.7 MHz
14:    107.9 MHz
15:    <no setting>      { 15 in a meaningless value }
```

Appendix 2: Sample Code

The sample code below is used to communicate to the FMT using a PIC micro controller, when using this method in conjunction with outputting information on a video screen a user is able to see visually on screen the status of the FMT.

Example Code

```
I/O Name          Function
SEL1_A:           Clear
SEL2_B:           Clock
FMTLOAD:          Load (reset)

*** INITIALIZATION PROCESS ***

// Initialization I/O

SEL1_A = 1;
SEL2_A = 1;
FMTLOAD = 1;

// Reset Counters

SEL1_A = 0;
< delay 2 microseconds >
SEL1_A = 1;

// Restore Previous

< read stored station from EEPROM >
< call function to update the FMT device with stored station >

*** FMT DEVICE UPDATE PROCESS ***

// verify that new station is to be programmed

        // reset counter

            SEL1_A = 0;
< delay 2 microseconds >
            SEL1_A = 1;

        // increment counter until desired station is achieved
```

```
        // do the following for each increment of the station
        // example:the following 3 lines should be done 3 times to set
88.3

            SEL2_A = 0;
< delay 2 microseconds >
            SEL2_A = 1;

        // store new station in EEPROM
```

Appendix 3: Schematic Diagram

Schematic; Wirless FMT; Audio Input and Power

Thursday, September 16, 2004

Schematic; Wirless FMT; Transmiter and Control

Friday, August 27, 2004
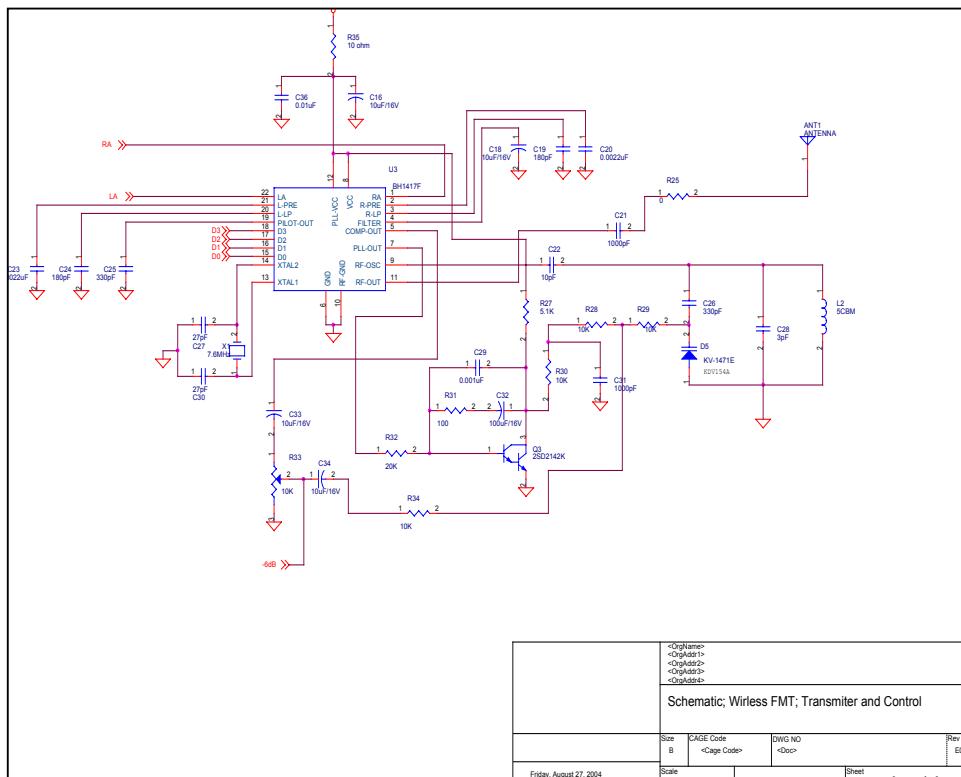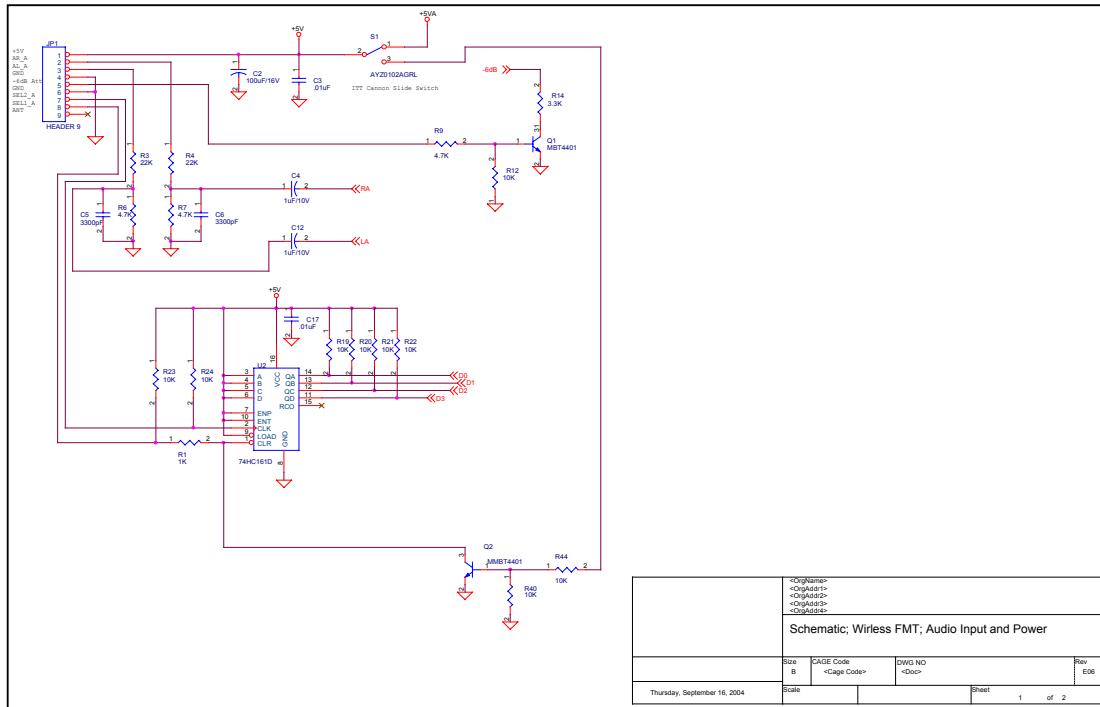
<u>Appendix 4: Specifications</u>

Operation power supply voltage	4.8 ~ 5.2 V DC
Transmission Frequency	88.1 ~ 88.9Mhz, 106.7 ~ 107.9 Mhz. Step 200Khz
Operating Temperature	0 ~ 60° C
Dimensions	70mm x 34mm x 11mm