TECHNICAL DESCRIPTION, AS5000TW-FM-HHU-1

SYSTEM DESCRIPTION, AS5000TW-FM-HHU-1

The RFM_1 board is used in the Remote end of a half duplex car starter/alarm system and operates at 433.920MHz. The receiver is activated by the Microprocessor after transmission or can be used in a polling mode to monitor alarms sent by the Car module. The AS5000TW-FM-IVU-1 board is inter-connected to the Microprocessor board by 2 Male/Female board-to-board connectors. The receiver is directly powered by a 1.5 Volt AAA battery as well as the 3.0 Volt output from the step-up Switching Converter. The transmitter is powered by the 3.0 Volt step-up Switching Converter from the SB02 micro board. System timing and control is done by 2 microprocessors, 1 in the Car, and 1 in the Remote.

CIRCUIT DESCRIPTION

Receiver Section

The design uses a Wide-Band FM single conversion super-het receiver with an Image filter and LNA

The signal enters via J1 and LPF L3, C10 to a SPDT MMIC RF switch (S1) and is forwarded to Q2 and Q3, a matched cascade transistor amplifier.(1.5V supply) signal is then fowarded to FLT1, a SAW Band Pass Filter. The output from the filter is matched to U2, a complete MMIC Receiver.(3.0V supply) This IC contains a Colpitts 3rd overtone oscillator, a balanced multiplier tripler, IF amplifier and demodulator.
The 433.920MHz signal is down converted to a 10.7MHz IF. The 10.7MHz IF signal is filtered by a ceramic filter (FLT1, 180KHz BW) and then amplified and demodulated by an FM discriminator L9, C26, C28. Baseband filtering and slicing time constants are provided by C16, 17, and C21. The Baseband signal is then fowarded to J3 pin 3.
The receiver is activated by a logic LOW on J3 pin1, which turns on Q4, (to LNA)and U2.
Q1 provides inverted logic for S1.

Transmitter Section

The transmitter IC, U1 is a complete synthesized transmitter. The 13.560MHz oscillator is WBFM modulated via U1 pin10. (PIN diode switch) RX, CY provise a 2 millisec. Delay to provide time for the synthesizer to lock befor transmission. The output of U1 is matched to 50 ohms by C6, C7,C8, and L2. L1 provides 3.0 V to U1 output circuitry. J2 pin 4 is high when in transmit.

Low Voltage Alarm
The alarm circuit uses Q5, a 1.0 volt detector. The output is open drain and is HIGH when the input voltage is above 1.0 volt.(Micro is programmed with an acitve high input) **The logic output is on J3 pin 2.**

Vibrator
The vibrator is powered by 1.5 volts through PNP switch, Q6. A LOW on J3 pin 4 will activate the vibrator.

INTERNAL CIRCUIT VOLTAGES

A reference schematic is provided for in circuit voltages. These voltages are provided to help trouble-shoot defective circuit boards. The values may vary ±10%.

AS5000TW-FM-HHU-1
TRANSCEIVER SPECIFICATION

TRANSCEIVER BOARD

RECEIVE SECTION	Design Requirement	Actual
Receiver Frequency	433.920 MHz	√
Receiver Sensitivity	-106 dBm min	Typ. –107 dBm
6dB IF Bandwidth	180 KHz min	
Image Rejection	-40dBc	-45dBc
LO feedthrough at Antenna Input	-60 dBm max	Typ. -70 dBm
Receive Data Rate	1.56Kbit/sec max	√
Data Format (Rx)	Manchester	√
Pulse Distortion	<5%	<5%
Frequency Deviation Acceptance	± 25KHz Nom.	√
Rx Data Out (3.0V to Micro)	0 to 2.95 V min.	√

Rec. Offset Frequency Acceptance for 3 dB degrad. of Sensitivity	± 32KHz	√
Rx. Input Voltage #1 (neg. Gnd.)	+1.5V Nom., +1.0V Min.	√
LNA Current @ 1.5 V	2.2mA	√
Rx. Input Voltage #2 (neg. Gnd.)	+3.0V Nom	√
Current Consumption (Rx @ 3.0V)	5.8 mA max.	√
P1dB(ref.to input and measured @10.7MHz IF filter output)	-25 dBm	√
Temperature range	-20°C to +60°C	√
Humidity	100% conden. @ 0°C	√
TRANSMIT SECTION		
Transmitter Frequency	433.920 MHz	√
Fre Tol. @ 25C	+/- 25KHz	
Radiated Output Power	12,000uV/Meter max.	√
Transmitter Har. Spurious Output	1200uV/Meter max.	√
Data Rate Transmit66/33% D. Cycle	1Kbit/sec max	√
Tx Modulator Input	0 to +3.0 volts Square Wave	√
Frequency Deviation	±25 KHz Typ.	20Min., 35 Max.
Tx. Input Voltage	+3.0V ±0.1V	√
Current Consumption (Tx)	15.5 mA max @ 3.0V	√
Frequency tolerance	±32KHz Max Over Temp.	√
Temperature range	-20°C to +60°C	√
Humidity	100% conden. @ 0°C	√

CONNECTIONS to MICRO BOARD (0.050 Pin Spacing)

J1 ANT

1	ANT, Solder Connection to Helical Spring

J2 TX (Female)

1	3.0 Volts
2	Tx Data
3	Ground

4	Tx ON (High)

J3 RX (Female)

1	Rx Enable (LOW is ON)
2	Low voltage alarm (HI = No Alm)
3	Rx Data
4	Vibrator Enable ((LOW is ON)
5	+1.5 Volt Battery