

## **TECHNICAL DESCRIPTION, ASRF5501 REMOTE (FCC ID:NAHAS5501)**

### **SYSTEM DESCRIPTION**

The ASRF5501 Remote is used in the Remote end of a half duplex car starter system and operates at 433.920MHz. After transmission, the receiver is activated by the Microprocessor, and monitors the status sent by the Car module.

2 - 3 volt CR2025 batteries in series power the board. 2 microprocessors, 1 in the Car, and 1 in the Remote do the system timing and control.

This model includes a 5digit/letter LCD Alpha-Numeric display and ICONS.

### **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 L1, C1, C2 to a SPDT MMIC RF switch (S7) and is then forwarded to Q1 and Q2, a matched cascade transistor amplifier.(3.3V supply) The signal is then forwarded to FL1, a SAW Band Pass Filter. The output from the filter is matched to U2, pin 26. U2 is a complete MMIC Transceiver used in stand-alone user mode. (3.3V supply)

The 433.920MHz signal is down converted to a 10.7MHz IF. The 10.7MHz IF signal is filtered by a ceramic filter (FL2, 180KHz BW) then amplified and demodulated by the MMIC. The base band filtering and slicing time constants are provided by C24. Base band signal is then forwarded to the microprocessor, U1, pin 55.

The receiver is activated by a logic HI on U2 pin 37, which turns on U2, and also provides 3.3V to bias LNA, Q1, 2.

#### **Transmitter Section**

U2 also has a complete synthesized transmitter. (Used in stand-alone user mode) The TX function is activated with U2, pin 60 HI. The 7.1505MHz oscillator is WBFM modulated via U2 pin11. (by an internal PIN diode switch) The Output of U2, pin 25 is matched to 50 ohms by L8, C38, C13, L5 and C9. Output power is forwarded via S7. (On during TX)

TX Data is forwarded from U1 Micro to U2, pin 12.

## **DC Power Control**

The board is powered continuously through D1 to regulator U3. U3 is a very low idle current series regulator. (3.3V) With no button activation, U1 is in sleep mode. Any button activation will turn on U1 to high-speed mode.

Voltage divider R19, 29 (low voltage alarm) drops the battery voltage so that it can be compared with the Micro (U1) internal comparator. The internal reference in the micro is set to 3.3V/2 via SW. The alarm trip point is at approx 4.0V battery supply. The battery check is done during the receive timing. Q3 is turned when the battery voltage is monitored.

## **Sounder**

The sounder is activated with 2730Hz generated by U1.

The TX and the Sounder are never on at the same time. (to save battery consumption)

## **LCD**

View Window Area is 12mmH X 20mmW

The LCD includes the following information:

5 Numeric letters or symbols

5 ICONS (LOCK/UNLOCK, START, READY MODE, VALET, and ALARM.

It also includes an Antenna Symbol and a P for the clock when PM is required.

## **Backlight**

RGB backlighting. The colour mixture is controlled by pulse-width modulating the red/green/blue LED's via U1. The colour is customer programmable.

## 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  $\pm 10\%$ .

## PRODUCT TECHNICAL SPECIFICATION

### ASRF4501 REMOTE TRANSCEIVER SPECIFICATION

RECEIVE SECTION	Design Requirement	Actual
Nominal Receiver Frequency	433.920 MHz	
Receiver Sensitivity	-110 dBm min	Typ -112 dBm
6dB IF Bandwidth	180 KHz min	Set by design
Image Response	-45dBc min	Typ -50dBc
LO feedthrough at Antenna Input	-60 dBm max	Typ. -70 dBm
Receive Data Rate(Manchester Encoded)	1.56Kbit/sec max.	
Preamble	6 preamble with 1000us	
Start bit	320us	
Data short bit	320us	
Data long bit	640us	
Pulse distortion 66/33% duty cycle	Worst case <5%	
Modulation Acceptance	WBFM $\pm 25\text{KHz}$ Nominal	
Rx Data Out (depends on system type)	0 to 3.15V min	
Rec. Offset Frequency Acceptance for 3 dB degrad. of Sensitivity.	< $\pm 26\text{KHz}$	
Voltage (neg. Gnd.)Tolerance	+6.2V max, 4.0V min	
LNA Current @ 3.3 V	3.0mA nom	Ref only
Current Consumption (Rx)@ 6V	14mA max	
P1dB (ref. to input)	-25 dBm	Ref only
Temperature range	-10°C to +60°C	
Humidity	100% condens. @ 0°C	

<b>TRANSMIT SECTION</b>		
Transmitter Nominal Frequency	433.920 MHz+/- 25KHz	
Voltage (neg. Gnd)	+6.0V nom., 4.0V min.	
Tolerance		
Output Power @ 6.0V	<11,000uV/meter@3meters	
Transmitter Spurious Output	<1,100uV/meter@3meters	
Data Rate Transmit (Manchester Encoded)	1Kbit/sec max 6 preamble	
Preamble	1000us	
DATA start bit	500us	
DATA short bit	500us	
DATA long bit	1000us	
Tx Modulator Input	0 to +3.3 volts Square Wave	By design
Frequency Deviation	±22 KHz typ.	±15 Min, ±30Max.
Current Consumption (Tx)	20 mA peak max @ 6.0V	
Frequency tolerance	±26KHz Max Over Temp.	
Temperature range	-10°C to +60°C	
Humidity	100% conden. @ 0°C	By design

### **SPECIAL SYSTEM REQUIREMENTS**

Polling interval	N/A	
RCV ON time during polling	N/A	
Time to achieve good data	3.5ms	
Data distortion after 5 bits (polling)	<5%	
Preamble lost due to turn-ON delay (XCVR, IVU)	1 bit	
Idle current (With LCD ON)	<8uA	
Calculated battery life (for remotes)	>1.2 years (10ops/day)	

### **UNIT Case Size**

40.5W X 67.5H X 14.6T (mm)