

TECHNICAL DESCRIPTION, AS5100TW-IVU

Version 1

SYSTEM DESCRIPTION

The AS5100TW-IVU board is used in a half duplex car starter/alarm system and operates at 433.920MHz. The receiver is continuously waiting for a signal from the AS5100TW-HHU Remote Transceiver. The unit can also page the remote transceiver in an alarm system to notify the user of an alarm condition.

The AS5100TW-IVU is connected to the car module with a 4-conductor cable. The transceiver is powered from the car module (+5 volts). 1 pin is used for both Tx and Rx data, 2 pins are used for GND and +5 volts, and the last pin is used for LED control. During transmit, 5 volts is applied to the transmit section via a transistor switch. System timing and control is done by 2 microprocessors, 1 in the car, and 1 in the remote.

CIRCUIT DESCRIPTION

Receiver Section

The receiver is a WBFM single conversion super-het design with an Image BPF. The signal enters via CON 1 and forwarded to LPF C2, L1. MMIC RF switch S1 forwards the 433.920MHz signal to a matched cascade amplifier Q1, Q2. SAW filter FL1, provides image rejection and protection from strong out of band signals. The output of FL1 is then matched to U2 by L7 and C15, U2 is a complete MMIC receiver. This IC contains a PLL frequency synthesizer, an IF amplifier and FM demodulator. It is based on the principle of a single conversion superhet.

The 433.920MHz signal is down converted to a 10.7MHz IF. The IF signal is band-pass filtered by a ceramic filter (FL2) and then amplified, and demodulated by an FM detector. The baseband signal is forwarded to U3B, pin 5. (+ input)
U3B pin 7 outputs signal to J2 pin 2.

Transmitter Section

The transmitter is provided by U2. The output is matched to Q3, and matched to 50 ohms by C11, L6, C10, C12. S1 forwards signal to the antenna.
The WBFM modulation is accomplished by the internal diode switch in U2. (Pin 11)

Baseband Diplexer

U3A and U3B provide the bi-directional function for the Tx and Rx path.

A data signal above 4.V peak will provide output at U3 pin 1. This output goes to RC time constant R29, C37 to turn ON Q4, Q5. With Q4 collector high, D3 holds U3B pin 7 high. Receive signals are held to 3.3V peak and will not trigger U3B. The threshold for U3A is 3.0V. D5 provided input transient protection.

U1 is a 3.3V regulator to power the board.

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 $\pm 10\%$.

AS5100TW-IVU TRANSCEIVER SPECIFICATION

TRANSCEIVER BOARD

RECEIVE SECTION	Design Requirement	Actual
Receiver Frequency	433.920 MHz	√
Receiver Sensitivity	-111 dBm min	Typ -113 dBm
6dB IF Bandwidth	180 KHz min	√
Image Response	-40dBc min	Typ -45dBc
LO feedthrough at Antenna Input	-60 dBm max	-70 dBm
Receive Data Rate	1 Kbit/sec max	√
Pulse distortion 66/33% duty cycle	<10%	<5%
Modulation	WBFM ± 25 KHzNominal	√
Rx Data Out	0 to 3.15V min	√
Rec. Offset Frequency Acceptance for 3 dB degrad. of Sensitivity	± 32 KHz	√
J2 Pin 1 Input Voltage (neg. Gnd.)	+5 V $\pm .25$ V	√
Current Consumption (Rx)	13 mA max	√
P1dB (ref. to input)	-25 dBm	√
Temperature range	-30°C to +60°C	√
Humidity	100% conden. @ 0°C	√
TRANSMIT SECTION		
Transmitter Frequency	433.920 MHz	√
Output Power	12,000 uV/M @ 3M	√
Transmitter Spurious Output	1200 uV/M @3M	Typ -40 dBc
Data Rate Transmit (Manchester Encoded)	1.56Kbit/sec max	√
Tx Modulator Input	0 to +4.8 volts Square Wave	√
Frequency Deviation	± 22 KHz typ.	15 Min, 30Max.
Current Consumption (Tx)	30 mA max	√
Frequency tolerance	± 32 KHz Max Over Temp.	√
Temperature range	-30°C to +60°C	√
Humidity	100% conden. @ 0°C	√

POWER INTERFACE CONNECTIONS (0.098 Pin Spacing)

1	+ 5 Volts
2	Tx/Rx Data
3	Ground
4	LED