

General Description

1. Introduction

Air-X1000 designed to report the real time status of your car whenever you want and automatically notify you the alert situation such as theft, impact on your car and undesirable operating.

Two-way car alarm system "Air-X1000" is composed with Remote and Brain.

And Remote is composed with RF Board and Logic Board.

And Brain is also composed with RF Board and Logic Board.

Therefore, 'Air-X1000' is made up 4pieces of Board.

REMOTE RF BOARD : Treating analog RF signal from the remote

REMORT LOGIC BOARD : Converting RF signal of the remote into Digital signal and controlling the function of the Remote.

BRAIN RF BOARD : Treating analog RF signal of the Brain.

BRAIN LOGIC PART :Converting RF signal of the Brain into Digital signal and controlling several function of the car.

2. Features

The SEMI_KOREA TWO WAT CAR ALARM SYSTEM(Air-X1000) have many features as follows.

- . Engine start / stop
- . Door open / close
- . Hood open / close
- . Trunk open / close
- . Parking light on / off
- . 4 step low batt(optionable)
- . Executing error notice
- . Siren(1~25 secor off)
- . Cold start
- . Reserve start(any time or off)
- . Engine warm-up time(1~30 min or off)
- . Morning call
- . Current time set
- . Driving / passive lock(on or off)
- . Low battery alert and display(REMORT)
- . Use single 'AAA' alkaline battery(REMORT)

3. Specifications

COMMUNICATION	FM TWO-WAY
OPERATING FREQUENCY	FM447.675MHz
MODULATION TYPE	FSK
MODULATION DEVIATION	STD 3KHz
ANTENNA IMPEDENCE OF R/C	50
FREQUENCY STABILITY	$\pm 5\text{ppm}(-10 \sim +50)$
REMORT OPERATING VOLTAGE	DC 1.5V AAA SIZE BATTERY
BRAIN OPERATING VOLTAGE	12V DC from CAR Battery
OUTPUT RF POWER	
RF OPERATING RANGE(OPEN FILE)	1Km(up to 300ft)
RF SENSITIVITY	-120dBm
SELECTIVITY	>50dB
IMAGE REJECTION	>40dB
SPURIOUS REJECTION	>50dB
WEIGHT	REMORT: 40g (Including battery)
DIMENSION	REMORT: 58(W)X38(H)X18(T) , BRAIN: 135(W)X90(H)X33(T) (mm)
OPERATING TEMPERATURE	-20 ~ +70

Technical Theory

1. General

Air-X1000 designed to use only one piece of DC1.5 AAA size battery and the Brain uses 12V DC of a car And its operationg frequency is from 447.675MHz

The Receive part of Air-X1000 is Double Super Heterodyne and the Transmit part is TDA5100TX Chip made by Infineon Co.

2. Circuit Description

1) RF section

Antenna

The antenna system for the Air-X1000 is formed by the metal helical ANT1 in series with capacitor C1. Capacitor C2 matches the antenna impadance and RF amplifier. By adjusting C3 , the antenna can be turned to the Air-X1000's operating frequency.

Front-end

The signal out of C2 is injected into a 2-stage common-base amplifier Q1 and Q2 which typically has 13dB gain. The first stage has about 8dB of gain and the second stage about 5dB. This topology affords a stable design without the need for neutralization as well as a reasonable input impedance level 50ohm. The input of Q1 has a broadband match which optimized the stage noise figure. The output of this stage is matched to 50ohm using C7.

Local oscillator

The local oscillator signal is derived from a crystal controlled oscillator circuit using crystal X3 as a reference. Crystal X3 is a highly stable part over temperature and operates at 47.363888MHz.

An adjustment circuit consisting of L31 and VC1 is used to set the Air-X1000 to the desired channel frequency. Transistor Q5 provides the gain needed for oscillation and the 9th harmonic (9fo) output of Q5 is injected into the multiplier via C32 & C33.

First mixer

The signal out of filter F1 is injected into the base of the mixer transistor Q3 and capacitor C12. Q3 is a static part, handle with the proper static precautions. The mixer input is matched to the filter with the network consisting of C54, L52, and C55. This network also provides 5dB of image rejection.

Inductor L5 is used to supply bias to Q3.

The output of the mixer is matched to the crystal filter F2.

TX PART(TDA5100)

The TDA5100 is a single chip FSK transmitter for the frequency bands 433-448MHz. The IC offers a high level of integration and needs only a few external components. The device contains a fully integrated PLL synthesizer and a high efficiency power amplifier to drive an antenna. A special circuit design and an unique power amplifier design are used to save current consumption and therefore to save battery life. Additionally features like a power down mode, a low power detect, a selectable crystal oscillator frequency and a divided clock output are implemented.

The IC can be used for FSK modulation.

2) DIGITAL SECTION

Message receiving

Once the pager's address is received, the microcontroller enters the message-receiving mode. And the received data from the internal decoder store in the internal RAM in series.

Display

During the display mode, the microcontroller looks at the message data stored in built-in internal RAM, retrieves the appropriate character data from the internal ROM, writes data to the LCD data register, And turns on the display. The display mode is entered by pressing the mode and the selection button or during receipt of an incoming message.

Memory retention

In order to pre-set, just the power-on reset, pager adapts the EEPROM U2.

The contents of EEPROM U2 consist of the pager's address, data baudrate, alert type and etc.

DC/DC Converter

This Pager adopts 1.5V AAA Alkaline battery.

DC/DC Converter does the 3V step-up with the 1.5V battery. 3V is required for the functioning of IC's on the logic board.

DC/DC Converter includes the MOS-FET, a CR oscillator circuit, a Voltage detector and the Control part.

The 3V step-up in DC/DC Converter is available through the charging and discharging process in L3 and D2

Microprocessor(MPU)

The Air-X1000 is controlled by the microprocessor

The microprocessor has 2 clocks, one is main clock(1MHz) which generated by the ceramic resonator. Another is sub clock(32.768KHz).

Microprocessor has ROM, RAM, A/D converter, In/Out port, SIO and LCD driver

When power is applied, the microprocessor operates (with lamp) by

using the I/O port, then address data is send to address register of decoder IC.

When data is applied from decoder, the information in the microprocessor is displayed on the LCD with the internal operation

The operation of key is detected by using the interrupt I/O port.