

25CHT Circuit Description

1. Introduction

The model 25 CHT is a 25 channel (43/49MHz) cordless telephone. The whole unit is divided into two main parts as follows:

One remote handset.

One base unit.

2. Function Blocks of the Remote Handset

- Keyboard matrix and function LED
- MCU and MCU interface
- Antenna and Duplexer
- Receiver amplifier
- Demodulator
- Audio amplifier
- compander
- Transmitter and receiver PLL frequency synthesizer
- Data shaper
- Transmitter amplifier
- Transmitter oscillator and modulator
- PLL loop filter
- Charge detector
- Buzzer amplifier

3. Circuit Block Description

3.1 Keyboard matrix and Function LED

Pin4 to Pin 6, Pin 8 to Pin11 and Pin 25 of the MCU form a keyboard and the talk LED, LED1 function is controlled by the Pin 7 of the MCU U2.

3.2 MCU and MCU interface

The heart of the handset is the MCU 87C405-HM. It communicates with the PLL of the TB31224 via pin 16,17 and 18. These three pins also control the audio path of the incoming and outgoing audio signal.

Transmitter DC power is controlled by pin 14 of U2.

Data communication between Handset and Base is via the pin 12 and pin24 by the RF link.

3.3 Antenna and Duplexer

ANT is the transmit and receive signal antenna.

DUP2 is a duplexer which rejects the transmitter signal to interfere the receiver.

3.4 Receiver amplifier

Q7 (9018H) and IFT3 is a tuned RF amplifier which amplifies the 43 to 46 MHz incoming RF signal and rejects the unwanted signal at the other frequencies.

3.5 Demodulator

U1 (TB31224F) is a combo chip includes a demodulator which performs double conversion in order to produce two IF signals and demodulate the FM signal into baseband audio. In addition, it has noise detector to monitor the receiving carrier for the changed condition of channels.

3.6 Transmitter amplifier

Q1, L2, C24, L3 and Q2 form transmitter amplifier which amplifies the outgoing 48 to 49 MHz RF signal.

3.7 Transmitter oscillator and modulator

Q3, IFT4, C33, C32, D13 C28 form a PLL tuned oscillator which oscillates at the FCC assigned channel frequencies. D14, C27 C29, C30 performs as a FM modulator.

3.8 PLL loop filter

C20, C73, R2, R1 and R37, C48, R38, C78, C79 are the receive and transmit PLL loop filters respectively.

3.9 Charge detector

ZD1, D5 R44, R43 and C50 form a charge detector to direct the charging signal to the MCU.

3.10 Buzzer amplifier

Q5 is a buzzer amplifier driven directly by the MCU pin 23. Pin 22 is used to lower the Buzzer volume when press the key.

3.11 Audio Amplifier

For U1 TB31224 - Pin 15, Pin 16, Pin 19, Pin 20 are the receive audio amplifier
For U1 TB31224 - Pin 13, Pin 14, Pin 9, Pin 10 are the transmit audio amplifier.

3.12 Compander and Low battery detector

U1 TR31224 also includes a compander IC which performs compression at transmitted signal via Pin 12 and expands the received signal via pin 17.

Low battery detector output is from U1's Pin 21.

3.12 Data shaper

U1's Pin 23 is a datashaper which send the information from BASE to the MCU Pin 24 (RXDAT).

4. Function Blocks of the Base unit

- Power supply
- MCU and MCU interface
- Antenna and Duplexer
- Receiver amplifier
- Demodulator
- Audio amplifier
- Compander
- Transmitter and receiver PLL frequency synthesizer
- PLL loop filter
- Data shaper and noise detector
- Transmitter amplifier
- Transmitter oscillator and modulator
- Charge detector
- Line audio interface
- Ring detector
- LED function board
- Power failure detector

5. Circuit Block Description

5.1 Power supply

BU3 78L05J regulate the input DC9V which provides 5VDC power to every part of the circuit.

5.2 MCU and MCU interface

The heart of the base is the MCU 87C405-BM communicates with the PLL of Combo Chip TR31224 via pin 18, 19 and 20

Transmitter DC is controlled by pin 22.

Pin 4 to Pin 9 consist of the DTMF generator. The communication between Handset and Base is via the Pin 28 and Pin 25 through the RF link.

5.3 Antenna and Duplexer

ANT is the transmit and receive signal antenna. BDUP2 is a duplexer which rejects the transmitter signal to interfere the receiver

5.4 Receiver amplifier

BQ1 and BIFT1 is RF amplifier which amplifies the 48 to 49 MHz incoming RF signal and rejects the unwanted signal at the other frequencies.

5.5 Demodulator

BU5 (TB31224F) includes a demodulator IC which performs double conversion to produce two IF signals and demodulate the FM signal into baseband audio. In addition, it has noise detector to monitor the receiving carrier for the changed condition of channels. BU5 pin 5 provide the logic signal to indicate the noisy condition to BU1 from pin 21.

5.6 Transmitter

BQ3, B13, BC30, BC33 and BQ5 form a RF transmitter amplifier which amplifies the outgoing 43 to 46 MHz RF signal. BQ4 and BQ6 are band switches.

5.7 Transmitter oscillator and modulator

BQ7, BC47, BC46, BC40, BVD2, BIF16 and BQ6 form a PLL tuned oscillator which oscillates at the FCC assigned channel frequencies. BVD1 performs as a FM modulator.

5.8 PLL loop filter

BR38, BR21, BC24, BC25, BC44 and BR15, BR16, BC16, BC17, BC18 are the transmit and receive PLL loop filters respectively.

5.9 Charge detector

BQ12 is a charge detector to direct the charging signal to the MCU pin 24.

5.10 Audio amplifier and compander

For BU5 TB31224 - Pin15, Pin 16, Pin19, Pin 20 are the receive audio amplifier.

For BU5 TB31224 - Pin13, Pin 14, Pin 9, Pin 19 are the transmit audio amplifier

BU5 TB31224 also include a compander IC which performs compression at transmitted

signal via Pin 12 and expands the received signal via pin 17

5.11 Line audio interface

BQ14, BR99, BR98, BR103, BR100, BR101, BC75 and RT1 line transformer are the audio interface to the telephone line. The transformer is also for telephone line isolation.

5.12 Data shaper and noise detector

BU5's Pin 23 is a data shaper which send the information from Handset to the MCU pin 12 (RXDAT).

BU5 pin 25, 26 form a noise detector. It can detect the high frequency noise and the signal is given out from BU5's pin 5 and to BU1 pin 21.

5.13 Ring Detector

BR105, BC76, BZ1, BZ2, BU4 (TLP521), BR102 and BD8 form a ring detector to signal the pin 23 of MCU BU1.

5.14 Power fail detector

BZD3, BR60, BQ11, BR87 form a power failure detector. The power failure signal is sent to pin 13 of BU1.

5.15 LED

BLLED1 is used to indicate charge or in use.