

FCC ID: LU9600715

Technical Description :

The brief circuit description is listed as follows :

- L1 acts as Loop Antenna.
- U2 W55MID50 acts as RFID Reader.
- X1 and associated circuit act as 13.56 MHz Oscillator.
- U1 W588D300 acts as MCU and Sound Synthesizer.
- Q1, Q2 and associated circuit act as Low Voltage Detection Circuit.
- SW1 to SW15 and K1 to K3 act as Control Keys.

Antenna Used :

An integral loop antenna has been used.



General Description

Winbond *MFID^{WB}* (Magnetic Field Identification) series is used in all areas of automatic data capture allowing contactless identification of objects using magnetic field. From ticketing to industrial automation and access control, the applications of MFID are burgeoning. In recent years automatic identification procedures have become very popular in many service industries, purchasing and distribution logistics, industry, manufacturing companies and material flow systems.

W55MID50 is one of series in Winbond *MFID^{WB}* family that supports multi-functional Reader solution and especially focus on toy, security, and consumer related applications. The applications with

Winbond *MFID^{WB}* Tag series such as W55MID10 that provides read-only mask ROM-ID version transponder for mass production solution in toy industrial, meanwhile W55MID15 provides the other solution for manufacture option, which is 243 bonding-ID selection transponder. Besides the single tag transponder application, W55MID35 offers multi-transponder recognition function for intelligent and smart toy applications.

W55MID50 provides a wide variety of applications for toy, security, and consumer market meanwhile the W55MID50 is the most cost effective solution on current *MFID^{WB}* related application market.

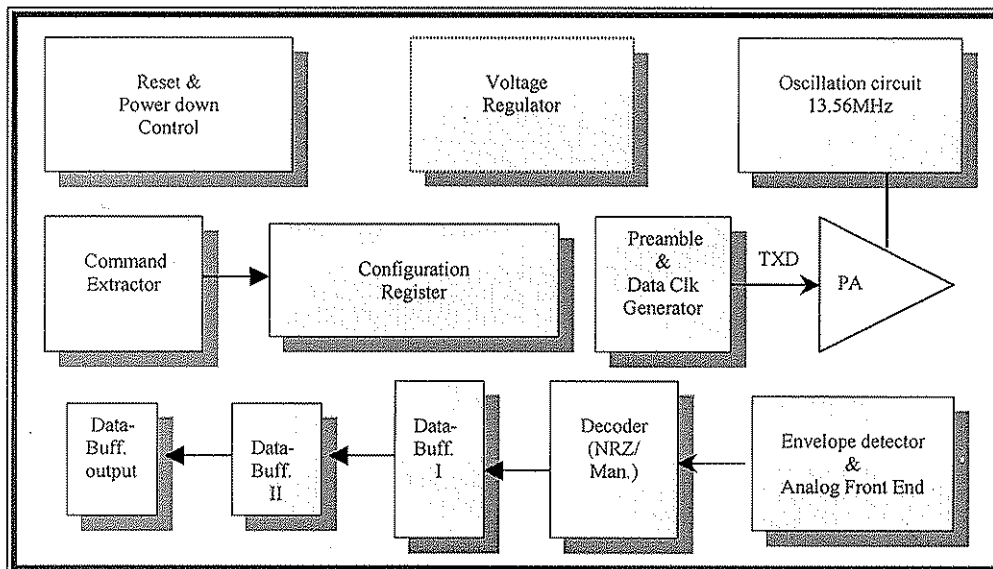
1.1 W55MID50 Features

- Magnetic field resonance frequency: 13.56MHz
- Data clock: 22 ~ 66KHz
- Inductive coupled power supplies for transponder's no battery operation
- On-chip rectifier, voltage limiter, clock extraction, power management, uC interface
- Provides NRZ and Manchester coding data format
- Adjustable 4-level of Reader transmission power selection
- Provides serial and parallel mode uC interface
- uC data output rate \geq 1Mbps
- Low power, low voltage operation
- Supports power-down mode \leq 1uA
- Operating distance: 0 ~ 10cm
- Operating voltage: 2.4V ~ 5.5V
- Operating temperature: 0 ~ 70 °C
- Package: Dice form, PDIP-20, SOP-20
- Reference design PC board Size: 2.0x2.0cm² (without PCB antenna)
- Winbond patented "Automatic Reader Transmission Power Adjustment" for Reader optimum transmission power adjust
- Minimize external components



System Description

2.1 W55MID50 System Block Diagram



2.2 W55MID50 Functional Description

Transmission Power Amplifier (PA)

It provides 4 different selectable transmission power for Reader chip to support *MFID^{WB}* Tag's radiation power supply. The external inductor coupling circuit is designed for 13.56MHz magnetic field resonance. The coupled center frequency will depend on equivalent value of external PCB inductor and capacitor.

The major function of this unit provides *MFID^{WB}* Tag's data can be extracted.

Voltage Regulator

The voltage regulator generates the system needs of device power supply.

Configuration Register

System configuration register controls the all functional settings of W55MID50 such as Tag data

Envelope Detector & Analog Front End

W55MID50 Data Sheet



format, Tag detection cycle, output data format, and PA transmission power selection.

Reset and Power-down Control

The function of system power-down control mode is normally used for power consumption saving.

Crystal Oscillation

The 13.56MHz system clock generator generates the need of device system clock.

Decoder NRZ/Manchester

This unit is in charge of Tag data format decoder, which can provide Tag-ID data format decoding of NRZ or Manchester.

Data Buffer and Output

This unit buffers the Tag-ID data, which is under de-frame processing.



1. GENERAL DESCRIPTION

The W588Dxxx is a powerful embedded microprocessor (uP) dedicated to speech and melody synthesis applications. This series chips are suitable for plush toys, educational Q&A toys, or interactive application. W588Dxxx can synthesize multi-channel speech and melody. 3-track of synthesized speech can be in different kinds of format, for example ADPCM and MDPCM. Regarding synthesized melody, W588Dxxx can provide 2-track of Tone melody (T-melody), or 3-track of High-Quality melody (HQ-melody) that can emulate the characteristics of musical instruments. In general speaking, W588Dxxx series can accomplish multi-tasking requirements easily and make toys with more complicated than traditional *PowerSpeech*.

The W588Dxxx provides at most 8 input pins & 24 bi-directional I/Os, maximum 512 bytes RAM, IR carrier, Serial Interface Management, and 32KHz-Divider for more and more sophisticated applications, such as interactive toys, cartridge toys and final count down function. 3 LED output pins with 256-level control means that numerous combination of RGB colors may result in a versatility of colorful effects. W588Dxxx has two kinds of power saving modes: one is Slow mode and the other is STOP mode. In addition, W588Dxxx also provides PWM mode output to save power during playback and Watch Dog Timer to prevent latch-up situation occurring.

ITEM	W588D003	W588D006	W588D009	W588D012	W588D015
*Duration	4 sec.	6 sec.	12 sec.	15 sec.	19 sec.
ITEM	W588D020	W588D025	W588D030	W588D035	W588D040
*Duration	25 sec.	29 sec.	32 sec.	44 sec.	50 sec.
ITEM	W588D045	W588D050	W588D055	W588D060	W588D070
*Duration	53 sec.	58 sec.	62 sec.	66 sec.	86 sec.
ITEM	W588D080	W588D100	W588D120	W588D150	W588D170
*Duration	100 sec.	118 sec.	134 sec.	169 sec.	203 sec.
ITEM	W588D210	W588D260	W588D300	W588D350	W588D400
*Duration	237 sec.	271 sec.	313 sec.	358 sec.	407 sec.

Note:

*: The duration time is based on 5-bit MDPCM at 6 KHz sampling rate. The firmware library and program code have been excluded from user's ROM space for the duration estimation.

2. FEATURE

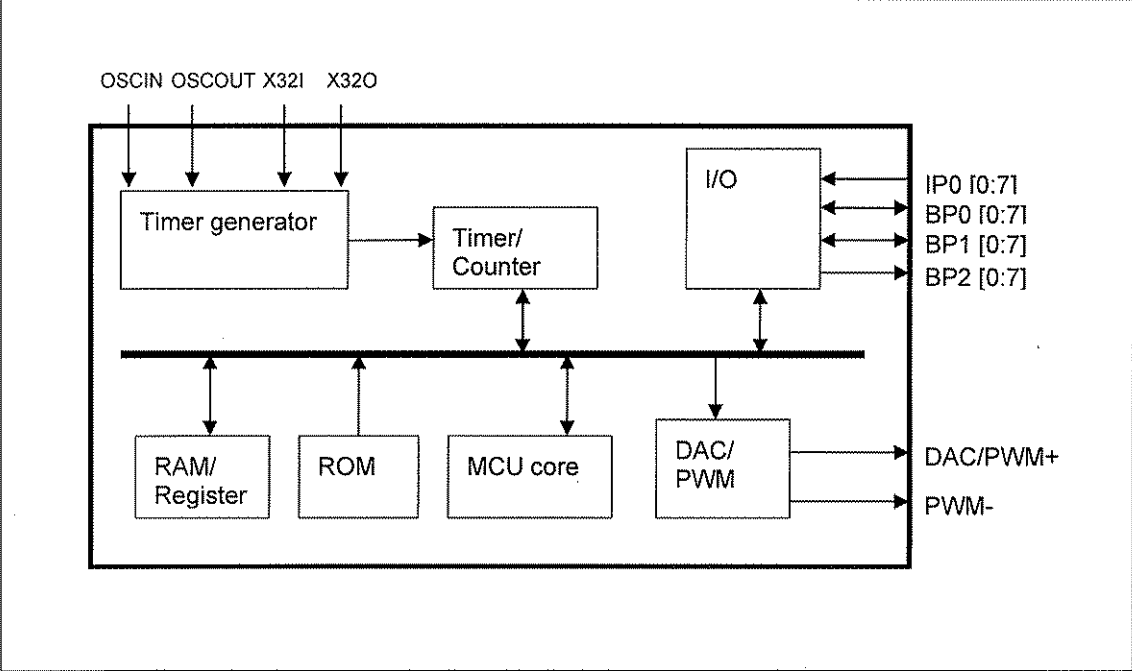
- Wide range of operating voltage:
 - 8 M Hz @ 3.0 volt ~ 5.5 volt
 - 6 M Hz @ 2.4 volt ~ 5.5 volt
- Provide power management to save current consumption:
 - 4 ~ 8 MHz system clocks, with Ring type or crystal type.
 - Slow mode to save power.
 - Stop mode for stopping all IC operations.
- F/W speech synthesis:
 - Multiple format parser that supports
 - ✓ 6-bit MDPCM, 5-bit MDPCM, 4-bit ADPCM, 8-bit Log PCM algorithm can be used
 - Pitch shippable ADPCM for voice changer application
 - Programmable sample rate
- F/W melody synthesizer
 - 2 tracks Tone melody which can emulate envelope of music instruments
 - 3 tracks High-Quality melody that can emulate characteristic of musical instruments
 - Voice melody can be implemented in 2 octaves
- Built-in 3 timers for speech/melody synthesis
 - 3 tracks speech
 - 1 speech channel plus dual-tone melody
 - 3 tracks High-Quality melody
- Harmonized synchronization among MIDI, Speech, LED, and Motor
- I/O configuration:
 - W588D003~D060: 16 I/O pins
 - W588D070~D260: 24 I/O pins
 - W588D300~D400: 8 input pins and 24 I/O pins
- Built-in IR carrier generation circuit for simplification firmware IR application
- Built-in IR receiver counting circuit for simplifying IR decoding
- Build-in 3 LED outputs with 256-level control of brightness.
- Built-in TimerG1 for general purpose applications
- Built-in Watch-Dog Timer (WDT) and Low Voltage Reset (LVR)
- Built-in 32 KHz crystal oscillator with divider for time-keeping application
- Provide serial interface
 - W55Fxx, W551Cxx
 - SPI flash
- Built-in Serial Interface Manager (SIM) in all W588Dxxx series
- 13-bit Current type digital-to-analog converters (DAC) to drive speaker output



- Direct-drive 12-bit PWM output to save power consumption
- Support **PowerScript™** for developing codes in easy way.
- Full-fledged development system
 - Source-level ICE debugger (Assembly & **PowerScript™** format)
 - **Ultra I/O™** tool for event synchronization mechanism
 - ICE system with USB port
 - User-friendly GUI environment
- Available package form:
 - COB is essential



4. BLOCK DIAGRAM



Notes:

- 1. IP0 is only providing in W588D300, W588D350 and W588D400.
- 2. BP2 isn't provided in W588D003 ~ W588D060.