

# **FCC ID:N3EHYPERDASH46001**

## **Technical Description :**

The brief circuit description is listed as follows :

- L4 acts as Loop Antenna.
- U1 W55MID50 acts as RFID Reader IC.
- Y1 and associated circuit act as 13.56 MHz Oscillator.
- K1 – K4, RST act as Control Keys.
- U2 W558S080 acts as MCU and Sound Synthesizer.

## **Antenna Used :**

A loop antenna has been used.



## General Description

Winbond *MFID<sup>WB</sup>* (Magnetic Field Identification) series W55MID50 supports selectable multi-level transmission power, programming base Control Register (CR) for W55MID15 single-tag ID or W55MID35 multi-tag IDs data recognition, serial-mode or parallel-mode uC interface, and power-down mode. The W55MID50 especially focus on toy, security, and consumer related applications.

The system applications with Winbond *MFID<sup>WB</sup>* Tag series such as W55MID15 provides the single-tag bonding-ID solution for manufacture, which has 243 bonding-IDs can be selected for use. Besides the single-

tag transponder, W55MID35 provides multi-tag transponder recognition function for intelligent and smart toy applications. Topically, 6 ~ 8 tags can be recognized in the same time as well as are located in the same reader antenna area. A special application for smart toy, W55MID35 supports both *Repeated-ID* mode and *Unique-ID* mode in operation.

W55MID50 provides a wide variety of applications for toy, security, and consumer market meanwhile the W55MID50 is the most cost effective solution for current *MFID<sup>WB</sup>* related application market.

### 1.1 W55MIDxx Series Selection Guide

W55MID Series Selection Guide

	W55MID15	W55MID35	W55MID50	W55MID20	W55MID55
Category	Single-tag	Multi-tag	Reader	R/W-tag	R/W-Reader
Frequency		13.56MHz		13.56MHz	
ID type	Bonding-ID		X	Programmable-ID	X
# of available IDs	243 IDs		X	Infinite	X
ID length	10-bit		X	64-bit	X
Anti-collision	X	5 ~ 8 Tags	X	5 ~ 8 Tags	X
TX power	X	4-level option		X	4-level option
uC interface	X	Serial/Parallel		X	Serial/Parallel
Package	Dice form	Dice/SOP-20		Dice form	Dice/SOP-20
E/S	Now			Apr. 2003	
Production	Jan./E, 2003			May, 2003	



## Features

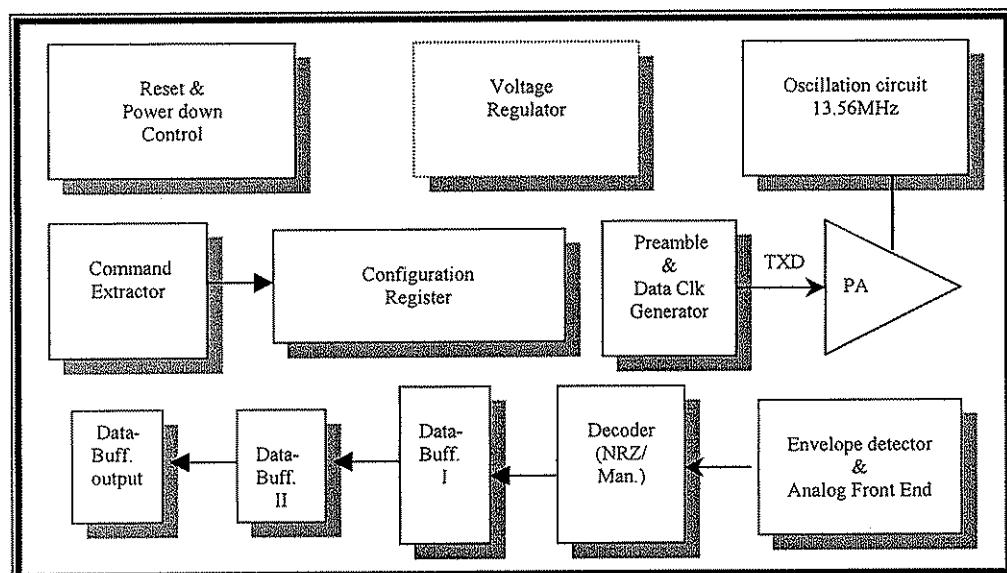
### 2.1 W55MID50 Features List

- 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: 2.0x2.0cm<sup>2</sup> (without PCB antenna)
- Winbond patented "Automatic Reader Transmission Power Adjustment" for Reader optimum transmission power adjust
- Minimize external components



## Architecture Overview

### 3.1 W55MID50 System Block Diagram



### 3.2 W55MID50 Functional Description

#### Transmission Power Amplifier (PA)

It provides 4 different selectable transmission power for Reader chip to support *MFID<sup>WB</sup>* 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.

#### Envelope Detector & Analog Front End

The major function of this unit provides *MFID<sup>WB</sup>* Tag's data can be extracted.

#### Voltage Regulator

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

# W55MID50 Design Guide



## Configuration Register

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

## 3.3 W55MID50 Pad/Pin Description

Symbol	PAD No.	PIN No. (PDIP-20, SOP-20)	I/O	Functional Description
D3	1	1	O	Data output #3
D2	2	2	O	Data output #2
D1	3	3	O	Data output #1
D0	4	4	O	Data output #0
XIN	5	5	I	Connect to external 13.56MHz oscillator
XOUT	6	6	O	Connect to external 13.56MHz oscillator
VSS	7	7	GND	Digital power return path
CMD	8	8	I/O	R/W configuration register
CLK	9	9	I	Command R-W/ Read data clock
VDD	10	10	Power	Power path
RX_VDD	11	13	Power	Power path of Rx
RX_VSS	12	14	GND	Power return path of Rx
ENV	13	15	I	Envelope detector input
/RESET	14	16	I	Reset
TagIn	15	17	O	Indication of tag arrival
COIL	16	18	O	PA output to connect with PCB antenna
TX_VSS	17	19	GND	Power return path of PA
TX_VDD	18	20	Power	Power path of PA

# W588SXXX



## 1. GENERAL DESCRIPTION

The W588Sxxx is a 8-bit microcontroller-based speech synthesizer with 3 channels of speech and melody for multi-tasking applications.

The W588Sxxx provides slow mode operation and PWM output to help reduce the power consumption for longer battery life. Also, the W588Sxxx adopts the MDPCM, ADPCM or PCM algorithm to reproduce high quality sound outputs.

Other functions like IR carrier generation and event synchronization mechanism are provided to meet the requirements for more complicated multi-tasking applications.

The W588Sxxx family contains several items with different playback duration as shown below: (@5-bit MDPCM algorithm, 6KHz sampling rate)

ITEM	W588S003	W588S006	W588S010	W588S013	W588S016
*Duration	4 sec.	7 sec.	12 sec.	16 sec.	20 sec.
ITEM	W588S020	W588S025	W588S030	W588S040	W588S050
Duration	25 sec.	29 sec.	32 sec.	50 sec.	58 sec.
ITEM	W588S060	W588S080	W588S100	W588S120	-
Duration	66 sec.	100 sec.	118 sec.	133 sec.	-

**ITEM	W588S009	W588S012	W588S015
Duration	12 sec.	16 sec.	20 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.

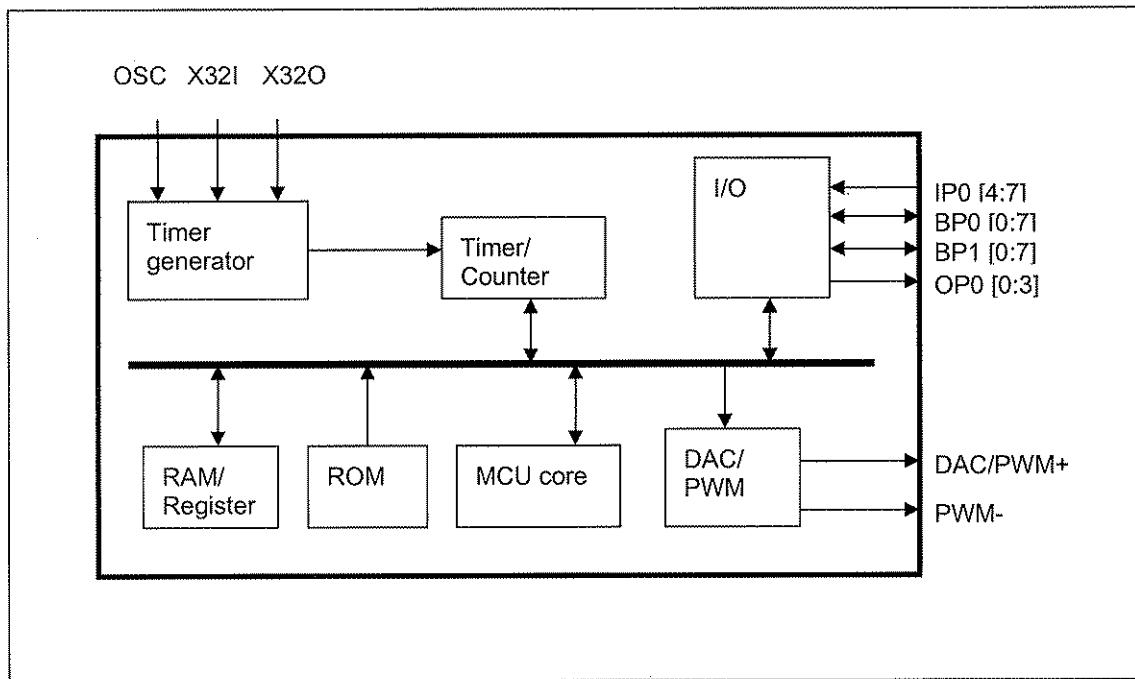
\*\*: W588S009, S012 and S015 are a little different in RAM and I/O definition. Meanwhile, PowerScript™ dose not support either.



## 2. FEATURE

- Wide Operating voltage: 2.4 ~ 5.5 volt
- Build in 8-bit MCU core with programmable capability
- System clock
  - 4 MHz at 2.4 ~ 5.5 volt
  - 8 MHz at 3.6 ~ 5.5 volt
- F/W speech synthesis
  - 5-bit MDPCM, 4-bit ADPCM or 8-bit PCM algorithm can be used
  - Programmable sample rate
- Direct-drive PWM output to save power consumption (no support in W588S003 and W588S006)
- Built-in 3 timers for speech/melody synthesis and general purpose applications
  - 2 speech channels
  - 1 speech channel plus dual-tone melody
- Build in on-chip mixer
- Built-in 32 KHz crystal oscillator with divider for time-keeping application
- Provide Watch Dog Timer (WDT)
- Provide power management to save current consumption:
  - 4 ~ 8 MHz system clock, with Ring type oscillator
  - Slow mode to reduce power
  - Stop mode for stopping all IC operations
- I/O configuration
  - W588S003 ~ W588S120: 16 I/O
  - W588S009, W588S012, W588S015: 4 In, 8 I/O, 4 Out
- Shared ROM for voice, melody and program storage
- Provide IR carrier generation
- Built-in Serial Interface Manager (SIM) in W588S080 ~ W588S120
- Support **PowerScript™** for developing codes in easy way. (No support in W588S009, S012, and S015)
- Full-fledged development system
  - Source-level ICE debugger (Assembly & **PowerScript™** format)
  - Event synchronization mechanism
  - Compatible with W566B/C & W567S system
  - User-friendly GUI environment
- Available package form:
  - COB is essential
  - W588S003 ~ W588S120: LQFP48
  - W588S009, S012, S015: QFP44

#### 4. BLOCK DIAGRAM



Notes:

1. IP0 and OP0 are only providing in W588S009, W588S012 and W588S015.
2. BP1 is no providing in W588S009, W588S012 and W588S015.
3. PWM is no providing in W588S003 and W588S006.

#### 5. ELECTRICAL CHARACTERISTICS

##### 5.1 Absolute maximum ratings

PARAMETER	SYMBOL	CONDITIONS	RATED VALUE	UNIT
Power Supply	VDD-VSS	-	-0.3 to +7.0	V
Input Voltage	VIN	All Inputs	Vss -0.3 to VDD +0.3	V
Storage Temp.	TSTG	-	-55 to +150	°C
Operating Temp.	TOPR	-	0 to +70	°C

Note: Exposure to conditions beyond those listed under Absolute Maximum Ratings may adversely affect the life and reliability of the device.