FCC ID: QDX19172

Technical Description:
The brief circuit description is listed as follows:

- Q1 and associated circuit act as RF Output Amplifier.
- U2 act as RFID Reader IC.
- Y1 and associated circuit act as 13.560MHz Oscillator.
- U1 acts as MCU with Voice Synthesizer.
- SW1 acts as OFF/Low-Volume/Hi-Volume switch.
- SW2 & SW3 acts as control keys.

Antenna Used:
Loop antennas have 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.
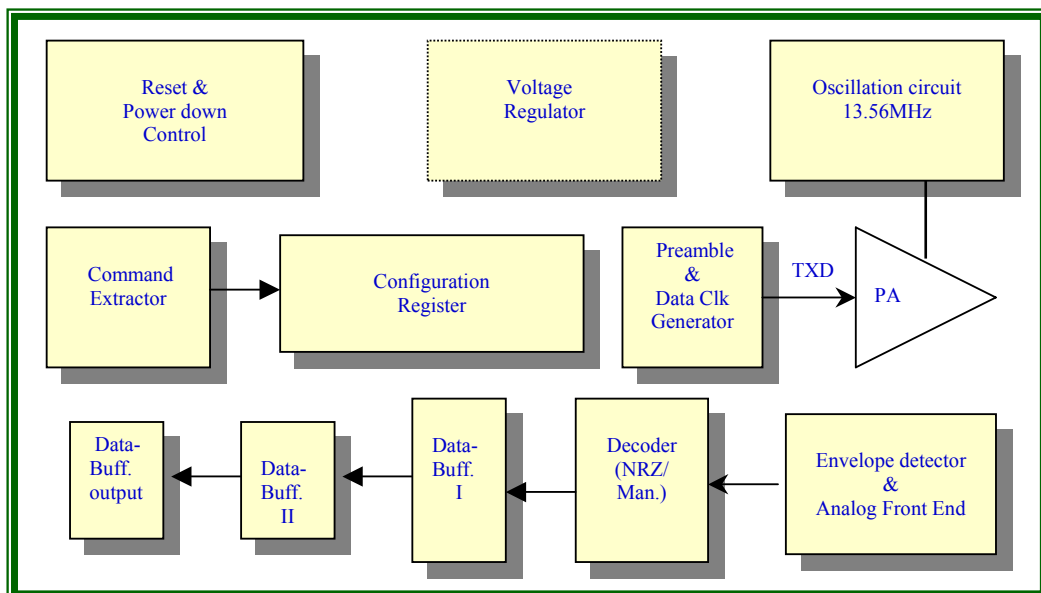
1.1 W55MID50 Features

- ❑ 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 ≥ 1Mbps

- ❑ Low power, low voltage operation
- ❑ Supports power-down mode ≤ 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^2 (without PCB antenna)
- ❑ Winbond patented "Automatic Reader Transmission Power Adjustment" for Reader optimum transmission power adjust
- ❑ Minimize external components

1.2 W55MID50 Pin Description

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

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.

Envelope Detector & Analog Front End

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

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.

Electronic Characteristics

3.1 W55MID50 Absolute Maximum Ratings

Parameter	Rating	Unit
Maximum Current in COIL	10	mA
Power Dissipation ($T_a = 70°C$)	100	mW
Ambient Operating Temperature	0 to +70	°C
Storage Temperature	-40 to +85	°C

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

3.2 W55MID50 DC Characteristics

(VDD-VSS = 4.5 V, Ta = 25°C; unless otherwise specified)

Parameter	Sym.	Conditions	Min.	Typ.	Max.	Unit
Operating Magnetic Field	f_{OP}	Field in resonation	-	13.56	-	MHz
Operating Voltage	V_{DD}	Field in resonation	3	-	5.5	V
Operating Temperature	Tamb	Ambient operating temp	0	25	70	°C
Operating Current	I_{OP}	f_{OP} = 13.56MHz	-	22	-	mA
Stand-by Current	I_{SB}	Power Down mode enter	-	0.7	1	uA
Sink Current	I_{SK}	VoL = 0.3VDD	-	10	-	mA
Source Current	I_{SR}	VoH = 0.7VDD	-	-6	-	mA

3.3 W55MID50 Ordering Information

W55MID50 provides two types of package in shipment: Dice form, PDIP-20, SOP-20, and Wafer

Part Number	Package	Remarks
W55MID50	Dice form	
W55MID50	PDIP-20	
W55MID50	SOP-20	
W55MID50	Wafer form	MOQ required