WINBOND MFID^{WB} TRANSPONDER

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1. GENERAL DESCRIPTION

MFID^{WB} (Magnetic Field Identification) 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.

W55MID15 is one of Winbond *MFID*^{WB} (Magnetic Field Identification) series in *WinRF*^{WB} family that focus on toy and consumer related applications meanwhile W55MID15 provides manufacture bonding-ID transponder. Regarding the *MFID*^{WB} Reader series, the W55MID50 supports multi-functional *MFID*^{WB} Reader solution. Besides the single transponder application, W55MID35 offers multi-transponder recognition function for intelligent and smart toy applications.

W55MID15 provides total 243 different bonding-IDs in manufacture and 10bit ID length in each ID. That can extremely save customer's design investment in consumer MFID related products.

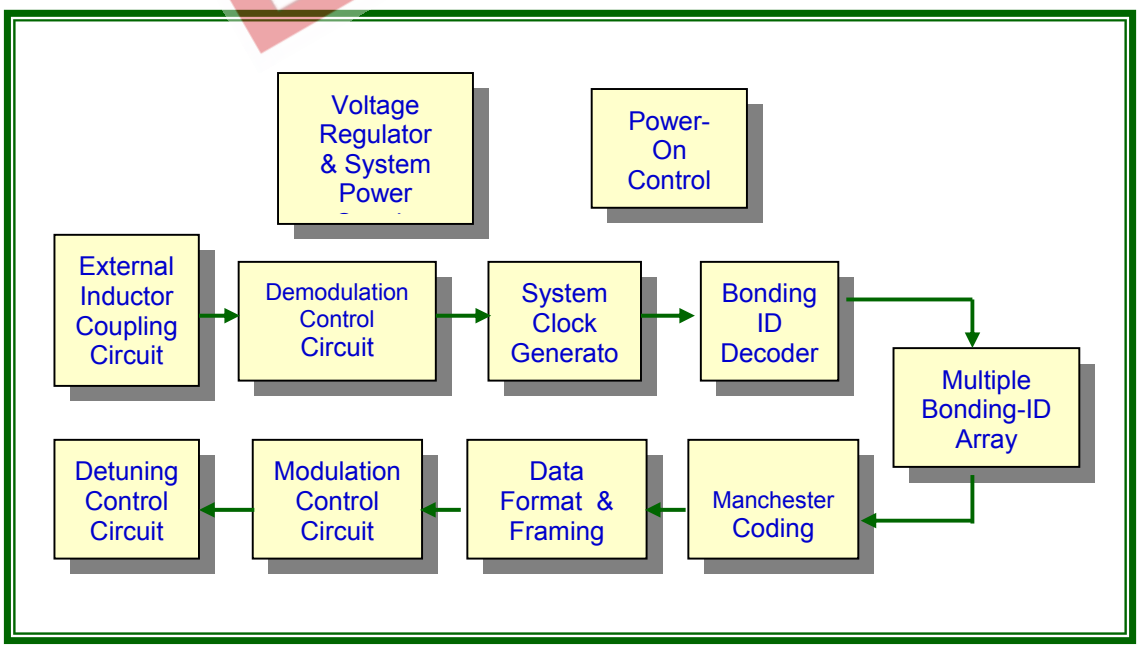
2. FEATURES

- Magnetic field resonance frequency: 13.56 MHz
- Data clock: 32 KHz
- Read-only bonding-ID transponder
- Inductive coupled power supply for no battery operation
- On-chip rectifier, voltage limiter, clock extraction
- 10bit bonding-ID length
- Provides Manchester coding data format
- RS0, RS1, RS2, RS3, and RS4 the 3-state bonding finger for the total 243 bonding-ID option in manufacture
- Low power, low voltage operation
- Operating distance: 0 ~ 5cm
- Operating temperature: 0 ~ 70 °C
- Package: Dice form
- Reference design PC board Size: 1.0 x 1.0cm^2 (with PCB antenna)
- Winbond patented "3-state Bonding Finger" for multiple bonding-ID option
- Minimize external component: capacitor and PCB antenna only

3. PAD DESCRIPTION

SYMBOL	PAD NO.	I/O	FUNCTIONAL DESCRIPTION
NC	1	--	Testing only, no connection
RS4	2	I	3-state bonding finger
RS3	3	I	3-state bonding finger
RS2	4	I	3-state bonding finger
RS1	5	I	3-state bonding finger
RS0	6	I	3-state bonding finger
VSS	7	Ground	Ground return path
COIL0	8	I/O	Coupling energy input and customer-ID output
COIL1	9	I/O	Coupling energy input and customer-ID output
NC	10	--	Testing only, no connection
VDD	11	Power	Power path

4. BLOCK DIAGRAM



5. FUNCTIONAL DESCRIPTION

5.1 External Inductor Coupling Circuit

The external inductor coupling circuit is designed for 13.56MHz magnetic field resonance. The coupled center frequency will depend on equivalent inductor of external PCB inductor and a paralleled capacitor.

5.2 Voltage Regulator & System Power Supply

The voltage regulator generates the need of device power supply.

5.3 Power-On Control Circuit

System power-on control circuit initiates the device to get into initial state.

5.4 Demodulation Control Circuit

The demodulation control circuit demodulates the signal of command, which is magnetic field coupling from W55MID50 *MFID*^{WB} Reader system.

5.5 System Clock Generator

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

5.6 Bonding-ID Decoder

The memory array decoder circuit decodes the mapping location of memory array, which indicates by external RS0, RS1, RS2, RS3, and RS4 the 3-state Bonding Finger (Winbond patented).

5.7 Multiple Bonding-ID Arrays

The multiple Bonding-IDs array provides total up to 243 different bonding-ID and 10bit in each ID.

5.8 Data Format and Framing Generator

The data format and framing generator is in charge of the entire bonding-ID and command data into a Winbond defined *MFID*^{WB} tag format.

5.9 Modulation Control Circuit

The modulation control circuit modulates the Winbond defined *MFID*^{WB} transponder format into the magnetic field resonation.

6. ELECTRICAL CHARACTERISTICS

6.1 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.

6.2 DC Characteristics

(V_{DD} –V_{SS} = 4.5V, T_A = 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} = 13.56 MHz	-	2	-	µA
Magnetic Resonat Voltage	V_M		6	-	9	V

7. ORDERING INFORMATION

W55MID15 provides two types of package in shipment: Dice form & Wafer

PART NUMBER	PACKAGE	REMARKS
W55MID15	Dice form	
W55MID15	Wafer form	MOQ required

8. DESIGN INFORMATION

8.1 Reference Design

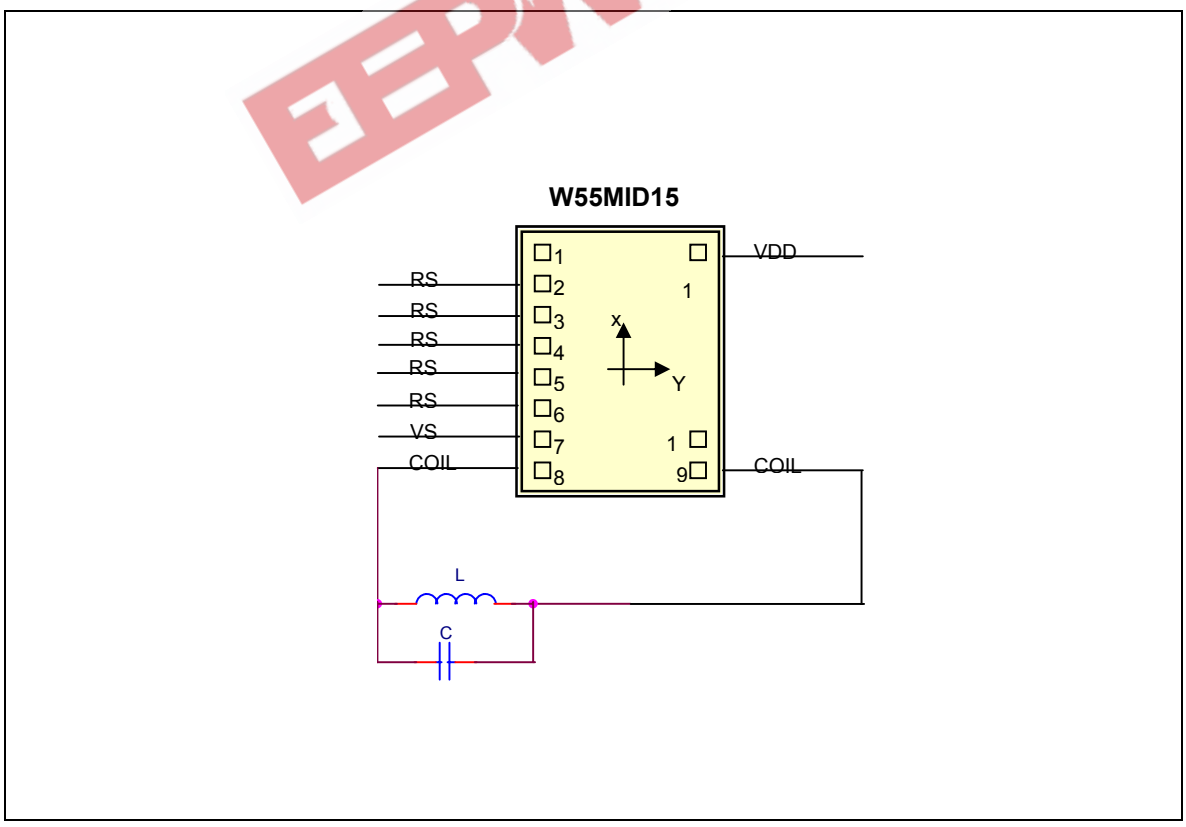
This W55MID15 application schematic is subject to modify for target specification evaluation. Some components are due to system specification evaluation purpose only which will be removed once the system evaluation is done. The magnetic field coupling strength is subject to the appropriate value of inductor and capacitor.

8.1.1 Demo Board

$$fop = \frac{1}{2\pi\sqrt{LC}} = 13.56MH$$

The value of "L" will depend on PCB coil layout and the value of "C" needs to fine-tune and matches the magnetic field resonance center f_{OP} = 13.56 MHz

9. TIPICAL APPLICATION CIRCUIT



10. REVISION HISTORY

VERSION	DATE	PAGE	DESCRIPTION
A0	Sep. 15, 2002	-	Preliminary version
A1	Dec. 29, 2002	-	Pin functional description update
A2	May 14, 2003	-	Application schematic update
A3	April 18, 2005	7	ADD IMPORTANT NOTICE

Important Notice

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