

TRH031M
13.56MHz Multi-Protocol
READER IC
Short Specification
Preliminary

3ALogics Inc.

7th Floor, Hyundai-Office Bldg, 9-4, Sunae-dong,
Bundang-gu, Seongnam-si,
Gyeonggi-do, 463-783, Korea

TEL: +82-31-715-7117

FAX: +82-31-719-7551

Web-site : <http://www.3alogics.com>

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1 PRODUCT OVERVIEW

TRH031M is a highly integrated multi-protocol reader IC for contactless communication at 13.56MHz. This Chip supports all layers of the ISO14443 Type A, Type B and ISO 15693 standard communication protocol.

The internal transmitter part is able to drive an antenna designed for proximity operation distance (up to 100mm) directly without additional active circuitry. TRH031M also support vicinity standard card protocol ISO 15693). TRH031M can communicate up to 1.5M with external power amplifier in ISO 15693 mode.

The receiver part of TRH031M provides a robust and efficient implementation of a demodulation and decoding circuitry for signals from ISO14443 Type A, Type B and ISO 15693 compatible cards. The receiver and transmitter part works in 3V supply voltage.

The Digital part of TRH031M handles the complete framing and error detection. Also it supports parallel and serial interface which can be directly connected to any 8-bit u-Processor.

2 FEATURES

- Highly integrated analog circuitry to demodulate and decode card response
- Buffered output drivers to connect an antenna with minimum number of external components
- Proximity operating distance (up to 100mm)
- Supports ISO/IEC 14443 Type A, Type B and ISO 15693 standards
- Parallel u-Processor interface with internal address latch and IRQ line
- Automatic external Interface type detection
- Automatic and flexible interrupt handling
- Comfortable 64-byte send and receive FIFO-buffer
- Bit- and Byte-oriented framing
- Supports hard reset with low power function and power down control
- Programmable 8-bit timer with pre-scaler
- 3.3V operation for analog Interface
- 3.3V operation for the digital part
- Internal oscillator buffer to connect 13.56 MHz quartz
- Independent power supply pins for digital, analog and transmitter part
- Supports SPI compatible serial interface
- Supports unique card detection function for low power consumption application

3 BLOCK DIAGRAM

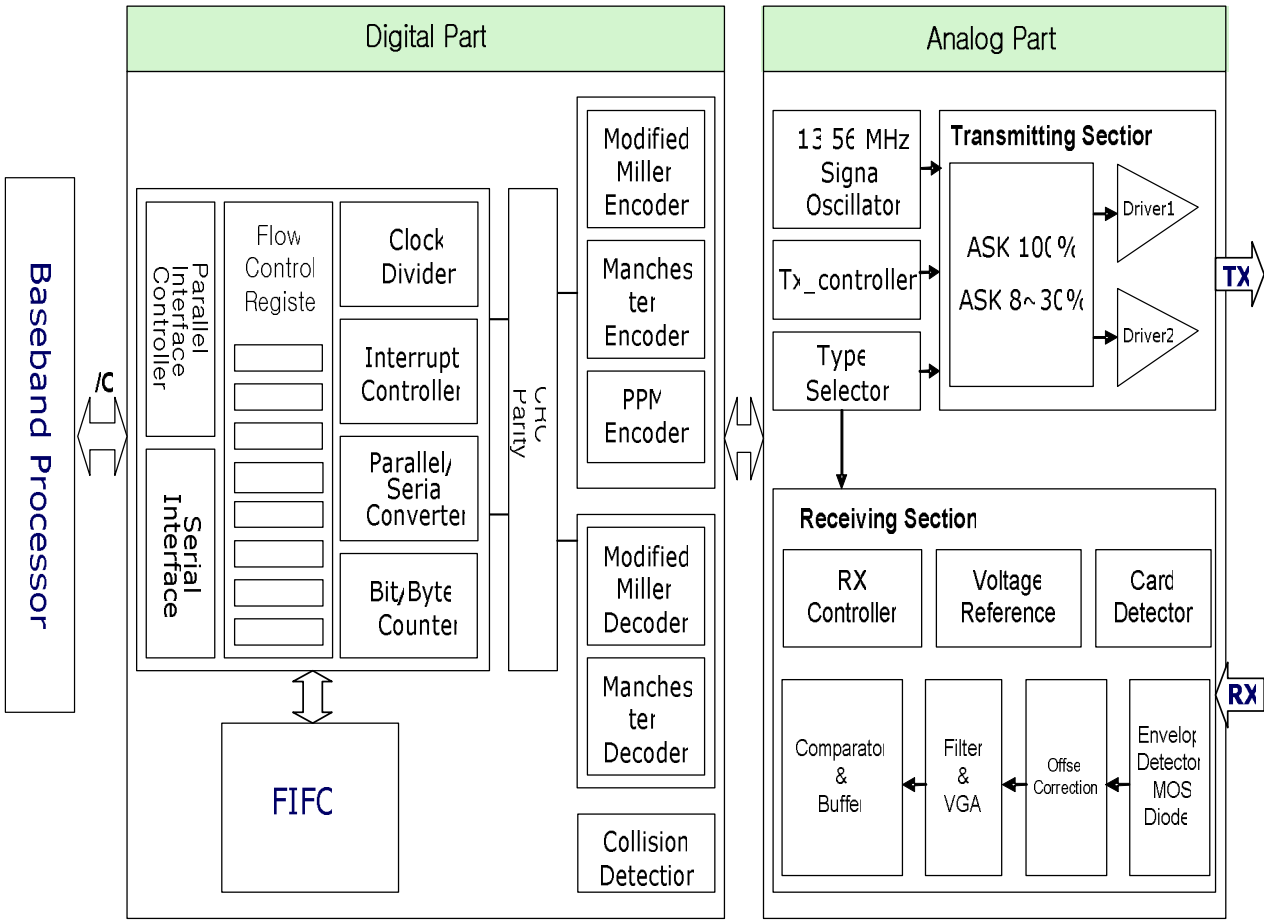


Figure 1. TRH031M Block Diagram

4 PIN ASSIGNMENT

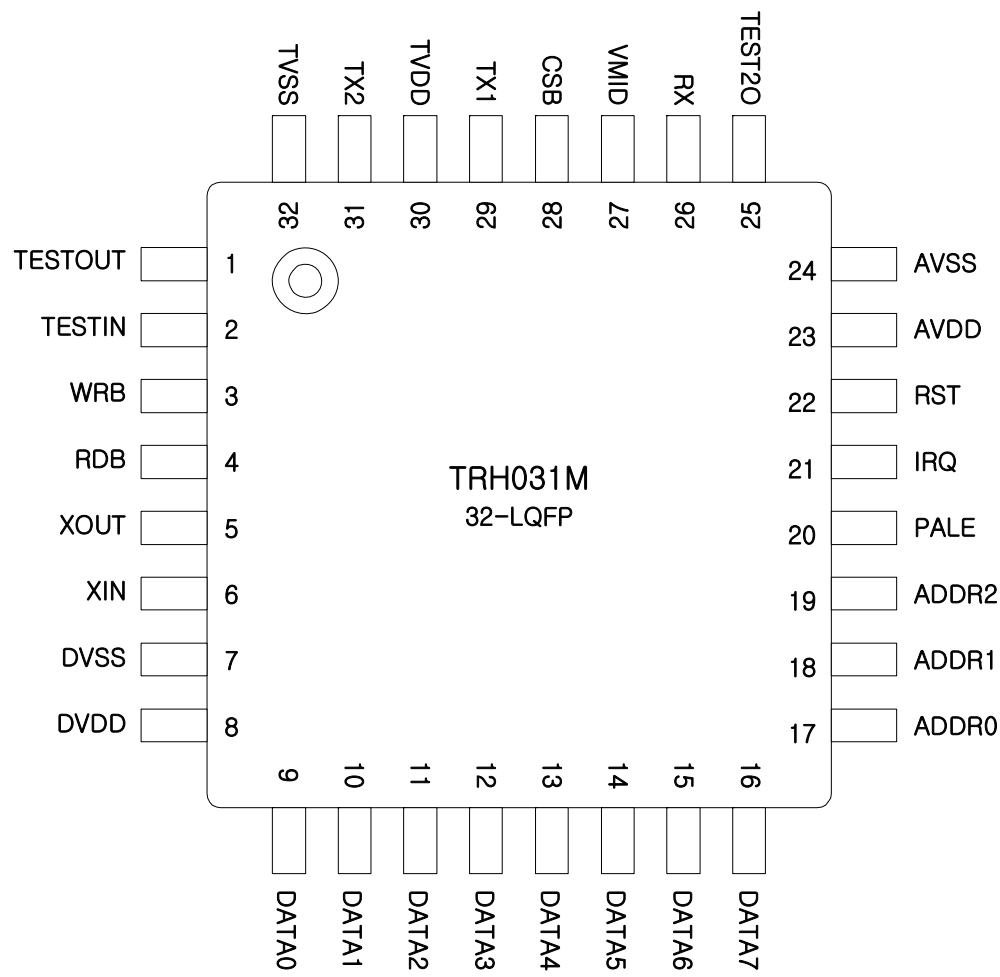


Figure 2. TRH031M Pin Assignment (32-LQFP)

5 PIN DESCRIPTIONS

Pin Name	Type	Pin Description	Number
TX1	O	Transmitter 1;delivers the modulated 13.56MHz energy carrier	29
TX2	O	Transmitter 2;delivers the modulated 13.56MHz energy carrier	31
WRB	I	Not Write: strobe to write data(applied on D0 to D7) into the MF RC500 register	3
R/NW	I	Read Not Write: selects if a read or write cycle shall be performed.	
RDB	I	Not Read: strobe to read data from the MF RC500 register(applied on D0 to D7)	4
NDS	I	Not Data Strobe: strobe for the read and the write cycle	
PALE	I	Address Latch Enable : strobe signal to latch DATA0 to DATA5 into the internal address latch when HIGH	20
ADDR0	I	Address Line 1: Bit 0 of register address	17
ADDR1	I	Address Line 1: bit 1 of register address	18
ADDR2	I	Address Line 2: bit 2 of register address	19
RX	I	Receiver Input: Input pin for the cards response, which is the load modulated 13.56MHz energy carried, that is coupled out from the antenna circuit.	26
RST	I	Reset and Power Down: When HIGH, internal current sinks are switched off, the oscillator is inhibited, and the input pads are disconnected from the outside world. With a negative edge on this pin the internal reset phase starts.	22
XIN	I	13.56MHz Crystal Oscillator Input	6
XOUT	O	Crystal Oscillator Output: Output of the inverting amplifier of the oscillator.	5
IRQ	O	Interrupt Request: output to signal an interrupt event	21
TEST2O	O	Auxiliary Output: This pin delivers analog test signals. Used for factory test	25
TESTIN	I	Used at Factory Test	2
TEST1O	O	Used at Factory Test	1
VMID	PWR	Internal reference voltage: This pin delivers the internal reference voltage. Note: It has to be supported by means of a 100 nF block capacitor.	27
TVDD	PWR	Transmitter Power Supply; supplies the output stages of TX1 and TX2	30
TVSS	PWR	Transmitter Ground: supplies the output stage of TX1 and TX2	32
DVDD	PWR	Digital Power Supply	8
DVSS	PWR	Digital Ground	7
AVDD	PWR	Analog Power Supply	23
AVSS	PWR	Analog Ground	24
DATA7 – DATA0	I/O	8-tib Bidirectional Data Bus(Dedicated Address Bus Mode) or Address/Data bus(Multiplexed Address Bus Mode)	16 - 9

6 ELECTRICAL CHARACTERISTICS

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	MIN	MAX	UNIT
T_{amb} , T_{sto}	Ambient or storage temperature range	-45	+150	°C
DVDD AVDD TVDD	DC Power supply	-0.5	3.5	V
V_{in}	Absolute voltage on any digital pin to DVSS	-0.5	$DVDD+0.3$	V
V_{RX}	Absolute voltage on RX pin to AVSS	-0.5	$AVDD+0.3$	V

OPERATING CONDITION RANGE

Symbol	Parameter	Conditions	MIN	TYP	MAX	UNIT
T_{amb}	Ambient or storage temperature range	-	-25	+25	+85	°C
DVDD	Digital Power supply	DVSS=AVSS=TVSS=0V	2.7	3.0	3.3	V
AVDD	Analog Power supply	DVSS=AVSS=TVSS=0V	2.7	3.0	3.3	V
TVDD	Transmitter Power supply	DVSS=AVSS=TVSS=0V	2.7	3.0	3.3	V

CURRENT CONSUMPTION

Symbol	Parameter	Conditions	MIN	TYP	MAX	UNIT
I_{DVDD}	Digital Supply current	Idle Command	3	6	12	mA
		Soft Power Down mode	500	800	1500	uA
		Hard Power Down mode	0.5	1	5	uA
I_{AVDD}	Analog Supply current	Idle Command, Receiver On	15	25	50	mA
		Idle Command, Receiver Off	5	8	17	mA
		Soft Power Down mode	0.5	1	5	uA
		Hard Power Down mode	0.5	1	5	uA
I_{TVDD}	Transmitter Supply current	Continuous Wave	50	100	150	mA
		TX1 and TX2 unconnected, TX1RFEn, TX2RFEn = 1	3	5	10	mA
		TX1 and TX2 unconnected, TX1RFEn, TX2RFEn = 0	40	60	150	uA

STANDARD INPUT PIN CHARACTERISTICS

Symbol	Parameter	Conditions	MIN	MAX	UNIT
I_{leak}	Input Leakage Current	-	-1.0	+1.0	uA
V_T	Threshold	DVDD < 3.0 V	0.35DVDD	0.65DVDD	V

※ DATA0 to DATA7, ADDR0, ADDR1 have CMOS input characteristics.

SCHMITT TRIGGER INPUT PIN CHARACTERISTICS

Symbol	Parameter	Conditions	MIN	MAX	UNIT
I_{leak}	Input Leakage Current	-	-1.0	+1.0	uA
V_{T+}	Positive-Going Threshold	DVDD < 3.0 V	0.35DVDD	0.65DVDD	V
V_{T-}	Negative-Going Threshold	DVDD < 3.0 V	0.35DVDD	0.65DVDD	V

※ CSB, WRB, RDB, PALE, TESTIN has Schmitt-Trigger characteristics.

