Shanghai Fudan Microelectronics Group Company Limited

复旦微电子

FM17522E
Contactless Transceiver IC

Short Datasheet

APR. 2019

Trademarks

Contents

1 Product Overview

1.1 Introduction

The FM17522E is a highly integrated Transceiver IC for Contactless communication at 13.56MHz. The FM17522E Transceiver IC support Reader/Writer mode supporting ISO14443A protocal.
The FM17522E's internal transmitter part is able to drive a reader/writer antenna designed to communicate with ISO/IEC14443A cards and transponders without additional active circuitry. The receiver part provides a robust and efficient implementation of a demodulation and decoding circuitry for signals from ISO/IEC14443A compatible cards and transponders. The digital part handles the complete ISO/IEC 14443A framing and error detection. The FM17522E supports ISO/IEC14443A cards and transponders with transfer speeds from 106kbit/s to 424kbit/s in both directions.
With the technique of Low-Power external Card Detection, in particular, FM17522E could be applied to those battery-supplied Reader/Writers which need to detect external RFID card with super low power consumption, like electronic door lock.

1.2 Features

- **Supports ISO14443A/M1 reader/writer mode**
- **ISO/IEC14443A 106kbit/s and higher transfer speed at 212kbit/s and 424kbit/s**
- **Typical operating distance in reader/writer mode for communication to a ISO14443A card up to 50mm (depending on the antenna size and tuning)**
- **Supports host interfaces**
  - SPI interface up to 10Mbit/s
  - I2C interface up to 400kbit/s in Fast Mode , and up to 3400kbit/s in High Speed Mode
  - Serial UART in different transfer speeds up to 1228.8kbit/s, framing according to the RS232 interface with voltage levels according pad voltage supply
- **Comfortable 64 byte send and receive FIFO-buffer**
- **Flexible interrupt modes**
- **Multiple low-power modes**
  - Soft power down mode
  - Hard power down mode
  - Deep power down mode （typical 1uA）
- **Low Power external Card Detect (LPCD) at Reader/writer mode**
- **Programmable timer**
- **Internal oscillator to connect 27.12MHz quartz**
- **Wide voltage supply: 2.2V ~ 3.6V**
- **Integrated CRC Co-processor**
- **Programmable I/O pins**

1.3 Pinning information

1.3.1 QFN32 Pinning Assignment

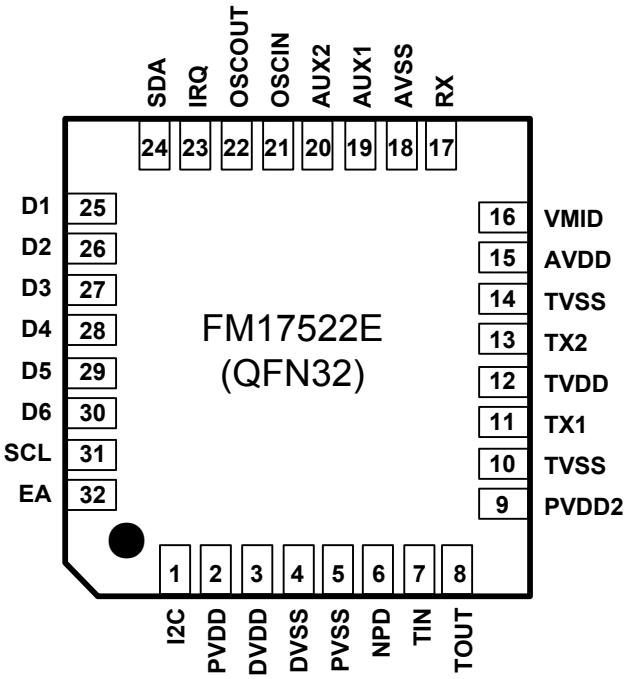

Fig 1-1 FM17522E QFN32 Pinning assignment

1.3.2 Pin description

Pin	Symbol	Type	Description
1	I2C	I	I2C-bus enable pin
2	PVDD	P	pin power supply
3	DVDD	P	chip power supply
4	DVSS	G	digital ground
5	PVSS	G	pin ground
6	NPD	I	power-down input, active low, reset chip when positive edge on NPD pin
7	TIN	I	test input
8	TOUT	O	test output
9	PVDD2	P	pin power supply for TIN and TOUT pin
10	TVSS	G	transmitter output 1 ground
11	TX1	O	transmitter 1 modulated 13.56MHz energy carrier output
12	TVDD	P	transmitter power supply
13	TX2	O	transmitter 2 modulated 13.56MHz energy carrier output
14	TVSS	G	transmitter output 2 ground
15	AVDD	P	analog power supply
16	VMID	P	internal reference voltage
17	RX	I	RF signal input
18	AVSS	G	analog ground

Pin	Symbol	Type	Description
19	AUX1	O	auxiliary outputs for test
20	AUX2	O	auxiliary outputs for test
21	OSCIN	I	crystal oscillator input; also input for externally generated clock (27.12MHz)
22	OSCOUT	O	crystal oscillator output
23	IRQ	O	interrupt request output, indicates an interrupt event
24	SDA	IO	I2C-bus serial data line input/output
	NSS	I	SPI signal input
	URX	I	UART input
25	D1	IO	test port
	ADR5	I	I2C-bus address 5 input
26	D2	IO	test port
	ADR4	I	I2C-bus address 4 input
27	D3	IO	test port
	ADR3	I	I2C-bus address 3 input
28	D4	IO	test port
	ADR2	I	I2C-bus address 2 input
29	D5	IO	test port
	ADR1	I	I2C-bus address 1 input
	SCK	I	SPI serial clock input
	DTRQ	O	UART request to send output to microcontroller
30	D6	IO	test port
	ADR0	I	I2C-bus address 0 input
	MOSI	I	SPI master out, slave in
	MX	O	UART output to microcontroller
31	SCL	I	I2C-bus clock input/output
	MISO	O	SPI master in, slave out
	UTX	O	UART data output to microcontroller
32	EA	I	external address input for coding I2C-bus address

Table 1-1 FM17522E QFN32 PIN description

2 Characteristics

2.1 Limiting Values

Parameter	最小值	最大值	单位
AVDD,DVDD,TVDD,PVDD,PVDD2	-0.5	4.0	V
ESD (HBM)		2K	V
ESD (CDM)		500	V

Table 2-1 FM17522E Limiting values

2.2 Reference Data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
T_A	Working temperature		-40		+85	°C
AVDD	Analog supply voltage		2.2	3.0	3.6	V
DVDD[1]	Digital supply voltage		2.2	3.0	3.6	V
TVDD[2]	Transmitter supply voltage		2.2	3.0	3.6	V
PVDD[3]	Pin supply voltage		1.62		3.6	V
PVDD2[4]	Test pin supply voltage		1.62		3.6	V
I_{DPD}	Deep power-down current	AVDD=DVDD=TVDD=PVDD=3V NPD=0, enter DPD		1	4	uA
I_{HPD}	Hard power-down current (register retention)	AVDD=DVDD=TVDD=PVDD=3V NPD=0 , enter HPD		2	6	uA
I_{SPD}	Soft power-down current	AVDD=DVDD=TVDD=PVDD=3V enter SPD mode		35	60	uA
I_{LPCD}[6]	LPCD current	AVDD=DVDD=TVDD=PVDD=3V enter LPCD mode		2	6	uA
I_{AVDD}	analog supply current	AVDD=3V, receiver switched on		10	13	mA
		AVDD=3V, receiver switched off		6	8	mA
I_{TVDD}[5]	TVDD supply current	continuous wave V_{TVDD} =3.0V		60	100	mA

Table 2-2 FM17522E Reference data

[1] AVDD and DVDD must always be the same voltage.
[2] TVDD must always be the same or higher voltage than AVDD.
[3] PVDD must always be the same or lower voltage than AVDD.
[4] PVDD2 is better the same voltage with PVDD
[5] I_{TVDD} depends on TVDD and the external circuit connected to pins TX1 and TX2.
[6] I_{LPCD} in Tab2-2 is the current of LPCD-T1 stage. The actual average current of LPCD mode depend on the configurations of LPCD mode.
[7] I_{DPD}、I_{HPD}、I_{SPD}、I_{LPCD} is the total current for all supplies.

3 Ordering information

Device number	Package	Wrap	Operating Environment
FM17522E-QNA-A-G	QFN32	tray	(-40℃ ~ +85℃)

Revision history

Version	Publication date	Pages	Paragraph or Illustration	Revise Description
1.0	Apr.2019	10		initial version

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