T77H395 User Manual

Project Name	NFC (Near Field Communication) Module
Rev.	01
FOXCONN Part No.	T77H395
Module Rev.	045

Revision History

Revision	Date	Originator	Comment
0.1	2012/07/18	Wei.Liao	Initial

Content

1. Introduction

The T77H395 NFC module provides contactless payment, contactless ticketing, service discovery, exchange information etc. This module is based on Broadcom BCM20792S solution, which is integrated NFC subsystem, interfaces, and microprocessor and memory unit.

1.1 Scope

The NFC module supports for the ISO/IEC 18092, ISO/IEC 21481, ISO/IEC 14443 Types A, B and B', Japanese industrial standard (JIS)(X) 6319-4, and ISO/IEC 15693 standards, etc.

1.2 Function

- NFC Features
  - Reader & Writer mode
  - Peer-to-Peer Communication mode
  - Card emulation mode

- BSC (I^2C-compatible) for host Interface, support all speed mode:
  - Low-speed mode (100 kbps)
  - Fast mode (400 kbps)
  - High-speed mode (3.4Mbps)

- 2-layers PCB printed antenna with 30mmx30mmx0.35mm size and 5 turns design

- On board XTAL of 26 MHz (+/- 10ppm)

- Option for on board embedded Secure Element (eSE) with 800kBytes flash memory
  Remark: eSE can be replaced by external SIM memory on platform.

- Windows 8 Logo Device Requirement compliant
  - NFC Forum Wave1 Certification
  - LLCP
  - SNEP

- RoHS and Green Compliant

1.3 Electrical Characteristics

Parameter		Minimum	Typical	Maximum	Units
Frequency Range		-	13.56	-	MHz
Input Supply Voltage	VBAT	2.3	-	5.5	V
	VDD I/O	1.62	-	3.6	V
	UICC (class C)	1.78	1.88	1.98	V
	UICC (class B)	2.9	3.1	3.3	V
Communication distance		20	-	-	mm
Peer to Peer Communication Speed		-	-	424	Kbps
NFC wake up		Wake up NFC module from sleep mode by NFC_WAKE signal via I^2C command			
Operating Temperature		0	~	70	℃
Storage Temperature		-20	~	85	℃
Storage Humidity		0	~	85	%

2. NFC standard conformance

Supported smart card (IC Card) types

	Read CSN (Card Serial Number)	Read/Write application data area	Typical operational distance	Supported baud rates
NFC Forum Type1 Tag	Yes	Yes	40	106
NFC Forum Type2 Tag	Yes	Yes	40	106
NFC Forum Type3 Tag	Yes	Yes	40	212
NFC Forum Type4 Tag	Yes	Yes	20	106
ISO/IEC 14443 Type A compliance cards	Yes	Yes	20	106, 212, 424
Mifare Classics 1K,4K	No	No		
Mifare DESFire	No	No		
Mifare Ultralight	Yes	Yes		
Mifare Plus	No	No		
(Mifare) SmartMX	No	No		
ISO/IEC 14443 Type B compliance cards	Yes	TBD	20	106, 212, 424
Jyuki (住基) cards (*1) issued by Japanese Government	TBD	TBD		
FeliCa general card	TBD	TBD		
FeliCa Edy card	TBD	TBD		
FeliCa Suica card	TBD	TBD		
FeliCa PKI Option card	TBD	TBD		
HID iCLASS	TBD	TBD		
Other card if any	Yes	Yes	52	Various

Other industrial standards and specifications

Standard	Yes / No	Note
I^2C	Yes	(Mandatory)
PC/SC 2.0	Yes	(Mandatory)
ISO/IEC 18092 (NFCIP-1)	Yes	(Mandatory)
ISO/IEC 15693	Yes	(Mandatory)
ISO/IEC 21481 (NFCIP-2)	Yes	(Mandatory)
Contact-less EMV	Yes	
PKCS#11	TBD	
CSP	TBD	
FIPS 201 PIV-II	TBD	

ISO standards at various bit rates

ISO/IEC 14443 A and B, Felica, and NFC Forum Modes						
Standard	Reader/Initiator			Tag/Target		
Data Rate (kbps)	106	212	424	106	212	424
ISO/IEC 14443 A	v	v	v	v	v	v
ISO/IEC 14443 B	v	v	v	v	v	v
ISO/IEC 14443 B - Prime				v	v	v
ISO/IEC 18092/ECMA 340 Active	v	v	v	v	v	v
ISO/IEC 18092/ECMA 340 Passive	v	v	v	v	v	v
JIS(X) 6319-4 FeliCa		v	v		v	v

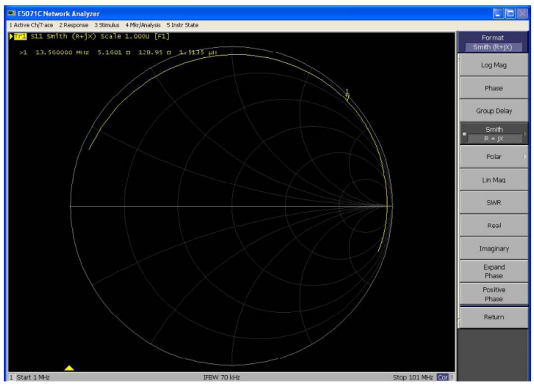
3. Hardware Specification

3.1 Antenna Electrical Specification

Parameter	Typical	Units
Operating frequency range	13.56	MHz
Communication distance	> 20	mm

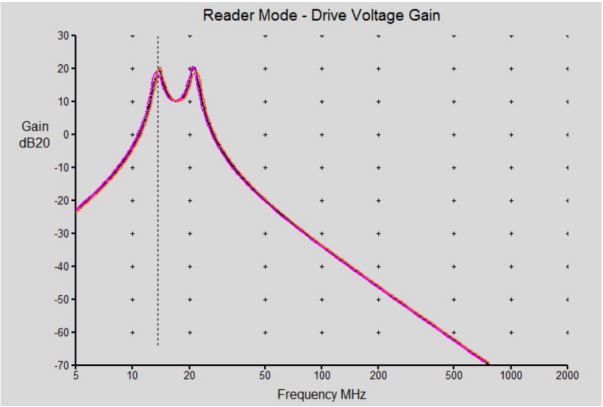
3.2 Antenna smith chart and on board antenna drawing.

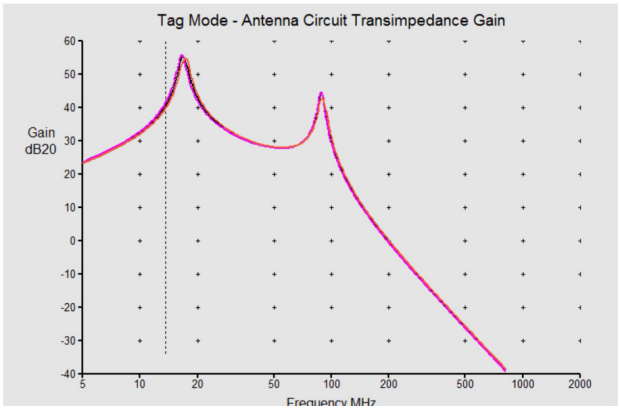
Network Analyzer used to measure s-parameters of antenna with TDK ferrite and steel plate.
Frequency swept from 1 to 101 MHz. Impedance at 13.56MHz = 5.16 + j129 ohms.



3.3 Antenna simulation

Reader mode and Tag or Card Emulation frequency response





4. Product Requirements

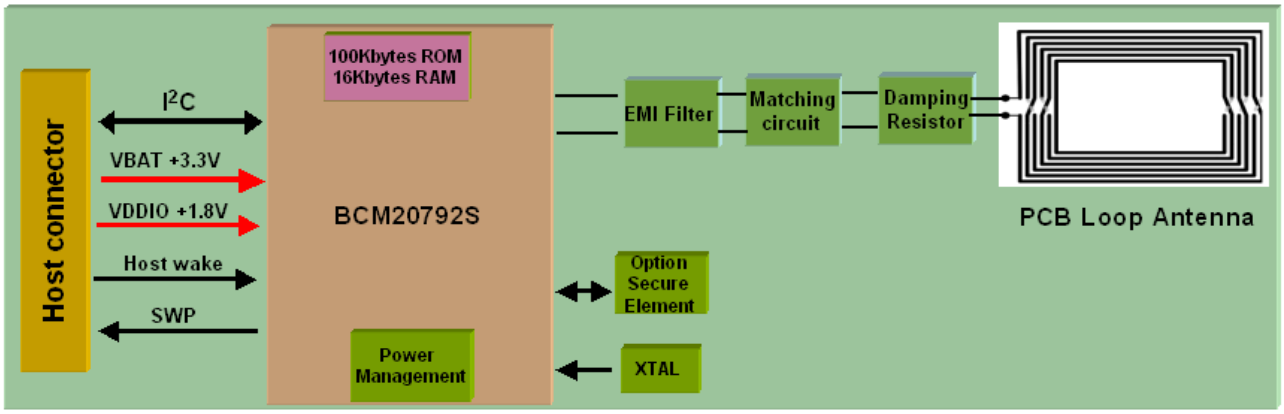
4.1 Hardware Requirements

Form factor	42 mm x30mm module with 10-pin FPC connector
Host Interface	BSC (I^2C -compatible) interface
PCB	4-layer design

4.2 Hardware Architecture

The T77H395 NFC module is based on Broadcom BCM20792S solution, which is integrated NFC subsystem, interfaces, and microprocessor and memory unit. This module is powered from the host (3.3V) and interfaces to the host with I^2C signals and with one-printed antennas, one on-board 26 MHz XTAL and option for one Secure Element (eSE) with 800kBytes flash memory.

The functional block diagram is shown as below.



5. Interface of Connector

Pin definition

Pin	Symbol	I/O	Note
1	VBAT	Input	Power supply from battery (2.3V - 5.5V)
2	VDDIO	Input	Power supply to I/O (1.62V – 3.6V)
3	VDD_Ext_SE	Output	Power supply to External Secure Element (1.65V - 1.95V)
4	I^2C -SDA	I/O	BSC Serial Data Line, active low
5	I^2C -SCL	I	BSC Serial Clock
6	GND	G	Ground
7	IRQ-NFC	O	BSC request, active high
8	UIM_PWR	Input	Power supply to UICC
9	SWP	I	SWP I/O 0 (Single-Wire Protocol interface)
10	NFC_PRESENCE	G	Ground
S1	GND	G	Ground
S2	GND	G	Ground

6. Test tool and SOP

Refer to another document for test sop.