Getac Technology Corporation

Getac ZX70G2 Tablet Product

NFC Board Engineering Specification

Rev. 0.1

Nov 14, 2019

Document Revision History

Revision	Date	Owner	Summary
0.1	2019.11.14		▪ Initial draft

1. Introduction

1.1.General Description

The NFC module is a highly integrated transceiver module for contactless reader/writer communication at 13.56 MHz. The main chip of this NFC module is NXP NQ310.

NQ310 is an NFC controller designed for integration in mobile devices and devices compliant with NFC standards (NFC Forum, NCI, EMVCo, ETSI/SCP).

NQ310 is designed based on learnings from previous NXP NFC device generation to ease the integration of NFC technology in mobile devices by providing:

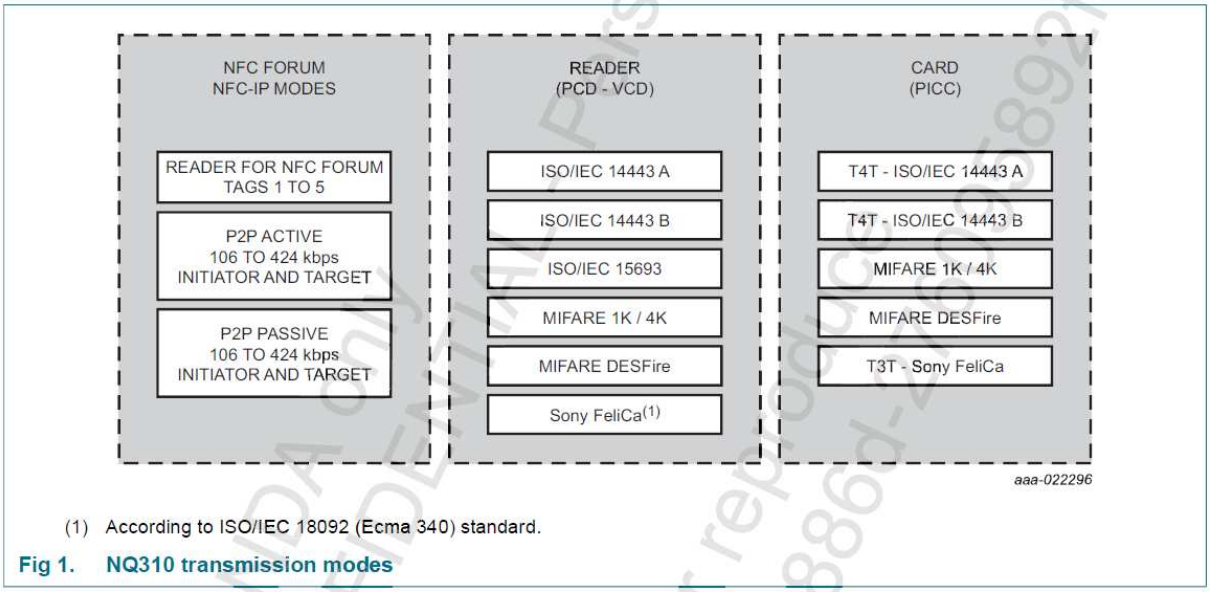
- An optimized architecture for low-power consumption in different modes (Standby, low-power polling loop)
- A highly efficient integrated power management unit allowing direct supply from an extended battery supply range (2.8 V to 5.5 V). Moreover, this power management provides full flexibility to support the different configurations in the mobile devices (screen ON, screen OFF, phone OFF)
- 2 SWP pads for UICC connections with dedicated power supply lines

NQ310 embeds a new generation RF contactless front-end supporting various transmission modes according to NFCIP-1 and NFCIP-2, ISO/IEC14443, ISO/IEC 15693, MIFARE and FeliCa specifications. This new contactless front-end design brings a major performance step-up with on one hand a higher sensitivity and on the other hand the capability to work in active load modulation communication enabling the support of small antenna form factor. It also allows to provide a higher output power by supplying the transmitter output stage from 2.7 V to 5.25 V.

- Enhanced Dynamic LMA (DLMA) to optimize and to enhance load modulation amplitude depending on external field strength. It allows higher range communication distance in card mode.
- Independent LMA phase adjustment by step of 5° for type A, B and F
- Dynamic Power control which allows to make use of the maximum power in reader mode without exceeding the maximum power allowed by the standard in 0 distance.
- Improved card mode receiver sensitivity down to 20 mV(p-p)

- Support of single ended receiver
- 1.3 W output transmitter power

NQ310 provides an architecture supporting several secure element interfaces (2 SWP) allowing a full flexibility for the support of SWP-based secure elements. It enables dynamic multiple secure element management (AID routing table). Supported transmission modes are listed in Figure 1. For contactless card functionality, the NQ310 can act autonomously if previously configured by the host in such a manner. PICC functionality can be supported without phone being turned on.



(1) According to ISO/IEC 18092 (Ecma 340) standard.

Fig 1. NQ310 transmission modes

1.2. Features

- ARM Cortex-M0 microcontroller core
  - Code memory: 128 kB ROM, 28 kB EEPROM
  - Data memory: 8 kB SRAM, 4 kB EEPROM
- Highly integrated demodulator and decoder
- Buffered output drivers to connect an antenna with minimum number of external components
- Integrated RF level detector
- Integrated Polling Loop for automatic device discovery
- Integrated routing mechanism to support multiple NFC execution environments

- RF protocols supported
  - ISO/IEC 14443A, ISO/IEC 14443B PICC mode designed according to EMVCo PICC.
  - ISO/IEC 14443A, ISO/IEC 14443B PCD designed according to NFC Forum digital protocol T4T platform and ISO-DEP.
  - FeliCa PCD mode
  - MIFARE PCD encryption mechanism (MIFARE 1K/4K)
  - NFC Forum tags T1T, T2T, T3T, T4T and T5T
  - NFCIP-1, NFCIP-2 protocol
  - NFC Forum certification release 9 for P2P, reader and card mode
  - FeliCa PICC mode
  - MIFARE PICC mode
  - ISO/IEC 15693/ICODE VCD mode
  - NFC forum compliant embedded T4T for NDEF short record
- Supported host interfaces
  - NCI protocol interface according to
  - NFC Forum standardization
  - I2C-bus High-speed mode
  - SPI-bus

1.3.Reference Data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{BAT}	battery supply voltage	Card Emulation and Passive Target; $V_{DD(UP)}$ > 2.9 V; V_{SS} = 0 V	[1]	2.5	-	5.5	V
		Reader, Active Initiator and Active Target; $V_{DD(UP)}$ > 3.1 V; V_{SS} = 0 V	[1]	2.8	-	5.5	V
$V_{DD(UP)}$	$V_{DD(UP)}$ input supply voltage	Card Emulation and Passive Target; V_{SS} = 0 V	[1]	2.8	-	5.8	V
		Reader, Active Initiator and Active Target; V_{SS} = 0 V	[1]	3.1	-	5.8	V
$V_{DD(PAD)}$	$V_{DD(PAD)}$ supply voltage	supply voltage for host interface; V_{SS} = 0 V	[1]	1.65	1.8	1.95	V
$V_{DD(GPIO)}$	$V_{DD(GPIO)}$ supply voltage	supply voltage for GPIO; V_{SS} = 0 V	[1]	1.65	1.8	1.95	V
$V_{DD(SIM\_PMU\_X)}$	UICC power supply	class C, UICC compliant to ETSI 102 221 rel 9	[2]	1.65	-	1.98	V
		class C, UICC compliant to ETSI 102 221 rel 12; $I_{VDD(SIM\_PMU\_X)}$ = 60 mA	[2]	1.75	-	1.85	V
		class B; $I_{VDD(SIM\_PMU\_X)}$ = 50mA	[2]	2.91	-	3.3	V
$V_{DD(SIM\_X)}$	$V_{DD(SIM\_X)}$ supply voltage	no $V_{DD(SIM\_PMU\_X)}$; $I_{VDD(SIM\_X)}$ = 10mA	[2]	1.625	-	1.98	V
I_{BAT}	battery supply current	in Hard Power Down state; V_{BAT} = 3.6 V; T = 25 °C	[3]	-	10.5	16	µA
		in Standby state; V_{BAT} = 3.6 V					
		enhanced RF detector		-	31	52	µA
		low sensitivity RF detector		-	21	36	µA
		in low-power polling loop; V_{BAT} = 3.6 V; T = 25 °C; loop time = 500 ms		-	100	-	µA
		continuous total current consumption in PCD mode at V_{BAT} = 3.6 V	[4]	-	-	290	mA
$I_{th(Ilim)}$	current limit threshold	current limiter on transmitter	[4]	270	300	330	mA
P_{tot}	total power dissipation	PCD mode at typical $V_{DD(TX)}$ = 5.25 V, $V_{DD(UP)}$ = 5.8 V and V_{BAT} = 3.6 V; includes power from V_{BAT} and $V_{DD(UP)}$		-	-	620	mW

2. Hardware description

2.1. General Specifications

- VBAT : Battery supply voltage:

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{BAT}	battery supply voltage	Card Emulation and Passive Target; $V_{DD(UP)}$ > 2.9 V; V_{SS} = 0 V [1]	2.5	-	5.5	V
		Reader, Active Initiator and Active Target; $V_{DD(UP)}$ > 3.1 V; V_{SS} = 0 V [1]	2.8	-	5.5	V

- Operational environment
  - Operating Temperature: -20°~60°
  - Storage Temperature: -25°~85°

2.2.Connector Pin List

CEI P/N: 23080009K00 BTB CONN 50150-04001-001 ACES			
Pin No.	Pin Name	Pin No.	Pin Name
1	GND	22	GND
2	Module ID	23	N/A
3	GND	24	V1P8
4	GND	25	GND
5	GND	26	GND
6	GND	27	SPI_CLK
7	GND	28	I2C_SDA
8	GND	29	SPI_MISO
9	GND	30	I2C_SCL
10	GND	31	SPI_MOSI
11	GND	32	GND
12	GND	33	SPI_CS
13	GND	34	NFC_INT_N
14	GND	35	GND
15	N/A	36	NFC_EN
16	GND	37	NFC_ESE_REQ
17	VBAT	38	NFC_DWL_REQ
18	UART_TX	39	GND
19	VBAT	40	NFC_WAKEUP
20	UART_RX	41	GND
21	VBAT	42	GND

2.3. Host interfaces

It provides the support of the following host interfaces:

- I2C-bus Slave Interface, up to 3.4 Mbaud
- SPI-bus Slave Interface, up to 7 Mbaud

Only one host interface can be active at same time as pins are shared for all interfaces. The selection between interfaces is fused during IC manufacturing so that different ordering numbers for the I2C-bus, SPI-bus version.

The host interfaces are woken-up in the following way:

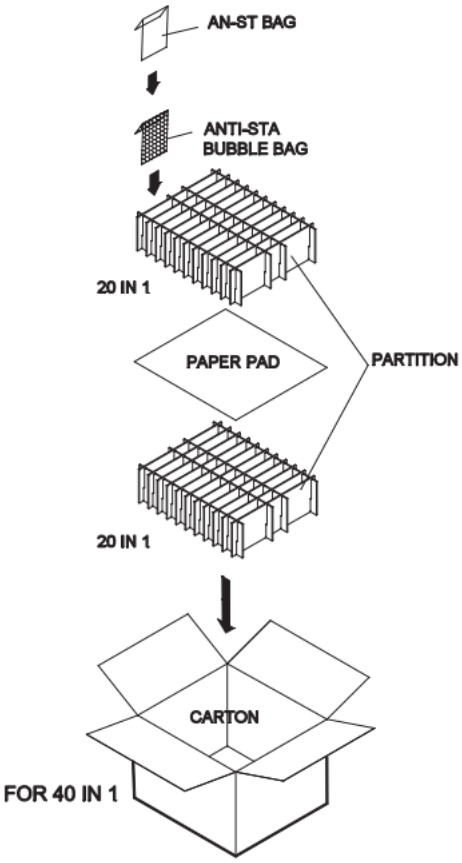
- Wake-up with WKUP_REQ input pin
- I2C-bus: wake-up on I2C-bus address
- SPI-bus: transition of NSS serial
- Data received on RX line

To enable and ensure data flow control between NQ310 and host controller, additionally a dedicated interrupt line IRQ is provided which Active state is programmable.

2.4. Key Part list

CEI P/N	Description	Specification
21AZP200C00	PCB	PCB AZP2 GS-368 REV:1.0 SB
04100003B00	IC TRANS	IC TRANS NQ310A1EV/C101Y NXP
1620000123W	CRYSTAL	CRYSTAL XRCGB27M120F3M10R0 27.12MHZ MU
23080009J00	BTB CONN	BTB CONN 50022-04071-001 ACES
23130005V00	SPR CONN	SPR CONN QM-18A6Q2G EMI STOP

3. Packing information



4. Federal Communication Commission Interference Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

IMPORTANT NOTE:

This NFC devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product. Any other installation or use will violate FCC Part 15 regulations. Modifications not expressly approved by Getac could void your authority to operate the equipment.

This module apply limit module approval, and just only install in end product (Brand: Getac / Model: ZX70).

Radiation Exposure Statement:

The product comply with the FCC portable RF exposure limit set forth for an uncontrolled environment and are safe for intended operation as described in this manual. The further RF exposure reduction can be achieved if the product can be kept as far as possible from the user body or set the device to lower output power if such function is available.

End Product Labeling:

The final end product must be labeled in a visible area with the following: “Contains FCC ID: QYLNQ310Z”. The grantee's FCC ID can be used only when all FCC compliance requirements are met.

Manual Information to the End User:

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user’s manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as show in this manual.

5. Industry Canada Statement

Canada, Industry Canada (IC) Notices

Class B digital circuitry of this device complies with Canadian ICES-003.

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Under Industry Canada regulations, the radio transmitter(s) in this device may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

This module apply limit module approval, and just only install in end product (Brand: Getac / Model: ZX70).

Radio Frequency (RF) Exposure Information

The radiated output power of this device is below the Industry Canada (IC) radio frequency exposure limits. This device has been evaluated for and shown compliant with the IC Radio Frequency (RF) Exposure limits. The device should be used in such a manner such that the potential for human contact during normal operation is minimized.

This device has been certified for use in Canada. Status of the listing in the Industry Canada's REL (Radio Equipment List) can be found at the following web address: http://www.ic.gc.ca/app/sitt/reltel/srch/nwRdSrch.do?lang=eng

Additional Canadian information on RF exposure also can be found at the following web address: http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf08792.html

Canada, avis d'Industry Canada (IC)

La circuiterie numérique de Classe B de cet appareil est conforme à la norme canadienne ICES-003.

Cet appareil est conforme aux normes d'exemption de licence RSS d'Industry Canada.

Son fonctionnement est soumis aux deux conditions suivantes : (1) cet appareil ne doit pas causer d'interférence et (2) cet appareil doit accepter toute interférence, notamment les interférences qui peuvent affecter son fonctionnement.

Conformément aux réglementations d'Industry Canada, les émetteurs radio de cet appareil ne peuvent fonctionner qu'à l'aide d'une antenne dont le type et le gain maximal (ou minimal) pour ces émetteurs - transmetteurs sont approuvés par Industry Canada. Pour réduire le risque d'interférence éventuelle pour les autres utilisateurs, le type et le gain de l'antenne doivent être choisis de manière à ce que la puissance isotrope rayonnée équivalente (p.i.r.e.) minimale nécessaire à une bonne communication soit fournie.

Informations sur l'exposition à la fréquence radio (FR)

La puissance rayonnée de sortie de cet appareil est inférieure aux limites d'exposition à la fréquence radio d'Industry Canada (IC). Cet appareil a été évalué et jugé conforme aux limites d'exposition à la fréquence radio (FR) d'IC. Cet appareil devrait être utilisé de manière à ce que le risque de contact humain au cours d'un fonctionnement normal soit réduit.

Cet appareil est homologué pour l'utilisation au Canada. Pour consulter l'entrée correspondant à l'appareil dans la liste d'équipement radio (REL - Radio Equipment List) d'Industry Canada, rendez-vous sur:
http://www.ic.gc.ca/app/sitt/reltel/srch/nwRdSrch.do?lang=eng

Pour des informations canadiennes supplémentaires sur l'exposition FR, rendez-vous sur :
http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf08792.html

6. Antenna Information:

Antenna	Antenna Net Gain (dBi)	Frequency range	Antenna Type	Connecter Type
NFC antenna	0	13.56 MHZ	PCB	Spring finger

7. Label Sample

Getac
NQ310
FCC ID: QYLNQ310Z
IC: 10301A-NQ310Z