H20

HSUPA PCI Express mini card module

Datasheet
Rev. 0.1
2008/04/30

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HISTORY

Version	Date	Notes
VER: 0.1	2008-APR-30	FIRST RELEASE

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1. INTRODUCTION

1.1 Description

<u>Overview</u>

This document describes all the functions, features, and interfaces of the HSUPA PCI Express Mini Card Module – H20 from Qisda. Qisda H20 HSUPA module supports Tri-band WCDMA/HSDPA/HSUPA and Quad-band GSM/GPRS/EDGE network connection capability.

Qisda H20 HSUPA card can provides high speed data connection, the data speed of downlink and uplink path is up to 7.2Mbps and 5.76Mbps respectively. Furthermore, users can ease to use this module by using the "HMTool" application software that we provide for Windows XP and Vista system.

With the Qisda H20 HSUPA module, devices are enhanced in both functionality and usability based on state of the art wireless technology.

1.2 Application Device

<u>Scope</u>

Qisda H20 module is a high speed modem card with PCI Express minicard form factor and is focusing on the Notebook, UMPC, MID and other portable device marketing.

➢ Notebook

➢ Ultra Mobile PC

➢ Mobile Internet Device

➢ Wireless Router

➢ USB Modem

➢ Car Embedded System

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2. FEATURES

2.1 General Characteristics

- Bands:

  Tri Band WCDMA and Quad Band GSM

Band	TX	RX
GSM850	824~849 MHz	869~894MHz
EGSM900	880~915 MHz	925~960MHz
DCS1800	1710~1785MHz	1805~1880MHz
PCS1900	1850~1910MHz	1930~1990MHz
WCDMA850	824~849 MHz	869~894MHz
WCDMA1900	1850~1910MHz	1930~1990MHz
WCDMA2100	1920~1980MHz	2110~2170MHz

- Support SIM Interface: 1.8V/3V
- Form factor
  - i.   Dimension: 50.95 x 30 x 5.0 mm
  - ii. Weight: 12g
- Power

  Operation Voltage: 3.3V +/- 9%
- Power Consumption:

  Speech Mode:

Band	Typ	Max	Unit
GSM850 / PCL=5	385	410	mA
EGSM900 / PCL=5	385	410	mA
DCS / PCL=0	330	350	mA
PCS / PCL=0	330	350	mA
WCDMA (all band)	750	820	mA

  Standby Mode:

	Typ (Average)	Max (Average)	Unit
GSM / Page frame=2	3.5	4.5	mA
GSM / Page frame=9	1.5	3	mA
DCS / Page frame=2	3.5	4.5	mA
DCS / Page frame=9	1.9	3.5	mA
PCS / Page frame=2	3.5	4.5	mA
PCS / Page frame=9	1.6	3	mA
WCDMA / DRX=6 (0.64 S)	4.2	5.5	mA
WCDMA / DRX=9 (5.12 S)	1.7	3	mA

- Hardware Interface:
  - 52 Pins PCI Express Mini Card connector interface
  - 2 RF Antenna Coaxial Connectors
- Software Interface:
  - USB driver
  - HMTool software tool.

2.2 RF Functionalities

Maximum TX Power

The performance of the transmitter meets test requirement ETSI TS 151 010-1 chapter 13.3 for GSM, chapter 13.17.3 for EDGE and TS 34.121 chapter 5.2&5.4.3 for WCDMA, chapter 5.2A for HSDPA, chapter 5.2B for HSUPA.

Band	Max	Min
GSM850	33 dBm ±2dBm	5 dBm ±5dBm
EGSM	33 dBm ±2dBm	5 dBm ±5dBm
DCS	30 dBm ±2dBm	0 dBm ±5dBm
PCS	30 dBm ±2dBm	0 dBm ±5dBm
GSM850(EDGE)	27 dBm ±3dBm	5 dBm ±5dBm
EGSM(EDGE)	27 dBm ±3dBm	5 dBm ±5dBm
DCS(EDGE)	26 dBm ±3dBm	2 dBm ±5dBm
PCS(EDGE)	26 dBm ±3dBm	2 dBm ±5dBm
UMTS-2100	24 dBm +1/-3dBm	Less than -50dBm
UMTS-1900	24 dBm +1/-3dBm	Less than -50dBm
UMTS-850	24 dBm +1/-3dBm	Less than -50dBm
$1/15 \leq \beta o/\beta d \leq 12/15$ (HS-DPCCH)	24 dBm +1/-3dBm	
$13/15 \leq \beta o/\beta d \leq 15/8$ (HS-DPCCH)	23 dBm +2/-3dBm	
$15/7 \leq \beta o/\beta d \leq 15/0$ (HS-DPCCH)	22 dBm +3/-3dBm	
Sub-test 1 (E-DCH)	24 dBm +1.7/-5.2dBm	
Sub-test 2 (E-DCH)	22 dBm +3.7/-5.2dBm	
Sub-test 3 (E-DCH)	23 dBm +2.7/-5.2dBm	
Sub-test 4 (E-DCH)	22 dBm +3.7/-5.2dBm	
Sub-test 5 (E-DCH)	24 dBm +1.7/-5.2dBm	

Parametric Performance

Tests carried out at $-20^{o}C$, $25^{o}C$ and $60^{o}C$ for each voltage 3V, 3.3V and 3.6V. The Measured Peak Phase, RMS Phase, frequency error, power level, and static sensitivity meets ETSI TS 151 010-1 chapter 13.1 for GSM and TS 34.121 chapter 5.13.1 for WCDMA, chapter 5.13.1A for HSDPA

Band (GSM)	Peak Phase Error	RMS Phase Error
GSM850	<20°	<5°
EGSM	<20°	<5°
DCS	<20°	<5°
PCS	<20°	<5°

Band (GSM)	Peak Phase Error	RMS Phase Error
Band (WCDMA)	Error Vector Magnitude	
UMTS-2100(HS-DPCCH)	<17.5%	
UMTS-1900(HS-DPCCH)	<17.5%	
UMTS-850(HS-DPCCH)	<17.5%	

Sensitivity

The performance of the receiver meets test requirement ETSI TS 151 010-1 chapter 14.2.1 for GSM, chapter 14.18.1 for EDGE and TS 34.121 chapter 6.2 for WCDMA.

Band	Typical	Min
GSM850	-107 dBm	-104 dBm
EGSM	-107 dBm	-104 dBm
DCS	-107 dBm	-103 dBm
PCS	-107 dBm	-103 dBm
EDGE(GMSK modulation)	-107 dBm	-104 dBm
EDGE(8-PSK modulation)	-104 dBm	-102 dBm
UMTS-2100(Primary)	-109 dBm	-106.7 dBm
UMTS-2100(Secondary)	-109 dBm	N/A
UMTS-1900(Primary)	-107 dBm	-104.7 dBm
UMTS-1900(Secondary)	-109 dBm	N/A
UMTS-850(Primary)	-109 dBm	-106.7 dBm
UMTS-850(Secondary)	-109 dBm	N/A

Radio Frequency

GSM850 (850 MHz)	
Frequency Range	TX 824-849 MHz; RX 869-894 MHz
Channel Spacing	200 KHz
Number of Channels	124 Carriers x 8 (TDMA)
Modulation	GMSK / 8-PSK
Duplex Spacing	45 MHz
Frequency Stability	+/- 0.1 ppm (Uplink TX)
Power Output	33 dBm Class 8 (2 W peak) – 5 dBm
Output Impedance	50 Ohm
Spurious Emission	-36 dBm up to 1 GHz (< -30 dBm > 1 GHz)
EGSM (900 MHz)	
Frequency Range	TX 880-915 MHz; RX 925-960 MHz
Channel Spacing	200 KHz
Number of Channels	124 Carriers x 8 (TDMA)
Modulation	GMSK / 8-PSK
Duplex Spacing	45 MHz
Frequency Stability	+/- 0.1 ppm (Uplink TX)
Power Output	33 dBm Class 8 (2 W peak) – 5 dBm
Output Impedance	50 Ohm
Spurious Emission	-36 dBm up to 1 GHz (< -30 dBm > 1 GHz)

DCS (1800 MHz)

Frequency Range	TX 1710-1785 MHz; RX 1805-1880 MHz
Channel Spacing	200 KHz
Number of Channels	374 Carriers x 8 (TDMA)
Modulation	GMSK / 8-PSK
Duplex Spacing	95 MHz
Frequency Stability	+/- 0.1 ppm (Uplink TX)
Power Output	30 dBm – 0 dBm
Output Impedance	50 Ohm
Spurious Emission	-36 dBm up to 1 GHz (< -30 dBm > 1 GHz) Compatible with phase 2 feature

PCS (1900 MHz)

Frequency Range	TX: 1850~1910MHz; RX: 1930~1990MHz
Channel Spacing	200KHz
Number of Channels	299 Carriers x 8 (TDMA)
Modulation	GMSK / 8-PSK
Duplex Spacing	80 MHz
Frequency Stability	+/- 0.1 ppm (Uplink TX)
Power Output	30 dBm – 0 dBm
Output Impedance	50 Ohm
Spurious Emission	-36 dBm up to 1 GHz (< -30 dBm > 1 GHz) Compatible with phase 2 feature

WCDMA_IMT (2100 MHz)

Frequency Range	TX: 1920~1980MHz; RX: 2110~2170MHz
Channel Raster	200KHz
Number of Channels	299 Carriers x 8 (TDMA)
Modulation	QPSK
Duplex Spacing	190 MHz
Frequency Stability	+/- 0.1 ppm (Uplink TX)
Power Output	24 dBm +1/-3dBm - less than -50dBm
Output Impedance	50 Ohm
Spurious Emission	-67dBm(925-935MHz);-79dBm(935-960MHz);-71dBm(1805-1880MHz) ;-60dBm(1845-1880MHz);-41dBm(1885-1920MHz)

WCDMA_PCS (1900 MHz)

Frequency Range	TX: 1850~1910MHz; RX: 1930~1990MHz
Channel Raster	200KHz
Number of Channels	299 Carriers x 8 (TDMA)
Modulation	QPSK
Duplex Spacing	80 MHz
Frequency Stability	+/- 0.1 ppm (Uplink TX)
Power Output	24 dBm +1/-3dBm - less than -50dBm
Output Impedance	50 Ohm
Spurious Emission	

WCDMA_850 (850 MHz)

Frequency Range	TX 824-849 MHz; RX 869-894 MHz
Channel Raster	200KHz
Number of Channels	299 Carriers x 8 (TDMA)
Modulation	QPSK
Duplex Spacing	45 MHz

Frequency Stability	+/- 0.1 ppm (Uplink TX)
Power Output	24 dBm +1/-3dBm - less than -50dBm
Output Impedance	50 Ohm
Spurious Emission	-60dBm(869-894MHz;1930-1990MHz;2110-2155MHz)

3. HARDWARE DESCRIPTION

3.1 System Interface

The I/O connectors of H20 module are PCI EXPRESS MINI CARD and two RF antenna connectors. Table 3-1 summarizes the 25 signals and 18 power lines that are supported by the PCI Express Mini Card System Interface. Table 3-2 shows the antenna interface.

Table 3-1 System Interface

Signal Group	Pin no.	Description
Power	5	3.3V power source
GND	13	Return current path
USB	2	USB serial data interface compliant to the USB 2.0 specification
PERST#	1	Function reset to the card
W_DISABLE#	1	Shutdown the HSDPA module
UIM	4	SIM function
LED	3	Status indicators

Table 3-2 Antenna interface

Signal Group	Connector no.	Description
ANT	2	Antenna interface

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3.2 Functional Diagram

Qisda H20 HSPA PCI Express mini card Block Diagram
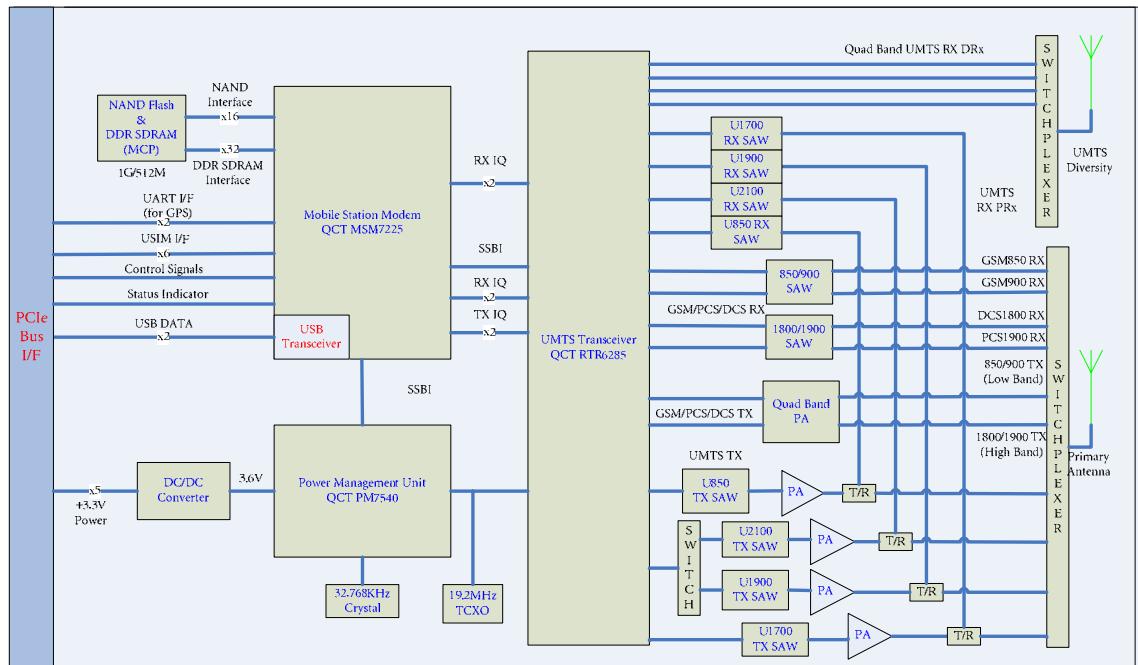
Used Frequency Range:

UMTS (WCDMA)			GSM			
UMTS2100 (Band I)	UMTS1900 (Band II)	UMTS850 (Band V)	GSM850	GSM900	DCS1800	PCS1900
1920 ~ 1980 MHz (UL)	1850 ~ 1910 MHz (UL)	824 ~ 849 MHz (UL)	824 ~ 849 MHz (UL)	890 ~ 915 MHz (UL)	1710 ~ 1785 MHz (UL)	1850 ~ 1910 MHz (UL)
2110 ~ 2170 MHz (DL)	1930 ~ 1990 MHz (DL)	869 ~ 894 MHz (DL)	869 ~ 894 MHz (DL)	935 ~ 960 MHz (DL)	1805 ~ 1880 MHz (DL)	1930 ~ 1990 MHz (DL)

3.3 Pin Description

Pin	Signal name	Direction	Description
1	NC		No connect
2	+3.3Vaux	Power	3.3V power source
3	NC		No connect
4	GND	Power	Return current path
5	NC		No connect
6	NC		No connect
7	NC		No connect
8	UIM_PWR	Output	Power source for the USIM
9	GND	Power	Return current path
10	UIM_DATA	Input / Output	USIM data signal
11	NC		No connect
12	UIM_CLK	Output	USIM clock signal
13	NC		No connect
14	UIM_RESET	Output	USIM reset signal
15	GND	Power	Return current path
16	NC		No connect
17	NC		No connect
18	GND	Power	Return current path
19	NC		No connect
20	W_DISABLE#	Input	Active low signal. This signal is used by the system to shutdown the HSDPA module.
21	GND	Power	Return current path
22	PERST#	Input	Active low signal. Function reset to the card.
23	NC		No connect
24	+3.3Vaux	Power	3.3V power source
25	NC		No connect
26	GND	Power	Return current path
27	GND	Power	Return current path
28	NC		No connect
29	GND	Power	Return current path
30	NC		No connect
31	NC		No connect

32	NC		No connect
33	NC		No connect
34	GND	Power	Return current path
35	GND	Power	Return current path
36	USB_D-	Input / Output	USB serial data interface (negative)
37	GND	Power	Return current path
38	USB_D+	Input / Output	USB serial data interface (postive)
39	+3.3Vaux	Power	3.3V power source
40	GND	Power	Return current path
41	+3.3Vaux	Power	3.3V power source
42	LED_WWAN#	Output	Active low signal. WAN status LED driver.
43	GND	Power	Return current path
44	LED_WLAN#	Output	Active low signal. LAN status LED driver.
45	NC		No connect
46	LED_WPAN#	Output	Active low signal. PAN status LED driver.
47	NC		No connect
48	NC		No connect
49	NC		No connect
50	GND	Power	Return current path
51	NC		No connect
52	+3.3Vaux	Power	3.3V power source

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3.4 Terminal Definition
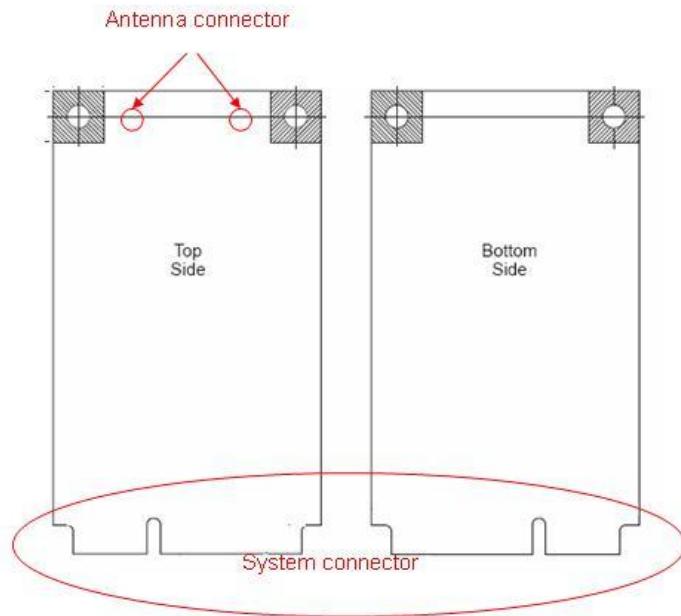
Recommend antenna connect

Hirose Coaxial Connectors

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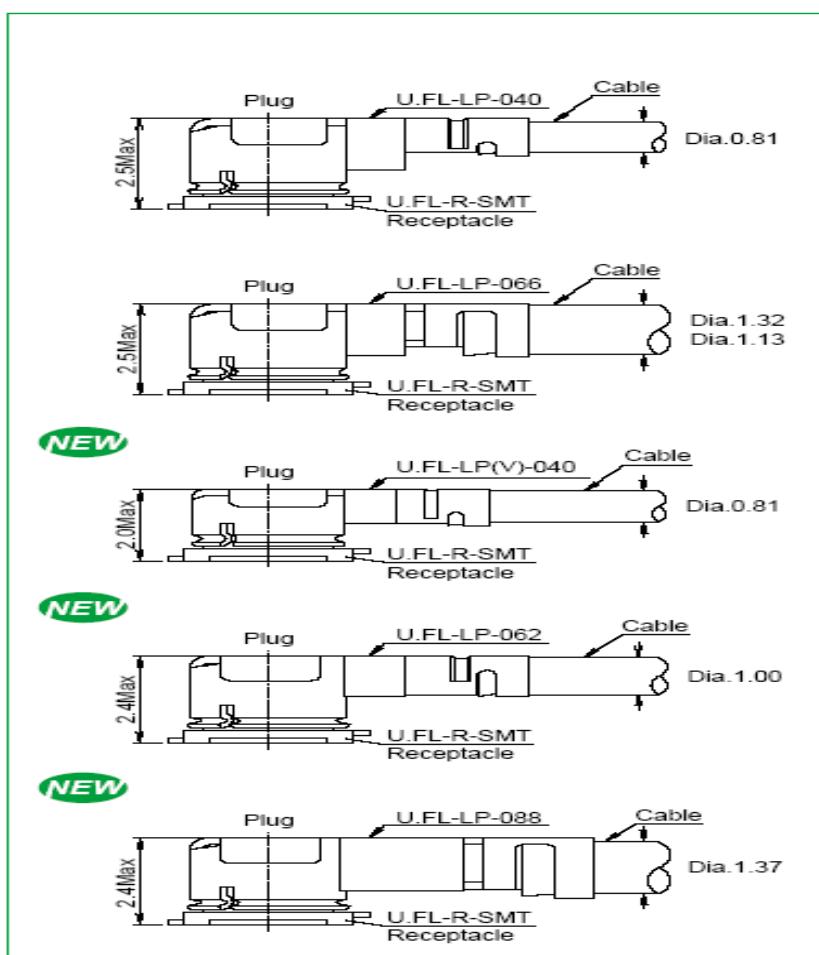
System connector
52 pins PCI Express Mini Card

2	
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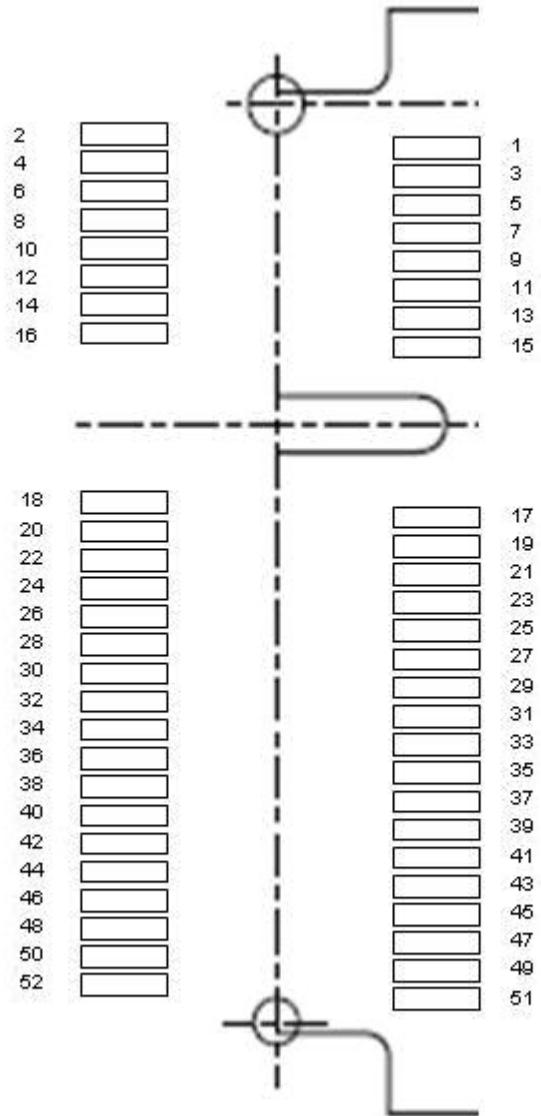
3.5 Electrical Characteristics

DC characteristics

Pin	Function/ Name	Direction	Parameter	Min	Typ	Max	Unit
1	NC						
2	+3.3Vaux	Power	Power Supply Voltage	3.0	3.3	3.6	V
3	NC						
4	GND	Power	Ground				
5	NC						
6	NC						
7	NC						
8	UIM_PWR	Output	Supply Voltage	1.5	2.85	3.05	V
			Current		150		mA
9	GND	Power	Ground				
10	UIM_DATA	Input / Output					
11	NC						
12	UIM_CLK	Output					
13	NC						
14	UIM_RESET	Output					
15	GND	Power	Ground				
16	NC						
17	NC						
18	GND	Power	Ground				
19	NC						
20	W_DISABLE#	Input	Logic High Input Voltage	1.69	2.6	3.3	V
			Logic Low Input Voltage	-0.3	0	0.91	V
21	GND	Power	Ground				
22	PERST#	Input	Logic High Input Voltage	1.69	2.6	3.3	V
			Logic Low Input Voltage	-0.3	0	0.91	V
23	NC						
24	+3.3Vaux	Power	Power Supply Voltage	3.0	3.3	3.6	V
25	NC						
26	GND	Power	Ground				
27	GND	Power	Ground				
28	NC						
29	GND	Power	Ground				
30	NC						
31	NC						

32	NC						
33	NC						
34	GND	Power	Ground				
35	GND	Power	Ground				
36	USB_D-	Input / Output	Termination Voltage	3.0	3.3	3.6	V
37	GND	Power	Ground				
38	USB_D+	Input / Output	Termination Voltage	3.0	3.3	3.6	V
39	+3.3Vaux	Power	Power Supply Voltage	3.0	3.3	3.6	V
40	GND	Power	Ground				
41	+3.3Vaux	Power	Power Supply Voltage	3.0	3.3	3.6	V
42	LED_WWAN#	Output	Driver current	0		150	mA
43	GND	Power	Ground				
44	LED_WLAN#	Output	Driver current	0		150	mA
45	NC						
46	LED_WPAN#	Output	Driver current	0		300	mA
47	NC						
48	NC						
49	NC						
50	GND	Power	Ground				
51	NC						
52	+3.3Vaux	Power	Power Supply Voltage	3.0	3.3	3.6	V

Digital interface

Parameter	Min	Typ	Max	Unit
Logic High Input Voltage	1.69	2.6	2.9	V
Logic Low Input Voltage	-0.3	0	0.91	V
Logic High Output Voltage	2.15	2.6	2.6	V
Logic Low Output Voltage	-0.3	0	0.45	V

USB Transceiver DC characteristics

The USB interface is powered from 3.3V power source.

Parameter	Comments	Min	Typ	Max	Unit
Input sensitivity (differential)	$|D+ - D-|$, V_{IN}=0.8 to 2.5V	0.2			V
Output voltage					
Logic LOW	R_L=1.5KΩ to 3.6V			0.3	V
Logic HIGH	R_L=1.5KΩ to GND, I_O=1mA	2.8		3.6	V
Series output resistance	D+, D-	28	33	44	Ω

Internal pull-up resistor	3.3V to D+, 3.3V to D-	1.425	1.5	1.575	KΩ
Internal pull-down resistor	D+ to GND, D- to GND	14.3	15	24.8	KΩ

USIM Interface

The USIM signals are defined on system connector to provide the interface between the removable User Identity Module. USIM interface usually run off either 1.8V or 3.0V.

Pin	Name	Direction	Description
8	UIM_PWR	Output	Power source for the USIM
10	UIM_DATA	Input / Output	USIM data signal
12	UIM_CLK	Output	USIM clock signal
14	UIM_RESET	Output	USIM reset signal

| Parameter	Comments	Min	Typ	Max	Unit
Logic High Input Voltage		1.8525	2.85	3.15	V
Logic Low Input Voltage		-0.3	0	0.9975	V
Logic High Output Voltage		2.4	2.85	2.85	V
Logic Low Output Voltage		-0.3	0	0.45	V
Schmitt Hysteresis		150			mV
Logic input leakage current		-200		200	nA
Internal pull-up resistor	Programmable range	1		30	KΩ

3.6 Environmental

Operational temperature: -20 ~ +60 ℃

Functional temperature: -20 ~ +70 ℃

Storage temperature: -40 ~ +85 ℃

Note:

➢ The maximum case temperature (Tc) of shielding case cover should be under 90 ℃ (@RF TX power = 24dBm) for ensure all of the characteristics of H20 module can be fulfilled the ETSI specification.


➢

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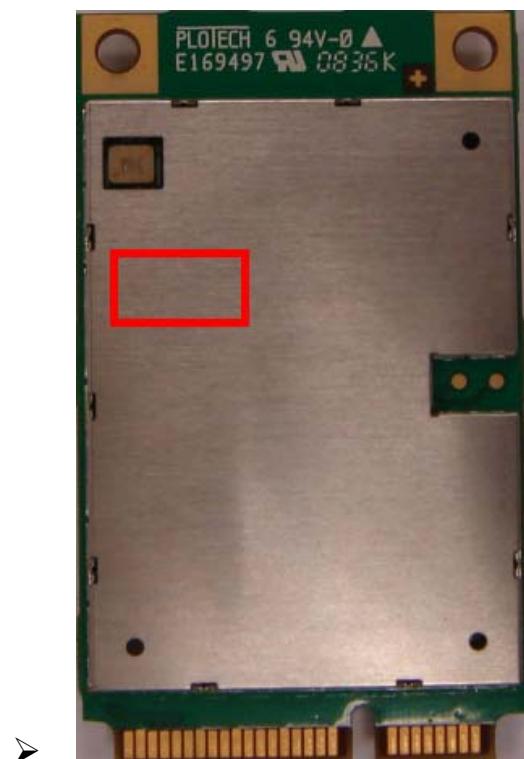
3.7 Physical Package
Top View

30.00 +0.00/-0.30

⊕ | 0.10 Ⓜ | A | B | C

24.20

2x Ø2.60 ± 0.10

⊕ | Ø0.10 | A | B | C

8.25

50.95 +0.00/-0.30

48.05

Top Side

1.65

3.85

Pin 1

Pin 51

See Detail A

⊄ of Card Width

B

C

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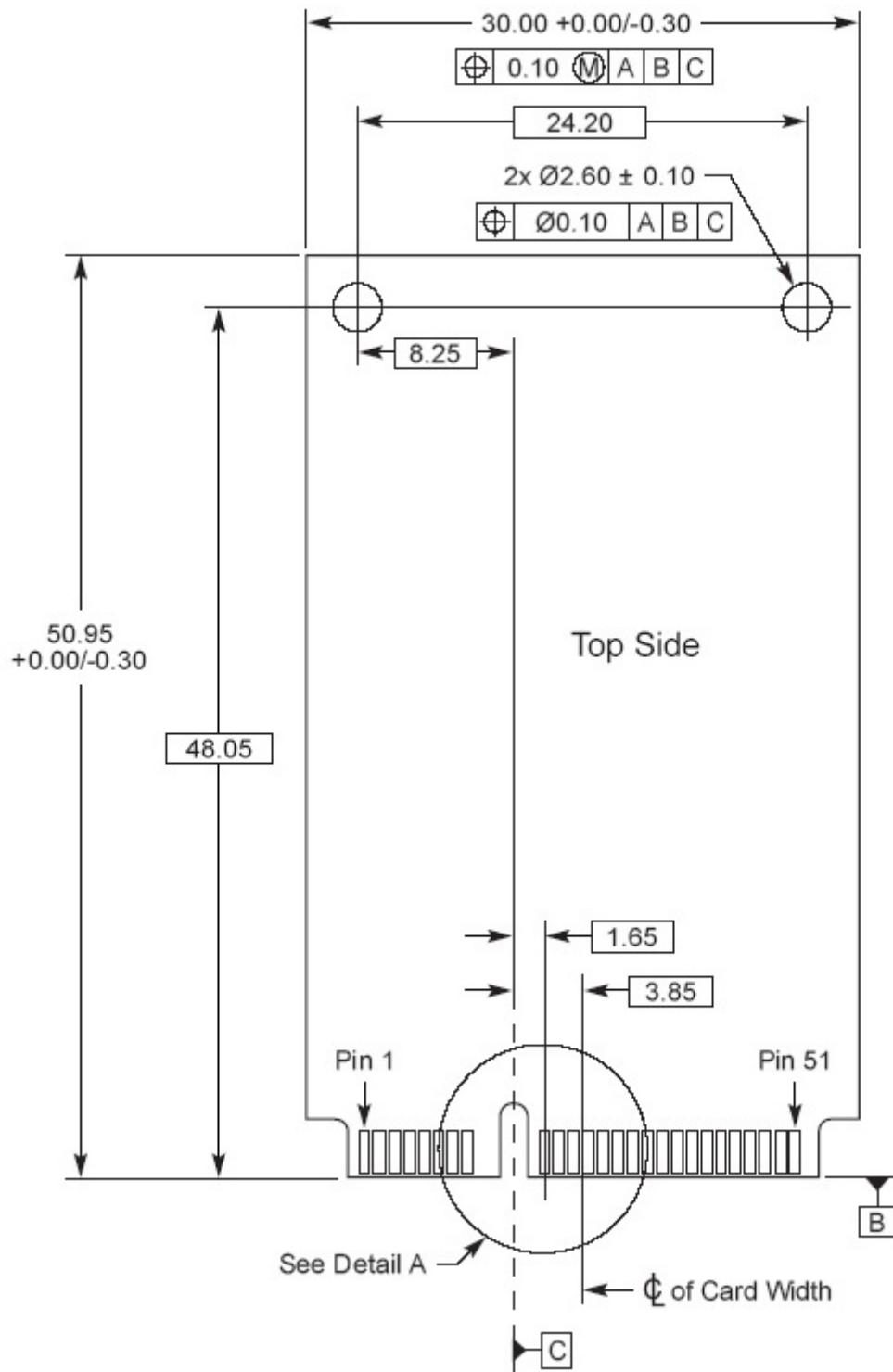
Bottom View

Pin numbering reference:
Odd pins – Top Side
Even pins – Bottom Side

8.25

50.95
REF

Bottom Side

2.05

Both Sides
5.60

Pin 52

13.60
Both Sides

2x 2.15 REF

Pin 2

2x R 0.80 MAX

See Detail B

C

2x 3.20 MIN

25.70

⊕ | 0.10 Ⓜ | A | B | C

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Side View

2.4 MAX

1.35 MAX

Hatched areas illustrate maximum
available component volume.
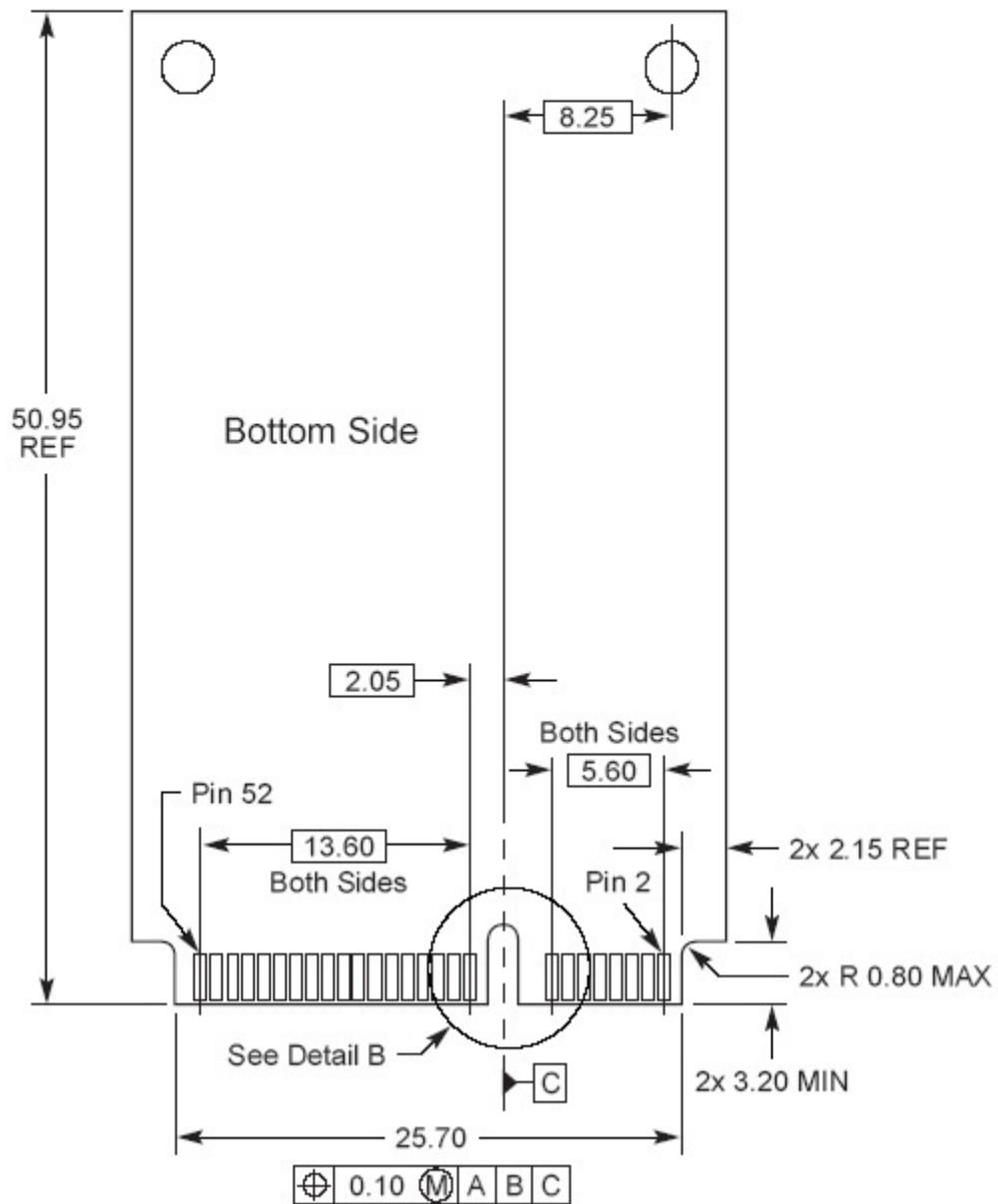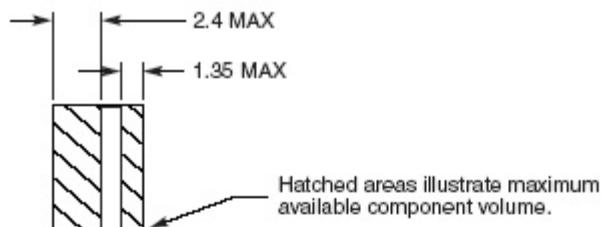
Notes:

⚠1 Card thickness applies across
tabs and includes plating
and/or metallization.

⚠2 Edge bevel must be present
and free of cutting burrs from
PCB and contact materials.

A

1.00 ± 0.10

⚠1

⚠2

$45° \pm 7°$

0.25 MAX

Detail B
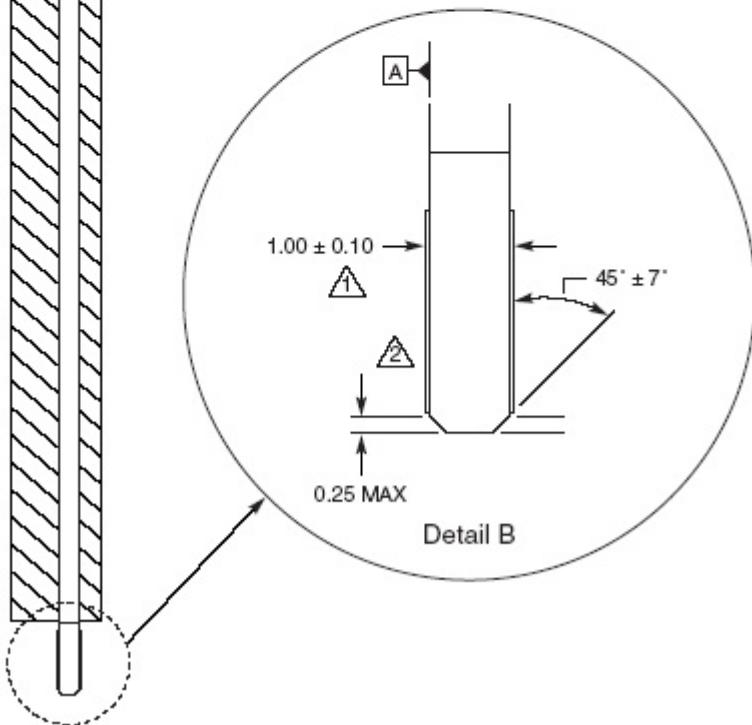
4. SOFTWARE CHARACTERISTICS

4.1 Introduction

We provide the PC Tool – HMTool for H20 HSUPA card. The main functions in this tool are **Contacts** (only SIM card), **SMS**, **Settings**, and **Network Management.**

4.2 Software Architecture
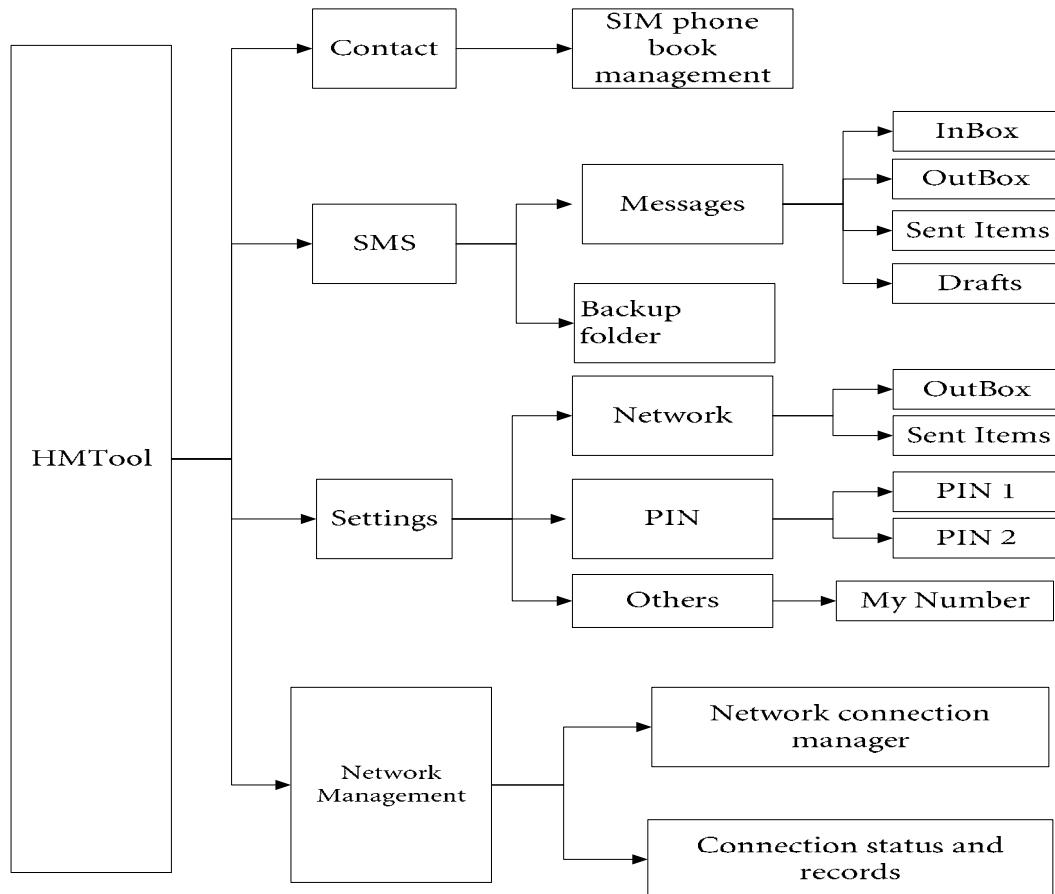
FEDERAL COMMUNICATIONS COMMISSION INTERFERENCE STATEMENT

This mobile device meets guidelines for exposure to radio waves. Your mobile device is a radio transmitter and receiver. It is designed not to exceed the limits for exposure to radio waves recommended by international guidelines.

This equipment has been tested and found to comp ly with the limits for a Class B digit al device, pursuant to P art 15 of the FCC Ru les. Thes e limit s are designed to provide reasonable protection against harmful interfer ence in a residential inst allation. This equipment generates, uses and c an radiate radio frequency energy and, if not inst alled and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarant ee that interference will not occur in a particular inst allation. If this equipment does cause harmful i nterference to radio or television reception, which c an be determined by turning the equipment of f and on, th e 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 circ uit dif ferent from that to w hich the receiver is connected.
– Consult the dealer or an experienced radio/TV technician for help.

CAUTION:
Any changes or modifications not expre ssly approved by the p arty responsible for compliance could void the user's authority to operate the equipment.

FCC RF Radiation Exposure Statement
This equipment complies with F CC RF radiation exposure limits set forth for an uncontrolled environment. This equipment must be inst alled and operated with a minimum dist ance of 20cm between the radiator and your body.