

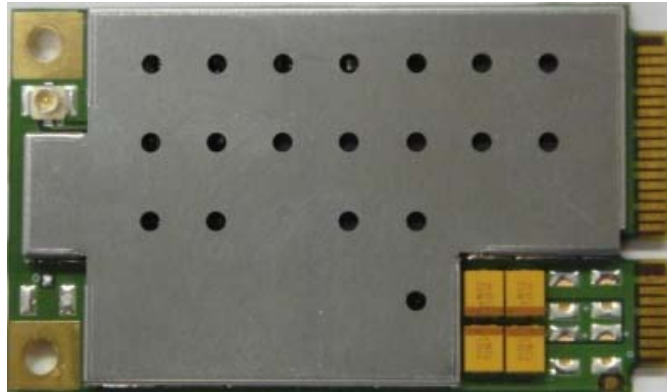
H18T

HSDPA PCI Express mini card module

Datasheet

Rev. 0.6

2010/04/06



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HISTORY

Version	Date	Notes
VER: 0.1	2009-NOV-05	PRELIMINARY VERSION
VER:0.2	2009-DEC-24	UPDATED THICKNESS INFORMATION
VER:0.3	2010-JAN-29	UPDATED PRODUCT PICTURE IN COVER PAGE
VER:0.4	2010-MAR-12	REMOVE "E-DCH" SPECIFICATION DUE TO NO SUPPORT HSUPA
VER:0.5	2010-MAR-19	UPDATED THE PEAK POWER CONDUCTION PARAMETRIC
VER:0.6	2010-APR-06	UPDATED USIM DESIGN APPLICATION

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1. INTRODUCTION

1.1 Description

Overview

This document describes all the functions, features, and interfaces of the HSDPA PCI Express Mini Card Module – H18T from Qisda. Qisda H18T HSDPA module supports tri-band WCDMA/HSDPA and quad-band GSM/GPRS/EDGE network connection capability.

Qisda H18T HSDPA card can provides high speed data connection, the data speed of downlink and uplink path is up to 3.6Mbps and 384Kbps respectively. Furthermore, users can ease to use this module by using the “HSPA Modem” application software that we provide for Windows XP and Vista system.

With the Qisda H18T HSDPA module, devices are enhanced in both functionality and usability based on state of the art wireless technology.

1.2 Application Device

Scope

Qisda H18T module is a high speed modem card with PCI Express minicard form factor and is focusing on the E-Book, Wireless Router and other portable device marketing.

- **E-Book**

- **Wireless Router**

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
 - Dimension: 50.95 x 30 x 3.6 mm
 - Weight: 10g
- Power

Operation Voltage: 3.3V ~ 3.6V

- Power Consumption:

Data Mode:

Band	Typ	Max	Unit
GSM850 / PCL=5	360	390	mA
EGSM900 / PCL=5	360	390	mA
DCS / PCL=0	310	340	mA
PCS / PCL=0	310	340	mA
WCDMA (all band)	750	820	mA

EDGE & GPRS Multislot:

Band	GMSK				8PSK			
	Slot 1	Slot 2	Slot 3	Slot 4	Slot 1	Slot 2	Slot 3	Slot 4
GSM850	< 380mA	<635mA	< 755mA	< 775mA	< 280mA	< 310mA	< 425mA	< 505mA
GSM900	< 380mA	< 635mA	< 755mA	< 775mA	<280mA	<310mA	< 425mA	< 505mA
DCS1800	< 330mA	< 525mA	< 610mA	< 640mA	< 200mA	< 305mA	< 340mA	< 375mA
PCS1900	<330mA	< 525mA	< 610mA	< 640mA	< 200mA	< 305mA	< 340mA	< 375mA

Sleeping Mode:

	Typ (Average)	Max (Average)	Unit
GSM / MFRM=2	5	6	mA
GSM / MFRM =9	3	4.5	mA
DCS / MFRM =2	5	6	mA
DCS / MFRM =9	3.4	5	mA
PCS / MFRM =2	5	6	mA
PCS / Page frame=9	3.1	4.5	mA
WCDMA / DRX=6 (0.64 S)	5.7	6.5	mA
WCDMA / DRX=9 (5.12 S)	3.2	4.5	mA

Shutdown current	10	50	uA
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- Hardware Interface:
 - 52 Pins PCI Express Mini Card connector interface
 - 1 RF Antenna Coaxial Connectors
- Software Interface:
 - USB driver
 - HSPA Modem 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.

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	
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Parametric Performance

Tests carried out at -20°C, 25°C and 60°C for voltage 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 (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	ETSI
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	-110 dBm	-106.7 dBm
UMTS-1900	-107.5 dBm	-104.7 dBm
UMTS-850	-109 dBm	-104.7 dBm

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 4 (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 4 (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 Class 1 (1 W peak) – 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 Class 1 (1 W peak) – 0 dBm
Output Impedance	50 Ohm
Spurious Emission	-36 dBm up to 1 GHz (< -30 dBm > 1 GHz) Compatible with phase 2 feature
WCDMA_BC 1 (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	-60dBm(860-895MHz);-60dBm(921-925MHz);-67dBm(925-935MHz); -79dBm(935-960MHz); -67dBm(1475.9-1500.9MHz);-71dBm(1805-1880MHz); -60dBm(1844.9-1879.9MHz);-41dBm(1884.5-1919.6MHz); -60dBm(2110-2170MHz); -60dBm(2620-2690MHz);
WCDMA_BC 2 (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	-60dBm(869-894MHz;1930-1990MHz;2110-2155MHz)
WCDMA_BC 5 (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 H18T module are PCI EXPRESS MINI CARD and two RF antenna connectors.

Table 3-1 summarizes the signals and 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

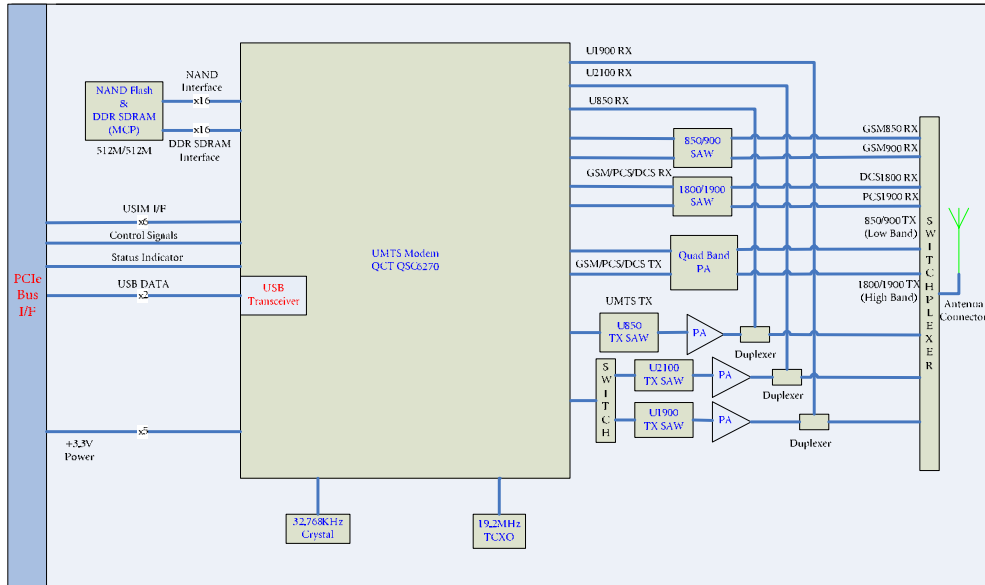
Signal Group	Pin counts.	Description
Power	5	3.3V power source
GND	13	Return current path
USB	2	USB serial data interface compliant to the USB 2.0 specification
W_DISABLE#	1	Enable/Disable the HSDPA module
UIM	4	SIM function
LED	1	Status indicator

Table 3-2 Antenna interface

Signal Group	Connector no.	Description
ANT	1	Antenna interface

3.2 Functional Diagram

Qisda H18T HSPA PCI Express mini card Block Diagram



Used Frequency Ranges:
UMTS (WCDMA)

UMTS2100 (Band I)	UMTS1900 (Band II)
1920 ~ 1980 MHz (UL)	1850 ~ 1910 MHz (UL)
2110 ~ 2170 MHz (DL)	1930 ~ 1990 MHz (DL)

UMTS850 (Band V)
824 ~ 849 MHz (UL)
869 ~ 894 MHz (DL)

GSM

GSM850	GSM900
824 ~ 849 MHz (UL)	890 ~ 915 MHz (UL)
869 ~ 894 MHz (DL)	935 ~ 960 MHz (DL)

DCS1800
1710 ~ 1785 MHz (UL)
1805 ~ 1880 MHz (DL)

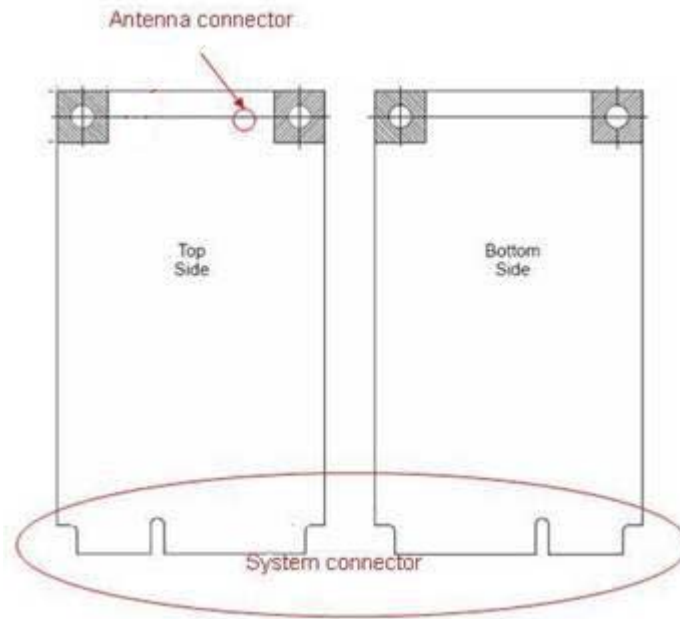
PCSI900
1850 ~ 1910 MHz (UL)
1930 ~ 1990 MHz (DL)

3.3 Pin Assignment and Description

Pin	Signal name	Direction	Description
1	NC		Not connect
2	+3.3Vaux	Power	3.3V power source
3	NC		Not 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	NC		No connect
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

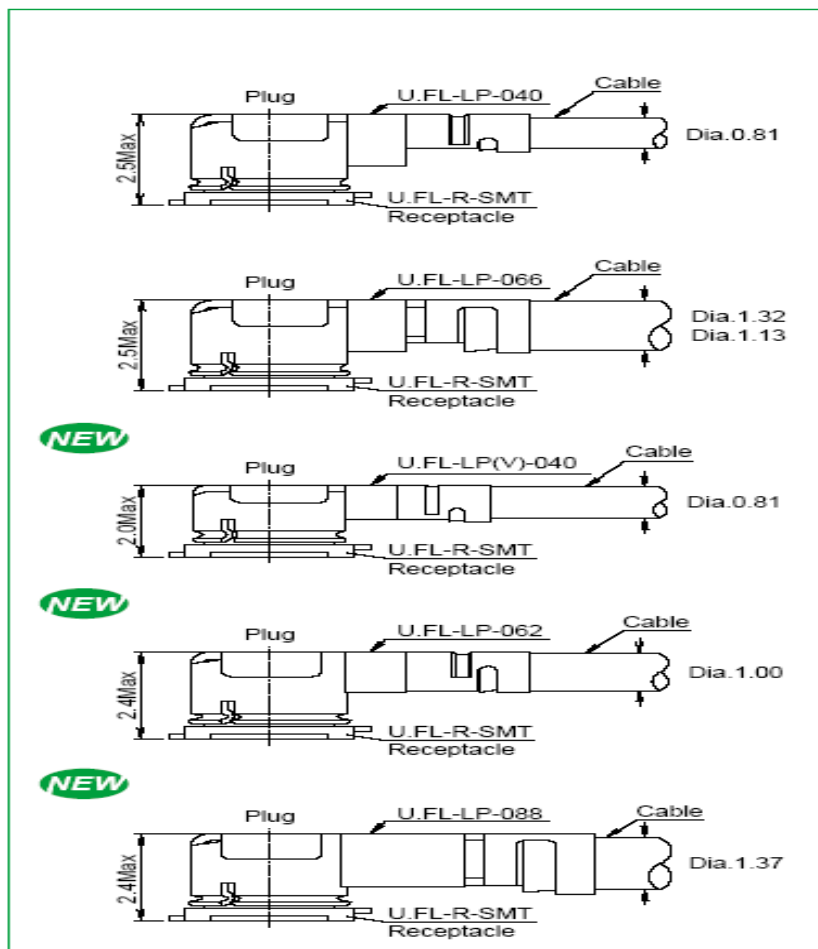
32	NC		No connect
33	NC		No connect
34	GND	Power	Return current path
35	GND	Power	Return current path
36	USB_D-	Input / Output	USB serial data interface (negative)
37	GND	Power	Return current path
38	USB_D+	Input / Output	USB serial data interface (postive)
39	+3.3Vaux	Power	3.3V power source
40	GND	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	NC		No connect
45	NC		No connect
46	NC		No connect
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

3.4 Terminal Definition



Recommend antenna connect

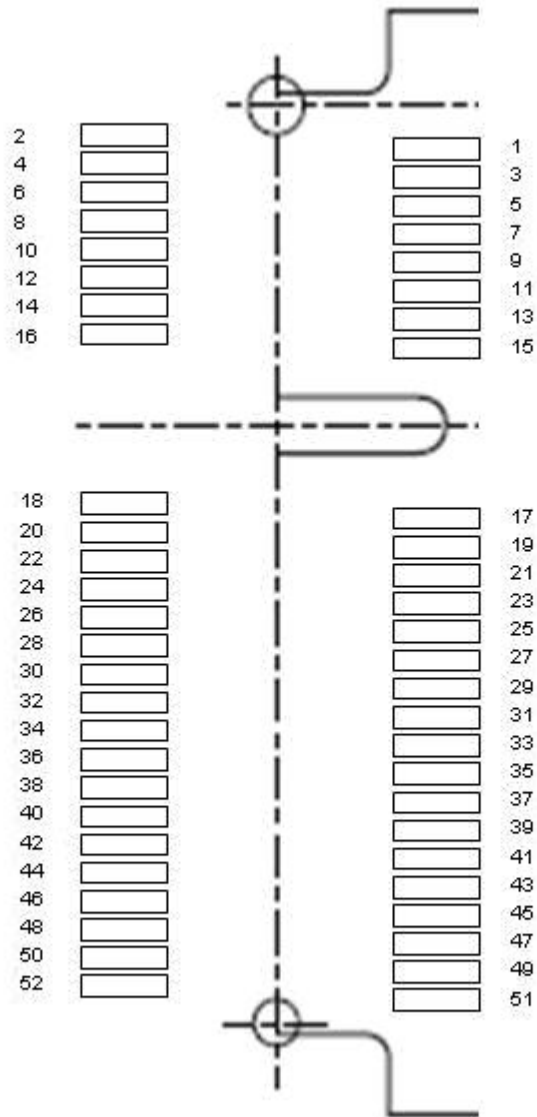
Hirose Coaxial Connectors



System connector

The Qisda H18T PCIe Express interface compatibility Mini Card Electromechanical Specification

Revision 1.1.



3.5 Electrical Characteristics

DC characteristics

Power Supply:

Symbol	Parameter	Min	Typ	Max	Unit
+3.3Vaux	Power Supply Voltage	3.2	3.3	3.6	V
I _{sys(peak)}	System Max Current Consumption		2.0	2.2	A
I _{sys(avg.)}	System Max Current Consumption		0.8	1.0	A

※ The module draws under more than 2.2A peak current while transmitting. Use wide traces for power supply line and compliant with the PCB layout rule.

The current rating of component related with the power supply line must be taken into consideration

※ Definitions:

Peak current – The highest averaged current value over any 100-microsecond period

Normal current – The highest averaged current value over any 1-second period

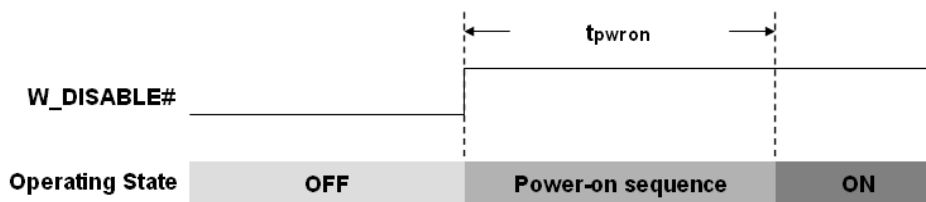
Control Interface:

W_DISABLE# :

Symbol	Parameter	Min	Max	Unit
V _{IH}	High Level Input Voltage	0.7V _{cc}		V
V _{IL}	Low Level Input Voltage		0.3V _{cc}	V
t _{pwr on}	Power-on sequence interval	1.5		sec

High Level: Device Power on

Low Level: Device Power off



※ W_DISABLE# must stay high at least t_{pwr on} to power on the Device.

USB Transceiver DC characteristics

The USB interface is powered from 3.3V power source.

Parameter	Symbol	Min	Max	Unit
Input Levels for Low/Full Speed				
High	V _{IH}	2.0		V

Low	VIL		0.8	V
Differential Input Sensitivity	VDI	0.2		V
Input Levels for High Speed				
High Speed Squelch Detection Threshold	VHSSQ	100	150	mV
High Speed Disconnection Detection Threshold	VHSDSC	100	150	mV
Output Levels for Low/Full Speed				
Low	VOL	0.0	0.3	V
High	VOH	2.85	3.3	V
Output Levels for High Speed				
High Speed Idle Level	VHSOI	-10.0	10.0	mV
High Speed Data Signaling High	VHSOH	360	440	mV
High Speed Data Signaling Low	VHSOL	-10.0	10.0	mV

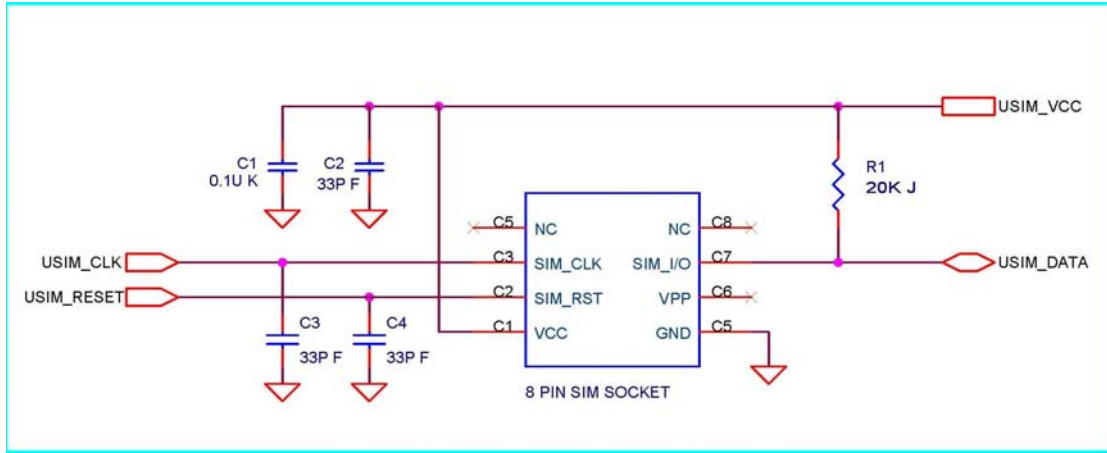
USIM Interface

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.

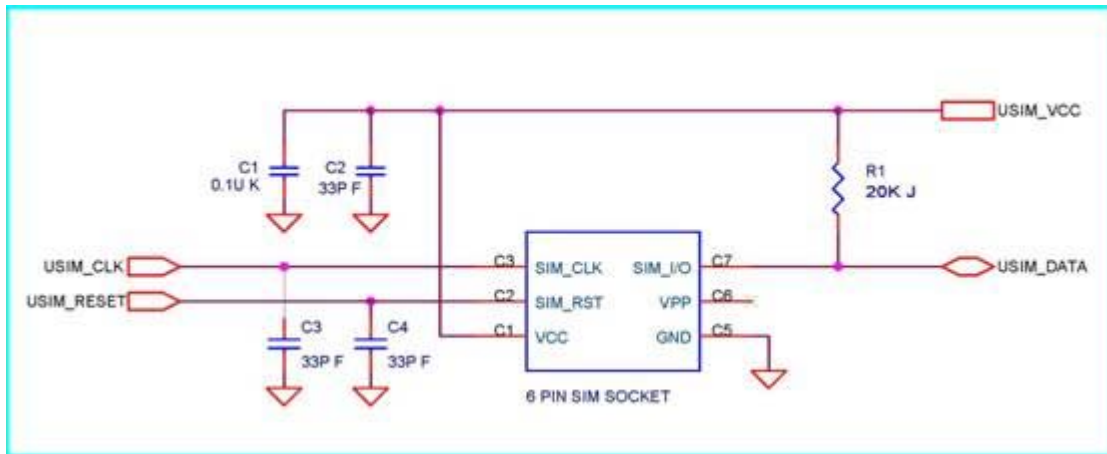
Pin	Name	Direction	Description
8	UIM_PWR	Output	Power source for the USIM
10	UIM_DATA	Input / Output	USIM data signal
12	UIM_CLK	Output	USIM clock signal
14	UIM_RESET	Output	USIM reset signal

Parameter	Symbol	Min	Max	Unit
Logic High Input Voltage	VIH	$0.65 \cdot VSIM$	$VSIM + 0.3$	V
Logic Low Input Voltage	VIL	-0.3	$0.35 \cdot VSIM$	V
Input High Leakage Current	IIH	-	1	uA
Input Low Leakage Current	IIL	-1	-	uA
Logic High Output Voltage	VOH	$VSIM - 0.45$	$VSIM$	V
Logic Low Output Voltage	VOL	0	0.45	V
High-Level, Three-State Leakage Current	IOZH	-	1	uA
Low-Level, Three-State Leakage Current	IOZL	-1	-	uA

Type I (8 Pins UIM socket)



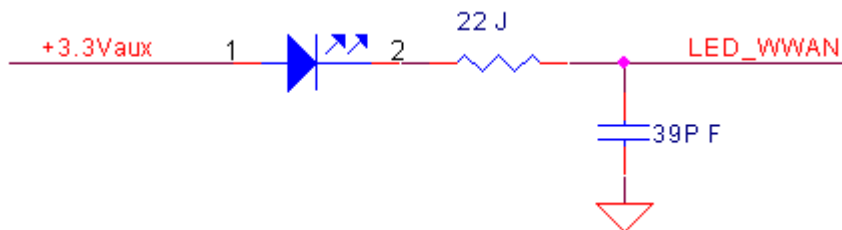
Type II (6 Pins UIM socket)



Current Driver Interface:

Parameter	Min	Typ	Max	Unit
LED_WWAN	10			mA

LED Application Circuit:



※ Recommend to reserve "Resistor" and "Capacitor" for improve RF wireless performance.

3.6 Environmental

Operational temperature: -20 ~ +60 °C

Functional temperature: -20 ~ +70 °C

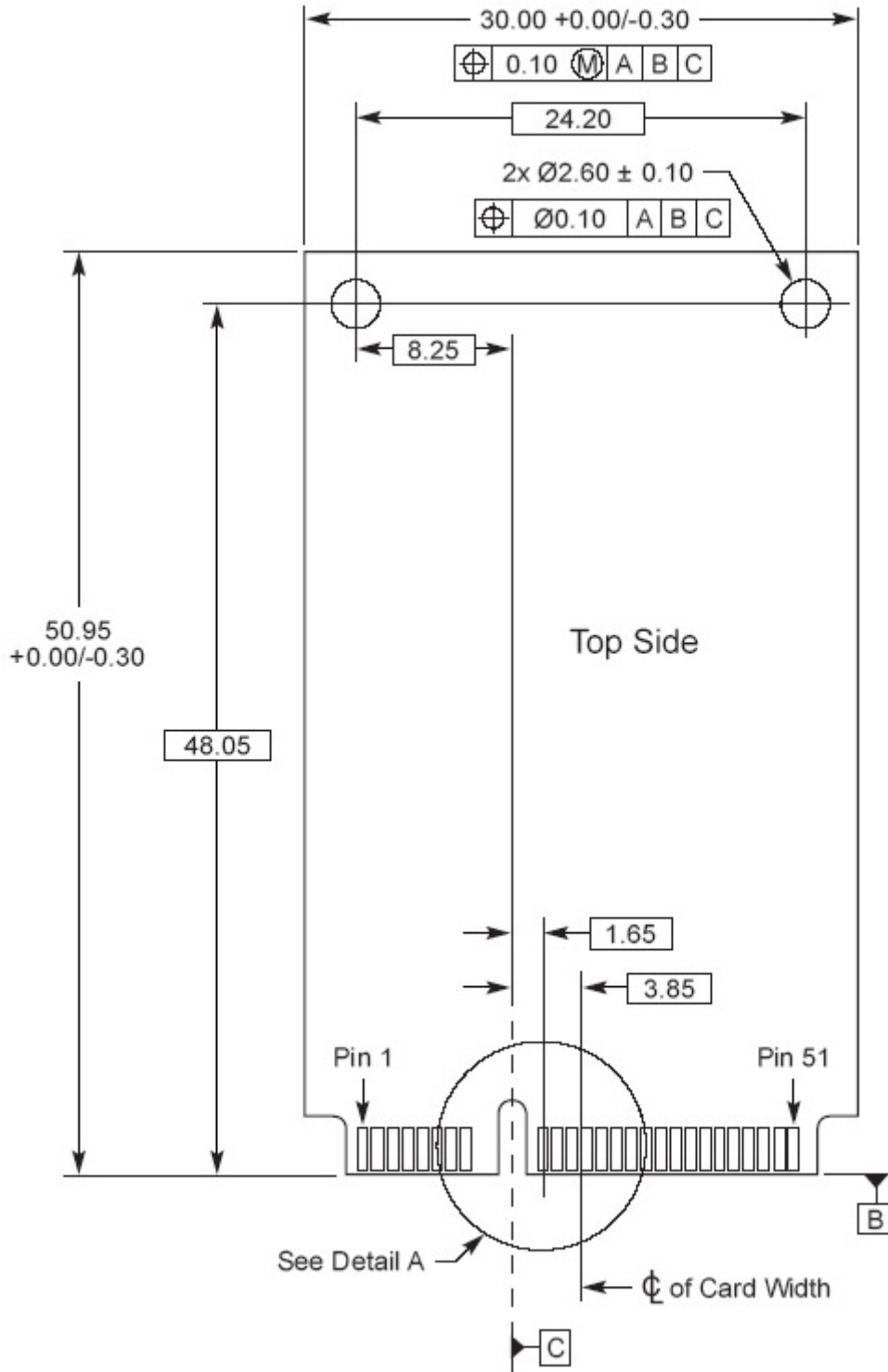
Storage temperature: -40 ~ +85 °C

Note:

The maximum case temperature (T_c) of shielding case cover should be under 90 °C (@RF TX power = 24dBm) for ensure all of the characteristics of H18T module can be fulfilled the ETSI specification.

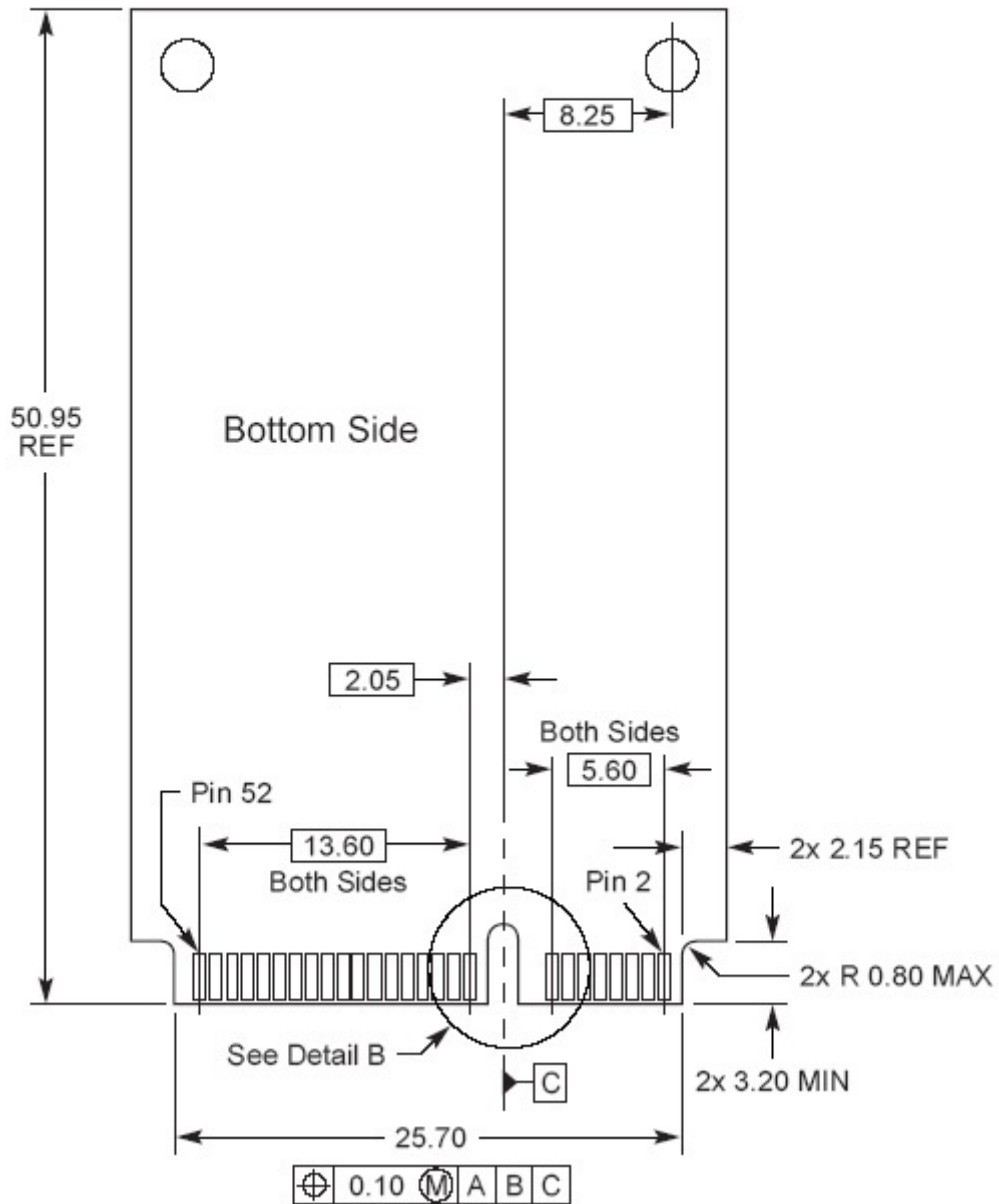
3.7 Physical Package

Top View

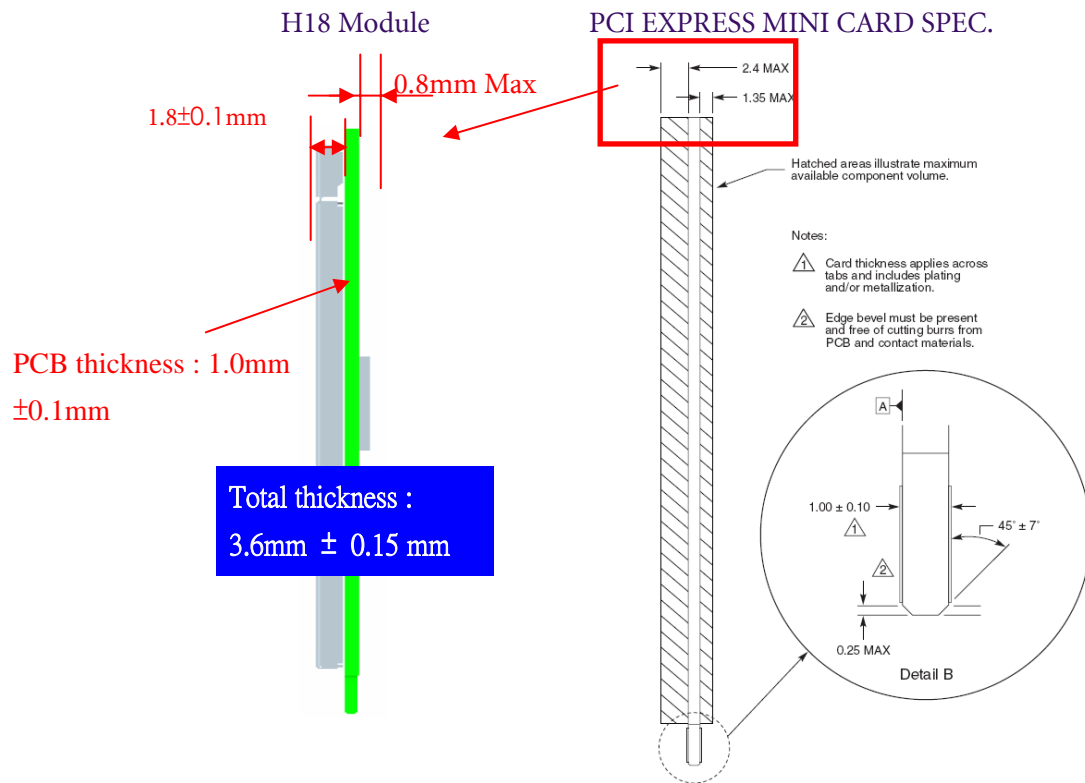


Bottom View

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



Side View



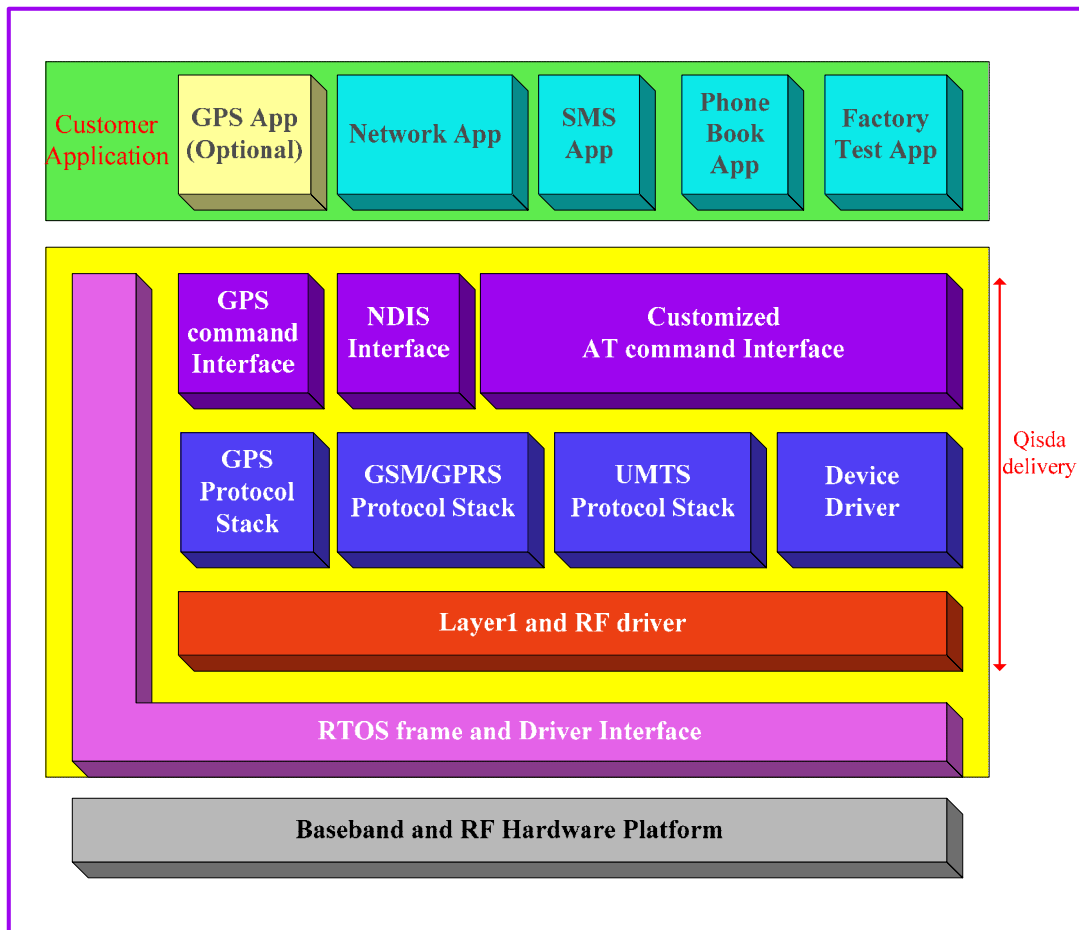
4. SOFTWARE CHARACTERISTICS

4.1 Introduction

H18T uses the cutting edge technique of Qualcomm 3.5G (HSDPA) wireless communication. It is a wireless data card product embedded in any host device which has mini-PCI Express interface. The software platform is Qualcomm QSC6270. It uses USB interfaces to communicate with PC/NB. The USB interfaces are composed of three parts "NDIS interface", "Customized AT command Interface" and "GPS command Interface". "Network app" use NDIS interface to transmit Internet data between H18T device and Host device. Dashboard ("SMS, phone book, query network mode, and network status") can send the AT commands to drive H18T device by "AT command Serial COM port", and H18T provides dual com port. Factory test app also uses AT command interface to test H18T functionality in the factory.

4.2 Software Architecture

The H18T product high-level software architecture is represented in the following figure:



(High Level Software Architecture)

4.3 Supported OS

- a. Windows XP/Vista/7 32bit and 64bit
- b. MAC OS 10.4/10.5/10.6
- c. Linux 2.6.x
- d. WIN CE 5.0

Federal Communications Commission (FCC) Statement

You are cautioned that changes or modifications not expressly approved by the part responsible for compliance could void the user's authority to operate the equipment.

15.105(b) for **Class B Device (usual)**

Federal Communications Commission (FCC) Statement

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.

15.19(a)(1) licensed project

This device complies with part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

End Product Labeling:



The final end product must be labeled in a visible area with the following: “Contains FCC ID: VRSH18T”.

Manual Information That Must be Included:

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 user’s manual for OEM Integrators must include the following information in a prominent location

FCC RF Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.