DT60 IW
(5122)

DT60M Interface Specification

Company Confidential

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Version History

Version	Date	Author	Status	Comments
0.1	2013-09-05	anttsam	Draft	First draft for DT60M Prototype 1
0.2	2013-09-12	anttsam	Draft	Added details about power supply and SW configuration
0.3	2013-11-04	anttsam	Draft	Added first GPIO specifications and layout considerations
0.4	2013-11-11	anttsam	Draft	Added SNMP details
0.5	2014-04-07	anttsam	Draft	Added RF specifications + admin-community for SNMP
0.6	2014-04-09	aescmic	Draft	HW specifications updated
0.7	2014-04-10	aescmic	Draft	Updated RF specification and GPIO chapters
0.8	2014-05-22	habeste	Draft	Rev03: Board-to board connector interface, block diagrams and temperature range updated
0.9	2014-06-12	aescmic	Draft	Interface descriptions updated
0.10	2014-08-21	aescmic	Draft	TRST inserted
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1.1	2015-05-12	aescmic	Approved	Regulatory notices added
1.2	2015-06-11	aescmic	Approved	Regulatory notices updated
1.3	2015-07-22	aescmic	Approved	Country codes updated
1.4	2015-12-21	aescmic	Approved	Country codes updated
1.5	2016-04-28	aescmic	Approved	Chapter 2.3 added

Table of Contents

1 Foreword

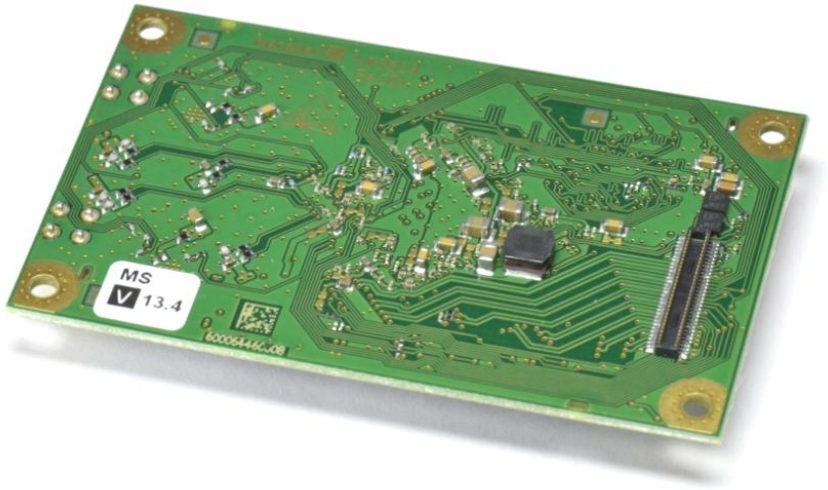
1.1 Scope

The scope of this document is to provide interface specifications for the Neratec DT60M WLAN module. Based on this information the customer of DT60M will be able to design the baseboard and the mechanical integration of the module.

This document applies to following versions of DT60M:

- **103678 DT60M Neratec Index A**

Picture 1: DT60M Top side



Picture 2: DT60M bottom side

1.2 References

No.	Author, ”Title”, Version, Date, Source/Filename/Link
[1]	Neratec, “SW6 User Guide”, Doc. No. 5100.20.105

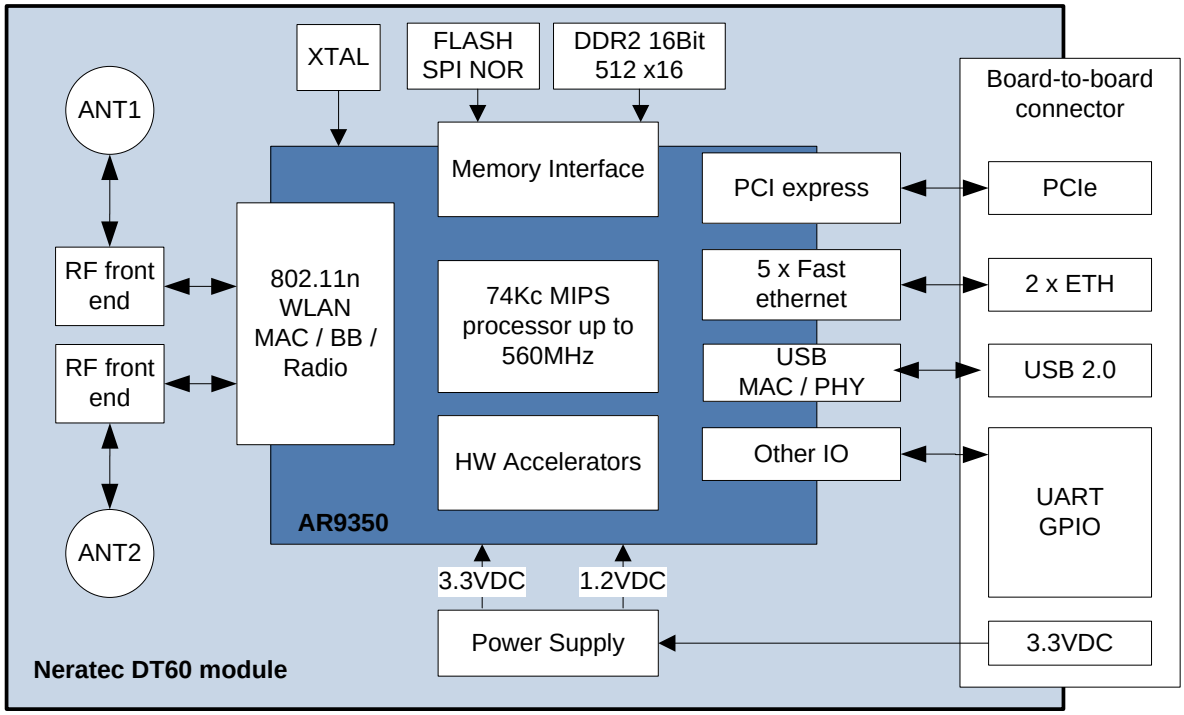
1.3 Abbreviations and Terms

Abbreviation	Description
AP	Access Point mode of IEEE801.11
BPSK	Binary phase-shift keying
CSMA/CD	Carrier Sense Multiple Access / Collision Detection contention protocol
DT60M	The name of the Neratec DT60 module
EMC	Electromagnetic compatibility
LED	Light Emitting Diode
LLC	Logical link control layer
MAC	Media access control layer
MMCX	micro-miniature coaxial connector type
MMI	Man-machine interface
MTBF	Mean Time Between Failures
OFDM	Orthogonal frequency-division multiplexing
ppm	Parts per million
PCB	Printed Circuit Board
PCBA	Printed Circuit Board Assembly, PCB with components assembled
PCIe	PCI Express, Peripheral Component Interconnect Express
QPSK	Quadrature phase-shift keying
STA	Client Mode of IEEE801.11
TFTP	Trivial File transfer protocol
USB CDC	USB Communication Device Class

2 Introduction DT60M

Neratec DT60 Platform is a robust highly integrated WLAN communication module, with optimized power to performance ratio. This platform is an extension for Neratec product portfolio allowing OEMs to Wi-Fi enable devices used in an array of machine-to-machine (M2M) applications.

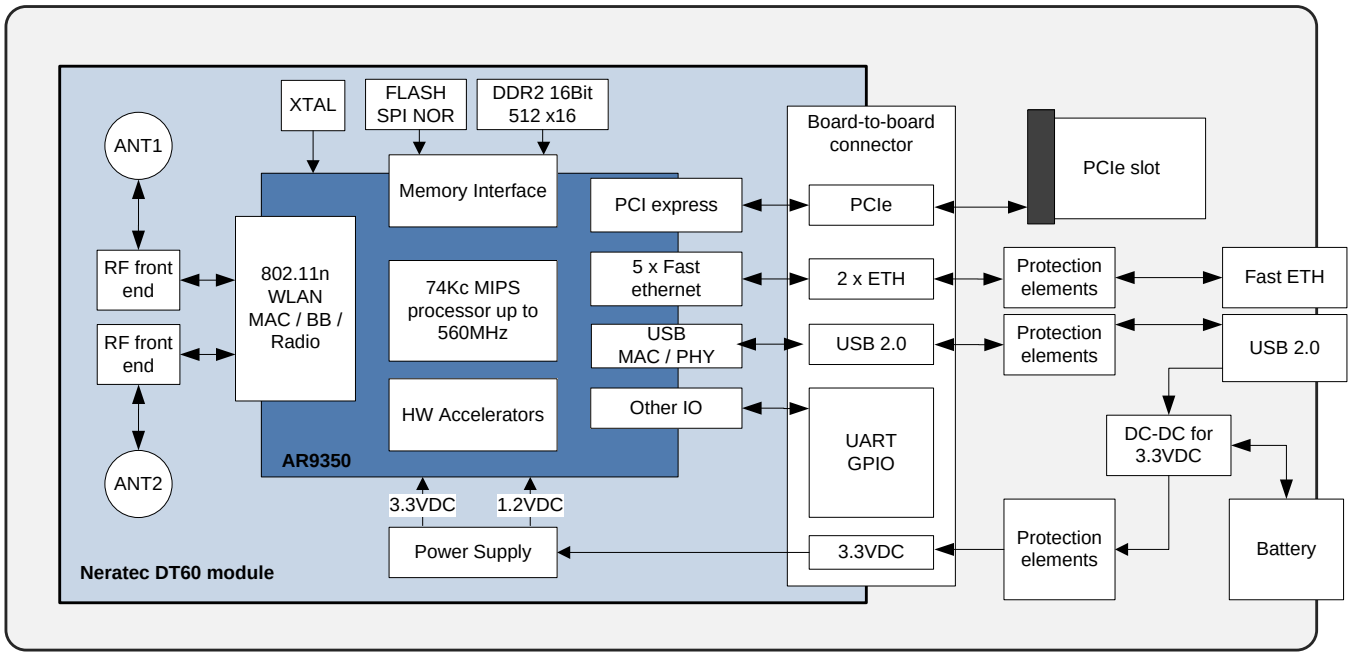
The DT60M has a dual-stream 802.11n 2x2 MIMO Radio based on industry leading Qualcomm Atheros technology, combined with Neratec RF front-end design, calibration optimization with increased transmit power and optimized receiver sensitivity. The typical power consumption is below 2.5W, depending on the transmit duty cycle and interfacing options. The block diagram is shown in the Picture 3 below.



Picture 3: Neratec DT60M Block Diagram

The Neratec DT60M module has two main usage scenarios:

- The Module can be used as such on WLAN extensions for various embedded applications
- The Module can be used as independent product, when integrated together with baseboard, which provides necessary connectors and protection elements required on product level, as an example of an independent product and baseboard related, please refer to the block diagram in Picture 4.



Picture 4: Example of a product based on Neratec DT60M

2.1 DT60M Delivery Content

The DT60M is delivered as a bare PCBA without connection cables, and any plugs, adapters etc.

Description:	*Number of Parts:*	*Notes:*
DT60M	***20***	*ESD packed*

2.2 Installation Country, DT60M Use

Installation country regulatory limits and operating parameters are controlled by DT60M software Country Code parameter.

DT60M supports:

Country Code, DT60M		
Country code	***Operating Frequency Ranges***	***Notes:***
Europe (EU)	***2400 … 2483.5 MHz, 5150 … 5350 MHz and 5470 … 5725 MHz***	*Operation according to ETSI limitations* *Detailed specification will be provided in SW6 User Guide [1]*
USA (USA)	***2400 … 2483.5 MHz, 5150 … 5350 MHz, 5470 … 5725 MHz and 5725 … 5845 MHz***	*Operation according to FCC 47 CFR Part 15 limitations* *Detailed specification will be provided in SW6 User Guide [1]*
Canada (CANADA)	***2400 … 2483.5 MHz, 5150 … 5350 MHz, 5470 … 5725 MHz and 5725 … 5845 MHz***	*Operation according to RSS-247 Issue 1 limitations* *Detailed specification will be provided in SW6 User Guide [1]*

2.3 OEM region settings

The licensed OEM partners are able to set the region of the module using the `NERATEC-REGULATORY-MIB` and the SNMP command `cfgRegulatoryRegionId.0`. The setting of the region requires SNMPv3 and is protected by user and passphrase, which is sent to the OEM partner.

The following regions are available.

Region code	Available country codes	Available antennas
U	USA, CANADA	Only the antennas listed in chapter 2.5 or same type and same or lower gain shall be used.
E	EU, EU_INDOOR	Only the antennas listed in chapter 2.5 or same or lower gain shall be used.

2.4 Regulatory notices

Caution!

Any changes or modifications shall be approved by the party responsible for compliance. If not, users could void the user's authority to operate the equipment.

2.4.1 United States (FCC)

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.
2. This device must accept any interference received, including interference that may cause undesired operation.

To fulfill FCC Certification requirements, an OEM manufacturer must comply with the following regulations:

1. The modular transmitter must be labelled with its own FCC ID number and if the FCC ID is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module.
2. The module may only be used with the antenna of section 2.5 or an antenna with the same characterisic and lower gain.

Example of label required for OEM product containing DT60M module:

Contains FCC ID: 2AEJD-103678-DT60M The enclosed device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (i.) this device may not cause harmful interference and (ii.) this device must accept any interference received, including interference that may cause undesired operation.

WARNING: The Original Equipment Manufacturer (OEM) must ensure that the OEM modular transmitter must be labeled with its own FCC ID number. This includes a clearly visible label on the outside of the final product enclosure that displays the contents shown below. If the FCC ID is not visible when the equipment is installed inside another device, then the outside of the device into which the equipment is installed must also display a label referring to the enclosed equipment.

OEM INSTRUCTIONS:

The DT60M module is limited to OEM installations only.

OEM integrators must ensure that the end-user has no manual instructions to remove or install the module. OEM's must comply with FCC marking regulation part 15 declaration of conformity (Section 2.925(e)).

This module is to be installed only in mobile or fixed applications (please refer to FCC CFR 47 Part 2.1091(b) for a definition of mobile and fixed devices).

Host platform of OEM integrators must ensure that module is powered within the limits (3.15…3.6V, 1000mA peak; 500mA average).

Separate approval is required for all other operating configurations, including portable configurations with respect to FCC CFR 47 Part 2.1093, and different antenna configurations.

The antenna used with this module must be installed to provide a separation distance of at least 20cm from all persons, and must not be co-located or transmit simulaneosly with any other antenna or transmitter, except in accordance with FCC multi transmitter product procedures.

Any changes or modifications of the module shall be approved by the party responsible for compliance. If not, users could void the user's authority to operate the equipment.

FCC Exposure Requirements:

To satisfy FCC RF exposure requirements for mobile transmitting devices, a separation distance of 20cm or more should be maintained between the antenna of this device and persons during operation. To ensure compliance, operations at closer distances than this are not recommended.

2.4.2 Canada (IC)

This device complies with Industry Canada's licence-exempt RSSs. Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence.L'exploitation est autorisée aux deux conditions suivantes:

1. l'appareil ne doit pas produire de brouillage.
2. l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Equipment is subject to certification under the applicable RSSs, shall be permanently labelled on each item, or as an inseparable combination. The label must contain the following information for full compliance:

Certification Number:	IC: 9301A-103678DT60M
Manufacturer's Name, Trade Name or Brand Name:	Neratec Solutions AG
Model Name:	DT60M

IMPORTANT: This equipment for which a certificate has been issued is not considered certified if it is not properly labelled. The information on the Canadian label can be combined with the manufacturer's other labelling requirements.

IMPORTANT: The instzaller of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF field in excess of Health Canada limits for the general population. Consult Safety Code 6, obtainable from Health Canada's website www.hc-sc.gc.ca.

IMPORTANT: This radio transmitter (identify the device by certification number) has been approved by Industry Canada to operate with the antenna types listed in section 2.5 with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

2.5 Antennas

Type	Part number	Manufacturer	Gain
Dipole	SL013-ANT01-PCBA	ALFA Network	2GHz: 5dBi max 5GHz: 3dBi max

2.6 Product Identification and Version Information

Product identification information is available at the DT60M product label.

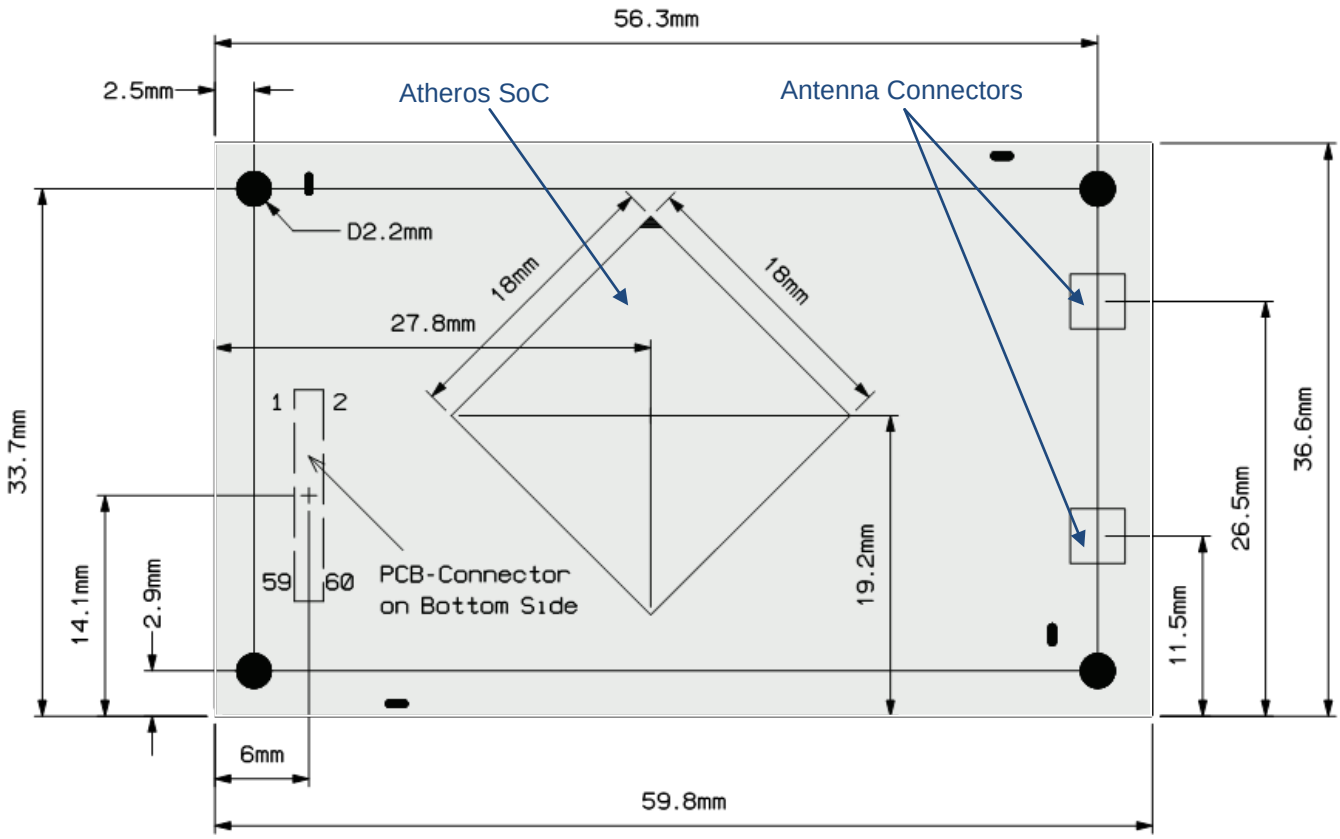
Product Identification, DT60M		
Specification:	***Value:***	***Notes:***
Product Number	***103678***	
SN	***NNNNNN-A-YY-XXXXXX*** ***NNNNNN: 103678*** ***A: Index*** ***YY: Revision*** ***XXXXXX: Serial number***	
Production date	**YYWW**	*Year and Week*
Power	***3.3VDC, 1A***	
MAC addresses	**XX:XX:XX:XX:XX:XX …** **YY:YY:YY:YY:YY:YY**	*Assignment:* *1. WLAN, 2. WAN, 3. LAN*
FCC ID	**FCC ID: 2AEJD-103678-DT60M**	
IC ID	**IC: 9301A-103678DT60M**	
Manufacturer	***Neratec Solutions AG***	
BAR CODE	**2D Code: Datamatrix, ECC200** **NNNNNN-A-YY-XXXXXX-YYWW**	*Includes SN and production date according previous definition*
WEEE		*This symbol, found on the product indicates that this product should not be treated as household waste when disposing of it.* *Instead it must be handled over to an applicable collection point for the recycling of electrical and electronic equipment.* *By ensuring this product is disposed correctly, you will help prevent potential negative consequences to the environment and human health, which could be otherwise be caused by inappropriate disposal of this product.*

3 Technical Specification

Parameter:	Specification:
Functionality	Wireless Communications for Customer Specific Applications
Operating Temperature Range	-30…+80°C at the Ground pads of the mounting holes
Storage Temperature Range	-35…+85°C
Power Feed	3.3VDC
Wireless Standards Supported	802.11n
Operating Frequency Range (depending on country code)	2,400..2.4835 GHz 5.150..5.350 GHz, 5.470..5.725 GHz, 5.725..5.850 GHz
Occupied Channel Bandwidth	According to IEEE 802.11
Data Rates Supported	802.11b: 1Mbit/s, 2, 5.5 & 11Mbit/s 802.11g & 802.11a: 6Mbit/s, 9, 12, 18, 24, 36, 48 & 54 Mbit/s 802.11n 20MHz BW: 1Nss: 65(72.2)Mbps maximal, 2Nss: 130(144.44)Mbps maximal 802.11n 40MHz BW: 1Nss: 135(150)Mbps maximal, 2Nss: 270(300)Mbps maximal
RF Transmit Power 2.4GHz	Max. conducted transmit power per antenna port: 802.11b: +15dBm (1..11Mbps) 802.11g: +15dBm (6..36Mbps), +14dBm (48Mbps), +12dBm (54Mbps) 802.11ng HT20: +14dBm (MCS0..4, 8..12), +13dBm (MCS5,13), +10dBm (MCS6,14) +8dBm (MCS7,15) 802.11ng HT40: +14dBm (MCS0..4, 8..12), +12dBm (MCS5,13), +9dBm (MCS6,14) +8dBm (MCS7,15) Note: Depending on regulatory limitations
RF Transmit Power 5GHz	Max. conducted transmit power per antenna port: 802.11a: +20dBm (6..36Mbps), +19dBm (48Mbps), +18dBm (54Mbps) 802.11na HT20: +20dBm (MCS0..4, 8..12), +19dBm (MCS5,13), +18dBm (MCS6,14) +16dBm (MCS7,15) 802.11na HT40: +20dBm (MCS0..4, 8..12), +19dBm (MCS5,13), +17dBm (MCS6,14) +16dBm (MCS7,15) Note: Depending on regulatory limitations
RF Antenna interfaces	2x2 MIMO, 2 x MMCX connectors
Receiver Sensitivity (typical, 2 RX)	802.11ng HT20: -93 dBm (MCS0), -74 dBm (MCS7), -71 dBm (MCS15) 802.11na HT20: -93 dBm (MCS0), -74 dBm (MCS7), -71 dBm (MCS15) 802.11ng HT40: -90 dBm (MCS0), -71 dBm (MCS7), -68 dBm (MCS15) 802.11na HT40: -90 dBm (MCS0), -71 dBm (MCS7), -68 dBm (MCS15)
Security	IEEE 802.11i WPA2 (AES/TKIP), RADIUS Client, Config. file encryption
Ethernet Interface	2 x Fast Ethernet over the Board-to-Board connector
Ethernet Routing/ Networking	Fixed fallback IP, IP aliases, MAC address control lists, Port forwarding, Routing, Multicast Routing, DHCP Server/Client, Multi BSSID, Roaming, NTP client, SNMP v2c and v3 with USM authentication and encryption support, SNMP Traps
Other Interfaces	USB 2.0 Host or Device modes, PCIe, GPIs and GPOs
Device Management	SNMP, Limited HTTP/HTTPS with user authentication
Physical Dimensions	36.6 x 59.8 x 6 mm (incl. shield element, without antenna connectors), PCB thickness 1.14 mm
Weight	15g
Connectors	RF Antenna: 2 * MMCX Board-to-Board Connector: Hirose DF40C-60DP-0.4V(51)
Fixing/ Mounting	With 4 x M2 Screws

4 Mechanical Interface and dimensions

The drawing below shows the physical dimensions of the DT60M module:



Picture 5: DT60M dimensions (top side)

The module will have a shielding component covering the board (on top side).

4.1 Thermal Integration

The heat is mainly generated by the Qualcomm Atheros SoC and it will be spread over the whole PCB to the fixing holes. User must take care to keep temperature at mounting holes within the specified operating temperature range.

5 Board-to-Board Connector Interface

Description	Pinout		Description
TMS	1	2	TDO
TDI	3	4	TCK
Reserved	5	6	Reserved
Reserved	7	8	Reserved
Reserved	9	10	Reserved
Reserved	11	12	GND
UART1 TX (GPO10)	13	14	USB_M
UART1 RX (GPI9)	15	16	USB_P
GND	17	18	GND
GPI21 (Bootstrap PCIe Root Complex)	19	20	LAN TX N0
GPI4 (Bootstrap Factory Reset)	21	22	LAN TX P0
GPI20 (Bootstrap USB Device Mode)	23	24	GND
GPIO11 (Open Drain)	25	26	LAN RX N0
GPIO17 (Open Drain)	27	28	LAN RX P0
GPIO16 (Open Drain)	29	30	GND
GPO22	31	32	WAN TX N4
GPO19	33	34	WAN TX P4
GPO18	35	36	GND
VDD 2V0_T (Ref. volt. out for transformers)	37	38	WAN RX N4
SYS_RST (Output)	39	40	WAN RX P4
RST_EXT (Input)	41	42	GND
PCIe RST_OUT	43	44	PCIe CLKOUT_N
GND	45	46	PCIe CLKOUT_P
3V3	47	48	GND
3V3	49	50	PCIe RX_N
3V3	51	52	PCIe RX_P
3V3	53	54	GND
GND	55	56	PCIe TX_N
GND	57	58	PCIe TX_P
TRST	59	60	GND

Table 1 Board-to-Board Connector Pinning

Pin #	Signal Name	Primary Function	I/O[1]	Level	Secondary Function / Remarks
1	TMS	JTAG – Test Mode Select	I	3.3V	
2	TDO	JTAG – Test Data Out	O	3.3V	
3	TDI	JTAG – Test Data In	I	3.3V	
4	TCK	JTAG – Test Clock	I	3.3V	
5	-	Reserved	-	-	Do not connect reserved pins
6	-	Reserved	-	-	Do not connect reserved pins
7	-	Reserved	-	-	Do not connect reserved pins
8	-	Reserved	-	-	Do not connect reserved pins
9	-	Reserved	-	-	Do not connect reserved pins
10	-	Reserved	-	-	Do not connect reserved pins
11	-	Reserved	-	-	Do not connect reserved pins
12	GND	System Ground	-	-	
13	UART1 TX	UART Transmit Data	O	3.3V	GPO10, configurable as output
14	USB_M	USB – Differential Data-	I/O	1V	USB 2.0, 480Mbps
15	UART1 RX	UART Receive Data	I	3.3V	GPI9, configurable as input
16	USB_P	USB – Differential Data+	I/O	1V	USB 2.0, 480Mbps
17	GND	System Ground	-	-	
18	GND	System Ground	-	-	
19	GPI21	General Purpose Input	I	3.3V	Bootstrap for PCIe RC or EP mode (input)
20	LAN TX N0	LAN – TX Data N0	O	3.3V	100BASE-TX Ethernet
21	Factory Reset	Factory Reset Input	I	3.3V	GPI4, configurable as input
22	LAN TX P0	LAN – TX Data P0	O	3.3V	100BASE-TX Ethernet
23	GPI20	General Purpose Input	I	3.3V	Bootstrap for USB Host / Device Mode (input)
24	GND	System Ground	-	-	
25	GPIO11	General Purpose I/O	I/O	3.3V	Bi-directional, open drain
26	LAN RX N0	LAN – RX Data N0	I	3.3V	100BASE-TX Ethernet
27	GPIO17	General Purpose I/O	I/O	3.3V	Bi-directional, open drain
28	LAN RX P0	LAN – RX Data P0	I	3.3V	100BASE-TX Ethernet
29	GPIO16	General Purpose I/O	I/O	3.3V	Bi-directional, open drain

[1] Primary direction as seen from DT60M module

30	GND	System Ground	-	-	
31	GPO22	General Purpose Output	O	3.3V	
32	WAN TX N4	WAN – TX Data N4	O	3.3V	100BASE-TX Ethernet
33	GPO19	General Purpose Output	O	3.3V	
34	WAN TX P4	WAN – TX Data P4	O	3.3V	100BASE-TX Ethernet
35	GPO18	General Purpose Output	O	3.3V	
36	GND	System Ground	-	-	
37	VDD 2V0_T		O	2.0V	Reference voltage out for ETH transformers
38	WAN RX N4	WAN – RX Diff. Data N4	O	3.3V	100BASE-TX Ethernet
39	SYS_RST	System Reset Output	O	3.3V	System reset output
40	WAN RX P4	WAN – RX Diff. Data P4	O	3.3V	100BASE-TX Ethernet
41	EXT_RST	System Reset Input	I	3.3V	Reset input, open-drain, internal pull-up 10kΩ
42	GND	System Ground	-	-	
43	PCIe RST_OUT	PCIe – Reset Output	O	3.3V	
44	PCIe CLKOUT_N	PCIe – Diff. Clock-	O	0.7V	PCIe 1.1, 100MHz
45	GND	System Ground	-	-	
46	PCIe CLKOUT_P	PCIe – Diff. Clock+	O	0.7V	PCIe 1.1, 100MHz
47	3V3	Power Supply	I	3.3V	3.3V Module Power Supply (±10%)
48	GND	System Ground	-	-	
49	3V3	Power Supply	I	3.3V	3.3V Module Power Supply (±10%)
50	PCIe RX_N	PCIe – RX Diff. Data-	I	0.7V	PCIe 1.1, 2.5GT/s
51	3V3	Power Supply	I	3.3V	3.3V Module Power Supply (±10%)
52	PCIe RX_P	PCIe – Diff. Recv. Data+	I	0.7V	PCIe 1.1, 2.5GT/s
53	3V3	Power Supply	I	3.3V	3.3V Module Power Supply (±10%)
54	GND	System Ground	-	-	
55	GND	System Ground	-	-	
56	PCIe TX_N	PCIe – TX Diff. Data-	O	0.7V	PCIe 1.1, 2.5GT/s
57	GND	System Ground	-	-	
58	PCIe TX_P	PCIe – TX Diff. Data+	O	0.7V	PCIe 1.1, 2.5GT/s
59	TRST	Direct reset	I	3.3V	For programmer only, leave this pin open
60	GND	System Ground	-	-	

Table 2 Board-to-Board Connector Pin Description

5.1 Recommended mating types

Stacking Height	Manufacturer	Type	Order number	Distance bolt
3.0mm	Hirose	DF40HC(3.0)- 60DS-0.4V(51)	684-4100-0-51	Penn Engineering SMTSO-M2-3ET
3.5mm	Hirose	DF40HC(3.5)- 60DS-0.4V(51)	684-4102-5-51	No recommendation
4.0mm	Hirose	DF40HC(4.0)- 60DS-0.4V(51)	684-4133-9-51	Penn Engineering SMTSO-M2-4ET

6 Interfaces

6.1 Power Supply interface

The provided 3.3VDC needs to be regulated and stable:

Component	Description / Specification
+3.3VDC	3.15…3.6V, 1000mA peak; 500mA average

6.2 Bootstrap options

Component	Bootstrap Purpose		Default Value
GPI4	Factory reset	low = Normal operation high = Factory reset	low
GPI20	USB device mode	low = Host mode high = Device mode	high
GPI21	PCIE RC	low = NA high = PCIE RC	high

The default bootstrap options are done with 10kΩ resistors. They can be overdriven with 1kΩ resistors.

6.3 Reset

The reset input (RST_EXT) is an active low input with internal 20kΩ pull-up to 3.3V. Reset is applied by putting the signal to low (GND level).

6.4 Reset output

The reset output (SYS_RST) is an active low push pull output (3.3V). This signal is low (GND level) during reset and start-up.

6.5 UART interface

The UART interface consists of transmit (UART1_TX) and receive (UART1_RX) signals with the following levels.

- UART1_TX
  - High Level Output Voltage: 2.6…3.3V (12mA max.)
  - Low Level Output Voltage: 0…0.7V (12mA max.)
- UART1_RX
  - High Level Input Voltage: 2.0…3.3V
  - Low Level Input Voltage: 0…0.8V

6.6 LAN/WAN interface

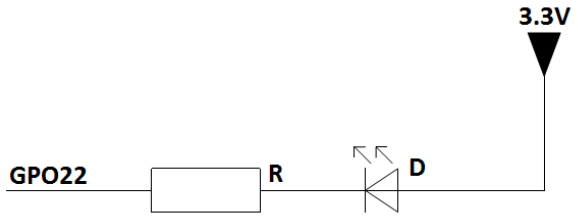
The DT60M integrates two 100Mbit/s Ethernet PHYs. External transformers are needed to connect the interfaces to a standard Ethernet network.

6.7 USB interface

Supports USB 2.0 host or device interface, configured via bootstrap option (see chapter 6.2).

6.8 LED

DT60M has integrated a yellow status LED connected to GPO22. If an external LED needs to be added, please connect it according to the following circuit example.



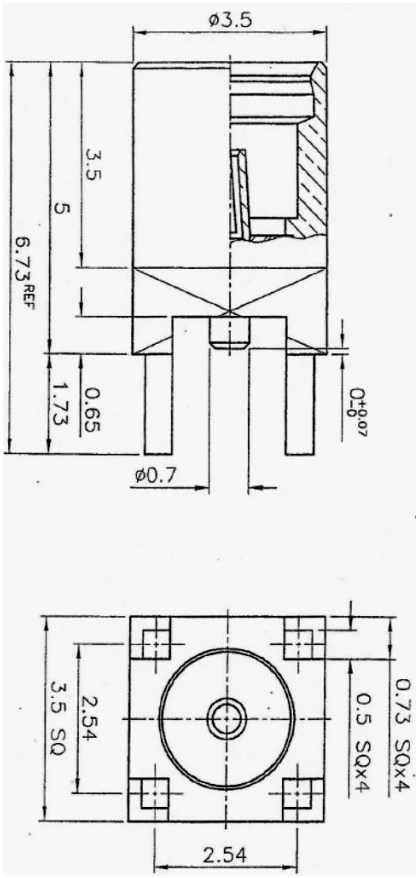
Picture 6: LED schematic example

6.9 GPIOs

- All GPI and GPO have 3.3V logic levels
  - High Level Input Voltage: 2.0…3.3V
  - Low Level Input Voltage: 0…0.8V
  - High Level Output Voltage: 2.6…3.3V (12mA max.)
  - Low Level Output Voltage: 0…0.7V (12mA max.)
- GPIO 11, 16 and 17 are open drain and pulled up (10kΩ) to 3.3V
  - High Level Input Voltage: 2.4…3.3V
  - Low Level Input Voltage: -0.3…0.3V
  - High Level Output Voltage: 3.3V
  - Low Level Output Voltage: 0V
- Possible interfaces on the GPI, GPO and GPIO pins (provided by the CPU):
  - SLIC
  - I2S
  - Clock observation
  - SPDIF
  - Ethernet LED's
  - WLAN related signals

7 Antenna Interface

Component	Description / Specification
Antenna Connector On-Board	2x MMCX Connector
Impedance	50Ω
ESD protection	IEC61000-4-2 +/-15kV air and contact protected
Maximum Input Power Capability	-20dBm for 2.4GHz -30dBm for 5GHz



Picture 7: MMCX connector

8 SW configuration Interfaces

DT60M and Neratec SW6 offers as standard configuration via SNMP.

Default configuration:

- IP: 192.168.1.20
- SNMP community R&W: admin-community

For more details see SW6 User Guide [1].

9 Layout Considerations

PCIE, Ethernet and USB are impedance controlled lines. Also length matching is required between plus and minus of a differential pair.

9.1 PCIE

- Trace length matching between pairs is not required
- Match each differential pair per segment
- Match overall length < 5mils
- Avoid tight bends
- Full GND plane reference recommended
- Avoid plane splits
- Stitching vias required for layer transition
- AC coupling caps must be 0603, better smaller. Symmetric placement is best
- Minimize via usage
- Avoid using stubs