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M210-AM Datasheet

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Notice

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Version Record

Version	Update Date	Description
V1.0.0	01/12/2017	First edition.
V2.0.0	05/17/2017	Second edition of M210-AM datasheet

About this Datasheet

Purpose and Scope

The M210-AM are complete Verizon Wireless certified LTE Category M1 modules including base-band, RF and memory, for the design of connected machine-to-machine devices, and other Internet-of-Things devices with embedded LTE connectivity. This document provides technical information about M210-AM LGA module. M210-AM are based on Sequans' Monarch platform.

Who Should Read this Datasheet

This document is intended for engineers who are developing User Equipment (UE) for LTE systems.

References

[1]

- Verizon Wireless Unified Module Process for Compliance Testing and Approval, Version 12.0; Feb 2015
- Verizon Wireless Device Requirements LTE 3GPP Band 13 Network Access, Version 29.00; June 2016
- Verizon Wireless Device Requirements LTE 3GPP Multi-Band Network Access, Version 3.00; June 2016

[2] Core technology specifications:

- 3GPP E-UTRA 21 series Release 13 (EPS)
- 3GPP E-UTRA 22 series Release 13 (IMEI)
- 3GPP E-UTRA 23 series Release 13 (NAS, SMS)
- 3GPP E-UTRA 24 series Release 13 (NAS)
- 3GPP E-UTRA 31 series Release 13 (UICC)
- 3GPP E-UTRA 33 series Release 13 (security)
- 3GPP E-UTRA 36 series Release 13 (RAN)
- 3GPP2 C.S0015-A v1.0 (SMS)
- IETF, RFC 3261, 4861, 4862, 6434

For more information, see

- ftp://ftp.3gpp.org/Specs/archive/
- http://www.3gpp2.org/public_html/specs/CS0015-0.pdf
- https://tools.ietf.org/html/

[3] Test specifications:
3GPP E-UTRA 36 series Release 13 (RAN)
ftp://ftp.3gpp.org/Specs/archive/

[4] Vocabulary reference:

- 3GPP TR 21.905: "Vocabulary for 3GPP Specifications"

For more information, see http://www.3gpp.org/ftp/specs/archive/21_series/21.905/

Changes in this Document

This is the first edition of the document.

Documentation Conventions

This section illustrates the conventions that are used in this document.

General Conventions	
Note	Important information requiring the user's attention.
Caution 	A condition or circumstance that may cause damage to the equipment or loss of data.
Warning 	A condition or circumstance that may cause personal injury.
Italics	Italic font style denotes • emphasis of an important word; • first use of a new term; • title of a document.
Screen Name	Sans serif, bold font denotes • on-screen name of a window, dialog box or field; • keys on a keyboard; • labels printed on the equipment.

Software Conventions	
`Code`	Regular Courier font denotes code or text displayed on-screen.
Code	Bold Courier font denotes commands and parameters that you enter exactly as shown. Multiple parameters are grouped in brackets [ ]. If you are to choose only one among grouped parameters, the choices are separated with a pipe: [parm1 | parm2 | parm3] If there is no pipe separator, you must enter each parameter: [parm1 parm2 parm3]
`Code`	Italic Courier font denotes parameters that require you to enter a value or variable. Multiple parameters are grouped in brackets [ ]. If you are to choose only one among grouped parameters, the choices are separated with a pipe: [parm1 | parm2 | parm3] If there is no pipe separator, you must enter a value for each parameter: [parm1 parm2 parm3]

Table of Contents

1 Product Features

1.1 Features Description

M210-AM modules include Monarch SQN3330 Cat-M1 baseband, a complete dual band RF front end, memory and required circuitry to meet 3GPP E-UTRA (Long Term Evolution - LTE, Release 13 set of specifications) and Verizon Wireless LTE Cat-M1 UE specifications.

For more information on the core technology specifications see the section References on page 3. The terms M210-AM module refer to the hardware and the associated embedded software.

The architecture block diagram of the M210-AM is presented on Figure 1-1.

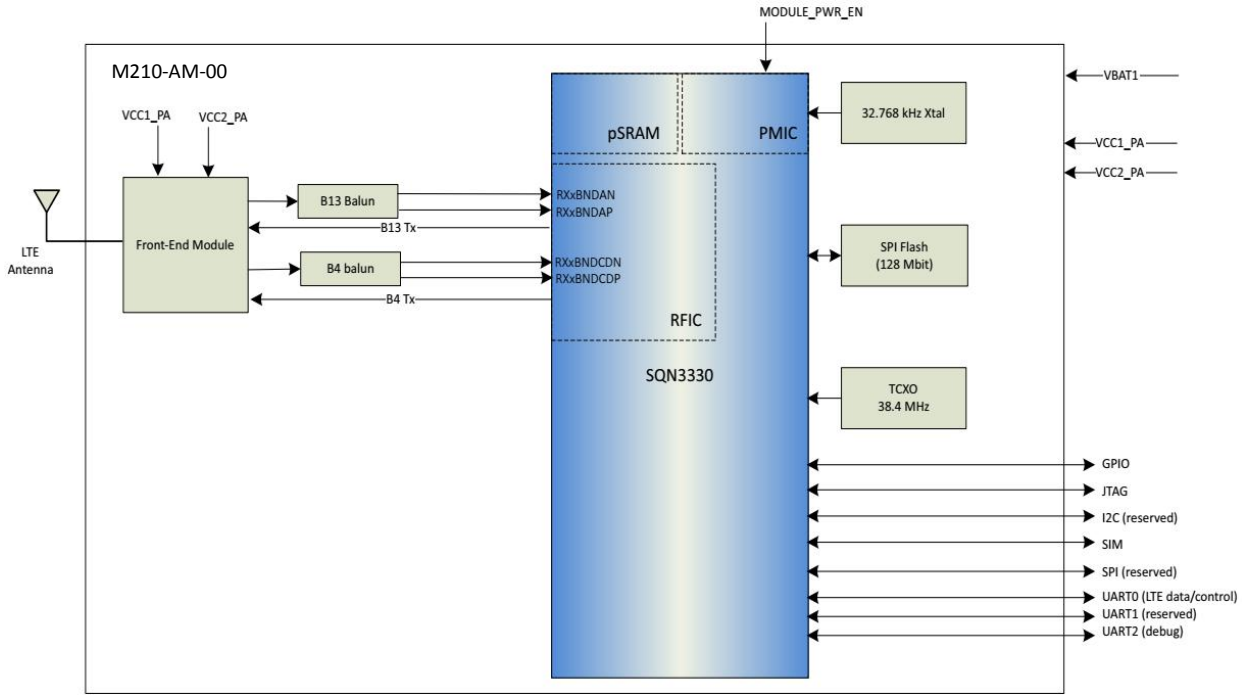

Figure 1-1: M210-AM-00 Block Diagram

Table 1-1 on page 10 provides detail on general features of the M210-AM.

Table 1-2 on page 11 provides detail for the LTE-related features of the M210-AM.

M210-AM's ECCN and part number are detailed in the Section 3.1 ECCN and Part Number on page 15.

Table 1-1: General Features

General interfaces	• JTAG • I2C (reserved) • USIM • SPI (reserved) • GPIO • UART (x3, including one reserved)
Supported Frequency Bands	• LTE Band 4 • LTE Band 13
Operation voltages	• V_{bat1} (range from 3.1 V to 4.5 V)
Packaging	• LGA module • 108 pads (21.35 x 20.25 x 1.79 mm) • RoHS compliant, halogen-free

Operating temperature	• RF compliant -30°C to +60°C (ambient) • Operational: -40°C to +85°C (board) See also Section 3.3 Environmental Operating Conditions on page 19.
Humidity	• 10% to 85% See also Section 3.3 Environmental Operating Conditions on page 19.

Table 1-2: LTE Features

Standard compliance	• 3GPP E-UTRA Release 13 compliant
PHY	• One UL and one DL transceiver • Support of HD-FDD Duplexing • Category M1 UE • Channel 1.4 MHz bandwidth • Normal and extended cyclic prefix • Support of MPDCCH • Modulation - DL: QPSK, 16QAM - UL: QPSK, 16QAM • All coding schemes corresponding to modulations • All channel coding (turbo-coding with interleaver, tail biting convolutional coding, block and repetition coding) and CRC lengths • Sounding (including in special subframes) • Control and data in special subframes • All power control schemes and DL power allocation schemes • HARQ Incremental Redundancy and Chase Combining, with bundling or multi-plexing • Measurements and computations related to CQI (Channel Quality Indicator), PMI (Pre-coding Matrix Indicator) and RI (Rank Indicator), RSRP, and RSRQ • UEPCOP (from 3GPP Release 12) Power Saving Mode
MAC	• Random Access procedure in normal and special subframes • Scheduling Request, Buffer Status Reporting, and Power Headroom Reporting • Discontinuous reception (DRX, eDRX) with long and short cycles • Fast scanning • Hosted configuration • IPv4, IPv6 • RoHC • Location based services • Advanced QoS features
RLC	• ARQ modes: UM, AM, and TM
PDCP	• Ciphering and deciphering: NULL, AES, SNOW 3G • Integrity and protection: AES, SNOW 3G
RRC	• MIB and new SIB1bis • Intra and inter-frequency measurements and handover • Up to 8 Data Radio Bearers supported • Support of CE (Coverage Extension) Mode

Table 1-2: LTE Features (Continued)

NAS and above	• NAS • SMS over SG • LWM2M Client

2 FCC Regulation Warning

- *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.

- *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 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.

  Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

- *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 20 cm between the radiator & your body.

- ***End Product Labeling***
  When the module is installed in the host device, the FCC ID label must be visible through a window on the final device or it must be visible when an access panel, door or cover is easily re-moved. If not, a second label must be placed on the outside of the final device that contains the following text: "Contains FCC ID: ZMOM210AM".
  The grantee's FCC ID can be used only when all FCC compliance require-ments are met.

This device is intended only for OEM integrators under the following conditions:

1. The antenna must be installed such that 20 cm is maintained between the antenna and users,
2. The transmitter module may not be co-located with any other transmitter or antenna.
3. To comply with FCC regulations limiting both maximum RF output power and human exposure to RF radiation, the maximum antenna gain including cable loss in a mobile exposure condition must not exceed:

   Standalone Condition:

   - 10 dBi in 700 MHz Band
   - 6 dBi in 1700 MHz Band

   Assuming collocated with an ordinary WLAN/WiMax transmitter with 34 dBm average EIRP power

   - 6.5 dBi in Cellular band
   - 6 dBi in PCS band

   Remark: This assumption is not valid if the output power of the collocated WLAN/ WiMax transmitter is higher than 34 dBm.

   In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.
4. The product using this module must also comply with the maximum antenna gain to meet FCC EMC and RF exposure related limits. The modular grant lists those maximum gain values.
5. The OEM integrator needs show that the product hosting this module needs to be compliant with radiated and conducted emissions limits for unintentional radiators (digital devices) per 15B testing (limits in part 15.107 and 15.109, respectively).

3 Physical Characteristics

3.1 ECCN and Part Number

The ECCN and orderable part number of the M210-AM modules will be provided in a future revision of the document.

3.2 Electrical Operating Conditions

3.2.1 Detailed Information

Table 3-1: Electrical Operating Conditions for M210-AM

	Direction	Minimum	Typical	Maximum
VBAT1	In	3.1 V		4.5 V
SIM_VCC (1.8 V or 3.0 V)	Out	1.62 V	1.8 V	1.98 V
		2.7 V	3.0 V	3.3 V
1V8 See note below.	Out	1.71 V	1.8 V	1.89 V
3V0	Out	2.85 V	3.0 V	3.15 V
VCC1_PA	In	2.85 V	3.0 V	3.3 V
VCC2_PA	In	2.85 V	3.0 V	3.3 V

Note:
1. The maximum current consumption allowed from the 1V8 reference pin is 100 mA.
2. Each output reference voltage (1V8, 3V0) can be either running or powered off depending on the internal software configuration. They should not be used to power external IC or parts that require permanent supply.

3.2.2 M210-AM Power Tree

Figure 3-1 provides a representation of the power tree of the M210-AM.

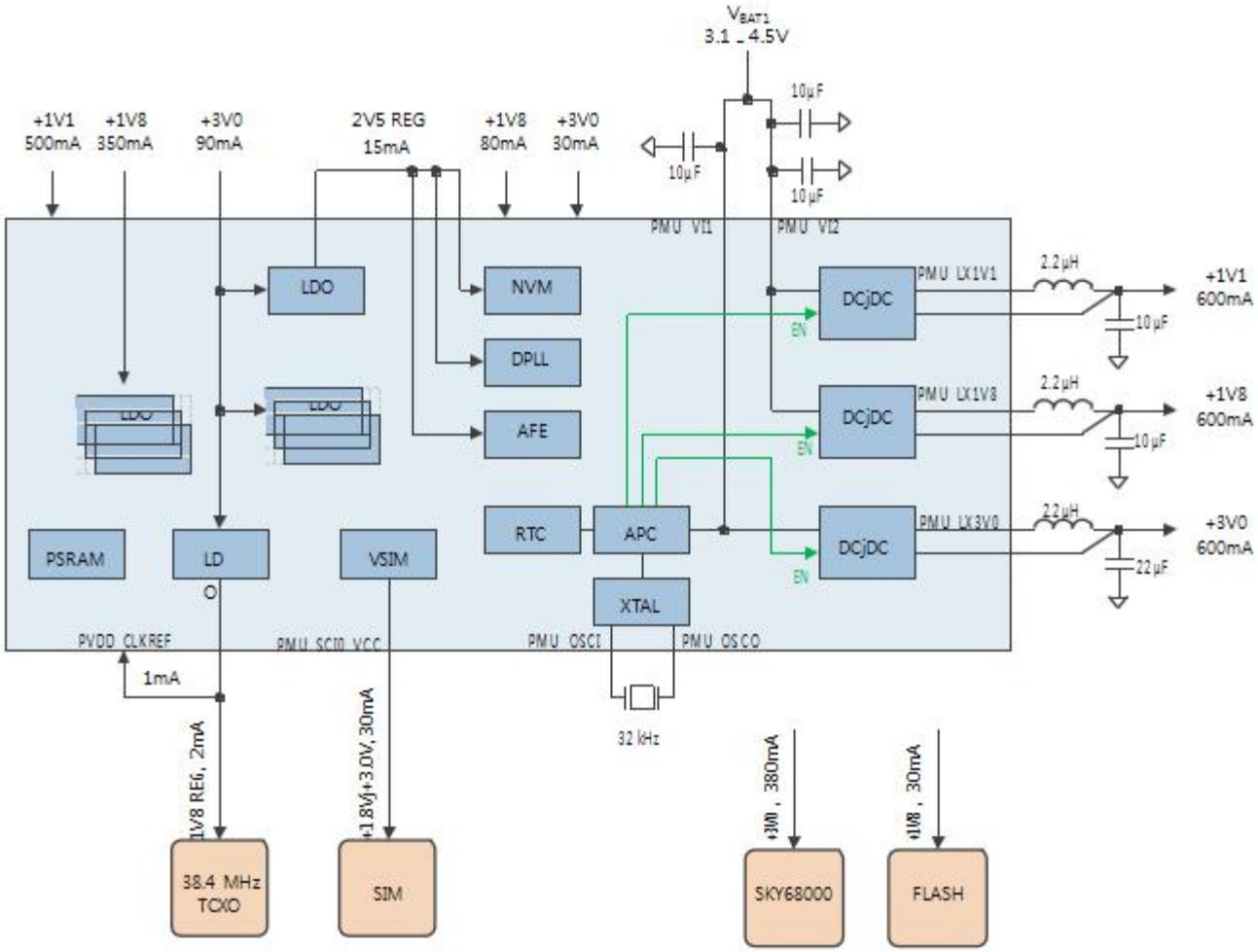

Figure 3-1: M210-AM Power Tree

3.2.3 Power Supplies Environment

Figure 3-2 illustrates the connections between the RF front-end power supplies of the M210-AM.

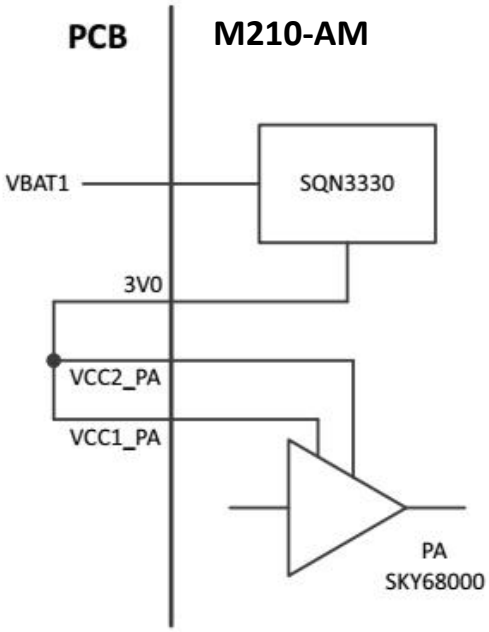

Figure 3-2: M210-AM LTE RF Front-End Power Supplies Diagram

3.3 Environmental Operating Conditions

3.3.1 Temperature

- RF compliant: -30°C to +60°C (ambient)
- Operational, with additional software to limit TxPower: -40°C to +85°C (measured on board)
- Storage: -40°C to +85°C

3.3.2 Humidity

- Operating: 10% to 85% (non condensing)
- Storage: 5% to 85% (non condensing)

3.4 Power Supply Dimensioning

Important: - Information provided here is ***estimated peak current consumption*** for the M210-AM Module in various LTE Tx/Rx configurations, with and without DC/DC losses.

- Average and detailed power consumption figures are provided in Sequans' Software Release Notes.

Table 3-2: Estimated Peak Current and Peak Power Consumption (LTE Band 13)

		Estimated Peak Power Consumption	Estimated Battery Peak Current (for V_{BAT1}=4.2 V)
TX	TX Power = 23 dBm	1.8 W	430 mA
	TX Power = 20 dBm	1.6 W	380 mA
	TX Power = 18 dBm	1.5 W	360 mA
	TX Power = 13 dBm	1.3 W	310 mA
RX		1.1 W	260 mA

3.5 I/O Characteristics

The voltage and current characteristics of the various IO pads of the M210-AM versus IO bank supply voltage are illustrated in the tables below.

Caution: Note that the V_{oh} values in the tables below do not apply to GPIOs configured in open drain mode. GPIOs can be individually configured in open drain mode. When in open drain mode they either drive the line to V_{ol}, or leave it floating, to be pulled up by an external pullup resistance. The PCB designer must ensure that the voltage on these pads never exceeds V_{ih} of the IO group to which they belong.

Refer to M210-AM Pin List to know the type of IO pad used on every termination.

- The Minimum values for I_{ol} and I_{oh} should not be exceeded to guarantee that the logical level are not spoiled for each pad type.
- The Nominal values for I_{ol} and I_{oh} represent the nominal values for the pad type. They are provided for information only.
- The Maximum values for I_{ol} and I_{oh} represent the maximal values for the pad type. They are provided for information only.

Table 3-3: DC Characteristics for Digital IOs, Voltage 1.8 V

Parameter	Drive Strength	Min.	Nom.	Max.	Unit
V_{IL} Input Low Voltage		-0.3		0.63	V
V_{IH} Input High Voltage		1.17		3.6	V
V_T Threshold Point		0.79	0.87	0.94	V
V_{T+} Schmitt Trigger Low to High Threshold Point		1	1.12	1.22	V
V_{T-} Schmitt Trigger High to Low Threshold Point		0.61	0.71	0.8	V
$V_{T\ PU}$ Threshold Point with Pull-up Resistor Enabled		0.79	0.86	0.93	V
$V_{T\ PD}$ Threshold Point with Pull-down Resistor Enabled		0.8	0.87	0.95	V
$V_{T+\ PU}$ Schmitt Trigger Low to High Threshold Point with Pull-up Resistor Enabled		1	1.12	1.21	V
$V_{T-\ PU}$ Schmitt Trigger High to Low Threshold Point with Pull-up Resistor Enabled		0.61	0.7	0.8	V
$V_{T+\ PD}$ Schmitt Trigger Low to High Threshold Point with Pull-down Resistor Enabled		1.01	1.13	1.23	V
$V_{T-\ PD}$ Schmitt Trigger High to Low Threshold Point with Pull-down Resistor Enabled		0.62	0.72	0.81	V
I_I Input Leakage Current @ VI=1.8V or 0V				±10	μA
I_{OZ} Tri-state Output Leakage Current @ VO=1.8V or 0V				±10	μA
Input Capacitance			3		pF

Table 3-3: DC Characteristics for Digital IOs, Voltage 1.8 V - BIDIR and IN Types

Parameter	Drive Strength	Min.	Nom.	Max.	Unit
R_{PU} Pull-up Resistor		56	89	148	kOhm
R_{PD} Pull-down Resistor		52	90	167	kOhm
V_{OL} Output Low Voltage				0.45	V
V_{OH} Output High Voltage		1.35			V
I_{OL} Low Level Output Current at V_{OL}(max)	2 mA	1.2	2.2	3.6	mA
	4 mA	2.3	4.3	7.1	mA
	8 mA	4.6	8.6	14.3	mA
I_{OH} High Level Output Current at V_{OH}(max)	2 mA	1.0	2.4	4.6	mA
	4 mA	2.0	4.7	9.2	mA
	8 mA	4.0	9.4	18.4	mA

Table 3-4: DC Characteristics for IN_PMU Type

Parameter	Drive Strength	Min.	Nom.	Max.	Unit
V_{IL} Input Low Voltage		-0.3		0.4	V
V_{IH} Input High Voltage		1.1		VBAT1 + 0.3	V

Table 3-5: DC Characteristics - BIDIR_WAKE Type

Parameter	Min.	Nom.	Max.	Unit
V_{IL} Input Low Voltage			0.2	V

Table 3-5: DC Characteristics - BIDIR_WAKE Type (Continued)

Parameter	Min.	Nom.	Max.	Unit
V_{IH} Input High Voltage. See note below related to maximum value.	0.8		3.6	V
V_{OL} Output Low Voltage			0	V
V_{OH} Output High Voltage	1.6		1.8	V

3.6 Performance

Table 3-5 and Table 3-6 present the M210-AM module's performance in LTE Band 4 and Band 13.

Table 3-5: Output Power

LTE Band	Frequency(kHz)	TCH	Conducted Power (dBm) Bandwidth 1.4 MHz, Full RB
Band 13	779500	23205	23 +2/-2.7
	782000	23230	23 +2/-2.7
	784500	23255	23 +2/-2.7
Band 4	1712500	19975	23 +2/-2.7
	1732500	20175	23 +2/-2.7
	1752500	20375	23 +2/-2.7

Table 3-6: RF Sensitivity

LTE Band	Frequency(kHz)	TCH	Typ. Sensitivity level (dBm) Bandwidth 1.4 MHz
Band 13	748500	5205	-103
	751000	5230	-103
	753500	5255	-103
Band 4	2112500	1975	-103
	2132500	2175	-103
	2152500	2375	-103

3.7 Component Reliability

Note:	Information related to component reliability will be provided in a future edition of this document.

3.8 Package Description

3.8.1 Module Footprint

The dimensions marked in Figure 3-4 are listed in Table 3-7.

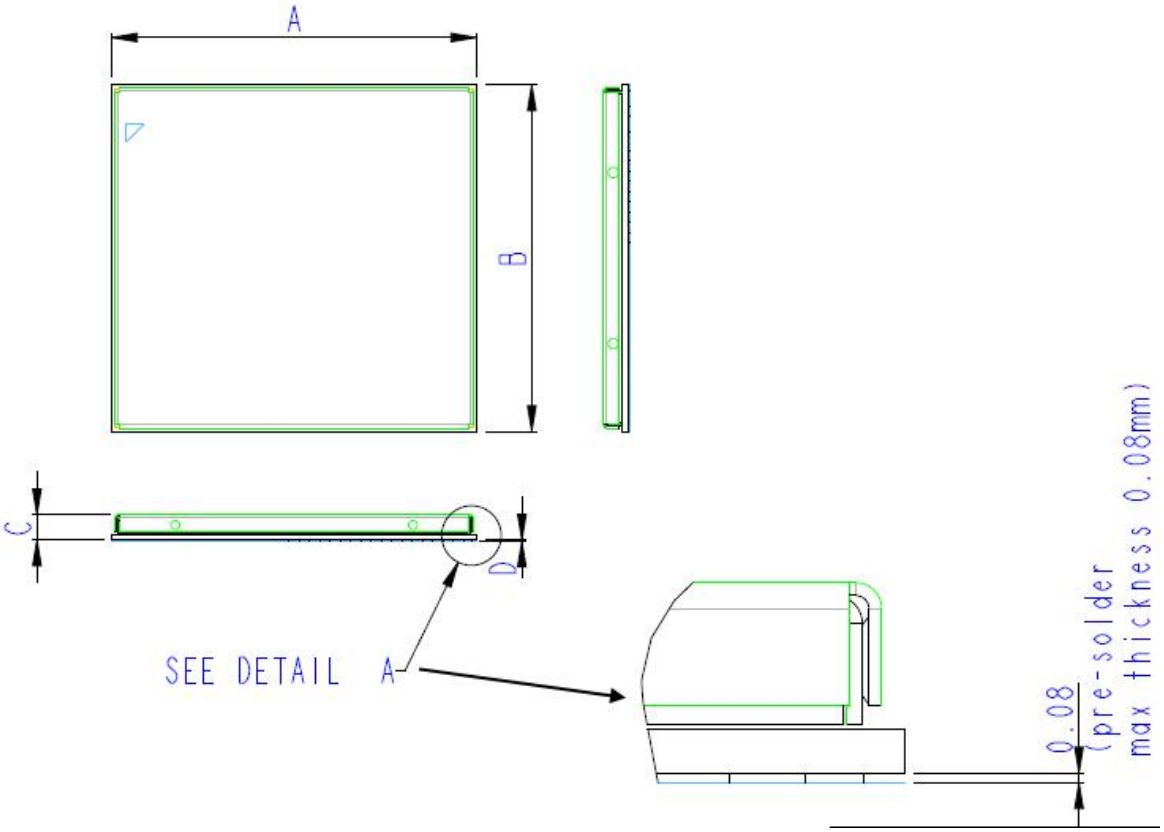

Figure 3-4: Top and Side View of the M210-AM

Table 3-7: M210-AM Outline Dimensions

Mark	Minimum (mm)	Nominal (mm)	Maximum (mm)
A	21.25	21.35	21.45
B	20.15	20.25	20.35
C	1.71	1.79	1.94
D	Not Available	Not Available	0.08

The dimensions marked in Figure 3-5 are listed in Table 3-8.

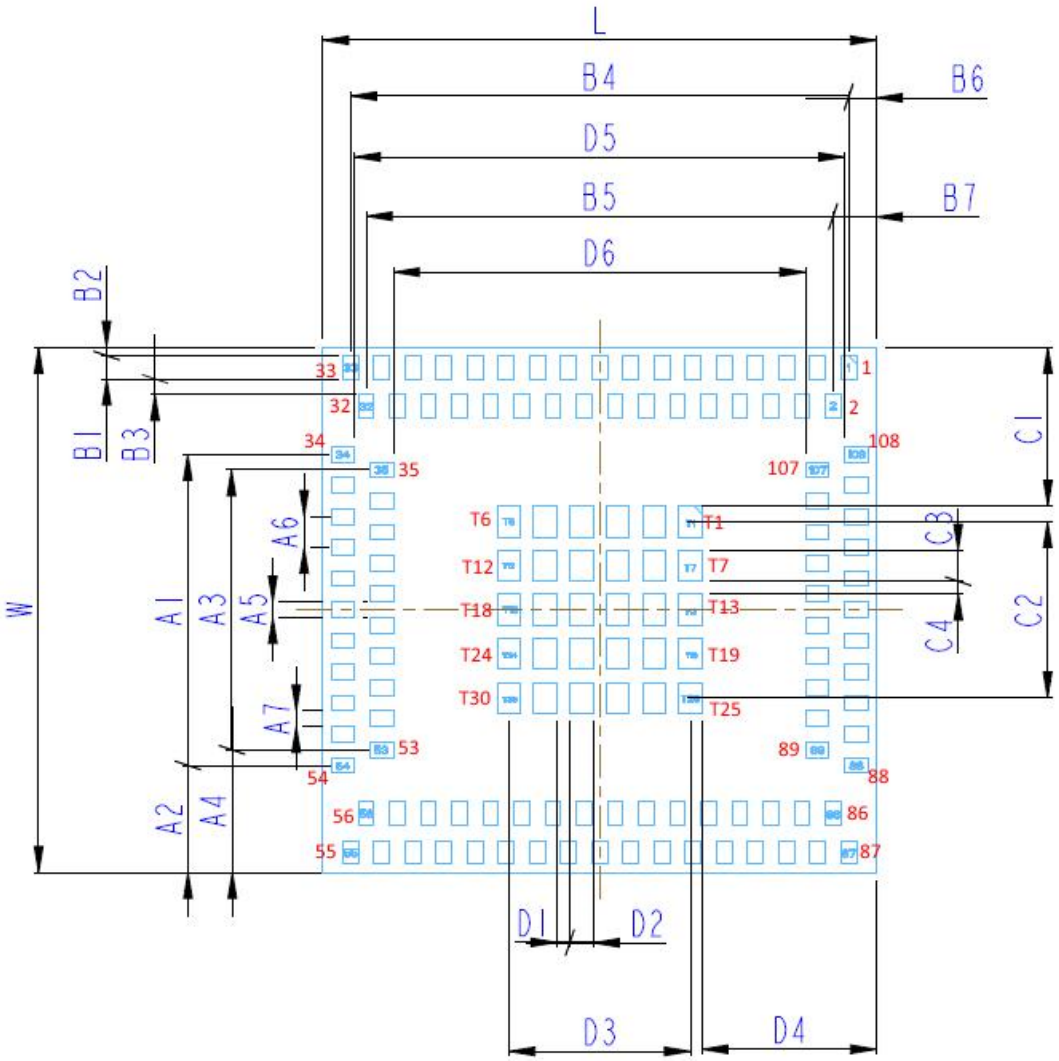

Figure 3-5: M210-AM Bottom Side View of Pads

Table 3-8: M210-AM Dimensions and Tolerances

Mark	Dimension and tolerance (mm)
L	21.35 ± 0.1
W	20.25 ± 0.1
A1	12 ± 1.0
A2	4.125 ± 0.5
A3	10.8 ± 1.0
A4	4.725 ± 0.5

Table 3-8: M210-AM Dimensions and Tolerances (Continued)

Mark	Dimension and tolerance (mm)
A5	0.6 ± 0.05
A6	1.2 ± 0.1
A7	0.6 ± 0.05
B1	0.9 ± 0.1
B2	0.325 ± 0.05
B3	0.6 ± 0.05
B4	19.2 ± 0.2
B5	18 ± 0.2
B6	1.075 ± 0.1
B7	1.675 ± 0.15
C1	6.125 ± 0.5
C2	6.8 ± 0.5
C3	1.2 ± 0.01
C4	0.5 ± 0.05
D1	0.5 ± 0.05
D2	0.9 ± 0.1
D3	7 ± 0.5
D4	6.725 ± 0.5
D5	18.9 ± 0.2
D6	15.9 ± 0.2

3.8.2 Marking Information

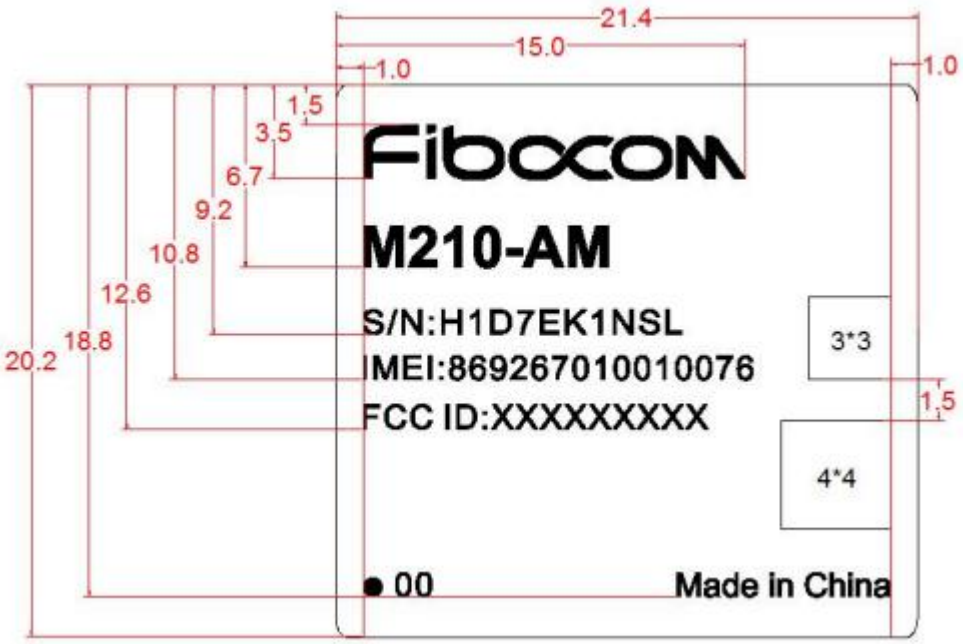

Figure 3-6: M210-AM-00 Marking Description

3.9 Packing Information

The module is delivered in Tape-and-Reel.

Note:	Details about packing of the modules will be provided in a future revision of this document.

3.10 Storage Conditions

Note:	Additional storage conditions impacting the mounting process are provided in Section 3.11 Mounting Considerations on page 31.

1. Calculated shelf life in sealed bag : 12 months at < 40°C and < 90% RH
2. Peak package body temperature: 250°C
3. After bag is opened, devices that will be subjected to reflow solder or other high temperature process must be:

a) mounted within 168 hours of factory conditions ≤ 30°C/60%RH, or

b) Stored as per J-STD-033

4. Devices require bake, before mounting, if

   a) Humidity Indicator Card reads >10% for level 2a-5a devices or >60% for level 2 devices when read at 23±5°C
   b) 3a or 3b above are not met

5. If baking is required, refer to IPC/FEDEC J-STD-033 for bake procedure.

Note: Level and body temperature are defined by IPC/JEDEC J-STD-020.

3.11 Mounting Considerations

This section provides reflow information.

Note: Details will be provided in a future revision of this document.

The M210-AM can support up to 3 reflows with 250°C maximum.

Table 3-10: Reflow Parameters

Parameter	Setting
Peak package body temperature	To be defined
Liquidous Time	To be defined
Preheat/Soak	To be defined
Ramp-up rate	To be defined
Ramp-down rate	To be defined

4 Signal and Pins

4.1 M210-AM Pinout

The signals and all the related details are listed in the MS-Excel companion file delivered together with the present document in a PDF portfolio.

The pads listed in Table 4-1 are connected to ground.

Table 4-1: Ground and Thermal Pads

Pad #	Pad Name	Comment
1 20 22 24 26 28 30 31 32 33 34 42 43 45 46 53 55 62 63 64 65 66 68 69 70 71 72 73 74 86 87	GND	All GND pads shall be connected to the same copper.
T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12 T13 T14 T15 T16 T17 T18 T19 T20 T21 T22 T23 T24 T25 T26 T27 T28 T29 T30	GND	T1 to T30 pads are used as both GND and thermal drops.

4.2 UART Interfaces

4.2.1 High-Speed UARTs

Figure 4-1 represents the typical implementation for the hardware flowcontrol for UART0, UART1 and UART2. TDX and RDX signals are mandatory. RTS and CTS are strongly recommended.The other signals are optional.

M210-AM are designed for use as DCE (Data Communication Equipment).

Based on the conventions for DCE-DTE connections, the DCE device will communicate with the customer application (DTE) using the following signals:

- Port TXD on Application sends data to the module's TXD signal line.
- Port RXD on Application receives data from the module's RXD signal line.

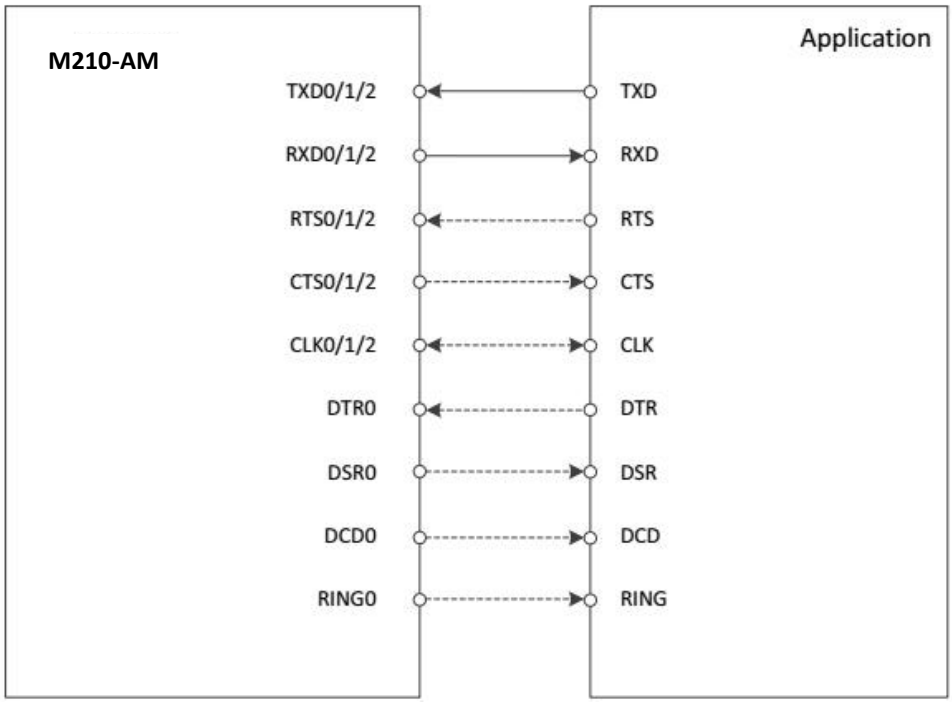

Figure 4-1: UART0, UART1 and UART2 Signals Convention and Flow Control

Note: CLK signals can be input or output.

4.3 Power-up Sequence

The following timing requirement applies to the signals VBAT1, MODULE_PWR_EN and RESET_N. It must be respected for proper M210-AM's behavior.

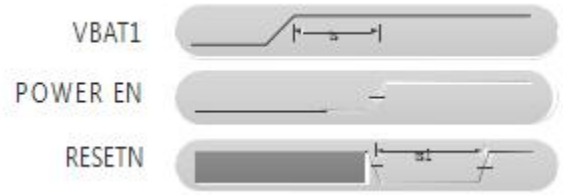

Figure 4-3: VBAT1, MODULE_PWR_EN and RESET_N Signals Timing Requirement for Cold Start

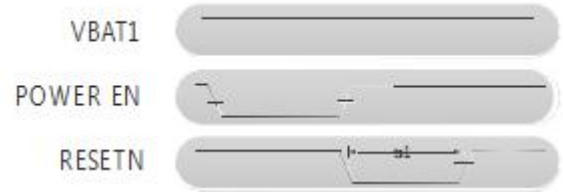

Figure 4-4: VBAT1, MODULE_PWR_EN and RESET_N Signals Timing Requirement for Warm Start

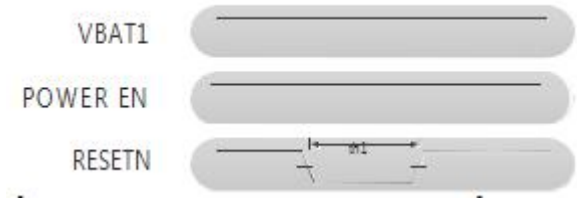

Figure 4-5: VBAT1, MODULE_PWR_EN and RESET_N Signals Timing Requirement for Reset Cycle

The timing minimum values are listed in Table 4-3.

Table 4-3: VBAT1, MODULE_PWR_EN and RESET_N Signal Timing Values

Symbol	Description	Minimum Duration	Maximum Duration
ts	VBAT1 setup time	1 ms	-
ts1	RESET_N setup time	1 ms	-
th1	RESET_N hold time	1 μs	-

4.4 LTE Low Power Mode

Important: The M210-AM module is provided with an internal RTC whose supply is VBAT1. As a consequence, VBAT1 should not be removed, in order to keep RTC active.

The M210-AM will automatically enter in low-power mode. M210-AM can be woken from low power mode by external sources through:

- SIM_DETECT input signal to cope with SIM card insertion into a SIM card connector with built-in hardware detection. The default configuration to wake-up the module is a low-to-high transition.
- The RTS0 input signal whenever data traffic is initiated by the host connected to the module UART0 with hardware flow control; The default configuration to wake-up the module is a high-to-low transition.
- Two dedicated input signal WAKE0 and WAKE1; The default configuration to wake-up the module is on a high-to-low transition. This can be modified by software. As example, these signals can be used to detect an alarm from an external IC such as a sensor. Software can disable the wake-up functionality on these signals.

Important: WAKE inputs are detected on level (configurable by software to 0 or 1) that must last at least 5 periods of the 32 kHz clock, that is 156.25 ìs.

- A subset of GPIO input signals: GPIO2, GPIO3, GPIO25, GPIO27, GPIO42; they are not configured by default as wake-up source but software can configure them for future use.

To get the lowest possible power consumption during low-power mode, all IOs must be stable. At software configuration time, take care of the following, to prevent them from being in conflict or floating:

- Pads that are not driven by an external device shall be driven low by software if they have a GPIO or RFDATA mode that allows it.
- For pads that are known to be driven by an external device:

  Configure that external device to hold the signal stable during low-power mode, and configure M210-AM to treat that pin as an input, without internal pull-up or pull-down.
- For pads where, at the time of low-power mode, the signal may or may not be driven by an external device:

  Configure M210-AM to enable the internal pull-up/pull-down on the pad to guarantee that it will not be floating during low-power mode.

Note: Each signal's pull (up or down) is determined by register. It can be modified by software. Please see the default configuration in the signal's list.

A Acronyms

Acronym	Definition
AFE	Analog Front-End
APC	Automatic Control Power
APT	Average Power Tracking
CE	Coverage Extension
COO	Country of origin
CPU	Central Processing Unit
DC/DC	Direct current converter
DL	Downlink
DPLL	Digital Phase-Locked Loop
ECCN	Export Control Classification Number
EPS	Evolved Packet System
ESD	Electro-static discharge
ETSI	European Telecommunications Standard Institute
GND	Ground
GNSS	Global Navigation Satellite System. Superset for systems such as GPS, Galileo, Glonass, BeiDou or QZSS among others.
GPIO	General Purpose Input Output
HBM	Human Body Model (ESD)
I/O	Input/Output
I2C	Inter-integrated circuit (bus)

Acronym	Definition
IMEI	International Mobile Equipment Identity
IMS	Instant Messaging Service
IP	Internet Protocol
JTAG	Joint Test Action Group. See IEEE 1149.7 specification
LDO	Low Drop-Out regulator
LGA	Large Grid Array
LNA	Low-Noise Amplifier
LTE	Long Term Evolution, or 4G. Standard is developed by the 3GPP www.3gpp.org.
MM	Machine Model (ESD)
NAS	Network Access Server
NVM	Non Volatile Memory
OMADM	Open Mobile Alliance Device Management
PCB	Printed Circuit Board
PHY	Physical Layer
PLL	Phase-Locked Loop
PMIC	Power Management Integrated Circuit
pSRAM	Pseudo-Static Random Access Memory
QTY	Quantity
RAM	Random Access Memory
RB	Resource Block
RF	Radio Frequency
RFIC	RF Integrated Circuit
RoHS	Restriction of Hazardous Substances
RTC	Real-Time Clock
Rx	Reception

Acronym	Definition
S/N	or SN: Serial Number
SAW	Surface Acoustic Wave (filters)
SDM	Socketed Device Model (ESD)
SIM	Subscriber Identification Module
SMS	Short Message Service
SPI	Serial Peripheral Interface
TCXO	Temperature-controlled crystal oscillator
Tx	Transmission
UART	Universal asynchronous receiver transmitter.
UE	User Equipment
UICC	Universal integrated circuit card (SIM)
UL	Uplink
XTAL	Crystal