



MTX-LTE-C3-AUDIO

• HARDWARE • USER **GUIDE**



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IMPORTANT INFORMATION

This technical description contains important information for the startup and use of the MTX-LTE-C3-Audio Modem. Read it carefully before you start working with the MTX-LTE-C3-Audio Modem. The warranty will be void should damage occur due to non-compliance with these instructions for use. We cannot accept any responsibility for consequential loss.

SERVICE AND SUPPORT

To contact customer support please contact your local distributor/sales agent or use the details below:

Address: Alejandro Sánchez 109, 28019 Madrid (Spain)
Email: iotsupport@mtx2m.com
Website: mtx2m.com

REVISION INFORMATION

REVISION	DATE	AUTHOR	CHANGES
1.0	2015/10	AEM	First draft
1.1	2017/01	JSSC	Minor review

INTRODUCTION

● 1. Description

The MTX-LTE-C3-Audio is a complete 4G/3G/2G radio modem that encapsulates everything you need for wireless M2M capability in one compact plug-and-play unit. When your application needs to receive data up to 100Mbps or transmit up to 50Mbps, the MTX-LTE-C3-Audio modem is the solution based on LTE technology.

LTE (Long Term Evolution) is a standard for wireless communication based on the GSM/EDGE and UMTS/HSPA network technologies, increasing the capacity and speed using a different radio interface together with core network improvements. This technology therefore enables services like broadband internet and e-mail access, high-speed download of large data files and streaming of videos or music.

The MTX-LTE-C3-Audio is controlled via AT commands and standard interfaces such as USB 2.0 High Speed and NDIS drivers.

When LTE network operation is not present, the MTX-LTE-C3-Audio can operate in lower speed modes such HSPA+ mode (max. 42Mbps DL, max. 5.76Mbps UL), EDGE Class 12 (max. 237kbps DL, max. 237kbps UL) or GPRS Class 12 (max. 85.6kbps DL, max. 85.6kbps).






The MTX-LTE-C3-Audio is a self-contained modem with its own SIM card reader and a USB 2.0 High Speed and RS232 interfaces, minimizing the need for further hardware development. This modem can be used as a powerful and flexible device that can be integrated in a wide range of telemetry and telematic applications that rely on the remote exchange of data and SMS via the GSM cellular network.

The MTX-LTE-C3-Audio also has an internal GNSS module (GPS & GLONASS), allowing to be used in track & location applications.








The MTX-LTE-C3-Audio is manufactured using SMD technology following ISO-9001 & ISO-14001 Quality certifications and it is RoHS/WEEE compliant.

The MTX-LTE-C3-Audio modem is powered by an internal Gemalto/Cinterion® ALS3 module. It can also contain ALS3 module with automotive features.






● 2. Highlights

MTX-LTE-C3-AUDIO 4G	
	Penta band LTE (800, 900, 1800, 2100, 2600MHz); tri band UMTS (900, 1800, 2100MHz); dual band GSM/GPRS/EDGE (900, 1800MHz)
	LTE cat.3: DL 100Mbps, UL 50Mbps
	HSPA+: DL cat.24, UL cat.6; dual carrier DL 42Mbps, UL 5.76Mbps UMTS: DL 384kbps, UL 384kbps EDGE class 12: DL 237kbps, UL 237kbps GPRS class 12: DL 85.6kbps, UL 85.6kbps
	SMS text and PDU mode
	VOICE: AMR, EFR, FR HR codecs CEPT/ANSI supervisory tones supported Handset, Headset, Hands-free modes Speakerphone operation TTY supported

Interfaces







	4G/3G/2G connectivity
	USB 2.0 high speed port up to 480Mbps
	RS232 (8-wire)
	SIM card interface 3V, 1.8V
	Handset audio interface
	Plug-in power supply
	GPS

Connectors





	2x LTE SMA F antennas
	MiniUSB B
	DB9 F: RS232 (8-wire)
	RJ11: handset audio
	RJ11: power supply

SOFTWARE FEATURES

General Features

-  SIM application toolkit, 3GPP release 99
-  Automatic restart
-  Multi OS support
-  Control via AT commands
-  TCP/IP stacks access via AT commands
-  Internet services: TCP, UDP, HTTP, FTP, SMTP, POP3
-  Standalone GPS/GLONASS: GNSS AT commands, tracking sensitivity >-158dBm

Drivers

-  NDIS/USB driver for Microsoft, Windows Vista, Windows 7 and Windows 8
-  RIL driver for devices based on Android OS
-  SB driver for Microsoft Windows Embedded Compact
-  CDC-ACM compliant mode for Linux

● 3. Product Label



1. MTX logo
2. Part number/ordering code
3. Product name (model)
4. Hardware and firmware versions
5. FCC ID
6. Year/week of fabrication
7. Barcode (code 128) (IMEI)
8. CE logo
9. RoHS symbol
10. WEEE symbol
11. Pb-free symbol
12. PTCRB certification logo

● 4. Main Features and Services

The MTX-LTE-C3-Audio performs a set of telecom services (TS) according to GSM standard phase 2+, ETSI and ITU-T. The services and functions of the MTX-LTE-C3-Audio are implemented by and issued over the USB interface.

4.1 Key features at a glance

The MTX-LTE-C3-Audio is a LTE/UMTS/HSPA+ and also GSM/GPRS/EDGE bands mobile station with the following characteristics.

FEATURE	IMPLEMENTATION
General	
Frequency bands	European version: <ul style="list-style-type: none">• GSM/GPRS/EDGE: Dual band, 900/1800MHz• UMTS/HSPA+: Triple band, 900 (VIII)/1800 (III)/2100MHz (I)• LTE: 5 band, 800 (20)/900 (8)/1800 (3)/2100 (1)/2600MHz (7)
GSM class	Small MS
Output power (according to Release 99)	Class 4 (+33dBm \pm 2dB) for EGSM900 Class 1 (+30dBm \pm 2dB) for GSM1800 Class E2 (+27dBm \pm 3dB) for GSM 900 8-PSK Class E2 (+26dBm +3 /-4dB) for GSM 1800 8-PSK Class 3 (+24dBm +1/-3dB) for UMTS 2100, WCDMA FDD BdI Class 3 (+24dBm +1/-3dB) for UMTS 1800, WCDMA FDD BdIII Class 3 (+24dBm +1/-3dB) for UMTS 900, WCDMA FDD BdVIII
Output power (according to Release 8)	Class 3 (+23dBm +-2dB) for LTE 2600, LTE FDD Bd7 Class 3 (+23dBm +-2dB) for LTE 1800, LTE FDD Bd3 Class 3 (+23dBm +-2dB) for LTE 900, LTE FDD Bd8 Class 3 (+23dBm +-2dB) for LTE 800, LTE FDD Bd20
Power supply	Single supply voltage Maximum: 6.5 to 40V (without damaging the device)* Recommended: 7 to 35V *(Device operation from 6.5 to 7V is not guaranteed over the whole temperature range / Supplies from 35 to 40V may damage the device during extended use)
Physical	Dimensions: 78,1 x 66,8 x 37,2 mm Weight: approx. 190g
RoHS	All hardware components are fully compliant with the EU RoHS Directive

LTE Features	
3GPP Release 9	UE CAT 3 supported DL 100Mbps, UL 50Mbps 2x2 MIMO in DL direction
HSPA Features	
3GPP Release 8	UE CAT. 1-14, 16, 24 supported DC-HSPA+ - DL 42Mbps ; 2x2 MIMO – DL 28.8Mbps HSUPA – UL 5.76Mbps Compressed mode (CM) supported according to 3GPP TS25.212
UMTS Features	
3GPP Release 8	PS data rate – 384 kbps DL / 384 kbps UL
GSM/GPRS/EGPRS Features	
Data transfer	<p>GPRS</p> <ul style="list-style-type: none"> • Multislot Class 12 • Mobile Station Class B • Coding Scheme 1–4 <p>EGPRS</p> <ul style="list-style-type: none"> • Multislot Class 12 • EDGE E2 power class for 8 PSK • Downlink coding schemes–CS 1-4, MCS 1-9 • Uplink coding schemes–CS 1-4, MCS 1-9 • SRB loopback and test mode B • 8-bit, 11-bit RACH • 1 phase/2 phase access procedures • Link adaptation and IR • NACC, extended UL TBF • Mobile Station Class B
SMS	Point-to-point MT and MO Cell broadcast Text and PDU mode
Software	
AT commands	Hayes, 3GPP TS 27.007 and 27.005 and proprietary Gemalto/Cinterion Wireless Modules commands
Firmware update	Firmware update from host application over USB

Audio	Audio speech codecs GSM: WB-AMR, AMR, EFR, FR, HR 3GPP: WB-AMR, AMR Speakerphone operation, echo cancellation, noise suppression, 9 ringing tones
Interfaces	
USB	Supports a USB 2.0 High Speed (480Mbit/s) device interface, Full Speed (12Mbit/s) compliant
RS232 (8-wire)	ASC0: <ul style="list-style-type: none"> • 8-wire modem interface with status and control lines, unbalanced, asynchronous • Adjustable baud rates from 9,600bps up to 921,600bps • Supports RTS0/CTS0 hardware flow control • Multiplex ability according to GSM 07.10 Multiplexer Protocol
Wakeup Control	Signal pin to wake up an inactive USB Host into an active state.
UICC interface	Supported chip cards: UICC/SIM/USIM 3V, 1.8V
Antenna	50 Ohms. GSM/UMTS/LTE main antenna, UMTS/LTE Diversity/MIMO antenna, GNSS antenna
Audio	1 analog differential interface
GNSS	
Protocol	NMEA
Modes	Standalone GNSS Assisted GNSS <ul style="list-style-type: none"> • Control plane – E911 • User plane - gpsOneXTRA
General	Power saving modes Power supply for active antenna
Power on/off, reset	
Power on/off	Autom Switch-on by hardware signal IGT Switch-off by AT command (AT^SMSO) or IGT Automatic switch-off in case of critical temperature or voltage conditions

Software reset	Orderly shutdown and reset by AT command
Hardware reset	Reset by hardware pin RESET
Special Features	
Antenna	SAIC (Single Antenna Interference Cancellation) / DARP (Downlink Advanced Receiver Performance) Rx Diversity (receiver type 3i – 64-QAM) / MIMO

4.2 Operating modes

The table below briefly summarizes the various operating modes referred to in the following chapters.

LIMITS	FUNCTION	
Normal operation	GSM/GPRS/UMTS/HSPA/LTE SLEEP	Power saving set automatically when no call is in progress and the USB connection is detached and no active communication via ASCO. Also, the GNSS active antenna mode has to be turned off or set to “auto”.
	GSM/GPRS/UMTS/HSPA/LTE IDLE	No data transfer in progress.
	GPRS DATA	GPRS data transfer in progress. Power consumption depends on network settings (e.g. power control level), uplink / downlink data rates and GPRS configuration (e.g. used multislot settings).
	EGPRS DATA	EGPRS data transfer in progress. Power consumption depends on network settings (e.g. power control level), uplink / downlink data rates and EGPRS configuration (e.g. used multislot settings).
	UMTS DATA	UMTS data transfer in progress. Power consumption depends on network settings (e.g. TPC Pattern) and data transfer rate.
	HSPA DATA	HSPA data transfer in progress. Power consumption depends on network settings (e.g. TPC Pattern) and data transfer rate.
	LTE DATA	LTE data transfer in progress. Power consumption depends on network settings (e.g. TPC Pattern) and data transfer rate.
Power down	Normal shutdown after sending the AT^SMSO command. Software is not active. Interfaces are not accessible. Operating voltage remains applied. All MTX family will power again after this command means no software shutdown is possible. We call this “automatic restart after shutdown feature”. In other words: 24/7 hours ON.	
Airplane mode	Airplane mode shuts down the radio part of the modem, causes the modem to log off from the GSM/GPRS network and disables all AT commands whose execution requires a radio connection. Airplane mode can be controlled by AT command.	

4.3 Power consumption

Internal consumptions to 3.8V.

	DESCRIPTION	CONDITIONS	TYPICAL	UNIT
IBATT+1	OFF State supply current	POWER DOWN	40	μA
	Average GSM/GPRS supply current	IDLE (USB disconnected) @ DRX=2	40	mA
		IDLE (USB active) @ DRX=2	50	mA
		GPRS Data transfer GSM900; PCL=5; 1Tx/4Rx	320	mA
		GPRS Data transfer GSM900; PCL=5; 2Tx/3Rx	540	mA
		GPRS Data transfer GSM900; PCL=5; 4Tx/1Rx	930	mA
		EDGE Data transfer GSM900; PCL=5; 1Tx/4Rx	220	mA
		EDGE Data transfer GSM900; PCL=5; 2Tx/3Rx	340	mA
		EDGE Data transfer GSM900; PCL=5; 4Tx/1Rx	570	mA
		GPRS Data transfer GSM1800; PCL=0; 1Tx/4Rx	230	mA
		GPRS Data transfer GSM1800; PCL=0; 2Tx/3Rx	360	mA
		GPRS Data transfer GSM1800; PCL=0; 4Tx/1Rx	590	mA
		EDGE Data transfer GSM900; PCL=0; 1Tx/4Rx	190	mA
		EDGE Data transfer GSM900; PCL=0; 2Tx/3Rx	290	mA

		EDGE Data transfer GSM900; PCL=0; 4Tx/1Rx	460	mA
Average WCDMA supply current	IDLE (USB disconnected) @ DRX=6		30	mA
		IDLE (USB active) @ DRX=6	40	mA
	UMTS Data transfer Band I @ +24dBm		560	mA
	UMTS Data transfer Band III @ +24dBm		620	mA
	UMTS Data transfer Band VIII @ +24dBm		500	mA
	HSDPA Data transfer Band I @ +24dBm		590	mA
	HSDPA Data transfer Band III @ +24dBm		620	mA
	HSDPA Data transfer Band VIII @ +24dBm		510	mA
Average LTE supply current2	IDLE (USB disconnected)		35	mA
	IDLE (USB active)		45	mA
	LTE Data transfer Band 3 @ +23dBm		650	mA
	LTE Data transfer Band 7 @ +23dBm		640	mA
	LTE Data transfer Band 8 @ +23dBm		520	mA
	LTE Data transfer Band 20 @ +23dBm		520	mA
IVUSB_ IN	Average USB supply current	VUSB_IN is used for detection only	150	μA

1. With an impedance of ZLOAD=500hm at the antenna connector. Measured at 25°C.
2. Communication tester settings:
 - Channel Bandwidth: 5MHz
 - Number of Resource Blocks: 25 (DL), 1 (UL)
 - Modulation: QPSK

4.4 RF antenna interface description

The table below briefly summarizes the RF Antenna interface GSM/UMTS/LTE (at operating temperature range1).

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNT
LTE connectivity2		Band 1, 3, 7, 8, 20			
Receiver Input Sensitivity @ ARP (ch. bandwidth 5MHz)	LTE 800 Band 20	-97	-103		dBm
	LTE 900 Band 8	-97	-104		dBm
	LTE 1800 Band 3	-97	-103		dBm
	LTE 2600 Band 7	-98	-102		dBm
RF Power @ ARP with 500hm Load	LTE 800 Band 20	21	23	25	dBm
	LTE 900 Band 8	21	23	25	dBm
	LTE 1800 Band 3	21	23	25	dBm
	LTE 2100 Band 1	21	23	25	dBm
	LTE 2600 Band 7	21	23	25	dBm
UMTS/HSPA Connectivity2		Band 1, 3, 8			
Receiver Input Sensitivity @ ARP	UMTS 900 Band VIII	-103.7	-111		dBm
	UMTS 1800 Band III	-103.7	-110		dBm
	UMTS 2100 Band I	-106.7	-110		dBm
RF Power @ ARP with 500hm Load	UMTS 900 Band VIII	21	24	25	dBm
	UMTS 1800 Band III	21	24	25	dBm
	UMTS 2100 Band I	21	24	25	dBm

GPRS Coding Schemes		Class 12, CS1 to CS4			
EGPRS		Class 12, MCS1 to MCS9			
GSM Class		Small MS			
Static Receiver Input Sensitivity @ ARP		E-GSM 900	-102	-111	dBm
		GSM 1800	-102	-110	dBm
RF Power @ ARP with 500hm Load GSM		E-GSM 900		33	dBm
		GSM 1800		30	dBm
RF Power @ ARP with 500hm Load	GPRS, 1 TX	E-GSM 900		33	dBm
		GSM 1800		30	dBm
	EDGE, 1 TX	E-GSM 900		27	dBm
		GSM 1800		26	dBm
	GPRS, 2 TX	E-GSM 900		33	dBm
		GSM 1800		30	dBm
	EDGE, 2 TX	E-GSM 900		27	dBm
		GSM 1800		26	dBm
	GPRS, 3 TX	E-GSM 900		33	dBm
		GSM 1800		30	dBm
	EDGE, 3 TX	E-GSM 900		27	dBm
		GSM 1800		26	dBm
	GPRS, 4 TX	E-GSM 900		33	dBm
		GSM 1800		30	dBm

	EDGE, 4 TX	E-GSM 900		27	dBm
		GSM 1800		26	dBm

3. At a restricted temperature range no active power is implemented – any deviations are hardware related
4. Applies also to UMTS/LTE Rx diversity/MIMO antenna

4.5 SIM card

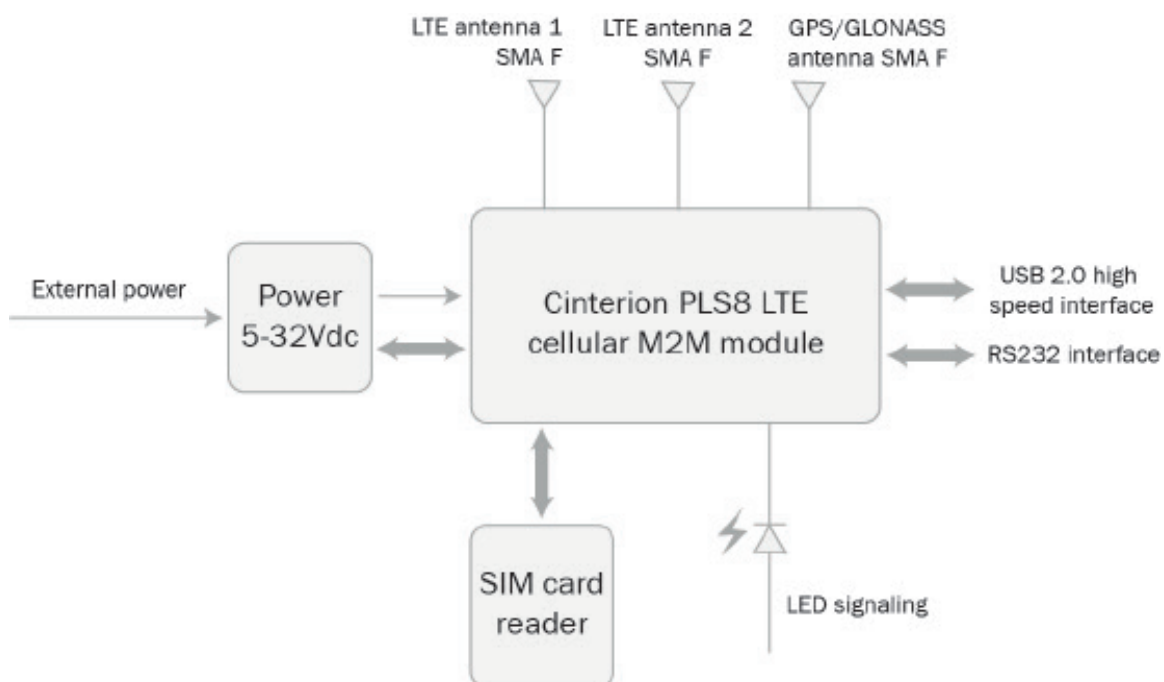
The MTX-LTE-C3-Audio supports an external SIM card through the integrated SIM holder. Both 3V and 1.8V SIM technology is supported. Older, 5V SIM technology is not supported.

● 5. Precautions

MTX-LTE-C3-Audio as a standalone item is designed for indoor use only. For outdoor use it must be integrated into a weatherproof enclosure. Do not exceed the environmental and electrical limits as specified in Technical Data

● 6. Block Diagram

The MTX-LTE-C3-Audio block diagram is shown in the following figure:



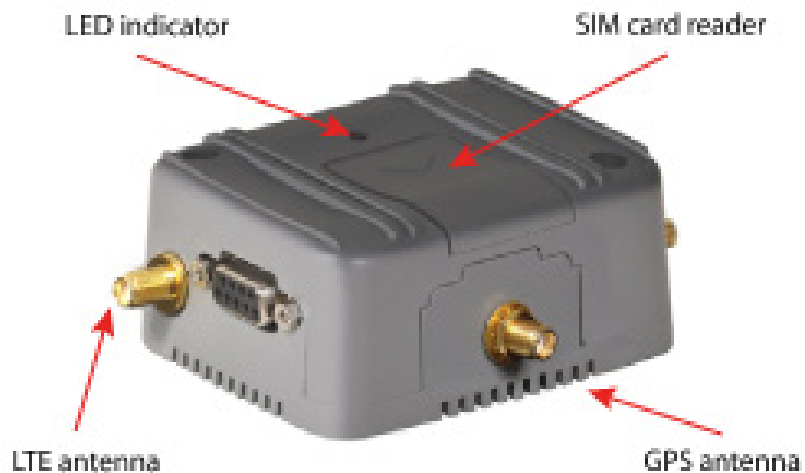
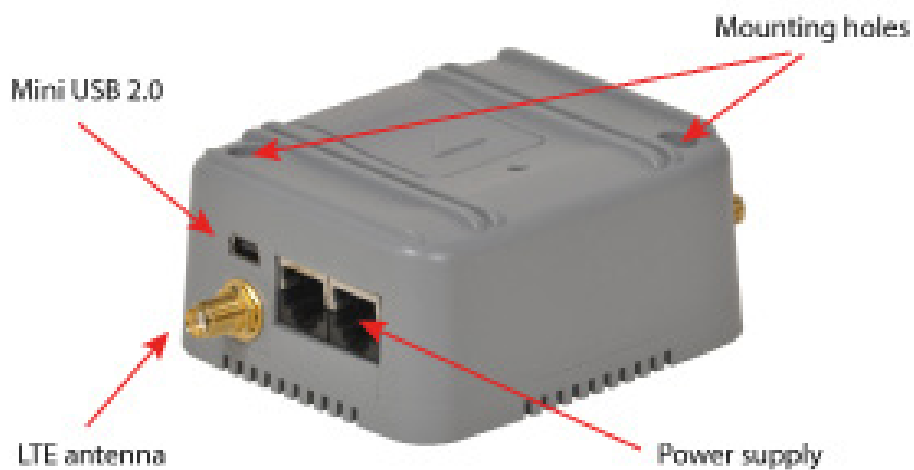
● 7. Hardware Revisions

HARDWARE REVISION	STARTING PRODUCTION DATE	CHANGES
1.0	2017/07	Initial version

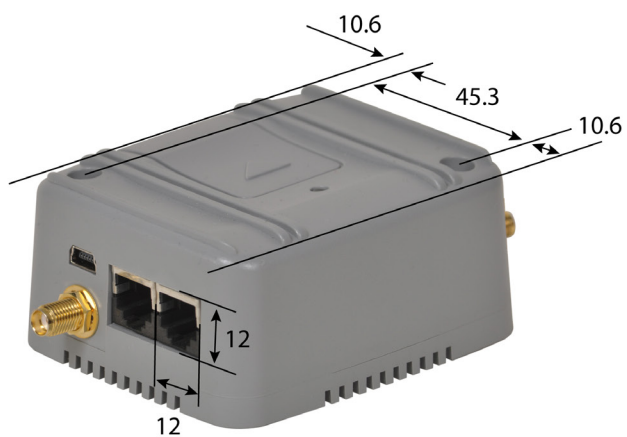
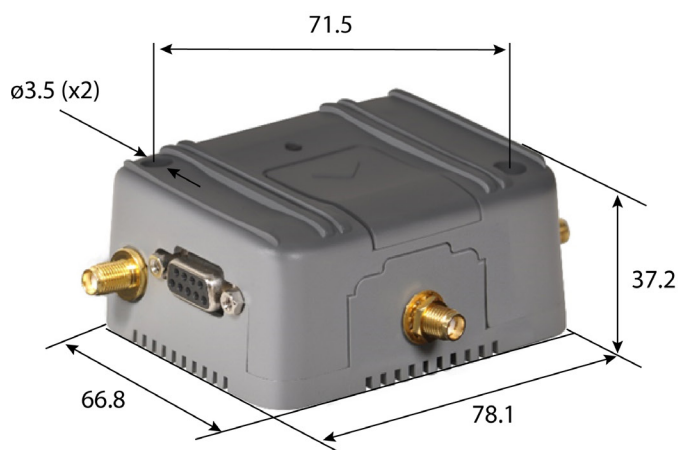
MECHANICAL DESCRIPTION

● 1. Overview

The pictures below show the mechanical design of the modem along with the positions of the different connectors and mounting holes. The modem case is made of durable PC/ABS plastic.



● 2. Dimensions (mm)



ELECTRICAL AND ENVIRONMENTAL CHARACTERISTICS

1. Absolute Maximum Ratings

1.1 Power Supply

ABSOLUTE MAXIMUM RATINGS					
Symbol	Parameter	Conditions	Min	Max	Unit
VIN	Supply voltage		0	45	V

CHARACTERISTICS						
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
VIN	Supply voltage	Maximum	6.5		40	V
		Recommended	7		35	V
IIN	Supply current		-	*	-	A
η	Efficiency	VIN=12V, IIN=2A, 25°C		80		%
f _o	Switching frequency		127	150	173	kHz

1.2 USB Interface

ABSOLUTE MAXIMUM RATINGS					
Symbol	Parameter	Conditions	Min	Max	Unit
Vio	I/O voltage range		-0.5	5.5	V

1.3 RS232 Interface

ABSOLUTE MAXIMUM RATINGS					
Symbol	Parameter	Conditions	Min	Max	Unit
V _I	Input voltage range	Drivers	-0.3	65	V
		Receivers	-25	25	V
V _O	Output voltage range	Drivers	-13.2	13.2	V
		Receivers	-0.3	5	V
	Electrostatic discharge	Human body model		2	kV

CHARACTERISTICS						
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V _{OH}	Driver high-level output voltage	R _L =3kΩ to GND	5	5.4		V
V _{OL}	Driver low-level output voltage	R _L =3kΩ to GND	-5	5.4		V
r _o	Driver output resistance	V _{IN} = 0V	300	10M		Ω
V _{IT+}	Receiver positive-going input threshold voltage			1.5	2.4	V
V _{IT-}	Receiver negative-going input threshold voltage		0.6	1.2		V
V _{hys}	Receiver input hysteresis (V _{IT+} - V _{IT-})			0.3		V
r _i	Receiver input resistance	Input voltage ±3 to ±25V	3	5	7	kΩ

● 2. Operating Temperatures

PARAMETER	MIN	TYP	MAX	UNIT
Normal temperature range ¹				
Normal temperature range	15	25	55	°C
Extreme temperature range	-30		85	°C
Extended temperature range ²	-40		95	°C
Automatic shutdown ³	<-40		>95	°C

1. Operating temperature range according to 3GPP type approval specifications
2. Extended operation allows normal mode data transmissions for a limited time until automatic thermal shutdown takes effect. Within the extended temperature range (outside the operating temperature range) there will be no inefficient use of the radio spectrum and no harm to the radio network. Also, there should not be any unrecoverable malfunctioning. However, general performance parameters like Pout or RX sensitivity may be reduced in their values. The modem's life time may also be affected, if deviating from a general temperature allocation model (for details see Section 3.2.1)
3. Due to temperature measurement uncertainty, a tolerance on the stated shutdown thresholds may occur. The possible deviation is in the range of $\pm 2^{\circ}\text{C}$ at the maximum-temperature and minimum-temperature limits

Note that within the specified operating temperature ranges the modem temperature may vary to a great extent depending on the operating mode, frequency band used, radio output power and current supply voltage.

2.1 Temperature Allocation Model

The temperature allocation model shown in the next table assumes shares of a modem's average lifetime of 10 years (given in %) during which the modem is operated at certain temperatures.

Modem lifetime share (in %) ¹	6	20	65	7	1	1
Modem Temperature (in °C)	-40	20	40	75	85	95

1. Based on an assumed average modem lifetime of 10 years (=100%)

Any deviations from the above temperature allocation model may reduce the modem's life span, for example, if the modem is operated close to the maximum automatic shutdown temperature not only for 1% but for 20% of its product life.

● 3. Storage Conditions

The conditions stated below are only valid for modems in their original packed state in weather protected, non-temperature-controlled storage locations. Normal storage time under these conditions is 12 months maximum. The modems will be delivered in packaging that meets the requirements according “IPD/ JEDEC J-STD-033B.1” for Low Temperature Carriers.

TYPE	CONDITION	UNIT	REFERENCE
Relative humidity: Low High	10 90 at 40°C	%	CbIPC/JEDEC J-STD-033A
Air pressure: Low High	70 106	kPa	IEC TR 60271-3-1:1K4 IEC TR 60271-3-1:1K4
Movement of air	1.0	m/s	IEC TR 60271-3-1:1K4
Water: rain, dripping, icing and frosting	Not allowed	-	-
Radiation: Solar Heat	1120 600	W/m ²	ETS 300 019-2-1: T1.2, IEC 60068-2-2Bb ETS 300 019-2-1: T1.2, IEC 60068-2-2Bb
Chemically active subs.	Not recomm.		IEC TR 60271-3-1:1C1L
Mechanically active subs.	Not recomm.		IEC TR 60271-3-1:1S1
Sinusoidal vibration: Displacement Acceleration Frequency range	1.5 5 2-9 9-200	mm m/s ² Hz	IEC TR 60271-3-1:1M2
Shocks: Shock spectrum Duration Acceleration	semi-sinusoidal 1 50	ms m/s ²	IEC 60068-2-27 Ea

INTERFACE DESCRIPTION

All electrical connections to the modem are protected in compliance with the standard air and contact Electrostatic Discharge (ESD).

The modem uses the following industry standard connectors:

- RJ12 6-way (power supply connector)
- USB mini connector
- DB9 female (RS232 port)
- SIM card reader
- 2x SMA female coaxial jack (for LTE antennae)
- SMA female coaxial jack (GNSS antenna connector)

● 1. Power Connector

An RJ12 6-way connector, as shown and described below, is used to connect the DC power supply to the modem.

The power supply, VCC, required by the modem is in the range of 6.5 to 40VDC. The power supply has to be a single voltage source capable of providing a peak current (at least 1A) during an active transmission. The uplink burst causes strong ripples (drop) on the power lines.

An active-high control signal, RESET, can be used to perform a hardware reset.



PIN	SIGNAL	DIRECTION	LIMITS	DESCRIPTION
1	VCC	Input	6.5-40VDC	Positive power input
2	Not connected	-		
3	RESET	Input	6.5-40VDC	Active high control line used to reset the modem VIH > 2V, VIL < 1V
4	Not connected	-		
5	Not connected	-		
6	GND	Input		Negative power input (ground)

● 2. Mini USB Connector

The USB 2.0 interface allows connectivity to all relevant PCs and control boards in offices and industrial environments. The USB interface is a USB 2.0 High Speed (480Mbit/s) interface for AT-C modem functionality between the MTX-LTE-C3-Audio Modem and a PC for example.

The USB I/O-pins are capable of driving the signal at min 3.0V. They are 5V I/O compliant. A mini USB 2.0 compatible connector is required to properly connect the modem's USB interface to the host. Furthermore, the USB modem driver delivered with the MTX-LTE-C3-Audio must be installed as described below.

The USB host is responsible for supplying power across the VUSB_IN line to the modem's USB interface, but not to other MTX-LTE-C3-Audio interfaces. This is because the MTX-LTE-C3-Audio is not designed as a self-powered device compliant with the "Universal Serial Bus Specification Revision 2.0".

It is mandatory to use an external power supply for the MTX-LTE-C3-Audio. See the correspondent section.

There are available drivers for Windows, Linux, Mac and Android environment applications. Visit the MTX-LTE-C3-Audio web page at www.mtxm2m.com.

● 3. Audio Connector

A 6-way 4-pole RJ connector, as shown below, allows a telephone handset to be plugged into the modem, giving access to the microphone and earpiece signals. The connector may also be used to drive other analog audio sub-systems or devices.

The audio interface provides one analog input for a microphone and one analog output for an earpiece.

- The microphone input and the earpiece output are balanced
- For electret microphones a supply source is implemented
- The MTX-LTE-C3-Audio is pre-configured to work with a range of handsets, the audio interface is flexible and its performance can be configured, using AT commands, to match a particular handset or audio subsystem
- Earpiece outputs are short-circuit protected



PIN	SIGNAL	DIRECTION	DESCRIPTION
1	Not connected		
2	MICN	Input	Microphone negative input
3	EPN	Output	Earpiece negative output
4	EPP	Output	Earpiece positive output
5	MICP	Input	Microphone positive input
6	Not connected		

To suit the different types of accessories, the audio interfaces can be configured for different audio modes via the AT^SNFS command. The electrical characteristics of the voiceband part vary with the audio mode. For example, sending and receiving amplification, sidetone paths, noise suppression etc. depend on the selected mode and can be altered with AT commands (except for mode 1). Both analog audio interfaces can be used to connect headsets with microphones or speakerphones. Headsets can be operated in audio mode 3 and speakerphones in audio mode 2. Audio mode 5 can be used for direct access to the speech coder without signal pre- or post-processing.

When shipped from the factory, all audio parameters of MTX-LTE-C3-Audio are set to interface 1 and audio mode 1. This is the default configuration optimized for the Votronic HH-SI-30.3/V1.1/0 handset and used for type approving the MTX Modems' reference configuration. Audio mode 1 has fixed parameters which cannot be modified. To adjust the settings of the Votronic handset simply change to another audio mode.

Audio mode no. AT^SNFS=	1	2	3	4	5	6
Name	Default handset	Router	User handset	Headset	Speaker phone	Trans
Purpose	DSB with Votronic handset	Analog phone interface	Same as audio mode 1	Mono headset	Handheld speakerph	Direct access to speech coder
TX-Filters	Adjusted	Flat	Adjusted	Flat	Flat	Flat
RX-Filters	Adjusted to fit artificial ear type 3.2 low leakage	Flat	Adjusted to fit artificial ear type 3.2 low leakage	800Hz HP	800Hz HP	Flat
Default SNFI Parameters <micAmp> <adcVol> <txVol>(reserved)	56 (+30dB) 192 (0dB) 16384 (0dB)	56 (+30dB) 192 (0dB) 16384 (0dB)	56 (+30dB) 192 (0dB) 16384 (0dB)	56 (+30dB) 192 (0dB) 16384 (0dB)	56 (+30dB) 192 (0dB) 16384 (0dB)	56 (+30dB) 192 (0dB) 16384 (0dB)
Default SNFO Parameters <cdcRxGain> <rxVol>	54 (-3dB) 33 (0dB)	54 (-3dB) 33 (0dB)	54 (-3dB) 33 (0dB)	54 (-3dB) 33 (0dB)	54 (-3dB) 33 (0dB)	54 (-3dB) 33 (0dB)

Echo canceller Behaviour optimized for	ON low echo	ON low echo	ON low echo	ON moderate echo	ON high echo	OFF
Residual echo suppression with comfort noise generator	ON	ON	ON	ON	ON	OFF
Noise Reduction (Tx)	-12dB	-15dB	-12dB	-15dB	-15dB	OFF
MIC input signal for 0dBm0, f = 1024 Hz	15mV	22.5mV	15mV	22.5mV	22.5mV	22.5mV
EP output signal in mV rms. @ 0dBm0, 1024 Hz, no load (default gain) / @ 3.14 dBm0	300mV	790mV	300mV	610mV	635mV	790mV
Sidetone gain at default settings	19.4dB	-∞ dB	19.4dB	17.8dB	-∞ dB	-∞ dB

● 4. DB9 Connector: RS232 port

The modem supports a standard RS232 8-wire serial interface (EIA/TIA 574) via its 9 pin Sub-D connector, shown below. It is connected to the modem's ASC0 main port using a level shifter converter.



The MTX-LTE-C3-Audio modem is designed to be used as a DCE (data circuit-terminating equipment). Based on the conventions for DCE-DTE connections, it communicates with the customer application (DTE- data terminating equipment) using the following signals:

- Port TxD @ application sends data to TXD of MTX-LTE-C3-Audio Terminal
- Port RxD @ application receives data from RXD of MTX-LTE-C3-Audio Terminal

The RS-232 interface is implemented as a serial asynchronous transmitter and receiver conforming to ITU-T V.24 Interchange Circuits DCE. It is configured for 8 data bits, no parity and 1 stop bit and can be operated at fixed bit rates from 1200bps to 921600bps.

Autobauding supports bit rates from 1200bps to 230400bps. Autobauding is not compatible with multiplex mode. Hardware handshake using the /RTS and /CTS signals and XON/XOFF software flow control are supported.

In addition, the modem control signals DTR, DSR, DCD and RING are available. The MODEM control RING signal (Ring Indication) can be used to indicate, to the cellular device application, that an incoming call or Unsolicited Result Code (URC) is received. It can also be used to send pulses to the host application; for example, to wake the application up from the power saving mode.

The DB9 connector pinout is shown in the table below:

PIN	SIGNAL	DIRECTION	DESCRIPTION
1	DCD	Output	Data carrier detected
2	RD 0	Output	Received data
3	TD 0	Input	Transmitted data
4	DTR	Input	Data terminal ready
5	GND	-	Ground connection
6	DSR	Output	Data set ready
7	RTS	Input	Request to send
8	CTS	Output	Clear to send
9	RI	Output	Ring indicator

Features:

- Includes the data lines TXD0 and RXD0, the status lines RTS0 and CTS0 and also the modem control lines DTR0, DSR0, DCD0 and RING0
- ASC0 is primarily designed for controlling voice calls, transferring CSD, fax and GPRS data and for controlling the GSM engine with AT commands
- Full Multiplex capability allows the interface to be partitioned into three virtual channels, but with CSD and fax services only available on the first logical channel. Please note that when the ASC0 interface runs in Multiplex mode, ASC1 cannot be used
- The DTR0 signal will only be polled once per second from the internal firmware of MTX-LTE-C3-Audio
- The RING0 signal serves to indicate incoming calls and other types of URCs (Unsolicited Result Code). It can also be used to send pulses to the host application; for example, to wake the application up from the power saving mode. To configure the RING0 line, use the following AT Command: AT^SCFG
- The default configuration is 8 data bits, no parity and 1 stop bit. The setting can be changed using the AT command AT+ICF and, if required, AT^STPB
- ASC0 can be operated at fixed bit rates from 1200bps to 921600bps

The default serial speed for MTX-LTE-C3-Audio is 115200bps.

● 5. SIM Card Reader

The MTX-LTE-C3-Audio modem is fitted with a SIM card reader designed for 1.8V and 3V SIM cards. It is the flip-up type which is lockable in the horizontal position and is accessed through a removable panel as shown below.



The card holder is a five wire interface according to GSM 11.11. It has a SIM card detector switch to detect whether or not the SIM card drawer is inserted.

Removing and inserting the SIM card during operation requires the software to be reinitialized. Therefore, after reinserting the SIM card it is necessary to restart the MTX-LTE-C3-Audio modem.

The full operation of the MTX-LTE-C3-Audio relies on a SIM card being inserted. Some MTX-LTE-C3-Audio functionality may be lost if you try to operate the control modem without a SIM card.

● 6. LTE Antenna Connectors

The antenna connectors allow radio frequency (RF) transmission signals between the modem and an external customer-supplied antennae. The modem is fitted with two 50Ω, SMA female coaxial jack, as shown below.



LTE antenna connectors

The external antennae must be matched properly to achieve the best performance regarding radiated power, DC-power consumption, modulation accuracy and harmonic suppression.

LTE technology relies in MIMO communications in order to improve the stability and quality of the downlink (Rx) path in a multipath environment. In such an environment the base station signal can reach the mobile device directly and/or via a reflected signal path. The signal may as such reach the modem from various directions.

The basic idea is to use two different receiver antennas simultaneously. The two antennas should have a different radiation pattern and polarization, as well as a specific mechanical distance between them. The mechanical displacement of both antennas helps to avoid signal fading nulls that occur with a spatial distribution. The displacement makes signal fading nulls unlikely to happen at both antenna locations at the same time.

The second antenna is therefore applied to even out fading and to rectify receive signal nulls, resulting in a more constant signal level over time.

Please note that the second antenna cannot overcome a weak performance of the main antenna.

● 7. GNSS Antenna Connector

The MTX-LTE-C3-Audio has an internal GNSS receiver which offers the full performance of GPS and GLONASS technologies. The GNSS receiver continuously tracks all satellites in view, thus providing accurate satellite positioning data.

7.1 GNSS Antenna Connector

The antenna connector allows for the transmission of radio frequency (RF) signals between the modem and an external customer-supplied antenna. The modem is fitted with a 50Ω, SMA F coaxial jack.

It is possible to connect active or passive GPS antennas. In either case they must have 50 Ohm impedance. We recommend to use 3V active antenna.



GPS antenna connector

7.2 GPS Application Interface

The GPS receiver supports implemented NMEA protocols. It is able to recognize input messages from any of these protocols (e.g., GGA, RMC GSA, GSV) and respond to them accordingly. Input messages can be arbitrarily mixed.

The NMEA protocol is an industry standard protocol developed for marine electronics. It was originally designed to allow data exchange between various sensors and navigation equipment aboard ships. Nowadays, it is a de-facto standard for GPS receiver data output. For more information on the NMEA Standard please refer to www.nmea.org. The GNSS receiver can be software controlled using NMEA protocol.

NMEA output is on DB9 RS232 port, need to be activated with AT commands on Application port.

7.3 Power Saving

Power saving can be enabled on the GSM part (using the AT+CFUN function). On the GPS receiver it is possible to use a special NMEA command. For more information on the AT command AT+CFUN, see the AT command manual. For more information about the NMEA internal GPS module please ask gsmsupport@matrix.es.

● 8. Software Updates

It is possible and sometimes may be necessary to update the MTX-LTE-C3-Audio firmware.

Updates must be carried out by an approved technician.

Please contact your supplier for details Service/Programming.

OPERATION

● 1. Switching on the modem. New “Automatic restart after shutdown” feature

There is no special way to turn the modem on. Just apply power to the VCC (pin 1) and the GND (pin 5). The modem will be fully operational after 4 seconds. Logging onto a network may take longer than this and is out of the modem's control.

The automatic restart after shutdown feature is enabled as part of the factory default settings. This means that if/when the modem has to be switched off, due to a critical power supply, the modem will restart itself within a few seconds.

You can reset by applying a voltage to the RESET pin, as described in the correspondent section.

AT COMMAND INTERPRETER

After the ALS8 driver package has been successfully installed, the physical USB interface of the modem is represented in the operating system by two virtual interfaces, each assigned to a virtual COM port of its own:

Modem interface:

This interface is referred to as “Modem” if queried using AT^SQPORT. In the quick reference tables it is named USB0-MDM.

The Modem interface is intended particularly for data transmission (LTE, UMTS or GPRS).

All URCs are normally issued on the Application interface. URCs related to data calls (RING, NO CARRIER) as well as the “^SYSSTART” URC are issued on the Modem interface.

Application interface:

This interface is referred to as “Application” if queried using AT^SQPORT. In the quick reference tables it is named USB0-APP.

The Application interface is designed especially for controlling the MTX-LTE-C3-Audio, i.e. for entering AT commands, receiving URCs, or sending and receiving short messages. It cannot be used as a data interface for LTE, UMTS, or GPRS.

Please note that URCs are normally indicated on this interface only, regardless of which interface (Modem or Application) was used to send the AT commands to activate their presentation. This URC management scheme is the default configuration recommended for a typical MTX-LTE-C3-Audio application.

Bear in mind that the Modem interface and the Application interface are handled by the same AT command interpreter.

As a result, AT commands entered on both interfaces are not executed in parallel but sequentially, one after the other. So, an AT command issued on one interface will be buffered on this interface to be executed after the other interface has completed processing earlier AT command(s).

When a data connection is established over the Modem interface, the Application interface can be used simultaneously for any control functions. This eliminates the need for the user to enter AT commands, such as +++, ATO and to switch back and forth between command and online mode when working on one interface only.

SAFETY AND PRODUCT CARE

Please read the information in this section and the information in “Installation of the Modem”, before starting your integration work.

● 1. Safety Instructions

PLEASE READ THESE SAFETY INSTRUCTIONS AND KEEP A COPY OF THEM.

- Always ensure that use of the modem is permitted. The modem may present a hazard if used in proximity to personal electronic medical devices. As a rule, the modem must not be used in hospitals, airports or planes.
- Never use the modem at a gas station, refuelling point, blasting area or in any other environment where explosives may be present.
- Operating the modem close to other electronic devices, such as antennas, television sets, and radios may cause electromagnetic interference.
- This product is intended to be used with the antenna or other radiating element at least 20cm away from any part of the human body. In applications where this rule cannot be applied, the application designer is responsible for providing the SAR measurement test report and declaration.
- You are responsible for observing your country's safety standards, and where applicable, the relevant wiring rules.

● 2. General Precautions

The MTX-LTE-C3-Audio Modem as a standalone item is designed for indoor use only. For outdoor use it must be integrated into a weatherproof enclosure. Do not exceed the environmental and electrical limits as specified in “Technical Data”.

- Avoid exposing the modem to lighted cigarettes, naked flames or extreme hot or cold temperatures.
- Never try to dismantle the modem yourself. There are no components inside the modem that can be serviced by the user. If you attempt to dismantle the modem, you may invalidate the warranty.
- The MTX-LTE-C3-Audio Modem must not be installed nor located in areas where the surface temperature of the plastic case could exceed 85°C.
- In order to provide strain relief and to avoid transmitting excessive vibration to the modem during installation, all cables connected to the MTX-LTE-C3-Audio Modem must be secured or clamped immediately adjacent to the modem's connectors.
- To protect the power supply cables, and in order to comply with fire safety requirements, when the unit is powered from a battery or a high current supply, a fast 1.25A fuse should be connected in line with the positive supply.
- Any incompatible components or products must not be connected to the MTX-LTE-C3-Audio modem.

Note: MTX-LTE-C3-Audio distributors and sales offices may refuse warranty claims where evidence of product misuse is found.

● 3. SIM Card Precautions

Before handling the SIM card in your application, ensure that you are not charged with static electricity. Use proper precautions to avoid electrostatic discharges.

- When the SIM card hatch is opened, the SIM card connectors lie exposed under the SIM card holder.

Caution: do not touch these connectors! If you do, you may release an electrical discharge that could damage the modem or the SIM card.

- When designing your application, the SIM card's accessibility should be taken into account. We always recommend that you have the SIM card protected by a PIN code. This will ensure that the SIM card cannot be used by an unauthorized person.

● 4. Antenna Precautions

If the antenna is to be mounted outside, consider the risk of lightning. Follow the instructions provided by the antenna manufacturer.

- Never connect more than one modem to a single antenna. The modem can be damaged by radio frequency energy from the transmitter of another modem.
- Like any mobile station, the antenna of the modem emits radio frequency energy. To avoid EMI (electromagnetic interference), you must determine whether the application itself, or equipment in the application's proximity, needs further protection against radio emission and the disturbances it might cause. Protection is secured either by shielding the surrounding electronics or by moving the antenna away from the electronics and the external signal cable.
- The modem and antenna may be damaged if either come into contact with ground potentials other than the one in your application. Beware: ground potentials are not always what they appear to be.

● 5. Radio Frequency (RF) Exposure and SAR

Your wireless modem device is a low-power radio transmitter and receiver (transceiver). When it is turned on, it emits low levels of radio frequency energy (also known as radio waves or radio frequency fields).

Governments around the world have adopted comprehensive international safety guidelines, developed by scientific organizations such as ICNIRP (International Commission on Non-Ionizing Radiation Protection) and IEEE (The Institute of Electrical and Electronics Engineers Inc.), through periodic and thorough evaluation of scientific studies. These guidelines establish permitted levels of radio wave exposure for the general population. The levels include a safety margin designed to assure the safety of all persons, regardless of age and health, and to account for any variations in measurements.

Specific Absorption Rate (SAR) is the unit of measurement for the amount of radio frequency energy absorbed by the body when using a transceiver. The SAR value is determined at the highest certified power level in laboratory conditions, but the actual SAR level of the transceiver while operating can be well below this value. This is because the transceiver is designed to use the minimum power required to reach the network.

The MTX-LTE-C3-Audio wireless modem device has been approved for applications where the antenna is located more than 20cm from the body. In all other configurations the user is responsible for meeting the local SAR regulations.

Users of the MTX-LTE-C3-Audio wireless modem device are responsible for ensuring that they meet the SAR regulatory requirements of the countries in which they intend to operate the device and that their documentation contains the relevant SAR declaration, certification information and user guidance as appropriate.

● 6. Personal Medical Devices

Wireless modem devices may affect the operation of cardiac pacemakers, hearing aids and certain other implanted equipment. If a minimum distance of 15 cm (6 inches) is maintained between the MTX-LTE-C3-Audio modem radiating antenna and a pacemaker, the risk of interference is limited. If the user's application is likely to be situated in the vicinity of personnel, a suitable warning should be contained in the equipment manual to this effect.

MODEM INSTALLATION

This chapter gives you advice and helpful hints on how to integrate the MTX-LTE-C3-Audio Modem into your application from a hardware perspective.

● 1. Where to Install the Modem

There are several conditions which need to be taken into consideration when designing your application as they might affect the modem and its function. They are:

1.1 Environmental conditions

The modem must be installed so that the environmental conditions stated in the Technical Data chapter such as temperature, humidity and vibration are satisfied.

Additionally, the electrical specifications in the Technical Data section must not be exceeded.

1.2 Signal strength

The modem has to be placed in a way that ensures sufficient signal strength. To improve signal strength, the antenna can be moved to another position. Signal strength may depend on how close the modem is to a radio base station. You must ensure that where you intend to use the modem is within the network coverage area. Degradation in signal strength can be the result of a disturbance from another source; for example, an electronic device in the immediate vicinity. More information about possible communication disturbances can be found in the correspondent section.

When an application is completed, you can verify the signal strength by issuing the AT command AT+CSQ.

Tip: before installing the modem, use an ordinary mobile telephone to check a possible location for it. In determining the location for the modem and antenna, you should consider signal strength as well as cable length.

1.3 Connections of components to MTX-LTE-C3-Audio modem

The user is responsible for the final integrated system. If not correctly designed or installed, external components may cause radiation limits to be exceeded. For instance, improperly made connections or improperly installed antennas can disturb the network and lead to malfunctions in the modem or equipment.

1.4 Network and subscription

Before your application is used, you must ensure that your chosen network provides the necessary telecommunication services. Contact your service provider to obtain the necessary information.

- If you intend to use SMS in the application, ensure this is included in your subscription
- Consider the choice of supplementary services

● 2. How to Install the Modem

2.1 Power supply

Use a high-quality power supply cable with low resistance. This ensures that the voltages at the connector pins are within the allowed range, even during the maximum peak current.

When the unit is powered from a battery or a high current supply, connect a fast 1.25A fuse in line with the positive supply. This protects the power cabling and modem.

2.2 Securing the modem

Before securing the modem take into account the amount of additional space required for the mating connectors and cables that will be used in the application.

- Where access is restricted, it may be easier to connect all the cables to the modem prior to securing it in the application
- Securely attach the MTX-LTE-C3-Audio Modem to the host application using two 3mm diameter pan-head screws

● 3. Antenna

3.1 General

The antenna is the component in your system that maintains the radio link between the network and the modem. Since the antenna transmits and receives electromagnetic energy, its efficient function will depend on:

- The type of antenna (for example, circular or directional)
- The placement of the antenna
- Communication disturbances in the vicinity in which the antenna operates

In the sections below, issues concerning antenna type, antenna placement, antenna cable, and possible communication disturbances are addressed. In any event, you should contact your local antenna manufacturer for additional information concerning antenna type, cables, connectors, antenna placement, and the surrounding area.

You should also determine whether the antenna needs to be grounded or not. Your local antenna manufacturer might be able to design a special antenna suitable for your application.

3.2 Antenna type

Make sure that you choose the right type of antenna for the modem. Consider the following requirements:

- The antenna must be designed for one of the frequency bands in use; please ask your network provider for more information:
 - LTE 700/800/850/1700/1800/1900/2100/2600 MHz
 - UMTS 800/850/900/1900/2100 MHz
 - GSM 850/900/1800/1900 MHz
- The impedance of the antenna and antenna cable must be 50Ω
- The antenna output-power handling must be a minimum of 2W

3.3 Antenna placement

The antenna should be placed away from electronic devices and other antennas. The recommended minimum distance between adjacent antennas, operating in a similar radio frequency band, is at least 50cm. If the signal strength is weak, it is useful to face a directional antenna towards the closest radio base station. This can increase the strength of the signal received by the modem. The modem's peak output power can reach 2W.

RF field strength varies with antenna type and distance. At 10cm from the antenna the field strength may be up to 70V/m and at 1m it will have reduced to 7V/m. In general, CE-marked products for residential / commercial areas and the light industry can withstand a minimum of 3V/m.

3.4 The antenna cable

Use 50Ω impedance low-loss cable and high-quality 50Ω impedance connectors (frequency range up to 3GHz) to avoid RF losses. Ensure that the antenna cable is as short as possible. The Voltage Standing-Wave Ratio (VSWR) may depend on the effectiveness of the antenna, cable and connectors. In addition, if you use an adaptor between the antenna cable and the antenna connector, it is crucial that the antenna cable is a high-quality, low-loss cable. Minimize the use of extension cables, connectors and adapters. Each additional cable, connector or adapter causes a loss of signal power.

3.5 Possible communications disturbances

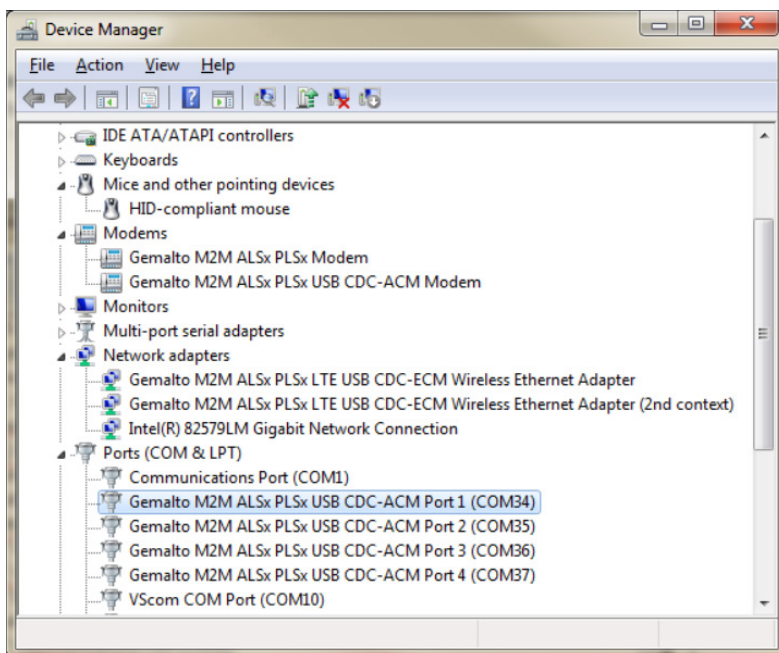
Possible communication disturbances include the following:

- Noise can be caused by electronic devices and radio transmitters
- Path-loss occurs as the strength of the received signal steadily decreases in proportion to the distance from the transmitter
- Shadowing is a form of environmental attenuation of radio signals caused by hills, buildings, trees or even vehicles. This can be a particular problem inside buildings, especially if the walls are thick and reinforced
- Multi-path fading is a sudden decrease or increase in the signal strength. This is the result of interference which is caused when direct and reflected signals reach the antenna simultaneously. Surfaces such as buildings, streets, vehicles, etc., can reflect signals
- Hand-over occurs as you move from one cell to another in the GSM network. Your mobile application call is transferred from one cell to the next. Hand-over can briefly interfere with communication and may cause a delay, or at worst, disruption

DRIVER INSTALLATION

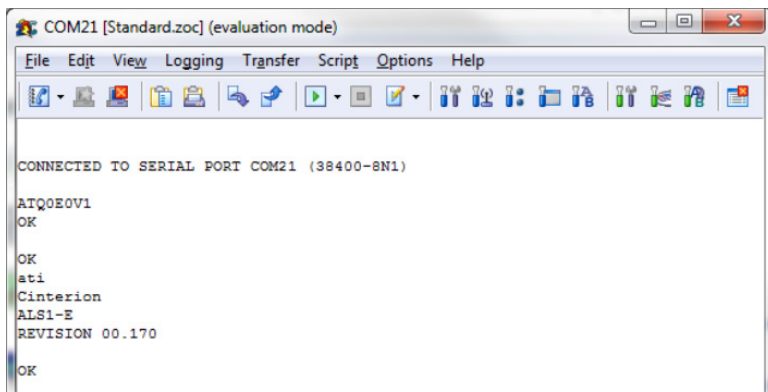
● 1. Windows

- Connect the USB cable to both the computer and MTX-LTE-C3-Audio Modem
- On Windows XP and Windows Vista, the installation will start by displaying the “Found New Hardware Wizard”
- On Windows 7, wait a few seconds until all USB devices show up as “LTE Modem” in the Windows Device Manager under “Other Devices”. Then right click each device and select the option “Update Driver Software...”
- In either case, cancel any Windows instructions to update the software automatically. For each USB device take care to browse to the folder containing the unzipped driver software
- After the USB driver is has successfully been installed, the installed USB devices are listed in the Windows Device Manager under “Modems”, “Network adapters” and “Ports (COM & LPT)” as shown in the following figure



The MTX-LTE-C3-Audio Modem is listed as Cinterion ALx PLSx Modem and it is accessible as AT command instance.

To connect to the MTX-LTE-C3-Audio modem via a USB interface, check the properties of the listed Cinterion ALx LTE USB Modem, call a terminal program on the PC and connect to the configured COM port. Type the AT command ATE1 to enable an echo for entered AT commands and then type ATI to display the module identification information. Type ATE1 to see echo.



In parallel and for configuration purpose use APPLICATION PORT present on CDC-ACM port 1. Use ZOC, hiperteminal, putty or other similar application in same way.

PORT MAP

Default mode:

AT^SSRVSET="current"

^SSRVSET: "usbcomp", "0061", "", "1E2D", "0061", "Cinterion", "LTE Modem", ""

^SSRVSET: "srvmap", "MDM", "ASC0", "MUX0"

^SSRVSET: "srvmap", "APP", "USB1", "MUX1"

^SSRVSET: "srvmap", "NMEA", "USB2", "MUX2"

^SSRVSET: "srvmap", "RSA", "USB3", "MUX3"

OK

Modem is on serial port. It is not the best.

This is an example to change port mapping USB as Modem, Application port & MDM and the RS232 port as GPS NMEA output.

AT^SSRVSET="usbcomp",10,"0061"

AT^SSRVSET="srvmap",10,"MDM","USB0","MUX0"

AT^SSRVSET="srvmap",10,"APP","USB1","MUX1"

AT^SSRVSET="srvmap",10,"NMEA","ASC0","MUX2"

AT^SSRVSET= "actSrvSet",10

AT+CFUN=1,1

USB has 3 endpoints

- MDM Wireless Ethernet Adapter. Needs Connection Manager software.
- USB Modem
- APPLICATION port. Intended for configuration AT commands, tests, and check communication coverage, etc..

ASCO will output GPS NMEA traces. Please remember GPS needs to be activated in USB application port as follow.

Write this commands in APPLICATION PORT:

This just need to be used once. Non-volatile commands. Will be activated by default. Just in case:

```
at^SCFG="MEopMode/PwrSave","disabled"
ok
at+cfun=1,1
ok
```

This needs to be used in initialization string. They are volatile commands

```
AT^SGPSC="Engine","1"
```

```
AT^SGPSC="NMEA/Output","on"
```

Then, at serial DB9 RS232 port, 115200 bauds, NMEA traces will appear

```
$GPGSV,4,1,16,16,30,313,39,18,21,168,31,21,65,234,33,22,28,160,45*7A
$GPGSV,4,2,16,26,,,46,33,,,38,40,,,40,03,65,070,*42
$GPGSV,4,2,16,26,,,46,33,,,38,40,,,40,03,65,070,*42
$GPGSV,4,3,16,06,60,070,,07,11,316,,08,19,307,,12,23,146,*78
$GPGSV,4,2,16,26,,,46,33,,,38,40,,,40,03,65,070,*42
$GPGSV,4,3,16,06,60,070,,07,11,316,,08,19,307,,12,23,146,*78
$GPGSV,4,4,16,13,,,14,,,15,,,19,70,005,*47
$GLGSV,1,1,01,,,30*67
$GNGNS,095716.6,,,,,NN,,,,,*47
$GPVTG,,T,,M,,N,,K,N*2C
$GPGSA,A,1,,,,,,,,,,,,,*1E
$GNGSA,A,1,,,,,,,,,,,,,*00
```

● 2. Linux

2.1 Kernel 3.12 or higher

PRODUCT	MODEM PORT	APPLICATION PORT	NMEAport	WWAN port
ALS3 Rel 2.1	ttyACMO	ttyACM1		usb0/usb1 (CDC Ethernet Device)

There is no need to modify any driver CDC ECM –driver ALS3 Rel2.1

- If the CDC ECM profile is supported by the WM product the cdc_ether driver should be loaded automatically.
- If your module doesn't enumerate properly, your qmi_wwan module does probably not contain the required product and vendor IDs yet.

Open source software

- Linux drivers:
 - cdc-wdm(qmi interface) <http://lxr.free-electrons.com/source/drivers/usb/class/cdc-wdm.c>
 - option (serial interface - replaces qcserial) <http://lxr.free-electrons.com/source/drivers/usb/serial/option.c>

Using the wwan interface - LTE platform

- Open a serial connection on ttyACMO.
- Make sure you are registered to the network:
 - AT+COPS?
- To employ GPRS, attach to the network:
 - AT+CGATT
- Create an IP connection (in this case to an APN supporting LTE):
 - AT+CGDCONT=1,"IP","internet.telekom"
- Activate the configured WWAN IP connection via the first WWAN/RmNet interface:
 - AT^SWWAN=1,1,1
- Manually ask the module's DHCP server for an IP address1:
 - dhcpcd usb0
- Test the Internet connection:
 - Ping a Google DNS server: ping 8.8.8.8

- If the previous step fails, the configured network operator may be blocking ICMP packages. In that case use wget to load a page via HTTP: nslookup google.com 8.8.8.8; wget [<IP address from the previous command's reply>]
- Note: If using a second WWAN/RmNet interface to open up a second IP connection, a further PDP context is required, i.e., a definition with a different PDP context identifier then employed for the first WWAM/RmNet interface. The identifier should be specified beforehand.

Using the wwan interface - 3G platform

General procedure same as on LTE platform, but the syntax differs:

1. AT+CGDCONT=17,"IP","<someAPN>" //set APN
2. AT+SGAUTH=17,1,"pass","user" // set credentials for APN authentication (PAP)
3. AT+CGACT=1,17 // activate context
4. Poll AT+CGPADDR=17 until an IP is assigned
5. WWAN interface is now up and answers DHCP requests
6. Once the interface is configured according to DHCP, IP connectivity is established

For information about other kernel versions, please contact gsmsupport@matrix.es

CONFORMITY ASSESSMENT

● 1. RED Declaration of Conformity

MATRIX ELECTRONICA S.L.U.
C/Alejandro Sanchez 109
28019 Madrid, Spain

We declare under our sole responsibility that the products MTX-LTE-C3-Audio Modem 0 containing a Cellular Engine Cinterion engine ALS3, to which this declaration relates, are labeled with the CE conformity mark.

STANDARDS of EUROPEAN TYPE APPROVAL

DIRECTIVE 99/05/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (in short referred to as R&TTE Directive 1999/5/EC).

DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 (and revised on 8 June 2011) on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS).

ECE-R 10: Economic Commission for Europe (ECE) Regulation No. 10: Uniform provisions concerning the approval of vehicles with regard to electromagnetic compatibility.

3GPP TS 51.010-1: Digital cellular telecommunications system (Release 7); Mobile Station (MS) conformance specification.

ETSI EN 301 511 V9.0.2: Global System for Mobile communications (GSM); Harmonized standard for mobile stations in the GSM 900 and DCS 1800 bands covering essential requirements under article 3.2 of the R&TTE directive (1999/5/EC).

GCF-CC V3.50: Global Certification Forum - Certification Criteria.

ETSI EN 301 489-01 V1.9.1: Electromagnetic Compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common Technical Requirements.

ETSI EN 301 489-07 V1.3.1: Electromagnetic Compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 7: Specific conditions for mobile and portable radio and ancillary equipment of digital cellular radio telecommunications systems (GSM and DCS).

ETSI EN 301 489-24 V1.9.1: Electromagnetic Compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 24: Specific conditions for IMT-2000 CDMA Direct Spread (UTRA) for Mobile and portable (UE) radio and ancillary equipment.

EN 908 489-01 V5.2.1: Electromagnetic Compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 24: Specific conditions for IMT-2000

CDMA Direct Spread (UTRA) for Mobile and portable (UE) radio and ancillary equipment.

EN 908 489-02 V5.2.1: Electromagnetic compatibility and Radio spectrum Matters (ERM); Base Stations (BS) and User Equipment (UE) for IMT-2000 Third Generation cellular networks; Part 2: Harmonized EN for IMT-2000, CDMA Direct Spread (UTRA FDD) (UE) covering essential requirements of article 3.2 of the R&TTE Directive.

EN 908 489-13 V5.2.1: IMT cellular networks; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive; Part 13: Evolved Universal Terrestrial Radio Access (E-UTRA) User Equipment (UE).

EN 300 440-02 V1.3.1: Electromagnetic compatibility and Radio spectrum Matters (ERM); Short range devices; Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Part 2: Harmonized EN covering essential requirements of article 3.2 of the R&TTE Directive.

EN 62311:2008: Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz).

IEC/EN 60950-1:2006+A11:2009+A1:2010+A12:2011: Safety of information technology equipment.

The technical documentation relevant to the above equipment will be held at:

MATRIX ELECTRONICA S.L.U.
C/ Alejandro Sanchez 109
28019 Madrid, Spain

Madrid, 25/7/2017

Mr. J. Vicente

Managing Board



REGULATORY AND TYPE APPROVAL INFORMATION

● 1. Directives and Standards

The MTX-LTE-C3-Audio modem has been designed to comply with the directives and standards listed below.

It is the responsibility of the application manufacturer to ensure compliance of the final product with all provisions of the applicable directives and standards as well as with the technical specifications provided in this document.

DIRECTIVES	
RED Directive 2014/53/EU and R&TTE Directive 99/5/EC	Directive of the European Parliament on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity . The product is labeled with the CE conformity mark.
ECE-R 10	Economic Commission for Europe (ECE) Regulation No. 10: Uniform provisions concerning the approval of vehicles with regard to electromagnetic compatibility.
2002/95/EC (RoHS 1) 2011/65/EC (RoHS 2)	Directive of the European Parliament and of the Council of 27 January 2003 (and revised on 8 June 2011) on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS).

STANDARDS OF EUROPEAN TYPE APPROVAL	
3GPP TS 51.010-1	Digital cellular telecommunications system (Release 7); Mobile Station (MS) conformance specification.
ETSI EN 301 511 V9.0.2	Global System for Mobile communications (GSM); Harmonized standard for mobile stations in the GSM 900 and DCS 1800 bands covering essential requirements under article 3.2 of the R&TTE directive (1999/5/EC).
GCF-CC V3.49	Global Certification Forum - Certification Criteria.
ETSI EN 301 489-01 V1.9.2	Electromagnetic Compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common Tech. Requirements.

ETSI EN 301 489-07 V1.3.1	Electromagnetic Compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 7: Specific conditions for mobile and portable radio and ancillary equipment of digital cellular radio telecommunications systems (GSM and DCS).
ETSI EN 301 489-24 V1.5.1	Electromagnetic Compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 24: Specific conditions for IMT-2000 CDMA Direct Spread (UTRA) for Mobile and portable (UE) radio and ancillary equipment.
EN 301 908-01 V5.2.1	Electromagnetic compatibility and Radio spectrum Matters (ERM); Base Stations (BS) and User Equipment (UE) for IMT-2000 Third Generation cellular networks; Part 1: Harmonized EN for IMT-2000, introduction and common requirements of article 3.2 of the R&TTE Directive.
EN 301 908-02 V5.2.1	Electromagnetic compatibility and Radio spectrum Matters (ERM); Base Stations (BS) and User Equipment (UE) for IMT-2000 Third Generation cellular networks; Part 2: Harmonized EN for IMT-2000, CDMA Direct Spread (UTRA FDD) (UE) covering essential requirements of article 3.2 of the R&TTE Directive.
EN 301 908-13 V5.2.1	IMT cellular networks; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive; Part 13: Evolved Universal Terrestrial Radio Access (E-UTRA) User Equipment (UE)
EN 300 440-02 V1.3.1	Electromagnetic compatibility and Radio spectrum Matters (ERM); Short range devices; Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Part 2: Harmonized EN covering essential requirements of article 3.2 of the R&TTE Directive
EN 62311:2008	Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz).
IEC/EN 60950-1:2006+A11:2009+A1:2010+A12:2011	Safety of information technology equipment.

REQUIREMENTS OF QUALITY

IEC 60068 Environmental testing.

DIN EN 60529 IP codes.

STANDARDS OF THE MINISTRY OF INFORMATION INDUSTRY OF THE REPUBLIC OF CHINA

SJ/T 11363-2006 “Requirements for Concentration Limits for Certain Hazardous Substances in Electronic Information Products.” (2006-06)

“Marking for Control of Pollution Caused by Electronic Information Products.” (2006-06)

SJ/T 11364-2006

According to the “Chinese Administration on the Control of Pollution caused by Electronic Information Products” (ACPEIP) the EPUP, i.e., Environmental Protection Use Period, of this product is 20 years as per the symbol shown here, unless otherwise marked. The EPUP is valid only as long as the product is operated within the operating limits described in the Gemalto M2M Hardware Interface Description?

Please see next table for an overview of toxic or hazardous substances or elements that might be contained in product parts in concentrations above the limits defined by SJ/T 11363-2006.

部件名称 Name of the part	有毒有害物质或元素 Hazardous substances					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
金属部件 (Metal Parts)	○	○	○	○	○	○
电路模块 (Circuit Modules)	X	○	○	○	○	○
电缆及电缆组件 (Cables and Cable Assemblies)	○	○	○	○	○	○
塑料和聚合物部件 (Plastic and Polymeric parts)	○	○	○	○	○	○
<p>O: 表示该有毒有害物质在该部件所有均质材料中的含量均在SJ/T11363-2006 标准规定的限量要求以下。 Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006.</p> <p>X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出SJ/T11363-2006标准规定的限量要求。 Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part <i>might exceed</i> the limit requirement in SJ/T11363-2006.</p>						

● 2. SAR Requirements Specific to Portable Mobiles

Mobile phones, PDAs or other portable transmitters and receivers incorporating a GSM module must be in accordance with the guidelines for human exposure to radio frequency energy. This requires the Specific Absorption Rate (SAR) of portable ALS3-E based applications to be evaluated and approved for compliance with national and/or international regulations.

Since the SAR value varies significantly with the individual product design, manufacturers are advised to submit their product for approval if designed for portable use. For European markets the relevant directives are mentioned below. It is the responsibility of the manufacturer of the final product to verify whether or not further standards, recommendations or directives are in force outside these areas.

Products intended for sale in European markets

EN 50360: Product standard to demonstrate the compliance of mobile phones with the basic restrictions related to human exposure to electromagnetic fields (300MHz - 3GHz).

● 3. SELV Requirements

The power supply connected to the ALS3-E module shall be in compliance with the SELV requirements defined in EN 60950-1.

ROHS STATEMENT

The MTX-LTE-C3-Audio modem is compliant with the 2002/95/EC Directive of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS).



DISPOSAL OF OLD ELECTRICAL AND ELECTRONIC EQUIPMENT



This symbol, applied on our products and/or on its packaging, indicates that this product should not be treated as household waste when you wish to dispose of it. Instead, it should be handed over to an applicable collection point for the recycling of electrical and electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences to the environment and human health, which could otherwise be caused by inappropriate disposal of this product. The recycling of materials will help to conserve natural resources. For more detailed information about the recycling of this product, please contact your local city office, household waste disposal service or the retail store where you purchased this product.

ABBREVIATIONS

ABBREVIATIONS	DESCRIPTION
ANSI	American National Standards Institute
ARP	Antenna Reference Point
CE	Conformité Européene (European Conformity)
CS	Coding Scheme
CS	Circuit Switched
CSD	Circuit Switched Data
DCS	Digital Cellular System
DL	Download
dnu	Do not use
DRX	Discontinuous Reception
DSB	Development Support Board
DTX	Discontinuous Transmission
EDGE	Enhanced Data rates for GSM Evolution
EGSM	Extended GSM
EMC	Electromagnetic Compatibility
ESD	Electrostatic Discharge
ETS	European Telecommunication Standard
ETSI	European Telecommunications Standards Institute
FDD	Frequency Division Duplex
GPRS	General Packet Radio Service

GSM	Global Standard for Mobile Communications
HiZ	High Impedance
HSDPA	High Speed Downlink Packet Access
I/O	Input/Output
IMEI	International Mobile Equipment Identity
ISO	International Standards Organization
ITU	International Telecommunications Union
kbps	kbits per second
LED	Light Emitting Diode
LGA	Land Grid Array
LTE	Long term evolution
MBB	Moisture barrier bag
Mbps	Mbits per second
MCS	Modulation and Coding Scheme
MIMO	Multiple Input Multiple Output
MLCC	Multi Layer Ceramic Capacitor
MO	Mobile Originated
MS	Mobile Station, also referred to as TE
MSL	Moisture Sensitivity Level
MT	Mobile Terminated
nc	Not connected
NTC	Negative Temperature Coefficient

PBCCH	Packet Switched Broadcast Control Channel
PCB	Printed Circuit Board
PCL	Power Control Level
PCS	Personal Communication System, also referred to as GSM 1900
PD	Pull Down resistor (appr. 100k)
PDU	Protocol Data Unit
PS	Packet Switched
PSK	Phase Shift Keying
PU	Pull Up resistor (appr. 100k)
QAM	Quadrature Amplitude Modulation
R&TTE	Radio and Telecommunication Terminal Equipment
RF	Radio Frequency
rfu	Reserved for future use
RTC	Real Time Clock
Rx	Receive Direction
SAR	Specific Absorption Rate
SELV	Safety Extra Low Voltage
SIM	Subscriber Identification Module
SMD	Surface Mount Device
SMS	Short Message Service
SMT	Surface Mount Technology
SRAM	Static Random Access Memory

SRB	Signaling Radio Bearer
TE	Terminal Equipment
TPC	Transmit Power Control
TS	Technical Specification
Tx	Transmit Direction
UL	Upload
UMTS	Universal Mobile Telecommunications System
URC	Unsolicited Result Code
USB	Universal Serial Bus
UICC	USIM Integrated Circuit Card
USIM	UMTS Subscriber Identification Module
WCDMA	Wideband Code Division Multiple Access

AT COMMAND SUMMARY

The AT standard is a line-oriented command language. AT is an abbreviation of Attention and it is always used to send a command line from the terminal equipment (TE) to the terminal adaptor (TA).

The command line consists of a string of alphanumeric characters. It is sent to the MTX-LTE-C3-Audio to instruct it to perform the commands specified by the characters.

The AT commands listed below are supported from within the MTX-LTE-C3-Audio. The AT Command Set manual can be downloaded from the MTX-LTE-C3-Audio web page at www.mtxm2m.com.

AT COMMAND	DESCRIPTION
AT&C	Set Data Carrier Detect (DCD) line mode
AT&D	Set Data Terminal Ready (DTR) line mode
AT&F	Reset AT Command Settings to Factory Default Values
AT&S	Set Data Set Ready (DSR) line mode
AT&V	Display current Configuration
AT&W	Store AT Command Settings to User Defined Profile
AT+CACM	Accumulated call meter (ACM) reset or query
AT+CCFC	Call forwarding number and conditions control
AT+CCLK	Real Time Clock
AT+CCWA	Call Waiting
AT+CEER	Extended Error Report
AT+CEREG	EPS Network Registration Status
AT+CFUN	ALS3-E Functionality Level
AT+CGACT	PDP Context Activate or Deactivate
AT+CGATT	PS Attach or Detach
AT+CGCONTRDP	PDP context read dynamic parameters

AT+CGDATA	Enter Data State
AT+CGDCONT	Define PDP Context
AT+CGEQOS	Define EPS Quality of Service
AT+CGEREP	GPRS event reporting
AT+CGMI	Request manufacturer identification
AT+CGMM	Request model identification
AT+CGMR	Request revision identification of software status
AT+CGPADDR	Show PDP Address
AT+CGREG	Packet Domain Network Registration Status
AT+CGSN	Request International Mobile Equipment Identity (IMEI)
AT+CHLD	Call Hold and Multiparty
AT+CHUP	Hang up call
AT+CIMI	Request International Mobile Subscriber Identity (IMSI)
AT+CLCC	List of current calls
AT+CLCK	Facility Lock
AT+CLIP	Calling Line Identification Presentation
AT+CLIR	Calling Line Identification Restriction
AT+CMEE	Error Message Format
AT+CMGC	Send an SMS command
AT+CMGD	Delete short message
AT+CMGF	Select SMS message format
AT+CMGL	List SMS messages from preferred store

AT+CMGR	Read SMS messages
AT+CMGS	Send Short Message
AT+CMGW	Write Short Messages to Memory
AT+CMSS	Send short messages from storage
AT+CMUX	Multiplex mode
AT+CNMA	New Message Acknowledgement to UE/TE
AT+CNMI	SMS Event Reporting Configuration
AT+CNMPSD	No more PS data
AT+CNUM	Read own numbers
AT+COLP	Connected Line Identification Presentation
AT+COPN	Read operator names
AT+COPS	Operator Selection
AT+CPAS	Activity Status
AT+CPBR	Read from phonebook
AT+CPBS	Select phonebook memory storage
AT+CPBW	Write into phonebook
AT+CPIN	PIN Authentication
AT+CPLS	Select Preferred Operator List
AT+CPMS	Preferred SMS message storage
AT+CPOL	Preferred Operator List
AT+CPWD	Change Password
AT+CR	Service reporting control

AT+CRC	Set Cellular Result Codes for incoming call indication
AT+CREG	Network Registration Status
AT+CRSM	Restricted USIM Access
AT+CSCA	SMS Service Center Address
AT+CSCB	Select Cell Broadcast Message Indication
AT+CSCS	Character Set
AT+CSDH	Show SMS text mode parameters
AT+CSMP	Set SMS Text Mode Parameters
AT+CSMS	Select Message Service
AT+CSQ	Signal Quality
AT+CSVM	Set voice mail number
AT+CUSD	Unstructured Supplementary Service Data
AT+GCAP	Capabilities List
AT+GMI	Request manufacturer identification
AT+GMM	Request model identification
AT+GMR	Request revision identification of software status
AT+GSN	Request International Mobile Equipment Identity (IMEI)
AT+IPR	Bit Rate
AT+VTS	DTMF and tone generation
AT+WS46	Select wireless network
AT\Q	Flow Control
AT^SAD	Antenna Configuration

AT^SAIC	Audio Interface Configuration
AT^SATR	Query SIM's Answer to Reset Data
AT^SBNW	Binary Write
AT^SBV	Battery/Supply Voltage
AT^SCFG	Extended Configuration Settings
AT^SCID	USIM Identification Number
AT^SCKS	Query USIM and Chip Card Holder Status
AT^SCPIN	Pin Configuration
AT^SCPOL	GPIO Level Polling Configuration
AT^SCTM	Critical Operating Temperature Monitoring
AT^SFDL	Enter Firmware Download Mode
AT^SGAUTH	Set Type of Authentication for PDP-IP Connections
AT^SGIO	Get IO state of a specified pin
AT^SGPSC	GNSS Configuration
AT^SHUP	Hang up call(s) indicating a specific 3GPP TS 24.008 release cause
AT^SIND	Extended Indicator Control
AT^SLCC	Extended list of current calls
AT^SLED	LED Feature
AT^SMGL	List Short Messages from preferred store without setting status to REC READ
AT^SMGR	Read short message without setting status to REC READ
AT^SMONI	Monitoring Serving Cell

AT^SMSO	Switch Off ALS3-E
AT^SNCSGLS	Operator CSG lists on USIM
AT^SNCSGSC	Closed Subscriber Group network scan
AT^SNFG	Generate Tone
AT^SNFI	Set microphone path parameters
AT^SNFO	Set audio output parameter (loudspeaker path)
AT^SNFS	Select audio hardware set
AT^SNMON	Network monitoring
AT^SPIC	Display PIN Counter
AT^SPIO	GPIO Driver Open/Close
AT^SQPORT	Query Port Type
AT^SRADC	Configure and Read ADC Measurement
AT^SRTC	Ring tone configuration
AT^SSDA	Set SMS Display Availability
AT^SSET	USIM Data Ready Indication
AT^SSIO	Set IO state of a specified pin
AT^SSRVSET	Service Interface Configuration
AT^SSTA	Remote-SAT Interface Activation
AT^SSTGI	SAT Get Information
AT^SSTGI	SAT Get Information - Refresh (1)
AT^SSTGI	SAT Get Information - Set Up Event List (5)
AT^SSTGI	SAT Get Information - Set Up Call (16)

AT^SSTGI	SAT Get Information - Send SS (17)
AT^SSTGI	SAT Get Information - Send USSD (18)
AT^SSTGI	SAT Get Information - Send Short Message (19)
AT^SSTGI	SAT Get Information - Send DTMF (20)
AT^SSTGI	SAT Get Information - Launch Browser (21)
AT^SSTGI	SAT Get Information - Play Tone (32)
AT^SSTGI	SAT Get Information - Display Text (33)
AT^SSTGI	SAT Get Information - Get Inkey (34)
AT^SSTGI	SAT Get Information - Get Input (35)
AT^SSTGI	SAT Get Information - Select Item (36)
AT^SSTGI	SAT Get Information - Set up Menu (37)
AT^SSTGI	SAT Get Information - Set up Idle Mode Text (40)
AT^SSTGI	SAT Get Information - Language Notification (53)
AT^SSTR	SAT Response
AT^SSTR	SAT Response - Refresh (1)
AT^SSTR	SAT Response - Set Up Event List (5)
AT^SSTR	SAT Response - Set Up Call (16)
AT^SSTR	SAT Response - Send SS (17)
AT^SSTR	SAT Response - Send USSD (18)
AT^SSTR	SAT Response - Send Short Message (19)
AT^SSTR	SAT Response - Send DTMF (20)
AT^SSTR	SAT Response - Launch Browser (21)

AT^SSTR	SAT Response - Play Tone (32)
AT^SSTR	SAT Response - Display Text (33)
AT^SSTR	SAT Response - Get Inkey (34)
AT^SSTR	SAT Response - Get Input (35)
AT^SSTR	SAT Response - Select Item (36)
AT^SSTR	SAT Response - Set Up Menu (37)
AT^SSTR	SAT Response - Set Up Idle Mode Text (40)
AT^SSTR	SAT Response - Language Notification (53)
AT^SSTR	SAT Event - Menu Selection (211)
AT^SSTR	SAT Event - User Activity (232)
AT^SSTR	SAT Event - Idle Screen Available (233)
AT^SSTR	SAT Event - Language Selection (235)
AT^SSTR	SAT Event - Browser Termination (236)
AT^SSTR	SAT Event - Terminate Command (254)
AT^SWWAN	PDP Context Activate or Deactivate
ATA	Connect to Incoming Call
ATD	Mobile originated call to specified number
ATD*99#	Request Packet Domain service
ATD><index>	Mobile originated call from active memory using index number
ATD><mem><index>	Mobile originated call using specific memory and index number
ATD><str>	Mobile originated call from memory using corresponding string
ATE	AT Command Echo

ATI	Display product identification information
ATQ	Result Code Presentation Mode
ATSO	Set number of rings before automatically answering a call
ATV	Result code format mode
ATX	CONNECT Result Code Format
ATZ	Restore AT Command Settings from User Defined Profile

ACCESSORIES

The MTX-LTE-C3-Audio has a wide range of available accessories, including:

- Power supplies
- All type of antennas (indoor, outdoor, high gain, etc.)
- Cables and DIN adapters

We ship the MTX-LTE-C3-Audio without any accessories

Please visit the following web sites to see the full range of accessories: mtxm2m.com.

SALES CONTACT

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