

3 TECHNICAL SPECIFICATIONS

The scope of this document is to summarize the technical characteristics of the Telital GS/GSM Dual Mode User Terminal.

For detailed informations refer to TECHNICAL SPECIFICATION code 30080ST10010A.

3.1 Operating frequencies

3.1.1 GSM

The GSM operating frequencies are:

TX frequencies: 890.2 ÷ 914.8 MHz

RX frequencies: 935.2 ÷ 959.8 MHz

The channel (ARFCN) are numbered from 1 to 124 and frequency offset between TX and RX frequency is 45 MHz.

3.1.2 GLOBALSTAR

The satellite operating frequencies are the standard Globalstar frequencies.

TX frequencies: 1618.11 MHz

Bandwidth: 15.99MHz

Channel bandwidth: 1.23MHz

Minimum channel shift: 30KHz

Number of shift: 0 ÷ 511

Number of preferred channels: 13

Preferred channels: 4, 45, 86, 127, 168, 209, 250, 291, 332, 373, 414, 455, 496.

Rx frequencies: 2491.77 MHz

Bandwidth: 15.99MHz

Channel bandwidth: 1.23MHz

Minimum channel shift: 123KHz

Number of shift: 0 ÷ 127

Number of preferred channels: 13

Preferred channels: 3, 13, 23, 33, 43, 53, 63, 73, 83, 93, 103, 113, 123.

3.2 Transmitter output power

3.2.1 GSM

a) RF power on 50 Ohm

The GSM section of the DMUT is a class 4 radiotelephone according to standard ETSI regulation that fix the limit at 2 Watts (+33dBm) on 50 Ohm;

In normal test conditions the transmitter nominal power range is between +31.5 dBm and +32.5 dBm on 50 Ohm.

With a supply voltage range between 6.7V and 8.4V and temperature range between -10°C and +55°C the transmitter power range is between +30.5 dBm and +32.5 dBm on 50 Ohm.

b) ERP power

Not supplied in the GSM specification.

The EIRP power will be measured in anechoic chamber.

3.2.2 GLOBALSTAR

Output power >23 dBm
+26 dBm

3.3 Reference sensitivity

3.3.1 GSM

Sensitivity on 50 Ohm

The sensitivity is according to the GSM specification for the class 4 portable terminal; The standard ETSI regulation para 6 fix a limit of -102dBm .

The goal limit is $\leq -104\text{ dBm}$ for an Rx Quality $< 0.2 - 0.4\%$.

3.3.2 GLOBALSTAR

Ref. Qualcomm specifications 80-25015-1 X6.

3.4 Antenna

3.4.1 GSM

The antenna for the GSM band is ALLGON 3576.2

3.4.2 Globalstar

The antenna for the satellite Globalstar band is composed of more parts and is assembled on the telephone in way that can rotate on 4 positions.

The satellite antenna in its rotating stalk contains an LNA for the Rx section, the receiving part Rx and the transmitting part Tx.

An optical sensor assembled on the body of the telephone under the antenna rotor, activates the satellite transmission when the antenna is rotated in the positions 1, 2 and 3. In the intermediary positions the transmitter of the satellite section is always disabled.

In the position 0 the telephone works only on the GSM band.

The rotation of the antenna is prevented over the position 3.

3.5 Audio characteristics

3.5.1 Microphone

The telephone uses a microphone PRIMO type EM131S2B2.
This is inserted in a rubber gasket.

3.5.1.1 Microphone sensitivity

The typical level is 3mV typical with a -4.7dBPa signal SPL at $f=1\text{kHz}$

3.5.1.1.1 Microphone electric level

The typical level is $>570\text{mVrms}$ with signal AF of 3mV @ $f=1\text{kHz}$.

3.5.1.1.2 Microphone distortion

The typical level is <2% with range of frequency 300Hz to 3400Hz.

3.5.1.2 Buzzer

The Buzzer used into the DMUT is the MUT-03A STAR.

3.5.1.2.1 Acoustic pressure of the buzzer

The value of acoustic pressure is -41dBV.

3.6 Device voltage supply

Nominal voltage	7.4 V
Working range	7 V ÷ 8.4 V
Power off voltage range:	6.8V

3.6.1 Power consumption

The following table lists the estimated current that flows from the 7.2V battery with a switching circuit efficiency $\eta=0.85$. The values are expressed in mA.

	GSM Baseband	G*Baseband	GSM Radio	G* Radio	Total
GSM Mode : RxTx @ Tx level=5	83	3.84	262	0.84	349.68
GSM Mode : idle	10.2	3.84	1.4	0.84	16.28
G* Mode : RxTx	60	219.6	1.56	664.44	945.0
G* Mode : idle @slot=1	10.2	129	1.56	97.44	238.2
G* Mode : idle @slot=0.2	10.2	26.4	1.56	19.44	57.6

3.6.2 Battery pack and battery life

The DMUT will be power supplied by a PP35 1350mAh battery pack composed of two Li Ion rechargeable serial elements.

3.6.2.1 Battery life in GSM mode

Operative mode	Rx/Tx*	Idle
Battery life	3.86h	83h

* @ Tx level=5

3.6.2.2 Battery life in Globalstar mode







Operative mode	Rx/Tx	Idle
Battery life	1.43h	5.66h @slot = 1
		23.43h @slot = 0.2

In conversation:	5.5 hrs
In idle:	70 hrs

3.7 Keypad

The keypad is composed by 20 keys and lighted with 12 leds.

The key functions, related to the specific operative conditions, are shortly listed on the table below.

Key	Function
	END function to terminate a call;
	SEND function to answer an incoming call;
	Mode Switch to define the DMUT operating mode;
M	Function MENU to enter in the DMUT operative menu;
C	Character and number cancellation in edit mode;
	Note Book function;
	SMS menu;
	DMUT power ON/OFF;
# ^	Menu scroll-up function;
v *	Menu scroll-down function;
1...9	Alphanumeric keys

3.8 Display

Type SEK1054B5A EPSON LCD, FSTN, positive, reflective, graphic.

The display will be backlighted with six leds.

3.9 Data service

Use of a Data Terminal Adapter for the following functions:

Full emulation of analog modem to allows the compatibility with the existent data communication programs.

Class 1 (EIA/TIA 578) and class 2 (TR29.2) command for compatibility with fax.

Max data rate 9600 bit/s.

In Globalstar mode the DTA will support the data service as described on the Globalstar standard specifications.

3.10 Software functionality and user interface

The software installed in the DMUT supports all the functions in table.

Radio interface	Radio Protocol Phase 2
Speech Coding	Full Rating
SIM	SIM 3/5 volt SIM Toolkit compliant GSM 11.14

The functionalities supported by the user interface of the telephone are phase 2 and are listed as follows:

Management of local security, with SIM Lock, keyboard lock and security code request at power-up;

Call control function, with call duration, cost indication and UDUB function;

Volume control and ringer setting function, ringer and signaling tones with possibility of activation of alarm also with telephone powered off;

Display management with contrast level regulation and duration of backlight;

Messages visualized setup in ready state and its language, visualization of the IMEI and the software release of the telephone;

Font Management uppercase/lowercase and international (no Chinese);

SIM related functions, as the activation/deactivation of the numbers in notebook FDN, ADN and PIN. Extension to the PIN2 of the possibility of insertion of PUK2 in case of lock. The telephone supports besides the functionalities of class 2 of the SIM Application Toolkit with the implementation of the relative commands and procedures at MMI level. Implementation of two levels SIM lock.

Tones Management DTMF;

Clock Management with time and alert activation indications for the wake-up service and for the programmed telephone power-up;

Indication of the call status and service availability;

Automatic call of busy number and automatic answer;

Visualization and selection of the GSM providers;

Management of the Supplementary Services (SS) of Call Barring (with related indication, also for SMS), Call Forwarding (with related indication), Advice of Charge, Calling Line

Identification Presentation, Calling Line Identification Restriction, Unstructured SS Mobile Originated, Call Waiting, other party Call Waiting Indication, Call Hold, other party Hold / Retrieved Indication, Multi Party;

Short Message Service Mobile Terminated with signaling of new incoming SMS, reading and SIM full, Mobile Originated with writing, storing in SIM and dispatch, Cell Broadcast compatible with CB-DRX (discontinuous reception) for energy saving.

Special Features, as the list of the incoming not answered calls;

Indications on the battery status through predefined icon on the display with tabs showing the charge level, bitmap on graphic area indicating the state of charge in progress, best terminated or failed for damaged battery and indication of the battery pack temperature during the charge.

Management of the language of menu interface. It is possible to set the DMUT from the language menu up to 16 languages.

Currently the available languages are: Italian, English, German, French, Polish, Norwegian, Spanish, Greek, Hungarian, Czech, Portuguese.

The user interface of the telephone is structured in the following menus:

Main menu pressing the "M" key and divided in the following submenus: "Own number", "Missed calls", "Call divert", "Clock", "Settings", "Security", "GSM Networks", "Call control", "Information".

When a Proactive SIM is inserted, it is available the SIM Toolkit menu identified by number item 0 whose elements are determined by the service provider;

SMS Menù, accessible with the ☒ key, containing all related functions for the messages SMS management;

Call related menù, available only during a call, which allows the access to the call related Services and other possible functions only in this state.

Phone book menu, accessible pressing the "M" key and pressing again for a long time the same "M" key.

It makes available the functions for the transfer between ADN and FDN, the insertion of new records, the cancellation of the records and the visualization of the information related to the phonebook stored on the SIM;

Customizable Menù. At any level of the main menù it is associated a number that can be used to made a fast selection of a menu or submenu item.

3.10.1 Clock

The internal clock besides the normal visualization of the time, allows to set the alarm and the telephone power-up.

The clock is autonomously powered by a not rechargeable lithium battery with autonomy of about 5 years.

3.10.2 Vehicularization

For the vehicularization of the DMUT is used a CAR-KIT.

3.11 Electrical interface

3.11.1 Bottom connector

The 20 pin bottom connector SO2 HIROSE MQ168–QC–20P/4 allows the DMUT interfacement with the accessories as Car Kit, Battery charger, Data Terminal Adapter.

The four pins from 21 to 24 allows the connection of battery pack.

PIN	NAME	A/D	IN/OUT	DESCRIPTION
1	+VBATT	A	IN	+10.4V from battery charger
2	DM_TX	D	OUT	TX serial line debug monitor G*edge
3	DM_RX	D	IN	RX serial line debug monitor G* edge
4	DM_RTS	D	OUT	Request To Send debug monitor G*edge
5	DM_CTS	D	IN	Clear To Send debug monitor G*edge
6	DATA_GS_TX	D	OUT	Data transmission line in G* mode
7	DATA_GS_RX	D	IN	Data reception line in G*mode
8	GSM_TX	D	OUT	Data transmission and monitor line in GSM mode
9	GSM_RX	D	IN	Data reception and monitor line in GSM mode
10	AXE	D	IN	External device connection signal
11	SW_BATT	A	OUT	Power supplied to external device connected with AXE = 0 V
12	CAR_PCM_CLK	D	OUT	CLOCK PCM connection to CAR KIT
13	CAR_PCM_DOUT	D	OUT	Data OUT PCM connection to CAR KIT
14	CAR_PCM_DIN	D	IN	Data IN PCM connection to CAR KIT
15	CAR_PCM_SYNC	D	OUT	SYNC PCM connection to CAR KIT
16	GS/GSM	D	OUT	Signalling for the DMUT operative mode GSM or G*
17	ON–OFF	D	IN	Signal for DMUT remote power on
18	CAR_AUDIO_IN	D	IN	Analog audio from CAR KIT
19	CAR_AUDIO_OUT	–	——	Analog Audio to CAR KIT
20	GND	A	——	Ground
21	NTC	A	——	Pin used for reading the internal temperature of battery pack by an NTC or other sensor.
22	GND	A	——	Ground Battery pack
23	+VBATT	–	——	Positive Battery pack
24	SPARE	–	——	

Legend: **A**: Analog; **D**: Digital 0 ÷ 3V CMOS

3.11.2 SIM

The DMUT uses a SIM card type "PLUG-IN".
The following table list the signals of SIM connector.

PIN	NAME	A/D	IN/OUT	DESCRIPTION
1	C1,CCVCC	A	IN	SIM 5Vcc power supply.
2	C2, RST	D	OUT	RESET command active high coming from uP and managed by the program protocols.
3	C3,CCLK	D	OUT	CLOCK supplied from uP for data management.
4	C5,GND	A	IN	SIM circuit ground termination.
5	C6,NC	—	—	Not Connected.
6	C7,I/O	D	IN/OUT	Input/output data for the SIM.

3.11.3 Test connector

This connector allows the connection of DMUT with test equipments for the maintenance, and production test.

ELCO connector Torson 2 x 5pins vertical SMD low profile.

P/N 23-5016-2005-10-081. The following table list the signals of test connector.

PIN	NOME	A/D	IN/OUT	DESCRIPTION
1	WAKEUP	D	IN	Signal for remote power on.
2	RST	D	IN	Reset
3	TXD1	D	OUT	Data transmission from 80386 serial line #1
4	RXD1	D	IN	Data reception to 80386 serial line #1
5	GND	A	—	Ground
6	DWLD	D	IN	Download in G* mode enabled
7	INT3	D	IN	Not used
8	GSM_TX_DATA	D	OUT	Data transmission and monitor line in GSM mode
9	GSM_RX_DATA	D	IN	Data reception and monitor line in GSM mode
10	+VBATT	A	—	Positive 7.4V power supply

Legenda: **A**: Analogico; **D**: Digitale 0 ÷ 3V CMOS

3.11.4 RF signals connector

The DMUT has three coaxial connectors to made the connection with the following:

- Band L external antenna (Tx satellite)
- Band S external antenna (Rx satellite)
- GSM external antenna (Tx /Rx)

3.11.5 DAI connector

Pads on pcb.

3.12 Physical characteristics

3.13 Dimensions

Length: 224 mm
Width: 65.5 mm
Thickness: 50 mm

3.14 Weight

400g battery pack included.

3.15 Figures

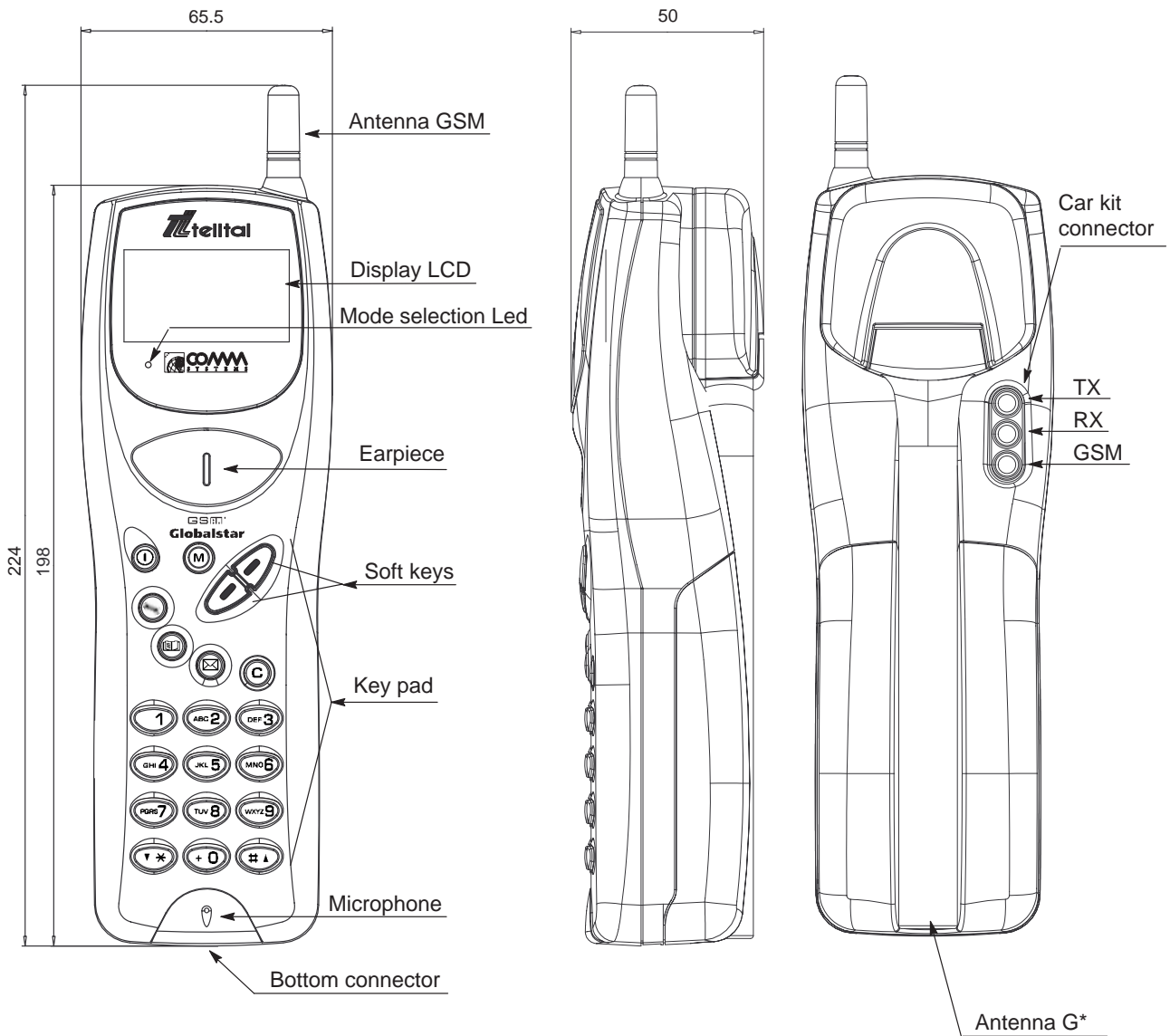


Figure 1 DMUT Assembly

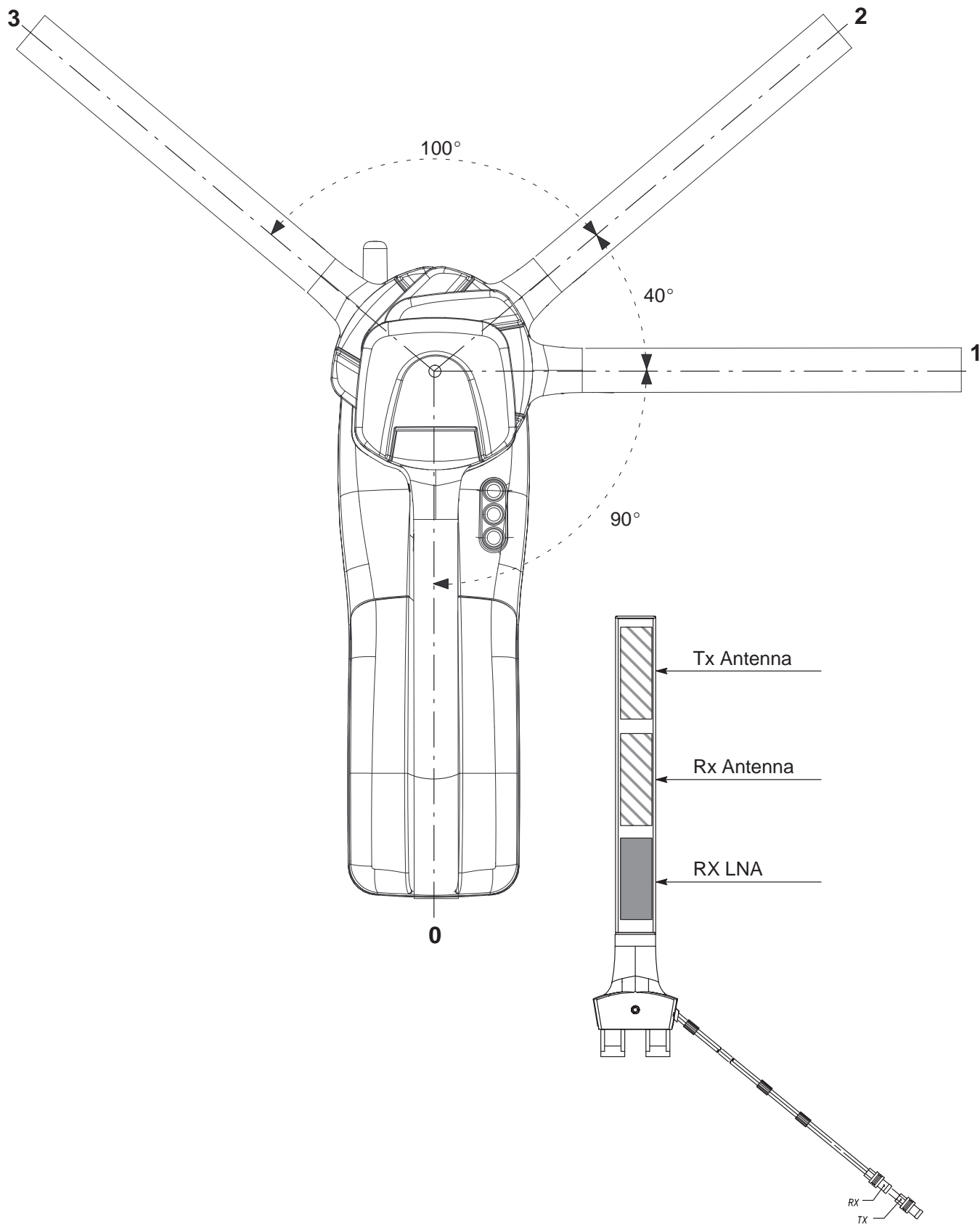


Figure 2 Globalstar Satellite antenna

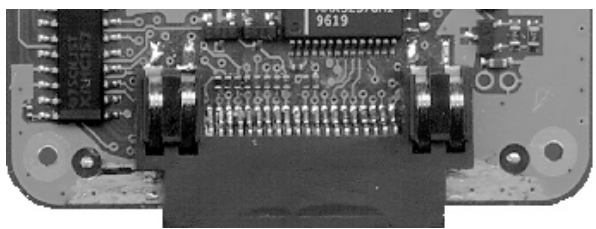
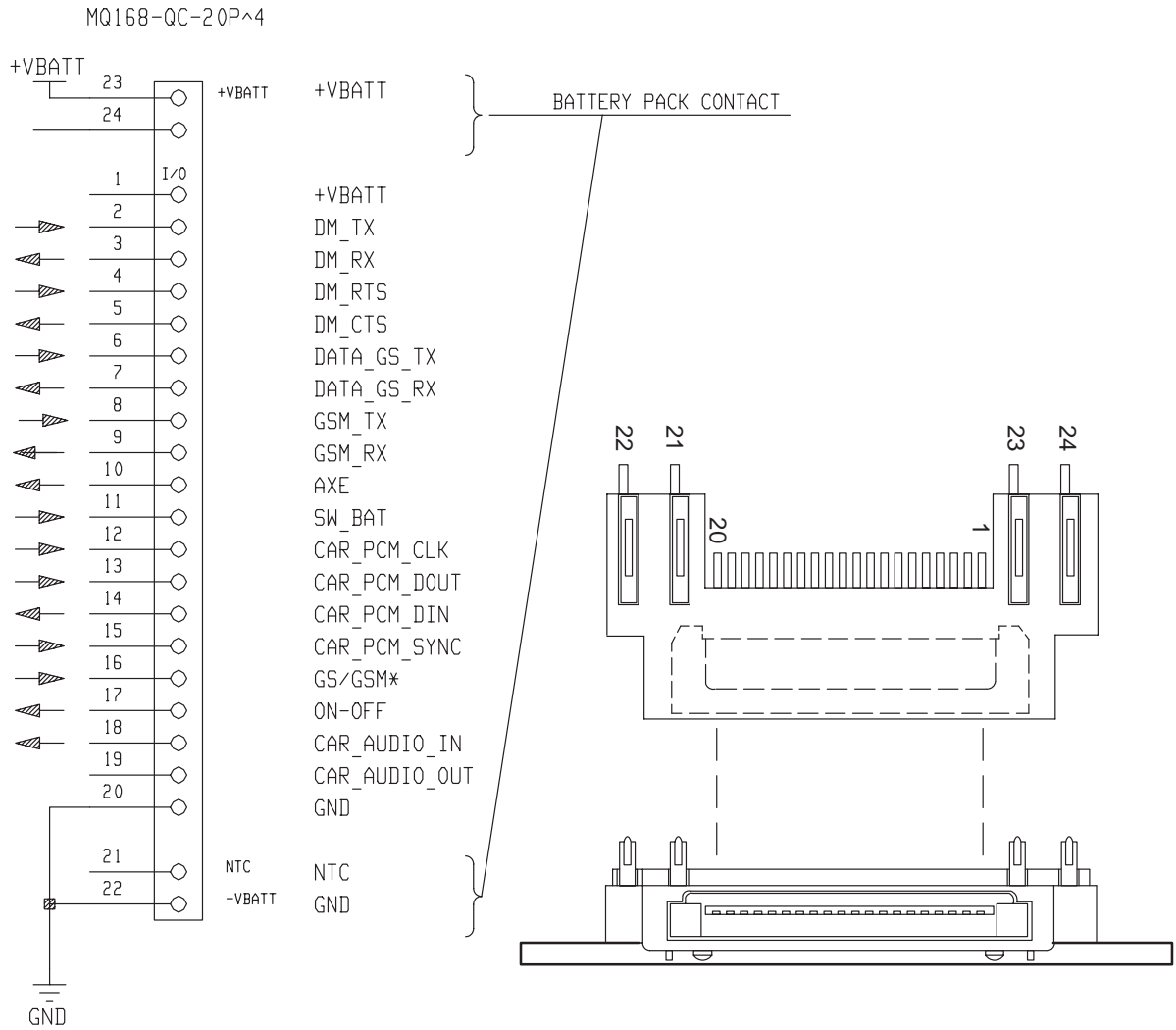


Figure 3 Bottom connector signals overview