



X BAND ON-THE-MOVE SATELLITE TERMINAL

TSO 102 D/X is an X band Phased Array Antenna based unit designed for communications with military satellites operating in X band and for being deployed either in tactical ground or on-board armoured vehicles. The unit has been widely used for vehicle and general ground application, military use, where communication on the move is a mandatory requirement.

Maximum Reliability is assured by a combination of electrical and mechanical beam steering. Dynamic platform compensation for roll, pitch and yaw is provided by an attitude heading reference system. An advanced antenna tracking system allows rapid satellite acquisition and tracking.

Motorized mechanical setup elevation can be used to incline the antenna to optimise performance in extreme looking angle conditions. To achieve this, the antenna will tilt during warm-up, depending on the geographic position.

The TSO-102/D X embeds a high performance and certified DVB-RCS MF-TDMA modem based on DVB-S2 forward links.

KEY FEATURES

- Compactness/Ruggedness
 - Mountable on different military armoured wheeled vehicles
- High Integration
 - Only two subsystems for a complete terminal
- High Efficiency
 - Bandwidth-on-Demand
 - Power / Bandwidth optimization thanks to high granularity FEC rates
- Crypto option
 - Provision of an encryption capability, based on AES encryption algorithm with 256 bit-sized key
- Fast Deployment
 - Ready to use.

TSO 102/D X

DVB-RCS MF-TDMA modem is able to support network connectivity in which may deliver interactive/ situational data, voice, and video conferencing, plus multicast IP applications. The unit is optimized for advanced IP networking such as VPNs, traffic acceleration, VPNs and Quality of Service.

All functions are controlled and monitored by a local laptop PC to remotely manage communication links using standard network protocols.

MAIN FEATURES

The TSO102/D X satellite terminal is a Communication On The Move Satellite terminal, based on the state of art of active Phased Array Technology. TSO-102/D X consists of an Outdoor Unit (ODU) and an Indoor Unit (IDU).

OUTDOOR UNIT

RF Section

The Active Phased Array antenna is composed by a mixing of electrical (in elevation) and mechanical (in azimuth) beam steering.

Two different planar antennas (Tx band and Rx band) in slotted waveguide technologies are applied.

The RF Active Beam Forming Network includes the RF power amplifier modules (SSPA) and the low noise receiver amplifiers (LNA). A single conversion process is used in both Up and Down chains, without spectral inversion.

Control Section

Advanced tracking technologies allow rapid and accurate acquisition and tracking of satellite while On The Move.

The Antenna Tracking System performs "Open Loop" and "Closed Loop", satellite tracking algorithms.

Power Section

The TSO102/D Ka is powered by 24-28VDC vehicle battery according to MIL-STD-1275D standard.



INDOOR UNIT

DVB/S2-RCS tactical modem

The TSO102/ X is equipped with a high performing and certified (SatLabs) DVB-RCS MF-TDMA modem (return link), in tactical version, supporting DVB-S2 forward link, optimized for IP networking, advanced QoS, traffic acceleration, VPNs, as well as is capable of supporting meshed network topology towards Gateway type terminals.

Added software features, makes the terminal ideal for interactive data, voice, and video conferencing, plus multicast IP applications.

Monitor & Control Interface

The TSO102/D X provides a standard SNMP interface for M&C purposes; as option it can be controlled and monitored locally by a GUI application running on a laptop PC.



SYSTEM PERFORMANCE (GENERAL)

GENERAL	
RF frequency band	TX: 7900MHz to 8400MHz RX: 7250MHz to 7750MHz
IF frequency band	L-Band: 950MHz to 1450MHz
Performance	G/T \geq 8.0 dB/K typical @ Broadside EIRP \geq 40 dBW typical @ Broadside
Looking Angle Satellite	85° \geq LA \geq 5° (70° \geq LA \geq 25° best performance)
SATELLITE ACQUISITION TIME	
First acquisition time (steady vehicle)	< 15 sec
Reacquisition time (on the move)	< 30 sec
TEST LAND	
Maximum vehicle speed	90Km/h on flat track
Max track slope	30%
M&C interface	Ethernet SNMP v2 protocol



DVB-RCS MODEM

IP QoS and Bandwidth-on-Demand	Traffic Classification
	QoS Treatment
	Capacity Requests
TDM RECEIVE (DVB-S2)	
Modulation	1Msps to 45Msps
MODCODs	With LDPC+BCH FEC Rates
QPSK	1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10
8PSK	3/5, 2/3, 3/4, 5/6, 8/9, 9/10
16APSK	2/3, 3/4, 4/5, 5/6, 8/9, 9/10
Roll-off factor	20%, 25%, or 35%
TDMA TRANSMIT AND RECEIVE	
Symbol rates	125ksps to 8Msps (RTN)
Symbol rates	200ksps to 3Msps (Mesh)
MODCODs	With Turbo Code FEC: 8-state and 16-state
QPSK	1/2, 2/3, 3/4, 4/5, 6/7 (DVB-RCS)
8PSK (Star only)	2/3, 3/4, 6/7 (DVB-RCS extension)
Frequency hopping	Fast Hopping on 750MHz range
TDMA mesh Rx	Up to 8 simultaneous bursts, 44MHz (RCS QPSK only)
SCPC burst mode	Dedicated carrier for Tx with full Constant Rate Access (CRA), no capacity requests required.
MECHANICAL	
Motorized mechanical elevation	Up to 45°
Size Outdoor Unit (W x D x H)	760mm x 920mm x 340 \leq H \leq 820 (depending on Mechanical Elevation)
Size Indoor Unit	19" rack mountable 1U
Clearance area	1150mm
Terminal overall weight	<115Kg
ELECTRICAL AND ENVIRONMENTAL	
Power Supply	24Vdc to 28Vdc
Power Consumption (According to MIL-STD-1275)	750W (average) 1560W (peak)
Operating temperature	-32°C to 49°C
Storage temperature	-33°C to 71°C
Humidity	Up to 100%
SAFETY	
According to directive 2006/95/CE, EN 60950-1	
EMI / EMC	
According to MIL-STD-461F (Ground Army)	



