

7 Regulatory Approval

The *LinkStar-STX3* module has received regulatory approvals for modular devices in the United States. Modular device approval allows the end user to place the STX3 module inside a finished product and not require regulatory testing for an intentional radiator (RF transmitter), provided no changes or modifications are made to the module circuitry. **Changes or modifications could void the user's authority to operate the equipment.** The end user must comply with all of the instructions provided by the *sci_Zone* and *Globalstar*, which indicate installation and/or operating conditions necessary for compliance. The integrator is still responsible for testing the end product for any additional compliance requirements required with this module installed (digital device emission, PC peripheral requirements, etc.) in the specific country that the end device will be marketed. For more information on regulatory compliance, refer to the specific country radio regulations in the following sections.

7.1 Radio Astronomy Site Avoidance

The end user device must comply with the requirements for Radio Astronomy Site avoidance as specified by the Globalstar National Science Foundation agreement of 2001. It must be compliant with CFR 25.213.

7.2 Regulatory Notices

The STX3 has received Federal Communications Commission authorization under FCC Rules Part 25 as a modular transmitter. Final installation must be in compliance with CFR 25.213 (see 7.1 above). The antenna installation and operating configurations of this transmitter must satisfy MPE categorical Exclusion Requirements of 2.1091.

The STX3 module will satisfy FCC modular transmitter requirements only when used with the antenna type specified in Appendix A. No power amplifiers may be used under the terms of this modular approval. It is permissible to use different antenna manufacturers provided the same antenna type that has similar inband and out-of-band radiation patterns and antenna gain (equal to or less than the antenna gain listed above) is used.

The module provides the Tallysman™ *TW2500* with 50cm cable with SMA male connector for an external antenna connected via the *LinkStar-STX3-ME* SMA connector. Other antennas connected via the SMA connector cable of similar performance can be used. Use of any antenna other than those listed in Appendix A will require proof of compliance (peak gain).

This device has been designed to operate with the antenna listed in Appendix A, and having a maximum gain of 4.55 dB. Antennas not included in this list or having a gain greater than 4.55 dB are strictly prohibited for use with this device. The required antenna impedance is 50 ohms

The *LinkStar-STX3-ME* radio system has been labeled with its own FCC ID number:

FCC ID: 2ANKS-LINKSTAR-STX3

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a commercial, industrial, aeronautical and space based installation. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment OFF and ON, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

WARNING: Changes or modifications not expressly approved by *sci_Zone, Inc* and *Globalstar* may render the device non-compliant to FCC and other regulatory body standards for operation and may void the user's authority to operate the equipment.

NOTICE: This equipment complies with the FCC RF Exposure Limits. A minimum of 20 centimeters (8 inches) separation between the device and the user and all other persons should be maintained.

AVIS: Cet équipement est conforme aux RSS-102 Limites d'exposition RF. Un minimum de 20 centimètres (8 pouces) entre l'appareil et l'utilisateur et toutes les autres personnes devrait être maintenue.

7.3 Warnings, Restrictions and Disclaimers

The *LinkStar-STX3-ME* is an experimental and development system.

The *LinkStar-STX3-ME* is for Feasibility Evaluation Only and testing, in Laboratory/Development and Outdoor Environments. The *LinkStar-STX3-ME* with the *Industrial BeagleBone Black* is a flexible development product, and thus not a complete product. It is intended solely for use for preliminary feasibility evaluation in laboratory/development, test and field environments by technically qualified electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems and subsystems including changing antennas and power supplies. It should not be used as all or part of a finished end product.

Your Sole Responsibility and Risk you acknowledge, represent, and agree that:

1. You have unique knowledge concerning Federal, State and local regulatory requirements (including but not limited to Food and Drug Administration regulations, if applicable) which relate to your products and which relate to your use (and/or that of your employees, affiliates, contractors or designees) of the *LinkStar-STX3-ME* for evaluation, testing and other purposes.
2. You have full and exclusive responsibility to assure the safety and compliance of your products with all such laws and other applicable regulatory requirements, and also to assure the safety of any activities to be conducted by you and/or your employees, affiliates, contractors or designees, using the *LinkStar-STX3-ME*. Further, you are responsible to assure that any interfaces (electronic and/or mechanical) between the *LinkStar-STX3-ME* and any human body are designed with suitable isolation and means to safely limit accessible leakage currents to minimize the risk of electrical shock hazard.
3. Since the *LinkStar-STX3-ME* is a flexible product and not a completed product, it may not meet all applicable regulatory and safety compliance standards which may normally be associated with similar items. You assume full responsibility to determine and/or assure compliance with any such standards and related

certifications as may be applicable. You will employ reasonable safeguards to ensure that your use of the *LinkStar-STX3-ME* will not result in any property damage, injury or death, even if the *LinkStar-STX3-ME* should fail to perform as described or expected.

Certain Instructions. It is important to operate the element 14 BeagleBone Black Industrial within Supplier's recommended specifications and environmental considerations per the user guidelines. Exceeding the specified BeagleBone ratings (including but not limited to input and output voltage, current, power, and environmental ranges) may cause property damage, personal injury or death. If there are questions concerning these ratings please contact the Supplier representative prior to connecting interface electronics including input power and intended loads. Any loads applied outside of the specified output range may result in unintended and/or inaccurate operation and/or possible permanent damage to the BeagleBone and/or interface electronics. Please consult the System Reference Manual prior to connecting any load to the BeagleBone output. If there is uncertainty as to the load specification, please contact the Supplier representative. During normal operation, some circuit components may have case temperatures greater than 60 C as long as the input and output are maintained at a normal ambient operating temperature. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors which can be identified using the BeagleBone schematic located at the link in the BeagleBone System Reference Manual. When placing measurement probes near these devices during normal operation, please be aware that these devices may be very warm to the touch. As with all electronic evaluation tools, only qualified personnel knowledgeable in electronic measurement and diagnostics normally found in development environments should use the BeagleBone.

Agreement to Defend, Indemnify and Hold Harmless. You agree to defend, indemnify and hold the Suppliers, its licensors and their representatives harmless from and against any and all claims, damages, losses, expenses, costs and liabilities (collectively, "Claims") arising out of or in connection with any use of the *LinkStar-STX3-ME* that is not in accordance with the terms of the agreement. This obligation shall apply whether Claims arise under law of tort or contract or any other legal theory, and even if the *LinkStar-STX3-ME* fails to perform as described or expected.

Safety-Critical or Life-Critical Applications. If you intend to evaluate the components for possible use in safety critical applications (such as life support) where a failure of the Supplier's product would reasonably be expected to cause severe personal injury or death, such as devices which are classified as FDA Class III or similar classification, then you must specifically notify Suppliers of such intent and enter into a separate Assurance and Indemnity Agreement.

Appendix A – TW2500 Antenna



When precision matters.™

A Tallysman Accutenna™ TW2500 Magnet Mount Globalstar™ Certified STU Antenna

The TW2500 employs Tallysman's unique *Accutenna™* technology in a magnet mount, passive left hand circularly polarised antenna for the 1610 to 1620 MHz frequency band, certified and specifically designed to maximise the performance of the Globalstar™ STU (Simplex Transmit Unit) Modem.

The TW2500 features a high performance dual-feed patch element that provides great axial ratio (3 dB max) over the entire Globalstar™ frequency band, thus signals at the band edges remain truly circular, unlike the response of single feed antennas.

The TW2500 is housed in a compact, industrial-grade weather-proof, magnet mount enclosure, with threaded base holes for screw down attach. It is available with a 50 cm cable, allowing for the STU modem to be mounted out of the elements and reach, and still providing excellent Globalstar™ signal coverage.

Applications

- Simplex Transmit Unit (STU) Applications
- Sea & Land Container Tracking
- Military & Security
- Fleet Management & Asset Tracking
- Marine & Avionics Systems
- Law Enforcement & Public Safety

Features

- Custom high gain 4.25 dBi dual-feed patch
- Great axial ratio, 3 dB over full bandwidth
- ESD 15 KV circuit protection
- Weather proof, IP67 housing
- Robust Industrial grade enclosure
- Magnet or screw mount
- Wide range of connector options

Benefits

- Excellent circular polarized signal transmission
- Industrial temperature range
- Rugged Design
- Ideal for harsh environments
- RoHS compliant
- Remote STU antenna

TW2500 Dimensions (mm)



www.tallysman.com



When precision matters...™

TW2500 Magnet Mount Globalstar™ Certified STU Antenna Specifications

Over full bandwidth, T=25°C

Antenna

Architecture	Dual, quadrature feeds
Antenna Gain (100mm ground plane)	4.25 dBi
Axial Ratio (over full bandwidth)	≤3 dB
0.5dB Bandwidth	1600MHz to 1630MHz

Electrical

Architecture	Hybrid 90° phase splitter
Frequency Bandwidth	1615 MHz ±10 MHz
Polarization	LHCP
Gain flatness	≤1 dB, from 1610 to 1620 MHz
VSWR (at antenna)	<1.5:1
Return Loss (10 dB bandwidth)	<-20MHz
ESD Circuit protection	15 KV air discharge

Mechanicals & Environmental

Mechanical Size	57 mm dia. x 15 mm H
Connectors	SMA, TNC, MCX Male (Plug). Other connectors optional
Cable	RG174 / 50 cm, custom lengths optional
Operating Temp. Range	-40 to +85 °C
Enclosure	Radome: ASA Plastic, Base: Zamak White Metal
Weight	150 g
Attachment Method	Magnet or permanent (pre-tapped 4 x 6-32UNC)
Environmental	IP67 and RoHS compliant
Shock	Vertical axis: 50 G, other axes: 30 G
Vibration	3 axis, sweep = 15 min, 10 to 200 Hz sweep: 3 G
Warranty	One year – parts and labour