

Technical Note

Timing Antenna Installation

Version 3.0



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Introduction

Tallysman designs and manufactures a range of antennas which are ideal for timing applications. These antennas are available with optional pre-filters to provide excellent Out-Of-Band filtering for use in hostile RF jamming environments characterized by high terrestrial L-Band RF fields.

Rugged Industrial Design

The antennas are housed in an industrial-grade IP67 enclosure and have 15 KV ESD protection to provide the reliability in virtually all operating environments.

Reliably Engineered

Tallysman’s timing antennas incorporate a wide range voltage regulator (2.7 VDC to 12 VDC) which allows customers to use the antenna with virtually every receiver on the market without worrying about changes in performance. Tallysman also uses temperature compensating very low noise amplifiers to ensure consistent performance through the full operating temperatures.

Designed for Tomorrow

Tallysman offers timing antennas to cover one, two, or four GNSS constellations. In some locations, it is costly to replace a timing antenna. By selecting an antenna which receives signals from all the current and emerging constellations, future costs can be avoided.

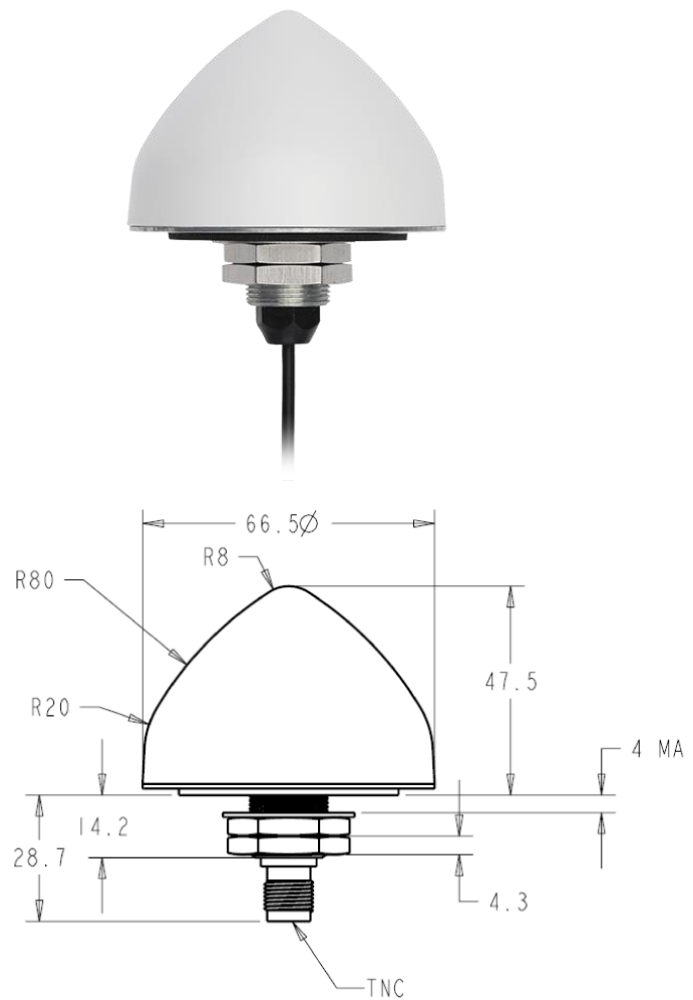


Figure 1 – Timing Antenna with Dimensions (mm)

Applications

- Network Timing and Synchronisation
- Long Cable Run Installations

GPS Installation Guide

The following recommendations describe a successful installation of a Tallysman timing antenna. A typical installation is shown in Figure 1.

The most important parameters that influence sensitivity are the overall gain and noise figure of the antenna amplifiers. It can be shown that the cascaded noise figure is maintained provided the net gain is higher than 15dB. i.e. (Antenna LNA Gain) – (Cable Losses) > 15dB. For the TW3xxx family of products, with an LNA gain of 40dB, the permissible cable losses are as high as 25dB.

Signal Attenuation

The cable length is the major cause of signal attenuation. The table below shows a typical system calculation using 120 feet (32m) of RG-58 cable (loss of 0.19 dB/ft).

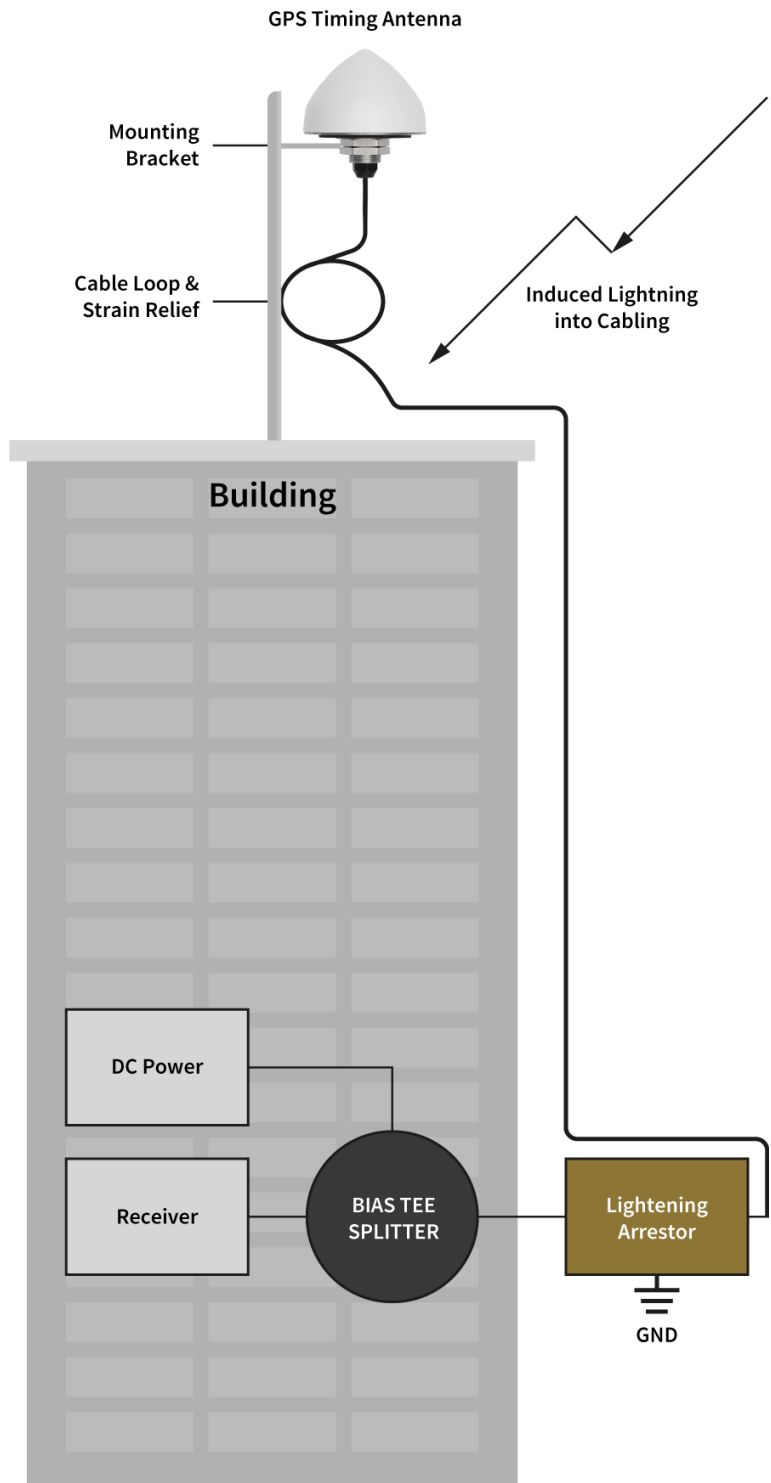


Figure 2 – GPS Timing Antenna Installation

System	Gain
Timing Antenna	40 dB
Cable Loss	-23 dB
Lightning Arrestor	-1 dB
Bias Tee	-1 dB
Net Gain	15 dB

Table 1 – Signal Attenuation

In the example shown the net gain is 15dB which is acceptable. A similar calculation with an antenna gain of 28 dB yields a cable length of 49 feet (15m).

Cable Selection

If the net gain when calculated is less than 15dB a 25dB in-line amplifier may be installed to increase the net gain. The in-line amplifier should be installed close to the antenna. A noise figure calculator is available on the Tallysman website for checking specific installation cases [insert dynamic link to website].

If longer cable lengths are needed use bigger cable diameter e.g. LMR-400 (loss of 0.05dB /foot).

Antenna Installation

Install the antenna with a clear view of the sky and clear of obstructions such as building, trees etc. Avoid proximity with high power transmitters. When installing multiple GPS antennas separate them by at least 1 m.

To ensure a trouble free installation the strain must be taken off the cable by looping the cable and tie wrapping to the pole as shown in Figure 2.

Tallysman offers a variety of mounting accessories to accommodate a variety of installations and environments. An L-Bracket is available for pole or wall mount applications in aluminum (P/N 23-0040-0) or, for marine environments, stainless steel (P/N 23-0040-1). Circular hose

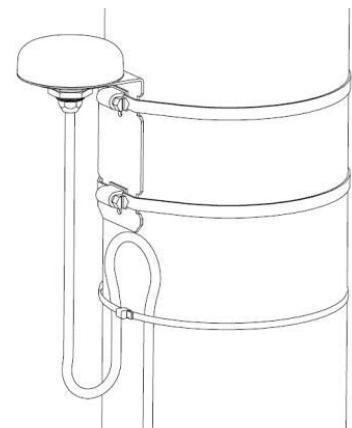


Figure 3 – Installation of a TW3XXX antenna with a cable loop to provide strain relief

clamps are shown fixing the bracket to the pole in Figures 2, 3 and 4. Another option for pole mounting is the aluminum Mast Mount TW3XXX (P/N 23-0092-0) (Figure 5). Also available is the stainless steel 1 ¼” NPS Pipe Mount (P/N 23-0065-1) for affixing the antenna to the top of a pipe with an outer diameter up to 43mm (Figure 6). Tallysman also offers an M18 to ¾” Pipe thread NPT adaptor (P/N 23-0110-0) (Figure 7).

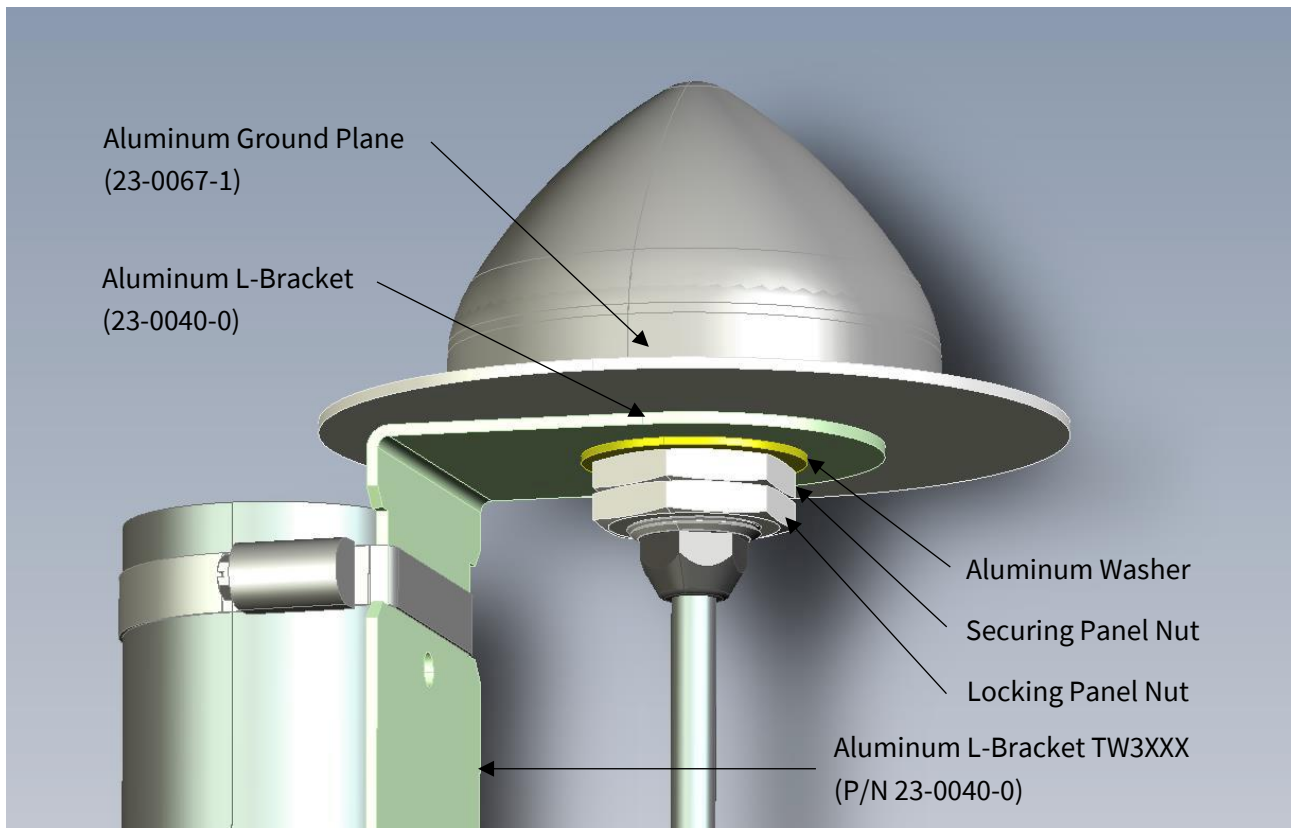


Figure 4 – Aluminum L-Bracket TW3XXX

Mounting clamps and pole not provided by Tallysman

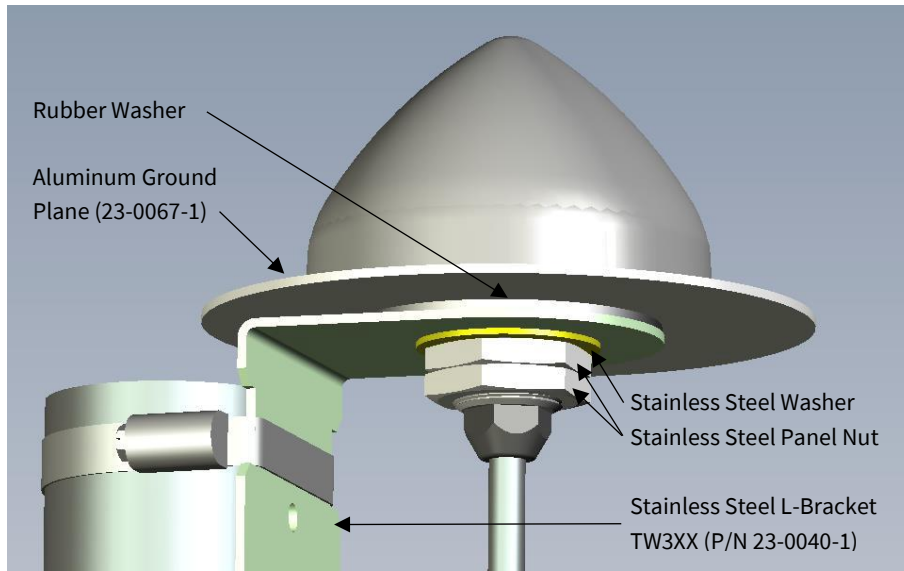


Figure 5 – Stainless Steel L-Bracket TW3XXX (P/N 23-0040-1)

Note the rubber washer between the L-bracket and aluminum ground plane to mitigate galvanic corrosion. Similarly, it is recommended to install the panel nuts with teflon tape to electrically isolate the stainless steel panel nuts from the zamac 3 antenna base. Mounting clamps, teflon tape and pole not provided by Tallysman.

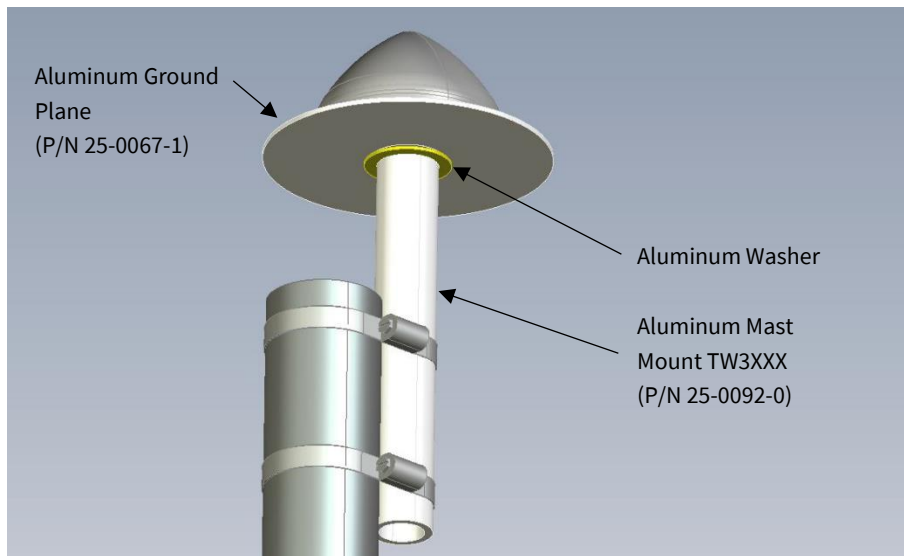


Figure 6 – Aluminum Mast Mount TW3XXX (P/N 25-0092-0)

For this application it is recommended to electrically insulate the mast mount from the galvanized steel pole with teflon tape. Mounting clamps, teflon tape and pole not provided by Tallysman.

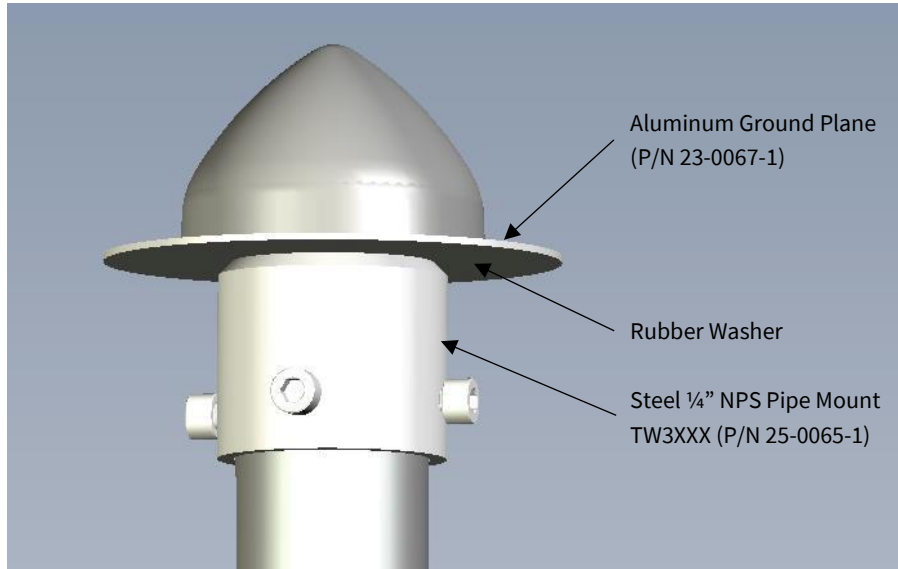


Figure 7 – Steel 1/4" NPS Pipe Mount TW3XXX (P/N 23-0065-1)

Note the rubber washer between the pipe mount and aluminum ground plane to mitigate galvanic corrosion. Pole not provided by Tallysman.

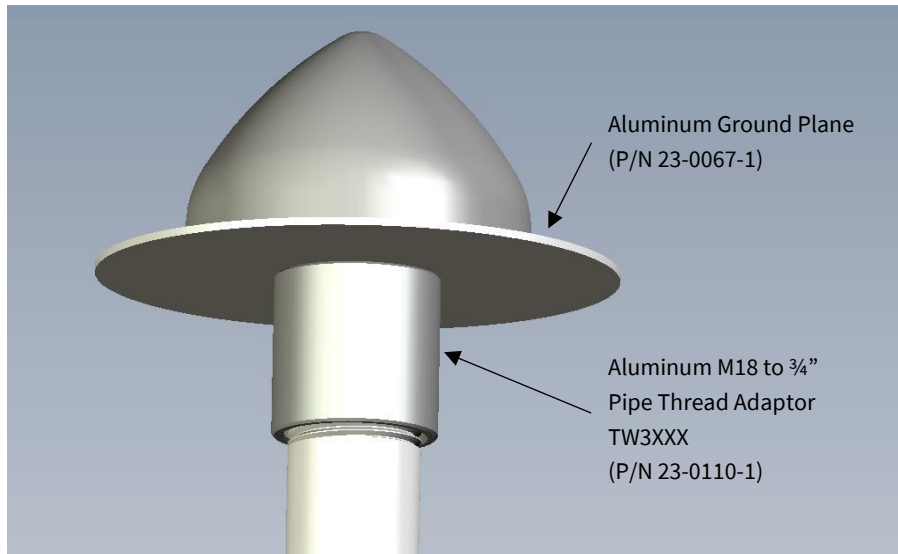


Figure 8 – Aluminum M18 to 3/4" Pipe Thread NPT Adaptor TW3XXX (P/N 23-0110-1)

It is recommended to install the antenna on the adaptor and the adaptor on the pipe with teflon tape to provide both electrical isolation and water proofing. Pole not provided by Tallysman.

In-Line Amplifiers

Tallysman offers a range of rugged waterproof, low cost, low noise, low power, in-line amplifiers specially designed to tightly filter and boost weak GPS L1 signals while maintaining low antenna noise figures. For more information, visit [Tallysman Amplifiers](#).



Splitters & Bias T

Tallysman offers a range of splitters that permits two GNSS receivers to operate on one antenna by allowing the DC voltage source to pass through Port 2 but blocked on Port 1. For more information, visit [Tallysman Signal Splitters](#).



Lightening Protection

Lightening surge protection is recommended on all installation to protection of end user equipment such as GPS receivers etc,

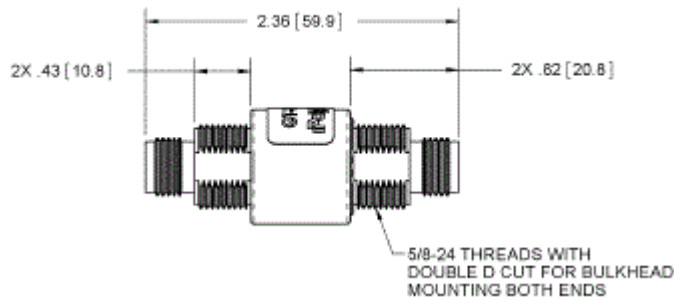
Tallysman offer the following lightening arrestors:

Product	Description	Frequency	Spec
GT-TFF-AL	Gas Tube Protector TNC Female/Female	DC to 7 GHz	DC Spark over 150V
DGXZ+15TFTF-A	Silicon Diode, MOV and Gas Tube Hybrid	800 to 2500MHz	20kA IEC 61000-4-5

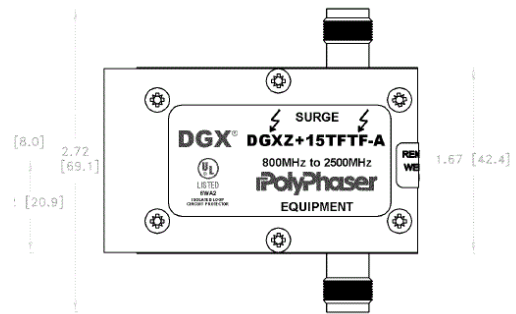
Table 2 – Lightening Arrestors

The GT unit is a low cost 150V spark over gas tube. If you intend to use this ensure that the end user equipment can withstand the 150V on the input.

The DGXZ products use a combination Silicon Diode, MOV and Gas Tube hybrid protection design. The Silicon Diode offers the fastest and lowest clamp point (16.5VDC) along with the robust MOV and Gas Tube elements.



GT-TFF-AL



DGXZ+15TFTF-A

Ordering Information

Mounting Brackets

Aluminum L- Bracket	TW3XXX P/N 23-0040-0
Stainless Steel L- Bracket	TW3XXX P/N 23-0040-1
Aluminum M18 to 3/4" NPT Pipe Adaptor	TW3XXX P/N 23-0110-1
Aluminum Mast Mount	TW3XXX P/N 23-0092-0
Steel 1 1/4" ID Pipe Mount	TW3XXX P/N 23-0065-1
Aluminum Ground Plane	P/N 23-0067-1

Lightening Arrestors

GT-TFF-AL	Gas Tube Protector TNC Female/Female
DGXZ+15TFTF-A	Silicon Diode, MOV and Gas Tube Hybrid

In Line Amplifiers

TW120 - GPS L1, 25 dB	P/N 33-0120-0
TW125 - 1.2 to 1.8 Ghz, 25 dB	P/N 33-0125-0
TW141 -1.2 to 1.8 Ghz, 40 dB Mid Power	P/N 33-0126-0

Splitter

TW150	1 to 2 signal splitter with DC pass-through
TW151	1 to 2 signal splitter with DC blocking
TW154	Bias Tee, 3.3Vdc out
TW155	Bias Tee, 5Vdc out

About Tallysman

Tallysman® is a developer, provider, and manufacturer of global positioning components and intelligent location based wireless infrastructure solutions for tracking systems.

Based in Ottawa, Canada, Tallysman is focused on high function, high performance technology and solutions. Our core competencies include digital wireless networks, RF and Global Navigation Satellite Systems (GNSS) component design.

Tallysman is known for its brands of Accutenna® and VeraPhase®. These technologies have proven themselves to provide the highest performance antennas (low axial ratios, high multi-path signal rejection, tight PCV) in their size and weight, while setting lower economical price points. Tallysman's antennas are the antennas of choice for a wide variety of applications.

Learn more at www.tallysman.com.