XFTP SAT LITE
Satellite Meter

OPERATION MANUAL

TRILITHIC
INNOVATIVE ENGINEERING

Trilithic Company Profile

Trilithic is a privately held manufacturer founded in 1986 as an engineering and assembly company that built and designed customer-directed products for telecommunications, military and industrial customers. From its modest beginnings as a two-man engineering team, Trilithic grew over the years and broadened its offerings of RF and microwave components by adding broadband solutions to its product line. This was accomplished with the acquisition of components manufacturer Cir-Q-Tel and instruments manufacturer Texscan.

Today, Trilithic is an industry leader providing telecommunications solutions for major broadband, RF and microwave markets around the world. As an ISO 9000:2001 certified company with over 40 years of collective expertise in engineering and custom assembly, Trilithic is dedicated to providing quality products, services and communications solutions that exceed customer expectations.

Trilithic is comprised of four major divisions:

- **Broadband Instruments & Systems**
  Offers test, analysis and quality management solutions for the major cable television systems worldwide.
- **RF Microwave Components**
  Provides components and custom subsystems for companies specializing in cellular, military and other wireless applications.
- **Emergency Alert Systems**
  Leading supplier of government-mandated emergency alert systems used by HFC service providers.
- **XFTP**
  Offers a specialty line of field technical products for cable operators and technicians, as well as a line of products for installing electronics in the home of the future.

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Helpful Website

The following website contains general information which may be of interest to you:

http://www.trilithic.com

Trilithic's website contains product specifications and information, tips, release information, marketing information, Frequently Asked Questions (FAQs), bulletins and other technical information. You can also check this website for product updates.

Where to Get Technical Support

Trilithic technical support is available Monday through Friday from 8:00AM to 5:00PM EST. Callers in North America can dial 1-317-895-3600 or 1-800-344-2412 (toll free). International callers should dial 1-317-895-3600 or fax questions to 1-317-895-3613. You can also e-mail technical support at *techsupport@trilithic.com*.

For quicker support response when calling or sending e-mail, please provide the following information:

- Your name and your company name
- The technical point of contact (name, phone number, e-mail)
- The XFTP SAT LITE serial number and firmware version number
- A detailed description of the problem you are having, including any error or information messages

How this Manual is Organized

This manual is divided into the following chapters:

- Chapter 1, “General Information” provides Trilithic contact information and describes how this Operation Manual is structured.
- Chapter 2, “Introduction” describes the XFTP SAT LITE. This chapter describes the mechanical features of the instrument and the equipment that is supplied with the instrument. This chapter also describes the battery operation and charging.
- Chapter 3, “Operation” describes how to use the XFTP SAT LITE for easy satellite dish alignment and testing.
- Chapter 4, “Satellite Configurations” describes how to view satellite configurations, change individual configuration parameters, and save new satellite configurations.
- Chapter 5, “Appendix” shows the technical specifications of the XFTP SAT LITE.

Conventions Used in this Manual

This manual has several standard conventions for presenting information.

- Connections, menus, menu options, and user entered text and commands appear in **bold**.
- Section names, Web and email addresses appear in *italics*.

Note: A note is information that will be of assistance to you related to the current step or procedure.

CAUTION: A caution alerts you to any condition that could cause a mechanical failure or potential loss of data.

WARNING: A warning alerts you to any condition that could cause personal injury.

Precautions

WARNING: Do not use the XFTP SAT LITE in any manner not recommended by the manufacturer.

CAUTION: Since the battery is delivered with the minimum amount of charge, you should charge the battery before first use.

CAUTION: Do not use any charger other than the charger that is supplied with the instrument. Doing so may result in damage to the instrument and/or battery and will void your warranty.

CAUTION: The factory default configurations have been set to provide correct satellite reception and to avoid locking on incorrect satellite signals. Changing any parameter on any memory channel may prevent the proper operation of the meter.

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What is the XFTP SAT LITE?

The XFTP SAT LITE Satellite Meter makes satellite dish alignment simple and fast. The satellite meter provides the following functions:

- Provides signal level and quality indicators (bar graphs) along with an audio tone proportional to signal strength for fine tuning the dish position.
- Provides a measurement screen with C/N and BER measurements to confirm a quality signal with the dish setup.

The XFTP SAT LITE Satellite Meter includes the following features:

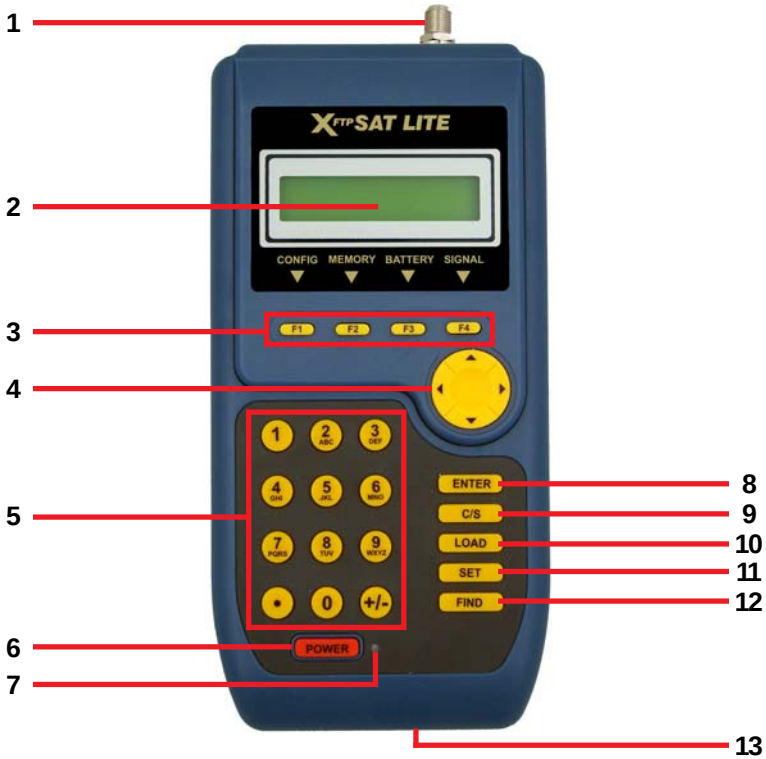
- The SAT LITE uses Satellite Datastream Identification (SDI) to ensure the meter will lock on to the selected satellite.
- Provides LNB power for dish alignment without a receiver or TV connection.
- Stores up to 60 satellite configurations.
- 22 KHz switching.

Supplied Equipment

The XFTP SAT LITE comes with the following:

- XFTP SAT LITE Satellite Meter
- Instrument Bag
- XFTP SAT LITE Battery Charger
- RF Input Connector
- Operation Manual

Mechanical Features



1. **RF Input** - BNC or F-Type input connection.
2. **LCD Display** - Displays the various parameters for the selected function.
3. **Function Keys** - There are four functions keys that function as follows:

   F1 - Use this button to view and edit the satellite configuration parameters. (Same as **SET Button**)

   F2 - Use this button to view the list of stored satellite configurations (Same as **LOAD Button**)

   F3 - Use this button to display the battery voltage and power settings (shutdown) screen.

   F4 - Use this button to exit any mode and go to the signal display mode.

4. **Direction Keys** - Use these keys to highlight the desired field on the LCD Display.
5. **Alphanumeric Keypad** - Use these keys to input numeric values as well as alphabetical characters including the decimal point and positive/negative symbols.
6. **POWER Button** - Use this button to turn the instrument on and off.
7. **Charge Indicator Light** - This light will be illuminated when the charger is connected to the instrument and AC power.
8. **ENTER Button** - Use this button to select the currently highlighted field on the LCD Display or change views in signal display mode.
9. **C/S Button** - Use this button from the configuration parameter display to save your satellite configuration to the satellite configuration list. Also, use this button from the signal display mode to enable or disable audio.
10. **LOAD Button** - Use this button to view the satellite configuration list.
11. **SET Button** - Use this button to view and edit the loaded satellite configuration parameters.
12. **FIND Button** - Use this button to display the list for satellite configuration selection and loading.
13. **DC Charge Port** - Use this port to connect the XFTP SAT LITE charger to the instrument.

Using the Alphanumeric Keypad

The instrument makes use of an alphanumeric keypad similar to that of a telephone for entering both numbers and letters.

- The 1 Button supports the number 1.
- The 2 Button supports A, B, C, a, b, c, 2.
- The 3 Button supports D, E, F, d, e, f, 3.
- The 4 Button supports G, H, I, g, h, i, 4.
- The 5 Button supports J, K, L, j, k, l, 5.
- The 6 Button supports M, N, O, m, n, o, 6.
- The 7 Button supports P, Q, R, S, p, q, r, s, 7.
- The 8 Button supports T, U, V, t, u, v, 8.
- The 9 Button supports W, X, Y, Z, w, x, y, z, 9.

Entering Numeric Values

Within several screens, you must enter numeric values. Use the ▲ or ▼ Direction Button(s) to highlight the desired field to change, press the ENTER Button or the ▶ Button to edit the field, and then press the alphanumeric buttons to enter the desired value.

For example to enter the number 12.0: Press ▶ + 1 + 2 + • + 0

Then press the ENTER Button or the ▶ Direction Button to enter the value into the instrument. If the value that you entered is in an invalid format, the field will default to its previous value when you press the ENTER Button or the ▶ Direction Button.

Entering Alphanumeric Characters

You can enter alphanumeric data for satellite configuration names by using the ▲ or ▼ Direction Button(s) to highlight the desired field to change, press the ENTER Button or the ▶ Direction Button, and then press the alphanumeric buttons to enter the desired value.

To enter the next character, you must press the ENTER Button or ▶ Direction Button to shift the cursor to the next character.

For example to enter the text “TEST”, perform the following steps:

- Use the ▲ or ▼ Direction Button(s) to highlight the desired field to change.
- Press the ENTER Button or the ▶ Direction Button to edit the highlighted field.
- Press 8 to enter “T” in the field and then press the ENTER Button or ▶ Direction Button to move the cursor to the next character.
- Press 3 + 3 to enter “E” in the field and then press the ENTER Button or ▶ Direction Button to move the cursor to the next character.
- Press 7 + 7 + 7 + 7 to enter “S” in the field and then press the ENTER Button or ▶ Direction Button to move the cursor to the next character.
- Press 8 to enter “T” in the field.
- Press the ENTER Button or ▶ Direction Button twice to accept the changes.

Note: If you make an error when entering a number or name, you can press the C/S Button or ◀ Direction Button to backspace and then re-enter the text.

Battery Operation and Charging

The XFTP SAT LITE operates on a high performance built-in 8.4 Volt Ni-MH battery and will typically provide more than three (3) hours of operation (more than one and a half (1.5) hours with LNB powered) if fully charged.

CAUTION: Since the battery is delivered with the minimum amount of charge, you should charge the battery before first use.

The time to fully charge the battery is typically less than three (3) hours while turned off. When you charge the battery for the first three times, it is recommended that you charge the battery for four (4) hours.

To charge the battery, connect one end of the charge cube to the DC Charge Port on the bottom of the instrument and plug the charge cube into an AC power supply. When the Charge Indicator Light next to the POWER Button is illuminated, the instrument is charging. The LED on the charger will illuminate red while fast charging the XFTP SAT LITE. The LED will be green after full charge and current is reduced to trickle charge.

Battery Charge Level

To view the battery voltage, press the F3 Button, the instrument will display the power settings screen as shown in the figure below.

The instrument has an automatic battery voltage monitoring function to alert the user to a low battery voltage condition. When the battery is below 7.7 Volts (± 0.2 Volts), the instrument will beep. After the instrument beeps, you must charge the battery or the instrument will automatically shut down.

CAUTION: Do not use any charger other than the charger that is supplied with the instrument. Doing so may result in damage to the instrument and/or battery and will void your warranty.

Power Saving

To change the power saving selection, press the F3 Button, the instrument will display the power settings screen as shown in the figure below.

Press the ▼ Button to move down to highlight the **Shutdown** Field as shown in the following figure.

To change the power saving setting, press the ENTER Button or the F4 Button repeatedly to scroll through the following options; **always**, **3m**, **10m**, or **30m**.

When you select **always**, the instrument will always remain on. When you select **3m**, **10m**, or **30m**; the instrument will shutdown after the specified amount of time as described below.

When the power saving feature is activated and the user has not performed any keyboard actions, the instrument will beep three times as the idle time approaches the user determined shutdown time. If the user doesn't press any keyboard buttons and the idle time exceeds the user determined shutdown time, the instrument will beep three times and then automatically shut down.

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Overview

The XFTP SAT LITE is designed to make satellite dish alignment easy and fast. The operation includes the following steps:

- Loading the satellite configuration.
- Signal and quality level meter for fine tuning of the satellite dish position.
- Display of measurement screen to confirm setup.

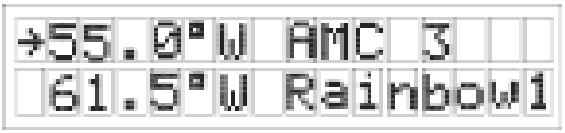
Let's Get Started

Turn the instrument power on by pressing the POWER Button at the bottom left of the keypad.

The instrument will briefly display an introduction screen with the model name, serial number, and firmware version number.

Loading a Satellite Configuration

After the power-up screen, the instrument will display the satellite configuration list in order of longitude as shown in the figure below. You can also access the satellite configuration list for loading from any screen by pressing the FIND Button.

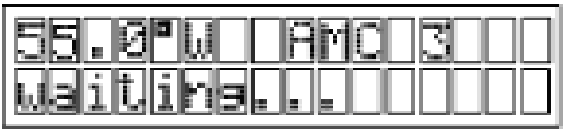


You can load a new satellite configuration as described below or use the last loaded configuration (including a configuration loaded prior to power off) by pressing the F4 Button to go directly to the signal display mode.

Note: You can also use the F4 Button from any screen to go directly to the signal display mode.

To select a new satellite configuration simply press ▲ or ▼ Direction Button(s) to highlight the desired configuration or press the ◀ or ▶ Direction Button(s) to move through the list four configurations at a time.

With the desired satellite configuration highlighted, press the ENTER Button to load the satellite configuration. The display will momentarily indicate **Loading...** and then display **waiting** for a few seconds while looking for a signal.

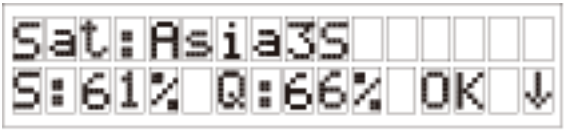


Note: A satellite configuration may also be loaded from the configuration memory list using F2 or LOAD. See Viewing Configuration Parameters in the following chapter.

Signal Display

After loading a satellite configuration or pressing the F4 Button to use the last configuration, one of the two signal display screens will be displayed for dish alignment as shown below.

You can switch between the view of bar graphs with signal and quality level percentages or satellite name with percentages by pressing the ENTER Button.



S (Signal Level) - This is the satellite signal level indicated as a percentage. The bar graph directly corresponds to the percentage shown to the right. To obtain a better signal level, adjust the Azimuth and Elevation of your satellite dish. Using the bar graph and speaker tone, you can easily find the maximum signal level. When the bar graph is longer, the percentage is higher, and the speaker's tone is higher, the signal level is stronger.

Q (Signal Quality) - This is the satellite signal quality indicated as a percentage. The bar graph directly corresponds to the percentage shown to the right. To obtain a better signal quality, adjust the polarization (tilt/skew) of the satellite dish. Using the bar graph, you can easily find the maximum signal quality. When the bar graph is longer, the percentage is higher, and the signal quality is better.

In the signal display mode, an audible tone may be heard when the signal level is greater than approximately -67 dBm (-20 dBmV or 40 dBµV) with a pitch proportional to signal strength to aid in fine tuning the dish position. Press the C/S Button to enable or disable audio.

Align the satellite dish to get the maximum values of signal level and quality.

When the XFTP SAT LITE is locked onto the satellite signal, the text **OK** will appear in the upper right portion of the screen.

Signal Measurements

From the signal display, press the ▼ Direction Button to display the measurements of Bit Error Rate and Carrier-to-Noise ratio as shown in the following figure.

Note: The BER and C/N measurements are for reference only and are only to be used to confirm the quality of your satellite dish setup.

Press the ▼ Direction Button again to display the name of the satellite and its longitude as shown in the following figure.

If desired, you can press the ▲ or ▼ Direction Buttons to cycle through the signal display, measurement mode, and selected satellite information again.

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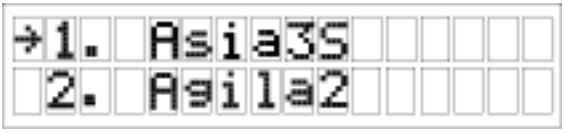
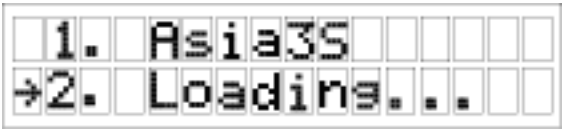
Viewing Configuration Parameters

The parameters of the currently loaded satellite configuration can be displayed for viewing or changing by pressing the F1 or SET Button.

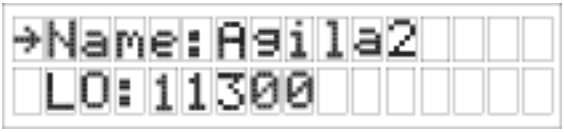
To select a configuration from the list of satellite configurations, press the F2 or LOAD Button. The satellite configuration list will appear in order of the configuration memory location as shown in the following figure.



To select a satellite configuration, simply press ▲ or ▼ Direction Button(s) to move up and down through the list one location at a time or press the ◀ or ▶ Direction Button(s) to move through the list four configurations at a time. With the desired satellite configuration highlighted, press the ENTER Button to load the satellite configuration parameters for viewing and editing. The display will momentarily indicate **Loading...** while the instrument is loading the satellite configuration.



Once the satellite configuration parameters have loaded, the details will be displayed as shown in the following figure.



You can use the F4 Button to go to the Signal Display or use the ▲ or ▼ Direction Button(s) to view all parameters. You can also edit the parameters from the displayed screen. For more information on how to modify the satellite configuration parameters, see the Changing Configuration Parameters in this chapter.

Changing Configuration Parameters

After you have loaded the satellite configuration parameters using the procedure shown in the Viewing Satellite Configuration Parameters section of this chapter, the configuration details screen will appear as shown in the following figure.

Each parameter can be changed as shown in the following sections. After making all of the desired parameter changes, you can save the new configuration as described in the Saving Configurations section of this chapter.

CAUTION: The factory default configurations have been set to provide correct satellite reception and to avoid locking on incorrect satellite signals. Changing any parameter on any memory channel may prevent the proper operation of the meter.

Configuration Name

To change the name of the configuration, use the ▲ or ▼ Direction Buttons to highlight the **Name** Field, press the ▶ Direction Button or ENTER Button, and then use the alphanumeric keypad to enter the new name as shown in the following figure.

Note: The configuration name can contain letters and/or numbers, but cannot exceed 8 characters.

Note: For more information about how to enter alphanumeric values, see Chapter 2: Introduction, *Using the Alphanumeric Keypad*.

When you are finished entering the configuration name, press the ▶ Direction Button or ENTER Button to finish editing the name.

Local Oscillator Frequency

To change the selected local oscillator frequency for the satellite dish LNB, use the ▲ or ▼ Direction Buttons to highlight the **LO** Field, then press the ▶ Direction Button or ENTER Button.

To change the local oscillator frequency, use the alphanumeric keypad to enter the new value, and then press the ▶ Direction Button or ENTER Button to complete your changes.

The range of the local oscillator frequency should be 0 MHz, 4500 to 5500 MHz, or 9500 to 11500 MHz.

Downstream Frequency

The downstream frequency is the frequency which is used for sending a signal to earth from a satellite and is measured in MHz.

To change the downstream frequency, use the ▲ or ▼ Direction Buttons to highlight the **F** Field, then press the ▶ Direction Button or ENTER Button.

To change the downstream frequency, use the alphanumeric keypad to enter the new value, and then press the ▶ Direction Button or ENTER Button to complete your changes.

The absolute value of the difference between the downstream frequency and the local oscillation frequency should be in the range of 950 to 2150 MHz.

Symbol Rate

The symbol rate is the speed of the data transmission. It is the bit rate of the digital signal and is measured in Mb/s.

To change the symbol rate, use the ▲ or ▼ Direction Buttons to highlight the **SR** Field, then press the ▶ Direction Button or ENTER Button.

To change the symbol rate, use the alphanumeric keypad to enter the new value, and then press the ▶ Direction Button or ENTER Button to complete your changes.

The symbol rate should be in the range of 1000 to 45000 Mb/s.

LNB Power Supply

The LNB power supply is the power supplied from the instrument to the satellite dish LNB and is measured in Volts.

To change the LNB power supply, use the ▲ or ▼ Direction Buttons to highlight the **LNB** Field, then press the ▶ Direction Button or ENTER Button.

To change the LNB power supply, press the ▶ Direction Button or ENTER Button to choose from **0V**, **13V**, or **18V**.

Satellite Longitude

The satellite longitude is the position of the satellite over the earth.

To change the satellite longitude, use the ▲ or ▼ Direction Buttons to highlight the **L** Field, then press the ▶ Direction Button or ENTER Button.

To change the satellite longitude, use the alphanumeric keypad to enter the new value, and then press the ▶ Direction Button or ENTER Button to complete your changes.

The satellite longitude is from -180° to +180°, where east longitude is positive and west longitude is negative.

22 KHz Status Switch

The 22 KHz status switch is sometimes used when the satellite dish being used has multiple LNBs. If there is only one LNB being used, the switch should be **Off**.

To change the status of the 22 KHz switch, use the ▲ or ▼ Direction Buttons to highlight the **22KHz** Field, then press the ▶ Direction Button or ENTER Button to choose from **Off** or **On**.

Modulation Mode

The modulation mode can be set for DVB, DTV (DSS), or AUTO modes.

To change the modulation MODE, use the ▲ or ▼ Direction Buttons to highlight the **Mode** field, then press the ENTER Button or the ▶ Direction Button to select DVB, DTV, or AUTO.

The AUTO mode will automatically select the correct modulation type for the signal.

FEC

The FEC (Forward Error Correction) can be set to 1/2, 2/3, 3/4, 5/6, 6/7, 7/8, or AUTO modes.

To change the FEC, use the ▲ or ▼ Direction Buttons to highlight the **FEC** field, then press the ENTER Button or the ▶ Direction Button to select a specific FEC mode or AUTO.

The AUTO mode will automatically select the correct FEC type for the signal.

Verify

The Verify mode is used to verify the absence of a signal on another channel to confirm the signal is for the selected configuration.

To change the Verify mode, use the ▲ or ▼ Direction Buttons to highlight the **Verify** field, then press the ENTER Button or the ▶ Direction Button. Enter the desired channel memory number (or 0 for null), then press the ENTER Button or the ▶ Direction Button again to exit the field.

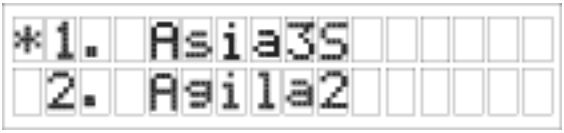
The Verify mode can be set to any SAT LITE memory channel or Null if a channel does not require verification.

CAUTION: The factory default configurations have been set to provide correct satellite reception and to avoid locking on incorrect satellite signals. Changing any parameter on any memory channel may prevent the proper operation of the meter.

Note: Any new configurations should be saved at the end of the memory list, in the first available “Null” location.

Saving Configurations

If you have changed any configuration parameters, you can save the new configuration to the satellite configuration list. To save the new satellite configuration, press the C/S Button.



To highlight the memory location for your satellite configuration, simply press ▲ or ▼ Direction Button(s) to move up and down through the list one location at a time or press the ◀ or ▶ Direction Button(s) to move through the list four configurations at a time.

Note: Any new configurations should be saved at the end of the memory list, in the first available “Null” location.

Press the ▶ Direction Button or ENTER Button to save the satellite configuration in the selected memory location. When saving the satellite configuration, the instrument will briefly display the text “Saving...” in place of the name of the satellite configuration as shown in the following figure:

When finished, press the F4 Button to exit to the signal display mode.

Specifications

Frequency Range:
950 MHz to 2,150 MHz

Signal Level Range:
-65 dBm to -25 dBm

RF Input Connector Type:
F Type

Input Resistance:
75 Ω

Measurements:
QPSK Bit Error Rate, Carrier-to-Noise

Storage:
60 satellite configuration files

LNB Power Supply:
Horizontal Polarization / LHCP
+18 V, ≤ 500 mA

Vertical Polarization / RHCP
+13 V, ≤ 500 mA

Power:

Total Power:	8 Watts

Rechargeable NiMH batteries
Fast charge in 3 hours or less
Provides more than 2 hours of operation with single LNB power
Provides more than 4 hours operation without LNB power

Miscellaneous:

Dimension:	8.84” H x 4.23” W x 1.96” D (excluding removable F connector)
Weight:	1.89 lbs (0.856 kg)
Display:	LCD with backlight
Working Temperature:	0 °C to 40 °C
Storage Temperature:	-20 °C to 70 °C
Charger:	US Plug (100 - 240 VAC)

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Warranty Information

Trilithic, Inc. warrants that each part of this product will be free from defects in materials and workmanship, under normal use, operating conditions and service for a period of one (1) year from date of delivery. Trilithic, Inc.'s obligation under this Warranty shall be limited, at Trilithic, Inc.'s sole option, to replacing the product, or to replacing or repairing any defective part, F.O.B. Indianapolis, Indiana; provided that the Buyer shall give Trilithic, Inc. written notice.

Batteries are not included or covered by this Warranty.

The remedy set forth herein shall be the only remedy available to the Buyer under this Warranty and in no event shall Trilithic, Inc. be liable for incidental or consequential damages for any alleged breach of this Warranty. This Warranty shall not apply to any part of the product which, without fault of Trilithic, Inc., has been subject to alteration, failure caused by a part not supplied by Trilithic, Inc., accident, fire or other casualty, negligence or misuse, or to any cause whatsoever other than as a result of a defect.

Except for the warranty and exclusions set forth above, and the warranties, if any, available to the Buyer from those who supply Trilithic, Inc., there are no warranties, expressed or implied (including without limitation, any implied warranties of merchantability of fitness), with respect to the condition of the product or its suitability for any use intended for it by the Buyer or by the purchaser from the Buyer.

TRILITHIC
INNOVATIVE ENGINEERING

9710 Park Davis Drive
Indianapolis, IN 46235
(317) 895-3600
www.trilithic.com

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