

**H600 RFHawk**  
**Quick Start User Manual**

[www.tektronix.com](http://www.tektronix.com)  
071-2464-00

**Tektronix**

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## Contacting Tektronix

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For product information, sales, service, and technical support:

- In North America, call 1-800-833-9200.
- Worldwide, visit [www.tektronix.com](http://www.tektronix.com) to find contacts in your area.

## Warranty 2

Tektronix warrants that this product will be free from defects in materials and workmanship for a period of one (1) year from the date of shipment. If any such product proves defective during this warranty period, Tektronix, at its option, either will repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product. Parts, modules and replacement products used by Tektronix for warranty work may be new or reconditioned to like new performance. All replaced parts, modules and products become the property of Tektronix.

In order to obtain service under this warranty, Customer must notify Tektronix of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. Customer shall be responsible for packaging and shipping the defective product to the service center designated by Tektronix, with shipping charges prepaid. Tektronix shall pay for the return of the product to Customer if the shipment is to a location within the country in which the Tektronix service center is located. Customer shall be responsible for paying all shipping charges, duties, taxes, and any other charges for products returned to any other locations.

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. Tektronix shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than Tektronix representatives to install, repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; c) to repair any damage or malfunction caused by the use of non-Tektronix supplies; or d) to service a product that has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty of servicing the product.

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## General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it.

To avoid potential hazards, use this product only as specified.

*Only qualified personnel should perform service procedures.*

While using this product, you may need to access other parts of a larger system. Read the safety sections of the other component manuals for warnings and cautions related to operating the system.

### To Avoid Fire or Personal Injury

**Use Proper Power Cord.** Use only the power cord specified for this product and certified for the country of use.

**Observe All Terminal Ratings.** To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for further ratings information before making connections to the product.

The inputs are not rated for connection to mains or Category II, III, or IV circuits.

**Power Disconnect.** The power cord disconnects the product from the power source. Do not block the power cord; it must remain accessible to the user at all times.

**Do Not Operate Without Covers.** Do not operate this product with covers or panels removed.

**Do Not Operate With Suspected Failures.** If you suspect that there is damage to this product, have it inspected by qualified service personnel.

**Avoid Exposed Circuitry.** Do not touch exposed connections and components when power is present.

**Replace Batteries Properly.** Replace batteries only with the specified type and rating.

**Recharge Batteries Properly.** Recharge batteries for the recommended charge cycle only.

**Use Proper AC Adapter.** Use only the AC adapter specified for this product.

**Do Not Operate in an Explosive Atmosphere.**

## Terms in this Manual

These terms may appear in this manual:



**WARNING.** *Warning statements identify conditions or practices that could result in injury or loss of life.*

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**CAUTION.** *Caution statements identify conditions or practices that could result in damage to this product or other property.*

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## Symbols and Terms on the Product

These terms may appear on the product:

- DANGER indicates an injury hazard immediately accessible as you read the marking.
- WARNING indicates an injury hazard not immediately accessible as you read the marking.
- CAUTION indicates a hazard to property including the product.



The following symbol(s) may appear on the product:



Standby

## Environmental Considerations

This section provides information about the environmental impact of the product.

### Product End-of-Life Handling

Observe the following guidelines when recycling an instrument or component:

**Equipment Recycling.** Production of this equipment required the extraction and use of natural resources. The equipment may contain substances that could be harmful to the environment or human health if improperly handled at the product's end of life. In order to avoid release of such substances into the environment and to reduce the use of natural resources, we encourage you to recycle this product in an appropriate system that will ensure that most of the materials are reused or recycled appropriately.



This symbol indicates that this product complies with the European Union's requirements according to Directive 2002/96/EC on waste electrical and electronic equipment (WEEE). For information about recycling options, check the Support/Service section of the Tektronix Web site ([www.tektronix.com](http://www.tektronix.com)).

**Battery Recycling.** This product contains a lithium ion (Li-ion) rechargeable battery, which must be recycled or disposed of properly. Please properly dispose of or recycle the battery according to local government regulations.

**Mercury Notification.** This product uses an LCD backlight lamp that contains mercury. Disposal may be regulated due to environmental considerations. Please contact your local authorities or, within the United States, the Electronics Industries Alliance ([www.eiae.org](http://www.eiae.org)) for disposal or recycling information.

**Perchlorate Materials.** This product contains one or more type CR lithium coin cell batteries. According to the state of California, CR lithium coin cells are classified as perchlorate materials and require special handling. See [www.dtsc.ca.gov/hazardouswaste/perchlorate](http://www.dtsc.ca.gov/hazardouswaste/perchlorate) for additional information.

## Transporting Batteries

The lithium ion rechargeable battery pack in this product contains less than 8 grams of equivalent lithium content, with individual cells containing less than 1.5 grams of equivalent lithium, as measured by International Civil Aviation Organization (ICAO) standards. Consult your air carrier for applicability and determination of any special lithium ion battery transportation requirements.

## Restriction of Hazardous Substances

This product has been classified as Monitoring and Control equipment, and is outside the scope of the 2002/95/EC RoHS Directive.

## Preface

This manual describes the installation and basic operation of the H600 RFHawk. For more detailed information on specific fields, tap the help buttons in the application to open the online help for those items.

## Key Features

The H600 RFHawk is a rugged, multi-standard spectrum analyzer, signal analysis, and interference mapping tool optimized for field use. Key features include:

- Input frequency range of 10 kHz to 6.2 GHz covers most modern signal sources
- Multiple signal markers, signal traces, and trace modes provide flexible measurement capabilities
- Spectrogram display for detection of intermittent signals
- Key RF measurements
- Signal Classification for analyzing and classifying signals of interest
- Plot measurements directly onto geo-referenced maps (using GPS) or image maps for on-site analysis of interference and coverage problems

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## Documentation

### To read about

### Use these documents

---

Installation and operation (overviews)

*H600 RFHawk Quick Start User Manual*. The quick start user manual contains general information about how to put your instrument into service, guides to user interface controls, and application examples.

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Help using the application

*Online Help*. The online help is context sensitive, displaying information appropriate for the active screen or the selected help button. (See page 27, *Getting Help*.)

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## Software Upgrades

Periodic software upgrades may become available. The software is operational only if you have a valid option key for the specific application module and serial number.

To check for upgrades:

1. Go to the Tektronix Web site ([www.tektronix.com](http://www.tektronix.com)).
2. Click **Software Downloads** on left side of the screen to link to the Software Downloads Web page.
3. Enter the product name or model number in the **Search by keyword** field and click **Go**.
4. Scroll through the list and select the appropriate link for your instrument to show more information or to download the software.

The instructions to perform the software upgrade are in the readme.txt file that is part of the software download.

## Conventions Used in This Manual

The following icons are used in this manual:

Sequence  
Step



Front panel  
power



Connect  
power



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## Preventing Personal Injury from Lightning



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**WARNING.** *To prevent personal injury from the effects of lightning, exercise the following precautions when using this product:*

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### Before connecting this product to any source

- Check your local weather forecast for the possibility of thunderstorms or lightning.
- If weather conditions could allow thunderstorms or lightning to develop, be sure to visually check the sky and weather conditions in your area frequently.
- If you can hear thunder or if you see lightning, do not connect this product to any source which may be exposed to the effects of lightning.
- Use your own good judgement and common sense. You must protect yourself from the effects of lightning.
- You must assume that hazardous voltages will be present on exposed surfaces of this product if it is connected to a source exposed to lightning. The insulation of this product will not protect you from these hazardous voltages.

## Do not connect this product to any source which might be subject to the effects of lightning

If thunderstorms or lightning are in your vicinity:

- When weather conditions that could lead to lightning activity exist in your area, ***you could be at risk of a lightning strike*** before the cloud is close enough for you to hear thunder or see lightning.
- When lightning strikes a structure or facility, current travels through rebar, concrete, pipes, cables, vent stacks, and electrical system.
- Lightning can induce electric and magnetic fields into structures and portions of wiring. The length of a conductor affected by the magnetic field of a lightning strike may exceed two miles.

## Be alert and aware of the effects of lightning

- When lightning strikes a conductor, which in turn introduces the current into an area some distance from the ground strike point, equipment can be damaged and personnel injured if they become an indirect path in the completion of the ground circuit.
- Conductors such as the braided shields of cables or unshielded wires will have significant transient currents flowing in them in regions exposed to the electric field effect of lightning.
- Induced voltages may cause breakdown of insulation in wiring at connectors and in electrical components or breakdown of air.



# Installation

Carefully unpack your instrument and verify that it includes the standard accessories.

## H600 RFHawk Standard Accessories

<b>Accessory</b>	<b>Tektronix part number</b>
H600 RFHawk instrument	H600
<i>H600 RFHawk Quick Start User Manual</i>	071-2464-xx
<i>H600 RFHawk installation software CD-ROM</i>	063-4122-xx
AC Power Adapter	119-7288-xx
Lithium-Ion Battery	146-0151-xx
GPS Antenna	119-7424-xx
Tilt stand	016-1868-xx
Soft carry case	016-1775-xx
BNC Connector cover (2)	200-0678-xx
N Connector cover (1)	200-4696-xx
Audio jack mute plug (mute all audio output from the instrument speaker)	131-8284-xx

Your instrument may also include optional accessories. Verify that the optional accessories you ordered are included with your instrument. For a current list of accessories, upgrades, and options, including service options, available for your instrument, visit the Tektronix Web site, [www.tektronix.com](http://www.tektronix.com).

## Operating Considerations

AC Adapter	Input voltage and current: 100 V - 240 V AC, 1.8 A Input frequency: 47 Hz to 63 Hz Output voltage and current: 24 V DC, 3 A
Dimensions	Height: 25.5 cm. (10.0 in) Width: 33 cm. (13 in) Depth: 12.5 cm. (4.8 in)
Weight	Weight: 6.0 kg (13.25 lbs) , instrument and one battery
Temperature Range	Operating: 0 °C to +50 °C specified performance, -10 °C to +50 °C typical Nonoperating: -40 °C to +60 °C
Humidity	Operating and Nonoperating: 5% to 95% relative humidity (RH) at up to +30 °C, 5% to 45% RH above +30 °C up to +50 °C, noncondensing
Altitude	Operating: Up to 4,600 m (15,092 ft.) Nonoperating: Up to 12,192 m (40,000 ft.)
RF Signal Input	Input frequency range: 10 kHz to 6.2 GHz Coupling: AC Input impedance: 50 Ω (nominal) Maximum input power without damaging instrument: 50 W rms 10 kHz to 3.2 GHz, 15 W rms 3.2 GHz to 6.2 GHz

## Cleaning

- Clean the exterior surfaces of the instrument with a dry lint-free cloth or a soft-bristle brush.
- Use a cloth or swab moistened with deionized or distilled water, or a 75% isopropyl alcohol solution for more stubborn stains, to clean the instrument or touch screen; use just enough moisture to dampen the cloth or swab.
- Use a gentle amount of force when cleaning the touch screen.



**CAUTION.** *Do not get moisture inside the instrument during exterior cleaning.*

*Do not wash the front-panel On/Standby switch. Cover the switch while washing the instrument.*

*Do not spray liquids directly on the instrument or touch screen.*

*Do not use abrasive cleaners, or chemical cleaning agents that contain benzene, toluene, xylene, acetone, or similar solvents; they can damage the instrument or touch screen. Do not use commercial glass cleaners to clean the touch screen.*

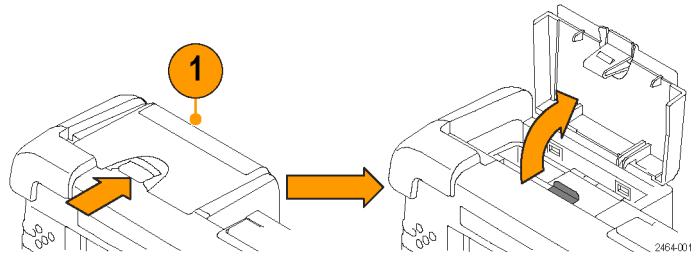
*Do not scrub the touch screen with excessive force while cleaning.*

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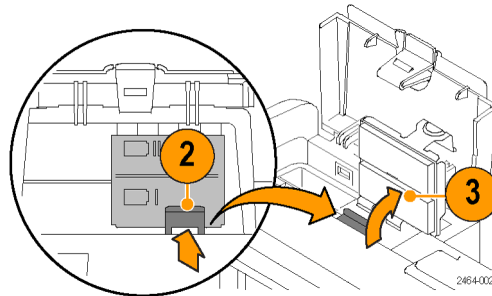
## Installing Batteries

The instrument comes standard with a single battery, which is not installed when the instrument is shipped. To install the battery, do the following:

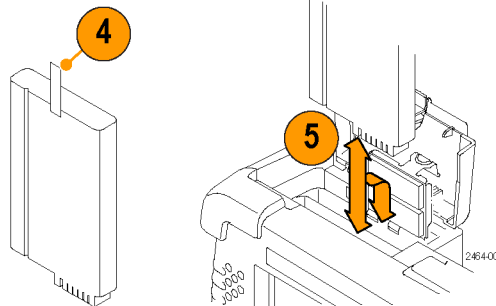
1. Push on the battery door latch, then open the battery door.



2. Push the metal battery retainer tab down and towards the back of the instrument.
3. Lift the battery retainer up.



4. Lift battery by the tab.
5. Insert the battery, oriented as shown, into either battery slot.
6. Close and latch the metallic battery retainer and the battery compartment door.
7. Reverse steps 1 through 6 to remove a battery.



You can add a second battery to increase the operating time. Replace a battery with the specified type only. To purchase a battery, contact your Tektronix Service Center for the correct part number.

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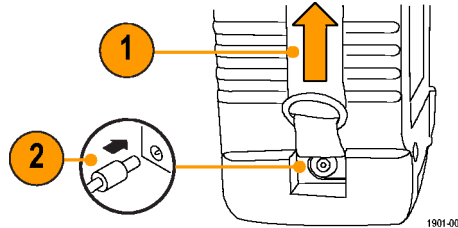
**NOTE.** *Disconnect power supply cables from the instrument before installing or removing batteries.*

*New batteries, or batteries that have not been used for an extended period, must be charged before using them to power the instrument. (See page 7, Charging the Batteries.)*

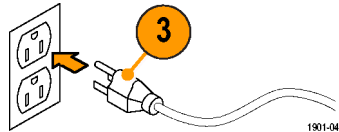
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## Connecting the AC Adapter

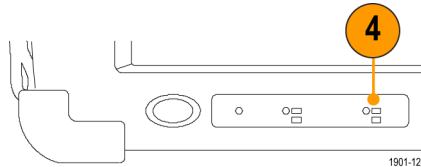
1. Lift the instrument strap to expose the power adapter connector.
2. Connect the AC power adapter to the instrument.



3. Connect the AC adapter to a properly-grounded AC power source using the provided power cord.



4. Charge the batteries before using the instrument on battery power for the first time. (See page 7, *Charging the Batteries.*)



## Charging the Batteries

Charge the batteries before using the instrument on battery power for the first time. Batteries are partially charged and calibrated at the factory. A calibrated battery allows the instrument to more accurately estimate how long the application modules can operate before the instrument automatically powers off. The front-panel BATTERIES charge status indicator turns off when charging is complete.

### Approximate charge time

Number of batteries	Instrument powered on	Instrument powered off
1	10 hours	5.5 hours
2	20 hours	11 hours

**NOTE.** *These are typical numbers for batteries that are low but not completely discharged.*

## Powering On and Off the Instrument, and Functional Verification

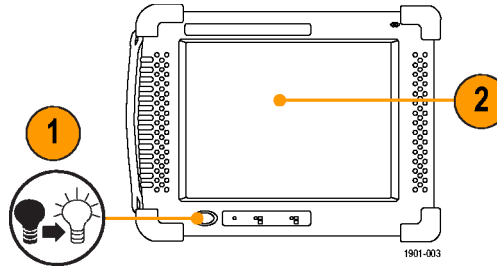
1. Tap the **On/Standby** button to power on the instrument.

The instrument WindowsCE Status bar shows the Battery icon when the instrument is operating on battery power and the External Power Connected icon when the instrument is operating with an external adapter.

To power off the instrument, tap the **On/Standby** button again.

For information on the instrument on/standby power modes, see the online help: **Start > Help > Tektronix Basics > Shutting Down the Instrument.**

2. For functional verification, watch the screen. Verify that the instrument does not display any power-on diagnostic error messages.





## Touch Screen Concepts

The instrument user interface is based on touch screen technology. Instead of using physical button and knob controls to select functions, set values, and take measurements, you tap (touch) virtual controls on the instrument screen. Virtual controls behave the same way as physical controls.

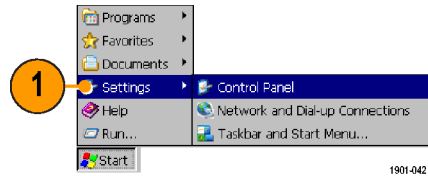
The following are touch screen terms used in this manual:

<b>Term</b>	<b>Description</b>	<b>Equivalent mouse operation</b>
Stylus	The physical object you use to touch the screen. A stylus is either your finger or an appropriate plastic-tipped stylus. Do not use any metal-tipped objects or pens for a stylus, as they can damage the touch screen.	The mouse pointer.
Tap	Touch the screen briefly with the stylus. Selects the item on the screen.	The left mouse button.
Drag	Press and hold on the screen with the stylus, drag the stylus to a new position, and then raise the stylus from the screen. Moves an item or selects an area.	Drag (hold down the left mouse button, move the mouse, and then release the button).

## Calibrate the Touch Screen

Before using the instrument for the first time, calibrate the touch screen display to respond correctly to your taps.

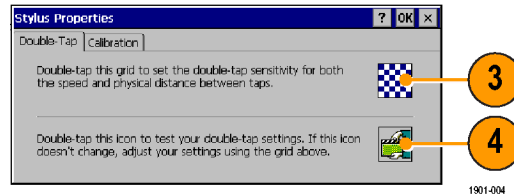
1. Tap **Start > Settings > Control Panel** to open the Control Panel screen.



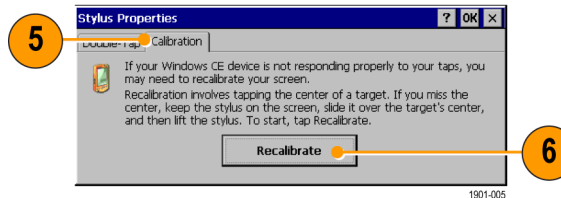
2. Double-tap the **Stylus** icon on the Control Panel screen.



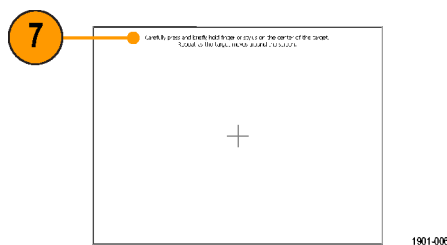
3. In the Double-Tap tab, double-tap the checkerboard grid at a comfortable speed with your stylus or finger to set the tap rate.
4. Double-tap the test icon to verify your settings.



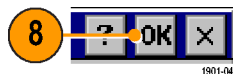
5. Tap the **Calibration** tab and read the instructions.
6. Tap the **Recalibrate** button to open the Cursor Position target screen.



7. Follow the target screen instructions. When the position target disappears, touch anywhere on the screen to return to the Calibration tab.



8. Tap **OK** to save calibration settings.

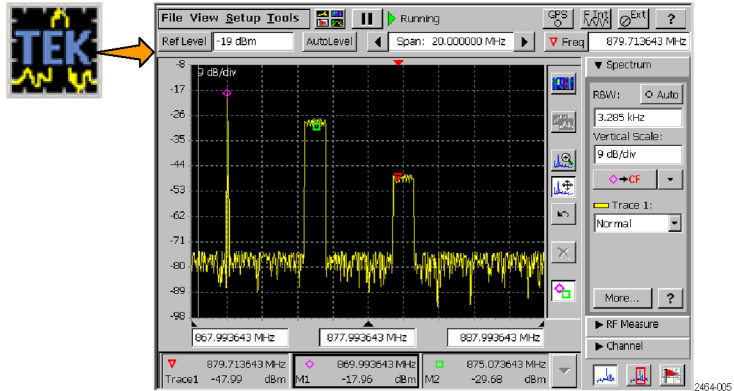


## Starting the H600 RFHawk Application

If purchased with preloaded software, RFHawk starts automatically when you power on the instrument. If RFHawk does not start automatically, or you have stopped the application, use either of the following methods to start the application:

- Double-tap the **RFHawk** icon on the instrument screen.
- Select **Start > Programs > Tektronix Applications > RFHawk**.

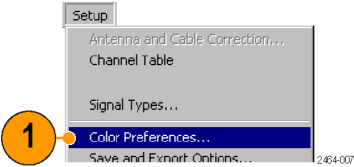
The instrument opens the application. The Microsoft WindowsCE taskbar displays a button for each running application. To bring the application to the front of the screen, tap the **RFHawk** button in the taskbar.



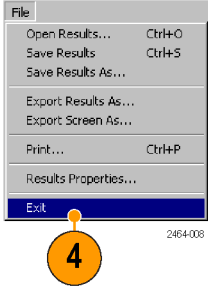
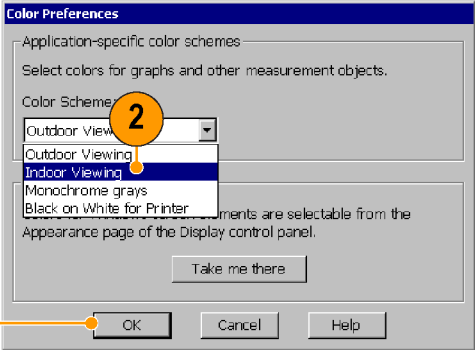
# Setting Display Colors

You can change the color scheme used in the instrument display. The color schemes optimize the display colors for use in different environments (outdoors or indoors) and for better printing quality on black and white (monochrome) printers.

- 1. Select **Setup > Color Preferences**.



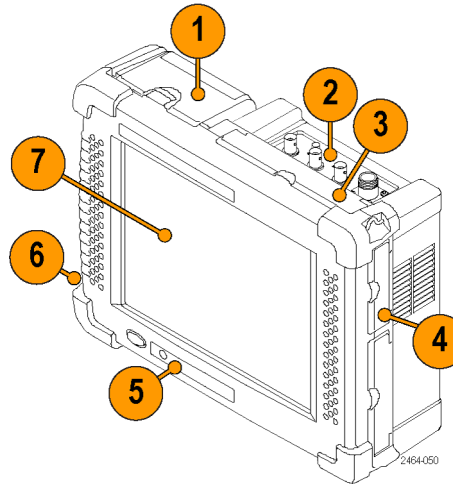
- 2. Tap the **Color Scheme** list field and select a display color scheme.
- 3. Tap **OK**.
- 4. Select **File > Exit** to close the application.
- 5. Restart the application to enable the changed color scheme.



# Getting Acquainted with Your Instrument

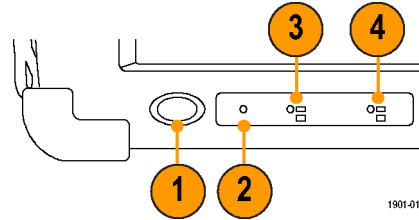
## Instrument Elements

1. Battery compartment.
2. Signal Connectors. (See page 17, *Signal Connectors*.)
3. Input/Output ports. (See page 16, *Input/Output Connectors*.)
4. PCMCIA card ports.
5. Power and Status panel. (See page 15, *Power On/Standby and Status Panel*.)
6. Connector for external power adapter. (See page 6, *Connecting the AC Adapter*.)
7. Touch screen.



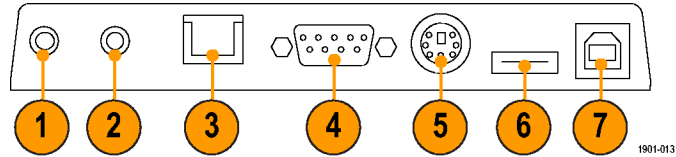
## Power On/Standby and Status Panel

1. Power On/Standby button. Push to power on or off the instrument. For more information, access the online help: **Start > Help > Tektronix Basics > Shutting Down the Instrument.**
2. Reset button. Performs a hardware reset; all programs and data loaded into volatile memory are erased. Generally only used to recover from a system lock-up. Use a thin probe to push the reset button.
3. Power/Display status. Green indicates that the instrument is powered on. Amber indicates that the instrument is powered on but the display is turned off (to conserve power).
4. Battery status. Green indicates that the instrument is connected to an external power source and is charging installed batteries. Red indicates a low battery. No color indicates that the batteries are charged.



## Input/Output Connectors

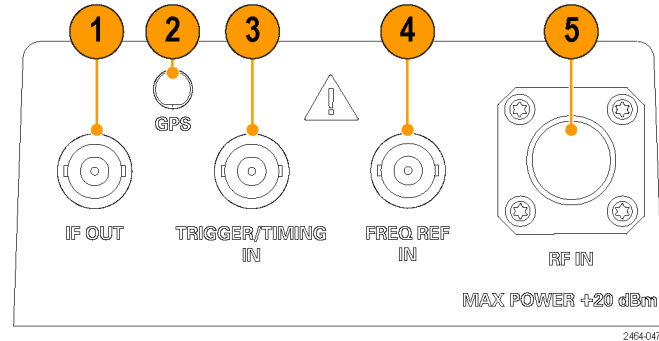
1. Microphone input
2. Headphone jack
3. Ethernet connector (RJ-45)
4. Serial RS-232 connector
5. PS/2 keyboard connector
6. USB Host connector
7. USB Slave connector





## Signal Connectors

1. IF OUT. For future use.
2. GPS. Connects to the GPS antenna.
3. TRIGGER/TIMING IN. For future use.
4. FREQ REF IN. Connect to an external frequency reference signal to improve measurement accuracy.
5. RF IN. The RF Input connects the RF measurement antenna or input signal source to the instrument.



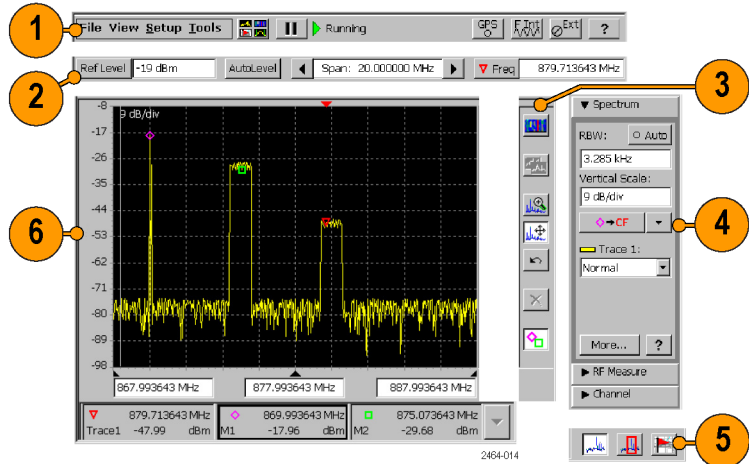
## Microsoft WindowsCE Elements

The Microsoft WindowsCE user interface is similar to other Microsoft Windows operating systems. You use standard Microsoft Windows operations to start (run) applications, select and move objects, and open folders or files. For more Microsoft WindowsCE information, access the online help: **Start > Help > WindowsCE Basics**.

The Status area, located at the bottom right of the screen, contains icons that include information about the instrument power status.

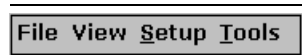



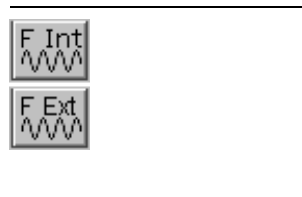
## The User Interface





1. **Command bar.** (See page 19, *The Command Bar.*)
2. **Spectrum Analyzer controls.** (See page 21, *The Spectrum Analyzer Controls.*)
3. **Display controls.** (See page 23, *Spectrum Display Control Buttons.*)
4. **Measurement drawers.** (See page 22, *The Measurement Drawer Buttons.*)
5. **Measurement mode buttons.** (See page 25, *The Measurement Mode Buttons.*)
6. **Measurement results.** Shows the waveform displays, measurement results, and marker readouts. The appearance of this area changes depending on the selected measurement mode and measurement type.



## The Command Bar

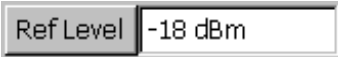


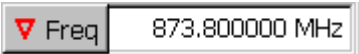
Contains the application menus, as well as buttons for running/pausing the application and setting GPS, reference signal, and external amplifier/attenuator parameters.

Element	Description
	Menus. See the online help topic <i>Menus</i> for information about the menu functions.
	Measurement Display button. Opens a dialog box from which to select the measurement type to display. (See page 30, <i>Select a Measurement Type</i> .)
	Run/Pause button. Runs or Pauses the current measurement acquisition.
	The GPS status button. Shows the GPS signal lock status of an attached GPS receiver. The color indicates the GPS receiver signal lock status. Tap this button to open the GPS dialog box. See the online topic <i>The GPS Dialog Box</i> for more information.
	<p>The Measurement Reference Frequency status button. Shows the measurement frequency reference source. Tap this button to open the Inputs dialog box. Use this button if you connect an external measurement reference frequency source to the instrument.</p> <p>The available measurement reference frequency sources are the internal instrument frequency reference (F INT) and an external reference (F EXT). See the online topic <i>The Inputs Dialog Box</i> for more information.</p>

Element	Description
	The RF Input Signal Gain/Attenuation status button. Shows the external attenuator or amplifier status. Tap this button to open the Inputs tab where you can set the input signal amplification or attenuation values. Use this button if you connect an attenuator or amplifier to the input signal. See the online topic <i>The Inputs Dialog Box</i> for more information.
	
 <small>2409-064</small>	
	Help button. Opens the online help. online help is context-sensitive and normally displays a help topic related to the current measurement mode or screen. If the current screen is not context-sensitive, the instrument opens the online help at the main help menu. Use the index, or do a word search, to locate specific information.

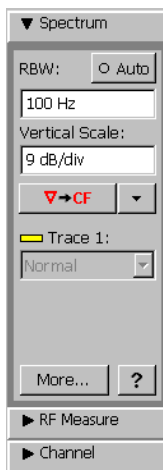
## The Spectrum Analyzer Controls

Sets the display reference level (manually or automatically), the frequency span, and the measurement frequency.

Element	Description
	<p>Reference Level button and field. Shows the current spectrum signal reference level. Tap the <b>Ref Level</b> button to open a keypad and enter a specific level value. Tap the Ref Level field to open an increment control to increase/decrease the current reference level value.</p>
	<p>AutoLevel button. Tap the button to automatically detect the maximum input signal level across the full instrument frequency range and set the Reference Level appropriately.</p>
	<p>Span controls and field. Shows the frequency span of the displayed signal. Tap the arrow buttons to increment or decrement the span value by the default span units (1–2–5). Tap the Span field to open a keypad and enter a specific span value.</p>
	<p>Measurement Frequency button and field. Shows the spectrum signal measurement frequency. Tap the <b>Freq</b> button to open a keypad and enter a specific frequency value. Tap the frequency field to open an increment control to increase/decrease the current reference level value in steps.</p> <p>Use the Freq/Span tab (<b>Spectrum drawer &gt; More</b>) to couple or uncouple the measurement frequency with the display center frequency.</p>

## The Measurement Drawer Buttons

### Element



### Description

Drawer buttons provide additional controls for setting parameters. The list of drawer buttons changes based on the measurement mode. The drawer buttons are always on screen to provide fast access to the most important controls for that measurement or setting.






Tap on a drawer button to open that drawer. A down-pointing arrow indicates an open drawer.

Tap the **More** button to open parameter tabs with which you can set additional measurement parameters.

Tap the **Help** button [?] to display information on that drawer.




## Spectrum Display Control Buttons

The Display Control buttons let you select the type of signal display, move the signal display area, and turn markers on and off.

Element	Description
	<p>Front Trace button. Selects which trace is in front on the display. Tap the button to cycle through all enabled traces. The Trace field in the Spectrum drawer shows the front trace name and trace type. See the online help topic <i>The Trace Tab</i> for more information.</p>
	<p>Move Display button. Lets you move the waveform display. Tap and drag on the screen to move the waveform in a horizontal or vertical direction (you cannot move the display diagonally). The vertical reference level scale changes to track the movement. If you move the display such that the measurement frequency is off-screen, the instrument sets the measurement frequency to the nearest edge of the display.</p>
	<p>Undo button. Undoes the last touch screen tap or drag action (such as a move or zoom).</p>
	<p>Reset button. Clears the current signal data and starts a new signal acquisition.</p>
	<p>Display Markers button. Shows or hides marker icons and readouts. See the online help topic <i>The Markers Tab</i> for more information.</p>

## Signal Classification Display Control Buttons




The following display control buttons are shown only when in Signal Classification mode, and replace existing spectrum display control buttons.

Element	Description
	Edit Region button. Enables the region edit mode, which lets you tap and drag on a region box to change the center frequency and span of a region. When selected, this button replaces the Zoom and Move Display buttons with the Change Span and Move Region buttons. (See page 40, <i>Edit a Signal Classification Region</i> .)
	Change Span button. Lets you change the frequency span of a region. This button replaces the spectrum Zoom button when Edit Region button is selected. You cannot use this function on a declared (classified) region. (See page 40, <i>Edit a Signal Classification Region</i> .)
	Move Region button. Lets you move a region to a new area on the signal. This button replaces the spectrum Move button when Edit Region mode is enabled. You cannot use this function on a declared (classified) region. (See page 40, <i>Edit a Signal Classification Region</i> .)



## The Measurement Mode Buttons

The Measurement Mode buttons select the type of measurement or operation to perform.

Element	Description
	Spectrum Measurement button. Sets the instrument to display spectrum measurements. (See page 32, <i>Display a Spectrum Signal</i> .)
	Signal Classification button. Sets the instrument to define signal regions, analyze, identify, and classify signals of interest. (See page 37, <i>Define a Signal Classification Region</i> .)
	iMap button. Sets the instrument to place instrument measurements on a map. Use for graphically recording measurements to help analyze signal characteristics, locate interference, and save measurement/location information. (See page 48, <i>iMap Measurement Mapping Mode</i> .)

## Parameter Entry Controls

Tap on a parameter field or button to open the appropriate parameter entry control for that field or button.

### Element

### Description




The Increment control lets you use buttons to increase or decrease the value of the field in small or large steps. The single arrow buttons make small changes. The double arrow buttons make larger changes.



Tap a keypad button to open a keypad in which to enter a value in the selected field. The keypad content changes to show the available entry functions for the selected item.





WindowsCE provides an Input Panel (virtual keyboard) that you can use to enter text such as file names. In most cases, when the instrument opens a dialog box that includes fields for text entry, the Input Panel also opens. When you close the dialog box, the Input Panel also closes.

To manually open the Input Panel, tap the WindowsCE **Input Panel** button (  right-most icon in the task bar). You can open a standard keyboard or a large keyboard. Tap the Input Panel button again and select **Hide Input Panel** to close the keyboard.

You can also open the Input Panel from **Tools > Keyboard**.

## Getting Help

The application includes a comprehensive online help system. You access the online help using the following methods:

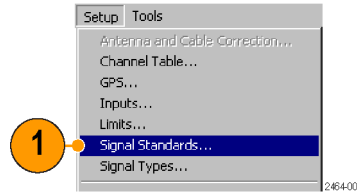
Online help element	Description
	Help button. Located at the top right of the screen, as well as on most measurement function drawers or tabs Tap this button to display a help topic that is relevant to the current display mode, measurement drawer, or tab contents.
	Dialog box help button. Tap this button to display an online help topic relevant to that dialog box.

# Operating Basics

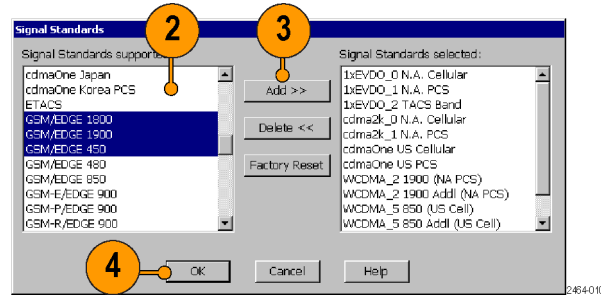
## Enabling Signal Standards

Enable (select) the signal standards that you expect to analyze or measure. Enabled signal standards are listed in various fields in the instrument.

1. Select **Setup > Signal Standards**.
2. Tap the name of the standard in the **Signal Standards supported** list that you want to enable. Drag the stylus to select two or more contiguous standards.



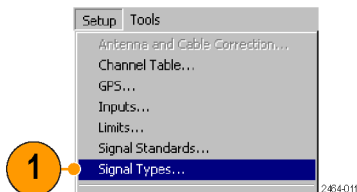
3. Tap the **Add >>** button to add the selected standard(s) to the **Signal Standards selected** list.
4. Tap **OK**. The enabled standards are now selectable from any Standards drop-down list.



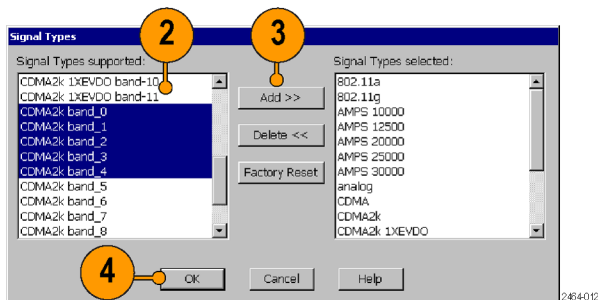
## Enabling Signal Types

Enable (select) the signal types that you expect to analyze or measure. Enabled signal types are listed in various fields in the instrument. Use enabled signal types to set measurement parameters such as measurement bandwidth.

1. Select **Setup > Signal Types**.

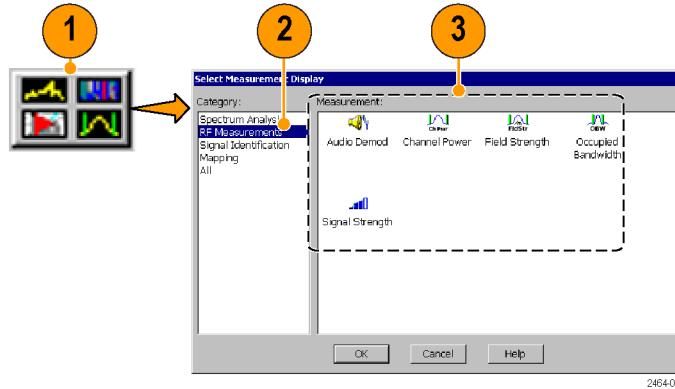


2. Tap the name of the standard in the **Signal Types supported** list that you want to enable. Drag the stylus to select two or more contiguous standards.
3. Tap the **Add >>** button to add the selected standard(s) to the **Signal Types selected** list.
4. Tap **OK**. The enabled types are now selectable from Signal Types drop-down lists.



## Select a Measurement Type

1. Tap the **Measurement Display** button.
2. Tap an item in the **Category** field.
3. Double-tap an item in the **Measurement** field to open the selected measurement display mode.



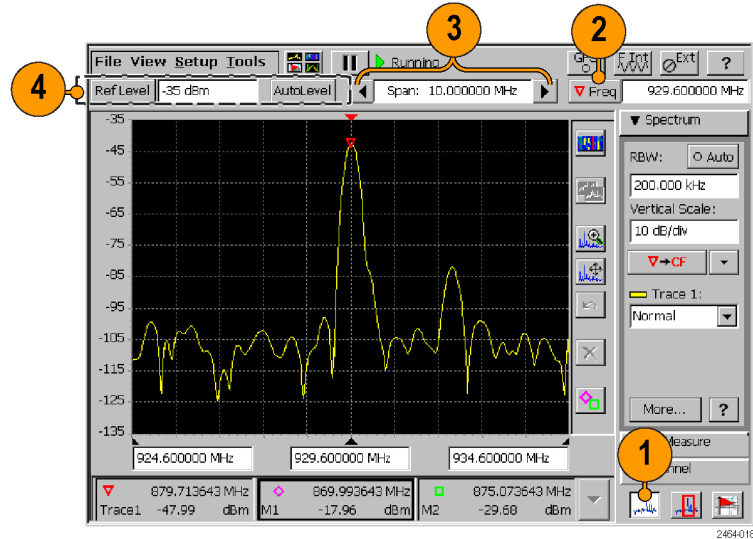
## Spectrum/Spectrogram Measurements

The spectrum measurement displays the spectral content of a signal (power versus frequency). The spectrum measurement features include a measurement frequency range of 10 kHz-6.2 GHz that covers most modern signal sources, the ability to detect very low level signals, seven measurement markers, two signal traces, five trace modes, and intermodulation markers for quickly checking for this common source of unusual signals.

The Spectrogram measurement displays the spectral content (power versus frequency) of a signal over time, where the signal amplitude is represented as a color. This display is especially useful for recording intermittent signals, as you can set the spectrogram to acquire measurements from seconds to days apart, and automatically save the measurements to a file.

## Display a Spectrum Signal

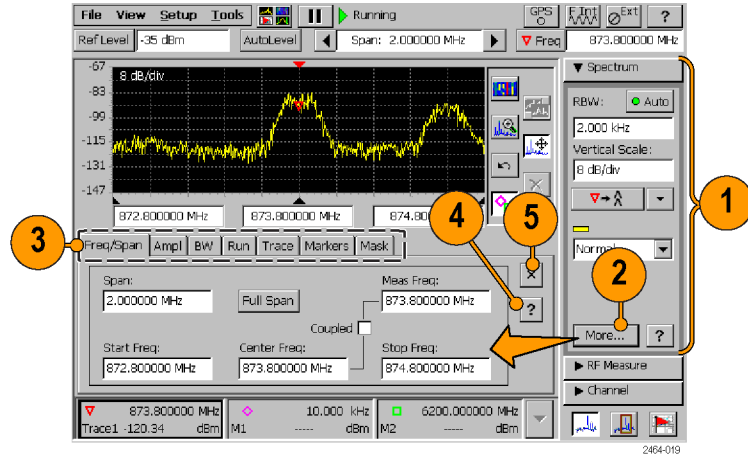
1. Tap the **Spectrum** mode button.
2. Tap the **Freq** button and enter a measurement frequency.
3. Tap the **Span** controls to change the displayed frequency span to show the waveform area of interest. Or tap the Span field and change the span value using the Increment control or the Keypad control.
4. Tap the **AutoLevel** button to set the display reference level. Or tap the **Ref Level** button and enter a value with the Reference Level keypad.





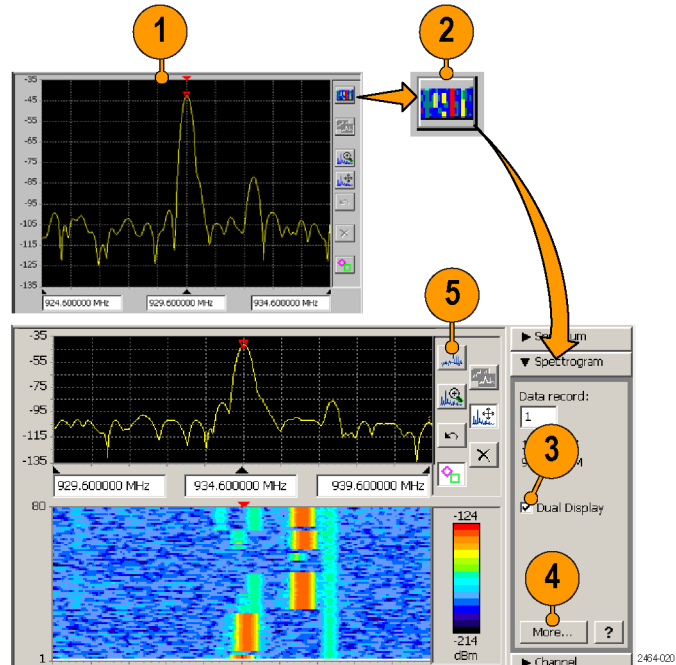
## Set Other Spectrum Parameters

1. Use the controls in the **Spectrum drawer** to set resolution bandwidth (RBW), the display vertical scale, the measurement frequency **Marker To** button actions, and the waveform trace type.
2. Tap the **More** button in the Spectrum drawer to display the spectrum parameter tabs.
3. Tap a tab to display the parameters set by that tab.
4. Tap the **Help** (question mark) button on a tab to display online help that describes the parameters for that tab. For example, to get information on measurement markers, tap the Markers tab and then tap the help button.
5. Tap the **Close (X)** button on a tab to close the tab display and return the instrument to a full-screen display mode.



## Display a Spectrogram

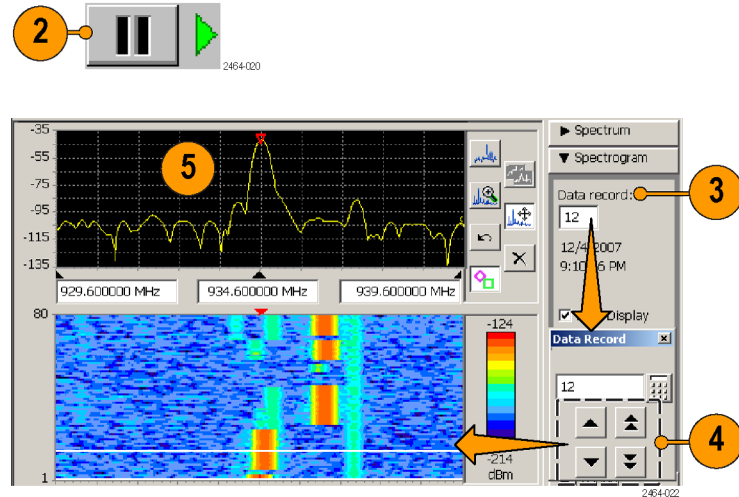
1. Display a spectrum signal of interest.
2. Tap the **Spectrogram** button. The instrument acquires and displays a spectrogram of the signal. The default mode is a dual spectrum and spectrogram display, but this depends on the last used display setting.
3. Set or clear the **Dual Display** check box in the Spectrogram drawer to enable or disable a split-screen spectrogram display.
4. Tap the **More** button to display the parameter tabs for the spectrogram settings.  
See the online help topic *Save Spectrogram Records to a File* for information on saving spectrogram records.
5. Tap the **Spectrum** display control button to return to a Spectrum display.



## View a Spectrogram Record

1. Display a spectrogram.
2. Tap the **Stop** button to stop measurement acquisition.
3. Tap the **Data Record** field in the **Spectrogram** drawer to open the **Data Record** increment control.
4. Tap the arrow keys to move the record cursor (white line in the spectrogram plot) to a record of interest. The Spectrogram drawer shows the time and date information of the selected record directly below the Data Record field.
5. The spectrum display shows the waveform for the selected record (in dual display mode).

See the online help topic *View Saved Spectrogram Files* for information on viewing saved spectrogram records.



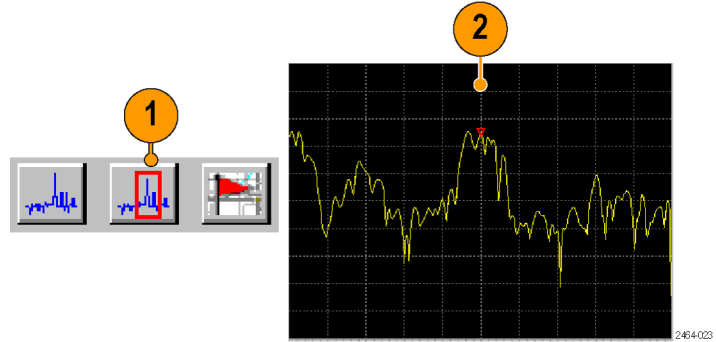
## Signal Classification

Signal Classification helps you determine the various parameters of an unidentified. Signal Classification lets you:

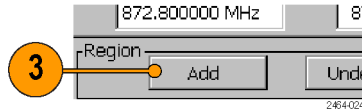
- Define areas of interest as regions (center frequency and frequency span) anywhere on the signal
- Assign classification labels and notes to regions
- Save all defined regions to a region survey file
- Test regions for spectral correlation to a subset of supported signal types

## Define a Signal Classification Region

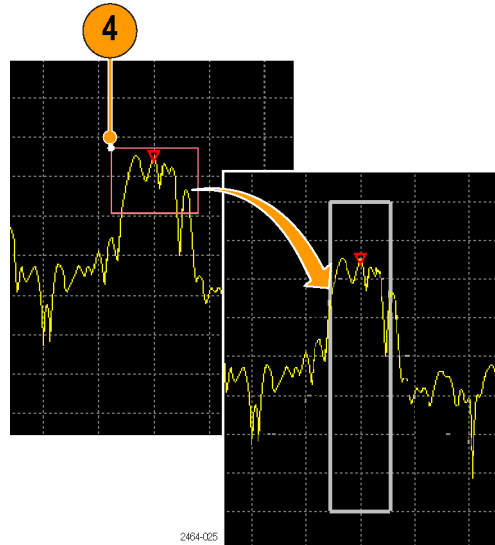
1. Tap the **Signal Classification** button.
2. Display a spectrum signal of interest.



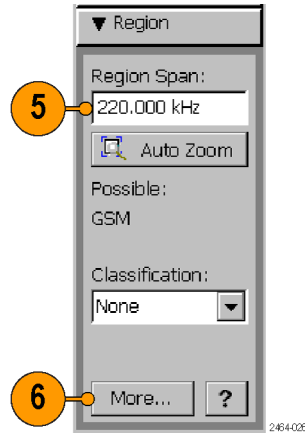
3. Tap the region **Add** button.



4. Tap and drag on the screen to define a region. The instrument draws a box to indicate the region span frequency. The amplitude portion of the signal does not need to be totally enclosed in the region box.



5. Tap the **Region Span** field to enter a precise frequency span of the region.
6. Tap the **More** button to display the parameter tabs to make additional region settings if required.



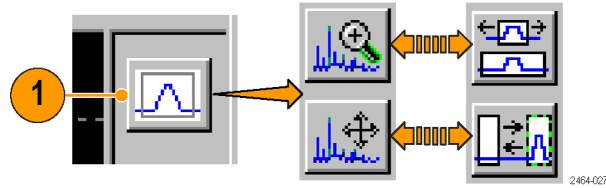
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**NOTE.** A maximum of two regions can overlap the same measurement frequency. If you define a new region that covers a frequency range already contained within two other regions, the instrument displays a warning message and the region definition box is drawn with a thin red line. Tap the **Delete** button to delete the invalid region, or use the **Change Span** or **Move Region** buttons to change the span definition. You cannot do any more region tasks until you correct the invalid region definition. (See page 40, *Edit a Signal Classification Region*.)

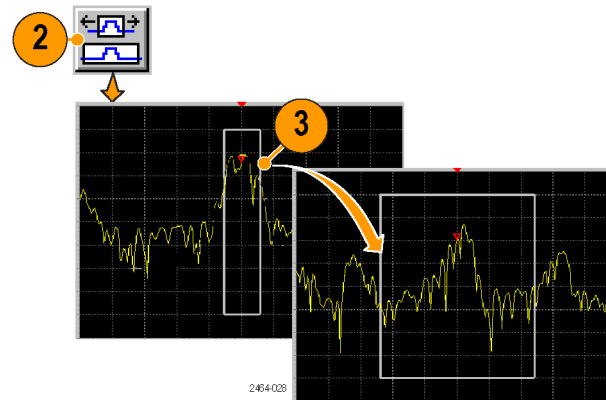
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## Edit a Signal Classification Region

1. Tap the **Edit Region** button to switch the Zoom and Move buttons with Change Region and Move Region buttons. This button is only shown while in the Signal Classification mode.



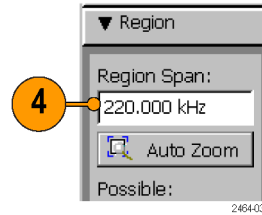
2. To change the width (frequency span) if a region, tap the **Change Span** button.
3. Tap the region to change. Then press and drag, with firm pressure, inside the region box to change the span of the region in the direction of the drag. Dragging from the center to outside of the box expands the region; dragging from the edge of the box towards the center reduces the region. Use a stylus to make tapping and dragging easier.



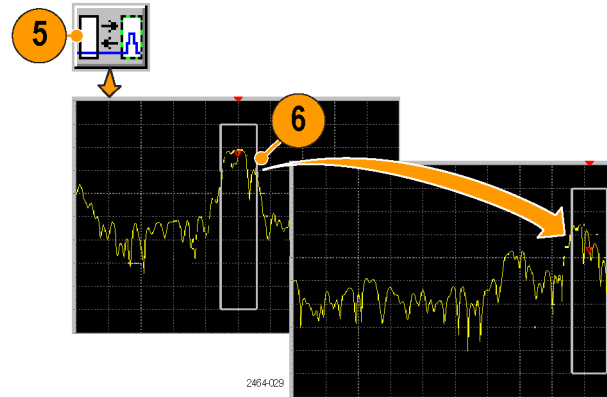
You can only move an undeclared region (Classification = None).



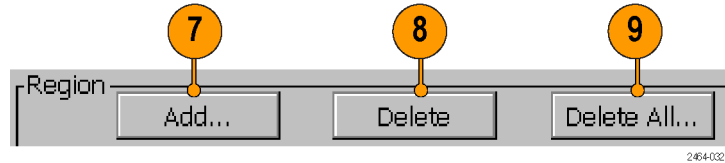
4. You can also tap the **Region Span** field in the Region drawer to enter a specific frequency span for the region.



5. To move a region, tap the **Move Region** button.
6. Tap the region to move. Then press and drag, with firm pressure, anywhere inside the region box to move the region in the direction of the drag. Use a stylus to make tapping and dragging easier. You can only move an undeclared region (Classification = None).

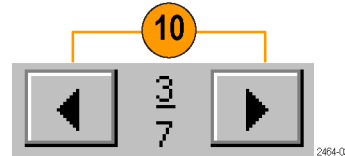


7. Tap the Region **Add** button to define a new region on the signal.
8. Tap the Region **Delete** button to delete the current selected region.
9. Tap the Region **Delete All** button to delete all defined regions from the signal.



2464-032

10. Tap the **Previous Region** or **Next Region** arrow buttons to display and select the previous or next defined region on the signal. The region order is based on the region measurement frequency (from left to right on the waveform), not in the order that they were created. If the region is off the screen, the instrument displays the region.

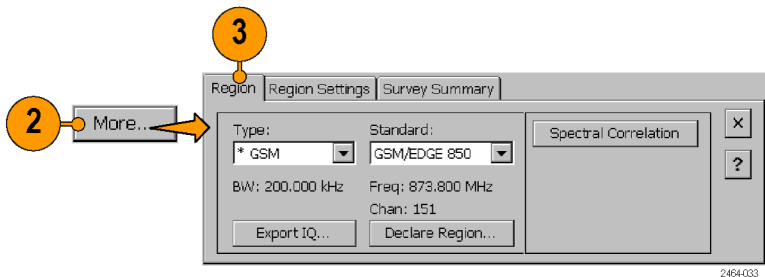


2464-031

The numbers indicate the current region (top number) and the total number of regions (bottom number). Regions are listed from the lowest frequency (left end of signal) to highest frequency. As regions are added or deleted, the number assigned to a particular region may change.

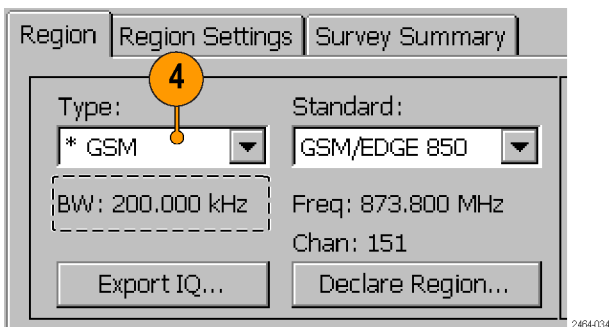
## Measure Signal Spectral Correlation

1. Select a region.
2. Tap the **More** button in the Region drawer to display the Region parameter tabs.
3. Tap the **Region** tab.



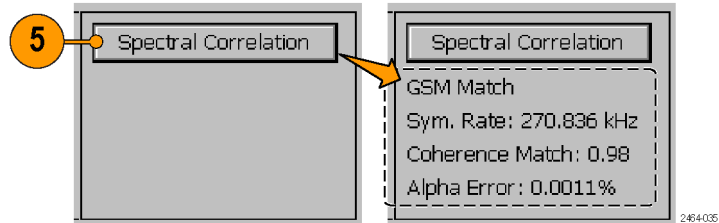
4. Tap the **Type** field and select a signal type that might match the signal based on the region span and measurement frequency. The BW (bandwidth) value shown below the Type field is the typical bandwidth of the selected signal type.

If the measurement Region Span is a close match to the BW of one or more signal types, the instrument marks those signal types in the list with an asterisk, and moves those signal types to the top of the list.



5. Tap the **Spectral Correlation** button.  
The instrument analyzes the signal and displays results below the button.

**NOTE.** If the *Spectral Correlation* button is grayed out, then there is no *Spectral Correlation* test available for the selected signal type.



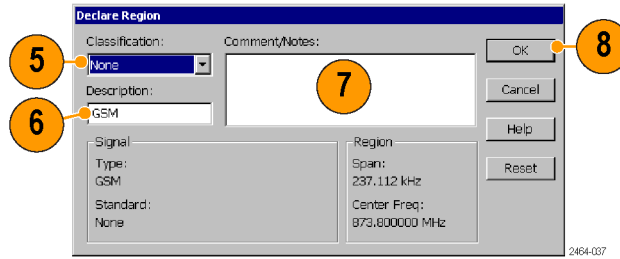
## Declare a Region (Classification)

Declaring a region lets you assign a classification category to the region and add additional notes about the region or signal.

1. Select a region.
2. Tap the **More** button in the Region drawer to open the Region tabs.
3. Tap the **Region** tab.
4. Tap the **Declare Region** button.



5. Tap the **Classification** list and select an appropriate classification. Assigning a classification type also assigns a color to the region box to let you quickly identify the classification of a declared region.
6. Tap the **Description** field to enter a brief description up to 14 characters long. The default value for this field is the signal type as set in the Region tab, but you can change the default value if desired. To enter characters, use the WindowsCE Inputs Panel on-screen keyboard control or a keyboard connected to the instrument PS2 port. (See page 26, *Parameter Entry Controls*.)
7. Tap the **Comments/Notes** field and enter descriptive details. You can enter a maximum of 255 characters.
8. Tap **OK** to close the dialog box and assign the declaration to the region.




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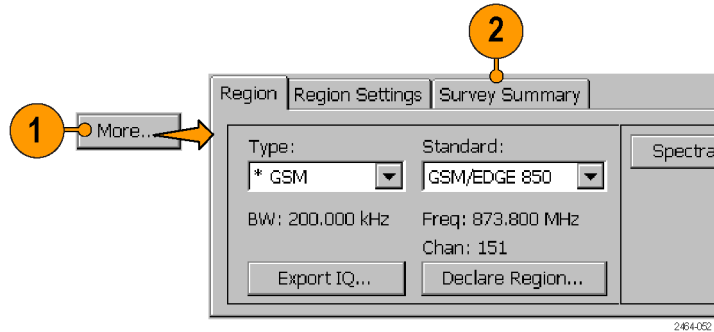
**NOTE.** Once a region is classified, you need to reclassify it to **None** to make any changes to that region declaration. Use the **Declare Region** dialog box, or the **Classification** field in the **Region** drawer, to change the region classification.

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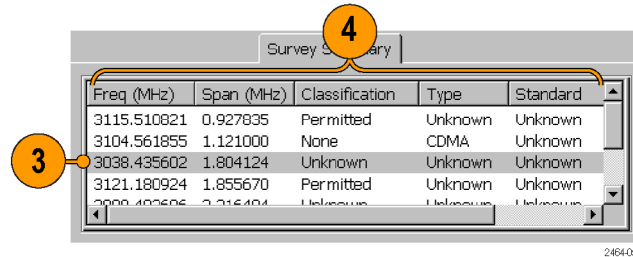
## The Survey Summary

The Survey Summary list shows all defined (declared or undeclared) regions, and lets you quickly select and display specific regions.

1. Tap the **More** button in the **Region** drawer to open the Region settings tabs.
2. Tap the **Survey Summary** tab.



3. Tap on an entry in the list to select and display that region.
4. Tap on any of the column headings to sort the list entries by the values in that column, in ascending order.



## Save and Load Region Surveys

A region survey is the set of all defined regions on the current signal, as listed in the Survey Summary tab. You can save region surveys to a file, and then load a region survey to merge with or replace your current region definitions.

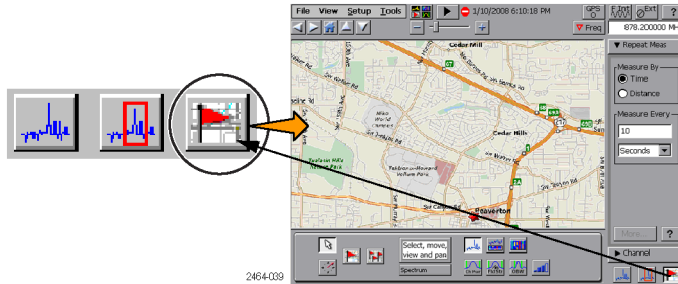
- **File > Save Survey:** saves all defined regions to a system-default file name and location. This function saves the region definitions only.
- **File > Save Survey As:** saves all defined regions to a specified file name and location. This function saves the region definitions only.
- **File > Load Survey:** loads a region survey from a file. Follow the on-screen instructions to replace or merge your current region definitions with those from the file.
- **File > Load Survey from Results:** loads region definitions that are part of a saved signal classification results file (File > Save Results). Follow the on-screen instructions to replace or merge your current region definitions with those from the file.

## iMap Measurement Mapping Mode

iMap integrates interference mapping, coverage mapping, in-building mapping, outdoor mapping, and provides an integrated solution for field interference and coverage problems in one instrument.

Using iMap is as easy as selecting a measurement and touching the displayed map where you want the measurement to be placed. Measurement icons are color coded to indicate if the measurements have passed or failed limit tests. You can also add a direction arrow to a measurement to indicate the direction the antenna was pointing when you took a measurement.

To start the iMap tool, tap the **iMap** button. When you open the iMap tool for the first time, the screen displays the message **Empty map**. Otherwise, iMap displays the last-loaded map.



You can load scanned bitmap files as maps for in-building mapping, or use GSF and MIF map file formats for outdoor maps. Using GSF or MIF map files lets you use the built-in GPS receiver to automatically place measurements at your current location.

You can save maps and associated measurement results data to common file formats such as CSV or MapInfo. Saving maps and measurement results lets you analyze measurement data (position, value, and direction) and prepare reports.



## Map File Concepts

The iMap tool uses two types of maps: Grid and Image.

**Grid Maps.** Grid maps have geophysical latitude and longitude coordinate references embedded in the map file. The instrument uses grid maps, along with an active GPS receiver, to place measurements on a map at your current geophysical position. Grid maps require specialized PC software to create or can be purchased from map-creating companies. The instrument can load both GSF- and MIF-format grid map files. You need to convert non-GSF or MIF grid maps to GSF format before you can load them into the iMap tool. (See page 63, *Converting Map File Formats to GSF*.)

Grid maps require an active GPS receiver to correctly link measurements to geophysical map locations. An active GPS receiver is a receiver that is locked to four or more satellite signals and is providing the instrument with accurate GPS location data. If you load a grid map and a GPS receiver is either not connected or does not have a good satellite signal lock, the instrument considers the grid map as an image map.

**Image Maps.** Image maps do not have any geophysical latitude and longitude references embedded in the map file. An image map is a bitmap picture, such as a scanned building floor plan or aerial photograph, to which you can attach measurements. Save the file to 256-color bitmap format. The iMap Converter, a program that is included with the PC version of the instrument application, lets you convert image maps to GSF format map files, as well as convert image maps to grid maps. (See page 65, *Adding Coordinates to an Image (Bitmap) File*.)

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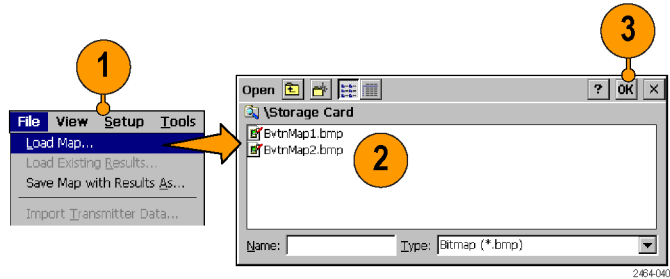
**NOTE.** *Image (bitmap) files that you convert to GSF-format load faster on the instrument because the instrument does not have to convert the bitmap to GSF before loading. However, it is then possible to confuse image GSF maps with grid (coordinate) GSF files. Use a file naming convention to differentiate between GSF maps that were created from coordinate maps and GSF maps that were created from bitmap files but do not contain coordinate information.*

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## Loading a Map

You need to load a map before you can use the iMap tool.

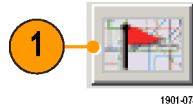
1. With iMap open, select **File > Load Map**.
2. Navigate to and select the map file to load (Bitmap, GSF, MIF, or ZIP (map with results) format).
3. Tap **OK**. The iMap application loads the map on the screen.



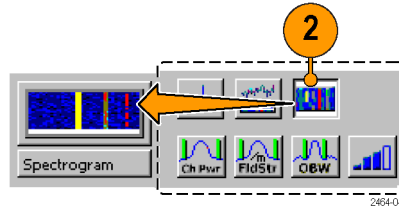
## Mapping a Measurement

The following procedure requires that you have already set up the measurement. You must have also loaded a map file. (See page 50, *Loading a Map*.)

1. Tap the **Single Measurement** button.

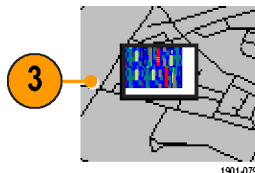


2. Tap an iMap measurement button. Available measurements depend on the current signal standard. The selected measurement is displayed in the Measurement Thumbnail area.

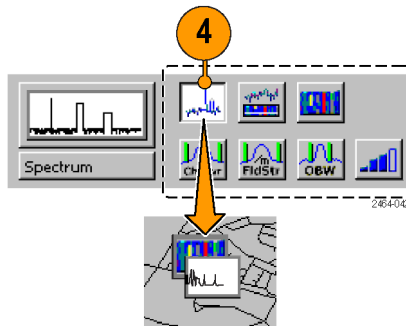


3. Tap the map:

- If a GPS receiver is active, and you are using a grid map, a single measurement is placed at the current GPS coordinates.
- If a GPS receiver is not active, or if you are using an image map (such as a building floor plan), a single measurement is placed where you tapped the map.



4. You can select a different measurement button, and then tap the map to add a new measurement to the map. Multiple measurement icons at the same location stack on top of each other.



5. To move an icon, tap the **Select** button and then tap and drag the icon to a new position. If the measurement was part of a stack of measurements (such as created by logging), then iMap moves the topmost icon in the stack. If the icon is moved to a new stack of measurements, then the icon is placed in the stack in time-of-measurement order.



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**NOTE.** To add measurements at a new location on a grid map with an active GPS receiver, you must physically move to the new location.

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**NOTE.** You can move measurement icons on an image map, or on a grid map with the GPS receiver inactive. Attempting to move an icon on a grid map with an active GPS receiver causes iMap to drag the map and its measurement icons to a new position on the screen; the measurement icons are not moved.

When a GPS receiver is not active, you can move any measurement icon. This includes moving measurement icons that were placed on the map while in GPS mode. iMap does not reposition moved GPS-related measurement icons back to their original geophysical position on a map when the GPS receiver is active.

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## iMap Measurement Icons

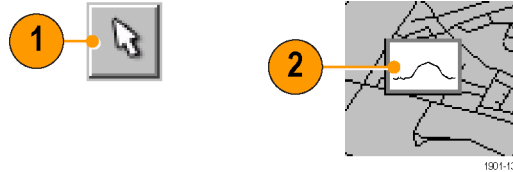
The iMap application uses icons on the map to represent a measurement taken at that location. There are two types of measurement icons: large and flag. The large icon displays the type of measurement that they represent. The flag icon is a simple small flag, and is used only in logging (multiple) measurement mode to indicate measurement placement. See the online help topic *iMap Measurement Map Icon Types* for more information.

You can perform various actions on measurement icons, including viewing the measurement results of an icon, moving the icon, deleting an icon, and attaching a measurement direction arrow to an icon. See the following sections, and the online help topic *View Map Measurements*, for more information.

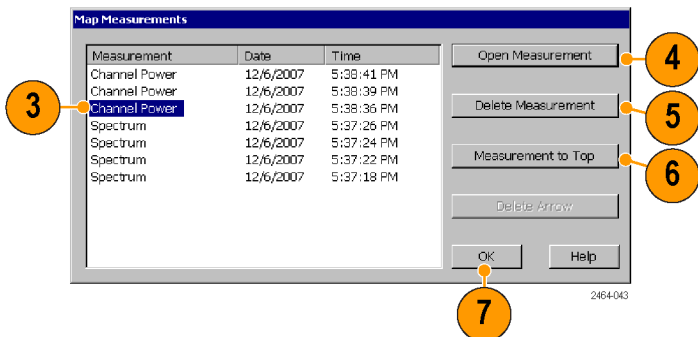
## Viewing and Deleting Icon Measurements

To view or delete the measurement results associated with an iMap measurement icon:

1. Tap the iMap **Select** mode button.
2. Tap a measurement icon to open the **Map Measurements** dialog box.



3. Tap the measurement of interest in the list.
4. Tap **Open Measurement** to open the measurement screen for the selected measurement. Tap the iMap button to return to the iMap screen.
5. Tap the **Delete Measurement** button to delete the selected measurement. If there are multiple measurements to delete, repeatedly select and tap **Delete**.
6. Tap **Measurement to Top** to move a selected measurement to the top of the list.
7. Tap **OK** to close the dialog box.




---

**NOTE.** You can also double-tap on a measurement icon to open the measurement window for that measurement. If there are multiple measurements at a location, double-tapping an icon displays the results for the measurement icon that is at the top of the list.

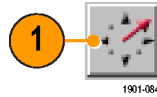
To delete all the measurement icons from a map, select **File > Clear All Measurements**.

---

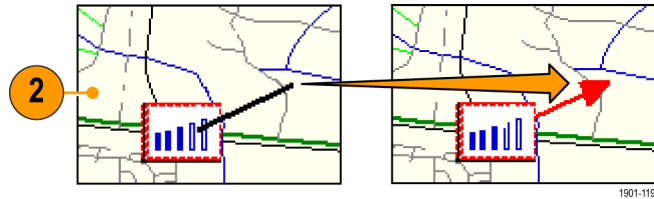
## Draw a Measurement Direction Arrow

The iMap direction arrow function lets you draw an arrow on a mapped measurement icon. You can use the arrow to indicate the direction your antenna was pointing when you took a measurement.

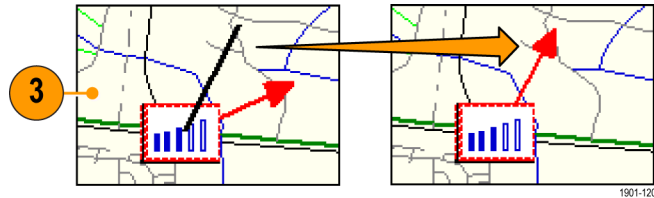
1. Tap the **Measurement Direction** button.



2. Tap and drag from the center of a measurement icon in the direction the antenna was pointing when the measurement was made. iMap draws an arrow from the measurement icon.



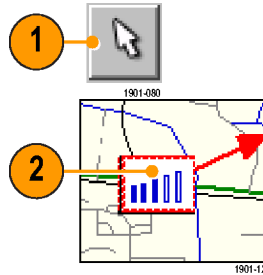
3. To change the arrow direction, draw a new line. iMap replaces the existing arrow with the new direction arrow.



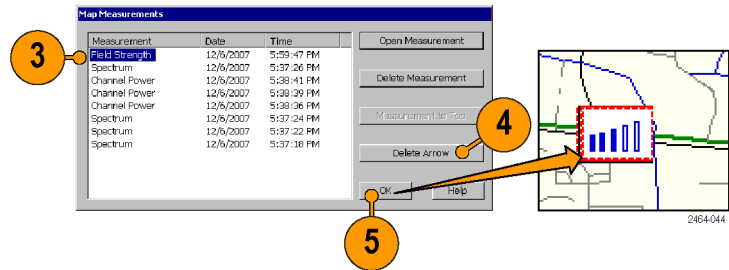


### Delete a Measurement Direction Arrow.

1. Tap the iMap **Select** mode button.
2. Single-tap the measurement icon with the direction arrow to delete. iMap opens the **Map Measurements** dialog box.



3. Tap the measurement name that has the direction arrow to delete.
4. Tap the **Delete Arrow** button.
5. Tap **OK**. iMap closes the dialog box and deletes the direction arrow.



## Logging iMap Measurements (Automatic Measurements)

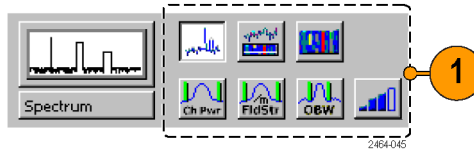
Logging measurements lets you automatically map a single measurement at a set time interval or change in GPS position (with active GPS receiver and a grid map).

---

**NOTE.** The iMap tool maps only completed measurement results. If the specified time interval is less than that required to take a measurement, iMap ignores the specified time interval and maps results as soon as the measurement acquisition is done. For example, if the instrument requires 20 seconds to take a measurement, but the time interval is set to 10 seconds, then the instrument maps results every 20 seconds.

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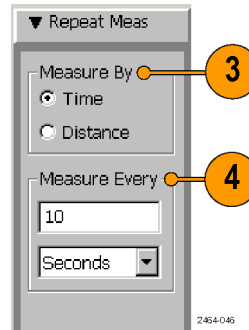
1. Tap a measurement button.



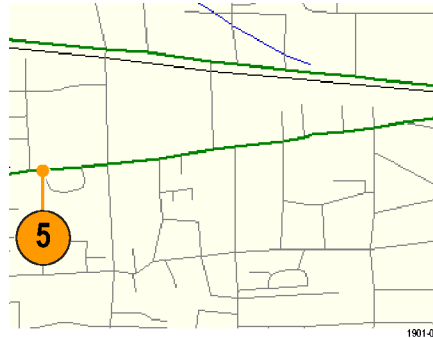
2. Tap the **Log Measurements** button.



3. Tap a button in the **Measure By** area to set the type of measurement interval (time interval or distance between measurement positions). Distance is only available when the GPS is active and acquiring accurate position data.
4. Tap a field in the **Measure Every** area to set the measurement interval.

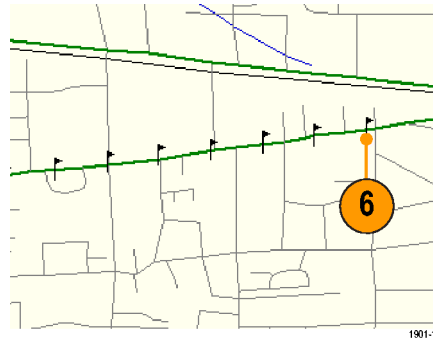


5. Tap the map to start logging measurements:
  - For grid maps with an active GPS receiver, tap the map at any point. The instrument adds measurement flags to the map at the current GPS position.
  - For image maps or for grid maps without an active GPS receiver, tap the map at the measurement starting location. The instrument begins taking measurements, but does not display them on the map until measurement logging is done.



6. Tap the map to stop measurements:

- For grid maps with an active GPS receiver, tap the map at any position. The instrument stops mapping measurements.
- For image maps or grid maps without an active GPS receiver, tap the map at the position the last measurement was taken. Measurements are then evenly spaced on a straight line between the start and stop map points.



7. Tap the **Single Measurement** or the **Select** button to exit the logging measurements mode.



**NOTE.** The iMap Log measurements function automatically sets the map view measurements mode to **Measurement Flags** during logging measurement acquisition. When iMap measurement logging is done, the instrument restores the map view measurements mode to the mode it was at before the iMap measurement logging was initiated.

If you tap the **Select**, **Measurement Direction**, or **Single Measurement** button while logging measurements in non-GPS mode, iMap cancels the log measurements mode and does not draw any measurement icons on the map.

Grid maps with an active GPS receiver support logging measurements by time interval or distance change interval. Image maps, or grid maps with an inactive GPS receiver, support logging measurements by time intervals.

You cannot place a measurement icon on any area of the map that is covered by a message banner.

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## The iMap Map Converter Program

The PC application software includes a map file conversion program that is installed at the same time as the application software. The iMap Converter program:

- Converts industry-standard MapInfo Interchange Format (.mif), ArcInfo Shape (.shp), USGS Digital Line Graph (.opt) geographic coordinate maps, and 256-color bitmap images (.bmp), into GSF-format files.
- Combines multiple coordinate map files into a single map.
- Lets you add geographic coordinate information to bitmap image files, effectively converting image maps to grid maps.
- Recognizes world files associated with an image file, and automatically creates a grid map with coordinates when you load an image map file that has an associated world file.

See the online help topic *Map File Concepts* for more information on converting map files.

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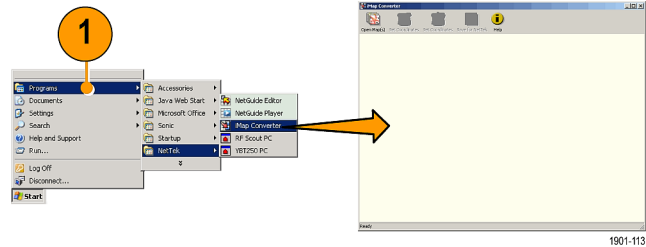
**NOTE.** *Bitmap files that are converted to GSF-format load faster on the instrument because the instrument does not have to do the bitmap-to-GSF conversion in the instrument. However, it is then possible to confuse image GSF maps with grid (coordinate) GSF files. Use a file naming convention to differentiate between GSF maps created from coordinate maps and GSF maps created from bitmap files that do not have coordinate information.*

*The MIF-format files take significantly longer to load than the GSF-format files. Tektronix recommends that you use iMap Converter to convert MIF map files to GSF map files, rather than loading MIF files directly on the instrument.*

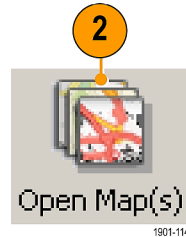
---

## Converting Map File Formats to GSF.

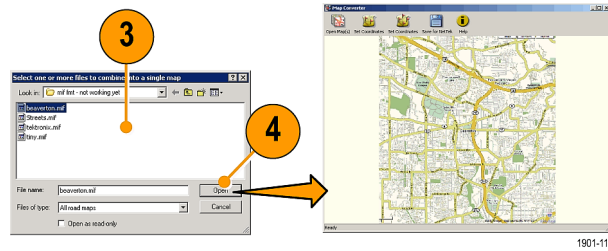
1. On the PC, select **Start > Programs > Tektronix > iMap Converter**.



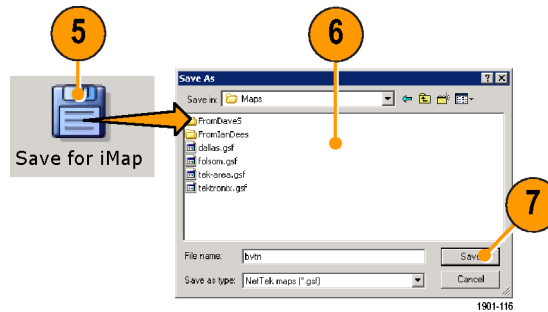
2. Click the **Open Map(s)** button to load grid (coordinate) or bitmap (image) map files.



3. Use the dialog box to navigate to and select one or more grid map files or a single bitmap file.
4. Click **Open**. The iMap Converter loads the file, converts the data, and displays the resulting map.



5. Click the **Save for iMap** button.
6. Use the dialog box to enter a map name and navigate to the location to save the GSF-format map file.
7. Click **Save** to save the file.







---

**NOTE.** The iMap Converter program saves all files as GSF-format. This includes bitmap files that you convert to GSF-format to reduce the map file size and loading time. Therefore it is possible to have GSF-format maps that are not grid (coordinate) maps. Use a file naming convention to differentiate between GSF maps created from coordinate maps and GSF maps created from bitmap files to which you have not added coordinates.

---

**Adding Coordinates to an Image (Bitmap) File.** The iMap Converter lets you add geographic coordinate information to an image (bitmap) map file, effectively converting it to a grid map. This feature lets you convert building or floor plan diagrams, saved images from road map programs, or photographs (such as aerial photographs) to grid (coordinate) maps for use with GPS measurement mapping.

There are two ways to manually add coordinates to an image file:

Element	Description
 <p data-bbox="261 644 418 668">Set Coordinates</p>	<p data-bbox="448 554 1498 639">Set Coordinates (two points) lets you enter the latitude and longitude of two points that you select on the image file. The iMap Converter uses those two points to add coordinate information for the entire image map, extrapolating the coordinates for any map area that is outside of the defined two points.</p>
 <p data-bbox="261 786 418 809">Set Coordinates</p>	<p data-bbox="448 695 1498 749">Set Coordinates (image edges) lets you enter the latitude and longitude of the edges of the image file. iMap Converter uses these points to add coordinate information to the entire image map.</p>

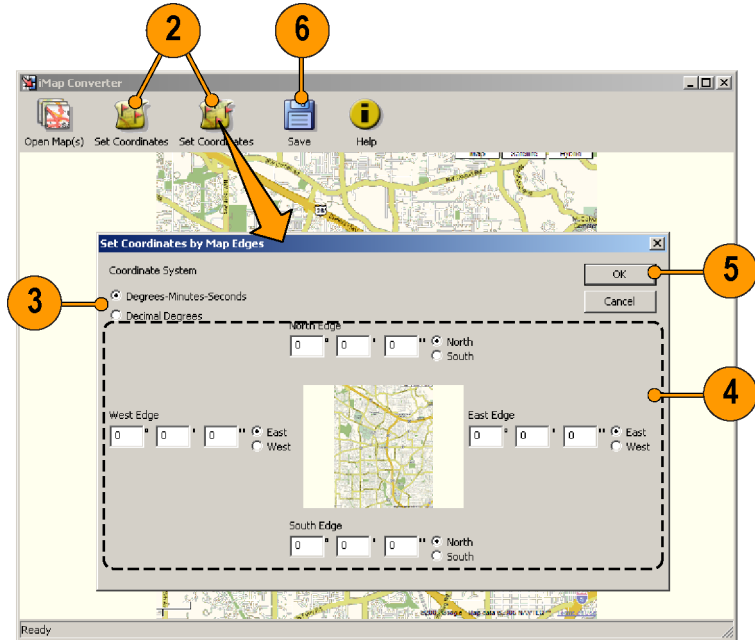
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**NOTE.** Image maps to which you plan to add coordinate information must have true North as the top edge of the image.

---

### To Add Coordinates to an Image Map.

1. Load an image (bitmap) map file into the iMap Converter program.
2. Click on the two point or edges **Set Coordinates** button, depending on how you want to enter the coordinate information. This example uses the Set Coordinates (image edges) button.
3. Set the coordinate system to either Degrees or Decimal.
4. Enter the map edge coordinates in the dialog box.
5. Click **OK**.
6. Click **Save for iMap** to save the converted map file.



2404-054

# Specifications

This section lists the electrical, environmental, and physical specifications for the H600 RFHawk. All specifications are guaranteed unless labeled “typical.” Typical specifications are provided for your convenience and are not guaranteed.

**Table 1: General Performance Characteristics**

Characteristic	Description
<b>RF Input</b>	
Operating Frequency Range	10 kHz – 6.2 GHz Operating Range for some features may be restricted. If so, the restricted range is defined with the relevant feature.
Maximum Operating Input Level	+20 dBm peak envelope power This is the maximum input level at which the instrument will meet its performance specifications. For a signal without any amplitude variation, peak envelope power = rms.
Maximum Input Power without Damage	50 W rms below 3.2 GHz 15 W rms between 3.2 GHz and 6.2 GHz
<b>Internal Timebase</b>	
Error	$\pm 0.5$ PPM from 0 °C to 50 °C $\pm 1.0$ PPM aging/year Twenty minute warm-up period required to meet accuracy specification
<b>External Reference Input</b>	
Impedance	1500 ohms

**Table 1: General Performance Characteristics (cont.)**

Frequency Range	1 MHz up to 20 MHz $\pm$ 1 PPM in 1 MHz steps
Input Level Range	-15 dBm to +15 dBm, 1 MHz to 15 MHz -10 dBm to +15 dBm, 16 MHz to 20 MHz dBm levels assume 50 ohm source

**Table 2: Spectrum Analyzer Characteristics**

Characteristic	Description
<b>Center Frequency</b>	
Range	10 kHz to 6.2 GHz, preamp off 10 MHz to 6.2 GHz, preamp on
Setting Resolution	1 Hz
<b>Span</b>	
Range	1 kHz to 6.2 GHz
Setting Resolution	1 Hz
<b>Resolution Bandwidth</b>	
Range	10 Hz to 3 MHz (Manual RBW) 10 Hz to 1 MHz (Auto RBW)
Setting Resolution	1 Hz
<b>Spectral Purity</b>	

Displayed Average Noise Level, Preamp On	<p>-153 dBm, 10 MHz – 2 GHz, 10 Hz RBW</p> <p>-152 dBm, 2 GHz – 4 GHz, 10 Hz RBW</p> <p>-151 dBm, 4 – 5 GHz, 10 Hz RBW</p> <p>-145 dBm, 5 – 6.2 GHz, 10 Hz RBW</p> <p>Reference Level <math>\leq</math> (DANL + 90 dB)</p>
Phase Noise	<p><math>\leq</math> -95 dBc/Hz @ 10 kHz offset</p> <p><math>\leq</math> -95 dBc/Hz @ 20 kHz offset</p> <p><math>\leq</math> -95 dBc/Hz @ 30 kHz offset</p> <p><math>\leq</math> -97 dBc/Hz @ 100 kHz offset</p> <p><math>\leq</math> -110 dBc/Hz @ 1 MHz offset</p>
Residual Spurious, Preamp Off	<p><math>\leq</math> -90 dBm, 0 dBm attenuator setting</p> <p>Exception frequencies:</p> <p>9 MHz to 19 MHz center frequency</p> <p>3464 MHz center frequency</p> <p>4592 MHz center frequency</p> <p>5374 MHz to 5378 MHz center frequency</p> <p>6160 MHz center frequency</p>
Residual Spurious, Preamp On	<p><math>\leq</math> -105 dBm, 0 dBm attenuator setting</p> <p>Exception frequencies:</p> <p>9 MHz to 19 MHz center frequency</p> <p>5374 MHz to 5378 MHz center frequency</p>
Third Order IMD	$\leq$ -70 dBc for two tones at or below the reference level, preamp off, all gain settings Auto-coupled
Second Harmonic	$\leq$ -60 dBc for a single tone at or below the reference level, preamp off, all gain settings Auto-coupled

## Specifications

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Input Related Spurious	$\leq -70$ dBc except for $F_{in} = 2.282 \text{ GHz} \pm 20 \text{ MHz}$ The reference for 'dBc' for this specification is the total power of all signals present at the input of the instrument regardless of the current span
Input Related Spurious, exception frequencies, typical	$\leq -55$ dBc except for $F_{in} = 2.282 \text{ GHz} \pm 20 \text{ MHz}$ The reference for "dBc" for this specification is the total power of all signals present at the input of the instrument regardless of the current span
Third Order Intercept	$\geq +7$ dBm, 0 dB Input Attenuation, Preamp Off
<b>Spectral Display Amplitude</b>	
Reference Level Range	+20 dBm to -160 dBm
Marker Power Accuracy	$\pm 1.75$ dB, $-50 \text{ dBm} \leq \text{input} \leq +20 \text{ dBm}$ , preamp off $\pm 3.0$ dB, $-80 \text{ dBm} \leq \text{input} < -50 \text{ dBm}$ , preamp on, above 10 MHz $\pm 3.75$ dB, $-120 \text{ dBm} \leq \text{input} < -80 \text{ dBm}$ , preamp on, above 10 MHz Use peak detector for CW-like signals; use average detector for wideband (signal $\gg$ RBW) Accuracy guaranteed for CW signals and span set to 20 MHz or less
<b>Display</b>	

Display Modes	<p>Normal - updates display with each new result</p> <p>Max Hold - updates displayed point only if new point &gt; old</p> <p>Min Hold - updates displayed point only if new point &lt; old</p> <p>Max/Min Hold - displays a vertical bar between Max Hold and Min Hold</p> <p>Average - displays average of N (specified by user) acquisitions</p> <p>Average is calculated as follows:</p> <p>Last N values are saved in memory; when a new result is available, the earliest result of the N stored values is discarded, the new result is added to the stored values, and a new average is calculated from the stored values</p> <p>If the number of results is less than N, then all of the results are averaged together</p>
Number of Averages	$1 \leq N \leq 200$

**Table 3: General Purpose RF Measurements Characteristics**

Characteristic	Description
<b>General Purpose RF Channel Power Measurement</b>	
Measurement Bandwidth Range	1 kHz - 20 MHz

**Table 3: General Purpose RF Measurements Characteristics (cont.)**

Accuracy	<p>≤1.2 dB; +20 dBm to -60 dBm; Resolution BW &lt; 100 kHz                  +20 dBm to -40 dBm; Resolution BW ≥ 100 kHz                  1 MHz to 3.2 GHz , preamp off</p> <p>≤2.4 dB; -60 dBm to -75 dBm; Resolution BW &lt; 100 kHz                  -40 dBm to -55 dBm; Resolution BW ≥ 100 kHz                  10 MHz to 3.2 GHz , preamp on</p> <p>≤1.8 dB; +20 dBm to -50 dBm; Resolution BW &lt; 100 kHz                  +20 dBm to -40 dBm; Resolution BW ≥ 100 kHz                  3.2 GHz to 6.2 GHz , preamp off</p> <p>≤3 dB; -50 dBm to -75 dBm; Resolution BW &lt; 100 kHz                  -40 dBm to -55 dBm; Resolution BW ≥ 100 kHz                  3.2 GHz to 6.2 GHz , preamp on</p> <p>Specifications apply for default control settings (Auto RBW, Auto Level)</p>
<b>Occupied Bandwidth Measurement</b>	
Percent Power Inclusion Range	50% - 100%
<b>RF Field Strength</b>	



**Table 3: General Purpose RF Measurements Characteristics (cont.)**

Channel Bandwidth Range	Same as Channel Power
Accuracy	Same as Channel Power

**Table 4: Signal Analysis and Monitoring Characteristics**

Characteristic	Description
<b>AM Demodulation</b>	Provides an audio output signal after AM demodulation of the user-selected signal.
Measurement Frequency	As previously selected
Minimum Input Signal Level, Typical	-100 dBm
Audio Measurement Bandwidth	8 kHz
<b>FM Demodulation</b>	Provides an audio output signal after FM demodulation of the user-selected signal.
Measurement Frequency	As previously selected
Minimum Signal Level, Typical	-100 dBm
Maximum Signal Deviation	Up to 100 kHz

**Table 4: Signal Analysis and Monitoring Characteristics (cont.)**

Audio Measurement Bandwidth	8 kHz, 15 kHz, 75 kHz, or 200 kHz
Maximum Audio Output Bandwidth	15 kHz
<b>Signal Strength Indicator</b>	Provides both an audio tone and a visual display that are related to the strength of the user selected signal
Input Signal Level	-120 dBm, minimum
Measurement Frequency	As previously selected
Measurement Bandwidth	Up to 20 MHz, dependent upon span and RBW setting
Tone Type	Variable beep rate or variable frequency
Update Rate, Typical	10 per second

**Table 5: Environmental characteristics**

<b>Characteristic</b>	<b>Description</b>
Temperature	Operating: 0 °C to +50 °C specified performance, -10 °C to +50 °C, typical Nonoperating: -40 °C to +60 °C The temperature specs above are modified with the following options installed: Li-Ion Batteries: Charge 0 °C to +45 °C, Storage -20 °C to +60 °C

**Table 5: Environmental characteristics (cont.)**

Humidity	Operating and Nonoperating: 5% to 95% relative humidity (RH) at up to +30 °C, 5% to 45% RH above +30 °C up to +50 °C, noncondensing
Altitude	Operating: Up to 4,600 meters (15,092 feet) Nonoperating: Up to 12,192 meters (40,000 feet)

**Table 6: Physical characteristics**

Characteristic	Description
Dimensions	Height: 25.5 cm. (10.0 in) Width: 33 cm. (13 in) Depth: 12.5 cm. (4.8 in)
Weight	6.0 kg (13.25 lbs): instrument and 1 battery

**Table 7: Miscellaneous characteristics**

Characteristic	Description
Recommended Instrument Calibration Interval	2 years

**Table 8: Safety compliance**

Category	Description
Safety Compliance	ANSI/UL61010-1:2004 Electrical Equipment for Measurement, Control, and Laboratory Use. CSA C22.2 No. 61010.1:2004 Electrical Equipment for Measurement, Control, and Laboratory Use. EN 61010-1:2001 Electrical Equipment for Measurement, Control, and Laboratory Use. IEC61010-1:2001 Electrical Equipment for Measurement, Control, and Laboratory Use. ISA 82.02.01 Electrical Equipment for Measurement, Control, and Laboratory Use.

## Certifications and Compliances

### EC Declaration of Conformity – EMC

Meets intent of Directive 2004/108/EC for Electromagnetic Compatibility. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Communities:

**EN 61326:1997.** EMC requirements for Class A electrical equipment for measurement, control, and laboratory use. <sup>1, 2, 3, 4</sup>

- IEC 61000-4-2:1999. Electrostatic discharge immunity (Performance criterion C)
- IEC 61000-4-3:2002. RF electromagnetic field immunity (Performance criterion A) <sup>5</sup>
- IEC 61000-4-4:2004. Electrical fast transient / burst immunity (Performance criterion B)
- IEC 61000-4-5:2005. Power line surge immunity (Performance criterion B)
- IEC 61000-4-6:2003. Conducted RF immunity (Performance criterion A) <sup>5</sup>
- IEC 61000-4-11:2004. Voltage dips and interruptions immunity (Performance criterion B)

**EN 61000-3-2:2000.** AC power line harmonic emissions

**EN 61000-3-3:1995.** Voltage changes, fluctuations, and flicker

#### European Contact.

Tektronix UK, Ltd.  
Western Peninsula  
Western Road  
Bracknell, RG12 1RF  
United Kingdom

- 1 **This product is intended for use in nonresidential areas only. Use in residential areas may cause electromagnetic interference.**
- 2 **Emissions which exceed the levels required by this standard may occur when this equipment is connected to a test object.**
- 3 **To ensure compliance with the EMC standards listed here, high quality shielded interface cables should be used.**
- 4 **Minimum Immunity test requirement.**
- 5 **Performance Criteria: Residual spurious signals can increase to  $-70$  dBm with exposure to the disturbance levels of this test.**

### **Australia / New Zealand Declaration of Conformity – EMC**

Complies with the EMC provision of the Radiocommunications Act per the following standard, in accordance with ACMA:

- EN 61326:1997. EMC requirements for electrical equipment for measurement, control, and laboratory use.

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