Instruction Manual

Model 2650 3.3GHz Spectrum Analyzer

General Safety Information

This portion provides general information for your safety. Before using this unit, please read all Warning notes on the back of the unit

- This Instrument must be used only by qualified personal that are aware of the risks of exposure to electric shock while performing electrical measurements on open circuits.
- Never use unit under severe whether conditions especially thunder storms.
- Never work in extremely close proximity from Hi-Power transmitting antennas without taking proper safety precautions listed by FCC.
- Always ground the unit to insure static electricity protection in stationary applications. Not properly grounded unit can damage tested circuits and in some cases expose user to the electric shock.
- In the case unit starts producing abnormal sounds, smell or smoke, immediately turn off the unit, disconnect AC adapter and remove the battery. Contact authorized repair center to arrange service.
- Any adjustments, calibrations, maintenance or repair work could be performed only by authorized repair center.
- Never use an AC adapter other than the one specified. Using unspecified adapter might damage the unit and avoid manufacture warranty.
- Never use a battery other than the one specified, because doing so it might damage the unit and avoid manufacture warranty. When removing or installing the battery, turn off the unit and disconnect the AC adapter first.
- For fuse replacement, disconnect the AC adapter first, open the battery compartment and remove the battery. Fuse located under battery in the battery compartment. Use only 5A/120V slow-blow fuse. Always use specified fuse. Using unspecified fuse might damage the unit and avoid manufacture warranty.

Warm-up time

To ensure the 100% specified measurement accuracy the 2650 needs to have at list 10 minutes of warm-up time, before performing any crucial measurements in the field. Always perform 10 min warm-up if unit is going to work in any stationary applications.

Table of Contents:

1. Overview

1.1 Product Introduction

2650 is ideal hand held spectrum analyzer capable to deliver performance and functions comparable to bench stationary analyzers.

1. Compact and light

The external dimensions are (W×H×D) 6.4×2.8×10.2" (162×70×260 mm). Weight is 3.7lb. (1.7 kg) including the battery. That alone make 2650 versatile hand healed unit for field use alone with stationary applications.

2. Frequency range 50kHz to 3.3GHz

This bandwidth is cover W-CDMA, CDMA, PDC, PHS, GSM, 2.4GHz band wireless LAN, Bluetooth, etc.

3. Operation time on battery power up to 100 min

2650 will work approximately 100 Min on fully charged battery (with display back light off).

4. Bench type, stationary analyzer capabilities

2650 guarantees a highly stable frequency axis by PLL synthesizer system. Center frequency step setup resolution is 100kHz. Displayed average noise level -110dBm or less. Turns, a broad dynamic range is secured and the reference level can be set in 1 dB steps.

5. Functions

- Measuring functions: Channel power measurement, channel leakage measurement, Occupied frequency bandwidth measurement, Electric field strength measurement, and Magnetic field strength measurement.
- Electric field strength measurement:
- Optimum for measurement of cellular phone and wireless LAN working environment.
- Magnetic field strength measurement:
- Optimum for EMI design verification and evaluation of printed circuit boards.
- Calculation functions: MAX HOLD, MIN HOLD, AVERAGE, OVER WRITE
- Marker * peak search.
- Save/load

6. Auto tuning

The center frequency is set at the spectrum of the maximum level in the 3.3GHz band, and in addition, optimum reference level, resolution bandwidth, video bandwidth and sweep time are set when the AUTO TUNE key is pressed.

7. Auto range

The resolution bandwidth, video bandwidth and sweep time are set automatically based on the frequency span settings. It is also possible to set auto range motion only one out of resolution bandwidth, video bandwidth and sweep time.

8. Printing capability

Then PT2650 (optional printer) is connected to the analyzer, user could use print command to get screen image printout. PT2605 printer operates on both AC adapter and alkaline standard AA batteries. Battery-powered, printer operates for approximately 30 min (printing time).

9. Display resolution.

Trace resolution could be as high as 1,001 points (in the horizontal axis) then it is displayed on PC screen by using 2650 optional PC Software.

1.2 Standard accessories

1) AC adaptor BC 2650
2) Soft carrying case
3) Accessory pouch.
4) Fuse (It has been installed in the inside)
5) Operating manual
6) Ni-MH Battery BP 2650 (Refer to "6.4 Installing the battery" for details.)

1.3 Optional accessories

1.) Dipole antenna AN 301, AN 302, AN 303, AN 304
(Refer to "19.4 Electric field strength measurement" for details.)

2.) Magnetic field probe PR 26M with a dedicated double-shielded coaxial cable.
(Refer to "19.5 Magnetic field strength measurement" for details.)

3.) PC software AK 2650 (Refer to "24. PC Software" for details.)

4.) Printer with AC adaptor. 4pcs of AA batteries, a roll paper.
(Refer to "21. Printing" for details.)

5.) Roll paper for optional printer PX 2650 (with 10 rolls)

6.) SMA coaxial cable CC 301(50cm), CC 302(1m), CC 303(1.5m)

Bandwidth is DC to 10GHz (VSWR< 1.5) performance could change by bending and deteriorate by repeating the insertion and extraction.

2 Specifications

Frequency

Frequency range	50kHz to 3,3GHz
Center frequency	
Setting resolution	100kHz (Allows rotary encoder, numeric key and function key)
Accuracy T : Sweep time (s)	within ± (30+100T) kHz±1dot (frequency span : 200kHz to 10MHz, RBW : 30kHz, 23 ±5°C) within ± (100+700T) kHz±1dot (frequency span : 20MHz to 3.3GHz, RBW : 100kHz, 23 ±5°C)
RBW frequency error	within ± 6% of RBW (RBW : 3kHz, 30kHz) within ± 30% of RBW (RBW : 100kHz to 3MHz)
Frequency span	
Setting range	0Hz (zero span), 200kHz to 2GHz (1-2-5step) and 3.3GHz (full span)
Accuracy	within ± 3% ± 20TkHz ± 1dot (Frequency span: 200kHz to 10MHz, 23 ±5°C)
T: Sweep time (s)	within ±3% ±200TkHz ±1dot (Frequency span : 20MHz to 3.3GHz, 23 ±5°C)
Display resolution	Frequency span/250 Frequency span/1000 (only the measurement by RS-232C communication)
Display dot number	251dots, 1001dots (only the measurement by RS-232C communication) (The unit displays data in 251 horizontal dots, but it internally captures the trace in 1001 dots)
Resolution bandwidth	3dB bandwidth
Setting range	3kHz to 3MHz (1-3step) and AUTO
Accuracy	within ±20%
Selectivity	1 : 12 (typical, 3dB : 60dB)
Video bandwidth	100Hz to 300Hz (1-3step), OFF and AUTO
SSB Phase noise	-90dBc / Hz (typical, 100kHz offset, RBW : 3kHz, VBW : 100Hz, Sweep time : 0.3s)
Spurious response	less than -60dBc
Harmonics	less than -40dBc (50kHz to100MHz) less than -45dBc (100MHz to 3.3GHz)

Amplitude

Reference level	
Setting range	+10 to -40dBm (1dB step)
Accuracy	within ±0.8dB ±1dot (center frequency : 100MHz, RBW : 3MHz, VBW : OFF, ATT : 0dB, 23 ±5°C)
Unit	dBm, dBV, dBmV, dBµV, dBµV/m, dBµA/m (dBµV/m and dBµA/m is used the measuring function)
Average noise level	-110dBm (typical, center frequency : 100MHz RBW : 3kHz, VBW : 100Hz)
Freq. Characteristic	within ±2.0dB ±1dot (50kHz to100MHz) within ±1.0dB ±1dot (100MHz to 3.3GHz)
Input impedance	50ohm
Input VSWR	less than 2.0
Input attenuator	
Operating range	0 to 25dB (1dB step), coupled with reference level
Switching error	within ±0.6dB
RBW switching error	within ±0.6dB
Display resolution	0.4dB (10dB/div), 0.08(2dB/div)
Display dot number	200dot
Display scale	10dB / div, 2dB / div
Scale	within ±0.2dB / 2dB ±1dot
Accuracy	within ±0.8dB / 10dB ±1dot within ±1.6dB / 70dB ±1dot
Input damage level	+20dBm (CW average power), 25VDC
Input connector	SMA (J)

Sweep

Sweep time	
Range	10ms to 30s (1-3step, frequency span: 0 to 2GHz) and AUTO 30ms to 30s (1-3step, frequency span: full span) and AUTO
Accuracy	within ±0.1% ±1dot (frequency span: 0 to 2GHz) within ±1.5% ±1dot (frequency span: full span)
Trigger mode	AUTO (frequency span : zero span)
Detection mode	Positive peak, Negative peak, Sample (when sweep time is 10ms or 30ms, only Sample can be set)

Functions

Marker	NORM: displays frequency (7 digits max) and level (4 digits max) at marker point.

		DELTA: displays difference frequency and level between 2 markers.
Peak search		NORM: searches a peak point within 10div. Available NEXT peak (10max).
		ZONE: searches a peak point within a zone designated by center and width. Marker moves to a peak point each sweep.
Calculation		NORM, MAX HOLD, MIN HOLD, AVERAGE, OVER WRITE MAX/MIN HOLD: 2 to 1024 times, AVERAGE: 2 to 256
Measuring		Channel power, Adjacent channel power, occupied frequency bandwidth, Electric field strength (needs optional antenna), Magnetic field strength (needs optional magnetic field probe) measurement.
AUTO tuning		When pressing AUTO TUNE key, the maximum level spectrum within 3.3GHz bandwidth is adjusted to center, and reference level, RBW, VBW and sweep time are adjusted to optimum values.
Save / Load		
	Save	Saves 100 traces and 100 setups
	Load	Loads 1 trace and 1 setup

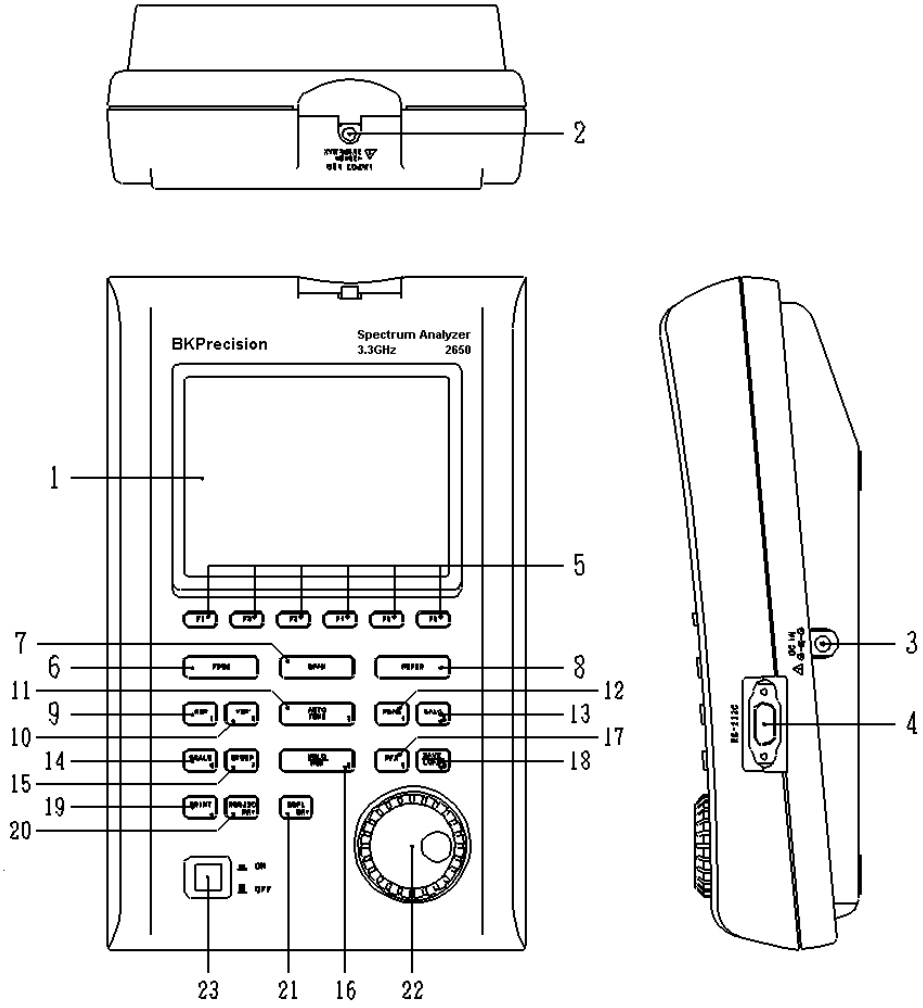
General

Communication		
	Interface	RS-232C
	Baud rate	2,400 to 38,400bps
Hard copy		allows direct hard copy with an optional printer
Display		
	Display	LCD
	Backlight	CFL backlight
	Resolution	320 (H) × 240 (V) dots
Power source		
	Battery	Ni-MH Battery (included)
	External DC	Pin jack, DC5V / 4A (BC 2650 included)
Operating temperature		0 to 40°C (Guaranteed at 23 ±10°C, without soft carrying case)
Operating humidity		less than 40°C / 80%RH (Guaranteed at less than 33°C / 70%RH, without soft carrying case)
Storage temperature		-20 to 60°C, less than 60°C / 70%RH
Dimensions (WxHxD)		6.4 x 2.75 x 10.25 (162 × 70 × 260 mm)
Weight (approx.)		3.75 lb. (1.7kg) included battery
		3.3 lb (1.5kg) without battery

2.1 Front panel view.

BK Precision Corporation reserves the right to make changes in design, specification and other information without prior notice.

3 2650 Front Panel at a Glance



1) LCD display

High-resolution 320×240 liquid crystal display. It simultaneously displays traces (10×8 div), various setting values, measured values, etc.

2) Input connector

SMA J type input connector.

3) External power connector

Power connector. In use for external BC 2650 AC power adapter.

4) RS-232 connector

RS-232C port.

5) Function keys (F1 to F6)

Flexible, function key.

6) Center frequency key

This key is used to set the center frequency. Center frequency can be set in range from 0 to 3.3GHz (100kHz step).

7) Frequency span key

Use this key to set the frequency span. It can set between 200kHz to 2GHz, ZERO SPAN and FULL SPAN (3.3GHz).

8) Reference level key

Set the reference level. It can set between +10dBm to -40dBm (1dB step).

9) Resolution bandwidth key

Use this key to set the Resolution bandwidth. It can set between 3kHz to 3MHz.

10) Video bandwidth key

Use this key to set the video bandwidth between 100Hz to 300kHz or OFF.

11) AUTO tuning key

Automatic tunes measured signal spectrum within 3.3GHz bandwidth. This does not operate normally when the signal level is -40 dBm or lower and the input frequency is 50 MHz or lower and the frequency span is ZERO SPAN and FULL SPAN.

12) Measuring function key

Available for Channel power, channel leakage, occupied frequency bandwidth, Electric field strength and Magnetic field strength measurement.

13) Calculation function key

Available for Max hold, Min hold, Average and Over write.

14) Display scale key

Use this key is used to select the display scale of amplitude from 2dB/div or 10dB/div.

15) Sweep key

This key is used to set sweep time between 10ms to 30s or set the detection mode.

16) Hold/Run key

Stops or restarts the measurement.

17) Marker - Peak search key

Use this key to set and move a marker.

18) Save/Load key

Saves 100traces and 100setups, and loads 1trace and 1setup.

19) Print key

Print screen key, if optional printer is connected.

20) RS-323C key

Sets baud rate and transfers a current or saved trace.

21) Display control key

Control's contrast, backlight ON/OFF, brightness of backlight, invert display and buzzer ON/OFF functions.

22) Rotary encoder

Universal encoder

23) Power switch

Power switch

4 Description Of Screen