TRANSCOM INSTRUMENTS
PRODUCTS CATALOG 2018

TRANSCOM INSTRUMENTS

Partnering with Us
to Serve Customer More

ISO9001   ISO14001

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WHO WE ARE

Transcom Instrument Co., Ltd. founded in 2005 and headquartered in Shanghai, is a leading manufacturer and provider of RF and wireless communication testing instruments and overall solutions in China. Based on its independent brands and a wide range of core patented technologies, Transcom became national high-tech enterprise with independent intelligent property rights and has been listed into Shanghai Enterprise Recognition Award for High Growth SMEs in Technology.

Transcom is backed by a experienced and dedicated research team in mobile communication, radio frequency and microwave, and network optimization testing instrument. Through "Industry-University-Research" cooperation with universities, Transcom founded Southeast University-Transcom Electronic Measurement Technology Center at Southeast University to futher ensure technology and talent reserve, and secure future visionary and sustainable technology development.

Transcom's product portfolios focus 4 areas: cellular network critical communication planning/maintenance/optimization, Manufacturing testing solution, educational instrument/equipment, spectrum monitoring sensor for system integration.

Vision: *China's high-end wireless communications test equipment leader!*

Mission: *To provide a total solution of RF test and measurement products to the mobile communication industry*

Core Values: *Innovation, Respect for People, and Total Customer Satisfaction*

National Science and Technology Progress Award Grand Prize

ISO9001 certification

ISO14001 certification

China National High-tech Enterprise Certificate

Member of IMT-2020(5G) Promotion Group

WE ACHIEVE

2005-2010

- **FIRST** private enterprise specialized in wireless T&M industry in China,headquartered in Shanghai
- **PREMIER** vendor of Huawei, ZTE and Nokia
- **LAUNCH** TD-SCDMA mobile tester, scanning receiver, vector network analyzer, etc.

2011-2016

- **TOP** China National Hi-tech Enterprises
- **ENTITLED** to Shanghai Engineering Research Center for Wireless Communication Testing Instruments
- **FIRST** Android-based handheld instruments worldwide
-SiteHawk (Cable & Antenna Analyzer)
-SpecMini (Spectrum Analyzer)
- **70%** market share on LTE scanner in China 4G industry
- **LISTED** on New Third Board (Chinese Nasdaq) (code: 831961)

2017

- **HONOURED** with State Science and Technology Progress Special Award with other 13 companies
- **LAUNCH** modular signal generator and analyzer: Micro TxRx for 4G/NB-IoT/LoRa
- **LAUNCH** 4G MIMO Channel Emulator
- **LAUNCH** HzMap solution based on Bigdata technology
- **PRESENTATE** 5G massive MIMO antenna measurement solution
- **PRESENTATE** in-building coverage simulation and verification solution

WE EXPAND

26	250	15%	76
Million revenue in 2016	Employees	Sales revenue invested in R&D	Invention Patents

WE FOCUS

Cellular Network/Critical Communication	RF Component Manufacturing	Research/Education	Spectrum Monitoring

01 Cellular Network Measurement

SpecMini Handheld Spectrum Analyzer

Overview

SpecMini is the first Android hand-held spectrum analyzer. It features high testing sensitivity, light weight, compact size and portable design. Android operating system and high-resolution touch screen allow testing and measurement can be performed user-friendly. With excellent performance, SpecMini meets the testing and measurement requirements of the majority of RF signals.

Key Facts

• Frequency Range: 10MHz to 6.0GHz

• DANL: -168dBm@1GHz (Sensitivity set to High, normalized to 1Hz)

• RBW: 10Hz to 5MHz

• Multi-screen: maximum 4 windows

• Android Operating System: touch screen operation, multi-touch, easy-to-use

• Compact size (200mm×99mm×67mm) and light weight (1.25kg, including the battery)

• 6 hours operating time

• Provide effective measurement guarantee during the building and maintenance of the transmission system

Innovative Features & Benefits

Product features

- Easy to carry
- Multiple test windows
- Touch screen: support multi-point touch

Typical applications

Set-up and maintenance of transmission system

- General spectrum test
- Occupied bandwidth test
- Channel power measurement
- Adjacent channel leakage power ratio measurement
- Support the measurement of RF parameters of each main communication signal
- Portable and suitable for long-time field test

Interference search

- Precise weak signal measurement
- Connect the omnidirectional and directional antenna to check interference

General test in laboratory, factory, school, etc.

- General spectrum analysis
- Common test status auto-saving
- Easy set-up
- Test parameters can be saved

Easy to operate

- User-friendly Android operating system
- Parameters can be set rapidly by clicking and sliding
- Test results can be read in any status

Software customization

- Application and Software customization

Solution Highlights

Set-up and maintenance of transmission system

SpecMini can be used to establish and maintain transmission system which has the following measurement functions:
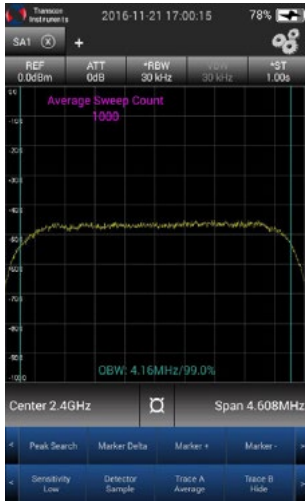
• Signal spectrum quality testing
• Mainstream communication system signal testing
• Applicable to the transmission test and air interface test

General spectrum test   Occupied bandwidth (OBW)

General spectrum test

SpecMini has broadband test function, including frequency test, power test, spurious test, etc.
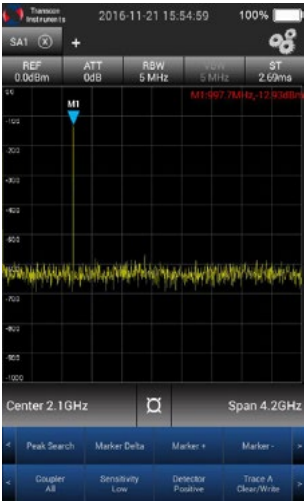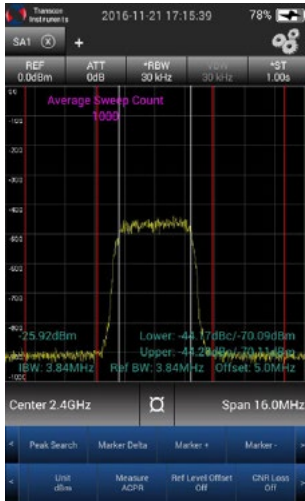
Occupied bandwidth (OBW)

Measure the bandwidth occupied by energy sent by communication channel.

Channel power measurement

This function can be used to measure the power and power spectrum density of the user-defined channels. The channel power measurement function of SpecMini supports channel power testing of various communication systems.

Adjacent channel leakage power ratio

Operator needs to minimize the adjacent channel leakage power ratio to prevent the interference to normal operation of adjacent channels. The adjacent channel leakage power ratio is measured to check the signal leakage and identification and control the interference source. The function of adjacent channel leakage power ratio can be applied to test the influence of base station carrier signals on adjacent channels within a certain distance.

Channel power measurement   Adjacent channel leakage power ratio

Spectrum measurement of main communication signal

Measure communication signals by means of parameter setting. Various communication signals can be separately tested by clicking the unique multi-window interface.
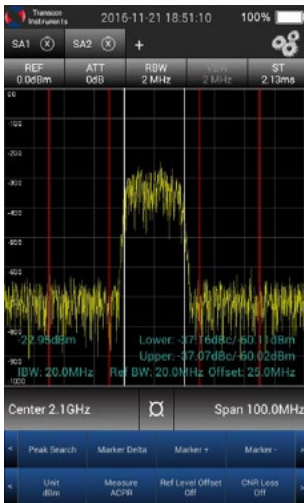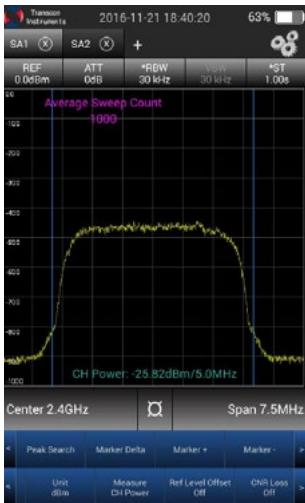
Portable and suitable for long-time field test

Compact design allows users to place and use SpecMini anywhere at anytime. The long standby time generally meets one-day field operation needs.

Spectrum measurement of main communication signal

Precise weak signal measurement

SpecMini is able to work for 6 hours,
and equipped with the protective circuit。

Recall function

Interference search

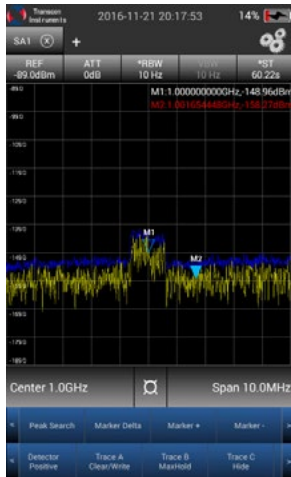Compact design allows users to place and use SpecMini anywhere at anytime. The long standby time generally meets one-day field operation needs.

Precise weak signal measurement

With sensitivity being down to -168dBm, SpecMini is perfect for interference search. In the high sensitivity mode with the built-in low noise amplifier open, weak signals will be shown on the screen.

Connect the omnidirectional and directional antenna to check interference

Connect omnidirectional antenna to qualitatively search signals and find interference signal. Then by connect directional antenna with SpecMini, and gradually locate the interference signal according to the relationship between the antenna direction and signal power.

Suitable and portable for long-time testing

Compact design allows users to place and use SpecMini anywhere at anytime. SpecMini is able to work for 6 hours which generally meets one-day field operation needs without charging.

General test in laboratory, factory, school, etc.

• General spectrum analysis.

•SpecMini has the broadband test function, including frequency test, power test, spurious test, etc.

Common test status auto-saving

SpecMini has auto-saving option for common test status. Once parameters are set, test state and parameter can be saved to be directly recalled for next operation, thus avoiding the repeated operation in each measurement and reducing the workload.

Easy set-up

SpecMini is small and lightweight, can be deployed easily and rapidly. It is easy to carry and free from the environmental influence. It is able to rapidly respond to test demands and can be directly deployed in place.

GNSS interference Analysis

Frequency attribution identificationm

FM demodulation and locating

Easy to operate

User-friendly Android operating system

SpecMini can be operated as same as a regular mobile phone. Even inexperienced user can easily obtain test results after simple training.

Parameters can be set rapidly by clicking and sliding

Operational shortcuts on the touch screen help users to operate the instrument more convenient, and obtain the desired test results only by clicking and sliding.
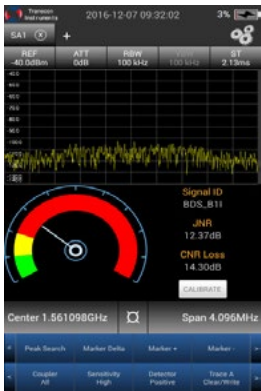
Test results can be read in any state.

SpecMini is equipped with the 5.5-inch 720p HD screen, with the brightness adjustable and no influence on parameter readout indoors or outdoors.

Software customization

Transcom provides SpecMini-based software customizing services. Variety of application and software can be pre-installed or build in SpecMini as users demanded.

SpecMini supports various customized software. Transcom carries out development and maintenance of customized applications to further upgrade SpecMini based on user's needs.

GNSS interference Analysis

This customized application can analyze GNSS (GPS, Beidou) signal quality through CNR Loss and JNR. Spectrum function coordinating with the customized application makes traditional testing more convenient.
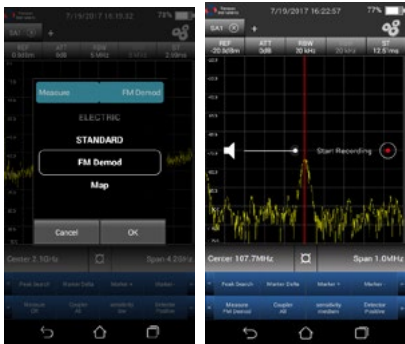
Frequency attribution identificationm

This customized application can analyze frequency attribution of current base stations with back-end database (editable). In the field test, marker can intelligently identify the application and operator attribution of concerned frequency band, avoid frequency conflicts

FM demodulation and locating

This customized application support FM demodulation in relevant channel, and play and record FM content as evidence. By using SpecMini, user can detect illegal broadcasts and locate the source with directional antenna.

Control Elements

RF input

HD screen(5.5 inch, 720p)

On/Off button

USB I/O interface

Power interface

Power LED
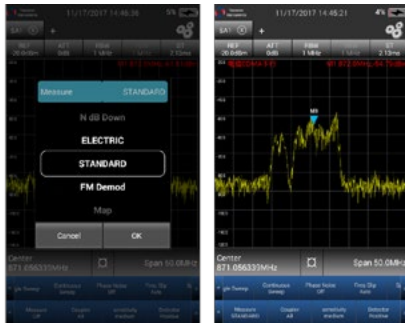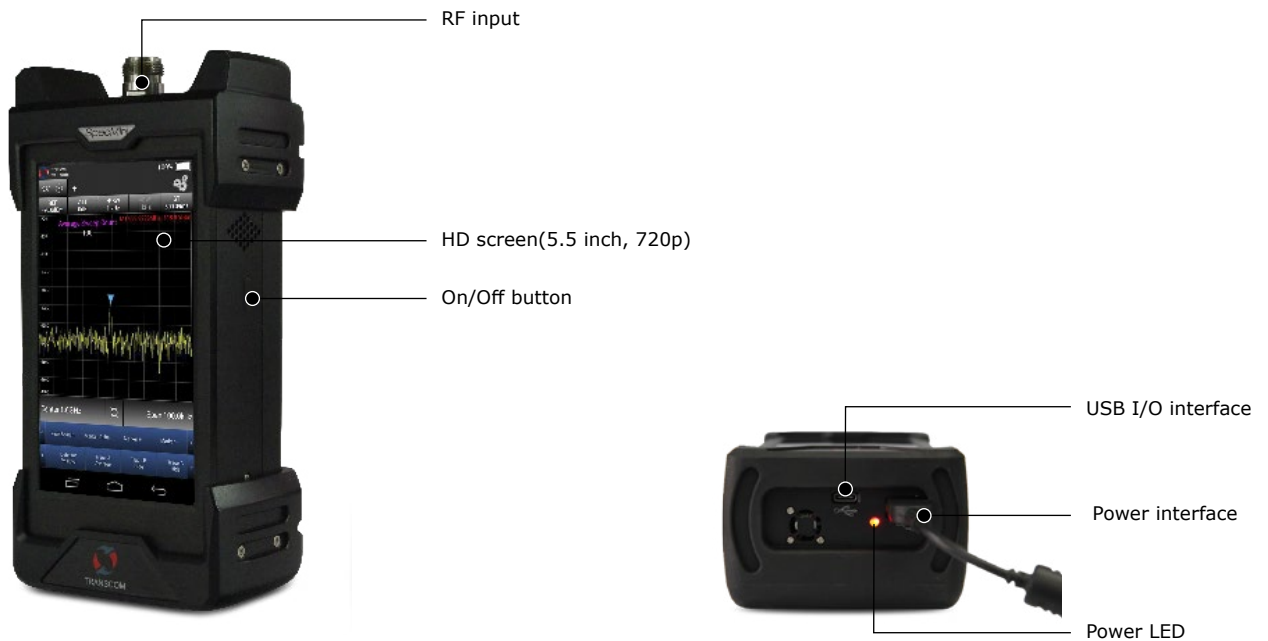
Specifications

Key Functions	
Measurement	ACPR，CH Power, OBW, Phase Noise, and N dB Bandwidth
Trace	3 Trace: A, B and C
	Trace operation: Clear/Write, Maxhold, Minhold, Average, View ,Hide
Sweep	Continuous/single
Trigger	Free
	Video (zero span)
Marker	8 maximum,surport 1 reference with 7 Delta Markers
	Peak Search, Marker Delta, Marker+, Marker-
Span	0Hz, 100Hz to 6.0GHz
	Freq Slip, Span Zoom (1-2-5-10 series, 4GHz, 4.2GHz, 6GHz)
Scale	Log/Lin
	Log: 0.1 to 1, 0.1 step
	Lin: 1 to 10, 1 step
Unit	dBm, dBuV, dBV, W, mW, uW, pW, V, mV, uV
Sensitivity	Low, Medium and High
Detector	Positive, Negative, Sample, Average, RMS
Ref Level Offset	-50dB to 50dB
Multi-Screen	4 Maximum
Frequency	
Frequency Range	10MHz to 6.0GHz
Frequency Reference	Aging Rate: ±1ppm
Frequency Readout Accuracy	±((Readout Frequency + 1GHz) x Frequency Reference + Frequency Span Accuracy x Span)
Frequency Span Accuracy	± 1%
Sweep Time	1.1ms to 1600s
	2.69ms to 1600s, zero span

Resolution Bandwidth	
RBW Range	10Hz to 5MHz (1-2-3-5-10 Series)
RBW Accuracy	RBW ≥ 1MHz, ±10% RBW < 1MHz, ±2%

Amplitude	
Measuring Range	Display average noise level to +20dBm
Input Attenuator Range	0 to 30dB, 1dB Step
Maximum Safe Input Level	Sensitivity(Low): +30dBm Sensitivity(Medium): 0dBm Sensitivity(High): -20dBm
Reference Level Range	-140dBm to +20dBm -190dBm to +70dBm (Ref level offset: ON)
Amplitude Accuracy	ATT set to 0 dB, input signal: -5 to -30 dBm; detector set to Positive,Sensitivity set to Low; RBW auto-coupled ,all other settingsauto-coupled, 23±5℃ ±1.5dB
RBW Switching Uncertainty	±0.3dB
Input Attenuator Uncertainty	±0.6dB
Accuracy of Reference Level	Reference level: ≥-60dBm, ±0.8dB
Display Average Noise Level (DANL) @1GHz	Input Terminated,Detector set to Positive,Trace Average set to 1000,Span set to 50kHz,Ref set to -100dBm,all other settings auto-coupled, 23±5℃ . Normalized to 1 Hz RBW Sensitivity: Low -131dBm/Hz (typically -133dBm/Hz) Sensitivity: Medium -151dBm/Hz (typically -153dBm/Hz) Sensitivity: High -168dBm/Hz (typically -169dBm/Hz)
Residual Response	-75dBm
Input-related Response	10MHz to 1.285GHz, 3.22GHz to 3.7GHz <-70dBc 1.625GHz to 1.775GHz <-55dBc 1.285GHz to 1.625GHz, 1.775GHz to 2.35GHz, 2.71GHz to 3.22GHz <-42dBc 3.22GHz to 4.2GHz <-50dBc 4.2GHz to 6.0GHz <-55dBc
Second Harmonic Distortion	1.6GHz -70dBc
Third-order Intercept (TOI)	-10dBm tones, 1MHz apart, Sensitivityset to low, Ref set to -10 dBm +15dBm
P1dB	+5dBm (nominal)
Phase Noise @1GHz	-96dBc/Hz, @10kHz (typically -98dBc/Hz) -118dBc/Hz, @1MHz (typically -120dBc/Hz)

General	
System settings	Preset, Save, ScreenCopy, Print, Language, Service, About
Connectors	RF input: N-type, female, 50Ω USB: USB type C Power interface: Slim Tip, DC 20V
Display	5.5-inch, 720p
Operating System	Android
Battery	Type: Lithium-ion Operation time: option1：6 hours option2：3.5 hours Charging time: option1：2.5 hours option2: 2 hours Charging temperature: 0°C to +35°C, Must be in power of state
Operating environment	Operating temperature: 0°C to 50°C Storage temperature: -20°C to 70°C
Dimension	200mm*99mm*67mm (7.8 in*3.9 in*2.6in)
Weight	1.25kg（2.8 lb）with battery option1 1.05kg （2.3lb）with battery option2

Technical specifications

This technical specifications include the influence of probability distribution, measurement uncertainty and environmental factors on the instrument performance. It guarantee the performance under the following conditions.
• The instrument is ON and warmed up for 30min.
• The instrument internal reference signal is applied.
Testing temperature is 23±5 ºC, unless other specific condition applied.

Typical value

Additional description does not cover all performance information of the product guarantee. Unless otherwise specified, the ® typical value refers to the indicator or technical specification with which more than 80% of products comply under 23 ± 5 ºC. The measurement uncertainty is excluded. SpecMini should be within the calibration period.

Nominal value

The nominal value refers to the characteristic description or design range. It is not tested or covered by the product. SpecMini should be within the calibration period.

Ordering List

Model	Description
T8160	SpecMini handheld spectrum analyzer (10MHz to 6.0GHz)
Accessories Model	**Description**
SPM-AS001	Power adapter (20V/4.5A output)
SPM-AS002	Power cable(China standard)
SPM-AS003	Power cable(US standard)
SPM-AS004	USB data cable
SPM-AS005	USB OTG cable
SPM-AS006	Capacitive pen
SPM-AS007	Portable box
SPM-AS008	Portable soft bag
Options	
SPM-AS010	700MHz to 2700MHz omnidirectional antenna
SPM-AS011	700MHz to 6000MHz omnidirectional antenna
SPM-AS012	700MHz to 4000MHz directional antenna
Replacement options	
SPM-AS021	11.1V and 6800mAH battery kit

SiteHawk Handheld Cable & Antenna Analyzer

Overview

SiteHawk is the world first handheld intelligent cable and antenna analyzer powered by Android operating system and high-resolution touch screen. It is small, lightweight and easy to carry. SiteHawk can be used for testing the matching of the cable and antenna system, accurately evaluating system performance by measuring return loss, voltage standing wave ratio, cable loss and other parameters, and measuring the RF power with the optional ThruLine power sensor.

SiteHawk is preferred for system installation, maintenance and fault location in the mobile communication system, national defense communication and broadcast industry. Meanwhile, SiteHawk can be applied in cable production and inspection, ship communication testing, public communication security, semiconductor production and calibration and other RF related area. The use of a full touch screen HMI makes operation easy. Its performance is sufficient to achieve high-precision repeatable test, to meet all your communication test needs.

SK-200   SK-4500

Key Facts

• Support wider range of test frequency, i.e. 300kHz to 6000MHz, and cover most of application spectrum

• The world smallest and lightest (0.9kg) instrument allows one-hand operation

• High measurement speed, up to 1ms/point and immediate display of measurement result

• Maximum 1500 meters DTF Range, SiteHawk is suitable for error checking and troubleshooting of long-distance cable system

• Built-in battery can be constantly operating for 10 hours, and additional portable battery can be applied to further extend battery capacity

• High frequency resolution (1kHz), simultaneous sweeping of 3201 data points at the same time, and high frequency accuracy: 2.5×10^{-6}

• HD color LCD screen, visible in sunlight and suitable for field work

• Built-in 16GB memory: measurement data can be shared via the WIFI cloud or recorded in the USB flash disk

Innovative Features & Benefits

Excellent Engineering Instrument

- Industrial grade design
- Engineering accessories
- Ergonomic instrument
- Powerful battery capability

Intelligent Platform and Cloud Application

- Android operating system
- Mass applications
- Data synchronization and cloud analysis
- GPS positioning function

Field Testing Functions

- Reflection characteristic measurement
- Single-port cable loss measurement
- DTF measurement

Flexible Test Solutions

- Feeder and antenna system maintenance/installation
- RF power measurement
- Indoor distribution test
- Semiconductor calibration load/RF cable test
- Trace background analysis

Solution Highlights

Excellent engineering instrument

SiteHawk' s excellent ergonomic design provides the constant guarantee for field operators in routine maintenance and in-depth fault analysis. Accurate measurement results can be obtained in a short time under any condition.

Industrial grade design

By using integrated ergonomic design, SiteHawk is dust and water proof, and supports stable measurement in harsh environment. Temperature stability is up to 0.01dB/℃ . SiteHawk is the smallest and lightest cable and antenna analyzer in the world, with the weight of only 0.9Kg including the battery.

Engineering accessories

SiteHawk is provided with waterproof suitcase and portable soft bag, where the host and all accessories can be assembled to facilitate carrying.

Ergonomic design

SiteHawk' s anti-slip rubber protective cover helps engineers hold more comfortably. Its vertical longitudinal layout makes it easy to operate when held.

Powerful battery capability

SiteHawk's built-in battery supports continuous operation for 10 hours. With external portable charger or battery, SiteHawk provides user a long and stable working environment.

Intelligent Platform and Cloud Application

SiteHawk is powered by Android operating system. Its operation interface is simple and user-friendly. Various kinds of professional software can be installed to expand the instrument performance. SiteHawk also supports external storage devices, Bluetooth and WIFI. Data can be flexibly shared or analyzed via the built-in large-capacity memory and Internet "cloud" application, or synchronized between each other. With the built-in GPS module, location information of testing point can be recorded, in order to achieve integrated test in the true sense.

Android operating system

SiteHawk is powered by Android system and has a full-screen touch interface. User-friendly interface is easy to operate and supports intelligent operations such as stretching.

Mass applications

SiteHawk can install multiple professional Applications to achieve various test functions and enhance the extension performance.

Data synchronization and cloud analysis

With 16GB memory, SiteHawk is able to save thousands of screenshots or traces. Test records can be synchronized between SiteHawk and cloud, and can be analyzed on each one.

Field Testing Functions

SiteHawk has all functions of field test: cable loss measurement, VSWR measurement, return loss measurement, DTF VSWR measurement and DTF return loss measurement.
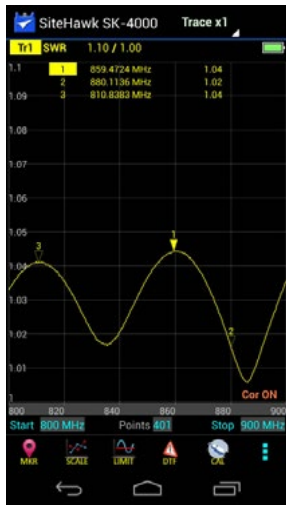
Reflection characteristic measurement

SiteHawk can be used for measuring reflection characteristic parameters based on frequency-domain reflection. Reflection characteristic parameters indicate specific matching of the antenna, feeder and other passive devices/systems. High-accuracy measurement results are shown in the VSWR or return loss form.

Single-port cable loss measurement

The cable insertion loss of the RF system has significant influence on power transmission characteristics. Poor cable loss also affects the overall matching of the antenna system. SiteHawk supports single-power cable loss measurement. With the built-in cable parameter table, true results can be automatically calculated according to the rated attenuation of each cable, which is conducive to overall evaluation of the RF system.
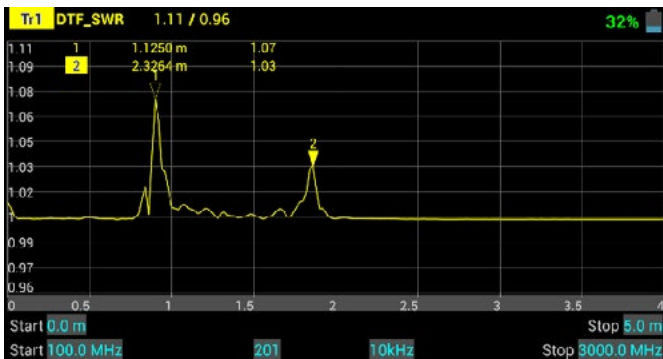
DTF VSWR/return loss measurement

The DTF test is carried out to determine the specific positions of nonconforming cables, components and connectors of the cable system, in the form of VSWR or return loss change along with the distance, in order to eliminate faults and risks.

Trace background analysis

SiteHawk has the powerful function of field test. SiteHawk software in PC supports playback and analysis of test curves saved in the S1P format, with no upper limit of traces on one screen. Using SiteHawk, the laboratory-level accurate analysis can be truly achieved.
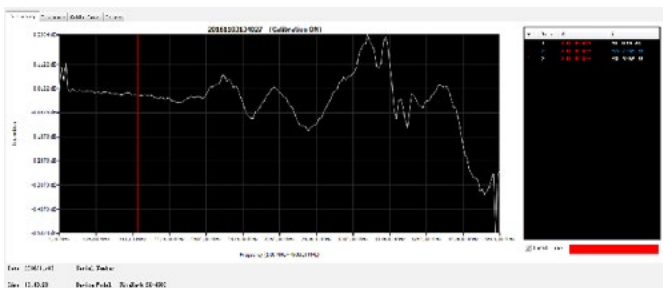
Flexible test solutions

SiteHawk can be widely applied in various RF measurement occasions. It can also provide flexible test solutions when combined with other RF test instruments.

• Feeder and antenna system maintenance/installation

When impedance of the antenna, feeder and other passive devices are not matched with each other or the impedance of the feeder and transmitter are not matched with each other, reflection will be caused as a result of high-frequency energy. In the case of poor return loss/VSWR, the transmitter will be damaged, the coverage area of the base station will be reduced, the call drop rate and blockage will be increased, and the data traffic rate will be decreased. SiteHawk is able to reflect actual results of antenna and feeder VSWR/return loss measurement, to facilitate prompt processing.

• RF power measurement

For the antenna and feeder system, SiteHawk supports accurate measurement of RF power with the optional RF power meter. The actual RF energy in the current position of the system can be accurately obtained by means of through type power measurement, to evaluate actual operation of the system.

(Power sensors include Bird 7020, 7022, 5012D, 5014, 5015, 5015-EF, 5016D, 5017D, 5018D and 5019D).

• Indoor distribution test

For the indoor distribution system, SiteHawk can examine the reception and transmission states when combined with SpecMini spectrum analyzer. The built-in signal source of SiteHawk can be used as a substitute of indoor distribution RF signal source. At the same time, relevant parameters such as the terminal channel power can be measured by the spectrum analyzer. SiteHawk is able to locate and measure faults of the indoor distribution system to effectively solve the problem of indoor distribution layout.

• Semiconductor calibration load/RF cable test

If the impedance of the cable system does not match in the semiconductor calibration process, the transmitter output and semiconductor production quality will be affected. SiteHawk can be applied to rapidly and accurately evaluate the RF cable and load.

Control Elements

RF out/reflection

On/Off button

HD screen(5.5 inch, 720p)

Anti-slip rubber
protective cover

USB I/O & Power interface

Specifications

Specifications		
Frequency Range	SK-200-TC	300kHz to 200MHz
	SK-4500-TC	1MHz to 4500MHz
	SK-6000-TC	20MHz to 6000MHz
Frequency Accuracy	$\pm2.5\times 10^{-6}$	
Output Power	SK-4500, SK-6000	-10dBm
	SK-200	-5dBm
Reflect Amplitude Accuracy	-15dB to 0dB	0.4dB
	-25dB to -15dB	1.5dB
	-35dB to -25dB	4.0dB
Trace Noise Magnitude(IFBW 1kHz)	0.5dB rms	
Measurement Speed	1ms/data point.	
Measurement Points	51 to 3201	
Temperature Stabalility	0.01dB/ ˚F	
	0.02dB/℃	
Return Loss Measurement Range	0dB to -60dB	
Resolution	0.01dB	
VSWR Measurement Range	1.0 to 65.0	
Cable Loss Measurement Range	0 dB to 30 dB	
DTF Range	0 to 5000(ft) 0 to 1500(m)	
Test Port Connector Impedance	N-type, Female 50 ohms	
Connector	SK-200-TC	Micro USB, USB 2.0
	SK-4500-TC, SK-6000-TC	USB Type-C, USB 3.0
Languages	English, Chinese, Espanol	
Recommended Calibration Interval	3 year	

Dimensions(L×W×H)	SK-200-TC	7.2×3.8×1.9(in) 182×95×46.5(mm)
	SK-4500-TC, SK-6000-TC	7.7×3.6×2.4(in) 195×90×60(mm)
Weight	1.98lbs (0.9kg)	
Maximum Input Voltage	50V	
Operates In Temperature	14 ℉ to 131 ℉	
	-10℃ to +55℃	
Storage Temperature	-40 ℉ to 176 ℉	
	-40℃ to +80℃	
Battery Charging Temperature	32 ℉ to 95 ℉	
	0℃ to +35℃	
Storage Capacity	Thousands of Trace and Setups	
Directivity	45dB	
Immunity to Interfering Signals	+13dBm	
CE	EMC-Standard EN 61326-1:2006 Safety-Standard EN 71010-1:2001 Standard EN61000-3-2:2006+A1:2009+A2:2009 EN61000-3-3:2013	
Battery（Lithium-ion rechargeable）	SK-200-TC	4 hours typical operating time
	SK-4500-TC, SK-6000-TC	10 hours typical operating time
Battery Charge Time	5 hours for full charge	
Power Measurement	Yes 7020, 5012D, 5014, 5015, 5015-EF, 5016D, 5017D, 5018D, 5019D	

Ordering List

| STANDARD ACCESSORIES PROVIDED SK-200-TC, SK-4000-TC	
SK-CAL-MN-C	Calibration Combo
SK-TP-112	Stylus
5B2229-510H-3	AC ADAPTER (5V DC Output)
7002A218-1	Hard Carrying Case
5A2653-3R5NL4	RF Cable, 1 meter long
920-SK-4000	Instruction Manual
7002A219-1	Soft Carrying Case
5A2745-1	USB Drive
5A2653-0R5NL5	USB Interface Cable, 15cm long
STANDARD ACCESSORIES PROVIDED SK-4500-TC,SK-6000-TC	
SK-CAL-MN-C	Calibration Combo
SK-TP-112	Stylus
APL336-1230	AC ADAPTER (12V DC Output)
7002A218-2	Hard Carrying Case
SK-TC-MNFN-1M	1m RF Cable
920-SK-4500	Instruction Manual
7002A219-2	Soft Carrying Case
5A2745-1	USB Drive
SK-CONN-OTG-2	USB OTG Connector
Battery	SK-BTY-7468
OPTIONAL Accessories	
PA-MNFE	Adapter, N(m) to 7/16 DIN(f)
PA-FNFE	Adapter, N(f) to 7/16 DIN(f)
PA-FNME	Adapter, N(f) to 7/16 DIN(m)
PA-MNME	Adapter, N(m) to 7/16 DIN(m)

TSP Transmitter

Overview

TSP Pilot Transmitter is a kind of special engineering instrument applicable to emulation and testing of indoor and outdoor signal coverage and evaluation and testing of signal interference. It is mainly used for simulating and outputting CW and modulation signals, i.e. actual pilot signals transmitted by the base station. Due to easy deployment and low cost, the instrument can be used as a substitute of actual base station in the test system for relevant tests of the simulating signal source.

TSP pilot transmitter, with compact structure, high portability and external large-capacity battery, is applicable to field or indoor engineering tests. Various combined modes are available and can be customized to meet various test demands of users. The instrument is generally applied in propagation model tuning, coverage evaluation testing and auxiliary design and engineering acceptance of indoor distribution systems.

Key Facts

• Support the output of GSM, TD-SCDMA, CDMA2000, WCD-MA, LTE, NB-IoT and LoRa modulation signals and CW signals.
• In the CW mode, the frequency and power are adjustable. In the modulation mode, the frequency and power are adjustable, and the BSIC code of GSM, Midamble code of TD-SCDMA, PN code of CDMA2000, scrambling code of WCD-MA, power of CPICH and Channel, PCI and bandwidth, and PCI of NB-IoT can be set; the modes of Standalone, In- band and Guard-band are available; and the PCI and S7-S12 waveform file of LoRa can be configured.
• Large power adjustment range: 0 to 43dBm (20W) and -10 to 33dBm (2W) in the standalone mode, with the step of 0.5dB.
.

• Wide band: support the 700MHz to 2700MHz output in the standalone mode, with the adjustment step of 10kHz, meeting the needs of standard signal test.
• The power, frequency and other parameters can be remotely set via APP. The instrument is easy to operate and carry, with the effective operating distance of 10m, avoiding radiation injury resulting from high-power transmission.
• Integrated design: small size (200mm×60mm×230mm) and light weight (2kg). With the external battery, the instrument can continuously work for 5 to 8 hours, which is applicable to outdoor complex environments.
• The instrument can be configured flexibly, and the frequency band and power can be customized according to user demands.

Innovative Features & Benefits
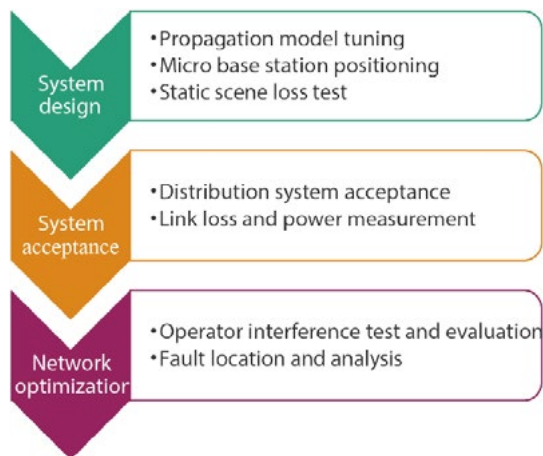
Product Features

• Support the signal emulation output of the existing multi-system network and the Internet of Things
• Support terminal test applications
• Large power adjustment range
• Support multi-output customization
• APP remote control and simple deployment

Typical applications

• Propagation model tuning test
• Micro base station planning test
• Static scene loss test
• Distribution system acceptance test

Solution Highlights

Support signal emulation of the existing multi-system network and the Internet of Things

A single TSP pilot transmitter meets the needs of CW and modulation signal output of all standard protocols and the protocol of the prevailing Internet of Things, saving the fund investment of customers and bringing conveniences for the user to test various signals.

Support terminal test applications

TSP pilot transmitter can be combined with the intelligent terminal (such as iPhone 6). In the service test, simulating signals sent by TSP transmitter are received by a mobile phone, the interference is evaluated based on the received signals, and the SINR value of the affected service cell and the average value of data service flow are provided.

Large power adjustment range

The dynamic adjustment range of a single instrument is 43dB, meeting test needs of indoor and outdoor scenes.

Support multi-output customization

Transcom provide output customization of TSP Transmitter. Support customization from 1 to 3 output. Each output perform the same with single port TSP Transmitter.

APP remote control and simple deployment

The transmitter is a kind of engineering test instrument, which should be easy to deploy and operate for tests in various scenes. TSP transmitter is controlled by APP within

10m, facilitating remote operation and avoiding radiation injury caused by radio waves in high-power transmission of signals.

Propagation model tuning

Background: The propagation model is used for describing and reflecting the characteristics of the actual wireless signal propagation environment and rules of signal changes to certain degree via one mathematical mode. It represents the propagation environment of specific scene, and characterizes the radio wave propagation loss of specific environments or propagation paths. It mainly focuses on slow fading caused by shadow effects of barriers on propagation paths. The geographic types and topographies of various countries and regions vary greatly. Some parameters of one model to be applied in various regions must be modified, which is known as propagation model tuning.

Solution: As a simulating signal source, TSP pilot transmitter is able to output CW signals. The signal parameters including geographic information are collected by the receiver by means of field testing, and the output data are imported into the planned software to adjust model parameters.
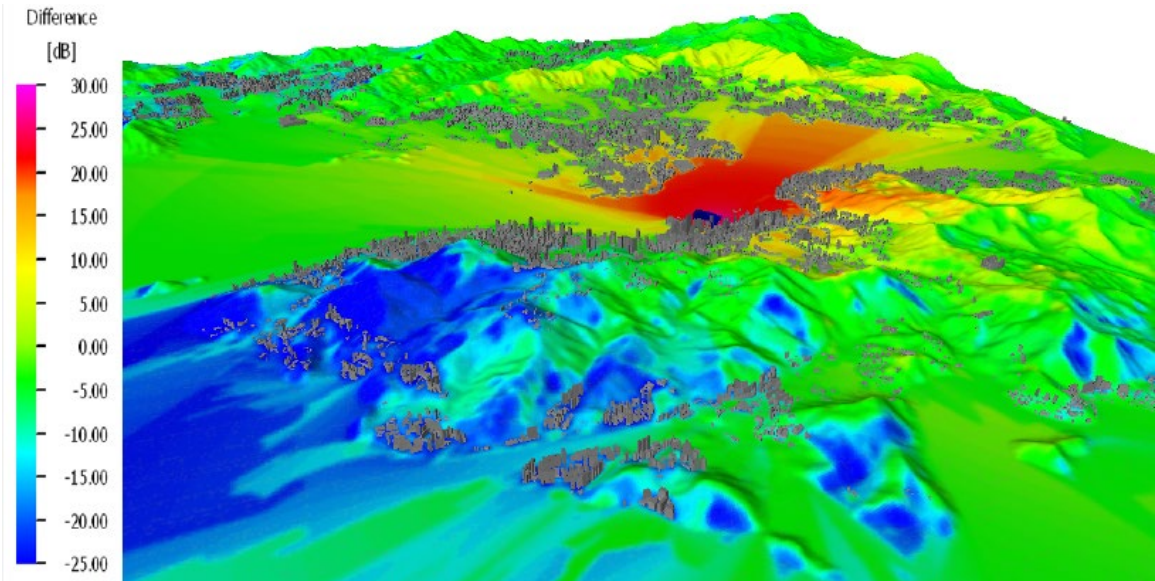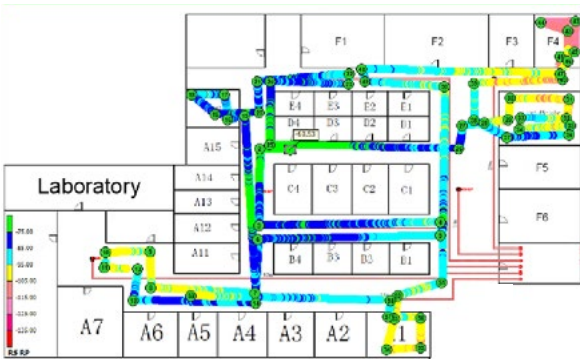
Micro base station Result

CW Result

Pilot Result

## Micro base station planning of indoor distribution system

Background: With building of 4G networks and popularization of intelligent terminals, data services are developed rapidly, and user behaviors of indoor scenes are more intensified. Operators can build indoor distribution systems to win indoor data traffic, improve the operation profits, expand new businesses and maintain the user loyalty. In order to improve the quality and management capability of the indoor distribution system, simplify the building of indoor distribution system, the new indoor distribution system will be greatly promoted in 2017 in China, and more micro base stations will be built. By means of emulation testing of new indoor distribution system, the layout problems of micro base stations can be solved effectively.

Signal coverage testing is able to accurately quantifying and locating base station to simulate the actual deployment. CW signal and pilot signal are the most common signals for emulation and performance testing. In most of the indoor scenario, signal can be blocked by obstacles or affected by complex area then cause propagation loss. CW signal testing result often varies compare to actual performance in terms of narrow and non-identical indoor environment that leads to RSSI difference. In contrast, pilot signal behaves identical with the actual signal and can be further evaluate by CINR ratio. Thus pilot signal is the primary requirement for micro base station distribution planning.

Solution: As a simulating signal source, TSP pilot transmitter is able to output modulation signals of operating systems of LTE and other existing networks. The cell signal parameters (Channel, PCI, RSRP, RSRQ, SINR, etc.) are collected by the receiver by means of walk test, and the actual coverage of the base station is simulated to simulate the coverage of base station signals, further confirm the locations and quantity of base stations and provide accurate data for the layout of indoor distribution system.

★ Transmitter Location   🟡 Point of Test
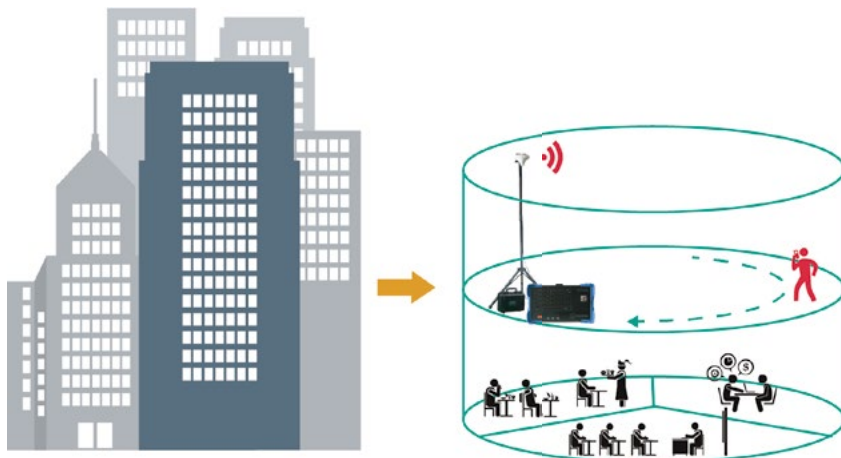
Static scene loss test
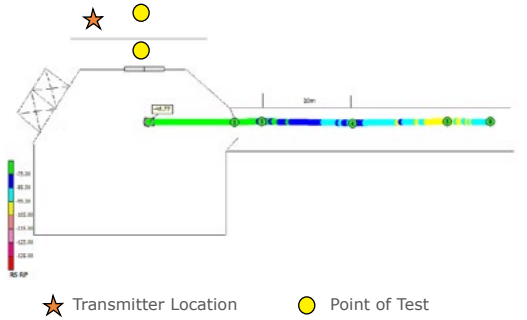
Background: The scenes of indoor distribution system vary. Before the distribution system is designed, the signal attenuation in actual scenes should be understood, such as conference rooms, offices, restaurant, hotels, classrooms, etc. The signal attenuation emulation tests of various scenes can provide calculation reference for the indoor distribution system design and improve the final coverage of the distribution system.

Solution: As a simulating signal source, TSP pilot transmitter is able to output modulation signals of operating systems of LTE and other existing networks. The loss properties of actual signals in special scenes (such as doors, walls, fixed barriers, etc.) can be simulated by means of testing with the receiver at the given point, to provide data for the indoor distribution system design.

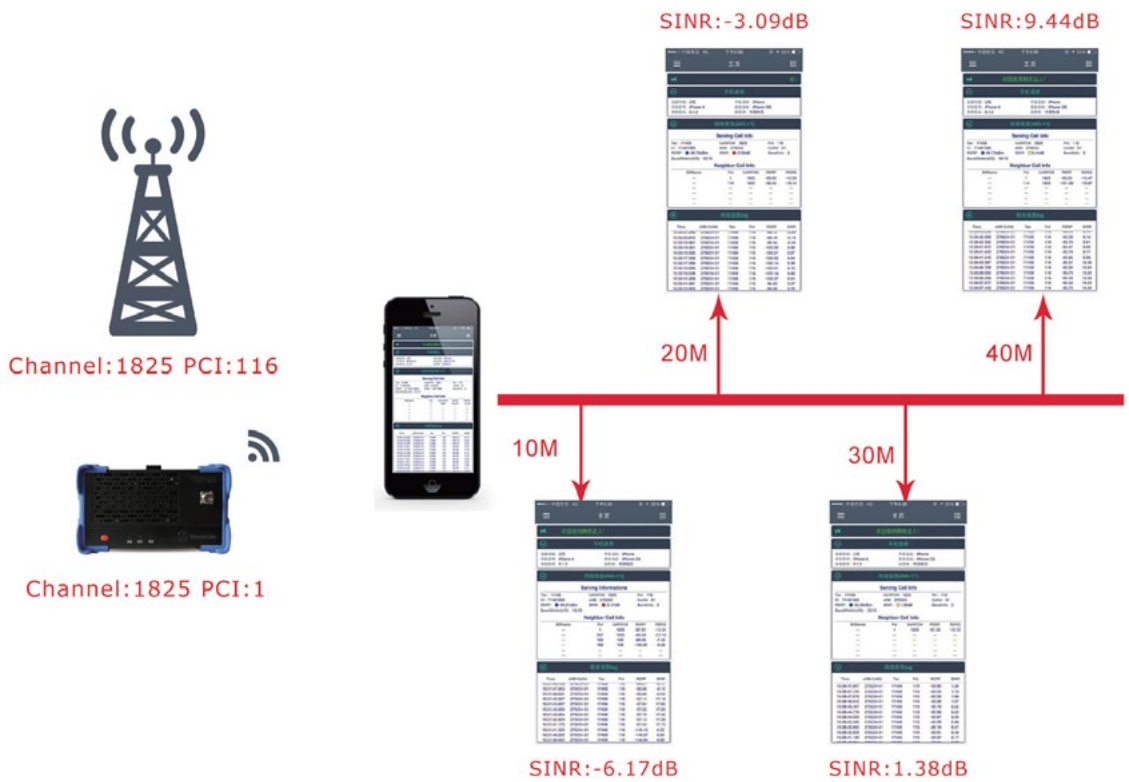## Acceptance of traditional indoor distribution system
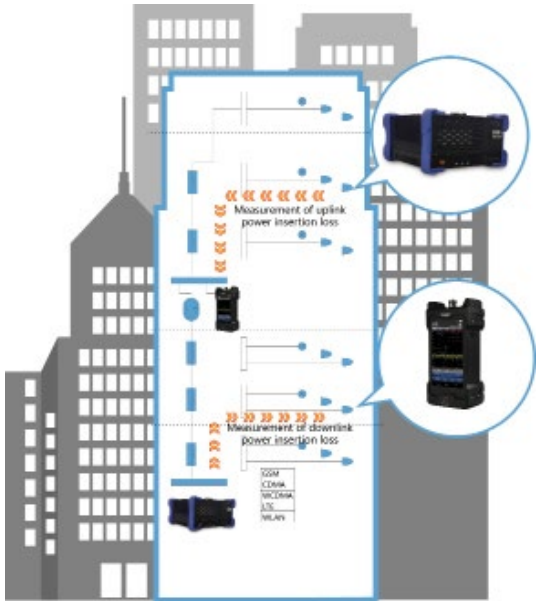
Background: The cable, passive device and ceiling antenna are used as signal transmission parts of the traditional indoor distribution system. The coverage should be verified in acceptance. At the same time, the conformity of the downlink power attenuation, uplink power attenuation and antenna downlink power to design values should be verified.

Solution: As a simulating signal source, TSP pilot transmitter is able to output modulation signals of operating systems of LTE and other existing networks. Cell signal parameters (such as the Channel, PCI, RSRP, RSRQ, SINR, etc.) are collected by the receiver by means of walk test, and the acceptance of indoor distribution system is carried out based on analysis results of wireless signal coverage. The downlink power attenuation, uplink power attenuation and antenna downlink power are subject to sampling inspection with the handheld power test instrument, to verify the conformity to design values. The compliance of the indoor distribution system with engineering acceptance standards is evaluated based on the wireless test and power test data. Faults of the distribution system are located, in combination with the handheld antenna/feeder test instrument.

Multi-operator interference evaluation

Background: At present, networks are run by various operators. As the stations of operators are concentrated and frequency resources are adjacent to each other, mutual influence indoors and outdoors are unavoidable. Operators can evaluate the influence of other networks by simulating the coverage of competition networks and downloading the service rate, SINR value and other parameters.

Solution: As a simulating signal source, TSP pilot transmitter is able to output modulation signals of operating systems of LTE and other existing networks. RF signal parameters (such as the Channel, PCI, RSRP, RSRQ, SINR, etc.) of each operator are collected by the terminal. Change the channel, power and system of the transmitter, and observe the SINR value of the tested cell on the terminal. Evaluate the influence of competition networks by service testing.

Channel:1825 PCI:116

Channel:1825 PCI:1

SINR:-3.09dB

SINR:9.44dB

20M

40M

10M

30M

SINR:-6.17dB

SINR:1.38dB

Control Elements

RF output

Power LED

Temperature LED

On/Off button

Status LED

WiFi interface
for remote control

Power interface

LAN
for internal commissionin

Specifications

Device type	Applicable network system	Frequency step
	CW(High range option: 3.3GHz-3.6GHz 4.8GHz-5GHz)	
TSP transmitter (700-2,700 MHz)	GSM	10 KHz
	CDMA 2000/EVDO	
	WCDMA	
	TD-SCDMA	
	TD-LTE	
	FDD-LTE	
	NB-IoT	
	LoRa	

Electrical Characteristic		
Output power	0dBm to 43dBm (20W); -10dBm to 33dBm (2W)	
Power step	0.5dB	
Power accuracy	Typical：±1dB	
	MAX：±1.5 dB	
Spectrum mode	CW/Pilot mode	
Out-of-band spurious	≤-50dBc (beyond the operating frequency of 200kHz)	
Second harmonic	≤-15dBc (typical)	
Operating temperature	-20°C to +50°C	
Storage temperature	-40°C to +70°C	

Mechanical features		
Dimension	200mm×110mm×230mm (20W)	200mm×60mm×230mm (2W)
Weight	4.5kg (9.9lb)	2kg (4.4lb)
RF Interface	N-type female connector	N-type female connector
Power Supply	220V AC; 28V DC; max power consumption: 140W	220 V AC; 28V DC; max power consumption: 50W
Communication Interface	Wi-Fi	Wi-Fi

Ordering List

Model	Description	
T3919A	TSP transmitter: (700MHz to 2700 MHz) 20W	
T3919AL	TSP transmitter: (700MHz to 2700 MHz) 2W	

Accessories Model	Description	
	(20W transmitter)	(2W transmitter)
TSPT-AS001	5m feeder and N-type connector	N/A
TSPT-AS002	5dBi omnidirectional antenna 870 to 960 MHz 5dBi	N/A
TSPT-AS003	omnidirectional antenna 1710 to 1990 MHz	N/A
TSPT-AS004	5dBi omnidirectional antenna 2000 to 2200 MHz	N/A
TSPT-AS005	5dBi omnidirectional antenna 2300 to 2400 MHz	N/A
TSPT-AS006	5dBi omnidirectional antenna 2500 to 2700 MHz	N/A
TSPT-AS007	5dBi omnidirectional antenna 3400 to 3600 MHz	N/A
TSPT-AS011	5dBi omnidirectional antenna 4800 to 5000 MHz	N/A
TSPT-AS008	Tripod	N/A
TSPT-AS009	Draw-bar box	N/A
TSPT-AS010		Portable

TSP Scanner

Overview

TSP Scanner is an integrated platform based on all-standard scanner and analysis software. It is used for automatically sweeping and scanning signals at high speed, such as GSM, CDMA2000/EVDO, TD-SCDMA, WCDMA and FDD/TD-LTE signals. The output results include cell coverage parameters, broadcast channel system messages and spectrum displayed intuitively by various means. The instrument can be widely applied in network survey, planning, building, optimization, etc.

Key Facts

• Support full band tests within 2MHz to 3GHz.

• Support CW test

• Support simultaneous tests of multi-system and multi- frequency GSM, CDMA/EVDO, TD-SCDMA, WCDMA, TDD-LTE, FDD-LTE signals.
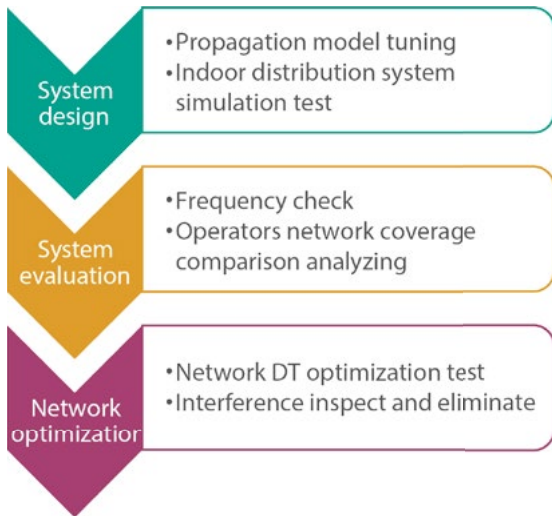
LTE test: reports RSSI, RP, RQ, Timing, Cell ID and other parameters. The instrument supports MIMO, time slot, RB measurement.

WCDMA test: supports multi-frequency simultaneous test and report of Peak Ec/Io, Peak Ec and Aggregate Ec/Io Pilot Delay, Delay Spread, SIR, etc.

GSM test: supports CCH testing and reporting of cell BCCH, BSIC, RxLev, C/I, etc.

• The scanning speed is adjustable to adapt to various applications, such as high-speed railway, highway, ordinary road and indoor tests.

• LTE Top N Scan Dynamic Range: 25dB.

• Support high-speed SIB decoding where decoding success rate is more than 90% if CINR is more than 0.

• Support automatic testing without PC. Test states can be remotely monitored, and data can be automatically transmitted back to the server with built-in 8GB memory.

Innovative Features & Benefits

- System design
  - Propagation model tuning
  - Indoor distribution system simulation test
- System evaluation
  - Frequency check
  - Operators network coverage comparison analyzing
- Network optimization
  - Network DT optimization test
  - Interference inspect and eliminate

Product features

- 2MHz to 3GHz spectrum and multi-system demodulation
- High-speed measurement for various scenes
- Powerful common-frequency capabilities
- Efficient SIB decoding
- Automatic testing
- Uplink time slot interference test

Typical applications

- Propagation model tuning test
- Indoor distribution system emulation test
- Frequency check
- Network DT optimization test
- Operators network coverage comparison analyzing
- Interference check

Solution Highlights

Product features

**2MHz to 3GHz spectrum and multi-system demodulation**

A single TSP Scanner device is applicable to cell demodulation tests of all standard networks and 2MHz to 3GHz spectrum tests. Test modes can be freely combined to improving multi-network test efficiency.

High-speed measurement for various scenes

TSP Scanner has the 100ms-level measurement rate, meeting the dotting requirements of limitations of various scenes, such as indoor, ordinary road, highway and high-speed railway tests.

Common-frequency cell test capability

TSP Scanner, with common-frequency cell test capability better than 25dB, is able to test single sample points in a deeper manner and demonstrate the coverage more accurately. It is applicable to be the solution to various network coverage, adjacent cell and interference problems. Thus, it is suitable for optimize LTE overlapping coverage.
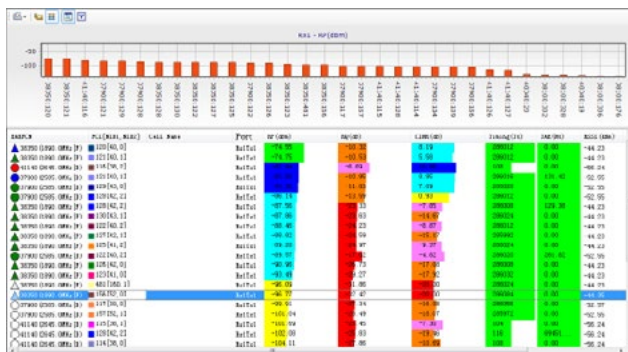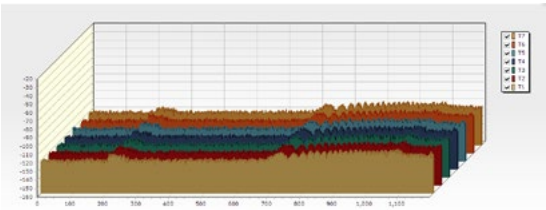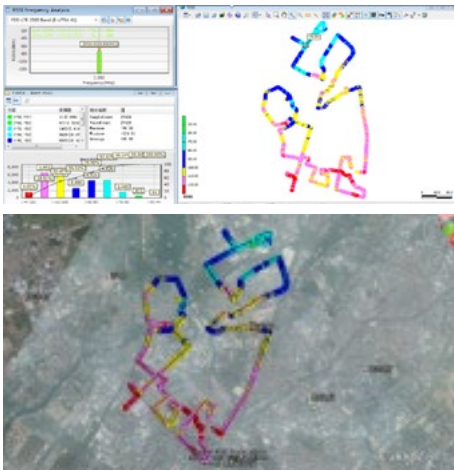
Efficient SIBs decoding

Automatic test

Uplink time slot interference test

Propagation model tuning

Efficient SIBs decoding

The SIBs decoding success rate of TSP Scanner is more than 90% when CINR is more than 0dB. User can determine cell configuration and assignment more accurately. TSP Scanner is applicable to competition analysis of multiple operators, understanding of competition trends and learning of competition advantages.

Automatic test

As scanner tests of TSP Scanner are unattended, labor costs are saved. At the same time, remote monitoring of equipment states or sending of new test commands can be achieved. Data can be transmitted automatically without manual intervention, thus avoiding manual operation errors. Massive data is centralized processed to facilitate the follow-up in-depth mining and intelligent analysis. And to predict potential problems.

Uplink time slot interference test

TSP Scanner with the RB measurement is able to check TDD-LTE uplink time slot interference. Without blocking the base station, test is accurate to RB. The RB block in the uplink time slot can be selected to demonstrate spectrum interference.
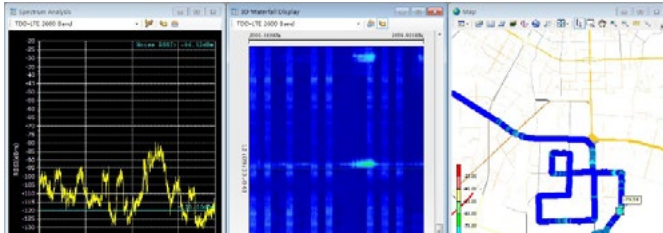
Typical applications
Propagation model tuning

The propagation model correct test is necessary to network planning. When test phone fails as a result of limitations, scanner is required. In the test process, Eagle transmitter is used for transmitting CW or pilot signals, and TSP Scanner, is used for scanning the fading and transmission distance. Data can be directly used for model tuning in planning software.

Solutions: TSP Scanner is used for receiving pilot or CW signals from the transmitter, collecting signal parameters including geographic information by DT testing, and importing data into the planning software to adjust model parameters.
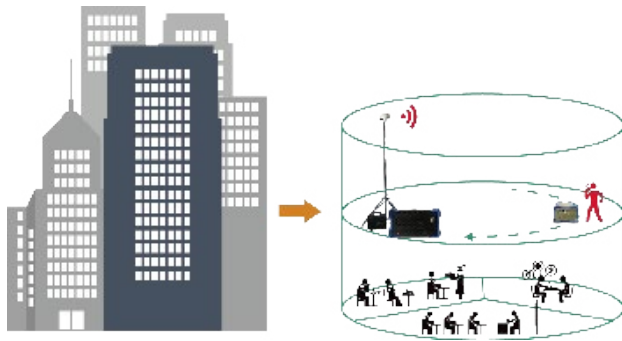
Micro base station planing test

Frequency check

Network DT optimization test

Operators network coverage comparison analyzing

Interference inspect and eliminate

Micro base station planning test

Background: The propagation model correct test is necessary to network planning. When test phone fails as a result of limitations, scanner is required. In the test process, TSP transmitter is used for transmitting CW or pilot signals, and TSP Scanner, is used for scanning the fading and transmission distance. Data can be directly used for model correction in planning software.

Solutions: TSP Scanner is used for receiving pilot or CW signals from the transmitter, collecting signal parameters data including geographic information by DT testing, and importing data into the planning software to adjust model parameters.

Frequency check

Solutions: The frequency check test should be performed within the planned frequency range before network planning and building, to know whether the frequency range is occupied or interfered. When TSP Scanner is used in the spectrum mode, the specific interference and occupation within the planned frequency range of urban roads can be analyzed based on spectrum , to evaluate whether the frequency range meet the operating requirements

Network DT optimization test

Solution: TSP Scanner can be used for collecting important parameters that cannot be collected by the mobile phone, such as cell parameters outside the planned adjacent cells that cannot be swept by the mobile phone. Thus, strong assistance is provided for the user to rapidly find and solve wireless problems of network coverage, interference and adjacent cells.
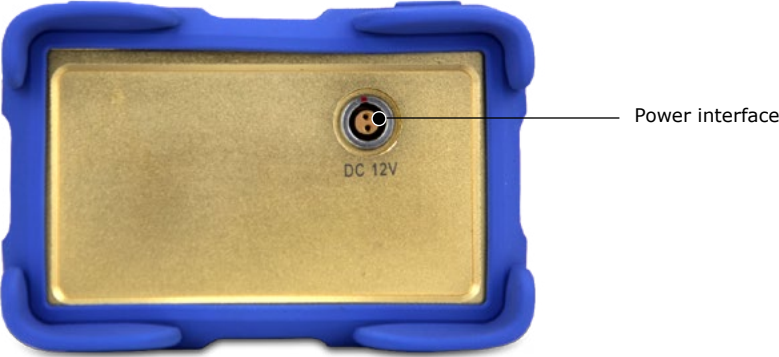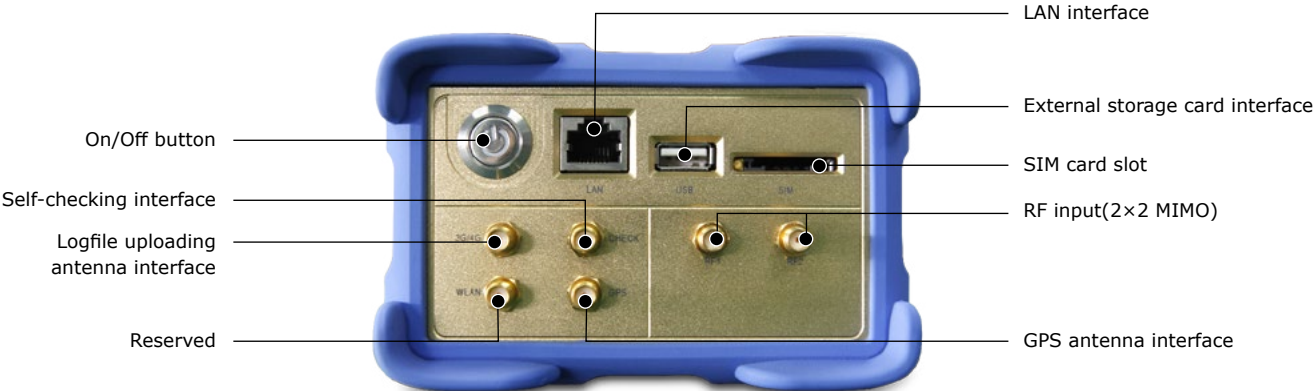
Operators network coverage comparison analyzing

Solutions: TSP Scanner is able to obtain network coverage of various operators by means of one test, distinguish the attributes of various operators based on the frequency or MNC, rank the coverage, network structure and interference indexes, evaluate the 4G network coverage and interference indicators of each operator, and demonstrate the problem areas an duty cycles in the form of statistical chart and trajectory chart. Understand the trends of competitors and highlight network optimization.

Interference inspect and eliminate

Solutions: TSP Scanner is able to receive RSSI to indicate the interference. When connected with a beam antenna, interference can be located and inspected. For TDD-LTE time-division system, the uplink time slot interference testing function of TSP Scanner captures the RB power of the uplink, compare it with the reverse spectrum and approach the interference source by testing multiple points with beam antenna.

Control Elements

On/Off button

LAN interface

External storage card interface

SIM card slot

RF input(2×2 MIMO)

Self-checking interface

Logfile uploading
antenna interface

Reserved

GPS antenna interface

Power interface

DC 12V

Specifications

Performance			
FDD/TD-LTE	Measurement mode		P-SCH/S-SCH, RS, and RB
	Data mode		RSSI, RS, RQ, CINR, Timing, Cell ID, Cyclic Prefix, CFO, Delay Spread,
	Channel bandwidth		1.4 / 3 / 5 / 10 / 15 / 20 MHz
	Antenna skills		SISO, MISO, MIMO (4x2)
	Measurement rate @20MHz		>40channel/sec
	SIB decoding success rate		90% @ CINR > 0 dB
	Common-frequency cell test capability		>25 dB
	Dynamic range (CINR) @ 20 MHz:P-SCH/S-SCH		-20 to +40 dB
	Dynamic range (CINR) @ 20 MHz: RS		-23 to +40 dB
	Test sensitivity: RS RP		-135 dBm (RSRP@ 20 MHz)
UMTS [WCDMA/HSPA(+)]	Measurement mode		Top N Pilot
	Data mode		lo, Ec/Io, Aggregate Ec/Io, SIR, Rake Finger Count, Time Off-set, Delay Spread
	Channel bandwidth		200 kHz / 3.84 MHz
	Measurement rate		20 channel/sec
	SIB decoding rate		200ms/Single Cell
	CPICH dynamic test range (Ec/Io)		-21dB
	Sensitivity		-110 dBm
GSM	Measurement mode		Color Code
	Data mode		BSIC, C/I, RSSI
	Channel bandwidth		30 kHz / 200 kHz
	Measurement rate		≥80Channel Decodes/sec
	SIB decoding rate		20s / 95 Carriers; 30s / 125Carriers
	Dynamic range		+2 dB C/I @ 90% BSIC Detection
	Sensitivity		-114 dBm
CDMA	Measurement mode		Top N PN
	Data mode		Ec, lo, Ec/Io, Aggregate Ec/Io, Pilot Delay, Delay Spread
	Channel bandwidth		30 kHz / 1.25 MHz
	Measurement rate		70 channel/sec
	Dynamic range		-7dB to -25dB
	Sensitivity		-114dB
TD-SCDMA	Measurement mode		Top N DWPTS, PCCPCH
	Data mode		Channel, Midamble Code, Sync-DL, RSCP, C/I, SIR, ISCP, Ec/Io, RSSI,
	Channel bandwidth		200 kHz / 1.28 MHz
	Measurement rate		30 channel/sec
	SIB decoding rate		4s / 9 Carriers
	Dynamic range		-15 dB
	Sensitivity		-110dBm
Power measurement	CW measurement		
	Measurement rate		>800 Channel/sec
	Spectrum measurement		
	Measuring range		>90dB
	Measurement rate		>3G/sec

RF features	Internal spurious response	-114 dBm
	Operation level	-15 dBm Max.
Physical	Maximum power (+8 to +16 VDC)	24W
	RF Operating Range: In - Band	-15 dBm Max.
	Temperature Range	Operating: 0ºC to 50ºC; Storage: - 40ºC to 85ºC
	Host Data Communications Interface	LAN
	RF Input	RF: SMA Female(50Ω); GPS: Male(50Ω) SMB

Ordering List

| Model	Description
T2627A	LTE Scanner (include TD-LTE FDD-LTE)
TSPS-AS010	GSM License
TSPS-AS011	CDMA / EVDO license
TSPS-AS012	TD-SCDMA license
TSPS-AS013	WCDMA license
Accessories Model	**Description**
TSPS-AS001	RF omnidirectional antenna 700MHz to 2700 MHz
TSPS-AS002	GPS antenna
TSPS-AS003	Data Cable (3m)
TSPS-AS007	Portable box
TSPS-AS008	COEAG USB license
TSPS-AS009	Power adapter
TSPS-S001	Data collecting and analyzing software
TSPS-S002	Analyzing software of operators network coverage comparison
TSPS-S003	Uplink time slot interference test function
TSPS-H001	Automatic test model
TSPS-H002	Uplink time slot interference test antenna

IoT Scanner

Overview

IoT Scanner covers the test and measurements for narrowband IoT (NB-IoT) and enhanced Machine-Type Communication (eMTC) specified by 3GPP for base stations. It is an integrated platform based on all-standard scanner and LPWAN analysis software. As a third-party test solution, IoT Scanner guaranteed the neutrality of test. IoT Scanner overcomes the disadvantages of conventional test solutions that does not support terminal handover. The instrument can measure and test cells deployed standalone, in-band or in guard band. Support switching to cell with strongest signal coverage in real time. Ultra-fast test speed and very high sensitivity make the instrument suitable for a variety of test environments, including road test.

Key Facts

• Support testing NB-IoT and eMTC

• Analyze and measure NB-IoT/eMTC base station downlink signal. Report cell frequency point, PCI, RSRP and RSSI. Output cell's signal strength waveform in time domain and frequency domain

• Support cell information measurement with independent deployment, in-band deployment and protect band deployment.

• Measuring speed ≤ 500ms (single frequency point)

• Sensitivity: -135dBm (Typical)

• Data interface: network port

• RF Interface: SMA Female
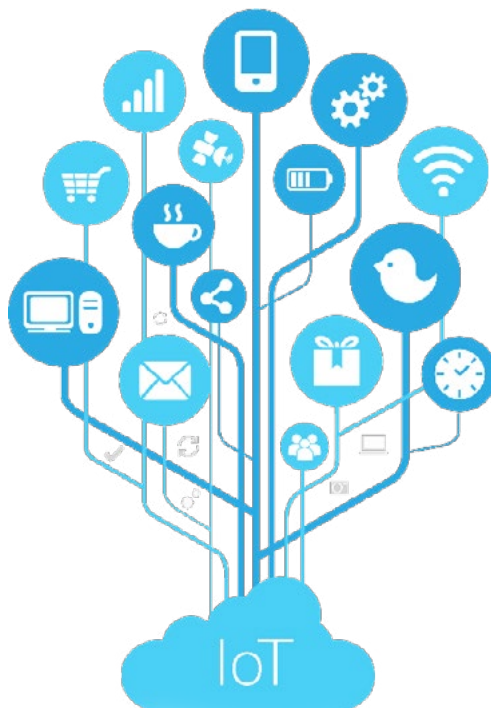
Innovative Features & Benefits

Product features

• Test NB-IoT and eMTC with one equipment

• Ultra-fast test speed and very high sensitivity

• Support cell information measurement with three operation methods

Typical applications

• Propagation model correction

• Network coverage optimization analysis

• Network structure quality assessment

• ndoor coverage test

Solution Highlights

eMTC test
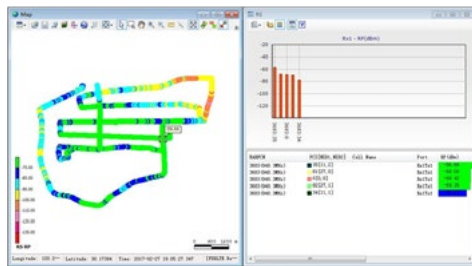

NB-IoT test

Data analysis with Google Map

Test NB-IoT and eMTC with one equipment
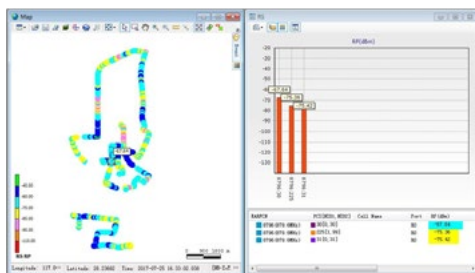
Conventional test solutions have several cons:

• Not support real-time terminal handover.

• IoT manufacturers' test solution are only for their own products. There is neutral solution that can test the actual coverage of IoT network from different manufacturers in contrast.

• There is a lack of test solutions that supports both NB-IoT and eMTC measurement, cannot meet the carriers' test requirements.

IoT Scanner Support both NB-IoT and eMTC signal demodulation. Report frequency of TOPN cell, PCI, RSRP, CINR and RSSI parameters. Measurement channels including PSS, SSS and RS. As compared to the previous solution, IoT Scanner supports real time terminal switching in NB-IoT test. Support the test of NB-IoT/eMTC network from all manufacturers. It can be used for manufacturers horizontal test and contrast.

Supporting software also has powerful features test plan can be freely defined, combined and showed in a variety of ways, such as track map, time domain graph, frequency domain graph, list, etc. Support data playback and parameter display, custom test report and automatically generate special test reports. Support the import and export of test data, test data can be generated into *.csv, *.kml and other formats. Instrument has built-in GPS module. The test results can be imported into third-party planning software to do network

Ultra-fast test speed and very high sensitivity

NB-IoT technology can enhance the uplink power spectral density, retransmission and codec technology to achieve more than 20dB coverage gain, compared to GSM. Therefore, achieve a coverage of more than 100 times the coverage of GSM, a wide and deep coverage. The detection level of the NB-IoT device should be less than -125dBm according to the LTE effective coverage level of -105dBm. IoT SCANER provided by Transcom provide -135dBm sensitivity which will meet the needs of the test. Besides, data measurement and uploading of single frequency point can be completed in 500ms to meet needs of various test environments, including road test.

## Support cell infomation measurement with three operation methods

NB-IoT has three operation methods.

The standalone operation is suitable for reuse the GSM band. Channel bandwidth of GSM is 200KHz. Just enough to embed the NB-IoT 180KHz bandwidth, and both sides can have a 10KHz guard band.

The guard band operation uses resource blocks of unused 180 kHz bandwidth in the LTE edge guard band.

In-band operation utilizes any resource blocks in the LTE carrier.

With the NB-IoT / eMTC test instrument Transcom provided, you can automatically detect the three deployment methods, rapid measure information of cells with different deployment methods.
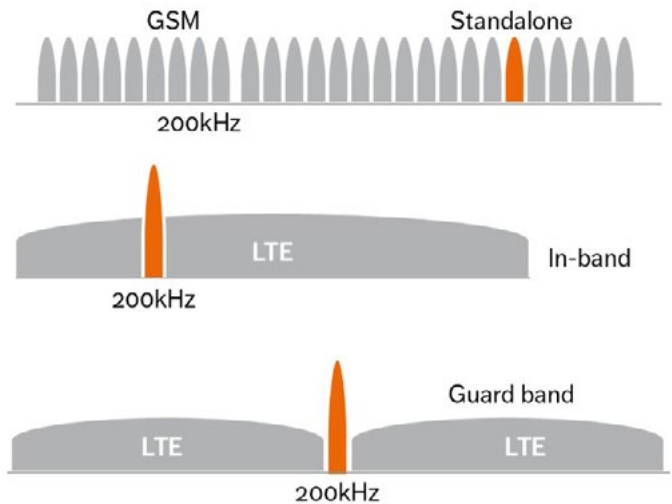
Specifications

Performance			
NB-IoT	Supported band	870MHz to 880MHz	
		900MHz to 1000MHz	
		1800MHz to 1900MHz	
		additional band customizable	
	Deployment scenario	Standalone	
		Guard band	
	Data output	In-band	
		Frequency Point, PCI, RSRP, RSSI, RSRQ, SINR	
	Handoff	Supported	
	Measuring mode	Support measure NB-IoT & eMTC simultaneously	
	Measurement speed	<500ms per frequency point	
	Carrier bandwidth	180KHz	
eMTC	Supported band	800MHz to 1000MHz	
		2620MHz to 2689MHz	
		1805MHz to 1880MHz	
		1845MHz to 1880MHz	
	Data output	Frequency Point, PCI, RSRP, RSSI, RSRQ, SINR	
	Measuring Mode	Support measure NB-IoT & eMTC simultaneously	
	Measurement Speed	<1S per frequency point	
	Carrier bandwidth	5MHz	
CW	Supported band	2MHz to 3GHz	
	Measurement Speed	>800	
		Channel/sec	
	Dynamic range	-125dBm to -25dBm	
RF Features	Residual response	<-70dB	
	Max safety input	< 10dBm	
	Max operation input	-15dBm	
	Frequency accuracy	±0.05ppm(GPS Locked) ±0.1ppm(GPS UnLocked)	
	Resolution bandwidth	15/30KHz	
	Sensitivity	-135dBm(RSRP)	
	RF input	SMA	
		Female(50Ω)	
	VSWR	1.5	
	Dynamic range (CINR)	-23dBm to +40dBm	

Physical	Power consumption	maximum 24W
	Size/weight	120*100*220mm/2Kg
	Temperature	Operating: 0℃ – 50℃ Storage: -40℃ – +85℃
	RF interface	RF1：NB-IoT RF2：eMTC RF3：MIMO
	Control interface	LAN
GPS	Sensitivity	-162dBm
	Interface	Male（50Ω）SMB

Ordering List

Model	Description
T2200	IoT Scanner
Accessories Model	**Description**
TSPS-AS001	RF omnidirectional antenna 700 to 2700 MHz
TSPS-AS002	GPS antenna
TSPS-AS003	Data cable (3m Ethernet cable)
TSPS-AS004	Battery kit
TSPS-AS007	Portable box

Feeler Handheld DAS Test Kit

FL-TX   FL-RX

Overview

As carriers shift emphasis from macro builds to providing the same level of LTE connectivity in-building, the outlook for distributed antenna systems (DAS) and small cell deployment, by carriers, venue owners and enterprises, is strong. As a result, DAS acceptance testing has also become a top priority for operators and DAS constructors.

Transcom has provided Feeler which significantly surpass current DAS acceptance test solutions on time and manpower consumption. Feeler is new set of DAS acceptance testing instruments that reduce the DAS acceptance testing time in seconds. Wit handheld size FL-TX Sweep Signal Source and FL-RX Sweep Signal Receiver, all frequency points testing results can be automatically output in one test, a signal person can perform the testing.

Key Facts

- Frequency Range: 85MHz to 4000MHz
- Output Power: -5dBm (Optional Power Amplifier: 1W)
- Testing dynamic range:>60dB
- Testing Speed: 200ms * Testing Channel Number
- Testing Channel Number: 30(Max) editable
- Dimension: FL-TX 182x95x47(mm)
          FL-RX 200x96x66(mm)
- Weight： FL-TX 0.9kg
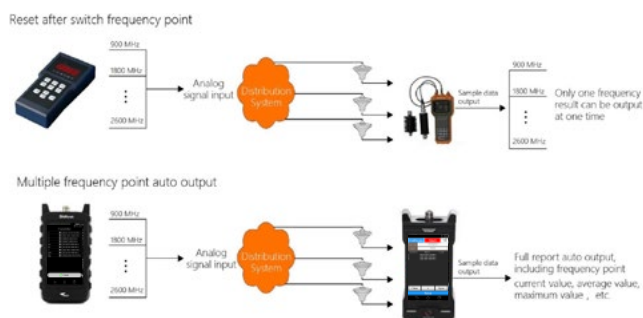   FL-RX 1.3kg
- Operating Time: 4 hours

Innovative Features & Benefits
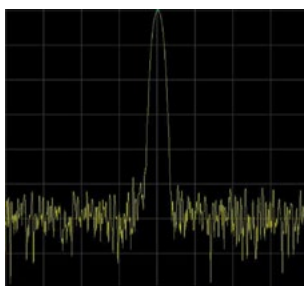
Product features

- Rapid Testing Speed
- Wide Testing Dynamic Range
- Test channel editable
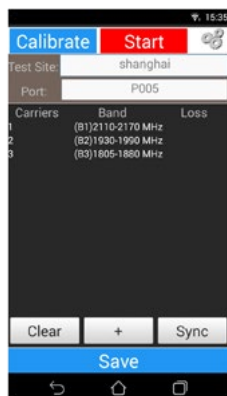- Convenient for field test
- Additional Features

Solution Highlights

Rapid Testing Speed

Wide Testing Dynamic Range

Test channel editable

Rapid testing speed

Current testing method needs to reset signal source after change frequency point and receiver only one RSSI for every sample. It takes 10-15min to finish multiple operator frequency range test. In comparison, Feeler only takes few sec to finish power measurement and data collection testing all band listed by user and automatically outputs the result report.

Wide testing dynamic range

Feeler provide large than 60dB testing Dynamic Range, satisfy for all unknown location of indoor distribution system power range testing.

Test channel editable

FL-TX and FL-RX are both using Android system, full touch screen and user friendly
Interface. User can easily edit their own list of bands to be tested, synchronize list between FL-TX and FL-RX, start the test and output the test result form. Full operation need no participation of specialist.

Convenient for field test

Full set of Feeler including FL-TX, FL-RX and calibration cable are only 2.3KG. Easy to carry for field work, a signal person can perform the testing.

Additional features

FL-RX also serve as a hand held size real spectrum analyzer. Support from 10MHz to 4.2GHz, with ultra-portable design and high sensitivity. A good choice for setting up and maintaining transmission system, providing added value for clients.

Specifications

RF Features	
Frequency Range	85MHz to 4000MHz
Testing dynamic range	>60dB
Internal time base reference oscillator	Aging: ±2.5ppm
Measurement amplitude accuracy	±1.5dB
Measuring Speed	200ms * Testing channel number
Testing channel number	30 (Max, editable)
TX max output power	-5dBm(1W optional)
Frequency resolution	1kHz
General	
OS	Android
Test port connectors	N type,female,50 Ω
Connector	TX: Micro USB B, USB 2.0
	RX: USB type C for data Slim Tip,DC20V for charging
Dimension	TX: 182x95x47(mm)
	RX: 200x96x66(mm)
Weight	TX: 0.9kg
	RX: 1.3kg
Operating time	4 hours
Environmental	Operating Temperature: 0°C to 50°C
	Storage Temperature: -20°C to 70°C
Battery	Li-on type

Ordering List

Model	Description
FL-TX	FL-TX Transmitter
FL-RX	FL-RX Receiver
Accessories Model	Description
FL-AS001	FL-RX power adapter (20V/4.5A output)
FL-AS002	Power cable (China standard)
FL-AS003	Power cable (US standard)
FL-AS004	USB data cable
FL-AS005	USB OTG cable
FL-AS006	Capacitive pen
FL-AS007	USD disk
FL-AS008	FL-TX power adapter (5V DC output)
FL-AS009	Micro USB cable
FL-AS010	N type Calibration cable

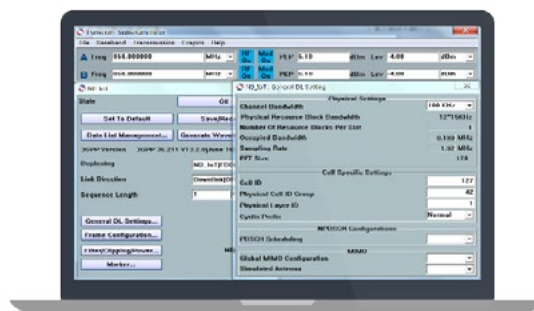*02* **Manufacturing
& Education**

G6 Vector Signal Generator

Overview

G6 Vector Signal Generator is a high performance vector signal generator. It can generate arbitrary wave signal, continuous wave signal, common vector signal, analog and digital signal, standard wireless vector signal, standard radio signal and customized signal. G6 is applicable for educational practices, wireless monitoring, mobile communication, aerospace and national defense industry in terms of research, manufacturing, testing and measurement, and electronic countermeasure. G6 can satisfy most of the signal simulation practices and provide user continues customization services.

Key Facts

• Frequency range: 10MHz to 6GHz (up to 9GHz supported in the near future)
• Power coverage: -110 to +10dBm
• Full range of common digital modulation: BPSK, QPSK, OQPSK, 8PSK, 16QAM, 32QAM, 64QAM, MSK, FSK, output linearity, log scan and multiple modulation mode
• Variety of common signal generating including GSM, EDGE, CDMA, TD-SCDMA, WCDMA, CDMA2000, TD-LTE, FDD-LTE, NB-IoT, and LoRa. Users can modify channels under different configuration
• Pulse modulation function
• Fixable integration interface, customized data can be input into module to generate customized signal
• Simple control via USB port. API is provided for secondary development

Innovative Features & Benefits

Product features

• Built-in automatic gain control
• Communication signal solution

Typical applications

• Laboratory radio frequency testing
• Manufacturing testing
• Educational practice
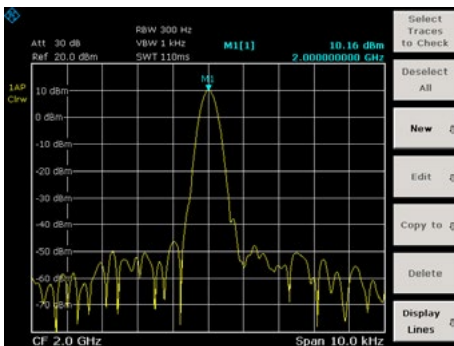• System integration

Solution Highlights

Product features

• Built-in high precision reference for ultra-high phase noise

• Built-in automatic gain control unit to fulfilled large dynamic range power output

• Support GSM, EDGE, CDMA, TD-SCDMA, WCDMA, CDMA2k, TD-LTE, FDD-LTE, NB-IoT, and LoRa signal generating solution
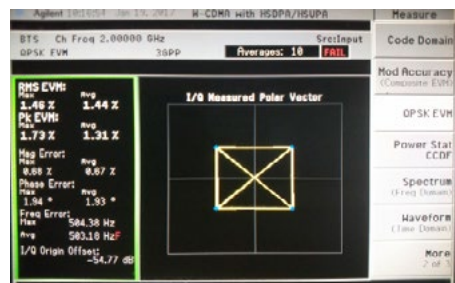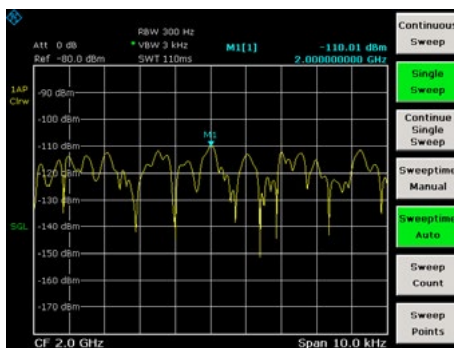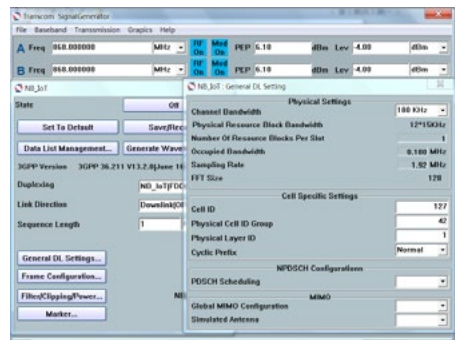

110dBc Phase Noise
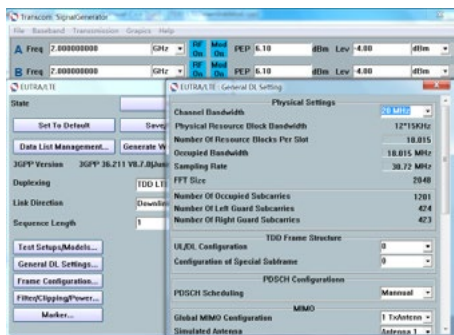

LTE signal

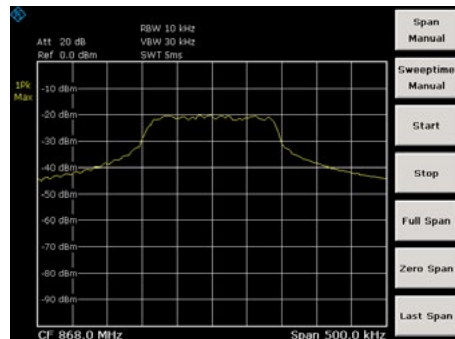10dBm signal output

WCDMA signal
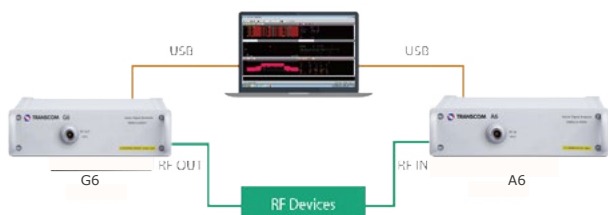

-110dBm Signal output

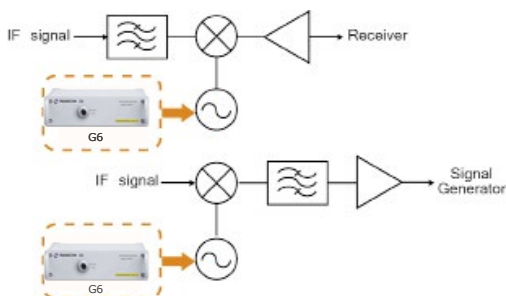NB-IoT signal output

LTE modulation signal output

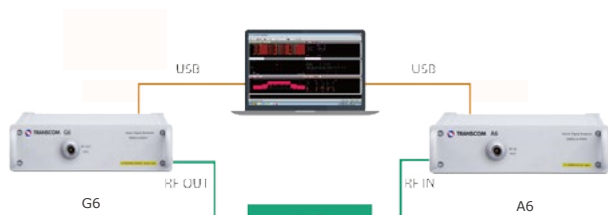NB-IoT signal

Radio frequency testing

T3610M LO signal substitution

Base station testing

RF microwave device teaching

Communication teaching demonstration

Typical applications

Laboratory radio frequency testing

G6 covers 10MHz to 6GHz wireless radio frequency communication range with full range 10KHz phase noise better than -110dBc, Hz (typical value) which allow G6 replace LO. G6 also supports testing of intermodulation distortion on amplifier, mixer and receiver. By using with spectrum analyzer, G6 is able to complete broadband and frequency response performance testing for antenna, amplifier, attenuator etc.

Manufacturing testing

G6 is able to simulating GSM, EDGE, CDMA, TD-SCDMA, WCDMA, CDMA2000, TD-LTE, FDD-LTE, NB-IoT, and LoRa standard base station signals to cooperate with production and calibration of UE, chips.
By combining G6 Vector Signal Generator Module with A6 Vector Signal Analyzer module, it provides base station consistency and function testing.

Educational practices

By combining G6 signal generator with A6 vector signal analyzer, it also provides RF micro-wave device testing demonstration to reduce the complexity of professional teaching.
G6 has the ability to produce all standard uplink and downlink signals and digital modulation signals in any chip rate to satisfy professional education practices.
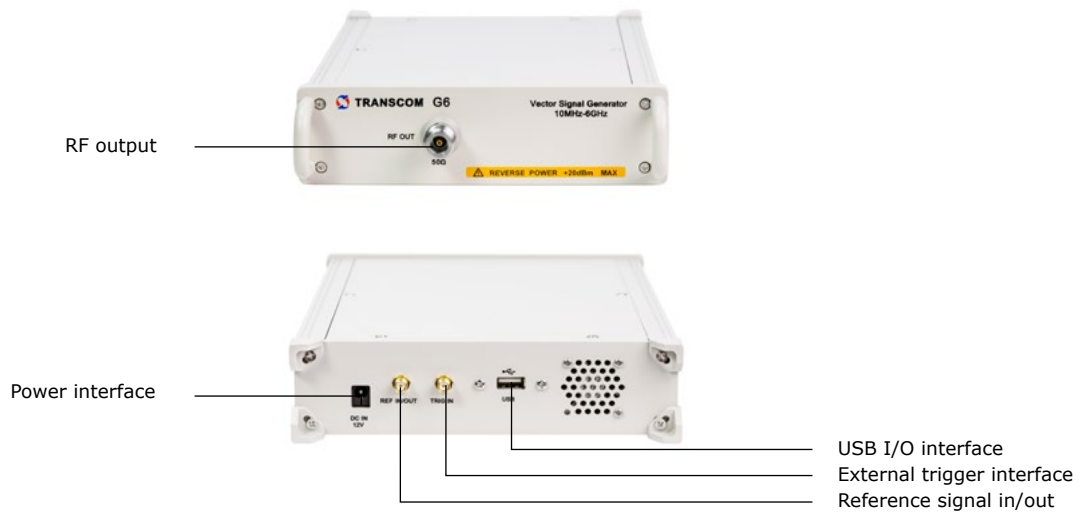
System integration

G6 has small size, high technical specification, comprehensive communication, standard modulation format and independent API. It fulfilled various integration needs with excellent performance. With further system integration, G6 can be used for large scale 5G antenna testing.

System integration

Control Elements

RF output

Power interface

USB I/O interface
External trigger interface
Reference signal in/out

Specifications

Technical	
Frequency Range	10MHz to 6GHz
Frequency Solution	1Hz
Frequency-temperature Stability	±1ppm
Initial frequency accuracy	±0.5ppm
Amplitude Range	-110 to +10dBm
Amplitude Solution	0.1dB
Amplitude accuracy	±1.5dB
Harmonic	≤-30dBc
Spurious	≤-55dBc
SSB Phase Noise	≤-104dBc, Hz@10kHz(6GHz)
Modulation bandwidth	20MHz（can scale to 40MHz）
Modulation Type	I/Q, Pulse
Pulse modulation parameters	pulse width: 100ns to 1s, repetition rate: 1Hz to 5MHz
Universal digital modulation type	BPSK, QPSK, OQPSK, 8PSK, MSK, FSK, 16QAM, 32QAM, 64QAM
Mobile communication standard	GSM, EDGE, CDMA, TD-SCDMA, WCDMA, CDMA2k, TD-LTE, FDD-LTE, NB-IoT, LoRa
Supported Channel(LTE)	PSS, SSS, CSRS, PBCH, PCFICH, PHICH, PDCCH, PDSCH, PUSCH, PUCCH, PRACH and SRS
EVM	≤2%rms
Frequency Error	Better than ±10Hz
Phase Error	Better than ±3°
Waveform Quality ρ	>0.9999
Channel	Single or Dual
Others	
Power Supply Voltage	12V DC
Power Supply Current	2A MAX
communication interface	USB type-C
Provide API	Support second-time development
Dimension	180×50×290(mm)

Ordering List

| Model	Description
G6	G6 Vector Signal Generator
Accessories	**Description**
G6A-AS001	power adapter
G6A-AS002	USB cable
Options	**Description**
G6A-S001	GSM License
G6A-S002	WCDMA License
G6A-S003	TDD-LTE License
G6A-S004	FDD-LTE License
G6A-S005	NB-IoT License
G6A-S006	LoRa License

A6 Vector Signal Analyzer

Overview

A6 is a vector signal analyzer with compact design. With excellent testing performance and measurement sensitivity, A6 satisfies the testing requirements of the majority of RF signals. A6 satisfies the needs of general spectrum test, signal demodulation of GSM, WCDMA, LTE and NB-IoT signals. In terms of system integration, PCB version module product is available and API library is provided for secondary development.

Key Facts

• Frequency range: 10MHz to 6000MHz (10MHz to 4200MHz)

• Signal demodulation: FM, AM, GSM, WCDMA, LTE and NB-IoT signal

• DANL: -168 dBm @1GHz (Sensitivity set to High, normalized to 1Hz)

• Resolution bandwidth: 10Hz to 5MHz

• Signal storage depth of 1Gbit for signal capture and analysis

• API library is provided for secondary development
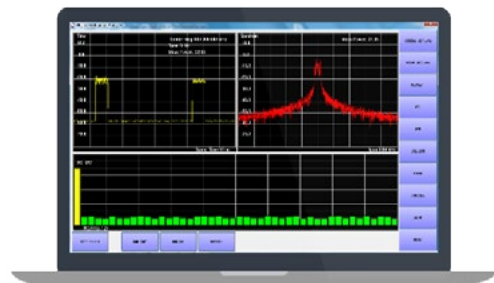
Innovative Features & Benefits

Product features

- Precise measurement performance
- Small size
- Easy to integrate
- Support secondary development

Typical applications

Signal demodulation

- FM/ AM demodulation
- GSM, WCDMA, LTE demodulation
- NB-IoT signal demodulation

General test in laboratory, factory, school, etc.

- General spectrum analysis
- Display waterfall plot
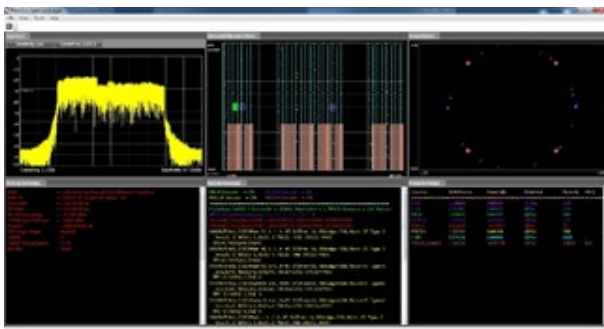- Easy installation and set-up

System integration

- General spectrum analysis
- Secondary development
- Small size and low power consumption

Radio fans

- Help to understand the spectrum
- Facilitate testing
- Simplified manipulation

Solution Highlights

LTE signal demodulation

General spectrum analysis.

Display in waterfall plot

Easy installation and set-up

Signal demodulation

A6 can do GSM, WCDMA and LTE signal demodulation. FM/AM demodulation are supported. NB-IoT signal demodulation is also supported.

General test in laboratory, factory, school, etc.

General spectrum analysis

A6 has the broadband spectrum test function, including frequency test, power test, stray test, etc.

Display waterfall plot

Waterfall plot test facilitating testing, observation and analysis.

Easy installation and set-up

A6 is small and lightweight. Spectrum test can be carried out with one computer. It only occupies small space which allows users to carry by hand or in the pocket or tool box.

System integration

General spectrum analysis

Integrated A6 can directly provides the broadband spectrum test results for the integrated system to analyze the spectrum.

Secondary development

Users can perform secondary development via the API function library provided by Transcom. With 1GB data storage, it meets the basic signal capture needs, so that users can analyze the collected signals. This feature can also be applied in the monitoring field.

Small size and low power consumption

Premium industrial design supports Micro-Rx to have competitive advantage in integration. Tiny size, low power consumption (less than 10W) and light weight provide convenient operation for users.

Radio fans

Help to understand the spectrum analysis

A6 is a good choice for beginner in the spectrum analysis field. With A6, users can have a preliminary understanding of spectrum analysis. When applied in spectrum test, A6 will provide new views for all users.

Facilitate testing

Spectrum analysis and test can be done with just one computer, one A6 and one data wire.

In-depth understanding and development

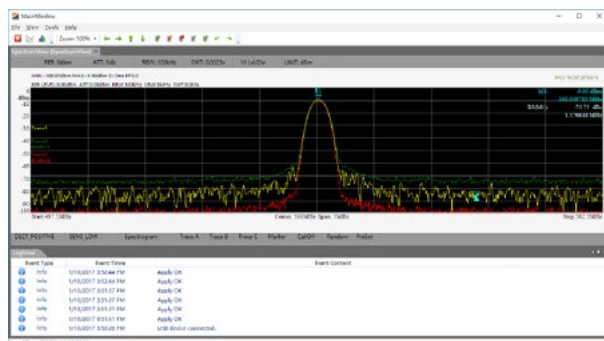User can customize the spectrum analysis function via the open API function library.

Internet of Things

We provide optional software to test NB-IoT (Narrow bandwidth Internet of Things).This optional software based on our spectrum module can satisfy users' NB-IoT transmission ending test.

• Surport NB-IoT test

• Optional software

Control Elements

RF input

Power interface

USB I/O interface
External trigger interface
Reference signal in/out

Specifications

Function	
Sensitivity	Low, Medium and High
Frequency	
Frequency Range	A4: 10MHz to 4.2GHz A6: 10MHz to 6.0GHz
Frequency Reference	Aging rate: ±1ppm
Frequency Readout Accuracy	±((readout frequency + 1GHz) x Frequency Reference + Frequency Span Accuracy x Span)
Frequency Span Accuracy	±1%
Sweep Time	1.1ms to 1600s 2.69ms to 1600s, zero span
Resolution bandwidth	
RBW Range	10Hz to 5MHz, (1-2-3-5-10 Sequence)
RBW Accuracy	RBW≥1MHz, ±10% RBW < 1MHz,±2%
Amplitude	
Measuring Range	Display average noise level to +20dBm
Input Attenuator Range	0-30dB, 1dB Step
Maximum Safe Input Level	Sensitivity: +30dBm (Low) Sensitivity: 0dBm (Medium) Sensitivity: -20dBm (High)
Reference Level Range	-140 dBm to +20dBm -190dBm to +70dBm (Ref level offset: ON)
Amplitude Accuracy	ATT set to 0 dB, input signal: -5 to -30 dBm; detector set to Positive,Sensitivity set to Low; RBW auto-coupled ,all other settingsauto-coupled, 23±5℃ Half hour warm-up required. ±1.5dB
RBW Switching Uncertainty	±0.3dB
Input Attenuator Uncertainty	±0.6dB
Accuracy of Reference Level	Reference level: ≥-60dBm, ±0.8dB

Display Average Noise Level (DANL) @1GHz	Input Terminated,Detector set to Positive,Trace Average set to 1000,Span set to 50kHz,Ref set to -100dBm,all other settings auto-coupled, 23±5℃ . Normalized to 1 Hz RBW	
	Sensitivity: Low	-131dBm/Hz (typically -133dBm/Hz)
	Sensitivity: Medium	-151dBm/Hz (typically -153dBm/Hz)
	Sensitivity: High	-168dBm/Hz (typically -169dBm/Hz)

Residual Response	-75dBm	
Input-Related Response	10M to 1.285G, 3.22G to 3.7G 10MHz to 1.285GHz, 3.22GHz to 3.7GHz	<-70dBc
	1.625GHz to 1.775GHz	<-55dBc
	1.285GHz to 1.625GHz, 1.775GHz to 2.35GHz, 2.71GHz to 3.22GHz	<-42dBc
	3.22GHz to 4.2GHz	<-50dBc
	4.2GHz to 6.0GHz	<-55dBc
Second Harmonic Distortion	1.6GHz -70dBc	
Third-Order Intercept (TOI)	-10dBm tones, 1MHz apart, Sensitivityset to low,Ref set to -10 dBm +15dBm	
P1dB	+5dBm (nominal)	
Phase Noise @1GHz	-96dBc/Hz, @10kHz (typically -98dBc/Hz) -118dBc/Hz, @1MHz (typically -120dBc/Hz)	

Storage	
Maximum storage depth	1Gbit
Data format	I/Q two-way, 16bit
Demodulation	FM, AM, GSM, WCDMA, TD-LTE, FDD-LTE, NB-IoT

General	
OS	WindowsXp, Windows7, Windows8, and Windows10
Connectors	RF input: N-type, female, 50Ω USB: USB type C Power interface: DC12V
Operating environment	Operating temperature: 0°C to 50°C Storage temperature: -20°C to 70°C
Dimension	180mm×50mm×290mm
Weight	0.8kg

Technical specifications

This technical specifications include the influence of probability distribution, measurement uncertainty and environmental factors on the instrument performance. It guarantee the performance under the following conditions.

• The instrument is ON and warmed up for 30min.

• The instrument internal reference signal is applied.

Testing temperature is 23±5 ºC, unless other specific condition applied.

Typical value

Additional description does not cover all performance information of the product guarantee. Unless otherwise specified, the typical value refers to the indicator or technical specification with which more than 80% of products comply under 23 ± 5 ºC. The measurement uncertainty is excluded. A6 should be within the calibration period.

Nominal value

The nominal value refers to the characteristic description or design range. It is not tested or covered by the product. A6 should be within the calibration period.

Ordering List

| Model	Description
A4	A4 signal analyzer (10MHz to 4200MHz)
A6	A6 signal analyzer (1MHz to 6000MHz)
Accessories Model	Description
MRX-AS001	Power adapter
MRX-AS002	Power cable(China standard)
MRX-AS003	Power cable(US standard)
MRX-AS004	USB disk
Options	
MRX-S001	NB-IoT analysis software

T6 USB Vector Network Analyzer

Overview

T6 USB Vector Network Analyzer offers wide dynamic range, low noise level, high resolution scanning with laboratory and research grade performance. T6 covers frequency range from 1MHz to 6GHz with 2-port and 2-pass that competitive with most of the bench-top VNAs on the market. T6 provides measurement convenience by offering end user excellent performance and attractive price. T6 is suitable for laboratory, manufacturing and many other safety testing environment.

Key Facts

- Frequency Range：1MHz to 6GHz
- Dynamic Range：>120 dB (IFBW=10 Hz), 123dB typical
- Low Noise Level：<-120 dB (IFBW=10 Hz)
- Low Trace Noise：10 mdB rms (IFBW=3 kHz)
- High Measurement Speed：250 µs/point (IFBW=30 kHz)
- High Effective Directivity：>42 dB
- Remote Control: LabView
- Low Power Consumption：18W
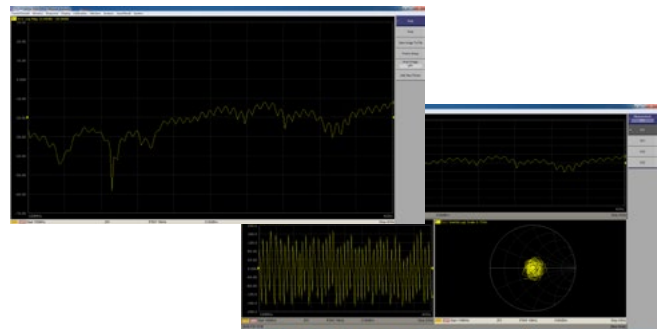
Innovative Features & Benefits

- Capable of replacing bench-top VNA
- Minimum budget requirement
- Suitable for laboratory, manufacturing and research and development purposes
- Compact design, implementation simplicity and various system upgrade

Control Elements

Test port

12V DC Input

USB

On/Off button

Ground

External trigger interface

10M Reference
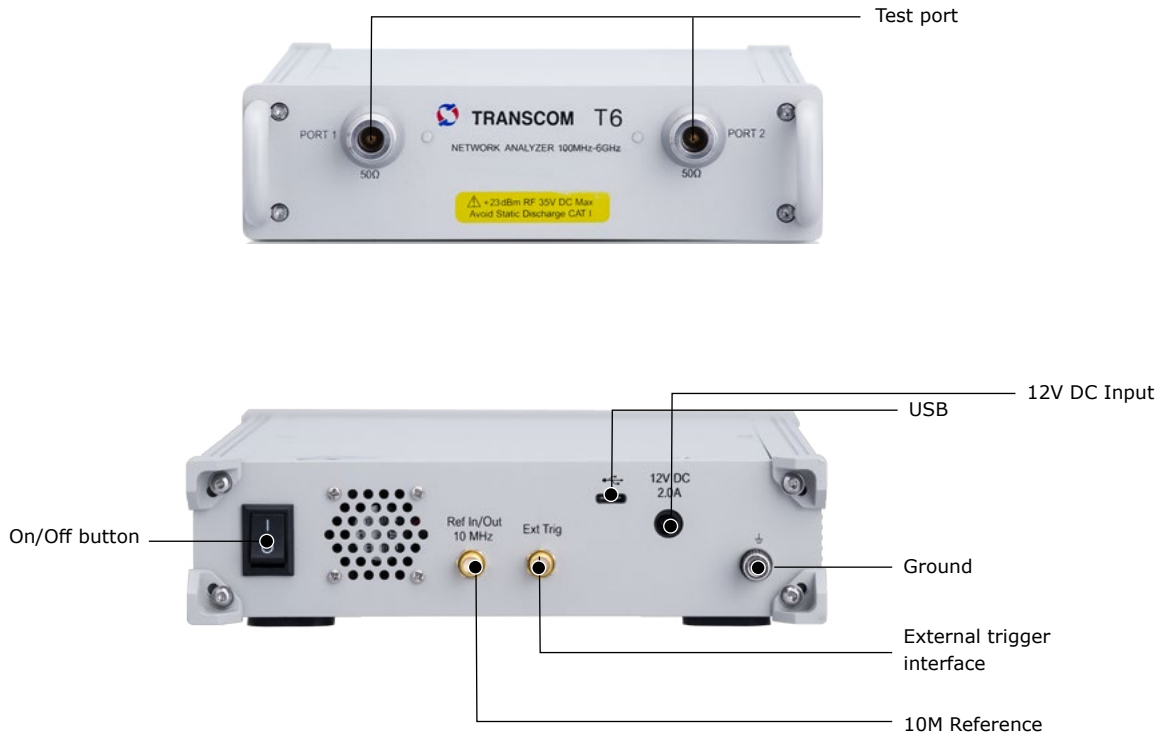
Specifications

Testing Range	Description
Impedance	50Ω
Test port connector	N-type, female
Number of test port	2
Frequency range	100MHz to 4GHz/6GHz; (Low range option: 1 to 100MHz)
Frequency accuracy	5ppm
Frequency resolution	10Hz
Number of measurement points	2 to 10001
Measurement bandwidths	10Hz to 100kHz
Dynamic range (IFBW 10Hz)	120dB, typ.123 dB
Measurement parameters	S11, S21, S12, S22
Testing Accuracy	
Transmission measurement accuracy(magnitude/phase)	
+5 dB to +10 dB	0.2dB/2º
-50 dB to +5 dB	0.1dB/1º
-70dB to -50dB	0.5 dB/3º
-90dB to -70dB	2.5 dB/11º
Reflection measurement accuracy(magnitude/phase)	
-15dB to 0dB	0.4dB/3º
-25dB to -15dB	1.0dB/6º
-35dB to -25dB	3.0dB/20º
Trace stability	
Trace noise magnitude (IF bandwidth 3kHz)	10 mdB rms
Temperature dependence(per one degree of temperature variation)	0.02dB

Effective System Data[1]	
Effective directivity	42 dB
Effective source match	40 dB
Effective load match	42 dB

[1]Applied over them temperature range of 23°C ± 5°C after 40 minutes of warming-up, with less than 1°deviation from the full two-port calibration temperature, at output power of -5dBm and IF bandwidth 10Hz.

Test port output	Description
Match(W/O system error correction)	18 dB
Power range	-30 dBm to +5 dBm
Power accuracy	±1.5 dB
Power resolution	0.05dB
Test port input	
Match(W/O system error correction)	18 dB
Max input level	+23 dBm
Max input voltage	+35 V
Noise level(IF bandwidth 10Hz)	-115 dBm
General Data	
External reference input	SMA female; 10 MHz; 2 dBm ± 3 dB
External reference output	SMA female; 10 MHz; 3 dBm ± 2 dB
Operating temperature range	+5°C to +40°C
Storage temperature range	-45°C to +55°C
Operating humidity	90% (25°C)
Operating atmospheric pressure	84 to 106.7 kPa
Calibration interval	3 years
Power supply	110/220 ± 22 V (AC), 50 Hz
Power consumption	18W
Dimensions(W × H × D) mm	180 ×50×290
Weight	2.3 kg

Ordering List

Model	Description
Main unit	
T4	2 port USB vector network analyzer (100MHz to 4000MHz)
T6	2 port USB vector network analyzer (100MHz to 6000MHz)
Option unit	
T4/LF-1	1M low frequency range option
T6/LF-1	1M low frequency range option

# T5280 Series Bench-top Vector Network Analyzer
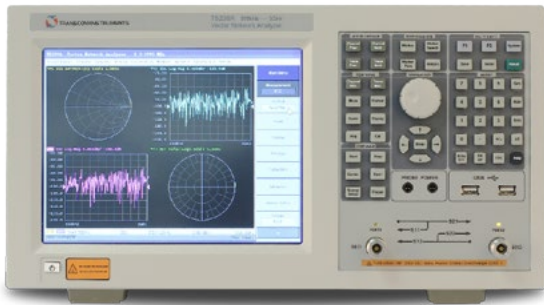
Overview

T5280 Bench-top Vector Network Analyzer offers the high RF performance, wide frequency range and versatile functions. The T5280A is the economic solution for manufacturing and R&D engineers evaluating RF components and circuits for frequency range up to 8GHz.

Key Facts

- Frequency Range：300kHz to 8GHz
- Dynamic Range：>125 dB (IFBW=10 Hz), 130 dB typical
- Low Noise Level：<-120 dB (IFBW=10 Hz)
- Low Trace Noise：1 mdB rms (IFBW=3 kHz)
- High Measurement Speed：100 μs/point (IFBW=30 kHz)
- High Effective Directivity：>45 dB
- Remote Control：LAN/GPIB/USB
- Very Low Power Consumption：60W
- "One-Key-Test" Solution
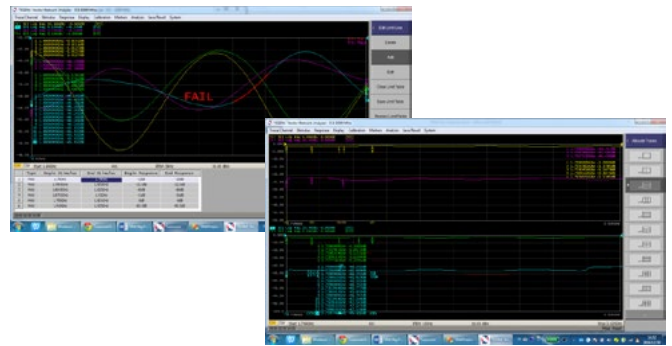
Innovative Features & Benefits

- Multiple analysis options
- Efficient communication interface for multi-types testing instruments
- Simplified testing manipulation

Control Elements

LCD touch screen
(10.4 inch)

Probe power(reserved)

USB I/O

Test port

On/Off button

USB I/O

External video
monitor display

LAN interface
for remote control

Remote control
automatic measurement

Power interface

On/Off button

Reference dock signal in/out

External trigger interface

Ground terminal
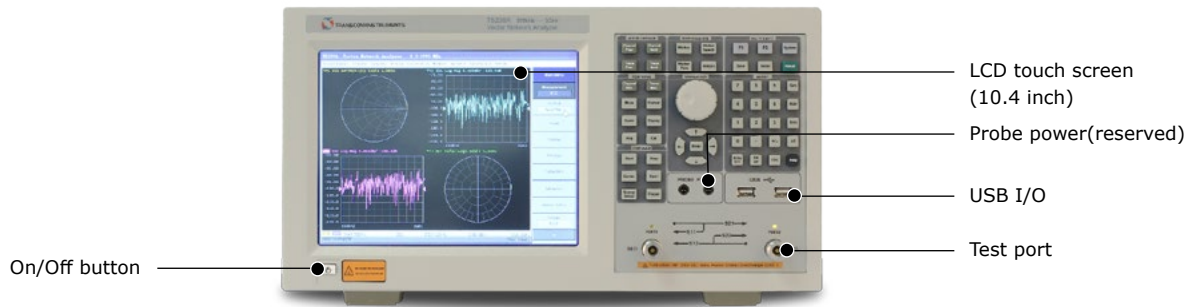
Specifications

Measurement Range	
Impedance	50Ω
Test Port Connector	N-type, female
Number of Test Ports	2
Frequency Range	300kHz to 8.0GHz
Full CW Frequency Accuracy	$\pm 5 \times 10^{-6}$
Frequency Resolution	1Hz
Number of Measurement Points	2 to 10001
Measurement Bandwidths	1Hz to 30kHz (in 1 / 1.5 / 2 / 3 / 5 / 7 steps)
Dynamic Range	125dB, typ.130dB
Measurement Parameters	S11, S21, S12, S22
Effective System Data[1]	
Product Model	T5280A
Effective Directivity	45 dB
Effective Source Match	40 dB
Effective Load Match	45 dB

1 Applies over the temperature range of 23°C ± 5°C after 40 minutes of warming-up, with less than 1°C deviation from the full two-port calibration temperature, at output power of -5 dBm and IF bandwidth 10 Hz

Measurement Accuracy	
Product Model	T5280
Accuracy of Transmission Measurements (magnitude / phase)	
+5dB to +15dB	0.2dB/2º
-50dB to +5dB	0.1dB/1º
-70dB to -50dB	0.2dB/2º
-90dB to -70dB	1.0dB/6º
Accuracy of Reflection Measurements (magnitude / phase)	
-15dB to 0dB	0.4dB/3º
-25dB to -15dB	1.0dB/6º
-35dB to -25dB	3.0dB/20º
Trace stability	
Trace Noise Magnitude (IF bandwidth 3 kHz)	1mdB rms
Temperature Dependence (per one degree of temperature variation)	0.02dB

Measurement Speed		
Product Model	T5280	
Measurement Time Per Point	100ms	
Source to Receiver Port Switchover Time	<10ms	
Typical Cycle Times Versus Number of Measurement Points (IFBW 30kHz)	401	1601
Uncorrected(300kHz to 10MHz)	102.3ms	408.3ms
Full Two-Port Calibration (300kHz to 10MHz)	230.5ms	840.5ms
Uncorrected(10MHz to 3GHz/8GHz)	40.5ms	157.7ms
Full Two-Port Calibration (10MHz to 3GHz/8GHz)	100.3ms	333.0ms

Test Port Output	
Product Model	T5280
Match (W/O System Error Correction)	18dB
Power Range	
300kHz to 1.3GHz/3GHz/6GHz	-60dBm to +10dBm
6GHz to 8GHz	-60dBm to +5dBm
Power Accuracy	±1.5dB
Power Resolution	0.05dB

Test Port Input	
Product Model	T5280
Match (W/O System Error Correction)	18 dB
Damage Level	+26dBm
Damage DC Voltage	+35V
Noise Level (IF Bandwidth 10 Hz)	<-125dBm

General Data	
Display	10.4 inch TFT color LCD, touch screen
External Trigger Input Connector	BNC female, Input level range: 0 to +5 V
External Reference Input	BNC female; 10 MHz; 2 dBm ± 2 dB
External Reference Output	BNC female; 10 MHz; 2 dBm ± 2 dB
VGA Video Output	15-pin mini D-Sub; female; driving the VGA compatible monitors
GPIB Connector (Optional)	24-pin D-Sub (type D-24), female; compatible with IEEE-488
USB Connector	Female; provides connection to printer, ECal module, USB storage
LAN Connector	10/100/1000 Base T Ethernet, 8-pin
Operating Temperature Range	+5°C to +40°C
Storage Temperature Range	-45°C to +55°C
Humidity	90% (25°C)
Atmospheric Pressure	84 to 106.7 kPa
Calibration Interval	3 year
Power Supply	220 ± 22 V (AC), 50 Hz
Power Consumption	60W
Dimensions (W × H × D) mm	440 ×231 ×360
Weight	12.5 kg

Ordering List

Model	Description
T5280	2 Ports 300kHz to 8GHz Vector Network Analyzer

T5840 Matrix Vector Network Analyzer

Overview

T5840 is a new generation of multiport matrix vector network analyzer developed by Shanghai Transcom Instrument Co., Ltd. It can be widely applied to the research, development and test of RF devices in the fields of communication, medical care, scientific research and electronics. The instrument has made a breakthrough in conventional multiport test scheme of 2/4 port VNA+matrix switch. It can carry out parallel test on DUT with 10 ports under standalone operation, thereby greatly improving test efficiency and reducing test cost.

Key Facts

● Frequency range: 300kHz to 4GHz

● Number of test ports：2-port basic unit (2 to 10 ports to be selected arbitrarily)

● Dynamic range：>120dB（IFBW 10Hz）typ. 123dB

● Power range：-50 to +10dBm

● Power accuracy：±1.0dBm

● IF bandwidths：10Hz to 100kHz

● Trace noise：0.002dBrms

● Simple configuration of multiport measurements

● Up to 128 traces and channel

● It supports standard VISA remote control command and is compatible with test cases of products of the similar type

Innovative Features & Benefits

- Real Multiport Network Analyzer
- Multiport all S-parameters Measurement
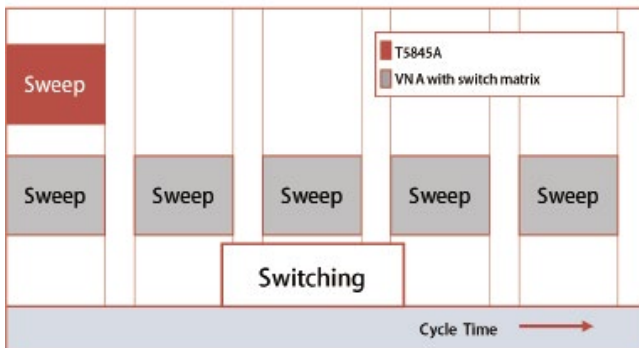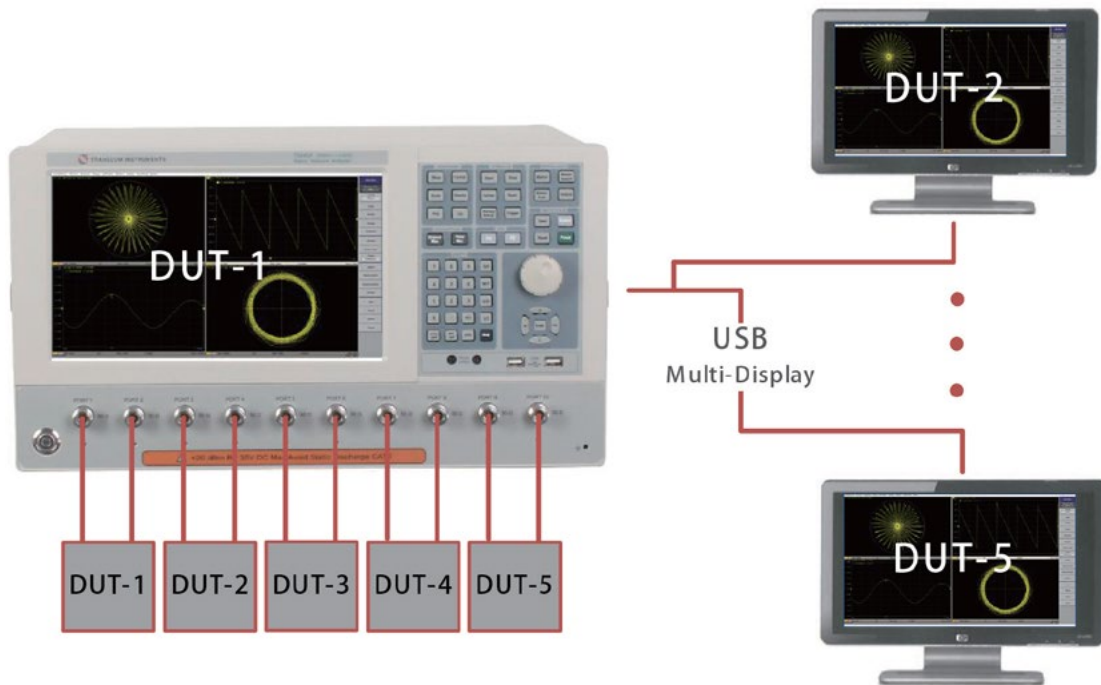- Multi-DUT Measurement

Solution Highlights
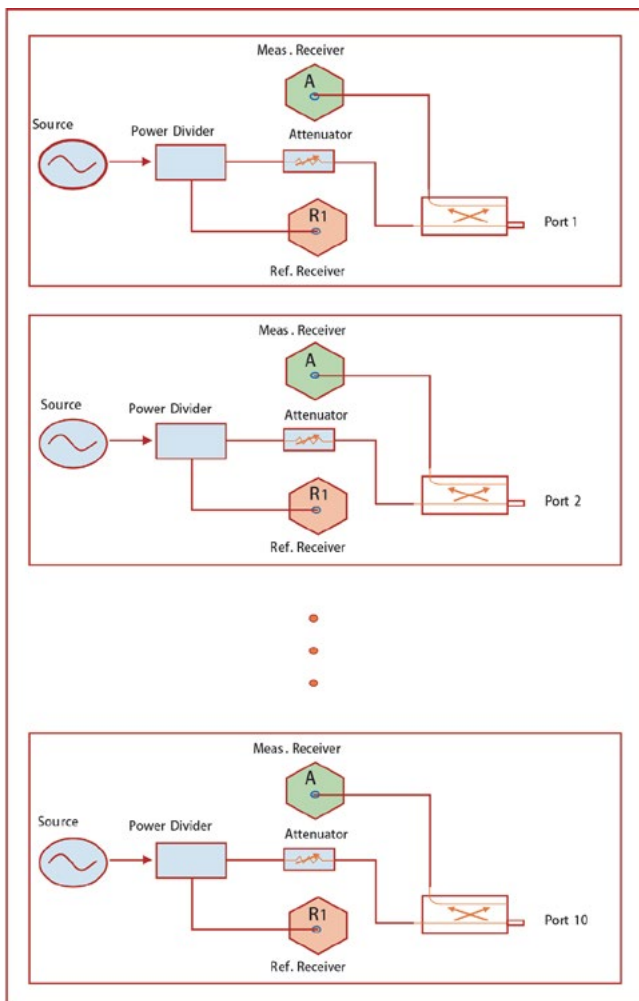
Real Multiport Network Analyzer

T5840 is a real multiport network analyzer with independent source, independent reference receiver and independent measuring receiver equipped for each test port. It supports user-defined number of port and calibration of all N ports, and therefore is the most ideal multiport test solution.

T5845A V.S. VNA+Switch Matrix
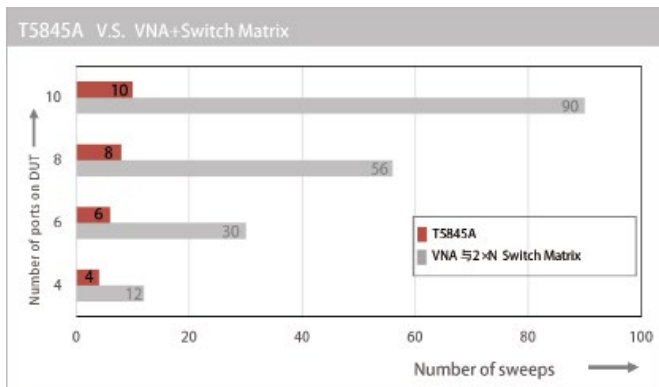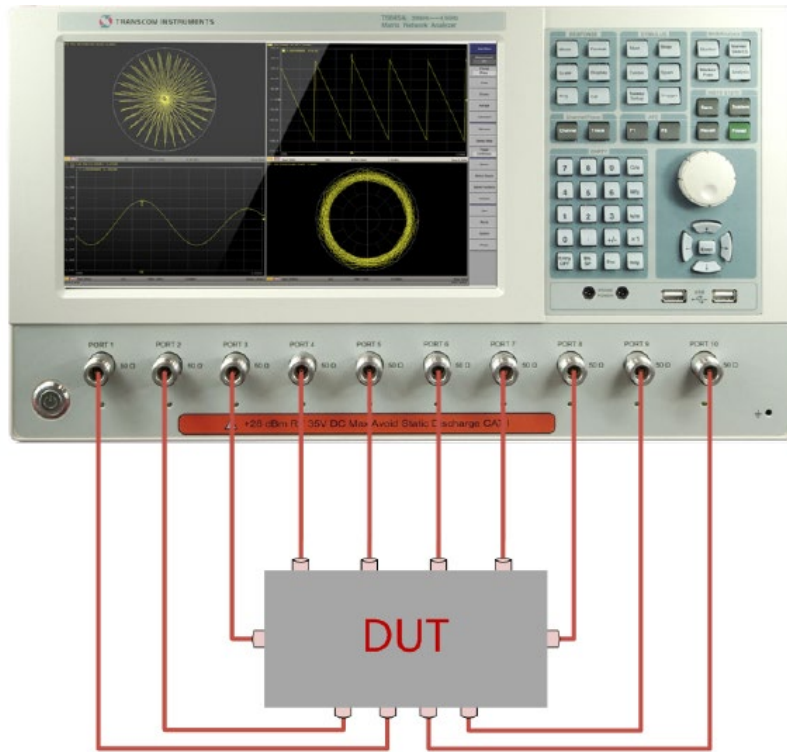
Multiport all S-parameters Measurement

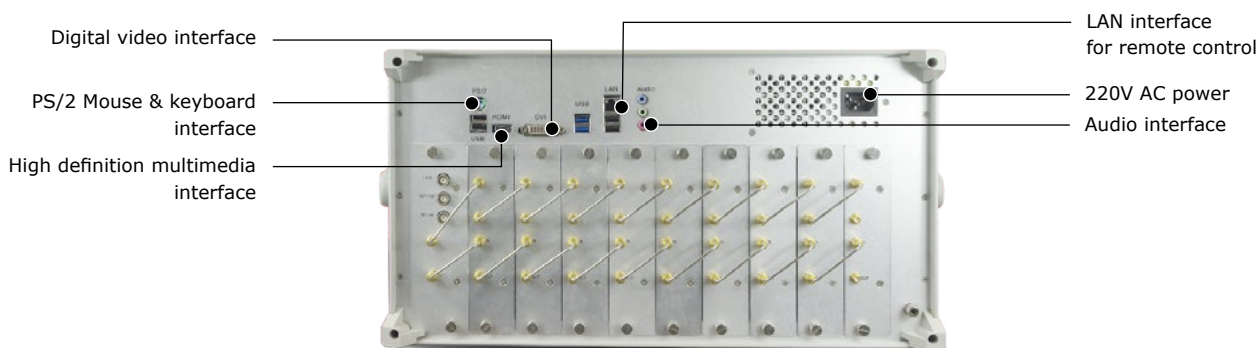Compared to conventional multiport test scheme of VNA+matrix switch, T5840 not only eliminates the insertion loss between test port and receiver, but also eliminates the sweep test required for multiport DUT test, and thereby greatly shortens test time. With parallel signal acquisition and processing mechanism, T5840 can measure S parameters of multiport DUT and conduct real-time synchronization for multipath signals.

Multi-DUT Measurement

Compared to conventional multiport test scheme of VNA+matrix switch, T5840 supports synchronous test of DUTs. Each DUT has its own test interface to achieve completely parallel operation. Therefore, the "multi-purpose" functions of T5840 are achieved without losing stability, accuracy and repeatability.

Control Elements

LCD touch screen (11.6 inch)

USB I/O

Test port

On/Off button

Digital video interface

PS/2 Mouse & keyboard interface

High definition multimedia interface

LAN interface for remote control

220V AC power

Audio interface
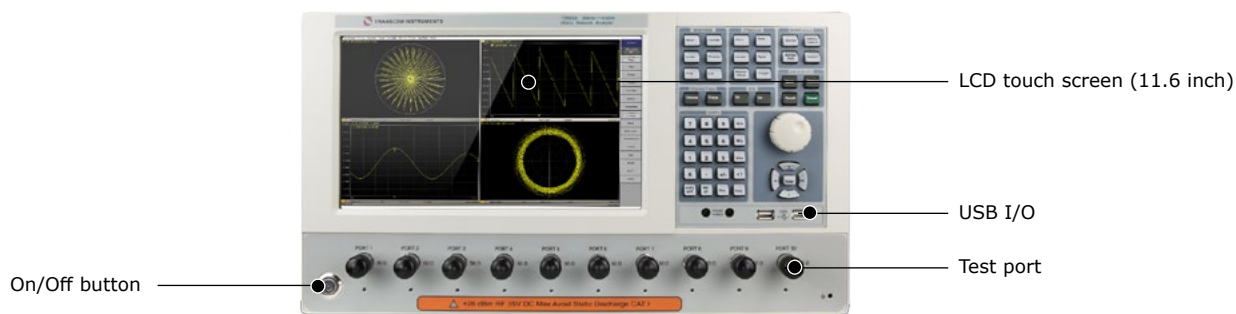
Specifications

Basic Parameter	
Frequency Range	300kHz to 4GHz
Impedance	50Ω,75Ω[1]
Test Port Connector	N-Type, Female
Number of Test Ports	2 to 10
IF Bandwidth	10Hz to 100kHz
Dynamic Range	IFBW 3kHz: 300kHz to 10MHz : 80dB; 10MHz to 4.5GHz : 95dB IFBW 10Hz: 300kHz to 10MHz : 105dB; 10MHz to 4.5GHz : 123dB
Frequency Accuracy	5.0 ppm

[1]75Ω CONNECTOR VIA ADAPTERS

Effective Data	
Effective Directivity	45 dB
Effective Source Match	40 dB

Measurement Speed	
Measurement Time Per Point	200us
Source to Receiver Port Switchover Time	10 ms
Measurement Accuracy	
Trace Noise Magnitude	0.002dBrms (Typ.)
Trace Noise Phase	0.02°rms (Typ.)
Power Range	-50 to +10dBm
Power Accuracy	±1.0dBm
Power Resolution	0.05 dB
Temperature Dependence	Magnitude: 0.006dB /°C Phase: 0.15° /°C
General Data	
Display Screen	300kHz to 4GHz
Input Connector Type	50Ω,75Ω
Input Reference Connector Type	N-Type, Female
Output Reference Connector Type	1 to 10
Video Output Connector	DVI
USB Connector	8 connectors (including 2 connectors with USB3.0); Female
LAN Connector	10/100/1000 Base T Ethernet, 8-pin
Operating Temperature Range	+5 to +40°C
Storage Temperature Range	-45°C to +60 °C
Humidity	90% (22°C)
Atmospheric Pressure	84 to 106.7kPa
Calibration Interval	3 year
Power Supply	220±22V (AC), 50Hz
Damage Voltage on Port	+26dBm, ±35V(DC)
Power Consumption	260W
Dimensions (W*H*D) mm	470*257*360

Ordering List

| Model	Description
Host machine	
T5840A-P02	2 Ports Matrix Vector Network Analyzer
T5840A-P03	3 Ports Matrix Vector Network Analyzer
T5840A-P04	4 Ports Matrix Vector Network Analyzer
T5840A-P05	5 Ports Matrix Vector Network Analyzer
T5840A-P06	6 Ports Matrix Vector Network Analyzer
T5840A-P07	7 Ports Matrix Vector Network Analyzer
T5840A-P08	8 Ports Matrix Vector Network Analyzer
T5840A-P09	9 Ports Matrix Vector Network Analyzer
T5840A-P10	10 Ports Matrix Vector Network Analyzer
Calibration kits	
5301N50	High-precision 3G/50Ω/N calibration kits (8 Nos.)
5601N50	High-precision 6G/50Ω/Ncalibration kits (8 Nos.)
5901N50	High-precision 9G/50Ω/N calibration kits (8 Nos.)
5603S50	High-precision 6G/50Ω/SMA calibration kits (8 Nos.)
5903S50	High-precision 9G/50Ω/SMA calibration kits (8 Nos.)
5801N50E-80011	High-precision 8G/50Ω/N (negative) electronic calibration kit
5801N50E-80012	High-precision 8G/50Ω/N (positive) electronic calibration kit
5801S50E-80021	High-precision 8G/50Ω/SMA (negative) electronic calibration kit
5801S50E-80022	High-precision 8G/50Ω/SMA (positive) electronic calibration kit

Pathrrot X2 Channel Emulator

Pathrrot X2 Channel Emulator

Overview

Pathrrot X2 channel emulator is the latest wireless measurement instrument launched by Transcom Instruments, which is oriented to the emulation for 4G/5G channel environment. It widely supports all kinds of MIMO channel models and has excellent RF performance, rich channel models, and friendly user experience etc. As a substitute of traditional field testing, the channel emulator can easily simulate the real world wireless propagation in the laboratory (i.e., virtual field test) by using real-time emulation capabilities of the instrument.

Pathrrot X2 provides a very effective means for the performance test of base station and user terminals, and it also builds a convenient test environment for the R&D of technologies and commercial products.

Key Facts

Pathrrot X2 channel emulator is a high-end wireless communication test instrument. It supports various types of MIMO channel models and it is featured by excellent RF performance, rich models, and friendly user experience. Customers can carry out simulation tests of various field environments in the laboratory.
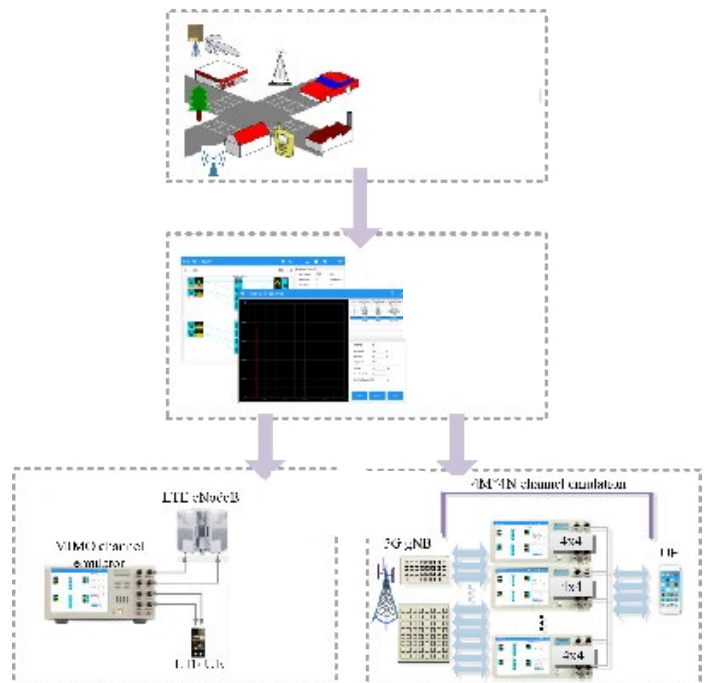
Setup of test systems with the channel emulator

Innovative Features & Benefits
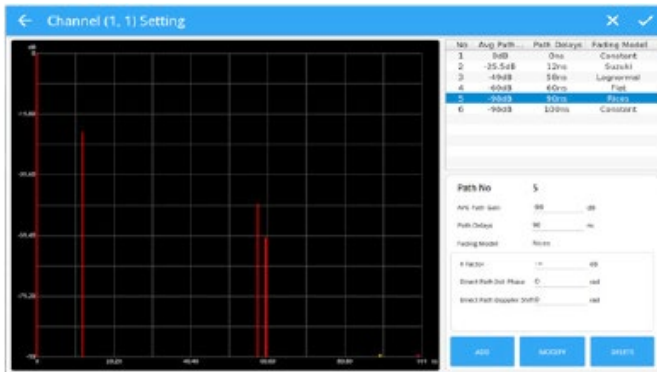
• Use the graphic user interface (GUI), support touch screen and provide friendly interaction experience

• Excellent RF performance, continuous coverage of wide frequency bands & large dynamic range of input/output power

• Include complex channel models for broadband wireless communications

• Flexible channel configurations, satisfying diverse needs of customers

• Have an open interface, and support user-defined channel models

Solution Highlights
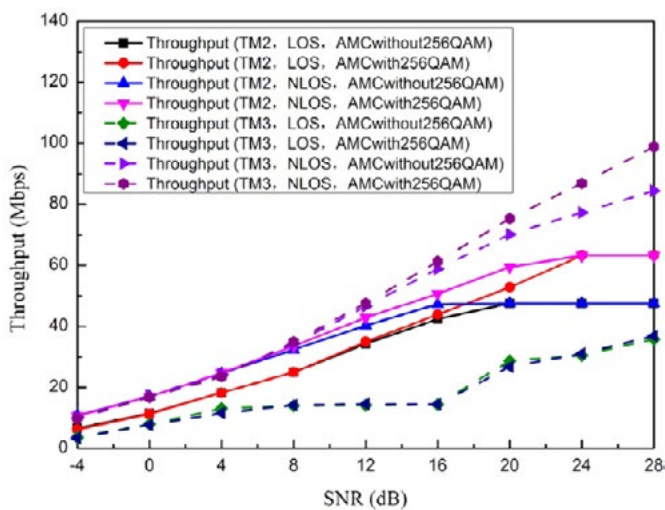
End-to-end performance tests of wireless device and network infrastructure
The test environment can be built indoors to vividly simulate outdoor channel characteristics instead of field testing.

Quality tests of wireless devices and network infrastructures
Fully demonstrate the influence of channels on the receiving and transmitting performance of terminals or base station equipment, and add reference specifications to improve equipment quality.

Algorithm verification for wireless channel models
Provide an integrated software and hardware platform to verify the model algorithm.
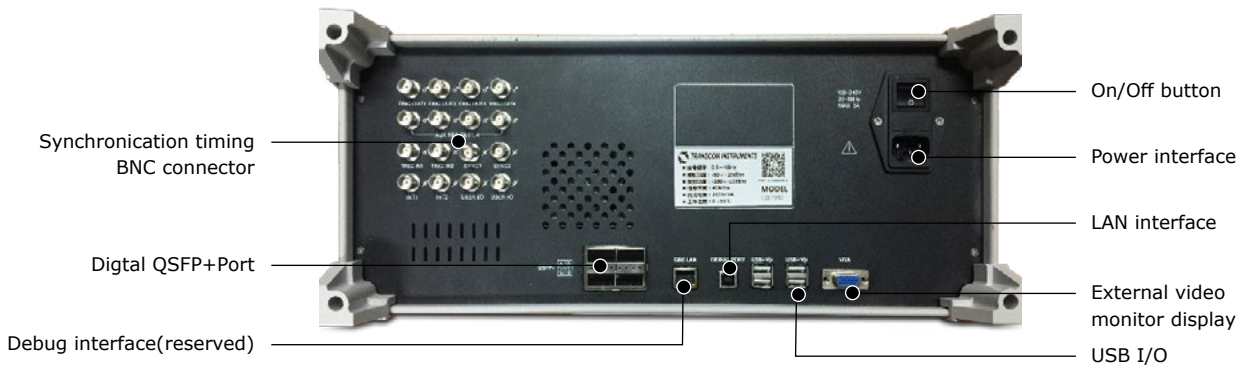
Simulate wireless channel characteristics

Include path loss, multipath fading, delay spread, Doppler shift, polarization, correlation and spatial parameters, which have significant influence on the performance of MIMO system.

Simulate the vivid interference scenario

Support the generation of AWGN and single-tone interference signals.

Control Elements

LCD touch screen

RF In/Out

RF In/Out LEDs

USB I/O

On/Off button

Synchronication timing BNC connector

Digtal QSFP+Port

Debug interface(reserved)

On/Off button

Power interface

LAN interface

External video monitor display

USB I/O

Specifications

General Specifications	
RF interface channel configurations	2 or 4（8, 16 optional）
MIMO emulation	2x2（4x2, 4x4, 8x4, 8x8 optional）
Number of paths per channel	Up to 48
Path delay resolution	Minimum 10ns
Noise Type	AWGN, CW
Doppler shift	Maximum 10kHz
Maximum time delay	30us
Bi-directional RF signal	Supported
Duplex mode	TDD（FDD optional）
Input power measurement	Supported
Input power meter modes	Instantaneous power detection, average power detection, frame power detection
Integrated phase and amplitude calibration	Supported
Dimensions	426x488x195.3（mm）
Weight	22kg
RF Specifications	
Frequency range	500MHz to 4GHz (30MHz to 6GHz optional)
RF channel signal bandwidth	60 MHz (100 MHz optional)
RF input power range	-50 to +15 dBm (-60 to +15dBm optional)
RF output power range	-100 to -10 dBm (-110 to -10dBm optional) , resolution 0.1 dB
Baseband Specifications	
ADC width	14 bits
DAC width	16 bits
Digital baseband clock rate	122.88MHz
Channel Modeling	
Fading profiles	Constant, Rayleigh, Rice, Normal, Suzuki, pure Doppler, Jakes
Fading profiles (optional)	Nakagami, Flat, Gauss, Butterworth
Standard channel models (optional)	GSM, DCS, TETRA, ITU 3G, JTC, 3GPP standard, 3GPP extended, 3GPP2 (IS-54, IS-95), 3GPP LTE MIMO, indoor hotspot, WiMAX MIMO, MIMO Kronecker, SCM/SCME, IMT-A, EPA, EVA
User-defined channel model loading	Supported

Ordering List

Basic Platform	
X2-M2	2 RF ports, SISO channels configurable
X2-M4	4 RF ports, SISO channels and 2x2 MIMO channels configurable
X2-M8	8 RF ports, SISO channels, 2x2, 4x2 and 4x4 MIMO channels configurable
Frequency Range	
X2-F4	500MHz to 4GHz
X2-F6	30MHz to 6GHz
Bandwidth	
X2-B40	40MHz
X2-B60	60MHz
X2-B100	100MHz

03 Spectrum Monitoring

TY800 Leaky Feeder Monitoring Module

Overview

GSM-Railway communication system operational quality is closely related to daily railway operating system's safety and stability. Leaky feeder, which is the key factor to operational security of GSM-R, its monitoring and fault locating are critical issues to railway routine activities.

Transcom radiating cable monitoring module TY800, precisely measures parameters of the leaky feeder such as VSWR, Return-Loss etc. TY800 connects with PC through LAN or RS485 (optional) to reads and locates fault location and sends real-time feedback for remote monitoring and control.

Key Facts

- 6W low power consumption
- Slim design, suitable for different integration
- Over 2000m monitoring distance
- Less than 5m positioning error
- LAN&S485 port with custom communication protocol
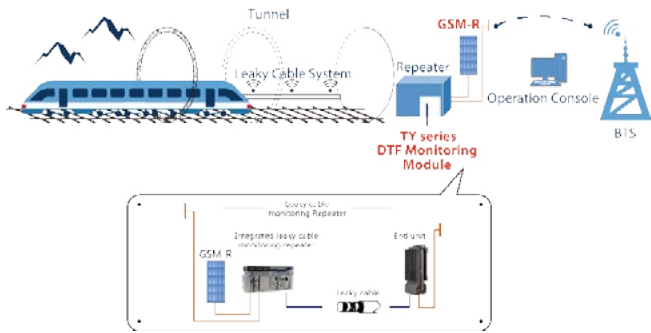- Industrial operating temperature , -40°C to +70°C
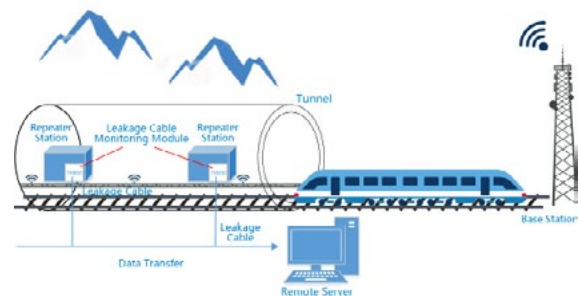
Innovative Features & Benefits

- Industrial grade tunnel leaky feeder monitoring module
- Precise measurement performance
- Stabilized working performance

Solution Highlights

DTF Trace

Industrial grade tunnel leaky feeder monitoring module

With qualified industrial design, TY800 can be easily integrate into multiple equipment or instrument in harsh or complex locations. TY800 can be installed directly into railway repeater station to minimize installation cost. Real- time monitoring

Precise measurement performance

Maximum distance: 1.5km or 2km optional

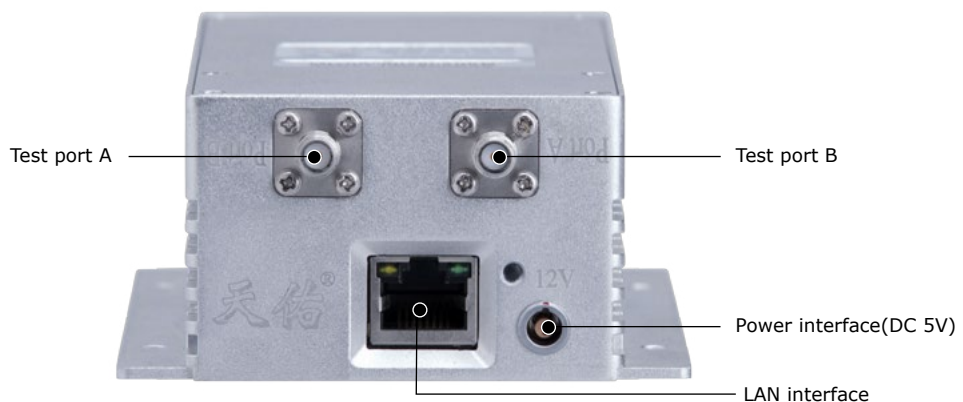Test resolution: 0.01dB

Default location error range: < 5m

Stabilized working performance

Operating temperature range: -40 ℃ to +50 ℃ , suitable for common railway environment

Rigid design enables to function properly under severe environment and extreme temperature

Control Elements

Test port A — Test port B

Power interface(DC 5V)

LAN interface
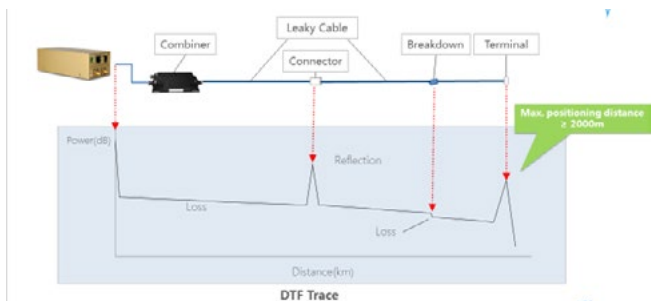
Specifications

General Data	
Impedance	50Ω
Test Port Connector	SMA, Female
Number of Test Port	2
Frequency Range	780MHz to 820MHz (Customized within 85-4000MHz)
Frequency Accuracy	5x10-6
Output Power	< -5 dBm
Number of Measurement Points	801
DTF Return Loss Measurement Range	0 to 100 dB
DTF Cable Loss Measurement Range	0 to 50 dB
Return Loss Measurement Accuracy	0.01dB
Maximum Positioning Distance	2000m (leaky cable loss less than 2.5dB/100 m)
Distance Positioning Accuracy	5m
DTF Return Loss Temperature Stability	0.01dB/°C
Calibration Interval	3 year
System	Linux
Communication Interface 1	LAN
Communication Interface 2 (optional)	RS485
Power Consumption	6w
Power Port	2 PIN connector
Voltage/ Current	+12V/1A
Dimension (L x W x H)	145.5 x 60 x 42.5 mm
Weight	0.5kg
Port Maximum Input Power	+22 dBm
Port Maximum Input Voltage	50V
Operating Temperature Range	–40°C to +70°C
Storage Temperature Range	40°C to +80°C
Humidity	90% (25°C)
Test Format	SWR, Return Loss, DTF SWR, DTF Return Loss.

Ordering List

Model	Description
Host machine	
TY800AA	1500m Leaky Feeder Monitoring Module (normal temperature, -25°C to +70°C)
TY800AB	1500m Leaky Feeder Monitoring Module (low temperature, -40°C to +50°C)
TY800BA	2000m Leaky Feeder Monitoring Module (normal temperature, -25°C to +70°C)
TY800BB	2000m Leaky Feeder Monitoring Module (low temperature, -40°C to +50°C)

RFHawk Sensor

Overview

RFHawk sensor can be used to collect and process mass data, and supports TDOA location. When the RFHawk sensor connect to network, the Radio Grid Monitoring System can perform channel monitoring, spectrum sweeping, traditional TDOA, virtual enhanced TDOA and other radio monitoring and acquisition functions. Thus RFHawk provides cost-effective solution for radio monitoring/location and spectrum management.

Key Facts

• Support the time-synchronized and level-synchronized acquisition of IQ data
• Support the spectrum output of AD and DDC data
• Have the function of spectrum compression
• The large-capacity cache is available on the board to record AD, IQ and voice data
• Support the broad and narrow receiver bandwidth
• Broadband bandwidth: 20MHz; narrow bandwidth: 500kHz
• Self-test function
• Automatic device register
• Exception management and simple fault recovery (restart)
• Provide continuous, 24×7 monitoring of the radio spectrum
• Unattended with local storage and support remote transmission of data

Innovative Features & Benefits

Industrial grade design

Stable and reliable performance

Automatic distributed system

Industrial grade design

• Small size and light weight, facilitating the static or mobile installation

• Cutting-edge technology, low power consumption and high performance

• Multiple RF ports, supporting multiple antennas
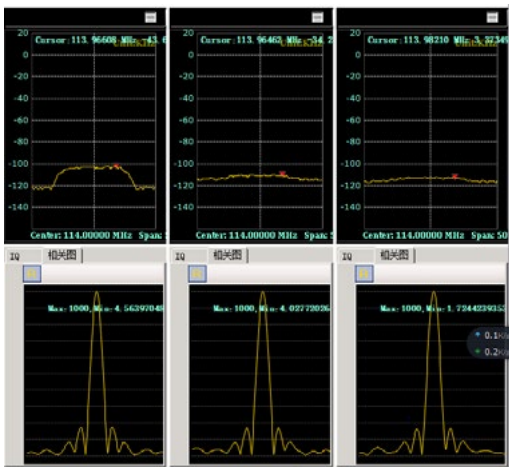
Stable and reliable performance

• Sweep speed 40GHz/Sec

• Spectrum range: 30MHz to 6GHz

• Signal analysis bandwidth of 20MHz, meeting various test needs

• I/Q signal recording with depth of 1G bits, possible for long time monitor with high accuracy

• High-precision TDOA signal locating technology, by the following timing accuracy: 30ns

Automatic distributed system

• Flexible system architecture and distributed layout of fixed and mobile monitoring nodes

• Real-time signal acquisition and optimization for data processing

• Monitoring node is well supported by radio management system

• Support data transmission resuming or re-transmission

Solution Highlights

Multiple networking modes with rich interfaces

The operating mode is shown on the panel led.

The device can identify network type intelligently and supports the following networking modes:

• 4G mode;

• LAN mode;

• Standalone mode.

External interfaces are concentrated on one side to facilitate installation and debugging. Rich interfaces are provided for extension, including:

Power input port: WS16-2 (one);

USB port: USB A-type port (one);

Network Connector: RJ45 (one);

GPS/BD antenna port: SMA (one);

RF antenna port: SMA (two).

Light in weight and easy to operate

• The load test of the RFHawk radio monitoring sensor can be performed with the knapsack, where the antenna and other components are kept. The product is powered up by the battery under load, and connected as shown on the figure left

• Schematic diagram of operation under load

• The UI interface supports touch operations
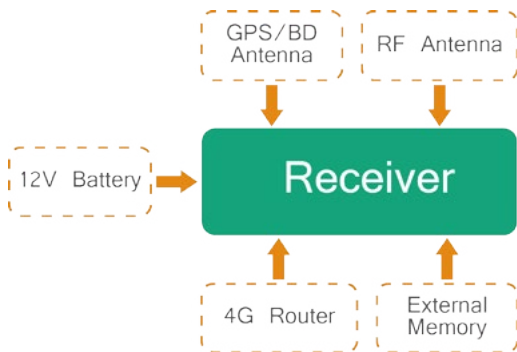
High accuracy

Multiple units can be connected by 4G or Mesh devices to form a monitoring network for high-accuracy positioning of target signals. The product can be used for measuring nanosecond-level IQ time difference, based on the high-precision GPS module and frequency locking technology.

High-accuracy location results can be obtained, in combination with the patented positioning algorithm (typical: the accuracy of 200KHz signal measurement within 2km in an open field ,the result is better than 50m).

Low power consumption and small size for loading on UAV

Dimensions:180mm×160mm×55mm
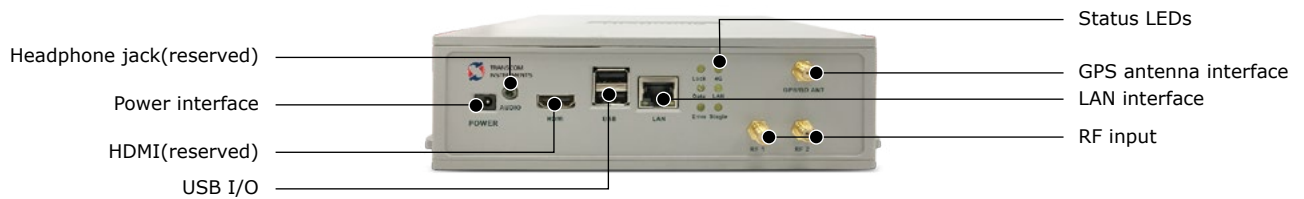
Weight: 1.5kg

Power consumption: 15W

It can be easily loaded on UAV to form an aerial monitoring node.

Good monitoring effects and high positioning accuracy can be achieved due to little aerial multi-path effect and large range of visibility.

Control Elements

Status LEDs
GPS antenna interface
LAN interface
RF input

Headphone jack(reserved)
Power interface
HDMI(reserved)
USB I/O

Specifications

Electrical characteristics	
Frequency Range	30MHz to 6GHz
Frequency Stability	≤±0.1ppm
3rd Order Intercept Point (IP3)	≥10dBm
Noise Factor	≤10dB (30MHZ to 3GHZ)
	≤15dB (3GHz to 5GHZ)
	≤20dB (5GHZ to 6GHZ)
Real-time Bandwidth	20MHz
Sensitivity	-110dBm (25KHz RBW)
Amplitude Measurement Accuracy	≤±2.0dB
Maximum Input Level	20dBm
Sweep Speed	40GHz/s (RBW=1MHz)
Data Time Stamp Accuracy	<30ns
Power Consumption	<15W
Operating Temperature (keeping the performance)	-20 to +55° C
Storage Temperature	-40°C to +70°C
Mechanical features	
Dimension	180mmx160mmx55mm
Weight	1.5kg
GPS Antenna Interface	SMA
RF Antenna Interface	SMA
Power Supply	12V DC
Communication Interface	Network interface RJ45 and USB A-type interface
Certification	CE

Ordering List

| Model	Description
RFH	RFHawk Sensor 30M to 6G radio monitoring receiver
Accessories Model	Description
RFH-AS001	Power adapter
Options	Description
RFH-AS002	GPS antenna
RFH-AS003	30M to 6G radio monitoring antenna
RFH-AS004	30M to 6G mini UAV planar antenna
RFH-AS005	Knapsack
RFH-H001	Onboard inverter
RFH-H002	4G Router
RFH-H003	12V40Ah portable power supply
RFH-H004	UAV
RFH-H005	MESH device
RFH-S001	HawkEye radio monitoring software (standard)
RFH-S002	Positioning module
RFH-S003	Combined spectrum sweep
RFH-S004	Combined discrete sweep
RFH-S005	Environmental threshold monitoring

FoxHunt Portable Monitoring Receiver

Overview
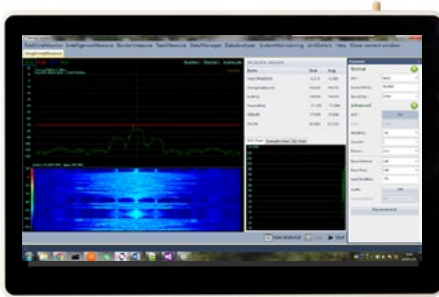
FoxHunt Portable Monitoring Receiver is designed for radio regulation. Benefits from its portable design, It is suitable for doing radio frequency monitoring and road test works. FoxHunt can do general spectrum scan, ITU measurement, 27MHz IF data acquisition, UAV signal identification and road test. API library provided for secondary development. Fox-Hunt is a portable but powerful solution for RF regulation field test.

Key Facts

- Frequency Range: 10MHz to 6000MHz
- Sweep speed: 20G/s @ frequency step 25KHz
- Amplitude Measurement Accuracy: ≤1.5dB
- Multi-function software installed
- LTE signal/drone signal detection, AM/FM demodulation
- Dimension: 315mm*215mm*28mm
- Weight: <1.5kg
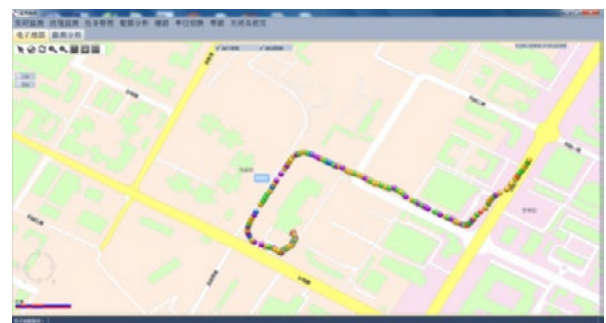
Drive test

Innovative Features & Benefits

Product features

- Compact design with light weight,   suitable for field test
- Powerful embedded software, suitable for RF monitoring and border patrol
- High sensitivity, wide monitoring range, fast scan speed and high accuracy.
- Ready for secondary development

Applications

- Road test for electromagnetic environment
- Frequency evaluation and data collection
- High speed IQ data collection
- UAV signal identification
- Board patrol and RF monitoring
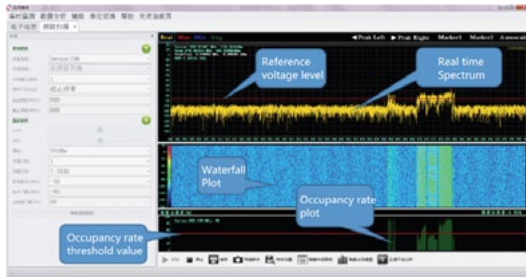- One-Key report generation for board patrol
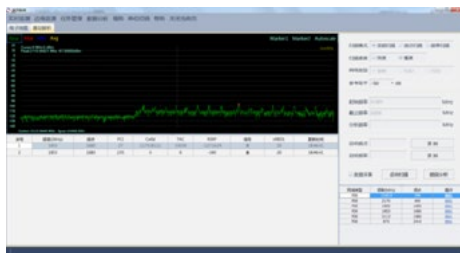

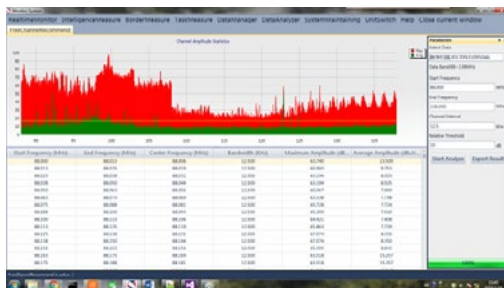Special UAV signal
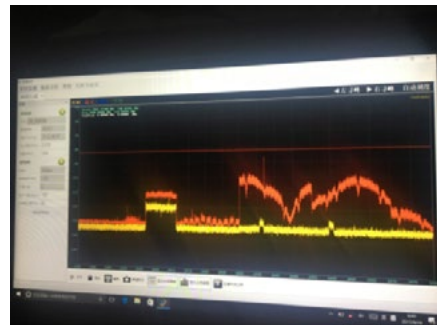
Commeicial UAV signal

Solution Highlights

General spectrum scan

BTS 4G signal demodulation

Long time interference monitorng

Idle channel analysis

Road test

Benefits from its compact design, and powerful software, FoxHunt is ready for road test and data analysis. It can do road test data play back, signal strength history analysis, suitable for Environmental voltage data logging, road test for certain frequency and border patrol

UAV signal identification

By reading characteristic of signal, FoxHunt is suitable for do UAV identification

BTS 4G signal demodulation

FoxHunt can do BTS 4G signal demodulation, which can show information like PCI, CL, signal quality and some other details.

Interference monitoring

By comparing real time spectrum with reference spectrum, Foxhunt can detect and report interference signal and unknown signal easily, this function is quite suitable for important event and area.

Spectrum scan

FoxHunt can do spectrum scanning from 10MHz to 6000MHz, it can show real time spectrum, waterfall plot, occupancy rate plot, intermodulation analysis, do maximum and minimum value recording, environmental voltage recording and etc.

Channel analysis

FoxHunt can do channel analysis, it can show frequency offset, field strength, bandwidth, SINR and many other parameters. Also it can do AM/FM demodulation, audio output and IQ data logging, sampling rate up to 40MB/s, and audio will be saved as .wav format.

Idle channel analysis

FoxHunt can make spectrum occupancy visible, which is suitable for manage spectrum resource and improving spectrum efficiency.

Specification

Electrical Characteristics	
Frequency Range	10MHz to 6GHz
Sensitivity	-110dBm (typical value)
Frequency accuracy	±0.1ppm
Sampling Bandwidth	≤27MHz @40M/S sampling rate
Amplitude accuracy	≤±1.5 dB
Noise factor	≤10dB (typical value, low noise mode)
Frequency resolution	≤10Hz
Scan speed	20GHz/s @frequency step 25KHz
2nd order Intercept point	>45dBm
IF rejection	≥50dB
MTBF	≥5000h
Weight	1.5kg
Dimension	315mm*215mm*28mm
Power Consumption	20W
Power Supply	12V DC
Operation time	3 hours
OS	Windows 7/8/10
Communication Interface	Network interface RJ45 and USB A-type interface
Operation style	Multi touch
Operating temperature	-25℃ to 60℃

Ordering List

Model	Description
HF01	FoxHunt 10M to 6G portable monitoring receiver
Standard Accessories Model	**Description**
HF01-AS001	Power adaptor
HF01-AS002	USB cable
HF01-AS003	Portable hard case
HF01-AS004	Portable soft case
HF01-AS008	MobileSearch Software standard version
Options	**Description**
HF01-AS005	Omni-Directional Antenna 30MHz to 6GHz (For vehicles)
HF01-AS006	Omni-Directional Antenna 700MHz to 6GHz
HF01-AS007	Omni-Directional Antenna 30MHz to 6GHz (For handheld)
HF01-AS009	UAV signal identification software
HF01-AS010	BTS signal demodulation/Border patrol software

RH36 Widedeband Radio Monitoring and Storage Equipment

Overview
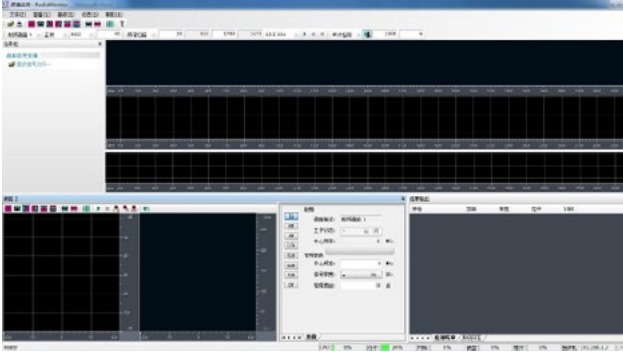
RH36 is a portable radio monitoring and storage system developed for wideband radio monitoring and detection, wideband signal sampling and analysis, data storage tasks, which is composed of a small collecting storage equipment RH36-WAR and a laptop with monitoring and analysis software. It performs spectrum scanning , radio monitoring , radio detection, frequency-fixed signal analysis, demodulation(AM&FM) , IQ data processing , wideband signal sampling, data storage within frequency range 30MHz to 3600MHz .

RH36-WAR comprises an embedded disk-array controller, 8 solid state disks (at most). Due to its largest 8TB volume, RH36-WAR can store or replay a wideband 36MHz sampling data continuously for more than 10 hours.

When supplied by the embedded lithium battery only, RH36-WAR can operate more than 2 hours continuously.

RH36-SE is a laptop loaded with Win10 and radio monitoring software developed by FUGLE incorporation. Connected to RH36-WAR through a Gigabit Ethernet, RH36-WAR is operated easily and flexibly by RH36-SE.
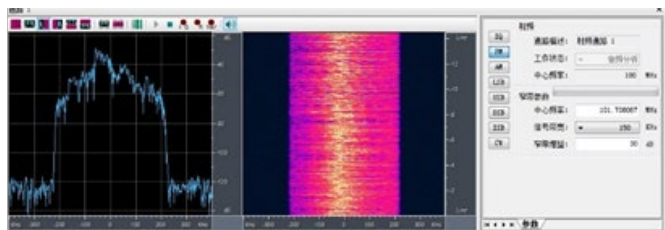
Key Facts

- Frequency Range：30MHz to 3.6GHz
- Noise Figure: ≤14dB
- IIP3：≥8dBm
- IF Output: 76.8MHz IF bandwidth: 36MHz
- IF Output: 70MHz IF bandwidth: 20MHz

Innovative Features & Benefits

- Industrial grade receiver
- Designed for wideband radio monitoring and detection,wideband signal sampling and analysis, data storage
- Performs spectrum scanning, radio monitoring, radio detection, frequency-fixed signal analysis, demodulation(AM &FM), IQ data processing

Specifications

Functionality	Description
Digital scan	Full span spectrum scan Waterfall diagram: waterfall Three-dimensional display of spectrum over frequency, time and color-coded signal level Scan speed: 3GHz/s; resolution: 12.5kHz/25kHz Spectrum display: average, max. hold, min. hold, expand/reduce Real-time measurement: center frequency, bandwidth, power level
IF Scan	Spectrum display: 4096 (FFT points) Spectrum display: average, max. hold, min. hold, expand, reduce; Waterfall diagram
IF Demodulation	AM/FM demodulation: bandwidth 3.2kHz to 300kHz(11,optional)
Sampling	Wideband sapling rates：3.2kHz to 36MHz (optional) Storage volume:4TB/8TB(optional), Record speed：300MB/s Data file access
Other functions	Replay: center frequency 70MHz/76.8MHz,bandwidth 20MHz/36MHz Search function: position search and time search File Management

Basic Platform		Description
Frequency	Range	30MHz to 3.6GHz
	Stability	≤±0.28x10-6/D (0 to +45°C)
	Phase noise	≤-96dBc/Hz@10KHz
Noise figure	NF	≤14dB
RF IN	Input protection	No damage under +25dBm signal level
	RF mode	LD(Low Distortion), Normal, LN(Low Noise)
		els configurable
Interference rejection	Image frequency rejection ratio	≥90dB
	IF rejection ratio	≥90dB
	IIP3	≥+8dBm
IF output	Frequency/bandwidth	76.8MHz/ 36MHz 或 70MHz/20MHz

Ordering List

Model	Description
RH36	Wideband Radio Monitoring and Storage Equipment
Accessories Model	Description
X2-F4	User Manual
X2-B60	Client Software
X2-B100	Power Cord

RH135Ultra-Short wave 4-Channel Narrowband Receiver

Overview

RH135 is specially developed for signal search, radio monitoring, radio detection and spectrum monitoring tasks. It receives 4 channel signals simultaneously within frequency range 30MHz to 1350MHz, and performs AM&FM demodulation or outputs IQ IF data directly.

Equipped with a wideband channel instead of a narrow one, RH135 can perform signal scanning, radio monitoring, radio detection and demodulation.

With high performance RF module, embedded electrically tuning filters, RH135's NF is less than 3.5dB at lower frequency band(<500MHz) and at the same time, its IIP3 is larger than 6dBm. RH135 features fine interference rejection, large dynamic range, high sensitivity. Due to coherent demodulation adopted, RH135 can demodulate signals with power level as weak as -120dBm.

Thanks to module design and Linux operation system, RH135 has many advantages such as easy operation, convenient maintenance, stability, and got wide use in radio monitoring, radio detection.

Key Facts

- Frequency Range: 30MHz to 1350MHz
- Noise Figure: ≤6dB (Typical 3.5dB)
- Demodulation bandwidth: 200Hz to 300kHz (16, optional)
- IF Output: 76.8MHz IF bandwidth: 36MHz
- IF Output: 70MHz IF bandwidth: 20MHz

Innovative Features & Benefits

- Industrial grade receiver
- Designed for signal searching, radio monitoring, radio detection and spectrum monitoring
- Stabilized working performance

Specifications

| Functionality	Description
Digital scan	Scan speed:3GHz/s, scan resolution: 12.5KHz/25KHz（wideband CH）
IF spectrum scan	7 resolution：390.625Hz to 25KHz（wideband CH）
AM&FM demodulation	4-CH AM&FM demodulation （No filtering） Demodulation bandwidth(16,optional)：300kHz, 250kHz, 200kHz, 150 kHz, 100kHz, 60 kHz, 50 kHz, 35 kHz, 25kHz, 15kHz, 10 kHz, 5.5kHz, 3.2kHz, 1 kHz, 500Hz, 200Hz
Audio information	4-CH AM&FM&CW Audio information Coherent demodulation ,Demodulation bandwidth(16,optional)：300kHz, 250kHz, 200 kHz, 150 kHz, 100 kHz, 60 kHz, 50 kHz, 35 kHz, 25kHz, 15kHz, 10 kHz, 5.5kHz, 3.2kHz, 1 kHz, 500Hz, 200Hz Sampling rate:8KHz/16KHz/32KHz, encoder:16-bit PCM
Squelch Mute	auto/manual (optional)
Sampling data	4-CH narrowband I&Q data Signal bandwidth (16 ,optional): 300kHz, 250kHz, 200 kHz, 150 kHz, 100 kHz, 60 kHz, 50 kHz, 35 kHz, 25kHz, 15kHz, 10 kHz, 5.5kHz, 3.2kHz, 1 kHz, 500Hz, 200Hz
Channel scan	Based on center frequency, bandwidth, gain, demodulation mode, dwell time and CH number. 4 operation modes，scan speed:50CH/s（No dwell） Output: power level and AM&FM audio information（with independent squelch）
Frequency-band scan	Based on start frequency, scan step, bandwidth.

Specification		Description
frequency	range stability Stable time Phase noise	30MHz to 1350MHz ≤±2.8x10-7/D ≤500μs ≤-96dBc/Hz@10KHz
Noise figure	NF	≤6dB(typical 3.5)
RF input	interface Input protection attenuation	4 inputs(N /50Ω) Bear +30dBm RF power level 0dB to 15dB(selectable)
Interference rejection	Image frequency rejection ratio IF rejection ratio IIP3	≥90dB ≥90dB ≥+6dBm
Sensitivity	FM AM CW	Not larger than -120dBm（bandwidth:10KHz,frequency offset:30%，S/N: 10dB) Not larger than -117dBm（bandwidth:5.5KHz,modulation depth:50%，S/N:10dB) Not larger than -119dBm（bandwidth:5.5KHz，S/N: 10dB)
timing	timing/protocol	GPS/BEIDOU，IRIG_B protocol
Environmental adaptation	Operational temperature Power supply/consumption Weight Structure	-20ºC to +45ºC 24V±10%,≤70W ≤15Kg Consolidated
Size	L*W*H	2U, 483*400*88mm

Ordering List

Model	Description
RH135	Ultra-Short wave 4-Channel Narrowband Receiver
Accessories Model	Description
RH135A0001	User Manual
RH135A0001	Client Software
RH135A0001	Power Cord

RHS All-In-One Radio Monitoring and Analysis Equipment

Overview
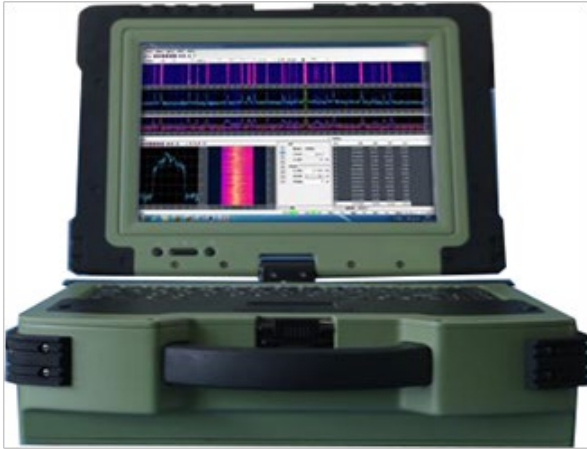
RHS is an all-in-one radio monitoring and analysis equipment developed for radio monitoring and analysis tasks on a single consolidated reinforced case, which comprises two RF modules and a signal processing module, processing results are displayed on the screen directly.

RHS performs wideband scanning, radio monitoring, radio detection, and analyzes a channel fixed-frequency signal simultaneously.

Due to the embedded electrically tuned filters in RF modular, RHS has fine interference performance so that it is well suitable for radio monitoring and detection under complicated electromagnetic environment.

RHS is an all-in-one equipment loaded with Win10 and used widely in radio monitoring, radio detection, signal processing etc., and it is composed of two RF modules, a DDC module, an embedded computing module, a power supply module, a touch screen and a LCD.

Key Facts

- Frequency range: 10MHz to 4200MHz
- Frequency Range: 30MHz to 1350MHz（Module 1), 30MHz to 3GHz（Module 2）
- Noise Figure: ≤12dB
- IIP3：≥8dBm
- IF Output: 76.8MHz IF bandwidth: 36MHz
- IF Output: 70MHz IF bandwidth: 20MHz

Innovative Features & Benefits
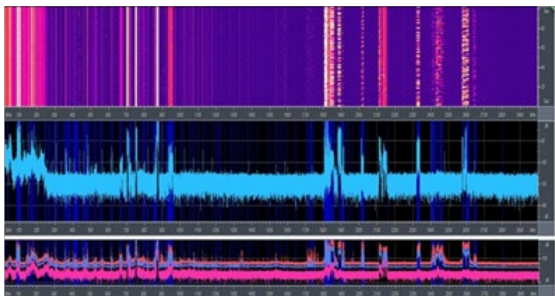
Product features

• Designed for radio monitoring and analysis tasks on a single consolidated reinforced case
• Precise measurement performance
• Suitable for radio monitoring and detection under complicated electromagnetic environment

Specifications

Functionality		Description
Digital scan		Full span spectrum scan Waterfall diagram: waterfall Three-dimensional display of spectrum over frequency, time and color-coded signal level Scan Speed:3GHz/s Scan Resolution: 12.5KHz/25KHz Spectrum display: average, max. hold, min. hold, expand/reduce
IF scan		Spectrum display: 4096 (FFT points) Spectrum display: average, max. hold, min. hold, expand/reduce Waterfall diagram: waterfall Three-dimensional display of spectrum over frequency, time and color-coded signal level Resolutions: 390.625Hz to 25KHz(7 totally)
IF demodulation		AM/FM demodulation: 3.2KHz to 300KHz(11 kinds of bandwidths supported) Audio Filtration: 8KHz/16KHz/32KHz(supported sampling rate), 16-bit PCM code Audio bandwidth: 3.2KHz to 300KHz (11 totally)
Data sampling		I&Q data sampling, local storage Sampling bandwidth：3.2KHz to 1MHz(11 optional)
Digital record		Recordable in local hard disk
Structure		All integrated in one case
Specification		**Description**
Frequency	Range Stability Phase noise	Module 1：30MHz to 1350MHz, Module 2：30MHz to 3GHz ≤±0.28x10-6/D (0 to +45°C) ≤-96dBc/Hz@10KHz
Noise figure	NF	≤12dB
RF IN	Input protection Input preselection	No damage under +25dBm signal level Voltage tuned filters
Interference rejection	Image frequency rejection ratio IF rejection ratio IIP3	≥90dB ≥90dB ≥+8dBm
IF output	frequency/bandwidth	76.8MHz/ 36MHz or 70MHz/20MHz
Environmental adaptation	Temperature Voltage Power Consumption	-10°C to +50°C 24V/5A, ≤70W
size	L*W*H	350*285*120mm

Ordering List

Model	Description
RHS	Full span spectrum scan All-In-One Radio Monitoring and Analysis Equipment
Accessories Model	Description
RHSA0001	Antenna
RHSA0002	Power Cord
RHSA0003	Client Software
RHSA0004	User Manual

RM&DF_SYS Portable Radio Monitoring and Direction Finding System

Overview
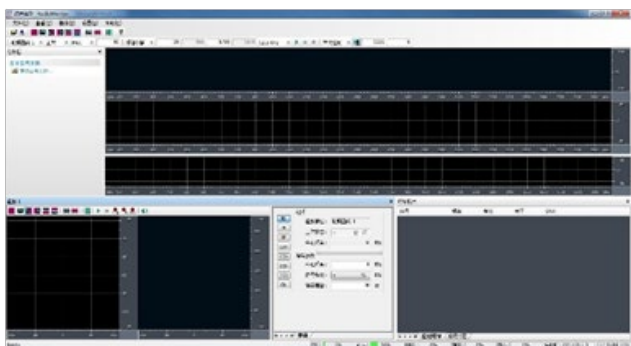
Portable Radio Monitoring and Direction Finding System is a total solution designed for radio monitoring, radio direction finding, and radio position finding in the frequency range from 30MHz to 3600MHz.

Portable Radio Monitoring and Direction Finding System, composed of a 7-unit large-aperture circular antenna array, a two-channel receiver, an operation terminal, adopts phase interferometric theory to implement direction finding. It performs radio monitoring , radio detection at frequency range 30MHz to 3.6GHz, and outputs results such as center frequency, bandwidth, power level etc., at the same time it implements direction finding through computing the phase difference between every two antenna array elements.

Due to embedded electrically tuned filters, the system has many fine performances such as high sensitivity, better interference rejection. Three operation modes (i.e. Low Noise, Low Distortion, Normal) makes the system be suitable for tasks under complicated electromagnetic environment.

Thanks to its foldable antenna array and all-in-one receiver, its size is small and weight light, operation is easy and maintenance convenient. Generally, its convenient erection and withdrawal, which can be finished by two persons within 20minutes, make it be widely used on radio monitoring, direction finding and networking positioning.

Portable Radio Monitoring And Direction Finding System comprises an antenna array, a multichannel receiver, an operation terminal

Key Facts

- Scanning frequency band: 30MHz to 3600MHz(scan speed: 3GHz/s, scanning resolution: 12.5kHz/25kHz)
- Monitoring sensitivity：2μV/m
- Direction finding Accuracy: 1.5°（r.m.s）
- IFDirection finding Sensitivity: 2μV/m
- Direction finding time: ≤10ms(single target)
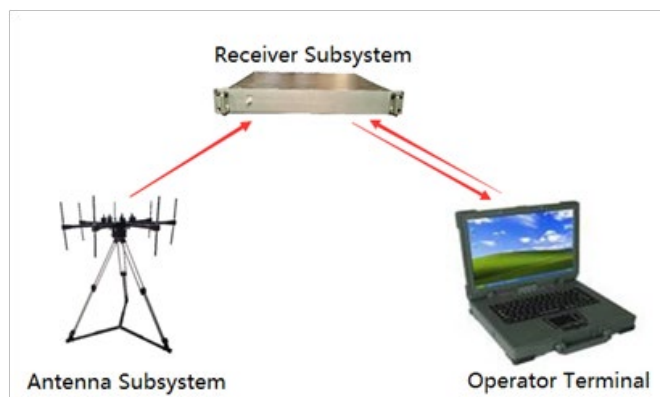
Innovative Features & Benefits
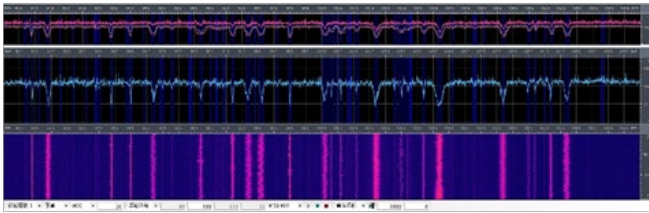
- Compact design, light weight, easy to carry
- Quick deploy
- Stable performance

Specifications

Monitoring Function	
Scanning frequency band	30 to 3600MHz
Scan speed	3GHz/s
Scanning resolution	12.5kHz/25kHz
IF spectrum display resolution	390.625Hz to 25kHz(optional)
IF display bandwidth	2MHz, 4MHz, 8MHz, 16MHz, 20MHz (36MHz)
Demodulation	AM&FM&IQ
Detection	center frequency, bandwidth, power level
Monitoring sensitivity	2μV/m
Level measurement accuracy	≤±2dB
Direction Finding	
Direction finding system	Phase interferometric direction finding
Accuracy	≤1.5°（r.m.s) (RMS, standard test background，S/N>20dB)
Sensitivity	2μV/m
Direction finding time	≤10ms(single target)

Ordering List

Model	Description
FGS25D	Full span spectrum scan All-In-One Radio Monitoring and Analysis Equipment
Accessories Model	**Description**
F25A0001	User Manual
F25A0002	Power Cord
F25A0003	Client Software

04 **Solutions**

Solution 1 - TY800 Leaky Cable Monitoring System

Overview

With the rapid development of High-Speed Railway(HSR), railway digital mobile communication system has became a significant part in daily operation. In order to ensure the stable operation of railway GSM-R system, leaky cables are laid beneath railway tunnel.

However, one of the feature of leaky cable is multiple connectors and adapters, and this particular feature often cause loose joints and corrosion damage, thus cause increase in transmission loss. GSM-R network signal quality in the tunnels will be weaken and even interrupted.

Performance of leaky cable is the key for stable and safe operation of railway GSM-R network system.

Leaky Cable

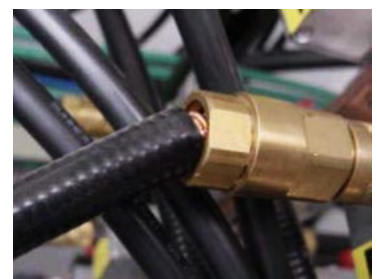TY800 Leaky Feeder Monitoring Receiver

DTF Function

More than 50% RF wireless system problems are caused by leaky cable and antenna feeder, which about 80% glitches are connector, jumper and antenna

Crush caused by stepping or jogging
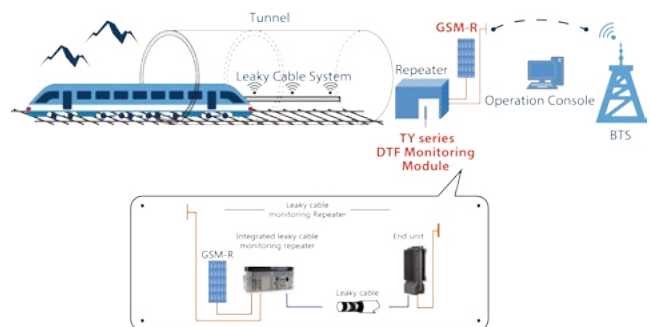

Excessive bending

Excessive push&pull

Key Facts

- Customized frequency range within 85MHz to 4000MHz
- Over 2000m monitoring distance
- Less than 5m positioning error
- LAN&S485 port with custom communication protocol
- -40°C to +70°C industrial operating temperature
- 6w low power consumption
- Dimension:145.5x60x42.5mm
- Weight: 0.5kg

Leaky Cable Monitoring Application Diagram

Case Study

Beijing Subway Leaky Cable Monitoring System

• By July 2016, Beijing Subway line 4 has compete full leaky cable monitoring system

• Real time monitoring for 4-8 leaky cables, including cable type, propagation velocity, start to terminal distance of uplink/downlink, standing wave ratio(SWR), return loss, location and condition of connector/DC-block, etc.

• Failure time, Failure confirmation time and recovery time auto-saving

• Failure alarm, including communication interrupt alarm, SWR alarm, equipment fault alarm, etc.

• Monitoring data automatically upload

• Post data analysis

• Leaky cable monitoring system is using SWR(return loss) measurement

• SWR(return loss) is unstable when mismatch happens, while monitoring system sends various grade alarms by compare to normal SWR(≤1.5)

• Locating function enables monitoring system to determine fault location
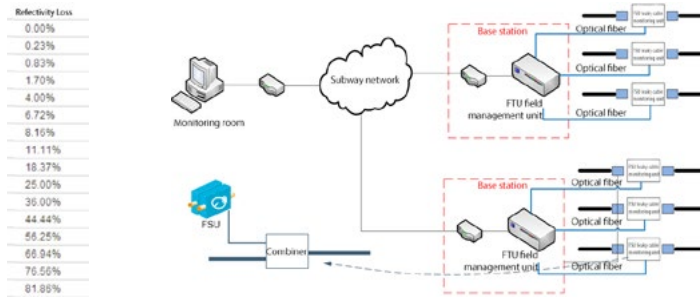
•Beijing Subway line 4 tunnel length is 3.2 KM

•Performed by series connection of 2 FSU leaky cable monitoring units

System Performance:

Max RF output power: -10dBm

Max combiner insertion loss: 0.45dB(operating range)

Max input/output VSWR: 1.3

Max power consumption: 20W

Less than -108dBm spurious emission
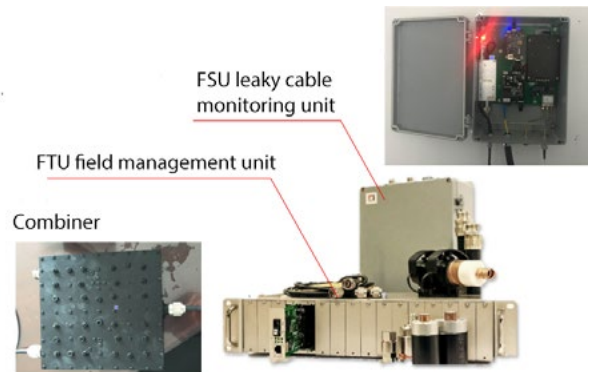
Monitoring Performance:

Max fault locating error: 4 meters

Max indoor SWR error: 0.05

Max outdoor SWR error: 0.07

Network Management Performance:

Network management sever minimum leaky cable monitoring units controlling: 1000 units
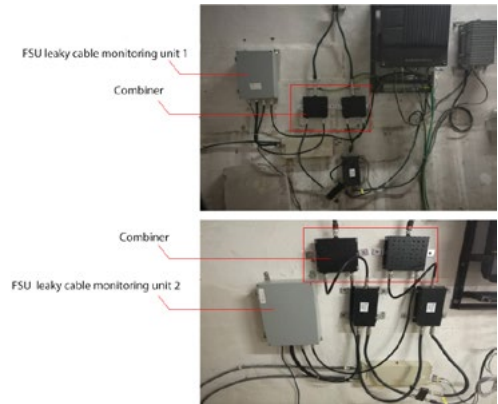
Network management sever minimum storage space: 300GB

Network management sever minimum storage time: 1 year

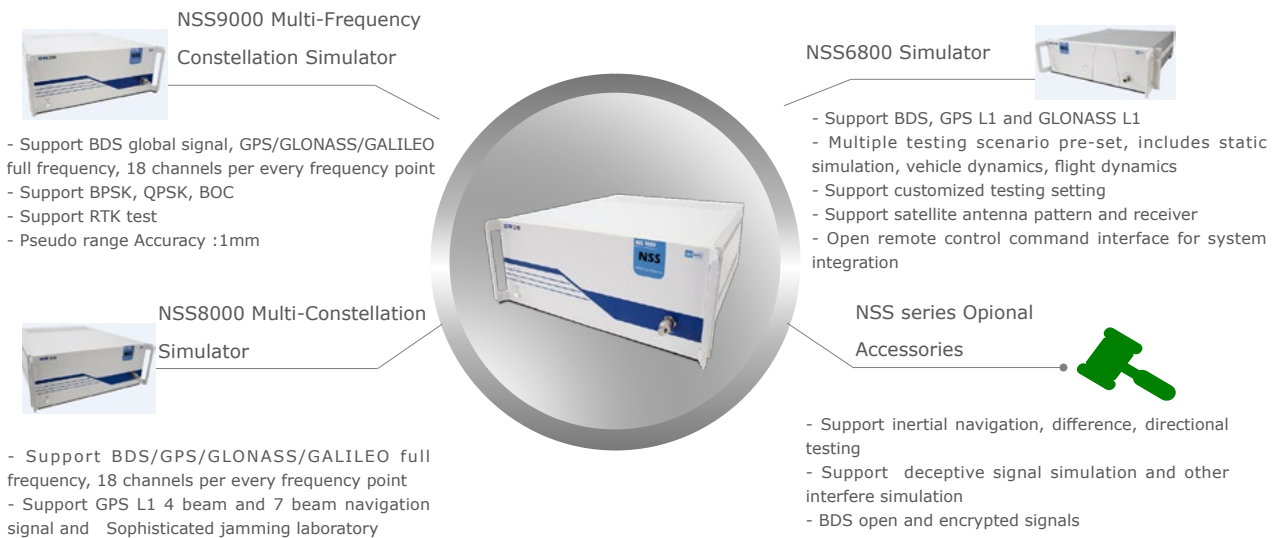Subway base station(FTU field management unit) ↓

Beijing subway line 4 OMC ↑
leaky cable monitoring system

FSU leaky cable monitoring unit 1

Combiner

Combiner

FSU leaky cable monitoring unit 2

Solution 2 - Navigation Relevant Solutions

NSS Series Multi-Frequency Constellation Simulator

NSS9000 Multi-Frequency Constellation Simulator

- Support BDS global signal, GPS/GLONASS/GALILEO full frequency, 18 channels per every frequency point
- Support BPSK, QPSK, BOC
- Support RTK test
- Pseudo range Accuracy :1mm

NSS8000 Multi-Constellation Simulator

- Support BDS/GPS/GLONASS/GALILEO full frequency, 18 channels per every frequency point
- Support GPS L1 4 beam and 7 beam navigation signal and   Sophisticated jamming laboratory

NSS6800 Simulator

- Support BDS, GPS L1 and GLONASS L1
- Multiple testing scenario pre-set, includes static simulation, vehicle dynamics, flight dynamics
- Support customized testing setting
- Support satellite antenna pattern and receiver
- Open remote control command interface for system integration

NSS series Opional Accessories

- Support inertial navigation, difference, directional testing
- Support deceptive signal simulation and other interfere simulation
- BDS open and encrypted signals

Comparison

	NSS9000	Spirent GSS9000
Frequency Point	BD2\GPS\GLONASS\Galileo full range	BD2\GPS\GLONASS\Galileo（BD-B3 not included）
Beidou global signal	included	not included
Pseudo range Accuracy	0.001m	0.003m
Harmonic Wave	≤-40dBc	≤-40dBc
Level Control Range	-150dBm to -10dBm	-170dBm to -60dBm
RF Signal Level Run to Run Repeatability	0.2dB	0.1dB
Signal Level Absolute Accuracy	0.5 dB	0.5 dB
Maximum Relative Velocity	±120000m/s	120,000 m/s
Maximum Relative Acceleration	±3000m/s^2	192600m/s^2
Maximum Relative Jerk	±5000m/s^3	890,400m/s^3
Phase Noise	≤0.005rad(RMS)	≤0.005rad(RMS)
Internal 10.00 MHz OCX Oscillator	≤ ±5×10^{-10}	≤ ±5×10^{-10}

RTS Series Closed Loop Test System

RTS7000 Closed Loop Test System

- Simulate satellite outbound signals of 5 RDSS GEO satellites, 2 beams for each satellites
- Simulate satellites orbit constellation, support passive positioning calculation
- Support RDSS user machine inbound signals, Pseudo range calculation, Power measurement and Doppler estimation
- Support Information Encryption Test
- Auto test for more than 30 parameters under both wireless and wired conditions.

RTS7800 Closed Loop Test System

 All RTS7400 functions included, support 8 instruments doing test at the same time under wireless or wired conditions

RTS7400 Closed Loop Test System

- Support 4 instruments doing test at the same time under wireless or wired conditions
- Hardware platform support RDSS multi users parallel test and configuration of GNSS Navigation signals
- Simulate satellite outbound signals of 5 RDSS GEO satellites, 2 beams for each satellites
- Synchronize with other navigation signal sources, support multi users' instruments development and test
- Support user machine inbound signals, inbound signals demodulation, Pseudo range calculation, power calculation and Doppler Support Information Encryption Test
- Provide data interface, used for auto test and reports generation
- Store inbound and outbound signals information, benefits for further analysis

RPS series GNSS RF Record & Playback System

RPS2000 Data Acquisition and Playback System

- 4 channels sampling simultaneously, with 400MHz maximum sampling
- Support more than 1GHz/s data flow
- Every channel has 20MHz to 100MHz sampling bandwidth, and support configuration of 4 ways BDS/GPS/GLONASS/GALILEO navigation frequency point.
- High accuracy: the synchronism between multiple channels is ns level, suitable for test like antenna differential test and RF receiver test
- Support all kinds of constellation, 4 in-build channels with 100MHz bandwidth, could be extended to 8 channels. Support GPS L1/L2/L5, BDS B1/B2, GLONASS L1/L2, CALILEO, QZSS and SBAS satellite signals
- In-built GPS module, support online monitoring navigation signal states

RPS1000 Handheld Signal Acquisition and Playback Apparatus

- Frequency point configurable
- Remote control via Smart phone
- 4 systems for capture and playback
- One-touch operation, 6 hours operation time
- In-built GPS module, support online monitoring navigation signal states
- No need for PC and external hard disk
Easy operation
- Charged by various kinds of external power source
- Record GNSS signals in real environment easily with high efficiency, and repeatedly playback when required
- Easy to carry
- Recorded signal and resolving signal could be playback at the same time, benefits for comparison between receivers and standard receivers

RPS Record and Playback System

Comparison

	RPS1000	Spirent GSS6450
Frequency Point	BD2\GPS\GLONASS\Galileo	BD2\GPS\GLONASS\Galileo
Number of Frequency Point of simultaneously acquisition	2	4
Sampling Bit Wide	2bit, 4bit, 8bit, 12bit, 16bit	4bit, 8bit, 16bit
Signal Bandwidth	2Mhz to 71Mhz	10Mhz, 30Mhz, 50Mhz
Internal Storage	-	2TB
Mobile HD	2TB	2TB
Internal GNSS Receiver	BD B1+GPS L1+GLO L1	BD1+GPS L1+GLO L1
Operation Time	3.h	1.5h
Removable Battery	-	Removable
CANBUS	Support	Optional
SPIBUS	Support	Optional
Screen size	5 inch	2.7 inch
Resolution	800*480	640*480
Size	145*210*50	216*200*76
Weight	1.8Kg	2.2Kg

SNRTest Testing and Evaluation Software

The test and evaluation software, SNRTest, could do auto test depending on default or user defined scripts. By comparing test data with reference data, it will generate test report automatically.
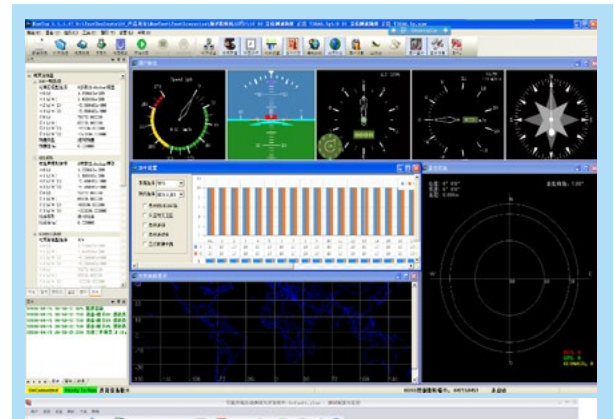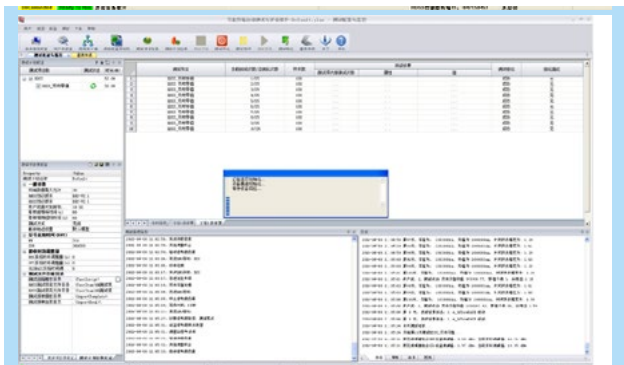
	Testing Center follows following 17 standards
1	GB/T 18214.1-2000 Global navigation satellite systems(GNSS)-Part 1:Global positioning system(GPS)-Receiver equipment-Performance STANDARDs, methods of testing and required test results
2	GB/T 15527-1995 General specification for marine GPS receiver
3	GB 12267-1990 Marine navigational equipment - General requirements - Methods of testing and required test results
4	GB/T 19056-2012 Vehicle travelling data record
5	GB/T 19392-2003 General specification for in-vehicle GPS navigation system
6	GBT 26782.3-2011 Satellite navigation based ship monitoring and management system - Part 3: Technical requirements for shipborne terminal
7	GB/T 26766-2011 On-board information terminal of urban public transit dispatching
8	SJ/T 11420-2010General specification for GPS navigation receiver
9	SJ/T 11423-2010 General specification for GPS timing receiver
10	SJ 20726-1999 General specification for GPS timing receiving equipment
11	SJ/T 11428-2010 Performance requirements and test methods for GPS receivers OEM board
12	JT/T 794-2011 GNSS system for operating vehicles-technical specification for vehicle terminals
13	JT/T 732.2-2008 Technical requirements for vessel satellite positioning application system part 2:shipborne terminal
14	AQ 3004-2005 Telematics control unit for monitoring safety of on-road vehicle transportation of dangerous chemical goods
15	QJ 20007-2011 General specification for navigational GNSS receiver
16	QJ20008-2011 Performance requirements and test methods for baseband processing chip of GNSS receiver
17	CHB5.6-2009 Verification regulation for Beidou user equipment

Solution: Terminal Production Line Test Platform

Follows General specification for Beidou subscriber terminal test system, benefits for improving production test efficiency .
Terminal production line test platform is designed for delivery inspection and tests.

The platform support various kinds of RDSS terminals, Beidou dual modes user machine, Beidou GNSS terminals, BDS/GPS dual modes navigation terminals, BDS/GPS/GLONASS triple mode terminals.
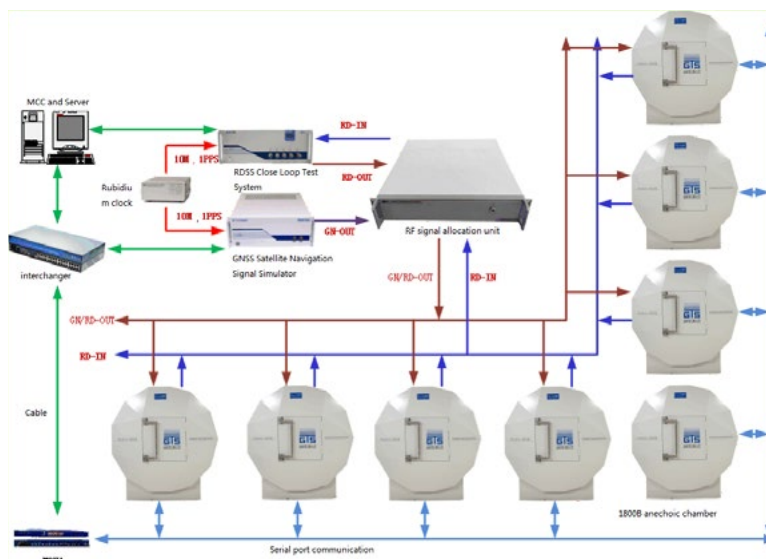
Terminal production line test platform

GNSS wired test platform

GNSS wireless test platform