



TRANSCOM
INSTRUMENTS

TRANSCOM INSTRUMENTS PRODUCTS CATALOG 2017



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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*

*Preparing Today for
5G of Tomorrow*

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.

2011-2015

- **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)

2016

- **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



Million revenue in 2015



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-4200MHz
- DANL: -168 dBm @1GHz (Sensitivity set to High , normalized to 1Hz)
- RBW: 10Hz-5MHz
- Multi-screen: maximum 4 windows
- Android operating system: touch screen operation, multi-touch, easy-to-use.
- Compact size (200mm×96mm×67mm) and light weight (1.25kg, including the battery)
- 6 hours full operating time battery
- 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 omni-directional 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

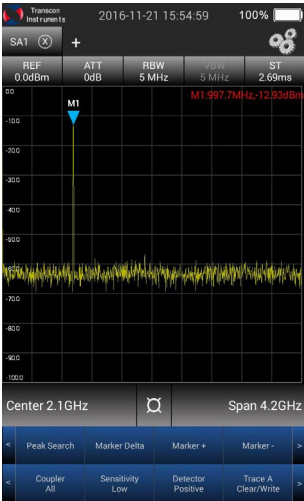
- User-friendly Android operating system
- Parameters can be set rapidly by clicking and sliding
- Test results can be read in any status

Software customization

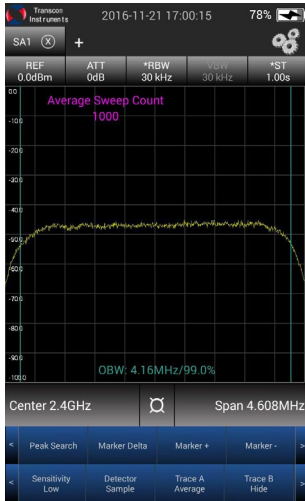
- Application and Software customization



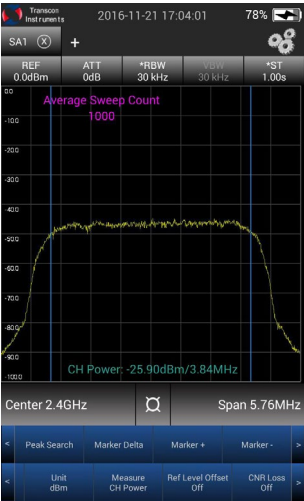
Solution Highlights



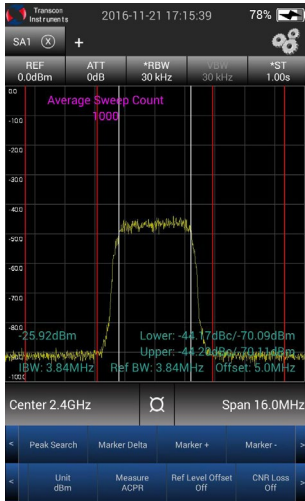
General spectrum test



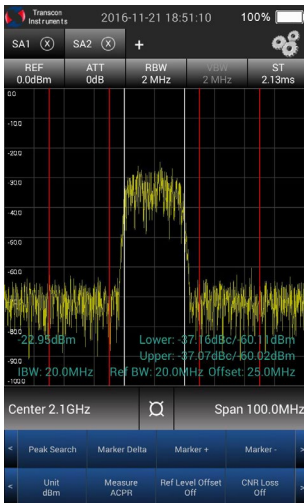
Occupied bandwidth (OBW)



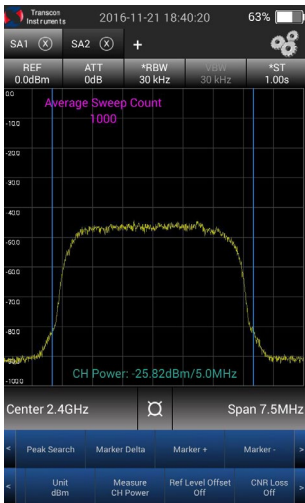
Channel power measurement



Adjacent channel leakage power ratio



Spectrum measurement of main communication signal



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

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

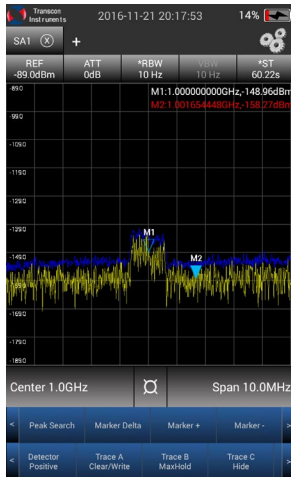
Operator needs to minimize the adjacent channel leakage power ratio to prevent the interference to normal operation of adjacent channels. The adjacent channel leakage power ratio is measured to check the signal leakage and identification and control the interference source. The function of adjacent channel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

Spectrum measurement of main communication signal

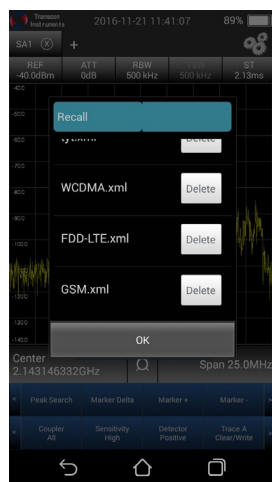
Measure communication signals by means of parameter setting. Various communication signals can be separately tested by clicking the unique multi-window interface.

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.



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



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 omni-directional and directional antenna to check interference

Connect omni-directional 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.

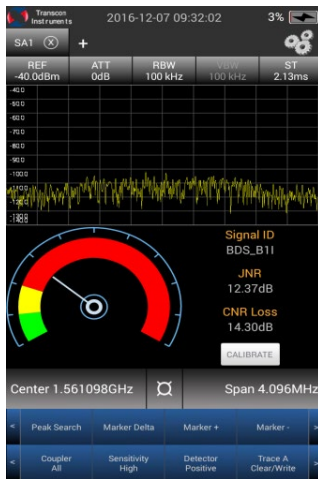
- General spectrum analysis.
- SpecMini has the broadband test function, including frequency test, power test, spurious test, etc.

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 Application

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 1080*720p HD screen, with the brightness adjustable and no influence on parameter readout indoors or outdoors.

Software customization

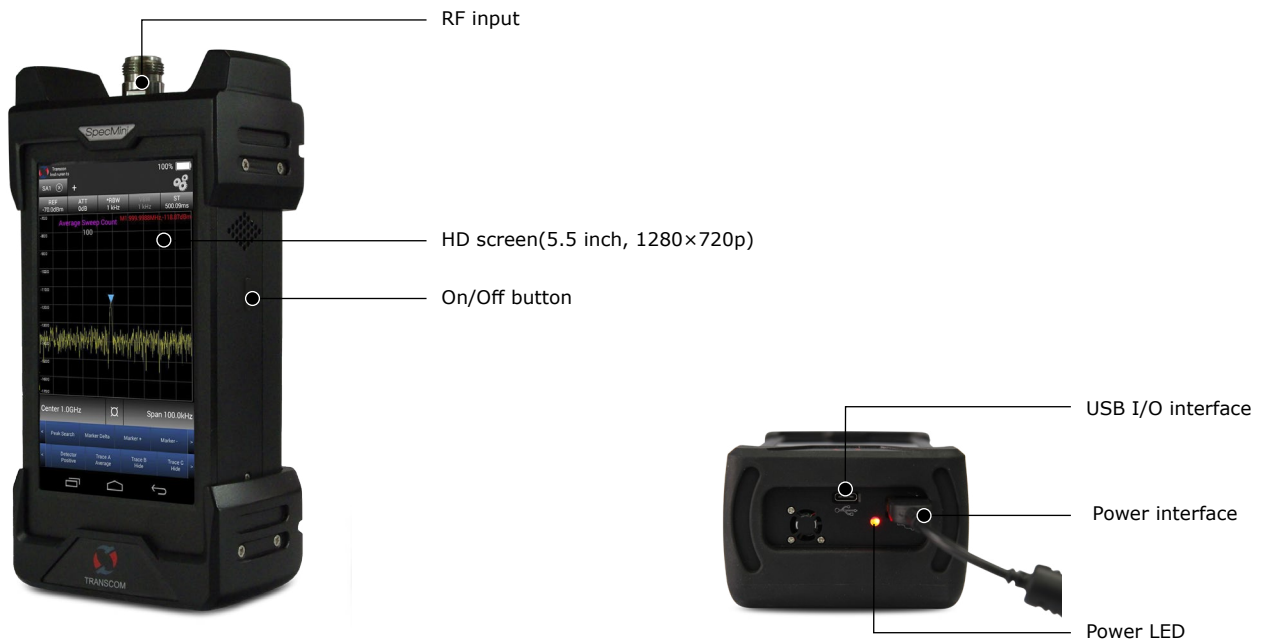
Transcom provides SpecMini-based software customizing services. Variety of application and software can be pre-installed or build in SpecMini as users demanded.

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 Application

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.

Control Elements



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-4.2GHz Freq Slip, Span Zoom (1-2-5-10 series, 4GHz, 4.2GHz)
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 4.2GHz
Frequency reference	Aging rate: ±1ppm
Frequency readout accuracy	± (readout frequency × frequency reference accuracy + RBW centering + 0.5 × horizontal resolution)
Frequency span accuracy	± 1%
Sweep time	1.1ms-1600s 2.69ms-1600s, zero span

Resolution bandwidth	
RBW range	10Hz-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(Low): +30dBm Sensitivity(Medium): 0dBm Sensitivity(High): -20dBm
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 settings auto-coupled, 23±5°C ±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°C . 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~1.285G, 3.22G ~3.7G <-70dBc 1.625G~1.775G <-55dBc 1.285G~1.625G, 1.775G~2.35G, 2.71G~3.22G <-42dBc 3.7G~4.2G <-35dBc 2.35G~2.71G <-25dBc
Second harmonic distortion	1.6GHz -70dBc
Third-order intercept (TOI)	-10dBm tones, 1MHz apart, Sensitivity set 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, DC20V
Display	5.5-inch, 1280*720p
OS	Android
Battery	Type: Lithium-ion Operating time: 6h (nominal, in low sensitivity mode) Charging period: 2.5h (nominal, in OFF mode) 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)

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 °C, 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 °C. 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
T8142	SpecMini handheld spectrum analyzer (10MHz-4,200MHz)
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-2700M omni-directional antenna
SPM-AS011	700MHz-6000M omni-directional antenna
SPM-AS012	700M-4000M directional antenna
Replacement options	
SPM-AS021	11.1V and 6800mAH battery kit

SiteHawk Handheld Cable & Antenna Analyzer



Overview

SiteHawk is the world first hand-held 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. Use of easy-to-operate full-screen touch HMI guarantees its high-precision and repeatable tests can be performed to meet various communication test needs.

Key Facts

- Support wider range of test frequency, i.e. 300kHz-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/°C . 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 has anti-slip rubber protective cover helps to be held more comfortably. With build-in gravity sensor, SiteHawk can be easily operated as a regular cellphone that provide convenient testing environment.

- Powerful battery capability

SiteHawk built-in battery supports 10 hours continuous operation. 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 communication and WIFI communication. Data can be flexibly shared via the built-in large-capacity memory and Internet “cloud” application. Data and cloud server can be synchronized and analyzed. With the built-in GPS function, location information can be recorded and tested, achieving the truly “integrated” test.

- 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.

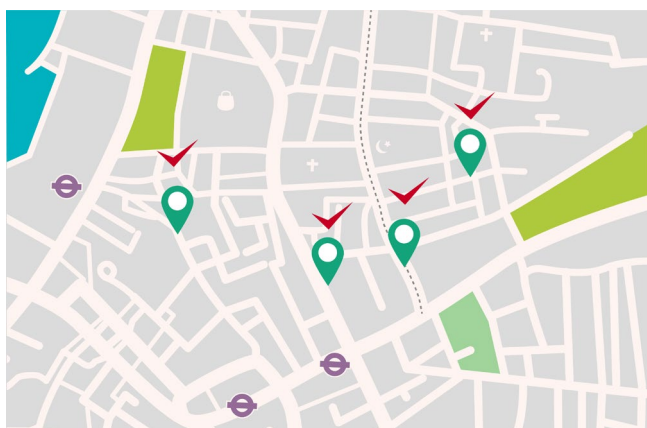
SiteHawk can be installed with multiple professional APPs to achieve various test functions and enhance the extension performance.

- Data synchronization and cloud analysis

With 16GB memory, SiteHawk is able to save thousands of screenshots or traces. Test records can be transmitted by Bluetooth, USB or WIFI cloud to synchronize and analyze data.

- GPS positioning function

GPS option allows test and evaluation become visible. By recording the longitude, latitude, altitude and other location information, wrong analysis and measurement missing of positioning records of the measurement site can be avoided, which ensuring the integrity of engineering test.



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

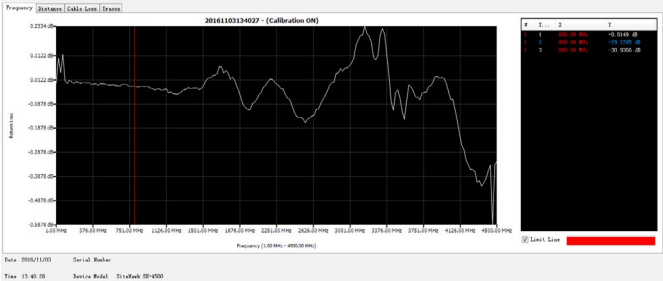
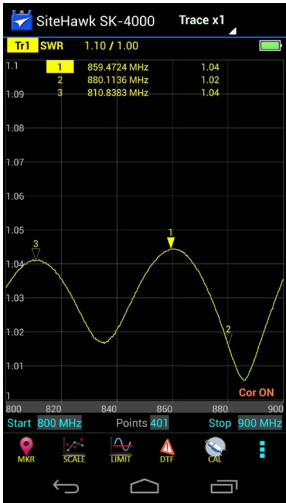
SiteHawk can be used for measuring reflection characteristic parameters based on frequency-domain reflection. Reflection characteristic parameters indicate specific matching of the antenna, feeder and other passive devices/systems. High-accuracy measurement results are shown in the VSWR or return loss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



Specifications

Specifications		
Frequency Range	SK-200-TC SK-4000-TC SK-4500-TC SK-6000-TC	300kHz-200MHz 85MHz-4000MHz 1MHz-4500MHz 20MHz-6000MHz
Frequency Accuracy	$\pm 2.5 \times 10^{-6}$	
Output Power	SK-4000, SK-4500, SK-6000 SK-200	-10dBm -5dBm
Reflect Amplitude Accuracy	-15dB to 0 dB -25dB to -15dB -35dB to -25dB	0.4dB 1.5dB 4.0dB
Trace Noise Magnitude(IFBW 1kHz)	0.02dB rms	
Measurement Speed	1ms/data point.	
Measurement Points	51 to 3201	
Temperature Stability	0.01dB/°F 0.02dB/°C	
Return Loss Measurement Range	0 dB 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,SK-4000-TC SK-4500-TC,SK-6000-TC	Micro USB B,USB 2.0 USB Type-C,USB 3.0
Languages	English,Chinese,Spanish	
Recommended Calibration Interval	3 year	

Dimensions(L×W×H)	SK-4000-TC,SK-200-TC SK-4500-TC , SK-6000-TC	7.2×3.8×1.9(in) 182×95×46.5(mm) 7.7×3.6×2.4(in) 195×90×60(mm)
Weight	1.98(lbs) 0.9(kg)	
Maximum Input Voltage	50V	
Operates In Temperature	14 °F to 131 °F -10°C to +55°C	
Storage Temperature	-40 °F to 176 °F -40°C to +80°C	
Battery Charging Temperature	32 °F to 95 °F 0°C to +35°C	
Storage Capacity	Thousands of Trace and Setups	
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-4000-TC,SK-200-TC SK-4500-TC , SK-6000-TC	4 Hrs Typical Operating Time 10 Hrs Typical Operating Time
Battery Charge Time	5 Hrs for Full Charge	
Power Measurement	Yes	
Compatible With	7020,5012D,5014,5015,5015-EF,5016D,5017D,5018D,5019D	
GPS	SK-4500-TC,SK-6000-TC	

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(5Vdc Output)
7002A218-1	Hard Carrying Case
5A2653-3R5NL4	USB Interface Cable,Power,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(12Vdc Output)
7002A218-2	Hard Carrying Case
SK-TC-MNFN-1M	RF Cable,1 meter long
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

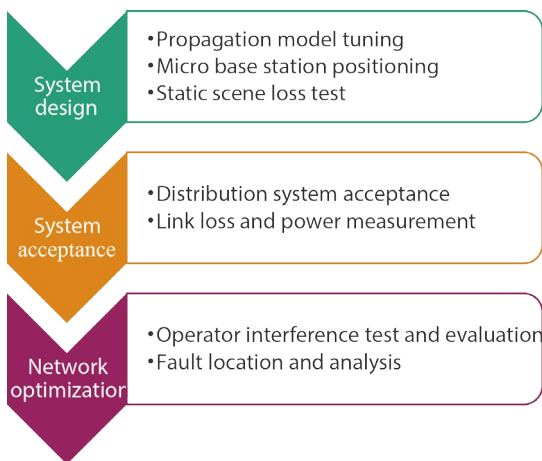
TSP pilot transmitter is a kind of special engineering instrument applicable to emulation and testing of indoor and outdoor signal coverage and evaluation and testing of signal interference. It is mainly used for simulating and outputting CW and modulation signals, i.e. actual pilot signals transmitted 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, WCDMA, LTE, NB-IoT and RoLa 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 WCDMA, 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 RoLa can be configured.
- Large power adjustment range: 0-43dBm (20W) and -10-33 dBm (2W) in the standalone mode, with the step of 0.5dB.
- Wide band: support the 700MHz-2,700MHz 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 (200×60×230 mm) and light weight (2kg). With the external battery, the instrument can continuously work for 5-8h, 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



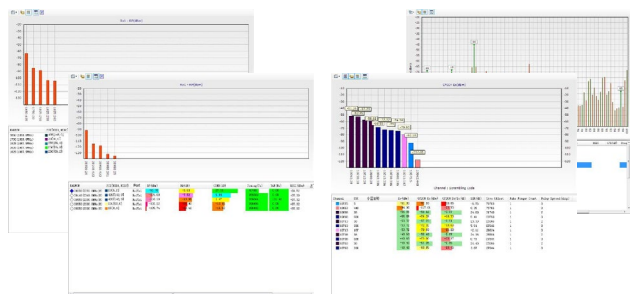
Product features

- Support the signal emulation output of the existing multi-system network and the Internet of Things
- Support terminal test applications
- Large power adjustment range
- 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
- Multi-operator interference evaluation

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.



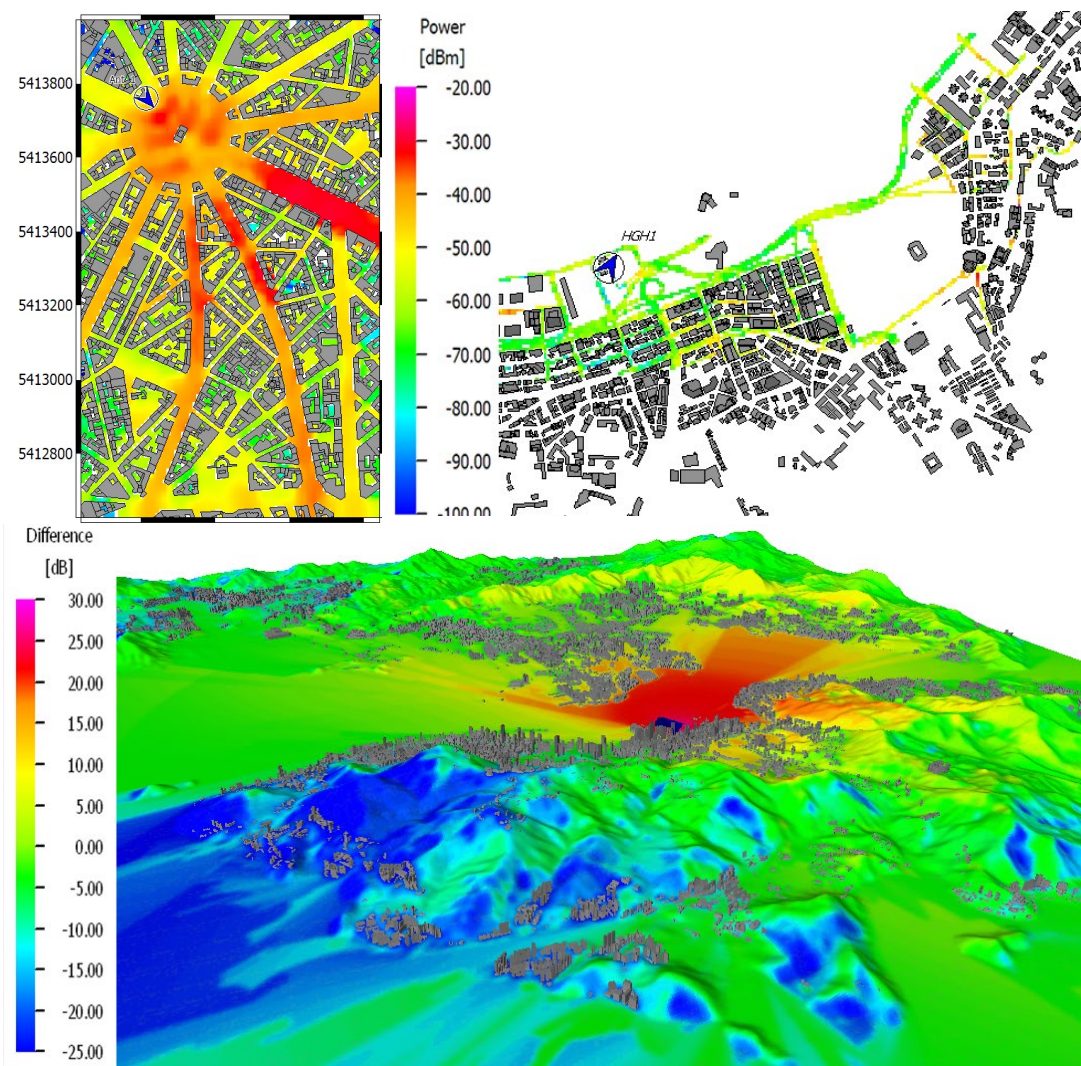
APP remote control and simple deployment

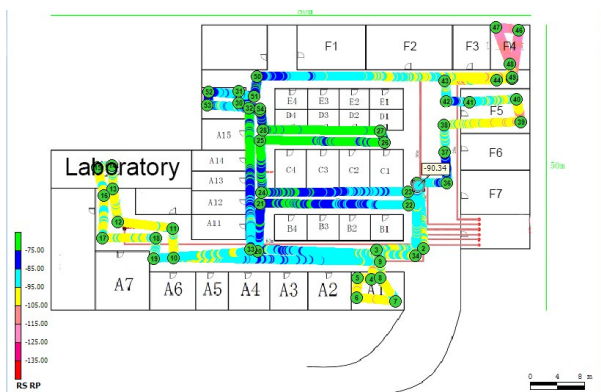
The transmitter is a kind of engineering test instrument, which should be easy to deploy and operate for tests in various scenes. TSP transmitter is controlled by APP within 10m, facilitating remote operation and avoiding radiation injury caused by radio waves in high-power transmission of signals.

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 an 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.

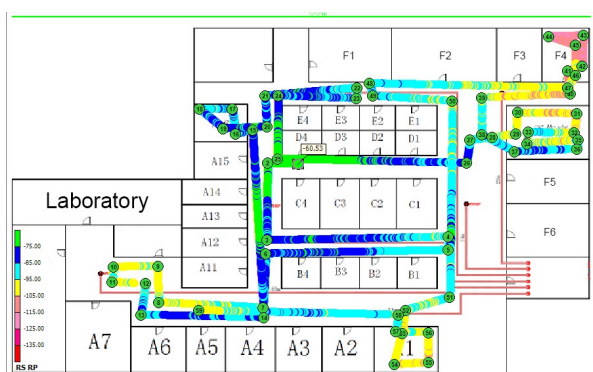




Micro base station Result



CW Result



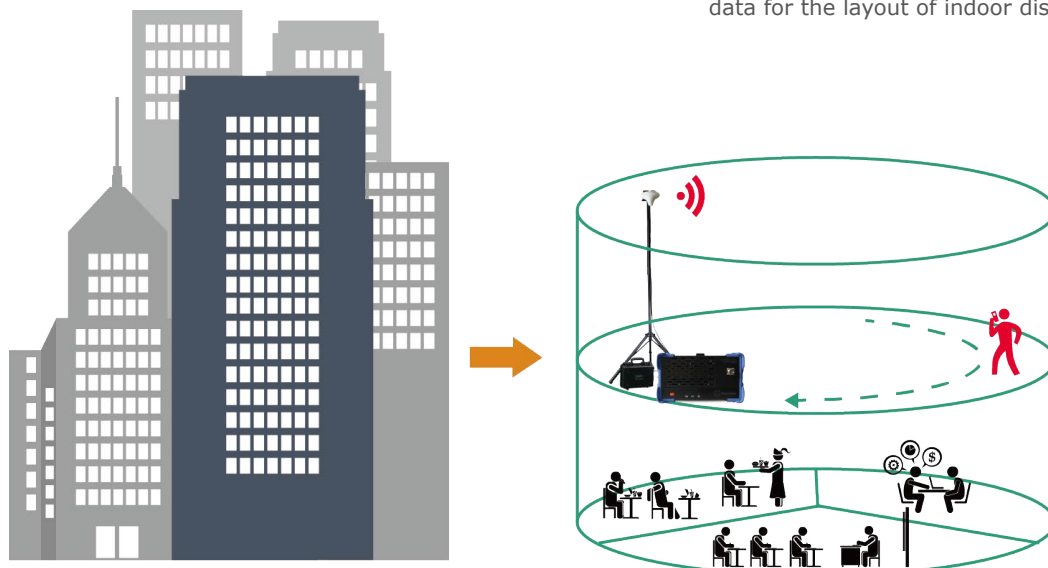
Pilot Result

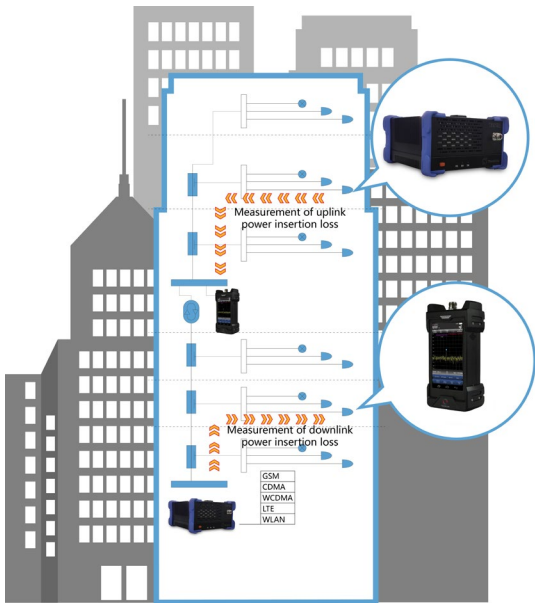
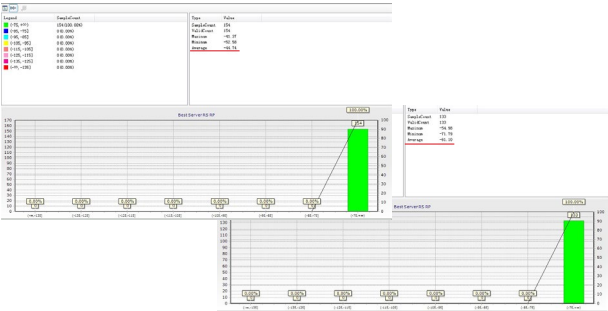
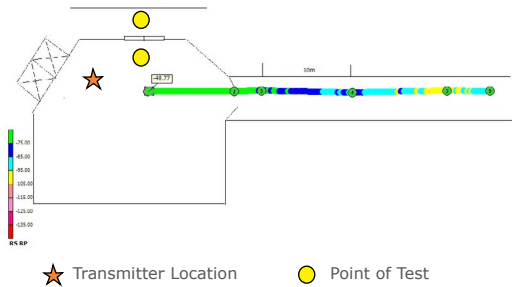
Micro base station planing of indoor distribution system

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 an 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.





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 an 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

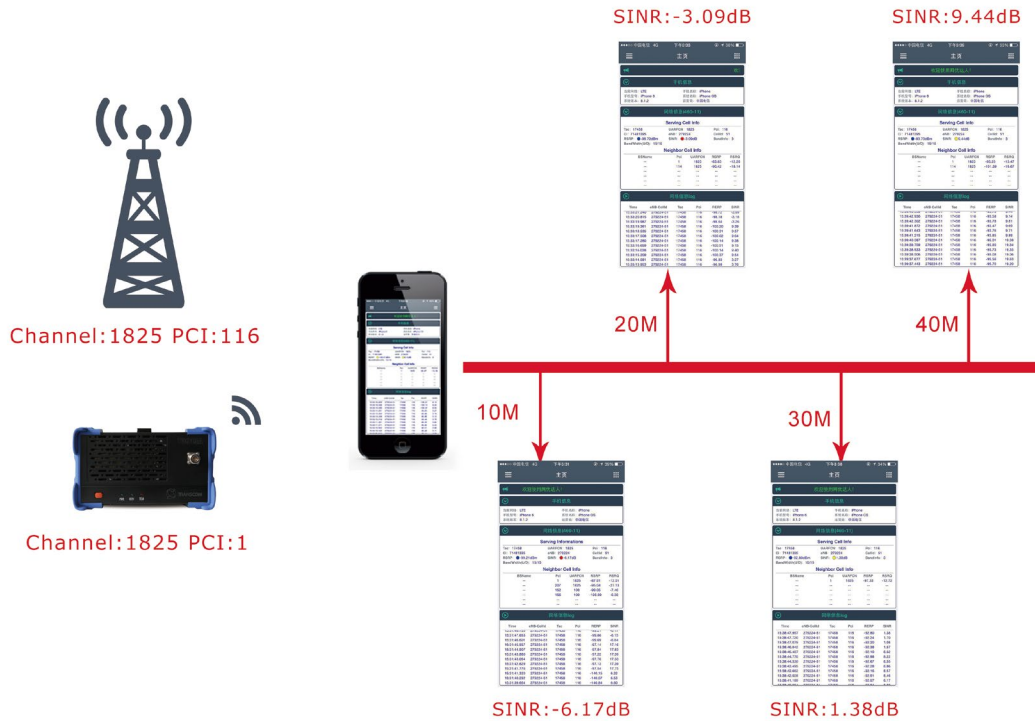
Background: The cable, passive device and ceiling antenna are used as signal transmission parts of the traditional indoor distribution system. The coverage should be verified in acceptance. At the same time, the conformity of the downlink power attenuation, uplink power attenuation and antenna downlink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

Solution: As an 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.



Control Elements



Specifications

Device type	Applicable network system	Frequency step
TSP transmitter (700-2,700 MHz)	GSM CDMA 2000/EVDO WCDMA TD-SCDMA TDD-LTE FDD-LTE NB-IoT LoRa	10 KHz
Electrical Characteristic		
Output power	0dBm to 43dBm (20W); -10dBm to 33dBm (2W)	
Power step	Min. 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 ~ +50°C	
Storage temperature	-40°C ~ +70°C	
Mechanical features		
Dimension	200×110×230 mm (20W)	200×60×230 mm (2W)
Weight	4.5 kg	2kg
RF interface	N-type female connector	N-type female connector
Power supply	220 V AC; 28V DC; max. power consumption: 140W	220 V AC; 28V DC; max. power consumption: 50W
Communication interface	WiFi	WiFi
Certification	CE	CE

Ordering List

Model	Description	
T3919A	TSP transmitter: (700-2,700 MHz) 20W	
T3919AL	TSP transmitter: (700-2,700 MHz) 2W	
Mechanical features	Description	
	(20W transmitter)	(2W transmitter)
TSPT-AS001	5m feeder and N-type connector	N/A
TSPT-AS002	5dBi omni-directional antenna 870-960 MHz	N/A
TSPT-AS003	5dBi omni-directional antenna 1710-1990 MHz	N/A
TSPT-AS004	5dBi omni-directional antenna 2000-2200 MHz	N/A
TSPT-AS005	5dBi omni-directional antenna 2300-2400 MHz	N/A
TSPT-AS006	5dBi omni-directional antenna 2500-2700 MHz	N/A
TSPT-AS007	5dBi omni-directional antenna 3400-3600 MHz	N/A
TSPT-AS008	tripod	N/A
TSPT-AS009	Draw-bar box	N/A
TSPT-AS010		Portable box

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, FDD/TD-TE 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-frequency tests within 2MHz-3GHz.
- Support CW test
- Support simultaneous tests of multi-system and multi-frequency GSM, CDMA/EVDO, TD-SCDMA, WCDMA, TDD-LTE, FDD-LTE signals.

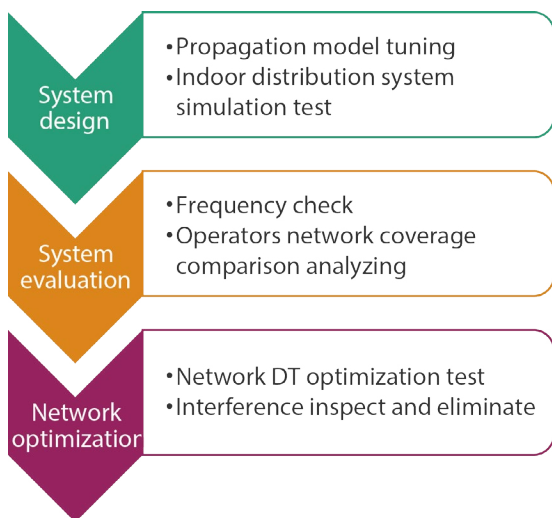
LTE test: reports RSSI, RP, RQ, Timing, CellID and other parameters. The instrument supports MIMO, time slot, RB measurement.

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



Product features

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

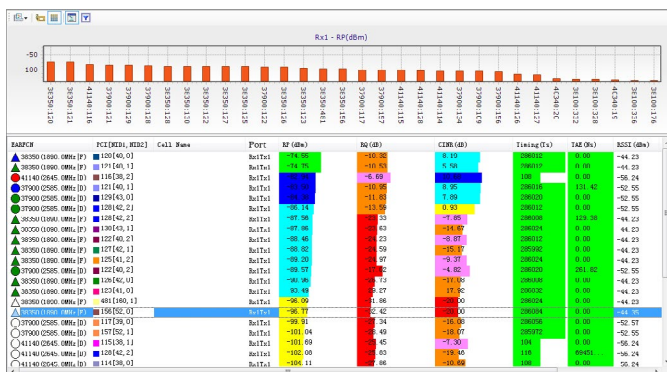
A single TSP Scanner device is applicable to cell demodulation tests of all standard networks and 2MHz-3GHz spectrum tests. Test modes can be freely combined to improving multi-network test efficiency.

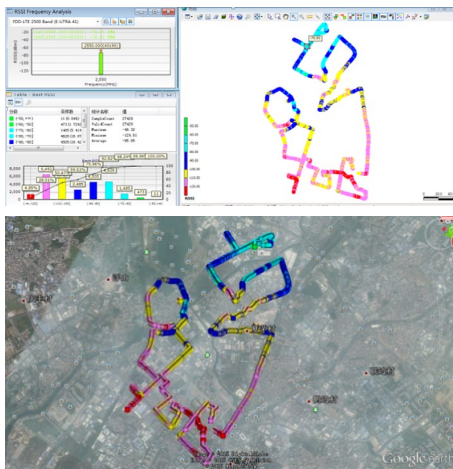
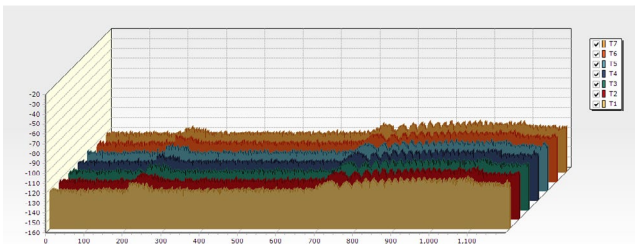
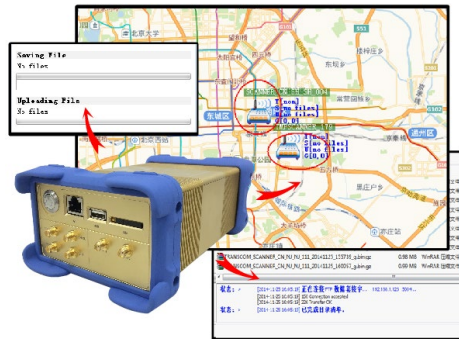
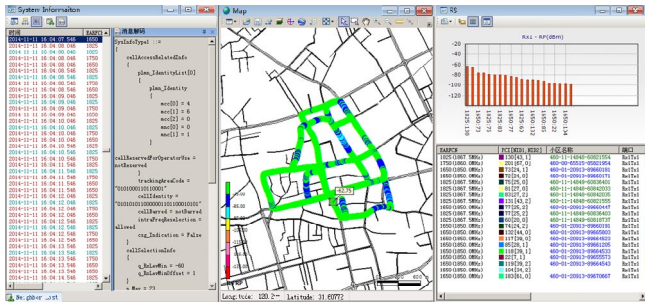
High-speed measurement for various scenes

TSP Scanner has the 100ms-level measurement rate, meeting the dotting requirements of limitations in 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

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. Mass data are subject to centralized processing, facilitating follow-up in-depth digging and intelligent analysis. Potential problems can be predicted.

Uplink time slot interference test

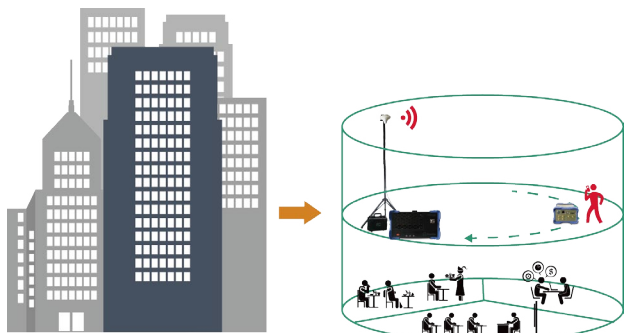
TSP Scanner with the RB measurement is able to check TDD-LTE uplink time slot interference. Without blocking the base station, test is accurate to RB. The RB block in the uplink time slot can be selected to demonstrate spectrum interference.

Typical applications

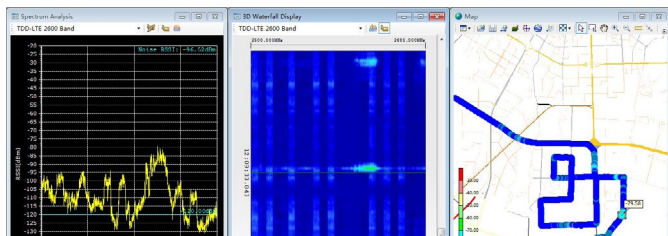
Propagation model tuning

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.

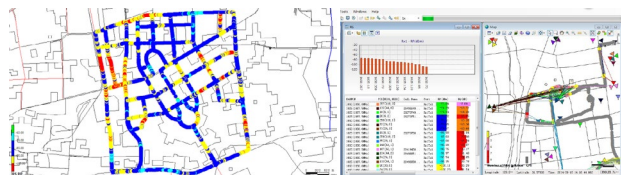
Solutions: TSP Scanner is used for receiving pilot or CW signals from the transmitter, collecting signal parameters including geographic information by DT testing, and importing data into the planning software to adjust model parameters.



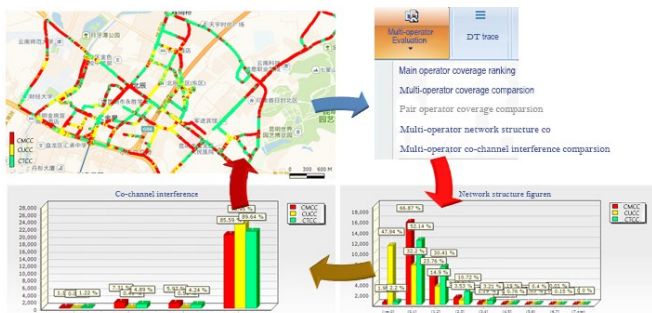
Micro base station planning test



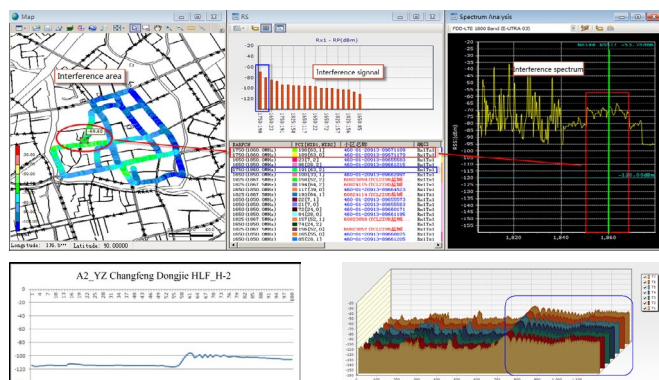
Frequency check



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.

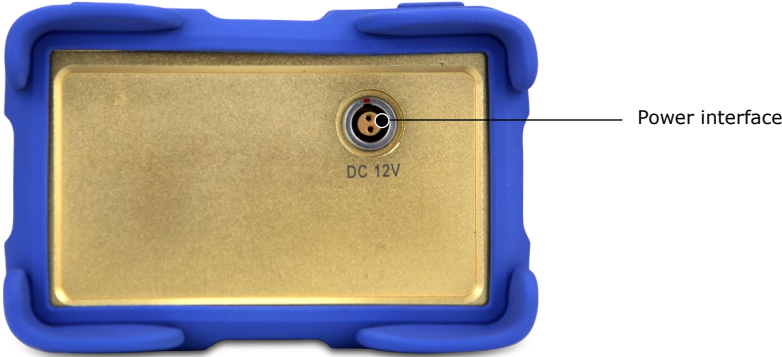
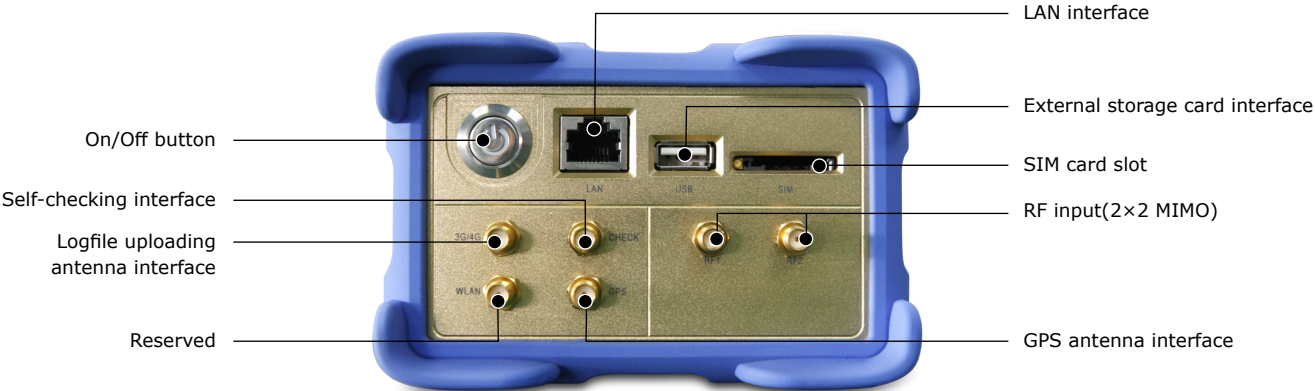
Operators network coverage comparison analyzing

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



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	Io, 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
CDMA	Measurement mode	Top N PN
	Data mode	Ec, Io, 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
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.
	Safety input level	≤ 10 dBm
	Frequency accuracy	± 0.05 ppm (GPS Locked); ± 0.1 ppm (GPS Unlocked)
Physical	Maximum Power (+8 ~ +16 VDC)	24W
	RF Operating Range: In - Band	-15 dBm Max.
	Temperature Range	Operating: 0°C ~ + 50°C; Storage: - 40°C ~ + 85°C
	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 omni-directional antenna 700-2700 MHz
TSPS-AS002	GPS antenna
TSPS-AS003	Data Cable (3m)
TSPS-AS007	Portable box
TSPS-AS008	COEAG USB softdog
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



02

**Manufacturing
& Education**

Micro-Tx Vector Signal Generator Module

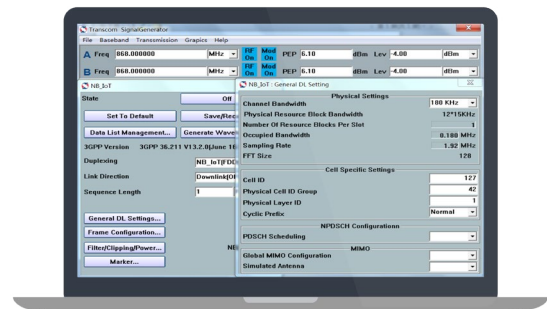
Overview



Micro-Tx vector signal generator module is a high performance vector signal generator. It supports arbitrary wave signal, continuous wave signal, common vector signal, simulation and digital modulation, standard wireless vector signal, standard radio signal and customized signal. Micro-Tx 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. Micro-Tx satisfied most of the signal simulation practices and provided user continues customization services.

Key Facts

- Frequency range: 10MHz~6GHz(up to 9GHz supported in the near future)
- Power coverage: -110~+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/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. Provide API for second-time development



Innovative Features & Benefits

Product features

- Built-in automatic gain control
- Communication signal solution

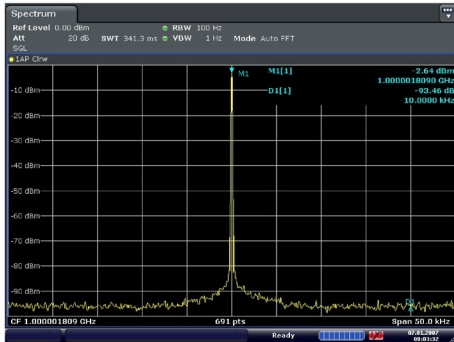
Typical applications

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

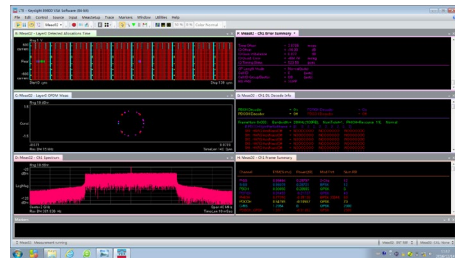
Solution Highlights

Product features

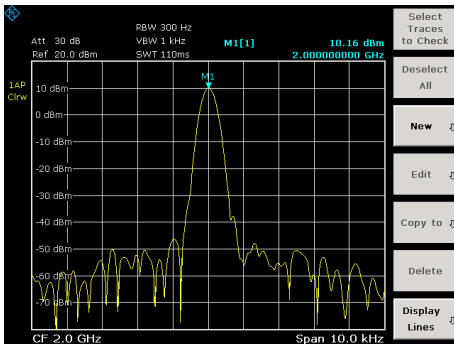
- Built-in high precision reference for ultra high phase noise
- Built-in automatic gain control unit to fulfilled large dynamic range power output
- Support GSM/EDGE/CDMA/TD-SCDMA/WCDMA/CDMA2k/ TD-LTE/FDD-LTE/NB-IoT/LoRa signal generating solution



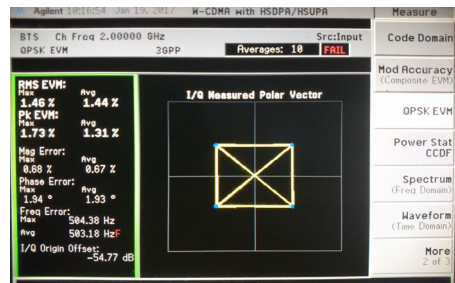
110dBc Phase Noise



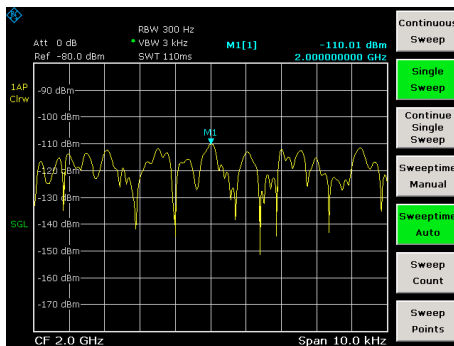
LTE signal



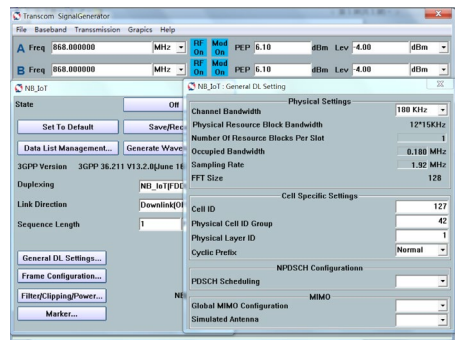
10dBm signal output



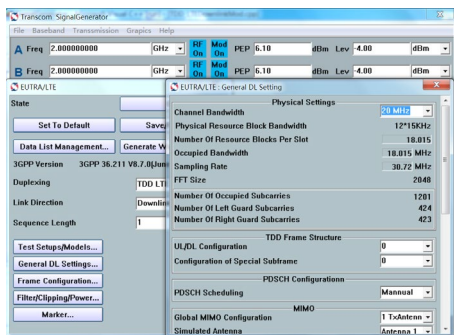
WCDMA signal



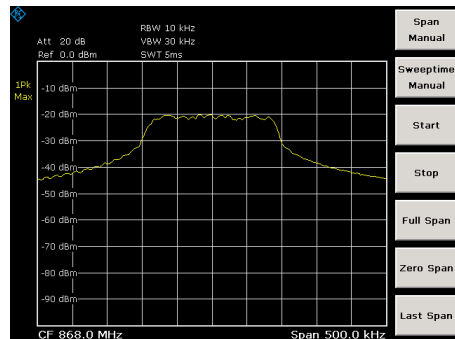
-110dBm Signal output



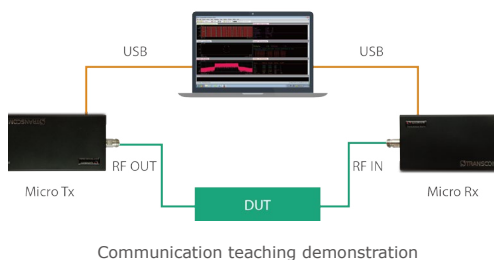
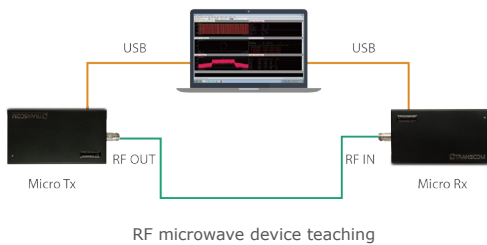
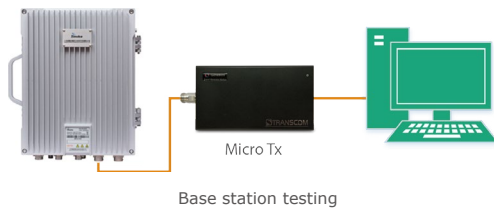
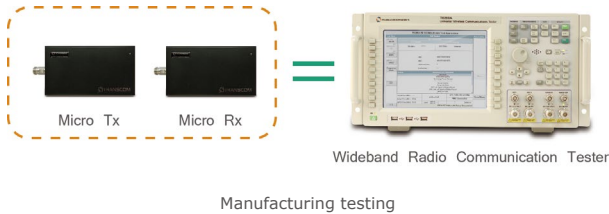
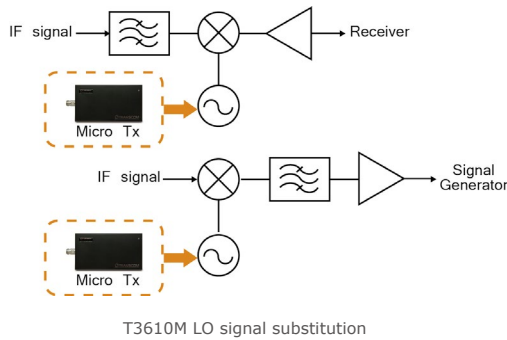
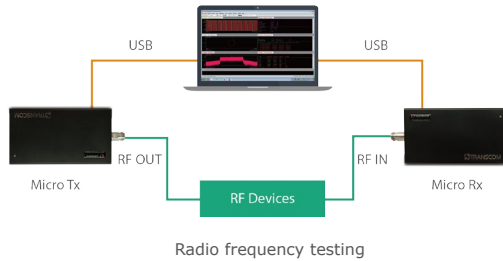
NB-IoT signal output



LTE modulation signal output



NB-IoT signal



Typical applications

Laboratory radio frequency testing

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

Manufacturing testing

Micro-Tx is able to simulating GSM/EDGE/CDMA/TD-SCDMA/WCDMA/CDMA2k/TD-LTE/FDD-LTE/NB-IoT/LoRa standard base station signals to cooperate with production and calibration of UE/chips.

By combining Micro-Tx signal source module with Micro-Rx vector signal generator module, it provides base station consistency and function testing.

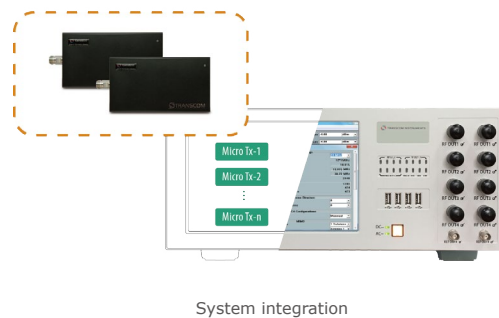
Educational practices

By combining Micro-Tx signal source module with Micro-Rx vector signal generator module, it also provides RF microwave device testing demonstration to reduce the complexity of professional teaching.

Micro-Tx 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

Micro-Tx 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, Micro-Tx can be used as large scale 5G antenna testing.



Control Elements



Specifications

Technical	
Frequency Range	10MHz~6GHz
Frequency Solution	0.1Hz
Frequency-temperature Stability	±1ppm
Initial frequency accuracy	±0.5ppm
Amplitude Range	-110~+10dBm
Amplitude Solution	0.1dB
Amplitude accuracy	±0.5dB
Harmonic	≤-30dBc
Spurious	≤-55dBc
SSB Phase Noise	≤-100dBc/Hz@10kHz(6GHz)
Modulation bandwidth	20MHz (can scale to 40MHz)
Modulation Type	Analog, Vector, Pulse
Pulse modulation parameters	pulse width: 100ns~1s, repetition rate: 1Hz~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 p	>0.9999
Others	
Power Supply Voltage	12V DC
Power Supply Current	2A MAX
communication interface	USB type-C
Provide API	Support second-time development
Dimension	190×93×32(mm)

Ordering List

Model	Description
T3610M	Micro-Tx vector signal generator module
Accessories Model	Description
MTX-AS001	power adapter
MTX-AS002	USB cable
Options	
MTX-S001	GSM License
MTX-S002	WCDMA License
MTX-S003	TDD-LTE License
MTX-S004	FDD-LTE License
MTX-S005	NB-IoT License
MTX-S006	LoRa License

Micro-Rx Signal Analyzer Module

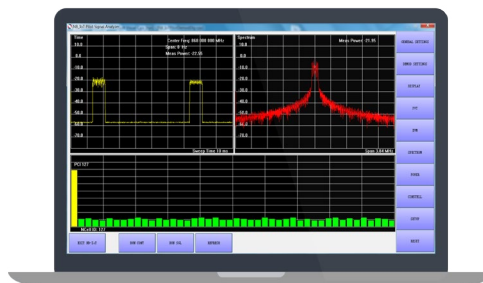
Overview



Micro-Rx designed with a small shape which allow it to be easily integrate to any instrument. With excellent testing performance and measurement sensitiveness, Micro-Rx suits the testing requirement of the majority of RF signals. Micro-Rx satisfy the needs of general spectrum test, and further secondary development is also allowed based on the API function library.

Key Facts

- Frequency range: 10MHz-4200MHz
- DANL: -168 dBm @1GHz (Sensitivity set to High, normalized to 1Hz)
- Resolution bandwidth: 10Hz-5MHz
- Signal storage depth of 1Gbit for signal capture and analysis
- Small (193mm×93mm×34mm), lightweight (only 0.8kg), and easy to carry.
- Provide API function library to support secondary development.



Innovative Features & Benefits

Product features

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

Typical applications

General test in laboratory, factory, school, etc.

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

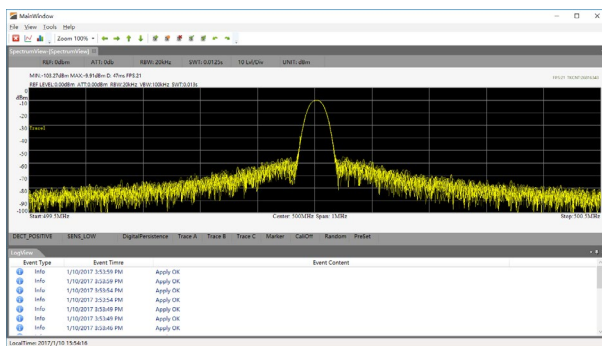
System integration

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

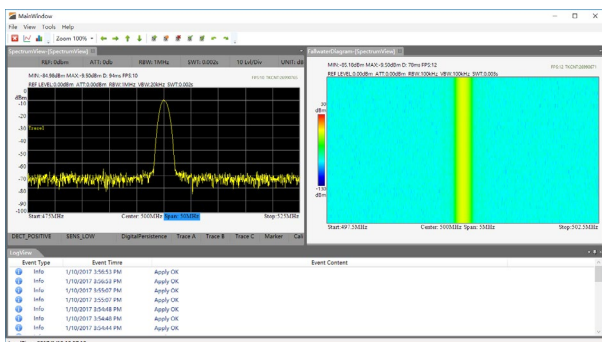
Radio fans

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

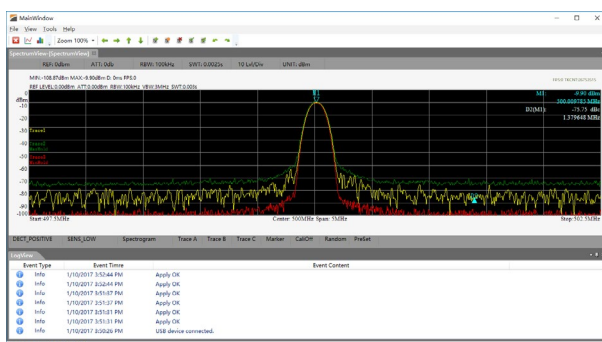
Solution Highlights



General spectrum analysis.



Display in waterfall plot



Easy installation and set-up

General test in laboratory, factory, school, etc.

General spectrum analysis

Micro-Rx has the broadband spectrum test function, including frequency test, power test, stray test, etc.

Display in waterfall plot

Waterfall plot test facilitating testing, observation and analysis.

Easy installation and set-up

Micro-Rx 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

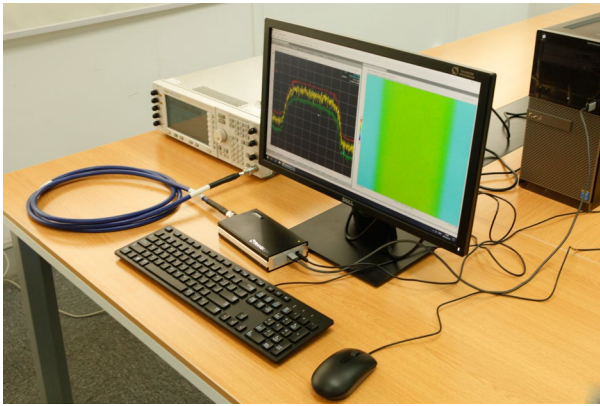
Integrated Micro-Rx can directly provides the broadband spectrum test results for the integrated system to analyze the spectrum.

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

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

Facilitate testing

Spectral analysis and test can be done with just one computer, one Micro-Rx 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 user's NB-IoT transmission ending test.

- Support NB-IoT test
- Optional software

Control Elements



Specifications

Function	
Sensitivity	Low, Medium and High
Frequency	
Frequency range	10MHz to 4.2GHz
Frequency reference	Aging rate: ±1ppm
Frequency readout accuracy:	± (readout frequency × frequency reference accuracy + RBW centering + 0.5 × horizontal resolution)
Frequency span accuracy	±1%
Sweep time	1.1ms-1600s 2.69ms-1600s, zero span
Resolution bandwidth	
RBW range	10Hz-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 ~ +20dBm -190dBm ~ +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 settings auto-coupled, 23±5°C 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°C . 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~1.285G, 3.22G ~3.7G <-70dBc 1.625G~1.775G <-55dBc 1.285G~1.625G, 1.775G~2.35G, 2.71G~3.22G <-42dBc 3.7G~4.2G <-35dBc 2.35G~2.71G <-25dBc
Second harmonic distortion	1.6GHz -70dBc
Third-order intercept (TOI)	-10dBm tones, 1MHz apart, Sensitivity set 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

General	
OS	windowsXp and windows7
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	193mm×93mm×34mm
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 °C, 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 °C. 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
T8142-M	Micro-Rx signal analyzer module (10MHz-4200MHz)
Accessories Model	Description
MRX-AS001	Power adapter
MRX-AS002	Power cable(China standard)
MRX-AS003	Power cable(US standard)
MRX-AS004	USB drive
Options	
MRX-S001	NB-IoT analysis software

T5845A Matrix Vector Network Analyzer

Overview



T5845A 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.

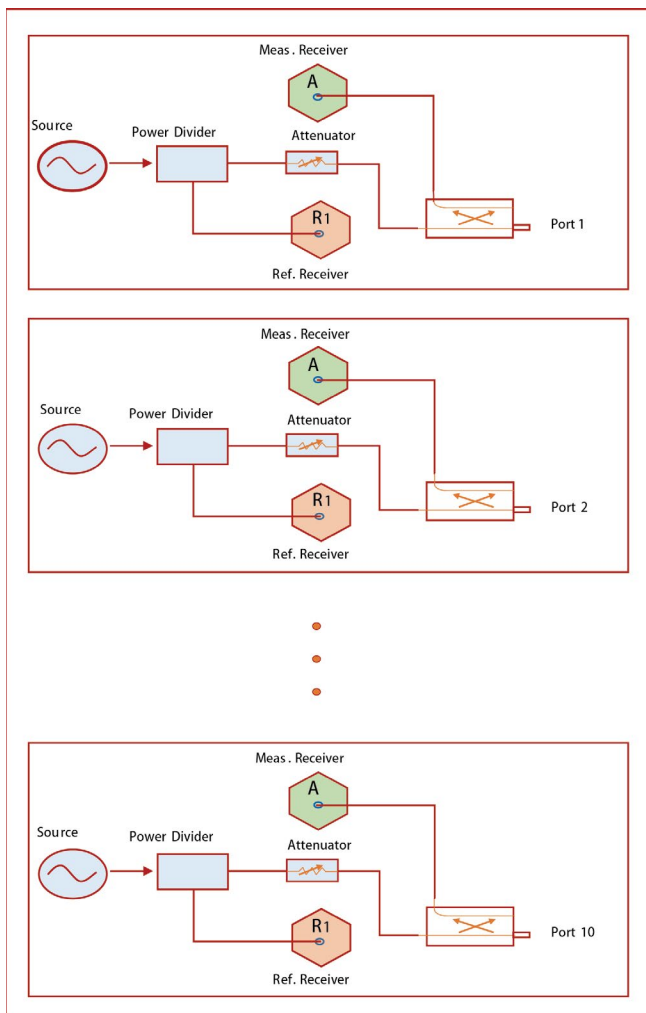
Key Facts

- Frequency range: 300kHz ~ 4.5GHz
- Number of test ports: 2-port basic unit (2~10 ports to be selected arbitrarily)
- Dynamic range: >120dB (IFBW 10Hz) typ. 123dB
- Power range: -50~+10dBm
- Power accuracy: ± 1.0 dBm
- IF bandwidths: 10Hz~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

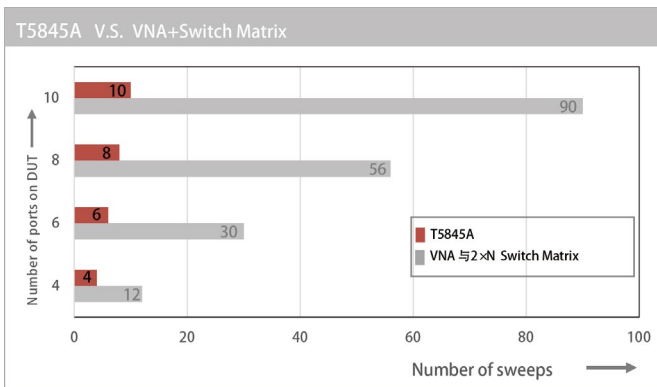
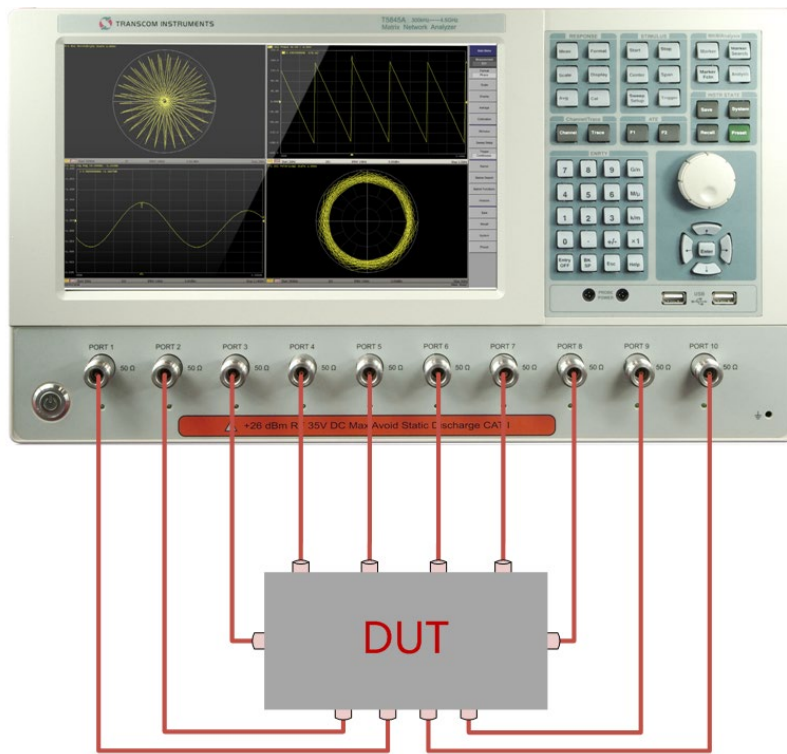
- Real Multiport Network Analyzer
- Multiport all S-parameters Measurement
- Multi-DUT Measurement

Solution Highlights



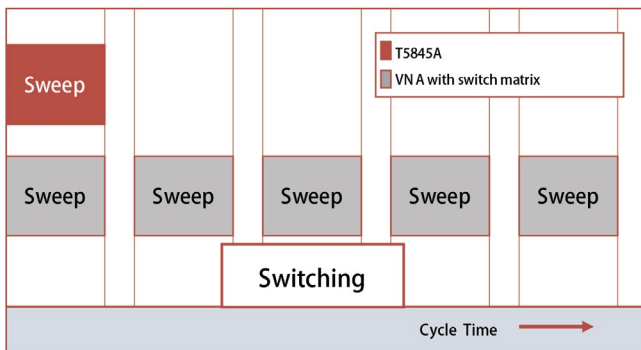
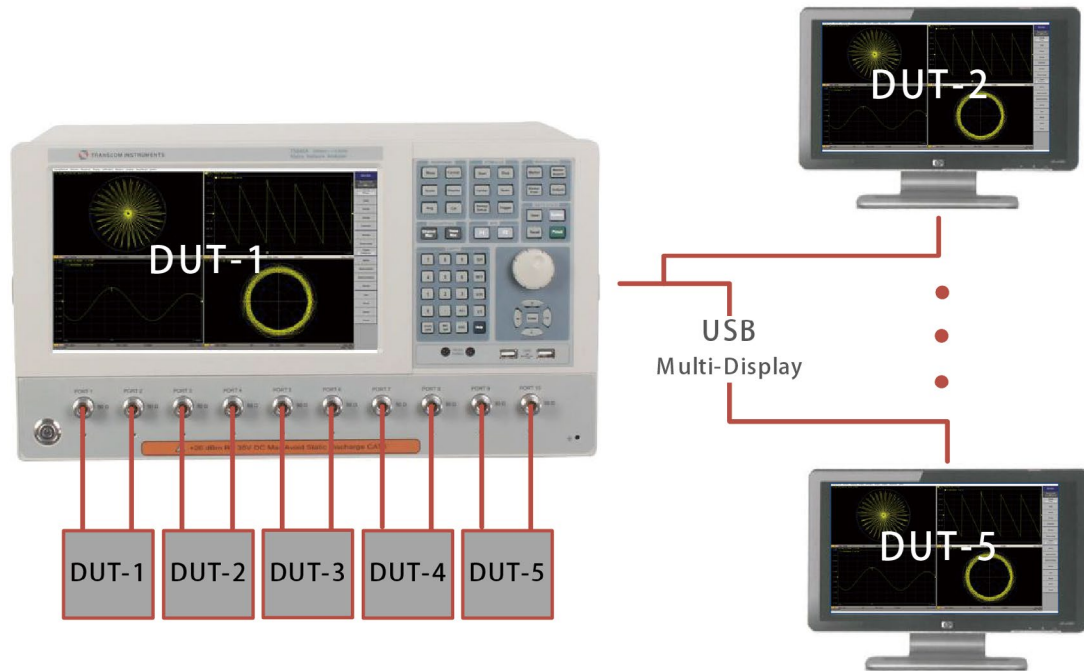
• Real Multiport Network Analyzer

T5845A 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.



• **Multiport all S-parameters Measurement**

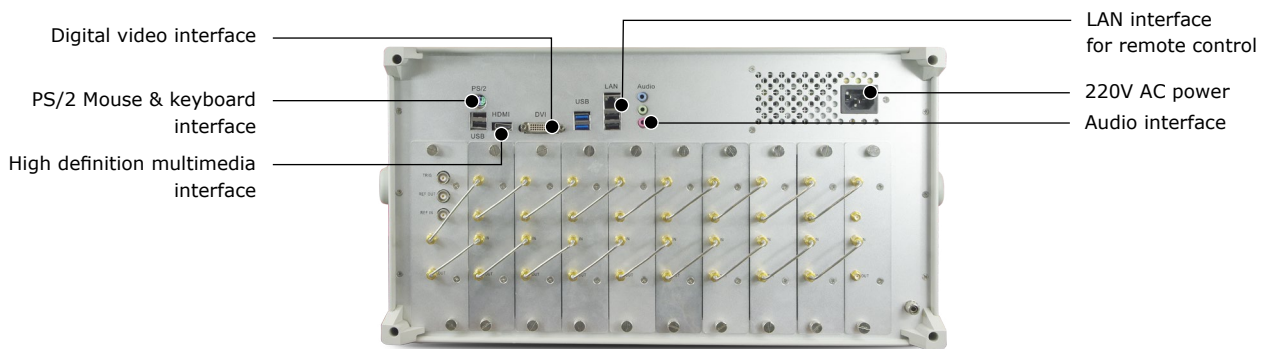
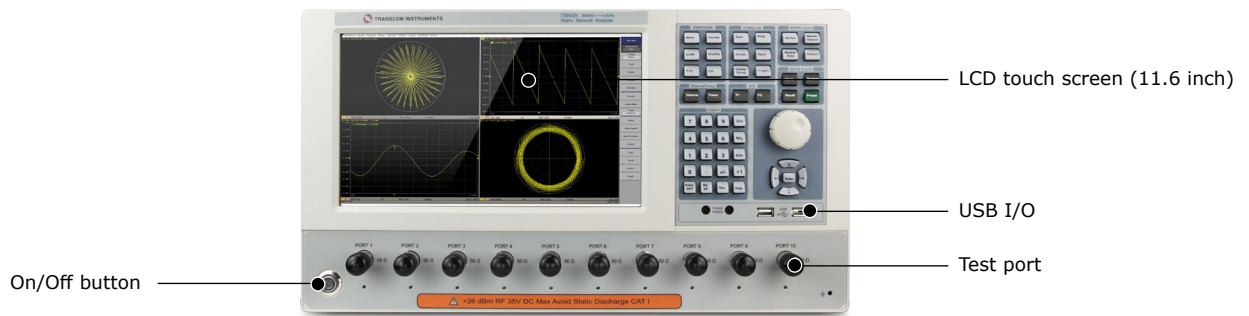
Compared to conventional multiport test scheme of VNA+matrix switch, T5845A not only eliminates the insertion loss between test port and receiver, but also eliminates the sweep test required for multiport DUT test, and thereby greatly shortens test time. With parallel signal acquisition and processing mechanism, T5845A 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, T5845A supports synchronous test of DUTs. Each DUT has its own test interface to achieve completely parallel operation. Therefore, the “multi-purpose” functions of T5845A are achieved without losing stability, accuracy and repeatability.

Control Elements



Specifications

Basic Parameter	
Frequency range	300kHz ~ 4.5GHz
Impedance	50Ω, 75Ω ¹
Test port connector	N-Type, Female
Number of test	1 ~ 10
IF bandwidth	10Hz ~ 100kHz
Dynamic range	IFBW 3kHz: 300kHz ~ 10MHz : 80dB; 10MHz ~ 4.5GHz : 95dB IFBW 10Hz: 300kHz ~ 10MHz : 105dB; 10MHz ~ 4.5GHz : 123dB
Frequency accuracy	5.0 ppm

¹75Ω CONNECTOR VIA ADAPTERS

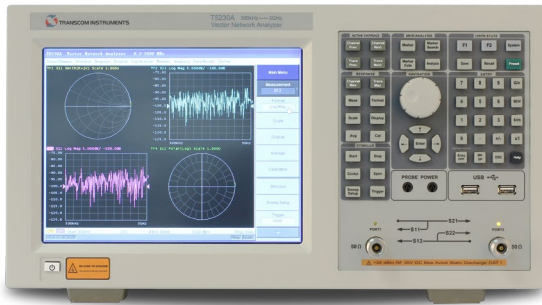
Effective Data	
Effective directivity	45 dB
Effective source match	40 dB

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 ~ +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 ~ 4.5GHz
Input connector type	50Ω, 75Ω ²
Input reference connector type	N-Type, Female
Output reference connector type	1 ~ 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 ~ +40°C
Storage temperature range	-45°C ~ +60 °C
Humidity	90% (22°C)
Atmospheric pressure	84 ~ 106.7kPa
Calibration interval	3year
Power supply	220±22V (AC) , 50Hz
Damage voltage on port	+26dBm, ±35V (DC)
Power consumption	260W
Dimensions (W*H*D) mm	470*257*360
Weight	22kg

Ordering List

Model	Description
Host machine	
T5845A-P02	2 Ports Matrix Vector Network Analyzer
T5845A-P03	3 Ports Matrix Vector Network Analyzer
T5845A-P04	4 Ports Matrix Vector Network Analyzer
T5845A-P05	5 Ports Matrix Vector Network Analyzer
T5845A-P06	6 Ports Matrix Vector Network Analyzer
T5845A-P07	7 Ports Matrix Vector Network Analyzer
T5845A-P08	8 Ports Matrix Vector Network Analyzer
T5845A-P09	9 Ports Matrix Vector Network Analyzer
T5845A-P10	10 Ports Matrix Vector Network Analyzer
Calibration kits	
5301N50	High-precision 3G/50Ω/N calibration kits (8 Nos.)
5601N50	High-precision 6G/50Ω/N calibration 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

T5000 Series Bench-top Vector Network Analyzer

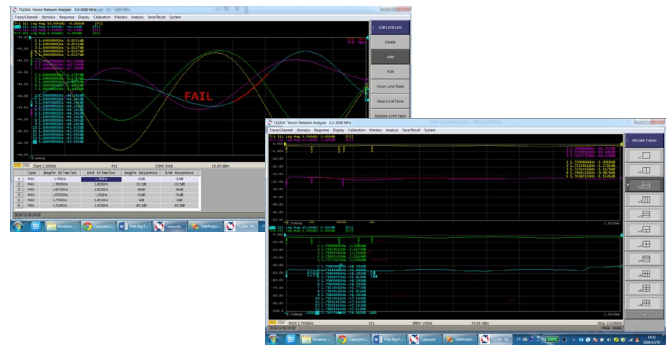


Overview

T5000 Series bench-top vector network analyzer offers the high RF performance, wide frequency range and versatile functions. The T5000 series 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~1.3GHz/3GHz/8GHz (T5113A/ T5230A/ T5280A) 100kHz~8GHz (T5480)
- 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 μ s/point (IFBW=30 kHz)
- High Effective Directivity: >45 dB
- Remote Control: LAN/GPIB/USB
- Very Low Power Consumption: 60W
- “One-Key-Test” Solution

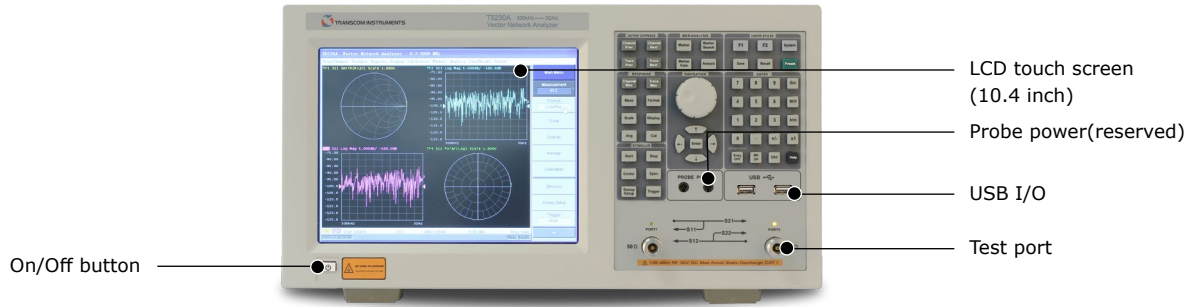


Innovative Features & Benefits



- Multiple analysis options
- Design of efficient communication interface for multi-types testing instruments
- Simplified testing manipulation

Control Elements



Specifications

Measurement Range												
Product Model	T5480A			T5280A			T5230A			T5113A		
Impedance	50Ω			50Ω			50Ω, 75Ω ¹			50Ω, 75Ω ¹		
Test Port Connector	N-type, female											
Number of Test Ports	4			2								
Frequency range	100kHz~8.0GHz			300kHz~8.0GHz			300kHz ~ 3.0GHz			300kHz~1.3GHz		
Full CW Frequency Accuracy	±5×10-6											
Frequency Resolution	1Hz											
Number of Measurement Points	2 ~ 10001									2 ~ 1601		
Measurement Bandwidths	1Hz to 30kHz (in 1 / 1.5 / 2 / 3 / 5 / 7 steps)									1Hz to 30kHz (in 1 / 3 steps)		
Dynamic Range	115 dB, typ. 125 dB (100kHz~300kHz) 135 dB, typ. 140 dB (300kHz~8GHz)			125dB, typ.130dB								
Measurement Parameters	S11, S21, S31, S41, S12, S22, S32, S42, S13, S23, S33, S43, S14, S24, S34, S44			S11, S21, S12, S22			S11, S21, S12, S22			S11, S21		

¹ Use 75 connector via adapter

Effective System Data ¹												
Product Model	T5480A			T5280A			T5230A			T5113A		
Effective Directivity	46			45 dB								
Effective Source Match	40			40 dB								
Effective Load Match	46			45 dB						NA		

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	T5480A			T5280A			T5230A			T5113A		
Accuracy of Transmission Measurements (magnitude / phase)												
+5dB to +15dB				0.2dB/2°						0.2dB/2° (+10dB to +13dB)		
-50dB to +5dB				0.1dB/1°						0.1dB/1° (-50dB to +10dB)		
-70dB to -50dB	1.5 dB/10°(100kHz~300kHz) 0.2dB/2°(300kHz~8GHz)						0.2dB/2°					
-90dB to -70dB	1.0dB/6°(300kHz~8GHz)						1.0dB/6°					
Accuracy of Reflection Measurements (magnitude / phase)												
-15dB to 0dB							0.4dB/3°					
-25dB to -15dB	1.0dB/6°						1.0dB/6°			1.5 dB/7°		
-35dB to -25dB	3.0dB/20°						3.0dB/20°			4.0 dB/22°		
Trace stability												
Trace Noise Magnitude (IF bandwidth 3 kHz)	1mdBrms (100kHz~300kHz) 1mdBrms (300kHz~8GHz)						1mdB rms			2 mdB rms		
Temperature Dependence (per one degree of temperature variation)							0.02dB					

Measurement Speed													
Product Model	T5048A			T5280A			T5230A			T5113A			
Measurement Time Per Point	100ms						125ms			150 ms			
Source to Receiver Port Switchover Time	< 10ms						< 10ms			NA			
Typical Cycle Times Versus Number of Measurement Points (IFBW 30kHz)	51	201	401	1601	51	201	401	1601	51	201	401	1601	
One-Path Two-Port Calibration (300kHz~1.3GHz)				NA						9ms	31ms	60ms	235ms

Uncorrected (300kHz~10MHz)	13.1ms	51.3ms	102.3ms	408.3ms	13ms	52ms	104ms	413ms	NA
Full Two-Port Calibration (300kHz~10MHz)	45.5ms	122.0ms	230.5ms	840.5ms	46ms	123ms	226ms	844ms	NA
Uncorrected (10MHz~3GHz/8GHz)	6.5ms	21.1ms	40.5ms	157.7ms	7ms	27ms	53ms	207ms	NA
Full Two-Port Calibration (10MHz~3GHz/8GHz)	32.4ms	61.7ms	100.3ms	333.0ms	34ms	73ms	125ms	434ms	NA

Test Port Output

Product Model	T5480A	T5280A	T5230A	T5113A
Match (W/O System Error Correction)	18dB		15dB	20dB
Power Range				
300kHz~1.3GHz/3GHz/6GHz	-60dBm to +10dBm (100kHz~6GHz)	-60dBm to +10dBm	-55dBm to +10dBm	-55 dBm to +3 dBm
6GHz~8GHz	-60dBm to +5dBm	-60dBm to +5dBm	NA	NA
Power Accuracy	±1.5 dB	±1.5dB	±1.0dB	±1.5 dB
Power Resolution	0.05dB			

Test Port Input

Product Model	T5480A	T5280A	T5230A	T5113A
Match (W/O System Error Correction)	18 dB		25dB	30dB
Damage Level	+26dBm			
Damage DC Voltage	+35V			
Noise Level (IF Bandwidth 10 Hz)	-105dBm(100kHz~300kHz) -125dBm (300kHz~8GHz)	< -125dBm	< -120dBm	< -127dBm

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 ± 3 dB (T5480A) BNC female; 10 MHz; 2 dBm ± 2 dB (T5280A/T5230A/T5113A)
External Reference Output	BNC female; 10 MHz; 3 dBm ± 2 dB (T5480A) BNC female; 10 MHz; 2 dBm ± 2 dB (T5280A/T5230A/T5113A)
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 ~ +40°C
Storage Temperature Range	-45°C ~ +55°C
Humidity	90% (25°C)
Atmospheric Pressure	84 to 106.7 kPa
Calibration Interval	3 yr
Power Supply	220 ± 22 V (AC), 50 Hz
Power Consumption	60W
Dimensions (W × H × D) mm	440 × 231 × 360
Weight	13kg(T5480A) 12.5 kg (T5280A/T5230A) 10kg (T5113A)

Ordering List

Model	Description
T5113A	2 Ports 300kHz~1.3GHz Vector Network Analyzer
T5230A	2 Ports 300kHz~3GHz Vector Network Analyzer
T5280A	2 Ports 300kHz~8GHz Vector Network Analyzer
T5480A	4 Ports 300kHz~8GHz Vector Network Analyzer

Pathrrot LTE-Hi Channel Emulator



Overview

Pathrrot LTE-Hi channel emulator is the latest wireless measurement instrument launched by Transcom, which is oriented to TD-LTE indoor channel emulation. It supports 4x4 channel model at most. It is characterized by small size, rich models and excellent RF metrics, and applicable to outfield signal emulation or testing in an indoor environment.

The MIMO technology is widely applied in various wireless standards, including WLAN / Wi-Fi, WiMAX, WCDMA, TD-SCDMA and LTE. Corresponding channel models are specified in these wireless standards. In 3GPP 802.11/802.16 and future 5G system standards, some channel models are defined thoroughly, including 3GPP SCM and SMCE. As MIMO channel modeling technology moves on, new models will be introduced as well. Pathrrot LTE-Hi channel emulator supports general channel models, especially those defined in broadband communication standards. With the third-party model interface, it supports loading of user-defined models. For the indoor environment, 3GPP proposed the LTE-Hi (LTE Hotspot/indoor) technology in Release12 (R12) in September 2012. LTE-Hi adopts 2x2 MIMO small base stations to meet hotspot and indoor coverage needs. Generally, LTE-Hi, derived from LTE, is developed to meet hotspot coverage needs. LTE-Hi is characterized by higher rate, lower cost, higher frequency efficiency, controllability, etc. At present, the whole industry, including operators and manufacturers is making efforts to promote LTE-Hi applications. The latest Pathrrot LTE-Hi channel emulator launched by Transcom is dedicated to LTE-Hi indoor emulation and it greatly improves test efficiency. It is a test instrument with excellent performance.

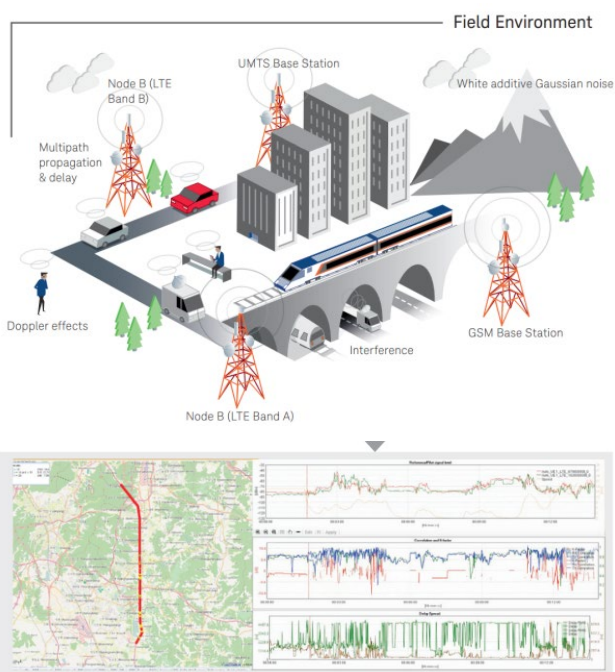
Key Facts

- Use the QT graphic user interface, support touch screen and provide excellent interaction experience.
- Support the RF frequency range 500MHz-4GHz, input power from -50dBm to 15dBm and output power from -100dBm to -10dBm. Have excellent performance, wide dynamic range and high precision.
- Support general channel models such as constant, Rayleigh and Rice. Other optional broadband wireless communication channel models are supported.
- The patented technology supports bidirectional signal emulation.
- Two or more instruments can be cascaded to enhance the extension capability.
- With open interfaces, support user-defined channel models.

Innovative Features & Benefits

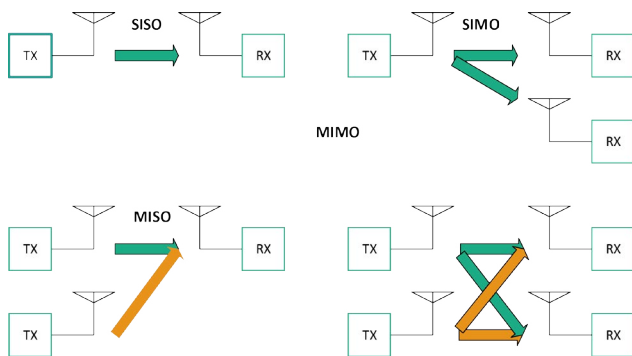


- This instrument is applicable to end-to-end performance tests of wireless device and network infrastructure, without the need of field testing. The test environment can be built indoors to truly simulate field channel characteristics.
- Simulate the characteristics of actual wireless channels in laboratory to improve the quality of wireless device and network infrastructure. Fully demonstrate the influence of channels on the receiving and transmitting performance of terminals or base station equipment, and add reference indicators to improve equipment quality.
- Enhance user experience of operating the RF attenuation simulator, which creates the vivid propagation environment. This instrument is applicable to indoor building of field emulation environment, providing an excellent system software and hardware platform to verify the model algorithm.
- Simulate wireless channel characteristics, including the path loss, multi-path fading, delay spreading, Doppler spreading, polarization, relevance and spatial parameters with significant influence on the performance of MIMO system.
- Simulate the vivid interference scene involving fading, and provide AWGN and single-tone interference signals.

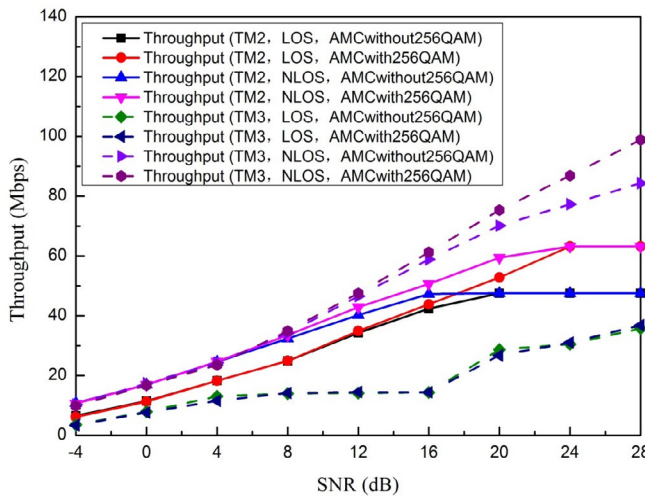


Real world wireless propagation in laboratory

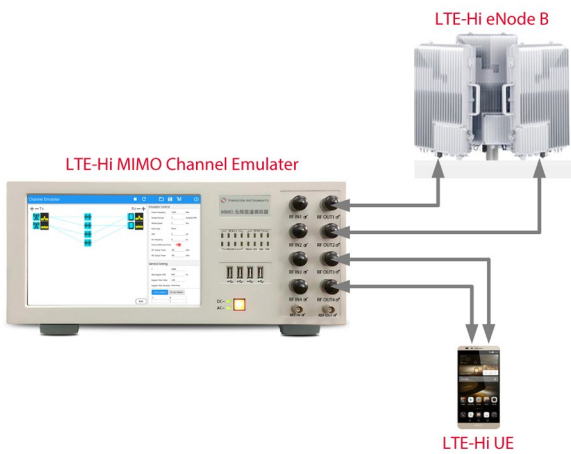
Solution highlights



- This instrument is dedicated to emulation of MIMO channel propagation environment for the wireless communication system, to provide quantitative indicators for the MIMO performance test. By using MIMO technology, higher data rates can be achieved due to high spectral efficiency. Since the performance of the wireless system can be greatly improved by MIMO technology, a number of standard committees have applied or are considering the application of MIMO or multi-antenna technology. For example, the ITU (International Telecommunication Union) has integrated MIMO technology in the HSDPA (High Speed Downlink Packet Access) channels, which is part of the standards of UMTS (Universal Mobile Telecommunications System). MIMO is also defined in WLAN 802.11n and mobile BWA IEEE 802.16 standards. The latter builds the foundation of Mobile WiMAX. Finally, MIMO will be included in the current roadmap of LTE standards Release 9 and 10, which are being developed. Such commercial wireless systems are operated in rich multi-path environment. Due to rich multi-path characteristics, the performance of the multi-antenna system is significantly improved.

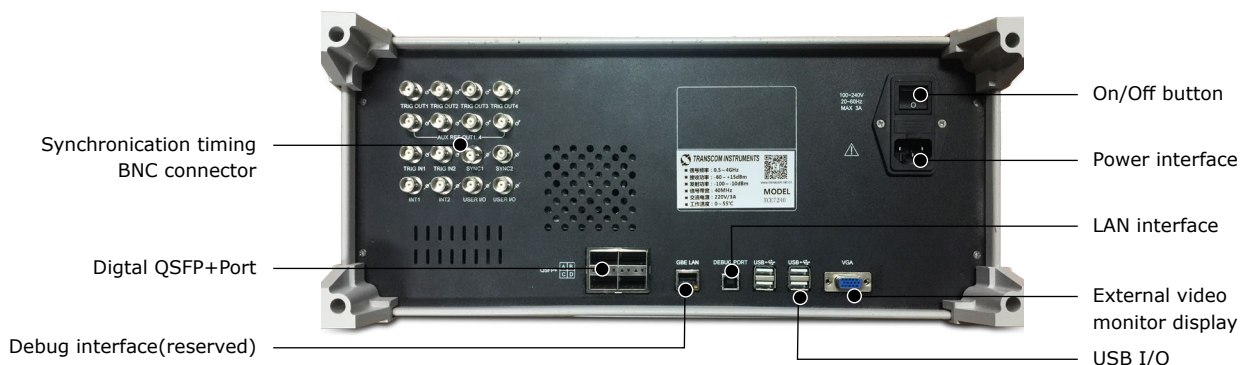


- Support the setting of multi-antenna relevance. In the wireless communication system, the wireless channel is a key factor that affects the system performance. Channel characteristics (such as path loss and multi-path fading) will result in attenuation of the received signal amplitude. If delay spread is longer than the cycle prefix (CP) of OFDM signal, the multi-path effect will lead to the inter-symbol interference. Both theory and experiments have proven that the spatial diversity and multiplexing can essentially improve system performance and overcome adverse multi-path effects. However, this result can only be achieved by appropriate configuration of spatial dimensions. The measurement example in the right figure provides 2x2 MIMO channel coefficients h_{00} , h_{10} , h_{01} and h_{11} of two fading channels. One channel has high relevance while the other has low relevance.



• As a substitute of traditional field testing, the emulation scene of channel propagation is built by the instrument with real-time emulation capacity. Field testing of traditional wireless communication system is time-consuming, labor-intensive and expensive. As a result of external interference and other uncertain factors, test results are always unrepeatably. Pathrrrot channel emulator provided by Transcom can easily simulate wireless environments (virtual field testing) in the laboratory, in order to provide a convenient test environment for the user to develop products. In LTE-Hi channel emulator, based on conventional LTE channel models, typical indoor channel models are added, which provides effective means to test the terminal.

Control Elements



Specifications

Item	Description
No. of fading paths	maximum 24 paths of one channel
Physical channels	2x2, 2 transmitting, 2 receiving
Frequency range	0.5~ 4 GHz
Frequency bandwidth	40MHz
RF Input signal magnitude	-50 ~ +15 dBm
RF output signal magnitude	-100~-10 dBm, with 1dB step
Fading type (default)	constant, Rayleigh, Rice, Normal, Suzuki, pure Doppler, Jakes
Fading type (optional)	Nakagami, Flat, Gauss, Butterworth
Standard channel model (default)	3GPP SCM/SCME MIMO, indoor hotspot
Standard channel model (optional)	GSM, DCS, TETRA, ITU 3G, JTC, 3GPP standard, 3GPP extended, 3GPP2 (IS-54, IS-95), 3GPP LTE MIMO, WiMAX MIMO, MIMO Kroneck
Doppler frequency shifts	10kHz
Interference signal type	AWGN

Ordering List

Model	Description
TCE7240	LTE-Hi 2X2 MIMO Channel Emulator with default channel models, including 3GPP SCM/SCME MIMO, indoor hotspot; and with optional channel modules, including GSM, DCS, TETRA, ITU 3G, JTC, 3GPP standard, 3GPP extended, 3GPP2 (IS-54,IS-95), 3GPP LTE MIMO, WiMAX MIMO, MIMO kroneck

03 Spectrum Monitoring



TY800 Leaky Feeder Monitoring Module

Overview

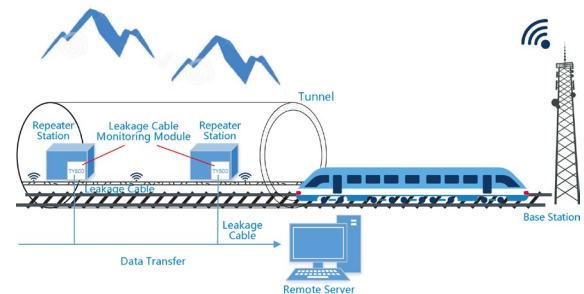


GSM-Railway communication system operational quality is closely related to daily railway operating system's safety and stability. Leaky feeder, which is the key factor to operational security of GSM-R, its monitoring and fault locating are critical issues to railway routine activities.

Transcom radiating cable monitoring module TY800, precisely measures parameters of the leaky feeder such as VSWR, Return-Loss etc. TY800 connects via 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 , $-40^{\circ}\text{C} \sim +70^{\circ}\text{C}$

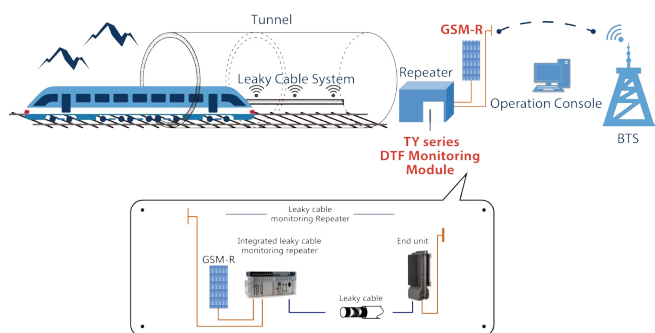


Innovative Features & Benefits



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

Solution Highlights



Industrial grade tunnel leaky feeder monitoring module

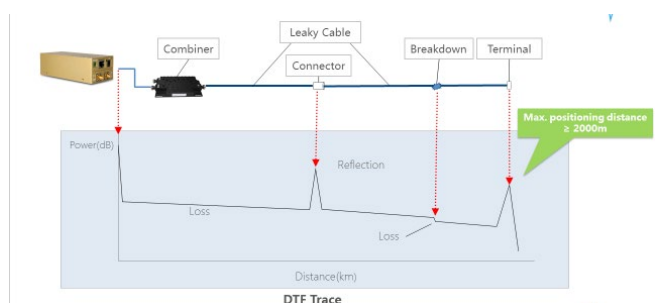
With qualified industrial design, TY800 can be easily integrate into multiple equipment or instrument in harsh or complex locations. TY800 can be installed directly into railway repeater station to minimize installation cost. Real-time monitoring

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 °C ~+50 °C , suitable for common railway environment
 Rigid design enables to function properly under severe environment and extreme temperature



Control Elements



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 ~ 100 dB
DTF Cable loss measurement range	0 ~ 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 yr
System	Linux
Communication interface 1	LAN
Communication interface 2 (optional)	RS485
Power consumption	6w
Power port	2 PIN connector
Voltage/ current	+12V/0.8A
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~+70°C)
TY800AB	1500m Leaky Feeder Monitoring Module (low temperature, --40°C~+50°C)
TY800BA	2000m Leaky Feeder Monitoring Module (normal temperature, -25°C~+70°C)
TY800BB	2000m Leaky Feeder Monitoring Module (low temperature, --40°C~+50°C)

GReye GSM-R Monitoring Sensor

Overview



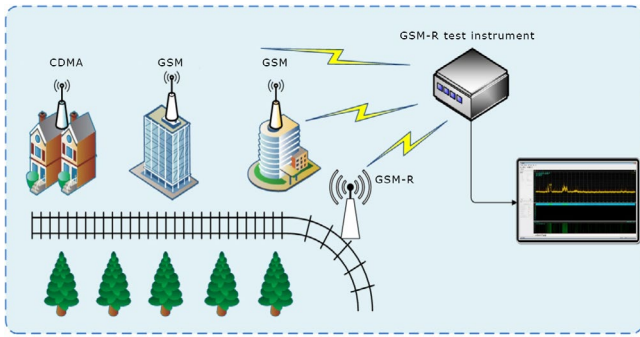
The health state of GSM-Railway network is critical to ensure an efficient railway transportation. GReye is used for the real-time monitoring of GSM-R system frequency and GSM network frequency, and it can promptly find and judge the interference sources by means of signaling interaction and evidence collection, frame error rate judgment, spectrum monitoring, etc., and guarantee the health of GSM-R network and efficiency of railway transportation.

Key Facts

- Scan GSM (including GSM-R) base stations, up to 24 cells in a single scanning.
- Decode the parameters of GSM (including GSM-R) base stations, such as the intensity, LAC, CellID, carrier configuration, operator number, frame error rate, frequency offset, MCC, etc.
- Calculate frame error rates and make statistics. The frame error rates of 40 cells can be summarized in parallel at the same time.
- Monitor more than 40 base stations in parallel, and providing the cell synchronization states.
- Alarm when network exception raised, and identifying cell health states with various legends.
- Analyze interference signal and report its parameters (center frequency, bandwidth and level) within the scan frequency range.
- Record in real-time the uplink and downlink signal interaction in real-time.
- Support DDC spectrum data output and acquisition.
- Support signal collection.
- Support data export and query information of base station.

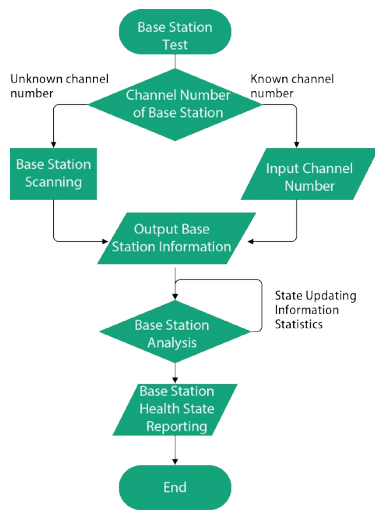


Innovative Features & Benefits

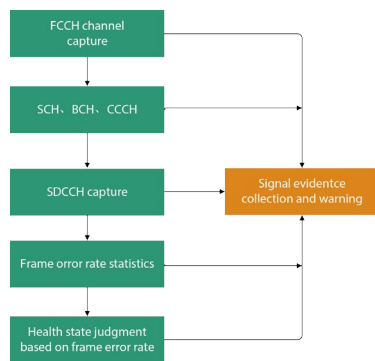


- Scan GSM (including GSM-R) base stations
- Analyze GSM (including GSM-R) base stations
- Report the health states of GSM (including GSM-R) base stations
- Scan and monitor GSM (including GSM-R) spectrum
- Collect DDC data

Solution Highlights



Base Station Test Flowchart



Schematic Diagram of Base Station Health Monitoring

GSM/GSM-R base station testing

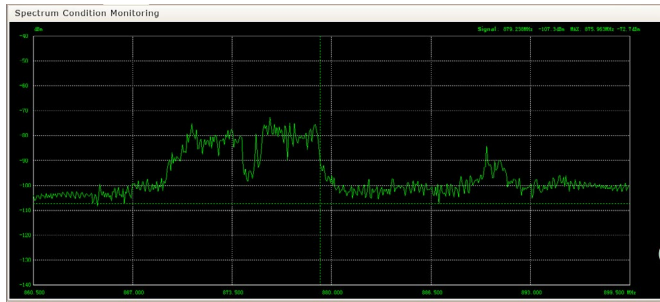
GSM/GSM-R base station testing function decodes base station downlink signal. First, search the channel numbers in the air. Then demodulate and analyze channels one by one, and respectively send the frame error rate and base station cell parameters. Carry out comparison and calculation in combination with the parameters of the actual base station in the mobile network, to judge the interference to specific channels and frequency bands in the designated area.

GSM/GSM-R base station health testing

GREye can be used for deeply analyzing the GSM-R protocol and expanding the base station demodulation function of GSM network, to obtain and record the signaling process. The health state of GSM-R network can be provided in a real-time manner by pushing the signal interaction process, signal intensity, frame error rate, etc.

Serial number	Channel number	Signal intensity	LAC	CD	Operator	Frame Error Rate	Adjacent cells	Secondary frequency	Frequency offset	MCC	Health Indication
1	112	-78	816	12185	Unicom	10		114-117-120-123	-1	860	●
2	13	-80	33297	3190	Mobile	0		7-10-13-16	-1	460	●
3	52	-78	33310	30903	Mobile	0	17-18-44-46-47-57-59-62-63-74-76-...	34-53	-1	460	●
4	54	-81	33297	61702	Mobile	0		20-54-67-89	-1	460	●
5	49	-81	33310	593	Mobile	3.8	1-2-3-9-10-12-13-14-25-30-31-33-3...	3-5-30-36-43-51-77	-1	460	●
6	53	-82	33297	2682	Mobile	21.7	2-5-6-10-11-12-14-27-28-29-30-37-...	17-31-33-38-53-89-87-93	-1	460	●
7	46	-84	33297	42222	Mobile	11.5	1-3-4-5-7-13-14-26-28-29-30-34-37-...	15-18-20-27-46-64	-1	460	●
8	51	-83	33297	61891	Mobile	0	1-3-4-5-7-13-14-26-28-29-30-34-37-...	26-38-61-70	-1	460	●
9	96	-82	816	20486	Unicom	0	17-18-44-46-47-57-59-62-63-74-76-...	115-118-121-126	-1	460	●
10	100	-83	816	25191	Unicom	0	17-18-44-46-47-57-59-62-63-74-76-...	113-116-119-122	-1	460	●
11	43	-88	33297	31253	Mobile	5.5	17-18-44-46-47-57-59-62-63-74-76-...	21-23-30-34-43-62-77-83	-1	460	●
12	40	-85	33310	40183	Mobile	0	17-18-44-46-47-57-59-62-63-74-76-...	6-19-32-36-40-72-74-...	-1	460	●
13	47	-88	33310	40181	Mobile	0	17-18-44-46-47-57-59-62-63-74-76-...	47-65-67-78-88	-1	460	●
14	42	-66	33310	40182	Mobile	0	17-18-44-46-47-57-59-62-63-74-76-...	2-12-14-17-22-24-38-...	-1	460	●
15	101	-69	816	20494	Unicom	10.5	17-18-44-46-47-57-59-62-63-74-76-...	113-116-119-122	-1	460	●
16	104	-70	816	20496	Unicom	14.2		118-119-121-124	-1	460	●

Frame Error Rate and Base Station Health Indication



GSM-R Spectrum Health Indication

GSM/GSM-R spectrum monitoring

GREye is mainly used for monitoring the 5MHz and 30MHz spectrum within 870-890MHz and 930-960MHz. Spectrum signal changes can be monitored in a real-time manner. If any interference occurs in the spectrum, the abnormal channel can be locked promptly, and the channel parameters of the abnormal channel can be analyzed.

Control Elements



Specifications

Performances	
Frequency Range	870-890MHz and 930-960MHz
Monitoring Cells	16-40
Sensitivity	-106dBm
Network Type	GSM-R, GSM
Base Station Parameters	Channel Number, LAC, CellID, Signal Intensity, Error Rate, Operator
Data Pattern	BSIC, C/I,RSSI
Spectral Bandwidth	5MHz, 30MHz
Spectral Resolution	10kHz
Average Noise Amplitude	-154dBm/Hz @ 5kHz-10MHz
Frequency Accuracy	≤0.1ppm
Frequency Measurement Error	$F \times 10^{-7}$ (F is the signal center frequency, and CW Interference is stronger than the bottom noise 20dB)
Level Measurement Accuracy	≤2dB (RMS)
Power	≤18W
AC Power Supply	220V, 50Hz
DC Power Supply	12-16V
Dimensions (W × H × D)	150mm×125mm×30mm
Weight	≤1.5kg
Air Pressure	69.8-106.8kPa
Operating Temperature	-40°C to +70°C (Antenna) and 20°C to +60°C (Host)
Storage Temperature	-55°C to +85°C
Humidity	95±3% (35°C ±2°C)
Anti-vibration Level	The instrument should work normally under load.
Data Storage Capacity	≥10hour
Spectral Data Storage Capacity	≥30day
Device Startup time	≤30s
Network Interface	RJ45Network Port
Antenna Interface	SMA female connector
Direction Finding Interface	4-core aviation connector/seat
Direction Finding Accuracy	≤2°
Direction Sensitivity	≤10dBuv/m
Trouble Free Time	≥500h

Ordering List

Model	Description
GRI	GREye sensor (870-890MHz , 930-960MHz)
Accessories Model	Description
GRI-AS001	1m Power line
GRI-AS002	Telescopic antenna
GRI-AS003	Sucker antenna
GRI-H001	Portable power supply
GRI-S001	Monitoring software

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 regist
- 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



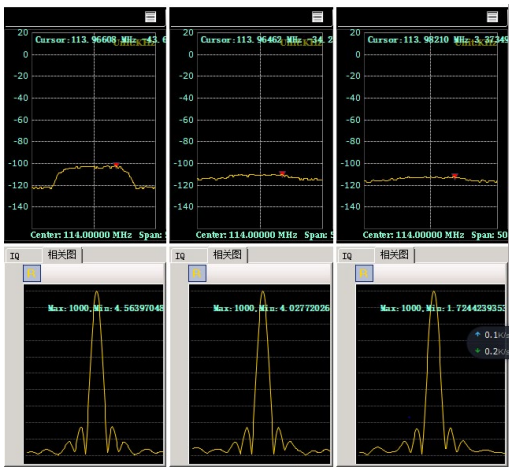
Innovative Features & Benefits



Industrial grade design

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



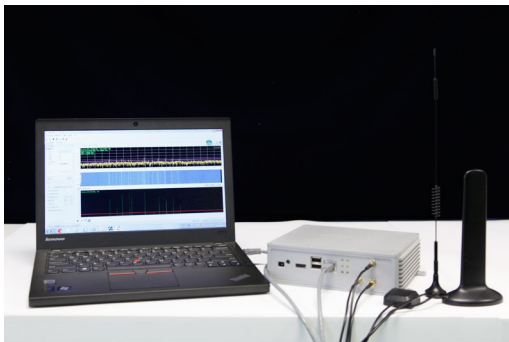
Stable and reliable performance

Stable and reliable performance

- Sweep speed 1GHz/Sec
- Spectrum range: 30MHz-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 locationing technology, by the following timing accuracy: 100ns

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



Automatic distributed system

Solution Highlights



Multiple networking modes with rich interfaces

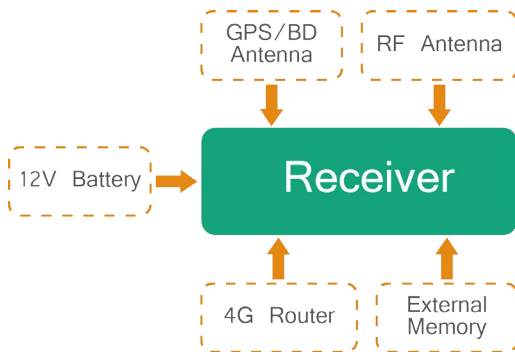
The operating mode is shown on the panel led.

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:

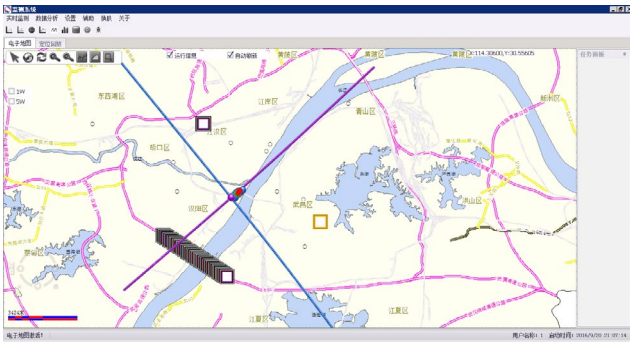
- Power input port: WS16-2 (one);
- USB port: USB A-type port (one);
- Network Connector: RJ45 (one);
- GPS/BD antenna port: SMA (one);
- RF antenna port: SMA (two).



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: 215×185×50mm

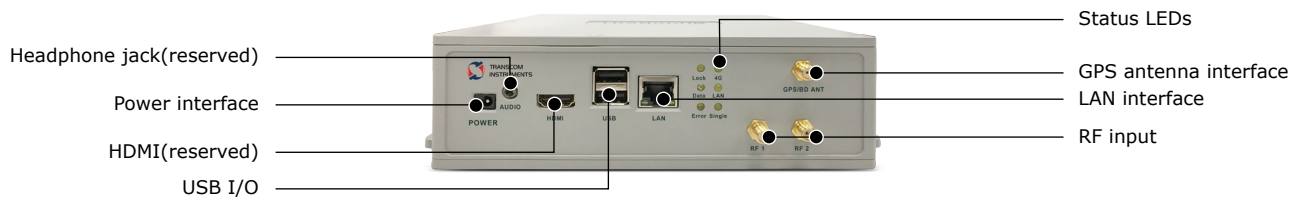
Weight: 2kg

Power consumption: 20W

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



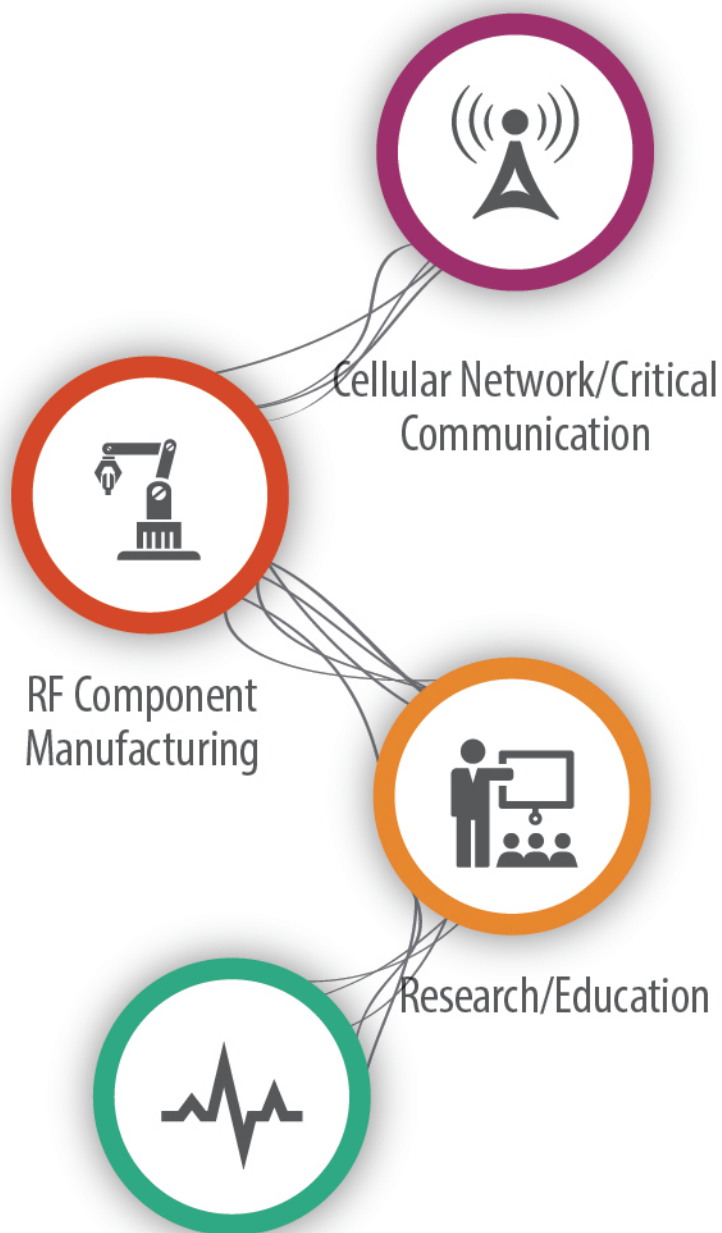
Specifications

Electrical characteristics	
Frequency range	30MHz~6GHz
Frequency stability	≤±1ppm
3rd order intercept point (IP3)	≥10dBm
Phase noise	-96dBc/Hz 10KHz
Noise factor	≤8dB
Real-time bandwidth	20MHz
Sensitivity	-105dBm (25KHz RBW)
Amplitude measurement accuracy	≤±2.0dB
Maximum input level	20dBm
Sweep speed	1GHz/s
Data time stamp accuracy	<100ns
Power consumption	<20W
Operating temperature (keeping the performance)	-20 ~ +55° C
Storage temperature	-40°C ~ +70°C
Mechanical features	
Dimension	215x185x50 mm
Weight	2Kg
GPS antenna interface	SMA
RF antenna interface	SMA
Power supply	12VDC
Communication interface	Network interface RJ45 and USB A-type interface
Certification	CE

Ordering List

Model	Description
RFH	RFHawk Sensor 30M-6G radio monitoring receiver
Accessories Model	Description
RFH-AS001	GPS antenna
RFH-AS002	30M-6G radio monitoring antenna
RFH-AS003	30M-6G mini UAV planar antenna
RFH-AS004	Power adapter
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

We Focusing



ISO9001



ISO14001

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