# IVR-Sync-10G
## Synchronisation Analysis Module

IVR-Sync-10G time analyser has built-in GPS and Beidou II tame atomic clock, providing high-precision time clock information. It supports the verification and calibration of traditional TDM and SDH network timing technology, and also the verification and calibration of the latest commercial Ethernet timing technologies such as Sync-E, 1PPS + TOD and IEEE 1588v2 PTP.
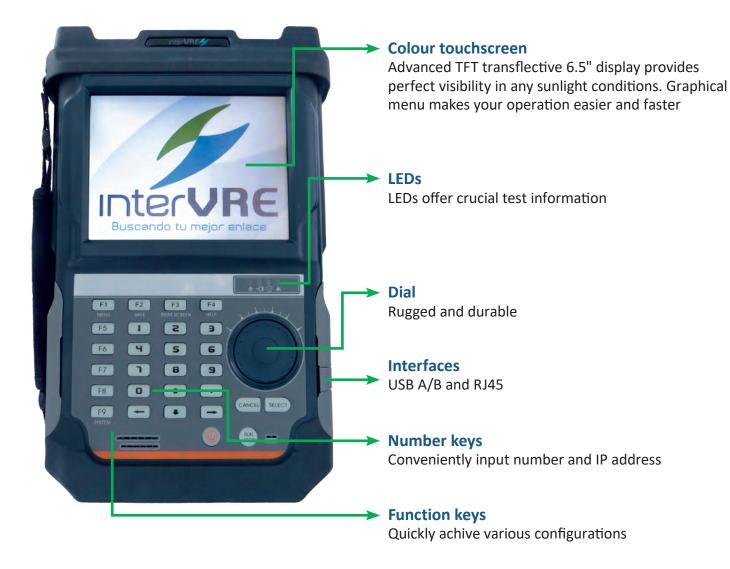
The IVR-Sync-10G provides efficient, high precision and comprehensive time and clock performance analysis and testing for power system, railway system, military communication network and 2G/3G/4G/5G synchronous network of operators.

*Product images are for illustrative purposes only and may differ from the actual product.*

- Supports 1PPS+ToD testing, 1PPS/PP2S testing, 1588v2 testing adn SyncE testing up to 10G
- 6.5 inch outdoor enhanced LCD touch color display screen, suitable for outdoor environment
- Remote access and control based on 10/100M Base-T interface
- Export the test report by USB 2.0 port
- Graphical user interface easy to operate
- Built in Beidou II and GPS tame atomic clock

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# IVR-Sync Platform Brief

**Colour touchscreen**
Advanced TFT transflective 6.5" display provides perfect visibility in any sunlight conditions. Graphical menu makes your operation easier and faster

**LEDs**
LEDs offer crucial test information

**Dial**
Rugged and durable

**Interfaces**
USB A/B and RJ45

**Number keys**
Conveniently input number and IP address

**Function keys**
Quickly achive various configurations

- Compact and lightweight designed
- Graphical user interface easy to operate
- 6.5 inches outdoor-enhanced LCD colour touch screen
- Ultra-high capacity field-exchangeable Li-ion battery pack extends testing time
- Powerful modular intelligent network test platform
- Dial, number keys and function keys for flexible scrolling and selecting
- Remote control by PC using 10/100M Base-T port

# Key Features

- Support 1588v2, SYNC-E, 1PPS+ToD, and TDM
- Integrated a rubidium or atomic GPS clock, which can keep GPS time signal for 2 hours, beneficial for some situation where is inconvenient for setting GPS antenna
- Support to test IEEE1588v2 time server, IP RAN/PTN/OTN/xPON infrastructures, and BS time synchronisation precision and performance
- Support to calculate MTIE, TDEV
- Support to reproduce UTC time and clock with high precision
- Support ESMC simulation and analysis, which is in accordance with ITU-T G.8264 standard
- Support to conduct 7X24 continuous test to analyse drift performance in a long term situation for time and clock synchronisation
- Support the Ethernet test function from 10M to 10G including BERT, Throughput, RFC2544, RFC3393 and Loopback, etc.
- Support E1 BERT test function
- Support 1PPS+ToD, IEEE1588v2 PTP and SYNC-E mask and slave emulation testing

## Time and clock test

- The built-in precise time service GPS and Beidou II, as well as the rubidium clock or atomic clock tamed by GPS and Beidou II, can reproduce high-precision UTC time and generate high-precision clock as the test benchmark.
- Precise measurement of time synchronization accuracy and performance of iEEE1588v2 time server, OTN / STN / SPN and base station equipment, including 1PPS + TOD interface and iEEE1588v2 PTP interface.
- Precision measurement of clock synchronization accuracy and performance of clock synchronization system based on iEEE1588v2 / 1PPS + TOD or SyncE.
- GPS and Beidou II generation tame atomic clock can obtain 4-hour time keeping ability, which is suitable for the scene where it is inconvenient to set up GPS antenna in the computer room in the basement.
- Master and slave simulation test function of IEEE 1588v2 / SyncE with dual port 100 / 1000m electrical port and 100M / 1000M / 10G Optical port.
- Time and clock test functions of 1PPS + Tod, 1PPS / pp2s, 2.048 MHz, 2.048 mbps, 10 MHz and other input and output test interfaces are supported
- Support IEEE1588v2 PTP master and slave test at the same time, and TIE analysis test of IEEE1588v2 PTP
- Support based on the Measurement, analysis and evaluation of time and clock in standard specifications including G.811, G.812, G.813, G.823, G.8261, G.8262, G.8265.1, G.8275.1, G.8275.2, G.8273.2, C37.238 series, etc.
- Support IEEE1588v2 master clock and slave clock (support one step clock and two step clock), and can automatically carry out IEEE1588v2 master slave messages exchange
- Support PTP information mapping of PTP message over Ethernet and PTP message over UDP over IPv4
- Support SynE, announcement and delay_ Transmission frequency setting of Req PTP message
- Real time statistics of PTP information sent and received is supported. PTP data content includes real-time analysis of PTP time stamp (T1, T2, T3, T4)
- Synchronous OAM test function
- Any combination of time and clock can test the function at the same time
- It supports directional capture of various types of messages of TOD, IEEE 1588v2, PTP and sync protocols through filtering

## Ethernet test

- Dual port 10 / 100 / 1000M Base-T, 100mbase FX, 1000m base-x and 10g base-x Ethernet test interfaces
- Layer 1 to layer 4. Error code insertion and detection are supported.
- It supports the generation of MAC layer, IP layer and TCP / UDP layer data stream; the user-defined frame range is 64 to 16000 bytes; it has the function of multi data stream generation and analysis, and users can customize 512 different data streams for frame analysis test
- Ethernet performance test (RFC2544): throughput, latency, frame loss, back-to-back; support 7 custom frames for test
- Support SLA test function based on y.1564 standard
- Support through and loopback functions
- Support Ethernet signal alarm, error analysis and traffic statistics
- Support service interruption test function

# General Specifications

| User Interface | |
|---|---|
| Screen | 6.5 Inch TFT Touch Screen (640 x 480) |
| **Other Interface** | |
| USB | • USB 2.0 A type: 2<br>• USB 2.0 Mini B type: 1 |
| Ethernet | Ethernet 10/100, RJ45 |
| Audio | 3.5mm Audio Interface |
| Storage | 16G (Optional: 32G, 64G, 128G, 256G, 512G) |
| **Physical Specifications** | |
| Temperature | • Operating: -10°C to 50°C<br>• Storage: -40°C to 70°C |
| Relative Humidity | 0% to 95% (non-condensing) |
| Size(H×W×D) | • IVR-Sync-10G platform: 319mm x 202mm x 105mm<br>• IVR-Sync-10G module: 50mm x 97mm x 259mm |
| Weight | • IVR-Sync-10G platform: 2.8kg<br>• IVR-Sync-10G module: 0.8kg |
| Vibrancy | 10Hz to 500Hz < 1.5g (on 3 main axes) |
| Mechanical Shock | 6 sides, 8 edges < 760cm, according to GR-196-CORE |
| EMC | • EN55022/CIPSR22<br>• EN61000-3-2<br>• EN55024 |
| **Battery** | |
| Battery | • Rechargeable Li-lon batteries<br>• Working time: 9 hours (typical for Atomic Clock)<br>• Working time: 4 hours (typical for Rubidium Clock)<br>• Charging time: 6 hours (typical: 25°C) |
| Power Source | • Input: 100-240VAC, 50-60Hz, 2A<br>• Output: 19VDC, 4A |

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# Technical Specifications

## Synchronization Features

| Item | Description | |
|---|---|---|
| GPS Receiver (Built in) | L1 band: C/A code 12 channels; 1PPS precision: 15ns (1 sigma) | |
| BeiDou II Receiver (Built in) | Optional* 12 channel; 1PPS accuracy: 15ns (1 sigma) | |
| Rubidium atomic clock | $1 \times 10^{-12}$ | |
| Time test resolution | 100ps | |
| Time test input interface | 1PPS/PP2S | TTL |
| | 1PPS+TOD | RS422 |
| | PTP (Slave) | Dual Ports :100/1000 BASE-T, 100 BASEFX, 1000 BASE-X, 10G BASE-X Support unicast and multicast mode |
| Clock test input interface | G.703 2.048MHz/2.048Mb/s (SMA), Sync-E (dual port 100/1000 BASE-T, 100BASE-FX, 1000BASE-X, 10GBASE-X) | |
| Clock output interface | G.703 2.048MHz/2.048Mb/s (SMA), 10MHz, Sync-E (dual port 100 / 1000 Base-T, 100Base-FX, 1000base-x, 10GBASE-X) | |
| Reference reference input signals | 1PPS, 1PPS+TOD, 2.048MHz/10MHz, PTP, Sync-E, etc. | |
| Management interface | USB interface, 10/100 Base-T Ethernet interface | |

## Synchronization Test

| GPS and Rubidium clock information | |
|---|---|
| GPS Interface | SMA, 1 |
| GPS Signal | ▪ Latitude, longitude, altitude, positioning type, GPS number<br>▪ GPS signal: elevation, azimuth, signal strength of 12 positioning satellites |
| Reference Signals and lock | ▪ Taming mode: real time 10s, fast 600s, ordinary 1800s, precision 3600s, high precision 7200s, ultra-high precision 18000s<br>▪ Clock type: atomic clock, 1PPS, etc.<br>▪ Clock status: free oscillation, locking, etc.<br>▪ Remaining time (s)<br>▪ Clock tracking time (s)<br>▪ Holding time (s)<br>▪ Remaining holding time (s)<br>▪ Temperature (°C) |

| Time Test | |
|---|---|
| 1PPS+ToD Test Type | **Test signal configuration:**<br>▪ Time server compensation, cable compensation<br>▪ Tod parameter configuration: baud rate, data width, check mode, stop mode<br>**Test results view:**<br>▪ Deviation statistics: sample count, current deviation, average deviation, deviation range, standard Tod, measured Tod, second deviation and standard deviation<br>▪ Deviation chart<br>▪ Deviation data<br>▪ Capture and analysis of TOD message |
| 1PPS+ToD Sending | **ToD Parameters configuration:**<br>▪ Baud rate, data width, check mode, stop mode |
| IEEE1588v2 PTP Slave | **Parameter configuration:**<br>Port parameters:<br>▪ Interface speed: two 100/1000m electrical ports and two 100/1000m /10G Optical ports<br>▪ Duplex mode: full duplex, half duplex<br>▪ Self-negotiation, advanced self-negotiation, negotiation status<br>▪ Clock type: automatic, master, slave<br>▪ Link status: disconnected, connected<br>▪ Port: RX power, frequency, frequency offset<br>▪ PTP slave clock configuration<br>▪ Protocol support types: G.8265.1, G.8275.1, G.8275.2<br>▪ Frame type: Ethernet, UDP<br>▪ Clock field number<br>▪ Delay mechanism: E2E, P2P<br>▪ Delay_ Req frequency: 1 / 16 to 64Hz<br>▪ Packet mode: single mode, multicast<br>▪ Destination IP, destination MAC,<br>▪ Signal: disable, enable<br>▪ Mac analysis<br>▪ Correction domain: sync, delay_ Req, Delay_ Resp, Follow_ up, Pdelay_ Req,<br>▪ Pdelay_ Resq, Pdelay_ Follow_ Up<br>Test results view:<br>▪ Deviation statistics: sample count, current deviation, average deviation, deviation range, ancestor clock ID, sending synchronization time (T1), receiving synchronization time (T2), path delay, second deviation, standard deviation<br>▪ Deviation chart<br>▪ Deviation data<br>▪ PDV / IPDV: sync PDV, delay PDV, sync packet loss rate, path delay<br>▪ PTP statistics: announcement, sync, delay_ Req, Delay_ Resp, Follow_up, Pdelay_ Req, Pdelay_ Resq, Pdelay_ Follow_ Statistics of sending and receiving packets of up, signaling and management<br>▪ Tie analysis |

| | |
|---|---|
| IEEE1588v2 PTP | **Parameter configuration:**<br>Port parameters:<br>▪ Interface speed: Dual 100 / 1000M electrical ports and Dual 100 / 1000M / 10G Optical ports<br>▪ Duplex mode: full duplex, half duplex<br>▪ Self-negotiation, advanced self-negotiation, negotiation status:<br>▪ Clock type: automatic, master, slave<br>▪ Link status: disconnected, connected<br>▪ Port: RX power, frequency, frequency offset<br>▪ PTP master clock configuration:<br>▪ Protocol support types: G.8265.1, G.8275.1, G.8275.2<br>▪ Frame type: Ethernet, UDP<br>▪ Clock field number<br>▪ Delay machine mode: one step, two steps<br>▪ Sync frequency: 1/2 to 256Hz<br>▪ Announcement: 1/2 to 64Hz<br>▪ Clock source properties<br>▪ Clock group, priority 1, priority 2<br>▪ Clock source: Atomic_ clock, GPS, Terrestrial_ Radio, PTP, NTP, Hand_ Set, Other, Internal_ osciallator, Receieved<br>▪ Mac analysis<br>▪ Correction domain: sync, delay_ Req, Delay_ Resp, Follow_ up, Pdelay_ Req, Pdelay_ Resq, Pdelay_ Follow_ Up |
| 1PPS/PP2S | **Configuration:**<br>▪ Time server compensation, cable compensation<br>**Test results view:**<br>▪ Deviation statistics: sample count, current deviation, average deviation, deviation range and standard deviation<br>▪ Deviation chart<br>▪ Deviation data |
| 1PSS/PP2S | SMA, RJ422 |
| Time and clock test at the same time | Any time and clock signal can be combined to test, and the results can be viewed and saved at the same time |
| Time reference source | ▪ GPS (local): cable delay compensation, cable length setting<br>▪ 1PPS + TOD: cable delay compensation, cable length setting<br>▪ 1PPS: cable delay compensation, cable length setting<br>▪ PTP: see PTP slave for configuration details |

| Clock test | |
|---|---|
| Sync-E Receiving | **Parameter configuration:**<br>Port parameters:<br>• Interface speed: Dual 100 / 1000M electrical ports and Dual 100 / 1000M / 10G Optical ports<br>• Duplex mode: full duplex, half duplex<br>• Self-negotiation, advanced self-negotiation, negotiation status:<br>• Clock type: automatic, master, slave<br>• Link status: disconnected, connected<br>• Port: RX power, frequency, frequency offset<br>• Sampling rate: 1, 5, 10, 30, 50 Hz<br>Test results view:<br>• Deviation statistics: sample count, current deviation, average deviation, deviation range and standard deviation<br>• Deviation chart<br>• Deviation data<br>• MTIE/TDEV: Support G.811; G.812 Type1, G.812 Type2 3, G.812 Type4; G.813 gen SEC Option1, G.813 gen SEC Option2, G.813 T-fer SEC Option2, G.813 T-sient SEC Option2, G.813 Holdover SEC Option2; G.823 PDH SYNC, G.823 PRC, G.823 SSU, G.823 SEC; G.8261 EEC Option1, G.8261 EEC Option1, G.8261 Case3; G.8262 geN EEC Option1, G.8262 geN EEC Option2, G.8262 T-fer EEC Option2, G.8262 T-sient EEC Option2 Equal template<br>• TIE Analysis |
| SyncE Sending | • ESMC: Enable, Disable<br>• ESMC Parameter Setting:<br>  ▪ C:Message PDU, Event PDU<br>  ▪ SSM: 0-f |
| 10M | • 10M Signal Sending<br>• 10M Signal Test:<br>  ▪ Sampling rate: 1, 5, 10, 30, 50 Hz<br>• Test results view:<br>  ▪ Deviation statistics: sample count, current deviation, average deviation, deviation range and standard deviation<br>  ▪ Deviation chart<br>  ▪ Deviation data MTIE/TDEV: Support G.811; G.812 Type1, G.812 Type2 3, G.812 Type4; G.813 gen SEC Option1 G.813 gen SEC Option2, G.813 T-fer SEC Option2, G.813 T-sient SEC Option2, G.813 Holdover SEC Option2; G.823 PDH SYNC, G.823 PRC, G.823 SSU, G.823 SEC; G.8261 EEC Option1, G.8261 EEC Option1, G.8261 Case3; G.8262 geN EEC Option1, G.8262 gen EEC Option2, G.8262 T-fer EEC Option2, G.8262 T-sient EEC Option2 Equal template<br>  ▪ TIE Analysis |

| | |
|---|---|
| 2.048 MHz / 2.048 Mbps Test | **Signal test:**<br>TX configuration<br>▪ Interface type: 2.048MHz, 2.048mbps<br>▪ Linear coding: HDB3, AMI<br>▪ Frame type: PCM30, pcm30c, pcm31, pcm31c, non-framing<br>▪ Sa4, Sa5, Sa6, Sa7, Sa8<br>**RX settings:**<br>▪ Interface type: 2.048MHz, 2.048mbps<br>▪ Linear coding: HDB3, AMI<br>▪ Frame type: PCM30, pcm30c, pcm31, pcm31c, non-framing<br>▪ Sa4, Sa5, Sa6, Sa7, Sa8<br>▪ Alarm type: LOS, LOF |
| 1PPS+ToD Test Type | Test signal configuration:<br>▪ Tod parameter configuration: baud rate, data width, check mode, stop mode<br>Test results view:<br>▪ Deviation statistics: sample count, current deviation, average deviation, deviation range and standard deviation<br>▪ Deviation chart<br>▪ Deviation data<br>▪ MTIE/TDEV: Support G.811; G.812 Type1, G.812 Type2 3, G.812 Type4; G.813 gen SEC Option1, G.813 gen SEC Option2, G.813 T-fer SEC Option2, G.813 T-sient SEC Option2, G.813 Holdover SEC Option2; G.823 PDH SYNC, G.823 PRC, G.823 SSU, G.823 SEC; G.8261 EEC Option1, G.8261 EEC Option1, G.8261 Case3; G.8262 gen EEC Option1, G.8262 gen EEC Option2, G.8262 T-fer EEC Option2, G.8262 T-sient EEC Option2; etc.<br>▪ TIE analysis |
| 1PPS+ToD Sending | Tod parameter configuration:<br>▪ Baud rate, data width, check mode, stop mode |
| 1PPS/PP2S test | ▪ Sending and receiving<br>▪ Test results view:<br>　▪ Deviation statistics: sample count, current deviation, average deviation, deviationrange and standard deviation<br>　▪ Deviation chart<br>　▪ Deviation data<br>　▪ MTIE/TDEV: Support G.811; G.812 Type1, G.812 Type2 3, G.812 Type4; G.813 gen SEC Option1, G.813 gen SEC Option2, G.813 T-fer SEC Option2, G.813 T-sient SEC Option2, G.813 Holdover SEC Option2; G.823 PDH SYNC, G.823 PRC, G.823 SSU, G.823 SEC; G.8261 EEC Option1, G.8261 EEC Option1, G.8261 Case3; G.8262 geN EEC Option1, G.8262 geN EEC Option2, G.8262 T-fer EEC Option2, G.8262 T-sient EEC Option2, etc.<br>　▪ TIE analysis |

| Clock reference source | <ul><li>GPS (local): cable delay compensation, cable length setting</li><li>1PPS + TOD: cable delay compensation, cable length setting</li><li>1PPS: cable delay compensation, cable length setting</li><li>2.048MHz / 2.048Mbps:</li><li>10M:</li><li>SyncE: port configuration</li></ul> |
|---|---|
| **Frequency test** | |
| SyncE Test | **Parameter configuration:**<br>Port parameters:<ul><li>Interface speed: two 100/1000m electrical ports and two 100/1000m/10G Optical ports</li><li>Duplex mode: full duplex, half duplex</li><li>Self-negotiation, advanced self-negotiation, negotiation status:</li><li>Clock type: automatic, master, slave</li><li>Link status: disconnected, connected</li><li>Port: RX power, frequency, frequency offset</li><li>Sampling rate: 1, 5, 10, 30, 50 Hz</li></ul>**Test results view:**<ul><li>Deviation statistics: sample count, current deviation, average deviation, deviation range and standard deviation</li><li>Deviation chart</li><li>Deviation data</li></ul> |
| 10M | <ul><li>10M signal transmission</li><li>10M signal test:</li><li>Sampling rate: 1, 5, 10, 30, 50 Hz</li><li>Test results view:<ul><li>Deviation statistics: sample count, current deviation, average deviation, deviation range and standard deviation</li><li>Deviation chart</li><li>Deviation data</li></ul></li></ul> |
| 2.048MHz/2.048Mbps Test | Signal test:<br>TX configuration:<ul><li>Interface type: 2.048MHz, 2.048mbps</li><li>Linear coding: HDB3, AMI</li><li>Frame type: PCM30, pcm30c, pcm31, pcm31c, non-framing</li><li>Sa4, Sa5, Sa6, Sa7, Sa8</li></ul>RX settings:<ul><li>Interface type: 2.048MHz, 2.048mbps</li><li>Linear coding: HDB3, AMI</li><li>Frame type: PCM30, pcm30c, pcm31, pcm31c, non-framing</li><li>Sa4, Sa5, Sa6, Sa7, Sa8</li><li>Alarm type: Los, lof</li></ul>Test results view:<ul><li>Deviation statistics: sample count, current deviation, average deviation, deviation range and standard deviation</li><li>Deviation chart</li><li>Deviation data</li></ul> |

| Other functional indicators | |
|---|---|
| Files | New configuration, Open configuration, Save configuration |
| Test | Start, Stop, Reset, test configuration |
| Tool | Packet capture analysis, Ping, trace route, test record, open data, save data |
| Report | Generate Report, preview, Print |

## 10G Ethernet

| Ethernet | |
|---|---|
| Port | • Electrical interface: dual RJ45 ports, 10/100/1000M Base-T<br>• Optical interface: dual ports, 100M Base-FX/1000M Base-X/10G Base-X; (SFP+) |
| Ethernet Feature | Auto negotiation, full and half duplex, flow control |
| Configuration | Monitor/generate, pass-through |
| Encapsulation | Ethernet type II, IEEE802.3 with 802.2, IEEE802.3 with SNAP |
| **Configuration, Monitoring, and Generation** | |
| Traffic Generation | • Variable line rate traffic generation, up to full line rate<br>• Traffic generation: continuous, burst, ramp, n-frame, n-burst, n-ramp<br>• Adjustable frame size: 64 bytes to 16000 bytes<br>• Frame size: constant, iMAX, random<br>• User-defined traffic mix of unicast and broadcast frames<br>• Fixed or increment MAC/IP identifier<br>• User programmable DSCP/TOS byte<br>• Configurable IP and Ethernet source and destination addresses (support IPv4 and IPv6)<br>• User programmable TCP/UDP address<br>• Generate pause frames, respond to pause frames<br>• Answer incoming ARP, ping requests |
| Stacked VLAN | • Up to 3 user-settable VLAN tags<br>• Parameters per VLAN tag:<br>  ▪ Ethernet type II 0x8100 (802.1Q), 0x88a8 (802.1ad), 0x9100, 0x9200, 0x9300<br>  ▪ User-defined VLAN ID, CFI, VLAN priority |
| Multi stream | Number of streams: up to 512 streams per port can be activated |
| Error Injection | FCS, IP check sum error, UDP/TCP check sum error, bit error |
| **Result, Monitoring and Generation** | |
| Status | • Link status, interface type, jabber detected, frames present, MPLS/VLAN, speed, full or half duplex, signal present, bit rate of incoming Ethernet signal, auto negotiation complete<br>• Link partner abilities: speed/duplex<br>• Indicators of utilisation, throughput and errored frames<br>• Signal level indication for optical Ethernet interfaces |

| Performance Statistics | Utilisation, throughput, frame rate |
|---|---|
| Frame Statistics | ▪ Total frames, total testing frames, total not testing frames, unicast/multicast/broadcast frames, number of pause frames<br>▪ Total VLAN frames<br>▪ Total MPLS frames<br>▪ Total errored framed, number of oversized, normal, and runt frame, number of FCS errored |
| Frame Distribution Statistics | Total valid/frames, <64, 64-127, 128-511, 512-1023, 1024-1518, >1518 |
| Multi stream | Display information per steam:<br>▪ Frame loss count/rate, throughput, latency, packet fitter, frames and bytes received and transmitted |
| Transmit Statistics | Total frames, unicast/multicast/broadcast |
| **Advanced IP Tools** | |
| VCT Cable Test | Use for CAT5 cable connectivity check:<br>▪ Status: pass/Fail<br>▪ Fault location<br>▪ Channel<br>▪ Polarity<br>▪ Pair Skew |
| Flow Control | Flow control time, us:<br>▪ Pause time: total, last, max, min<br>▪ Pause Frame count: TX, RX |
| FTP Upload/ Download | Use for FTP server and client emulation:<br>▪ Support IPv4 and URL<br>▪ Username/password<br>▪ File upload/download<br>▪ Result: pass/fail indication, upload/download time display |
| HTTP | WEB access:<br>▪ Support IPv4 and URL<br>▪ HTTP access pass/fail |
| Advanced PING (Topology) | Advance/Fast PING, PING segments of the IP one by one in one time:<br>▪ IP address range: start, end<br>▪ Send count<br>▪ File upload/download<br>▪ Result: pass/fail indication, upload/download time display |
| **MPLS (optional)** | |
| Number of MPLS Header | Up to 3 MPLS header set by user |
| Parameter per MPLS Header | User defined label, EXP and TLL fields in each MPLS header |
| Statistics | MPLS frame count |

| Ethernet Frame Capture | |
|---|---|
| Buffer Size | ▪ 16K Byte<br>▪ When capture buffer full: stop |
| Capture frame packet length interception | If activated, the first 64 or 128 bytes of the frame are intercepted (ignoring the rest of the frame), and the byte length can be defined |
| Capture Data | CAP format for display in Wireshark |

## PDH (E1 test)

| PDH (E1 test) | |
|---|---|
| Test Interface | ▪ PDH: E1 1 port<br>▪ Interface: SMA |
| Test mode | ▪ Offline testing<br>▪ Online testing |
| Standard | E1: According to ITU-T G.703 2.048mbps |
| Impedance | E1: 75Ω(disequilibrium) |
| Line coding | E1: HDB3, AMI |
| Frame structure | E1: Unframed, PCM30, PCM31, PCM30CRC, PCM31CRC |
| Clock reference | Internal clock accuracy: 4.6 ppm<br>▪ Frequency offset: ±125ppm (1 ppm)<br>Recovery clock<br>▪ TTL level external 2.048MHz clock<br>▪ E1: 2.048Mbps, DS1: 1.544Mbps |
| Received signal rate | ±150ppm<br>▪ Frequency offset display accuracy: ±1ppm |
| Test method | E1: Terminal, monitoring |
| Alarm | Alarm and monitoring<br>▪ E1: LOS, LOF, OOF, RAI, AIS, CRCLOFM, MFASOOF, LOFMFAS, MFASRAI, LSS<br>Alarm generation mode:<br>▪ Continuous<br>▪ Alternation<br>▪ Sudden |
| BERT | Error code insertion and monitoring<br>▪ E1: FAS, CRC4, E-BIT, Code, Bit<br>Error code insertion mode:<br>▪ Continuous<br>▪ Alternation<br>▪ Rate<br>▪ Single<br>▪ Sudden |

| | |
|---|---|
| Bit pattern test | Generation and detection of test pattern based on ITU-T O.181 Bulk<br>▪ Test pattern support: PRBS9, PRBS11, PRBS15,PRBS20.PRBS23,PRBS31<br>▪ The test pattern can be reversed<br>▪ User defined pattern (pattern length: 16bit step size) |
| **PDH/DSn Test Report** | |
| Status | Current interface information<br>▪ Monitoring line alarm and error code display<br>▪ Input level display<br>▪ Actual interface rate<br>▪ Frequency offset |
| Statistics | Statistical information: alarm (seconds and ratio), error code (number, number and ratio), frequency offset display |
| Histogram | All alarms and error codes can be displayed in graphic mode, so that users can view all alarms and error codes at a glance |
| Bit error performance | G.821/g.826/m.2100 analysis of receiving model, error code and alarm based on detection: es, SES, as, UAS, EFS, etc. |
| APS | Test and analysis of aps-aps (automatic protection switching)<br>▪ The APS switching time was measured. Automatic judgment failure when exceeding 50ms<br>▪ Trigger event ()<br>Users can select all PDH / DSN alarms or error codes, error threshold, etc<br>▪ The number of handoffs indicated by APS protocol<br>▪ APS switching time measurement resolution: 1US |
| Loopback delay measurement | ▪ Resolution: 0.1us<br>▪ Maximum test time: 10.0s |

# Ordering Information

| STANDARD CONFIGURATION | |
|---|---|
| **Module** | **Description** |
| IVR-Sync-10G Platform | Test Platform, support SDH, OTN, Ethernet, Packet Ethernet, OTDR test modules |
| IVR-Sync-10G Module | 10GE Synchronisation test module: Support 2.048MHz, 2.048Mbps, 10MHz, 1PPS, 1PPS+ToD, SYNC-E and IEEE1588v2 test function |
| | Adapted to lab and field environments with optional internal measurement references—GPS and internal rubidium |
| | Prove 1588v2 (PTP), Sync-E etc. implementations. To ITU-T G.8261, etc. |
| | Prove 1588v2 (PTP) to the ITU-T Telecom Profile G.8265.1 |
| | Test 1588v2 Ordinary Clock |
| | Support IEEE1588v2 PTP Master Clock and Slave Clock, also support one-step and two-step clock modes |
| | Support PTP message over Ethernet |
| | Support setup Sync Announce and Delay,Req PTP message frequency, support PTP header setup, include clock class domain number and so on parameters setup |
| | Support PTP message statistics |
| | Measure time and frequency (MTIE/TDEV) to specified limits (G.823, G.824, and G.8261.1) |
| | Support IEEE1588v2(PTP),1PPS+ToD,1PPS/PP2S and Sync-E up to 1000M |
| | Measure2.048MHz/2.048bit/s and 10MHz recovered clock compliance to ITU-T G.823/G.824/G.8261.1 (MITE/TDEV) |
| **Quantity** | **Accessories Description** |
| 1 | GPS receiving antenna |
| 1 | GPS receiving feeder |
| 2 | SMA test cables |
| 2 | CAT5 cables, 3m |
| 2 | LC/PC to LC/PC full-duplex single-mode fibre, 3m |
| 2 | 10G 1310nm LC SFP+ optical module |
| 1 | 100-240V input and 19V output AC/DC power adapter |
| 1 | Lithium ion rechargeable battery |
| 1 | Disc with user manual and InterVRE remote control software |
| 1 | Trolley Case |
| 1 | One year warranty service |

InterVRE

| OPTIONAL CONFIGURATION | |
|---|---|
| **Synchronisation Optional Software** | |
| OIVR-TimeReferASync | Use 1PPS+ToD and IEEE1588v2 PTP as reference time |
| OIVR-ClockReferASync | Use Sync-E, 1PPS, 2.048MHz, 2.048Mbps, 10MHz as reference clock |
| OIVR-PTPwithIP | IEEE1588v2 PTP support Unicast and Multicast transmit method with IP Layer |
| OIVR-SyncEwanderASync | Sync-E wander test |
| OIVR-FrequencyASync | Frequency test feature for Sync-E, 2.048MHz, 2.048Mbps, 10MHz |
| OIVR-EFrequencyASync | Advanced frequency sampling test |
| OIVR-100FX | IEEE1588v2 PTP and Sync-E test feature for 100M Base-X port |
| OIVR-PaquetCapture | IEEE1588v2 PTP, Sync-E, 1pps+ToD message capture and decode |
| OIVR-ESMCASync | Sync-E G.8264 ESMC test function |
| **Ethernet test Optional Function** | |
| OPAP-GE | Dual ports GE Ethernet test function |
| OPAP-10GLAN | Dual ports 10G LAN Ethernet interface test function |
| OPAP-IPv6for10G | 10GE IPv6 test function |
| OPAP-3MPLSfor10G | 10GE 3 layers MPLS test function |
| OPAP-128Streams10G | 10GE 128 Data stream generation test function |
| OPAP-512Streams10G | 10GE 512Data stream generation test function (including 10GE 128 data stream option function) |
| OPAP-Y1564for10G | 10GE Y.1564 Test function |
| OPAP-EPINGfor10G | 10GE Advanced Ping test function |
| OPAP-Scanfor10G | 10GE Online business scanning function |
| **Optional Hardware** | |
| 43160031 | Lithium polymer rechargeable battery |
| Onewarranty | One year extended warranty service |
| Twowarranty | Two years extended warranty service |
| 14020160 | 10G-850nm-550m-SX SFP+ optical module |
| 14020090 | 10G-1310nm-15km -LX SFP+ optical module |
| 14020340 | 10G-1550nm-40km-ZX SFP+ optical module |