

## Specifications

## Clock Module Specifications

<b>Pre-defined Signal/Clock Types</b>	<ul style="list-style-type: none"> <li>• 1 pps (PTP subordinate/recovered clock).</li> <li>• 8 kHz (frame clock).</li> <li>• 64 kHz/64 kb/s (E0/DS0).</li> <li>• 1.544 MHz/1.544 Mb/s (T1/DS1 clock/data).</li> <li>• 2.048 MHz/2.048 Mb/s (E1 clock/data).</li> <li>• 5 MHz/10 MHz (frequency reference).</li> <li>• 25 MHz/125 MHz/156.25 MHz (SyncE clock rate).</li> <li>• 34 Mb/s (E3), 45 Mb/s (DS3).</li> <li>• 155.52 MHz/155 Mb/s (STM-1/STS-3 clock/data).</li> </ul>
<b>User-defined Clock Types</b>	From 0.5 Hz to 200 MHz in 0.5 Hz steps. Note: symmetrical, unipolar clock signals.
<b>Measurement Ports</b>	<p>Number of Ports: 2 per module.  Connector: BNC.  Impedance: 75 <math>\Omega</math>, VSWR &lt;2:1 or 1 M<math>\Omega</math>.  Voltage Range: <math>\pm</math>5.00 V.  Sensitivity: min input voltage 60 mVpp, Signal Check voltages are for indication only.  Signal Type: Symmetrical pulse (clock signal); Unsymmetrical repetitive pulse (clock signal);  HDB3-coded data (data signal); AMI B8ZS, B3ZS (data signal).  1 pps: Constant TE measurement accuracy with reference to GNSS <math>\pm</math>75 ns.</p>
<b>Test Modes</b> (MTIE and TDEV Masks)	<p>Masks can be applied for TIE, MTIE and TDEV graphs.  PRC/SSU/SEC: Masks for G.811/G.812/G.813-clocks (ETSI 300 462-3).  Networks: According to G.823/G.824/G.8261/G.8261.1  SyncE: According to G.8261, G.8262  ANSI-standard: DS1 and OC-N masks.</p>
<b>Graph Display</b>	<p>Display Modes: TIE, MTIE, TDEV.  Update Rate: Approx. once/10 seconds.  Number of Graphs: Up to 6 graphs of the same type can be over-laid on screen. Color coded.  Masks on Screen: Up to 6 MTIE and TDEV masks according to selected test mode. Pass/Fail result available for each mask.</p>

## Ethernet Specifications

<b>Synchronous Ethernet</b>	<p>SyncE clock measurement.  Conformance to G.8261 masks (MTIE/TDEV).  Extract and graph ESMC message (SSM).  Generate and change ESMC.</p>
<b>PTP (1588) and NTP</b>	<p>Network 2-way TE, Forward (Sync) PDV, Reverse (DelReq) PDV and Network Delay.  Raw PDV (vs time and distribution graphs).  Selected Packet PDV (vs time and distribution graphs).  Cluster/band packet selection.  Pseudo-subordinate Mode or Monitor Mode.  1 ns resolution timestamp.  Captured PDVs can be replayed on Calnex Paragon-X for troubleshooting.</p> <p><b>PTP (1588):</b> Layer 2 Multicast and Layer 3 (UDP/IPv4, UDP/IPv6) Multicast/Unicast.  <b>NTP:</b> Layer 3 (UDP/IPv4/IPv6) Multicast/Unicast.</p>
<b>Measurement Ports</b>	<p>Number of Ports: Maximum of 2.  Connector: RJ45 for 10/100/1000 Base-T, SFP/SFP+ for 100M/1G/10G Optical (SFP/SFP+ not supplied).</p>

## OTA Module Specifications

<b>Measurement Accuracy</b>	$\pm$ 150 ns.
<b>Operating Frequencies</b>	Up to 3.5 GHz.
<b>LTE Bands</b>	TDD and FDD.
<b>Metrics</b>	TIE and Absolute TE.

## Platform Specifications

<b>Reference Clock</b>	Built-in Rubidium reference or external reference input 1 MHz, 5 MHz or 10 MHz.
<b>Internal Data Storage</b>	Up to 32G.
<b>External Data Storage</b>	USB memory stick.
<b>Start/Stop</b>	Via START/STOP key.
<b>Signal Check Parameters</b>	Signal type (Clock, Data or Unknown); Frequency (for clock signals); Pulse width (for data signals).
<b>Display</b>	Colour TFT, 8.4", 800 x 600 pixels, resistive touchscreen.

## Platform Specifications (continued)

	<p><b>Internal Rb Clock</b></p> <p>Output frequency accuracy (7 mins to warmup): <math>1 \times 10^{-9}</math>          Ageing (1 day): <math>&lt;1 \times 10^{-12}</math>          Ageing (1 year): <math>&lt;5 \times 10^{-10}</math></p>
<b>Stability</b>	
	<p><b>GNSS-disciplining</b></p> <p>12 channels, TRAIM GNSS receiver, high sensitivity. GPS, GLONAS, Beidou, Galileo.</p> <p><b>Built-in GNSS Module</b></p> <p><b>Time Accuracy</b> <math>\pm 15</math> ns at <math>1\sigma</math> after 24 hours lock.</p> <p><b>Frequency Accuracy</b> <math>2 \times 10^{-12}</math> averaged over 24 hours.</p> <p><b>GNSS Disciplining Modes</b> Always disciplining, always in holdover, disciplining only between measurements.          Requires 6 hours disciplining if disconnected from GNSS for <math>&lt;1</math> week; 12 hours if <math>&gt;1</math> week.          Requires 1 hour disciplining if using Cs quality 1 pps (from any state).</p>
<b>Built-in GNSS Module</b>	
<b>Time Accuracy</b>	
<b>Frequency Accuracy</b>	
<b>GNSS Disciplining Modes</b>	
	<p><b>External References</b></p> <p><b>Frequency Reference Input (std)</b> Input Frequency: 10 MHz, 5 MHz.          Voltage Range: 0.1 Vrms to 5 Vrms.          Impedance: Approx. 50 <math>\Omega</math>.</p> <p><b>External 1 pps Timing Input</b> Voltage Range: 0 V to 0.8 V (Low), 2 V to 3.3 V (High) into 50 <math>\Omega</math>.          Required Accuracy: <math>\pm 100</math> ns to UTC.</p> <p><b>GNSS Timing Reference</b> Antenna Input: N-type connector.          DC-feed: +5 V on centre pin to active GNSS antenna.</p>
<b>Frequency Reference Input (std)</b>	
<b>External 1 pps Timing Input</b>	
<b>GNSS Timing Reference</b>	
	<p><b>Output References</b></p> <p><b>Reference Frequency Output</b> Reference Frequency: 10 MHz sine-wave.          Output Levels: 1 Vrms in 50 <math>\Omega</math>.          Impedance: Approx. 50 <math>\Omega</math>.</p> <p><b>1 pps Output</b> Source: Internal Rubidium oscillator.          Output Logic Levels: TTL levels in 50 <math>\Omega</math>.</p> <p><b>E1/T1 Output</b> Connector: Clock: BNC.          Data: Isolated BNC.          Frequency: 2.048/1.544 MHz, 2.048/1.544 Mb/s.          Output Level: Accurate to G.703 <math>\pm 1.2</math> V <math>\pm 10\%</math> in 75 <math>\Omega</math>.</p>
<b>Reference Frequency Output</b>	
<b>1 pps Output</b>	
<b>E1/T1 Output</b>	
	<p><b>Interfaces</b></p> <p><b>USB Device Port</b> Connector: Std USB type B.          USB Version: 2.0</p> <p><b>USB Host Port</b> Connector: Std USB type A.          Maximum Supply Current: 400 mA.          USB Version: 2.0</p> <p><b>Ethernet</b> Communication Port: RJ45, 10/100 Base-T.          Protocol: DHCP, FTP, VNC.</p>
<b>USB Device Port</b>	
<b>USB Host Port</b>	
<b>Ethernet</b>	
<b>Remote Operation</b>	<p>Remote operation via VNC.          Event Log: On screen log of measurement start/stop, duration, alarms, loss of data, loss of communication link, etc.          Log can be saved as text file.          Report Generation: Printable, custom-designed measurement report in pdf format.          Security: Password secured access.</p>
	<p><b>Environmental Data</b></p> <p><b>Operating Temperature</b> 0°C to 40°C. (30°C when charging Rb backup-battery.)</p> <p><b>Storage</b> Temperature from 0 to 50°C and Humidity up to 90% non-condensing.</p> <p><b>Safety</b> EN 61010-1: 2010.</p> <p><b>EMC</b> EN 61326: 2013.</p> <p><b>Power Supply</b> Line Voltage: 100 to 240 Vrms <math>\pm 10\%</math>, 50 Hz to 60 Hz, <math>&lt;100</math> W.</p> <p><b>Optional Battery Backup</b> 3 hours autonomy for Rubidium only to maintain internal timebase accuracy during transport mode.</p>
<b>Operating Temperature</b>	
<b>Storage</b>	
<b>Safety</b>	
<b>EMC</b>	
<b>Power Supply</b>	
<b>Optional Battery Backup</b>	
	<p><b>Mechanical Data</b></p> <p>Fold-out stand.          Ruggedized casing.</p> <p><b>Dimensions (w x h x d)</b> 320 x 388 x 126 mm (12.6" x 15.3" x 5").</p> <p><b>Weight</b> Net <math>&lt;7</math> kg (15 lb); Shipping with transport case <math>&lt;16</math> kg (35 lb). Weights are approximations based on varying configurations.</p>
<b>Dimensions (w x h x d)</b>	
<b>Weight</b>	

Specification is subject to change without notice.