



Precise Time and Frequency, LLC.
an LGL Group Company

Product Catalog



Precise Time and Frequency, LLC.

Introduction

Over more than a decade Precise Time and Frequency, Inc. has developed a reputation for providing a wide range of high performance frequency and timing products tailored to meet the demanding application requirements of our customers. Products range from simple, low cost time and frequency solutions, to premium products designed to deliver the absolute best in performance for the most demanding applications.

Additionally the company also provides a number of products that complement the frequency and time sources. In particular Precise Time and Frequency, Inc. has become established as a world leader in Time and Frequency Distribution and Auto switching and redundancy products .

RF distribution amplifiers cover the range from <100Hz to 2GHz, with additional broadband capability in Digital and Time Code Distribution. The most recent additions to this product range include Remote Monitoring and Control capability, together with analog readouts of RF input and output levels. Automatic redundancy switches now provide multiple channels of switching and up to thirty six channels of distribution in a single unit.

Our careful attention to cost structure and overhead insures that we are able to efficiently deliver these products to market, at highly competitive prices to our customers, while at the same time our policy of continuing product development insures that we stay on the leading edge of technological development.

Typical applications:

- *Precision frequency references for fixed and mobile WiMax applications*
- *Master time and frequency references for communications and broadcasting systems*
- *Frequency and timing reference systems for satellite ground control stations and gateways*
- *Calibration instruments in metrology laboratories*
- *Master time and frequency references in laboratory research facilities*
- *SAASM enabled GPS receivers for military applications*
- *Network time synchronization sources for computer networks and e-commerce applications*
- *Frequency reference and distribution for high-technology manufacturing*
- *Stratum 1 network synchronization sources for telecommunications networks*
- *Portable calibration references for on-site calibration and service applications*

Due to our continual development of new products, it may well be that even if you do not find exactly what you are looking for within this catalog, we already have the solution available or imminent. Please do not hesitate to contact us with your specific requirements and consult one of our product specialists, including our worldwide network of sales and service reps.

We look forward to meeting your time and frequency applications requirements!

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Overview - Distribution Amplifiers and Redundancy Auto Switches

Distribution

Many applications that use a high performance frequency reference require distribution of the reference to several, or many, independent locations to drive different items of equipment either completely independent of one another, or synchronized in some way to meet the overall requirements of a larger system.

When distributing such signals, it is crucial that the quality of the signal Distribution is appropriate for the signal source being used to avoid degradation, and maintain the integrity of the reference source.

Typically the key parameters of interest in such applications include phase noise, short and long-term stability, to preserve the input source quality, and input to output, and output to output isolation to avoid one malfunctioning item under test affecting the signal quality delivered to other units.

The ptf Distribution range is designed to provide the most effective cost/performance solution for the application, including options for full remote monitoring/control (including RF analog signal monitoring) and optional level control.

The distribution product range includes standard fixed configuration units with either 12 or 16 channels, together with more flexible units that allow the user to define specific configurations including different types of input/output signals combined into a convenient 1U or 2U package.

Auto Switches

In systems designed to provide continuous services to millions of subscribers (e.g. internet connectivity) high reliability is a must. Over the years ptf has supplied a myriad of applications requiring very high reliability and uptime, and the wide range of ptf Auto Switches provide a tailored solution to switching RF, Digital, and Time Code signals with most models that providing full local (front panel) and remote (RS232/Ethernet) monitoring and control functions.

1202A Broadband HF Distribution

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- **Input Frequencies 30MHz to 400MHz**
- **12 High Frequency RF Outputs**
- **Low Additive Phase Noise**
- **Isolation (>85dB typical)**
- **Low Cost Convenient 1U Package**



The ptf 1202A High Frequency RF Distribution amplifier provides high performance frequency references for laboratory or system use requiring distribution at frequencies of 30MHz and above.

The ptf 1202A is especially designed to distribute the high frequency input signal to 12 separate outputs, with minimum signal distortion and maximum isolation between individual output signals.

In most applications the phase noise capability of the ptf 1202A will outperform the input signal performance to such a degree that no additive phase noise will be noticeable on the outputs.

Isolation output to output is >85 dB and harmonics are <-40 dB. Non-harmonics are <-80dB

Specifications

Electrical

| | |
|--|--------------------------------------|
| RF Output (twelve) | |
| Frequency Range | 30MHz to 400MHz Broadband outputs |
| Level | 1V rms (13dBm nominal) |
| Harmonic Distortion | <-40 dB |
| Non-Harmonic Signals | <-80 dB |
| Load Impedance | 50W |
| Isolation | >85 dB* |
| Connectors | BNC |
| *Isolation alternating channels | >100dB |
| Additive SSB Phase Noise | |
| (1 Hz Bandwidth) Offset from carrier | |
| 1 Hz | -80 dB |
| 10 Hz | -105 dB |
| 100 Hz | -125 dB |
| 1,000 Hz | -140 dB |
| 10,000 Hz | -155 dB |
| RF Input | |
| Frequency Range | 30MHz to 400MHz |
| Level | 1 V rms (13dBm nominal) |
| Alarm Output | |
| Summary alarm indicates failure of any output signal | |
| Non-alarm condition: | Relay energized (fail safe) |
| Connector: | 9 pin D-male |

Controls & Indicators

| | |
|-------|-----------------------------------|
| Power | Green LED, power is connected |
| Alarm | Red LED, signal output failure |

Environmental & Physical

| | |
|---------------------|--------------------------|
| Temperature: | 0° to 55° C |
| Relative Humidity: | 0 to 95%, non-condensing |
| Power Requirements | |
| AC Input (±15%) | 90 - 264 VAC, <10W |
| DC Input (optional) | |
| Dimensions (HxWxD): | 1U x 19" x 12" |

Configuration Options

| Option # | Description |
|----------|---------------------|
| DCPS | DC Power Supply |
| RSLD | Mounted Rack slides |



1203C Broadband RF Distribution

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- **Input Frequencies 500kHz to 50MHz**
- **12 Broadband Outputs**
- **Low Additive Phase Noise**
- **Isolation (>100dB typical)**
- **Low Cost**
- **Convenient 1U, 19" rack mount package**



The ptf 1203C Broadband RF Distribution amplifier provides high performance frequency references for laboratory or system use.

The ptf 1203C uses two stages of input signal buffering to distribute the input signal to 12 separate outputs, and insure maximum isolation between individual output signals.

Specifications

Electrical

| | |
|--|---|
| RF Output (twelve) | |
| Frequency Range | 500kHz to 50MHz Broadband outputs 1 kHz - 20 MHz (optional) |
| Level | 1V rms (nominal) |
| Harmonic Distortion | <-40 dB |
| Non-Harmonic Signals | <-80 dB |
| Load Impedance | 50W |
| Isolation | >90 dB* |
| Connectors | BNC |
| *Isolation alternating channels >100dB, up to 30MHz | |
| Additive SSB Phase Noise (1 Hz Bandwidth) Offset from carrier | |
| 1 Hz | -132 dB |
| 10 Hz | -150 dB |
| 100 Hz | -160 dB |
| 1,000 Hz | -165 dB |
| 10,000 Hz | -165 dB |

| | |
|--|--|
| RF Input | |
| Frequency Range | 900kHz to 50MHz 1 kHz - 20 MHz (optional) |
| Level | 1 V rms (nominal) |
| Alarm Output | |
| Summary alarm indicates failure of any output signal | |
| Non-alarm condition: | Relay energized (fail safe) |
| Connector: | 9 pin D-male |

In most applications the phase noise capability of the ptf 1203C will outperform the input signal performance to such a degree that no additive phase noise will be noticeable on the outputs.

Isolation output to output is >100 dB and harmonics are <-40 dB.

Controls & Indicators

| | |
|-------|-----------------------------------|
| Power | Green LED, power is connected |
| Alarm | Red LED, signal output failure |

Environmental & Physical

| | |
|---------------------|--------------------------|
| Temperature: | 0° to 55° C |
| Relative Humidity: | 0 to 95%, non-condensing |
| Power Requirements | |
| AC Input (±15%) | 90 - 264 VAC, <10W |
| DC Input (optional) | |
| Dimensions (HxWxD): | 1U x 19" x 12" |

Configuration Options

| Option # | Description |
|----------|---------------------|
| DCPS | DC Power Supply |
| RSLD | Mounted Rack slides |



1203D Matched Phase Broadband RF Distribution

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- **Input Frequencies 300kHz to 60MHz**
- **12 Broadband Outputs**
- **Low Additive Phase Noise**
- **Isolation (>100dB typical)**
- **Low Cost**
- **Convenient 1U, 19" rack mount package**

The ptf 1203D Broadband RF Distribution amplifier provides high performance distribution of frequency references for laboratory or system use, with very low channel to channel phase skew, and very low phase change temperature coefficient.

The ptf 1203D uses a carefully designed transmission line layout to distribute the input signal to 12 separate outputs, to ensure minimum phase difference between individual output signals.

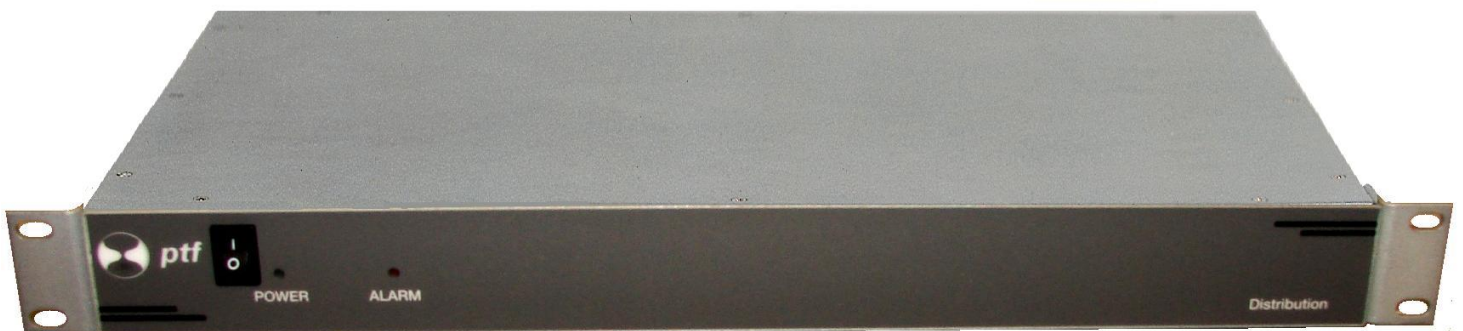
In most applications the phase noise capability of the *ptf* 1203D will outperform the input signal performance to such a degree that no additive phase noise will be noticeable on the outputs.

Isolation output to output is >80 dB and no harmonic exceeds -40 dBc. The unit provides a nominal gain of 1, and all outputs are provided on TNC connectors. Input to output voltage gain of unity (up to x 10 optionally available) provides up to 13dBm into a 50 ohm load.

BNC available, but not recommended for low electrical length temperature coefficient.

Options;

| | |
|---|----------------|
| Option -1 | |
| Standard unit | ± 8.0 ps/deg.C |
| Option -2 | |
| Very low phase delay temperature coefficient | ± 1.3 ps/deg.C |



Specifications

Electrical

| | |
|-----------------------|--------------------------------------|
| RF Output (twelve) | |
| Freq. Range (-3dB BW) | 300kHz to 60MHz Broadband outputs |
| Level | 1V rms (nominal) |
| No Harmonic Exceeds | -40 dBc |
| Non-Harmonic Signals | < -80 dB |
| Load Impedance | 50 ohm |
| Isolation | >80 dB* |
| Connectors | TNC |

*Isolation of alternating output channels
>100dB, up to 30MHz

Additive SSB Phase Noise

| | |
|--------------------------------------|---------------|
| (1 Hz Bandwidth) Offset from carrier | |
| 1 Hz | < -120 dBc/Hz |
| 10 Hz | < -135 dBc/Hz |
| 100 Hz | < -145 dBc/Hz |
| 1,000 Hz | < -155 dBc/Hz |
| 10,000 Hz | < -160 dBc/Hz |

| | |
|-------------------------|----------------------|
| Channel to Channel Skew | <250ps |
| Input to output delay | <5ns nom. @ 10MHz |

| | |
|-----------------------------|-------------------------|
| Input to output temp. coeff | |
| Option -1 tempco | < 8.0ps / deg C |
| Option -2 tempco | < 1.3ps / deg C |
| | (Over +17 to +31 deg C) |

| | |
|-----------------|------------------|
| Input VSWR | < 1.5:1 |
| (1MHz to 60MHz) | (1.2:1 typical) |
| (at 10MHz) | < 1.04:1 |

| | |
|-----------------|------------------|
| Output VSWR | < 1.5:1 |
| (1MHz to 60MHz) | (1.2:1 typical) |
| (at 10MHz) | < 1.04:1 |

| | |
|----------------------|--|
| RF Input | |
| Frequency Range | 300kHz to 60MHz |
| Max Input Level | 1 V rms |
| Alarm Output | Summary alarm. (Alarms if at least one output is < -10dBm, nominal) |
| Non-alarm condition: | Relay energized (fail safe) |
| Alarm Connector: | 9 pin D-male (SPDT contacts) |

Controls & Indicators

| | |
|-----------------|---|
| Power | Green LED, (power connected) |
| Alarm Indicator | Red LED, (output failure, input not present) |

Environmental and Physical

| | |
|---------------------|--------------------------|
| Temperature: | |
| Operating | 0° to 55° C |
| Storage | -20° to +85° C |
| Relative Humidity: | 0 to 95%, non-condensing |
| Power Requirements | |
| AC Input (±15%) | 90 - 264 VAC, <10W |
| DC Input (optional) | |
| Dim. (HxWxD): | 1U (1.752") x 19" x 12" |
| Weight | 4 lbs. |

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1204A Broadband Digital Distribution

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- Compact Rack Mount 1U High Package
- Twelve Channel Output Distribution
- Daisy Chain For Additional Output
- Buffered Outputs
- Minimum Skew & Propagation Delay
- Pulse and Time Code (IRIG DCLS etc.)



The ptf 1204A Digital Signal Distribution unit is a flexible platform used for distribution of various pulse formats (ex. 1 PPS, 1 PPM, 10 PPM, etc). The ptf 1204A will also distribute digital timing signals such as IRIG-B DCLS format up to frequencies of >10MHz..

In order to cater for a wide range of input pulse frequencies, the ptf 1204A design utilizes a

CPLD with jumper selectable alarm delays to correct alarm on the various pulse frequencies. The unit reproduces precision pulse input signals with the minimum of propagation delays.

The unit uses high speed signal buffering to distribute the input signal to 12 separate outputs and maintain the quality of the input signals.

Specifications

Electrical

| | |
|------------------|------------------------|
| Input Level | 10V max (0-5V nominal) |
| Output Level | 0 - 5V |
| Output Impedance | 50 Ohm |
| Load Impedance | 50 Ohm |
| Frequency Range | 50MHz maximum |
| Rise Time | <2ns |
| Ch to Ch Skew | <2ns |

Controls & Indicators

| | |
|-------|-----------------------------------|
| Power | Green LED, power is connected |
| Alarm | Red LED, signal output failure |

Environmental & Physical

| | |
|-----------------------|--------------------------|
| Temperature | 0° to 55° C |
| Relative Humidity | 0 to 95%, non-condensing |
| Power Requirements | |
| AC Input (±15%) | 90 - 264 VAC, <10W |
| DC Input (optional) | |
| Dimensions (HxWxD): | 1U x 19" x 12" |
| Configuration Options | |

| Option # | Description |
|----------|---------------------|
| DCPS | DC Power Supply |
| RSLD | Mounted Rack slides |



1205A Modulated Time Code Distribution

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- **Wide range of modulation frequencies**
- **High Channel Isolation**
- **Twelve Channel Output Distribution**
- **Daisy Chain For Additional Outputs**
- **Convenient 1U , 19" rack mount package**

The ptf 1205A is a 12-channel Amplitude Modulated Time Code distribution amplifier housed in a convenient 1U high package.

The ptf 1205A uses a broadband design to minimize input/output delays which are of the order of nano seconds, and can cater for almost

all forms of modulated time code from 100Hz modulation up to 1MHz modulation.

The unit uses two stages of input signal buffering to distribute the input signal to 12 separate outputs, and insure maximum isolation between individual output signals.

Specifications

Electrical

| | |
|---|--------------------|
| Time Code Input/Output (twelve outputs) | |
| Code Format | IRIG A,B,D,E,G & H |
| Modulation Frequency | 100Hz to 1MHz |
| Modulation Ratio | 3:1 to 6:1 |
| Amplitude | 6V P-P into 50W |
| | 50 ohm impedance |
| Connectors | BNC |

Controls & Indicators

| | |
|-------|-----------------------------------|
| Power | Green LED, power is connected |
| Alarm | Red LED, signal output failure |

Environmental & Physical

| | |
|---------------------|--------------------------|
| Temperature | 0° to 55° C |
| Relative Humidity | 0 to 95%, non-condensing |
| Power Requirements | |
| AC Input (±15%) | 90 - 264 VAC, <10W |
| DC Input (optional) | |
| Dimensions (HxWxD): | 1U x 19" x 12" |

Configuration Options

| Option # | Description |
|----------|---------------------|
| DCPS | DC Power Supply |
| RSLD | Mounted Rack-slides |



1200-MC Series, Distribution With Remote Monitor / Control

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- **Input Frequencies 500kHz to 50MHz**
- **12 output channels**
- **Low Jitter / Phase Noise**
- **High Isolation**
- **Remote Monitoring of RMS Output Levels (Analog versions)**
- **Remote Selection of Active Outputs**
- **Dual Input with Auto Switch Option**
- **Low Cost, Convenient 1U, 19" rack mount package**

Building on the success of the 1200 series Broadband Distribution amplifiers, the 1200-MC series provides not only high performance distribution of frequency and timing references, but enhances this with a full remote monitor and control interface.

With the added monitor and control, allows status monitoring of inputs/outputs on either RS232 or Ethernet with Telnet, web browser and SNMP interfaces. Optionally the unit can take two separate inputs into an input switch with either fully automatic or manual control.

Individual outputs can be enabled / disabled via remote control so that unused outputs are isolated from the alarm system.

Input and output status is immediately evident from front panel indicators of each

channel. Also auto/manual selection of the auto switched input is available from the front panel key pad.

Low jitter / phase noise insures top quality delivery of input to up to 12 output channels.

High isolation insures minimum impact on any other output in the event of one of the outputs being overloaded. Inputs and outputs are provided on convenient BNC connectors. Output drive provides up to 13dBm or 5V CMOS/TTL into a 50 ohm load (dependent upon model).

Models:
1203C-MC RF Distribution
1204A-MC Digital Distribution
1205A-MC Time Code Distribution



Specifications

Electrical

Outputs (twelve)
 Frequency Range (RF) 900kHz to 50MHz
 Frequency Range (Digital) DC to 30MHz
 Frequency Range (TC) 100Hz to 1MHz

Level 1V rms (RF)
 Level 5V TTL (Digital)
 Level 6V pk-pk (TC)

Load Impedance 50 ohms
 Connectors BNC

Additive SSB Phase Noise (RF version)
 (1 Hz Bandwidth) Offset from carrier

| | |
|-----------|---------|
| 1 Hz | -132 dB |
| 10 Hz | -150 dB |
| 100 Hz | -160 dB |
| 1,000 Hz | -165 dB |
| 10,000 Hz | -165 dB |

Alarm Output Summary alarm indicates failure of any output signal

Non-alarm condition: Relay energized (fail safe)

Connector: 9 pin D-male

Controls & Indicators

Each Channel Green/Red LED, Healthy/Fault
 Input Manual/Auto Red LED(manual)

Keypad Manual/Auto Channel (A/B)

Ethernet RJ 45, Front Panel
 RS232 DB9 (Rear panel)

Protocols(Ethernet)

Telnet
 SNMP
 Web Browser

Environmental and Physical

Temperature: 0° to 55° C

Relative Humidity: 0 to 95%, non-condensing

Power Requirements

AC Input ($\pm 15\%$) 90 - 264 VAC, <10W

DC Input (optional)

Dimensions (HxWxD): 1U x 19" x 12"

1203C-MC Broadband RF Distribution With Remote Monitor and Control Interface

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- **Input Frequencies 500kHz to 50MHz**
- **12 Broadband Outputs**
- **Low Additive Phase Noise**
- **Isolation (>100dB typical)**
- **Remote Monitoring of RMS Output Levels**
- **Remote Selection of Active Outputs**
- **Dual Input with Auto Switch Option**
- **Low Cost**
- **Convenient 1U, 19" rack mount package**

Building on the success of the ptf 1203C Broadband RF Distribution amplifier, the ptf 1203C-MC provides not only the high performance distribution of frequency references, but enhances this with a full remote monitor and control interface.

With the added monitor and control, a remote user can easily monitor status of each of the inputs/outputs of the unit on either RS232 or Ethernet with Telnet, web browser and SNMP interfaces. Optionally the unit can take two separate inputs into an input switch with either fully automatic or manual control.

For added flexibility, individual outputs can be enabled/disabled via remote control so that unused outputs are isolated from the alarm system.

Input and output status is immediately evident from front panel indicators of each channel. Also auto/manual selection of the auto switched input is available from the front panel key pad.

In most applications the phase noise capability of the unit will outperform the input signal performance to such a degree that no additive phase noise will be noticeable on the outputs.

Isolation output to output is >100 dB and harmonics are <-40 dB. The unit provides a fixed gain of 1, and all outputs are provided on convenient BNC connectors. Outputs provide up to 13dBm into a 50 ohm load.



Specifications

Electrical

| | |
|----------------------|--|
| RF Output (twelve) | |
| Frequency Range | 900kHz to 50MHz Broadband outputs 1 kHz - 20 MHz (optional) |
| Level | 1V rms (nominal) |
| Harmonic Distortion | <-40 dB |
| Non-Harmonic Signals | <-80 dB |
| Load Impedance | 50W |
| Isolation | >90 dB* |
| Connectors | BNC |

*Isolation alternating channels >100dB, up to 30MHz

Additive SSB Phase Noise

(1 Hz Bandwidth) Offset from carrier

| | |
|-----------|---------|
| 1 Hz | -132 dB |
| 10 Hz | -150 dB |
| 100 Hz | -160 dB |
| 1,000 Hz | -165 dB |
| 10,000 Hz | -165 dB |

RF Inputs

| | |
|----------------------|--|
| Frequency Range | 900kHz to 50MHz 1 kHz - 20 MHz (optional) |
| Level | 1 V rms (nominal) |
| Alarm Output | Summary alarm indicates failure of any output signal |
| Non-alarm condition: | Relay energized (fail safe) |
| Connector: | 9 pin D-male |

Controls & Indicators

| | |
|--------------|---------------------------------|
| Each Channel | Green/Red LED, Healthy/Fault |
| Input | Manual/Auto Red LED(manual) |
| Keypad | Manual/Auto Channel (A/B) |
| Ethernet | RJ 45, Front Panel |
| RS232 | DB9 (Rear panel) |

Protocols(Ethernet)

Telnet

SNMP

Web Browser

Environmental and Physical

Temperature: 0° to 55° C

Relative Humidity: 0 to 95%, non-condensing

Power Requirements

AC Input ($\pm 15\%$) 90 - 264 VAC, <10W

DC Input (optional)

Dimensions (HxWxD): 1U x 19" x 12"

1204A-MC Digital Signal Distribution With Remote Monitor and Control Interface

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- **Input Frequencies DC to 30MHz**
- **Suitable for 1PPS, IRIG DCLS etc.**
- **12 Channel Output Distribution**
- **Low Skew and Propagation Delay**
- **Remote Monitoring of Input/Output Levels**
- **Remote Selection of Active Outputs**
- **Dual Input with Auto Switch Option**
- **Low Cost**
- **Convenient 1U, 19" rack mount package**

Building on the success of the 1204A Digital Distribution amplifier, the 1204A-MC is a flexible distribution platform suitable for various pulse formats enhanced with a full remote monitor and control interface.

With the added monitor and control, a remote user can easily monitor status of each of the inputs/outputs of the unit on either RS232 or Ethernet with Telnet, web browser and SNMP interfaces. Optionally the unit can take two separate inputs into an input switch with either fully automatic or manual control.

For added flexibility, individual outputs can be enabled/disabled via remote control so that unused outputs are isolated from the alarm system.

Input and output status is immediately evident from front panel indicators of each channel. Also auto/manual selection of the auto switched input is available from the front panel key pad.

All outputs are provided on convenient BNC connectors. Outputs provide 5V TTL levels into a 50 ohm load.



Specifications

Electrical

| | |
|------------------|-------------------|
| Input Level | 10V max |
| Input Impedance | 50 ohm |
| Input High Level | 2V to 5V (50 ohm) |
| Input Low Level | <0.7V (50 ohm) |

| | |
|-------------------|----------------|
| Output High Level | 3.5V (minimum) |
| Output Low Level | 0.5V (maximum) |
| Output Impedance | 50 ohm |

| | |
|-----------------|-------------|
| Frequency Range | DC to 30MHz |
|-----------------|-------------|

| | |
|------------|-----|
| Connectors | BNC |
|------------|-----|

| | |
|----------------------|--|
| Alarm Output | Summary alarm indicates failure of any output signal |
| Non-alarm condition: | Relay energized (fail safe) |

| | |
|------------|--------------|
| Connector: | 9 pin D-male |
|------------|--------------|

Controls & Indicators

| | |
|--------------|------------------------------|
| Each Channel | Green/Red LED, Healthy/Fault |
| Input | Manual/Auto Red LED(manual) |
| Keypad | Manual/Auto Channel (A/B) |
| Ethernet | RJ 45, Front Panel |
| RS232 | DB9 (Rear panel) |

Protocols(Ethernet)
Telnet
SNMP
Web Browser

Environmental and Physical

Temperature: 0° to 55° C

Relative Humidity: 0 to 95%, non-condensing
Power Requirements
AC Input (±15%) 90 - 264 VAC, <10W
DC Input (optional)
Dimensions (HxWxD): 1U x 19" x 12"

1205A-MC Modulated IRIG Distribution With Remote Monitor and Control Interface

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- **IRIG am Time Code Distribution**
- **Distributes IRIG A, B, D, E, G, & H**
- **High Channel Isolation**
- **12 Channel Output Distribution**
- **Remote Monitoring of Input/Output Levels**
- **Remote Selection of Active Outputs**
- **Dual Input with Auto Switch Option**
- **Low Cost**
- **Convenient 1U, 19" rack mount package**

Building on the success of the 1205A IRIG Distribution amplifier, the 1205A-MC provides not only the high performance time code distribution, but enhances this with a full remote monitor and control interface.

With the added monitor and control, a remote user can easily monitor status of each of the inputs/outputs of the unit on either RS232 or Ethernet with Telnet, web browser and SNMP interfaces. Optionally the unit can take two separate inputs into an input switch with either fully automatic or manual control.

For added flexibility, individual outputs can be enabled/disabled via remote control so that unused outputs are isolated from the alarm system.

Input and output status is immediately evident from front panel indicators of each channel. Also auto/manual selection of the auto switched input is available from the front panel key pad.

Two stages of input signal buffering are used to distribute the input signal to 12 separate output channels, and insure maximum isolation between output signals.



1206A & 1207A Configurable Distribution

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- **Input Frequencies 100Hz to 50MHz**
- **100 MHz Option Available**
- **12 Broadband Outputs**
- **Low Additive Phase Noise**
- **Isolation (>100dB typical)**
- **Buffered Outputs**
- **Minimum Skew & Propagation Delay**
- **Pulse and IRIG DCLS**
- **1U or 2U , 19" rack mount package**
- **Cost Effective**



1206A

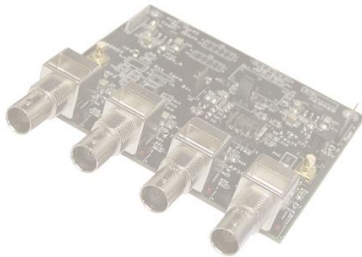


1207A with auto switch option

The ptf 1206A (1U) & ptf 1207A (2U) provide the flexibility of distributing a variety of signals from one highly configurable box.

With ptf's quad-bloc distribution cards you can build a system that is tailored to your specific needs.

Based on the ptf family of Distribution products, ptf quad-blocs are available for Broadband RF, Digital Pulse and Modulated IRIG distribution. Dual input A/B autoswitching capabilities are also available as an option.



The ptf Broadband RF Distribution provides high performance frequency references for laboratory or system use.

In most applications the phase noise capability of the ptf Broadband RF Distribution will out perform the input signal performance to such a degree that no additive phase noise will be noticeable on the outputs.

Isolation output to output is ~100 dB and harmonics are <-40 dB.

The ptf Digital Signal Distribution is a flexible platform used for distribution of various pulse formats (e.g. 1 PPS, 1 PPM, 10 PPM, etc). The ptf Digital Signal Distribution will also distribute digital timing signals such as IRIG-B DCLS format.

Through decades of timing design experience, the ptf team is able to reproduce precision pulse input signals with the minimum of propagation delays, with two stages of input signal buffering to distribute the input signal to 12 separate outputs and insure maximum isolation between individual output signals.

The ptf Modulated IRIG Distribution uses a broadband design to distribute modulated IRIG signal input to provide separate outputs.

The ptf Auto Switch is purpose designed for time and frequency applications where reliability criteria call for redundant RF, Pulse and timing sources. The unit accepts a pre-configured input consisting of either an RF (sine) signal, a pulse (typically 1 PPS), or Timing (IRIG)



signals. The primary signal is monitored and automatically switches to the backup channel within ~ 3msec (typical).

Specifications

Electrical

RF Distribution Specifications

| | |
|--|-----------------------------------|
| Output | |
| Frequency Range | 500kHz to 50MHz 1 kHz - 20 MHz |
| Level | 1V rms (nominal) |
| Harmonic Distortion | <-40 dB |
| Non-Harmonic Signals | <-80 dB |
| Load Impedance | 50 ohms |
| Isolation | >90 dB* |
| Connectors | BNC |
| *Isolation alternating channels >100 dB, up to 30MHz | |
| Additive SSB Phase Noise (1 Hz Bandwidth) Offset from 10MHz | |
| 1 Hz | -120 dB |
| 10 Hz | -135 dB |
| 100 Hz | -145 dB |
| 1,000 Hz | -155 dB |
| 10,000 Hz | -160 dB |

| | |
|--|-----------------------------------|
| RF Input | |
| Frequency Range | 500kHz to 50MHz 1 kHz - 20 MHz |
| Level | 1 V rms (nominal) |
| Alarm Output | |
| Summary alarm indicates failure of any output signal | |
| Non-alarm condition: | Relay energized |
| Connector: | 9 pin D-male |

Digital Distribution Specifications

| | |
|------------------|-----------------------------------|
| Input Level | 10V max (0-5V nominal) |
| Output Level | 0 - 5V |
| Output Impedance | 50 ohms |
| Load Impedance | 50 ohms |
| Frequency Range | 50MHz maximum |
| Rise Time | <2ns |
| Ch to Ch Skew | <5ns (multi-cards), <1ns (1 card) |

Modulated Time Code Distribution Specifications

| | |
|------------------------|--------------------|
| Time Code Input/Output | |
| Code Format | IRIG A,B,D,E,G & H |

| | |
|----------------------|---|
| Modulation Frequency | 100Hz to 1MHz |
| Modulation Ratio | 3:1 to 6:1 |
| Amplitude | 6V P-P into 50 ohms 50 ohm i/p impedance |
| Connectors | BNC |
| Impedance | 50ohm/Hi Z switch |

Auto Switch Specifications

| | |
|----------------|--|
| Switching Time | <3 milli seconds (typical) |
| Type | Relays (Failsafe) Break before Make |
| Switch Control | Auto/Remote/Local |

Controls & Indicators

| | |
|-------|-----------------------------------|
| Power | Green LED, power is connected |
| Alarm | Red LED, signal output failure |

Environmental & Physical

| | |
|---------------------|--------------------------|
| Temperature: | 0° to 55° C |
| Relative Humidity: | 0 to 95%, non-condensing |
| Power Requirements | |
| AC Input (±15%) | 90 - 264 VAC, <10W |
| DC Input (optional) | |
| Dimensions (HxWxD): | 1U x 19" x 12" |

Configuration Options

| | Option # | Description |
|------|----------|------------------------------------|
| | RF10 | 1MHz to 10MHz Sinewave out |
| (x4) | RF100 | 100MHz Sinewave out (x4) |
| | TIME | Time Code Output |
| | PULS | Pulse Distribution (x4) |
| | TELC | T1/E1 Distribution (x4) |
| | AUTO | Auto Switch (Digital, Irig, or RF) |
| | DCPS | DC Power Supply |
| | RSLD | Mounted Rackslides |



1206A rear view



1207A rear view

1207A Distribution with Remote Monitor / Control Interface

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- Up to 36 output channels
- RF, Digital, and time code options
- **ANALOG LEVEL Monitoring** on RF Channels
- All configurations include broadband range
- Optional Gain Adjustment on RF Channels
- Optional auto switch input
- Remote Monitor/Control (Ethernet/RS 232)
- NTP Client for automatic event time-stamping



1207A with Auto Switch option

This latest version of the ptf 1207A provides RF, and/or Digital, and/or Time Code, Distribution unit with full remote monitoring and control interface.

The ptf 1207A delivers up to thirty six channels of frequency and/or timing references to critical applications such as Satellite Communications, Broadcasting, WiMax and others.

RF channels include a unique feature of **output level monitoring** of rms output level, together with an optional gain control allowing each RF channel output level to be independently adjusted.

The unit can optionally accept a pair of two inputs (usually from separate primary and backup sources), and provides auto switching and monitoring of both the inputs and output for signal integrity.

RF channels include analog level monitoring. With the auto switch option fitted, if the primary input on any channel fails, the unit will automatically switch to the backup input and indicate a primary signal fault.

Full remote monitoring and control via RS232 and Ethernet interfaces includes telnet, http (web browser), and SNMP protocols.

Specifications

Inputs

RF

Frequency 1MHz to 30MHz
Amplitude 13dBm into 50 ohms
(1V rms into 50 ohms)

Digital

Frequency 0.01 PPS to 20 MPPS
Amplitude 5V TTL into 50 ohms
(nominal)

Time Code

Modulation Freq. 100Hz to 1MHz
Amplitude 3V pk-pk
Modulation Ratio 3 : 1

Outputs

RF

Frequency 1MHz to 30MHz
Amplitude 13dBm into 50 ohms
(1V rms into 50 ohms)

Digital

Frequency 0.01 PPS to 20 MPPS
Amplitude 5V TTL into 50 ohms
(nominal)

Time Code

Modulation Freq. 100Hz to 1MHz
Amplitude 3V pk-pk
Modulation Ratio 3 : 1

Switching Characteristics(optional)

Switch Type Latching Relay
Switching time <3ms typical

Indicators/Controls

Power Green LED
Channel A Red LED
Channel B Red LED
Manual Selected Red LED

Controls

Auto/Manual Membrane switch
Channel Select Membrane switch

Power Supply

Input voltage 90 - 264 VAC
Input power <10W

Environmental

Temperature: 0° to 55° C
Relative Humidity: 0 to 95%, non-condensing

Physical

Dimensions
(HxWxD): 2U x 19" x 12"
Weight <15lbs



1207A Rear Panel View



1207A Multi Channel Auto Switch

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- Switches Multiple Signal Channels
- Fast Switching time
- Broadband range
- Latching switches
- Remote Monitor /Control
- Power fail “failsafe” operation



With intense competition and subscribers demanding ever more from service providers, quality and availability of service have never been more critical to maintaining and expanding the subscriber base.

The ptf 1207ARF, Digital, and/or Time Code, Auto Switch complements the range of high quality frequency and timing references and insure delivery of the performance and reliability customers demand.

The ptf 1207A delivers up to eight channels of fully redundant, frequency and timing references to critical applications such as Satellite Communications, Broadcasting, WiMax and others, with **no single point of failure**.

The unit accepts two inputs on each channel from separate sources (primary and backup), monitors the inputs for signal integrity, and outputs the primary signal with no degradation of the input.

If the primary input on any channel fails, the unit will automatically switch to the backup input and indicate a primary signal fault.

The unit will accept up to eight channels simultaneously and independently switch on each channel.

The unit also includes full remote monitoring and control via RS232 and Ethernet interfaces.

Specifications

Inputs

RF

Frequency 1MHz to 30MHz
Amplitude 13dBm into 50 ohms
(1V rms into 50 ohms)

Digital

Frequency 0.01 PPS to 20 MPPS
Amplitude 5V TTL into 50 ohms
(nominal)

Time Code

Modulation Freq. 1kHz to 1MHz
Amplitude 3V pk-pk
Modulation Ratio 3 : 1

Outputs

RF

Frequency 1MHz to 30MHz
Amplitude 13dBm into 50 ohms
(1V rms into 50 ohms)

Digital

Frequency 0.01 PPS to 20 MPPS
Amplitude 5V TTL into 50 ohms
(nominal)

Time Code

Modulation Freq. 1kHz to 1MHz
Amplitude 3V pk-pk

Modulation Ratio 3 : 1

Switching Characteristics

Switch Type Latching Relay
Switching time <3ms typical

Indicators/Controls

Power Green LED
Channel Fault Red LED
Manual Selected Red LED
Channel Selected Green LED

Controls

Auto/Manual Membrane switch
Channel Select Membrane switch

Power Supply

Input voltage 90 - 264 VAC
Input power <10W

Environmental

Temperature: 0° to 55° C

Relative Humidity: 0 to 95%, non-condensing

Dimensions (HxWxD): 1U x 19" x 12"

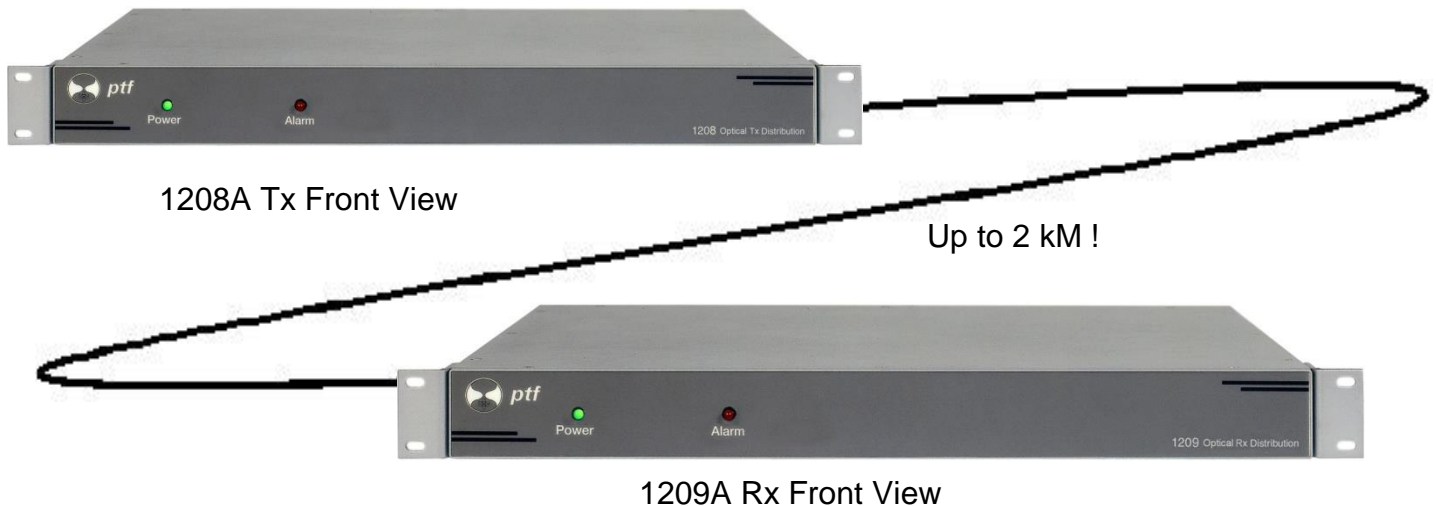


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1208/9A Optical Distribution, Rx/Tx

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- Distribution of signals from 1kHz to 20MHz
- Transmission Distance >2 km
- Highly flexible configuration of Transmitter and Receiver
- Simple to install and configure
- Input and output signal monitoring and alarms
- <-90 dBc channel to channel isolation



The ptf 1208A (transmitter) and ptf 1209A (receiver) provide a convenient and simple way to transmit high quality RF signals over long distances, without the concerns associated with electrical interference and pick-up.

The ptf 1208A accepts an RF input in the range from 1kHz up to greater than 10MHz and provides a combination of 8 local, high isolation, RF distribution outputs and 4 optical transmission outputs for distances up to 2 kilometers.

The ptf 1209A accepts an optical input (transmitted from the ptf 1208A) and provides 12 local RF outputs, either digital (TTL into 50 ohms) or low noise sine wave signals driving 1V rms into 50 ohms (with the PLL option), or both.

These systems are especially designed to accommodate IRIG B DCLS, 1PPS and other RF signals in the range from 1kHz to 20MHz.

The modular construction allows for a variety of input/output configurations to provide a fully tailored application solution

Specifications



1208A Tx rear

Inputs

RF Input
Frequency 1kHz to 20MHz
Level 0V to 5V (TTL) into 50 ohms
Connector BNC

Outputs

RF Outputs(8)
Frequency 1kHz to 20MHz
Level 0V to 5V (TTL) into 50 ohms
Connector BNC
Isolation >-90dB

Optical Outputs(4)
Frequency 850nm with modulated square wave
Modulation 1kHz to 20MHz
Connector ST



1209A Rx rear

Optical Input
Frequency 850nm with modulated square wave from 1kHz to 20MHz
Level -10dBm to -30dBm
Connector ST

RF Outputs(12)
Frequency 1kHz to 20MHz
Level 0V to 5V (TTL) into 50 ohms
Connector BNC
Isolation >-90dB

Feed-through RF output(1)
Frequency 1kHz to 20MHz
Level 0V to 5V (TTL) into 50 ohms
Connector BNC

Environmental / Physical

Input Power
AC 100 VAC to 265 VAC
DC(opt.) 20 VDC to 70 VDC

Operating Temp. -35 to 75 deg. C

Relative Humidity 0-95%(non-cond.)

Dimensions 1U x 19" x 12"
Operating Temp. 0 to 50 deg. C
Relative Humidity 0-95%(non-cond.)

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1210A LVDS Distribution

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- CMOS to LVDS Pulse Conversion
- Precision Matching of All Outputs to <2ns
- Modular, Expandable Up to 60 Outputs
- Fault Alarm for Input Pulse Failure
- Convenient RJ12 Output Connections
- Accommodates Pulse Rates From 0.1 Hz to 10 MHz



The ptf 1210A LVDS Distribution uses high performance FPGA technology to precisely match the path times from the input pulse to all of the FPGA output LVDS signals. The propagation delay of electronic signals through normal copper wiring is approximately 1 nano second per foot. Through careful design in matching physical path lengths from the FPGA LVDS outputs, the individual paths to all of the ptf 1210A outputs are matched in length, to insure the leading edge pulse synchronization is maintained.

In addition, the transmission line characteristics of the printed circuit board have been carefully designed to provide impedance matching, and preserve the integrity of the digital edges of the LVDS outputs. The individual expansion modules are connected to the FPGA base board by means of internal RJ45 connections and high performance, shielded twisted pair, cables.

In order to maintain the stringent performance of the unit, cable lengths have been carefully

calculated to insure equal delays to all output connections, maintaining <2ns differential error between outputs.

The input to the LVDS Distribution unit is a CMOS level (5V nominal) pulse in the frequency range 0.5 Hz to 10 MHz.

This input pulse is converted internally within the ptf 1210A LVDS Distribution, to provide pseudo current loop LVDS outputs, at the same frequency as the input signal. Up to 60 parallel LVDS outputs can be accommodated by the unit, by fitting up to 15, 4 channel LVDS Distribution modules. The standard configuration is supplied with one expansion module (4 LVDS outputs) fitted.

Through high performance semiconductor technology, the ptf 1210A LVDS Distribution Unit maintains the leading edge of all pulse outputs to within 2ns of all other outputs.

Specifications

Electrical

Inputs

Level CMOS Pulse (5V nominal)
Impedance 50W

Frequency range 0.1 Hz 10 MHz

Input to any output < 20ns
propagation delay

Outputs

Level ± 0.625 V LVDS (current
loop)
Impedance 100 W (differential load)

Channels per
expansion module 4 LVDS Channels

Number of expansion
modules 15 Max (60 outputs total)

Controls & Indicators

Power Green LED,
power is connected
Alarm Red LED,
signal output failure

Environmental/Physical

Power Requirements

AC Input ($\pm 15\%$) 90 - 264 VAC, <10W
DC Input (optional)

Dimensions

2U x 19" x 12"
Operating Temp. 0 to 50 deg. C
Relative Humidity 0-95% (non-cond.)

Configuration Options

| Option # | Description |
|----------|---------------------|
| EXP4 | 4 ch. Expansion |
| DCPS | DC Power Supply |
| RSLD | Mounted Rack slides |



1210A Rear View



Expansion Module

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1220A Failsafe Redundant Auto Switch

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- Switches two RF/Pulse Pairs
- Fast Switching time (<3msec typical)
- Settable pulse and RF period
- Settable "jitter" range
- Remote Control/Monitor
- SNMP, HTTP, Console, interfaces
- Power fail "failsafe" operation



1220A Front

The ptf 1220A Auto Switch is purpose designed for time and frequency applications where reliability criteria call for redundant RF and Pulse sources.

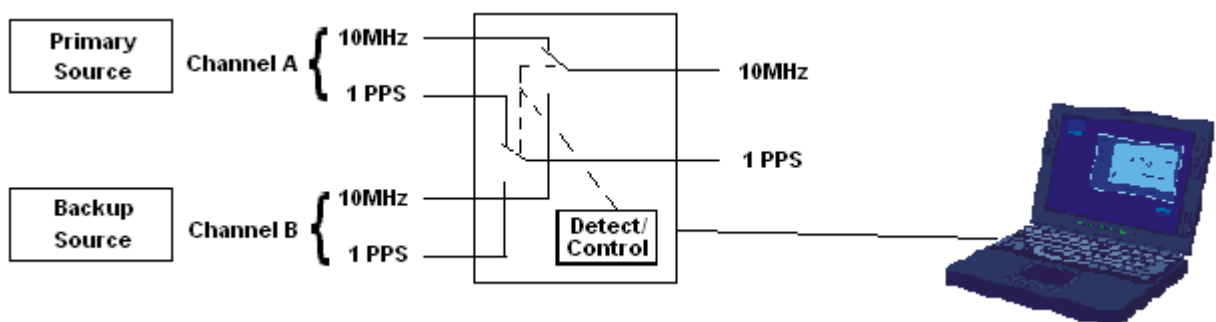
Based on the latest advances in semiconductor technology, the unit accepts two input pairs consisting of an RF (sine/square) signal and a pulse (typically 1 PPS). Both primary and backup input pairs are monitored for signal health, and if either the primary RF or pulse signals are determined faulty, the unit automatically switches to the backup channel within < 3msec (typical).

In addition to providing for local control from the instrument front panel, the comprehensive

communications package provides status reporting and instrument control on both RS232 and Ethernet interfaces with a variety of available protocols.

Range setting on the pulse and frequency inputs allows fast detection of RF signals from <1MHz to >20MHz and pulse ranges from 0.1second to 2 seconds.

Front panel indicators include RF and fault monitoring on each of the input channels, together with active channel indication and operating mode (auto/manual).



Typical Layout Schematic

Monitor/Control

Specifications

Electrical

Inputs

Channel A

RF Input >1MHz to <20MHz sine wave
13 dBm (1V rms nominal)

Pulse Input 0.5 to 10 Hz
5V CMOS into 50 ohms

Channel B

RF Input >1MHz to <20MHz sine wave
13 dBm (1V rms nominal)

Pulse Input 0.5 to 10 Hz
5V CMOS into 50 ohms

Outputs (Same as Selected Input Signals)

RF <1MHz to >20MHz sine wave
13 dBm (1V rms nominal)

Pulse 1 PPS (range 0.5 to 10 Hz)
5V CMOS into 50 ohms

Alarms Relay Contacts

Switching

Switching Time <3 milli seconds (typical)
Type Relays (Failsafe)
Break before Make

Switch Control Auto/Remote/Local

Front Panel Controls/Indicators

Mode Auto/Manual
Channel Select Ch A / Ch B
Mode(Manual/Auto) Green LED
Active Ch. (A/B) Green LED

Channel A
Fault 1 (Pulse) Red LED
Fault 2 (RF) Red LED

Channel B
Fault 1 (Pulse) Red LED
Fault 2 (RF) Red LED

Control/Monitor Features

Ethernet Telnet, SNMP, HTTP
RS 232 Console interface

Environmental/Physical

Power Requirements
AC Input ($\pm 15\%$) 90 - 264 VAC, <10W
DC Input (optional)
Dimensions 1U x 19" x 12"
Operating Temp. 0 to 50 deg. C
Relative Humidity 0-95% (non-cond.)

Configuration Options

| Option # | Description |
|----------|--------------------|
| DCPS | DC Power Supply |
| RSLD | Mounted Rackslides |
| FSRF | Fast RF Switching |



1220A Rear

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1226A Redundant Auto Switch with Distribution

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- Switches two RF/Pulse Pairs
- Fast Switching time (<3msec typical)
- Settable pulse and RF period
- Settable "jitter" range
- Remote Control/Monitor
- SNMP, HTTP, Console, interfaces
- Up to 24 RF and/or Digital Outputs



1226A Front

The ptf 1226A Auto Switch is purpose designed for time and frequency applications where reliability criteria call for redundant RF and Pulse sources with multiple outputs.

Based on the latest advances in semiconductor technology, the unit accepts two input pairs consisting of an RF (sine/square) signal and a pulse (typically 1 PPS). Both primary and backup input pairs are monitored for signal health, and if either the primary RF or pulse signals are determined faulty, the unit automatically switches to the backup channel within < 3msec (typical).

In addition to providing for local control from the instrument front panel, the comprehensive

communications package provides status reporting and instrument control on both RS232 and Ethernet interfaces with a variety of available protocols.

Range setting on the pulse and frequency inputs allows fast detection of RF signals from <1MHz to >20MHz and pulse ranges from 0.1second to 2 seconds.

Front panel indicators include RF and fault monitoring on each of the input channels, together with active channel indication and operating mode (auto/manual).

Specifications

Electrical

Inputs

Channel A

RF Input >1MHz to <20MHz sine wave
13 dBm (1V rms nominal)

Pulse Input 0.5 to 10 Hz
5V CMOS into 50 ohms

Channel B

RF Input >1MHz to <20MHz sine wave
13 dBm (1V rms nominal)

Pulse Input 0.5 to 10 Hz
5V CMOS into 50 ohms

Outputs (Same as Selected Input Signals)

RF <1MHz to >20MHz sine wave
13 dBm (1V rms nominal)

Pulse 1 PPS (range 0.5 to 10 Hz)
5V CMOS into 50 ohms

Alarms Relay Contacts

Switching

Switching Time <3 milli seconds (typical)
Type Relays (Failsafe)

Break before Make

Switch Control Auto/Remote/Local

Front Panel Controls/Indicators

Mode Auto/Manual

Channel Select Ch A / Ch B

Mode(Manual/Auto) Green LED

Active Ch. (A/B) Green LED

Channel A

Fault 1 (Pulse) Red LED

Fault 2 (RF) Red LED

Channel B

Fault 1 (Pulse) Red LED

Fault 2 (RF) Red LED

Control/Monitor Features

Ethernet Telnet, SNMP, HTTP

RS 232 Console interface

Environmental/Physical

Power Requirements

AC Input ($\pm 15\%$) 90 - 264 VAC, <10W

DC Input (optional)

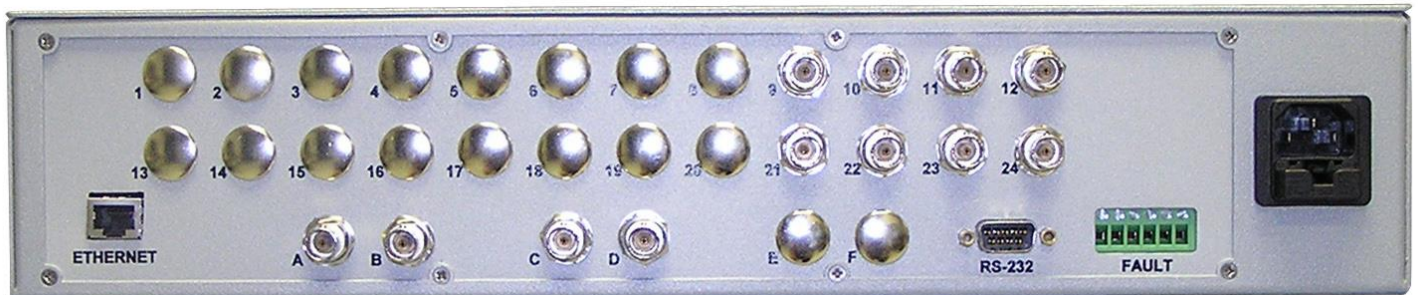
Dimensions 1U x 19" x 12"

Operating Temp. 0 to 50 deg. C

Relative Humidity 0-95% (non-cond.)

Configuration Options

| Option # | Description |
|----------|--------------------|
| DCPS | DC Power Supply |
| RSLD | Mounted Rackslides |
| FSRF | Fast RF Switching |



1226A Rear

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1226 Auto Switch / Distribution with Remote Monitor/Control Interface

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- Up to 36 output channels
- RF, Digital, and time code options available
- Unique **ANALOG LEVEL Monitoring** on RF Channels
- Broadband RF, Digital and Modulate Time Code
- Front Panel Status Indication
- Up to three separate auto switched inputs
- Remote Monitor /Control (Ethernet – Telnet, SNMP, Web Browser/RS 232)
- NTP Client included for automatic event time-stamping

The ptf 1226 Auto Switch represents the next generation of redundancy switching that includes an additional switch channel (now 3 channels total) of RF, and/or Digital, and/or Time Code, Auto Switching, and a full Ethernet/RS232 remote monitoring/control interface designed with the same look and feel as the **ptf** range of GPS frequency and time standards.

In addition to the auto switching capability, the **ptf 1226** delivers up to thirty six channels of RF, Digital or Time Code frequency and/or timing references to critical applications such as Satellite Communications, Broadcasting, WiMax and others.

Analog channels include a unique **output level monitoring** feature to provide remote indication of rms voltage output level.

The unit can accept up to three pairs of inputs (usually from separate primary and backup sources), and provides monitoring of both the inputs and outputs for signal integrity. In addition RF channels include analog level monitoring. If the primary input on any auto switch channel fails, the unit will automatically switch to the backup input and indicate a primary signal fault.

Full remote monitoring and control via RS232 and Ethernet interfaces includes telnet, http (web browser), and SNMP protocols

ptf 1226 Front View



Specifications

Inputs

RF

Frequency 1MHz to 30MHz
Amplitude 13dBm into 50 ohms
(1V rms into 50 ohms)

Digital

Frequency 0.01 PPS to 20 MPPS
Amplitude 5V TTL into 50 ohms
(nominal)

Time Code

Modulation Freq. 100Hz to 1MHz
Amplitude 3V pk-pk
Modulation Ratio 3 : 1

Outputs

RF

Frequency 1MHz to 30MHz
Amplitude 13dBm into 50 ohms
(1V rms into 50 ohms)

Digital

Frequency 0.01 PPS to 20 MPPS
Amplitude 5V TTL into 50 ohms
(nominal)

Time Code

Modulation Freq. 100Hz to 1MHz
Amplitude 3V pk-pk
Modulation Ratio 3 : 1

Switching Characteristics(optional)

Switch Type Latching Relay
Switching time <3ms typical

Indicators/Controls

Power/Sum. Fault Green/Orange LED
Channel Ok/Fault Green/Red LED
Manual Selected Red LED

Controls

Auto/Manual Membrane switch
Channel Select Membrane switch

Power Supply

Input voltage 90 - 264 VAC
Input power <10W

Environmental

Temperature: 0° to 55° C
Relative Humidity: 0 to 95%, non-condensing

Physical

Dimensions (HxWxD): 2U x 19" x 12"
Weight <15 lbs



Rear Panel View

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ptf 1229A Frequency Generator/Micro Phase Stepper

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- **Wide Output Frequency Range (0.1Hz to 30MHz)**
- **High Resolution 0.1 Hz (over full range)**
- **Phase adjustments to 1ns resolution**
- **Sine and Square Wave outputs for each channel**
- **Up to Four Independent Frequency Output Channels**
- **External reference capability for precision applications**
- **Redundant Input Auto Switching Capability**
- **Full remote Monitoring/Control (Ethernet/RS232/USB)**
- **User Friendly Front Panel Keypad/Vacuum Fluorescent Display**



The ptf 1229A utilizes the latest technological advances in precision frequency synthesizers to provide a multiple output, wide range, high precision frequency reference instrument, capable of delivering frequencies over the range of 0.1Hz up to 30MHz with a resolution of 0.1 Hz over the full range.

The unit includes an external reference input to allow extremely high accuracy outputs at precisely the frequency required, together with a front panel indicator to verify “lock” to the external reference. The standard unit includes two independent frequency outputs of any frequency within the range, and provides both sine and square wave outputs for each frequency.

An expansion module gives the capability to increase the number of independent frequency outputs up to a total of four frequencies, with sine and square wave outputs for each, giving a total of eight outputs.

Additionally the unit provides a capability to inject phase changes on the output with a resolution of 1ns. Set up allows either advance or retard of phase.

The unit includes full remote monitoring/control interfaces with the standard ptf menu system including expanded help on each command, RS232/USB, and Ethernet interfaces with telnet, and web browser protocols. For local front panel control the unit has an easy to use front panel keypad and high brightness vacuum fluorescent display that allows parameter setting through a menu system, and status monitoring with multiple status screens available on the highly visible display.

The estimated MTBF of the unit is >300,000 hours, but for applications requiring even greater reliability, the unit offers an auto switching input option, allowing two independent references to be connected to the unit.

Specifications

Electrical

Frequency Output Channels (6 max.)

Frequency Range 0.1Hz to 30MHz

Output Level

Sine 1V rms (nominal)

Square 5V TTL

Harmonic Distortion <-40 dB

Non-Harmonic Signals <-80 dB

Load Impedance 50 ohms

Isolation >80 dB

Connectors BNC

SSB Phase Noise @ 10MHz

(1 Hz Bandwidth) Offset from carrier

10 Hz -95 dBc/Hz

100 Hz -125 dB

1,000 Hz -148 dB

10,000 Hz -162 dB

RF Input

Frequency 10MHz

Level 1 V rms (nominal)

Alarm Output

Summary alarm indicates failure of any output signal

Non-alarm condition: Relay energized (fail safe)

Connector: 9 pin D-male

Controls & Indicators

Power Green LED, power is connected

Alarm Red LED, signal output failure

Lock Input signal indicator

Environmental and Physical

Temperature: 0° to 55° C

Relative Humidity: 0 to 95%, non-condensing

Power Requirements

AC Input ($\pm 15\%$) 90 - 264 VAC, <10W

Dimensions (HxWxD): 1U x 19" x 12"

Configuration Options

| Option # | Description |
|----------|-----------------------------|
| ADOP | Additional outputs(total 4) |
| DCPS | DC Power Supply |

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1231A L1 Band Distribution

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- **Input Frequency 200 to 2000 MHz**
- **High Quality RF Outputs**
- **Low Noise**
- **Isolation (>40dB typical)**
- **Use one GPS antenna for up to 12 outputs**
- **Convenient 1U Rack Mount Packaging**



The ptf 1231A GPS L-Band RF Distribution amplifiers provide high performance GPS signal references for laboratory or systems use.

In most applications the low noise and signal gain capability of the unit will provide users with up to 12 robust GPS signal sources from one antenna for lab or system requirements.

The unit uses individually buffered output stages and insures maximum isolation between

the individual outputs. Outputs provide a load of 180 ohms to simulate the DC power draw of a healthy active antenna for those receivers that monitor antenna current.

Isolation from output to output is >-40 dB. The input also offers a DC voltage for biasing an active antenna.

Specifications

Electrical

RF Input

| | |
|-----------------------|-------------------|
| Frequency Range | 200 to 2000 MHz |
| Input Level (minimum) | 5 dBm |
| Load Impedance | 50 ohm |
| Connectors (female) | TNC |
| GPS Antenna Bias | Selectable 3/5VDC |

RF Output

| | |
|---------------------|-----------------|
| ptf 1231A | 12 outputs |
| Frequency Range | 200 to 2000 MHz |
| Gain at each output | 5 dB, +/- 1 dB |
| Load Impedance | 50 ohm |
| Isolation | >40dB |
| Connector (female) | TNC |

Alarm Output

Summary alarm indicates failure of any output
Non-alarm condition: Relay energized

Controls & Indicators

| | |
|-------|-----------|
| Power | Green LED |
| Alarm | Red LED |

Environmental/Physical

| | |
|---------------------|--------------------|
| Temperature: | 0° to 55° C |
| Power Requirements: | 90 - 264VAC, <15W |
| DC Option | 18 to 72 VDC |
| Dimensions (HxWxD): | 1.75 " x 19" x 12" |
| Relative Humidity : | 0-95% (non-cond.) |

1603A Broadband RF Distribution Amplifier with Remote M/C

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- Input frequencies 500kHz to 50MHz
- 16 Broadband Outputs
- Low Additive Phase Noise
- Isolation (>100dB typical)
- Remote Monitoring of RMS Output Levels
- Remote Selection of Active Outputs
- Input Auto Switch (option)
- Adjustable Output Level (option)
- Low Cost
- Convenient 1U, 19" rack mount package

Building on the success of the 1203C Broadband RF Distribution amplifier, the 1603A provides additional high performance frequency outputs, enhanced this with a full remote monitor and control interface.

With the monitor and control, a remote user can easily monitor status of each of the inputs/outputs of the unit on either RS232 or Ethernet with Telnet, web browser and SNMP interfaces. Optionally the unit can take two separate inputs into an input switch with either fully automatic or manual control.

For added flexibility, individual outputs can be enabled/disabled via remote control so that

unused outputs are isolated from the alarm system.

Input and output status is immediately evident from front panel indicators of each channel. Also auto/manual selection of the auto switched input is available from the front panel key pad.

In most applications the phase noise capability of the unit will out-perform the input signal performance to such a degree that no additive phase noise will be noticeable on the outputs.

Isolation output to output is >100 dB and harmonics are <-40 dB. The unit provides a fixed gain of 1, and all outputs are provided on convenient BNC connectors. Outputs provide up to 13dBm into a 50 ohm load



Specifications

Electrical

| | |
|--|--------------------------------------|
| RF Output (sixteen) Frequency Range | 500kHz to 50MHz Broadband outputs |
| Level | 1V rms (nominal) |
| Harmonic Distortion | <-40 dB |
| Non-Harmonic Signals | <-80 dB |
| Load Impedance | 50 ohm |
| Isolation | >100 dB |
| Connectors | BNC |

| | |
|--|---------|
| Additive SSB Phase Noise (1 Hz Bandwidth) Offset from carrier | |
| 1 Hz | -135 dB |
| 10 Hz | -150 dB |
| 100 Hz | -160 dB |
| 1,000 Hz | -165 dB |
| 10,000 Hz | -165 dB |

| | |
|------------------------------|-----------------|
| RF Inputs Frequency Range | 500kHz to 50MHz |
|------------------------------|-----------------|

| | |
|----------------------|--|
| Level | 1 V rms (nominal) |
| Alarm Output | Summary alarm indicates failure of any output signal |
| Non-alarm condition: | Relay energized (fail safe) |
| Connector: | 9 pin D-male |

Controls & Indicators

| | |
|--------------|---|
| Each Channel | Green/Red LED, Healthy/Fault |
| Input | Manual/Auto Red LED(manual) (if Auto switch fitted) |
| Keypad | Manual/Auto Channel (A/B) |
| Ethernet | RJ 45, Rear Panel |
| RS232 | DB9 Rear panel |

Protocols(Ethernet)

Telnet
SNMP
Web Browser

NOTE: Chassis reversible for front panel
outputs

Environmental and Physical

| | |
|---------------------|--------------------------|
| Temperature: | 0° to 55° C |
| Relative Humidity: | 0 to 95%, non-condensing |
| Power Requirements | |
| AC Input (±15%) | 90 - 264 VAC, <10W |
| DC Input (optional) | |
| Dimensions (HxWxD): | 1U x 19" x 16" |

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1604A Digital Distribution Amplifier with Remote M/C

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- Input frequencies DC to 30MHz
- 16 Digital Outputs
- Isolation (>100dB typical)
- Remote Monitoring Outputs
- Remote Selection of Active Outputs
- Input Auto Switch (option)
- Low Cost
- Convenient 1U, 19" rack mount package

Building on the success of the 1204A Digital Distribution amplifier, the 1604A provides additional high performance digital outputs, and enhances this with a full remote monitor and control interface.

With the monitor and control, a remote user can easily monitor status of each of the inputs/outputs of the unit on either RS232 or Ethernet with Telnet, web browser and SNMP interfaces. Optionally the unit can take two separate inputs into an input switch with either fully automatic or manual control.

For added flexibility, individual outputs can be enabled/disabled via remote control so that unused outputs are isolated from the alarm system.

Input and output status is immediately evident from front panel indicators of each channel. Also auto/manual selection of the auto switched input is available from the front panel key pad. .

Isolation output to output is >100 dB. The unit provides 5V TTL, 50 ohm outputs, and all outputs are provided on convenient BNC connectors.



Specifications

Electrical

| | |
|---|--|
| Digital Output (sixteen) Frequency Range | DC to 10MHz |
| Level | 5V TTL (nominal) |
| Load Impedance | 50 ohm |
| Isolation | >100 dB |
| Connectors | BNC |
| Digital Inputs Frequency Range | DC to 10MHz |
| Level | 5V TTL (nominal) |
| Output Impedance | 50 ohm |
| Alarm Output | Summary alarm indicates failure of any output signal |
| Non-alarm condition: | Relay energized (fail safe) |
| Connector: | 9 pin D-male |

Controls & Indicators

| | |
|---------------------|---|
| Each Channel | Green/Red LED, Healthy/Fault |
| Input | Manual/Auto Red LED(manual) (if Auto switch fitted) |
| Keypad | Manual/Auto Channel (A/B) |
| Ethernet | RJ 45, Rear Panel |
| RS232 | DB9 Rear panel |
| Protocols(Ethernet) | |
| Telnet | |
| SNMP | |
| Web Browser | |

Environmental and Physical

| | |
|---------------------|--------------------------|
| Temperature: | 0° to 55° C |
| Relative Humidity: | 0 to 95%, non-condensing |
| Power Requirements | |
| AC Input (±15%) | 90 - 264 VAC, <10W |
| DC Input (optional) | |
| Dimensions (HxWxD): | 1U x 19" x 16" |

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1605A IRIG(am) Time Code Distribution with Remote M/C

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- Input frequencies 100Hz to 1MHz
- 16 Time Code Outputs
- Remote Monitoring Outputs
- Remote Selection of Active Outputs
- Input Auto Switch (option)
- Low Cost
- Convenient 1U, 19" rack mount package

Building on the success of the 1205A IRIG B (am) Time Code Distribution amplifier, the 1605A provides additional high performance Time Code outputs, and enhances this with a full remote monitor and control interface.

With the monitor and control, a remote user can easily monitor status of each of the inputs/outputs of the unit on either RS232 or Ethernet with Telnet, web browser and SNMP interfaces. Optionally the unit can take two separate inputs into an input switch with either fully automatic or manual control.

For added flexibility, individual outputs can be enabled/disabled via remote control so that unused outputs are isolated from the alarm system.

Input and output status is immediately evident from front panel indicators of each channel. Also auto/manual selection of the auto switched input is available from the front panel key pad. .

The unit provides >3V pk-pk, 50 ohm outputs, and all outputs are provided on convenient BNC connectors.



Specifications

Electrical

Time Code Output (sixteen)
Frequency Range 100Hz to 1MHz

Level >3V pk-pk
Load Impedance 50 ohm
Connectors BNC

Time Code Inputs
Frequency Range 100Hz to 1MHz

Level 3V pk-pk
Output Impedance 50 ohm

Alarm Output Summary alarm
 indicates failure of
 any output signal

Non-alarm condition: Relay energized (fail
 safe)

Connector: 9 pin D-male

Controls & Indicators

Each Channel Green/Red LED,
 Healthy/Fault

Input Manual/Auto
 Red LED(manual)
 (if Auto switch fitted)

Keypad Manual/Auto
 Channel (A/B)

Ethernet RJ 45, Rear Panel

RS232 DB9 Rear panel

Protocols(Ethernet)

Telnet
SNMP
Web Browser

Environmental and Physical

Temperature: 0° to 55° C

Relative Humidity: 0 to 95%, non-condensing

Power Requirements

AC Input (±15%) 90 - 264 VAC, <10W
DC Input (optional)

Dimensions (HxWxD): 1U x 19" x 16"

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Overview - Quartz Frequency Standards

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Quartz Frequency Standards provide the most cost effective reference solution for many application requirements.

The high quality Quartz oscillators utilized in ptf Quartz Frequency Standards deliver outstanding phase noise and short term stability performance for applications where low noise is paramount.

In addition the disciplined versions enable coupling of this outstanding short-term performance to the long-term stability of an external reference such as GPS, Rubidium or Cesium, providing to the user an excellent all round performance at minimum cost.

Options include adding RF and Pulse distribution ideal for numerous applications where clean multiple reference signals are required.

2210A Quartz Frequency Standard

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- **5MHz or 10MHz Frequency Reference**
- **100kHz Capability (with MOPS option)**
- **Ultra High Stability**
- **Low Phase Noise**
- **Alarm Indicator and Output**

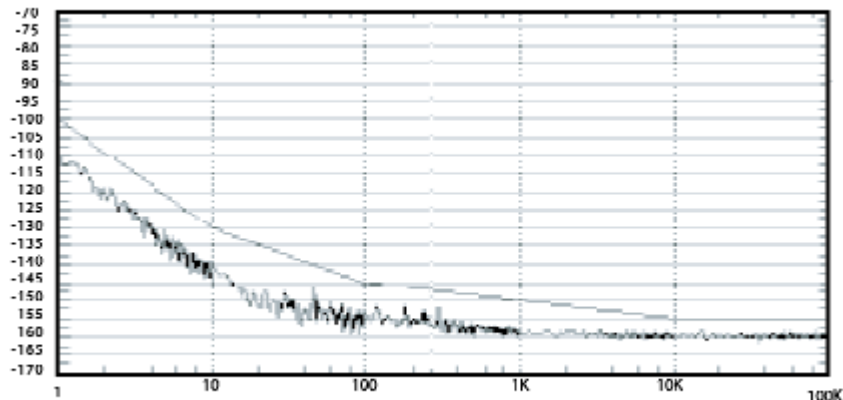


The ptf 2210A Quartz Frequency Standard has been designed to provide a highly stable and spectrally pure frequency reference for applications requiring the ultimate in short term frequency performance.

The instrument contains a double oven controlled stress compensated (SC cut) quartz crystal oscillator (OCXO) to give the ultimate in performance.

Ideal for laboratory or system use, the unit provides good stability performance at lower cost and with improved phase noise.

A range of options are available to enhance the functionality of the unit including disciplining from an external reference for improved long term stability, multiple frequency outputs and a DC power supply.



2210A Phase Noise Plot

Specifications

Electrical Outputs

| | | |
|---------------------------|----------------------------------|-------|
| Frequency | 5MHz or 10MHz RF sine, +13dBm | |
| Output Amplitude | 1V (into 50W) | |
| Harmonic Distortion | -40dB | |
| Spurious | <-80dB | |
| Aging | 1E-10/day (5MHz) 3E-8/year | |
| | 5E-10/day (10MHz) 3E-8/year | |
| Short-term Stability | 1E-12 (5MHz) | |
| | 1E-11 (10MHz) | |
| SSB Phase Noise (dBc/Hz) | | |
| Offset | 5MHz | 10MHz |
| 1Hz | -110 | - 95 |
| 10Hz | -140 | -125 |
| 100Hz | -150 | -150 |
| 1000kHz | -155 | -150 |
| 10000kHz | -155 | -155 |
| 100000kHz | -155 | -155 |

Environmental & Physical

| | | |
|---------------------|-------------------------|--|
| Temp. Range | 0° to +50°C (Ref +25°C) | |
| Power Requirements | | |
| AC Input (±15%) | 90 - 264 VAC, <10W | |
| DC Input (optional) | | |
| Dimensions (HxWxD) | 1U x 19" x 12" | |

Configuration Options

| Option # | Description |
|----------|----------------------------------|
| PPSI | External 1 PPS |
| MOPS | Multiple Outputs(0.1,1,5 &10MHz) |
| RF01 | 1MHz Sine wave out (x4) |
| RF05 | 5MHz Sine wave out (x4) |
| RF10 | 10MHz Sine wave out (x4) |
| RF100 | 100MHz Sine wave out (x4) |
| PULS | Pulse Distribution (x4) |
| DCPS | DC Power Supply |
| RSLD | Mounted Rack slides |

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Overview - GPS/GNS Frequency and Time Standards and Network Time Servers

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The GPS system has become a de facto standard for numerous applications requiring precise time synchronization and frequency accuracy.

Now with the impending capability of a number of additional satellite constellations the techniques developed for the original GPS system are assured of being effective over a complete range of different systems including Glonass, Galileo, Beidou and others.

The GPS system comprises 24 active satellites each updated twice daily from the USAF master clock reference ensemble based in Colorado. Through constant monitoring by the National Institute of Standards and Technology (NIST) the system is traceable to the international reference for world time, Universal Time Coordinated (UTC). Other systems differ in exact detail, but their principals of operation remain the same.

The ptf range of GNS Frequency References and Network Time Servers now include the latest addition, the ptf 3207A range of products, that deliver unrivalled performance from this highly accurate signal in a number of cost effective forms to meet a multitude of time and frequency reference requirements. From low phase noise, highly stable and accurate, system frequency references for Sat-Com and Digital Broadcasting applications, to computer network and e-commerce time stamping applications.

3201B GlobalTyme™ GPS Standard

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- **GPS Tracking: 12 parallel channels**
- **Ovenized Quartz Oscillator**
- **7 ms Over 8 Hours**
- **1PPS and 10MHz Outputs**
- **GPS Antenna and 30 ft. Cable Included**
- **Low Cost**
- **Convenient 1U , 19" rack mount package**



The ptf 3201B provides an alternative low-cost solution for applications requiring a GPS receiver but with a 12 channel receiver and additional remote monitoring/control functionality over the 3201A. The 3201B offers contro/monitor on both RS 232 and Ethernet ports plus a “time print” RS 232 port, thus allowing interfacing to a wider range of equipment. This additional functionality comes in a package which is still offered at a low cost to the end user.

The ptf 3201B uses at its heart a microprocessor-CPLD combination interfacing to a 12-channel GPS receiver, control circuitry and a high-quality ovenized oscillator all on a single board. The result is high integrity and reliability.

As with the 3201A, the level of integration of the ptf 3201B makes it the perfect solution for the precise timing applications within the wireless industry. Among its uses are synchronizing and maximizing bandwidth for wireless local loop.

The ptf 3201B's GPS Clock outputs a 10 MHz reference signal and a 1PPS signal with an over-determined solution synchronized to GPS or UTC time. The 10MHz reference

accommodates applications requiring sub-microsecond timing.

The microprocessor/CPLD combination performs both the GPS navigation and oscillator disciplining functions. The GPS receiver is driven directly by the 10MHz output signal of the oscillator. This is calibrated against the incoming GPS signal, with the resulting clock and frequency measurements fed into the oscillator frequency control algorithm.

The ptf 3201B operates on the coarse acquisition (C/A) code transmitted from each satellite. This C/A code, which is unique for each satellite, contains information on the satellite identity for acquisition and tracking. The C/A pseudo random number (PRN) code is a 1023 bit code that repeats at the rate of every millisecond.

Operating on the L1 band and utilizing the C/A code transmissions, the ptf 3201B determines time and frequency by measuring the time of arrival of a precise timing mark transmitted by each of the satellites, and computing the time against its known (previously determined or entered) position. This is the basis for the ptf 3201B's one pulse per second (1PPS) output

Specifications

Electrical

GPS Sub-system
L1 frequency, C/A code (SPS)
12-channel continuous tracking receiver

Outputs

10MHz Special Low Phase Noise Output
+12.5dBm \pm 2.5dBm into 50W

1PPS Referenced to UTC, BNC, TTL
levels into 50ohms, 20 ns
(one sigma, fixed position mode)

Additive SSB Phase Noise
(1 Hz Bandwidth) Offset from carrier

| | |
|--------|---------|
| 1 Hz | -94 dB |
| 10 Hz | -125 dB |
| 100Hz | -155 dB |
| 1 kHz | -162 dB |
| 10 kHz | -162 dB |

Harmonic Level -40 dBc max

Spurious -70 dBc max

Oscillator (OCXO)

Aging <5E-10/day <5E-8/year
Electrical Control Range \pm 5E-7

Controls & Indicators

| | |
|-------|-----------|
| Power | Green LED |
| Lock | Green LED |
| Fault | Red LED |

Environmental & Physical

| | |
|-----------------------|----------------|
| Temperature Operating | -0° to +60° C |
| Storage | -40° to +85° C |

| | |
|------------------|---------------|
| Maximum Altitude | 18,000 meters |
|------------------|---------------|

Relative Humidity

| | |
|---------|-----------------------------|
| Chassis | 0 to 95%, RH non-condensing |
| Antenna | Unlimited |

Power Requirements

| | |
|-------------------|---------------|
| Input voltage | 90 to 264 VAC |
| Input Freq. Range | 45 to 65 Hz |
| DC (optional) | |

| | |
|--------------------|----------------|
| Dimensions (HxWxD) | 1U x 19" x 12" |
|--------------------|----------------|

| | | |
|--------|---------|----------|
| Weight | Chassis | <10 lbs |
| | Antenna | <1.5 lbs |

Configuration Options

| Option # | Description |
|----------|---------------------|
| RSLD | Mounted Rack slides |

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3203A & 3204A GlobalTyme™ GPS Receivers

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- **GPS Tracking: 12 parallel channels**
- **Acquisition Time: <1.5 minutes (warm start)**
- **Accuracy (1PPS): <20ns**
- **Holdover: <0.2 micro seconds/day (Rb opt)**
- **100/10 Base T ethernet**
- **NTP (optional), Telnet, TCP/IP, FTP**
- **Monitor/Control i/f**
- **Alarm indicator and output**
- **1MHz, 5MHz o/p options**
- **GPS Antenna & 30 Ft. Cable Included**
- **Available in 1U (3203A) & 2U (3204A)**



The ptf GlobalTyme™ Multi Function GPS Receiver provides extraordinary stability in a highly flexible approach to utilizing the caesium stability of the GPS satellite system. Available in both 1U (3203A) and 2U (3204A) versions, the GlobalTyme™ can be configured as a high performance frequency standard, a comprehensive time standard or both.

Frequency standard performance is application tailored with a range of local oscillator options (TCXO, OCXO, Ultra Low Noise, Rubidium & High Performance Rubidium).

The GlobalTyme™ is equipped with one 10MHz RF output (1MHz and 5MHz available as options). Additional options for telecommunications signals of E1 or T1 clock

are also available. Internally fitted distribution can be added to provide up to 10 (3203A) or 24 (3204A) outputs.

For timing, synchronization and time keeping applications the unit provides IRIG B, 1 PPS, and optional NTP. The 1 PPS output is accurate to within ~20ns (1 sigma) of UTC.

An optional 1PPS input offers system redundancy or simply alternative master reference inputs to the internal GPS if desired.

For monitoring and control the unit houses an Ethernet interface (RJ-45) with various protocols suited to different user needs, from a simple Telnet interface to a fully web-driven browser interactive interface.



Specifications

Electrical

GPS Rx 12 parallel channel

Front Panel Disp. Vacuum Fluorescent
Display(opt)

RF Outputs*

10MHz sine wave 1V rms into 50 ohms
5MHz (opt) 1V rms into 50 ohms
1MHz (opt) 1V rms into 50 ohms
100kHz(opt) 1V rms into 50 ohms

* Standard configuration offers 10MHz sine wave, IRIG B(am) and 1PPS outputs

Digital Outputs

1PPS 5V CMOS into 50 ohms
Prog 5V CMOS into 50 ohms

Pulse Rates
(1PPS to 10MPPS)

100/10 Ethernet i/f RJ-45 Connector
Telnet monitoring/configuration/control
HTTP configuration control
DHCP TCP/IP auto configuration
NTP(optional)
SNMP(optional)

Serial Interface

RS232 Control/Monitor(DB9)
RS232(opt) Time Output(DB9)

Timing Outputs

IRIG B(am) 3v p-p into 600 ohm
IRIG B(DCLS) 5V/50 ohm, IEEE 1344

Accuracy

10MHz <2E-12 (Locked to GPS)

1PPS <20ns wrt UTC (1 sigma)

NTP <10ms (typical)

Stability (Allan Deviation)

| | TCXO | OCXO | ULNO | Rb |
|-------|-------|-------|-------|-------|
| 1 day | 2E-10 | 3E-11 | 3E-11 | 3E-12 |
| 1 mth | 2E-11 | 2E-11 | 2E-11 | 2E-12 |
| 1 yr | 1E-9 | 3E-11 | 5E-12 | 2E-12 |

Aging (unlocked from GPS)

| | TCXO | OCXO | ULNO | Rb |
|-------|------|------|-------|---------|
| 1 day | | 1E-9 | 5E-10 | 1.7E-12 |
| 1 mth | | | | 5E-11 |
| 1 yr | | | | 5E-10 |

Phase Noise(SSB), dBc/Hz

| | TCXO | OCXO | ULNO | Rb |
|--------|------|------|------|------|
| 1 Hz | -72 | -94 | -108 | -90 |
| 10 Hz | -93 | -125 | -125 | -130 |
| 100 Hz | -115 | -155 | -150 | -140 |
| 1kHz | -126 | -162 | -160 | -150 |
| 10kHz | -126 | -162 | -160 | -160 |

Spurious (OCXO option)

Offset from carrier

1kHz to 200kHz <-100dBc

200kHz to 1MHz <-80dBc

1MHz to 10MHz <-80dBc

Front Panel

Indicators

Fault Amber LED

Lock Green LED

Power Green LED

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Environmental/Physical

Temperature

Operating

| | |
|---------|---------------------|
| Unit | 0 deg C to 50 deg C |
| Antenna | -40 to +85 deg C |

Storage

| | |
|---------|------------------|
| Unit | -20 to 70 deg C |
| Antenna | -40 to 100 deg C |

Humidity

| | |
|---------|--------------------|
| unit | 0-95% RH(non-cond) |
| Antenna | Mil-STD-810E |

Power Requirements

| | |
|-------------------|---------------|
| AC input (+/-15%) | 90-264 VAC |
| DC input(opt) | 18V to 72V DC |

Dimensions

| | |
|-------------------|-------------------|
| 3203A | 1Ux19"x12" |
| 3204A | 2Ux19"x12" |
| Relative Humidity | 0-95% (non-cond.) |

Dynamic Characteristics

| | |
|--------------|---------------------|
| Velocity | 1800km/hr(515m/s) |
| Altitude | 60,000 ft / 18,000m |
| Acceleration | 4g maximum |
| Jerk | 5 m/s ³ |

Configuration Options

| Option | Description |
|--------|----------------------------|
| PPSI | External 1PPS in |
| MOPS | Multi RF outputs |
| RF01 | 1MHz sine x 4 |
| RF05 | 5MHz sine x 4 |
| RF10 | 10MHz sine x 4 |
| RF100 | 100MHz sine x 4 |
| TIME | IRIG B(am)x 4 |
| PULS | Pulse Distr.x 4 |
| OPTO | Optical Fiber Output |
| OPTI | Optical Fiber Input |
| OVEN | Hi Perf. OCXO |
| RUBS | Std perf. Rubidium |
| RUBH | Hi perf. Rubidium |
| ULNO | Ultra Low Noise o/p |
| DISP | Front panel keypad/Display |
| DCPS | DC power Supply |
| NTPO | Network Time Protocol |
| SNMP | Simple Network Mgt Prot. |
| HTTP | Web Browser |
| WINA | Window Mount antenna |
| LKIT | Lightning Protection Kit |
| RSLD | Mounted rack slides |



ptf 3204A



ptf 3203A

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- **GPS Tracking: 12 parallel channel**
- **Acquisition Time: <1.5 m (warm start)**
- **Accuracy (1PPS): <20ns(static mode)**
- **Accuracy (1PPS): <100ns(mobile mode)**
- **100/10 Base T Ethernet. Telnet**
- **NTP (optional)**
- **Monitor/Control i/f**
- **Alarm indicator and output**
- **1MHz, 5MHz o/p options**
- **GPS antenna and cable included**
- **Available in 1U(3203AB) and 2U(3204AB)**

The mobile version of the ptf GlobalTyme™ GPS Receivers provides the same functionality as the static version, with the additional feature of being able to operate in mobile mode for both ground and airborne applications. Available in both 1U (3203A) and 2U (3204A) versions, the units can be configured as a high performance frequency standard, a comprehensive time standard, or both.

Performance is application tailored with a range of local oscillator options including TCXO(standard), OCXO, Ultra Low noise oscillator, and high performance rubidium.

In standard configuration, the unit is equipped with 10MHz (options to add 100 kHz, 1 MHz, and 5 MHz), 1PPS and IRIG B(am) outputs.

Additional options for telecommunications signals of E1 (2048 kHz) or T1(1544 kHz) clock are also available. Internal RF distribution can be fitted to provide up to 10(3203AB) or 20(3204AB)10MHz outputs .

For timing, synchronization and time keeping, the unit provides optional NTP, TP and Daytime Protocol, in addition to the standard 1PPS and IRIG B outputs. The 1PPS output is accurate within <20ns (1 sigma) of UTC(USNO).

Velocity (2D and 3D), heading, and position coordinates are available through commands on the console/monitor ports and additional status screens on the front panel display(display option only)

Specifications

Environmental/Physical

Temperature

Operating

| | |
|---------|---------------------|
| Unit | 0 deg C to 50 deg C |
| Antenna | -40 to +85 deg C |

Storage

| | |
|---------|------------------|
| Unit | -20 to 70 deg C |
| Antenna | -40 to 100 deg C |

Humidity

| | |
|---------|--------------------|
| unit | 0-95% RH(non-cond) |
| Antenna | Mil-STD-810E |

Power Requirements

| | |
|-------------------|---------------|
| AC input (+/-15%) | 90-264 VAC |
| DC input(opt) | 18V to 72V DC |

Dimensions

| | |
|-------------------|-------------------|
| 3203A | 1Ux19"x12" |
| 3204A | 2Ux19"x12" |
| Relative Humidity | 0-95% (non-cond.) |

Dynamic Characteristics

| | |
|--------------|---------------------|
| Velocity | 1800km/hr(515m/s) |
| Altitude | 60,000 ft / 18,000m |
| Acceleration | 4g maximum |
| Jerk | 5 m/s ³ |

Configuration Options

| Option | Description |
|--------|----------------------------|
| PPSI | External 1PPS in |
| MOPS | Multi RF outputs |
| RF01 | 1MHz sine x 4 |
| RF05 | 5MHz sine x 4 |
| RF10 | 10MHz sine x 4 |
| RF100 | 100MHz sine x 4 |
| TIME | IRIG B(am)x 4 |
| PULS | Pulse Distr.x 4 |
| OPTO | Optical Fiber Output |
| OPTI | Optical Fiber Input |
| OVEN | Hi Perf. OCXO |
| RUBS | Std perf. Rubidium |
| RUBH | Hi perf. Rubidium |
| ULNO | Ultra Low Noise o/p |
| DISP | Front panel keypad/Display |
| DCPS | DC power Supply |
| NTPO | Network Time Protocol |
| SNMP | Simple Network Mgt Prot. |
| HTTP | Web Browser |
| WINA | Window Mount antenna |
| LKIT | Lightning Protection Kit |
| RSLD | Mounted rack slides |



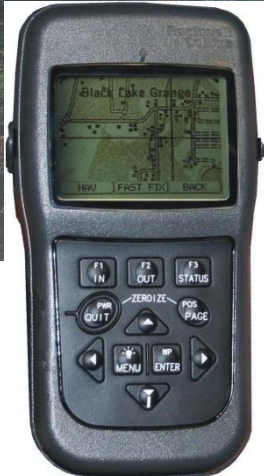
ptf 3204AB



ptf 3203AB

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3204A SAASM Solution



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- **GPS Tracking: 12 parallel channel**
- **TTFF: <100s (cold start)**
- **Accuracy (1PPS): <120ns**
- **100/10 Base T Ethernet**
- **NTP, Telnet**
- **Monitor/Control i/f**
- **Alarm indicator and output**
- **1MHz, 5MHz o/p options**
- **SAASM receiver not included**
- **TCXO, OCXO and Rubidium options**
- **Available in 2U(3204A)**

The ptf GlobalTyme™ Multi Function GPS Receiver provides extraordinary stability in a highly flexible approach to utilizing the caesium stability of the GPS satellite system. Available a 2U (3204A) version, the GlobalTyme™ can be configured as a high performance frequency standard, a comprehensive time standard or both.

Frequency standard performance is application tailored with rubidium oscillator option. The GlobalTyme™ is equipped with one 10MHz RF output (1MHz and 5MHz available as options). Additional options for telecommunications signals of E1 or T1 clock are also available. Internal fitted RF distribution can be added to provide up to 20 outputs.

For timing, synchronization and time keeping applications the unit provides IRIG, 1 PPS and NTP (optional). The 1 PPS output is accurate to within <20ns of UTC (USNO) .

Optional 1PPS input offers system redundancy or simply alternative master reference inputs to the internal GPS if desired.

For monitoring and control the unit houses an Ethernet interface (RJ-45) with various protocols suited to different user needs, from a simple Telnet interface to a fully web-driven browser interactive interface.

Specifications

Electrical

| | | | |
|--|----------------------|-----------------------------|--------------------------|
| Front Panel Display | Vacuum Fluorescent | Accuracy | |
| | | 10MHz | <2E-12 (Locked to GPS) |
| | | 1PPS | <120ns wrt UTC (1 sigma) |
| | | NTP | <10ms (typical) |
| RF Outputs* | | Stability (Allan Deviation) | |
| 10MHz sine wave | 1V rms into 50 ohms | 1s | 3E-11 |
| 5MHz (opt) | 1V rms into 50 ohms | 10s | 2E-11 |
| 1MHz (opt) | 1V rms into 50 ohms | 100s | 3E-12 |
| 100kHz(opt) | 1V rms into 50 ohms | | |
| * Standard configuration offers 10MHz sine wave, IRIG B(am) and 1PPS outputs | | | |
| Digital Outputs | | Aging | |
| 1PPS | 5V CMOS into 50 ohms | 1day | 1.7E-12 |
| Prog | 5V CMOS into 50 ohms | 1 month | 5E-11 |
| Pulse Rates | | 1 year | 5E-10 |
| (1PPS to 10MPPS) | | | |
| 100/10 Ethernet i/f | RJ-45 Connector | Phase Noise(SSB) | |
| Telnet monitoring/configuration/control | | 1Hz | -90dBc |
| HTTP configuration control | | 10Hz | -135dBc |
| DHCP TCP/IP auto configuration | | 100Hz | -140dBc |
| NTP(optional) | | 1000Hz | -150dBc |
| SNMP(optional) | | 10kHz | -150dBc |
| Serial Interface | | Front Panel | |
| RS232 Control/Monitor(DB9) | | Indicators | |
| RS232(opt) Time Output(DB9) | | Fault | Amber LED |
| | | Lock | Green LED |
| | | Power | Green LED |
| Timing Outputs | | | |
| IRIG B(am) | 3v p-p into 600 ohm | | |
| IRIG B(DCLS) | 5V into 50 ohm | | |
| IEEE 1344 compliant | | | |

Environmental/Physical

| | | |
|-------------|------|---------------------|
| Temperature | | |
| Operating | Unit | 0 deg C to 50 deg C |
| | Ant | -40 to +85 deg C |
| Storage | Unit | -20 to 70 deg C |
| | Ant | -40 to 100 deg C |
| Humidity | unit | 0-95% RH |
| | Ant | Mil-STD-810E |

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Power Requirements

| | |
|-------------------|---------------|
| AC input (+/-15%) | 90-264 VAC |
| DC input(opt) | 18V to 72V DC |

Dimensions

| | |
|-------|------------|
| 3204A | 2Ux19"x12" |
|-------|------------|

3203A WiMax Multi Function GPS Receiver

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- **GPS Tracking: 12 parallel channels**
- **Accuracy (1PPS): <20ns**
- **100/10 Base T Ethernet**
- **NTP, Telnet**
- **Monitor/Control i/f**
- **Alarm indicator and output**
- **GPS antenna and cable included**
- **Compact 1U package**
- **AC (100V to 265V) and DC (20 to 72V and -48V) versions available**

The ptf 3203A WiMax GPS Receiver provides extraordinary stability by using the caesium stability of the GPS satellite system. Available in both DC power and AC power versions, the 3203A is a high performance frequency standard, and comprehensive time standard, designed to meet the demanding specifications of WiMax.

Frequency standard performance is application tailored using a high performance OCXO local oscillator to provide the necessary phase noise and stability performance.

The standard configuration, provides three 10MHz and three 1PPS outputs all conveniently mounted on the front of the unit for easy access.

For timing, synchronization and time keeping, the unit provides NTP, TP and Daytime Protocol, in addition to the standard 1PPS outputs. The 1PPS output is accurate within <20ns (1 sigma) of UTC(USNO).

For monitoring and control the unit houses both RS232 serial and 100/10 BaseT Ethernet (RJ 45) with Telnet and SNMP protocols, and a browser driven web interface.

Specifications

Electrical

GPS Rx 12 parallel channel

RF Outputs*
10MHz sine(3) 1V rms into 50 ohms

Digital Outputs
1PPS(3) 5V CMOS into 50 ohms

100/10 Ethernet i/f RJ-45 Connector
Telnet monitoring/configuration/control
HTTP configuration control
DHCP TCP/IP auto configuration
SNTP
SNMP(v1)

Serial Interface
RS232 Control/Monitor(DB9)

Accuracy
10MHz <2E-12 (Locked to GPS)
1PPS <20ns wrt UTC (1 sigma)
NTP <10ms (typical)

Phase Noise(SSB) @ 10MHz

10Hz -125dBc
100Hz -155dBc
1000Hz -162dBc
10000Hz -162dBc

Spurious

Offset from carrier
1kHz to 200kHz <-100dBc
200kHz to 1MHz <-80dBc
1MHz to 10MHz <-80dBc

Aging
Holdover 1E-9 / day

Indicators
Fault Amber LED
Lock Green LED
Power Green LED

Power Requirements
AC version 100-264 VAC
DC version 20V to 72V DC
-48V DC

Environmental/Physical

Temperature
Operating
Unit 0 deg C to 50 deg C
Ant -40 to +85 deg C

Storage
Unit -20 to 70 deg C
Ant -40 to 100 deg C

Humidity
Unit 0-95% RH
Ant Mil-STD-810E

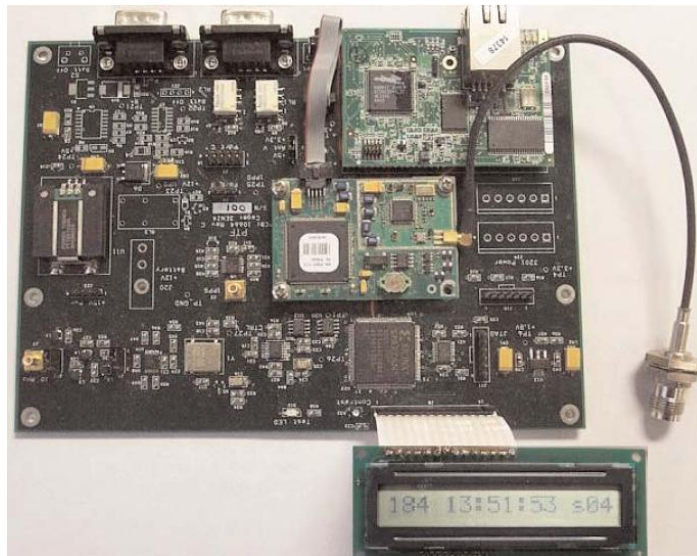
Dimensions 1Ux19"x12"

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3205A GlobalTyme™ 12 Channel GPS Receiver

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- GPS Tracking: 12 parallel channels
- Acquisition Time: <1.5 minutes (warm start)
- Accuracy (1PPS): <50ns
- 100/10 Base T Ethernet
- Remote Control/Monitor
- SNMP, HTTP, Console, interfaces
NTP (optional), Telnet



This OEM member of the ptf GlobalTyme™ GPS receiver family uses the benefits of the latest technological advances to provide an unrivalled price/performance GPS receiver.

Features include remote interface via telnet connection, NTP over a 10/100 BaseT Ethernet connection, an HTTP web browser interface, and even an SNMP interface.

The unit provides highly accurate RF outputs at 10MHz and 4MHz, together with one pulse per second (1PPS) and time print output, providing time in an ASCII format over an RS232 port.

Remote monitoring and control is available over both RS232 and Telnet interfaces, backed by a comprehensive help menu.

Specifications

Electrical

Input/Output Connections

| | |
|------|---|
| RF | 10MHz and 4MHz sine wave 13 dBm (1V rms nominal) |
| 1PPS | 5V CMOS into 50 ohms |

| | |
|-------|-----------------|
| RS232 | Control/Monitor |
| RS232 | Time Output |

Ethernet Connections

| |
|--------|
| Telnet |
| NTP |

Accuracy

| | |
|-------|------------------------|
| 10MHz | <2E-12 (Locked to GPS) |
| 1PPS | <50ns wrt UTC |
| NTP | <10ms (typical) |

10MHz

Stability (Allan Deviation)

| | |
|------|-------|
| 1s | 2E-10 |
| 10s | 2E-10 |
| 100s | 1E-9 |

Phase Noise

| | |
|--------|---------|
| 1Hz | -72dBc |
| 10Hz | -93dBc |
| 100Hz | -115dBc |
| 1000Hz | -126dBc |

Front Panel

Indicators

| | |
|--------|-----------|
| Fault | Red LED |
| Locked | Green LED |
| Power | Green LED |

Display(optional)

| | |
|-------------|---------------|
| LCD Display | 16 Characters |
|-------------|---------------|

| | |
|----------------|--------|
| Initialization | Status |
|----------------|--------|

Operation

| | |
|------------------------|--------------------|
| Day of Year | DDD |
| Time of Day, Local/UTC | HH:MM:SS |
| Status | Satellites in View |

Control/Monitor Features

| | |
|-----------------|-------------------|
| Ethernet | SNMP HTTP |
| RS 232 | Console interface |
| Time Print Port | DOY HH:MM:SS |

Environmental/Physical

| | |
|--------------------|-------------------|
| Power Requirements | 9 36 VDC <10W |
| Operating Temp. | 0 to 50 deg. C |
| Relative Humidity | 0-95% (non-cond.) |

| | |
|--------------------|------------------------|
| Dimensions(inches) | 5.25W 7.25D 0.7H |
|--------------------|------------------------|

3207A GlobalTyme™ 2 GPS/GNSS Receiver



- **GPS Tracking: 12 parallel channels**
 - **Galileo Ready**
 - **Optional 2nd Receiver (GPS or Galileo)**
 - **Accuracy (1PPS): <20ns**
 - **100/10 Base T Ethernet**
 - **NTP v4 (optional)**
 - **Monitor/Control i/f**
 - **User Friendly Web Browser**
 - **Telnet**
 - **Serial**
 - **Alarm indicator and output**
 - **GPS antenna and cable included**
- Available in 1U and 2U**

The **ptf** 3207A GlobalTyme™₂ GPS Receiver introduces a new level of advanced capability from a second generation, based on the highly successful ptf 3203A and ptf 3204A GlobalTyme™ receivers.

With it's extraordinary stability and highly flexible approach, this unit provides numerous input source options, the latest updates in industry standard protocols, and comes ready to accept a Galileo receiver engine. Available in both 1U and 2U versions, the GlobalTyme 2™ unit can be configured as a high performance frequency standard, comprehensive time standard, or both.

Frequency standard performance is application tailored with a range of local oscillator options including TCXO(standard), OCXO, Ultra Low noise oscillator, rubidium, and high performance rubidium. In standard configuration the GlobalTyme 2™ is equipped with 10MHz

(options to add 100kHz, 1MHz, and 5MHz), 1PPS and IRIG B(am) outputs. Additional options for selectable output clock frequencies are also available.

For timing, synchronization and time keeping, the unit provides optional NTP(v4), in addition to the standard 1PPS and IRIG B outputs. The 1PPS output is accurate within <20ns (1 sigma) of UTC(USNO).

The optional 1PPS, IRIG, and 10MHz inputs offer system redundancy or simply alternative master reference inputs to gps or Galileo if desired.

For monitoring and control the unit houses both RS232 serial and 100/10 BaseT Ethernet (RJ 45) with various protocols suited to different user needs including Telnet, SNMP(optional) and a browser driven web interface

Specifications

Electrical

GPS Rx 12 parallel channel
(optional 2nd receiver)

Front Panel Display Vacuum Fluorescent
(additional display opt.)

RF Outputs

10MHz sine wave 1V rms into 50 ohms
5MHz (opt) 1V rms into 50 ohms
1MHz (opt) 1V rms into 50 ohms
100kHz(opt) 1V rms into 50 ohms

Digital Outputs

1PPS 5V CMOS into 50 ohms
Prog 5V CMOS into 50 ohms
Pulse Rates(opt)
(1PPS to 10MPPS)

Timing Outputs

IRIG B(am) 3v p-p into 600 ohm
IRIG B(DCLS)opt. 5V into 50 ohm
IEEE 1344 compliant

Standard configuration offers 10MHz sine wave, IRIG B(am) and 1PPS outputs

100/10 Ethernet i/f RJ-45 Connector
Telnet monitoring/configuration/control
HTTP configuration control
DHCP TCP/IP auto configuration
NTPv4(optional)
SNMPv1/2/3(optional)

Serial Interface

RS232 Control/Monitor(DB9)
RS232(opt) Time Output(DB9)

Accuracy

10MHz <2E-12 (Locked to GPS)
1PPS <20ns wrt UTC (1 sigma)
NTP <10ms (typical)

10MHz

Stability (Allan Deviation)

| | TCXO | OCXO | ULN | RUB |
|------|-------|--------|-------|-------|
| 1s | 2E-10 | <3E-11 | 3E-11 | 3E-11 |
| 10s | 2E-10 | <2E-11 | 2E-11 | 2E-11 |
| 100s | 1E-9 | <2E-11 | 3E-12 | 3E-12 |

Phase Noise(ssb)

| | TCXO | OCXO | ULN | RUB |
|--------|---------|---------|---------|---------|
| 1Hz | -72dBc | -96dBc | -108dBc | -90dBc |
| 10Hz | -93dBc | -130dBc | -125dBc | -130dBc |
| 100Hz | -115dBc | -155dBc | -150dBc | -145dBc |
| 1000Hz | -126dBc | -162dBc | -160dBc | -150dBc |
| 10kHz | | -162dBc | -165dBc | -150dBc |

Spurious (OCXO option)

Offset from carrier
1kHz to 200kHz <-100dBc
200kHz to 1MHz <-80dBc
1MHz to 10MHz <-80dBc

Front Panel

Indicators
Fault Amber LED
Lock Green LED
Power Green LED

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Environmental/Physical

Temperature

| | | |
|-----------|------|---------------------------|
| Operating | Unit | 0 deg C to 50 deg C |
| | Ant | -40 to +85 deg C |
| Storage | Unit | -20 to 70 deg C |
| | Ant | -40 to 100 deg C |
| Humidity | unit | 0-95% RH (non-condensing) |
| Ant | | Mil-STD-810E |

Power Requirements

| | |
|-------------------|-------------------|
| AC input (+/-15%) | 90-264 VAC |
| DC input(opt) | 18V to 72V DC |
| Dimensions | |
| 3207A | 1Ux19"x12" |
| | 2Ux19"x12" |
| Relative Humidity | 0-95% (non-cond.) |

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3223A NetTymetm Network Time Server

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- **Stand-Alone Time Server**
- **NTP Support**
- **Ethernet 10/100 Base T Interface**
- **12 Channel GPS Receiver**
- **Independent Time Acquisition from GPS**
- **Ideal for Electronic Commerce**
- **GPS Antenna and Cable Included**
- **1PPS and IRIG-B outputs standard**



The ptf 3223A NetTymeTM provides Stratum I accuracy for your enterprise network installation. Time acquired via the GPS antenna is distributed using the TCP/IP NTP to network workstations. Synchronization over the network takes place in 1 to 5 milliseconds.

By applying today's advanced GPS technology to address the growing need for providing accurate network time, the ptf 3223A NetTyme delivers precise time via an Ethernet interface using the network time protocol standard common in most computer systems today. (TCP and UDP are also included)

The ptf 3223A NetTyme uses at its heart a highly advanced, 12 channel GPS timing receiver, to deliver milli second accuracy to the network.

In addition to NTP, the ptf 3223 NetTyme supports a number of network management tools to keep your network in sync and working for you.

Other standard features include high precision 1 PPS and IRIG-B outputs (via BNC) for time synchronization and time display applications.

Specifications

Electrical

Input/Output Connections

Network 10/100 Base T Ethernet

Serial Port A

RS-232/DB9 DTE, Config/Control

IRIG-B (am)

1 PPS

Front Panel (status indicators) LED

Timing Accuracy

Network 1-10 milliseconds, typical

GPS Receiver <0.5 microseconds relative to UTC

Internal Clock <0.5 microseconds (relative to UTC, GPS tracking)

OCXO Option Hold <10ms for 30 days

GPS Receiver Twelve channel

Environmental & Physical

Power Requirements

AC Input ($\pm 15\%$) 90 - 264 VAC, <10W

DC Input (optional)

Dimensions

(HxWxD) 1U x 19" x 12"

Operating Temp

0° to 50° C

Relative Humidity

(non-condensing) 0 to 95%

Supported Network Features

TCP/IP, NTPv2 (RFC 1119), NTPv3 (RFC 1305), SNTP (RFC 1361), Daytime Protocol (RFC 867), Time Protocol (RFC 868), SNMPv1 w/Custom MIB II Extension, Telnet, HTTP/HTML Status Page

Configuration Options

Option # Description

HSOP High Security Option

PPSI External 1 PPS

TIME Time Code Output (x4)

PULS Pulse Distribution (x4)

RUBS Rubidium

DISP Front Panel Display and Keypad

DCPS DC Power Supply

SNMP SNMP

HTTP http

WINA Window Mount Antenna

LKIT Lightning Protection Kit

RSLD Mounted Rackslides



ptf 3223A NetTyme rear view

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3225A NetTyme OEM Network Time Server

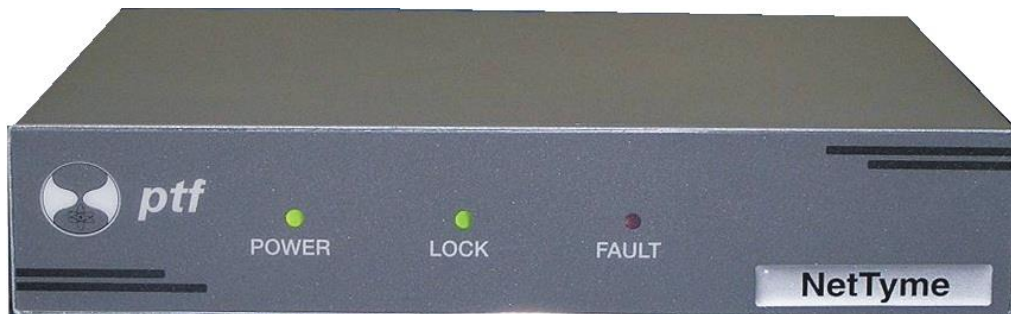
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- Stand Alone Time Server
- NTP support
- Ethernet 10/100 Base T
- 12 Channel GPS Receiver
- Independent time acquisition from GPS
- Ideal for e-Commerce
- 1ms to 10ms accuracy (typical)

By applying today's advanced GPS technology to address the growing need for providing accurate network time, the **ptf 3225A NetTyme** delivers precise time via an ethernet interface using the network time protocol standard common in most computer systems today.

The **ptf 3225A NetTyme** uses at its heart a highly advanced, 12 channel GPS timing receiver, to deliver milli second accuracy to the network.

Additional features include a telnet interface and RS 232 interface for set up and monitoring, together with an intuitive web page interface



Specifications

Electrical

Input/Output Connections

10/100 BaseT Ethernet RJ-45
Serial RS 232 DB9 (monitor/control)

1Pulse Per Second (optional)

Front Panel Status Indicators

| | |
|-------|-----------|
| Power | green LED |
| Lock | green LED |
| Alarm | red LED |

Timing Accuracy

| | |
|-----------|----------------------|
| Network | 1ms to 10ms(typical) |
| 1PPS(opt) | <100 nano seconds |

GPS Receiver

12 parallel channels

| | |
|----------|---|
| RF Input | 1575.42 MHz (L1) 16 - 26 dBm at input from GPS antenna. |
|----------|---|

| | |
|-------------------|---------------------------|
| Antenna Supply | 3V and 5V (selectable) |
|-------------------|---------------------------|

| | |
|-----------------|---------------------------|
| Antenna Gain | Selectable for hi or std. |
|-----------------|---------------------------|

Control/Monitor Features

| | |
|----------|---|
| Ethernet | NTP Telnet Interface http: web page |
|----------|---|

| | |
|--------|-------------------|
| RS 232 | Console interface |
|--------|-------------------|

Environmental/Physical

| | |
|--------------------|-----------------------------------|
| Power Requirements | 9 to 36V DC (AC adapter incl.) |
|--------------------|-----------------------------------|

| | |
|------------|-----------------|
| Dimensions | 1.75" x 7" x 7" |
|------------|-----------------|

| | |
|-----------------|----------------|
| Operating Temp. | 0 to 50 deg. C |
|-----------------|----------------|

| | |
|-------------------|-----------------------|
| Relative Humidity | 0-95% (non- cond.) |
|-------------------|-----------------------|

Overview - Rubidium Atomic Frequency References

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Rubidium frequency references have long been established as one of the world's most cost effective atomic clock solutions where an independent and highly accurate frequency reference is required.

The ptf range of Rubidium instruments includes units with outstanding phase noise and short-term stability for demanding metrology applications, to lower cost units providing excellent long term performance at low cost for many applications such as telecommunications synchronization and portable reference sources.

Additional options such as external or internal disciplining to a highly stable long-term reference such as GPS extend the usefulness of these devices to become low cost alternatives to the more expensive caesium atomic clock solution.

4210A Rubidium Frequency Standard

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- **10MHz Rubidium Frequency Reference**
- **100kHz Capability (with MOPS option)**
- **1PPS Disciplining Input (standard)**
- **Ultra Low Phase Noise (-130dBc at 10Hz)**
- **RS 232 Monitor/Control**
- **Convenient 2U bench or 19" rack mount**



The ptf 4210A Rubidium Frequency Standard is a unique solution for providing a highly stable, low phase noise, frequency reference for applications requiring atomic reference stability performance.

The instrument contains a high performance rubidium module, with an extended life design, and very low aging rate, with high quality OCXO o/p for low phase noise.

For even better long term stability the unit will accept a 1PPS input that can be derived from a reference such as caesium or GPS.

An ideal laboratory or system frequency reference, which includes a range of options are available to enhance the functionality of the unit.

Specifications

Electrical

Output Level (standard)

10MHz 0.5 vrms into 50W

1PPS 5 v CMOS ± 20 mA sink/source

Output Levels (w/MOPS Option)

1MHz 1.0 vrms into 50W +13dBm ± 1 dBm

5MHz 1.0 vrms into 50W +13dBm ± 1 dBm

10MHz 1.0 vrms into 50W +13dBm ± 1 dBm

1PPS 4.2 v CMOS into 50W

Stability

Short-term: 1s 2E-11

10s 1E-11

100s 2E-12

Aging <5 E-11/month (after 30 days)

<5 E-10/year

Accuracy 5E-11 (at shipment)

Phase Noise, 1Hz b/w,

Offset from carrier Phase Noise (dBc)

10Hz -130

100Hz -140

Spurious -130 dBc (100kHz bw)

Environmental & Physical

Power Requirements

AC Input ($\pm 15\%$) 90 - 264 VAC, <10W

DC Input (optional)

Dimensions

(HxWxD) 2U x 19" x 12"

Configuration Options

Option # Description

PPSI External 1 PPS

EXP4 4 ch. Expansion Module

MOPS Multiple RF o/p's (1,5 & 10MHz)

RF01 1MHz Sinewave out (x4)

RF05 5MHz Sinewave out (x4)

RF10 10MHz Sinewave out (x4)

PULS Pulse Distribution (x4)

OCXO High Performance OCXO

ULNO Ultra Low Noise Output

DCPS DC Power Supply

RSLD Mounted Rackslides



ptf 4210A rear view (w/MOPS option)

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4211A Rubidium Frequency Standard

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- **10MHz Rubidium Frequency Reference**
- **100kHz Capability (with MOPS option)**
- **1PPS Disciplining Input (standard)**
- **RS 232 Monitor/Control**
- **Convenient 1U bench or 19" rack mount**



The ptf 4211A Rubidium Frequency Standard is an excellent, low cost, solution for providing a stable frequency reference in applications requiring atomic reference stability performance.

The instrument contains an integrated rubidium module with low aging rate, and standard output oscillator.

For even better long term stability the unit will accept a 1PPS input that can be derived from a reference such as caesium or GPS.

An ideal laboratory or system frequency reference, which includes a range of options are available to enhance the functionality of the unit.

Specifications

Electrical

Output Level (standard)

10MHz 0.5 vrms into 50W
1PPS 5 v CMOS w/960W
source impedance

Output Level (w/MOPS Option)

1MHz 1.0 vrms into 50W +13dBm
±1dBm
5MHz 1.0 vrms into 50W +13dBm
±1dBm
10MHz 1.0 vrms into 50W +13dBm ±1dBm
1PPS 4.2 v CMOS into 50W

Stability

Short-term 1s 3E-11
10s 1E-11
100s 3E-12

Aging <5 E-11/month (after 30 days)
<5 E-10/year

Accuracy 5E-11 (at shipment)

Phase Noise 1Hz b/w,

Offset from carrier Phase Noise (dBc)

10Hz -90
100Hz -128

Spurious -60 dBc (100kHz bw)

Environmental & Physical

Power Requirements

AC Input (±15%) 90 - 264 VAC, <10W
DC Input (optional) 20 to 70 VDC, 10W

Dimensions

(HxWxD) 1U x 19" x 12"

Configuration Options

| Option # | Description |
|----------|----------------------------------|
| PPSI | External 1 PPS |
| EXP4 | 4 ch. Expansion Module |
| MOPS | Multiple RF o/p's (1, 5 & 10MHz) |
| RF01 | 1MHz Sinewave out (x4) |
| RF05 | 5MHz Sinewave out (x4) |
| RF10 | 10MHz Sinewave out (x4) |
| PULS | Pulse Distribution (x4) |
| OCXO | High Performance OCXO |
| ULNO | Ultra Low Noise Output |
| FPOC | Front Panel Outputs |
| DCPS | DC Power Supply |
| RSLD | Mounted Rackslides |



ptf 4211A rear view (w/MOPS option)

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4220A Rubidium Frequency Standard

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- **10MHz Rubidium Frequency Reference**
- **100kHz Capability (with MOPS option)**
- **1PPS Disciplining Input (standard)**
- **Ultra Low Phase Noise (-128dBc at 10Hz)**
- **RS 232 Monitor/Control**
- **Convenient 2U bench or 19" rack mount**



The ptf 4220A is an Ultra Low Noise Disciplined Frequency Standard with rubidium and OCXO clean-up oscillator.

The instrument contains a high performance rubidium module, with an extended life design, and very low aging rate, with high quality OCXO o/p for low phase noise.

For even better long term stability the unit will accept a 1PPS input that can be derived from a reference such as caesium or GPS.

An ideal laboratory or system frequency reference, which includes a range of options that are available to enhance the functionality of the unit.

Specifications

Electrical

Outputs

10MHz @ +7dBm(RF sinewave)
1PPS TTL Level
1,5 & 10 MHz @ +13dBm(1Vrms)sinewave

Stability

Short-term: 1s 2E-11
10s 1E-11
100s 2E-12

Aging <5 E-11/month (after 30 days)
<5 E-10/year

Accuracy 5E-11 (at shipment)

Phase Noise at 10MHz

| Offset from carrier | Phase Noise (dBc) |
|---------------------|-------------------|
| 1 Hz | -108 |
| 10 Hz | -128 |
| 100 Hz | -150 |
| 1000 Hz | -170 |
| 10000 Hz | -170 |

Spurious -75 dBc (100kHz bw)

Environmental & Physical

Power Requirements

AC Input ($\pm 15\%$) 120 or 230 VAC, <10W
DC Input (optional) 20 to 70 VDC, 10W

Dimensions

(HxWxD) 2U x 19" x 12"

Configuration Options

| Option # | Description |
|----------|-------------------------|
| PPSI | External 1 PPS |
| EXP4 | 4 ch. Expansion Module |
| RF01 | 1MHz Sinewave out (x4) |
| RF05 | 5MHz Sinewave out (x4) |
| RF10 | 10MHz Sinewave out (x4) |
| PULS | Pulse Distribution (x4) |
| OCXO | High Performance OCXO |
| ULNO | Ultra Low Noise Output |
| FPOC | Front Panel Outputs |
| DCPS | DC Power Supply |
| RSLD | Mounted Rackslides |



ptf 4220A rear view

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Overview - Time Code Generators

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The ptf time code generators provide a convenient and effective way to generate a range of local high quality signals in either a stand-alone mode or locked to an incoming time code reference.

In addition to being able to re-generate a local time base with time and date offset if required, high quality RF frequency and 1PPS references are also provided to drive a range of application requirements.

Additional options include optical interfaces to receive or transmit signals over long distances or in electrically noisy environments.

5203A TymeGen Time Code Generator

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- **Multiple Input Sources**
- **Master, Slave or GPS Optional Configurations**
- **Accuracy (1PPS): <20ns(GPS)**
- **100/10 Base T Ethernet**
- **Keypad + Bright VF Display(opt)**
- **Up/Down Count Capability**
- **Remote Control/Monitor, RS 232/Telnet**
- **NTP (optional)**



The ptf 5203A optionally combines the precision of GPS disciplined timing (<20ns), Time Code input, or stand-alone time code Master generator. Available oscillator options include TCXO, OCXO or a rubidium atomic source.

Remote access is available via telnet connection, optional NTP over a 10/100 BaseT Ethernet connection, an HTTP web browser interface, and an SNMP interface.

Standard outputs include highly accurate 10MHz RF output, together with IRIG B (am),

IRIG B (DCLS), one pulse per second (1PPS), and time print output, providing time in an ASCII format over an RS232 port.

Additional capability includes selectable frequency outputs, pulse outputs including 1PPM, and phase measurement of an incoming 1PPS signal.

Remote monitoring and control is available over both RS232 and Telenet interfaces, backed by a comprehensive help menu.

Operation

The internally generated 1PPS is phase locked to the selected incoming source (GPS or IRIG B DCLS Time Code) or can be free running in the "Master" mode. The synchronized IRIG B output provides amplitude modulated (AM) IRIG B encoded information on a modulated 1kHz carrier, and DC level shift (DCLS) format at TTL levels.

Also available is a 10MHz RF sine wave output, an "on time" 1PPS output, and configurable pulse frequency outputs including T1 (1544 kHz) and E1 (2048 kHz) phase locked to the incoming signal. Optional distribution modules provide expansion to give multiple outputs of any of the available signals.

For long transmission distances or electrically noisy environments optical fiber Receiver/Transmitter options are available

Specifications

Electrical

Input/Output Connections

| | |
|-----------|--|
| RF | 10MHz sine wave 13 dBm (1V rms nominal) |
| 1PPS | 5V CMOS into 50 ohms |
| Time Code | IRIG B am to IEEE1344 |

| | |
|-------|-----------------|
| RS232 | Control/Monitor |
| RS232 | Time Output |

Ethernet Connections

Telnet
HTTP
NTP(optional) v1, v2, v3, SNTP

Accuracy(Locked to GPS)

| | |
|-------|-----------------|
| 10MHz | <2E-12 |
| 1PPS | <100ns wrt UTC |
| NTP | <10ms (typical) |

| | |
|-----------------------------|-------|
| 10MHz | |
| Stability (Allan Deviation) | |
| 1s | 2E-10 |
| 10s | 2E-10 |
| 100s | 1E-9 |

| | | |
|-------------|---------|----------|
| Phase Noise | TCXO | OCXO |
| 1Hz | -72dBc | -95 dBc |
| 10Hz | -93dBc | -125dBc |
| 100Hz | -115dBc | -135 dBc |
| 1000Hz | -126dBc | -145 dBc |

Front Panel

Indicators

| | |
|--------|-----------|
| Fault | Red LED |
| Locked | Green LED |
| Power | Green LED |

Display/Keypad(optional)

| | |
|---|----------------------------------|
| Vacuum Fluorescent Keypad(Membrane type) | High Brightness Alpha/Numeric |
|---|----------------------------------|

Control/Monitor Features

| | |
|----------------------|-------------------|
| Ethernet | SNMP HTTP |
| RS 232 | Console interface |
| Time Print Port(opt) | DOY HH:MM:SS |

Environmental/Physical

| | |
|--------------------|-----------------------|
| Power Requirements | 100 - 250 VAC <10W |
| Dimensions | 1U x 19" x 12" |
| Operating Temp. | 0 to 50 deg. C |
| Relative Humidity | 0-95% (non-cond.) |

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Overview - Clock Displays

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Complementing the ptf range of precision frequency and time references the Company offers a series of high visibility Clock Displays on our [ON-LINE STORE](#)

Available in a wide variety of sizes, mounting configurations and colors, these NTP and Time Code displays provide an ideal add-on to distribute time information from any of our GPS or network time server solutions.

All data sheets are available on-line by clicking on the Clock Display image.

[Go to NTP Displays](#)

[Go to Time Code Displays](#)

NTP Clock Displays

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Rack Mount

2.3" (5.8 cm) Six Digit Rack Unit



NTDS26

1.8" (4.6 cm) Nine Digit Rack Unit



NTDS29

*The above rack mount units can also be wall mounted.

1" (2.5 cm) Six Digit Rack



NTDS16-RM

1" (2.5 cm) Nine Digit Rack



NTDS19-RM

1" (2.5 cm) 2 Six Digit



NTDS112-RM

Desk Top

1" (2.5 cm) Six-Digit Desktop Display



NTDS16



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Wall Mount and Dual Faced (DF)

2.3" (5.8 cm) Four Digit Wall Unit



**NTDS24
NTDS24-DF**

2.3" (5.8 cm) Six Digit Wall Unit



**NTDS26
NTDS26-DF**

4" (10.2 cm) Four Digit Wall Unit



**NTDS44
NTDS44-DF**

4" (10.2 cm) Six Digit Wall Unit



**NTDS46
NTDS46-DF**

7" (18 cm) Four Digit Wall Unit



NTDS84

7" (18 cm) Six Digit Wall Unit



**NTDS86
NTDS86-DF**

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Two Line

4" (10.2 cm) over 2.3" (5.8 cm) Six Digit
Stainless Steel Wall Unit



NTDS4626
NTDS4626-3AL
NTDS4626-12AL

7" (18 cm) over 4" (10.2 cm) Six Digit Stainless
Steel Wall Unit



NTDS8646

Time Code Clock Displays

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Rack Mount - Click on Display Images for data sheet

2.3" (5.8 cm) Six Digit Rack Unit



TCDS26

1.8" (4.6 cm) Nine Digit Rack Unit



TCDS29

*The above rack mount units can also be wall mounted.

1" (2.5 cm) Six Digit Rack



TCDS16-RM

1" (2.5 cm) Nine Digit Rack



TCDS19-RM

1" (2.5 cm) 2 Six Digit



TCDS112-RM

Desk Top

0.6"/1.5cm six digit display for small case desktop applications.



TCD200

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Wall Mount and Dual Faced (DF)

2.3" (5.8 cm) Four Digit Wall Unit



TCDS24

2.3" (5.8 cm) Six Digit Wall Unit



TCD26

TCDS26-DF

4" (10.2 cm) Four Digit Wall Unit



TCD44

4" (10.2 cm) Six Digit Wall Unit



TCD46

7" (18 cm) Six Digit Wall Unit



TCD86

7"/18cm over 4"/10.2cm two row six digit display



TCDS8646

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Standard Warranty

Unless otherwise specified, Precise Time and Frequency, Inc. (ptf) warrants that the products contained herein are free from defects in materials and workmanship for a period of one year from the date of delivery. Warranty service will be performed on a complete unit at a ptf facility (unless prior authorization is obtained from ptf for return of a part or sub-assembly), or at ptf discretion, warranty service may be performed in the field.

Upon return of the unit to the ptf facility, repair or replacement of the unit will be performed at no further expense to the customer (provided the unit has not been improperly installed, maintained, interfaced, or operated outside of its environmental specifications or otherwise misused).

Customers are requested to contact ptf prior to returning a unit for service. The customer shall prepay shipping charges for units to be returned to the ptf facility and Precise Time and Frequency, Inc. shall pay for the return of the unit to the customer once serviced or repaired.

**NO OTHER WARRANTY IS EITHER EXPRESSED OR IMPLIED.
PRECISE TIME AND FREQUENCY, INC. SHALL NOT BE RESPONSIBLE FOR
CONSEQUENTIAL LOSS OR DAMAGE.**

Special Warranties

In addition to the above Standard Warranty special warranties may be available on certain products for an additional charge. Please contact ptf for details. Repairs outside of the warranty period are excluded from the Standard Warranty statement, however ptf normally offers a special 90-day warranty on customer paid repairs.

Payment Terms

Normal payment terms for Domestic USA customers are net 30 days after shipment with established credit history. International sales through our distributors vary according to country. Direct International sales are strictly by Wire Transfer or Credit Card when ready for shipment, or Irrevocable Letter of Credit, drawn on a US bank, payable upon presentation of shipping documents.

All product prices are quoted ex Works the ptf facility unless otherwise agreed in writing at time of order.

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Tel: +1 781-245-9090
866-ptf-inc1

Fax: +1 781-245-9099

E-mail: info@ptf-llc.com

Web: www.ptf-llc.com

