



# DA1-100-10-10MHz: 10 MHz Distribution Amplifier



## Key Features

- 10 MHz Main Input
- AGC Level Controlled
- 10 sinewave outputs
- Ultra low phase noise
- 90 dB channel isolation
- 135 dB reverse isolation
- Optional second frequency “Back-up” input
- Optional internal back-up oscillator
- Above two options automatically switched in
- Optional Alarm Relay, enabled on alarm condition
- Optional Redundancy (two units with automatic switchover)
- High Quality Design

## General Description

The DA1-100-10-10MHz is a 10 MHz distribution amplifier. It can be used to synchronize up to ten instruments (option 15 outputs) to a frequency reference input. The reference input will typically be an OXCO, Rubidium, Caesium or Hydrogen Maser Frequency Standard.

The DA1-100-10-10MHz has features not found in any competitive unit. This makes the DA1-100-10-10MHz the industries leading distribution amplifier.

The DA1-100-10-10MHz has outstanding phase noise. Therefore the DA1-100-10-10MHz will not add any noise or jitter to the frequency reference input.

Phase noise is typically  $<-130$  dBc @ 1 Hz. This low phase noise enables units to be cascaded for over 1000 outputs.

## Amplifier with Gain

Unlike most competitive units, the DA1-100-10-10MHz accepts inputs from +7 dBm to +13 dBm and provides an output of 0 to +13 dBm. The output will not vary with input variations. This is very useful when long cable runs are being used, or input signals have different levels.

Lower input levels can also be used without AGC. In this mode, the output level will be 4 to 7 dB above the input level.

The gain of the DA1-100-10-10MHz can be optionally changed to suit individual customer’s requirements. This may have an affect on the phase noise, but phase noise data will be supplied with this option.

## Outputs

There are ten sinewave outputs with an option to increase to 15 outputs. Each output is completely isolated from the input and each other. Therefore the reference oscillator connected to the DA1-100-10-10MHz's input is protected against load variations, short circuits etc. that may be applied to the outputs.

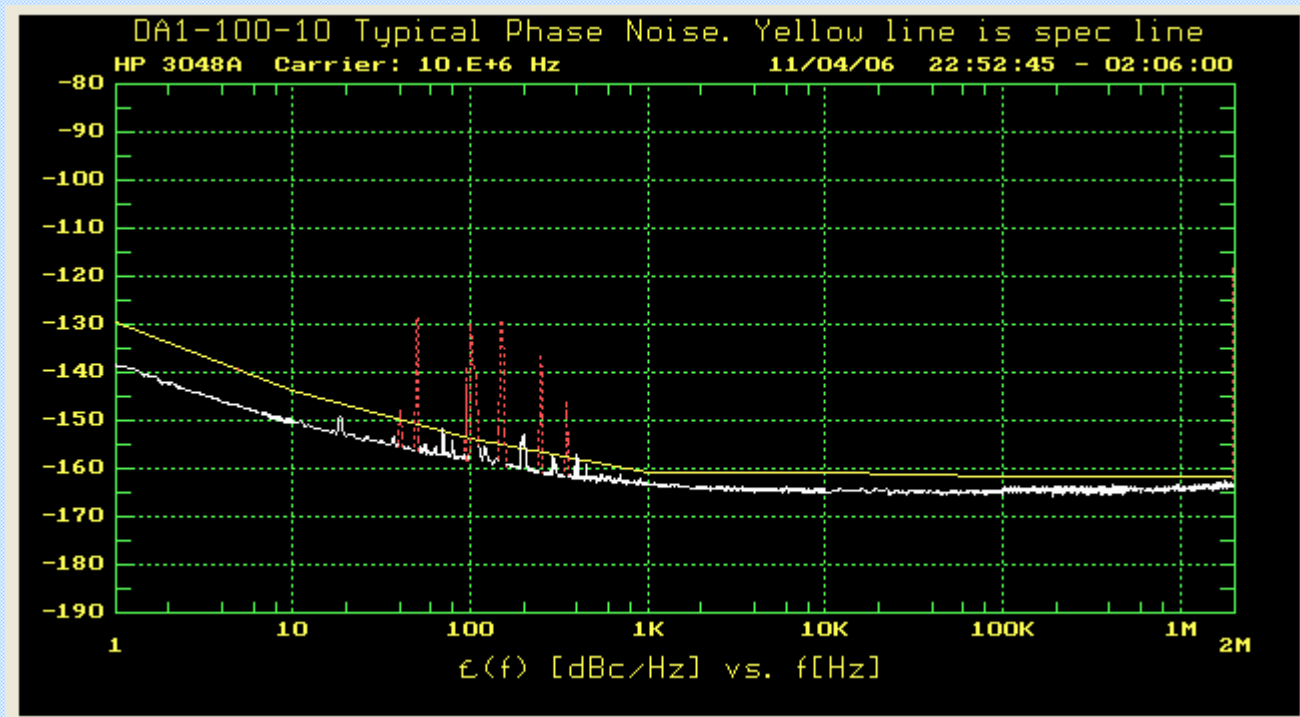
Channel to channel isolation is > 90 dB. Output to input isolation is > 130 dB. Each output port can be independently set to any level from 0 to +10 dBm on the standard unit and outputs to +13 dBm or +15 dBm are optional available.

Over 1000 outputs can be obtained without any significant increase in close-in phase noise.

## Phase Noise

The DA1-100-10-10MHz has very low phase noise. This enables units to be connected in series without adding any appreciable noise to the reference input. With only three DA1-100-10-10MHz's in series, up to 1000 outputs can be derived from one reference input.

A typical plot of phase noise is shown below. The yellow line is the DA1-100-10-10MHz's specifications. The red lines are spurious outputs. These spurs are all line related (50 or 60 Hz) and are present in any equipment connected to the AC 115 or 230 VAC supply. The white line is the actual phase noise. The far out noise (offsets > 10 kHz) can even be improved upon by careful selection of the output level and amplifier gain. Contact Precision Test for details.



## Alarms

Every output has alarm monitoring. Should the RF level drop on any output, an alarm will be raised. Also front panel Led's shows the status of the alarms. The alarm signals are also available on the rear panel.

## Applications

The DA1-100-10-10MHz Distribution Amplifier is ideal for use in calibration or standard laboratories, space research, satellite systems, communication systems or anywhere where ultimate performance is needed.

## Miscellaneous Information

The DA1-100-10-10MHz is a highly reliable unit. The DA1-100-10-10MHz is housed in a fully screened 19" rack mount case and operates from a 100 to 240 VAC supply (usable 90 to 260 VAC). The DA1-100-10-10MHz is CE marked for sale within the EEC.

## Options and Other Amplifiers available from Precision Test Systems

Options for the DA1-100-10-10MHz include:

- Different operation frequency. Any frequency from 1 MHz to 150 MHz.
- Fully isolated outputs. Useful in preventing ground loops on long cable runs.
- Squarewave outputs. Either at the same frequency as the input, or at different frequencies.
- Multiplied or divided outputs. E.g. 10 MHz, input with 5 MHz output. 10 MHz input with 100 MHz output. Any type of multiplication / division can be incorporated.
- Low pass filter on outputs. This reduces the harmonic output.
- Guaranteed phase noise specifications. Measured phase noise specifications supplied with unit.
- Higher output levels, up to +13 or +15 dBm.
- Different amplifier gains allowing different input levels from -20 dBm to +30 dBm to be accommodated.
- Additional five outputs, giving 15 outputs in all
- External DC Power Input. The DA1-100-10-10MHz also has an external 12VDC input (12 - 15 VDC). This can be used to provide back up power. If the main AC power is lost, the DA1-100-10-10MHz will immediately switch to the external 12VDC external input without loss of output.
- Redundancy. Two units operate together. If one unit fails, the outputs are automatically switched to the secondary unit.
- Internal backup oscillator. This oscillator is automatically enabled should the input signal fail.



DA1-100-10-10MHz Rear view (with option 04 TNC Connectors).

Precision Test Systems also manufactures the PTS50 and DA1010 series of distribution amplifiers. These models are lower cost alternatives to the DA1-100-10-10MHz but still give very good performance.

Specifications for the DA1-100-10-10MHz are shown on the next page.



## DA1-100-10-10MHz SPECIFICATIONS

Specification Parameter	Specification	Comments
<b>Input</b>		
Frequency	10 MHz	Main Frequency Input
Bandwidth (10 MHz $\pm$ 500 kHz)	$\pm$ 0.5 dB	
Impedance	50 $\Omega$	
Input VSWR	< 1.35	Slave output terminated in 50 $\Omega$
Input Level	7 dBm to +19 dBm	AGC Controlled. Can be used with lower inputs levels
<b>Sinewave Outputs</b>		
Output Waveform	Sinewave	50 $\Omega$ BNC Connector on rear panel
Output Frequency	Exactly the same as the input frequency	
Output VSWR	< 1.15: 1 @ 10 MHz	
Output level (individually adjustable)	Adjustable from 0 dBm to +10 dBm	Option to +13 or +15 dBm available
Output Level Stability	< 0.05 dB / $^{\circ}$ C variation in output level	Typically < 0.02 dB / $^{\circ}$ C
Harmonic Distortion (10 dBm input)	-425 dBc	
Spurious Outputs (> 500 kHz)	-125 dBc	Typical
Channel to Channel Isolation	> 90 dB	Typically > 95 dB
Input to Output Isolation	> 130 dB	Typically 135
Temperature Stability of delay	10 ps/ $^{\circ}$ C	
<b>Slave Output</b>		
Slave Output	Passive output derived from input	Level = input level - 7 dB.
<b>Allan Variance</b>		
Allan Variance	< $5 \times 10^{-14}$ (1 sec)	Calculated from phase noise
<b>Phase Noise &amp; Broadband Noise</b>		
Phase Noise (dBc/Hz)	-130 / -144 / -154 / -160 / -161 / -162	1 / 10 / 100 / 1k / 10k / 100k Hz offsets
Phase Noise (dBc/Hz) typical with +10 dB Input and +10 dBm Output	-134 / -148 / -157 / -162 / -163 / -164	1 / 10 / 100 / 1k / 10k / 100k Hz offsets
<b>General</b>		
Power (AC)	100 - 240 VAC (usable 90 - 260 VAC)	50 Watts max
Size and weight	483 x 275 x 44 mm and 2.8 kg	Width x Depth x Height
Ambient Operating Temperature	-10 $^{\circ}$ C to +40 $^{\circ}$ C	
Alarm Output	Alarm Outputs on rear panel	
<b>Options (not all options can be fitted at the same time)</b>		
Option 01	Dual changeover alarm relay contacts	Activated in the event of an alarm
Option 02A	Ground Isolated Input	
Option 02B	Ground Isolated Outputs	
Option 03	Redundancy	Requires two units
Option 09	Additional five sinewave outputs	15 o/p's in all. AGC range 10-19dBm
Option 10	Squarewave outputs	TTL/CMOS or ECL output levels

Option 11	Divided frequency output	E.g. 2.048 MHz, 5 MHz
Option 12	Multiplied output	E.g. x 10, x 100
Option 13	Low Pass filter on output	Improved harmonic rejection
Option 14	External 12VDC input	Operates from 12.0 to 15.0 VDC
Option 15	Internal temperature controlled fan for increased ambient temperature operation	Allows operation to 50 °C
Option 16-XXX	Internal backup oscillator	XXX = frequency in MHz.
Option 17-XXX	Different Gain Levels	Customer to advise gain requirement
<b>Precision Test Systems</b>		
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Full specifications available from [www.ptsyst.com](http://www.ptsyst.com). Specifications and features subject to change without notice (300107)