Utah Scientific
THE DIRECTION IN DIGITAL SWITCHING

FIELD BULLETIN

4750 Wiley Post Way, Suite 150 - Salt Lake City, UT 84116 - Phone 801.575-8801 - Fax 801.537.3099 - www.utahscientific.com

How to calculate the antenna gain and cable loss for CY490 SPG GPS antenna installation

GPS satellites orbit the earth at an altitude of 20,183 Km and output a signal at 1575.42MHz. Once the GPS signal reaches your GPS antenna the signal is so weak it is below the noise floor of the earth. It comes as no surprise that any further attenuation of this signal can render it useless.

Over the past decade GPS receivers have been getting more and more sensitive.

The Courtyard supplied GPS receiver latest offerings can pick up signals al low as -130dBm.

Because of the sensitivity of the GPS receivers, due care and attention must be paid to the antenna setup. For the best dynamic performance, an active antenna is recommended. Our recommended active antennas contain a low noise amplifier (LNA) and a filter to reduce the effects of out of band noise.

In the world of GPS; too much signal gain can be just as detrimental as too little, and RF noise, even if it is out of band, can severely disrupt the performance of your GPS application.

As a quick calculation…

The Courtyard GPS receiver has a minimum input gain of 20dB and a maximum of 30dB.

The recommended antenna has a 26dB gain.

Recommended cable is RG58 and TNC connectors having a loss of 0.85dB per metre.

(RG174 has a loss of 1.2dB per meter.)

Maximum cable length is: (26dB-20dB)/0.85dBpermetre = 7.06 metres

Minimum cable length is: (30dB -26dB)/0.85dBpermetre = 4.70 meters

As a general rule, keep RF cable lengths as short as possible and use a good quality GPS antenna with the correct gain. Courtyard provide antenna and cable assemblies as part of the option. Using your own assembly is NOT recommended.

E&OE

Installation Kit

A kit of parts is included to provide the installer with all connectors that might be needed. This kit contains:

Mounted internal to the CY490 SPG frame:

1. CY409_3 – Jupiter21 assembly
   - Various screws, washers etc.
2. 50ohm SMB male to male bulkhead adaptor
   - Emerson Network Power Johnson part number 131-3901-401
   - or www.gigatronix.co.uk part number MB02-10-A01
3. 50ohm SMB plug to SMB R/A plug cable 130mm long USING RG174 (3mm) cable
   - Courtyard part
   - or www.gigatronix.co.uk part number KP1BKR1BB174-130

Mounted externally - Provided for use by the system installer:

1. 50ohm SMB crimp plug to RG174 (3mm) cable
   - Emerson Network Power Johnson part number 131-3403-001
2. 50ohm SMB crimp plug to RG58 (6mm) cable
   - Emerson Network Power Johnson part number 131-3407-001
3. 50ohm TNC crimp plug to RG174 (3mm) cable
   - Emerson Network Power Johnson part number VT10-2071
4. 50ohm TNC crimp plug to RG58 (6mm) cable
   - Emerson Network Power Johnson part number VT10-2051
5. 50ohm FME crimp plug to RG58 (6mm) cable
   - Emerson Network Power Johnson part number VR10-2051

6. 50ohm SMB plug to TNC jack RG174 (3mm) cable 130mm long
   - Courtyard part
   - or www.gigatronix.co.uk part number DJ6BKP1BB174-130
7. 50ohm TNC plug to TNC/FME plug RG58 (6mm) cable 8000mm long
   - Courtyard part
   - or www.gigatronix.co.uk part number DP6BDP6BB058-8000 TNC-TNC
   - or www.gigatronix.co.uk part number DP6BFP6BT058-8000 TNC-FME
8. GPS antenna (26dB gain)
   - www.micropulse.com 12100 series part number 1210FW TNC connector
   - or www.panorama-antennas.com GPSP-F FME connector
   - Alternative parts are available on request.
   - Detailed mechanical drawings are available.

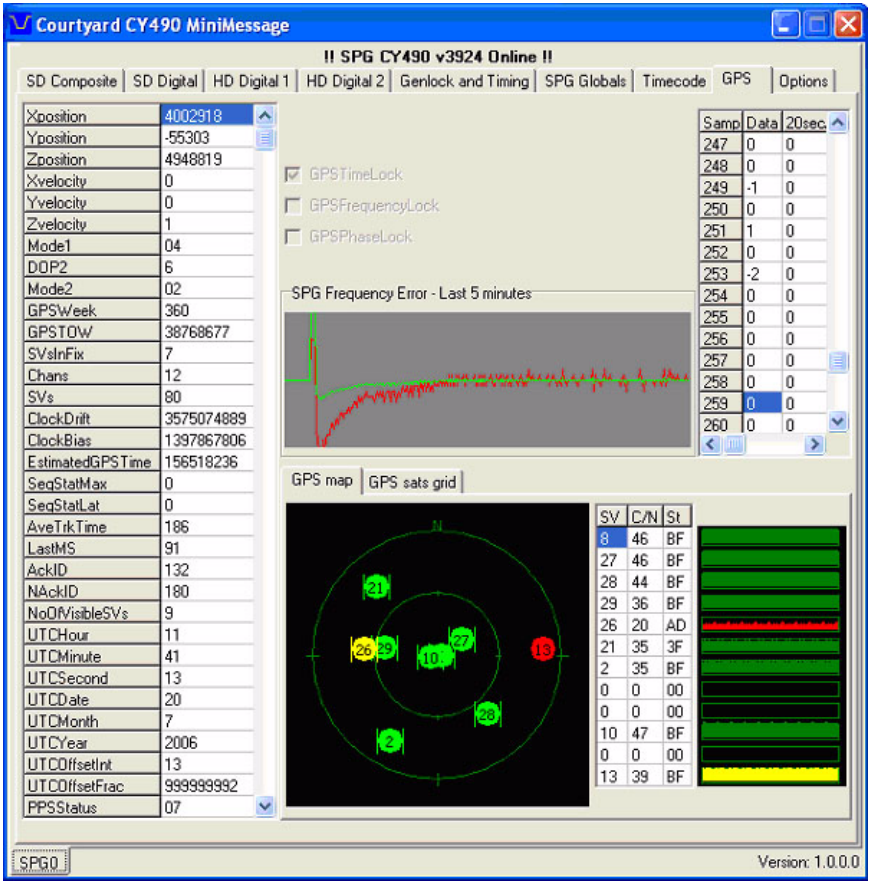
1210FW-TNC Connector

GPSP-F-FME connector

CY490 MiniMessage

The serial control port can connect to the CY490 SPG to give control and status information about the SPG.

Perhaps especially useful is the GPS status page on which details of the GPS lock can be viewed.



Standard Antenna

Alternative Antenna