



# GPS L5 Tracking

## Introduction

The first GPS satellite broadcasting L5 was launched in March 2009. As of December 13, 2019, there are 14 satellites in space with L5. All block IIF, block III, and block IIIIF satellites broadcast GPS L5.

NovAtel OEMV, OEM6, and OEM7 receivers acquire and track GPS L5. Information about which OEM7 receivers track GPS L5 is on the OEM7 brochure:

<https://en.calameo.com/read/001915796b12d63262ed6?authid=UR9Q4EEfPmMK>.

Information about which OEM6 receivers track GPS L5 is here:

<https://novatel.com/support/previous-generation-products-drop-down/previous-generation-products>

To track a GPS L5 signal, the antenna must also support GPS L5. Several NovAtel antennas support L5:

<https://novatel.com/products/antennas>.

## Models with GPS L5 channels

The firmware models that support GPS L5 are in the following table.

Receiver family	Models with GPS L5
OEMV	All models starting with L15 or L125
OEM6	All models with GPS that have either 5 or A as the second character.
OEM7	All models with GPS that have F as the second character.
OEMStar or before OEMV	No models

## Channel Configurations with GPS L5 channels

Most models have multiple channel configurations that can be used. To ensure the receiver is configured to track GPS L5, these steps can be used.

1. Log CHANCONFIGLIST (<https://docs.novatel.com/OEM7/Content/Logs/CHANCONFIGLIST.htm>).
2. Below is a sample CHANCONFIGLIST log from a FFNPNTBN model on OEM7. For a channel configuration to have L5, it must say L5 on the GPS line. These are highlighted in yellow below. In this model, channel configurations 1, 3, 4, and 5 have L5. The current channel configuration is the first number after the header, highlighted in green.

<CHANCONFIGLIST COM1 0 51.5 FINESTEERING 2081 249481.207 02040020 d1c0  
15761

```
< 3 5
< 7
< 16 GPSL1L2PL5
< 4 QZSSL1CAL2CL5
< 4 SBASL1
< 14 GLOL1L2
< 16 GALE1E5B
< 22 BEIDOU1B2
< 5 LBAND
< 7
< 16 GPSL1L2
< 4 QZSSL1CAL2C
< 4 SBASL1
< 14 GLOL1L2
< 16 GALE1E5B
< 22 BEIDOU1B2
< 5 LBAND
< 7
< 16 GPSL1L2PL2CL5
< 4 QZSSL1CAL2CL5
< 4 SBASL1
< 14 GLOL1L2PL2C
< 16 GALE1E5AE5BALTBOC
< 22 BEIDOU1B2
< 5 LBAND
< 8
< 16 GPSL1L2PL2CL5
< 4 QZSSL1CAL2CL5
< 4 SBASL1L5
< 14 GLOL1L2PL2C
< 16 GALE1E5AE5BALTBOC
< 20 BEIDOU1B1CB2B3
< 8 NAVICL5
< 5 LBAND
< 8
< 16 GPSL1L2PL2CL5L1C
< 4 QZSSL1CAL2CL5L1CL6
< 4 SBASL1L5
< 14 GLOL1L2PL2CL3
< 11 GALE1E5AE5BALTBOCE6
< 16 BEIDOU1B1CB2B3
< 8 NAVICL5
< 5 LBAND
```

- To change the channel configuration, use the SELECTCHANCONFIG command (<https://docs.novatel.com/OEM7/Content/Commands/SELECTCHANCONFIG.htm>). This will also reset the receiver. If there are any configuration commands that a user wants to keep, they should use a SAVECONFIG command before the SELECTCHANCONFIG command.  
Command example:

```
SELECTCHANCONFIG 4
```

- To confirm the new channel configuration, another CHANCONFIGLIST can be logged. The first number after the header will be the new configuration.

```
<CHANCONFIGLIST COM1 0 53.5 FINESTEERING 2081 249565.661 02040020 d1c0  
15761  
< 4 5
```

## Tracking GPS L5

GPS L5 acquisition is aided by GPS L1 C/A, so L1 C/A must be tracked before L5 is acquired. Once a receiver channel has acquired GPS L5, then GPS L5 is tracked independently in OEM6 and OEM7.

If the channel configuration has GPS L5, then once the receiver is tracking L1 C/A from a satellite it will search for L5 if the satellite is transmitting L5 (block IIF, III, and IIIF satellites). If a satellite is not transmitting L5, the L5 channel will be idled. The receiver knows which satellites are in which block from the almanac.

The TRACKSTAT log sample below has 5 GPS satellites. The order of the signal in the TRACKSTAT log is the same as in the CHANCONFIGLIST log. For instance, the order above was GPSL1L2PL2CL5, so the order of GPS channels is:

- L1 C/A
- L2 P
- L2 C
- L5

The yellow highlighted rows in the TRACKSTAT log sample are GPS L5.

```

<TRACKSTAT COM1 0 67.5 FINESTEERING 2081 250352.000 02000020 457c 15761
< SOL_COMPUTED SINGLE 5.0 283
< 26 0 1810bc04 23046293.031 3027.082 44.256 835.839 -1.017 GOOD 0.238
< 26 0 11303c0b 23046296.507 2358.766 43.870 793.736 0.000 OBSL2 0.000
< 26 0 02309c0b 23046296.593 2358.766 49.667 796.200 0.000 OBSL2 0.000
< 26 0 01d03c04 23046295.302 2260.478 52.192 797.234 0.000 OBSL5 0.000
< 0 0 0000a020 0.000 0.000 0.000 0.000 0.000 NA 0.000
< 0 0 00a02020 0.000 0.000 0.000 0.000 0.000 NA 0.000
< 0 0 02208020 0.000 0.000 0.000 0.000 0.000 NA 0.000
< 0 0 01c02020 0.000 0.000 0.000 0.000 0.000 NA 0.000
< 3 0 1810bc44 20655148.950 1093.005 52.240 839.769 -0.082 GOOD 0.238
< 3 0 11303c4b 20655151.255 851.692 52.109 799.746 0.000 OBSL2 0.000
< 3 0 02309c4b 20655151.764 851.693 53.743 801.581 0.000 OBSL2 0.000
< 3 0 01d03c44 20655150.945 816.238 55.777 803.029 0.000 OBSL5 0.000
< 6 0 1810bc64 24913261.931 2501.555 37.665 780.594 -0.478 GOOD 0.232
< 6 0 11303c6b 24913264.719 1949.262 37.044 775.414 0.000 OBSL2 0.000
< 6 0 02309c6b 24913265.415 1949.265 46.444 778.613 0.000 OBSL2 0.000
< 6 0 01d03c64 24913265.033 1868.108 49.338 780.053 0.000 OBSL5 0.000
< 23 0 0810bc84 23002079.485 2670.431 48.400 838.858 -0.264 GOOD 0.238
< 23 0 01303c8b 23002077.652 2080.856 45.043 793.739 0.000 OBSL2 0.000
< 0 0 02208080 0.000 0.000 0.000 0.000 0.000 NA 0.000
< 0 0 01c02080 0.000 0.000 0.000 0.000 0.000 NA 0.000

```

In the above sample:

- 3 of the 5 channels are tracking a satellite with L5 (PRN 26, 3, and 6).
- 1 of 5 is idle, because the other GPS channels are already tracking all satellites above the elevation mask.
- 1 of 5 is idle for L2C and L5, since it is a block IIR satellite that doesn't have L2C or L5 (PRN 23).

RANGE logs only include satellites that the receiver is tracking, so the channel tracking status word should be used to determine what is tracking (an example of this is below). The channel tracking status word is the same in RANGE and TRACKSTAT, and is defined here:

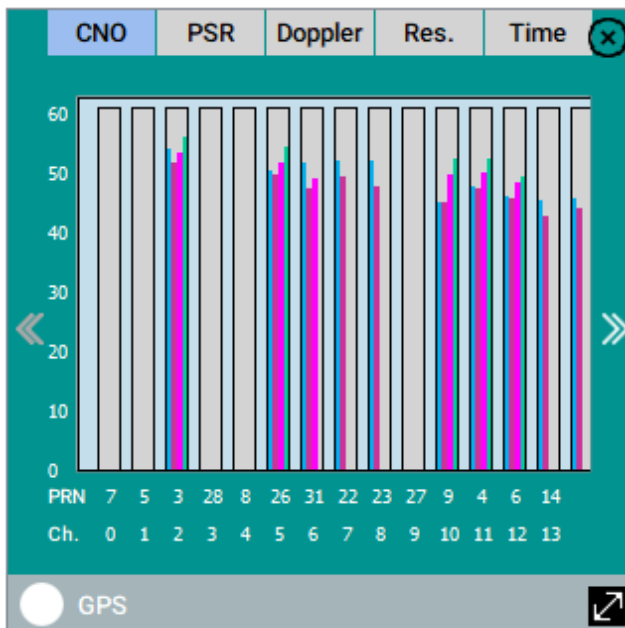
<https://docs.novatel.com/OEM7/Content/Logs/RANGE.htm>

Here is how to check the channel tracking status word to see what is tracking. Below is the channel tracking status words for the first satellite, PRN 26. The yellow highlight is the signal and the green highlight is the system.

Word	Binary	Signal	System	Signal type
1810bc04	00011000000100001011110000000100	00000 = 0	000 = 0	GPS L1 C/A
11303c0b	00010001001100000011110000001011	01001 = 9	000 = 0	GPS L2P (Y), semi-codeless
02309c0b	00000010001100001001110000001011	10001 = 17	000 = 0	GPS L2C (M)
01d03c04	00000001110100000011110000000100	01110 = 14	000 = 0	GPS L5 (Q)

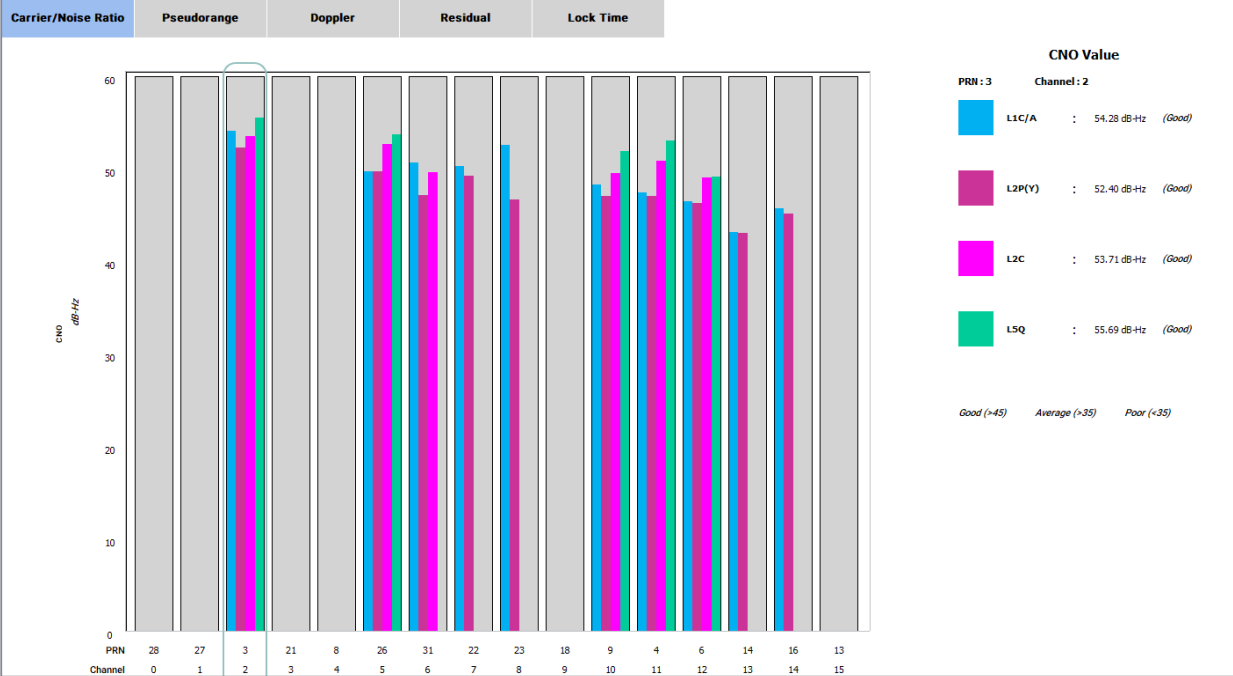
Another way to see what satellites are tracking which signals is in NovAtel Connect. One way is to use the GPS tile. Here are the steps to do that.

1. Hover the mouse above the GPS tile, and then click on the arrow that appears in the bottom right corner.



2. This will significantly increase the size of the GPS channel tracking status tile. In this view, it can be easily seen which signals are tracking. In this example, PRNs 3, 26, 9, 4, and 6 are tracking GPS L5. To see the C/No for a given satellite, hover the mouse over that satellite.

GPS Channel Tracking Status Satellites 9/10 [< BACK](#)





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