Broadcom OneSync Performance, ITU-T G.8273.2 BC and G.8273.4 PTS Slave Clock

This report contains the 1588 performance data for the Broadcom OneSync device. The presented results include a subset of Boundary Clock (BC) results for ITU-T G.8273.2 Full Time support, and a subset of Slave Clock (SC) results for ITU-T G.8273.4 Partial Time Support (PTS). The Renesas 1588 servo was used for all performance tests.

Contents

1. Results Summary

Standard	Test Case	Results
G.8273.2	Noise Generation – 1PPS	Pass
G.8273.2	Noise Generation – PTP	Pass
G.8273.2	Noise Generation – No SyncE – 1PPS	Pass
G.8273.2	Noise Generation – No SyncE – PTP	Pass
G.8273.2	Holdover – 1PPS	Pass
G.8273.2	Holdover – PTP	Pass
G.8273.2	Holdover – No SyncE – 1PPS	Pass
G.8273.2	Holdover – No SyncE - PTP	Pass
G.8273.2	PTP to 1PPS Noise Transfer	Pass
G.8273.2	PTP to PTP Noise Transfer	Pass
G.8273.2	SyncE to 1PPS Noise Transfer	Pass
G.8273.2	SyncE to PTP Noise Transfer	Pass
G.8273.2	Noise Tolerance – 1PPS	Pass
G.8273.2	Noise Tolerance – PTP	Pass
G.8273.4 PTS	Noise Generation	Pass
G.8273.4 PTS	Holdover	Pass
G.8261	Test Case 15 - Network Traffic Model B	Pass
G.8261	Test Case 16 - Network Traffic Model B	Pass

2. Test Configuration

Device Under Test	Broadcom OneSync
Oscillator	STP3384LF
1pps Source	Symmetricom TP5000
Software Version	Pipeline 151653 (Master Branch 4.3)
Instrument	Paragon Neo
Instrument Serial Number	00036081
Ethernet Interface	Optical
CAT Version	28.10.22111.2025 [S] (C)

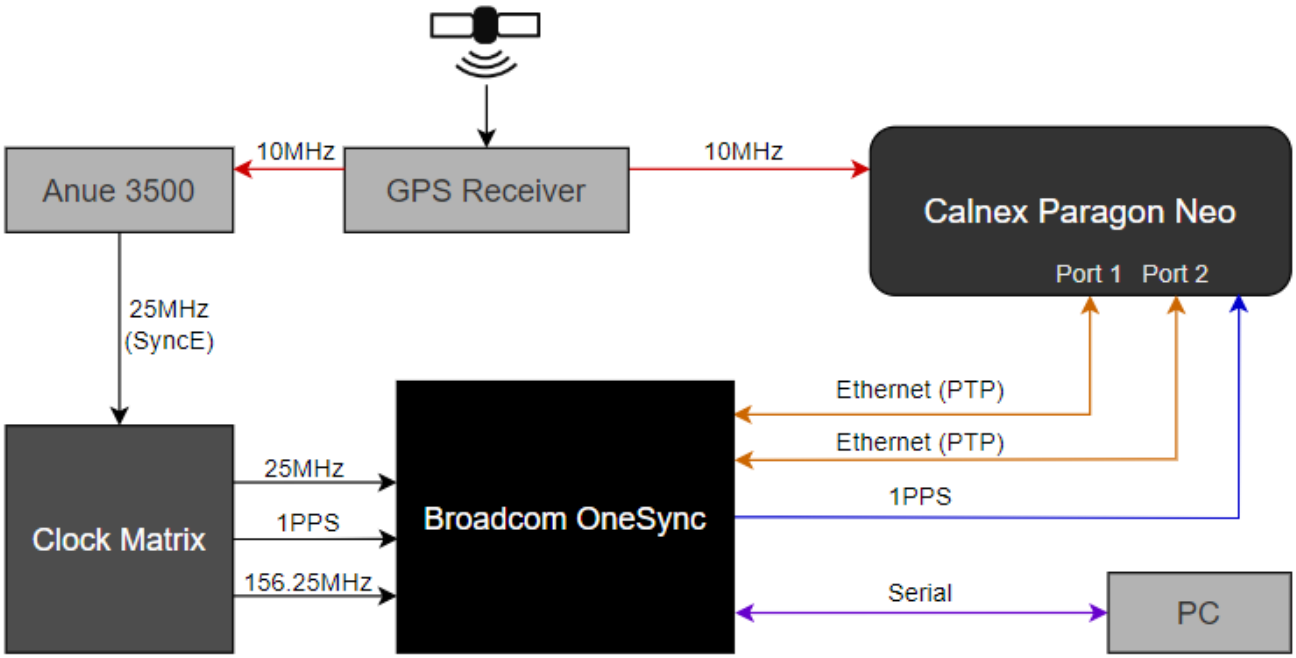


Figure 1. Equipment Configuration

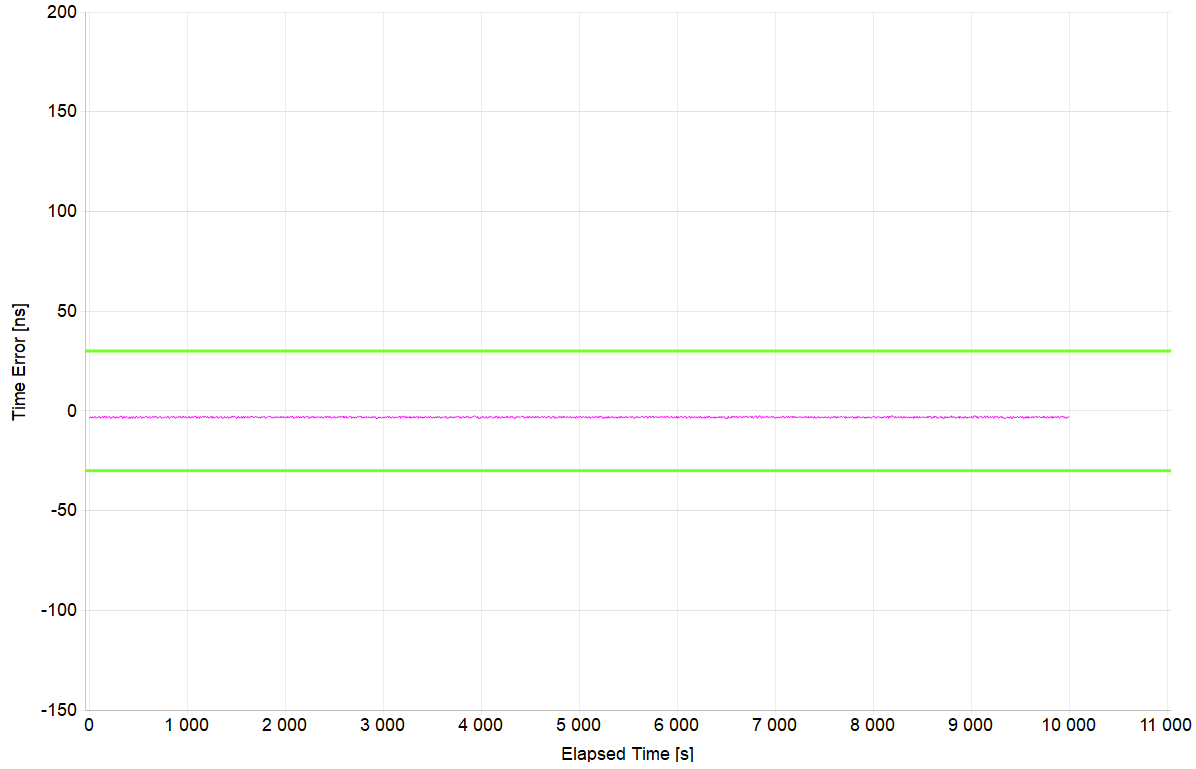
3. G.8273.2: Noise Generation – 1PPS

Test Description	Noise Generation 1PPS
Report Date	23-02-13_08-16-51
Packet Rate (pkt/s)	16
Beginning of Test	2023-02-07 5:49:51 PM
Test Duration	02:46:40
Time to Phase Lock (s)	18

All Mask Results	**Pass**
Mask ONEPPS	0.03µs
Mask ONEPPS Result	**Pass**
Mask FILTEREDTIMEERROR	0.005µs
Mask FILTEREDTIMEERROR Result	**Pass**
Mask CTE	0.01µs
Mask CTE Result	**Pass**
Mask DTE	0.01µs
Mask DTE Result	**Pass**
Mask DTEHF	0.07µs
Mask DTEHF Result	**Pass**
Mask DTEMTIE	G.8273.2 T-BC Provisional Class D Dynamic TE LF Const. Temp.
Mask DTEMTIE Result	**Pass**
Mask DTETDEV	G.8273.2 T-BC Provisional Class D Dynamic TE LF Const. Temp.
Mask DTETDEV Result	**Pass**

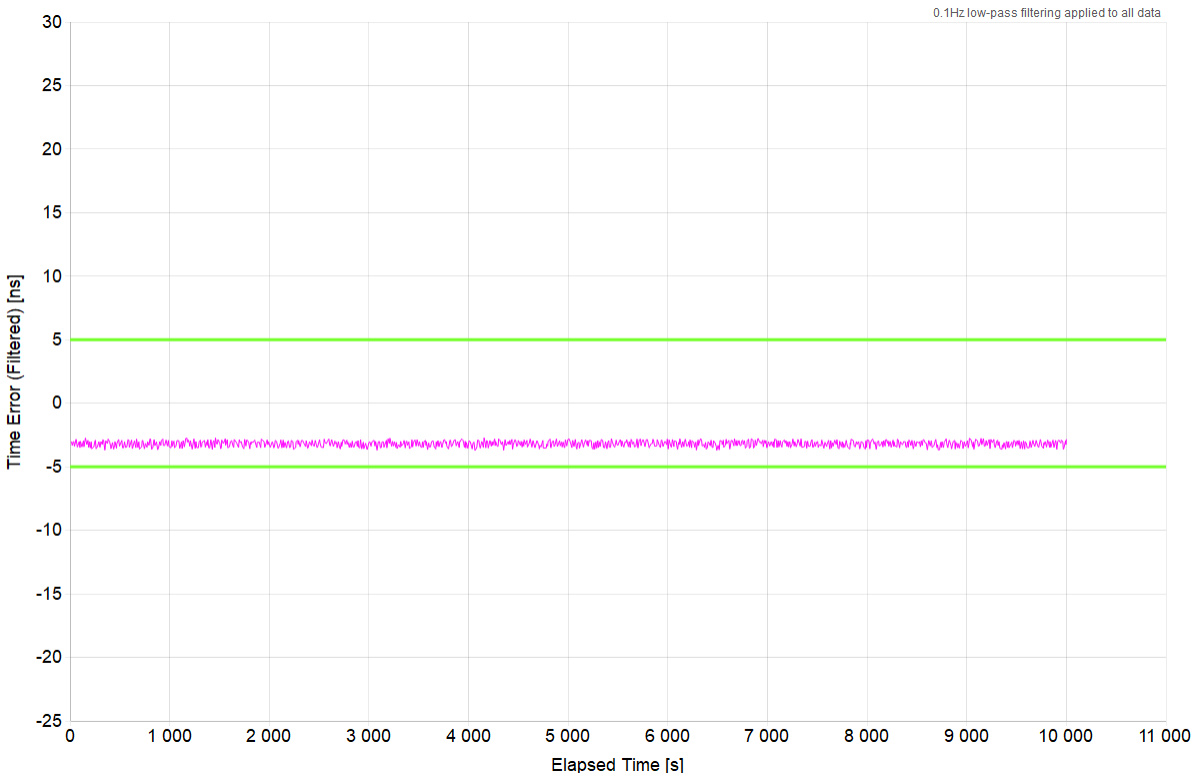
3.1 ONEPPS Analysis

Offset Removal Applied	Off
Zero Offset	-3.513ns



Mean [ns]	-3.183
Min [ns]	-3.763
Max [ns]	-2.513
Max-Min [ns]	1.25

3.2 FILTEREDTIMEERROR Analysis



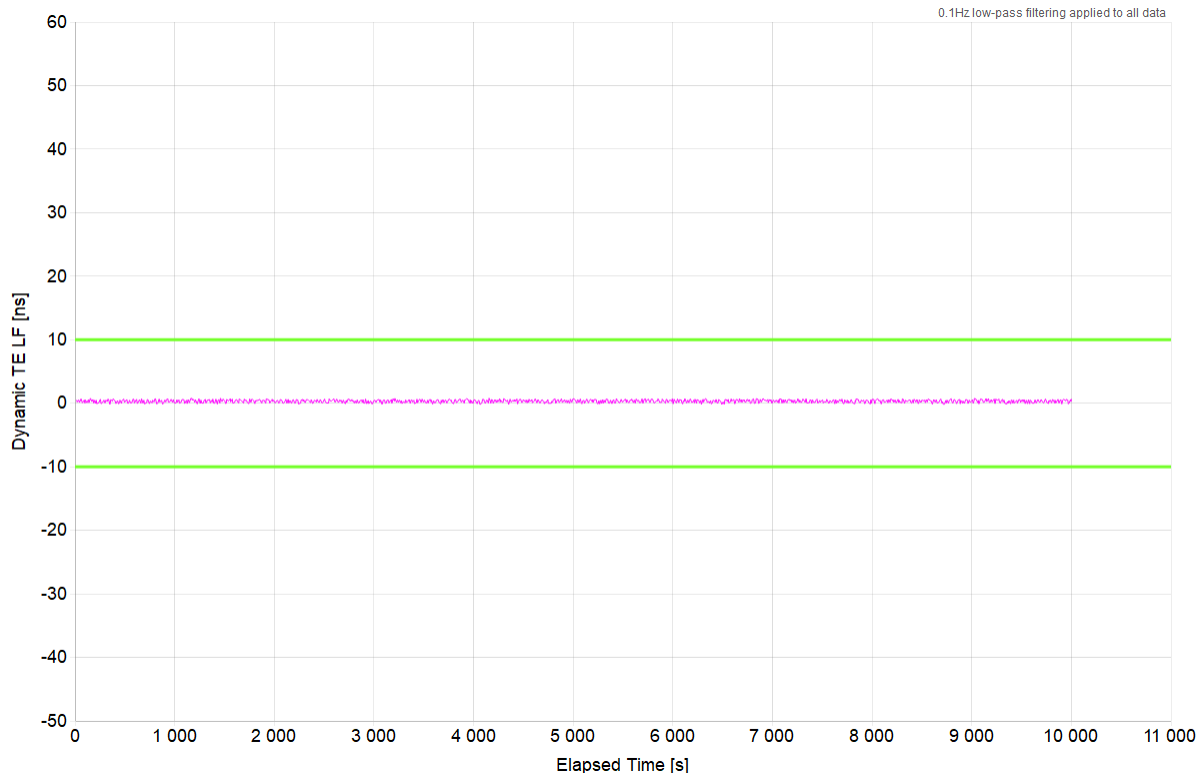
Mean [ns]	-3.183
Min [ns]	-3.718
Max [ns]	-2.72
Max-Min [ns]	0.998

3.3 CTE Analysis

Averaging Time (s)	1000

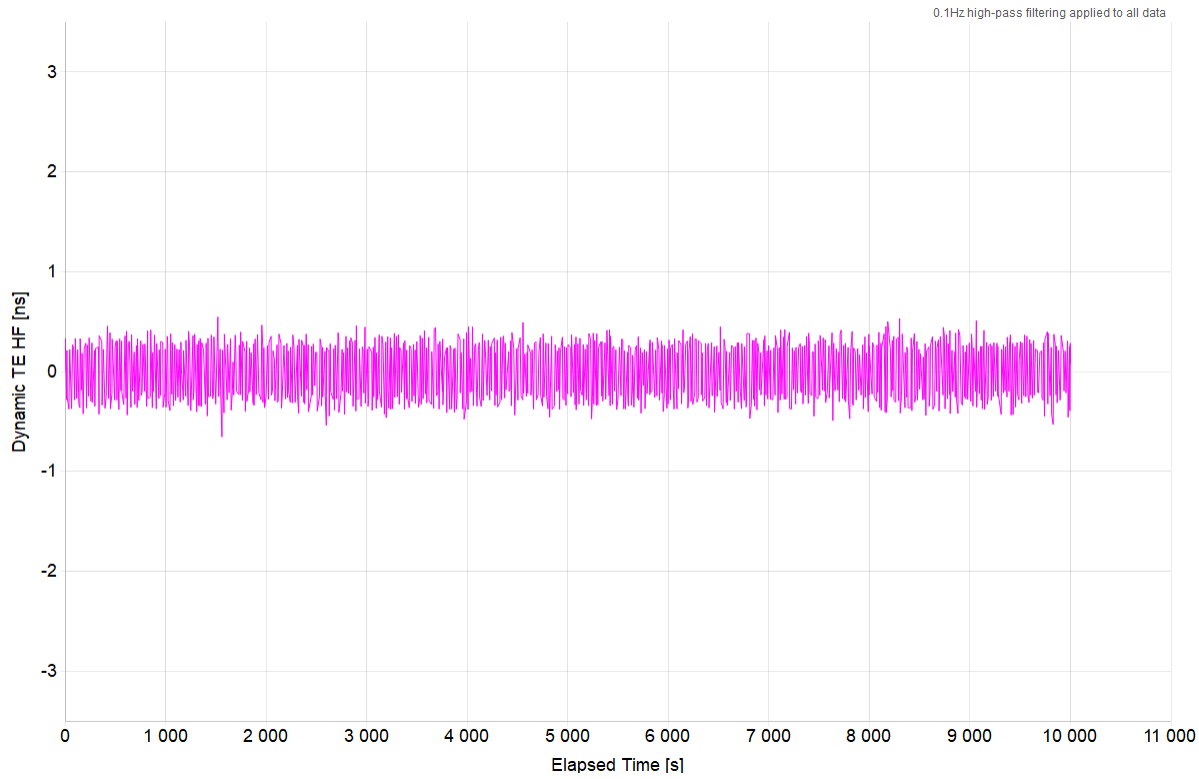
Constant Time Error [ns]	-3.181
Min [ns]	-3.213
Max [ns]	-3.147
Max-Min [ns]	0.067

3.4 DTE Analysis



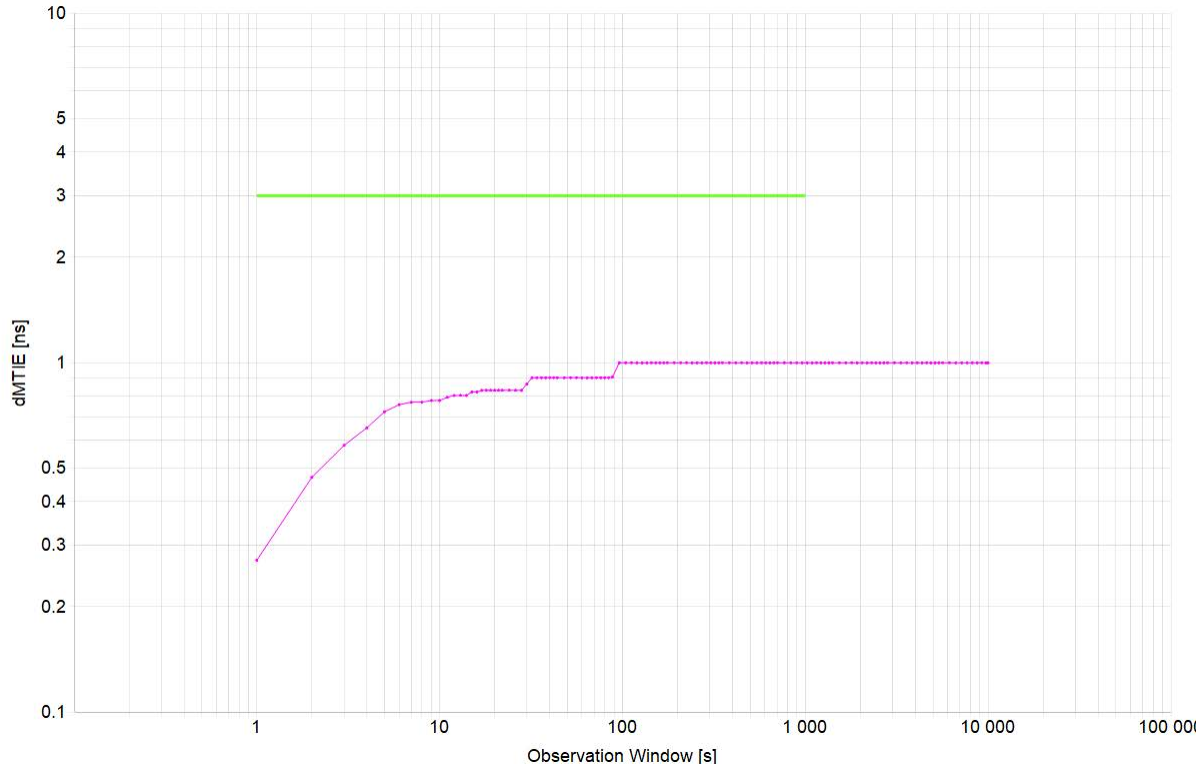
Mean [ns]	0.33
Min [ns]	-0.205
Max [ns]	0.793
Max-Min [ns]	0.998

3.5 DTEHF Analysis



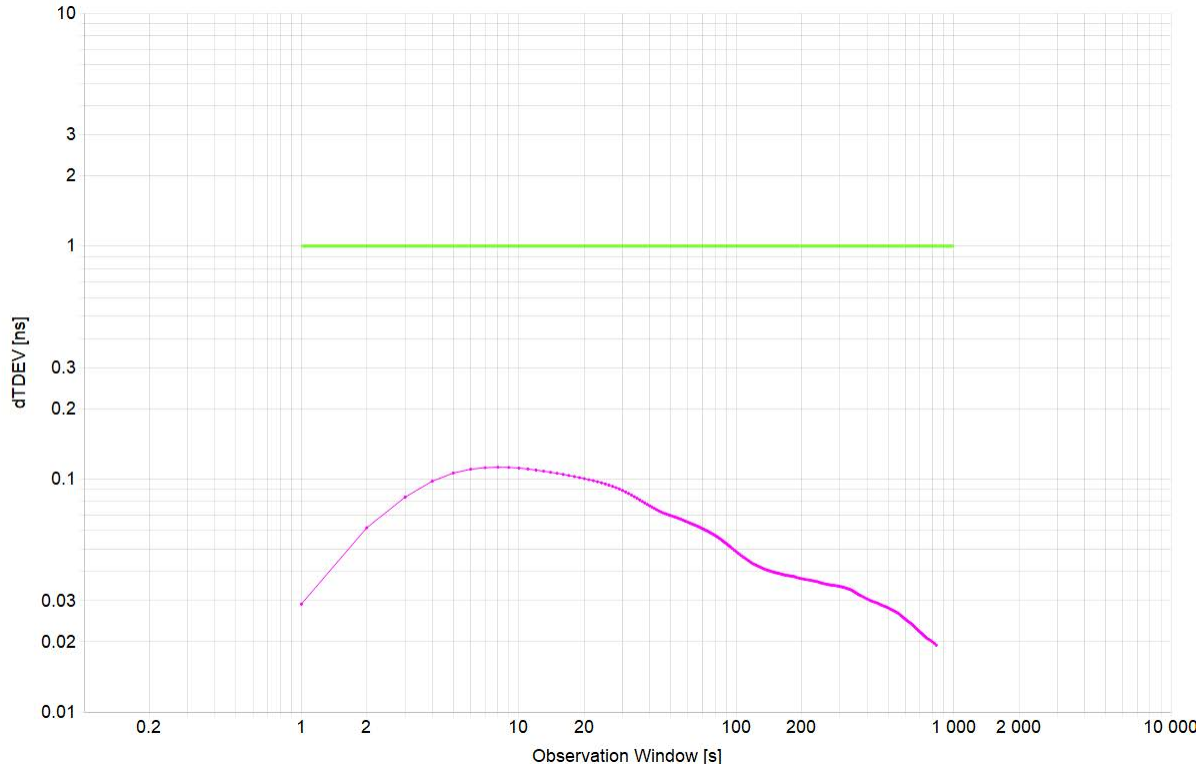
Mean [ns]	0
Min [ns]	-0.656
Max [ns]	0.546
Max-Min [ns]	1.202

3.6 DTEMTIE Analysis



Min [ns]	0.272
Max [ns]	0.998
Max-Min [ns]	0.726

3.7 DTETDEV Analysis



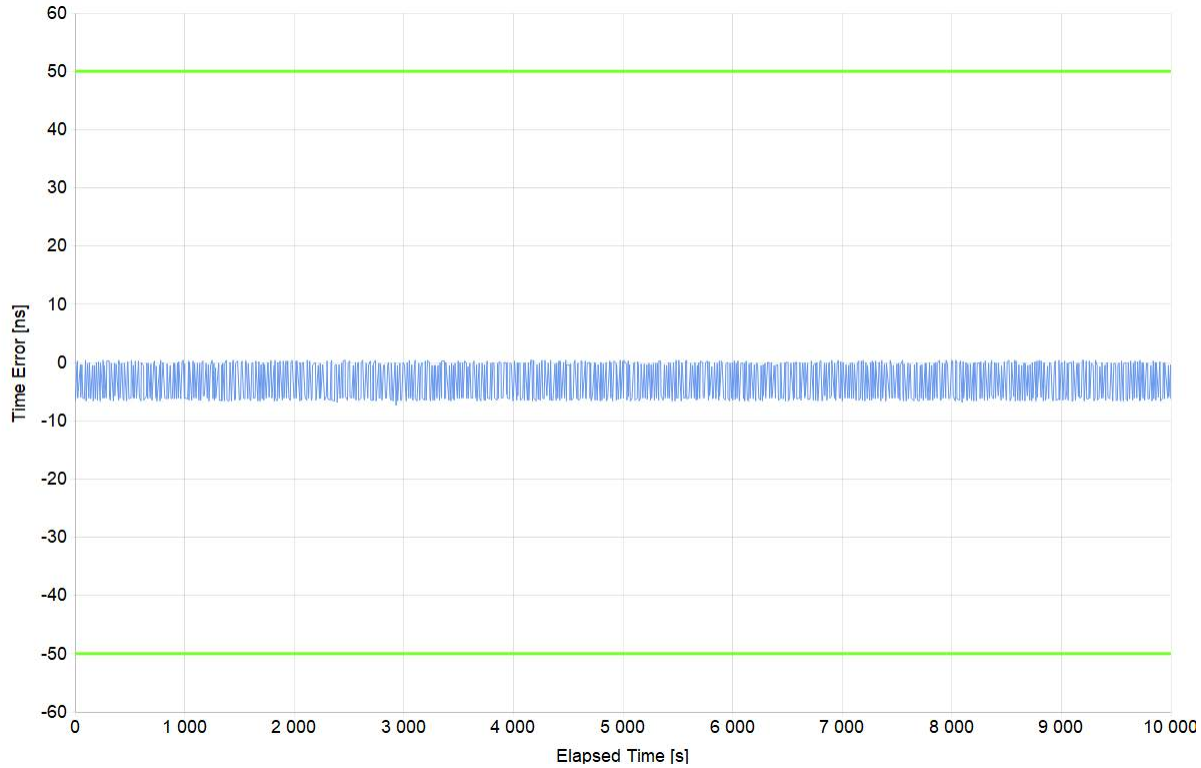
Min [ns]	0.019
Max [ns]	0.112
Max-Min [ns]	0.093

4. G.8273.2: Noise Generation – PTP

Test Description	Noise Generation - PTP
Report Date	23-02-10_13-07-16
Packet Rate (pkt/s)	16
Beginning of Test	2023-02-07 5:49:51 PM
Test Duration	02:46:40
Time to Phase Lock (s)	18

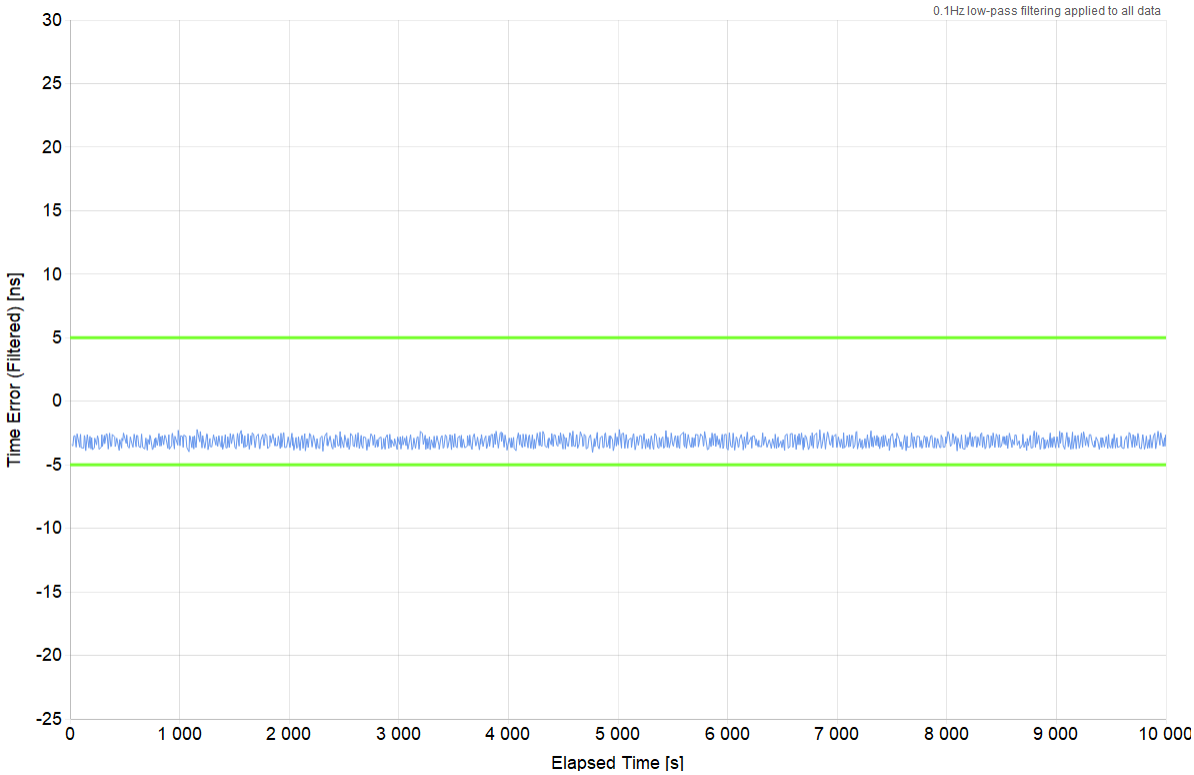
All Mask Results	**Pass**
Mask TIMEERROR	0.05µs
Mask TIMEERROR Result	**Pass**
Mask FILTEREDTIMEERROR	0.005µs
Mask FILTEREDTIMEERROR Result	**Pass**
Mask CTE	0.01µs
Mask CTE Result	**Pass**
Mask DTE	0.01µs
Mask DTE Result	**Pass**
Mask DTEHF	0.07µs
Mask DTEHF Result	**Pass**
Mask DTEMTIE	G.8273.2 T-BC Class C Dynamic TE LF Const. Temp.
Mask DTEMTIE Result	**Pass**
Mask DTETDEV	G.8273.2 T-BC Class C Dynamic TE LF Const. Temp.
Mask DTETDEV Result	**Pass**

4.1 TIMEERROR Analysis



Pk-Pk [ns]	7.75
Mean [ns]	-3.183
Min [ns]	-7.363
Max [ns]	0.387

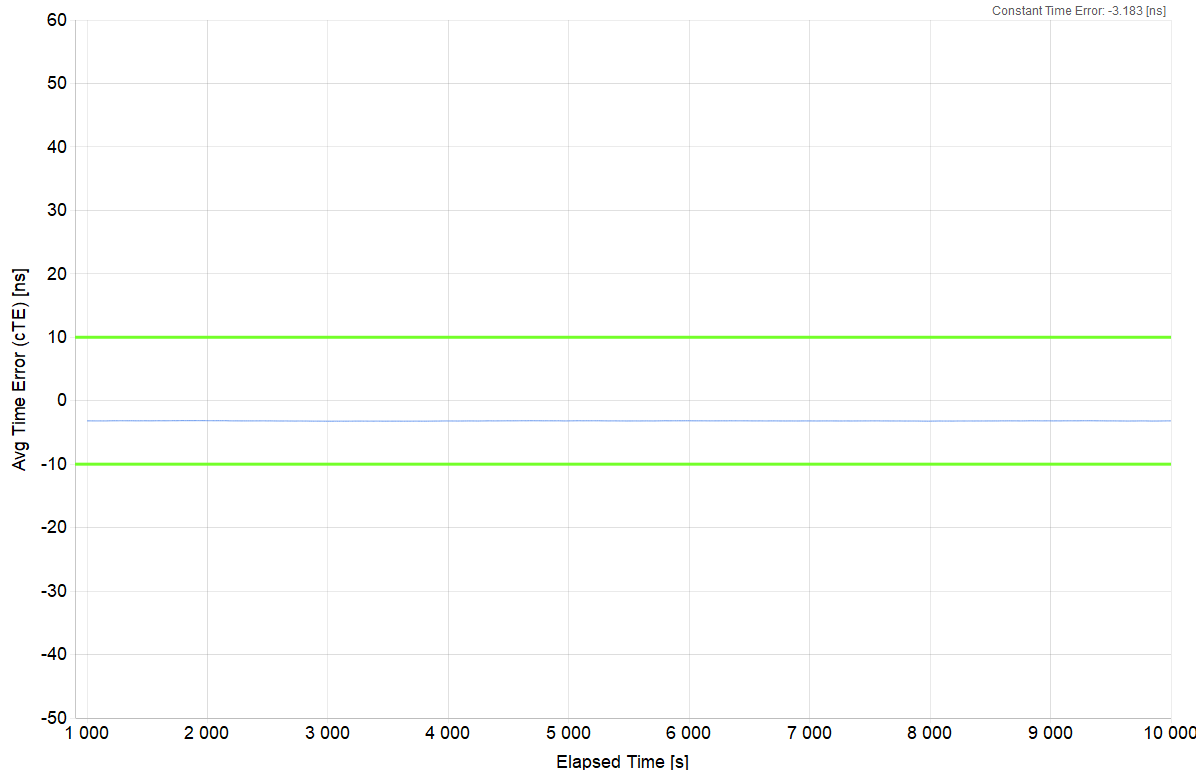
4.2 FILTEREDTIMEERROR Analysis



Mean [ns]	-3.183
Min [ns]	-4.024
Max [ns]	-2.222
Max-Min [ns]	1.802

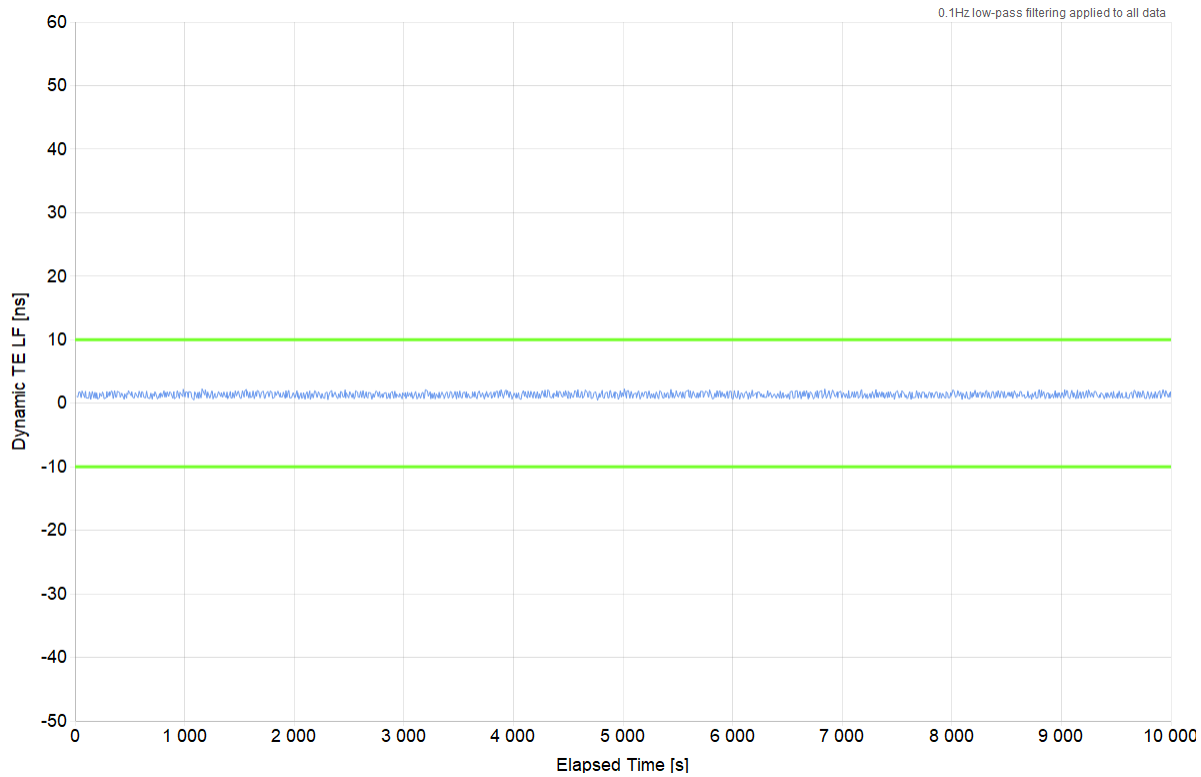
4.3 CTE Analysis

Averaging Time (s)	1000



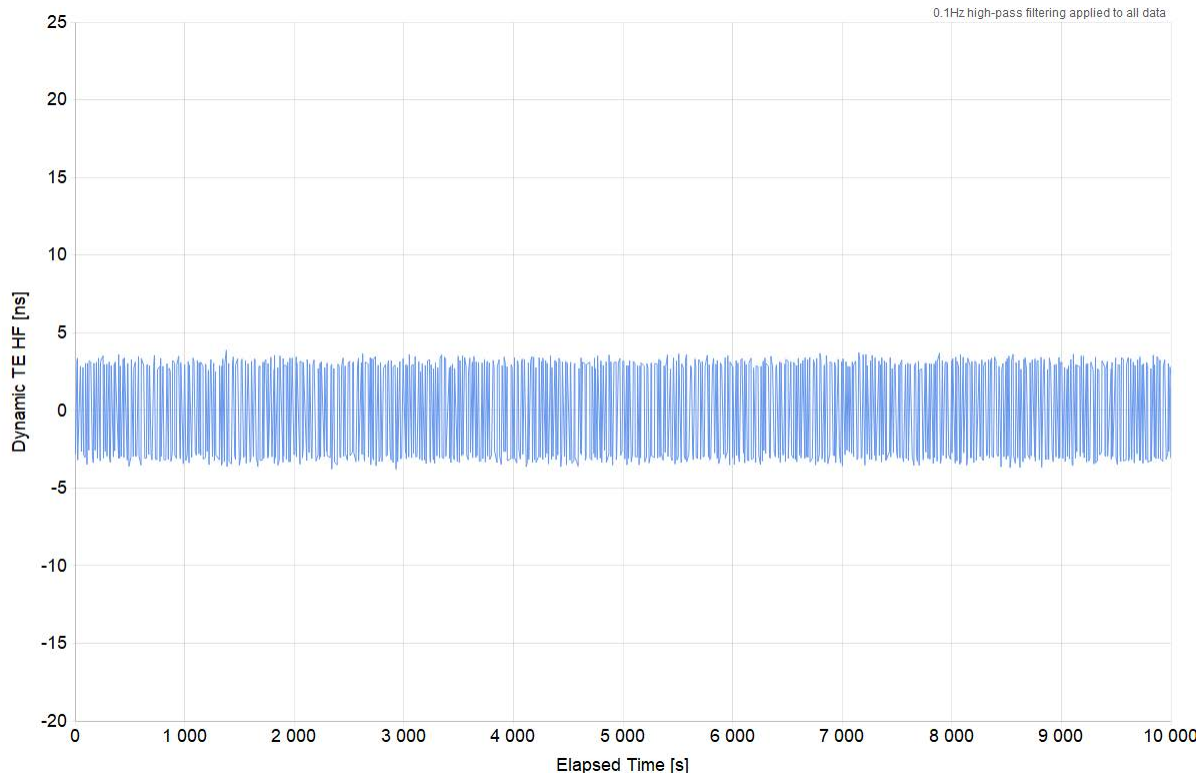
Constant Time Error [ns]	-3.183
Min [ns]	-3.228
Max [ns]	-3.137
Max-Min [ns]	0.091

4.4 DTE Analysis



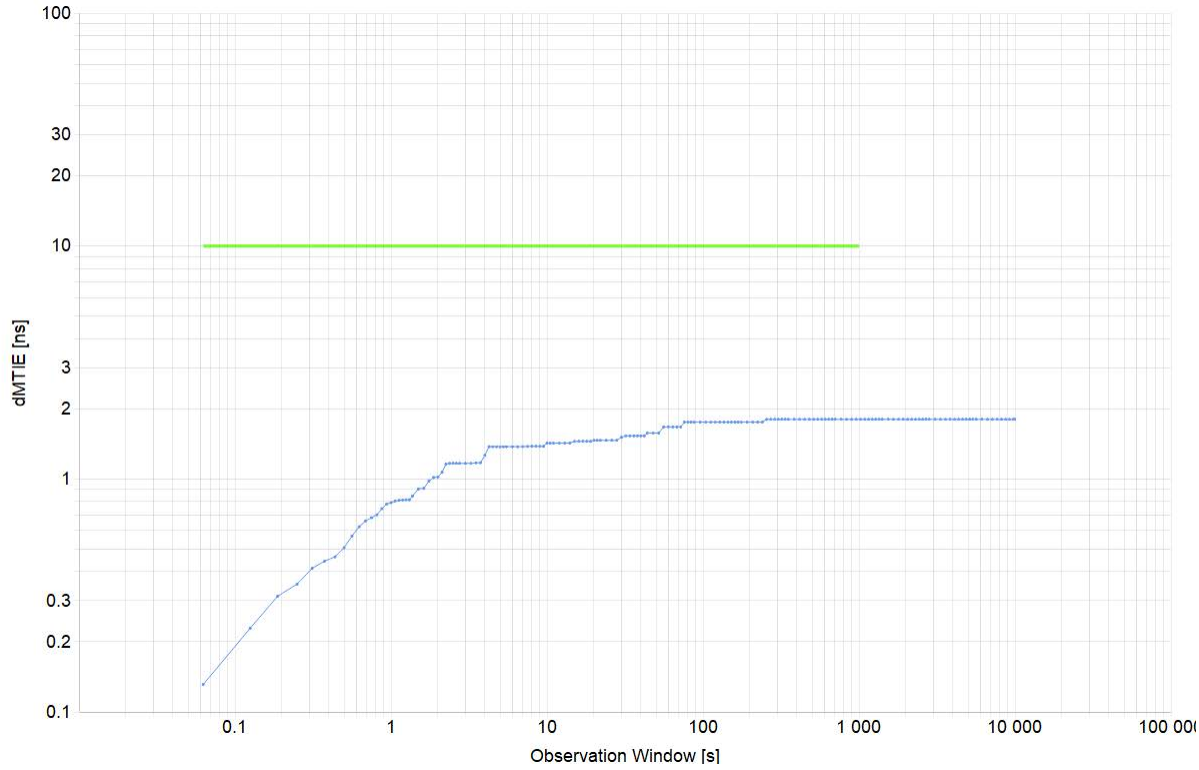
Mean [ns]	1.306
Min [ns]	0.464
Max [ns]	2.267
Max-Min [ns]	1.802

4.5 DTEHF Analysis



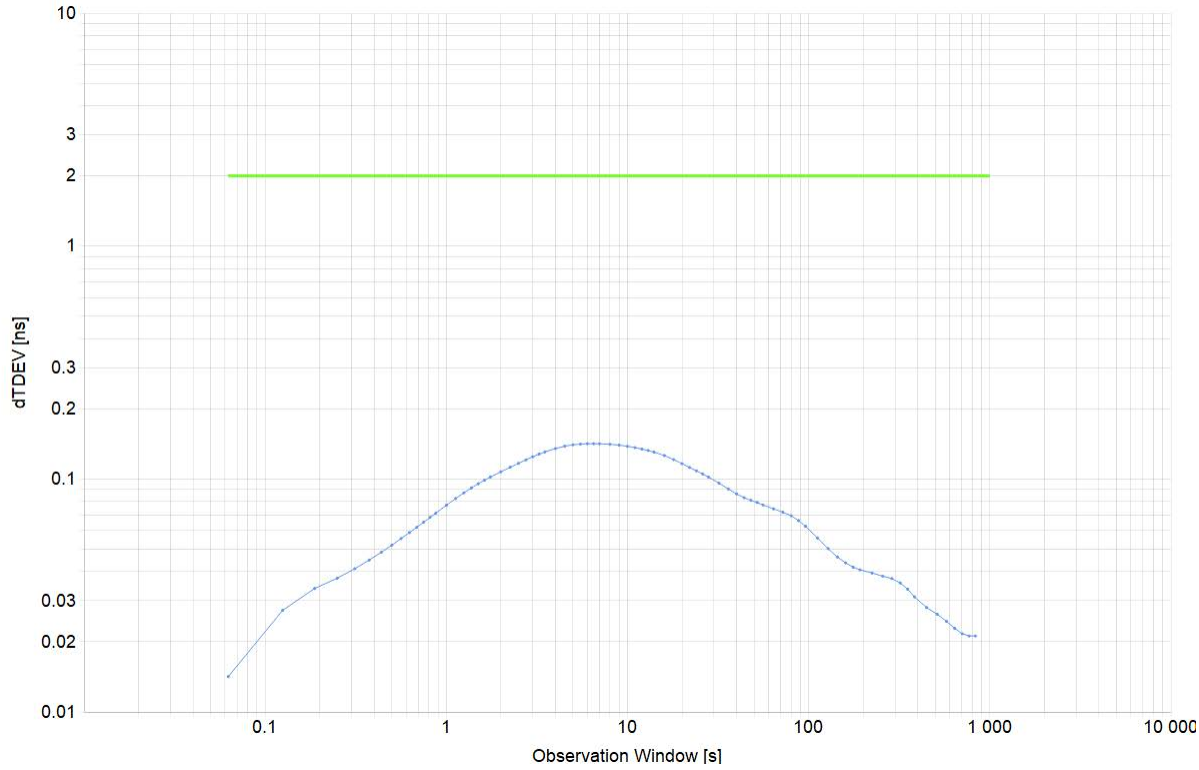
Pk-Pk [ns]	7.666
Mean [ns]	0
Min [ns]	-3.791
Max [ns]	3.875

4.6 DTEMTIE Analysis



Min [ns]	0.131
Max [ns]	1.802
Max-Min [ns]	1.671

4.7 DTETDEV Analysis



Min [ns]	0.014
Max [ns]	0.142
Max-Min [ns]	0.128

5. G.8273.2: Noise Generation – No SyncE – 1PPS

Test Description	Noise Generation – No SyncE – 1PPS
Report Date	23-02-10_13-07-16
Packet Rate (pkt/s)	16
Beginning of Test	2023-02-07 9:59:48 PM
Test Duration	02:46:40
Time to Phase Lock (s)	19

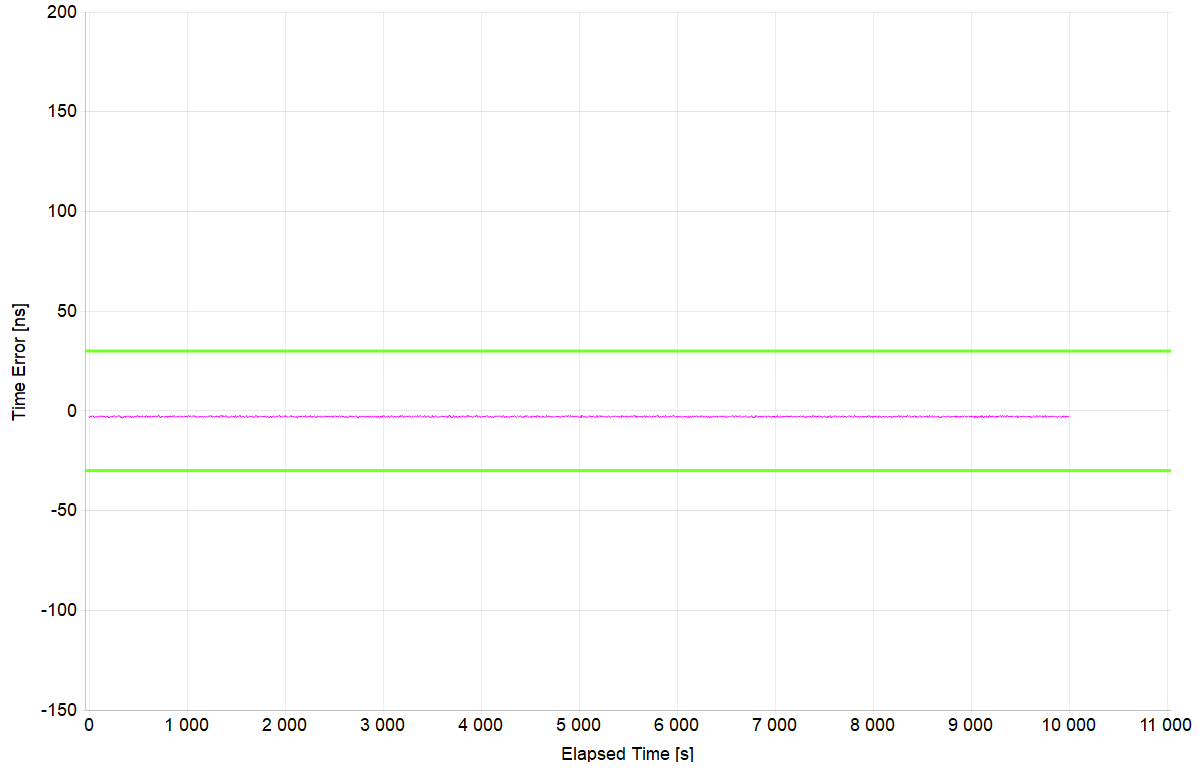
All Mask Results	**Pass**
Mask ONEPPS	0.03µs
Mask ONEPPS Result	**Pass**
Mask FILTEREDTIMEERROR	0.005µs
Mask FILTEREDTIMEERROR Result	**Pass**
Mask CTE	0.01µs
Mask CTE Result	**Pass**
Mask DTE	0.01µs
Mask DTE Result	**Pass**
Mask DTEHF	0.07µs
Mask DTEHF Result	**Pass**
Mask DTEMTIE	G.8273.2 T-BC Provisional Class D Dynamic TE LF Const. Temp.
Mask DTEMTIE Result	**Pass**
Mask DTETDEV	G.8273.2 T-BC Provisional Class D Dynamic TE LF Const. Temp.
Mask DTETDEV Result	**Pass**

1. SyncE was disabled using a parameter in the PCM4L Json file to set the SyncE clock category below the desired threshold:

```
physicalPllClockCategory = 4,
physicalPllClockCategoryThreshold = 1,
```

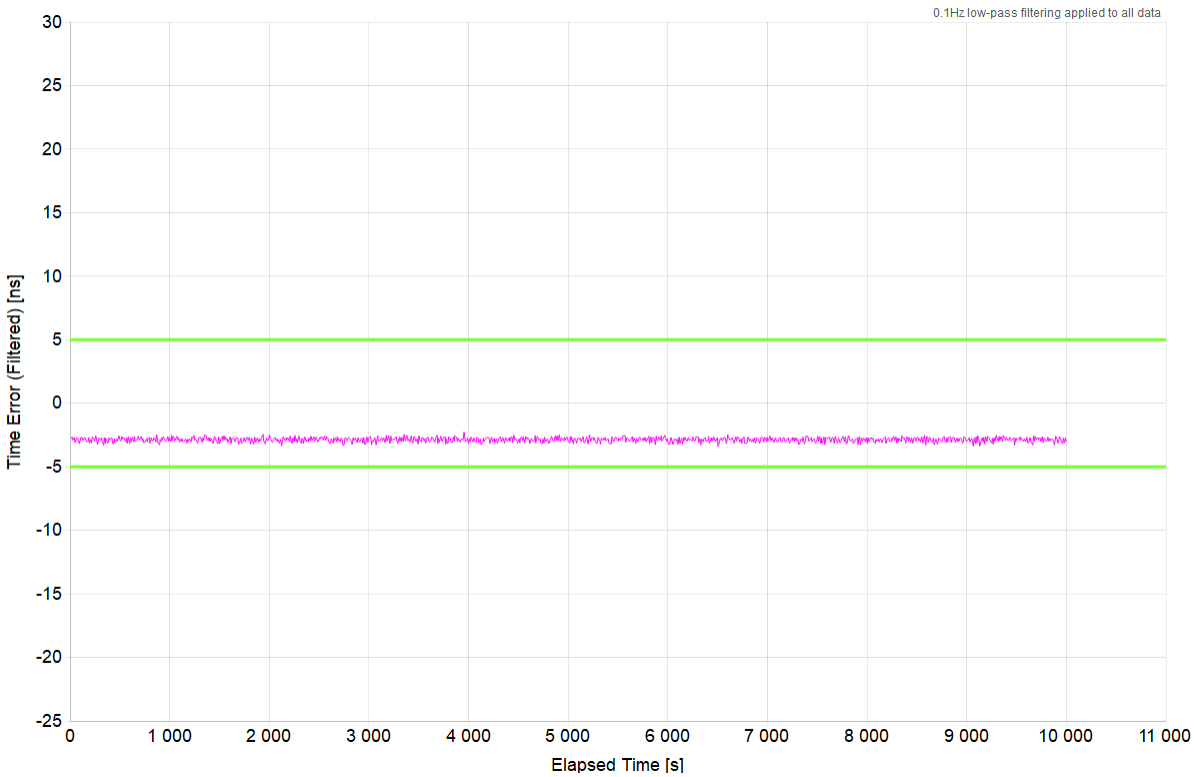
5.1 ONEPPS Analysis

Offset Removal Applied	Off
Zero Offset	-2.803ns



Mean [ns]	-2.863
Min [ns]	-3.553
Max [ns]	-2.053
Max-Min [ns]	1.5

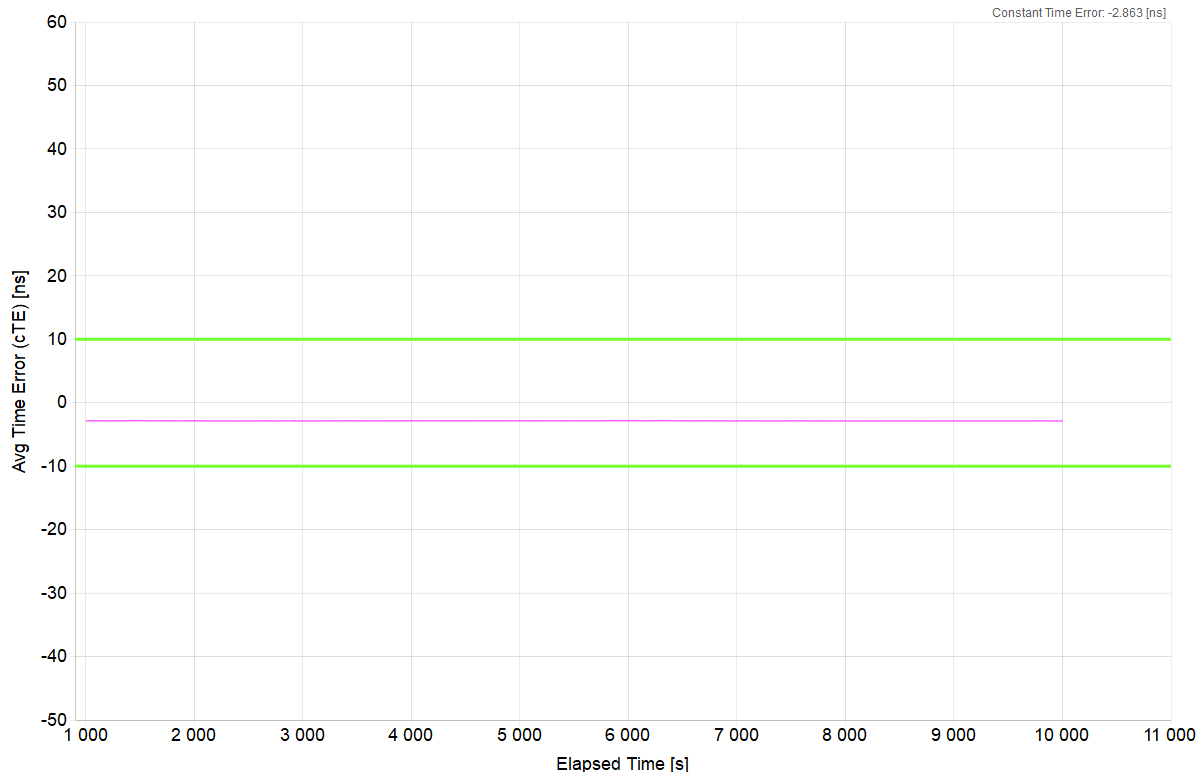
5.2 FILTEREDTIMEERROR Analysis



Mean [ns]	-2.863
Min [ns]	-3.403
Max [ns]	-2.268
Max-Min [ns]	1.136

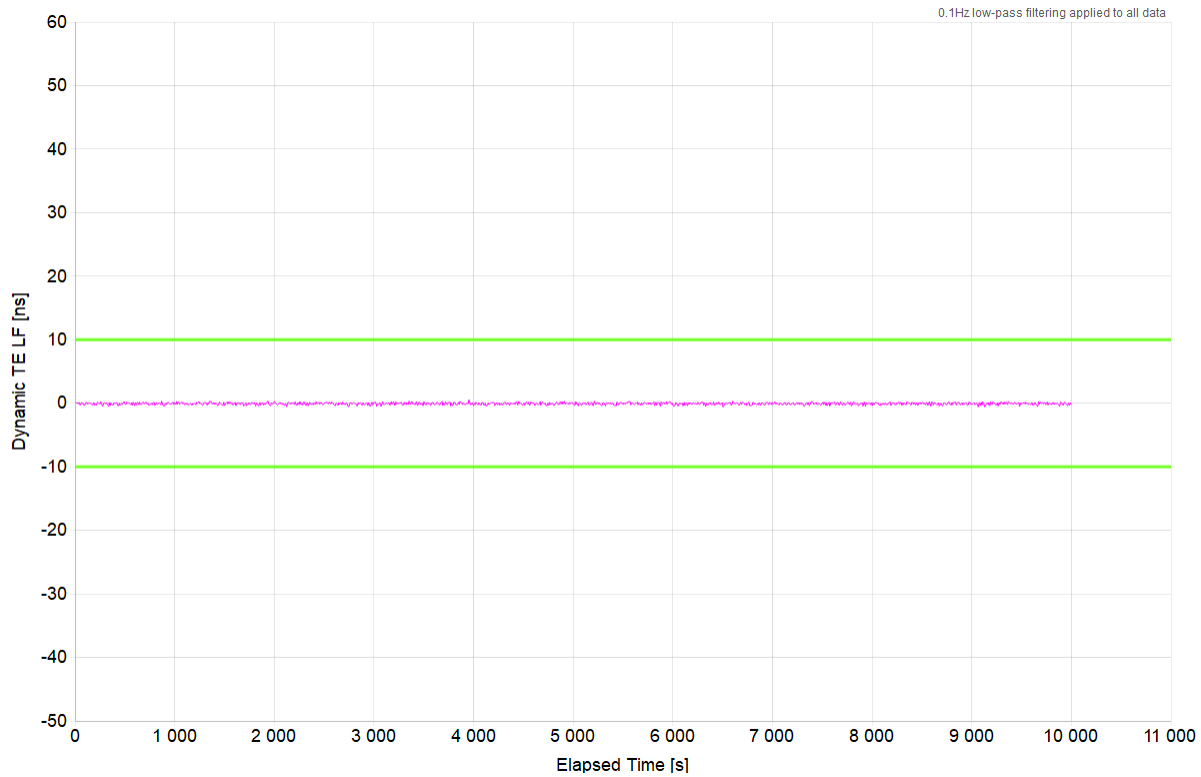
5.3 CTE Analysis

Averaging Time (s)	1000



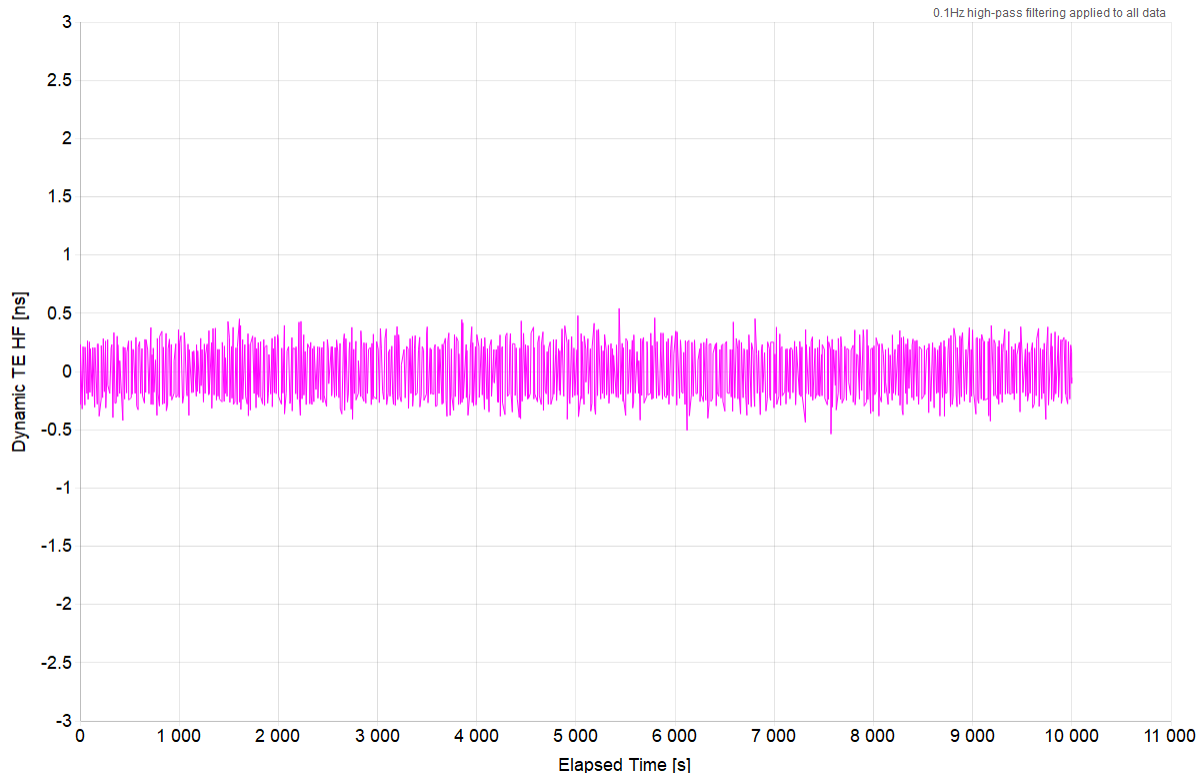
Constant Time Error [ns]	-2.863
Min [ns]	-2.88
Max [ns]	-2.844
Max-Min [ns]	0.036

5.4 DTE Analysis



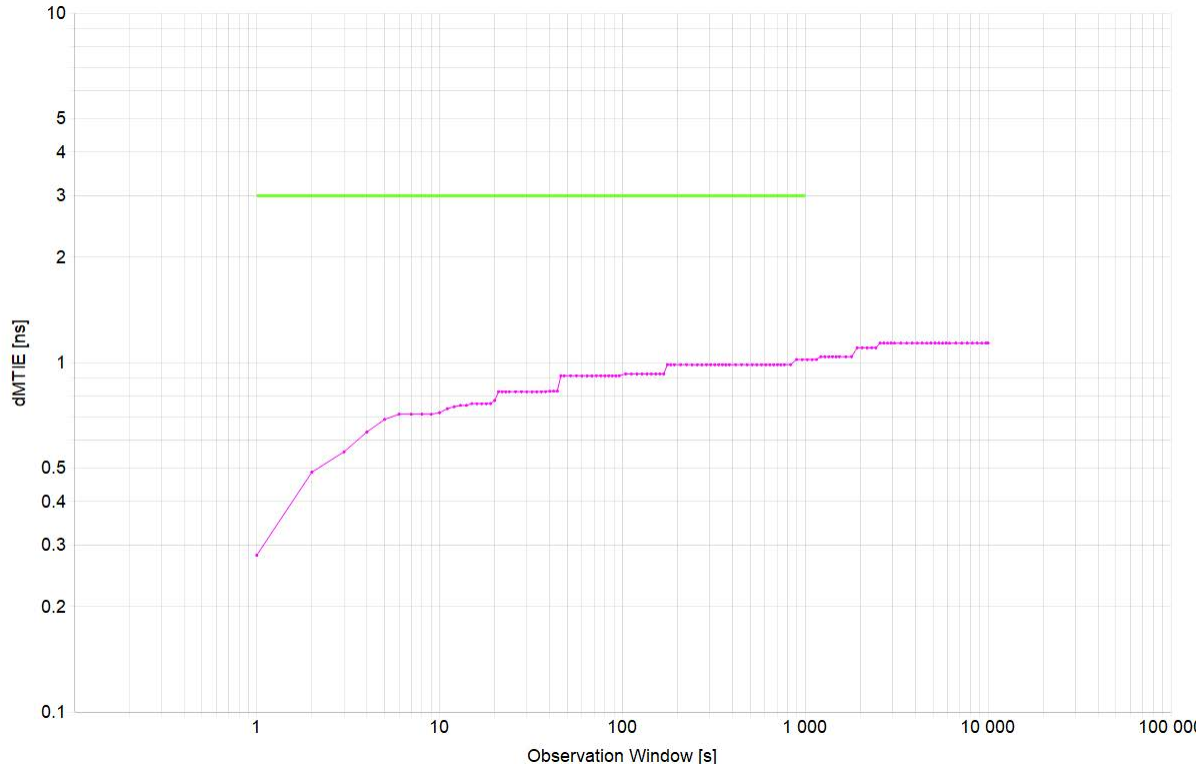
Mean [ns]	-0.06
Min [ns]	-0.6
Max [ns]	0.535
Max-Min [ns]	1.136

5.5 DTEHF Analysis



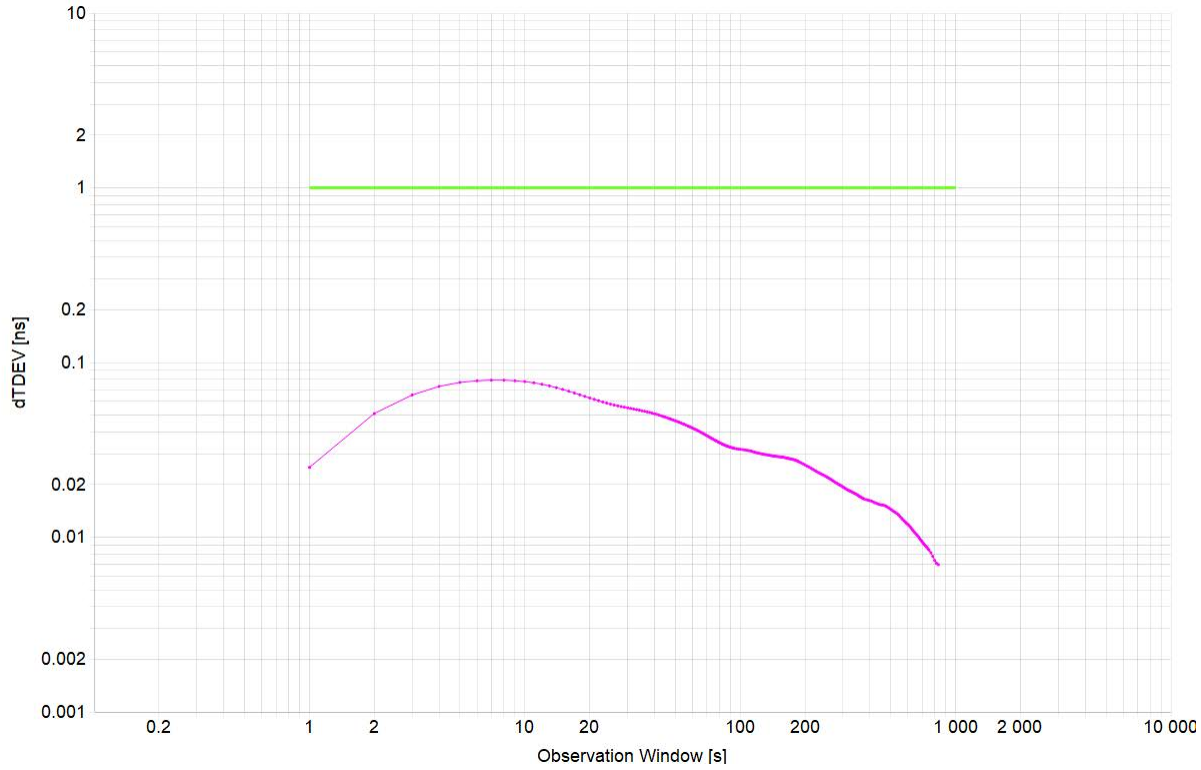
Mean [ns]	0
Min [ns]	-0.537
Max [ns]	0.542
Max-Min [ns]	1.079

5.6 DTEMTIE Analysis



Min [ns]	0.281
Max [ns]	1.136
Max-Min [ns]	0.855

5.7 DTETDEV Analysis



Min [ns]	0.007
Max [ns]	0.079
Max-Min [ns]	0.072

6. G.8273.2: Noise Generation – No SyncE – PTP

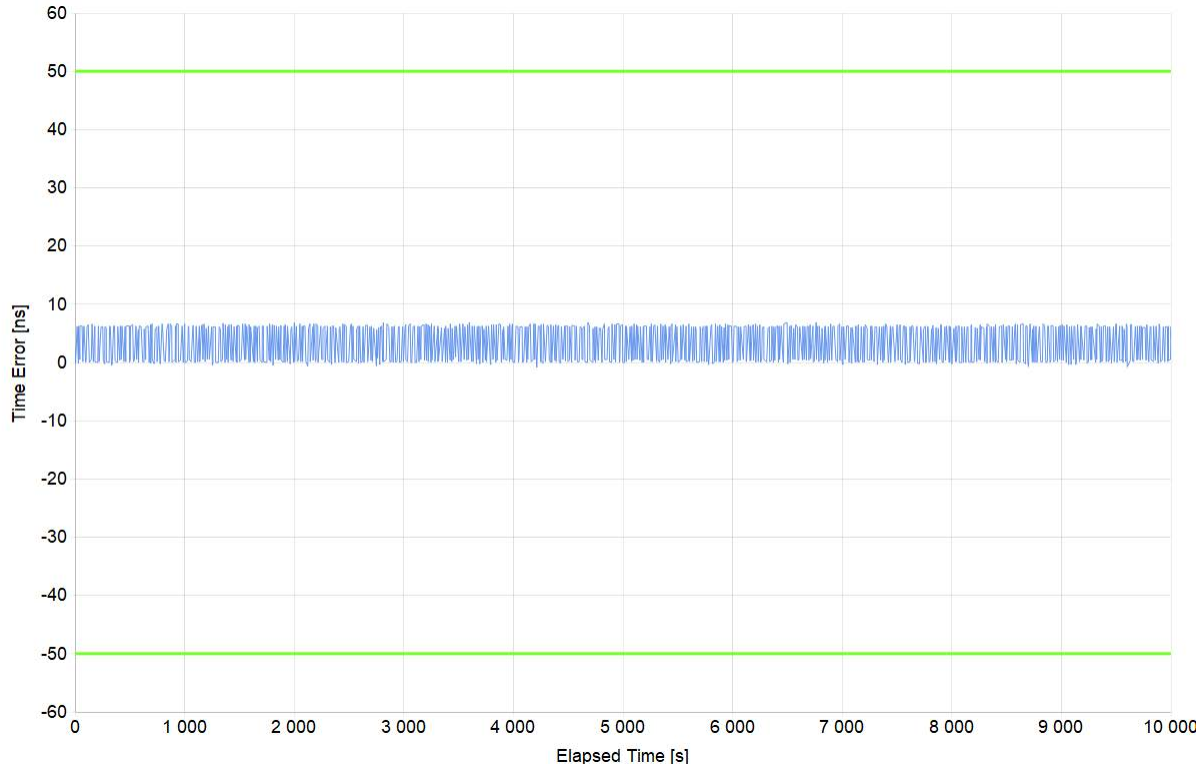
Test Description	Noise Generation – No SyncE - PTP
Report Date	23-02-10_13-07-16
Packet Rate (pkt/s)	16
Beginning of Test	2023-02-07 9:59:48 PM
Test Duration	02:46:39
Time to Phase Lock (s)	19

All Mask Results	**Pass**
Mask TIMEERROR	0.05µs
Mask TIMEERROR Result	**Pass**
Mask FILTEREDTIMEERROR	0.005µs
Mask FILTEREDTIMEERROR Result	**Pass**
Mask CTE	0.01µs
Mask CTE Result	**Pass**
Mask DTE	0.01µs
Mask DTE Result	**Pass**
Mask DTEHF	0.07µs
Mask DTEHF Result	**Pass**
Mask DTEMTIE	G.8273.2 T-BC Class C Dynamic TE LF Const. Temp.
Mask DTEMTIE Result	**Pass**
Mask DTETDEV	G.8273.2 T-BC Class C Dynamic TE LF Const. Temp.
Mask DTETDEV Result	**Pass**

1. SyncE was disabled using a parameter in the PCM4L Json file to set the SyncE clock category below the desired threshold:

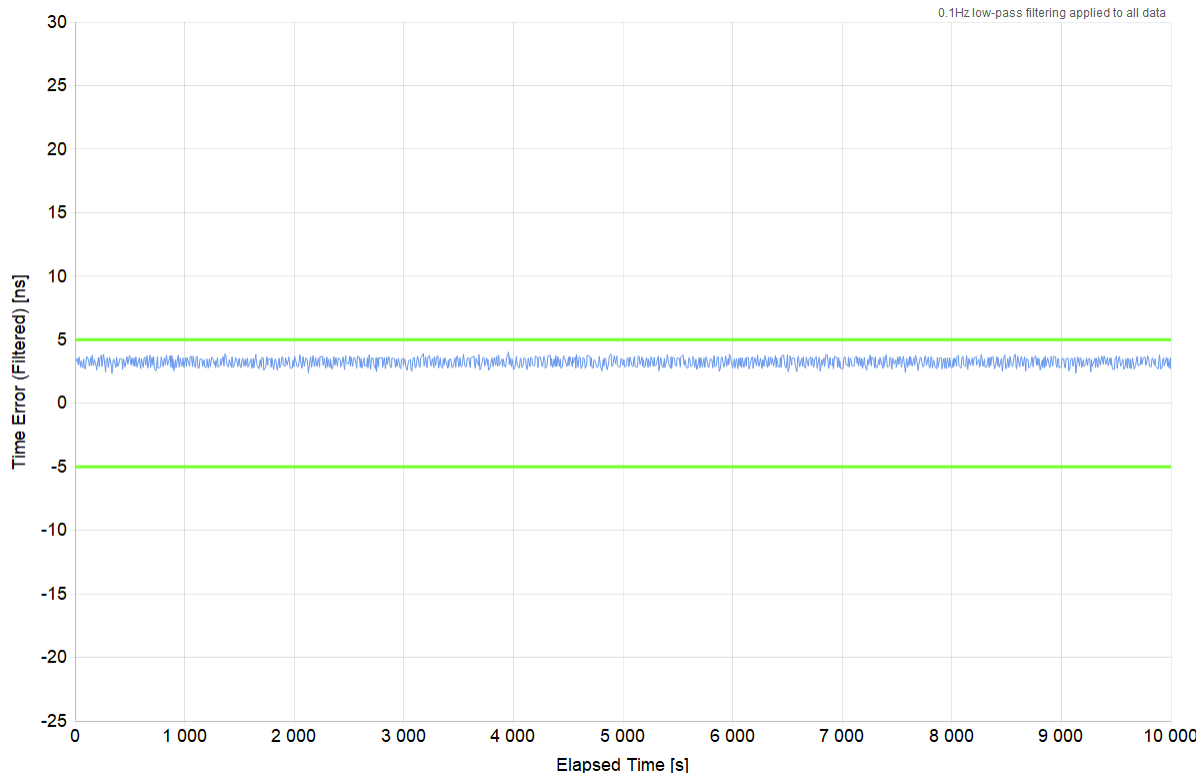
```
physicalPllClockCategory = 4,
physicalPllClockCategoryThreshold = 1,
```

6.1 TIMEERROR Analysis



Pk-Pk [ns]	7.75
Mean [ns]	3.228
Min [ns]	-0.875
Max [ns]	6.875

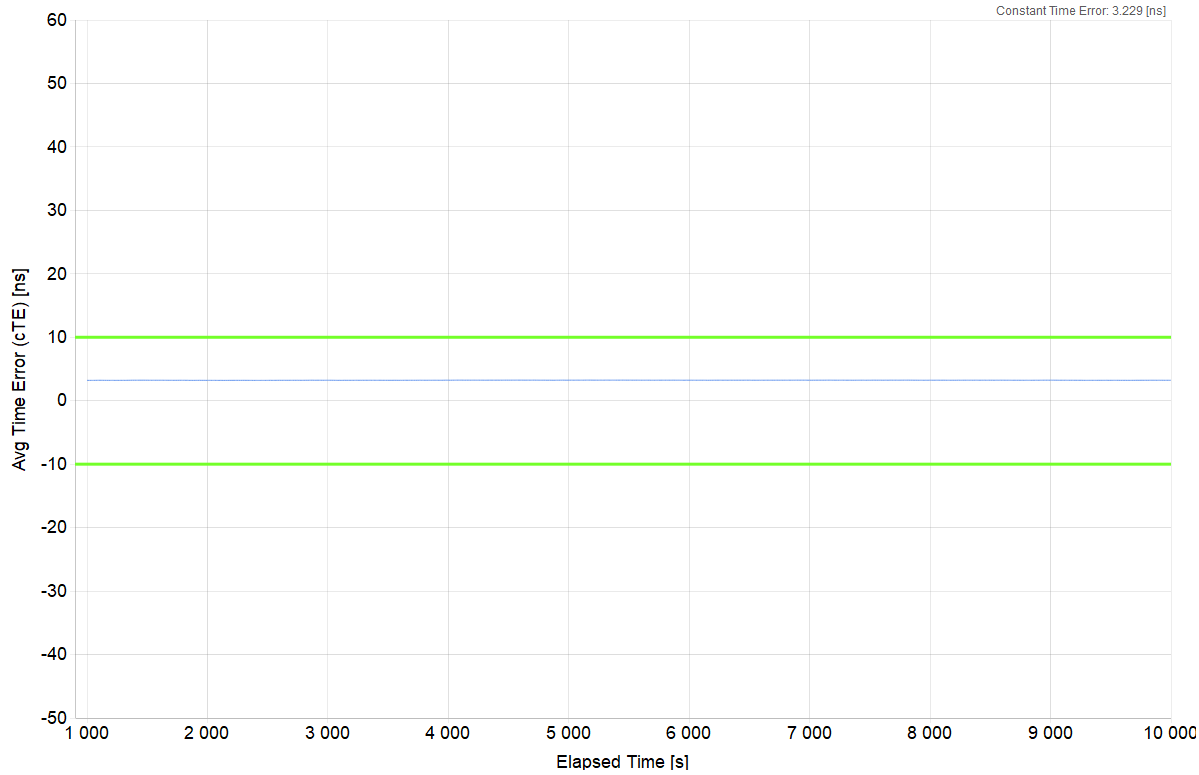
6.2 FILTEREDTIMEERROR Analysis



Mean [ns]	3.228
Min [ns]	2.341
Max [ns]	4.031
Max-Min [ns]	1.69

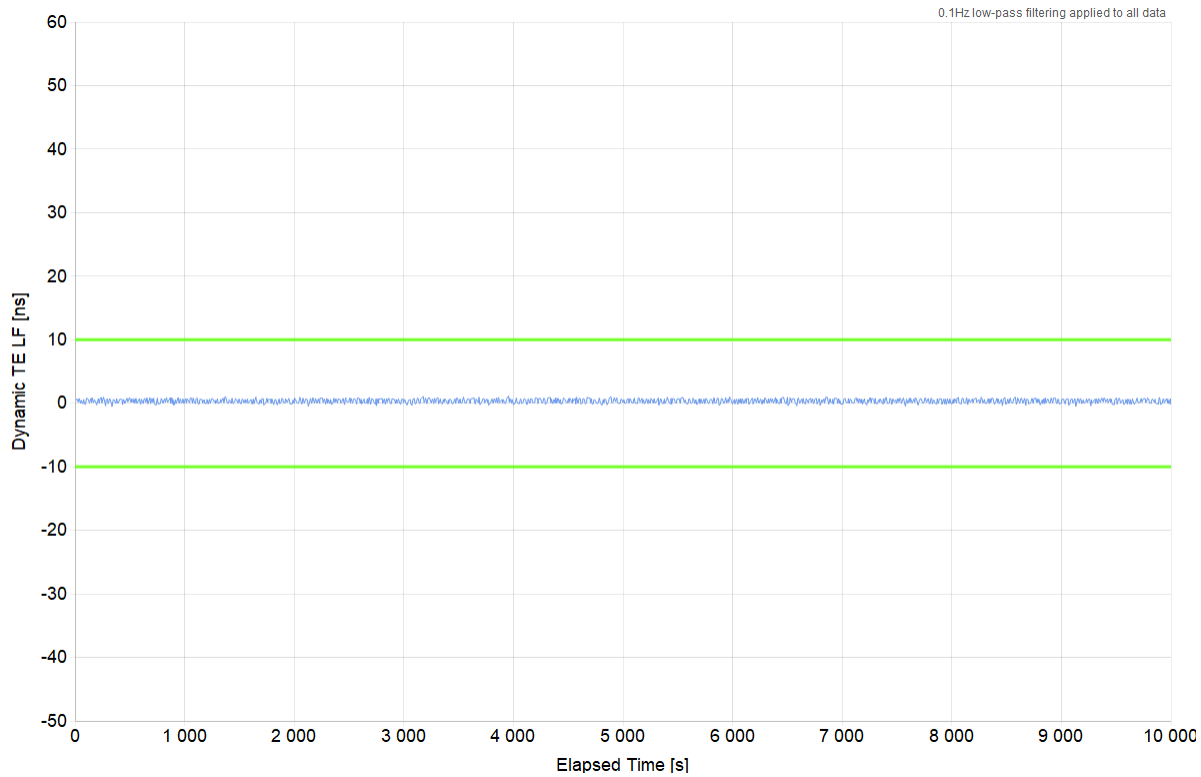
6.3 CTE Analysis

Averaging Time (s)	1000



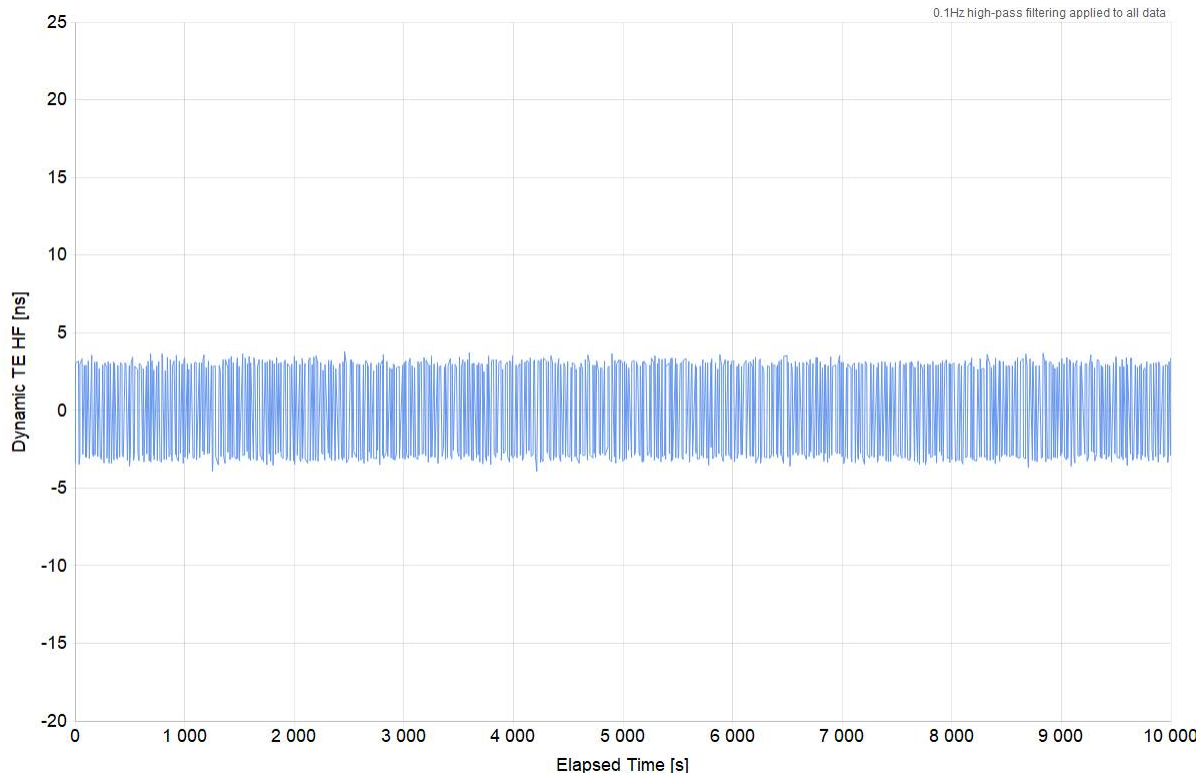
Constant Time Error [ns]	3.229
Min [ns]	3.205
Max [ns]	3.249
Max-Min [ns]	0.044

6.4 DTE Analysis



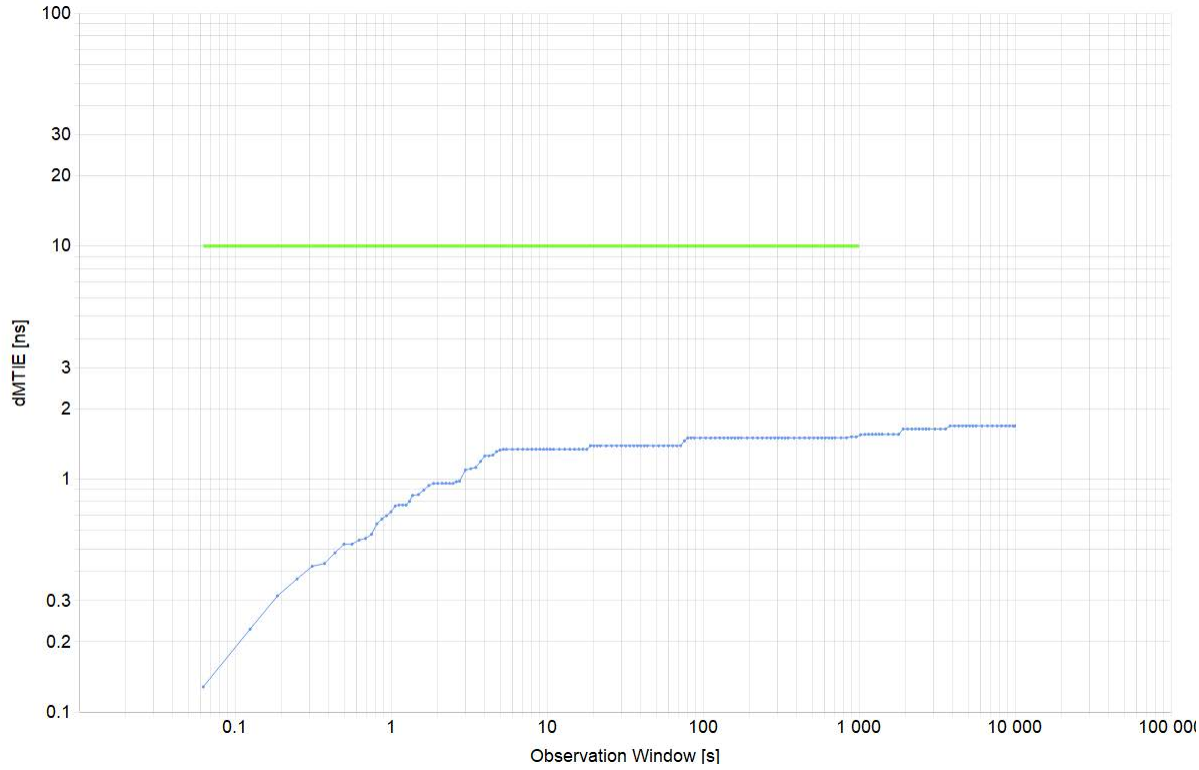
Mean [ns]	0.353
Min [ns]	-0.534
Max [ns]	1.156
Max-Min [ns]	1.69

6.5 DTEHF Analysis



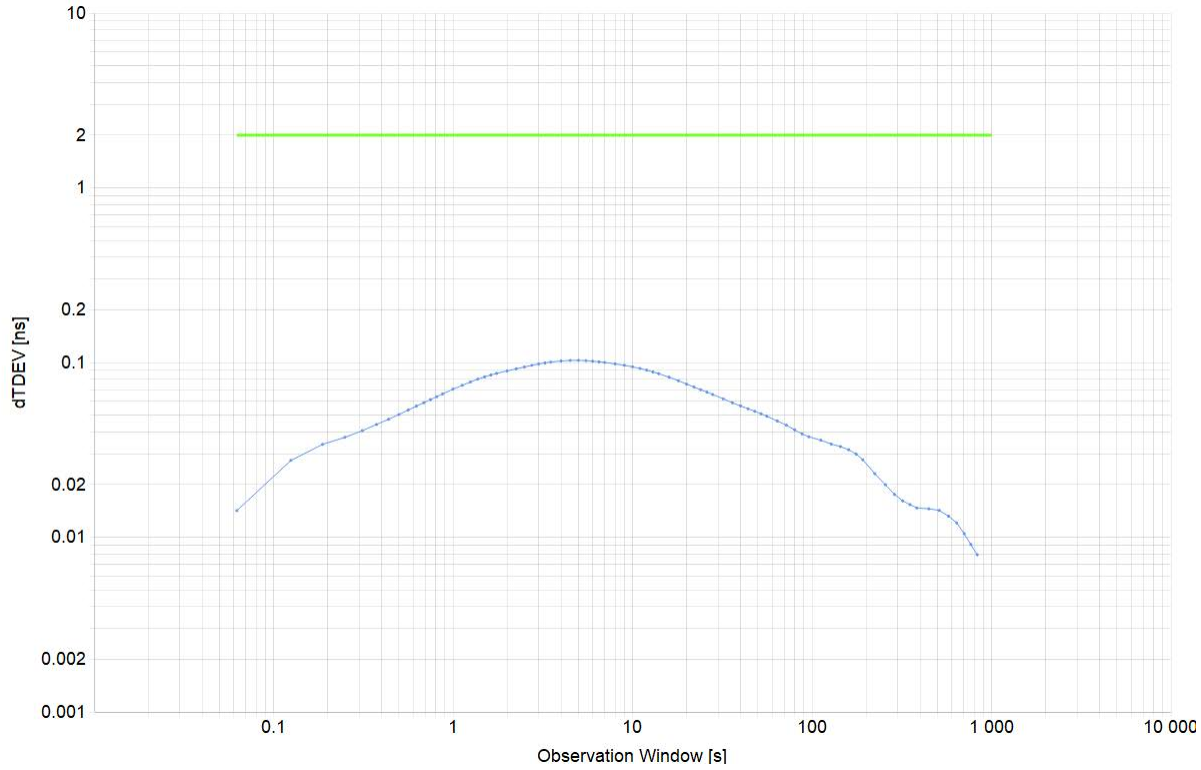
Pk-Pk [ns]	7.74
Mean [ns]	0
Min [ns]	-3.943
Max [ns]	3.797

6.6 DTEMTIE Analysis



Min [ns]	0.128
Max [ns]	1.69
Max-Min [ns]	1.562

6.7 DTETDEV Analysis



Min [ns]	0.008
Max [ns]	0.103
Max-Min [ns]	0.095

7. G.8273.2: Holdover – 1PPS

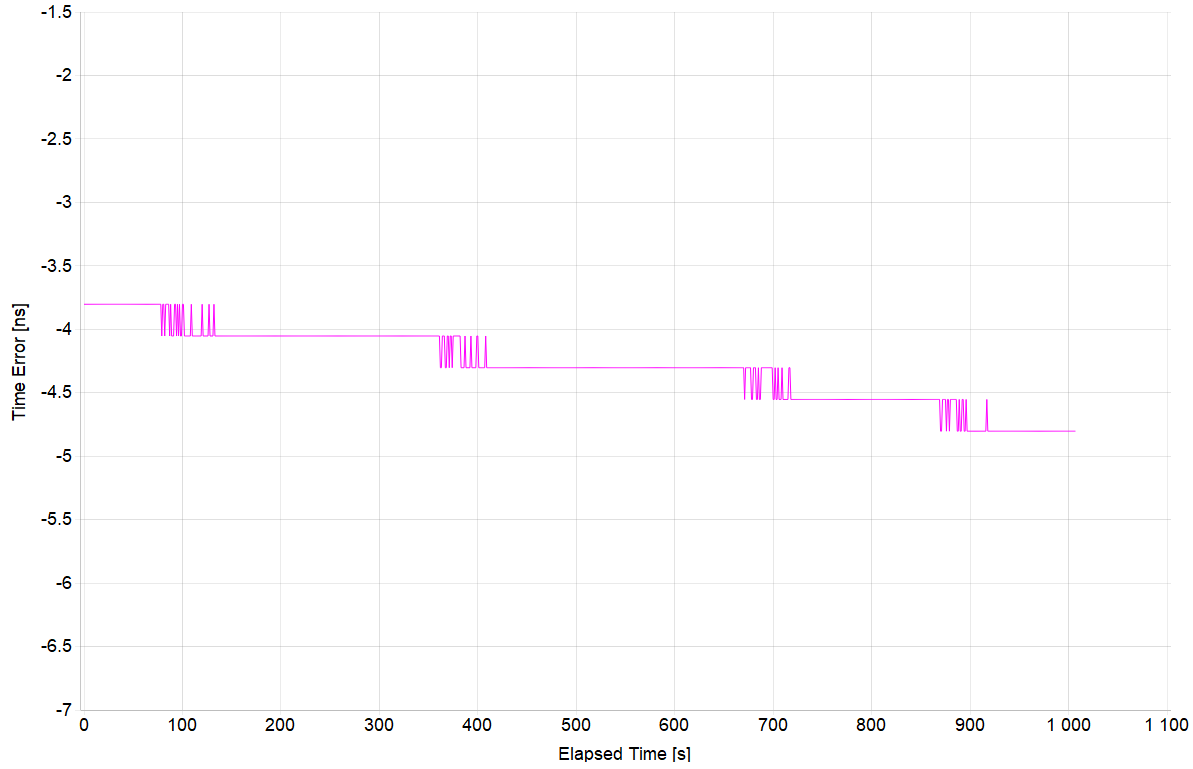
Test Description	Holdover – 1PPS
Report Date	23-02-10_13-07-16
Packet Rate (pkt/s)	16
Beginning of Test	2023-02-08 10:39:11 AM
Test Duration	00:16:47
Time to Phase Lock (s)	23

All Mask Results	**Pass**
Mask ONEPPS	-
Mask ONEPPS Result	No Mask
Mask MTIE	G.8273.2 T-BC Class B Time Holdover Const. Temp.
Mask MTIE Result	**Pass**

1. Settling time = 1500s.

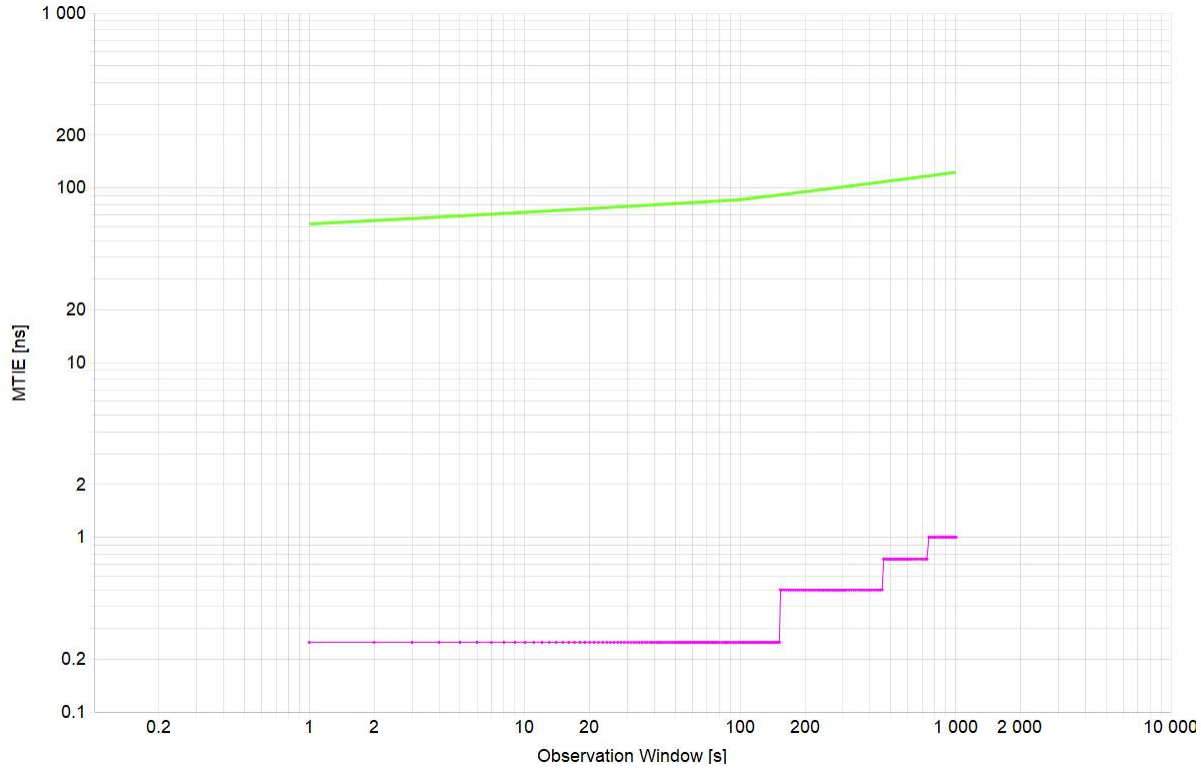
7.1 ONEPPS Analysis

Offset Removal Applied	Off
Zero Offset	-3.803ns



Mean [ns]	-4.291
Min [ns]	-4.803
Max [ns]	-3.803
Max-Min [ns]	1

7.2 MTIE Analysis



Min [ns]	0.25
Max [ns]	1
Max-Min [ns]	0.75

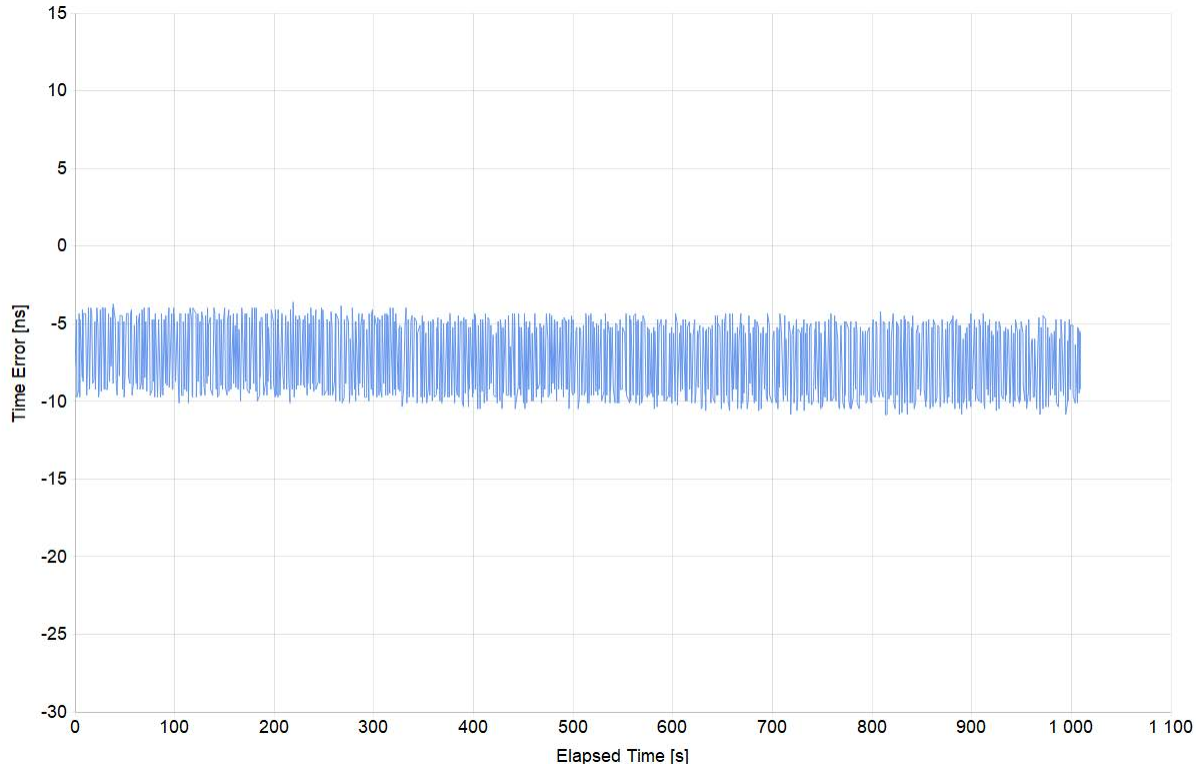
8. G.8273.2: Holdover – PTP

Test Description	Holdover – PTP
Report Date	23-02-10_14-57-59
Packet Rate (pkt/s)	16
Beginning of Test	2023-02-08 10:39:11 AM
Test Duration	00:16:48
Time to Phase Lock (s)	23

All Mask Results	**Pass**
Mask TIMEERROR	-
Mask TIMEERROR Result	No Mask
Mask DTE	-
Mask DTE Result	No Mask
Mask DTEMTIE	G.8273.2 T-BC Class B Time Holdover Const. Temp.
Mask DTEMTIE Result	**Pass**

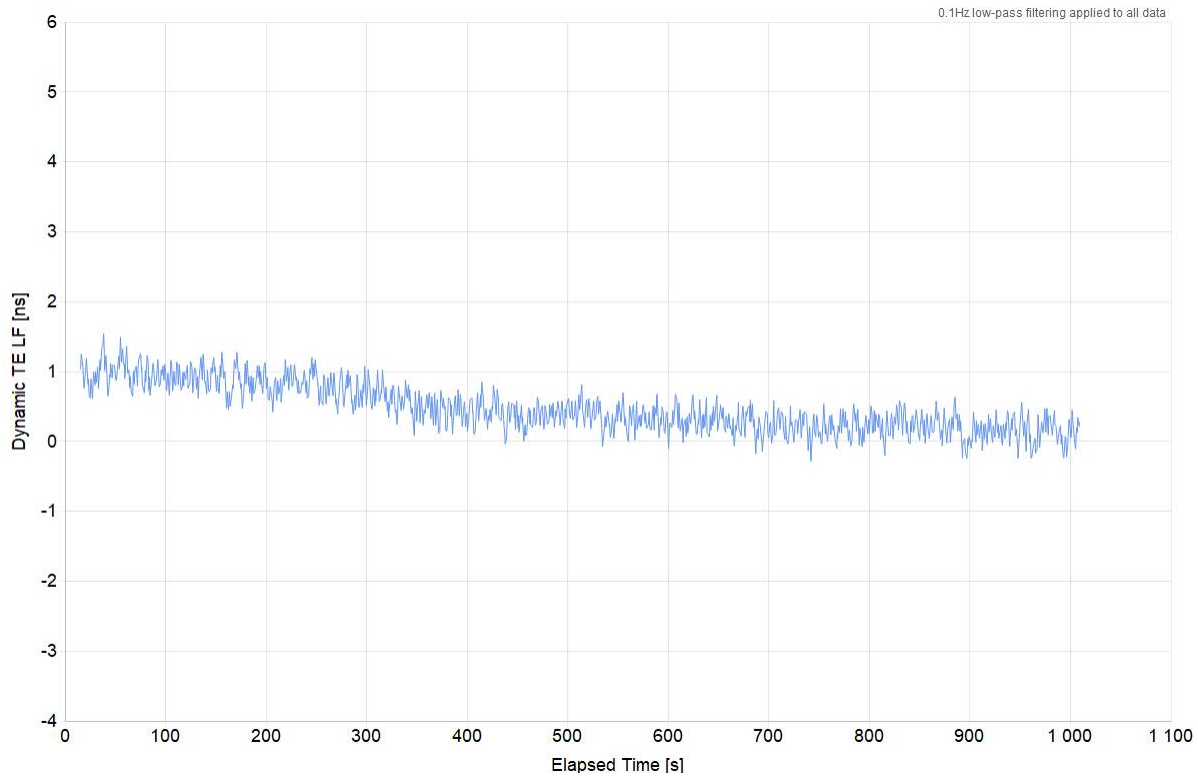
1. Settling time = 1500s.

8.1 TIMEERROR Analysis



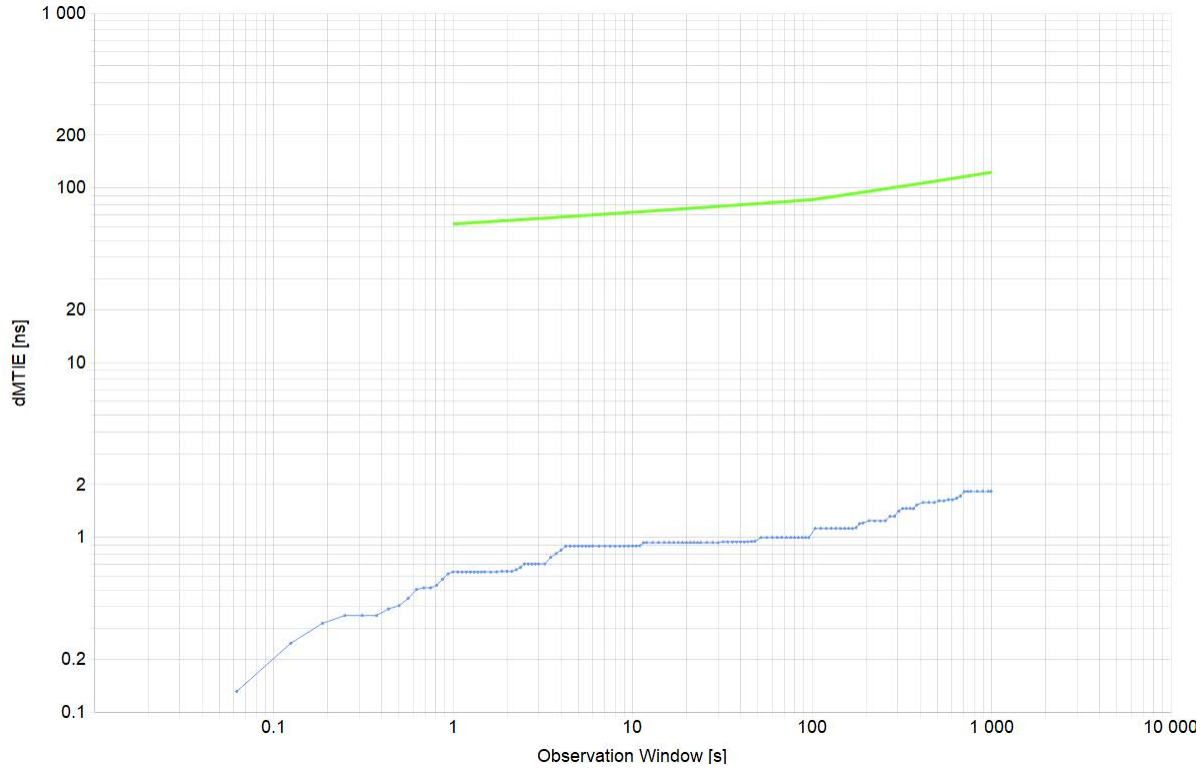
Pk-Pk [ns]	7.25
Mean [ns]	-7.256
Min [ns]	-10.857
Max [ns]	-3.607

8.2 DTE Analysis



Mean [ns]	0.47
Min [ns]	-0.285
Max [ns]	1.54
Max-Min [ns]	1.825

8.3 DTEMTIE Analysis



Min [ns]	0.131
Max [ns]	1.825
Max-Min [ns]	1.694

9. G.8273.2: Holdover – No SyncE – 1PPS

Test Description	Holdover – No SyncE – 1PPS
Report Date	23-02-10_14-57-59
Packet Rate (pkt/s)	16
Beginning of Test	2023-02-08 11:24:42 AM
Test Duration	00:16:46
Time to Phase Lock (s)	24

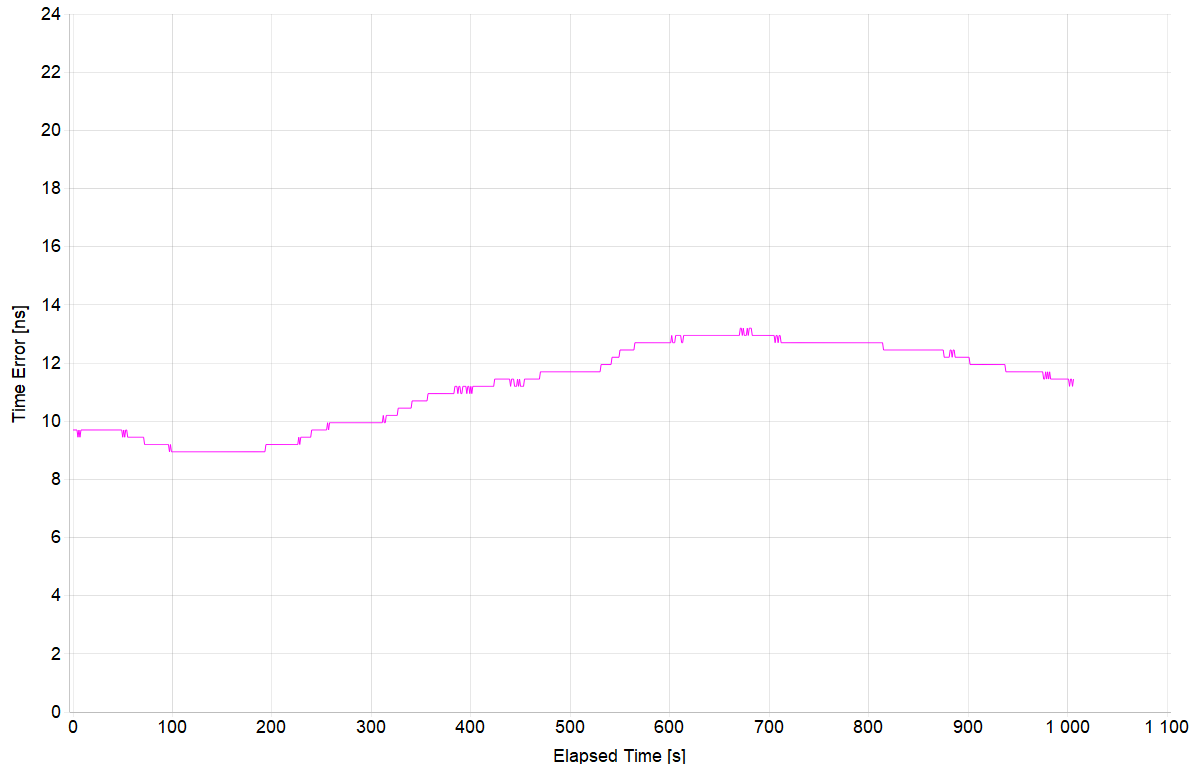
All Mask Results	**Pass**
Mask ONEPPS	-
Mask ONEPPS Result	No Mask
Mask MTIE	G.8273.2 T-BC Class B Time Holdover Const. Temp.
Mask MTIE Result	**Pass**

1. Settling time = 1500s.
2. SyncE was disabled using a parameter in the PCM4L Json file to set the SyncE clock category below the desired threshold:

```
physicalPllClockCategory = 4,
physicalPllClockCategoryThreshold = 1,
```

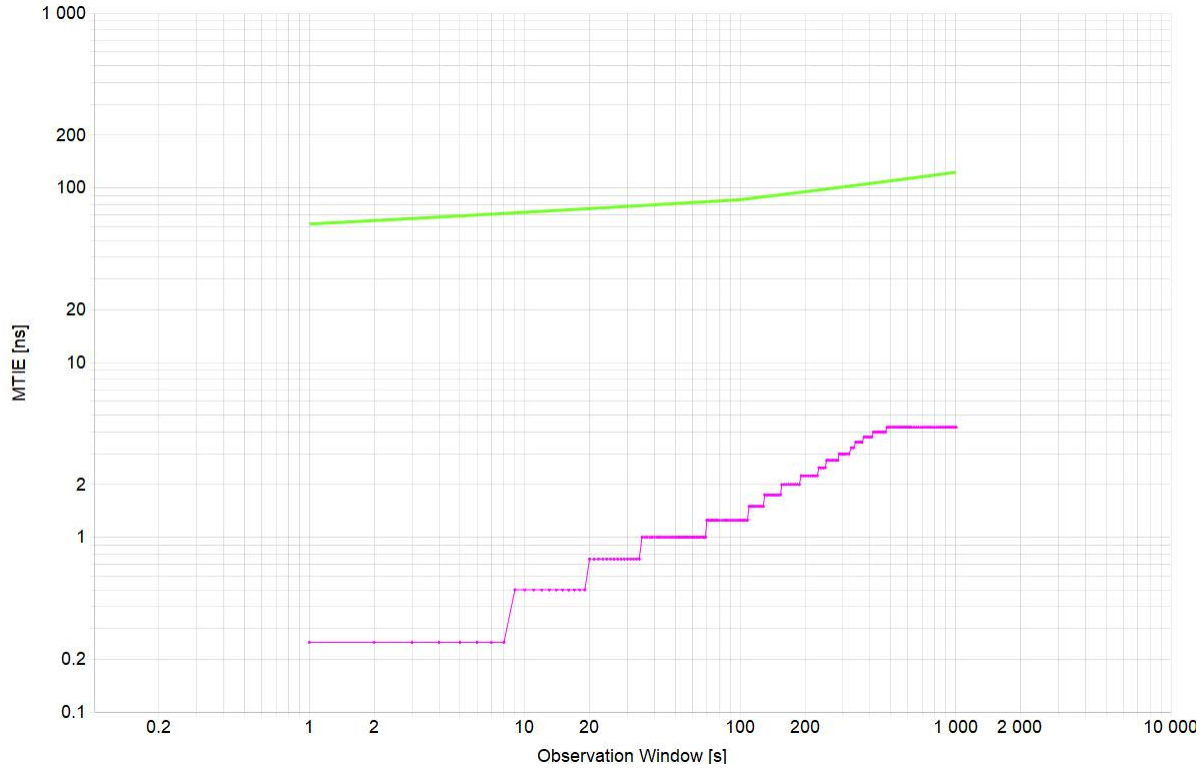
9.1 ONEPPS Analysis

Offset Removal Applied	Off
Zero Offset	9.697ns



Mean [ns]	11.225
Min [ns]	8.947
Max [ns]	13.197
Max-Min [ns]	4.25

9.2 MTIE Analysis



Min [ns]	0.25
Max [ns]	4.25
Max-Min [ns]	4

10. G.8273.2: Holdover – No SyncE – PTP

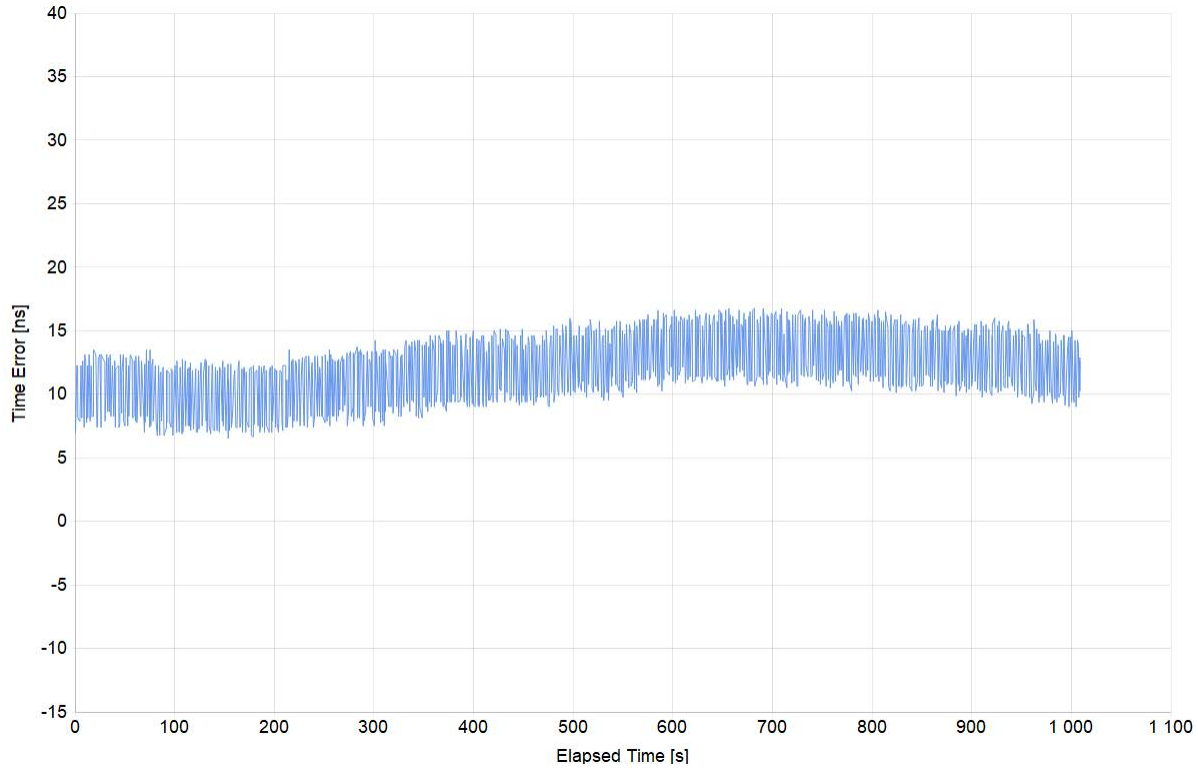
Test Description	Holdover – No SyncE – PTP
Report Date	23-02-10_14-57-59
Packet Rate (pkt/s)	16
Beginning of Test	2023-02-08 11:24:42 AM
Test Duration	00:16:48
Time to Phase Lock (s)	24

All Mask Results	**Pass**
Mask TIMEERROR	-
Mask TIMEERROR Result	No Mask
Mask DTE	-
Mask DTE Result	No Mask
Mask DTEMTIE	G.8273.2 T-BC Class B Time Holdover Const. Temp.
Mask DTEMTIE Result	**Pass**

1. Settling time = 1500s.
2. SyncE was disabled using a parameter in the PCM4L Json file to set the SyncE clock category below the desired threshold:

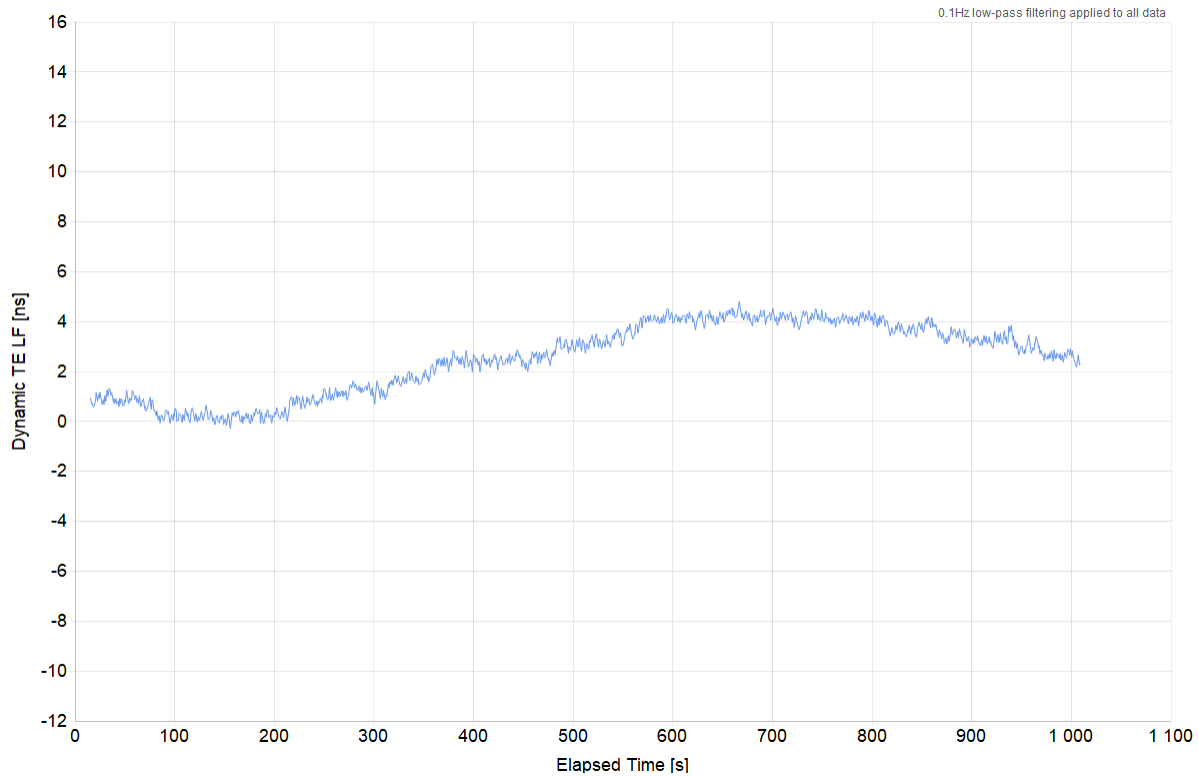
```
physicalPllClockCategory = 4,
physicalPllClockCategoryThreshold = 1,
```

10.1 TIMEERROR Analysis



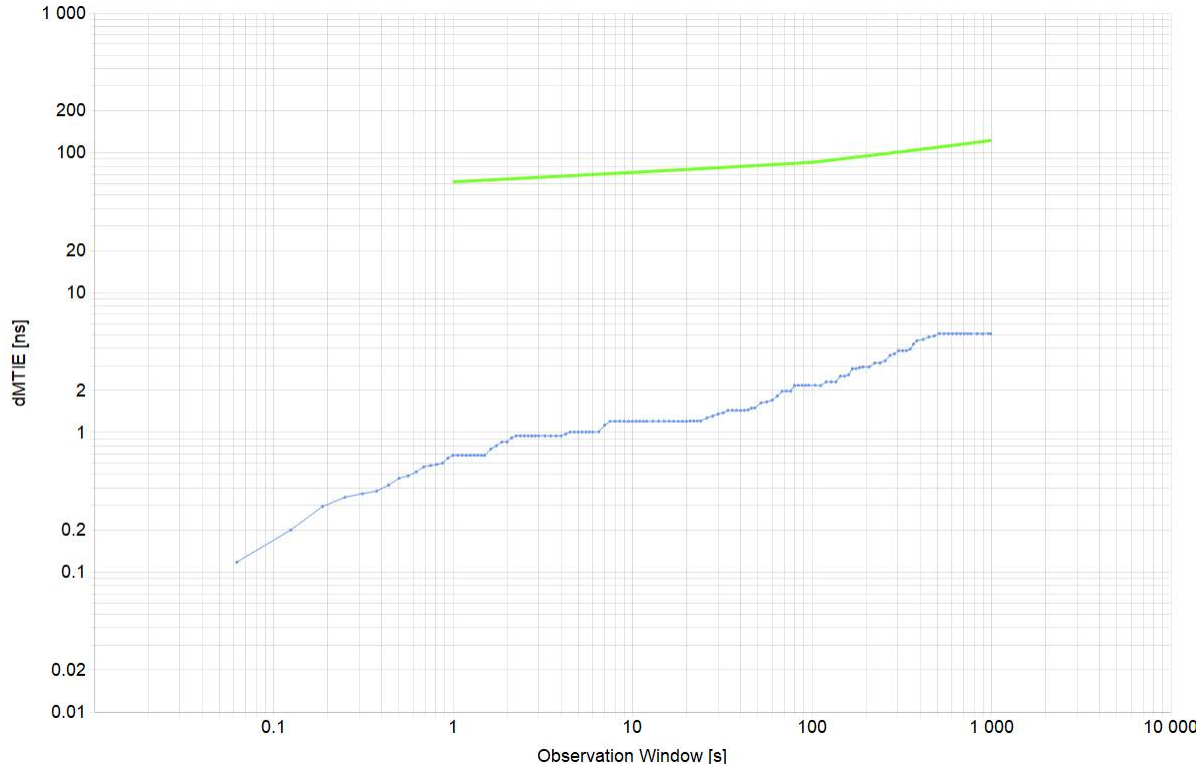
Pk-Pk [ns]	10.25
Mean [ns]	11.995
Min [ns]	6.504
Max [ns]	16.754

10.2 DTE Analysis



Mean [ns]	2.515
Min [ns]	-0.293
Max [ns]	4.801
Max-Min [ns]	5.094

10.3 DTEMTIE Analysis



Min [ns]	0.118
Max [ns]	5.094
Max-Min [ns]	4.976

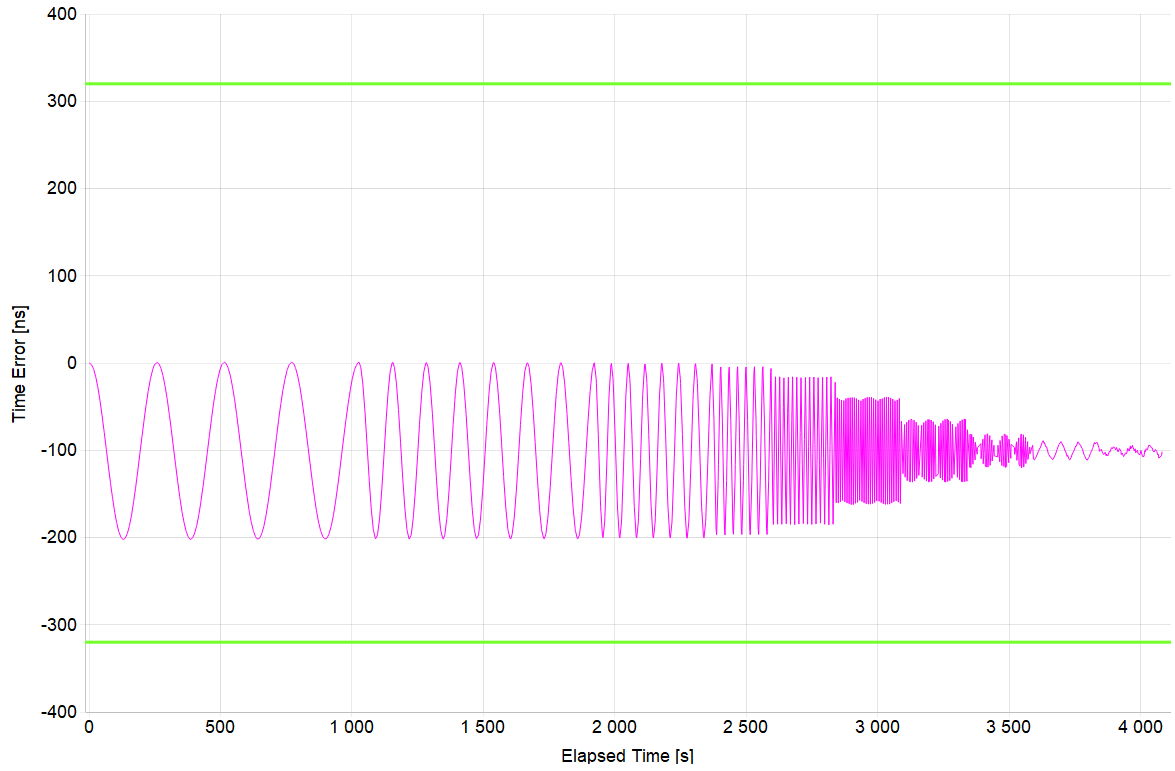
11. G.8273.2: PTP to 1PPS Noise Transfer

Test Description	PTP to 1PPS Noise Transfer
Report Date	23-02-10_14-57-59
Packet Rate (pkt/s)	16
Beginning of Test	2023-02-07 4:12:57 PM
Test Duration	01:12:11
Time to Phase Lock (s)	18

All Mask Results	**Pass**
Mask ONEPPS	0.32µs
Mask ONEPPS Result	**Pass**
Mask PTPNoiseTransfer	G.8273.2 Class A,B T-BCs Noise Transfer
Mask PTPNoiseTransfer Result	**Pass**

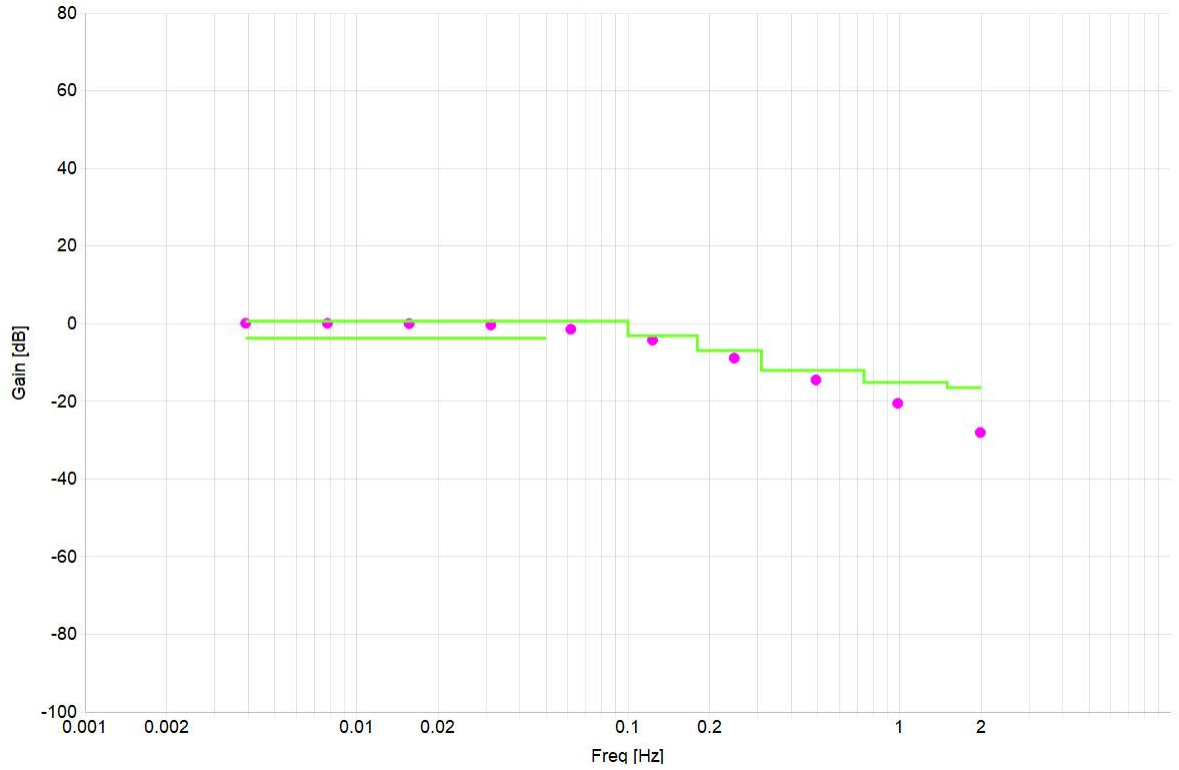
11.1 ONEPPS Analysis

Offset Removal Applied	Off
Zero Offset	-0.303ns



Mean [ns]	-100.888
Min [ns]	-202.303
Max [ns]	0.947
Max-Min [ns]	203.25

11.2 PTPNoiseTransfer Analysis



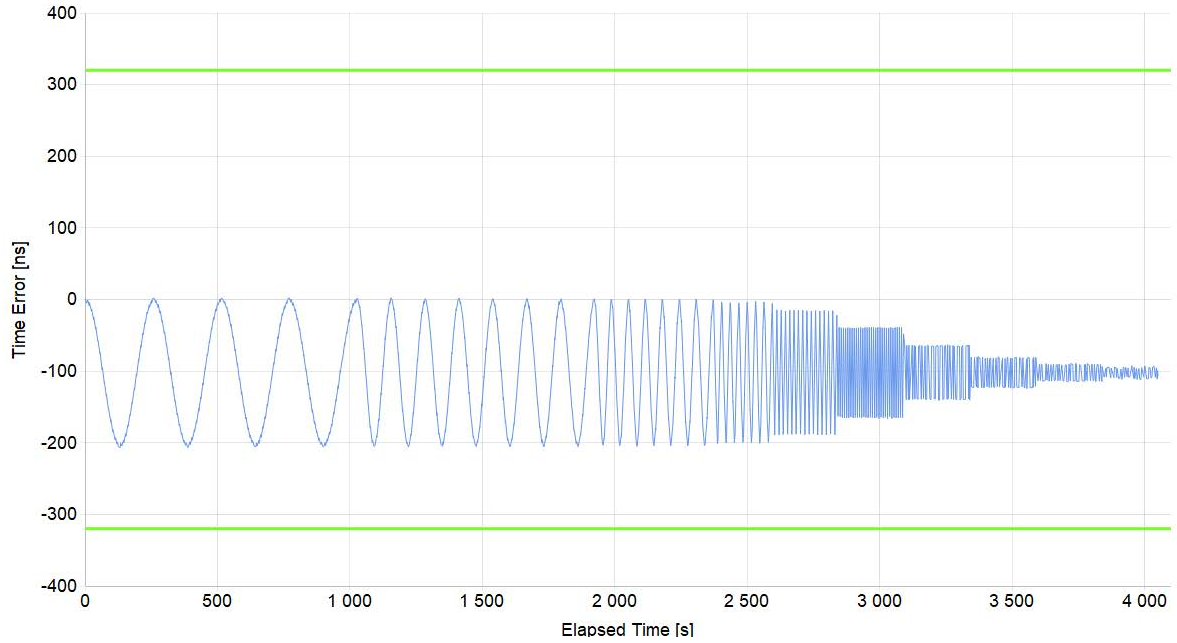
Point #	Freq (Hz)	Ampl (ns)	Duration (s)	Pk-Pk Output (ns)	Gain (dB)	Upper Pk-Pk Limit (ns)	Lower Pk-Pk Limit (ns)
1	0.00390625	200	1024.00	202.43	0.10	215	130
2	0.0078125	200	896.00	201.96	0.08	215	130
3	0.015625	200	448.00	200.03	0.00	215	130
4	0.03125	200	224.00	192.29	-0.34	215	130
5	0.0615625	200	243.65	169.38	-1.44	215	-
6	0.123125	200	251.78	122.78	-4.24	140	-
7	0.24625	200	251.78	71.89	-8.89	90	-
8	0.4925	200	249.75	37.68	-14.50	50	-
9	0.985	200	249.75	18.84	-20.52	35	-
10	1.985	200	249.87	7.93	-28.04	30	-

12. G.8273.2: PTP to PTP Noise Transfer

Test Description	PTP to PTP Noise Transfer
Report Date	23-02-10_15-26-39
Packet Rate (pkt/s)	16
Beginning of Test	2023-02-07 4:12:57 PM
Test Duration	01:12:13
Time to Phase Lock (s)	18

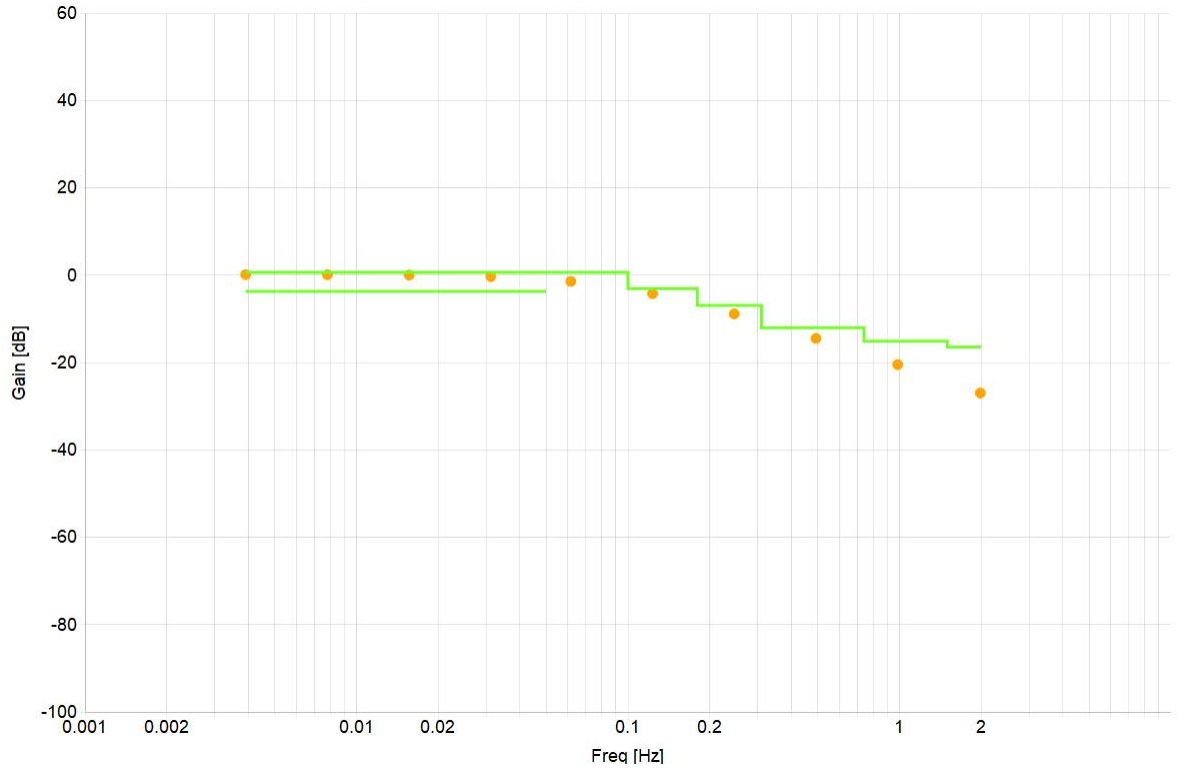
All Mask Results	**Pass**
Mask TIMEERROR	0.32µs
Mask TIMEERROR Result	**Pass**
Mask PTPNoiseTransfer	G.8273.2 Class A,B T-BCs Noise Transfer
Mask PTPNoiseTransfer Result	**Pass**

12.1 TIMEERROR Analysis



Pk-Pk [ns]	209.375
Mean [ns]	-102.315
Min [ns]	-206.871
Max [ns]	2.504

12.2 PTPNoiseTransfer Analysis



Point #	Freq (Hz)	Ampl (ns)	Duration (s)	Pk-Pk Output (ns)	Gain (dB)	Upper Pk-Pk Limit (ns)	Lower Pk-Pk Limit (ns)
1	0.00390625	200	1024.00	202.42	0.10	215	130
2	0.0078125	200	896.00	202.01	0.09	215	130
3	0.015625	200	448.00	200.08	0.00	215	130
4	0.03125	200	224.00	192.15	-0.35	215	130
5	0.0615625	200	243.65	169.20	-1.45	215	-
6	0.123125	200	251.78	122.78	-4.24	140	-
7	0.24625	200	251.78	71.95	-8.88	90	-
8	0.4925	200	249.75	37.76	-14.48	50	-
9	0.985	200	249.75	18.92	-20.48	35	-
10	1.985	200	249.87	8.93	-27.00	30	-

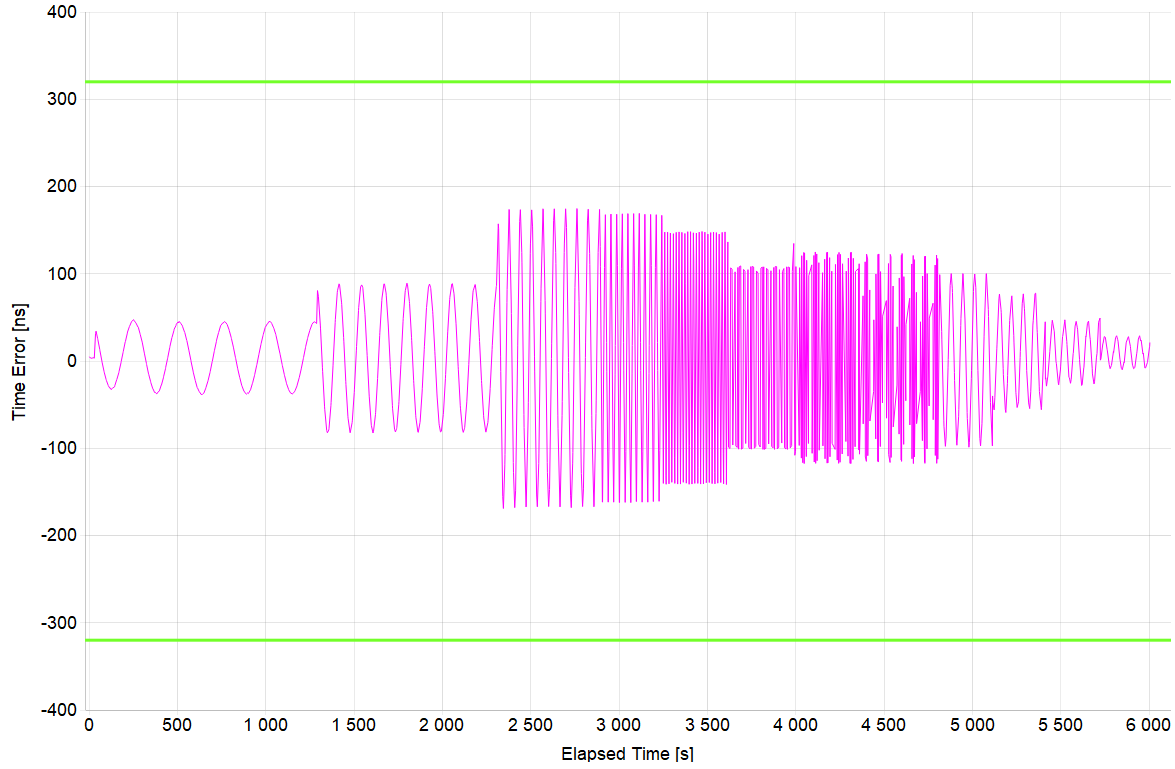
13. G.8273.2: SyncE to 1PPS Noise Transfer

Test Description	SyncE to 1PPS Noise Transfer
Report Date	23-02-10_15-40-56
Packet Rate (pkt/s)	16
Beginning of Test	2023-02-07 2:19:48 PM
Test Duration	01:40:02
Time to Phase Lock (s)	20

All Mask Results	**Pass**
Mask ONEPPS	0.32µs
Mask ONEPPS Result	**Pass**

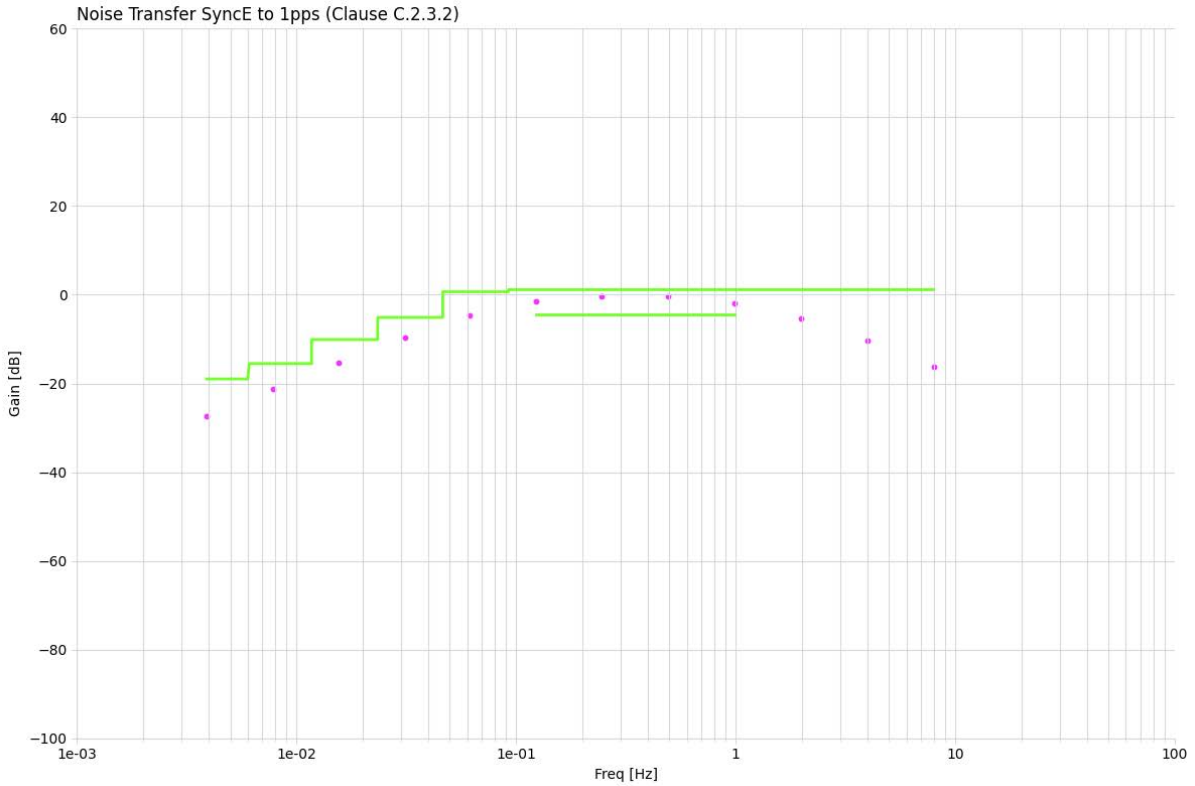
13.1 ONEPPS Analysis

Offset Removal Applied	Off
Zero Offset	4.697ns



Mean [ns]	4.228
Min [ns]	-169.053
Max [ns]	174.697
Max-Min [ns]	343.75

13.2 SyncENoiseTransfer Analysis



Point #	Freq (Hz)	Ampl (ns)	Duration (s)	Pk-Pk Output (ns)	Gain (dB)	Upper Pk-Pk Limit (ns)	Lower Pk-Pk Limit (ns)
1	0.00391	2000	1023.02	85.75	-27.35	225	-
2	0.00781	2000	896.29	171.75	-21.32	340	-
3	0.01563	2000	447.86	342.75	-15.32	630	-
4	0.03125	1000	224.00	331.5	-9.59	565	-
5	0.06156	500	243.66	289.75	-4.73	545	-
6	0.12313	250	251.77	210.25	-1.50	285	150
7	0.24625	250	251.78	242.5	-0.26	285	150
8	0.4925	250	249.75	240.75	-0.33	285	150
9	0.985	250	249.75	199.0	-1.98	285	150
10	1.985	250	249.87	136.0	-5.29	285	-
11	3.985	250	249.94	75.25	-10.43	285	-
12	7.985	250	249.97	39.0	-16.14	285	-

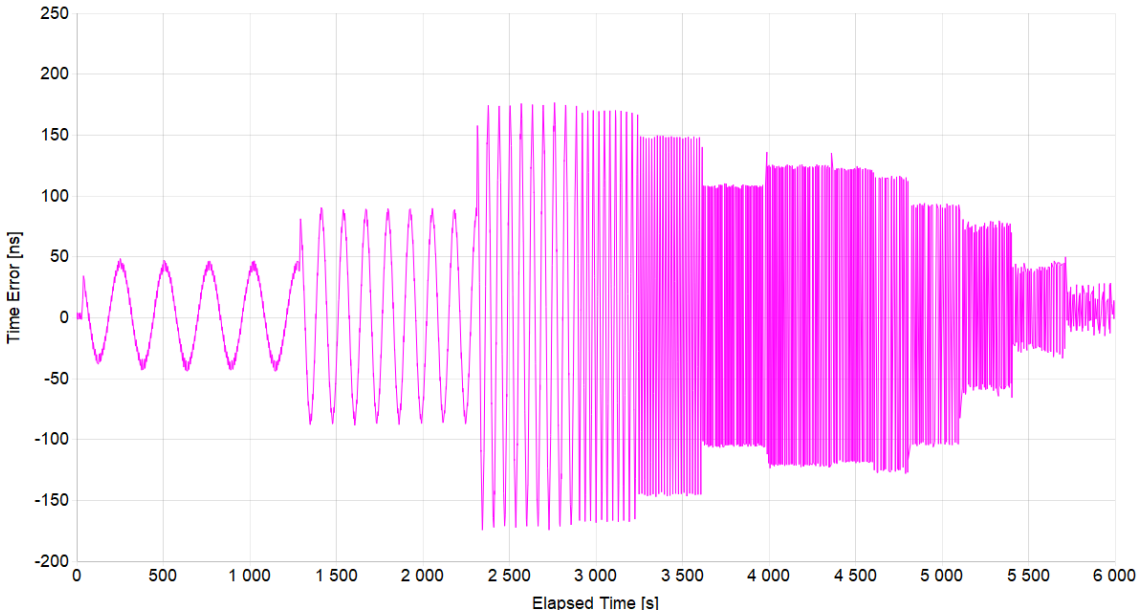
14. G.8273.2: SyncE to PTP Noise Transfer

Test Description	SyncE to PTP Noise Transfer
Report Date	23-02-10_15-40-56
Packet Rate (pkt/s)	16
Beginning of Test	2023-02-07 2:19:48 PM
Test Duration	01:40:02
Time to Phase Lock (s)	20

All Mask Results	**Pass**
Mask ONEPPS	0.32µs
Mask ONEPPS Result	**Pass**

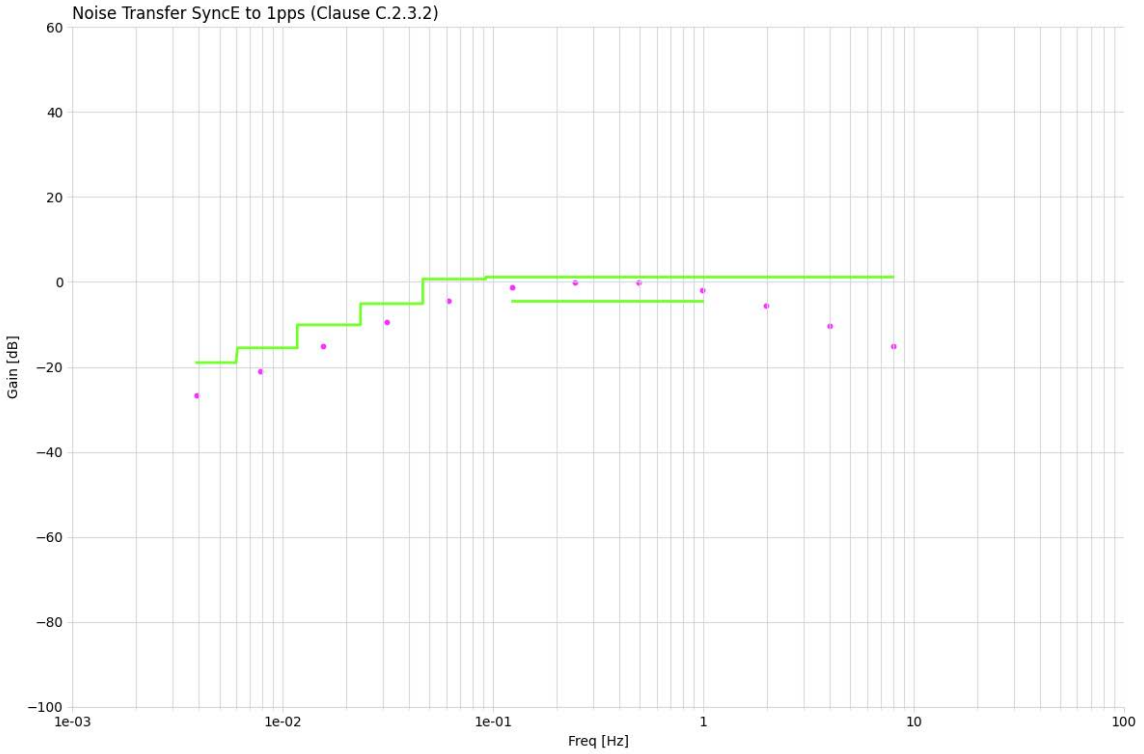
14.1 ONEPPS Analysis

Offset Removal Applied	Off
Zero Offset	1.137



Mean [ns]	1.158
Min [ns]	-174.363
Max [ns]	176.637
Max-Min [ns]	351

14.2 SyncENoiseTransfer Analysis



Point #	Freq (Hz)	Ampl (ns)	Duration (s)	Pk-Pk Output (ns)	Gain (dB)	Upper Pk-Pk Limit (ns)	Lower Pk-Pk Limit (ns)
1	0.00391	2000	1023.02	92.5	-26.70	225	-
2	0.00781	2000	896.29	179.0	-20.96	340	-
3	0.01563	2000	447.86	351.0	-15.11	630	-
4	0.03125	1000	224.00	338.63	-9.41	565	-
5	0.06156	500	243.66	296.75	-4.53	545	-
6	0.12313	250	251.77	217.0	-1.22	285	150
7	0.24625	250	251.78	248.38	-0.06	285	150
8	0.4925	250	249.75	243.75	-0.22	285	150
9	0.985	250	249.75	200.25	-1.93	285	150
10	1.985	250	249.87	132.75	-5.50	285	-
11	3.985	250	249.94	75.88	-10.36	285	-
12	7.985	250	249.97	43.5	-15.18	285	-

15. G.8273.2: Noise Tolerance – 1PPS

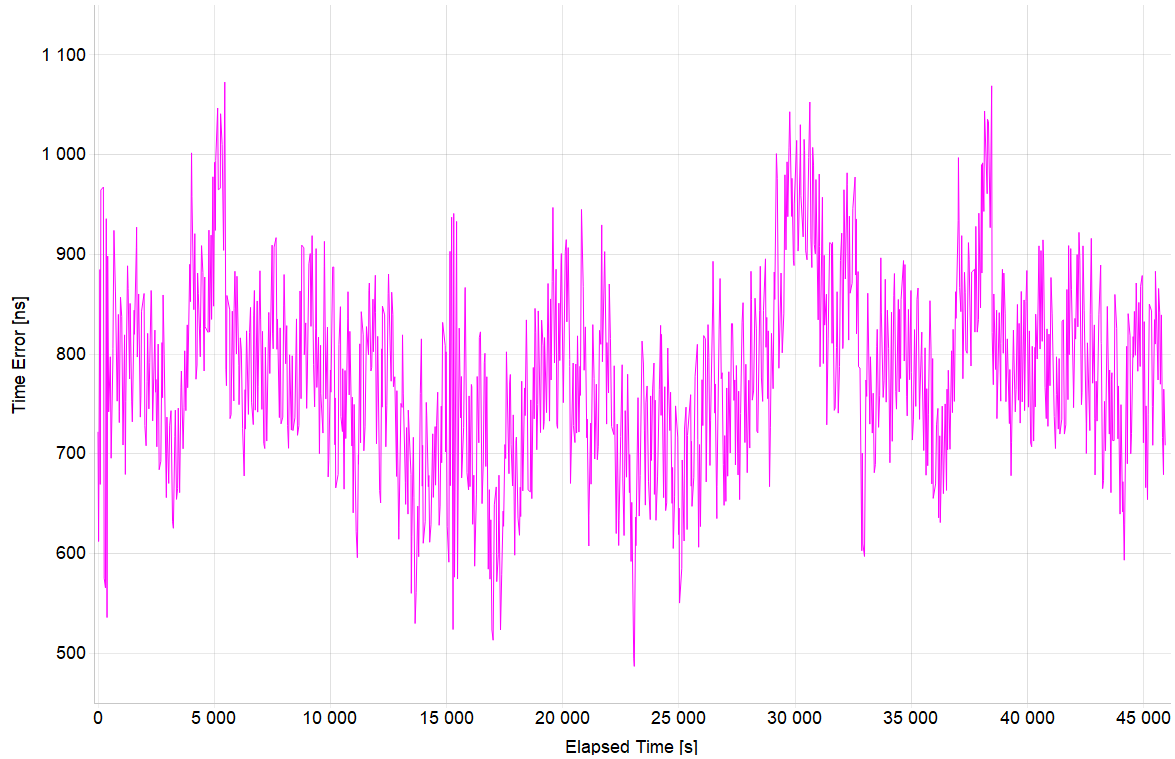
Test Description	Noise Tolerance – 1PPS
Report Date	23-02-13_08-23-03
Packet Rate (pkt/s)	16
Beginning of Test	2023-02-10 2:08:04 PM
Test Duration	12:45:24
Time to Phase Lock (s)	20

All Mask Results	**Pass**
Mask ONEPPS	-
Mask ONEPPS Result	No Mask

1. Passing criteria for this test is tolerance of input noise on the SyncE and PTP sources while not causing any alarms, reference switching or holdover. No reference switching, holdover nor alarms occurred during this test.

15.1 ONEPPS Analysis

Offset Removal Applied	Off
Zero Offset	721.947ns



Mean [ns]	780.697
Min [ns]	486.697
Max [ns]	1072.697
Max-Min [ns]	586

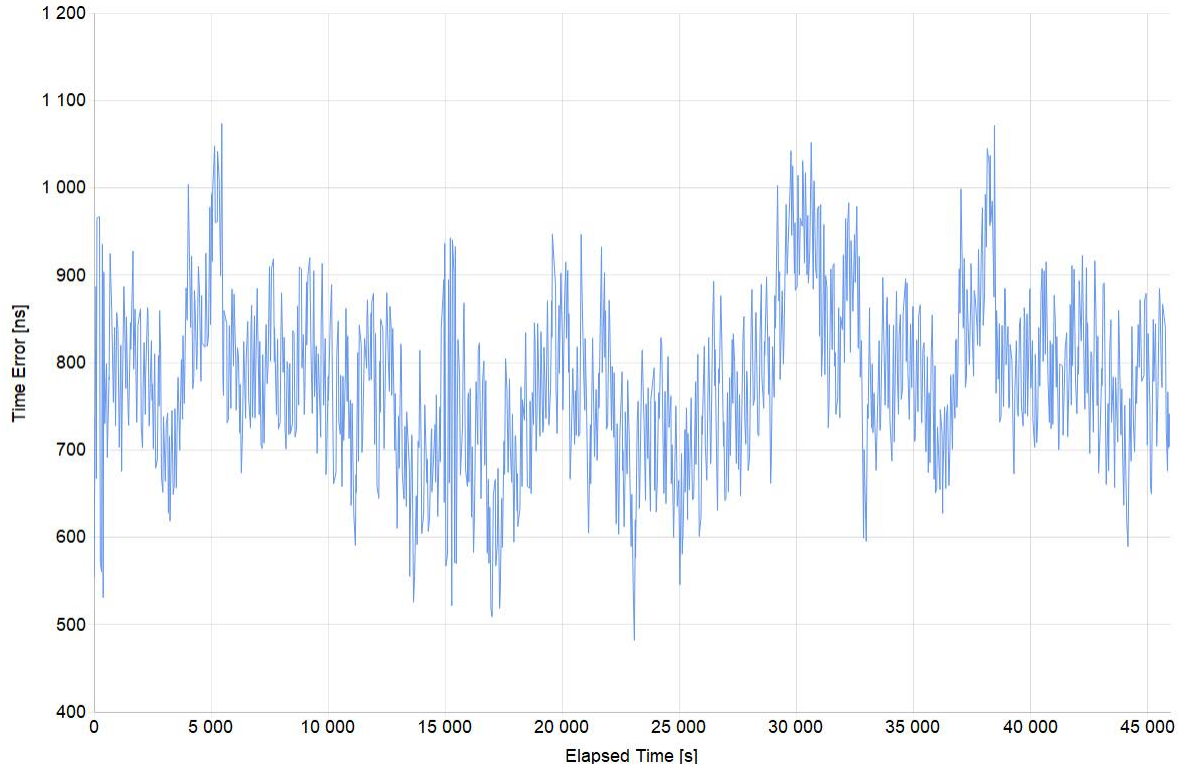
16. G.8273.2: Noise Tolerance – PTP

Test Description	Noise Tolerance – PTP
Report Date	23-02-13_08-23-03
Packet Rate (pkt/s)	16
Beginning of Test	2023-02-10 2:08:04 PM
Test Duration	12:45:27
Time to Phase Lock (s)	20

All Mask Results	**Pass**
Mask TIMEERROR	-
Mask TIMEERROR Result	No Mask

1. Passing criteria for this test is tolerance of input noise on the SyncE and PTP sources while not causing any alarms, reference switching or holdover. No reference switching, holdover nor alarms occurred during this test.

16.1 TIMEERROR Analysis



Pk-Pk [ns]	591.375
Mean [ns]	778.95
Min [ns]	482.008
Max [ns]	1073.382

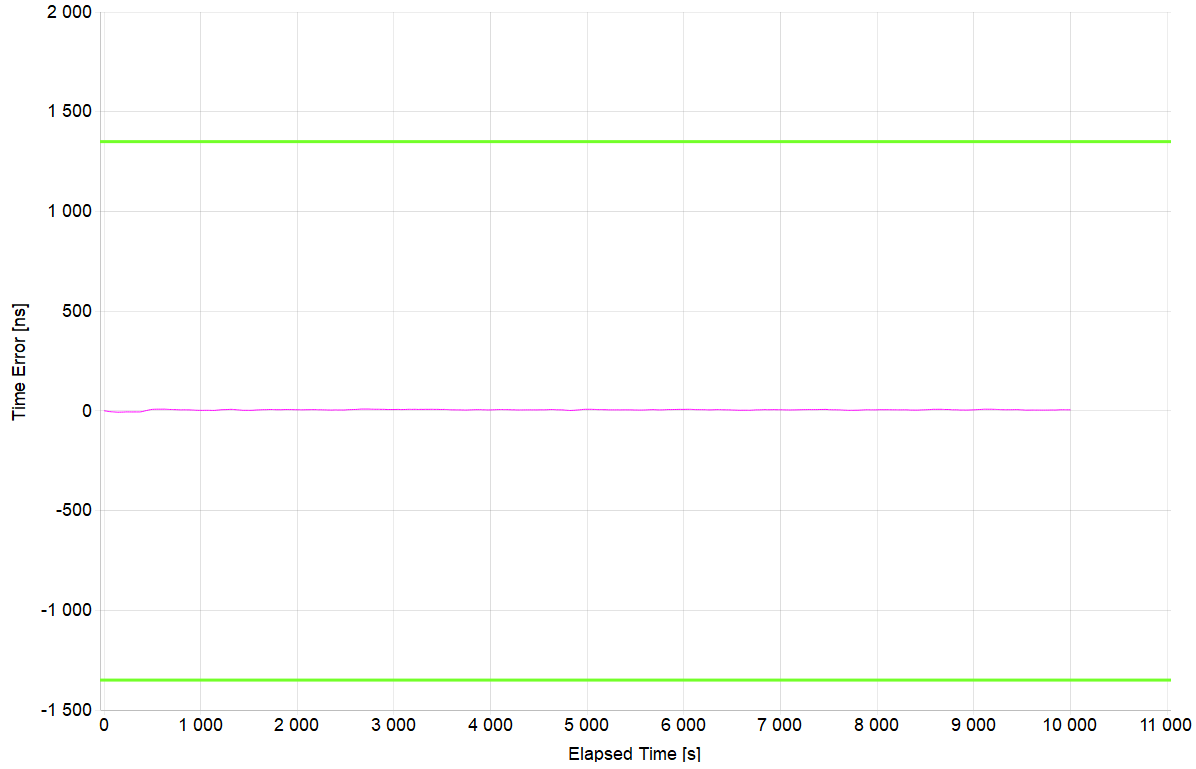
17. G.8273.4 PTS: Noise Generation

Test Description	Noise Generation
Report Date	23-02-10_15-40-56
Packet Rate (pkt/s)	16
Beginning of Test	2023-02-09 10:21:33 PM
Test Duration	02:46:40
Time to Phase Lock (s)	70

All Mask Results	**Pass**
Mask ONEPPS	1.35µs
Mask ONEPPS Result	**Pass**
Mask CTE	0.02µs
Mask CTE Result	**Pass**
Mask DTE	0.2µs
Mask DTE Result	**Pass**
Mask DTEHF	-
Mask DTEHF Result	No Mask

17.1 ONEPPS Analysis

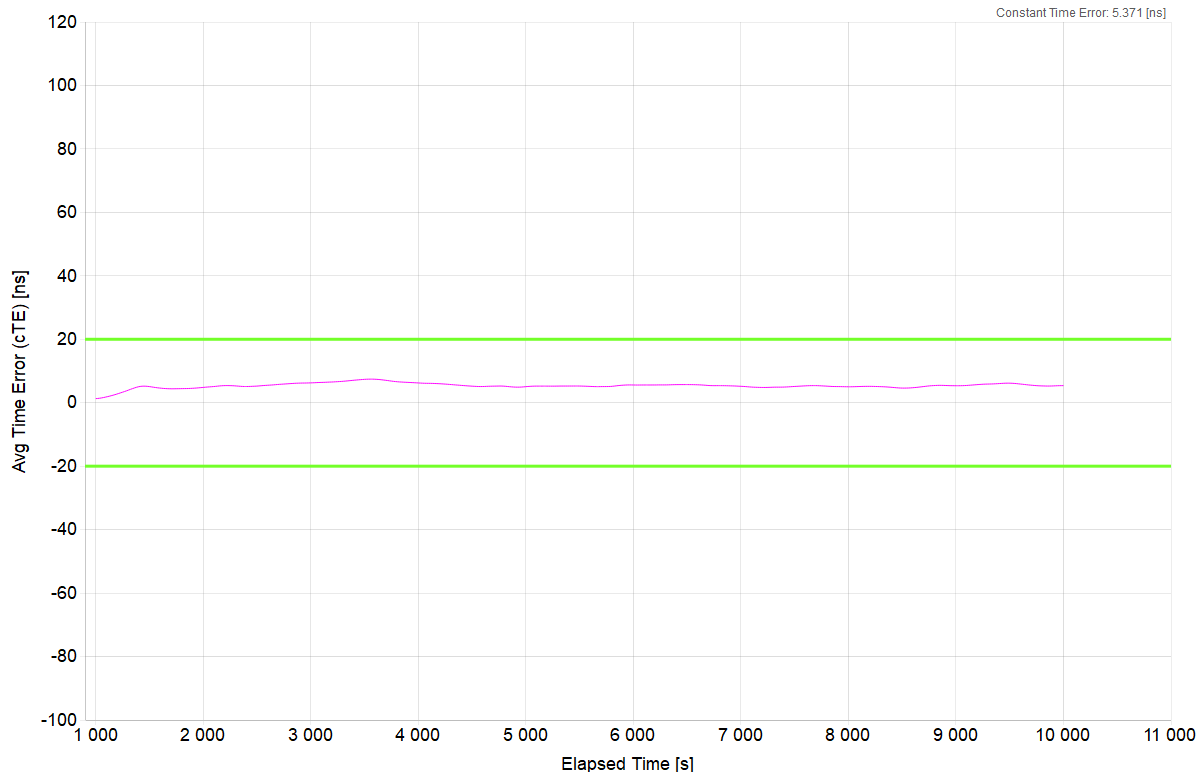
Offset Removal Applied	Off
Zero Offset	0.697ns



Mean [ns]	5.023
Min [ns]	-6.803
Max [ns]	8.947
Max-Min [ns]	15.75

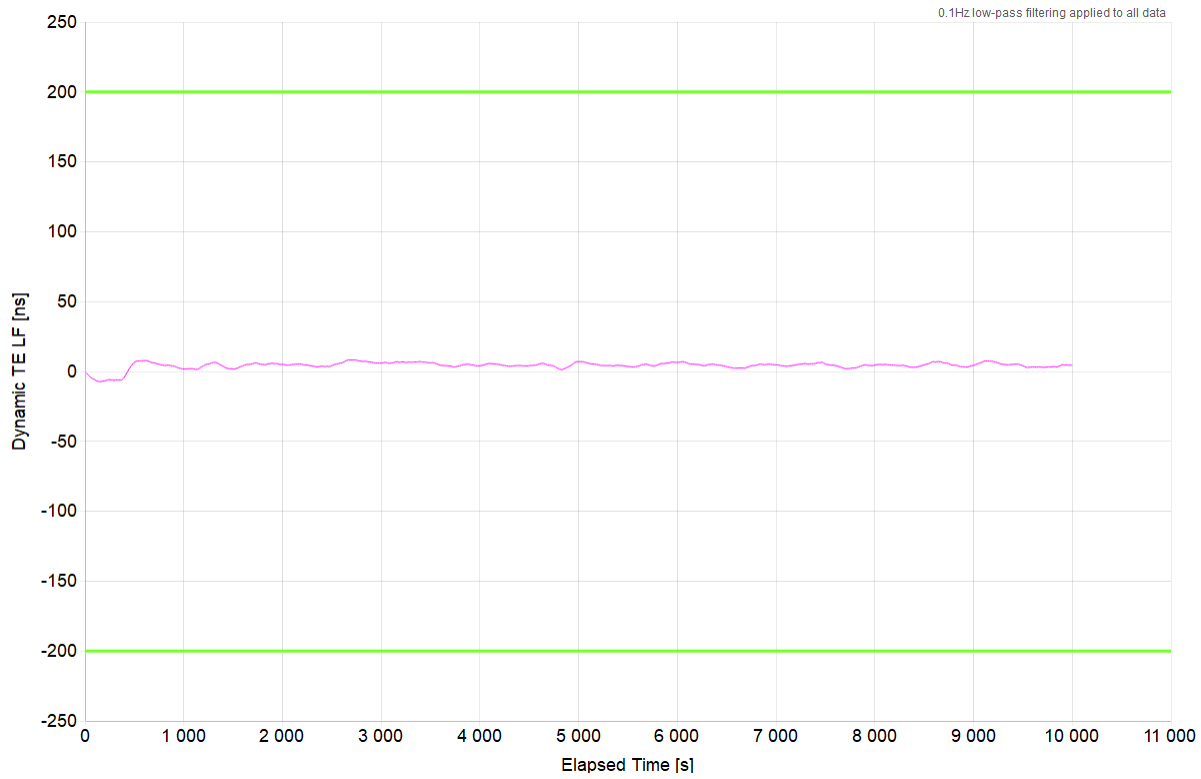
17.2 CTE Analysis

Averaging Time (s)	1000



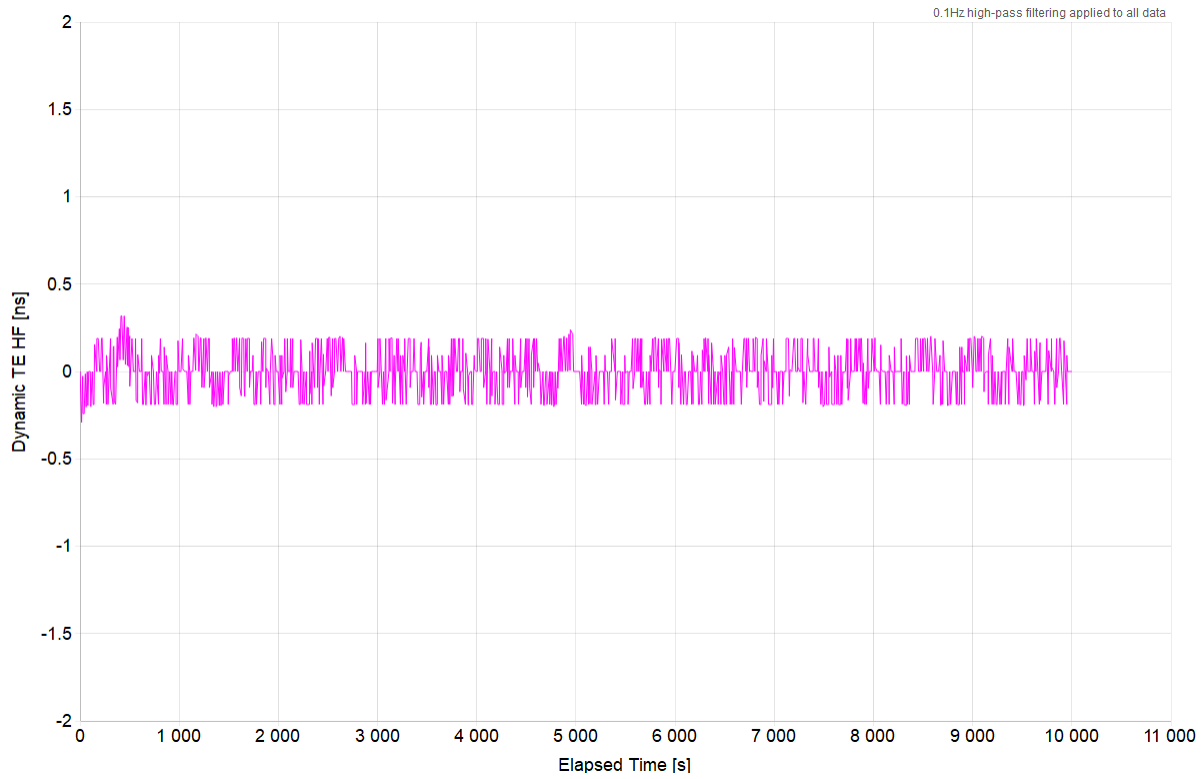
Constant Time Error [ns]	5.371
Min [ns]	1.299
Max [ns]	7.434
Max-Min [ns]	6.135

17.3 DTE Analysis



Mean [ns]	4.332
Min [ns]	-7.434
Max [ns]	8.25
Max-Min [ns]	15.684

17.4 DTEHF Analysis



Mean [ns]	0.001
Min [ns]	-0.292
Max [ns]	0.318
Max-Min [ns]	0.61

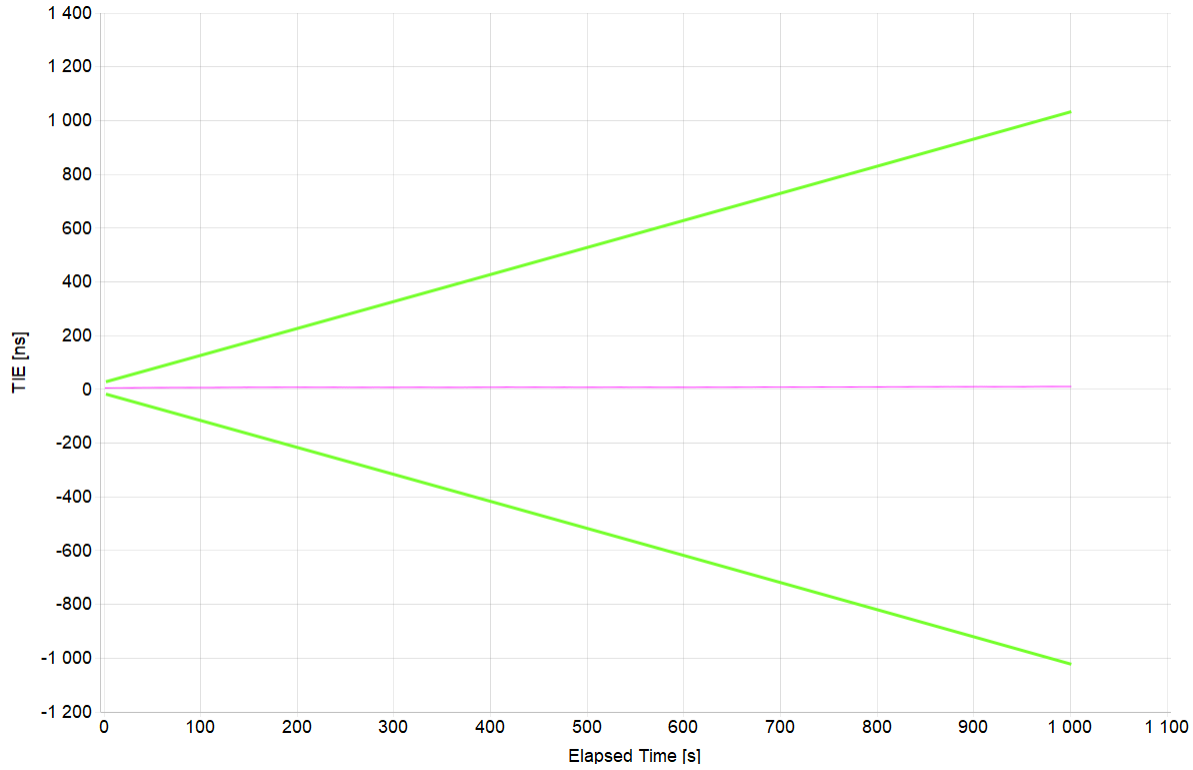
18. G.8273.4 PTS: Holdover

Test Description	Holdover
Report Date	23-02-10_15-40-56
Packet Rate (pkt/s)	16
Beginning of Test	2023-02-09 10:21:33 PM
Test Duration	00:16:40
Time to Phase Lock (s)	N/A

All Mask Results	**Pass**
Mask TIE	G.8273.4 PTS Holdover (Oscillator) Const. Temp.
Mask TIE Result	**Pass**

1. This test is a continuation of the previous Noise Generation test. This allows for an appropriate amount of settling time before collecting holdover data (10 000s). The results are split because holdover requires a different mask than noise generation.

18.1 TIE Analysis



Mean [ns]	8.075
Min [ns]	5.197
Max [ns]	10.447
Max-Min [ns]	5.25

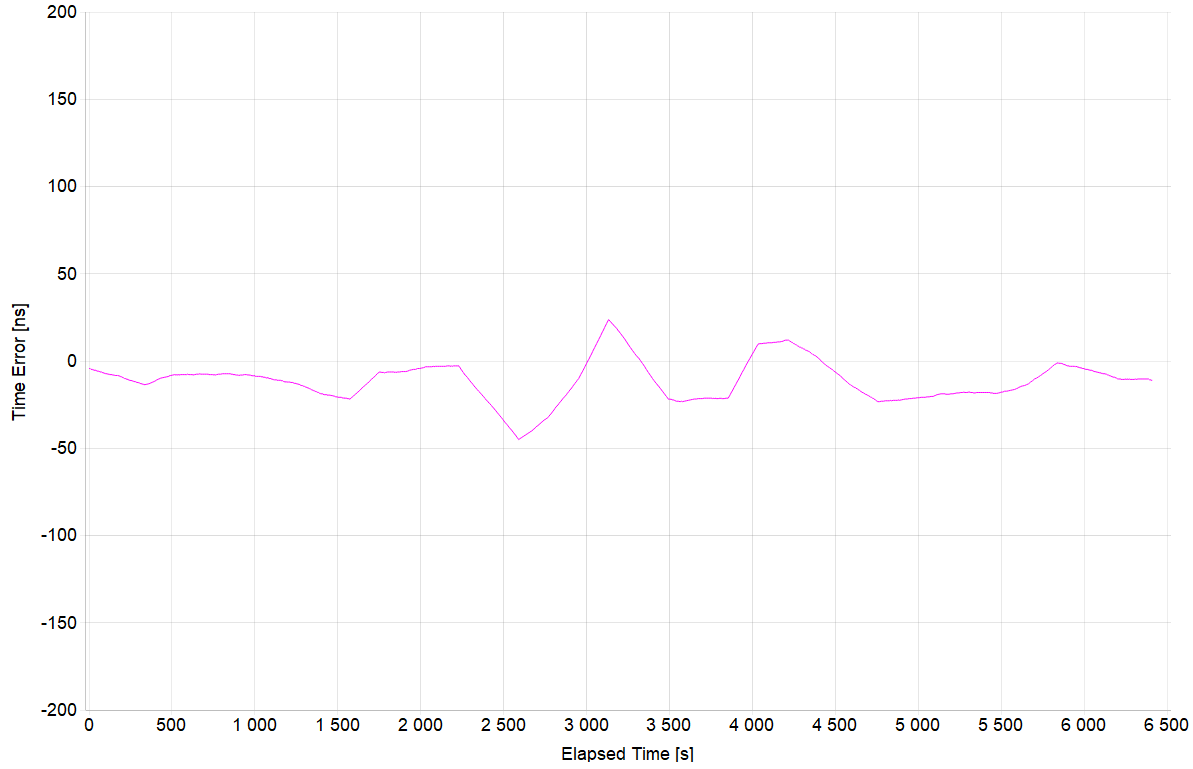
19. G.8261: Test Case 15 – Network Traffic Model B

Test Description	Test Case 15 - Network Traffic Model B
Report Date	23-02-10_15-40-56
Packet Rate (pkt/s)	16
Beginning of Test	2023-02-09 2:50:41 PM
Test Duration	01:46:50
Time to Phase Lock (s)	379

All Mask Results	**Pass**
Mask ONEPPS	-
Mask ONEPPS Result	No Mask
Mask MTIE	G.8261 EEC Opt. 1 Wander Limit
Mask MTIE Result	**Pass**
Mask TDEV	G.8261 EEC Opt. 1 Wander Limit
Mask TDEV Result	**Pass**

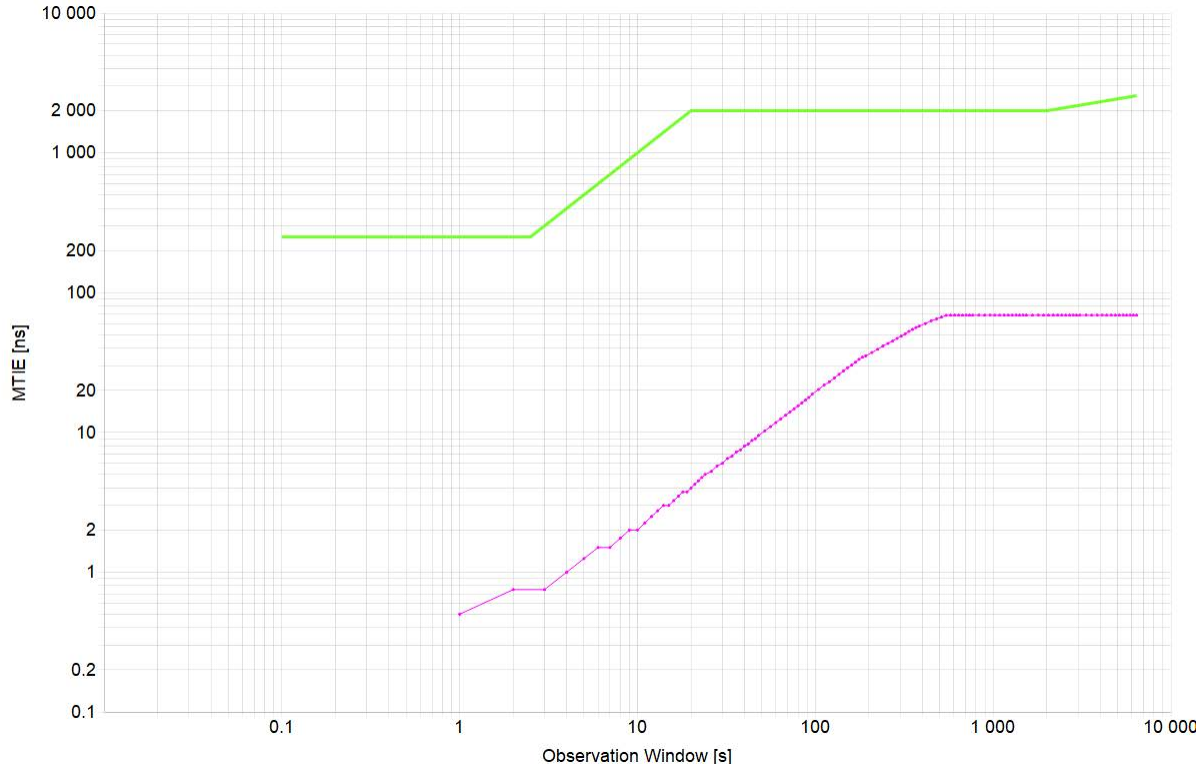
19.1 ONEPPS Analysis

Offset Removal Applied	Off
Zero Offset	-4.303ns



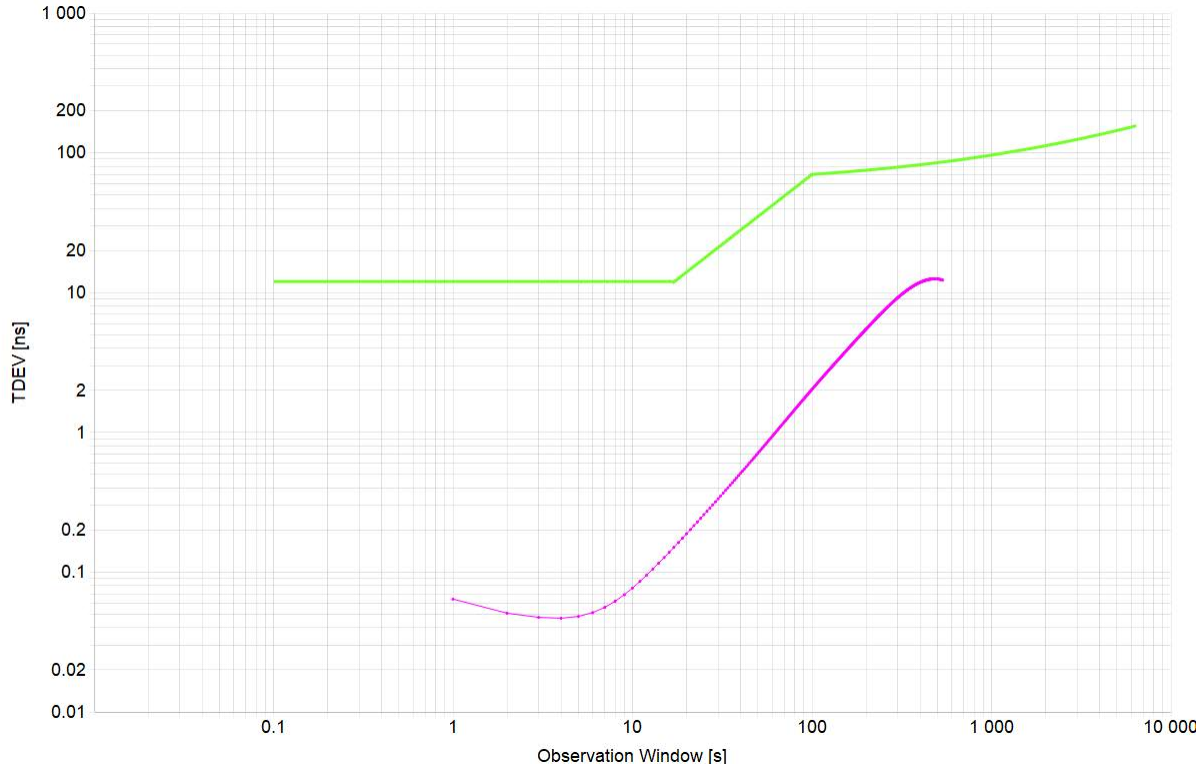
Mean [ns]	-11.281
Min [ns]	-45.053
Max [ns]	23.697
Max-Min [ns]	68.75

19.2 MTIE Analysis



Min [ns]	0.5
Max [ns]	68.75
Max-Min [ns]	68.25

19.3 TDEV Analysis



Min [ns]	0.047
Max [ns]	12.539
Max-Min [ns]	12.493

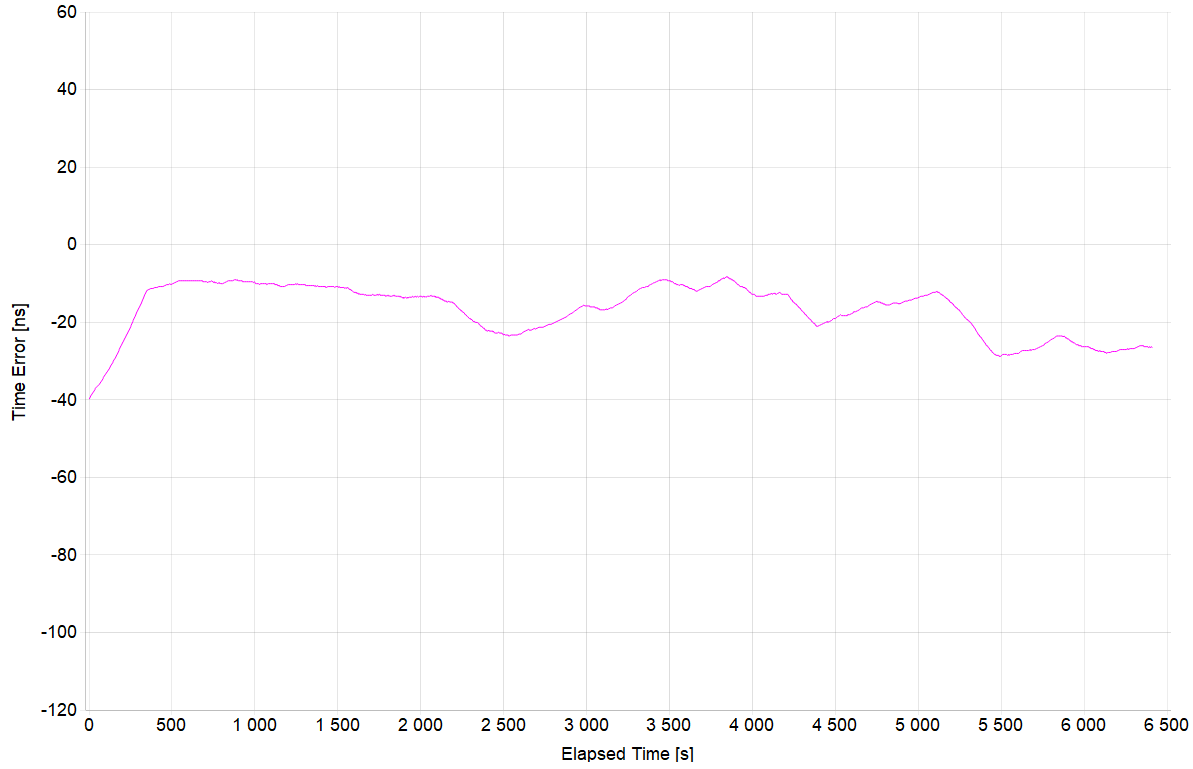
20. G.8261: Test Case 16 – Network Traffic Model B

Test Description	Test Case 16 - Network Traffic Model B
Report Date	23-02-10_15-40-56
Packet Rate (pkt/s)	16
Beginning of Test	2023-02-10 9:18:11 AM
Test Duration	01:46:50
Time to Phase Lock (s)	381

All Mask Results	**Pass**
Mask ONEPPS	-
Mask ONEPPS Result	No Mask
Mask MTIE	G.8261 EEC Opt. 1 Wander Limit
Mask MTIE Result	**Pass**
Mask TDEV	G.8261 EEC Opt. 1 Wander Limit
Mask TDEV Result	**Pass**

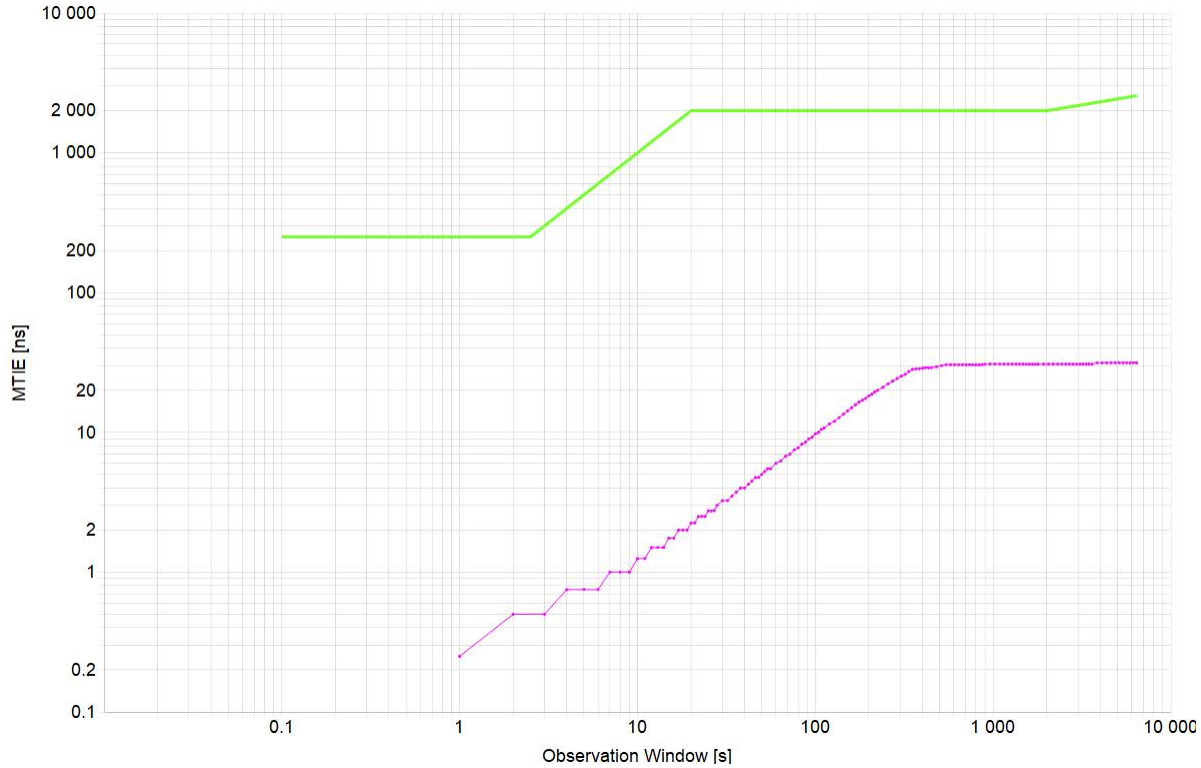
20.1 ONEPPS Analysis

Offset Removal Applied	Off
Zero Offset	-39.803ns



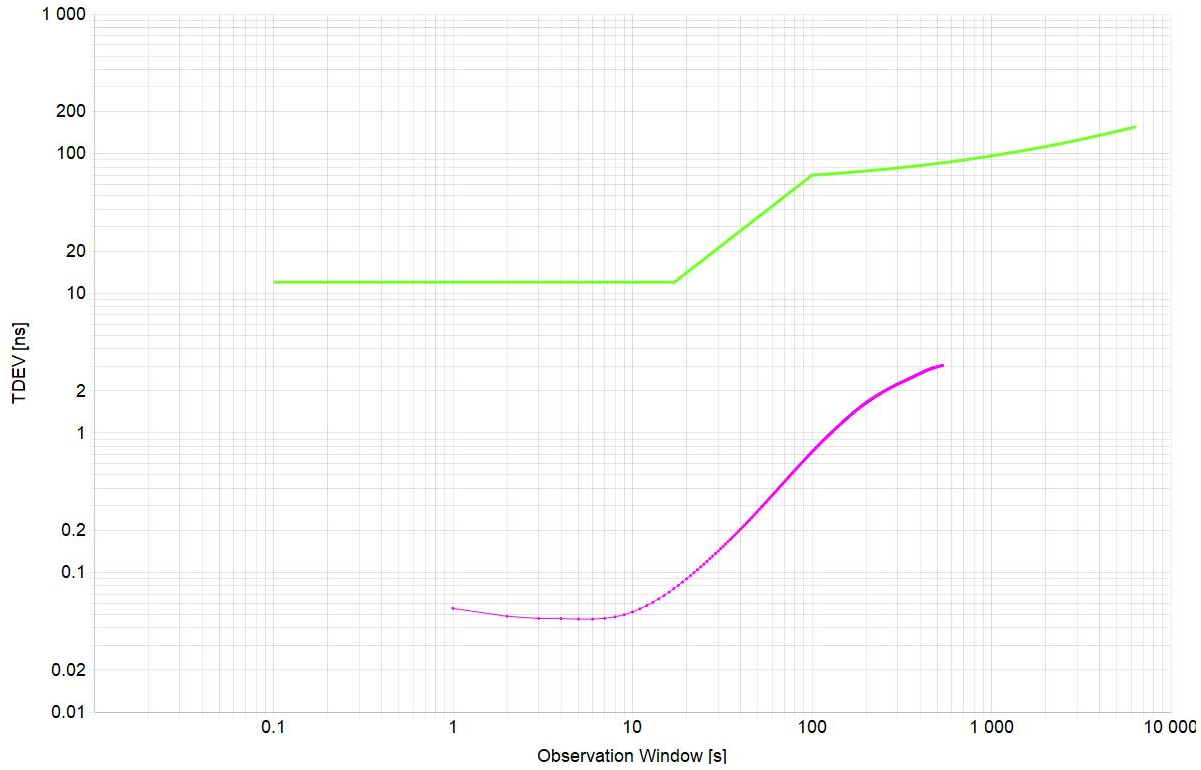
Mean [ns]	-16.805
Min [ns]	-39.803
Max [ns]	-8.303
Max-Min [ns]	31.5

20.2 MTIE Analysis



Min [ns]	0.25
Max [ns]	31.5
Max-Min [ns]	31.25

21. TDEV Analysis



Min [ns]	0.046
Max [ns]	3.031
Max-Min [ns]	2.985

22. Configuration Files

22.1 PCM4L Json Files

22.1.1 G.8273.4 PTS

```
{
  "versionId": "0.0",
  "testModeEnable": 0,
  "referenceTrackerType": "AdaptiveTime",
  "mgmtIpAddress": "127.0.0.1",

  "remoteUdsAddress": "/var/run/ptp4l",
  "localUdsAddress": "/var/run/pcm4l",

  "stepWindowSeconds": 1,

  "phc4lConfig":
  {
      "dcoDevice": "/dev/ptp2",
      "tsDevice":
          [
                {
                      "tsDeviceName": "/dev/ptp1",
                      "tsDevicePinIndex": -1,
                      "tsDeviceExttsChannel": 3,
                      "tsDeviceExttsCorrectionNs": -63
                }
      ],
      "charDevice": "/dev/rsmu0",

      "phaseSnapDelaySeconds": 3
  },

  "deviceConfig":
  {
      "oscillatorType": "MiniOcxo",
      "dpll1588Instance": 2,
      "tsDeviceAlignmentDisable": 0,
      "qualificationTimeoutSeconds": 900,
      "holdover":
      {
          "holdoverType": "Software",
          "holdoverLossPhysicalOosEnable": 0,
          "holdoverTimeoutSeconds": 1000,
          "unqualifiedTimeoutSeconds": 10000,
          "outOfSpecUserDefinedFrequencyOffsetEnable": 0,
          "outOfSpecUserDefinedFrequencyOffsetPpb": 0
      }
  },

  "profileConfig":
  {
```

```
    "physicalPllClockCategory": 4,
    "physicalPllClockCategoryThreshold": 2,
    "physicalPllInstance": 1,
    "physicalPllWaitToRestoreTimeoutValue": 10
},

"loggerConfig":
{
    "timestampType": "System",
    "stdoutLog":
    {
        "enable": 0,
        "selectionMask": "0000000000111111",
        "_description_": "        | ||||||___ 0: Sync error                ",
        "_description_": "        | |||||____ 1: Sync warning              ",
        "_description_": "        | ||||_____ 2: Sync analysis             ",
        "_description_": "        | |||______ 3: Error                      ",
        "_description_": "        | ||_______ 4: Warning                    ",
        "_description_": "        | |________ 5: Debug                      ",
        "_description_": "        |__________ 7: Timestamp                  "
    },

    "externalFdLog":
    {
        "enable": 0,
        "selectionMask": "0000000000011111",
        "_description_": "        | ||||||___ 0: Sync error                ",
        "_description_": "        | |||||____ 1: Sync warning              ",
        "_description_": "        | ||||_____ 2: Sync analysis             ",
        "_description_": "        | |||______ 3: Error                      ",
        "_description_": "        | ||_______ 4: Warning                    ",
        "_description_": "        | |________ 5: Debug                      ",
        "_description_": "        |__________ 7: Timestamp                  "
    },

    "logFile1":
    {
        "enable": 1,
        "fileName": "first_log_file.txt",
        "selectionMask": "0000000000011111",
        "purge": 1,
        "maxFileSize": 1000000,
        "archives": 2
    },

    "syslog":
    {
        "enable": 0,
        "selectionMask": "0000000000011111",
        "ipAddress": "10.64.10.45",
        "udpPort": 514
    }
},
```

```
"instanceConfig":
[
    {
        "instanceEnable": 1,
        "correctionFieldEnable": 1,
        "lostMasterTimeoutMilliseconds": 2000,

        "trackerConfig":
        {
            "floorDelayEstimateSeconds": -1.0,
            "willCorrectFrequencyAtFirstSnap": 0,
            "minExpProportionForMinTracking": 0.12,

            "stationarityBounds":
            {
                "measure1Lower": 0.4,
                "measure1Upper": 2.5
            },

            "maxNumberOfPhaseSnap": 1,
            "doubleDcoThresholdNanoseconds": 600,
            "phaseSnapThresholdSeconds": 0.00001,
            "rerouteFloorDelayThresholdSeconds": 0.000002,
            "rerouteAbnormalTodChangePpb": 20,
            "highPrecisionFrequencyCorrectionTimeMinutes": 6,

            "pdvThreshold":
            {
                "downlink": -20,
                "uplink": -20
            },

            "pdvThresholdExceededHysteresis":
            {
                "downlink": 1,
                "uplink": 1
            },

            "snapTransitionTimestamps": 4,

            "dcoLoopFilter":
            {
                "minResponseTimeSeconds": 100,
                "maxFfoCorrection": 5,
                "integralBranchGain": 0.2,
                "bandwidthScalar": 0.5
            },

            "desiredPrecisionSeconds": 0.0000001,
            "frequencyLockThresholdPpb": 15.0,
            "timeLockThresholdNanoseconds": 2450,
            "ffoSlopeLimitPpbPerSecond": -1
```

```
          }
      }
  ]
}
```

22.1.2 G.8273.2 FTS

```
{
  "versionId": "0.0",
  "testModeEnable": 0,
  "referenceTrackerType": "WritePhase",
  "remoteUdsAddress": "/var/run/ptp4l",
  "localUdsAddress": "/var/run/pcm4l",

  "stepWindowSeconds": 1,

  "phc4lConfig":
  {
      "dcoDevice": "/dev/ptp2",
      "tsDevice":
      [
          {
              "tsDeviceName": "/dev/ptp1",
              "tsDevicePinIndex": -1,
              "tsDeviceExttsChannel": 3,
              "tsDeviceExttsCorrectionNs": -63
          }
      ],
      "charDevice": "/dev/rsmu0",

      "phaseSnapDelaySeconds": 3,
      "tsCalibrationEnable": 0
  },

  "deviceConfig":
  {
      "oscillatorType": "Ocxo",
      "dpll1588Instance": 2,
      "tsDeviceAlignmentDisable": 0,
      "holdover":
      {
          "holdoverType": "HardwareEnhanced",
          "holdoverLossPhysicalOosEnable": 0,
          "holdoverTimeoutSeconds": 1000,
          "holdoverQualificationSeconds": 100,
          "unqualifiedTimeoutSeconds": 10000,
          "outOfSpecUserDefinedFrequencyOffsetEnable": 0,
          "outOfSpecUserDefinedFrequencyOffsetPpb": 0
      }
  },

  "profileConfig":
  {
```

```
    "physicalPllClockCategory": 1, Note: Changed to 4 to test without SyncE
    "physicalPllClockCategoryThreshold": 1,
    "physicalPllInstance": 1,
    "physicalPllWaitToRestoreTimeoutValue": 10
},

"loggerConfig":
{
    "stdoutLog":
    {
        "enable": 0,
        "selectionMask": "0000000000011111",
        "_description_": "        | ||||||___ 0: Sync error                ",
        "_description_": "        | |||||____ 1: Sync warning              ",
        "_description_": "        | ||||_____ 2: Sync analysis             ",
        "_description_": "        | |||______ 3: Error                      ",
        "_description_": "        | ||_______ 4: Warning                    ",
        "_description_": "        | |________ 5: Debug                      ",
        "_description_": "        |__________ 7: Timestamp                  "
    },

    "externalFdLog":
    {
        "enable": 0,
        "selectionMask": "0000000000011111",
        "_description_": "        | ||||||___ 0: Sync error                ",
        "_description_": "        | |||||____ 1: Sync warning              ",
        "_description_": "        | ||||_____ 2: Sync analysis             ",
        "_description_": "        | |||______ 3: Error                      ",
        "_description_": "        | ||_______ 4: Warning                    ",
        "_description_": "        | |________ 5: Debug                      ",
        "_description_": "        |__________ 7: Timestamp                  "
    },
    "logFile1":
    {
        "enable": 1,
        "fileName": "first_log_file.txt",
        "selectionMask": "0000000000011111"
    }
},

"instanceConfig":
[
    {
        "correctionFieldEnable": 1,
        "lostMasterTimeoutMilliseconds": 2000,
        "manageClockClassExtendedEnable" : 0,

        "trackerConfig":
        {
          "phaseSnapThresholdSeconds": 0.00001,
          "floorDelayEstimateSeconds": -1.0,
          "timeLockThresholdNanoseconds": 250,
```

```
            "willCorrectFrequencyAtFirstSnap": 1,
            "frequencyLockThresholdPpb": 16.0,
            "lockFilterWindowLengthSeconds": 1.0
          }
      }
  ]
}
```

22.2 PTP4L Config Files

22.2.1 G.8275.2 Unicast Slave Clock

```
[global]
domainNumber    44

twoStepFlag     0

# Announce messages
announceReceiptTimeout  2
logAnnounceInterval     1

# Sync/Delay_Req/Delay_Resp messages
# ex. 0 = 1 PPS, -3 = 8 PPS, -4 = 16 PPS
logSyncInterval         -4
logMinDelayReqInterval  -4

slaveOnly       1
masterOnly      0

clockClass      255
clockAccuracy   0xFE
timeSource      0xa0
maxStepsRemoved 255

offsetScaledLogVariance 0xffff

G.8275.defaultDS.localPriority  128
G.8275.portDS.localPriority     128

priority1       128
priority2       255

dataset_comparison      G.8275.x
transportSpecific       0

clock_type      OC
delay_mechanism E2E

#
# Send timestamps to pcm4l
#
free_running            1
slave_event_monitor     /var/run/pcm4l
```

```
tsproc_mode             raw
tx_timestamp_timeout    5
sanity_freq_limit       0


network_transport       UDPv4

hybrid_e2e                      1
inhibit_multicast_service       1
unicast_listen                  1
unicast_req_duration            300

[unicast_master_table]
table_id                1
logQueryInterval        2
UDPv4                   10.64.10.1

[vnptp1]
unicast_master_table    1
```

22.2.2 G.8275.1 Multicast Boundary Clock

```
[global]
domainNumber    24

twoStepFlag     0

# Announce messages
announceReceiptTimeout  3
logAnnounceInterval     -3

# Sync/Delay_Req/Delay_Resp messages – 16 packets-per-second, -4 = 16 PPS
logSyncInterval         -4
logMinDelayReqInterval  -4

#
# step_window is in units of sync packets
#
# 3 seconds:
#   @ 16 PPS, set to 48
#   @ 1  PPS, set to  3
step_window     48

clockClass      255
clockAccuracy   0xFE
timeSource      0xa0
maxStepsRemoved 255

offsetScaledLogVariance 0xffff

G.8275.defaultDS.localPriority  128
G.8275.portDS.localPriority     128
```

```
priority1       128
priority2       255

dataset_comparison      G.8275.x
transportSpecific       0

network_transport       L2

clock_type      BC
delay_mechanism E2E
#
# Send timestamps to pcm4l
#
free_running            1
slave_event_monitor     /var/run/pcm4l
tsproc_mode             raw
tx_timestamp_timeout    5
sanity_freq_limit       0

tsproc_mode             raw
ptp_dst_mac             01:1B:19:00:00:00

[vnptp0]
[vnptp1]
```

22.3 TCS/Bin Files

Standard	TCS/Bin Files
G.8273.2 FTS	8A34001_knetsync_todsync_en_v2_synce2.bin
G.8273.4 PTS	8A34001_knetsync_todsync_en_v2_wf.bin

23. Revision History

Revision	Date	Description
1.00	May 10, 2023	Initial release.

IMPORTANT NOTICE AND DISCLAIMER

RENESAS ELECTRONICS CORPORATION AND ITS SUBSIDIARIES (“RENESAS”) PROVIDES TECHNICAL SPECIFICATIONS AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT OF THIRD-PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for developers who are designing with Renesas products. You are solely responsible for (1) selecting the appropriate products for your application, (2) designing, validating, and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements. These resources are subject to change without notice. Renesas grants you permission to use these resources only to develop an application that uses Renesas products. Other reproduction or use of these resources is strictly prohibited. No license is granted to any other Renesas intellectual property or to any third-party intellectual property. Renesas disclaims responsibility for, and you will fully indemnify Renesas and its representatives against, any claims, damages, costs, losses, or liabilities arising from your use of these resources. Renesas' products are provided only subject to Renesas' Terms and Conditions of Sale or other applicable terms agreed to in writing. No use of any Renesas resources expands or otherwise alters any applicable warranties or warranty disclaimers for these products.

(Disclaimer Rev.1.01)

Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,
Koto-ku, Tokyo 135-0061, Japan
www.renesas.com

Contact Information

For further information on a product, technology, the most up-to-date version of a document, or your nearest sales office, please visit www.renesas.com/contact-us/.

Trademarks

Renesas and the Renesas logo are trademarks of Renesas Electronics Corporation. All trademarks and registered trademarks are the property of their respective owners.