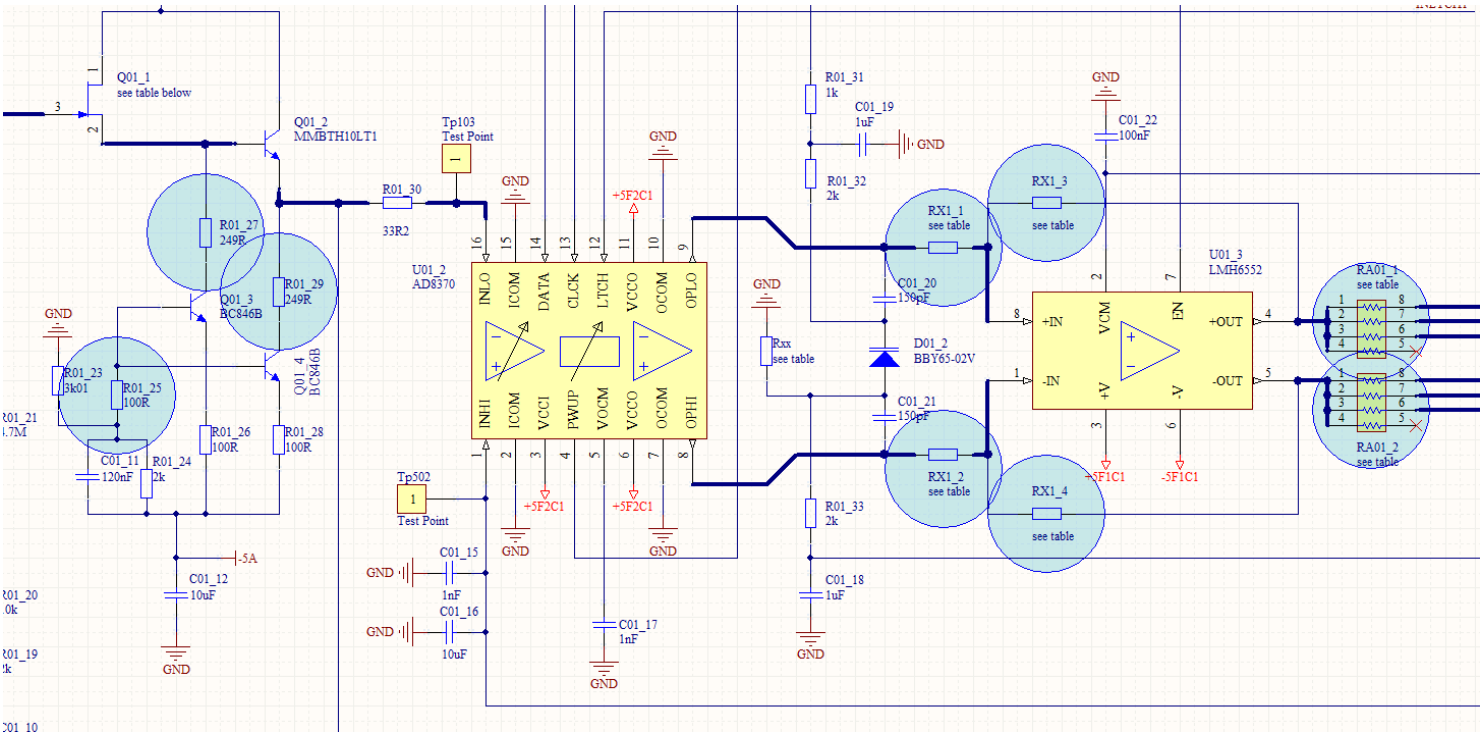
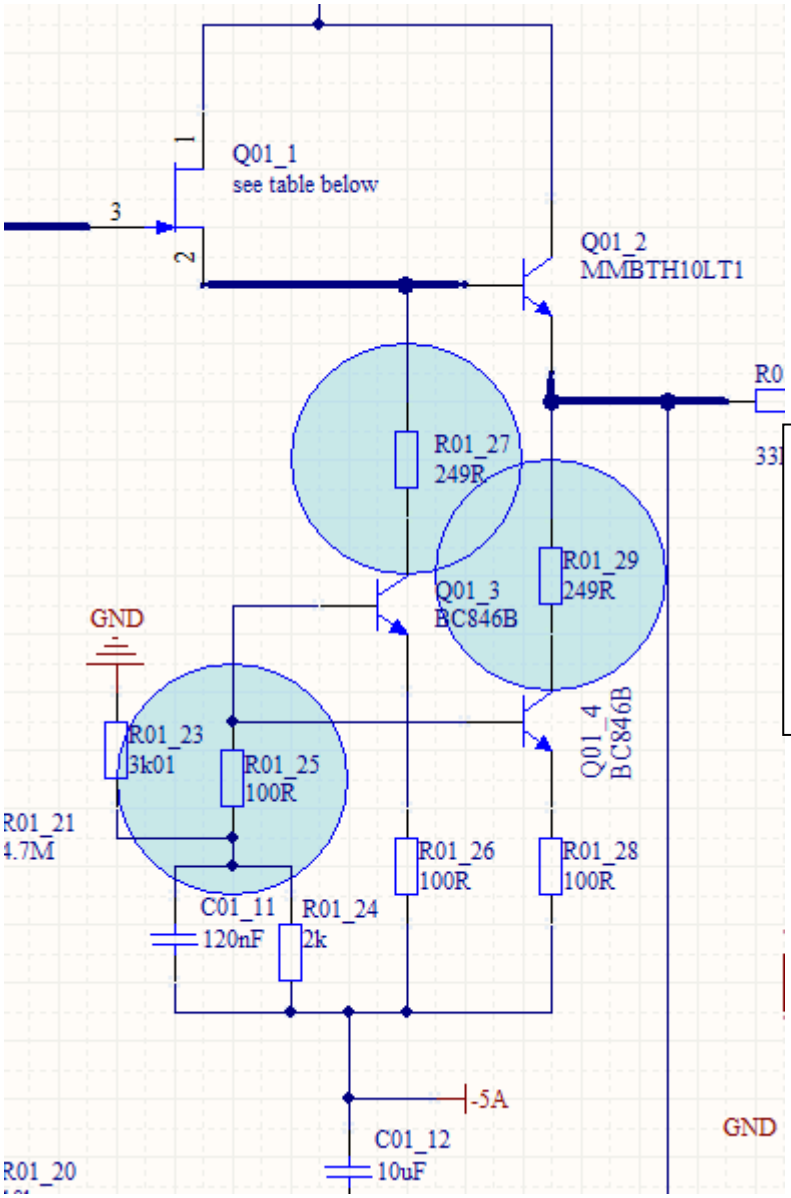
Tekway DST1062B/DST1102B, Hantek DSO5062B/DSO5102B, Voltcraft DSO1062D/DSO3062C modifications.

After 200MHz bandwidth hack all blue marked parts need to be replaced to allow proper frequency and pulse response.





ArnoR tweak

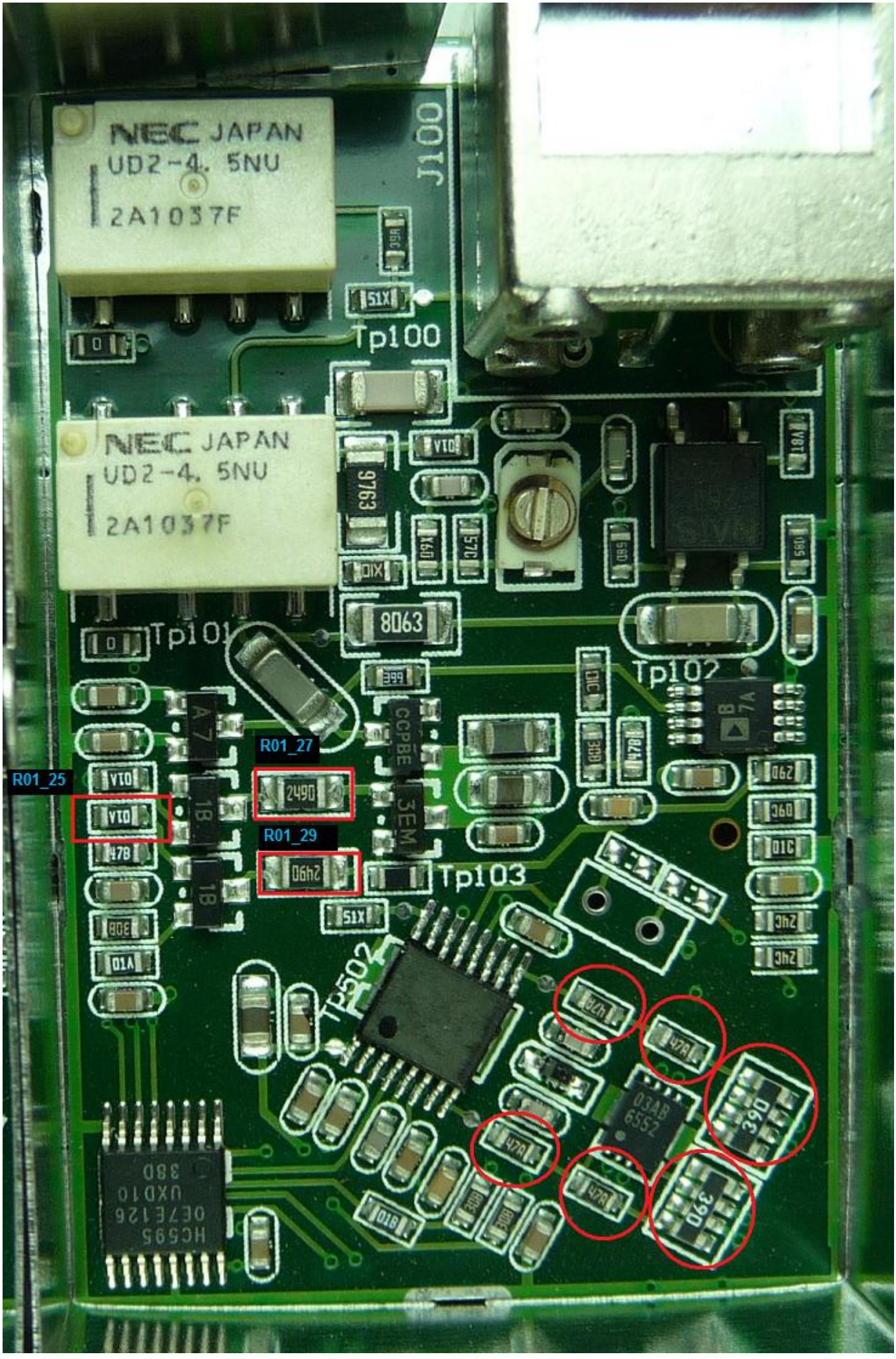
(as proposed by user “ArnoR” on microcontroller.net forum)

R01_27 – change to 125R

R01_29 – change to 0R

R01_25 – change to 0R

(or 24R4, or 50R <- to achieve best result see below in text)

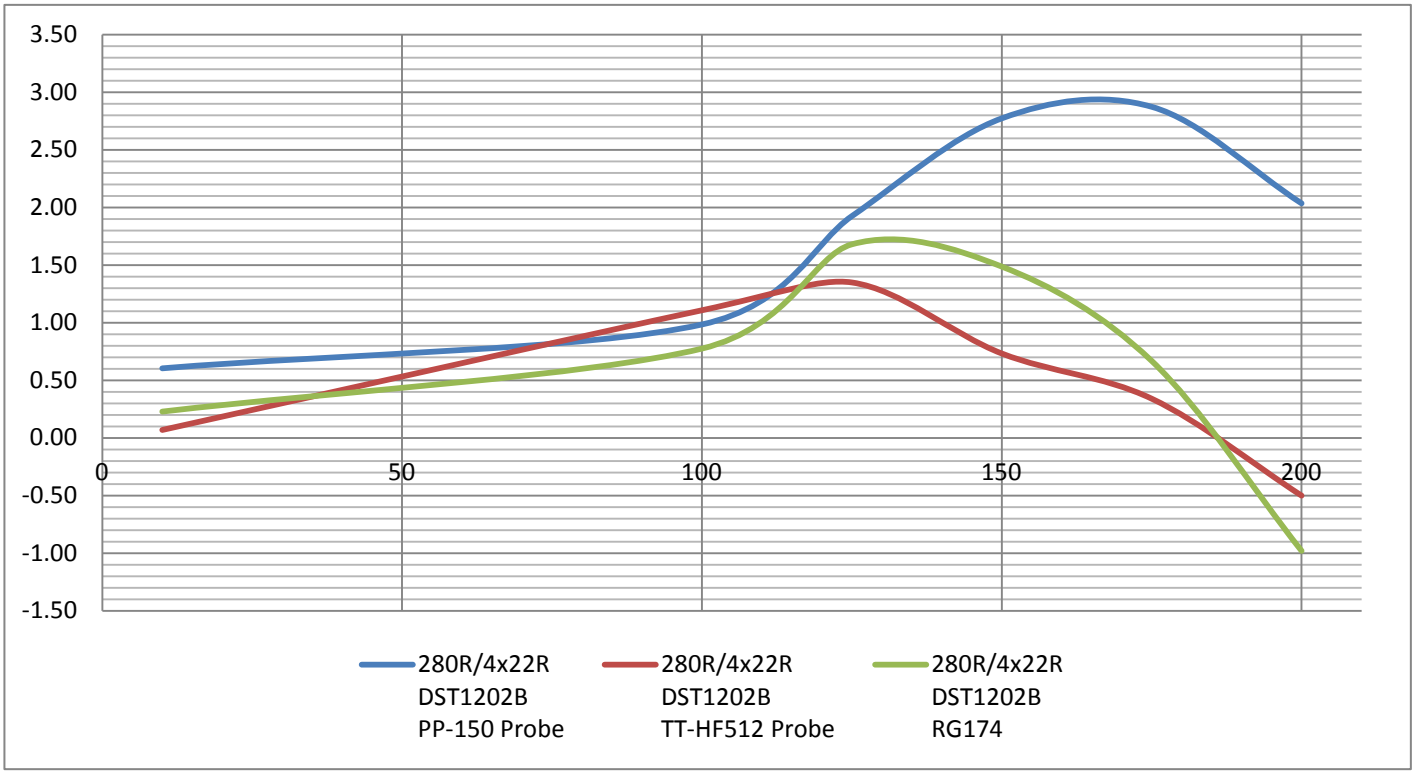

NEC JAPAN
UD2-4. 5NU
2A1037F
NEC JAPAN
UD2-4. 5NU
2A1037F
J100
Tp100
Tp101
Tp102
Tp103
Tp502
R01_25
R01_27
R01_29
2490
8063
9763
390
390

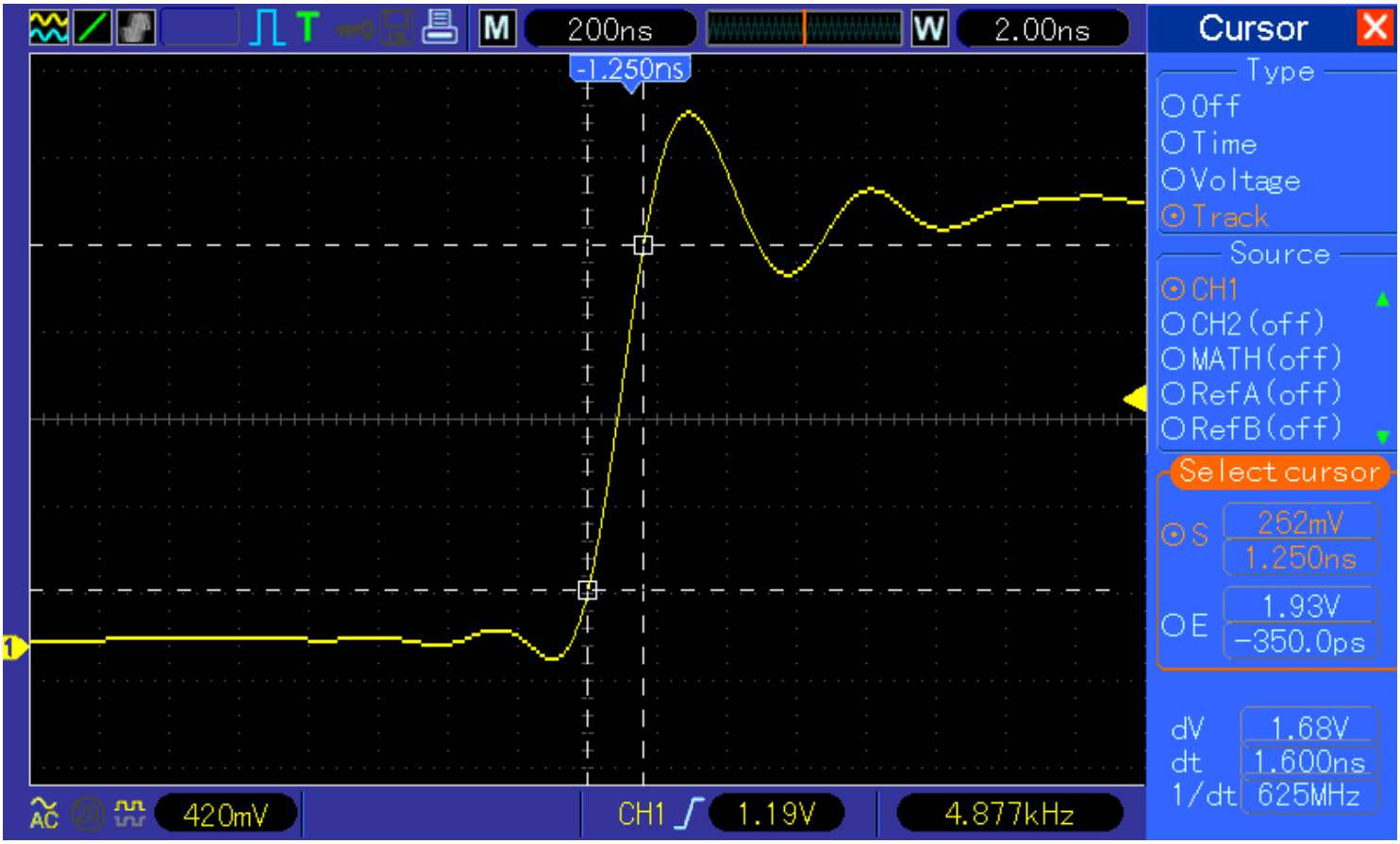
Original hw1007 input stage:

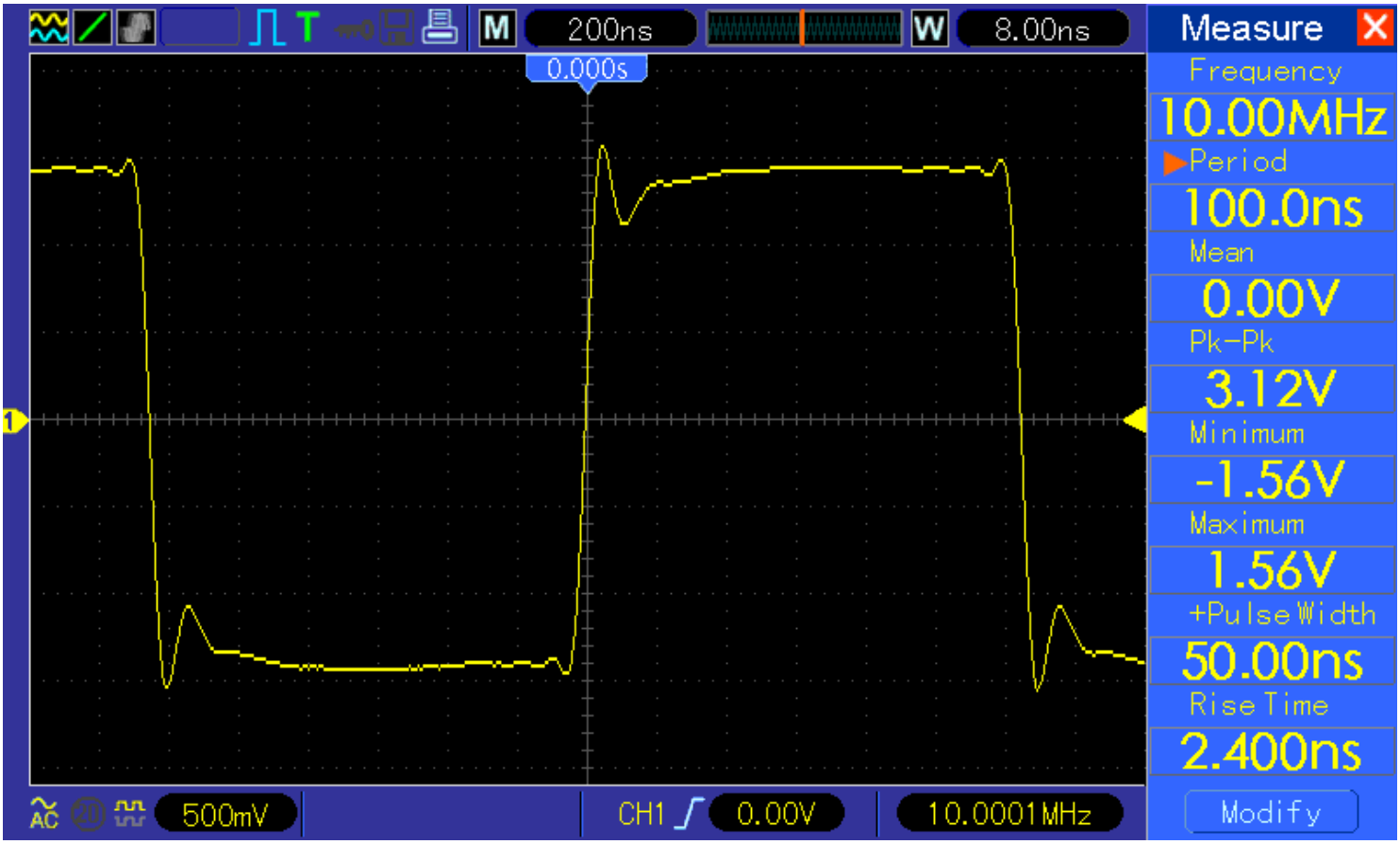
RX1=RX2=RX3=RX4= 280R

RA1=RA2= 4 x 22R array

MHz	mV	norm. mV	dBm	DSO type/setup
10	2.68	239.70	0.60	280R/4x22R DST1202B PP-150 Probe
100	2.8	250.43	0.98	
125	3.12	279.05	1.92	
150	3.44	307.67	2.77	
175	3.48	311.25	2.87	
200	3.16	282.63	2.03	
10	2.52	225.39	0.07	280R/4x22R DST1202B TT-HF512 Probe
100	2.84	254.01	1.11	
125	2.92	261.16	1.35	
150	2.72	243.28	0.73	
175	2.6	232.54	0.34	
200	2.36	211.08	-0.50	
10	3.08	229.56	0.23	280R/4x22R DST1202B RG174
100	3.28	244.47	0.78	
125	3.64	271.30	1.68	
150	3.56	265.34	1.49	
175	3.24	241.49	0.67	
200	2.68	199.75	-0.98	



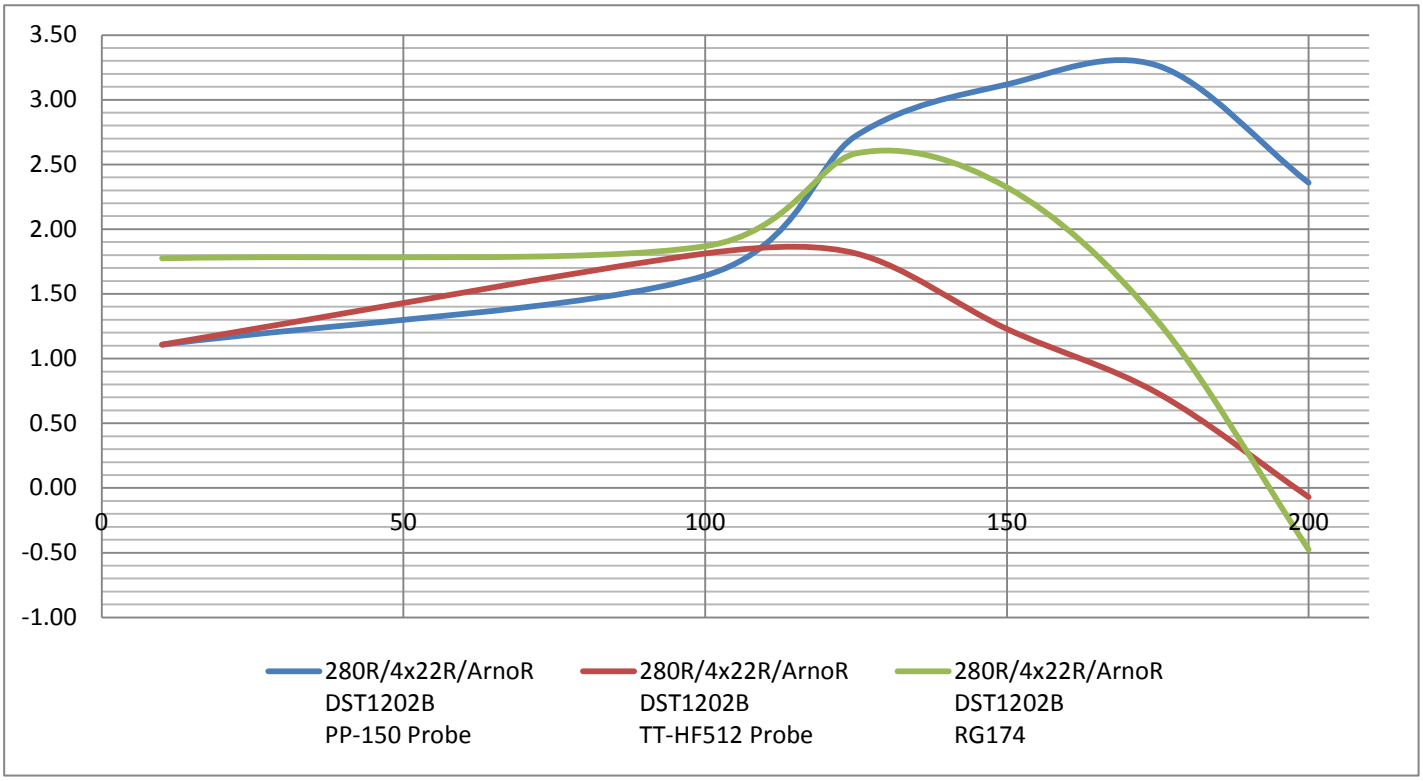

M
200ns
W
2.00ns
-1.250ns
Cursor
Type
Off
Time
Voltage
Track
Source
CH1
CH2 (off)
MATH (off)
RefA (off)
RefB (off)
Select cursor
S
262mV
1.250ns
E
1.93V
-350.0ps
dV
1.68V
dt
1.600ns
1/dt
625MHz
AC
420mV
CH1
1.19V
4.877kHz

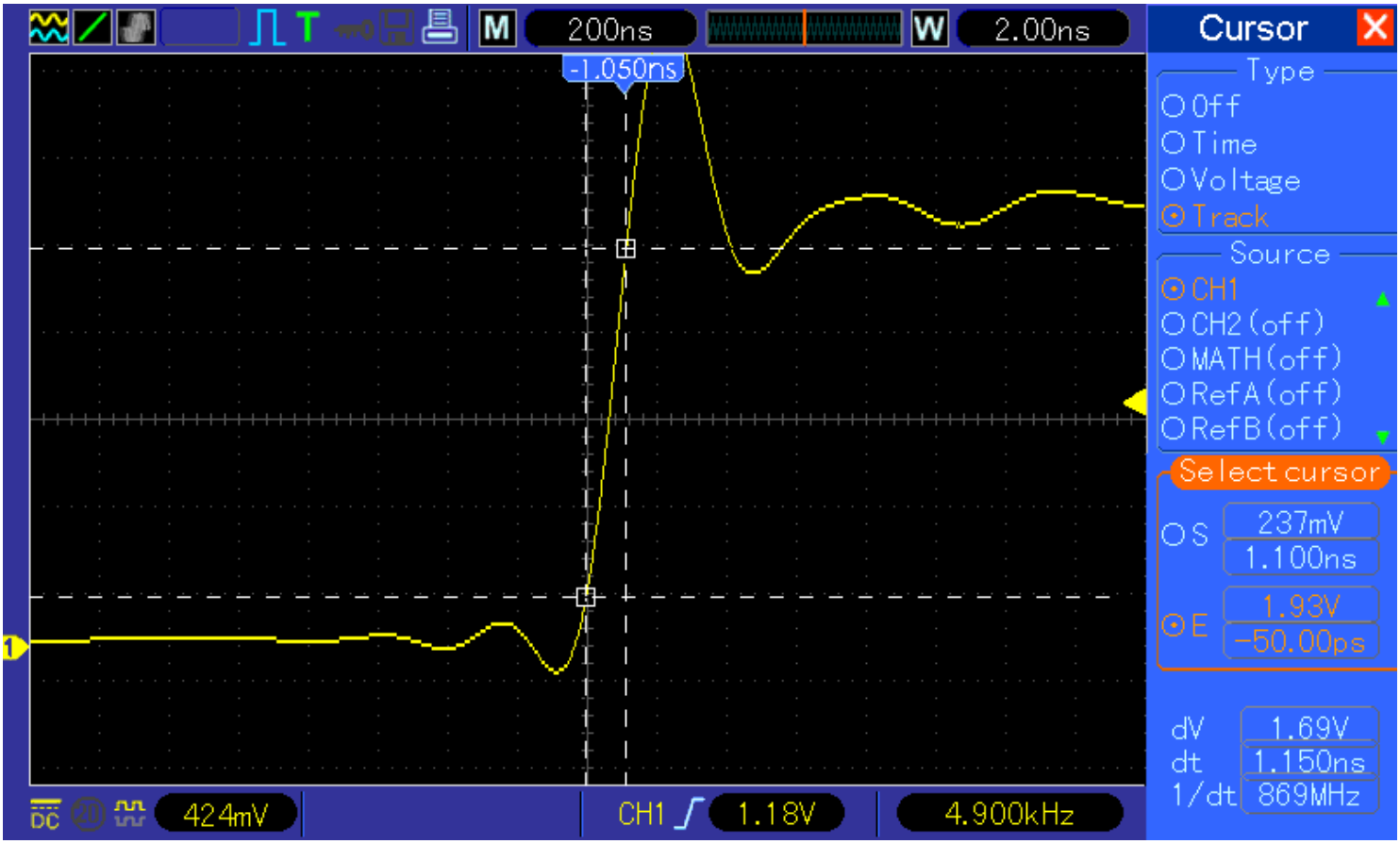

M
200ns
W
8.00ns
0.000s
Measure
Frequency
10.00MHz
Period
100.0ns
Mean
0.00V
Pk-Pk
3.12V
Minimum
-1.56V
Maximum
1.56V
+Pulse Width
50.00ns
Rise Time
2.400ns
Modify
AC
500mV
CH1
0.00V
10.0001MHz

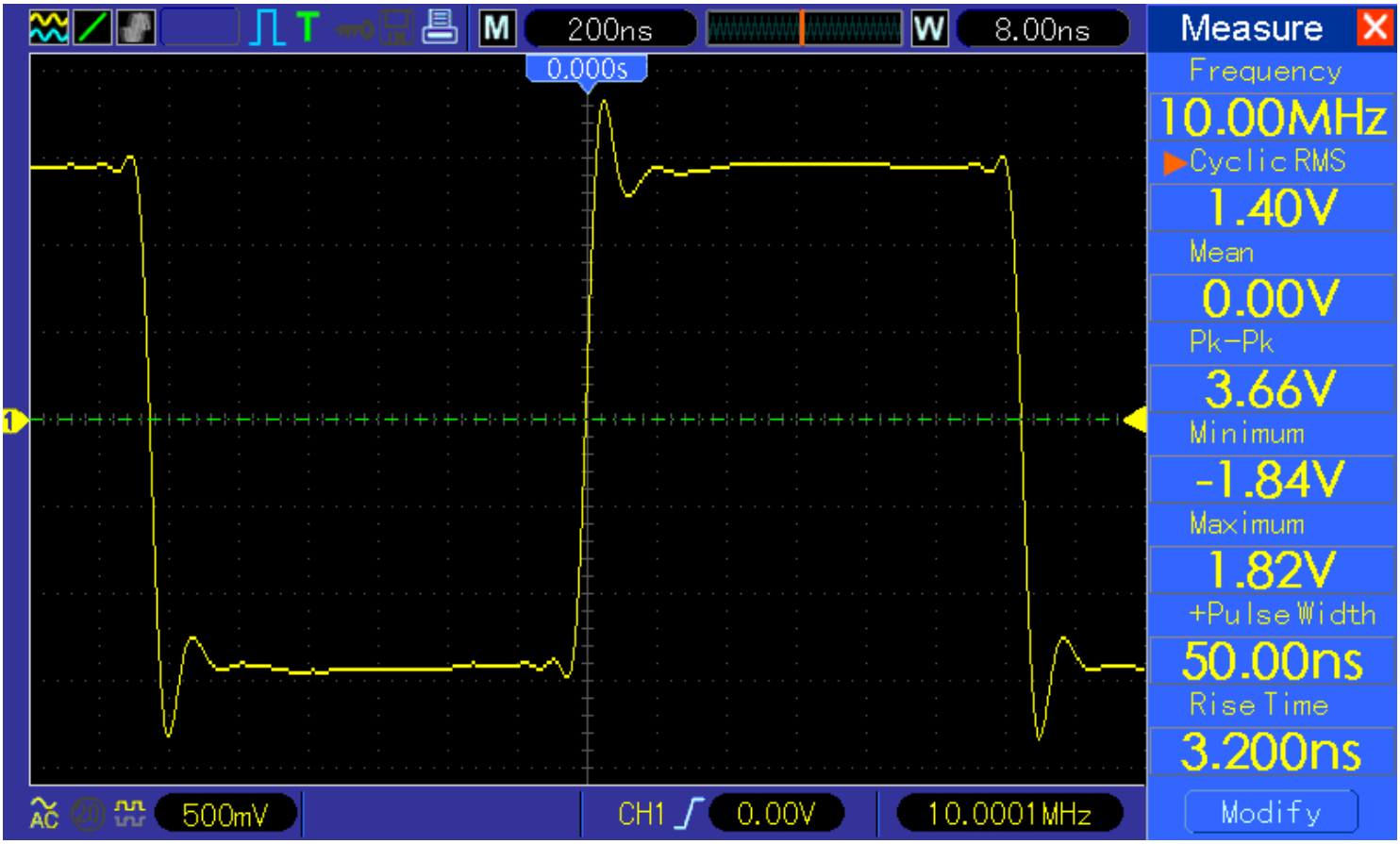
Modified hw1007 input stage (ArnoR tweak):

RX1=RX2=RX3=RX4= 280R
RA1=RA2= 4 x 22R array
R01/2_27 = 125R
R01/2_29 = 0R
R01/2_25 = 0R

MHz	mV	norm. mV	dBm	DSO type/setup
10	2.84	254.01	1.11	280R/4x22R/ArnoR DST1202B PP-150 Probe
100	3.02	270.11	1.64	
125	3.42	305.88	2.72	
150	3.58	320.20	3.12	
175	3.64	325.56	3.26	
200	3.28	293.36	2.36	
10	2.84	254.01	1.11	280R/4x22R/ArnoR DST1202B TT-HF512 Probe
100	3.08	275.48	1.81	
125	3.08	275.48	1.81	
150	2.88	257.59	1.23	
175	2.72	243.28	0.73	
200	2.48	221.81	-0.07	
10	3.68	274.28	1.77	280R/4x22R/ArnoR DST1202B RG174
100	3.72	277.26	1.87	
125	4.04	301.12	2.59	
150	3.92	292.17	2.32	
175	3.48	259.38	1.29	
200	2.84	211.67	-0.48	




M
200ns
W
2.00ns
-1.050ns
Cursor
Type
Off
Time
Voltage
Track
Source
CH1
CH2 (off)
MATH (off)
RefA (off)
RefB (off)
Select cursor
S
237mV
1.100ns
E
1.93V
-50.00ps
dV
1.69V
dt
1.150ns
1/dt
869MHz
DC
424mV
CH1
1.18V
4.900kHz


M
200ns
W
8.00ns
0.000s
Measure
Frequency
10.00MHz
Cyclic RMS
1.40V
Mean
0.00V
Pk-Pk
3.66V
Minimum
-1.84V
Maximum
1.82V
+Pulse Width
50.00ns
Rise Time
3.200ns
Modify
AC
500mV
CH1
0.00V
10.0001MHz

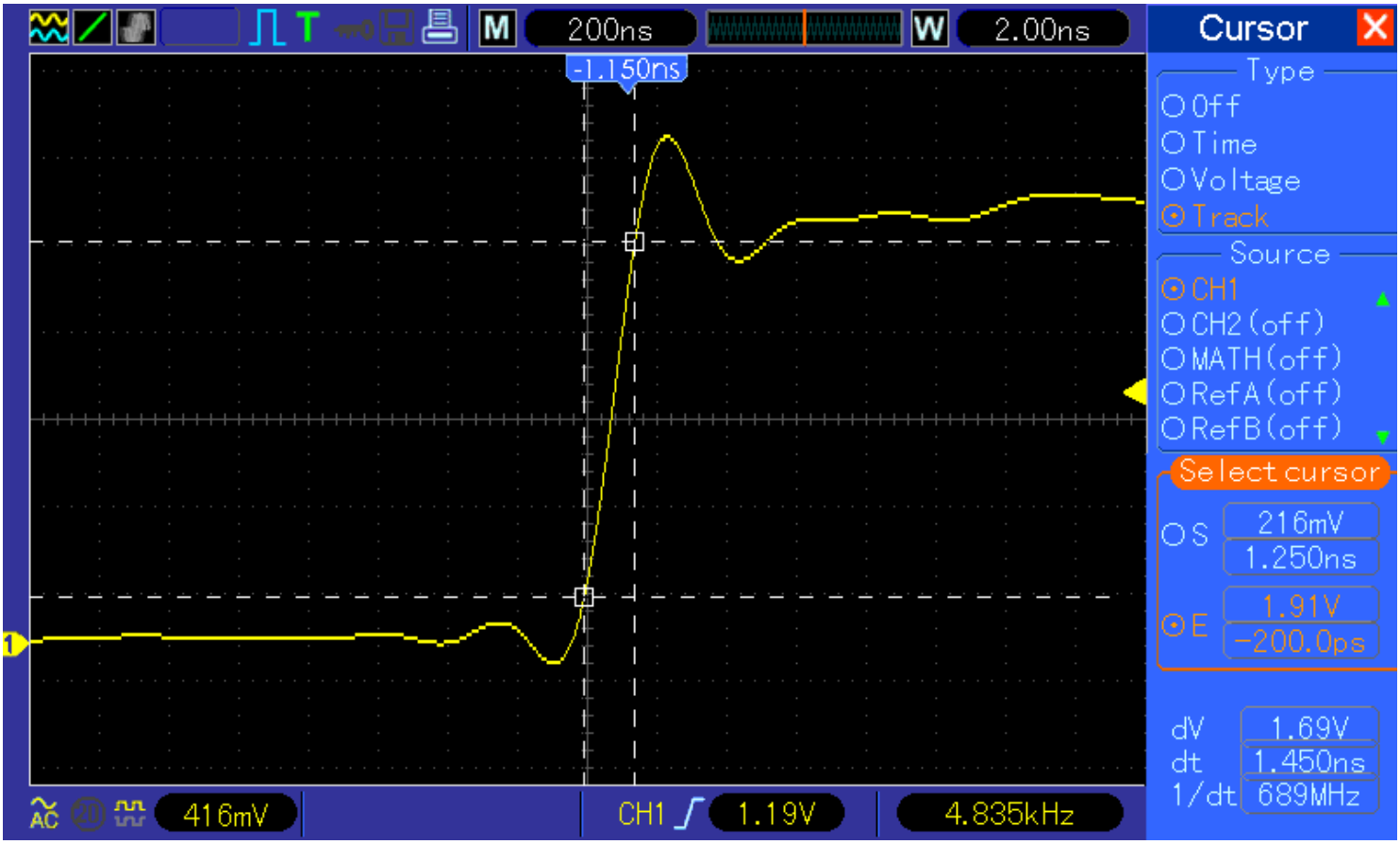
Modified hw1007 input stage:

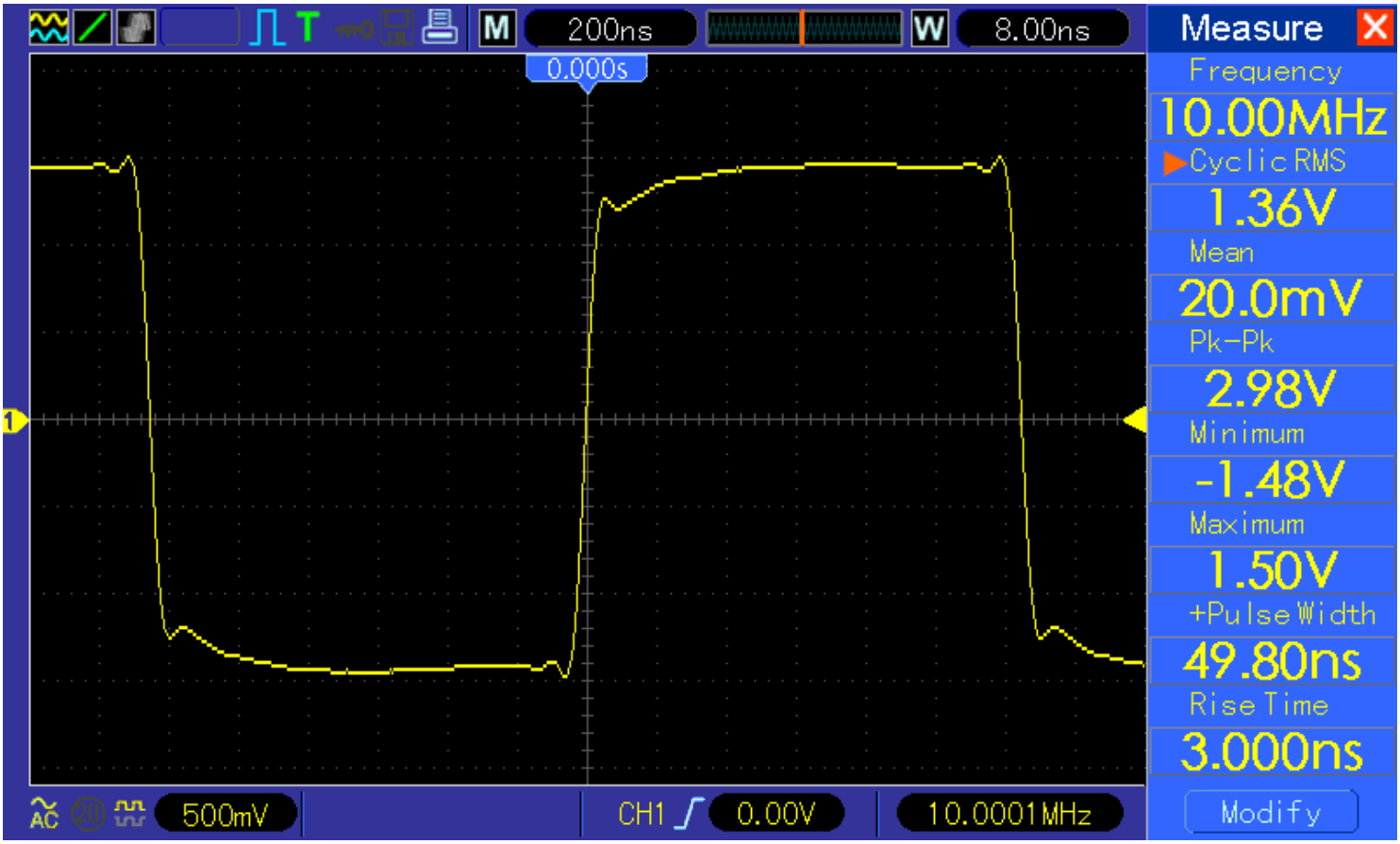
RX1=RX2=RX3=RX4= 280R

RA1=RA2= 4 x 33R array

hw0, hw1005 and early hw1007 original 200MHz DSO was like that

MHz	mV	norm. mV	dBm	DSO type/setup
10	2.54	227.18	0.14	280R/4x33R DST1202B PP-150 Probe
100	2.24	200.35	-0.95	
125	2.42	216.44	-0.28	
150	2.4	214.66	-0.35	
175	2.36	211.08	-0.50	
200	2.26	202.13	-0.88	
10	2.54	227.18	0.14	280R/4x33R DST1202B TT-HF512 Probe
100	2.48	221.81	-0.07	
125	2.58	230.76	0.27	
150	2.4	214.66	-0.35	
175	2.28	203.92	-0.80	
200	2.14	191.40	-1.35	
10	3.08	229.56	0.23	280R/4x33R DST1202B RG174
100	2.84	211.67	-0.48	
125	2.82	210.18	-0.54	
150	2.6	193.79	-1.24	
175	2.28	169.94	-2.38	
200	1.98	147.58	-3.61	

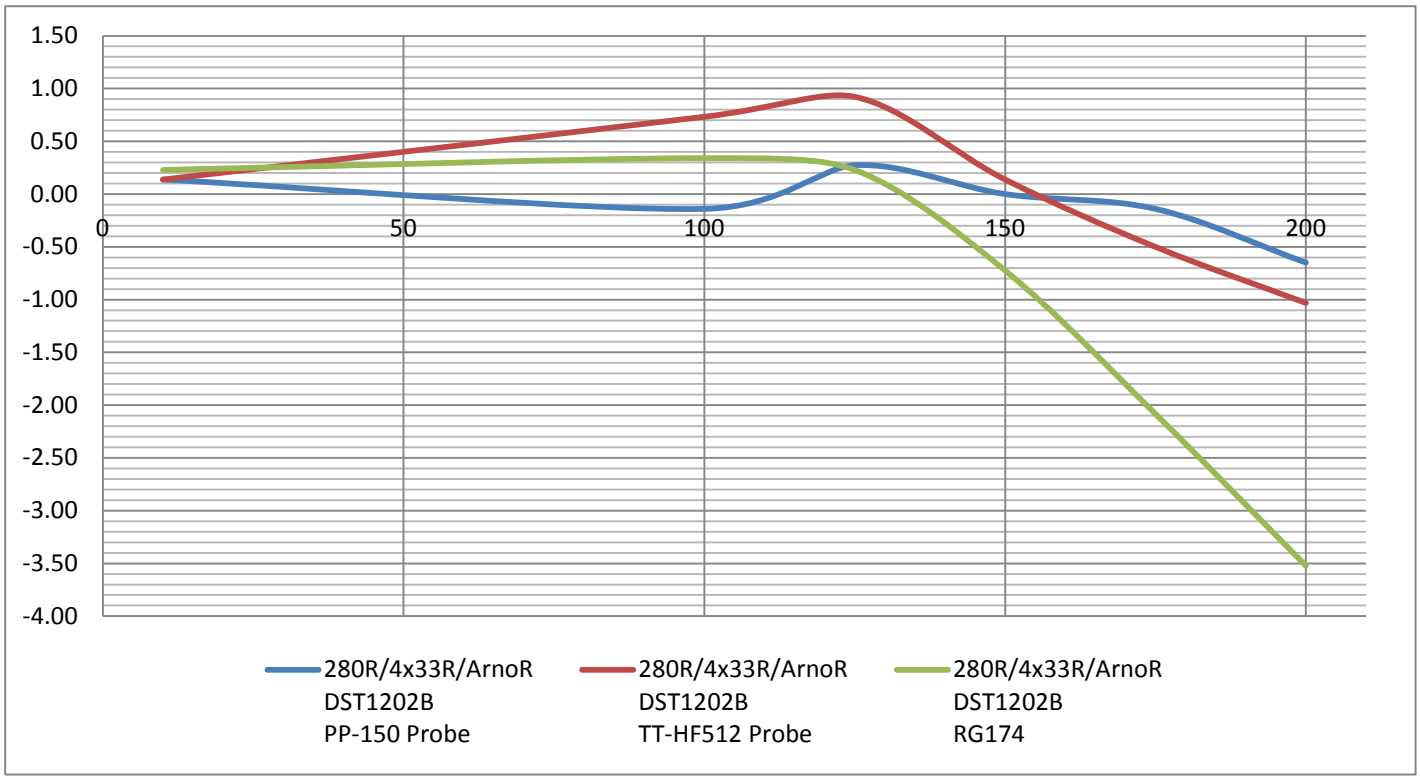

M
200ns
W
2.00ns
-1.150ns
Cursor
Type
Off
Time
Voltage
Track
Source
CH1
CH2 (off)
MATH (off)
RefA (off)
RefB (off)
Select cursor
S
216mV
1.250ns
E
1.91V
-200.0ps
dV
1.69V
dt
1.450ns
1/dt
689MHz
AC
416mV
CH1
1.19V
4.835kHz

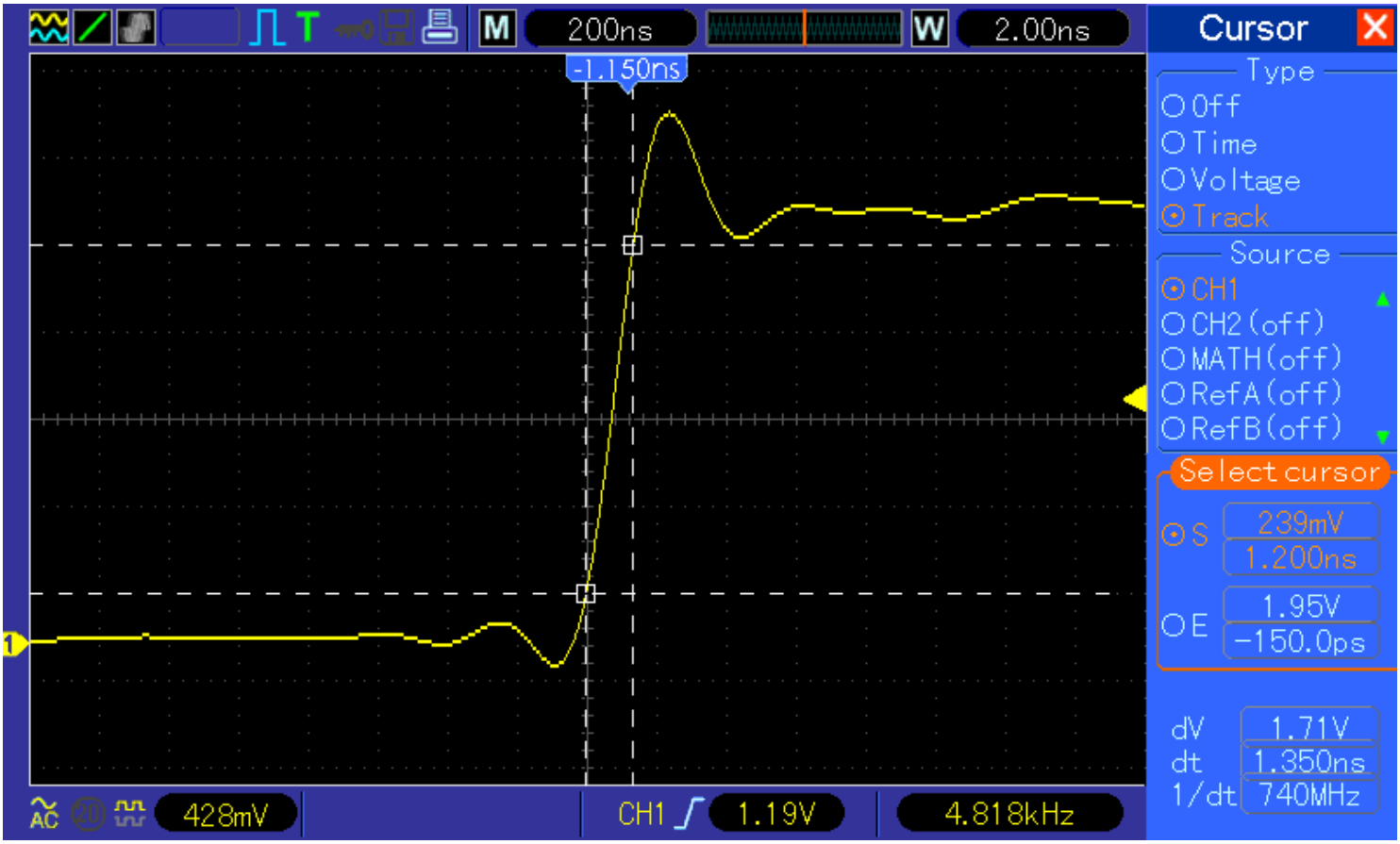

M
200ns
W
8.00ns
0.000s
Measure
Frequency
10.00MHz
Cyclic RMS
1.36V
Mean
20.0mV
Pk-Pk
2.98V
Minimum
-1.48V
Maximum
1.50V
+Pulse Width
49.80ns
Rise Time
3.000ns
Modify
AC
500mV
CH1
0.00V
10.0001MHz

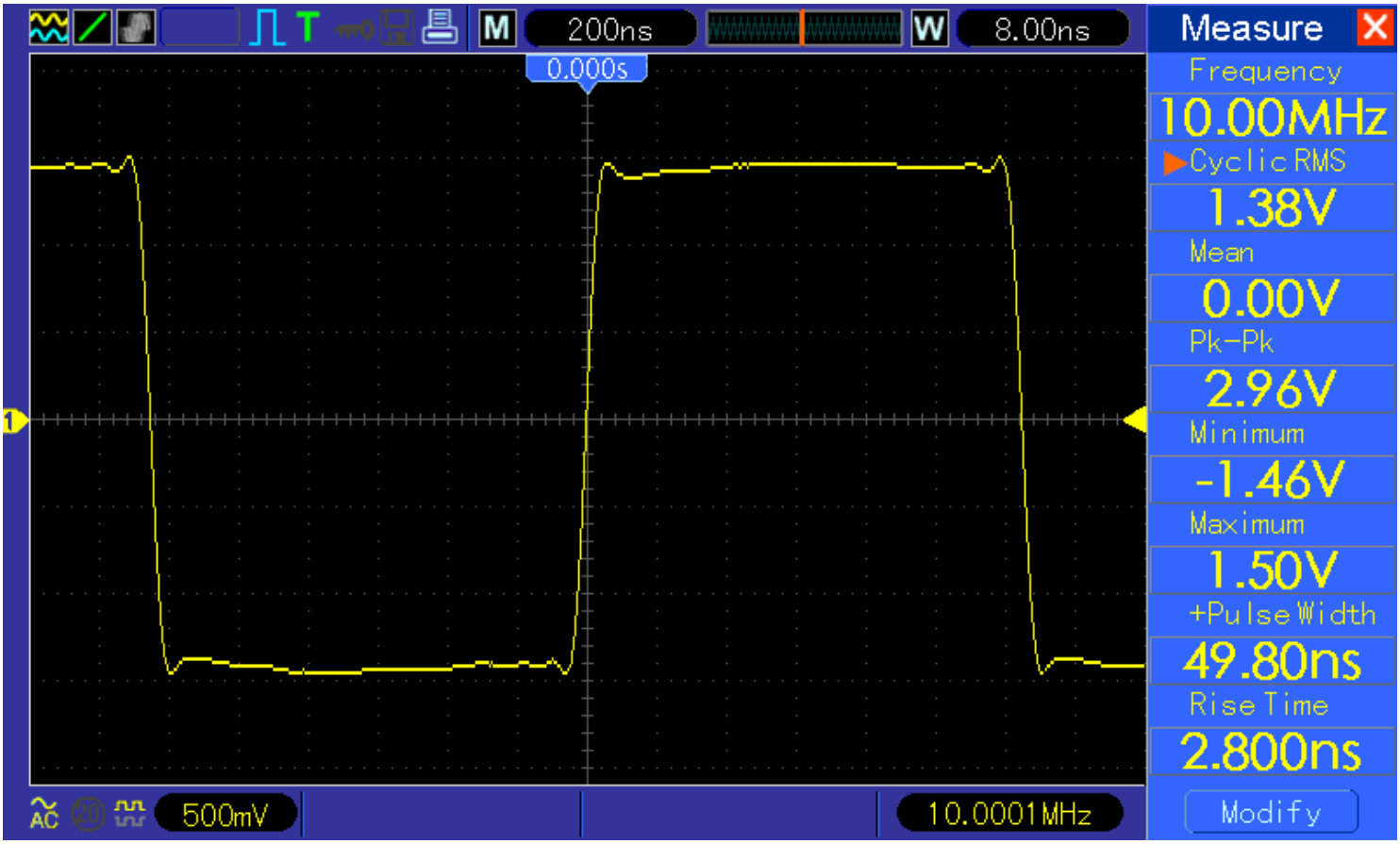
Modified hw1007 input stage (ArnoR tweak):

RX1=RX2=RX3=RX4= 280R
RA1=RA2= 4 x 33R array
R01/2_27 = 125R
R01/2_29 = 0R
R01/2_25 = 0R

MHz	mV	norm. mV	dBm	DSO type/setup
10	2.54	227.18	0.14	280R/4x33R/ArnoR DST1202B PP-150 Probe
100	2.46	220.02	-0.14	
125	2.58	230.76	0.27	
150	2.5	223.60	0.00	
175	2.46	220.02	-0.14	
200	2.32	207.50	-0.65	
10	2.54	227.18	0.14	280R/4x33R/ArnoR DST1202B TT-HF512 Probe
100	2.72	243.28	0.73	
125	2.78	248.64	0.92	
150	2.54	227.18	0.14	
175	2.36	211.08	-0.50	
200	2.22	198.56	-1.03	
10	3.08	229.56	0.23	280R/4x33R/ArnoR DST1202B RG174
100	3.12	232.54	0.34	
125	3.08	229.56	0.23	
150	2.76	205.71	-0.72	
175	2.36	175.90	-2.08	
200	2	149.07	-3.52	




M
200ns
W
2.00ns
-1.150ns
Cursor
Type
Off
Time
Voltage
Track
Source
CH1
CH2 (off)
MATH (off)
RefA (off)
RefB (off)
Select cursor
S
239mV
1.200ns
E
1.95V
-150.0ps
dV
1.71V
dt
1.350ns
1/dt
740MHz
AC
428mV
CH1
1.19V
4.818kHz

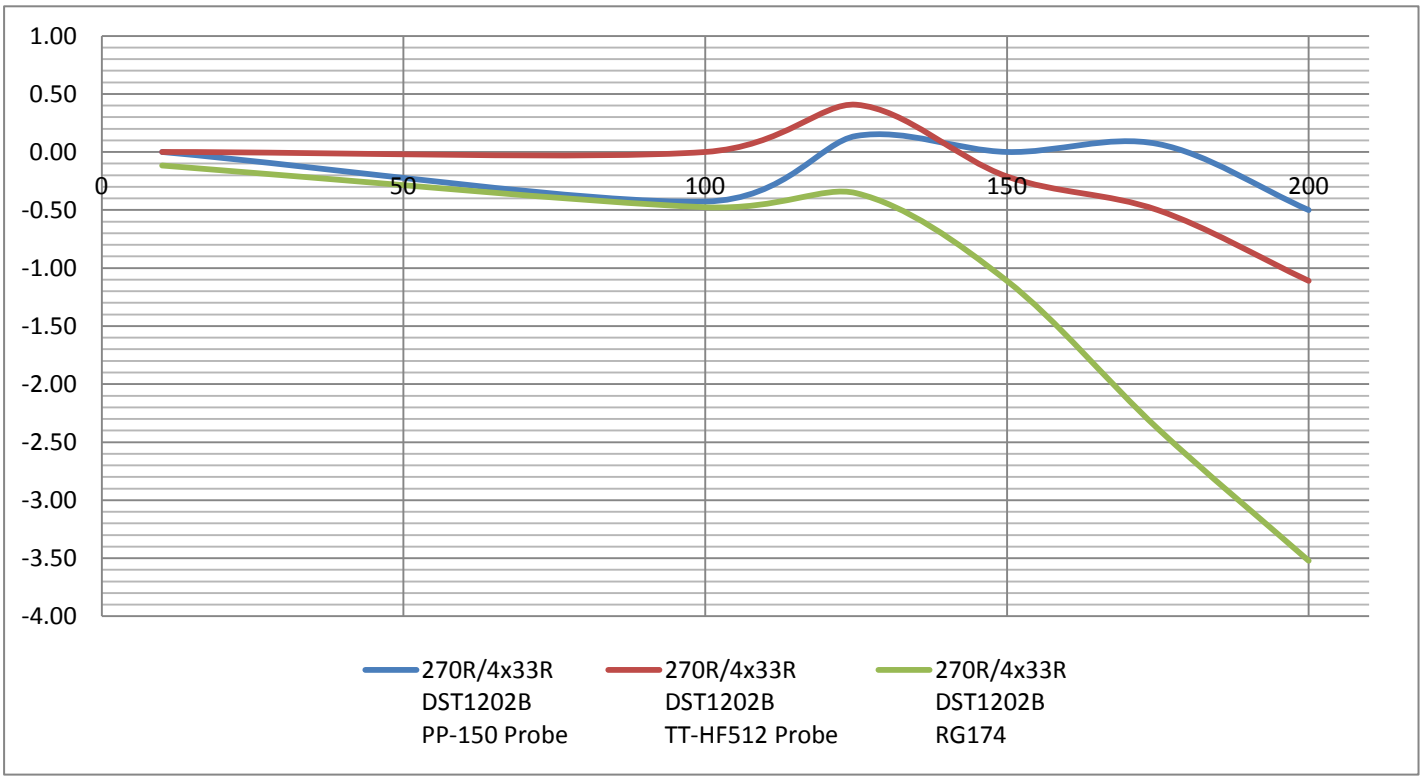

M
200ns
W
8.00ns
0.000s
Measure
Frequency
10.00MHz
Cyclic RMS
1.38V
Mean
0.00V
Pk-Pk
2.96V
Minimum
-1.46V
Maximum
1.50V
+Pulse Width
49.80ns
Rise Time
2.800ns
Modify
AC
500mV
10.0001MHz

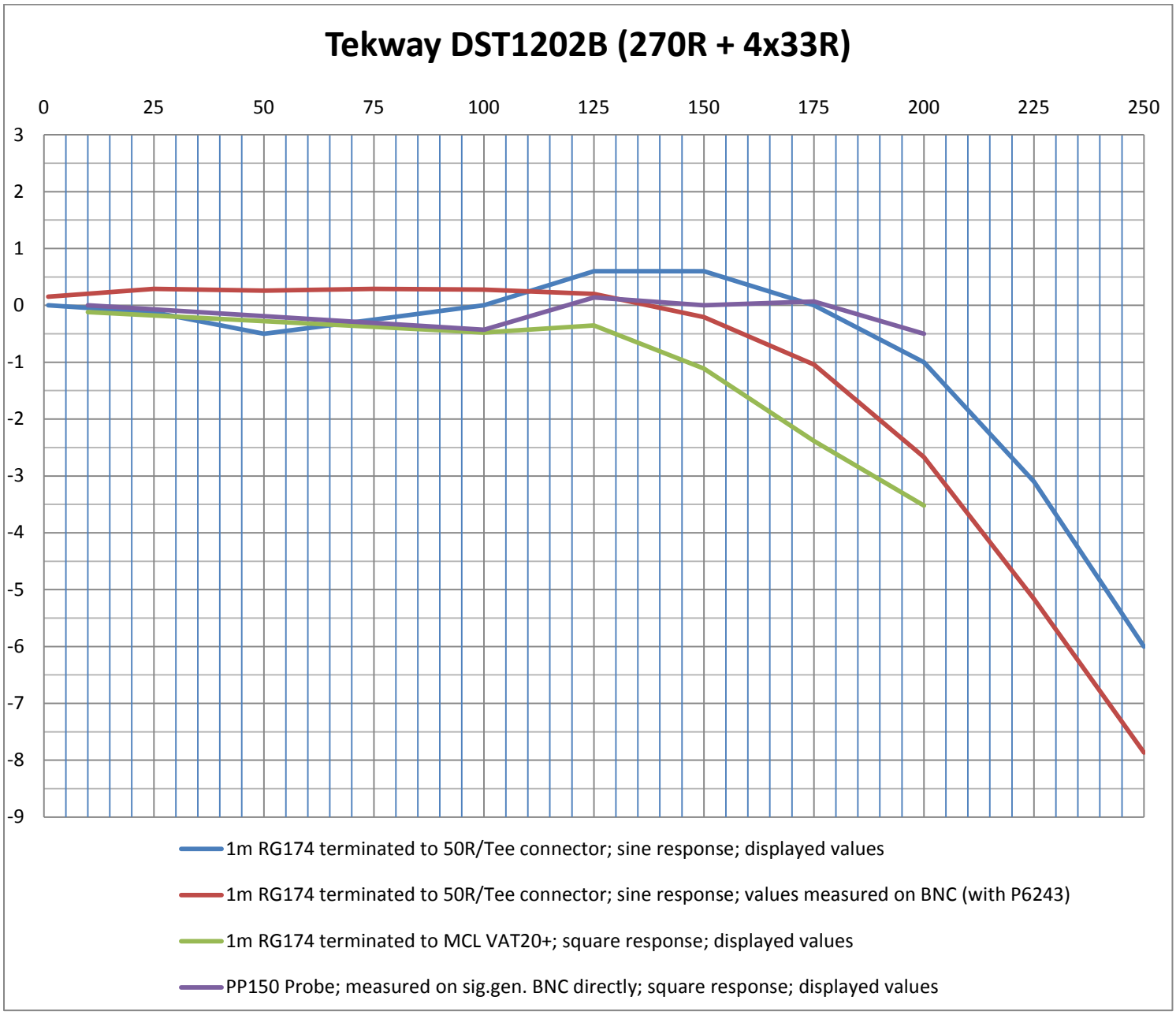
Modified hw1007 input stage:

RX1=RX2=RX3=RX4= 270R

RA1=RA2= 4 x 33R array

MHz	mV	norm. mV	dBm	DSO type/setup
10	2.5	223.60	0.00	270R/4x33R DST1202B PP-150 Probe
100	2.38	212.87	-0.43	
125	2.54	227.18	0.14	
150	2.5	223.60	0.00	
175	2.52	225.39	0.07	
200	2.36	211.08	-0.50	
10	2.5	223.60	0.00	270R/4x33R DST1202B TT-HF512 Probe
100	2.5	223.60	0.00	
125	2.62	234.33	0.41	
150	2.44	218.23	-0.21	
175	2.36	211.08	-0.50	
200	2.2	196.77	-1.11	
10	2.96	220.62	-0.12	270R/4x33R DST1202B RG174
100	2.84	211.67	-0.48	
125	2.88	214.66	-0.35	
150	2.64	196.77	-1.11	
175	2.28	169.94	-2.38	
200	2	149.07	-3.52	

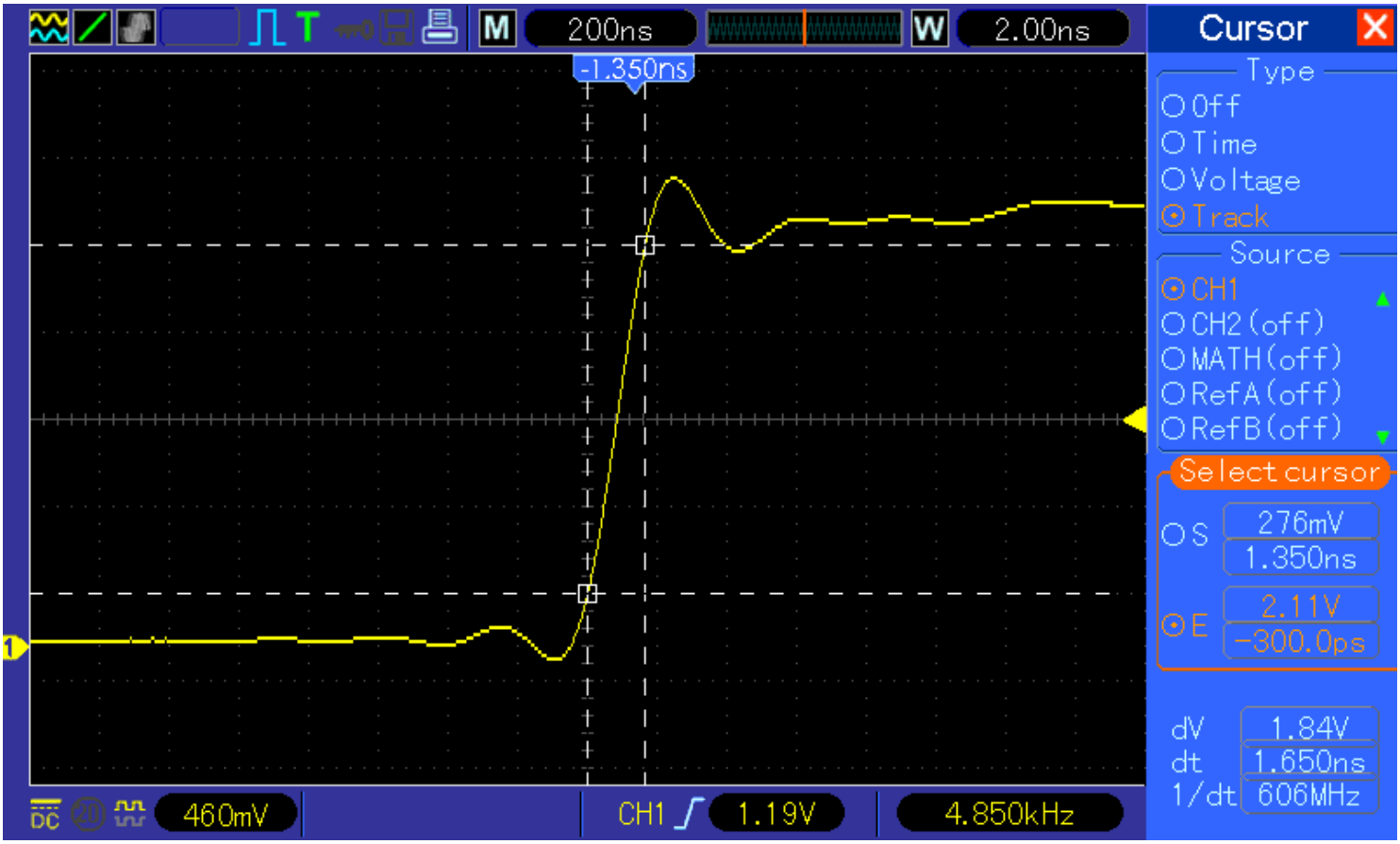


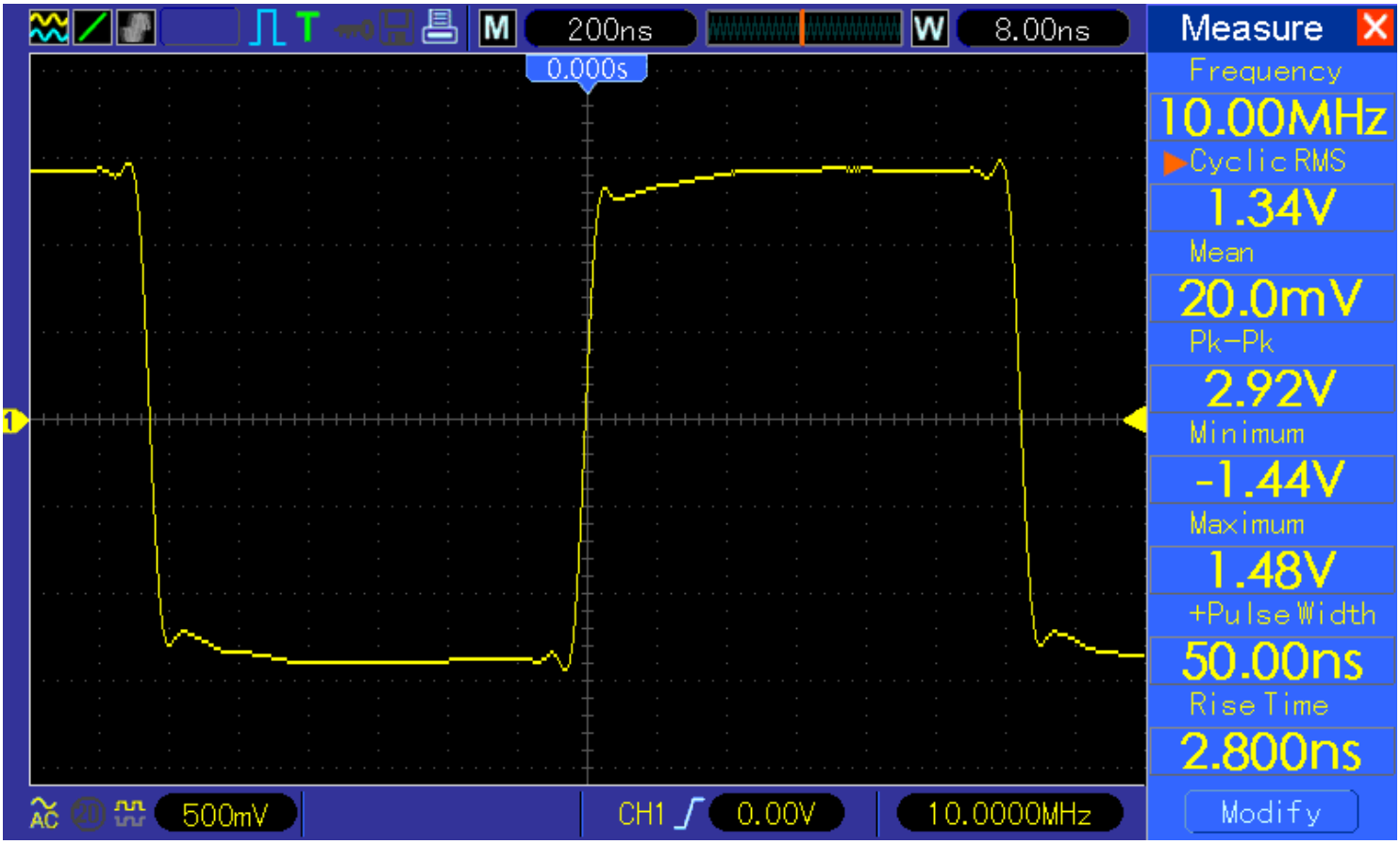


This is actually what I use on daily basis. It is slightly modified Tekway DST1202B (280R replaced by 270R).
The reason why I like this component combination is the max ±0.6dB response deviation when terminated to 50R (over tee connector), which I need for the DIY probes*

Probably – need further investigation on 50R response – I will use the “ArnoR” tweak as well, however the “base 50R version” <- see below in text.

*- http://welecw2000a.sourceforge.net/docs/Hardware/Aktiver_Tastkopf_mit_OPA659.pdf

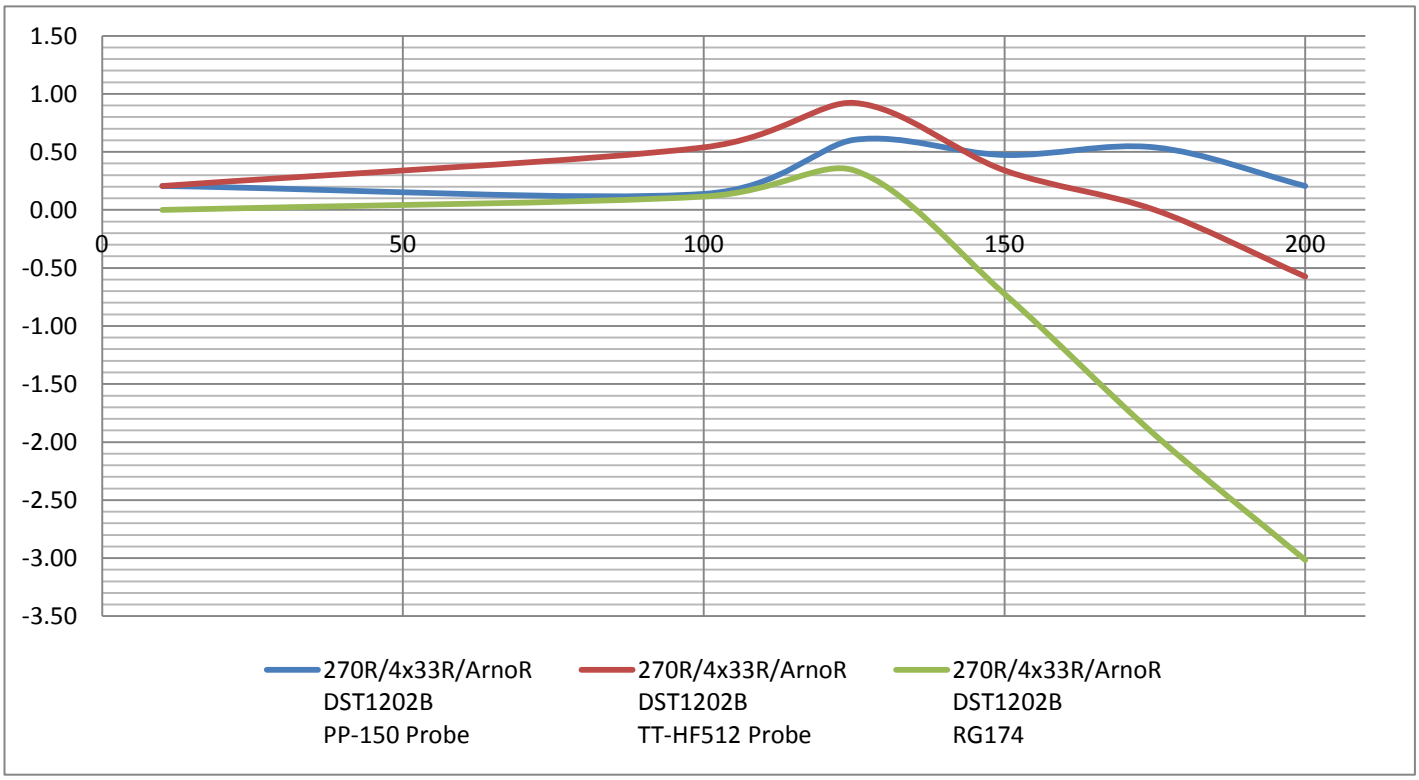

M
200ns
W
2.00ns
-1.350ns
Cursor
Type
Off
Time
Voltage
Track
Source
CH1
CH2 (off)
MATH (off)
RefA (off)
RefB (off)
Select cursor
S
276mV
1.350ns
E
2.11V
-300.0ps
dV
1.84V
dt
1.650ns
1/dt
606MHz
DC
460mV
CH1
1.19V
4.850kHz

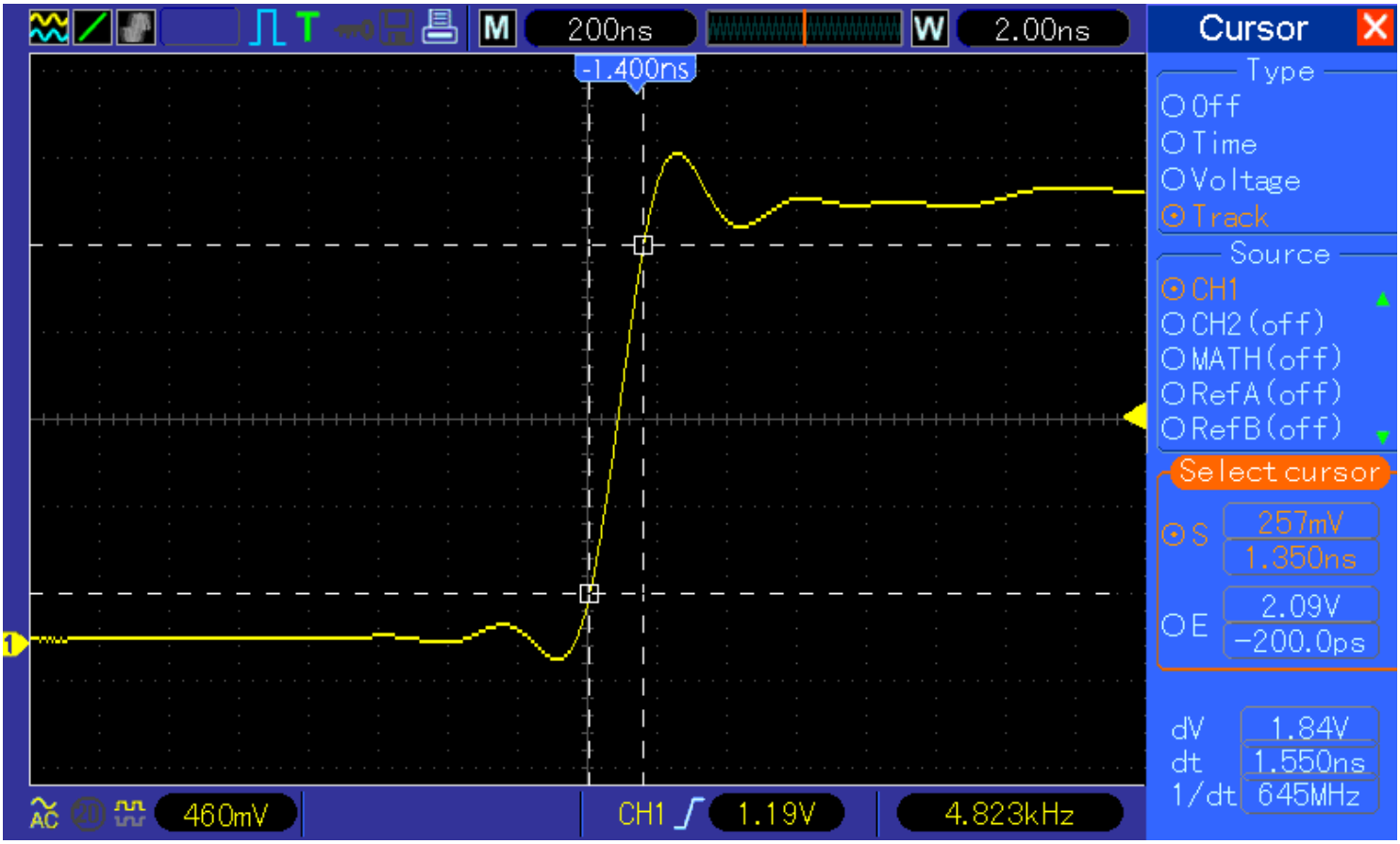

M
200ns
W
8.00ns
0.000s
Measure
Frequency
10.00MHz
Cyclic RMS
1.34V
Mean
20.0mV
Pk-Pk
2.92V
Minimum
-1.44V
Maximum
1.48V
+Pulse Width
50.00ns
Rise Time
2.800ns
Modify
AC
500mV
CH1
0.00V
10.0000MHz

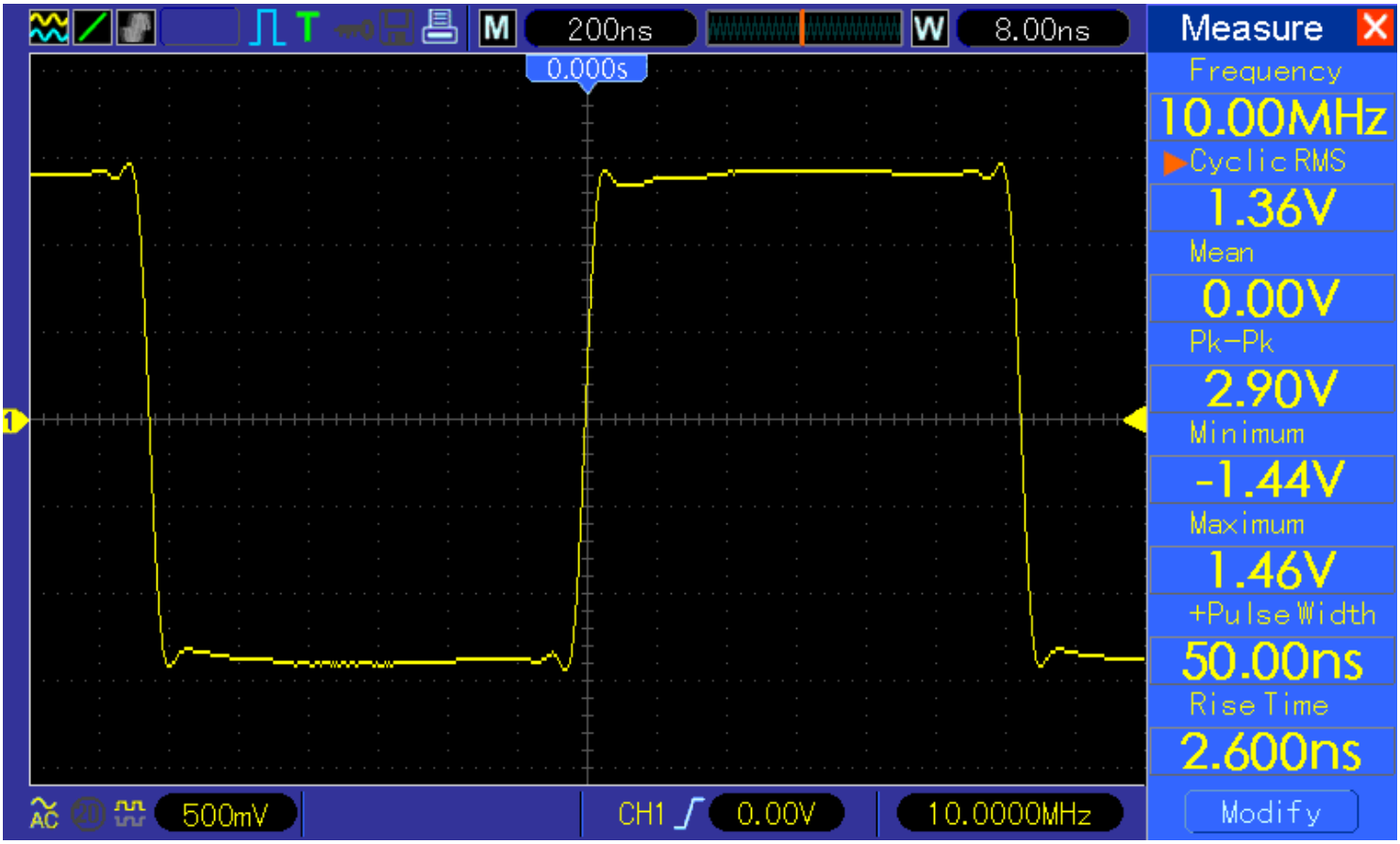
Modified hw1007 input stage (ArnoR tweak):

RX1=RX2=RX3=RX4= 270R
RA1=RA2= 4 x 33R array
R01/2_27 = 125R
R01/2_29 = 0R
R01/2_25 = 0R

MHz	mV	norm. mV	dBm	DSO type/setup
10	2.56	228.97	0.21	270R/4x33R/ArnoR DST1202B PP-150 Probe
100	2.54	227.18	0.14	
125	2.68	239.70	0.60	
150	2.64	236.12	0.47	
175	2.66	237.91	0.54	
200	2.56	228.97	0.21	
10	2.56	228.97	0.21	270R/4x33R/ArnoR DST1202B TT-HF512 Probe
100	2.66	237.91	0.54	
125	2.78	248.64	0.92	
150	2.6	232.54	0.34	
175	2.5	223.60	0.00	
200	2.34	209.29	-0.57	
10	3	223.60	0.00	270R/4x33R/ArnoR DST1202B RG174
100	3.04	226.58	0.12	
125	3.12	232.54	0.34	
150	2.76	205.71	-0.72	
175	2.4	178.88	-1.94	
200	2.12	158.01	-3.02	



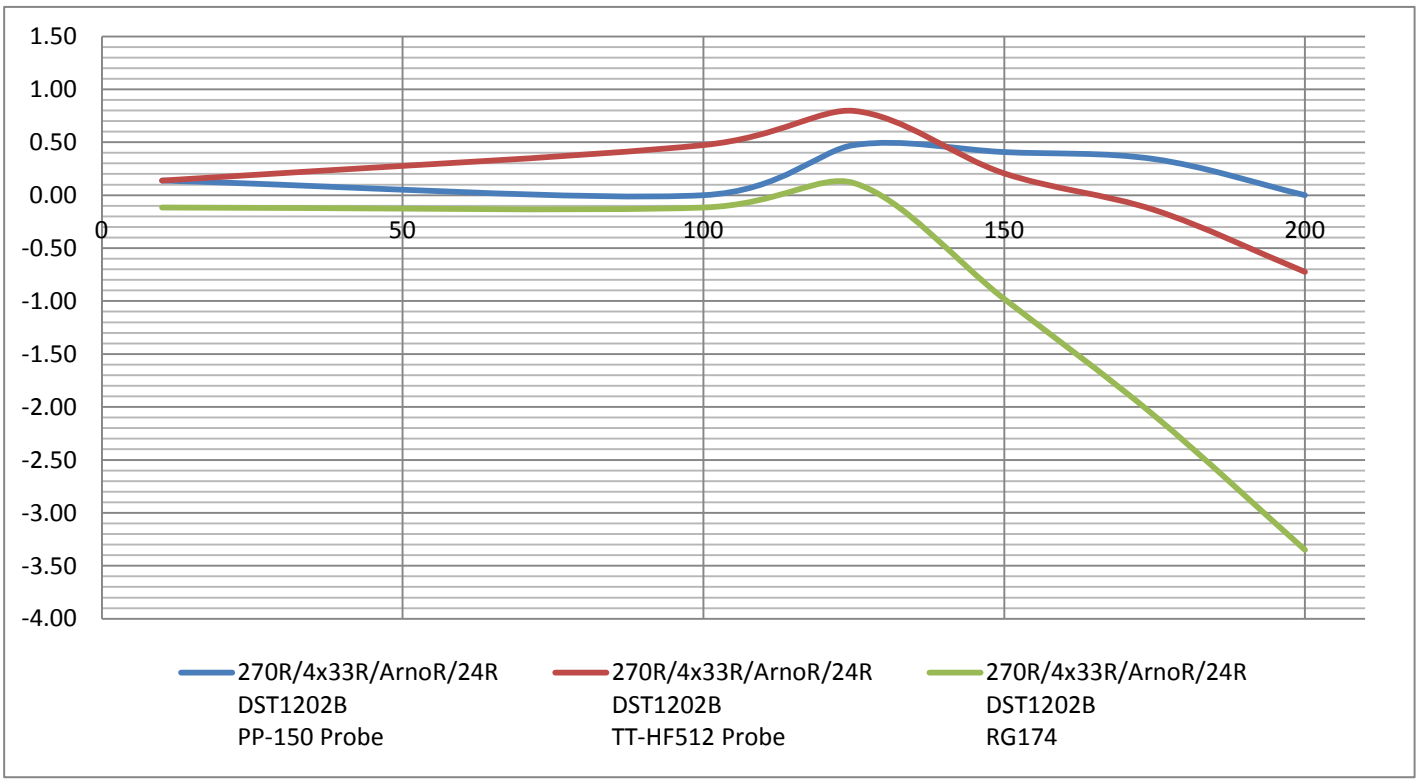

M
200ns
W
2.00ns
-1.400ns
Cursor
Type
Off
Time
Voltage
Track
Source
CH1
CH2 (off)
MATH (off)
RefA (off)
RefB (off)
Select cursor
S
257mV
1.350ns
E
2.09V
-200.0ps
dV
1.84V
dt
1.550ns
1/dt
645MHz
AC
460mV
CH1
1.19V
4.823kHz

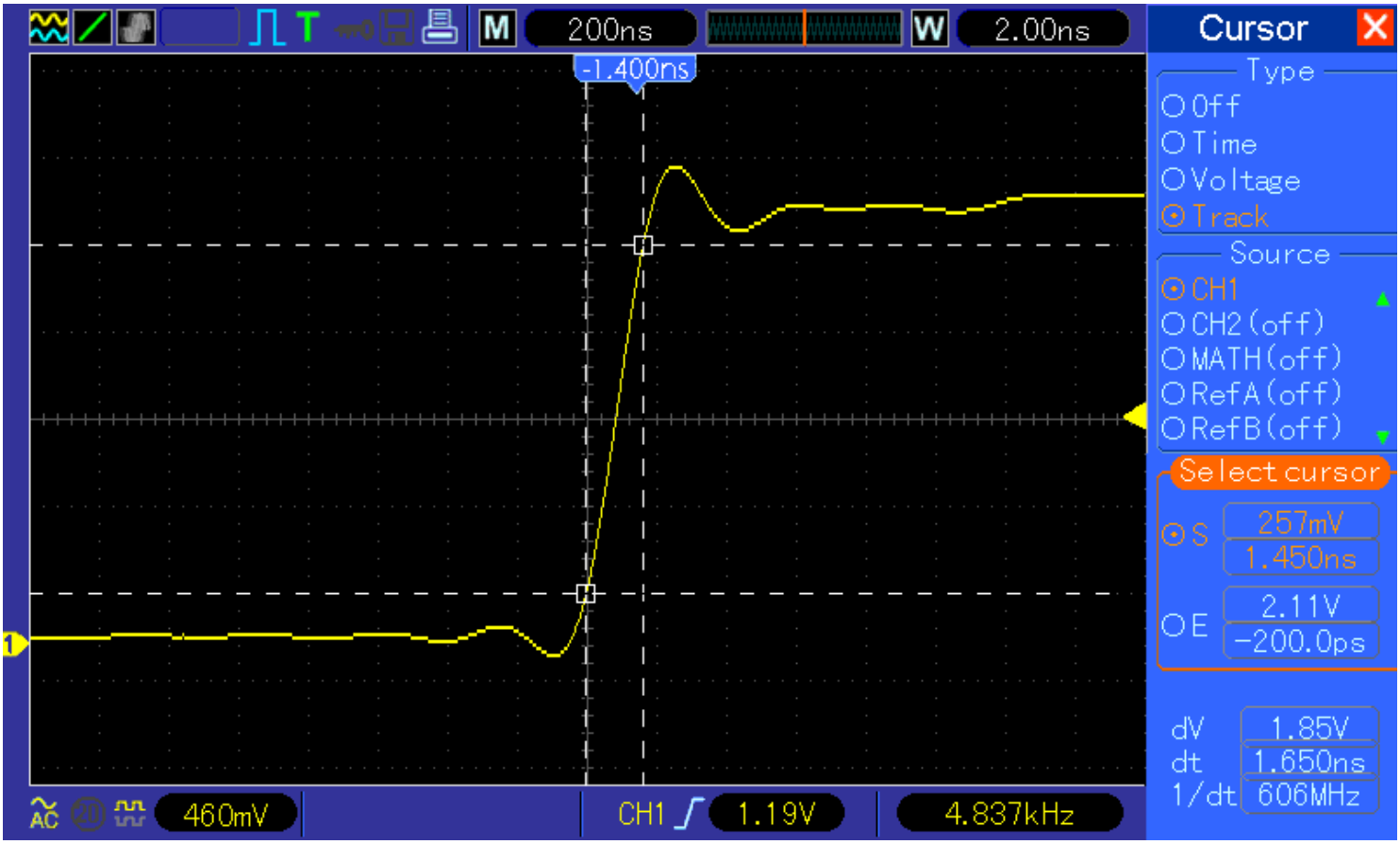

M
200ns
W
8.00ns
0.000s
Measure
Frequency
10.00MHz
Cyclic RMS
1.36V
Mean
0.00V
Pk-Pk
2.90V
Minimum
-1.44V
Maximum
1.46V
+Pulse Width
50.00ns
Rise Time
2.600ns
Modify
AC
500mV
CH1
0.00V
10.0000MHz

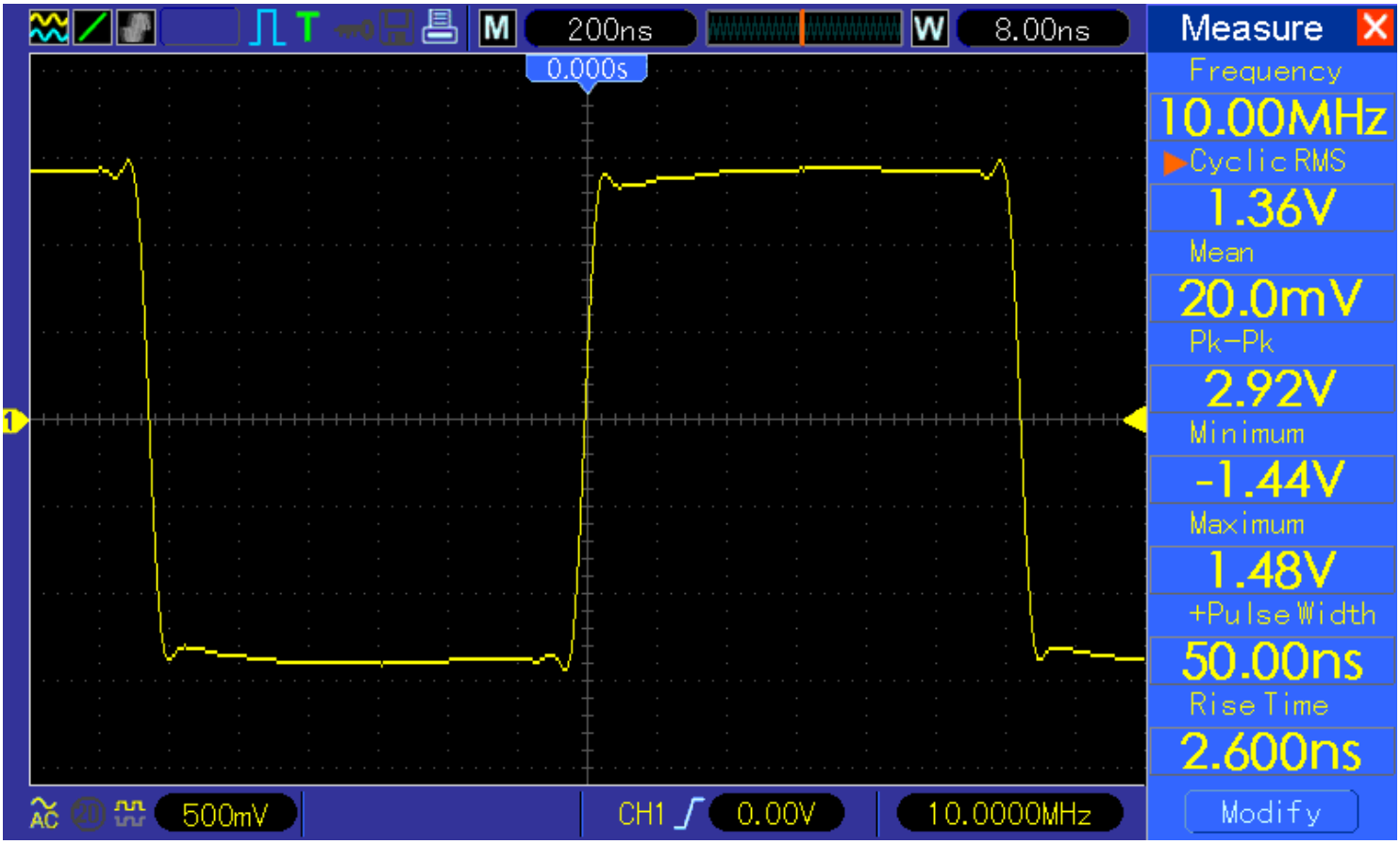
Modified hw1007 input stage (ArnoR tweak + 24R3 base resistor):

RX1=RX2=RX3=RX4= 270R
RA1=RA2= 4 x 33R array
R01/2_27 = 125R
R01/2_29 = 0R
R01/2_25 = 24R3

MHz	mV	norm. mV	dBm	DSO type/setup
10	2.54	227.18	0.14	270R/4x33R/ArnoR/24R DST1202B PP-150 Probe
100	2.5	223.60	0.00	
125	2.64	236.12	0.47	
150	2.62	234.33	0.41	
175	2.6	232.54	0.34	
200	2.5	223.60	0.00	
10	2.54	227.18	0.14	270R/4x33R/ArnoR/24R DST1202B TT-HF512 Probe
100	2.64	236.12	0.47	
125	2.74	245.07	0.80	
150	2.56	228.97	0.21	
175	2.46	220.02	-0.14	
200	2.3	205.71	-0.72	
10	2.96	220.62	-0.12	270R/4x33R/ArnoR/24R DST1202B RG174
100	2.96	220.62	-0.12	
125	3.04	226.58	0.12	
150	2.68	199.75	-0.98	
175	2.36	175.90	-2.08	
200	2.04	152.05	-3.35	




M
200ns
W
2.00ns
-1.400ns
Cursor
Type
Off
Time
Voltage
Track
Source
CH1
CH2 (off)
MATH (off)
RefA (off)
RefB (off)
Select cursor
S
257mV
1.450ns
E
2.11V
-200.0ps
dV
1.85V
dt
1.650ns
1/dt
606MHz
AC
460mV
CH1
1.19V
4.837kHz

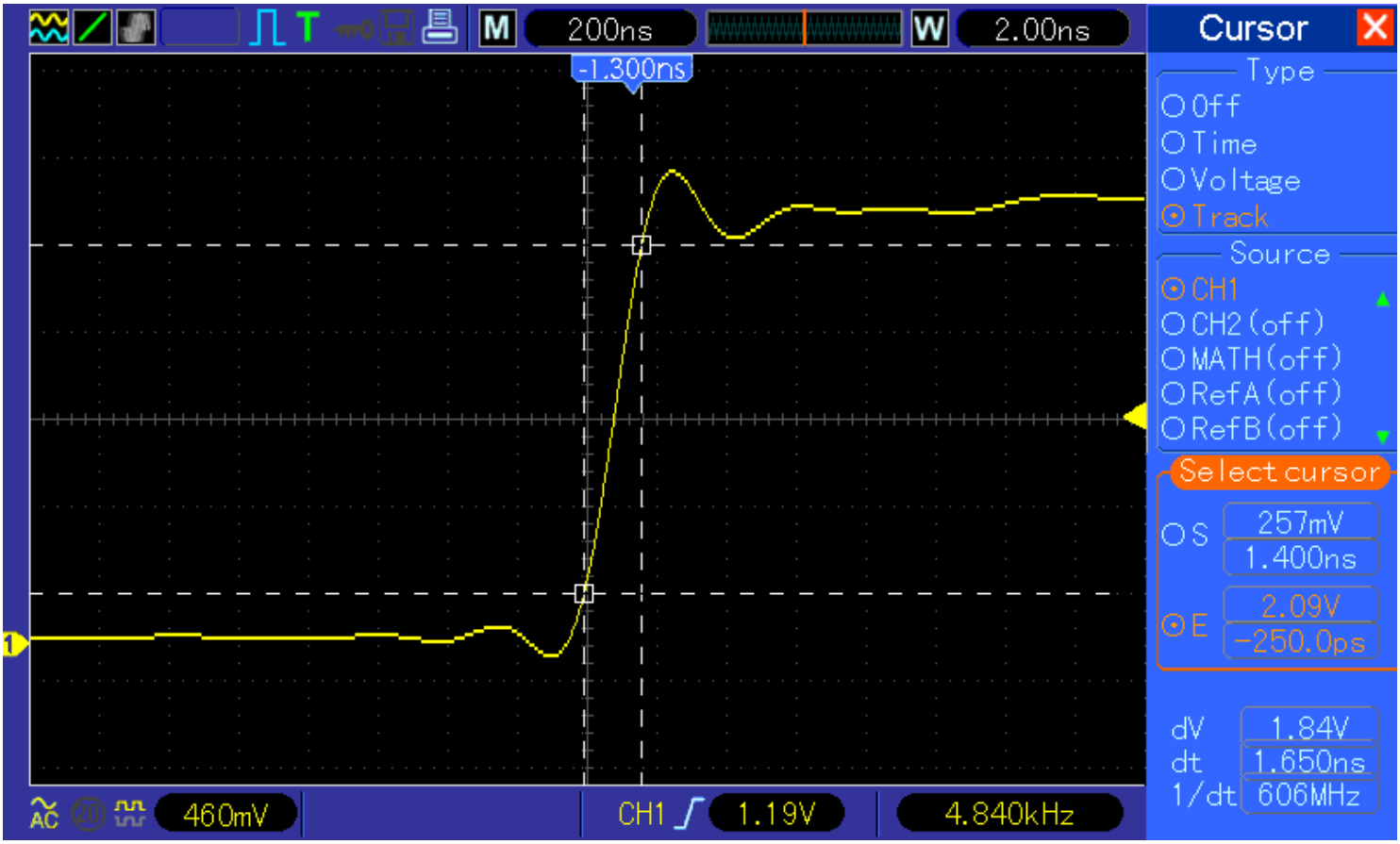

M
200ns
W
8.00ns
0.000s
Measure
Frequency
10.00MHz
Cyclic RMS
1.36V
Mean
20.0mV
Pk-Pk
2.92V
Minimum
-1.44V
Maximum
1.48V
+Pulse Width
50.00ns
Rise Time
2.600ns
Modify
AC
500mV
CH1
0.00V
10.0000MHz

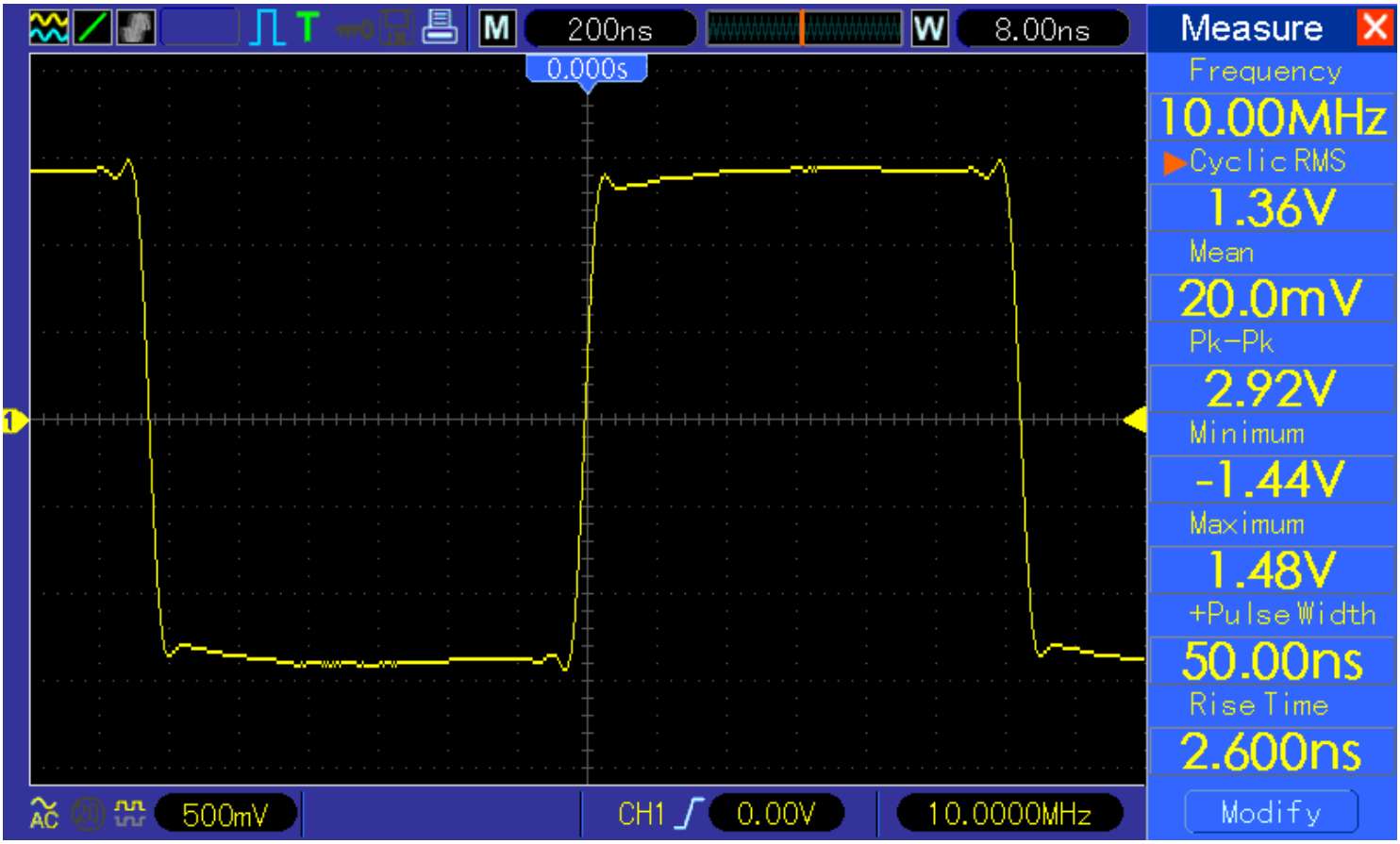
Modified hw1007 input stage (ArnoR tweak + 50R base resistor):

RX1=RX2=RX3=RX4= 270R
RA1=RA2= 4 x 33R array
R01/2_27 = 125R
R01/2_29 = 0R
R01/2_25 = 50R

This is “probably” what I will use in the future; need to double check the 50R response (with the DIY active probes) before I decide. The response of org. passive probes looks not bad, the “hard to compensate” HF512 is not really what I would expect from 100EUR probe, but yeah, I’m not using it anyway for HF anymore (active probes are better).

MHz	mV	norm. mV	dBm	DSO type/setup
10	2.52	225.39	0.07	270R/4x33R/ArnoR/50R DST1202B PP-150 Probe
100	2.48	221.81	-0.07	
125	2.6	232.54	0.34	
150	2.58	230.76	0.27	
175	2.58	230.76	0.27	
200	2.48	221.81	-0.07	
10	2.52	225.39	0.07	270R/4x33R/ArnoR/50R DST1202B TT-HF512 Probe
100	2.6	232.54	0.34	
125	2.7	241.49	0.67	
150	2.52	225.39	0.07	
175	2.42	216.44	-0.28	
200	2.28	203.92	-0.80	
10	2.96	220.62	-0.12	270R/4x33R/ArnoR/50R DST1202B RG174
100	2.96	220.62	-0.12	
125	2.96	220.62	-0.12	
150	2.68	199.75	-0.98	
175	2.32	172.92	-2.23	
200	2.02	150.56	-3.44	


M
200ns
W
2.00ns
-1.300ns
Cursor
Type
Off
Time
Voltage
Track
Source
CH1
CH2 (off)
MATH (off)
RefA (off)
RefB (off)
Select cursor
S
257mV
1.400ns
E
2.09V
-250.0ps
dV
1.84V
dt
1.650ns
1/dt
606MHz
AC
460mV
CH1
1.19V
4.840kHz


M
200ns
W
8.00ns
0.000s
Measure
Frequency
10.00MHz
Cyclic RMS
1.36V
Mean
20.0mV
Pk-Pk
2.92V
Minimum
-1.44V
Maximum
1.48V
+Pulse Width
50.00ns
Rise Time
2.600ns
Modify
AC
500mV
CH1
0.00V
10.0000MHz