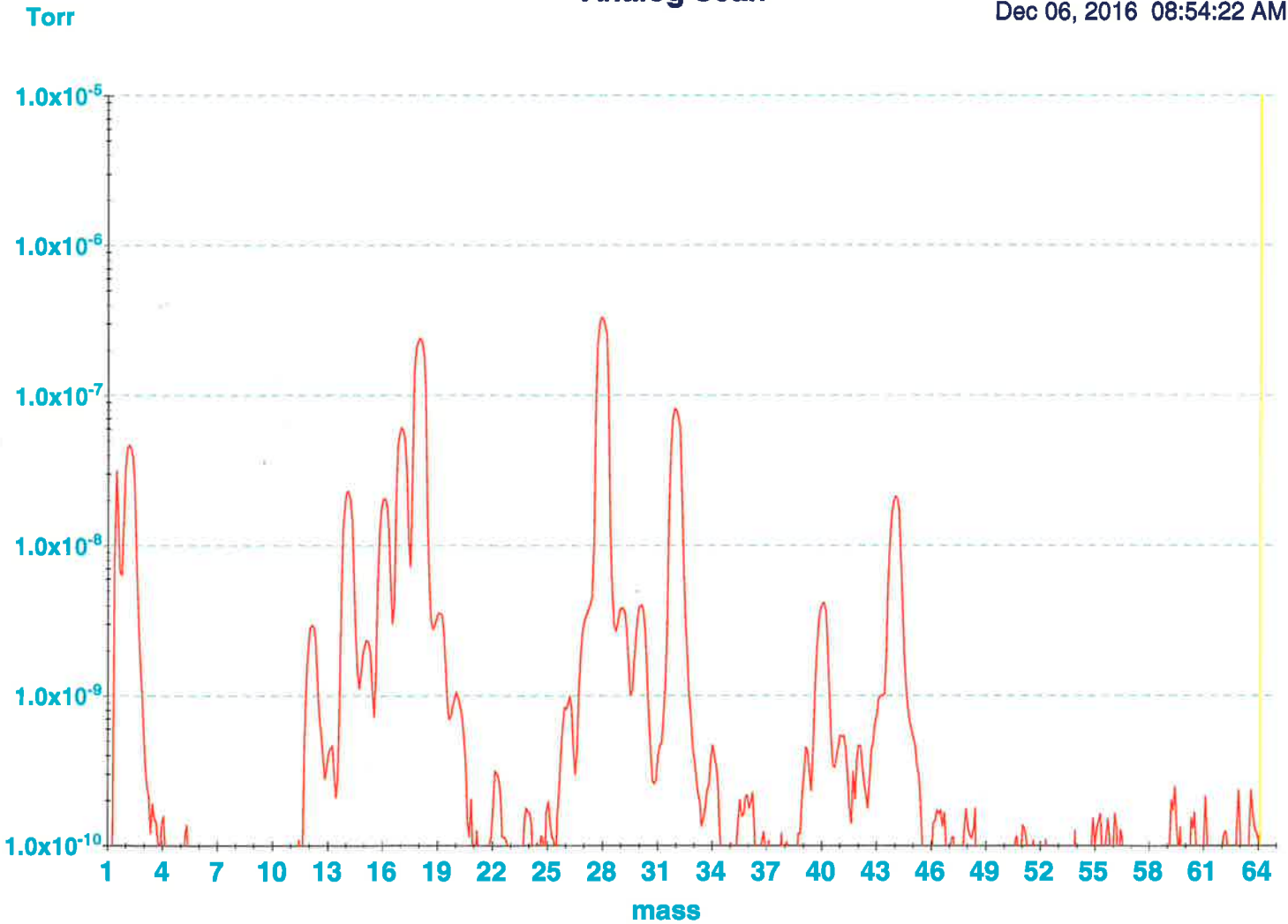


Analog Scan

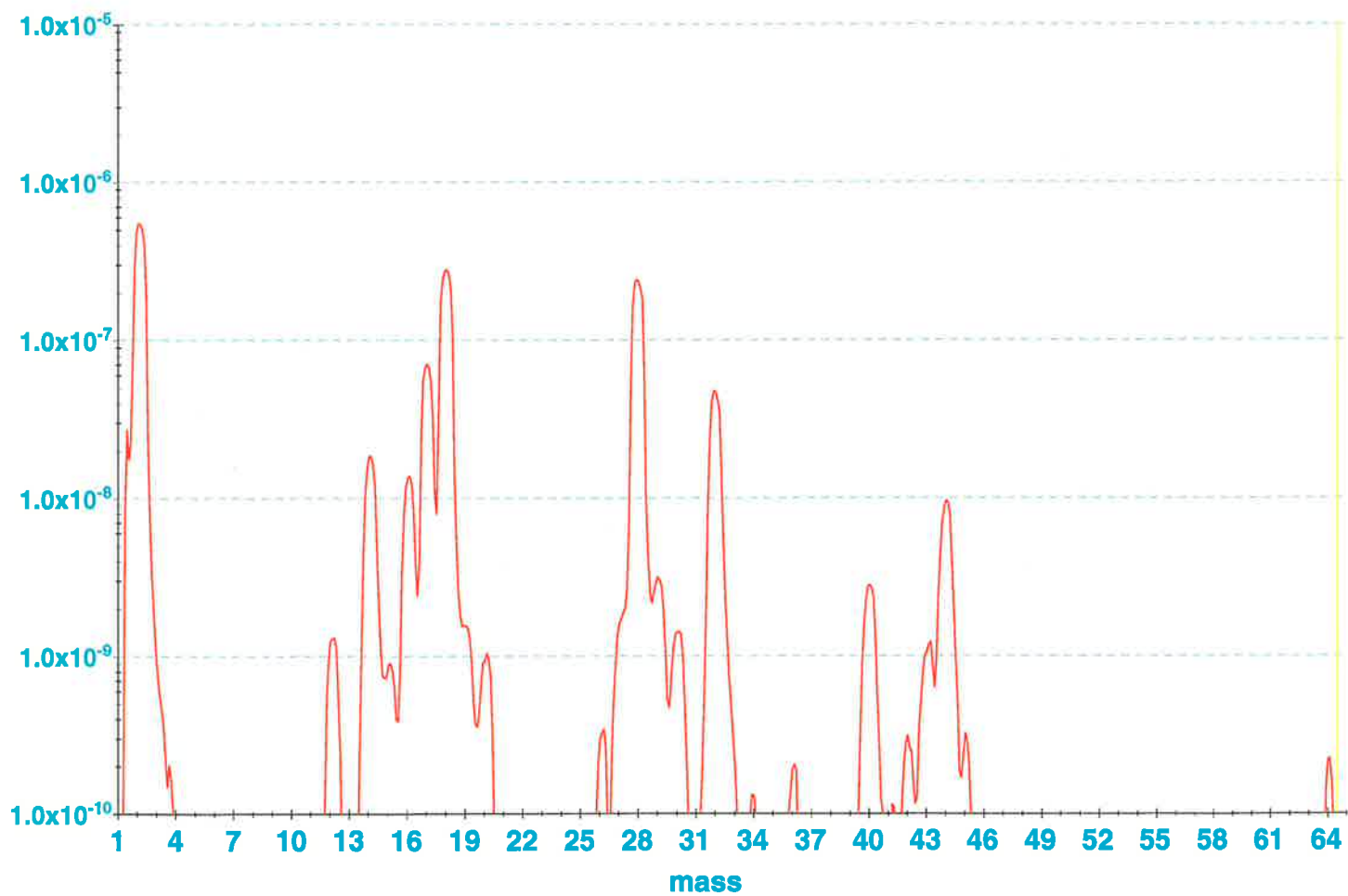
Dec 06, 2016 08:54:22 AM



Analog Scan

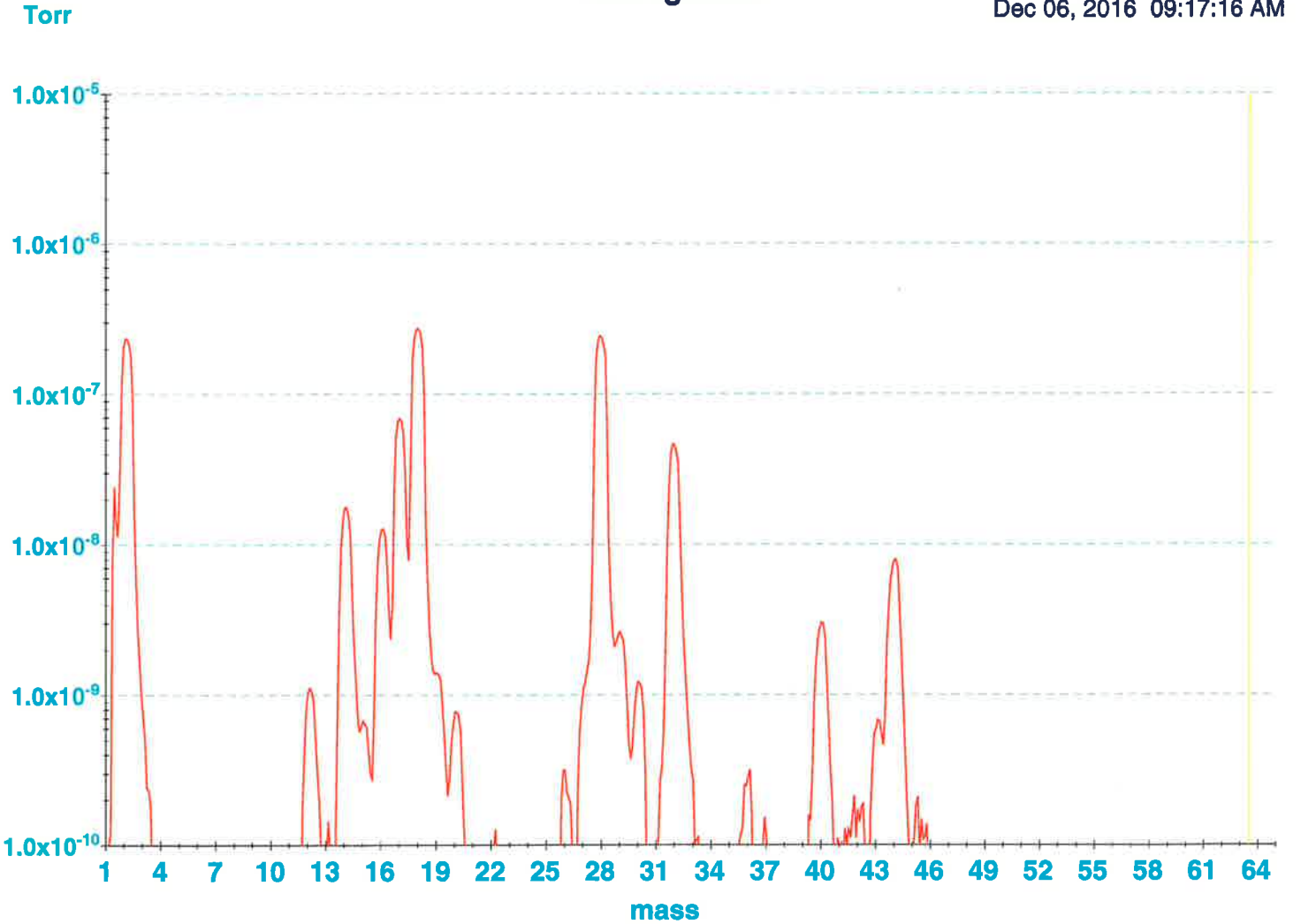
Dec 06, 2016 09:09:09 AM

Torr



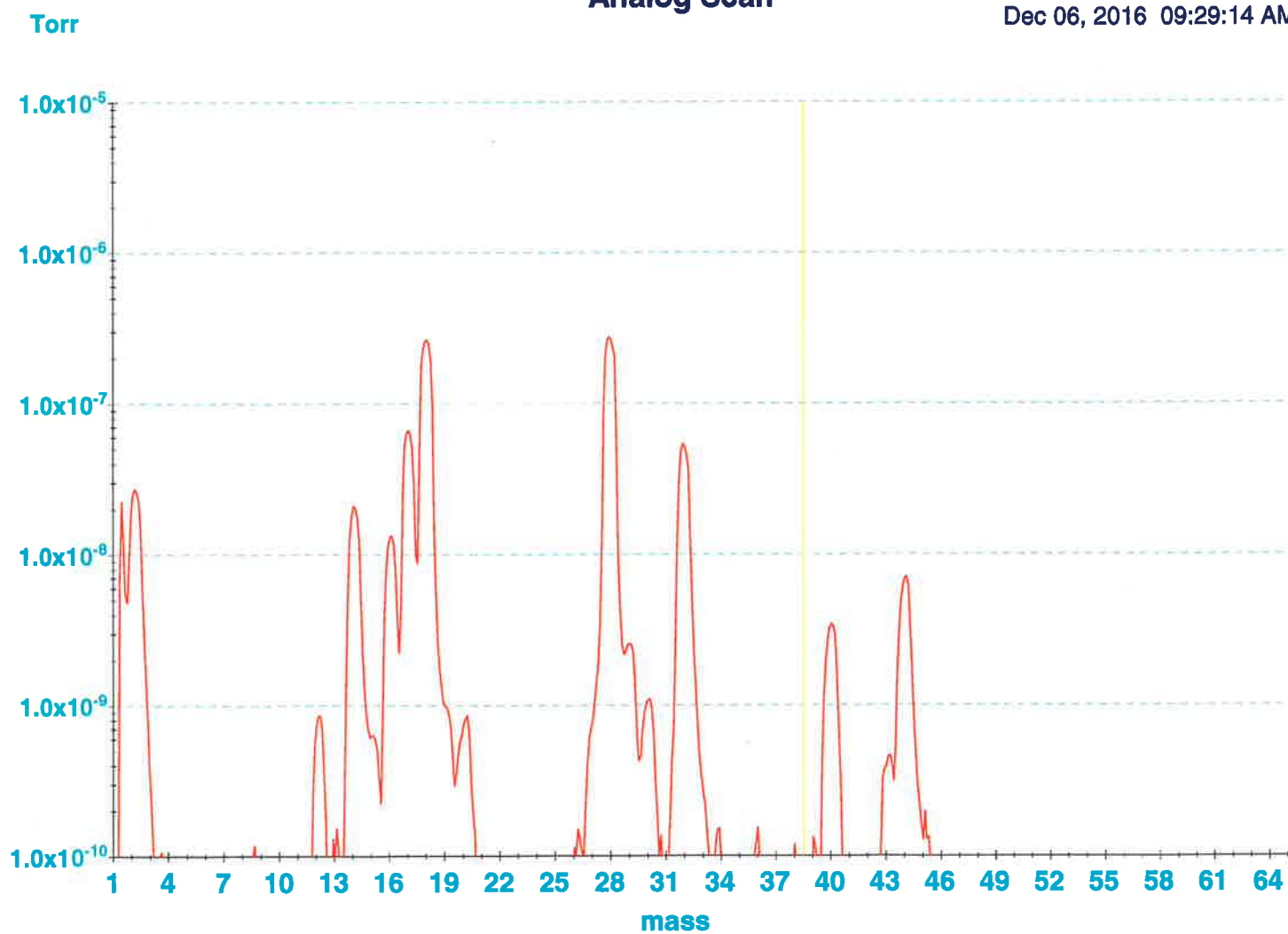
Analog Scan

Dec 06, 2016 09:17:16 AM



Analog Scan

Dec 06, 2016 09:29:14 AM

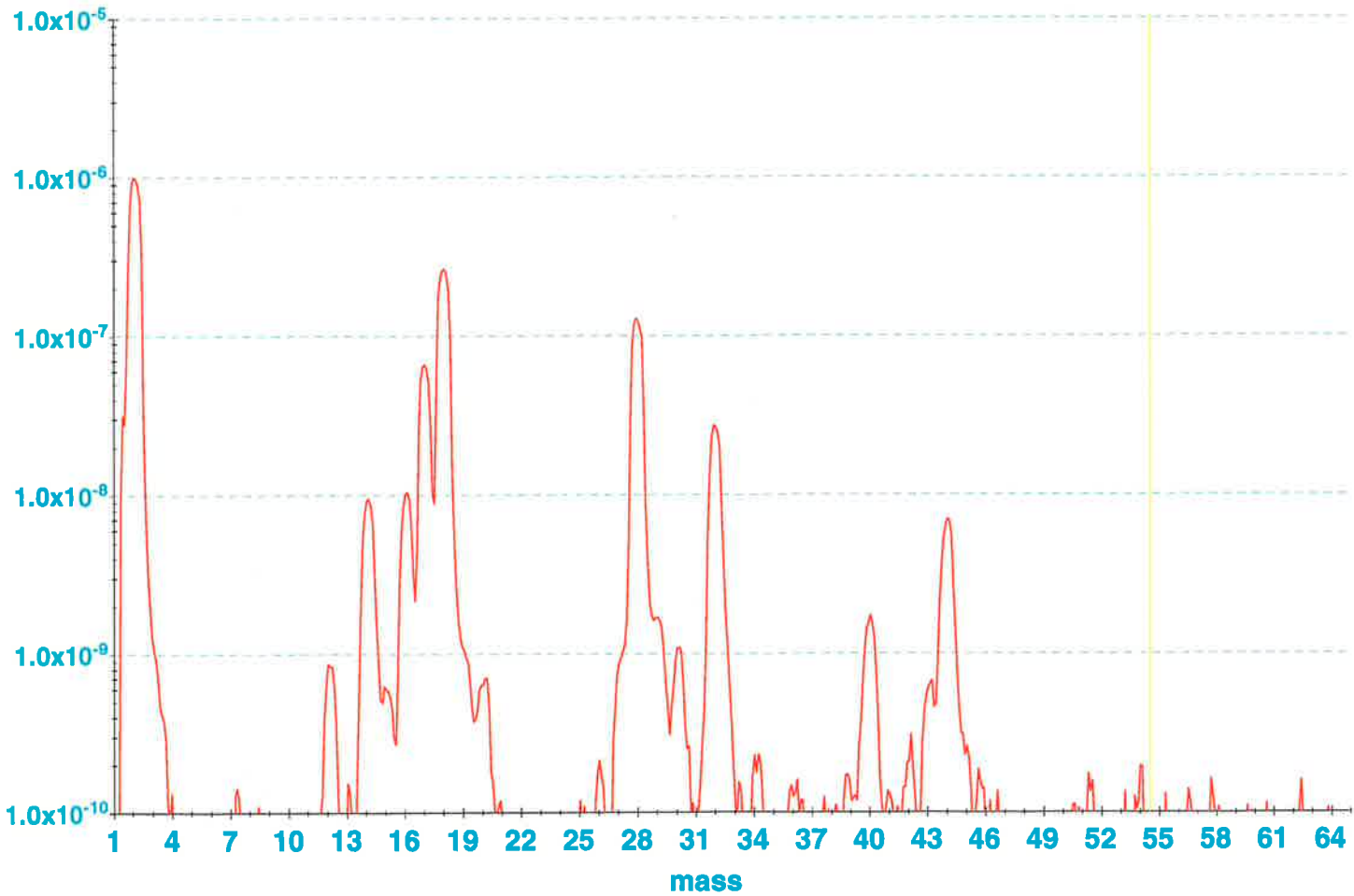


Lost H_2 flow
9:30 turn
 H_2 flow
on again

Analog Scan

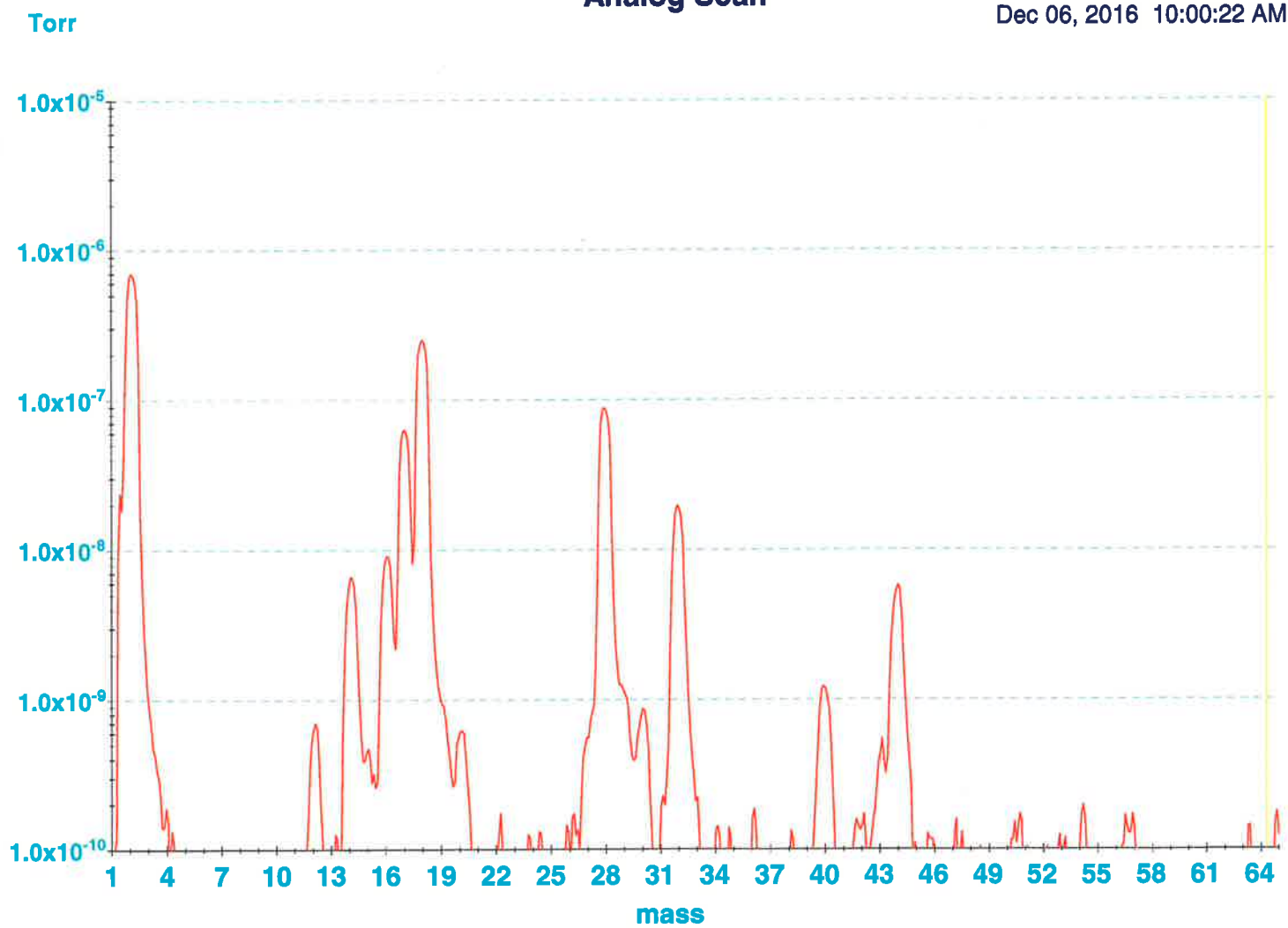
Dec 06, 2016 09:32:52 AM

Torr



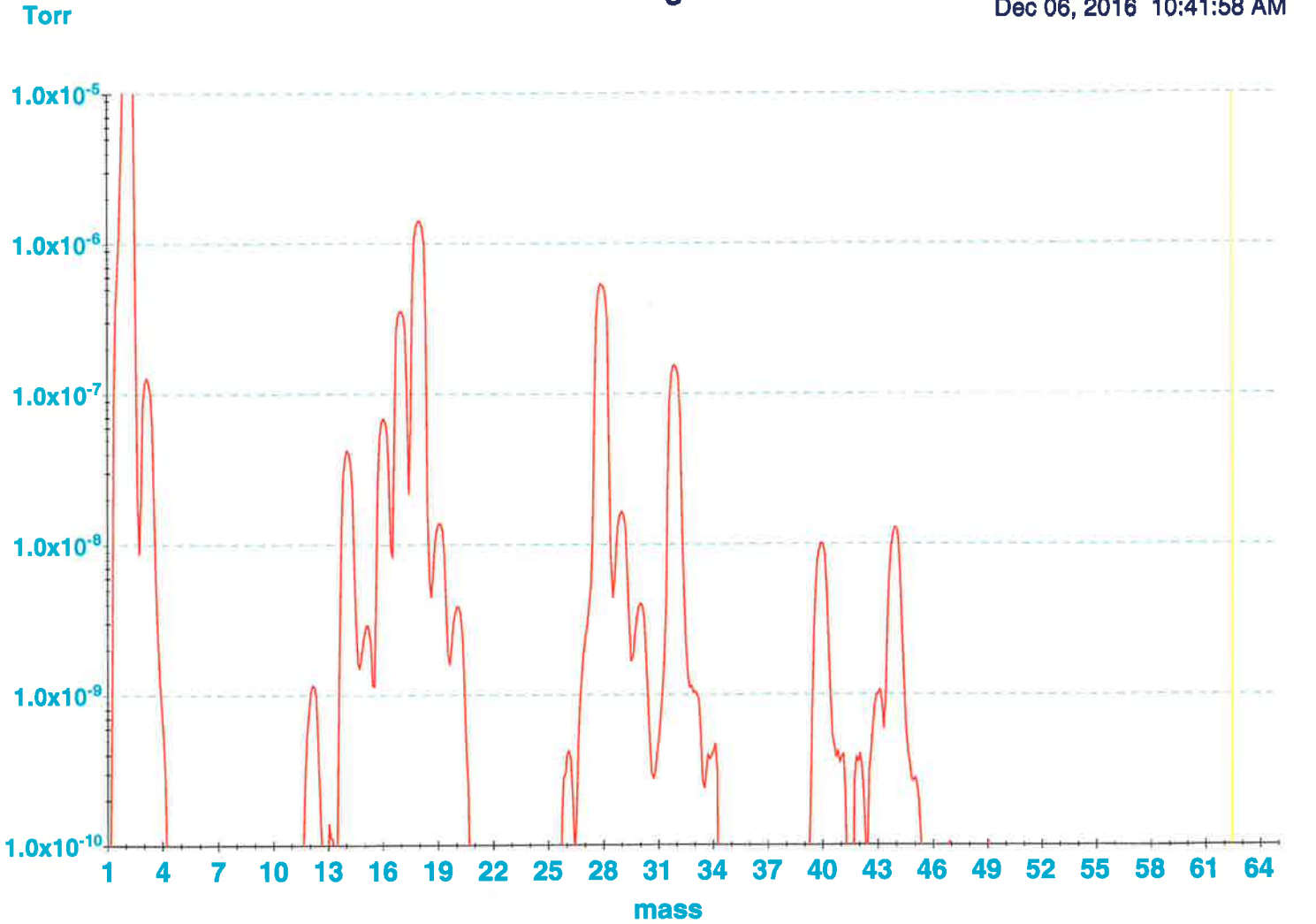
Analog Scan

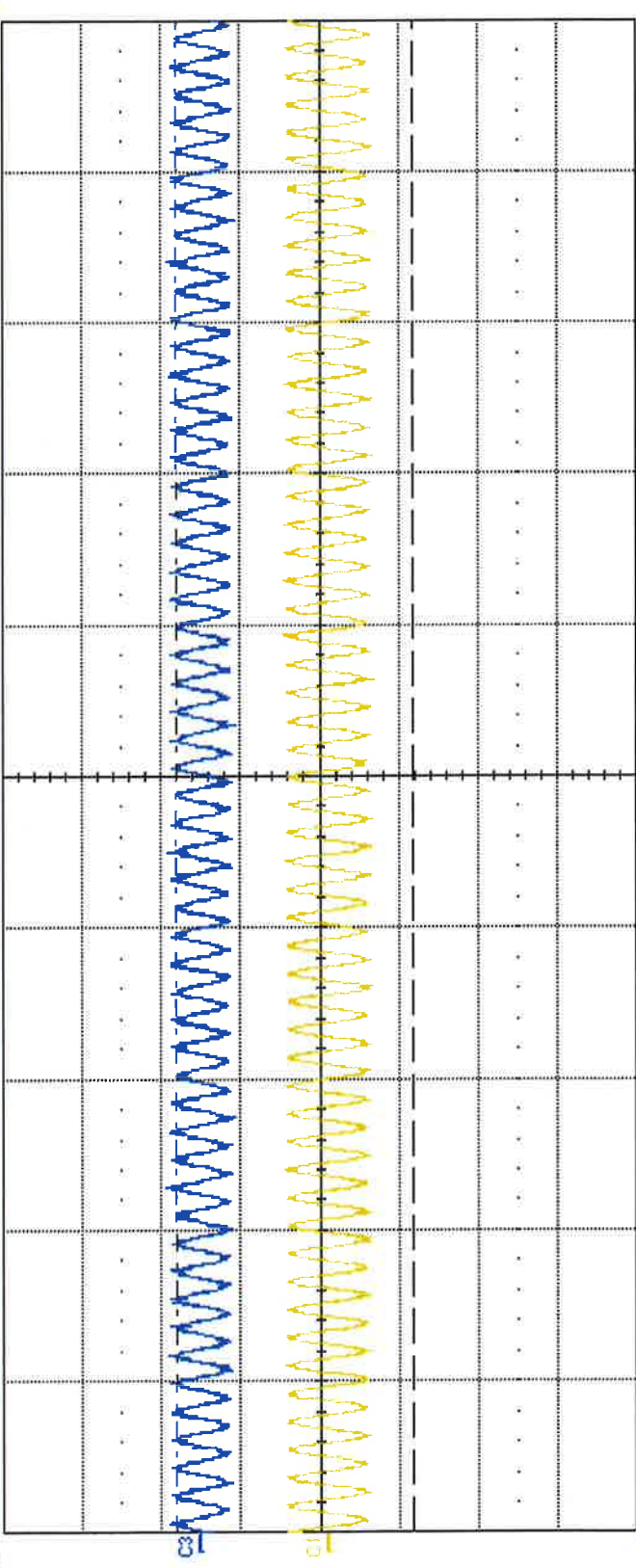
Dec 06, 2016 10:00:22 AM



Analog Scan

Dec 06, 2016 10:41:58 AM





Measure	P1:pkpk(C1)	P2:ampl(C1)	P3:ampl(C3)	P4:pkpk(C3)	P5:mean(C3)	P6:---
value	1.09 V	860 mV	78.8 V	175 V	-3.7 V	
mean	1.0921 V	845.28 mV	109.231 V	167.23 V	-23 mV	
min	1.03 V	777 mV	72.5 V	150 V	-5.0 V	
max	1.19 V	1.063 V	181.3 V	188 V	5.8 V	
sdev	28.3 mV	29.57 mV	28.476 V	6.51 V	2.144 V	
num	280	280	280	280	280	
status	✓	✓	✓	✓	✓	

C1

DCIM

1.00 V/div

-110 mV offset

1.92 V

-1.06 V

-2.98 V

ΔV

C3

DCIM

200 V/div

300.0 V offset

62 V

-534 V

-596 V

ΔV

Tbase

-1.540000 ms

4.00 kS

200 ns/div

2.0 GS/s

Trigger

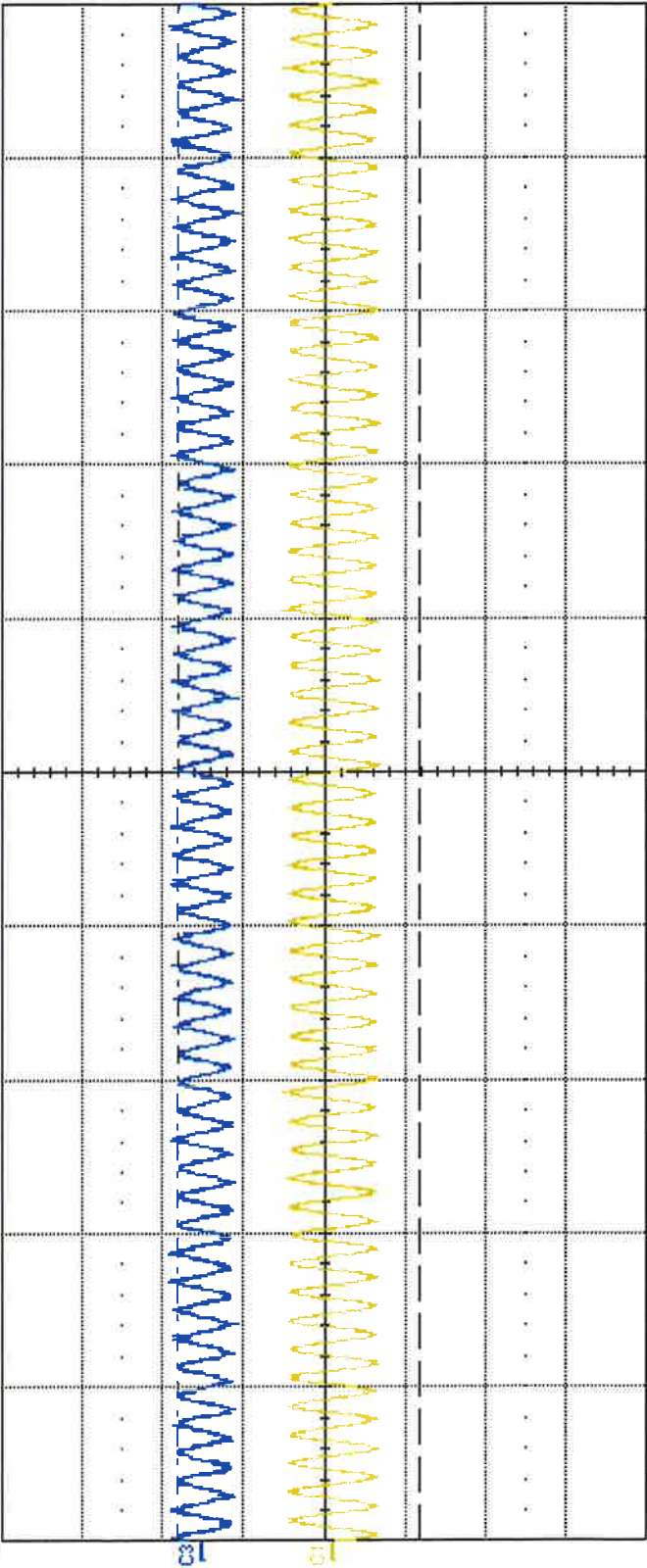
Auto

Edge

1.400 V

Positive

C3:DC



Measure		P1:pkpk(C1)	P2:ampl(C1)	P3:ampl(C3)	P4:pkpk(C3)	P5:mean(C3)	P6:---
value		1.19 V	900 mV	156 V	156 V	-2.7 V	
mean		1.0977 V	849.64 mV	108.455 V	167.30 V	-18 mV	
min		1.03 V	744 mV	71.6 V	150 V	-6.6 V	
max		1.22 V	1.125 V	187.5 V	200 V	7.1 V	
sdev		27.9 mV	27.08 mV	27.652 V	6.36 V	2.298 V	
num		8.836e+3	8.836e+3	8.836e+3	8.836e+3	8.836e+3	
status		✓	✓	✗	✓	✓	

C1

DCIM

1.00 V/div

-110 mV ofst

1.92 V

-1.06 V

-2.98 V

ΔV

C3

DCIM

200 V/div

300.0 V offset

62 V

-534 V

-595 V

ΔV

Tbase

-1.540000 ms

4.00 kS

200 ns/div

2.0 GS/s

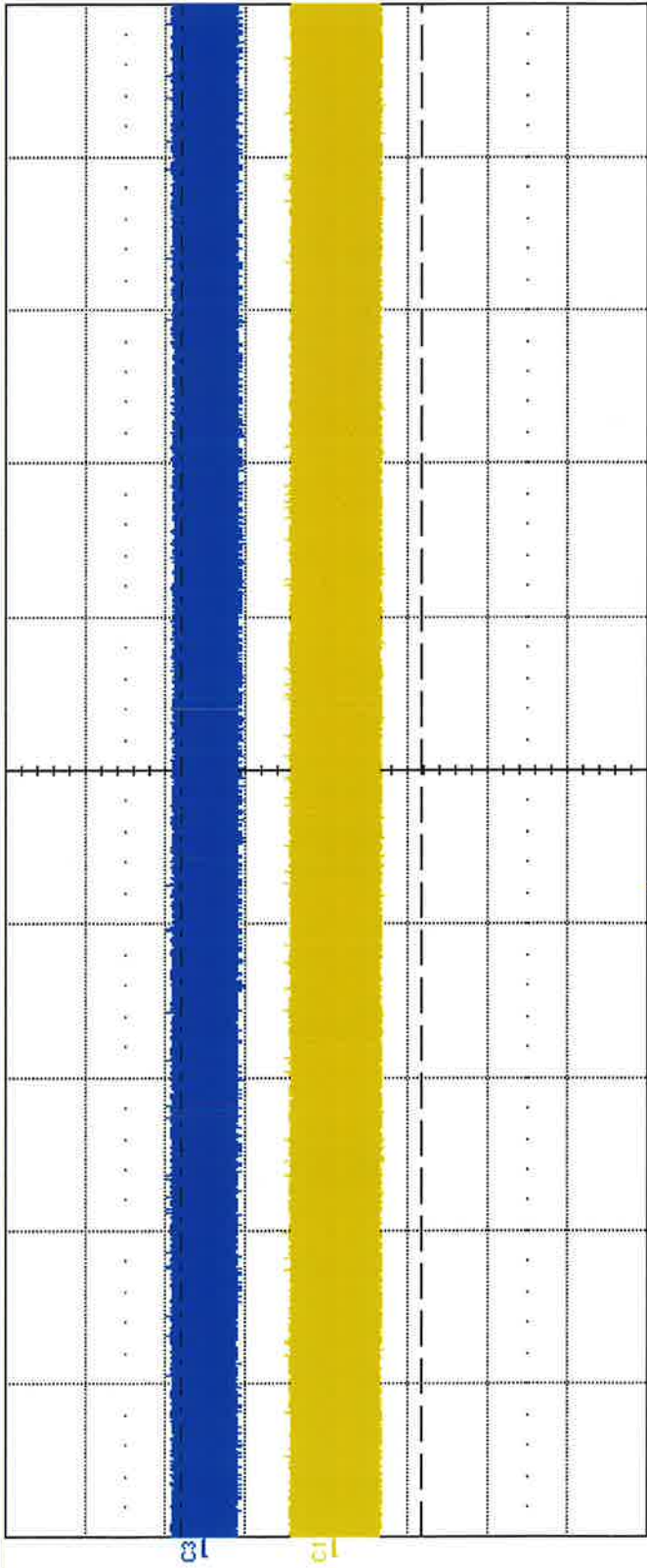
Trigger

Auto

Edge

1.400 V

Positive



Measure		P1:pkpk(C1)	P2:ampl(C1)	P3:ampl(C3)	P4:pkpk(C3)	P5:mean(C3)	P6:---
value		1.22 V	895 mV	194 V	194 V	-631 mV	
mean		1.2188 V	873.15 mV	195.39 V	195.39 V	950 mV	
min		1.19 V	848 mV	194 V	194 V	-1.9 V	
max		1.25 V	895 mV	200 V	200 V	2.8 V	
sdev		24.8 mV	16.40 mV	2.75 V	2.75 V	1.399 V	
num		19	19	19	19	19	
status		✓	✓	✓	✓	✓	

C1

DCIM

1.00 V/div

-110 mV of st

1.92 V

-1.06 V

-2.98 V

Δy

C3

DCIM

200 V/div

380.0 V offset

62 V

-534 V

-596 V

Δy

Timebase

-1.52 ms

2.00 ms/div

2.00 MS

100 MS/s

Trigger

C4:DC

Auto

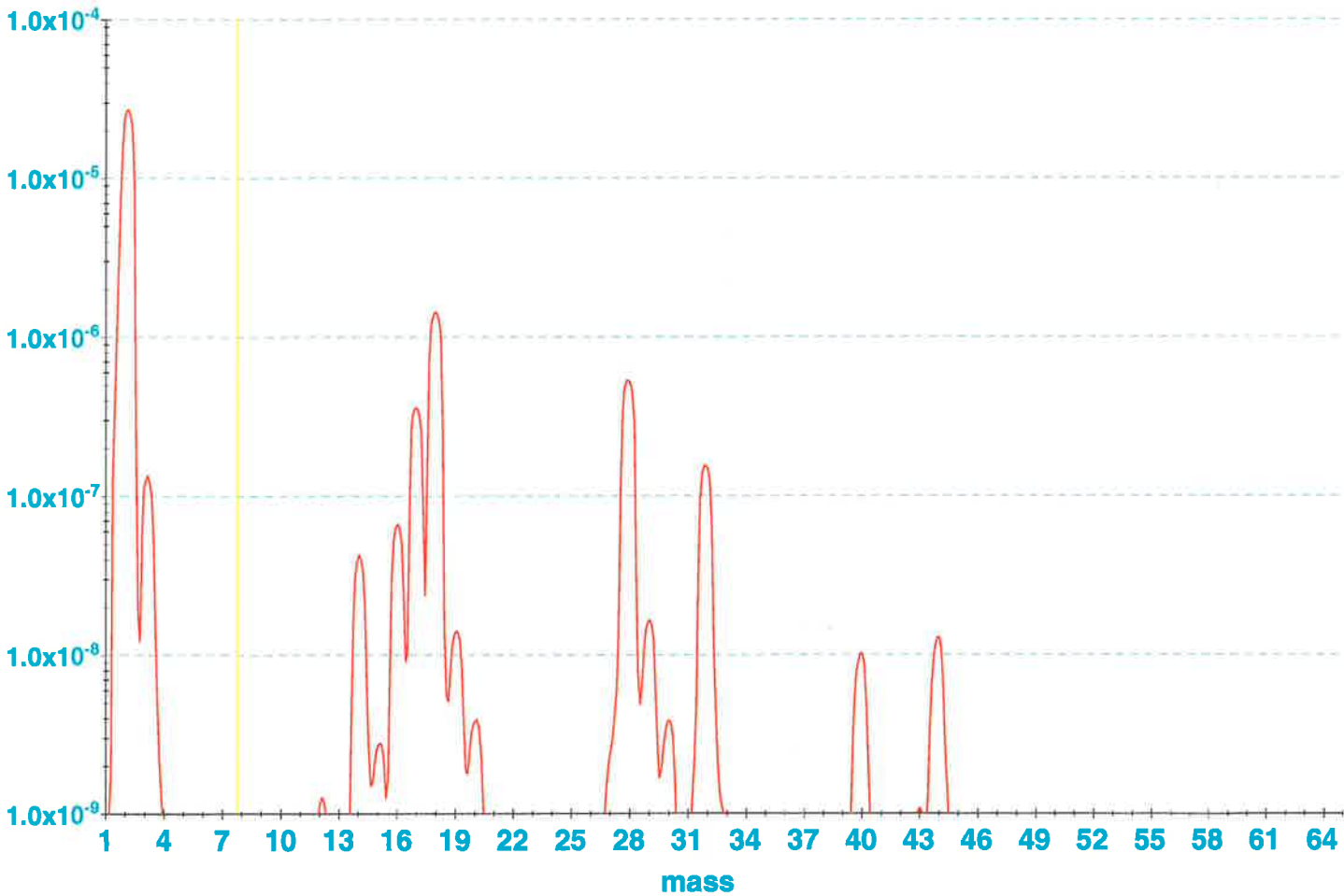
Edge

Positive

Analog Scan

Dec 06, 2016 10:44:41 AM

Torr



6-Dec-16
10:53:00

1
1 ms
1.00 V

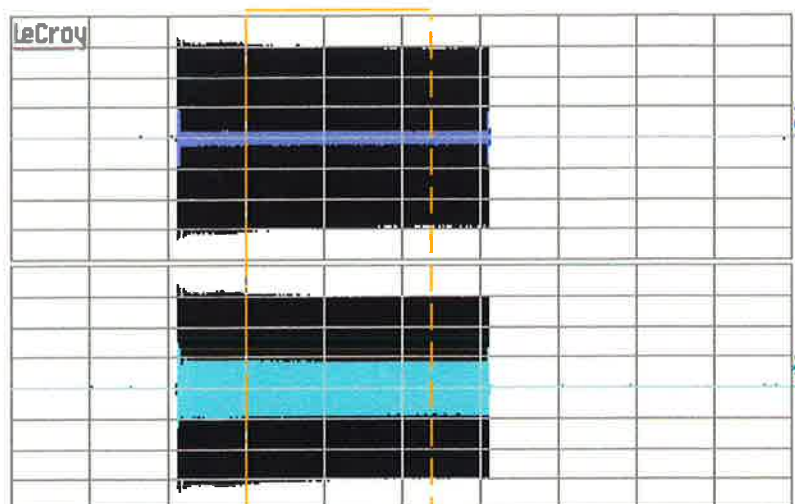
2
1 ms
1.00 V

3
1 ms
1.00 V

4
1 ms
1.00 V

1 ms

1 1 V AC
2 1 V AC
3 1 V AC
4 1 V AC



380 sweeps:

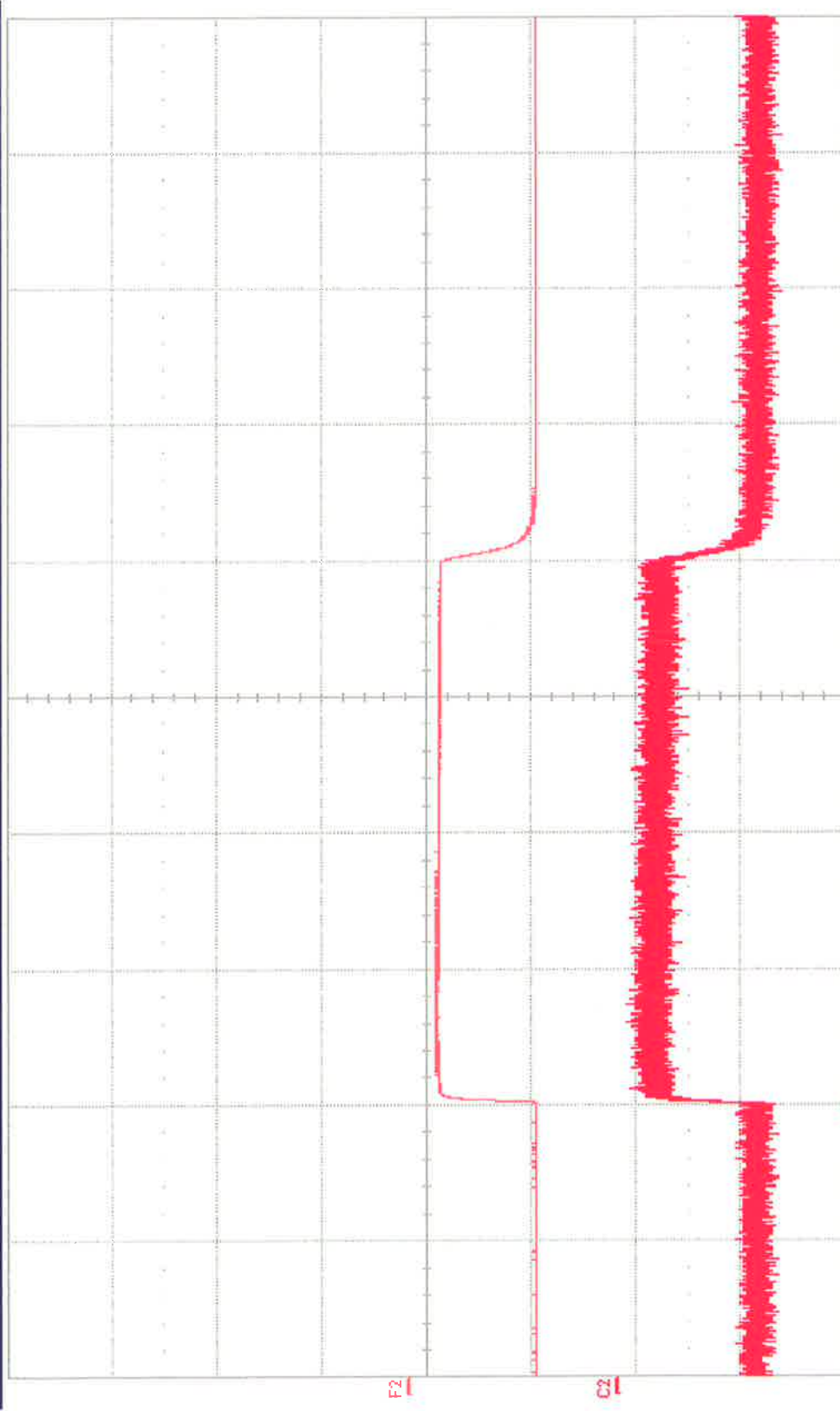
	average	low	high	sigma
rms(1)	2.112 V	1.755	2.342	0.135
rms(2)	137mV	100	174	17
rms(3)	2.139 V	1.799	2.354	0.127
rms(4)	616mV	498	688	43
phase(1,3)	-89 °	-94	-86	2



Ext10 DC 0.05 V 1MΩ

10 MS/s

☐ NORMAL



C2 **DCIM** 50.0 mV/div -91.5 mV
F2 **<C2>** 50.0 mV/div 1.00 ms/div 642 #

Tbase -3.04 ms
1.00 kS 10 MS/s
Trigger Normal Edge Negative
C4 DC 2.42 V

6-Dec-16
10:58:37

1
1 ms
1.00 V

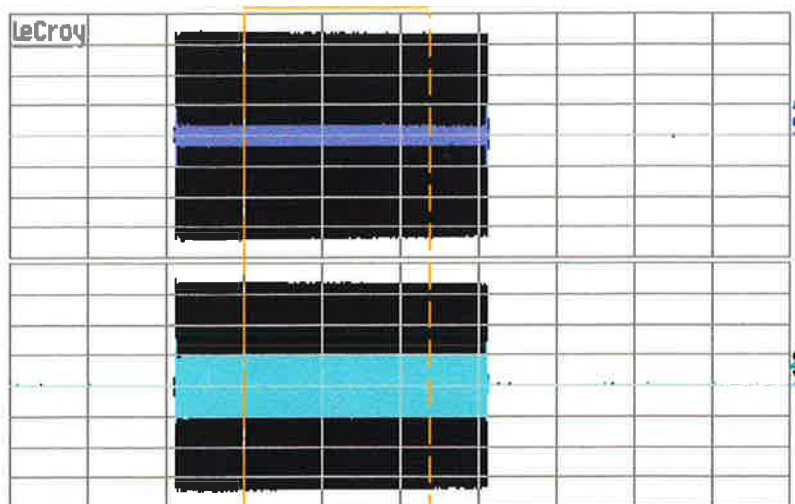
2
1 ms
1.00 V

3
1 ms
1.00 V

4
1 ms
1.00 V

1 ms

1 1 V AC
2 1 V AC
3 1 V AC
4 1 V AC



333 sweeps:

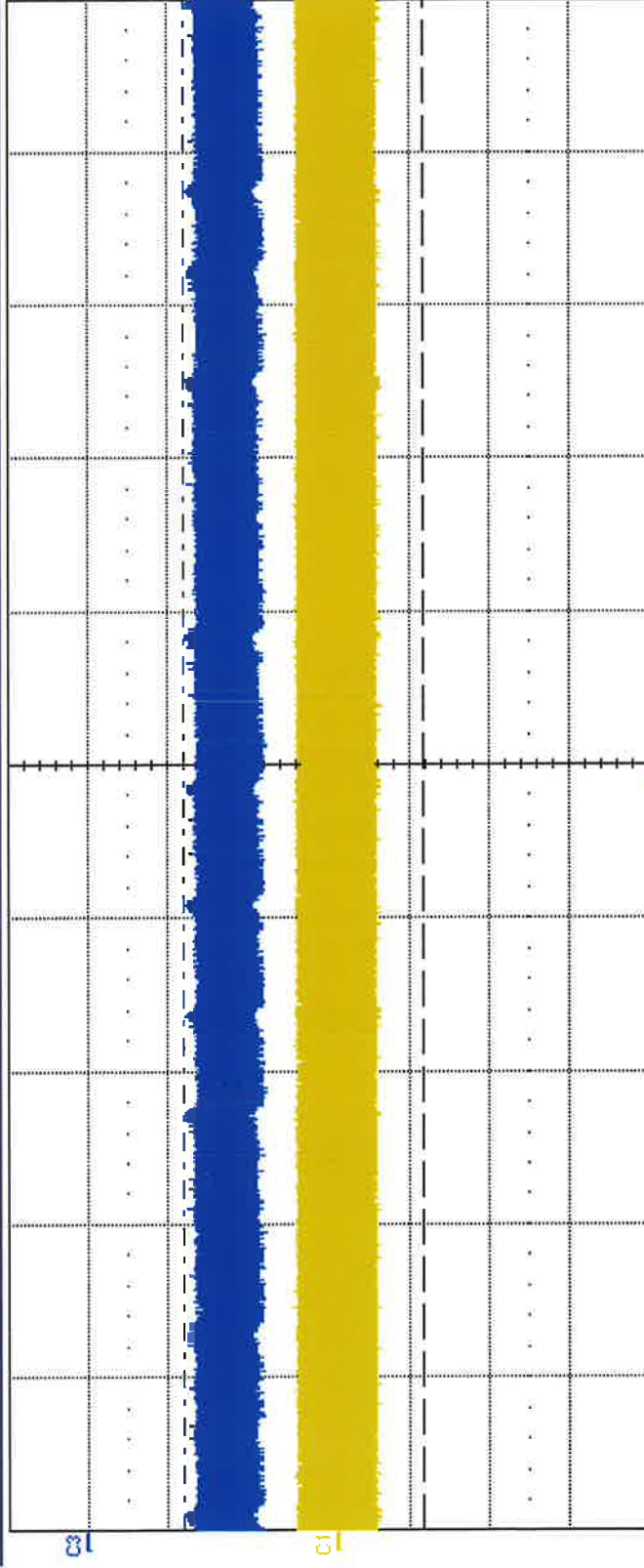
	average	low	high	sigma
rms(1)	2.298 V	2.084	2.366	0.079
rms(2)	178mV	144	200	15
rms(3)	2.309 V	2.109	2.373	0.074
rms(4)	674mV	605	699	26
phase(1,3)	-89 °	-94	-86	2



Ext10 DC 0.05 V 1MΩ

10 MS/s

☐ NORMAL



Measure	P1:pkpk(C1)	P2:ampl(C1)	P3:ampl(C3)	P4:pkpk(C3)	P5:mean(C3)	P6:---
value	1.09 V	720 mV	306 V	306 V	-355.7 V	
mean	1.0767 V	729.35 mV	211.36 V	211.36 V	-338.633 V	
min	1.06 V	718 mV	188 V	188 V	-355.7 V	
max	1.09 V	738 mV	306 V	306 V	-328.7 V	
sdev	15.6 mV	8.27 mV	30.71 V	30.71 V	8.194 V	
num	11	11	11	11	11	
status	✓	✓	✗	✓	✓	

C1 DCIM

1.00 V/div

-110 mV orst

1.52 V

-1.06 V

-2.98 V

ΔV

C3 DCIM

200 V/div

600.0 V offset

-238 V

-634 V

-596 V

ΔV

Timebase -1.6 ms

10.0 ms/div

2.00 MS

20 MS/s

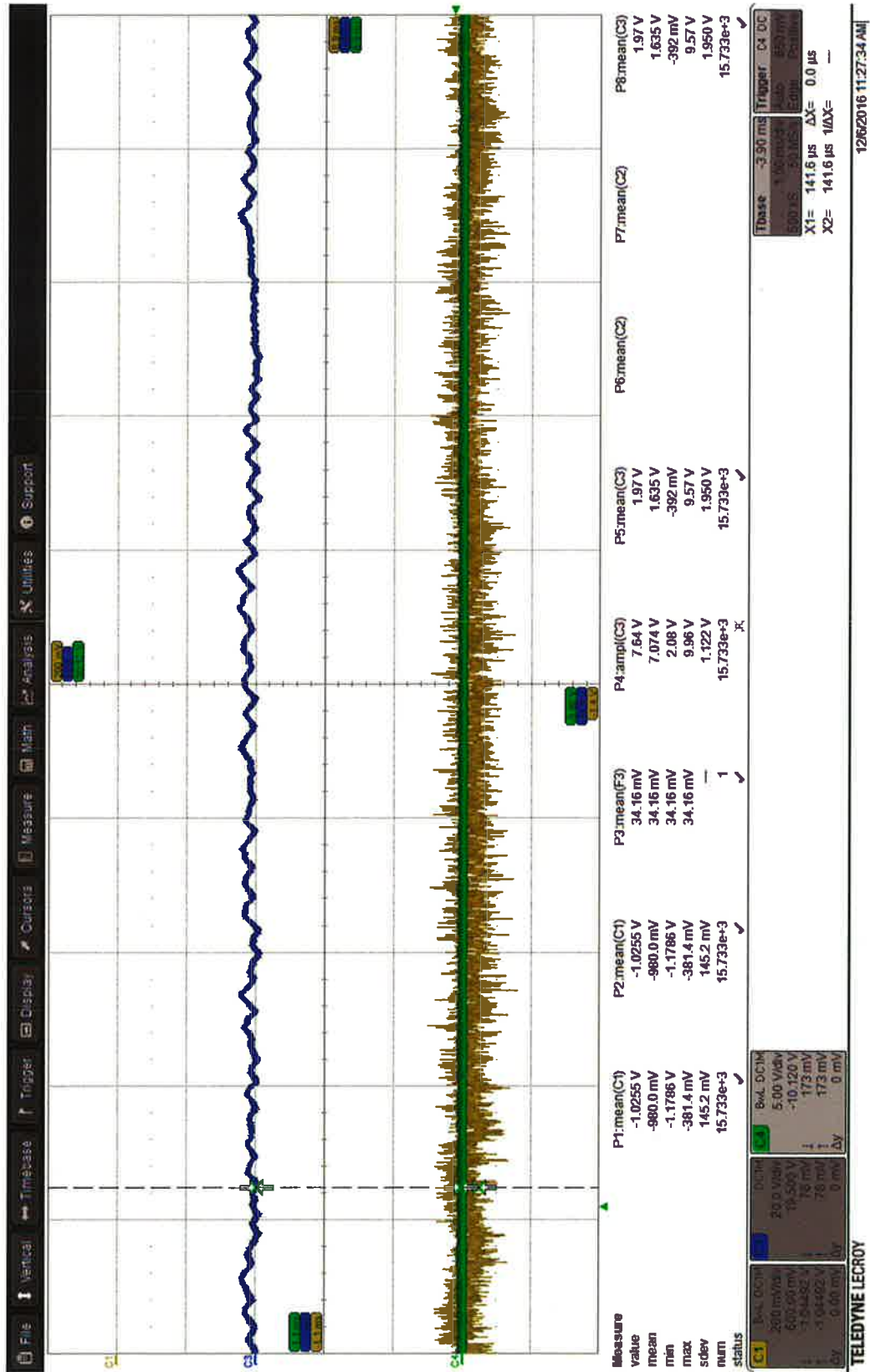
Trigger C4:DC

Auto

Edge

1.400 V

Positive



6-Dec-16
11:39:37

1
1 ms
1.00 V

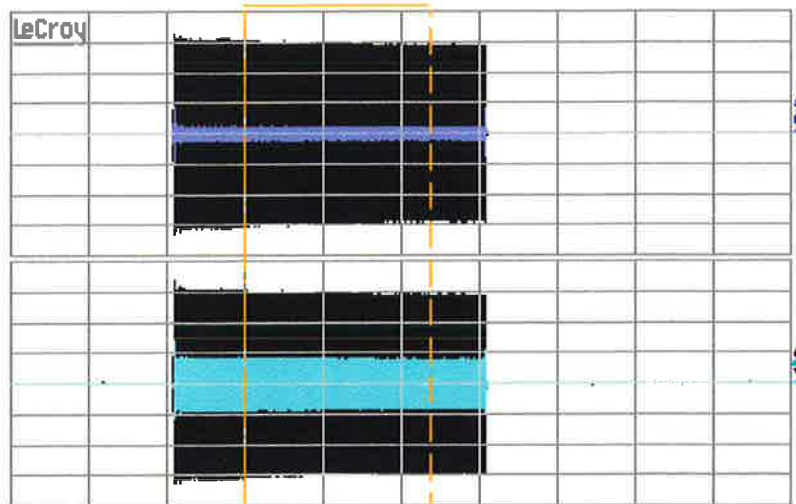
2
1 ms
1.00 V

3
1 ms
1.00 V

4
1 ms
1.00 V

1 ms

1 1 V AC
2 1 V AC
3 1 V AC
4 1 V AC



224 sweeps:

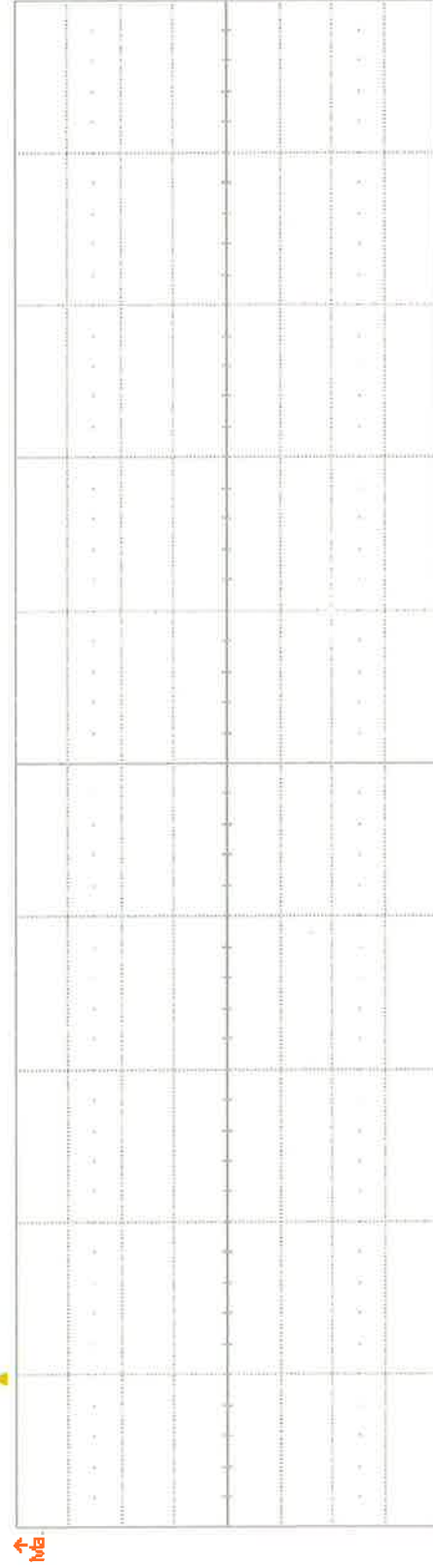
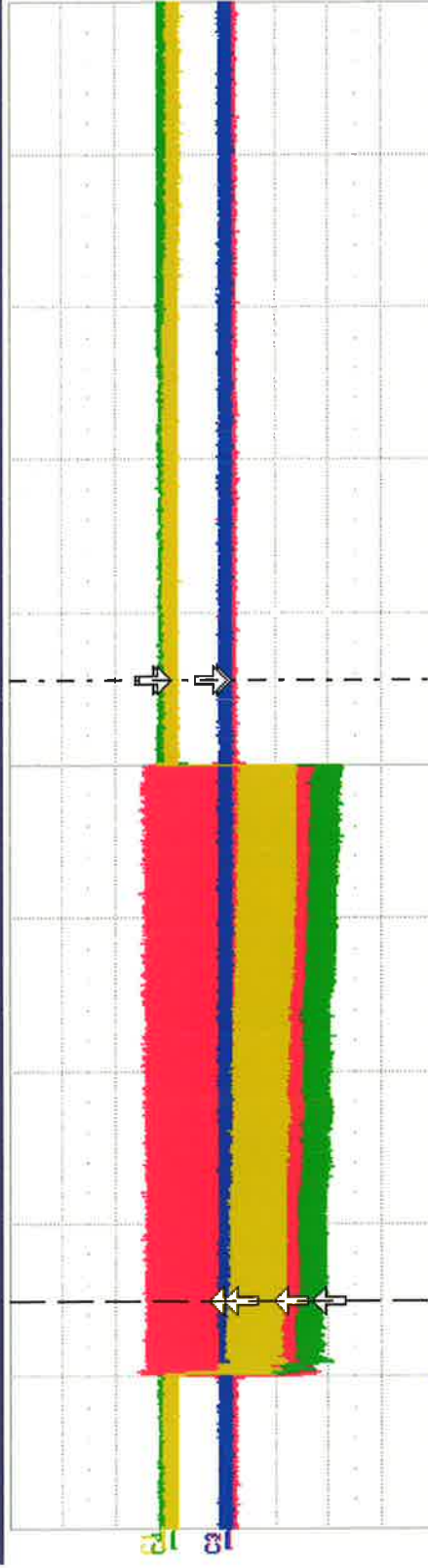
	average	low	high	sigma
rms(1)	2.219 V	2.007	2.360	0.104
rms(2)	159mV	139	181	13
rms(3)	2.220 V	2.012	2.363	0.099
rms(4)	624mV	517	695	32
phase(1,3)	-89 °	-94	-85	2



Ext10 DC 0.05 V 1MΩ

10 MS/s

☐ NORMAL

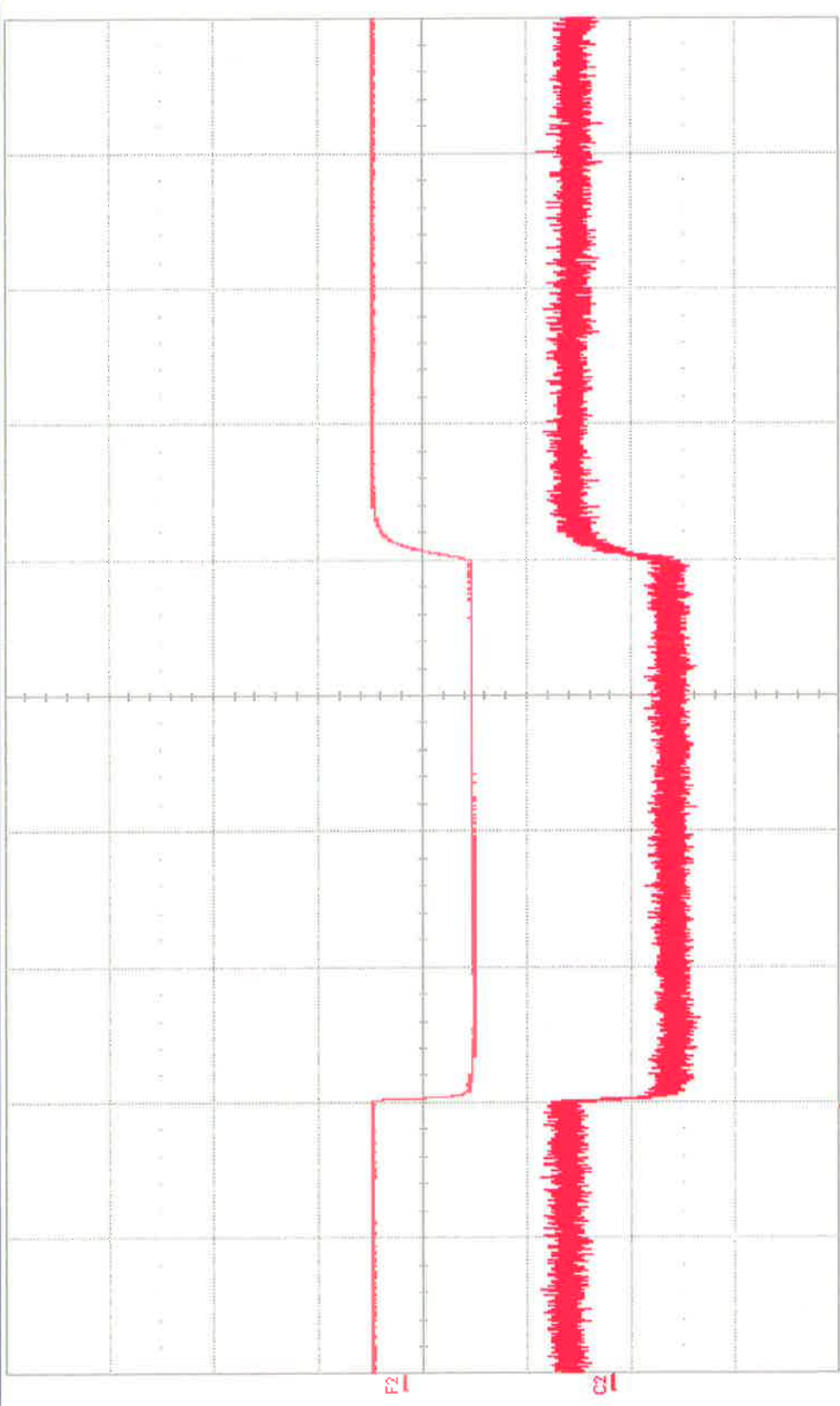


Timebase	-4.02 ms	Trigger	Ext10	DC
1.00 MS	1.00 ms/div	Normal	0.00 V	
	100 MS/s	Edge	Negative	

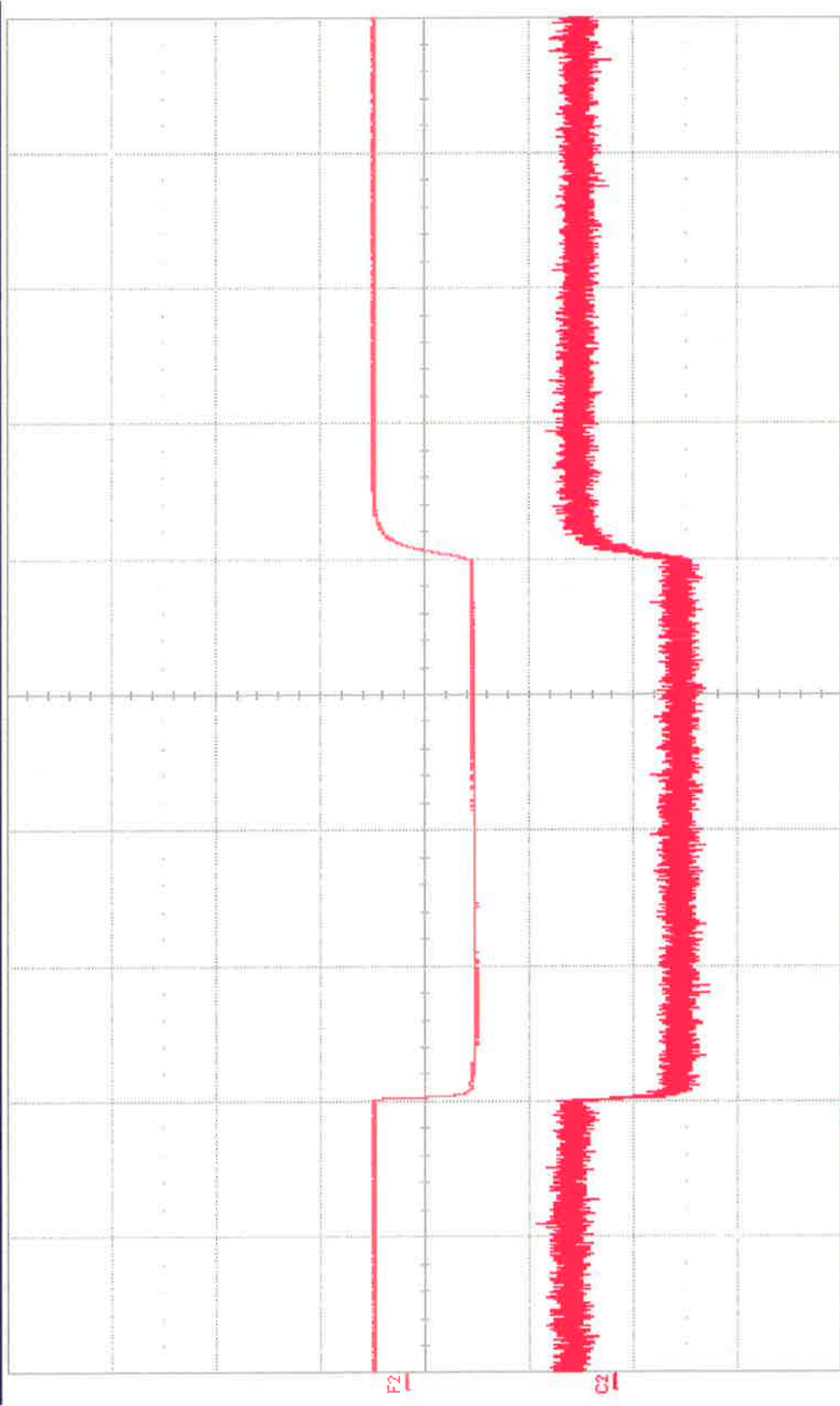
Math	<FFT(C4)>
700 mV/div	52 kHz/div
4.543 kHz	

C1	C2	C3	C4
20.0 mV/div	200 mV/div	50.0 V/div	20.0 mV/div
22.00 mV/div	-30.0 mV/div	-5.0 V/div	18.00 mV/div
-2.31 mV	-6.4 mV	300 mV	1.59 mV
-42.31 mV	273.2 mV	300 mV	-50.39 mV
-40.00 mV	279.6 mV	0.0 V	-51.98 mV

X1	X2	ΔX	1/ΔX
4.58000 ms	5.00000 ms	0.41999 ms	2400.00 Hz



C2	DC	50.0 mV/div	-91.5 mV
F2	<C2>	50.0 mV/div	1.00 ms/div
Tbase	-3.04 ms	1.00 ms/div	100 kS
Trigger	C4	Normal	2.42 V
		Edge	Negative



C2

DCIM

50.0 mV/div

-91.5 mV

F2

<C2>

50.0 mV/div

1.00 ms/div

689 #

Tbase

-3.04 ms

Trigger

Normal

Edge

C4 DC

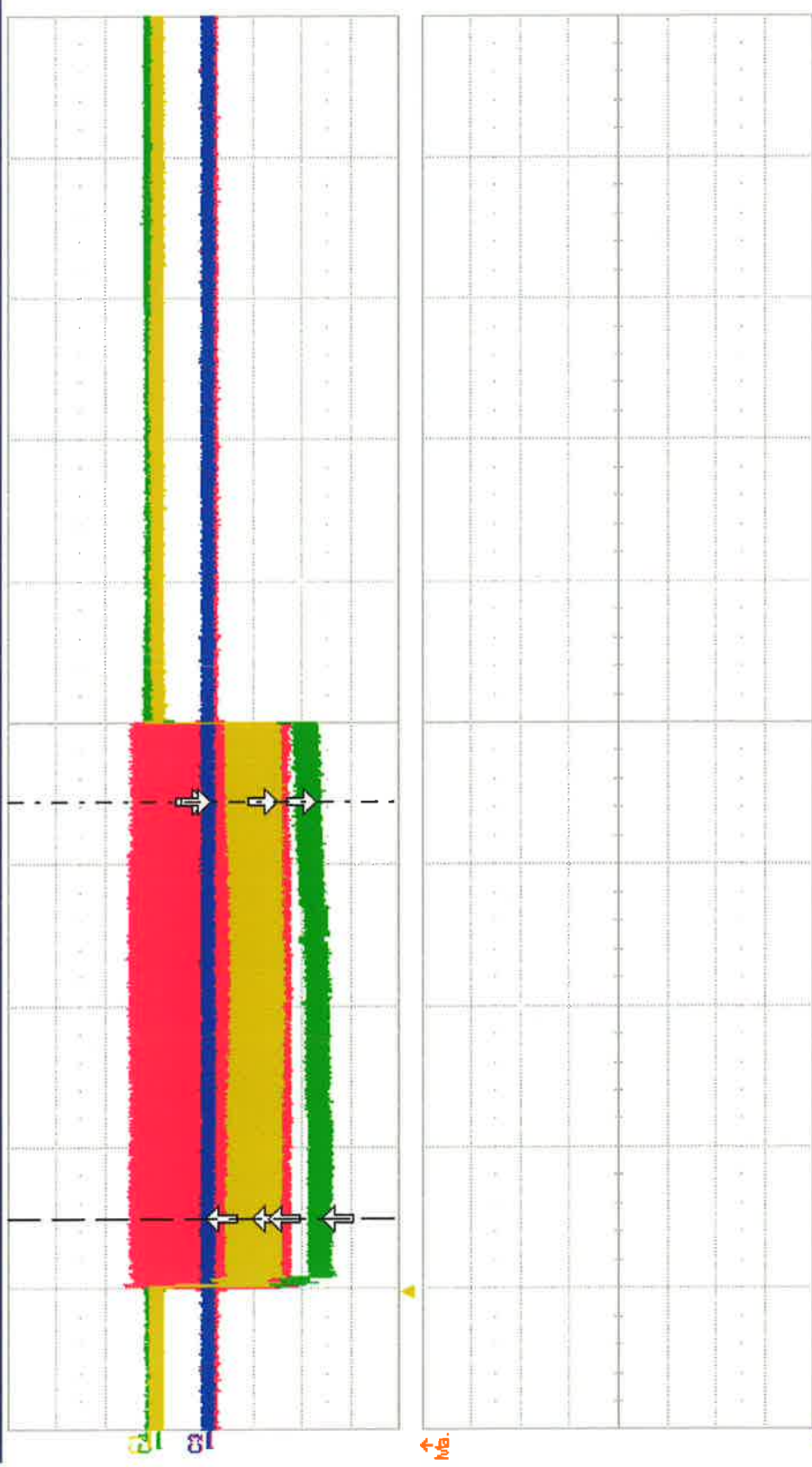
100 kS

1.00 ms/div

10 MS/s

2.42 V

Negative



Timebase	-4.02 ms	Trigger	Ext/10 DC
1.00 mV/div	Normal	0.00 V	
1.00 MS	100 MS/s	Edge	Negative
X1 = 3.46097 ms	ΔX = -2.94097 ms		
X2 = 520.00 μs	1/ΔX = -340.024 Hz		

Math	4FFT(C4)
700 mV/div	52 kHz/div
5.146 kHz	

C4	DCIM
20.0 mV/div	18.00 mV offset
Δy	Δy
-62.98 mV	↑
-66.91 mV	↑
-3.93 mV	Δy

C3	DCIM
50.0 V/div	-5.0 V offset
Δy	Δy
-1.2 V	↑
1.5 V	↑
2.7 V	Δy

C2	DCIM
200 mV/div	-30.0 mV offset
Δy	Δy
30.2 mV	↑
-169.4 mV	↑
-199.6 mV	Δy

C1	DCIM
20.0 mV/div	22.00 mV offset
Δy	Δy
-51.37 mV	↑
-48.98 mV	↑
2.39 mV	Δy

6-Dec-16
11:51:33

1
1 ms
1.00 V

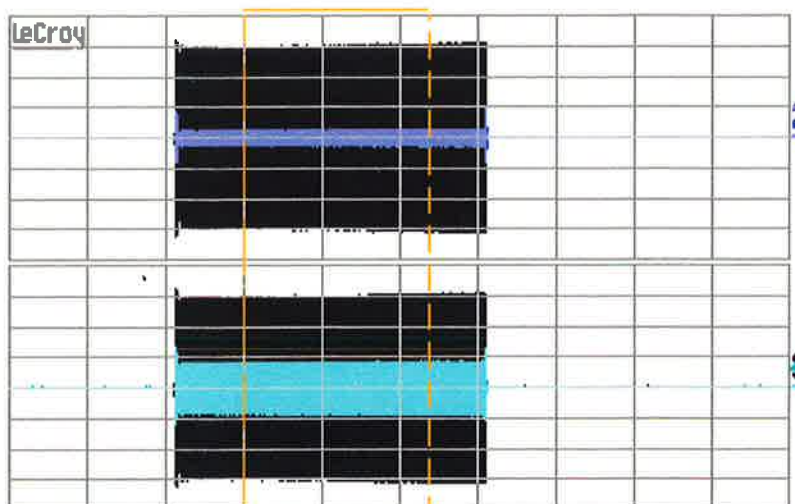
2
1 ms
1.00 V

3
1 ms
1.00 V

4
1 ms
1.00 V

1 ms

1 1 V AC
2 1 V AC
3 1 V AC
4 1 V AC



940 sweeps: average low high sigma
rms(1) 2.232 V 1.964 2.360 0.102
rms(2) 177mV 139 213 20
rms(3) 2.227 V 1.971 2.363 0.095
rms(4) 634mV 516 695 33
phase(1,3) -89 ° -94 -85 2



Ext10 DC 0.05 V 1MΩ

10 MS/s

☐ NORMAL

6-Dec-16
11:51:38

1
20 μ s
20.0mV

2
20 μ s
50mV

3
20 μ s
50mV

4
20 μ s
100mV

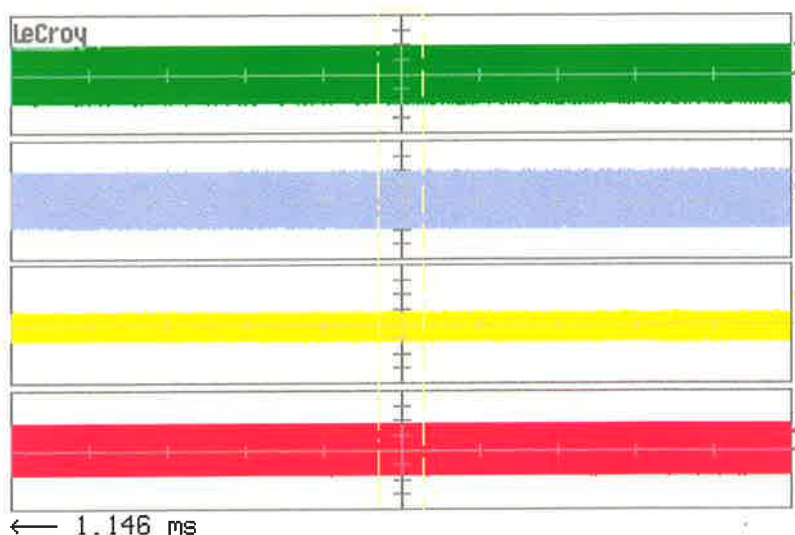
20 μ s

1 20 mV 50 Ω

2 50 mV 50 Ω

3 50 mV 50 Ω

4 .1 V 50 Ω



	22 sweeps:	average	low	high	sigma
pkpk (1)		77.5mV	75.0	83.1	2.2
pkpk (2)		192.1mV	184.4	201.6	5.5
pkpk (3)		103.6mV	100.0	109.4	2.7
pkpk (4)		347mV	334	366	8
phase (2,1)		68.7 °	65.6	71.9	0.9



Ext10 DC 0.15 V 1M Ω

200 MS/s

☐ NORMAL

6-Dec-16
11:51:45

1
20 μ s
200mV

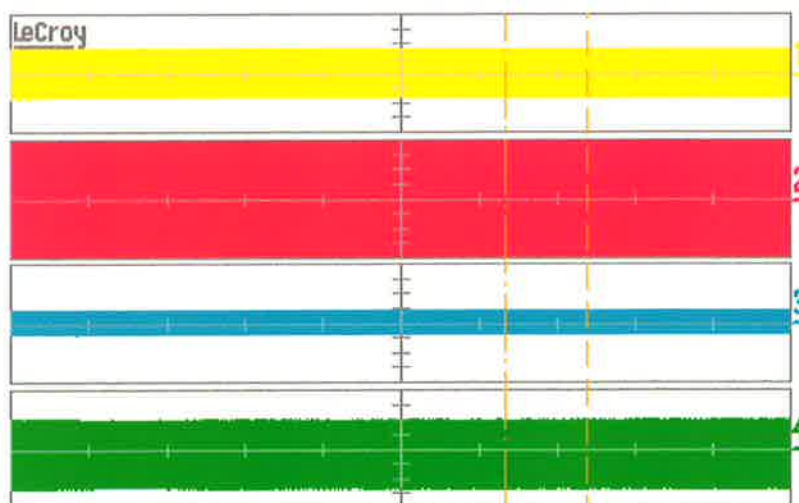
2
20 μ s
200mV

3
20 μ s
50mV

4
20 μ s
50mV

20 μ s

1 .2 V DC
2 .2 V DC
3 50 mV 50 Ω
4 50 mV 50 Ω



← 120 μ s

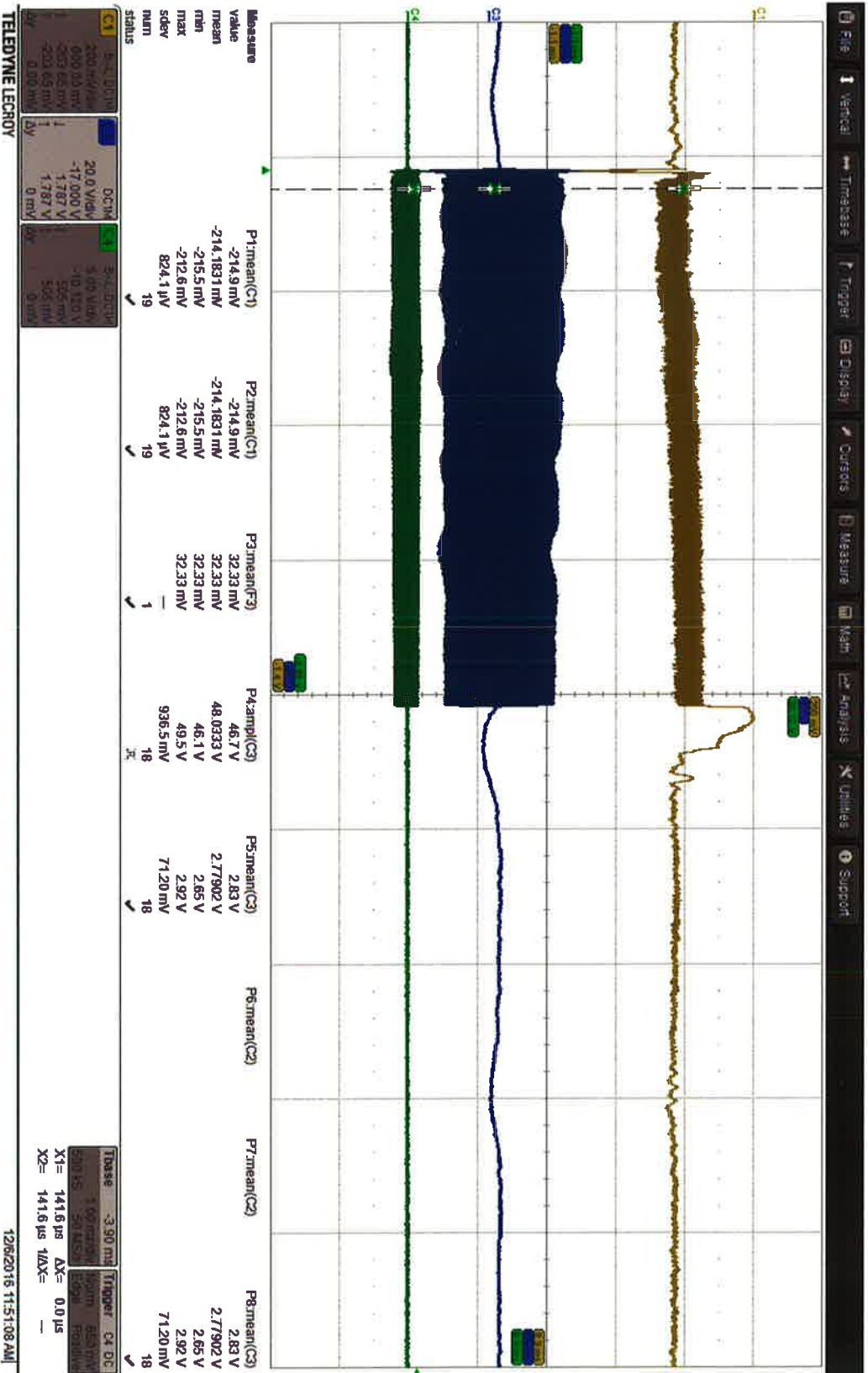
	31 sweeps:	average	low	high	sigma
pkpk(1)		667mV	631	706	22
pkpk(2)	↕	1.594 V	1.594	1.594	0.000
pkpk(3)		85.6mV	81.3	90.6	3.0
pkpk(4)		232.8mV	221.9	246.9	7.7
phase(1,2)		-13.4 °	-15.7	-11.3	0.6



Ext10 DC 0.3 V 1M Ω

200 MS/s

☐ NORMAL



Take
X1000
probe
on probe
Ta probe

Leaky probe
on sec probe
out of focus

RMP pick-up

6-Dec-16
12:02:39

1
1 ms
1.00 V

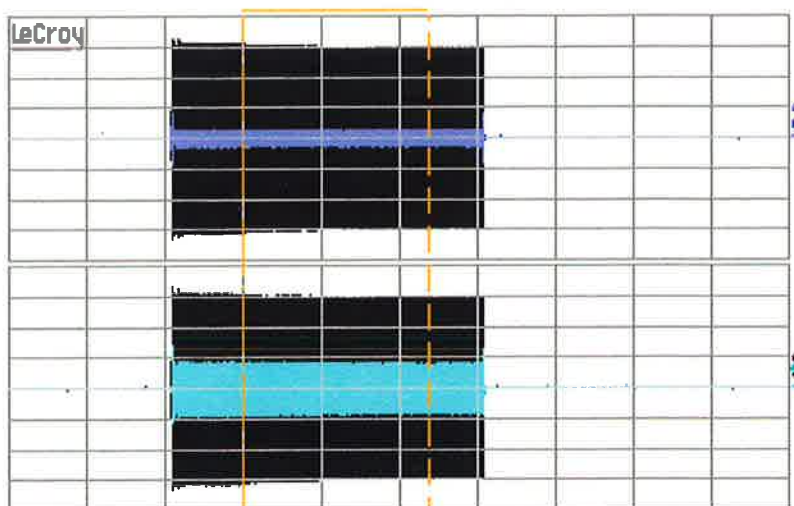
2
1 ms
1.00 V

3
1 ms
1.00 V

4
1 ms
1.00 V

1 ms

1 1 V AC
2 1 V AC
3 1 V AC
4 1 V AC



1606 sweeps:

	average	low	high	sigma
rms(1)	2.221 V	1.922	2.360	0.100
rms(2)	183mV	139	220	19
rms(3)	2.214 V	1.924	2.363	0.093
rms(4)	629mV	488	695	33
phase(1,3)	-89 °	-94	-85	2



Ext10 DC 0.05 V 1MΩ

10 MS/s

☐ NORMAL

6-Dec-16
12:05:48

1
1 ms
1.00 V

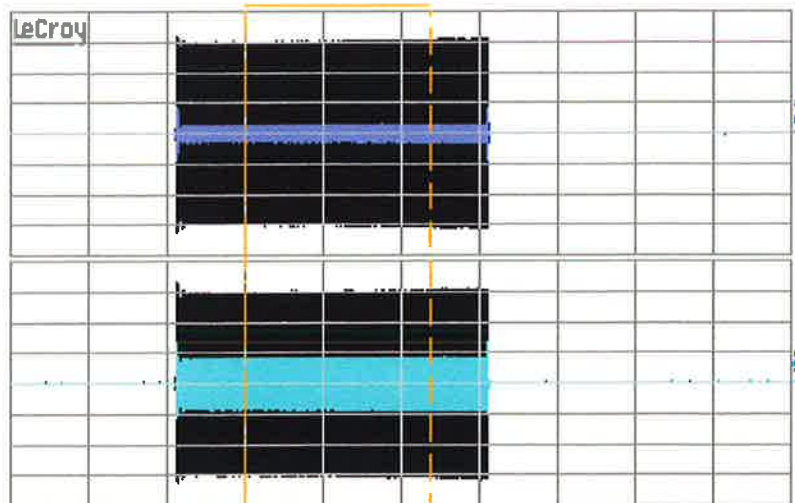
2
1 ms
1.00 V

3
1 ms
1.00 V

4
1 ms
1.00 V

1 ms

1 1 V AC
2 1 V AC
3 1 V AC
4 1 V AC



184 sweeps:

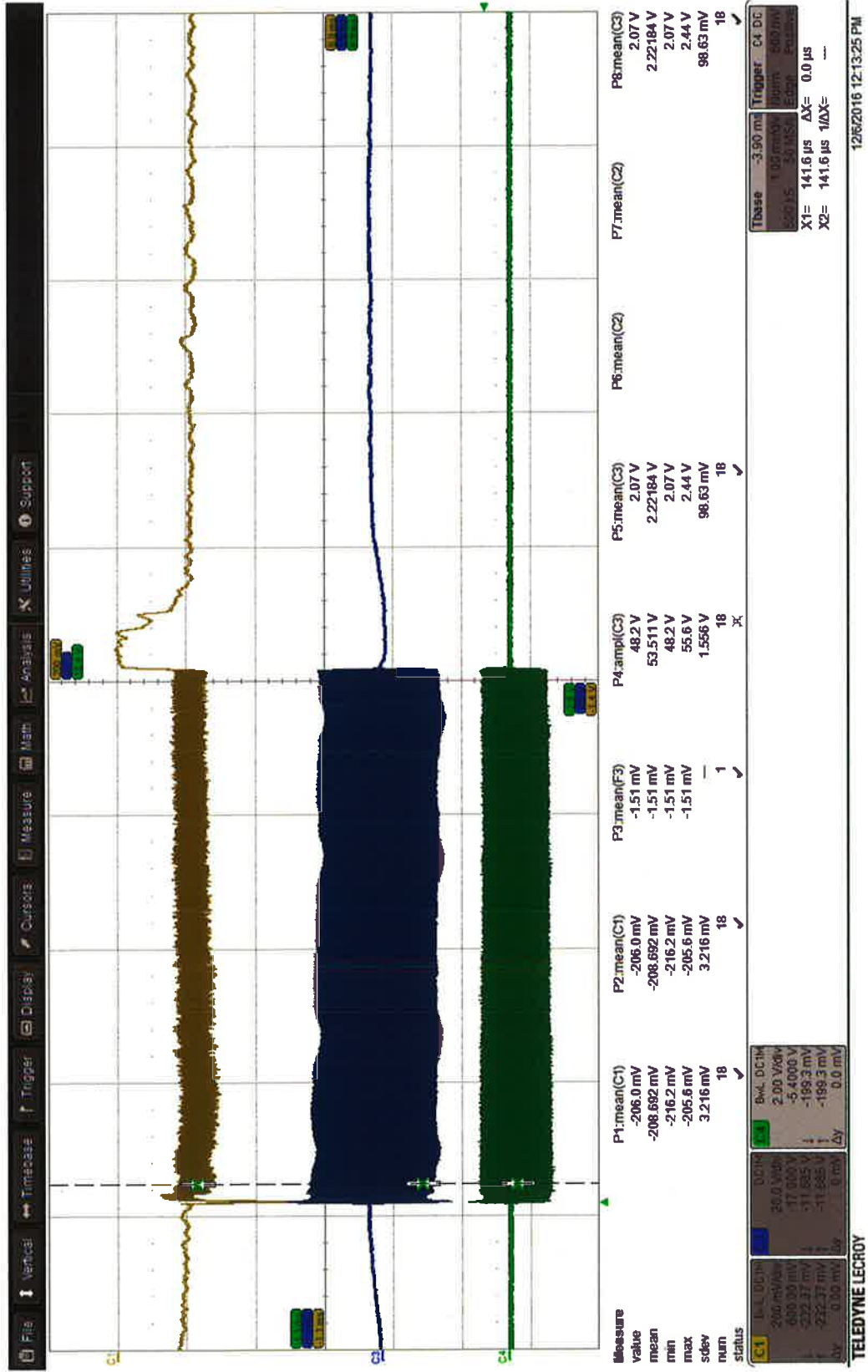
	average	low	high	sigma
rms(1)	2.241 V	2.078	2.347	0.080
rms(2)	199mV	174	218	12
rms(3)	2.231 V	2.081	2.328	0.074
rms(4)	631mV	559	665	24
phase(1,3)	-89 °	-94	-86	2



Ext10 DC 0.05 V 1MΩ

10 MS/s

☐ NORMAL



6-Dec-16
12:23:36

1
1 ms
1.00 V

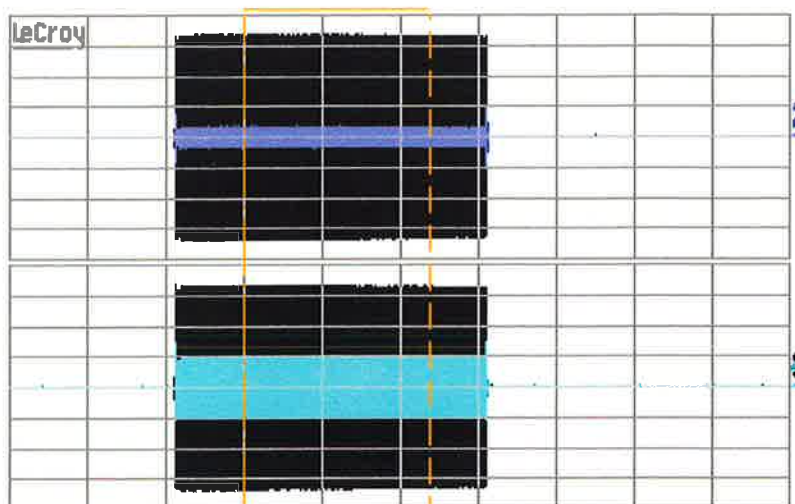
2
1 ms
1.00 V

3
1 ms
1.00 V

4
1 ms
1.00 V

1 ms

1 1 V AC
2 1 V AC
3 1 V AC
4 1 V AC



1252 sweeps:

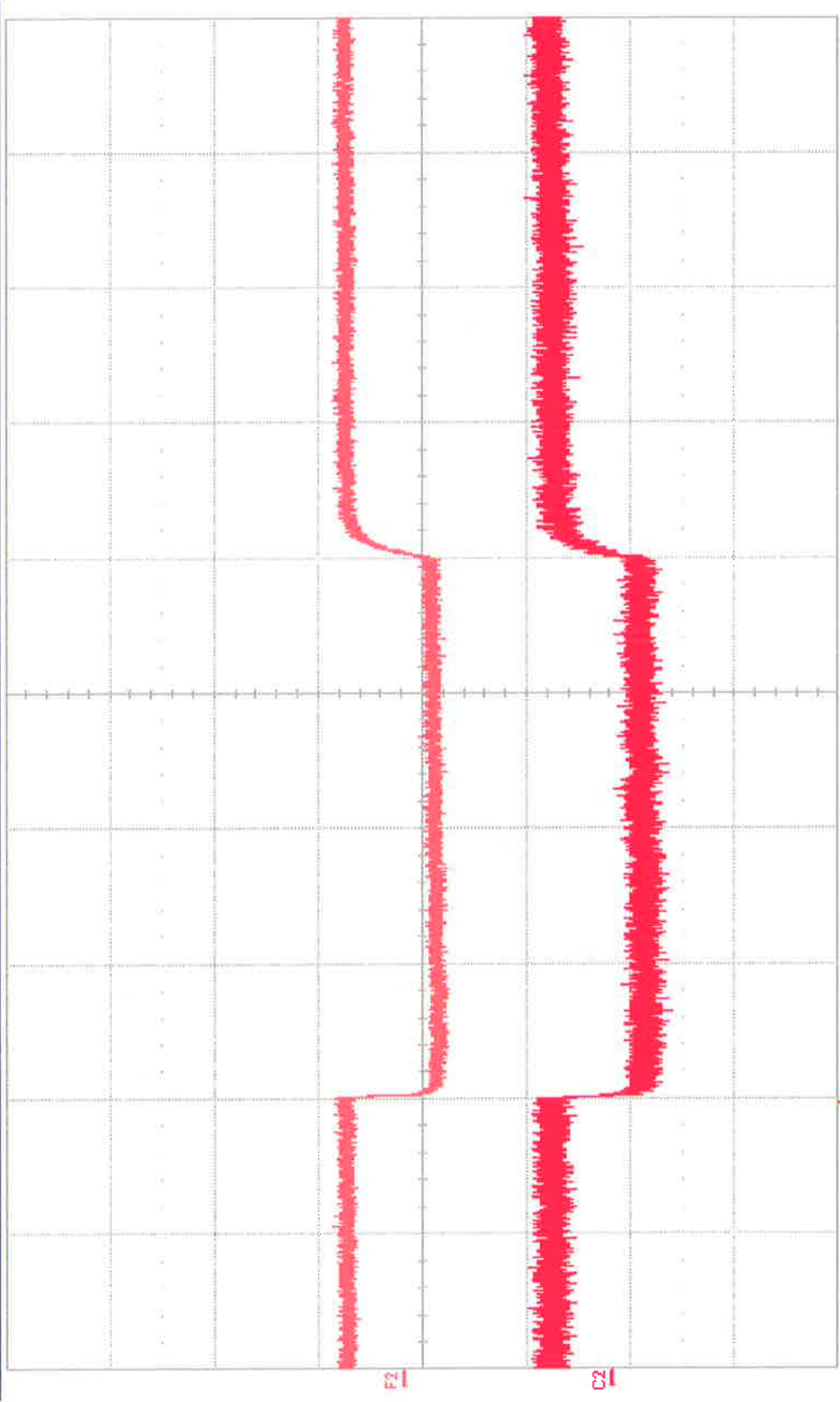
	average	low	high	sigma
rms(1)	2.243 V	1.995	2.352	0.086
rms(2)	196mV	162	223	16
rms(3)	2.227 V	1.995	2.328	0.079
rms(4)	643mV	518	697	31
phase(1,3)	-89 °	-94	-85	2



Ext10 DC 0.05 V 1MΩ

10 MS/s

☐ NORMAL



C2	DCM	50.0 mV/div	-91.5 mV
F2	<C2>	50.0 mV/div	1.00 ms/div
		5 #	
Tbase	-3.04 ms	Trigger	C4 DC
1.00 kS	1.00 ms/div	Normal	2.42 V
	10 MS/s	Edge	Negative

6-Dec-16
12:41:56

1
1 ms
1.00 V

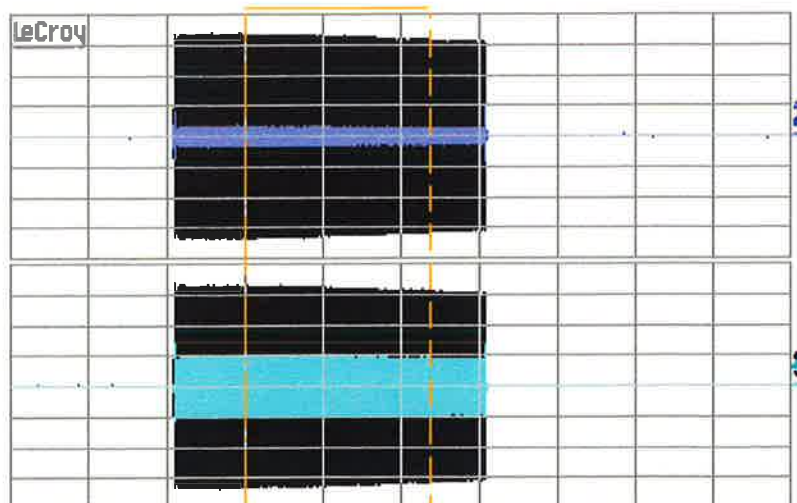
2
1 ms
1.00 V

3
1 ms
1.00 V

4
1 ms
1.00 V

1 ms

1 1 V AC
2 1 V AC
3 1 V AC
4 1 V AC



	1083 sweeps:	average	low	high	sigma
rms(1)		2.291 V	2.058	2.384	0.063
rms(2)		197mV	173	221	12
rms(3)		2.262 V	2.042	2.360	0.058
rms(4)		675mV	567	735	21
phase(1,3)		-89 °	-94	-85	2



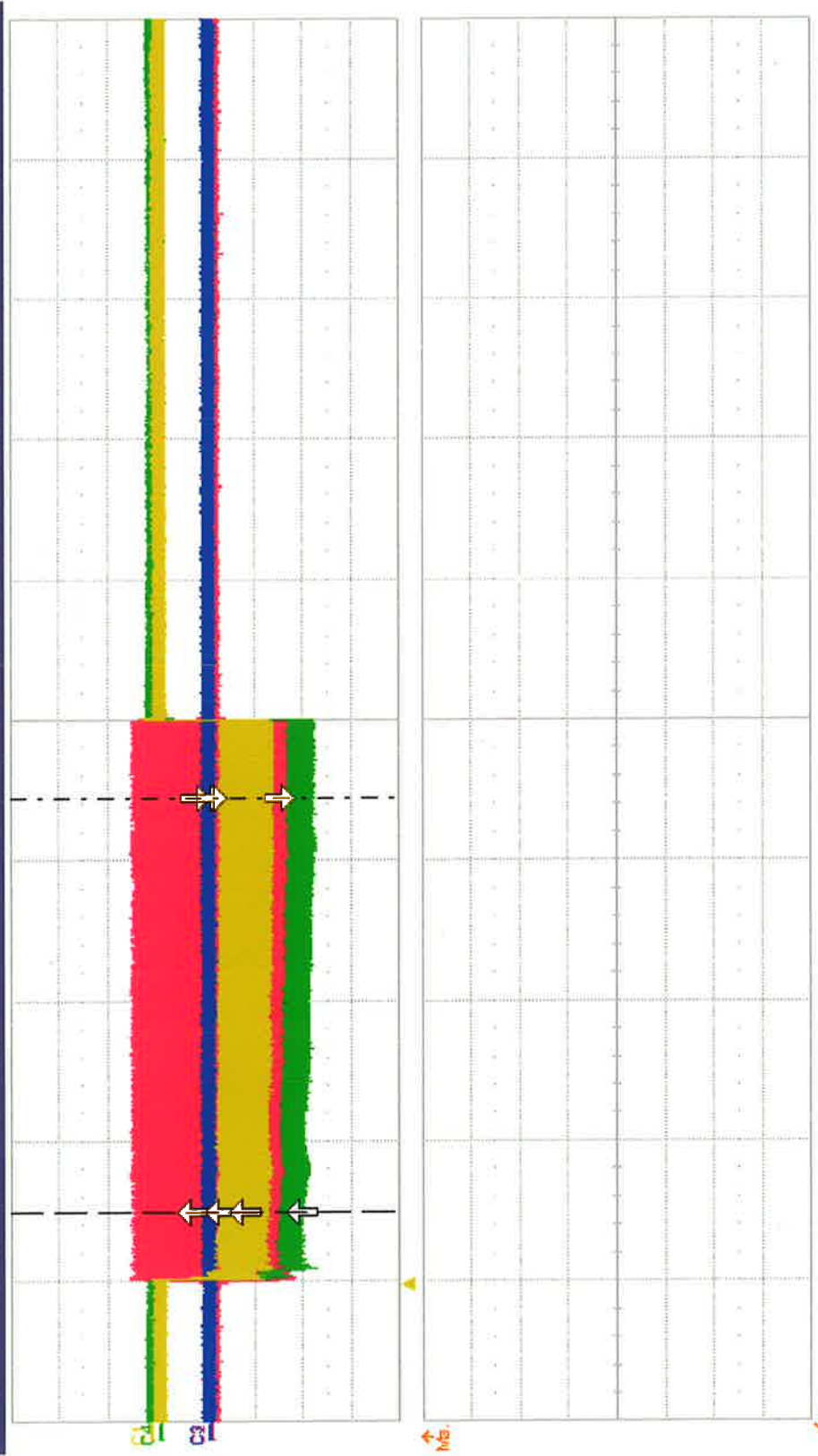
Ext10 DC 0.05 V 1MΩ

10 MS/s

☐ NORMAL



TELEDYNE LECROY



C1	C2	C3	C4	Math	Trigger	Timebase
20.0 mV/div	200 mV/div	50.0 V/div	20.0 mV/div	700 mV/div	Normal	-4.02 ms
22.00 mV ofst	-30.0 mV ofst	-5.0 V ofst	18.00 mV ofst	52 kHz/div	Edge	1.00 MS
-29.91 mV	-220.0 mV	-100 mV	-55.98 mV	4 #	$\Delta X = -2.94097$ ms	1.00 MS
-32.19 mV	-46.8 mV	1.1 V	-51.60 mV		$\Delta X = -340.024$ Hz	
-2.29 mV	173.2 mV	1.1 V	4.38 mV			
Δy	Δy	Δy	Δy			

6-Dec-16
12:58:22

1
1 ms
1.00 V

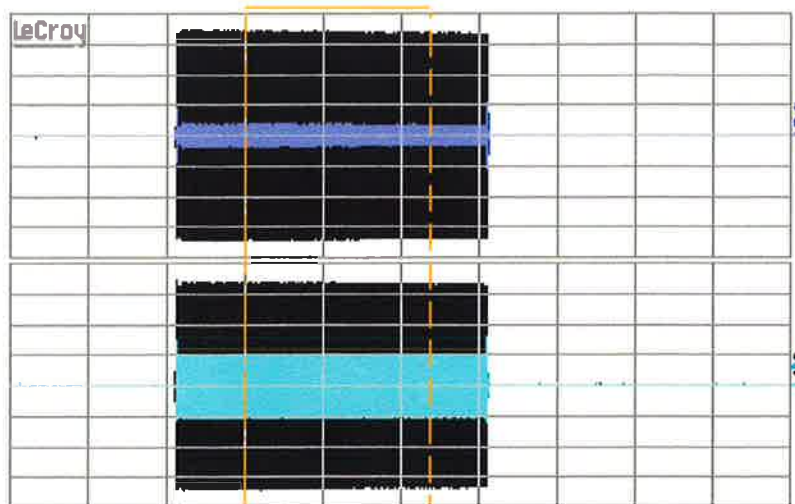
2
1 ms
1.00 V

3
1 ms
1.00 V

4
1 ms
1.00 V

1 ms

1 1 V AC
2 1 V AC
3 1 V AC
4 1 V AC



2069 sweeps:

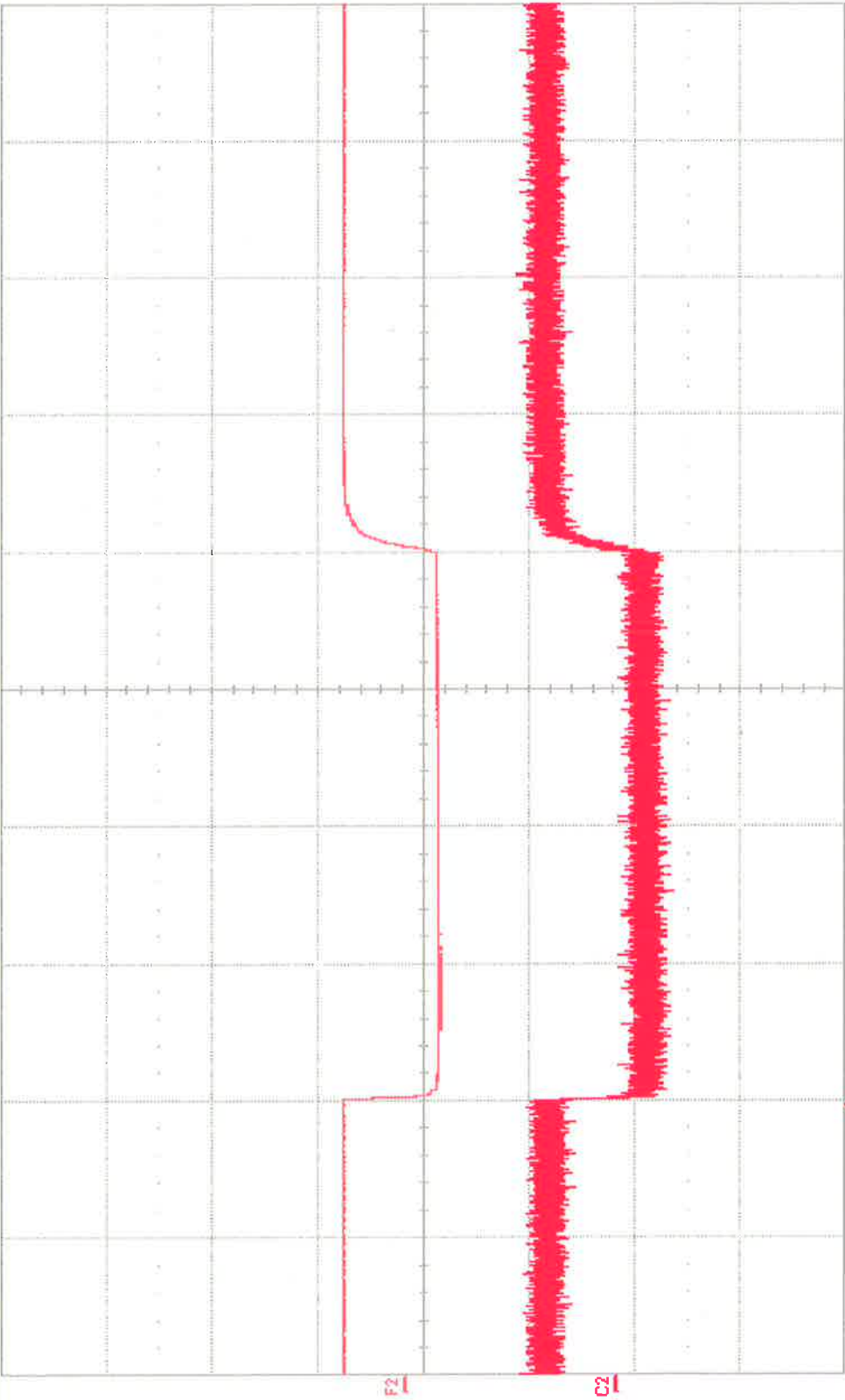
	average	low	high	sigma
rms(1)	2.311 V	2.058	2.390	0.058
rms(2)	199mV	173	225	11
rms(3)	2.281 V	2.042	2.360	0.054
rms(4)	687mV	567	735	24
phase(1,3)	-89 °	-94	-85	2



Ext10 DC 0.05 V 1MΩ

10 MS/s

☐ NORMAL



C2

DCIM

50.0 mV/div

-91.5 mV

F2

<C2>

50.0 mV/div

1.00 ms/div

1.955 kHz

Tbase

-3.04 ms

1.00 ms/div

100 kS

Trigger

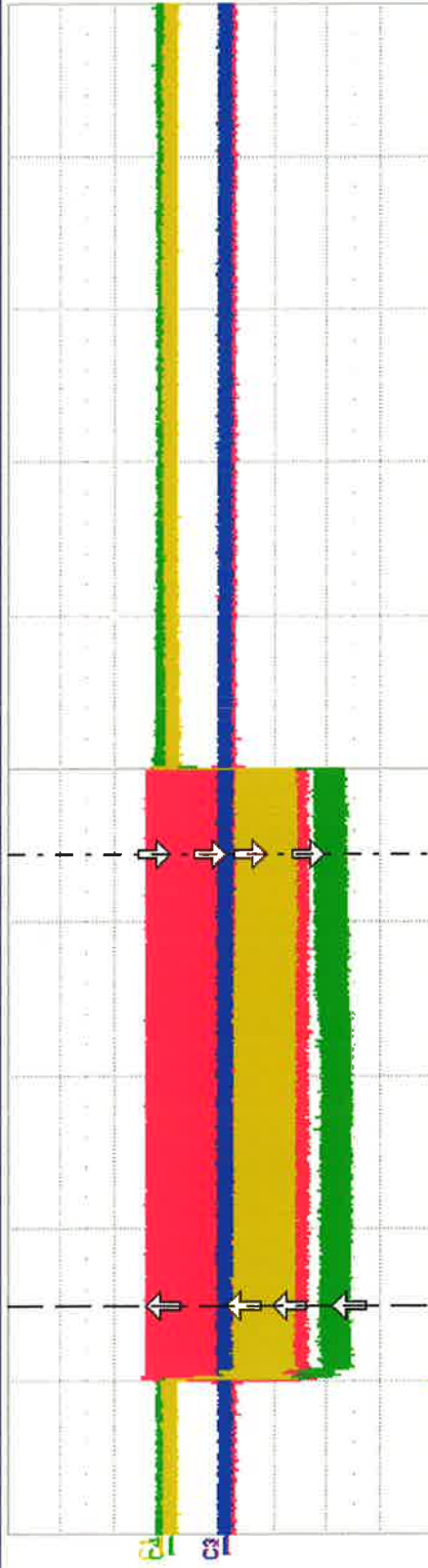
C4 DC

Normal

Edge

2.42 V

Negative



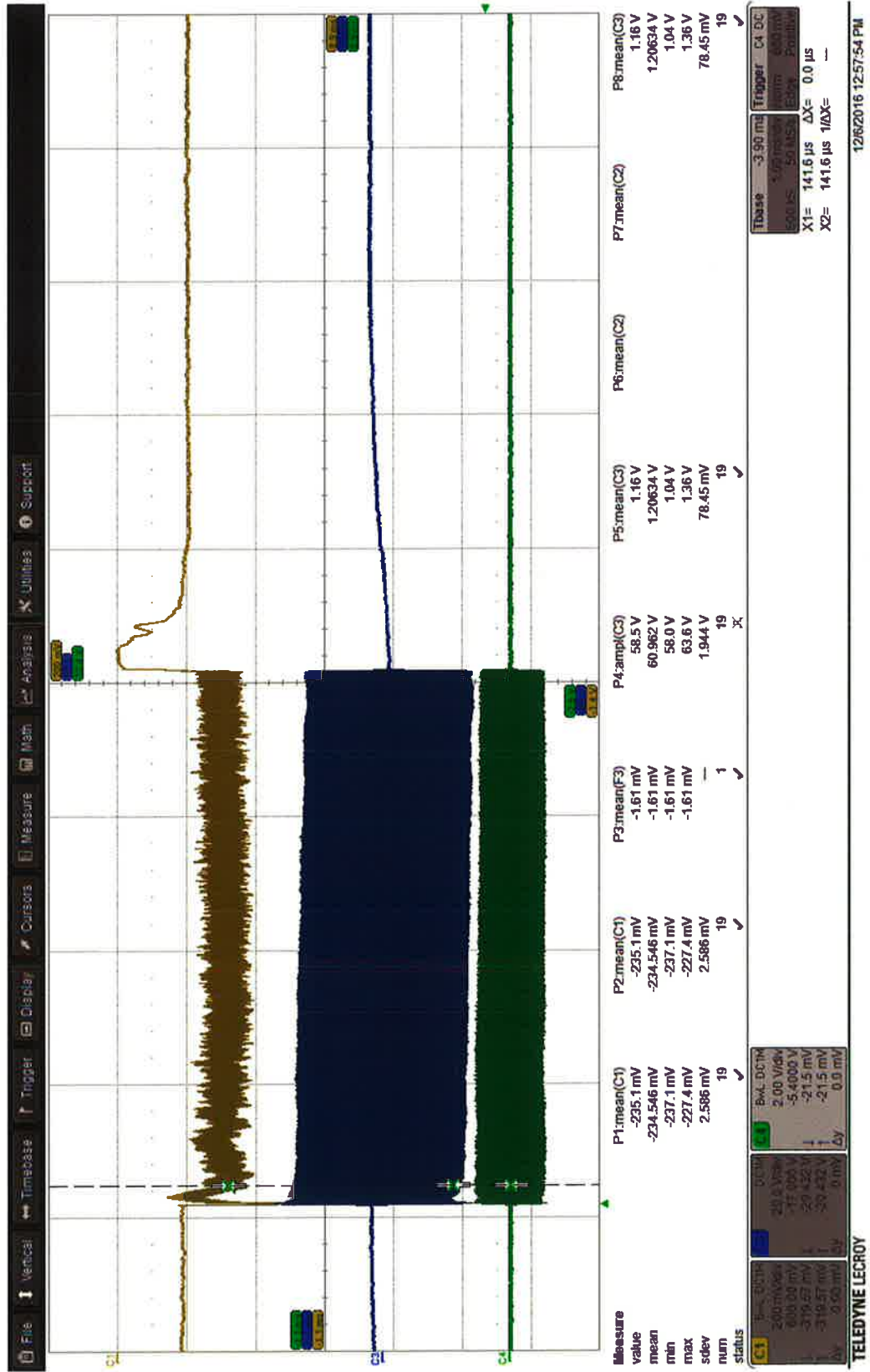
Timebase	-4.02 ms	Trigger	Edge
	1.00 ms/div	Normal	0.00 V
	1.00 MS	Edge	Negative

X1=	3.46097 ms	$\Delta X=$	-2.94097 ms
X2=	520.00 μ s	1/ $\Delta X=$	-340.024 Hz

C1	C2	C3	C4	Math	4FFT(C4)*
20.0 mV/div	200 mV/div	50.0 V/div	20.0 mV/div	700 mV/div	700 mV/div
22.00 mV offset	-30.0 mV offset	-5.0 V offset	18.00 mV offset	52 kHz/div	52 kHz/div
				663 #	663 #
↑	↑	↑	↑	↑	↑
-38.30 mV	145.5 mV	1.9 V	-57.47 mV		
↑	↑	↑	↑	↑	↑
-42.05 mV	257.0 mV	-800 mV	-58.54 mV		
Δy	Δy	Δy	Δy	Δy	Δy
-3.75 mV	111.5 mV	-2.4 V	-1.07 mV		

LeCroy

12/6/2016 12:58:34 PM



6-Dec-16
13:01:21

1
1 ms
1.00 V

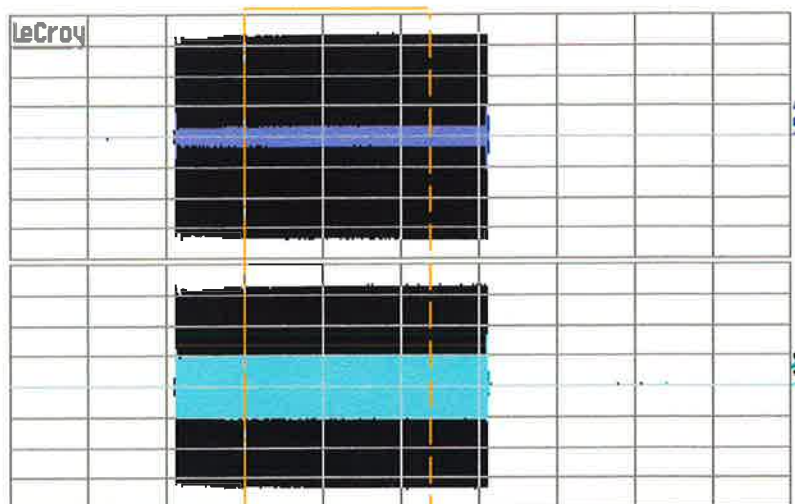
2
1 ms
1.00 V

3
1 ms
1.00 V

4
1 ms
1.00 V

1 ms

1 1 V AC
2 1 V AC
3 1 V AC
4 1 V AC



75 sweeps:

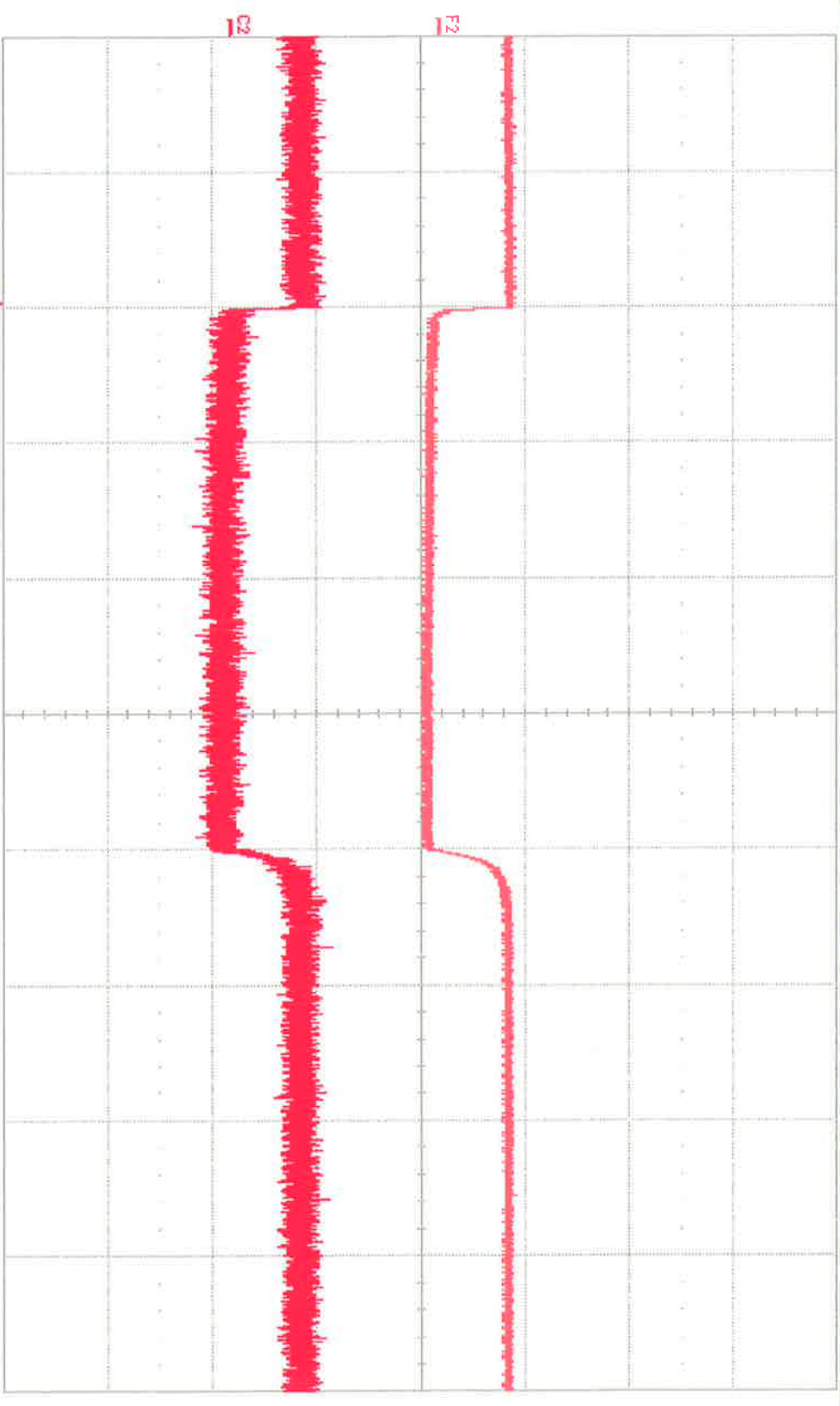
	average	low	high	sigma
rms(1)	2.354 V	2.320	2.389	0.017
rms(2)	201mV	192	210	4
rms(3)	2.309 V	2.274	2.347	0.019
rms(4)	730mV	710	757	16
phase(1,3)	-89 °	-94	-85	2



Ext10 DC 0.05 V 1MΩ

10 MS/s

☐ NORMAL



C2 **DC IN**
50.0 mV/div
-91.5 mV

F2 **<C2>**
50.0 mV/div
1.00 ms/div
17 #

Tbase -3.04 ms **Trigger** **C4 DC**
1.00 ms/div Normal 2.42 V
100 kS 10 MS/s Edge Negative

LeCroy

12/6/2016 1:03:05 PM

6-Dec-16
13:12:47

1

1 ms

1.00 V

2

1 ms

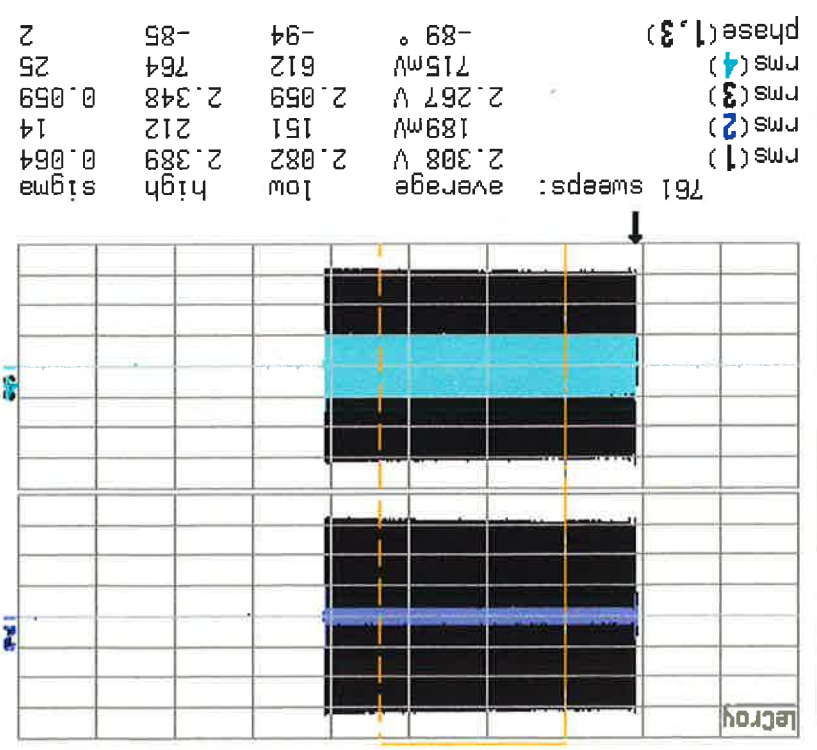
1.00 V

3

1 ms

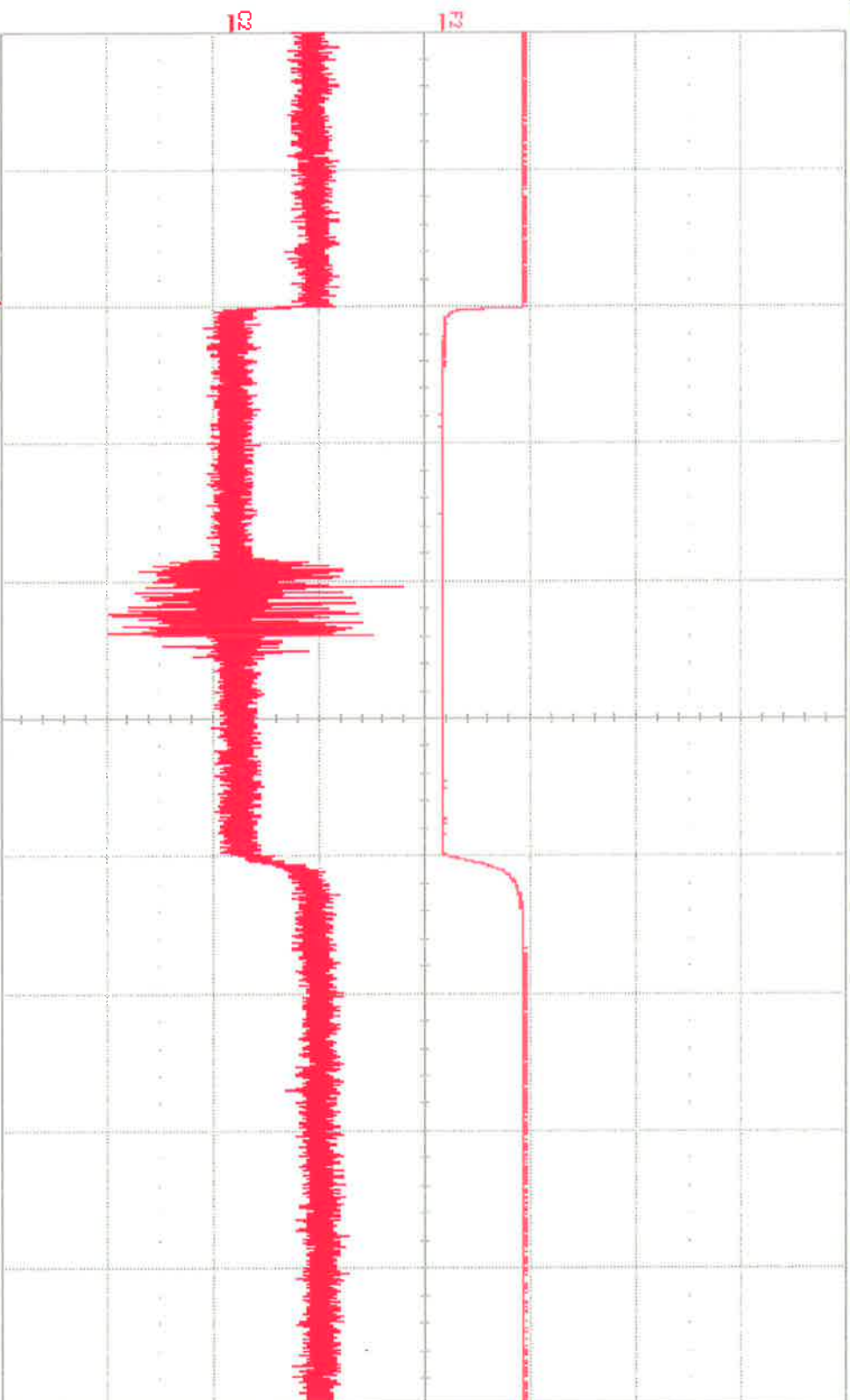
1.00 V

1 1 V AC
2 1 V AC
3 1 V AC



Ext10 DC 0.05 V 1M

10 MS/s
NORMAL

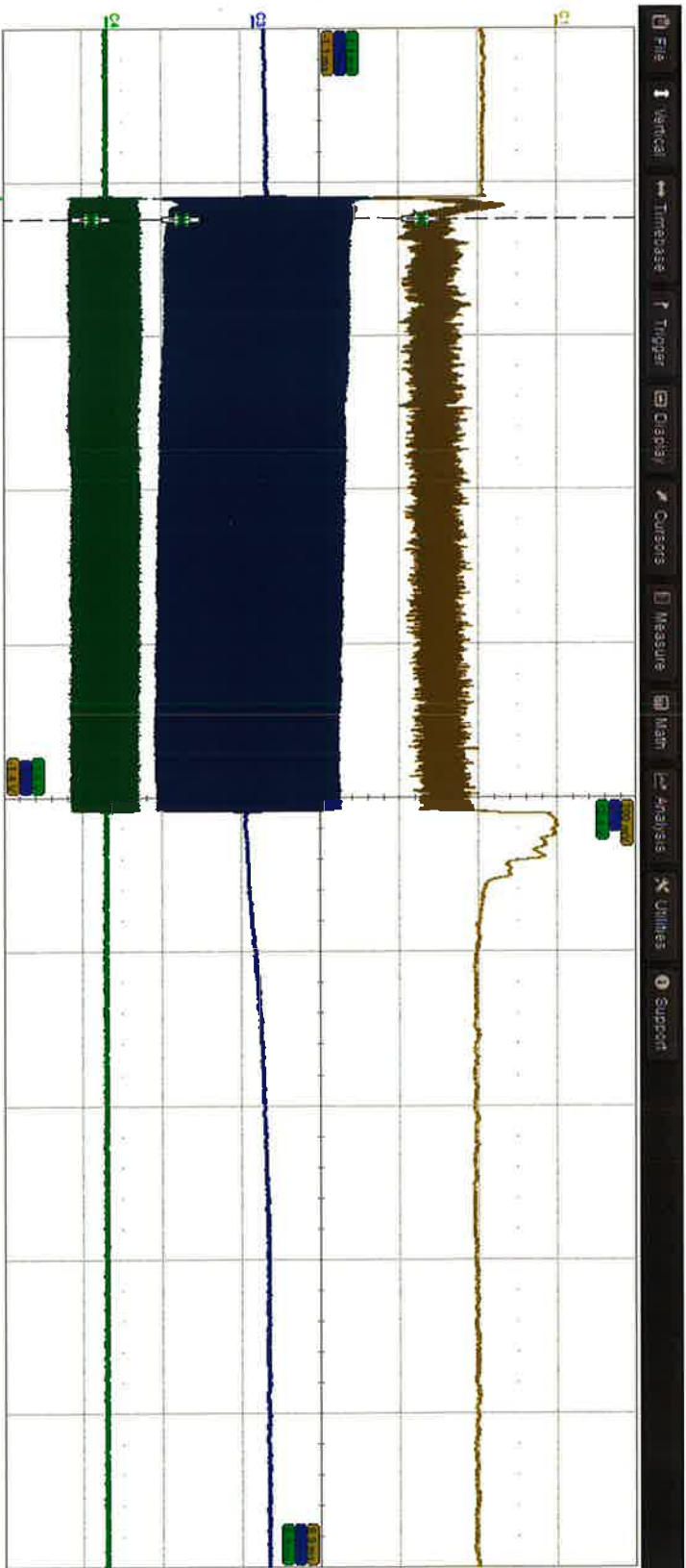


C2 **DCIM** **F2** **<C2>**
50.0 mV/div 50.0 mV/div
-91.5 mV 1.00 ms/div
621 #

Tbase **-3.04 ms** **Trigger** **C4 DC**
1.00 ms/div **Stop** 2.42 V
100 kS 10 MS/s **Edge** **Negative**

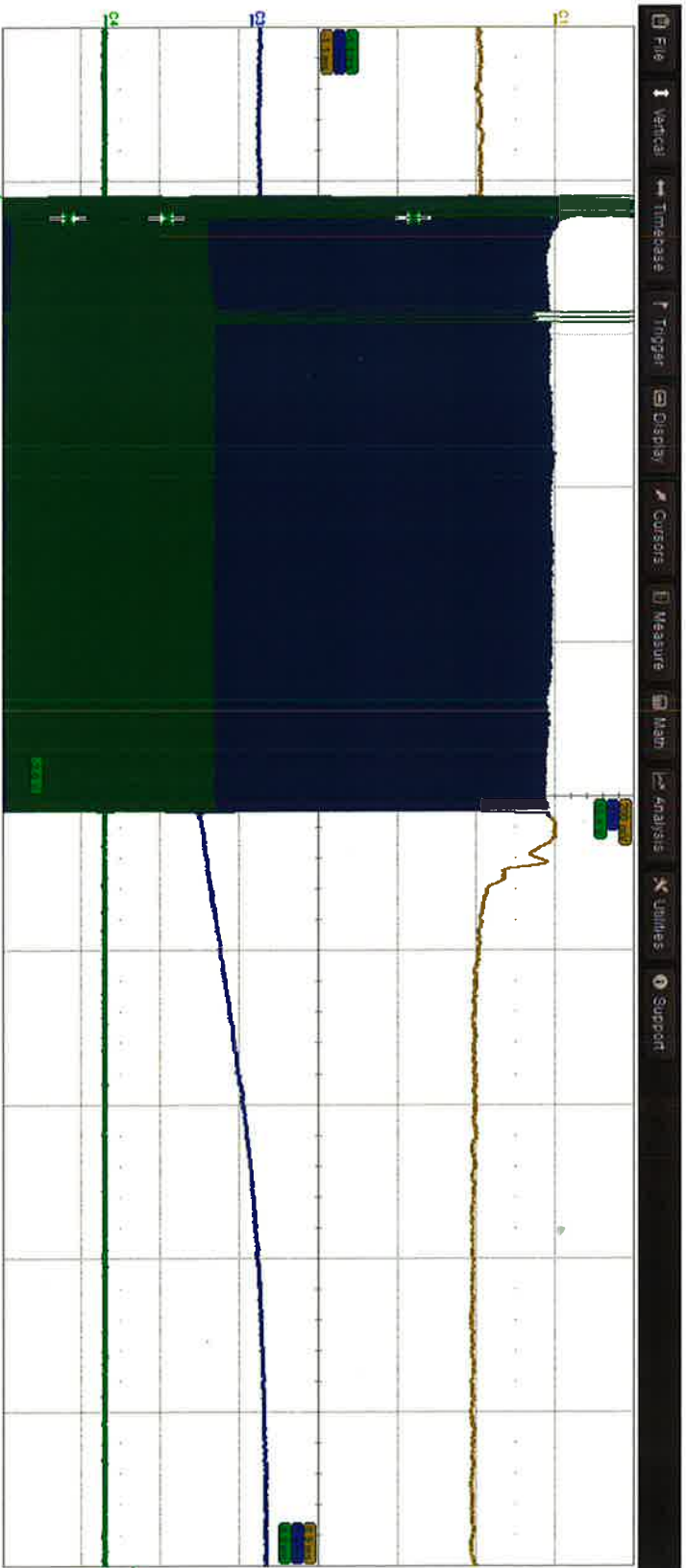
LeCroy

12/6/2016 1:13:13 PM



Measure	P1:mean(C1)	P2:mean(C1)	P3:mean(F3)	P4:amp(C5)	P5:mean(C3)	P6:mean(C2)	P7:mean(C2)	P8:mean(C3)
value	-224.5 mV	-224.5 mV	-217 μ V	1.35 V	< 1.1224 V	1.35 V		1.35 V
mean	-230.978 mV	-230.978 mV	-217 μ V	> 61.92 V	< 1.1224 V			< 1.1224 V
min	-248.9 mV	-248.9 mV	-217 μ V	> 3.44 V	< 3.40 V			< 3.40 V
max	-192.5 mV	-192.5 mV	-217 μ V	> 163.80 V	< 3.19 V			< 3.19 V
stdv	6.611 mV	6.611 mV	—	> 11.12 V	< 283.9 mV			< 283.9 mV
nan	847	847	1	847	839			839
status	✓	✓	✓	✗	✓			✓

[illegible]



Measure	P1:mean(C1)	P2:mean(C1)	P3:mean(F3)	P4:amp(C3)	P5:mean(C3)	P6:mean(C2)	P7:mean(C2)	P8:mean(C3)
value	-244.9 mV	-244.9 mV	-537 μ V	> 72.04 V	—			—
rmean	-231.056 mV	-231.056 mV	-537 μ V	> 61.77 V	< 1.1259 V			< 1.1259 V
rmin	-248.9 mV	-248.9 mV	-537 μ V	> 3.44 V	< -3.40 V			< -3.40 V
rmax	-192.5 mV	-192.5 mV	-537 μ V	> 163.80 V	< 3.19 V			< 3.19 V
sddev	6.513 mV	6.513 mV	—	> 10.92 V	< 279.1 mV			< 279.1 mV
rnum	885	885	1	885	876			876
status	✓	✓	✓	⊕	⊕			⊕

[illegible]

6-Dec-16
13:26:59

1
1 ms
1.00 V

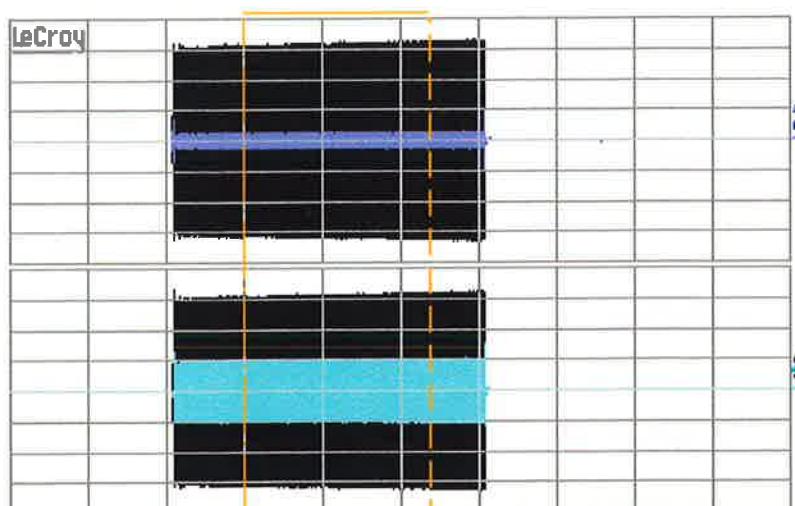
2
1 ms
1.00 V

3
1 ms
1.00 V

4
1 ms
1.00 V

1 ms

1 1 V AC
2 1 V AC
3 1 V AC
4 1 V AC



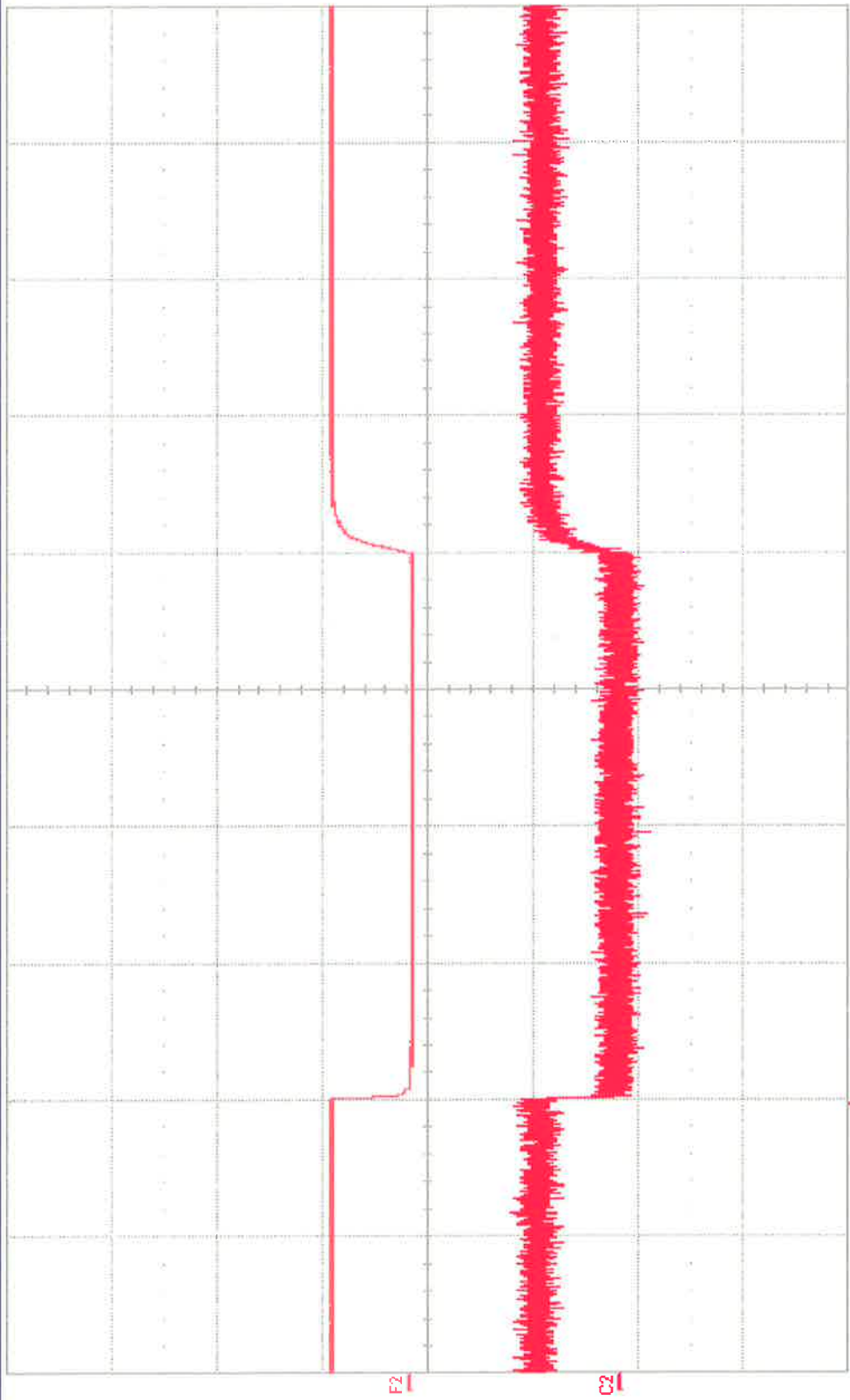
1613 sweeps: average low high sigma
rms(1) 2.299 V 2.080 2.389 0.066
rms(2) 185mV 151 212 15
rms(3) 2.260 V 2.056 2.348 0.060
rms(4) 719mV 612 764 24
phase(1,3) -89 ° -94 -85 2



Ext10 DC 0.05 V 1MΩ

10 MS/s

☐ NORMAL



C2 **DCIM** 50.0 mV/div
-91.5 mV

F2 **<C2>** 50.0 mV/div
1.00 ms/div
1.446 kV

Tbase -3.04 ms
1.00 ms/div
100 kS

Trigger **C4 DC**
Normal 2.42 V
Edge Negative