1250 Peterson Dr., Wheeling, IL 60090

Company: Holt Integrated Circuits, Inc.
Model Tested: HI-8450
Report Number: 19807
Project No. 6433

TEST SPECIFICATIONS:

RTCA/DO-160G (December 8, 2010)

RADIO TECHNICAL COMMISSION FOR AERONAUTICS

ENVIRONMENTAL CONDITIONS

AND

TEST PROCEDURE FOR AIRBORNE EQUIPMENT

THE FOLLOWING **MEETS** SECTION 22 (PIN) TEST PROCEDURE OF THE ABOVE TEST SPECIFICATION

Formal Name:	Single / Quad ARINC 429 Line Receivers with Integrated DO-160G Level 3 Lightning Protection
Kind of Equipment:	ARINC 429 Line Receiver
Test Configuration:	Tabletop (Tested at 3.3 Vdc)
Model Number(s):	HI-8450
Model(s) Tested:	HI-8450
Serial Number(s):	1, 2, 3
Date of Tests:	February 27, 2014
Test Conducted for:	Holt Integrated Circuits, Inc. 23351 Madero Mission Viejo, California 92691

NOTICE: “This report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government”. Please see the "Additional Description of Equipment Under Test" page listed inside of this report.

1250 Peterson Dr., Wheeling, IL 60090

Company: Holt Integrated Circuits, Inc.
Model Tested: HI-8450
Report Number: 19807
Project No. 6433

SIGNATURE PAGE

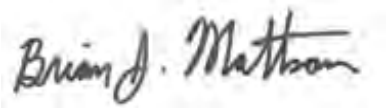
Report Written By:

Arnom C. Rowe
Test Engineer
EMC-001375-NE

Report Reviewed By:

Jack Prawica
Lab Manager
EMC-002412-NE

Report Approved By:



Brian J. Mattson
General Manager

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United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 100276-0

D.L.S. Electronic Systems, Inc.
Wheeling, IL

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2013-10-01 through 2014-09-30
Effective dates

For the National Institute of Standards and Technology

NVLAP-01C (REV. 2009-01-28)

1.0 INTRODUCTION:

On February 27, 2014, a series of susceptibility tests were made to demonstrate that the Single / Quad ARINC 429 Line Receivers with Integrated DO-160G Level 3 Lightning Protection, Model Number(s) HI-8450, serial number 1, 2, 3, manufactured by Holt Integrated Circuits, Inc. was tested to the requirements of RTCA/DO-160G (December 8, 2010), Environmental conditions and Test Procedures for Airborne Equipment using the following test procedure(s): Section 22 (PIN).

2.0 TEST FACILITY:

D.L.S. Electronic Systems, Inc. is a full service EMC Testing Laboratory accredited to ISO Guide 17025. NVLAP Certificate and Scope can be viewed at http://www.dlsemc.com/certificate. Our facilities are registered with the FCC, Industry Canada, and VCCI. All tests were performed by personnel of D.L.S. Electronic Systems, Inc. at the following location(s):

Main Test Facility:
D.L.S. Electronic Systems, Inc.
1250 Peterson Drive
Wheeling, Illinois 60090

A list of the test equipment used, along with identification and calibration data, is included in the Table of each Appendix of this report. All primary equipment was calibrated against known reference standards with a verified traceable path to NIST.

3.0 TEST SET-UP:

All susceptibility tests were performed at D.L.S. Electronic Systems, Inc. The Single / Quad ARINC 429 Line Receivers with Integrated DO-160G Level 3 Lightning Protection was placed on a copper bench measuring 24' long and 40" wide. The following describes the Lab that was used for testing:

LAB E 26' long x 16' wide x 16' high semi-ferrite lined enclosure.

*****Electromagnetic field absorbers were strategically placed according to Figure 21-11 of the RTCA/DO-160 Standard. All lines leaving the room were filtered. The auxiliary equipment was located outside the main room.

The tests were run in the following lab:

LAB E Section 22, Lightning Inducted Transient Susceptibility

4.0 OPERATING CONDITIONS OF TEST SAMPLE:

All test measurements were made at a laboratory temperature of **72˚F** at **40%** humidity with the following mode of operation:

Power up the device with 3.3 V supply at VDD.

5.0 PERFORMANCE MONITORED:

The Single / Quad ARINC 429 Line Receivers with Integrated DO-160G Level 3 Lightning Protection performance was monitored as follows:

Any change to the initial supply current measurement after lightning injection will be categorized as out of specification. Current draw should be between 8-9mA.

6.0 DESCRIPTION OF TEST SAMPLE: (See also Paragraph 7.0)

6.1 DESCRIPTION

Single / Quad ARINC 429 Line Receivers with Integrated DO-160G Level 3 Lightning Protection.

6.5 DESCRIPTION OF ALL CIRCUIT BOARDS:

Item 1 Board 2

Item 2 Board 3

7.0 ADDITIONAL DESCRIPTION OF EQUIPMENT UNDER TEST:
(See also Paragraph 6.0)

There were no changes made during testing.

8.0 PHOTO ID INFORMATION:

The test set up can be seen in the accompanying photograph.

Item 0 Board 1

Item 1 Board 2

Item 2 Board 3

9.0 PHOTO ID TAKEN DURING TESTING:

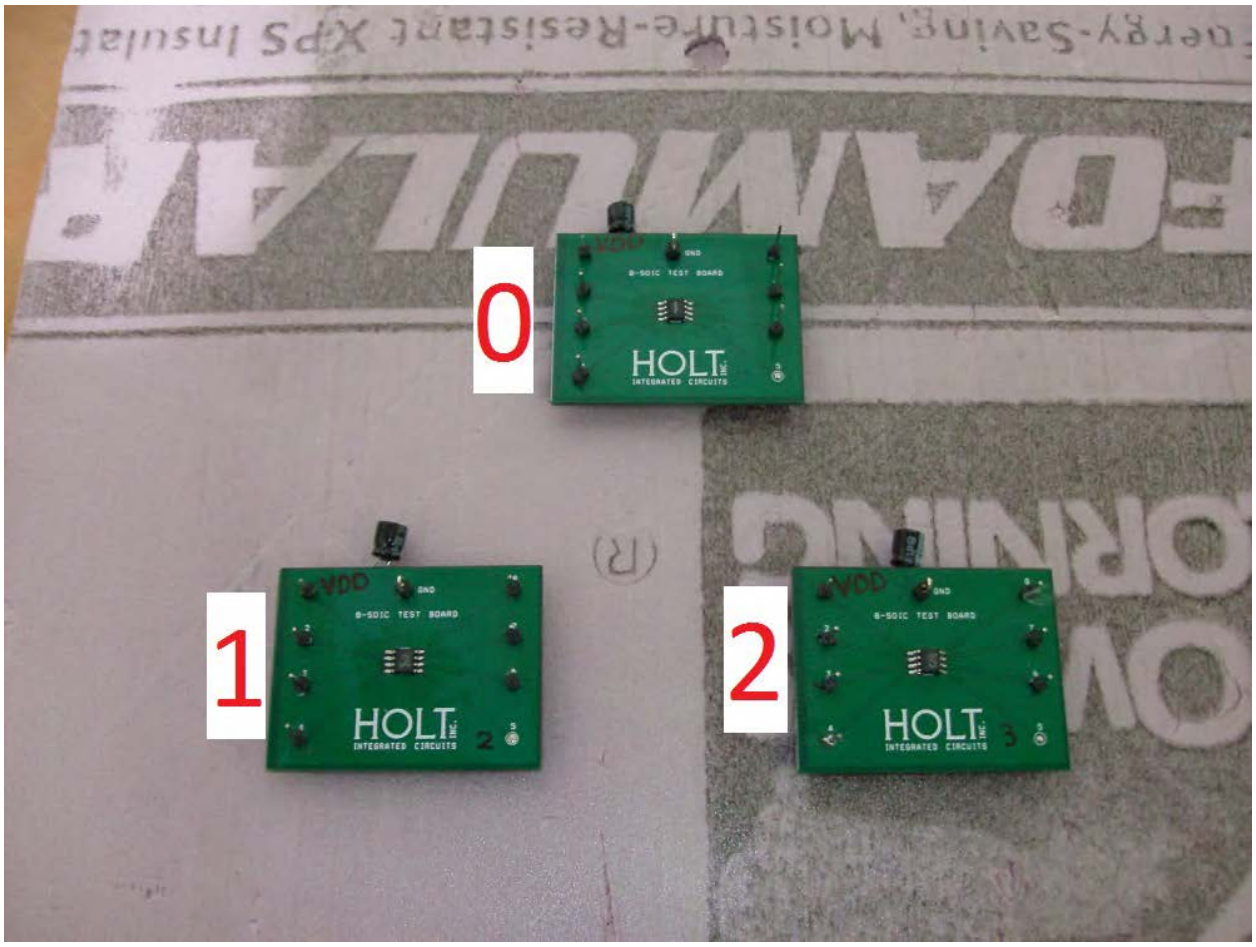


Photo ID

10.0 REFERENCES:

1. Document No. RTCA/DO-160G, December 8, 2010
   Prepared by: SC-135

11.0 TEST RESULTS:

The Single / Quad ARINC 429 Line Receivers with Integrated DO-160G Level 3 Lightning Protection was subject to the test procedure(s) Section 22 (PIN). A detailed explanation of how these tests and their measurements were made is shown in Appendix(es) A at the end of this report.

12.0 CONCLUSION OF SUSCEPTIBILITY TESTS:

The Single / Quad ARINC 429 Line Receivers with Integrated DO-160G Level 3 Lightning Protection, Model Number(s) HI-8450, **meets** Section 22 (PIN) RTCA/DO-160G (December 8, 2010), Environmental conditions and Test Procedures for Airborne Equipment. See the Appendix(es) A for a detailed explanation of the test results.

APPENDIX A

RTCA/DO-160G

SECTION 22

PARAGRAPH 22.5

LIGHTNING INDUCED

TRANSIENT SUSCEPTIBILITY

PIN INJECTION

1.0 PURPOSE OF THE TEST:

These tests verify the capability of the equipment to withstand effects of lightning induced electrical transients. The damage tolerance test was performed using the Pin Injection test method.

2.0 CATEGORIES, WAVEFORMS AND LEVELS:

Categories used are A3,B3 & Z3

Category designations for equipment consist of five characters appears as follows:

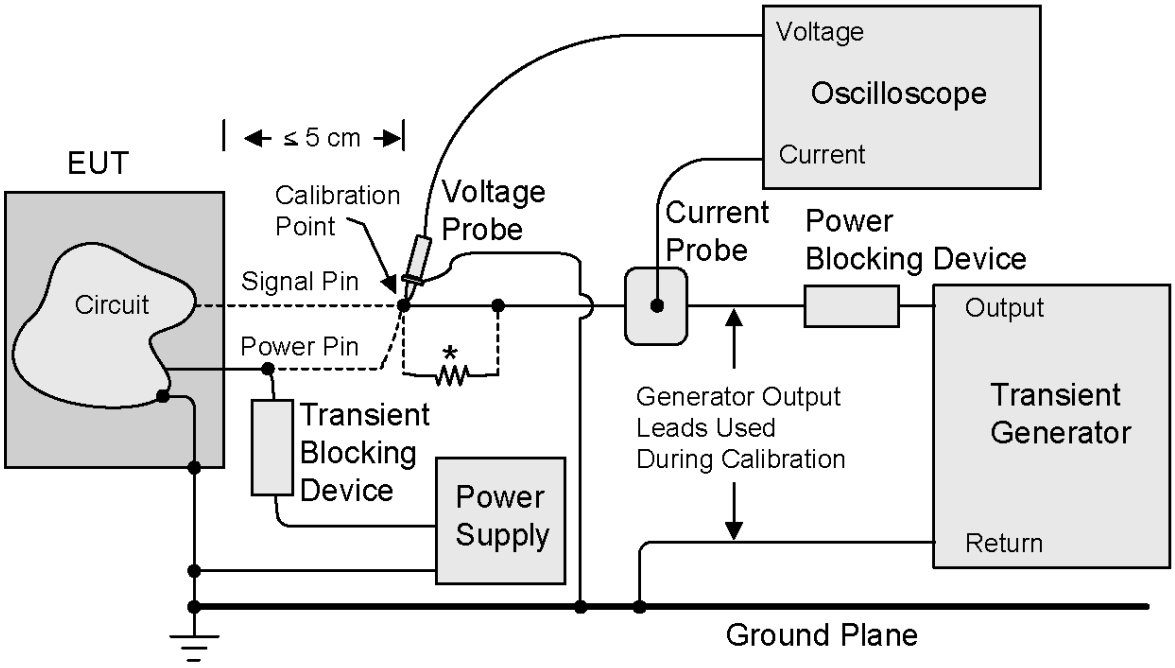
3, 4, 5	3	X	X	X	X
Pin Test Waveform Set	Pin Test Level	Cable Bundle Single and Multiple Stroke Test Waveform Set	Cable Bundle Single and Multiple Stroke Test Level	Cable Bundle Multiple Burst Test Waveform Set	Cable Bundle Multiple Burst Test Level

X = Tests not performed

The equipment under test was tested to the levels and waveforms consistent with its expected use and aircraft installation. The Single / Quad ARINC 429 Line Receivers with Integrated DO-160G Level 3 Lightning Protection was subjected to Waveform(s) 3,4,5A,5B using Level(s) 3.

3.0 TEST SETUP AND APPARATUS:

A typical test setup is shown in Figure 22-13.



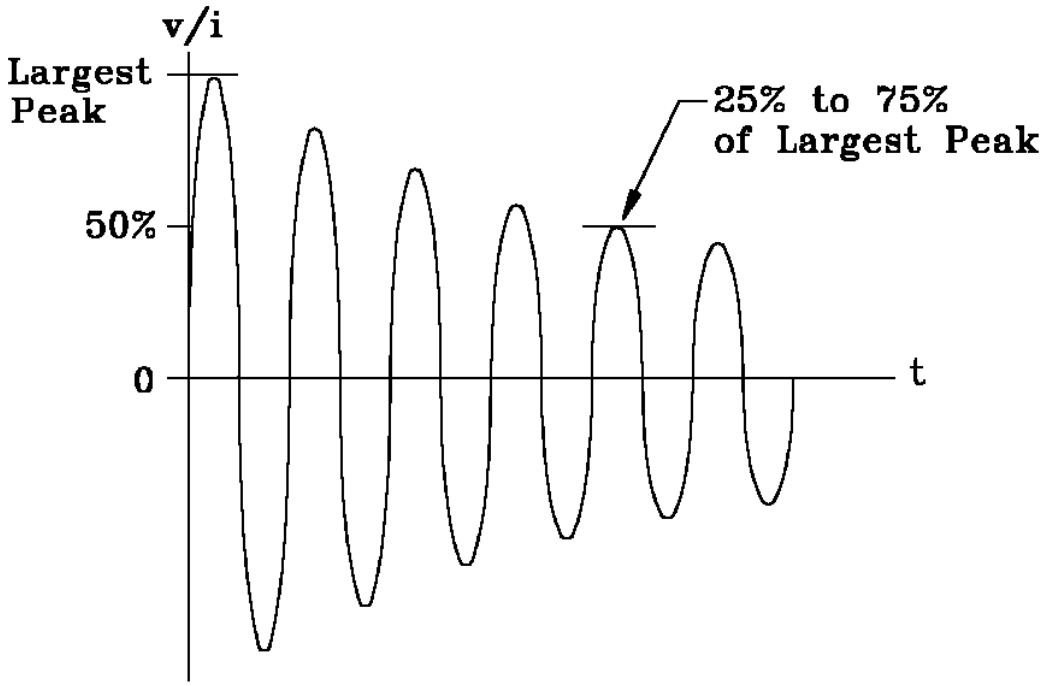
NOTES:

1. *The notes from the calibration setup of Figure 22-10 apply.*
2. *Test setup and procedures are to be such that the required lightning transients appear differentially between the aircraft power and return/neutral lines. If power and return/neutral originate from a remote load, in the same cable bundle with signals, then the test setup should use an isolated power return to ensure the proper common-mode evaluation.*
3. *The power supply is not necessary for tests on un-powered equipment.*
4. *Test procedures assume lightning transients appear common-mode between all pins and case. If the expected installation utilizes local power and/or signal returns tied either internally or externally to case or aircraft structure, tests shall be performed with the return(s) tied to the case.*
5. *Return wire lengths shall be kept as short as possible.*

Figure 22-13 Pin Injection Test Setup, Signal Pins & Power Pins – Direct Injection Method

3.0 TEST SETUP AND APPARATUS: (CON'T)

The transient generator used produced the Voltage/Current Waveform 3 shown in Figure 22-3 of the test specification. Any method of generating the spike may be used if the waveform complies with Figure 22-3. The generator was connected to the designated pin and case ground of the device under test by means of a short, low inductance lead.



NOTES:
1. *Voltage and current are not required to be in phase.*
2. *The waveshape may have either a damped sine or cosine waveshape.*

Figure 22-3 Voltage/Current Waveform 3

3.0 TEST SETUP AND APPARATUS: (CON'T)

The transient generator used produced the Voltage Waveform 4 shown in Figure 22-4 of the test specification. Any method of generating the spike may be used if the waveform complies with Figure 22-4. The generator was connected to the designated pin and case ground of the device under test by means of a short, low inductance lead.

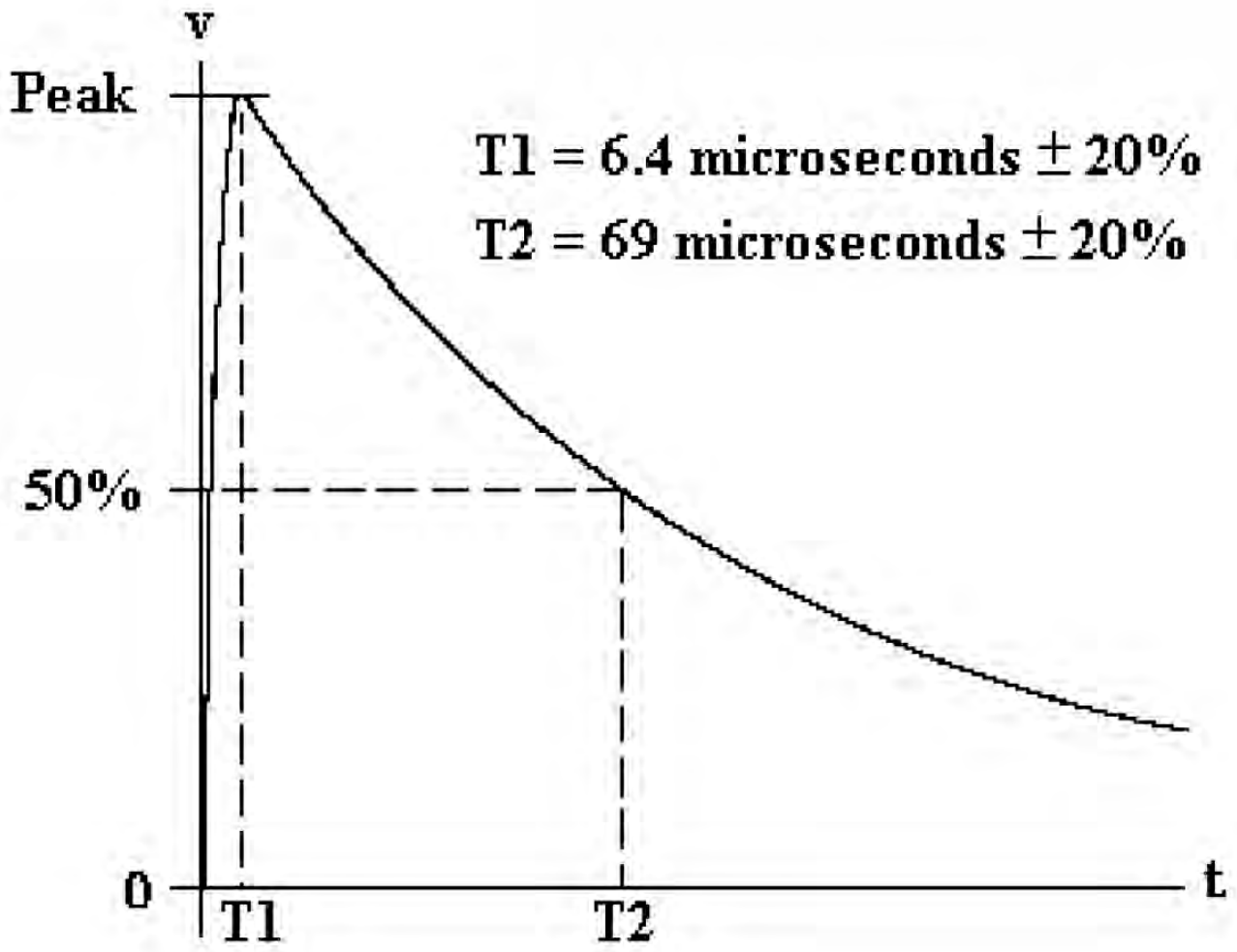


Figure 22-4 Voltage Waveform 4

3.0 TEST SETUP AND APPARATUS: (CON'T)

The transient generator used produced the Current/Voltage Waveform 5 shown in Figure 22-5 of the test specification. Any method of generating the spike may be used if the waveform complies with Figure 22-5. The generator was connected to the designated pin and case ground of the device under test by means of a short, low inductance lead.

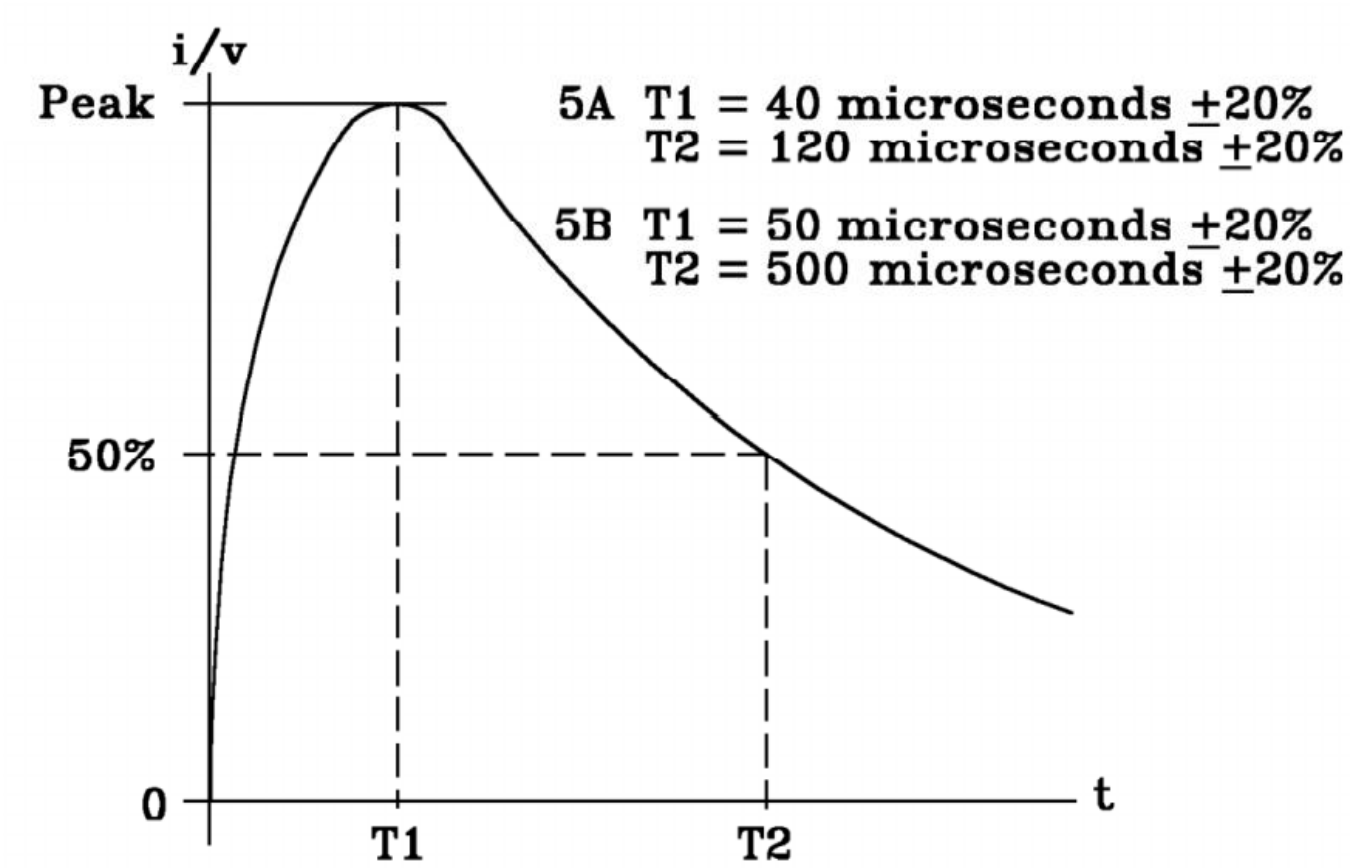


Figure 22-5 Current/Voltage Waveform 5

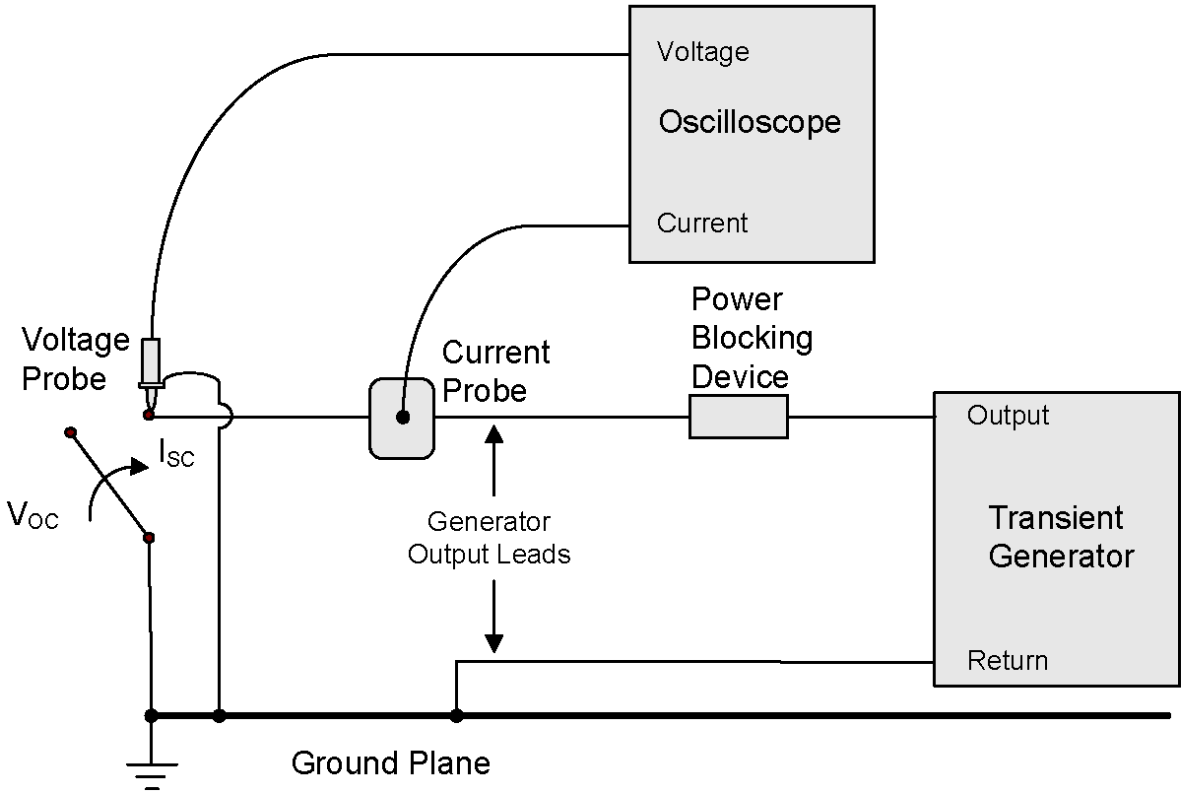
4.0 TEST PROCEDURE:

Pin injection testing is a technique whereby the chosen transient waveform(s) is applied directly to each pin and case ground of the designated pins. Waveform 3 (1MHz damped sine), Waveform 4 (6.4 x 69us double exponential), 5A (T1 = 40 usec and T2 = 120 usec) and 5B (T1 = 50 usec and T2 = 500 usec) were each applied at level 3 positive and negative polarities, to the Single / Quad ARINC 429 Line Receivers with Integrated DO-160G Level 3 Lightning Protection pins called out in Table 22-1 & 22-2 of RTCA/DO-160F. The Single / Quad ARINC 429 Line Receivers with Integrated DO-160G Level 3 Lightning Protection was not powered up and none of the cables were connected throughout Pin Injection test.

For each waveform at each level, ten positive and ten negative discharges were applied at minimum intervals of 10 seconds. The actual waveshape applied to each pin was measured with a 1000x oscilloscope probe within 5cm of the pin. All waveshapes were recorded.

4.0 TEST PROCEDURE:

The following test setup was used for calibration.



NOTES:

1. *Tests of active ac power circuits may require transformer coupling of the applied transients to the power lines and transients should be synchronized to the pea k of the ac waveform.*

2. *A power blocking device may be used to isolate voltages at the pins of the EUT from the low generator impedance and must be present during calibration since they may adversely affect the waveform calibration. Typical power blocking devices are bipolar suppression devices for Waveforms 4 and 5 or a series capacitor for Waveform 3. The bipolar suppression device is selected with a voltage rating close to the expected EUT operating voltage but may have a nominal value to allow testing with one calibrated setup. A voltage rating that represents a significant percentage of the applied transient will affect waveform calibration. The capacitor is selected to achieve the calibration current; too large a value may produce unwanted resonance during test.*

3. *The Power Blocking Device is not necessary for tests on un -powered equipment.*

Figure 22-10 Pin Injection Calibration Setup, Signal Pins & Power Pins – Direct Injection Method

5.0 LIMITS & RESULTS:

5.1 LIMITS:

The Waveform used for the test is taken from the following table:

Table 22-2 Generator Setting Levels for Pin Injection

Level	Waveforms		
	3/3	4/1	5A/5A
	Voc/Isc	Voc/Isc	Voc/Isc
1	100/4	50/10	50/50
2	250/10	125/25	125/125
3	600/24	300/60	300/300
4	1500/60	750/150	750/750
5	3200/128	1600/320	1600/1600

NOTES:

1. *Voc = Peak Open Circuit Voltage (Volts) available at the calibration point shown in Figure 22-10, Figure 22-11, or Figure 22-12.*
2. *Isc = Peak Short Circuit Current (Amps) available at the calibration poin t shown in Figure 22-10, Figure 22-11, or Figure 22-12.*
3. *Amplitude Tolerances +10%, -0%.*
4. *The ratio of Voc to Isc is the generator source impedance to be used during the calibration procedure.*
5. *Waveforms 3, 4 and 5A are identified in Figure 22-3, Figure 22-4 and Figure 22-5.*

a

5.0 LIMITS & RESULTS (CON'T):

5.2 RESULTS:

The unit under test was powered up and monitored for susceptibility during testing. The actual waveshapes were applied to the pins and recorded. On any given pin, the waveshape did not significantly vary between the first and tenth discharges. At regular intervals and after all events, the generators' open circuit calibration waveshape and source impedance were re-verified. In all cases, the generator maintained its' performance. There were no events noted during testing, indicating possible damage to circuitry through these pins. The post operation was verified and the Single / Quad ARINC 429 Line Receivers with Integrated DO-160G Level 3 Lightning Protection passed the requirements of Section 22 (Pin Injection).

5.0 LIMITS & RESULTS (CON'T):

5.2 RESULTS:

The Single / Quad ARINC 429 Line Receivers with Integrated DO-160G Level 3 Lightning Protection **meets** the following conditions:

Lab used: E

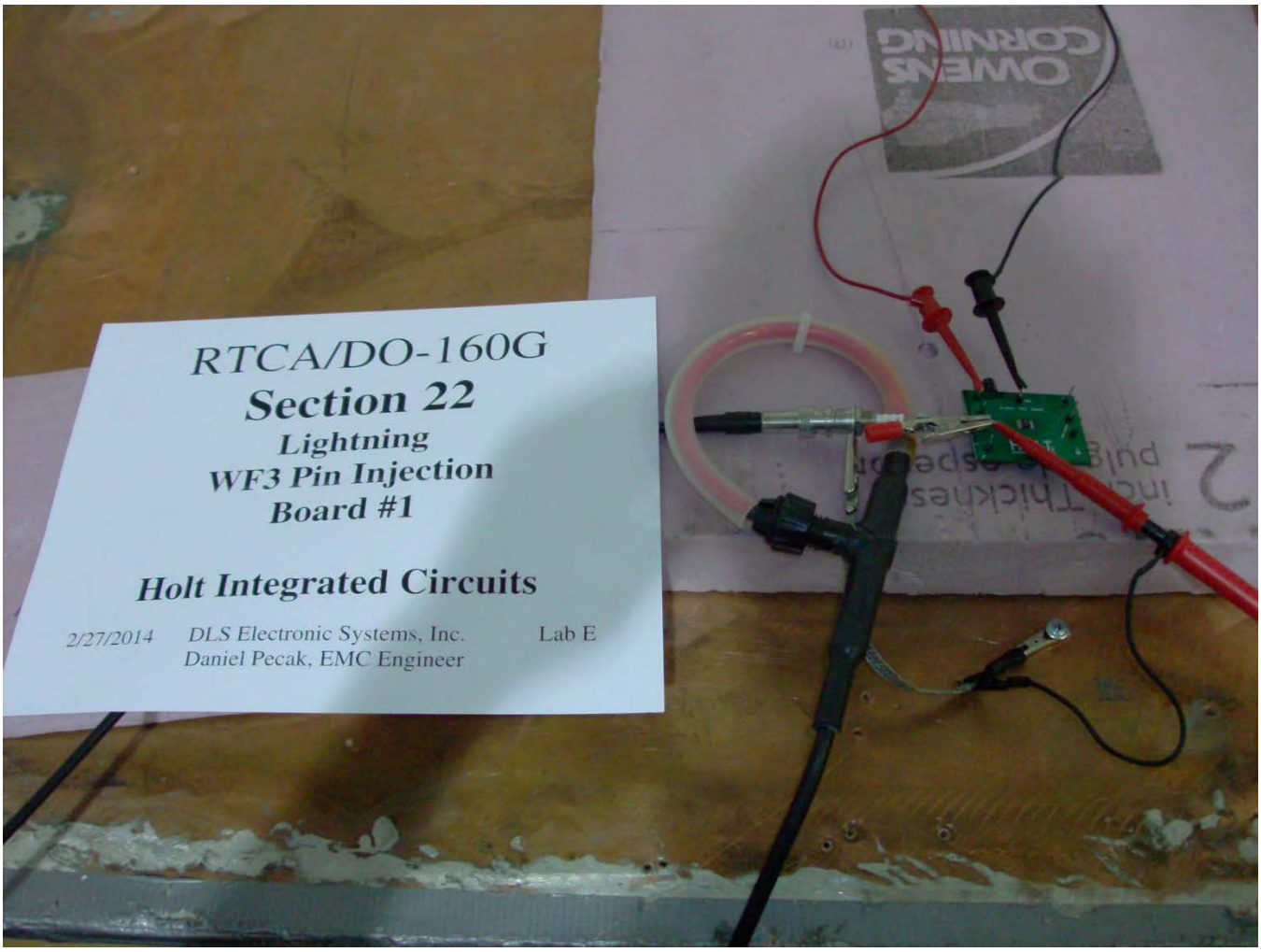
Summary:

Board 1 was tested to Category A3, Board 2 to Category B3, Board 3 to Category Z3. Category Z3 consisted of WF3 and WF5B.

Input 1A and 1B was tested on each board. The pretest resistance measurement of 19kOhms did not change after the lightning pin injection was performed.

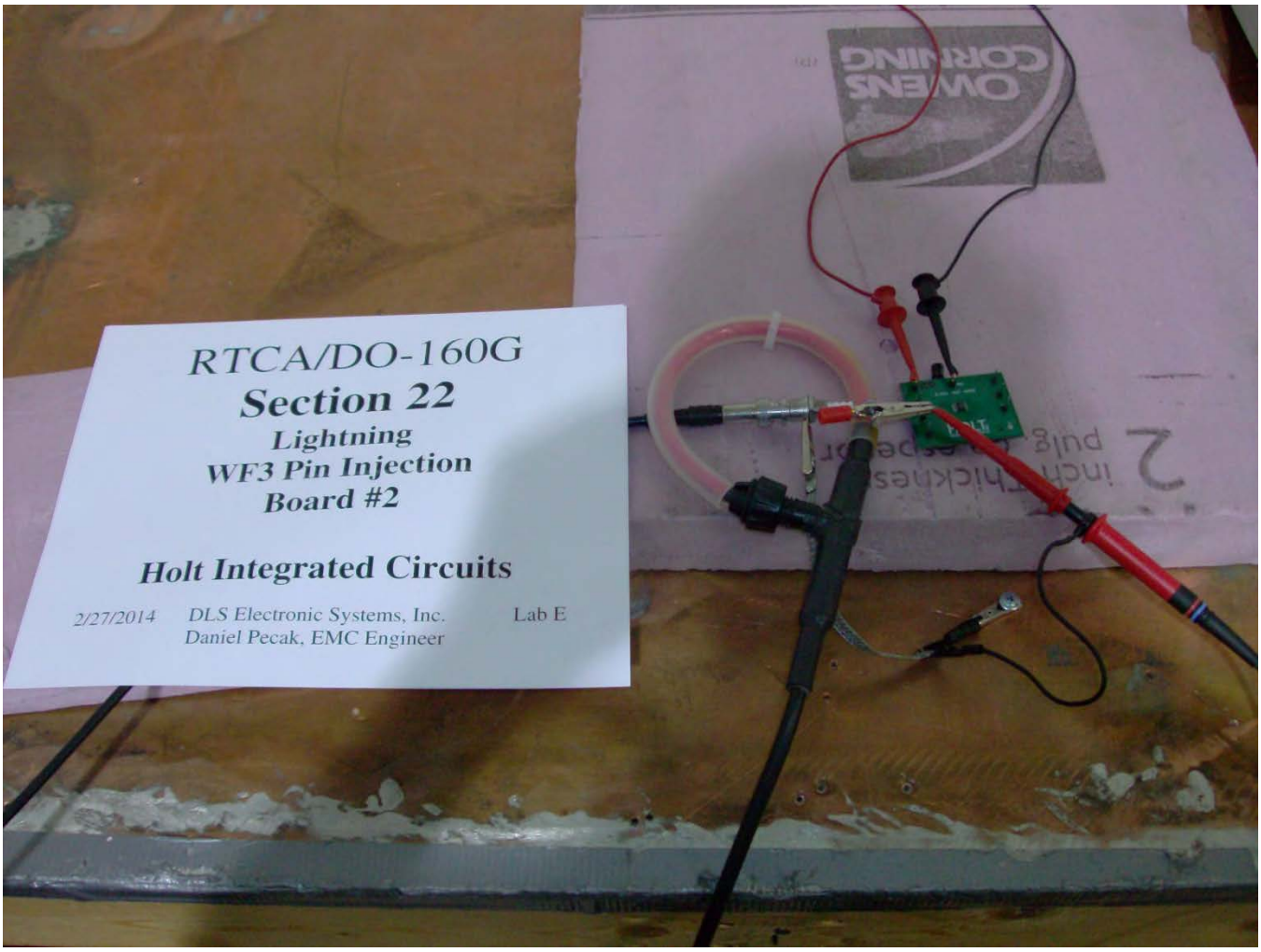
There were no issues were observed during this test. See the data sheets at the end of this appendix for the test results.

6.0 PHOTOS TAKEN DURING TESTING



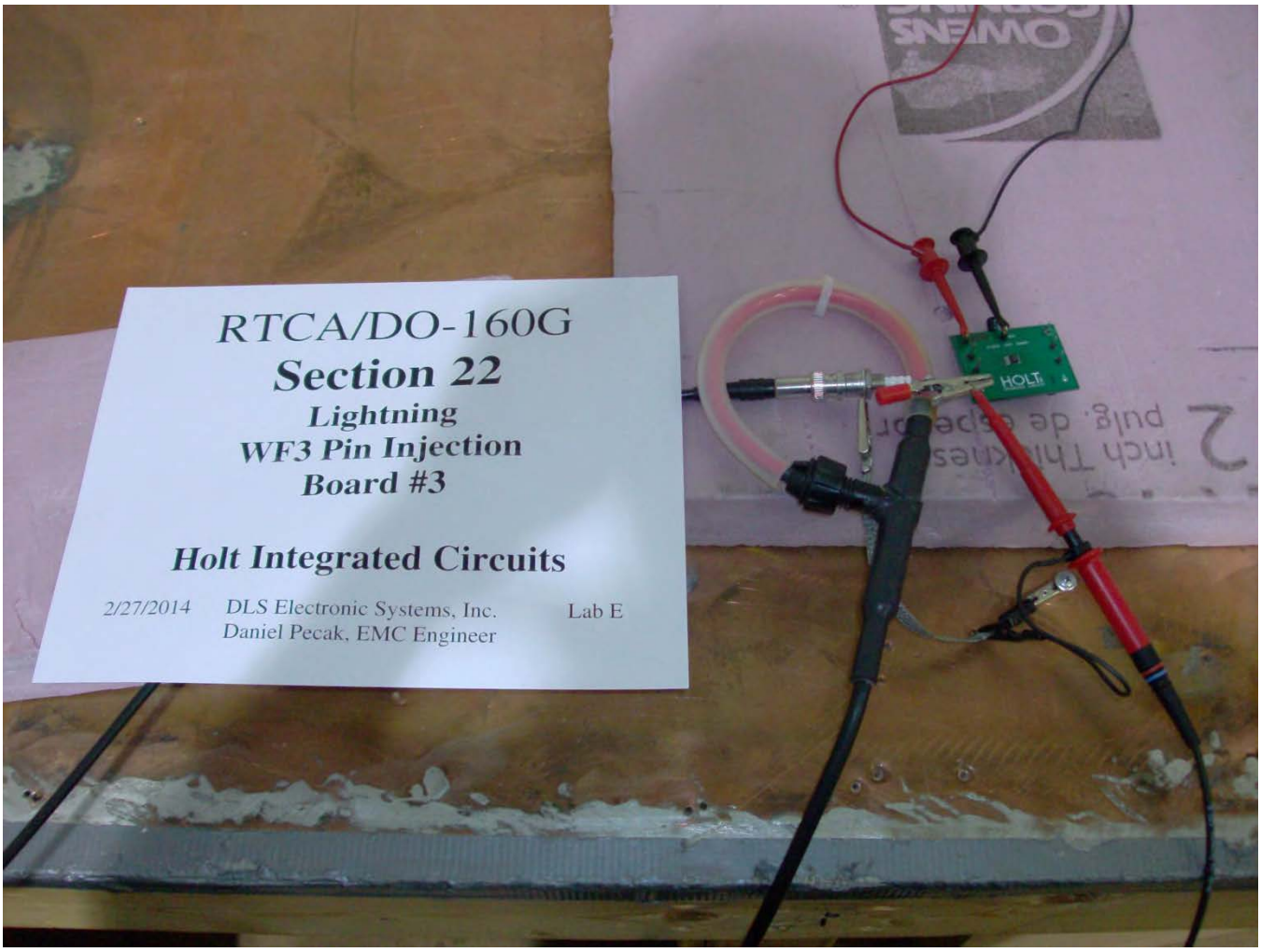
Section 22 Pin Injection - WF3 Board 1

6.0 PHOTOS TAKEN DURING TESTING



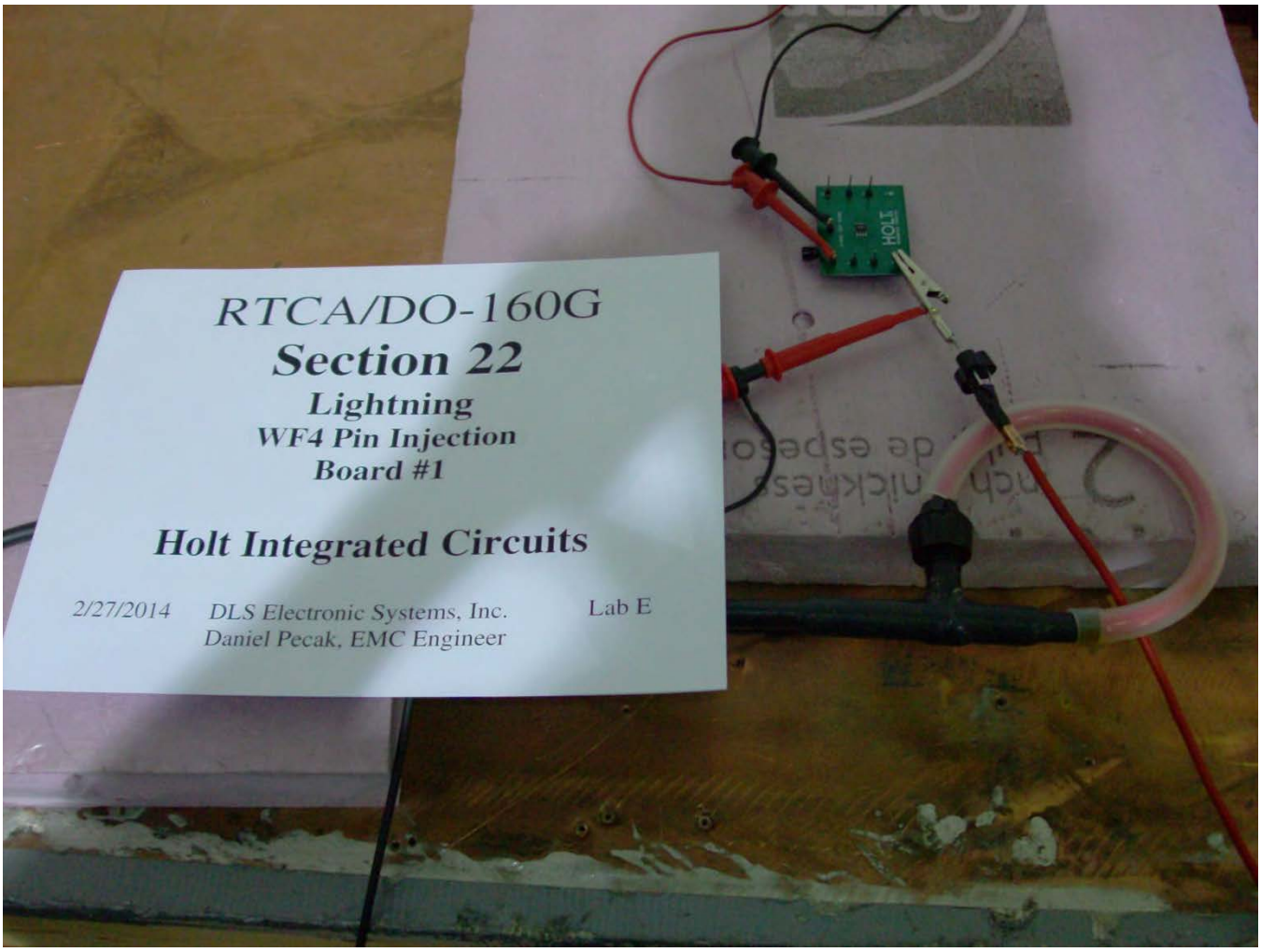
Section 22 Pin Injection - WF3 Board 2

6.0 PHOTOS TAKEN DURING TESTING



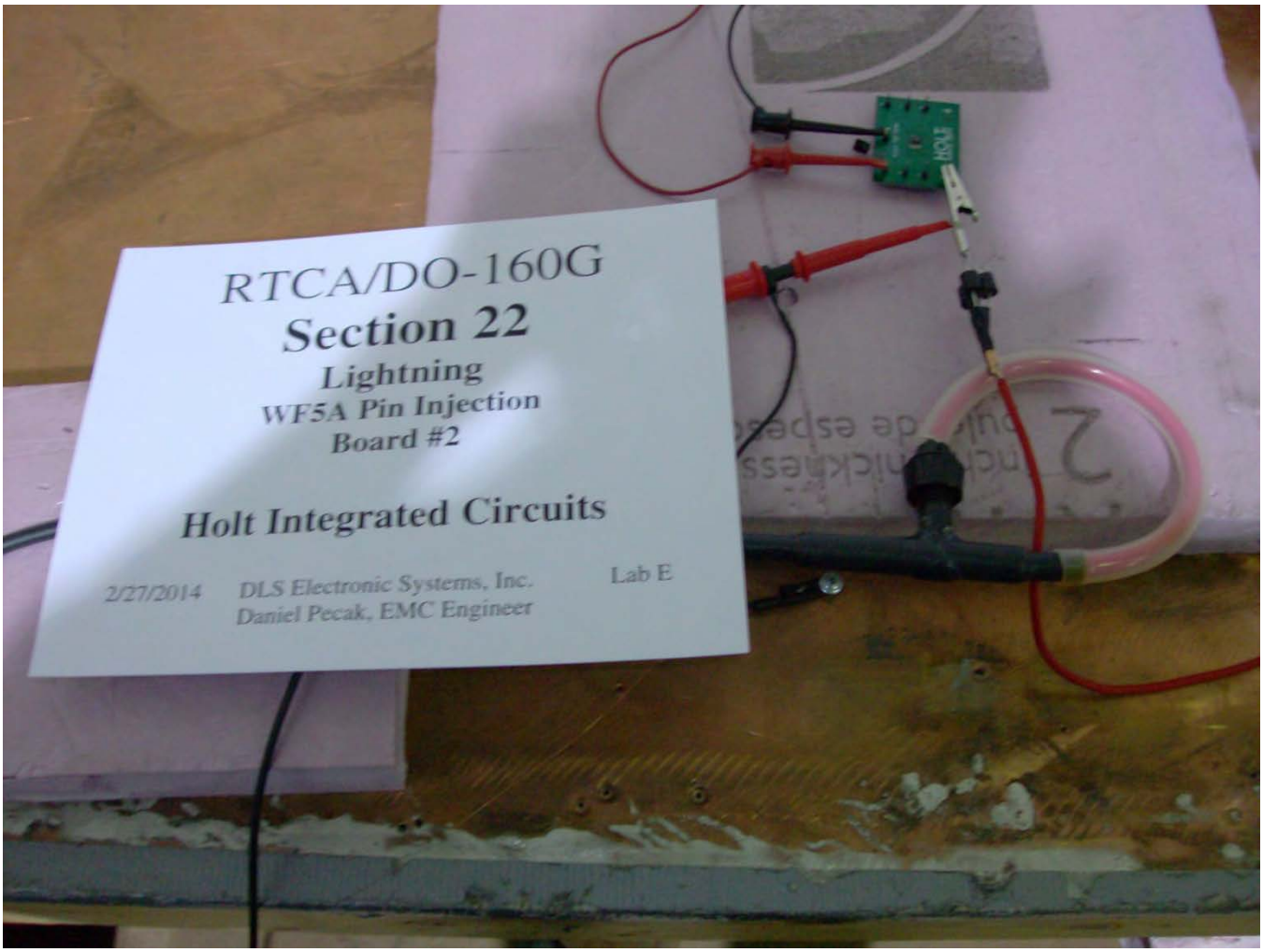
Section 22 Pin Injection - WF3 Board 3

6.0 PHOTOS TAKEN DURING TESTING



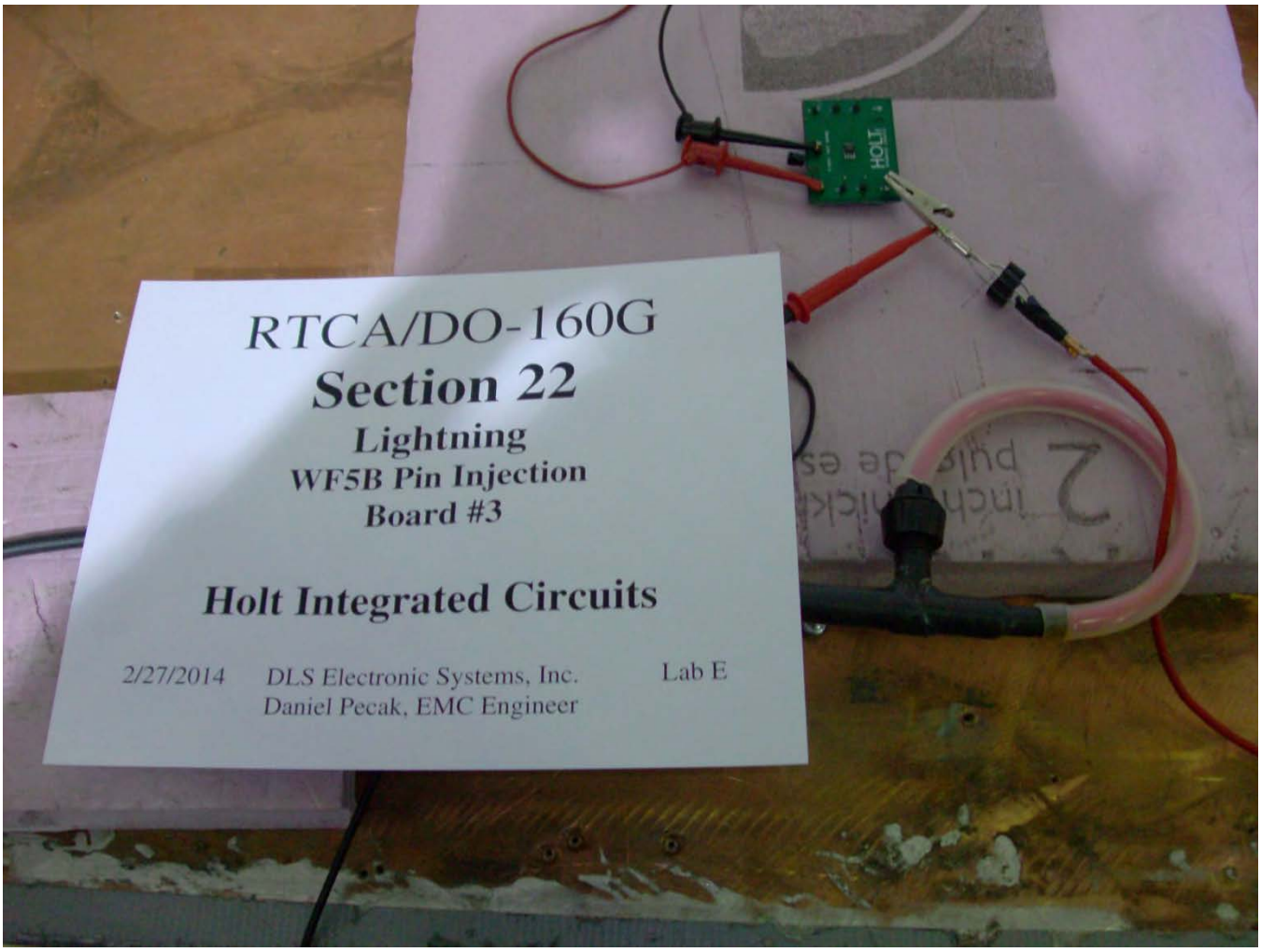
Section 22 Pin Injection - WF4 Board 1

6.0 PHOTOS TAKEN DURING TESTING



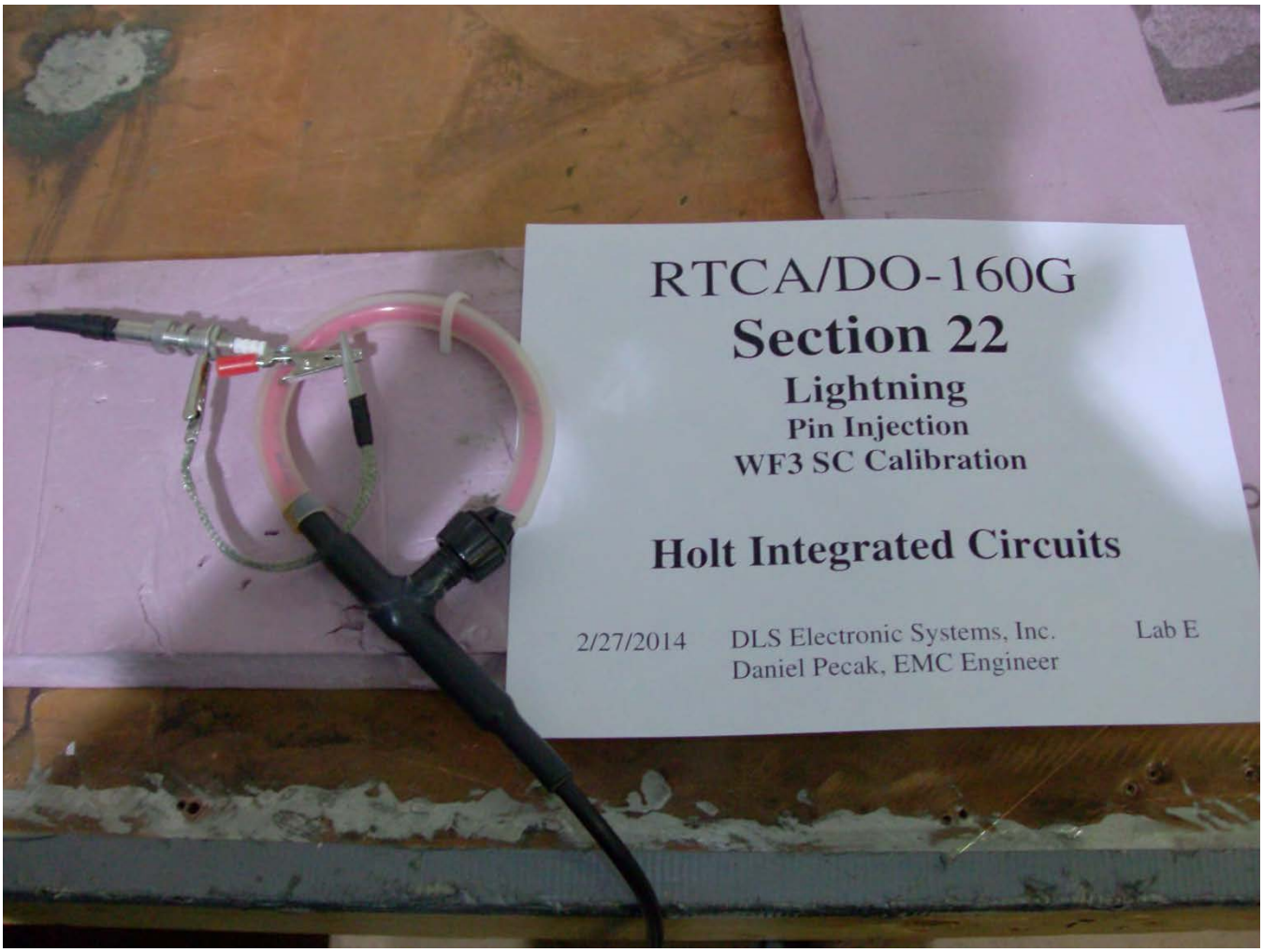
Section 22 Pin Injection - WF5A Board 2

6.0 PHOTOS TAKEN DURING TESTING



Section 22 Pin Injection - WF5B Board 3

6.0 PHOTOS TAKEN DURING TESTING



Section 22 Pin Injection - WF3 SC Calibration

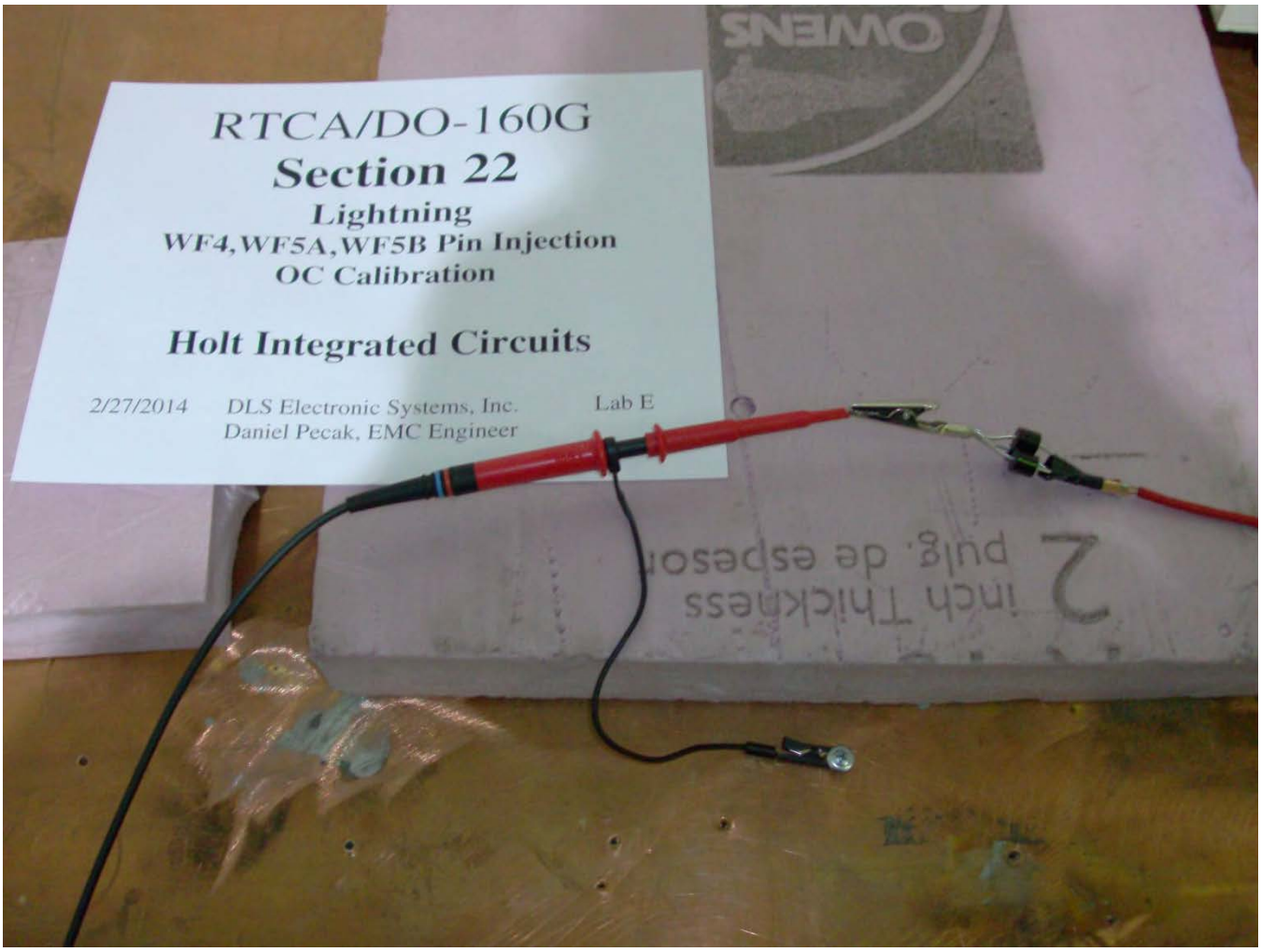
6.0 PHOTOS TAKEN DURING TESTING

Section 22 Pin Injection - WF3 OC Calibration

6.0 PHOTOS TAKEN DURING TESTING

Section 22 Pin Injection - WF4, WF5A & WF5B SC Calibration

6.0 PHOTOS TAKEN DURING TESTING



Section 22 Pin Injection - WF4, WF5A & WF5B OC Calibration

SECTION 22

TEST INSTRUMENTATION

Lightning Induced Transient Susceptibility

TABLE 1

Equipment	Manufacturer	Model Number	Serial Number	Range	Cal. On	Cal. Due
Oscilloscope	LeCroy	WavePro 7200A	LCRY0705N13389	2 GHz 20GS/s	06/04/2013	06/04/2014
Current Probe	PEM	CWT 6R	6997-8287	16 MHz	11/4/2013	11/4/2014

All primary equipment is calibrated against known reference standards with a verified traceable path NIST.

SECTION 22

TEST EQUIPMENT

Lightning Induced Transient Susceptibility

TABLE 2

Equipment	Manufacturer	Model Number	Serial Number	Range
Transient Generator	EMC Partner	MIG0600MS	DLS#795	N/A
Transient Generator	EMC Partner	MIG-OS-MB	DLS#796	N/A

NOTE: The above test equipment is verified upon use.

PIN INJECTION TEST DATA SHEETS

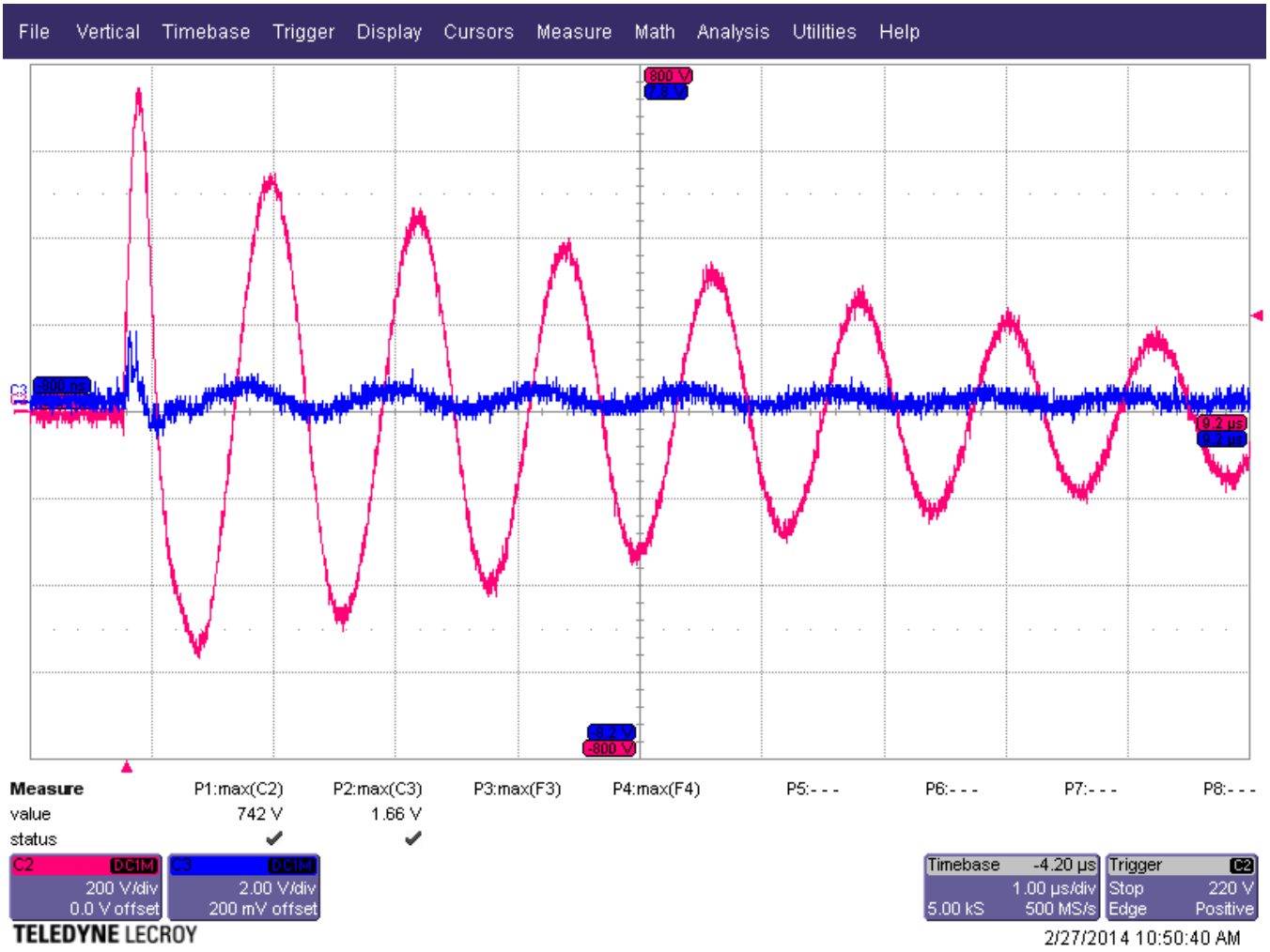
WF3

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 10:50:30 AM

Pin WF3 Test Pos - Board 1 - Input 1A

DLS EMC & Product Safety Testing • Consulting

Holt Integrated Electronics
Board 1
Pin Inj. WF3 (Direct Injection)
Level 3 - 600V/24A
Gen 650



Channel Status

		C2	C3
Vertical	V / Div	200 V	2.00 V
	Offset	0.0 V	200 mV
	Coupling	DC1MΩ	DC1MΩ
	BW	Full	Full
	Probe	1.000e+3	200.000
	Sweeps	1 #	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

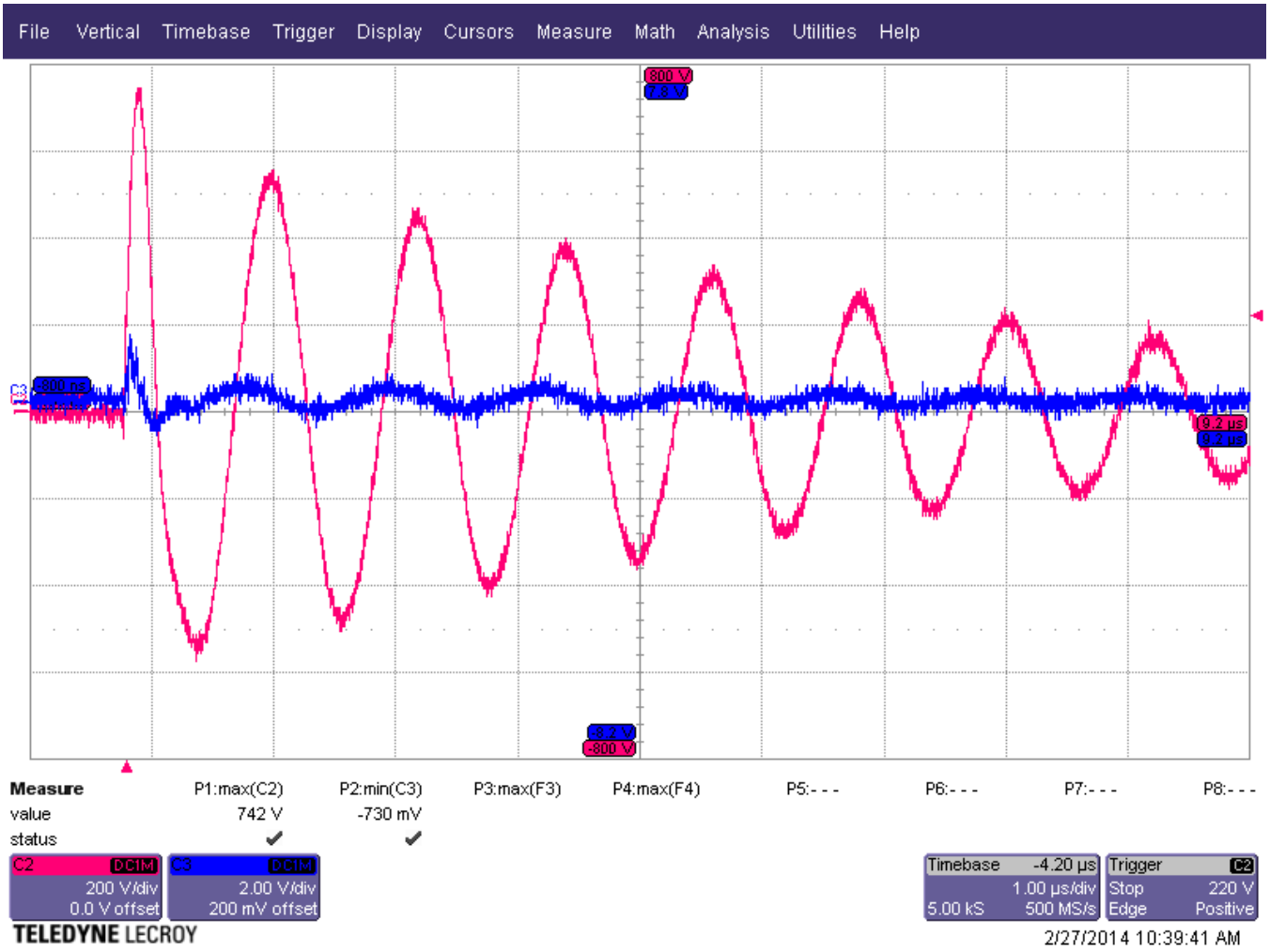
Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 10:39:28 AM

Pin WF3 Test Pos - Board 1 - Input 1B

DLS EMC & Product Safety Testing • Consulting

Holt Integrated Electronics
Board 1
Pin Inj. WF3 (Direct Injection)
Level 3 - 600V/24A
Gen 650



Channel Status

		C2	C3
Vertical	V / Div	200 V	2.00 V
	Offset	0.0 V	200 mV
	Coupling	DC1MΩ	DC1MΩ
	BW	Full	Full
	Probe	1.000e+3	200.000
	Sweeps	1 #	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

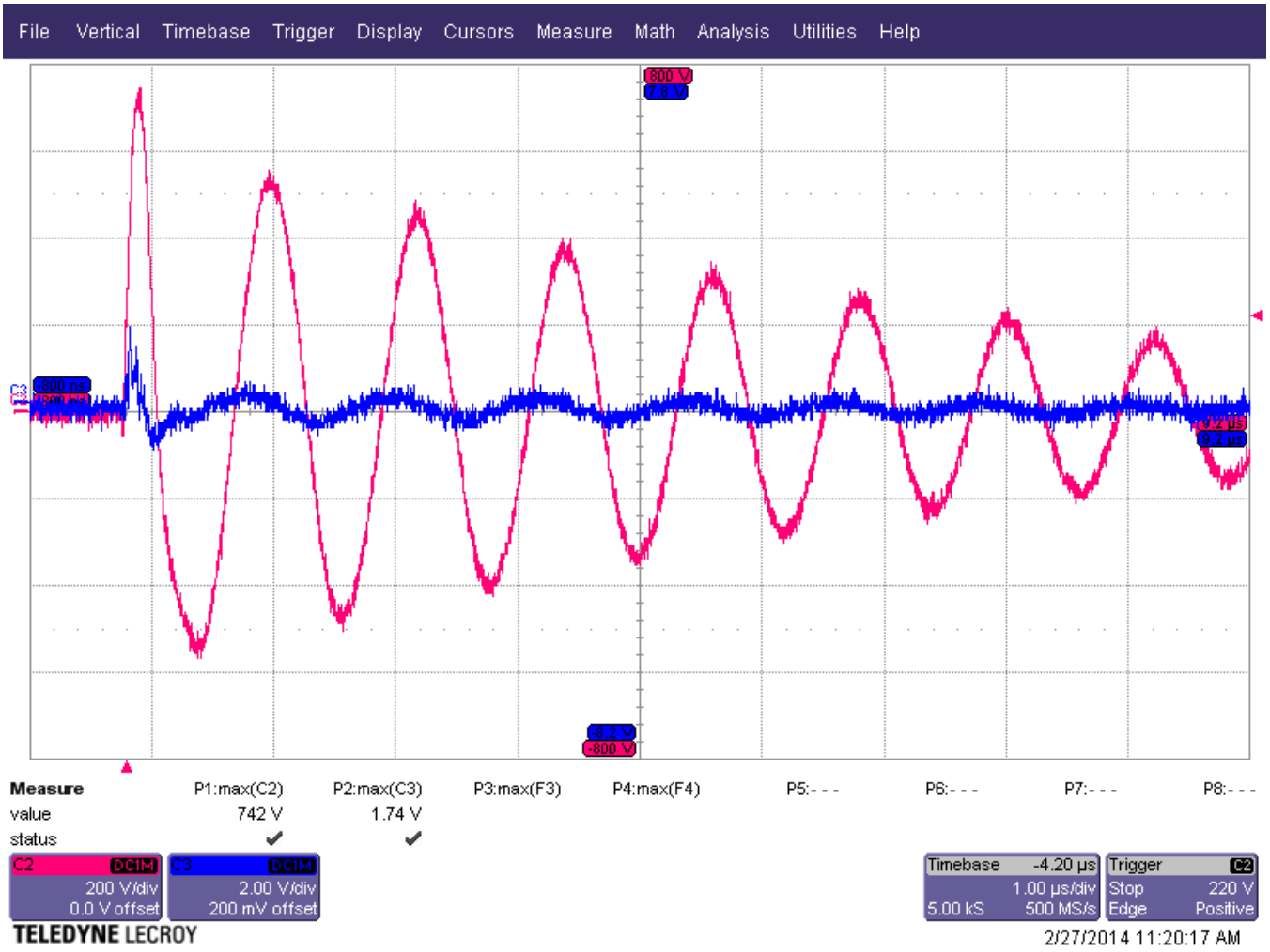
Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 11:20:07 AM

Pin WF3 Test Pos - Board 2 - Input 1A

DLS EMC & Product Safety Testing • Consulting

Holt Integrated Electronics
Board 2
Pin Inj. WF3 (Direct Injection)
Level 3 - 600V/24A
Gen 650



Channel Status

		C2	C3
Vertical	V / Div	200 V	2.00 V
	Offset	0.0 V	200 mV
	Coupling	DC1MΩ	DC1MΩ
	BW	Full	Full
	Probe	1.000e+3	200.000
	Sweeps	1 #	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

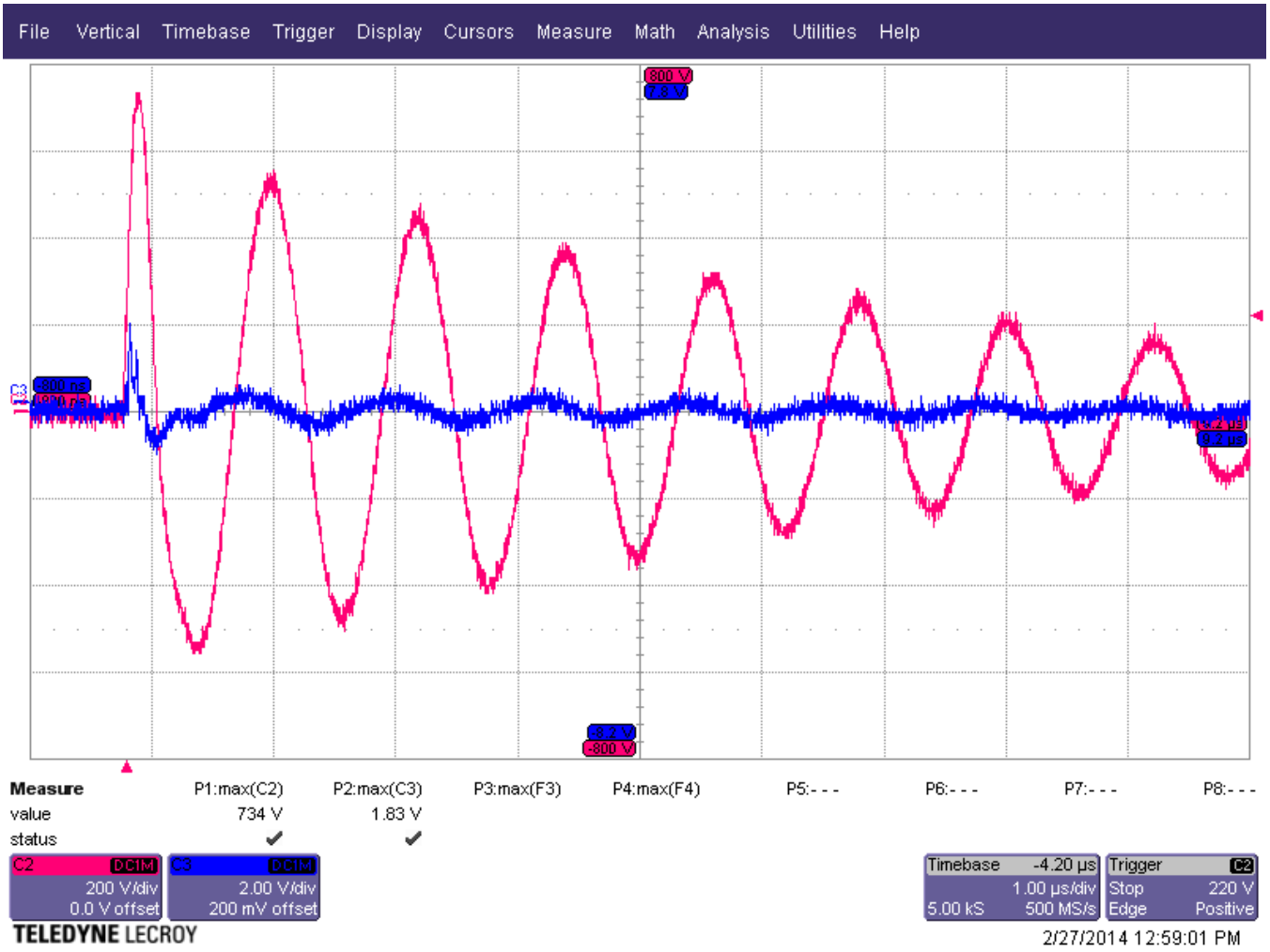
Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 12:58:49 PM

Pin WF3 Test Pos - Board 2 - Input 1B

DLS EMC & Product Safety Testing • Consulting

Holt Integrated Electronics
Board 2
Pin Inj. WF3 (Direct Injection)
Level 3 - 600V/24A
Gen 650



Channel Status

		C2	C3
Vertical	V / Div	200 V	2.00 V
	Offset	0.0 V	200 mV
	Coupling	DC1MΩ	DC1MΩ
	BW	Full	Full
	Probe	1.000e+3	200.000
	Sweeps	1 #	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

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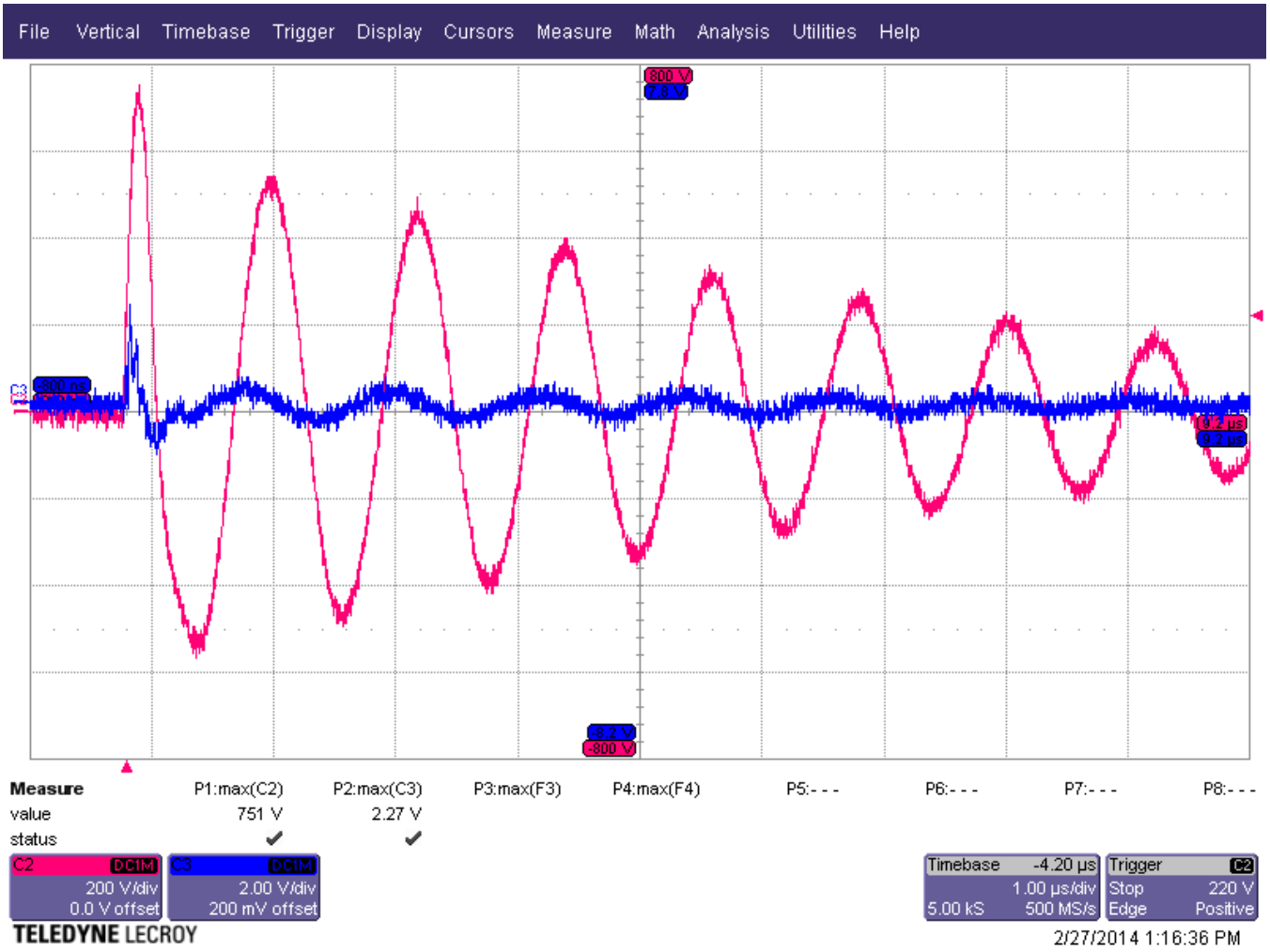
DSO S/N:
User: labadmin
Time: 2/27/2014 1:16:25 PM

Pin WF3 Test Pos - Board 3 - Input 1A

DLS EMC & Product Safety Testing • Consulting

Holt Integrated Electronics
Board 3
Pin Inj. WF3 (Direct Injection)
Level 3 - 600V/24A
Gen 650



Channel Status

		C2	C3
Vertical	V / Div	200 V	2.00 V
	Offset	0.0 V	200 mV
	Coupling	DC1MΩ	DC1MΩ
	BW	Full	Full
	Probe	1.000e+3	200.000
	Sweeps	1 #	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

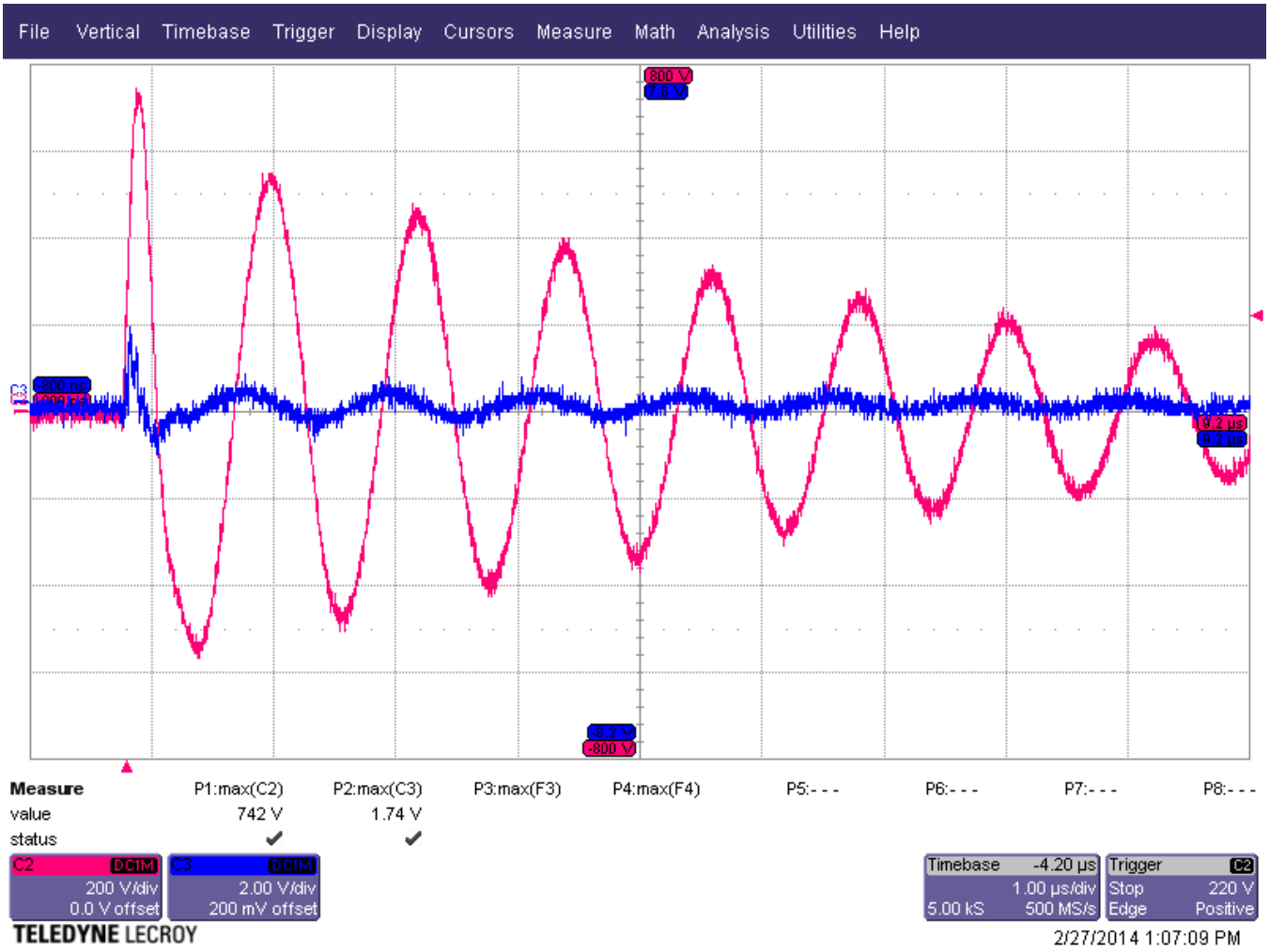
Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 1:06:52 PM

Pin WF3 Test Pos - Board 3 - Input 1B

DLS EMC & Product Safety Testing • Consulting

Holt Integrated Electronics
Board 3
Pin Inj. WF3 (Direct Injection)
Level 3 - 600V/24A
Gen 650



Channel Status

		C2	C3
Vertical	V / Div	200 V	2.00 V
	Offset	0.0 V	200 mV
	Coupling	DC1MΩ	DC1MΩ
	BW	Full	Full
	Probe	1.000e+3	200.000
	Sweeps	1 #	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

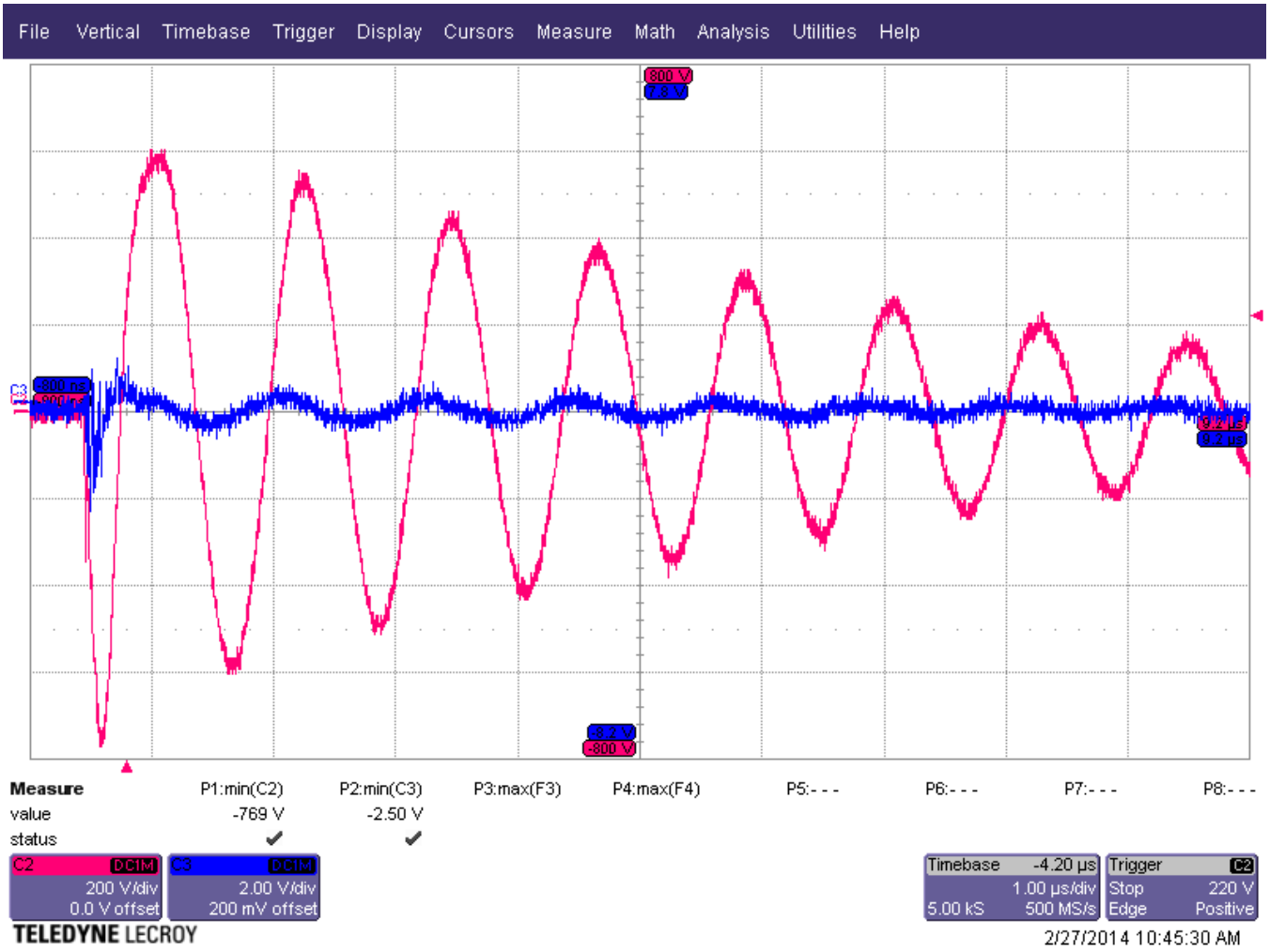
Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 10:45:21 AM

Pin WF3 Test Neg - Board 1 - Input 1A

DLS EMC & Product Safety Testing • Consulting

Holt Integrated Electronics
Board 1
Pin Inj. WF3 (Direct Injection)
Level 3 - 600V/24A
Gen 650



Channel Status

		C2	C3
Vertical	V / Div	200 V	2.00 V
	Offset	0.0 V	200 mV
	Coupling	DC1MΩ	DC1MΩ
	BW	Full	Full
	Probe	1.000e+3	200.000
	Sweeps	1 #	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

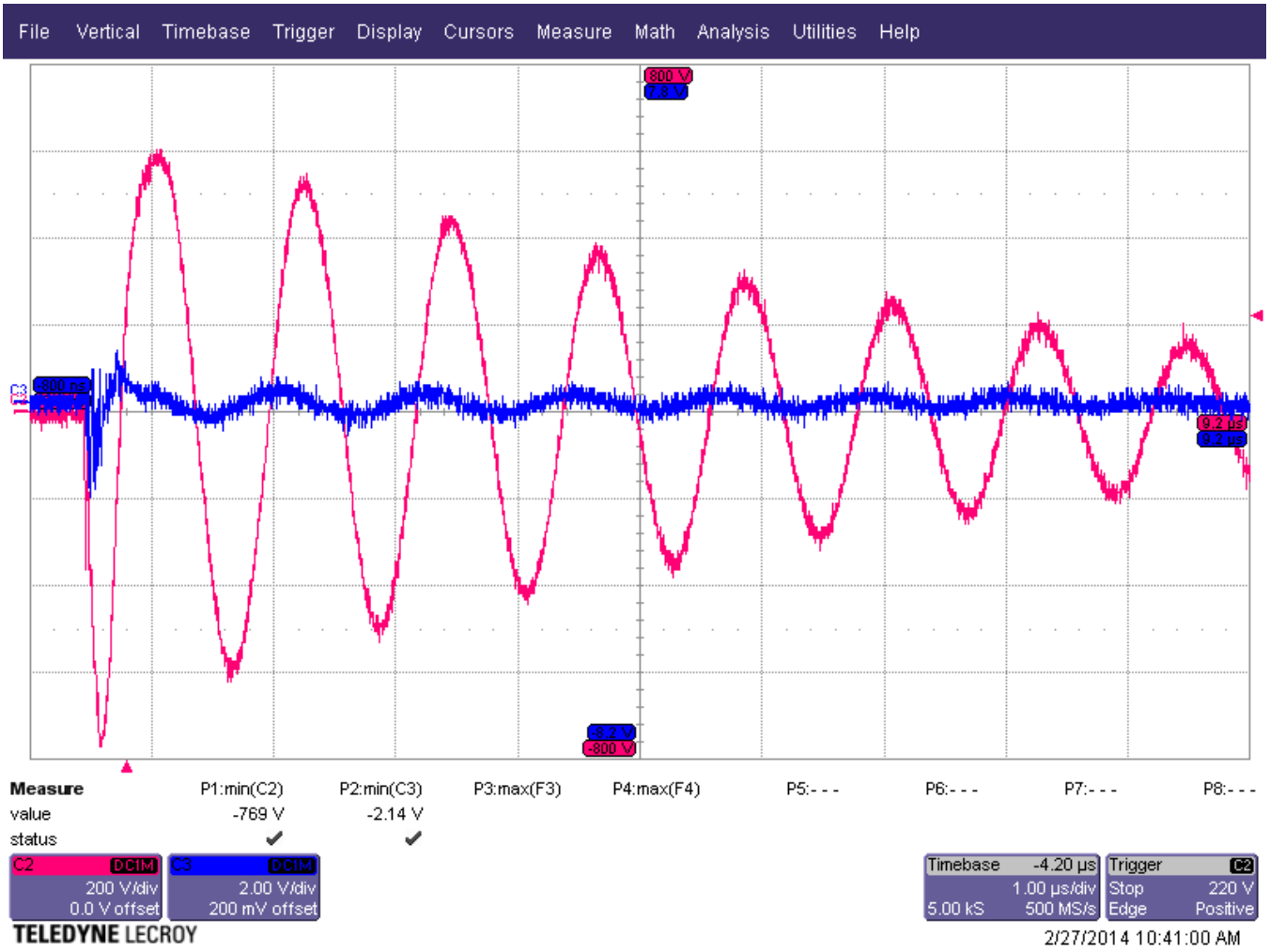
Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 10:40:51 AM

Pin WF3 Test Neg - Board 1 - Input 1B

DLS EMC & Product Safety Testing • Consulting

Holt Integrated Electronics
Board 1
Pin Inj. WF3 (Direct Injection)
Level 3 - 600V/24A
Gen 650



Channel Status

		C2	C3
Vertical	V / Div	200 V	2.00 V
	Offset	0.0 V	200 mV
	Coupling	DC1MΩ	DC1MΩ
	BW	Full	Full
	Probe	1.000e+3	200.000
	Sweeps	1 #	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

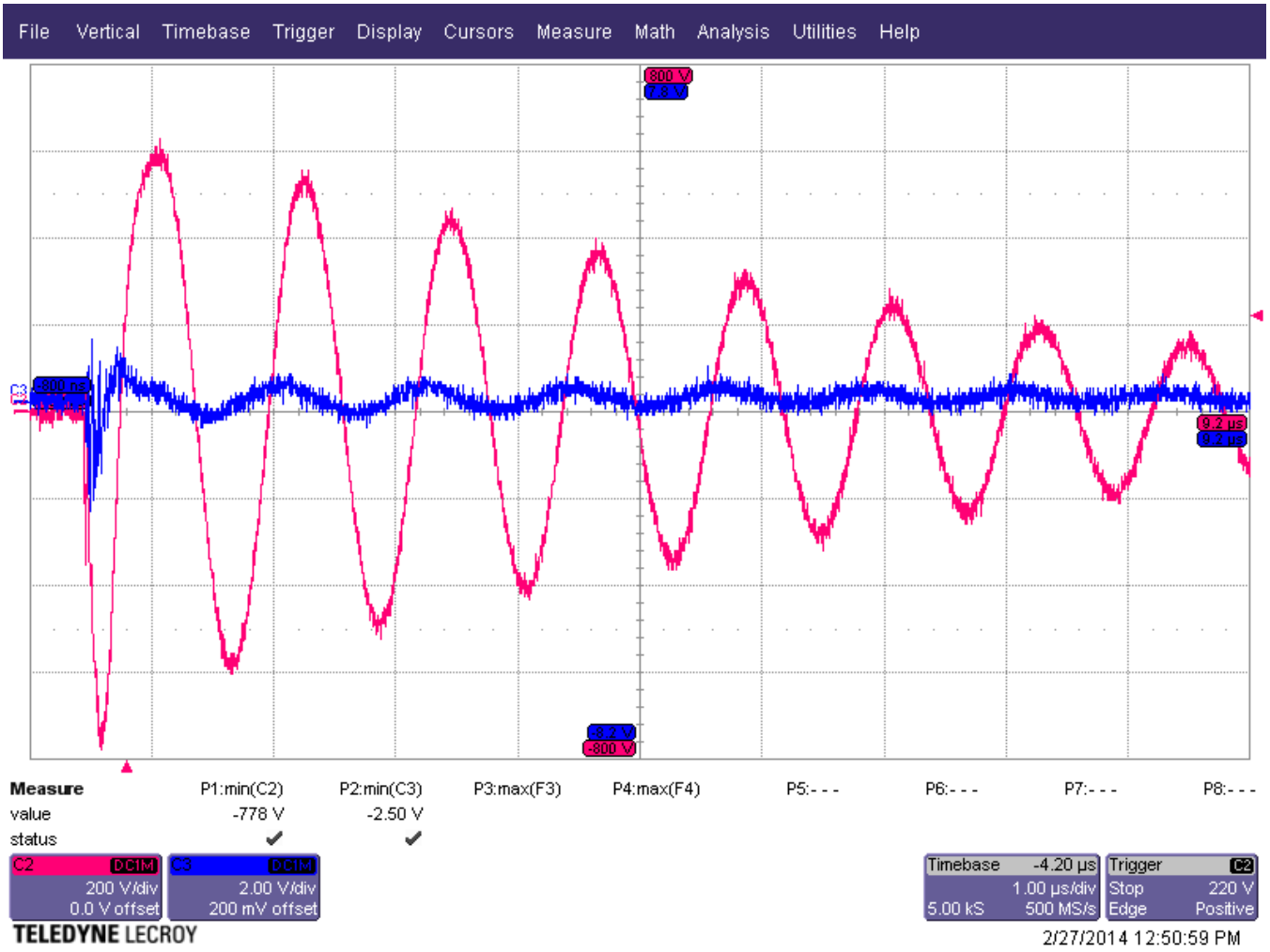
Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 12:50:51 PM

Pin WF3 Test Neg - Board 2 - Input 1A

DLS EMC & Product Safety Testing • Consulting

Holt Integrated Electronics
Board 2
Pin Inj. WF3 (Direct Injection)
Level 3 - 600V/24A
Gen 650



Channel Status

		C2	C3
Vertical	V / Div	200 V	2.00 V
	Offset	0.0 V	200 mV
	Coupling	DC1MΩ	DC1MΩ
	BW	Full	Full
	Probe	1.000e+3	200.000
	Sweeps	1 #	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

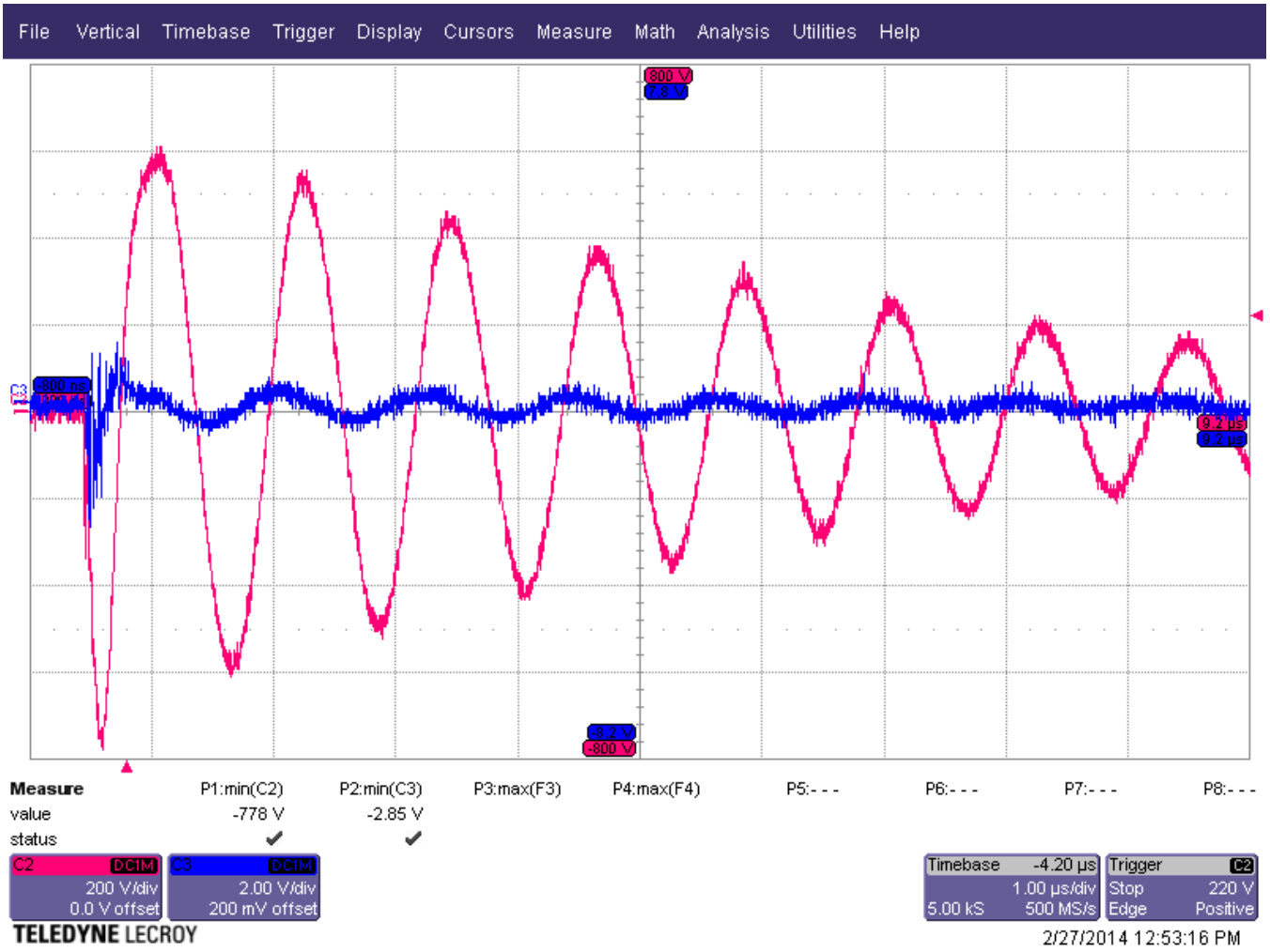
Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 12:53:08 PM

Pin WF3 Test Neg - Board 2 - Input 1B

DLS EMC & Product Safety Testing • Consulting

Holt Integrated Electronics
Board 2
Pin Inj. WF3 (Direct Injection)
Level 3 - 600V/24A
Gen 650



Channel Status

		C2	C3
Vertical	V / Div	200 V	2.00 V
	Offset	0.0 V	200 mV
	Coupling	DC1MΩ	DC1MΩ
	BW	Full	Full
	Probe	1.000e+3	200.000
	Sweeps	1 #	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

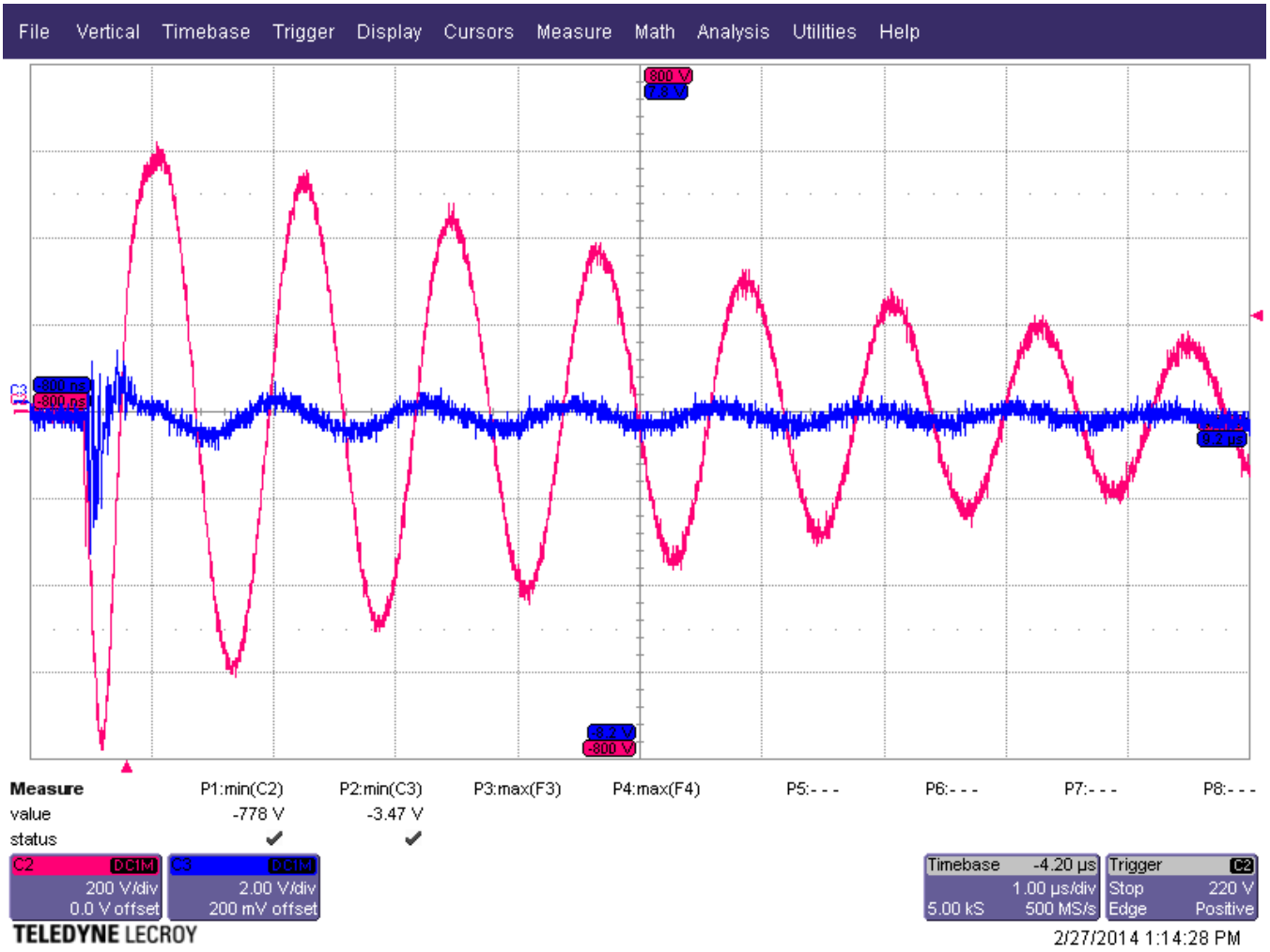
Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 1:14:20 PM

Pin WF3 Test Neg - Board 3 - Input 1A

EMC & Product Safety Testing • Consulting

Holt Integrated Electronics
Board 3
Pin Inj. WF3 (Direct Injection)
Level 3 - 600V/24A
Gen 650



Channel Status

		C2	C3
Vertical	V / Div	200 V	2.00 V
	Offset	0.0 V	200 mV
	Coupling	DC1MΩ	DC1MΩ
	BW	Full	Full
	Probe	1.000e+3	200.000
	Sweeps	1 #	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

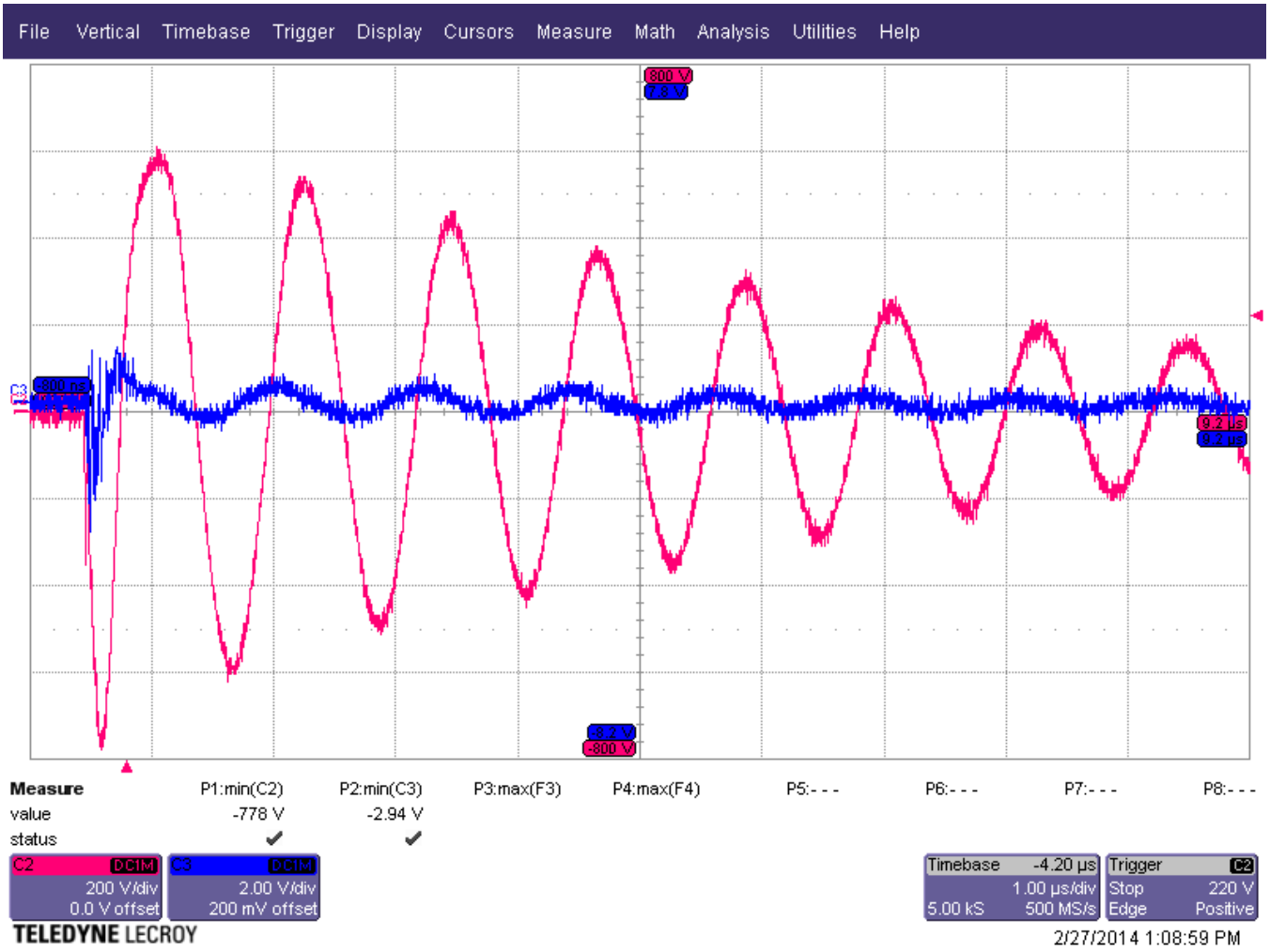
Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 1:08:51 PM

Pin WF3 Test Neg - Board 3 - Input 1B

DLS EMC & Product Safety Testing • Consulting

Holt Integrated Electronics
Board 3
Pin Inj. WF3 (Direct Injection)
Level 3 - 600V/24A
Gen 650



Channel Status

		C2	C3
Vertical	V / Div	200 V	2.00 V
	Offset	0.0 V	200 mV
	Coupling	DC1MΩ	DC1MΩ
	BW	Full	Full
	Probe	1.000e+3	200.000
	Sweeps	1 #	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

PIN INJECTION TEST DATA SHEETS

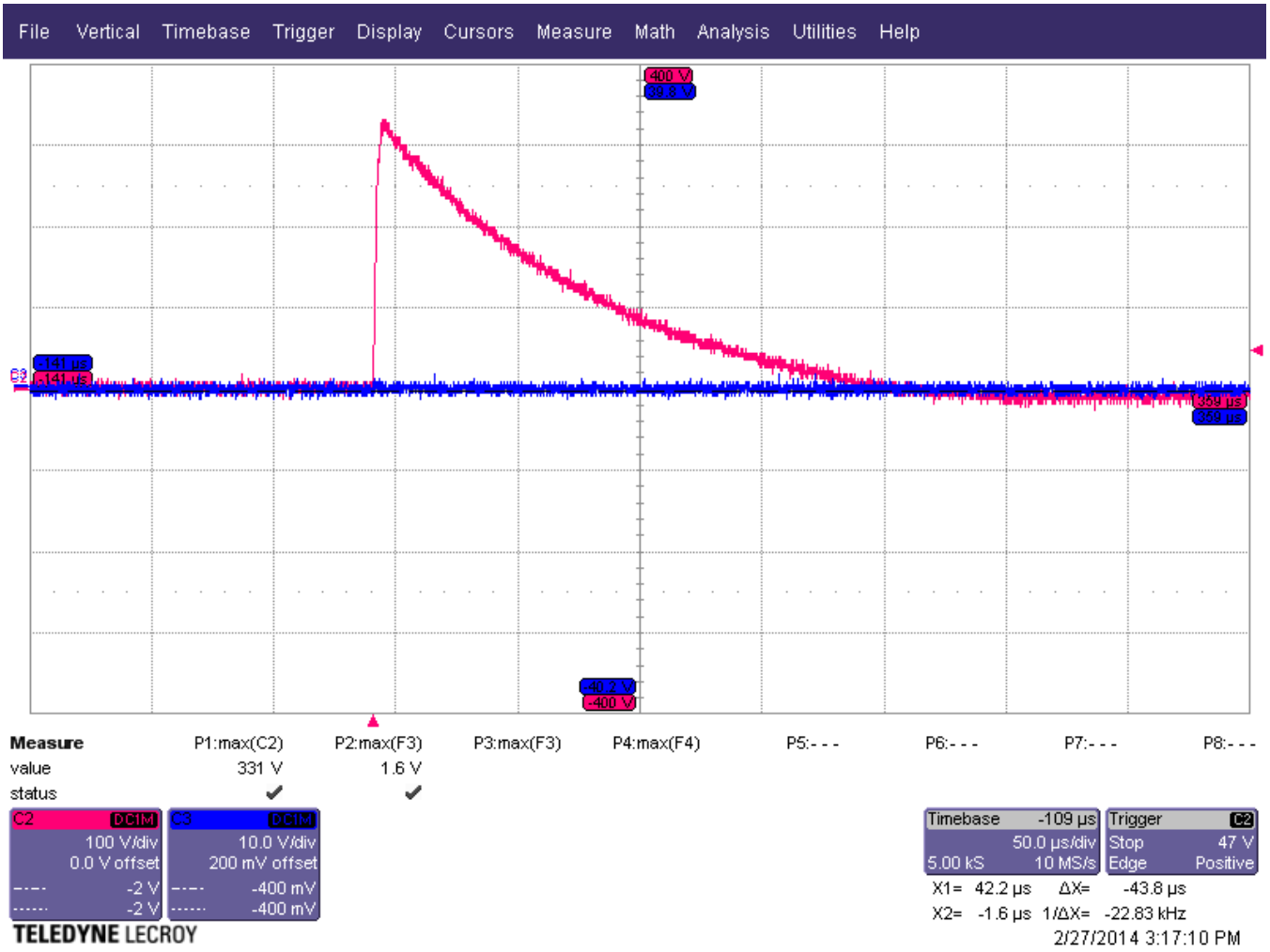
WF4

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 3:17:01 PM

Pin WF4 Test Pos - Board 1 - Input 1A

DLS EMC & Product Safety Testing • Consulting

Holt Integrated Electronics
Board 1
Pin Inj. WF4 (Direct Injection)
Level 3 - 300V/60A
Gen 350



Channel Status

		C2	C3
Vertical	V / Div	100 V	10.0 V
	Offset	0.0 V	200 mV
	Coupling	DC1MΩ	DC1MΩ
	BW	Full	Full
	Probe	1.000e+3	200.000
	Sweeps	1 #	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

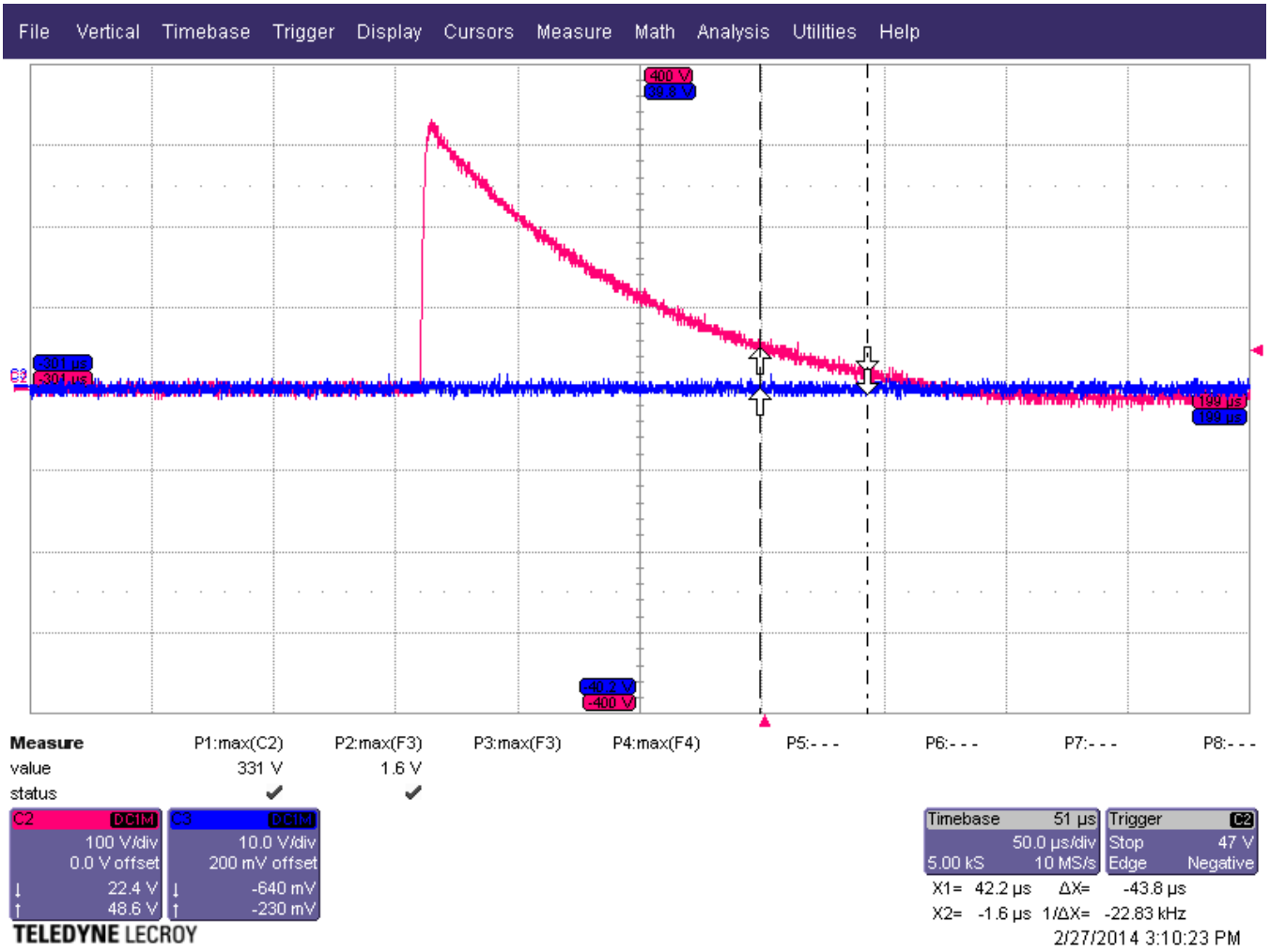
Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 3:09:56 PM

Pin WF4 Test Pos - Board 1 - Input 1B

DLS EMC & Product Safety Testing • Consulting

Holt Integrated Electronics
Board 1
Pin Inj. WF4 (Direct Injection)
Level 3 - 300V/60A
Gen 350



Channel Status

		C2	C3
Vertical	V / Div	100 V	10.0 V
	Offset	0.0 V	200 mV
	Coupling	DC1MΩ	DC1MΩ
	BW	Full	Full
	Probe	1.000e+3	200.000
	Sweeps	1 #	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

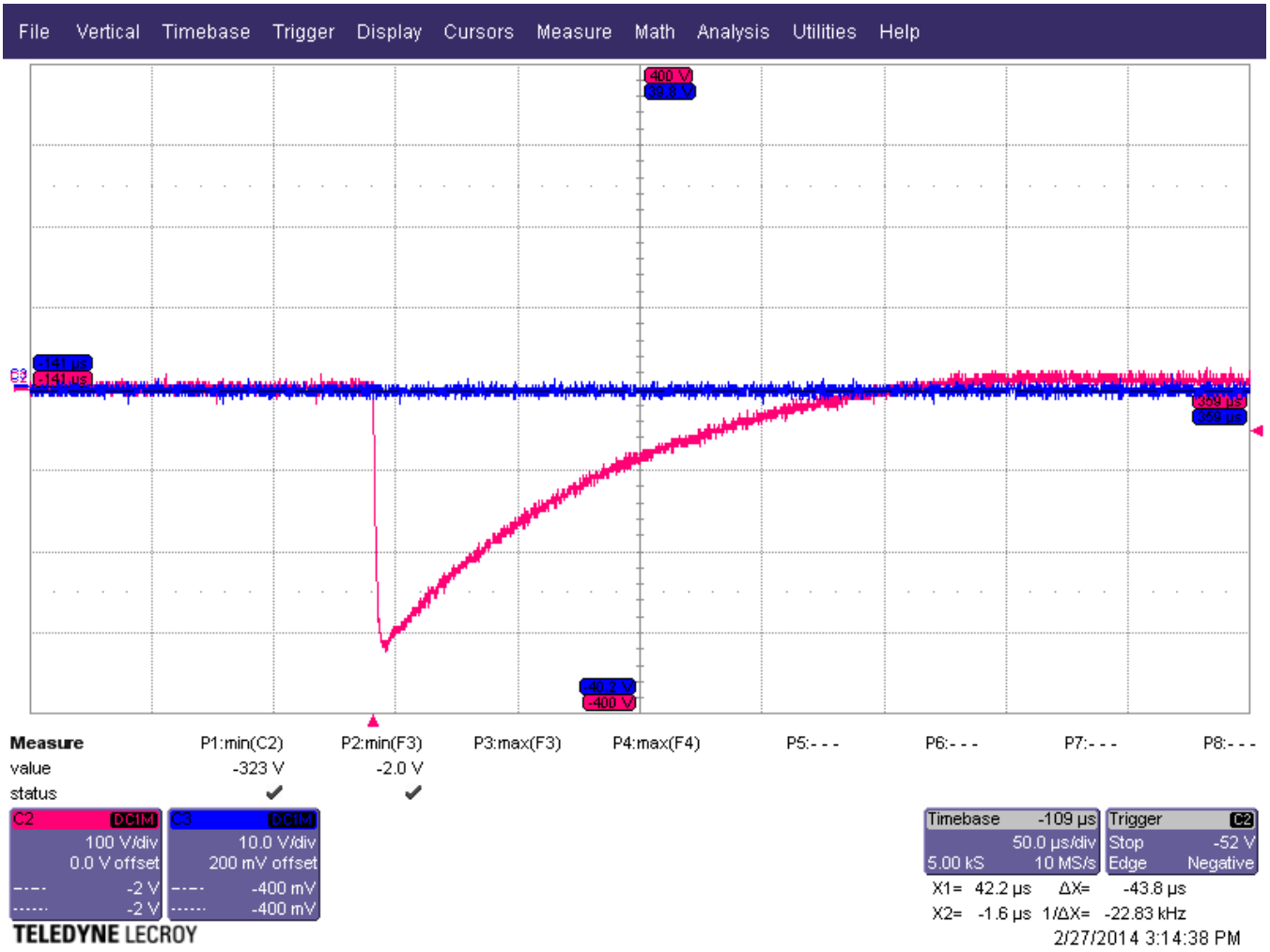
Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 3:14:27 PM

Pin WF4 Test Neg - Board 1 - Input 1A

DLS EMC & Product Safety Testing • Consulting

Holt Integrated Electronics
Board 1
Pin Inj. WF4 (Direct Injection)
Level 3 - 300V/60A
Gen 350



Channel Status

		C2	C3
Vertical	V / Div	100 V	10.0 V
	Offset	0.0 V	200 mV
	Coupling	DC1MΩ	DC1MΩ
	BW	Full	Full
	Probe	1.000e+3	200.000
	Sweeps	1 #	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

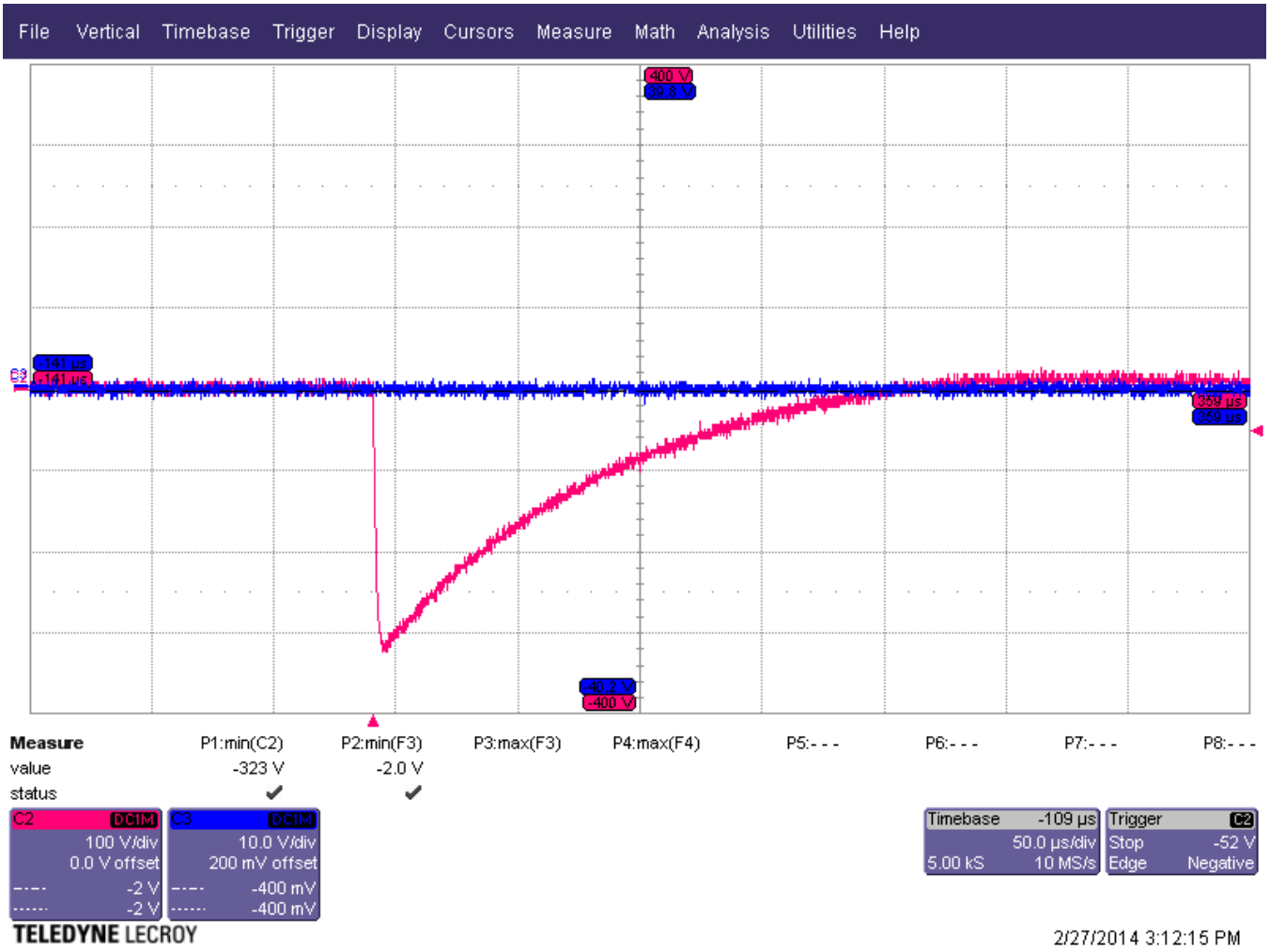
Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 3:12:05 PM

Pin WF4 Test Neg - Board 1 - Input 1B

DLS EMC & Product Safety Testing • Consulting

Holt Integrated Electronics
Board 1
Pin Inj. WF4 (Direct Injection)
Level 3 - 300V/60A
Gen 350



Channel Status

		C2	C3
Vertical	V / Div	100 V	10.0 V
	Offset	0.0 V	200 mV
	Coupling	DC1MΩ	DC1MΩ
	BW	Full	Full
	Probe	1.000e+3	200.000
	Sweeps	1 #	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

PIN INJECTION TEST DATA SHEETS

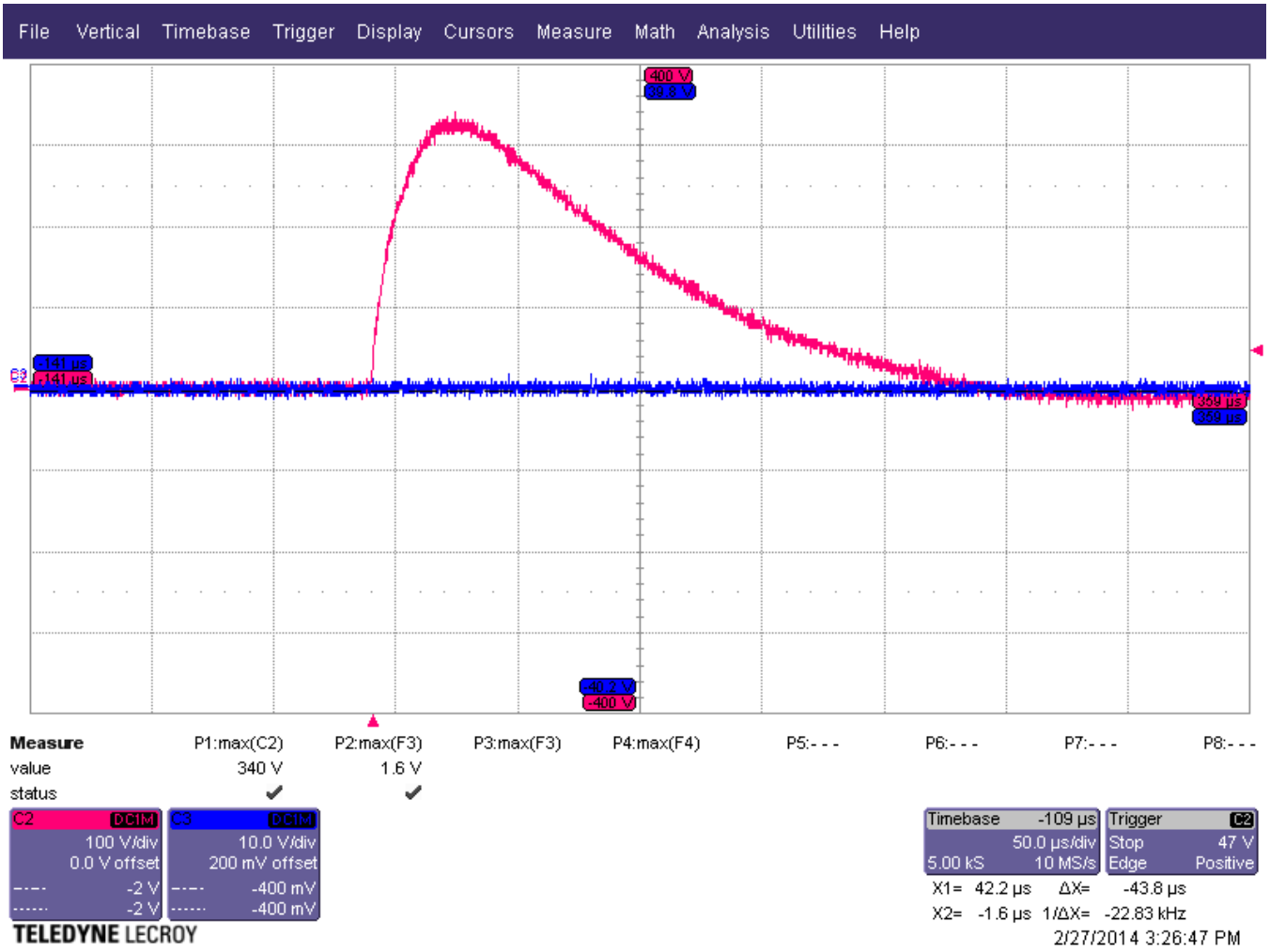
WF5A

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 3:26:37 PM

Pin WF5A Test Pos - Board 1 - Input 1A

DLS EMC & Product Safety Testing • Consulting

Holt Integrated Electronics
Board 2
Pin Inj. WF5A (Direct Injection)
Level 3 - 300V/300A
Gen 370



Channel Status

		C2	C3
Vertical	V / Div	100 V	10.0 V
	Offset	0.0 V	200 mV
	Coupling	DC1MΩ	DC1MΩ
	BW	Full	Full
	Probe	1.000e+3	200.000
	Sweeps	1 #	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

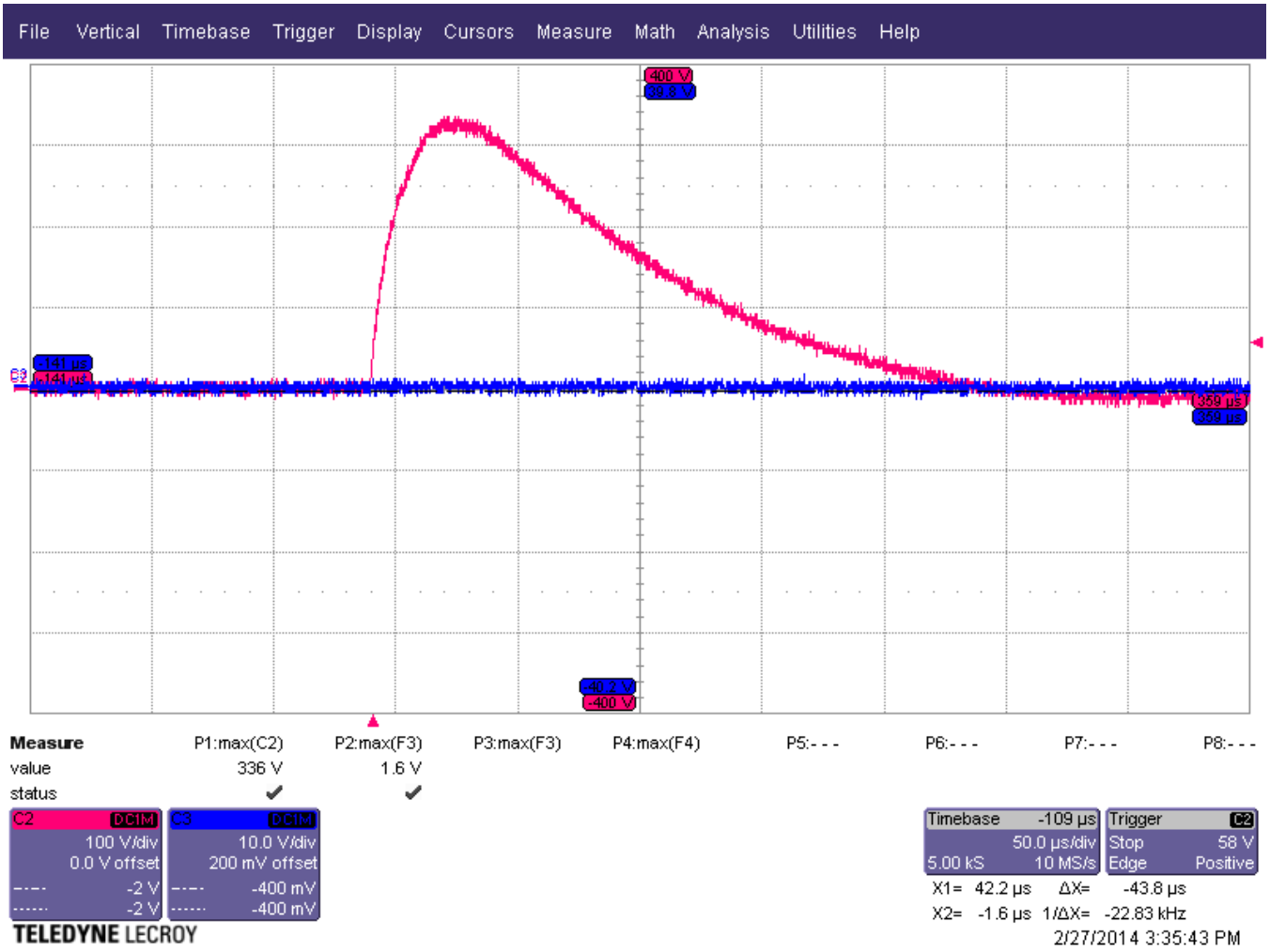
Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 3:35:34 PM

Pin WF5A Test Pos - Board 2 - Input 1B

DLS EMC & Product Safety Testing • Consulting

Holt Integrated Electronics
Board 2
Pin Inj. WF5A (Direct Injection)
Level 3 - 300V/300A
Gen 370



Channel Status

		C2	C3
Vertical	V / Div	100 V	10.0 V
	Offset	0.0 V	200 mV
	Coupling	DC1MΩ	DC1MΩ
	BW	Full	Full
	Probe	1.000e+3	200.000
	Sweeps	1 #	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

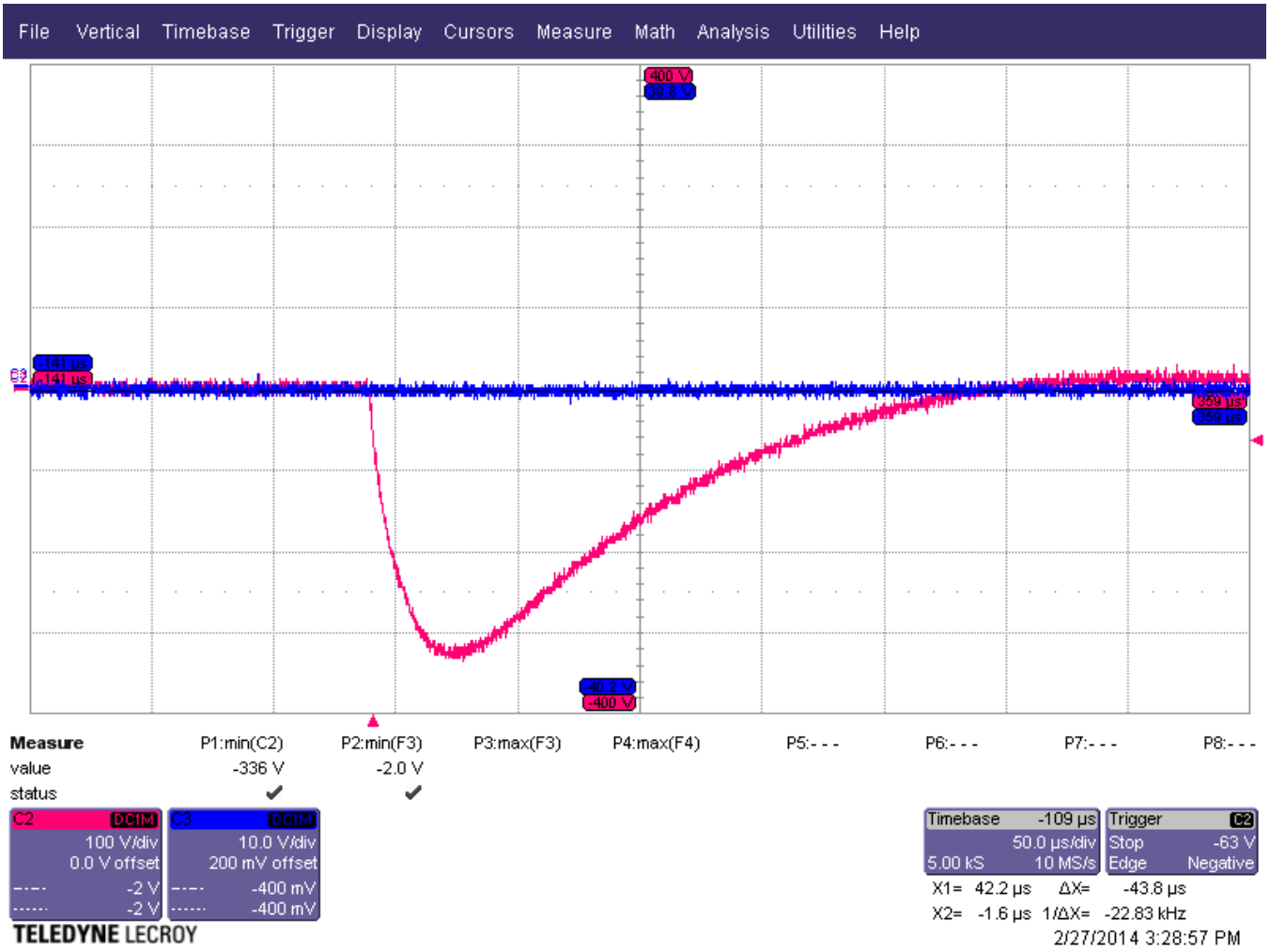
Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 3:28:46 PM

Pin WF5A Test Neg - Board 2 - Input 1A

DLS EMC & Product Safety Testing • Consulting

Holt Integrated Electronics
Board 2
Pin Inj. WF5A (Direct Injection)
Level 3 - 300V/300A
Gen 370



Measure	P1:min(C2)	P2:min(F3)	P3:max(F3)	P4:max(F4)	P5:- - -	P6:- - -	P7:- - -	P8:- - -
value	-336 V	-2.0 V						
status	✔	✔						

Channel Status

		C2	C3
Vertical	V / Div	100 V	10.0 V
	Offset	0.0 V	200 mV
	Coupling	DC1MΩ	DC1MΩ
	BW	Full	Full
	Probe	1.000e+3	200.000
	Sweeps	1 #	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

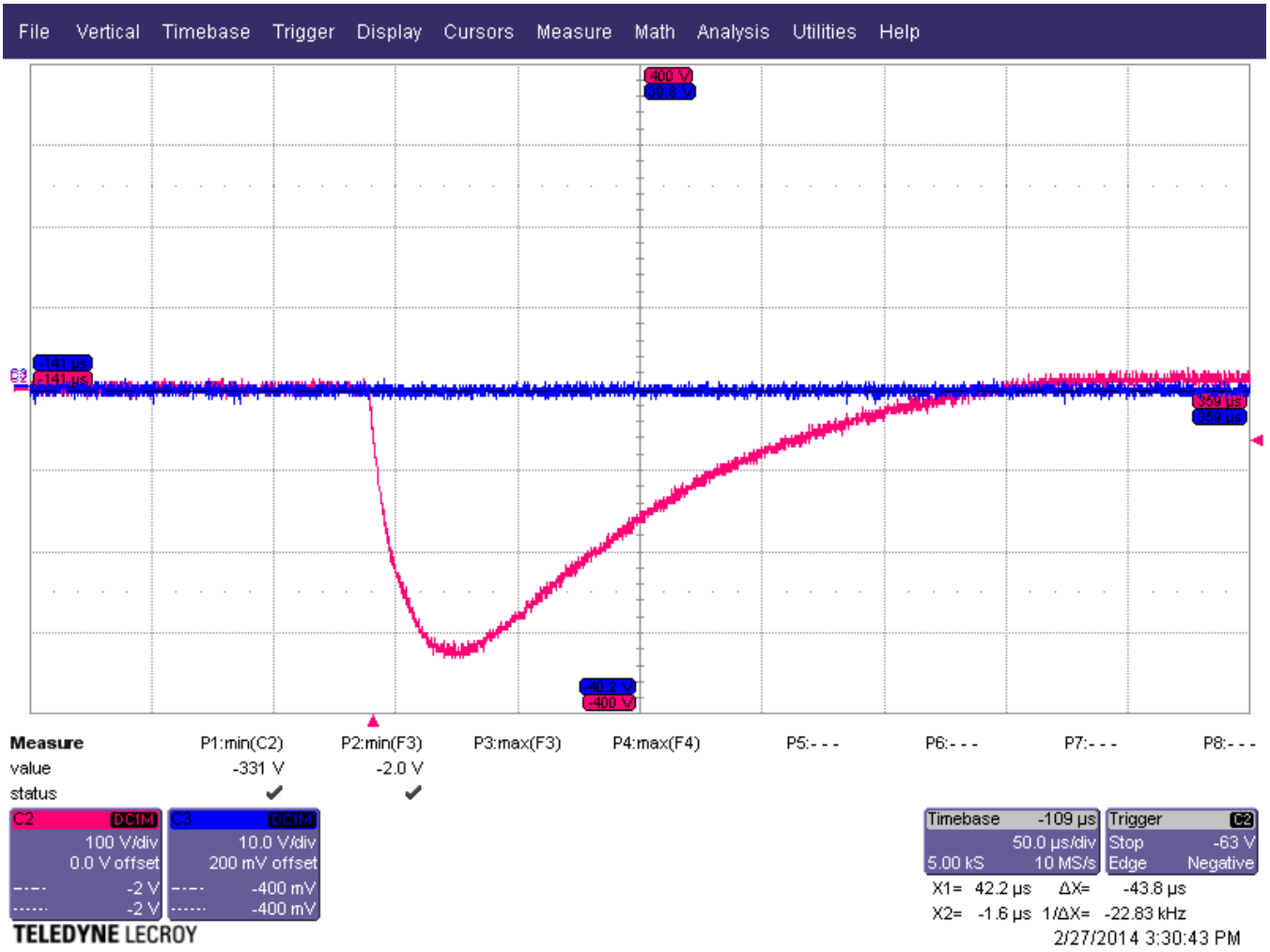
Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 3:30:34 PM

Pin WF5A Test Neg - Board 2 - Input 1B

DLS EMC & Product Safety Testing • Consulting

Holt Integrated Electronics
Board 2
Pin Inj. WF5A (Direct Injection)
Level 3 - 300V/300A
Gen 370



Channel Status

		C2	C3
Vertical	V / Div	100 V	10.0 V
	Offset	0.0 V	200 mV
	Coupling	DC1MΩ	DC1MΩ
	BW	Full	Full
	Probe	1.000e+3	200.000
	Sweeps	1 #	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

PIN INJECTION TEST DATA SHEETS

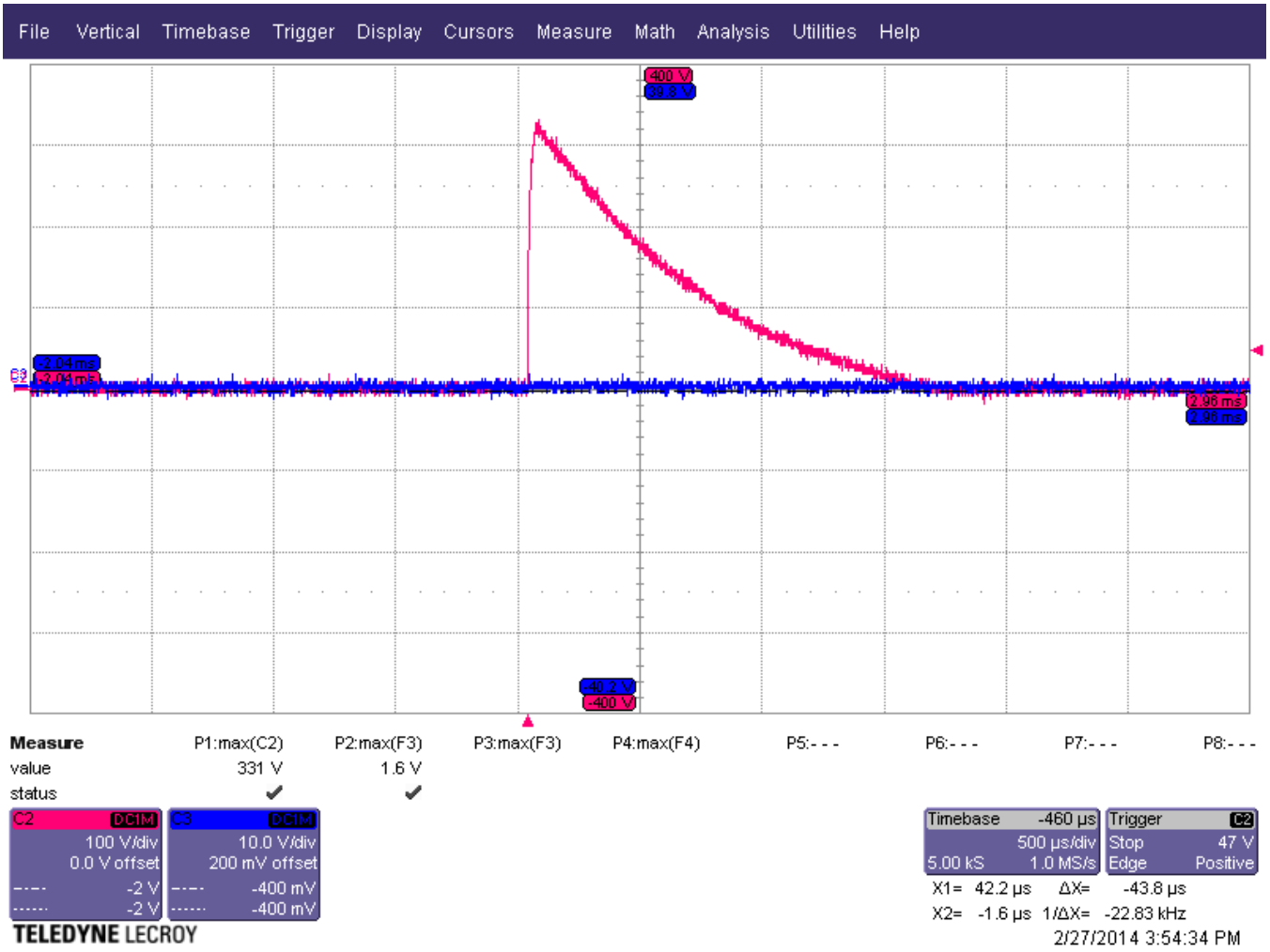
WF5B

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 3:54:26 PM

Pin WF5B Test Pos - Board 3 - Input 1A

DLS EMC & Product Safety Testing • Consulting

Holt Integrated Electronics
Board 3
Pin Inj. WF5B (Direct Injection)
Level 3 - 300V/300A
Gen 370



Channel Status

		C2	C3
Vertical	V / Div	100 V	10.0 V
	Offset	0.0 V	200 mV
	Coupling	DC1MΩ	DC1MΩ
	BW	Full	Full
	Probe	1.000e+3	200.000
	Sweeps	1 #	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

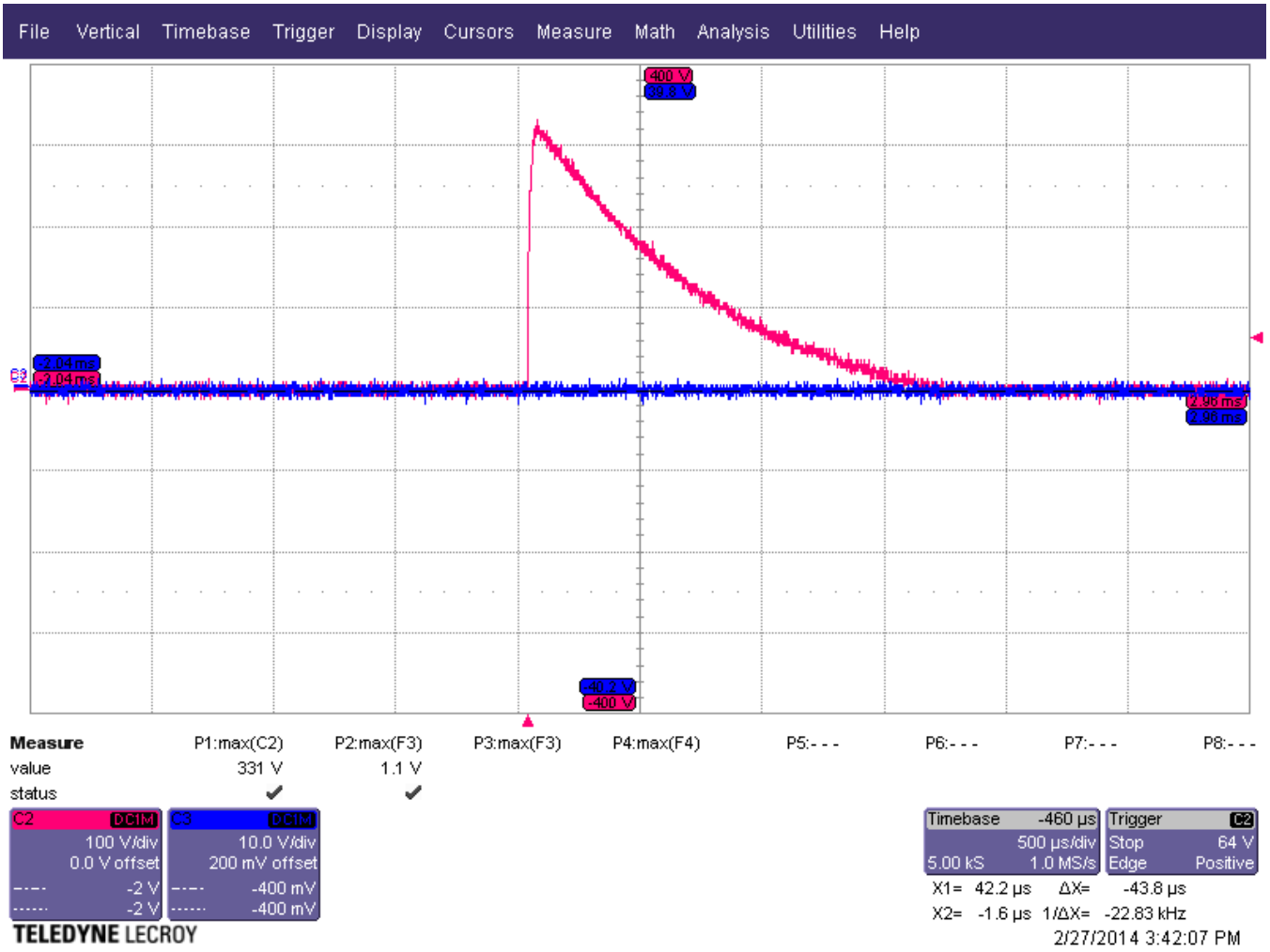
Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 3:41:50 PM

Pin WF5B Test Pos - Board 3 - Input 1B

DLS EMC & Product Safety Testing • Consulting

Holt Integrated Electronics
Board 3
Pin Inj. WF5B (Direct Injection)
Level 3 - 300V/300A
Gen 370



Channel Status

		C2	C3
Vertical	V / Div	100 V	10.0 V
	Offset	0.0 V	200 mV
	Coupling	DC1MΩ	DC1MΩ
	BW	Full	Full
	Probe	1.000e+3	200.000
	Sweeps	1 #	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

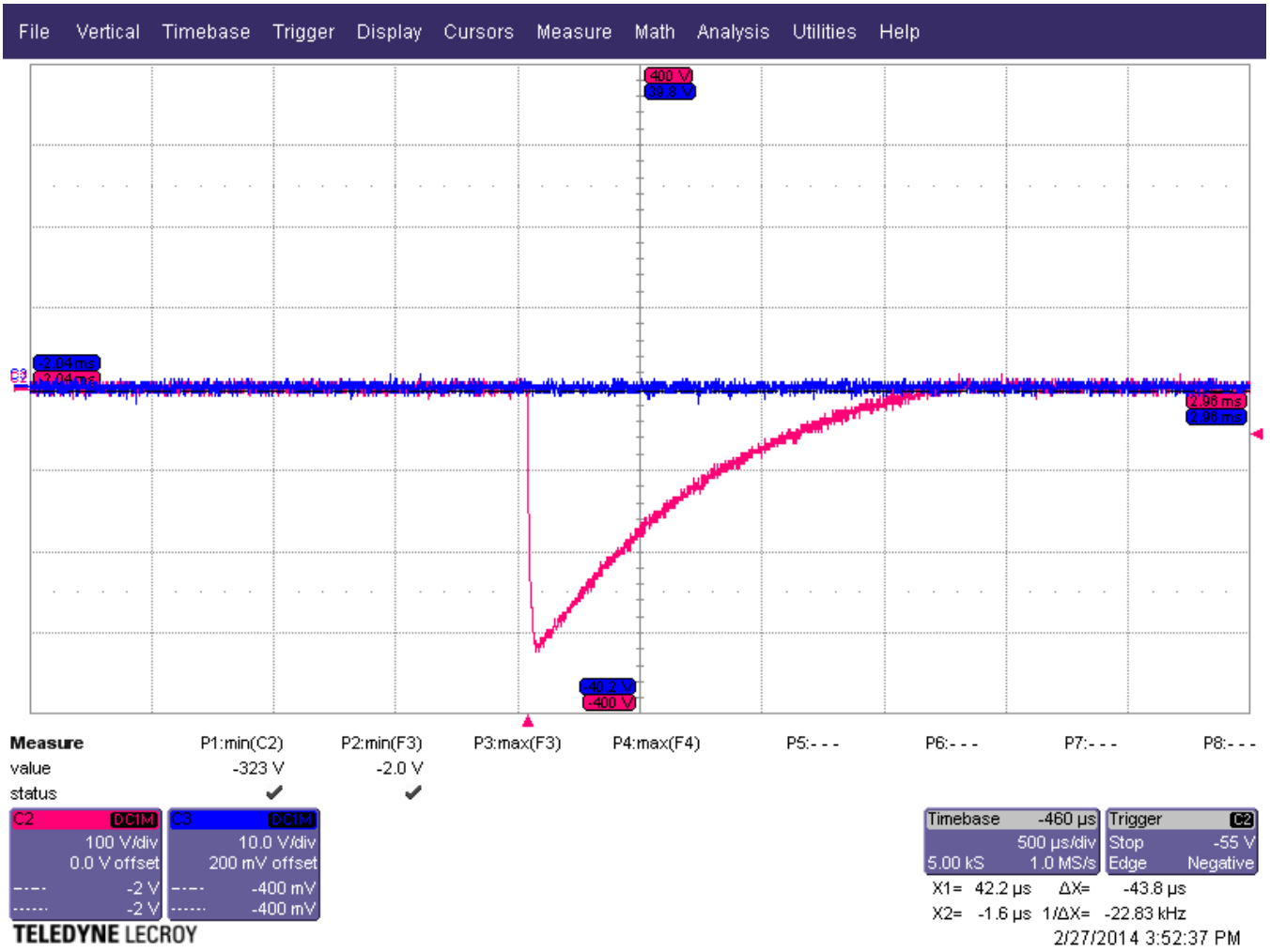
Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 3:52:25 PM

Pin WF5B Test Neg - Board 3 - Input 1A

DLS EMC & Product Safety Testing • Consulting

Holt Integrated Electronics
Board 3
Pin Inj. WF5B (Direct Injection)
Level 3 - 300V/300A
Gen 370



Channel Status

		C2	C3
Vertical	V / Div	100 V	10.0 V
	Offset	0.0 V	200 mV
	Coupling	DC1MΩ	DC1MΩ
	BW	Full	Full
	Probe	1.000e+3	200.000
	Sweeps	1 #	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

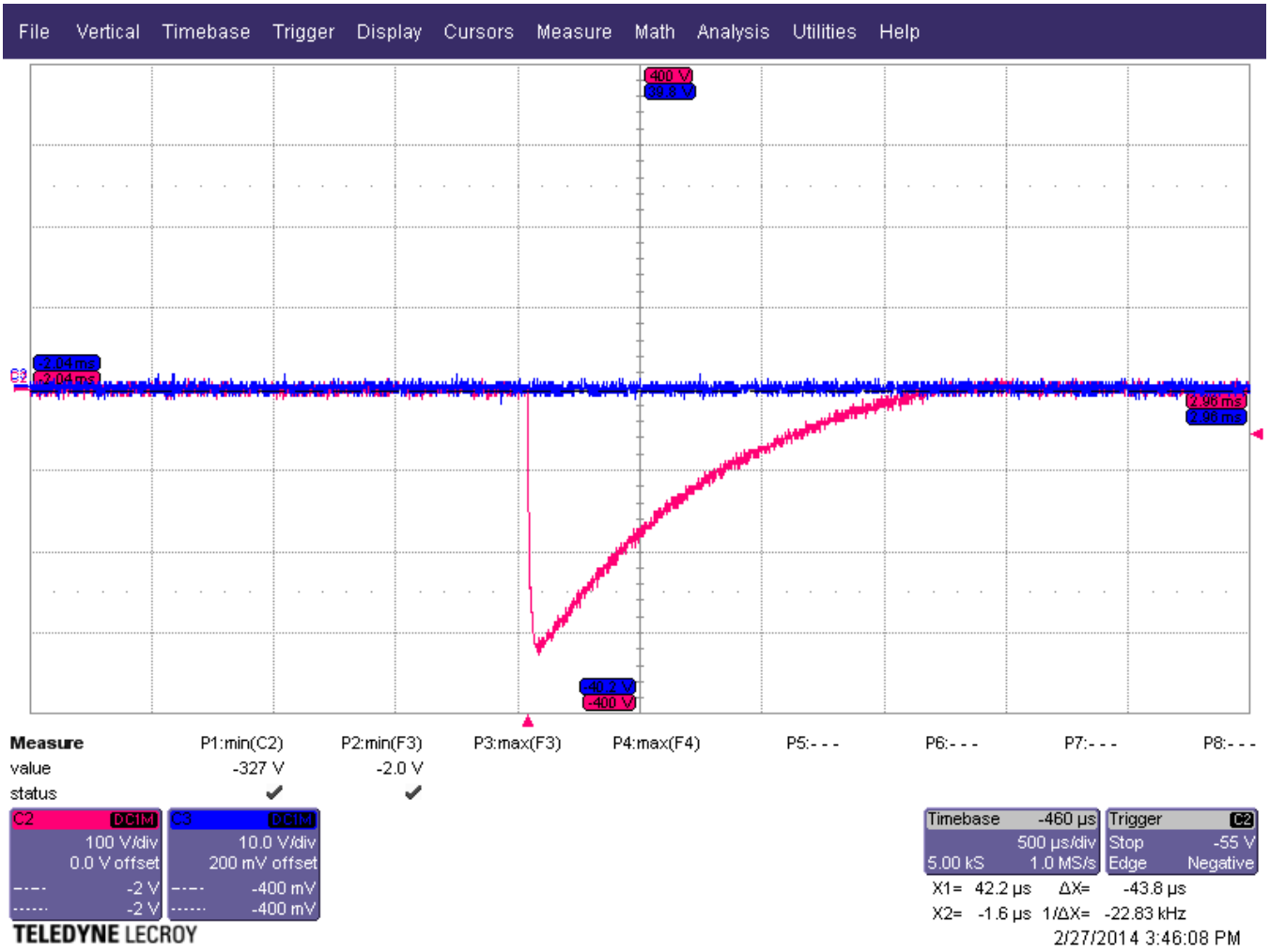
Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 3:46:00 PM

Pin WF5B Test Neg - Board 3 - Input 1B

DLS EMC & Product Safety Testing • Consulting

Holt Integrated Electronics
Board 3
Pin Inj. WF5B (Direct Injection)
Level 3 - 300V/300A
Gen 370



Channel Status

		C2	C3
Vertical	V / Div	100 V	10.0 V
	Offset	0.0 V	200 mV
	Coupling	DC1MΩ	DC1MΩ
	BW	Full	Full
	Probe	1.000e+3	200.000
	Sweeps	1 #	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

PIN INJECTION TEST DATA SHEETS

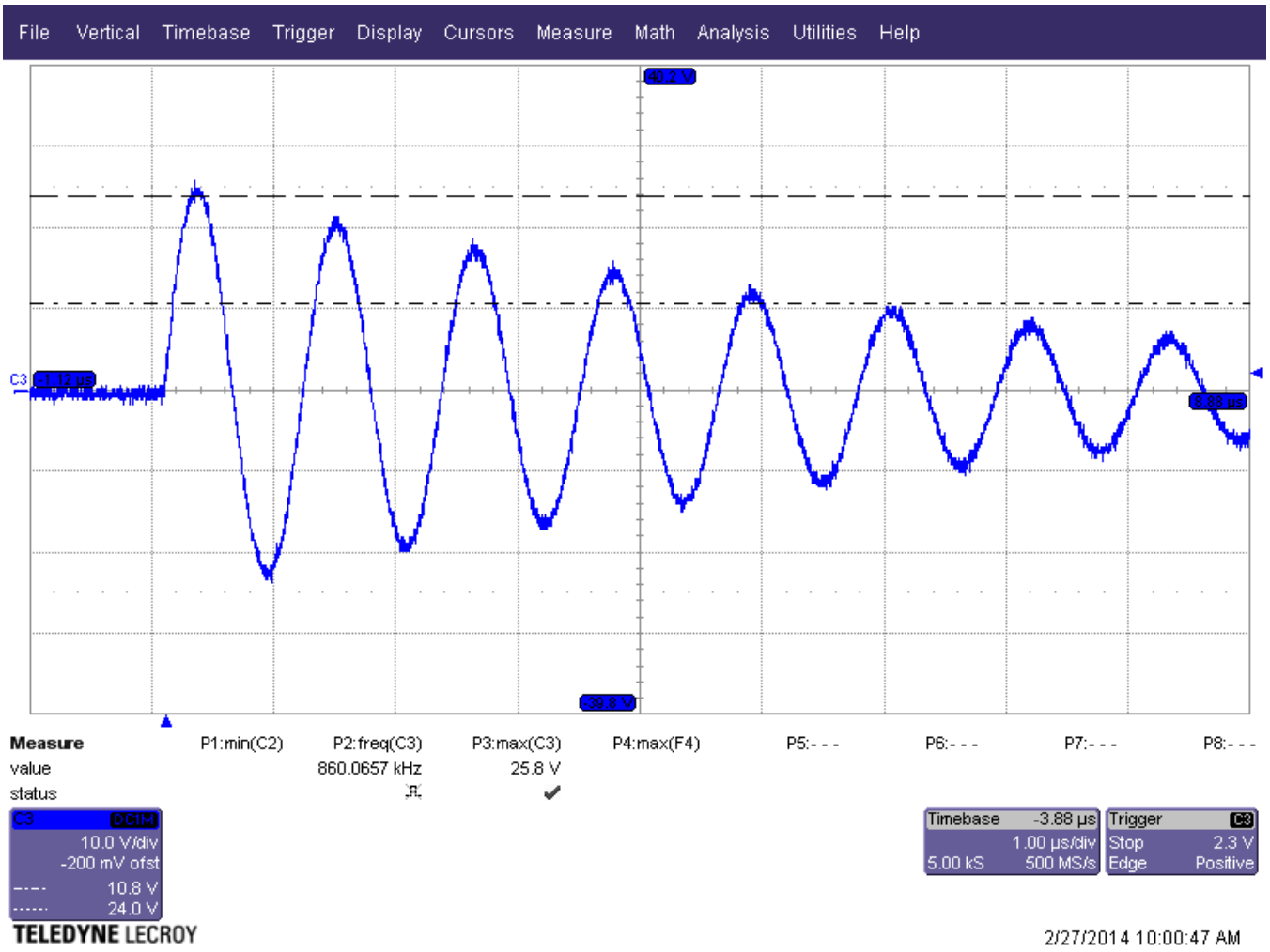
WF3 CALIBRATION DATA

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 10:00:14 AM

Pin WF3 Level 3 Short Circuit Verification - Positive

DLS EMC & Product Safety Testing • Consulting

WF3 Pin Injection (Direct Injection)
Short Circuit Verification
Level 3 600V/24A
f=1MHz +-20%
5th-25%-75% of 1st
Gen = 650



Channel Status

		C3
Vertical	V / Div	10.0 V
	Offset	-
	Coupling	DC1MΩ
	BW-Limit	Full
	Probe	200.000
	Sweeps	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

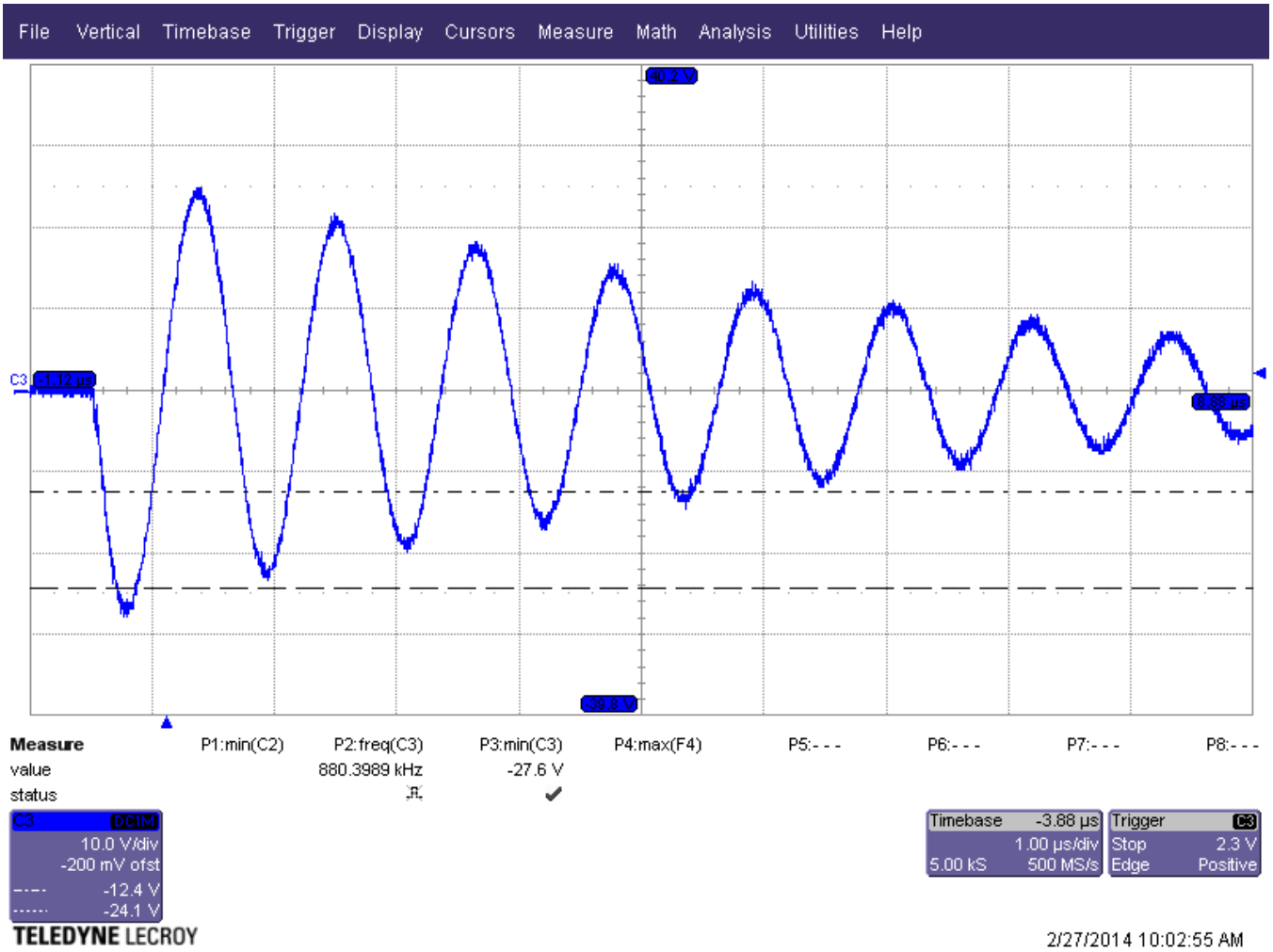
Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 10:02:46 AM

Pin WF3 Level 3 Short Circuit Verification - Negative

DLS EMC & Product Safety Testing • Consulting

WF3 Pin Injection (Direct Injection)
Short Circuit Verification
Level 3 600V/24A
f=1MHz +-20%
5th-25%-75% of 1st
Gen = 650



Channel Status

		C3
Vertical	V / Div	10.0 V
	Offset	-
	Coupling	DC1MΩ
	BW-Limit	Full
	Probe	200.000
	Sweeps	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

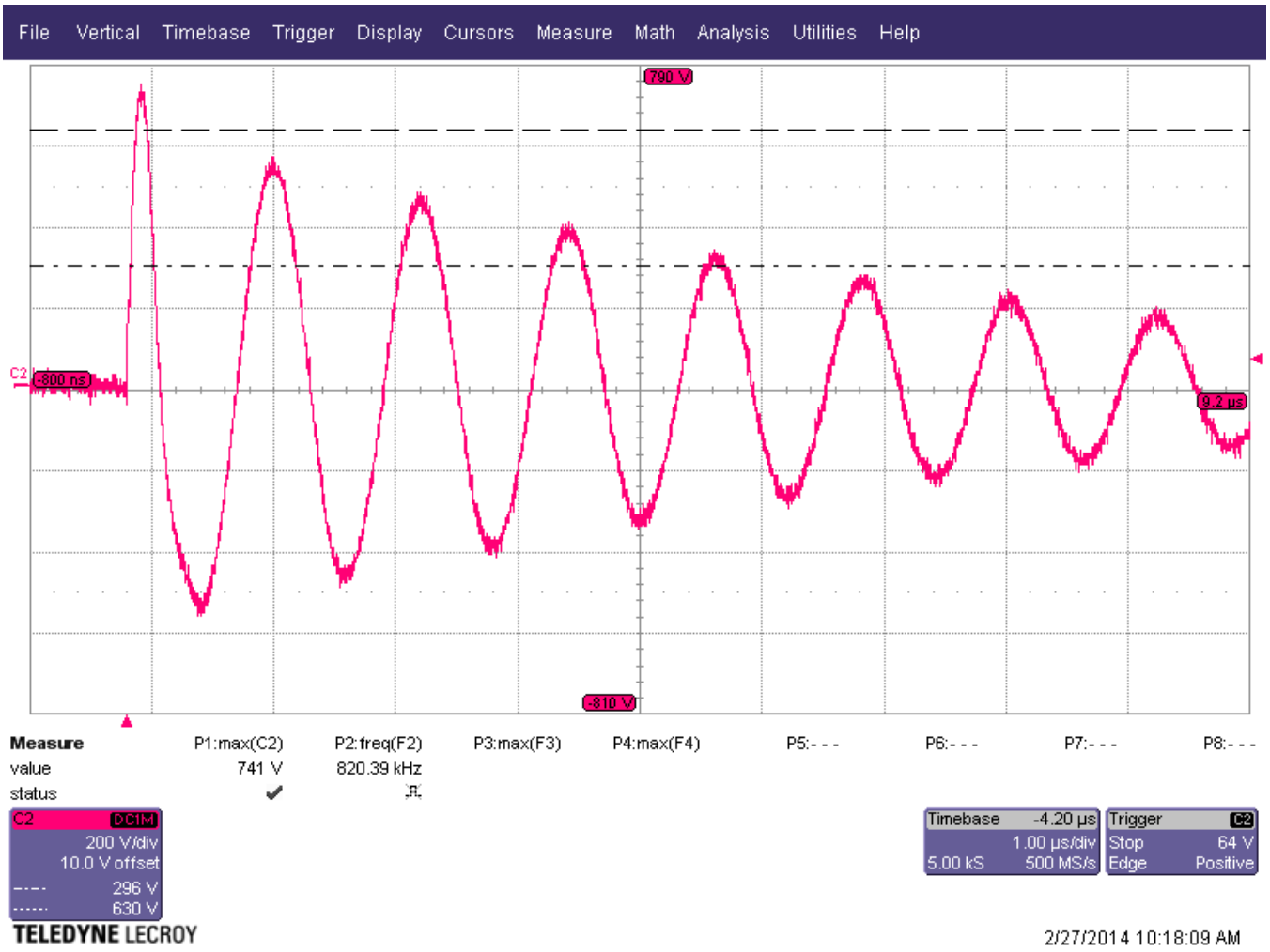
Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 10:18:00 AM

Pin WF3 Level 3 Open Circuit Verification - Positive

EMC & Product Safety Testing • Consulting

WF3 Pin Injection (Direct Injection)
Open Circuit Verification
Level 3 600V/24A
f=1MHz +-20%
5th-25%-75% of 1st
Gen = 650



Channel Status

		C2
Vertical	V / Div	200 V
	Offset	10.0 V
	Coupling	DC1MΩ
	BW-Limit	Full
	Probe	1.000e+3
	Sweeps	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

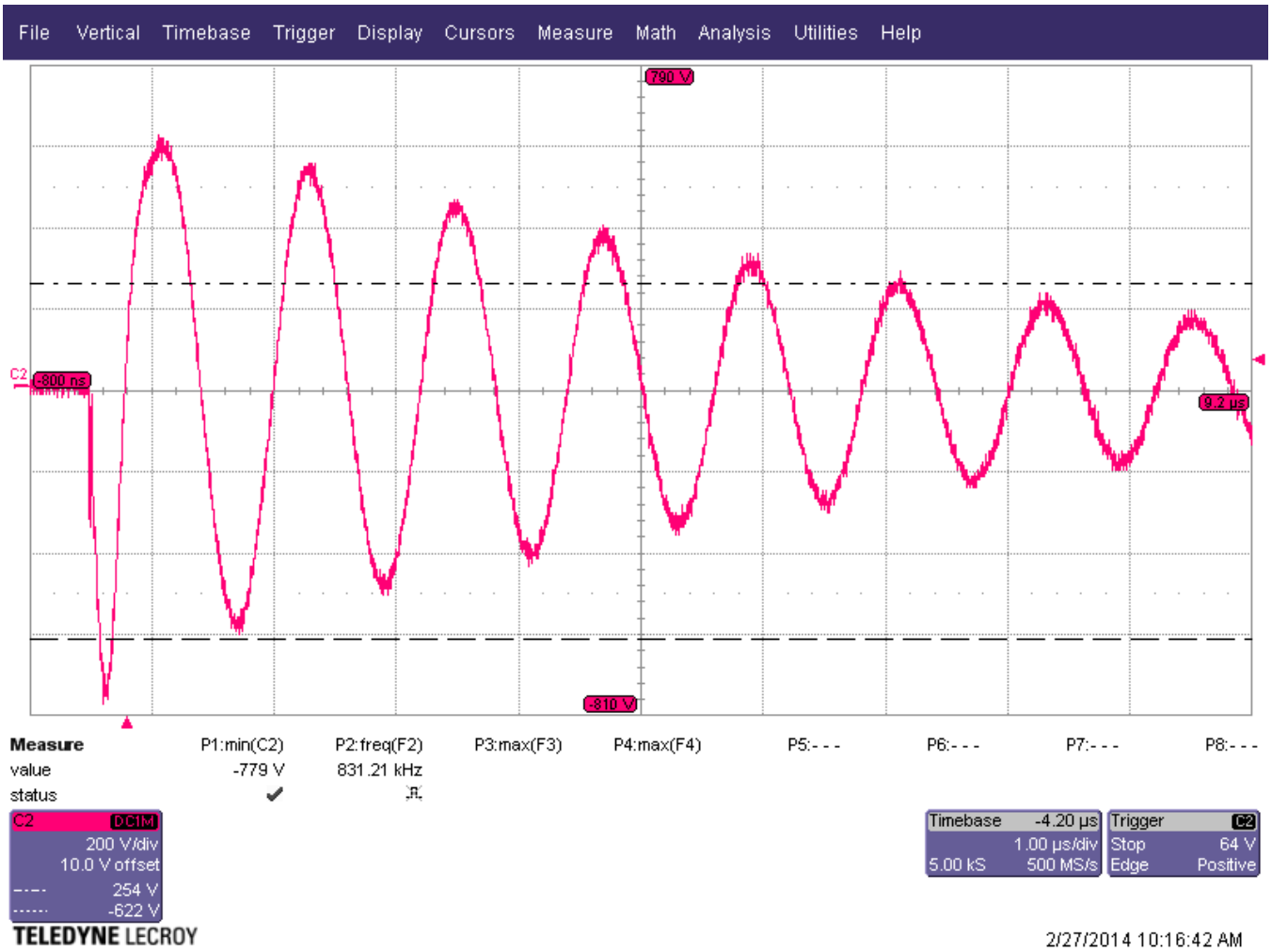
Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 10:16:33 AM

Pin WF3 Level 3 Open Circuit Verification - Negative

EMC & Product Safety Testing • Consulting

WF3 Pin Injection (Direct Injection)
Open Circuit Verification
Level 3 600V/24A
f=1MHz +-20%
5th-25%-75% of 1st
Gen = 650



Channel Status

		C2
Vertical	V / Div	200 V
	Offset	10.0 V
	Coupling	DC1MΩ
	BW-Limit	Full
	Probe	1.000e+3
	Sweeps	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

PIN INJECTION TEST DATA SHEETS

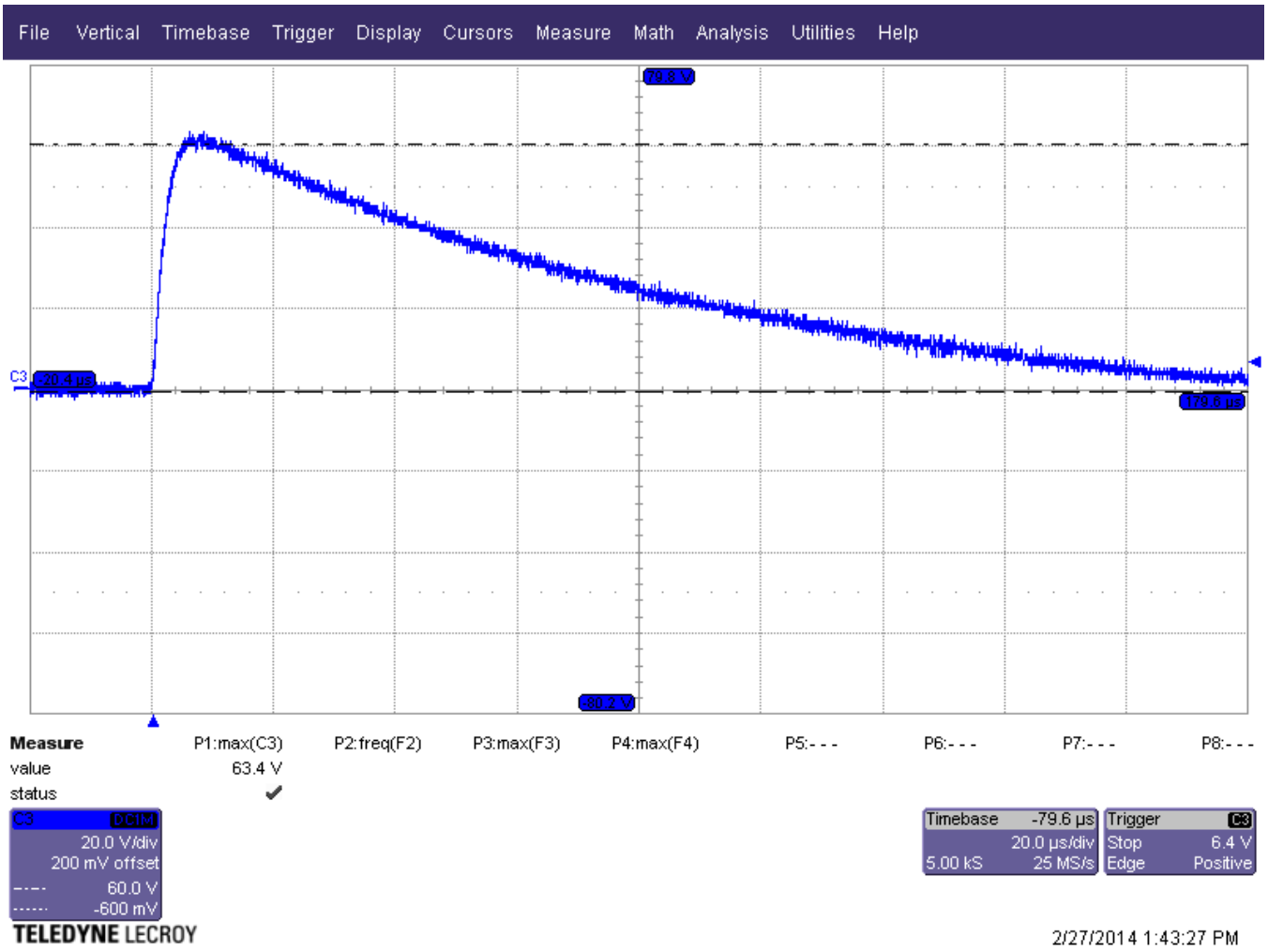
WF4 CALIBRATION DATA

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 1:43:17 PM

Pin WF4 Level 3 Short Circuit Verification - Positive

EMC & Product Safety Testing • Consulting

WF4 Pin Injection (Direct Injection)
Short Circuit Verification
Level 3 300V/60A
Gen = 350



Channel Status

		C3
Vertical	V / Div	20.0 V
	Offset	200 mV
	Coupling	DC1MΩ
	BW-Limit	Full
	Probe	200.000
	Sweeps	1 #

Acquisition Status

Horizontal	Time / Div	0 s	Sampling Rate	10.000000000 GS/s
	Time / Pt	1 fs	Sampling Mode	undef

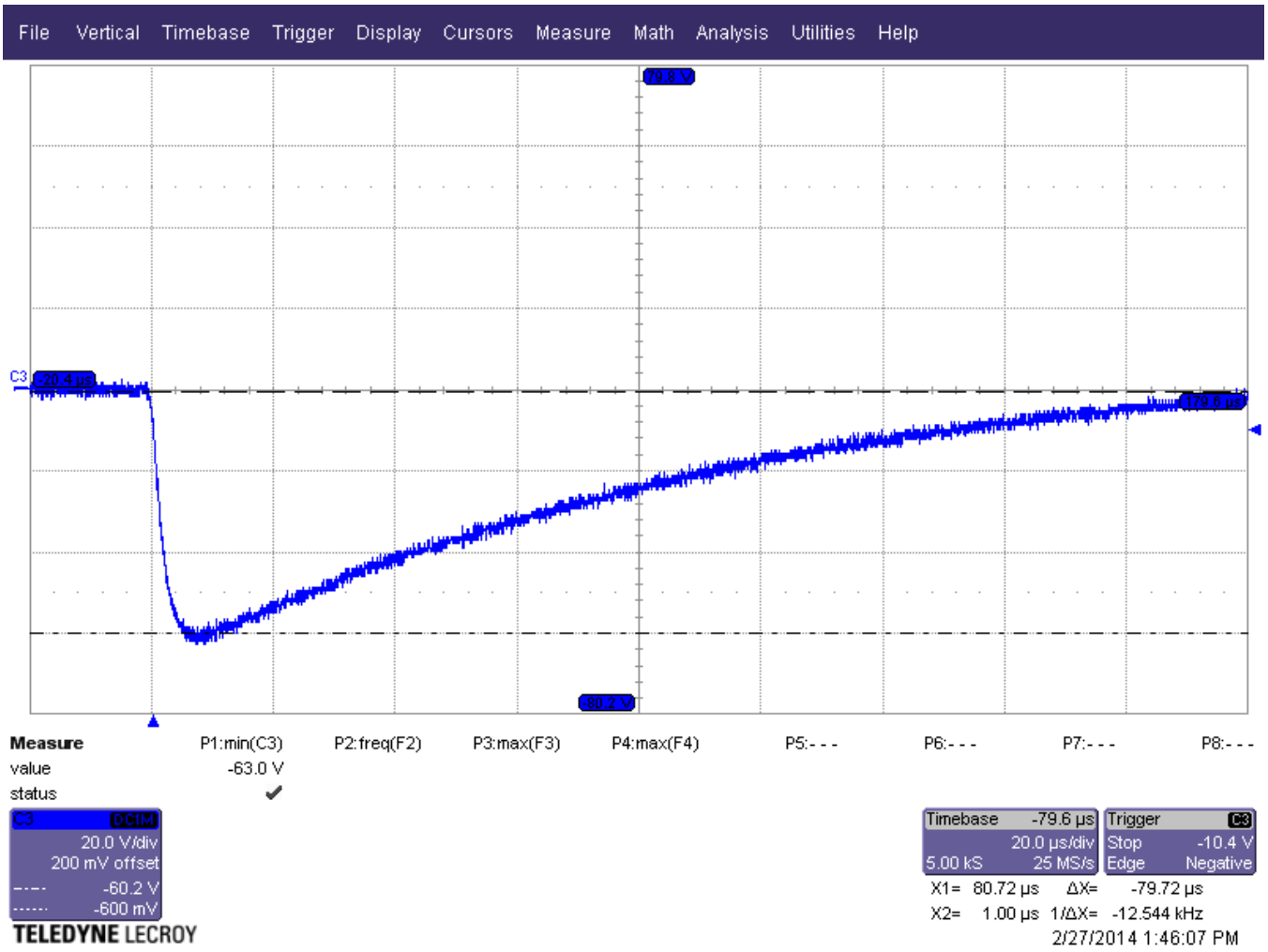
	Pts / Div	0.0 S	Trigger Delay	1.0
	Mode	Normal	Slope	undef
Trigger	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 1:45:57 PM

Pin WF4 Level 3 Short Circuit Verification - Negative

EMC & Product Safety Testing • Consulting

WF4 Pin Injection (Direct Injection)
Short Circuit Verification
Level 3 300V/60A
Gen = 350



Channel Status

		C3
Vertical	V / Div	20.0 V
	Offset	200 mV
	Coupling	DC1MΩ
	BW-Limit	Full
	Probe	200.000
	Sweeps	1 #

Acquisition Status

Horizontal	Time / Div	0 s	Sampling Rate	10.000000000 GS/s
	Time / Pt	1 fs	Sampling Mode	undef

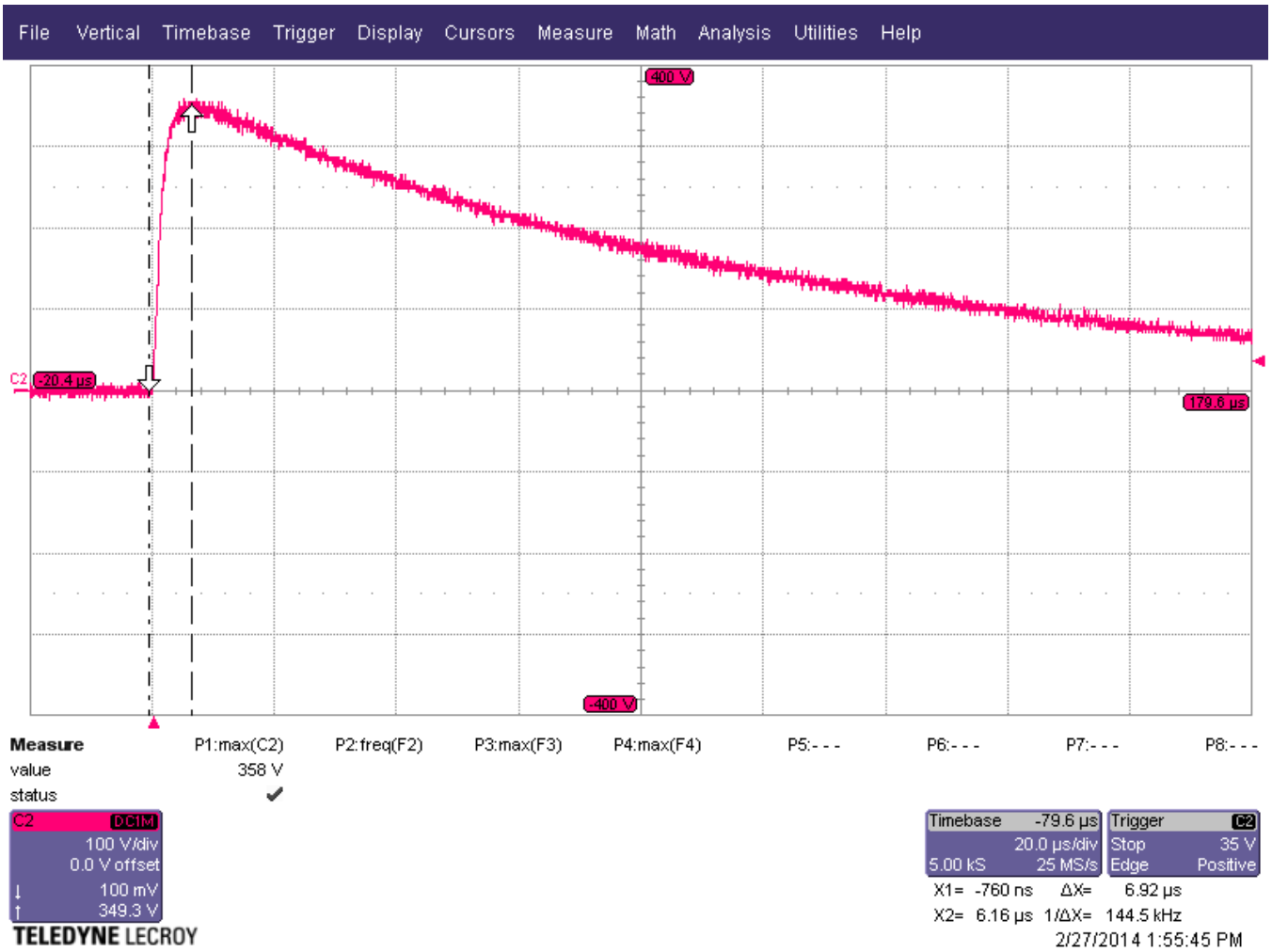
	Pts / Div	0.0 S	Trigger Delay	1.0
	Mode	Normal	Slope	undef
Trigger	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 1:55:36 PM

Pin WF4 Level 3 Open Circuit Verification - Positive T1

EMC & Product Safety Testing • Consulting

WF4 Pin Injection (Direct Injection)
Open Circuit Verification
Level 3 600V/60A
T1 = 6.4uS (+/- 20%)
T2 = 69uS (+/- 20%)
Gen = 350



Channel Status

		C2
Vertical	V / Div	100 V
	Offset	0.0 V
	Coupling	DC1MΩ
	BW-Limit	Full
	Probe	1.000e+3
	Sweeps	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

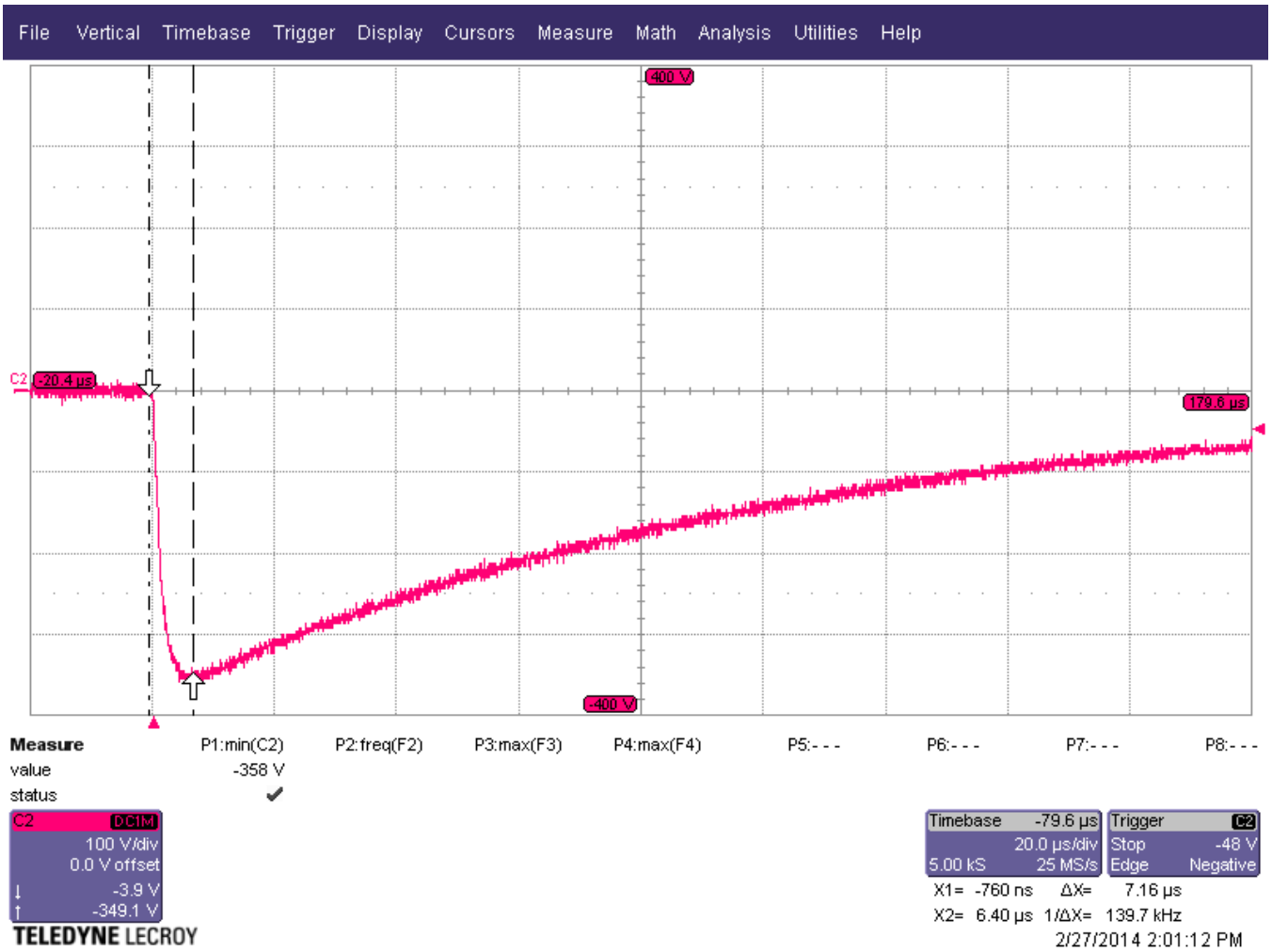
Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 2:00:59 PM

Pin WF4 Level 3 Open Circuit Verification - Negative T1

DLS EMC & Product Safety Testing • Consulting

WF4 Pin Injection (Direct Injection)
Open Circuit Verification
Level 3 600V/60A
T1 = 6.4uS (+/- 20%)
T2 = 69uS (+/- 20%)
Gen = 350



Channel Status

		C2
Vertical	V / Div	100 V
	Offset	0.0 V
	Coupling	DC1MΩ
	BW-Limit	Full
	Probe	1.000e+3
	Sweeps	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

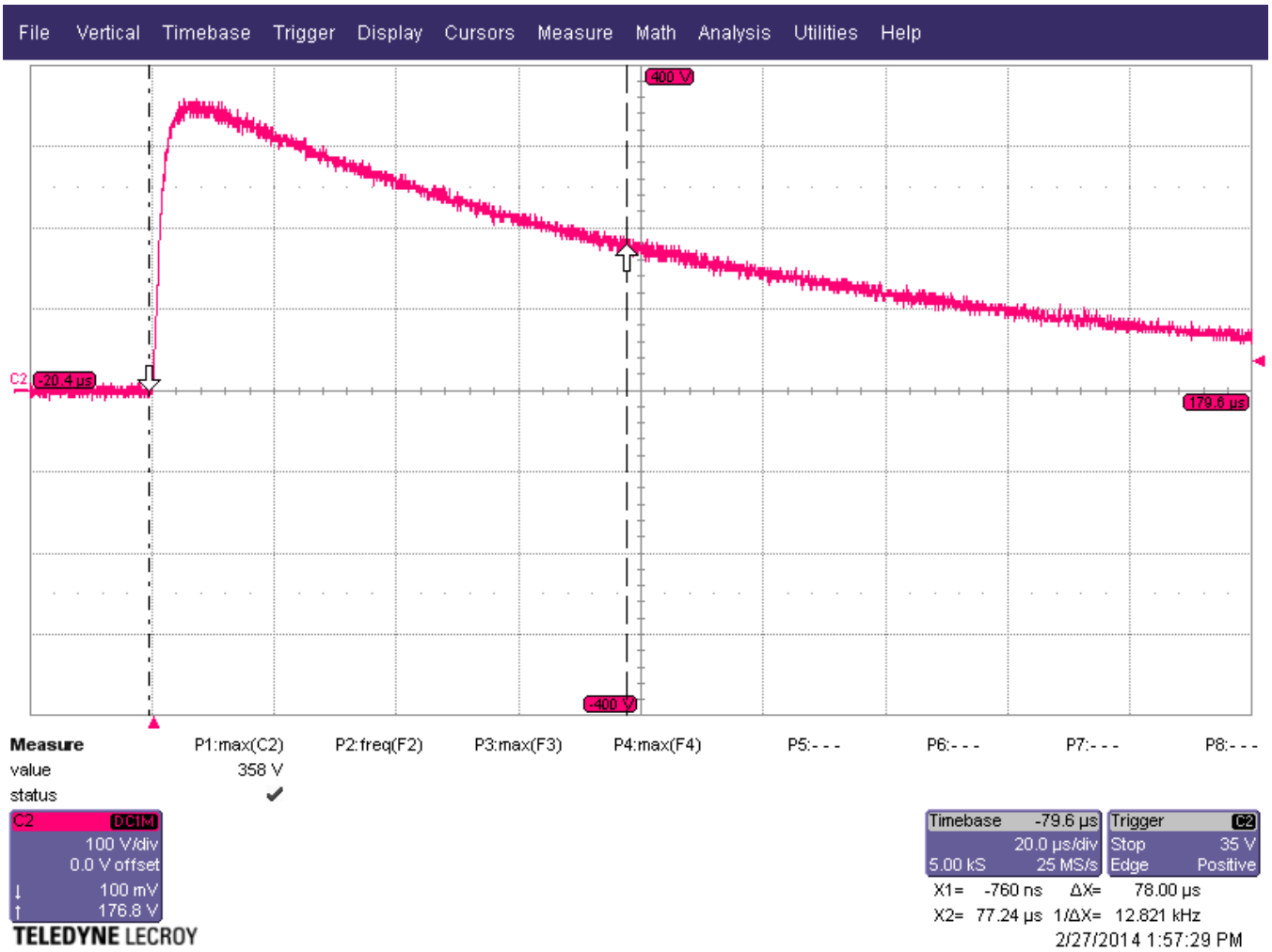
Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 1:57:16 PM

Pin WF4 Level 3 Open Circuit Verification - Positive T2

EMC & Product Safety Testing • Consulting

WF4 Pin Injection (Direct Injection)
Open Circuit Verification
Level 3 600V/60A
T1 = 6.4uS (+/- 20%)
T2 = 69uS (+/- 20%)
Gen = 350



Channel Status

		C2
Vertical	V / Div	100 V
	Offset	0.0 V
	Coupling	DC1MΩ
	BW-Limit	Full
	Probe	1.000e+3
	Sweeps	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

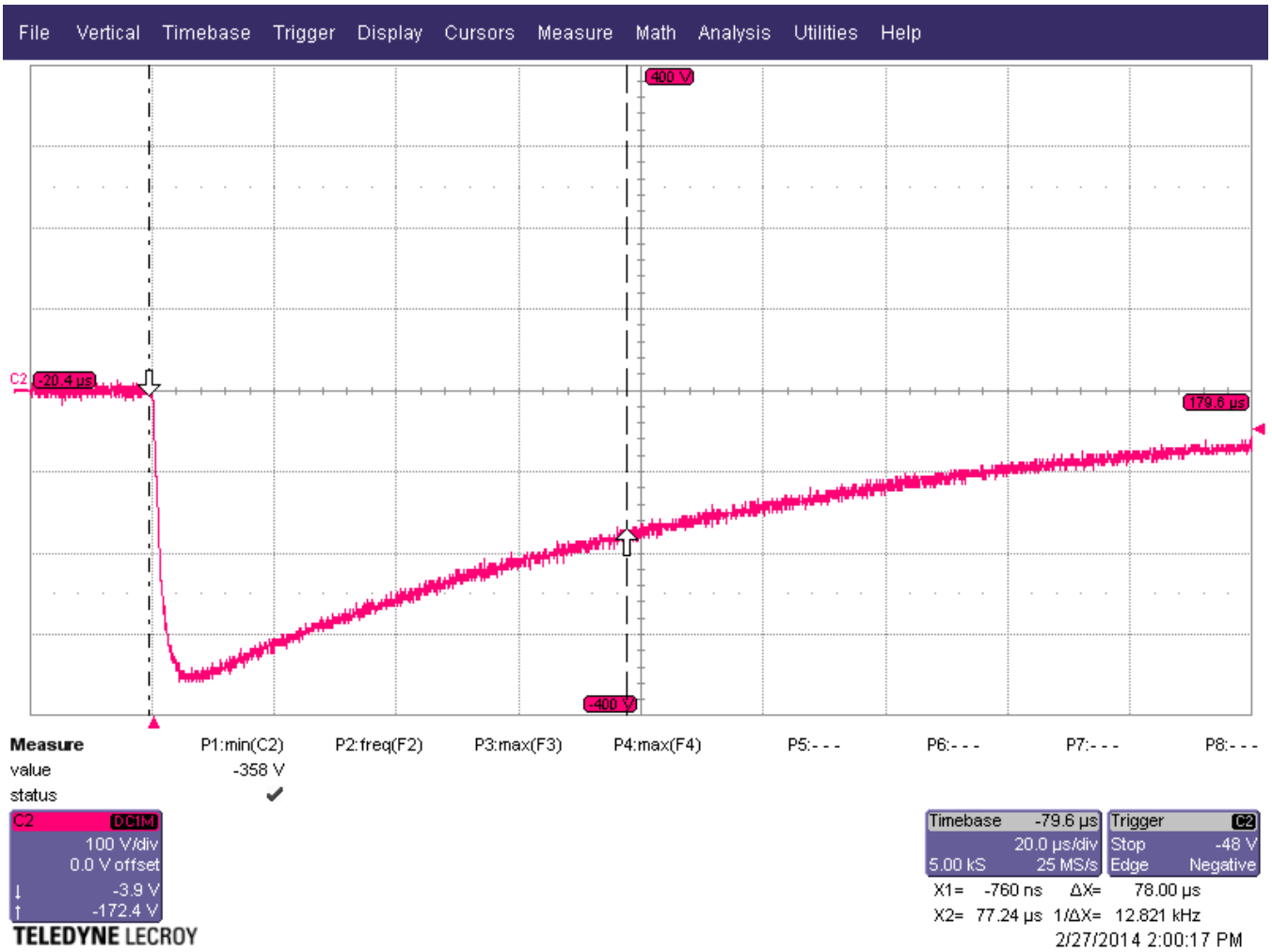
Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 2:00:07 PM

Pin WF4 Level 3 Open Circuit Verification - Negative T2

EMC & Product Safety Testing • Consulting

WF4 Pin Injection (Direct Injection)
Open Circuit Verification
Level 3 600V/60A
T1 = 6.4uS (+/- 20%)
T2 = 69uS (+/- 20%)
Gen = 350



Channel Status

		C2
Vertical	V / Div	100 V
	Offset	0.0 V
	Coupling	DC1MΩ
	BW-Limit	Full
	Probe	1.000e+3
	Sweeps	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

PIN INJECTION

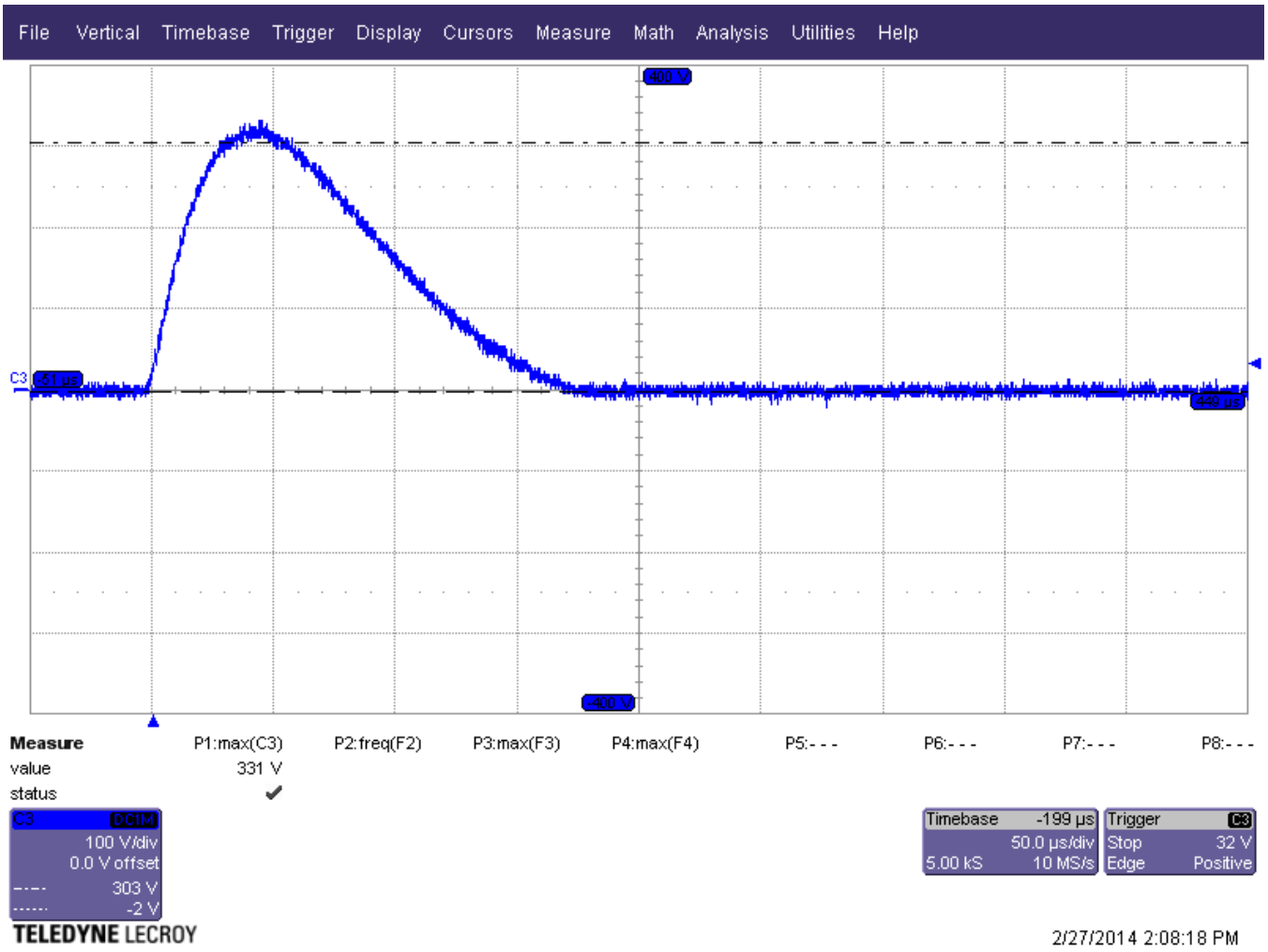
WF5A CALIBRATION DATA SHEETS

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 2:07:58 PM

Pin WF5A Level 3 Short Circuit Verification - Positive

EMC & Product Safety Testing • Consulting

WF5A Pin Injection (Direct Injection)
Short Circuit Verification
Level 3 300V/300A
Gen = 370



Channel Status

		C3
Vertical	V / Div	100 V
	Offset	0.0 V
	Coupling	DC1MΩ
	BW-Limit	Full
	Probe	200.000
	Sweeps	1 #

Acquisition Status

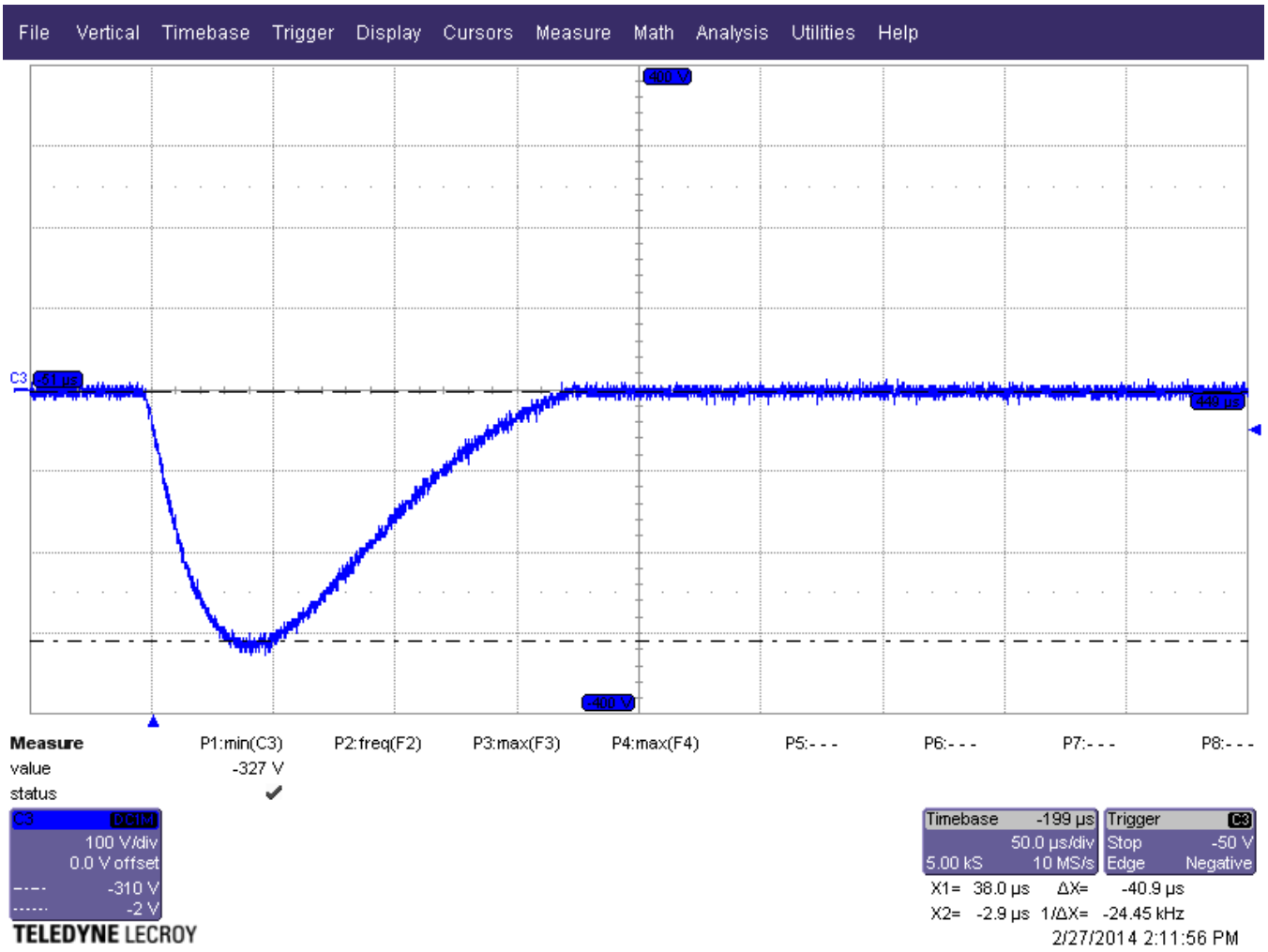
Horizontal	Time / Div	0 s	Sampling Rate	10.000000000 GS/s
	Time / Pt	1 fs	Sampling Mode	undef

	Pts / Div	0.0 S	Trigger Delay	1.0
	Mode	Normal	Slope	undef
Trigger	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 2:11:48 PM

Pin WF5A Level 3 Short Circuit Verification - Negative

WF5A Pin Injection (Direct Injection)
Short Circuit Verification
Level 3 300V/300A
Gen = 370



Channel Status

		C3
Vertical	V / Div	100 V
	Offset	0.0 V
	Coupling	DC1MΩ
	BW-Limit	Full
	Probe	200.000
	Sweeps	1 #

Acquisition Status

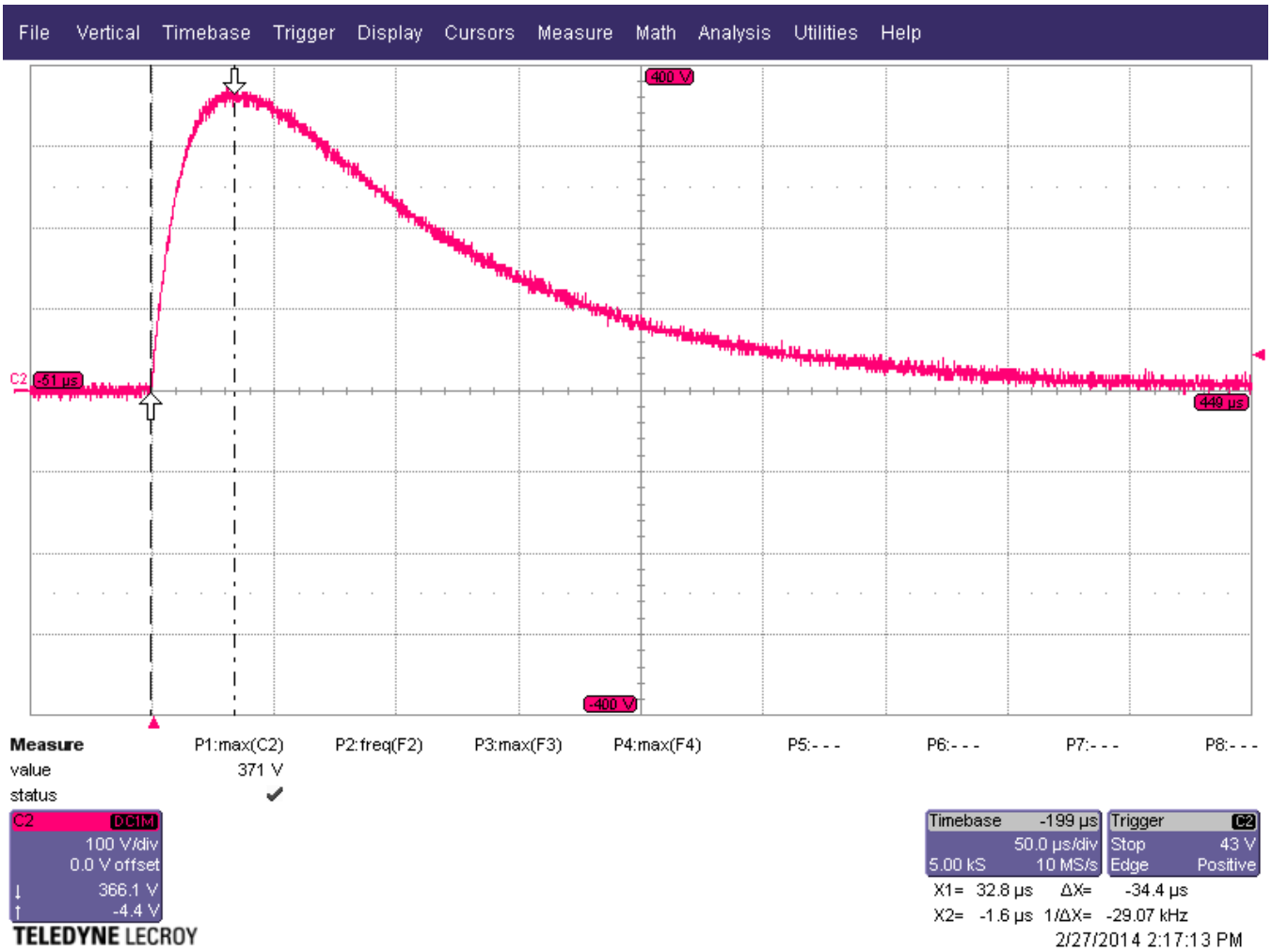
Horizontal	Time / Div	0 s	Sampling Rate	10.000000000 GS/s
	Time / Pt	1 fs	Sampling Mode	undef

	Pts / Div	0.0 S	Trigger Delay	1.0
	Mode	Normal	Slope	undef
Trigger	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 2:17:02 PM

Pin WF5A Level 3 Open Circuit Verification T1 - Positive

WF5A Pin Injection (Direct Injection)
Open Circuit Verification
Level 3 300V/300A
T1 = 40uS (+/- 20%)
T2 = 120uS (+/- 20%)
Gen = 370



Channel Status

		C2
Vertical	V / Div	100 V
	Offset	0.0 V
	Coupling	DC1MΩ
	BW-Limit	Full
	Probe	1.000e+3
	Sweeps	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

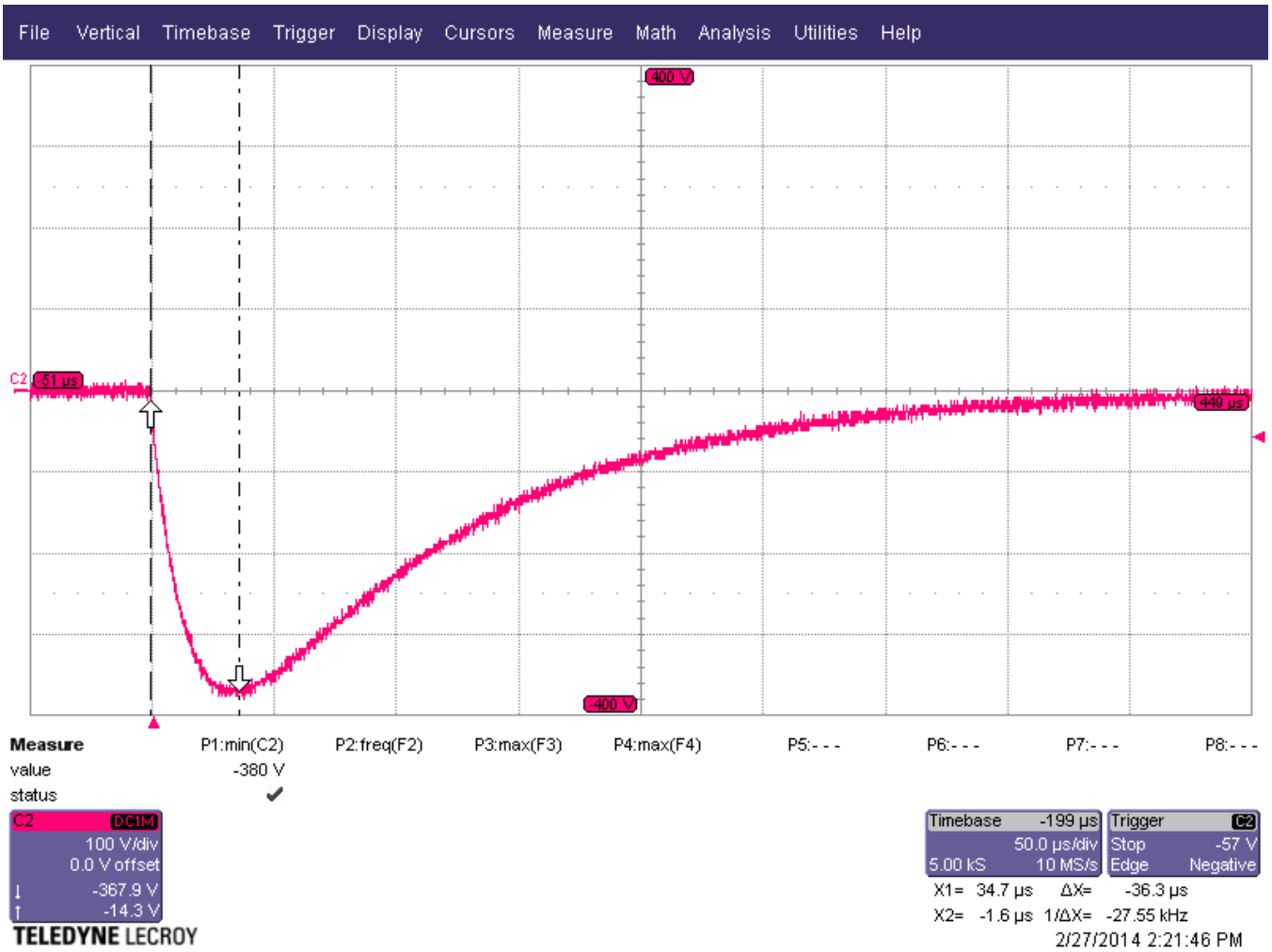
Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 2:21:34 PM

Pin WF5A Level 3 Open Circuit Verification T1 - Negative

EMC & Product Safety Testing • Consulting

WF5A Pin Injection (Direct Injection)
Open Circuit Verification
Level 3 300V/300A
T1 = 40uS (+/- 20%)
T2 = 120uS (+/- 20%)
Gen = 370



Channel Status

		C2
Vertical	V / Div	100 V
	Offset	0.0 V
	Coupling	DC1MΩ
	BW-Limit	Full
	Probe	1.000e+3
	Sweeps	1 #

Acquisition Status

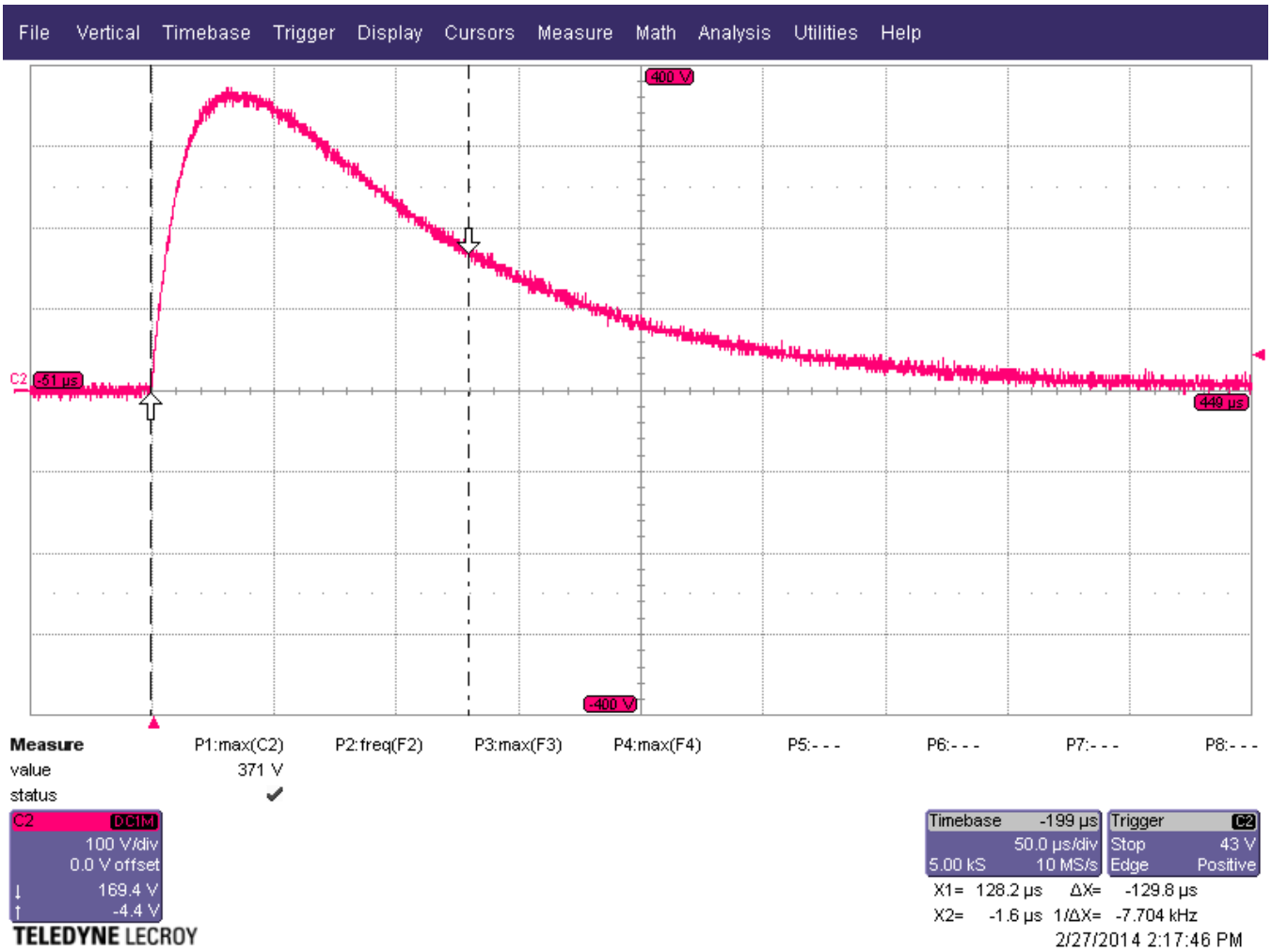
Time / Div	0 s	Sampling Rate	10.000000000 GS/s

Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 2:17:34 PM

Pin WF5A Level 3 Open Circuit Verification T2 - Positive

WF5A Pin Injection (Direct Injection)
Open Circuit Verification
Level 3 300V/300A
T1 = 40uS (+/- 20%)
T2 = 120uS (+/- 20%)
Gen = 370



Channel Status

		C2
Vertical	V / Div	100 V
	Offset	0.0 V
	Coupling	DC1MΩ
	BW-Limit	Full
	Probe	1.000e+3
	Sweeps	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

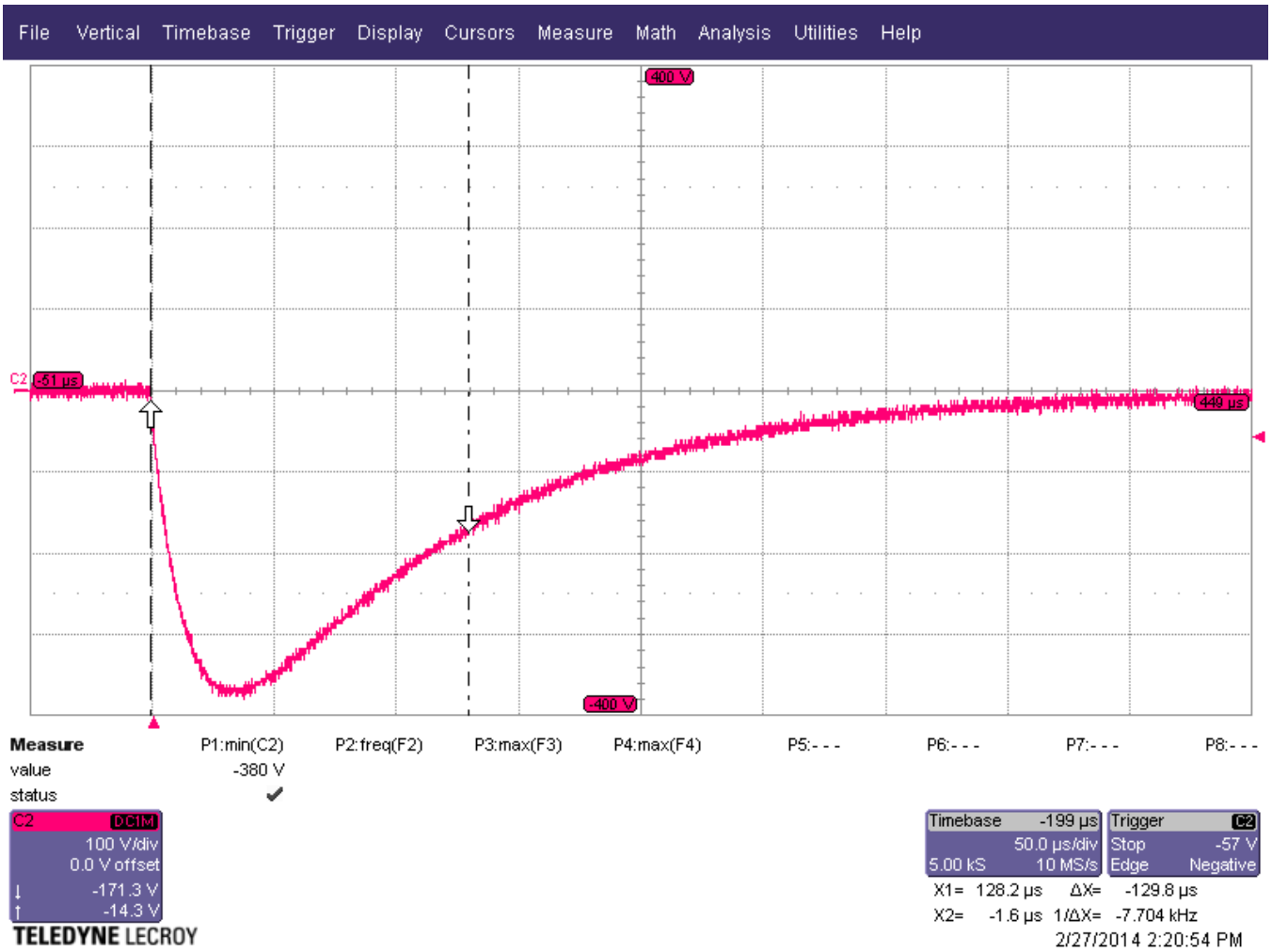
Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 2:20:12 PM

Pin WF5A Level 3 Open Circuit Verification T2 - Negative

EMC & Product Safety Testing • Consulting

WF5A Pin Injection (Direct Injection)
Open Circuit Verification
Level 3 300V/300A
T1 = 40uS (+/- 20%)
T2 = 120uS (+/- 20%)
Gen = 370



Channel Status

		C2
Vertical	V / Div	100 V
	Offset	0.0 V
	Coupling	DC1MΩ
	BW-Limit	Full
	Probe	1.000e+3
	Sweeps	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

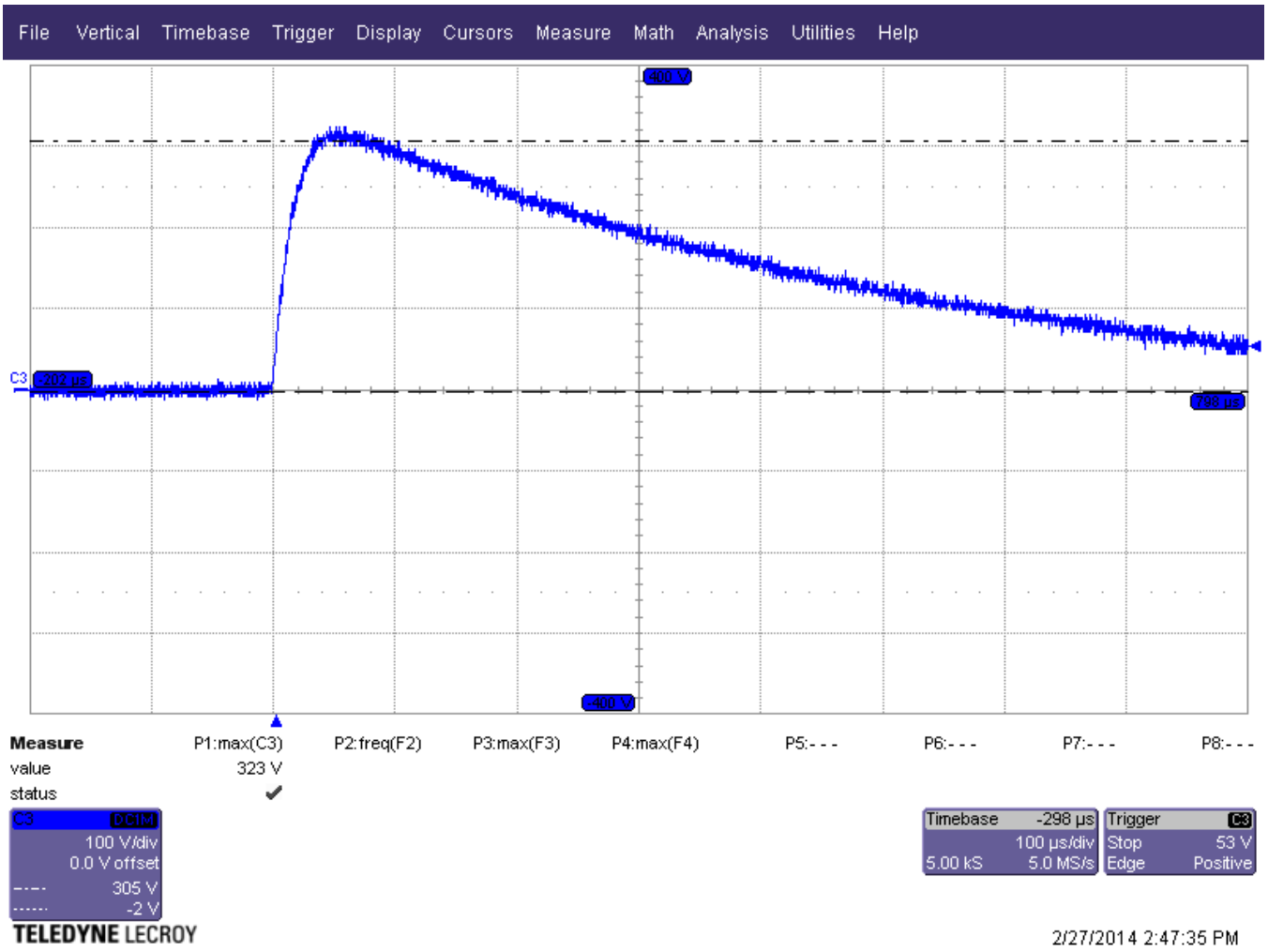
PIN INJECTION

WF5B CALIBRATION DATA SHEETS

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 2:47:24 PM

Pin WF5B Level 3 Short Circuit Verification - Positive

WF5B Pin Injection (Direct Injection)
Short Circuit Verification
Level 3 300V/300A
Gen = 370



Channel Status

		C3
Vertical	V / Div	100 V
	Offset	0.0 V
	Coupling	DC1MΩ
	BW-Limit	Full
	Probe	200.000
	Sweeps	1 #

Acquisition Status

Horizontal	Time / Div	0 s	Sampling Rate	10.000000000 GS/s
	Time / Pt	1 fs	Sampling Mode	undef

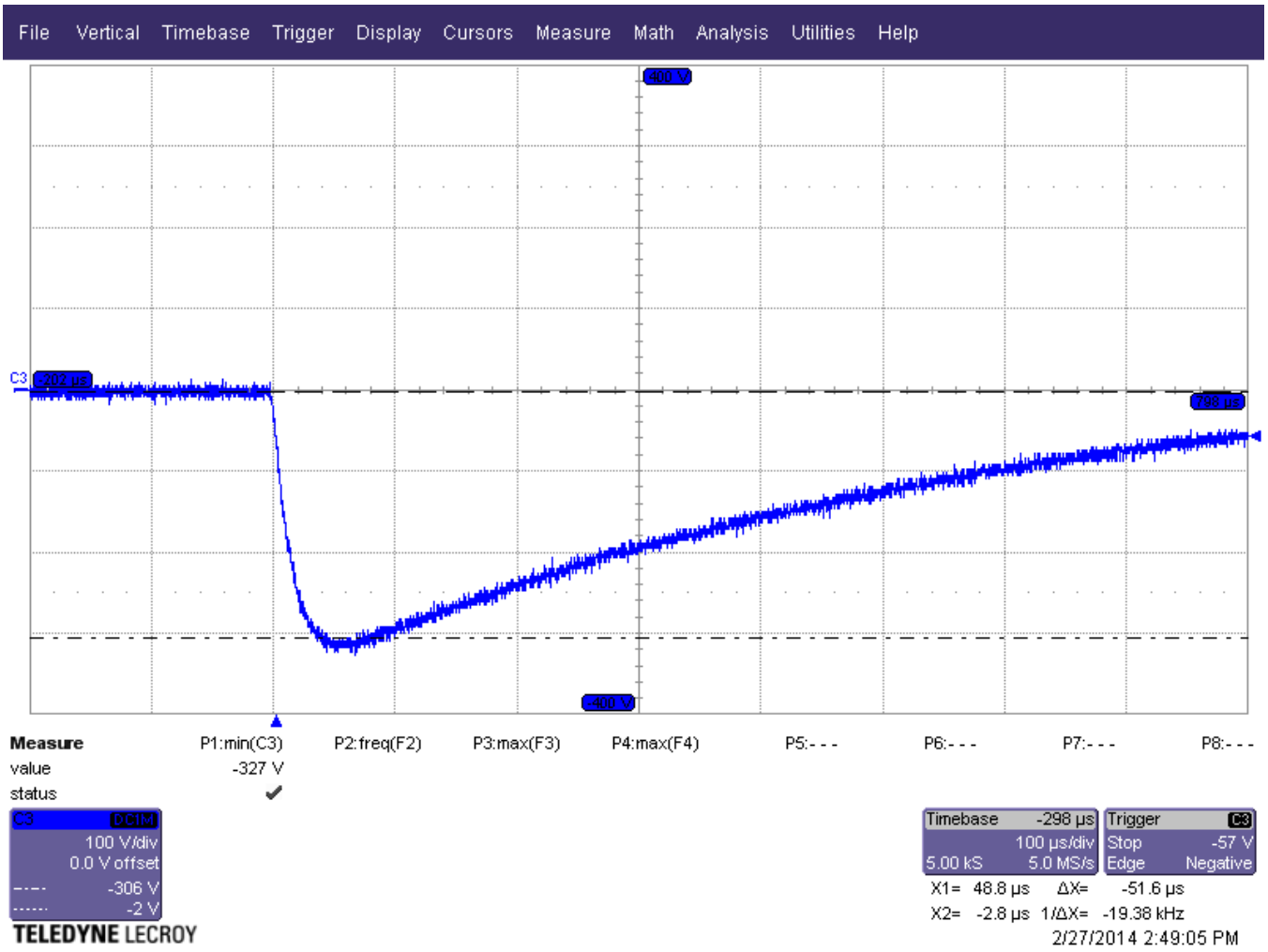
	Pts / Div	0.0 S	Trigger Delay	1.0
	Mode	Normal	Slope	undef
Trigger	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 2:48:55 PM

Pin WF5B Level 3 Short Circuit Verification - Negative

EMC & Product Safety Testing • Consulting

WF5B Pin Injection (Direct Injection)
Short Circuit Verification
Level 3 300V/300A
Gen = 370



Channel Status

		C3
Vertical	V / Div	100 V
	Offset	0.0 V
	Coupling	DC1MΩ
	BW-Limit	Full
	Probe	200.000
	Sweeps	1 #

Acquisition Status

Horizontal	Time / Div	0 s	Sampling Rate	10.000000000 GS/s
	Time / Pt	1 fs	Sampling Mode	undef

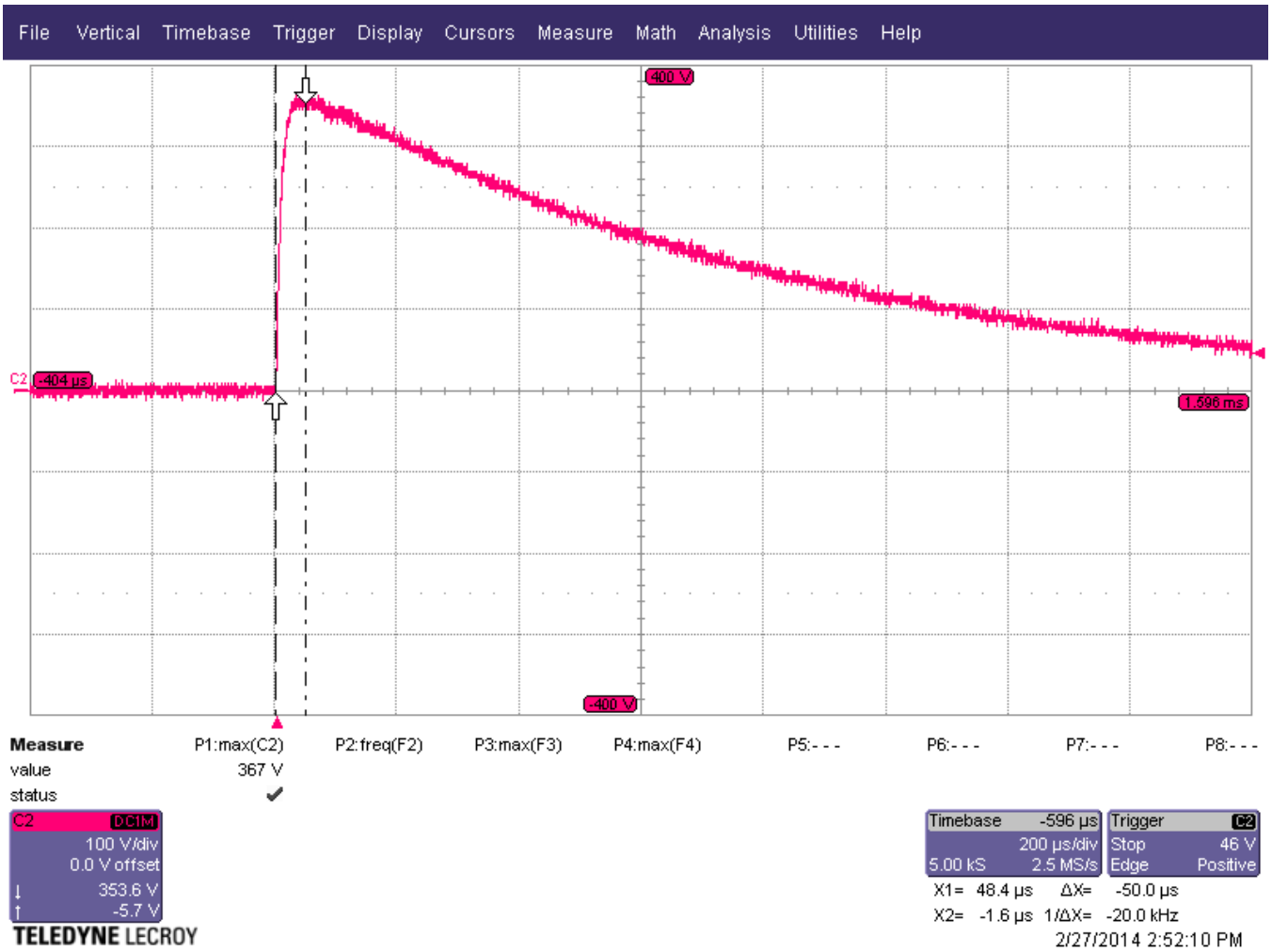
	Pts / Div	0.0 S	Trigger Delay	1.0
	Mode	Normal	Slope	undef
Trigger	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 2:51:58 PM

Pin WF5B Level 3 Open Circuit Verification T1 - Positive

DLS EMC & Product Safety Testing • Consulting

WF5B Pin Injection (Direct Injection)
Open Circuit Verification
Level 3 300V/300A
T1 = 50uS (+/- 20%)
T2 = 500uS (+/- 20%)
Gen = 370



Channel Status

		C2
Vertical	V / Div	100 V
	Offset	0.0 V
	Coupling	DC1MΩ
	BW-Limit	Full
	Probe	1.000e+3
	Sweeps	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

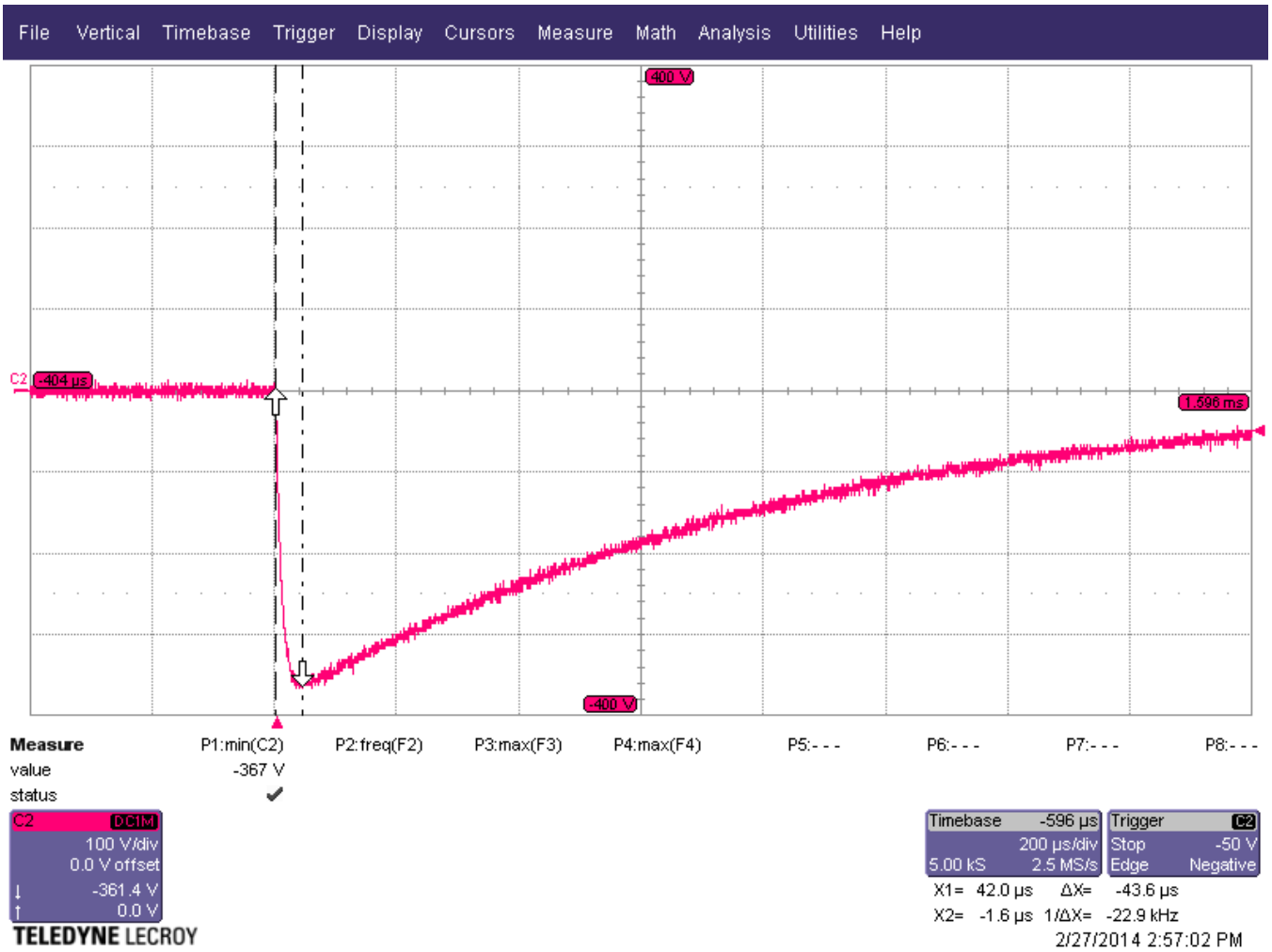
Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 2:56:49 PM

Pin WF5B Level 3 Open Circuit Verification T1 - Negative

EMC & Product Safety Testing • Consulting

WF5B Pin Injection (Direct Injection)
Open Circuit Verification
Level 3 300V/300A
T1 = 50uS (+/- 20%)
T2 = 500uS (+/- 20%)
Gen = 370



Channel Status

		C2
Vertical	V / Div	100 V
	Offset	0.0 V
	Coupling	DC1MΩ
	BW-Limit	Full
	Probe	1.000e+3
	Sweeps	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

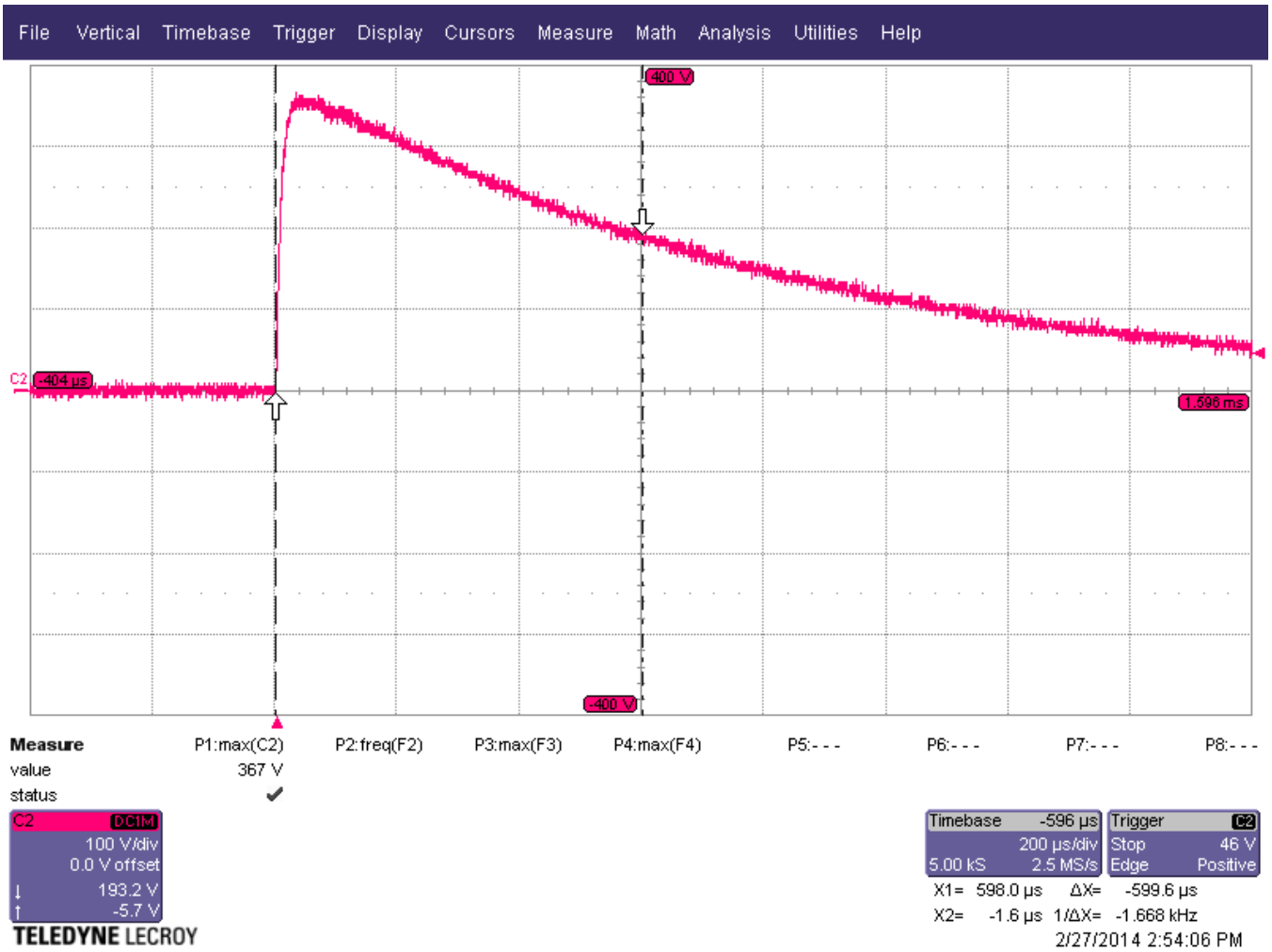
Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 2:53:55 PM

Pin WF5B Level 3 Open Circuit Verification T2 - Positive

EMC & Product Safety Testing • Consulting

WF5B Pin Injection (Direct Injection)
Open Circuit Verification
Level 3 300V/300A
T1 = 50uS (+/- 20%)
T2 = 500uS (+/- 20%)
Gen = 370



Channel Status

		C2
Vertical	V / Div	100 V
	Offset	0.0 V
	Coupling	DC1MΩ
	BW-Limit	Full
	Probe	1.000e+3
	Sweeps	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

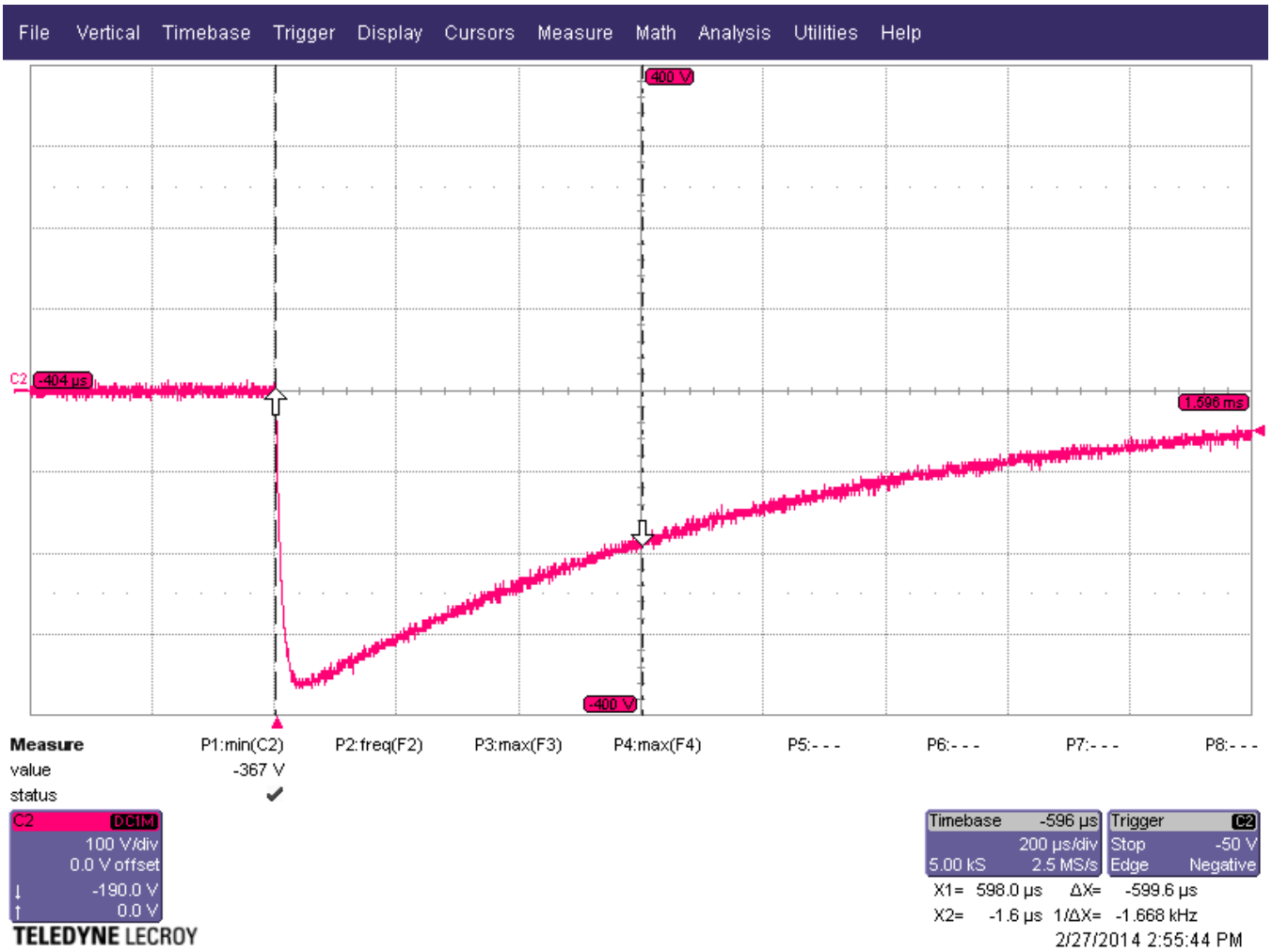
Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef

Lab Notebook Entry from LeCroy DSO
DSO S/N:
User: labadmin
Time: 2/27/2014 2:55:33 PM

Pin WF5B Level 3 Open Circuit Verification T2 - Negative

EMC & Product Safety Testing • Consulting

WF5B Pin Injection (Direct Injection)
Open Circuit Verification
Level 3 300V/300A
T1 = 50uS (+/- 20%)
T2 = 500uS (+/- 20%)
Gen = 370



Channel Status

		C2
Vertical	V / Div	100 V
	Offset	0.0 V
	Coupling	DC1MΩ
	BW-Limit	Full
	Probe	1.000e+3
	Sweeps	1 #

Acquisition Status

Time / Div	0 s	Sampling Rate	10.000000000 GS/s

Horizontal	Time / Pt	1 fs	Sampling Mode	undef
	Pts / Div	0.0 S	Trigger Delay	1.0
Trigger	Mode	Normal	Slope	undef
	Type	undef	Level	50 mV
	Source	undef	Coupling	undef