

NTS Labs, LLC
(DBA Element Materials Technology Huntsville)
Test Report for
CS117 Testing of the
Battery

Prepared For

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Prepared By

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EMI Project Engineer

Quality Assurance Representative

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Revision History

Rev.	Description	Technical Writer	Project Engineer	Quality Assurance
0	Initial Release	—	—	—

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1.0 Introduction

This document presents the test procedures used and the results obtained during the performance of an EMI test program. The test program was conducted to assess the ability of the specified Equipment Under Test (EUT) to successfully satisfy the requirements listed in Section 2.0.

2.0 References

The following references listed below form a part of this document to the extent specified herein.

- Test Specification: MIL-STD-461G
- Rubix LLC Purchase Order(s) Credit Card
- Quote(s) QUO-000747537-0
- ISO/IEC 17025:2017(E) General Requirements for the Competence of Testing and Calibration Laboratories, dated 11/1/2017
- ISO-9001:2015, Quality Management Systems Requirements

3.0 Product Selection and Description

Rubix LLC selected and provided the following test sample(s) to be used as the Equipment Under Test.

Table 3.0-1: Product Identification - Equipment Under Test (EUT)

Item	Qty.	Name/Description	Part Number	Serial Number
1	1	Battery	RS51100	Element - 001

3.1 Received EUT Photographs



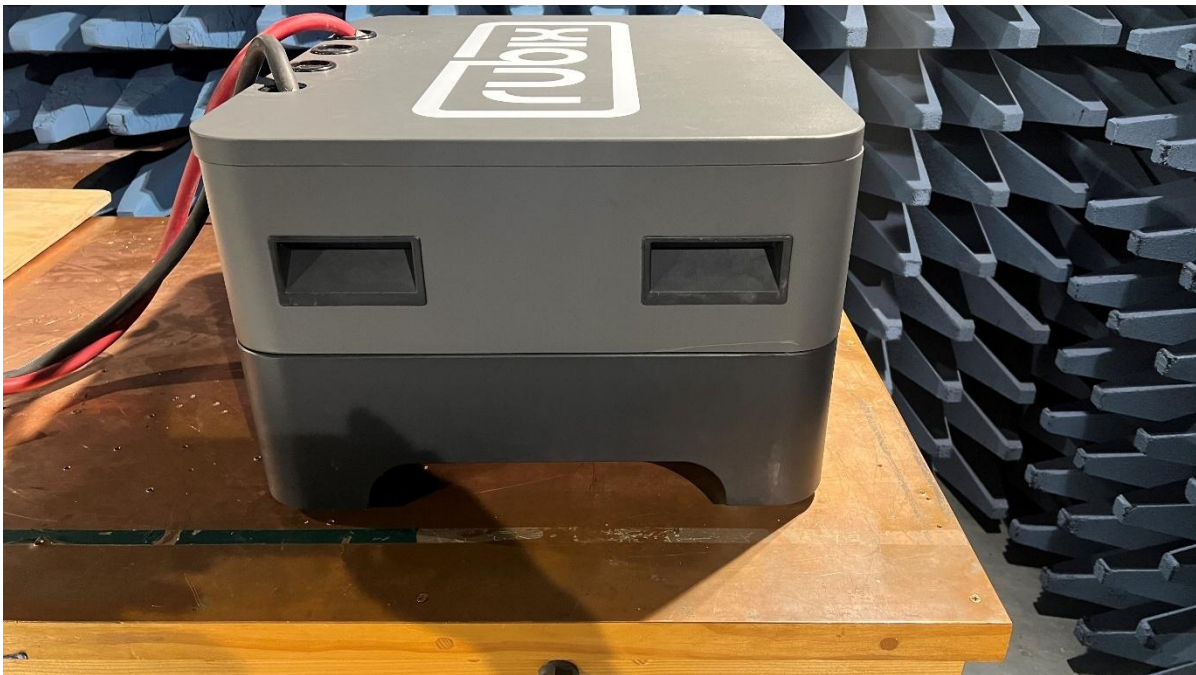
01 EUT - Rubix Battery



02 EUT - Rubix Battery



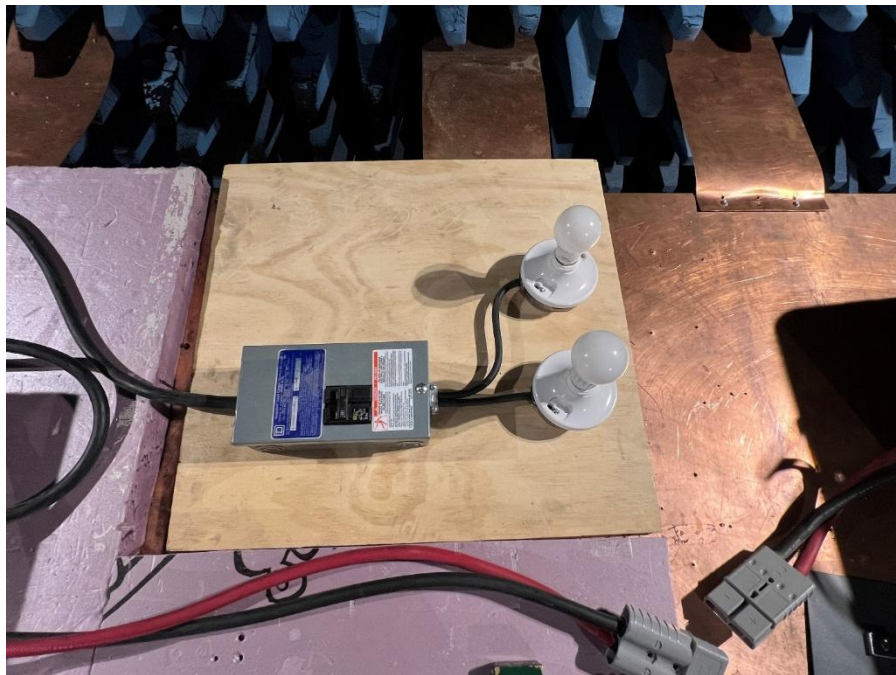
03 EUT - Rubix Battery



04 EUT - Rubix Battery



05 EUT - Rubix Battery



06 Light Bulb Fixture - Load



07 Support Equipment - Sol-Ark 12k-P



08 Support Equipment - Sol-Ark 12k-P



09 Support Equipment - Sol-Ark 12k-P



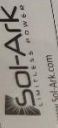


10 Support Equipment - Sol-Ark 12k-P



11 Support Equipment - Sol-Ark 12k-P



12 Support Equipment - Sol-Ark 12k-P

  		Model No. Sol-Ark-12k-P Set No. _____ Engineered, Tested, & Serviced in USA. Made in China. This Grid support Inverter complies with UL STD 1741 SA, CPUC RULE 21, HECO RULE 14H, IEC 61731 SA-V1.1, IEEE1547-2003, FCC 15 Class-B, UL1699 Arc-Fault Circuit-protection Type 1. Technical support: 1-972-575-8875	
12kW MPPT 9kW Charger Split-Phase Inverter			
AC Voltage @ 120/240V (Vrms)	Min	Nom	Max
AC Output Current @ 240V (A)	211	240	264
AC Voltage @ 120/208V (Vrms)			37.5
AC Output Current @ 208V (A)	183	208	229
AC Frequency @ 60 (Hz)	55	60	65
PV Input Voltage (Vdc)	150	175-425	500
Battery Voltage @ 48V (Vdc)	43	48	63
PV Max Current (self-limiting)	20A MPPT1 / 20A MPPT2		
DO NOT EXCEED 550 Vdc on PV Input Max Continuous AC Passthrough Max Continuous Inverter Power	15120W 63A L-L 240V 7560W 63A L-N 120V 9000W 37.5A L-L 240V 4500W 37.5A L-N 120V		
AC Power Factor	0.9 - 1.0		
Operating Temperature	-25 to 55C, >45C/113F derating		
Enclosure NEMA	3R (Indoor and outdoors), IP65		



13 Support Equipment - Sol-Ark 12k-P



14 Support Equipment - Sol-Ark 12k-P

3.2 Security Classification
Non-classified

3.3 Source Inspection
Element QA

3.4 Quality Assurance

All work performed on this test program was in accordance with Element’s Quality Program.

The Element Materials Technology, Huntsville Facility, Quality Management System is registered in compliance with the ISO-9001:2015 International Quality Standard. Registration has been completed by Intertek.

4.0 General Test Requirements

4.1 Test Equipment

The instrumentation used in the performance of these tests is periodically calibrated and standardized within manufacturer's rated accuracies and are traceable to the National Institute of Standards and Technology. The calibration procedures and practices are in accordance with ISO 17025:2017. Certification of calibration is on file subject to inspection by authorized personnel.

4.2 Standard Test Conditions

The EUT was configured using the method as described in MIL-STD-461G.

1. The EUT physical layout was performed by Element Materials Technology personnel with assistance from the customer's technical representative.
2. The EUT installation and operation were verified prior to the start of testing by the customer's technical representative.
3. The customer's technical representative authorization was acquired prior to test commencement.

Table 4.2-1: MIL-STD-461 Bonding Summary

Measurement Points			Measurements	Units
From	To	Location	Bonding reading	
Table	Table	Chamber 1	0.08	mΩ
Table	Floor		0.62	
EUT	Table		0.36	

5.0 Test Descriptions and Results

Table 5.0-1: Summary of Test Information & Results

Section	Test	Specification	Test Facility	Test Date	Part #	Serial #	Notice of Deviation (NOD)	Test Result
5.1	CS117	MIL-STD-461G	Huntsville, AL	12/02/2025 - 12/18/2025	RS51100	Element - 001	N/A	Compliant

The decision rule for Test Results was based on the Test Specification used for testing.

5.1 CS117**5.1.1 Test Procedure**

CS117 testing was performed on the EUT in the manner detailed in MIL-STD-461G.

5.1.2 Test Equipment

All EMI test equipment required for this test is listed on the Test Equipment List.

Element Huntsville uses commercially purchased EMI test software. The ETS-Lindgren Test software called TILE was specifically designed for EMI testing.

5.1.3 Test Result

Conducted Susceptibility per MIL-STD-461G was performed on the EUT. During testing, the EUT showed no signs of susceptibility, and no deviations were noted. The EUT was compliant with CS117.

The test results contain the following information:

- CS117 Datasheets
- CS117 Photographs
- CS117 Test Data
- CS117 Test Equipment List

5.1.4 Test Datasheet

ELEMENT
Project No.: PUS58000458
Test Dates: 12/02/2025 – 12/18/2025

Customer: Rubix Temperature: 70.1°F Humidity: 20%
EUT: Battery Measurement Point: See Test Points below
Model No.: RS51100 Interference Signal: See Test Level Applied below
Serial No.: Element - 001 Frequency Range: N/A

Test Title CS117, Conducted Susceptibility, Lightning Induced Transients, per MIL-STD-461G

Waveform	Polarity	Type	Meets Limit		Reached First: V _T / I _L or V _L / I _T	Voltage Level	Current Level	Comments / Test Point
			Yes	No				
WF1	Positive	Multiple Stroke	X		V _L	First Stroke: 332.8 V Subsequent Stroke: 167.0 V	0.675 mA 0.275 mA	Bundle
WF1	Negative	Multiple Stroke	X		V _L	First Stroke: -331.3 V Subsequent Stroke: -164.0 V	-0.630 mA -0.290 mA	Bundle
WF1	Positive	Multiple Stroke	X		V _L	First Stroke: 310.0 V Subsequent Stroke: 77.0 V	323.9 A 84.0 A	High Side
WF1	Negative	Multiple Stroke	X		V _L	First Stroke: -308.7 V Subsequent Stroke: -73.0 V	-314.7 A -78.0 A	High Side
WF2	Positive	Multiple Stroke	X		V _L	First Stroke: 316.6 V Subsequent Stroke: 166.0 V	1.574 A 0.165 mA	Bundle
WF2	Negative	Multiple Stroke	X		V _L	First Stroke: -333.8 V Subsequent Stroke: -164.0 V	-1.006 A -0.205 mA	Bundle
WF2	Positive	Multiple Stroke	X		V _L	First Stroke: 322.8 V Subsequent Stroke: 161.0 V	118.6 A 59.0 A	High Side
WF2	Negative	Multiple Stroke	X		V _L	First Stroke: -316.7 V Subsequent Stroke: -159.0 V	-122.3 A -58.0 A	High Side
WF3 (1 MHz)	Positive	Multiple Stroke	X		V _L	First Stroke: 730.0 V Subsequent Stroke: 305.0 V	3.45 A 0.280 mA	Bundle
WF3 (1 MHz)	Negative	Multiple Stroke	X		V _L	First Stroke: -642.0 V Subsequent Stroke: -354.0 V	-2.52 A -0.900 mA	Bundle
WF3 (1 MHz)	Positive	Multiple Stroke	X		V _L	First Stroke: 654.0 V Subsequent Stroke: 328.0 V	41.0 A 19.0 A	High Side
WF3 (1 MHz)	Negative	Multiple Stroke	X		V _L	First Stroke: -630.0 V Subsequent Stroke: -307.0 V	-40.4 A -19.6 A	High Side

ELEMENT
Project No.: PUS58000458
Test Dates: 12/02/2025 – 12/18/2025

Customer: Rubix Temperature: 70.1°F Humidity: 20%
EUT: Battery Measurement Point: See Test Points below
Model No.: RS51100 Interference Signal: See Test Level Applied below
Serial No.: Element - 001 Frequency Range: N/A

Test Title CS117, Conducted Susceptibility, Lightning Induced Transients, per MIL-STD-461G

Waveform	Polarity	Type	Meets Limit		Reached First: V _L / I _T	Test Level Applied	Test Levels	Comments / Test Point
			Yes	No				
WF3 (10 MHz)	Positive	Multiple Stroke	X		I _T	First Stroke: 24.8 A Subsequent Stroke: 12.0 A	420 V 210 V	Bundle
WF3 (10 MHz)	Negative	Multiple Stroke	X		I _T	First Stroke: -25.6 A Subsequent Stroke: -12.0 A	-396 V -210 V	Bundle
WF3 (10 MHz)	Positive	Multiple Stroke	X		I _L	First Stroke: 25.2 A Subsequent Stroke: 12.14 A	504 V 265.3 V	High Side
WF3 (10 MHz)	Negative	Multiple Stroke	X		I _L	First Stroke: -24.4 A Subsequent Stroke: -12.0 A	-504 V -268.68 V	High Side
WF3 (1 MHz)	Positive	Multiple Burst	X		V _T	360 V	4.5 A	Bundle
WF3 (1 MHz)	Negative	Multiple Burst	X		V _T	-368 V	-3.78 A	Bundle
WF3 (1 MHz)	Positive	Multiple Burst	X		I _L	6.3 A	102 V	High Side
WF3 (1 MHz)	Negative	Multiple Burst	X		I _L	-6.3 A	-106 V	High Side
WF3 (10 MHz)	Positive	Multiple Burst	X		I _L	6.7 A	100.8 V	Bundle
WF3 (10 MHz)	Negative	Multiple Burst	X		I _L	-6.3 A	-108.0 V	Bundle
WF3 (10 MHz)	Positive	Multiple Burst	X		I _L	6.5 A	148.0 V	High Side
WF3 (10 MHz)	Negative	Multiple Burst	X		I _L	-6.5 A	-140.0 V	High Side

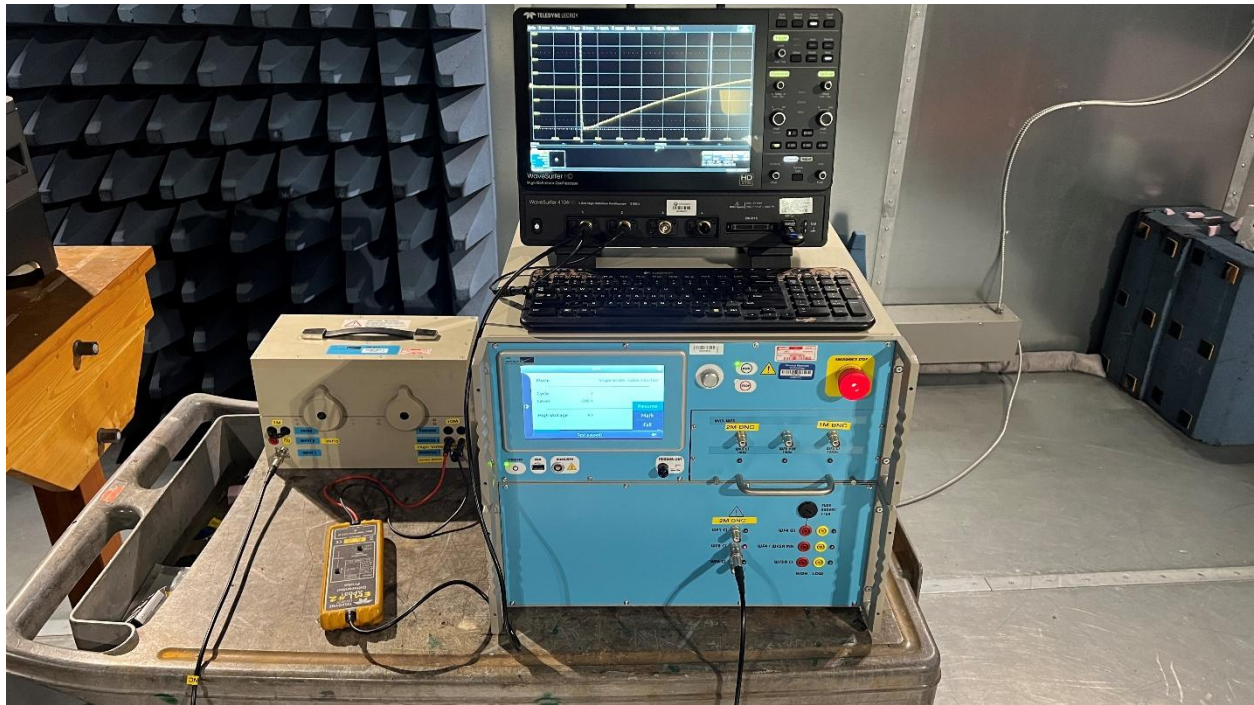
Notice of Deviation: None

Tested By: Chris Thompson
Technician

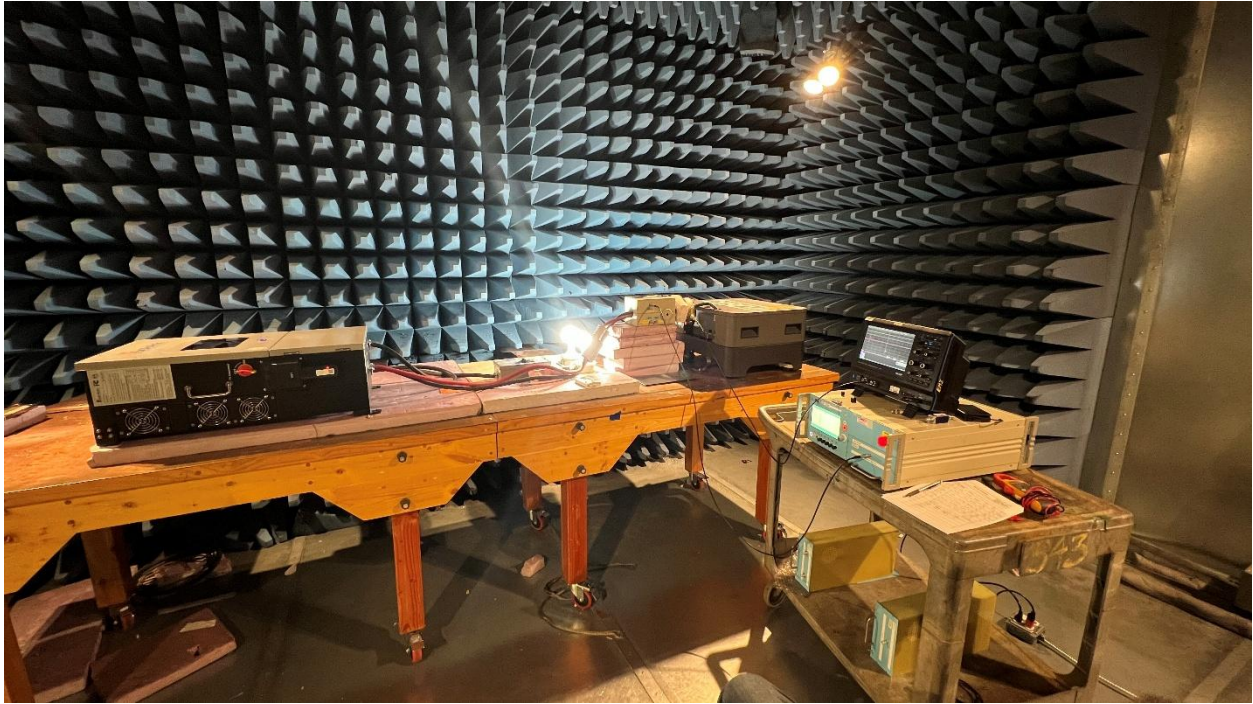
Witness: None

Approved: Lance Wallace
Project Engineer

5.1.5 Test Photographs



01 CS117 - Calibration - Voltage Probe



03 CS117 - Active - Test Setup

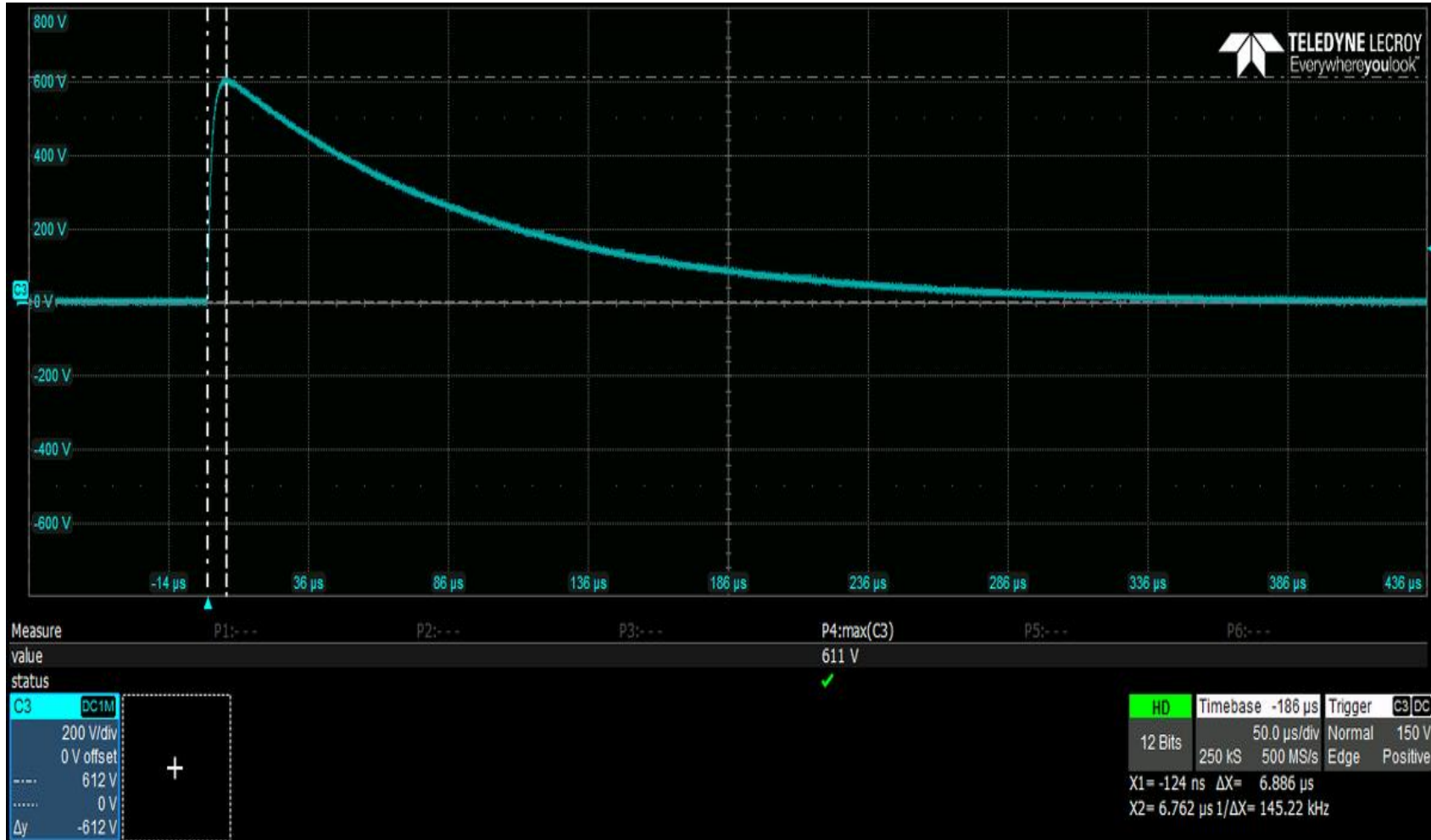


04 CS117 - Active - Power Bundle

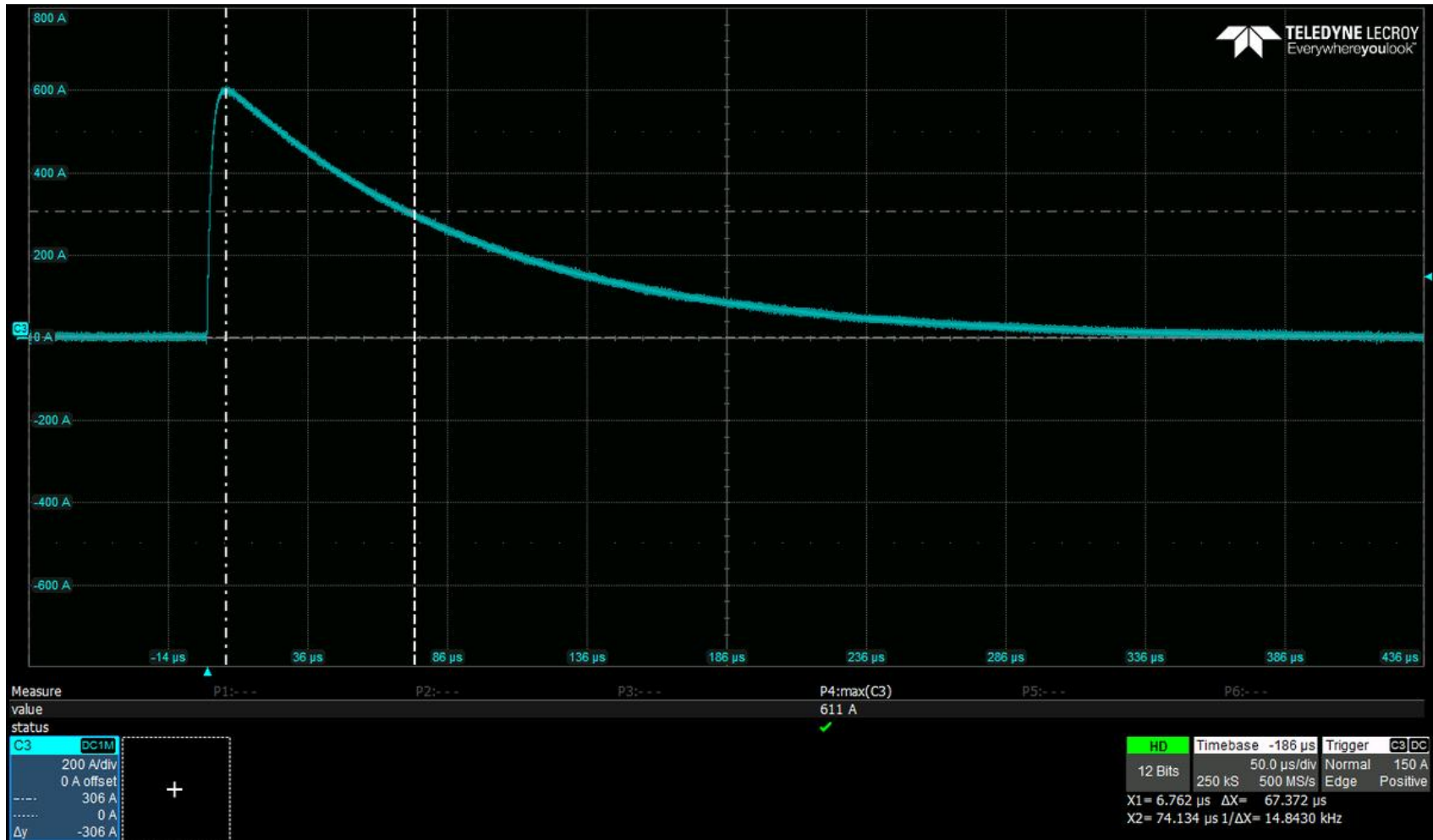


05 CS117 - Active - High Side

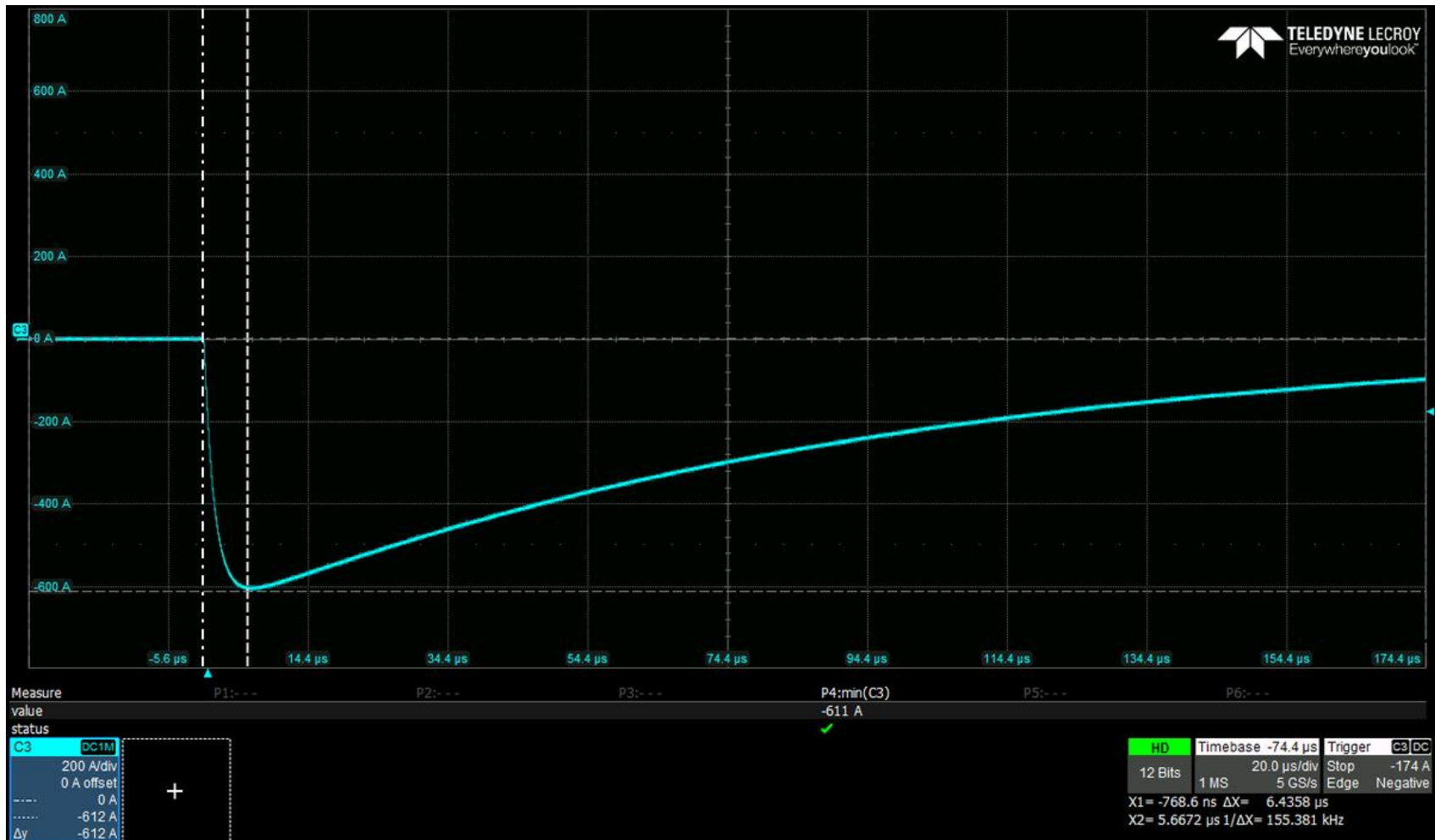
5.1.6 Test Data



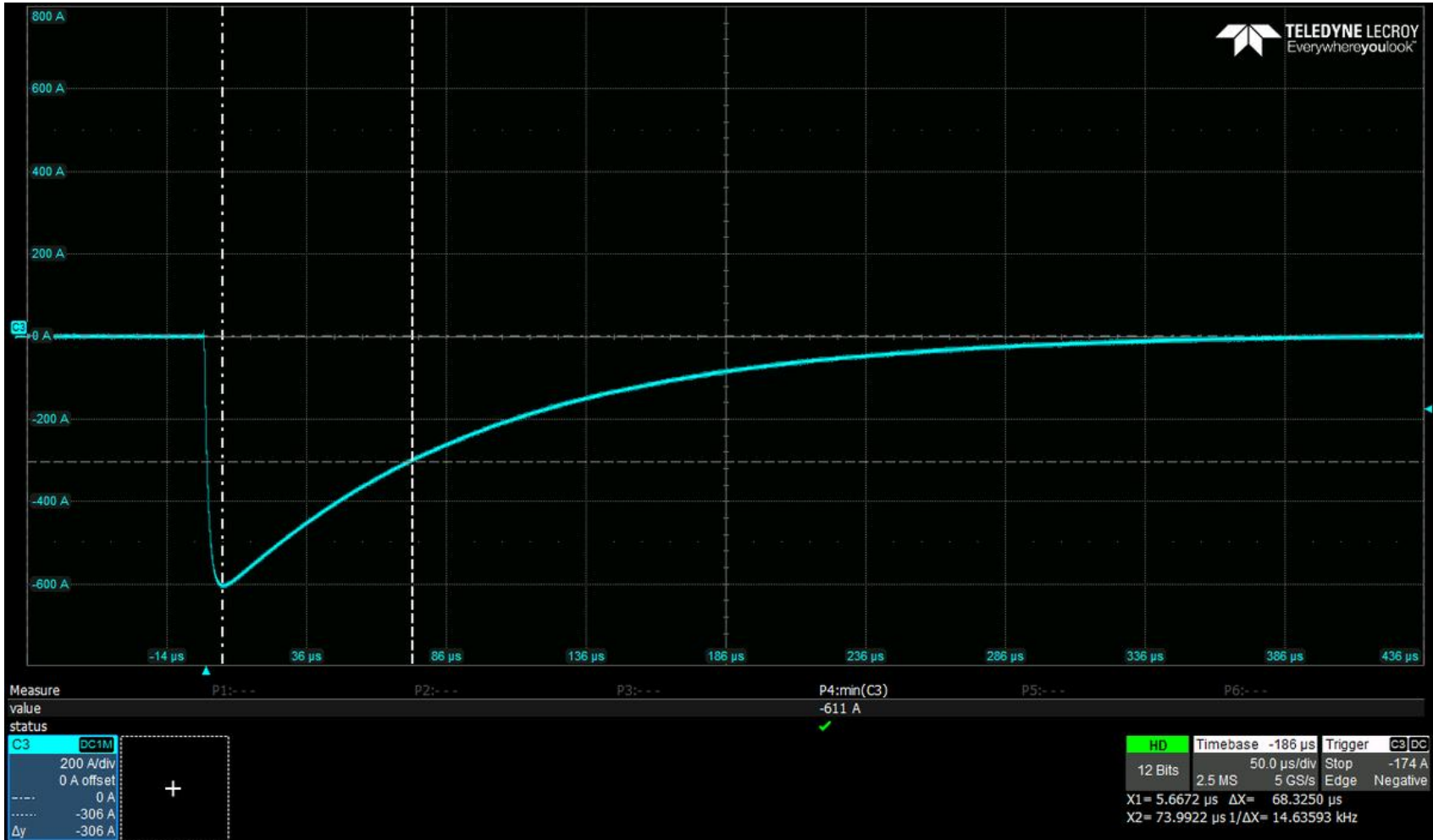
01 CS117 - Verification - WF1 - Positive - T1 - Single Stroke



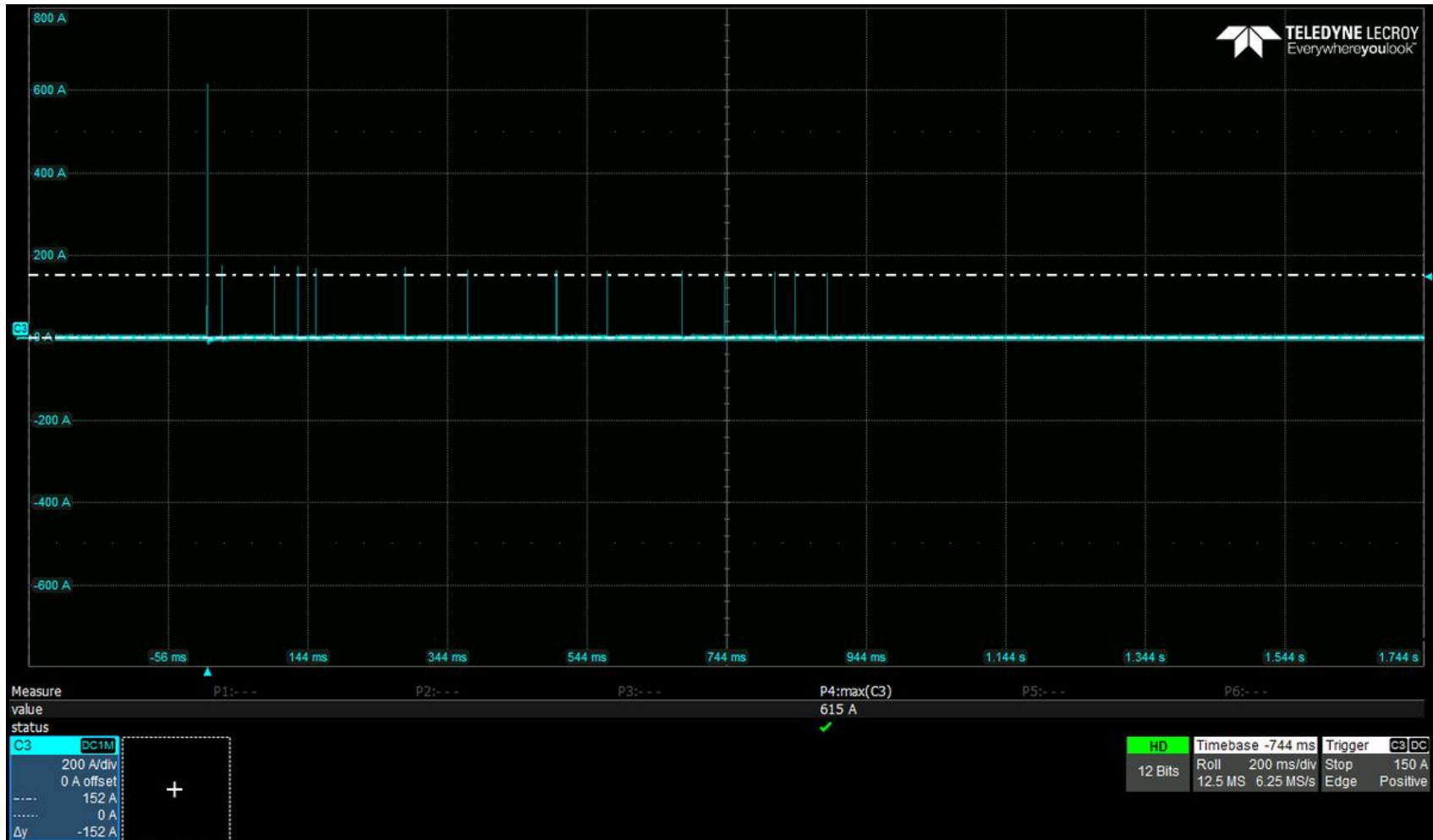
02 CS117 - Verification - WF1 - Positive - T2 - Single Stroke



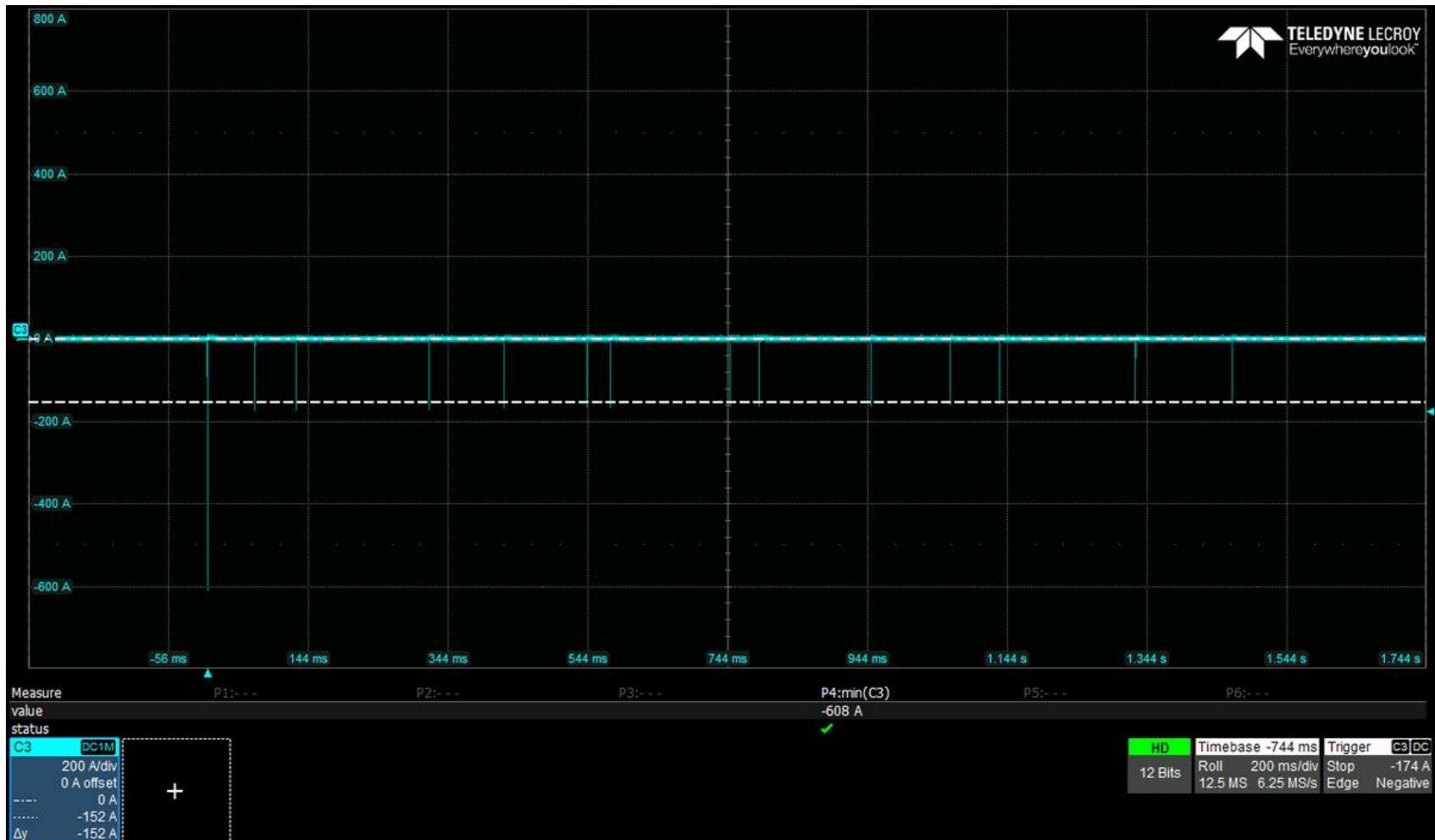
03 CS117 - Verification - WF1 - Negative - T1 - Single Stroke



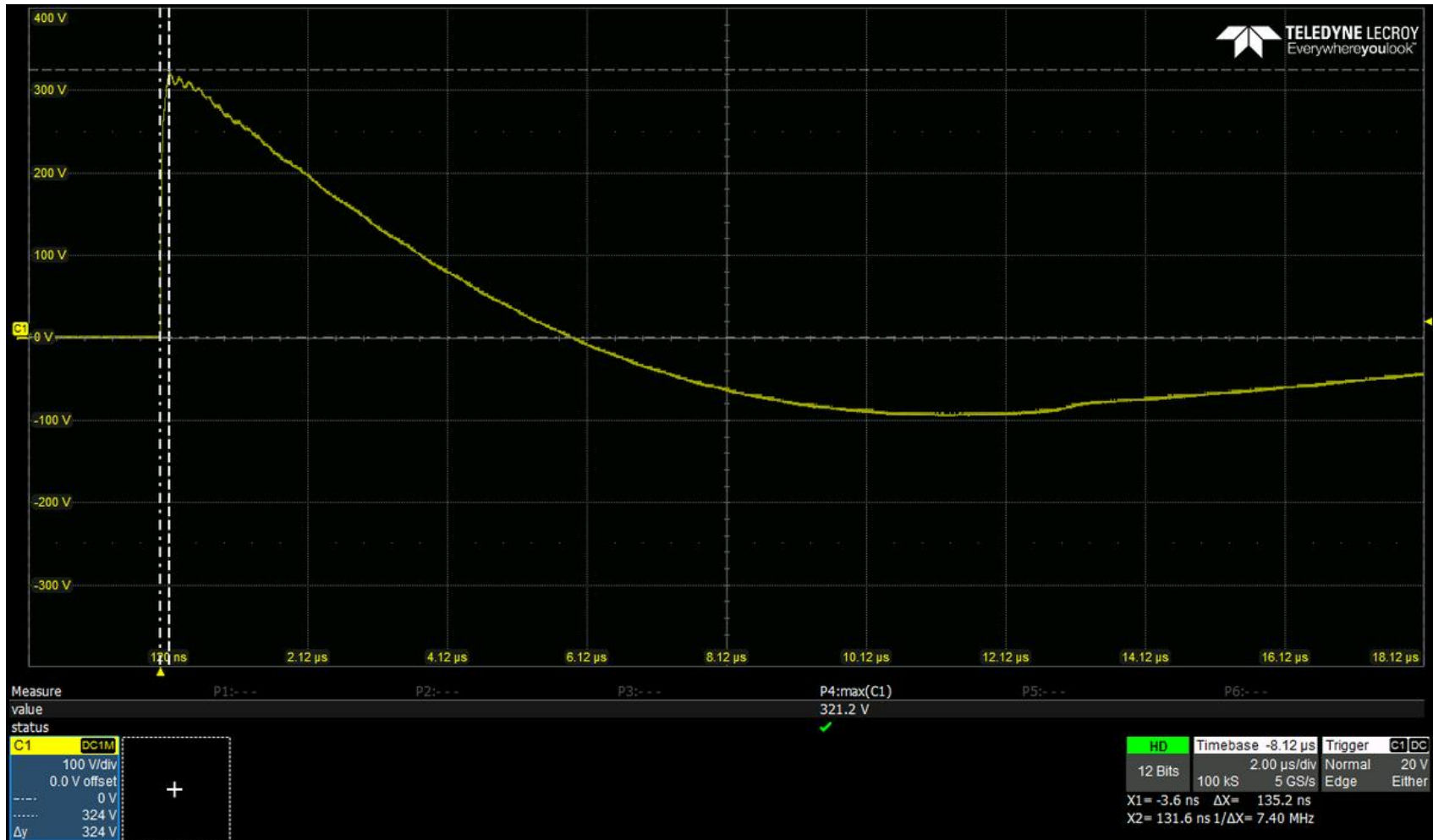
04 CS117 - Verification - WF1 - Negative - T2 - Single Stroke



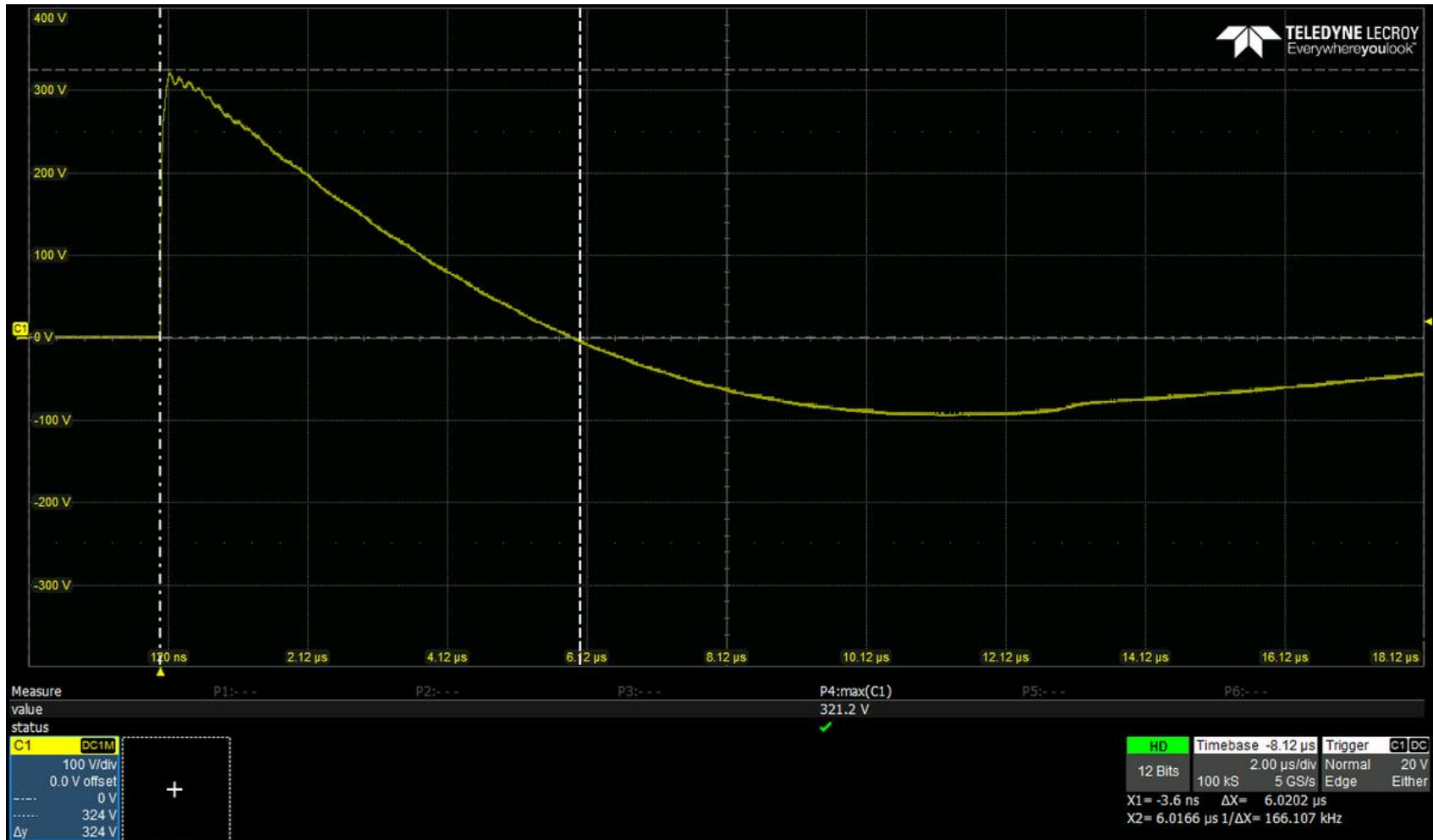
05 CS117 - Verification - WF1 - Positive - Multiple Stroke



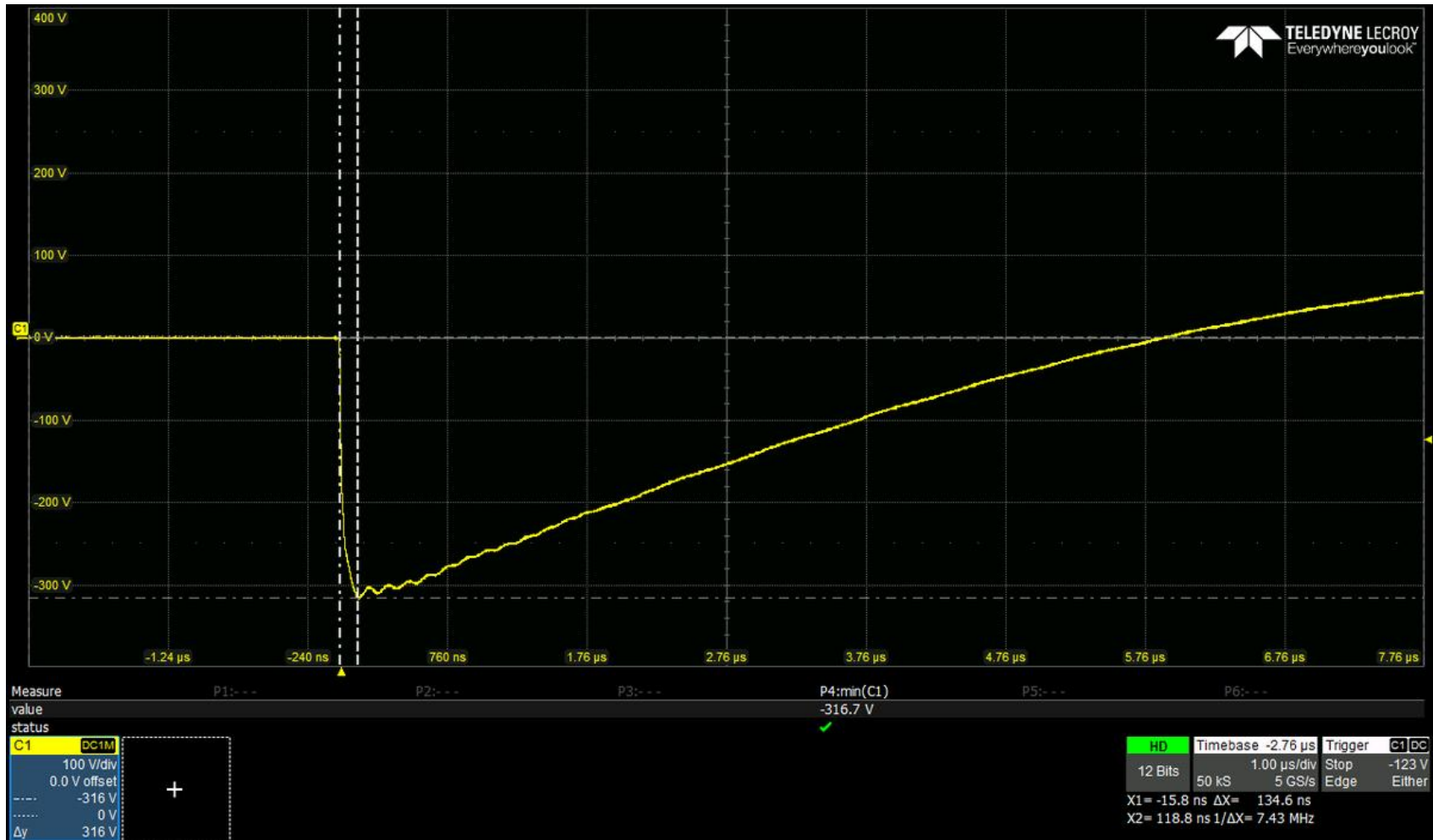
06 CS117 - Verification - WF1 - Negative - Multiple Stroke



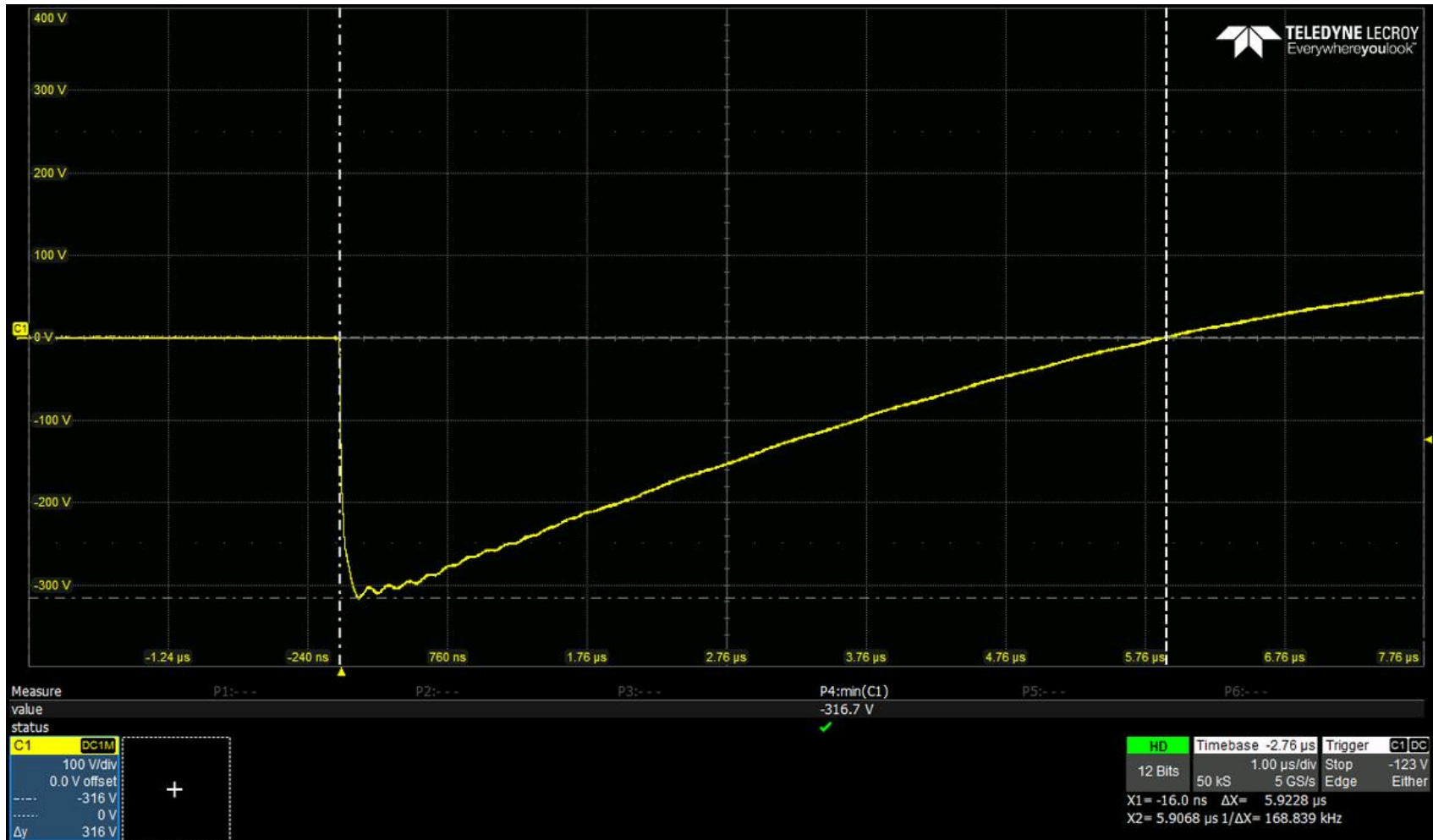
07 CS117 - Verification - WF2 - Positive - T1 - Single Stroke



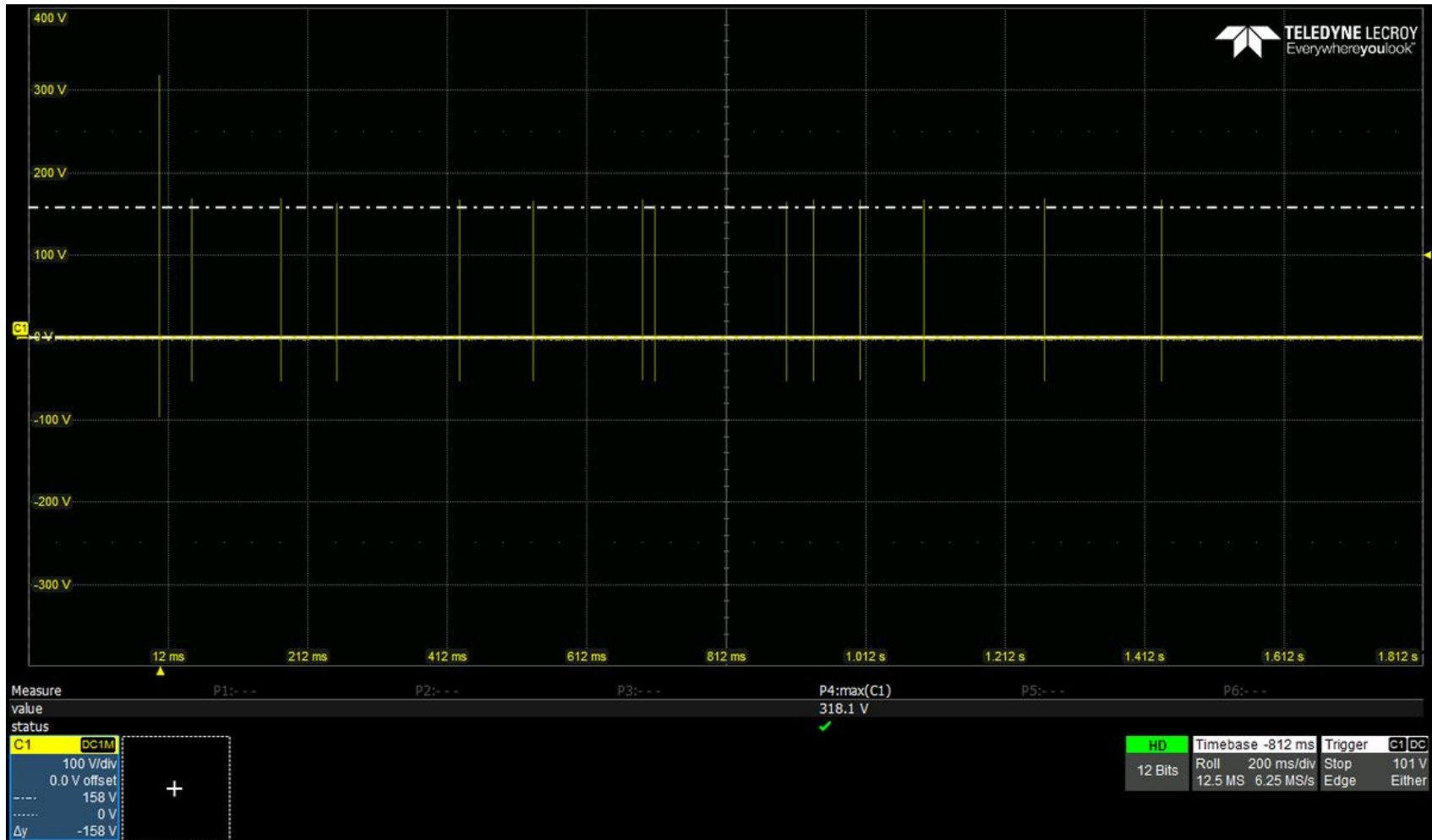
08 CS117 - Verification - WF2 - Positive - T2 - Single Stroke



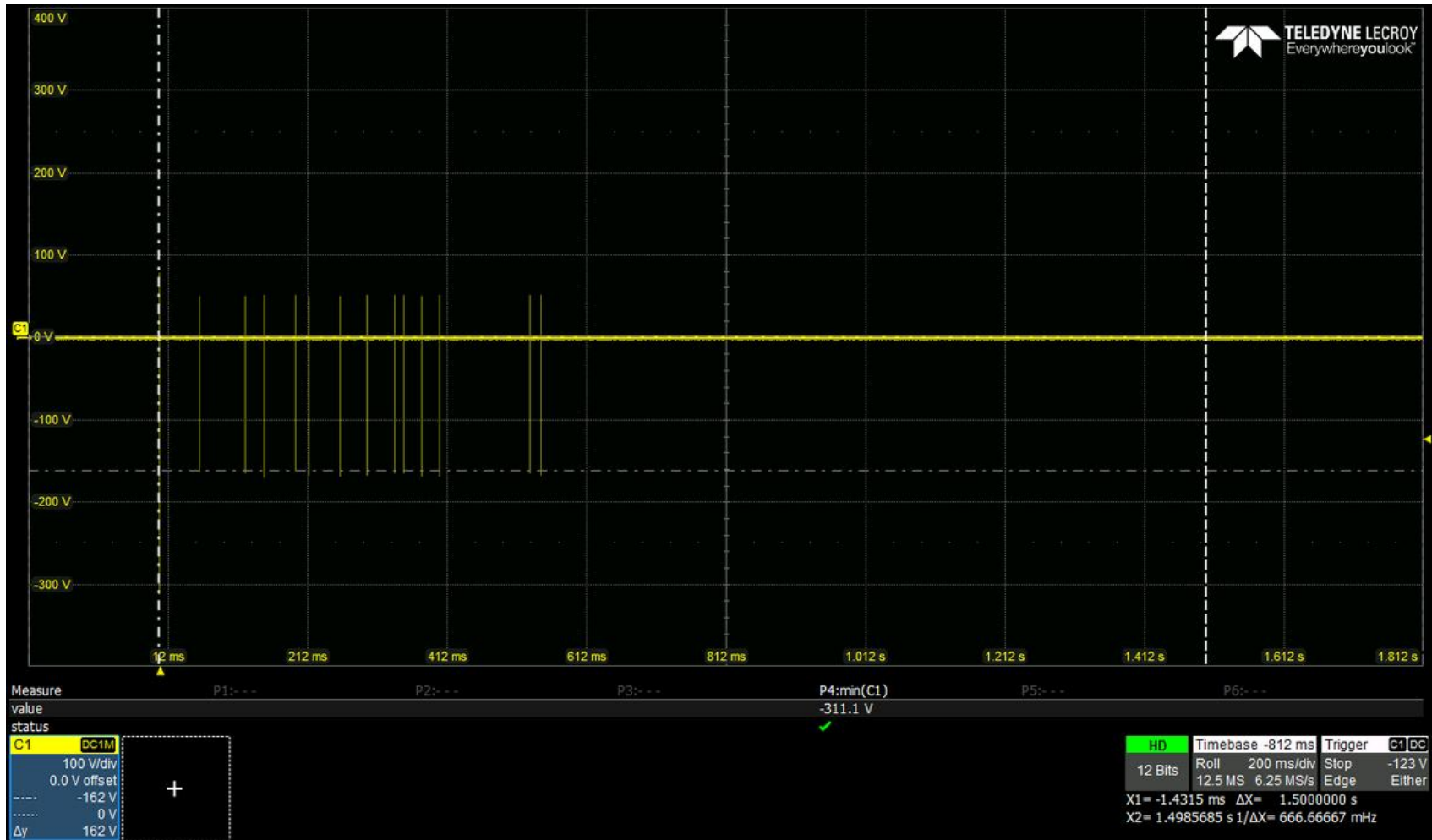
09 CS117 - Verification - WF2 - Negative - T1 - Single Stroke



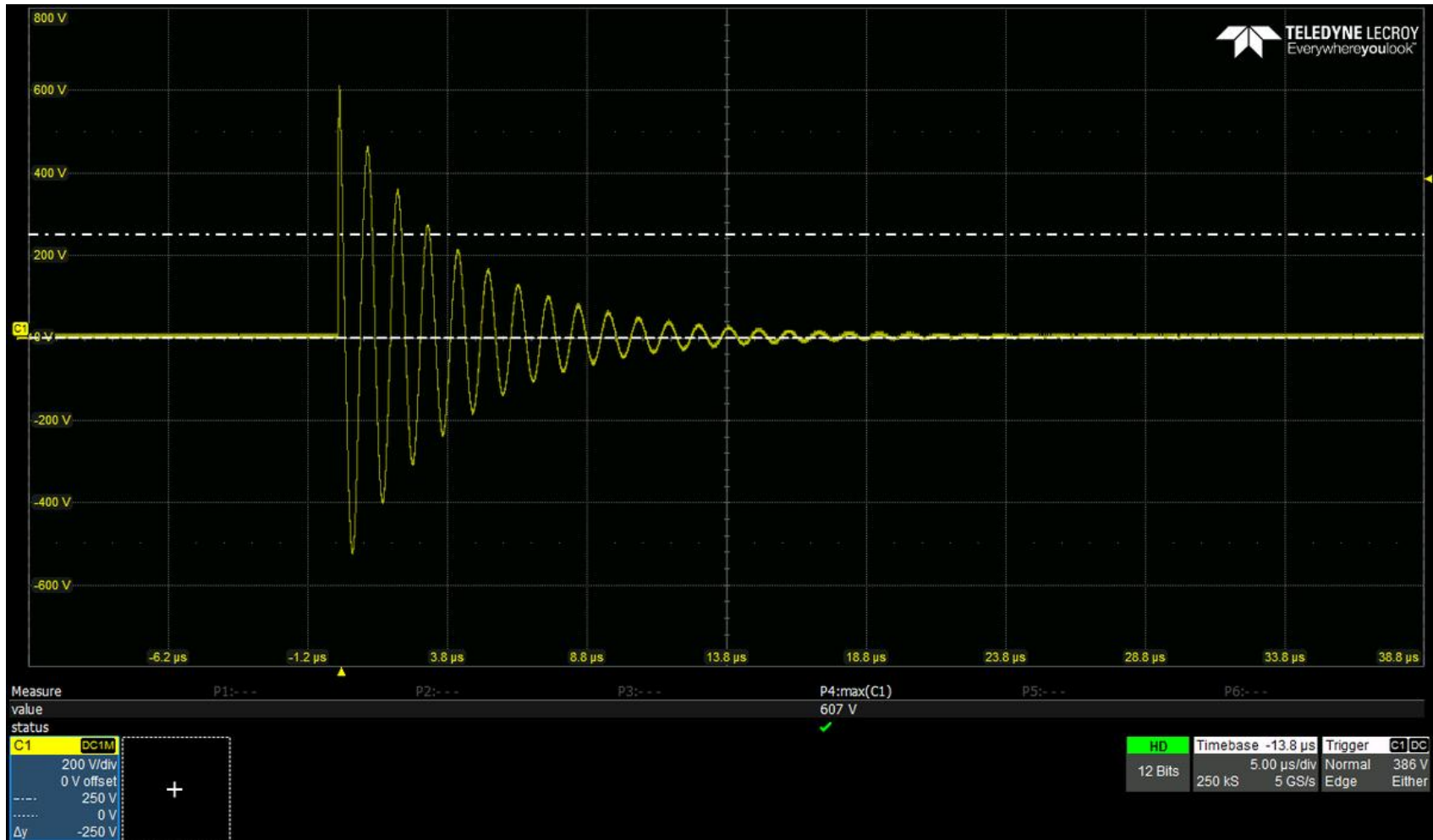
10 CS117 - Verification - WF2 - Negative - T2 - Single Stroke



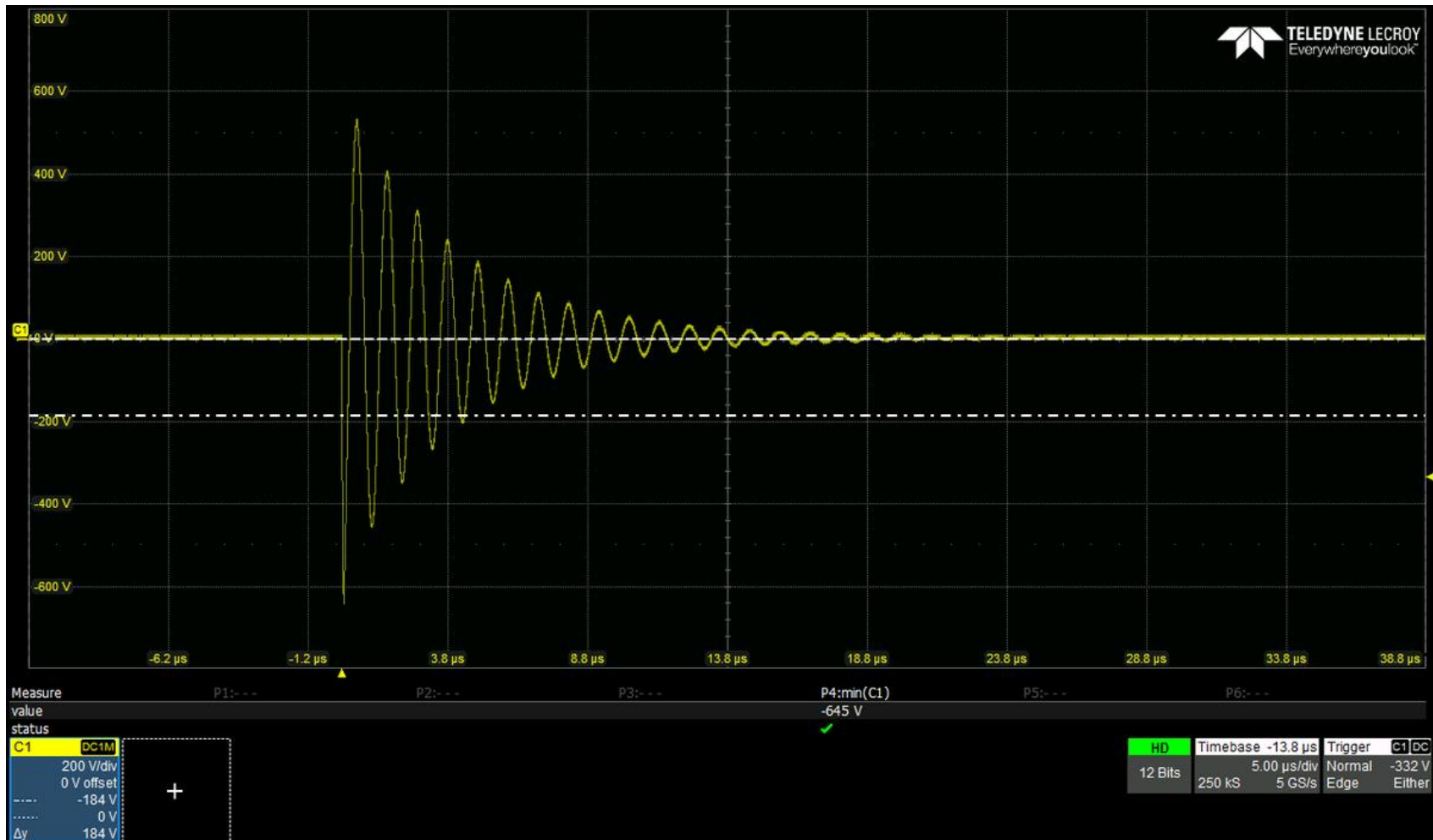
11 CS117 - Verification - WF2 - Positive - Multiple Stroke



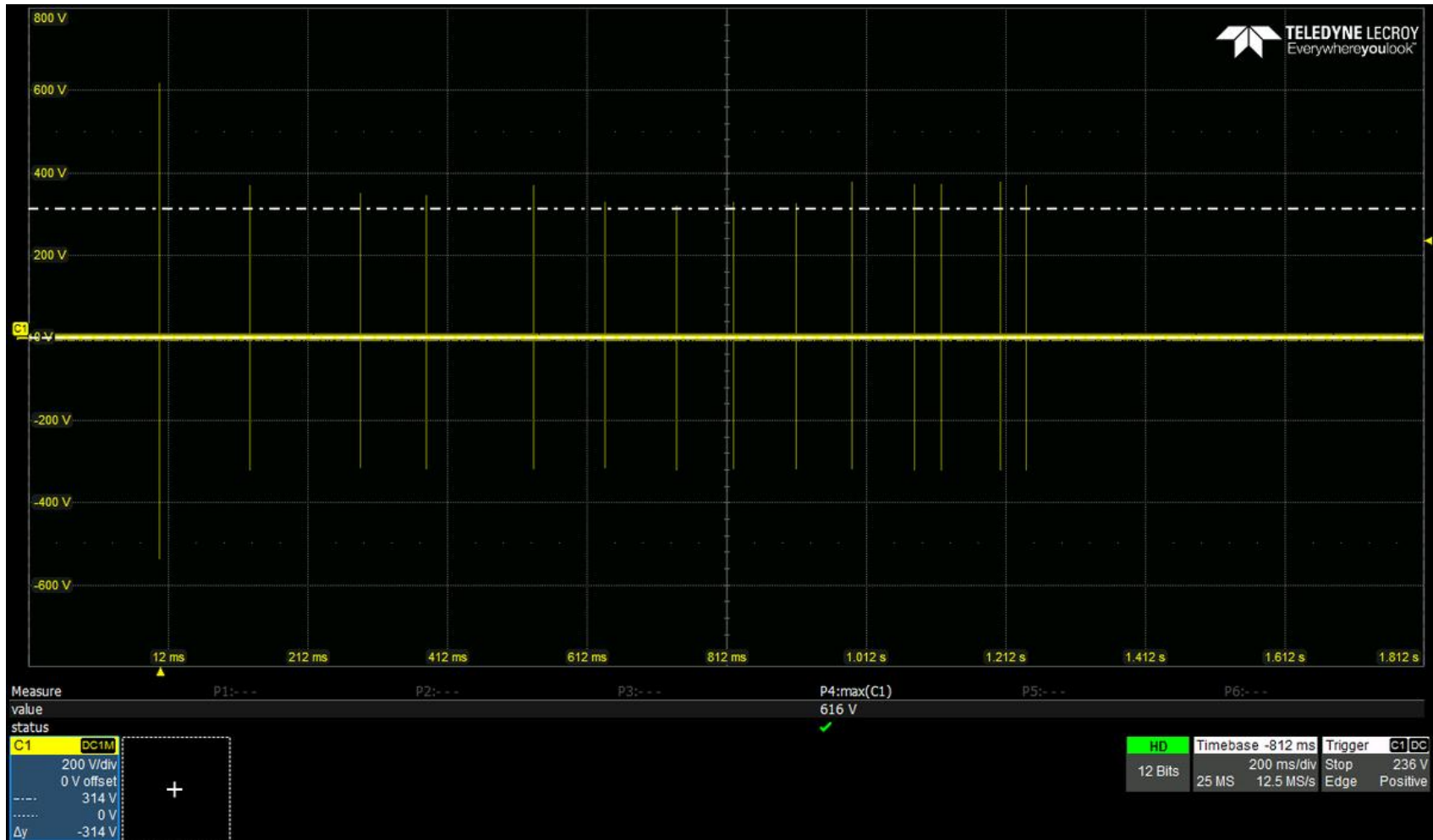
12 CS117 - Verification - WF2 - Negative - Multiple Stroke



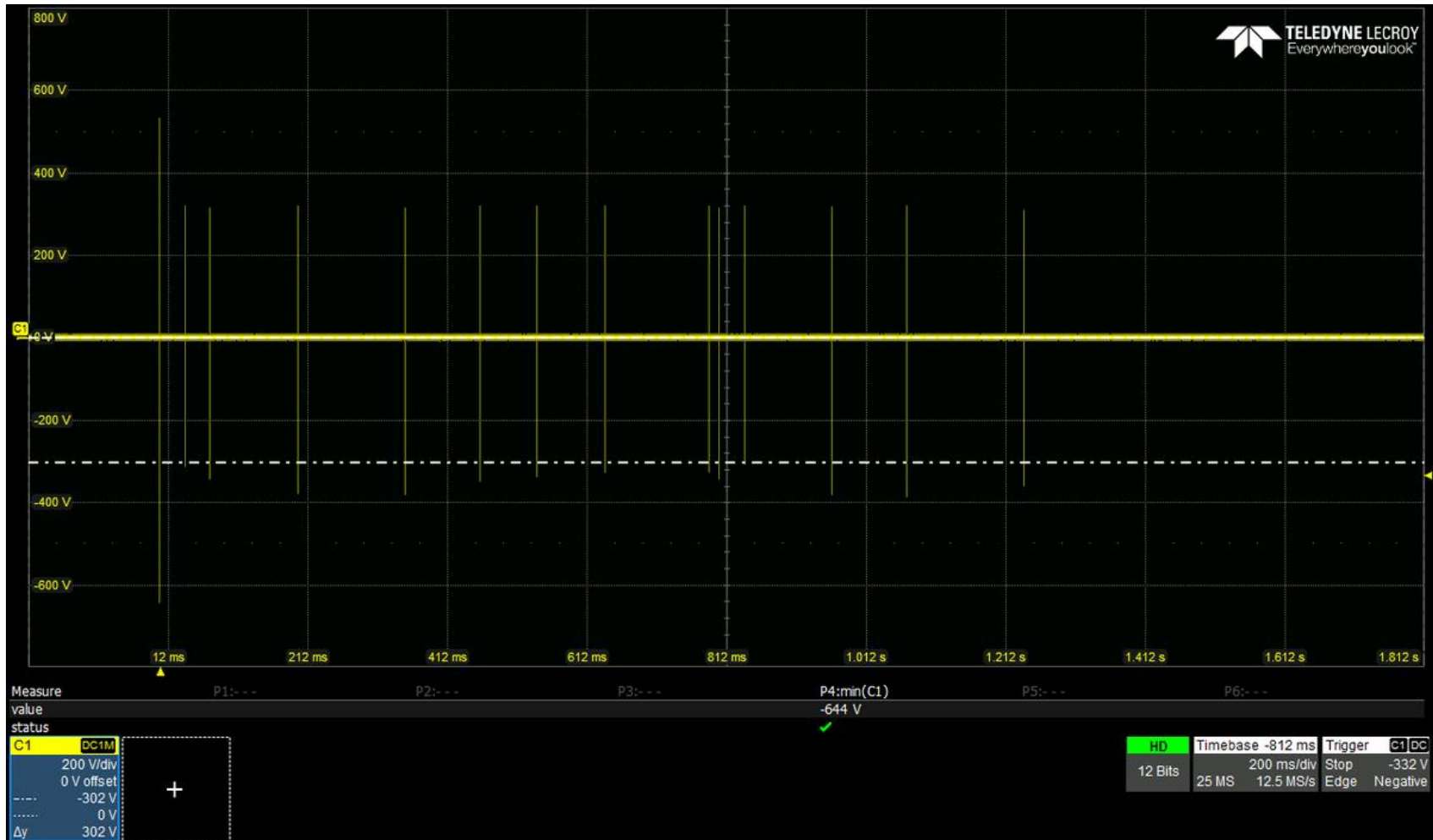
13 CS117 - Verification - WF3 - 1 MHz - Positive - Single Stroke



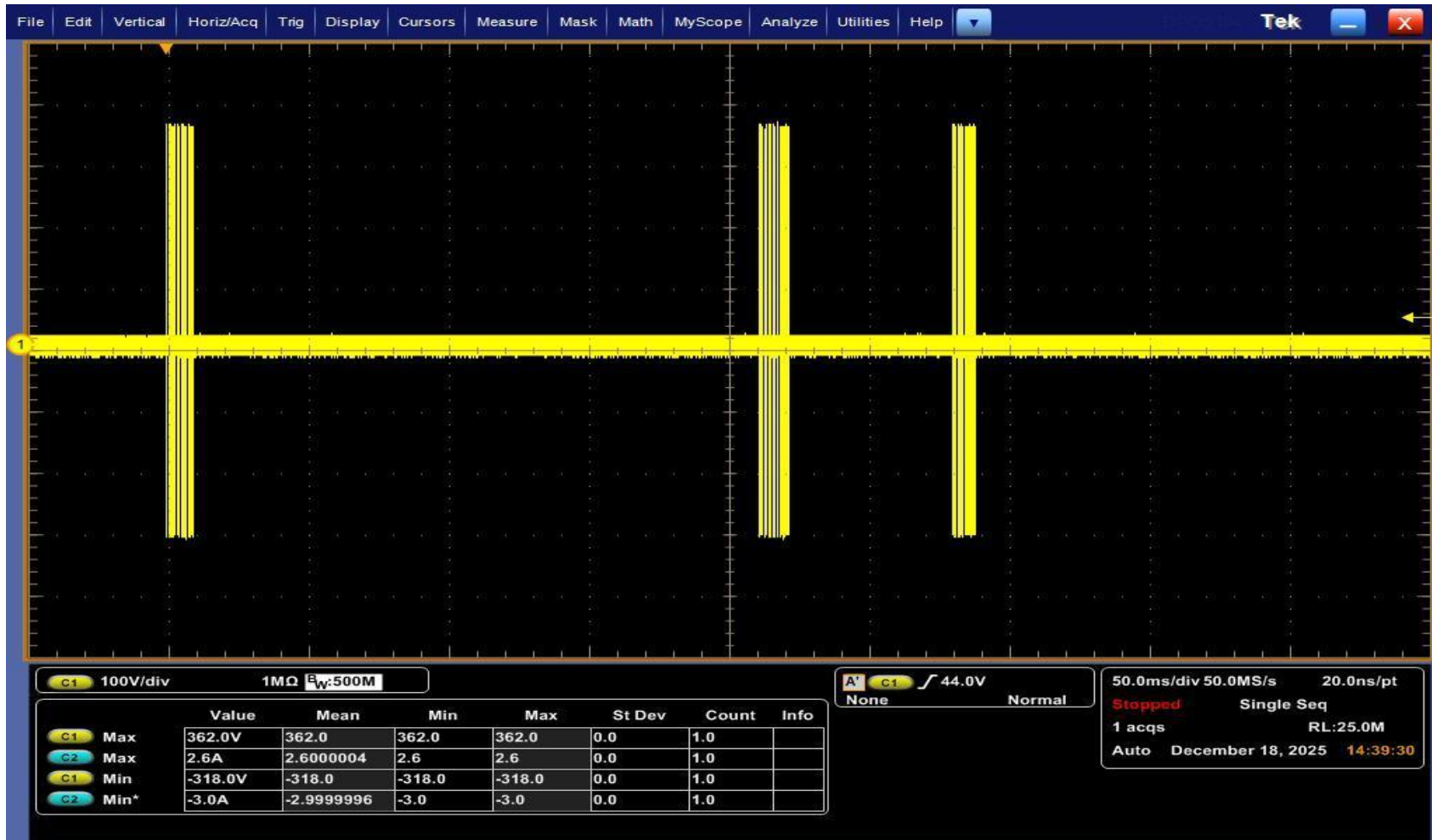
14 CS117 - Verification - WF3 - 1 MHz - Negative - Single Stroke



15 CS117 - Verification - WF3 - 1 MHz - Positive - Multiple Stroke



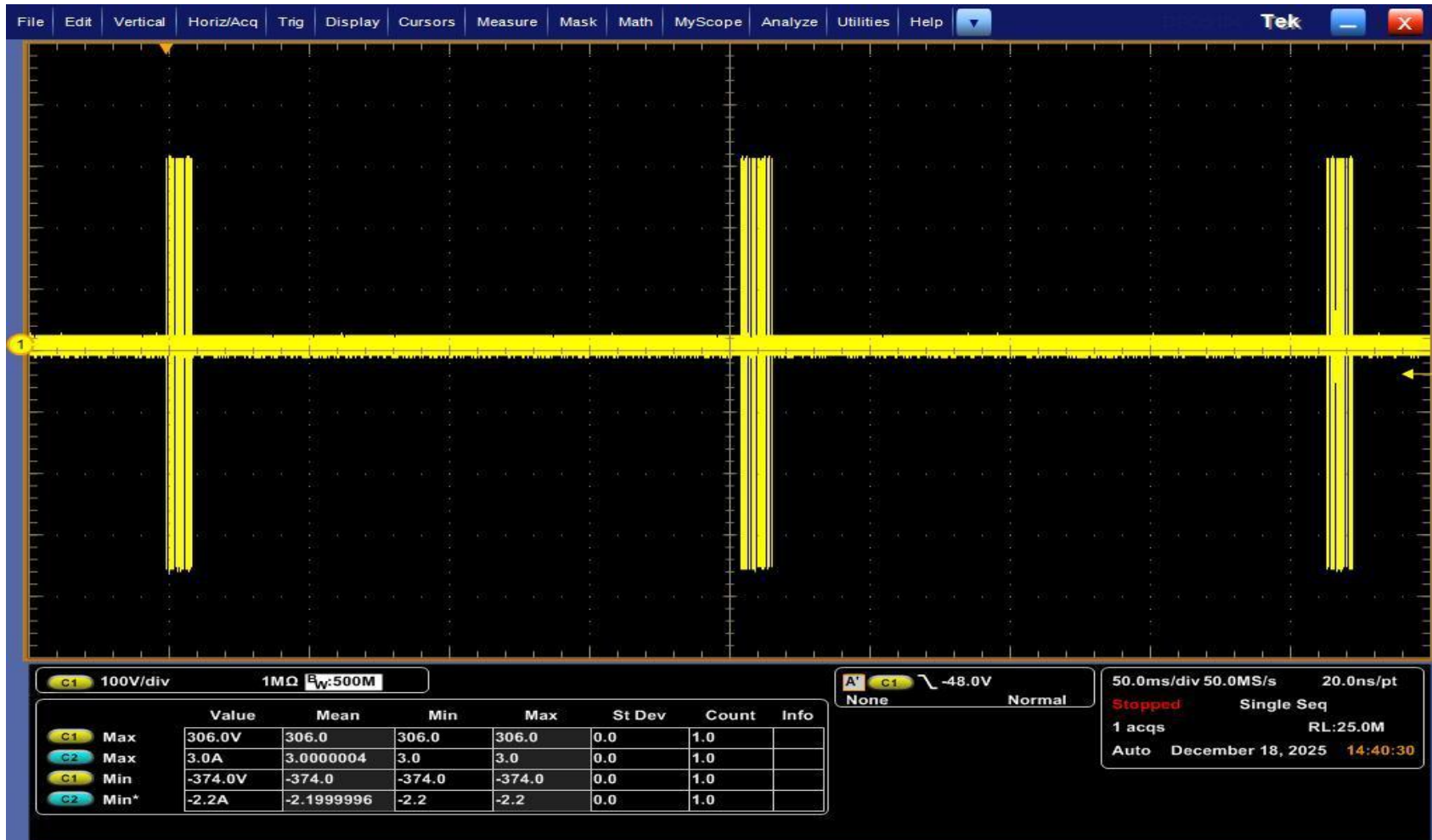
16 CS117 - Verification - WF3 - 1 MHz - Negative - Multiple Stroke



17 CS117 - Verification - WF3 - 1 MHz - Positive - Multiple Burst - Burst Application



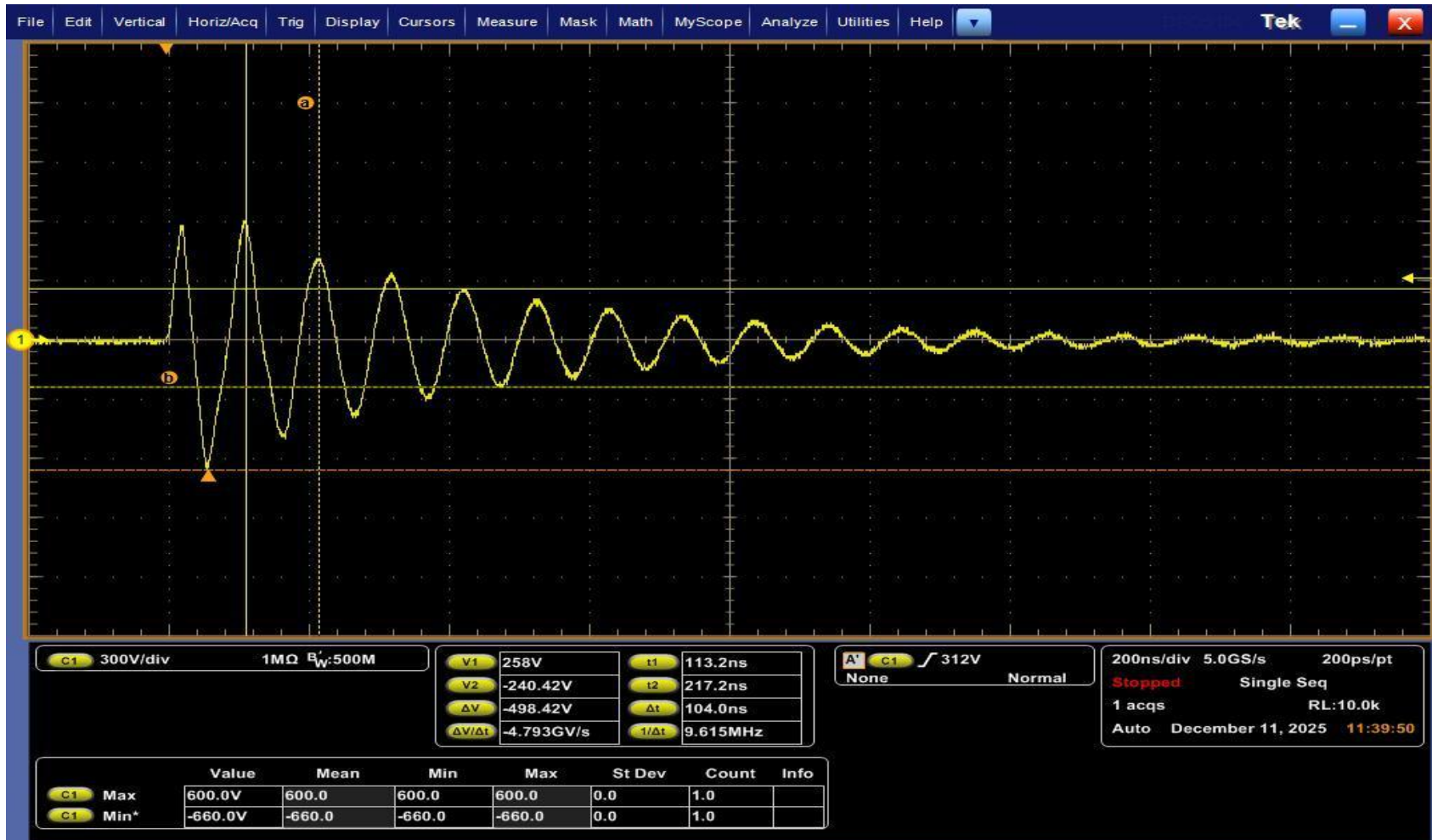
18 CS117 - Verification - WF3 - 1 MHz - Positive - Multiple Burst - 20 Transients



19 CS117 - Verification - WF3 - 1 MHz - Negative - Multiple Burst - Burst Application



20 CS117 - Verification - WF3 - 1 MHz - Negative - Multiple Burst - 20 Transients



21 CS117 - Verification - WF3 - 10 MHz - Positive - Single Stroke



23 CS117 - Verification - WF3 - 10 MHz - Positive - Multiple Stroke



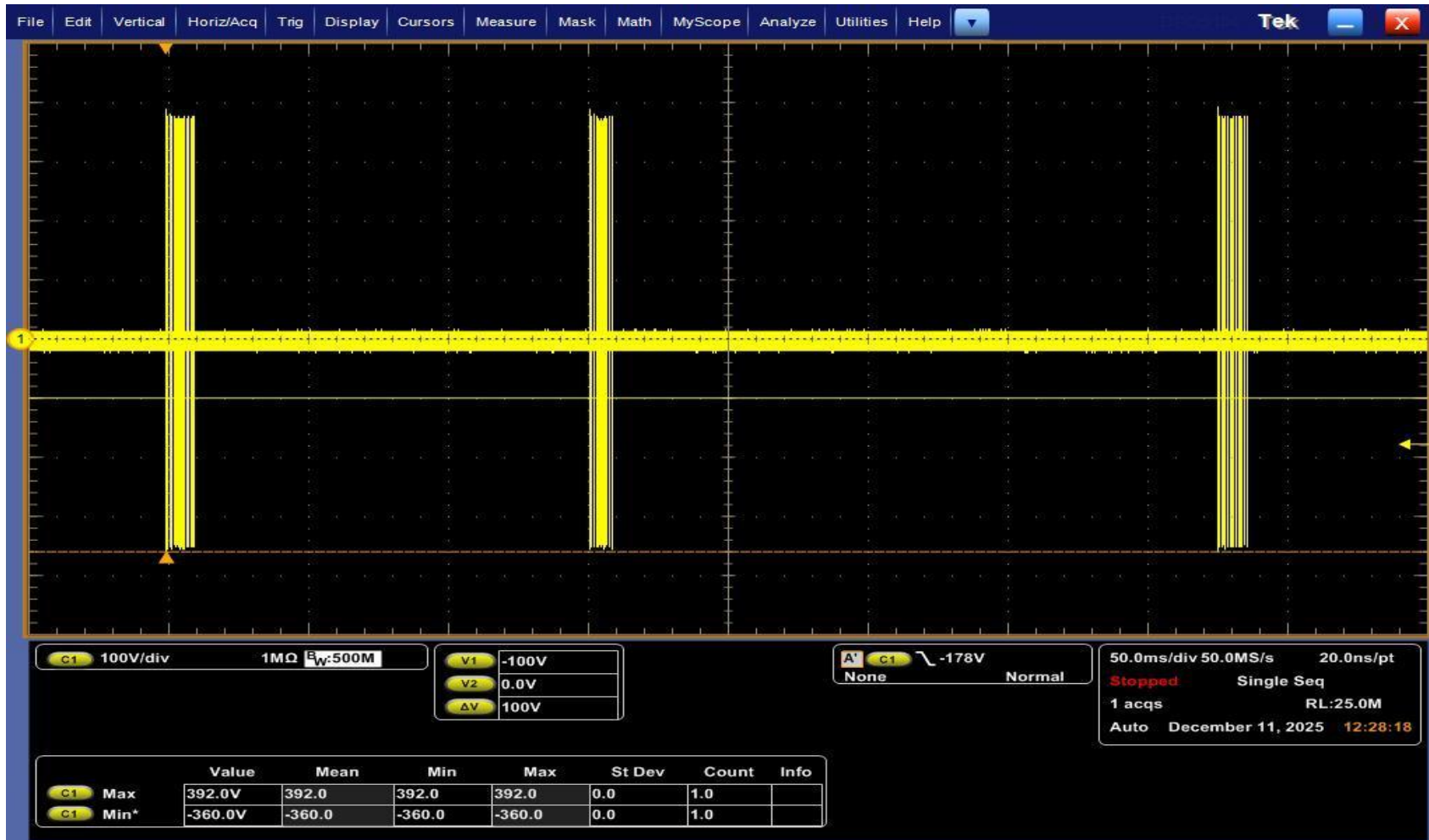
24 CS117 - Verification - WF3 - 10 MHz - Negative - Multiple Stroke



25 CS117 - Verification - WF3 - 10 MHz - Positive - Multiple Burst - Burst Application



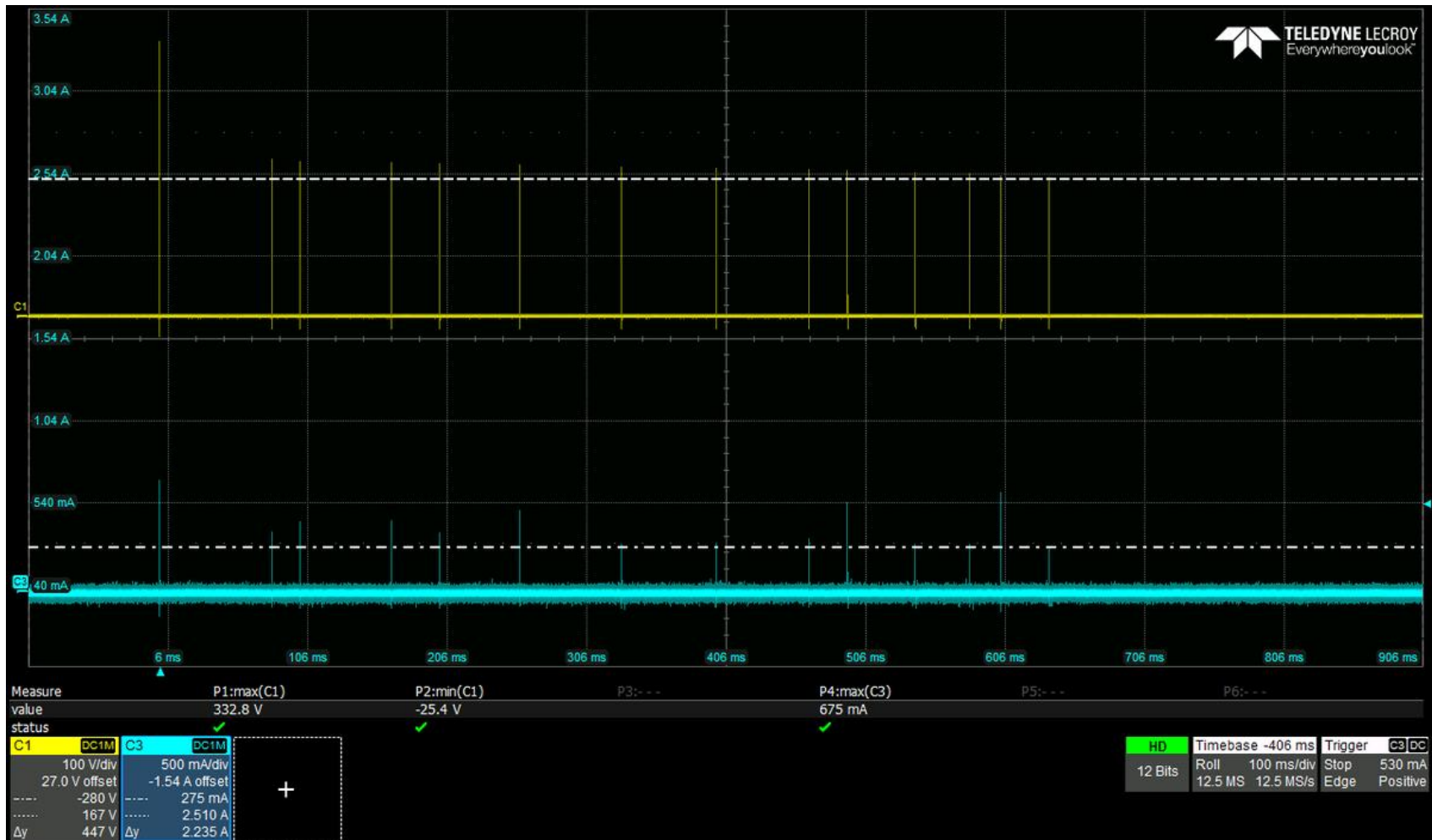
26 CS117 - Verification - WF3 - 10 MHz - Positive - Multiple Burst - 20 Transients



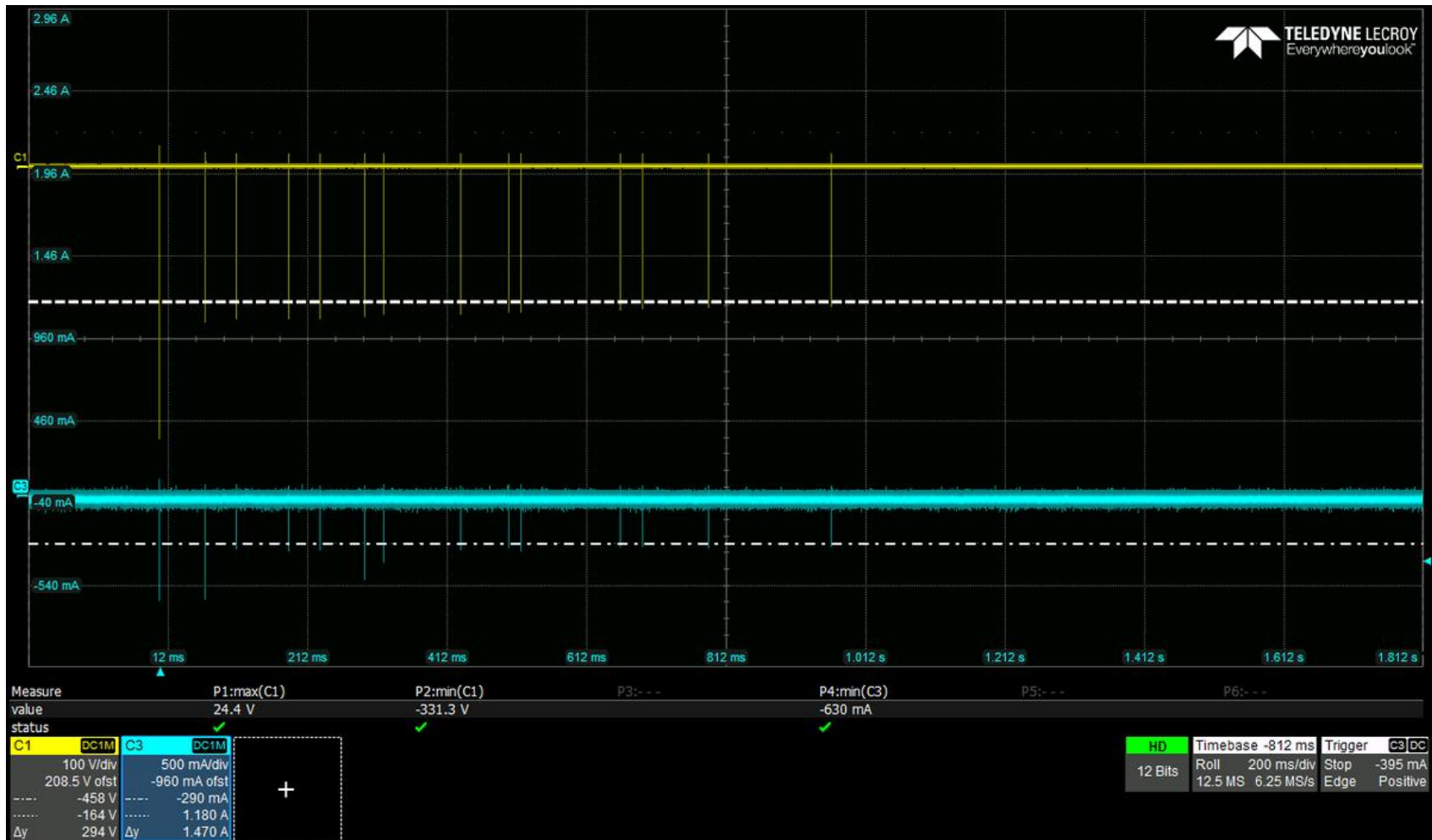
27 CS117 - Verification - WF3 - 10 MHz - Negative - Multiple Burst - Burst Application



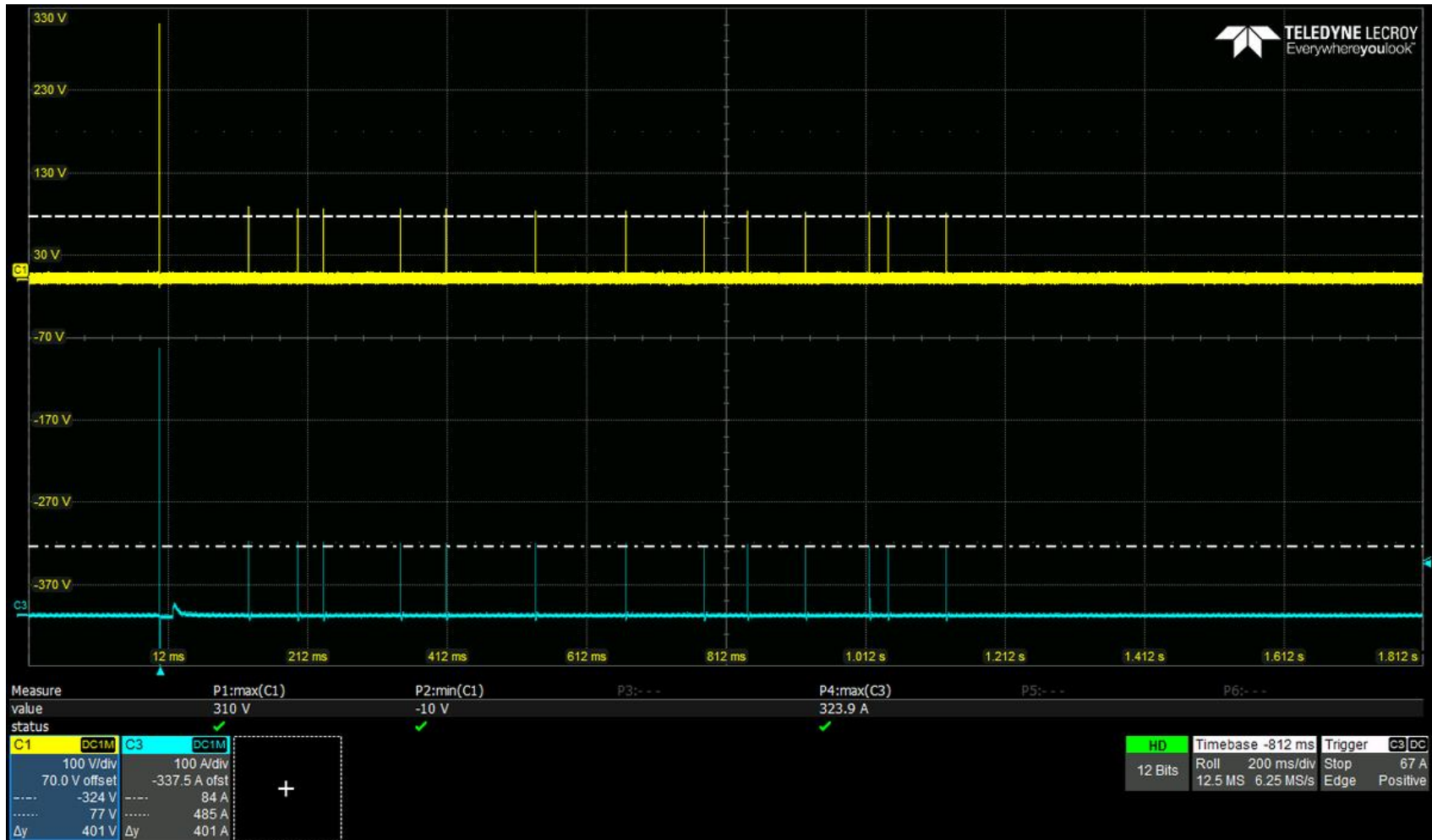
28 CS117 - Verification - WF3 - 10 MHz - Negative - Multiple Burst - 20 Transients



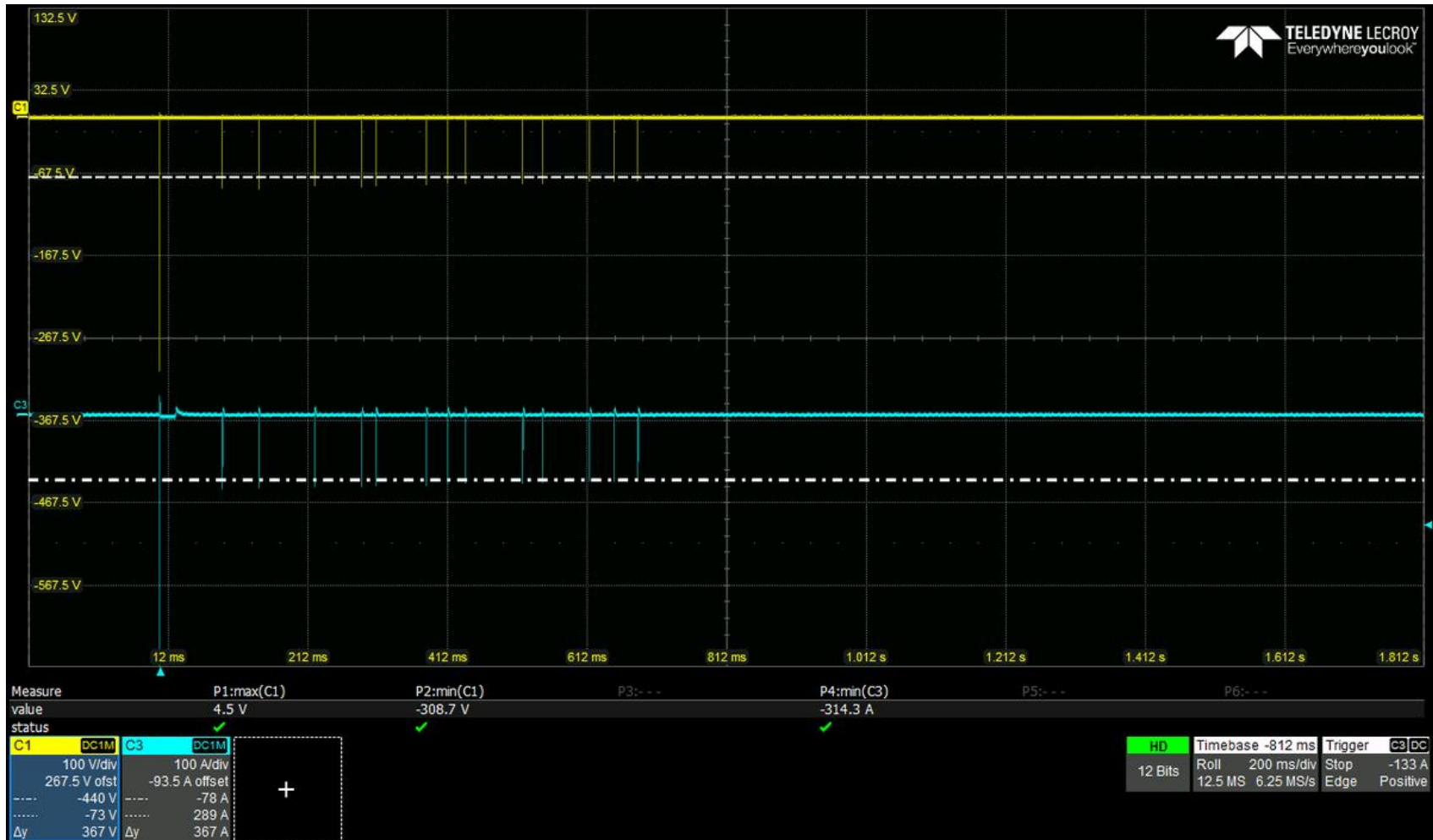
29 CS117 - Active - WF1 - Positive - Multiple Stroke - Power Bundle



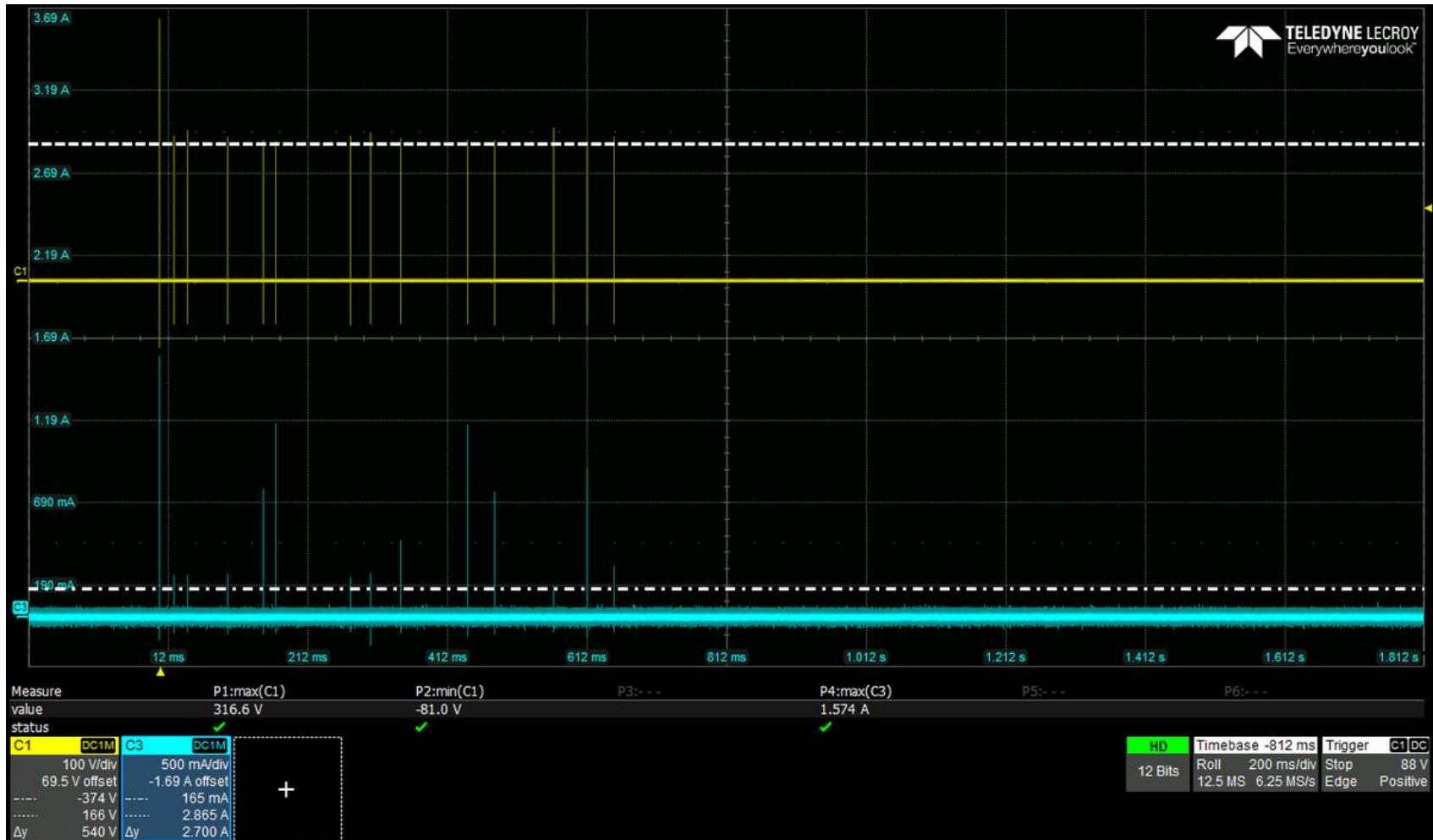
30 CS117 - Active - WF1 - Negative - Multiple Stroke - Power Bundle



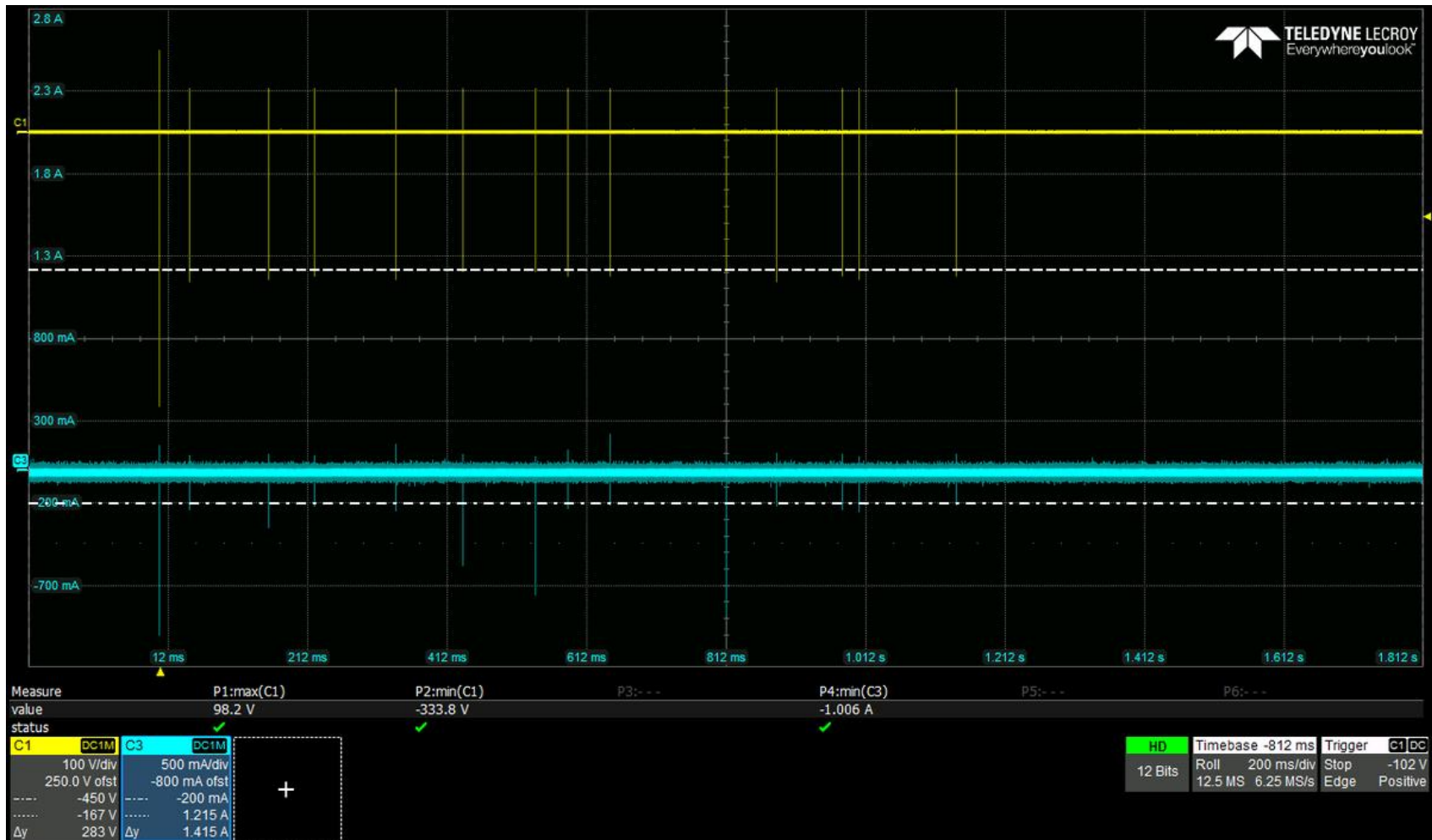
31 CS117 - Active - WF1 - Positive - Multiple Stroke - High Side



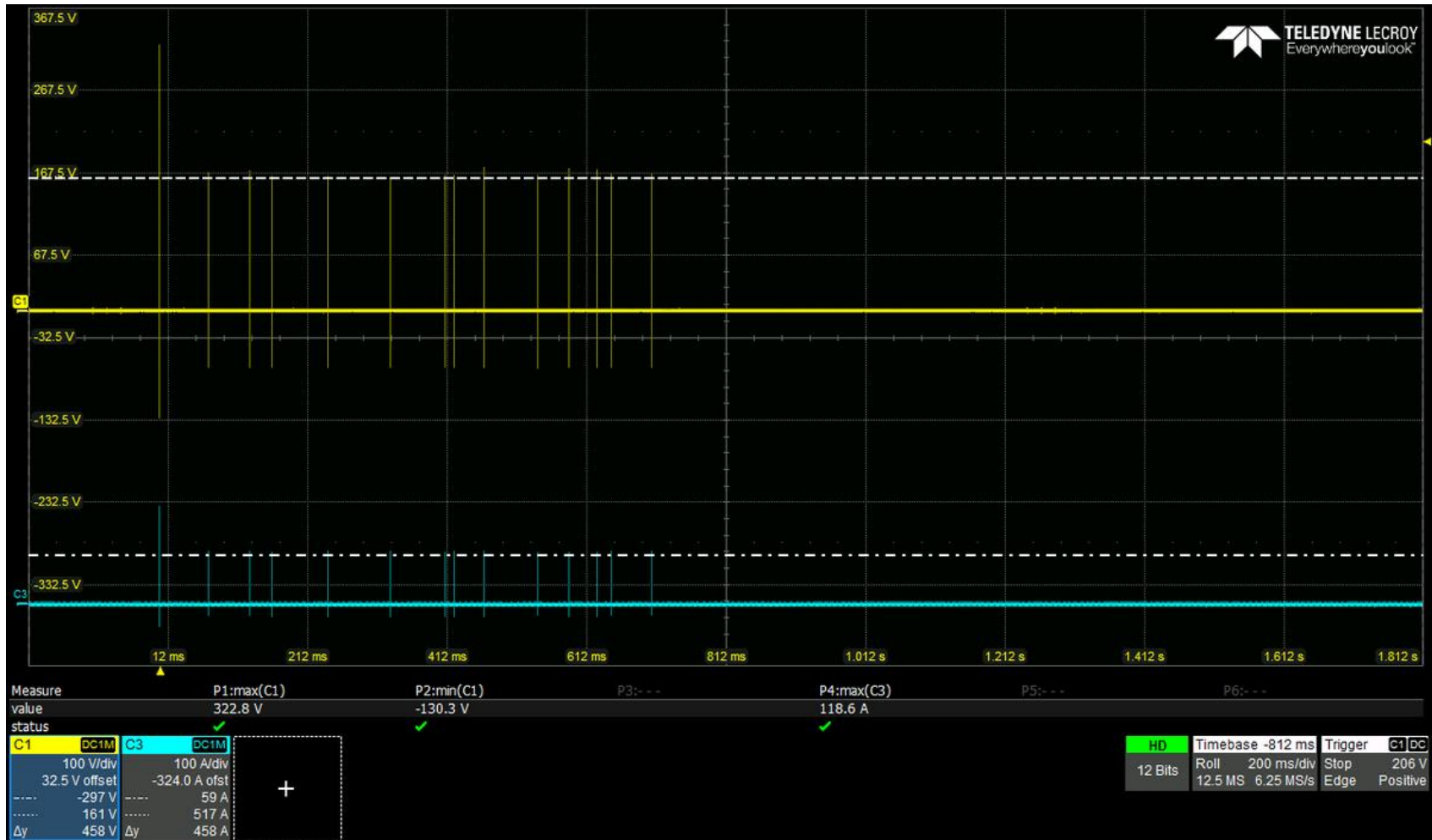
32 CS117 - Active - WF1 - Negative - Multiple Stroke - High Side



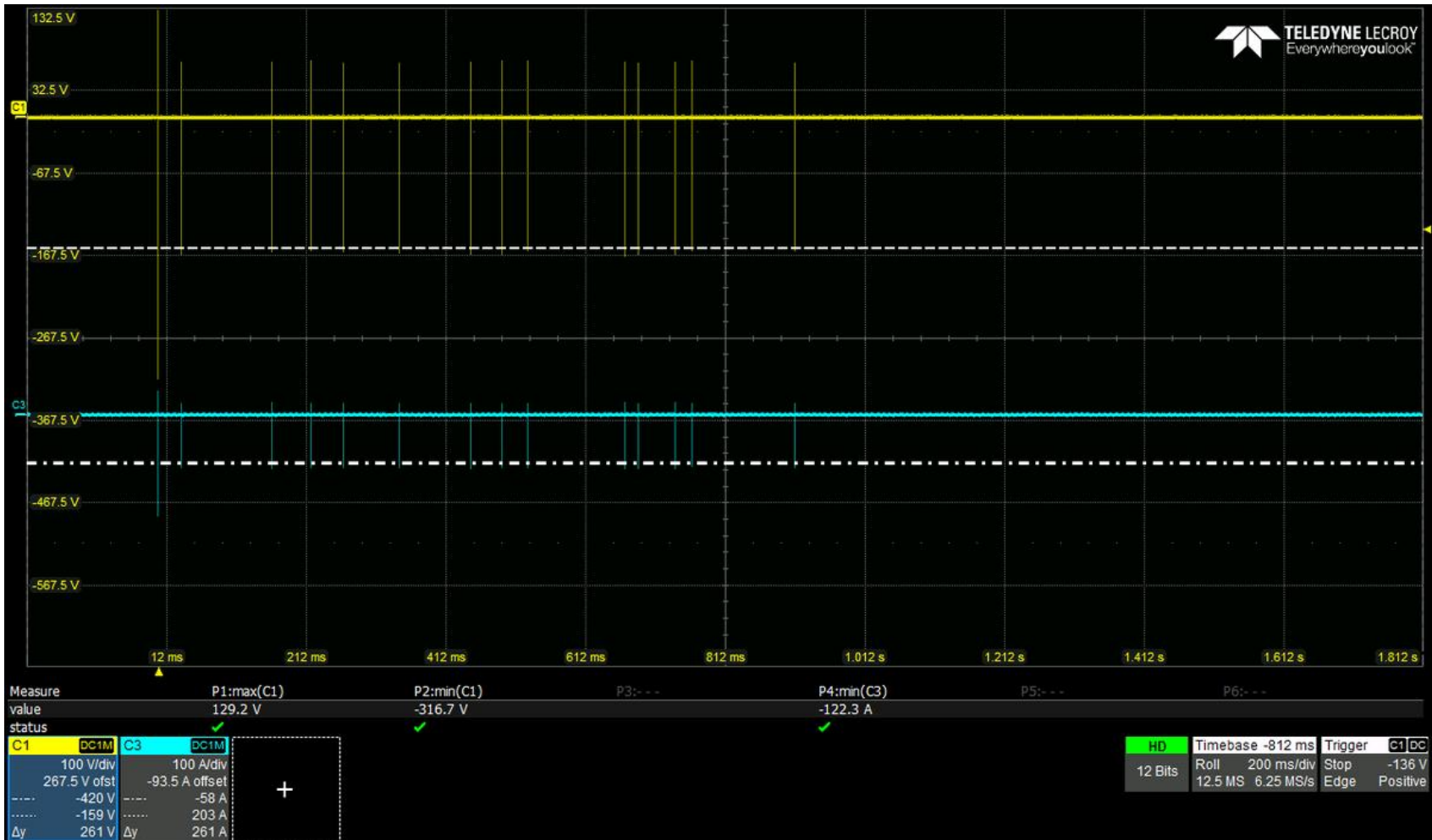
33 CS117 - Active - WF2 - Positive - Multiple Stroke - Power Bundle



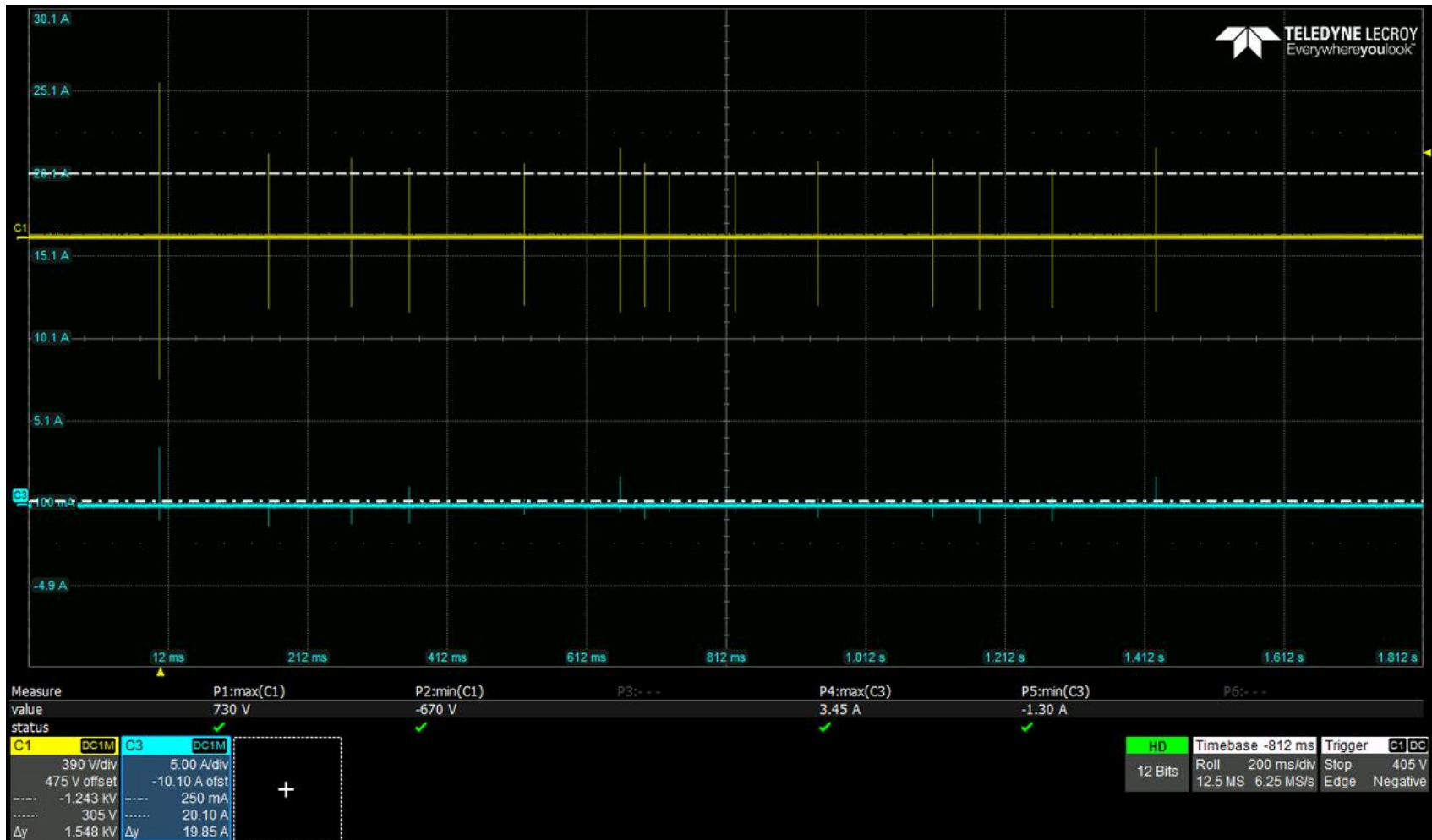
34 CS117 - Active - WF2 - Negative - Multiple Stroke - Power Bundle



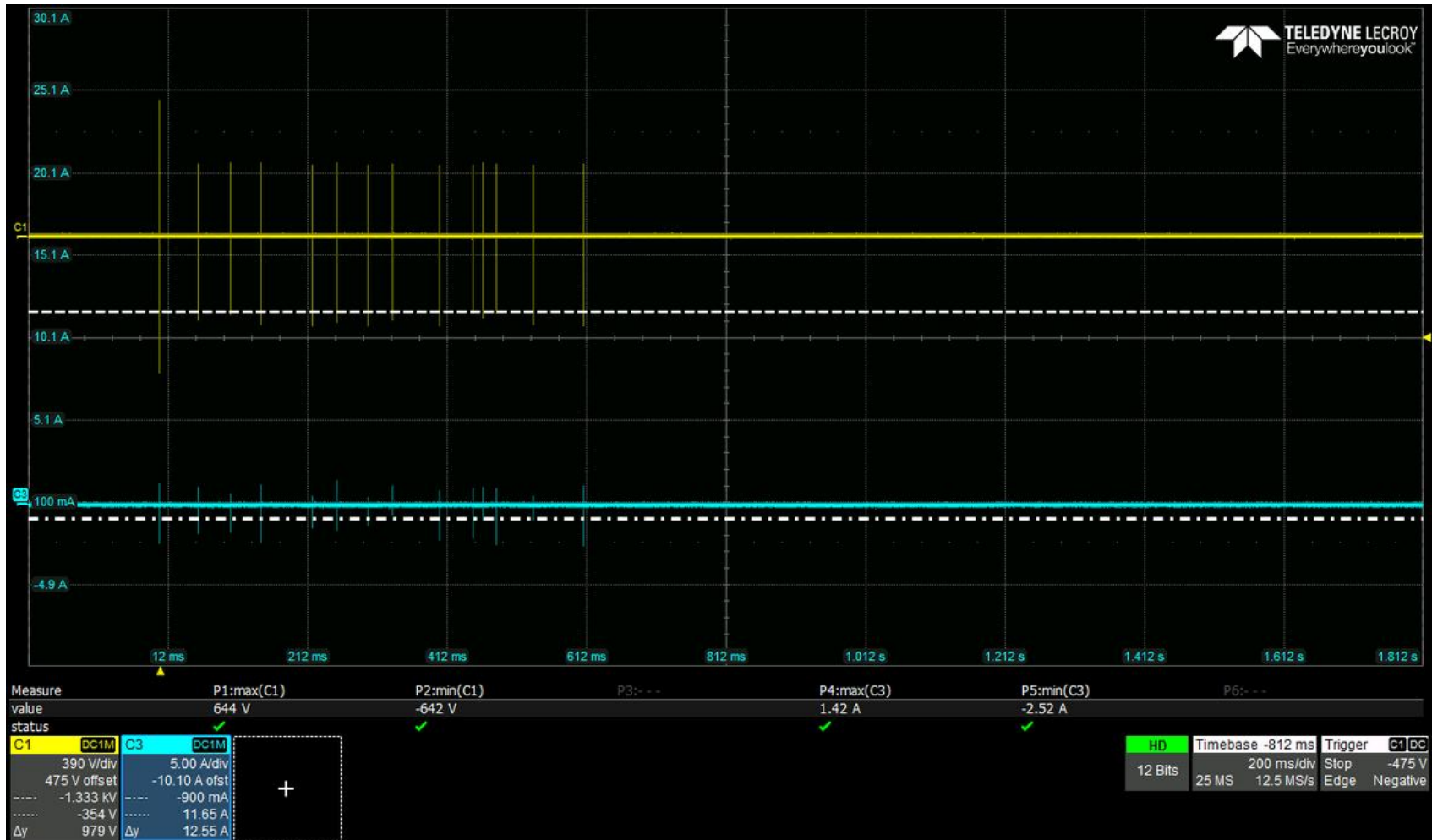
35 CS117 - Active - WF2 - Positive - Multiple Stroke - High Side



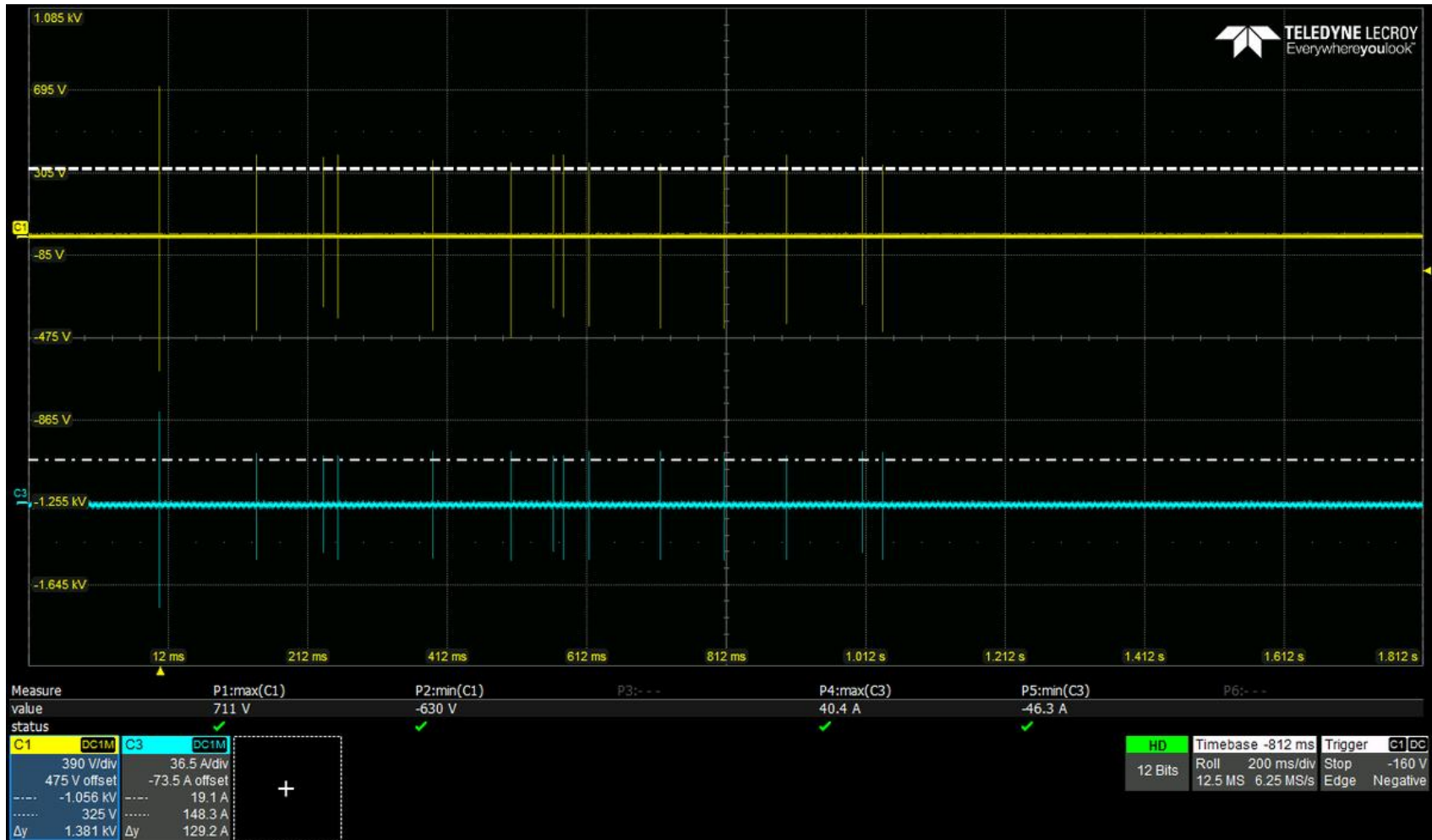
36 CS117 - Active - WF2 - Negative - Multiple Stroke - High Side



37 CS117 - Active - WF3 - 1 MHz - Positive - Multiple Stroke - Power Bundle



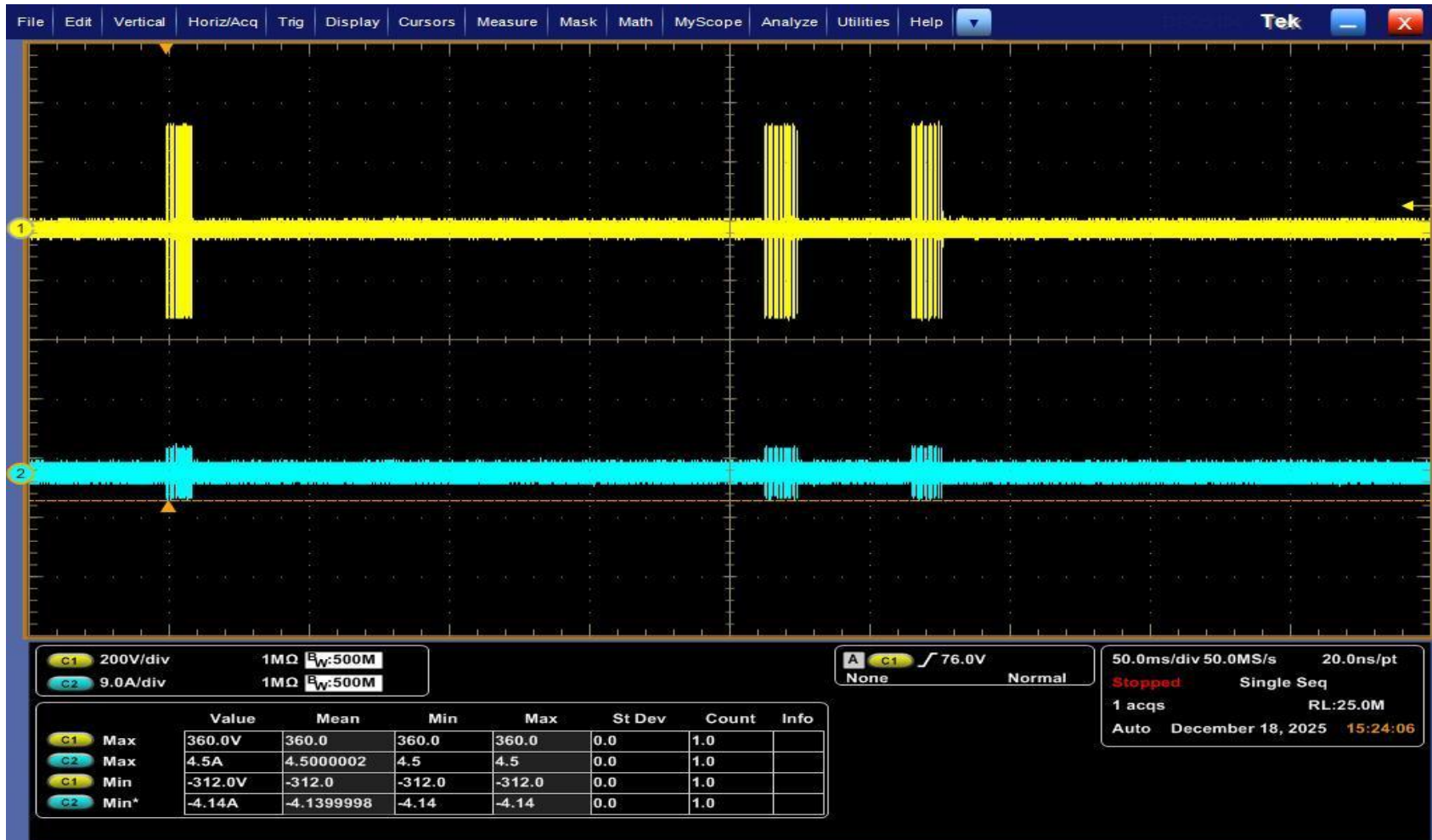
38 CS117 - Active - WF3 - 1 MHz - Negative - Multiple Stroke - Power Bundle



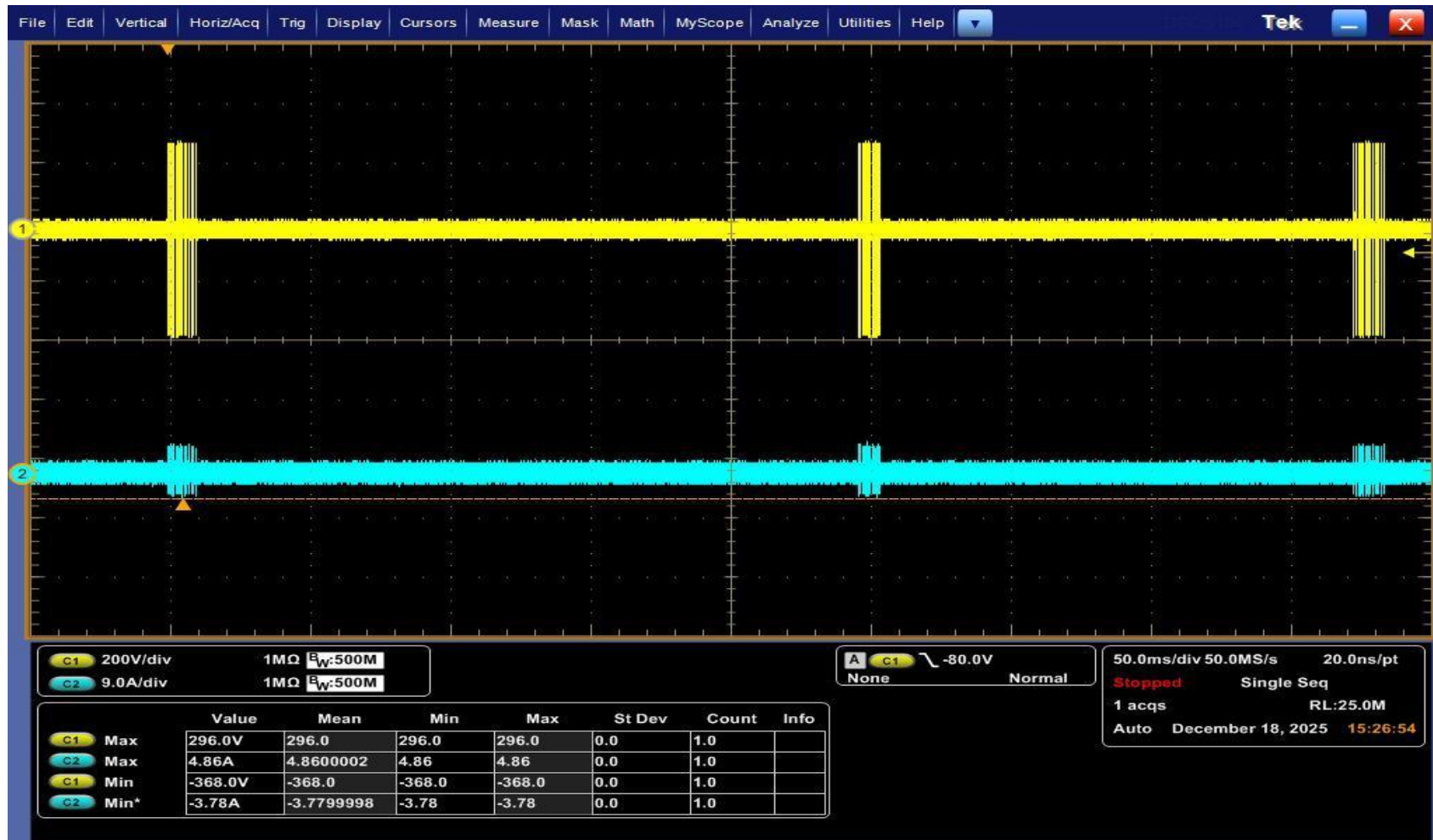
39 CS117 - Active - WF3 - 1 MHz - Positive - Multiple Stroke - High Side



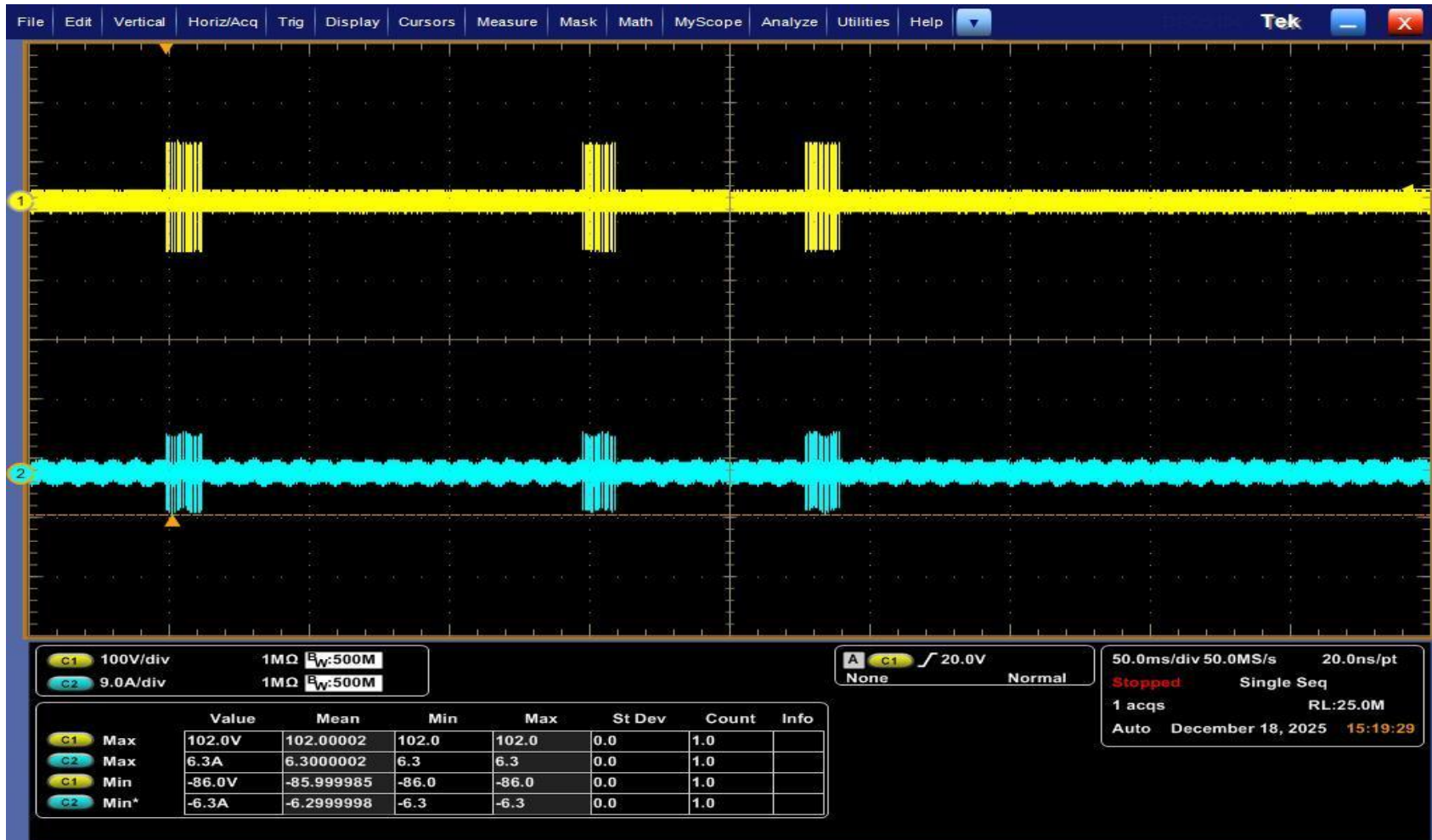
40 CS117 - Active - WF3 - 1 MHz - Negative - Multiple Stroke - High Side



41 CS117 - Active - WF3 - 1 MHz - Positive - Multiple Burst - Power Bundle



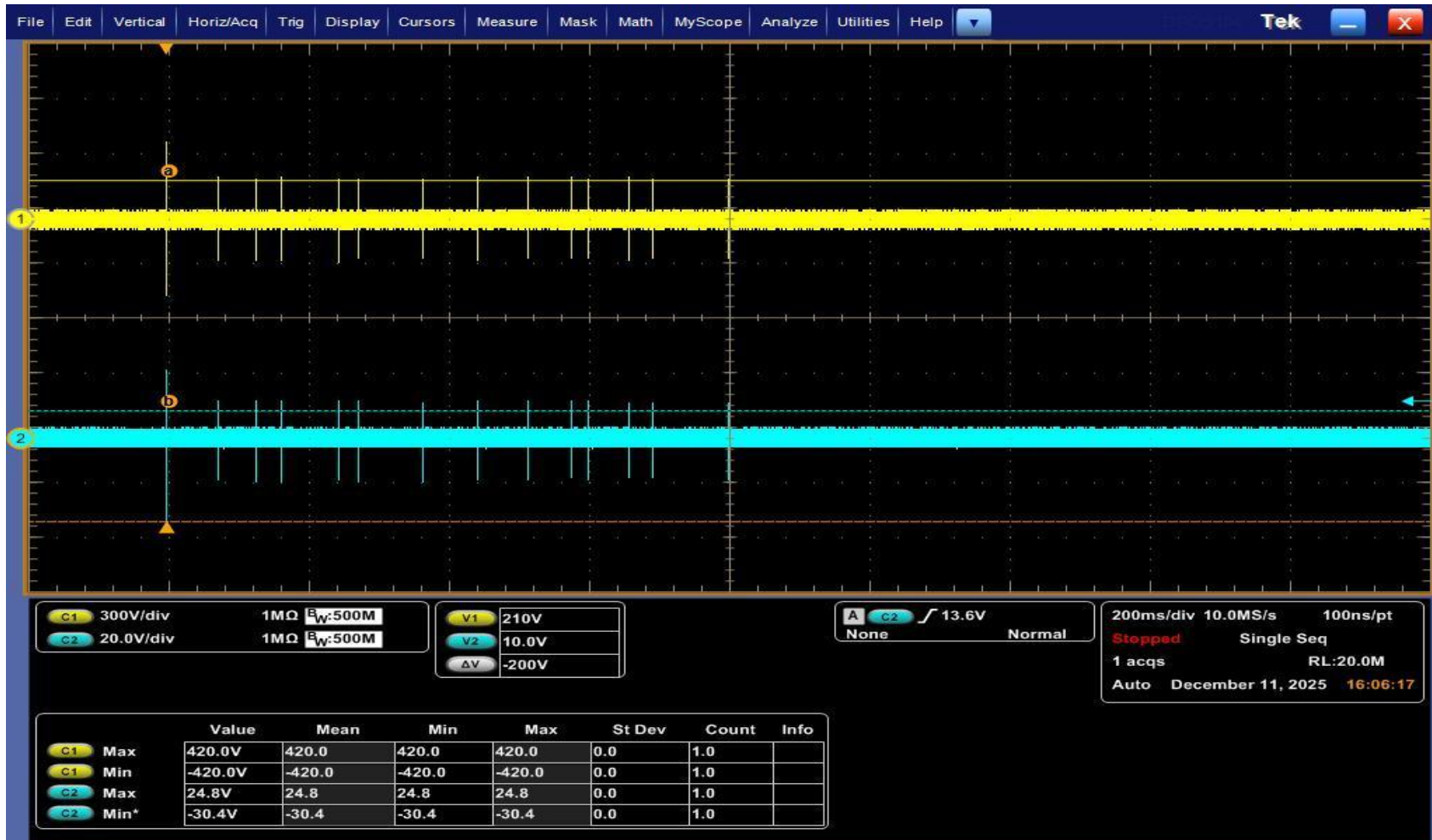
42 CS117 - Active - WF3 - 1 MHz - Negative - Multiple Burst - Power Bundle



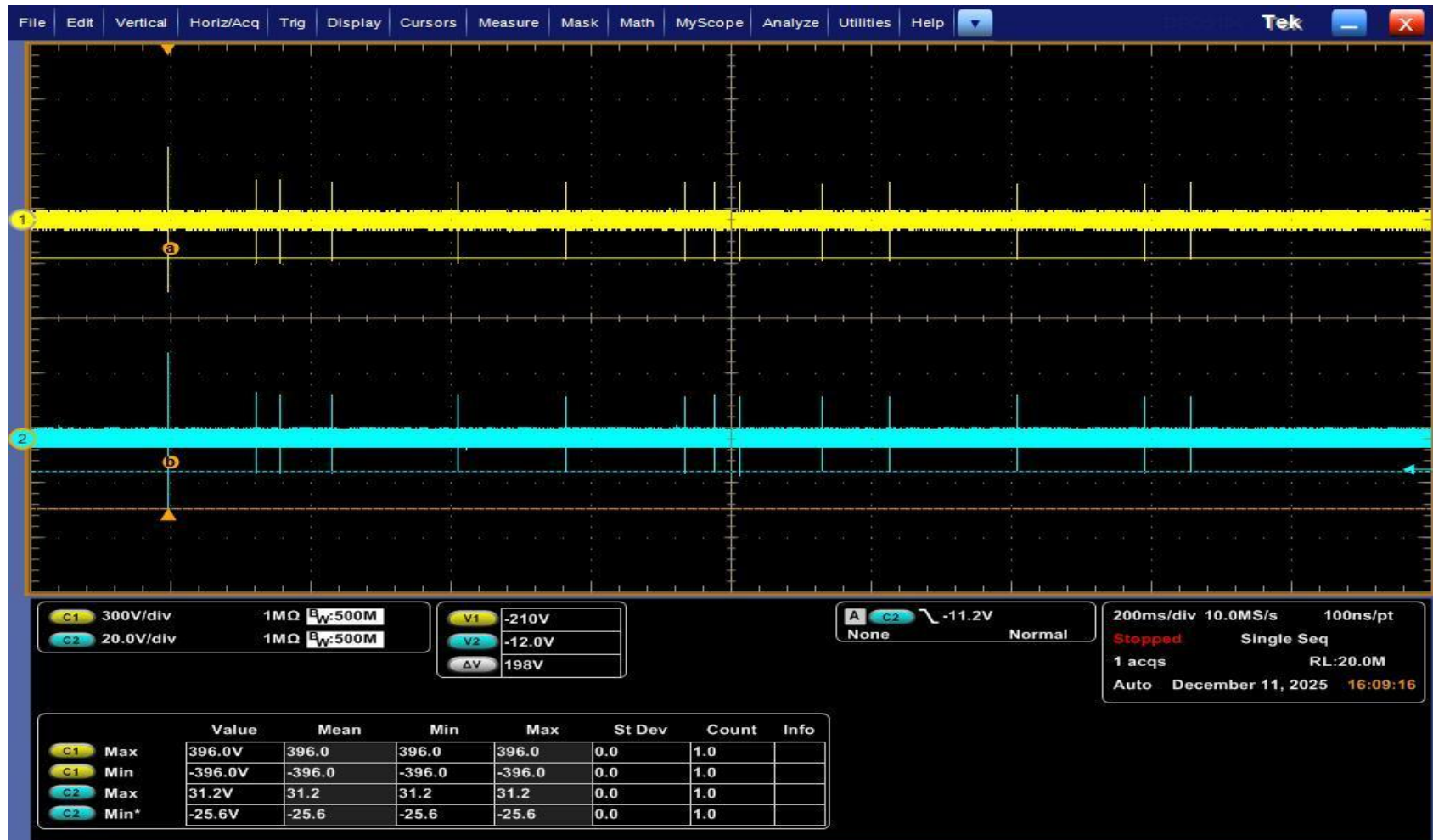
43 CS117 - Active - WF3 - 1 MHz - Positive - Multiple Burst - High Side



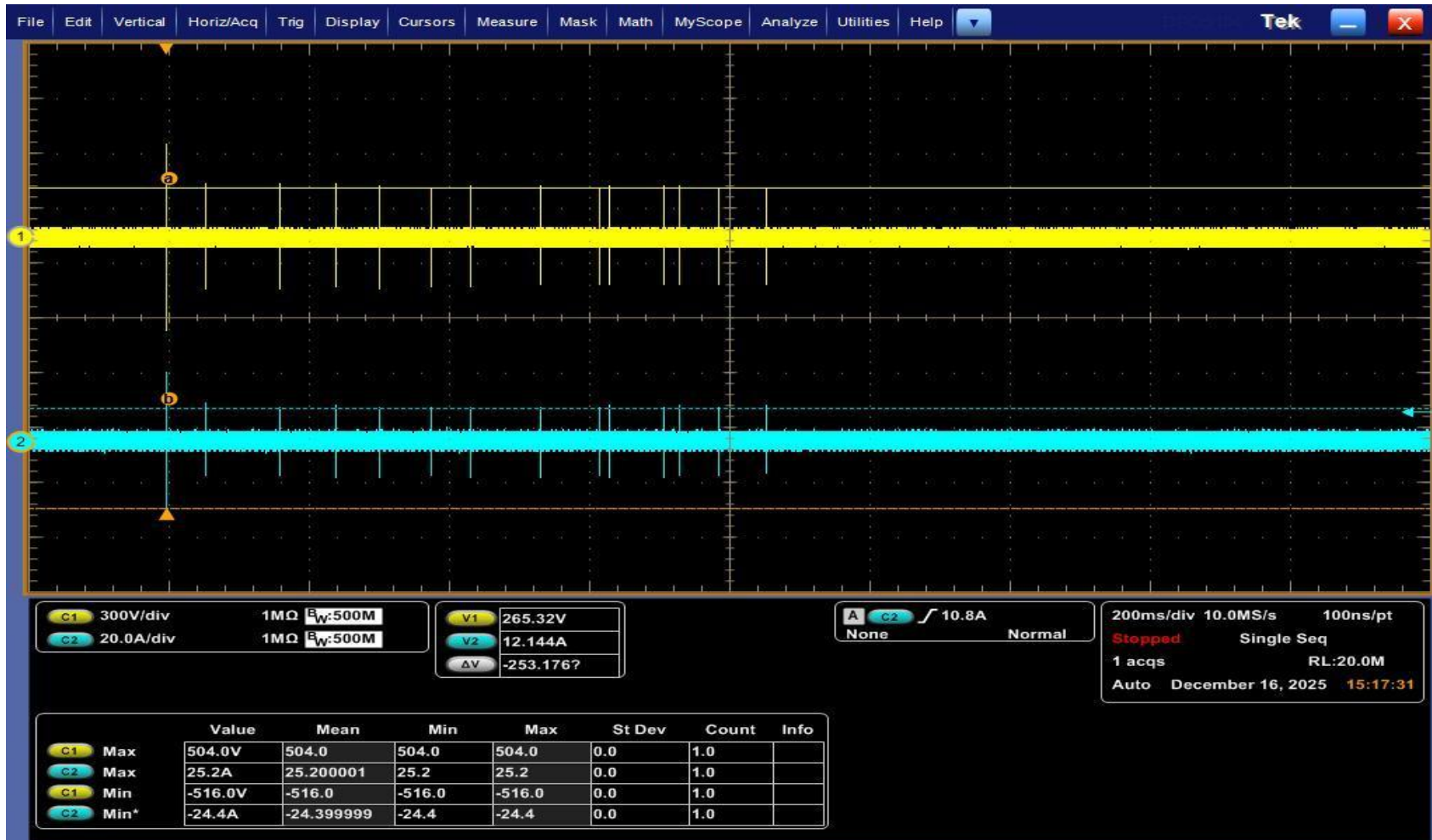
44 CS117 - Active - WF3 - 1 MHz - Negative - Multiple Burst - High Side



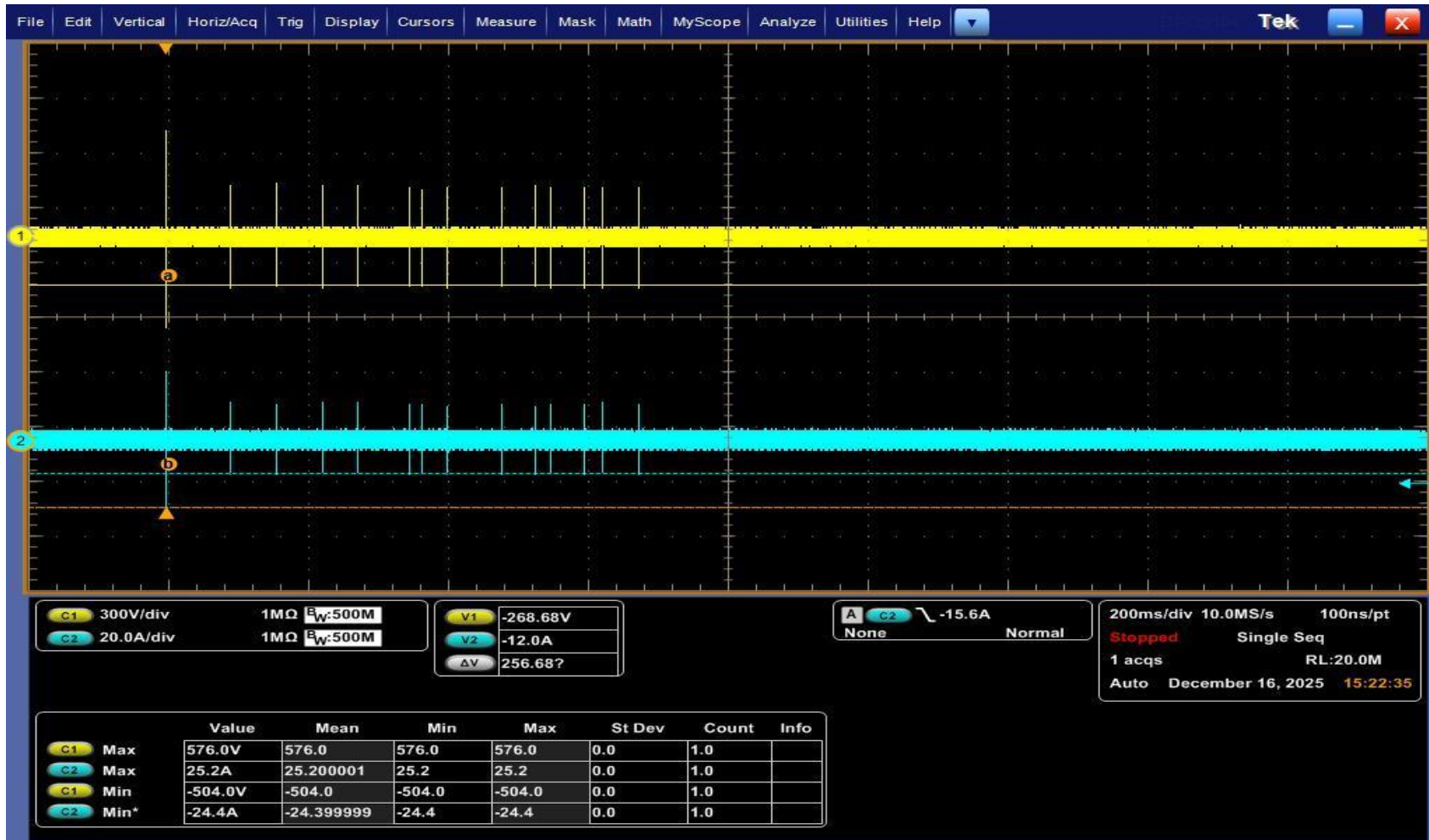
45 CS117 - Active - WF3 - 10 MHz - Positive - Multiple Stroke - Power Bundle



46 CS117 - Active - WF3 - 10 MHz - Negative - Multiple Stroke - Power Bundle



47 CS117 - Active - WF3 - 10 MHz - Positive - Multiple Stroke - High Side



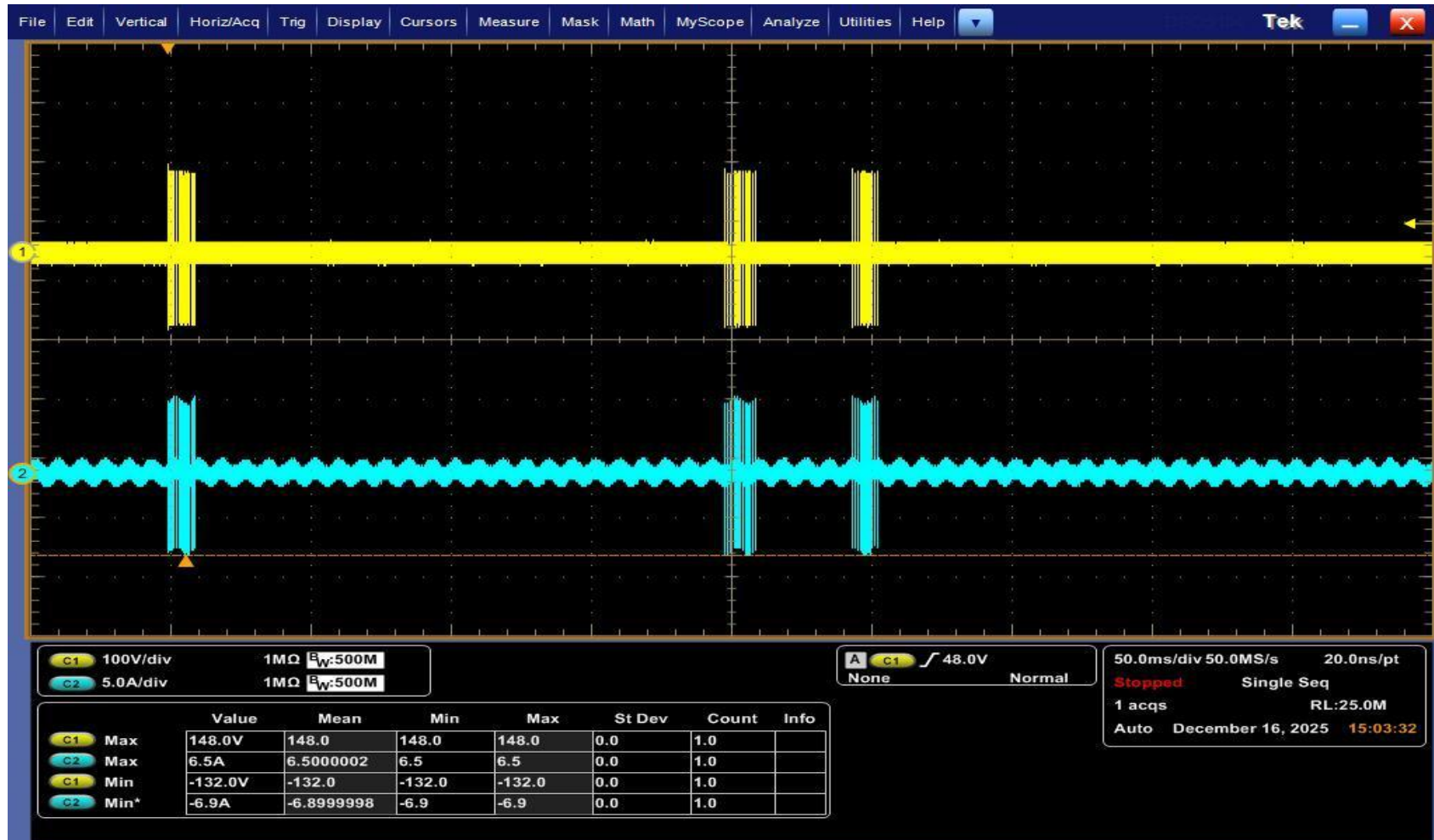
48 CS117 - Active - WF3 - 10 MHz - Negative - Multiple Stroke - High Side



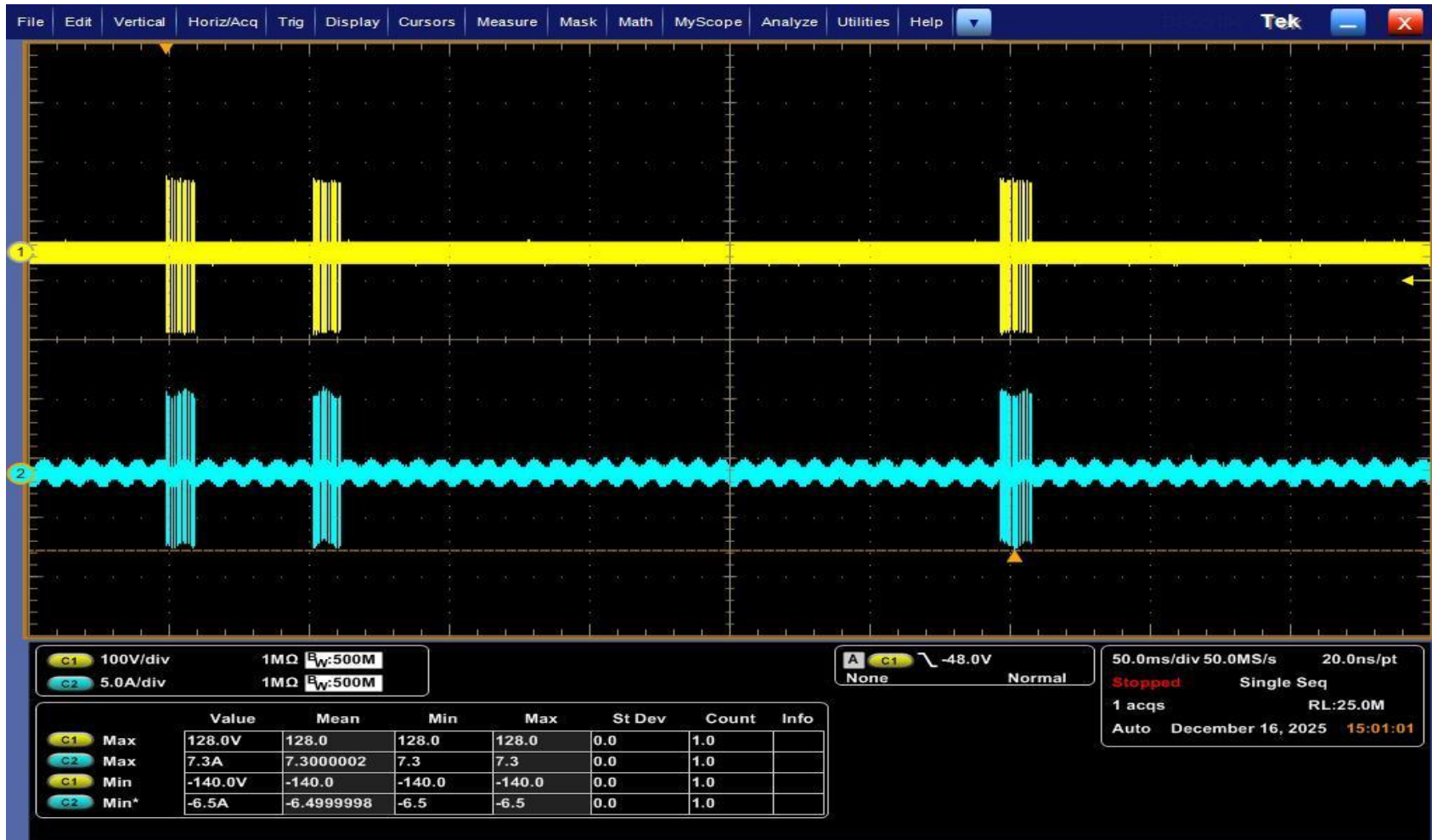
49 CS117 - Active - WF3 - 10 MHz - Positive - Multiple Burst - Power Bundle



50 CS117 - Active - WF3 - 10 MHz - Negative - Multiple Burst - Power Bundle



51 CS117 - Active - WF3 - 10 MHz - Positive - Multiple Burst - High Side



52 CS117 - Active - WF3 - 10 MHz - Negative - Multiple Burst - High Side

5.1.7 Test Equipment List

Table 5.1-1: CS117 Test Equipment List

Asset Number	Asset Name	Manufacturer	Model	Calibrated	Due
US58-A042563	EMIC3 22' x 12' x 8'	Universal Shielding	CH 3 (NPN)	NCR	NCR
US58-A073878	Generator (Lightning)	EMC-Partner	AVI3000	NCR	NCR
US58-A084191	Oscilloscope	LeCroy	WS4104HD	05/09/2025	05/09/2026
US58-A073881	Injection Probe	EMC-Partner	CN-BT7	NCR	NCR
US58-A041819	Hygrometer	Extech Instruments	445702	01/27/2025	01/27/2026
US58-A083035	Pearson Current Monitor	Pearson Electronics	4160	06/24/2025	07/07/2026
US58-A069127	Tape Measure	Solid Rule	MG-TM26	07/14/2025	07/14/2026

Calibration Abbreviations

CAL: Calibration

NCR: No Calibration Required

End of Test Report