Keystone Compliance, LLC
131 Columbus Inner Belt
New Castle, PA 16101

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Kan-Seal

1708-152EA

EMI TEST REPORT 1708-152EA REV. A

TEST STANDARDS: MIL-STD-188-125-1

For

KAN-SEAL
1905 HIGHWAY 75
BURLINGTON, KS 66839

On

1PH FILTER
MODEL NUMBER: SP-120-240-W / SP-120-240-RL / SP-120-240-TB / SP-240-EUW / SP-240-EUTB / SP-240-EURL ; PART NUMBER: NONE ; SERIAL NUMBER: NONE

PERFORMED BY: KEYSTONE COMPLIANCE, LLC.
131 COLUMBUS INNER BELT
NEW CASTLE, PA 16101

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DOCUMENT HISTORY

Revision	Issue Date	Description Of Modifications	Revised By	Approved By
N/C	11/16/2017	Initial release	N/A	T.M.
A	11/16/2017	Added Model Numbers	AH	TM

CLIENT INFORMATION

Purchase Order Quote Number EUT Arrival Date	Signed Quote 1708-152EA 11/9/2017 -- Recieved in good condition
Company Name Address City, State Zip	Kan-Seal 1905 Highway 75 Burlington, KS 66839
Contact Name Phone Email	Tim Carty 785-806-5523 TimothyaCarty@gmail.com

TEST FACILITY INFORMATION

Test Laboratory Address City, State, Zip Code Phone Fax Web Site	Keystone Compliance, LLC. 131 Columbus Inner Belt New Castle, PA 16101 (724) 657-9940 (724) 657-9920 www.keystonecompliance.com
Contact Name Title E-Mail Address	Tony Masone Jr. EMC Lab Manager tonyjr@keystonecompliance.com

TEST PROGRAM INFORMATION

Test Personnel	Mike Gennaro -- EMC Test Technician
Test Title & Test Dates	Pulsed Current Injection -- November 13, 2017 to November 14, 2017

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TABLE OF CONTENTS

INTRODUCTION 6
ACRONYMS AND ABBREVIATIONS 6
CONFIGURATION 7
SUMMARY OF TESTS PERFORMED & RESULTS 8
SECTION 1 – TEST CONDITIONS AND EQUIPMENT 9
1.1 Instrumentation and Equipment 9
1.2 Tolerances 9
SECTION 2 – REFERENCES 10
2.1 Applicable Specifications 10
SECTION 3 –TEST EQUIPMENT, TEST DATA, & TEST PHOTOGRAPHS 11
3.1 PULSED CURRENT INJECTION TEST 11
3.1.1 Pulsed Current Injection Test Equipment Log 12
3.1.2 Pulsed Current Injection Test Data 13
3.1.3 Pulsed Current Injection Test Photographs 38
SECTION 4 – CONCLUSION 40

LIST OF TABLES

Table 1 Test Performed & Results 8
Table 2 Test Performed & Results 40

INTRODUCTION

This report documents the results of the EMC tests performed on the 1Ph Filter, Model Number: SP-120-240-W / SP-120-240-RL / SP-120-240-TB / SP-240-EUW / SP-240-EUTB / SP-240-EURL; Part Number: None; Serial Number: None, submitted by Kan-Seal

The EMC test programs described herein were performed in accordance with the applicable requirements of MIL-STD-188-125-1.

All test data is included in Section 3 of this document.

All tests performed at Keystone Compliance New Castle, PA EMC test facility. All tests were performed using the test set-ups of the relevant standard for tests performed in laboratory conditions.

ACRONYMS AND ABBREVIATIONS

EMC – Electromagnetic Compatibility

EMI – Electromagnetic Interference

EUT – Equipment Under Test

M/N – Model Number

P/N – Part Number

S/N – Serial Number

Vac – Voltage Alternating Current

DC – Direct Curent

AM – Amplitude Modulation

dB – Decibel

deg – Degree

H/V – Horizontal or Vertical Polarity

m – Meters

cm – Centimeter

V/m – Volts per meter

dBuV/m – Decibel microvolts per meter

kV – Kilovolt

Hz – Hertz

kHz – Kilohertz

MHz – Megahertz

GHz – Gigahertz

pF – Picofarad

Ω – Ohm

QP – Quasi-Peak

N/A – Not Applicable

CONFIGURATION

Testing performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations, and settings used to complete the evaluation. The actual test parameters specified in the test data; this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation indicated in the test data.

EUT		
Description	Manufacturer	
1Ph Filter	**Kan-Seal**	
Model Number	Part Number	Serial Number
SP-120-240-W / SP-120-240-RL / SP-120-240-TB / SP-240-EUW / SP-240-EUTB / SP-240-EURL	**None**	**None**

SUMMARY OF TESTS PERFORMED & RESULTS

TABLE 1 TEST PERFORMED & RESULTS

Report Paragraph	Test Description	Specification	Notes	Results
MIL-STD-188-125-1				
3.1	Pulsed Current Injection	MIL-STD-188-125-1	Short Pulse (Powered): Common Mode 5000A/≥60Ω; ≤2×10-8 (Rise) x 5×10-7-5.5×10-7 Short Pulse (Un-powered): Wire to Ground 2500A/≥60Ω; ≤2×10-8 (Rise) x 5×10-7-5.5×10-7 Intermediate Pulse: Common Mode 250A/≥10Ω; ≤1.5×10-6 (Rise) x 3×10-3-5×10-3 Intermediate Pulse: Wire to Ground 250A/≥10Ω; ≤1.5×10-6 (Rise) x 3×10-3-5×10-3	Compliant

SECTION 1 – TEST CONDITIONS AND EQUIPMENT

1.1 INSTRUMENTATION AND EQUIPMENT

Measuring and test equipment, utilized in the performance of these tests, was calibrated in accordance with ANSI/NCSL Z540-3-2006, by Keystone Compliance, LLC or a commercial facility, utilizing reference standards (or interim standards) whose calibrations have been certified as being traceable to the National Institute of Standards & Technology (NIST). All reference standards utilized in the above calibration system are supported by certificates, reports, or data sheets attesting to the date, accuracy, and conditions under which the results furnished were obtained. All subordinate standards, measuring and test equipment are supported by like data, when such information is essential to achieve the accuracy control required by the procedure.

Keystone Compliance, LLC attests that the commercial sources providing calibration services on the above referenced equipment, other than the NIST Standards are in fact capable of performing the required services to the satisfaction of Keystone Compliance, LLC Quality Assurance. Certifications of all calibrations performed are retained on file in the Keystone Compliance, LLC Quality Assurance Department, and are available for inspection upon request by customer representatives.

The test equipment utilized during this test program is listed on individual Test Equipment Logs located in Section 3 of this document.

1.2 TOLERANCES

All test conditions were maintained within all applicable specified tolerances.

SECTION 2 – REFERENCES

2.1 APPLICABLE SPECIFICATIONS

Reference Specification Title	**MIL-STD-188-125-1** **High-Altitude Electromagnetic Pulse (HEMP) Protection For Ground-Based C41 Facilities Performing Critical, Time-Urgent Missions Part 1 Fixed Facilities**
Calibration Information	**ANSI/NCSL Z540-3-2006** **Calibration Laboratories and Measuring Test Equipment - General Requirements**

SECTION 3 –TEST EQUIPMENT, TEST DATA, & TEST PHOTOGRAPHS

3.1 PULSED CURRENT INJECTION TEST

a) The Pulsed Current Injection test requirements for the 1Ph Filter are specified in MIL-STD-188-125-1.

b) The Pulsed Current Injection test equipment used to test the 1Ph Filter is located in Paragraph 3.1.1 of this document.

c) All recorded test data for the Pulsed Current Injection test on the 1Ph Filter is located in Paragraph 3.1.2 of this document.

d) The Pulsed Current Injection test photographs for the 1Ph Filter are located in Paragraph 3.1.3 of this document.

3.1.1 PULSED CURRENT INJECTION TEST EQUIPMENT LOG

Equipment Log			
EUT:	1Ph Filter	Job Number:	1708-152EA
Customer:	Kan-Seal	Model Number:	SP-120-240-W / SP-120-240-RL / SP-120-240-TB / SP-240-EUW / SP-240-EUTB / SP-240-EURL
Date:	11/13/17 - 11/14/17	Part Number:	None
Test Engineer:	M.Gennaro	Serial Number:	None
Test:	Pulsed Current Injection		
Test Specifications			
Test Spec:	MIL-STD-188-125-1		

Test Equipment					
Asset No.	Description	Manufacturer	Model	Serial No.	Cal. Due
ED004	Digital Oscilloscope	Tektronix	TDS784A	B040986	11/18/2017
EJ046	Current Monitor	Pearson	2877	none	1/24/2018
EJ052	Current Monitor	Pearson Electronics	110	88437	5/24/2018
EF095	Short Pulse Generator	Keystone	None	None	UWCE
EF096	Intermediate Pulse Generator	Keystone	None	None	UWCE
EU000	WaveStar (Version 2.9)	Tektronix	None	None	UWCE

UWCE: Used With Calibrated Equipment

PAGE:	1	ENGINEER/TECHNICIAN(S):	M.Gennaro
OF:	1	QUALITY REVIEWER:	J. Sullivan

3.1.2 PULSED CURRENT INJECTION TEST DATA

Pulsed Current Injection Data Sheet					
EUT:	1Ph Filter			Job Number:	1708-152EA
M/N:	SP-120-240-W / SP-120-240-RL / SP-120-240-TB / SP-240-EUW / SP-240-EUTB / SP-240-EURL	P/N:	None	S/N:	None
Customer:	Kan-Seal				
Date:	11/13/17 - 11/14/17			Test Engineer:	M.Gennaro
Config. #:	1	Power:	120 / 240 VAC	Job Site:	Keystone Compliance
Test Specifications					
Test Spec.:	MIL-STD-188-125-1				

Intermediate Pulse Test Data

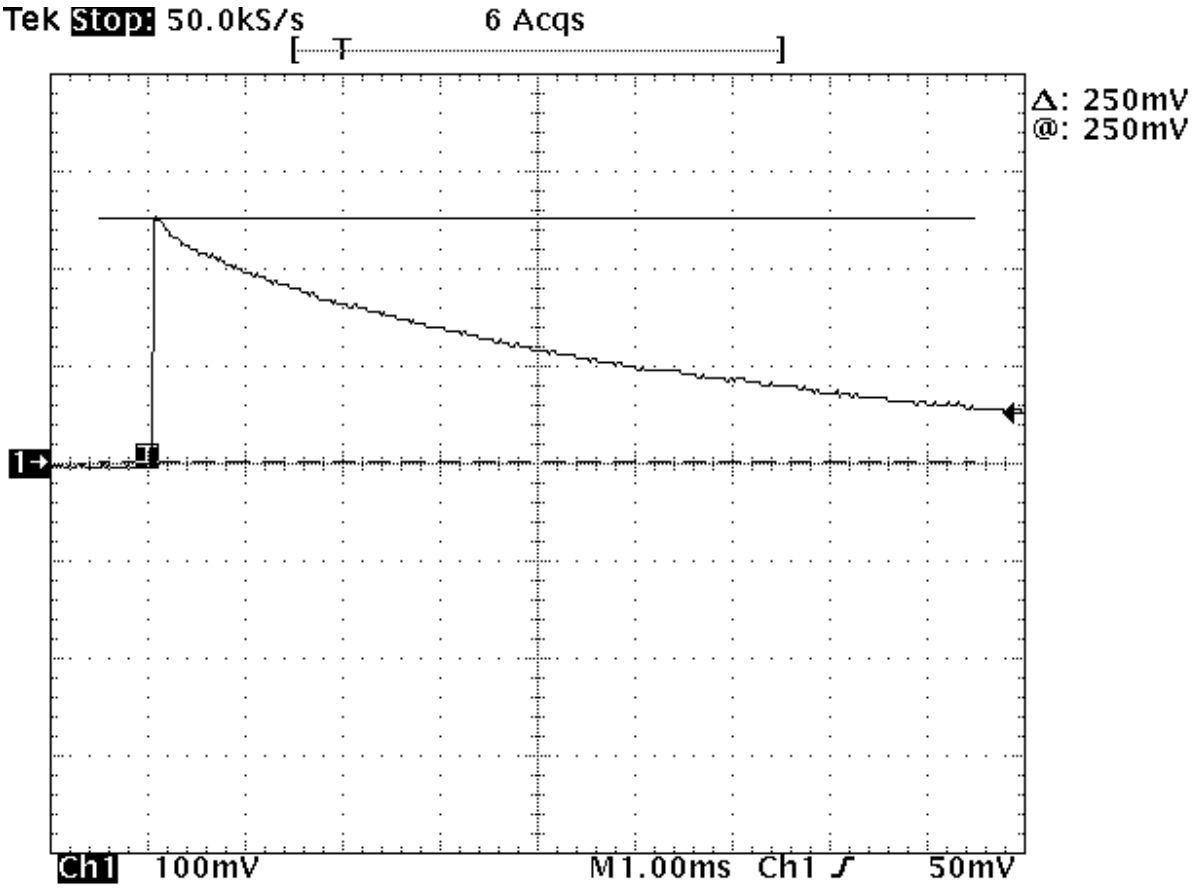
Test Level (A)	Test Configuration	Pre-test Breakdown (VDC) L1-L2	L1-PE	L2-N	Induced Current (A)	Post-test Breakdown (VDC) L1-L2	L1-PE	L2-N
50	L1-PE/N	300	278	283	ND	300	281	285
50	L2-PE/N				ND			
100	L1-PE/N	300	281	285	66	300	285	286
100	L2-PE/N				69			
150	L1-PE/N	300	285	286	113	300	285	286
150	L2-PE/N				113			
200	L1-PE/N	300	285	286	158	300	286	288
200	L2-PE/N				158			
250	L1-PE/N	300	286	288	202	300	286	290
250	L2-PE/N				206			

Short Pulse Test Data

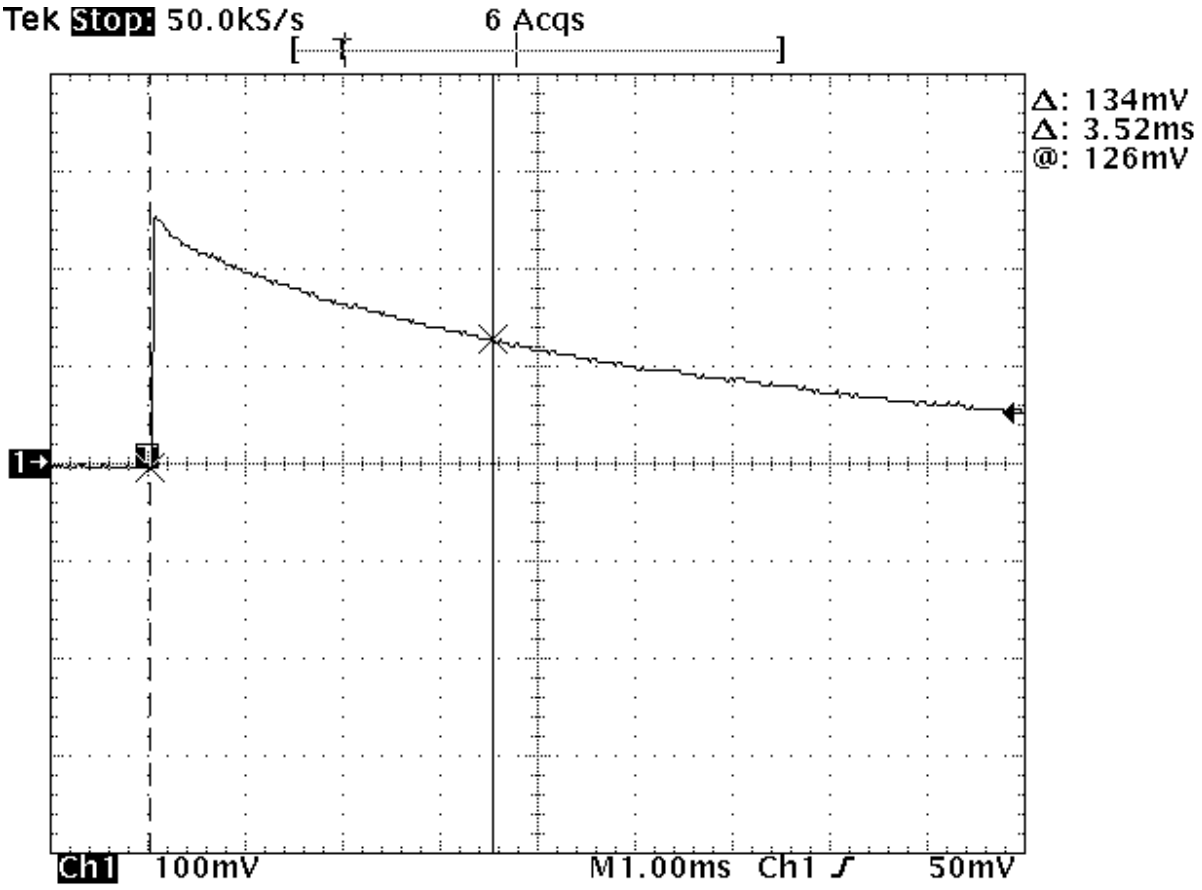
Test Level (A)	Test Configuration	Pre-test Breakdown (VDC) L1-L2	L1-PE	L2-N	Induced Current (A)	Post-test Breakdown (VDC) L1-L2	L1-PE	L2-N
500	L1-PE/N	295	285	281	500	297	286	281
500	L2-PE/N				472			
1000	L1-PE/N	297	286	281	1000	297	286	283
1000	L2-PE/N				1000			
1500	L1-PE/N	297	286	283	1350	297	286	283
1500	L2-PE/N				1350			
2000	L1-PE/N	297	286	283	1670	297	286	283
2000	L2-PE/N				1670			
2500	L1-PE/N	297	286	283	1950	297	288	281
2500	L2-PE/N				1980			

EUT Operating Modes
Unpowered
Comments
No Damage Or Degradation Of EUT Performance
Deviations From Test Standard
N/A
Results
Compliant

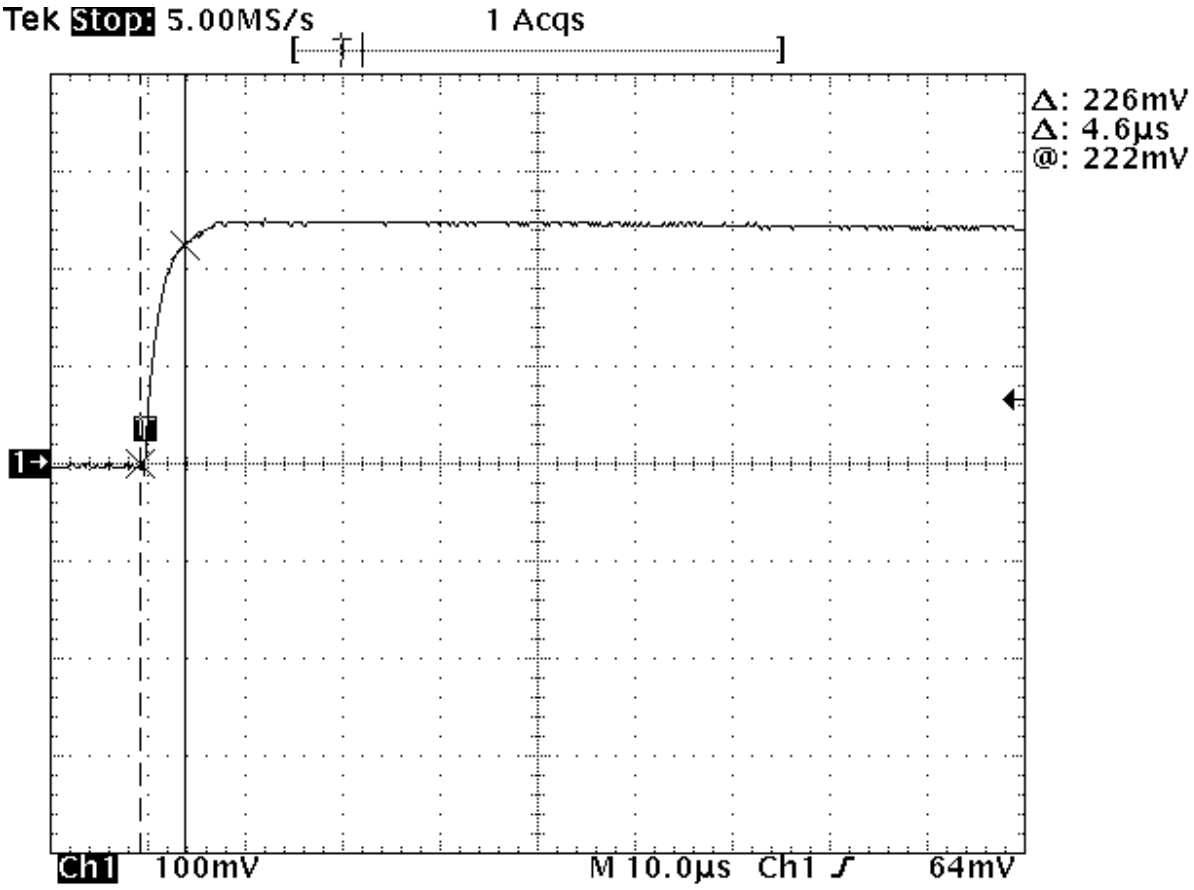
Intermediate Pulse Current Amplitude Calibration



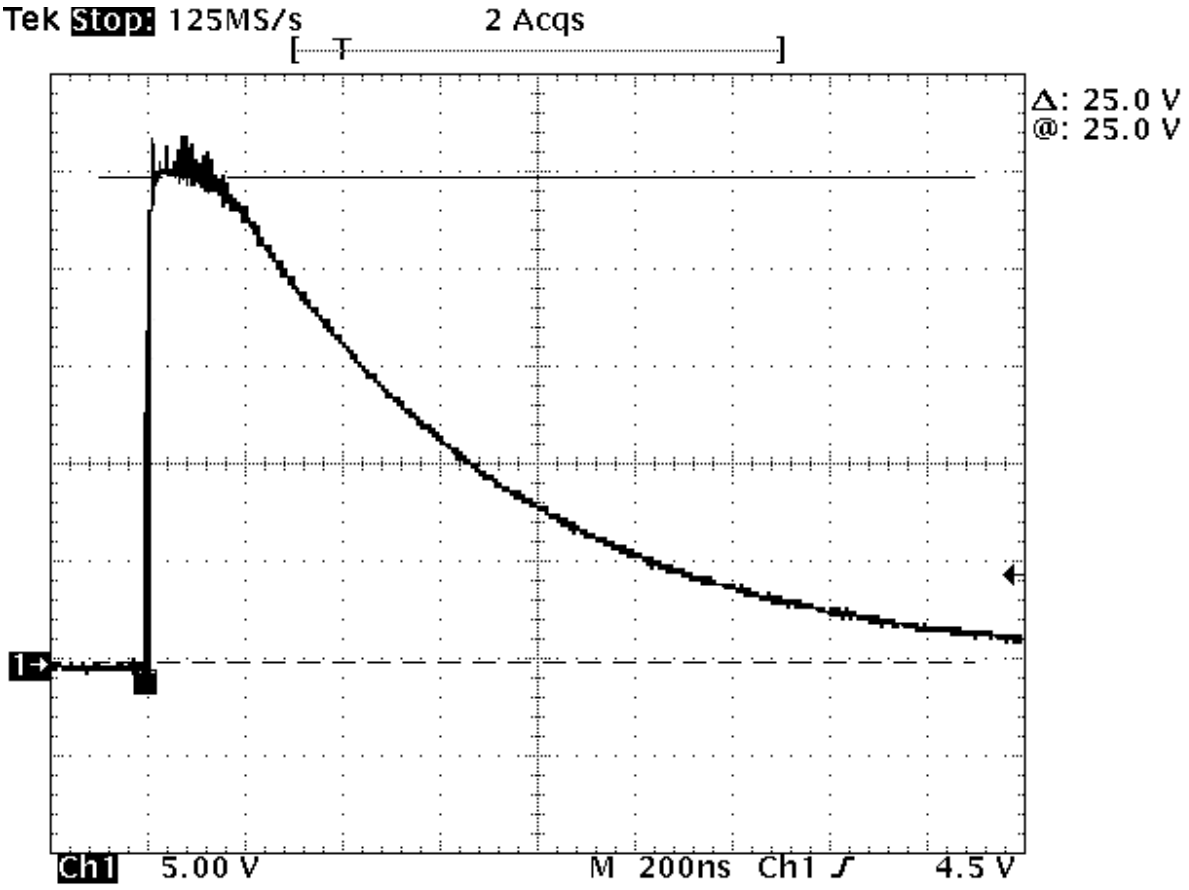
Intermediate Pulse Current Fall Time Calibration



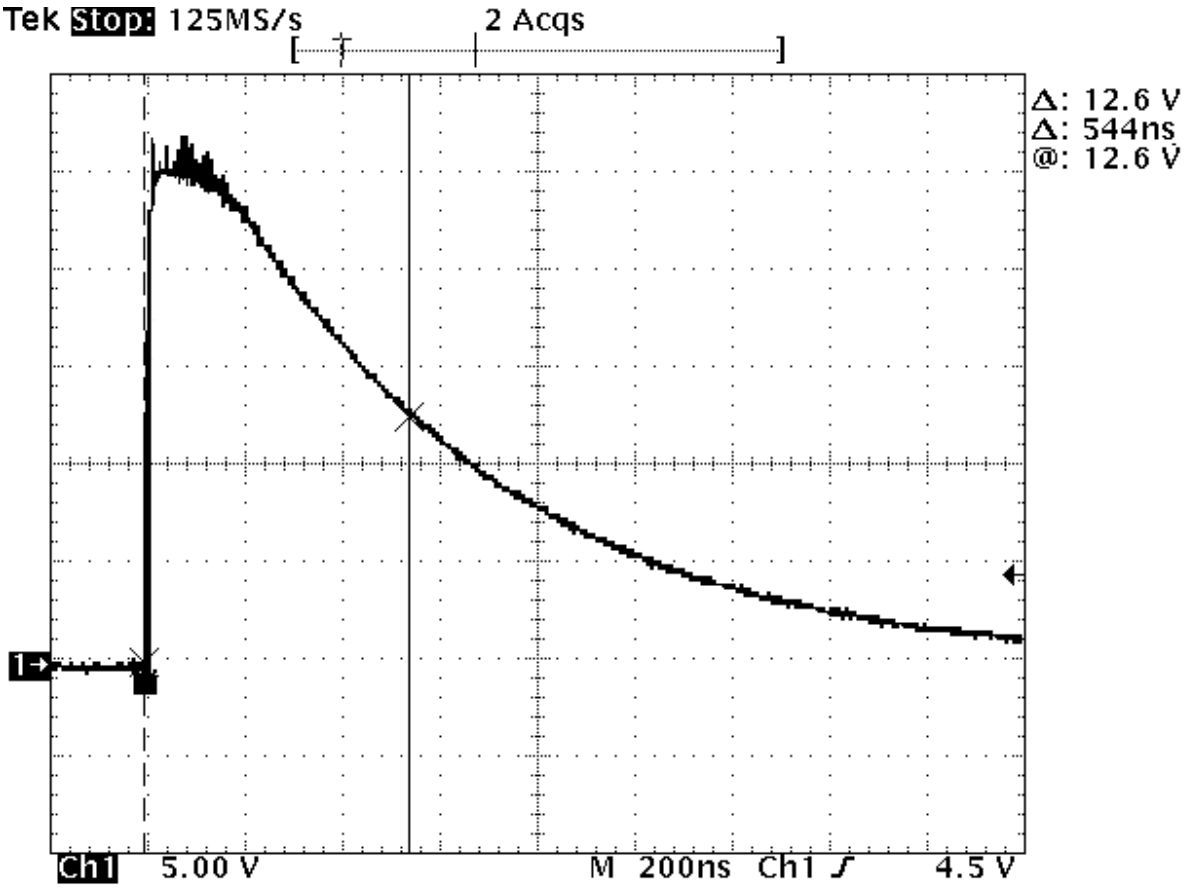
Intermediate Pulse Current Rise Time Calibration



Short Pulse Current Amplitude Calibration



Short Pulse Current Fall Time Calibration



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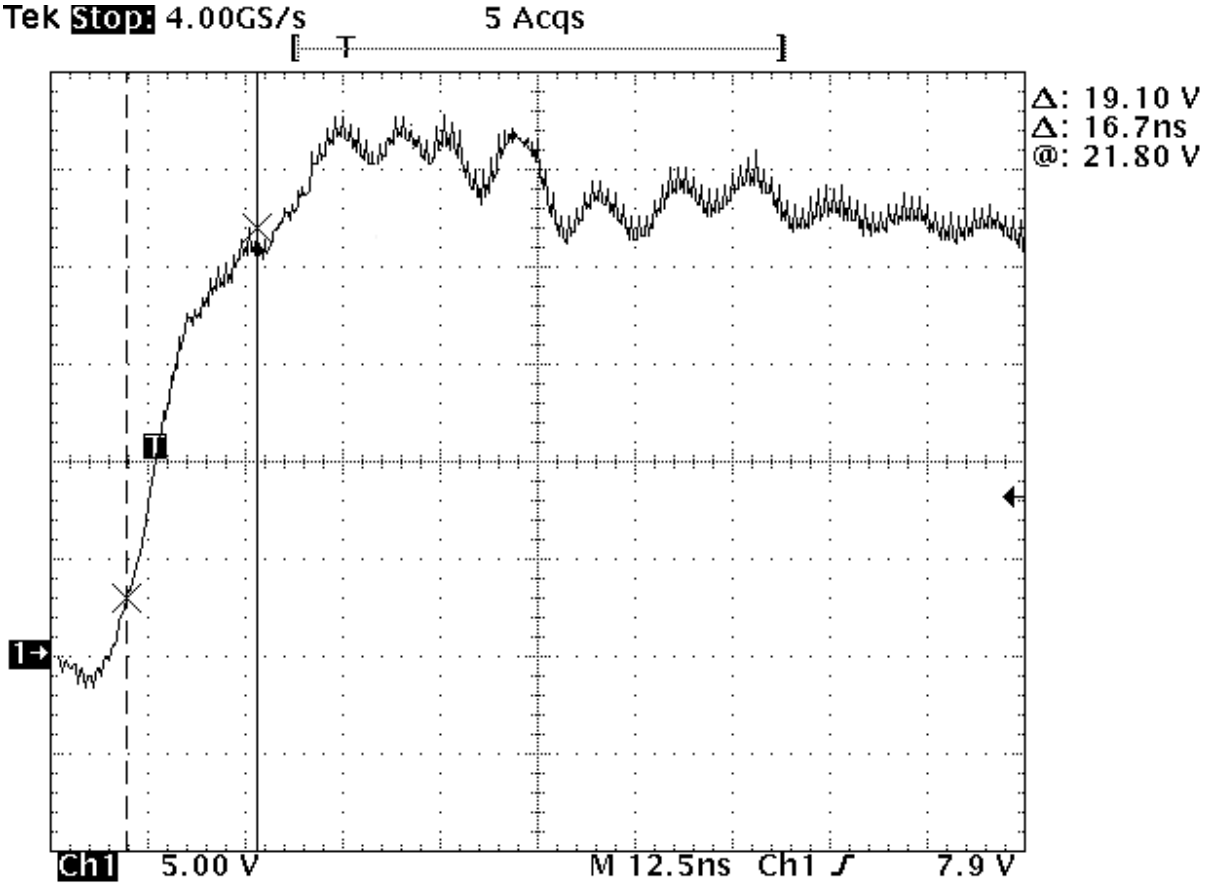

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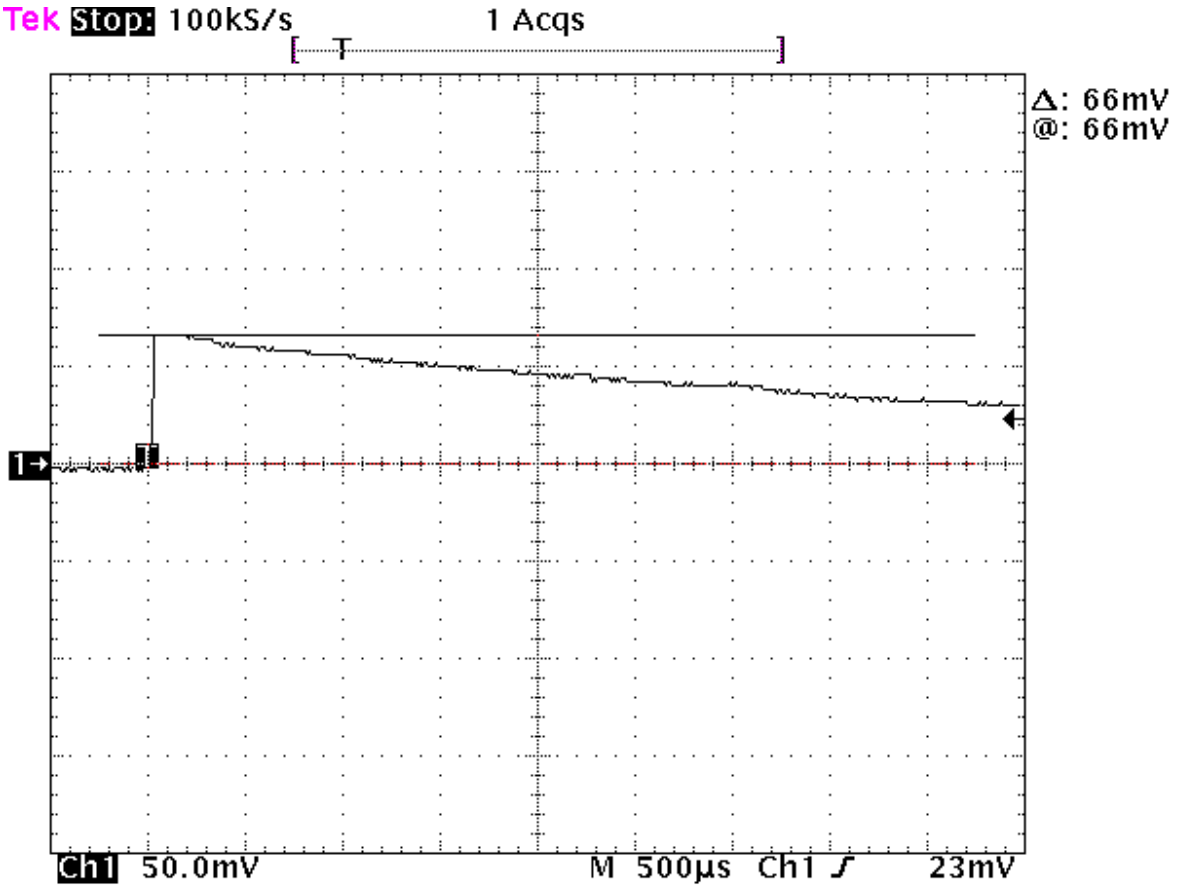

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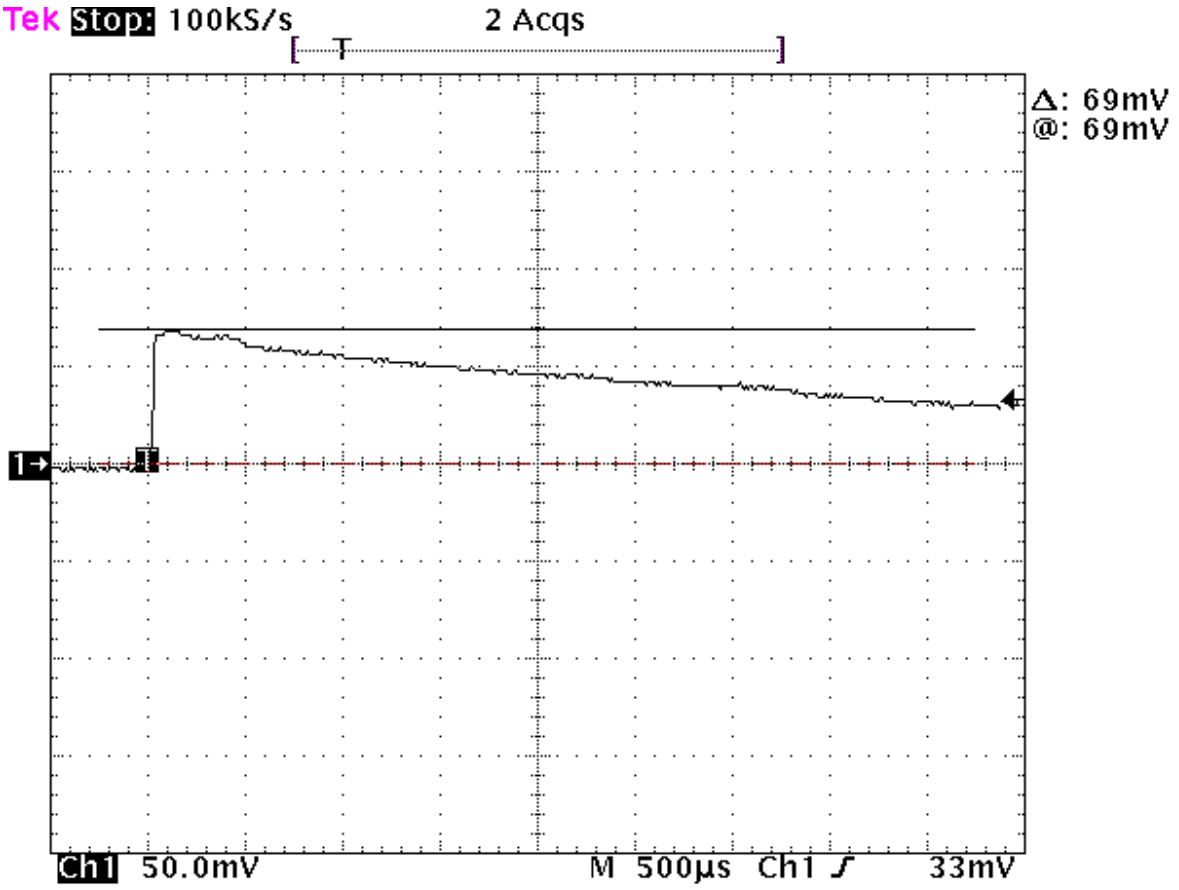
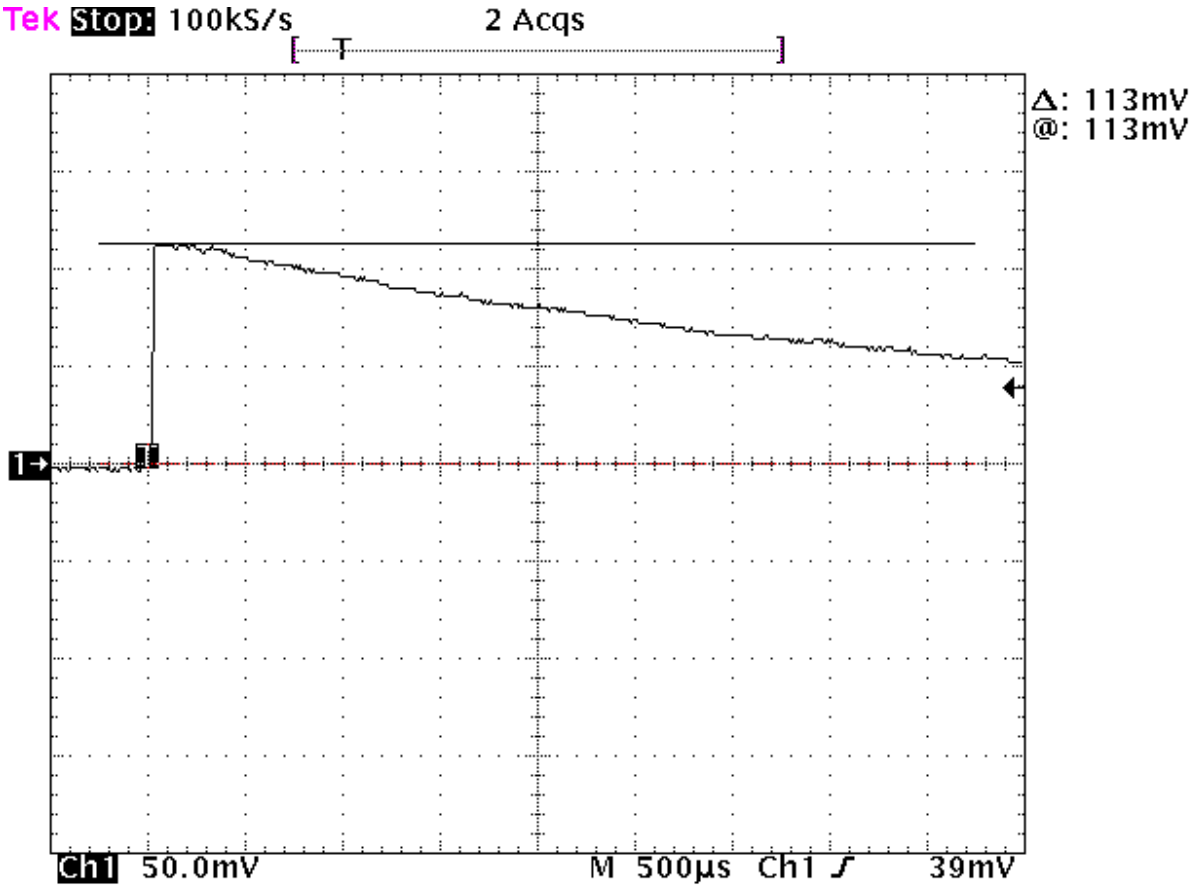


Line 1 60% Intermediate Test Plot



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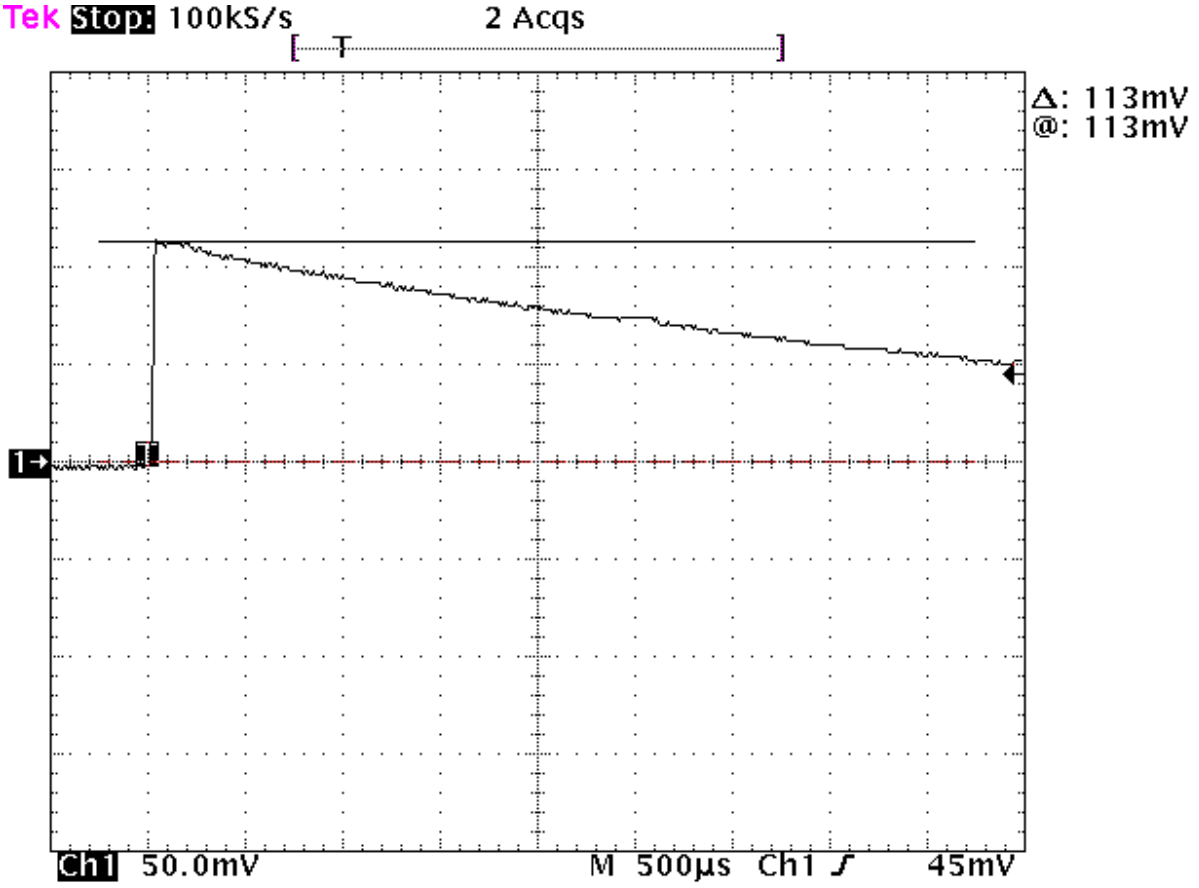

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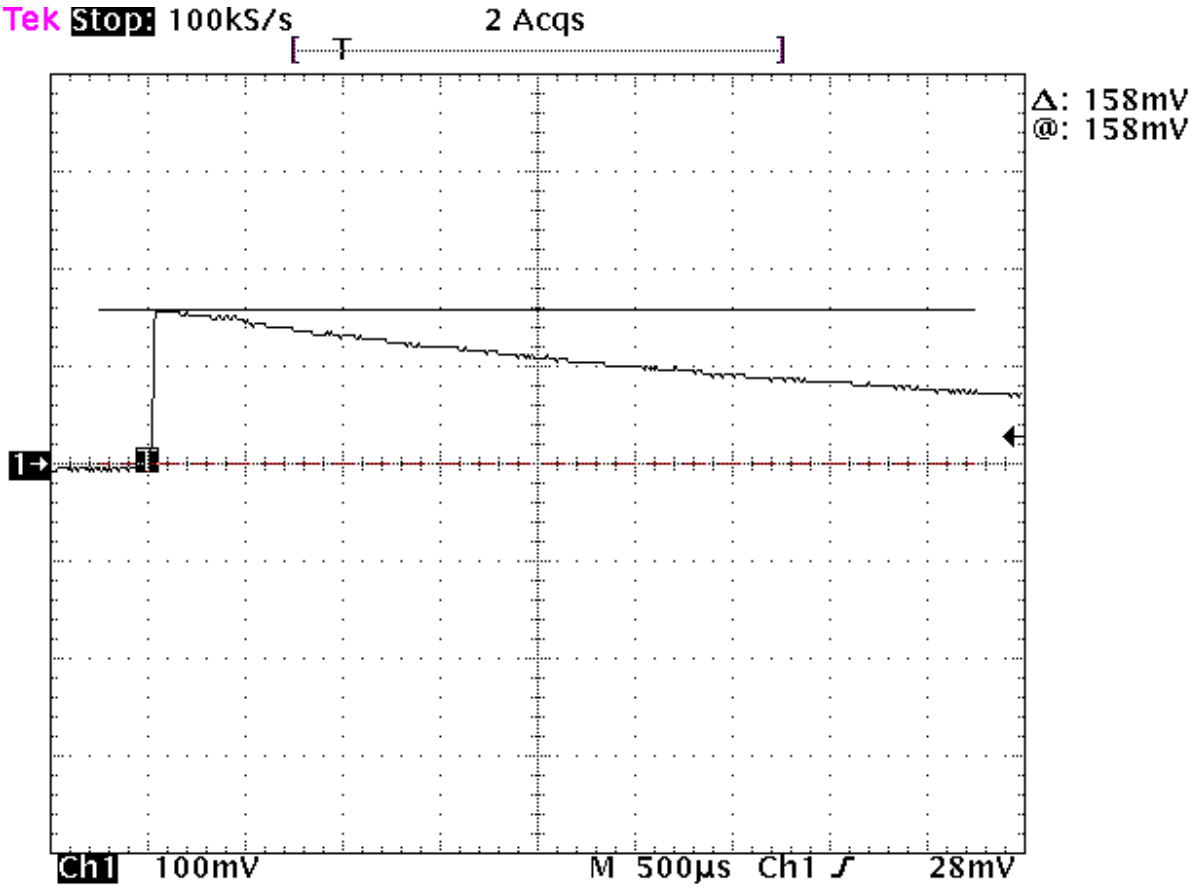

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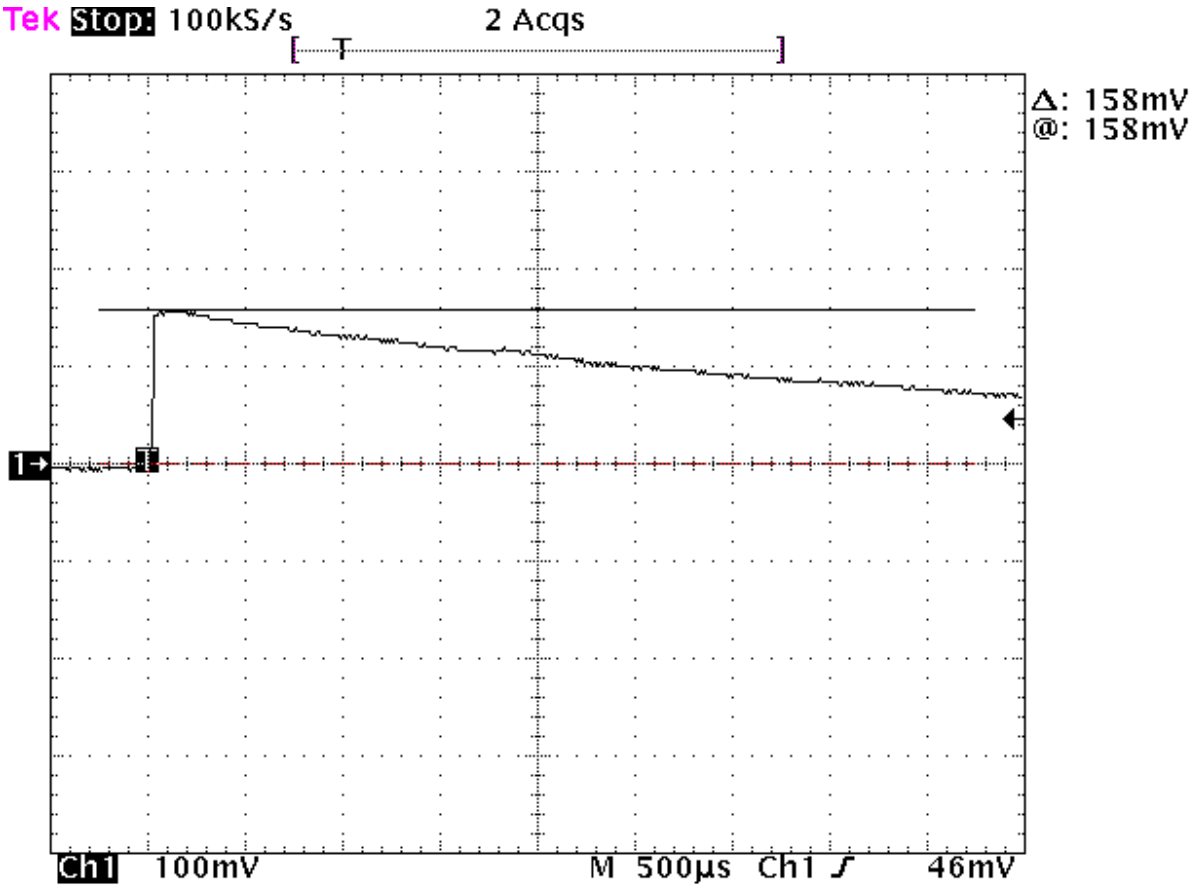

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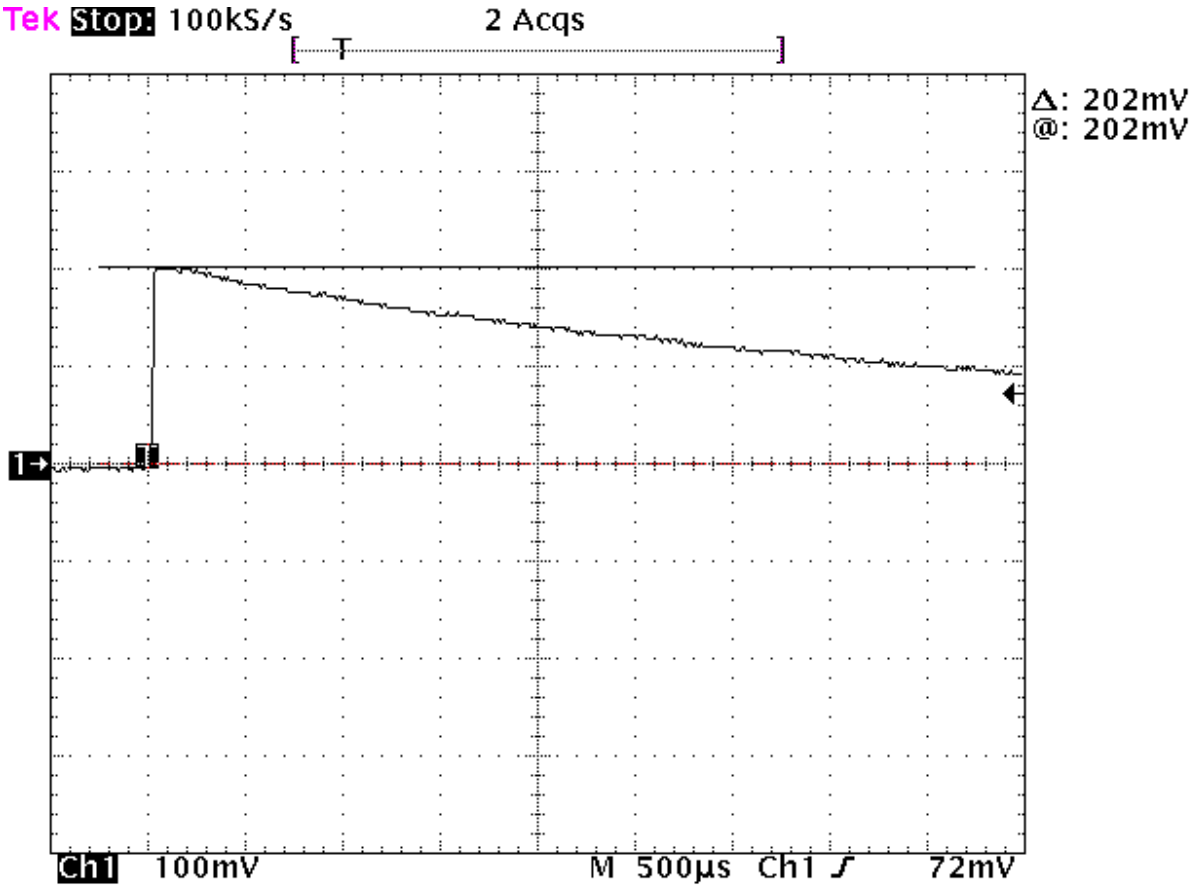

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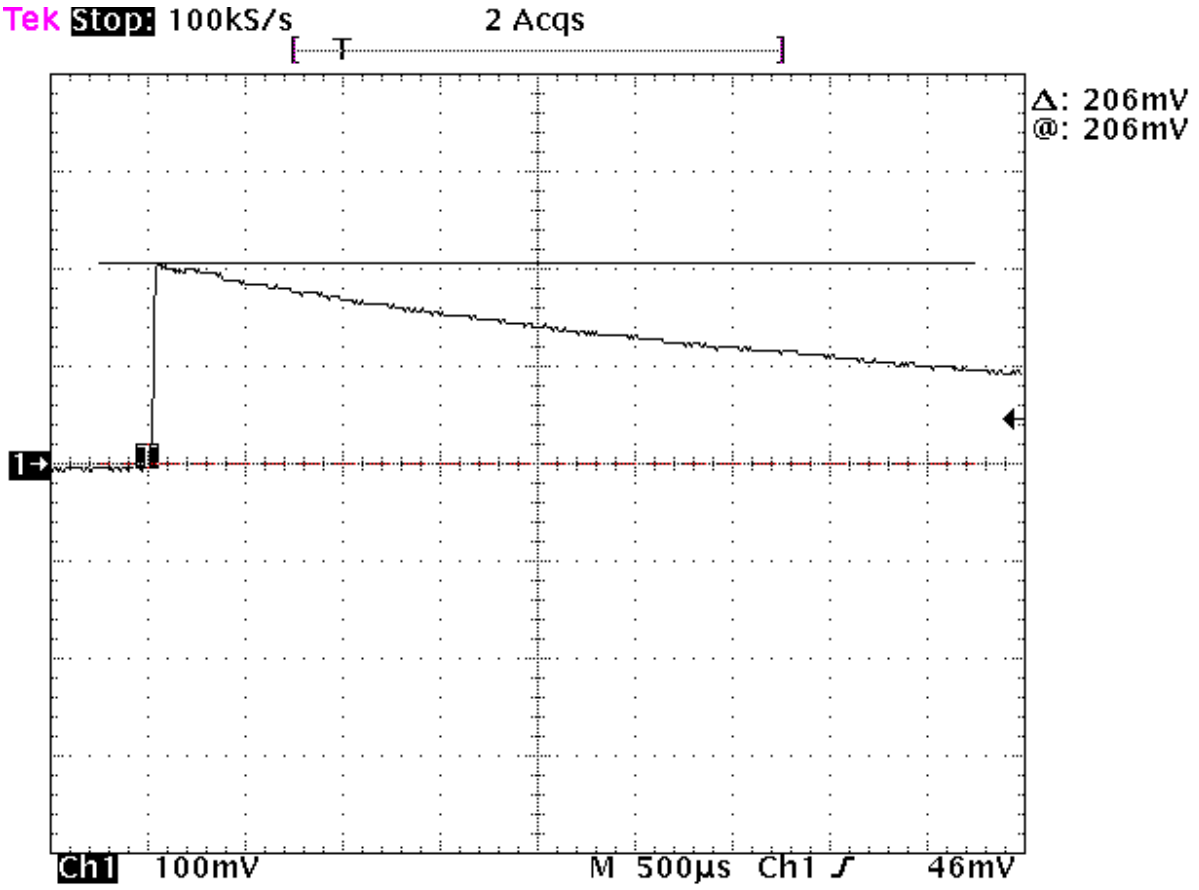

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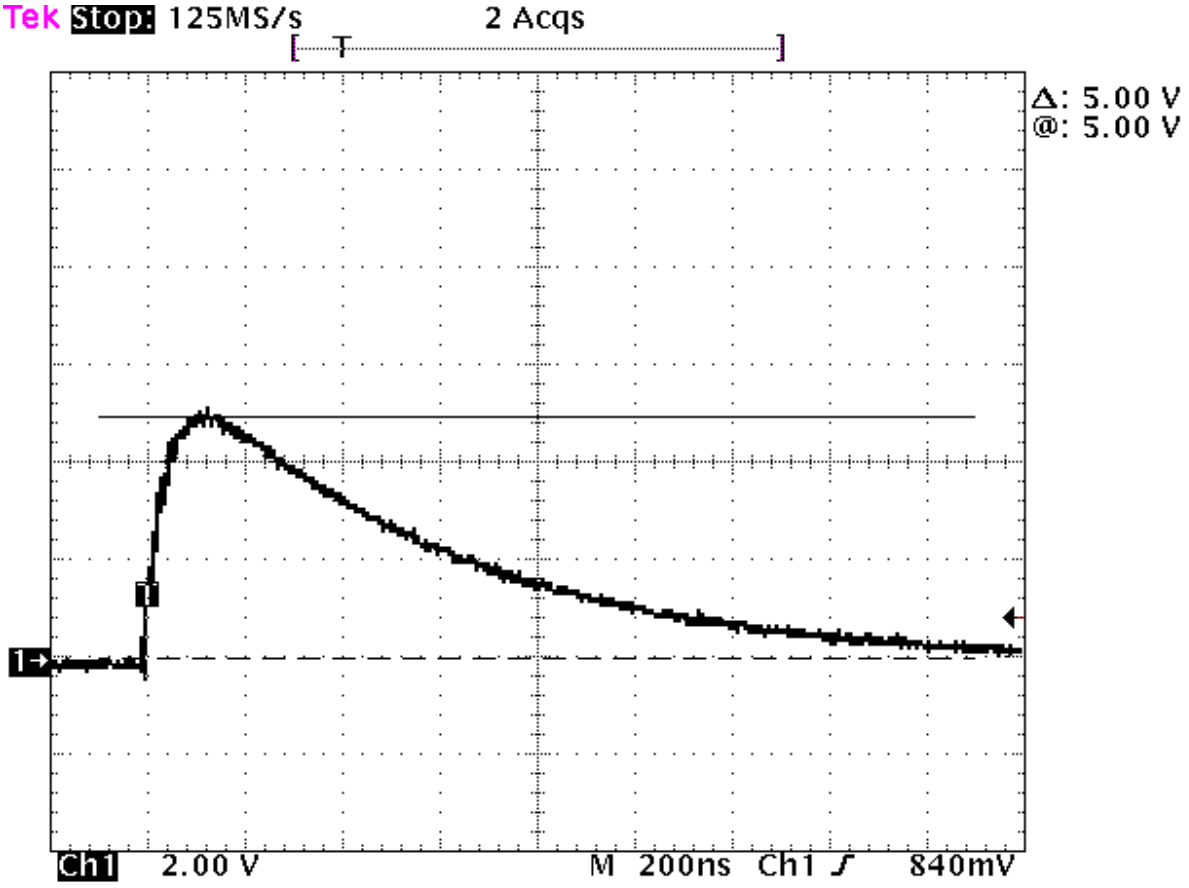

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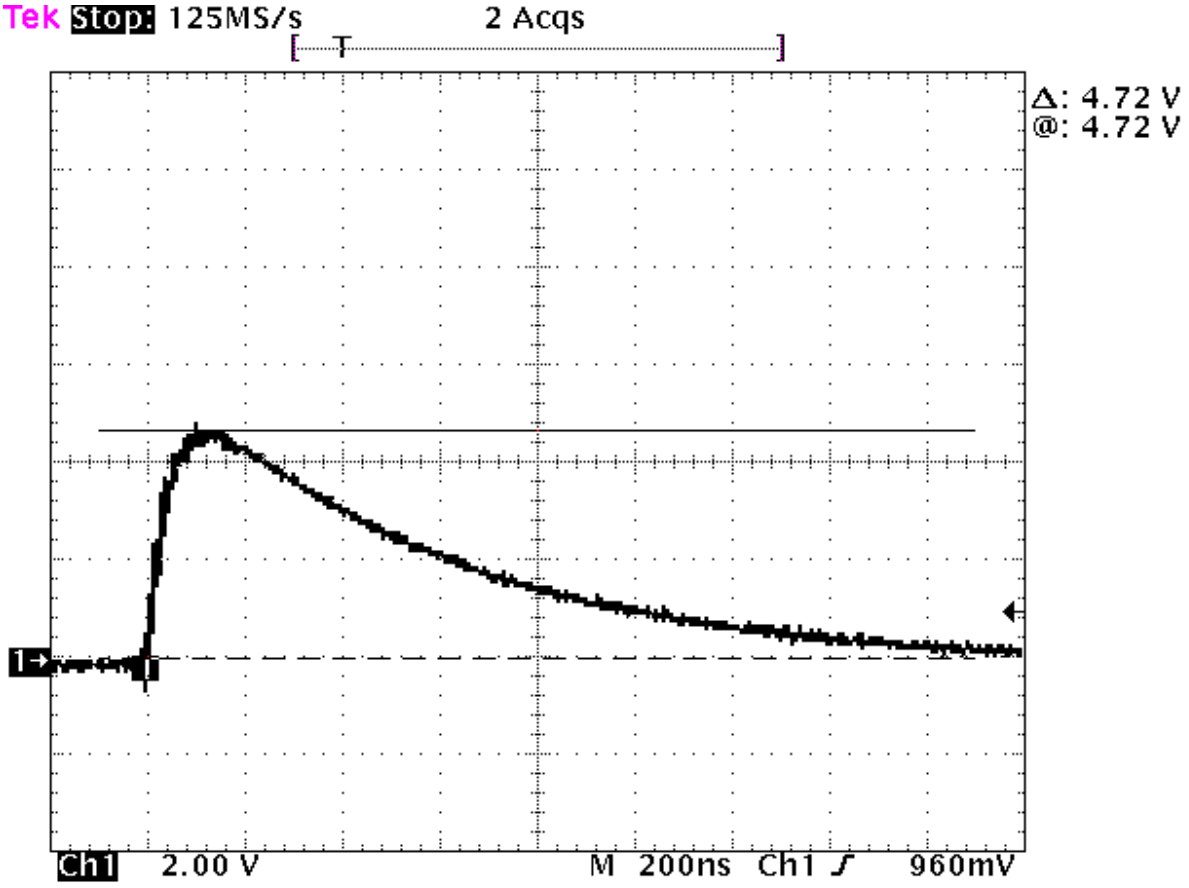

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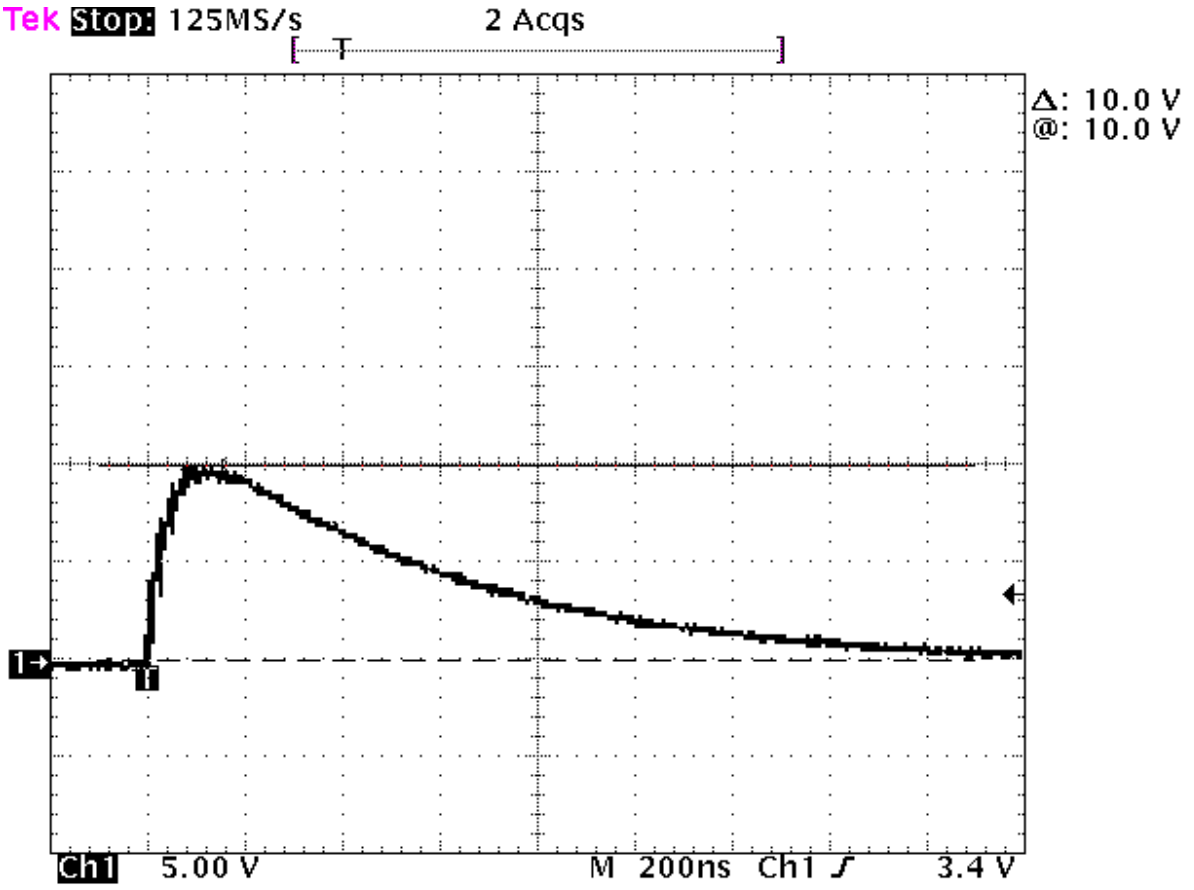

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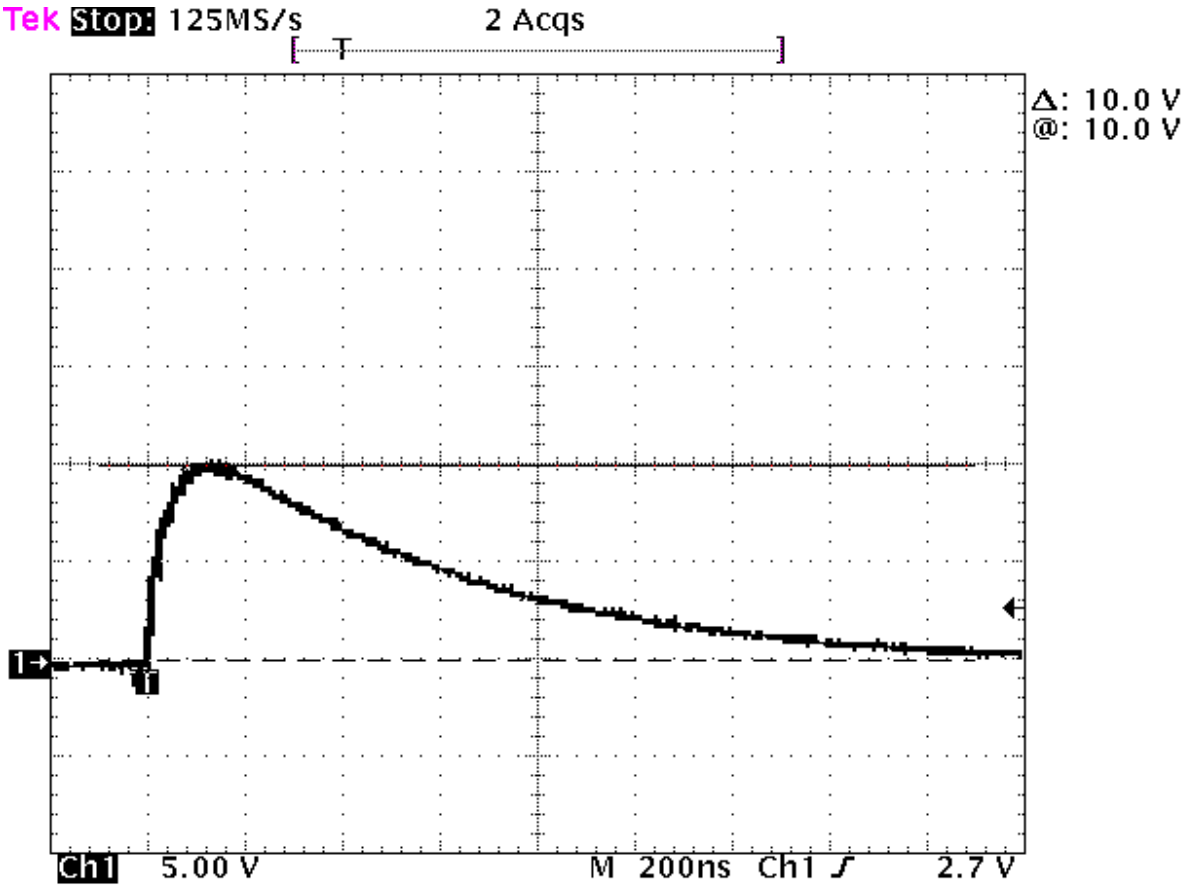

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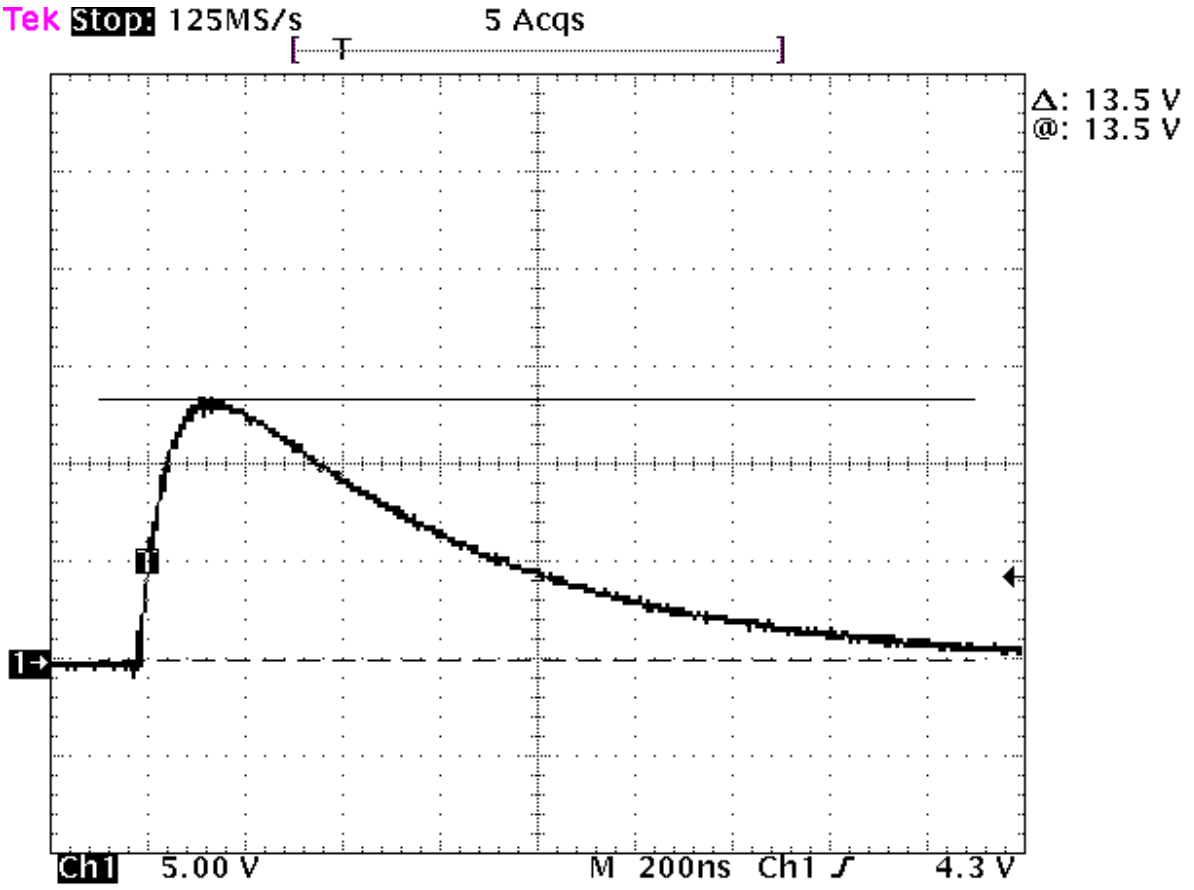

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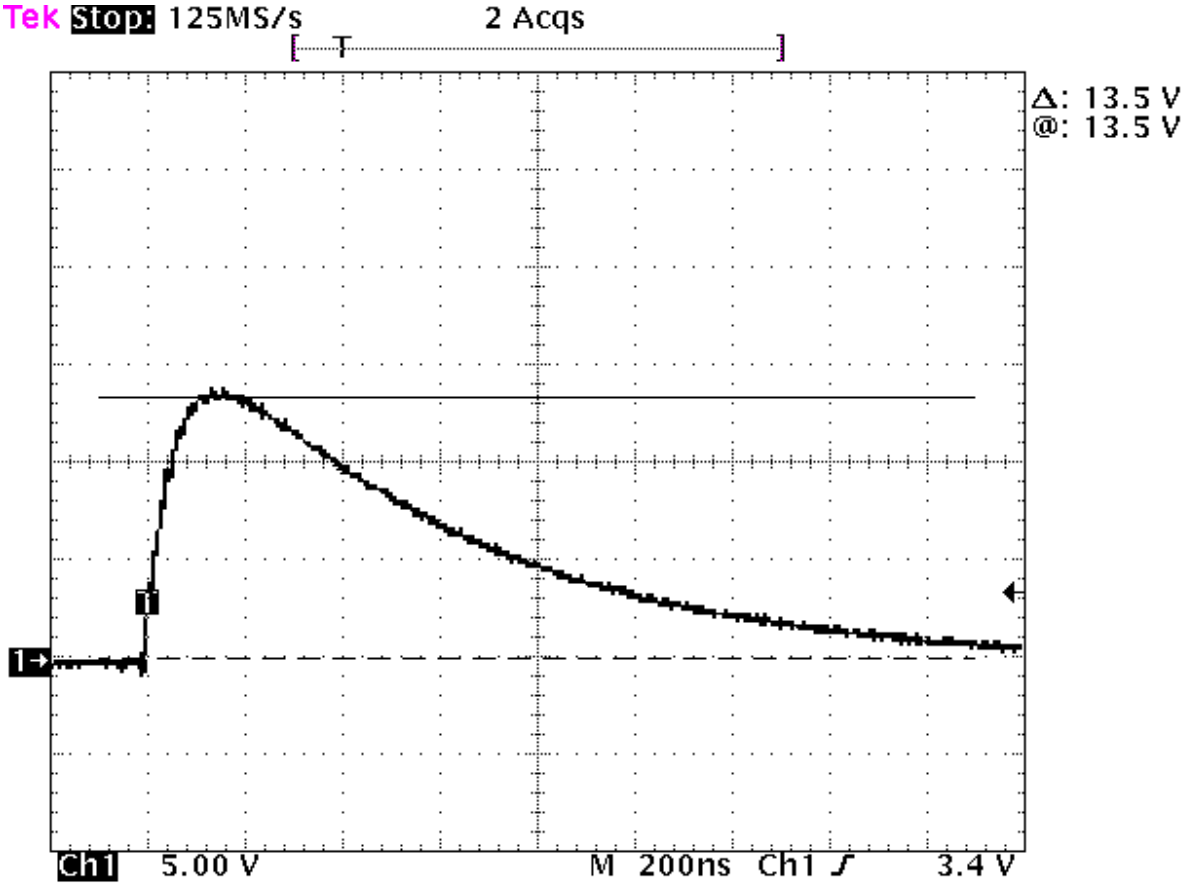

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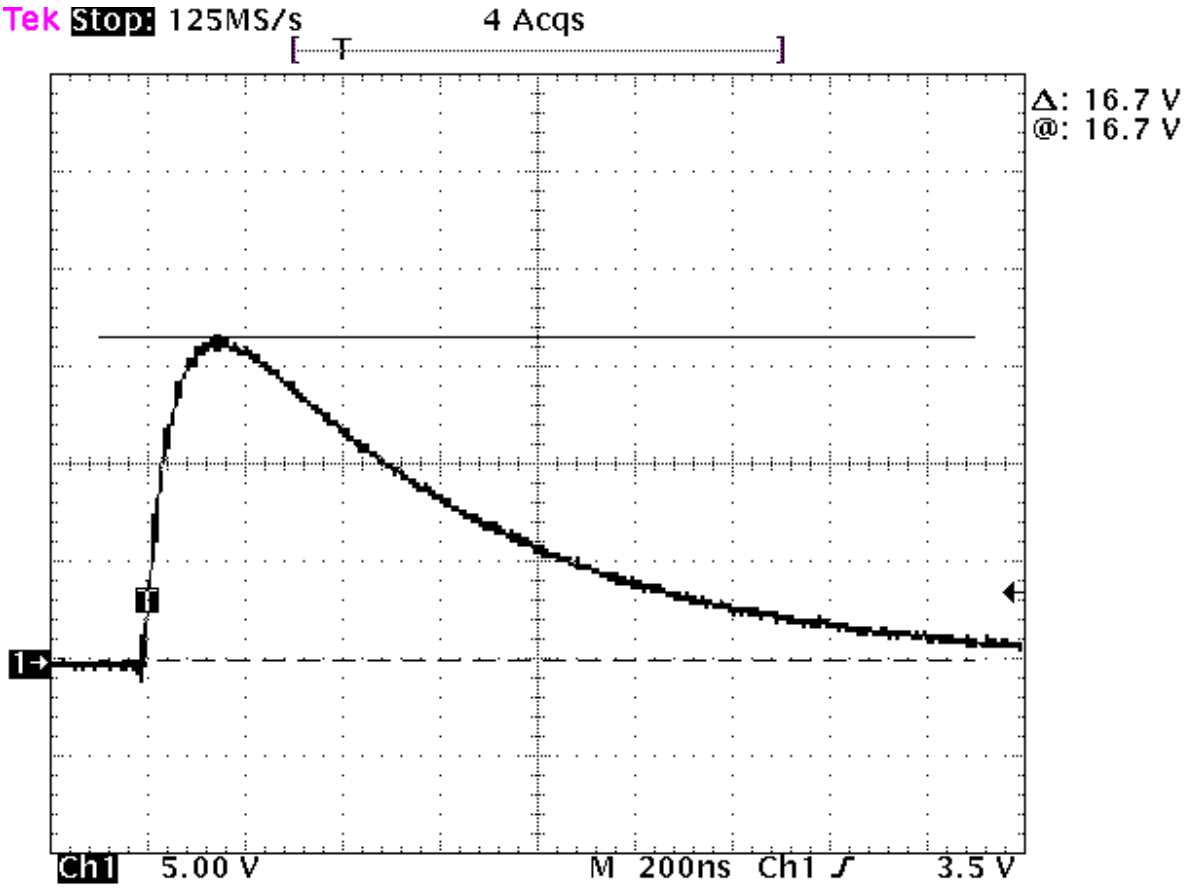
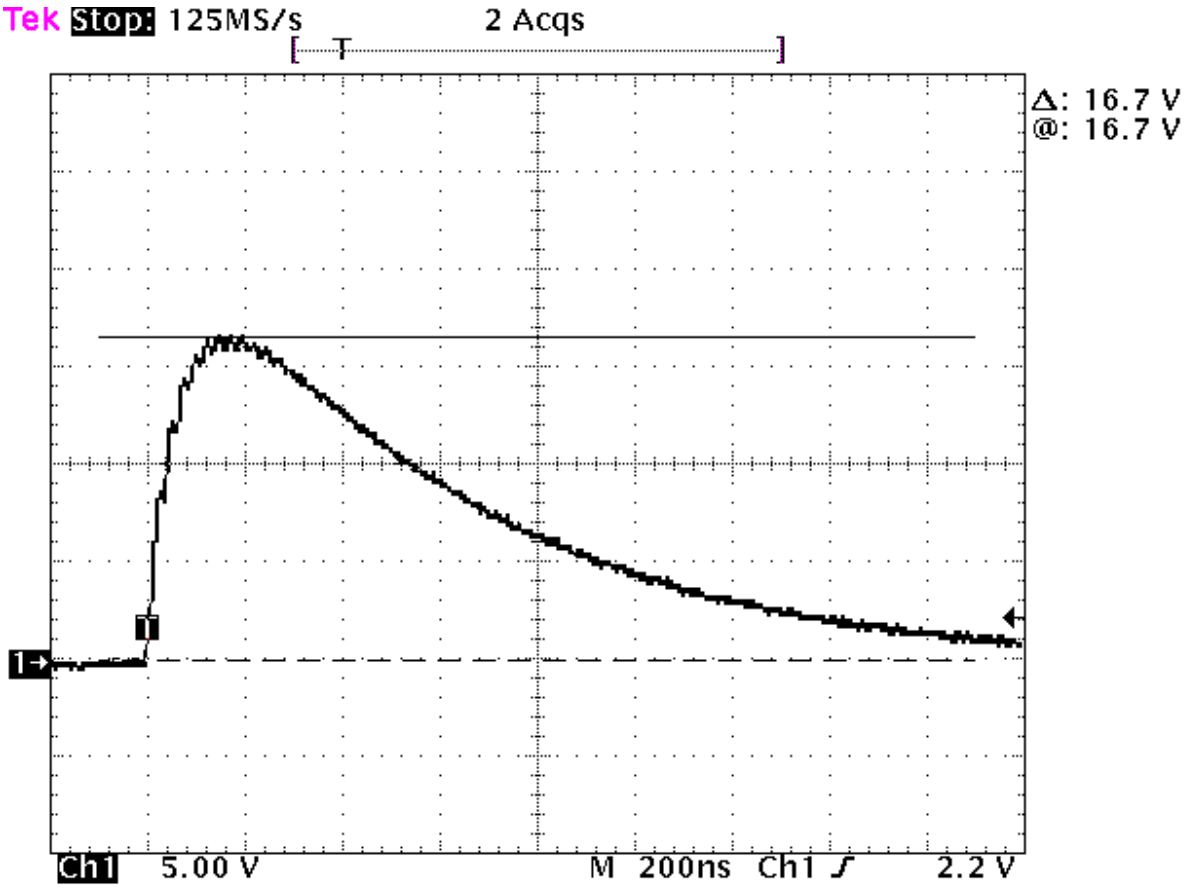


Line 2 80% Short Test Plot



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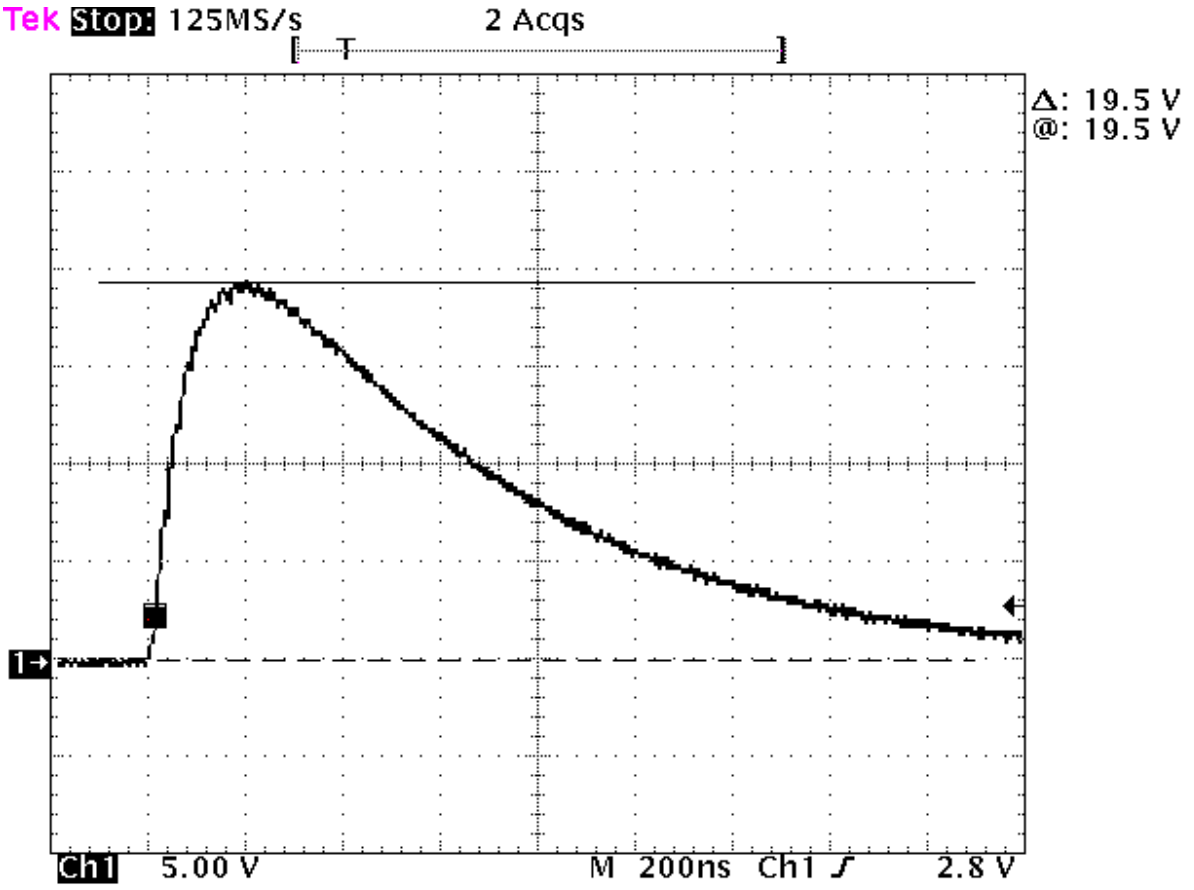

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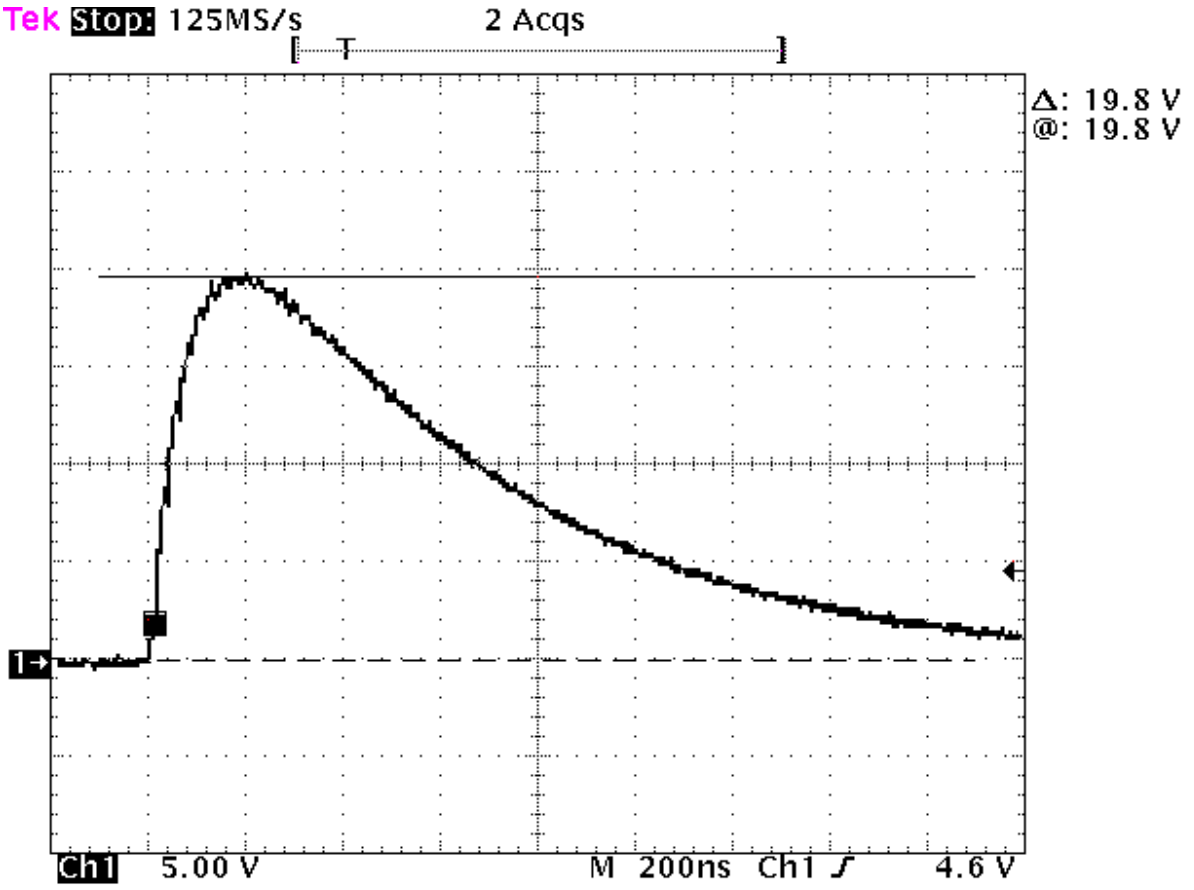
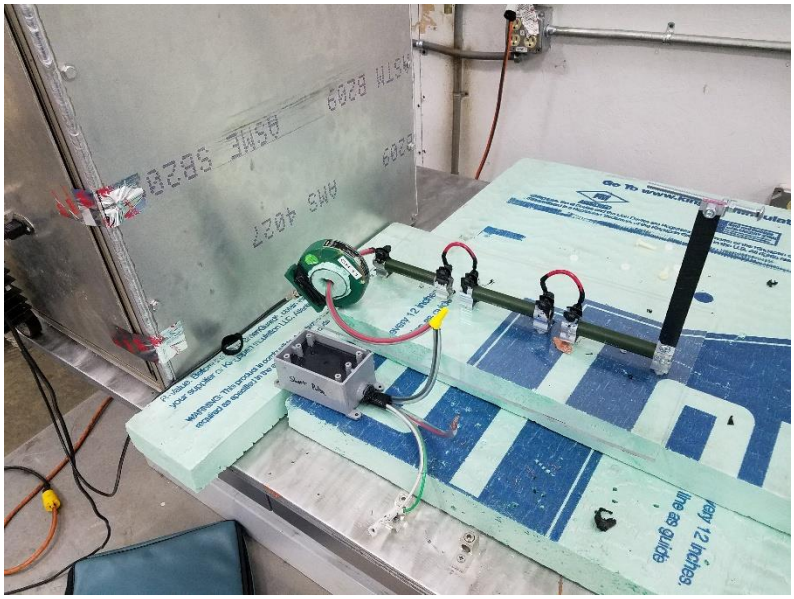


3.1.3 PULSED CURRENT INJECTION TEST PHOTOGRAPHS

Pulsed Current Injection	
MIL-STD-188-125-1	
Intermediate Pulse Test Setup	
Unit Tested	1Ph Filter
Model Number	SP-120-240-W / SP-120-240-RL / SP-120-240-TB / SP-240-EUW / SP-240-EUTB / SP-240-EURL
Part Number	None
Serial Number	None
Kan-Seal	
Date:	11/13/17 - 11/14/17
Job #:	1708-152EA



Pulsed Current Injection	
MIL-STD-188-125-1	
Short Pulse Test Setup	
Unit Tested	1Ph Filter
Model Number	SP-120-240-W / SP-120-240-RL / SP-120-240-TB / SP-240-EUW / SP-240-EUTB / SP-240-EURL
Part Number	None
Serial Number	None
Kan-Seal	
Date:	11/13/17 - 11/14/17
Job #:	1708-152EA

SECTION 4 – CONCLUSION

a) The 1Ph Filter, Model Number: SP-120-240-W / SP-120-240-RL / SP-120-240-TB / SP-240-EUW / SP-240-EUTB / SP-240-EURL; Part Number: None; Serial Number: None, was subjected to the following EMC Tests in accordance with MIL-STD-188-125-1 and the specifications as shown in Table 2:

TABLE 2 TEST PERFORMED & RESULTS

Test Description	Specification	Results
MIL-STD-188-125-1		
Pulsed Current Injection	**MIL-STD-188-125-1**	**Compliant**

b) The 1Ph Filter was returned to Kan-Seal after completion of the EMI Test.