

Tesla AC Powerwall ( 4.8 kVA)

連系協議用資料—代表機試験結果 (60Hz)

Ver1.4

装置型式：

AC Powerwall model: 1092170-xx-y, 2012170-xx-y, 3012170-xx-y

## 1. Summary

Confirmation test on system interconnection protection of this equipment is tested under the test conditions, test methods, and judgment criteria of the following documents.

- JETGR0002-1-11.0 (2020.01) Test method for grid interconnection protection device etc. for compact dispersed power generation system General rules
- JETGR0003-5-9.0 (2020.01) Individual test method such as system interconnection protection device for storage battery system

本装置の系統連系保護の確認試験に関しては、下記資料の試験条件、試験方法、判定基準のもと試験を行う。

- JETGR0002-1-11.0 (2020.01) 小型分散型発電システム用系統連系保護装置等の試験方法通則
- JETGR0003-5-9.0 (2020.01)蓄電池システム用系統連系保護装置等の個別試験方法

## 2. Sample information 装置シリアル番号

Product 品名	S/N	Remarks 備考
AC Powerwall 2.0	T1710013744, T17B0000035, TG120184001J07	

### 3. Measurement Device / Equipment List 計測器

Sr. No.	Description 計測器名	Manufacturer メーカー	Model 型名	Serial シリアル	Cal Date 校正日	Cal Due 校正期限日
1	Power Analyzer	Yokogawa	WT3000E	91UA13165	12/2/2019	12/2/2020
2	Current Probe	Yokogawa	701930	180828556	5/14/2019	5/14/2021
3	Current Probe	Yokogawa	701930	180828214	5/14/2019	5/14/2021
4	Temperature and Humidity measurement	Vaisala	HM24Probe	L0830459	12/4/2019	12/4/2020
5	Scope	Yokogawa	DL850EV	91U616293	7/29/2019	7/29/2020
6	Differential Probe	Yokogawa	700924	1900535	3/14/2020	3/14/2021
7	Differential Probe	Yokogawa	700924	1803221	7/11/2019	7/11/2020
8	Differential Probe	Yokogawa	700924	1803234	7/11/2019	7/11/2020
9	Differential Probe	Yokogawa	700924	1810859	3/14/2020	3/14/2021
10	Power Analyzer	Yokogawa	WT3000E	91W217312	3/11/2020	3/11/2021
11	Scope	Yokogawa	DL850EV	91V119360	07/24/2019	07/24/2021

#### 4. Test Results

Section Number	Test Description	Completion date	Pass/Fail
3.1.3	Direct Current Component Detection Test 直流分検出試験	8/12/2020	Pass
3.2.1	Alternative Current Overvoltage and Undervoltage Test (Magnitude) 交流過電圧及び不足電圧試験（しきい値）	7/13/2020	Pass
3.2.1	Alternative Current Overvoltage and Undervoltage Test (Time) 交流過電圧及び不足電圧試験（時限）	7/18/2020	Pass
3.2.2	Test procedure for Frequency tripping Thresholds 周波数上昇及び低下試験（しきい値）	1/31/2020	Pass
3.2.2	Test procedure for measuring Frequency trip time 周波数上昇及び低下試験（時限）	1/31/2020	Pass
3.2.3	Reverse power prevention 逆電力防止試験	1/31/2020	Pass
3.2.7	Independent Operation Prevention Test 1 単独運転検出試験	7/22/2020	Pass
3.2.8.1	Anti-Islanding with multiple inverters 複数台試験	7/29/2020	Pass
3.2.9.1	Test for Preventing Power-On for a Certain Period After Recovery (without Excursion) 復電後の一定時間投入阻止試験 1	7/10/2020	Pass
3.2.9.2	Test for Preventing Power-On for a Certain Period After Recovery (with Excursion) 復電後の一定時間投入阻止試験 2	7/9/2020	Pass
3.2.10	Instantaneous ( Unbalanced) Overvoltage Test 瞬時(不平衡)過電圧試験	7/13/2020	Pass
3.2.11	Transition confirmation test of active islanding detection mode アクティブな単独運転検出モードの遷移確認テスト	9/07/2020	Pass
3.2.12	Reactive Power oscillation suppression confirmation Test	8/11/2020	Pass

	無効電力発振抑制確認試験		
4.3	Power Factor Operation Test 運転力率試験	7/23/2020	Pass
4.4	Output Harmonic Current Test 出力高調波電流試験	7/23/2020	Pass
4.5	Leakage Current Test 漏洩電流試験	7/10/2020	Pass
4.6	Power Factor operation test 力率一定運転	7/10/2020	Pass
4.8	Soft Start Function Test ソフトスタート機能試験	7/10/2020	Pass
5.1	Rapid Input Power Change and Rapid Load Change Test 入力電力急変試験及び負荷急変試験	09/04/2020	Pass
6.3	Instantaneous Voltage Drop Test 瞬時電圧低下試験（FRT 試験）	8/11/2020	Pass
6.4	Frequency Fluctuation Test (FRT) 周波数変動試験（FRT 試験）	2/05/2020	Pass
12.1	Switching to Backup operation mode 自立運転切換試験	07/30/2020	Pass
12.2	Automatic switching to backup mode 自立運転自動切換試験	07/30/2020	Pass
12.4	Independent disconnection signal disruption test 自立解列信号途絶試験	09/04/2020	Pass

### 3.1.3 DC Injection Test 直流分検出試験

Test Parameters 設定値

DC Injection	Vac	Prated	Irated	Threshold 検出値	Detection Time 検出時間
	101(L-N)	4800W	24A	0.24A	0.5s

Test Result 試験結果：

Phase AB

Actual Set point (A) (1% Irated) 直流分電流	0.24	Pass / Fail 判定
Output Power (kW) (100%) パワコン出力	4800	
Measured Value (A) 計測値	0.190	Pass
Remarks 備考		
Actual Set point (s) (jump from 0% to 110% of DC set point) 直流分電流	0.5s	
Time to Trip (s) Gate block stop 検出時限 (GB 時限)	0.0456	Pass
Time to open the relay (s) 検出時限 (RY 解列時限)	0.0456	Pass
Remarks 備考		

Scope Channel Description:

Channel 1\_1: Phase A Voltage

Channel 1\_2: Phase A Current

Channel 2\_1: Phase B Voltage

Channel 2\_2: Phase B Current

PINV\_RLY0: Relay Signal

GT\_DRV0: Gate Signal

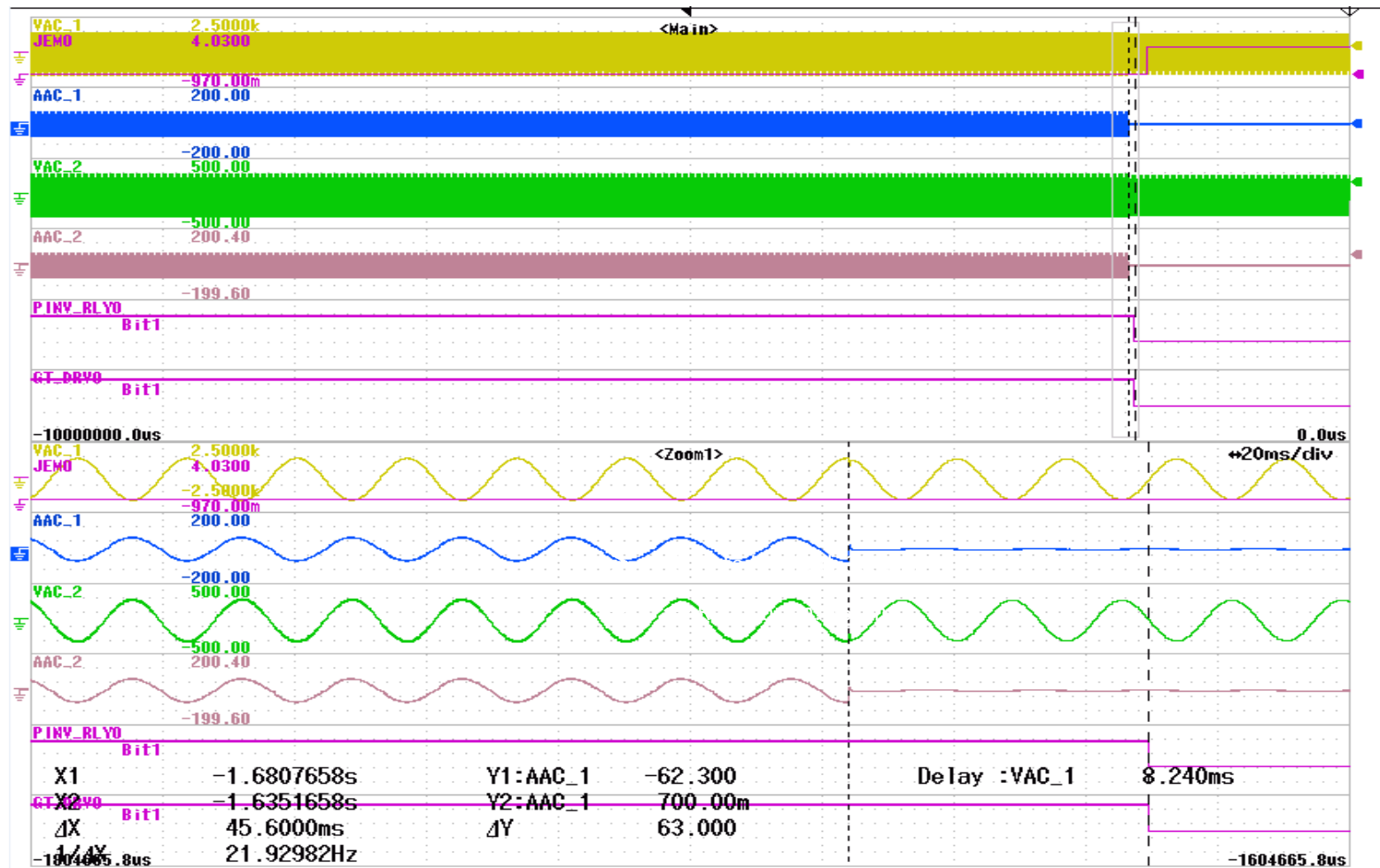


Figure 3.1.3 DC Injection (Time to open Gate Block= 45.6 ms)



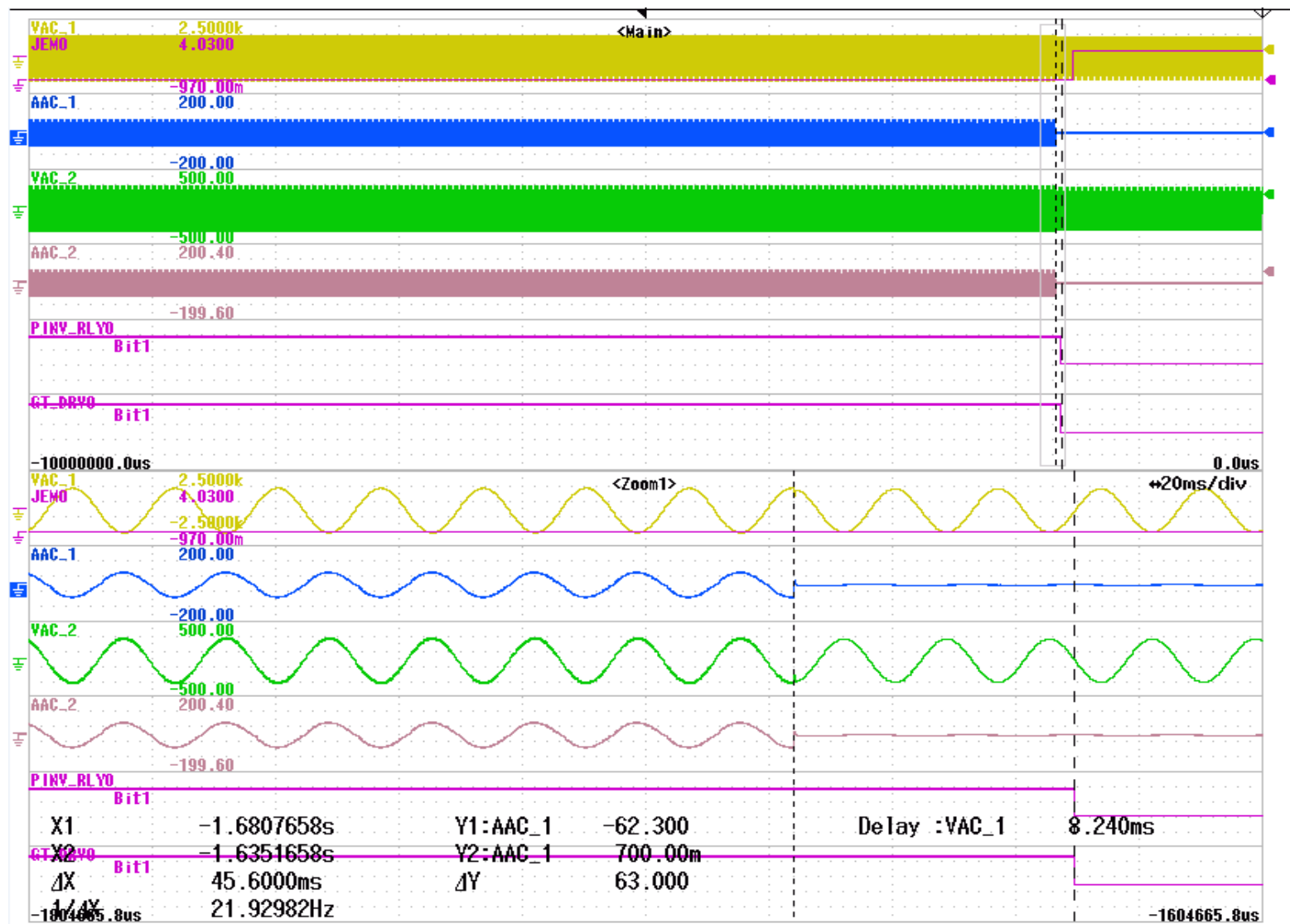


Figure 3.1.3 DC Injection (Time to Open Relay Signal=45.6 ms)

### 3.2.1 Over Voltage And Under Voltage Test 交流過電圧及び不足電圧試験

Over Voltage Test Parameters: 過電圧設定値

	Threshold 検出値	Detection Time 時限	Re-connection Time 再並列阻止時間
OVR	121.2Vrms	1s	10s

OVR detection threshold test:

AC Voltage 交流電圧	Output Power 出力電力	Frequency 周波数	Operation Mode 動作モード	Tested Phase 試験相	Measurement (Vrms) 測定結果	Pass / Fail 判定 (121.2±2.424Vrms)	Remarks 備考
A: 115.14Vrms (95%)↑ B: 101Vrms	-4.8kW	60 Hz	Charge 充電	A	123.202	Pass	
A: 101Vrms B: 115.14Vrms (95%)↑				B	122.49	Pass	
A: 115.14Vrms (95%)↑ B: 115.14Vrms (95%)↑				AB	122.377 122.218	Pass	
A: 115.14Vrms (95%)↑ B: 101Vrms	4.8kW	60 Hz	Discharge 放電	A	119.347	Pass	
A: 101Vrms B: 115.14Vrms (95%)↑				B	120.499	Pass	
A: 115.14Vrms (95%)↑ B: 115.14Vrms (95%)↑				AB	120.093 119.999	Pass	

OVR Time Trips    OVR 検出時限確認及び再投入時間確認：

AC Voltage 交流電圧	Output Power 出力電力	Frequency 周波数	Operation Mode 動作モード	Tested Phase 試験相	Measurement			Pass / Fail 判定 <sup>1</sup> GB success <sup>2</sup> 1.0s±0.1s <sup>3</sup> more than 10s	Remarks 備考
					Gate Block (s) <sup>1</sup> GB 時限	Relay open time (s) <sup>2</sup> Ry 解列時限	Recon time (s) <sup>3</sup> 再並列阻止時間		
AB: 101Vrms →111.1Vrms (110%)↑	-4.8kW	60 Hz	Charge 充電	AB	1.046	1.046	12.398	Pass	Figure 3.2.1.1-3.2.1.3
AB: 101Vrms →111.1Vrms (110%)↑	4.8kW		Discharge 放電	AB	1.070	1.070	12.446	Pass	

Scope Channel Description:

Channel 1\_1: Phase A Current

Channel 1\_2: Phase A Voltage

Channel 2\_1: Phase B Current

Channel 2\_2: Phase B Voltage

PINV\_RLY: Relay Signal

GT\_DRV: Gate Signal

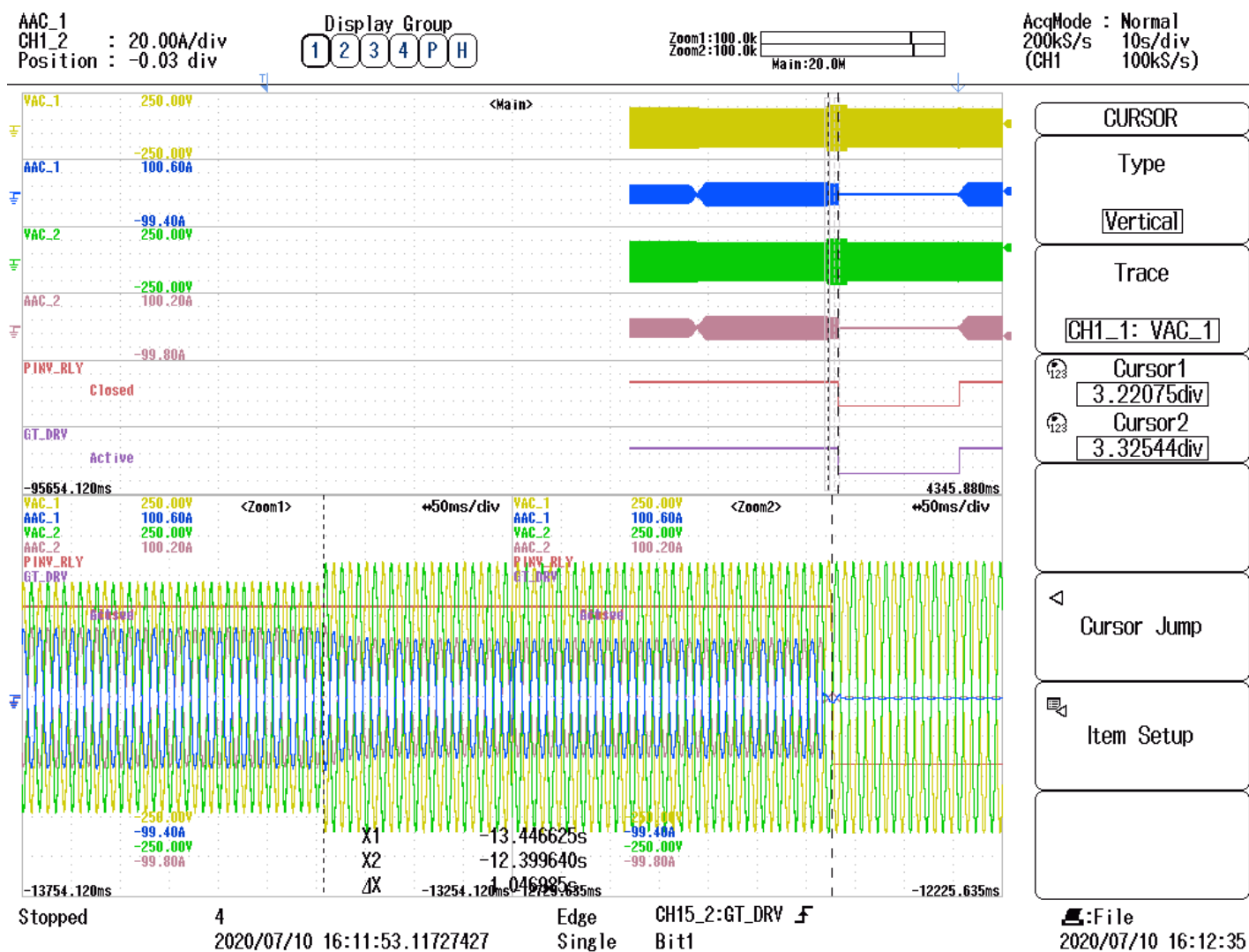


Figure 3.2.1.1 OVR Gate Block time = 1.046 sec (AB: 101Vrms → 127.26Vrms)

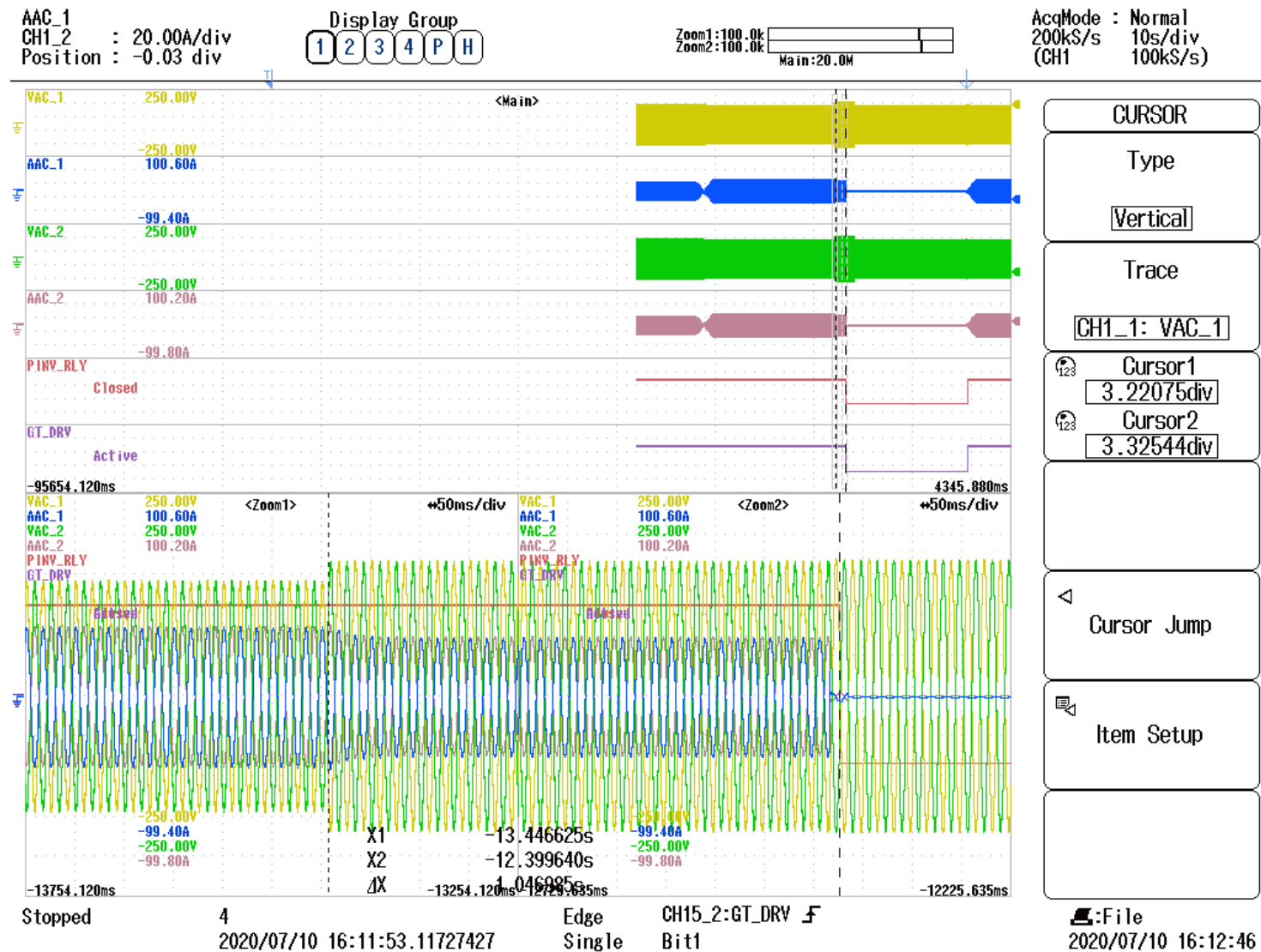


Figure 3.2.1.2 OVR Relay Open Time = 1.046 sec (AB: 101Vrms → 127.26Vrms)



## Under Voltage Test Parameters 不足電圧設定値

	Threshold 検出値	Detection Time 検出時限	Re-connection Time 再並列阻止時間
UVR	80.8Vrms	1s	10s

UVR Default detection threshold test UVR 検出レベル確認:

AC Voltage 交流電圧	Output Power 出力電力	Frequency 周波数	Operation Mode 動作モード	Tested Phase 試験相	Measurement (Vrms) 試験結果	Pass / Fail (80.8±1.616Vrms) 判定	Remarks 備考
A: 84.84Vrms (105%)↓ B: 101Vrms	-4.8kW	60 Hz	Charge	A	80.669	Pass	
A: 101Vrms B: 84.84Vrms (105%)↓				B	81.544	Pass	
A: 84.84Vrms (105%)↓ B: 84.84Vrms (105%)↓				AB	80.406 80.16	Pass	
A: 84.84Vrms (105%)↓ B: 101Vrms	4.8kW	60 Hz	Discharge	A	79.486	Pass	
A: 101Vrms B: 84.84Vrms (105%)↓				B	81.429	Pass	
A: 84.84Vrms (105%)↓ B: 84.84Vrms (105%)↓				AB	81.999 82.159	Pass	



UVR Time Trips      UVR 検出時限確認及び再投入時間確認：

AC Voltage 交流電圧	Output Power 出力電力	Frequency 周波数	Operation Mode 動作モード	Tested Phase 試験相	Measurement			Pass / Fail 判定 <sup>1</sup> GB success <sup>2</sup> 1.0s±0.1s <sup>3</sup> more than 10s	Remarks 備考
					Gate Block (s) <sup>1</sup> GB 時限	Relay open time (s) <sup>2</sup> Ry 解列時限	Recon time (s) <sup>3</sup> 再並列阻止時間		
AB:101Vrms→76.76 Vrms(95%)↓	-4.8 kW	60 Hz	Charge	AB	1.063	1.063	12.298	Pass	Figure 3.2.1.4-3.2.1.6
AB:101Vrms→193.04 Vrms(95%)↓	4.8 kW		Discharge	AB	1.098	1.098	12.299	Pass	

Scope Channel Description:

Channel 1\_1: Phase A Current

Channel 1\_2: Phase A Voltage

Channel 2\_1: Phase B Current

Channel 2\_2: Phase B Voltage

Relay: Relay Signal

Gate drive: Gate Signal

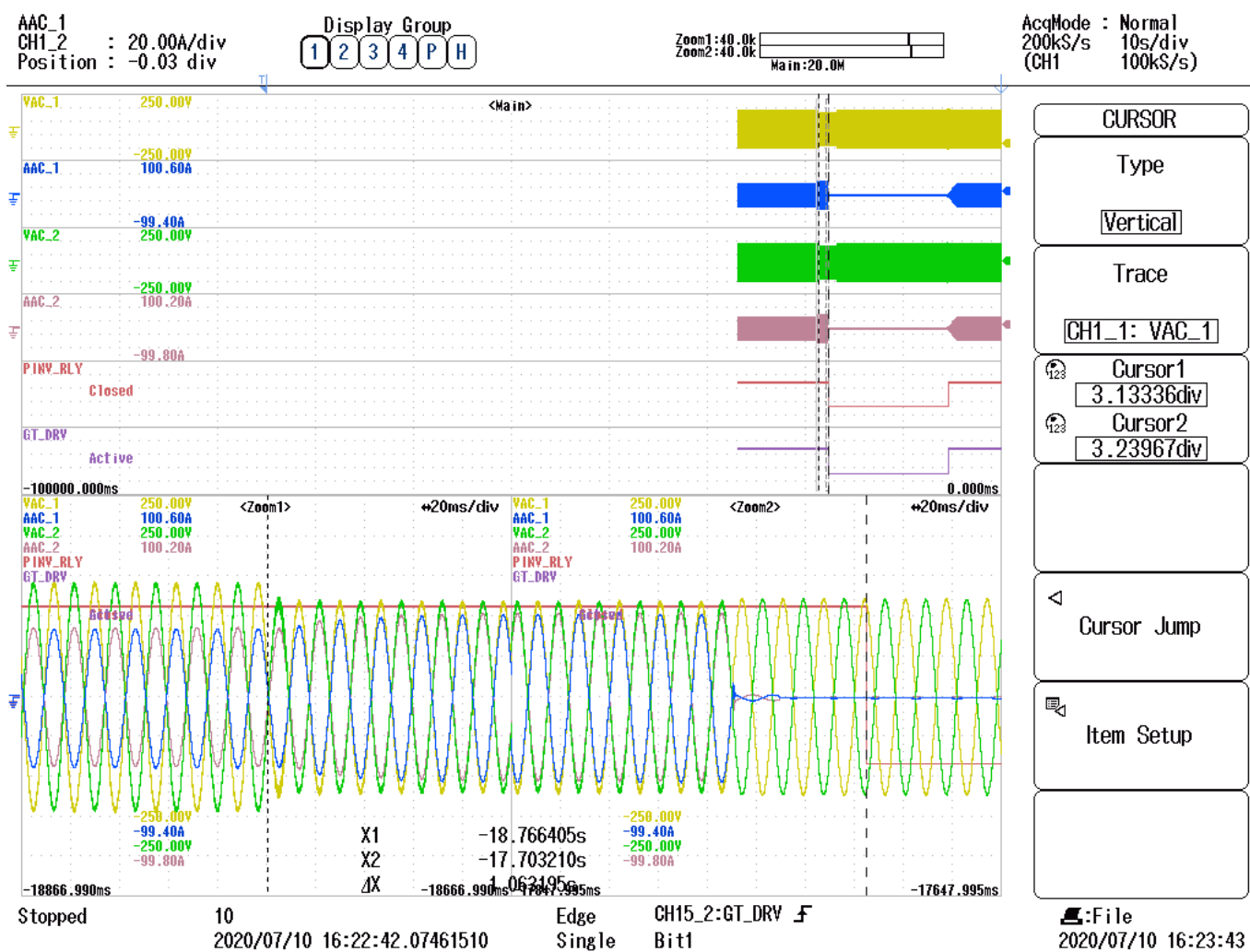
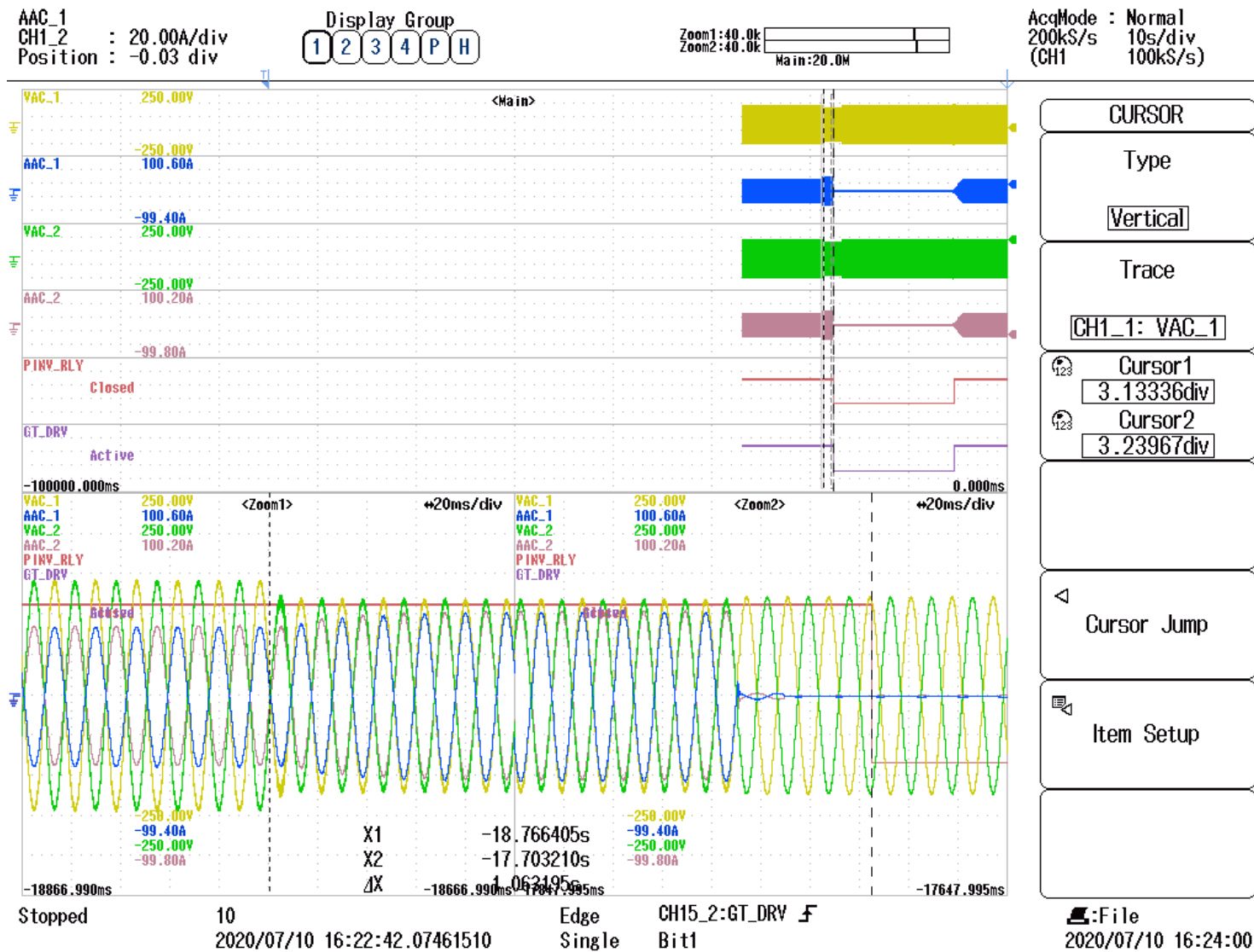


Figure 3.2.1.4 UVR Gate Block time = 1.063 sec (AB: 101Vrms → 76.76Vrms)



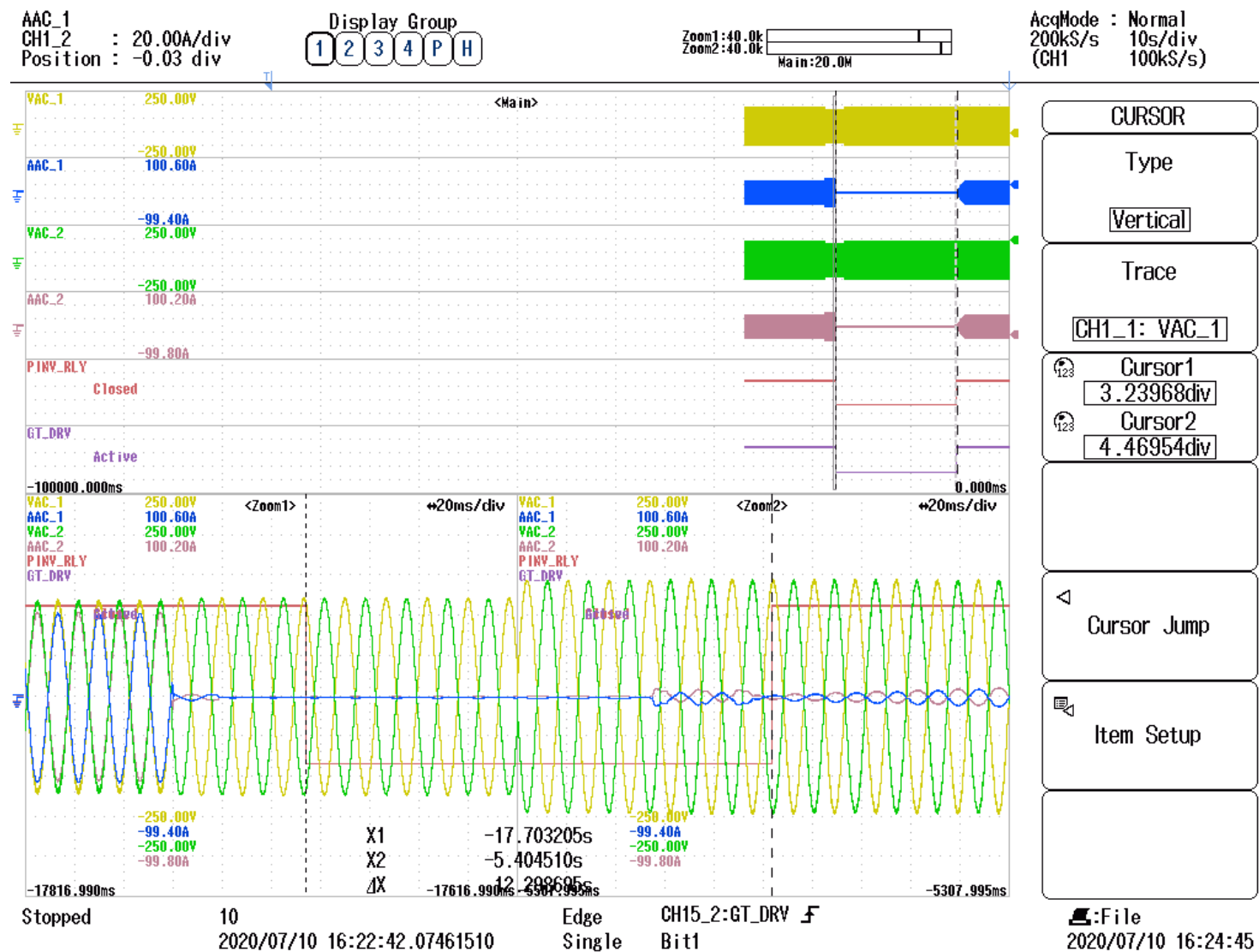


Figure 3.2.1.6 Reconnection time = 12.298 sec (AB: 76.76Vrms → 101Vrms)

### 3.2.2 Frequency Functional Test 周波数上昇及び低下試験

#### Over Frequency Test 周波数上昇試験結果

Parameter 設定値:

	Threshold 検出値	Detection Time 検出時限	Reconnect time 再並列阻止時間
OFR	61.8 Hz	1s	10s

OFR Detection Threshold Test:

AC Voltage 交流電圧	Output Power 出力電力	Frequency 周波数	Operation Mode 動作モード	Tested Phase 試験相	Measurement 測定結果	Pass / Fail 判定 (61.8±0.1 Hz)	Remarks 備考
Phase A: 101Vrms Phase B: 101Vrms	- 4.8kW	61Hz↑	Charge	AB	61.81	Pass	
	4.8kW		Discharge	AB	61.89	Pass	

OFR trip time:

AC Voltage 交流電圧	Output Power 出力電力	Frequency 周波数	Operation Mode 動作モード	Tested Phase 試験相	Measurement			Pass / Fail 判定 <sup>1</sup> GB success <sup>2</sup> 1.0s±0.1s <sup>3</sup> more than 10s	Remarks 備考
					Gate Block (s) <sup>1</sup> GB 時限	Relay open time (s) <sup>2</sup> Ry 解列時限	Recon time (s) <sup>3</sup> 再並列阻止時間		
Phase A: 101Vrms Phase B: 101Vrms	- 4.8kW	60.0Hz →64.89(105%)	Charge	AB	1.026	1.04	11.47	Pass	Figure 3.2.2.1-3.2.2.3
	4.8kW		Discharge	AB	1.08	1.088	11.8	Pass	

Scope Channel Description:

Channel 1\_1: Phase A Current

Channel 1\_2: Phase A Voltage

Channel 2\_1: Phase B Current

Channel 2\_2: Phase B Voltage

Relay: Relay Signal

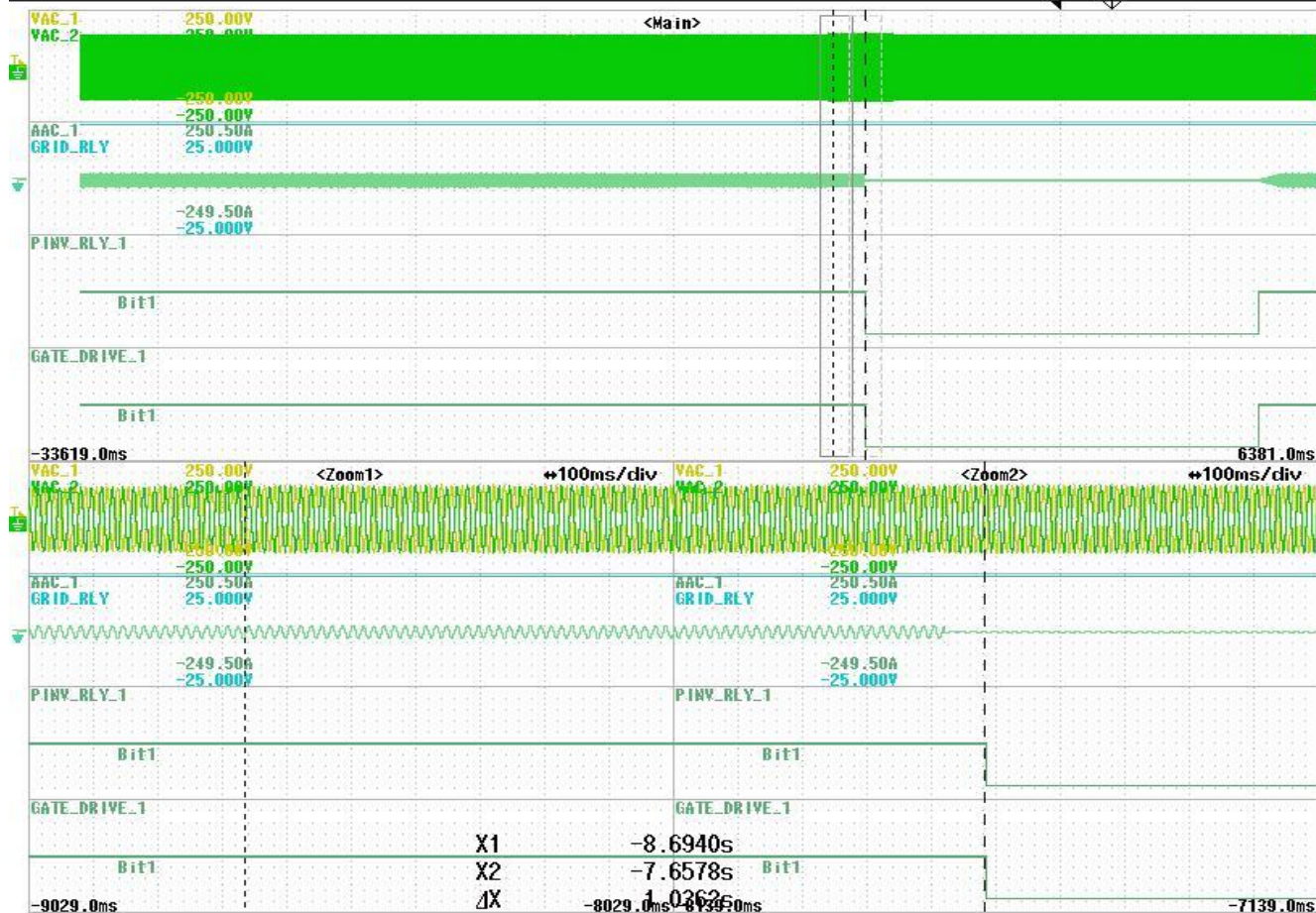
Gate drive: Gate Signal

AAC\_1  
CH1\_2 : 50.00A/div  
Position : -0.01 div

Display Group  
1 2 3 4 P H

Zoom1:5.0k  
Zoom2:5.0k  
Main:200.0k

AcqMode : Normal  
5kS/s 4s/div  
(CH1 1kS/s)



CURSOR

Type  
Vertical

Trace  
CH5\_1

Cursor1  
1.2313div

Cursor2  
1.4904div

Cursor Jump

Item Setup

Stopped

24  
2020/01/31 15:05:29.85560427

Edge  
Single  
0.00V

CH1\_1:VAC\_1

File  
2020/01/31 15:05:52

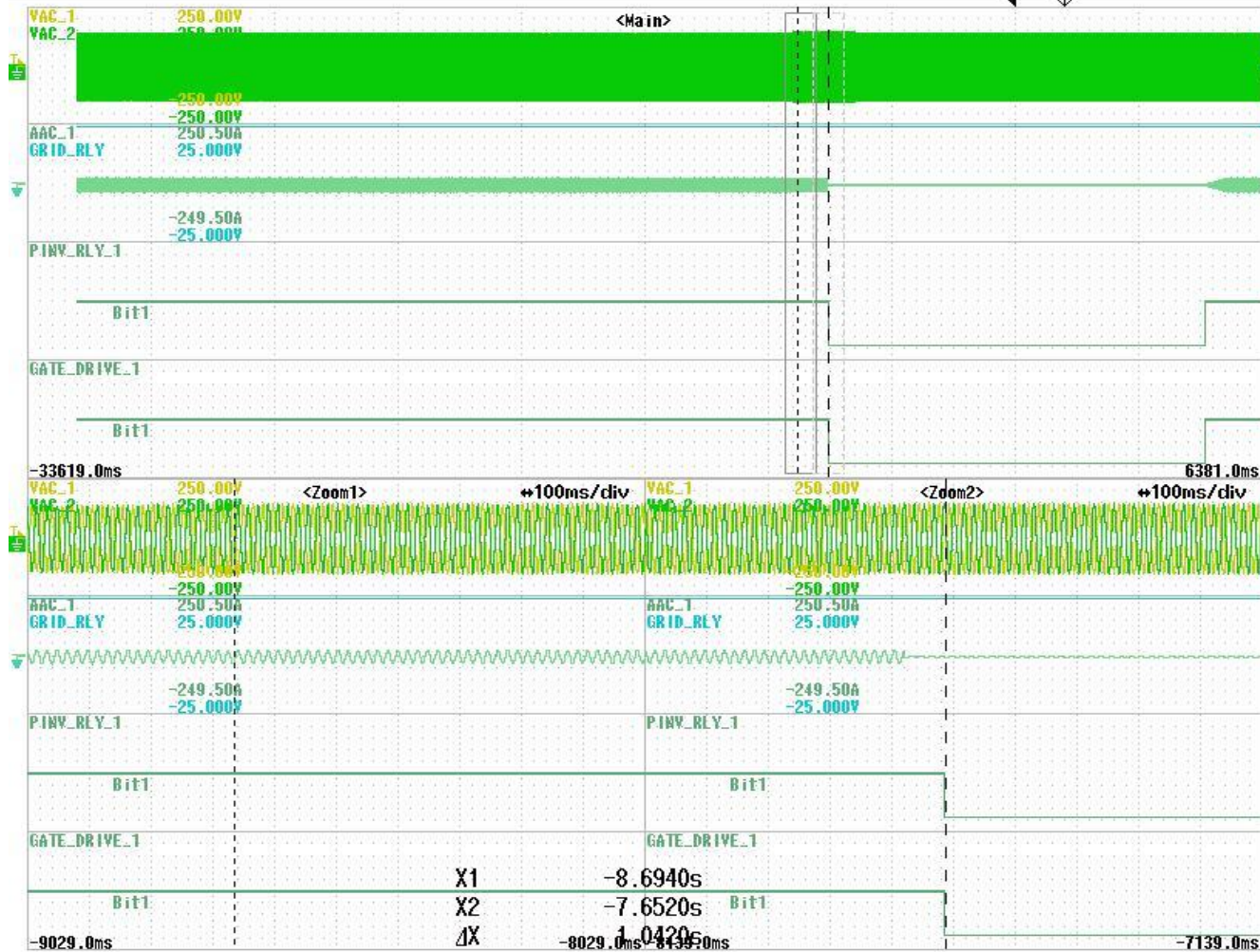
Figure 3.2.2.1 OFR Gate block time = 1.026 sec (60.0Hz → 64.89Hz)

AAC\_1  
CH1\_2 : 50.00A/div  
Position : -0.01 div

Display Group  
1 2 3 4 P H

Zoom1:5.0k  
Zoom2:5.0k  
Main:200.0k

AcqMode : Normal  
5kS/s 4s/div  
(CH1 1kS/s)



CURSOR

Type

Vertical

Trace

CH5\_1



Cursor1

1.2313div



Cursor2

1.4918div



Cursor Jump



Item Setup

Stopped

24

2020/01/31 15:05:29.85560427

Edge

Single

CH1\_1:VAC\_1

0.00V

File

2020/01/31 15:06:11

Figure 3.2.2.2 OFR Relay open time = 1.04 sec (60.0Hz → 64.89Hz)

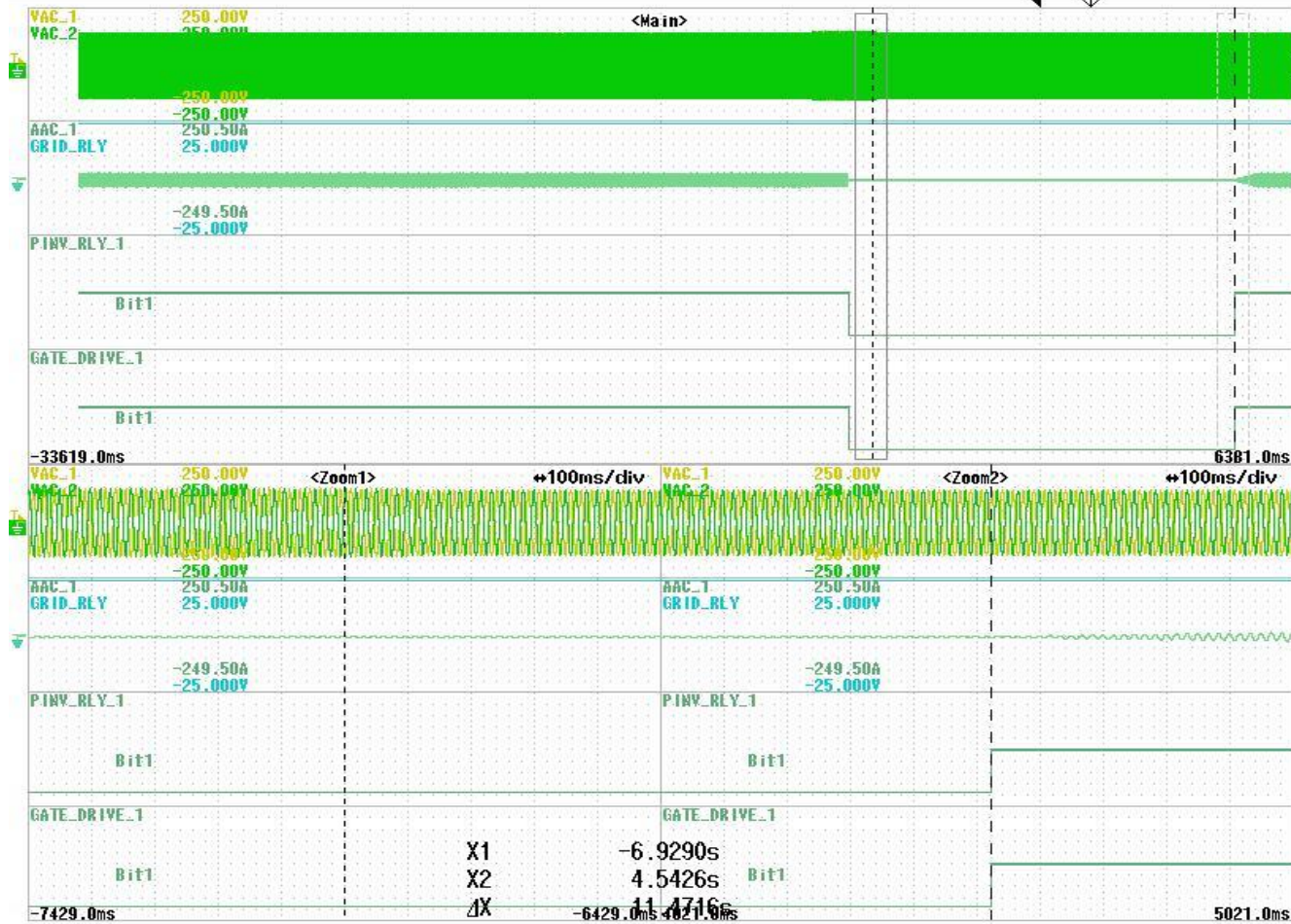


AAC\_1  
CH1\_2 : 50.00A/div  
Position : -0.01 div

Display Group  
1 2 3 4 P H

Zoom1:5.0k  
Zoom2:5.0k  
Main:200.0k

AcqMode : Normal  
5kS/s 4s/div  
(CH1 1kS/s)



CURSOR

Type

Vertical

Trace

CH5\_1

123

Cursor1

1.6726div

123

Cursor2

4.5405div

△

Cursor Jump

📄

Item Setup

📁:File

2020/01/31 15:07:17

Figure 3.2.2.3 Reconnection time = 11.47 sec (64.89Hz → 60Hz)

## Under Frequency Test 周波数低下試験結果

Parameter 設定値：

	Threshold	Detection Time	Reconnect time
UFR	58.2 Hz	1s	10s

UFR Detection Threshold Test 検出レベル確認：

AC Voltage 交流電圧	Output Power 出力電力	Frequency 周波数	Operation Mode 動作モード	Tested Phase 試験相	Measurement 測定結果	Pass / Fail 判定 (58.2±0.1 Hz)	Remarks 備考
Phase A: 101Vrms Phase B: 101Vrms	- 4.8kW	59Hz ↓	Charge	AB	58.17	Pass	
	4.8kW		Discharge	AB	58.19	Pass	

UFR trip time 検出時限確認及び再投入時間確認：

AC Voltage 交流電圧	Output Power 出力電力	Frequency 周波数	Operation Mode 動作モード	Tested Phase 試験相	Measurement			Pass / Fail 判定 <sup>1</sup> GB success <sup>2</sup> 1.0s±0.1s <sup>3</sup> more than 10s	Remarks 備考
					Gate Block (s) <sup>1</sup> GB 時限	Relay open time (s) <sup>2</sup> Ry 解列時限	Recon time (s) <sup>3</sup> 再並列阻止時間		
Phase A: 101Vrms Phase B: 101Vrms	- 4.8kW	60.0Hz → 55.29Hz↓	Charge	AB	1.02	1.03	11.51	Pass	Figure 3.2.2.4-3.2.2.6
	4.8kW		Discharge	AB	1	1.0	11.82	Pass	

Scope Channel Description:

Channel 1\_1: Phase A Current

Channel 1\_2: Phase A Voltage

Channel 2\_1: Phase B Current

Channel 2\_2: Phase B Voltage

PINV\_RLY\_1: Relay Signal

Gate\_Drive\_1: Gate Signal

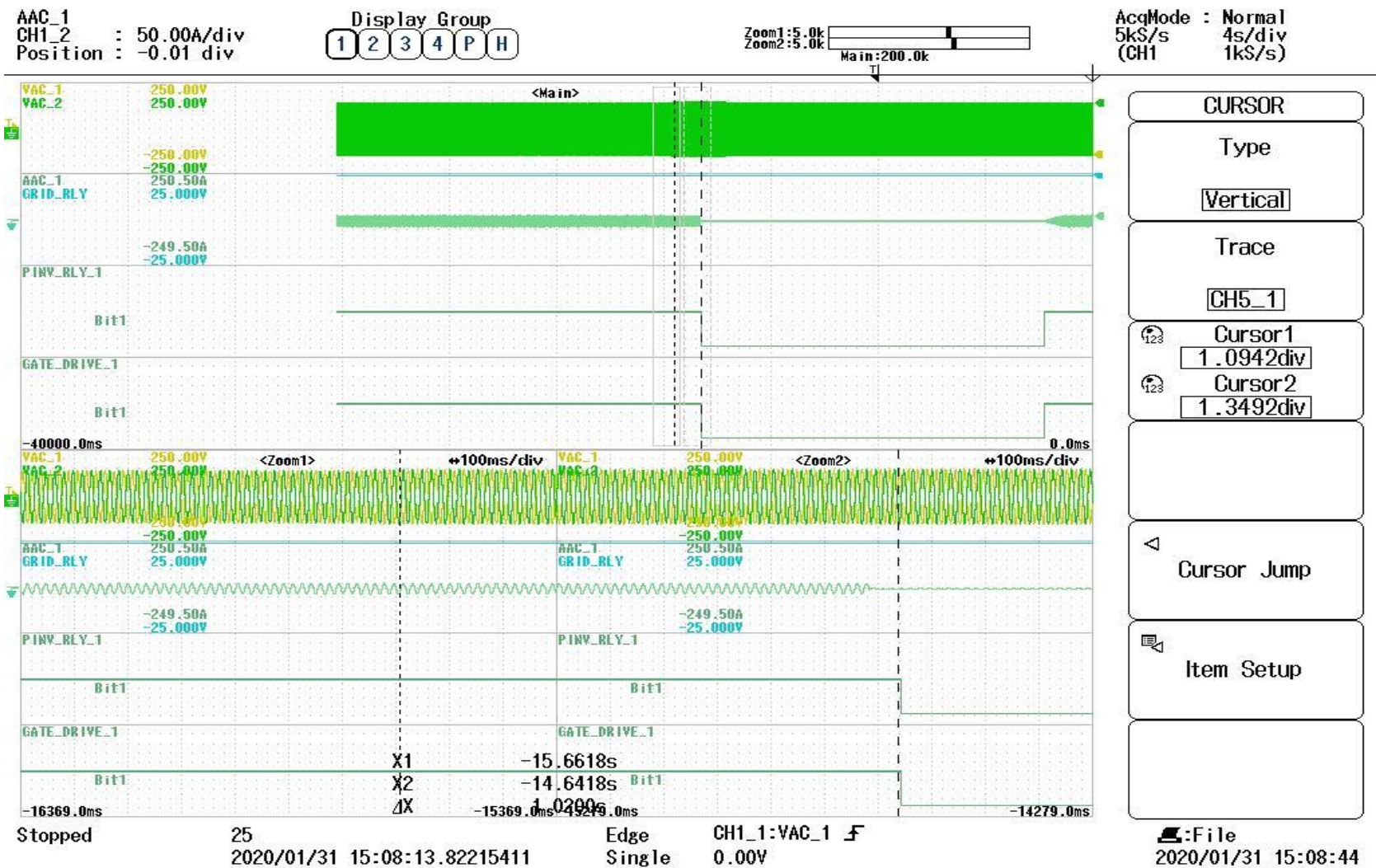


Figure 3.2.2.4 UFR Gate Block time = 1.02 sec (60.0Hz → 55.29Hz)

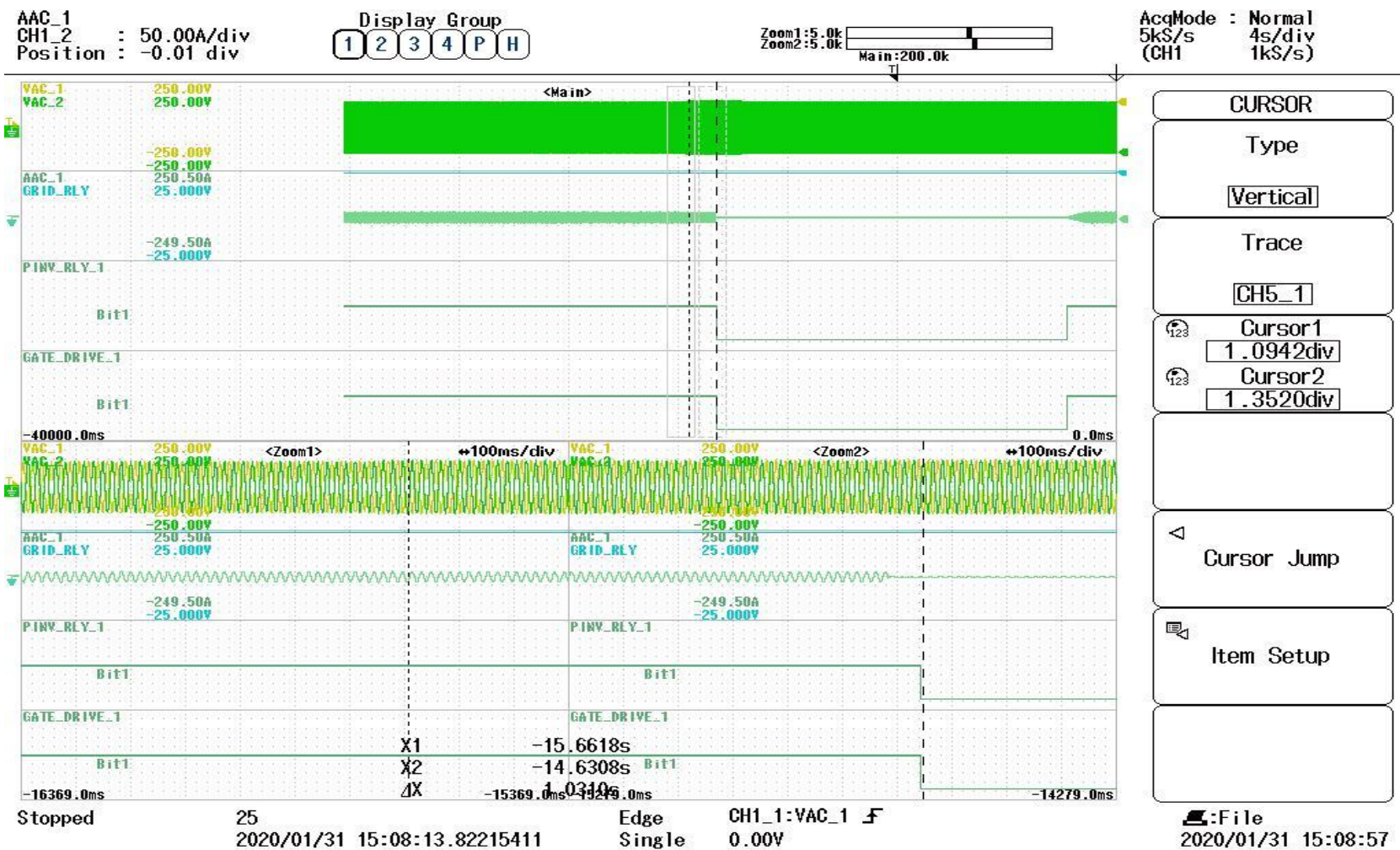


Figure 3.2.2.5 UFR Relay open time = 1.03 sec (60.0Hz → 55.29Hz)

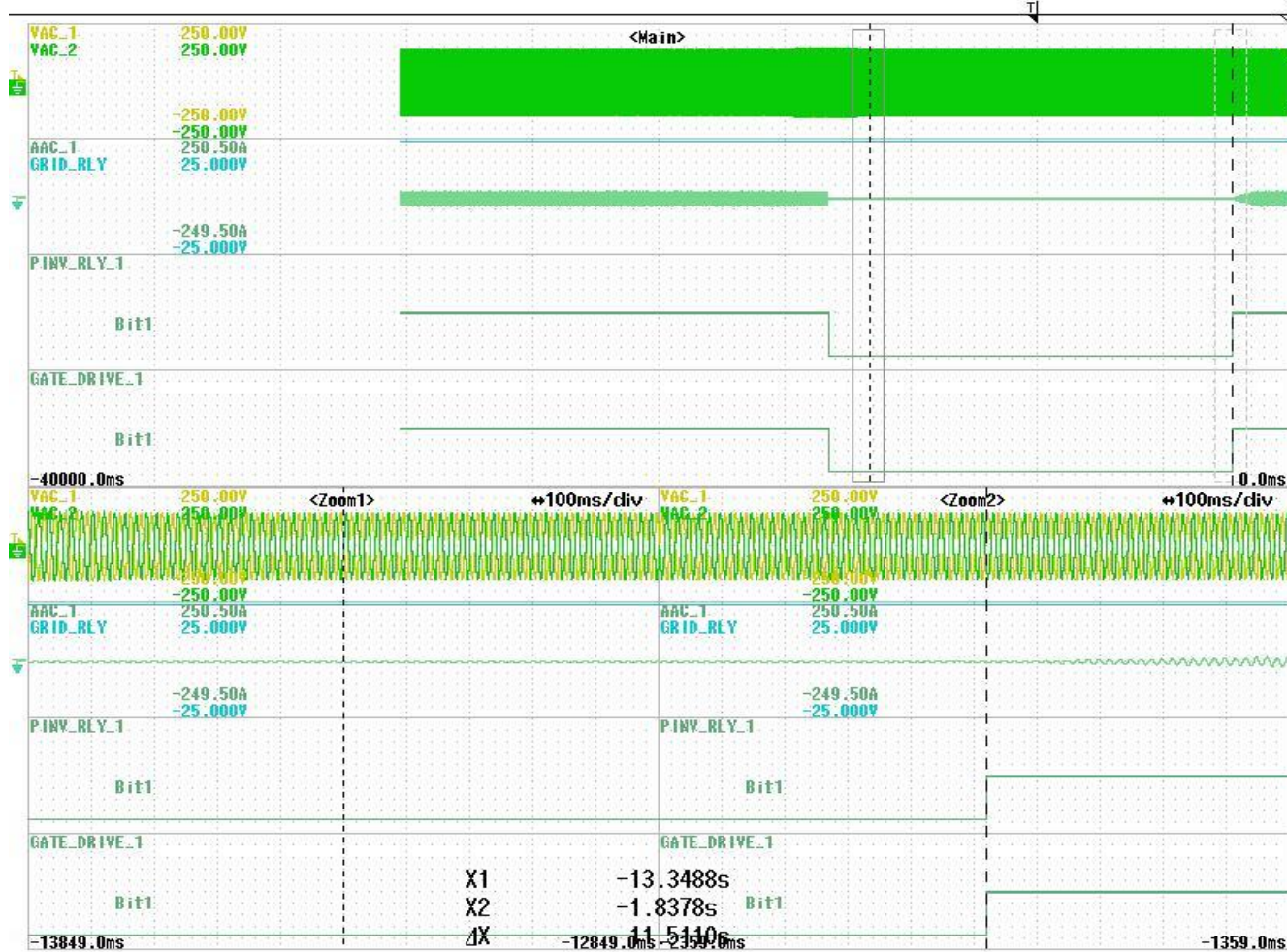


AAC\_1  
CH1\_2 : 50.00A/div  
Position : -0.01 div

Display Group  
1 2 3 4 P H

Zoom1:5.0k  
Zoom2:5.0k  
Main:200.0k

AcqMode : Normal  
5kS/s 4s/div  
(CH1 1kS/s)



Stopped

25  
2020/01/31 15:08:13.82215411

Edge  
Single

CH1\_1:VAC\_1 F  
0.00V

File  
2020/01/31 15:09:29

CURSOR

Type

Vertical

Trace

CH5\_1

Cursor1  
1.6725div

Cursor2  
4.5502div

Cursor Jump

Item Setup

Figure 3.2.2.6 Reconnection time = 11.51 sec (55.29Hz → 60Hz)

### 3.2.3 Reverse Power Prevention 逆潮流防止試験

EUT set power (% of EUT name plate power rating)	Load setting (% of EUT name plate power rating)	Voltage (V)	Frequency (Hz)	EUT Power (W)	EUT Power (% of EUT nameplate)	EUT Current (A)	EUT Current (% of EUT nameplate)	Time (s) 判定基準 (<0.5s)	Remarks
50	50→75	102.500	59.993	3609.100	0.752	17.658	0.736	0.4018	Fig: 3.2.3.1
50	75→50	102.045	60.000	2403.800	0.501	11.837	0.493	0.3014	
50	50→25	101.890	60.001	1187.800	0.247	5.930	0.247	0.402--	Fig: 3.2.3.2
50	25→50	102.014	60.002	2423.700	0.505	11.945	0.498	0.3015	



Fig: 3.2.3.1 Load follwing from 50% to 75%



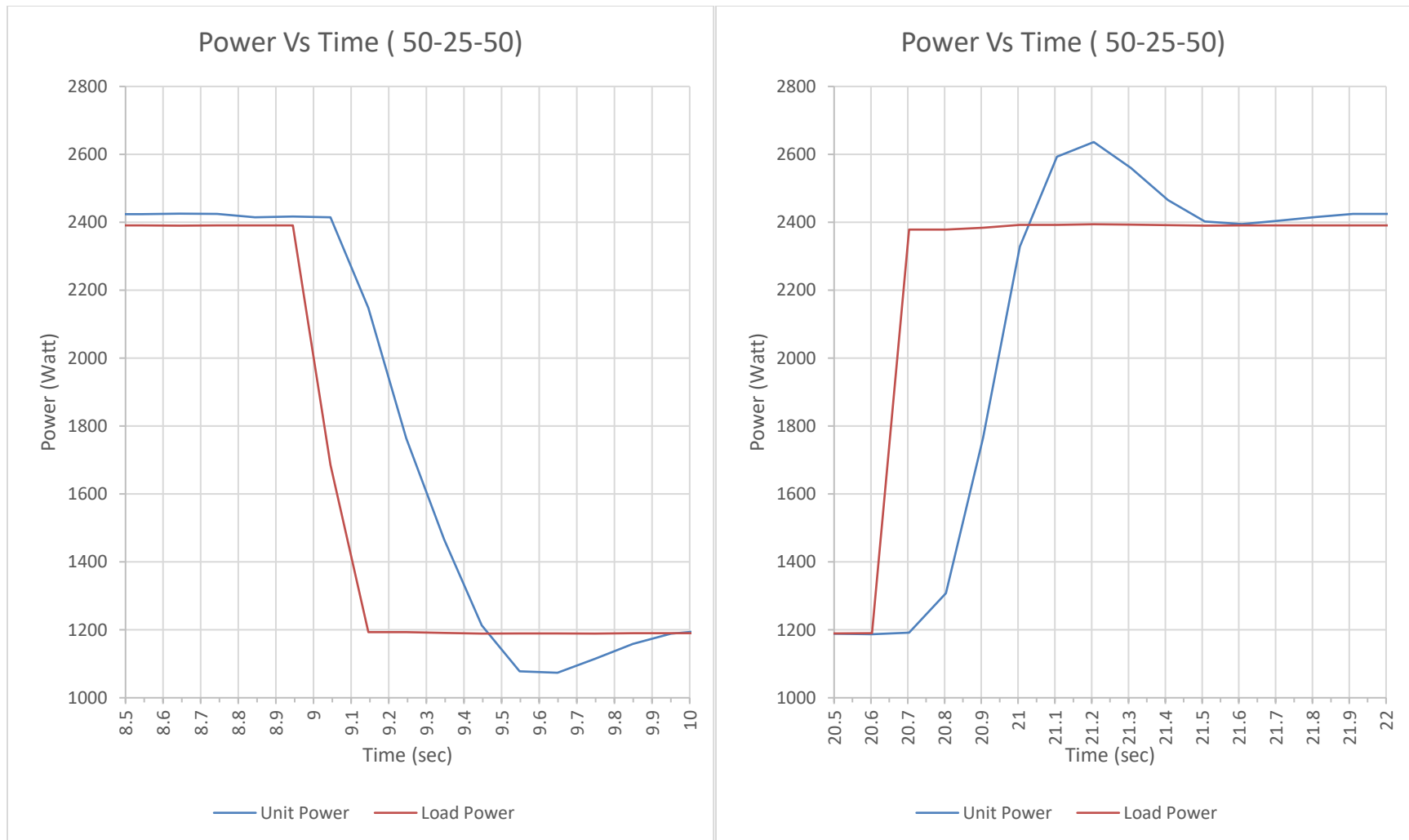


Fig: 3.2.3.2 Load follwing from 50% to 25%

### 3.2.7 Anti-Islanding Detection Test 1 単独運転検出試験

Parameter 設定値: 抵抗負荷、受動

Load Condition 負荷条件	Mode of Operation 動作モード	Method of Island Detection 単独運転検出モード	Cut Off Time 検出時限	Reconnect time 再並列阻止時間
Resistive load 抵抗負荷	Discharge 放電	Passive 受動	< 0.5s	10 s

Output Power: 4.8 kW

Parameters 設定値				Frequency 周波数	Operation Mode 動作モード	Measurement Result 測定結果			Pass / Fail 1,2 <0.5s 3>10s 判定	Remarks 備考
Active Power 有効電力		Reactive Power 無効電力				Gate Block (s) <sup>1</sup> GB 時限	Relay Open (s) <sup>2</sup> Ry 解列 時限	Reconnection Time (s) <sup>3</sup> 再並列阻止時間		
10 %	480W	0%	0	60 Hz	Discharge 放電	0.483	0.483	11.596	Pass	
5%	240W	0%	0			0.48	0.48	11.492	Pass	
0%	0W	0%	0			0.468	0.468	11.49	Pass	Figure 3.2.7.1- 3.2.7.3
-5%	-240W	0%	0			0.188	0.188	11.49	Pass	
-10%	-480W	0%	0			0.1595	0.1595	11.58	Pass	

Scope Channel Description:

Channel 1\_1: Phase A Current

Channel 1\_2: Phase B Current

Channel 2\_1: Phase C Current

Channel 3\_1: Phase A Voltage

Channel 3\_2: Phase B Voltage

Channel 4\_1: Phase C Voltage

INV\_Relay: Relay Signal

PWM: Gate Signal

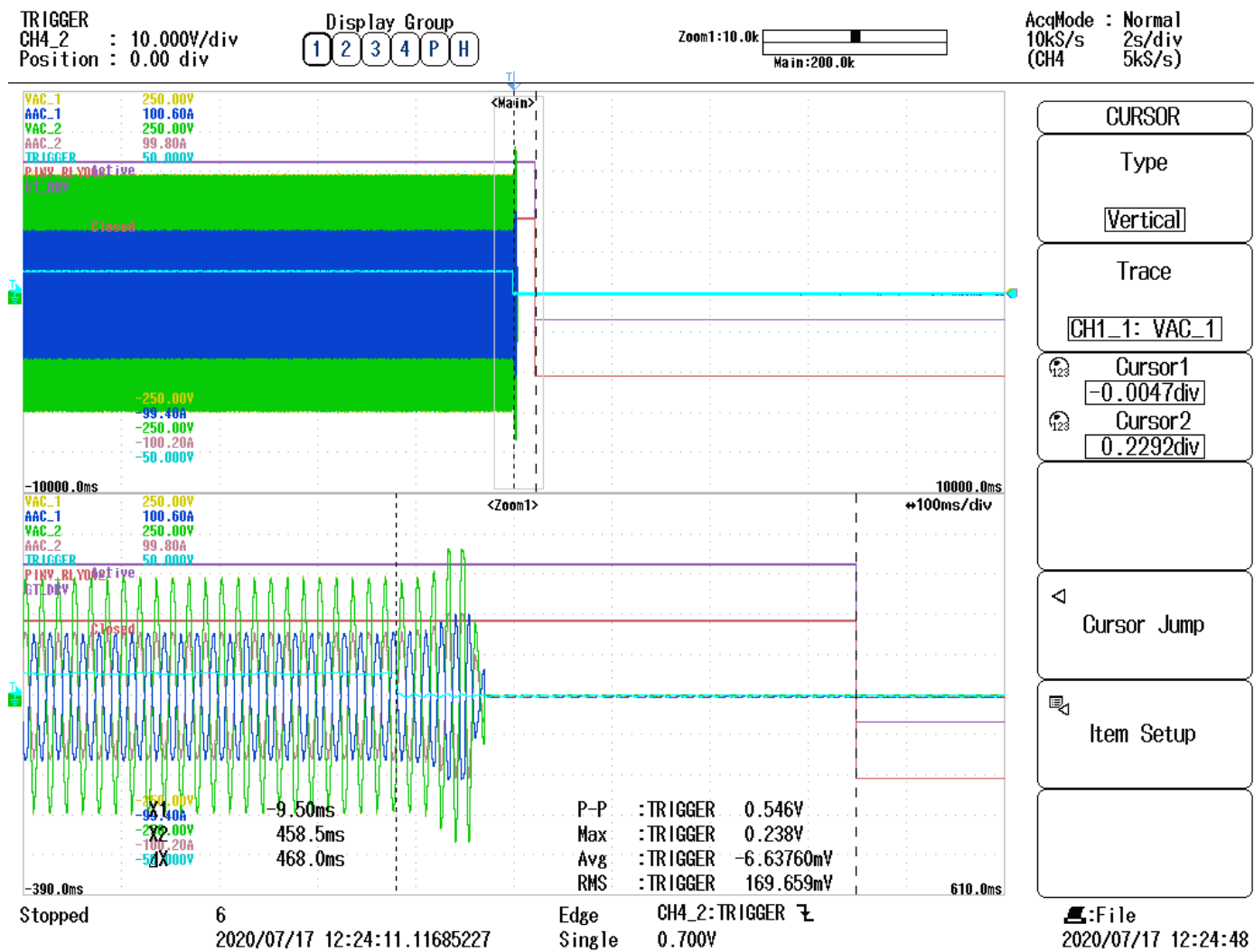


Figure 3.2.7.1 AI Gate Block Time- Passive Islanding- R 0% Resistive load condition. (0.468 sec)

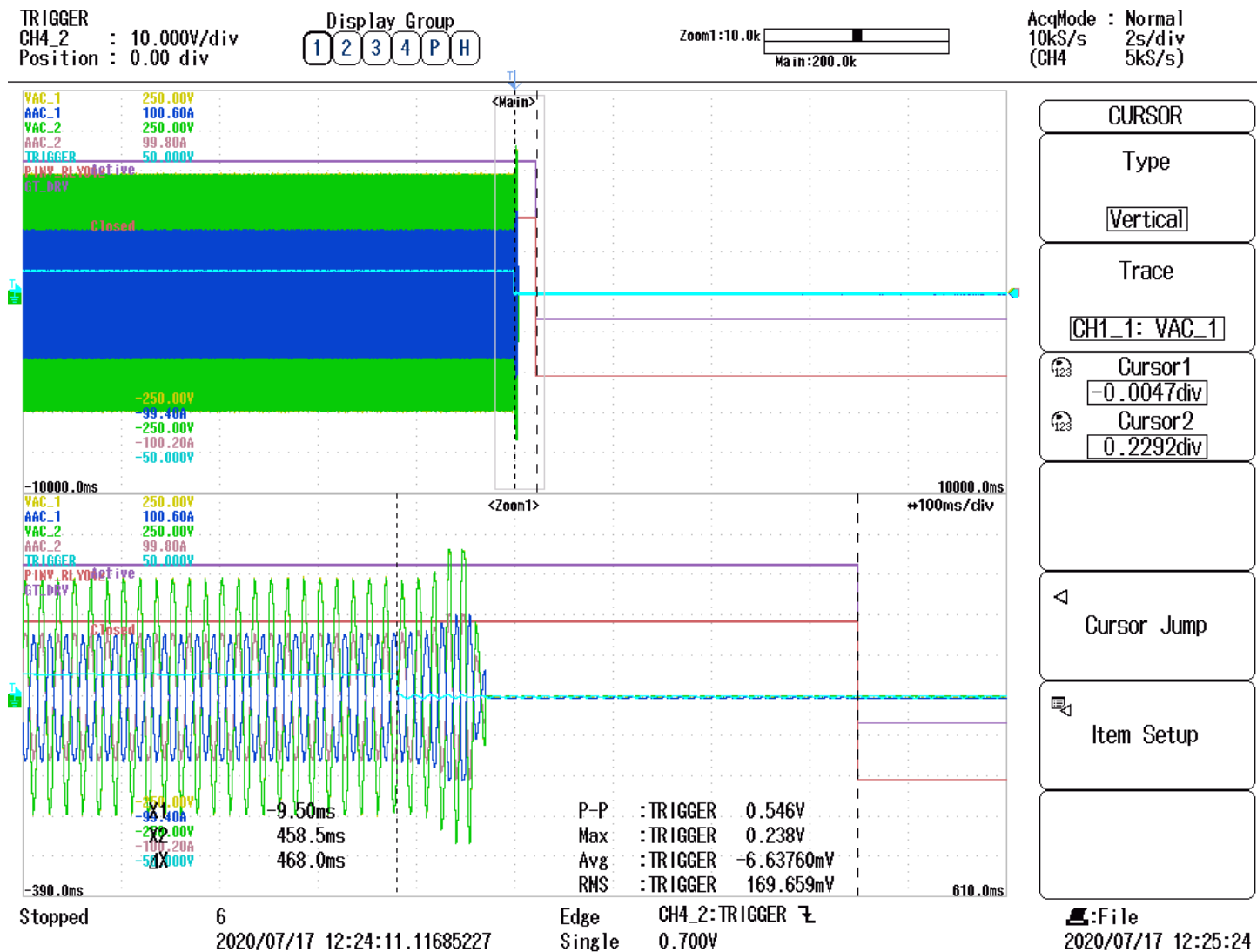


Figure: 3.2.7.2 AI Relay Open Time - Passive Islanding- R 0% Resistive load condition (0.468 sec)

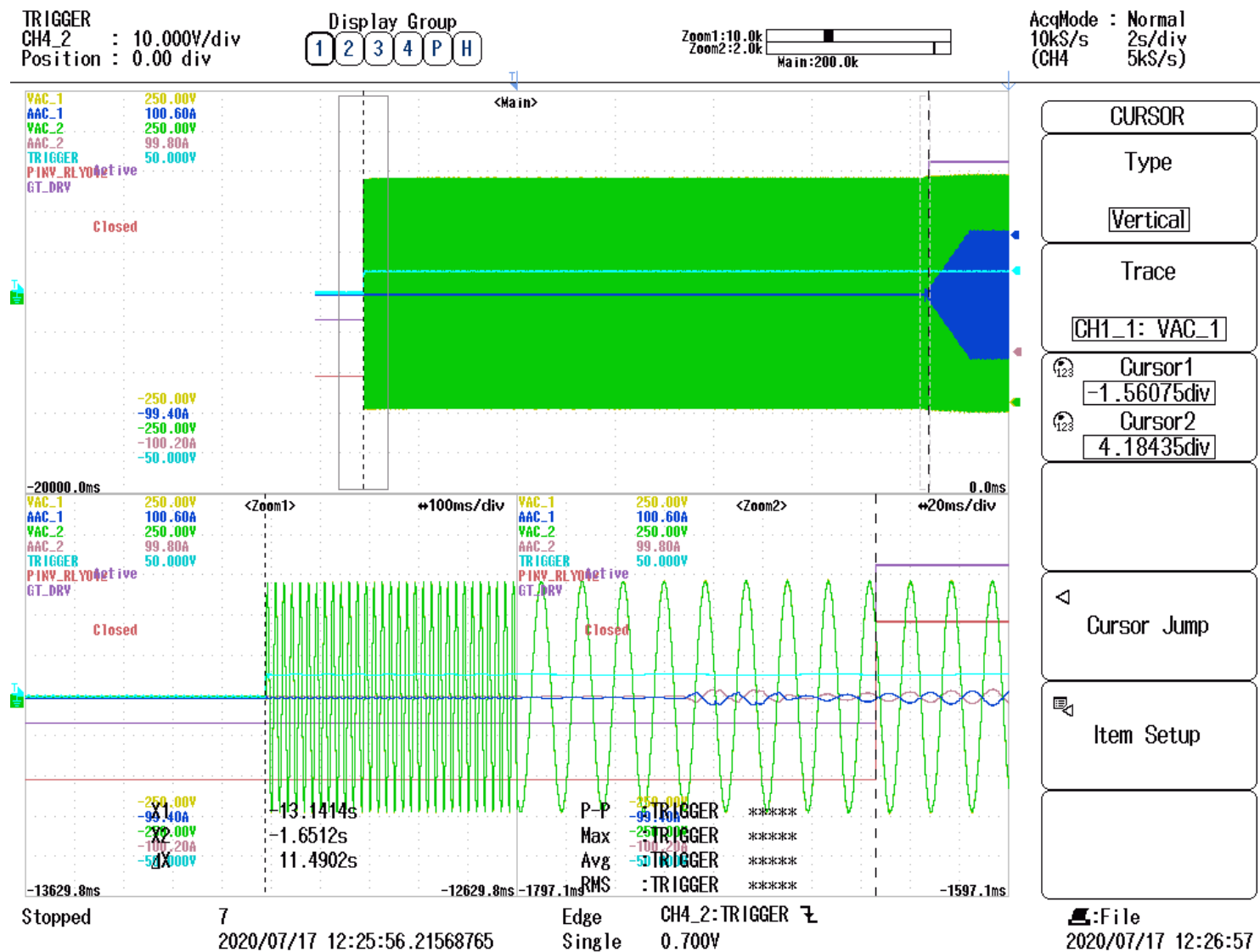


Figure 3.2.7.3 AI Reconnect time.- Passive Islanding- R 0% Resistive load condition (11.4902 sec)

Parameter 設定値: 不平衡負荷、受動

Load Condition 負荷条件	Mode of Operation 動作モード	Method of Island Detection 単独運転検出モード	Cur Off Time 検出時限	Reconnect time 再並列阻止時間
Unbalanced load 不平衡負荷	Discharge 放電	Passive 受動	< 0.5s	10 s

Output Power: 4.8 kW

Parameters 設定値				Frequency 周波数	Operation Mode 動作モード	Measurement Result 測定結果			Pass / Fail 判定 1,2 <0.5s 3>10s	Remarks 備考
Active Power 有効電力		Reactive Power 無効電力				Gate Block (s) <sup>1</sup> GB 時限	Relay Open (s) <sup>2</sup> Ry 解列 時限	Reconnection Time (s) <sup>3</sup> 再並列阻止時間		
10 %	480 W	10%	480 Var	60 Hz	Discharge 放電	0.1985	0.1985	11.511	Pass	
10 %		5%	240 Var			0.1965	0.1965	11.46	Pass	
10 %		0%	0			0.2265	0.2265	11.541	Pass	
10 %		-5%	-240 Var			0.153	0.153	11.508	Pass	
10 %		-10%	-480 Var			0.4685	0.4685	11.497	Pass	
5%	240 W	10%	480 Var			0.2	0.2	11.46	Pass	
5%		5%	240 Var			0.227	0.227	11.542	Pass	
5%		0%	0			0.2335	0.2335	11.533	Pass	
5%		-5%	-240 Var			0.216	0.216	11.52	Pass	
5%		-10%	-480 Var			0.1625	0.1625	11.534	Pass	
0%	0	10%	480 Var			0.216	0.216	11.49	Pass	
0%		5%	240 Var			0.192	0.192	11.575	Pass	
0%		0%	0			0.2165	0.2165	11.45	Pass	Figure 3.2.7.4 & 3.2.7.5
0%		-5%	-240 Var			0.192	0.192	11.509	Pass	
0%		-10%	-480 Var			0.2065	0.2065	11.518	Pass	

-5%	-240 W	10%	480 Var			0.19	0.19	11.568	Pass	
-5%		5%	240 Var			0.176	0.176	11.567	Pass	
-5%		0%	0			0.183	0.183	11.492	Pass	
-5%		-5%	-240 Var			0.224	0.224	11.587	Pass	
-5%		-10%	-480 Var			0.192	0.192	11.57	Pass	
-10%	-480 W	10%	480 Var			0.192	0.192	11.635	Pass	
-10%		5%	240 Var			0.189	0.189	11.515	Pass	
-10%		0%	0			0.206	0.206	11.502	Pass	
-10%		-5%	-240 Var			0.219	0.219	11.503	Pass	
-10%		-10%	-480 Var			0.17	0.17	11.505	Pass	

Scope Channel Description:  
Channel 1\_1: Phase A Voltage  
Channel 1\_2: Phase A Current  
Channel 2\_1: Phase B Voltage  
Channel 3\_1: Phase BCurrent  
Channel 3\_2: Phase C Voltage  
Channel 4\_1: Phase Current  
INV\_RLY1: Relay Signal  
PWM1: Gate Signal

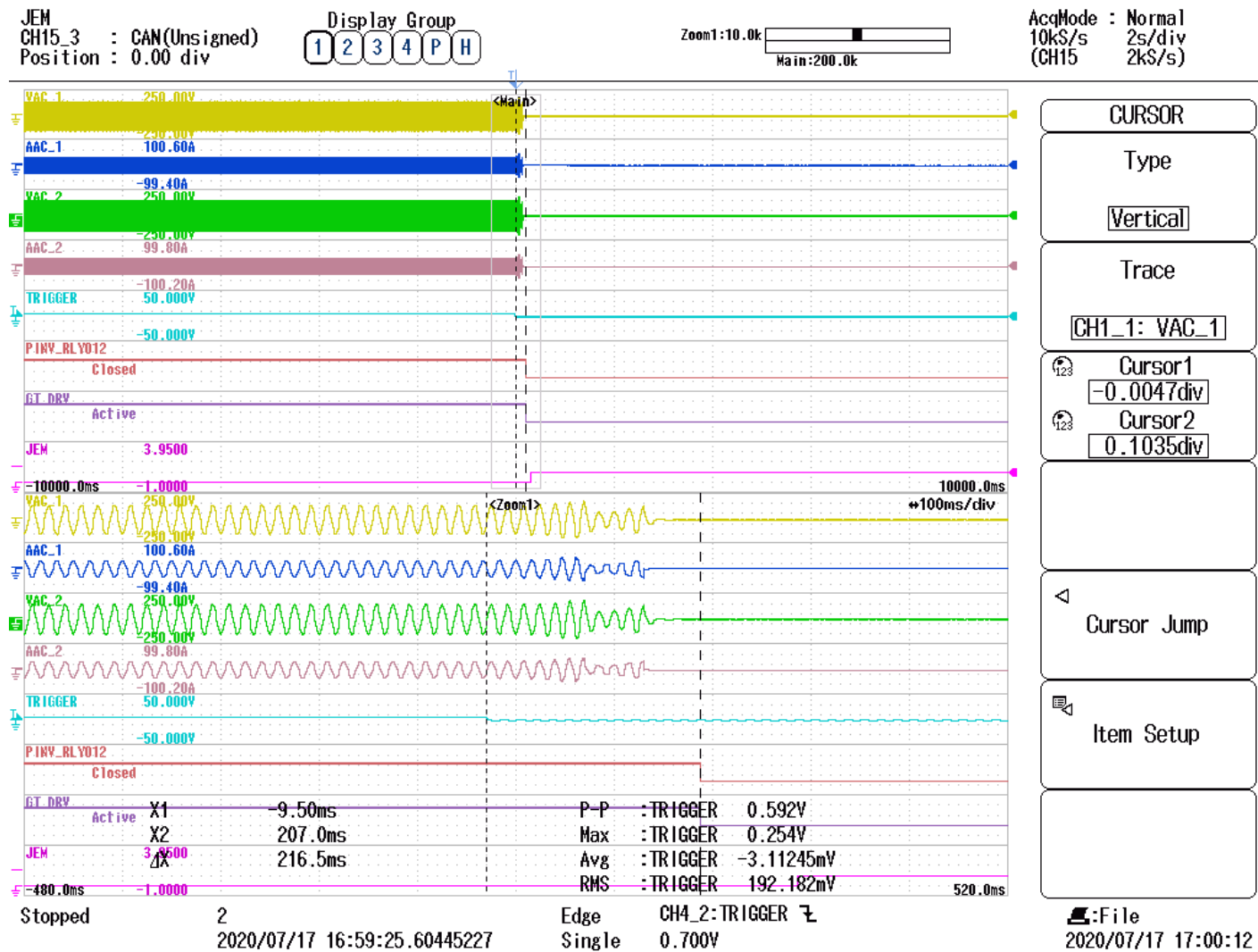


Figure 3.2.7.4 AI Gate block time- Passive Islanding- RLC 0% Unbalanced load condition (0.2165 sec)



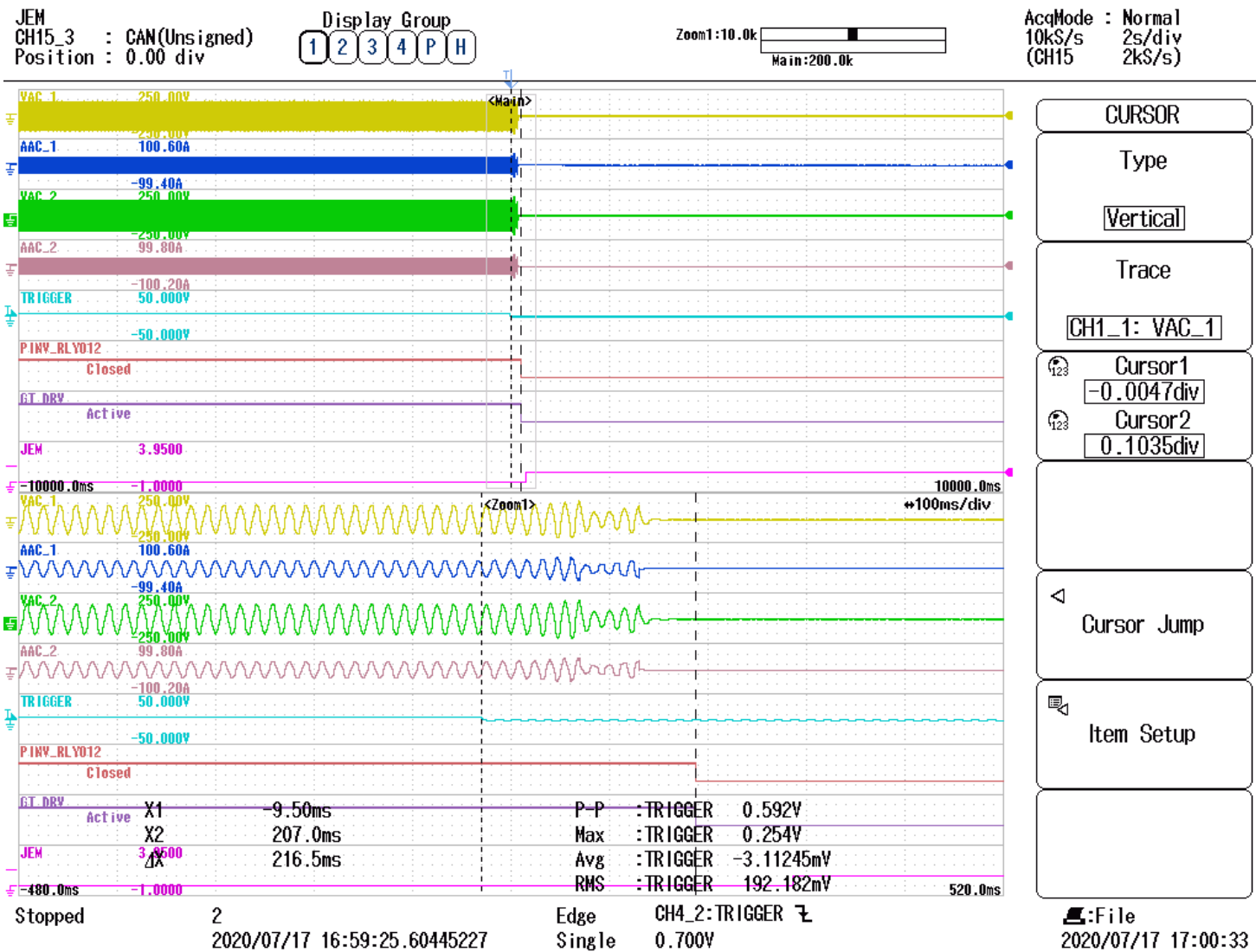


Figure: 3.2.7.5 Relay Open time- Passive Islanding- RLC 0% Unbalanced load condition (0.2165 sec)

Parameter 設定値：並行負荷、受動

Load Condition 負荷条件	Mode of Operation 動作モード	Method of Island Detection 単独運転検出モード	Cur Off Time 検出時限	Reconnect time 再並列阻止時間
Balanced load 並行負荷（回転機負荷）	Discharge 放電	Passive 受動	< 0.5s	10 s

Output Power: 4.8 kW

Parameters 設定値				Frequency 周波数	Operation Mode 動作モード	Measurement Result 測定結果			Pass / Fail 判定 1,2 <0.5s 3>10s	Remarks 備考
Active Power 有効電力		Reactive Power 無効電力				Gate Block (s) <sup>1</sup> GB 時限	Relay Open (s) <sup>2</sup> Ry 解列時 限	Reconnection Time (s) <sup>3</sup> 再並列阻止時 間		
10 %	480W	10%	480 Var	60 Hz	Discharge 放電	0.211	0.211	11.69	Pass	
10 %		5%	240 Var			0.2205	0.2205	11.75	Pass	
10 %		0%	0			0.159	0.159	11.7	Pass	
10 %		-5%	-240 Var			0.25	0.25	11.54	Pass	
10 %		-10%	-480 Var			0.2455	0.2455	11.687	Pass	
5%	240 W	10%	480 Var			0.1645	0.1645	11.698	Pass	
5%		5%	240 Var			0.159	0.159	11.729	Pass	
5%		0%	0			0.201	0.201	11.513	Pass	
5%		-5%	-240 Var			0.215	0.215	11.672	Pass	
5%		-10%	-480 Var			0.2025	0.2025	11.682	Pass	
0%	0	10%	480 Var			0.175	0.175	11.816	Pass	
0%		5%	240 Var			0.2285	0.2285	11.614	Pass	
0%		0%	0			0.1715	0.1715	11.778	Pass	Figure 3.2.7.6- 3.2.7.7;
0%		-5%	-240 Var			0.225	0.225	11.76	Pass	

0%		-10%	-480 Var			0.2815	0.2815	11.716	Pass	
-5%	-240 W	10%	480 Var			0.236	0.236	11.51	Pass	
-5%		5%	240 Var			0.228	0.228	11.644	Pass	
-5%		0%	0			0.185	0.185	11.734	Pass	
-5%		-5%	-240 Var			0.187	0.187	11.634	Pass	
-5%		-10%	-480 Var			0.2195	0.2195	11.558	Pass	
-10%	-480 W	10%	480 Var			0.205	0.205	11.696	Pass	
-10%		5%	240 Var			0.2	0.2	11.718	Pass	
-10%		0%	0			0.224	0.224	11.638	Pass	
-10%		-5%	-240 Var			0.1785	0.1785	11.529	Pass	
-10%		-10%	-480 Var			0.247	0.247	11.496	Pass	

Scope Channel Description:

Channel 1\_1: Phase A Voltage

Channel 1\_2: Phase A Current

Channel 2\_1: Phase B Voltage

Channel 3\_1: Phase B Current

Channel 3\_2: Phase C Voltage

Channel 4\_1: Phase Current

INV\_RLY1: Relay Signal

PWM1: Gate Signal

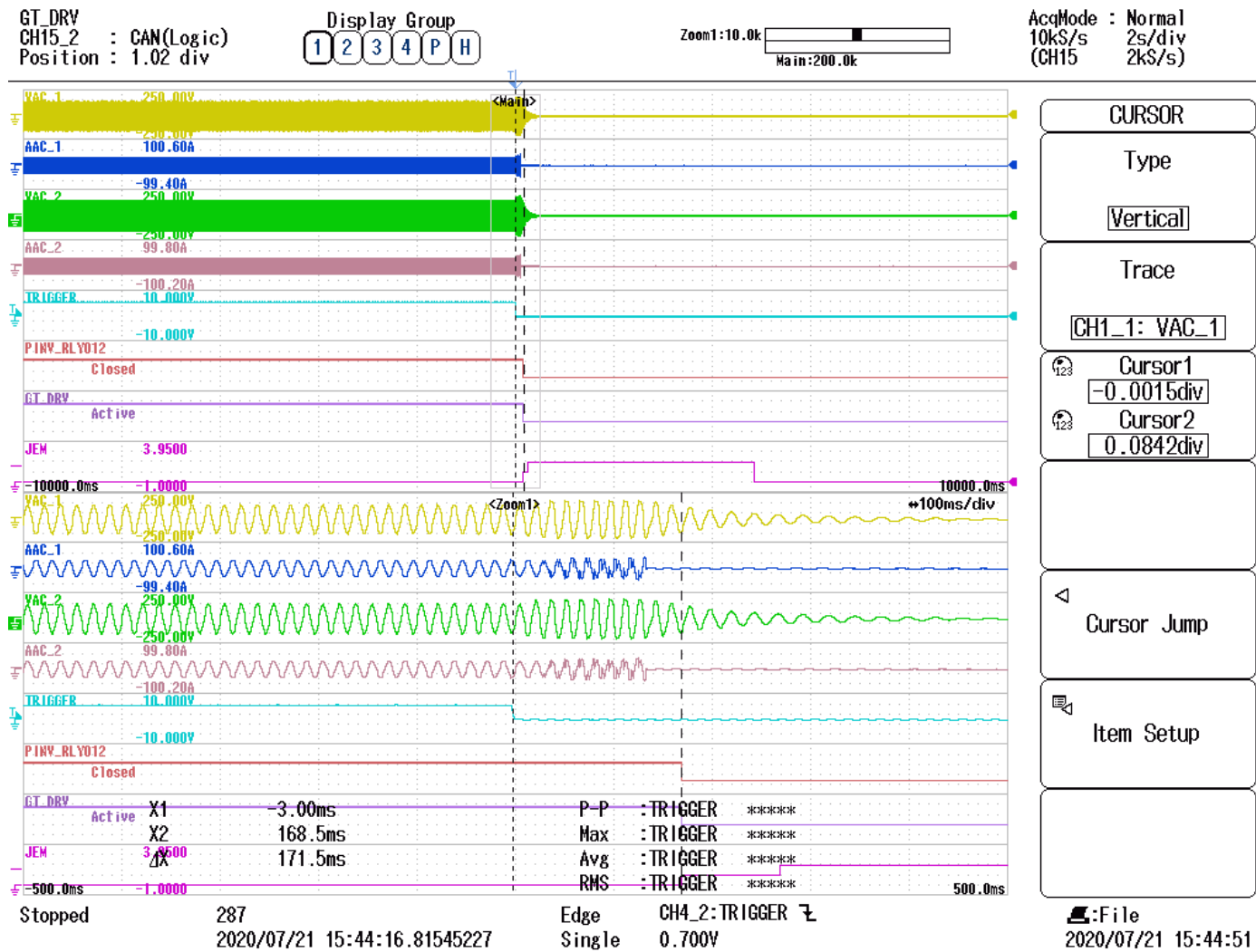


Figure 3.2.7.6 AI Gate block time- Passive Islanding- RLC 0% Unbalanced load condition (0.1715 sec)

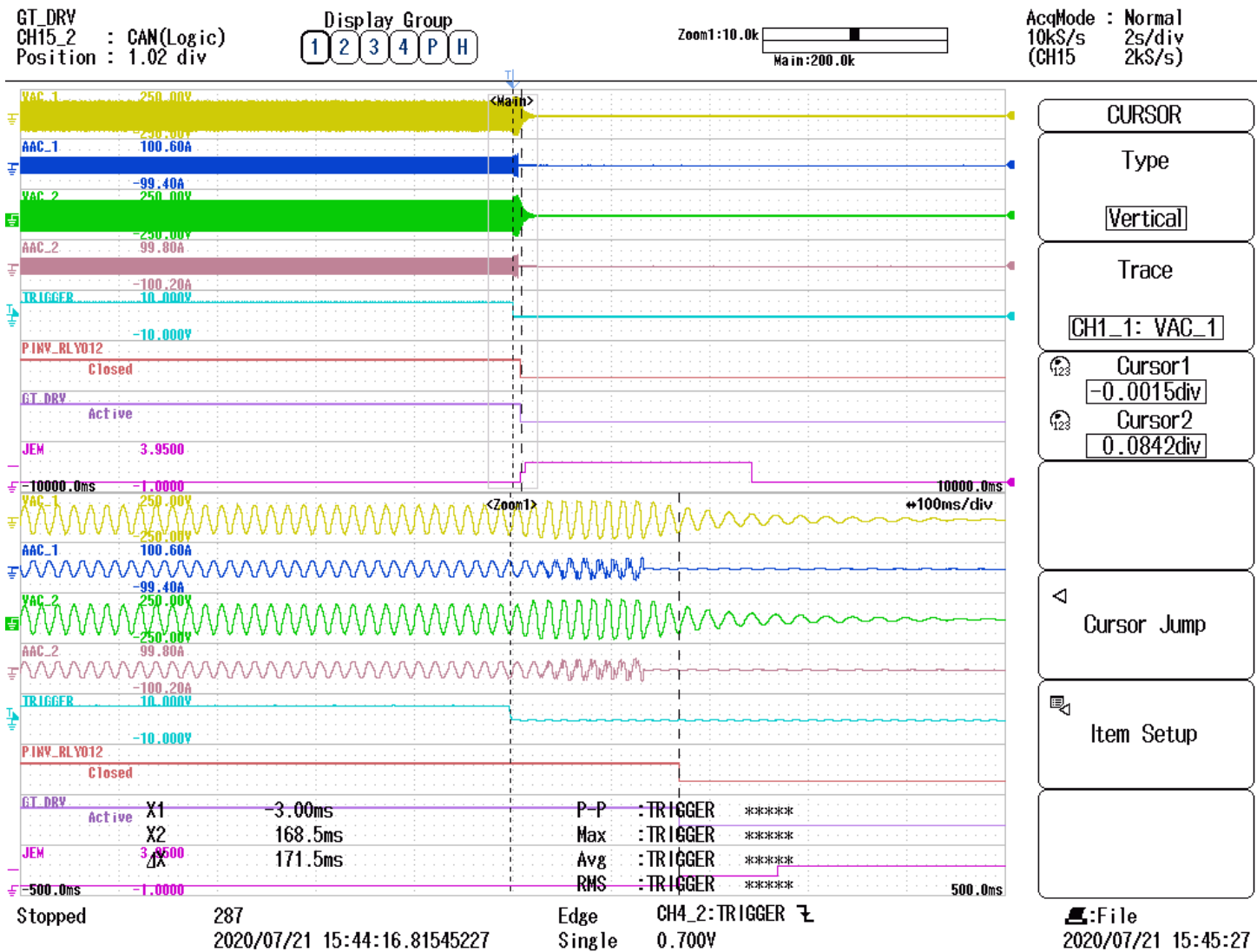


Figure: 3.2.7.7 Relay Open time- Passive Islanding- RLC 0% Unbalanced load condition (0.1715 sec)

# Parameter 設定値: 抵抗負荷、能動

Load Condition 負荷条件	Mode of Operation 動作モード	Method of Island Detection 単独運転検出モード	Cur Off Time 検出モード	Reconnect time 再並列阻止時間
Resistive load 抵抗負荷	Discharge 放電	Active 能動	< 0.2s	10 s

Output Power: 4.8 kW

Parameters 設定値				Frequency 周波数	Operation Mode 動作モード	Measurement Result    測定結果			Pass / Fail 判定 1,2 <1s 3>10s	Remarks 備考
Active Power 有効電力		Reactive Power 無効電力				Gate Block (s) <sup>1</sup> GB 時限	Relay Open (s) <sup>2</sup> Ry 解列時 限	Reconnection Time (s) <sup>3</sup> 再並列阻止 時間		
10 %	480 W	0%	0	60 Hz	Discharge	0.185	0.185	11.596	Pass	
5%	240 W	0%	0			0.15	0.15	11.616	Pass	
0%	0	0%	0			0.1805	0.1805	10.544	Pass	Figure 3.2.7.8- 3.2.7.10
-5%	-240 W	0%	0			0.184	0.184	11.482	Pass	
-10%	-480 W	0%	0			0.19	0.19	11.536	Pass	

Scope Channel Description:

Channel 1\_1: Phase A Current

Channel 1\_2: Phase B Current

Channel 2\_1: Phase C Current

Channel 3\_1: Phase A Voltage

Channel 3\_2: Phase B Voltage

Channel 4\_1: Phase C Voltage

INV\_RELAY: Relay Signal

PWM: Gate Signal

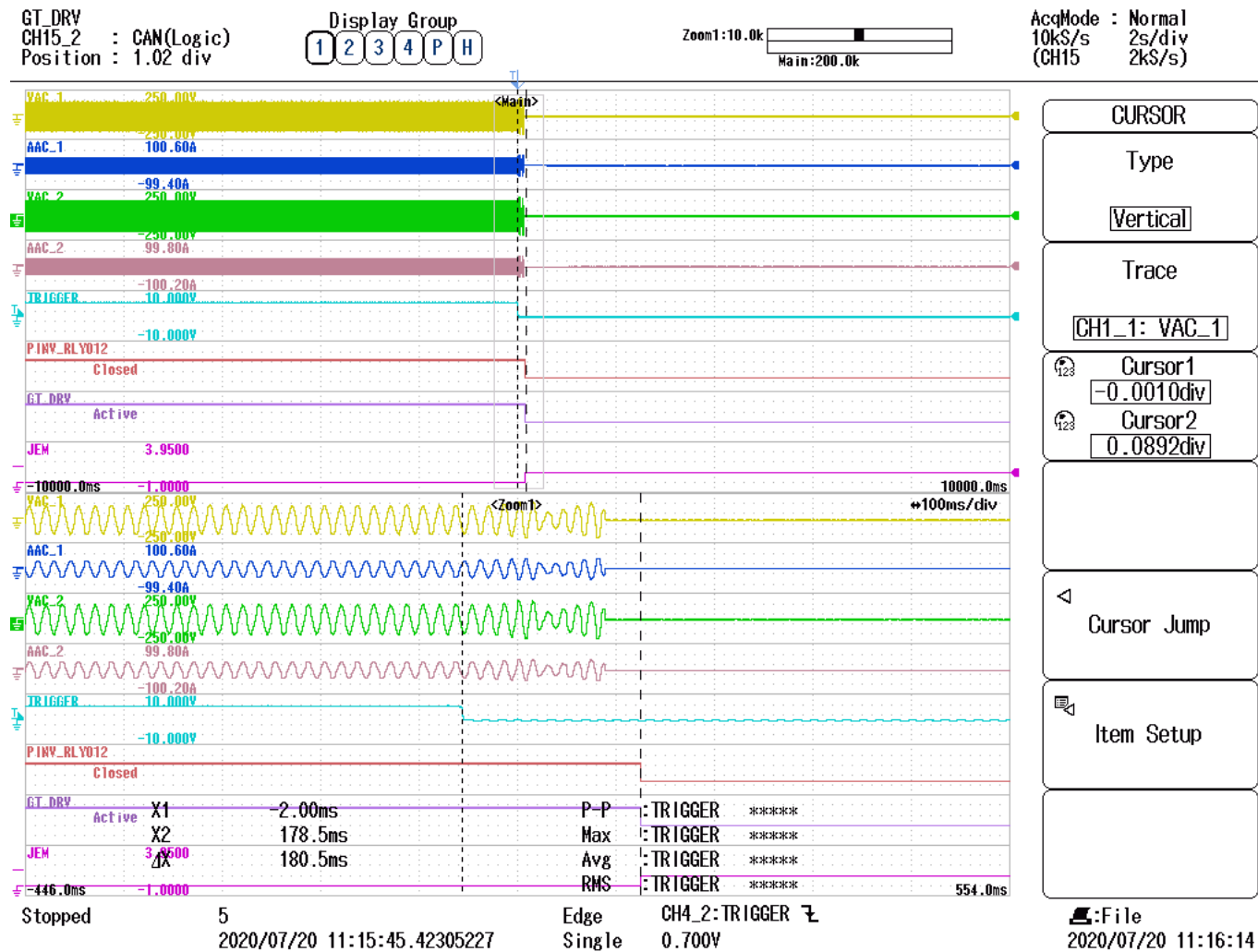


Figure: 3.2.7.8 AI Gate Block time- Active Islanding- R 0% Resistive load condition (0.1805 sec)

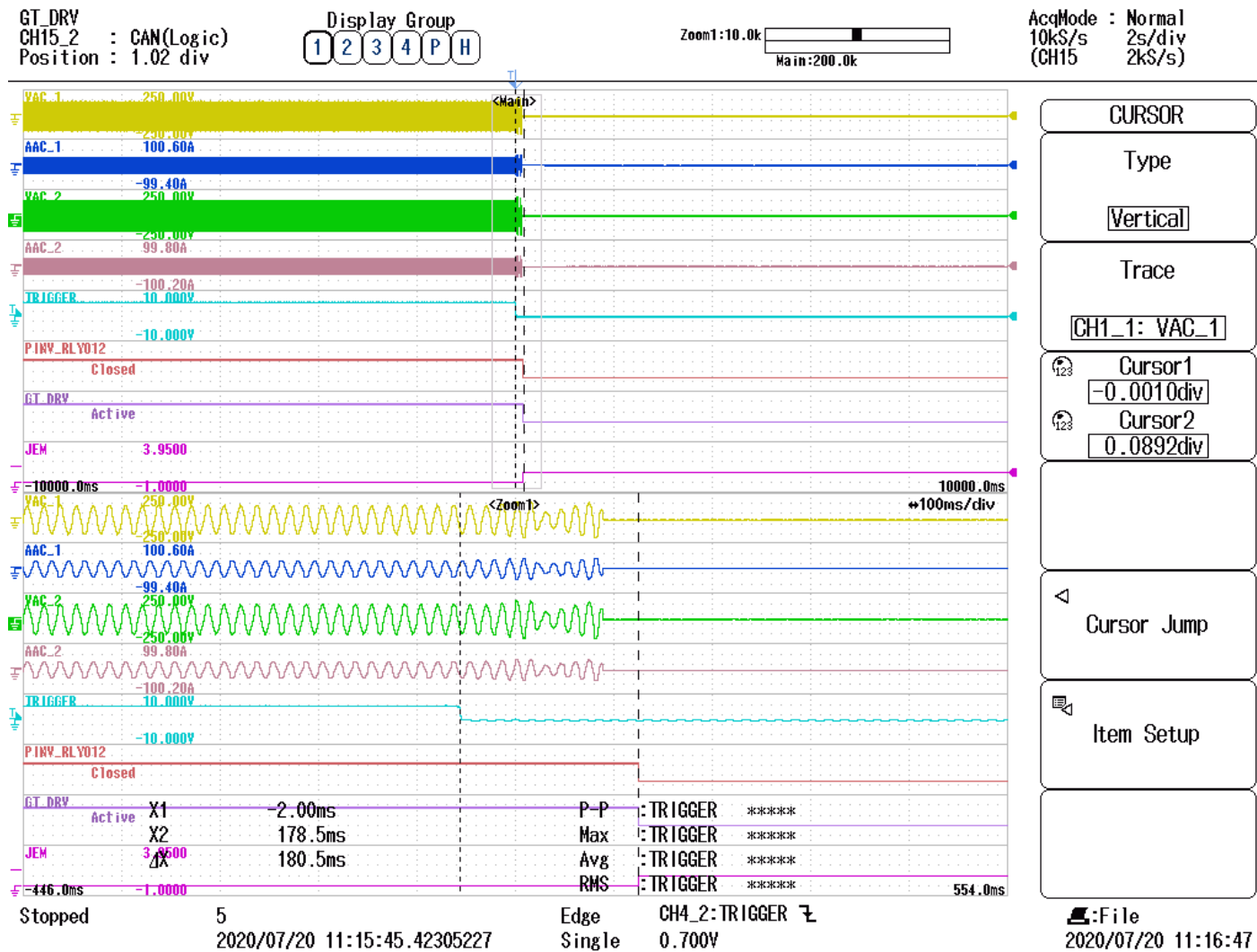


Figure: 3.2.7.9 AI Relay Open time- Active Islanding- R 0% Resistive load condition (0.1805 sec)



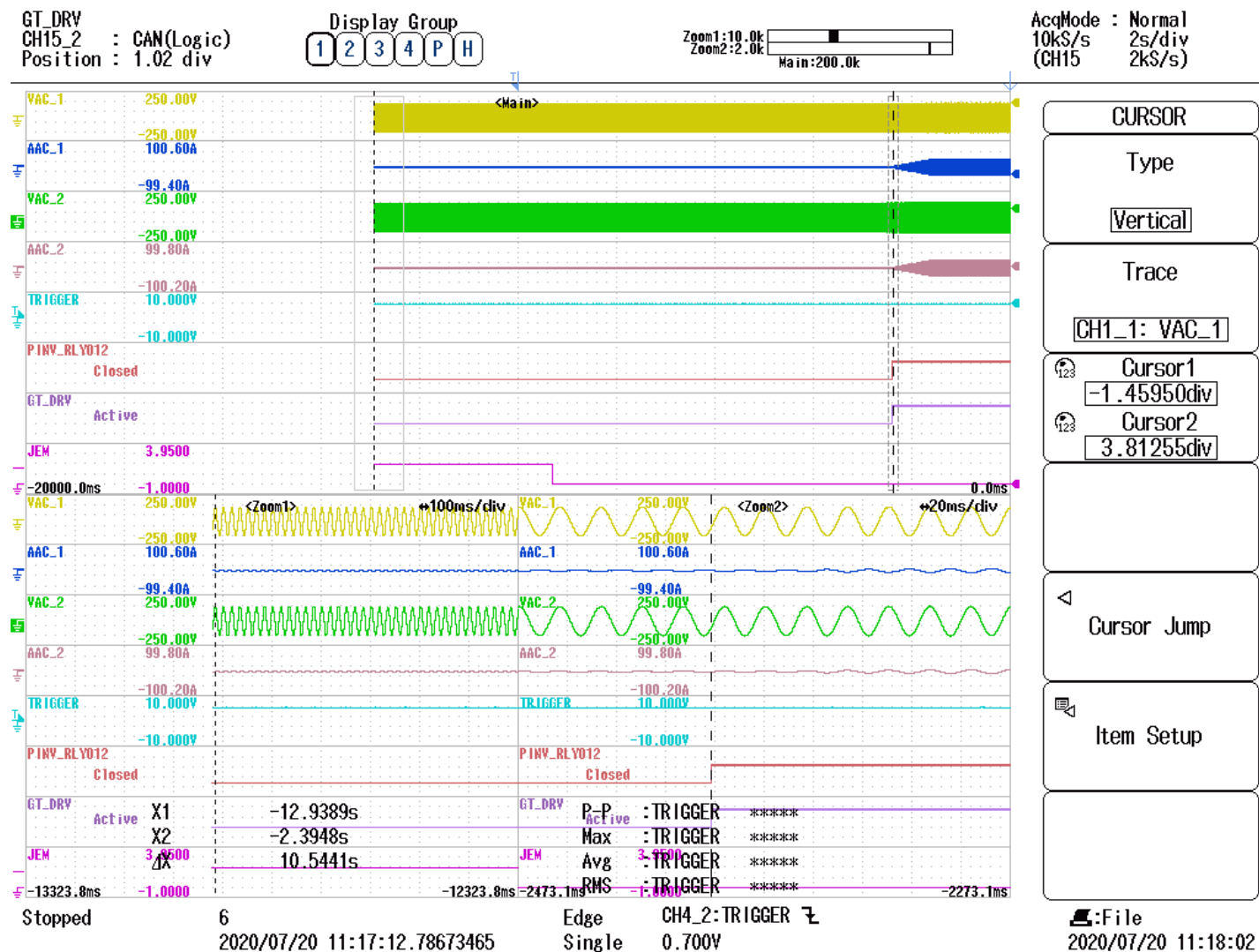


Figure 3.2.7.10 AI Reconnect time- Active Islanding- R 0% Resistive load condition (10.544 sec)

Parameter 設定値: 不平衡負荷、能動

Load Condition 負荷条件	Mode of Operation 動作モード	Method of Island Detection 単独運転検出モード	Cur Off Time 検出時限	Reconnect time 再並列阻止時間
Unbalanced load 不平衡負荷	Discharge 放電	Active 能動	< 0.2s	10 s

Output Power: 4.8 kW

Parameters 設定値				Frequency 周波数	Operation Mode 動作モード	Measurement Result			Pass / Fail 判定 1,2 <1s 3>10s	Remarks 備考
Active Power 有効電力		Reactive Power 無効電力				Gate Block (s) <sup>1</sup> GB 時限	Relay Open (s) <sup>2</sup> Ry 解列 時限	Reconnection Time (s) <sup>3</sup> 再並列阻止 時間		
10 %	480 W	10%	480 Var	60 Hz	Discharge	0.179	0.179	11.535	Pass	
10 %		5%	240 Var			0.173	0.173	11.544	Pass	
10 %		0%	0			0.193	0.193	11.594	Pass	
10 %		-5%	-240 Var			0.186	0.186	11.484	Pass	
10 %		-10%	-480 Var			0.155	0.155	11.506	Pass	
5%	240 W	10%	480 Var			0.183	0.183	11.511	Pass	
5%		5%	240 Var			0.1685	0.1685	11.519	Pass	
5%		0%	0			0.1835	0.1835	11.622	Pass	
5%		-5%	-240 Var			0.18	0.18	11.464	Pass	
5%		-10%	-480 Var			0.162	0.162	11.487	Pass	
0%	0	10%	480 Var			0.1695	0.1695	11.468	Pass	
0%		5%	240 Var			0.1775	0.1775	11.525	Pass	
0%		0%	0			0.1775	0.1775	11.555	Pass	Figure 3.2.7.11- 3.2.7.13
0%		-5%	-240 Var			0.1735	0.1735	11.457	Pass	

0%		-10%	-480 Var			0.1705	0.1705	11.604	Pass	
-5%	-240 W	10%	480 Var			0.154	0.154	11.437	Pass	
-5%		5%	240 Var			0.1765	0.1765	11.505	Pass	
-5%		0%	0			0.177	0.177	11.495	Pass	
-5%		-5%	-240 Var			0.183	0.183	11.44	Pass	
-5%		-10%	-480 Var			0.188	0.188	11.476	Pass	
-10%	-480 W	10%	480 Var			0.141	0.141	11.678	Pass	
-10%		5%	240 Var			0.1645	0.1645	11.497	Pass	
-10%		0%	0			0.1795	0.1795	11.497	Pass	
-10%		-5%	-240 Var			0.162	0.162	11.442	Pass	
-10%		-10%	-480 Var			0.181	0.181	11.432	Pass	

Scope Channel Description:

Channel 1\_1: Phase A Current

Channel 1\_2: Phase B Current

Channel 2\_1: Phase C Current

Channel 3\_1: Phase A Voltage

Channel 3\_2: Phase B Voltage

Channel 4\_1: Phase C Voltage

INV\_RELAY: Relay Signal

PWM: Gate Signal



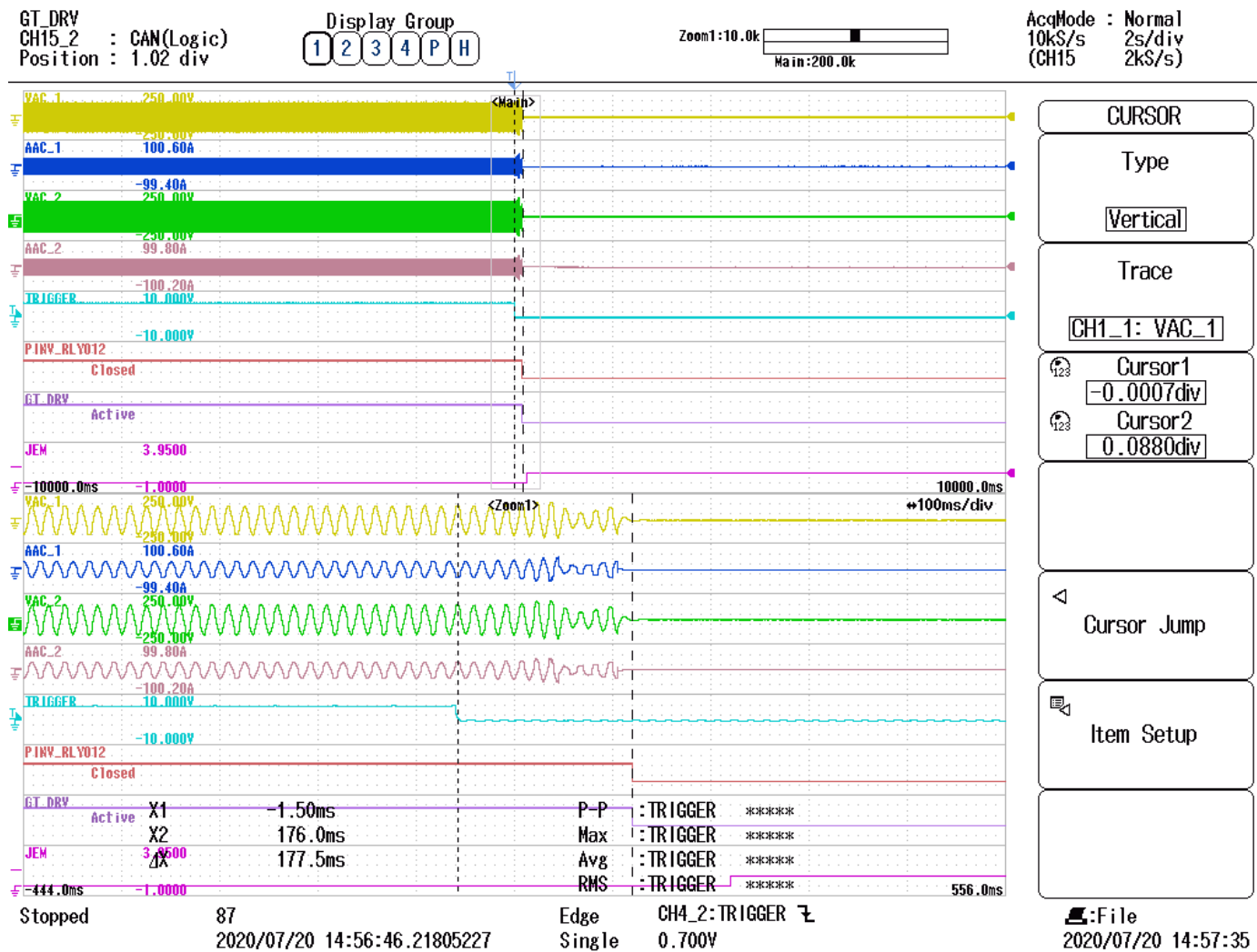


Figure 3.2.7.12 Relay Open time- Active Islanding- RLC 0% Unbalanced load condition (0.1775sec)



Parameter 設定値: 並行負荷、能動

Load Condition 負荷条件	Mode of Operation 動作モード	Method of Island Detection 単独運転検出モード	Cur Off Time 検出時限	Reconnect time 再並列阻止時間
Balanced load 並行負荷（回転機負荷）	Discharge 放電	Active 能動	< 0.2s	10 s

Output Power: 4.8 kW

Parameters 設定値				Frequency 周波数	Operation Mode 動作モード	Measurement Result    測定結果			Pass / Fail 判定 1,2 <1s 3>10s	Remarks 備考
Active Power 有効電力		Reactive Power 無効電力				Gate Block (s) <sup>1</sup> GB 時限	Relay Open (s) <sup>2</sup> Ry 解列 時限	Reconnection Time (s) <sup>3</sup> 再並列阻止時間		
10 %	480 W	10%	480 Var	60 Hz	Discharge	0.1625	0.1625	11.586	Pass	
10 %		5%	240 Var			0.196	0.196	11.693	Pass	
10 %		0%	0			0.1495	0.1495	11.706	Pass	
10 %		-5%	-240 Var			0.152	0.152	11.463	Pass	
10 %		-10%	-480 Var			0.18	0.18	11.516	Pass	
5%	240 W	10%	480 Var			0.154	0.154	11.58	Pass	
5%		5%	240 Var			0.176	0.176	11.686	Pass	
5%		0%	0			0.19	0.19	11.702	Pass	
5%		-5%	-240 Var			0.172	0.172	11.546	Pass	
5%		-10%	-480 Var			0.181	0.181	11.74	Pass	
0%	0	10%	480 Var			0.147	0.147	11.659	Pass	
0%		5%	240 Var			0.157	0.157	11.552	Pass	
0%		0%	0			0.146	0.146	11.672	Pass	Figure 3.2.7.14- 3.2.7.16

0%	-240 W	-5%	-240 Var			0.187	0.187	11.664	Pass	
0%		-10%	-480 Var			0.167	0.167	11.717	Pass	
-5%		10%	480 Var			0.151	0.151	11.733	Pass	
-5%		5%	240 Var			0.1685	0.1685	11.667	Pass	
-5%		0%	0			0.175	0.175	11.656	Pass	
-5%		-5%	-240 Var			0.178	0.178	11.732	Pass	
-5%	-480 W	-10%	-480 Var			0.176	0.176	11.545	Pass	
-10%		10%	480 Var			0.15	0.15	11.678	Pass	
-10%		5%	240 Var			0.178	0.178	11.544	Pass	
-10%		0%	0			0.187	0.187	11.643	Pass	
-10%		-5%	-240 Var			0.195	0.195	11.549	Pass	
-10%		-10%	-480 Var			0.161	0.161	11.722	Pass	

Scope Channel Description:  
Channel 1\_1: Phase A Voltage  
Channel 1\_2: Phase A Current  
Channel 2\_1: Phase B Voltage  
Channel 3\_1: Phase B Current  
Channel 3\_2: Phase C Voltage  
Channel 4\_1: Phase Current  
INV\_RLY1: Relay Signal  
PWM1: Gate Signal



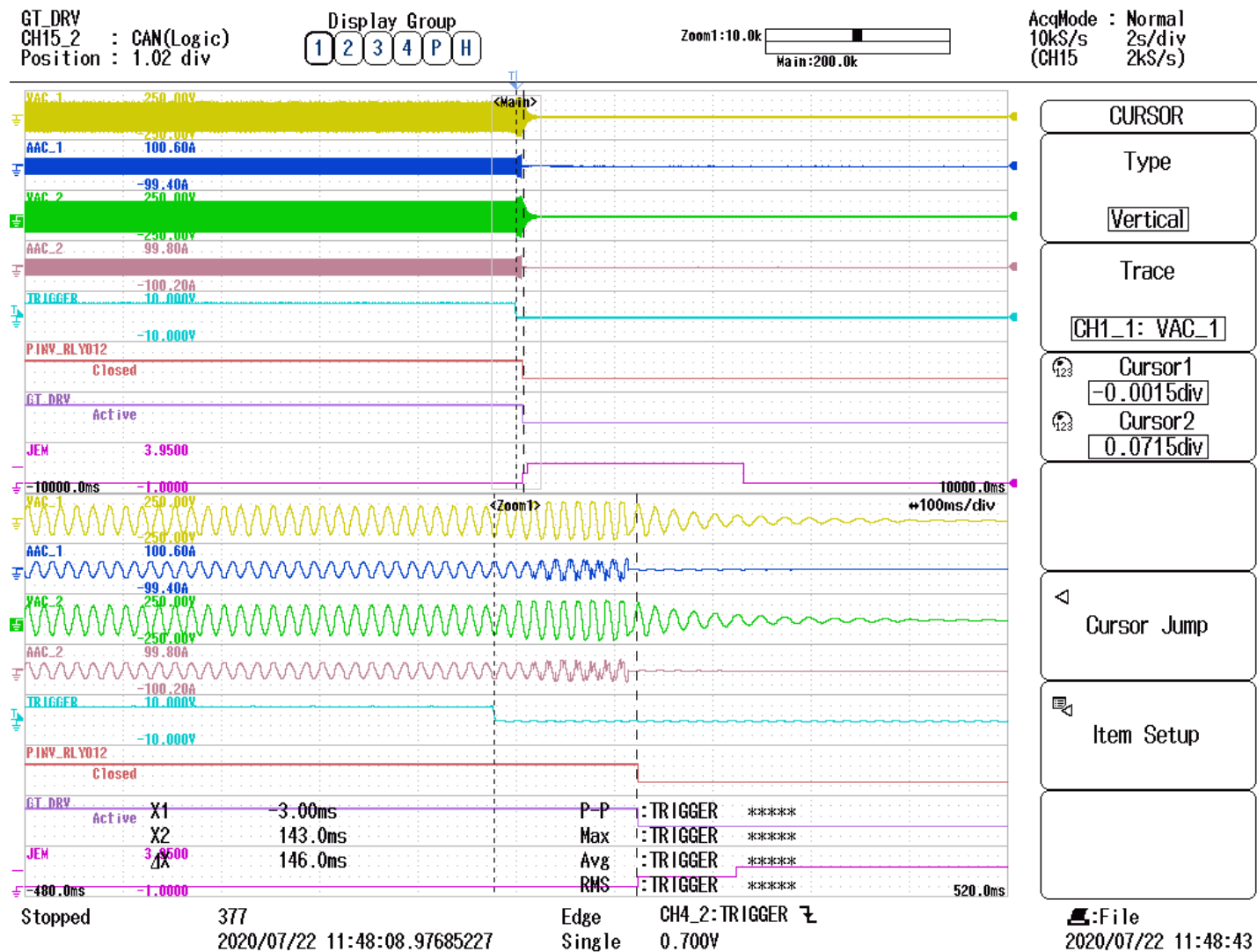


Figure 3.2.7.14 AI Gate Block Time- Active Islanding- RLC 0% balanced load condition (0.146 sec)

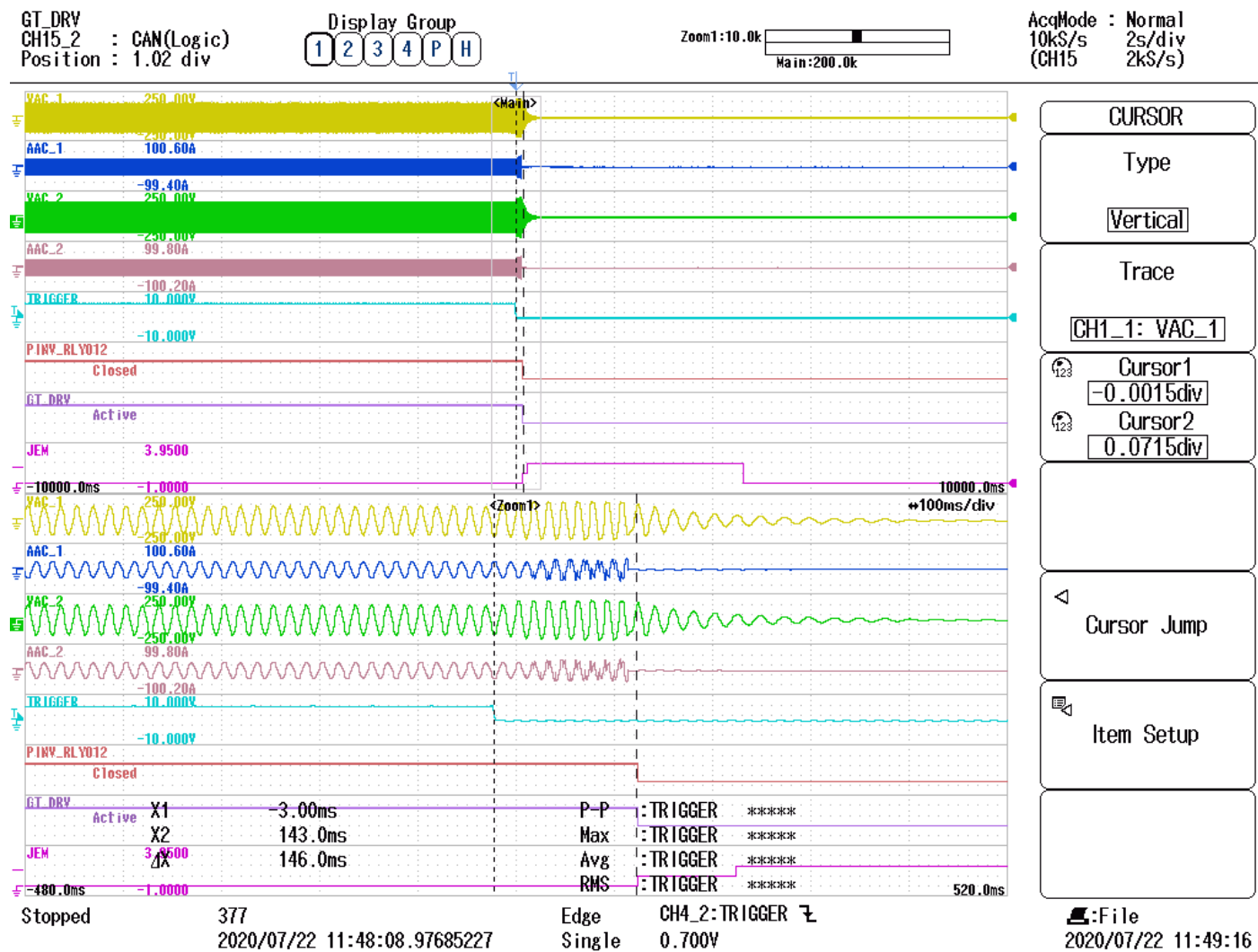


Figure 3.2.7.15 AI Relay Open Time- Active Islanding- RLC 0% balanced load condition (0.146 sec)

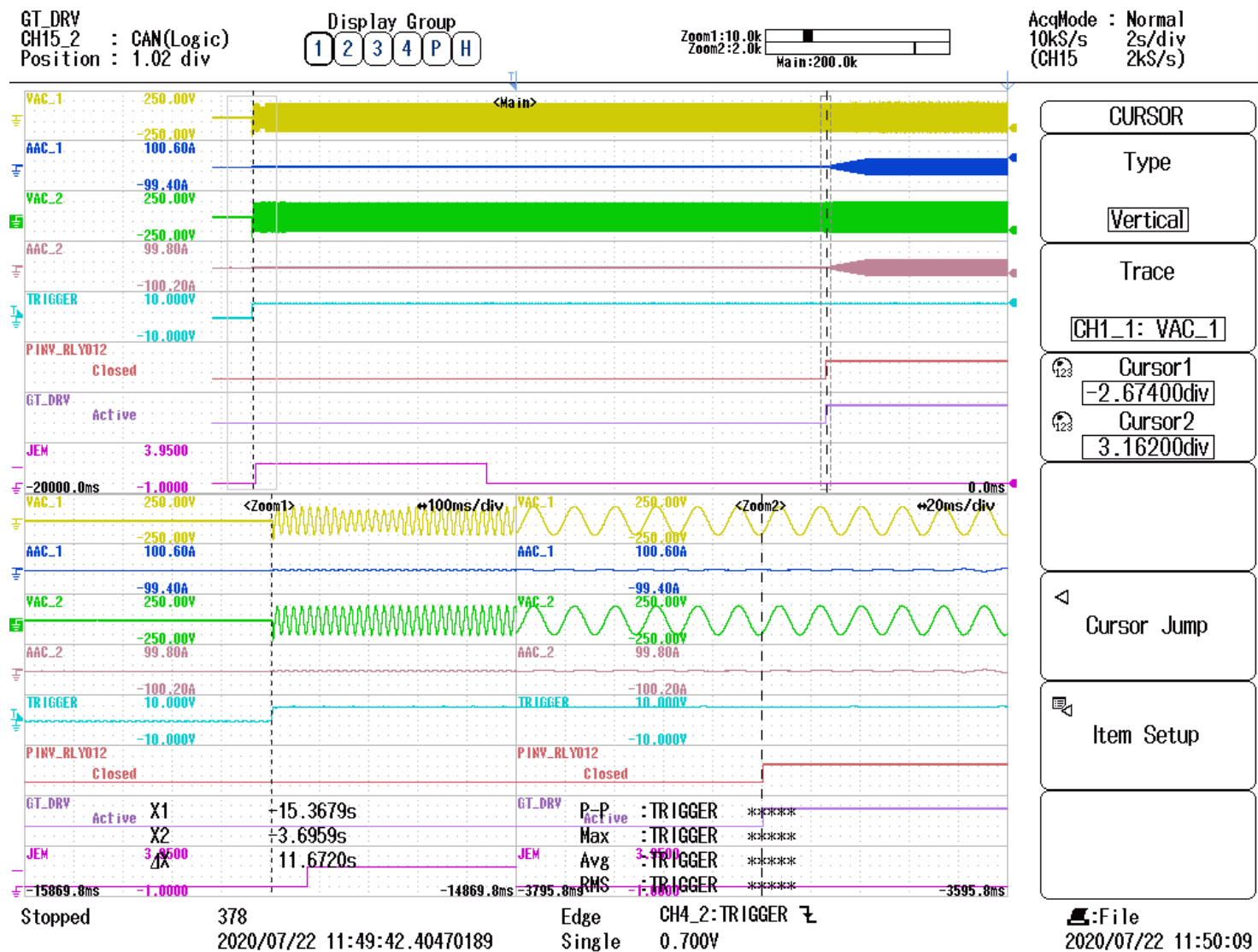


Figure 3.2.7.16 AI Reconnect Time- Active Islanding- RLC 0% balanced load condition (11.672 sec)

Parameter 設定値: 抵抗負荷、受動+能動

Load Condition 負荷条件	Mode of Operation 動作モード	Method of Island Detection 単独運転検出モード	Cur Off Time 検出時限	Reconnect time 再並列阻止時間
Resistive load 抵抗負荷	Discharge 放電	Passive and Active 受動+能動	< 0.2s	10 s

Output Power: 4.8 kW

Parameters 設定値				Frequency 周波数	Operation Mode 動作モード	Measurement Result 測定結果			Pass / Fail 判定 1,2 <1s 3>10s	Remarks 備考
Active Power 有効電力		Reactive Power 無効電力				Gate Block (s) <sup>1</sup> GB 時限	Relay Open (s) <sup>2</sup> Ry 解列 時限	Reconnection Time (s) <sup>3</sup> 再並列阻止時間		
10 %	480 W	0%	0	60 Hz	Discharge	0.1855	0.1855	11.453	Pass	
5%	240 W	0%	0			0.1665	0.1665	11.492	Pass	
0%	0	0%	0			0.1775	0.1775	11.569	Pass	Figure 3.2.7.17- 3.2.7.19
-5%	-240 W	0%	0			0.17	0.17	11.507	Pass	
-10%	-480 W	0%	0			0.197	0.197	11.584	Pass	

Scope Channel Description:

Channel 1\_1: Phase A Current

Channel 1\_2: Phase B Current

Channel 2\_1: Phase C Current

Channel 3\_1: Phase A Voltage

Channel 3\_2: Phase B Voltage

Channel 4\_1: Phase C Voltage

INV\_RELAY: Relay Signal

PWM: Gate Signal





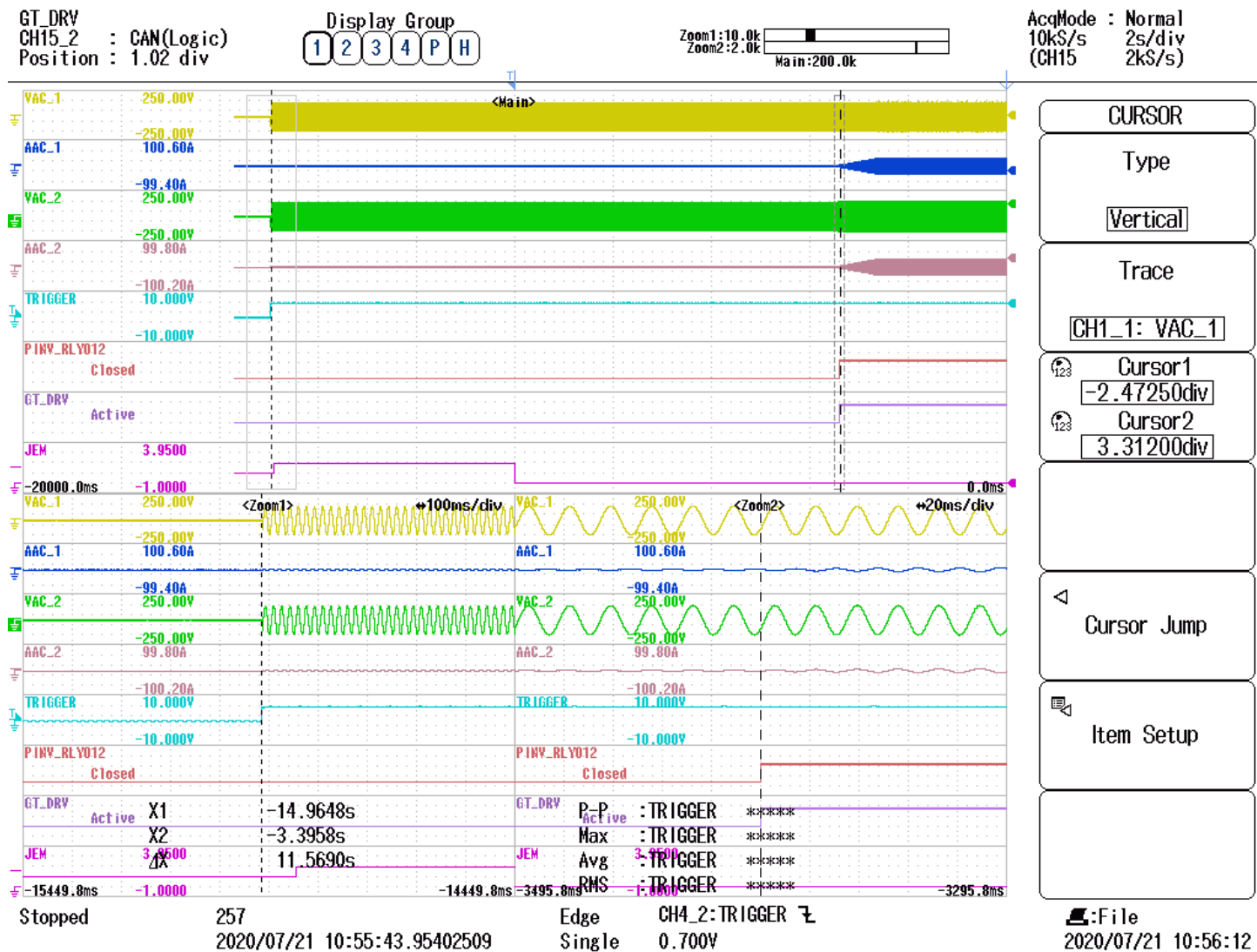


Figure 3.2.7.19 AI Reconnect time-Active and Passive Islanding, R 0% Resistive load condition. ( 11.569 sec)

Parameter 設定値：不平衡負荷、受動＋能動

Load Condition 負荷条件	Mode of Operation 動作モード	Method of Island Detection 単独運転検出モード	Cur Off Time 検出時限	Reconnect time 再並列阻止時間
Unbalanced load 不平衡負荷	Discharge 放電	Passive and Active 受動＋能動	< 0.2s	10 s

Output Power: 4.8 kW

Parameters 設定値				Frequency 周波数	Operation Mode 動作モード	Measurement Result    測定結果			Pass / Fail 判定 判定 <sup>1,2</sup> <1s <sup>3</sup> >10s	Remarks 備考
Active Power 有効電力		Reactive Power 無効電力				Gate Block (s) <sup>1</sup> GB 時限	Relay Open (s) <sup>2</sup> Ry 解列 時限	Reconnection Time (s) <sup>3</sup> 再並列阻止時間		
10 %	480 W	10%	480 Var	60 Hz	Discharge 放電	0.146	0.146	11.594	Pass	
10 %		5%	240 Var			0.189	0.189	11.514	Pass	
10 %		0%	0			0.166	0.166	11.434	Pass	
10 %		-5%	-240 Var			0.165	0.165	11.458	Pass	
10 %		-10%	-480 Var			0.1915	0.1915	11.505	Pass	
5%	240 W	10%	480 Var			0.197	0.197	11.536	Pass	
5%		5%	240 Var			0.1475	0.1475	11.421	Pass	
5%		0%	0			0.177	0.177	11.546	Pass	
5%		-5%	-240 Var			0.1665	0.1665	11.459	Pass	
5%		-10%	-480 Var			0.1675	0.1675	11.635	Pass	
0%	0	10%	480 Var			0.1435	0.1435	11.54	Pass	
0%		5%	240 Var			0.1695	0.1695	11.55	Pass	
0%		0%	0			0.1665	0.1665	11.507	Pass	Figure 3.2.7.20- 3.2.7.22



0%	-240 W	-5%	-240 Var			0.172	0.172	11.51	Pass	
0%		-10%	-480 Var			0.1625	0.1625	11.548	Pass	
-5%		10%	480 Var			0.157	0.157	11.459	Pass	
-5%		5%	240 Var			0.1495	0.1495	11.537	Pass	
-5%		0%	0			0.168	0.168	11.477	Pass	
-5%		-5%	-240 Var			0.198	0.198	11.619	Pass	
-5%	-480 W	-10%	-480 Var			0.174	0.174	11.522	Pass	
-10%		10%	480 Var			0.1575	0.1575	11.522	Pass	
-10%		5%	240 Var			0.1625	0.1625	11.508	Pass	
-10%		0%	0			0.1715	0.1715	11.567	Pass	
-10%		-5%	-240 Var			0.092	0.092	11.43	Pass	
-10%		-10%	-480 Var			0.186	0.186	11.452	Pass	

Scope Channel Description:  
Channel 1\_1: Phase A Current  
Channel 1\_2: Phase B Current  
Channel 2\_1: Phase C Current  
Channel 3\_1: Phase A Voltage  
Channel 3\_2: Phase B Voltage  
Channel 4\_1: Phase C Voltage  
INV\_RELAY: Relay Signal  
PWM: Gate Signal

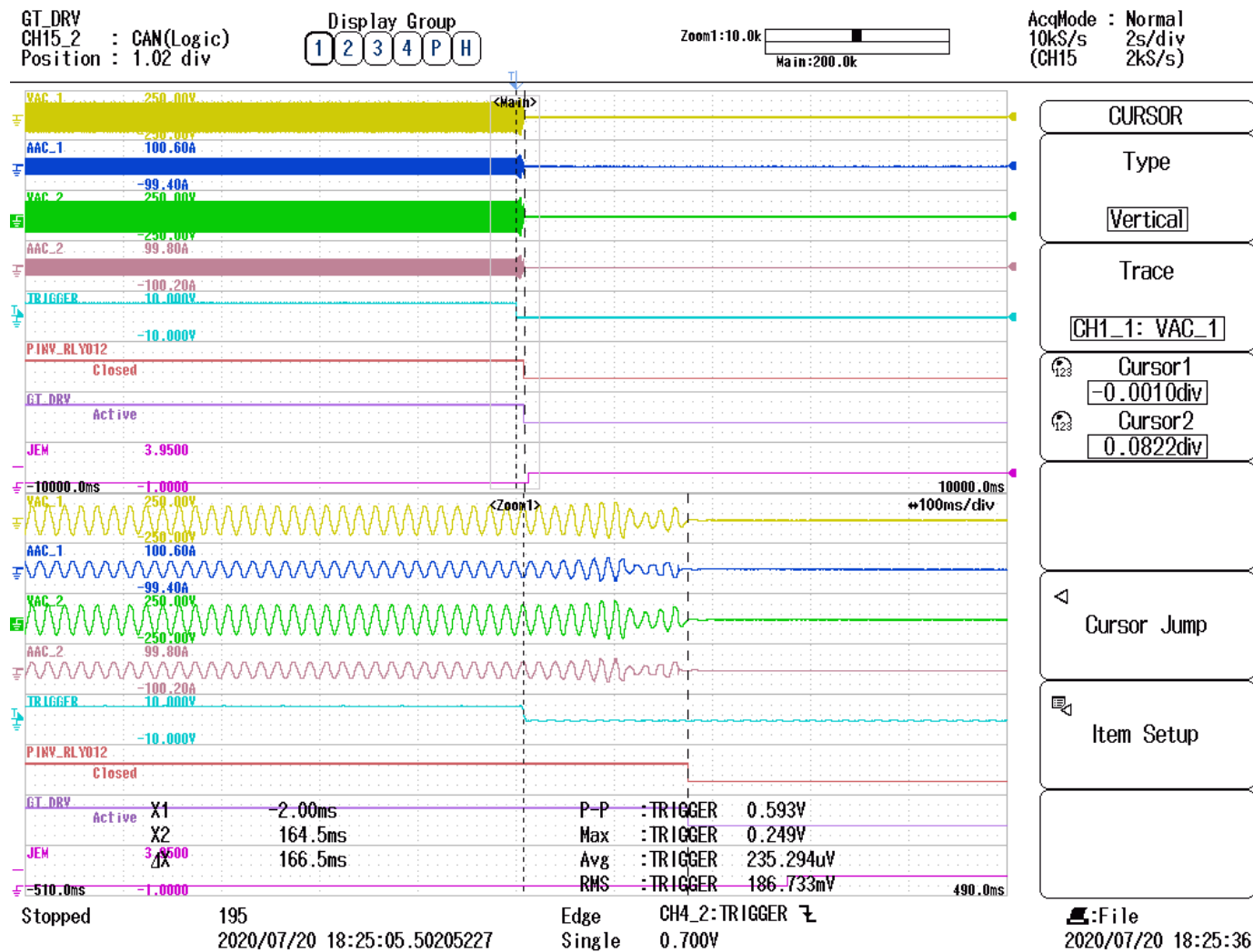


Figure 3.2.7.20 AI Gate block time –Active and Passive Islanding, RLC 0% Unbalanced load condition. (0.1665 sec)

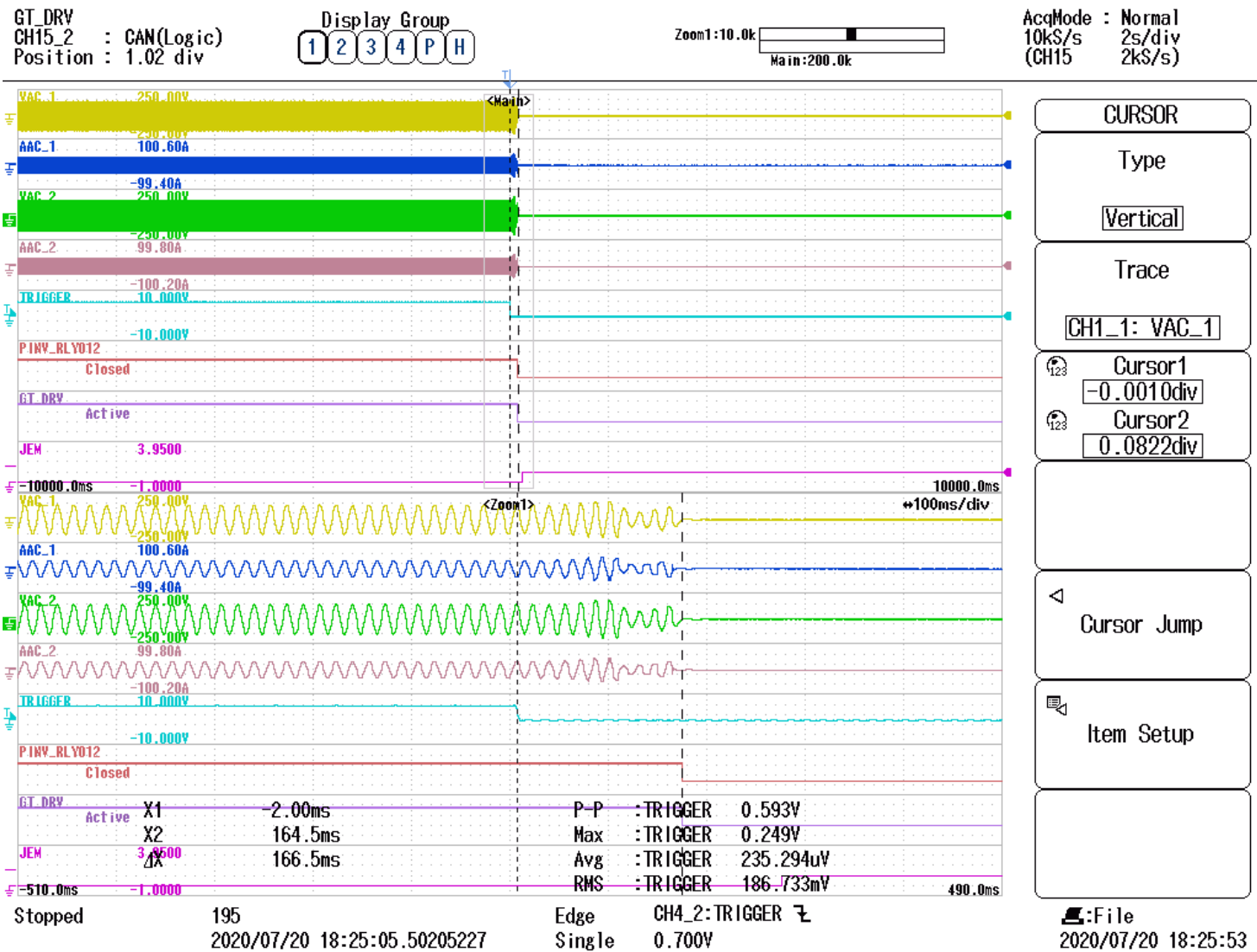


Figure 3.2.7.21 AI Relay Open time- Active and Passive Islanding, RLC 0% Unbalanced load condition. (0.1665 sec)



Parameter 設定値：並行負荷、受動＋能動

Load Condition 負荷条件	Mode of Operation 動作モード	Method of Island Detection 単独運転検出モード	Cur Off Time 検出時限	Reconnect time 再並列阻止時間
Balanced load 並行負荷（回転機負荷）	Discharge 放電	Passive and Active 受動＋能動	< 0.2s	10 s

Output Power: 4.8 kW

Parameters 設定値				Frequency 周波数	Operation Mode 動作モード	Measurement Result 測定結果			Pass / Fail 判定 1,2 <1s 3>10s	Remarks 備考
Active Power 有効電力		Reactive Power 無効電力				Gate Block (s) <sup>1</sup> GB 時限	Relay Open (s) <sup>2</sup> Ry 解列 時限	Reconnection Time (s) <sup>3</sup> 再並列阻止 時間		
10 %	480 W	10%	480 Var	60 Hz	Discharge	0.1315	0.1315	11.746	Pass	
10 %		5%	240 Var			0.163	0.163	11.72	Pass	
10 %		0%	0			0.18	0.18	11.55	Pass	
10 %		-5%	-240 Var			0.163	0.163	11.663	Pass	
10 %		-10%	-480 Var			0.159	0.159	11.708	Pass	
5%	240 W	10%	480 Var			0.1975	0.1975	11.638	Pass	
5%		5%	240 Var			0.157	0.157	11.752	Pass	
5%		0%	0			0.194	0.194	11.691	Pass	
5%		-5%	-240 Var			0.1535	0.1535	11.67	Pass	
5%		-10%	-480 Var			0.197	0.197	11.744	Pass	
0%	0	10%	480 Var			0.154	0.154	11.683	Pass	
0%		5%	240 Var			0.1515	0.1515	11.707	Pass	
0%		0%	0			0.163	0.163	11.69	Pass	Figure 3.2.7.23- 3.2.7.25

0%		-5%	-240 Var			0.189	0.189	11.687	Pass	
0%		-10%	-480 Var			0.159	0.159	11.57	Pass	
-5%		10%	480 Var			0.148	0.148	11.662	Pass	
-5%		5%	240 Var			0.1545	0.1545	11.471	Pass	
-5%		0%	0			0.195	0.195	11.703	Pass	
-5%		-5%	-240 Var			0.1695	0.1695	11.513	Pass	
-5%		-10%	-480 Var			0.182	0.182	11.65	Pass	
-10%		10%	480 Var			0.1625	0.1625	11.526	Pass	
-10%		5%	240 Var			0.1485	0.1485	11.628	Pass	
-10%		0%	0			0.172	0.172	11.652	Pass	
-10%		-5%	-240 Var			0.17	0.17	11.674	Pass	
-10%		-10%	-480 Var			0.187	0.187	11.555	Pass	

Scope Channel Description:  
Channel 1\_1: Phase A Voltage  
Channel 1\_2: Phase A Current  
Channel 2\_1: Phase B Voltage  
Channel 3\_1: Phase B Current  
Channel 3\_2: Phase C Voltage  
Channel 4\_1: Phase Current  
INV\_RLY1: Relay Signal  
PWM1: Gate Signal



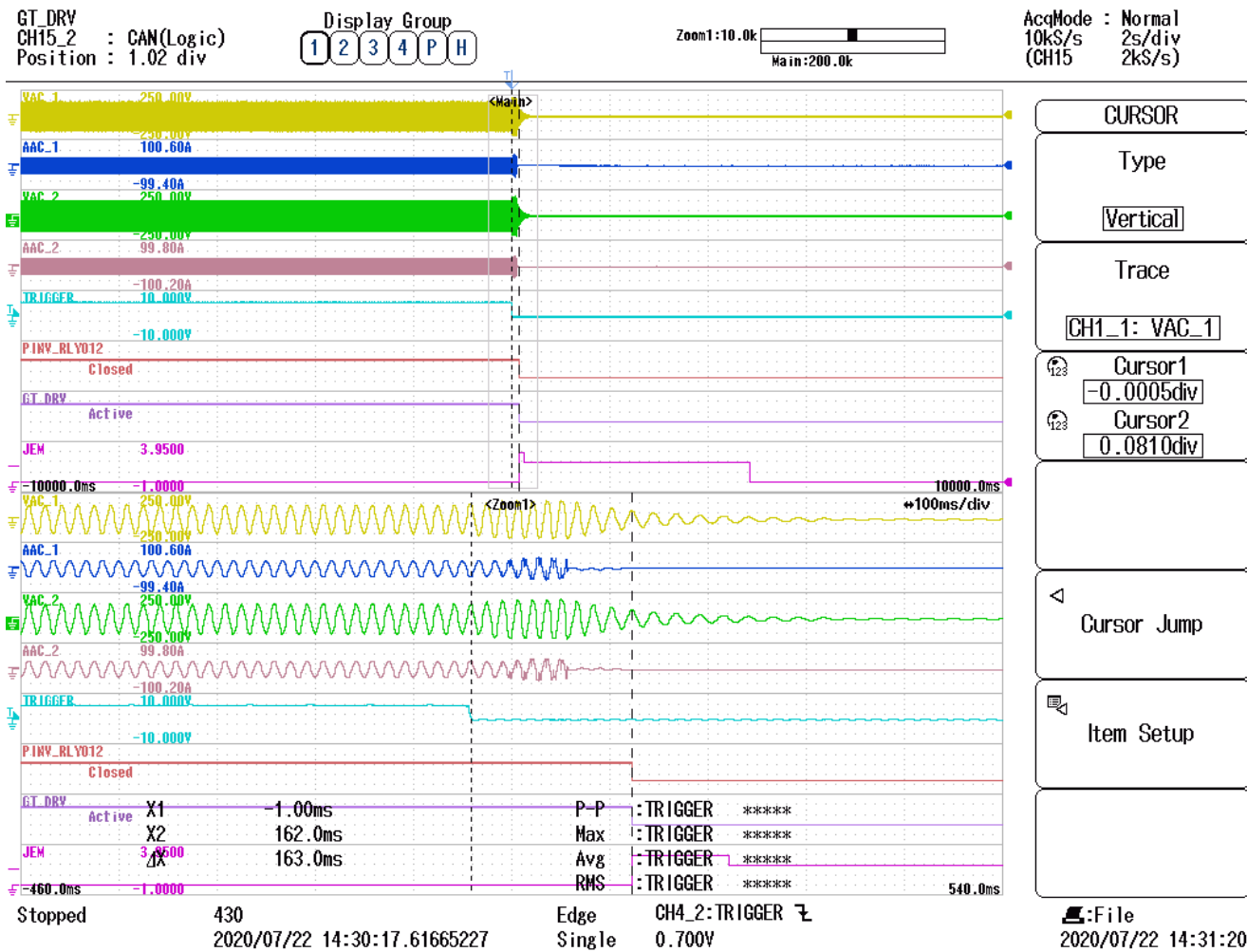


Figure 3.2.7.24 AI Relay Open time- Active and Passive Islanding, RLC 0% balanced load condition (0.163)



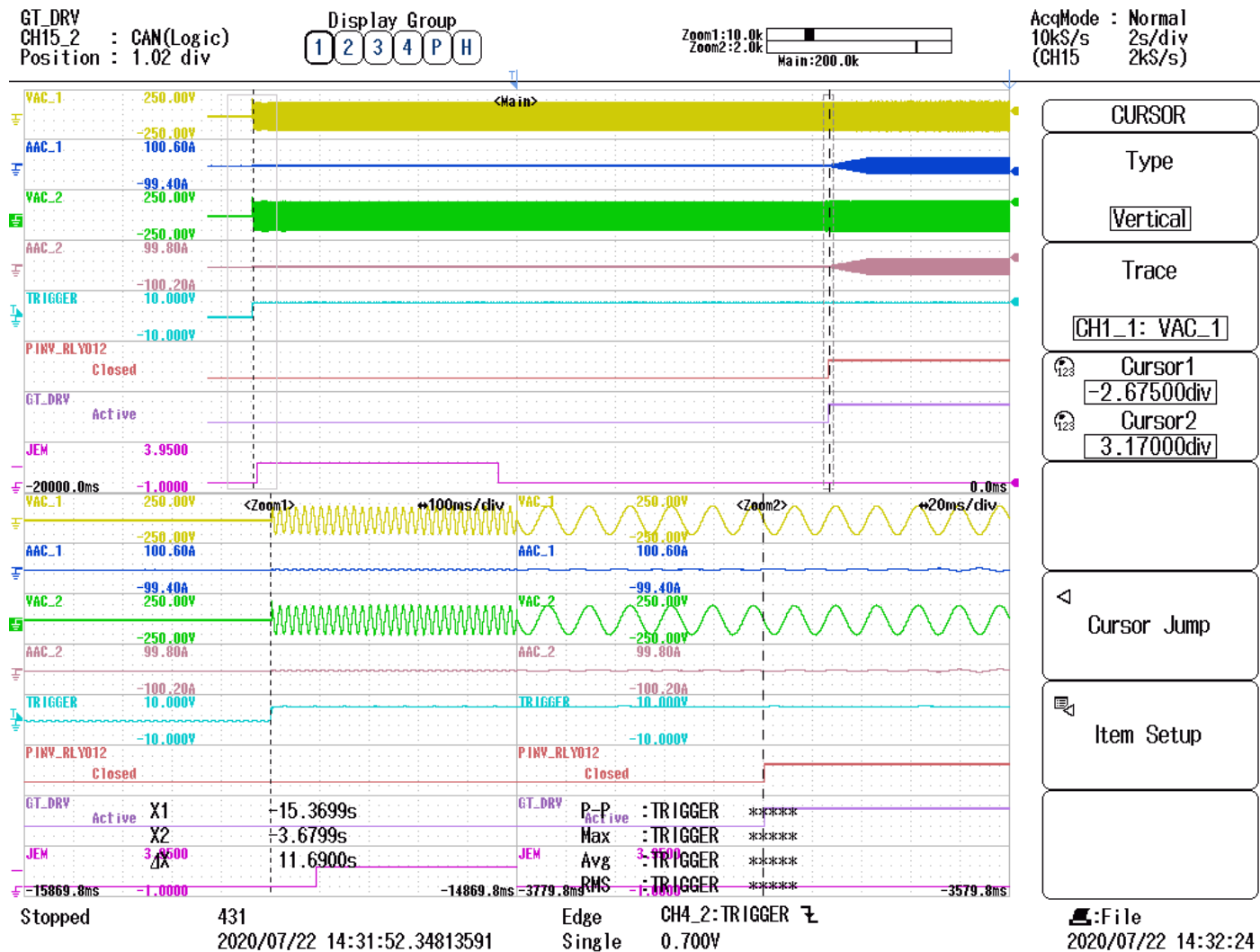


Figure 3.2.7.25 AI Reconnect time- Active and Passive Islanding, RLC 0% balanced load condition (11.69)

### 3.2.8.1 Islanding detection test with active islanding detection mode: normal

アクティブな単独運転検出モードを使用した単独運転検出テスト：通常

Parameter 設定値: 2 units(1 reverse phased)

Load Condition 負荷条件	Mode of Operation 動作モード	Method of Island Detection 単独運転検出モード	Cut Off Time 検出時限	Reconnect time 再並列阻止時間
Balanced load 不平衡負荷	Discharge 放電	Active 能動	< 0.2s	10 s

Output Power: 4.8 Kw

Parameters				Frequency	Operation Mode
Active Power		Reactive Power			
5	240	10	480	60Hz	Discharge

2 Inverters (1 reverse phased)								
Measurement Result 測定結果								
Gate Block (s) <sup>1</sup>	Relay Open (s) <sup>2</sup>	Gate Block (s)	Relay Open (s)	Reconnection Time (s)	Reconnection Time (s)	Max. Values	Average	Remarks
GB 時限	Ry 解列時限	GB 時限	Ry 解列時限	再並列阻止時間	再並列阻止時間			備考
0.1915	0.1915	0.1415	0.1415	11.486	11.535	0.1915	0.17483333	Fig 3.2.8.1.1; 3.2.8.1.2; 3.2.8.1.3; 3.2.8.1.4
0.135	0.135	0.14	0.14	11.738	11.685	0.14		
0.145	0.145	0.1915	0.1915	11.838	11.785	0.1915		
0.146	0.146	0.1335	0.1335	11.51	11.555	0.146		
0.1395	0.1395	0.184	0.184	11.777	11.719	0.184		
0.196	0.196	0.14	0.14	11.771	11.713	0.196		
0.1315	0.1315	0.13	0.13	11.803	11.844	0.1315		
0.158	0.158	0.198	0.198	11.64	11.68	0.198		
0.167	0.167	0.138	0.138	11.831	11.799	0.167		
0.186	0.186	0.155	0.155	11.535	11.702	0.186		
0.179	0.179	0.147	0.147	11.603	11.571	0.179		
0.195	0.195	0.181	0.181	11.771	11.737	0.195		
0.176	0.176	0.1425	0.1425	11.812	11.876	0.176		
0.175	0.175	0.139	0.19	11.88	11.889	0.19		
0.166	0.166	0.141	0.17	11.59	11.699	0.17		



**Scope Channel Description:**

AAC\_1: Unit 1 Phase A Current

AAC\_3: Unit 2 Phase A Current

VAC\_1: Phase A Voltage

VAC\_2: Phase B Voltage

PINV\_Relay\_1: Relay Signal from Unit 1

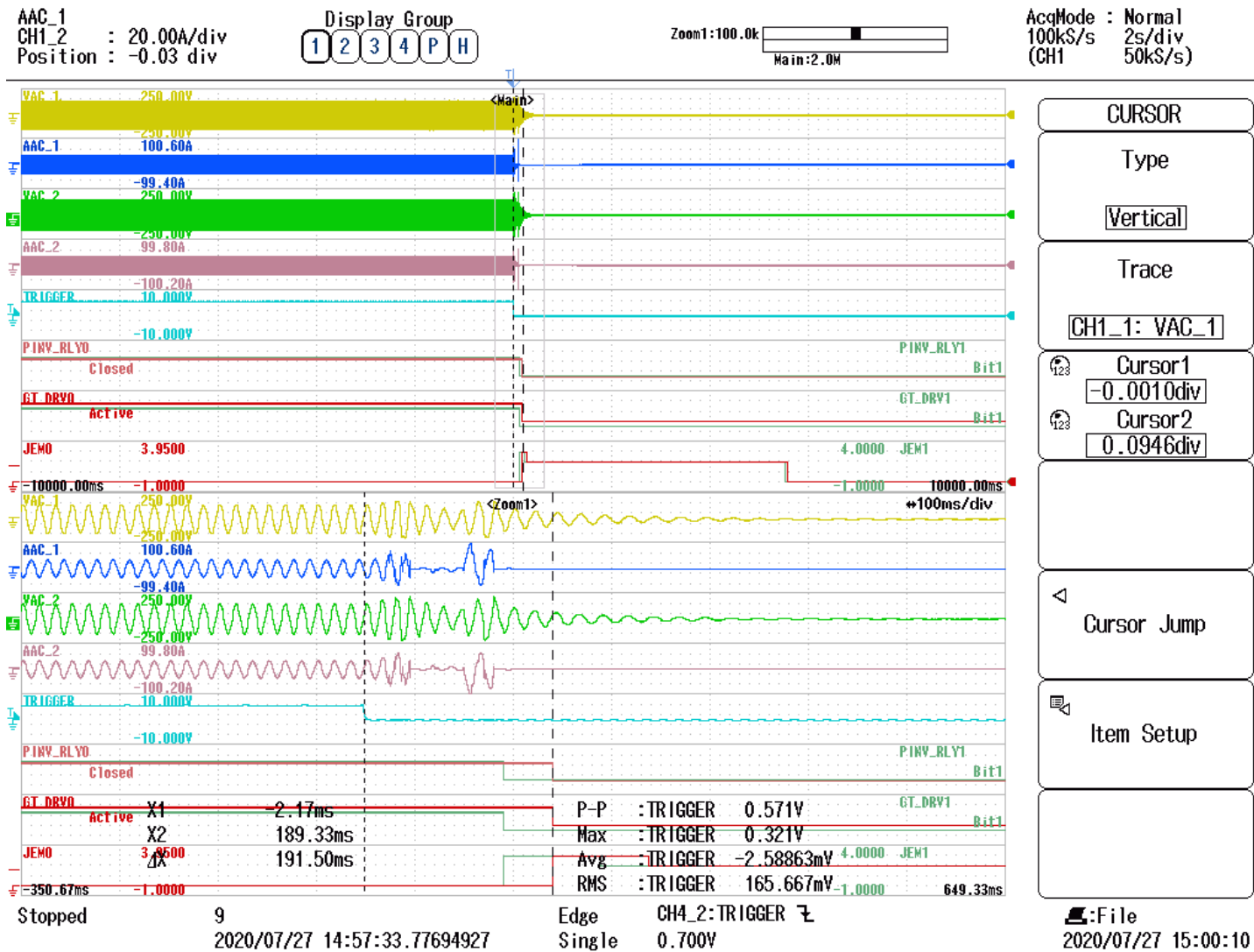
PINV\_Relay\_3: Relay Signal from Unit 2

GATE\_DRIVE\_1: Relay Signal from Unit 1

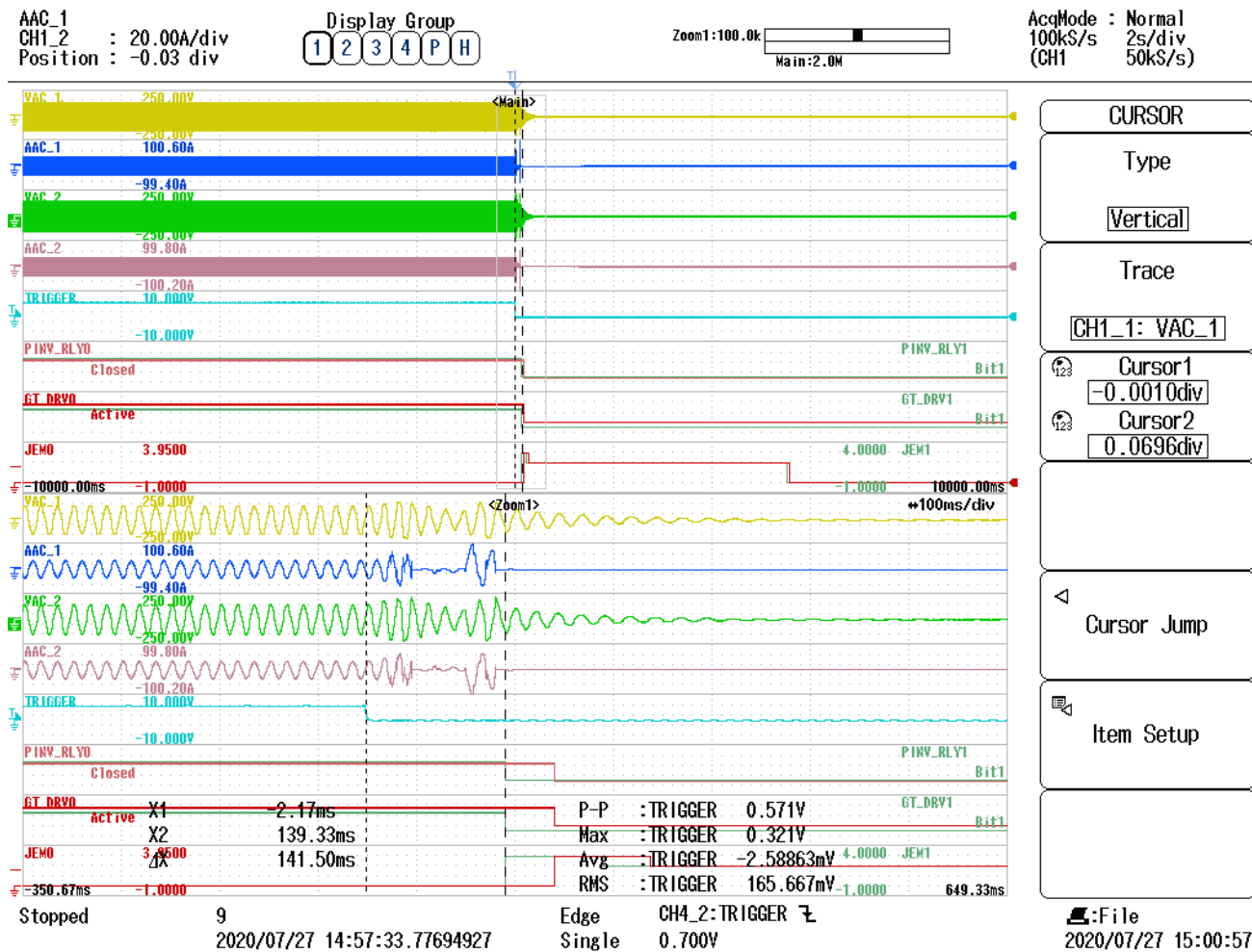
GATE\_DRIVE\_3: Relay Signal from Unit 2

JEM\_1: JEM Signal from Unit 1

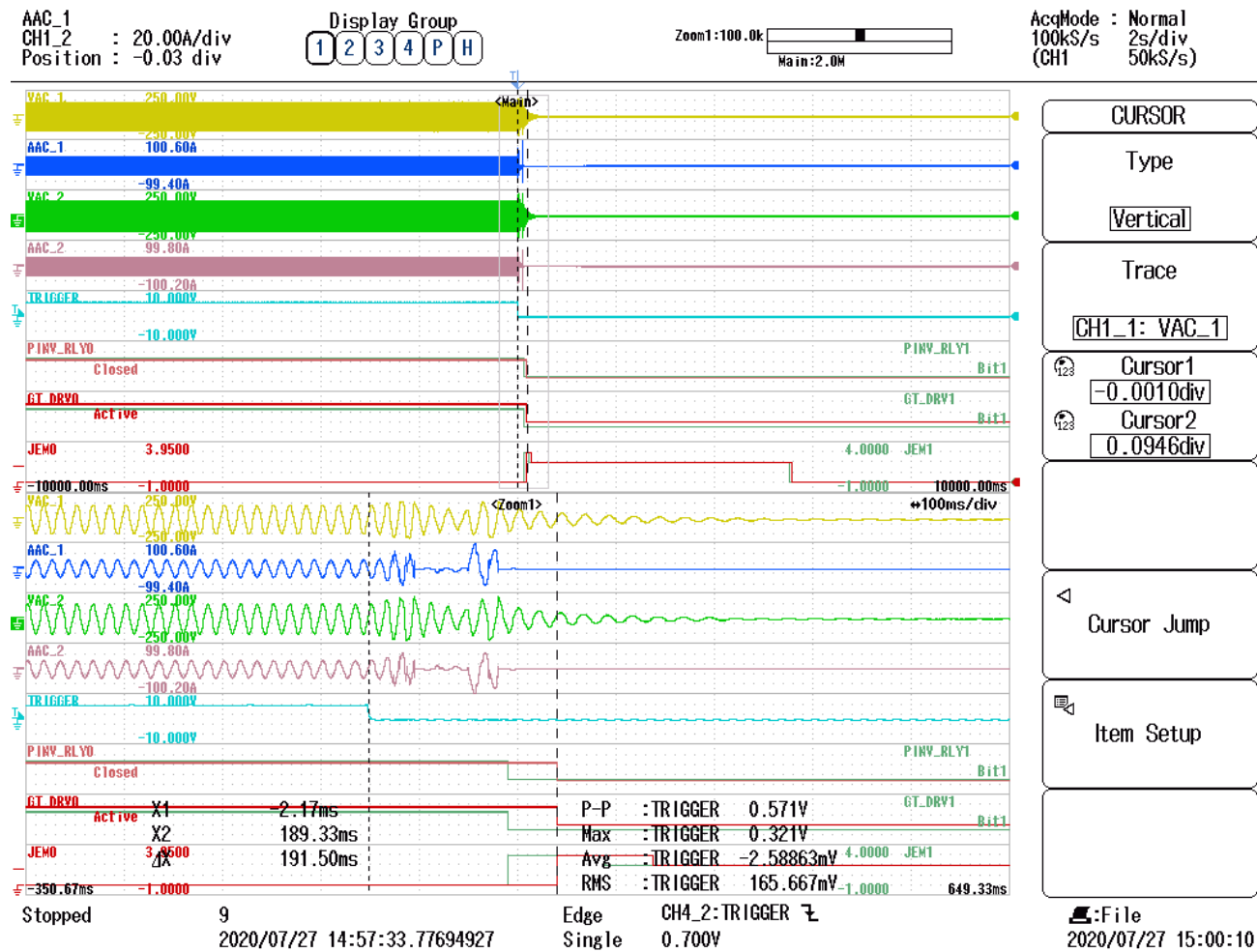
JEM\_3: JEM Signal from Unit 2

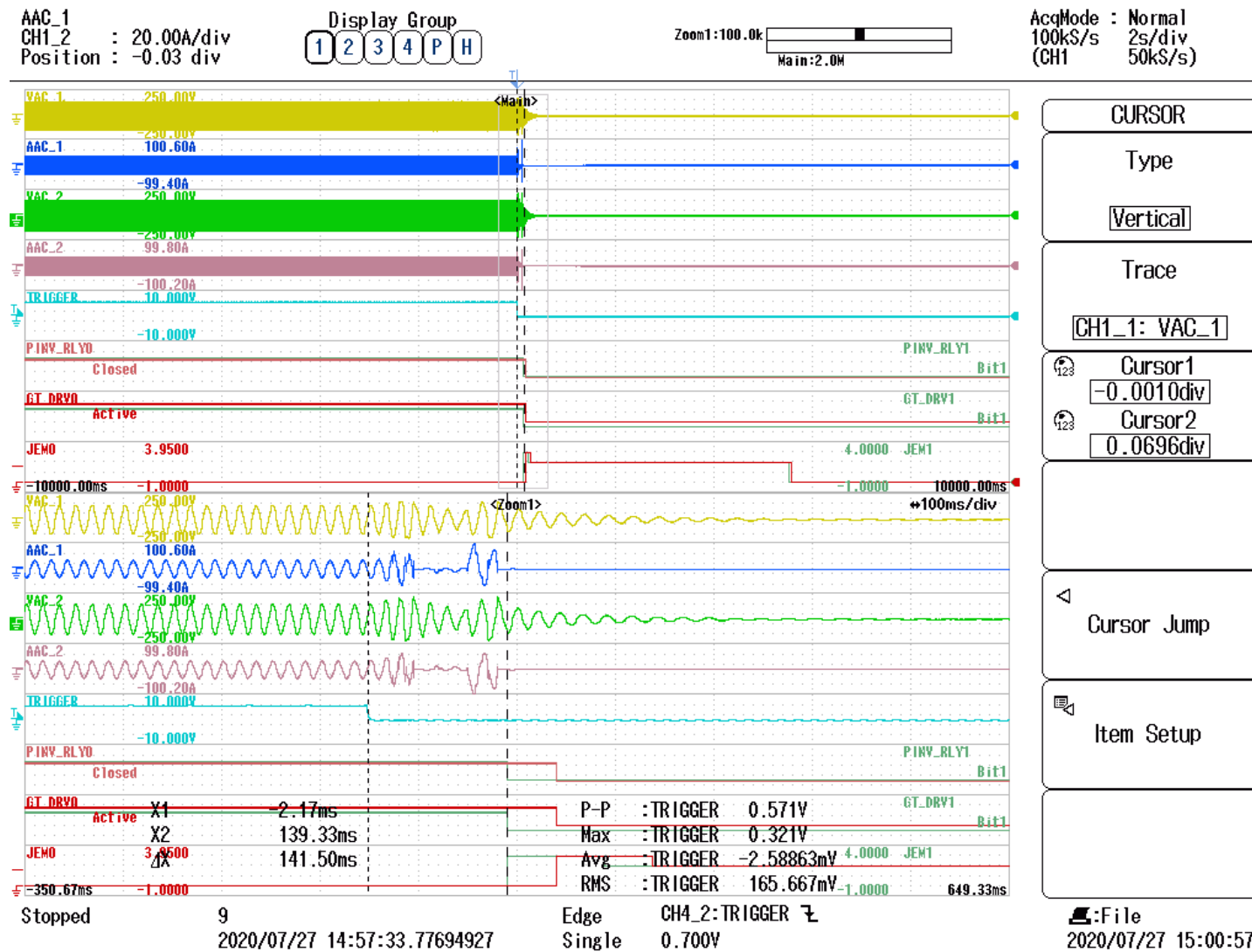


**Fig 3.2.8.1.1 AI gate signal open time @0.1915sec for unit 1**



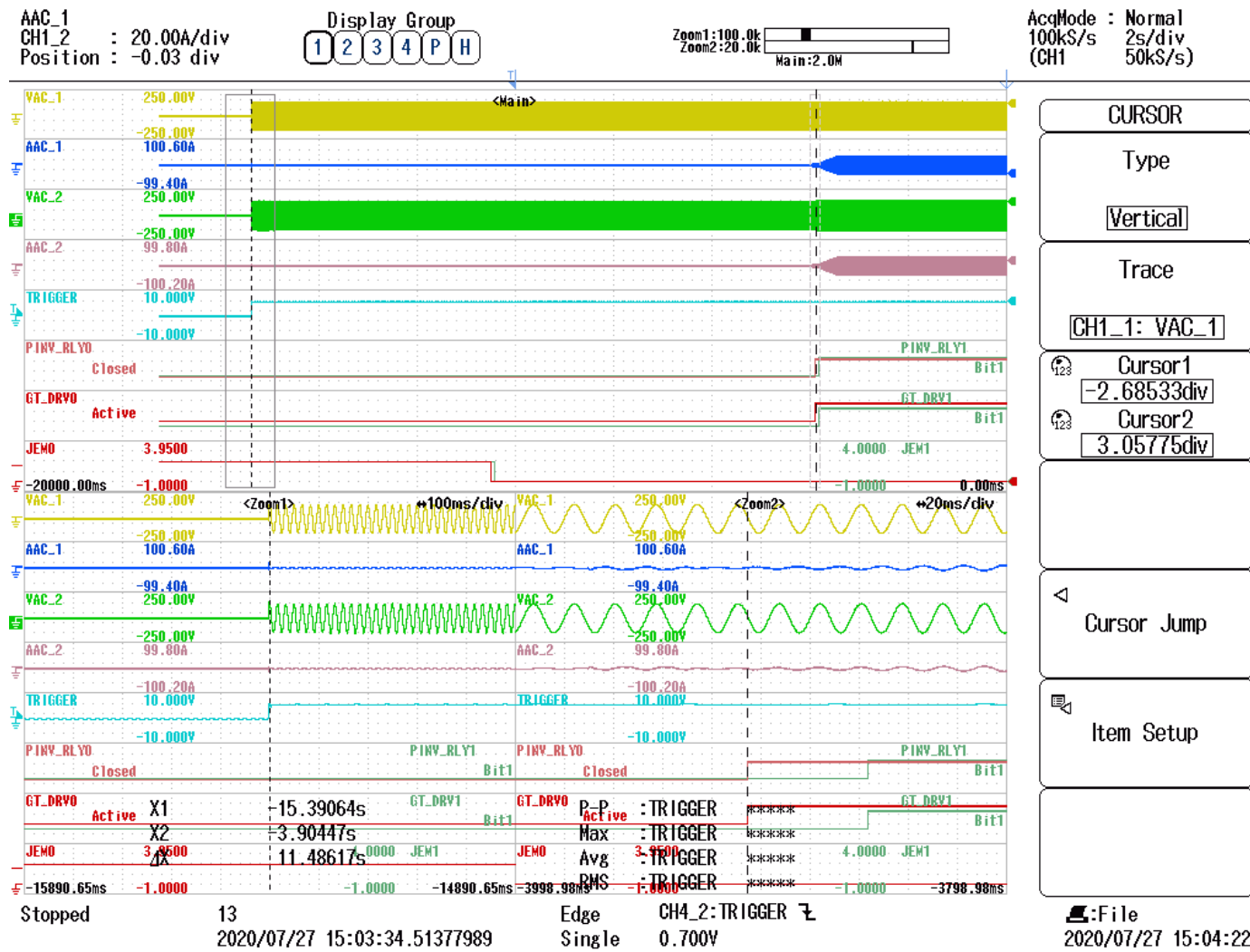
**Fig 3.2.8.1.2 AI gate signal open time @0.1415sec for unit 2**



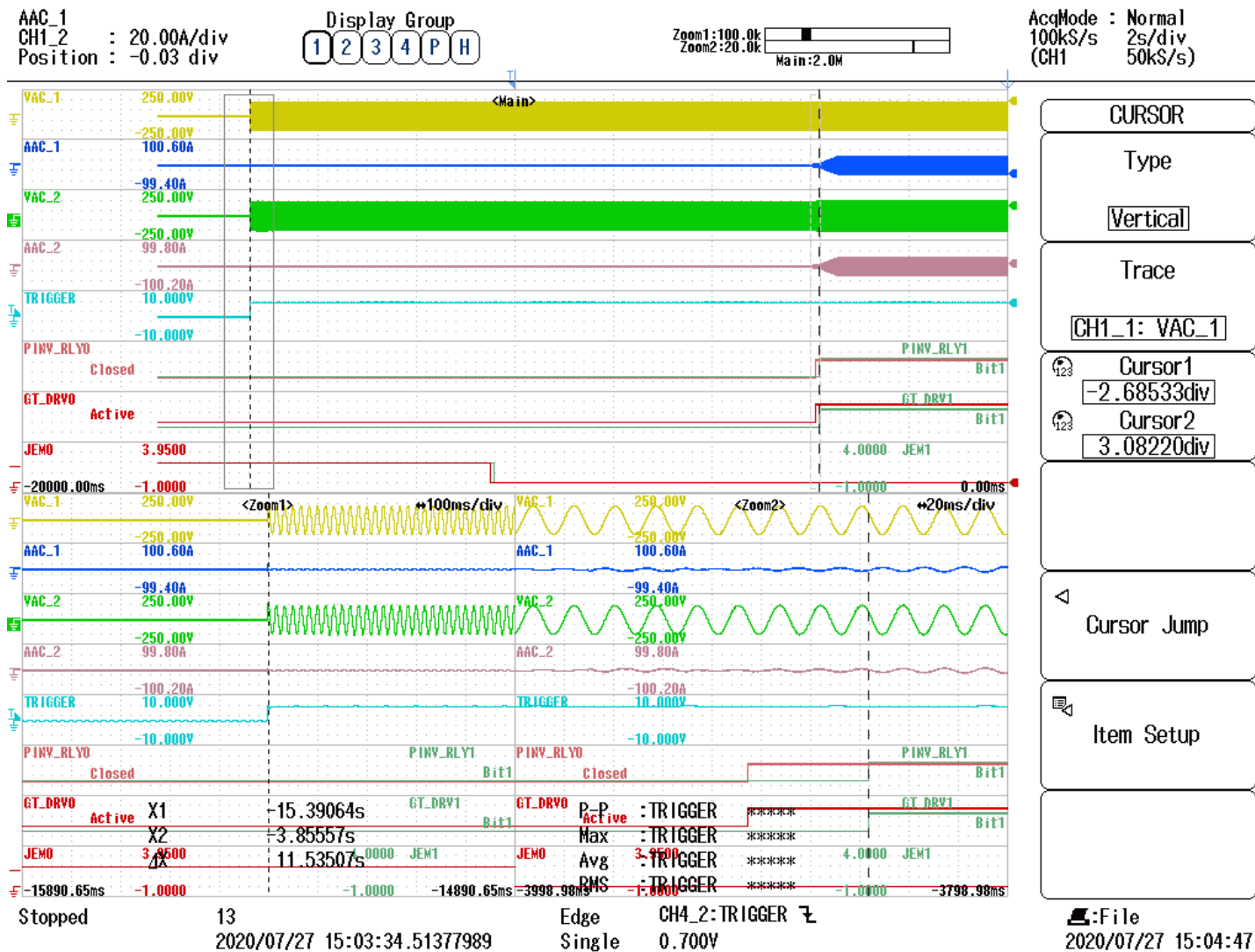


**Fig 3.2.8.1.4 AI relay signal open time @0.1415sec for unit 2**





**Fig 3.2.8.1.5 Reconnection time for unit 1 @11.486sec**



# Parameter 設定値: 3 units(1 reverse phased)

Load Condition 負荷条件	Mode of Operation 動作モード	Method of Island Detection 単独運転検出モード	Cut Off Time 検出時限	Reconnect time 再並列阻止時間
Balanced load 不平衡負荷	Discharge 放電	Active 能動	< 0.2s	10 s

Output Power: 4.8 Kw

Parameters 設定値				Frequency 周波数	Operation Mode 動作モード
Active Power 有効電力		Reactive Power 無効電力			
5	240	10	480	60Hz	Discharge

3 Inverters:(1 inverter phase reversed)												
Sr, no.	Unit 1		Unit 2		Unit 3		Unit 1	Unit 2	Unit 3			
	Gate Block time (s)	Relay open time (s)	Gate Block time (s)	Relay open time (s)	Gate Block time (s)	Relay open time (s)	Reconnect Time (s)	Reconnect Time (s)	Reconnect Time (s)	Remarks	Max. Value (s)	Average
	3 Units											
1	0.159	0.159	0.147	0.147	0.16	0.16	11.899	11.944	11.853	Fig: 3.2.8.1.7; 3.2.8.1.8; 3.2.8.1.9; 3.2.8.1.10; 3.2.8.1.11; 3.2.8.1.12; 3.2.8.1.13; 3.2.8.1.14; 3.2.8.1.15	0.171	0.1746
2	0.165	0.165	0.161	0.161	0.171	0.171	11.722	11.72	11.729		0.16	
3	0.149	0.149	0.146	0.146	0.157	0.157	11.794	11.791	11.802		0.157	
4	0.166	0.166	0.161	0.161	0.173	0.173	11.828	11.825	11.733		0.173	
5	0.136	0.136	0.131	0.131	0.143	0.143	11.786	11.78	11.69		0.143	
6	0.152	0.152	0.143	0.143	0.156	0.156	11.561	11.553	11.563		0.156	
7	0.141	0.141	0.184	0.184	0.181	0.181	11.77	11.754	11.765		0.184	
8	0.179	0.179	0.183	0.183	0.125	0.125	11.504	11.589	11.601		0.183	
9	0.176	0.176	0.181	0.181	0.176	0.176	11.723	11.802	11.718		0.181	
10	0.186	0.186	0.164	0.164	0.144	0.144	11.853	11.829	11.807		0.186	
11	0.186	0.186	0.15	0.15	0.144	0.144	11.867	11.839	11.876		0.186	
12	0.177	0.177	0.15	0.15	0.188	0.188	11.753	11.723	11.763		0.188	
13	0.181	0.181	0.152	0.152	0.19	0.19	11.83	11.799	11.738		0.19	
14	0.165	0.165	0.134	0.134	0.172	0.172	11.797	11.765	11.803		0.172	
15	0.159	0.159	0.131	0.131	0.189	0.189	11.588	11.552	11.589		0.189	



### **Scope Channel Description:**

AAC\_1: Unit 1 Phase A Current

AAC\_2: Unit 2 Phase A Current

AAC\_3: Unit 3 Phase A Current

VAC\_1: Phase A Voltage

VAC\_2: Phase B Voltage

PINV\_Relay\_1: Relay Signal from Unit 1

PINV\_Relay\_2: Relay Signal from Unit 2

PINV\_Relay\_3: Relay Signal from Unit 3

GATE\_DRIVE\_1: Relay Signal from Unit 1

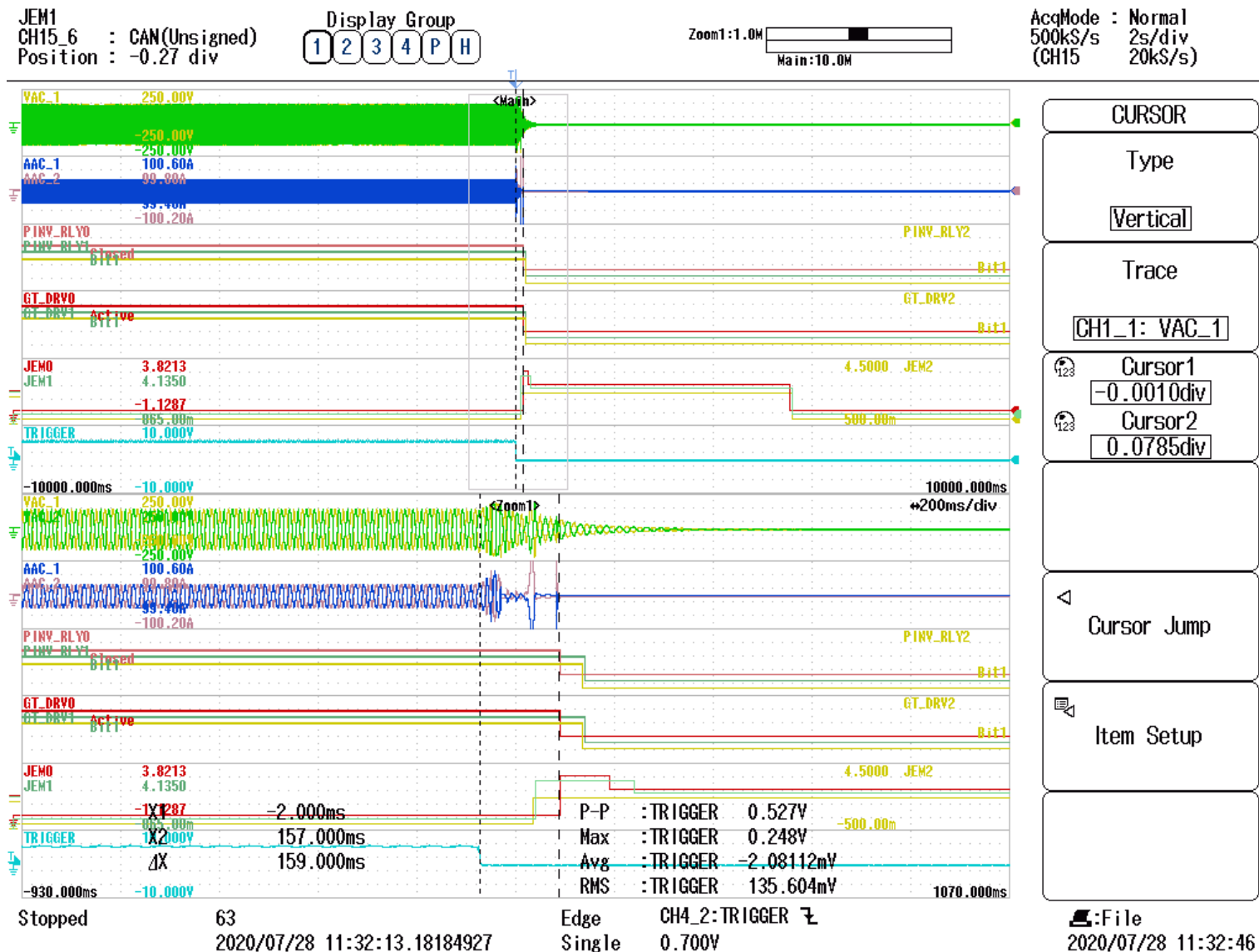
GATE\_DRIVE\_2: Relay Signal from Unit 2

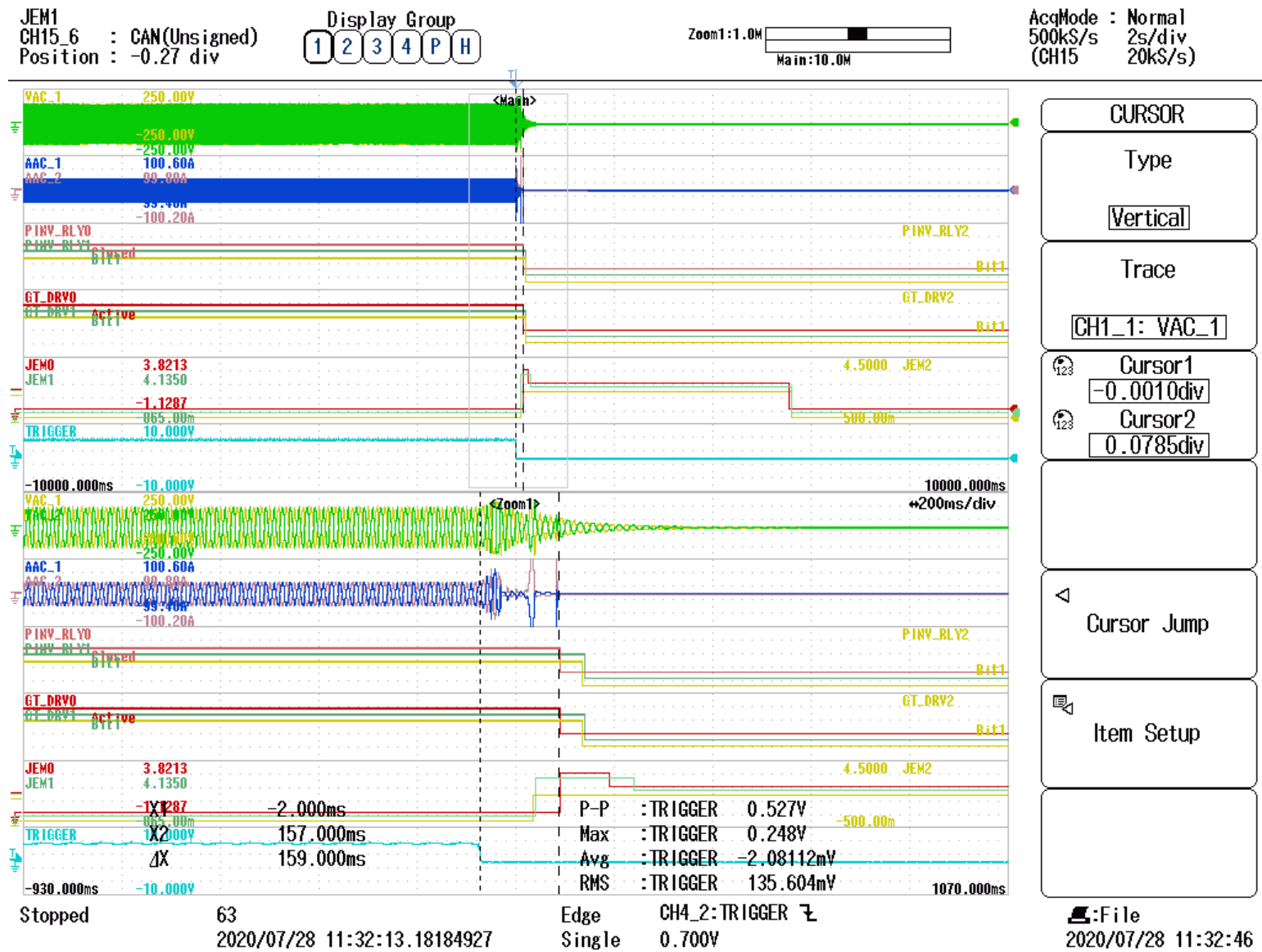
GATE\_DRIVE\_3: Relay Signal from Unit 3

JEM\_1: JEM Signal from Unit 1

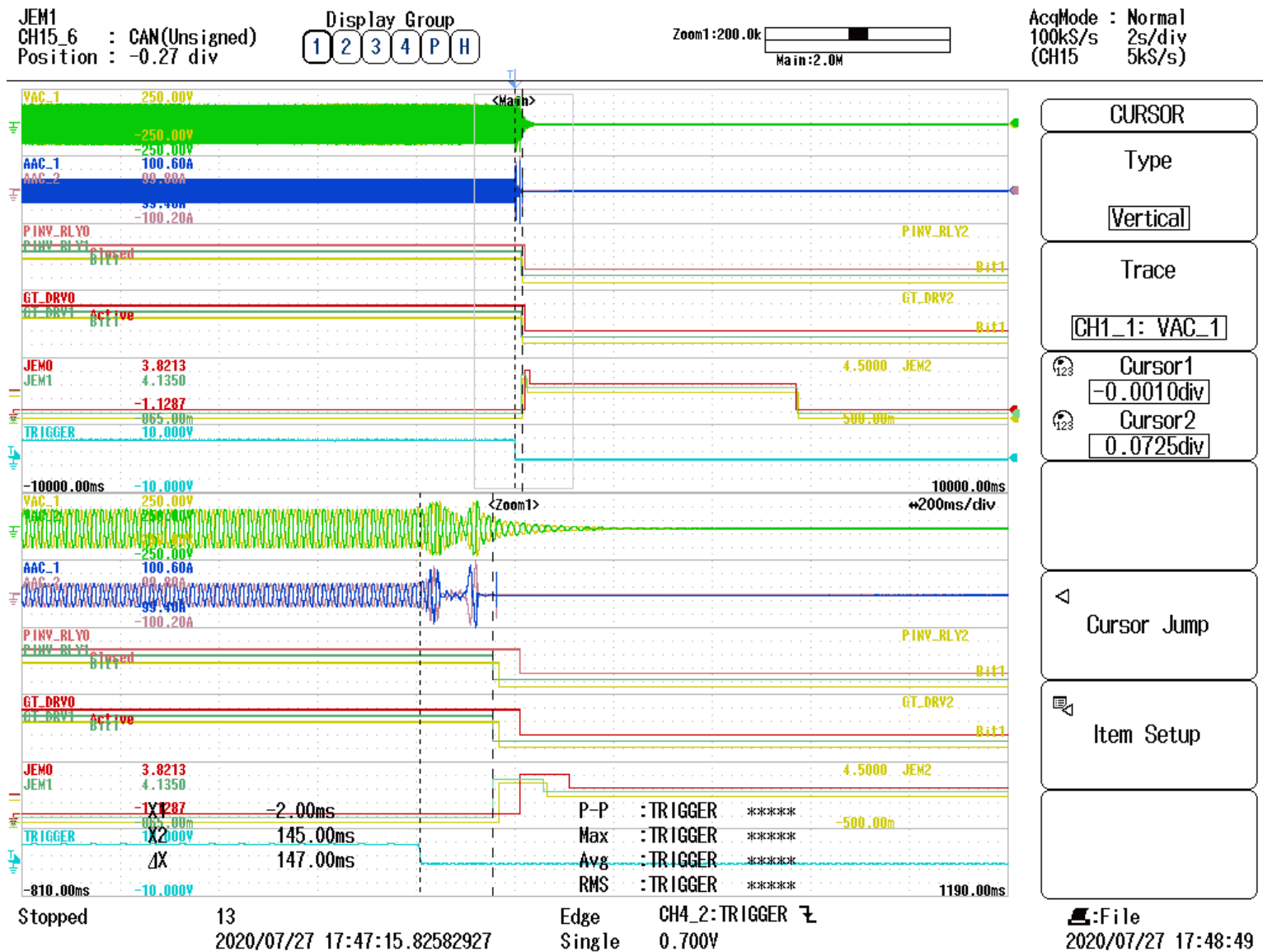
JEM\_2: JEM Signal from Unit 2

JEM\_3: JEM Signal from Unit 3





**Fig 3.2.8.1.8 AI relay signal open time @0.159sec for unit 1**



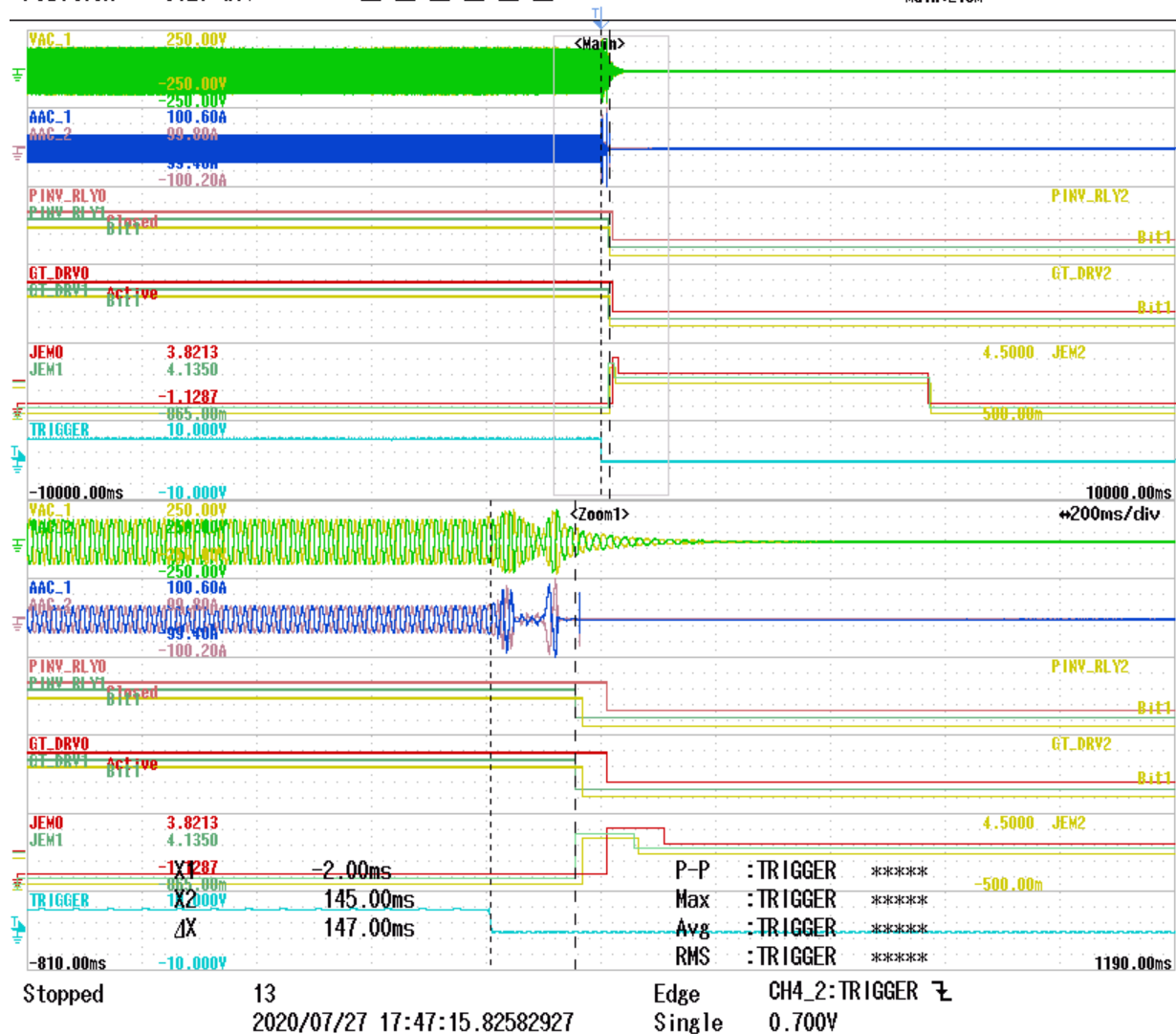


```
JEM1
CH15_6 : CAN(Unsigned)
Position : -0.27 div
```

Display Group

Zoom1:200.0k  
Main:2.0M

AcqMode : Normal  
100kS/s 2s/div  
(CH15 5kS/s)



CURSOR

Type

Vertical

Trace


CH1\_1: VAC\_1

Cursor1  
-0.0010div

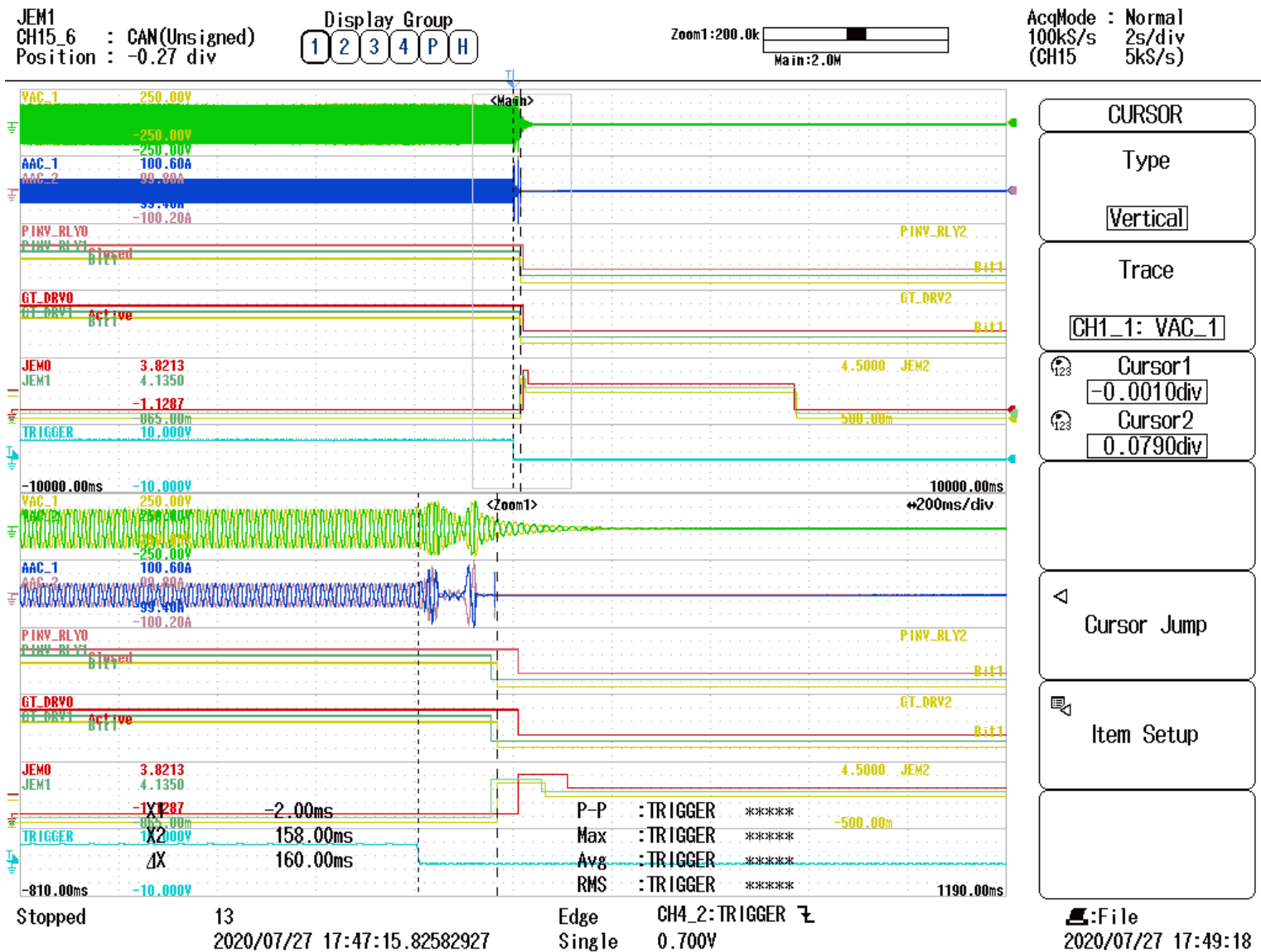
Cursor2  
0.0725div

△	Cursor Jump
---	-------------

## Item Setup

:File  
2020/07/27 17:48:49

#### 3.2.8.1.10 AI relay signal open time @0.147sec for unit 2

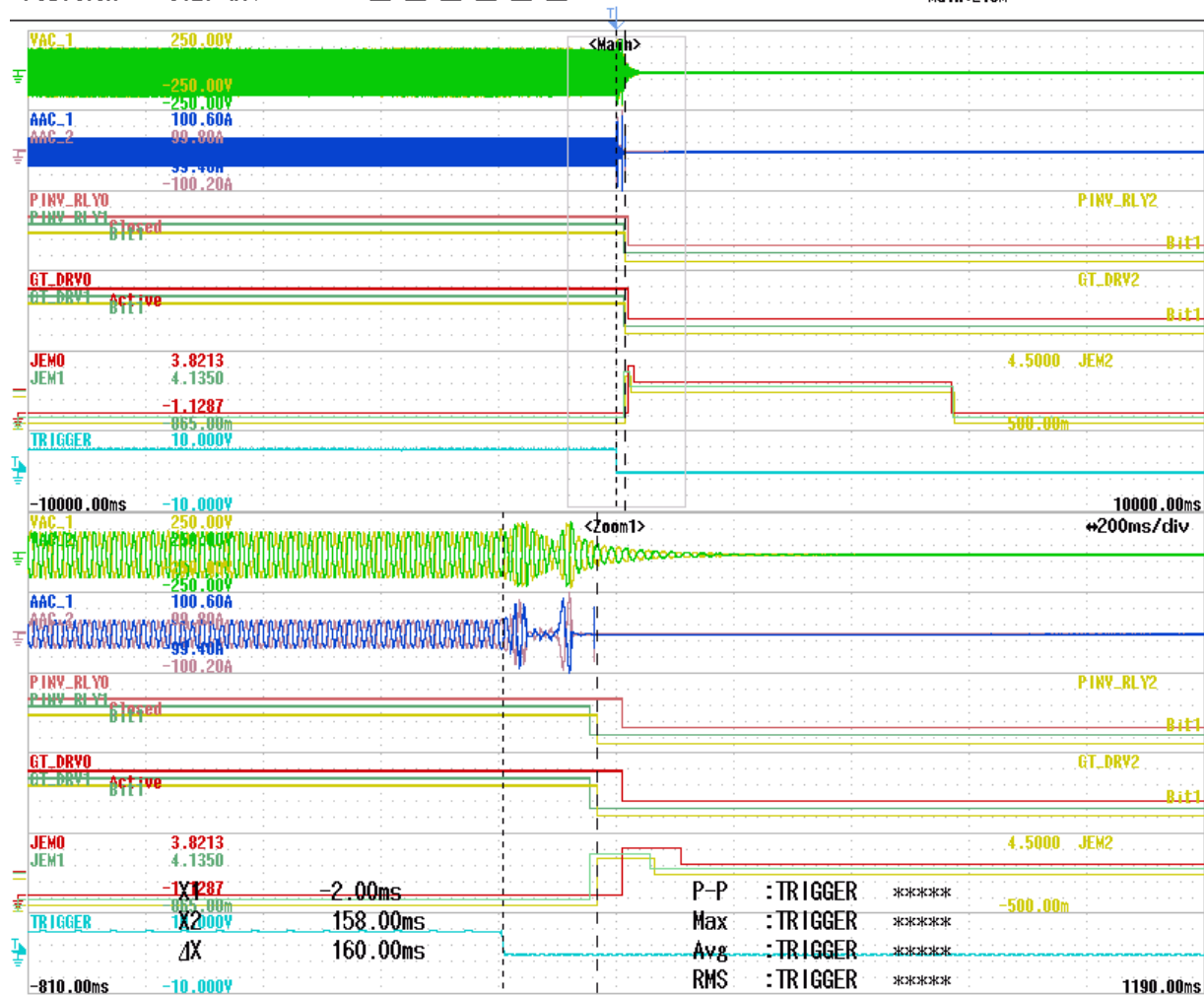


```
JEM1
CH15_6 : CAN(Unsigned)
Position : -0.27 div
```

Display Group

Zoom1:200.0k  
Main:2.0M

AcqMode : Normal  
100kS/s 2s/div  
(CH15 5kS/s)



CURSOR

Type

Vertical

Trace

CH1\_1: VAC\_1

Cursor1  
-0.0010div

Cursor2  
0.0790div

Cursor2  
0.0790div

### Cursor Jump

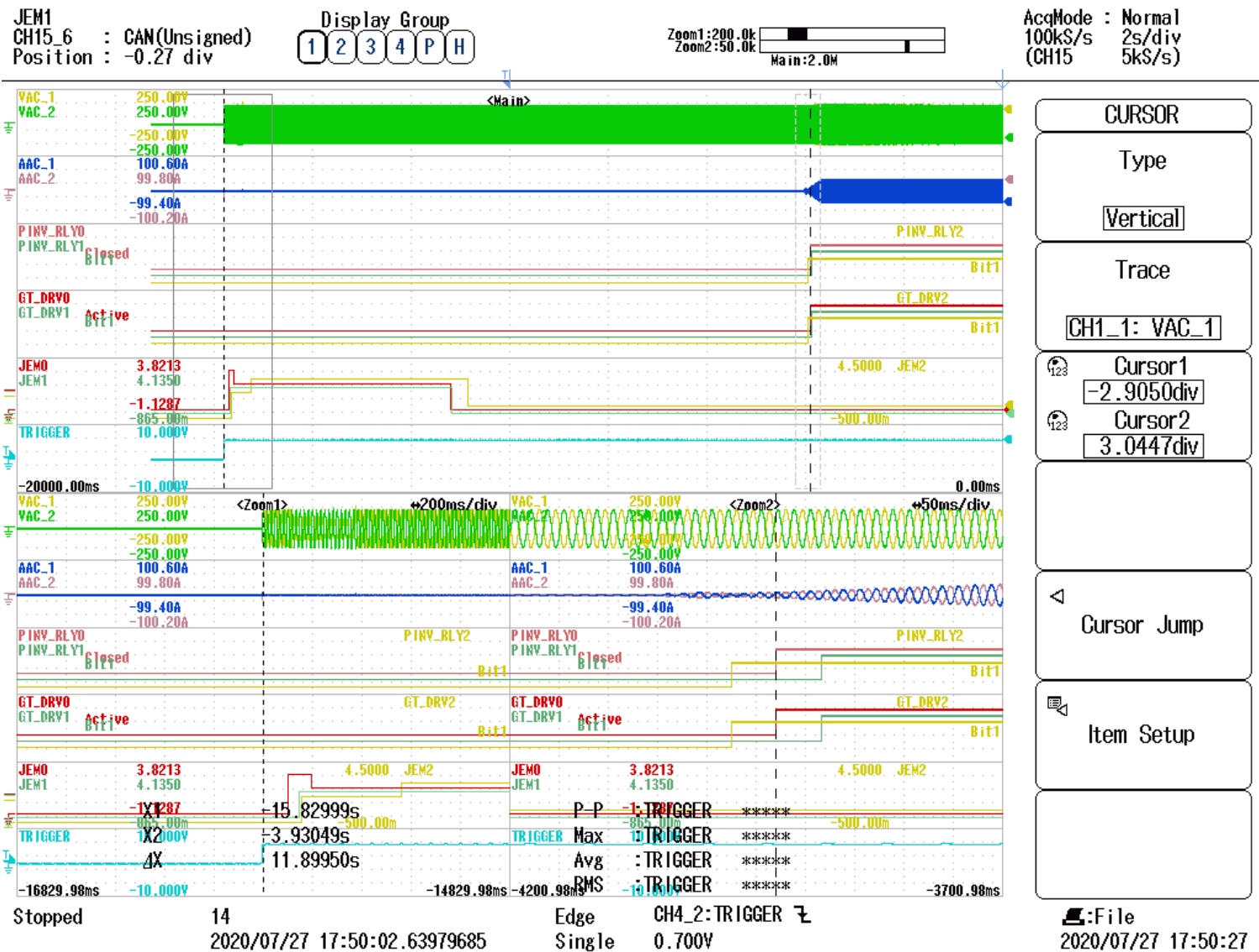
Item Setup

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Stopped 13
2020/07/27 17:47:15.82582927
```

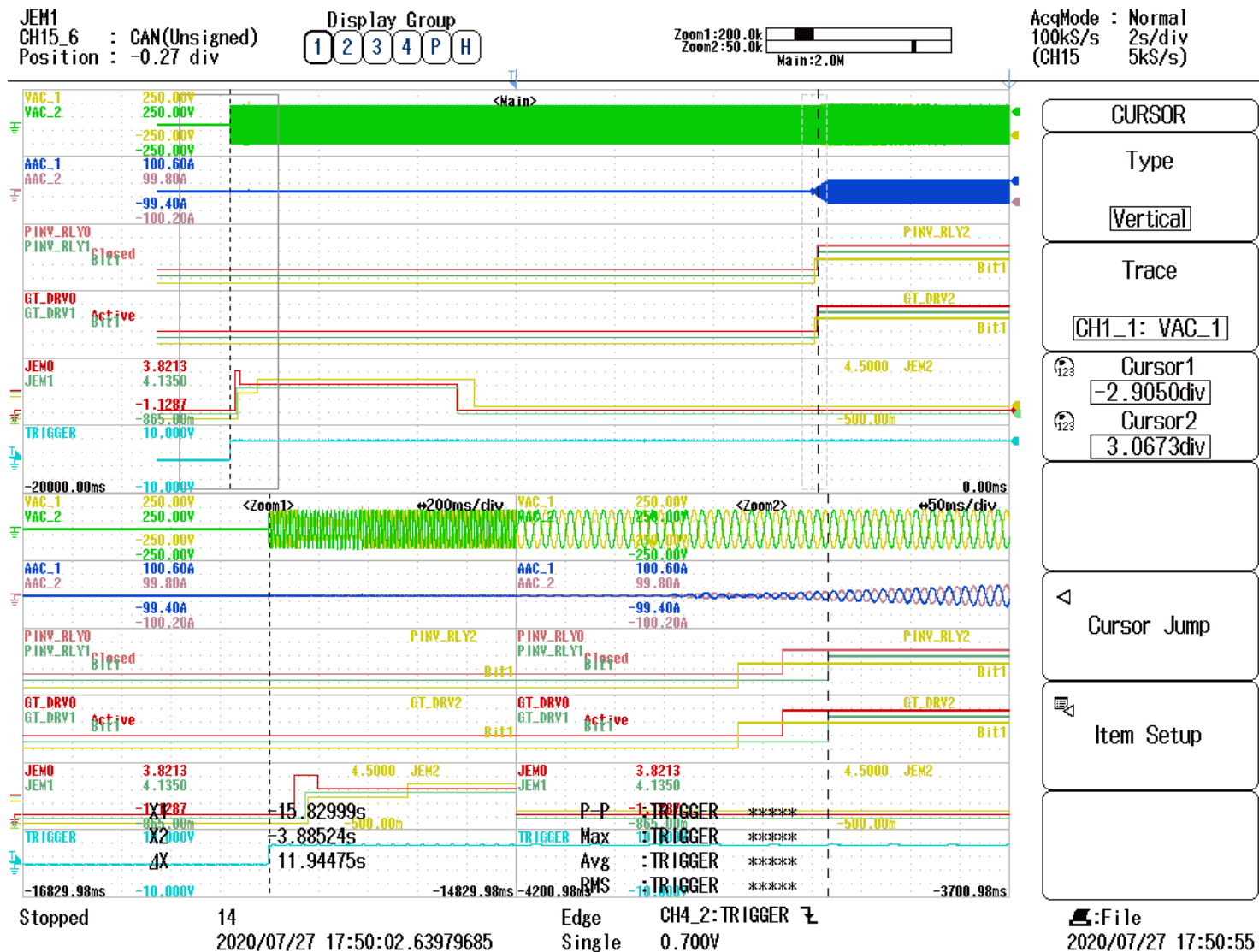
Edge CH4\_2:TRIGGER 7  
Single 0.700V

:File  
2020/07/27 17:49:18

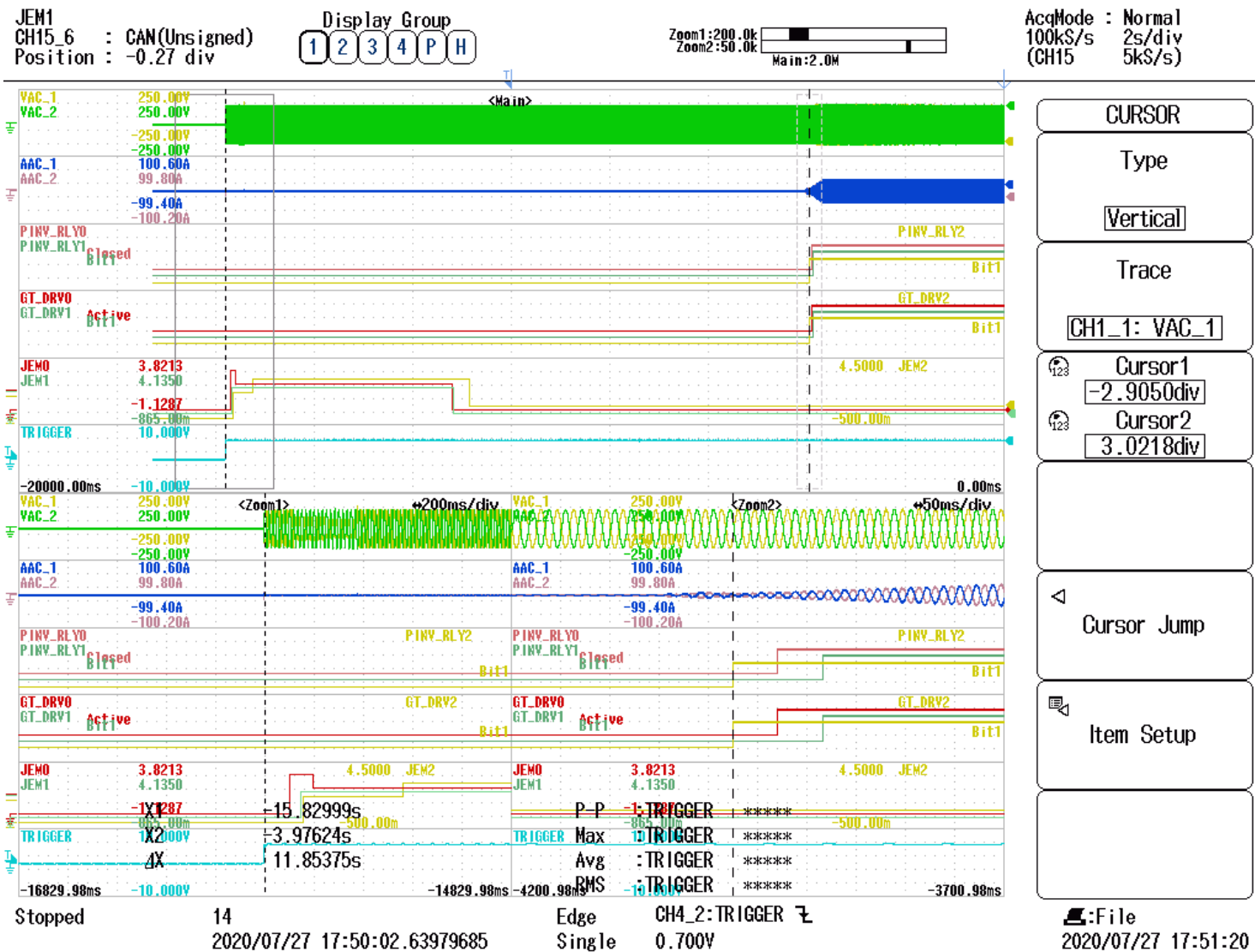
### 3.2.8.1.12 AI relay signal open time @0.16sec for unit 3



**Fig 3.2.8.1.13 Reconnection time for unit 1 @11.899sec**



**Fig 3.2.8.1.14 Reconnection time for unit 2 @11.944sec**



**Fig 3.2.8.1.15 Reconnection time for unit 3 @11.853sec**

# Parameter 設定値: 4 units(2 reverse phased)

Load Condition 負荷条件	Mode of Operation 動作モード	Method of Island Detection 単独運転検出モード	Cut Off Time 検出時限	Reconnect time 再並列阻止時間
Balanced load 不平衡負荷	Discharge 放電	Active 能動	< 0.2s	10 s

Output Power: 4.8 Kw

Parameters 設定値				Frequency 周波数	Operation Mode 動作モード
Active Power 有効電力		Reactive Power 無効電力			
5	240	10	480	60Hz	Discharge

4 Inverters:(2 inverters phase reversed)											
Sr,no.	Unit 1(reversed)		Unit 2		Unit 3 (reversed)		Unit 4				
	Gate Block time (s)	Relay open time (s)	Gate Block time (s)	Relay open time (s)	Gate Block time (s)	Relay open time (s)	Gate Block time (s)	Relay open time (s)	Max. Values	Average	
	4 Units										
1	0.126	0.126	0.125	0.125	0.138	0.138	0.185	0.185	0.182	0.158	Fig: 3.2.8.1.16; 3.2.8.1.17; 3.2.8.1.18; 3.2.8.1.19; 3.2.8.1.20; 3.2.8.1.21; 3.2.8.1.22; 3.2.8.1.23; 3.2.8.1.24; 3.2.8.1.25; 3.2.8.1.26; 3.2.8.1.27
2	0.13	0.13	0.121	0.121	0.125	0.125	0.196	0.196	0.196		
3	0.12	0.12	0.124	0.124	0.139	0.139	0.134	0.134	0.139		
4	0.133	0.133	0.13	0.13	0.148	0.148	0.176	0.176	0.176		
5	0.133	0.133	0.142	0.142	0.145	0.145	0.183	0.183	0.183		
6	0.191	0.191	0.18	0.18	0.178	0.178	0.179	0.179	0.191		
7	0.125	0.125	0.129	0.129	0.139	0.139	0.174	0.174	0.174		
8	0.13	0.13	0.124	0.124	0.127	0.127	0.177	0.177	0.176		
9	0.123	0.123	0.121	0.121	0.132	0.132	0.176	0.176	0.185		
10	0.151	0.151	0.141	0.141	0.133	0.133	0.136	0.136	0.151		
11	0.121	0.121	0.12	0.12	0.125	0.125	0.179	0.179	0.179		
12	0.12	0.12	0.179	0.179	0.18	0.18	0.124	0.124	0.18		
13	0.151	0.151	0.18	0.18	0.163	0.163	0.182	0.182	0.182		
14	0.123	0.123	0.134	0.134	0.127	0.127	0.133	0.133	0.134		
15	0.179	0.179	0.174	0.174	0.182	0.182	0.13	0.13	0.182		



Unit 1	Unit 2	Unit 3	Unit 4
Reconnect Time (s)	Reconnect Time (s)	Reconnect Time (s)	Reconnect Time (s)
11.801	11.757	11.731	11.785
12.017	11.872	11.943	11.99
11.801	11.792	11.786	11.756
11.571	11.55	11.51	11.553
11.74	11.808	11.794	11.752
11.891	11.847	11.875	11.839
11.807	11.739	11.731	11.74
11.882	11.832	11.842	11.833
11.748	11.729	11.732	11.731
11.737	11.694	11.687	11.693
11.919	11.861	11.857	11.86
11.73	11.711	11.717	11.709
11.609	11.619	11.62	11.604
11.855	11.763	11.777	11.774
11.744	11.71	11.711	11.715



### **Scope Channel Description:**

AAC\_1: Unit 1 Phase A Current  
AAC\_2: Unit 2 Phase A Current  
AAC\_3: Unit 3 Phase A Current  
AAC\_4: Unit 4 Phase A Current

VAC\_1: Phase A Voltage  
VAC\_2: Phase B Voltage

PINV\_Relay\_1: Relay Signal from Unit 1  
PINV\_Relay\_2: Relay Signal from Unit 2  
PINV\_Relay\_3: Relay Signal from Unit 3  
PINV\_Relay\_4: Relay Signal from Unit 4

GATE\_DRIVE\_1: Relay Signal from Unit 1  
GATE\_DRIVE\_2: Relay Signal from Unit 2  
GATE\_DRIVE\_3: Relay Signal from Unit 3  
GATE\_DRIVE\_4: Relay Signal from Unit 4

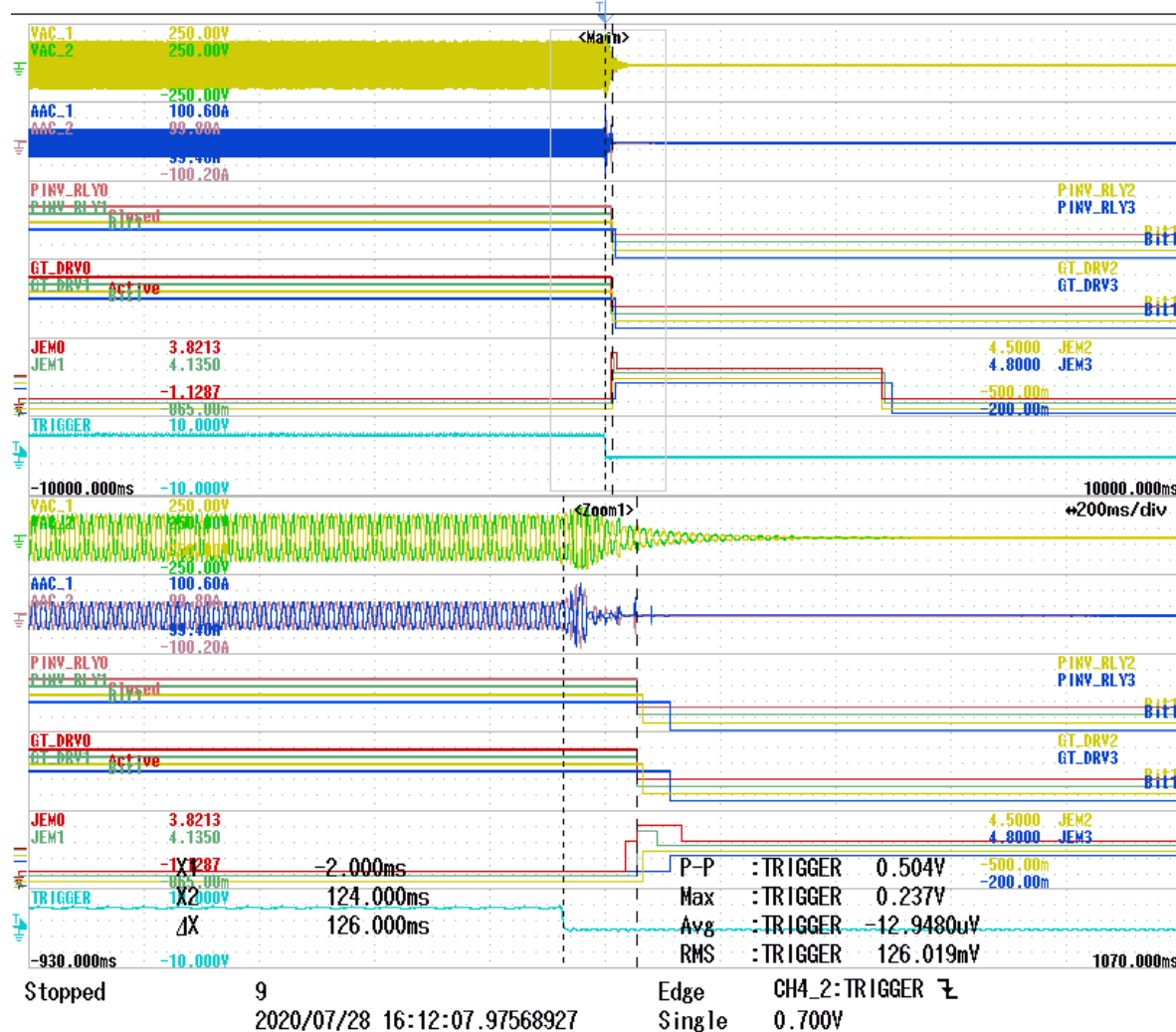
JEM\_1: JEM Signal from Unit 1  
JEM\_2: JEM Signal from Unit 2  
JEM\_3: JEM Signal from Unit 3  
JEM\_4: JEM Signal from Unit 4

PINV\_RLY3  
CH15\_10 : CAN(Logic)  
Position : -3.00 div

Display Group  
1 2 3 4 P H

Zoom1:1.0M  
Main:10.0M

AcqMode : Normal  
500kS/s 2s/div  
(CH15 20kS/s)



CURSOR

Type

Vertical

Trace

CH1\_1: VAC\_1

Cursor1

-0.0010div

Cursor2

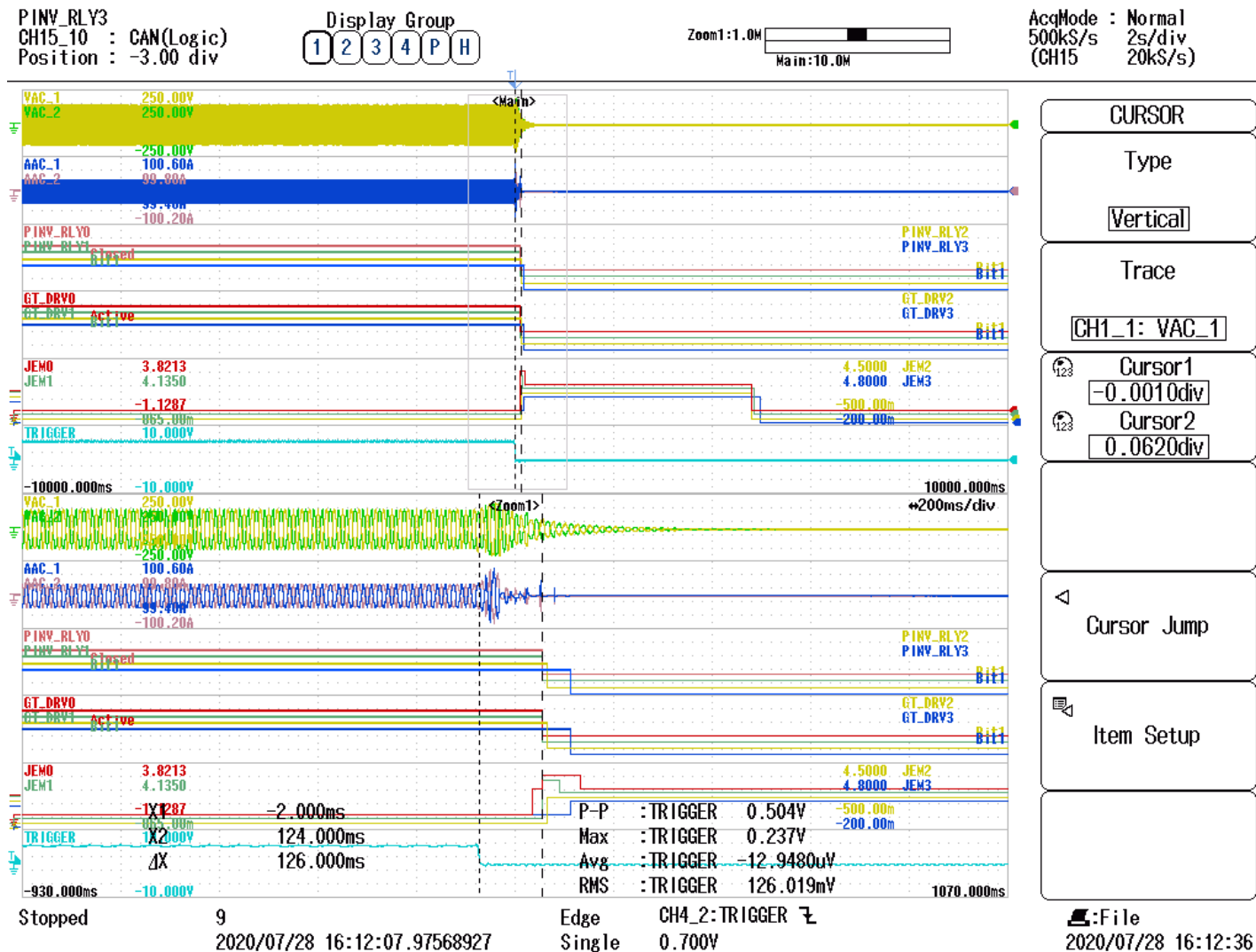
0.0620div

Cursor Jump

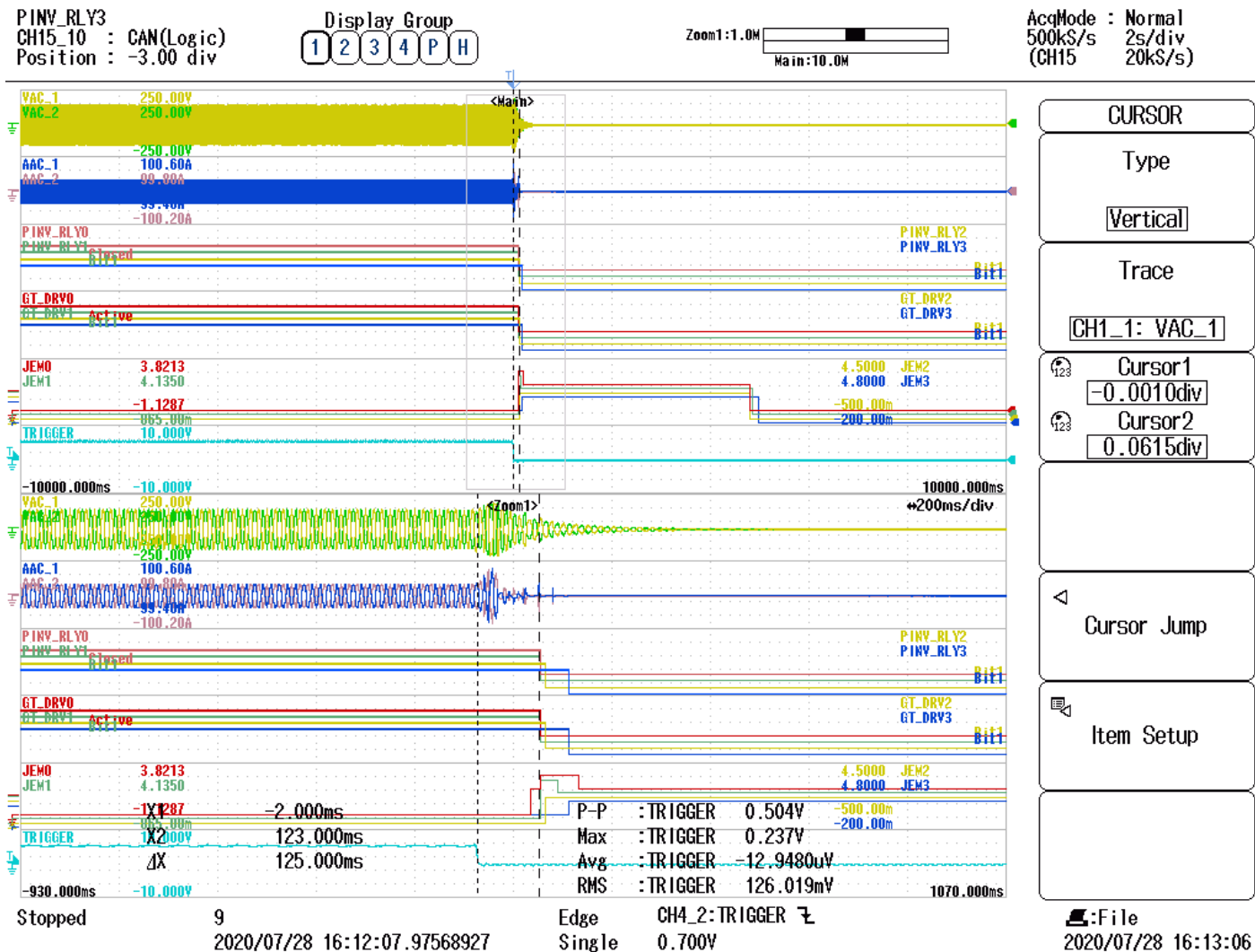
Item Setup

File  
2020/07/28 16:12:36

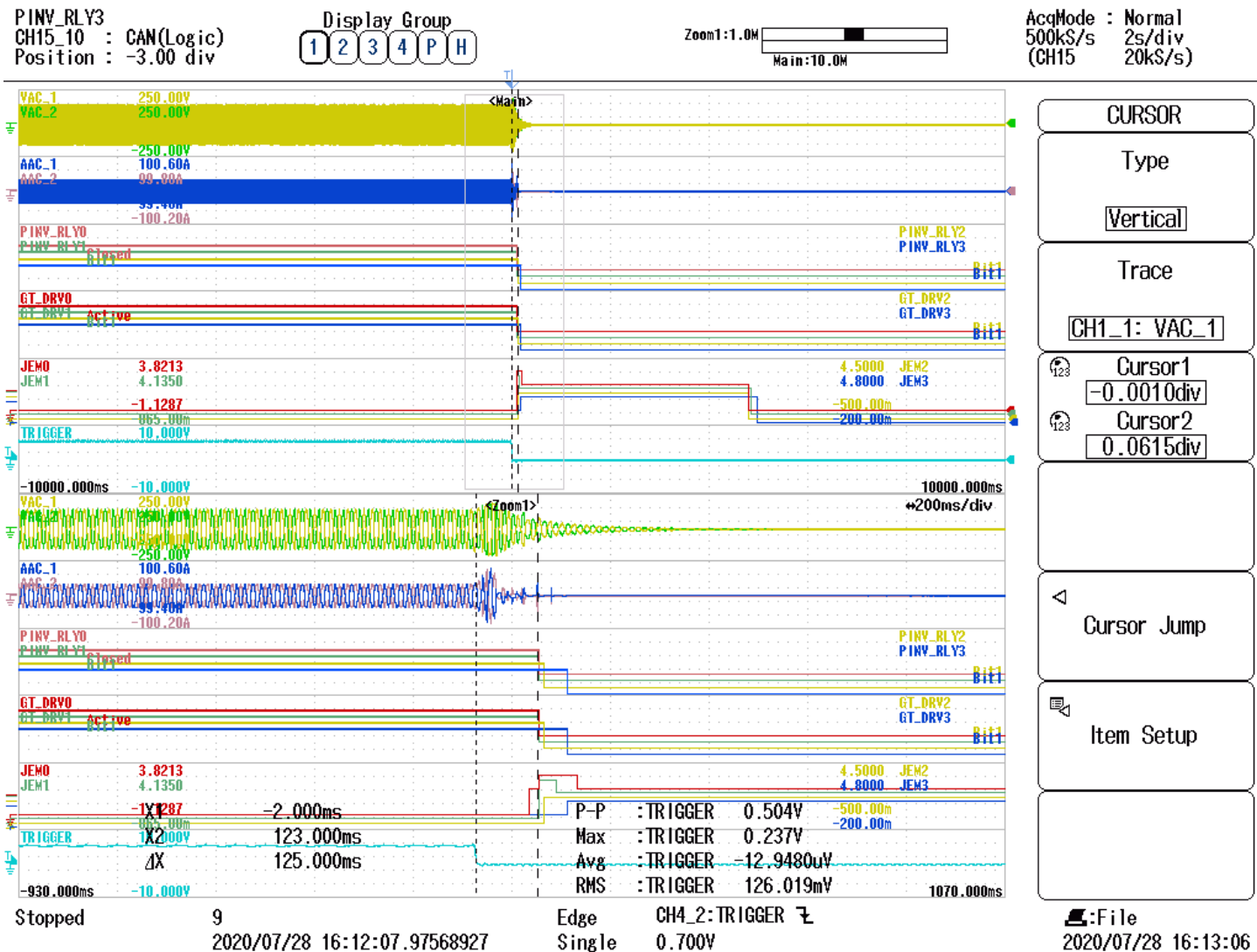
### 3.2.8.1.16 AI Gate signal open time @0.126sec for unit 1

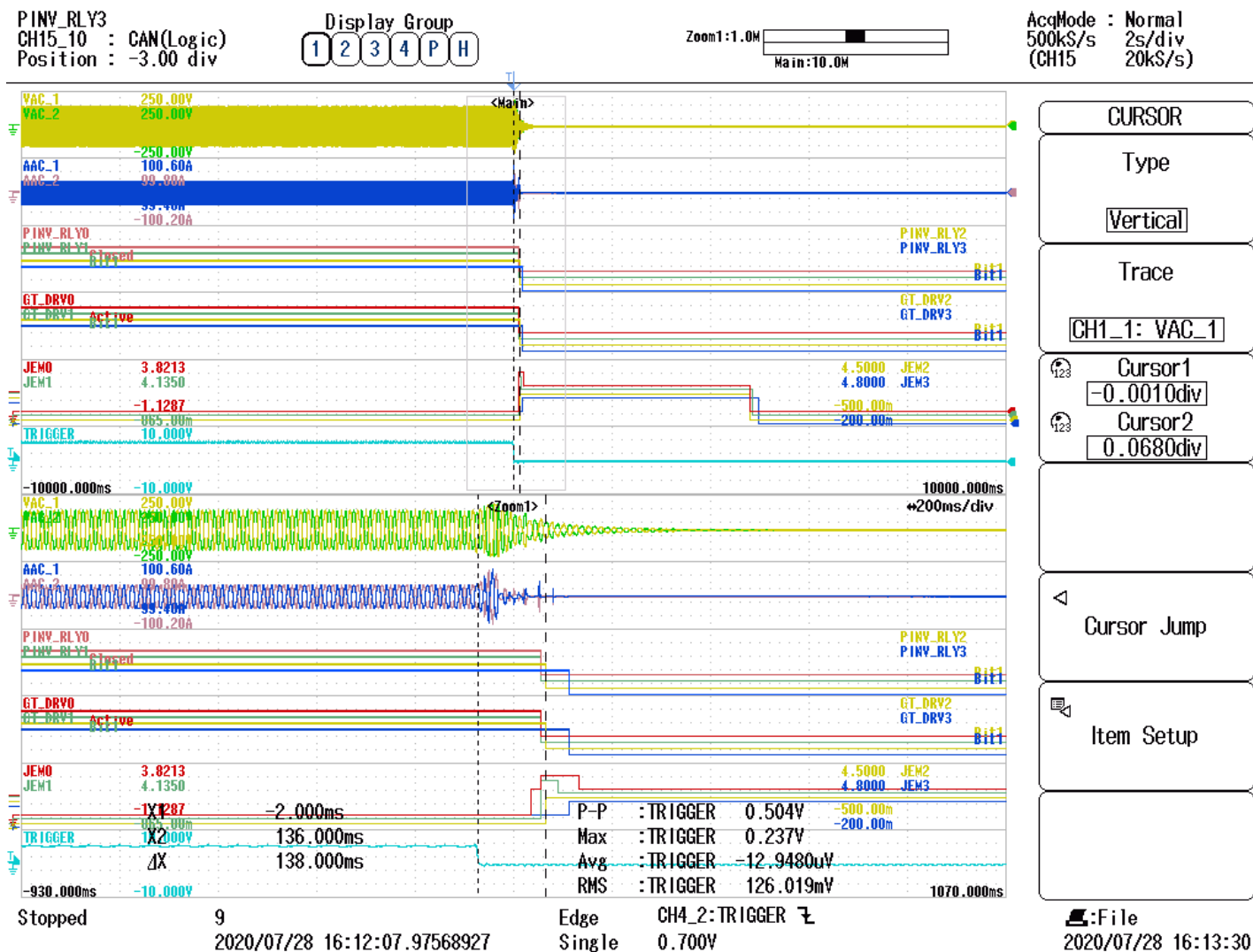


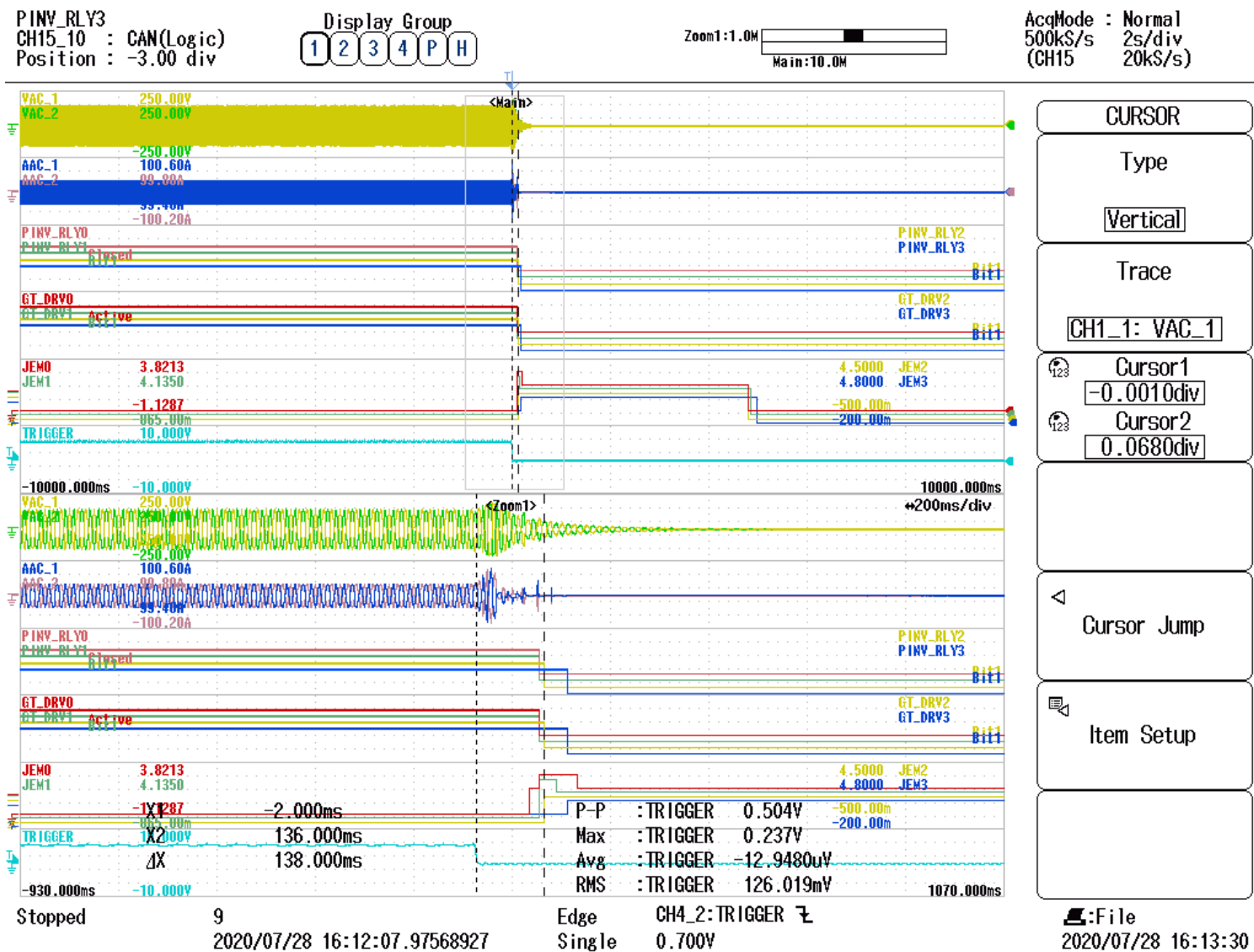
### 3.2.8.1.17 AI relay signal open time @0.126sec for unit 1



### **3.2.8.1.18 AI Gate signal open time @0.125sec for unit 2**







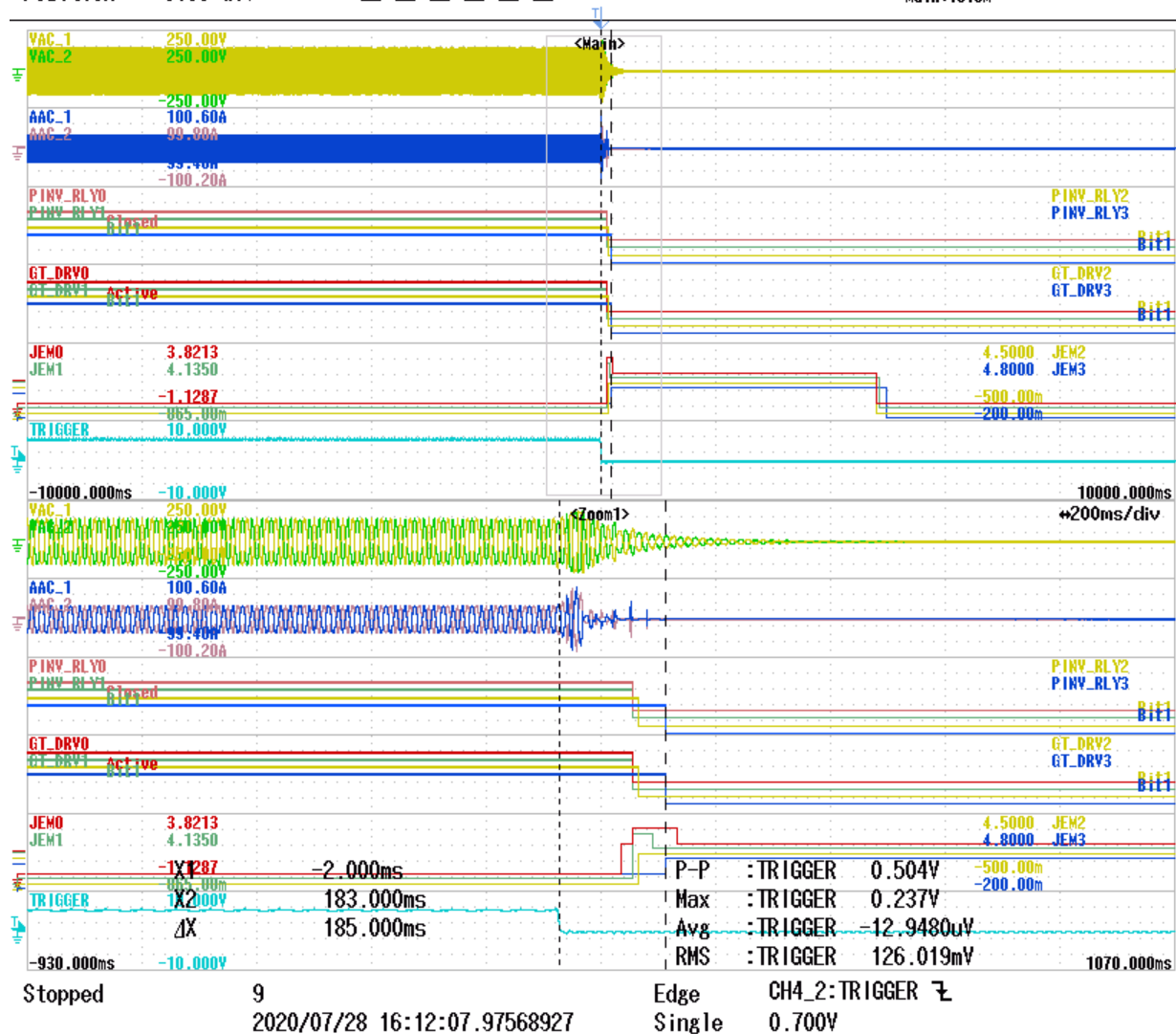


PINV\_RLY3  
CH15\_10 : CAN(Logic)  
Position : -3.00 div

Display Group

Zoom1:1.0M  
Main:10.0M

AcqMode : Normal  
500kS/s 2s/div  
(CH15 20kS/s)



CURSOR

Type

Vertical

Trace


CH1\_1: VAC\_1

Cursor1  
-0.0010div

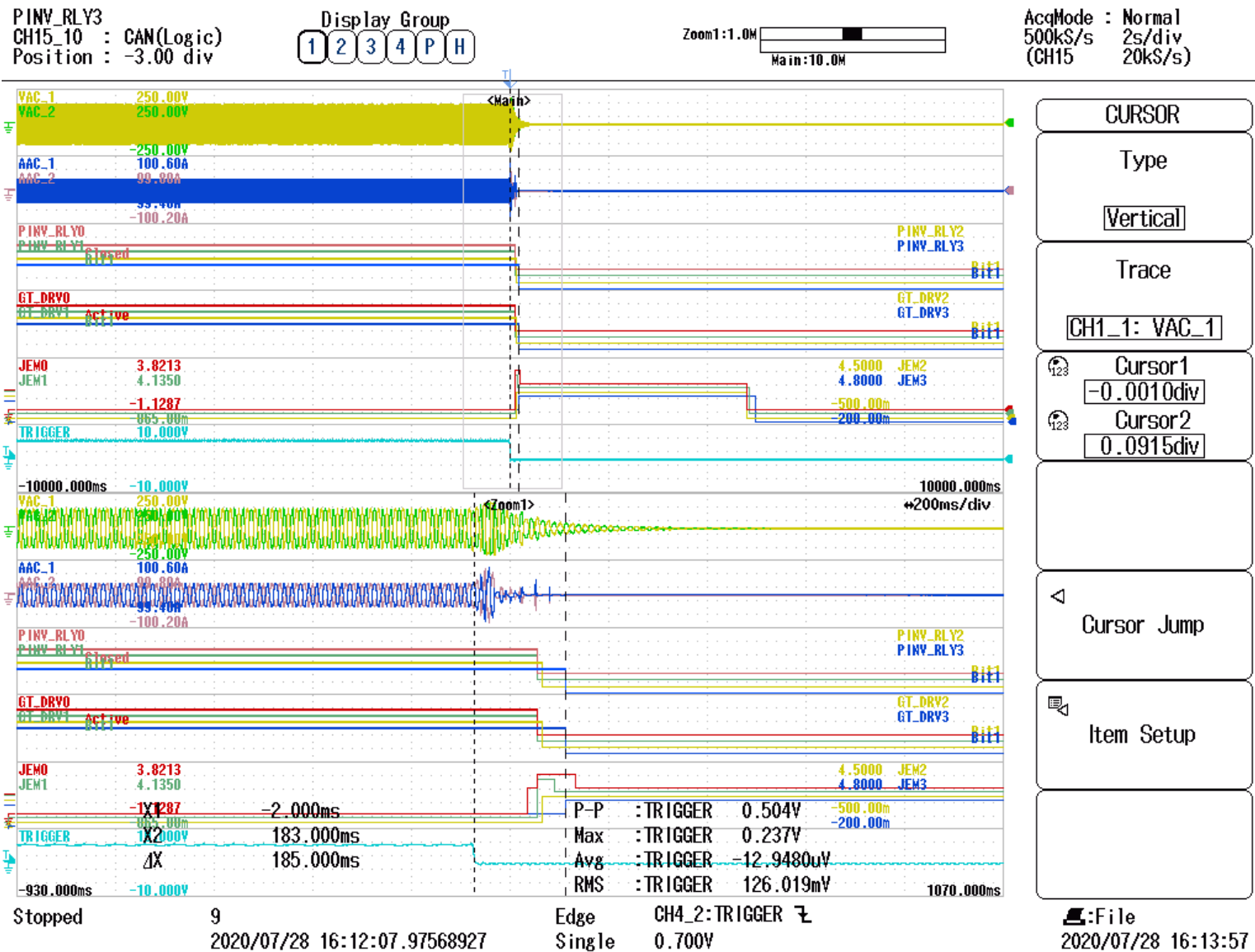
Cursor2  
0.0915div

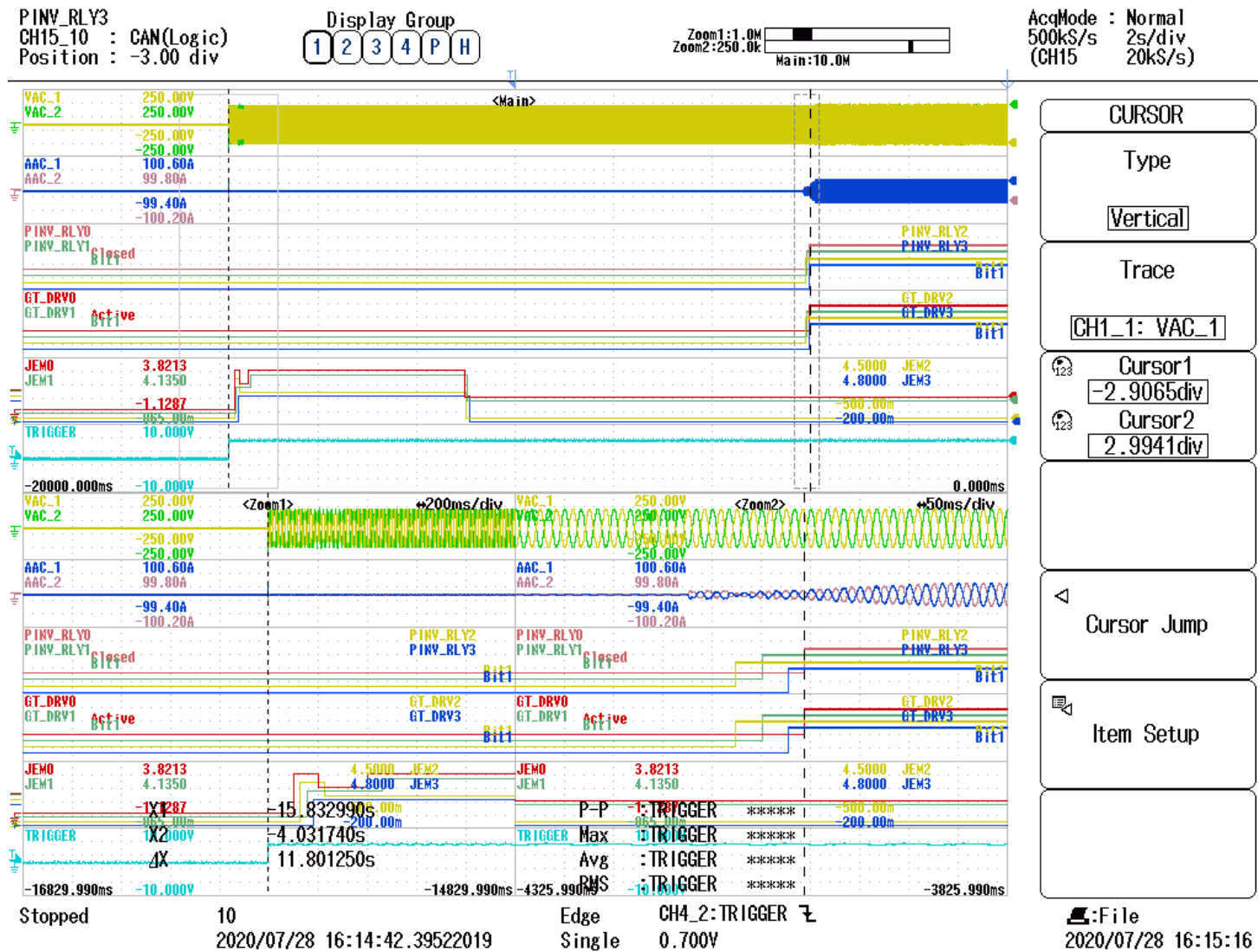
△	Cursor Jump
---	-------------

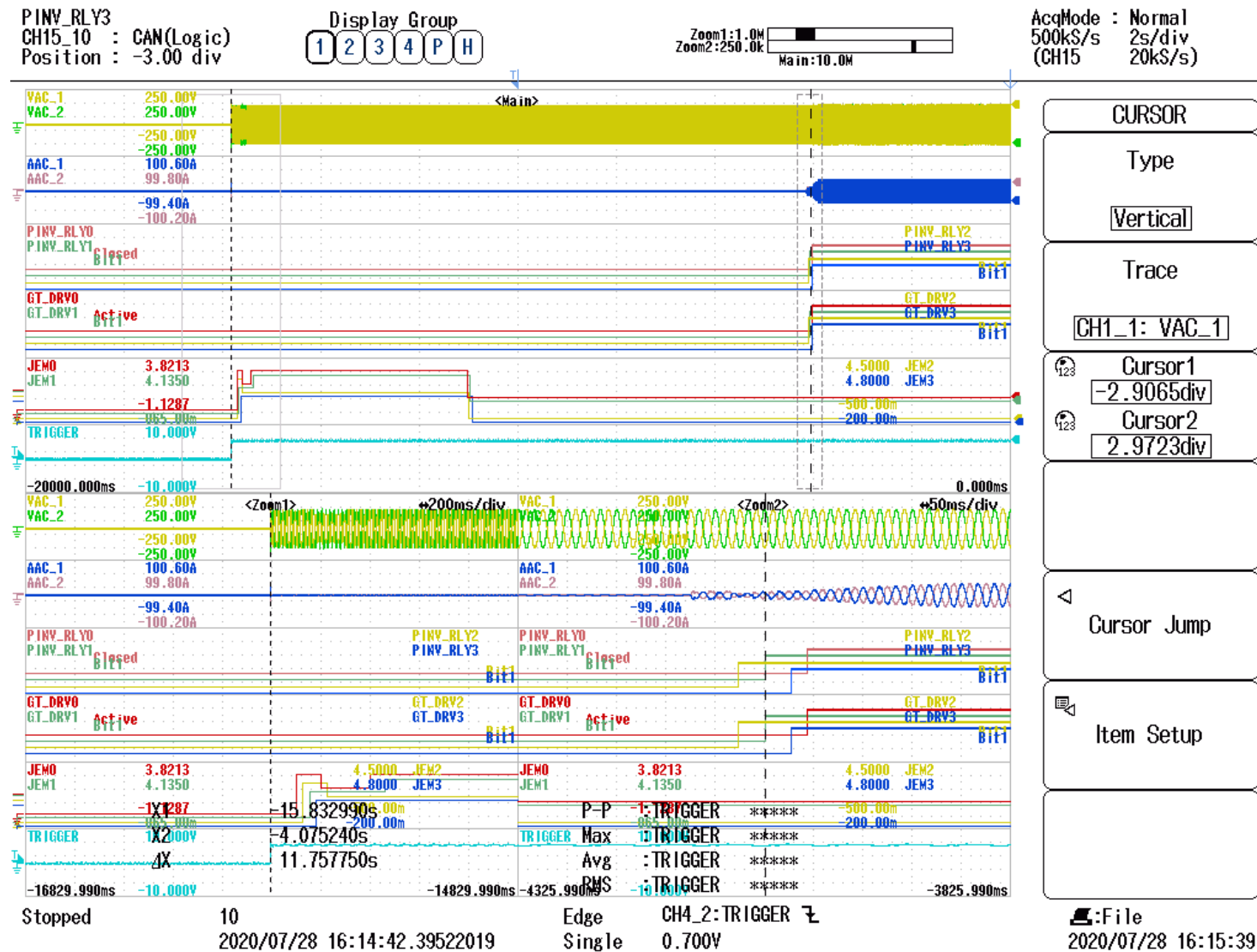
Item Setup

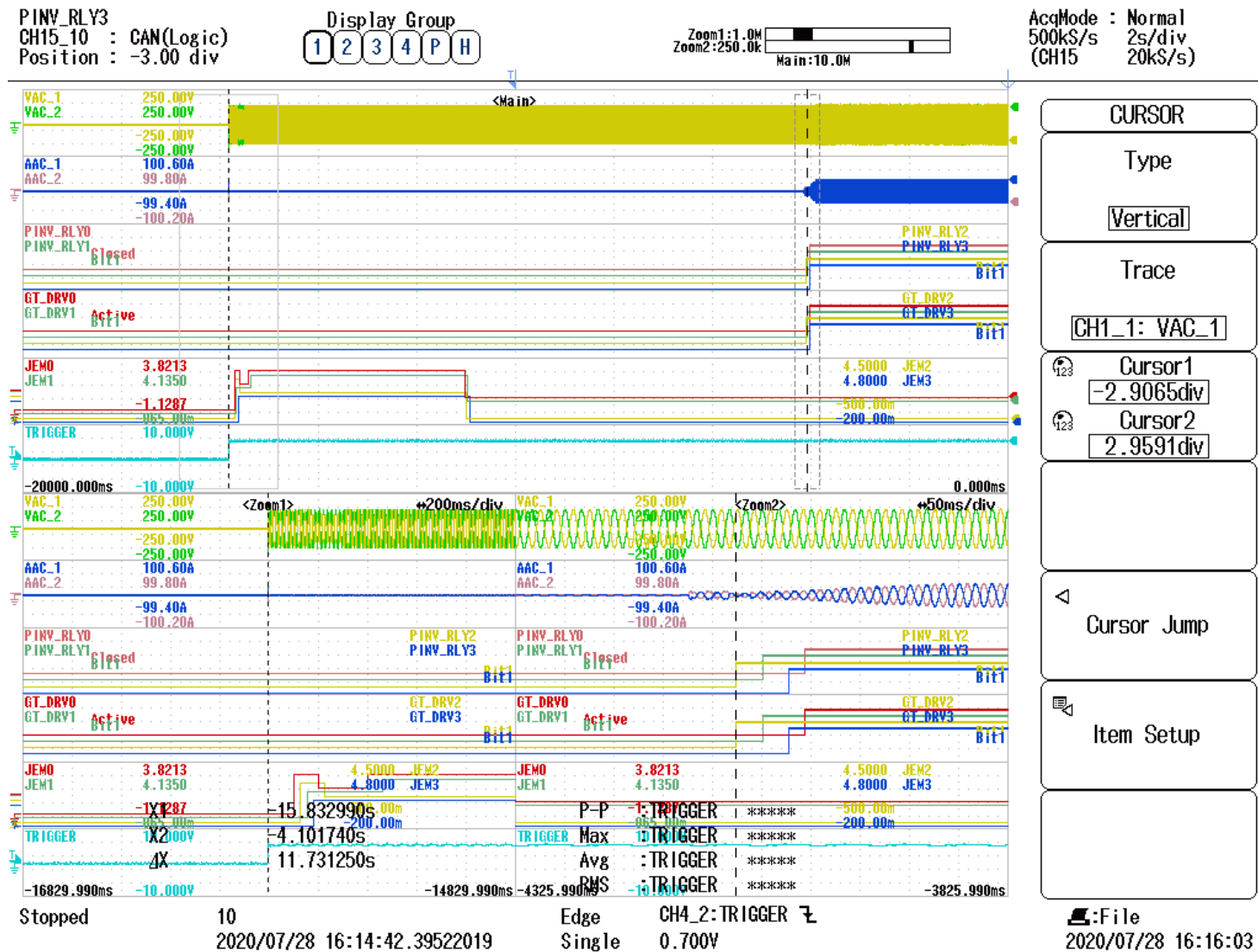
:File  
2020/07/28 16:13:57

#### **3.2.8.1.22 AI Gate signal open time @0.185sec for unit 4**

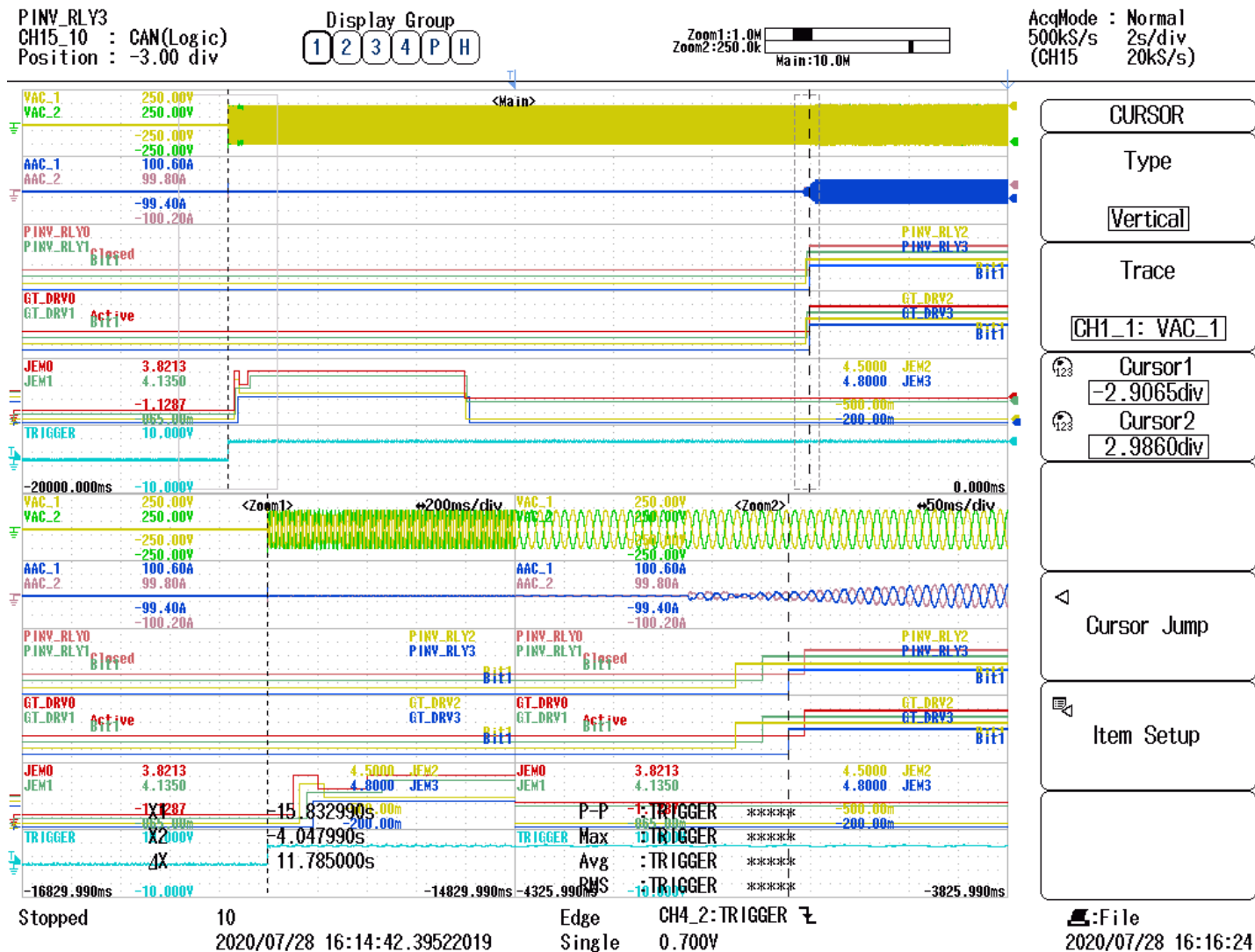








**Fig 3.2.8.1.26 Reconnection time for unit 3 @11.731sec**



**Fig 3.2.8.1.27 Reconnection time for unit 4 @11.785sec**

Parameter 設定値: 4 units(1 reverse phased)

Load Condition 負荷条件	Mode of Operation 動作モード	Method of Island Detection 単独運転検出モード	Cut Off Time 検出時限	Reconnect time 再並列阻止時間
Balanced load 不平衡負荷	Discharge 放電	Active 能動	< 0.2s	10 s

Output Power: 4.8 Kw

Parameters 設定値				Frequency 周波数	Operation Mode 動作モード
Active Power 有効電力		Reactive Power 無効電力			
5	240	10	480	60Hz	Discharge



### **Scope Channel Description:**

AAC\_1: Unit 1 Phase A Current  
AAC\_2: Unit 2 Phase A Current  
AAC\_3: Unit 3 Phase A Current  
AAC\_4: Unit 4 Phase A Current

VAC\_1: Phase A Voltage  
VAC\_2: Phase B Voltage

PINV\_Relay\_1: Relay Signal from Unit 1  
PINV\_Relay\_2: Relay Signal from Unit 2  
PINV\_Relay\_3: Relay Signal from Unit 3  
PINV\_Relay\_4: Relay Signal from Unit 4

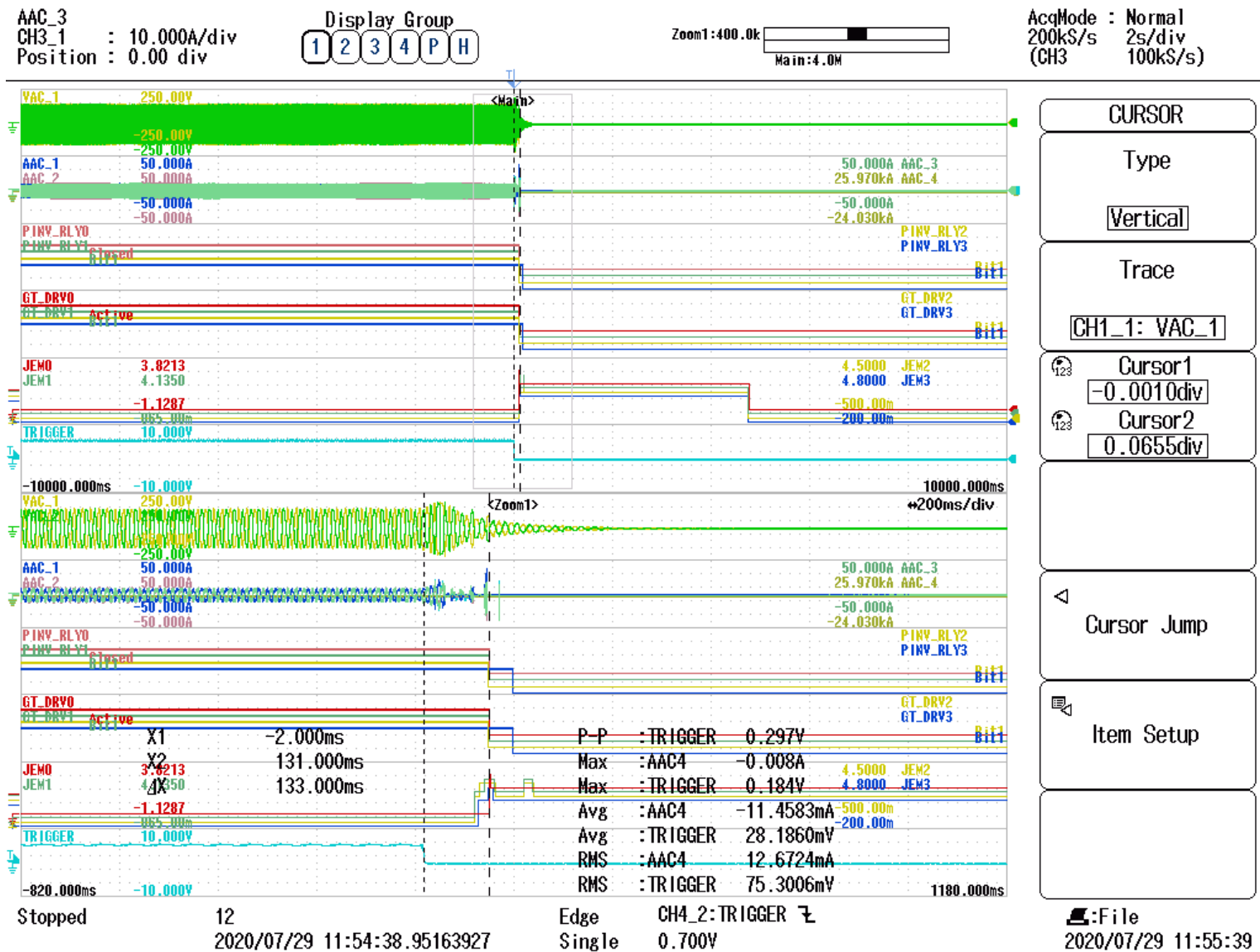
GATE\_DRIVE\_1: Relay Signal from Unit 1  
GATE\_DRIVE\_2: Relay Signal from Unit 2  
GATE\_DRIVE\_3: Relay Signal from Unit 3  
GATE\_DRIVE\_4: Relay Signal from Unit 4

JEM\_1: JEM Signal from Unit 1  
JEM\_2: JEM Signal from Unit 2  
JEM\_3: JEM Signal from Unit 3  
JEM\_4: JEM Signal from Unit 4

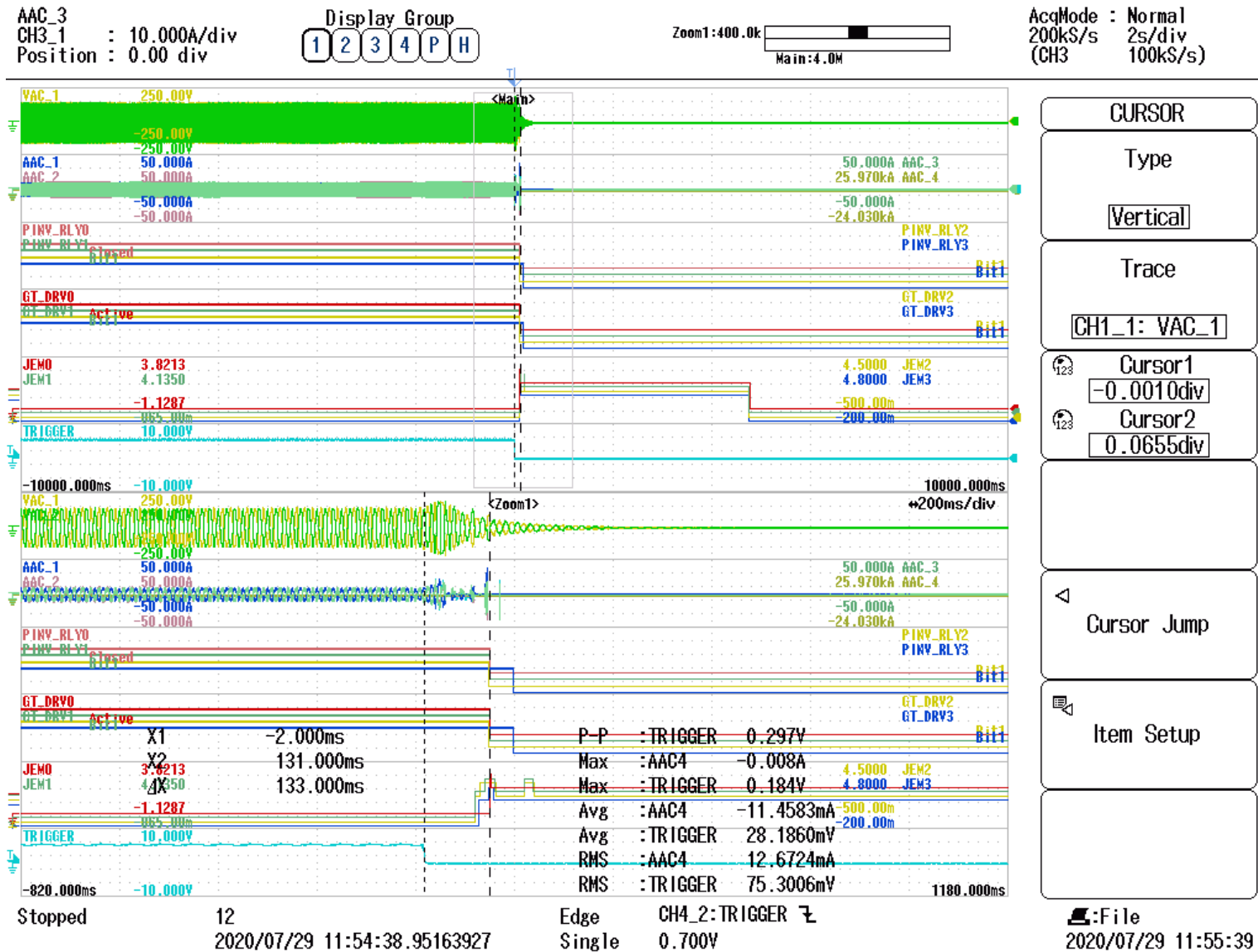


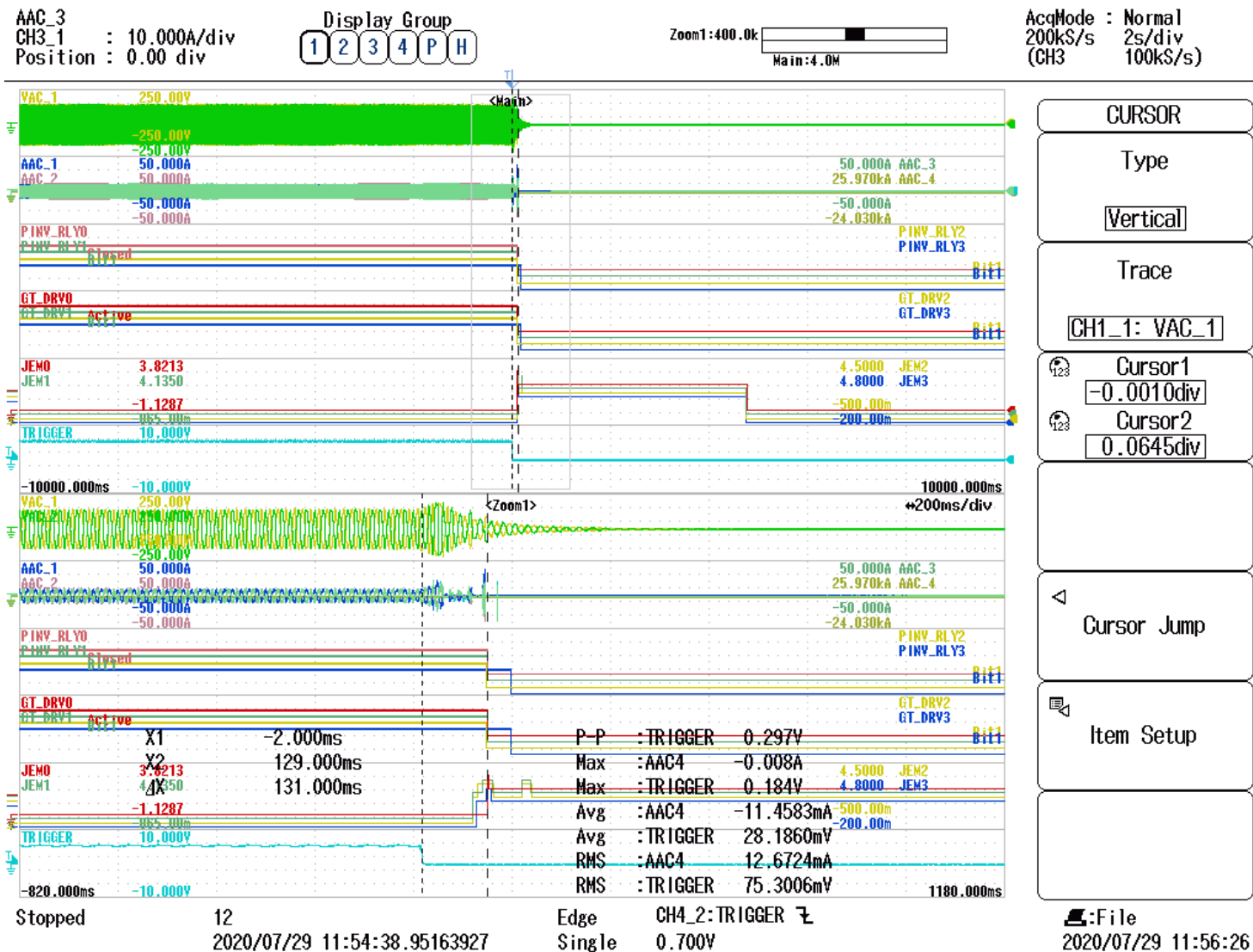
4 inverters( 1 REVERSE PHASED)											
Sr,no.	Unit 1		Unit 2		Unit 3		Unit 4				
	Gate Block time (s)	Relay open time (s)	Gate Block time (s)	Relay open time (s)	Gate Block time (s)	Relay open time (s)	Gate Block time (s)	Relay open time (s)	Max.Values	Average	Remarks
	4 Units										
1	0.133	0.133	0.131	0.131	0.129	0.129	0.18	0.18	0.18	0.170533	Fig: 3.2.8.1.28 3.2.8.1.29; 3.2.8.1.30; 3.2.8.1.31; 3.2.8.1.32; 3.2.8.1.33; 3.2.8.1.34; 3.2.8.1.35; 3.2.8.1.36; 3.2.8.1.37; 3.2.8.1.38; 3.2.8.1.39
2	0.125	0.125	0.13	0.13	0.132	0.132	0.18	0.18	0.18		
3	0.126	0.126	0.132	0.132	0.141	0.141	0.177	0.177	0.177		
4	0.132	0.132	0.129	0.129	0.134	0.134	0.181	0.181	0.181		
5	0.135	0.135	0.125	0.125	0.128	0.128	0.176	0.176	0.176		
6	0.125	0.125	0.129	0.129	0.139	0.139	0.182	0.182	0.182		
7	0.126	0.126	0.182	0.182	0.131	0.131	0.182	0.182	0.182		
8	0.131	0.131	0.126	0.126	0.133	0.133	0.18	0.18	0.18		
9	0.131	0.131	0.13	0.13	0.145	0.145	0.14	0.14	0.145		
10	0.122	0.122	0.133	0.133	0.123	0.123	0.127	0.127	0.133		
11	0.128	0.128	0.131	0.131	0.133	0.133	0.127	0.127	0.133		
12	0.176	0.176	0.185	0.185	0.181	0.181	0.18	0.18	0.185		
13	0.127	0.127	0.133	0.133	0.139	0.139	0.173	0.173	0.173		
14	0.121	0.121	0.125	0.125	0.136	0.136	0.171	0.171	0.171		
15	0.126	0.126	0.128	0.128	0.139	0.139	0.18	0.18	0.18		

Unit 1	Unit 2	Unit 3	Unit 4
Reconnect Time (s)	Reconnect Time (s)	Reconnect Time (s)	Reconnect Time (s)
11.817	11.731	11.726	11.733
11.884	11.846	11.833	11.848
11.791	11.719	11.722	11.723
11.813	11.738	11.743	11.739
11.804	11.745	11.829	11.771
11.887	11.799	11.813	11.812
11.82	11.743	11.738	11.739
11.812	11.739	11.753	11.753
11.849	11.817	11.853	11.838
11.802	11.736	11.741	11.729
11.705	11.703	11.729	11.714
11.721	11.726	11.733	11.724
11.833	11.837	11.835	11.833
11.671	11.684	11.691	11.686
11.727	11.737	11.764	11.743

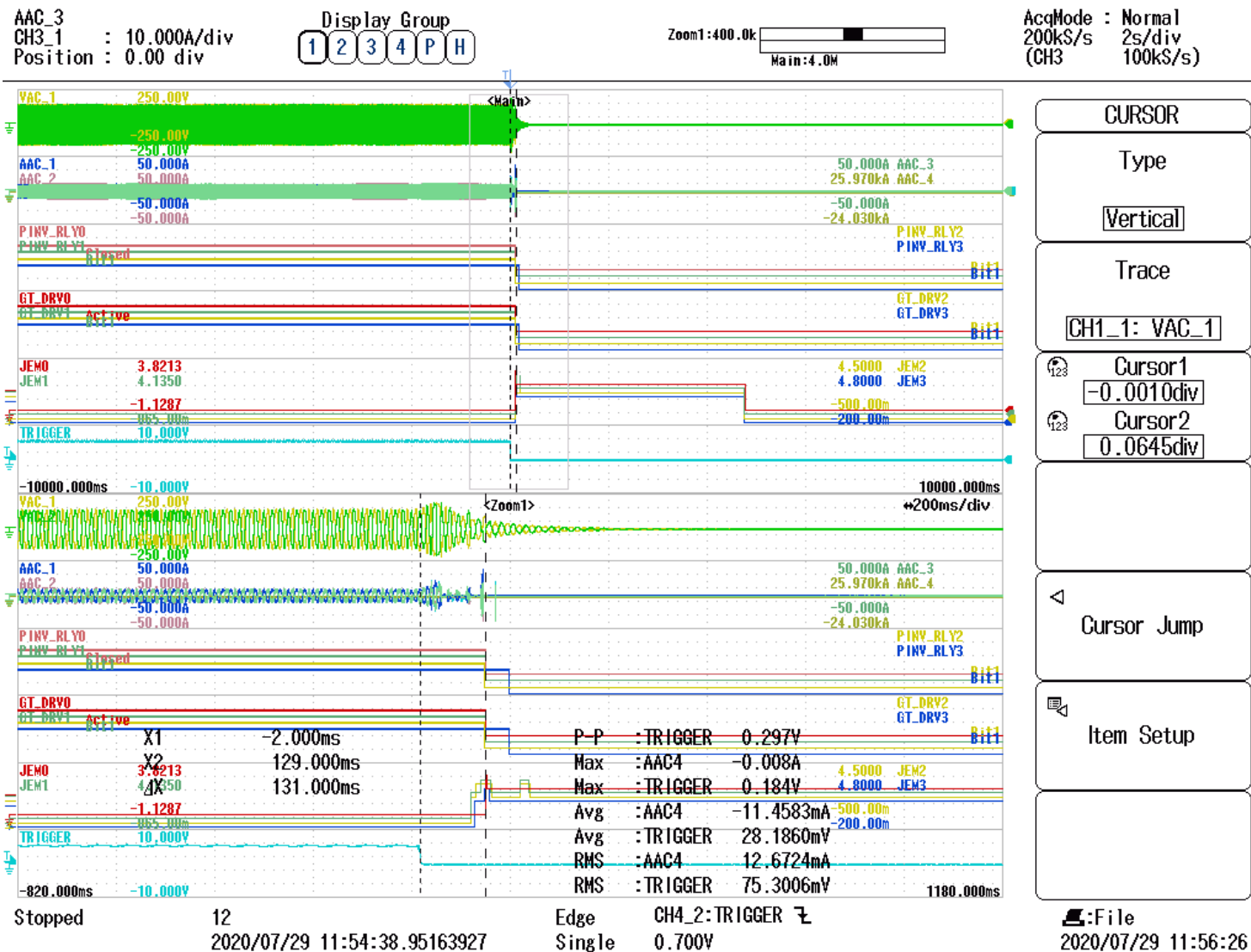


### 3.2.8.1.28 AI Gate signal open time @0.133sec for unit 1

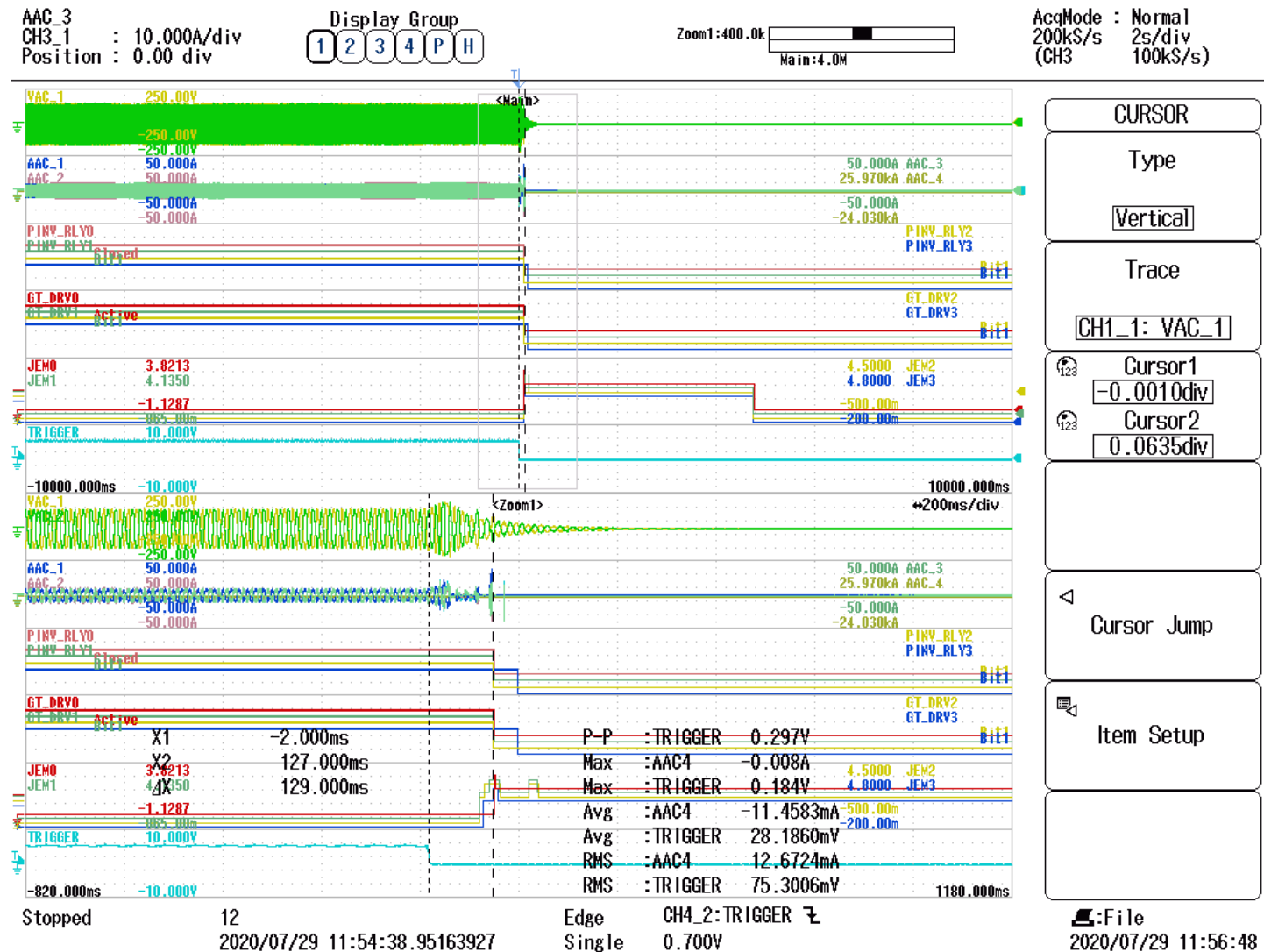


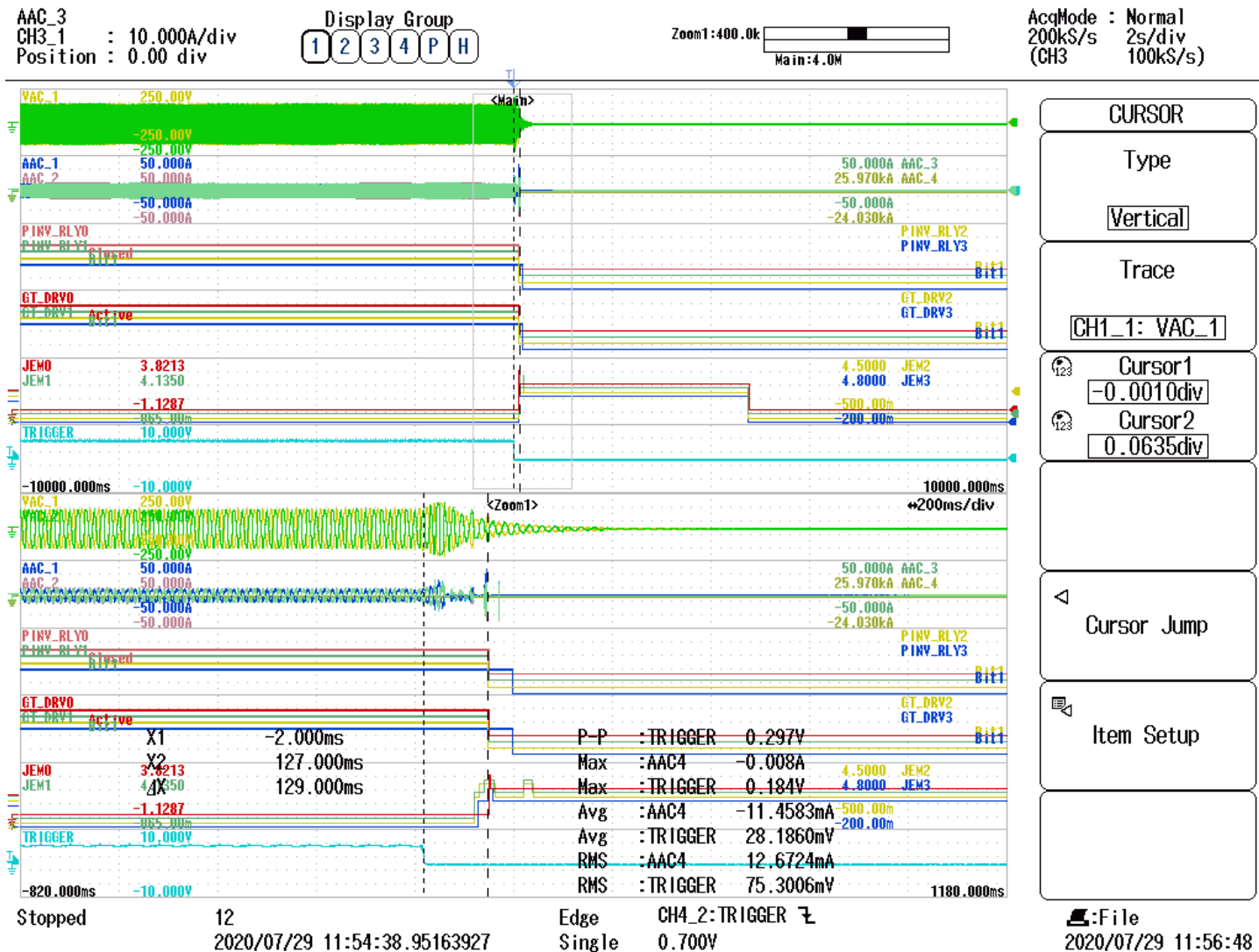


### 3.2.8.1.30 AI Gate signal open time @0.131sec for unit 2



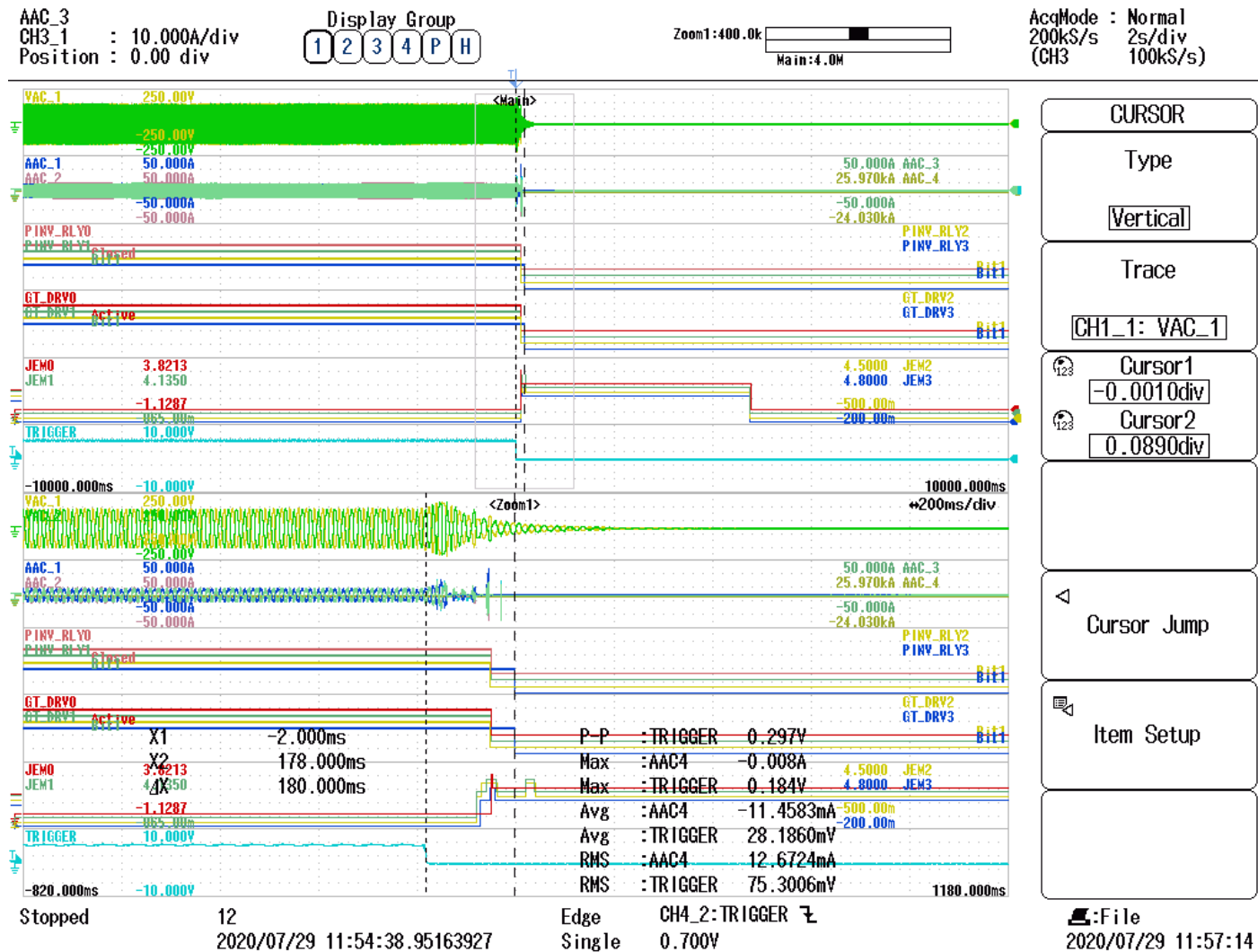
### **3.2.8.1.31 AI relay signal open time @0.131sec for unit 2**





### 3.2.8.1.33 AI relay signal open time @0.129sec for unit 3





### 3.2.8.1.34 AI Gate signal open time @0.18sec for unit 4

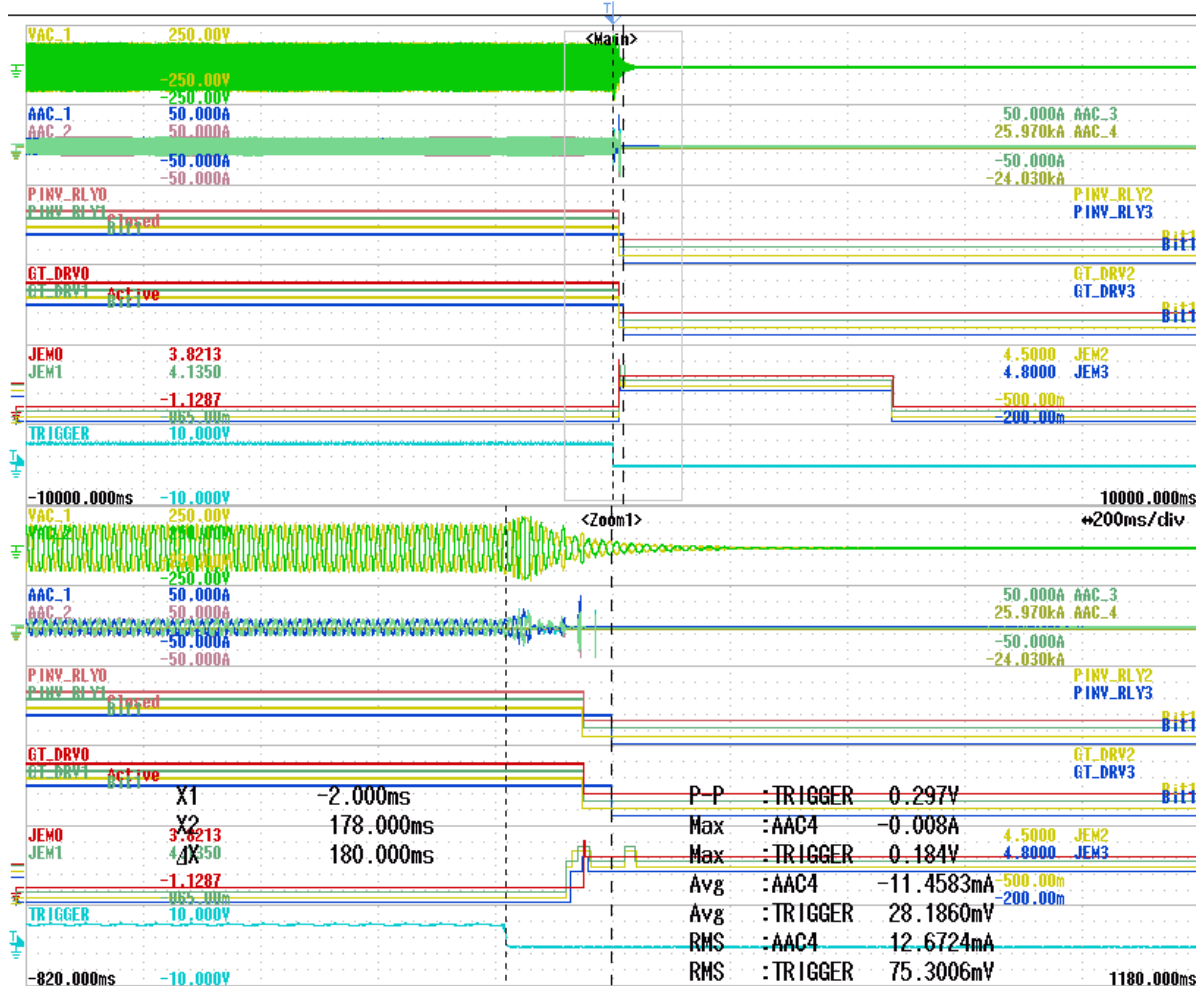


AAC\_3  
CH3\_1 : 10.000A/div  
Position : 0.00 div

Display Group  
1 2 3 4 P H

Zoom1:400.0k  
Main:4.0M

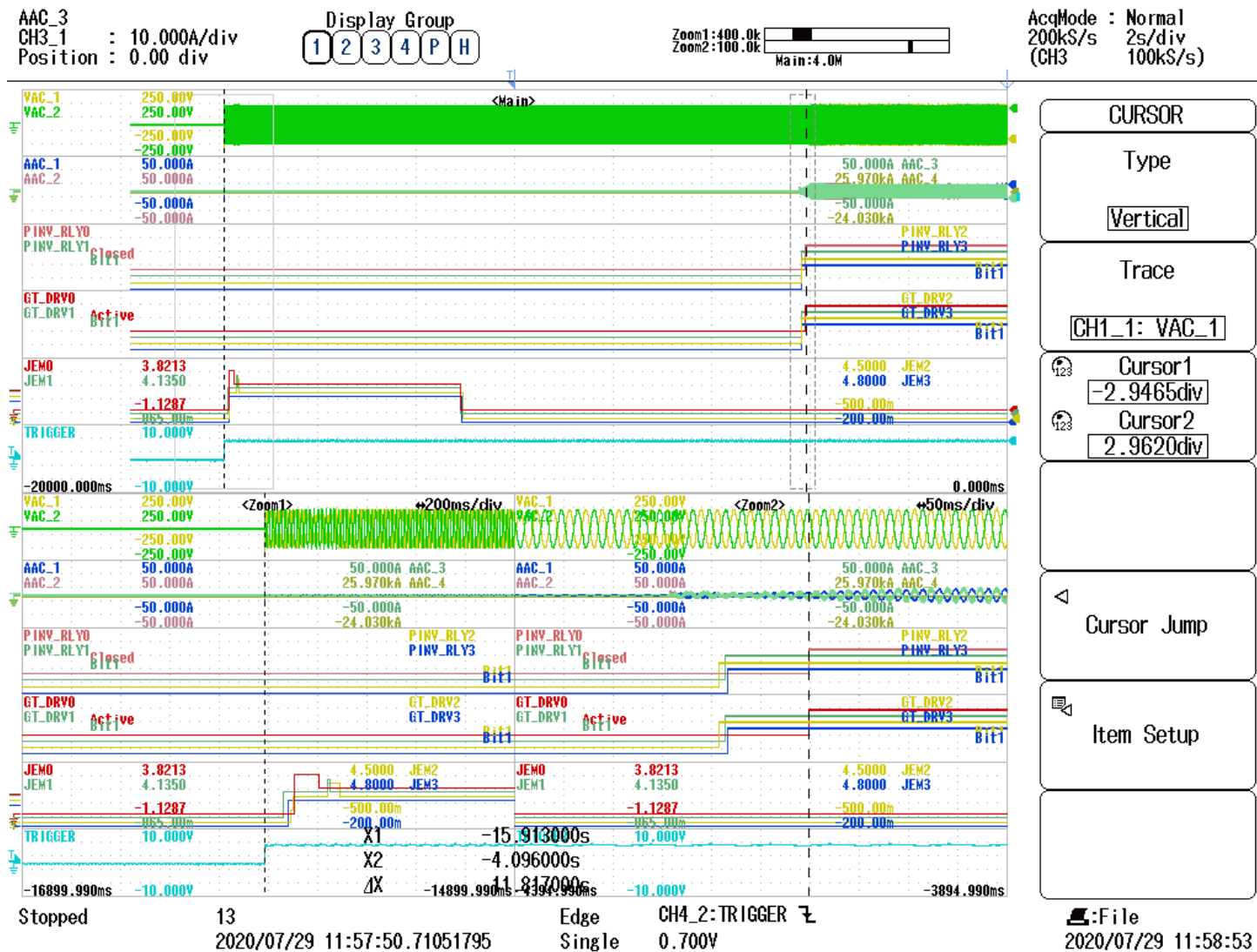
AcqMode : Normal  
200kS/s 2s/div  
(CH3 100kS/s)



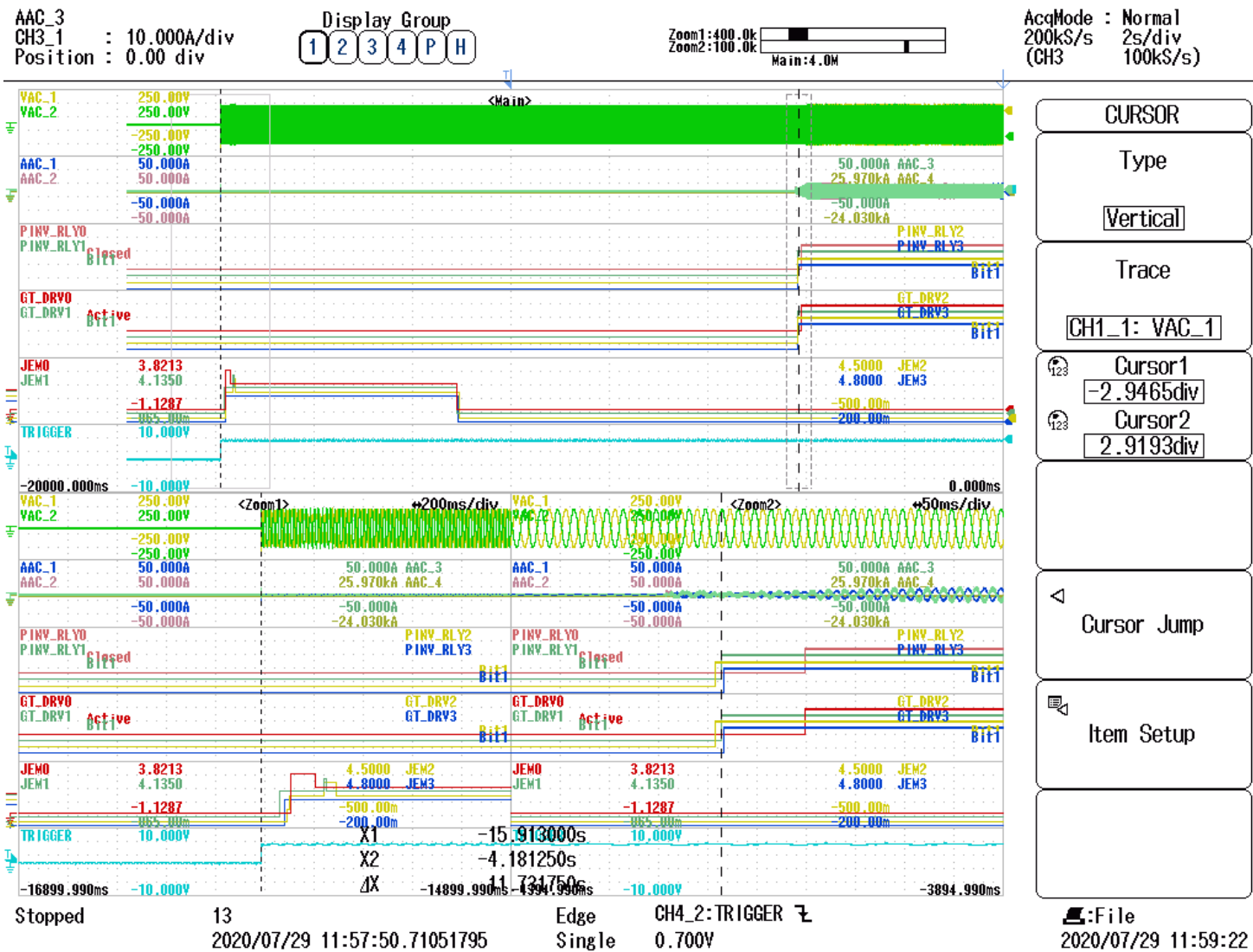
Stopped 12  
2020/07/29 11:54:38.95163927

Edge CH4\_2:TRIGGER 7  
Single 0.700V

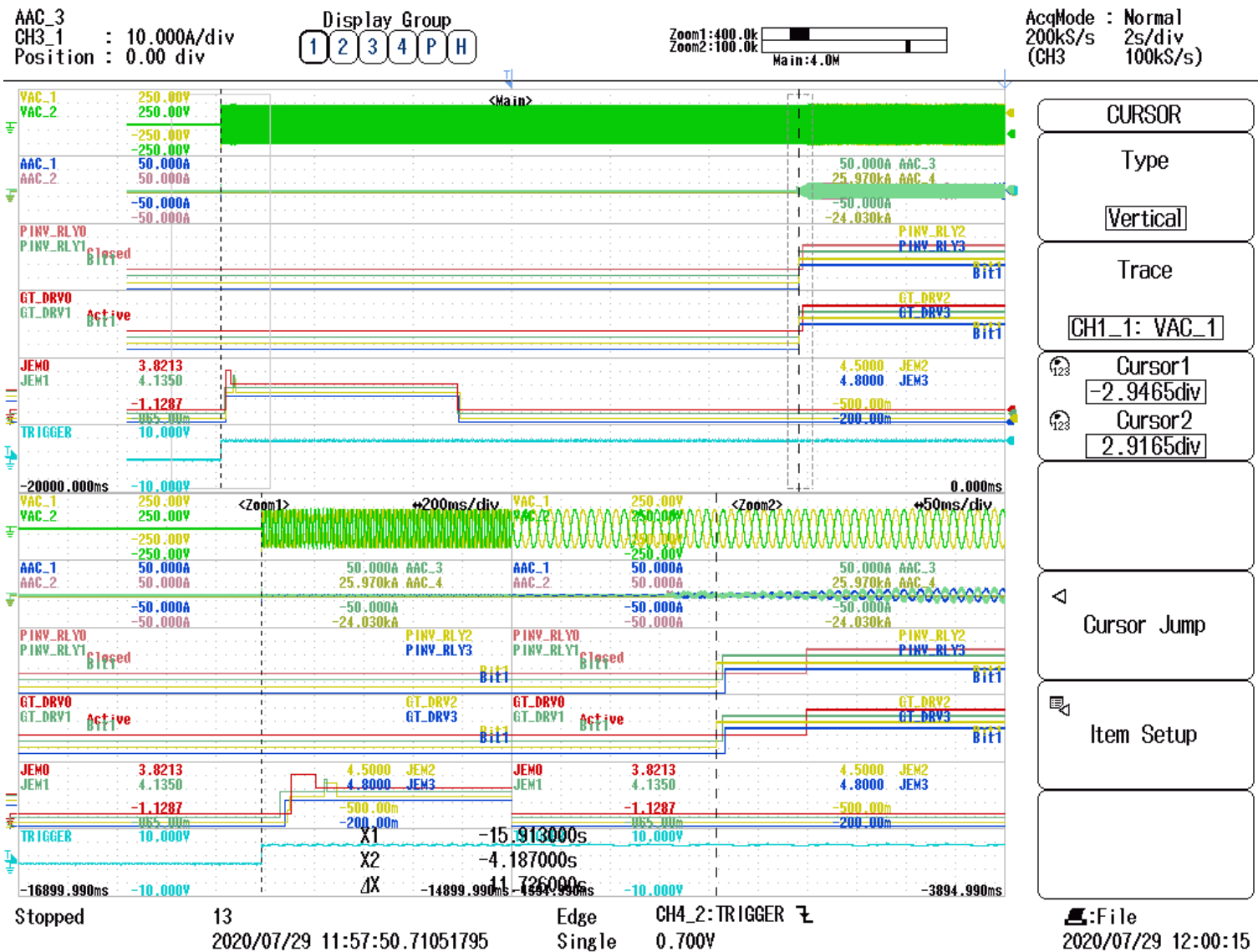
### 3.2.8.1.35 AI relay signal open time @0.18sec for unit 4

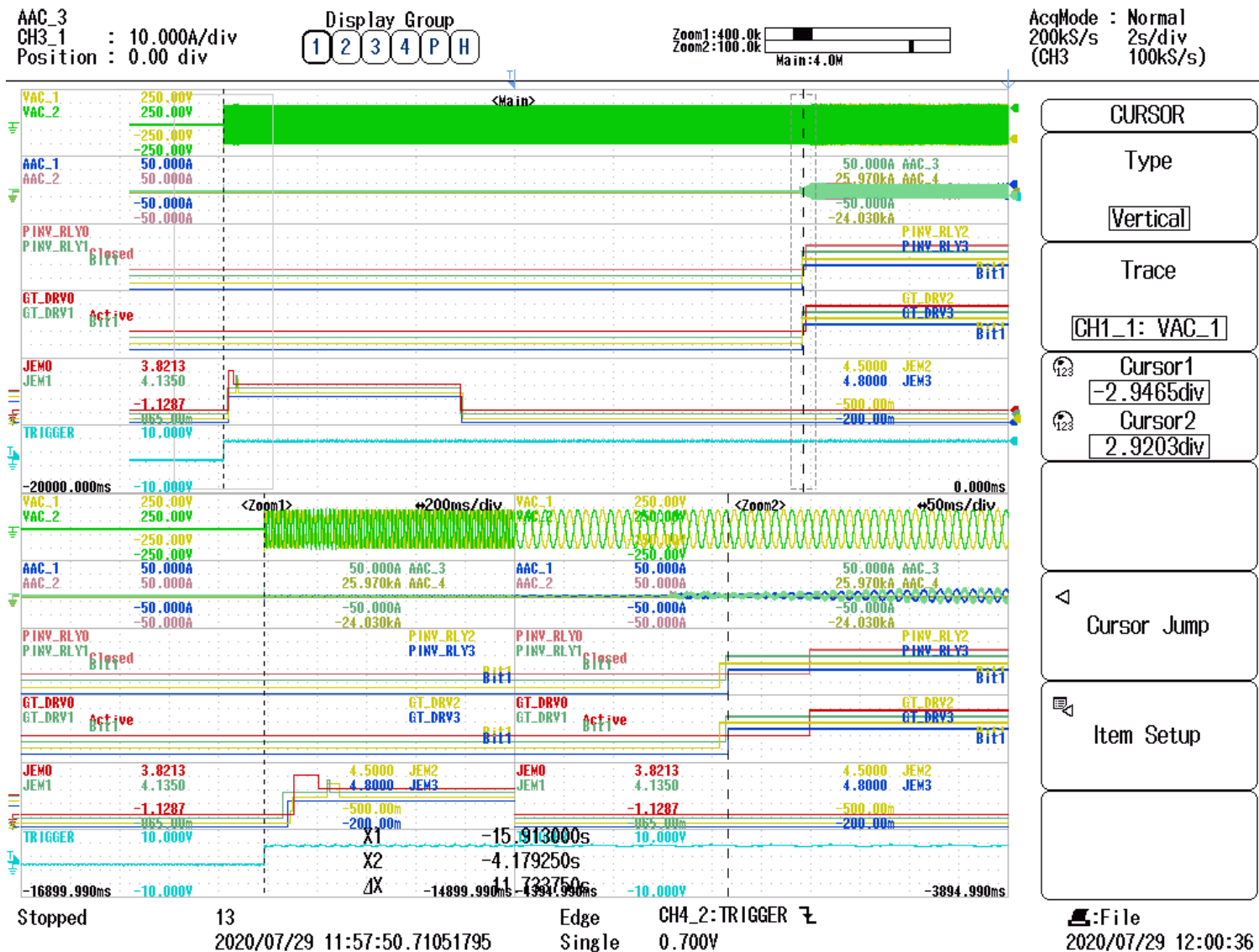


**Fig 3.2.8.1.36 Reconnection time for unit 1 @11.817sec**



**Fig 3.2.8.1.37 Reconnection time for unit 2 @11.731sec**





**Fig 3.2.8.1.39 Reconnection time for unit 4 @11.733sec**



Result :

Average Time→	2 INVERTER AVERAGE	3 INVERTER AVERAGE	4 INVERTERS (2 REVERSE PHASED) AVERAGE	4 INVERTERS (1 REVERSE PHASED) AVERAGE
Average Values	0.174833333	0.1746	0.174	0.170533333
MAX	0.174833333			
MIN	0.170533333			
Difference	0.0043			

### 3.2.8.2 Islanding detection test with active islanding detection mode: standby

本試験は、【多数台連系 FRT 対応型】、【多数台連系対応型】で【単相機器】の場合に実施する。

Active Islanding	Original Status	Standby
	Final Status	Operational

4 Units								Comments
Unit 1		Unit 2		Unit 3		Unit 4		
Gate Block time (s)	Relay open time (s)	Gate Block time (s)	Relay open time (s)	Gate Block time (s)	Relay open time (s)	Gate Block time (s)	Relay open time (s)	
0.128	0.128	0.131	0.131	0.133	0.133	0.127	0.127	Fig: 3.2.8.2.1; 3.2.8.2.2; 3.2.8.2.3; 3.2.8.2.4; 3.2.8.2.5; 3.2.8.2.6; 3.2.8.2.7; 3.2.8.2.8





**Scope Channel Description:**

AAC\_1: Unit 1 Phase A Current

AAC\_3: Unit 2 Phase A Current

VAC\_1: Phase A Voltage

VAC\_2: Phase B Voltage

PINV\_Relay\_1: Relay Signal from Unit 1

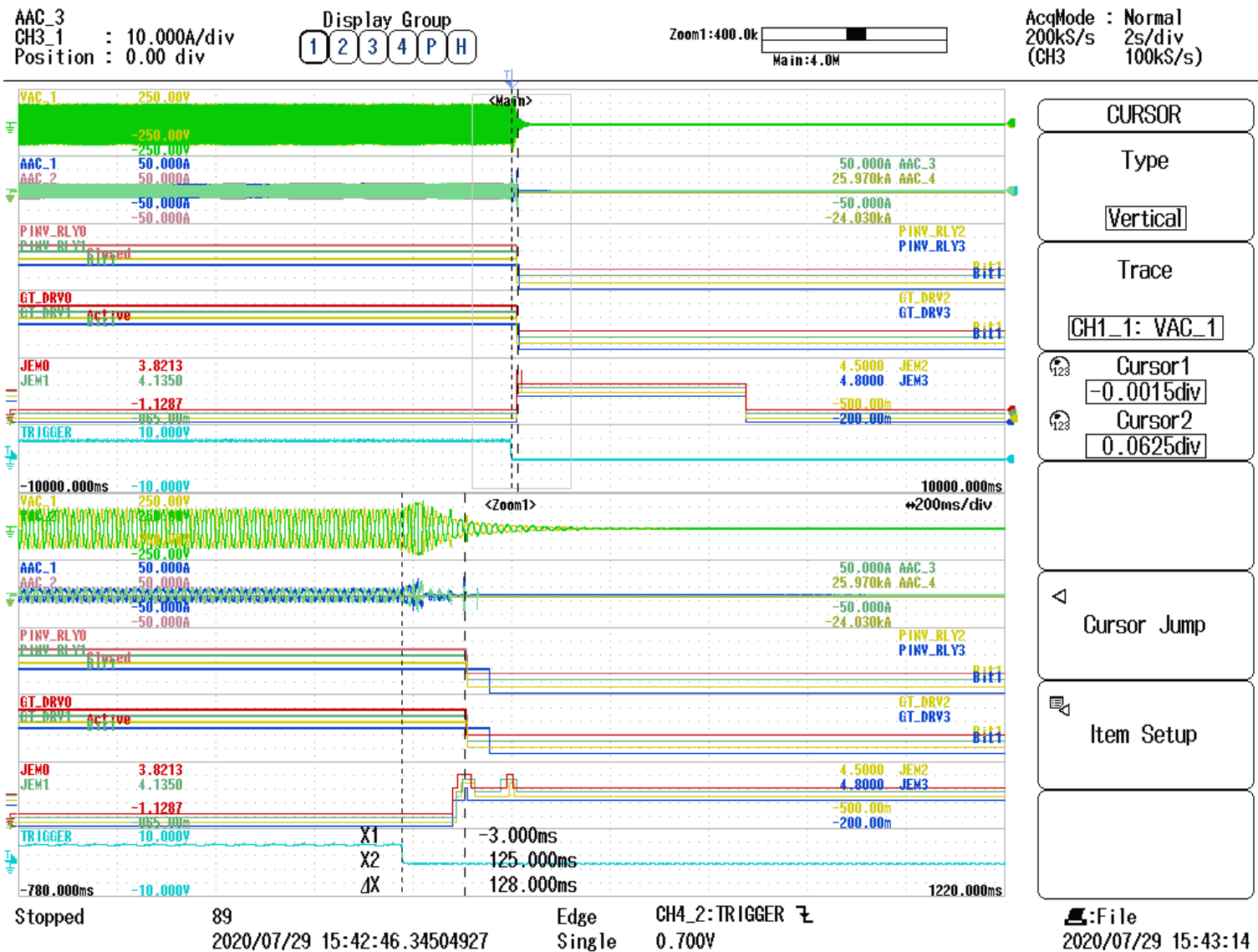
PINV\_Relay\_2: Relay Signal from Unit 2

GATE\_DRIVE\_1: Relay Signal from Unit 1

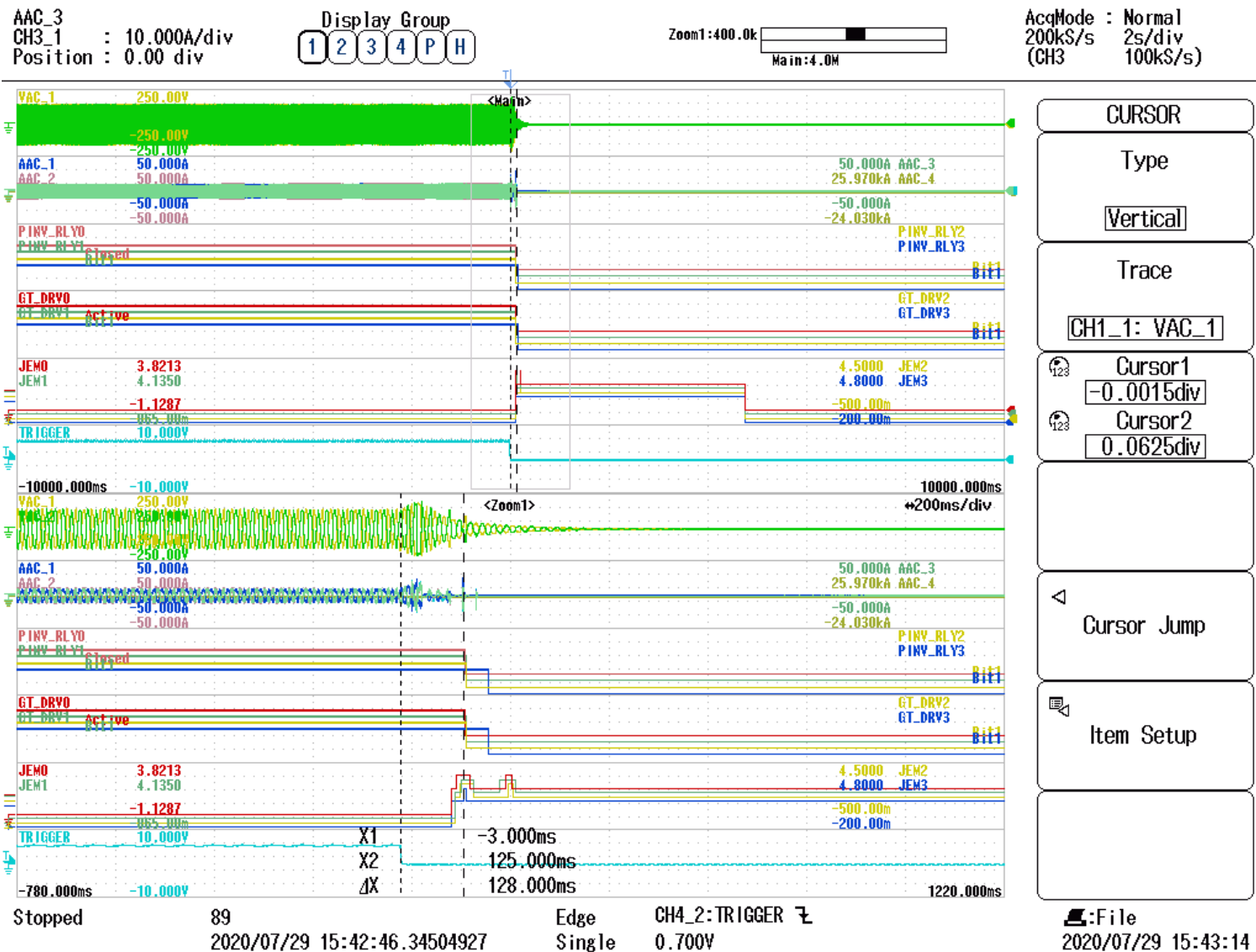
GATE\_DRIVE\_2: Relay Signal from Unit 2

JEM\_1: JEM Signal from Unit 1

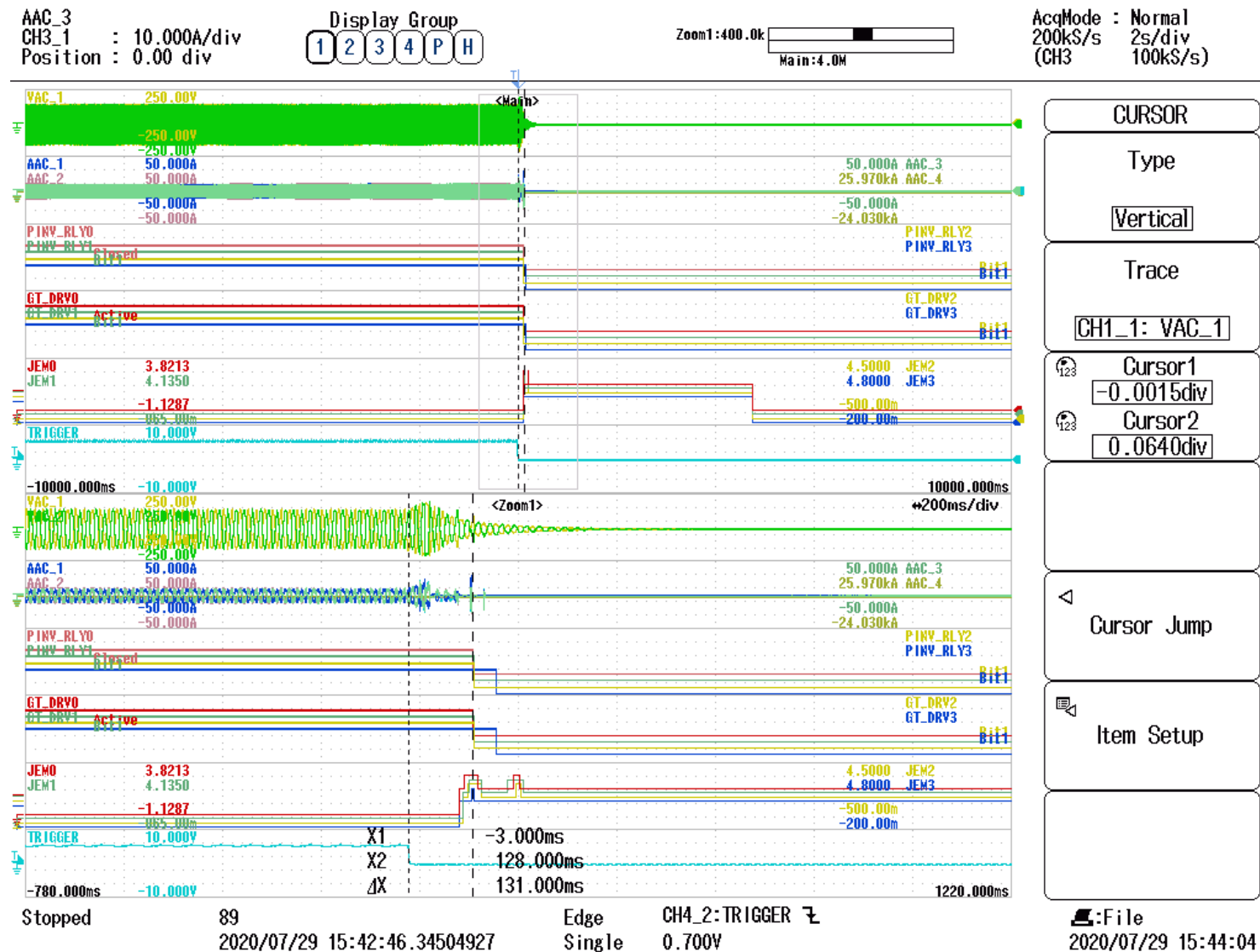
JEM\_2: JEM Signal from Unit 2



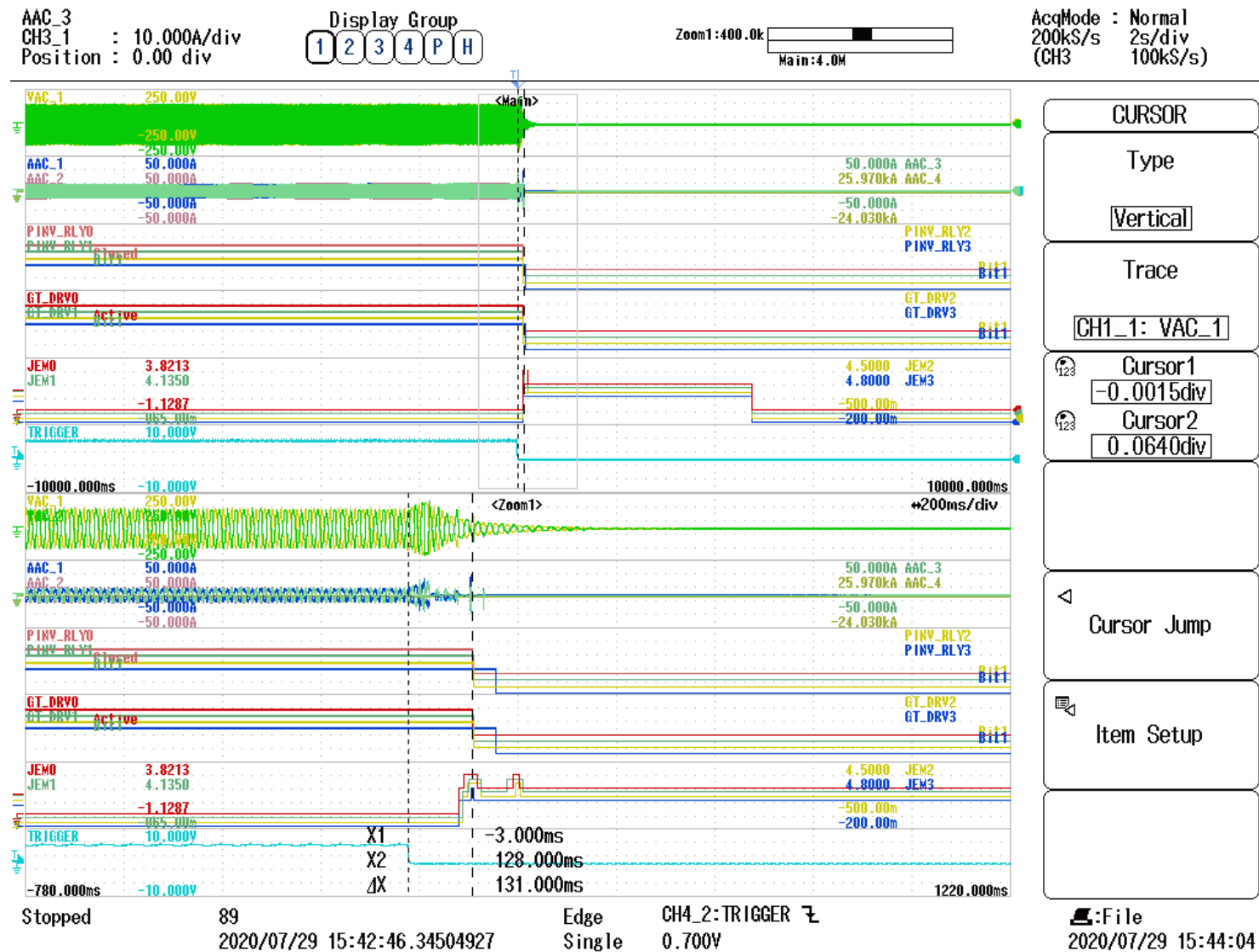
**Fig 3.2.8.2.1 Gate trip time for unit 1 @0.128sec**



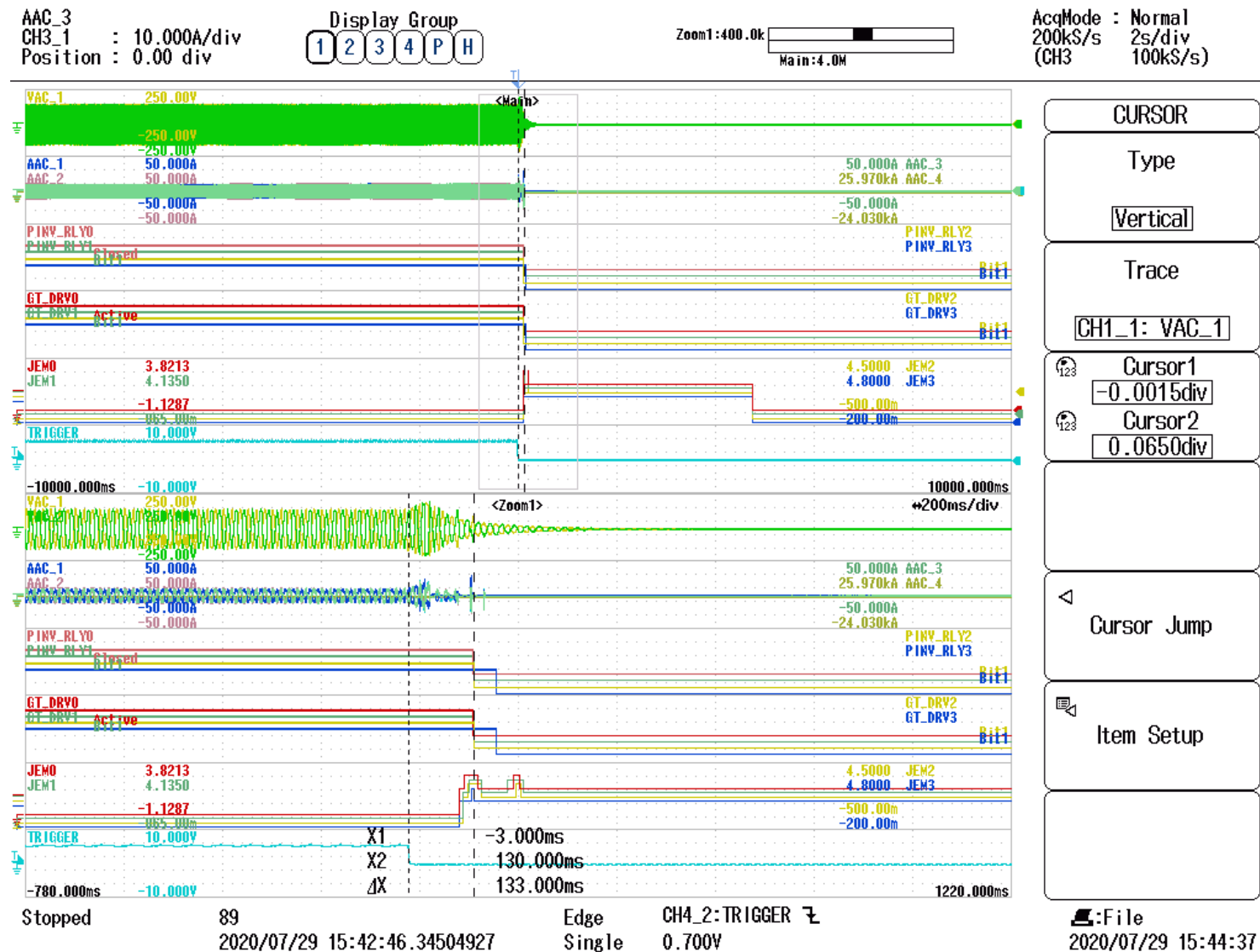
**Fig 3.2.8.2.2 Relay trip time for unit 1 @0.128sec**



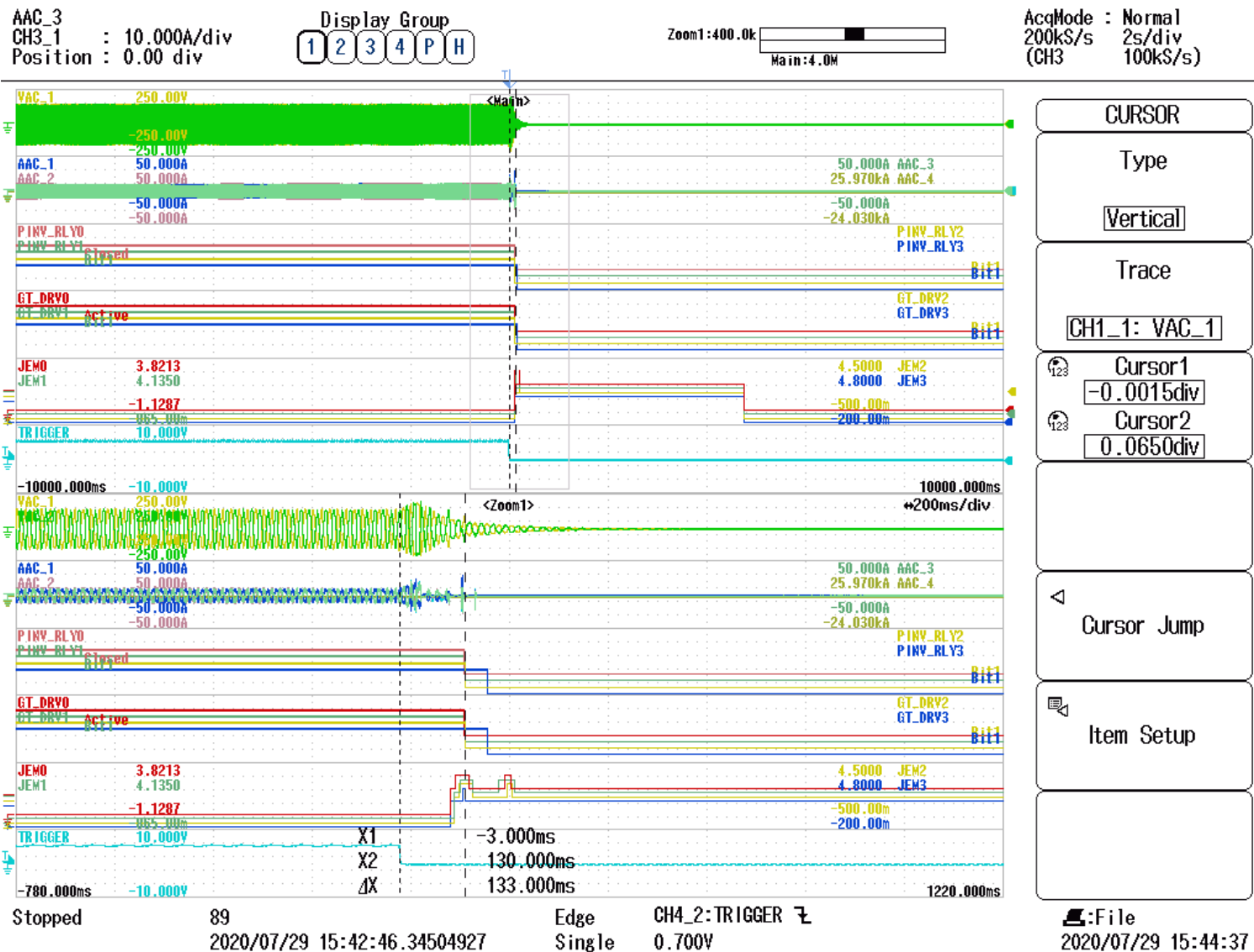
**Fig 3.2.8.2.3 Gate trip time for unit 2 @0.131sec**



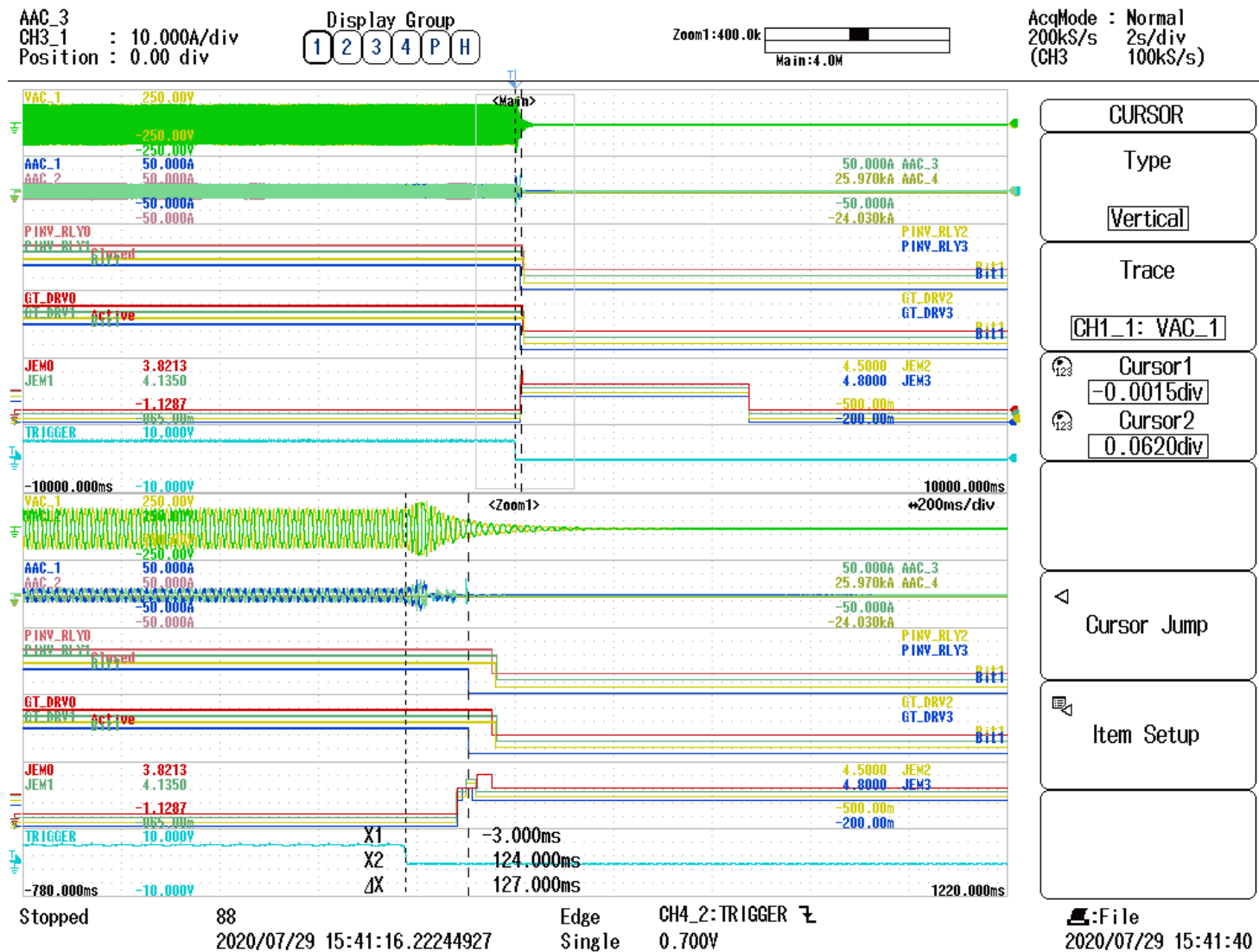
**Fig 3.2.8.2.4 Relay trip time for unit 2 @0.131sec**



**Fig 3.2.8.2.5 Gate trip time for unit 3 @0.133sec**

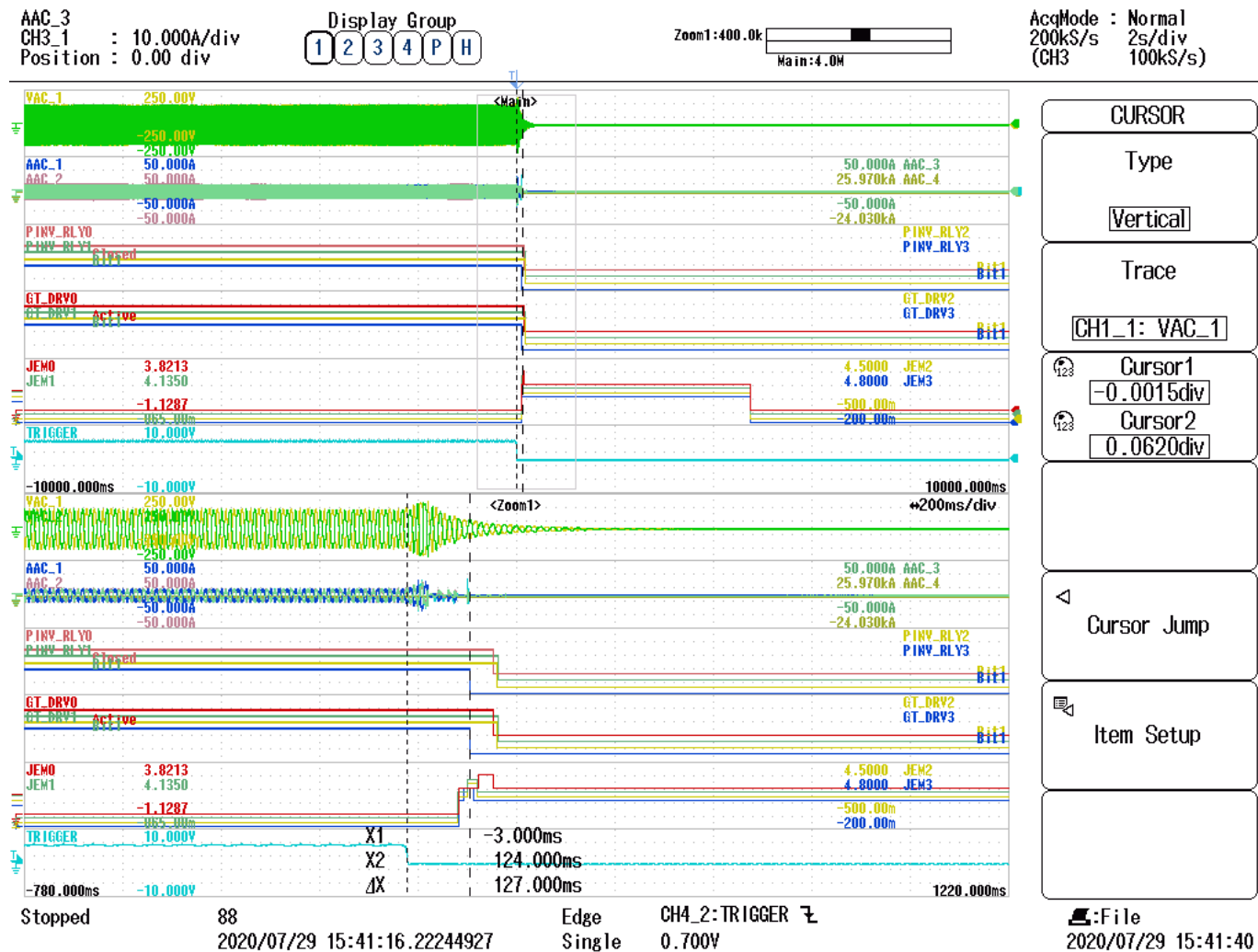


**Fig 3.2.8.2.6 Relay trip time for unit 3 @0.133sec**



**Fig 3.2.8.2.7 Gate trip time for unit 4 @0.127sec**





**Fig 3.2.8.2.8 Relay trip time for unit 4 @0.127sec**

### 3.2.9.1 Reconnection Time 復電後の一定時間投入阻止試験 1

Parameter:

Reconnection Testing 再並列阻止時間試験	Time Set Point 待機時間
Reconnection Time 1	300s

AC Voltage 交流電圧	Output Power 出力電力	Frequency 周波数	Mode 動作モード	Measurement 試験結果	Pass / Fail 判定	Remarks 備考
				Reconnection Time 再並列阻止時間	>300s	
Phase A: 101Vrms Phase B: 101Vrms	4.8 kW	60 Hz	Discharge	301.446 s	Pass	Figure 3.2.9.1
	-4.8 kW		Charge	301.483 s	Pass	

Scope Channel Description:

Channel 1\_1: Phase A Current

Channel 1\_2: Phase A Voltage

Channel 2\_1: Phase B Current

Channel 2\_2: Phase B Voltage

PINV\_RLY: Relay Signal

GT\_DRV: Gate Signal

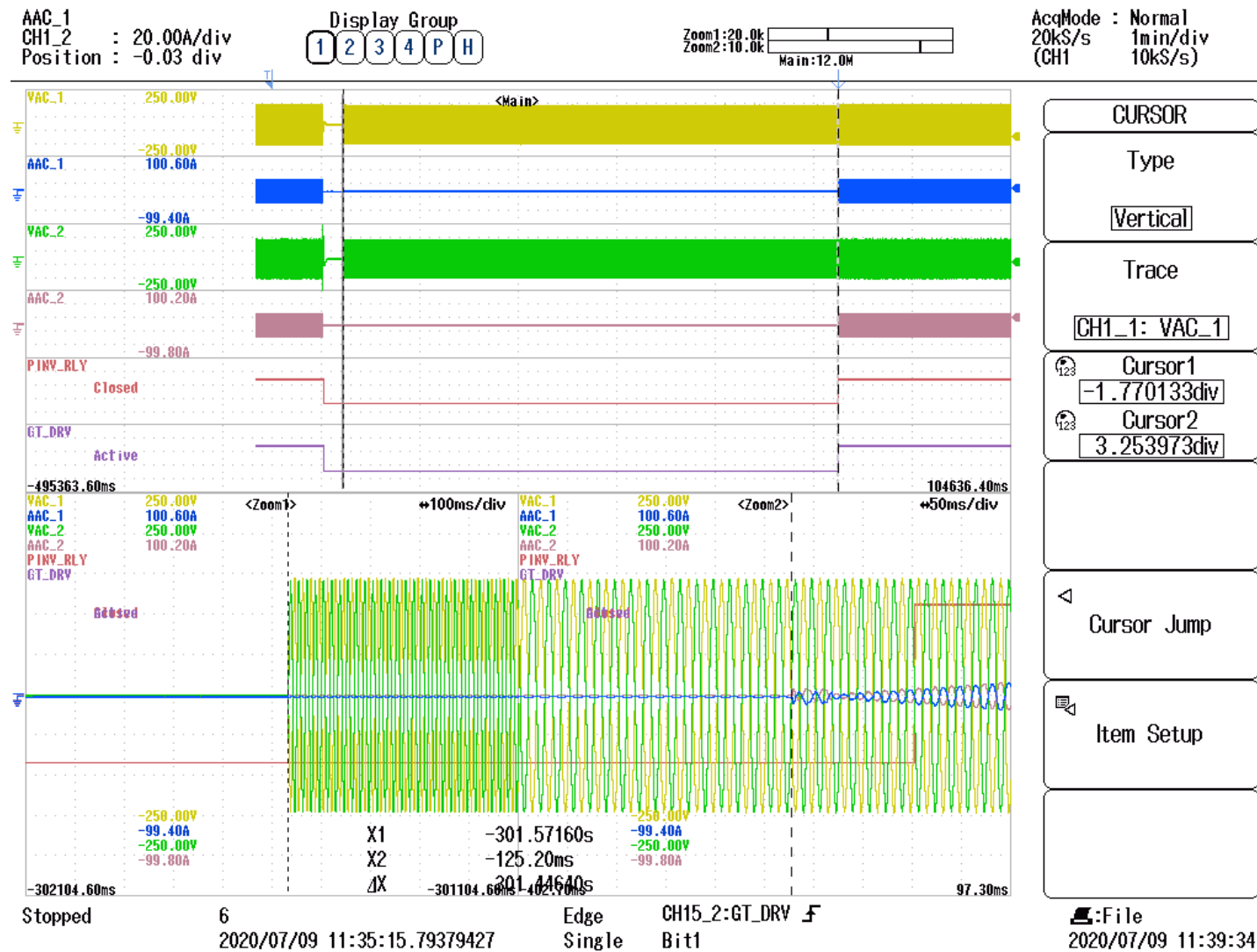


Figure: 3.2.9.1 – After power is restored, Power exportation is prevented for certain time. Reconnection timer 1 (Reconnection Time= 301.466 sec)

### 3.2.9.2 Reconnection Time 2 2 復電後の一定時間投入阻止試験 2

Parameter 設定値:

Reconnection Testing 再並列阻止時間試験	Time Set Point
Reconnection Time 2	300s

AC Voltage 交流電圧	Output Power 出力電力	Frequency 周波数	Operation Mode 動作モード	Measurement 試験結果	Pass / Fail 判定	Remarks 備考
				Reconnection Time 再並列阻止時間	>300s	
Phase A: 101Vrms Phase B: 101Vrms	4.8 kW	60 Hz	Discharge	301.394 s	Pass	Figure 3.2.9.2

Scope Channel Description:

Channel 1\_1: Phase A Current

Channel 1\_2: Phase A Voltage

Channel 2\_1: Phase B Current

Channel 2\_2: Phase B Voltage

Relay: Relay Signal

Gate drive: Gate Signal

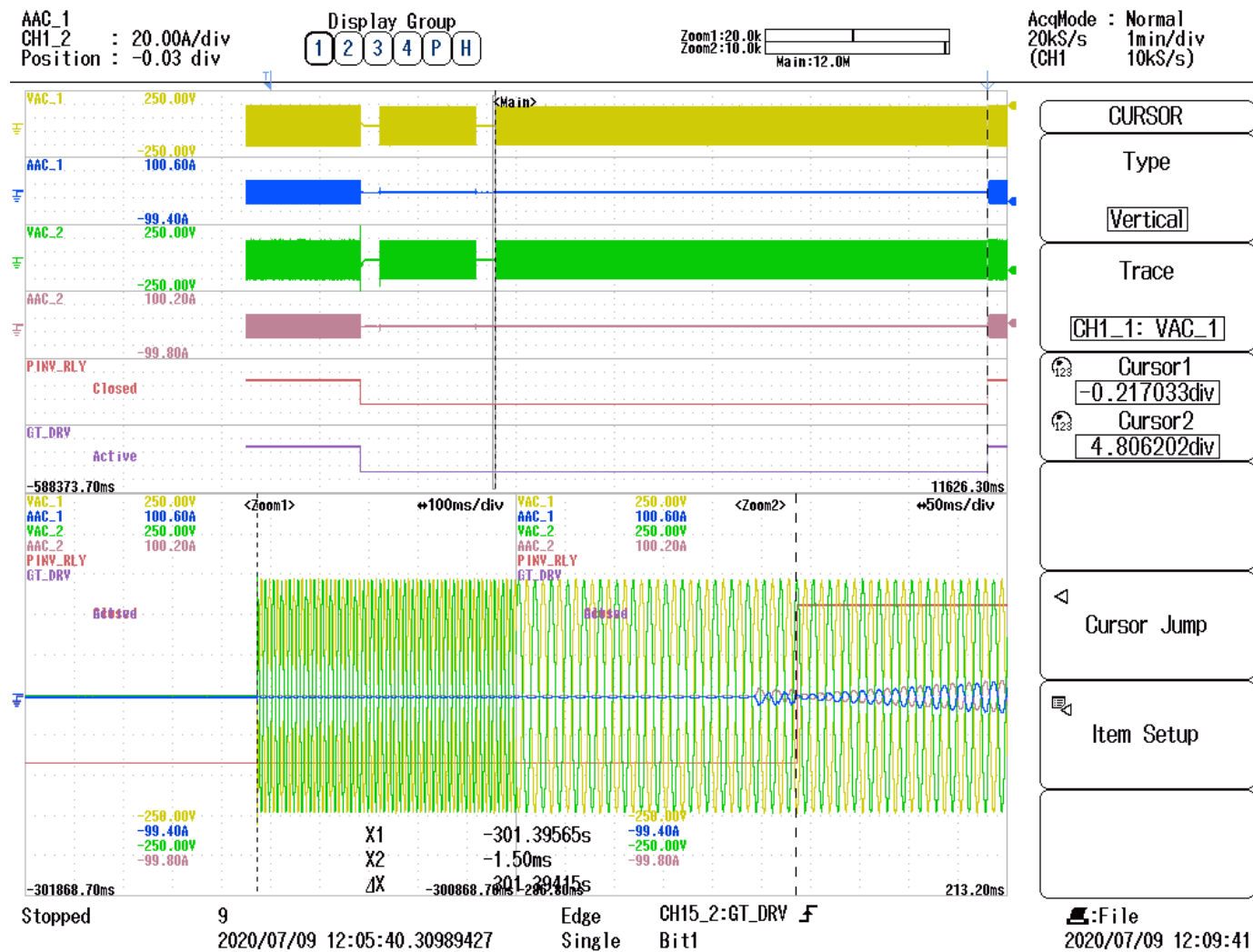


Figure: 3.2.9.2- After power is restored – input voltage is blocked for some time, Reconnection timer test 2 (Reconnection Time= 301.394 sec)

### Grid reconnect with Distortion

SWCB state	Unit Relay	Gate Drive	Time to Transition	Remarks
close	Closed		--	
open	Open		11.726	Fig: 3.2.9.2.1
Open	Closed		--	
Close	Opwn		11.635	
Close	Closed		301.394	Fig: 3.2.9.2.2

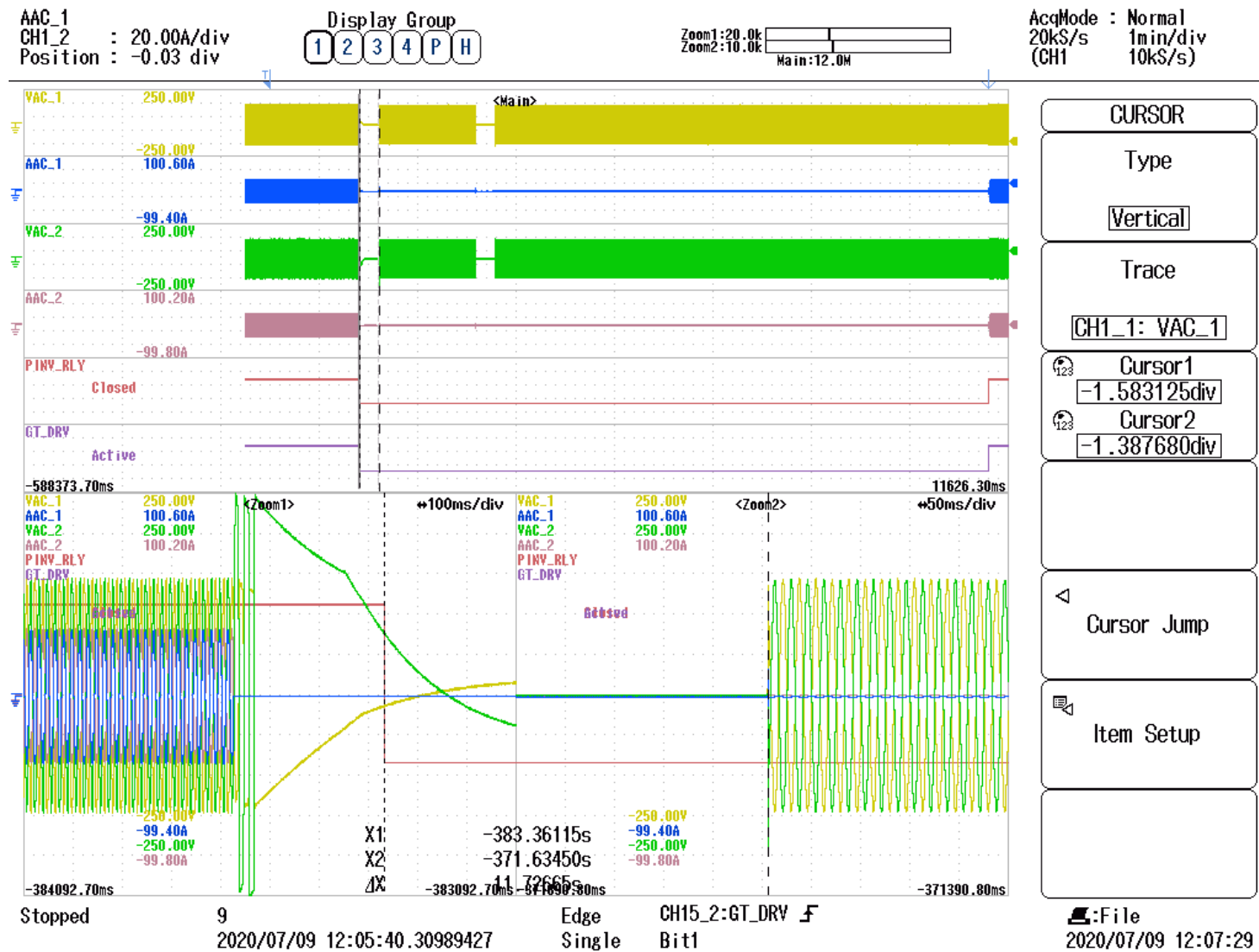


Fig: 3.2.9.2.1 Grid relay open->backup operation: 11.726secs

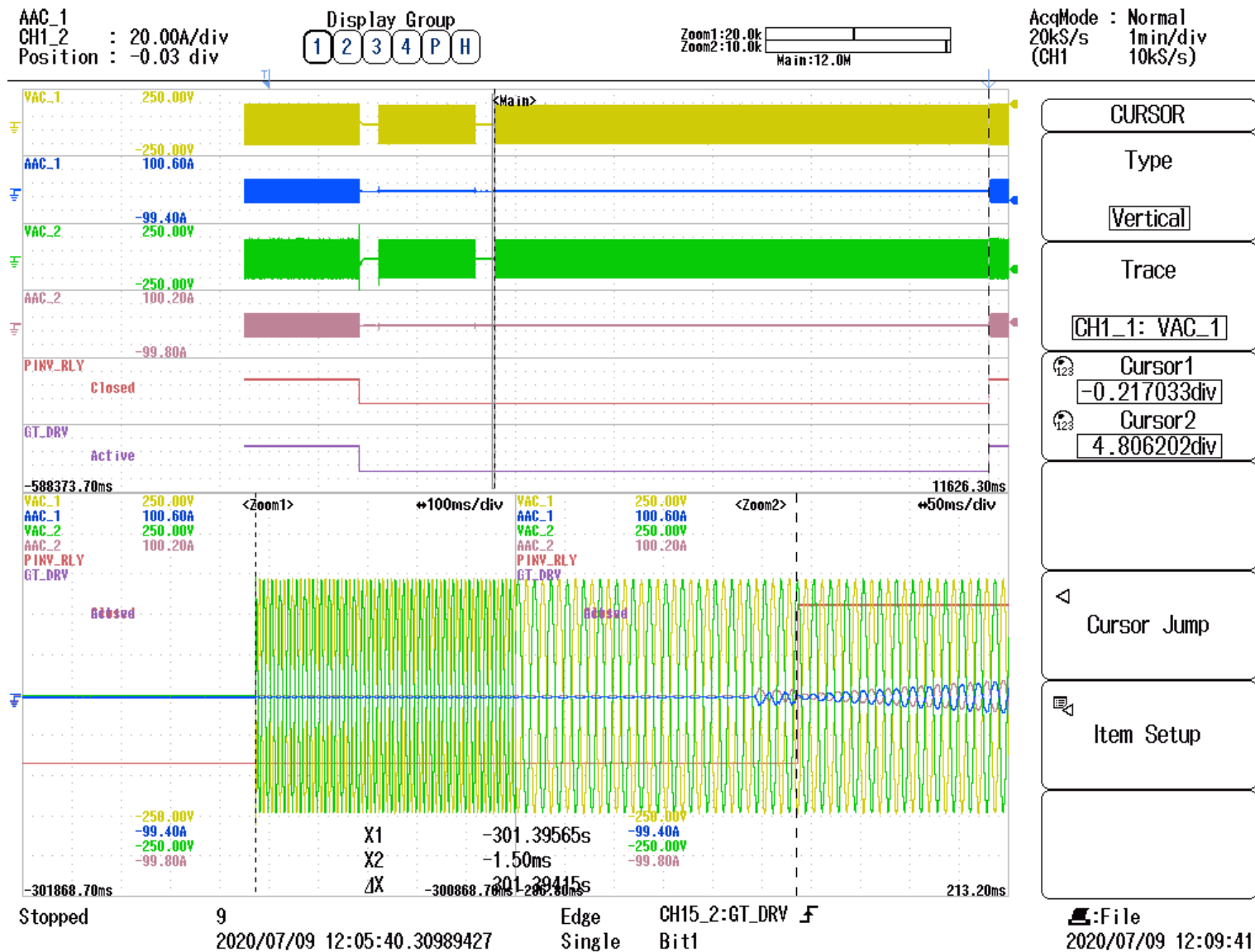


Fig: 3.2.9.2.2 Reconnection with distortion:301.394 secs





### 3.2.10 Instantaneous ( Unbalanced) Overvoltage Test - 瞬時(不平衡)過電圧試験

Over Voltage Test Parameters: 過電圧設定値

	Threshold 検出値	Detection Time 時限	Re-connection Time 再並列阻止時間
OVR	121.2Vrms	<1s	10s

OVR detection threshold test:

AC Voltage 交流電圧	Output Power 出力電力	Frequency 周波数	Operation Mode 動作モード	Tested Phase 試験相	Measurement (Vrms) 測定結果	Pass / Fail 判定 (121.2±2.424Vrms)
A: 109.08Vrms (90%)↑ B: 101Vrms	-4.8kW	60 Hz	Charge 充電	A	123.138	Pass
A: 101Vrms B: 109.08Vrms (90%)↑				B	123.047	Pass
A: 109.08Vrms (90%)↑ B: 101Vrms	4.8kW	60 Hz	Discharge 放電	A	119.363	Pass
A: 101Vrms B: 109.08Vrms (90%)↑				B	119.981	Pass

AC Voltage 交流電圧	Output Power 出力電力	Frequency 周波数	Operation Mode 動作モード	Tested Phase 試験相	Measurement (Time)	Pass / Fail	Remarks 備考
A: 109.08Vrms (90%)↑ B: 101Vrms	-4.8kW	60 Hz	Charge 充電	A	0.953	Pass	Fig: 3.2.10.1
A: 101Vrms B: 109.08Vrms (90%)↑				B	0.946	Pass	Fig: 3.2.10.2
A: 109.08Vrms (90%)↑ B: 101Vrms	4.8kW	60 Hz	Discharge 放電	A	0.884	Pass	Fig: 3.2.10.3
A: 101Vrms B: 109.08Vrms (90%)↑				B	0.870	Pass	Fig: 3.2.10.4

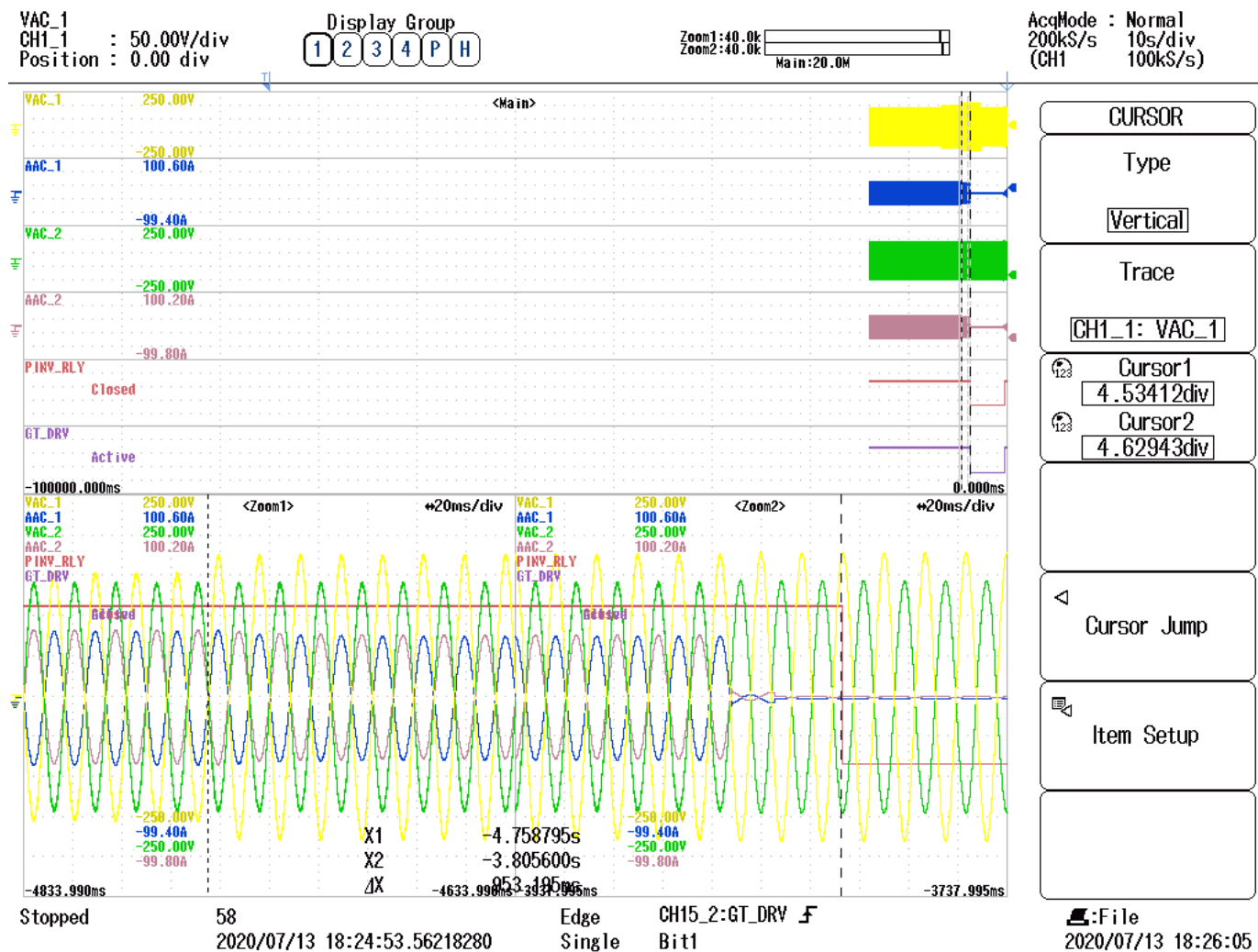


Fig: 3.2.10.1 Phase A charging mode Overvoltage:123.138V; 0.953secs

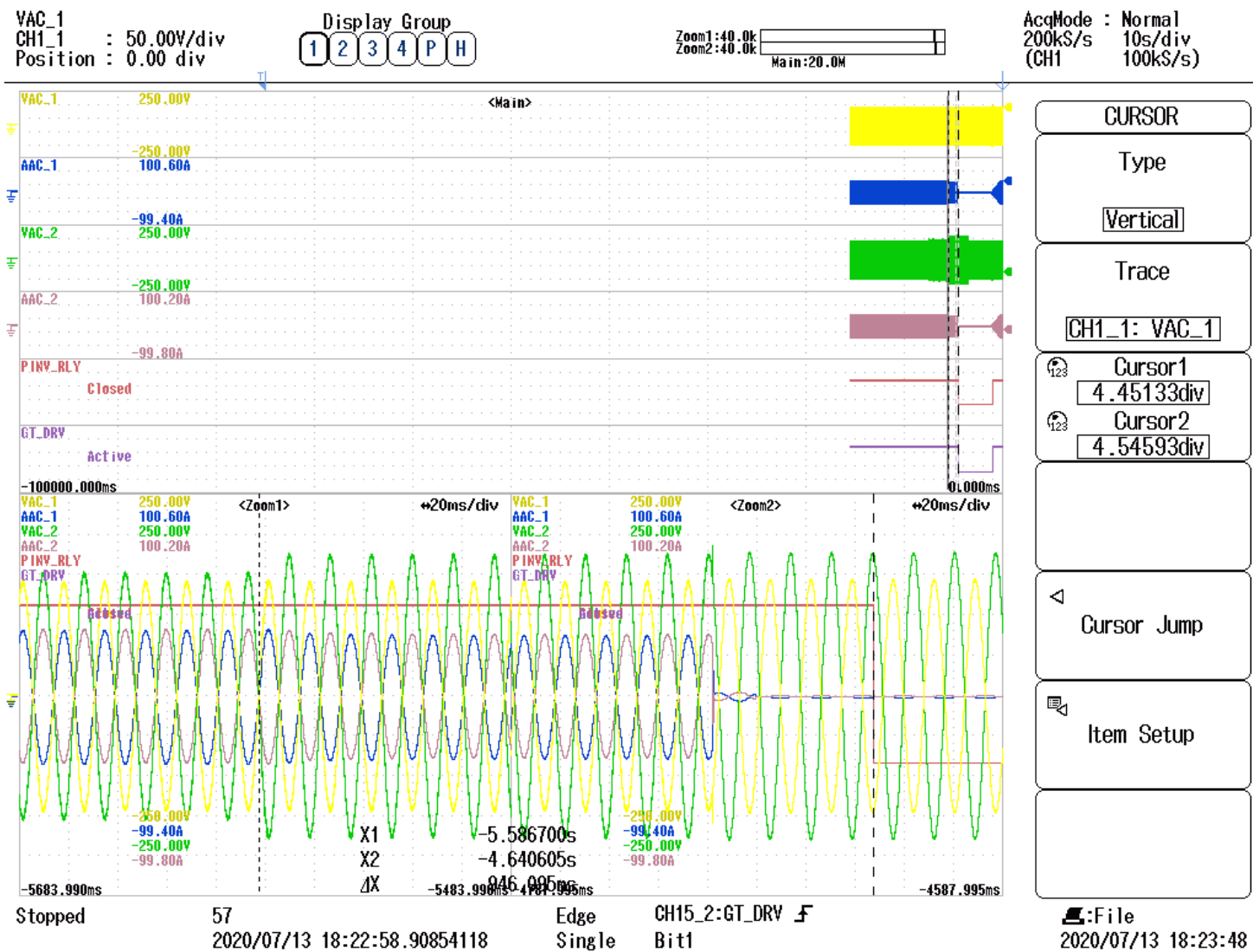
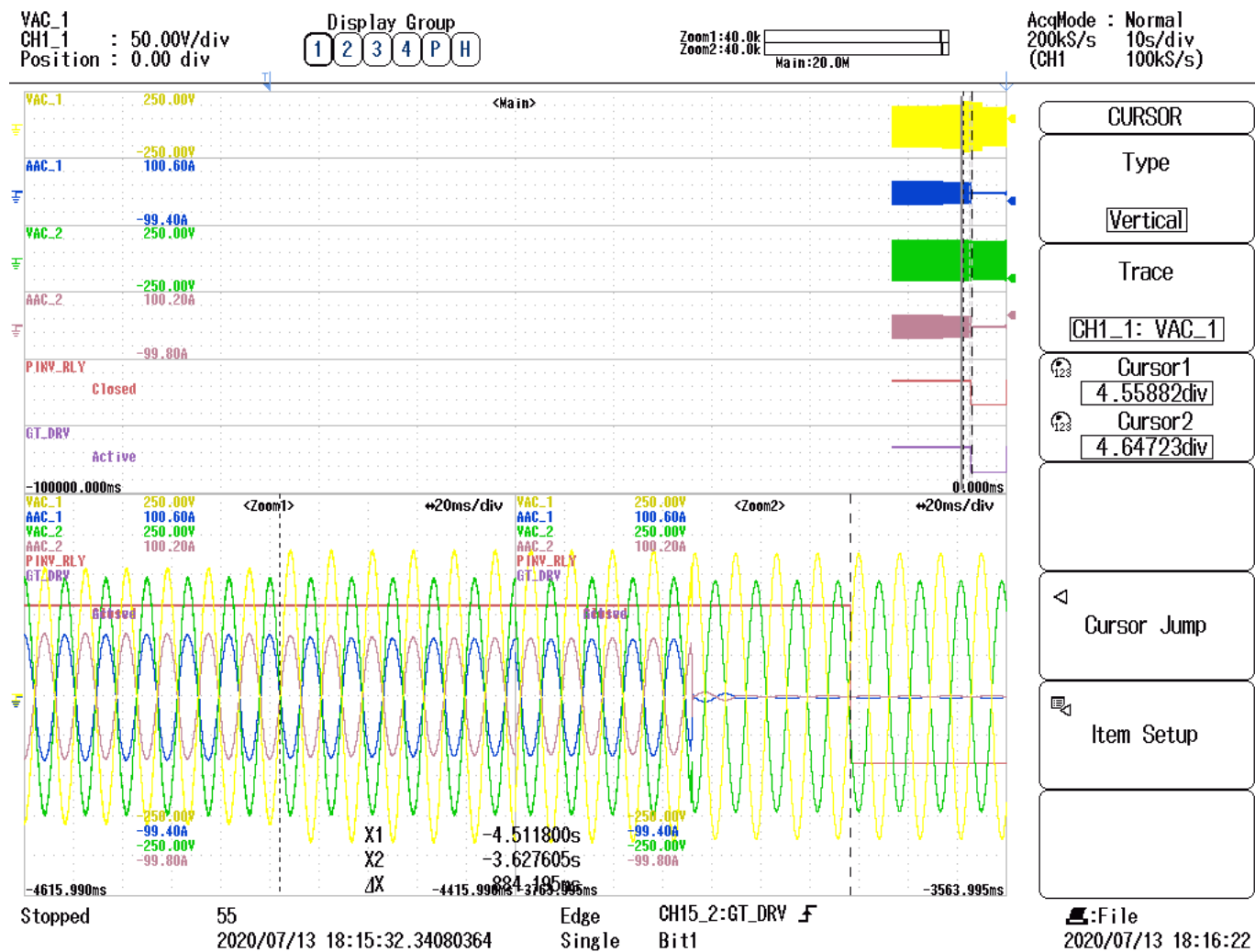


Fig: 3.2.10.2 Phase B Charging mode Overvoltage:123.047; 0.946secs



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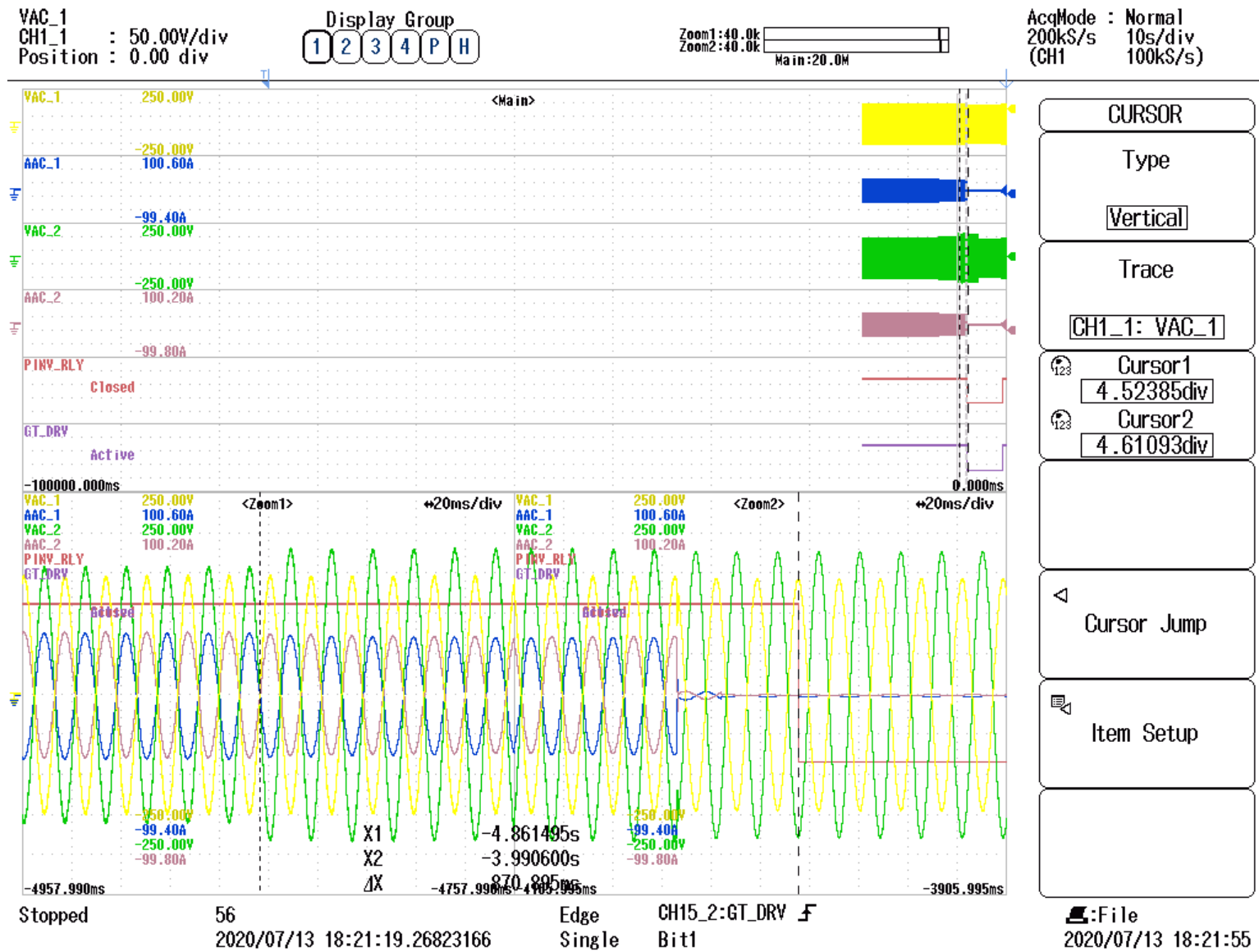


Fig: 3.2.10.4 Phase B Discharging mode Overvoltage:119.981; 0.870secs

### 3.2.11 Transition confirmation test of active islanding detection mode (Transition from active islanding detection mode: standby to active islanding detection mode: normal)

This test applies to 【多数台連系 FRT 対応型】、【多数台連系対応型】で【単相機器】

Harmonic Voltage	Initial Status	Final Status	Remarks
2.2	Standby	Operational	Fig.3.2.11.1-3.2.11.29
1.8V	Standby	Standby	

#### **Scope Channel Description:**

VAC\_1: Phase A Voltage

AAC\_1: Unit 1 Phase A Current

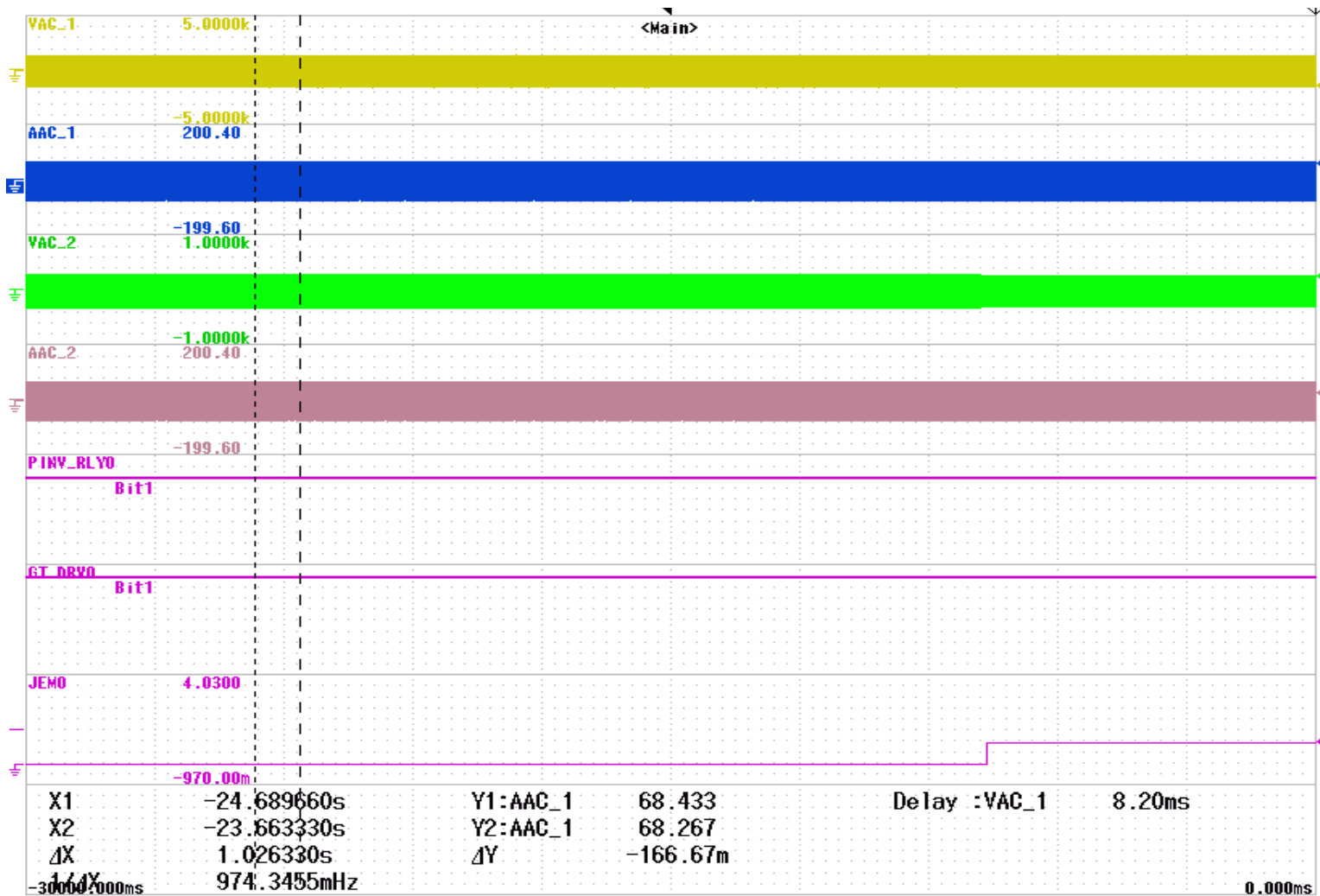
VAC\_2: Phase B Voltage

AAC\_2: Unit 2 Phase B Current

PINV\_RLY0: Relay Signal from Unit 1

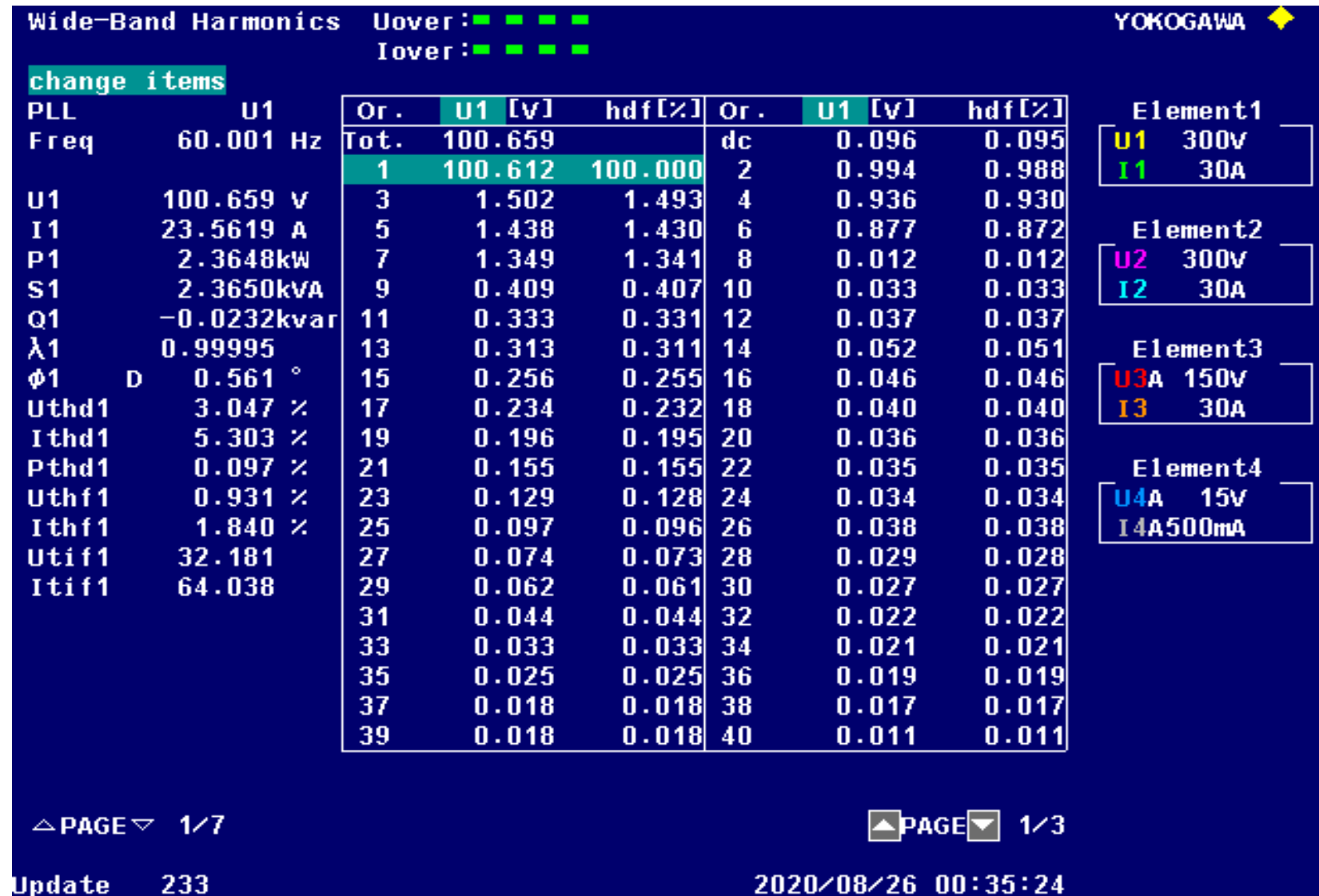
GT\_DRV0: Relay Signal from Unit 1

JEM0:

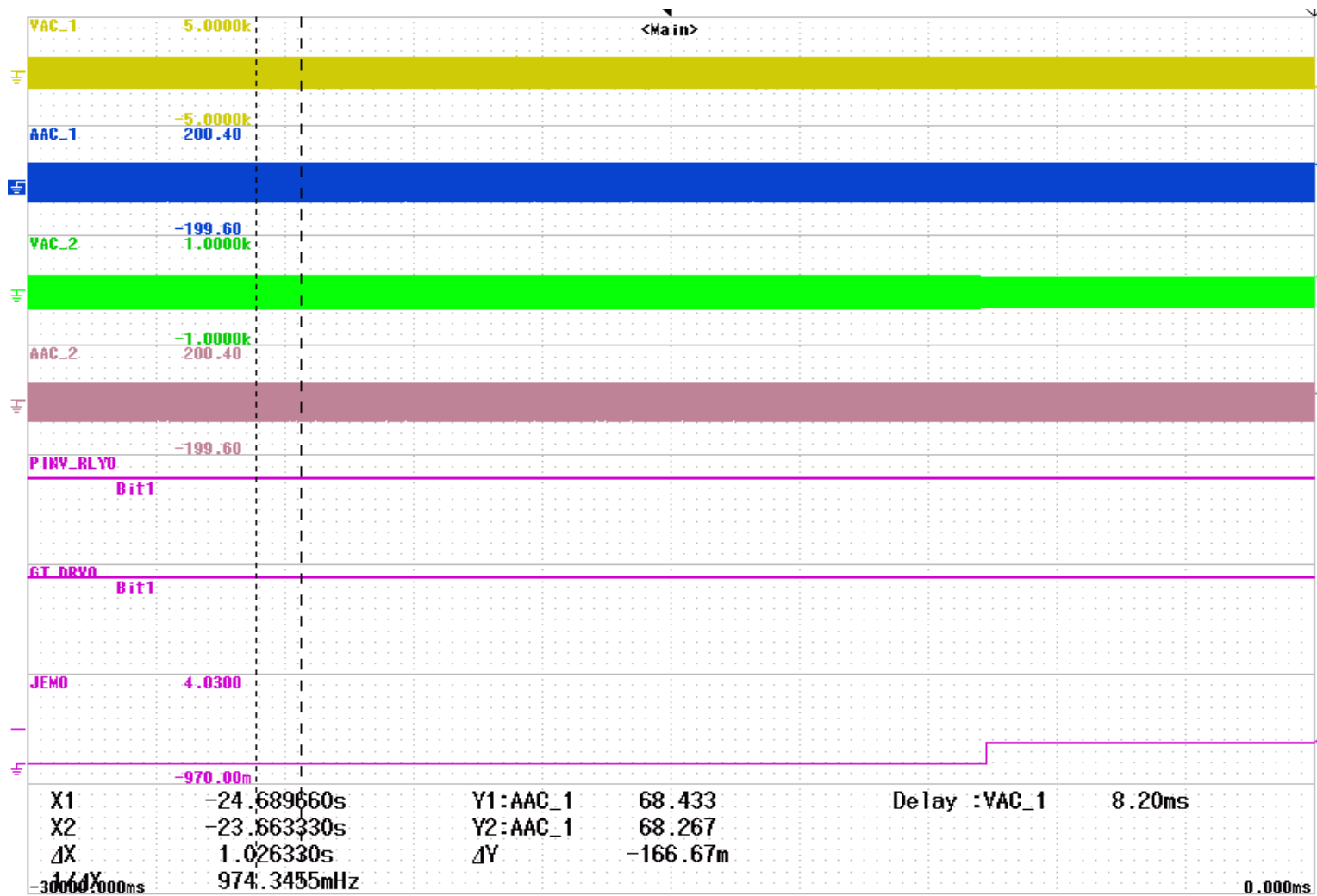


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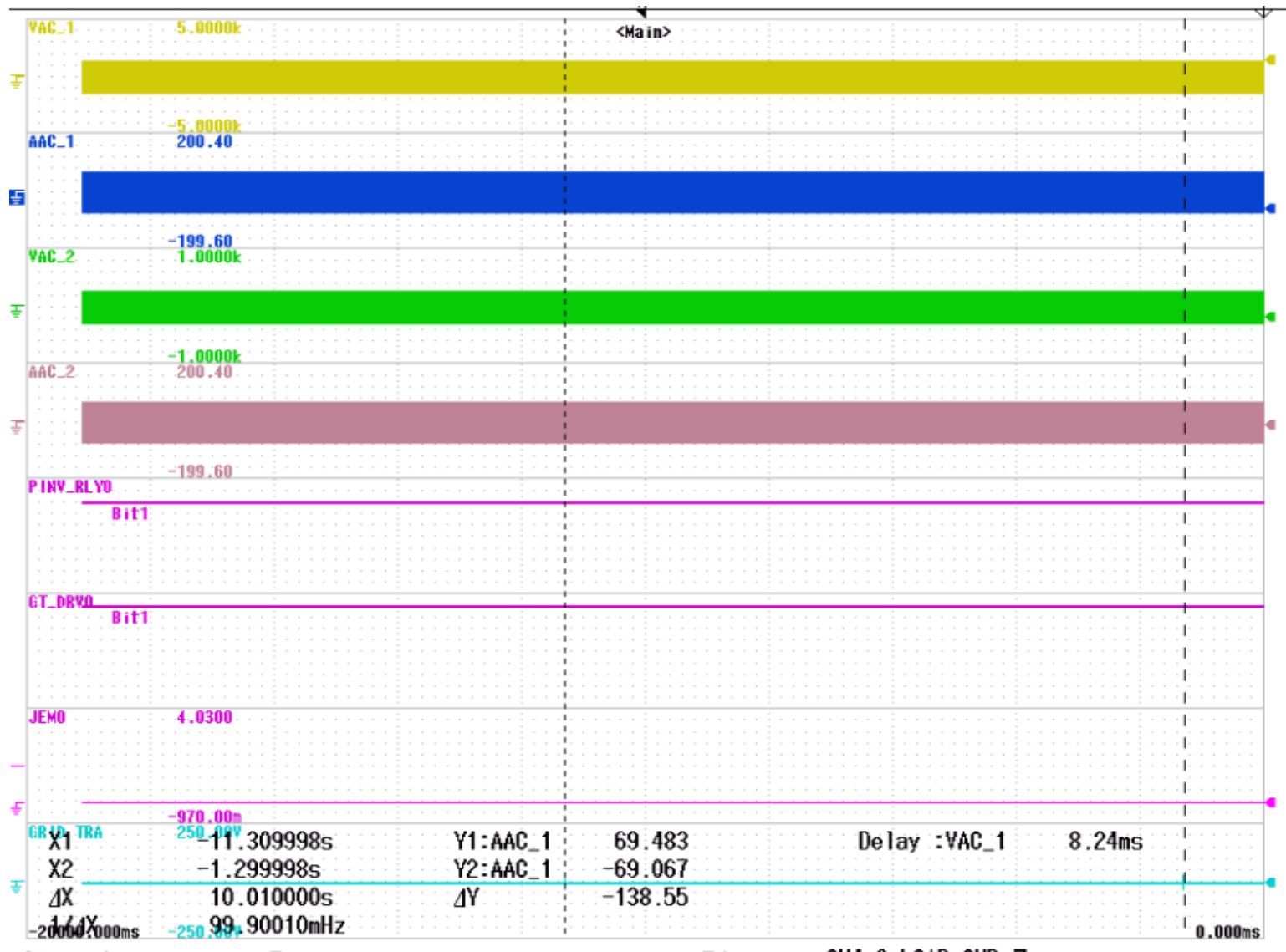
3.2.11.2: Power Analyzer-All harmonics THD>2.2V



3.2.11.3: Scope-All harmonics THD>2.2V. JEM Status Standby to Active

Wide-Band Harmonics			Uover: ■ ■ ■ ■			U1 : 300V			YOKOGAWA ◆	
			Iover: ■ ■ ■ ■						Image Save	
PLL	U1	Or.	U1 [V]	hdf[%]	Or.	U1 [V]	hdf[%]			
Freq	60.001 Hz	Tot.	99.783		dc	0.082	0.082			
U1	99.783 V	1	99.767	100.000	2	0.394	0.394			
I1	23.7174 A	3	0.943	0.946	4	0.357	0.358	Format		
P1	2.3625kW	5	0.874	0.876	6	0.335	0.335	PNG		
S1	2.3626kVA	7	0.821	0.823	8	0.008	0.008			
Q1	-0.0229kvar	9	0.407	0.408	10	0.016	0.016	Color		
λ1	0.99995	11	0.346	0.347	12	0.014	0.014	Color		
φ1	D 0.556 °	13	0.307	0.307	14	0.018	0.018			
Uthd1	1.830 %	15	0.252	0.252	16	0.022	0.022			
Ithd1	4.513 %	17	0.224	0.224	18	0.014	0.014			
Pthd1	0.050 %	19	0.188	0.188	20	0.017	0.017	Comment		
Uthf1	0.858 %	21	0.161	0.162	22	0.014	0.014			
Ithf1	1.857 %	23	0.132	0.133	24	0.012	0.012			
Utif1	31.060	25	0.107	0.107	26	0.013	0.013			
Itif1	65.504	27	0.088	0.088	28	0.014	0.014			
		29	0.066	0.066	30	0.012	0.012			
		31	0.052	0.052	32	0.012	0.012			
		33	0.045	0.045	34	0.008	0.008			
		35	0.035	0.035	36	0.008	0.008	File List		
		37	0.028	0.028	38	0.009	0.009			
		39	0.018	0.018	40	0.008	0.008	File Name		
								JPH1		
△PAGE ▾ 1/7			△PAGE ▾ 1/3							
Update 1386			2020/09/07 23:02:37							

#### 3.2.11.4: Power Analyzer-All harmonics THD=1.8V



3.2.11.5: Scope-All harmonics THD-1.8V. JEM Status Standby ( Cursors indicate the duration where 1.8V harmonics introduced)

Wide-Band Harmonics

Uover:■■■■

PLL Source: U1

YOKOGAWA

Image Save

Iover:■■■■

Format

PNG

Color

Color

Comment

File List

File Name

JPH1

△PAGE▽ 1/7

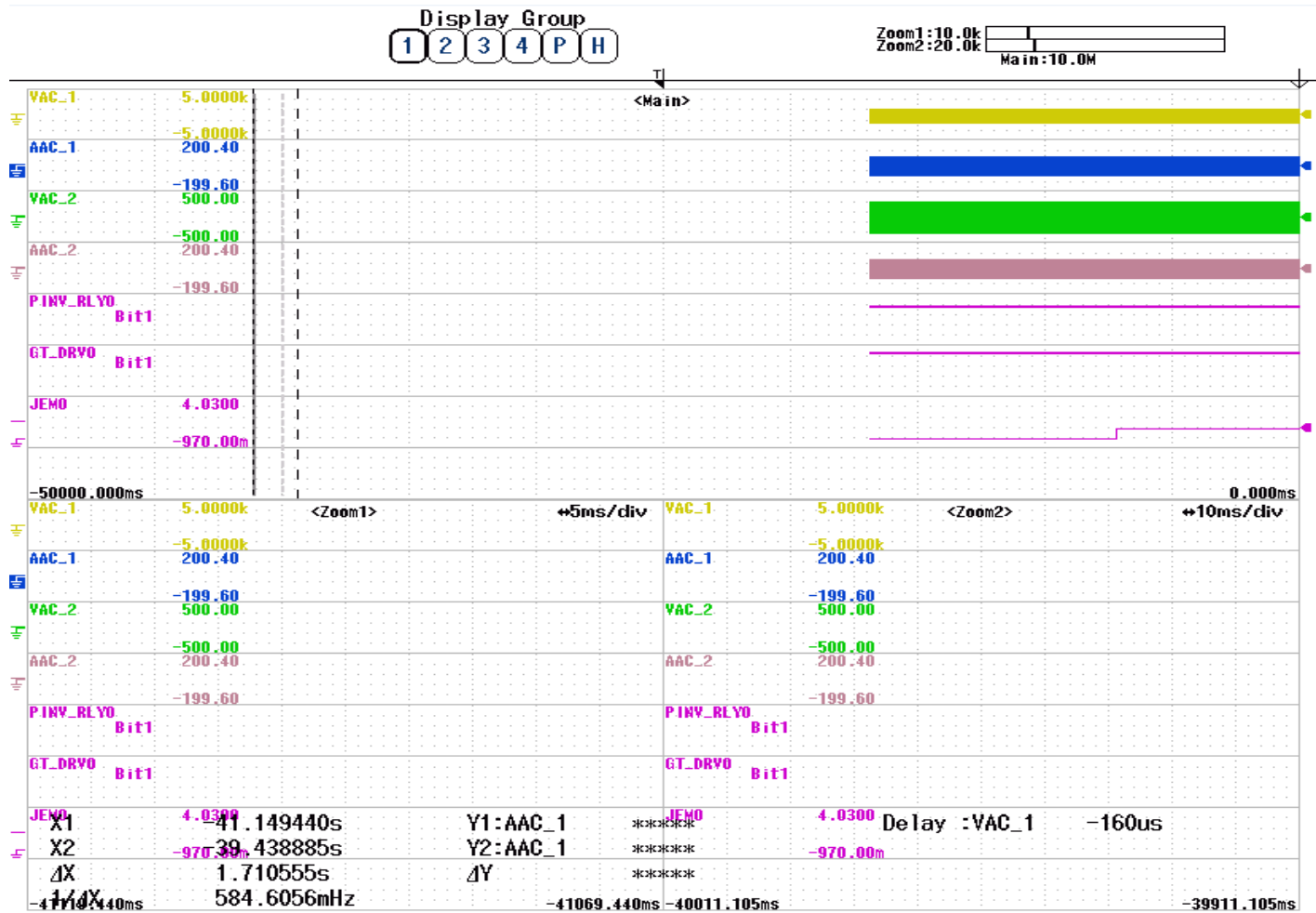
△PAGE▽ 1/3

Update 795

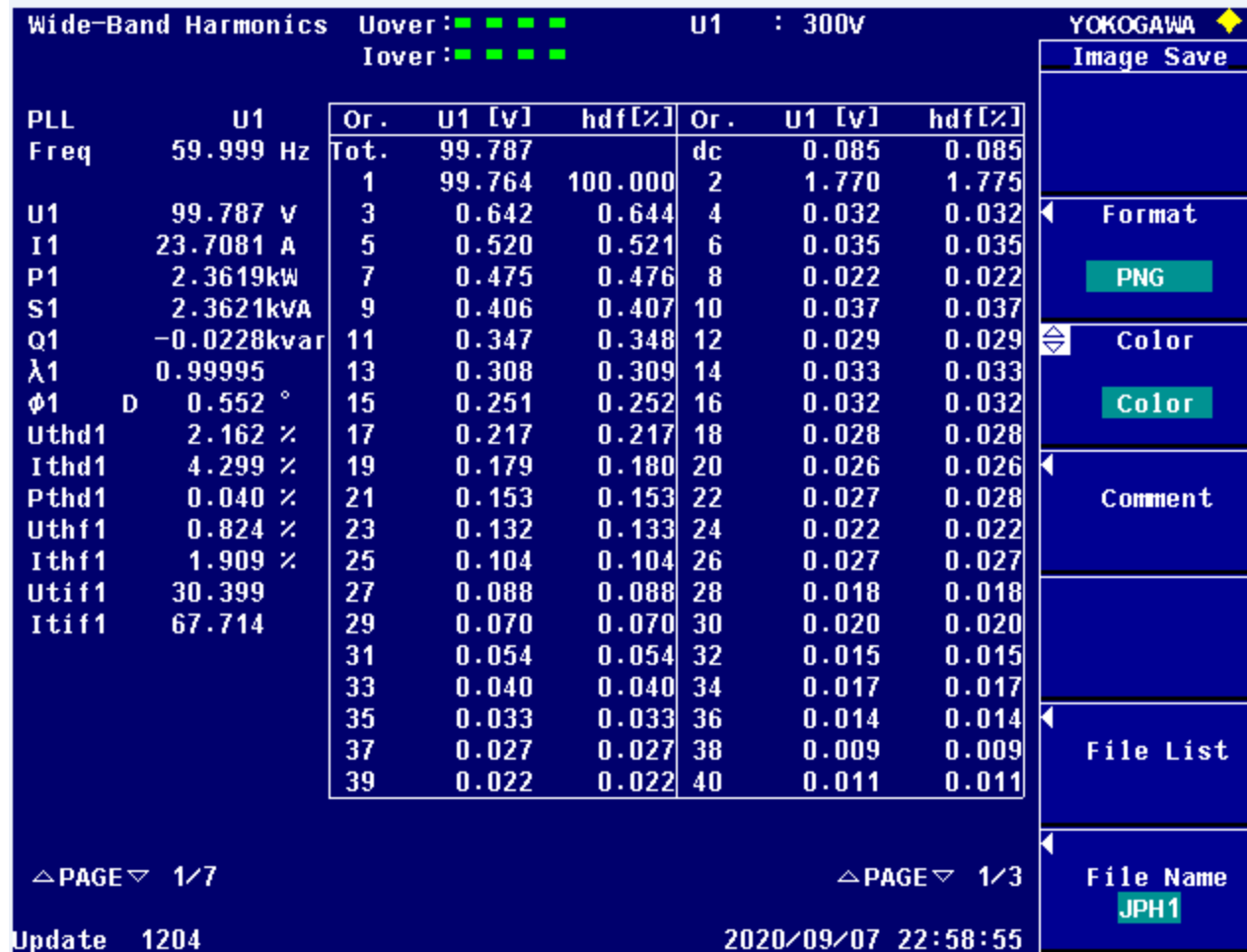
2020/08/19 05:41:15

PLL	U1	Or.	U1 [V]	hdf[%]	Or.	U1 [V]	hdf[%]
Freq	60.001 Hz	Tot.	101.113		dc	0.099	0.098
U1	101.113 V	1	101.081	100.000	2	2.216	2.193
I1	23.4762 A	3	0.669	0.662	4	0.036	0.036
P1	2.3695kW	5	0.534	0.528	6	0.045	0.045
S1	2.3696kVA	7	0.480	0.475	8	0.029	0.029
Q1	-0.0225kvar	9	0.410	0.406	10	0.044	0.044
λ1	0.99995	11	0.351	0.347	12	0.032	0.031
φ1	D 0.544 °	13	0.308	0.304	14	0.040	0.040
Uthd1	2.524 %	15	0.258	0.256	16	0.033	0.032
Ithd1	4.463 %	17	0.227	0.225	18	0.035	0.035
Pthd1	0.042 %	19	0.188	0.186	20	0.036	0.036
Uthf1	0.833 %	21	0.158	0.157	22	0.031	0.031
Ithf1	1.931 %	23	0.136	0.135	24	0.027	0.027
Utif1	30.668	25	0.107	0.106	26	0.032	0.031
Itif1	68.510	27	0.083	0.082	28	0.025	0.025
		29	0.066	0.065	30	0.024	0.024
		31	0.048	0.048	32	0.018	0.018
		33	0.040	0.040	34	0.020	0.019
		35	0.031	0.031	36	0.015	0.015
		37	0.022	0.022	38	0.012	0.012
		39	0.018	0.017	40	0.008	0.008

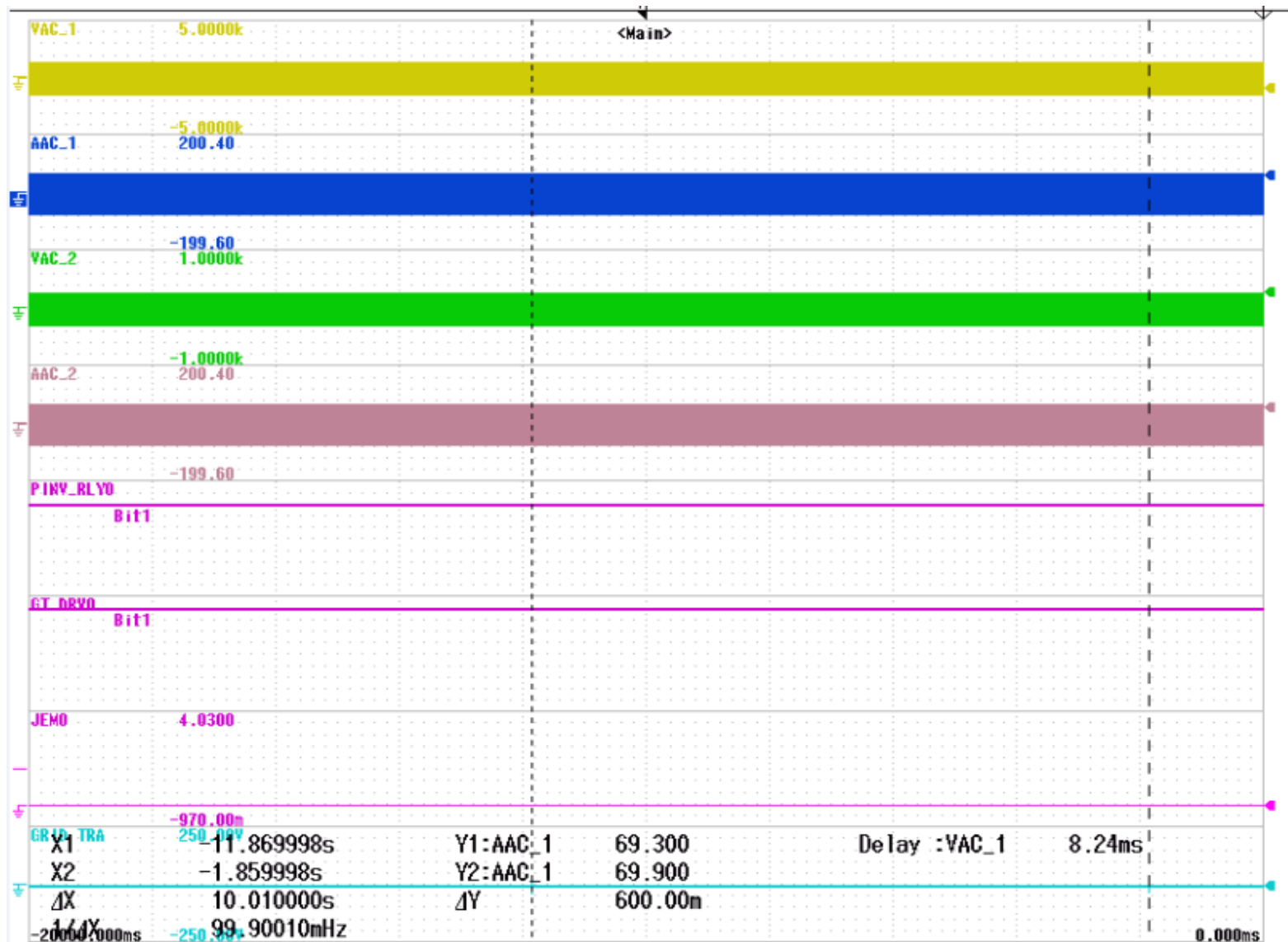
3.2.11.6: Power Analyzer-2<sup>nd</sup> harmonic =2.2V



3.2.11.7: Scope-2nd harmonics=2.2V. JEM Status Standby to Active



3.2.11.8: Power Analyzer-2<sup>nd</sup> harmonic =1.8V

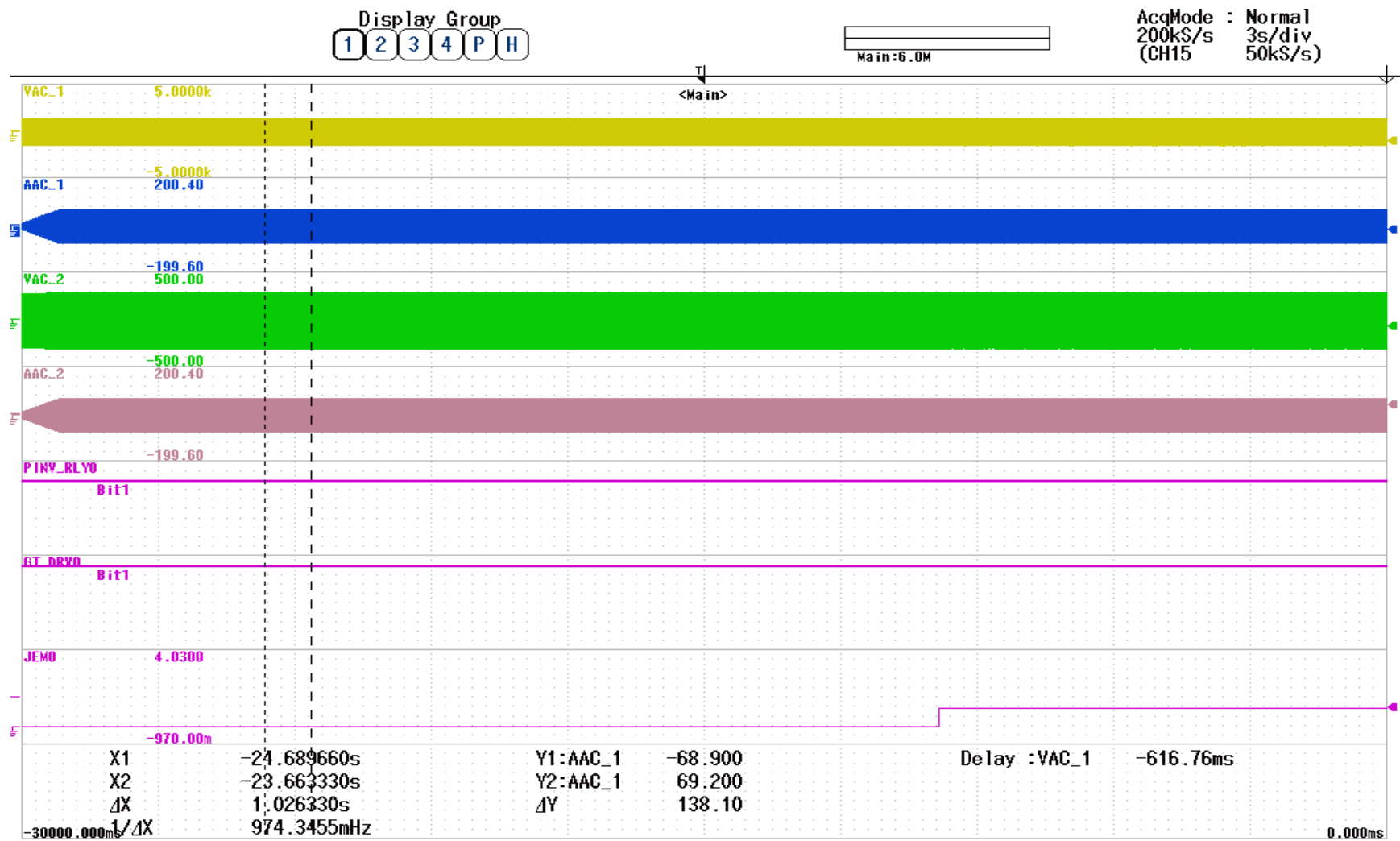


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Wide-Band Harmonics			Uover:■■■■			PLL Source: U1			YOKOGAWA ◆		
			Iover:■■■■						Image Save		
PLL	U1		Or.	U1 [V]	hdf[%]	Or.	U1 [V]	hdf[%]			
Freq	59.999 Hz	Tot.	101.107			dc	0.095	0.094			
		1	101.073	100.000		2	0.006	0.006			
U1	101.107 V	3	0.669	0.662		4	2.297	2.273	Format		
I1	23.4947 A	5	0.536	0.531		6	0.012	0.011	PNG		
P1	2.3699kW	7	0.482	0.477		8	0.028	0.028			
S1	2.3700kVA	9	0.410	0.405		10	0.019	0.019	Color		
Q1	-0.0223kvar	11	0.347	0.343		12	0.037	0.037	Color		
λ1	0.99996	13	0.310	0.306		14	0.032	0.031			
φ1	D 0.540 °	15	0.269	0.266		16	0.035	0.034			
Uthd1	2.595 %	17	0.230	0.228		18	0.030	0.029	Comment		
Ithd1	4.850 %	19	0.195	0.193		20	0.025	0.024			
Pthd1	0.081 %	21	0.162	0.161		22	0.024	0.023			
Uthf1	0.849 %	23	0.133	0.132		24	0.025	0.025			
Ithf1	1.955 %	25	0.109	0.108		26	0.025	0.025			
Utif1	31.123	27	0.083	0.082		28	0.029	0.029			
Itif1	69.338	29	0.071	0.070		30	0.022	0.022			
		31	0.052	0.052		32	0.021	0.020			
		33	0.039	0.039		34	0.016	0.016			
		35	0.027	0.027		36	0.016	0.016			
		37	0.021	0.021		38	0.011	0.011	File List		
		39	0.017	0.017		40	0.014	0.014			
△PAGE ▾ 1/7						△PAGE ▾ 1/3			File Name		
									JPH1		
Update 1232						2020/08/19 05:47:23					

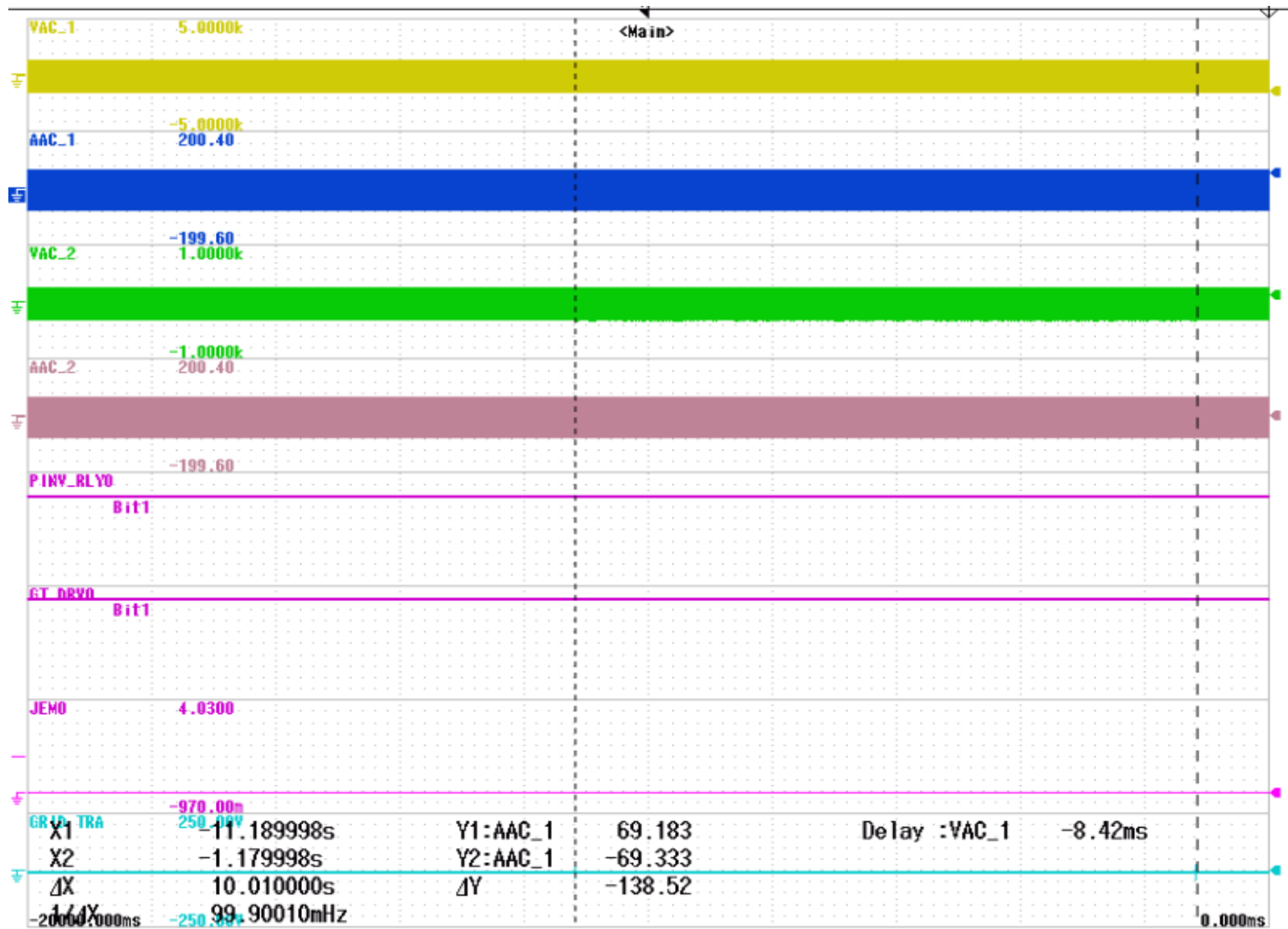
3.2.11.10: Power Analyzer-4th harmonic=2.2V



3.2.11.11: Scope-4<sup>th</sup> harmonics=2.2V. JEM Status Standby to Active



Wide-Band Harmonics			Uover:■■■■			U1 : 300V			YOKOGAWA ◆		
			Iover:■■■■						Image Save		
PLL	U1	Or.	U1 [V]	hdf[%]	Or.	U1 [V]	hdf[%]				
Freq	60.002 Hz	Tot.	99.761		dc	0.089	0.090				
		1	99.737	100.000	2	0.007	0.007				
U1	99.761 V	3	0.647	0.648	4	1.770	1.775	Format			
I1	23.7078 A	5	0.521	0.522	6	0.011	0.011				
P1	2.3605kW	7	0.477	0.478	8	0.023	0.023			PNG	
S1	2.3606kVA	9	0.406	0.407	10	0.017	0.017				
Q1	-0.0227kvar	11	0.351	0.352	12	0.032	0.032	Color			
λ1	0.99995	13	0.309	0.310	14	0.027	0.027			Color	
φ1	D 0.550 °	15	0.257	0.258	16	0.031	0.031				
Uthd1	2.166 %	17	0.222	0.223	18	0.027	0.027				
Ithd1	4.535 %	19	0.184	0.184	20	0.018	0.018				
Pthd1	0.062 %	21	0.155	0.155	22	0.016	0.016	Comment			
Uthf1	0.837 %	23	0.130	0.131	24	0.022	0.022				
Ithf1	1.926 %	25	0.107	0.107	26	0.019	0.019				
Utif1	30.742	27	0.086	0.086	28	0.024	0.024				
Itif1	68.184	29	0.070	0.070	30	0.017	0.017				
		31	0.056	0.056	32	0.022	0.022				
		33	0.041	0.041	34	0.016	0.016				
		35	0.035	0.035	36	0.013	0.013				
		37	0.025	0.025	38	0.013	0.013	File List			
		39	0.016	0.016	40	0.014	0.014				
△PAGE▽ 1/7						△PAGE▽ 1/3			File Name		
Update 168									JPH1		

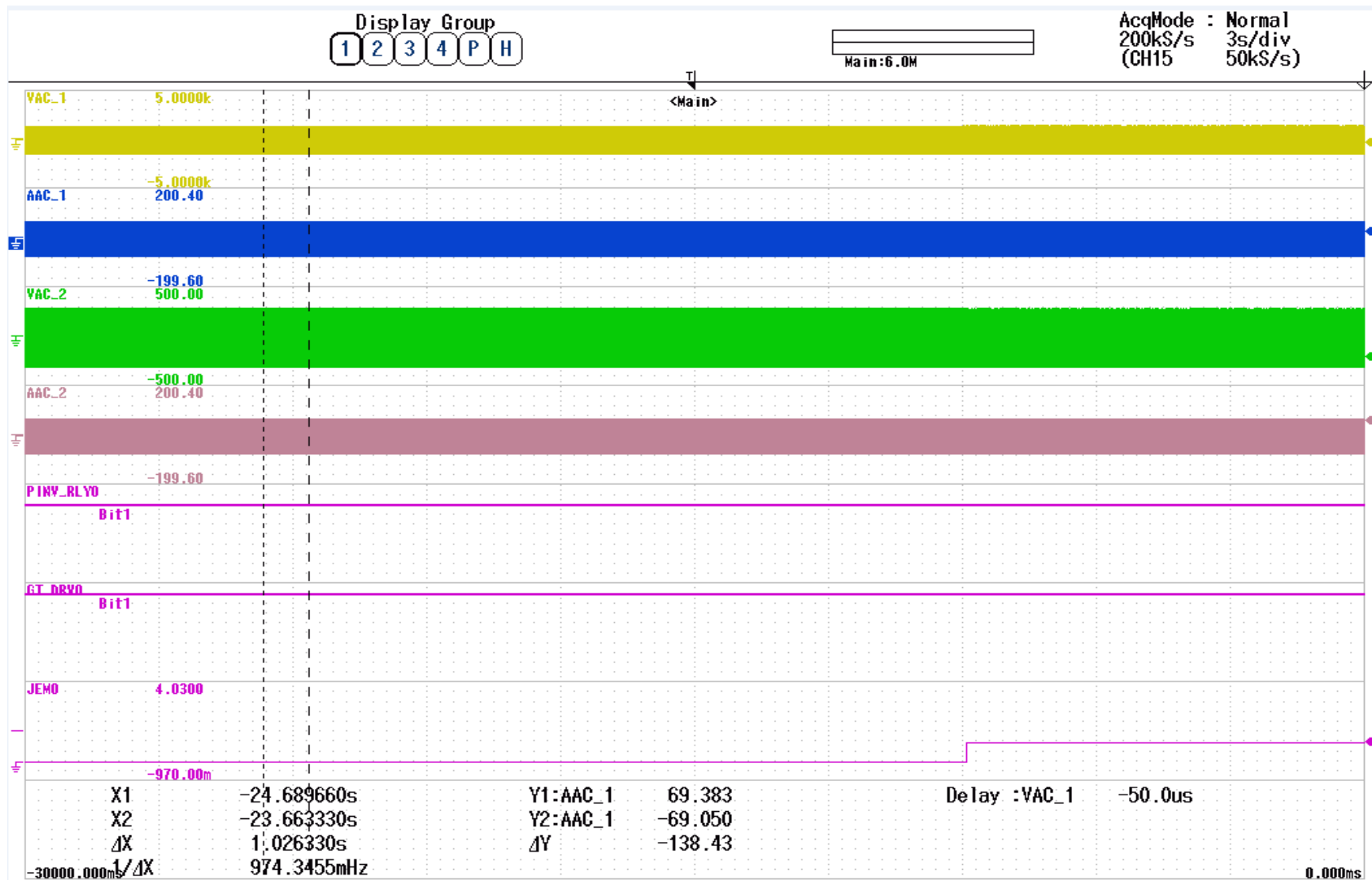


3.2.11.13: Scope-4<sup>th</sup> harmonics=1.8V. JEM Status Standby( Cursors indicate the duration where 1.8V harmonics introduced)

Wide-Band Harmonics			PLL Source:			U1		
Uover: <span style="color: red;">■ ■ ■ ■</span>			Iover: <span style="color: red;">■ ■ ■ ■</span>					
PLL Freq	60.001 Hz		Or.	U1 [V]	hdf[%]	Or.	U1 [V]	hdf[%]
U1	101.100 V		Tot.	101.100		dc	0.093	0.092
I1	23.4955 A		1	101.068	100.000	2	0.005	0.005
P1	2.3699kW		3	0.658	0.651	4	0.011	0.011
S1	2.3700kVA		5	0.532	0.526	6	2.243	2.220
Q1	-0.0223kvar		7	0.483	0.478	8	0.026	0.025
λ1	0.99996		9	0.409	0.405	10	0.025	0.025
φ1	D 0.540 °		11	0.348	0.344	12	0.032	0.032
Uthd1	2.545 %		13	0.311	0.308	14	0.031	0.030
Ithd1	4.792 %		15	0.269	0.266	16	0.027	0.026
Pthd1	0.081 %		17	0.229	0.227	18	0.024	0.023
Uthf1	0.930 %		19	0.200	0.198	20	0.020	0.020
Ithf1	2.014 %		21	0.163	0.161	22	0.018	0.018
Utif1	32.246		23	0.133	0.131	24	0.019	0.019
Itif1	70.579		25	0.105	0.104	26	0.022	0.022
			27	0.084	0.084	28	0.021	0.021
			29	0.069	0.068	30	0.020	0.020
			31	0.049	0.049	32	0.022	0.022
			33	0.041	0.041	34	0.014	0.014
			35	0.030	0.030	36	0.012	0.012
			37	0.021	0.021	38	0.015	0.014
			39	0.017	0.017	40	0.014	0.014

△PAGE ▾ 1/7
△PAGE ▾ 1/3

Update 1542
2020/08/19 05:53:22

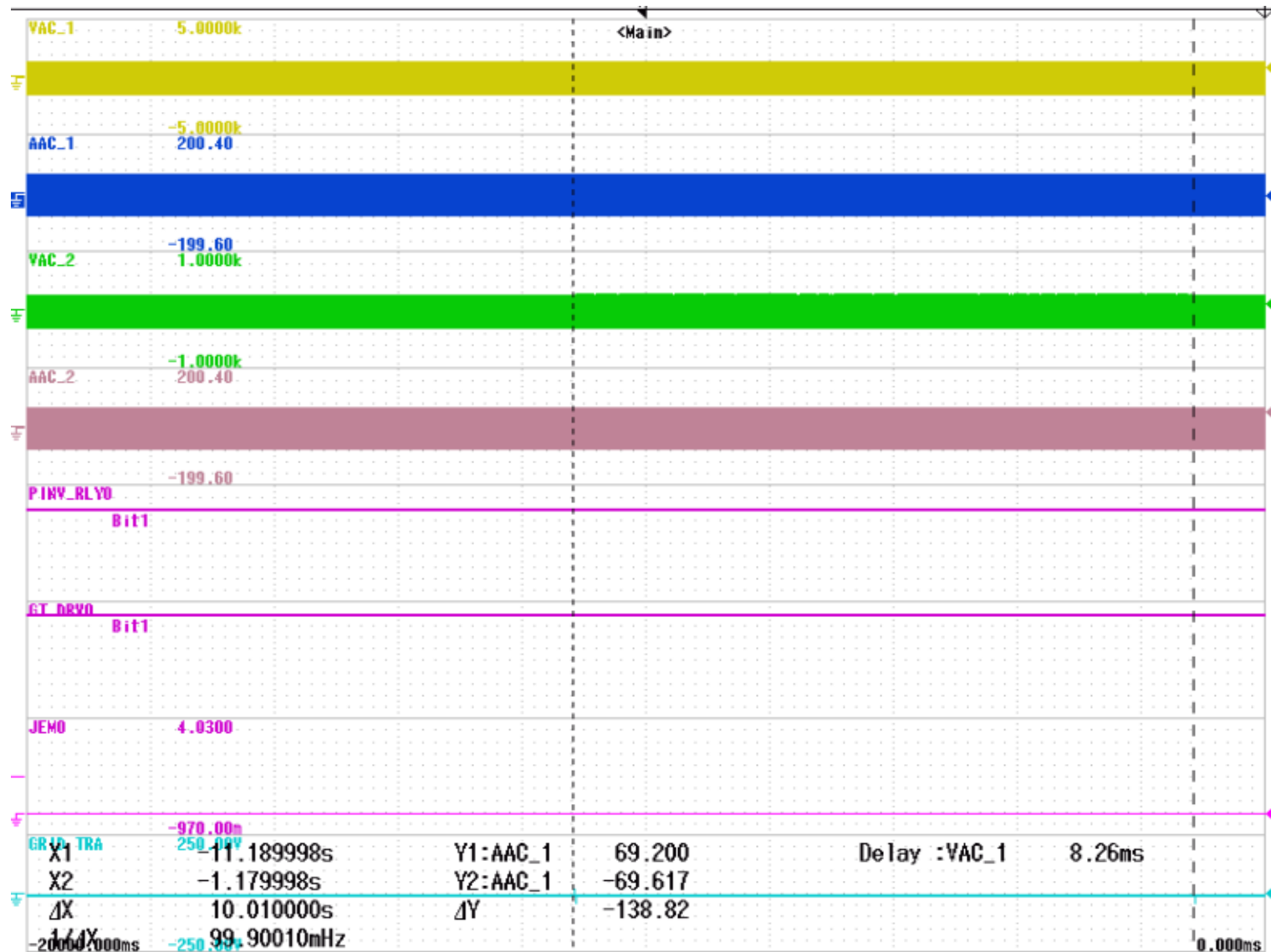


3.2.11.15: Scope-6th harmonics=2.2V. JEM Status Standby to Active



Wide-Band Harmonics			Uover:■■■■			U1 : 300V			YOKOGAWA ◆	
			Iover:■■■■						Image Save	
PLL	U1	Or.	U1 [V]	hdf[%]	Or.	U1 [V]	hdf[%]			
Freq	60.002 Hz	Tot.	99.781		dc	0.082	0.083			
U1	99.781 V	1	99.759	100.000	2	0.002	0.002			
I1	23.7172 A	3	0.645	0.647	4	0.014	0.014	Format		
P1	2.3621kW	5	0.520	0.521	6	1.704	1.708	PNG		
S1	2.3622kVA	7	0.476	0.478	8	0.020	0.020			
Q1	-0.0227kvar	9	0.409	0.410	10	0.020	0.020	Color		
λ1	0.99995	11	0.349	0.350	12	0.028	0.028	Color		
φ1	D 0.551 °	13	0.305	0.306	14	0.023	0.023			
Uthd1	2.110 %	15	0.259	0.259	16	0.022	0.022			
Ithd1	4.475 %	17	0.218	0.218	18	0.014	0.014			
Pthd1	0.061 %	19	0.187	0.187	20	0.015	0.015	Comment		
Uthf1	0.884 %	21	0.154	0.154	22	0.009	0.009			
Ithf1	1.951 %	23	0.136	0.137	24	0.012	0.012			
Utif1	31.335	25	0.108	0.108	26	0.020	0.020			
Itif1	68.561	27	0.085	0.085	28	0.013	0.013			
		29	0.071	0.072	30	0.019	0.019			
		31	0.052	0.052	32	0.013	0.013			
		33	0.044	0.044	34	0.013	0.013			
		35	0.034	0.034	36	0.010	0.010			
		37	0.023	0.023	38	0.008	0.008	File List		
		39	0.019	0.019	40	0.012	0.012			
△PAGE ▾ 1/7						△PAGE ▾ 1/3			File Name	
Update 1286						2020/09/07 23:00:43			JPH1	

3.2.11.16: Power Analyzer-6th harmonic =1.8V



3.2.11.17: Scope-6th harmonics=1.8V. JEM Status Standby ( Cursors indicate the duration where 1.8V harmonics introduced)





Wide-Band Harmonics
Uover:
Iover:

PLL Source:
U1

YOKOGAWA
Image Save
Format
PNG
Color
Color
Comment
File List
File Name
JPH1

PLL	U1	Or.	U1 [V]	hdf[%]	Or.	U1 [V]	hdf[%]
Freq	60.001 Hz	Tot.	101.062		dc	0.095	0.094
U1	101.062 V	1	101.030	100.000	2	0.013	0.013
I1	23.4783 A	3	2.283	2.260	4	0.033	0.032
P1	2.3675kW	5	0.535	0.530	6	0.030	0.030
S1	2.3676kVA	7	0.481	0.476	8	0.021	0.021
Q1	-0.0221kvar	9	0.413	0.408	10	0.024	0.024
$\lambda$ 1	0.99996	11	0.349	0.346	12	0.024	0.023
$\phi$ 1	D 0.536 °	13	0.318	0.314	14	0.024	0.024
Uthd1	2.502 %	15	0.267	0.264	16	0.022	0.021
Ithd1	4.990 %	17	0.248	0.246	18	0.022	0.021
Pthd1	0.059 %	19	0.206	0.203	20	0.018	0.017
Uthf1	0.866 %	21	0.170	0.168	22	0.019	0.019
Ithf1	1.865 %	23	0.141	0.140	24	0.014	0.014
Utif1	31.957	25	0.107	0.106	26	0.014	0.014
Itif1	66.628	27	0.087	0.086	28	0.010	0.010
		29	0.072	0.071	30	0.008	0.008
		31	0.057	0.056	32	0.007	0.007
		33	0.042	0.042	34	0.008	0.008
		35	0.030	0.030	36	0.003	0.003
		37	0.022	0.022	38	0.006	0.006
		39	0.022	0.021	40	0.007	0.007

△PAGE▽ 1/7
Update 2209

△PAGE▽ 1/3
2020/08/19 06:05:23

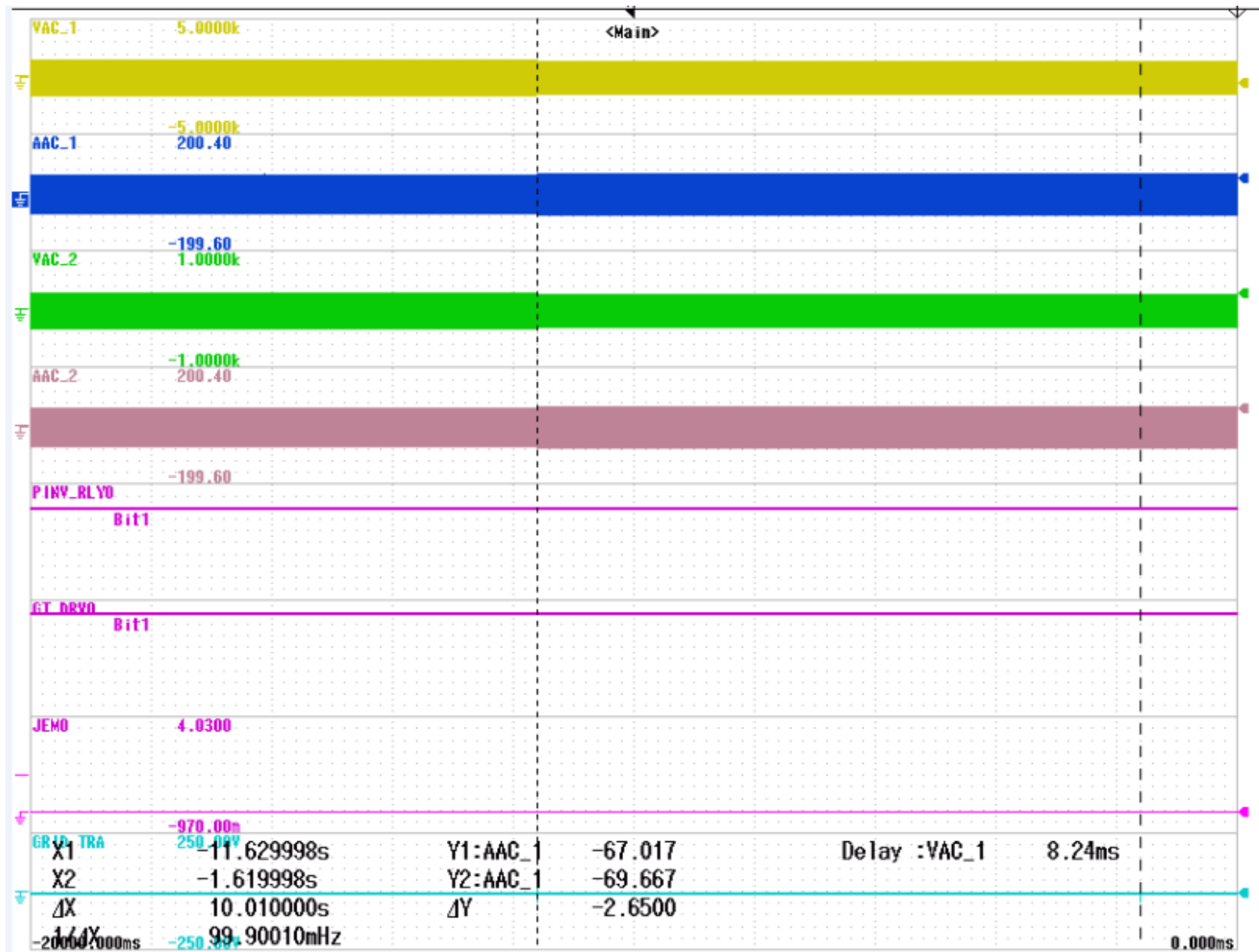
3.2.11.18: Power Analyzer-3rd harmonic =2.2V



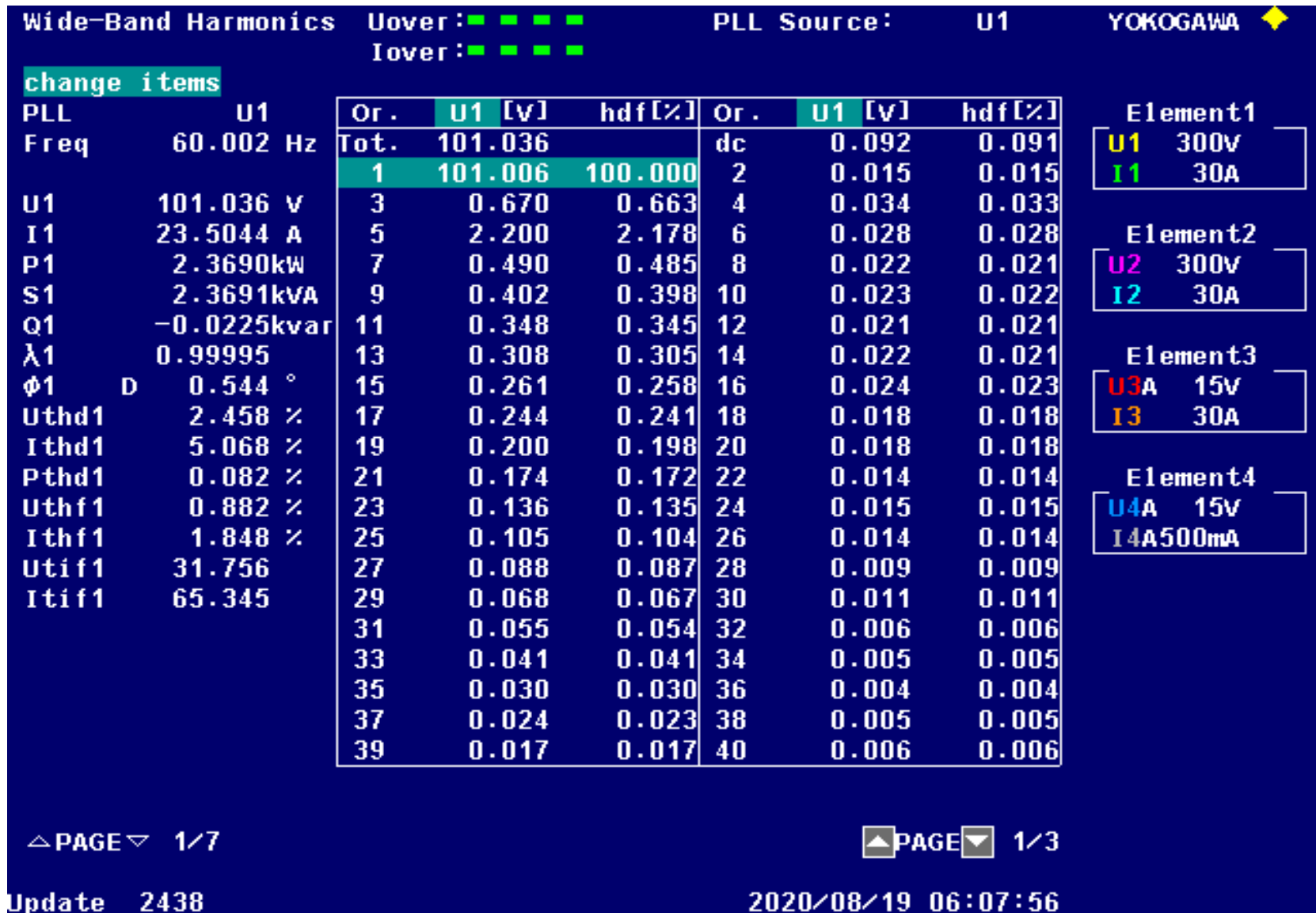
3.2.11.19: Scope- 3<sup>rd</sup> harmonics=2.2V. JEM Status Standby to Active

Wide-Band Harmonics				U1 : 300V			YOKOGAWA	
Uover: ■■■■							Image Save	
Iover: ■■■■								
PLL	U1	Or.	U1 [V]	hdf[%]	Or.	U1 [V]	hdf[%]	
Freq	60.000 Hz	Tot.	99.781		dc	0.084	0.085	
U1	99.781 V	1	99.759	100.000	2	0.008	0.008	
I1	23.7055 A	3	1.836	1.840	4	0.028	0.028	Format
P1	2.3610kW	5	0.522	0.523	6	0.026	0.026	PNG
S1	2.3611kVA	7	0.477	0.479	8	0.017	0.017	
Q1	-0.0220kvar	9	0.407	0.408	10	0.017	0.017	Color
λ1	0.99996	11	0.346	0.347	12	0.020	0.020	Color
φ1	D 0.534 °	13	0.312	0.313	14	0.021	0.021	
Uthd1	2.124 %	15	0.253	0.254	16	0.017	0.017	Comment
Ithd1	4.679 %	17	0.221	0.222	18	0.019	0.019	
Pthd1	0.049 %	19	0.192	0.192	20	0.018	0.018	
Uthf1	0.841 %	21	0.162	0.162	22	0.014	0.014	
Ithf1	1.851 %	23	0.135	0.136	24	0.016	0.016	
Utif1	31.096	25	0.110	0.110	26	0.011	0.011	
Itif1	65.905	27	0.088	0.088	28	0.013	0.013	
		29	0.071	0.071	30	0.009	0.009	
		31	0.058	0.058	32	0.007	0.007	
		33	0.044	0.044	34	0.006	0.006	
		35	0.037	0.037	36	0.003	0.003	File List
		37	0.025	0.025	38	0.005	0.005	
		39	0.022	0.022	40	0.004	0.004	
△PAGE ▾ 1/7				△PAGE ▾ 1/3			File Name	
Update 837				2020/09/07 22:53:43			JPH1	

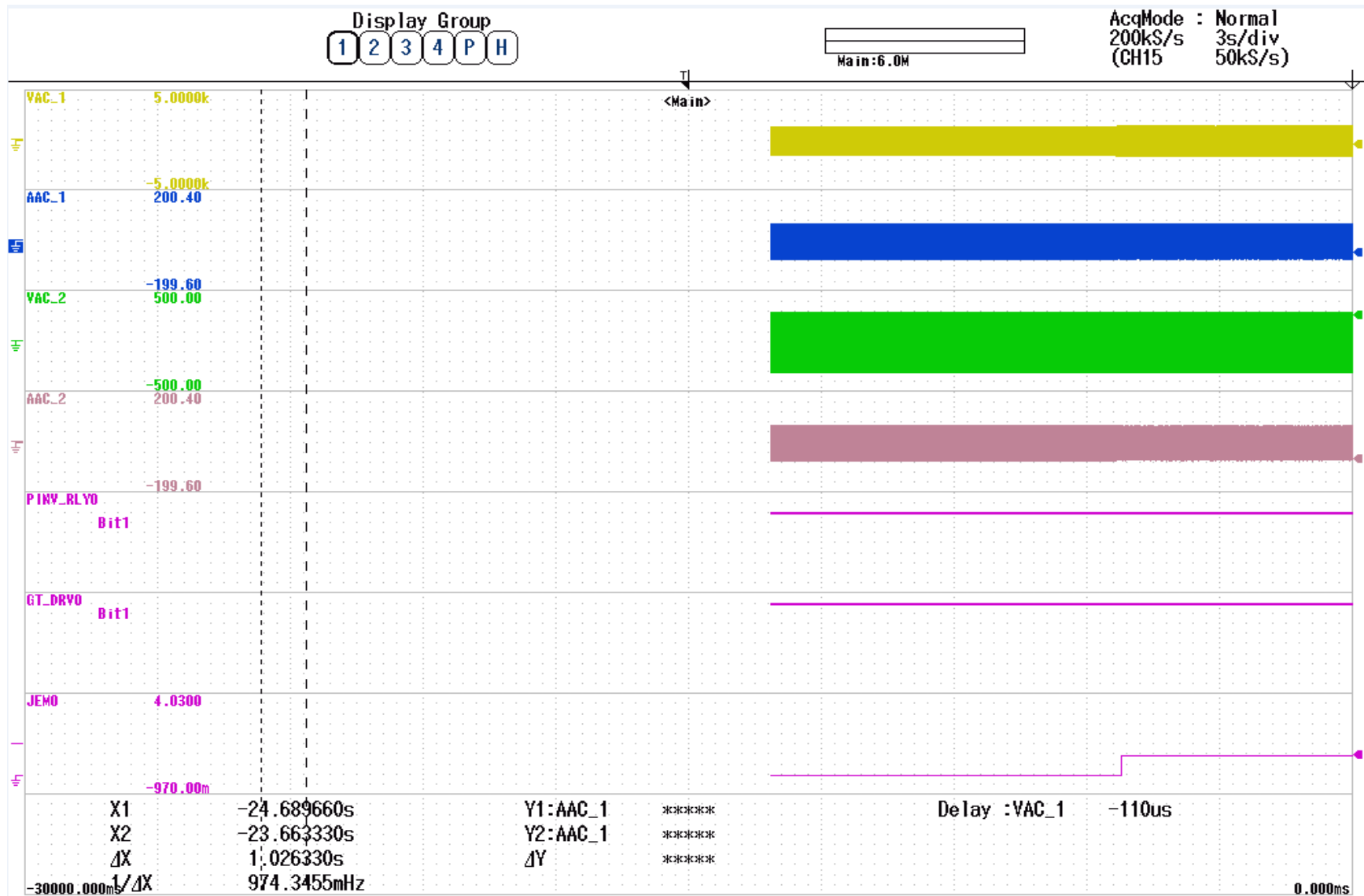
3.2.11.20: Power Analyzer-3rd harmonic =1.8V



3.2.11.21: Scope-3rd harmonics=1.8V. JEM Status Standby( Cursors indicate the duration where 1.8V harmonics introduced)



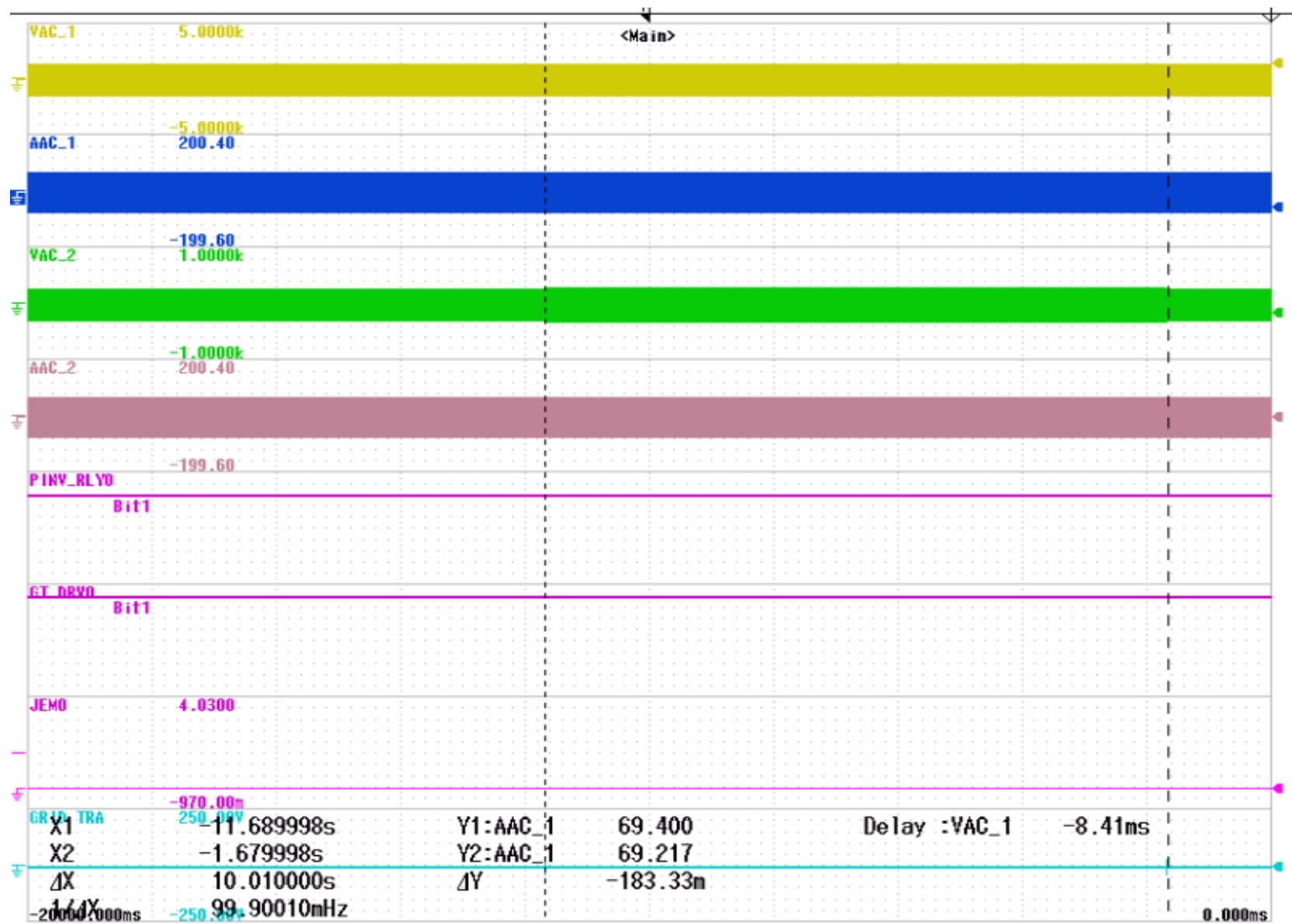
3.2.11.22: Power Analyzer-5<sup>th</sup> harmonic =2.2V



3.2.11.23: Scope-5<sup>th</sup> harmonics=2.2V. JEM Status Standby to Active

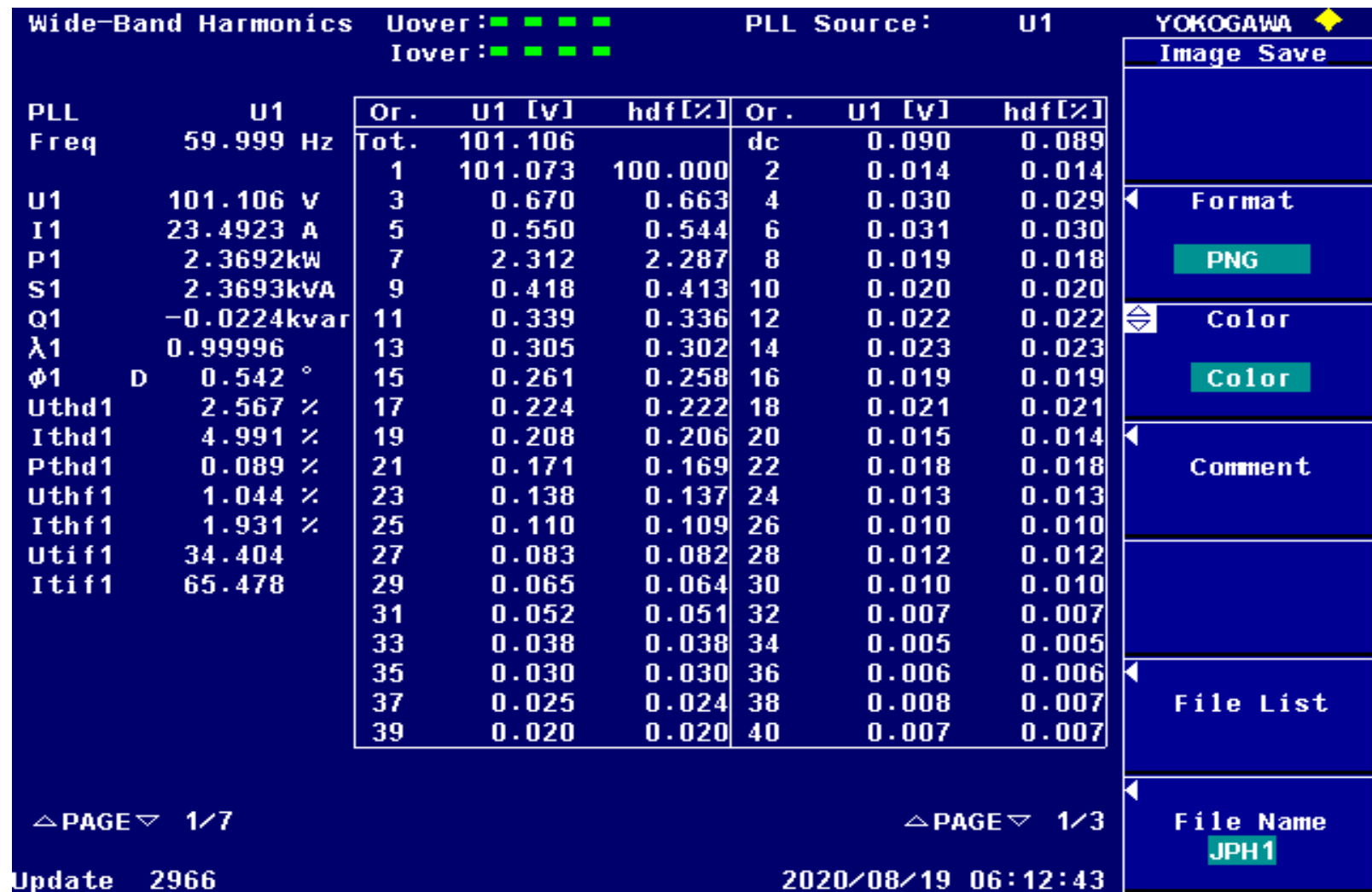
Wide-Band Harmonics			Uover: ■ ■ ■ ■	U1 : 300V	YOKOGAWA ◆	
			Iover: ■ ■ ■ ■		Image Save	
PLL	U1	Or.	U1 [V]	hdf[%]	Or.	U1 [V]
Freq	59.999 Hz	Tot.	99.793		dc	0.088
		1	99.772	100.000	2	0.008
U1	99.793 V	3	0.649	0.651	4	0.029
I1	23.7211 A	5	1.731	1.735	6	0.022
P1	2.3625kW	7	0.482	0.483	8	0.016
S1	2.3626kVA	9	0.402	0.403	10	0.019
Q1	-0.0223kvar	11	0.346	0.347	12	0.019
λ1	0.99996	13	0.303	0.303	14	0.018
φ1	D 0.541 °	15	0.249	0.249	16	0.019
Uthd1	2.068 %	17	0.227	0.228	18	0.018
Ithd1	4.705 %	19	0.184	0.185	20	0.017
Pthd1	0.063 %	21	0.160	0.160	22	0.015
Uthf1	0.850 %	23	0.135	0.135	24	0.011
Ithf1	1.837 %	25	0.105	0.105	26	0.010
Utif1	30.885	27	0.086	0.086	28	0.010
Itif1	65.029	29	0.070	0.071	30	0.011
		31	0.057	0.057	32	0.008
		33	0.045	0.045	34	0.008
		35	0.031	0.031	36	0.004
		37	0.025	0.025	38	0.006
		39	0.021	0.021	40	0.007
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Update 934			2020/09/07 22:55:31			JPH1

3.2.11.24: Power Analyzer-5<sup>th</sup> harmonic =1.8V



3.2.11.25: Scope-5<sup>th</sup> harmonics=1.8V. JEM Status Standby ( Cursors indicate the duration where 1.8V harmonics introduced)





3.2.11.26: Power Analyzer-7<sup>th</sup> harmonic =2.2V



3.2.11.27: Scope-7<sup>th</sup> harmonics=2.2V. JEM Status Standby to Active

Wide-Band Harmonics

Uover:■■■■

U1 : 300V

YOKOGAWA ◆

Iover:■■■■

Image Save

PLL	U1	Or.	U1 [V]	hdf[%]	Or.	U1 [V]	hdf[%]
Freq	60.001 Hz	Tot.	99.799		dc	0.084	0.084
		1	99.778	100.000	2	0.007	0.007
U1	99.799 V	3	0.653	0.654	4	0.030	0.030
I1	23.7170 A	5	0.533	0.534	6	0.025	0.025
P1	2.3623kW	7	1.718	1.722	8	0.010	0.010
S1	2.3624kVA	9	0.417	0.417	10	0.017	0.017
Q1	-0.0225kvar	11	0.339	0.340	12	0.017	0.017
λ1	0.99995	13	0.307	0.308	14	0.020	0.020
φ1	D 0.545 °	15	0.250	0.251	16	0.016	0.016
Uthd1	2.072 %	17	0.219	0.219	18	0.015	0.015
Ithd1	4.580 %	19	0.189	0.190	20	0.014	0.014
Pthd1	0.064 %	21	0.159	0.159	22	0.014	0.014
Uthf1	0.947 %	23	0.137	0.137	24	0.012	0.012
Ithf1	1.888 %	25	0.109	0.109	26	0.012	0.012
Utif1	32.514	27	0.084	0.084	28	0.009	0.009
Itif1	65.166	29	0.067	0.067	30	0.009	0.009
		31	0.055	0.056	32	0.006	0.006
		33	0.041	0.041	34	0.006	0.006
		35	0.038	0.038	36	0.005	0.005
		37	0.024	0.024	38	0.008	0.008
		39	0.020	0.020	40	0.006	0.006

Format

PNG

Color

Color

Comment

File List

File Name

JPH1

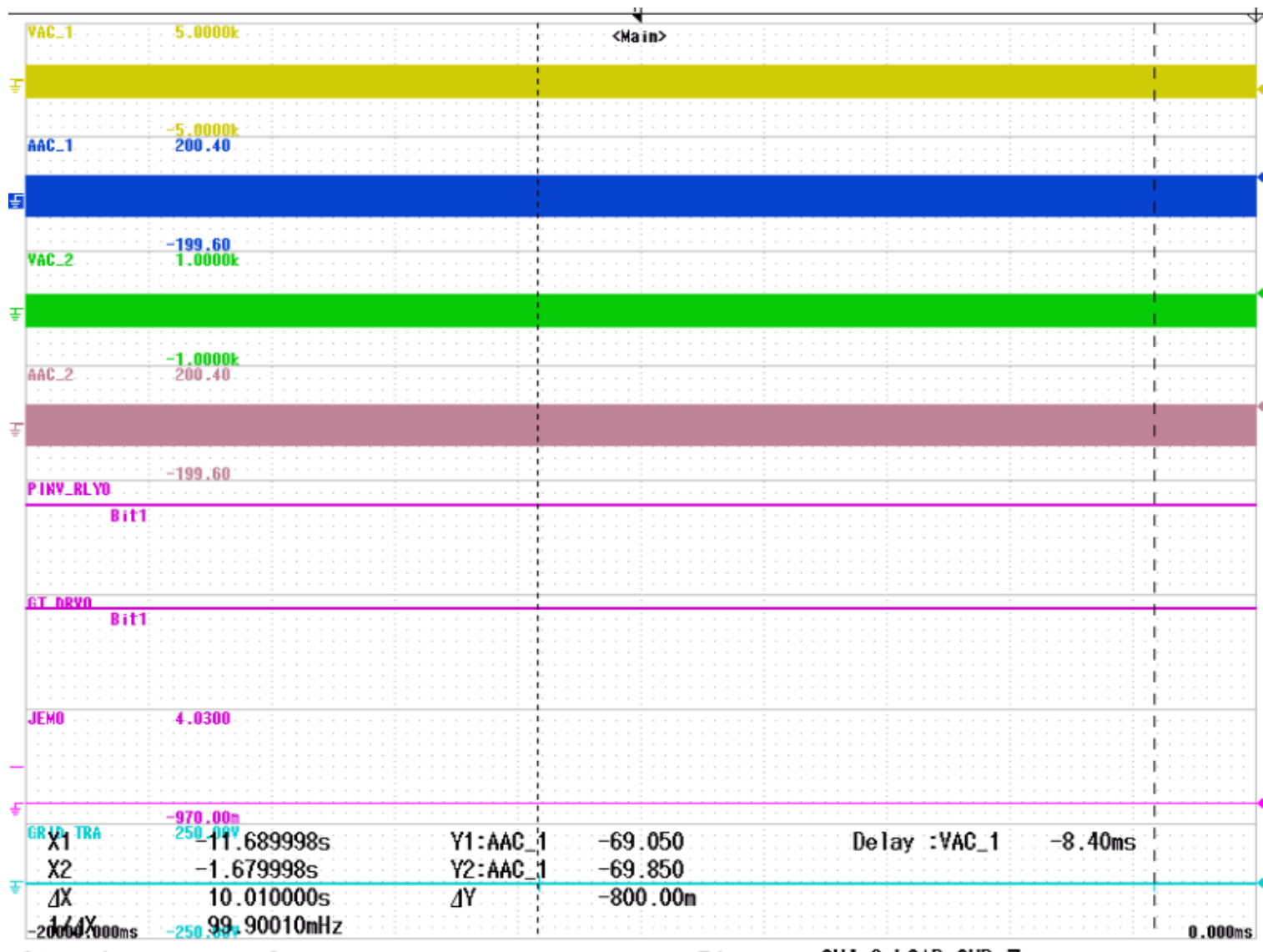
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2020/09/07 22:56:56

3.2.11.28: Power Analyzer-7<sup>th</sup> harmonic =1.8V



3.2.11.29: Scope-7<sup>th</sup> harmonics=1.8V. JEM Status Standby( Cursors indicate the duration where 1.8V harmonics introduced)



### 3.2.12 Reactive power oscillation suppression confirmation test 無効電力発振抑制確認試験

This test applies to 【多数台連系 FRT 対応型】、【多数台連系対応型】で【単相機器】

Condition	Initial Status	Final Status	Did Status change?	Did it run for 1 min?	Remarks
Impedance & Phase Angle change 10°	Operational	Standby	YES	YES	Fig: 3.2.11.1; 3.2.11.2

#### **Scope Channel Description:**

AAC\_1: Unit 1 Phase A Current

AAC\_2: Unit 2 Phase A Current

VAC\_1: Phase A Voltage

VAC\_2: Phase B Voltage

PINV\_RLY0: Relay Signal from Unit 1

PINV\_RLY1: Relay Signal from Unit 2

GT\_DRV0: Relay Signal from Unit 1

GT\_DRV1: Relay Signal from Unit 2

JEM0: JEM Signal from Unit 1

JEM 1: JEM Signal from Unit 2

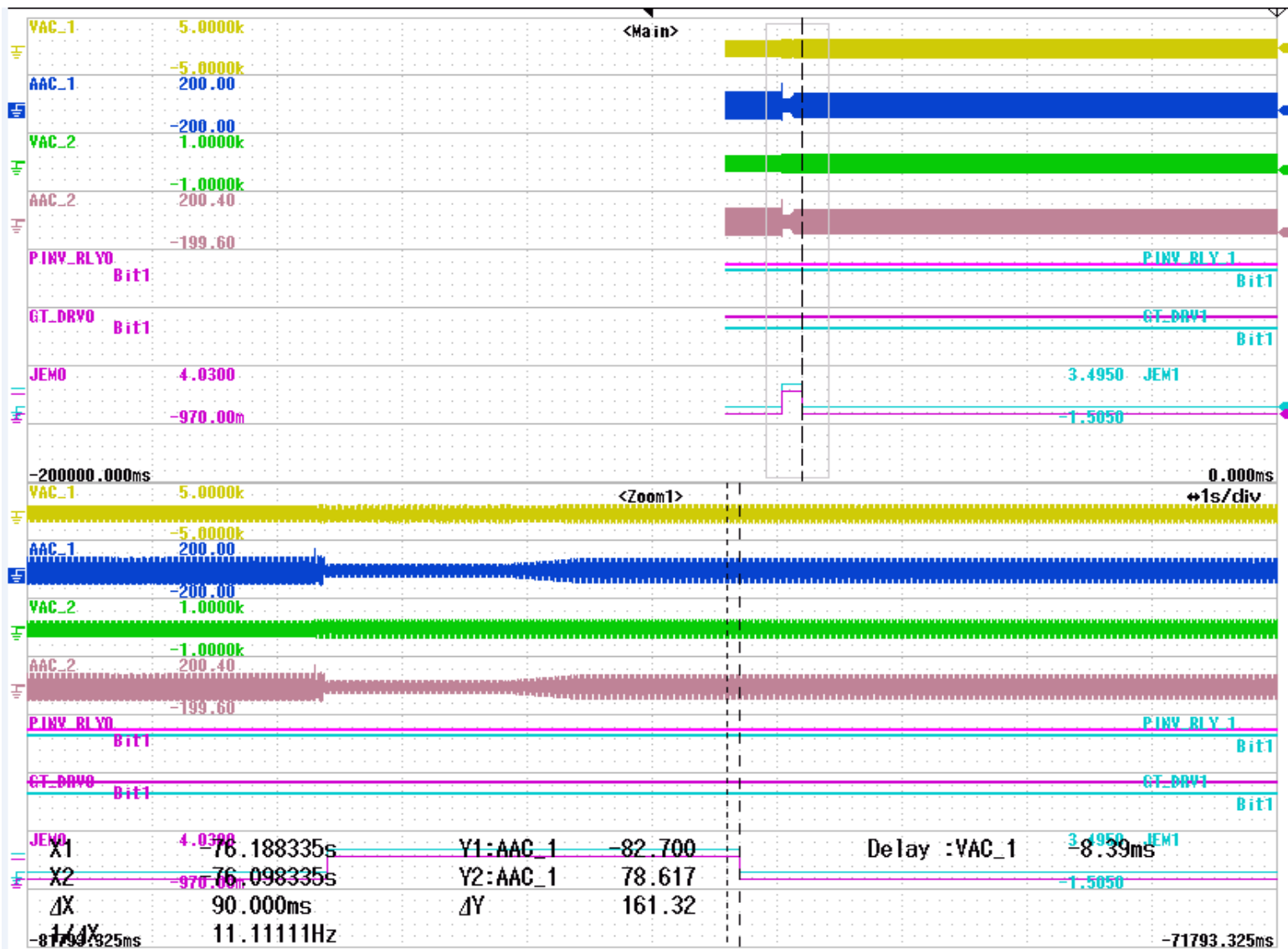


Figure: 3.2.12.1- JEM Status change=> Operational to Standby

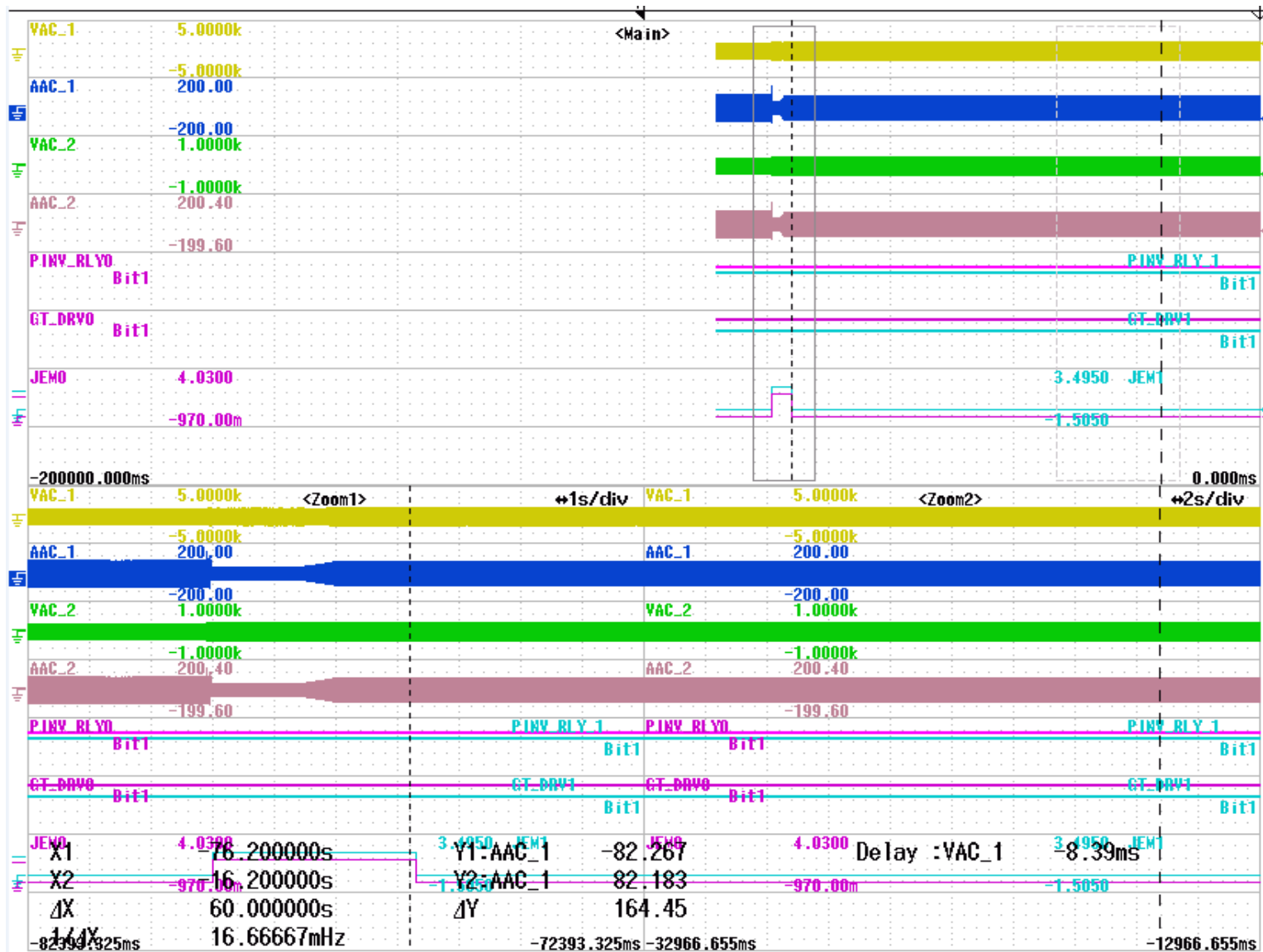


Figure: 3.2.12.1- JEM Status change=> Standby; EUT running for 1 min.



### 4.3 Power Factor 運転力率

AC Voltage 交流電圧	Output Power 出力電力	Frequency 周波数	Measurement 試験結果		Pass / Fail 判定	Remarks 備考
			Power 出力電力	PF 力率一定	>0.95	
Phase A: 101Vrms Phase B: 101Vrms	4800 W	60 Hz	4848 W	0.9983	Pass	



#### 4.4 Output Harmonic Current 出力高調波電流

AC Voltage 交流電圧	Output Power 出力電力	Frequency 周波数	Phase 試験相	Operation Mode 動作モード	Measurement 試験結果			Pass / Fail 判定	Remarks 備考
					THD %	PF 力率	Highest Harm with Order 電流歪率 (各次)	THD<5% PF>0.95 Individual Harmonics<3%	
Phase A: 101Vrms Phase B: 101Vrms	4.8 kW	60 Hz	A	Discharge	4.631	1.00	3 <sup>rd</sup> : 2.6%	Pass	See Below
			B		4.633	1.00	3 <sup>rd</sup> : 2.7%	Pass	

Detailed reference data of each harmonic (output current distortion ratio)						Rated output current = 21A					
Phase	Order	1	2	3	4	5	6	7	8	9	10
A	Harmonic current A	21.360	0.004	0.549	0.020	0.418	0.010	0.199	-0.008	0.139	-0.005
	Order	11	12	13	14	15	16	17	18	19	20
	Harmonic current A	0.078	-0.011	0.085	-0.009	0.060	-0.010	0.047	-0.011	0.024	-0.011
	Order	21	22	23	24	25	26	27	28	29	30
	Harmonic current A	0.005	-0.008	0.005	-0.008	-0.002	-0.005	-0.002	-0.012	-0.007	-0.011
	Order	31	32	33	34	35	36	37	38	39	40
	Harmonic current A	-0.003	-0.010	-0.004	-0.018	-0.005	-0.010	-0.009	-0.009	-0.004	-0.012
Phase	Order	1	2	3	4	5	6	7	8	9	10
B	Harmonic current A	21.359	0.020	0.565	0.022	0.388	0.009	0.233	-0.005	0.110	-0.002
	Order	11	12	13	14	15	16	17	18	19	20
	Harmonic current A	0.097	-0.006	0.084	-0.014	0.072	-0.010	0.041	-0.010	0.027	-0.006
	Order	21	22	23	24	25	26	27	28	29	30
	Harmonic current A	0.019	-0.007	0.003	-0.008	0.008	-0.008	0.001	-0.011	-0.009	-0.017
	Order	31	32	33	34	35	36	37	38	39	40
	Harmonic current A	-0.011	-0.010	-0.008	-0.008	-0.010	-0.005	-0.002	-0.010	-0.005	-0.011



## 4.5 Leakage Current Test 漏洩電流

AC Voltage 交流電圧	Output Power 出力電力	Frequency 周波数	Mode 動作モード	Tested Phase 試験相	Measurement 試験結果	Pass / Fail 判定 1≤5V	Remarks 備考
					Volt <sup>1</sup> 電圧		
Phase A: 101Vrms Phase B: 101Vrms Phase C: 101Vrms	4.8kW	60 Hz	Discharge	A to PE	0.25	Pass	
	-4.8kW		Charge		0.241	Pass	
	4.8kW		Discharge	B to PE	0.248	Pass	
	-4.8kW		Charge		0.243	Pass	
	4.8kW		Discharge	N to PE	0.044	Pass	
	-4.8kW		Charge		0.045	Pass	
	4.8kW		Discharge	G to PE	0.018	Pass	
	-4.8kW		Charge		0.018	Pass	



## 4.6 Powerfactor operation test 力率一定運転

Parameter 設定値：

Voltage 電圧	Reactive Power 無効電力
101Vrms	0 Var

AC Voltage 交流電圧	Power Level 出力	Frequency 周波数	PF Set 力率設定	Measurement 試験結果		Pass / Fail 判定 <sup>1</sup> 1.00±0.040	Remarks 備考
				Active Power (W) 有効電力	PF (cos) <sup>1</sup> 力率		
Phase A: 101Vrms Phase B: 101Vrms	100%	60 Hz	1	4782.00	0.999	Pass	
	90%			4276.00	0.999	Pass	
	80%			3801.00	0.999	Pass	
	70%			3333.00	0.999	Pass	
	60%			2859.00	0.999	Pass	
	50%			2384.00	0.999	Pass	
	40%			1909.00	0.999	Pass	
	30%			1435.00	0.999	Pass	
	20%			957.00	0.999	Pass	
	10%			485.00	0.999	Pass	



Parameter 設定値:

Voltage 電圧	PF set- 0.925 力率設定
101Vrms	Lagging 遅れ

AC Voltage 交流電圧	Power Level 出力	Frequency 周波数	PF Set 力率設定	Measurement 試験結果		Pass / Fail 判定 <sup>1</sup> 0.925±0.040	Remarks 備考
				Active Power (W) 有効電力	PF (cos) <sup>1</sup> 力率		
Phase A: 101Vrms Phase B: 101Vrms	100%	60 Hz	0.925	4779.00	0.926	Pass	
	90%			4271.00	0.926	Pass	
	80%			3894.00	0.926	Pass	
	70%			3325.00	0.926	Pass	
	60%			2853.00	0.926	Pass	
	50%			2376.00	0.926	Pass	
	40%			1903.00	0.927	Pass	
	30%			1431.00	0.929	Pass	
	20%			955.00	0.932	Pass	
	10%			474.00	0.940	Pass	



Parameter 設定値:

Voltage 電圧	PF set- 0.925 力率設定
101Vrms	Leading 進み

AC Voltage 交流電圧	Power Level 出力	Frequency 周波数	PF Set 力率設定	Measurement 試験結果		Pass / Fail 判定 <sup>1</sup> 0.925±0.040	Remarks 備考
				Active Power (W) 有効電力	PF (cos) <sup>1</sup> 力率		
Phase A: 101Vrms Phase B: 101Vrms	100%	60 Hz	0.925	4768.00	0.919	Pass	
	90%			4259.00	0.919	Pass	
	80%			3792.00	0.919	Pass	
	70%			3322.00	0.919	Pass	
	60%			2851.00	0.919	Pass	
	50%			2381.00	0.919	Pass	
	40%			1909.00	0.919	Pass	
	30%			1435.00	0.917	Pass	
	20%			957.00	0.913	Pass	
	10%			474.00	0.900	Pass	



Parameter:

Voltage 電圧	PF set- 0.85 力率設定
101Vrms	Lagging 遅れ

AC Voltage 交流電圧	Power Level 出力	Frequency 周波数	PF Set 力率設定	Measurement 試験結果		Pass / Fail 判定 <sup>1</sup> 0.85±0.040	Remarks 備考
				Active Power (W) 有効電力	PF (cos) <sup>1</sup> 力率		
Phase A: 101Vrms Phase B: 101Vrms	100%	60 Hz	0.85	4772.00	0.848	Pass	
	90%			4268.00	0.860	Pass	
	80%			3796.00	0.850	Pass	
	70%			3324.00	0.850	Pass	
	60%			2852.00	0.851	Pass	
	50%			2796.00	0.851	Pass	
	40%			1903.00	0.851	Pass	
	30%			1430.00	0.853	Pass	
	20%			952.00	0.857	Pass	
	10%			475.00	0.866	Pass	





Parameter:

Voltage 電圧	PF set- 0.85 力率設定
101Vrms	Leading 進み

AC Voltage 交流電圧	Power Level 出力	Frequency 周波数	PF Set 力率設定	Measurement 試験結果		Pass / Fail 判定 <sup>1</sup> 0.85±0.040	Remarks 備考
				Active Power (W) 有効電力	PF (cos) <sup>1</sup> 力率		
Phase A: 101Vrms Phase B: 101Vrms	100%	60 Hz	0.85	4749.00	0.840	Pass	
	90%			4246.00	0.854	Pass	
	80%			3778.00	0.841	Pass	
	70%			3310.00	0.841	Pass	
	60%			2845.00	0.841	Pass	
	50%			2374.00	0.841	Pass	
	40%			1905.00	0.841	Pass	
	30%			1433.00	0.840	Pass	
	20%			956.00	0.836	Pass	
	10%			474.00	0.821	Pass	

#### 4.8 Soft Start Function Test ソフトスタート機能試験

AC Voltage	Output Power	Operation Mode	Frequency	% of output fluctuation		Pass / Fail <sup>1</sup> No Overcurrent <sup>1</sup> Is 150% or less of the rated current, <sup>2</sup> The time exceeding 100% is within 0.5 seconds	Remarks
				Output Fluctuation <sup>1</sup>	Time spent over 100% of nominal current (sec) <sup>2</sup>		
Phase A: 101Vrms Phase B: 101Vrms	4.8 kW	Discharge	60 Hz	0%	0	Pass	Figure 4.8

Scope Channel Description:

Channel 1\_1: Phase A Current

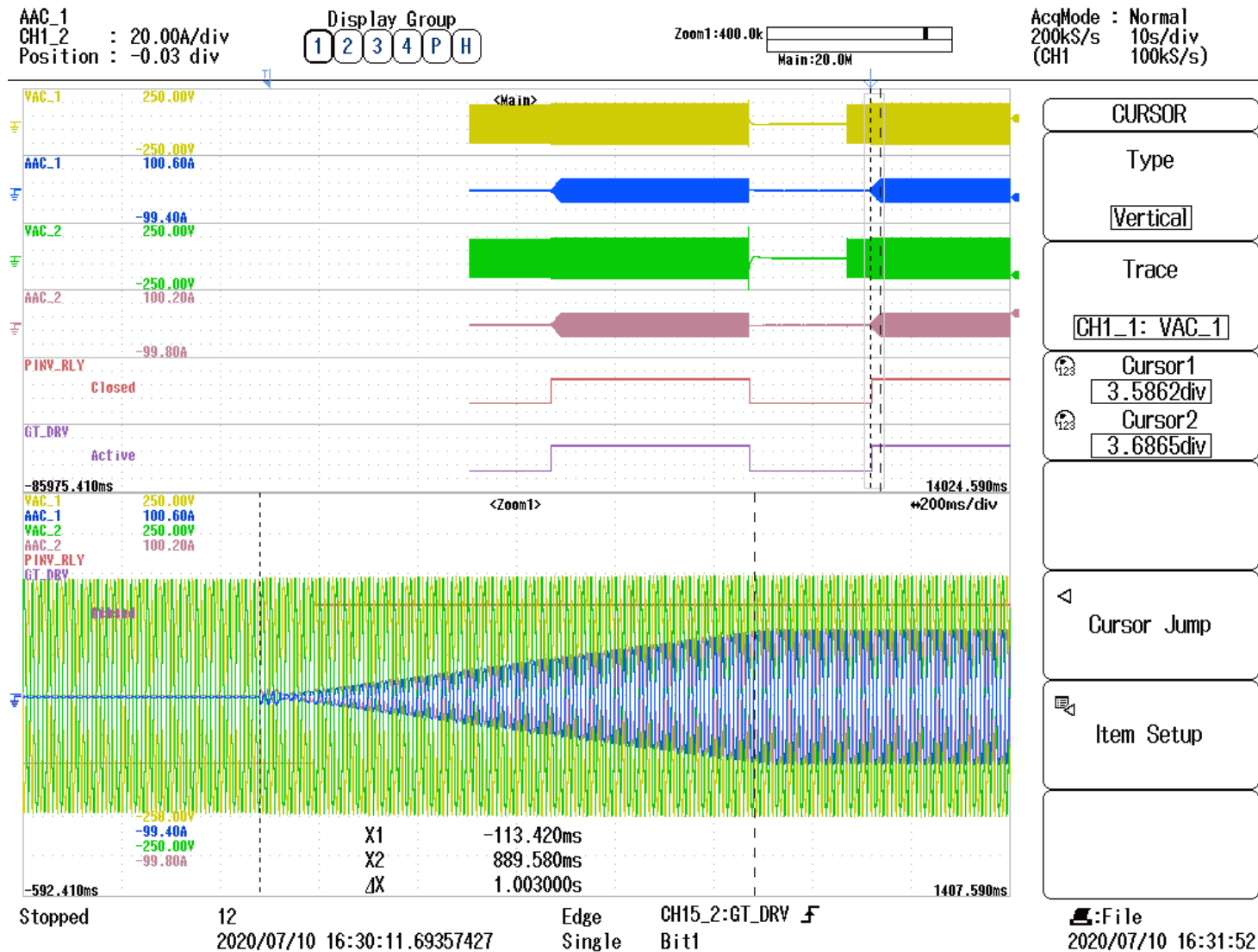
Channel 1\_2: Phase A Voltage

Channel 2\_1: Phase B Current

Channel 2\_2: Phase B Voltage

Relay: Relay Signal

Gate drive: Gate Signal



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## 5.1 Rapid Input Power Change and Rapid Load Change Test

EUT set power (% of EUT name plate power rating)	Load setting (% of EUT name plate power rating)	Voltage (V)	Frequency (Hz)	EUT Power (W)	EUT Power (% of EUT nameplate)	EUT Current (A)	EUT Current (% of EUT nameplate)	Time Spent over 100% (ms)	Remarks
50	50	102.038	60.011	2403.700	0.501	11.839	0.493	--	
50	75	102.500	59.993	3609.100	0.752	17.658	0.736	--	Fig: 5.1.1
50	50	102.045	60.000	2403.800	0.501	11.837	0.493	--	
50	50	102.051	59.996	2414.800	0.503	11.902	0.496	--	
50	25	101.890	60.001	1187.800	0.247	5.930	0.247	--	Fig: 5.1.2
50	50	102.014	60.002	2423.700	0.505	11.945	0.498	--	
100	100	102.816	60.011	4903.7	1.02	23.891	0.995	--	
100	0	101.049	59.991	-0.5	0.000	1.0132	0.04	--	Fig: 5.1.3
100	100	102.807	60.006	4920.8	1.025166667	23.79	0.99125	--	

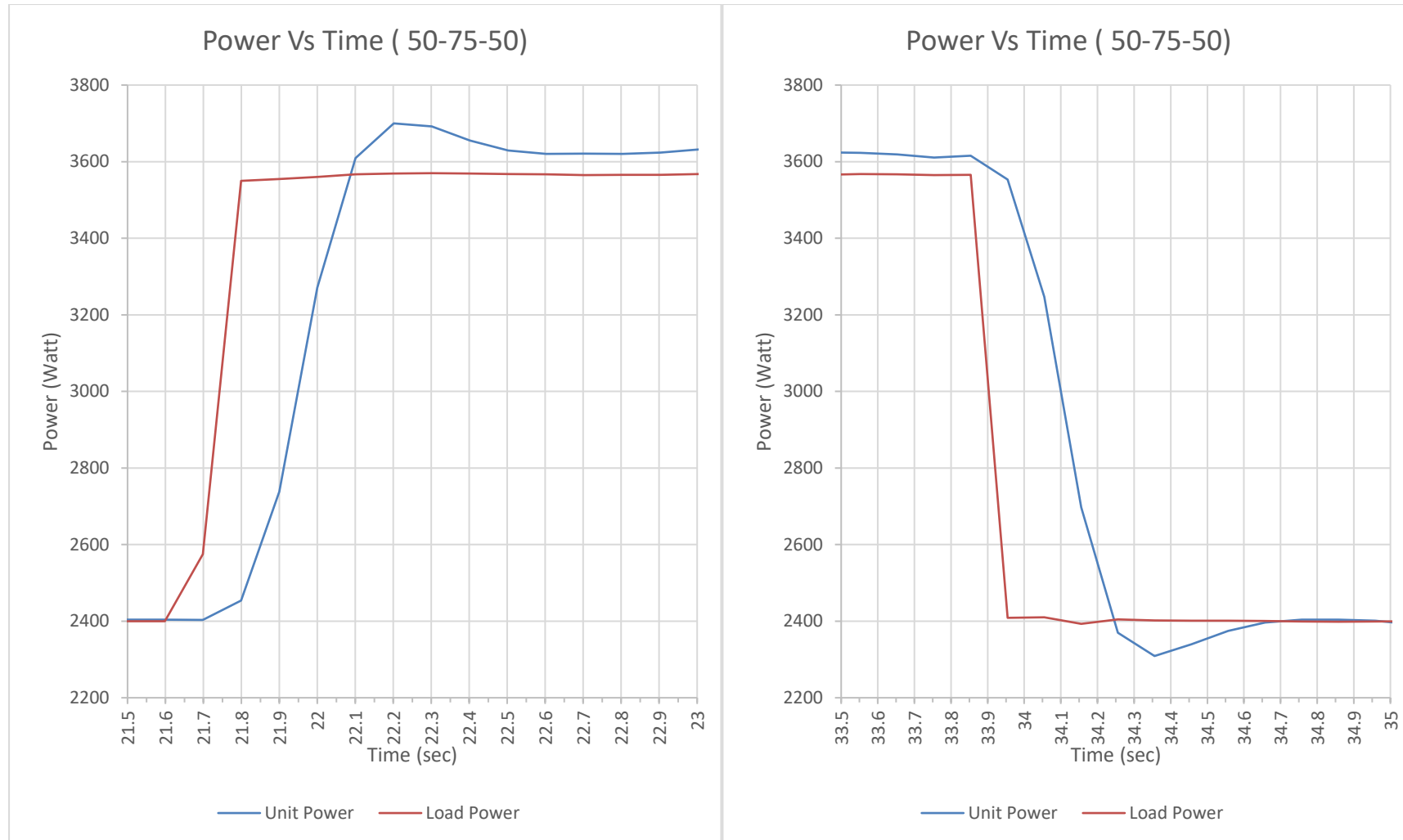


Fig: 5.1.1 Load follwing from 50% to 75%



Fig: 5.1.2 Load follwoing from 50% to 25%



Fig: 5.1.3 Load following from 100% to 0%

## 6.3 Instantaneous Voltage Drop Test 瞬時電圧低下試験 (FRT 試験)

Voltage Drop To 20% (Nominal voltage = 94%Vn = 94.94Vrms) 残電圧 20 %時

AC Voltage 交流電圧	Output Power 出力電力	Operation Mode 動作モード	Frequency 周波数	Entry Angle 位相	Measurement 試験結果				Pass / Fail 判定 <sup>1</sup> <100ms <sup>2</sup> <150% of Irated <sup>3</sup> <500ms	Remarks 備考
					80% Output Recovering time 出力復帰時間	Over Current (A(%)) 過電流値	Time Spent over 100% (ms) 100%を超える時間	Operation is Continuous? 電圧低下後の運転継続?		
94.94Vrms (A,B) → 20.2Vrms (A,B) → 94.94Vrms (A,B)L-N	4.8kW	Discharge 放電	60 Hz	0	0.1	22.04 A (91.83%)	0	Yes	Pass	Fig 6.3.1
				45	0.1	20.522 A (85.51%)	0	Yes	Pass	Fig 6.3.2
				90	0.05	20.388 A (84.95%)	0	Yes	Pass	Fig 6.3.3







Voltage Drop To 20% (Nominal voltage =  $V_n = 101V_{rms}$ ) 残電圧 20%時

AC Voltage 交流電圧	Output Power 出力電力	Operation Mode 動作モード	Frequency 周波数	Entry Angle 位相	Measurement 試験結果				Pass / Fail 判定 <sup>1</sup> <100ms <sup>2</sup> <150% of $I_{rated}$ <sup>3</sup> <500ms	Remarks 備考
					80% Output Recovering time 出力復帰時間	Over Current (A(%)) 過電流値	Time Spent over 100% (ms) 100%を超える時間	Operation is Continuous? 電圧低下後の運転継続?		
101Vrms (A,B) → 20.2Vrms (A,B) → 101Vrms (A,B)L-N	4.8kW	Discharge 放電	60 Hz	0	0.1	20.15 A (83.96%)	0	Yes	Pass	
				45	0.1	21.124 A (88.02%)	0	Yes	Pass	
				90	0.05	19.865 A (82.77%)	0	Yes	Pass	



Voltage Drop To 20% (Nominal voltage = 106%Vn = 107.06Vrms) 残電圧 20%時

AC Voltage 交流電圧	Output Power 出力電力	Operation Mode 動作モード	Frequency 周波数	Entry Angle 位相	Measurement 試験結果				Pass / Fail 判定 <sup>1</sup> <100ms <sup>2</sup> <150% of Irated <sup>3</sup> <500ms	Remarks 備考
					80% Output Recovering time 出力復帰時間	Over Current (A(%)) 過電流値	Time Spent over 100% (ms) 100%を超える時間	Operation is Continuous? 電圧低下後の運転継続?		
107.06Vrms (A,B) → 20.2Vrms (A,B) → 107.06Vrms (A,B)L-N	4.8kW	Discharge 放電	60 Hz	0	0.2	20.051 A (83.55%)	0	Yes	Pass	
				45	0.1	19.749 A (82.29%)	0	Yes	Pass	
				90	0.15	19.71 A (82.13%)	0	Yes	Pass	

Scope Channel Description:

Channel 1\_1: Phase A Voltage

Channel 1\_2: Phase A Current

Channel 2\_1: Phase B Voltage

Channel 2\_2: Phase B Current

PINV\_RLY: Relay Signal

GT\_DR: Gate Signal

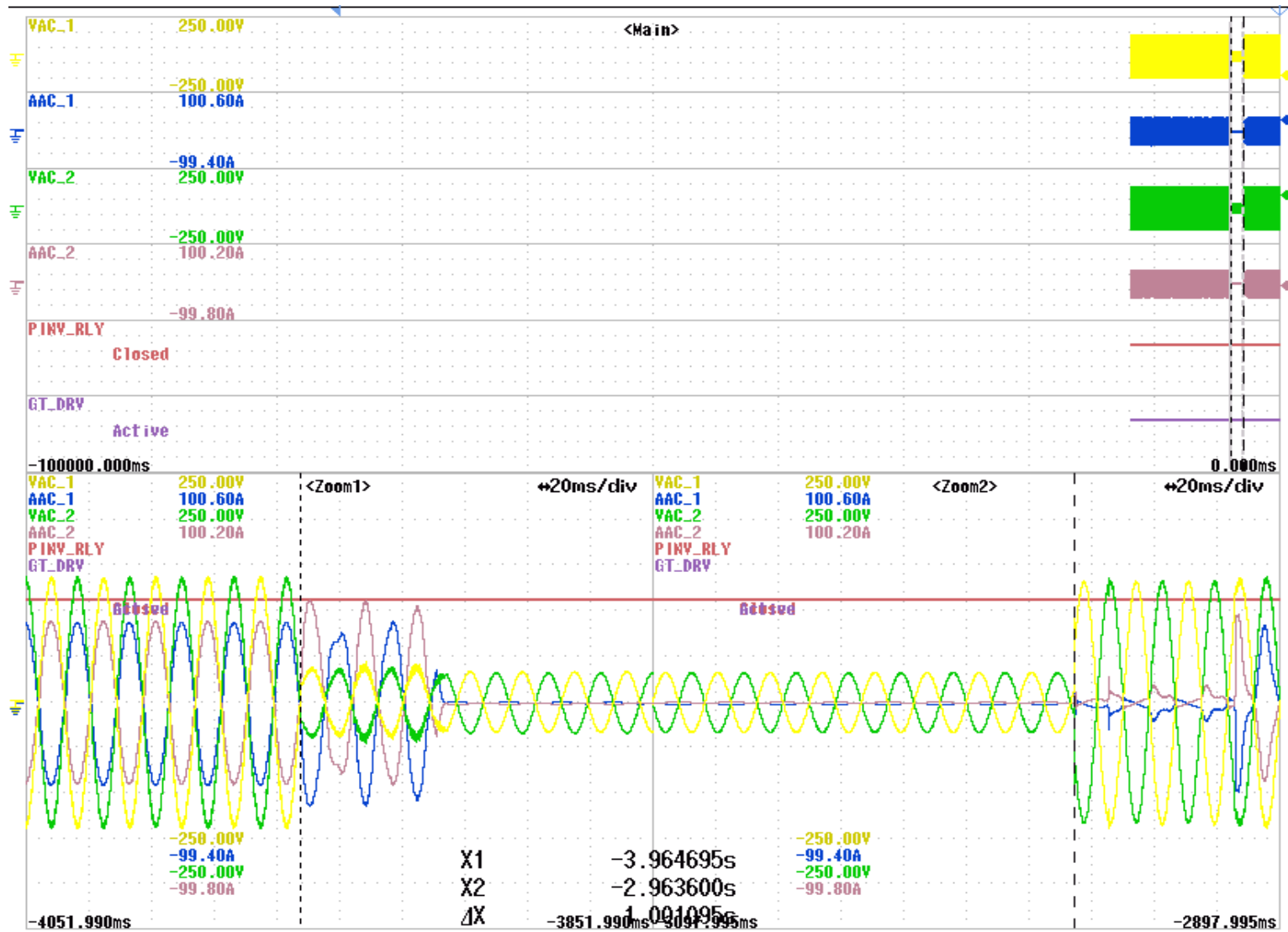


Figure 6.3.1 Instantaneous voltage drop at 0° entry angle (94.94Vrms → 20.2Vrms → 94.94Vrms)

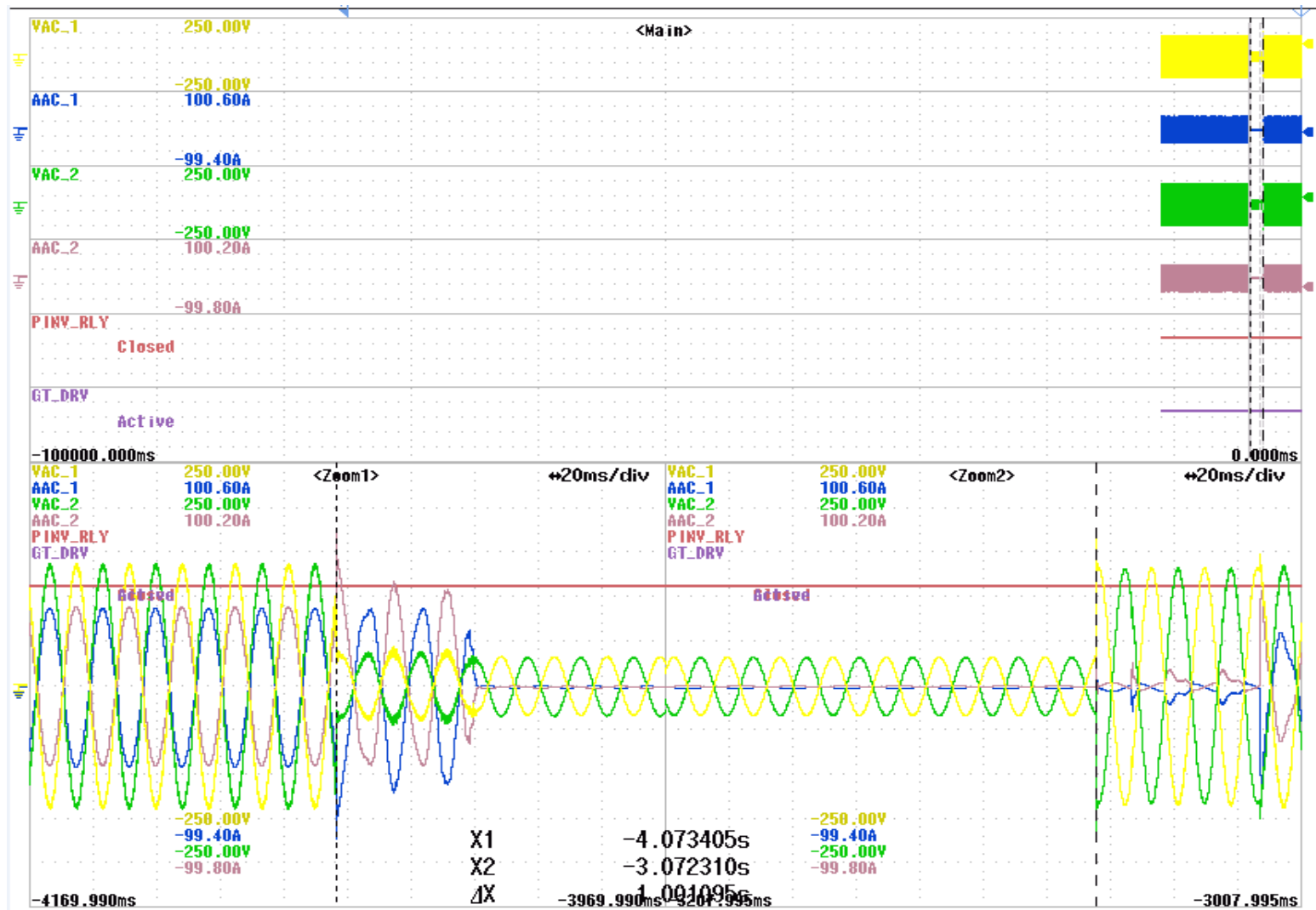


Figure 6.3.2 Instantaneous voltage drop at 45° entry angle (94.94Vrms → 20.2Vrms → 94.94Vrms)

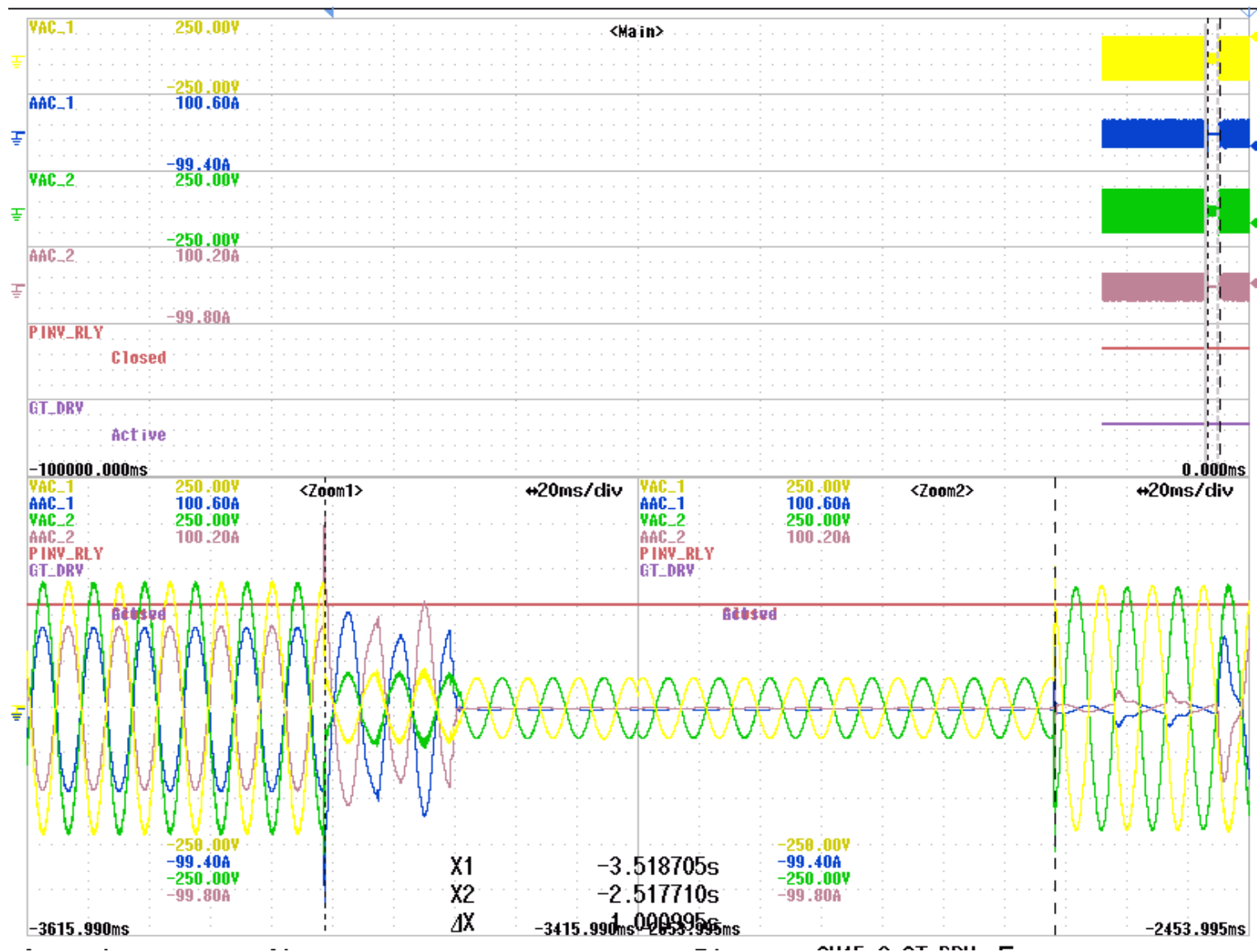


Figure 6.3.3 Instantaneous voltage drop at 90° entry angle (94.94Vrms → 20.2Vrms → 94.94Vrms)

Voltage Drop To 0% (Nominal voltage = 94%Vn = 94.94Vrms) 残電圧 0 %

AC Voltage 交流電圧	Output Power 出力電力	Operation Mode 動作モード	Frequency 周波数	Entry Angle 位相	Measurement 試験結果				Pass / Fail 判定 <sup>1</sup> <100ms <sup>2</sup> <150% of Irated <sup>3</sup> <500ms	Remarks 備考
					80% Output Recovering time 出力復帰時間	Over Current (A(%)) 過電流値	Time Spent over 100% (ms) 100%を超える時間	Operation is Continuous? 電圧低下後の運転継続?		
101Vrms (A,B,C) → 0Vrms (A,B,C) → 101Vrms (A,B,C)	4.8 kW	Discharge 放電	60 Hz	0	0.15	20.096 (83.73%)	0	Yes	Pass	Fig 6.3.4
				45	0.15	20.004 (83.55%)	0	Yes	Pass	Fig 6.3.5
				90	0.1	20.353 (84.80%)	0	Yes	Pass	Fig 6.3.6

Voltage Drop To 0% (Nominal voltage = Vn = 101Vrms) 残電圧 0 %



AC Voltage 交流電圧	Output Power 出力電力	Operation Mode 動作モード	Frequency 周波数	Entry Angle 位相	Measurement 試験結果				Pass / Fail 判定 <sup>1</sup> <100ms <sup>2</sup> <150% of Irated <sup>3</sup> <500ms	Remarks 備考
					80% Output Recovering time 出力復帰時間	Over Current (A(%)) 過電流値	Time Spent over 100% (ms) 100%を超える時間	Operation is Continuous? 電圧低下後の運転継続?		
101Vrms (A,B,C) → 0Vrms (A,B,C) → 101Vrms (A,B,C)	4.8 kW	Discharge 放電	60 Hz	0	0.15	19.86 (82.75%)	0	Yes	Pass	
				45	0.05	19.302 (80.43%)	0	Yes	Pass	
				90	0.1	19.71 (82.13%)	0	Yes	Pass	

Voltage Drop To 0% (Nominal voltage = 106%Vn = 107.06Vrms) 残電圧 0 %

AC Voltage 交流電圧	Output Power 出力電力	Operation Mode 動作モード	Frequency 周波数	Entry Angle 位相	Measurement 試験結果	Pass / Fail 判定	Remarks 備考
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	出力電力	動作モード		位相	80% Output Recovering time 出力復帰時間	Over Current (A(%)) 過電流値	Time Spent over 100% (ms) 100%を超える時間	Operation is Continuous? 電圧低下後の運転継続?	<sup>1</sup> <100ms <sup>2</sup> <150% of Irated <sup>3</sup> <500ms	
101Vrms (A,B,C) → 0Vrms (A,B,C) → 101Vrms (A,B,C)	4.8 kW	Discharge 放電	60 Hz	0	0.15	19.86 (82.75%)	0	Yes	Pass	
				45	0.15	19.302 (80.43%)	0	Yes	Pass	
				90	0.25	20.29 (84.54%)	0	Yes	Pass	

Scope Channel Description:

Channel 1\_1: Phase A Current

Channel 1\_2: Phase A Voltage

Channel 2\_1: Phase B Current

Channel 2\_2: Phase B Voltage

PINV\_RLY0: Relay Signal

GT\_DRV0: Gate Signal

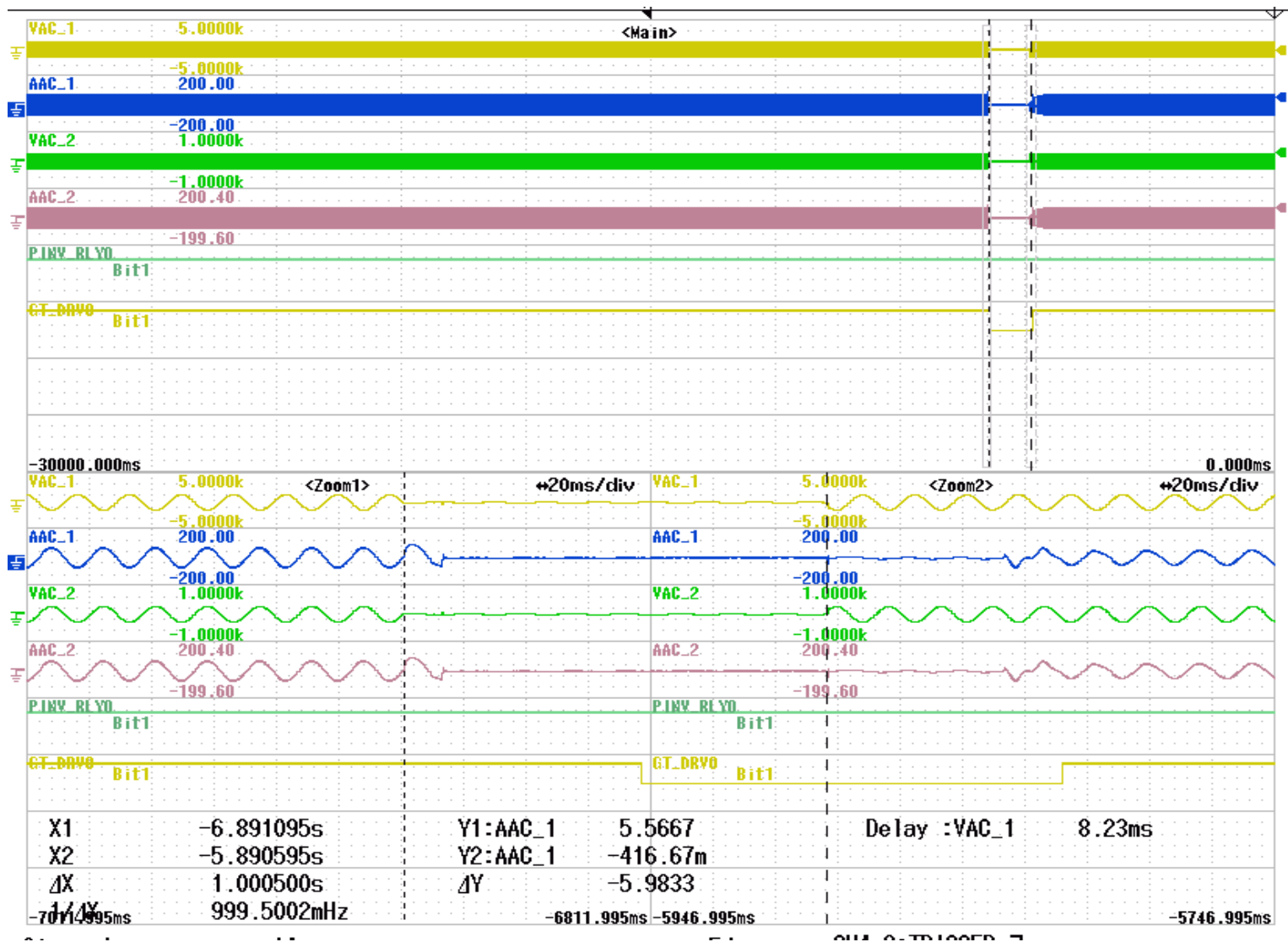


Figure 6.3.4 Instantaneous voltage drop at 0° entry angle (101Vrms → 0Vrms → 101Vrms)

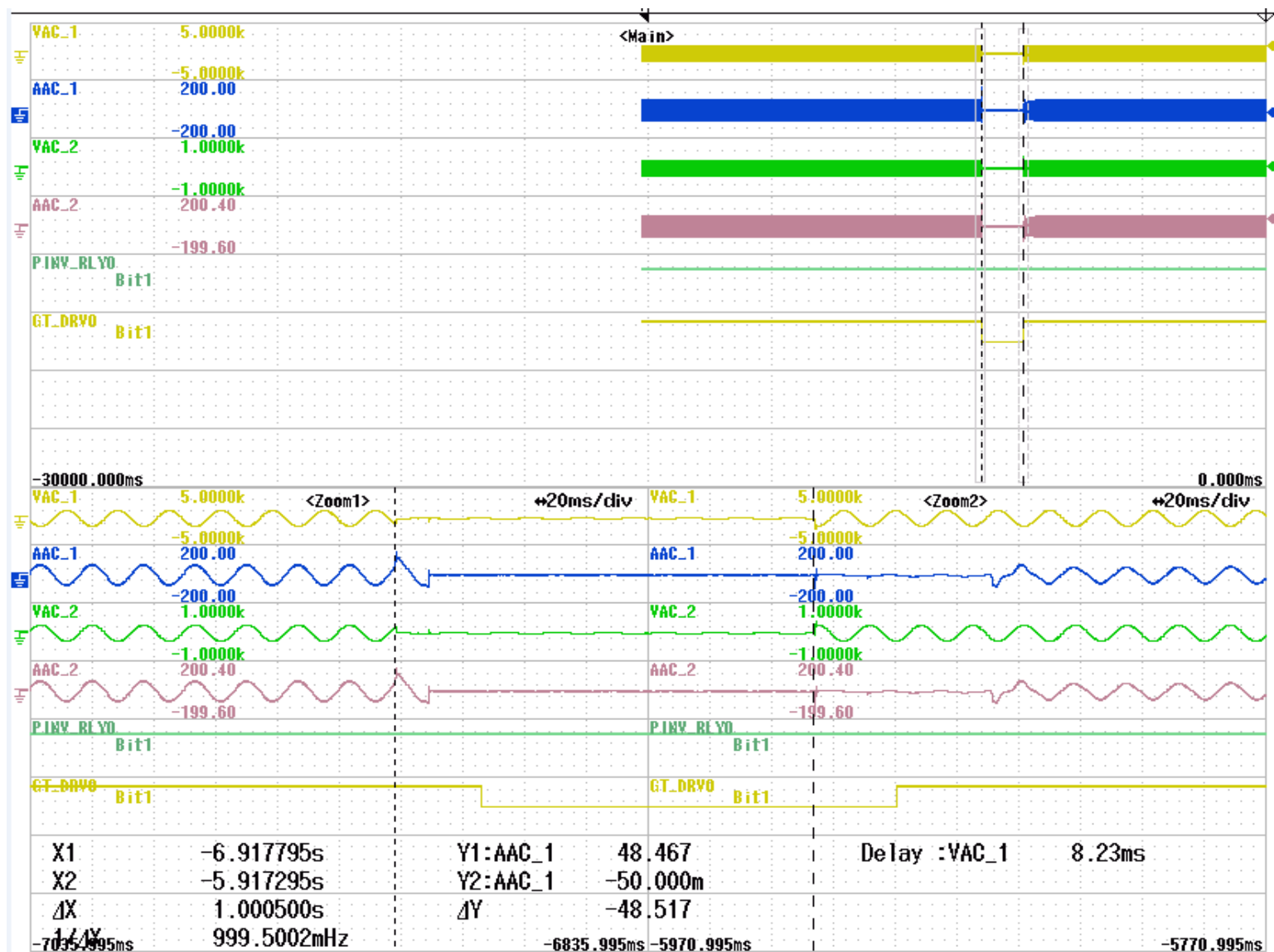


Figure 6.3.5 Instantaneous voltage drop at 45° entry angle (101Vrms → 0Vrms → 101Vrms)

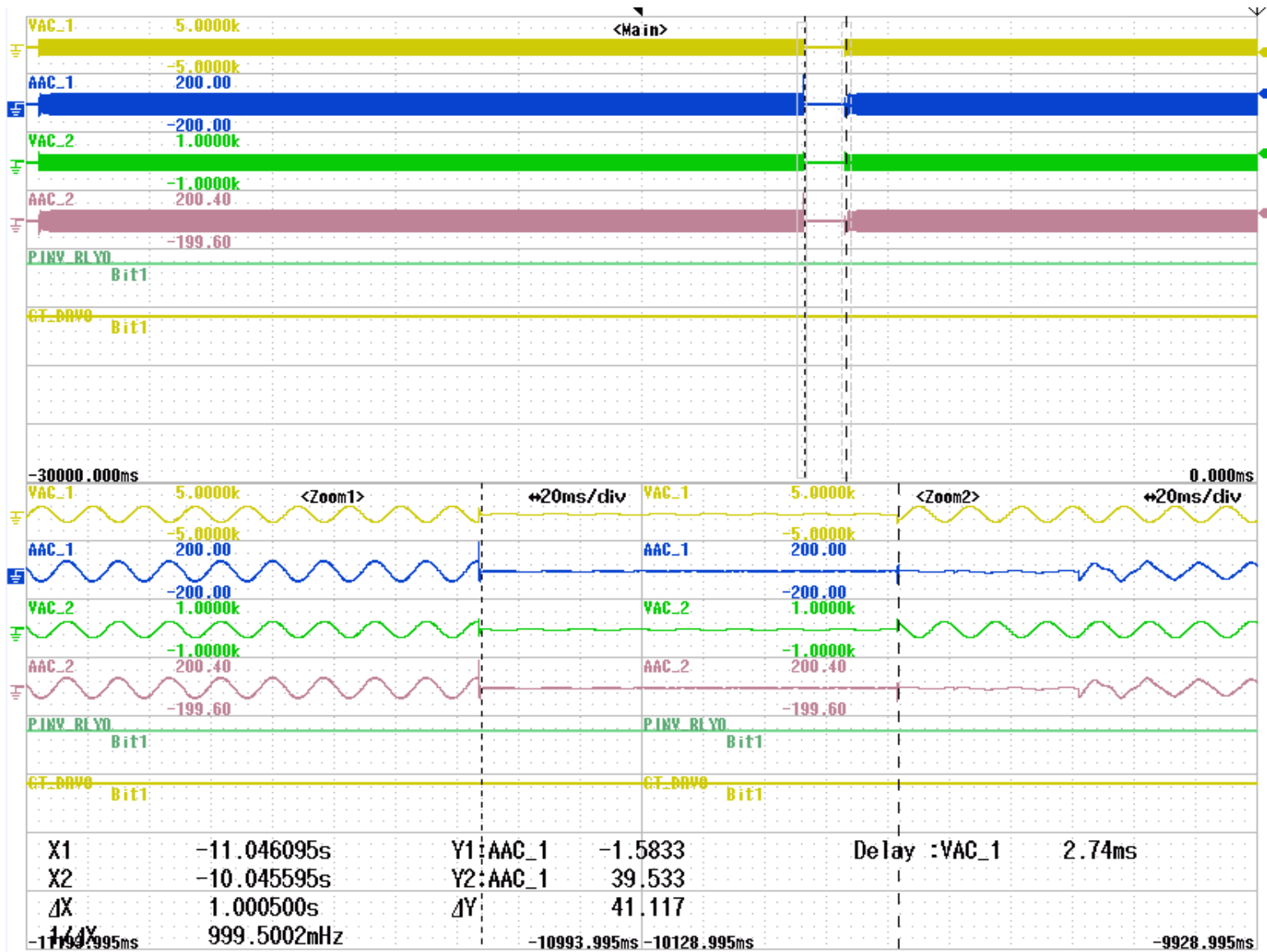


Figure 6.3.6 Instantaneous voltage drop at 90° entry angle (101Vrms → 0Vrms → 101Vrms)



Voltage Drop To 52% (Nominal voltage = 94%Vn = 94.94Vrms) % 残電圧 5 2 %

Phase jump 0 to 41° 位相変化 4 1 °

AC Voltage 交流電圧	Output Power 出力電力	Operation Mode 動作モード	Frequency 周波数	Entry Angle 位相	Measurement 試験結果				Pass / Fail 判定 <sup>1</sup> <100ms <sup>2</sup> <150% of Irated <sup>3</sup> <500ms	Remarks 備考
					80% Output Recovering time 出力復帰時間	Over Current (A(%)) 過電流値	Time Spent over 100% (ms) 1 0 0 % を超える時間	Operation is Continuous? 電圧低下後の運転継続?		
94.94Vrms (A,B) → 52.52Vrms (A,B) → 94.94Vrms (A,B)L-N	4.8kW	Discharge 放電	60 Hz	0	-	24.019 A (100.08%)	0	Yes	Pass	Fig 6.3.7
				45	-	23.667 A (98.61%)	0	Yes	Pass	Fig 6.3.8
				90	-	21.099 A (87.91%)	0	Yes	Pass	Fig 6.3.9



Voltage Drop To 52% (Nominal voltage =  $V_n = 101V_{rms}$ ) % 残電圧 52 %

Phase jump 0 to 41° 位相変化 41°

AC Voltage 交流電圧	Output Power 出力電力	Operation Mode 動作モード	Frequency 周波数	Entry Angle 位相	Measurement 試験結果				Pass / Fail 判定 <sup>1</sup> <100ms <sup>2</sup> <150% of $I_{rated}$ <sup>3</sup> <500ms	Remarks 備考
					80% Output Recovering time 出力復帰時間	Over Current (A(%)) 過電流値	Time Spent over 100% (ms) 100%を超える時間	Operation is Continuous? 電圧低下後の運転継続?		
101Vrms (A,B) → 52.52Vrms (A,B) → 101Vrms (A,B)L-N	4.8kW	Discharge 放電	60 Hz	0	-	23.813A (99.22%)	0	Yes	Pass	
				45	-	24.54A (102.25%)	0	Yes	Pass	
				90	-	23.283 A (97.01%)	0	Yes	Pass	

Voltage Drop To 52% (Nominal voltage =  $106\%V_n = 107.06V_{rms}$ ) % 残電圧 52 %



Phase jump 0 to 41° 位相変化 4 1°

AC Voltage 交流電圧	Output Power 出力電力	Operation Mode 動作モード	Frequency 周波数	Entry Angle 位相	Measurement 試験結果				Pass / Fail 判定 <sup>1</sup> <100ms <sup>2</sup> <150% of Irated <sup>3</sup> <500ms	Remarks 備考
					80% Output Recovering time 出力復帰時間	Over Current (A(%)) 過電流値	Time Spent over 100% (ms) 100%を超える時間	Operation is Continuous? 電圧低下後の運転継続?		
107.06Vrms (A,B) → 52.52Vrms (A,B) → 107.06Vrms (A,B)L-N	4.8kW	Discharge 放電	60 Hz	0	-	23.54 A (98.08%)	0	Yes	Pass	
				45	-	23.166 A (96.53%)	0	Yes	Pass	
				90	-	22.172 A (92.38%)	0	Yes	Pass	

Scope Channel Description: s  
 Channel 1\_1: Phase A Voltage  
 Channel 1\_2: Phase A Current  
 Channel 2\_1: Phase B Voltage  
 Channel 2\_2: Phase B Current

PINV\_RLY: Relay Signal  
 GT\_DRV: Gate Signal

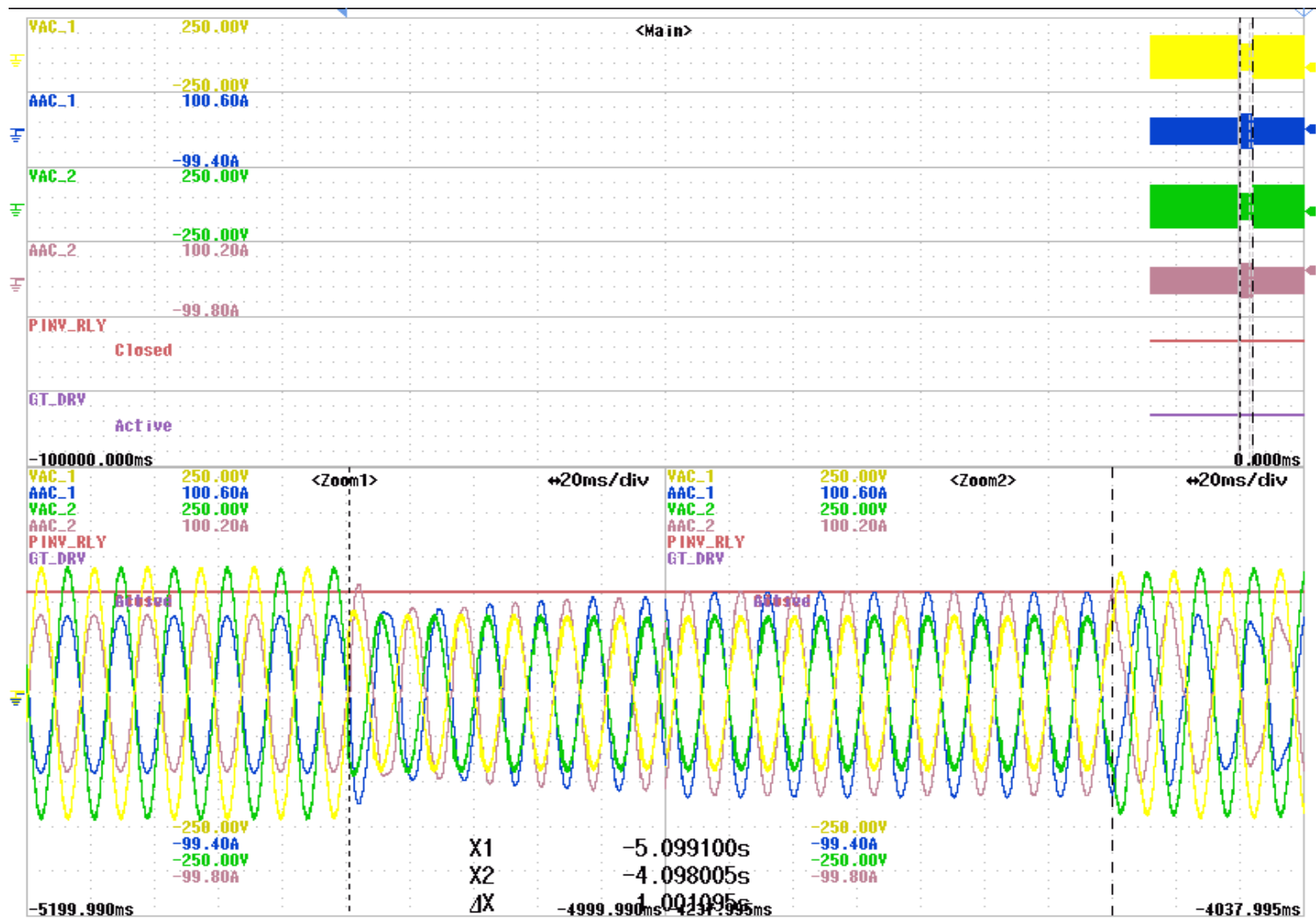


Figure 6.3.7 Instantaneous voltage drop at 0° entry angle (94.94Vrms → 52.52Vrms → 94.94Vrms)



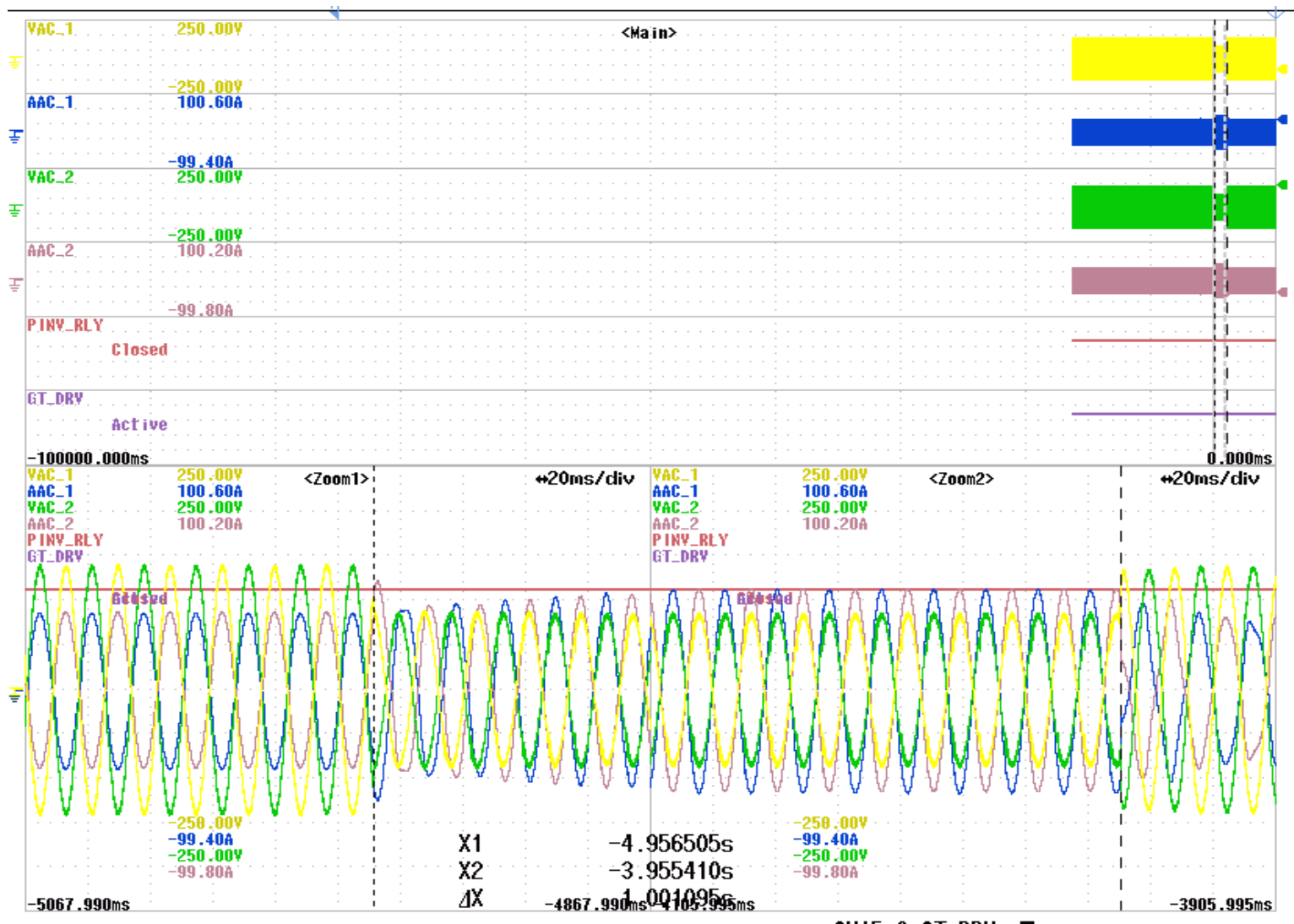


Figure 6.3.8 Instantaneous voltage drop at 45° entry angle (94.94Vrms → 52.52Vrms → 94.94Vrms)

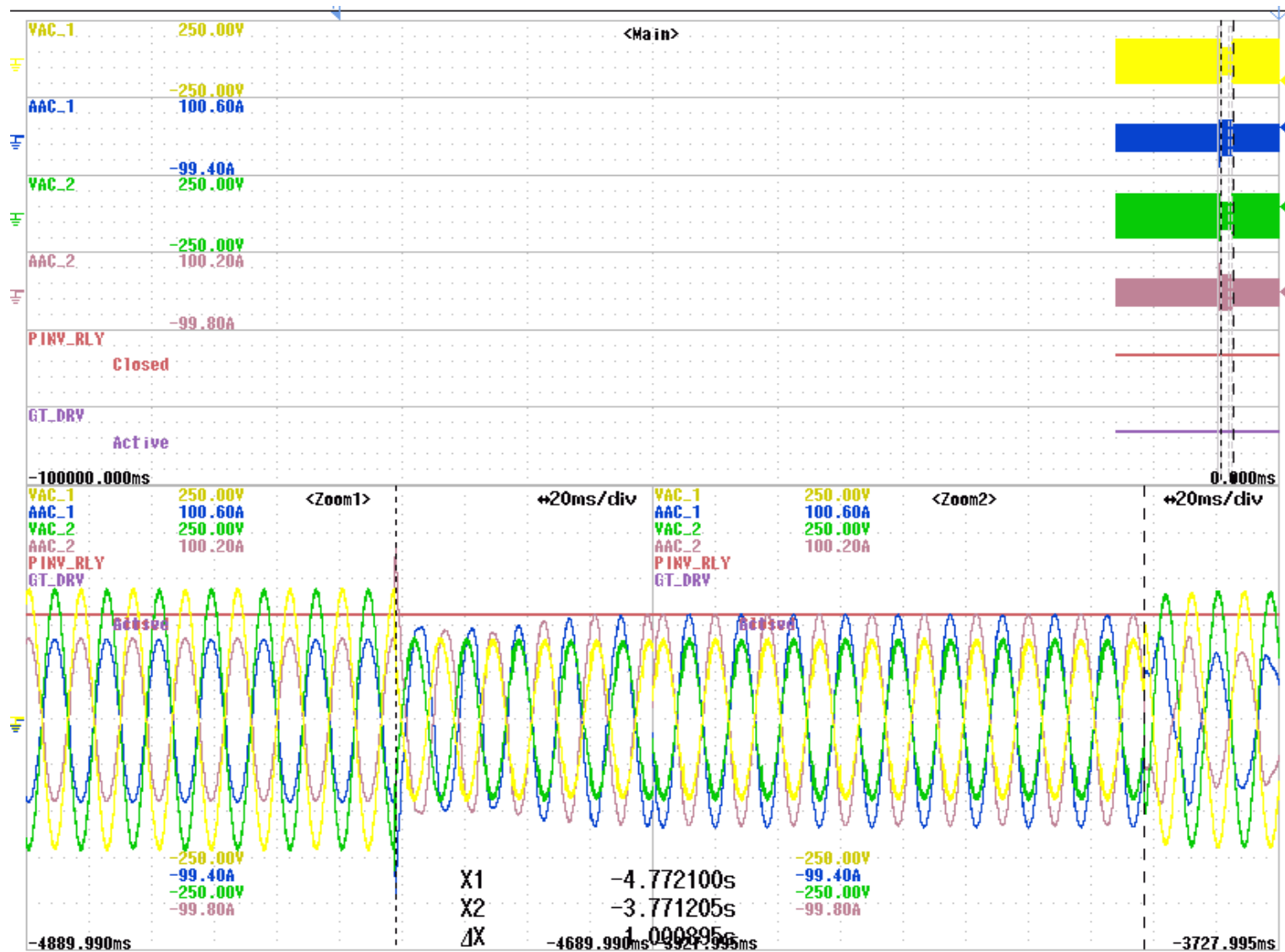


Figure 6.3.9 Instantaneous voltage drop at 90° entry angle (94.94Vrms → 52.52Vrms → 94.94Vrms)



## 6.4 Frequency Step Change Test(60Hz) 周波数変動試験

AC Voltage 交流電圧	Output Power 出力電力		Operation Mode 動作モード	Frequency 周波数	Frequency Change 周波数変動	Frequency Deviation(Hz) 変動周波数(Hz)	Freq. Chang Duration 変動時間	Inverter Continue? 運転継続	Pass / Fail 判定	Remarks 備考
Phase A: 101Vrms Phase B: 101Vrms	4.8 kW		Discharge	60 Hz	Step Change	+1.0 Hz	0.05s	Yes	Pass	Figure 6.4.7 – 6.4.8

Scope Channel Description:

Channel 1\_1: Phase A Current

Channel 1\_2: Phase A Voltage

Channel 2\_1: Phase B Current

Channel 2\_2: Phase B Voltage

Relay: Relay Signal

Gate drive: Gate

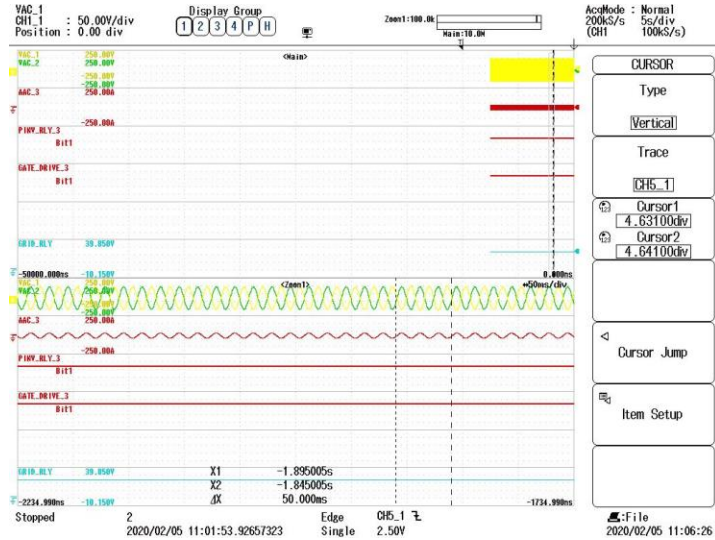


Figure: 6.4.7 Frequency Step Change (60.0Hz → 61Hz)

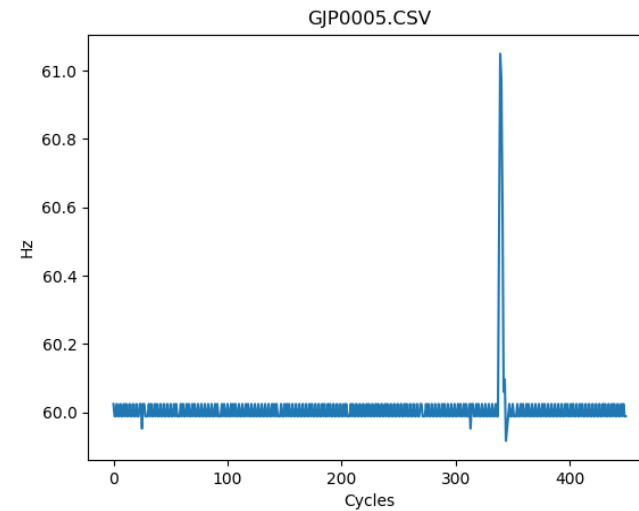


Figure: 6.4.8 Frequency Step Change (60.0Hz → 61Hz)

Ramp Change: ランプ状変化

AC Voltage 交流電圧	Output Power 出力電力	Mode	Frequency 周波数	Frequency Change 周波数変動	Frequency Deviation 変動周波数	Freq. Chang Duration 変動時間	Continuous operation during Freq. deviation?	Pass / Fail 判定	Remarks 備考
Phase A: 101Vrms Phase B: 101Vrms	4.8 kW	Discharge	60 Hz	Ramp Change ランプ状変化	+1.8	0.9	Yes	Pass	Figure 6.4.9 – 6.4.10
					-3	1.5	Yes	Pass	Figure 6.4.11 – 6.4.12

Scope Channel Description:

Channel 1\_1: Phase A Current

Channel 1\_2: Phase A Voltage

Channel 2\_1: Phase B Current

Channel 2\_2: Phase B Voltage

Relay: Relay Signal

Gate drive: Gate

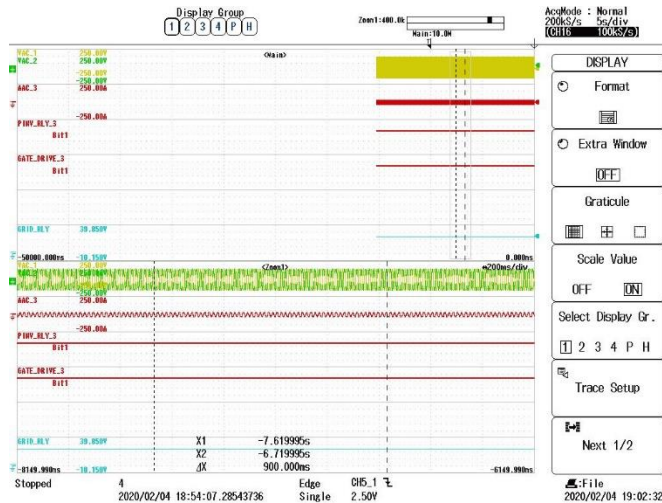


Figure 6.4.9 Frequency Ramp Change (60.0Hz→61.8Hz)

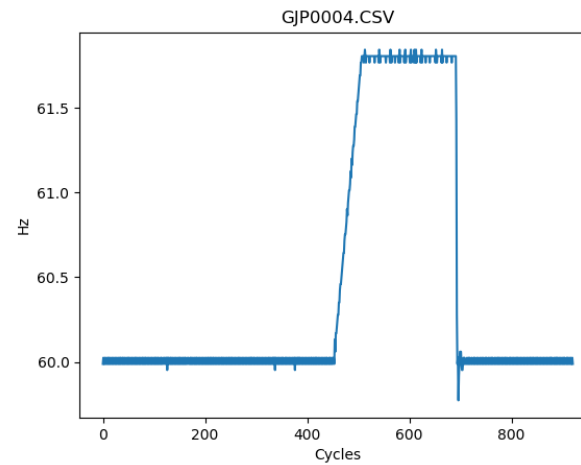


Figure 6.4.10 Frequency Ramp Change (60.0Hz→61.8Hz)

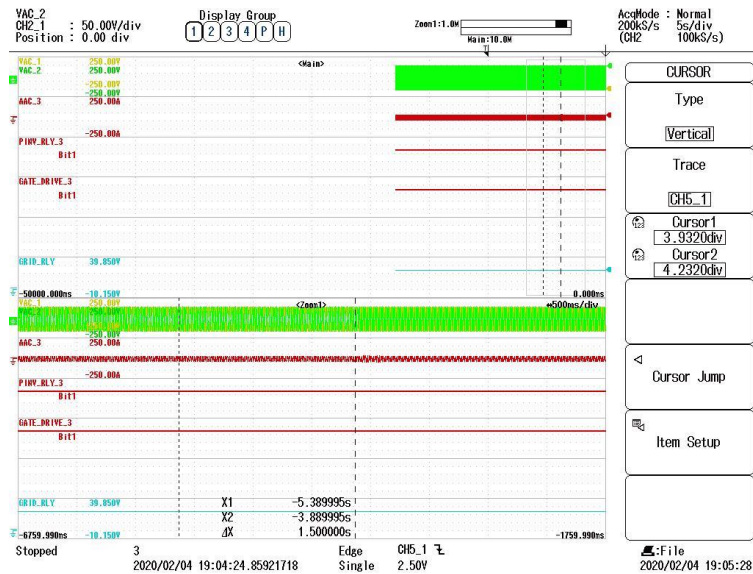


Figure 6.4.11 Frequency Ramp Change (60.0Hz→57Hz)

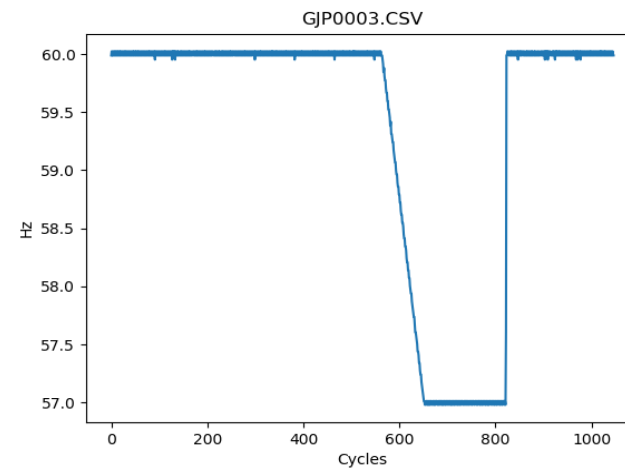


Figure 6.4.12 Frequency Ramp Change (60.0Hz→57Hz)

## 12.1 Switching to Backup operation mode 自立運転切換試験

SWCB state	Unit Relay	Gate Drive	Time to Transition	Remarks
close	Closed		--	
open	Open	Open	4.1	Fig: 12.1.1
Open	Closed	Closed	--	
Close	Closed	Closed	--	
Close	Closed	Closed	309.975	Fig: 12.1.2



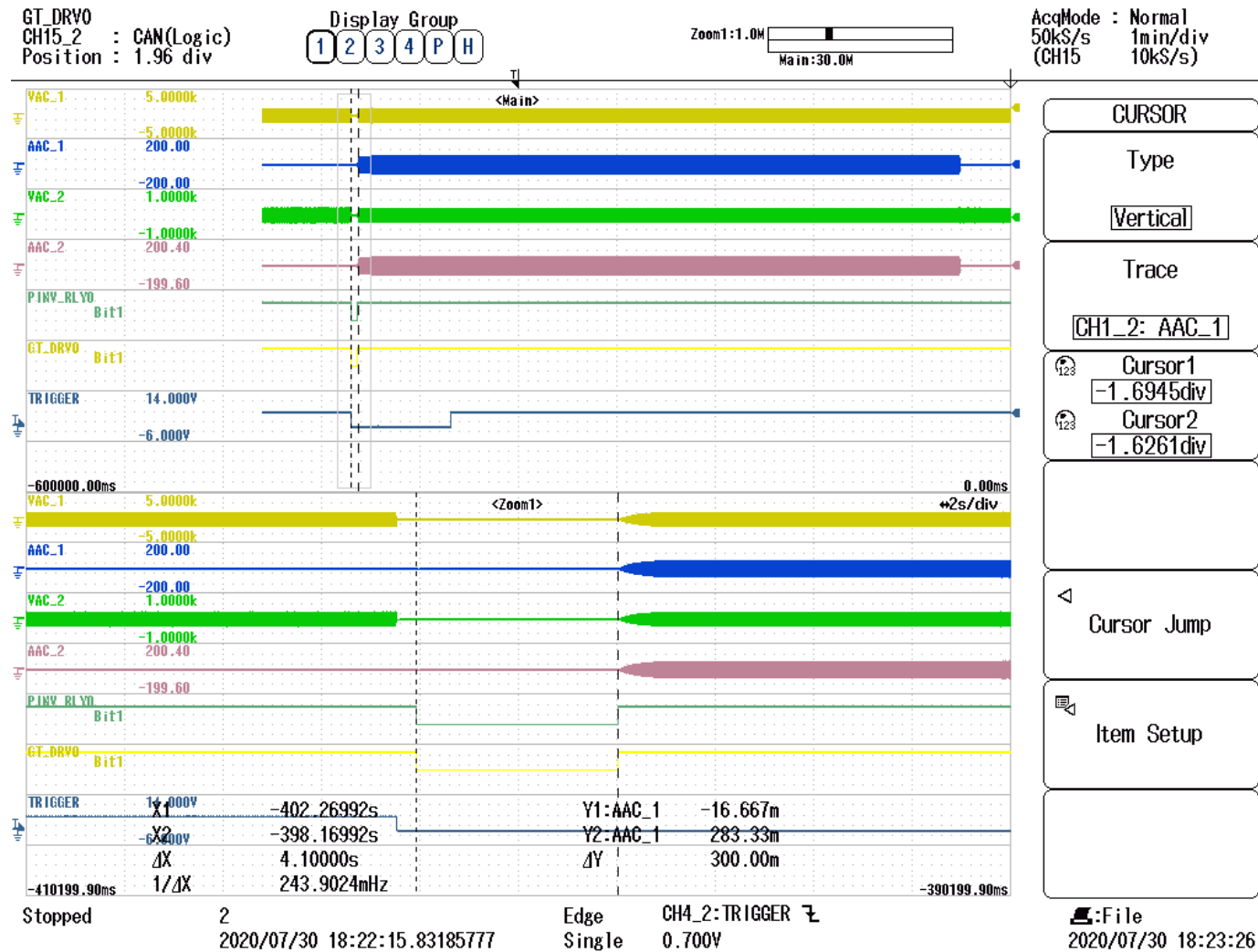


Fig: 12.1.1 Grid Following to Backup Mode:Relay & Gate block signal:Open (4.1scs)

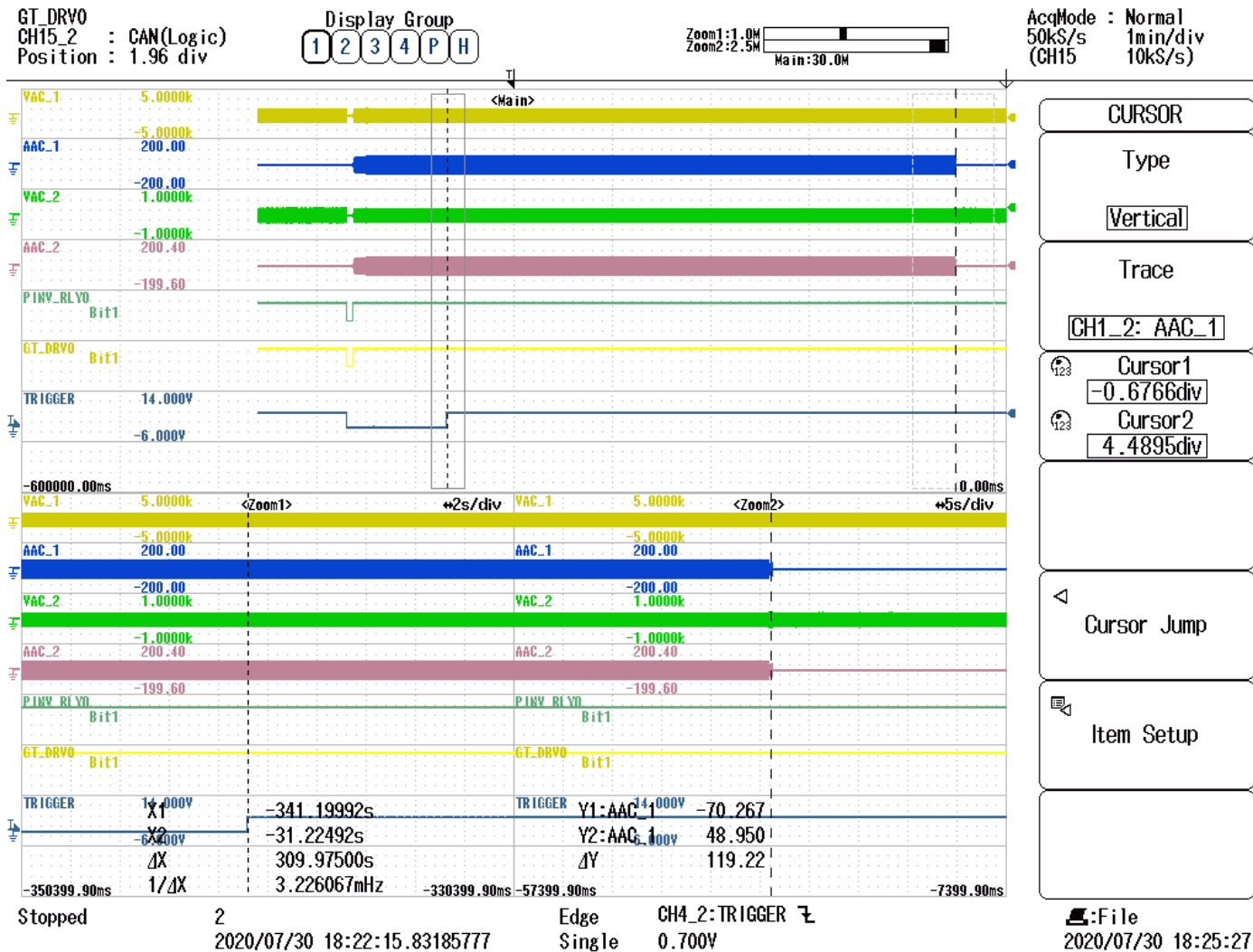


Fig: 12.1.2 Backup to Grid following mode: Relay & Gate block signal:Closed(309.975 secs)

## 12.2 Automatic switching to backup mode 自立運転自動切換試験

Load setting (% of EUT name plate power rating)	EUT set power (%of EUT name plate power rating)	Voltage (V)	Frequency (Hz)	EUT Power (W)	EUT Power (% of EUT nameplate)	EUT Current (A)	EUT Current (% of EUT nameplate)	Remarks
100	100	200.615	60.003	-0.3	-0.00625	0.2306	0.960833333	Before Backup
100	100	202.275	59.998	4773.3	99.44375	23.361	97.3375	After Backup

## 12.4 Independent disconnection signal disruption test 自立解列信号途絶試験

### Test 1: Disconnection of Communication line before backup

Before Backup operation mode	Load setting (% of EUT name plate power rating)	EUT set power (%of EUT name plate power rating)	Voltage (V)	Frequency (Hz)	EUT Power (W)	EUT Power (% of EUT nameplate)	EUT Current (A)	EUT Current (% of EUT nameplate)	Remarks
With Comms. Cable	100	100	204.3	60.002	4803.6	100.075	23.3938	97.4741	Fig: 12.4.1
Without Comms. Cable	100	100	0	0	0	0	0	0	

## Test 2: Disconnection of communication line after backup

During Backup operation mode	Load setting (% of EUT name plate power rating)	EUT set power (%of EUT name plate power rating)	Voltage (V)	Frequency (Hz)	EUT Power (W)	EUT Power (% of EUT nameplate)	EUT Current (A)	EUT Current (% of EUT nameplate)	Remarks
With Comms. Cable	100	100	194.731	59.886	4612	96.08333333	23.2014	96.6725	Fig: 12.4.2
Without Comms. Cable	100	100	0	0	0	0	0	0	



Scope Channel Description:

Channel 1\_1: Phase A Current

Channel 1\_2: Phase A Voltage

Channel 2\_1: Phase B Current

Channel 2\_2: Phase B Voltage

PINV\_RLY0: Relay Signal

GT\_DRV0: Gate Signal

GRD\_REL: Grid open signal

Load Curr: Load Current

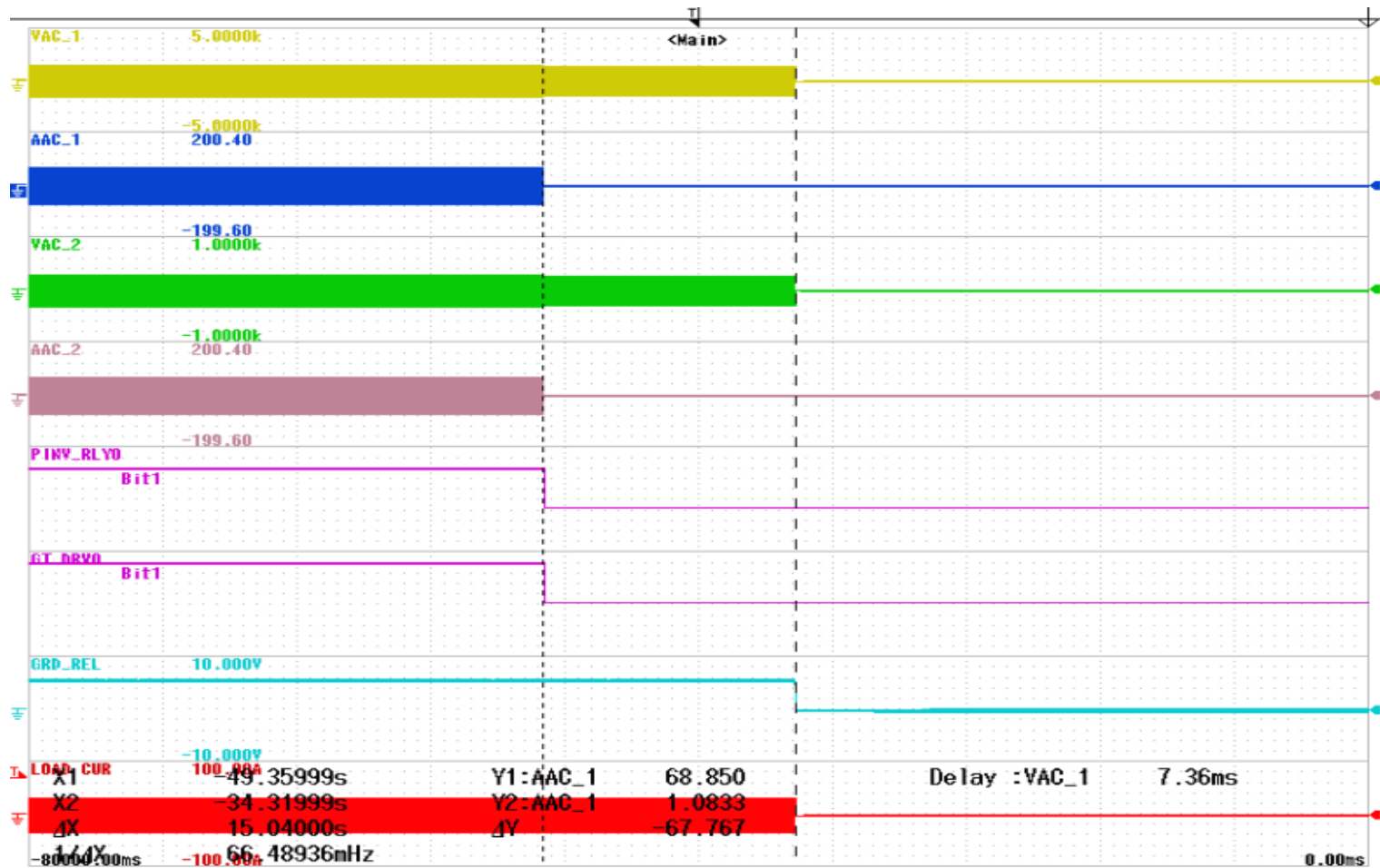


Fig: 12.4.1 Communication removed before backup operation ( After Communication cable is disconnected, Gate and relay signal drops low, GRD\_REL describes opening of Grid SWCB, unit does not go to backup operation mode)

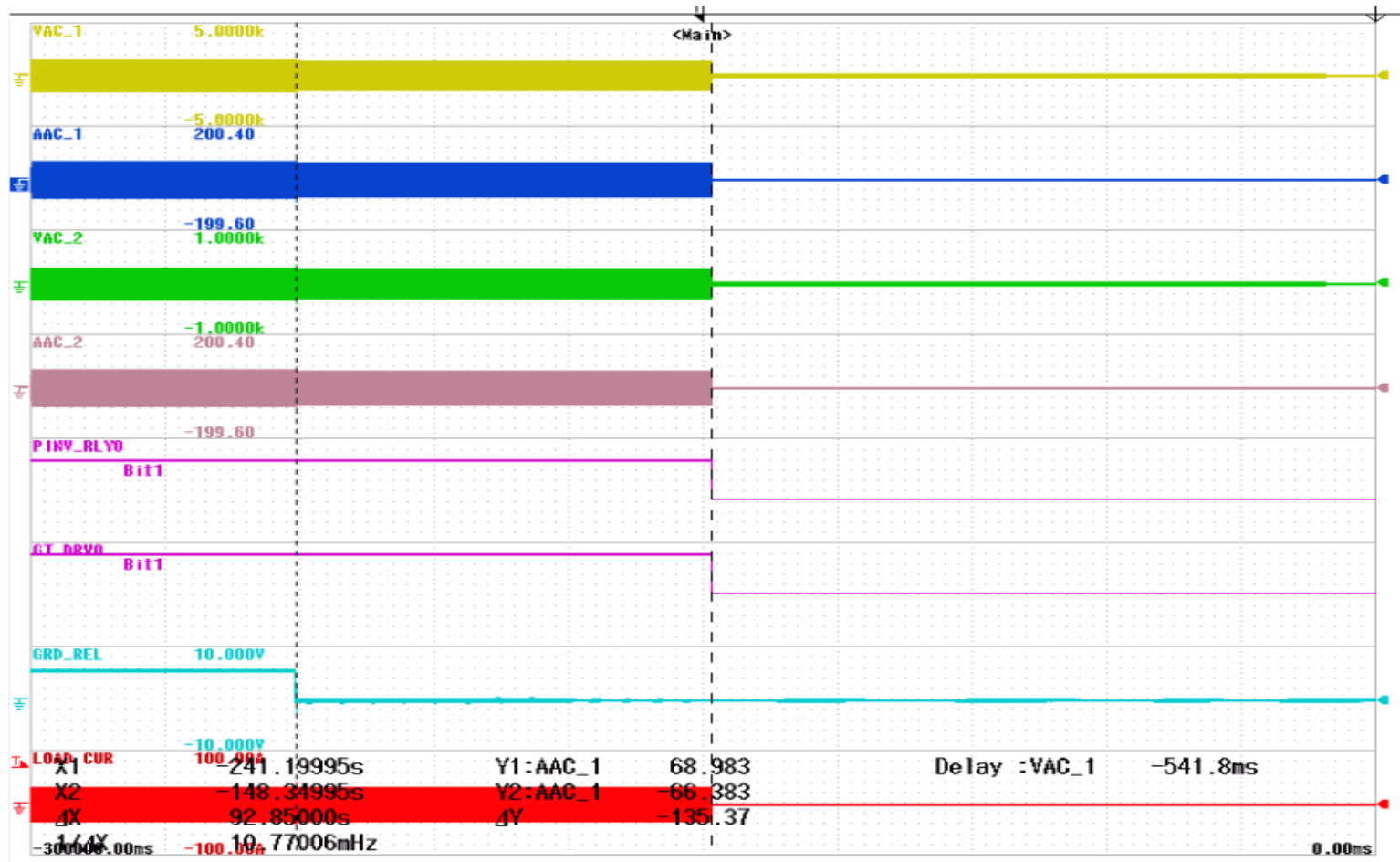


Fig: 12.4.2 Communication removed after backup operation ( After Communication cable is disconnected, Gate and relay signal drops low, Unit stops expirting power to the load in backup mode)