



# Tesla AC Powerwall2 ( 5.0 kVA)

連系協議用資料—代表機試験結果 (50Hz)

Ver2.0

装置型式：

AC Powerwall2 model: 1092170-xx-y, 2012170-xx-y, 3012170-xx-y



1. Summary 要約

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

- JETGR0002-1-16.1 (2024) General test method for low voltage grid interconnection protection device etc.
- JETGR0003-5-9.1 (2021) Individual test method such as low voltage grid 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。

- JETGR0002-1-16.1 (2024) 低圧系統連系保護装置等の試験方法通則
- JETGR0003-5-9.1 (2021) 蓄電池システム用低圧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 Powerwall2	TG1243290037KW	Equipment List 1
	TG12432900373J	
	TG1243300008FV	
	TG124330002B8J	
	TG1243300008DD	Equipment List 2

### 3. Measurement Device / Equipment List 計測器/機器リスト

#### Equipment List 1

No.	Description 計測器名	Manufacturer メーカー	Model 型名	Serial シリアル	Cal Date 較正日	Cal Due 較正期限日
1	Power Analyzer	Yokogawa	WT3000E	91WC09192	7/29/2024	7/29/2025
2	ScopeCorder	Yokogawa	DL850EV	91U616293	10/22/2024	10/22/2025
3	Power Analyzer	Yokogawa	WT3000E	91WC09191	3/10/2025	3/10/2026
4	Current Transducer 200A	DaniSense	DS200ID	23270041031	8/19/2024	8/19/2025
6	Current Transducer 200A	DaniSense	DS200ID	15310040015	4/9/2025	4/9/2026
5	Current Transducer 200A	Danisense	DS200ID	20450040257	8/19/2024	8/19/2025
7	Current Transducer 200A	DaniSense	DS200ID	15310040016	8/19/2024	8/19/2025
8	Current Transducer 200A	Danisense	DS200ID	19510040059	8/20/2024	8/20/2025
9	Current Transducer 200A	Danisense	DS200ID	24270041013	8/26/2024	8/26/2025
10	Current Transducer 200A	DaniSense	DS200ID	20450040253	8/19/2024	8/19/2025
11	Current Transducer 200A	DaniSense	DS200ID	24220041010	8/26/2024	8/26/2025
12	Current Probe	Yokogawa	701930	180828556	2/13/2025	2/13/2026
13	Current Probe	Yokogawa	701930	230801785	11/25/2024	11/25/2025
14	Current Probe	Yokogawa	701930	200102298	2/13/2025	2/13/2026
15	Current Probe	Yokogawa	701930	200626686	11/13/2024	11/13/2025
16	Differential Probe	Yokogawa	700924	1900531	11/8/2024	11/8/2025
17	Differential Probe	Yokogawa	700924	2001405	2/7/2025	2/7/2026
18	Differential Probe	Testec	TT-SI 9010	2108053	1/23/2025	1/23/2026
19	Differential Probe	Testec	TT-SI 9010	2108028	1/23/2025	1/23/2026

## Equipment List 2

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	Data Acquisition Unit	Dewetron	C8240214-USA	DEWE3-PA8	12/9/2024	12/9/2025
2	ScopeCorder	Yokogawa	90Z730668	DL950	11/15/2024	11/15/2025
3	Current Transducer 200A	Danisense	19510040091	DS200ID	10/3/2024	10/3/2025
4	Current Transducer 200A	Danisense	20380040273	DS200IDSA	11/15/2024	11/15/2025
5	Current Probe	Yokogawa	210101801	701931	11/13/2024	11/13/2025
6	Differential Probe	Yokogawa	190421	701978	11/12/2024	11/12/2025

#### 4. Test Results テスト結果一覧

Section Number	Test Description	Completion date	Pass / Fail
3.2.5	Frequency Feedback Function Test 周波数フィードバック機能試験	5/25/2025	Pass
3.2.6	Step Injection Function Test ステップ注入機能試験	5/29/2025	Pass
3.2.7.1	Anti-Islanding Operation Prevention Load Area Test 単独運転防止負荷領域試験	5/21/2025	Pass
3.2.7.2	Anti-Islanding Operation Prevention Test after Instantaneous Voltage Drop Detection 瞬時電圧低下検出後の単独運転防止試験	5/30/2025	Pass
3.2.8.1	Anti-Islanding Operation Prevention Test in Multiple-unit interconnection 多数台連系での単独運転防止試験	5/23/2025	Pass
3.2.8.2	Anti-Islanding Operation Prevention Test in Active Function Standby State 能動機能待機状態での単独運転防止試験	5/31/2025	Pass
3.2.11.1	State Transition Verification Test from Active Function Standby State to Active Function Enabled State 能動機能待機状態から能動機能有効状態への状態遷移確認試験	5/30/2025	Pass
3.2.11.2	State Transition Verification Test from Active Function Enabled State to Active Function Standby State 能動機能有効状態から能動機能待機状態への状態遷移確認試験	5/27/2025	Pass
3.2.12	Reactive Power Oscillation Suppression Confirmation Test 無効電力発振抑制確認試験	6/1/2025	Pass

### 3.2.5 Frequency Feedback Function Test 周波数フィードバック機能試験

	Voltage 電圧 (V)	Current 電流 (A)	Active Power 有効電力 (W)	Frequency 周波数 (Hz)	Reactive Power 無効電力 (var)	Max Q measured Q の最大測 定値 (var)	Injected Q Q 注入量 (var)	Injected Q Q 注入量 (pu)	Pass / Fail 判定 Gain1: no Q injected Gain 2: Q injection ≤0.25pu+accuracy
Gain 1 ±10mHz	200.846	19.614	3932.762	50.002	-83.256	-	-	-	-
	200.848	19.613	3932.882	50.012	-83.303	-	-	-	Pass
	200.849	19.612	3932.556	50.002	-83.844	-	-	-	Pass
	200.850	19.616	3933.155	49.992	-83.473	-	-	-	Pass
	200.849	19.612	3932.421	50.002	-83.303	-	-	-	Pass
Gain 2 ±0.3Hz	200.853	19.627	3935.994	50.302	-53.141	-1020.87	-937.57	-0.238	Pass
	200.850	19.599	3929.732	50.002	-104.699	895.32	948.46	0.241	Pass
	200.826	19.602	3929.535	49.702	-108.180	884.9	989.60	0.252	Pass
	200.858	19.627	3935.903	50.002	-61.563	-1033.34	-925.16	-0.235	Pass

### 3.2.6 Step Injection Function Test ステップ注入機能試験

Criteria①\_During a harmonic voltage surge 判定基準①\_高調波電圧急増時

	Voltage 電圧 (V)	Current 電流 (A)	Active Power 有効電力 (W)	Frequency 周波数 (Hz)	Reactive Power 無効電力 (var)	Max Q measured Q の最大測定値 (var)	Injected Q Q 注入量 (var)	Injected Q Q 注入量 (pu)	Harmonic Voltage Step 高調波電圧ステップ(V)	Pass / Fail 判定 Q injection $\leq 0.1\text{pu} + \text{accuracy}$
2nd order	202.049	19.501	3933.628	50.002	-83.215	-	-	-	0.055	-
	202.034	19.508	3932.879	50.002	-82.739	-477.550	-394.335	-0.079	2.323	Pass
3rd order	202.043	19.494	3932.221	50.002	-83.438	-	-	-	1.021	-
	202.026	19.521	3929.581	50.002	-84.616	-492.104	-408.666	-0.082	3.255	Pass
4th order	202.037	19.497	3932.282	50.002	-83.339	-	-	-	0.025	-
	202.023	19.505	3931.412	50.002	-83.882	-471.141	-387.803	-0.078	2.261	Pass
5th order	202.036	19.497	3931.761	50.002	-83.438	-	-	-	0.815	-
	202.027	19.516	3929.706	50.002	-84.477	-464.935	-381.498	-0.076	3.057	Pass
6th order	202.028	19.494	3931.839	50.002	-83.420	-	-	-	0.018	-
	202.018	19.504	3931.055	50.002	-83.941	-460.765	-377.346	-0.075	2.232	Pass
7th order	202.037	19.493	3932.010	50.002	-83.386	-	-	-	0.599	-
	202.026	19.507	3930.359	50.002	-83.959	-457.150	-373.765	-0.075	2.813	Pass
THD	202.035	19.494	3932.049	50.002	-83.758	-	-	-	1.442	-
	202.011	19.515	3929.427	50.002	-85.055	-498.116	-414.357	-0.083	3.696	Pass

Criteria②\_During a fundamental voltage surge 判定基準②\_基本波電圧急増時

	Voltage 電圧 (V)	Current 電流 (A)	Active Power 有効電力 (W)	Frequency 周波数 (Hz)	Reactive Power 無効電力 (var)	Max Q measured Q の最大測 定値 (var)	Injected Q Q 注入量 (var)	Injected Q Q 注入量 (pu)	Pass / Fail 判定 Gain1: no Q injected Gain 2: Q injection ≤0.25pu+accuracy
Standby	202.061	19.496	3932.949	50.002	-83.778	-	-	-	-
待機状態	204.849	19.237	3934.372	50.002	-83.623	N/A	N/A	N/A	Pass
Operational	202.042	19.499	3933.246	50.002	-83.632	-	-	-	-
有効状態	204.829	19.239	3934.277	50.002	-83.757	-469.636	-385.879	-0.098	Pass



### 3.2.7.1 Anti-Islanding Operation Prevention Load Area Test 単独運転防止負荷領域試験

Output Power: 5.0 kW

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	Reconnection prevention 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	5s

Parameters 設定値				Measurement Result 測定結果			Pass / Fail 判定  <
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-5%	-250	-10%	500	50	Discharge	0.143	0.143	6.3	PASS	Figure 3.2.7.4 & 3.2.7.5
0%	0	10%	-500			0.143	0.143	6.3	PASS	
0%	0	5%	-250						DEADBAND	
0%	0	0%	0						DEADBAND	
0%	0	-5%	250						DEADBAND	
0%	0	-10%	500			0.145	0.145	6.3	PASS	
5%	250	10%	-500			0.150	0.150	6.3	PASS	
5%	250	5%	-250						DEADBAND	
5%	250	0%	0						DEADBAND	
5%	250	-5%	250						DEADBAND	
5%	250	-10%	500			0.145	0.145	6.3	PASS	
10%	500	10%	-500			0.150	0.150	6.3	PASS	
10%	500	5%	-250						DEADBAND	
10%	500	0%	0						DEADBAND	
10%	500	-5%	250						DEADBAND	
10%	500	-10%	500			0.147	0.147	6.3	PASS	

**Scope Channel Description (-0\*suffix indicates unit number e.g. '-00', '-01', '-02', '-03'):**

Vac-0\*: Line-Line Voltage  
 aac-0\*: Phase A Current  
 gridrly: SWcb State (Grid Contactor)  
 pwm-0\*: Power Conditioner Gate Signal  
 rly-0\*: Power Conditioner Output Relay  
 sts-0\*: Power Conditioner Active Function Status Signal (Operational – HIGH, Standby – LOW)  
 inj-0\*: Power Conditioner Step Injection Signal

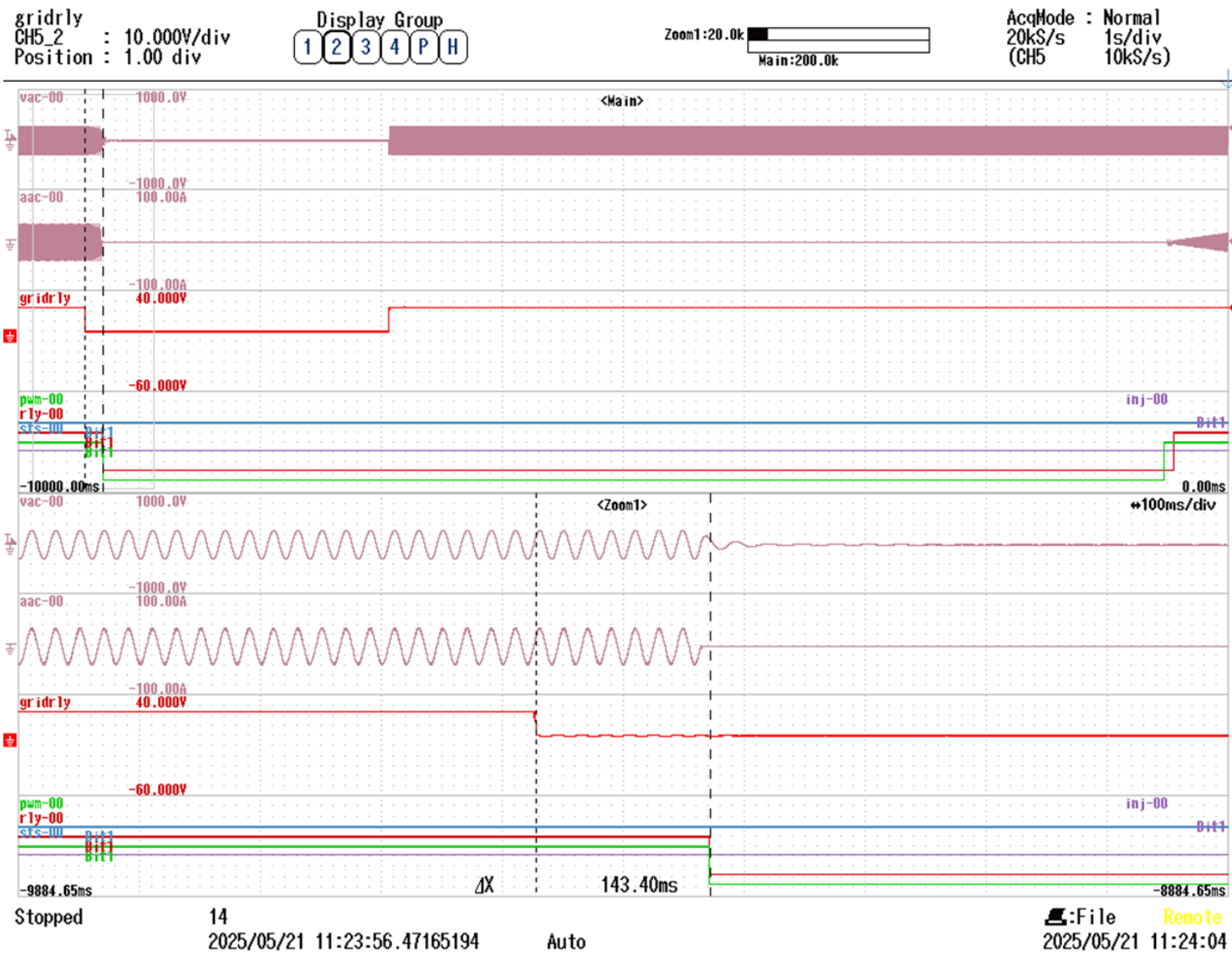


Figure 3.2.7.4 Gate Block Time

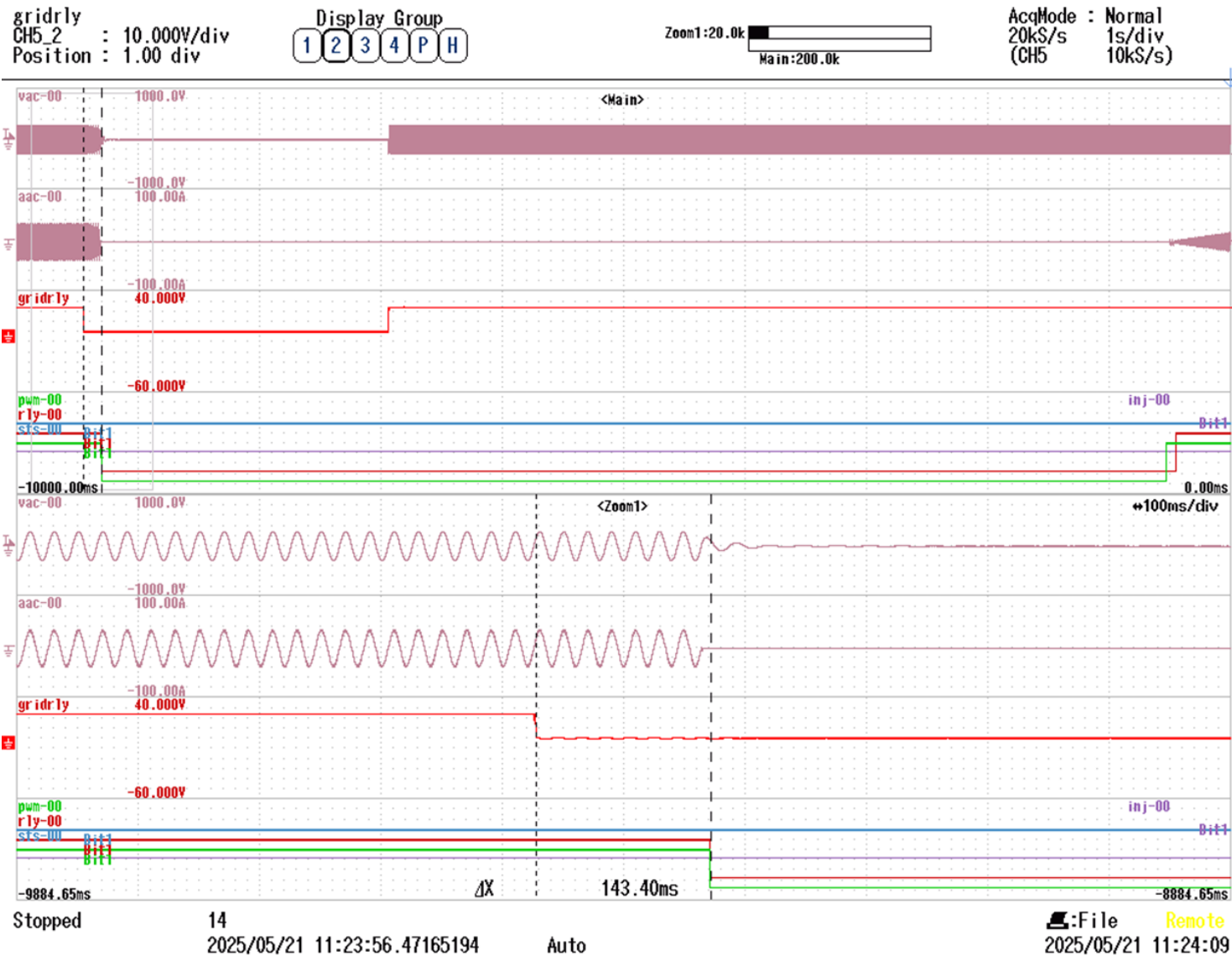


Figure 3.2.7.5 Relay Time

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	Reconnection prevention time 再並列阻止時間
Resistive load 抵抗負荷	Discharge 放電	Active 能動	< 0.2s	5s

Parameters 設定値					Measurement Result 測定結果			Pass / Fail 判定  <sup>1,2</sup> <0.2s <sup>3</sup> >5s	Remarks   備考	
Active Power(W)		Reactive Power(Var)		Frequency	Operation Mode	Gate Block (s) <sup>1</sup>	Relay Open (s) <sup>2</sup>			Reconnection Prevention Time (s) <sup>3</sup>
有効電力		無効電力		周波数	動作モード	GB 時限	Ry 解列時限			再並列阻止時間
-10%	-500	0%	0	50	Discharge	0.128	0.128	6.3	PASS	Figure 3.2.7.6 & 3.2.7.7
-5%	-250	0%	0			0.143	0.143	6.3	PASS	
0%	0	0%	0			0.137	0.137	6.3	PASS	
5%	250	0%	0			0.140	0.140	6.3	PASS	
10%	500	0%	0			0.131	0.131	6.3	PASS	

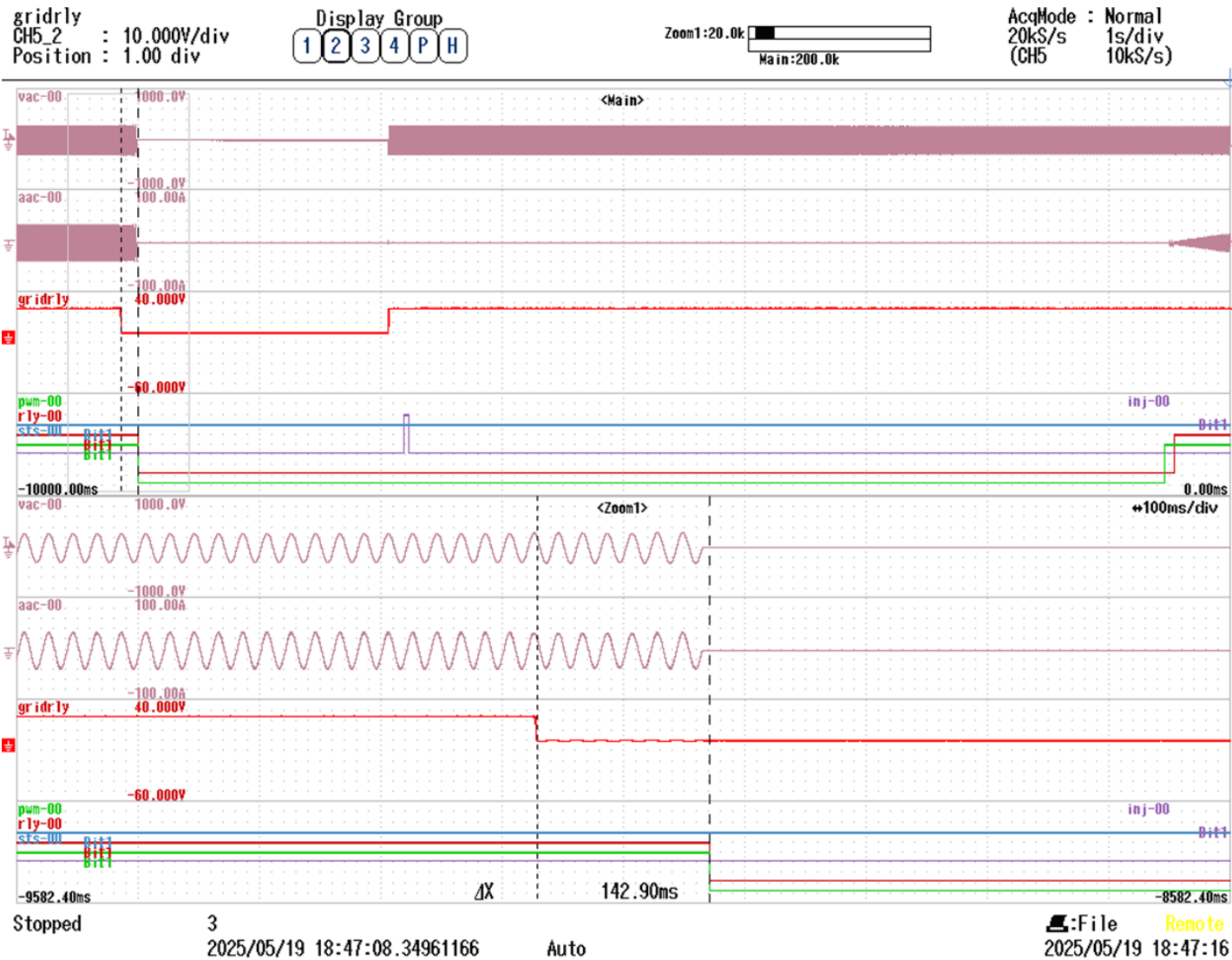


Figure 3.2.7.6 Gate Block Time

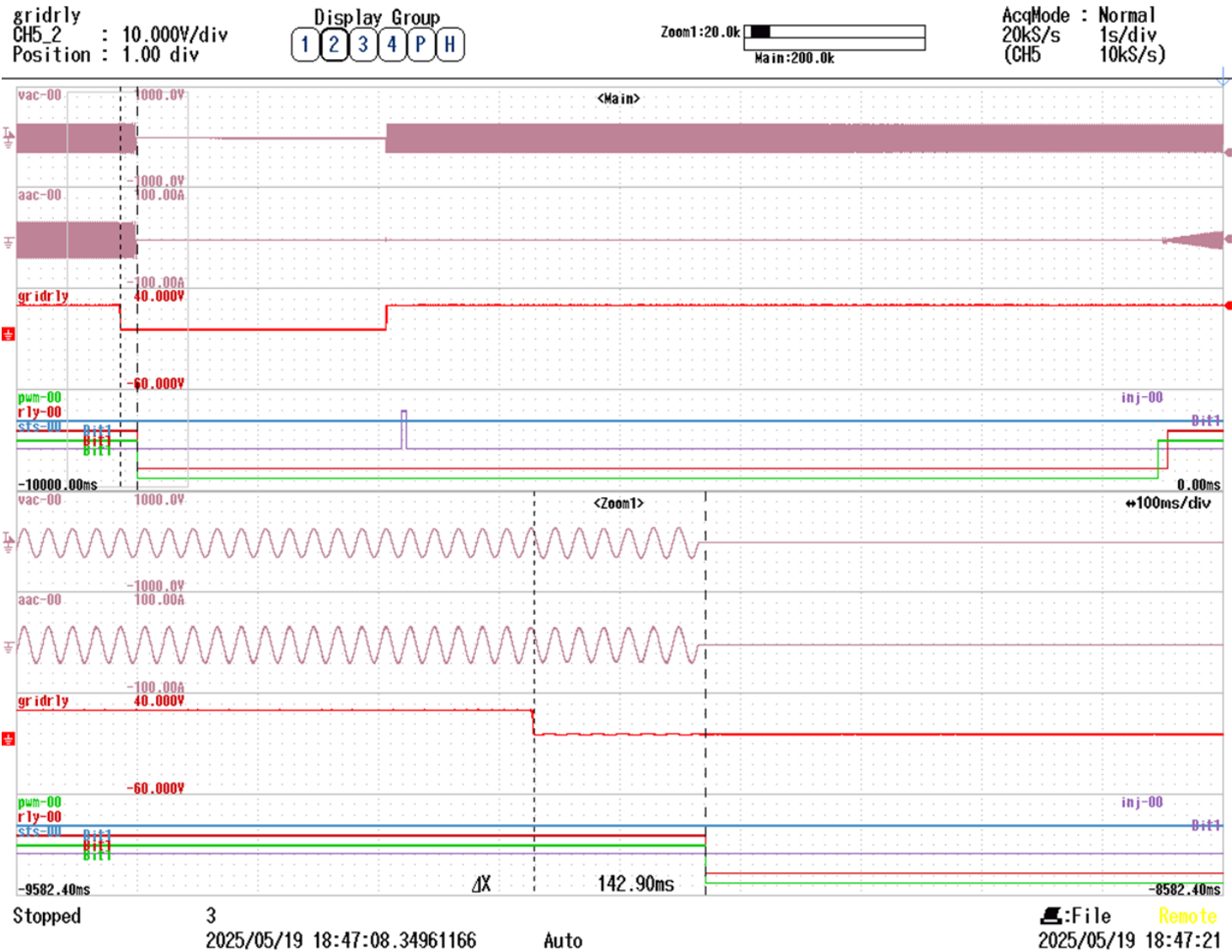


Figure 3.2.7.7 Relay Time

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	Reconnection prevention time 再並列阻止時間
Resistive load 抵抗負荷	Discharge 放電	Passive + Active 受動 + 能動	< 0.2s	5s

Parameters 設定値					Measurement Result 測定結果			Pass / Fail 判定	Remarks
Active Power(W) 有効電力		Reactive Power(Var) 無効電力		Frequency 周波数	Operation Mode 動作モード	Gate Block (s) <sup>1</sup> GB 時限	Relay Open (s) <sup>2</sup> Ry 解列時限	Reconnection Prevention Time (s) <sup>3</sup> 再並列阻止時間	1,2 < 0.2s 3 > 5s 備考
-10%	-500	0%	0	50	Discharge	0.124	0.124	6.3	PASS
-5%	-250	0%	0			0.136	0.136	6.3	PASS
0%	0	0%	0			0.175	0.175	6.3	PASS
5%	250	0%	0			0.137	0.137	6.3	PASS
10%	500	0%	0			0.125	0.125	6.3	PASS



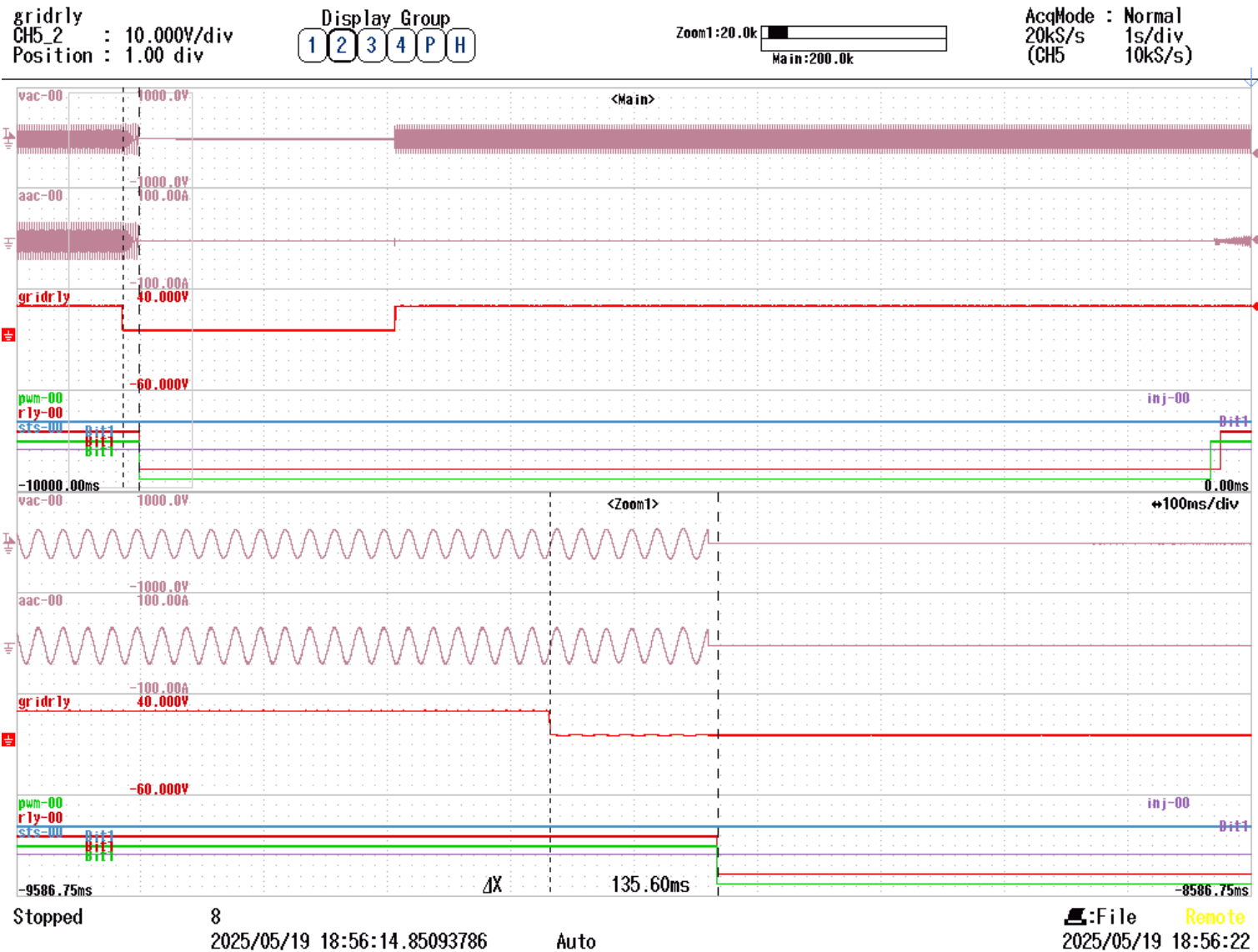
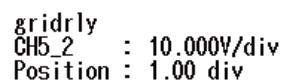


Figure 3.2.7.8 Gate Block Time



Display Group

1	2	3	4	P	H
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Zoom1:20.0k  
Main:200.0k

AcqMode : Normal  
20kS/s 1s/div  
(CH5 10kS/s)

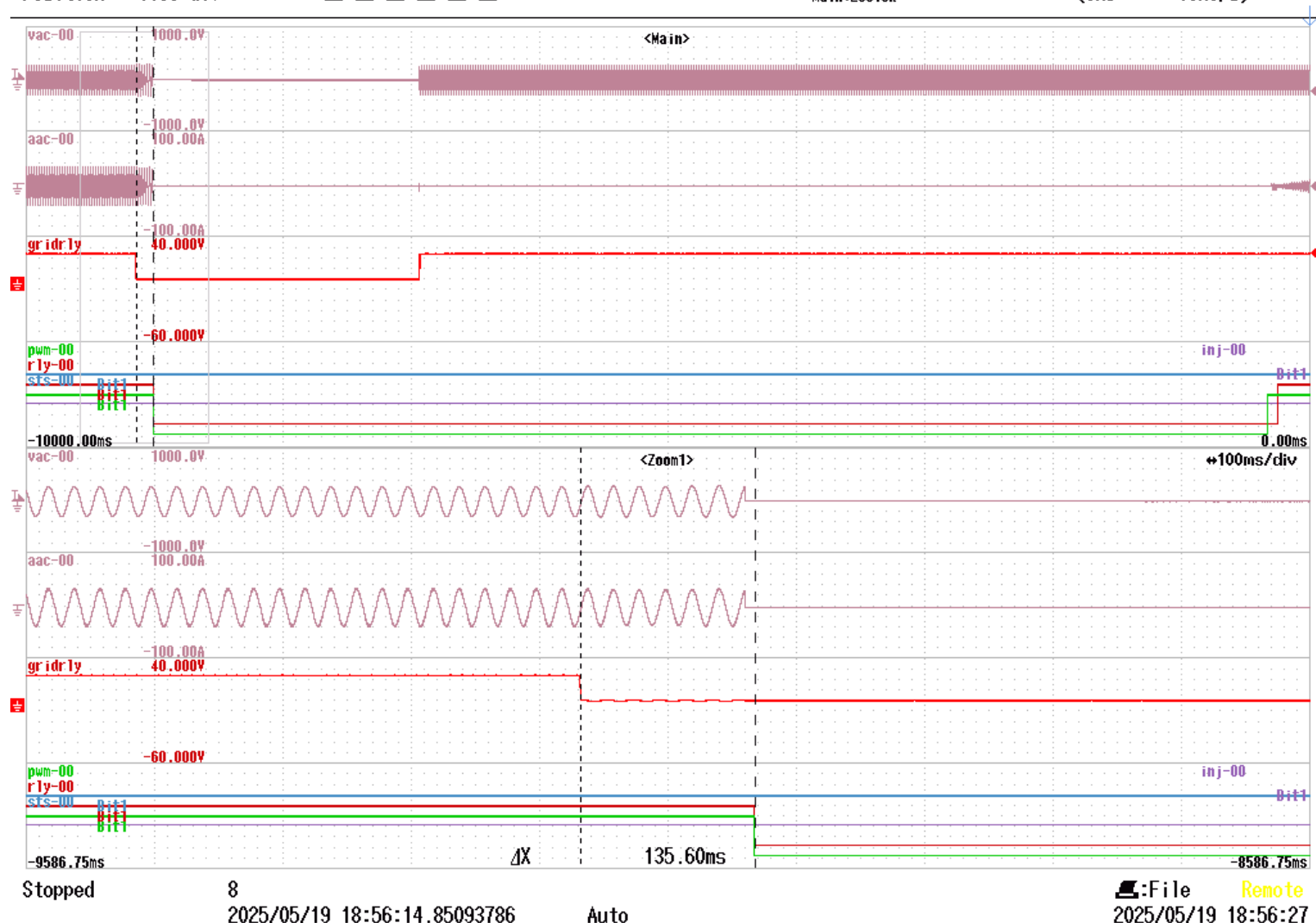


Figure 3.2.7.9 Relay Time

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	Reconnecion prevention 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	5s

Parameters 設定値				Measurement Result 測定結果			Pass / Fail 判定  1,2 <0.2s 3>5s	Remarks  備考		
Active Power(W)  有効電力		Reactive Power(Var)  無効電力		Frequency  周波数	Operation Mode  動作モード	Gate Block (s) <sup>1</sup>  GB 時限			Relay Open (s) <sup>2</sup>  Ry 解列時限	Reconnection Prevention Time (s) <sup>3</sup>  再並列阻止時間
-10%	-500	10%	-500	50	Discharge	0.103	0.103	6.3	PASS	
-10%	-500	5%	-250			0.117	0.117	6.3	PASS	
-10%	-500	0%	0			0.138	0.138	6.3	PASS	
-10%	-500	-5%	250			0.112	0.112	6.3	PASS	
-10%	-500	-10%	500			0.099	0.099	6.3	PASS	
-5%	-250	10%	-500			0.105	0.105	6.3	PASS	
-5%	-250	5%	-250			0.120	0.120	6.3	PASS	
-5%	-250	0%	0			0.154	0.154	6.3	PASS	
-5%	-250	-5%	250			0.113	0.113	6.3	PASS	
-5%	-250	-10%	500			0.103	0.103	6.3	PASS	
0%	0	10%	-500			0.110	0.110	6.3	PASS	
0%	0	5%	-250			0.115	0.115	6.3	PASS	
0%	0	0%	0			0.144	0.144	6.3	PASS	

0%	0	-5%	250	50	Discharge	0.121	0.121	6.3	PASS	
0%	0	-10%	500			0.106	0.106	6.3	PASS	
5%	250	10%	-500			0.118	0.118	6.3	PASS	
5%	250	5%	-250			0.124	0.124	6.3	PASS	
5%	250	0%	0			0.157	0.157	6.3	PASS	
5%	250	-5%	250			0.124	0.124	6.3	PASS	
5%	250	-10%	500			0.111	0.111	6.3	PASS	
10%	500	10%	-500			0.107	0.107	6.3	PASS	
10%	500	5%	-250			0.128	0.128	6.3	PASS	
10%	500	0%	0			0.173	0.173	6.3	PASS	Figure 3.2.7.10 & 3.2.7.11
10%	500	-5%	250			0.125	0.125	6.3	PASS	
10%	500	-10%	500			0.107	0.107	6.3	PASS	

**Scope Channel Description (-0\*suffix indicates unit number e.g. '-00', -01', -02', -03'):**

Vac-0\*: Line-Line Voltage  
 aac-0\*: Phase A Current  
 gridrly: SWcb State (Grid Contactor)  
 pwm-0\*: Power Conditioner Gate Signal  
 rly-0\* : Power Conditioner Output Relay  
 sts-0\* : Power Conditioner Active Function Status Signal (Operational – HIGH, Standby – LOW)  
 inj-0\* : Power Conditioner Step Injection Signal

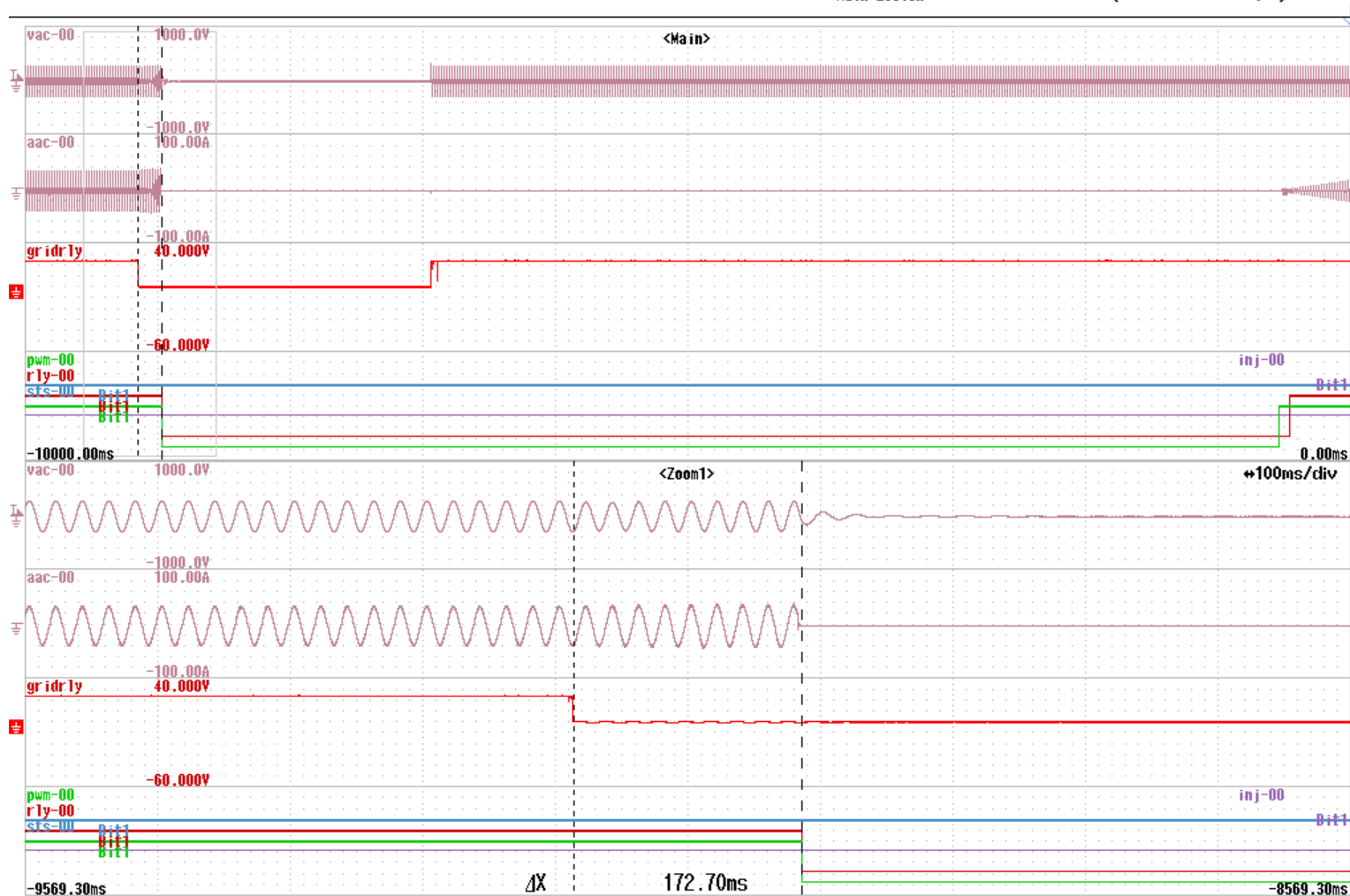


gridrly  
CH5\_2 : 10.000V/div  
Position : 1.00 div

Display Group  
1 2 3 4 P H

Zoom1:20.0k  
Main:200.0k

AcqMode : Normal  
20kS/s 1s/div  
(CH5 10kS/s)



Stopped 50  
2025/05/19 17:58:39.35603858 Auto

File Remote  
2025/05/19 17:58:47

Figure 3.2.7.10 Gate Block Time

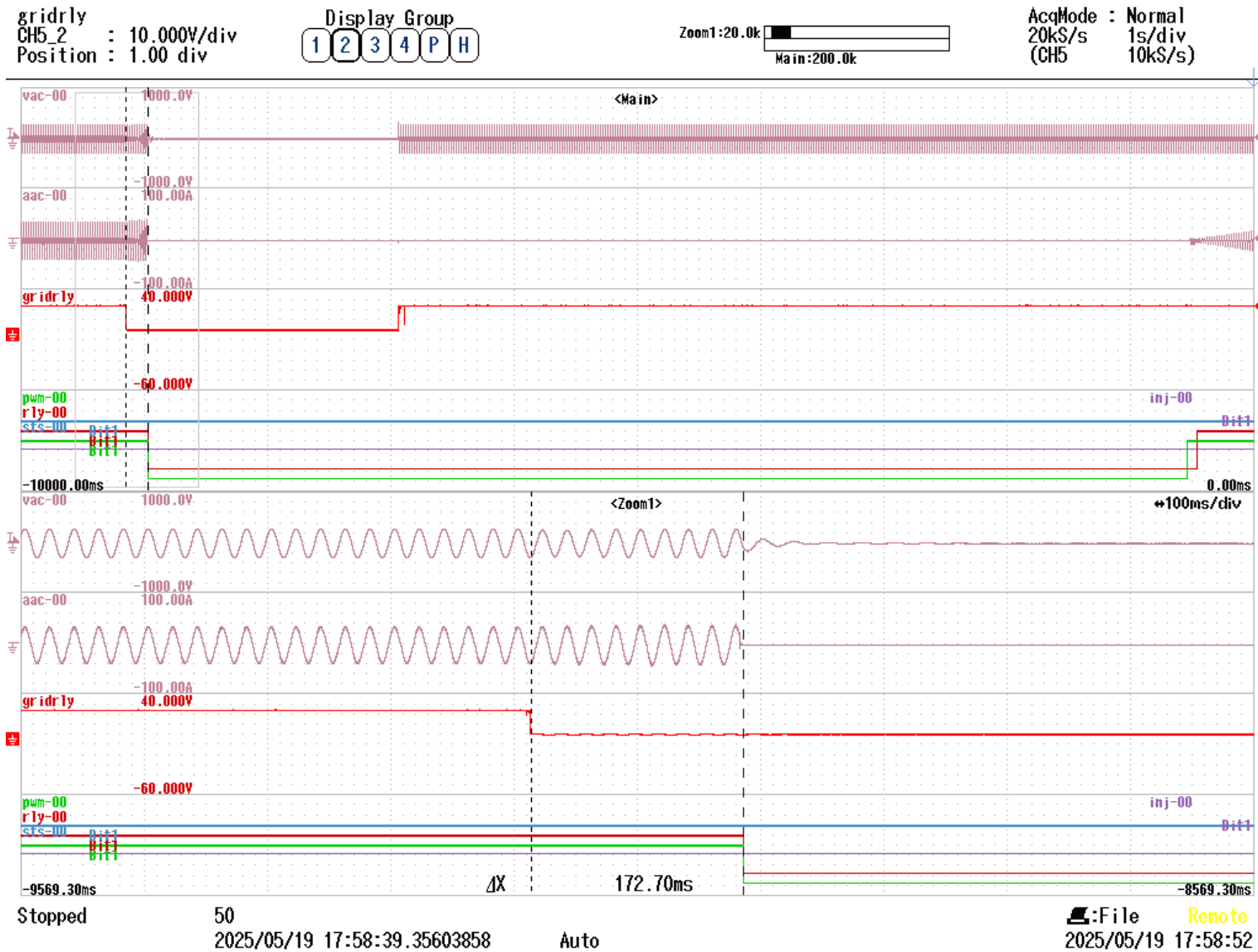


Figure 3.2.7.11 Relay Time

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	Reconnection prevention time 再並列阻止時間
Balanced load 並行負荷（回転機負荷）	Discharge 放電	Passive + Active 受動 + 能動	< 0.2s	5s

Parameters 設定値				Measurement Result 測定結果			Pass / Fail 判定  <sup>1,2</sup> <0.2s  <sup>3</sup> >5s	Remarks   備考				
Active Power(W)  有効電力		Reactive Power(Var)  無効電力		Frequency  周波数	Operation Mode  動作モード	Gate Block (s) <sup>1</sup>  GB 時限			Relay Open (s) <sup>2</sup>  Ry 解列時限	Reconnection Prevention Time (s) <sup>3</sup>  再並列阻止時間		
-10%	-500	10%	-500	50	Discharge	0.105	0.105	6.3	PASS			
-10%	-500	5%	-250			0.121	0.121	6.3	PASS			
-10%	-500	0%	0			0.141	0.141	6.3	PASS			
-10%	-500	-5%	250			0.116	0.116	6.3	PASS			
-10%	-500	-10%	500			0.103	0.103	6.3	PASS			
-5%	-250	10%	-500			0.103	0.103	6.3	PASS			
-5%	-250	5%	-250			0.126	0.126	6.3	PASS			
-5%	-250	0%	0			0.160	0.160	6.3	PASS			
												Figure 3.2.7.12 & 3.2.7.13
-5%	-250	-5%	250			0.184	0.184	6.3	PASS			
-5%	-250	-10%	500			0.107	0.107	6.3	PASS			
0%	0	10%	-500			0.103	0.103	6.3	PASS			
0%	0	5%	-250	0.126	0.126	6.3	PASS					



0%	0	0%	0	50	Discharge	0.155	0.155	6.3	PASS	
0%	0	-5%	250			0.117	0.117	6.3	PASS	
0%	0	-10%	500			0.103	0.103	6.3	PASS	
5%	250	10%	-500			0.108	0.108	6.3	PASS	
5%	250	5%	-250			0.121	0.121	6.3	PASS	
5%	250	0%	0			0.155	0.155	6.3	PASS	
5%	250	-5%	250			0.125	0.125	6.3	PASS	
5%	250	-10%	500			0.108	0.108	6.3	PASS	
10%	500	10%	-500			0.105	0.105	6.3	PASS	
10%	500	5%	-250			0.121	0.121	6.3	PASS	
10%	500	0%	0			0.122	0.122	6.3	PASS	
10%	500	-5%	250			0.129	0.129	6.3	PASS	
10%	500	-10%	500			0.101	0.101	6.3	PASS	

**Scope Channel Description (-0\*suffix indicates unit number e.g. '-00', '-01', '-02', '-03'):**

Vac-0\*: Line-Line Voltage  
 aac-0\*: Phase A Current  
 gridrly: SWcb State (Grid Contactor)  
 pwm-0\*: Power Conditioner Gate Signal  
 rly-0\* : Power Conditioner Output Relay  
 sts-0\* : Power Conditioner Active Function Status Signal (Operational – HIGH, Standby – LOW)  
 inj-0\* : Power Conditioner Step Injection Signal



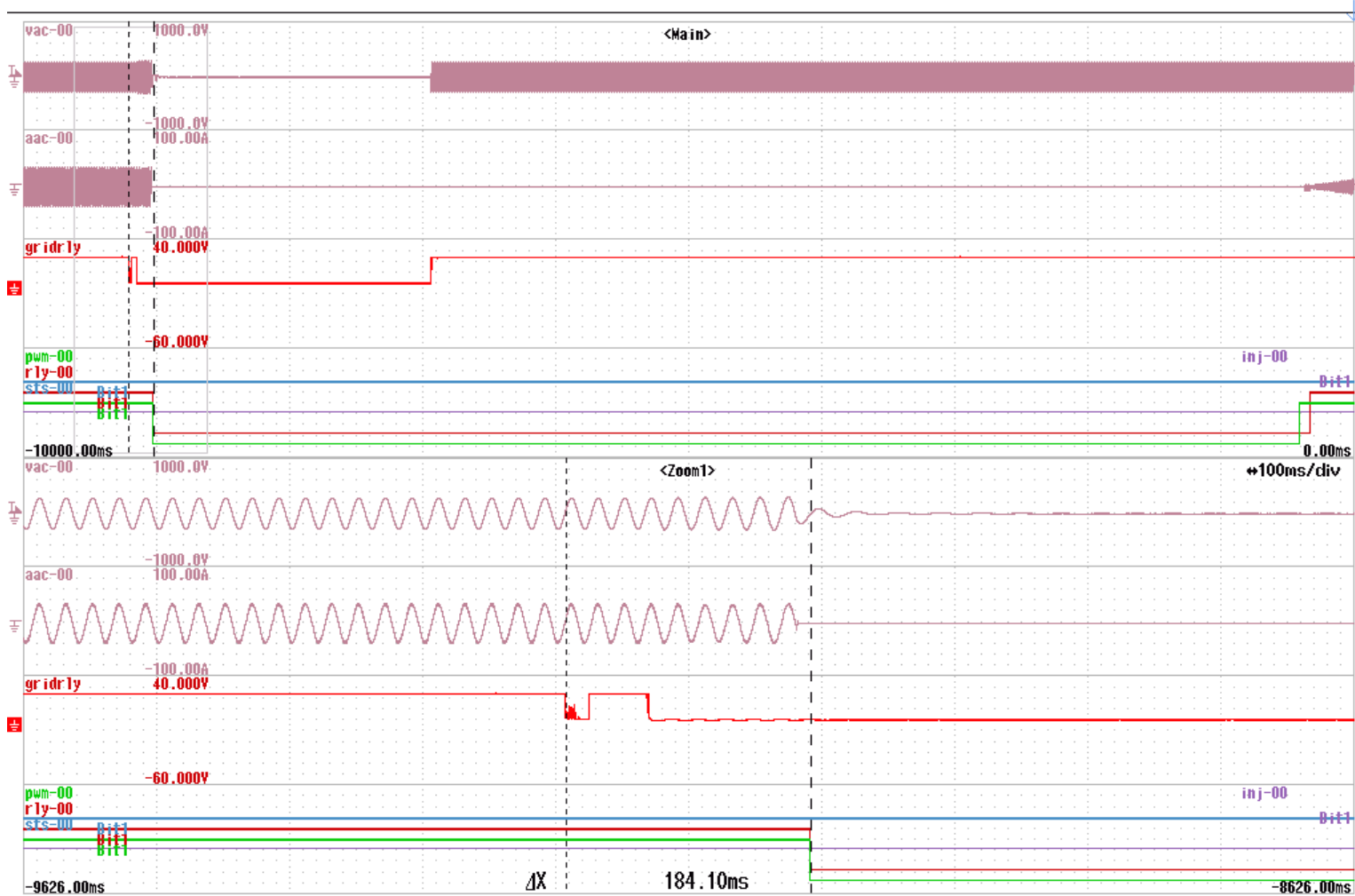


gridrly  
CH5\_2 : 10.000V/div  
Position : 1.00 div

Display Group  
1 2 3 4 P H

Zoom1:20.0k  
Main:200.0k

AcqMode : Normal  
20kS/s 1s/div  
(CH5 10kS/s)



Stopped 11  
2025/05/19 15:19:43.17416622 Auto

File Remote  
2025/05/19 15:19:50

Figure 3.2.7.12 Gate Block Time

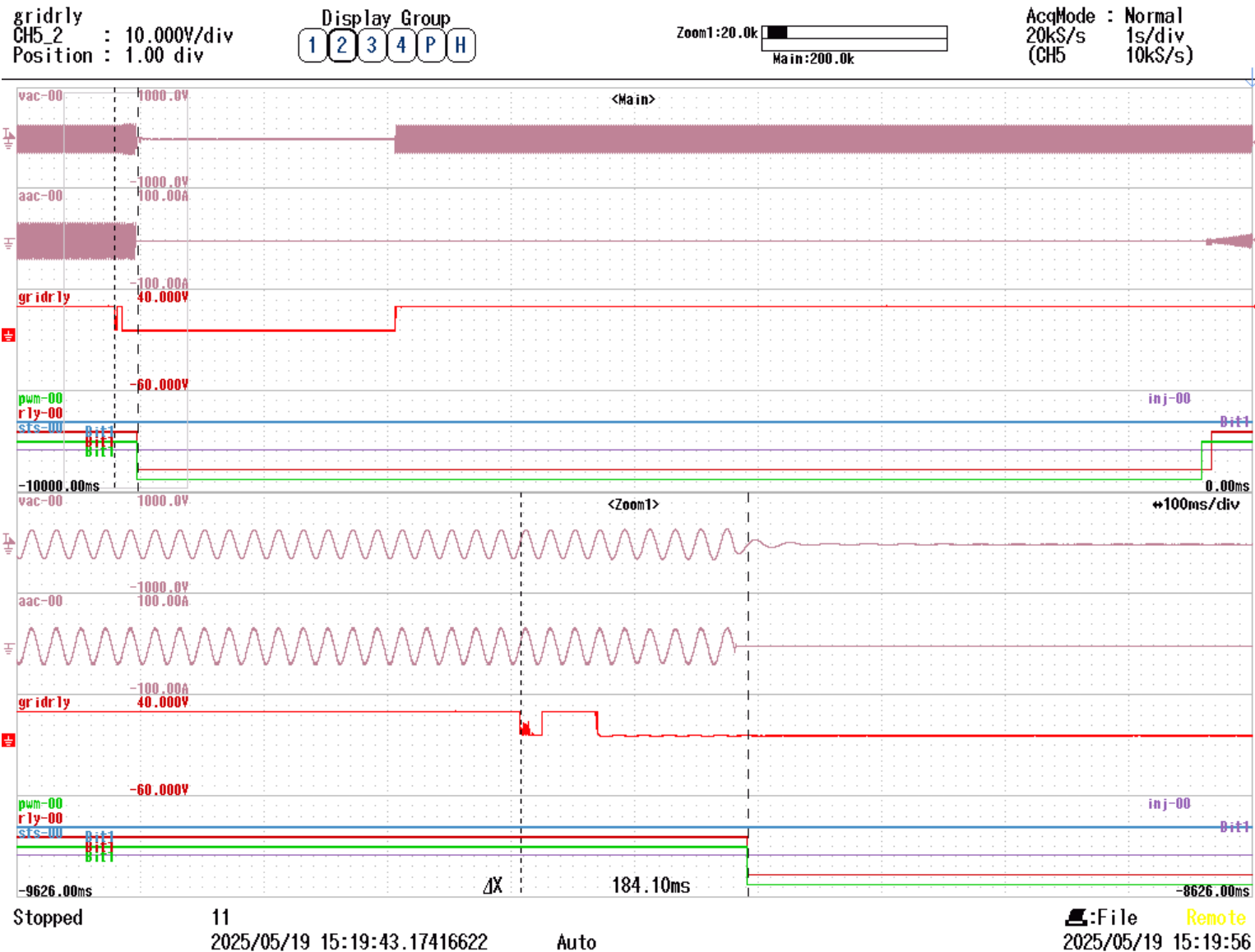


Figure 3.2.7.13 Relay Time

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	Reconnection prevention time 再並列阻止時間
Imbalanced load 不平衡負荷	Discharge 放電	Active 能動	< 0.2s	5s

Parameters 設定値					Measurement Result 測定結果			Pass / Fail 判定  1,2 <0.2s  3>5s	Remarks   備考	
Active Power(W)  有効電力		Reactive Power(Var)  無効電力		Frequency  周波数	Operation Mode  動作モード	Gate Block (s) <sup>1</sup>  GB 時限	Relay Open (s) <sup>2</sup>  Ry 解列時限			Reconnection Prevention Time (s) <sup>3</sup>  再並列阻止時間
-10%	-500	10%	-500	50	Discharge	0.106	0.106	6.3	PASS	
-10%	-500	5%	-250			0.120	0.120	6.3	PASS	
-10%	-500	0%	0			0.143	0.143	6.3	PASS	
-10%	-500	-5%	250			0.106	0.106	6.3	PASS	
-10%	-500	-10%	500			0.092	0.092	6.3	PASS	
-5%	-250	10%	-500			0.105	0.105	6.3	PASS	
-5%	-250	5%	-250			0.113	0.113	6.3	PASS	
-5%	-250	0%	0			0.159	0.159	6.3	PASS	Figure 3.2.7.14 & 3.2.7.15
-5%	-250	-5%	250			0.117	0.117	6.3	PASS	
-5%	-250	-10%	500			0.098	0.098	6.3	PASS	
0%	0	10%	-500			0.104	0.104	6.3	PASS	
0%	0	5%	-250			0.116	0.116	6.3	PASS	



0%	0	0%	0	50	Discharge	0.153	0.153	6.3	PASS	
0%	0	-5%	250			0.120	0.120	6.3	PASS	
0%	0	-10%	500			0.100	0.100	6.3	PASS	
5%	250	10%	-500			0.105	0.105	6.3	PASS	
5%	250	5%	-250			0.113	0.113	6.3	PASS	
5%	250	0%	0			0.148	0.148	6.3	PASS	
5%	250	-5%	250			0.124	0.124	6.3	PASS	
5%	250	-10%	500			0.104	0.104	6.3	PASS	
10%	500	10%	-500			0.101	0.101	6.3	PASS	
10%	500	5%	-250			0.122	0.122	6.3	PASS	
10%	500	0%	0			0.121	0.121	6.3	PASS	
10%	500	-5%	250			0.136	0.136	6.3	PASS	
10%	500	-10%	500			0.105	0.105	6.3	PASS	

**Scope Channel Description (-0\*suffix indicates unit number e.g. '-00', -01', -02', -03'):**

Vac-0\*: Line-Line Voltage  
 aac-0\*: Phase A Current  
 gridrly: SWcb State (Grid Contactor)  
 pwm-0\*: Power Conditioner Gate Signal  
 rly-0\* : Power Conditioner Output Relay  
 sts-0\* : Power Conditioner Active Function Status Signal (Operational – HIGH, Standby – LOW)  
 inj-0\* : Power Conditioner Step Injection Signal

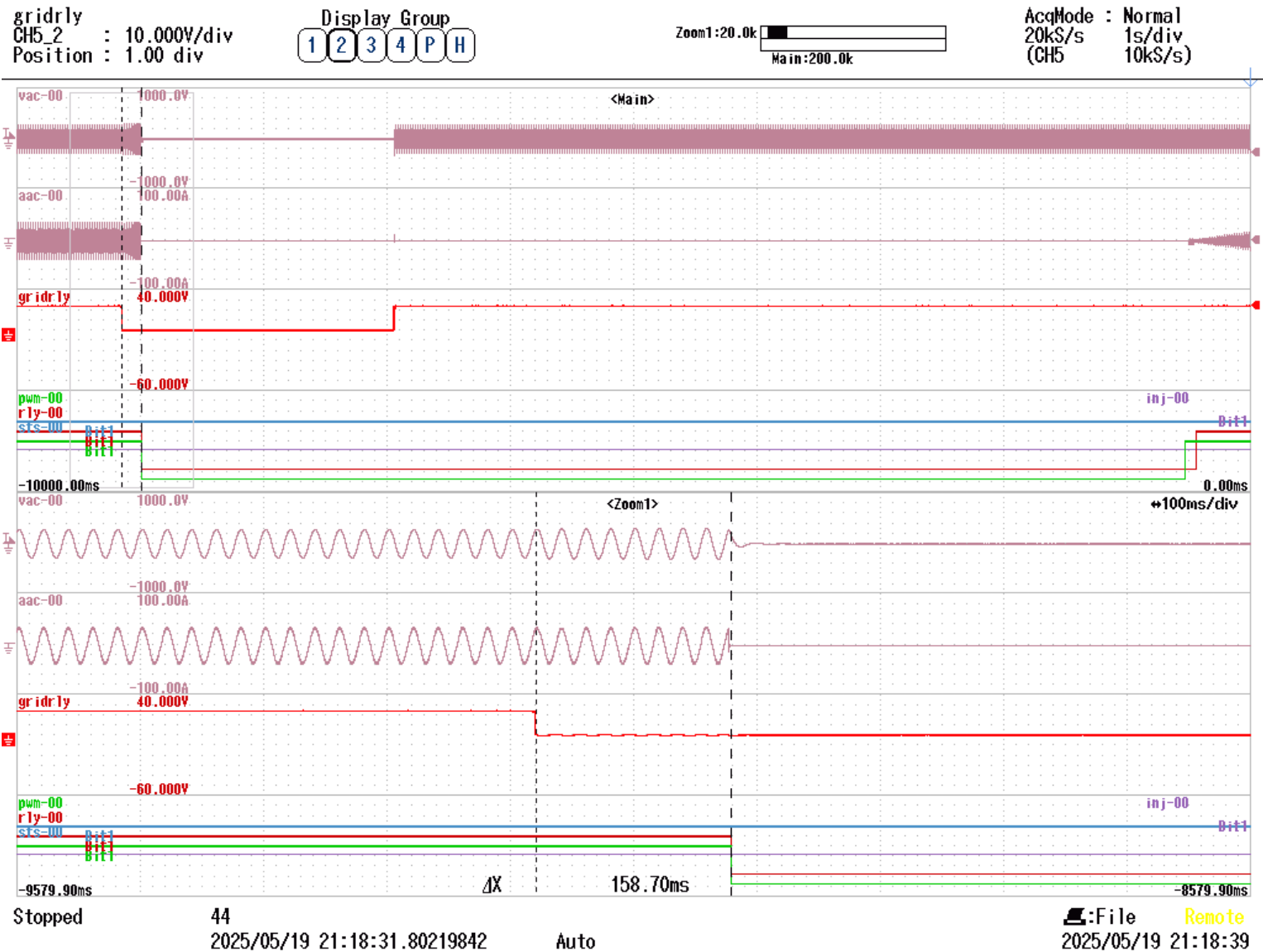
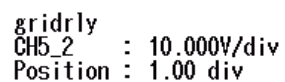


Figure 3.2.7.14 Gate Block Time

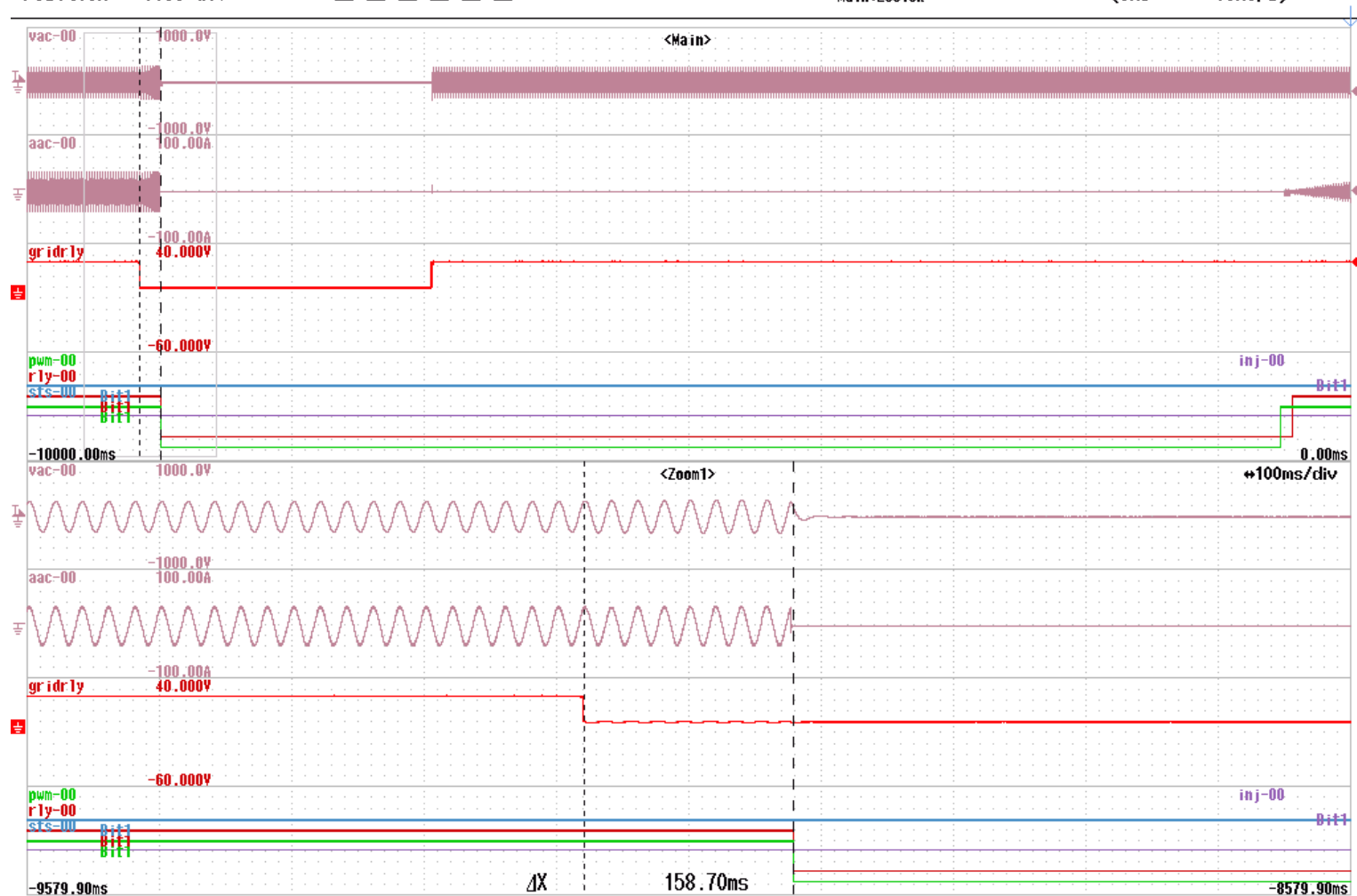


Display Group

1	2	3	4	P	H
---	---	---	---	---	---

Zoom1:20.0k  
Main:200.0k

AcqMode : Normal  
20kS/s 1s/div  
(CH5 10kS/s)



Stopped

44

2025/05/19 21:18:31.80219842

Auto

File Remote

2025/05/19 21:18:44

### Figure 3.2.7.15 Relay Time

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	Reconnecion prevention time 再並列阻止時間
Imbalanced load 不平衡負荷	Discharge 放電	Passive + Active 受動 + 能動	< 0.2s	5s

Parameters						Measurement Result			Pass / Fail 判定	Remarks
設定値						測定結果			1,2 <0.2s 3>5s	備考
Active Power(W) 有効電力		Reactive Power(Var) 無効電力		Frequency 周波数	Operation Mode 動作モード	Gate Block (s) <sup>1</sup> GB 時限	Relay Open (s) <sup>2</sup> Ry 解列時限	Reconnection Prevention Time (s) <sup>3</sup> 再並列阻止時間		
-10%	-500	10%	-500	50	Discharge	0.104	0.104	6.3	PASS	
-10%	-500	5%	-250			0.134	0.134	6.3	PASS	
-10%	-500	0%	0			0.145	0.145	6.3	PASS	
-10%	-500	-5%	250			0.102	0.102	6.3	PASS	
-10%	-500	-10%	500			0.101	0.101	6.3	PASS	
-5%	-250	10%	-500			0.098	0.098	6.3	PASS	
-5%	-250	5%	-250			0.119	0.119	6.3	PASS	
-5%	-250	0%	0			0.143	0.143	6.3	PASS	
-5%	-250	-5%	250			0.116	0.116	6.3	PASS	
-5%	-250	-10%	500			0.101	0.101	6.3	PASS	
0%	0	10%	-500			0.104	0.104	6.3	PASS	
0%	0	5%	-250			0.120	0.120	6.3	PASS	

0%	0	0%	0	50	Discharge	0.150	0.150	6.3	PASS	Figure 3.2.7.16 & 3.2.7.17
0%	0	-5%	250			0.116	0.116	6.3	PASS	
0%	0	-10%	500			0.101	0.101	6.3	PASS	
5%	250	10%	-500			0.100	0.100	6.3	PASS	
5%	250	5%	-250			0.117	0.117	6.3	PASS	
5%	250	0%	0			0.145	0.145	6.3	PASS	
5%	250	-5%	250			0.130	0.130	6.3	PASS	
5%	250	-10%	500			0.103	0.103	6.3	PASS	
10%	500	10%	-500			0.102	0.102	6.3	PASS	
10%	500	5%	-250			0.108	0.108	6.3	PASS	
10%	500	0%	0			0.149	0.149	6.3	PASS	
10%	500	-5%	250			0.141	0.141	6.3	PASS	
10%	500	-10%	500			0.105	0.105	6.3	PASS	

**Scope Channel Description (-0\*suffix indicates unit number e.g. '-00', -01', -02', -03'):**

Vac-0\*: Line-Line Voltage  
 aac-0\*: Phase A Current  
 gridrly: SWcb State (Grid Contactor)  
 pwm-0\*: Power Conditioner Gate Signal  
 rly-0\*: Power Conditioner Output Relay  
 sts-0\*: Power Conditioner Active Function Status Signal (Operational – HIGH, Standby – LOW)  
 inj-0\*: Power Conditioner Step Injection Signal



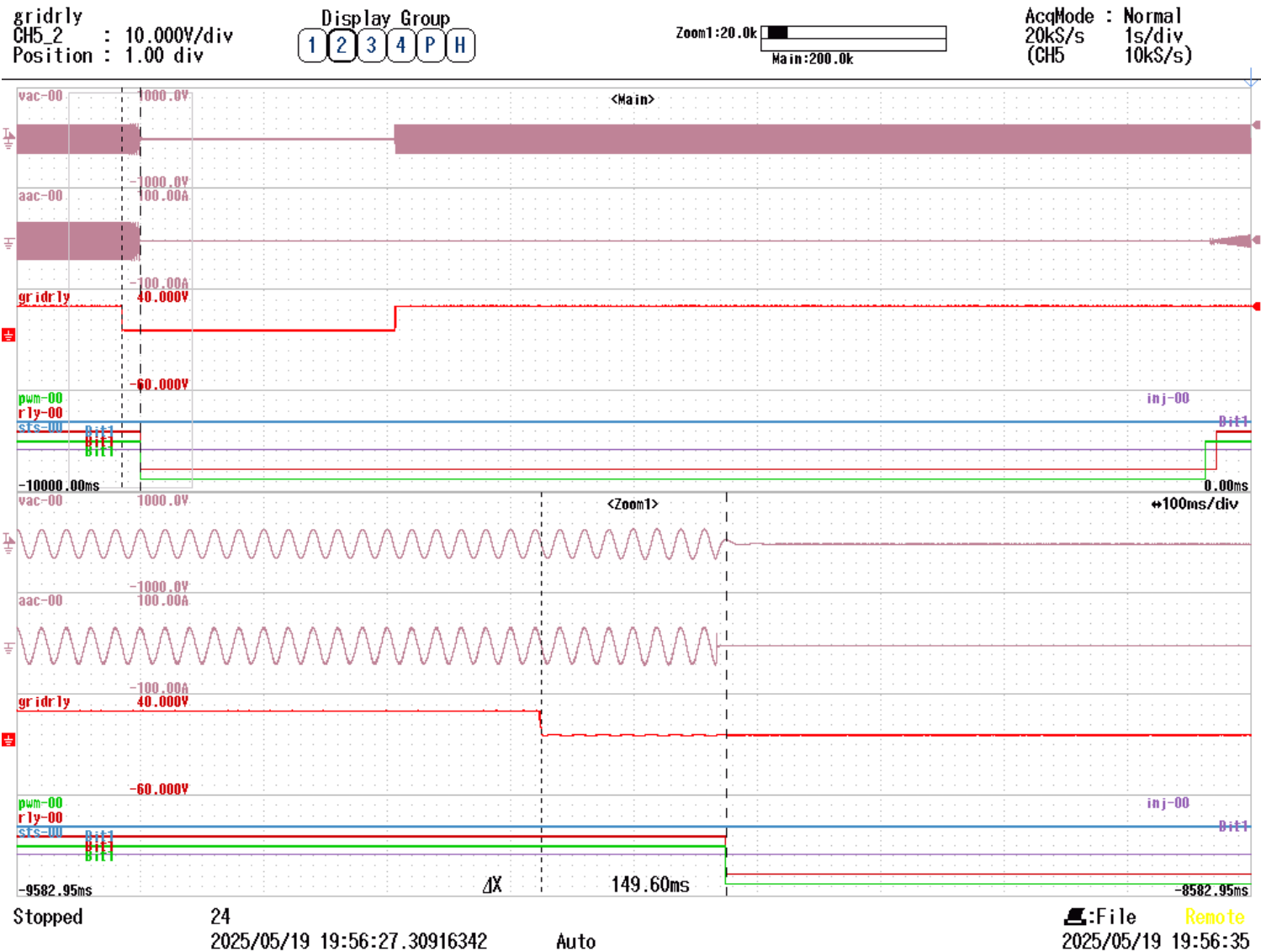


Figure 3.2.7.16 Gate Block Time

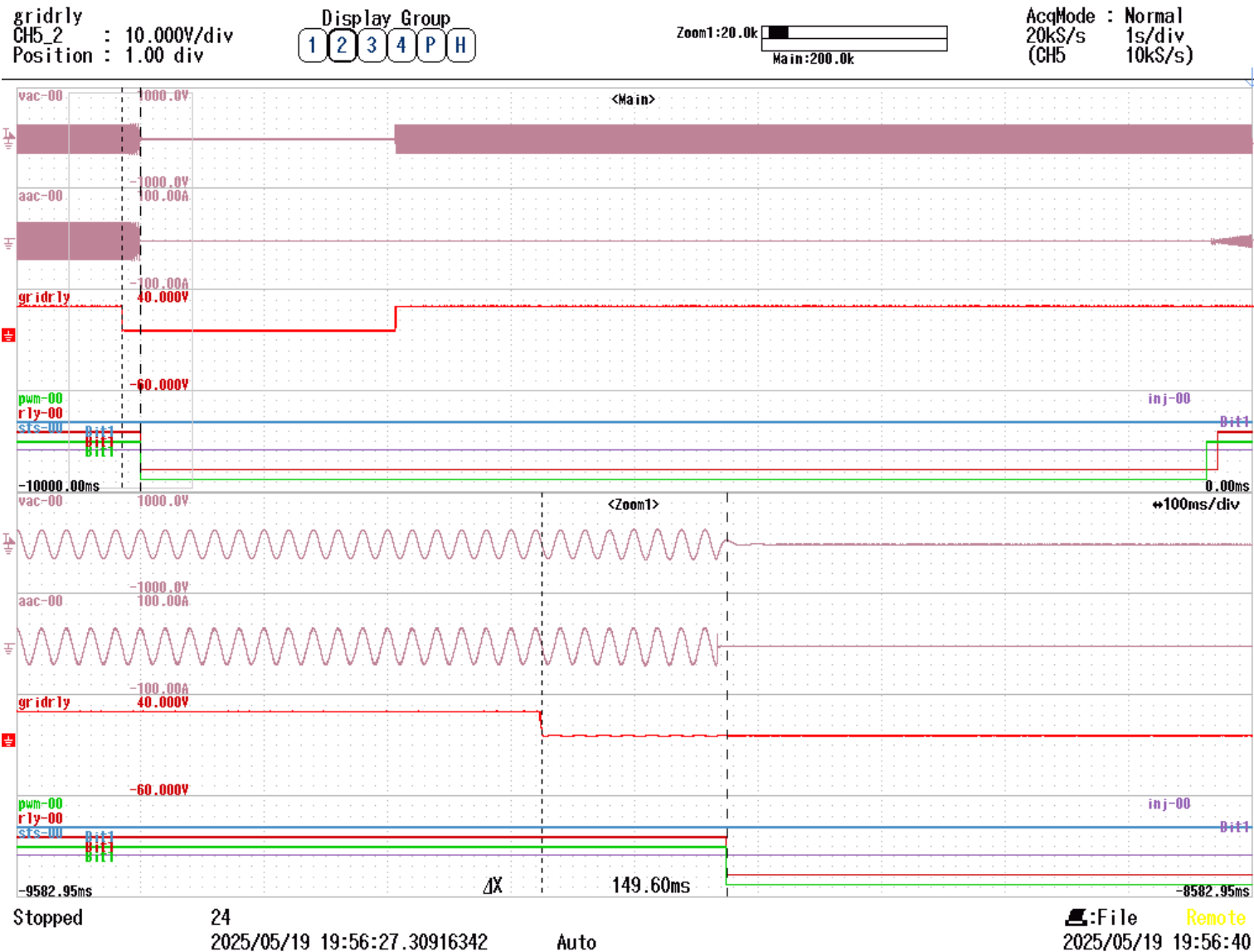


Figure 3.2.7.17 Relay Time

### 3.2.7.2 Anti-Islanding Operation Prevention Test after Instantaneous Voltage Drop

#### Detection 瞬時電圧低下検出後の単独運転防止試験

Output Power: 5.0 kW

Criteria イ 判定基準イ（単独運転検出が可能なインピーダンスによる試験）

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	Gate Block Time GB 検出時限	Relay Open Time Ry 解列時限
Imbalanced load 不平衡負荷	Discharge 放電	Passive + Active 受動 + 能動	< 0.2s	< 0.3s

Parameters 設定値					Measurement Result 測定結果		Pass / Fail 判定  <sup>1</sup> <0.2s <sup>2</sup> <0.3s	Remarks  備考	
Active Power(W)  有効電力		Reactive Power(Var)  無効電力		Frequency  周波数	Operation Mode  動作モード	Gate Block (s) <sup>1</sup>  GB 時限			Relay Open (s) <sup>2</sup>  Ry 解列時限
-10%	-500	10%	-500	50	Discharge	0.105	0.105	PASS	
-10%	-500	5%	-250			0.087	0.087	PASS	
-10%	-500	0%	0			0.085	0.085	PASS	
-10%	-500	-5%	250			0.084	0.084	PASS	
-10%	-500	-10%	500			0.083	0.083	PASS	
-5%	-250	10%	-500			0.166	0.166	PASS	
-5%	-250	5%	-250			0.090	0.090	PASS	
-5%	-250	0%	0			0.115	0.115	PASS	

-5%	-250	-5%	250	50	Discharge	0.075	0.075	PASS	
-5%	-250	-10%	500			0.077	0.077	PASS	
0%	0	10%	-500			0.103	0.103	PASS	
0%	0	5%	-250			0.191	0.191	PASS	Figure 3.2.7.18 & 3.2.7.19
0%	0	0%	0			0.080	0.080	PASS	
0%	0	-5%	250			0.075	0.075	PASS	
0%	0	-10%	500			0.088	0.088	PASS	
5%	250	10%	-500			0.121	0.121	PASS	
5%	250	5%	-250			0.132	0.132	PASS	
5%	250	0%	0			0.103	0.103	PASS	
5%	250	-5%	250			0.107	0.107	PASS	
5%	250	-10%	500			0.094	0.094	PASS	
10%	500	10%	-500			0.134	0.134	PASS	
10%	500	5%	-250			0.140	0.140	PASS	
10%	500	0%	0			0.183	0.183	PASS	
10%	500	-5%	250			0.076	0.076	PASS	
10%	500	-10%	500			0.118	0.118	PASS	



**Scope Channel Description (-0\*suffix indicates unit number e.g. '-00', -01', -02', -03'):**

Vac-0*:	Line-Line Voltage
aac-0*:	Phase A Current
gridrly:	SWcb State (Grid Contactor)
pwm-0*:	Power Conditioner Gate Signal
rly-0* :	Power Conditioner Output Relay
sts-0* :	Power Conditioner Active Function Status Signal (Operational – HIGH, Standby – LOW)
inj-0* :	Power Conditioner Step Injection Signal



gridrly  
CH5\_2 : 10.000V/div  
Position : 1.00 div

Display Group  
1 2 3 4 P H

Zoom1:20.0k  
Main:200.0k

AcqMode : Normal  
20kS/s 1s/div  
(CH5 10kS/s)

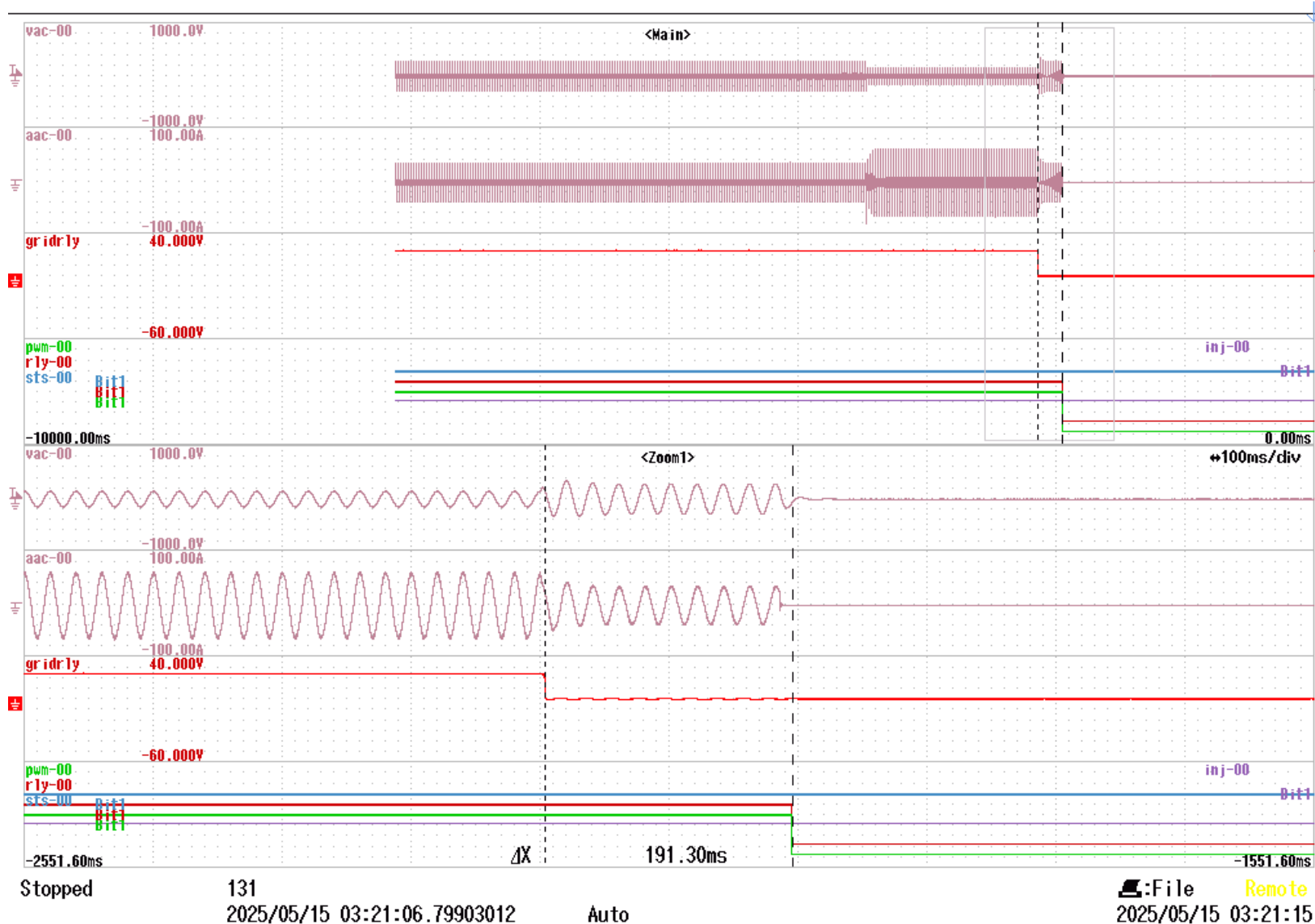


Figure 3.2.7.18 Gate Block Time



gridrly  
CH5\_2 : 10.000V/div  
Position : 1.00 div

Display Group  
1 2 3 4 P H

Zoom1:20.0k  
Main:200.0k

AcqMode : Normal  
20kS/s 1s/div  
(CH5 10kS/s)

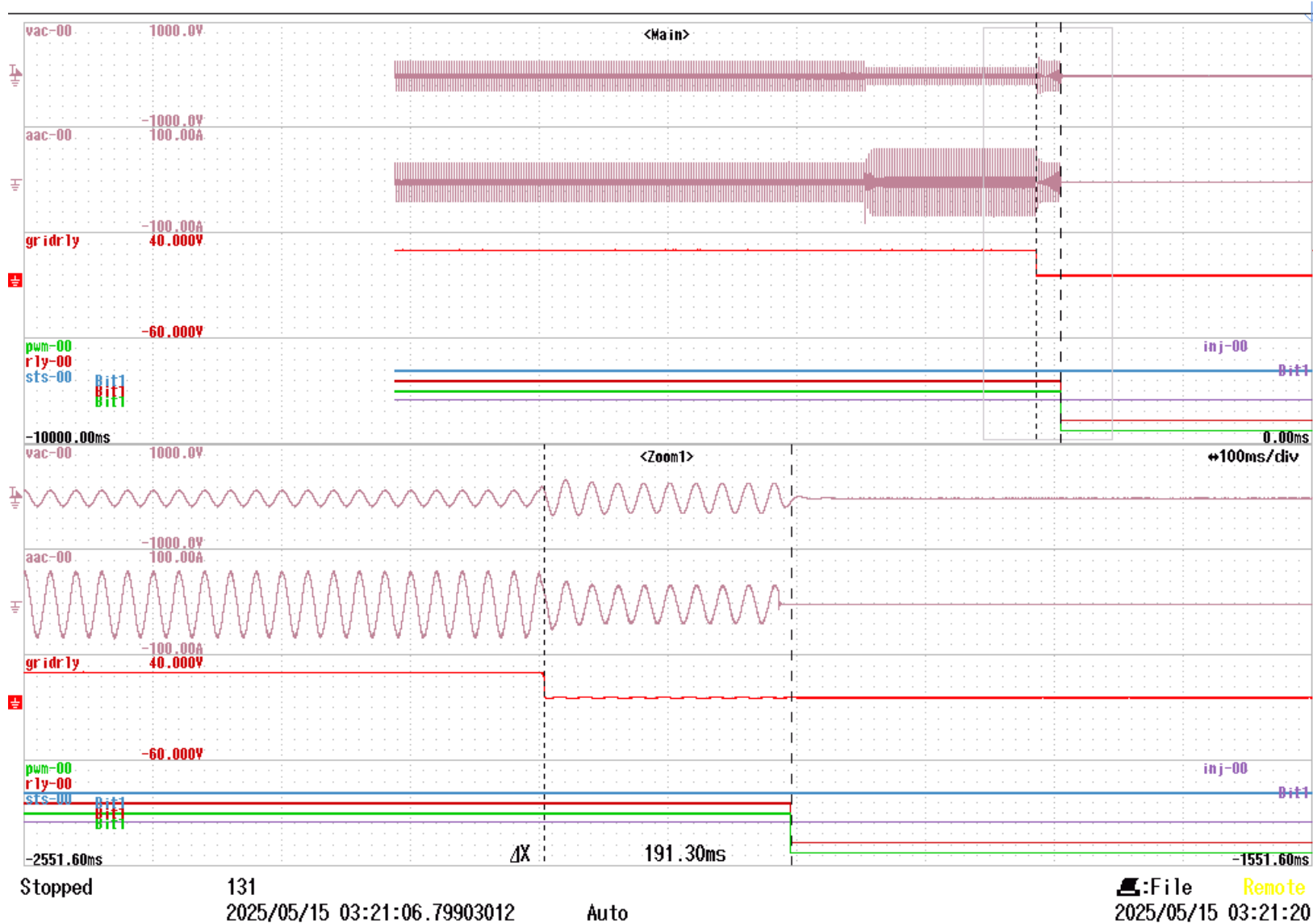


Figure 3.2.7.19 Relay Time

## Criteria □ 判定基準□（瞬時電圧低下検出後の無負荷による試験）

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	Gate Block Time GB 検出時限	Relay Open Time Ry 解列時限
No load 無負荷	Discharge 放電	Passive + Active 受動 + 能動	< 0.2s	< 1s

Parameters 設定値				Measurement Result 測定結果		Pass / Fail 判定	Remarks 備考
Active Power(W) 有効電力	Frequency 周波数	Operation Mode 動作モード	Gate Block (s) <sup>1</sup> GB 時限	Relay Open (s) <sup>2</sup> Ry 解列時限			
100%	5000	50	Discharge	0.096	0.096	PASS	Figure 3.2.7.20

## Scope Channel Description (-0\*suffix indicates unit number e.g. '-00', '-01', '-02', '-03'):

Vac-0*:	Line-Line Voltage
aac-0*:	Phase A Current
gridrly:	SWcb State (Grid Contactor)
pwm-0*:	Power Conditioner Gate Signal
rly-0*:	Power Conditioner Output Relay
sts-0*:	Power Conditioner Active Function Status Signal (Operational – HIGH, Standby – LOW)
inj-0*:	Power Conditioner Step Injection Signal





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### 3.2.8.1 Anti-Islanding Operation Prevention Test in Multiple-unit interconnection 多数台連系 での単独運転防止試験

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
Balanced load 並行負荷（回転機負荷）	Discharge 放電	Active 能動	< 0.2s

	Average Cut off Time(s) 解列までの平均時間	Pass / Fail 判定			Remarks 備考
		Criteria イ Max Ave– Min Ave < 0.02s	Criteria ロ Ave of n >= Ave of n+1	Criteria ハ Cut Off time < 0.2s	
2 Inveters	0.180	Pass (0.015s)	Pass	Pass	
3 Inveters	0.173				
4 Inveters	0.165				

**Scope Channel Description (-0\*suffix indicates unit number e.g. '-00', -01', -02', -03'):**

Vac-0\*: Line-Line Voltage  
 aac-0\*: Phase A Current  
 gridrly: SWcb State (Grid Contactor)  
 pwm-0\*: Power Conditioner Gate Signal  
 rly-0\*: Power Conditioner Output Relay  
 sts-0\*: Power Conditioner Active Function Status Signal (Operational – HIGH, Standby – LOW)  
 inj-0\*: Power Conditioner Step Injection Signal

2 inverters (1 reversed phase)

No.	Max Gate Block (s) GB 時限	Max Relay Open (s) Ry 解列時限	Average (s) 平均值	Remarks 備考
1	0.180	0.180	0.180	
2	0.185	0.185		
3	0.180	0.180		
4	0.177	0.177		
5	0.176	0.176		
6	0.175	0.175		
7	0.177	0.177		
8	0.188	0.188		
9	0.182	0.182		
10	0.181	0.181		
11	0.178	0.178		
12	0.174	0.174		
13	0.191	0.191		
14	0.178	0.178		
15	0.179	0.179		Figure 3.2.8.4 & 3.2.8.5

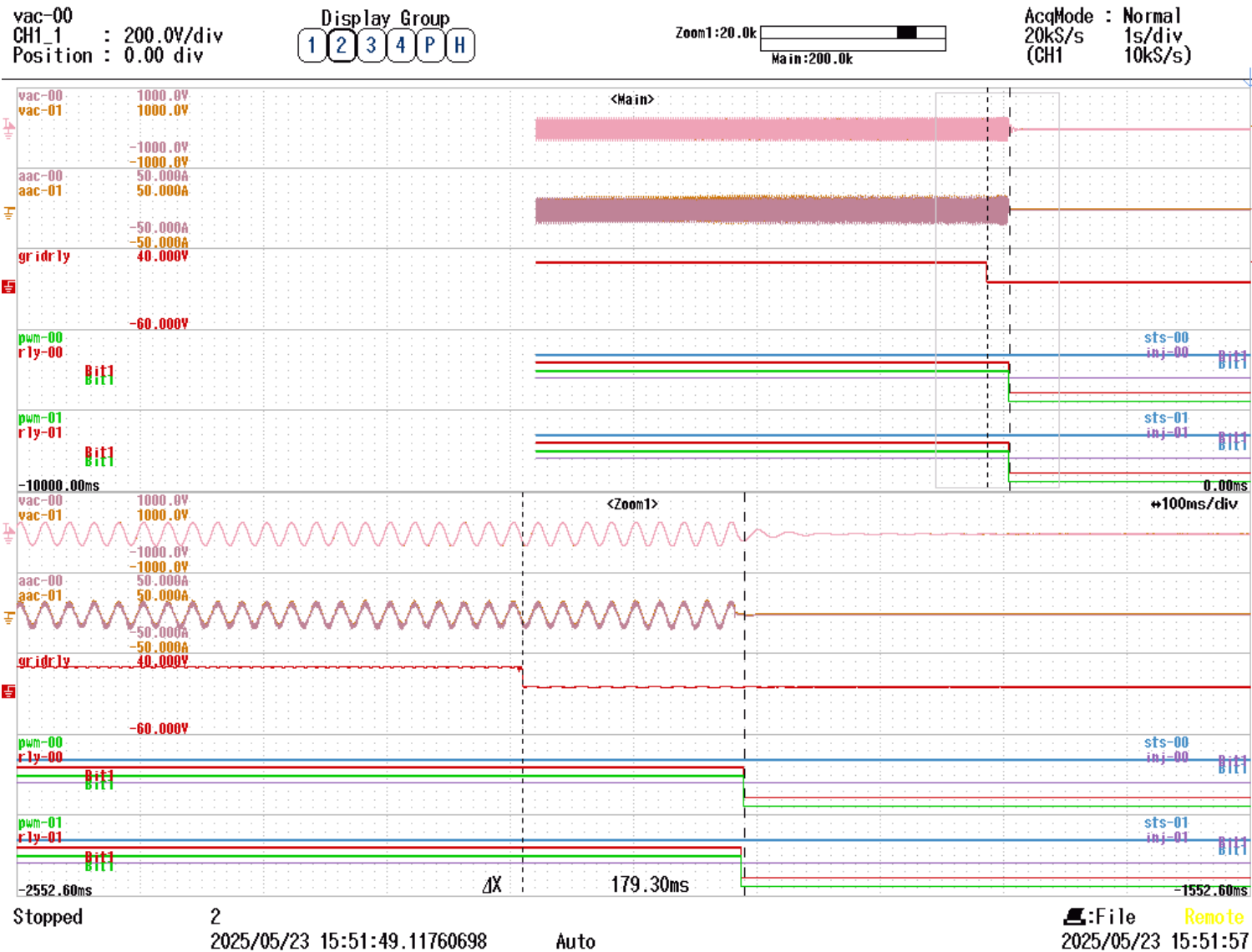


Figure 3.2.8.4 Gate Block Time

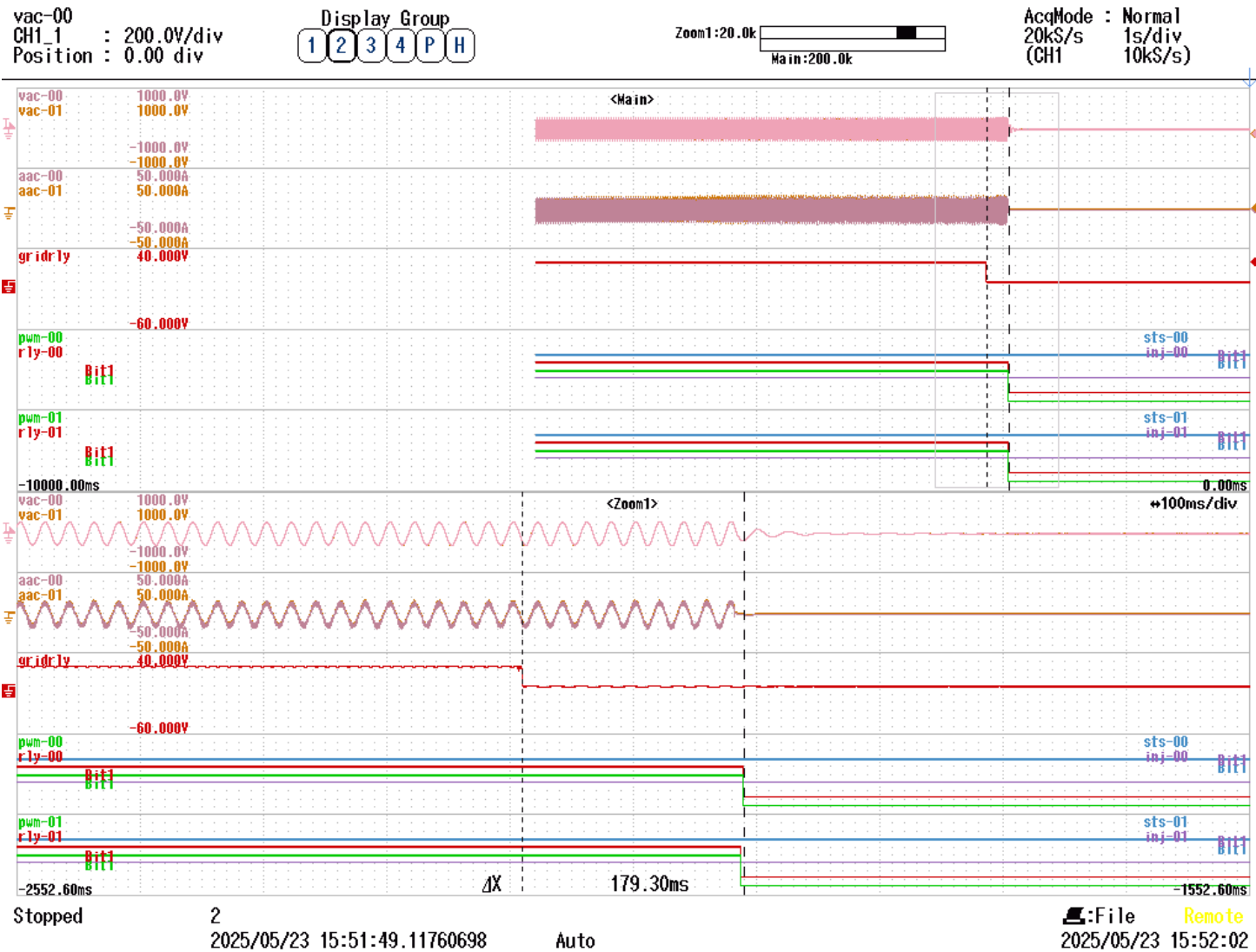


Figure 3.2.8.5 Relay Time

3 inverters (1 reversed phase)

No.	Max Gate Block (s) GB 時限	Max Relay Open (s) Ry 解列時限	Average (s) 平均值	Remarks 備考
1	0.172	0.172	0.173	Figure 3.2.8.6 & 3.2.8.7
2	0.170	0.170		
3	0.171	0.171		
4	0.178	0.178		
5	0.177	0.177		
6	0.170	0.170		
7	0.167	0.167		
8	0.176	0.176		
9	0.174	0.174		
10	0.169	0.169		
11	0.172	0.172		
12	0.171	0.171		
13	0.171	0.171		
14	0.177	0.177		
15	0.181	0.181		

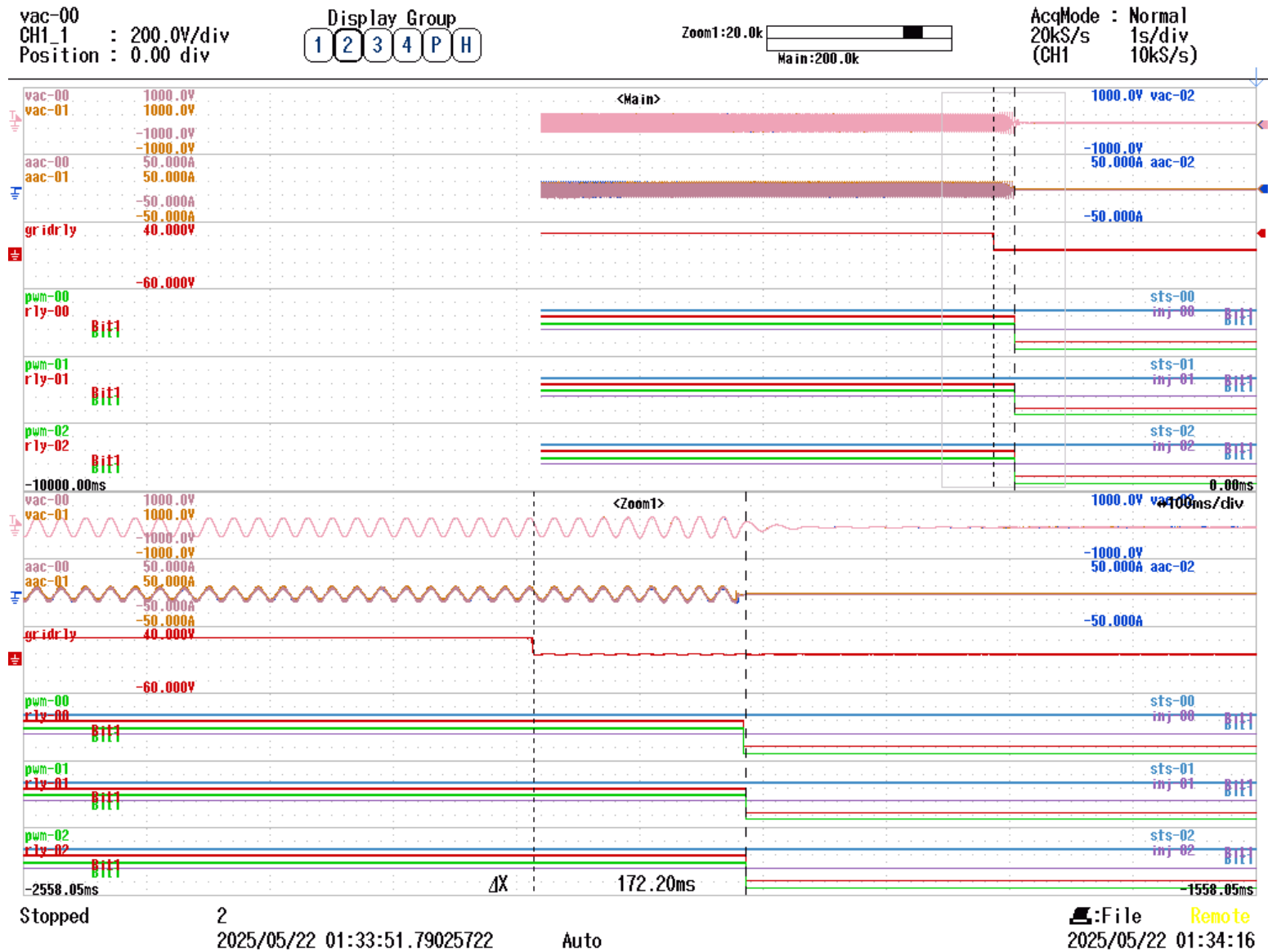


Figure 3.2.8.6 Gate Block Time

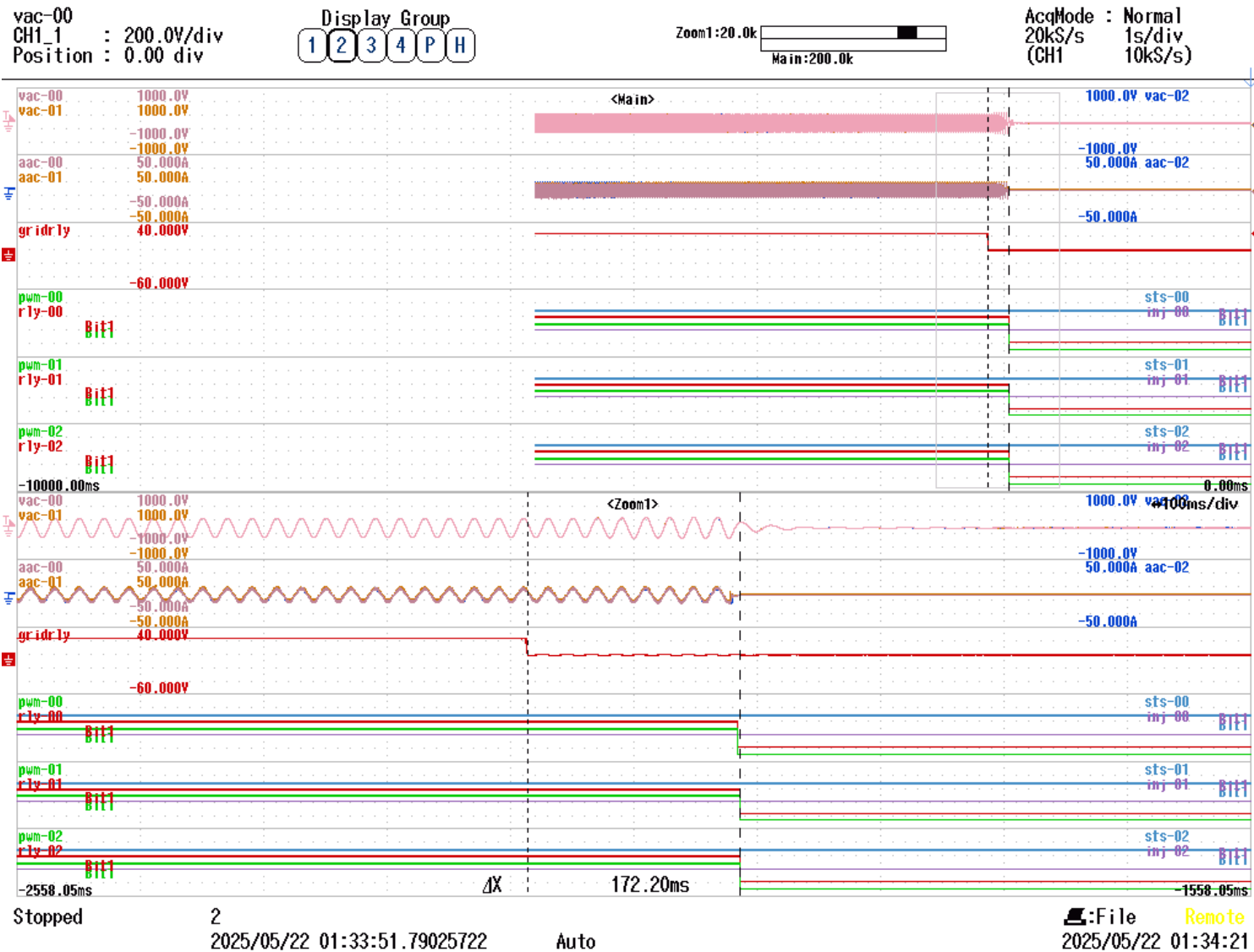


Figure 3.2.8.7 Relay Time



4 inverters (2 reversed phase)

No.	Max Gate Block (s) GB 時限	Max Relay Open (s) Ry 解列時限	Average (s) 平均值	Remarks 備考
1	0.167	0.167	0.165	
2	0.167	0.167		
3	0.162	0.162		
4	0.167	0.167		
5	0.165	0.165		
6	0.162	0.162		
7	0.165	0.165		Figure 3.2.8.8 & 3.2.8.9
8	0.167	0.167		
9	0.160	0.160		
10	0.162	0.162		
11	0.167	0.167		
12	0.164	0.164		
13	0.169	0.169		
14	0.168	0.168		
15	0.168	0.168		

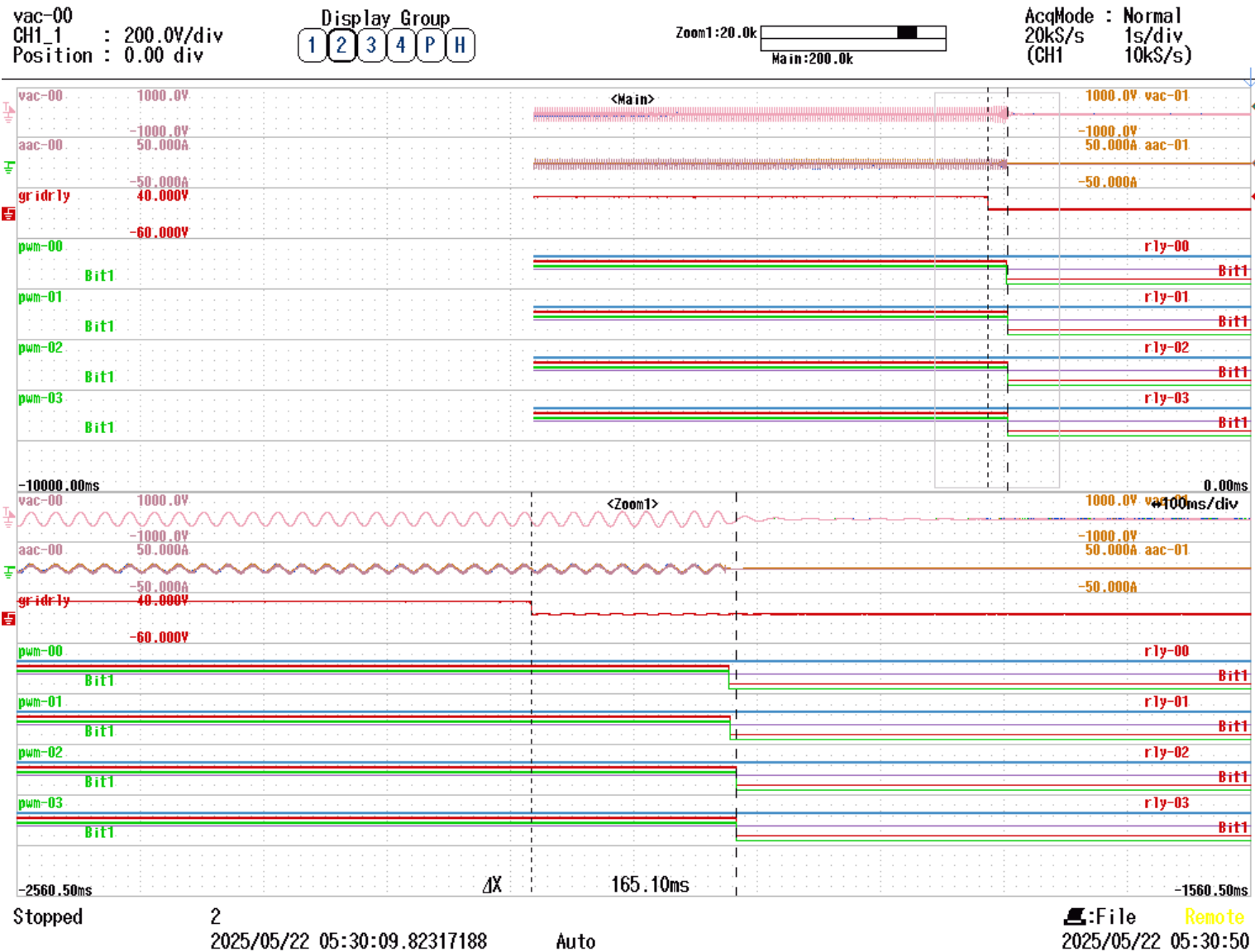


Figure 3.2.8.8 Gate Block Time

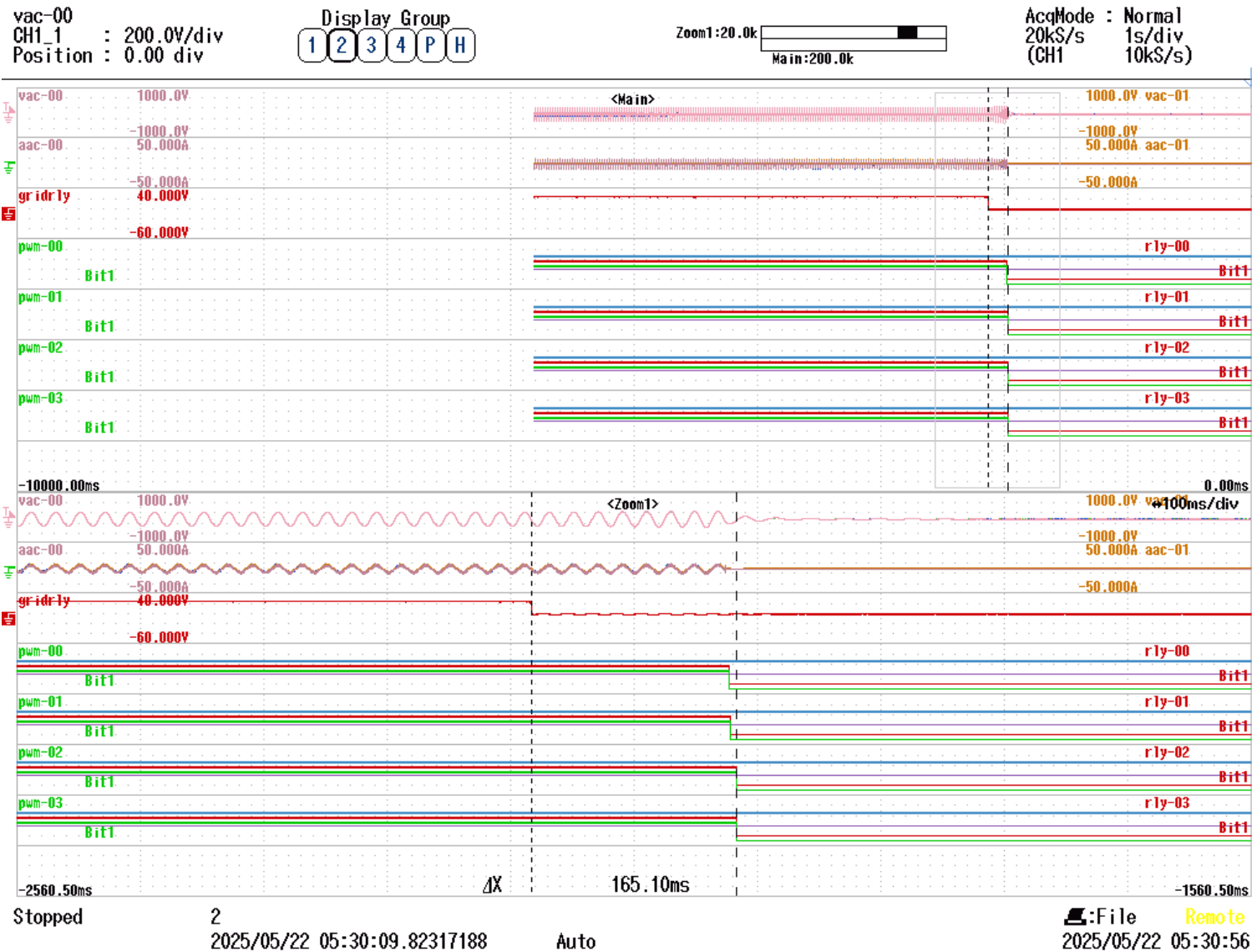


Figure 3.2.8.9 Relay Time

### 3.2.8.2 Anti-Islanding Operation Prevention Test in Active Function Standby State

#### 能動機能待機状態での単独運転防止試験

本試験は、【多数台連系 FRT 対応型】の場合に実施する。

3.2.8.1 の試験を「能動機能有効状態」で実施したため、本試験を行う。

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
Balanced load 並行負荷（回転機負荷）	Discharge 放電	Active 能動	< 0.2s

4 inverters (2 reversed phase)

No.	Max Gate Block (s) GB 時限	Max Relay Open (s) Ry 解列時限	Pass / Fail 判定 <0.2s	Remarks 備考
1	0.161	0.161	Pass	
2	0.160	0.160	Pass	
3	0.160	0.160	Pass	
4	0.150	0.150	Pass	
5	0.148	0.148	Pass	Figure 3.2.8.10 & 3.2.8.11
6	0.152	0.152	Pass	
7	0.142	0.142	Pass	
8	0.140	0.140	Pass	
9	0.144	0.144	Pass	
10	0.143	0.143	Pass	
11	0.140	0.140	Pass	
12	0.143	0.143	Pass	
13	0.144	0.144	Pass	
14	0.145	0.145	Pass	
15	0.152	0.152	Pass	



**Scope Channel Description (-0\*suffix indicates unit number e.g. '-00', -01', -02', -03'):**

Vac-0*:	Line-Line Voltage
aac-0*:	Phase A Current
gridrly:	SWcb State (Grid Contactor)
pwm-0*:	Power Conditioner Gate Signal
rly-0* :	Power Conditioner Output Relay
sts-0* :	Power Conditioner Active Function Status Signal (Operational – HIGH, Standby – LOW)
inj-0* :	Power Conditioner Step Injection Signal

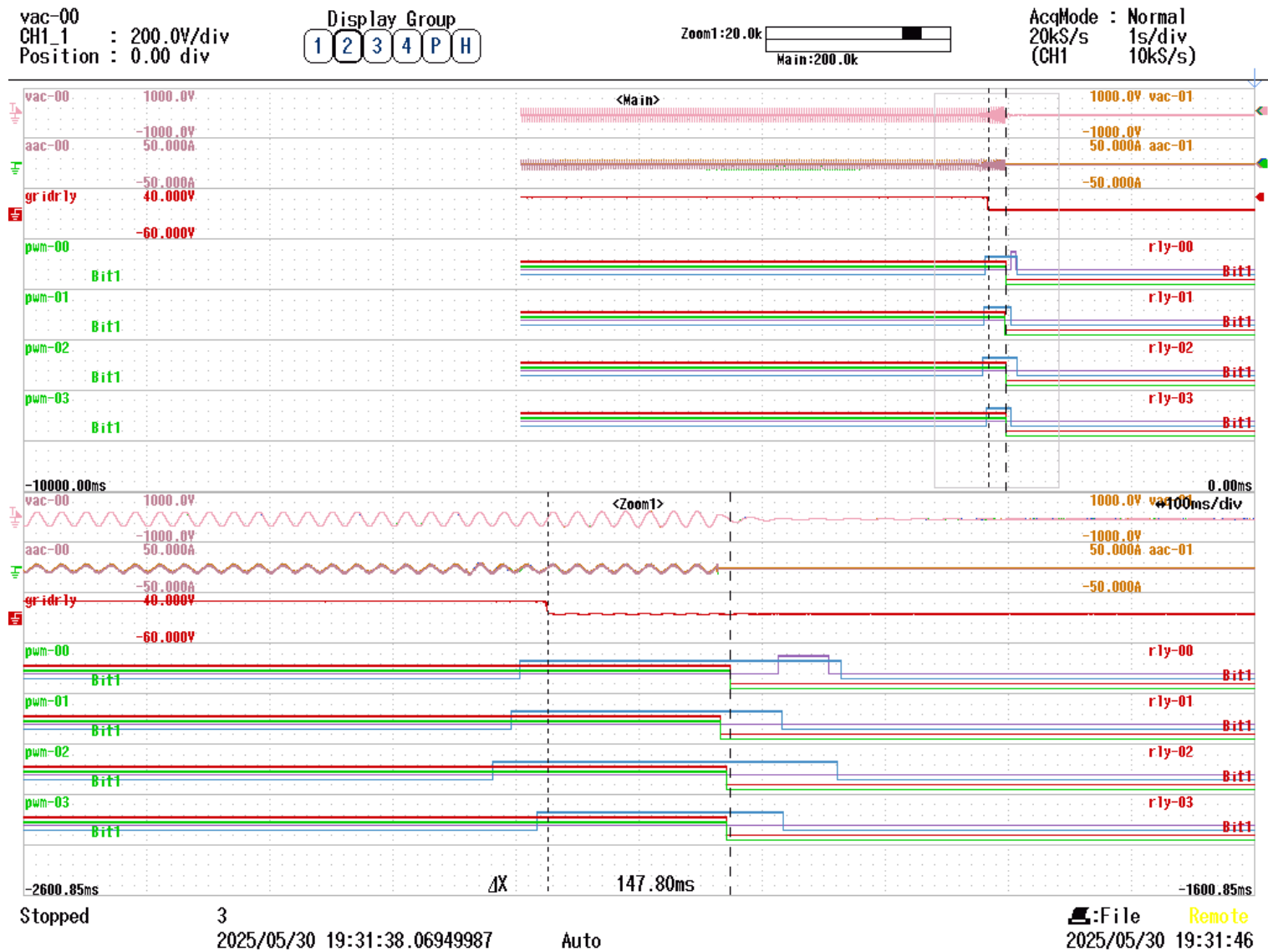


Figure 3.2.8.10 Gate Block Time

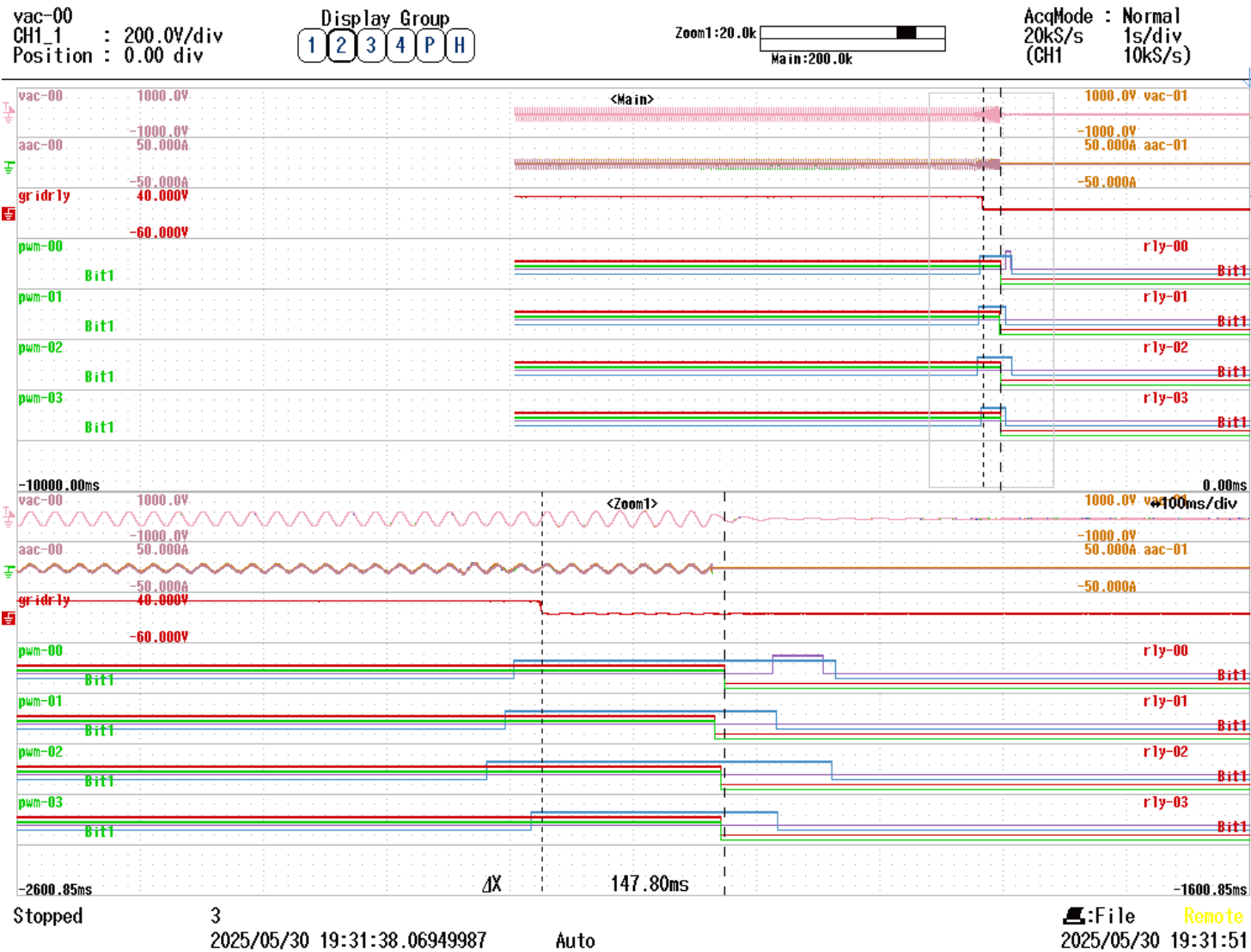


Figure 3.2.8.11 Relay Time



### 3.2.11.1 State Transition Verification Test from Active Function Standby State to Active Function Enabled State 能動機能待機状態から能動機能有効状態への状態遷移確認試験

本試験は、【多数台連系 FRT 対応型】の場合に実施する。

Criteria イ 判定基準イ（測定方法口項の際は、能動機能待機状態から能動機能有効状態に移行すること）

	Voltage 電圧(V)	Current 電流 (A)	Active Power 有効電力(W)	Frequency 周波数(Hz)	Harmonic Voltage Step 高調波電圧 ステップ (V)	Active state 能動状態	Pass / Fail 判定 state change to operational	Remarks 備考
2nd order	202.264	24.342	4916.599	50.002	0.037	Standby	-	
	202.251	24.347	4915.964	50.002	2.284	Operational	Pass	
3rd order	202.266	24.344	4916.880	50.002	1.021	Standby	-	
	202.255	24.371	4914.653	50.002	3.219	Operational	Pass	
4th order	202.272	24.339	4916.203	50.002	0.015	Standby	-	
	202.255	24.344	4914.596	50.002	2.261	Operational	Pass	
5th order	202.276	24.331	4914.760	50.002	0.827	Standby	-	
	202.260	24.351	4912.741	50.002	3.060	Operational	Pass	
6th order	202.254	24.332	4914.458	50.002	0.018	Standby	-	
	202.244	24.339	4913.021	50.002	2.280	Operational	Pass	
7th order	202.289	24.329	4914.544	50.002	0.623	Standby	-	
	202.263	24.344	4912.472	50.002	2.889	Operational	Pass	
THD	202.261	24.330	4913.924	50.002	1.452	Standby	-	
	202.235	24.353	4911.568	50.002	3.694	Operational	Pass	

Criteria □ 判定基準□（測定方法二項の際は、能動機能待機状態から能動機能有効状態に移行しないこと）

	Voltage 電圧(V)	Current 電流 (A)	Active Power 有効電力(W)	Frequency 周波数(Hz)	Harmonic Voltage Step 高調波電圧 ステップ (V)	Active state 能動状態	Pass / Fail 判定 no state change	Remarks 備考
2nd order	202.240	24.345	4916.739	50.002	0.042	Standby	-	
	202.232	24.349	4916.338	50.002	1.901	Standby	Pass	
3rd order	202.230	24.345	4916.237	50.002	1.026	Standby	-	
	202.221	24.365	4914.243	50.002	2.842	Standby	Pass	
4th order	202.225	24.341	4915.418	50.002	0.022	Standby	-	
	202.217	24.347	4914.950	50.002	1.892	Standby	Pass	
5th order	202.223	24.338	4914.878	50.002	0.017	Standby	-	
	202.222	24.343	4914.033	50.002	1.875	Standby	Pass	
6th order	202.223	24.338	4914.878	50.002	0.017	Standby	-	
	202.222	24.343	4914.033	50.002	1.875	Standby	Pass	
7th order	202.262	24.340	4916.121	50.002	0.628	Standby	-	
	202.246	24.350	4914.712	50.002	2.470	Standby	Pass	
THD	202.263	24.343	4916.894	50.002	1.464	Standby	-	
	202.249	24.360	4914.505	50.002	3.308	Standby	Pass	

### 3.2.11.2 State Transition Verification Test from Active Function Enabled State to Active Function Standby State 能動機能有効状態から能動機能待機状態への状態遷移確認試験

本試験は、【多数台連系 FRT 対応型】の場合に実施する。

Voltage 電圧(V)	Current 電流(A)	Active Power 有効電力 (W)	Frequency 周波数 (Hz)	Active Status 能動状態	State change time 状態遷移までの時間 (s)	Pass / Fail 判定 state change to standby within 0.55±0.1s	Remarks 備考
201.046	24.489	4916.450	50.002	Opertional	-	-	
201.045	24.488	4916.270	50.022	Standby	0.553	Pass	

### 3.2.12 Reactive Power Oscillation Suppression Confirmation Test 無効電力発振抑制確認試験

本試験は、【多数台連系 FRT 対応型】の場合に実施する。

	Active Status	Pass / Fail 判定 Status changes to standby and stays for 1min 有効→待機への切替後に 1 分以上の抑制が継続	Remarks 備考
Step 1	Operational 能動状態	-	
Step 2	Standby 待機状態	Pass	



## 5. Revision History 變更履歷

Revision	Content	Date
2.0	First Issue	6/4/2025