



Tesla AC Powerwall2 ( 5.0 kVA)

連系協議用資料—代表機試験結果 (60Hz)

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 校正日	Cal Due 校正期限日
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 較正日	Cal Due 較正期限日
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	5/28/2025	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 の測定最 大値 (var)	Q injected 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	19.621	3933.954	60.002	-35.862	-	-	-	-
	200.840	19.626	3934.884	60.012	-35.754	-	-	-	Pass
	200.840	19.623	3934.320	60.003	-35.973	-	-	-	Pass
	200.841	19.624	3934.296	59.992	-36.448	-	-	-	Pass
	200.840	19.626	3934.631	60.002	-36.018	-	-	-	Pass
Gain 2 ±0.3Hz	200.857	19.637	3937.349	60.302	-15.755	-970.95	-934.93	-0.237	Pass
	200.837	19.623	3934.240	60.002	-39.494	936.98	952.73	0.242	Pass
	200.842	19.613	3932.072	59.702	-51.841	918.71	958.20	0.244	Pass
	200.838	19.629	3935.566	60.002	-15.615	-977	-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)	Q injected 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 ≤0.1pu+accuracy
2nd order	202.041	19.499	3932.746	60.002	-36.803	-	-	-	0.075	-
	202.030	19.508	3932.807	60.002	-36.694	-423.098	-386.295	-0.077	2.253	Pass
3rd order	202.039	19.501	3933.148	60.002	-36.638	-	-	-	1.247	-
	202.027	19.530	3930.686	60.002	-38.274	-420.8228	-384.185	-0.077	3.458	Pass
4th order	202.058	19.507	3934.537	60.002	-35.588	-	-	-	0.024	-
	202.039	19.513	3933.040	60.002	-35.870	-432.702	-397.114	-0.079	2.247	Pass
5th order	202.052	19.508	3934.289	60.002	-35.825	-	-	-	0.970	-
	202.039	19.528	3932.092	60.002	-37.064	-439.860	-404.034	-0.081	3.200	Pass
6th order	202.052	19.504	3933.454	60.002	-35.885	-	-	-	0.029	-
	202.032	19.512	3932.129	60.002	-36.085	-452.410	-416.526	-0.083	2.262	Pass
7th order	202.041	19.506	3933.534	60.002	-35.789	-	-	-	0.690	-
	202.025	19.520	3931.717	60.002	-36.215	-448.894	-413.105	-0.083	2.900	Pass
THD	202.035	19.510	3934.727	60.002	-35.917	-	-	-	1.726	-
	202.012	19.532	3932.085	60.002	-37.105	-437.952	-402.035	-0.080	3.924	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 measuredQ の最大測定 値(var)	Q injected Q 注入量 (var)	Injected Q Q 注入量 (pu)	Pass / Fail 判定 Standby:no Q injected Operational: Q injection ≤0.1pu+accuracy
Standby 待機状態	202.024	19.504	3933.765	60.002	-35.289	-	-	-	-
	204.814	19.245	3934.948	60.002	-35.432	N/A	N/A	N/A	Pass
Operational 有効状態	202.022	19.506	3933.788	60.002	-35.297	-	-	-	-
	204.811	19.247	3935.193	60.002	-35.827	-428.601	-392.773	-0.079	Pass



### 3.2.7.1 Anti-Islanding Operation Prevention Load Ahead 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  <sup>1,2</sup> <0.5s <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	60	Discharge	0.145	0.145	6.3	PASS	
-10%	-500	5%	-250						DEADBAND	
-10%	-500	0%	0						DEADBAND	
-10%	-500	-5%	250						DEADBAND	
-10%	-500	-10%	500			0.139	0.139	6.3	PASS	
-5%	-250	10%	-500			0.137	0.137	6.3	PASS	
-5%	-250	5%	-250						DEADBAND	
-5%	-250	0%	0						DEADBAND	
-5%	-250	-5%	250						DEADBAND	

-5%	-250	-10%	500	60	Discharge	0.143	0.143	6.3	PASS	Figure 3.2.7.4 & 3.2.7.5
0%	0	10%	-500			0.142	0.142	6.3	PASS	
0%	0	5%	-250						DEADBAND	
0%	0	0%	0						DEADBAND	
0%	0	-5%	250						DEADBAND	
0%	0	-10%	500			0.144	0.144	6.3	PASS	
5%	250	10%	-500			0.139	0.138	6.3	PASS	
5%	250	5%	-250						DEADBAND	
5%	250	0%	0						DEADBAND	
5%	250	-5%	250						DEADBAND	
5%	250	-10%	500			0.143	0.143	6.3	PASS	
10%	500	10%	-500			0.149	0.149	6.3	PASS	
10%	500	5%	-250						DEADBAND	
10%	500	0%	0						DEADBAND	
10%	500	-5%	250						DEADBAND	
10%	500	-10%	500			0.150	0.150	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)

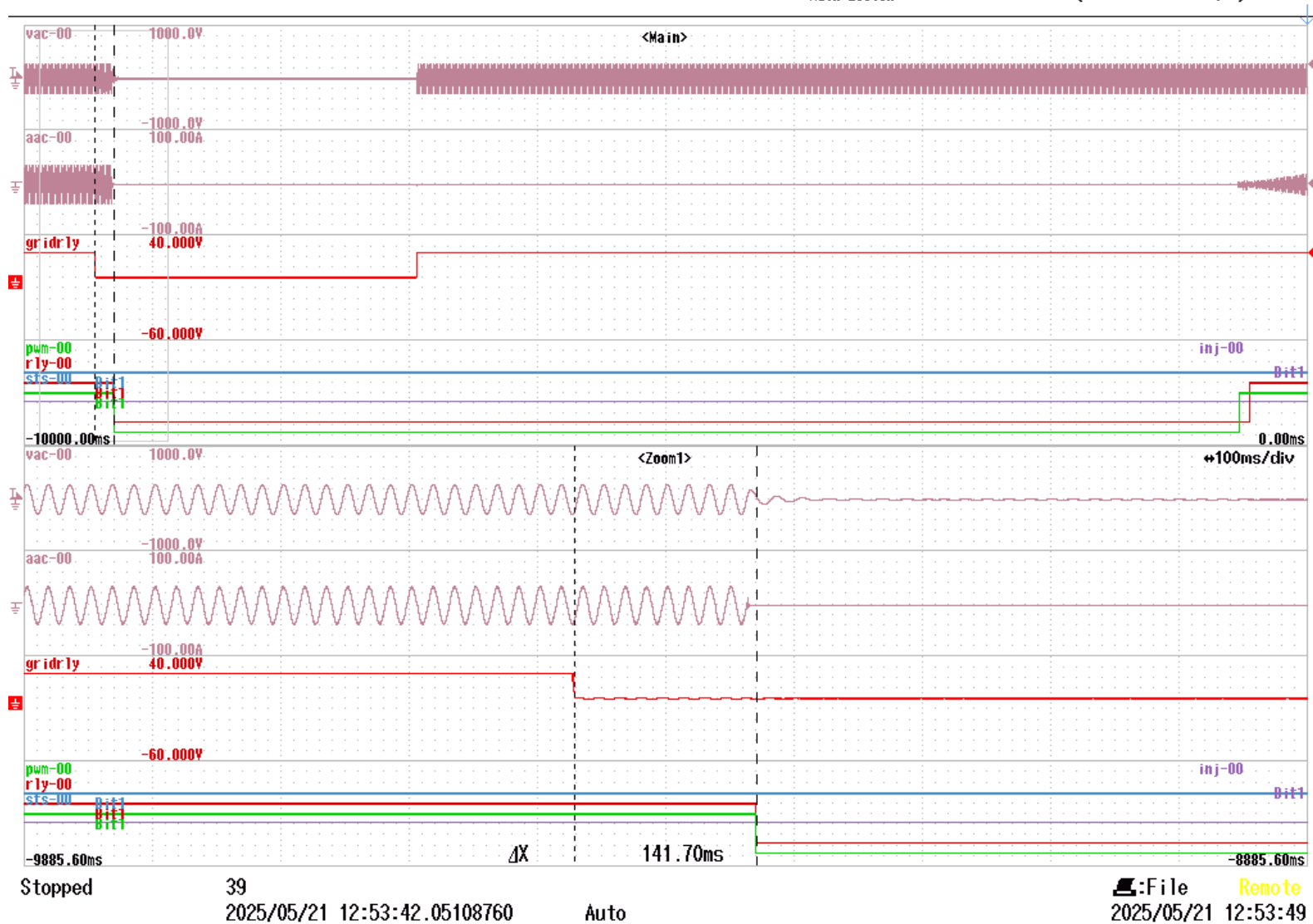


Figure 3.2.7.4 Gate Block Time

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)

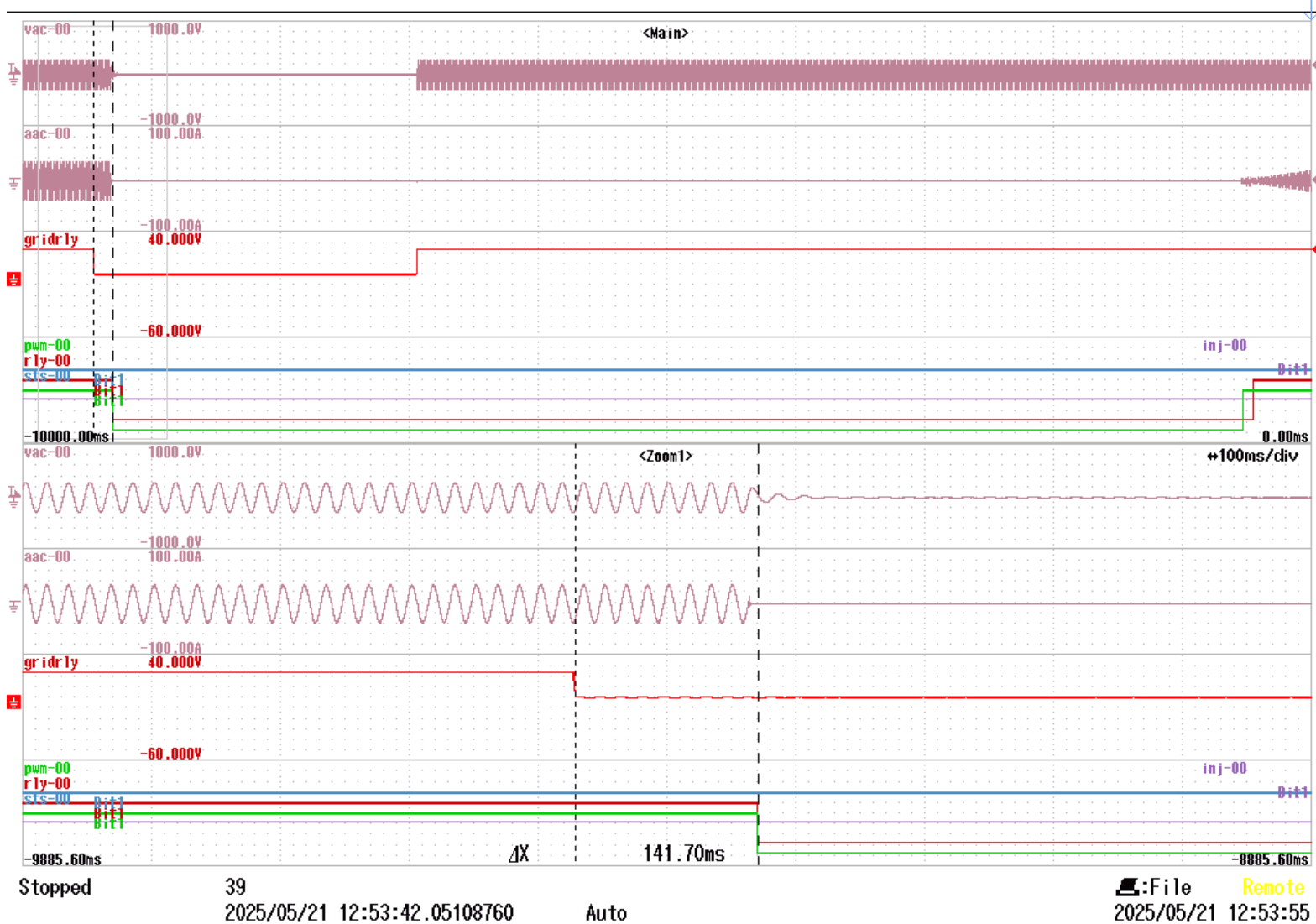


Figure 3.2.7.5 Relay Time

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	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	60	Discharge	0.085	0.085	6.3	PASS	
-5%	-250	0%	0			0.086	0.086	6.3	PASS	
0%	0	0%	0			0.088	0.088	6.3	PASS	Figure 3.2.7.6 & 3.2.7.7
5%	250	0%	0			0.089	0.089	6.3	PASS	
10%	500	0%	0			0.089	0.089	6.3	PASS	

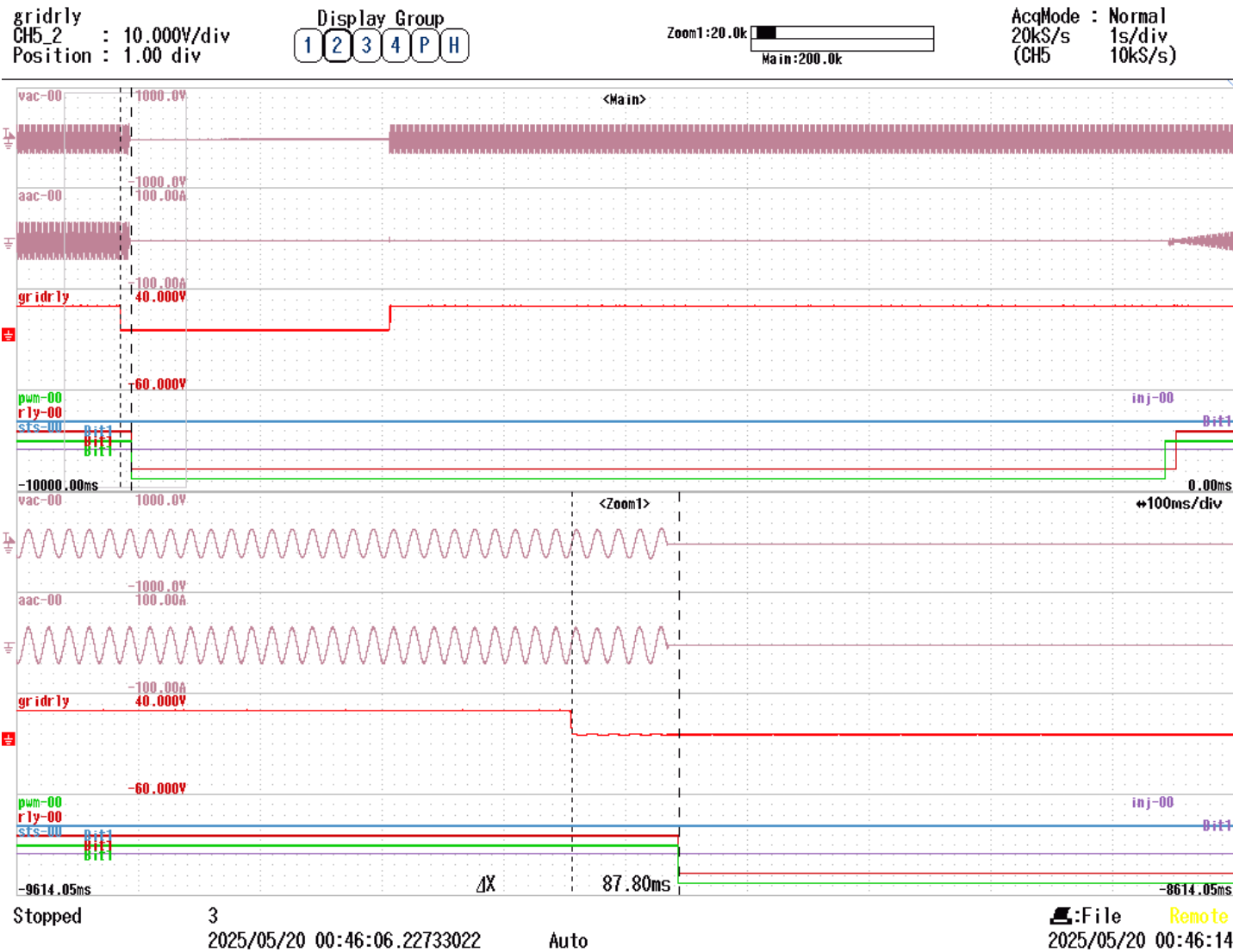


Figure 3.2.7.6 Gate Block Time

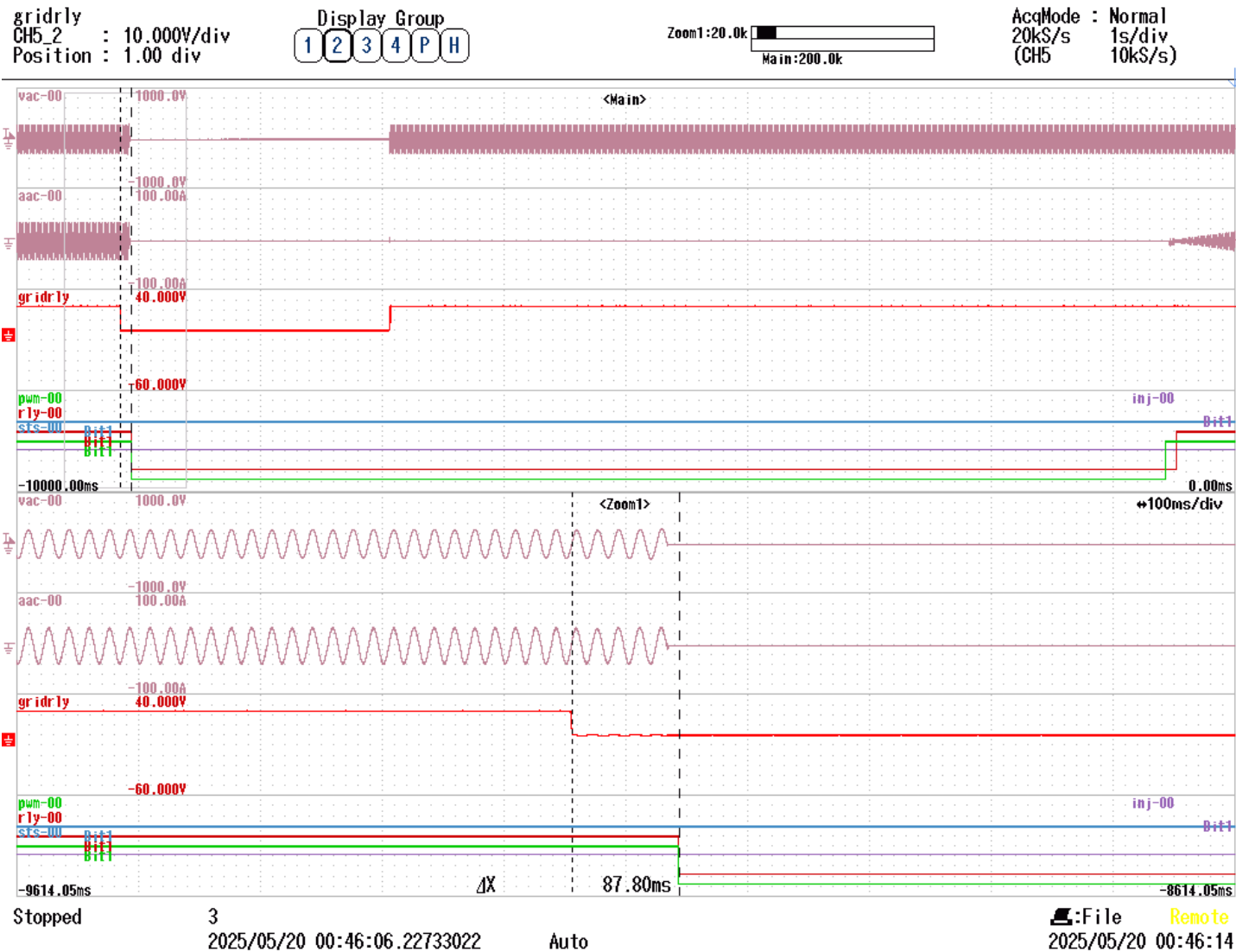


Figure 3.2.7.7 Relay Time

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	<sup>1,2</sup> <0.2s <sup>3</sup> >5s	備考
-10%	-500	0%	0	60	Discharge	0.079	0.079	6.3	PASS	
-5%	-250	0%	0			0.079	0.079	6.3	PASS	
0%	0	0%	0			0.090	0.090	6.3	PASS	
5%	250	0%	0			0.084	0.084	6.3	PASS	
10%	500	0%	0			0.093	0.093	6.3	PASS	Figure 3.2.7.8 & 3.2.7.9



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)

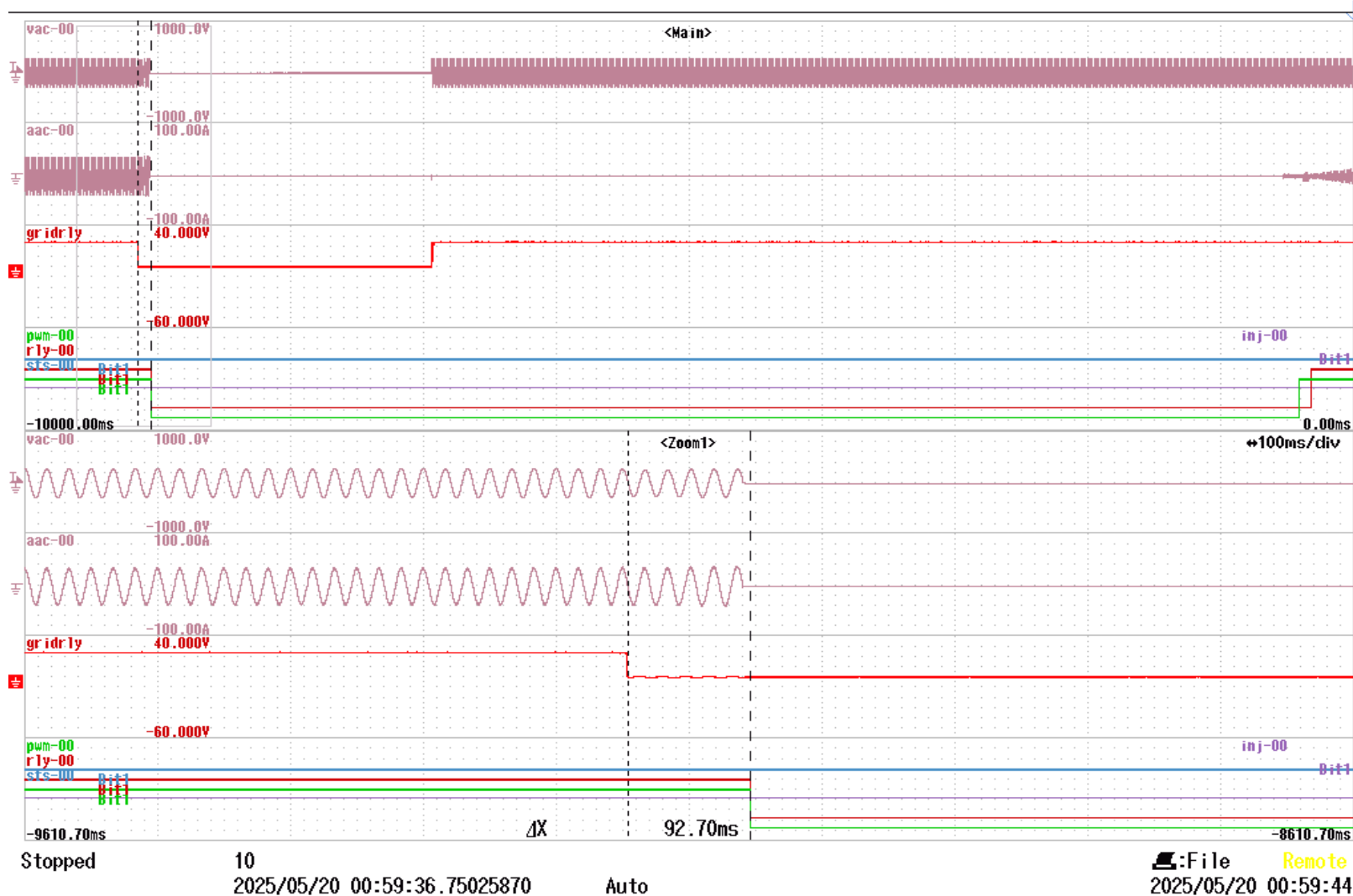


Figure 3.2.7.8 Gate Block Time

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)

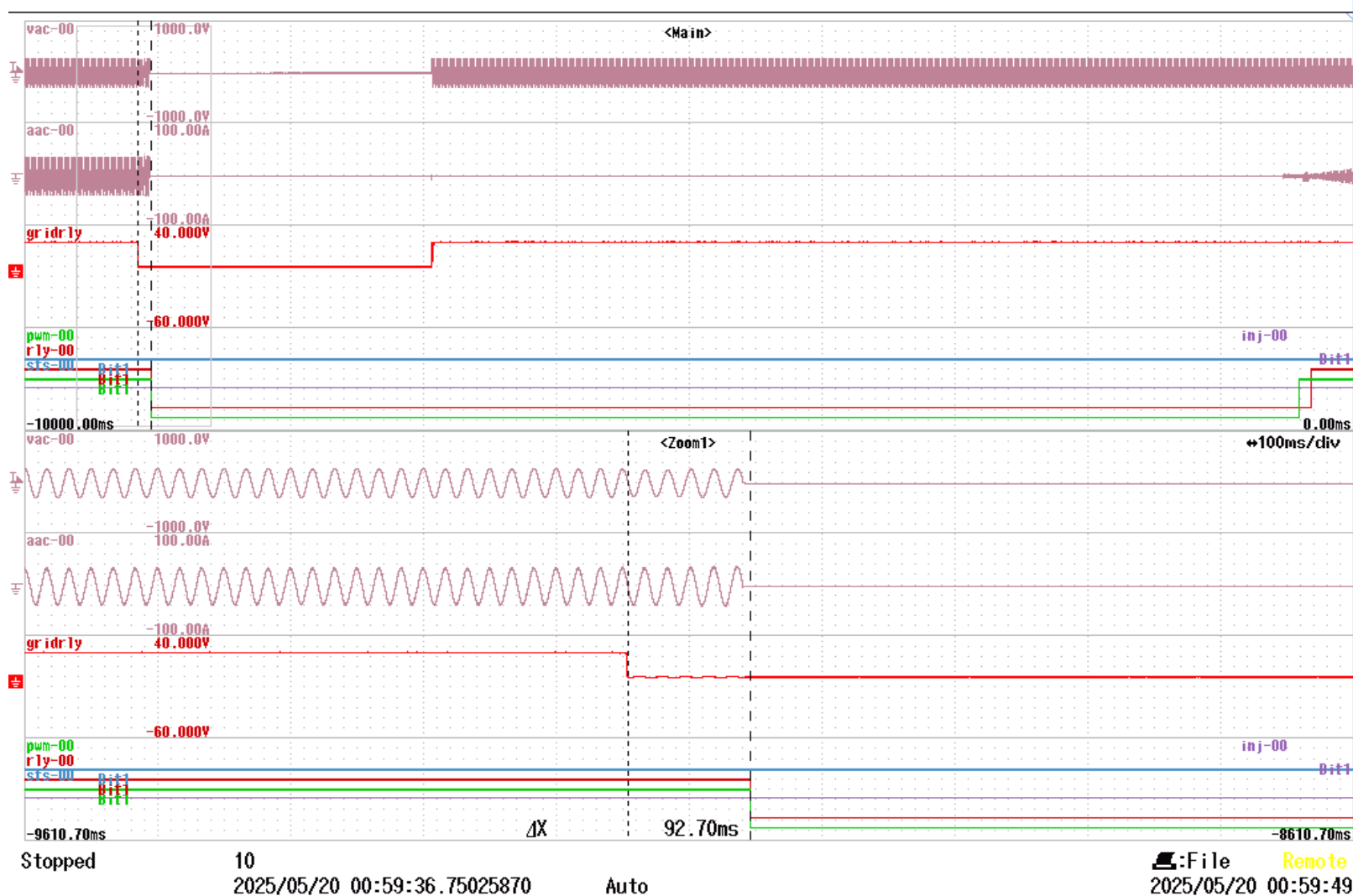


Figure 3.2.7.9 Relay Time

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	Reconnection 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  <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	10%	-500	60	Discharge	0.102	0.102	6.3	PASS	
-10%	-500	5%	-250			0.116	0.116	6.3	PASS	
-10%	-500	0%	0			0.114	0.114	6.3	PASS	
-10%	-500	-5%	250			0.114	0.114	6.3	PASS	
-10%	-500	-10%	500			0.102	0.102	6.3	PASS	
-5%	-250	10%	-500			0.102	0.102	6.3	PASS	
-5%	-250	5%	-250			0.113	0.113	6.3	PASS	
-5%	-250	0%	0			0.141	0.141	6.3	PASS	
-5%	-250	-5%	250			0.119	0.119	6.3	PASS	
-5%	-250	-10%	500			0.105	0.105	6.3	PASS	
0%	0	10%	-500			0.106	0.106	6.3	PASS	
0%	0	5%	-250			0.110	0.110	6.3	PASS	

0%	0	0%	0	60	Discharge	0.166	0.166	6.3	PASS	Figure 3.2.7.10 & 3.2.7.11
0%	0	-5%	250			0.126	0.126	6.3	PASS	
0%	0	-10%	500			0.098	0.098	6.3	PASS	
5%	250	10%	-500			0.097	0.097	6.3	PASS	
5%	250	5%	-250			0.123	0.123	6.3	PASS	
5%	250	0%	0			0.150	0.150	6.3	PASS	
5%	250	-5%	250			0.118	0.118	6.3	PASS	
5%	250	-10%	500			0.109	0.109	6.3	PASS	
10%	500	10%	-500			0.105	0.105	6.3	PASS	
10%	500	5%	-250			0.114	0.114	6.3	PASS	
10%	500	0%	0			0.113	0.113	6.3	PASS	
10%	500	-5%	250			0.124	0.124	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)

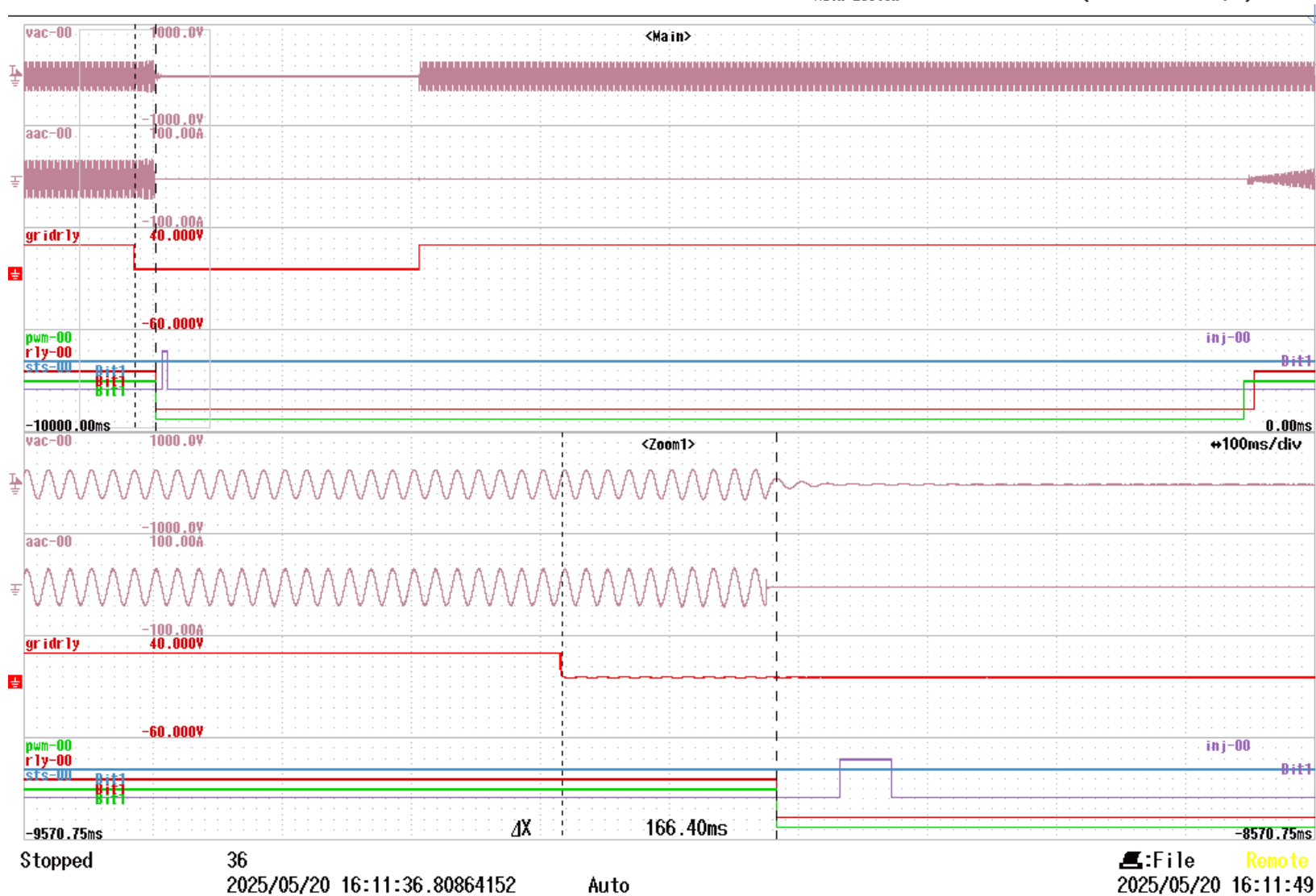


Figure 3.2.7.10 Gate Block Time

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)

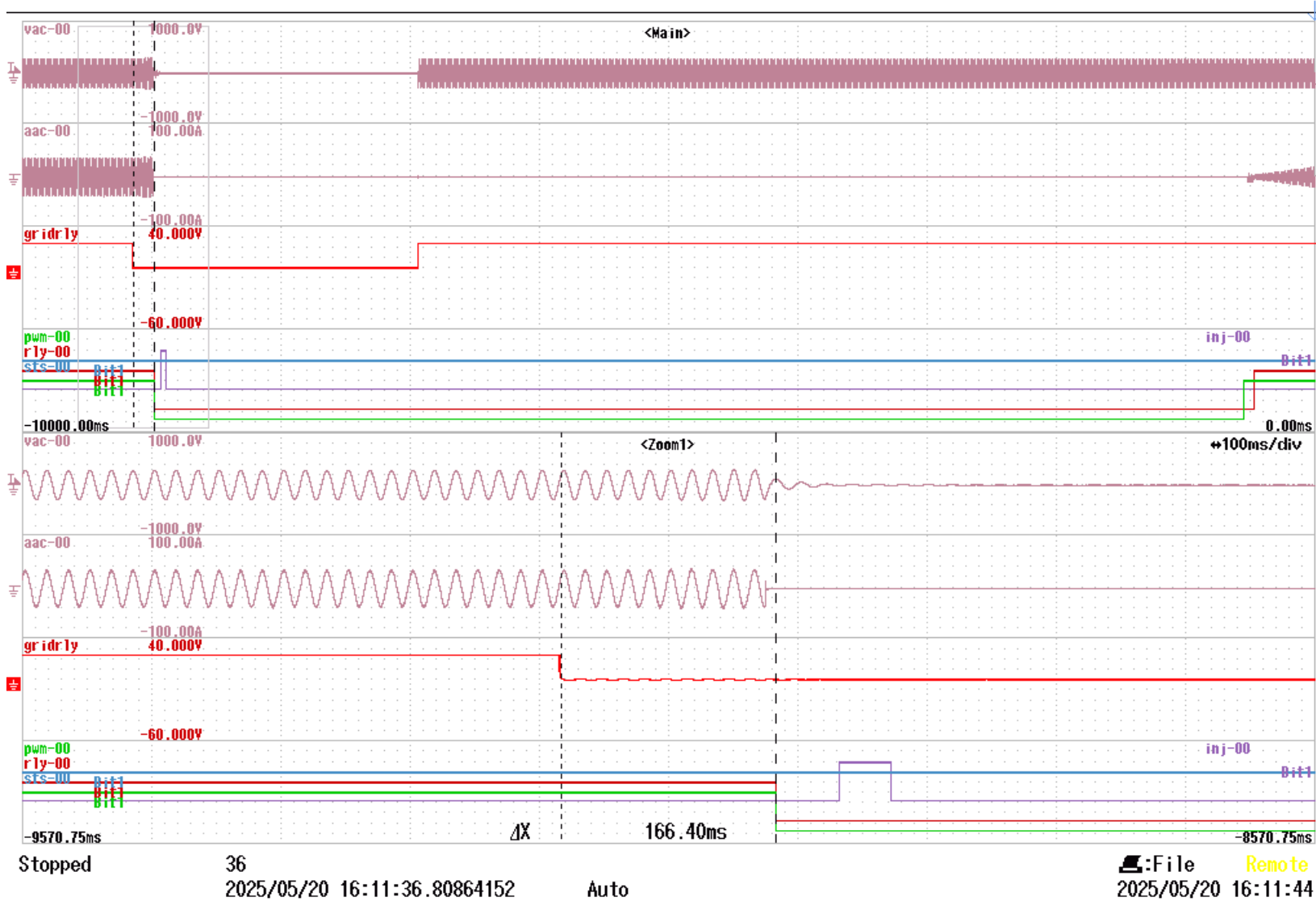


Figure 3.2.7.11 Relay Time

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)		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								
-10%	-500	10%	-500	60	Discharge	0.116	0.116	6.3	PASS	
-10%	-500	5%	-250			0.101	0.101	6.3	PASS	
-10%	-500	0%	0			0.101	0.101	6.3	PASS	
-10%	-500	-5%	250			0.109	0.109	6.3	PASS	
-10%	-500	-10%	500			0.146	0.146	6.3	PASS	
-5%	-250	10%	-500			0.113	0.113	6.3	PASS	
-5%	-250	5%	-250			0.105	0.105	6.3	PASS	
-5%	-250	0%	0			0.104	0.104	6.3	PASS	
-5%	-250	-5%	250			0.114	0.114	6.3	PASS	
-5%	-250	-10%	500			0.141	0.141	6.3	PASS	
0%	0	10%	-500			0.125	0.125	6.3	PASS	
0%	0	5%	-250			0.101	0.101	6.3	PASS	Figure 3.2.7.12 & 3.2.7.13

0%	0	0%	0	60	Discharge	0.104	0.104	6.3	PASS	
0%	0	-5%	250			0.118	0.118	6.3	PASS	
0%	0	-10%	500			0.147	0.147	6.3	PASS	
5%	250	10%	-500			0.114	0.114	6.3	PASS	
5%	250	5%	-250			0.107	0.107	6.3	PASS	
5%	250	0%	0			0.101	0.101	6.3	PASS	
5%	250	-5%	250			0.107	0.107	6.3	PASS	
5%	250	-10%	500			0.115	0.115	6.3	PASS	
10%	500	10%	-500			0.126	0.126	6.3	PASS	
10%	500	5%	-250			0.107	0.107	6.3	PASS	
10%	500	0%	0			0.096	0.096	6.3	PASS	
10%	500	-5%	250			0.118	0.118	6.3	PASS	
10%	500	-10%	500			0.146	0.146	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)

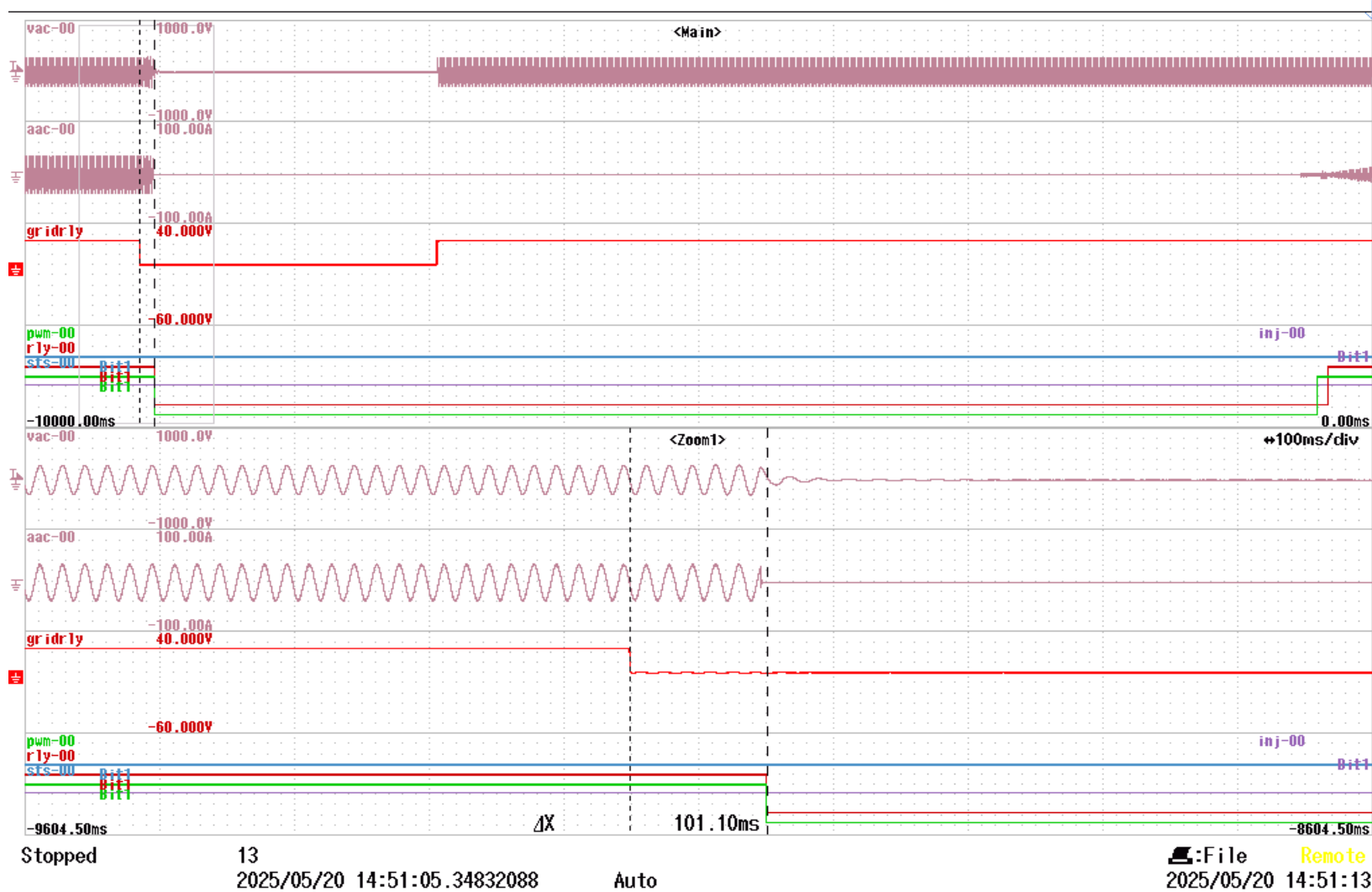


Figure 3.2.7.12 Gate Block Time

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)

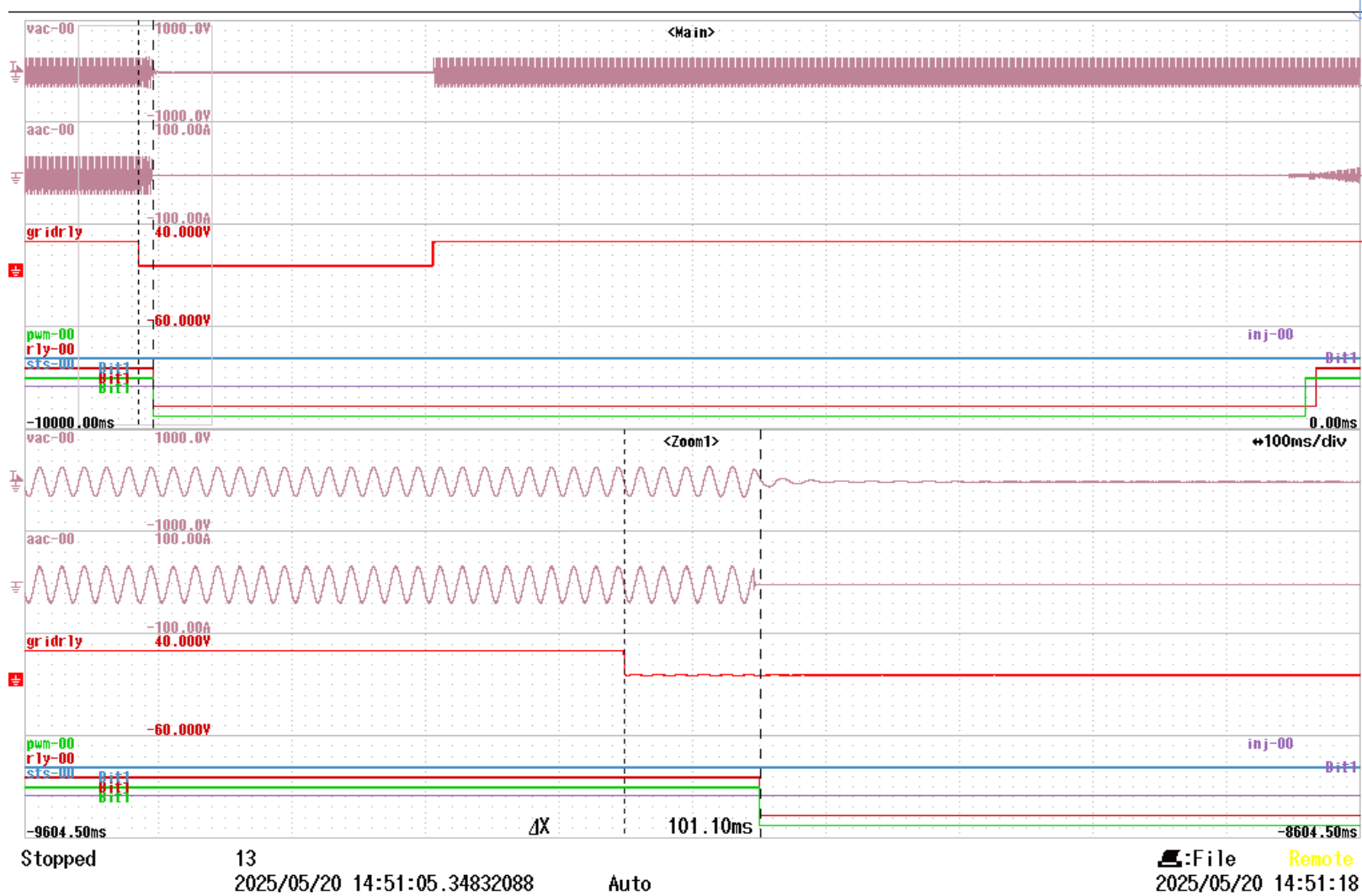


Figure 3.2.7.13 Relay Time

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	Reconnecion 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	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	10%	-500	60	Discharge	0.098	0.098	6.3	PASS	
-10%	-500	5%	-250			0.126	0.126	6.3	PASS	
-10%	-500	0%	0			0.137	0.137	6.3	PASS	
-10%	-500	-5%	250			0.113	0.113	6.3	PASS	
-10%	-500	-10%	500			0.092	0.092	6.3	PASS	
-5%	-250	10%	-500			0.104	0.104	6.3	PASS	
-5%	-250	5%	-250			0.118	0.118	6.3	PASS	
-5%	-250	0%	0			0.138	0.138	6.3	PASS	
-5%	-250	-5%	250			0.121	0.121	6.3	PASS	
-5%	-250	-10%	500			0.096	0.096	6.3	PASS	
0%	0	10%	-500			0.100	0.100	6.3	PASS	
0%	0	5%	-250			0.111	0.111	6.3	PASS	

0%	0	0%	0	60	Discharge	0.152	0.152	6.3	PASS	Figure 3.2.7.14 & 3.2.7.15
0%	0	-5%	250			0.125	0.125	6.3	PASS	
0%	0	-10%	500			0.098	0.098	6.3	PASS	
5%	250	10%	-500			0.101	0.101	6.3	PASS	
5%	250	5%	-250			0.120	0.120	6.3	PASS	
5%	250	0%	0			0.138	0.138	6.3	PASS	
5%	250	-5%	250			0.140	0.140	6.3	PASS	
5%	250	-10%	500			0.099	0.099	6.3	PASS	
10%	500	10%	-500			0.096	0.096	6.3	PASS	
10%	500	5%	-250			0.118	0.118	6.3	PASS	
10%	500	0%	0			0.136	0.136	6.3	PASS	
10%	500	-5%	250			0.126	0.126	6.3	PASS	
10%	500	-10%	500			0.110	0.110	6.3	PASS	

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

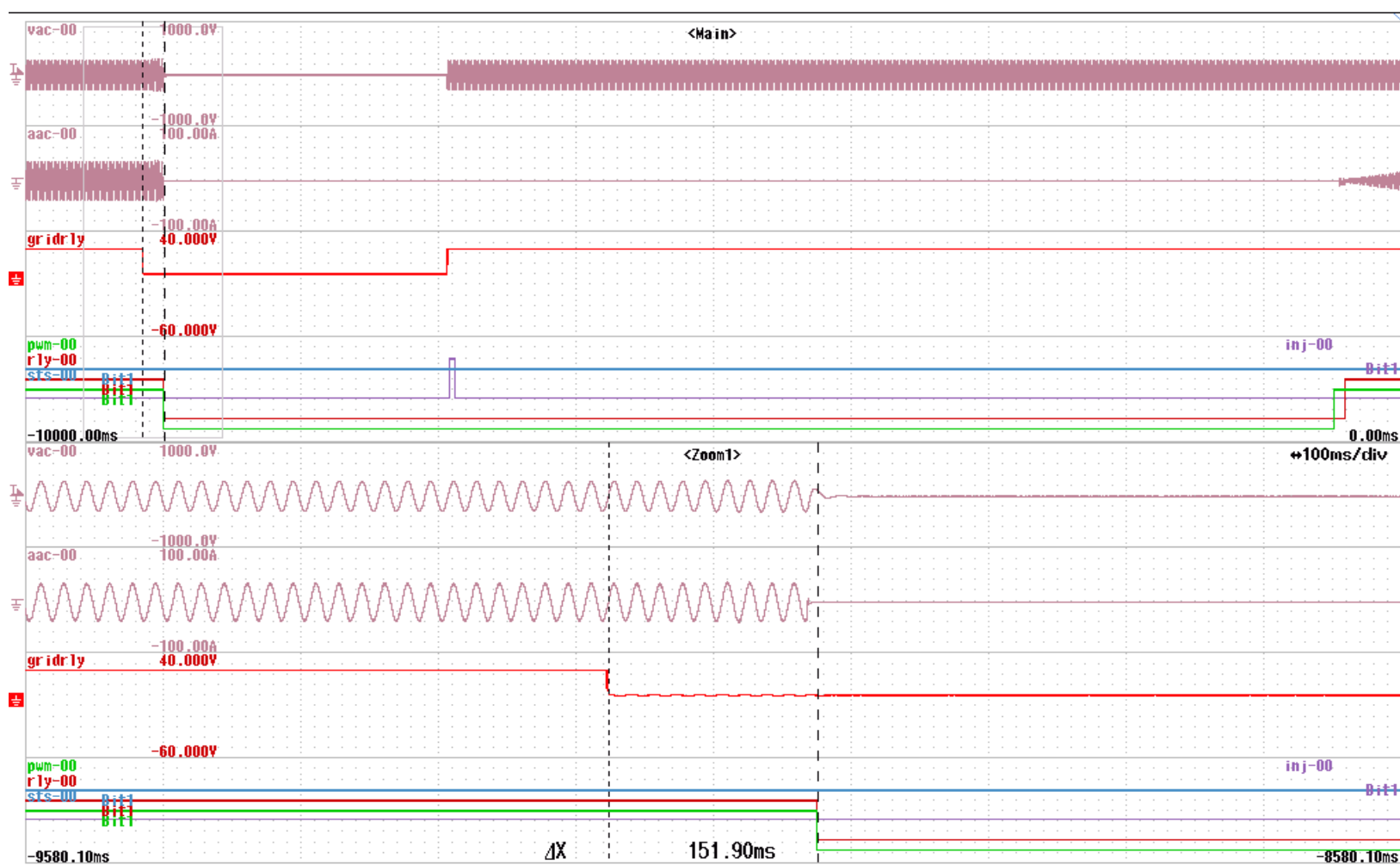
Vac-0\*: Line-Line Voltage  
 aac-0\*: Phase A Current  
 gridrly: SWcb State (Grid Contactor)  
 pwm-0\*: Power Conditioner Gate Signal  
 rly-0\*: Power Conditioner Output Relay  
 sts-0\*: Power Conditioner Active Function Status Signal (Operational – HIGH, Standby – LOW)  
 inj-0\*: Power Conditioner 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 40  
2025/05/20 21:14:08.40501310

Auto

:File Remote  
2025/05/20 21:14:21

Figure 3.2.7.14 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)

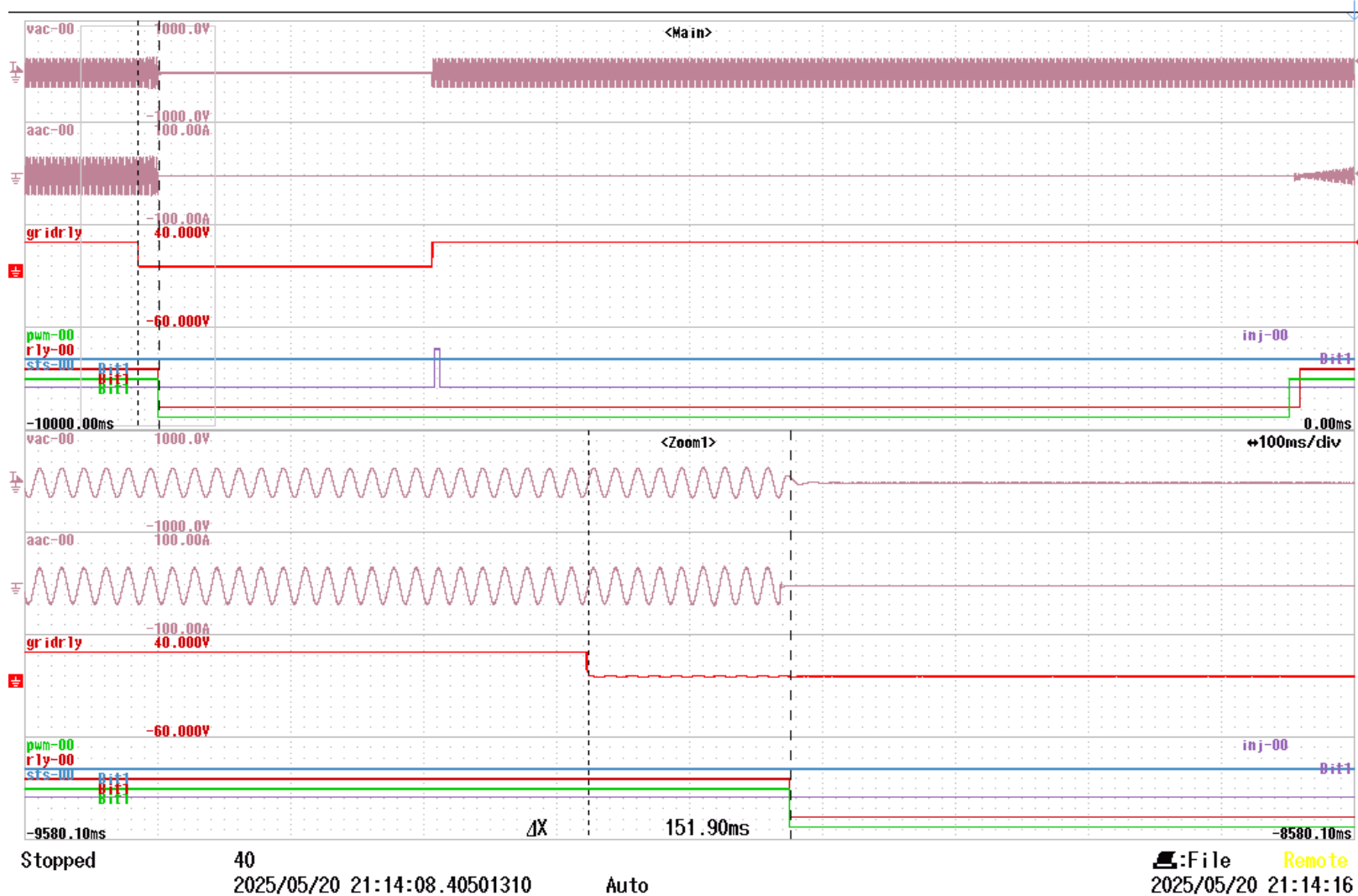


Figure 3.2.7.15 Relay Time

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 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)		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	10%	-500	60	Discharge	0.104	0.104	6.3	PASS	
-10%	-500	5%	-250			0.115	0.115	6.3	PASS	
-10%	-500	0%	0			0.164	0.164	6.3	PASS	
-10%	-500	-5%	250			0.110	0.110	6.3	PASS	
-10%	-500	-10%	500			0.095	0.095	6.3	PASS	
-5%	-250	10%	-500			0.097	0.097	6.3	PASS	
-5%	-250	5%	-250			0.112	0.112	6.3	PASS	
-5%	-250	0%	0			0.151	0.151	6.3	PASS	
-5%	-250	-5%	250			0.113	0.113	6.3	PASS	
-5%	-250	-10%	500			0.100	0.100	6.3	PASS	
0%	0	10%	-500			0.095	0.095	6.3	PASS	
0%	0	5%	-250			0.112	0.112	6.3	PASS	

0%	0	0%	0	60	Discharge	0.151	0.151	6.3	PASS	Figure 3.2.7.16 & 3.2.7.17
0%	0	-5%	250			0.113	0.113	6.3	PASS	
0%	0	-10%	500			0.102	0.102	6.3	PASS	
5%	250	10%	-500			0.097	0.097	6.3	PASS	
5%	250	5%	-250			0.116	0.116	6.3	PASS	
5%	250	0%	0			0.130	0.130	6.3	PASS	
5%	250	-5%	250			0.139	0.139	6.3	PASS	
5%	250	-10%	500			0.106	0.106	6.3	PASS	
10%	500	10%	-500			0.097	0.097	6.3	PASS	
10%	500	5%	-250			0.107	0.107	6.3	PASS	
10%	500	0%	0			0.128	0.128	6.3	PASS	
10%	500	-5%	250			0.144	0.144	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

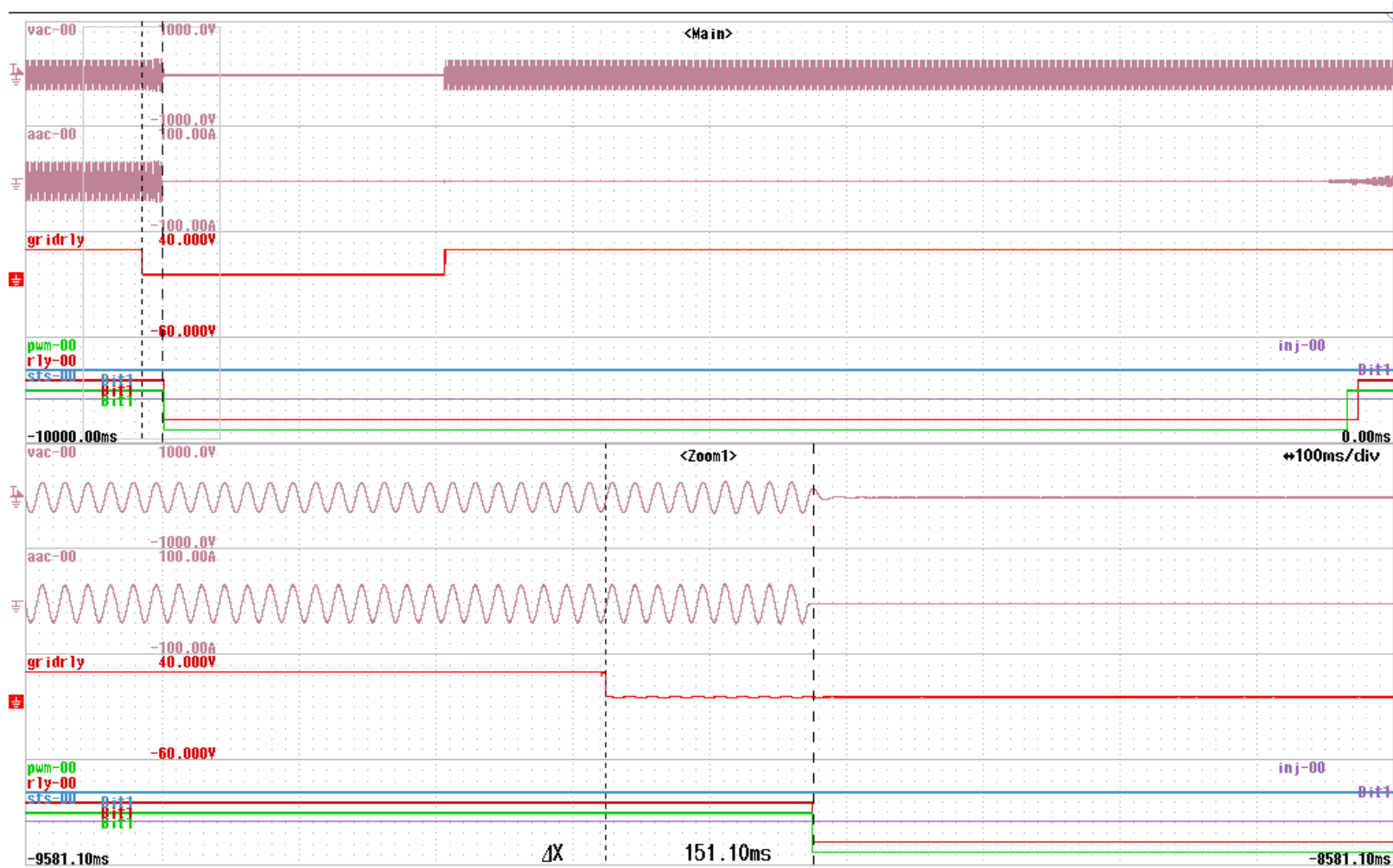


gridrly  
CH5\_2 : 10.000V/div  
Position : 1.00 div

Display Group  
1 2 3 4 P H

Zoom1:20.0k  
Main:200.0k

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



Stopped

15  
2025/05/20 18:48:23.76555982

Auto

File Remote  
2025/05/20 18:48:31

Figure 3.2.7.16 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)

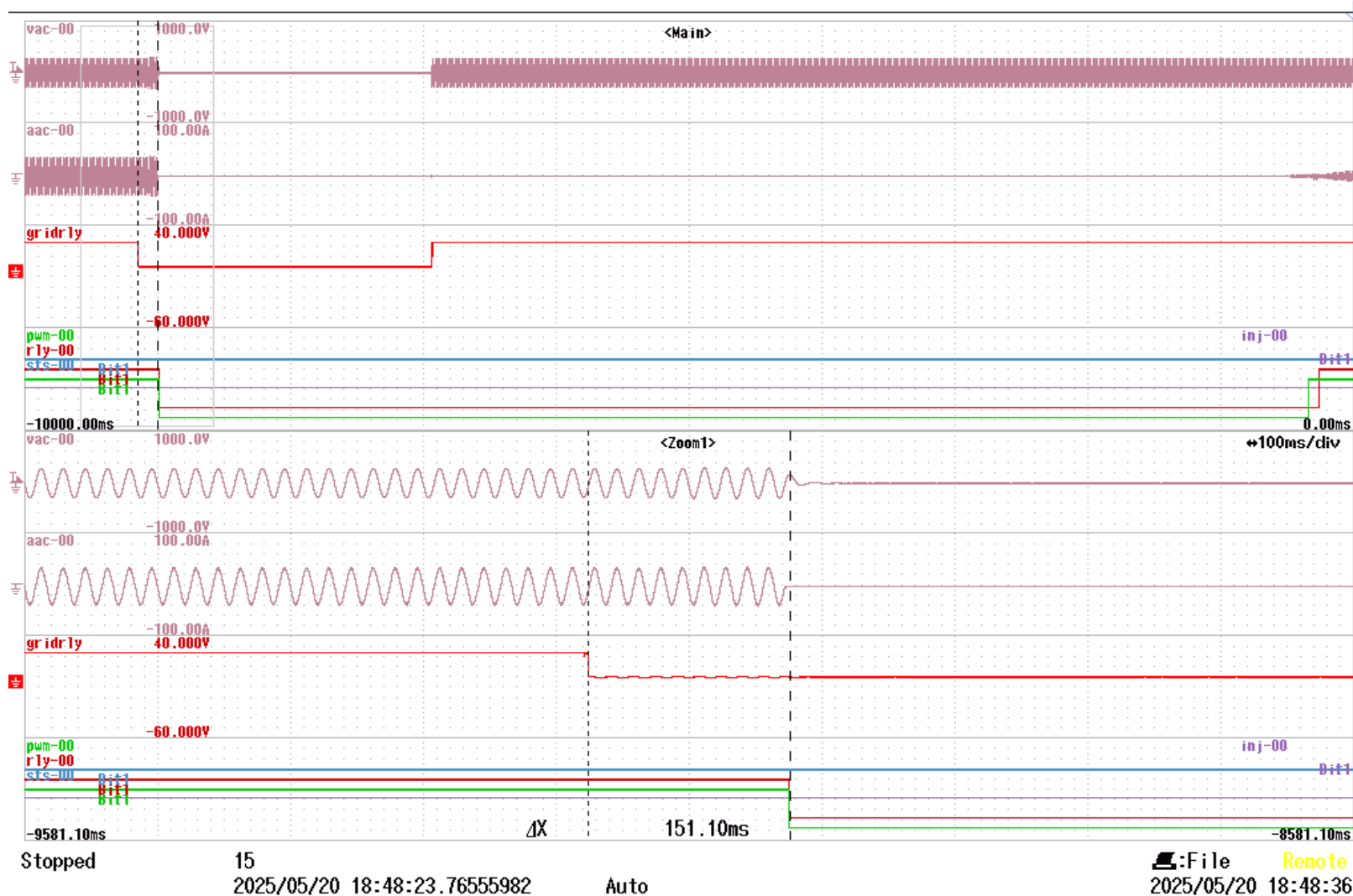


Figure 3.2.7.17 Relay Time

### 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	Voltage Drop Level 電圧低下レベル	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	0.52pu	< 0.2s	< 0.3s

Parameters 設定値					Measurement Result 測定結果		Pass / Fail 判定	Remarks	
Active Power(W)		Reactive Power(Var)		Frequency	Operation Mode	Gate Block (s) <sup>1</sup>		Relay Open (s) <sup>2</sup>	備考
有効電力		無効電力		周波数	動作モード	GB 時限		Ry 解列時限	
-10%	-500	10%	-500	60	Discharge	0.0867	0.0867	PASS	
-10%	-500	5%	-250			0.1577	0.1577	PASS	
-10%	-500	0%	0			0.0972	0.0972	PASS	
-10%	-500	-5%	250			0.1277	0.1277	PASS	
-10%	-500	-10%	500			0.1483	0.1483	PASS	
-5%	-250	10%	-500			0.1062	0.1062	PASS	
-5%	-250	5%	-250			0.0859	0.0859	PASS	
-5%	-250	0%	0			0.1215	0.1215	PASS	

-5%	-250	-5%	250	60	Discharge	0.1105	0.1105	PASS	
-5%	-250	-10%	500			0.1299	0.1299	PASS	
0%	0	10%	-500			0.088	0.088	PASS	
0%	0	5%	-250			0.0871	0.0871	PASS	
0%	0	0%	0			0.0909	0.0909	PASS	
0%	0	-5%	250			0.1202	0.1202	PASS	
0%	0	-10%	500			0.1659	0.1659	PASS	Figure 3.2.7.18 & 3.2.7.19
5%	250	10%	-500			0.0914	0.0914	PASS	
5%	250	5%	-250			0.0927	0.0927	PASS	
5%	250	0%	0			0.0996	0.0996	PASS	
5%	250	-5%	250			0.1326	0.1326	PASS	
5%	250	-10%	500			0.1136	0.1136	PASS	
10%	500	10%	-500			0.09	0.09	PASS	
10%	500	5%	-250			0.1154	0.1154	PASS	
10%	500	0%	0			0.0898	0.0898	PASS	
10%	500	-5%	250			0.1102	0.1102	PASS	
10%	500	-10%	500			0.1192	0.1192	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

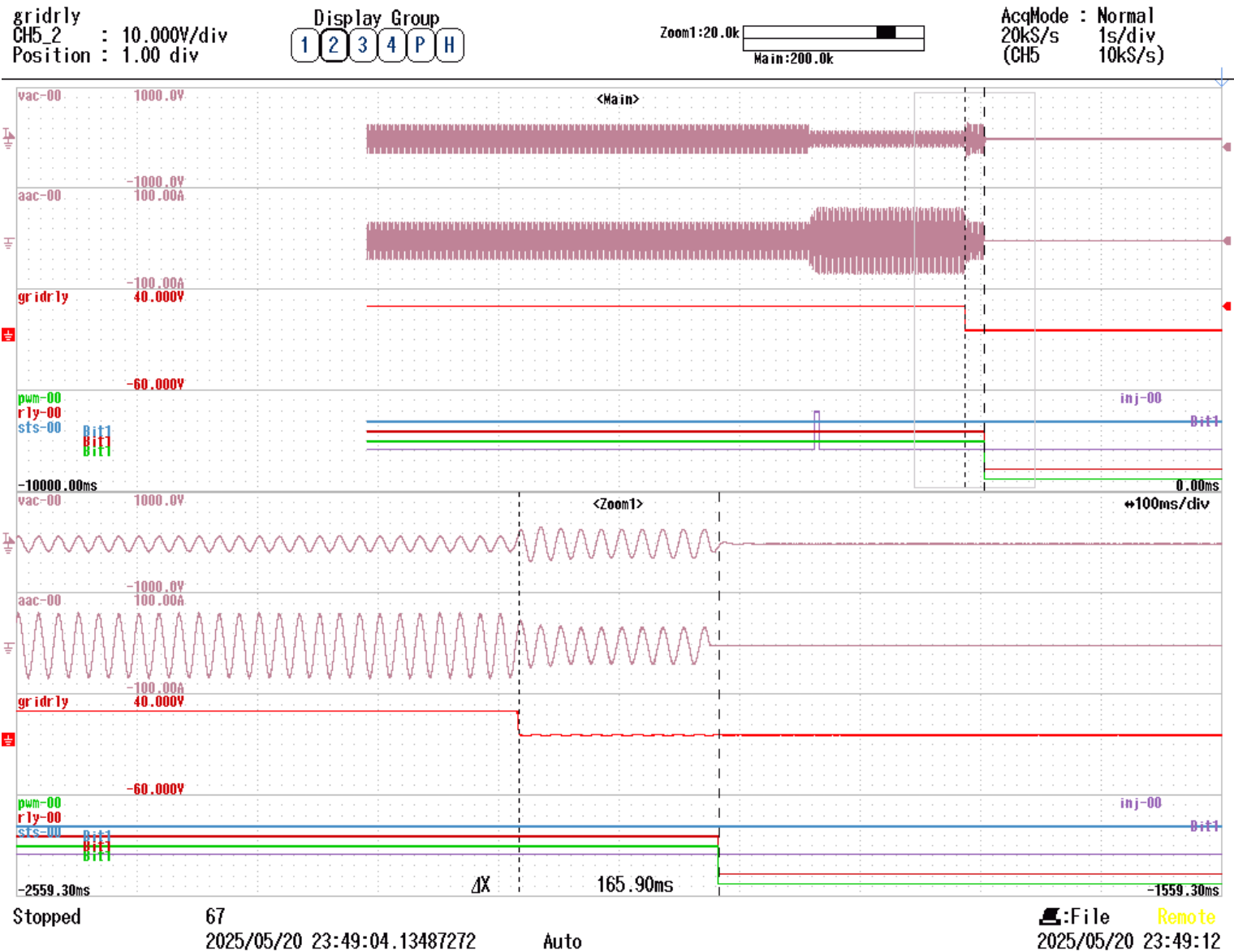


Figure 3.2.7.18 Gate Block Time

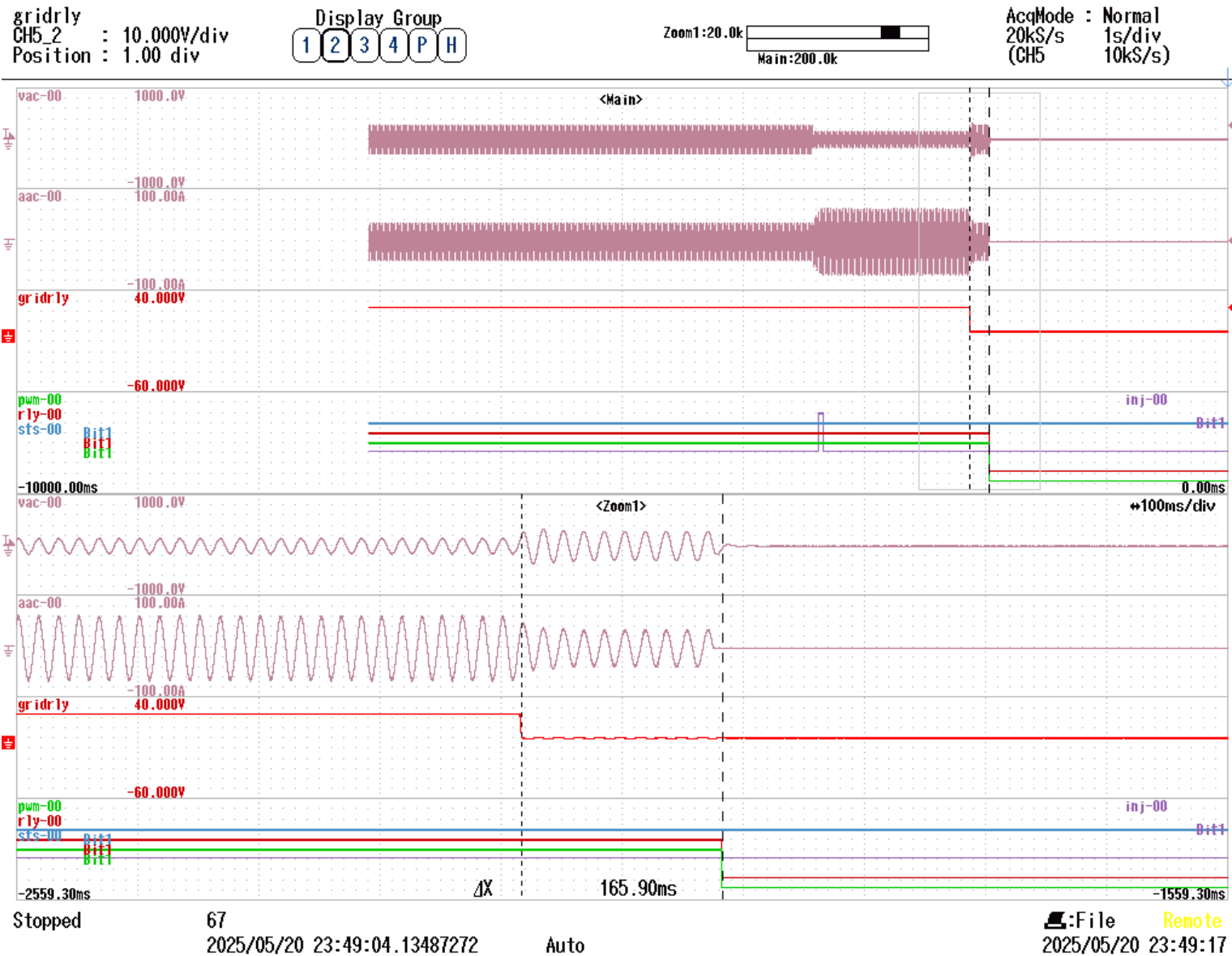


Figure 3.2.7.19 Relay Time

## 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
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	<sup>1</sup> <0.2s <sup>2</sup> <1s	備考
100%	5000	60	Discharge	0.069	0.069	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



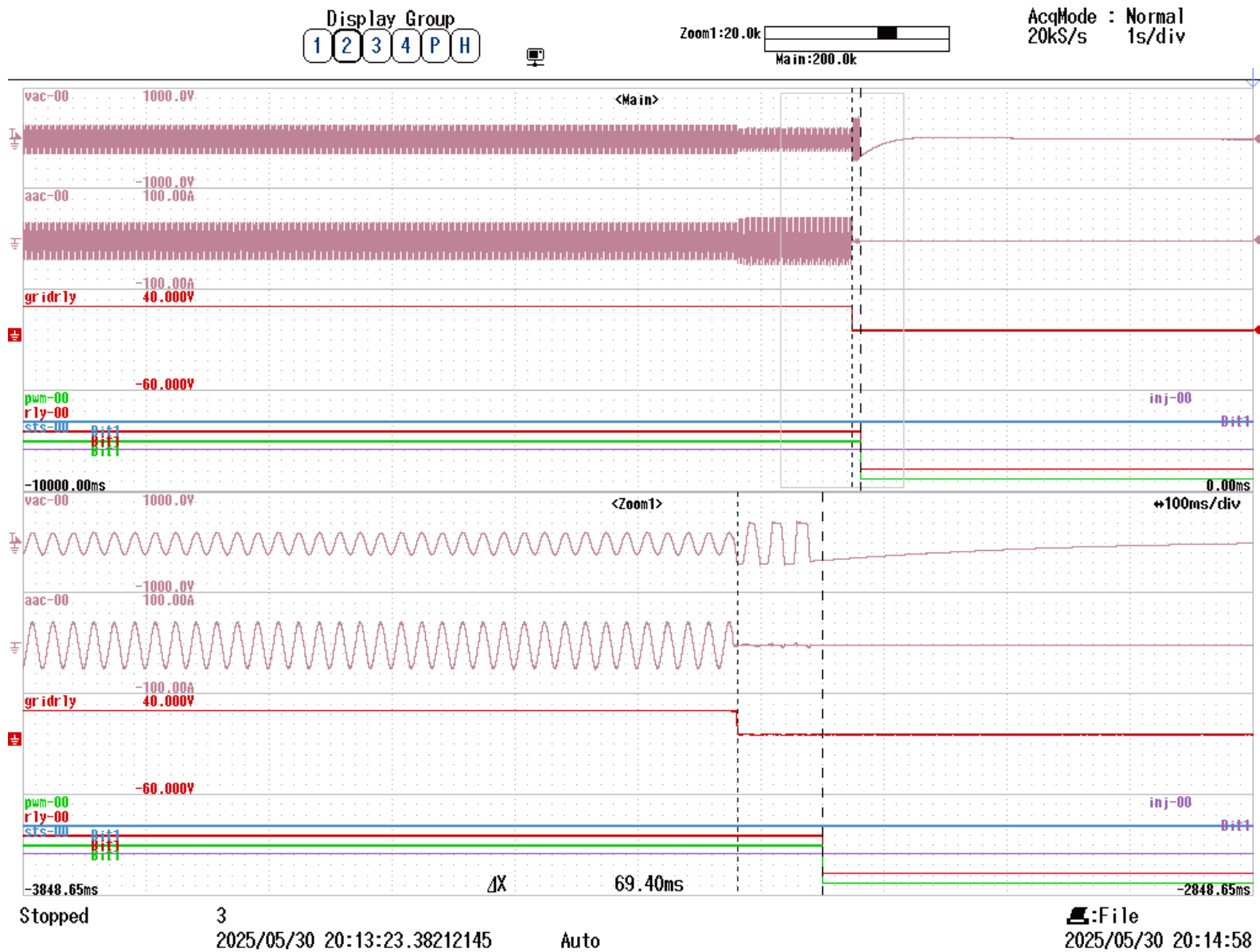


Figure 3.2.7.20

### 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

#### Test Result 試験結果

	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 < 0.2s	Criteria □ Ave of n >= Ave of n+1	Criteria ハ Cut Off time < 0.2s	
2 Inveters	0.169	Pass (0.013s)	Pass	Pass	
3 Inveters	0.161				
4 Inveters	0.156				

**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	0.169	
2	0.168	0.168		
3	0.167	0.167		
4	0.164	0.164		
5	0.164	0.164		
6	0.173	0.173		
7	0.164	0.164		
8	0.166	0.166		
9	0.180	0.180		
10	0.164	0.164		
11	0.169	0.169		Figure 3.2.8.4 & 3.2.8.5
12	0.164	0.164		
13	0.177	0.177		
14	0.175	0.175		
15	0.166	0.166		

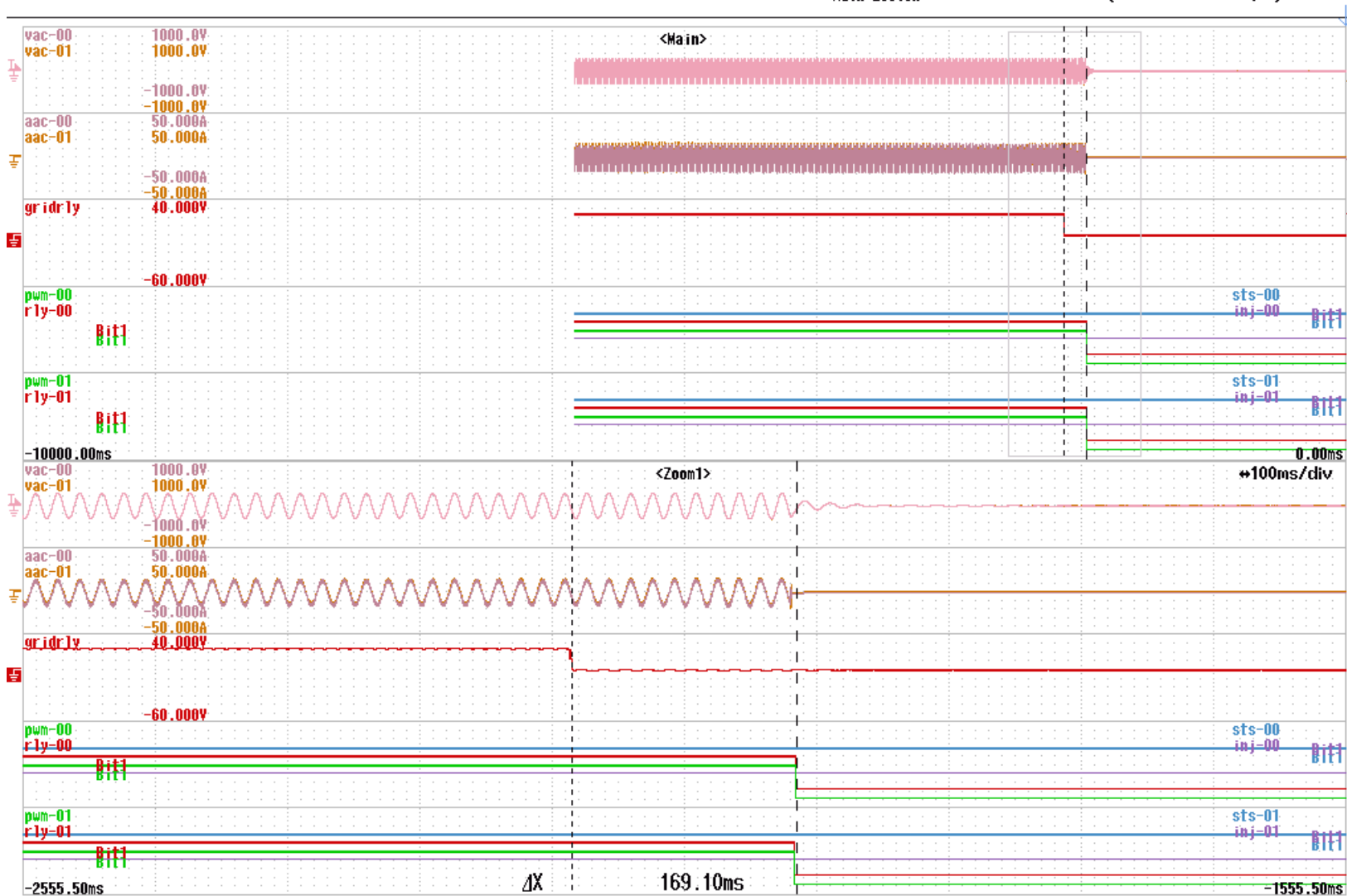


vac-00  
CH1\_1 : 200.0V/div  
Position : 0.00 div

Display Group  
1 2 3 4 P H

Zoom1:20.0k  
Main:200.0k

AcqMode : Normal  
20kS/s 1s/div  
(CH1 10kS/s)



Stopped

3

2025/05/23 12:27:42.58510896

Auto

File Remote  
2025/05/23 12:27:50

Figure 3.2.8.4 Gate Block Time

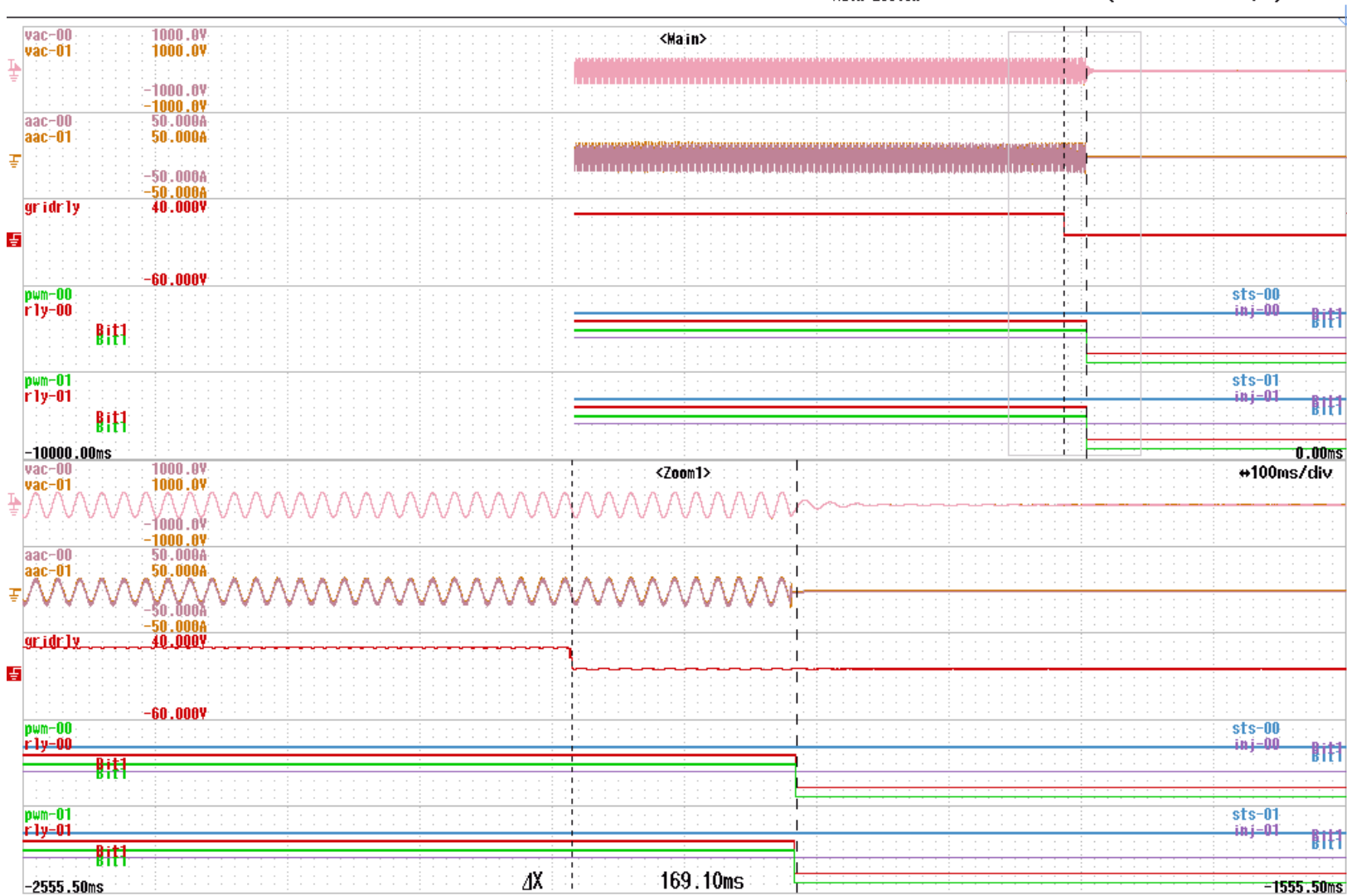


vac-00  
CH1\_1 : 200.0V/div  
Position : 0.00 div

Display Group  
1 2 3 4 P H

Zoom1:20.0k  
Main:200.0k

AcqMode : Normal  
20kS/s 1s/div  
(CH1 10kS/s)



Stopped 3  
2025/05/23 12:27:42.58510896

Auto

File Remote  
2025/05/23 12:27:55

Figure 3.2.8.5 Relay Time

3 inverters (1 reversed phase)

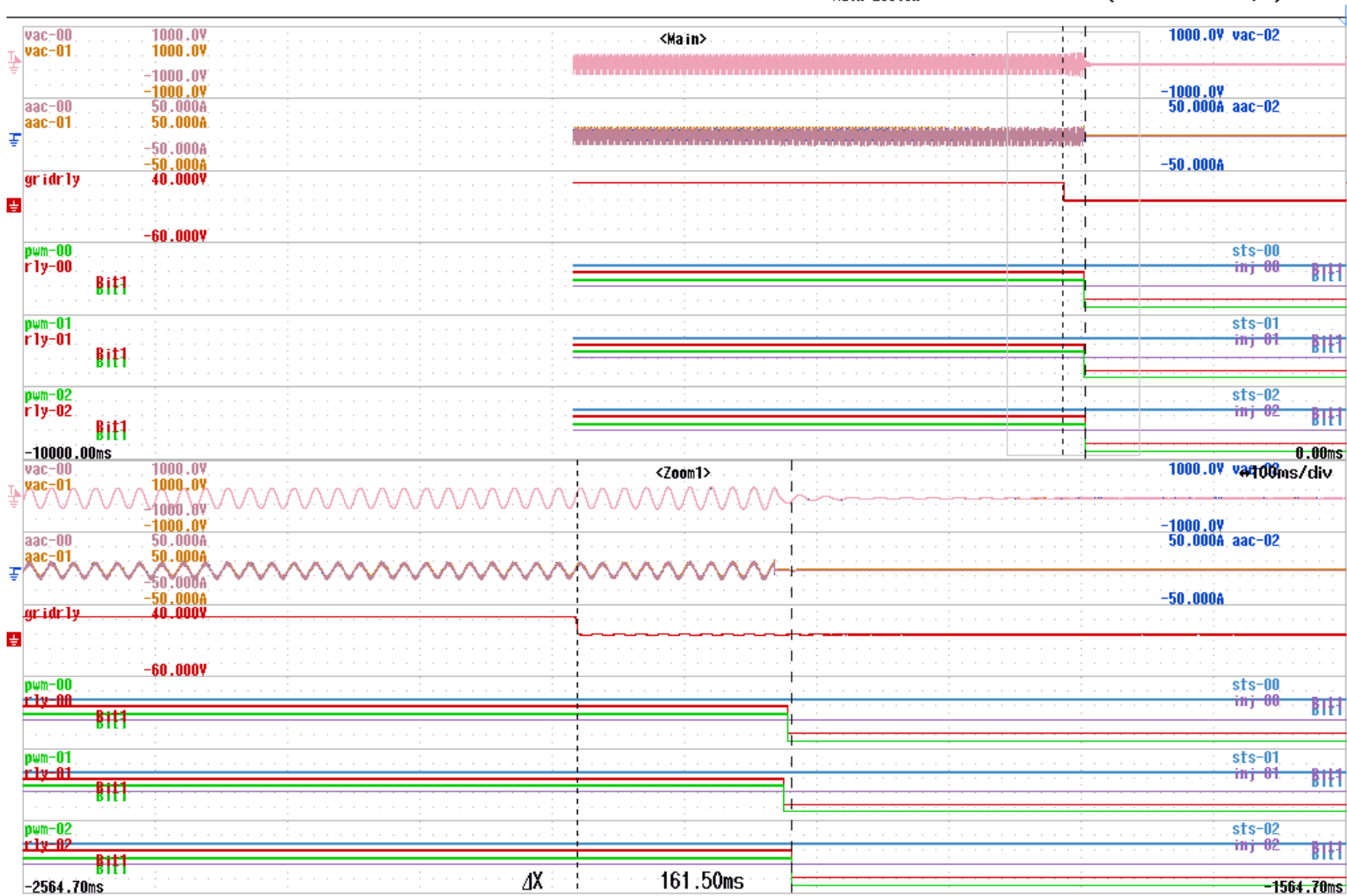
No.	Max Gate Block (s) GB 時限	Max Relay Open (s) Ry 解列時限	Average (s) 平均值	Remarks 備考
1	0.1615	0.162	0.161	Figure 3.2.8.6 & 3.2.8.7
2	0.1583	0.158		
3	0.1599	0.160		
4	0.1585	0.159		
5	0.1569	0.157		
6	0.1589	0.159		
7	0.1689	0.169		
8	0.1678	0.168		
9	0.1648	0.165		
10	0.1568	0.157		
11	0.1682	0.168		
12	0.1582	0.158		
13	0.1562	0.156		
14	0.1596	0.160		
15	0.1666	0.167		

vac-00  
CH1\_1 : 200.0V/div  
Position : 0.00 div

Display Group  
1 2 3 4 P H

Zoom1:20.0k  
Main:200.0k

AcqMode : Normal  
20kS/s 1s/div  
(CH1 10kS/s)



Stopped 7  
2025/05/22 00:58:17.79031614

Auto

File Remote  
2025/05/22 00:58:58

Figure 3.2.8.6 Gate Block Time

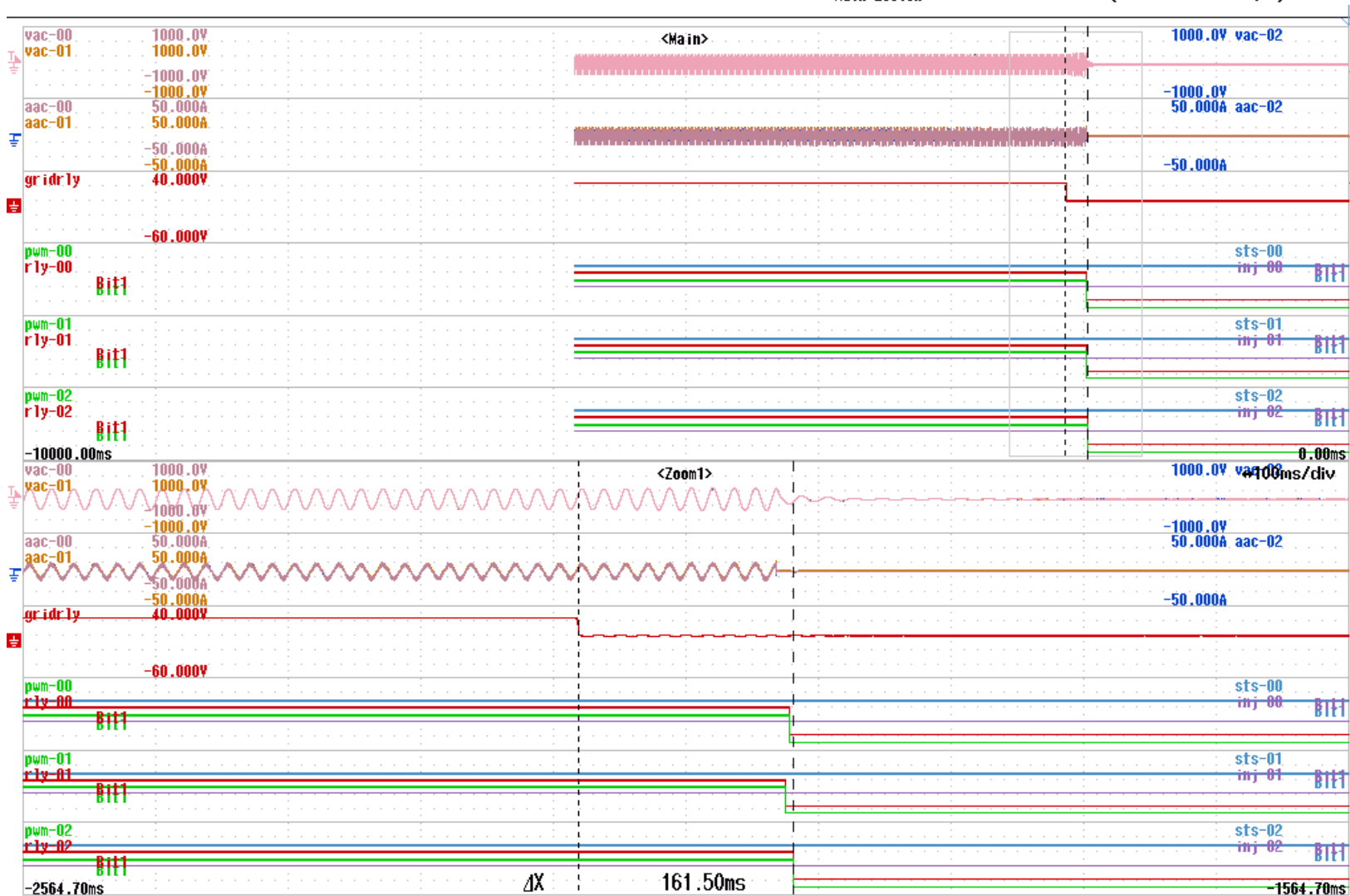


vac-00  
CH1\_1 : 200.0V/div  
Position : 0.00 div

Display Group  
1 2 3 4 P H

Zoom1:20.0k  
Main:200.0k

AcqMode : Normal  
20kS/s 1s/div  
(CH1 10kS/s)



Stopped 7  
2025/05/22 00:58:17.79031614

Auto

File Remote  
2025/05/22 00:59:03

Figure 3.2.8.7 Relay Time

4 inverters (2 reversed phase)

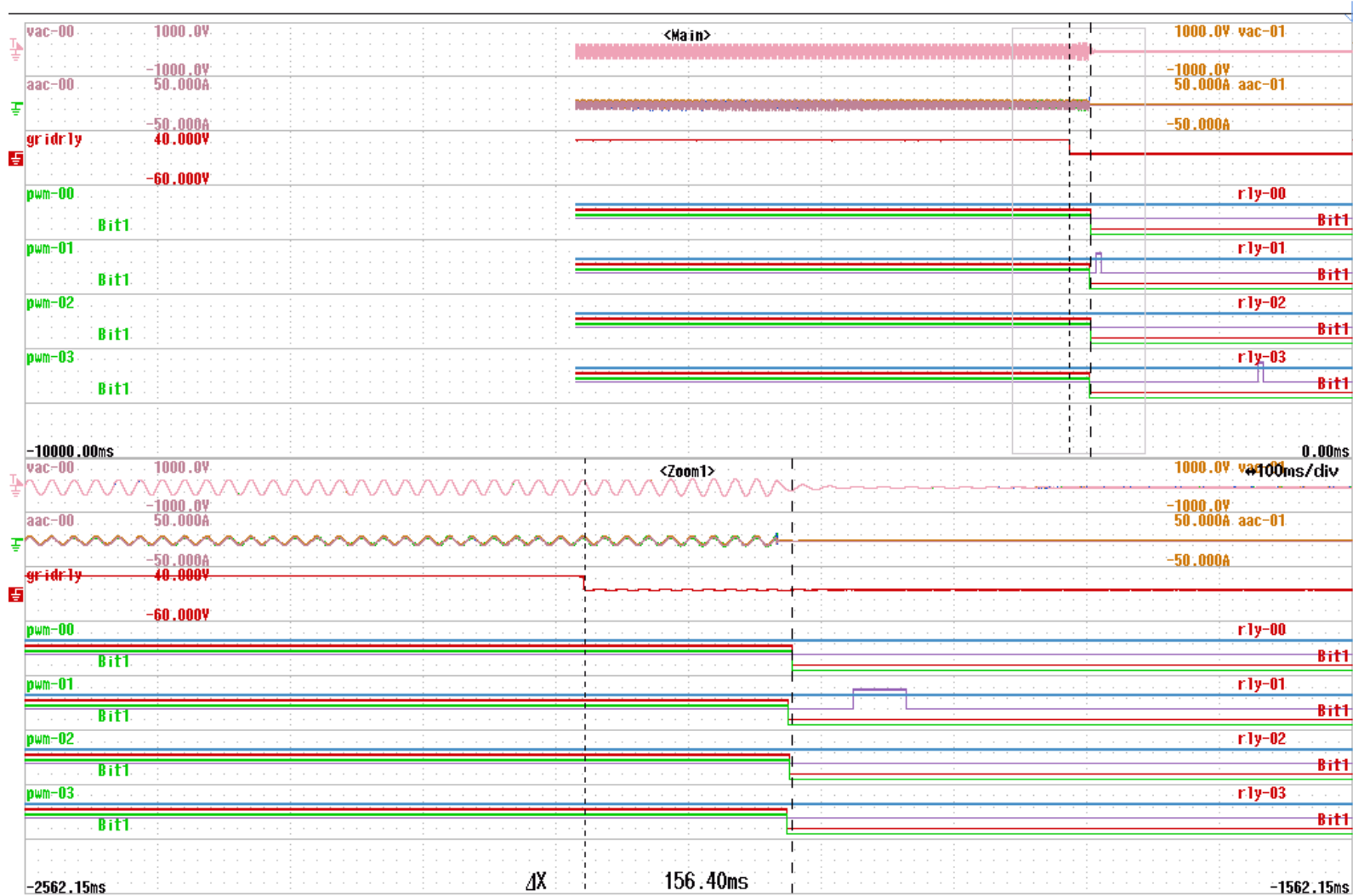
No.	Max Gate Block (s) GB 時限	Max Relay Open (s) Ry 解列時限	Average (s) 平均值	Remarks 備考
1	0.163	0.163	0.156	
2	0.153	0.153		
3	0.152	0.152		
4	0.153	0.153		
5	0.152	0.152		
6	0.157	0.157		
7	0.162	0.162		
8	0.164	0.164		
9	0.151	0.151		
10	0.163	0.163		
11	0.154	0.154		
12	0.153	0.153		
13	0.154	0.154		Figure 3.2.8.8 & 3.2.8.9
14	0.155	0.155		
15	0.161	0.161		

vac-00  
CH1\_1 : 200.0V/div  
Position : 0.00 div

Display Group  
1 2 3 4 P H

Zoom1:20.0k  
Main:200.0k

AcqMode : Normal  
20kS/s 1s/div  
(CH1 10kS/s)



Stopped 3  
2025/05/22 04:52:29.47194358

Auto

File Remote  
2025/05/22 04:52:37

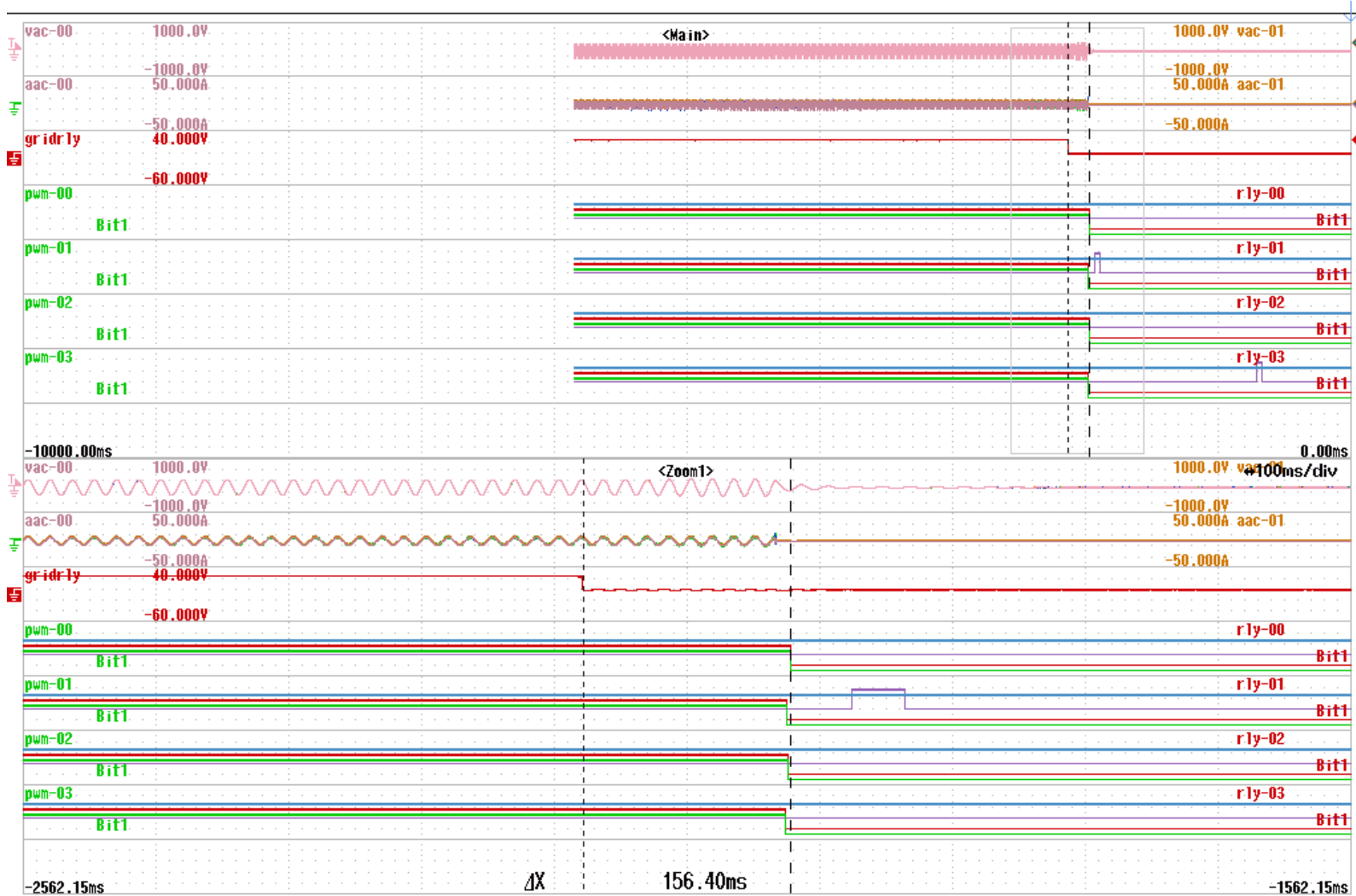
Figure 3.2.8.8 Gate Block Time

vac-00  
CH1\_1 : 200.0V/div  
Position : 0.00 div

Display Group  
1 2 3 4 P H

Zoom1:20.0k  
Main:200.0k

AcqMode : Normal  
20kS/s 1s/div  
(CH1 10kS/s)



Stopped

3  
2025/05/22 04:52:29.47194358

Auto

File Remote  
2025/05/22 04:52:43

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	0.143	0.143	Pass	
2	0.184	0.184	Pass	
3	0.156	0.156	Pass	
4	0.164	0.164	Pass	
5	0.137	0.137	Pass	
6	0.150	0.150	Pass	
7	0.147	0.147	Pass	
8	0.155	0.155	Pass	
9	0.148	0.148	Pass	Figure 3.2.8.10 & 3.2.8.11
10	0.134	0.134	Pass	
11	0.132	0.132	Pass	
12	0.138	0.138	Pass	
13	0.141	0.141	Pass	
14	0.139	0.139	Pass	
15	0.142	0.142	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

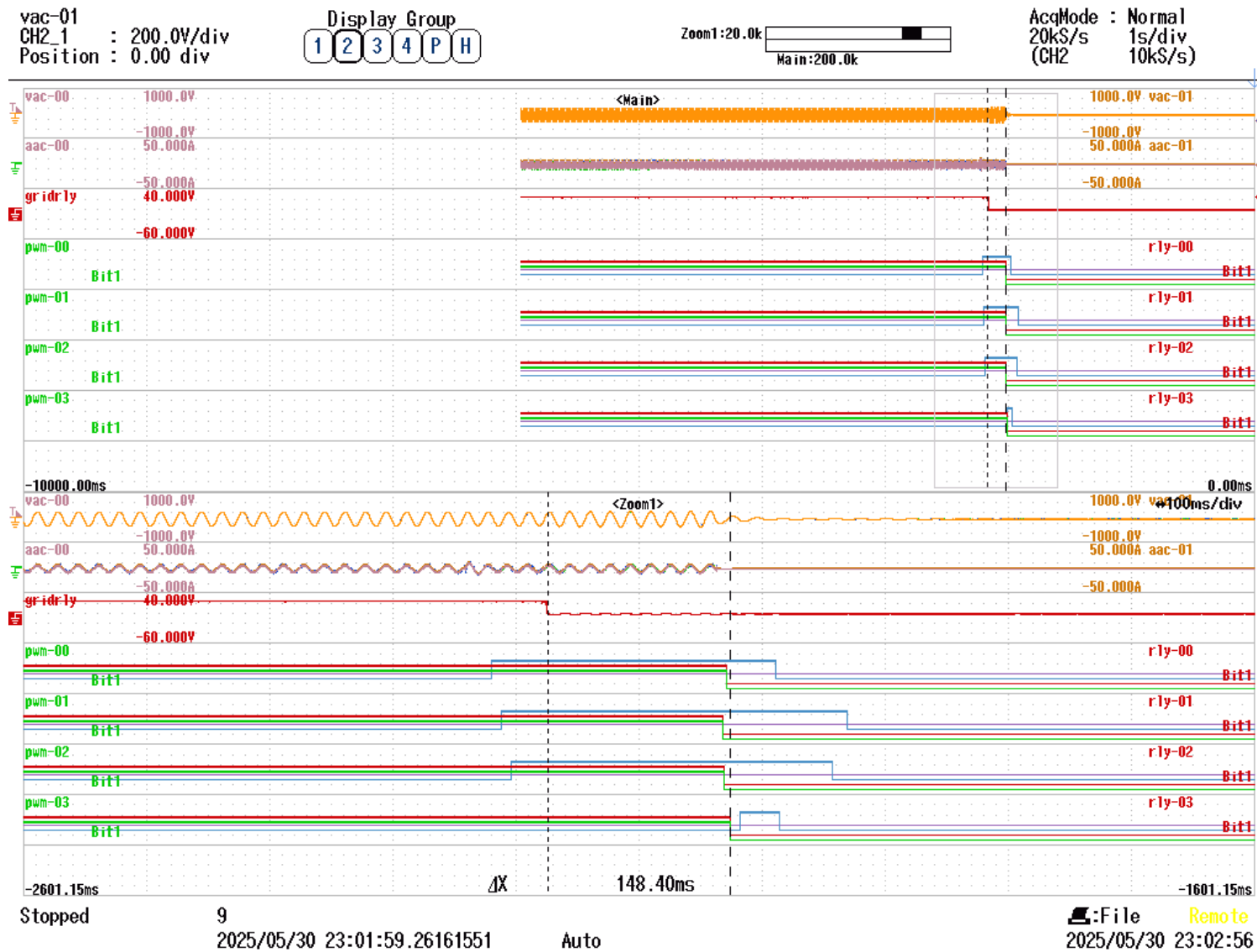


Figure 3.2.8.10 Gate Block Time



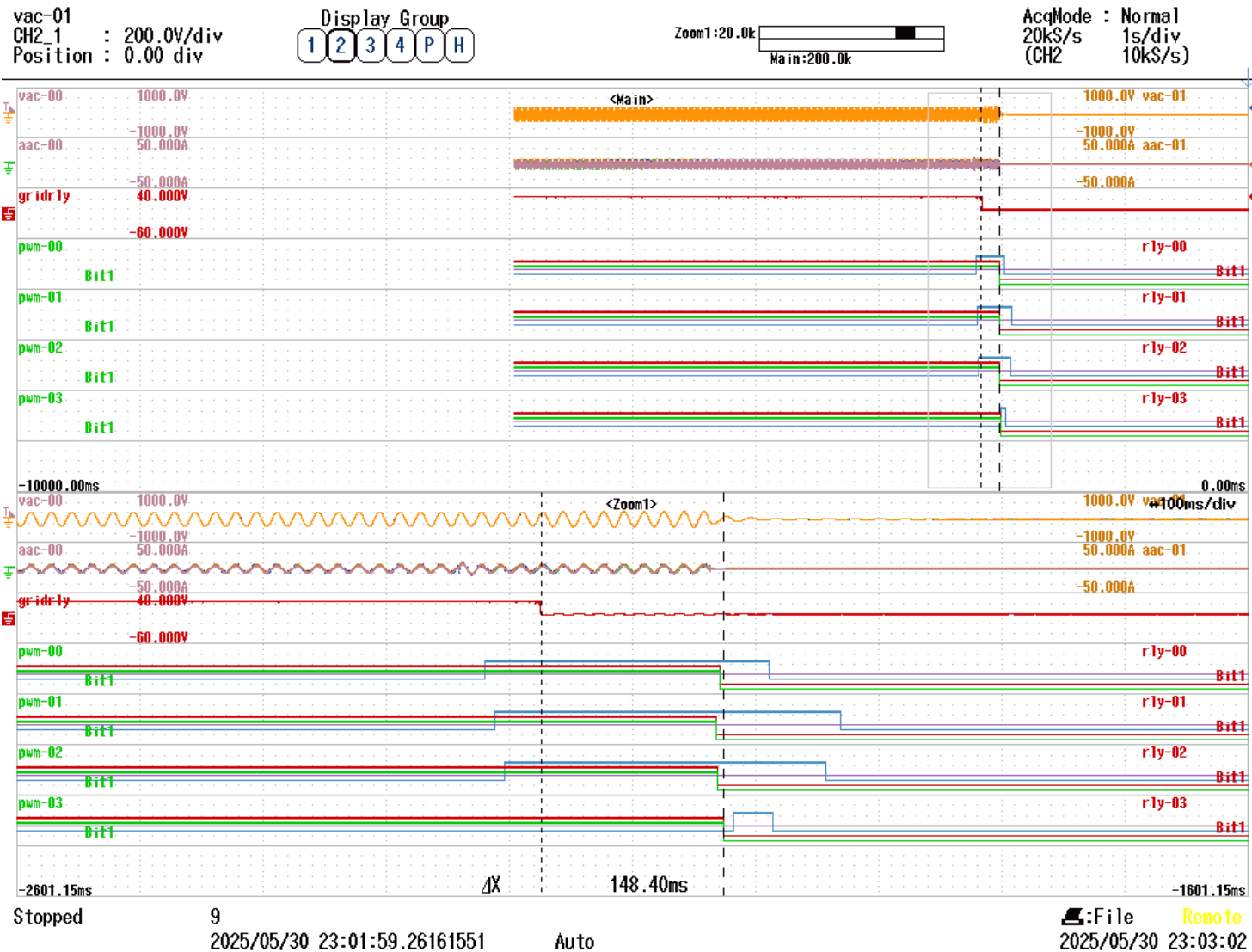


Figure 3.2.8.11 Relay Time

### 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)	Applied Voltage 印加電圧 (V)	Active state 能動状態	Pass / Fail 判定 state change to operational	Remarks 備考
2nd order	202.232	24.356	4918.595	60.002	0.055	-	Standby	-	
	202.223	24.364	4918.451	60.002	2.245	2.19	Operational	Pass	
3rd order	202.235	24.356	4918.664	60.002	1.245	-	Standby	-	
	202.218	24.384	4915.806	60.002	3.484	2.239	Operational	Pass	
4th order	202.226	24.357	4918.654	60.002	0.028	-	Standby	-	
	202.214	24.366	4917.704	60.002	2.254	2.226	Operational	Pass	
5th order	202.232	24.356	4918.556	60.002	0.987	-	Standby	-	
	202.219	24.376	4915.969	60.002	3.284	2.297	Operational	Pass	
6th order	202.260	24.361	4920.350	60.002	0.039	-	Standby	-	
	202.249	24.368	4918.891	60.002	2.281	2.242	Operational	Pass	
7th order	202.247	24.358	4919.343	60.002	0.722	-	Standby	-	
	202.232	24.373	4917.324	60.002	2.995	2.273	Operational	Pass	
THD	202.252	24.365	4920.826	60.002	1.754	-	Standby	-	
	202.225	24.391	4918.543	60.002	3.990	2.236	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)	Reactive Power 無効電力(var)	Harmonic Voltage Step 高調波電圧 ステップ(V)	Applied Voltage 印加電圧 (V)	Active state 能動状態	Pass / Fail 判定 no state change	Remarks 備考
2nd order	202.235	24.359	4919.163	60.002	-44.937	0.058	-	Standby	-	
	202.226	24.365	4919.072	60.002	-44.574	1.856	1.798	Standby	Pass	
3rd order	202.249	24.355	4918.676	60.002	-44.998	1.248	-	Standby	-	
	202.246	24.377	4916.884	60.002	-46.348	3.046	1.798	Standby	Pass	
4th order	202.232	24.356	4918.634	60.002	-45.121	0.031	-	Standby	-	
	202.225	24.361	4917.848	60.002	-45.519	1.885	1.854	Standby	Pass	
5th order	202.224	24.356	4918.475	60.002	-45.632	0.988	-	Standby	-	
	202.220	24.372	4916.906	60.002	-46.874	2.838	1.85	Standby	Pass	
6th order	202.225	24.365	4920.129	60.002	-45.525	0.023	-	Standby	-	
	202.219	24.369	4919.226	60.002	-46.124	1.863	1.84	Standby	Pass	
7th order	202.235	24.358	4918.949	60.002	-45.839	0.722	-	Standby	-	
	202.225	24.370	4917.916	60.002	-46.990	2.579	1.857	Standby	Pass	
THD	202.261	24.367	4921.561	60.002	-44.386	1.755	-	Standby	-	
	202.235	24.387	4919.136	60.002	-46.429	3.603	1.848	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
201.051	24.508	4920.423	60.003	Operational	-	-	
201.050	24.508	4920.377	60.022	Standby	0.551	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 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	6/3/2025