Test Report

CFR Title 47 Sections:

Part 2 (2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055)
Part 80 (80.209, 80.211, 80.213, 80.215)
Part 90 (90.205, 90.207, 90.209, 90.210, 90.213, 90.215, 90.248)

Trade Name : **FURUNO**
Model : **Transceiver for MARINE RADAR**
FAR-2028-NXT-MARK-2,
FAR-3025-NXT-MARK-2
Type : **RTR-137**

Report Number : LIC 12-25-088
Date of Issue : 28 November 2025

Labotech International Co., Ltd.

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Testing Laboratory Status

Labotech International Co., Ltd. (hereafter called "LIC") has been holding the following status after having been assessed according to the provisions of ISO/IEC 17025 and/or the relevant rules:

(1) JAB Accredited Testing Laboratory:
- accredited by Japan Accreditation Board (JAB)
- Laboratory accreditation number: RTL03220 (Date of initial accreditation: 14 January 2011 (*))
- Scope of accreditation: Electrical testing - EMC, Climatic, Vibration and Radio tests

(2) Kiwa Listed Testing Laboratory:
- listed by Kiwa Netherlands B.V., (The Netherlands)
- Laboratory assignment number: L116 (Date of initial listing: 26 July 1999 (*))
- for testing the following product categories/ test standards: EN 60945, IEC 61162-1/-2, IEC/EN 61162-450, IEC 62288, ETSI EN 301 843-1/-2, ETSI EN 301 489-1/-3 /-17

(3) TÜV Appointed EMC Test Laboratory:
- appointed by TÜV Rheinland Japan Ltd.
- Laboratory assignment number: UA 50046428 (Date of initial appointment: 21 December 1998 (*))
- for carrying out the tests of EMC emission and immunity

(4) RMRS Recognized Testing Laboratory:
- recognized by Russian Maritime Register of Shipping (Russia)
- Laboratory recognition number: 17.13259.170 (Date of initial recognition: 27 January 2009 (*))
- for carrying out testing in the field of:
  Electrical measurements and tests, EMC tests, Mechanical measurements and tests, Equipment protection degree tests, and Climatic tests for Ship's radio and navigational equipment and IEC 60945: 2002

(5) DNV Recognized Environmental Test Laboratory:
- recognized by Det Norske Veritas AS
- Recognition certificate number: 262.1-015854-J-12 (Date of initial recognition: 12 July 2013 (*))
- Scope of recognition: Testing according to the standards IEC 60945, IEC 61162-1/-2/-450, IEC 62288, IEC 62388 and IEC 62252 Annex E
- Application: Provisions of Environmental, interface and safety testing

(6) CCS Recognized Test Agency:
- recognized by China Classification Society
- Recognition certificate number: DB21PAA00001 (Date of initial recognition: 29 January 2014 (*))
- Scope of recognition: Performance/Environmental/EMC/Special purpose/Safety precautions tests for Electrical & Electronic Product including Maritime Navigation and Radio-communication Equipment & Systems

(7) A2LA accredited Testing Laboratory:
- accredited by American Association of Laboratory Accreditation (A2LA)
- Certificate number: 5241.01 (Date of initial accreditation: 17 July 2019 (*))
- Scope of accreditation: Electrical testing - Radio - Maritime Radio Systems, Stations in the maritime services, Private land mobile radio service, Radio / Intentional radiators, and RF Exposure

(*) The latest certification status may be found on the LIC website (https://www.labotech-intl.co.jp/).

1 Report Summary

LIC project number	:	LIC 04-25-0142
Customer	:	FURUNO ELECTRIC CO., LTD. 9-52 Ashihara-cho, Nishinomiya City, Hyogo. 662-8580, Japan
Manufacturer	:	FURUNO ELECTRIC CO., LTD. 9-52 Ashihara-cho, Nishinomiya City, Hyogo. 662-8580, Japan
Trade name	:	FURUNO
Model	:	Transceiver for MARINE RADAR FAR-2028-NXT-MARK-2, FAR-3025-NXT-MARK-2
Type	:	RTR-137
Serial number	:	See Clause 2.1 of this report.
Product function and intended use	:	Marine radar: CAT 1C, 2C/ 1HC, 2HC
Date of receipt of samples	:	26 August 2025
Test period	:	From 9 October 2025 to 12 November 2025
Test standard(s)/ Test specification(s)	:	CFR Title 47 Sections: 2.1046 - RF Power Output 2.1047 - Measurements required: Modulation Characteristics 2.1049 - Occupied Bandwidth 2.1051 - Spurious Emissions at Antenna Terminals 2.1053 - Field Strength of Spurious Radiation 2.1055 - Measurements required: Frequency Stability 80.209 - Transmitter frequency tolerances 80.211 - Emission limitations 80.213 - Modulation requirements 80.215 - Transmitter power 90.205 - Power and antenna height limits 90.207 - Types of emissions 90.209 - Bandwidth limitations 90.210 - Emission masks 90.213 - Frequency stability 90.215 - Transmitter measurement 90.248 - Wildlife and ocean buoy tracking (the latest version on the first day of the testing period)
Test results/Compliance	:	Passed. The test results of this report relate only to the samples tested.

Place of test : Labotech International Co., Ltd.
- LABOTECH EMC Center
FCC Test firm Designation Number: JP2007
FCC Test firm Registration Number: 838049
1-16, Fukazu-cho, Nishinomiya-shi, Hyogo, 663-8203 Japan

- Nishinomiya Lab.
FCC Test firm Designation Number: JP2010
FCC Test firm Registration Number: 696248
9-52 Ashihara-cho, Nishinomiya-shi, Hyogo, 662-8580 Japan

Approved by : Yasuharu Nakamura
Title: Manager, Testing & Facilities Control Section, Technical Department,
Labotech International Co., Ltd.
Signature:

Approved Date : 28 November 2025

Note: The following abbreviations and symbols are used in this report.

--	None
NA	Not applicable
NP	Not performed
P	Power
S	Signal/control

Revision History

Version	Date	Page	Item	Description/ Reason of the change
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Disclaimer:
Information in Clause 2 and information of the cable(s) used on this report have been provided by the customer. LIC would not be responsible for this information and the test results, if the test results were affected by the information provided by the customer.

2 Principal Information

2.1 Equipment under test (EUT)

2.1.1 General

(a) Trade name: FURUNO

(b) Manufacturer: FURUNO ELECTRIC CO., LTD.
9-52 Ashihara-cho, Nishinomiya City, Hyogo. 662-8580, Japan

(c) Model: Transceiver for Marine Radar FAR-2028-NXT-MARK-2/FAR-3025-NXT-MARK-2

Name	Type	Serial number	Note
MARINE RADAR ANTENNA UNIT	RSB-146-137	R000-3200-0006	--
Transceiver	RTR-137	No.1	Installed in RSB-146-137.
Performance monitor	PM-32B	No.1	
Scanner	RSB-146	No.1	
DE-ICER	CP03-274	No.1	
ANTENNA RADIATOR	XN12AF	A010-6064	One (1) selectable
ANTENNA RADIATOR	XN20AF	A024-3942	
ANTENNA RADIATOR	XN24AF	A031-3114	

Associated units (AU)

Name	Type	Serial number	Manufacturer
MARINE RADAR PROCESSOR UNIT	RPU-025	1000-7910-0063	Furuno
CONTROL UNIT	RCU-014	100068	Furuno
MONITOR UNIT	MU-192HD	1001-57 9002	Furuno

Auxiliary Equipment (AE)

Name	Type	Serial number	Manufacturer
PC	CF-FV1RDAAS	3LKSA57001	Panasonic
CONTROL UNIT	RCU-029	000011	Furuno
DISPLAY UNIT	RDP-155	1000-5900-0008	Furuno
AC/DC POWER SUPPLY UNIT	PR-241	109710	Furuno
Dummy load	4D376	R27200006	SPC
DC POWER SUPPLY UNIT	HRP-200-24	EB92939675	MEAN WELL

(d) FCC ID: ADB9ZWRTR137

(e) Primary function: Ship radar station operating in the band 9300–9500 MHz

(f) Frequency range: Fixed frequency, 9403.75 – 9433.75 MHz

(g) Type of emission: P0N/Q0N

(h) Occupied bandwidth:

Pulse type			S1	S2	M1	M2	M3	L
Occupied bandwidth (MHz)	TT24NM	ch1(P0N)	38.375	27.936	20.268	14.360	11.009	9.003
		ch1(Q0N)	9.201	9.007	8.891	6.350	6.335	6.242
		ch2(P0N)	38.497	27.662	20.011	14.147	10.735	8.866
		ch2(Q0N)	9.202	8.975	8.881	6.321	6.327	6.183
	TT32NM	ch1(P0N)	38.280	27.979	20.312	14.386	11.014	9.021
		ch1(Q0N)	9.219	9.009	8.847	6.348	6.334	6.235
		ch2(P0N)	38.392	27.638	20.012	14.184	10.758	8.813
		ch2(Q0N)	9.213	8.983	8.873	6.328	6.321	6.188
	2nd Trace	ch1(P0N)	38.285	27.911	20.262	14.342	11.114	9.121
		ch1(Q0N)	9.218	8.985	8.875	6.332	6.340	6.229
		ch2(P0N)	38.378	27.644	19.930	14.115	11.189	8.948
		ch2(Q0N)	9.209	9.030	8.908	6.337	6.346	6.235

Note: measured data

(i) Size and mass: 1260 mm (W) × 570 mm (H) × 449 mm (D), 38 kg (*1)
2040 mm (W) × 570 mm (H) × 449 mm (D), 43 kg (*2)
2550 mm (W) × 570 mm (H) × 449 mm (D), 45 kg (*3)
(*1) with ANTENNA RADIATOR (Type: XN12AF) installed.
(*2) with ANTENNA RADIATOR (Type: XN20AF) installed.
(*3) with ANTENNA RADIATOR (Type: XN24AF) installed.

(j) Power supply: 100-230 VAC, 50-60 Hz (*)
(*) Powered from MARINE RADAR PROCESSOR UNIT (AU), not directly from AC mains.

2.1.2 Transceiver module

Type: RTR-137 (Contained in MARINE RADAR ANTENNA UNIT)

2.1.2.1 Transmitter

(a) Assignable frequency band: Between 9300 and 9500 MHz (CFR Title 47 Sections: 80.375 (d)-(1))

(b) Type of RF generator:
- Magnetron type: Solid-state device (no magnetron)
- Peak output power: 600 W nominal
- Fundamental frequency: ch1: P0N 9403.75 MHz/ Q0N 9423.75 MHz
  ch2: P0N 9413.75 MHz/ Q0N 9433.75 MHz
- Manufacturing: ± 0.5 MHz
- Pulling: 0.5 MHz
- Tolerance for 20°C temperature variation: -1.0 MHz

(c) Pulse characteristics:

Pulse type		S1	S2	M1	M2	M3	L
Pulse length (μs)	P0N	0.07	0.137	0.286	0.489	0.686	1.187
	Q0N	4.68	7.02	11.7	16.38	17.13	20.59
PRF (Hz)	TT24NM (Normal mode)	1500	1500	1200	1000	1000	600
	TT32NM	1200	1200	1200	1000	1000	600
	2nd trace	1000	1000	600	600	600	450

2.1.2.2 Modulator

(a) FET Type: GaN
Trigger Voltage: Approx. 5 VDC positive

2.1.2.3 Receiver

(a) Passband

RF Stage: 300 MHz

IF Stage: 60 MHz

(b) Intermediate Frequency: P0N: 83.75 MHz / Q0N: 103.75 MHz

(c) Gain (overall): Approximately 35 dB

(d) Overall Noise Figure: 4.0 dB (typical)

(e) Video Output Voltage: ±1 V

(f) Features Provided: Sensitivity Time Controls (Anti-clutter Sea),
Fast Time Constant (Anti-clutter Rain)

(g) If receiver is tunable, describe method for adjusting frequency: Phase locked loop

(h) Frequency adjustable range: Phase locked loop

2.1.3 Antenna and Scanner

(a) Antenna specifications

Antenna model		XN12AF	XN20AF	XN24AF
Length (mm)		1260	2040	2550
Rotation diameter (mm)		1400	2200	2700
Transmission frequency		9410±30 MHz		
Horizontal beam width (-3 dB)		1.9°	1.23°	0.95°
Vertical beam width (-3 dB)		20°		
Side lobe (max.)	Less than ±10°	-24 dB	-28 dB	-28 dB
	Outside ±10°	-30 dB	-32 dB	-32 dB
Gain		27.5 dBi	30.0 dBi	31.0 dBi
Radiator		Slot array		
Polarization		Horizontal		
Type of Beam		Vertical fan		

(b) Antenna Rotation ON-OFF Switch: Provided

(c) Scanning (rotating or oscillating): Rotating over 360° continuously clockwise

(d) Antenna Rotation Rate: 24/36/42 rpm

(e) Sector Scan: Provided

(f) Rated Loss of Transmission Line per 100 Feet: Negligible (Transmission path is only in Radar Sensor.)

2.1.4 Operational Features

(a) Is positive means provided to indicate whether or not the overall operation of the equipment is such that it may be relied upon to provide effective operation in accordance with its primary function:
Yes (Hardware alarms)

(b) Is the equipment for continuous operation: Yes

(c) Is provision made for operation with shore based radar beacons (RACONS): Yes (RACONS)

2.1.5 Construction Features

(a) Does equipment embody replacement units with chassis type assembly: Yes

(b) Are fuse alarms provided: No

(c) State units that are weatherproof: MARINE RADAR ANTENNA UNIT (IEC 60529 – IP56)

(d) If all units are not housed in a single container, indicate number and give description of individual units: See Clause 2.1.1 (c) of this report.

(e) Approximate space required for installation excluding Antenna Unit: Not applicable

2.2 Observation and comments

(1) Test items test conditions to be applied were specified by the customer.

2.3 Modification made to the EUT

No modifications were made to the EUT during testing.

3 Test Results Summary

Clause number of this report	CFR Title 47 Sections	Item	Result	Test engineer
4.1	2.1046 (a) 80.215 90.205 (s)	RF Power Output	Passed.	Y. Hijiri
4.2	2.201 2.1047 (d) 90.207	Modulation Characteristics	Passed.	Y. Hijiri
4.3	2.1055 (a)(2),(d)(1),(d)(3) 80.209 (b) 90.213 90.248	Frequency Stability –temperature & voltage variation	Passed.	Y. Hijiri
4.4	2.202 (a) 2.1049 (c)(1) 80.209 (b) 80.211 (f) 90.210 (b)	Occupied Bandwidth	Passed.	Y. Hijiri
4.5	2.1051 80.211 (f) 80.273 90.210 90.215	Spurious Emissions at Antenna Terminals	Passed.	Y. Hijiri
4.6	2.1053 80.211 (f) 90.210 90.215	Field Strength of Spurious Radiation	Passed.	Y. Hijiri

4 Test Results

4.1 RF Power Output

4.1.1 Test conditions:

For all TX (S1/S2/M1/M2/M3/L) pulses, the transmitter output power was measured at the antenna port with a non-reflective load as a substitute for the antenna.

4.1.2 Test setup:

See Clause 5.

4.1.3 Test results:

Complied.

ch1, P0N

TT24NM mode (Normal mode)

Pulse type	S1	S2	M1	M2	M3	L
Transmission mean power Pm (W)	0.055	0.103	0.168	0.234	0.337	0.348
Pulse length *T* (μs) (50% points)	0.074	0.145	0.296	0.492	0.694	1.196
Pulse Repetition Frequency PRF (Hz)	1500.0	1500.0	1200.0	1000.0	1000.0	600.1
Transmission pulse power Pp (W) (*)	495.0	472.0	473.8	475.7	485.0	485.1

TT32NM mode

Pulse type	S1	S2	M1	M2	M3	L
Transmission mean power Pm (W)	0.042	0.081	0.168	0.234	0.337	0.349
Pulse length *T* (μs) (50% points)	0.072	0.145	0.296	0.492	0.694	1.196
Pulse Repetition Frequency PRF (Hz)	1200.0	1200.0	1200.0	1000.0	1000.0	600.0
Transmission pulse power Pp (W) (*)	484.2	466.8	473.8	475.7	485.0	486.5

2nd trace mode

Pulse type	S1	S2	M1	M2	M3	L
Transmission mean power Pm (W)	0.034	0.067	0.081	0.138	0.199	0.260
Pulse length *T* (μs) (50% points)	0.073	0.146	0.294	0.494	0.696	1.198
Pulse Repetition Frequency PRF (Hz)	1000.0	1000.0	600.0	600.0	600.0	450.0
Transmission pulse power Pp (W) (*)	463.8	457.0	458.9	466.6	477.1	482.6

ch1, Q0N

TT24NM mode (Normal mode)

Pulse type	S1	S2	M1	M2	M3	L
Transmission mean power Pm (W)	3.313	5.018	5.066	6.471	6.481	5.900
Pulse length *T* (μs) (50% points)	4.680	7.000	8.840	13.560	13.600	20.600
Pulse Repetition Frequency PRF (Hz)	1500.0	1500.0	1200.0	1000.0	1000.0	600.0
Transmission pulse power Pp (W) (*)	471.9	477.9	477.6	477.2	476.5	477.3

TT32NM mode

Pulse type	S1	S2	M1	M2	M3	L
Transmission mean power Pm (W)	2.654	3.991	5.057	6.471	6.471	5.890
Pulse length *T* (μs) (50% points)	4.680	7.000	8.880	13.560	13.560	20.560
Pulse Repetition Frequency PRF (Hz)	1200.0	1200.0	1200.0	1000.0	1000.0	600.0
Transmission pulse power Pp (W) (*)	472.6	475.1	474.5	477.2	477.2	477.5

2nd trace mode

Pulse type	S1	S2	M1	M2	M3	L
Transmission mean power Pm (W)	2.209	3.323	2.519	3.885	3.885	4.437
Pulse length *T* (μs) (50% points)	4.680	6.980	8.860	13.560	13.520	20.560
Pulse Repetition Frequency PRF (Hz)	1000.0	1000.0	600.0	600.1	600.0	450.0
Transmission pulse power Pp (W) (*)	471.9	476.0	473.8	477.4	478.9	479.5

ch2, P0N

TT24NM mode (Normal mode)

Pulse type	S1	S2	M1	M2	M3	L
Transmission mean power Pm (W)	0.053	0.101	0.164	0.229	0.329	0.341
Pulse length *T* (μs) (50% points)	0.071	0.144	0.293	0.493	0.692	1.196
Pulse Repetition Frequency PRF (Hz)	1500.0	1500.0	1200.0	1000.0	1000.0	600.0
Transmission pulse power Pp (W) (*)	491.8	465.8	467.7	465.1	475.3	475.9

TT32NM mode

Pulse type	S1	S2	M1	M2	M3	L
Transmission mean power Pm (W)	0.041	0.079	0.163	0.229	0.329	0.341
Pulse length *T* (μs) (50% points)	0.072	0.144	0.294	0.493	0.694	1.196
Pulse Repetition Frequency PRF (Hz)	1200.0	1200.0	1200.0	1000.0	1000.0	600.0
Transmission pulse power Pp (W) (*)	467.7	456.1	463.4	465.1	473.9	475.9

2nd trace mode

Pulse type	S1	S2	M1	M2	M3	L
Transmission mean power Pm (W)	0.033	0.065	0.079	0.134	0.195	0.254
Pulse length *T* (μs) (50% points)	0.072	0.144	0.294	0.491	0.694	1.196
Pulse Repetition Frequency PRF (Hz)	1000.0	1000.0	600.0	600.0	600.0	450.0
Transmission pulse power Pp (W) (*)	458.0	451.4	447.5	456.4	469.3	472.7

ch2, Q0N

TT24NM mode (Normal mode)

Pulse type	S1	S2	M1	M2	M3	L
Transmission mean power Pm (W)	3.244	4.885	4.943	6.342	6.342	5.769
Pulse length *T* (μs) (50% points)	4.680	7.000	8.860	13.600	13.600	20.600
Pulse Repetition Frequency PRF (Hz)	1500.0	1500.0	1199.9	1000.0	1000.0	600.0
Transmission pulse power Pp (W) (*)	462.1	465.2	465.0	466.3	466.3	466.7

TT32NM mode

Pulse type	S1	S2	M1	M2	M3	L
Transmission mean power Pm (W)	2.603	3.904	4.953	6.342	6.332	5.769
Pulse length *T* (μs) (50% points)	4.640	7.000	8.860	13.600	13.560	20.560
Pulse Repetition Frequency PRF (Hz)	1200.0	1201.0	1201.0	1000.0	1000.0	600.0
Transmission pulse power Pp (W) (*)	467.5	464.4	465.5	466.3	467.0	467.6

2nd trace mode

Pulse type	S1	S2	M1	M2	M3	L
Transmission mean power Pm (W)	2.166	3.253	2.467	3.797	3.797	4.341
Pulse length *T* (μs) (50% points)	4.680	7.020	8.840	13.600	13.560	20.560
Pulse Repetition Frequency PRF (Hz)	1000.0	1000.0	600.0	599.9	599.9	450.0
Transmission pulse power Pp (W) (*)	462.8	463.5	465.1	465.4	466.8	469.2

(*) P_p (kW) = (P_m (W) / (*T* (μs) × *PRF* (Hz))) × 1000000

where,

P_m (W) = AV measurement (mW) × $10^{(\text{pathloss (dB)} / 10)}$ / 1000

Environmental conditions observed: On 17 October 2025, 23°C to 22°C, 65%RH to 65%RH
On 20 October 2025, 22°C to 23°C, 64%RH to 59%RH
On 21 October 2025, 23°C to 23°C, 45%RH to 39%RH
On 22 October 2025, 23°C to 23°C, 41%RH to 46%RH

Power supply voltage measured: 100 VAC, 60 Hz to 100 VAC, 60 Hz (*)
(*) The power supplied to MARINE RADAR PROCESSOR UNIT (AU).

4.2 Modulation Characteristics

4.2.1 Test conditions:

The RF envelope of the output pulse was measured with an envelope detector and an oscilloscope.

4.2.2 Test setup:

See Clause 5.

4.2.3 Test results:

Complied.

ch1, P0N

TT24NM mode (Normal mode)

Pulse type	S1	S2	M1	M2	M3	L
Pulse length T (μs) (50% points)	0.074	0.145	0.296	0.492	0.694	1.196
Rise time t_r (μs) (10 to 90 % amplitude)	0.034	0.030	0.030	0.032	0.029	0.029
Decay time t_f (μs) (90 to 10 % amplitude)	0.030	0.030	0.029	0.033	0.030	0.032
Pulse Repetition Frequency PRF (Hz)	1500.0	1500.0	1200.0	1000.0	1000.0	600.1

TT32NM mode

Pulse type	S1	S2	M1	M2	M3	L
Pulse length T (μs) (50% points)	0.072	0.145	0.296	0.492	0.694	1.196
Rise time t_r (μs) (10 to 90 % amplitude)	0.034	0.029	0.030	0.031	0.030	0.029
Decay time t_f (μs) (90 to 10 % amplitude)	0.030	0.028	0.029	0.032	0.031	0.032
Pulse Repetition Frequency PRF (Hz)	1200.0	1200.0	1200.0	1000.0	1000.0	600.0

2nd trace mode

Pulse type	S1	S2	M1	M2	M3	L
Pulse length T (μs) (50% points)	0.073	0.146	0.294	0.494	0.696	1.198
Rise time t_r (μs) (10 to 90 % amplitude)	0.033	0.029	0.030	0.032	0.030	0.029
Decay time t_f (μs) (90 to 10 % amplitude)	0.030	0.029	0.029	0.035	0.030	0.030
Pulse Repetition Frequency PRF (Hz)	1000.0	1000.0	600.0	600.0	600.0	450.0

ch1, Q0N

TT24NM mode (Normal mode)

Pulse type	S1	S2	M1	M2	M3	L
Pulse length T (μs) (50% points)	4.680	7.000	8.840	13.560	13.600	20.600
Rise time t_r (μs) (10 to 90 % amplitude)	0.132	0.212	0.782	0.392	0.384	0.564
Decay time t_f (μs) (90 to 10 % amplitude)	0.116	0.176	0.238	0.374	0.356	0.536
Pulse Repetition Frequency PRF (Hz)	1500.0	1500.0	1200.0	1000.0	1000.0	600.0

TT32NM mode

Pulse type	S1	S2	M1	M2	M3	L
Pulse length T (μs) (50% points)	4.680	7.000	8.880	13.560	13.560	20.560
Rise time t_r (μs) (10 to 90 % amplitude)	0.320	0.244	0.320	0.380	0.364	0.596
Decay time t_f (μs) (90 to 10 % amplitude)	0.122	0.178	0.224	0.352	0.336	0.550
Pulse Repetition Frequency PRF (Hz)	1200.0	1200.0	1200.0	1000.0	1000.0	600.0

2nd trace mode

Pulse type	S1	S2	M1	M2	M3	L
Pulse length T (μs) (50% points)	4.680	6.980	8.860	13.560	13.520	20.560
Rise time t_r (μs) (10 to 90 % amplitude)	0.198	0.246	0.304	0.356	0.368	0.552
Decay time t_f (μs) (90 to 10 % amplitude)	0.117	0.177	0.221	0.340	0.336	0.520
Pulse Repetition Frequency PRF (Hz)	1000.0	1000.0	600.0	600.1	600.0	450.0

ch2, P0N

TT24NM mode (Normal mode)

Pulse type	S1	S2	M1	M2	M3	L
Pulse length T (μs) (50% points)	0.071	0.144	0.293	0.493	0.692	1.196
Rise time t_r (μs) (10 to 90 % amplitude)	0.032	0.028	0.028	0.030	0.029	0.029
Decay time t_f (μs) (90 to 10 % amplitude)	0.030	0.030	0.028	0.032	0.032	0.033
Pulse Repetition Frequency PRF (Hz)	1500.0	1500.0	1200.0	1000.0	1000.0	600.0

TT32NM mode

Pulse type	S1	S2	M1	M2	M3	L
Pulse length T (μs) (50% points)	0.072	0.144	0.294	0.493	0.694	1.196
Rise time t_r (μs) (10 to 90 % amplitude)	0.033	0.028	0.029	0.030	0.029	0.029
Decay time t_f (μs) (90 to 10 % amplitude)	0.030	0.031	0.029	0.034	0.031	0.033
Pulse Repetition Frequency PRF (Hz)	1200.0	1200.0	1200.0	1000.0	1000.0	600.0

2nd trace mode

Pulse type	S1	S2	M1	M2	M3	L
Pulse length T (μs) (50% points)	0.072	0.144	0.294	0.491	0.694	1.196
Rise time t_r (μs) (10 to 90 % amplitude)	0.033	0.028	0.029	0.031	0.030	0.028
Decay time t_f (μs) (90 to 10 % amplitude)	0.031	0.030	0.030	0.034	0.031	0.032
Pulse Repetition Frequency PRF (Hz)	1000.0	1000.0	600.0	600.0	600.0	450.0

ch2, Q0N

TT24NM mode (Normal mode)

Pulse type	S1	S2	M1	M2	M3	L
Pulse length T (μs) (50% points)	4.680	7.000	8.860	13.600	13.600	20.600
Rise time t_r (μs) (10 to 90 % amplitude)	0.159	0.232	0.816	0.370	0.362	0.608
Decay time t_f (μs) (90 to 10 % amplitude)	0.112	0.173	0.237	0.350	0.330	0.556
Pulse Repetition Frequency PRF (Hz)	1500.0	1500.0	1199.9	1000.0	1000.0	600.0

TT32NM mode

Pulse type	S1	S2	M1	M2	M3	L
Pulse length T (μs) (50% points)	4.640	7.000	8.860	13.600	13.560	20.560
Rise time t_r (μs) (10 to 90 % amplitude)	0.588	0.272	0.872	0.370	0.396	0.568
Decay time t_f (μs) (90 to 10 % amplitude)	0.121	0.176	0.226	0.346	0.348	0.502
Pulse Repetition Frequency PRF (Hz)	1200.0	1201.0	1201.0	1000.0	1000.0	600.0

2nd trace mode

Pulse type	S1	S2	M1	M2	M3	L
Pulse length T (μs) (50% points)	4.680	7.020	8.840	13.600	13.560	20.560
Rise time t_r (μs) (10 to 90 % amplitude)	0.185	0.224	0.344	0.364	0.368	0.556
Decay time t_f (μs) (90 to 10 % amplitude)	0.119	0.169	0.227	0.338	0.348	0.528
Pulse Repetition Frequency PRF (Hz)	1000.0	1000.0	600.0	599.9	599.9	450.0

Measured Plots: See Clause 7.

Environmental conditions observed: On 20 October 2025, 22°C to 23°C, 64%RH to 59%RH
On 21 October 2025, 23°C to 23°C, 45%RH to 39%RH
On 22 October 2025, 23°C to 23°C, 41%RH to 46%RH

Power supply voltage measured: 100 VAC, 60 Hz to 100 VAC, 60 Hz (*)
(*) The power supplied to MARINE RADAR PROCESSOR UNIT (AU).

4.3 Frequency Stability –temperature & voltage variation

4.3.1 Test conditions:

(1) Radar transmitter settings: All TX (S1/S2/M1/M2/M3/L) pulses

(2) Ambient temperature settings: -30°C to +50°C (10°C interval)

(3) Power supply voltage settings: 85/100/115% of nominal voltage:

MARINE RADAR PROCESSOR UNIT (AU): 100 VAC – 230 VAC

V_L: 85 VAC / V_{nom}: 100 VAC / V_H: 264.5 VAC

4.3.2 Test setup:

See Clause 5.

4.3.3 Frequency tolerance limits:

ch1, P0N

TT24NM mode

Pulse type	S1	S2	M1	M2	M3	L
Guard Band f(1.5/T) (MHz) (*1)	20.4	10.4	5.1	3.0	2.2	1.3
Upper limit (MHz) (*2)	9479.6	9489.6	9494.9	9497.0	9497.8	9498.7
Lower limit (MHz) (*2)	9320.4	9310.4	9305.1	9303.0	9302.2	9301.3

TT32NM mode

Pulse type	S1	S2	M1	M2	M3	L
Guard Band f(1.5/T) (MHz) (*1)	20.7	10.3	5.1	3.0	2.2	1.3
Upper limit (MHz) (*2)	9479.3	9489.7	9494.9	9497.0	9497.8	9498.7
Lower limit (MHz) (*2)	9320.7	9310.3	9305.1	9303.0	9302.2	9301.3

2nd trace mode

Pulse type	S1	S2	M1	M2	M3	L
Guard Band f(1.5/T) (MHz) (*1)	20.5	10.3	5.1	3.0	2.2	1.3
Upper limit (MHz) (*2)	9479.5	9489.7	9494.9	9497.0	9497.8	9498.7
Lower limit (MHz) (*2)	9320.5	9310.3	9305.1	9303.0	9302.2	9301.3

ch1, Q0N

TT24NM mode

Pulse type	S1	S2	M1	M2	M3	L
Guard Band f(1.5/T) (MHz) (*1)	0.3	0.2	0.2	0.1	0.1	0.1
Upper limit (MHz) (*2)	9499.7	9499.8	9499.8	9499.9	9499.9	9499.9
Lower limit (MHz) (*2)	9300.3	9300.2	9300.2	9300.1	9300.1	9300.1

TT32NM mode

Pulse type	S1	S2	M1	M2	M3	L
Guard Band f(1.5/T) (MHz) (*1)	0.3	0.2	0.2	0.1	0.1	0.1
Upper limit (MHz) (*2)	9499.7	9499.8	9499.8	9499.9	9499.9	9499.9
Lower limit (MHz) (*2)	9300.3	9300.2	9300.2	9300.1	9300.1	9300.1

2nd trace mode

Pulse type	S1	S2	M1	M2	M3	L
Guard Band f(1.5/T) (MHz) (*1)	0.3	0.2	0.2	0.1	0.1	0.1
Upper limit (MHz) (*2)	9499.7	9499.8	9499.8	9499.9	9499.9	9499.9
Lower limit (MHz) (*2)	9300.3	9300.2	9300.2	9300.1	9300.1	9300.1

ch2, P0N

TT24NM mode

Pulse type	S1	S2	M1	M2	M3	L
Guard Band f(1.5/T) (MHz) (*1)	21.1	10.4	5.1	3.0	2.2	1.3
Upper limit (MHz) (*2)	9478.9	9489.6	9494.9	9497.0	9497.8	9498.7
Lower limit (MHz) (*2)	9321.1	9310.4	9305.1	9303.0	9302.2	9301.3

TT32NM mode

Pulse type	S1	S2	M1	M2	M3	L
Guard Band f(1.5/T) (MHz) (*1)	20.7	10.4	5.1	3.0	2.2	1.3
Upper limit (MHz) (*2)	9479.3	9489.6	9494.9	9497.0	9497.8	9498.7
Lower limit (MHz) (*2)	9320.7	9310.4	9305.1	9303.0	9302.2	9301.3

2nd trace mode

Pulse type	S1	S2	M1	M2	M3	L
Guard Band f(1.5/T) (MHz) (*1)	20.9	10.4	5.1	3.1	2.2	1.3
Upper limit (MHz) (*2)	9479.1	9489.6	9494.9	9496.9	9497.8	9498.7
Lower limit (MHz) (*2)	9320.9	9310.4	9305.1	9303.1	9302.2	9301.3

ch2, Q0N

TT24NM mode

Pulse type	S1	S2	M1	M2	M3	L
Guard Band f(1.5/T) (MHz) (*1)	0.3	0.2	0.2	0.1	0.1	0.1
Upper limit (MHz) (*2)	9499.7	9499.8	9499.8	9499.9	9499.9	9499.9
Lower limit (MHz) (*2)	9300.3	9300.2	9300.2	9300.1	9300.1	9300.1

TT32NM mode

Pulse type	S1	S2	M1	M2	M3	L
Guard Band f(1.5/T) (MHz) (*1)	0.3	0.2	0.2	0.1	0.1	0.1
Upper limit (MHz) (*2)	9499.7	9499.8	9499.8	9499.9	9499.9	9499.9
Lower limit (MHz) (*2)	9300.3	9300.2	9300.2	9300.1	9300.1	9300.1

2nd trace mode

Pulse type	S1	S2	M1	M2	M3	L
Guard Band f(1.5/T) (MHz) (*1)	0.3	0.2	0.2	0.1	0.1	0.1
Upper limit (MHz) (*2)	9499.7	9499.8	9499.8	9499.9	9499.9	9499.9
Lower limit (MHz) (*2)	9300.3	9300.2	9300.2	9300.1	9300.1	9300.1

(*1) Guard Band is specified to be equal to 1.5/T MHz, where "T" is the pulse length in microseconds.
(CFR Title 47 Sections: 80.209 (b))

(*2) Upper limit frequency, f(U) = 9500 -1.5/T
Lower limit frequency, f(L) = 9300 +1.5/T

4.3.4 Test results:

Complied.

(1) Temperature test at the rated supply voltage of 100 VAC, 60 Hz:

ch1, P0N

TT24NM mode

Pulse type		S1	S2	M1	M2	M3	L
Frequency at maximum emission (MHz)	-30°C	9404.0	9404.0	9403.9	9403.8	9403.9	9403.9
	-20°C	9404.0	9403.9	9403.9	9403.9	9403.9	9403.9
	-10°C	9403.9	9404.0	9403.9	9403.9	9403.9	9403.8
	0°C	9403.7	9403.9	9403.8	9403.8	9403.8	9403.8
	+10°C	9403.8	9403.7	9403.7	9403.8	9403.8	9403.8
	+20°C	9403.5	9403.9	9403.8	9403.8	9403.8	9403.8
	+30°C	9403.4	9403.7	9403.6	9403.7	9403.7	9403.7
	+40°C	9403.2	9403.6	9403.7	9403.7	9403.7	9403.7
	+50°C	9403.6	9403.6	9403.7	9403.7	9403.7	9403.7
	Result	Complied.	Complied.	Complied.	Complied.	Complied.	Complied.

TT32NM mode

Pulse type		S1	S2	M1	M2	M3	L
Frequency at maximum emission (MHz)	-30°C	9404.0	9404.0	9403.8	9403.9	9403.9	9403.9
	-20°C	9404.1	9403.9	9403.8	9403.9	9403.9	9403.9
	-10°C	9404.0	9403.8	9403.8	9403.8	9403.9	9403.8
	0°C	9403.8	9403.8	9403.7	9403.8	9403.8	9403.8
	+10°C	9403.7	9403.8	9403.8	9403.8	9403.8	9403.8
	+20°C	9403.7	9403.7	9403.7	9403.7	9403.7	9403.8
	+30°C	9403.6	9403.6	9403.6	9403.7	9403.7	9403.7
	+40°C	9403.2	9403.7	9403.7	9403.7	9403.7	9403.7
	+50°C	9403.1	9403.5	9403.7	9403.6	9403.6	9403.7
	Result	Complied.	Complied.	Complied.	Complied.	Complied.	Complied.

2nd trace mode

Pulse type		S1	S2	M1	M2	M3	L
Frequency at maximum emission (MHz)	-30°C	9404.0	9404.0	9403.9	9403.9	9403.9	9403.9
	-20°C	9403.8	9403.9	9403.9	9403.8	9403.9	9403.9
	-10°C	9403.8	9404.0	9403.9	9403.9	9403.9	9403.8
	0°C	9404.0	9403.8	9403.8	9403.8	9403.8	9403.8
	+10°C	9403.7	9403.8	9403.8	9403.8	9403.8	9403.8
	+20°C	9403.1	9403.5	9403.8	9403.8	9403.7	9403.8
	+30°C	9403.6	9403.6	9403.7	9403.7	9403.7	9403.7
	+40°C	9403.5	9403.6	9403.7	9403.7	9403.7	9403.7
	+50°C	9403.4	9403.5	9403.7	9403.6	9403.6	9403.7
	Result	Complied.	Complied.	Complied.	Complied.	Complied.	Complied.

ch1, Q0N
TT24NM mode

Pulse type		S1	S2	M1	M2	M3	L
Frequency at maximum emission (MHz)	-30°C	9423.9	9423.9	9423.9	9423.9	9423.9	9423.9
	-20°C	9423.9	9423.9	9423.9	9423.9	9423.9	9423.9
	-10°C	9423.9	9423.9	9423.9	9423.9	9423.9	9423.9
	0°C	9423.8	9423.9	9423.9	9423.8	9423.9	9423.9
	+10°C	9423.8	9423.8	9423.8	9423.8	9423.8	9423.8
	+20°C	9423.8	9423.8	9423.8	9423.8	9423.8	9423.8
	+30°C	9423.7	9423.7	9423.8	9423.7	9423.7	9423.7
	+40°C	9423.7	9423.7	9423.7	9423.7	9423.7	9423.7
	+50°C	9423.7	9423.7	9423.7	9423.7	9423.7	9423.7
	Result	Complied.	Complied.	Complied.	Complied.	Complied.	Complied.

TT32NM mode

Pulse type		S1	S2	M1	M2	M3	L
Frequency at maximum emission (MHz)	-30°C	9423.9	9423.9	9423.9	9423.9	9423.9	9423.9
	-20°C	9423.9	9423.9	9423.9	9423.9	9423.9	9423.9
	-10°C	9423.9	9423.9	9423.9	9423.9	9423.9	9423.9
	0°C	9423.8	9423.9	9423.9	9423.8	9423.9	9423.9
	+10°C	9423.8	9423.8	9423.8	9423.8	9423.8	9423.8
	+20°C	9423.8	9423.8	9423.8	9423.8	9423.8	9423.8
	+30°C	9423.7	9423.7	9423.8	9423.7	9423.7	9423.7
	+40°C	9423.7	9423.7	9423.7	9423.7	9423.7	9423.7
	+50°C	9423.7	9423.7	9423.7	9423.7	9423.7	9423.7
	Result	Complied.	Complied.	Complied.	Complied.	Complied.	Complied.

2nd trace mode

Pulse type		S1	S2	M1	M2	M3	L
Frequency at maximum emission (MHz)	-30°C	9423.9	9423.9	9423.9	9423.9	9423.9	9423.9
	-20°C	9423.9	9423.9	9423.9	9423.9	9423.9	9423.9
	-10°C	9423.9	9423.9	9423.9	9423.9	9423.9	9423.9
	0°C	9423.8	9423.9	9423.9	9423.8	9423.9	9423.9
	+10°C	9423.8	9423.8	9423.8	9423.8	9423.8	9423.8
	+20°C	9423.8	9423.8	9423.8	9423.8	9423.8	9423.8
	+30°C	9423.7	9423.7	9423.7	9423.7	9423.7	9423.7
	+40°C	9423.7	9423.7	9423.7	9423.7	9423.7	9423.7
	+50°C	9423.7	9423.7	9423.7	9423.7	9423.7	9423.7
	Result	Complied.	Complied.	Complied.	Complied.	Complied.	Complied.

ch2, P0N
TT24NM mode

Pulse type		S1	S2	M1	M2	M3	L
Frequency at maximum emission (MHz)	-30°C	9413.9	9413.8	9413.9	9413.9	9413.8	9413.9
	-20°C	9413.8	9413.9	9413.8	9413.9	9413.9	9413.9
	-10°C	9413.8	9413.9	9413.8	9413.8	9413.9	9413.9
	0°C	9413.7	9413.8	9413.8	9413.8	9413.8	9413.8
	+10°C	9413.8	9413.8	9413.8	9413.8	9413.8	9413.8
	+20°C	9413.3	9413.7	9413.8	9413.8	9413.8	9413.8
	+30°C	9413.5	9413.6	9413.7	9413.7	9413.7	9413.7
	+40°C	9413.3	9413.5	9413.6	9413.6	9413.7	9413.7
	+50°C	9413.0	9413.4	9413.6	9413.7	9413.7	9413.7
	Result	Complied.	Complied.	Complied.	Complied.	Complied.	Complied.

TT32NM mode

Pulse type		S1	S2	M1	M2	M3	L
Frequency at maximum emission (MHz)	-30°C	9414.0	9413.8	9413.9	9413.9	9413.9	9413.8
	-20°C	9413.9	9413.8	9413.9	9413.9	9413.9	9413.9
	-10°C	9413.8	9413.8	9413.8	9413.9	9413.8	9413.8
	0°C	9413.5	9413.5	9413.8	9413.8	9413.8	9413.8
	+10°C	9413.8	9413.8	9413.7	9413.8	9413.8	9413.8
	+20°C	9413.3	9413.7	9413.7	9413.8	9413.7	9413.7
	+30°C	9413.1	9413.5	9413.6	9413.7	9413.7	9413.7
	+40°C	9413.3	9413.5	9413.7	9413.7	9413.7	9413.7
	+50°C	9413.3	9413.5	9413.6	9413.7	9413.7	9413.7
	Result	Complied.	Complied.	Complied.	Complied.	Complied.	Complied.

2nd trace mode

Pulse type		S1	S2	M1	M2	M3	L
Frequency at maximum emission (MHz)	-30°C	9413.9	9413.9	9413.8	9413.9	9413.9	9413.9
	-20°C	9413.9	9413.9	9413.8	9413.8	9413.9	9413.9
	-10°C	9413.8	9413.8	9413.8	9413.8	9413.9	9413.8
	0°C	9413.5	9413.7	9413.8	9413.8	9413.8	9413.8
	+10°C	9413.5	9413.9	9413.8	9413.8	9413.8	9413.8
	+20°C	9413.9	9413.7	9413.7	9413.7	9413.8	9413.8
	+30°C	9413.3	9413.6	9413.7	9413.7	9413.7	9413.7
	+40°C	9413.2	9413.4	9413.6	9413.7	9413.7	9413.7
	+50°C	9413.3	9413.6	9413.6	9413.6	9413.6	9413.6
	Result	Complied.	Complied.	Complied.	Complied.	Complied.	Complied.

ch2, Q0N
TT24NM mode

Pulse type		S1	S2	M1	M2	M3	L
Frequency at maximum emission (MHz)	-30°C	9433.9	9433.9	9433.9	9433.9	9433.9	9433.9
	-20°C	9433.9	9433.9	9433.9	9433.9	9433.9	9433.9
	-10°C	9433.9	9433.9	9433.9	9433.9	9433.9	9433.9
	0°C	9433.9	9433.8	9433.8	9433.9	9433.9	9433.9
	+10°C	9433.8	9433.8	9433.8	9433.8	9433.8	9433.8
	+20°C	9433.8	9433.8	9433.8	9433.8	9433.8	9433.8
	+30°C	9433.7	9433.7	9433.7	9433.7	9433.7	9433.7
	+40°C	9433.7	9433.7	9433.7	9433.7	9433.7	9433.7
	+50°C	9433.7	9433.7	9433.7	9433.7	9433.7	9433.7
	Result	Complied.	Complied.	Complied.	Complied.	Complied.	Complied.

TT32NM mode

Pulse type		S1	S2	M1	M2	M3	L
Frequency at maximum emission (MHz)	-30°C	9433.9	9433.9	9433.9	9433.9	9433.9	9433.9
	-20°C	9433.9	9433.9	9433.9	9433.9	9433.9	9433.9
	-10°C	9433.9	9433.9	9433.9	9433.9	9433.9	9433.9
	0°C	9433.9	9433.8	9433.8	9433.9	9433.9	9433.9
	+10°C	9433.8	9433.8	9433.8	9433.8	9433.8	9433.8
	+20°C	9433.8	9433.8	9433.8	9433.8	9433.8	9433.8
	+30°C	9433.7	9433.7	9433.7	9433.7	9433.7	9433.7
	+40°C	9433.7	9433.7	9433.7	9433.7	9433.7	9433.7
	+50°C	9433.7	9433.7	9433.7	9433.7	9433.7	9433.7
	Result	Complied.	Complied.	Complied.	Complied.	Complied.	Complied.

2nd trace mode

Pulse type		S1	S2	M1	M2	M3	L
Frequency at maximum emission (MHz)	-30°C	9433.9	9433.9	9433.9	9433.9	9433.9	9433.9
	-20°C	9433.9	9433.9	9433.9	9433.9	9433.9	9433.9
	-10°C	9433.9	9433.9	9433.9	9433.9	9433.9	9433.9
	0°C	9433.9	9433.8	9433.8	9433.9	9433.9	9433.9
	+10°C	9433.8	9433.8	9433.8	9433.8	9433.8	9433.8
	+20°C	9433.8	9433.8	9433.8	9433.8	9433.8	9433.8
	+30°C	9433.7	9433.7	9433.7	9433.7	9433.7	9433.7
	+40°C	9433.7	9433.7	9433.7	9433.7	9433.7	9433.7
	+50°C	9433.7	9433.7	9433.7	9433.7	9433.7	9433.7
	Result	Complied.	Complied.	Complied.	Complied.	Complied.	Complied.

(2) Voltage variation test at the temperature of +20°C:
ch1, P0N
TT24NM mode

Pulse type		S1	S2	M1	M2	M3	L
Frequency at maximum emission (MHz)	V_L	9403.6	9403.7	9403.8	9403.8	9403.8	9403.8
	V_{nom}	9403.5	9403.9	9403.8	9403.8	9403.8	9403.8
	V_H	9403.8	9403.8	9403.7	9403.7	9403.7	9403.8
	Result	Complied.	Complied.	Complied.	Complied.	Complied.	Complied.

TT32NM mode

Pulse type		S1	S2	M1	M2	M3	L
Frequency at maximum emission (MHz)	V_L	9403.8	9403.6	9403.7	9403.8	9403.8	9403.7
	V_{nom}	9403.7	9403.7	9403.7	9403.7	9403.7	9403.8
	V_H	9403.8	9403.7	9403.8	9403.8	9403.7	9403.8
	Result	Complied.	Complied.	Complied.	Complied.	Complied.	Complied.

2nd trace mode

Pulse type		S1	S2	M1	M2	M3	L
Frequency at maximum emission (MHz)	V_L	9403.3	9403.7	9403.8	9403.7	9403.7	9403.8
	V_{nom}	9403.1	9403.5	9403.8	9403.8	9403.7	9403.8
	V_H	9403.8	9403.7	9403.8	9403.8	9403.8	9403.8
	Result	Complied.	Complied.	Complied.	Complied.	Complied.	Complied.

ch1, Q0N
TT24NM mode

Pulse type		S1	S2	M1	M2	M3	L
Frequency at maximum emission (MHz)	V_L	9423.8	9423.8	9423.8	9423.8	9423.8	9423.8
	V_{nom}	9423.8	9423.8	9423.8	9423.8	9423.8	9423.8
	V_H	9423.8	9423.8	9423.8	9423.8	9423.8	9423.8
	Result	Complied.	Complied.	Complied.	Complied.	Complied.	Complied.

TT32NM mode

Pulse type		S1	S2	M1	M2	M3	L
Frequency at maximum emission (MHz)	V_L	9423.8	9423.8	9423.8	9423.8	9423.8	9423.8
	V_{nom}	9423.8	9423.8	9423.8	9423.8	9423.8	9423.8
	V_H	9423.8	9423.8	9423.8	9423.8	9423.8	9423.8
	Result	Complied.	Complied.	Complied.	Complied.	Complied.	Complied.

2nd trace mode

Pulse type		S1	S2	M1	M2	M3	L
Frequency at maximum emission (MHz)	V_L	9423.8	9423.8	9423.8	9423.8	9423.8	9423.8
	V_{nom}	9423.8	9423.8	9423.8	9423.8	9423.8	9423.8
	V_H	9423.8	9423.8	9423.8	9423.8	9423.8	9423.8
	Result	Complied.	Complied.	Complied.	Complied.	Complied.	Complied.

ch2, P0N
TT24NM mode

Pulse type		S1	S2	M1	M2	M3	L
Frequency at maximum emission (MHz)	V_L	9413.4	9413.6	9413.8	9413.7	9413.8	9413.8
	V_{nom}	9413.3	9413.7	9413.8	9413.8	9413.8	9413.8
	V_H	9413.0	9413.5	9413.7	9413.8	9413.7	9413.8
	Result	Complied.	Complied.	Complied.	Complied.	Complied.	Complied.

TT32NM mode

Pulse type		S1	S2	M1	M2	M3	L
Frequency at maximum emission (MHz)	V_L	9413.4	9413.6	9413.7	9413.8	9413.7	9413.7
	V_{nom}	9413.3	9413.7	9413.7	9413.8	9413.7	9413.7
	V_H	9413.4	9413.7	9413.7	9413.8	9413.7	9413.8
	Result	Complied.	Complied.	Complied.	Complied.	Complied.	Complied.

2nd trace mode

Pulse type		S1	S2	M1	M2	M3	L
Frequency at maximum emission (MHz)	V_L	9413.6	9413.8	9413.7	9413.7	9413.7	9413.8
	V_{nom}	9413.9	9413.7	9413.7	9413.7	9413.8	9413.8
	V_H	9413.2	9413.7	9413.7	9413.8	9413.8	9413.8
	Result	Complied.	Complied.	Complied.	Complied.	Complied.	Complied.

ch2, Q0N
TT24NM mode

Pulse type		S1	S2	M1	M2	M3	L
Frequency at maximum emission (MHz)	V_L	9433.8	9433.8	9433.8	9433.8	9433.8	9433.8
	V_{nom}	9433.8	9433.8	9433.8	9433.8	9433.8	9433.8
	V_H	9433.8	9433.8	9433.8	9433.8	9433.8	9433.8
	Result	Complied.	Complied.	Complied.	Complied.	Complied.	Complied.

TT32NM mode

Pulse type		S1	S2	M1	M2	M3	L
Frequency at maximum emission (MHz)	V_L	9433.8	9433.8	9433.8	9433.8	9433.8	9433.8
	V_{nom}	9433.8	9433.8	9433.8	9433.8	9433.8	9433.8
	V_H	9433.8	9433.8	9433.8	9433.8	9433.8	9433.8
	Result	Complied.	Complied.	Complied.	Complied.	Complied.	Complied.

2nd trace mode

Pulse type		S1	S2	M1	M2	M3	L
Frequency at maximum emission (MHz)	V_L	9433.8	9433.8	9433.8	9433.8	9433.8	9433.8
	V_{nom}	9433.8	9433.8	9433.8	9433.8	9433.8	9433.8
	V_H	9433.8	9433.8	9433.8	9433.8	9433.8	9433.8
	Result	Complied.	Complied.	Complied.	Complied.	Complied.	Complied.

Environmental conditions observed: On 23 October 2025, 23°C to 22°C, 45%RH to 43%RH
On 27 October 2025, 22°C to 22°C, 54%RH to 46%RH
On 28 October 2025, 22°C to 21°C, 40%RH to 39%RH
On 29 October 2025, 22°C to 22°C, 37%RH to 37%RH
On 30 October 2025, 23°C to 23°C, 39%RH to 42%RH

Power supply voltage measured: 100 VAC, 60 Hz to 100 VAC, 60 Hz (*)
(*) The power supplied to MARINE RADAR PROCESSOR UNIT (AU).

4.4 Occupied Bandwidth

4.4.1 Test conditions:

For all TX (S1/S2/M1/M2/M3/L) pulses, the transmitter output power was measured at the antenna port with a non-reflective load as a substitute for the antenna.

4.4.2 Test setup:

See Clause 5.

4.4.3 Emission Limits (CFR Title 47 Sections: 80.211 (f)):

Frequency removed from the assigned frequency (*1)	Emission attenuation (mean power, dB)
50 to 100% (of the authorized bandwidth) (*2)	At least 25
100 to 250% (of the authorized bandwidth) (*2)	At least 35
more than 250% (of the authorized bandwidth) (*2)	At least 43 + 10 $\log_{10}$ (mean power in watts) = -13 dBm

(*1) Assigned frequency (center frequency) = 9403.75, 9413.75, 9423.75, 9433.75 MHz (for X-band radars)
(*2) Authorized band width = 200 MHz (for X-band radars)

4.4.4 Test results:

Complied.
Spectrum plots: See Clause 8.1.

Environmental conditions observed: On 4 November 2025, 21°C to 23°C, 40%RH to 35%RH
On 5 November 2025, 22°C to 23°C, 45%RH to 43%RH

Power supply voltage measured: 100 VAC, 60 Hz to 100 VAC, 60 Hz (*)
(*) The power supplied to MARINE RADAR PROCESSOR UNIT (AU).

4.5 Spurious Emissions at Antenna Terminals

4.5.1 Test conditions:

(a) For S1 pulse, the transmitter output power was measured at the antenna port with a non-reflective load converter as a substitute for the antenna. (*1)

(*1) Emission measurements only need to be carried out for the pulse length setting producing the widest calculated B–40 bandwidth. (IEC 62388 Ed.2/ Annex B.4.2 part)

(b) Spurious measurement range for X-band radar: 4.59 GHz to 40 GHz

Lower measurement band	Upper measurement band
From 4.59 GHz (*2) to the lower OoB boundary	From the upper OoB boundary to 40 GHz

(*2) 0.7 times of the waveguide cut-off frequency for WRJ-10 (ITU-R SM.329-12, Section 2.5)

4.5.2 Test setup:

See Clause 5.

4.5.3 Emission limits (CFR Title 47 Sections: 80.211 (f)):

Frequency removed from the assigned frequency (*1)	Emission attenuation (mean power, dB)
More than 250% (*3) (of the authorized bandwidth) (*2)	At least 43 + 10 $\log_{10}$ (mean power in watts) = -13 dBm

(*1) Assigned frequency (center frequency) =9 403.75, 9413.75, 9423.75, 9433.75 MHz (for X-band radars)
(*2) Authorized bandwidth = 200 MHz (for X-band radars)
(*3) Spurious measurement range for X-band radar (WRJ-10): 4.59 GHz to 40 GHz

4.5.4 Harmonics frequencies:

f_0 (GHz)	$1/2f_0$	$2f_0$	$3f_0$	$4f_0$
9.410	4.705	18.820	28.23	37.64

4.5.5 Test results:

Complied.

Measured maximum emission value
ch1

Frequency (GHz)	Level (dBm)	Limit (dBm)	Margin (dB)
18.8474	-55.20	-13.0	42.20

ch2

Frequency (GHz)	Level (dBm)	Limit (dBm)	Margin (dB)
18.8673	-56.04	-13.0	43.04

Environmental conditions observed: On 10 November 2025, 21°C to 23°C, 49%RH to 34%RH
On 11 November 2025, 22°C to 22°C, 37%RH to 37%RH
On 12 November 2025, 20°C to 22°C, 41%RH to 34%RH

Power supply voltage measured: 100 VAC, 60 Hz to 100 VAC, 60 Hz (*)
(*) The power supplied to MARINE RADAR PROCESSOR UNIT (AU).

4.6 Field Strength of Spurious Radiation

4.6.1 Test conditions:

(a) For S1 pulse, the transmitter output power was measured at the antenna port with a non-reflective load as a substitute for the antenna. (*1)

(*1) Emission measurements only need to be carried out for the pulse length setting producing the widest calculated B–40 bandwidth. (IEC 62388 Ed.2/ Annex B.4.2 part)

(b) Spurious measurement range for X-Band RADAR: 4.59 GHz to 40 GHz

Lower measurement band	Upper measurement band
From 4.59 GHz (*1) to the lower OoB boundary	From the upper OoB boundary to 40 GHz

(*1) 0.7 times of the waveguide cut-off frequency for WRJ-10 (ITU-R SM.329-12, Section 2.5)

(c) Antenna port was terminated with dummy load.

4.6.2 Test site: LIC EMC Center, Semi-anechoic chamber

4.6.3 Distance between the radar and measuring antenna: 3 m

4.6.4 Test setup:

See Clause 5.
The GRP (Ground reference plane, metal floor) between the EUT and the measuring (receiving) antenna was lined with the radio absorbers (3.0 m × 2.4 m × 0.3 m) to reduce the influences of the reflections of the RF waves from the floor.

Measuring (receiving) the antenna height and polarization:

(a) Antenna height: EUT center (1.98 m)

(b) Antenna polarization: vertical and horizontal.

EUT height: 1.5 m

4.6.5 Field strength limits (CFR Title 47 Sections: 80.211 (f)):

Frequency removed from the assigned frequency (*1)	Emission attenuation (mean power, dB)
More than 250% (*3) (of the authorized bandwidth) (*2)	At least 43 + 10 $\log_{10}$ (mean power in watts) = -13 dBm

(*1) Assigned frequency (center frequency) = 9403.75, 9413.75, 9423.75, 9433.75 MHz (for X-band radars)
(*2) Authorized bandwidth = 200 MHz (for X-band radars)
(*3) Spurious measurement range for X-band radar: 4.59 GHz to 40 GHz

4.6.6 Harmonics frequencies:

f_0 (GHz)	$1/2f_0$	$2f_0$	$3f_0$	$4f_0$
9.410	4.705	18.820	28.23	37.64

4.6.7 Test results:

Complied.

Spurious emission levels measured were found to be attenuated more than 20 dB below the limits.

Measured maximum emission value

ch1

Frequency (GHz)	Level (dBμV/m)	Limit (dBμV/m) (*1)	Margin (dB)
28.27115	31.76	82.2	50.44

ch2

Frequency (GHz)	Level (dBμV/m)	Limit (dBμV/m) (*1)	Margin (dB)
28.30180	31.76	82.2	50.44

(*1) -13 dBm = 82.2 dBμV/m (3 m) (Refer to ITU-R SM.329-12/ Annex 1, Section 3.)

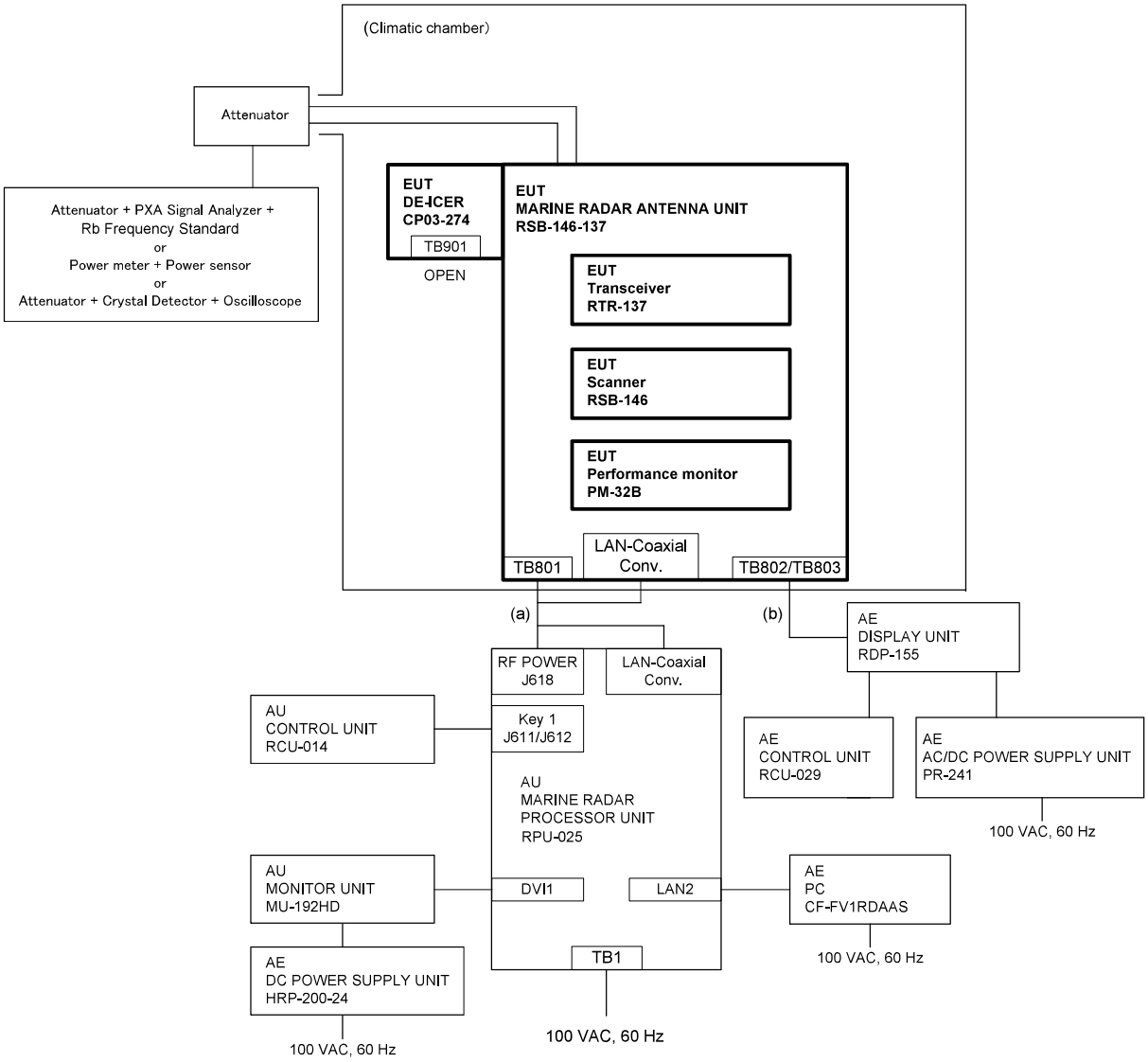
Spectrum plots: See Clause 9.

Environmental conditions observed: On 9 October 2025, 24°C to 24°C, 53%RH to 53%RH
On 10 October 2025, 24°C to 24°C, 53%RH to 53%RH

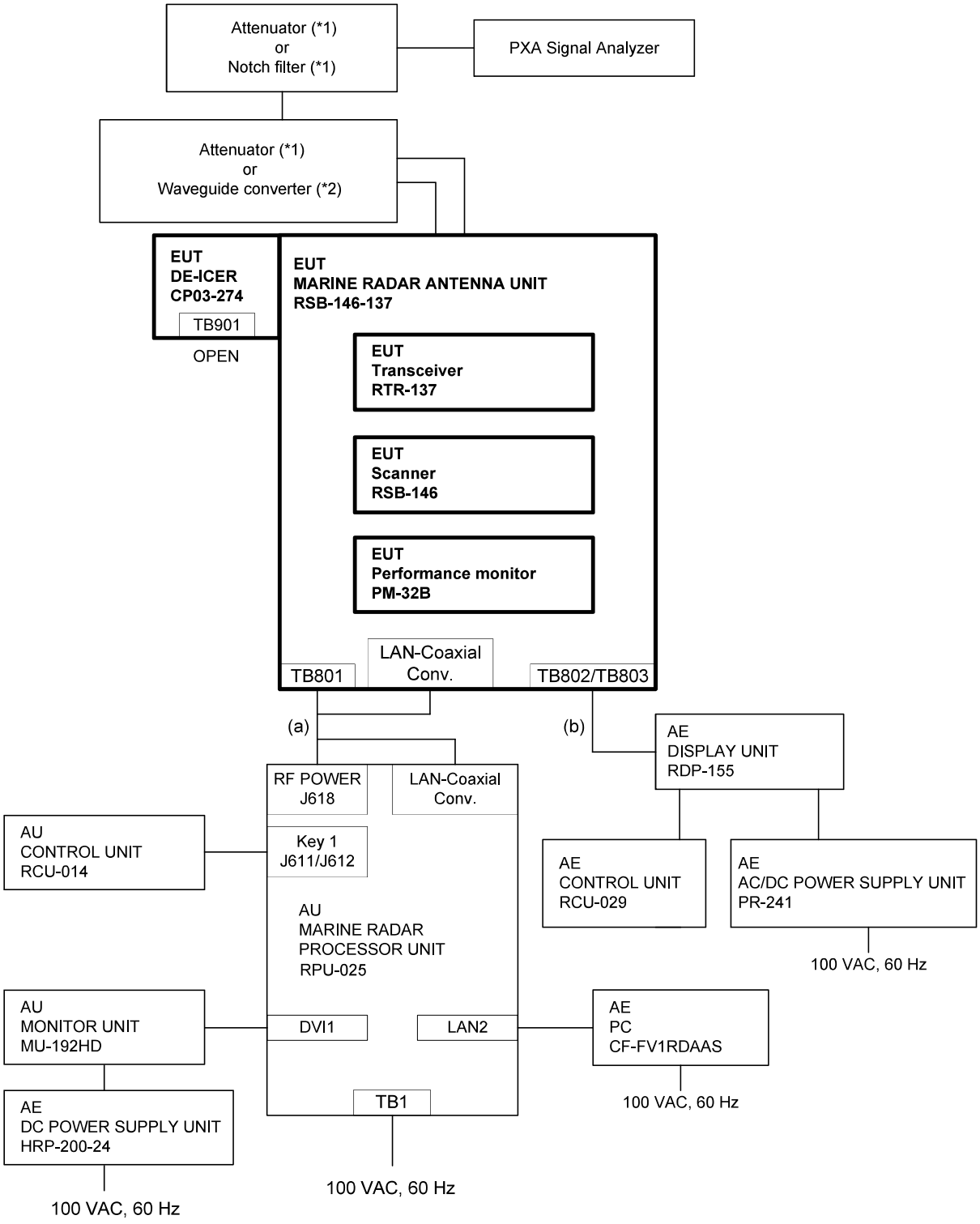
Power supply voltage measured: 100 VAC, 60 Hz to 100 VAC, 60 Hz (*)
(*) The power supplied to MARINE RADAR PROCESSOR UNIT (AU).

5 Test Setup for Measurements

5.1 Test Setup for Clause 4.1, 4.2, 4.3 and 4.4

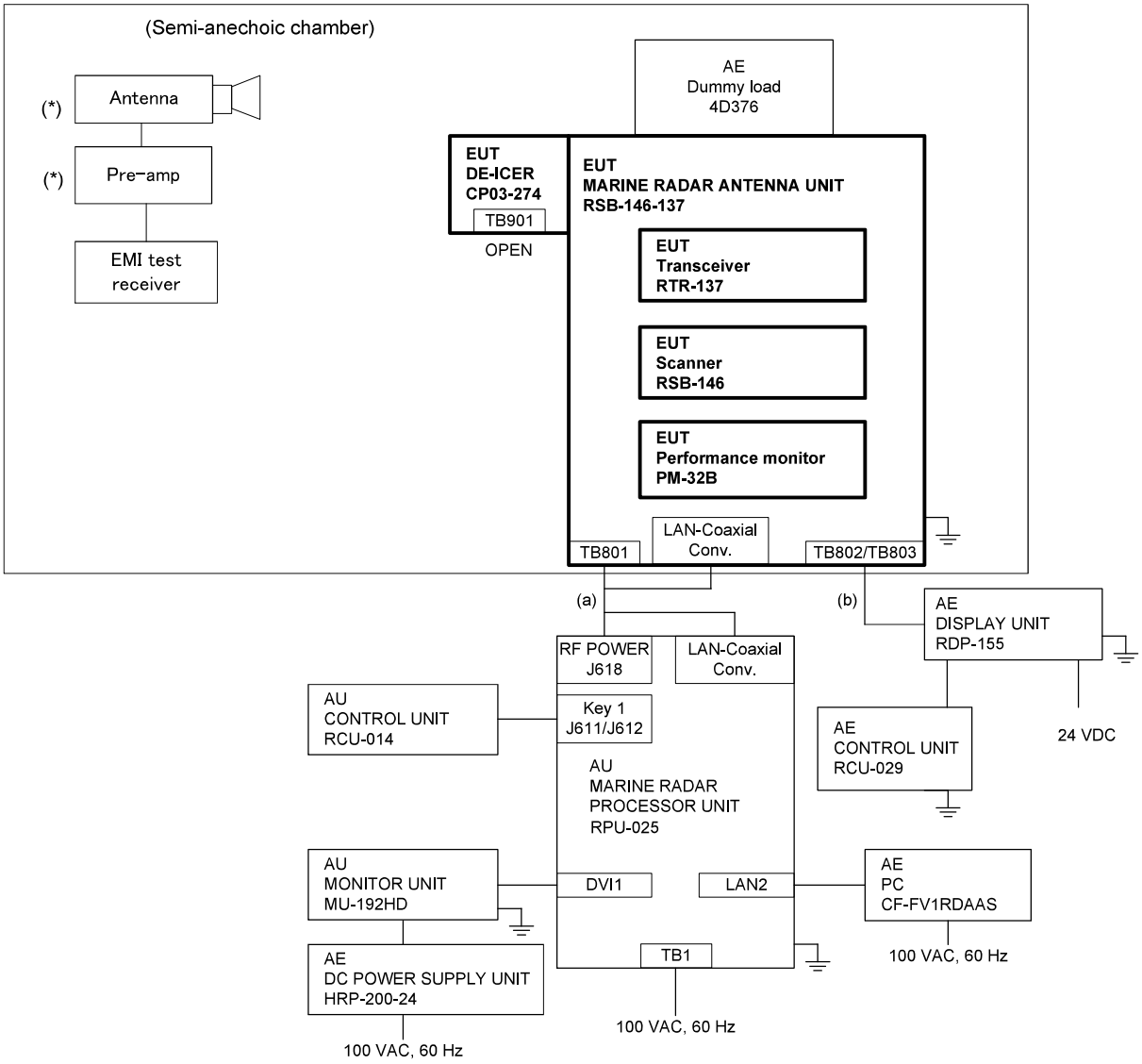


5.2 Test Setup for Clause 4.5



(*1) Used for the measurement up to 18 GHz.
(*2) Submitted by the customer and used for the measurement above 18 GHz.

5.3 Test Setup for Clause 4.6



(*) Used depending on measurement frequency bandwidth.

Cable designations

No.	Category	Name	Type	Length (m)	Number of cables used	Cable shielded
a	S	Multicore cable	RW-9600	20	1	Yes
b	S	Multicore cable	RW-00136	20	1	Yes

6 Measuring Equipment List

Measuring/Test instruments have been appropriately calibrated/maintained according to the LIC programs/ procedures and ISO/IEC 17025. Measuring/Test instruments used for the tests are listed below.

(1) For Clause 4.1 RF Power Output

C/N	Instrument	Type	S/N	Manufacturer	Date of last calibration	Calibration interval
RT301	Attenuator	66-30-43	CE7304	API-Weinschel	15 Oct '25	1 year
RT213	Waveguide	WRJ-10	--	Furuno	06 Feb '25	1 year
HT653	Attenuator	8491B	MY39264135	Agilent	04 Feb '25	1 year
RT200	Power meter	E4419B	MY45101375	Agilent	14 Apr '25	1 year
RT201	Power sensor	8481A	2349A39603	Agilent	11 Apr '25	1 year
HT654	Attenuator	8494B	MY42148134	Agilent	04 Feb '25	1 year
HT1223	Attenuator	8495B	MY42148137	Keysight	04 Feb '25	1 year
HT1221	Crystal Detector	423B	MY51342422	Agilent	19 May '25	1 year
HT972	Oscilloscope	MSO4054B	C030483	Tektronix	10 Dec '24	1 year
HT1339	Climatic Chamber (Large)	TBE-3EW0P2T	3015007780	Espec	03 Oct '25	1 year
HT1204	AC power supply	DPO45M	9158465	NF	NA	--
HT1369	Digital multimeter	115	66531397WS	Fluke	09 Oct '25	1 year

(2) For Clause 4.2 Modulation Characteristics

C/N	Instrument	Type	S/N	Manufacturer	Date of last calibration	Calibration interval
RT301	Attenuator	66-30-43	CE7304	API-Weinschel	15 Oct '25	1 year
RT213	Waveguide	WRJ-10	--	Furuno	06 Feb '25	1 year
HT653	Attenuator	8491B	MY39264135	Agilent	04 Feb '25	1 year
HT654	Attenuator	8494B	MY42148134	Agilent	04 Feb '25	1 year
HT1223	Attenuator	8495B	MY42148137	Keysight	04 Feb '25	1 year
HT1221	Crystal Detector	423B	MY51342422	Agilent	19 May '25	1 year
HT972	Oscilloscope	MSO4054B	C030483	Tektronix	10 Dec '24	1 year
HT1339	Climatic Chamber (Large)	TBE-3EW0P2T	3015007780	Espec	03 Oct '25	1 year
HT1204	AC power supply	DPO45M	9158465	NF	NA	--
HT1369	Digital multimeter	115	66531397WS	Fluke	09 Oct '25	1 year

(3) For Clause 4.3 Frequency Stability –temperature & voltage variation

C/N	Instrument	Type	S/N	Manufacturer	Date of last calibration	Calibration interval
RT301	Attenuator	66-30-43	CE7304	API-Weinschel	15 Oct '25	1 year
RT213	Waveguide	WRJ-10	--	Furuno	06 Feb '25	1 year
HT653	Attenuator	8491B	MY39264135	Agilent	04 Feb '25	1 year
HT654	Attenuator	8494B	MY42148134	Agilent	04 Feb '25	1 year
HT1223	Attenuator	8495B	MY42148137	Keysight	04 Feb '25	1 year
HT1317	PXA Signal Analyzer	N9030B	SG57142024	Keysight	17 Dec '24	1 year
HT1339	Climatic Chamber (Large)	TBE-3EW0P2T	3015007780	Espec	03 Oct '25	1 year
HT1204	AC power supply	DPO45M	9158465	NF	NA	--
HT582	Rb Frequency Standard	Rb-1008BD	0354H	EPSON TOYOCOM	15 Oct '25	1 year
HT1369	Digital multimeter	115	66531397WS	Fluke	9 Oct '25	1 year

(4) For Clause 4.4 Occupied Bandwidth

C/N	Instrument	Type	S/N	Manufacturer	Date of last calibration	Calibration interval
RT301	Attenuator	66-30-43	CE7304	API-Weinschel	15 Oct '25	1 year
HT653	Attenuator	8491B	MY39264135	Agilent	04 Feb '25	1 year
HT654	Attenuator	8494B	MY42148134	Agilent	04 Feb '25	1 year
HT1223	Attenuator	8495B	MY42148137	Keysight	04 Feb '25	1 year
HT1317	PXA Signal Analyzer	N9030B	SG57142024	Keysight	17 Dec '24	1 year
HT1204	AC power supply	DPO45M	9158465	NF	NA	--
HT1369	Digital multimeter	115	66531397WS	Fluke	09 Oct '25	1 year

(5) For Clause 4.5 Spurious Emissions at Antenna Terminals

C/N	Instrument	Type	S/N	Manufacturer	Date of last calibration	Calibration interval
RT301	Attenuator	66-30-43	CE7304	API-Weinschel	15 Oct '25	1 year
HT653	Attenuator	8491B	MY39264135	Agilent	04 Feb '25	1 year
--	Adapter	X281A	--	Hewlett Packard	NA	--
--	Adapter	PE9803 WR-62	--	Pasternack	NA	
--	Adapter	K281C	--	Agilent	NA	--
--	Adapter	R281B	00472	Hewlett Packard	NA	--
--	Isolator	OMC FX0157	--	--	NA	--
HT1317	PXA Signal Analyzer	N9030B	SG57142024	Keysight	17 Dec '24	1 year
HT1328	Notch filter	BRC20663	001	Micro-Tronics	09 Aug '25	1 year
KB288	Coaxial cable	SF104A/11SMA/11SMA/5500MM	800047/4A	HUBER+ SUHNER	09 Aug '25	1 year
KB181	Coaxial cable	SUCOFLEX 102A	1261/2A	HUBER+ SUHNER	09 Aug '25	1 year
HT1204	AC power supply	DPO45M	9158465	NF	NA	--
HT1369	Digital multimeter	115	66531397WS	Fluke	09 Oct '25	1 year

(6) For Clause 4.6 Field Strength of Spurious Radiation

C/N	Instrument	Type	S/N	Manufacturer	Date of last calibration	Calibration interval
HT779	Semi-anechoic chamber	10mSAC	90984	Tokin	NSA: 28 Jan '23	3 years
					SVSWR: 23 Dec '22	3 years
HT1277	Test software	EP5/RE	Ver.6.0.112	Toyo	NA	--
HT1270	EMI test receiver (2 Hz to 44 GHz)	ESW44	101841	Rohde & Schwarz	09 Aug '25	1 year
HT758	Broadband horn antenna (1 GHz to 6 GHz)	BBHA9120B	522	Schwarzbeck	09 Aug '25	1 year
HT759	Double rigged horn antenna & amp. (6 GHz to 18 GHz)	HAP06-18W	B1510452211-124	Toyo	07 Mar '25	1 year
HT761	Double rigged horn antenna & amp. (18 GHz to 26 GHz)	HAP18-26N	B2010482304-144	Toyo	10 Jun '25	1 year
HT762	Double rigged horn antenna & amp. (26 GHz to 40 GHz)	HAP26-40N	B3208602111-092	Toyo	10 Jun '25	1 year
HT780	AC/DC power supply	ES18000W	9128767-1+9128767-2	NF	NA	--
HT866	Digital multimeter	115	19170029	Fluke	03 Feb '25	1 year

7 RF Envelope and Spectrum of the Output Pulse

ch1, P0N
TT24NM mode

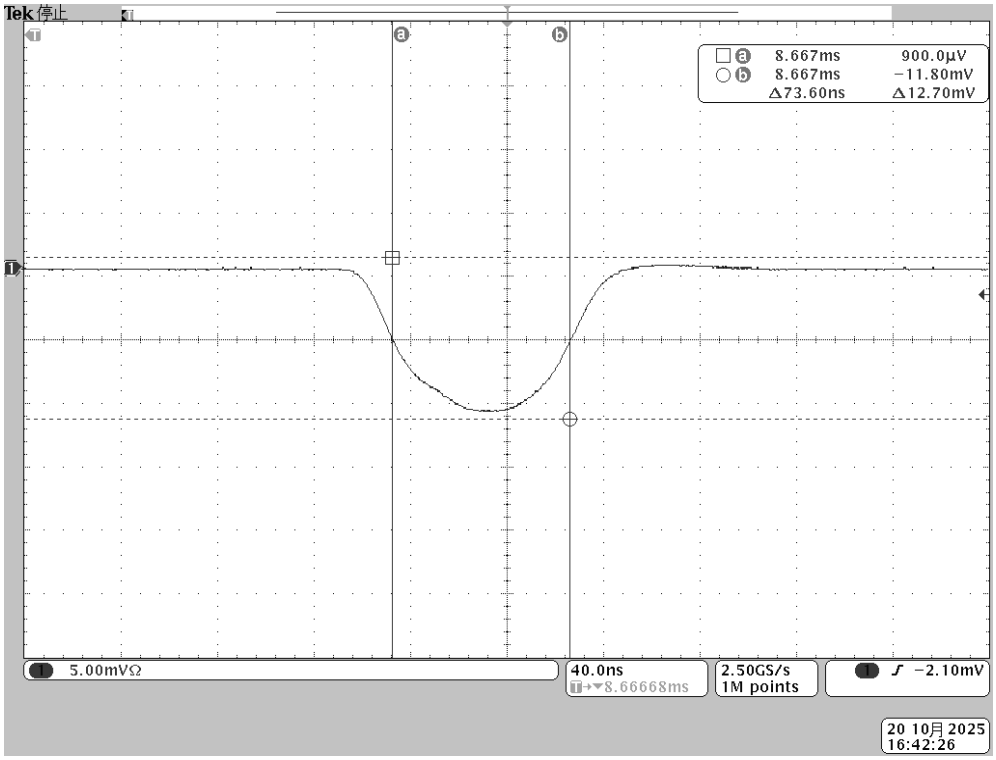


Fig. 7.1 S1 pulse envelope

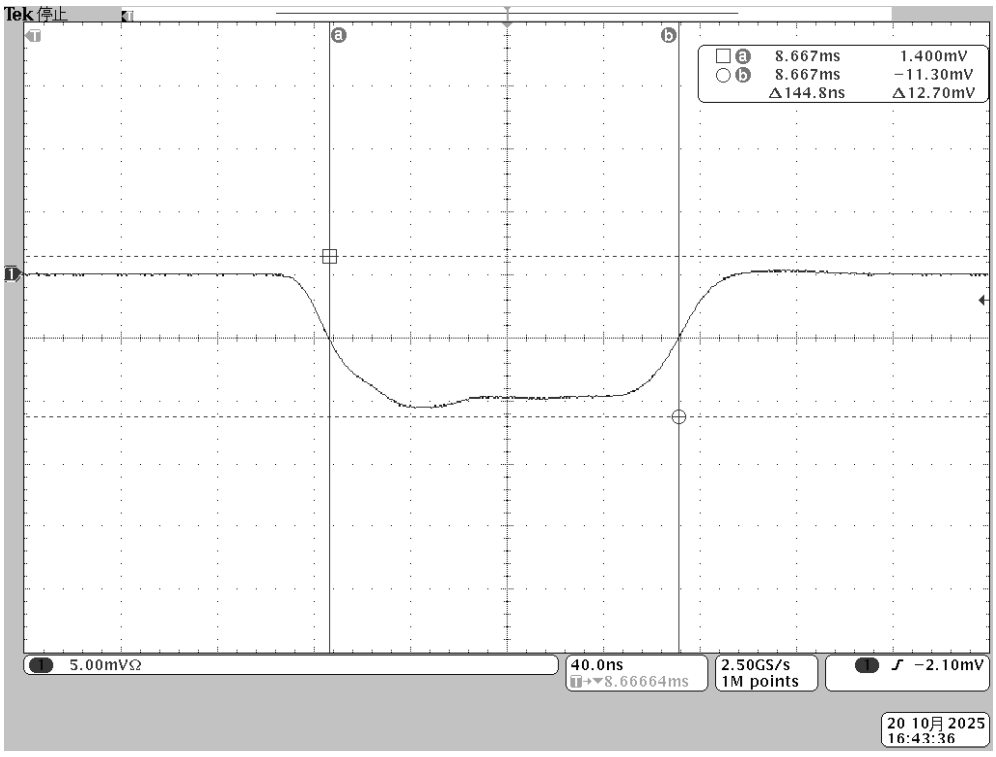


Fig. 7.2 S2 pulse envelope

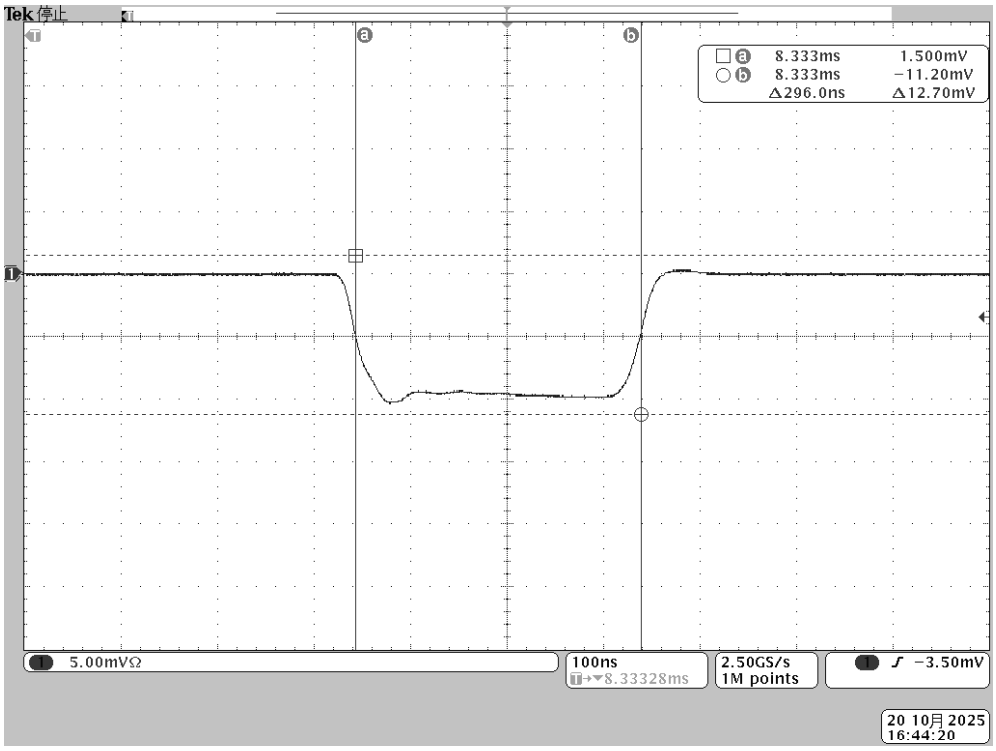


Fig. 7.3 M1 pulse envelope

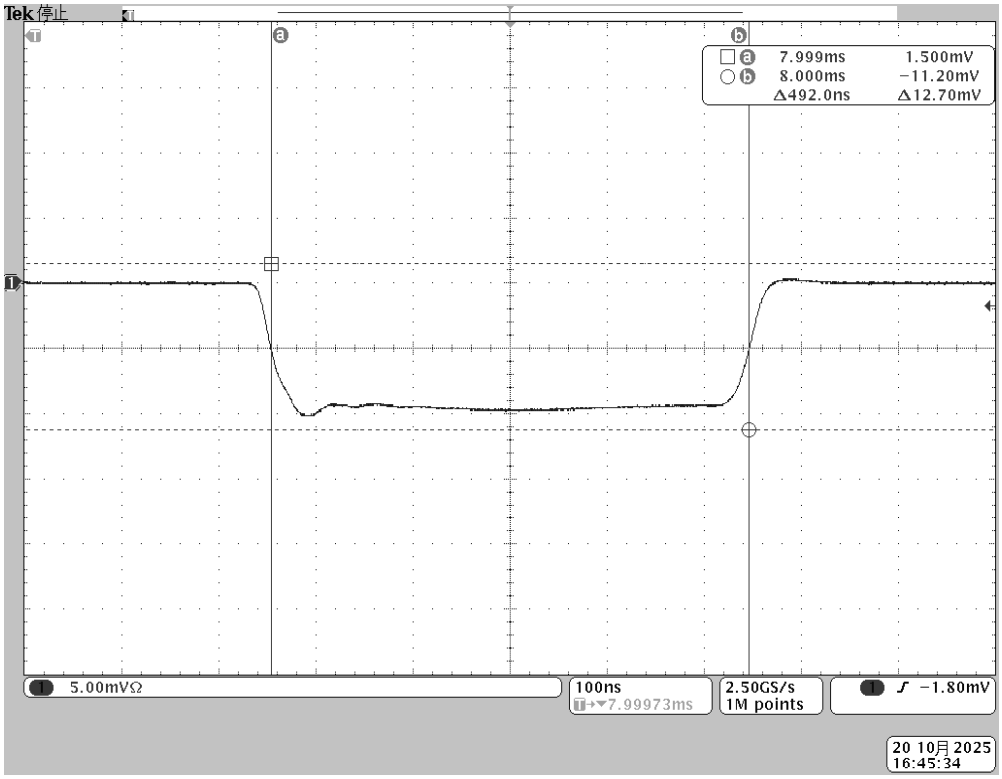


Fig. 7.4 M2 pulse envelope

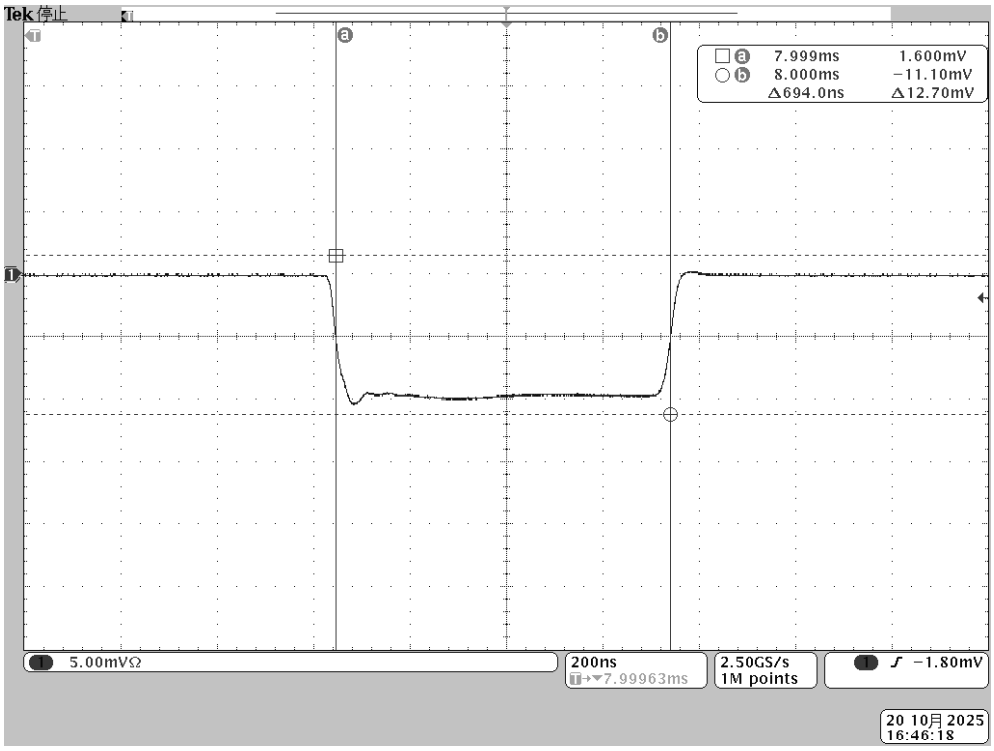


Fig. 7.5 M3 pulse envelope

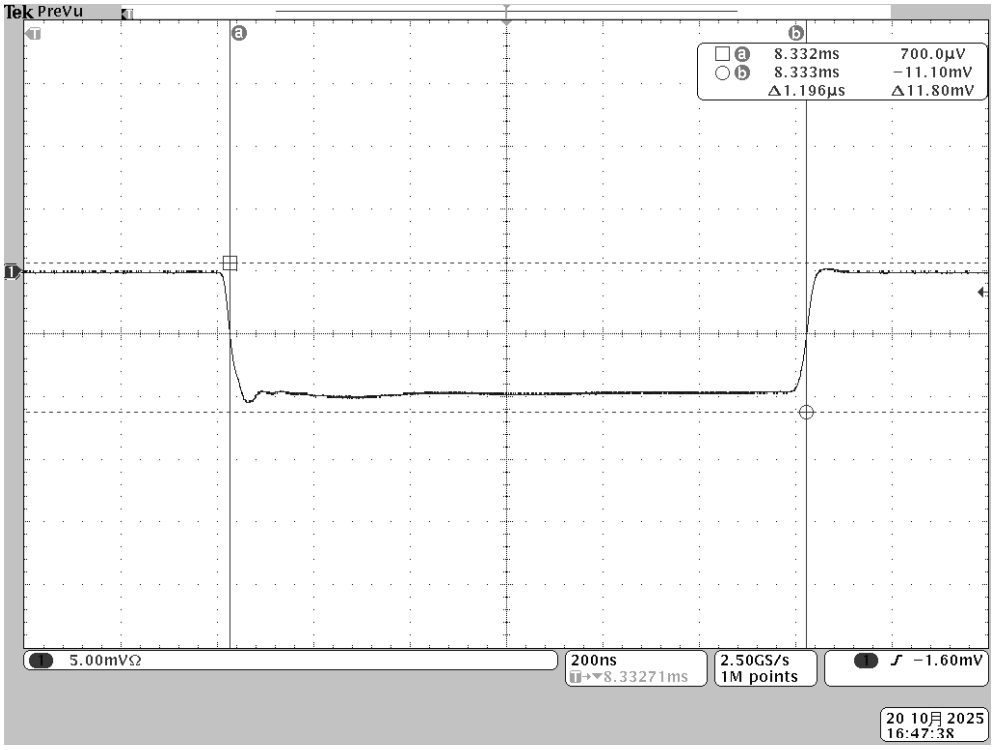


Fig. 7.6 L pulse envelope

TT32NM mode

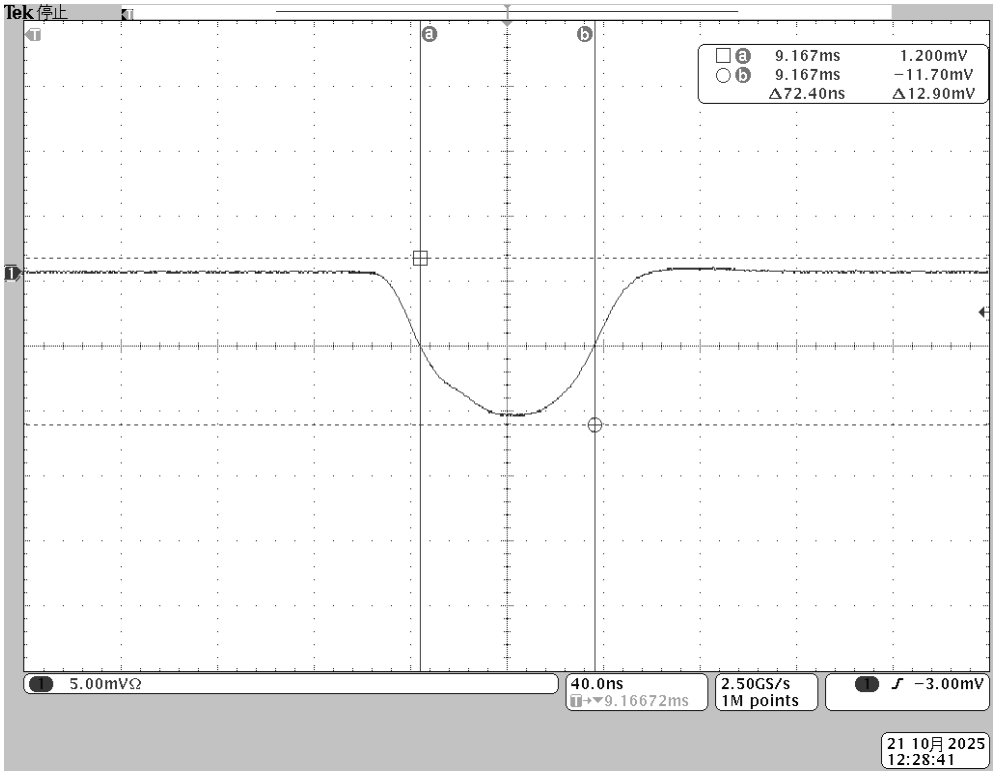


Fig. 7.7 S1 pulse envelope

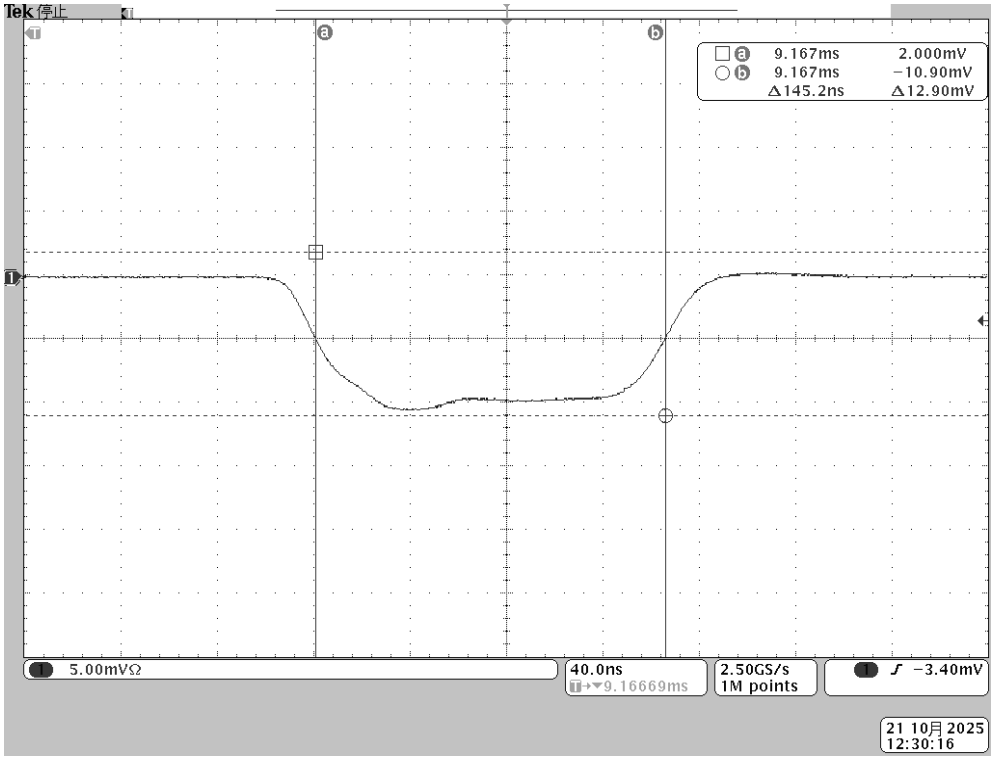


Fig. 7.8 S2 pulse envelope

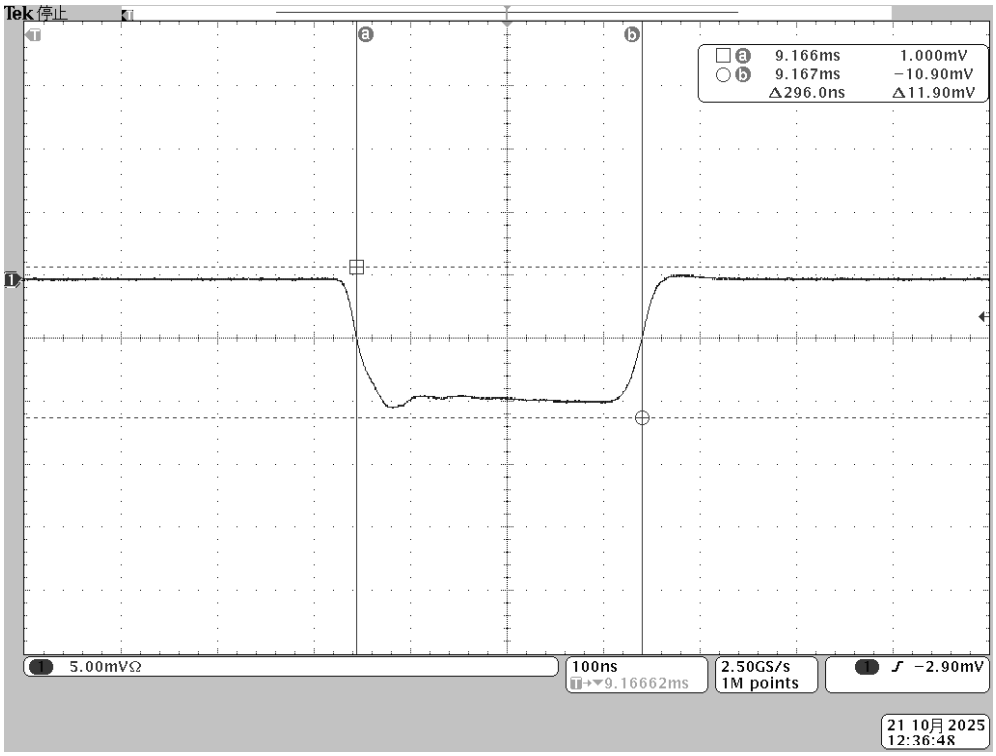


Fig. 7.9 M1 pulse envelope

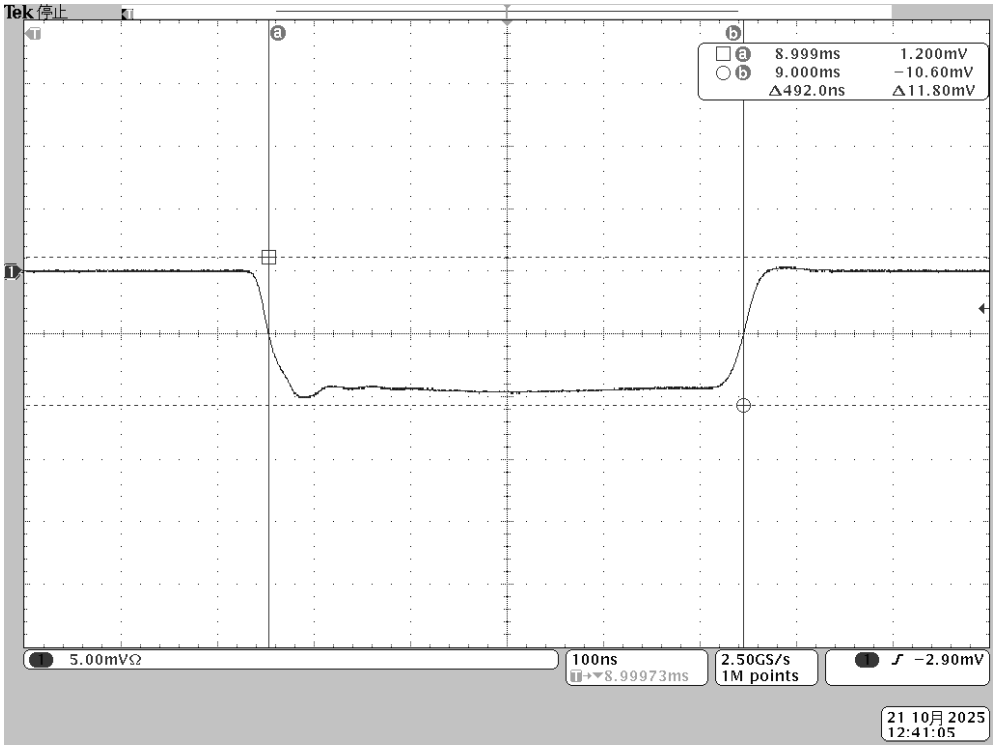


Fig. 7.10 M2 pulse envelope

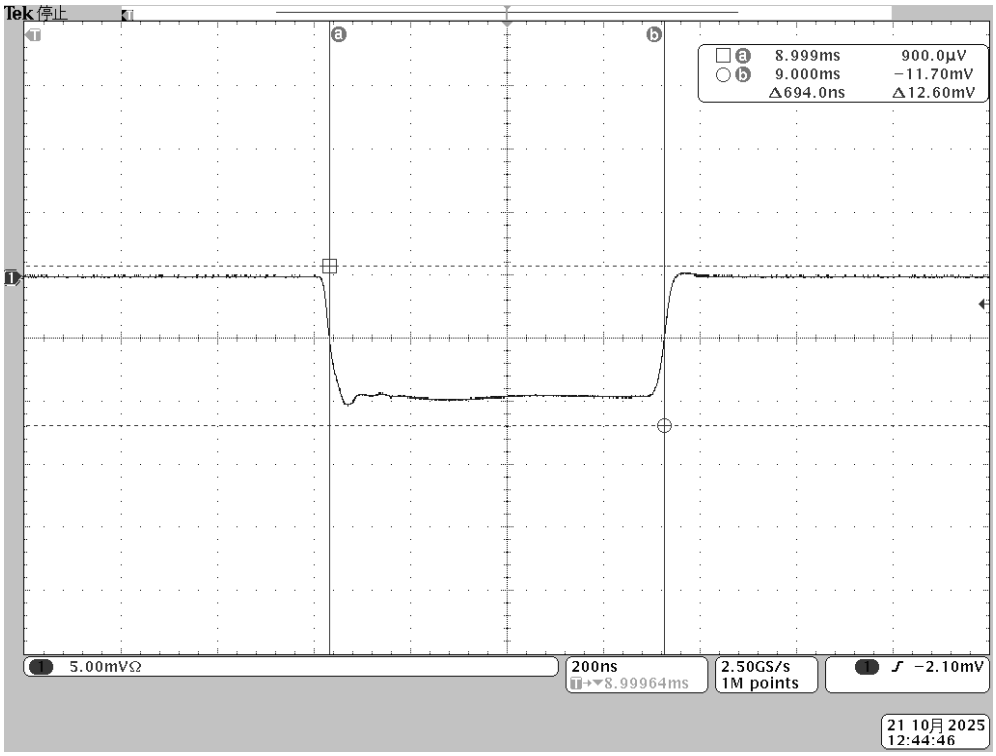


Fig. 7.11 M3 pulse envelope

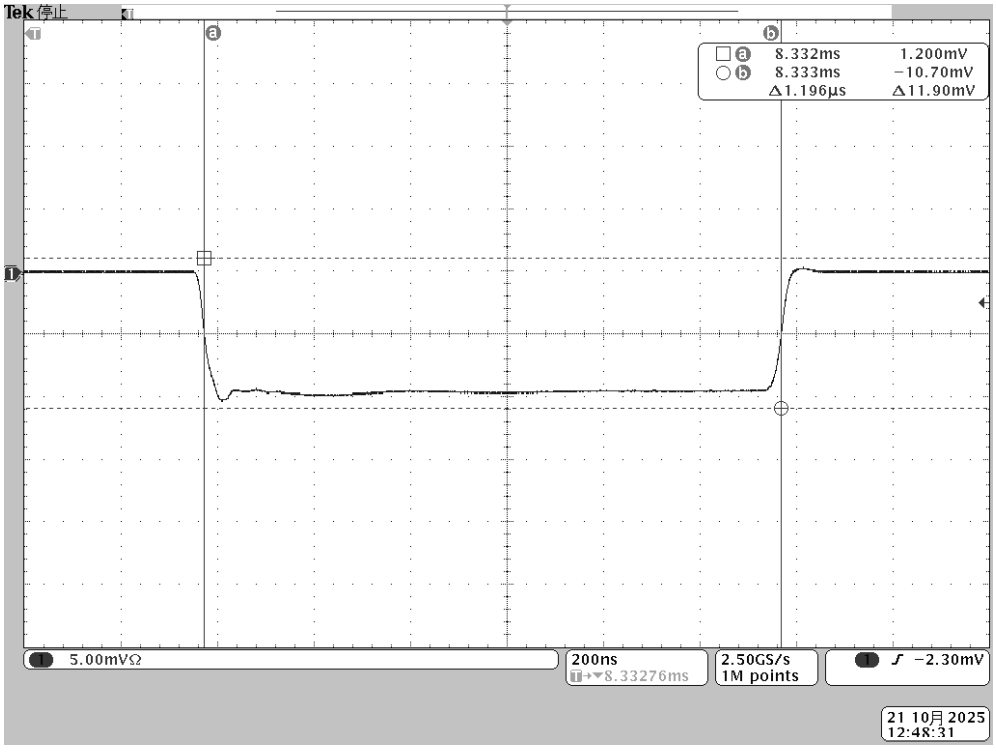


Fig. 7.12 L pulse envelope

2nd trace mode

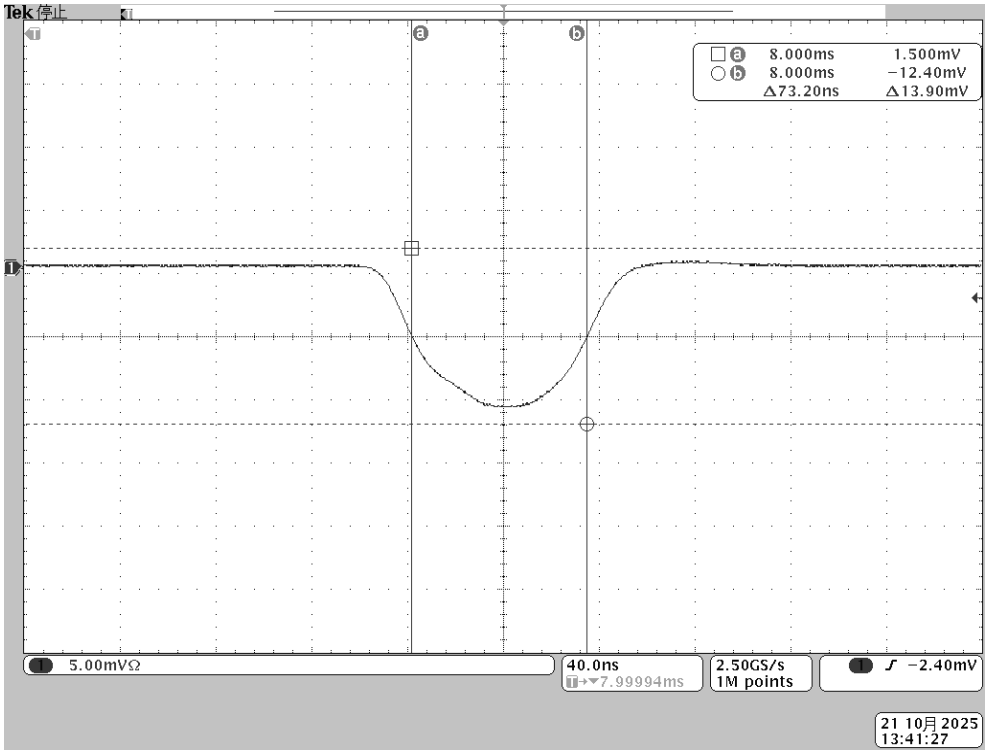


Fig. 7.13 S1 pulse envelope

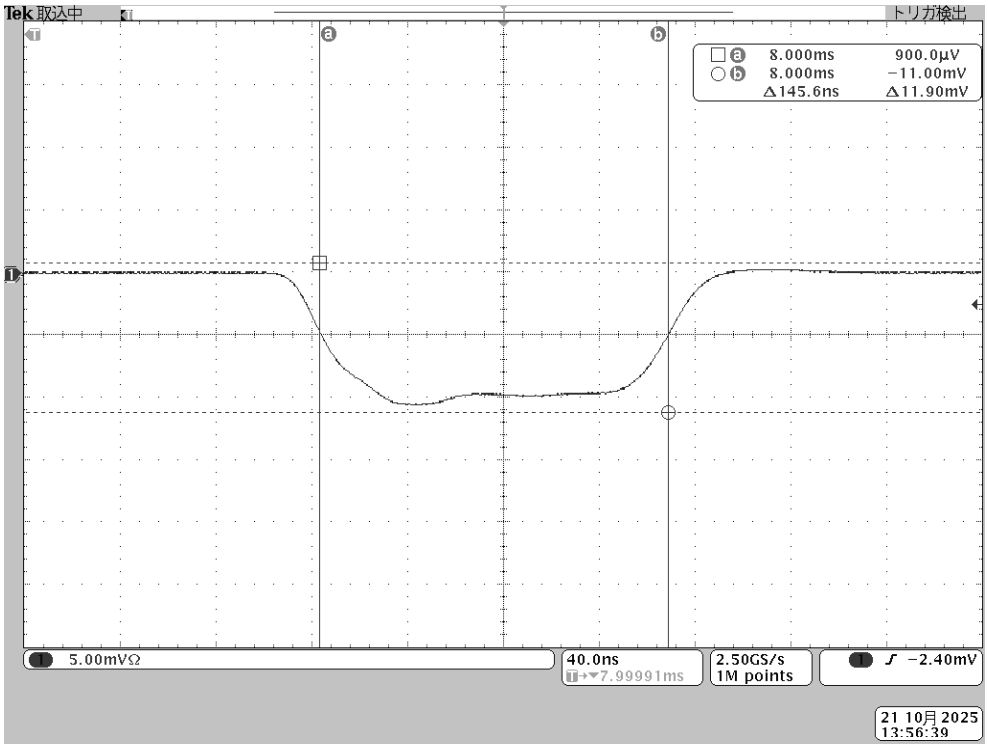


Fig. 7.14 S2 pulse envelope

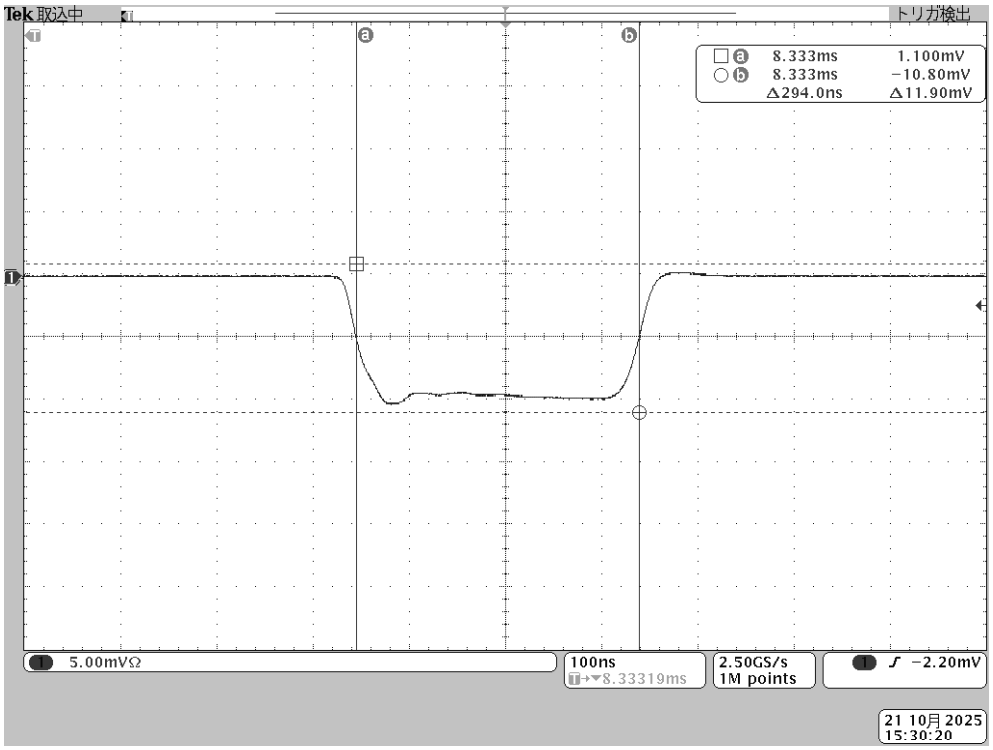


Fig. 7.15 M1 pulse envelope

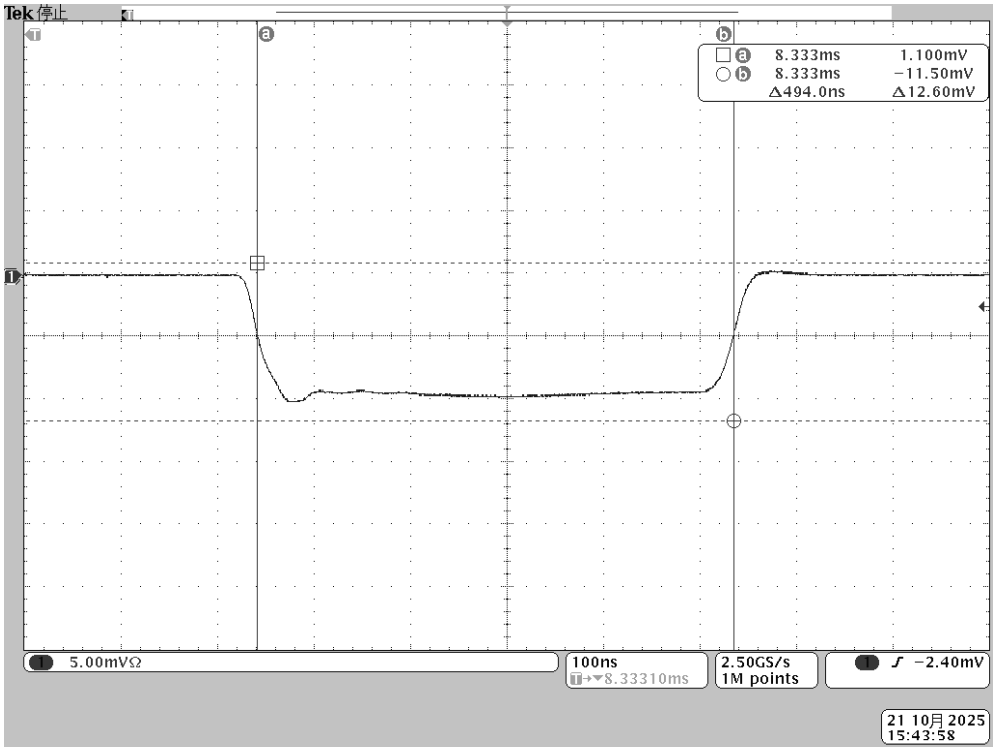


Fig. 7.16 M2 pulse envelope

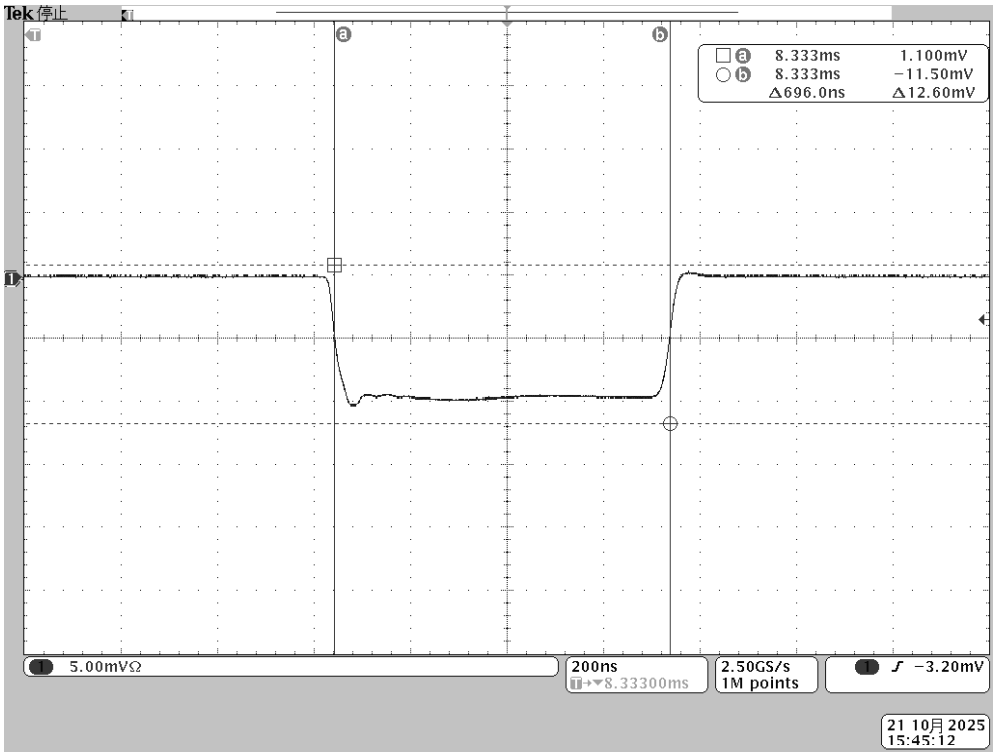


Fig. 7.17 M3 pulse envelope

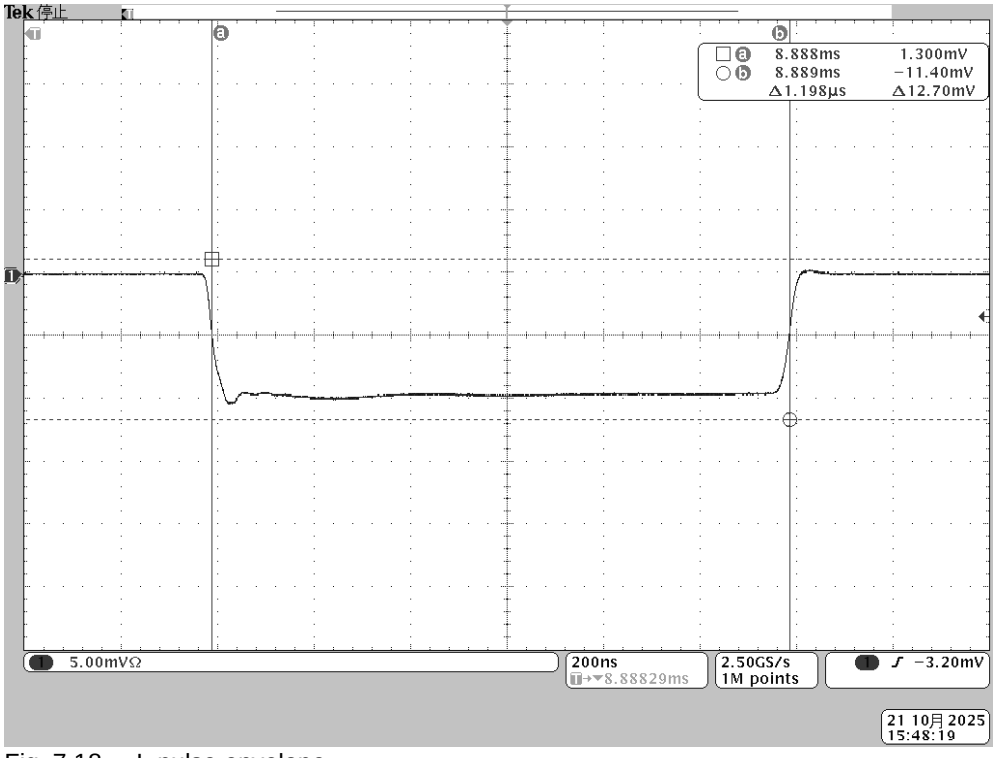


Fig. 7.18 L pulse envelope

ch1, Q0N
TT24NM mode

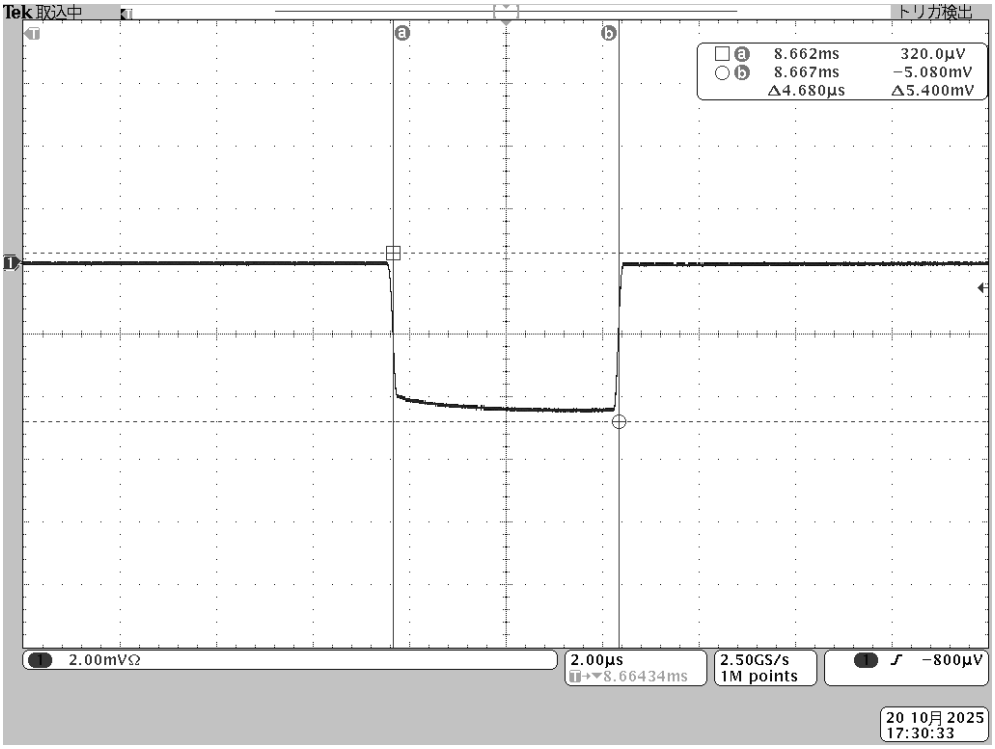


Fig. 7.19 S1 pulse envelope

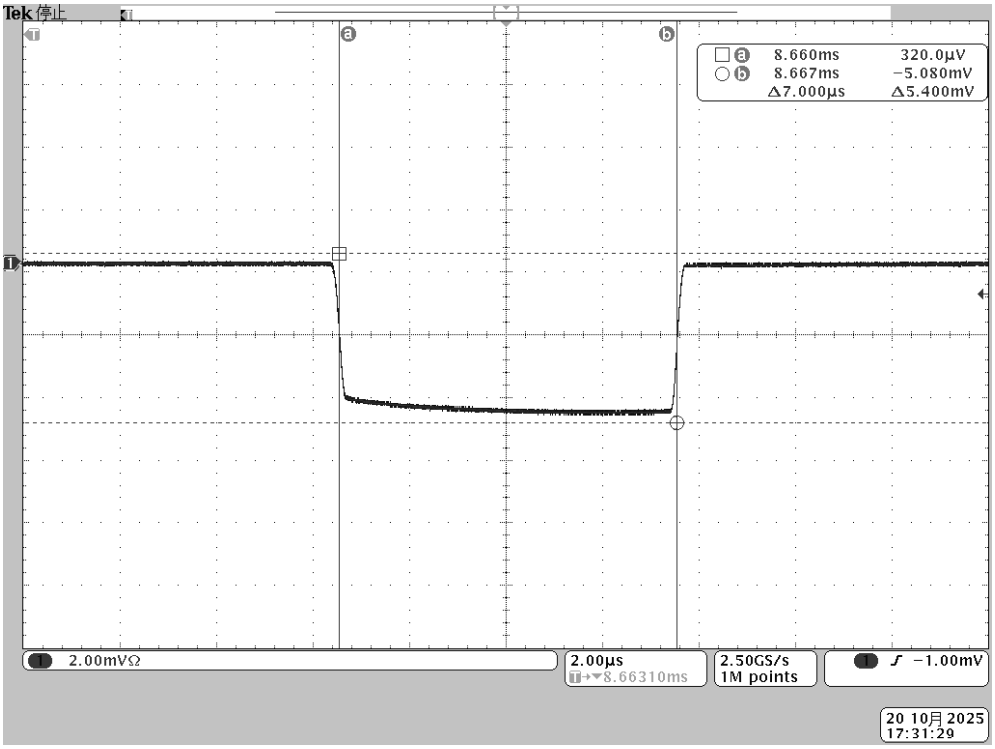


Fig. 7.20 S2 pulse envelope

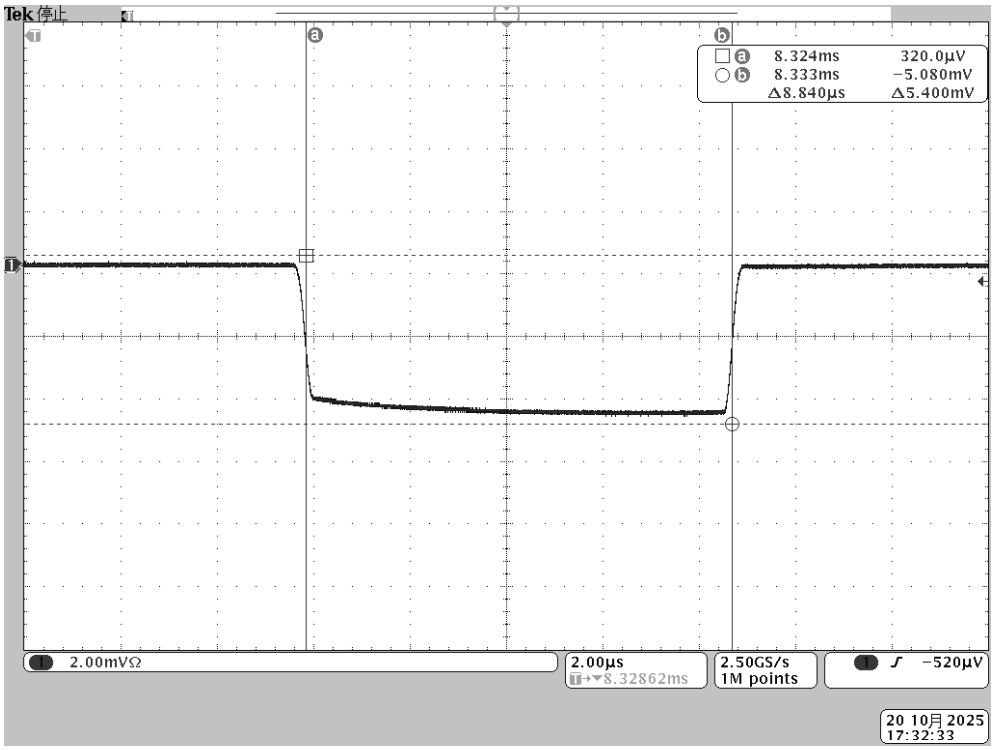


Fig. 7.21 M1 pulse envelope

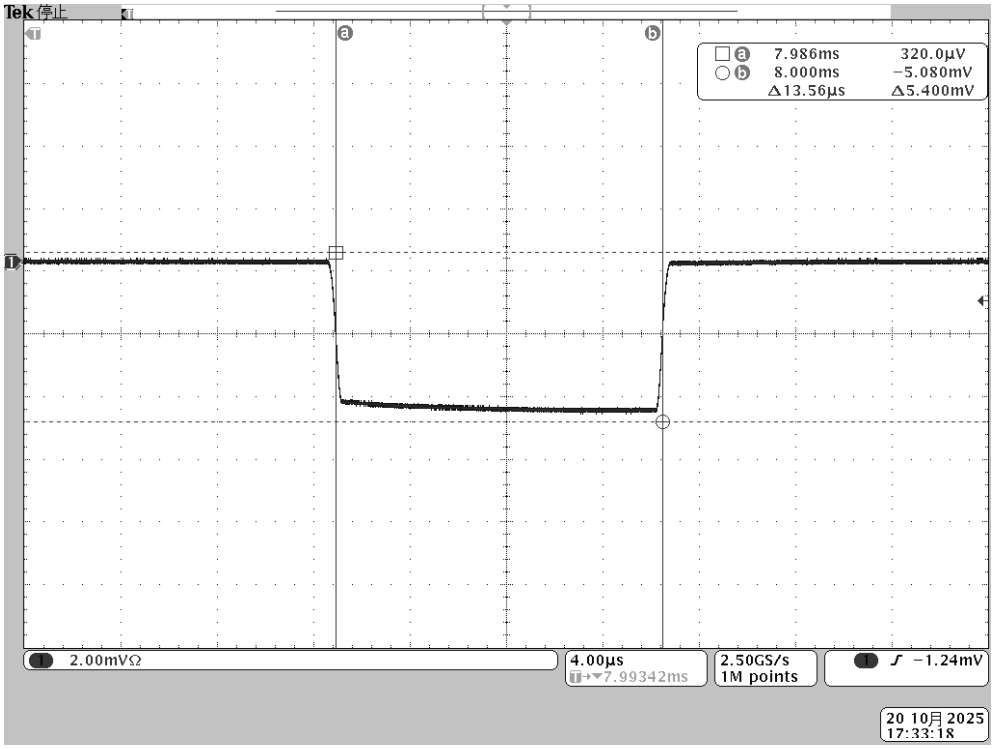


Fig. 7.22 M2 pulse envelope

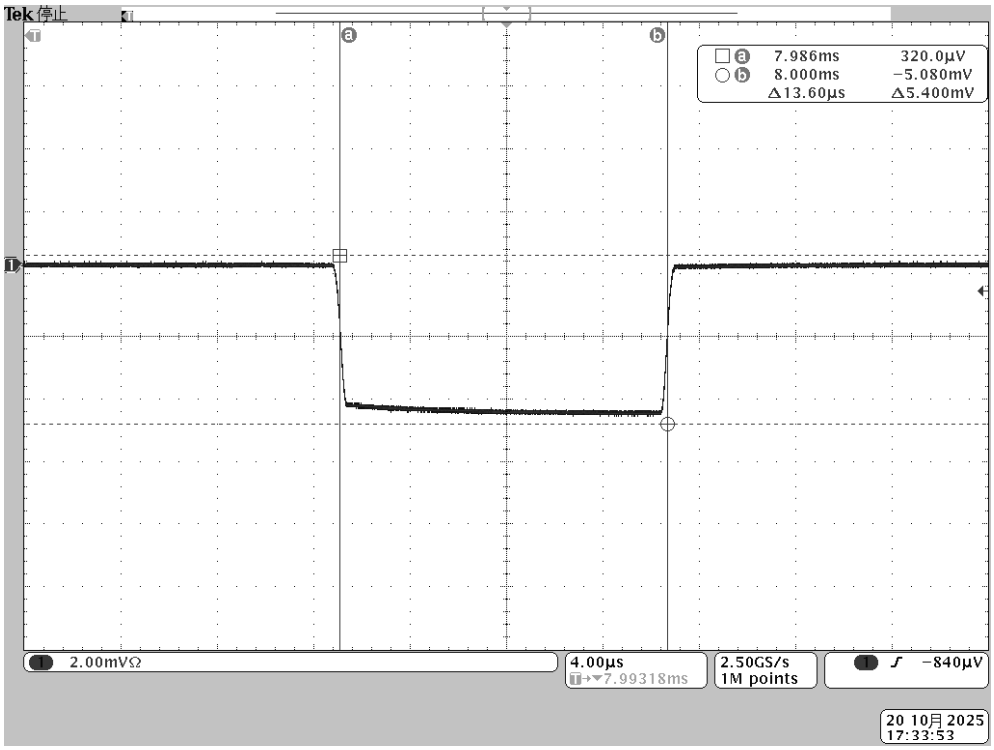


Fig. 7.23 M3 pulse envelope

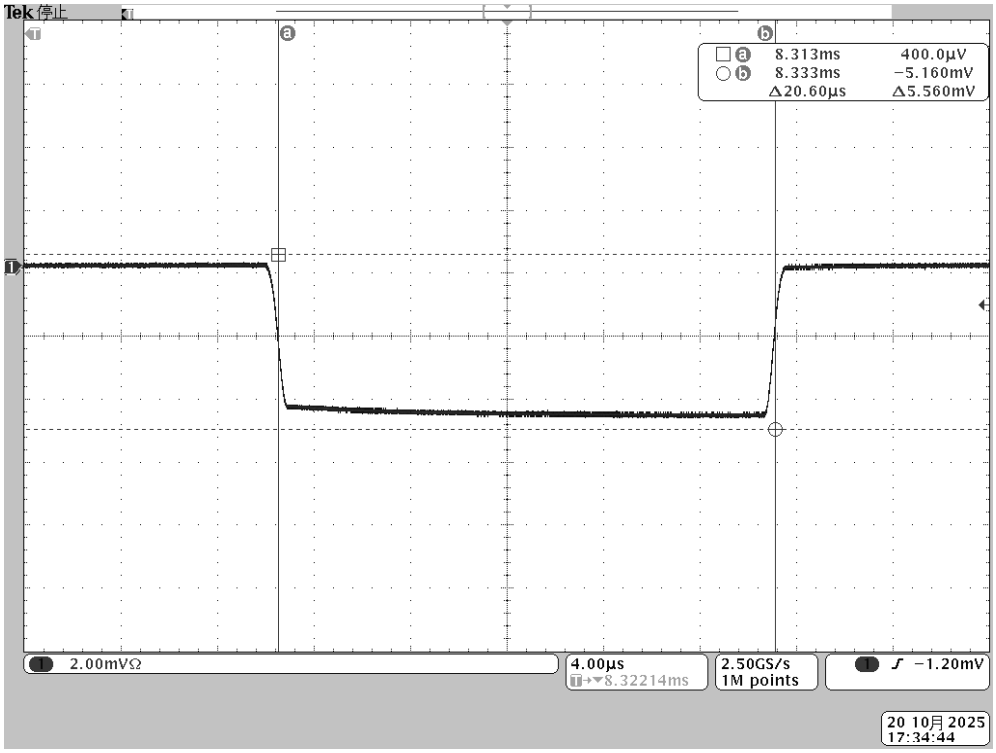


Fig. 7.24 L pulse envelope

TT32NM mode

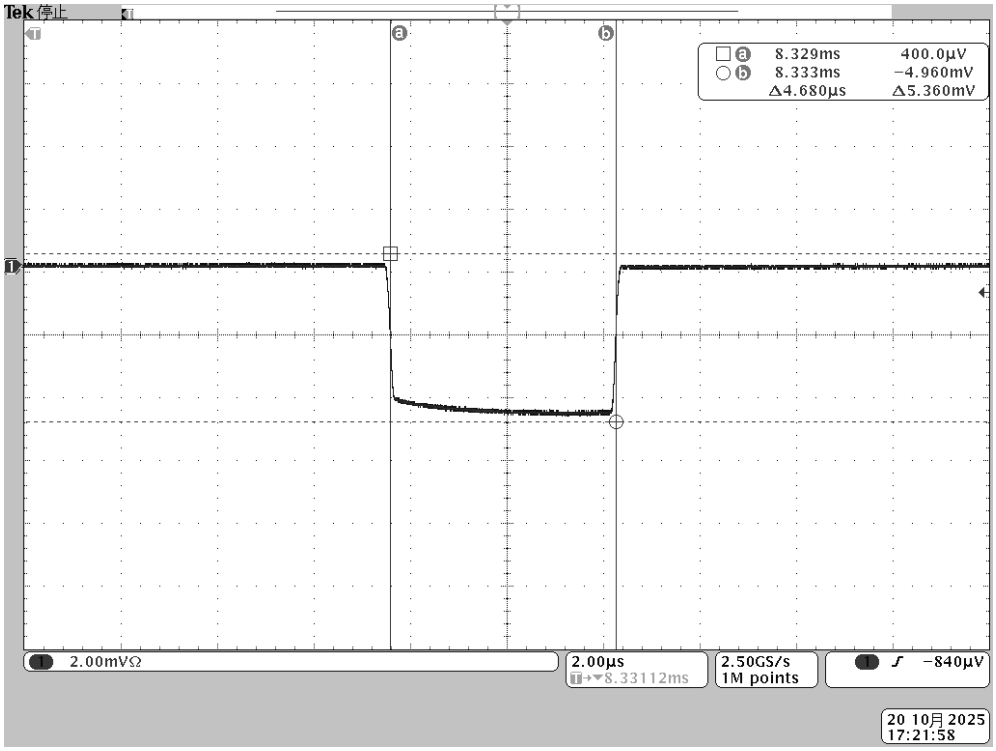


Fig. 7.25 S1 pulse envelope

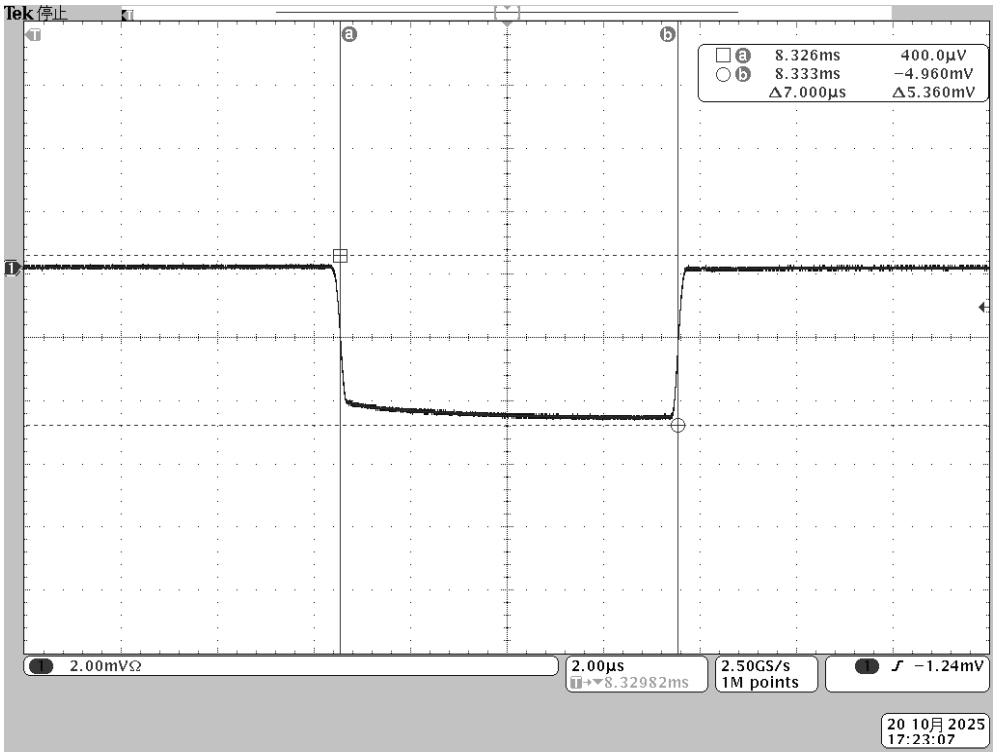


Fig. 7.26 S2 pulse envelope

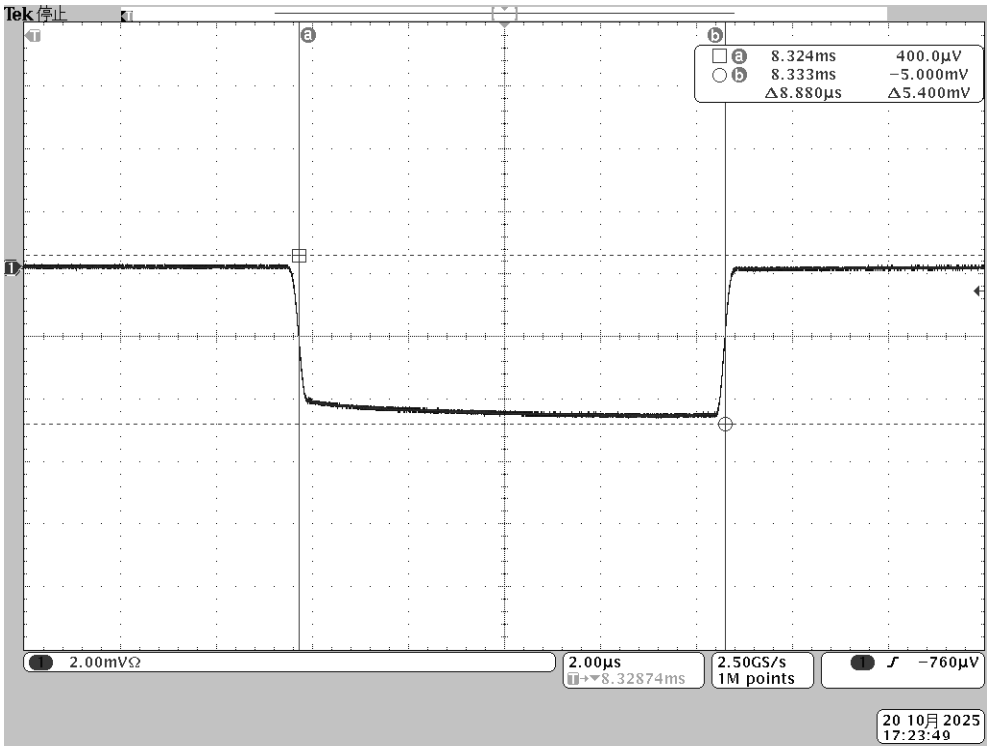


Fig. 7.27 M1 pulse envelope

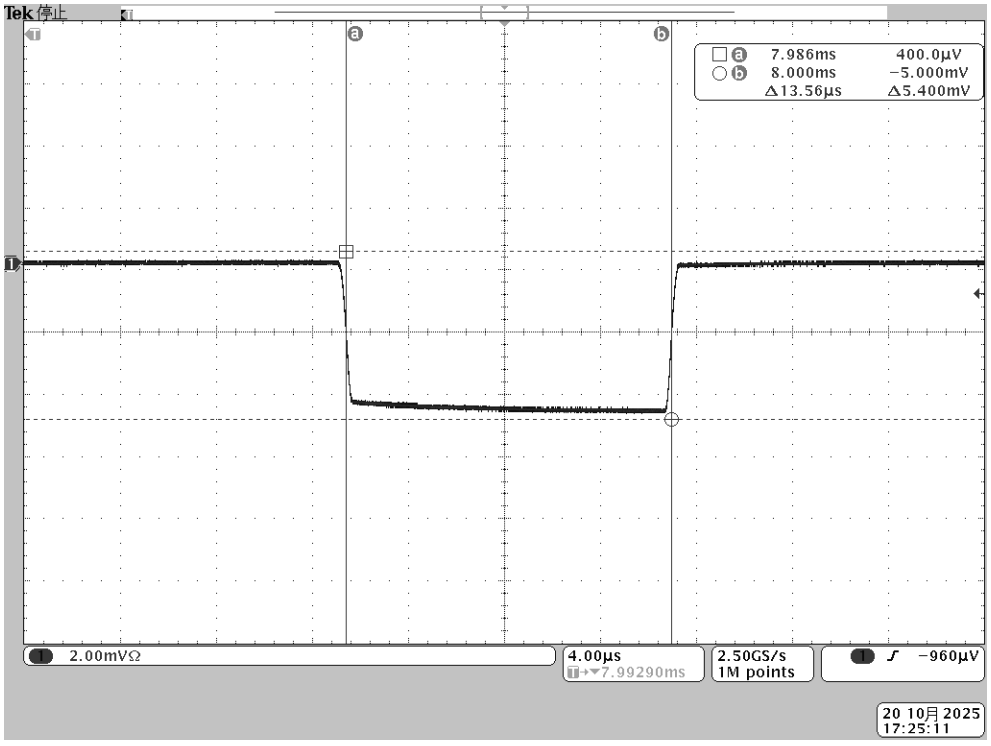


Fig. 7.28 M2 pulse envelope

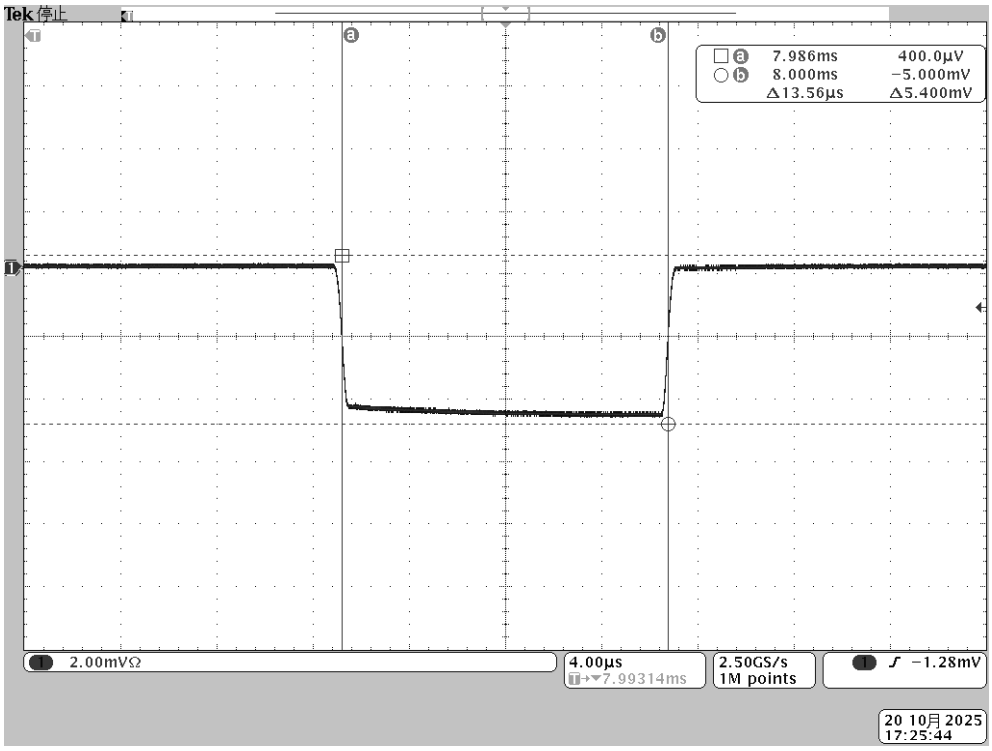


Fig. 7.29 M3 pulse envelope

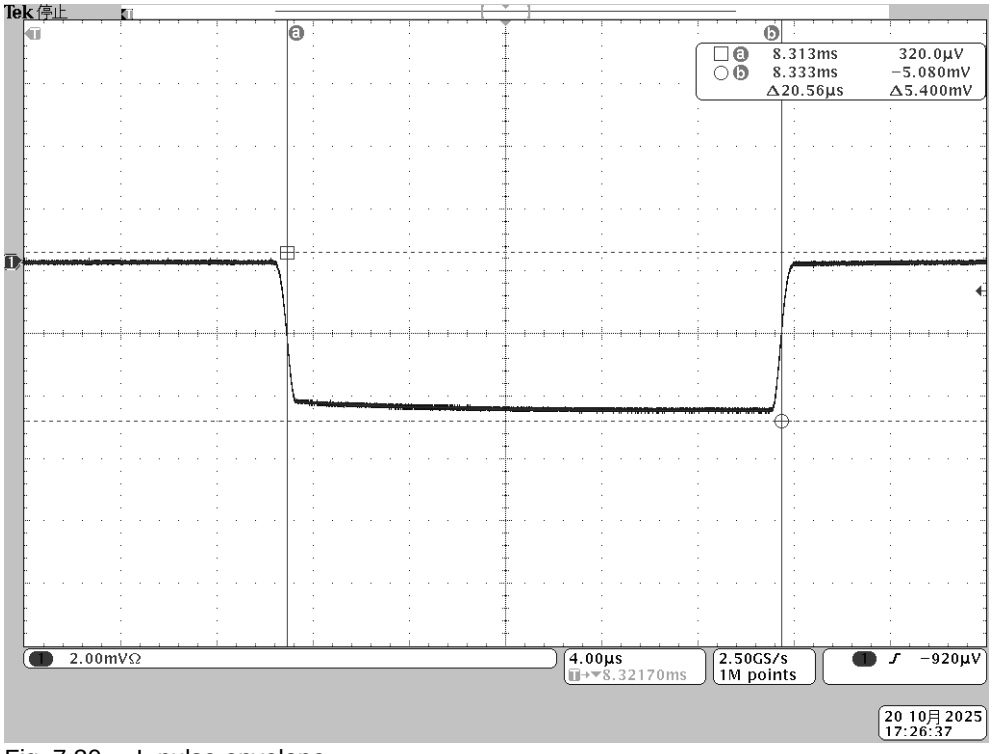


Fig. 7.30 L pulse envelope

2nd trace mode

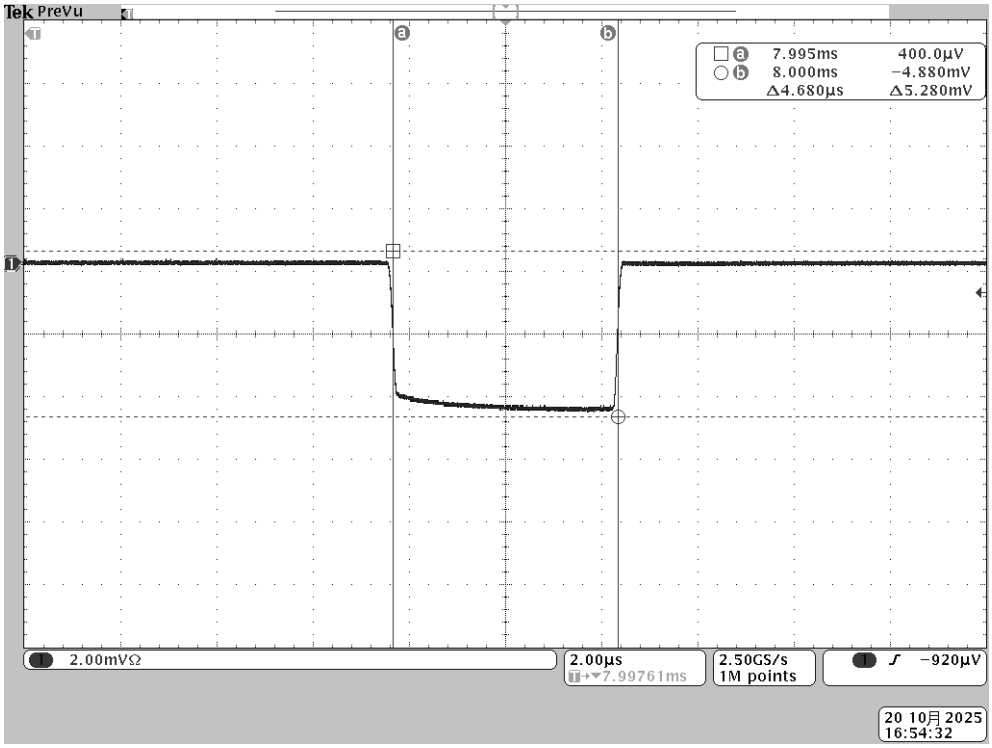


Fig. 7.31 S1 pulse envelope

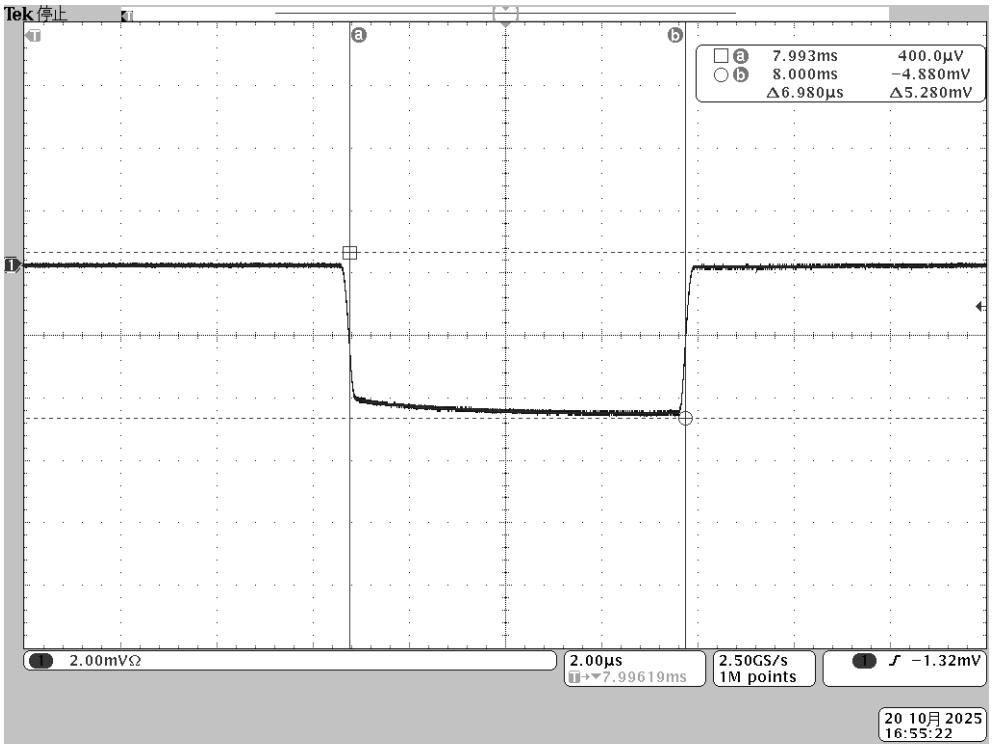


Fig. 7.32 S2 pulse envelope

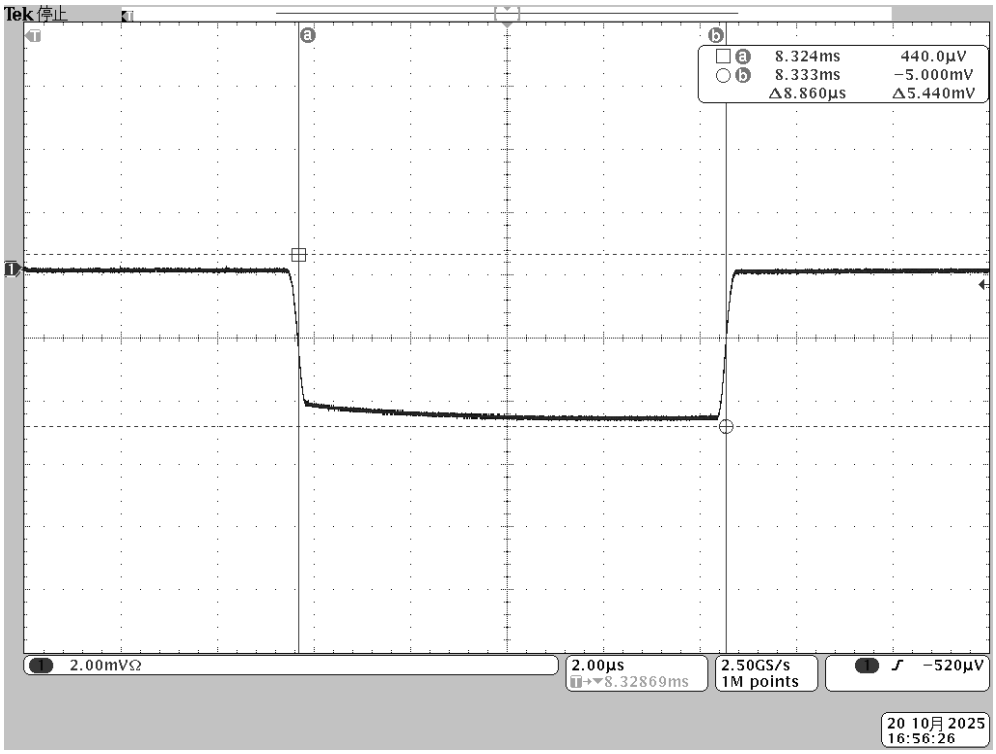


Fig. 7.33 M1 pulse envelope

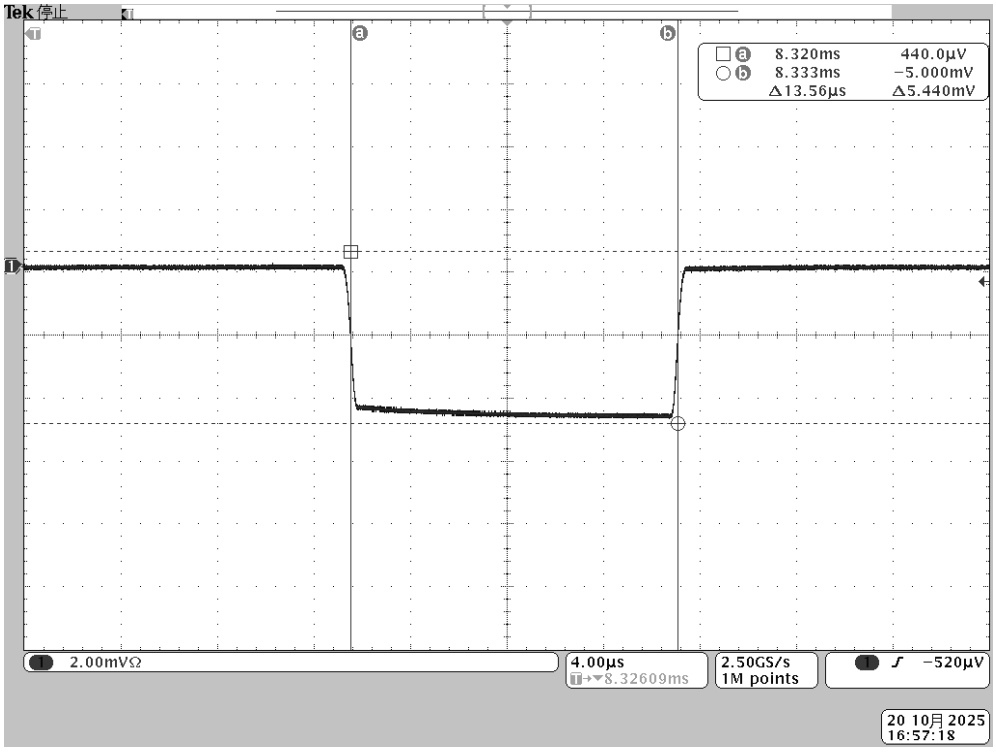


Fig. 7.34 M2 pulse envelope

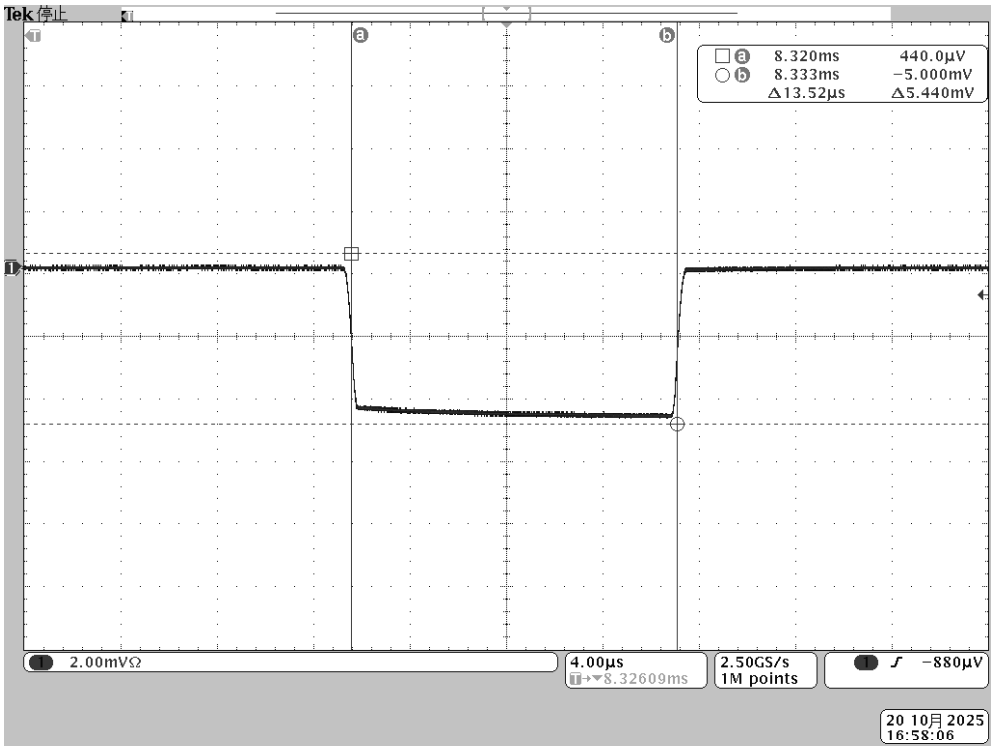


Fig. 7.35 M3 pulse envelope

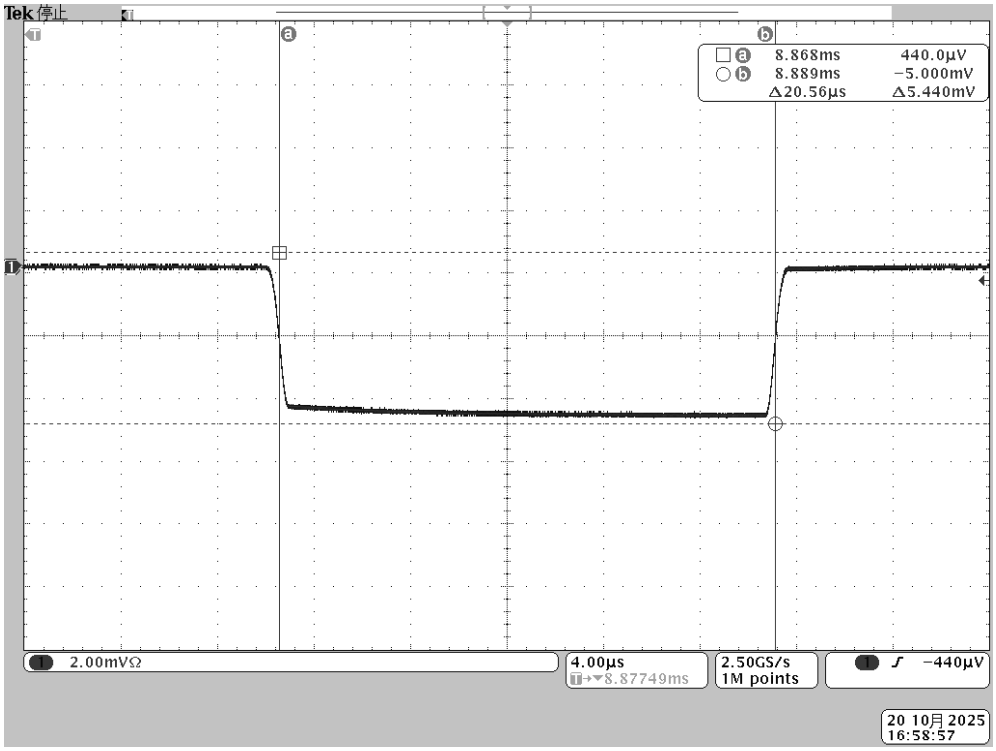


Fig. 7.36 L pulse envelope

ch2, P0N
TT24NM mode

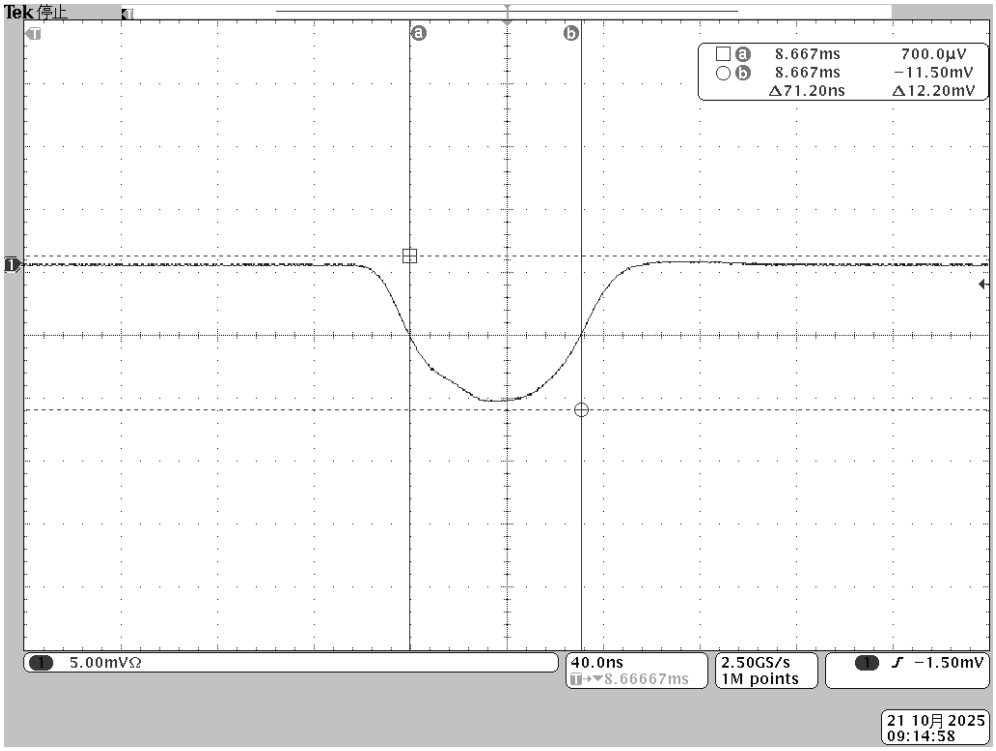


Fig. 7.37 S1 pulse envelope

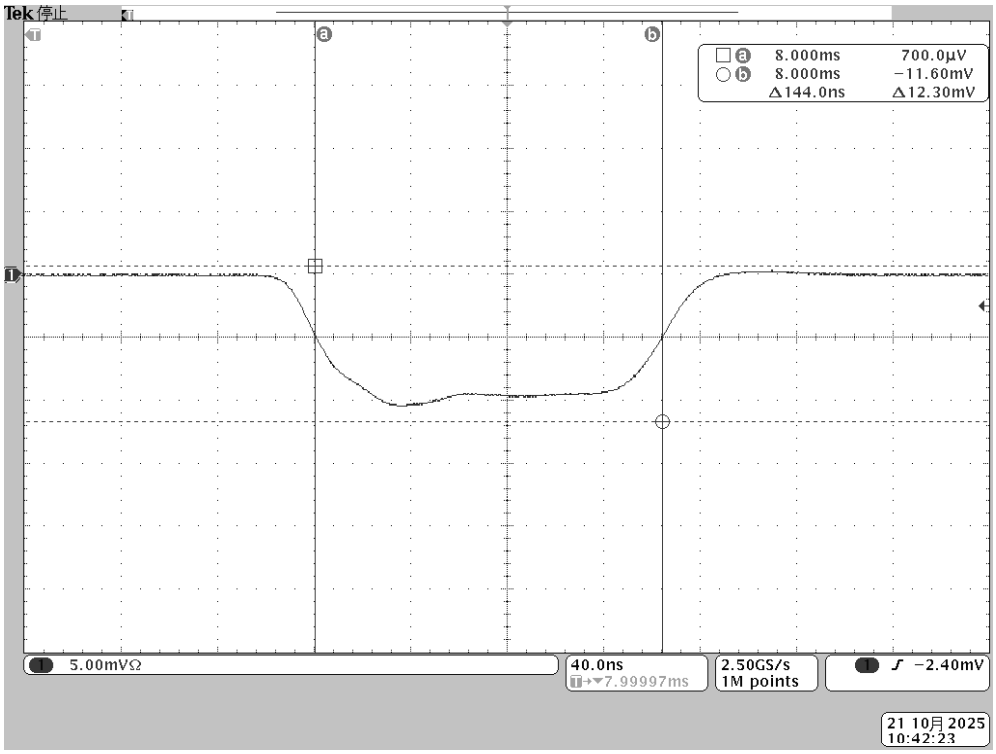


Fig. 7.38 S2 pulse envelope

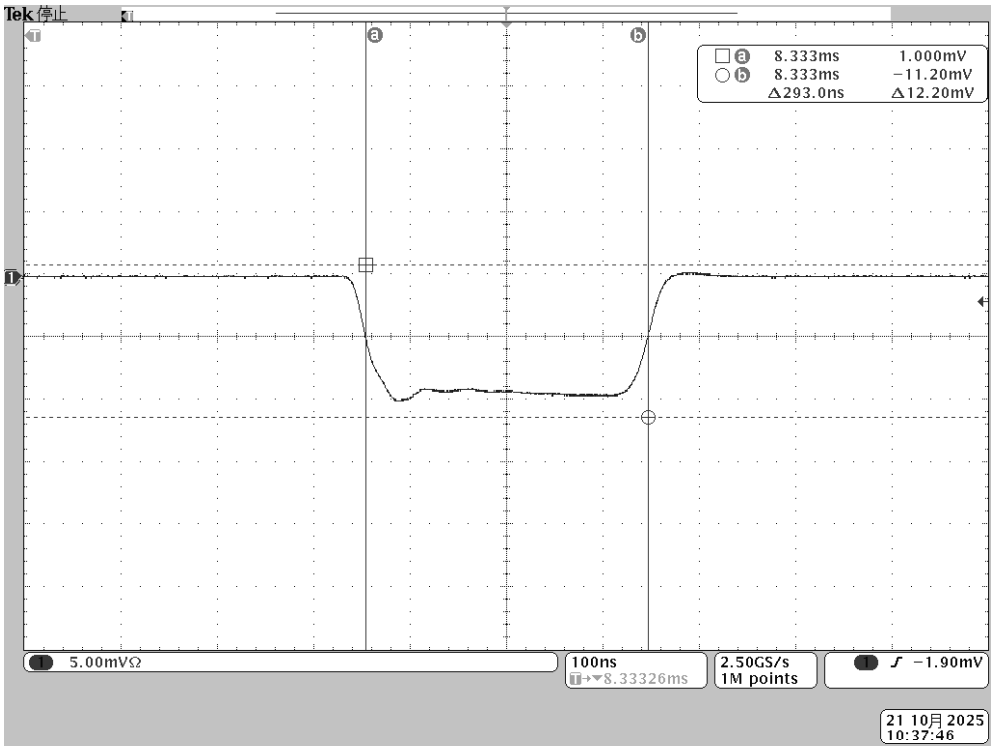


Fig. 7.39 M1 pulse envelope

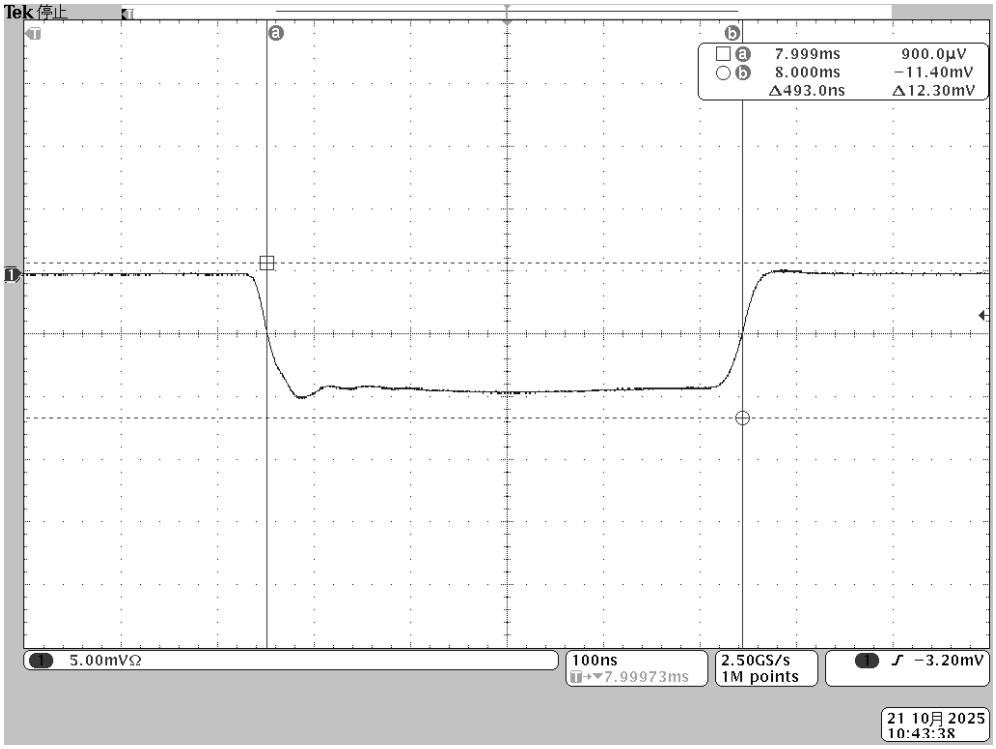


Fig. 7.40 M2 pulse envelope

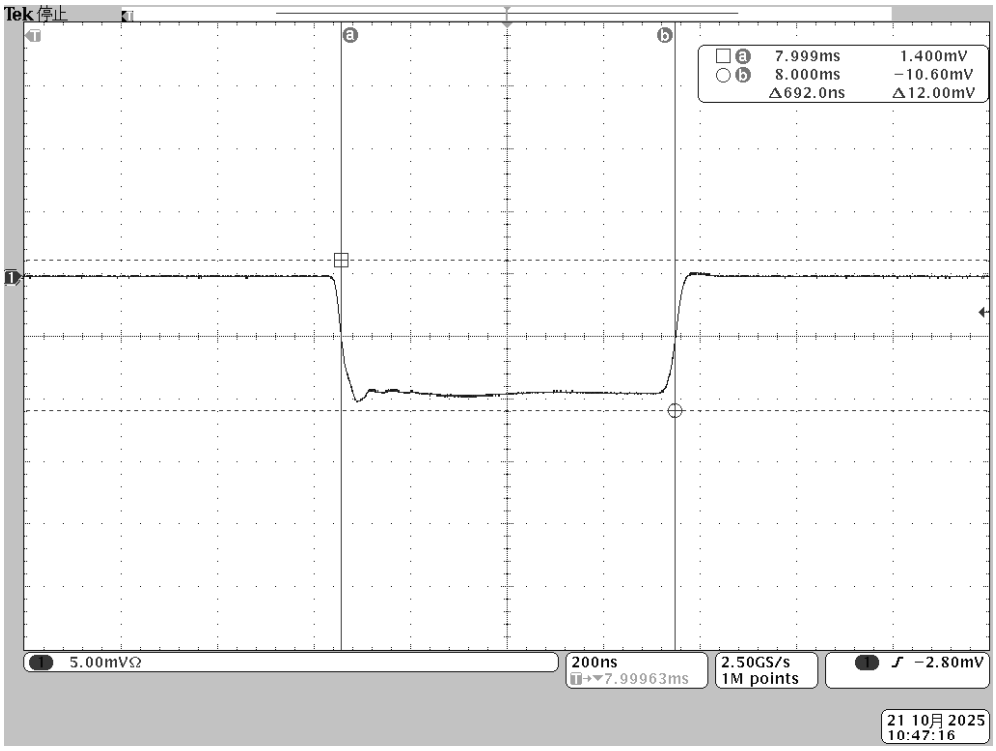


Fig. 7.41 M3 pulse envelope

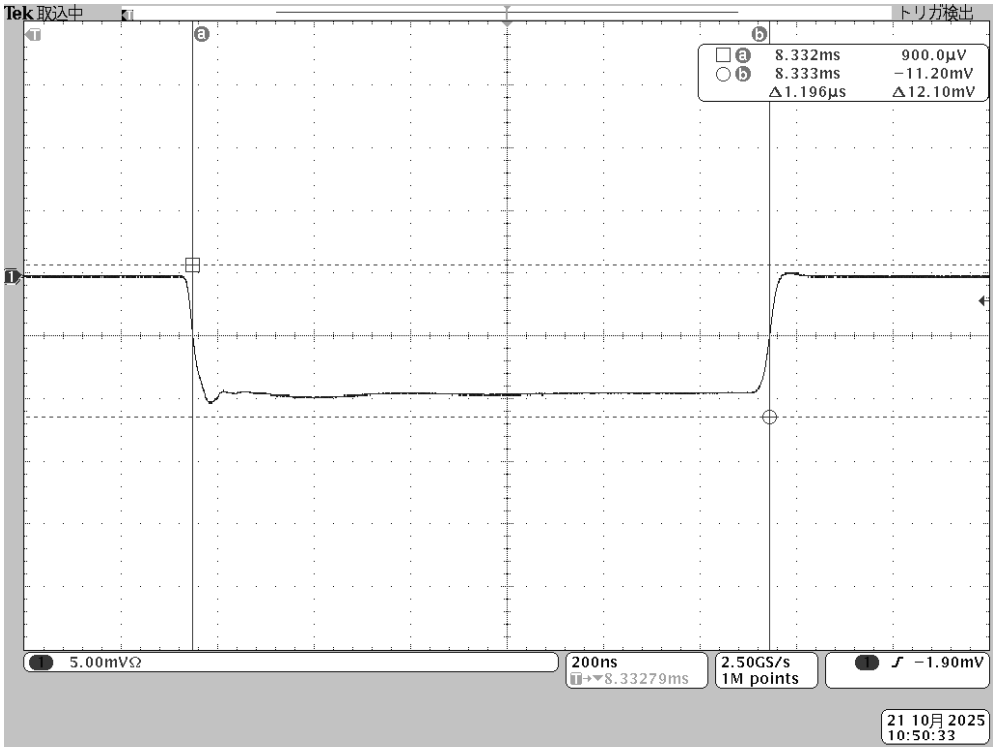


Fig. 7.42 L pulse envelope

TT32NM mode

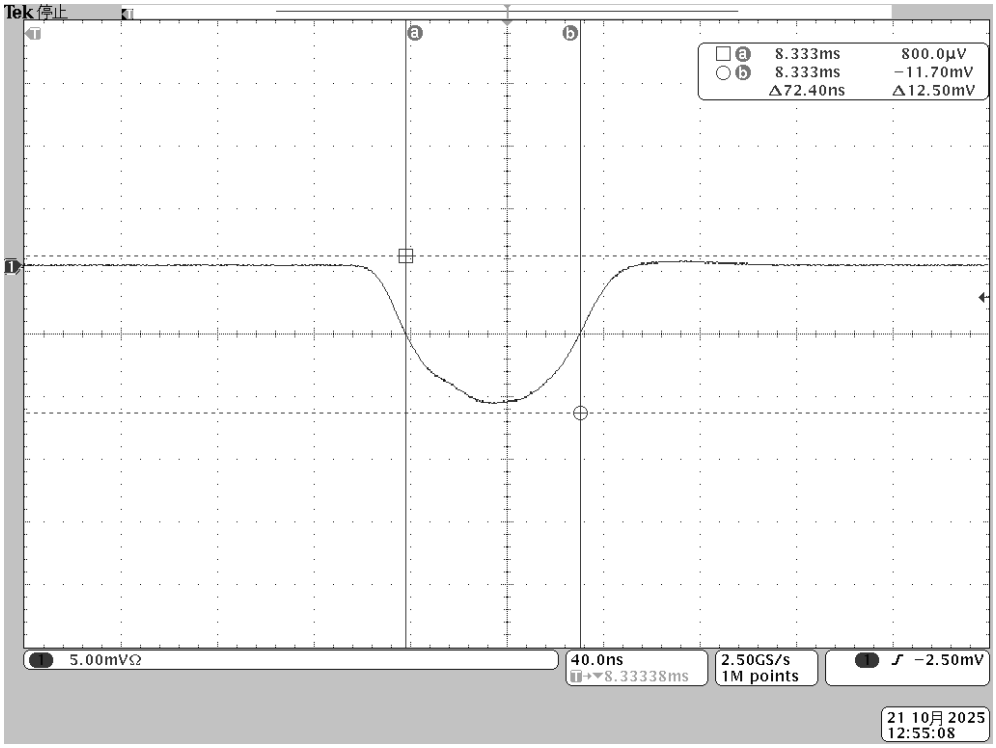


Fig. 7.43 S1 pulse envelope

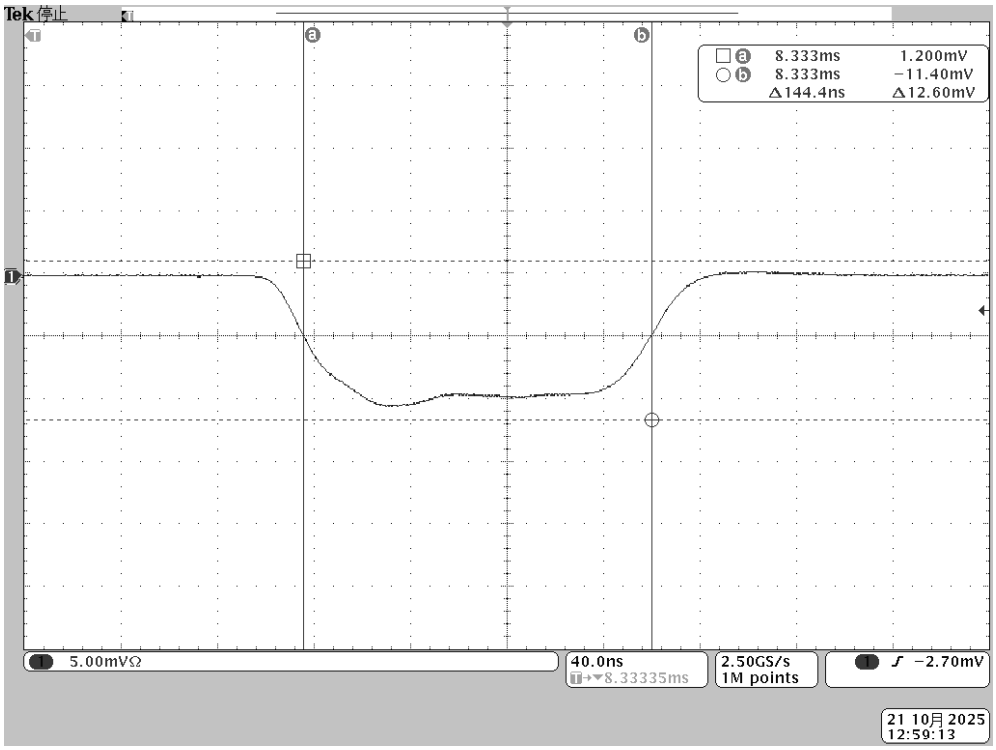


Fig. 7.44 S2 pulse envelope

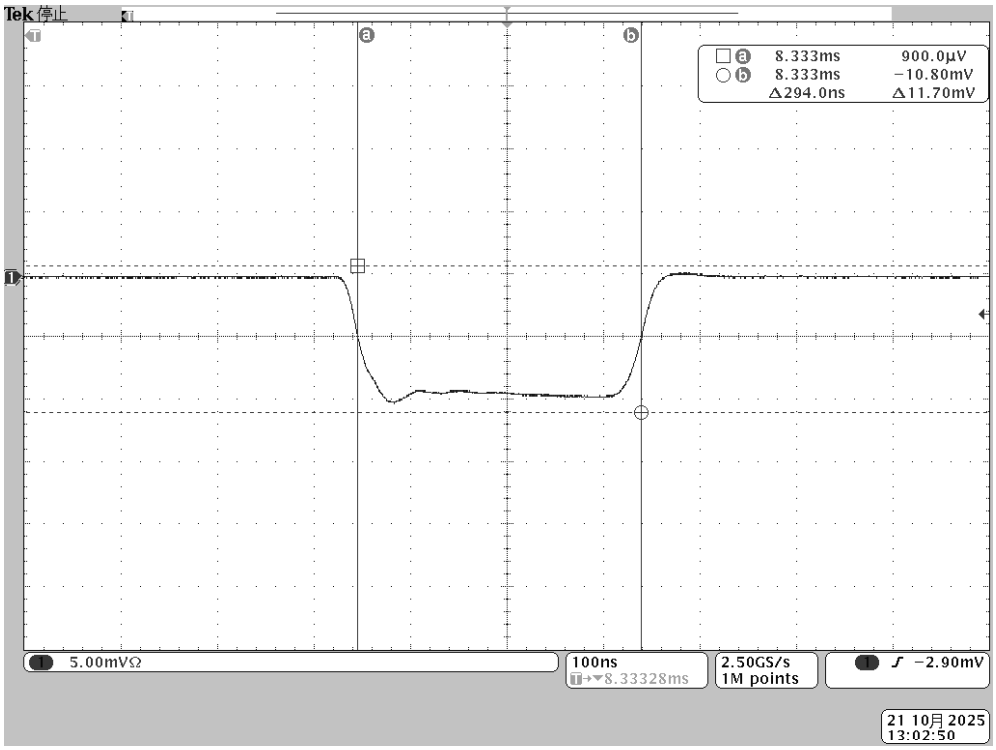


Fig. 7.45 M1 pulse envelope

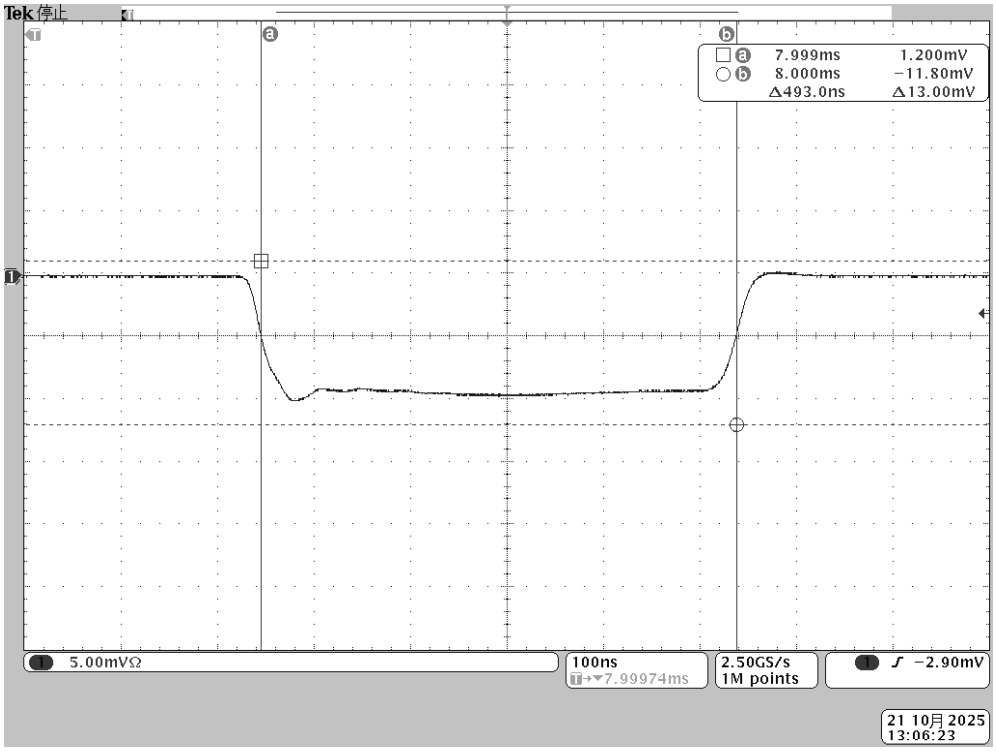


Fig. 7.46 M2 pulse envelope

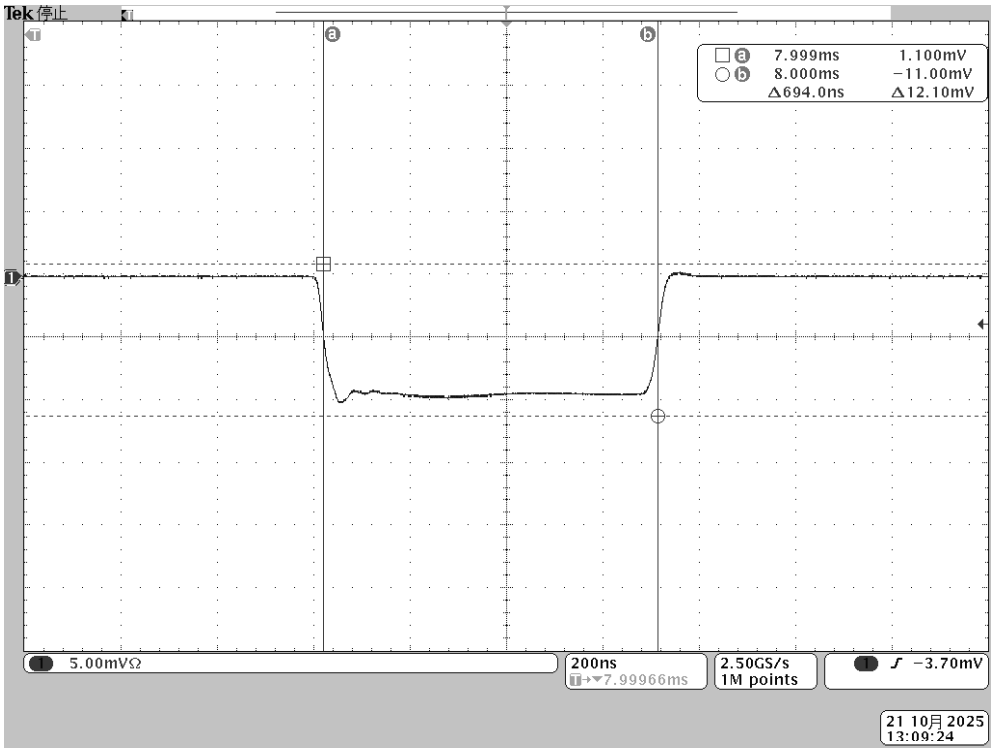


Fig. 7.47 M3 pulse envelope

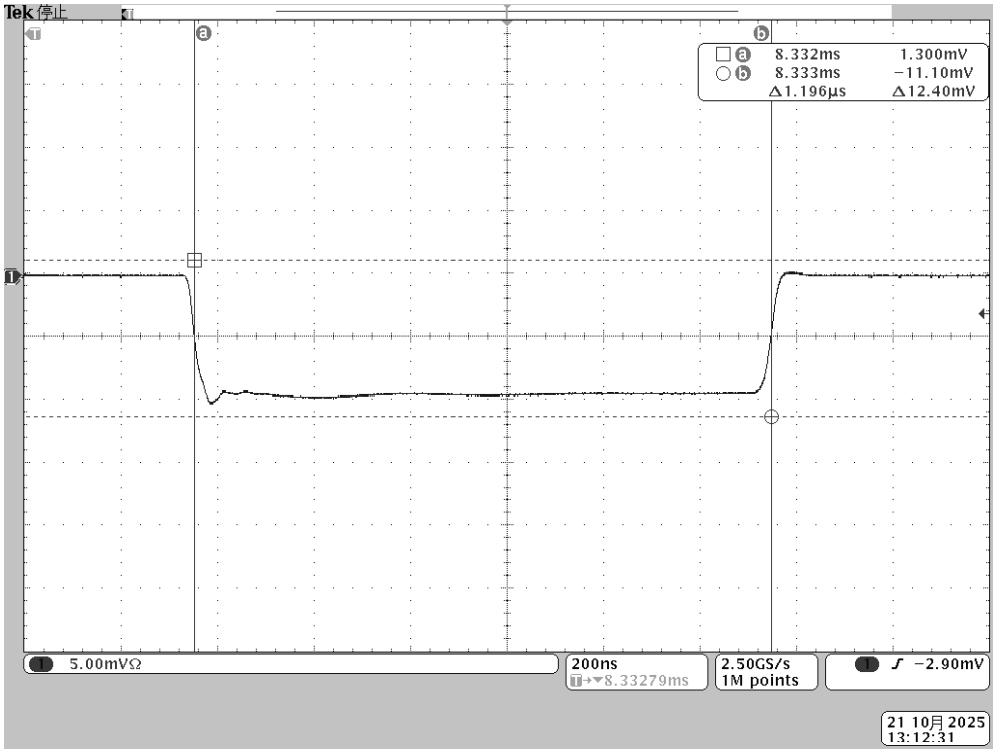


Fig. 7.48 L pulse envelope

2nd trace mode

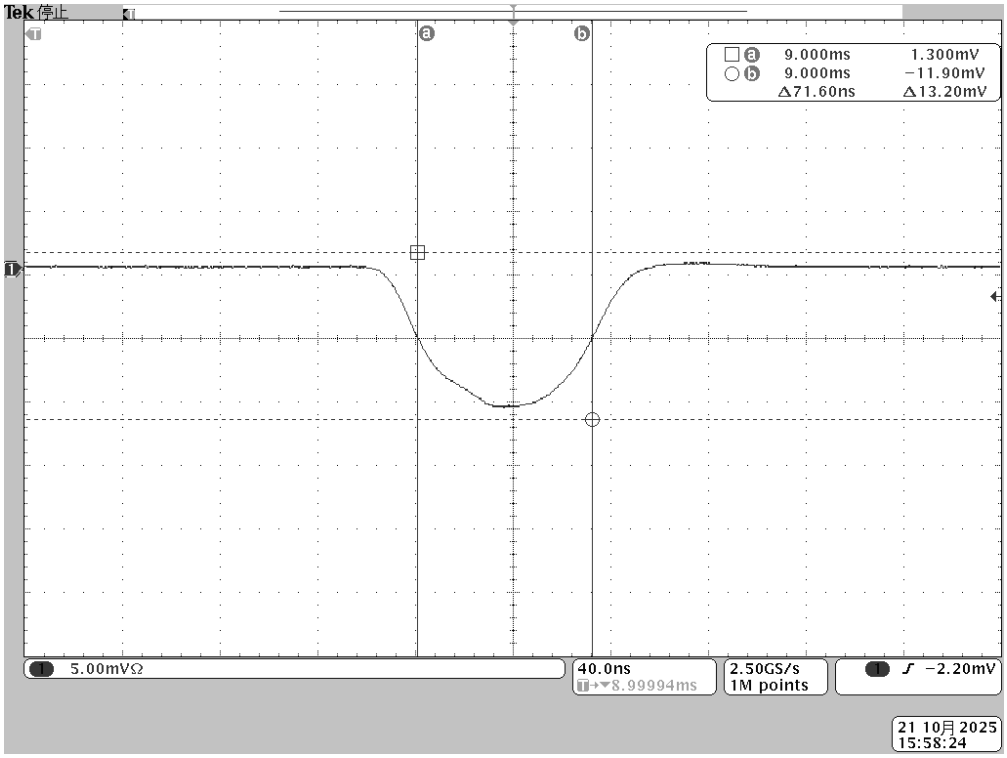


Fig. 7.49 S1 pulse envelope

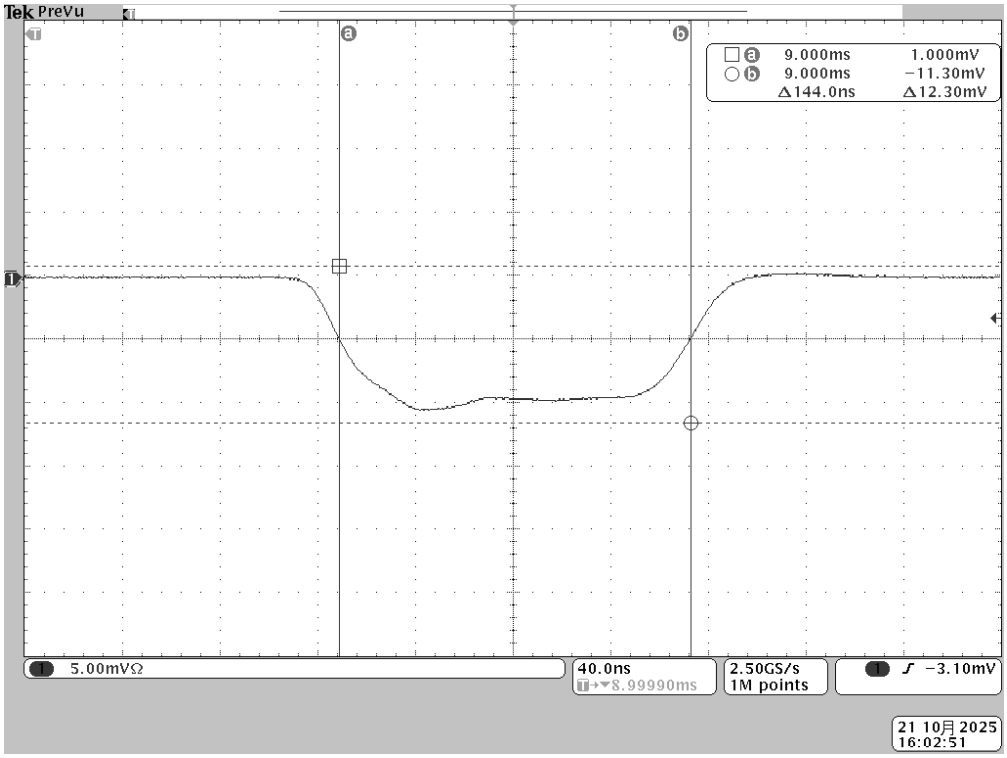


Fig. 7.50 S2 pulse envelope

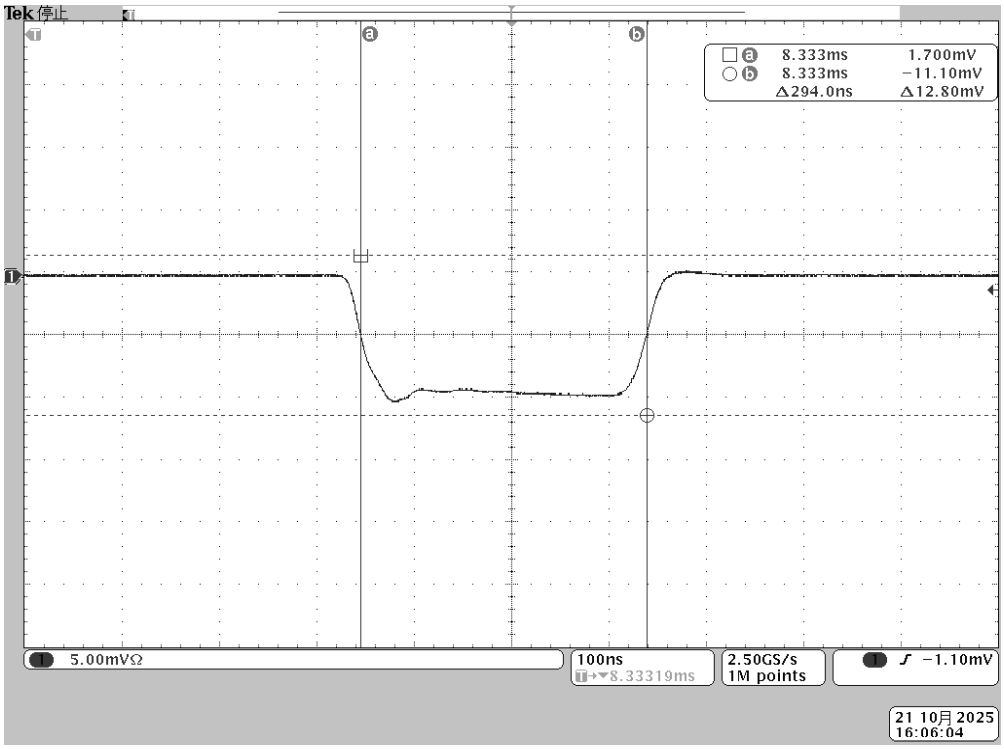


Fig. 7.51 M1 pulse envelope

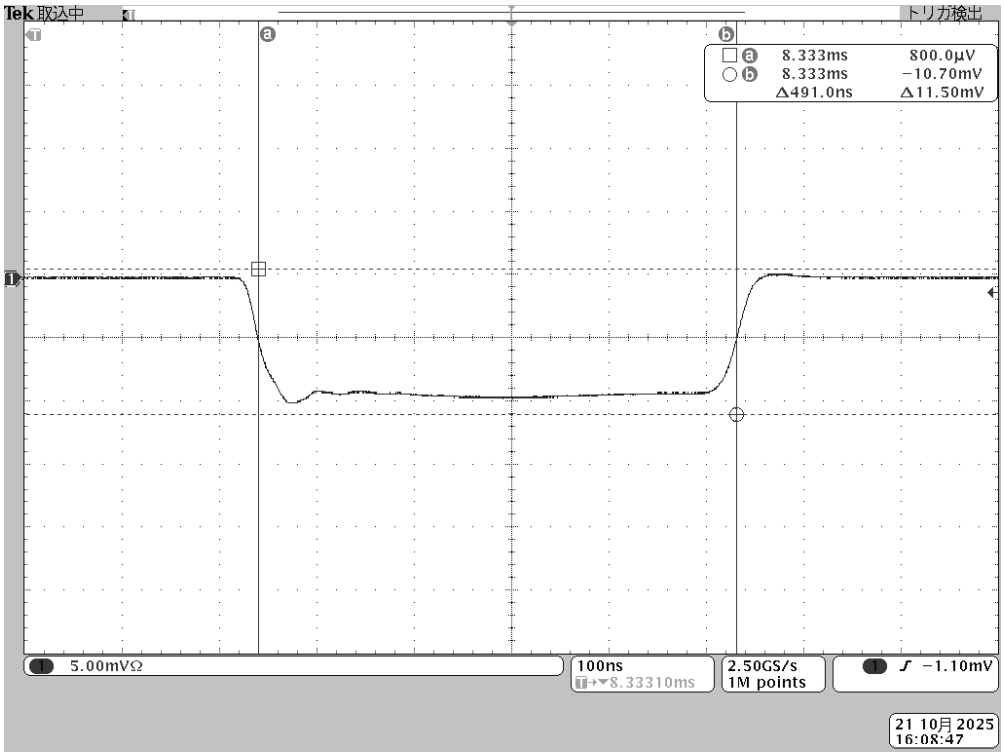


Fig. 7.52 M2 pulse envelope

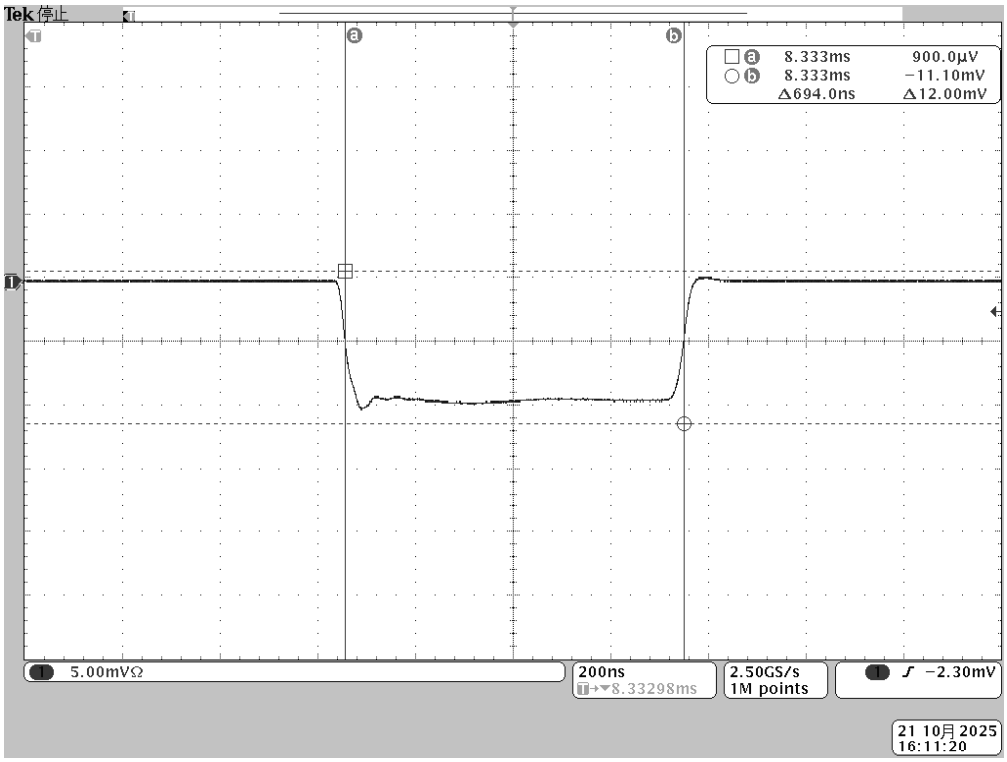


Fig. 7.53 M3 pulse envelope

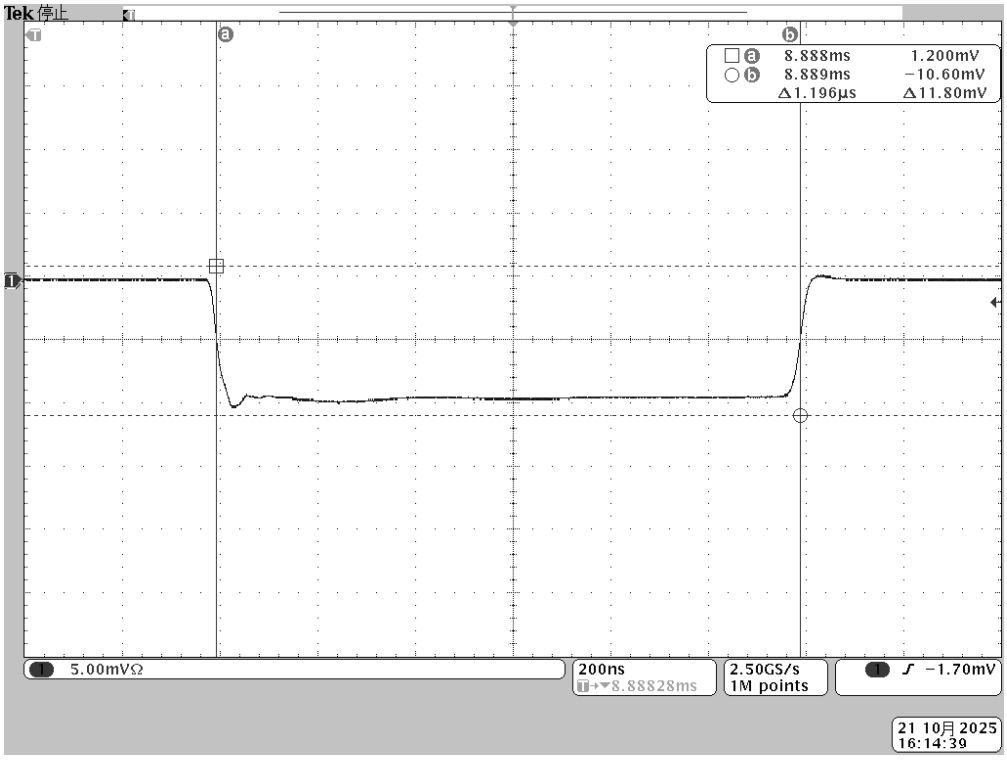


Fig. 7.54 L pulse envelope

ch2, Q0N
TT24NM mode

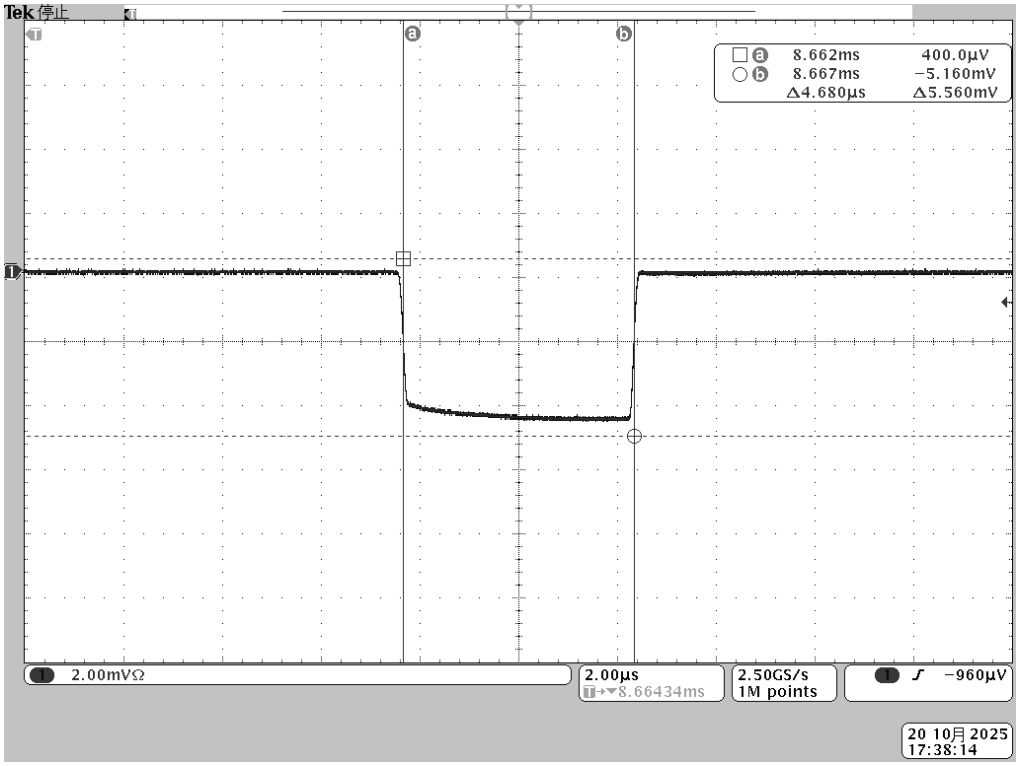


Fig. 7.55 S1 pulse envelope

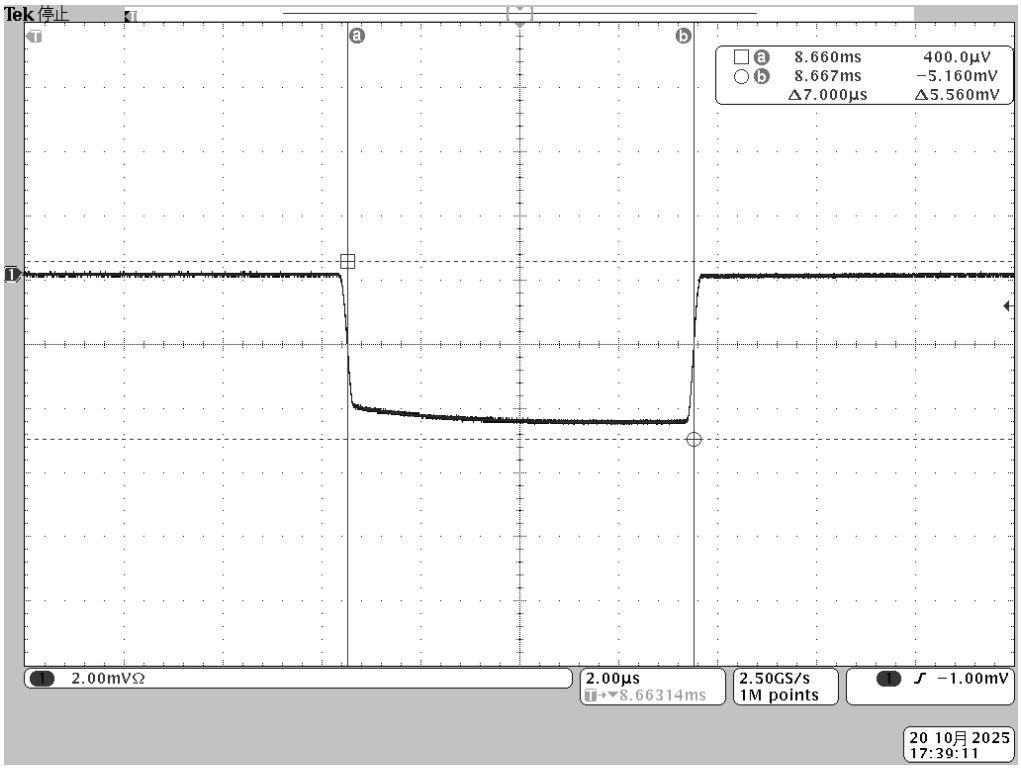


Fig. 7.56 S2 pulse envelope

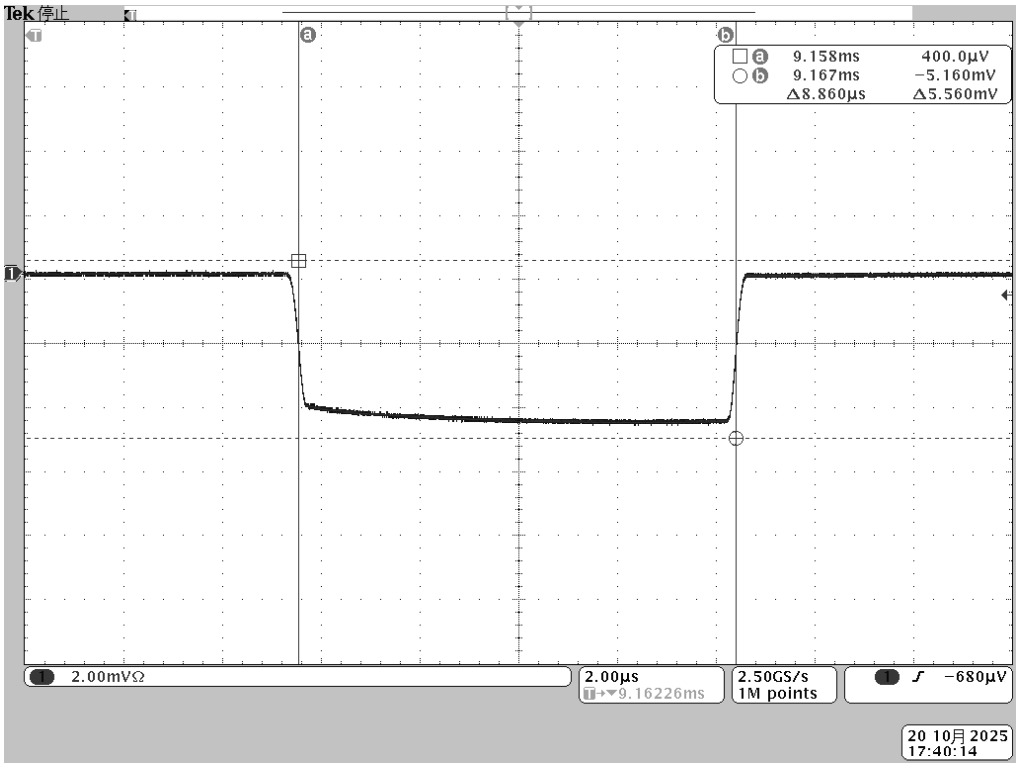


Fig. 7.57 M1 pulse envelope

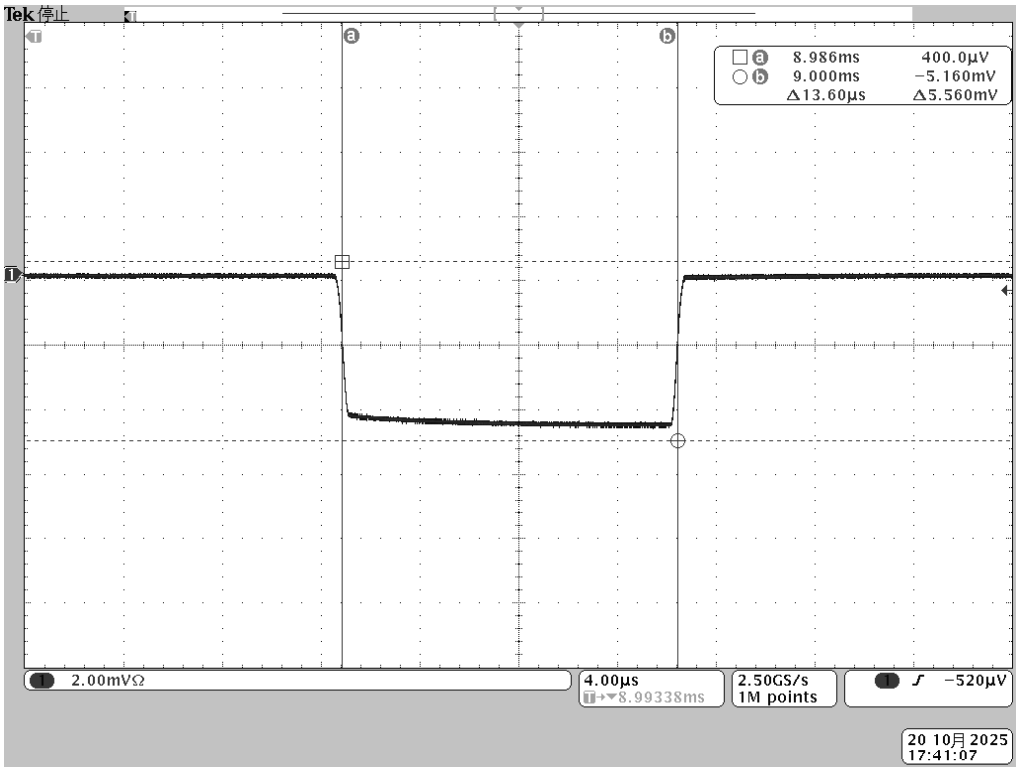


Fig. 7.58 M2 pulse envelope

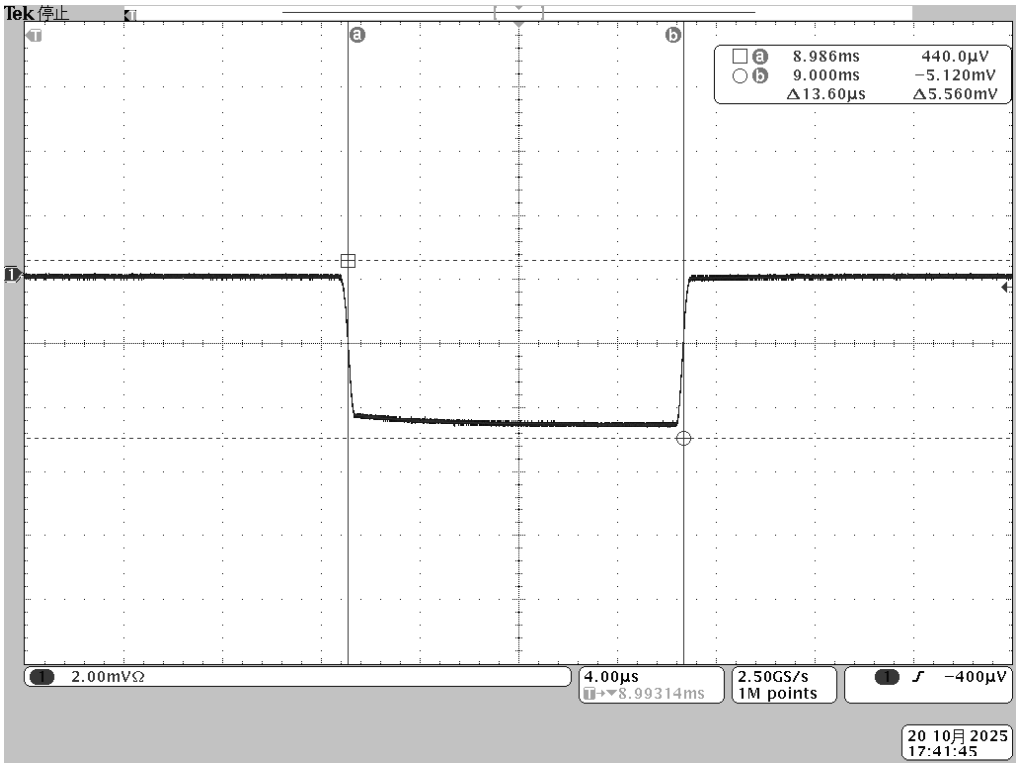


Fig. 7.59 M3 pulse envelope

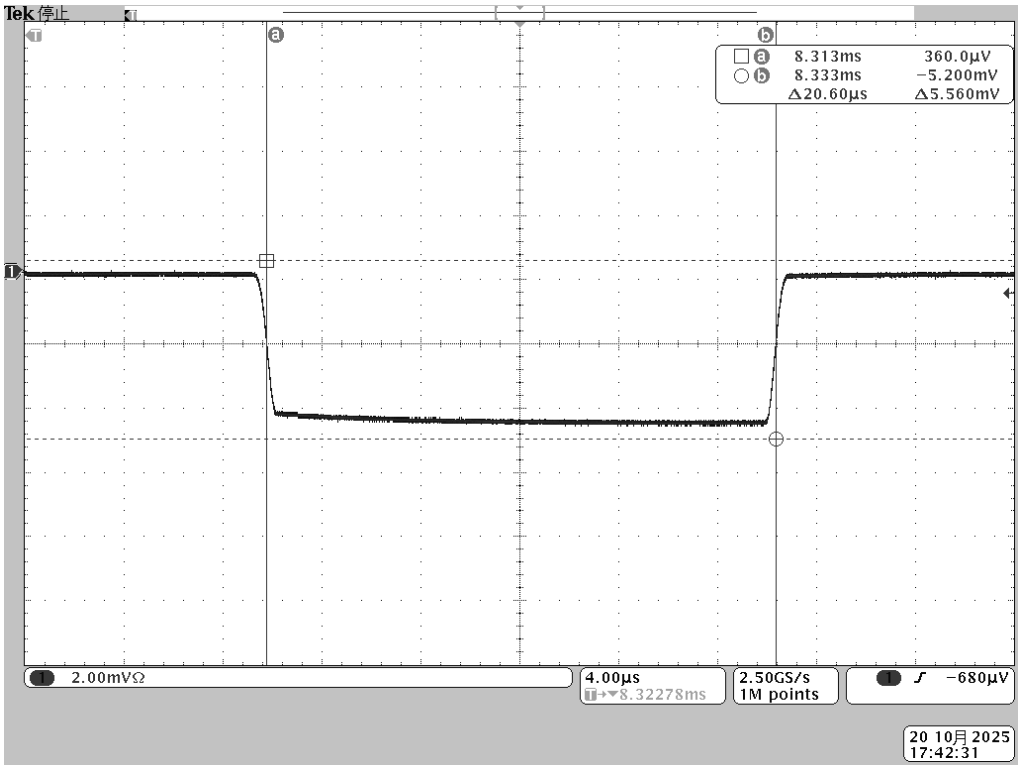


Fig. 7.60 L pulse envelope

TT32NM mode

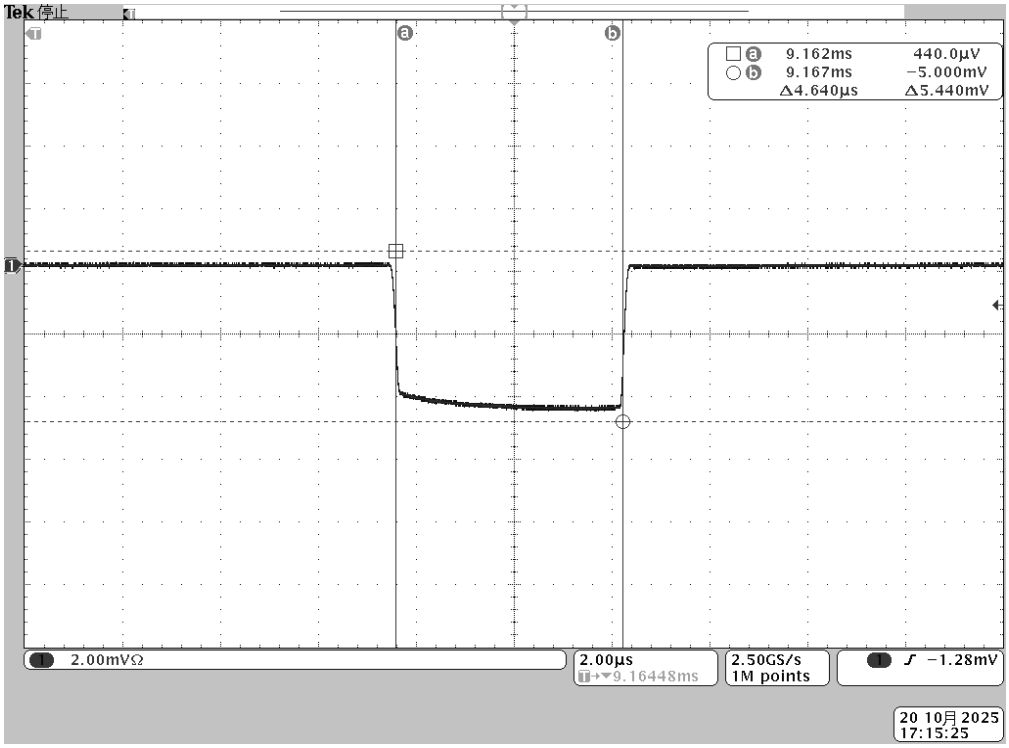


Fig. 7.61 S1 pulse envelope

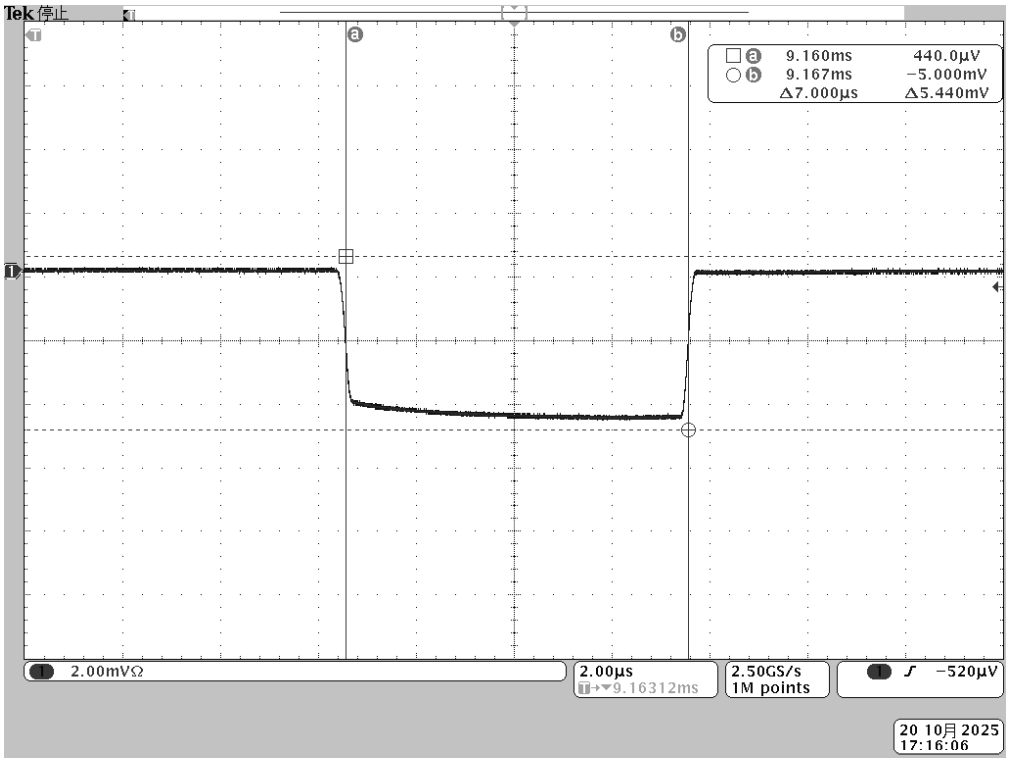


Fig. 7.62 S2 pulse envelope

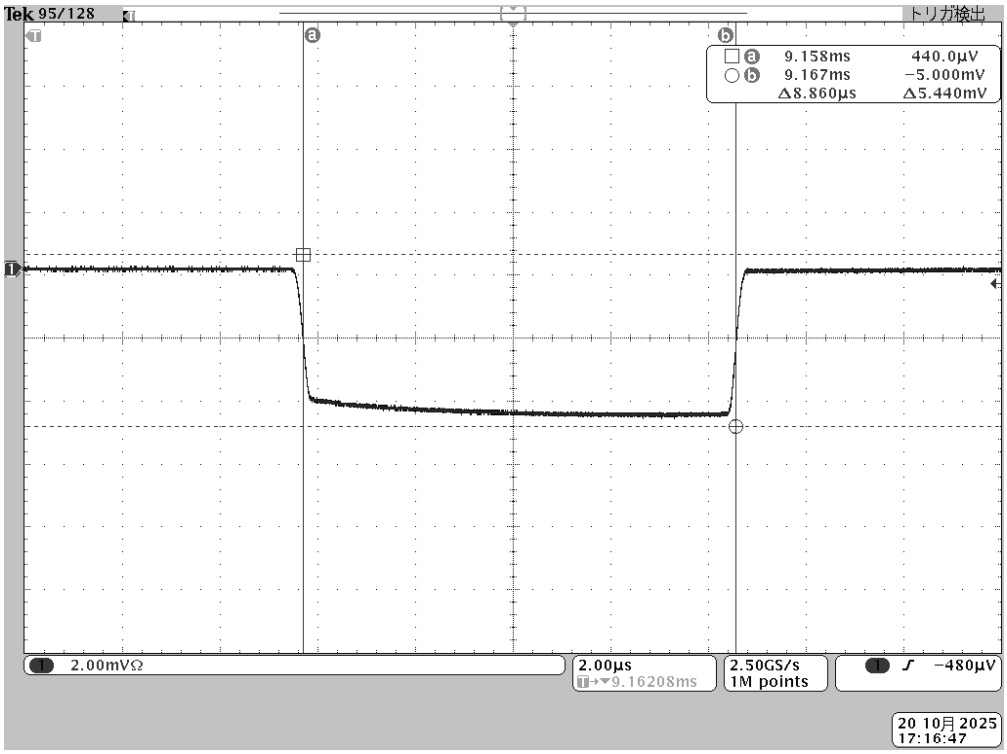


Fig. 7.63 M1 pulse envelope

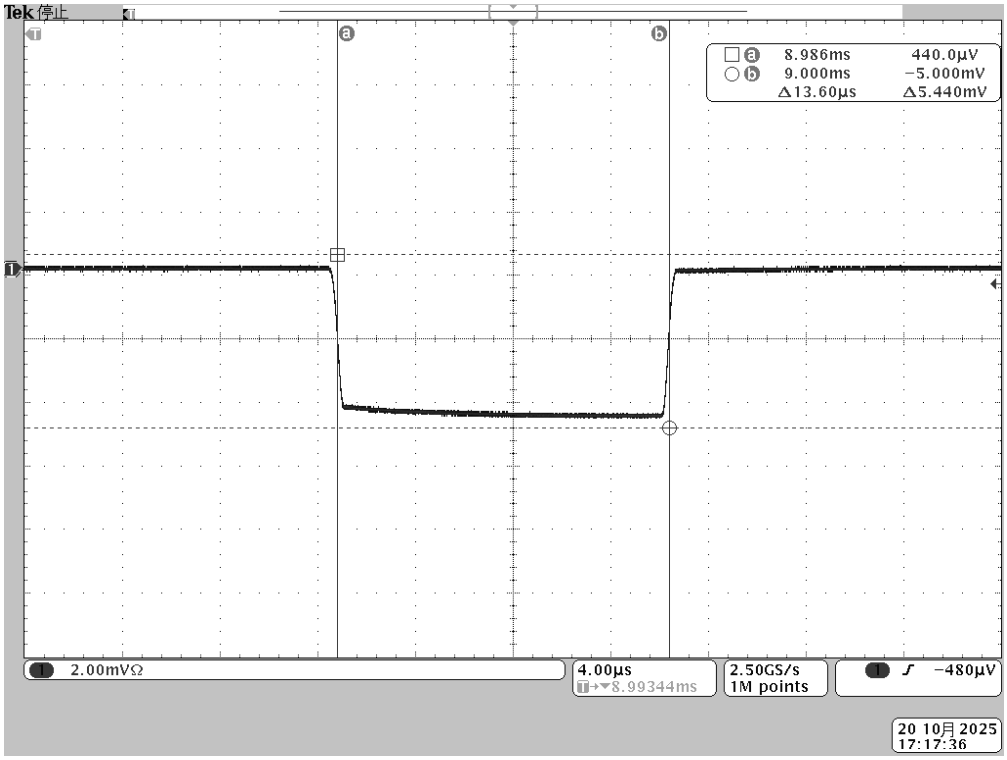


Fig. 7.64 M2 pulse envelope

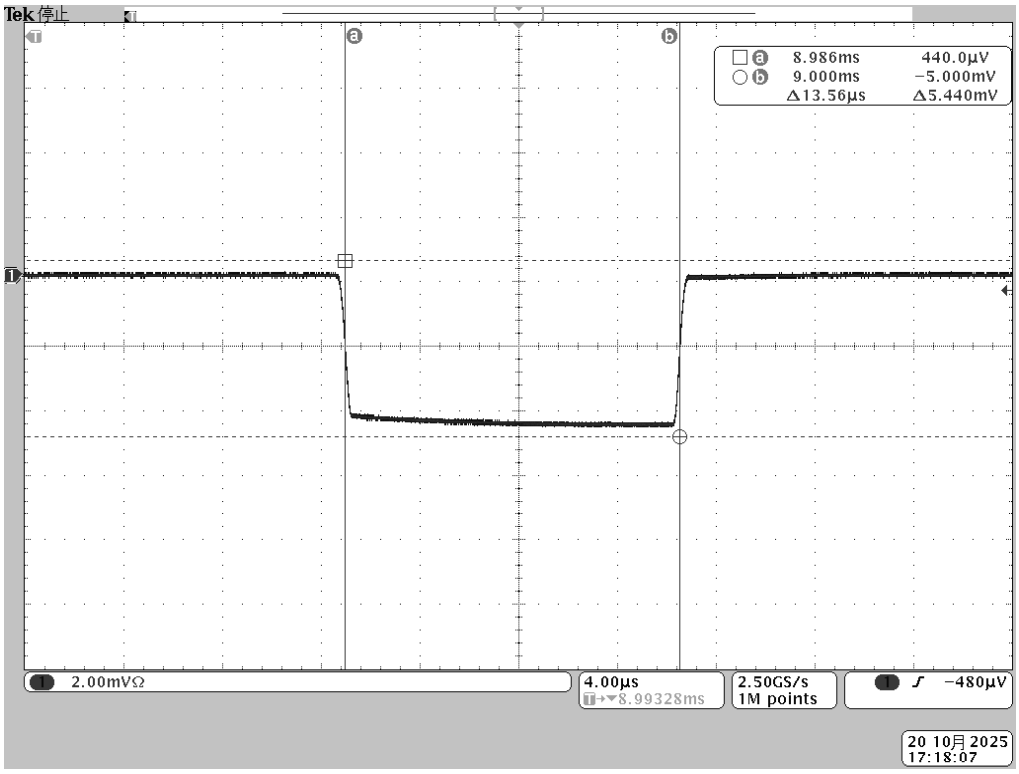


Fig. 7.65 M3 pulse envelope

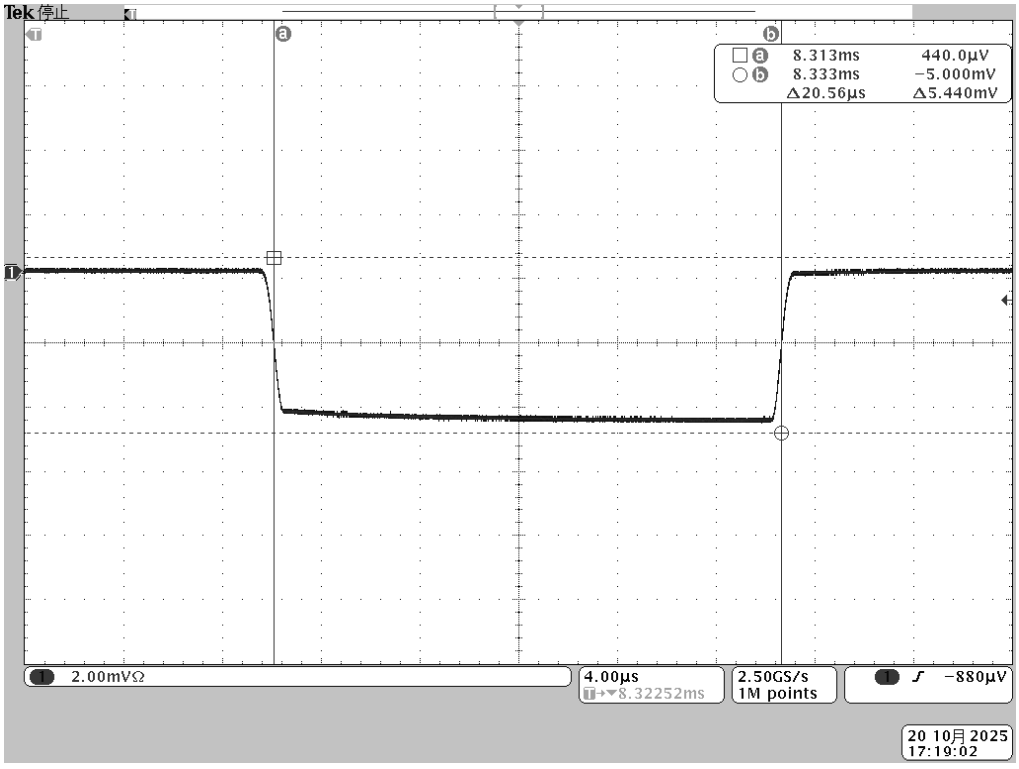


Fig. 7.66 L pulse envelope

2nd trace mode

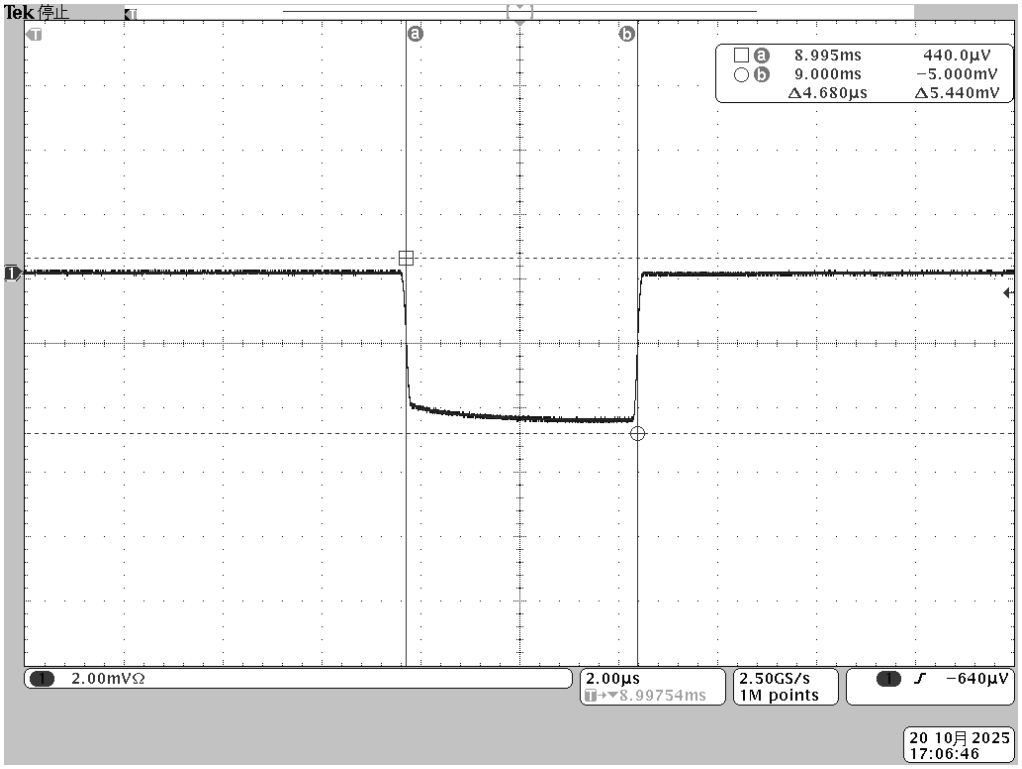


Fig. 7.67 S1 pulse envelope

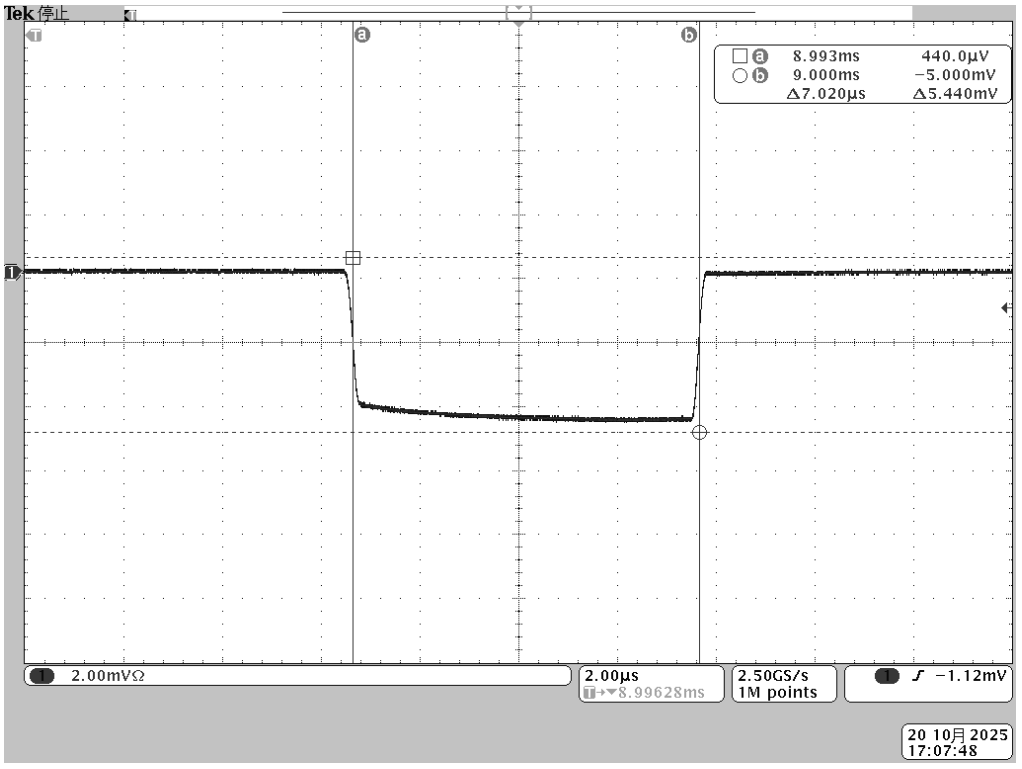


Fig. 7.68 S2 pulse envelope

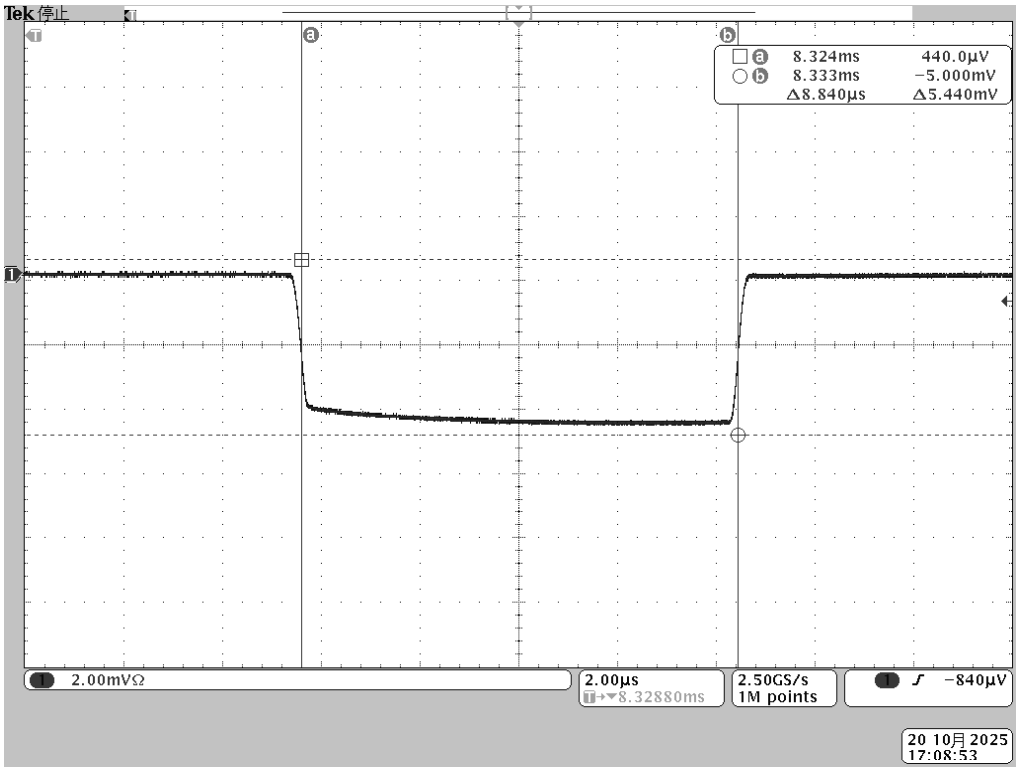


Fig. 7.69 M1 pulse envelope

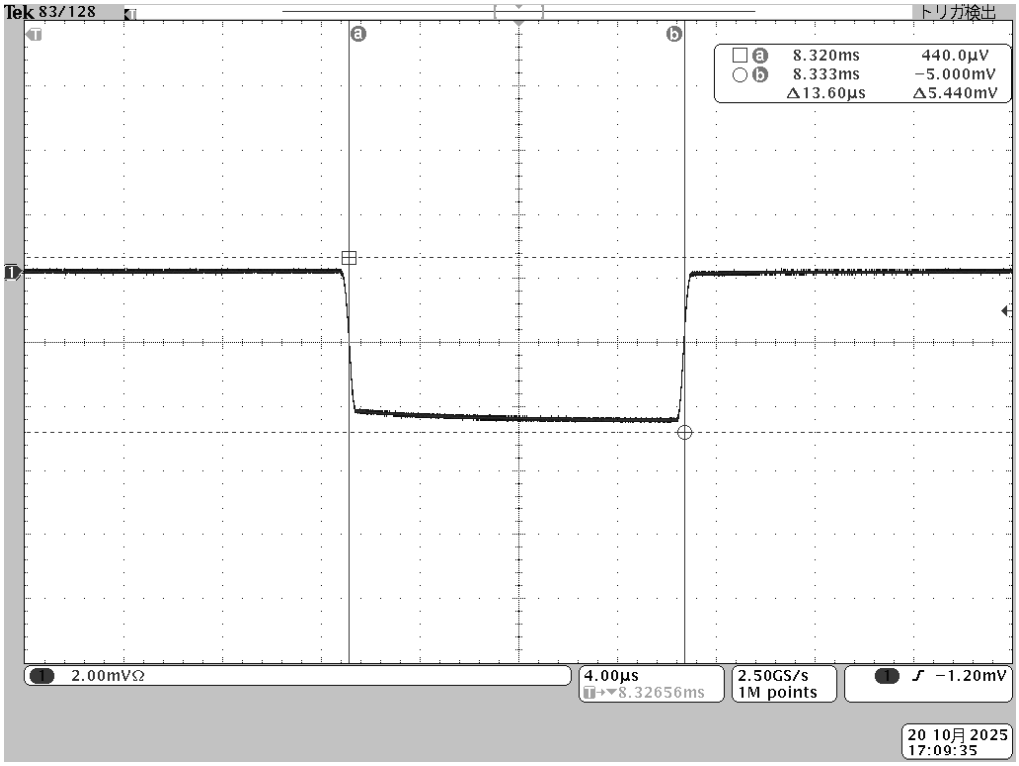


Fig. 7.70 M2 pulse envelope

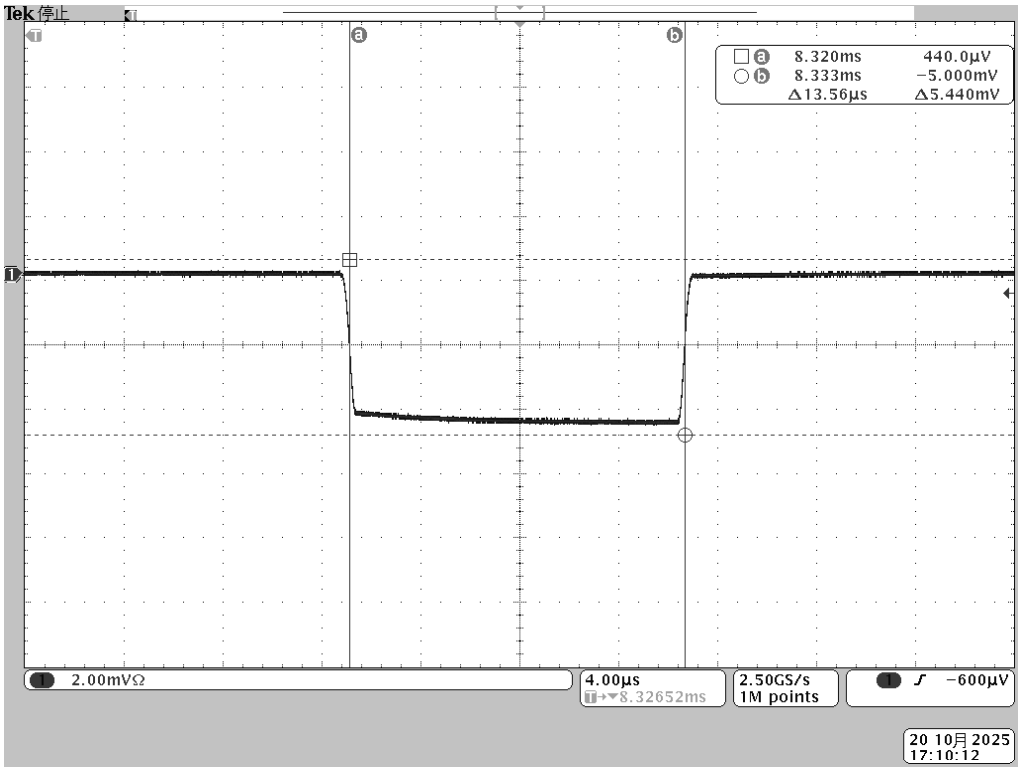


Fig. 7.71 M3 pulse envelope

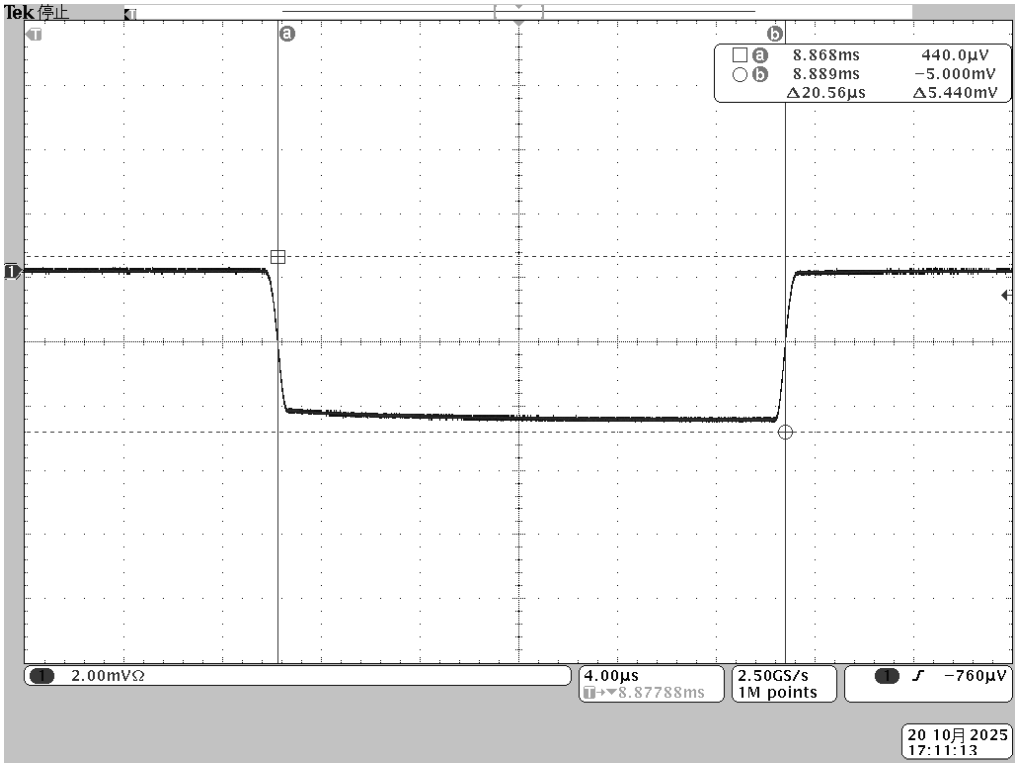


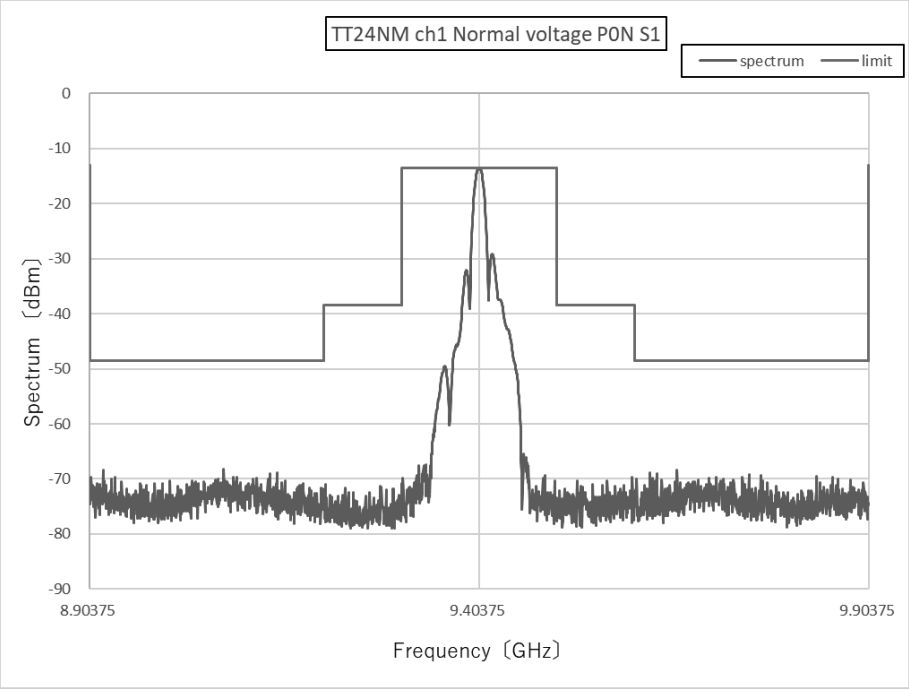
Fig. 7.72 L pulse envelope

8 Spurious Emission Plots measured at Antenna Terminal

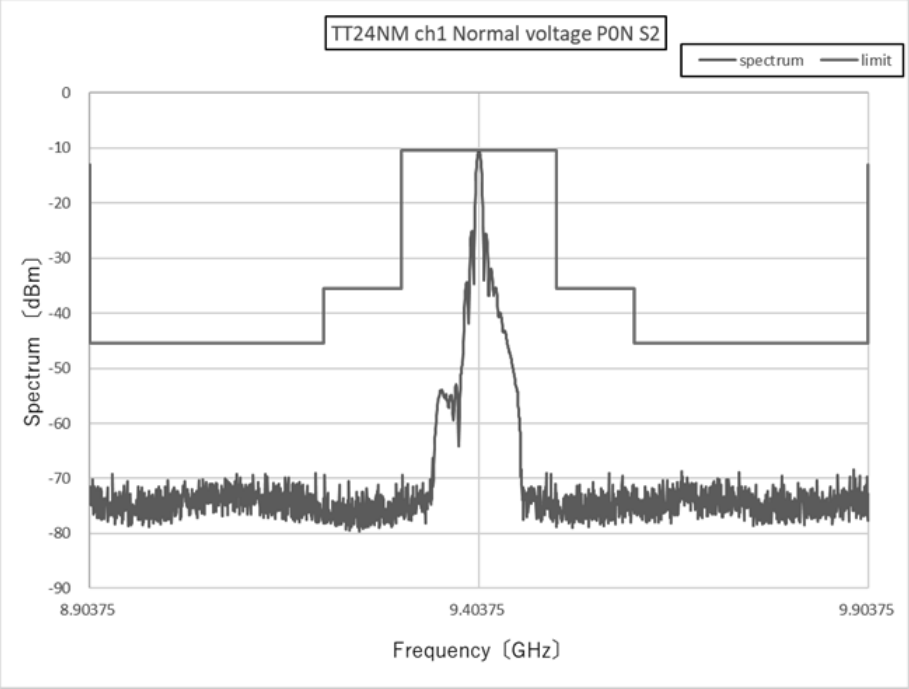
8.1 Occupied Bandwidth

ch1, P0N

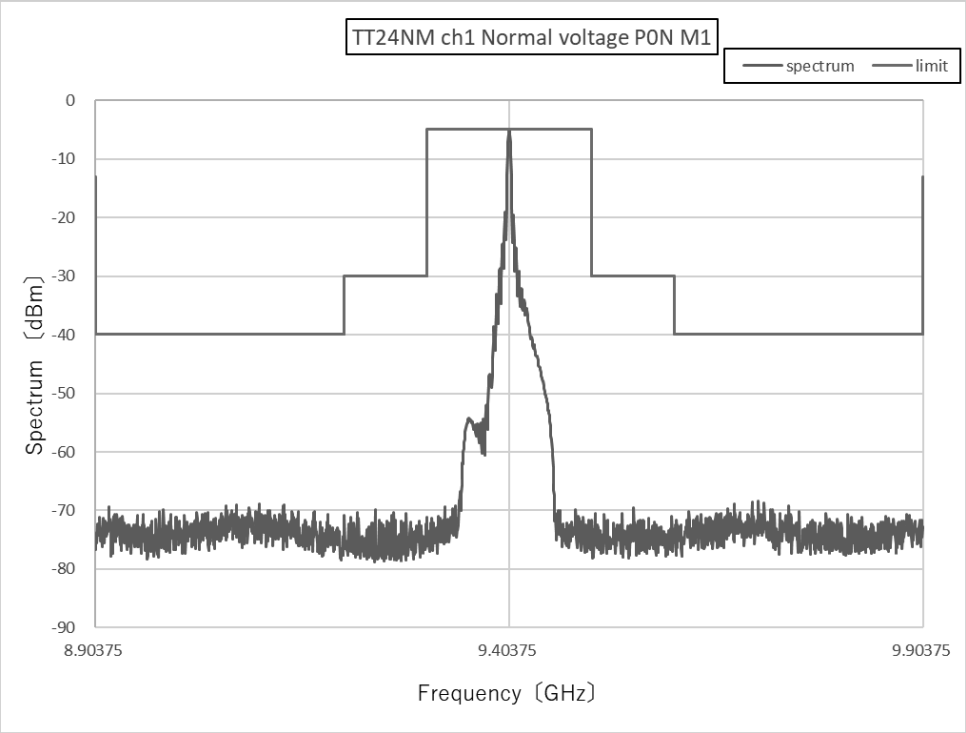
TT24NM mode



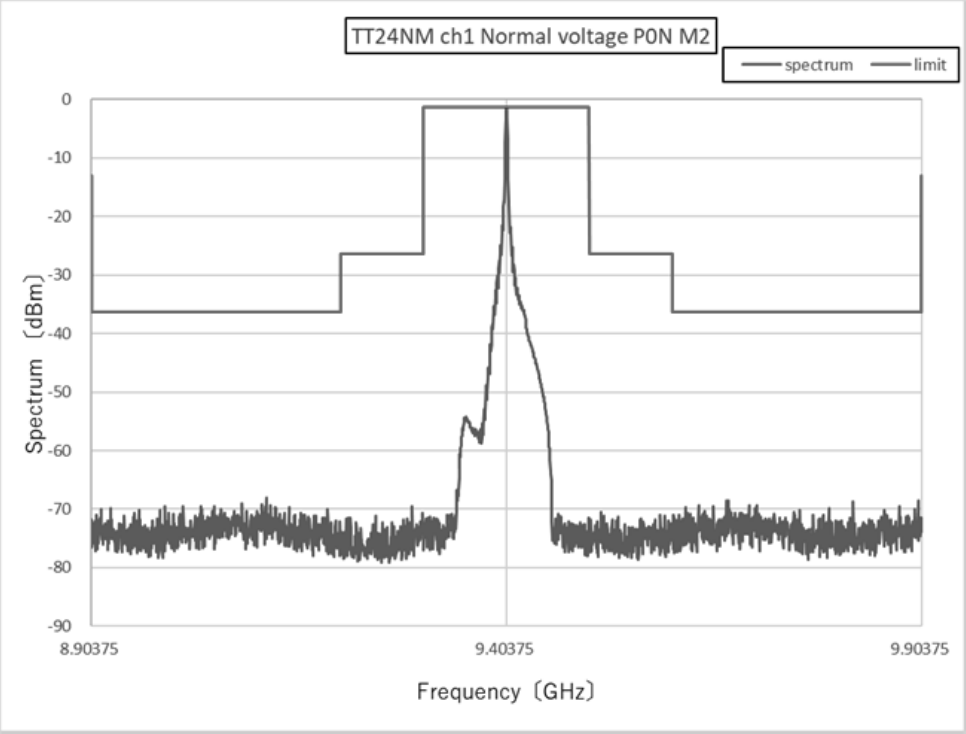
Occupied bandwidth: 38.375 MHz
Fig. 8.1 S1 pulse



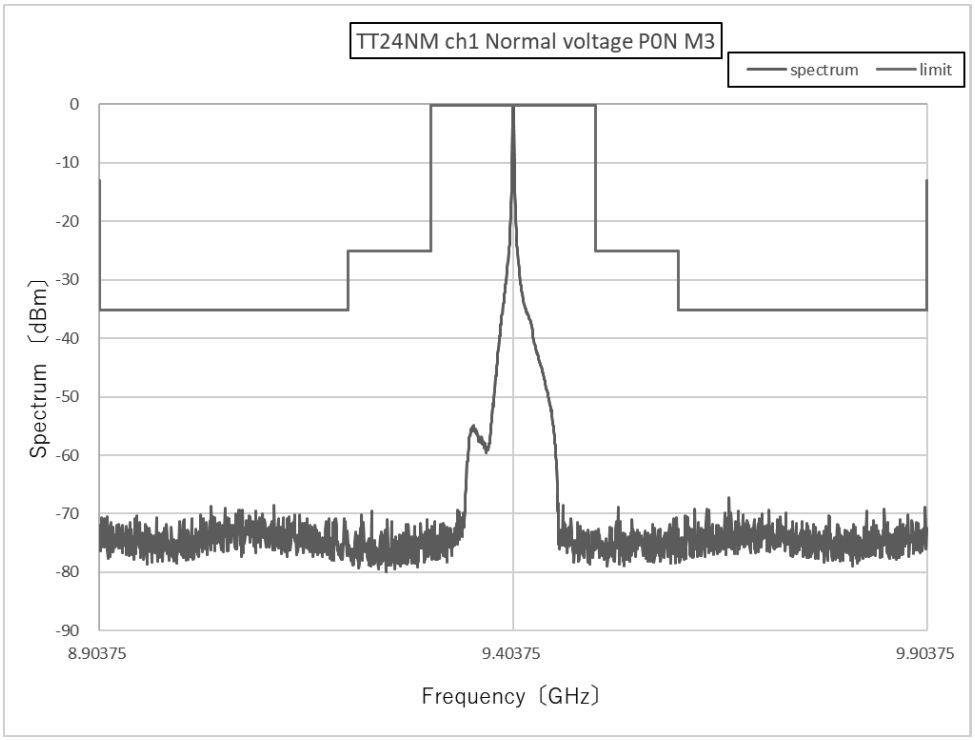
Occupied bandwidth: 27.936 MHz
Fig. 8.2 S2 pulse



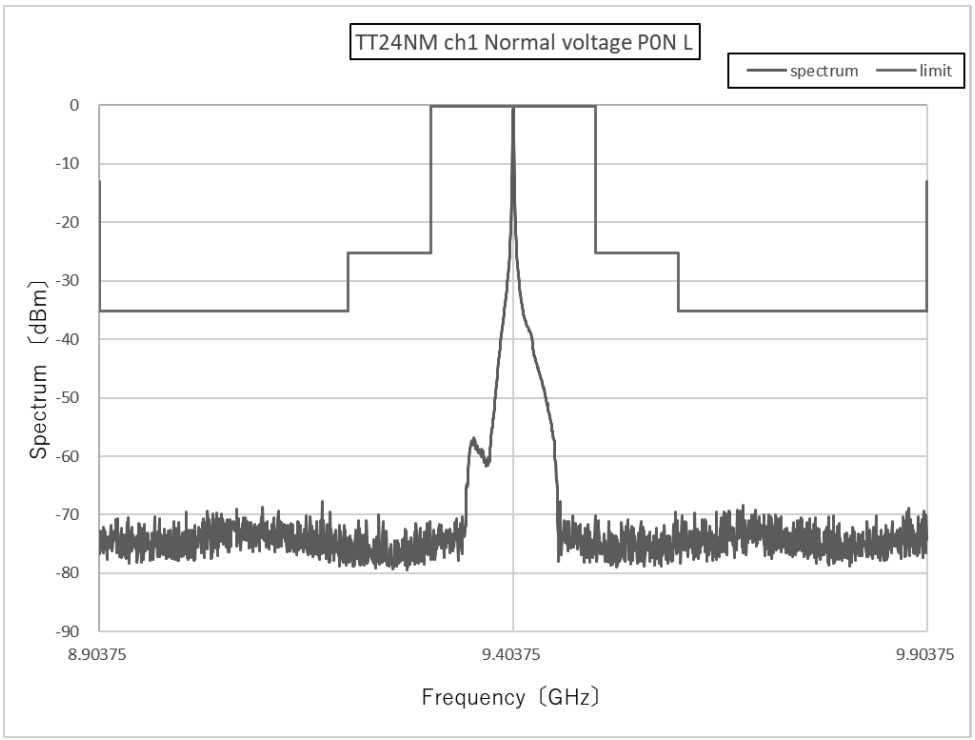
Occupied bandwidth: 20.268 MHz
Fig. 8.3 M1 pulse



Occupied bandwidth: 14.360 MHz
Fig. 8.4 M2 pulse

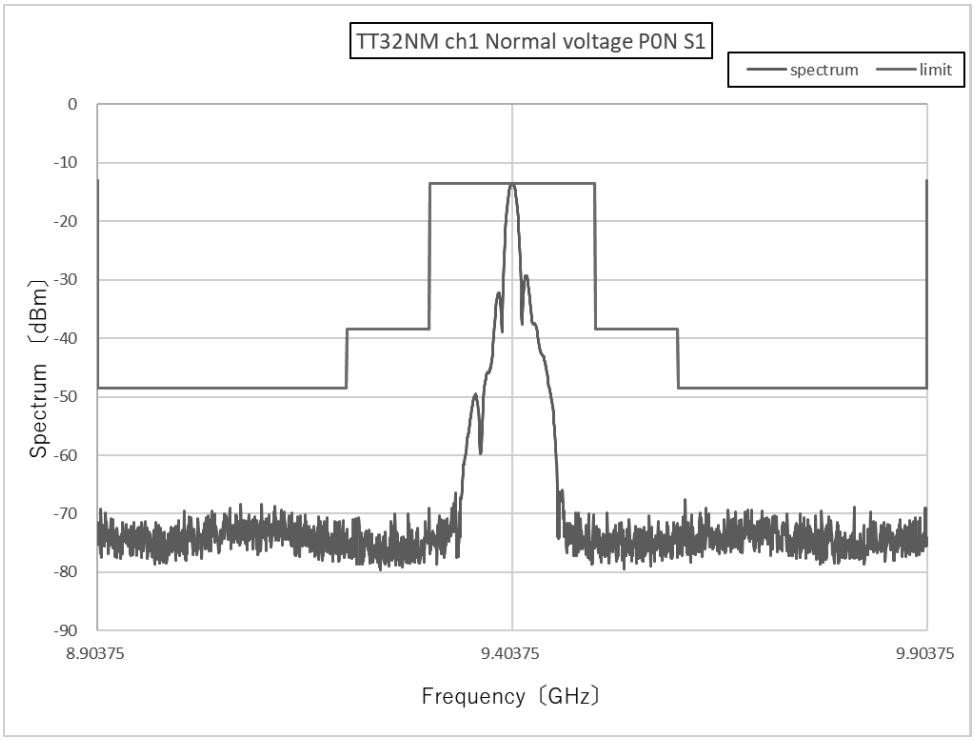


Occupied bandwidth: 11.009 MHz
Fig. 8.5 M3 pulse

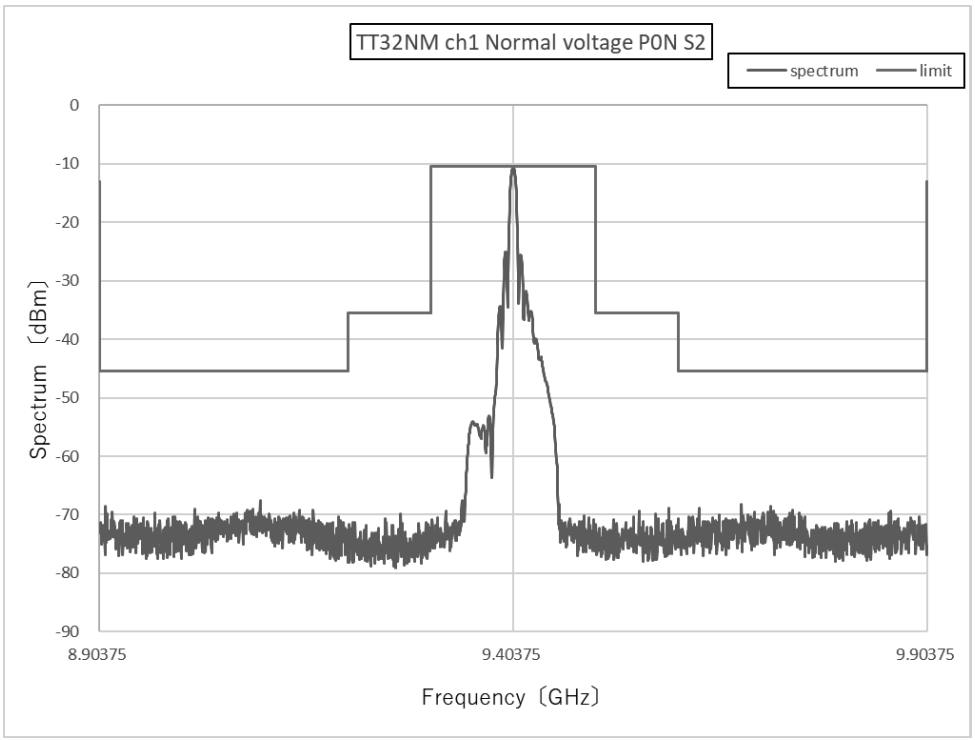


Occupied bandwidth: 9.003 MHz
Fig. 8.6 L pulse

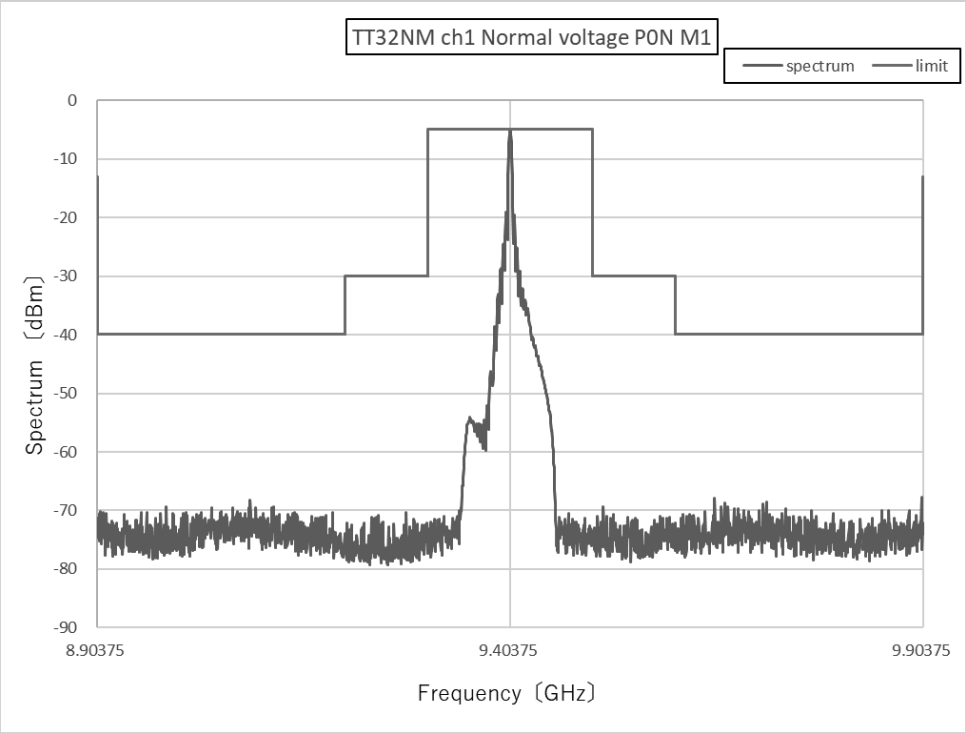
TT32NM mode



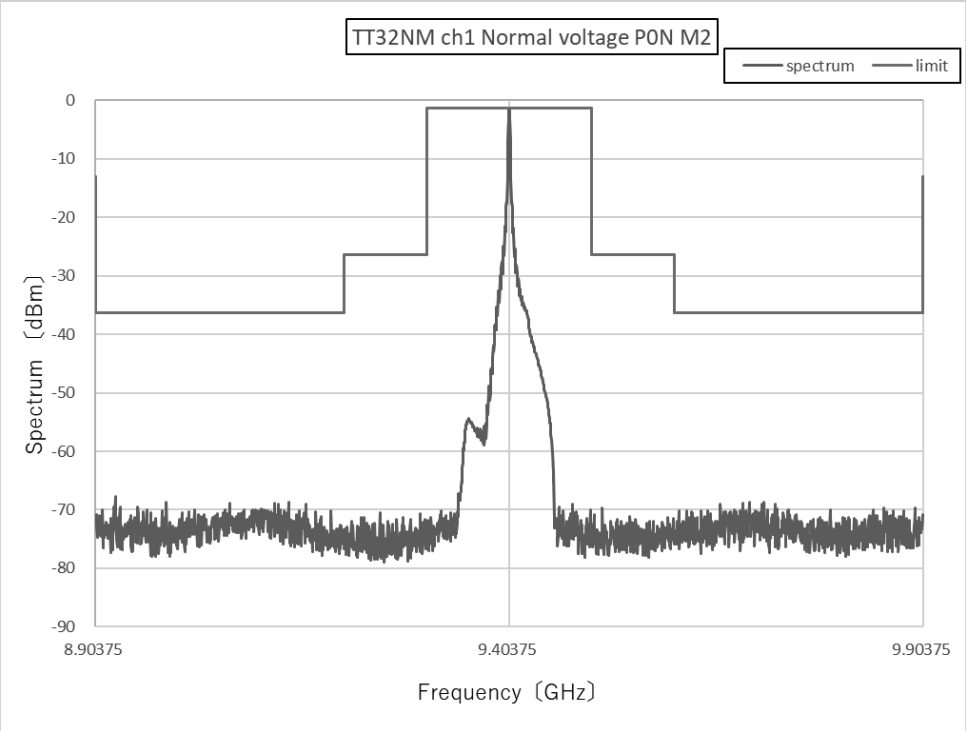
Occupied bandwidth: 38.280 MHz
Fig. 8.7 S1 pulse



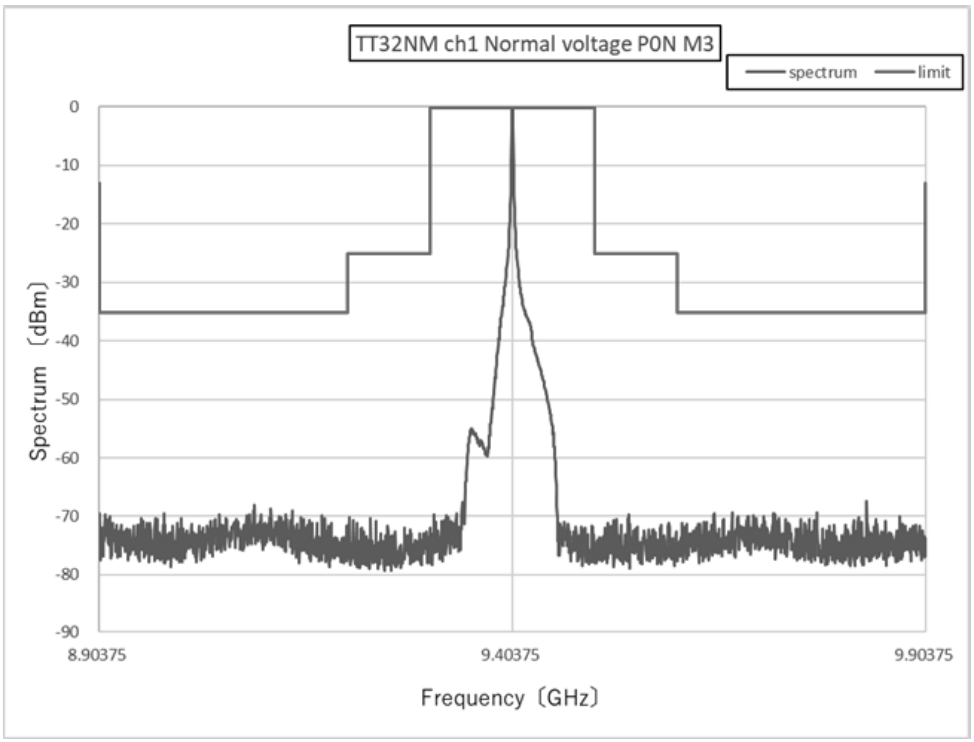
Occupied bandwidth: 27.979 MHz
Fig. 8.8 S2 pulse



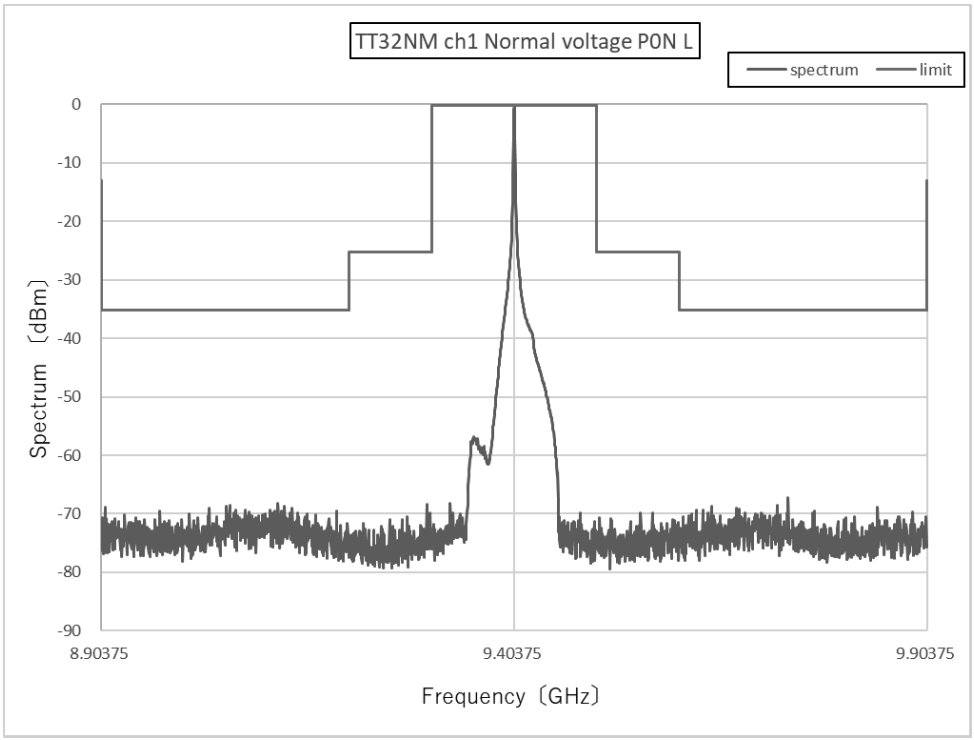
Occupied bandwidth: 20.312 MHz
Fig. 8.9 M1 pulse



Occupied bandwidth: 14.386 MHz
Fig. 8.10 M2 pulse

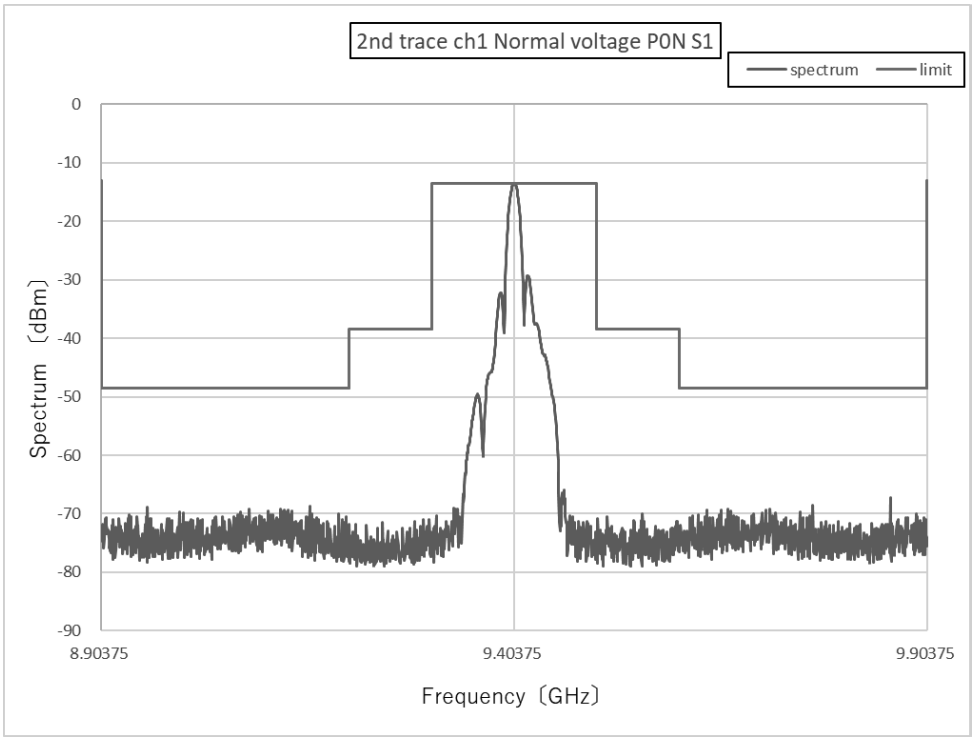


Occupied bandwidth: 11.014 MHz
Fig. 8.11 M3 pulse

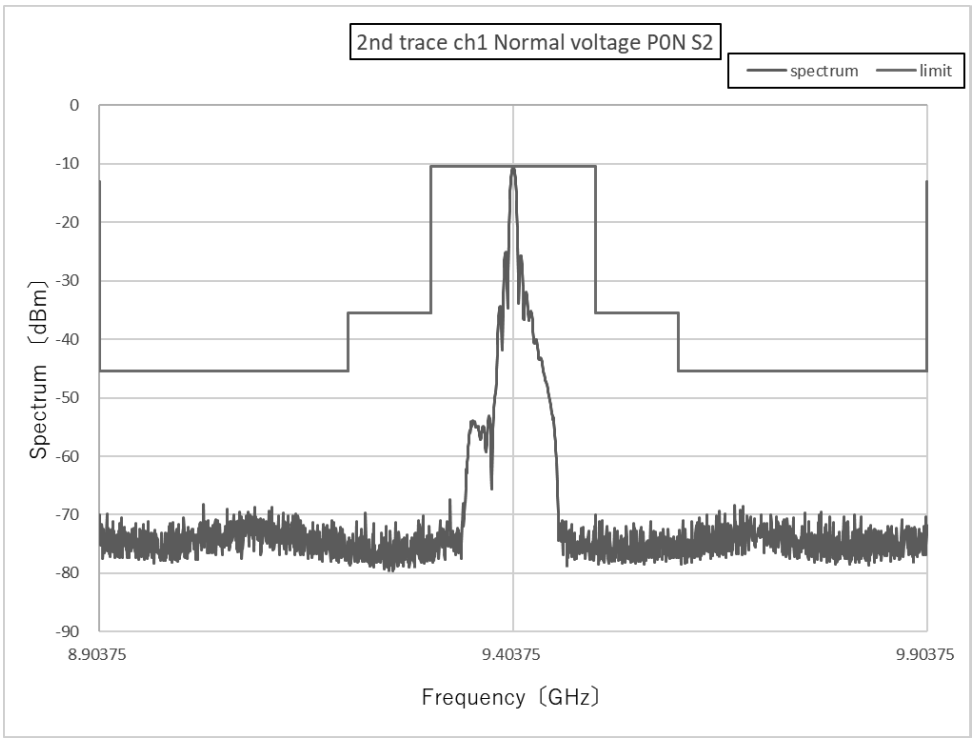


Occupied bandwidth: 9.021MHz
Fig. 8.12 L pulse

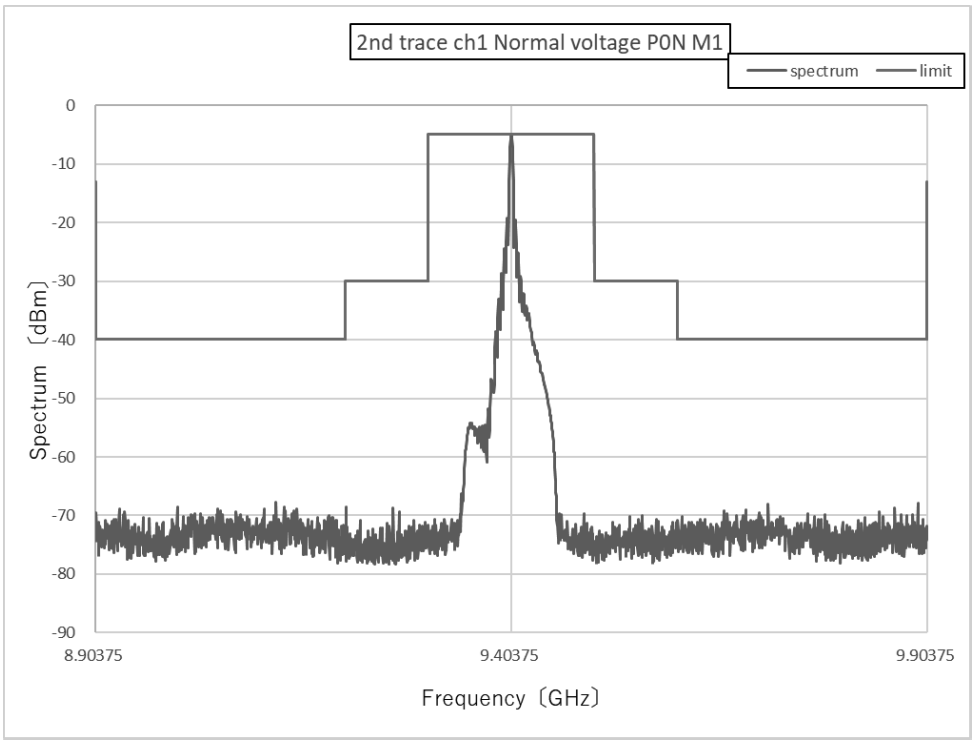
2nd trace mode



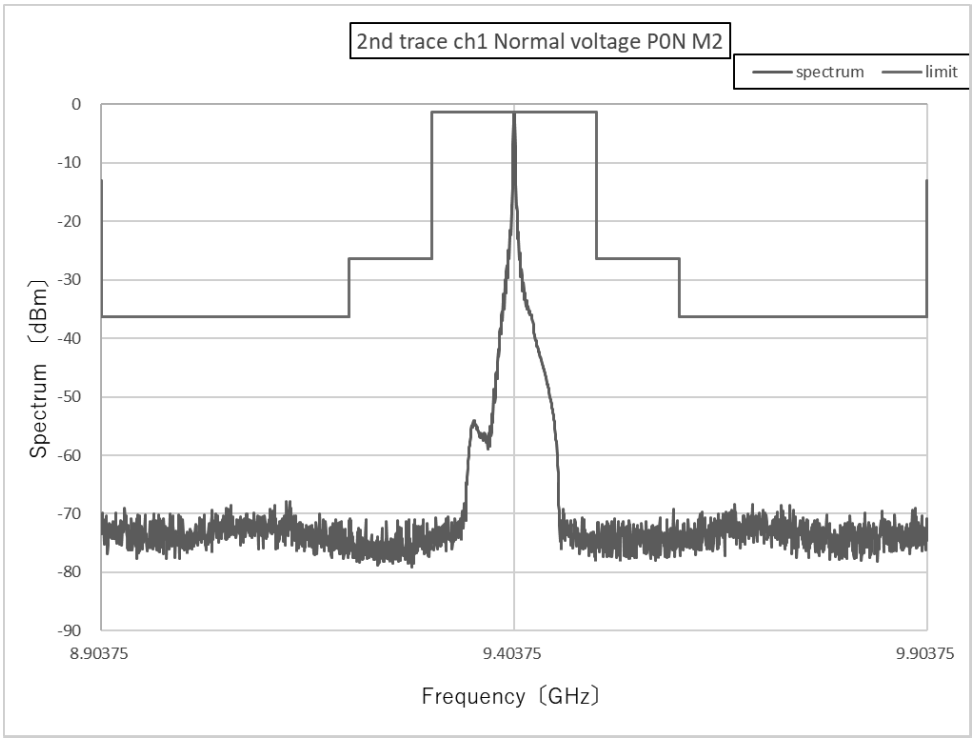
Occupied bandwidth: 38.285 MHz
Fig. 8.13 S1 pulse



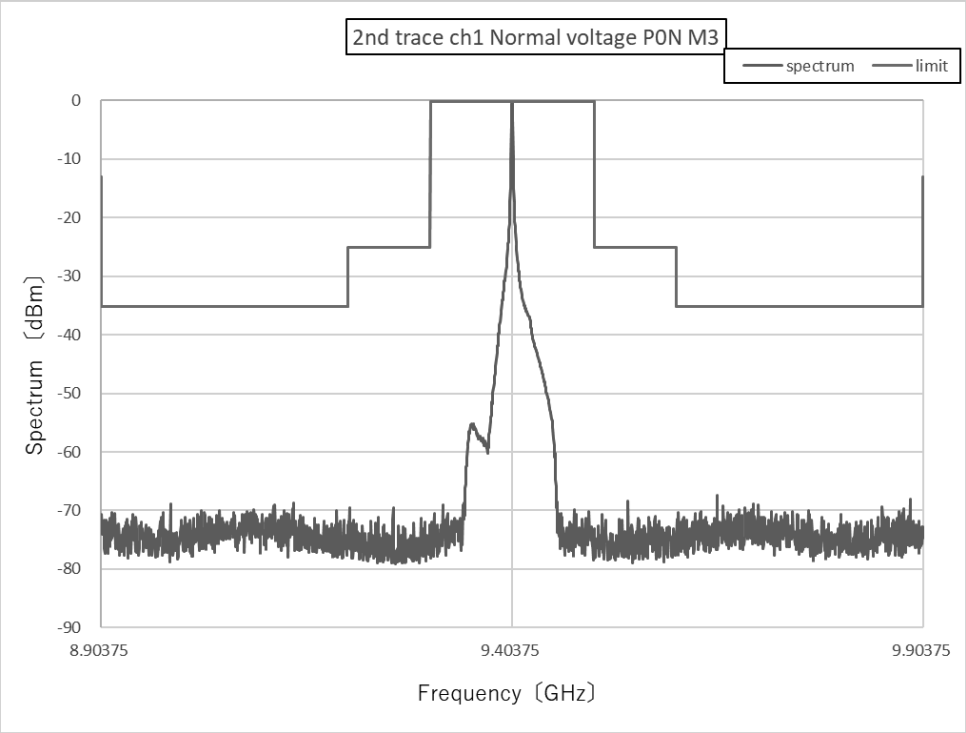
Occupied bandwidth: 27.911 MHz
Fig. 8.14 S2 pulse



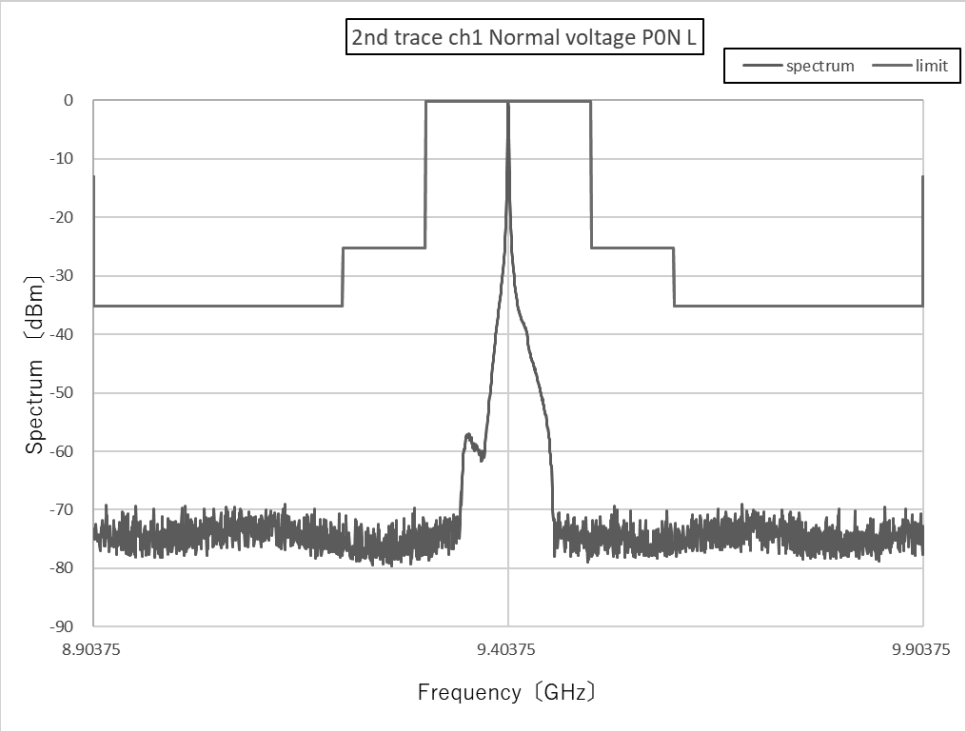
Occupied bandwidth: 20.262 MHz
Fig. 8.15 M1 pulse



Occupied bandwidth: 14.342 MHz
Fig. 8.16 M2 pulse

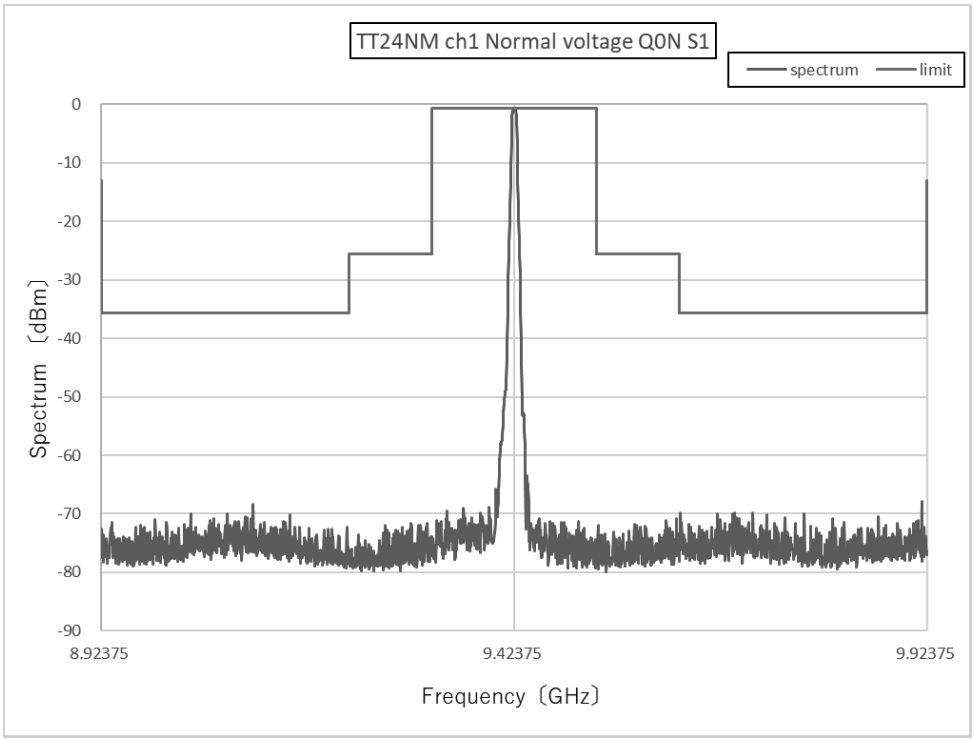


Occupied bandwidth: 11.114 MHz
Fig. 8.17 M3 pulse

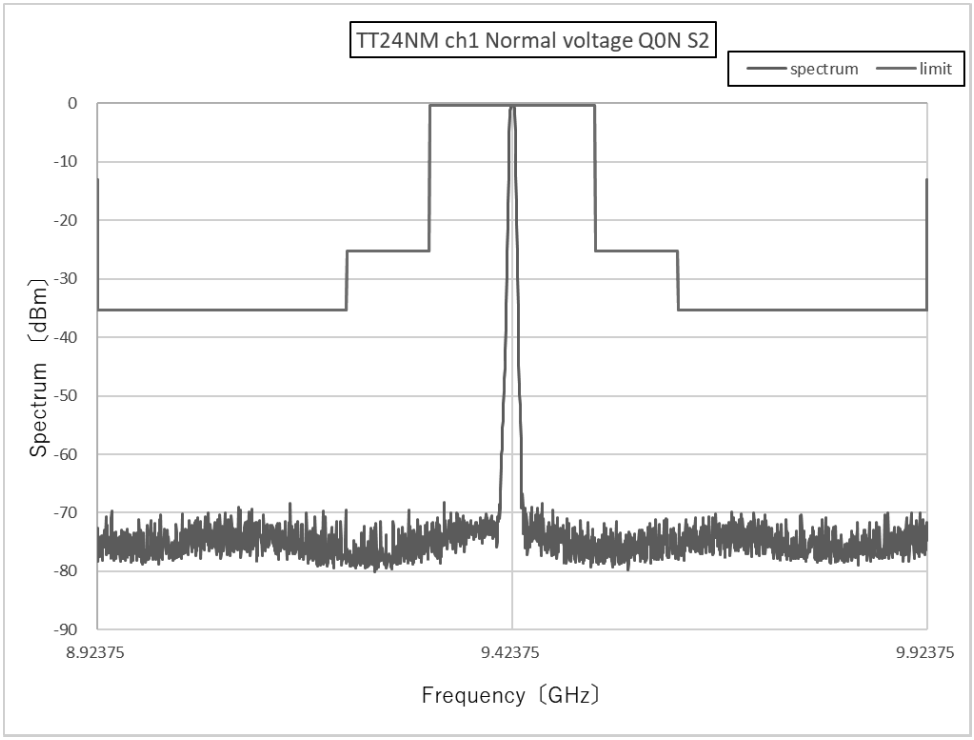


Occupied bandwidth: 9.121 MHz
Fig. 8.18 L pulse

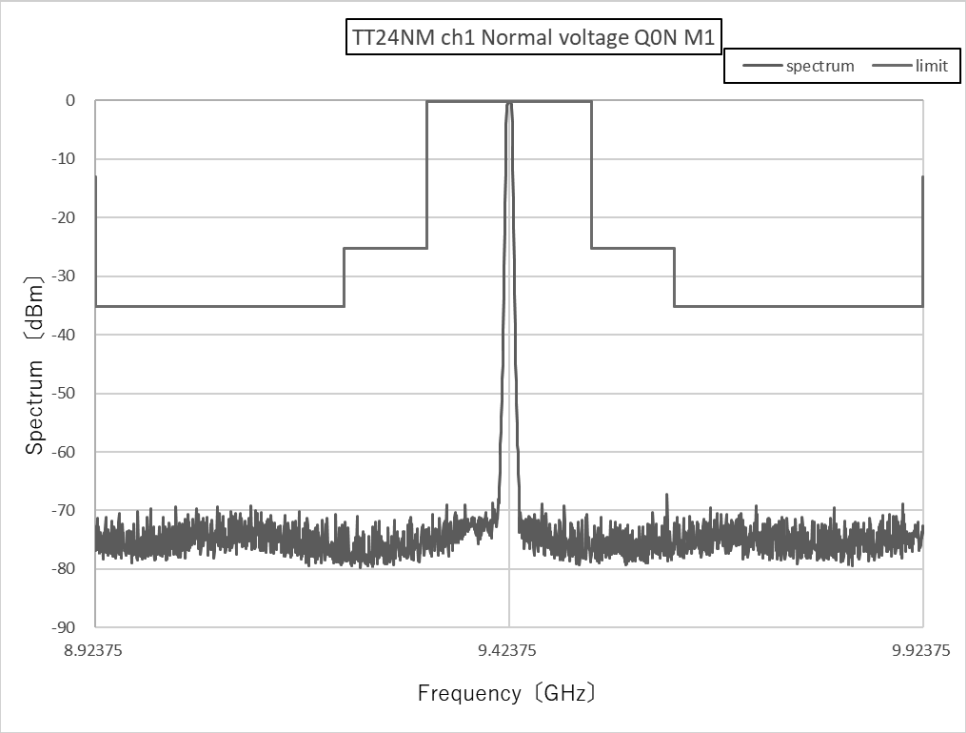
ch1, Q0N
TT24NM mode



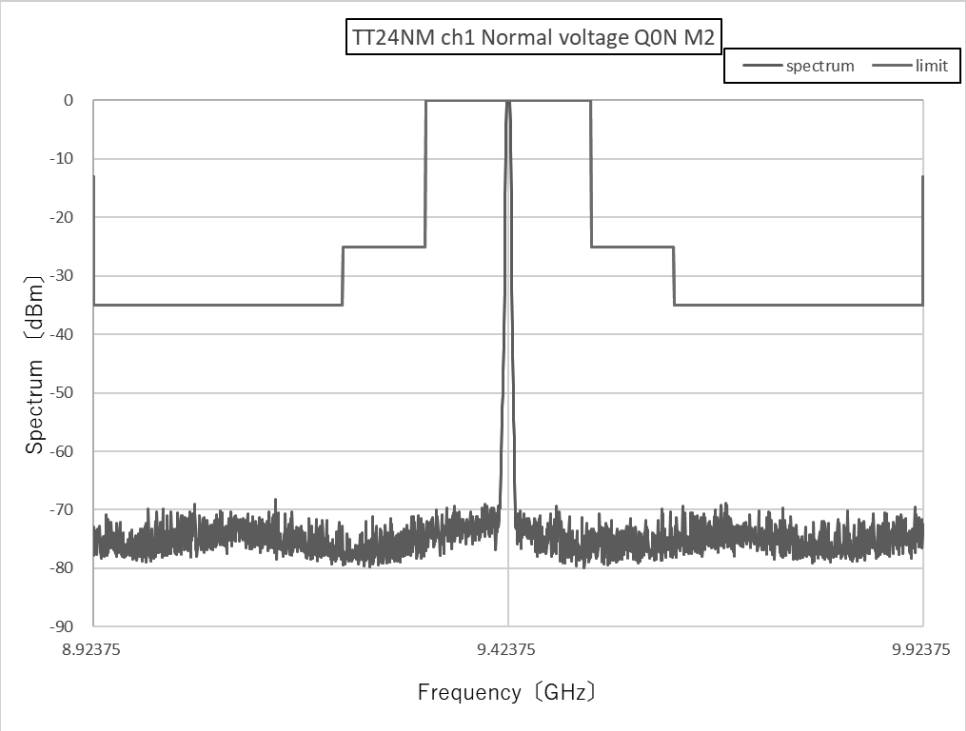
Occupied bandwidth:9.201MHz
Fig. 8.19 S1 pulse



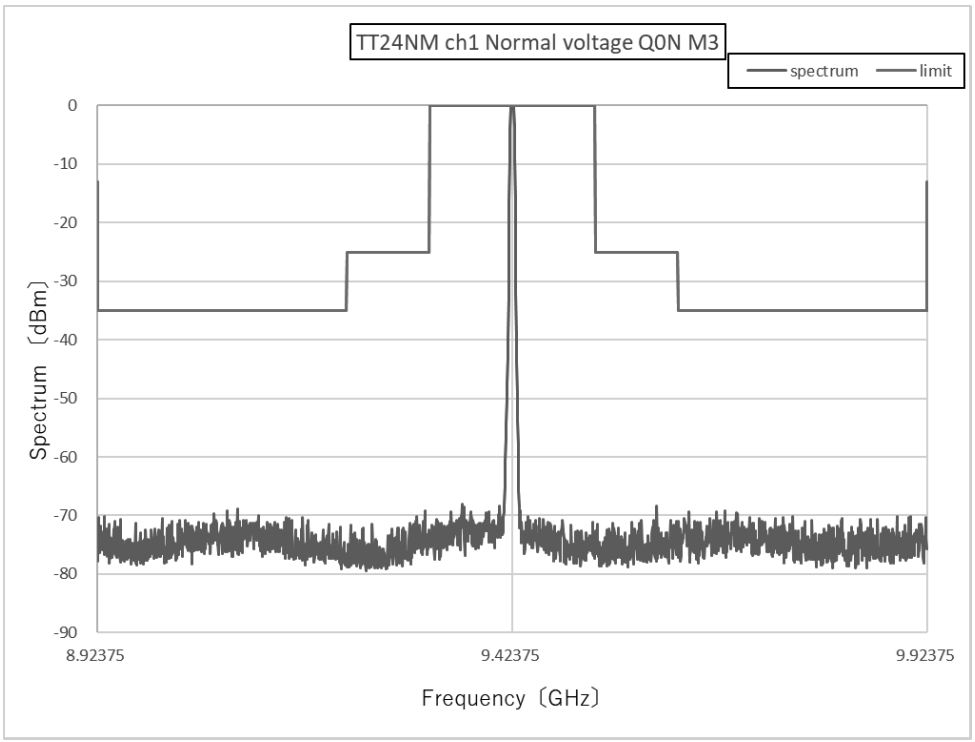
Occupied bandwidth: 9.007 MHz
Fig. 8.20 S2 pulse



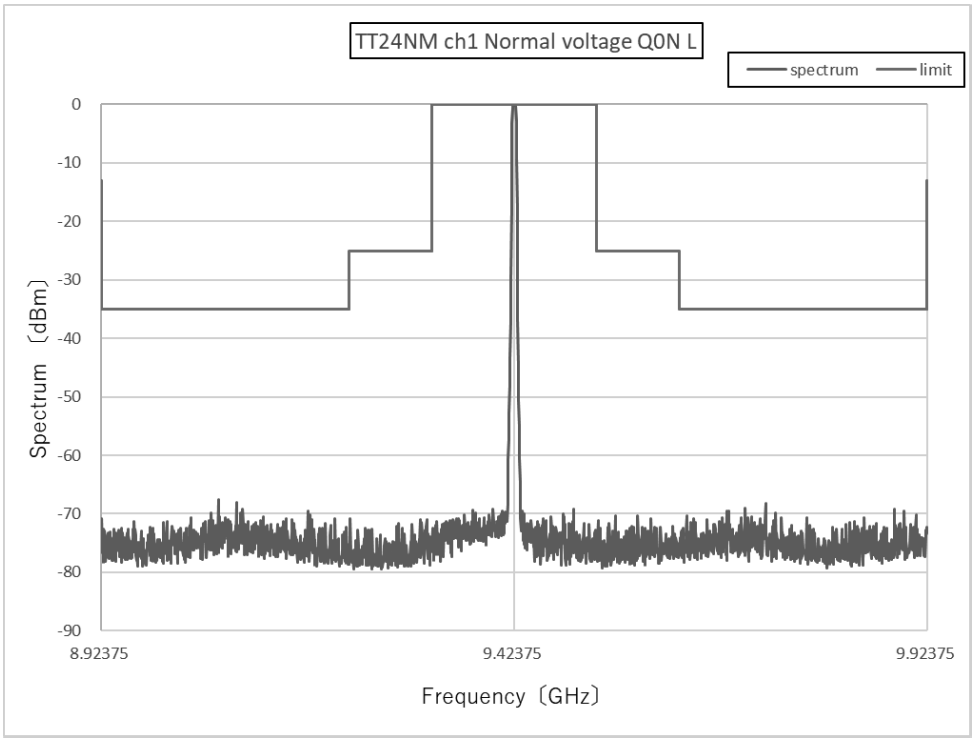
Occupied bandwidth: 8.891 MHz
Fig. 8.21 M1 pulse



Occupied bandwidth: 6.350 MHz
Fig. 8.22 M2 pulse

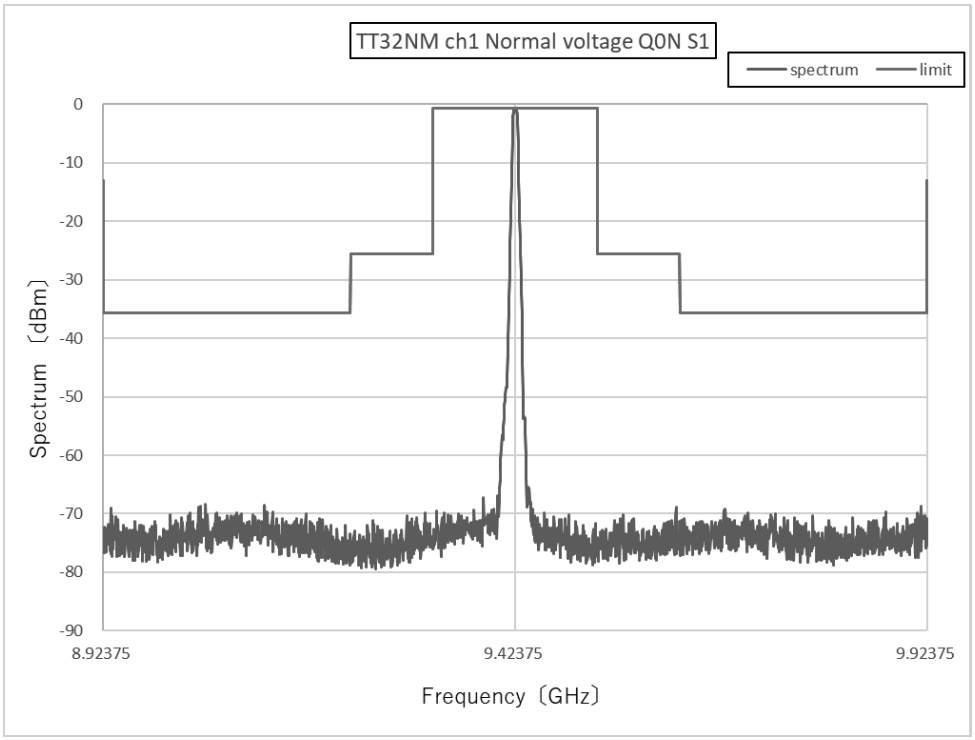


Occupied bandwidth: 6.335 MHz
Fig. 8.23 M3 pulse

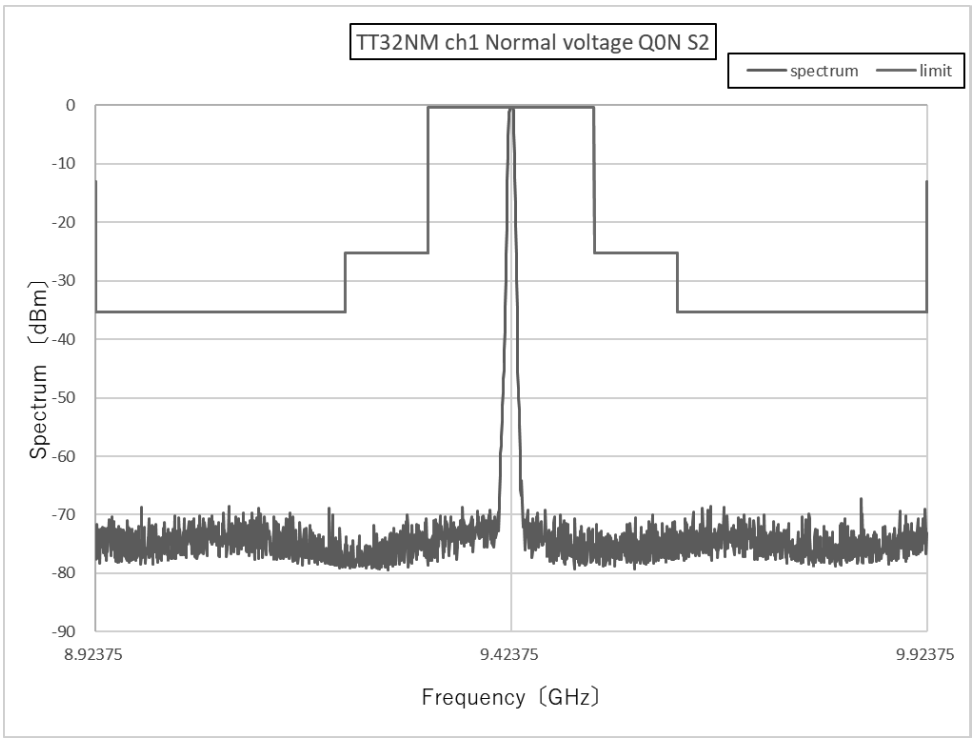


Occupied bandwidth: 6.242 MHz
Fig. 8.24 L pulse

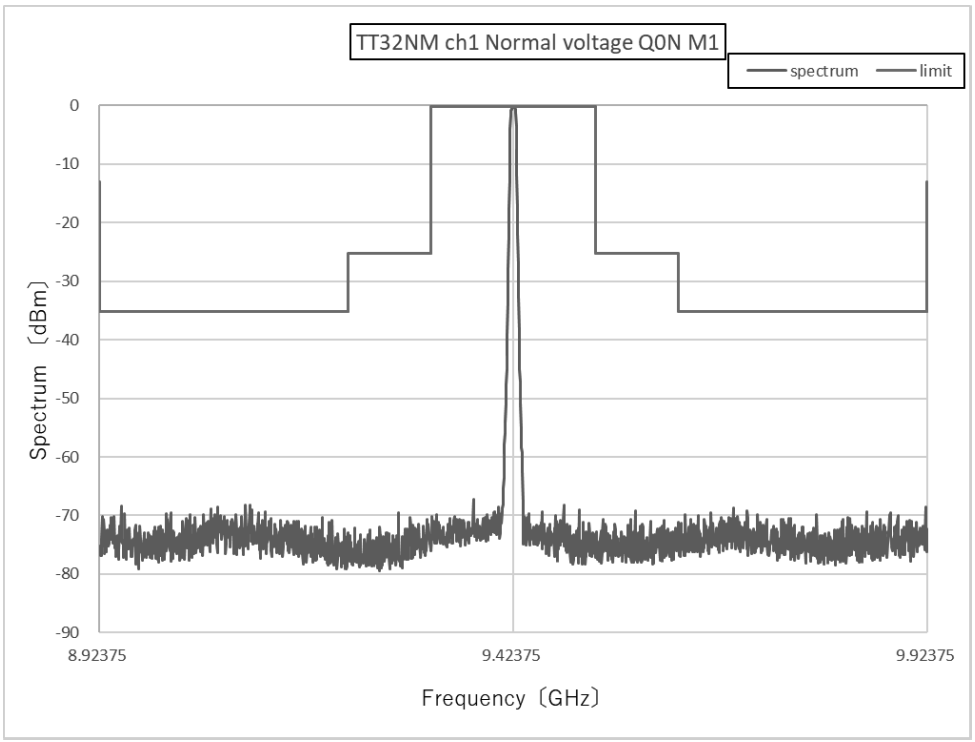
TT32NM mode



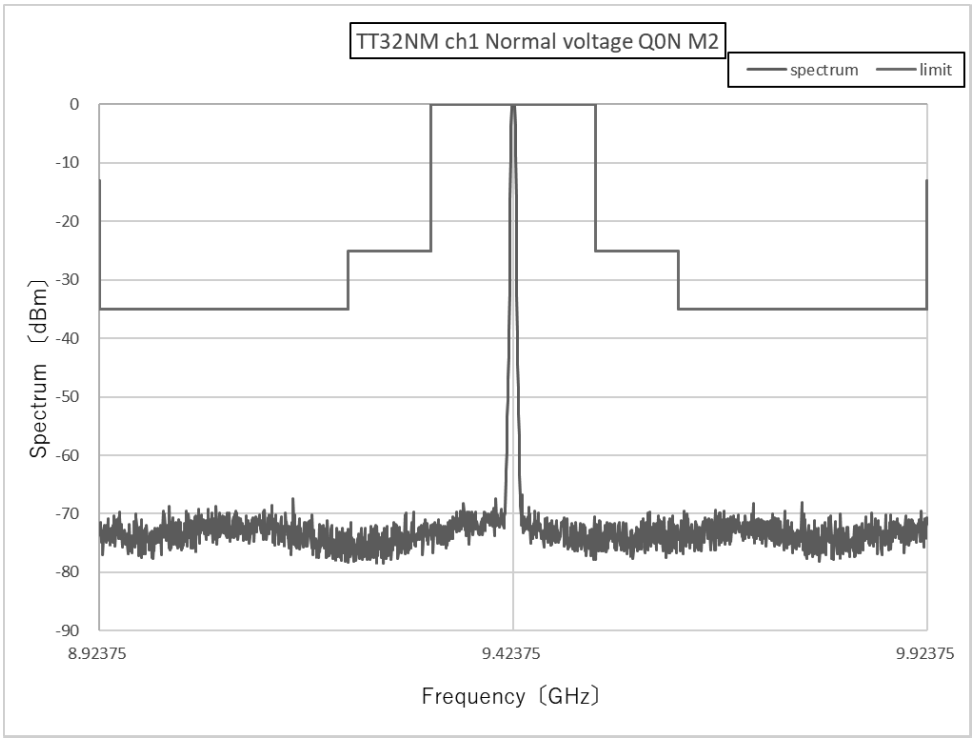
Occupied bandwidth: 9.219 MHz
Fig. 8.25 S1 pulse



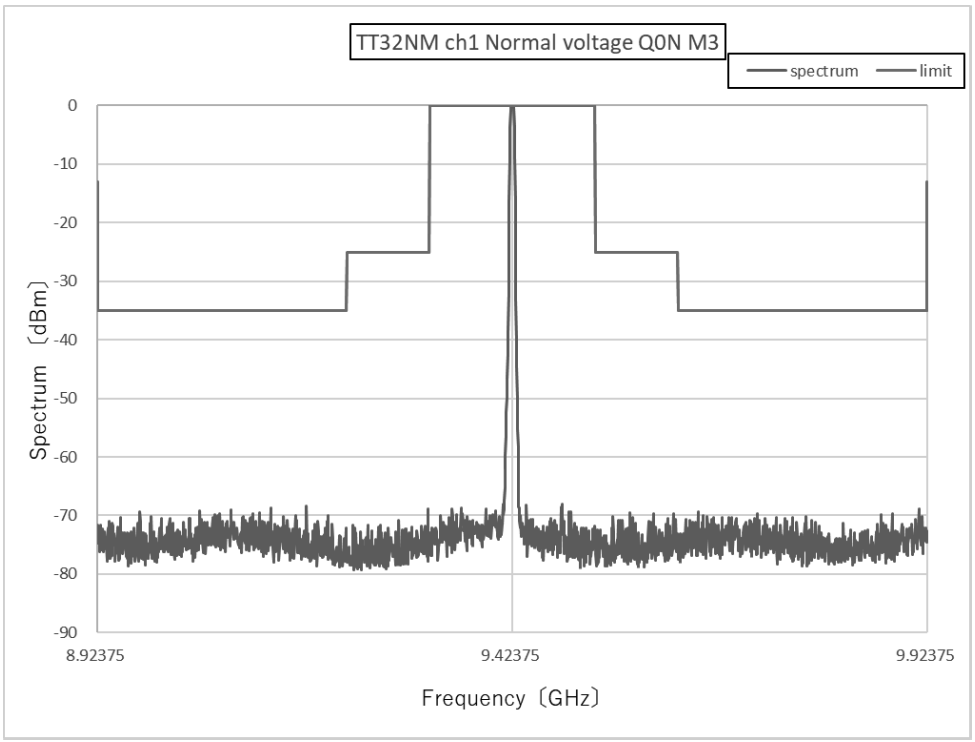
Occupied bandwidth: 9.009 MHz
Fig. 8.26 S2 pulse



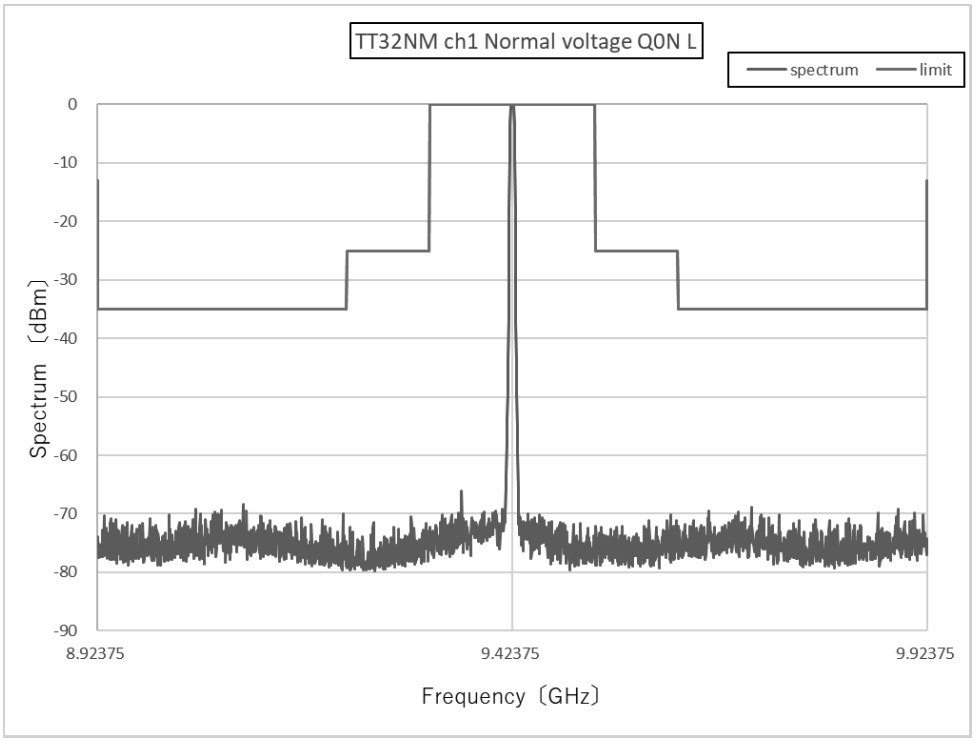
Occupied bandwidth: 8.847 MHz
Fig. 8.27 M1 pulse



Occupied bandwidth: 6.348 MHz
Fig. 8.28 M2 pulse

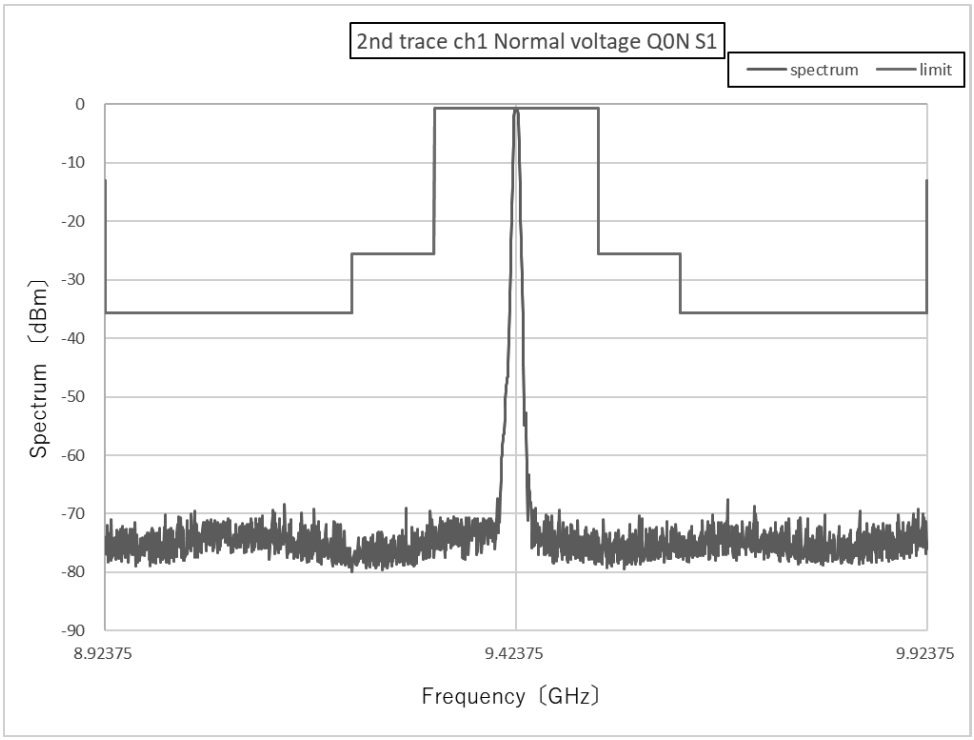


Occupied bandwidth: 6.334 MHz
Fig. 8.29 M3 pulse

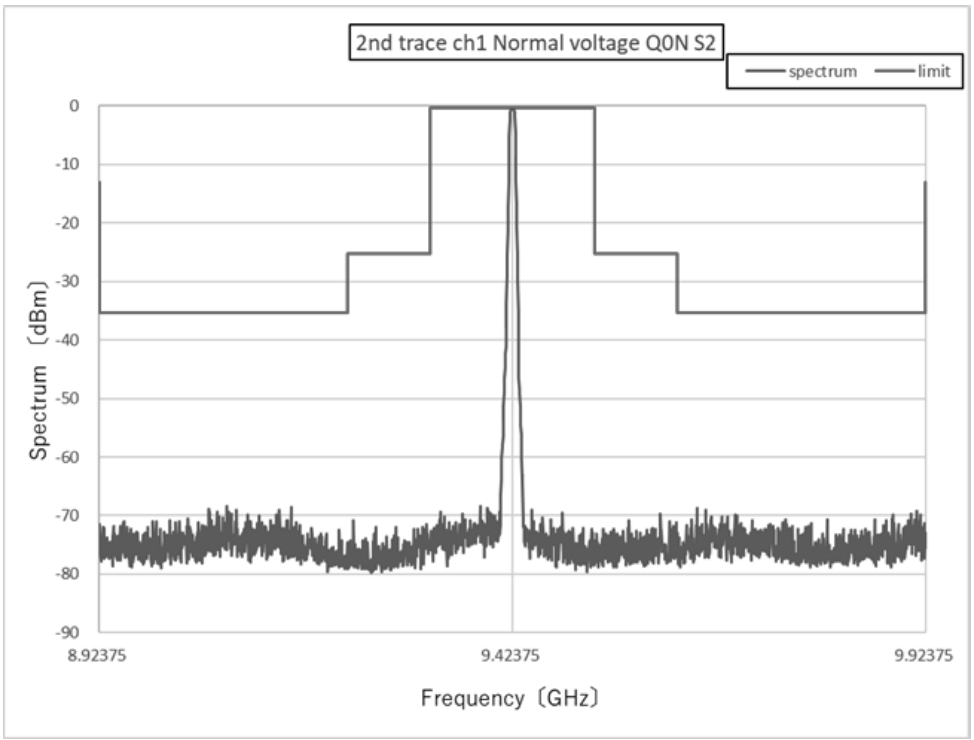


Occupied bandwidth: 6.235 MHz
Fig. 8.30 L pulse

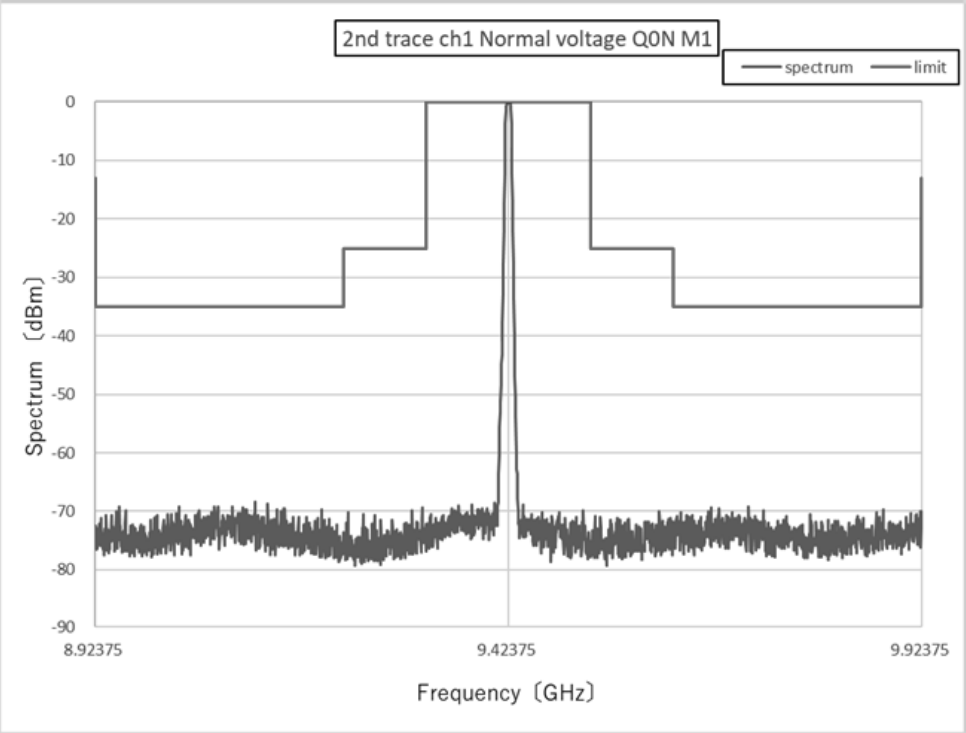
2nd trace mode



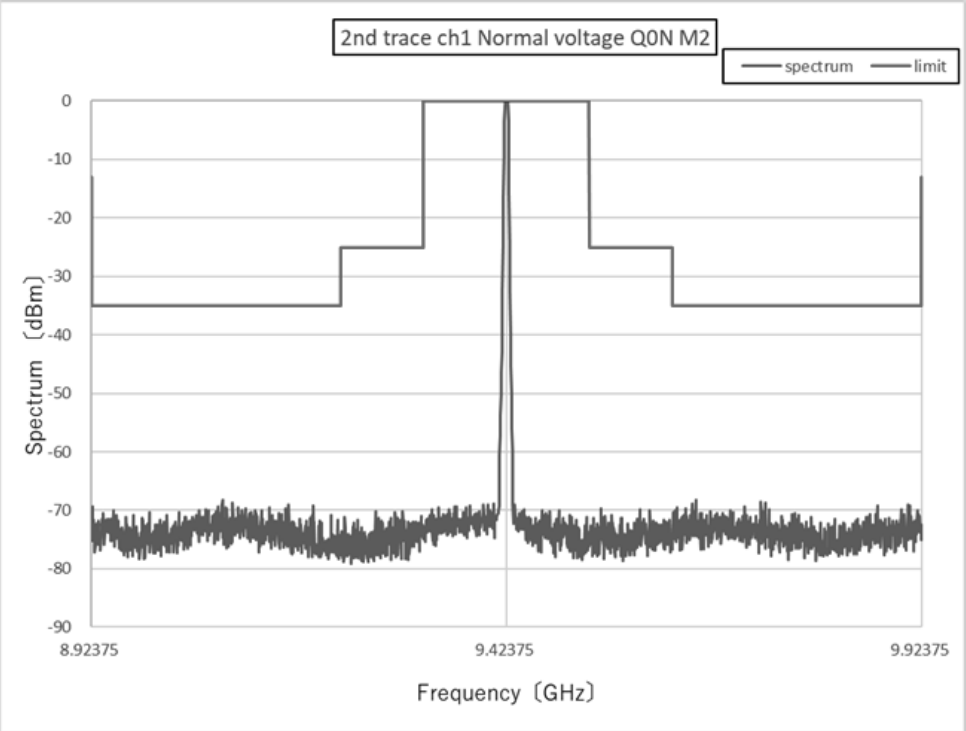
Occupied bandwidth: 9.218 MHz
Fig. 8.31 S1 pulse



Occupied bandwidth: 8.985 MHz
Fig. 8.32 S2 pulse



Occupied bandwidth: 8.875 MHz
Fig. 8.33 M1 pulse



Occupied bandwidth: 6.332 MHz
Fig. 8.34 M2 pulse
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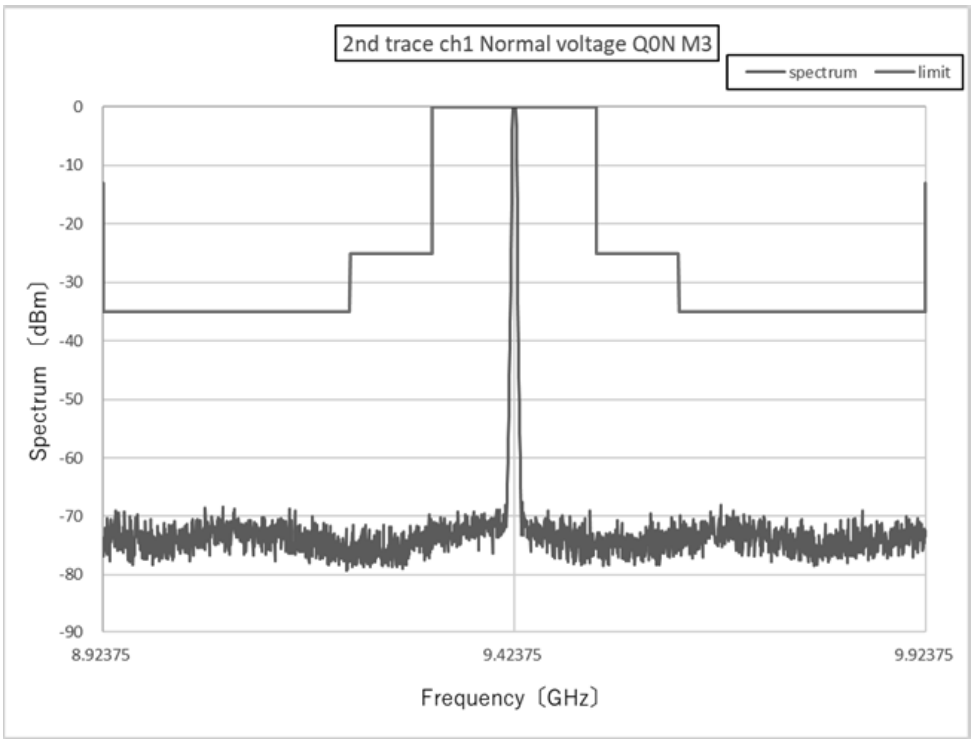
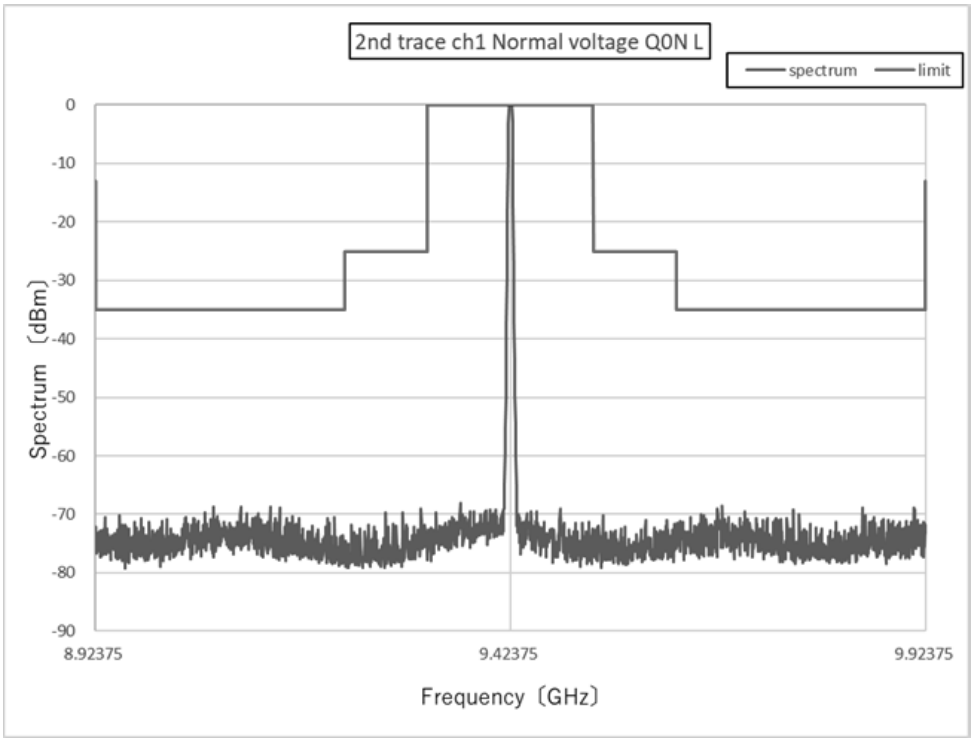
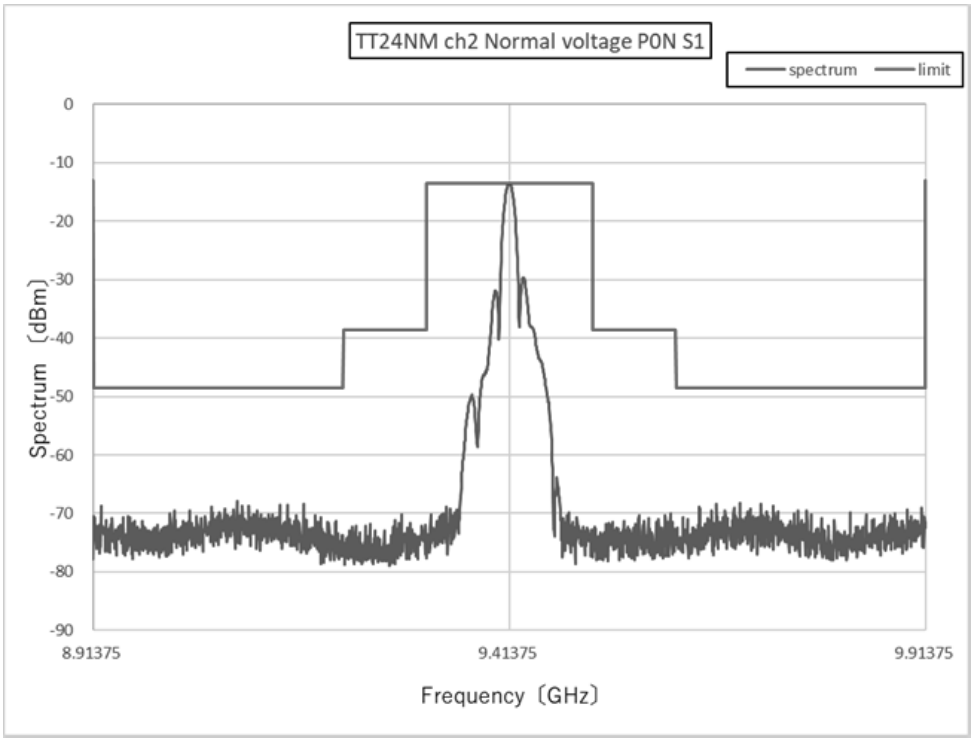


Occupied bandwidth: 6.340 MHz
Fig. 8.35 M3 pulse

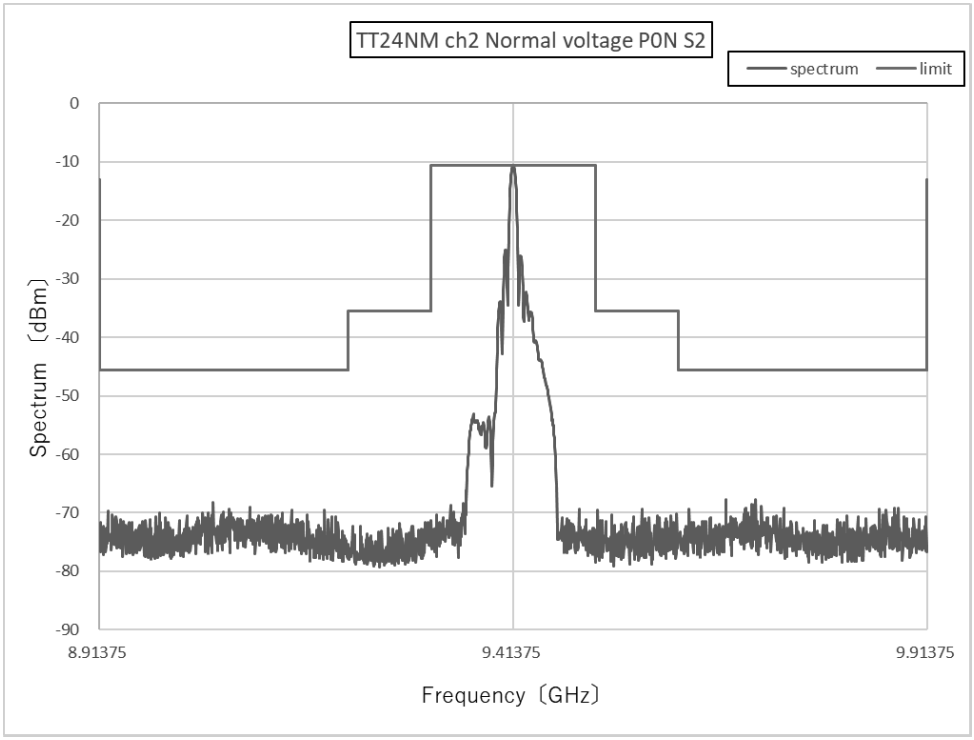


Occupied bandwidth: 6.229 MHz
Fig. 8.36 L pulse

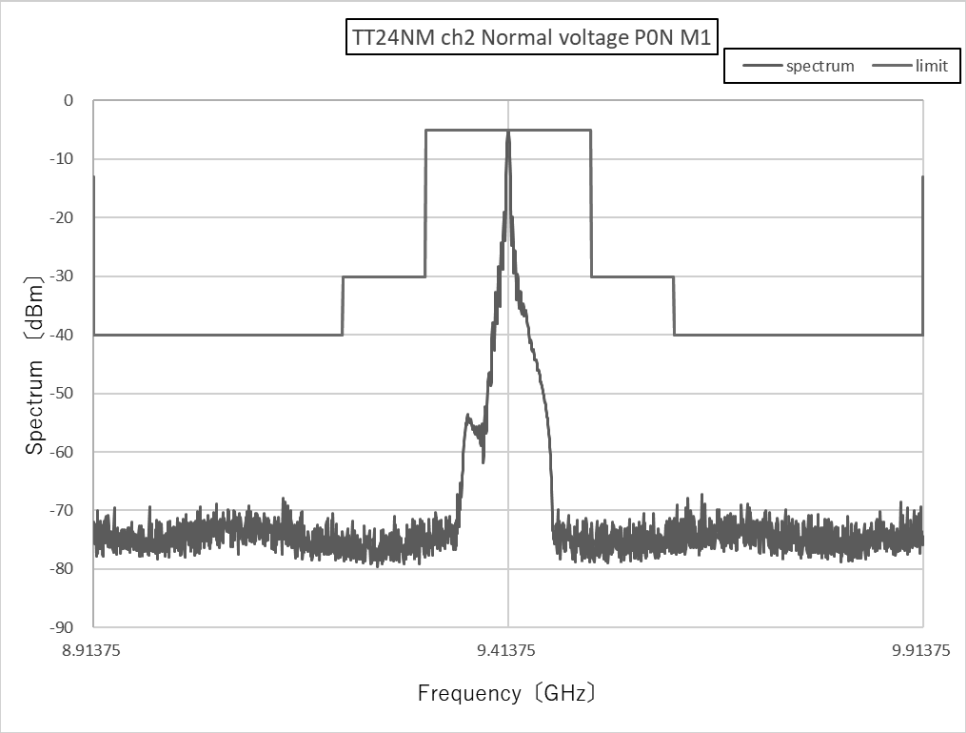
ch2, P0N
TT24NM mode



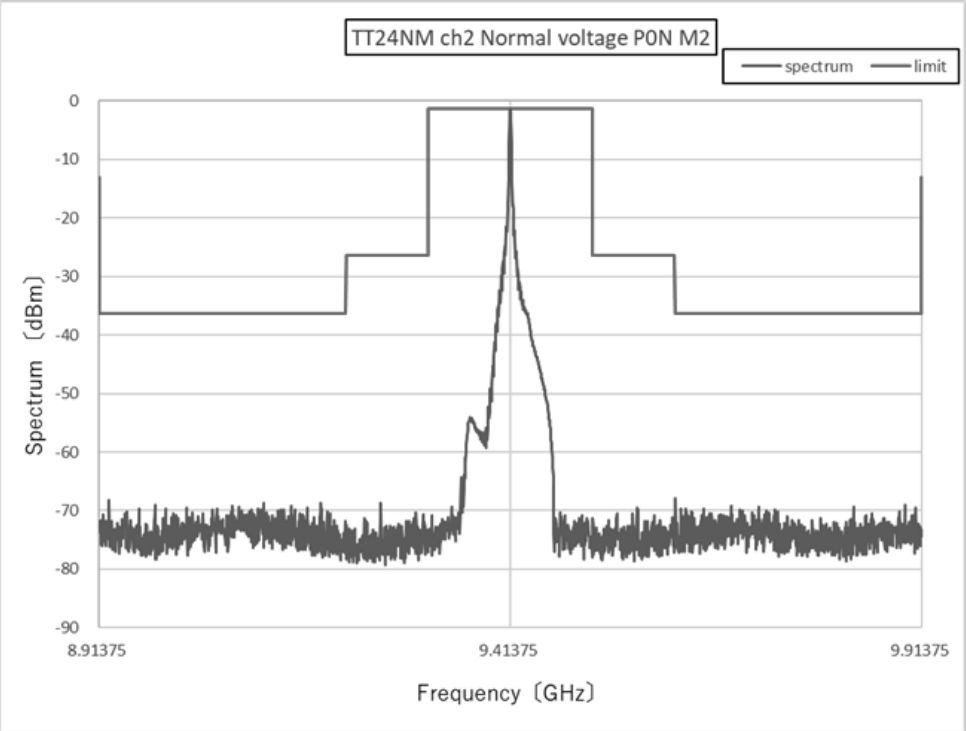
Occupied bandwidth: 38.497 MHz
Fig. 8.37 S1 pulse



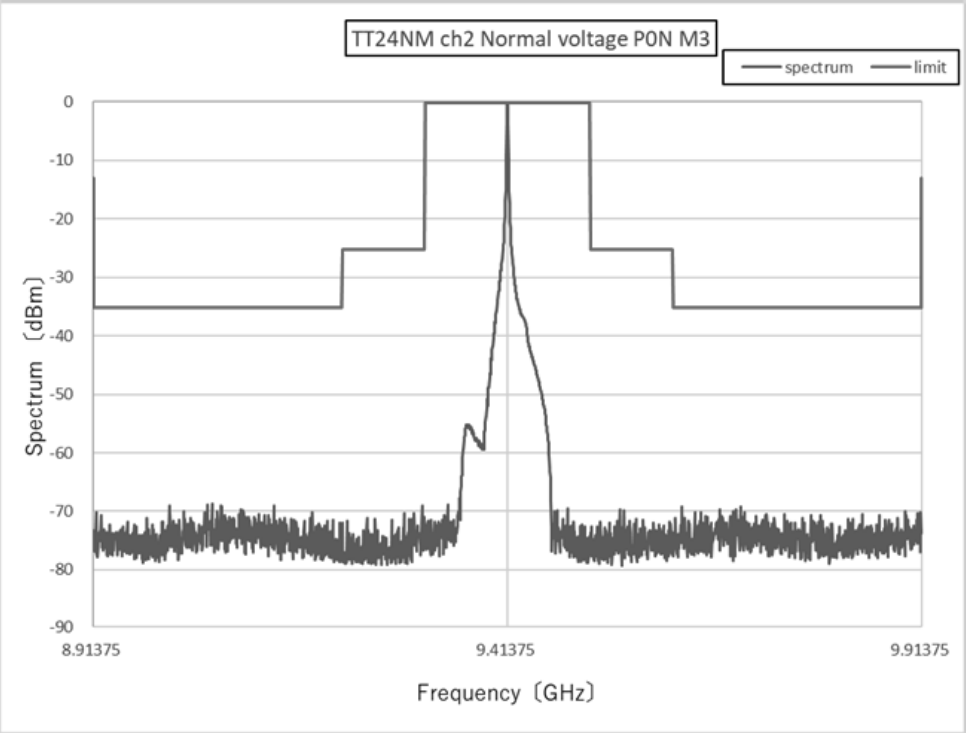
Occupied bandwidth: 27.662 MHz
Fig. 8.38 S2 pulse



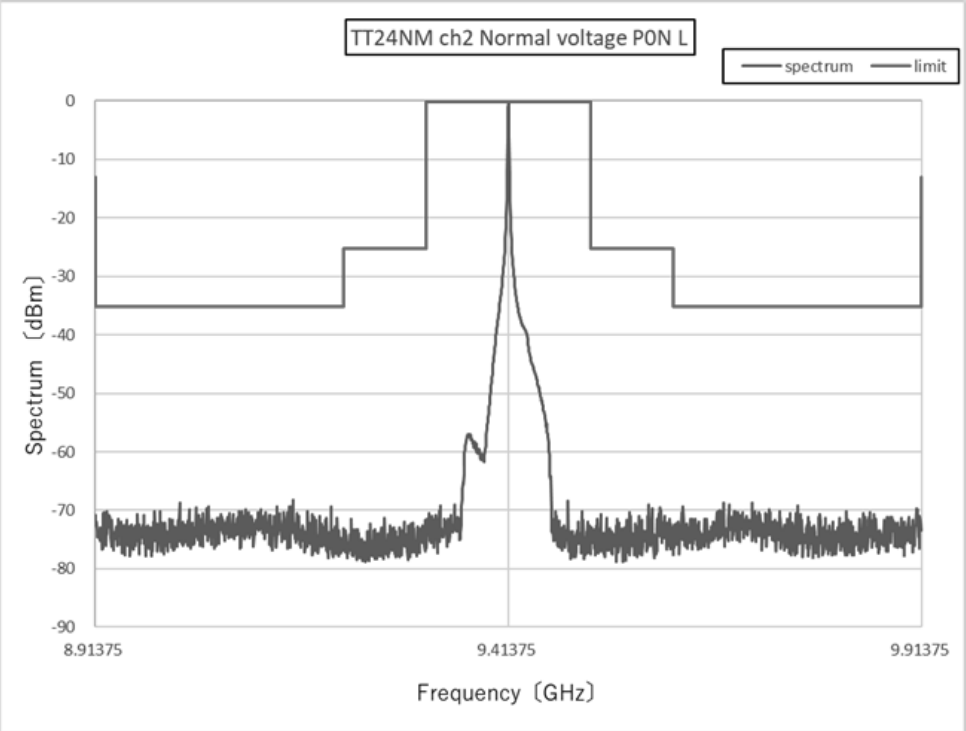
Occupied bandwidth: 20.011 MHz
Fig. 8.39 M1 pulse



Occupied bandwidth: 14.147 MHz
Fig. 8.40 M2 pulse

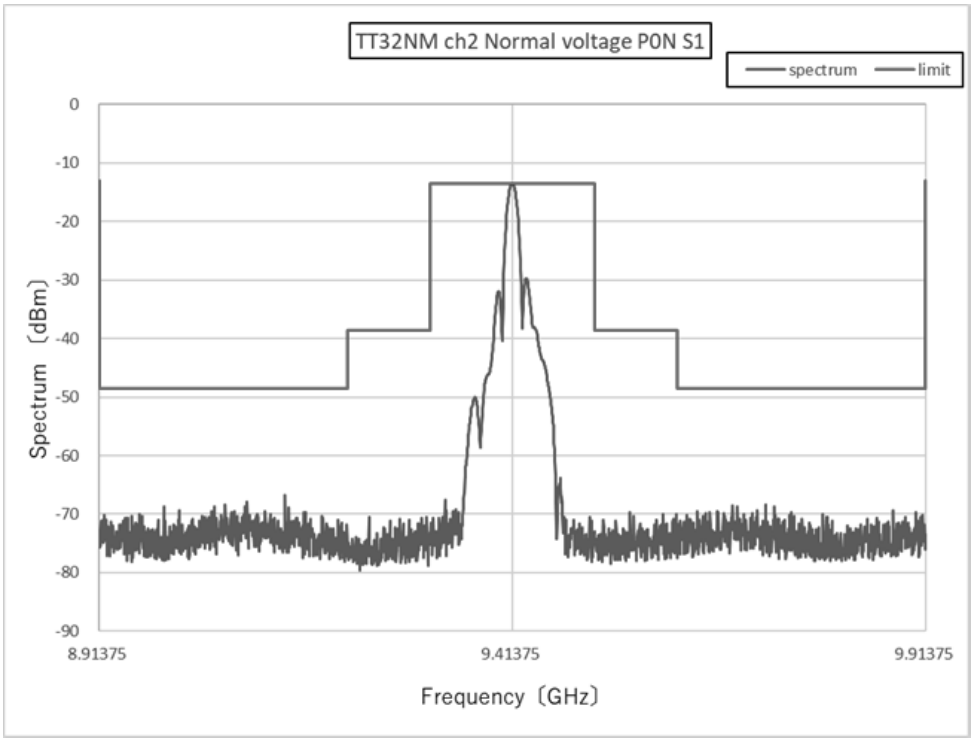


Occupied bandwidth: 10.735 MHz
Fig. 8.41 M3 pulse

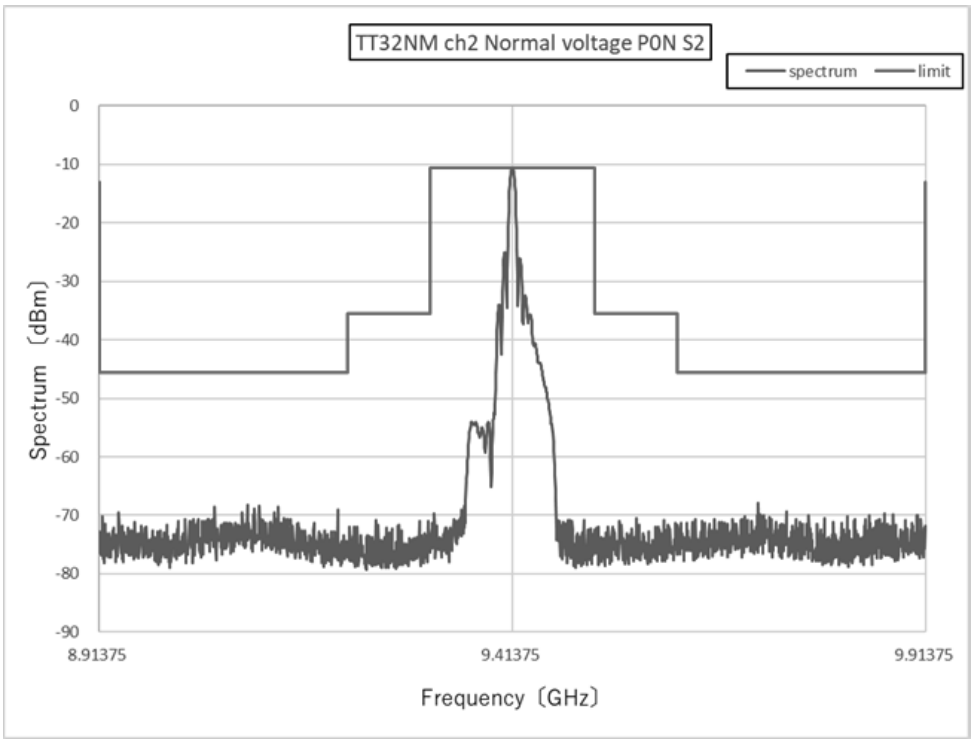


Occupied bandwidth: 8.866 MHz
Fig. 8.42 L pulse

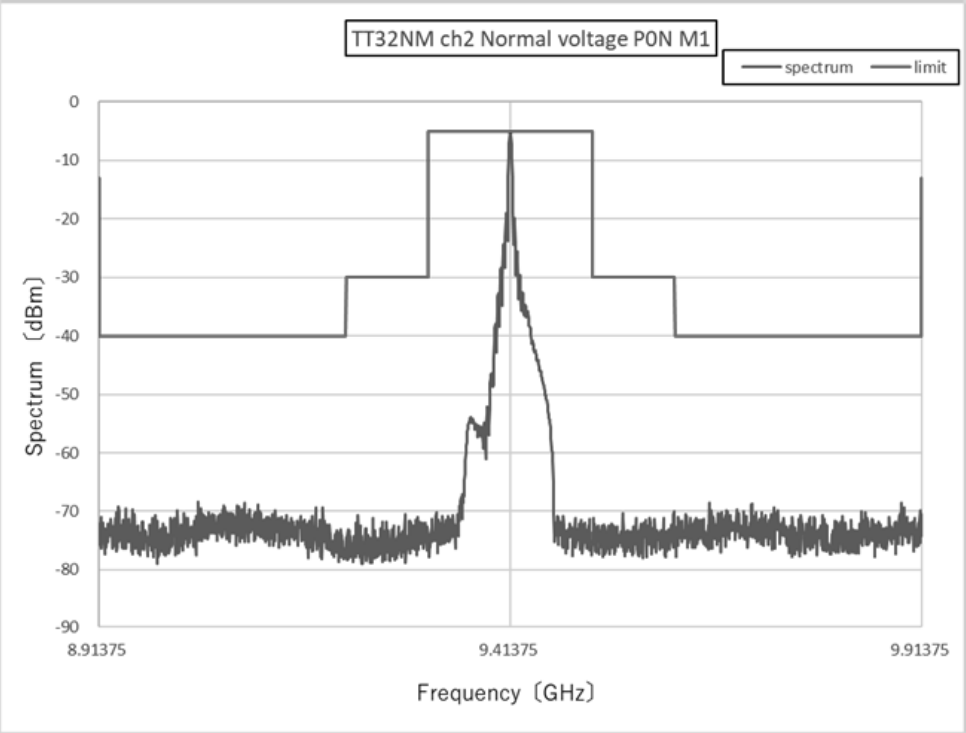
TT32NM mode



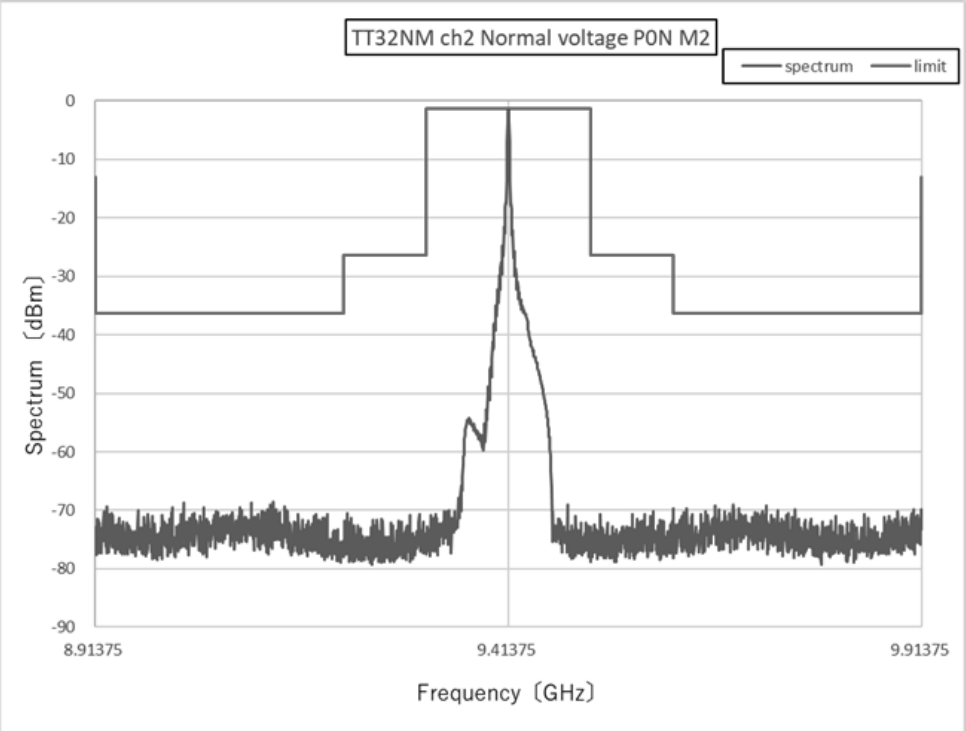
Occupied bandwidth: 38.392 MHz
Fig. 8.43 S1 pulse



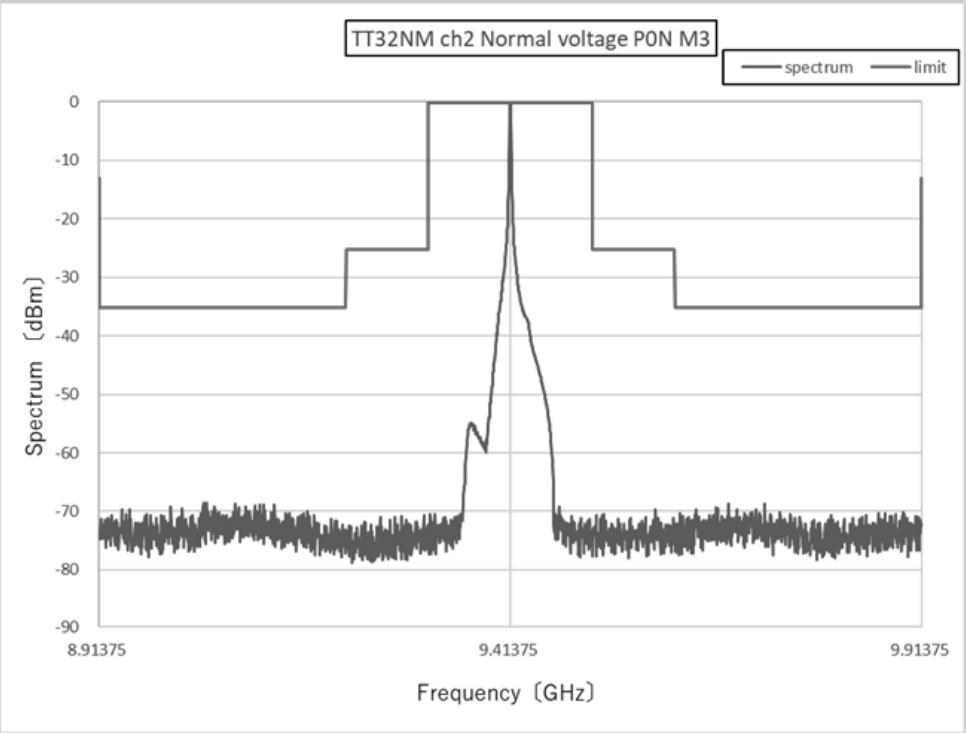
Occupied bandwidth: 27.638 MHz
Fig. 8.44 S2 pulse



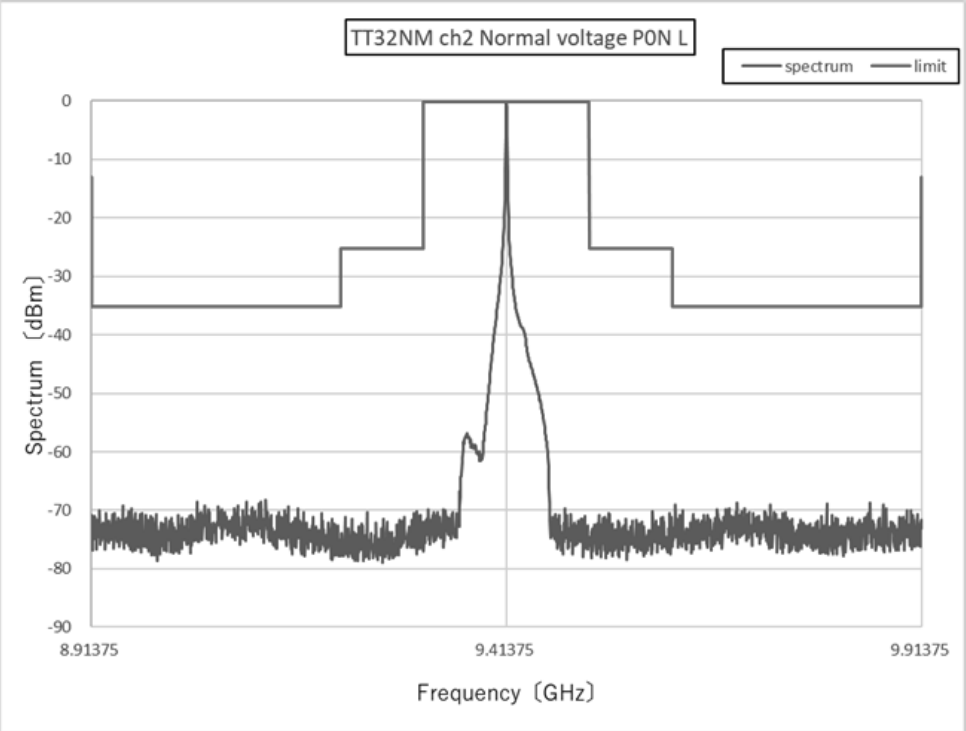
Occupied bandwidth: 20.012 MHz
Fig. 8.45 M1 pulse



Occupied bandwidth: 14.184 MHz
Fig. 8.46 M2 pulse

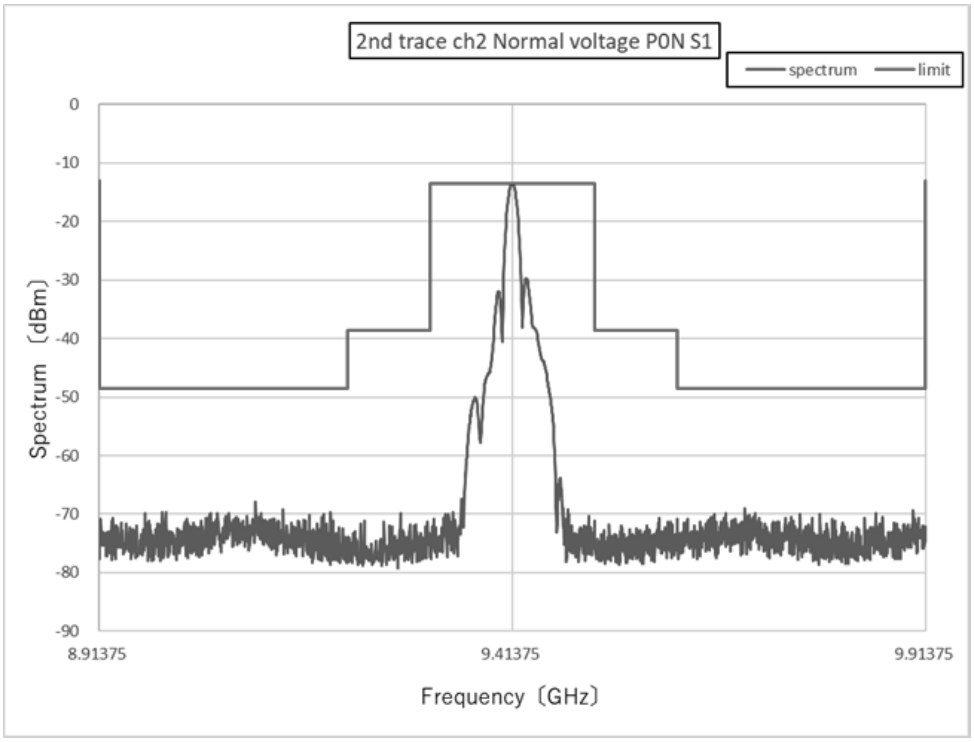


Occupied bandwidth: 10.758 MHz
Fig. 8.47 M3 pulse

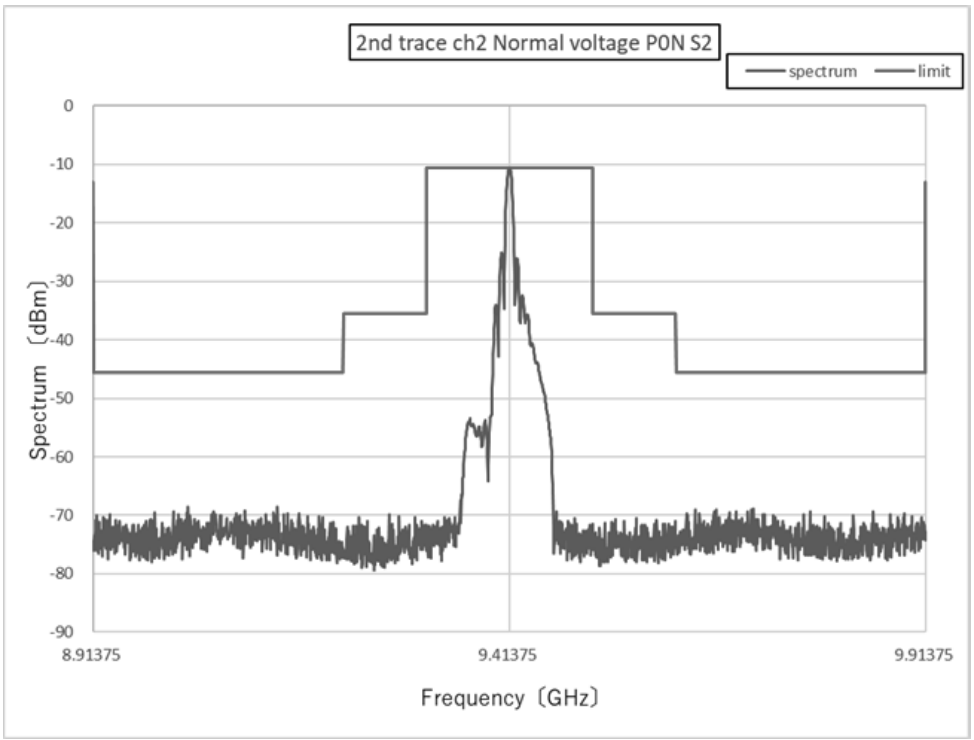


Occupied bandwidth: 8.813 MHz
Fig. 8.48 L pulse

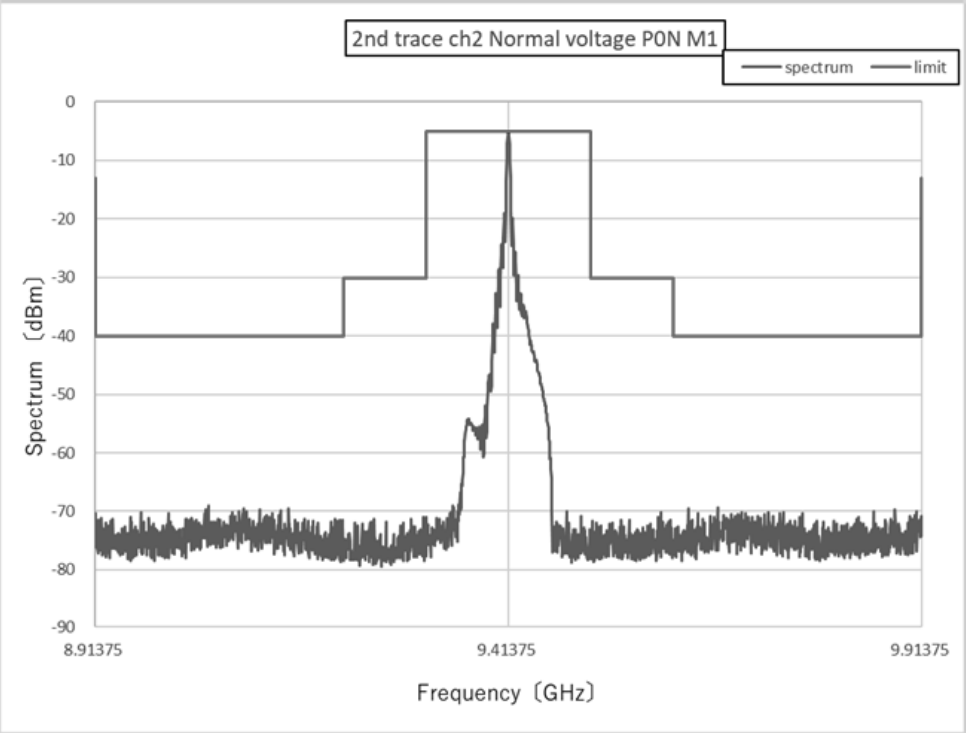
2nd trace mode



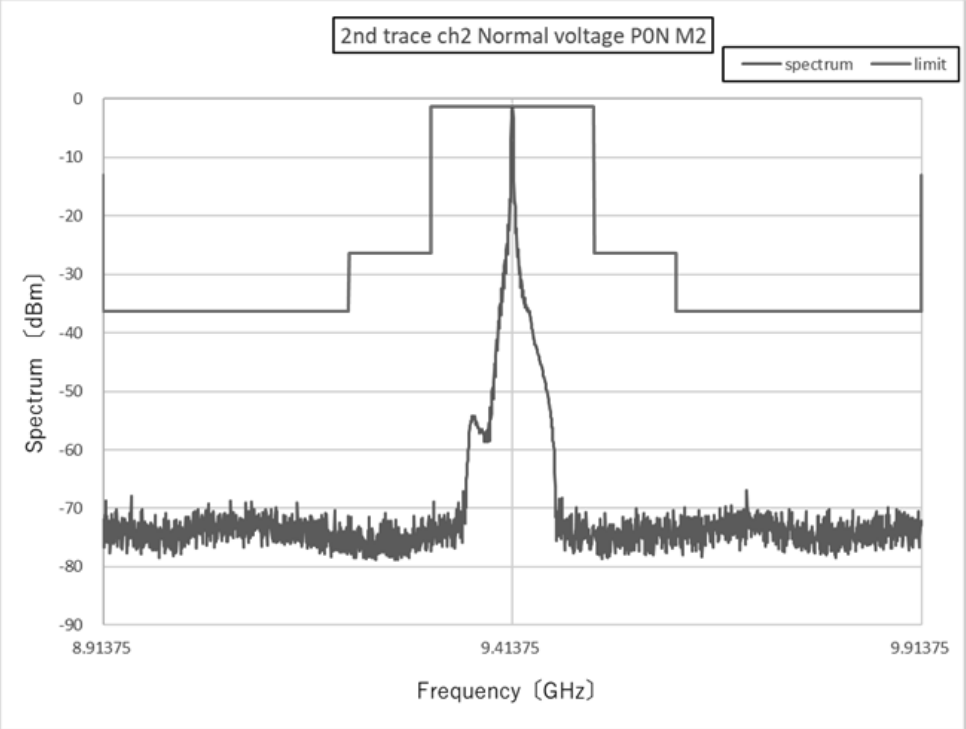
Occupied bandwidth: 38.378 MHz
Fig. 8.49 S1 pulse



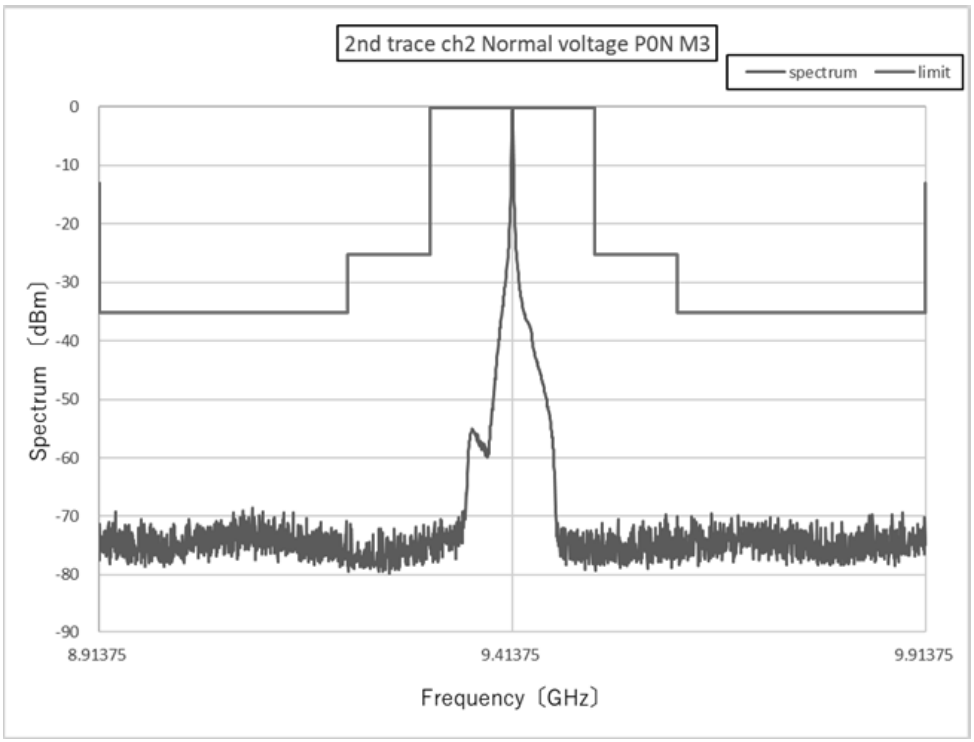
Occupied bandwidth: 27.644 MHz
Fig. 8.50 S2 pulse



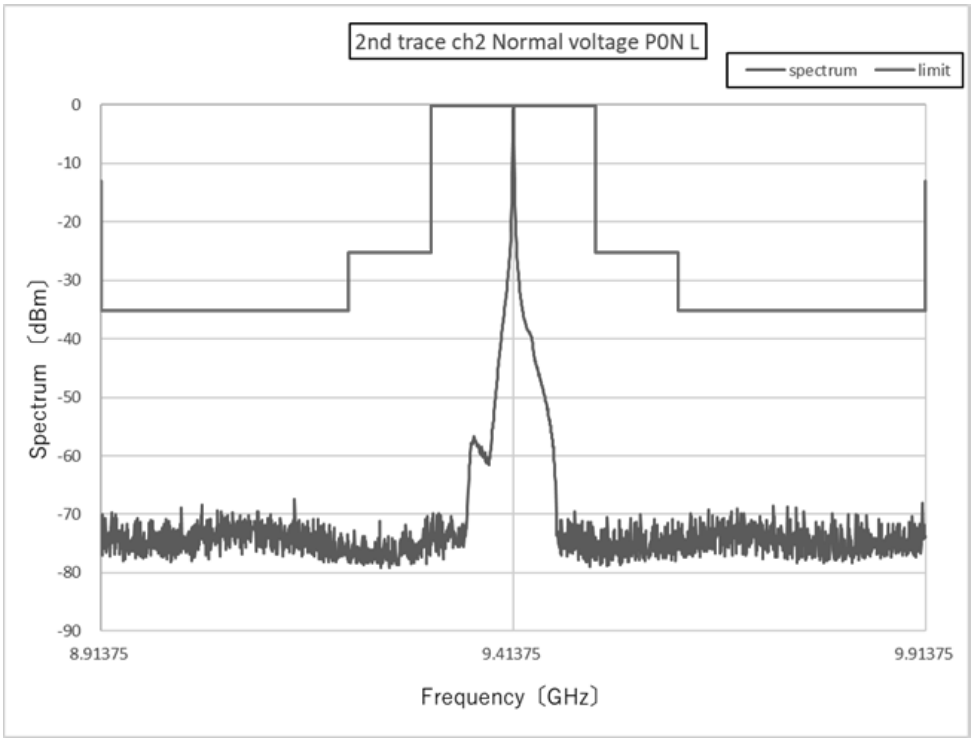
Occupied bandwidth: 19.930 MHz
Fig. 8.51 M1 pulse



Occupied bandwidth: 14.115MHz
Fig. 8.52 M2 pulse

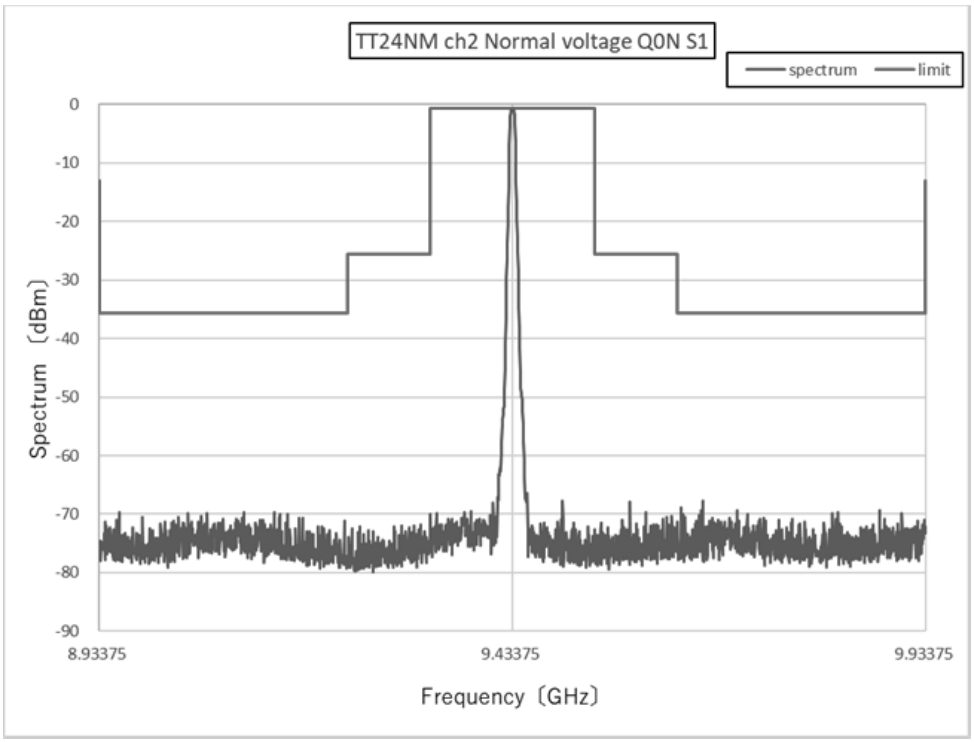


Occupied bandwidth: 11.189 MHz
Fig. 8.53 M3 pulse

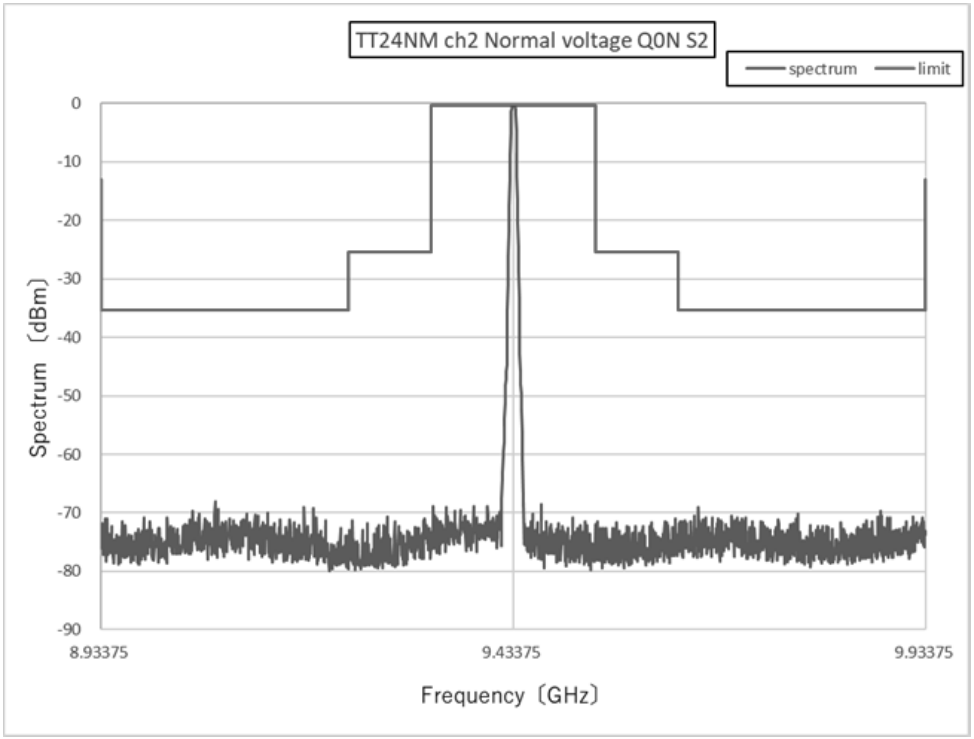


Occupied bandwidth: 8.948 MHz
Fig. 8.54 L pulse

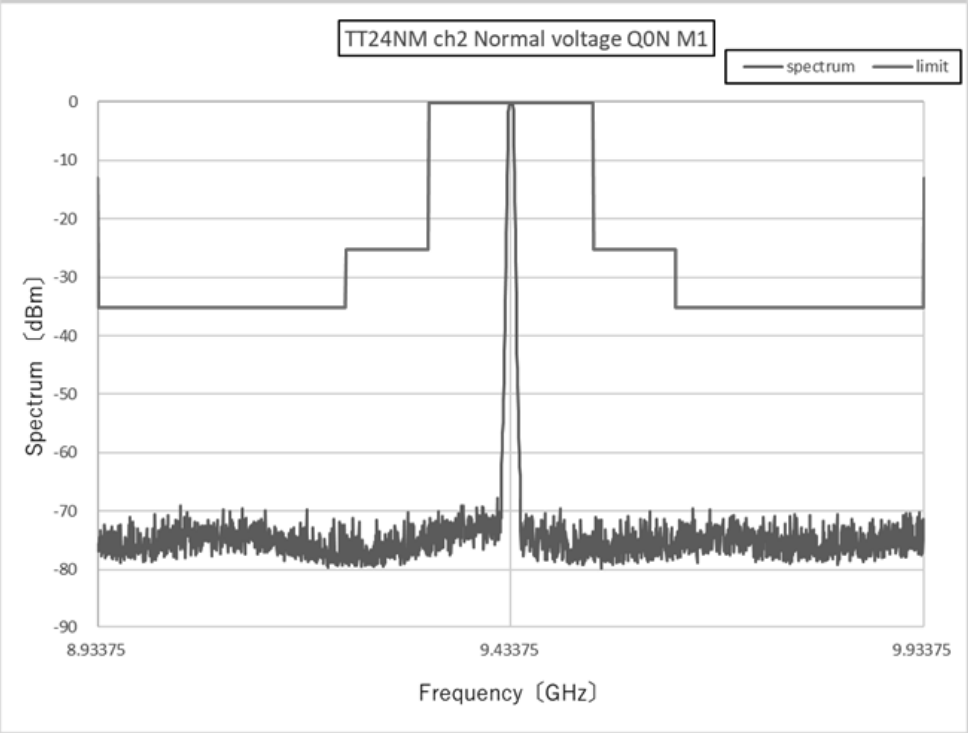
ch2, Q0N
TT24NM mode



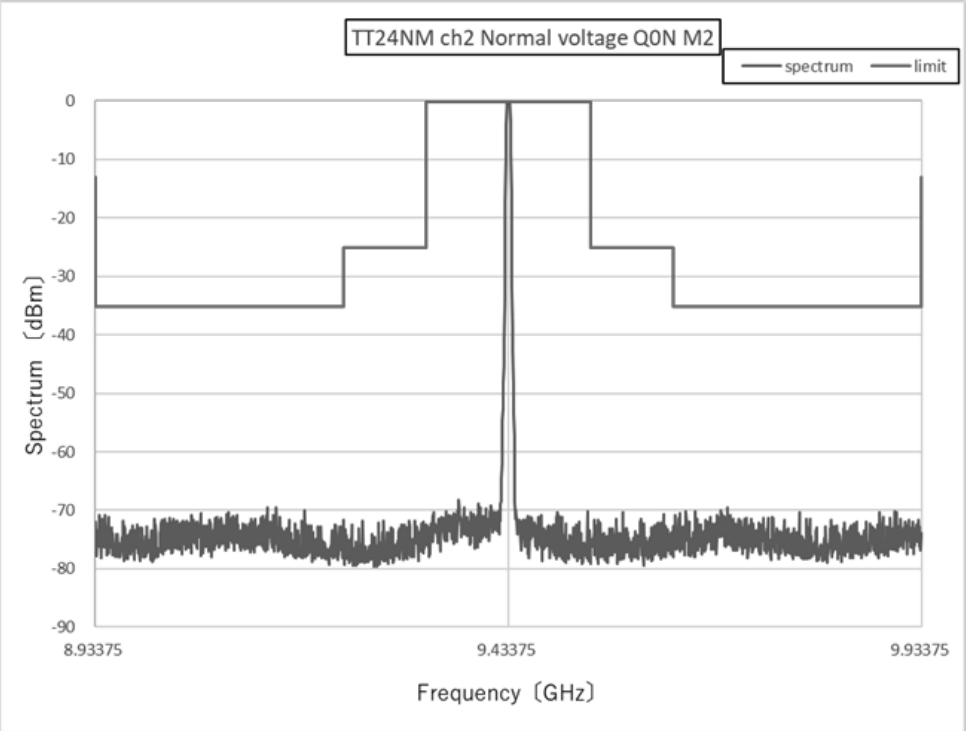
Occupied bandwidth: 9.202 MHz
Fig. 8.55 S1 pulse



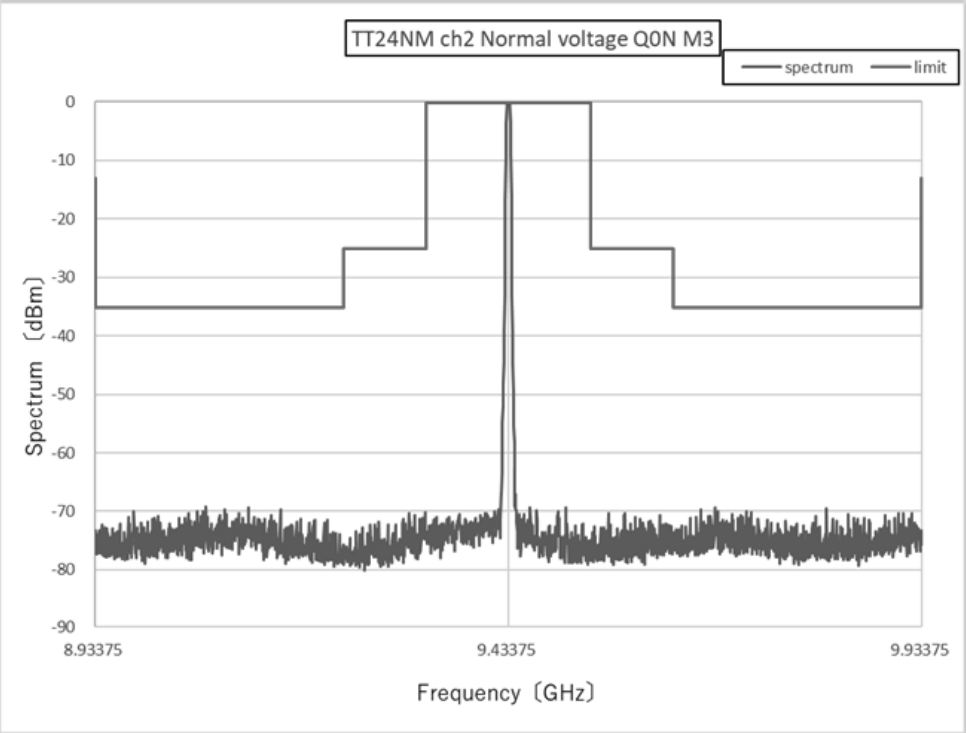
Occupied bandwidth: 8.975 MHz
Fig. 8.56 S2 pulse



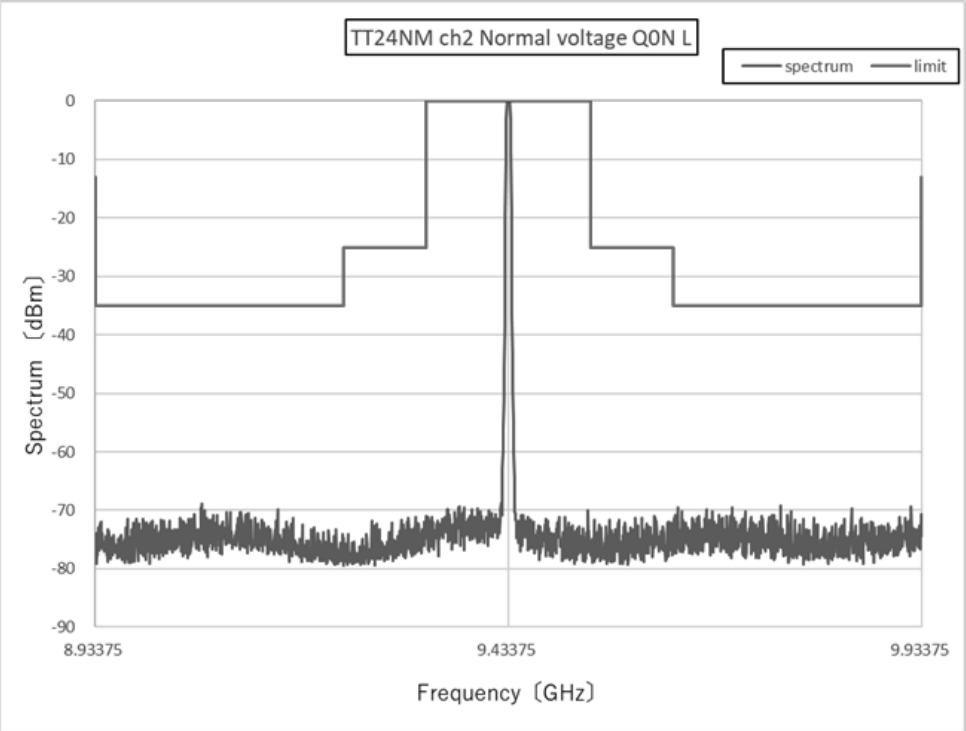
Occupied bandwidth: 8.881 MHz
Fig. 8.57 M1 pulse



Occupied bandwidth: 6.321 MHz
Fig. 8.58 M2 pulse

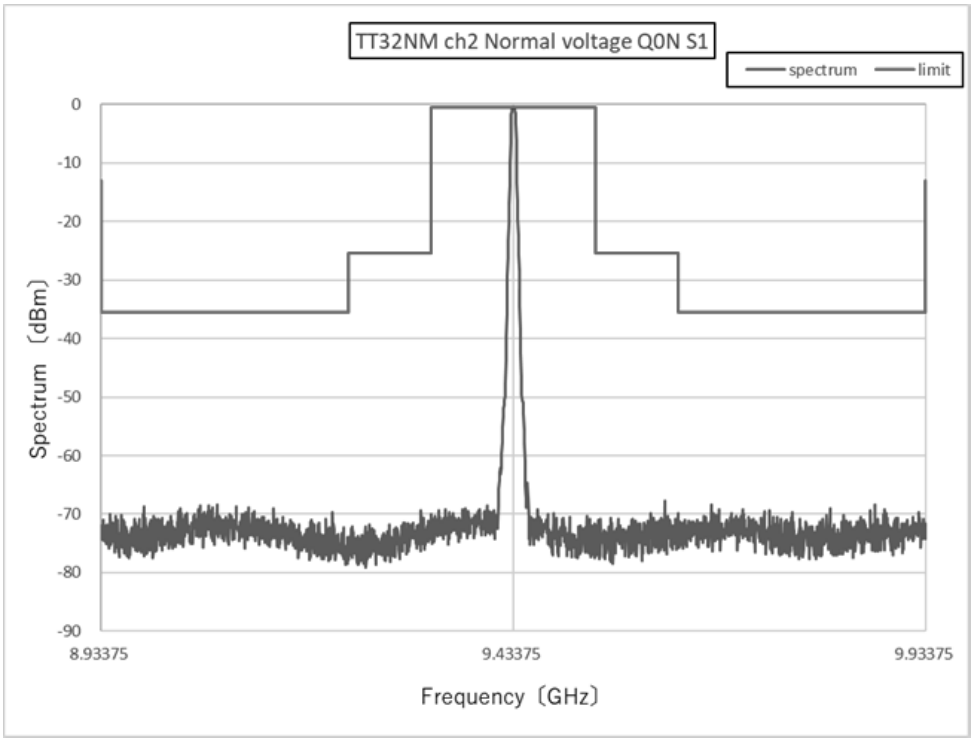


Occupied bandwidth: 6.327 MHz
Fig. 8.59 M3 pulse

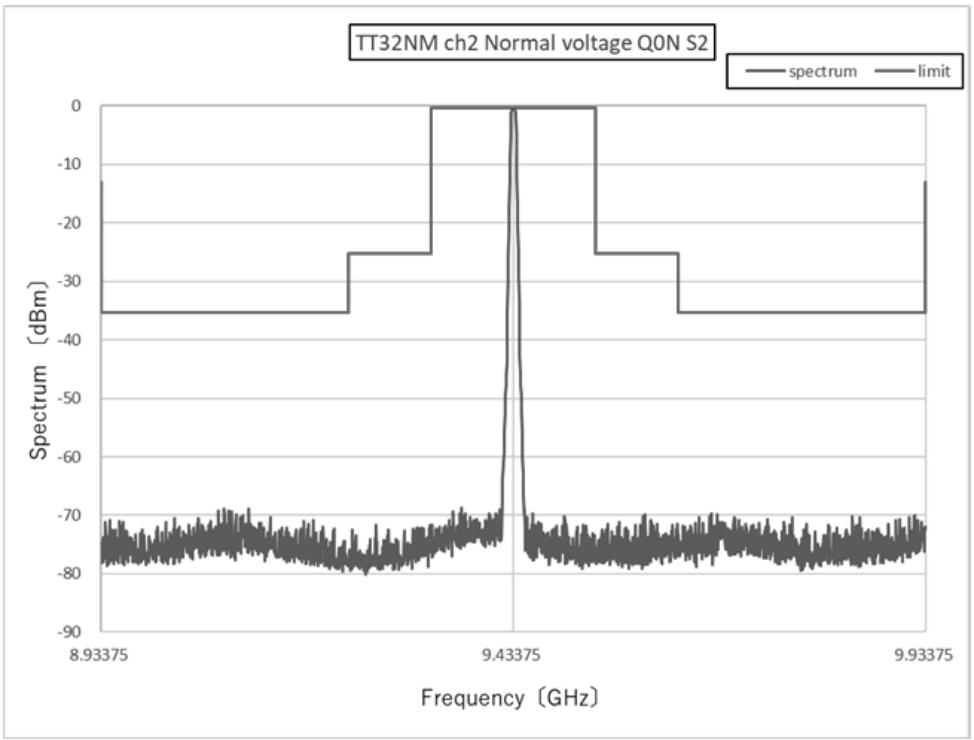


Occupied bandwidth:6.183 MHz
Fig. 8.60 L pulse

TT32NM mode



Occupied bandwidth: 9.213 MHz
Fig. 8.61 S1 pulse



Occupied bandwidth: 8.983 MHz
Fig. 8.62 S2 pulse
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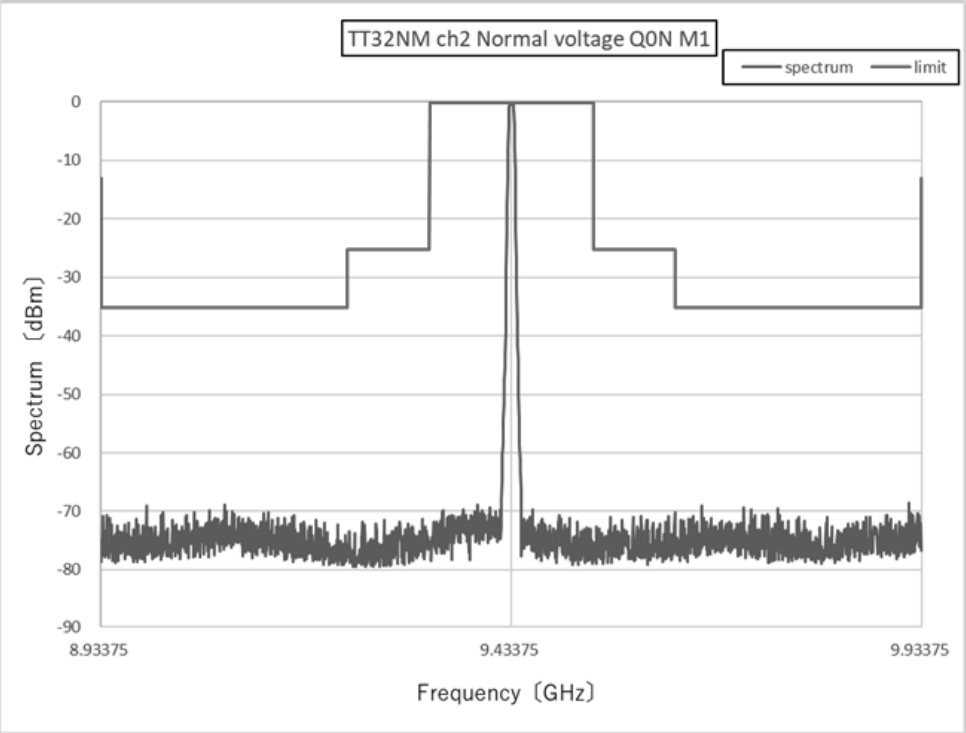
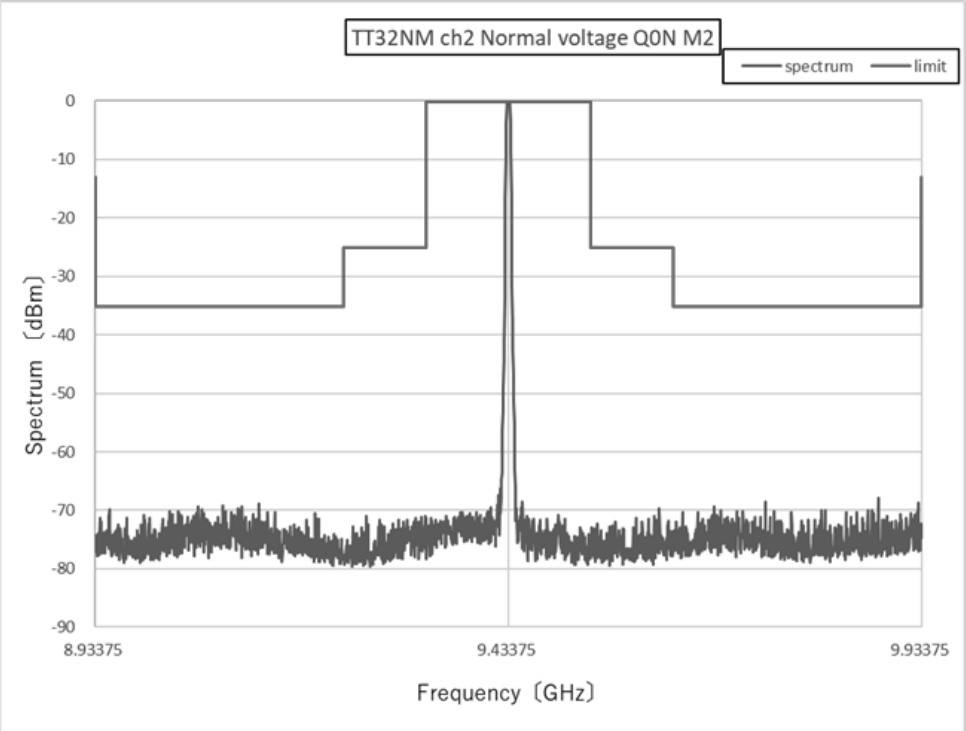
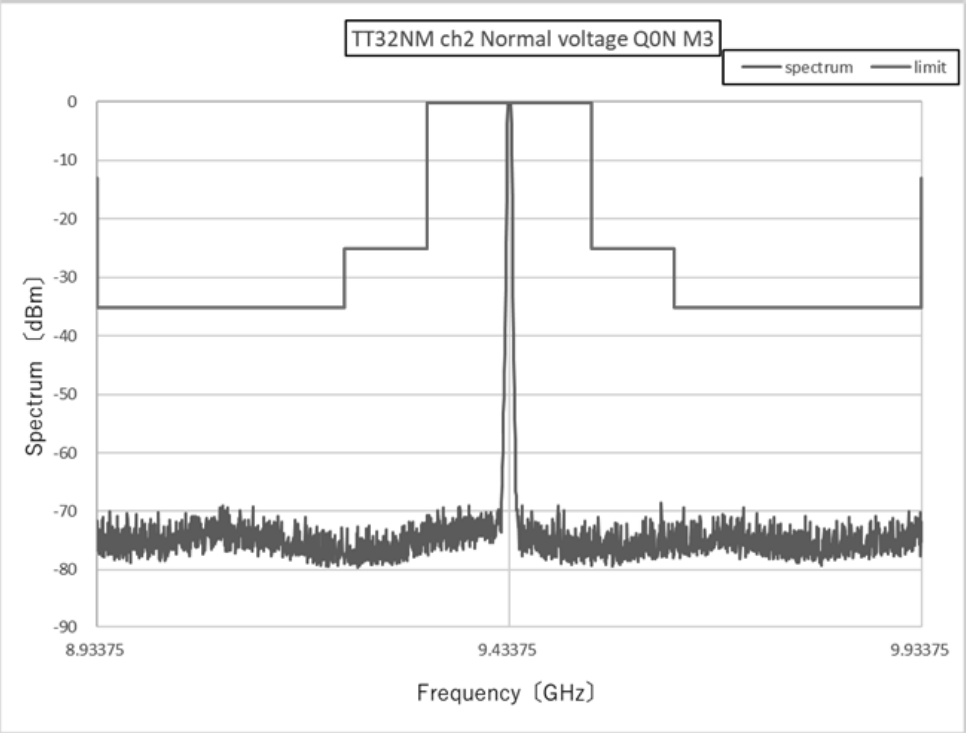


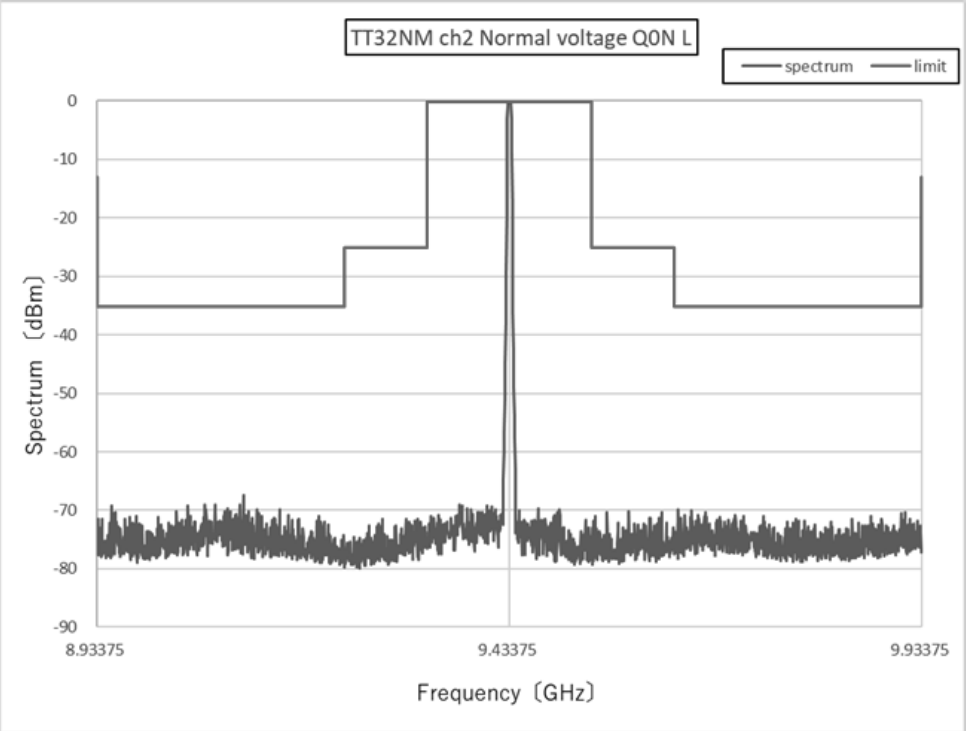
Occupied bandwidth: 8.873 MHz
Fig. 8.63 M1 pulse



Occupied bandwidth: 6.328 MHz
Fig. 8.64 M2 pulse

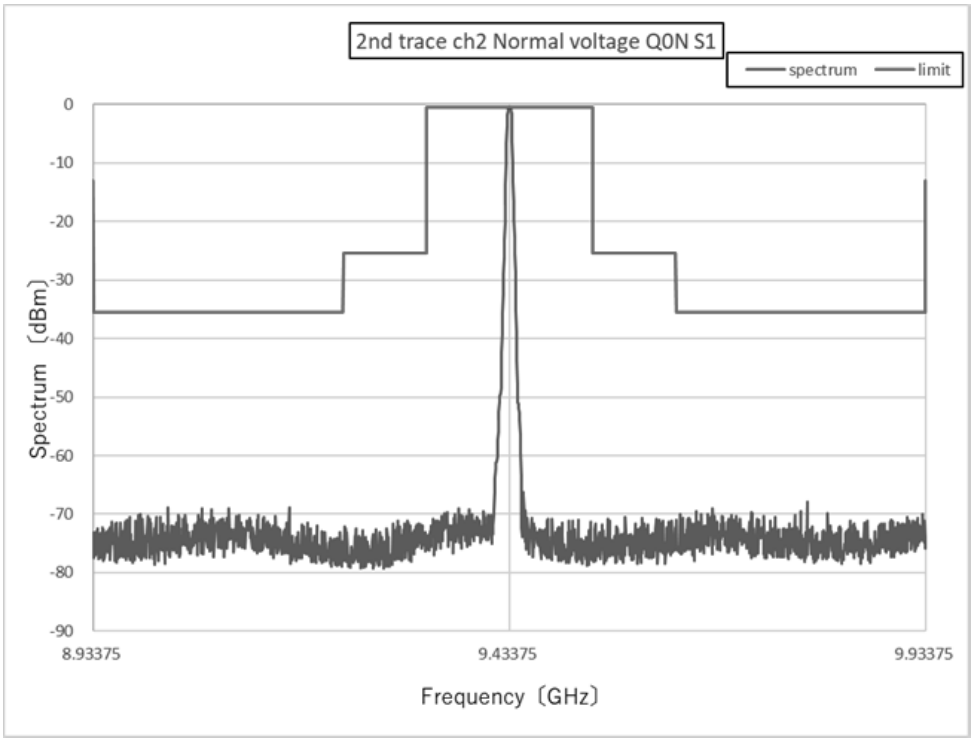


Occupied bandwidth: 6.321 MHz
Fig. 8.65 M3 pulse

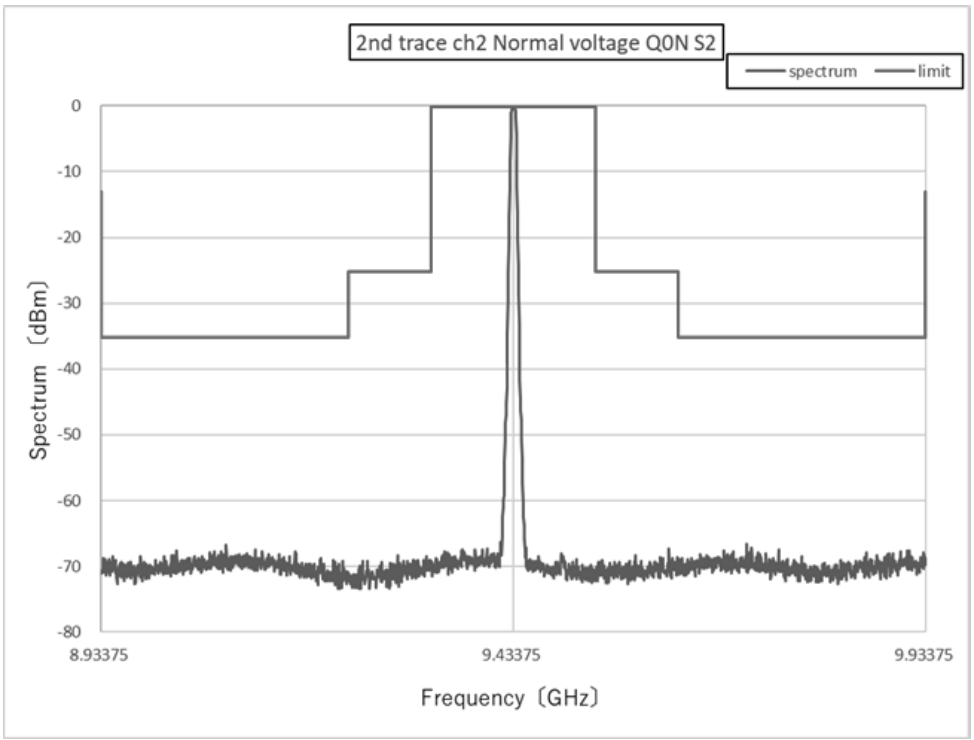


Occupied bandwidth: 6.188 MHz
Fig. 8.66 L pulse

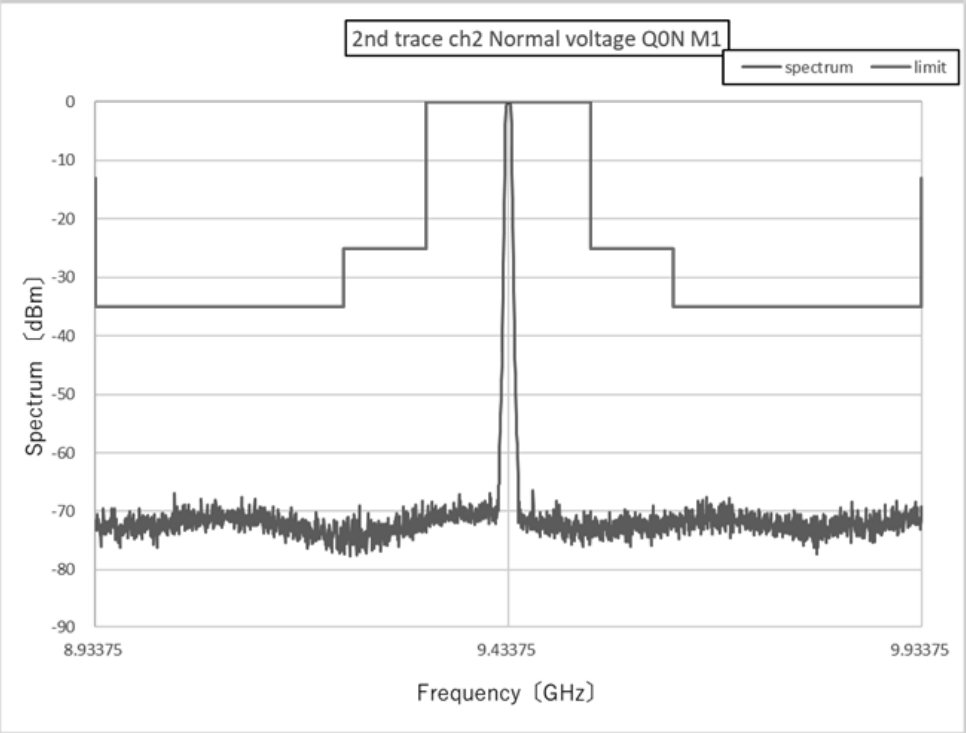
2nd trace mode



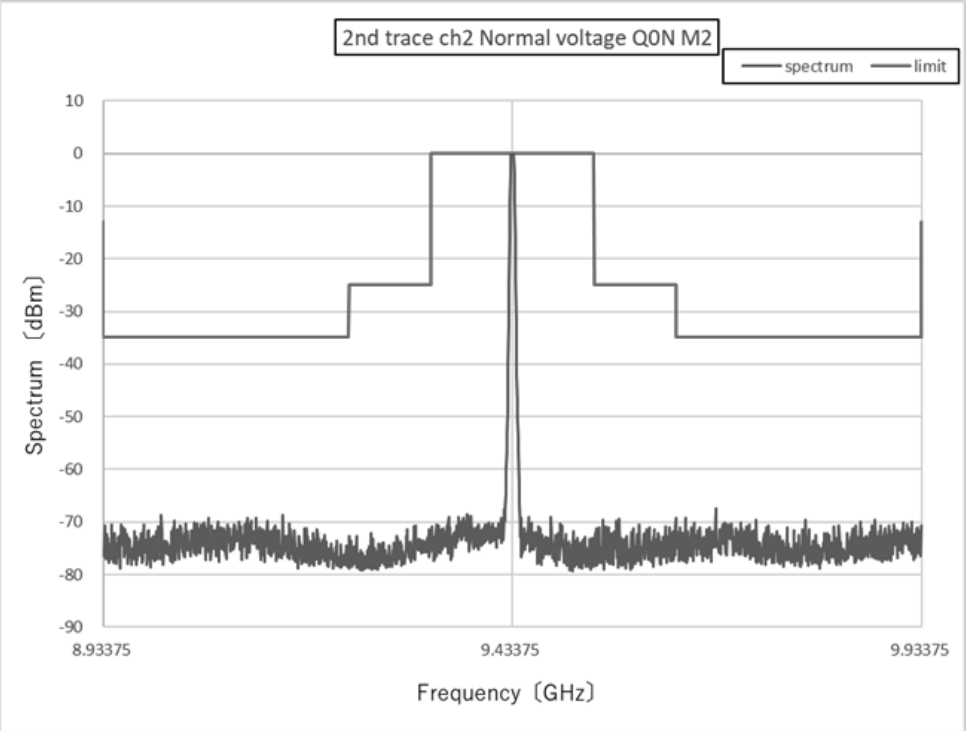
Occupied bandwidth: 9.209 MHz
Fig. 8.67 S1 pulse



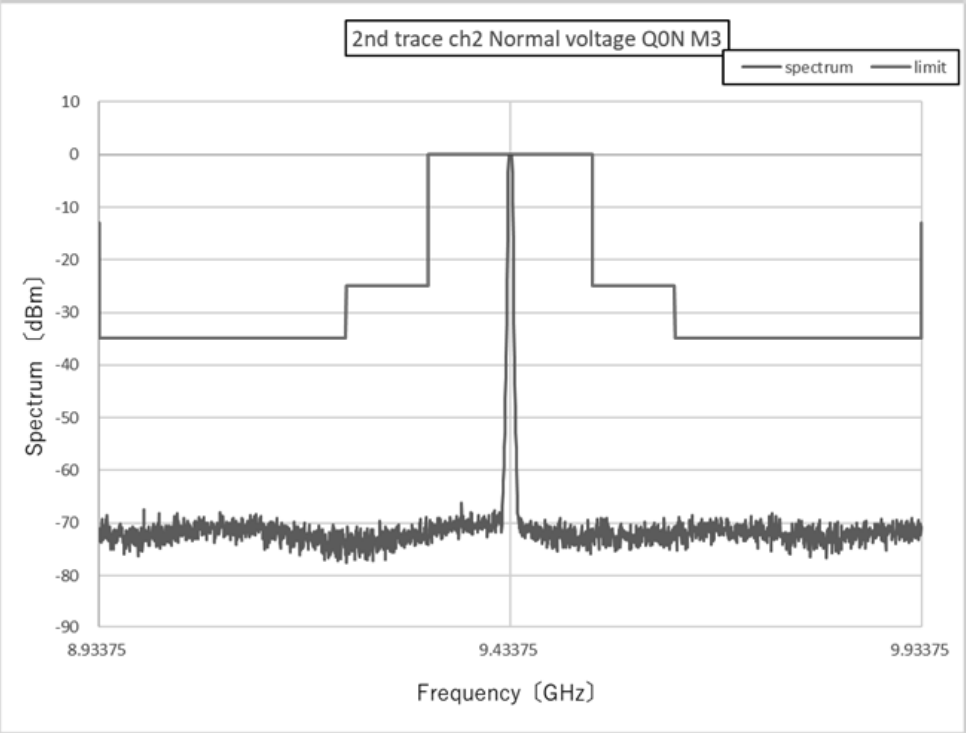
Occupied bandwidth: 9.030 MHz
Fig. 8.68 S2 pulse



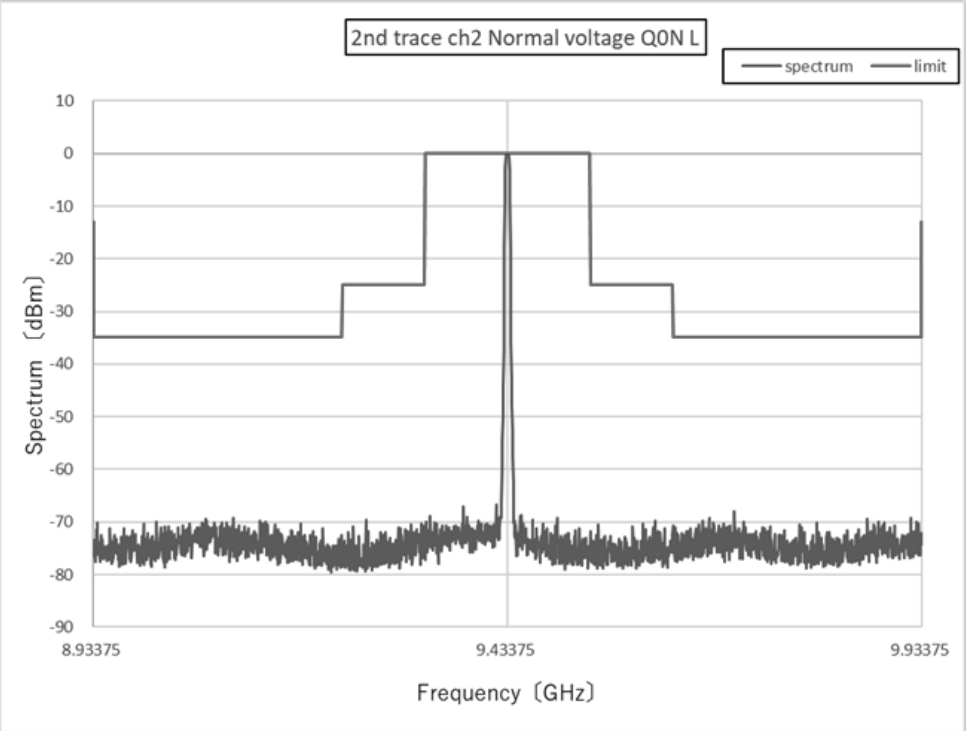
Occupied bandwidth: 8.908 MHz
Fig. 8.69 M1 pulse



Occupied bandwidth: 6.337 MHz
Fig. 8.70 M2 pulse



Occupied bandwidth: 6.346 MHz
Fig. 8.71 M3 pulse



Occupied bandwidth: 6.235 MHz
Fig. 8.72 L pulse

8.2 Spurious Emissions

Note: The measurement results included the path loss.

ch1

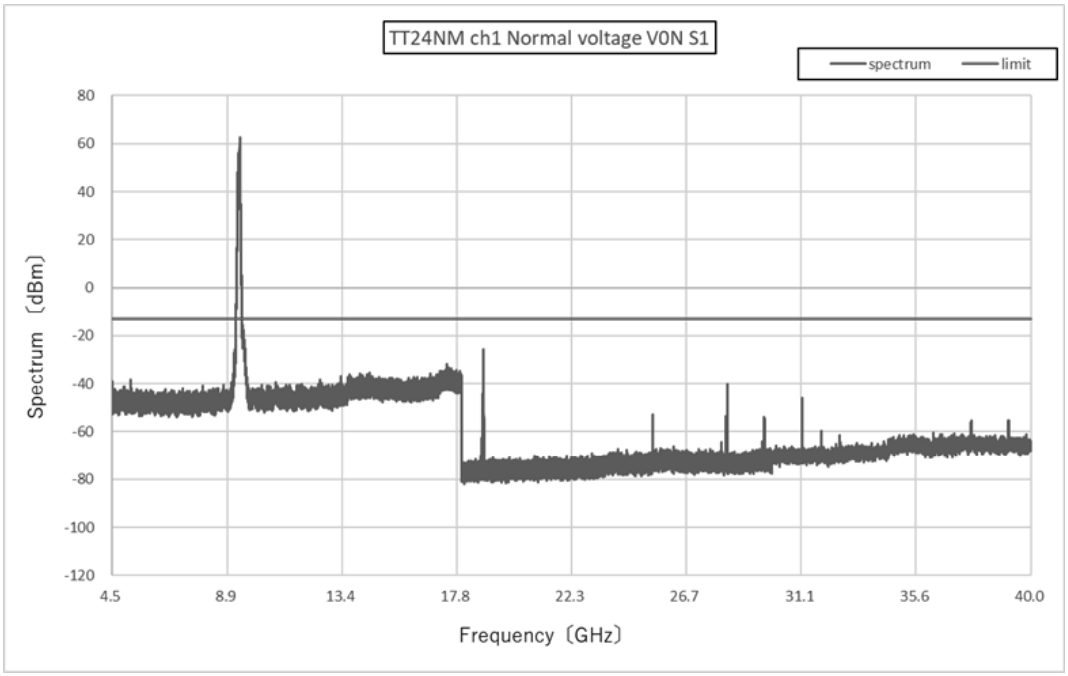


Fig 8.73 Peak, 4.5 GHz to 40 GHz

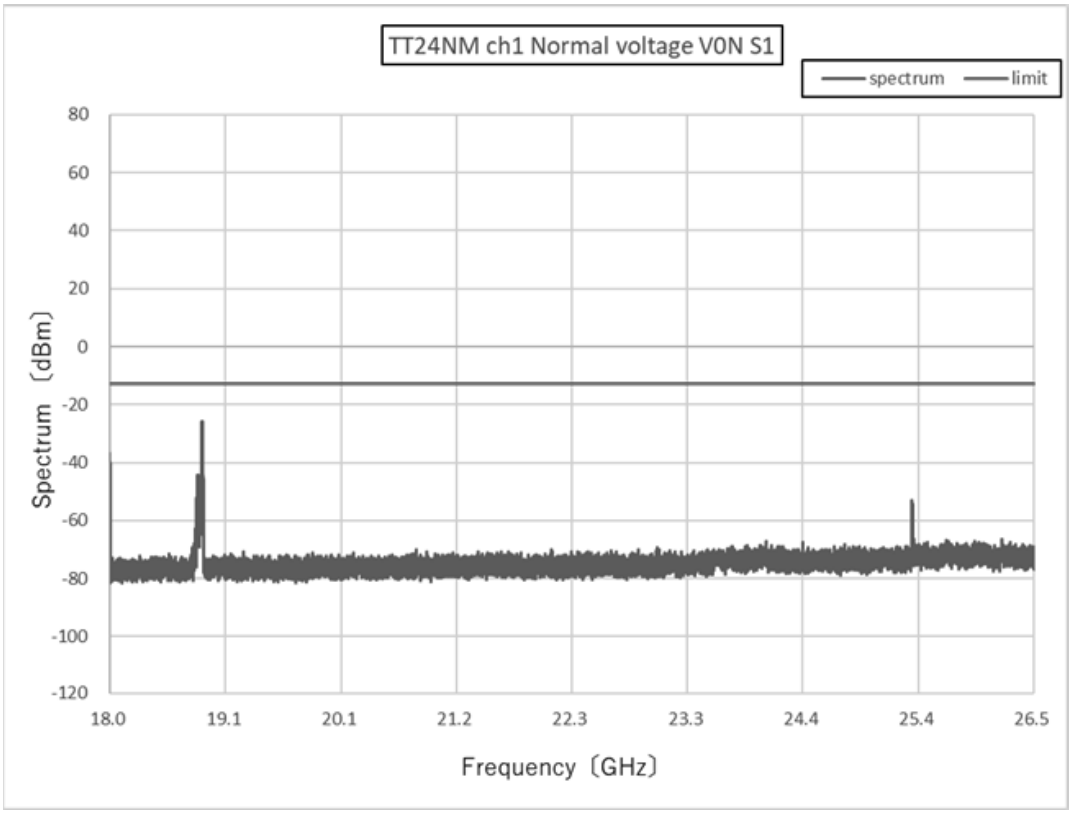


Fig 8.74 Peak, 18 GHz to 26.5 GHz (maximum peak value)

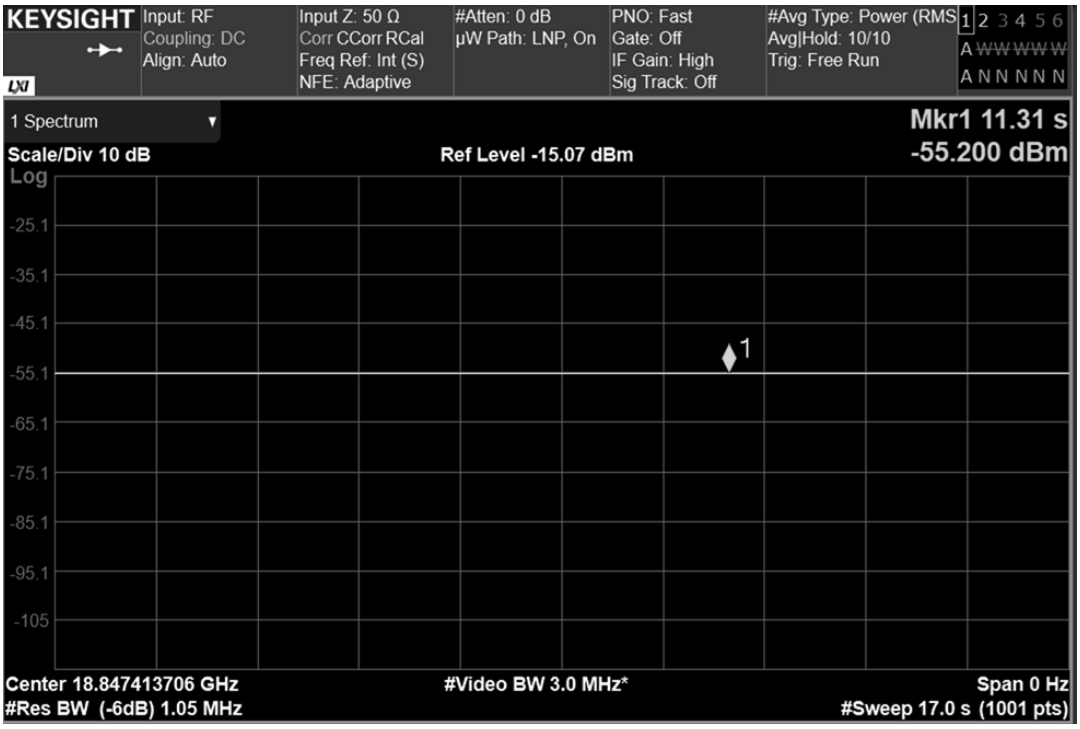


Fig 8.75 Average of the maximum peak value

ch2

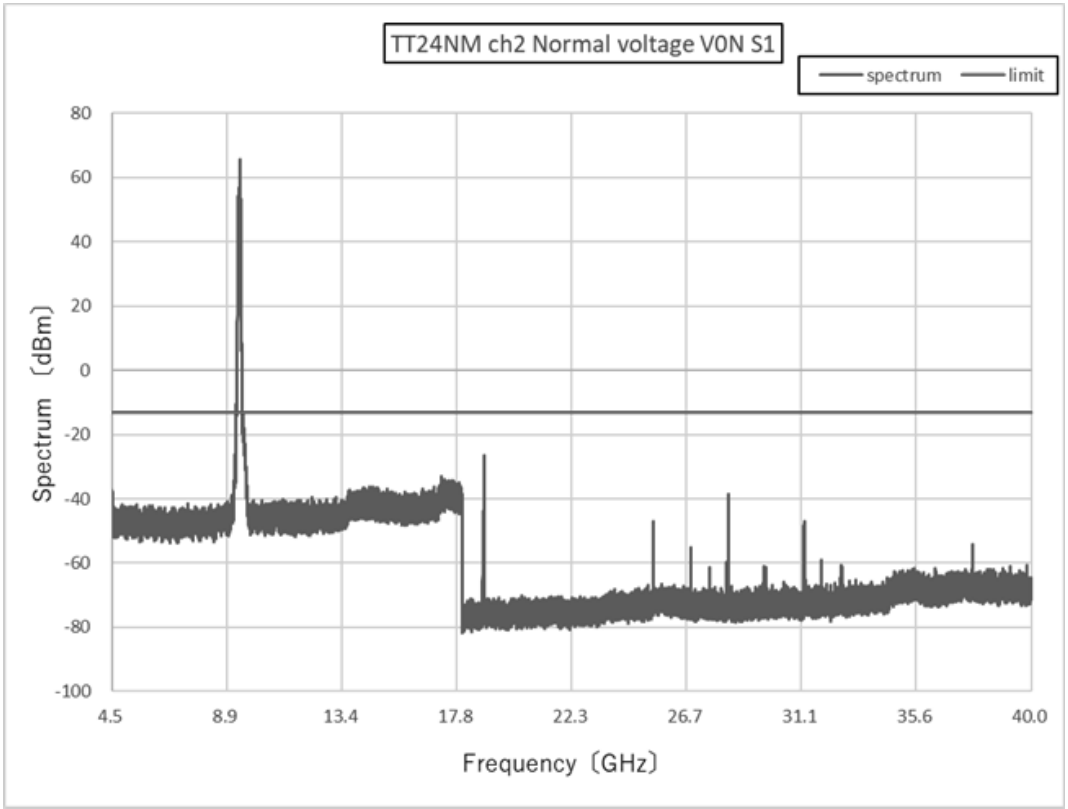


Fig 8.76 Peak, 4.5 GHz to 40 GHz

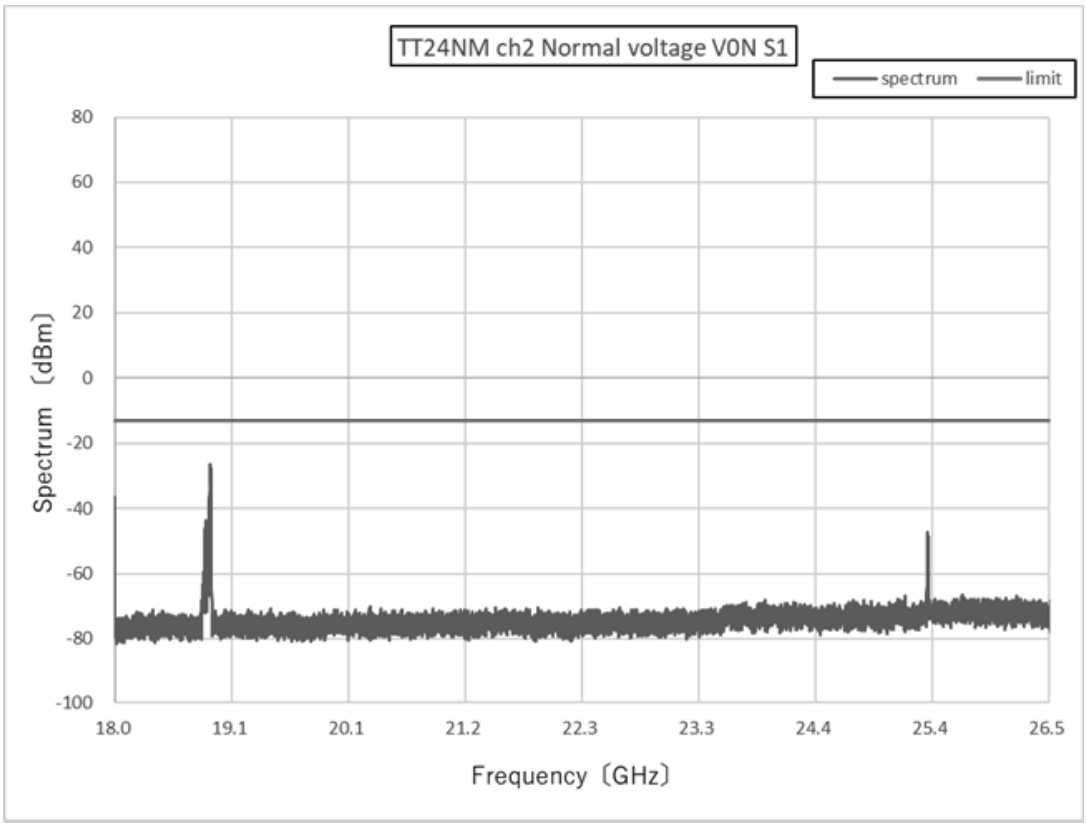


Fig 8.77 Peak, 18 GHz to 26.5 GHz (maximum peak value)

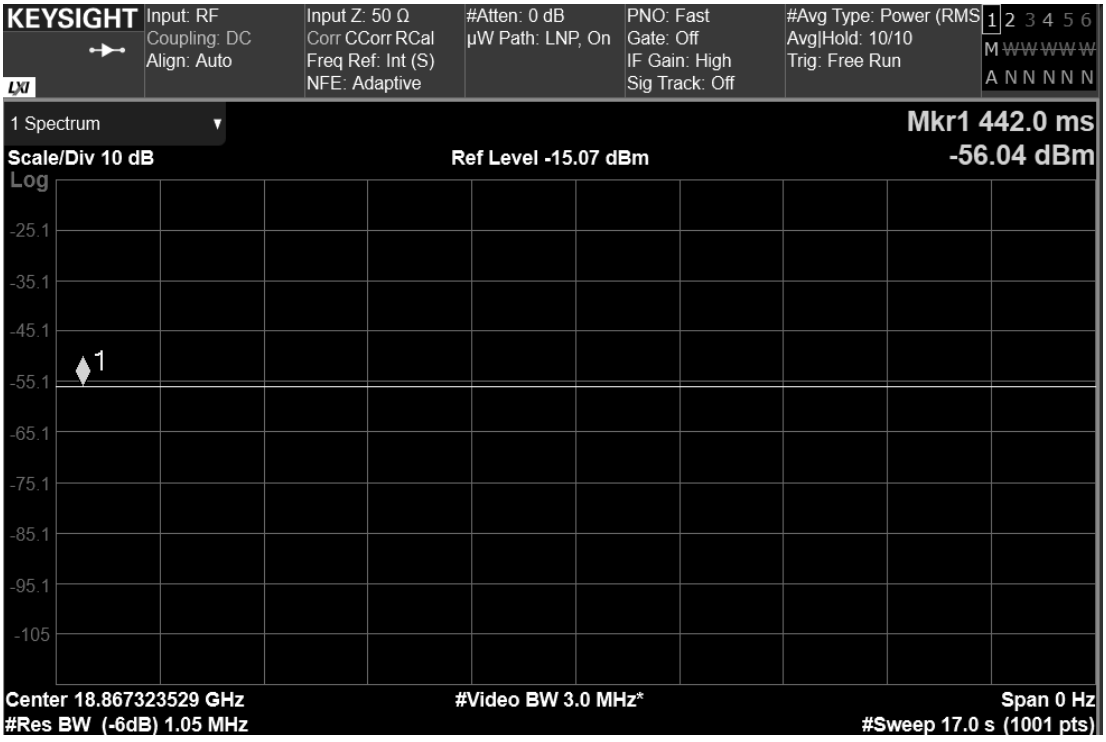
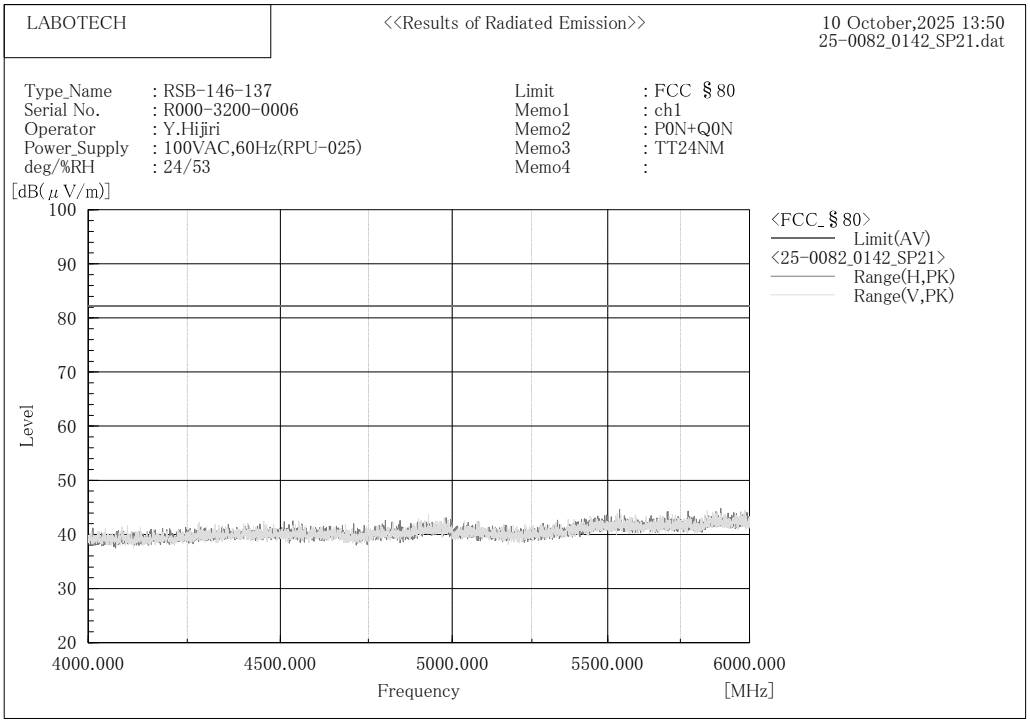


Fig 8.78 Average of the maximum peak value

9 Field Strength of Spurious Radiation Plots measured in the Spurious domain

9.1 Measured maximum emission value

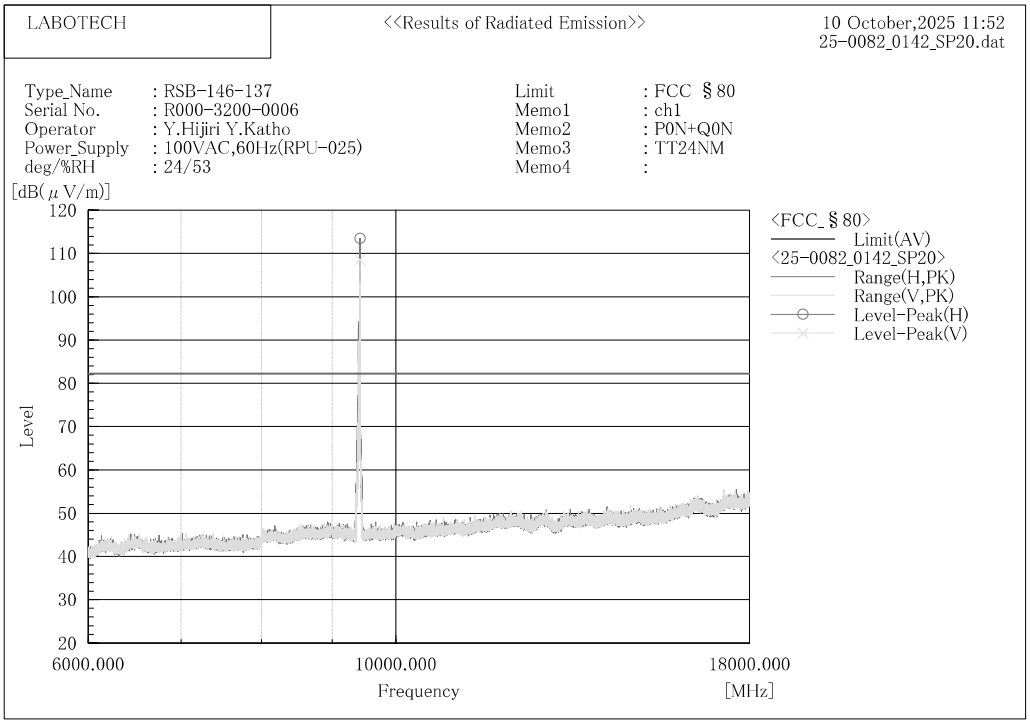
ch1



Final Result

No.	Frequency [MHz]	(P)	c.f [dB(1/m)]	Height [cm]	Angle [°]	Remark

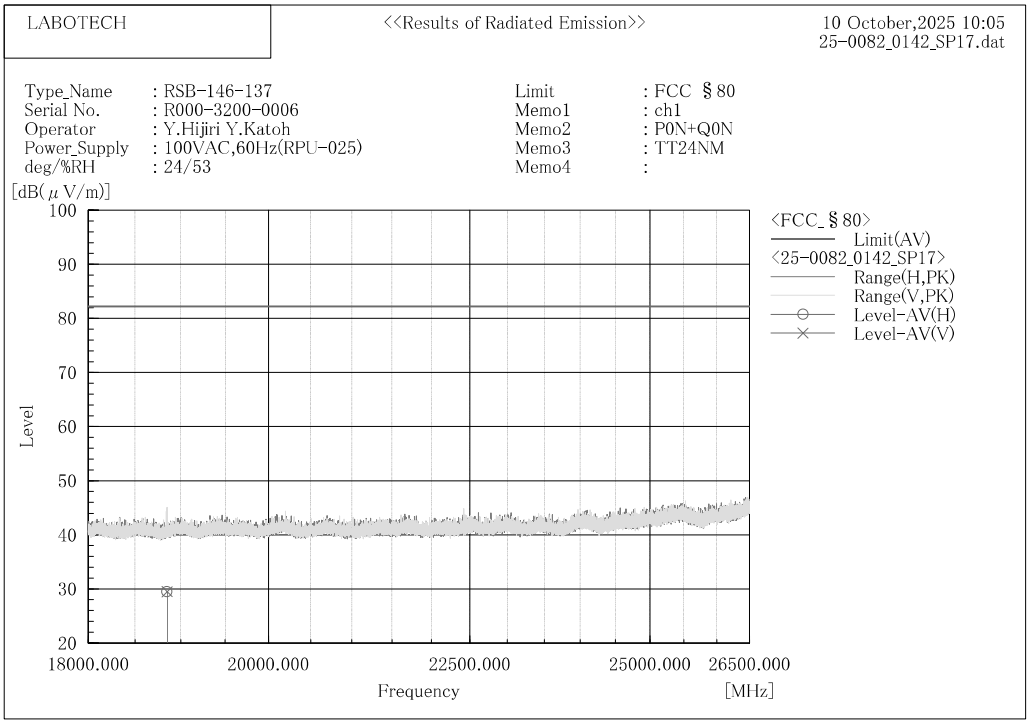
Note: Result AV (dBμV/m) = Reading (dBμV) + c.f (Antenna Factor (dB(1/m)) + Path Loss (dB))



Spectrum Selection

No.	Frequency [MHz]	(P)	Reading [dB(μV)]	c.f [dB(1/m)]	Result PK [dB(μV/m)]	Remark
1	9425.203	V	113.57	-4.96	108.61	Carrier frequency
2	9424.345	H	118.45	-4.96	113.49	Carrier frequency

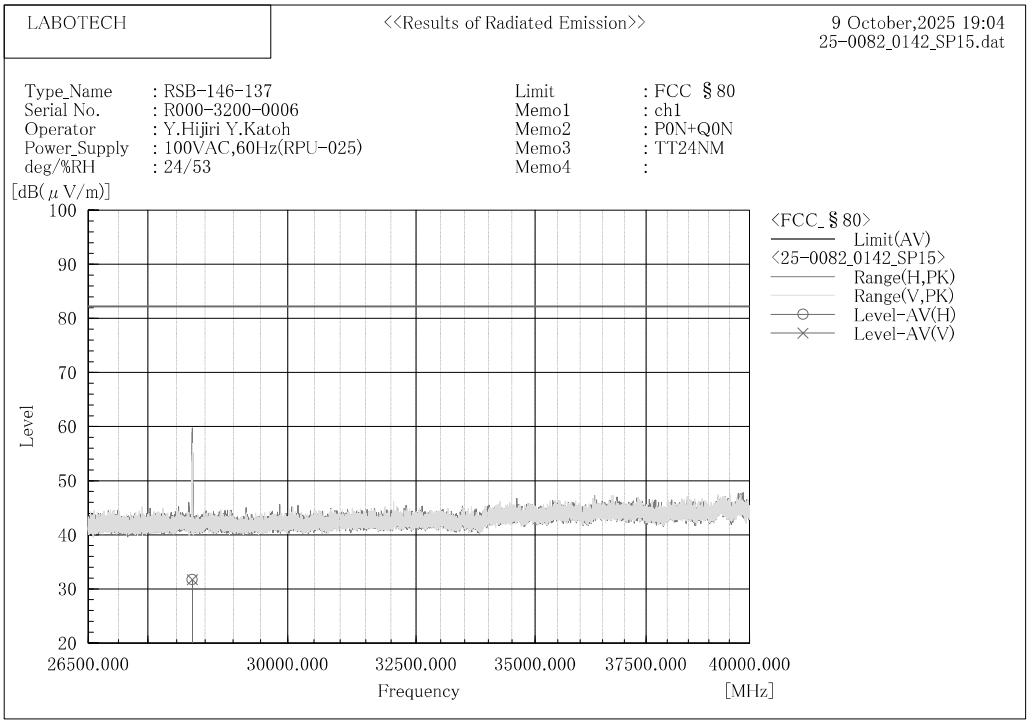
Note: Result AV (dBμV/m) = Reading (dBμV) + c.f (Antenna Factor (dB(1/m)) + Path Loss (dB))



Final Result

No.	Frequency	(P)	Reading AV	c.f	Result AV	Limit AV	Margin AV	Height	Angle	Remark
	[MHz]		[dB(μV)]	[dB(1/m)]	[dB(μV/m)]	[dB(μV/m)]	[dB]	[cm]	[°]	
1	18847.410	H	37.41	-7.89	29.52	82.2	52.7	205.0	359.0	
2	18847.410	V	37.40	-7.89	29.51	82.2	52.7	199.0	93.0	

Note: Result AV (dBμV/m) = Reading (dBμV) + c.f (Antenna Factor (dB(1/m)) + Path Loss (dB))

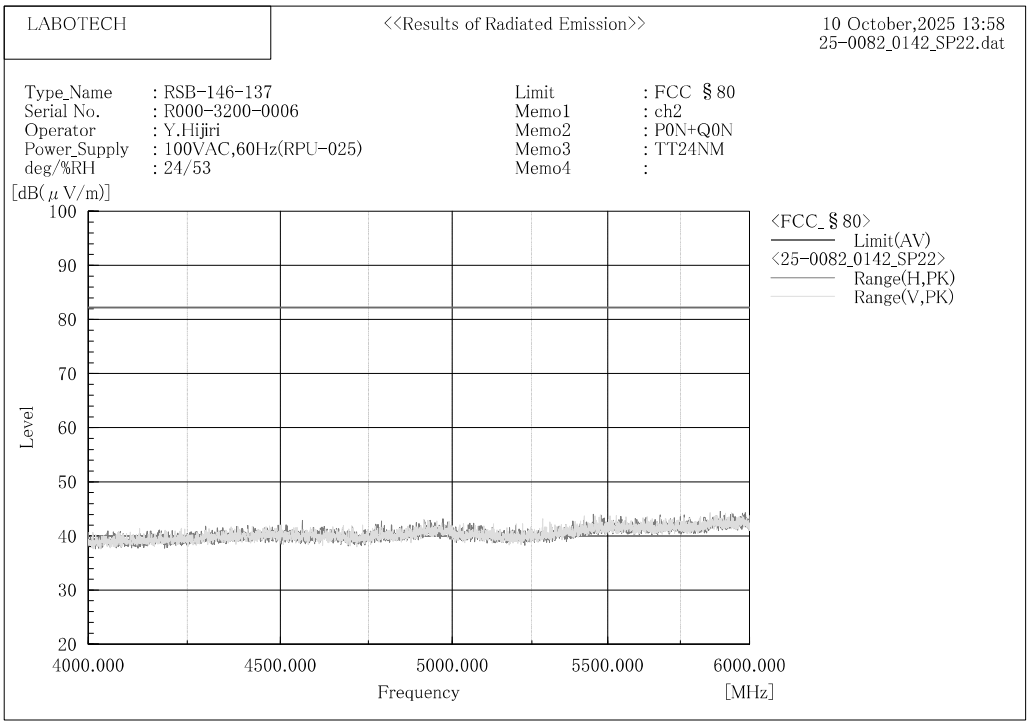


Final Result

No.	Frequency	(P)	Reading AV	c.f	Result AV	Limit AV	Margin AV	Height	Angle	Remark
	[MHz]		[dB(μV)]	[dB(1/m)]	[dB(μV/m)]	[dB(μV/m)]	[dB]	[cm]	[°]	
1	28271.150	H	45.00	-13.24	31.76	82.2	50.4	202.0	331.0	
2	28270.730	V	44.94	-13.23	31.71	82.2	50.5	204.0	321.0	

Note: Result AV (dBμV/m) = Reading (dBμV) + c.f (Antenna Factor (dB(1/m)) + Path Loss (dB))

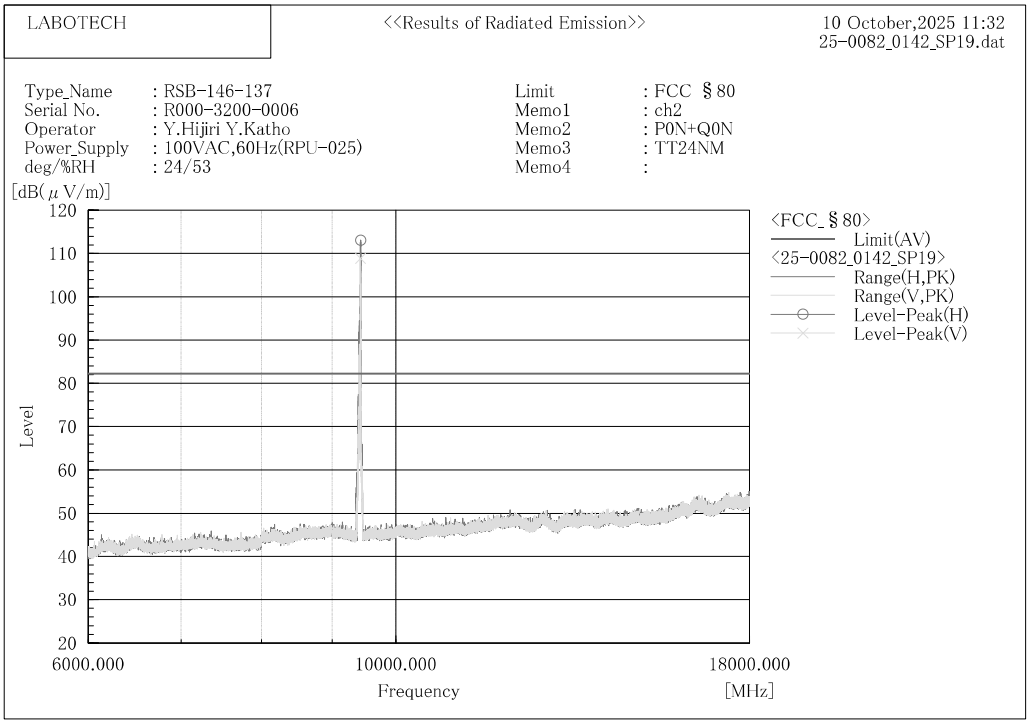
ch2



Final Result

No.	Frequency [MHz]	(P)	c.f [dB(1/m)]	Height [cm]	Angle [°]	Remark

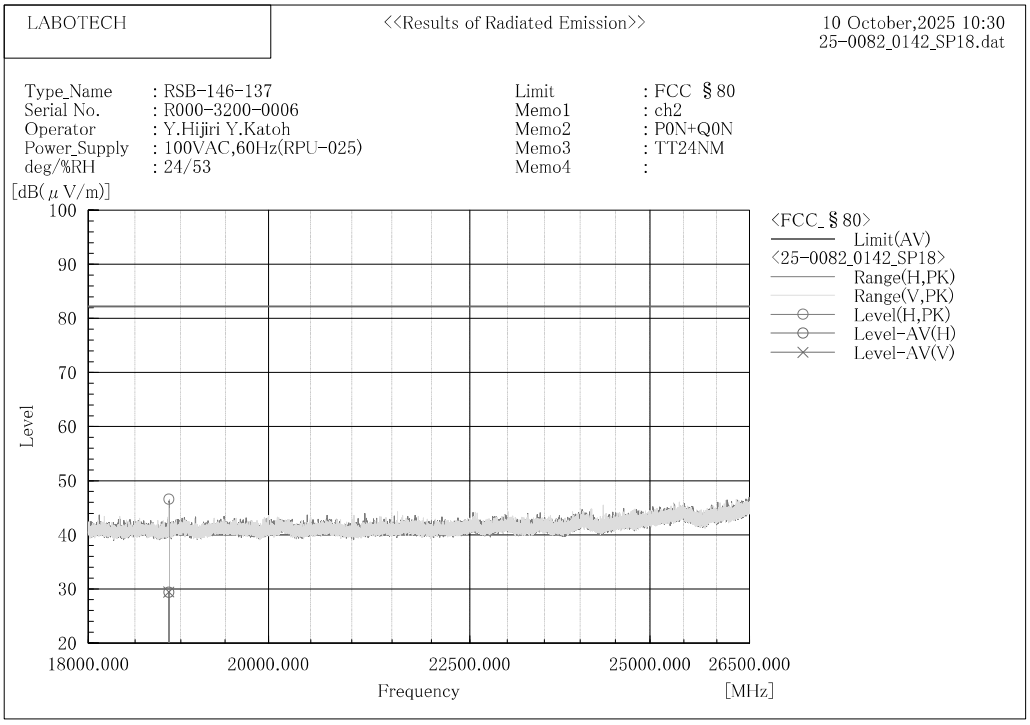
Note: Result AV (dBμV/m) = Reading (dBμV) + c.f (Antenna Factor (dB(1/m)) + Path Loss (dB))



Spectrum Selection

No.	Frequency [MHz]	(P)	Reading [dB(μV)]	c.f [dB(1/m)]	Result PK [dB(μV/m)]	Remark
1	9434.633	H	117.99	-4.93	113.06	Carrier Frequency
2	9432.061	V	113.85	-4.94	108.91	Carrier Frequency

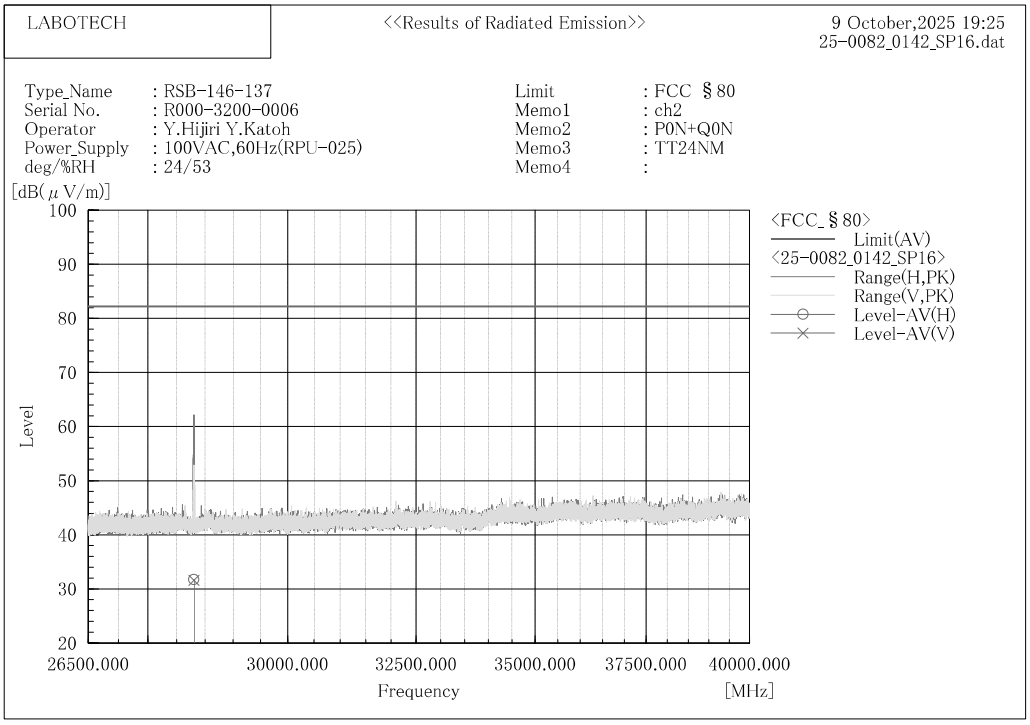
Note: Result AV (dBμV/m) = Reading (dBμV) + c.f (Antenna Factor (dB(1/m)) + Path Loss (dB))



Final Result

No.	Frequency	(P)	Reading AV	c.f	Result AV	Limit AV	Margin AV	Height	Angle	Remark
	[MHz]		[dB(μV)]	[dB(1/m)]	[dB(μV/m)]	[dB(μV/m)]	[dB]	[cm]	[°]	
1	18867.980	V	37.28	-7.83	29.45	82.2	52.8	163.0	56.0	
2	18868.840	H	37.22	-7.83	29.39	82.2	52.8	175.0	359.0	

Note: Result AV (dBμV/m) = Reading (dBμV) + c.f (Antenna Factor (dB(1/m)) + Path Loss (dB))



Final Result

No.	Frequency	(P)	Reading AV	c.f	Result AV	Limit AV	Margin AV	Height	Angle	Remark
	[MHz]		[dB(μV)]	[dB(1/m)]	[dB(μV/m)]	[dB(μV/m)]	[dB]	[cm]	[°]	
1	28301.800	H	45.11	-13.35	31.76	82.2	50.4	179.0	338.0	
2	28300.340	V	44.94	-13.35	31.59	82.2	50.6	217.0	334.0	

Note: Result AV (dBμV/m) = Reading (dBμV) + c.f (Antenna Factor (dB(1/m)) + Path Loss (dB))

End of text