

TEST REPORT

Date of Issue: 29th September 2026

The laboratory doesn't take part in the sampling and this test report applies only to the samples tested.

Without the laboratory approval by the documents, this report should not be copied in part.

1. Applicant

Company Name : SHIMANO INC.
Mailing Address : 3-77 Oimatsu-cho, Sakai-ku, Sakai City,
Osaka 590-8577, Japan

2. Identification of Tested Device

Type of Device : Digital Device
Device Name : Wireless Unit
Model Number : 7LN1
Trade Name : SHIMANO
Type of Test : ☐ Production ☐ Pre-production ☒ Prototype

3. Test Items

Antenna Gains

Shimano Inc. EMC Test Laboratory
3-77 Oimatsu-cho, Sakai-ku, Sakai City, Osaka, 590-8577, Japan

Takashi Kotani

Test engineer: Takashi Kotani

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1. REVISION HISTORY

Report Version	Page	Revised Content	Reason for Revision	Date of Issue	Status
A	-	Initial issue of report	-	5th March 2026	Original
B	5	Updated the procedure to measure and adjust the dipole antenna input power using a spectrum analyzer.	To ensure accurate setting of the reference transmit power.	29th September 2026	Released

2. GENERAL INFORMATION

The information provided by the customer is as follows;

-Applicant, Type of EUT, Model Number of EUT on the cover and other relevant pages.

*The laboratory is exempted from liability of any test results affected by the above information.

2.1. Operating Modes and Measured Frequencies

Mode / Frequency Summary

Mode	Frequency Range (MHz)	Measured Frequency Point(s) in this Report (MHz)
Shimano Original	2478 (Fixed)	2478
Bluetooth Low Energy	2402-2480	2402, 2442, 2480

2.2. Antenna List

Antenna Identification and Attributes

Antenna ID	Type	Band	Maker / Model	Connector	Replaceability	Notes
ANT1	Folded monopole	2.4GHz	Proprietary	None	Fixed	

2.3. Engineering changes to the EUT

■ without changes, □ with changes (details are found inside of this report)

3. TEST SYSTEM

3.1. Test Procedure

Antenna gain measurements are performed in an anechoic chamber using the substitution method with a calibrated reference antenna.

The EUT was mounted on a positioner and rotated from 0 to 360 degrees.

The measurement antenna is placed at a separation distance of 2 m, and its height is adjusted as appropriate (nominally 1.5 m).

For the reference measurement, the calibrated reference antenna (dipole) with known gain is placed at the EUT position and driven by a signal generator, and the received level was recorded during rotation.

The EUT transmit power is defined by the power measured at the antenna feed point on the EUT printed circuit board using a spectrum analyzer and is used as the reference power for setting the signal generator output.

For the EUT measurement, the EUT is operated in transmit mode and measured over-the-air (OTA), and the received level was recorded during rotation.

Spectrum Analyzer Setup Conditions:

Center Frequency:	2478 MHz (Shimano Original) 2402/2442/2480 MHz (Bluetooth Low Energy)
Frequency Span:	300 kHz
Resolution Bandwidth:	300 kHz
Sweep Time:	Auto
Detector Function:	Normal
Number of Points:	1001

[Calculation]

EUT Antenna Gain (dBi)

= Measured received level(maximum over 0 to 360 degrees rotation) (dBm)

– Reference received level(maximum over 0 to 360 degrees rotation) (dBm)

+ Reference Antenna Gain (dBi)

+ Correction (dB)

Correction: Cable loss and EUT output power corrections were applied.

3.2. Test Software List

Software Name	Version	Manufacturer
MATEOS.NET	1.13.16	Microwave Factory

3.3. Date of Test

Receipt of Test Sample : 25th February 2026

Condition of Test Sample : ☒ Damage is not found on the set.

☐ Damage is found on the set. (Details are described in this report)

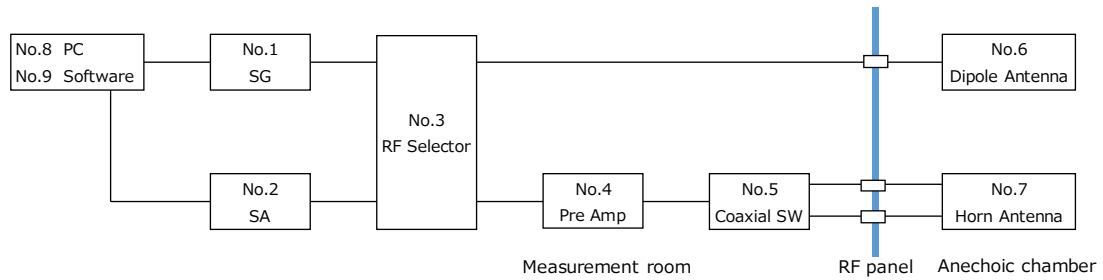
Test Completed on : 25th February 2026

Condition of Test Sample : ☒ Damage is not found on the set.

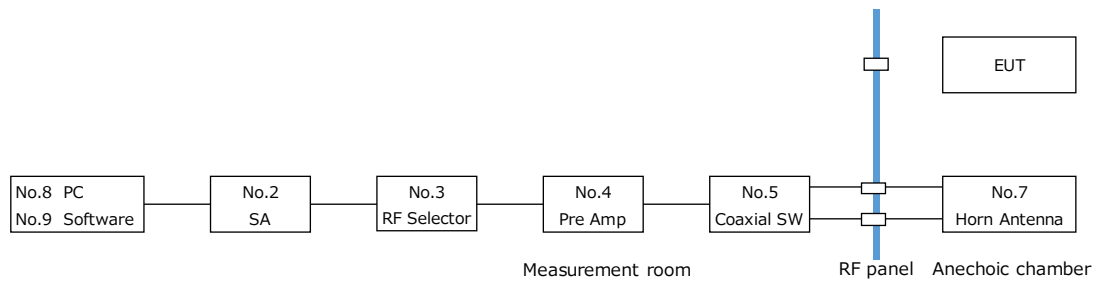
☐ Damage is found on the set. (Details are described in this report)

3.4. Block Diagram of Test System

• Reference Antenna Measurement



• EUT Antenna Measurement



3.5. Test Location

Shimano Inc. EMC Test Laboratory

3-77 Oimatsu-cho, Sakai-ku, Sakai City, Osaka, 590-8577, Japan

4. ANTENNA GAIN

4.1. Test Results

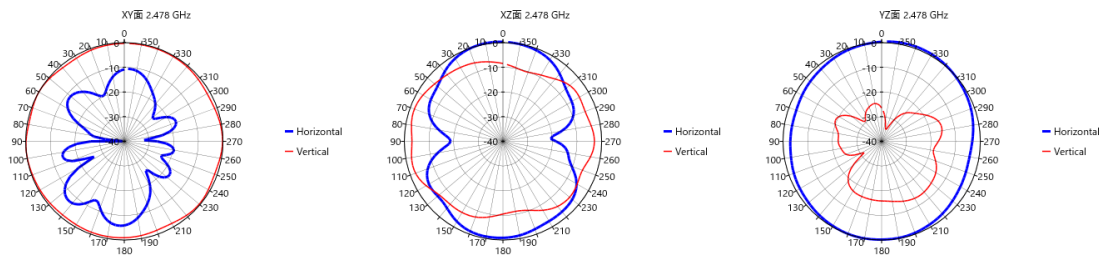
•Antenna Peak Gain:

Mode	Peak Gain (dBi)
Shimano Original	0.83
Bluetooth Low Energy	0.82

•Shimano Original:

Measured Frequency (MHz)	Plane	Polarization	EUT Antenna Gain (dBi)
2478	XY	Horizontal	-5.74
		Vertical	0.00
	XZ	Horizontal	0.39
		Vertical	-1.77
	YZ	Horizontal	0.83
		Vertical	-13.15

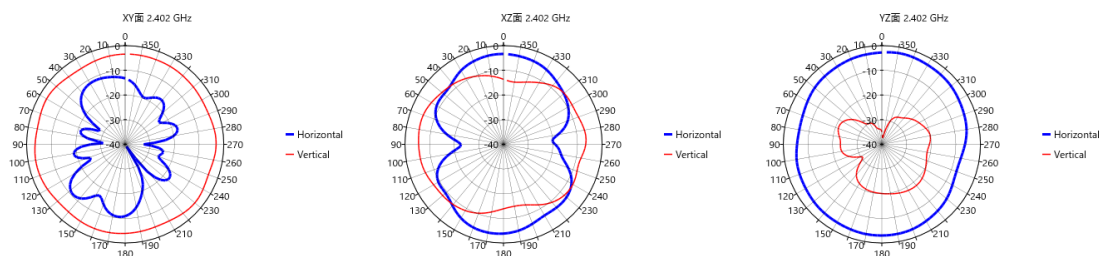
Test Results in Graph



•Bluetooth Low Energy:

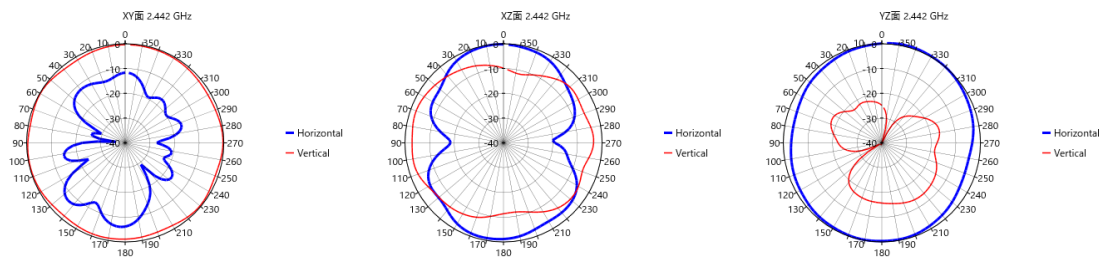
Measured Frequency (MHz)	Plane	Polarization	EUT Antenna Gain (dBi)
2402	XY	Horizontal	-10.50
		Vertical	-3.08
	XZ	Horizontal	-3.38
		Vertical	-5.22
	YZ	Horizontal	-2.39
		Vertical	-18.23

Test Results in Graph



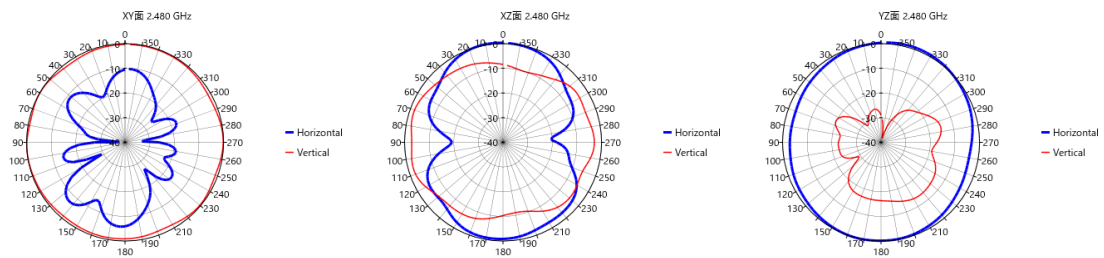
Measured Frequency (MHz)	Plane	Polarization	EUT Antenna Gain (dBi)
2442	XY	Horizontal	-6.02
		Vertical	-0.22
	XZ	Horizontal	-0.16
		Vertical	-2.27
	YZ	Horizontal	0.58
		Vertical	-13.38

Test Results in Graph



Measured Frequency (MHz)	Plane	Polarization	EUT Antenna Gain (dBi)
2480	XY	Horizontal	-5.77
		Vertical	-0.01
	XZ	Horizontal	0.39
		Vertical	-1.72
	YZ	Horizontal	0.82
		Vertical	-13.40

Test Results in Graph



5. TEST EQUIPMENT

No.	Equipment	Manufacturer	Model No.	Last Cal.	Next Cal.
1	Signal Generator	Keysight Technology	N5171	June 19.2025	June 2026
2	Spectrum Analyzer	Keysight Technology	N9000B	June 19.2025	June 2026
3	RF Selector	Microwave Factory	MRM-S78T	-	-
4	RF Pre-Amplifier (500 MHz ~ 8 GHz)	R&K	LA1020-RS	June 20.2025	June 2026
5	USB Coaxial Switch	Keysight Technology	U1810B	-	-
6	Dipole Antenna	Anritsu	MA5612 B4	August 29.2023	-
7	Horn Antenna	Schwarzbeck	BBHX 9120 LF	April 17.2025	April 2026
8	Personal Computer (Control measurement)	HP	EliteTower 800 G9	-	-
9	Antenna Measurement Software	Microwave Factory	MATEOS.NET	-	-

Note: The equipment used for this measurement is verified for proper operation prior to testing.

End of Report.