

TEST REPORT

Date of Issue : 20 April 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 switch
Model Number : SW-UT600
Trade Name : SHIMANO
Type of Test : ☐Production ☐Pre-production ☒Prototype

3.Test Items

Antenna Gains

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

Tatsuya Sakurai

Test engineer: Tatsuya Sakurai

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1. REVISION HISTORY

Report Version	Page	Revised Content	Reason for Revision	Date of Issue	Status
A	-	Initial issue of report	-	10 February 2025	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.	20 April 2026	Release

2. GENERAL INFORMATION

The information provided from the customer is as follows;

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

-2.1. : Product Description

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

2.1. Product Description

(1) Technical Specifications

Antenna Number		SW-UT600_W	SW-UT600_B
Operating Temperature		-10 °C ~ 50 °C	
Operation Voltage		3.0 V	
Antenna Material		PCB on board	
Antenna Type		Printed monopole antenna	
Antenna dimension		12.7 x 1.0 mm (LengthxWidth)	
Wireless Circuit	Frequency Range	2478 MHz	2402 – 2480 MHz
	Output Power	<3.32 dBm	<3.86 dBm(BLE)
	Modulation	GFSK	GFSK
	Antenna Gain	PCB antenna with 0.96 dBi gain	PCB antenna with 1.86 dBi gain

(2) Test Arrangement

Test Arrangement	
☒ Table-top	☐ Floor-standing ☐ Combinations ☐ Other (Install on bicycle)

[Attention]

All above information in this chapter was declared by the applicant.

2.2. Engineering changes to the EUT

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

3. TEST SYSTEM

3.1. Test Procedure

- Reference Antenna Measurement
 - (1) Set the reference antenna which has the known antenna gain in the anechoic chamber at the center of the rotation table in the condition of horizontal or vertical polarization.
See also the block diagram and the photographs of EUT System configuration in this report.
Also, the EUT is placed about 1.5 m height.
 - (2) To enable measurement of the power applied to the dipole antenna (No. 5) shown in the block diagram, connect the spectrum analyzer (No. 1) to the connection point of the dipole antenna (No. 5) and configure the measurement setup so that the desired signal input level can be adjusted. Adjust the output level of the signal generator (No. 3) until the reading on the spectrum analyzer matches the EUT transmit power.
The EUT transmit power is defined as 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.
 - (3) Feed the dipole antenna with the signal generator at the adjusted power and receive the signal with measurement antenna at a distance of the 2 m at the same height.
 - (4) Rotate the turntable 360 degrees and record the maximum received power as the reference value using the spectrum analyzer. ※¹
- EUT Antenna Measurement
 - (5) Change the measurement equipment to the EUT antenna measurement system.
 - (6) Feed the EUT antenna with Internal signal of the EUT and receive it with measurement antenna at the 2 m distance and the same height.
 - (7) Rotate the table 360 degrees and get the maximum value of the received power as the EUT with the spectrum analyzer.
 - (8) Calculate the antenna gain using the measured value and the reference value and plot it in the polar chart.

[Note]

※¹ Spectrum Analyzer Set Up Conditions

Center Frequency	: 2478 MHz (SW-UT600_W)
	2442 MHz (SW-UT600_B)
Frequency span	: 300 kHz
Resolution bandwidth	: 100 kHz
Reference level	: 10 dBm
Sweep time	: Auto
Detector function	: Normal
Number of points	: 101

3.2. Test Software List

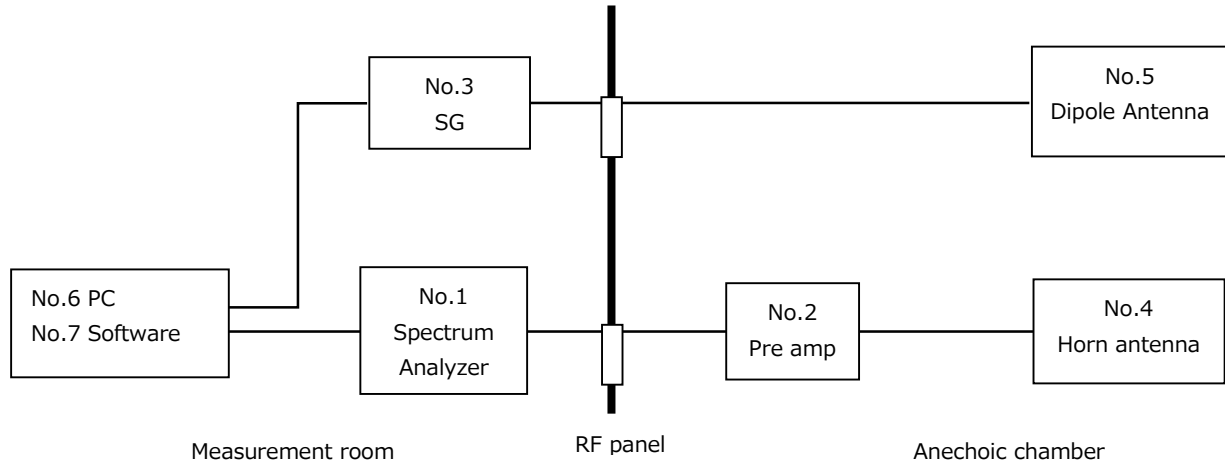
Software Name	Version	Manufacture
TDK Antenna-Lab	2.3.8299.25404	TDK

3.3. Date of Test

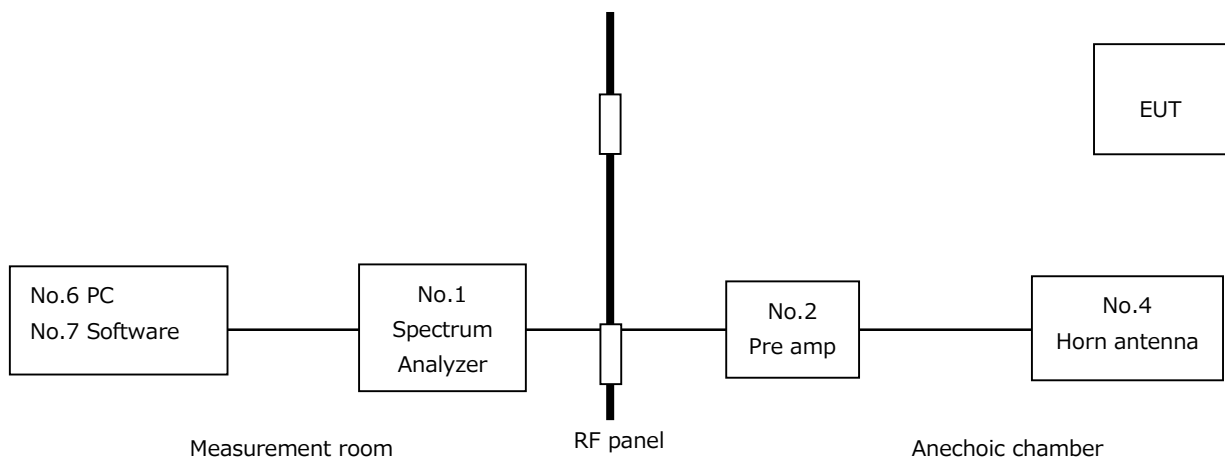
- Receipt of Test Sample : 9 Feb. 2025
- Condition of Test Sample : ☒ Damage is not found on the set.
☐ Damage is found on the set. (Details are described in this report)
- Test Completed on : 9 Feb. 2025
- Condition of Test Sample : ☒ Damage is not found on the set.
☐ Damage is found on the set. (Details 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

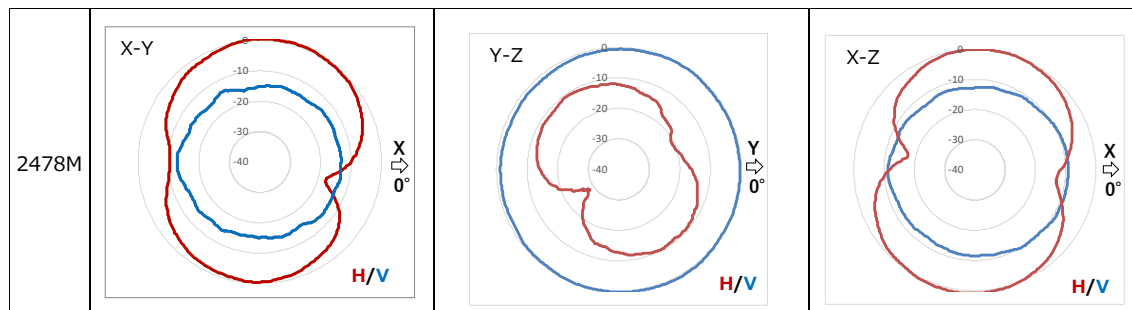
4. ANTENNA Gain

4.1. Test Results

SW-UT600_W

Measured Frequency (MHz)	Plane	Polarization	Meter Reading (dBm)	Reference Value (dBm)	Reference Antenna Gain (dBi)	EUT Antenna Gain (dBi)
2478	XY	Horizontal	5.71	7.16	2.10	0.65
		Vertical	-7.30	7.61	2.10	-12.81
	XZ	Horizontal	6.02	7.16	2.10	0.96
		Vertical	-3.44	7.61	2.10	-8.95
	YZ	Horizontal	-5.15	7.16	2.10	-10.21
		Vertical	6.22	7.61	2.10	0.71

Test Results in Graph

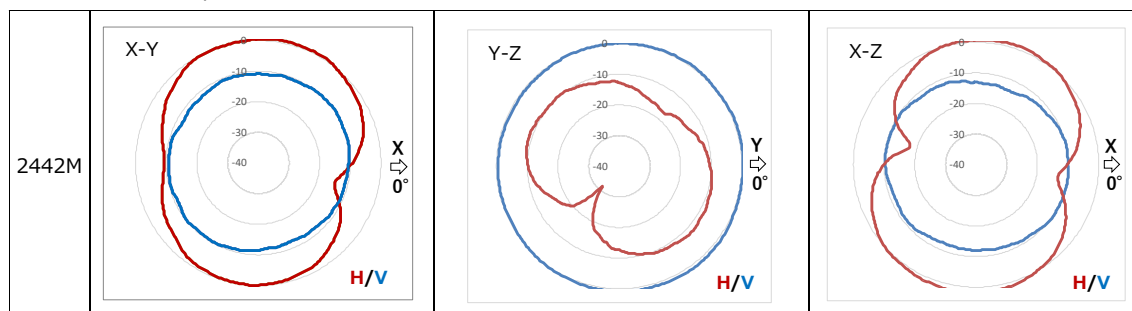


H : Horizontal Polarization
V : Vertical Polarization

SW-UT600_B

Measured Frequency (MHz)	Plane	Polarization	Meter Reading (dBm)	Reference Value (dBm)	Reference Antenna Gain (dBi)	EUT Antenna Gain (dBi)
2442	XY	Horizontal	5.51	6.84	2.10	0.77
		Vertical	-4.48	7.22	2.10	-9.60
	XZ	Horizontal	6.60	6.84	2.10	1.86
		Vertical	-4.55	7.22	2.10	-9.67
	YZ	Horizontal	-3.31	6.84	2.10	-8.05
		Vertical	6.30	7.22	2.10	1.18

Test Results in Graph



H : Horizontal Polarization
V : Vertical Polarization

[Note]

(1) The reference value is the maximum value of the reference antenna which is positioned at the same manner with the EUT.

[Calculation Method]

EUT Antenna Gain (dBi)

= *Meter Reading (maximum level of all directions) (dBm) – Reference value (dBm)*
+ *Reference Antenna Gain (dBi)*

For example: at 2478 MHz XY Plane Horizontal value,

EUT Antenna Gain (dBi) = (5.71) (dBm) – (7.16) (dBm) + (2.1) (dBi) = 0.65

4.2. Photographs of Test System

Refer to a separate test setup photo.

5. TEST EQUIPMENT

No.	Equipment	Manufacturer	Model No.	Calibration Date
1	Spectrum Analyzer	Keysight Technology	N9010B	June 20, 2024
2	RF Pre-Amplifier (500 MHz ~ 8 GHz)	R&K	LA1020-RS	June 21, 2024
3	Signal Generator	Keysight Technology	N5171B	June 20, 2024
4	Broadband Horn Antenna	TDK	HRN-0118	October 10, 2024
5	Dipole Antenna	Anritsu	MA5612 B4	N/A
6	Personal Computer (Control measurement)	HP	ELITEDESK 800 G4 TW/CT	N/A
7	Antenna Measurement Software	TDK	TDK Antenna- Lab	N/A

Note : Shimano Inc. EMC Test Laboratory checked the performance, before using this device.

The overall program of calibration and verification of equipment is designed and operated so as to ensure that measurement made by Shimano Inc.

End of Report.