

Prüfbericht-Nr.: <i>Test Report No.:</i>	50299813 001	Auftrags-Nr.: <i>Order No.:</i>	238104047	Seite 1 von 57 Page 1 of 57
Kunden-Referenz-Nr.: <i>Client Reference No.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	16-Aug-2019	
Auftraggeber: <i>Client:</i>	昇陽自行車國際股份有限公司 臺南市仁德區義林路 418 號 1 樓			
Prüfgegenstand: <i>Test item:</i>	自行車訓練台			
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	T8000			
Auftrags-Inhalt: <i>Order content:</i>	NCC LP0002 test report			
Prüfgrundlage: <i>Test specification:</i>	NCC Low-power Radio-frequency Devices Technical Regulations LP0002(2018) Section 3.10.1			
Wareneingangsdatum: <i>Date of receipt:</i>	06-Aug-2019			
Prüfmuster-Nr.: <i>Test sample No.:</i>	A000974020-001 A000974020-006 A000974037-004			
Prüfzeitraum: <i>Testing period:</i>	29-Aug-2019 – 05-Oct-2019			
Ort der Prüfung: <i>Place of testing:</i>	EMC/RF Laboratory Taipei			
Prüflaboratorium: <i>Testing laboratory:</i>	TUV Rheinland Taiwan Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von / tested by:  14-Oct-2019 Jack Chang/Project Manager		kontrolliert von / reviewed by:  14-Oct-2019 Arvin Ho/Vice General Manager		
Datum <i>Date(Report Date)</i>	Name / Stellung <i>Name / Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>	Name / Stellung <i>Name / Position</i>
Sonstiges / Other: The product(T8000) contains two sets of BLE/ANT wireless chipsets. All wireless part are tested and defined in the test report as below: T8000(main part of the IUT), T8000D(display part of the IUT)				
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
* Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable N/T = not tested				
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.				

TEST SUMMARY

5.1.1 ANTENNA REQUIREMENT

RESULT: Passed

5.1.2 PEAK OUTPUT POWER

RESULT: Passed

5.1.3 6dB BANDWIDTH

RESULT: Passed

5.1.4 POWER DENSITY

RESULT: Passed

5.1.5 CONDUCTED SPURIOUS EMISSIONS AND FREQUENCY BAND EDGE MEASURED IN 100kHz BANDWIDTH

RESULT: Passed

5.1.6 SPURIOUS EMISSION

RESULT: Passed

5.2.1 MAINS CONDUCTED EMISSIONS

RESULT: Passed

Contents

1.	GENERAL REMARKS	5
1.1	COMPLEMENTARY MATERIALS.....	5
1.2	DECISION RULE OF CONFORMITY.....	5
2.	TEST SITES	6
2.1	TEST LABORATORY	6
2.2	TEST FACILITY.....	6
2.3	LIST OF TEST AND MEASUREMENT INSTRUMENTS.....	7
2.4	TRACEABILITY	8
2.5	CALIBRATION	8
2.6	MEASUREMENT UNCERTAINTY	8
3.	GENERAL PRODUCT INFORMATION.....	9
3.1	PRODUCT FUNCTION AND INTENDED USE	9
3.2	SYSTEM DETAILS AND RATINGS.....	9
3.3	INDEPENDENT OPERATION MODES.....	10
3.4	NOISE GENERATING AND NOISE SUPPRESSING PARTS	10
3.5	SUBMITTED DOCUMENTS.....	10
4.	TEST SET-UP AND OPERATION MODES.....	11
4.1	PRINCIPLE OF CONFIGURATION SELECTION	11
4.2	TEST OPERATION AND TEST SOFTWARE.....	12
4.3	SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT	12
4.4	COUNTERMEASURES TO ACHIEVE EMC COMPLIANCE.....	12
4.5	TEST SETUP DIAGRAM	13
5.	TEST RESULTS	15
5.1	TRANSMITTER REQUIREMENT & TEST SUITES	15
5.1.1	<i>Antenna Requirement</i>	<i>15</i>
5.1.2	<i>Peak Output Power</i>	<i>16</i>
5.1.3	<i>6dB Bandwidth</i>	<i>18</i>
5.1.4	<i>Power Density</i>	<i>26</i>
5.1.5	<i>Conducted spurious emissions and Frequency Band Edge measured in 100kHz Bandwidth.....</i>	<i>34</i>
5.1.6	<i>Spurious Emission</i>	<i>45</i>
5.2	MAINS EMISSIONS.....	46
5.2.1	<i>Mains Conducted Emissions.....</i>	<i>46</i>
6.	PHOTOGRAPHS OF THE TEST SET-UP, T8000.....	47

Produkte
Products

Prüfbericht - Nr.: 50299813 001
Test Report No.

Seite 4 von 57
Page 4 of 57

7.	PHOTOGRAPHS OF THE TEST SET-UP, T8000D	52
8.	LIST OF TABLES	57
9.	LIST OF PHOTOGRAPHS.....	57

1. General Remarks

1.1 Complementary Materials

The following attachments are integral parts of this test report:

Appendix P: Photo Documentation internal view
(File Name: 50299813 001 APPENDIXP)

Appendix D: Test Result of Radiated Emissions
(File Name: 50299813 001 APPENDIXD)

Test Specifications

The following standards were applied.

Table 1: Applied Standard and Test Levels

Radio
NCC Low-power Radio-frequency Devices Technical Regulations LP0002(2018) (107 年 1 月 10 日)

1.2 Decision Rule of conformity

The decision rule of conformity of this test report is following the requirements of the requested standard in the quotation, and agreed among testing laboratory and manufacturer (applicant) to exclude the consideration of Measurement Uncertainty, unless it is required by the specific standard.

2. Test Sites

2.1 Test Laboratory

Conducted test site:
TUV Rheinland Taiwan Ltd.
Taipei Testing Laboratories

11F. No.758, Sec. 4, Bade Rd., Songshan Dist.
Taipei City 105
Taiwan (R.O.C.)

Radiated test site:
TUV Rheinland Taiwan Ltd.
Taipei Testing Laboratories

No.458-18, Sec. 2, Fenliao Rd., Linkou Dist.
New Taipei City 244
Taiwan (R.O.C.)

2.2 Test Facility

TUV Rheinland Taiwan Ltd.

11F. No.758, Sec. 4, Bade Rd., Songshan Dist.
Taipei City 105
Taiwan (R.O.C.)

FCC RegistrationNo.: 180491
IC Canada Registration No.: 9465A
TAF Accredited NCC Test Lab. No.:3567
TAF ISO17025 Certification effective period: 6th-May-2019 to 05th-May-2022



Testing Laboratory
3567

2.3 List of Test and Measurement Instruments

Table 2: List of Test and Measurement Equipment

Kind of Equipment	Manu-facturer	Type	S/N	Last Calibration	Next Calibration
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100797	2019/01/16	2020/01/16
Two-Line V-Network	Rohde & Schwarz	ENV216	101262	2019/07/16	2020/07/16
Spectrum Analyzer	R&S	FSV40	101513	2019/2/8	2020/2/8
Thermo Chamber	Giant Force	GHT-150-40-CP-SD	MAA1902-010	2019/2/1	2020/2/1
Signal Generator	R&S	SMB100A03	181335	2019/1/23	2020/1/23
Power Meter	Anritsu	ML2495A	1901008	2019/4/29	2020/4/28
Power Sensor	Anritsu	MA2411B	1725269	2019/4/29	2020/4/28
EMI Test Receiver	R&S	ESR7	102109	2019/4/17	2020/4/16
Spectrum Analyzer	R&S	FSV40	101509	2019/2/4	2020/2/4
Pre-Amplifier	Agilent	8447D	2727A05146	2019/2/22	2020/2/22
Pre-Amplifier	EMCI	EMC051845SE	980635	2019/2/25	2020/2/25
Pre-Amplifier	EMCI	EMC184045SE	980656	2019/2/23	2020/2/23
Bilog Antenna	SCHWARZBECK	VULB-9168	00950	2019/1/14	2020/1/14
Horn Antenna	ETS-Lindgren	3117	00218929	2018/12/27	2019/12/27
Horn Antenna	SCHWARZBECK	BBHA 9170	00890	2019/4/12	2020/4/11
Loop Antenna	EMCI	LPA600	287	2018/12/20	2019/12/19
Test Software	Audix	e3	Ver. 9	N/A	N/A

2.4 Traceability

All measurement equipment calibrations are traceable to NML(Taiwan)/NIST(USA) or where calibration is performed outside Taiwan, to equivalent nationally recognized standards organizations.

2.5 Calibration

Equipment requiring calibration is calibrated periodically in a suitably accredited Calibration Lab. Additionally all equipment is verified for proper performance on a regular schedule using in house standards or comparisons.

2.6 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements.

Table 3: Emission Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-7}$
RF power, conducted	± 1.5 dB
RF power density, conducted	± 3 dB
spurious emissions, conducted	± 3 dB
all emissions, radiated	± 6 dB
Temperature	± 1 °C
Humidity	± 5 %

3. General Product Information

3.1 Product Function and Intended Use

The EUT is a Bicycle training platform. It contains a ANT and Bluetooth compatible module enabling the user to communicate data through a Wireless interface.

For details refer to the User Guide, Data Sheet and Circuit Diagram.

3.2 System Details and Ratings

Table 4: Basic Information of EUT

Item	EUT information
Kind of Equipment/Test Item	自行車訓練台
Type Designation	T8000
Brand Name	TACX

Table 5: Technical Specification of EUT

T8000:

Technical Specification	Value
Operating Frequencies	ANT: 2403MHz to 2480MHz BLE: 2402MHz to 2480MHz
Operation Voltage	110Vac to 3.3Vdc
Modulation	ANT: GFSK BLE: GFSK
Antenna gain	4.56dBi

T8000D:

Technical Specification	Value
Operating Frequencies	ANT: 2403MHz to 2480MHz BLE: 2402MHz to 2480MHz
Operation Voltage	110Vac to 3.3Vdc
Modulation	ANT: GFSK BLE: GFSK
Antenna gain	4.33dBi

3.3 Independent Operation Modes

Basic operation modes are:

- A. Transmitting
 - 1. Low channel
 - 2. Middle channel
 - 3. High channel
- B. Receiving
- C. Standby
- D. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.5 Submitted Documents

- Circuit Diagram
- Instruction Manual
- Rating Label
- Technical Description

4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

The test modes were adapted accordingly in reference to the instructions for use.

During testing, Channel and Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Table 6: Table for Parameters of Test Software Setting-T8000

Mode	Channel Frequency		
	2403 MHz	2442 MHz	2480 MHz
ANT	2	2	2
Mode	2402 MHz	2440 MHz	2480 MHz
BLE	4	4	4

Table 7: Table for Parameters of Test Software Setting-T8000D

Mode	Channel Frequency		
	2403 MHz	2442 MHz	2480 MHz
ANT	2	2	2
Mode	2402 MHz	2440 MHz	2480 MHz
BLE	4	4	4

4.2 Test Operation and Test Software

Setup for testing: The EUT is provided with an USB interface which makes it possible to control the module through the test software installed on a notebook computer.

This software was running on the laptop computer connected to the EUT. It was used to enable the operation modes listed in section 3.3 as appropriate.

The samples were used as follows:

Conducted sample: A000974020-001 (T8000D)

Conducted sample: A000974037-004 (T8000)

Radiation sample : A000974020-006 (T8000)

Full test was applied on all test modes, but only worst case was shown

4.3 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

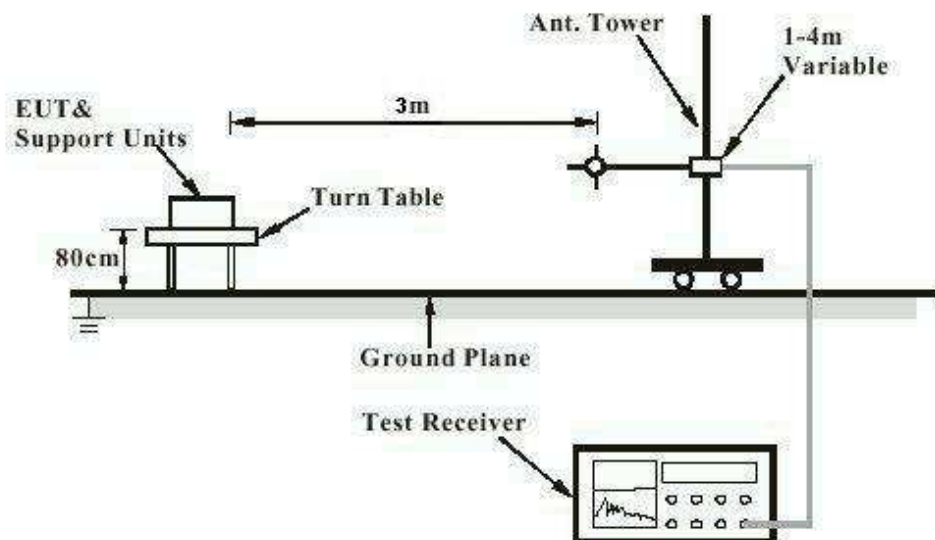
Description	Manufacturer	Model No.	Serial No.
Notebook	Lenovo	E480	-
Test tool	TACX	RASP	2.0.32

4.4 Countermeasures to achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Constructional Data Form or the Technical Construction File. No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



Note: Measurements above 1 GHz are done with a table height of 1.5m

Diagram of Measurement Equipment Configuration for Mains Conduction Measurement (if applicable)

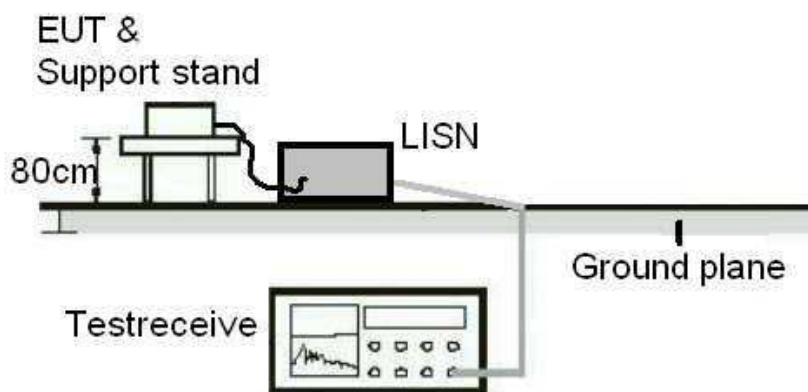
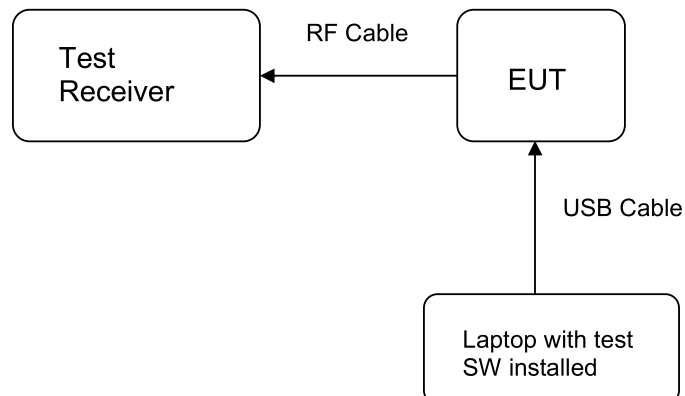


Diagram of Measurement Equipment Configuration for Conducted Transmitter Measurement



5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT:**Passed**

Test standard : LP0002(2018): 2.2, 3.10.1.3, 3.10.1.4

Requirement : use of approved antennas only with directional gains that do not exceed 6 dBi

According to the manufacturer declaration, the EUT has an antenna with Max directional gain of 4.56dBi. The antenna is a printed PCB trace with no possibility of replacement with a non-approved antenna by the end-user. Therefore, the EUT is considered to comply with this provision.

Refer to EUT photo for details.

5.1.2 Peak Output Power

RESULT:**Passed**

Test standard	:	LP0002(2018): 3.10.1.2(1)(C)
Basic standard	:	ANSI C63.10:2013
		LP0002(2008) Appendix II
Limit	:	1 Watt
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	20-24 °C
Relative humidity	:	50-65 %
Atmospheric pressure	:	100-103 kPa

Table 8: Test result of conducted Peak output power, T8000 ANT

Channel	Channel Frequency (MHz)	Output Power		Limit
		(dBm)	(W)	(W)
Low Channel	2403	4.26	0.00267	1
Middle Channel	2442	4.22	0.00264	1
High Channel	2480	4.14	0.00259	1

Table 9: Test result of conducted Peak output power, T8000 BLE

Channel	Channel Frequency (MHz)	Output Power		Limit
		(dBm)	(W)	(W)
Low Channel	2402	4.23	0.00265	1
Middle Channel	2440	4.21	0.00264	1
High Channel	2480	4.14	0.00259	1

Table 10: Test result of conducted Peak output power, T8000D ANT

Channel	Channel Frequency (MHz)	Output Power		Limit
		(dBm)	(W)	(W)
Low Channel	2403	4.51	0.00282	1
Middle Channel	2442	4.54	0.00284	1
High Channel	2480	4.54	0.00284	1

Table 11: Test result of conducted Peak output power, T8000D BLE

Channel	Channel Frequency (MHz)	Output Power		Limit
		(dBm)	(W)	(W)
Low Channel	2402	4.52	0.00283	1
Middle Channel	2440	4.53	0.00284	1
High Channel	2480	4.53	0.00284	1

5.1.3 6dB Bandwidth**RESULT:****Passed**

Test standard : LP0002(2018): 3.10.1.6(2)(A)
Basic standard : ANSI C63.10:2013
LP0002(2008) Appendix II
Kind of test site : Shielded room

Test setup

Test Channel : Low/ Middle/ High
Operation Mode : A

Ambient temperature : 20-24°C
Relative humidity : 50-65%
Atmospheric pressure : 100-103 kPa

Table 12: Test result of 6dB Bandwidth, T8000 ANT

Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)	Limit (kHz)	Result
Low Channel	2403	501.3	>500	Pass
Mid Channel	2442	501.4	>500	Pass
High Channel	2480	501.6	>500	Pass

Table 13: Test result of 6dB Bandwidth, T8000 BLE

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Limit (kHz)	Result
Low Channel	2402	1.161	>500	Pass
Mid Channel	2440	1.148	>500	Pass
High Channel	2480	1.162	>500	Pass

Table 14: Test result of 6dB Bandwidth, T8000D ANT

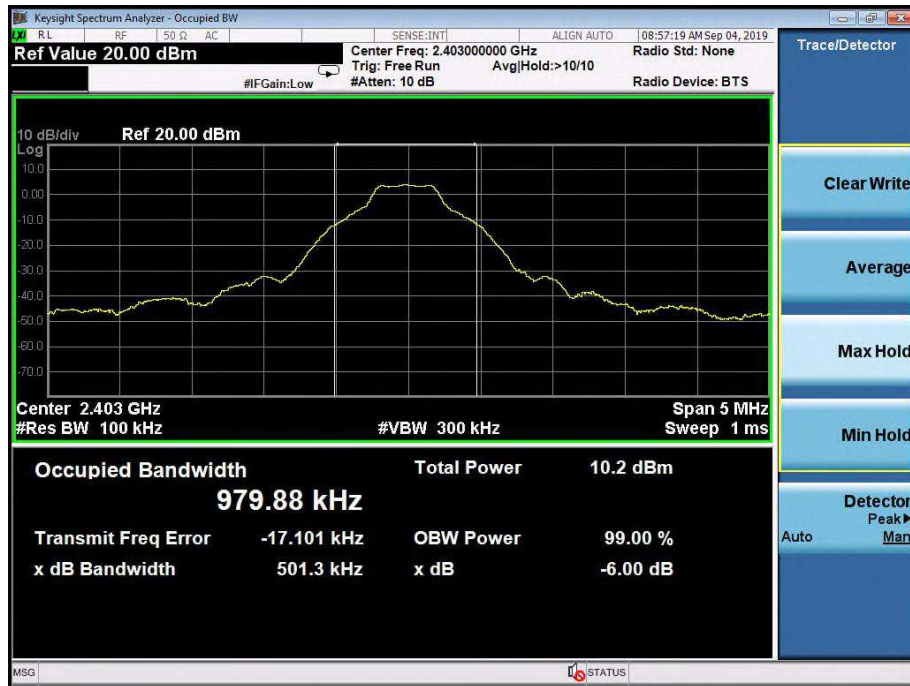
Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)	Limit (kHz)	Result
Low Channel	2403	501.8	>500	Pass
Mid Channel	2442	502.2	>500	Pass
High Channel	2480	501.6	>500	Pass

Table 15: Test result of 6dB Bandwidth, T8000D BLE

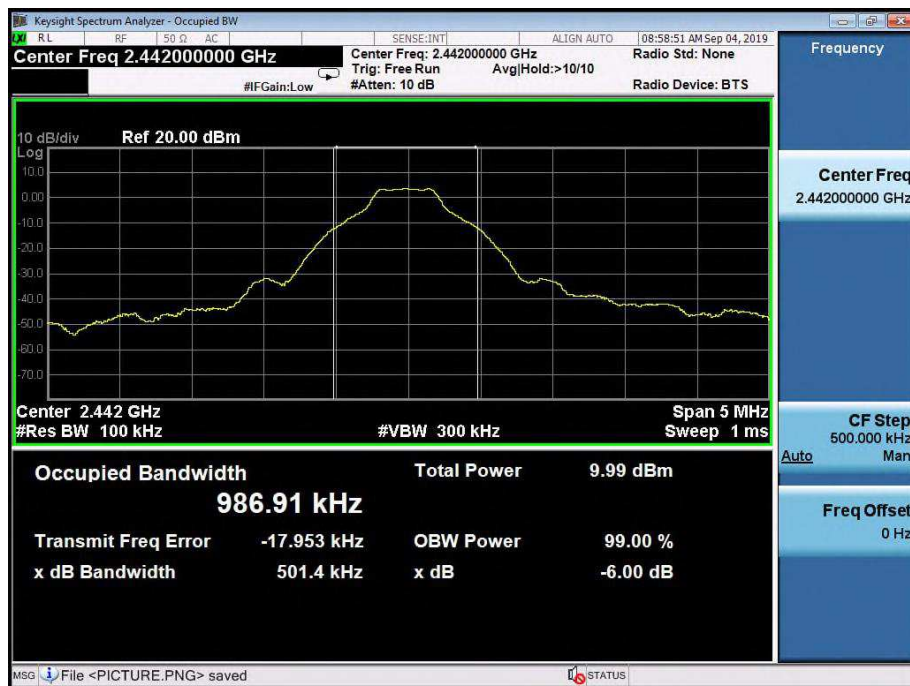
Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Limit (kHz)	Result
Low Channel	2402	1.163	>500	Pass
Mid Channel	2440	1.162	>500	Pass
High Channel	2480	1.163	>500	Pass

Test Plot of 6dB Bandwidth, T8000 ANT

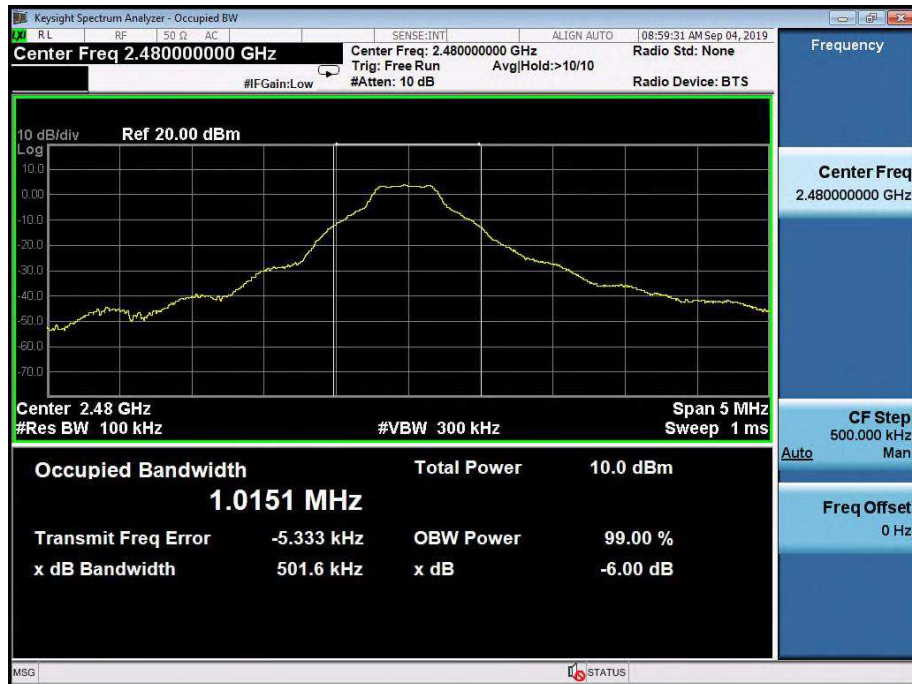
Low Channel



Middle Channel



High Channel

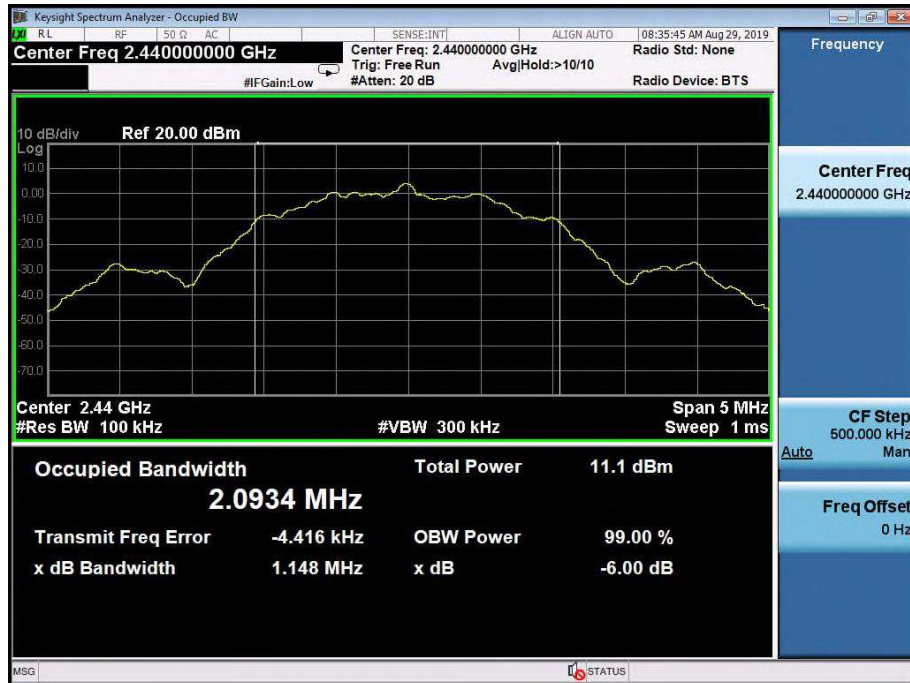


Test Plot of 6dB Bandwidth, T8000 BLE

Low Channel



Middle Channel

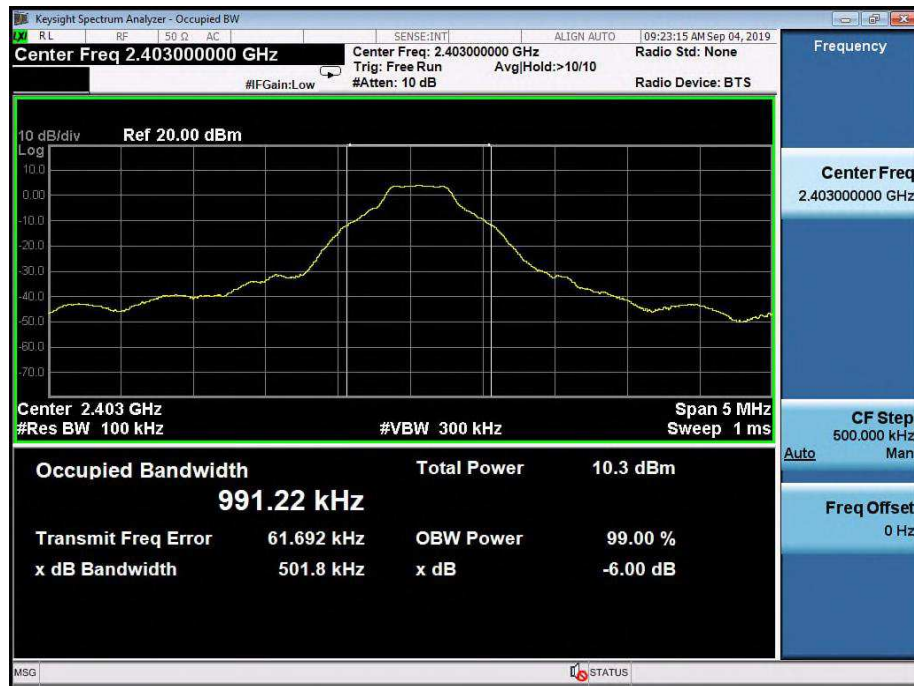


High Channel

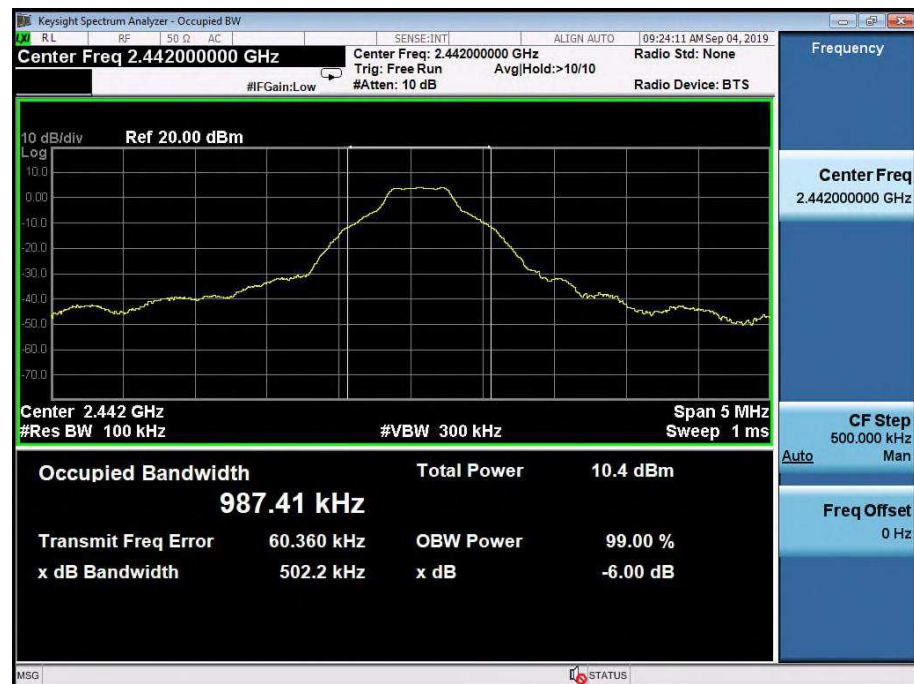


Test Plot of 6dB Bandwidth, T8000D ANT

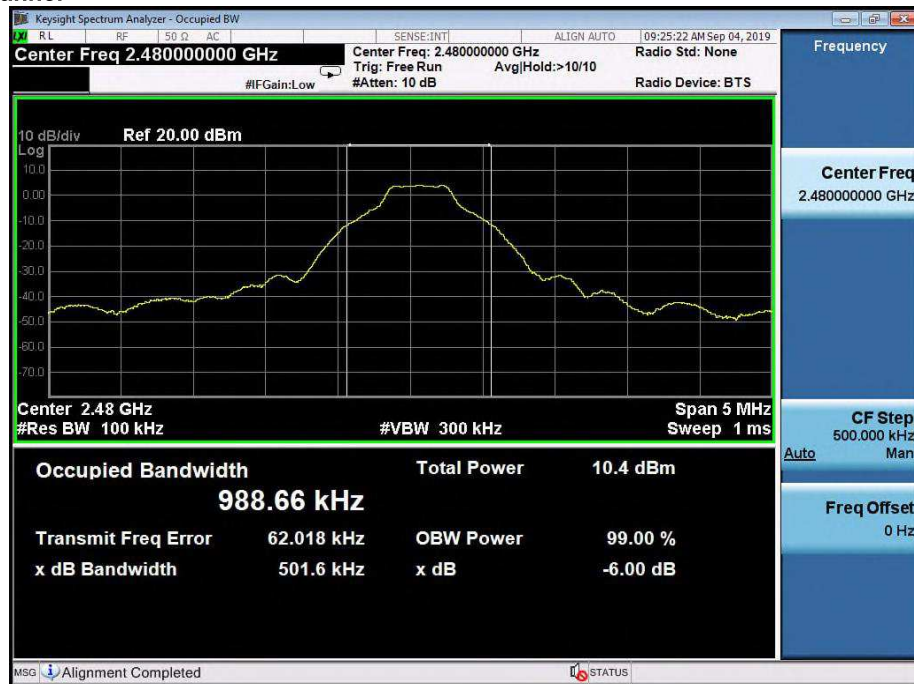
Low Channel



Middle Channel



High Channel

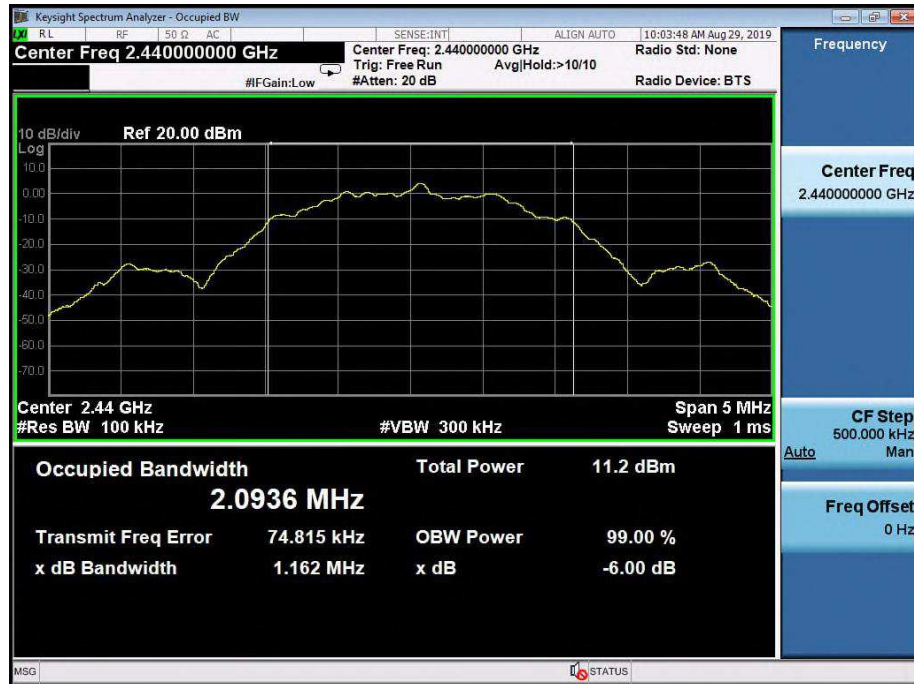


Test Plot of 6dB Bandwidth, T8000D BLE

Low Channel



Middle Channel



High Channel

