FCC Test Report

Product Name	Portable computer
Model No.	P102F
FCC ID.	E2K-P102F00401

Applicant	Dell Inc.
Address	One Dell Way, Round Rock, Texas 78682, United States.

Date of Receipt	Mar. 20, 2020
Issued Date	May 28, 2020
Report No.	2030634R-RFUSP23V00-A
Report Version	V1.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.

This report must not be used to claim product endorsement by TAF or any agency of the government.

The test report shall not be reproduced without the written approval of DEKRA Testing and Certification Co., Ltd.

Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.



Test Report

Issued Date: May 28, 2020 Report No.: 2030634R-RFUSP23V00-A



Product Name	Portable computer
Applicant	Dell Inc.
Address	One Dell Way, Round Rock, Texas 78682, United States.
Manufacturer	Dell Inc.
Model No.	P102F
FCC ID.	E2K-P102F00401
EUT Rated Voltage	AC 100-240V, 50-60Hz
EUT Test Voltage	AC 120V / 60Hz
Trade Name	DELL
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C
	ANSI C63.4: 2014, ANSI C63.10: 2013
Test Result	Complied

Documented By

:

:

:

Rita Huang

(Senior Adm. Specialist / Rita Huang)

Tested By

3 HJJ

(Engineer / Boris Hsu)

Approved By

(Director / Vincent Lin)



TABLE OF CONTENTS

I. GENERAL INFORMATION 5 1.1. EUT Description 5 1.2. Operational Description 7 1.3. Tested System Details 8 1.4. Configuration of Tested System 8 1.5. EUT Exercise Software 9 1.6. Test Facility 10 1.7. List of Test Equipment 11 1.8. Uncertainty 13 2.1. Test Setup 14 2.1. Test Setup 14 2.1. Test Setup 14 2.2. Limits 14 2.3. Test Procedure 15 2.4. Uncertainty 15 2.5. Test Result of Conducted Emission 16 3.8. PEAK POWER OUTPUT 18 3.1. Test Setup 18 18 3.2. Limit 18 3.3. Test Procedure 18 3.4. Uncertainty 18 3.5. Test Result of Peak Power Output 18 3.5. Test Setup	Des	scription	Page
1.2. Operational Description 7 1.3. Tested System Details 8 1.4. Configuration of Tested System 8 1.5. EUT Exercise Software 9 1.6. Test Facility 10 1.7. List of Test Equipment 11 1.8. Uncertainty 13 2. CONDUCTED EMISSION 14 2.1. Test Setup 14 2.1. Test Setup 14 2.1. Test Procedure 15 2.4. Uncertainty 15 2.5. Test Result of Conducted Emission 16 3.4. Test Procedure 18 3.1. Test Setup 18 3.2. Limit 18 3.3. Test Procedure 18 3.4. Uncertainty 18 3.5. Test Result of Peak Power Output 19 4. Nucertainty 20 4.1. Test Procedure 20 4.2. Limits 21 4.3. Test Procedure 22 <	1.	GENERAL INFORMATION	5
1.3. Tested System Details 8 1.4. Configuration of Tested System 8 1.5. EUT Exercise Software 9 1.6. Test Facility 10 1.7. List of Test Equipment 11 1.8. Uncertainty 13 2. CONDUCTED EMISSION 14 2.1. Test Setup 14 2.2. Limits 14 2.3. Test Procedure 15 2.4. Uncertainty 15 2.5. Test Result of Conducted Emission 16 3.1. Test Setup 18 3.1. Test Setup 18 3.1. Test Result of Conducted Emission 16 3.2. Limit 18 3.3. Test Procedure 18 3.4. Uncertainty 18 3.5. Test Result of Peak Power Output 19 4. RADIATED EMISSION 20 4.1. Test Setup 20 4.2. Limits 35 5.3. Test Result of Radiated Emission	1.1.	EUT Description	5
1.4. Configuration of Tested System	1.2.	Operational Description	7
1.5. EUT Exercise Software	1.3.	Tested System Details	
1.6. Test Facility 10 1.7. List of Test Equipment. 11 1.8. Uncertainty 13 2. CONDUCTED EMISSION 14 2.1. Test Setup 14 2.2. Limits. 14 2.3. Test Procedure 15 2.4. Uncertainty 15 2.5. Test Result of Conducted Emission 16 3. PEAK POWER OUTPUT 18 3.1. Test Setup 18 3.2. Limit 18 3.3. Test Procedure 18 3.4. Uncertainty 18 3.5. Test Result of Peak Power Output. 18 3.4. Uncertainty 18 3.5. Test Result of Peak Power Output. 19 4.8. RADIATED EMISSION 20 4.1. Test Setup 20 4.2. Limits. 21 4.3. Test Procedure 22 4.4. Uncertainty 23 5.5. Test Setup 35 <	1.4.	Configuration of Tested System	
1.7. List of Test Equipment. 11 1.8. Uncertainty 13 2. CONDUCTED EMISSION 14 2.1. Test Setup 14 2.2. Limits. 14 2.3. Test Procedure 15 2.4. Uncertainty 15 2.5. Test Result of Conducted Emission 16 3. PEAK POWER OUTPUT 18 3.1. Test Setup 18 3.2. Limit 18 3.3. Test Procedure 18 3.4. Uncertainty 18 3.5. Test Result of Peak Power Output 18 3.4. Uncertainty 18 3.5. Test Result of Peak Power Output 19 4.8. ARADIATED EMISSION 20 4.1. Test Setup 20 4.2. Limits 21 4.3. Test Procedure 22 4.4. Uncertainty 23 4.5. Test Result of Radiated Emission 24 5. Test Result of Radiated Emission <	1.5.	EUT Exercise Software	9
1.8. Uncertainty 13 2. CONDUCTED EMISSION 14 2.1. Test Setup 14 2.2. Limits 14 2.3. Test Procedure 15 2.4. Uncertainty 15 2.5. Test Result of Conducted Emission 16 3. PEAK POWER OUTPUT 18 3.1. Test Setup 18 3.1. Test Setup 18 3.2. Limit 18 3.3. Test Procedure 18 3.4. Uncertainty 18 3.5. Test Result of Peak Power Output 19 4. RADIATED EMISSION 20 4.1. Test Setup 20 4.2. Limits 21 4.3. Test Procedure 22 4.4. Uncertainty 23 4.5. Test Result of Raiated Emission 24 5.6. Test Result of Raiated Emission 24 5.7. Test Setup 35 5.8. Test Procedure 35	1.6.	Test Facility	
2. CONDUCTED EMISSION 14 2.1. Test Setup 14 2.2. Limits 14 2.3. Test Procedure 15 2.4. Uncertainty 15 2.5. Test Result of Conducted Emission 16 3. PEAK POWER OUTPUT 18 3.1. Test Setup 18 3.2. Limit 18 3.3. Test Procedure 18 3.4. Uncertainty 18 3.5. Test Result of Peak Power Output 19 4. RADIATED EMISSION 20 4.1. Test Setup 20 4.1. Test Setup 20 4.1. Test Procedure 22 4.2. Limits 21 4.3. Test Procedure 22 4.4. Uncertainty 23 4.5. Test Result of Radiated Emission 24 5.6. RF ANTENNA CONDUCTED TEST 35 5.7. Test Procedure 35 5.8. Test Procedure 35	1.7.	List of Test Equipment	
2.1. Test Setup 14 2.2. Limits 14 2.3. Test Procedure 15 2.4. Uncertainty 15 2.5. Test Result of Conducted Emission 16 3. PEAK POWER OUTPUT 18 3.1. Test Setup 18 3.2. Limit 18 3.3. Test Procedure 18 3.4. Uncertainty 18 3.5. Test Result of Peak Power Output 19 4. RADIATED EMISSION 20 4.1. Test Setup 20 4.2. Limits 21 4.3. Test Procedure 22 4.4. Uncertainty 23 4.5. Test Result of Radiated Emission 24 5.1. Test Setup 35 5.2. Limits 35 5.3. Test Procedure 35 5.4. Uncertainty 35 5.5. Test Result of R Antenna Conducted Test 36 5.5. Test Result of R Antenna Conducted Test 36 <td>1.8.</td> <td>Uncertainty</td> <td></td>	1.8.	Uncertainty	
2.2. Limits 14 2.3. Test Procedure 15 2.4. Uncertainty 15 2.5. Test Result of Conducted Emission 16 3. PEAK POWER OUTPUT 18 3.1. Test Setup 18 3.2. Limit 18 3.3. Test Procedure 18 3.4. Uncertainty 18 3.5. Test Result of Peak Power Output 19 4. RADIATED EMISSION 20 4.1. Test Setup 20 4.1. Test Setup 20 4.2. Limits 21 4.3. Test Procedure 22 4.4. Uncertainty 23 4.5. Test Procedure 22 4.4. Uncertainty 23 5.5. Test Result of Radiated Emission 24 5.8. Test Setup 35 5.9. Test Setup 35 5.1. Test Setup 35 5.2. Limits 35 5.3. Test P	2.	CONDUCTED EMISSION	14
2.3. Test Procedure 15 2.4. Uncertainty 15 2.5. Test Result of Conducted Emission 16 3. PEAK POWER OUTPUT 18 3.1. Test Setup 18 3.2. Limit 18 3.3. Test Procedure 18 3.4. Uncertainty 18 3.5. Test Result of Peak Power Output 19 4. RADIATED EMISSION 20 4.1. Test Setup 20 4.1. Test Setup 20 4.2. Limits. 21 4.3. Test Procedure 22 4.4. Uncertainty 23 4.5. Test Result of Radiated Emission 24 5. Test Result of Radiated Emission 24 5.1. Test Setup 35 5.2. Limits 35 5.3. Test NonDUCTED TEST 35 5.4. Uncertainty 35 5.5. Test Result of RF Antenna Conducted Test 36 6.6. BAND EDGE 37 </td <td>2.1.</td> <td>Test Setup</td> <td></td>	2.1.	Test Setup	
2.4. Uncertainty 15 2.5. Test Result of Conducted Emission 16 3. PEAK POWER OUTPUT 18 3.1. Test Setup 18 3.2. Limit 18 3.3. Test Procedure 18 3.4. Uncertainty 18 3.5. Test Result of Peak Power Output 19 4. RADIATED EMISSION 20 4.1. Test Setup 20 4.2. Limits. 21 4.3. Test Procedure 22 4.4. Uncertainty 23 4.5. Test Result of Radiated Emission 24 5.6. Test Result of Radiated Emission 24 5.7. Test Setup 35 5.1. Test Setup 35 5.2. Limits. 35 5.3. Test Result of RF Antenna Conducted Test 36 6.4. Uncertainty 35 5.5. Test Result of RF Antenna Conducted Test 36 6.6. BAND EDGE 37 6.1. Test Setup	2.2.	Limits	
2.5. Test Result of Conducted Emission 16 3. PEAK POWER OUTPUT 18 3.1. Test Setup 18 3.2. Limit 18 3.3. Test Procedure 18 3.4. Uncertainty 18 3.5. Test Result of Peak Power Output 19 4. RADIATED EMISSION 20 4.1. Test Setup 20 4.2. Limits 21 4.3. Test Procedure 22 4.4. Uncertainty 21 4.3. Test Procedure 22 4.4. Uncertainty 23 4.5. Test Result of Radiated Emission 24 5.6. Test Result of Radiated Emission 24 5.7. Test Setup 35 5.1. Test Setup 35 5.2. Limits 35 5.3. Test Procedure 35 5.4. Uncertainty 35 5.5. Test Result of RF Antenna Conducted Test 36 6.6. BAND EDGE 37	2.3.	Test Procedure	
3. PEAK POWER OUTPUT 18 3.1. Test Setup 18 3.2. Limit 18 3.3. Test Procedure 18 3.4. Uncertainty 18 3.5. Test Result of Peak Power Output 19 4. RADIATED EMISSION 20 4.1. Test Setup 20 4.2. Limits 21 4.3. Test Procedure 22 4.4. Uncertainty 23 4.5. Test Result of Radiated Emission 24 4.6. Test Setup 23 4.7. Uncertainty 23 4.8. Test Result of Radiated Emission 24 5. RF ANTENNA CONDUCTED TEST 35 5.1. Test Setup 35 5.2. Limits 35 5.3. Test Procedure 35 5.4. Uncertainty 35 5.5. Test Result of RF Antenna Conducted Test 36 6. BAND EDGE 37 6.1. Test Setup 37 <t< td=""><td>2.4.</td><td>Uncertainty</td><td></td></t<>	2.4.	Uncertainty	
3.1. Test Setup 18 3.2. Limit 18 3.3. Test Procedure 18 3.4. Uncertainty 18 3.5. Test Result of Peak Power Output 19 4. RADIATED EMISSION 20 4.1. Test Setup 20 4.2. Limits 21 4.3. Test Procedure 22 4.4. Uncertainty 23 4.5. Test Result of Radiated Emission 24 4.6. Test Setup 35 5.1. Test Setup 35 5.2. Limits 35 5.3. Test Procedure 35 5.4. Uncertainty 35 5.5. Test Result of RF Antenna Conducted Test 36 6.6. BAND EDGE 37 6.1. Test Setup 37 6.2. Limit 38 6.3. Test Procedure 38 6.4. Uncertainty 37 6.5. Test Result of Band Edge 40 7.	2.5.	Test Result of Conducted Emission	
3.2. Limit 18 3.3. Test Procedure 18 3.4. Uncertainty 18 3.5. Test Result of Peak Power Output 19 4. RADIATED EMISSION 20 4.1. Test Setup 20 4.2. Limits 21 4.3. Test Procedure 22 4.4. Uncertainty 23 4.5. Test Result of Radiated Emission 24 5. Test Result of Radiated Emission 24 5. Test Setup 35 5.1. Test Setup 35 5.2. Limits 35 5.3. Test Procedure 35 5.4. Uncertainty 35 5.5. Test Result of RF Antenna Conducted Test 36 6. BAND EDGE 37 6.1. Test Setup 37 6.2. Limit 38 6.3. Test Procedure 38 6.4. Uncertainty 39 6.5. Test Result of Band Edge 40	3.	PEAK POWER OUTPUT	
3.3. Test Procedure 18 3.4. Uncertainty 18 3.5. Test Result of Peak Power Output 19 4. RADIATED EMISSION 20 4.1. Test Setup 20 4.2. Limits 21 4.3. Test Procedure 22 4.4. Uncertainty 23 4.5. Test Result of Radiated Emission 24 5. RF ANTENNA CONDUCTED TEST 35 5.1. Test Setup 35 5.2. Limits 35 5.3. Test Procedure 35 5.4. Uncertainty 35 5.5. Test Result of RF Antenna Conducted Test 36 6. BAND EDGE 37 6.1. Test Setup 37 6.2. Limit 38 6.3. Test Procedure 38 6.4. Uncertainty 39 6.5. Test Result of Band Edge 40 7. 6DB BANDWIDTH 42	3.1.	Test Setup	
3.4. Uncertainty 18 3.5. Test Result of Peak Power Output 19 4. RADIATED EMISSION 20 4.1. Test Setup 20 4.2. Limits 21 4.3. Test Procedure 22 4.4. Uncertainty 23 4.5. Test Result of Radiated Emission 24 5.6. RF ANTENNA CONDUCTED TEST 35 5.1. Test Setup 35 5.2. Limits 35 5.3. Test Procedure 35 5.4. Uncertainty 35 5.5. Test Result of RF Antenna Conducted Test 36 6. BAND EDGE 37 6.1. Test Setup 37 6.2. Limit 38 6.3. Test Procedure 38 6.4. Uncertainty 39 6.5. Test Result of Band Edge 40 7. 6DB BANDWIDTH 42	3.2.	Limit	
3.5. Test Result of Peak Power Output 19 4. RADIATED EMISSION 20 4.1. Test Setup 20 4.2. Limits 21 4.3. Test Procedure 22 4.4. Uncertainty 23 4.5. Test Result of Radiated Emission 24 5. RF ANTENNA CONDUCTED TEST 35 5.1. Test Setup 35 5.2. Limits 35 5.3. Test Procedure 35 5.4. Uncertainty 35 5.5. Test Result of RF Antenna Conducted Test 36 6. BAND EDGE 37 6.1. Test Setup 37 6.2. Limit 38 6.3. Test Procedure 38 6.4. Uncertainty 39 6.5. Test Result of Band Edge 40 7. 6DB BANDWIDTH 42	3.3.	Test Procedure	
4. RADIATED EMISSION 20 4.1. Test Setup 20 4.2. Limits 21 4.3. Test Procedure 22 4.4. Uncertainty 23 4.5. Test Result of Radiated Emission 24 5. RF ANTENNA CONDUCTED TEST 35 5.1. Test Setup 35 5.2. Limits 35 5.3. Test Procedure 35 5.4. Uncertainty 35 5.5. Test Result of RF Antenna Conducted Test 36 6. BAND EDGE 37 6.1. Test Setup 37 6.2. Limit 38 6.3. Test Procedure 38 6.4. Uncertainty 39 6.5. Test Result of Band Edge 40 7. 6DB BANDWIDTH 42	3.4.	Uncertainty	
4.1. Test Setup 20 4.2. Limits	3.5.	Test Result of Peak Power Output	
4.2. Limits	4.	RADIATED EMISSION	20
4.3. Test Procedure 22 4.4. Uncertainty 23 4.5. Test Result of Radiated Emission 24 5. RF ANTENNA CONDUCTED TEST 35 5.1. Test Setup 35 5.2. Limits 35 5.3. Test Procedure 35 5.4. Uncertainty 35 5.5. Test Result of RF Antenna Conducted Test 36 6. BAND EDGE 37 6.1. Test Setup 37 6.2. Limit 38 6.3. Test Procedure 38 6.4. Uncertainty 39 6.5. Test Result of Band Edge 40 7. 6DB BANDWIDTH 42	4.1.	Test Setup	
4.4. Uncertainty 23 4.5. Test Result of Radiated Emission 24 5. RF ANTENNA CONDUCTED TEST 35 5.1. Test Setup 35 5.2. Limits 35 5.3. Test Procedure 35 5.4. Uncertainty 35 5.5. Test Result of RF Antenna Conducted Test 36 6. BAND EDGE 37 6.1. Test Setup 37 6.2. Limit 38 6.3. Test Procedure 38 6.4. Uncertainty 39 6.5. Test Result of Band Edge 40 7. 6DB BANDWIDTH 42	4.2.	Limits	21
4.5. Test Result of Radiated Emission 24 5. RF ANTENNA CONDUCTED TEST 35 5.1. Test Setup 35 5.2. Limits 35 5.3. Test Procedure 35 5.4. Uncertainty 35 5.5. Test Result of RF Antenna Conducted Test 36 6. BAND EDGE 37 6.1. Test Setup 37 6.2. Limit 38 6.3. Test Procedure 38 6.4. Uncertainty 39 6.5. Test Result of Band Edge 40 7. 6DB BANDWIDTH 42	4.3.	Test Procedure	
5. RF ANTENNA CONDUCTED TEST	4.4.	Uncertainty	
5.1. Test Setup 35 5.2. Limits 35 5.3. Test Procedure 35 5.4. Uncertainty 35 5.5. Test Result of RF Antenna Conducted Test 36 6. BAND EDGE 37 6.1. Test Setup 37 6.2. Limit 38 6.3. Test Procedure 38 6.4. Uncertainty 39 6.5. Test Result of Band Edge 40 7. 6DB BANDWIDTH 42	4.5.	Test Result of Radiated Emission	
5.2. Limits	5.	RF ANTENNA CONDUCTED TEST	
5.3. Test Procedure 35 5.4. Uncertainty 35 5.5. Test Result of RF Antenna Conducted Test 36 6. BAND EDGE 37 6.1. Test Setup 37 6.2. Limit 38 6.3. Test Procedure 38 6.4. Uncertainty 39 6.5. Test Result of Band Edge 40 7. 6DB BANDWIDTH 42	5.1.	Test Setup	
5.4. Uncertainty 35 5.5. Test Result of RF Antenna Conducted Test 36 6. BAND EDGE 37 6.1. Test Setup 37 6.2. Limit 38 6.3. Test Procedure 38 6.4. Uncertainty 39 6.5. Test Result of Band Edge 40 7. 6DB BANDWIDTH 42	5.2.	Limits	
5.5. Test Result of RF Antenna Conducted Test	5.3.	Test Procedure	
6. BAND EDGE 37 6.1. Test Setup 37 6.2. Limit 38 6.3. Test Procedure 38 6.4. Uncertainty 39 6.5. Test Result of Band Edge 40 7. 6DB BANDWIDTH 42	5.4.	Uncertainty	
6.1. Test Setup 37 6.2. Limit 38 6.3. Test Procedure 38 6.4. Uncertainty 39 6.5. Test Result of Band Edge 40 7. 6DB BANDWIDTH 42	5.5.	Test Result of RF Antenna Conducted Test	
6.2. Limit 38 6.3. Test Procedure 38 6.4. Uncertainty 39 6.5. Test Result of Band Edge 40 7. 6DB BANDWIDTH 42	6.	BAND EDGE	
6.3. Test Procedure	6.1.	Test Setup	
6.4. Uncertainty	6.2.	Limit	
6.5. Test Result of Band Edge	6.3.	Test Procedure	
7. 6DB BANDWIDTH	6.4.	Uncertainty	
	6.5.	Test Result of Band Edge	40
7.1. Test Setup	7.	6DB BANDWIDTH	
	7.1.	Test Setup	

DEKRA

7.2.	Limits	
7.3.	Test Procedure	42
7.4.	Uncertainty	42
7.5.	Test Result of 6dB Bandwidth	43
8.	POWER DENSITY	46
8.1.	Test Setup	46
8.2.	Limits	46
8.3.	Test Procedure	46
8.4.	Uncertainty	46
8.5.	Test Result of Power Density	47
9.	DUTY CYCLE	50
9.1.	Test Setup	50
9.2.	Test Procedure	50
9.3.	Uncertainty	50
9.4.	Test Result of Duty Cycle	51
10.	EMI REDUCTION METHOD DURING COMPLIANCE TESTING	52
	ent 1: EUT Test Photographs ent 2: EUT Detailed Photographs	



1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Portable computer	
Trade Name	DELL	
Model No.	P102F	
FCC ID.	E2K-P102F00401	
Frequency Range	2402 – 2480MHz	
Channel Number	V5.0: 40CH	
Type of Modulation	V5.0: GFSK(1Mbps)	
Antenna Type	PIFA Antenna	
Channel Control	Auto	
Antenna Gain	Refer to the table "Antenna List"	
Power Adapter	MFR: Chiconypower, M/N: HA65NS5-00	
	Input: AC 100-240V~50-60Hz 1.7A	
	Output: 19V==3.34A	
	Cable Out: Shielded, 1.7m, with one ferrite core bonded	

Antenna List

No.	Manufacturer	Part No. (Vendor)	Antenna Type	Peak Gain
1	SPEED	025.901MP.0001 (Main)	PIFA Antenna	-0.24dBi in 2.4 GHz
		025.901MP.0001 (Aux)		
2	WNC	025.901MP.0011 (Main)	PIFA Antenna	-0.40dBi in 2.4 GHz
		025.901MP.0011 (Aux)		

Note: The antenna of EUT is conforming to FCC 15.203.

Center Frequency of Each Channel: (For V5.0)

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 00:	2402 MHz	Channel 01:	2404 MHz	Channel 02:	2406 MHz	Channel 03:	2408 MHz
Channel 04:	2410 MHz	Channel 05:	2412 MHz	Channel 06:	2414 MHz	Channel 07:	2416 MHz
Channel 08:	2418 MHz	Channel 09:	2420 MHz	Channel 10:	2422 MHz	Channel 11:	2424 MHz
Channel 12:	2426 MHz	Channel 13:	2428 MHz	Channel 14:	2430 MHz	Channel 15:	2432 MHz
Channel 16:	2434 MHz	Channel 17:	2436 MHz	Channel 18:	2438 MHz	Channel 19:	2440 MHz
Channel 20:	2442 MHz	Channel 21:	2444 MHz	Channel 22:	2446 MHz	Channel 23:	2448 MHz
Channel 24:	2450 MHz	Channel 25:	2452 MHz	Channel 26:	2454 MHz	Channel 27:	2456 MHz
Channel 28:	2458 MHz	Channel 29:	2460 MHz	Channel 30:	2462 MHz	Channel 31:	2464 MHz
Channel 32:	2466 MHz	Channel 33:	2468 MHz	Channel 34:	2470 MHz	Channel 35:	2472 MHz
Channel 36:	2474 MHz	Channel 37:	2476 MHz	Channel 38:	2478 MHz	Channel 39:	2480 MHz

Note:

- 1. The EUT is a Portable computer with built-in WLAN and Bluetooth transceiver, this report for Bluetooth.
- These tests were conducted on a sample for the purpose of demonstrating compliance of Bluetooth V5.0 transmitter with Part 15 Subpart C Paragraph 15.247 for spread spectrum devices.
- 3. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.

Test Mode Mode 1: Transmit - BLE

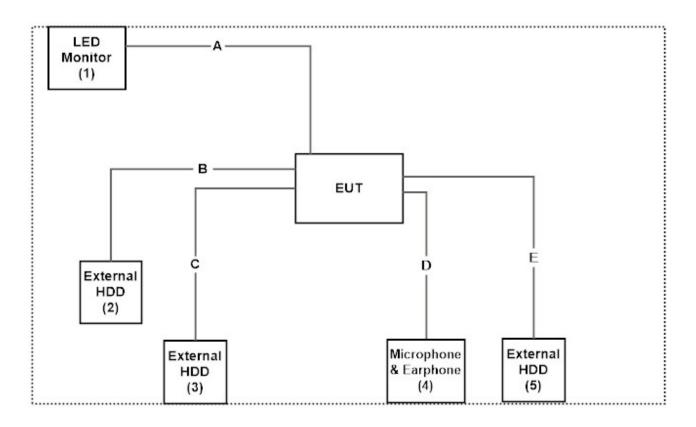
1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

	Product	Manufacturer	Model No.	Serial No.	Power Cord
1	LED Monitor	ViewSonic	VX2257-mhd	UFY163502150	Non-Shielded, 1.8m
2	External HDD	Transcend	TS1TSJ25H3B	F21786-0125	N/A
3	External HDD	Transcend	TS1TSJ25MC	F30467-0011	N/A
4	Microphone & Earphone	RONEVER	MOE241	N/A	N/A
5	External HDD	Transcend	TS1TSJ25H3B	F21786-0019	N/A

Signa	l Cable Type	Signal cable Description
А	HDMI Cable	Shielded, 1.8m
В	USB Cable	Shielded, 0.5m
С	USB to Type-C Cable	Shielded, 0.5m
D	Microphone & Earphone Cable	Non-Shielded, 1.2m
Е	USB Cable	Shielded, 0.5m

1.4. Configuration of Tested System





1.5. EUT Exercise Software

- 1. Setup the EUT as shown in Section 1.4.
- 2. Execute software "DRTU Ver.11.1941.0-10270" on the EUT.
- 3. Configure the test mode, the test channel, and the data rate.
- 4. Press "OK" to start the continuous Transmit.
- 5. Verify that the EUT works properly.



1.6. Test Facility

Ambient conditions in the laboratory:

Performed Item	Items	Required	Actual
Contrate 1 Environment	Temperature (°C)	10~40 °C	24.9 °C
Conducted Emission	Humidity (%RH)	10~90 %	60 %
	Temperature (°C)	10~40 °C	20.5 °C
Radiated Emission	Humidity (%RH)	10~90 %	65.2 %
	Temperature (°C)	10~40 °C	21.1 °C
Conductive	Humidity (%RH)	10~90 %	71.7 %

USA	:	FCC Registration Number: TW3023
Canada	:	IC Registration Number: 4075A

Site Description:	Accredited by TAF Accredited Number: 3023
Test Laboratory:	DEKRA Testing and Certification Co., Ltd
Address:	No.5-22, Ruishukeng, Linkou Dist., New Taipei City 24451,
	Taiwan, R.O.C.
Phone number:	886-2-8601-3788
Fax number:	886-2-8601-3789
Email address:	info.tw@dekra.com
Website:	http://www.dekra.com.tw



1.7. List of Test Equipment

For Conducted measurements /CB3/SR8

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Date	Due. Date
	Temperature Chamber	WIT GROUP	TH-1S-B	EQ-201-00146	2020/04/06	2021/04/05
Х	Spectrum Analyzer	Agilent	N9010A	MY53470892	2019/09/25	2020/09/24
Х	Peak Power Analyzer	Keysight	8990B	MY51000410	2019/07/30	2020/07/29
Х	Wideband Power Sensor	Keysight	N1923A	MY56080003	2019/07/30	2020/07/29
Х	Wideband Power Sensor	Keysight	N1923A	MY56080004	2019/07/30	2020/07/29
Х	EMI Test Receiver	R&S	ESCS 30	100369	2019/11/27	2020/11/26
Х	LISN	R&S	ENV216	101105	2020/04/27	2021/04/26
Х	LISN	R&S	ESH3-Z5	836679/014	2020/04/26	2021/04/25
Х	Coaxial Cable	DEKRA	RG 400	LC018-RG	2019/06/20	2020/06/19

Note:

1. All equipments are calibrated every one year.

2. The test instruments marked with "X" are used to measure the final test results.

3. Test Software version : DEKRA Conduction Test SystemV9.0.5.



FO.	r Radiated measure	ments /Sites/CB8				
	Equipment	Manufacturer	Model No.	Serial No.	Cali. Date	Due. Date
Х	Test Receiver	R&S	ESR7	101602	2019/12/16	2020/12/15
Х	Signal Analyzer	R&S	FSV40	101869	2019/07/04	2020/07/03
Х	Loop Antenna	Teseq	HLA6121	37133	2019/10/15	2021/10/14
Х	Bilog Antenna	Schaffner Chase	CBL6112B	2916	2020/01/20	2021/01/19
Х	Coaxial Cable	DEKRA	L1907-001C	280280.F141.1000D	2019/07/10	2020/07/09
Х	Amplifier	EMCI	EMC001330	980254	2019/08/22	2020/08/21
Х	Horn Antenna	ETS-LINDGREN	3117	00228113	2020/05/01	2021/04/30
Х	Coaxial Cable	DEKRA	L1907-002C	280280.F141.1000D	2019/07/10	2020/07/09
Х	Amplifier	EMCI	EMC05820SE	980362	2019/06/26	2020/06/25
Х	Amplifier	EMCI	EMC051845SE	980632	2019/08/08	2020/08/07
	Horn Antenna	Com-Power	AH-1840	101101	2019/10/31	2020/10/30
	Amplifier + Cable	EMCI	EMC184045SE	980369	2020/04/23	2021/04/22
	Bilog Antenna	Schaffner Chase	CBL6112B	2925	2020/02/20	2021/02/19
	Coaxial Cable	DEKRA	L1907-003C	00100A1B3A120M	2019/07/10	2020/07/09
	Amplifier	EMCI	EMC001330	980255	2020/03/17	2021/03/16
Х	Filter	MICRO-TRONICS	BRM50702	G270	2019/08/08	2020/08/07
	Filter	MICRO-TRONICS	BRM50716	G196	2019/08/08	2020/08/07

For Radiated measurements /Site3/CB8

Note:

Loop Antenna is calibrated every two years, the other equipments are calibrated every one year. The test instruments marked with "X" are used to measure the final test results. 1.

2.

Test Software version : DEKRA Test SystemV1.1. 3.

1.8. Uncertainty

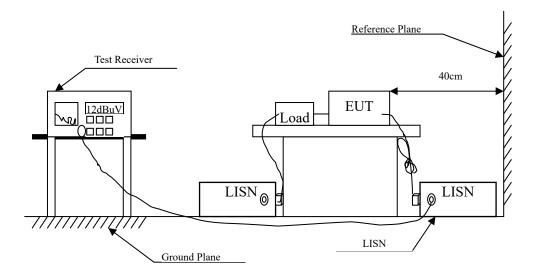
Uncertainties have been calculated according to the DEKRA internal document, and is described in each test chapter of this report.

The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

2. Conducted Emission

2.1. Test Setup



2.2. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit					
Frequency	Limits				
MHz	QP	AV			
0.15 - 0.50	66-56	56-46			
0.50-5.0	56	46			
5.0 - 30	60	50			

Remarks: In the above table, the tighter limit applies at the band edges.

2.3. Test Procedure

The EUT and Peripherals are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

The EUT was setup to ANSI C63.4, 2014; tested to DTS test procedure of FCC KDB-558074 for compliance to FCC 47CFR Subpart C requirements.

2.4. Uncertainty

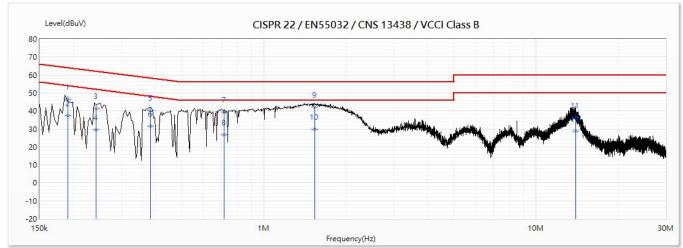
±2.26dB



2.5. Test Result of Conducted Emission

Product	:	Portable computer
Test Item	:	Conducted Emission Test
Test date	:	2020/05/28
Test Mode	:	Mode 1: Transmit - BLE (2440MHz)

Line1



No	Frequency	Emission	Limit	Margin	Reading Level		Detector
	(MHz)	Level	(dBuV)	(dB)	(dBuV)	(dB)	Туре
		(dBuV)					
1	0.19	46.70	64.03	-17.33	36.91	9.79	QP
2	0.19	37.32	54.03	-16.71	27.52	9.79	AV
3	0.241	41.46	62.05	-20.59	31.67	9.79	QP
4	0.241	29.47	52.05	-22.58	19.68	9.79	AV
5	0.383	40.25	58.21	-17.96	30.46	9.79	QP
6	0.383	31.39	48.21	-16.82	21.61	9.79	AV
7	0.714	39.34	56.00	-16.66	29.54	9.80	QP
8	0.714	26.76	46.00	-19.24	16.96	9.80	AV
*9	1.535	42.17	56.00	-13.83	32.32	9.85	QP
10	1.535	29.91	46.00	-16.09	20.07	9.85	AV
11	14.006	36.37	60.00	-23.63	26.21	10.16	QP
12	14.006	28.85	50.00	-21.15	18.69	10.16	AV

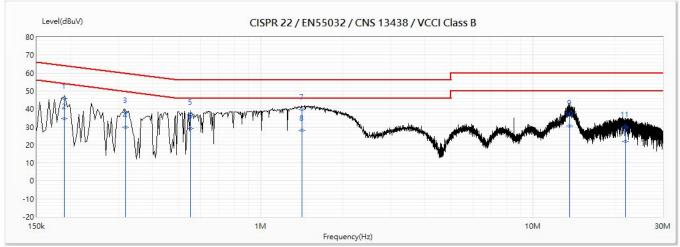
Remark:

- 1. "*" means this data is the worst emission level;"!" means this data is over limit.
- 2. Emission Level=Reading Level + Correct Factor(Correct Factor=LISN Factor+Cable Loss).
- 3. Margin=Emission Level-Limit



Product	:	Portable computer
Test Item	:	Conducted Emission Test
Test date	:	2020/05/28
Test Mode	:	Mode 1: Transmit - BLE (2440MHz)

Ν



No	Frequency (MHz)	Emission Level	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
		(dBuV)					
1	0.189	45.75	64.06	-18.31	35.98	9.77	QP
2	0.189	34.55	54.06	-19.51	24.78	9.77	AV
3	0.318	37.90	59.76	-21.85	28.13	9.77	QP
4	0.318	29.96	49.76	-19.80	20.18	9.77	AV
5	0.55	36.90	56.00	-19.10	27.11	9.78	QP
6	0.55	29.22	46.00	-16.78	19.44	9.78	AV
*7	1.417	39.83	56.00	-16.17	30.00	9.83	QP
8	1.417	28.20	46.00	-17.80	18.37	9.83	AV
9	13.617	36.56	60.00	-23.44	26.34	10.22	QP
10	13.617	30.37	50.00	-19.63	20.15	10.22	AV
11	21.894	30.32	60.00	-29.68	19.90	10.41	QP
12	21.894	22.09	50.00	-27.91	11.68	10.41	AV

Remark:

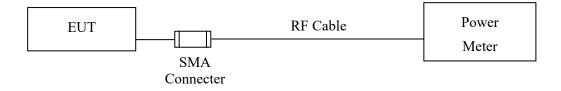
1. "*" means this data is the worst emission level;"!" means this data is over limit.

2. Emission Level=Reading Level + Correct Factor(Correct Factor=LISN Factor+Cable Loss).

3. Margin=Emission Level-Limit

3. Peak Power Output

3.1. Test Setup



3.2. Limit

The maximum peak power shall be less 1Watt.

3.3. Test Procedure

The EUT was tested according to C63.10:2013 for compliance to FCC 47CFR 15.247 requirements. The maximum peak conducted output power using C63.10:2013 Section 11.9.1.3 PKPM1 Peak power meter method.

3.4. Uncertainty

±1.19 dB



3.5. Test Result of Peak Power Output

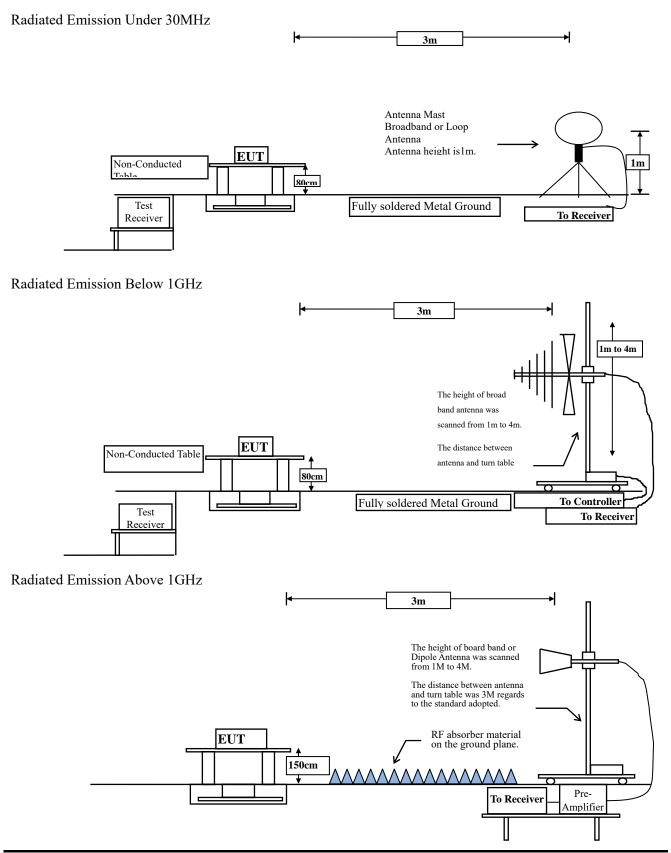
Product	:	Portable computer
Test Item	:	Peak Power Output
Test Mode	:	Mode 1: Transmit - BLE
Test Date	:	2020/05/14

Channel No.	Frequency	Measurement	Required Limit	Result
	(MHz)	(dBm)		
Channel 00	2402.00	5.98	1 Watt= 30 dBm	Pass
Channel 19	2440.00	5.86	1 Watt= 30 dBm	Pass
Channel 39	2480.00	5.96	1 Watt= 30 dBm	Pass



4. Radiated Emission

4.1. Test Setup



4.2. Limits

➤ General Radiated Emission Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15	FCC Part 15 Subpart C Paragraph 15.209 Limits					
Frequency MHz	Field strength	Measurement distance				
	(microvolts/meter)	(meter)				
0.009-0.490	2400/F(kHz)	300				
0.490-1.705	24000/F(kHz)	30				
1.705-30	30	30				
30-88	100	3				
88-216	150	3				
216-960	200	3				
Above 960	500	3				

Remarks: 1. RF Voltage $(dBuV) = 20 \log RF$ Voltage (uV)

- 2. In the Above Table, the tighter limit applies at the band edges.
- 3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

4.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to C63.10:2013 Section 11.12.1 for compliance to FCC 47CFR 15.247 requirements.

Measuring the frequency range below 1GHz, the EUT is placed on a turn table which is 0.8 meter above ground, when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 meter above ground.

The turn table is rotated 360 degrees to determine the position of the maximum emission level.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2013 on radiated measurement.

The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna. The measurement frequency range form 9kHz - 10th Harmonic of fundamental was investigated.

RBW and VBW Parameter setting:

According to C63.10 Section 11.12.2.4 Peak measurement procedure.

RBW = as specified in Table 1.

VBW \geq 3 x RBW.

Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

According to C63.10 Section 11.12.2.5 Average measurement procedure.

RBW = 1MHz.

VBW = 10Hz, when duty cycle \ge 98 %

VBW $\geq 1/T$, when duty cycle < 98 %

(T refers to the minimum transmission duration over which the transmitter is on and is

transmitting at its maximum power control level for the tested mode of operation.)									
2.4GHz band	1/T	VBW							

2.4GHz band	Duty Cycle	Duty Cycle T		VBW	
	(%)	(ms)	(Hz)	(Hz)	
BLE	BLE 85.55		466	500	

Note: Duty Cycle Refer to Section 9

4.4. Uncertainty

± 4.08 dB above 1GHz

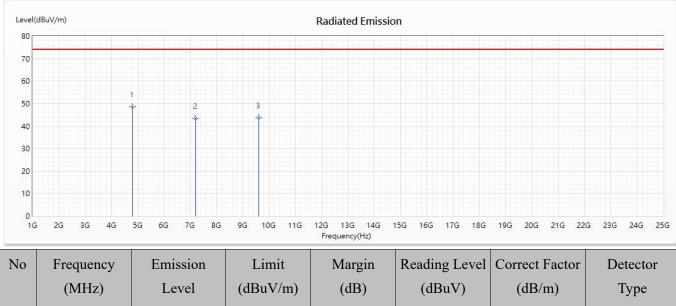
± 4.22 dB below 1GHz



4.5. Test Result of Radiated Emission

Product	:	Portable computer
Test Item	:	Harmonic Radiated Emission
Test Mode	:	Mode 1: Transmit - BLE(2402MHz)
Test Date	:	2020/05/14

Horizontal



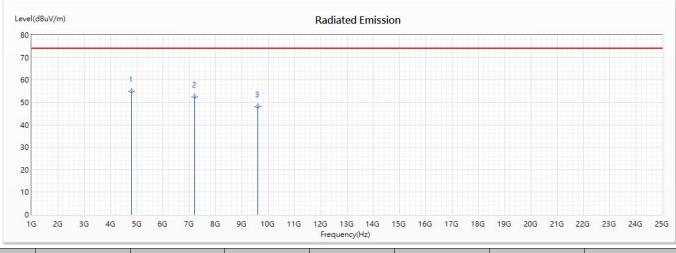
		(dBuV/m)					
* 1	4804	48.66	74.00	-25.34	60.81	-12.15	РК
2	7206	43.41	74.00	-30.59	56.55	-13.14	РК
3	9608	43.57	74.00	-30.43	56.99	-13.42	РК

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Emission Level = Reading Level + Correct Factor.
- 3. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 4. The average measurement was not performed when the peak measured data under the limit of average detection.
- 5. The emission levels of other frequencies are very lower than the limit and not show in test report.



Product	:	Portable computer
Test Item	:	Harmonic Radiated Emission
Test Mode	:	Mode 1: Transmit - BLE (2402MHz)
Test Date	:	2020/05/14

Vertical



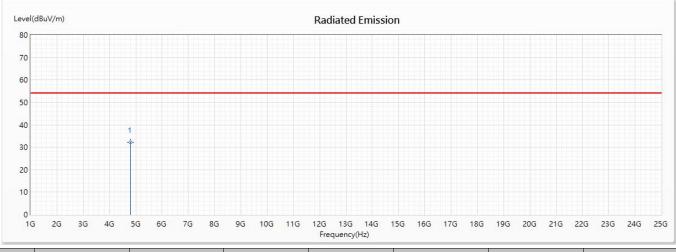
No	Frequency	Emission	Limit	Margin	Reading Level	Correct Factor	Detector
	(MHz)	Level	(dBuV/m)	(dB)	(dBuV)	(dB/m)	Туре
		(dBuV/m)					
* 1	4804	54.95	74.00	-19.05	67.10	-12.15	РК
2	7206	52.41	74.00	-21.59	65.55	-13.14	РК
3	9608	48.08	74.00	-25.92	61.50	-13.42	РК

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Emission Level = Reading Level + Correct Factor.
- 3. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 4. The average measurement was not performed when the peak measured data under the limit of average detection.
- 5. The emission levels of other frequencies are very lower than the limit and not show in test report.



Product	:	Portable computer
Test Item	:	Harmonic Radiated Emission
Test Mode	:	Mode 1: Transmit - BLE (2402MHz)
Test Date	:	2020/05/14

Vertical



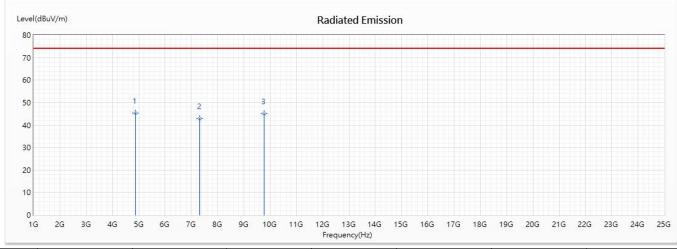
No	Frequency	Emission	Limit	Margin	Reading Level	Correct Factor	Detector
	(MHz)	Level	(dBuV/m)	(dB)	(dBuV)	(dB/m)	Туре
		(dBuV/m)					
* 1	4804	32.31	54.00	-21.69	44.46	-12.15	AV

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Emission Level = Reading Level + Correct Factor.
- 3. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 4. The average measurement was not performed when the peak measured data under the limit of average detection.
- 5. The emission levels of other frequencies are very lower than the limit and not show in test report.



Product	:	Portable computer
Test Item	:	Harmonic Radiated Emission
Test Mode	:	Mode 1: Transmit - BLE(2440MHz)
Test Date	:	2020/05/14

Horizontal



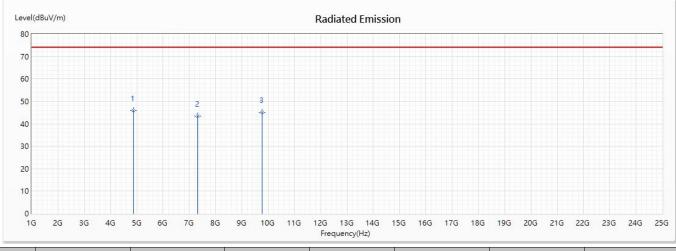
No	Frequency	Emission	Limit	Margin	Reading Level	Correct Factor	Detector
	(MHz)	Level	(dBuV/m)	(dB)	(dBuV)	(dB/m)	Туре
		(dBuV/m)					
* 1	4880	45.36	74.00	-28.64	56.96	-11.60	РК
2	7320	42.97	74.00	-31.03	56.52	-13.55	РК
3	9760	45.02	74.00	-28.98	57.50	-12.48	РК

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Emission Level = Reading Level + Correct Factor.
- 3. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 4. The average measurement was not performed when the peak measured data under the limit of average detection.
- 5. The emission levels of other frequencies are very lower than the limit and not show in test report.



Product	:	Portable computer
Test Item	:	Harmonic Radiated Emission
Test Mode	:	Mode 1: Transmit - BLE (2440MHz)
Test Date	:	2020/05/14

Vertical



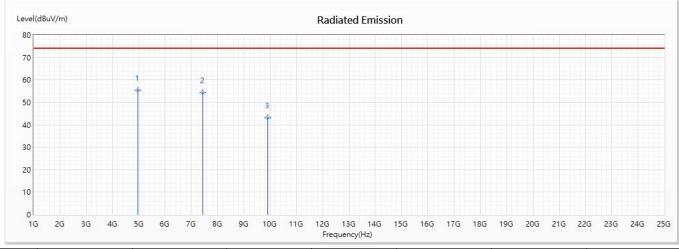
No	Frequency	Emission	Limit	Margin	Reading Level	Correct Factor	Detector
	(MHz)	Level	(dBuV/m)	(dB)	(dBuV)	(dB/m)	Туре
		(dBuV/m)					
* 1	4880	45.81	74.00	-28.19	57.41	-11.60	РК
2	7320	43.31	74.00	-30.69	56.86	-13.55	РК
3	9760	44.93	74.00	-29.07	57.41	-12.48	РК

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Emission Level = Reading Level + Correct Factor.
- 3. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 4. The average measurement was not performed when the peak measured data under the limit of average detection.
- 5. The emission levels of other frequencies are very lower than the limit and not show in test report.



Product	:	Portable computer
Test Item	:	Harmonic Radiated Emission
Test Mode	:	Mode 1: Transmit - BLE (2480MHz)
Test Date	:	2020/05/14

Horizontal



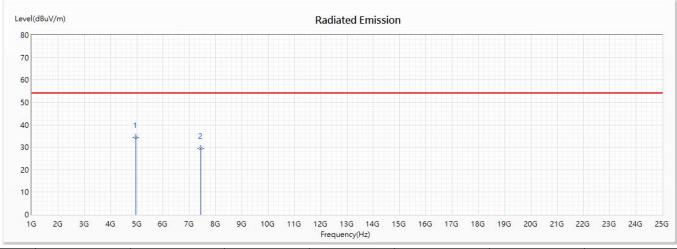
No	Frequency	Emission	Limit	Margin	Reading Level	Correct Factor	Detector
	(MHz)	Level	(dBuV/m)	(dB)	(dBuV)	(dB/m)	Туре
		(dBuV/m)					
* 1	4960	55.41	74.00	-18.59	66.30	-10.89	РК
2	7440	54.23	74.00	-19.77	68.85	-14.62	РК
3	9920	43.01	74.00	-30.99	57.24	-14.23	РК

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Emission Level = Reading Level + Correct Factor.
- 3. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 4. The average measurement was not performed when the peak measured data under the limit of average detection.
- 5. The emission levels of other frequencies are very lower than the limit and not show in test report.



Product	:	Portable computer
Test Item	:	Harmonic Radiated Emission
Test Mode	:	Mode 1: Transmit - BLE (2480MHz)
Test Date	:	2020/05/14

Horizontal



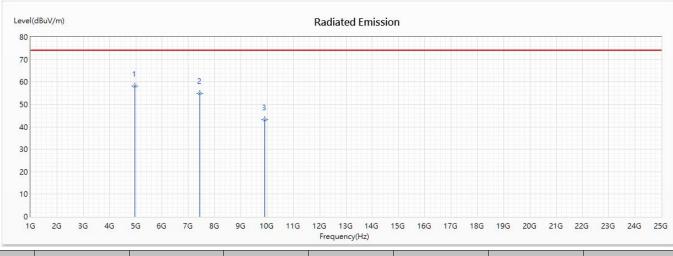
No	Frequency	Emission	Limit	Margin	Reading Level	Correct Factor	Detector
	(MHz)	Level	(dBuV/m)	(dB)	(dBuV)	(dB/m)	Туре
		(dBuV/m)					
* 1	4960	34.38	54.00	-19.62	45.27	-10.89	AV
2	7440	29.53	54.00	-24.47	44.15	-14.62	AV

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Emission Level = Reading Level + Correct Factor.
- 3. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 4. The average measurement was not performed when the peak measured data under the limit of average detection.
- 5. The emission levels of other frequencies are very lower than the limit and not show in test report.



Product	:	Portable computer
Test Item	:	Harmonic Radiated Emission
Test Mode	:	Mode 1: Transmit - BLE (2480MHz)
Test Date	:	2020/05/14

Vertical



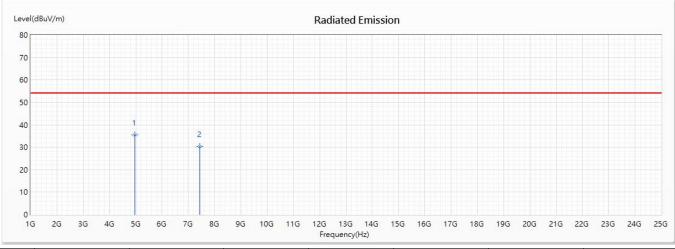
No	Frequency	Emission	Limit	Margin	Reading Level	Correct Factor	Detector
	(MHz)	Level	(dBuV/m)	(dB)	(dBuV)	(dB/m)	Туре
		(dBuV/m)					
* 1	4960	58.18	74.00	-15.82	69.07	-10.89	РК
2	7440	54.88	74.00	-19.12	69.50	-14.62	РК
3	9920	43.18	74.00	-30.82	57.41	-14.23	РК

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Emission Level = Reading Level + Correct Factor.
- 3. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 4. The average measurement was not performed when the peak measured data under the limit of average detection.
- 5. The emission levels of other frequencies are very lower than the limit and not show in test report.



Product	:	Portable computer
Test Item	:	Harmonic Radiated Emission
Test Mode	:	Mode 1: Transmit - BLE (2480MHz)
Test Date	:	2020/05/14

Vertical



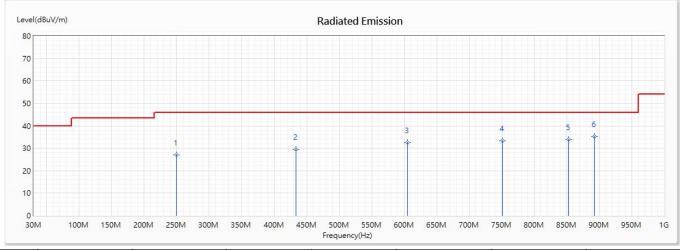
No	Frequency	Emission	Limit	Margin	Reading Level	Correct Factor	Detector
	(MHz)	Level	(dBuV/m)	(dB)	(dBuV)	(dB/m)	Туре
		(dBuV/m)					
* 1	4960	35.46	54.00	-18.54	46.35	-10.89	AV
2	7440	30.41	54.00	-23.59	45.03	-14.62	AV

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Emission Level = Reading Level + Correct Factor.
- 3. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 4. The average measurement was not performed when the peak measured data under the limit of average detection.
- 5. The emission levels of other frequencies are very lower than the limit and not show in test report.



Product:Portable computerTest Item:General Radiated EmissionTest Mode:Mode 1: Transmit - BLE (2440MHz)Test Date:2020/05/14

Horizontal



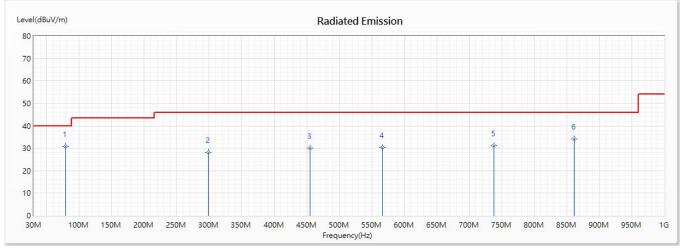
No	Frequency	Emission	Limit	Margin	Reading Level	Correct Factor	Detector
	(MHz)	Level	(dBuV/m)	(dB)	(dBuV)	(dB/m)	Туре
		(dBuV/m)					
1	249.22	27.08	46.00	-18.92	38.53	-11.45	QP
2	433.52	29.62	46.00	-16.38	33.68	-4.06	QP
3	605.21	32.47	46.00	-13.53	33.02	-0.55	QP
4	750.71	33.22	46.00	-12.78	33.76	-0.54	QP
5	852.56	33.76	46.00	-12.24	35.88	-2.12	QP
* 6	892.33	35.30	46.00	-10.70	38.30	-3.00	QP

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Emission Level = Reading Level + Correct Factor.
- 3. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 4. The emission levels of other frequencies are very lower than the limit and not show in test report.
- 5. No emission found between lowest internal used/generated frequency to 30MHz.



Product	:	Portable computer
Test Item	:	General Radiated Emission
Test Mode	:	Mode 1: Transmit - BLE (2440MHz)
Test Date	:	2020/05/14

Vertical

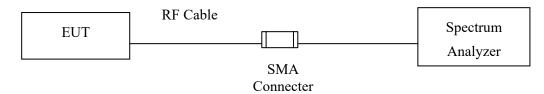


No	Frequency	Emission	Limit	Margin	Reading Level	Correct Factor	Detector
	(MHz)	Level	(dBuV/m)	(dB)	(dBuV)	(dB/m)	Туре
		(dBuV/m)					
* 1	79.47	30.79	40.00	-9.21	42.89	-12.10	QP
2	298.69	28.11	46.00	-17.89	36.64	-8.53	QP
3	454.86	30.08	46.00	-15.92	34.04	-3.96	QP
4	566.41	30.30	46.00	-15.70	33.34	-3.04	QP
5	738.1	31.15	46.00	-14.85	30.79	0.36	QP
6	861.29	34.01	46.00	-11.99	36.12	-2.11	QP

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Emission Level = Reading Level + Correct Factor.
- 3. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 4. The emission levels of other frequencies are very lower than the limit and not show in test report.
- 5. No emission found between lowest internal used/generated frequency to 30MHz.

5. **RF Antenna Conducted Test**

5.1. Test Setup



5.2. Limits

According to FCC Section 15.247(d). In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

5.3. Test Procedure

The EUT was tested according to C63.10:2013 Section 11.11 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Set VBW> RBW, scan up through 10th harmonic.

5.4. Uncertainty

±1.20dB

5.5. Test Result of RF Antenna Conducted Test

Product	:	Portable computer
Test Item	:	RF Antenna Conducted Test
Test Mode	:	Mode 1: Transmit - BLE
Test Date	:	2020/05/14

Figure Channel 00:

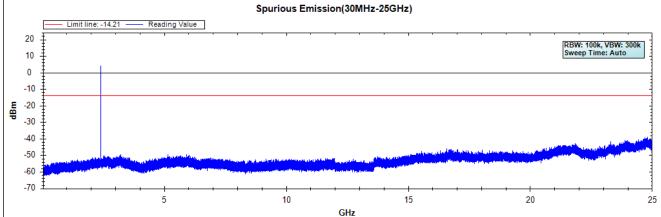


Figure Channel 19:

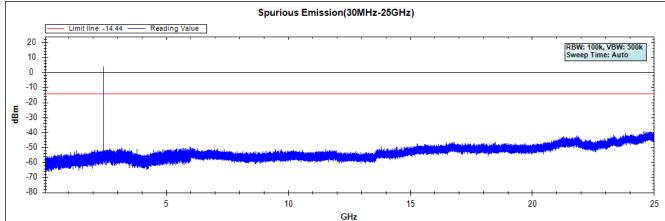
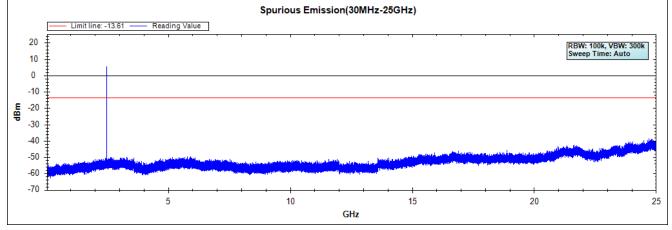


Figure Channel 39:



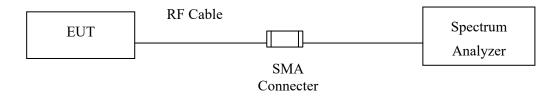
Note: The above test pattern is synthesized by multiple of the frequency range.



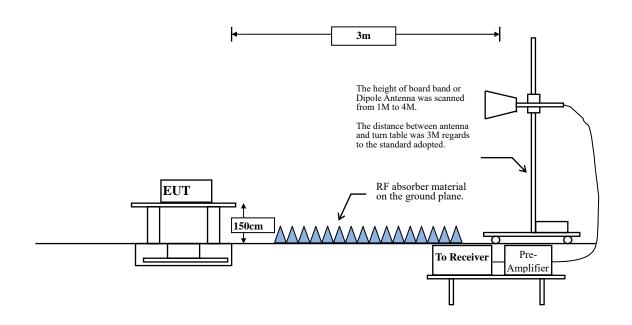
6. Band Edge

6.1. Test Setup

RF Conducted Measurement



RF Radiated Measurement:



6.2. Limit

According to FCC Section 15.247(d). In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

6.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013 and tested according to C63.10:2013 Section 11.12.1 for compliance to FCC 47CFR 15.247 requirements.

The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.

RBW and VBW Parameter setting:

According to C63.10 Section 11.12.2.4 Peak measurement procedure.

RBW = as specified in Table 1.

VBW \geq 3 x RBW.

Table 1 — RBW as a function of frequency	Table 1 — RBW as a fun	iction of frequency
--	------------------------	---------------------

Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

According to C63.10 Section 11.12.2.5 Average measurement procedure.

RBW = 1MHz.

VBW = 10Hz, when duty cycle \ge 98 %

VBW \geq 1/T, when duty cycle < 98 %

(T refers to the minimum transmission duration over which the transmitter is on and is

transmitting at its maximum power control level for the tested mode of operation.)							
2.4GHz band	Duty Cycle	Т	1/T	VBW			

2.4GHz band	Duty Cycle T		1/T	VBW	
	(%)	(ms)	(Hz)	(Hz)	
BLE	85.55	2.1449	466	500	

Note: Duty Cycle Refer to Section 9

6.4. Uncertainty

± 4.08 dB above 1GHz

± 4.22 dB below 1GHz



6.5. Test Result of Band Edge

Product	:	Portable computer
Test Item	:	Band Edge
Test Mode	:	Mode 1: Transmit - BLE (2402MHz)
Test Date	:	2020/05/13

Peak:

Att 🗧		30 dE	B SWT 15.1 μ	s 💩 VBW 3 MHz	Mode Auto FFT	8	
1Pk M	ах						
	nit Che e 2.4G	CK DTS_P€	ak	PASS PASS	M1[1]		5.74 dBn 2.402300 GH -51.61 dBn 2.390000 GH
0 dBm-	-			_			2.390000 GH
-10 dBn							
-20 dBn							
2.4G DTS					MB		
-30 dBn							
MA⊉ dBn) الس	50	25
SOUBH	man			mm Mg	hand	Josephan	man
C20 18							
-60 dBn	1						
-70 dBn							
	· -						
	9 GHz		<u> </u>	691 p	ots		Span 100.0 MHz
CF 2.3							
		Trc	X-value	Y-value	Function	Functi	on Result
	Ref		2.4023 GH				
Marker Type M1	Ref	1		 -51.61 dBn 	0		
Marker Type M1 M2	Ref	1	2.39 GH				
Marker Type M1	Ref		2.39 GH 2.4 GH 2.34195 GH	z -27.66 dBn	n		

Date: 13.MAY.2020 08:58:50

Average:

Ref Lo Att Count		21.26 dBn 30 dB 00			RBW 1 MHz VBW 500 Hz	Mode Auto FF	т		
P1Pk M	эх								
Lin Lin 10 dBm	nit Ch e 2.4	eck G DTS_RM	ns		PASS	M1[1]			-18.12 dBr 2.402010 GH -60.23 dBr 2.390000 GH
0 dBm-	-		+ +		+				2.390000 GH
-10 dBm						M1			
-20 dBm	+					X			_
-30 dBm									
2.4G DTS	_RMS								
						MB			
		-	_		M2			~	_
-70 dBm							-		
CF 2.3	9 GHz				691 pt	s	10	Sp	an 100.0 MHz
larker									
Туре	Ref		X-value		Y-value	Function		Function Re	esult
M1	-	1	2.4020		-18.12 dBm				
M2 M3		1		9 GHz 4 GHz	-60.23 dBm -47.44 dBm				
M4		1	2.342		-56.76 dBm		-		

Date: 13.MAY.2020 08:59:31



Product	:	Portable computer
Test Item	:	Band Edge
Test Mode	:	Mode 1: Transmit - BLE (2480MHz)
Test Date	:	2020/05/13

Peak:

		1ode Auto FFT		Offset 1.26 dB SWT 15.1 µs	21.26 dBm 30 dB	ef Level : .tt
				1		Pk Max
5.91 dB 2.480030 GI -45.48 dB 2.483500 GI		M1[1]	PASS PASS M1	(2000) (Contraction of the contraction of the contr	eck G DTS_Pe	Limit Ch Line 2.4 dBm
2.485500 G	-		+ A+			Bm-
						dBm
	_	ask2	2.4G DTS_P6			dBm
		dak2	2.40 D15_PE			dBm
		мз Х				dBm
mon	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	mon	mar N	mon	v	
	-					dBm
						dBm
Span 100.0 MH			691 pts	2	Hz	2.4835 G
						rker
ction Result	Fun	Function	Y-value	X-value	Trc	pe Ref
			5.91 dBm	2.48003 GHz	1	M1
			-45.48 dBm -41.23 dBm	2.4835 GHz 2.48741 GHz	1	M2 M3

Date: 13.MAY.2020 09:00:16

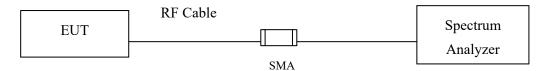
Average:

Att	21.26 dBr 30 d		RBW 1 MHz VBW 500 Hz	Mode Auto FFT		
Count 100/ 1Pk Max	100					
Limit d	heck 4G DTS_R!		PASS PASS	M1[1]		-17.80 dBn 2.480030 GH -57.75 dBn 2.483500 GH
0 dBm					+ +	
-10 dBm			M1			
-20 dBm			- X-			
-30 dBm			+ $()+$			
-40 dBm			2.4G DTS_	RMS2		
-50 dBm			- M2			
~60 d8m			+			
-70 dBm						
CF 2.4835	GHz		691 pt	s		Span 100.0 MHz
Marker						
Type Ret		X-value	Y-value	Function	Function	on Result
M1 M2	1	2.48003 GHz 2.4835 GHz	-17.80 dBm -57.75 dBm			

Date: 13.MAY.2020 09:00:45

7. 6dB Bandwidth

7.1. Test Setup



7.2. Limits

The minimum bandwidth shall be at least 500 kHz.

7.3. Test Procedure

The EUT was setup according to ANSI C63.4, 2014; tested according to ANSI C63.10 Section 11.8 for compliance to FCC 47CFR 15.247 requirements.

7.4. Uncertainty

±283Hz

7.5. Test Result of 6dB Bandwidth

Product	:	Portable computer
Test Item	:	6dB Bandwidth Data
Test Mode	:	Mode 1: Transmit - BLE (2402MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
00	2402	740	>500	Pass

Figure Channel 00:

🊺 Keysig	ht Spect		Analyzer - Swe									
XI.		RF		AC		SE	NSE:INT		ALIGN AUTO		M May 13, 2020	Frequency
Cente	er Fre	ed 3	2.40200	0000 G	HZ NO:Wide ⊂⊾	Trig: Fre	e Run	Avgity	/pe: Log-Pwr	TYP	E 1 2 3 4 5 6 E M WWWW	
					Gain:Low	#Atten:				DE	T P NNNNN	
									Mkr	2 2.401	62 GHz	Auto Tun
10 dB/c			Offset 1.5 f 21.50 c								24 dBm	
			21.00 0		1			1				
11.5 —						A 2	⊕ <mark>'</mark> 3					Center Fre
1.50							\sim				-0.10 dBm	2.402000000 GH
-8.50												
-18.5 —												Start Fre
-28.5 —								\wedge				2.397000000 GH
-38.5					h for			had	when when when when when when when when			
48.5	. A		- Pr - 1997	mon	mo			2	w When	Ann		
-58.5	why w	(Pure	JV 1000 - 111	~ 0 0 -					v	44.000	marin	Stop Fre
												2.407000000 GH
-68.5												
Cente	r 2 4	020	00 GHz							Snan 1	0.00 MHz	CF Ste
#Res I					#VBV	V 300 kHz	,	Sweer	o (#Swp) 1	.000 ms (1.000000 MH
		_					-		· · · ·			Auto Ma
MKR MOI		f		X 2 402 (0 GHz	5.90 d		ICTION	FUNCTION WIDTH	FUNCTION	DN VALUE	
2 N	1	f		2.402 0		-0.24 d	Bm					
3 N	1	f		2.402 3	36 GHz	-0.44 d	Bm					Freq Offs
4	_											01
6												
7 8												
9												
10 11	_	<u> </u>										
< [-				m						
ISG										s		L
									~			



Product	:	Portable computer
Test Item	:	6dB Bandwidth Data
Test Mode	:	Mode 1: Transmit - BLE (2440MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
19	2440	740	>500	Pass

Figure Channel 19:

🎉 Keysight Spectrum Analyzer - Swe	pt SA						
₩	AC 0000 GHz	SENSE:INT	ALIGN AUTO	03:23:04 PM May 13, 2020 TRACE 1 2 3 4 5 6 TYPE M MANAAAAAAA	Frequency		
Ref Offset 1.5 10 dB/div Ref 21.50 d		#Atten: 30 dB	Mkr	Mkr2 2.439 62 GHz -0.40 dBm			
11.5 -8.50		2	3	0.28 dBm	Center Fred 2.440000000 GHz		
-18.5	an part				Start Fred 2.435000000 GH;		
-48.5 -58.5 -68.5	- In man Mar		hord hord	to the second second	Stop Free 2.445000000 GH		
Center 2.440000 GHz #Res BW 100 kHz	#VBW	/ 300 kHz	Sweep (#Swp) 1	Span 10.00 MHz .000 ms (1001 pts)	CF Ste 1.000000 MH <u>Auto</u> Ma		
1 N 1 f 2 N 1 f 3 N 1 f 4 5 6	2.440 00 GHz 2.439 62 GHz 2.440 36 GHz	5.72 dBm -0.40 dBm -0.58 dBm			Freq Offse 0 H		
7 8 9 10 11 (
MSG				s			



Product	:	Portable computer
Test Item	:	6dB Bandwidth Data
Test Mode	:	Mode 1: Transmit - BLE (2480MHz)

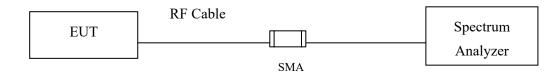
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
39	2480	750	>500	Pass

Figure Channel 39:

💓 Keysight Spectrum Analyzer - Swe	·				
ເx ⊫ 50 Ω Center Freq 2.48000	AC 0000 GHz PNO: Wide C	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr	03:25:49 PM May 13, 2020 TRACE 1 2 3 4 5 6 TYPE MWWWW	Frequency
Ref Offset 1.5	IFGain:Low	#Atten: 30 dB	Mkr	2 2.479 61 GHz 0.13 dBm	Auto Tune
Log 11.5 1.50		2 1 3		0.50 dBm	Center Freq 2.480000000 GHz
-18.5	Mar Mar		L		Start Fred 2.475000000 GHz
-48.5	Madan "V"		Manaka	Arows Interver	Stop Fred 2.485000000 GH;
Center 2.480000 GHz #Res BW 100 kHz	#VBW	300 kHz	Sweep (#Swp) 1	Span 10.00 MHz .000 ms (1001 pts)	CF Step 1.000000 MH <u>Auto</u> Ma
1 N 1 f 2 N 1 f 3 N 1 f 4 5 6	2.480 00 GHz 2.479 61 GHz 2.480 36 GHz	6.50 dBm 0.13 dBm 0.41 dBm		н	Freq Offse 0 Hi
7 8 9 10 11					
MSG				3	L

8. **Power Density**

8.1. Test Setup



8.2. Limits

The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3kHz bandwidth.

8.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013; tested according to DTS test procedure of KDB 558074 for compliance to FCC 47CFR 15.247 requirements. The maximum power spectral density using C63.10 Section 11.10.2 Method PKPSD (peak PSD)

8.4. Uncertainty

±1.20dB



8.5. Test Result of Power Density

Product	:	Portable computer
Test Item	:	Power Density Data
Test Mode	:	Mode 1: Transmit - BLE (2402MHz)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
00	2402	5.79	$\leq 8 dBm$	Pass

Figure Channel 00:

🊺 Keysight Spe	ectrum Analyzer - Swept SA					
X Center F	RF 50 Ω AC req 2.40200000	0 GHz	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr	03:20:44 PM May 13, 2020 TRACE 1 2 3 4 5 6 TYPE MWWWWW	Frequency
10 dB/div	Ref Offset 1.5 dB Ref 21.50 dBm	PNO: Wide ⊊ IFGain:Low	#Atten: 30 dB	Mkr1 2	2.402 232 0 GHz 5.79 dBm	Auto Tune
11.5						Center Freq 2.402000000 GHz
-8.50						Start Free 2.401445000 GH:
-18.5						Stop Free 2.402555000 GH:
-38.5						CF Step 111.000 kH <u>Auto</u> Mar
-58.5						Freq Offse 0 H
-68.5						
Center 2.4 #Res BW	4020000 GHz 100 kHz	#VBW	300 kHz	Sweep (#Swp)	Span 1.110 MHz I.000 ms (1001 pts)	
MSG					s	



Product	:	Portable computer
Test Item	:	Power Density Data
Test Mode	:	Mode 1: Transmit - BLE (2440MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
19	2440	5.56	\leq 8dBm	Pass

Figure Channel 19:

🎉 Keysight Sp	ectrum Analyzer - Swept SA		0			
💴 Center F	RF 50 Ω AC req 2.440000000) GHz	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr	03:23:25 PM May 13, 2020 TRACE 1 2 3 4 5 6 TYPE M MAAAAAAAAA	Frequency
10 dB/div	Ref Offset 1.5 dB Ref 21.50 dBm	PNO: Wide 🖵 IFGain:Low	#Atten: 30 dB	Mkr1 2	2.440 236 4 GHz 5.56 dBm	Auto Tune
11.5				↓ ¹		Center Freq 2.440000000 GHz
-8.50						Start Freq 2.439445000 GHz
-18.5						Stop Freq 2.440555000 GHz
-38.5						CF Step 111.000 kHz <u>Auto</u> Man
-58.5						Freq Offset 0 Hz
-68.5						
Center 2.4 #Res BW	4400000 GHz 100 kHz	#VBW	300 kHz	Sweep (#Swp) 1	Span 1.110 MHz .000 ms (1001 pts)	
MSG					5	



Product	:	Portable computer
Test Item	:	Power Density Data
Test Mode	:	Mode 1: Transmit - BLE (2480MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
39	2480	6.39	\leq 8dBm	Pass

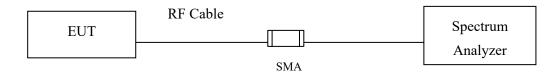
Figure Channel 39:

🎉 Keysight Sp	ectrum Analyzer - Swept SA		8			
<mark>w</mark> Center F	RF 50 Ω AC	0 GHz	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr	03:26:10 PM May 13, 2020 TRACE 1 2 3 4 5 6	Frequency
10 dB/div	Ref Offset 1.5 dB Ref 21.50 dBm	PNO: Wide 🏳 IFGain:Low	#Atten: 30 dB	Mkr1 2	түре Минини Det P NNNNN .480 238 5 GHz 6.39 dBm	Auto Tune
11.5				1		Center Freq 2.480000000 GHz
-8.50						Start Freq 2.479437500 GHz
-18.5						Stop Freq 2.480562500 GHz
-38.5						CF Step 112.500 kHz <u>Auto</u> Man
-58.5						Freq Offset 0 Hz
-68.5	4800000 GHz				Span 1.125 MHz	
#Res BW	100 kHz	#VBW	300 kHz	Sweep (#Swp) 1	.000 ms (1001 pts)	



9. Duty Cycle

9.1. Test Setup



9.2. Test Procedure

The EUT was setup according to ANSI C63.10 2013; tested according to ANSI C63.10 2013 for compliance to FCC 47CFR 15.247 requirements.

9.3. Uncertainty

± 2.31msec



9.4. Test Result of Duty Cycle

Product	:	Portable computer
Test Item	:	Duty Cycle
Test Mode	:	Mode 1: Transmit - BLE

Duty Cycle Formula:

Duty Cycle = Ton / (Ton + Toff)

Duty Factor = 10 Log (1/Duty Cycle)

Results:

2.4GHz band	Ton	Ton + Toff	Duty Cycle	Duty Factor
	(ms)	(ms)	(%)	(dB)
BLE	2.1449	2.5072	85.55	0.68

Spectrum	Spectrum 2	Spectrum 3	Spectr	rum 4 🗵	
Ref Level 137	′.00 dBµV	RBW 1 MHz		00	
Att	40 dB 👄 SWT 10 ms	VBW 1 MHz			
SGL					
1Pk Clrw	105 St.	57 N			
			D3[1]		-0.01 dE
130 dBµV					2.5072 m
2012			M1[1]		113.57 dBµ\
120 dBµV-	M1	02	D3 I		2.8986 ms
110 10.44		4	A		
110 dBµV-					
100 dBuV-					
100 0804					
90 dBµV					
80 dBµV					
70 dBµV			+ +		
. to M	p-h-4	4	N	what I	
θο dBμV	testla	W^	ha	- VW	
100 B					
50 dBµV					
10.10.11					
40 dBµV					1.0.1
CF 2.402 GHz		691 pts			1.0 ms/
Marker					
Type Ref T		Y-value	Function	Function	1 Result
M1 D2 M1	1 2.8986 ms 1 2.1449 ms	113.57 dBµV -0.22 dB			
D3 M1	1 2.1449 ms 1 2.5072 ms	-0.22 dB -0.01 dB			
NIT	2:3072 113	0.01 00			

Date: 8.MAY.2020 11:35:55



10. EMI Reduction Method During Compliance Testing

No modification was made during testing.