

# Shenzhen Toby Technology Co., Ltd.

Report No.: TB-FCC145507

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# **FCC Radio Test Report** FCC ID: 2AF8C-T373B

## **Original Grant**

Report No. TB-FCC145507

Ulbo Tech Co., Limited **Applicant** 

**Equipment Under Test (EUT)** 

**EUT Name OBDII GPS Tracker** 

Model No. T373B

Series No. T360, T361, T363A, T363B, T370, T371, T373A

**Brand Name** Ulbo Tech Co., Limited

**Receipt Date** 2015-09-21

2015-09-21 to 2015-10-21 **Test Date** 

**Issue Date** 2015-10-22

FCC Part 15, Subpart C (15.247:2015) **Standards** 

**Test Method** ANSI C63.10: 2013

**Conclusions PASS** 

In the configuration tested, the EUT complied with the standards specified above,

The EUT technically complies with the FCC and IC requirements

**Test/Witness** 

**Engineer** 

Approved&

**Authorized** 

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.

TB-RF-074-1.0



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# 1. General Information about EUT

#### 1.1 Client Information

Applicant : Ulbo Tech Co., Limited

Address : Room 601, Building 3 Zone2 No.11 Kuiqi First Road Chan Cheng

District Foshan, Guangdong China

Manufacturer : Ulbo Tech Co., Limited

Address : Room 601, Building 3 Zone2 No.11 Kuiqi First Road Chan Cheng

District Foshan, Guangdong China

1.2 General Description of EUT (Equipment Under Test)

EUT Name	E	OBDII GPS Tracker			
Models No.	P	T360, T361, T363A, T36	33B, T370, T371, T373A, T373B		
Model Difference	:	All these models are identical in the same PCB, layout and electrical circuit, the only difference is model name for commercial.			
Product Description		Operation Frequency: Bluetooth 4.0 (BLE): 240 GSM 850: 824.20MHz-8 PCS1900: 1850.20MHz-1850.20MHz-1950 UMTS Band II: 1852.40I UMTS Band V:826.40MI Number of Channel: RF Output Power: Antenna Gain: Modulation Type: Bit Rate of Transmitter:	48.80MHz -1909.80MHz MHz-1907.60MHz Hz-846.60MHz Bluetooth 4.0 (BLE): 40 channels see note(3) -1.586 dBm Conducted Power 0.46 dBi PCB Antenna GFSK		
Power Supply		DC power by Li-ion battery.			
Power Rating	*	DC 3.7V by Li-ion Battery. DC 12V/2A by DC Battery.			
Connecting I/O Port(S)		Please refer to the User's Manual			

#### Note:

- (1) This Test Report is FCC Part 15.247 for Bluetooth BLE, the test procedure follows the FCC KDB 558074 D01 DTS Meas Guidance v03r03.
- (2) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual. The EUT has also been tested and complied the FCC 2&22&24 for GSM and WCDMA function, and recorded in the separate test report.
- (3) Antenna information provided by the applicant.



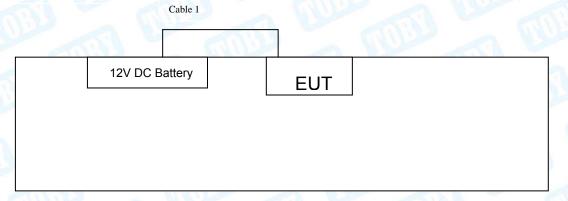
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# (4) Channel List:

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

# 1.3 Block Diagram Showing the Configuration of System Tested

# TX Mode



# 1.4 Description of Support Units

Equipment Information						
Name Model FCC ID/DOC Manufacturer Used "√"						
12V DC Battery	FM1212	- P	W. British	<b>√</b>		
	Cable Information					
Number	Number Shielded Type Ferrite Core Length Note					
Cable 1	NO	NO	0.2m			



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## 1.5 Description of Test Mode

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned follow was evaluated respectively.

For Conducted Test				
Final Test Mode Description				
N/A	N/A			

For Radiated Test				
Final Test Mode	Description			
Mode 1	DC Power With TX Mode			
Mode 2	TX Mode (Channel 00/20/39)			

#### Note:

(1) For all test, we have verified the construction and function in typical operation. And all the test modes were carried out with the EUT in transmitting operation in maximum power with all kinds of data rate.

According to ANSI C63.10 standards, the measurements are performed at the highest, middle, lowest available channels, and the worst case data rate as follows:

Bluetooth BLE Mode: GFSK Modulation Transmitting mode.

- (2) During the testing procedure, the continuously transmitting with the maximum power mode was programmed by the customer.
- (3) The EUT is considered a mobile unit; in normal use it was positioned on X-plane. The worst case was found positioned on X-plane. Therefore only the test data of this X-plane was used for radiated emission measurement test.



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## 1.6 Description of Test Software Setting

During testing channel& 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 power parameters of RF setting.

Test Software Version	sscom42:exe		
Channel	CH 00 CH 20 CH 39		CH 39
BLE Mode	DEF	DEF	DEF

## 1.7 Measurement Uncertainty

The reported uncertainty of measurement  $y \pm U$ , where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

Test Item	Parameters	Expanded Uncertainty (U <sub>Lab</sub> )
THE PARTY OF	Level Accuracy:	
Conducted Emission	9kHz~150kHz	±3.42 dB
	150kHz to 30MHz	±3.42 dB
Dedicted Engineer	Level Accuracy:	14 CO 4D
Radiated Emission	9kHz to 30 MHz	±4.60 dB
Dedicted Emission	Level Accuracy:	14.40 dD
Radiated Emission	30MHz to 1000 MHz	±4.40 dB
Dedicted Emission	Level Accuracy:	14 20 dD
Radiated Emission	Above 1000MHz	±4.20 dB



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## 1.8 Test Facility

The testing report were performed by the Shenzhen Toby Technology Co., Ltd., in their facilities located at 1A/F., Bldg.6, Yusheng Industrial Zone, The National Road No.107 Xixiang Section 467, Xixiang, Bao'an, Shenzhen, Guangdong, China. At the time of testing, the following bodies accredited the Laboratory:

#### **CNAS (L5813)**

The Laboratory has been accredited by CNAS to ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories for the competence in the field of testing. And the Registration No.: CNAS L5813.

#### FCC List No.: (811562)

The Laboratory is listed in the United States of American Federal Communications Commission (FCC), and the registration number is 811562.

#### IC Registration No.: (11950A-1)

The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing. The site registration: Site# 11950A-1.

May 22, 2014 certificated by TUV Rheinland(China) Co., Ltd. with TUV certificate No.: UA 50282953 0001 and report No.: 17026822 002. The certificate is valid until the next scheduled audit or up to 18 months, at the discretion of TUV Rhineland.



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# 2. Test Summary

Standa	Standard Section				
FCC	IC	Test Item	Judgment	Remark	
15.203	1	Antenna Requirement	PASS	N/A	
15.207	RSS-GEN 7.2.4	Conducted Emission	N/A	(1)	
15.205	RSS-GEN 7.2.2	Restricted Bands	PASS	N/A	
15.247(a)(2)	RSS 247 5.2 (1)	6dB Bandwidth	PASS	N/A	
15.247(b)	RSS 247 5.4 (4)	Peak Output Power	PASS	N/A	
15.247(e)	RSS 247 5.2 (2)	Power Spectral Density	PASS	N/A	
15.247(d)	RSS 247 5.5	Transmitter Radiated Spurious Emission	PASS	N/A	

Note: (1)"/" for no requirement for this test item.

N/A is an abbreviation for Not Applicable.



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# 3. Test Equipment

Conducted Emission Test					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
EMI Test Receiver	Rohde & Schwarz	ESCI	100321	Aug. 07, 2015	Aug. 06, 2016
RF Switching Unit	Compliance Direction Systems Inc	RSU-A4	34403	Aug. 07, 2015	Aug. 06, 2016
AMN	SCHWARZBECK	NNBL 8226-2	8226-2/164	Aug. 07, 2015	Aug. 06, 2016
LISN	Rohde & Schwarz	ENV216	101131	Aug. 07, 2015	Aug. 06, 2016
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Date
	Emission Tes				Cal. Due
Spectrum	Agilent	E4407B	MY45106456	Aug. 29, 2015	Aug. 28, 2016
Analyzer EMI Test Receiver	Rohde & Schwarz	ESCI	100010/007	Aug. 07, 2015	Aug. 06, 2016
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Mar. 28, 2015	Mar. 27, 2016
Bilog Antenna	ETS-LINDGREN	3142E	00117542	Mar. 28, 2015	Mar. 27, 2016
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar. 28, 2015	Mar. 27, 2016
Horn Antenna	ETS-LINDGREN	3117	00143209	Mar. 28, 2015	Mar. 27, 2016
Pre-amplifier	Sonoma	310N	185903	Mar. 28, 2015	Mar. 27, 2016
Pre-amplifier	HP	8447B	3008A00849	Mar. 28, 2015	Mar. 27, 2016
Cable	HUBER+SUHNER	100	SUCOFLEX	Mar. 28, 2015	Mar. 27, 2016
Positioning Controller	ETS-LINDGREN	2090	N/A	N/A	N/A



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# 4. Conducted Emission Test

#### 4.1 Test Standard and Limit

4.1.1Test Standard FCC Part 15.207

#### 4.1.2 Test Limit

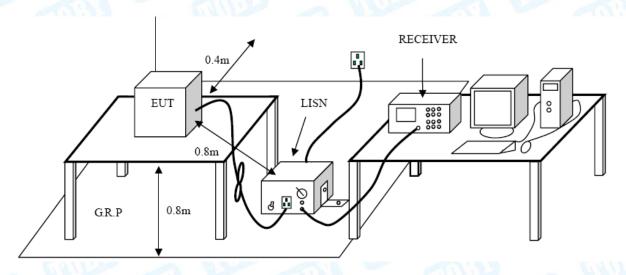
#### **Conducted Emission Test Limit**

THE PROPERTY OF THE PARTY OF TH	Maximum RF Line	e Voltage (dBμV)
Frequency	Quasi-peak Level	Average Level
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50

#### Notes:

- (1) \*Decreasing linearly with logarithm of the frequency.
- (2) The lower limit shall apply at the transition frequencies.
- (3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

## 4.2 Test Setup



#### 4.3 Test Procedure

The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/50uH of coupling impedance for the measuring instrument.

Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.



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I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

LISN at least 80 cm from nearest part of EUT chassis.

The bandwidth of EMI test receiver is set at 9kHz, and the test frequency band is from 0.15MHz to 30MHz.

## 4.4 EUT Operating Mode

Please refer to the description of test mode.

#### 4.5 Test Data

The EUT is powered by DC battery, no requirement for this test item.



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# 5. Radiated Emission Test

#### 5.1 Test Standard and Limit

5.1.1 Test Standard FCC Part 15.209

5.1.2 Test Limit

### Radiated Emission Limits (9kHz~1000MHz)

Frequency (MHz	Field Strength (microvolt/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

## Radiated Emission Limit (Above 1000MHz)

Frequency	Class A (dBu	V/m)(at 3 M)	Class B (dBuV/m)(at 3 M)		
(MHz)	Peak	Average	Peak	Average	
Above 1000	80	60	74	54	

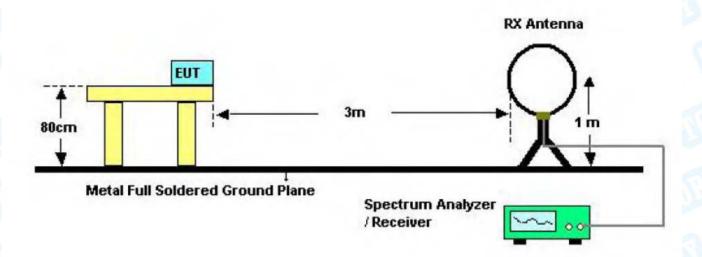
#### Note:

- (1) The tighter limit applies at the band edges.
- (2) Emission Level(dBuV/m)=20log Emission Level(uV/m)

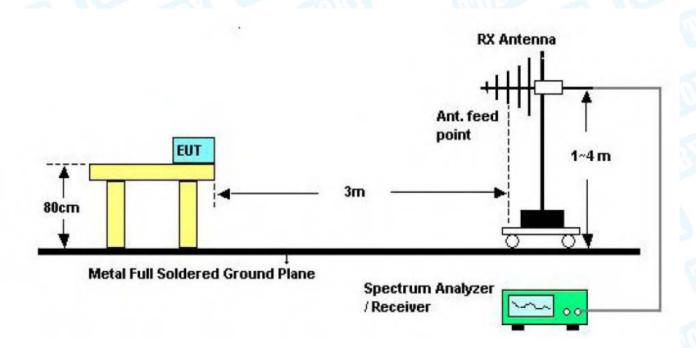


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# 5.2 Test Setup



Below 30MHz Test Setup



Below 1000MHz Test Setup



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Page:

Antenna tower Horn 3mantenna EUT 4mSpectrum analyzer Turntable 1m1.5m30cm Pre-amp

Above 1GHz Test Setup

#### 5.3 Test Procedure

- (1) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1 GHz. The EUT was placed on a rotating 0.8m high above ground, the table was rotated 360 degrees to determine the position of the highest radiation.
- (2) Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.
- (3) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- (4) The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- (5) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
- (6) Testing frequency range below 1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection.
- (7) Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
- (8) For the actual test configuration, please see the test setup photo.



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# 5.4 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power.

#### 5.5 Test Data

Remark: During testing above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=1 kHz with Peak Detector for Average Values.

Test data please refer the following pages.



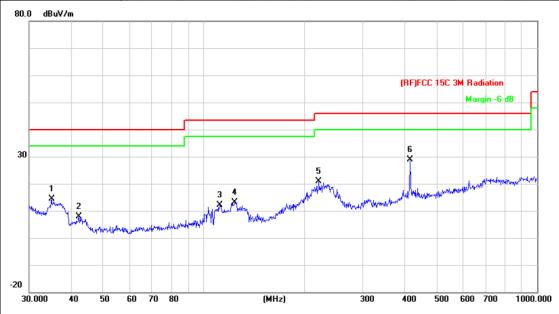
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EUT:		OBDI	I GPS Track	ker	Model:		T373B	
Temper	nperature: 25 °C Relative Humid				lumidity:	55%	N.	
Test Vo	est Voltage: DC 12V							
Ant. Po	Ant. Pol. Horizontal					62	-	
Test Mo	Mode: BLE TX 2402 Mode						HA	l less
Remark	<b>(:</b>	Only	worse case	is reported		CITI'S		_
80.0 dBu	iV/m							
		1 X	having of the good party of the state of the	2 3	5	(RF)FCC 15C	: 3M Radiation Margin -6	dB A
20 30.000	40 50	60 70	80	(MHz)	300	400 500	600 700	1000.00
No.	Mk. Fr	eq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
	MH	Ηz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detecto
1	70.8	315	34.05	-23.59	10.46	40.00	-29.54	peak
2	126.3	3285	42.31	-22.30	20.01	43.50	-23.49	peal
3	179.3	8863	40.27	-20.61	19.66	43.50	-23.84	peal
4	227.6	904	52.34	-19.18	33.16	46.00	-12.84	peal
5	323.3	3204	44.52	-16.20	28.32	46.00	-17.68	peal
	* 416.1		48.73	-12.88	35.85	46.00	-10.15	peal
				<b></b>	· <b>- ·</b>			
*:Maximu		ver limit	!:over margin	ect Factor				



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EUT:	OBDII GPS Tracker	Model:	T373B
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 12V		79
Ant. Pol.	Vertical		
Test Mode:	BLE TX 2402 Mode		All Des
Remark:	Only worse case is reported	ed	



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1		35.0048	31.42	-17.06	14.36	40.00	-25.64	peak
2		42.3021	29.10	-21.14	7.96	40.00	-32.04	peak
3		111.7378	34.00	-21.98	12.02	43.50	-31.48	peak
4		124.1329	35.62	-22.37	13.25	43.50	-30.25	peak
5		221.3919	40.35	-19.46	20.89	46.00	-25.11	peak
6	*	416.1791	41.83	-12.88	28.95	46.00	-17.05	peak

<sup>\*:</sup>Maximum data x:Over limit !:over margin



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		OBL	DII G	SPS T	racker	MOC	Model:			T3	73B	
erature:		25	$^{\circ}$ C	ET	130	Rela	Relative Humidity:			55	%	N. S.
oltage:		DC	12V	J. A.		13.0		(F	m'			
ol.		Hori	izon	tal	S W			1 6			AR.	
BLE TX 2442 Mode							1					
rk:		Only	y wo	rse c	ase is report	ed		611				
BuV/m												
								(RF)FC	C 15C :	3M Rad	liation	
										Marg	gin -6 d	В
						4		6				
						, Avry	5	1				
					2	3 / 1	MAN HANDER	٠.ال. ١			جدوه رسال المالية	and bethou
			1		JAN	Mirrial		James	of many distributions	handpillippe.	1	
my remarks		Jed.	X ALLUMAN	A PHILIPPINA PART	White and the state of the stat							
. *	United States		1									
40				)	(MHz)	)	300	400	500	enn	700	1000.0
	50	6U /	70 80							000	700	
	50	ьи и		eadir	ng Correc	t Meas	sure-					
Mk.	Fre		R	eadir Leve	_			Limit		Ove		
Mk.		eq.	R		l Facto		nt	<b>Limit</b>			r	Detecto
	Fre	<b>:q</b> .	R	Leve	I Facto	or me dBu	nt		'm	Ove	er	Detecto
7	Fre MH	eq. Z 315	R <sub>i</sub>	<b>Leve</b> dBuV	dB/m -23.59	or me dBu ) 10.	ent V/m .46	dBu∀/	m <b>O</b>	<b>Ove</b>	er 54	
7	Fre MH <b>70</b> .83	eq. z 315 285	R <sub>1</sub>	<b>Le∨e</b> dBu∨ <b>34.0</b> \$	dB/m 5 -23.59 1 -22.30	dBu dBu ) 10.	ent V/m .46	dBu∀/ <b>40</b> .0	m 0 ·	Ove dB -29.5	er 54 49	peal
7 1:	Fre MH 70.83	eq. Z 315 285 863	Ri I	Leve dBu∨ 34.05 42.31	dB/m 5 -23.59 1 -22.30 7 -20.61	or me dBu ) 10. ) 20. 1 19.	ent V/m .46 .01 .66	dBu∀/ 40.0 43.5	m 0 ·	O∨e dB -29.:	54 49 84	peal peal
7 1: 1' 2:	Fre MH 70.83 26.33	eq. z 315 285 863 904	R	Leve dBu√ 34.05 42.31 40.27	dB/m 5 -23.59 1 -22.30 7 -20.61 4 -19.18	or me dBu ) 10. ) 20. 1 19. 3 33.	ent	40.0 43.5 43.5	0 ·	Ove dB -29.: -23.:	54 49 84	peal peal peal
	oltage: ol.	ol. lode: 'k: BuV/m	erature: 25 oltage: DC ol. Hor lode: BLE rk: Onl BuV/m	erature: 25 °C oltage: DC 12V ol. Horizon lode: BLE TX rk: Only wo	oltage: DC 12V  ol. Horizontal  lode: BLE TX 2442  rk: Only worse of BuV/m	ol. Horizontal lode: BLE TX 2442 Mode ck: Only worse case is report	oltage: DC 12V  ol. Horizontal lode: BLE TX 2442 Mode  ok: Only worse case is reported  BuV/m	Perature: 25 °C Relative Holtage: DC 12V  ol. Horizontal  lode: BLE TX 2442 Mode  Only worse case is reported  BuV/m	Prature: 25 °C Relative Humidit oltage: DC 12V  OI. Horizontal  Iode: BLE TX 2442 Mode  Only worse case is reported  Buv/m  (RF)FO	Prature: 25 °C Relative Humidity:  oltage: DC 12V  ol. Horizontal  lode: BLE TX 2442 Mode  Only worse case is reported  Buv/m  (RFJFCC 15C:	Prature: 25 °C Relative Humidity: 55  oltage: DC 12V  ol. Horizontal  lode: BLE TX 2442 Mode  rk: Only worse case is reported  BBUV/m  (REFJECC 15C 3M Rad Mark	Prature: 25 °C Relative Humidity: 55%  oltage: DC 12V  ol. Horizontal BLE TX 2442 Mode  Only worse case is reported  Buv/m  (RFJFCC 15C 3M Radiation Margin 6 of 5 of



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EUT:	OBDII GPS Trac	ker	Model:		T373B	and the
Temperature:	25 ℃	W.	Relative H	lumidity:	55%	N. Jaco
Test Voltage:	DC 12V			TIES	133	
Ant. Pol.	Vertical	Alter		1 62	-	
Test Mode:	BLE TX 2442 Mode					
Remark:	Only worse case	is reported	600	CITI'S		_ 6
30 1 1 -20 30.000 40 50 No. Mk. Fr	Reading req. Level	(MHz)  Correct Factor	300 Measure- ment	6 ×		1000.000
	Hz dBuV	dB/m	dBuV/m	dBuV/m		 Detector
	5172 27.35	-16.76	10.59	40.00	-29.41	peak
2 92.7	7870 33.21	-22.45	10.76	43.50	-32.74	peak
3 126.	7723 34.71	-22.29	12.42	43.50	-31.08	peak
4 148.	4410 35.76	-21.30	14.46	43.50	-29.04	peak
5 230.9	9068 42.62	-19.03	23.59	46.00	-22.41	peak
6 * 416.	1791 44.59	-12.88	31.71	46.00	-14.29	peak
	Over limit !:over margin					



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EUT:	OBDII	OBDII GPS Tracker Model:			T373B		
Temperature:	25 ℃		NO T	Relative Humidity:			N. Pe
Test Voltage:	DC 12\	/	1	1339			
Ant. Pol.	Horizor	ntal					
Test Mode:	BLE T	< 2480 Mod	de				l lister
Remark:	Only w	orse case i	s reported		CITE !	3	_ {
80.0 dBuV/m							
					(RF)FCC 150	3M Radiation	
						Margin -6	dB
30							
				5 6			
1 2 3 *\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	مراجع الماري	A. JAMAHAMANATA	The purchase have	Share James Market	ggyadolyd hwythologycong globy	- William Market Company	
. 14	ANTICON STATES OF THE PROPERTY	MC .					
-20		80	(MHz)	300	400 500	600 700	1000.000
-20	60 60 70 8	80			400 500	600 700	1000.000
-20 30.000 40 5	60 60 70 8		(MHz)  Correct Factor	Measure- ment	400 500 Limit	600 700 Over	1000.000
-20 30.000 40 5	60 60 70 1	Reading	Correct	Measure-			
-20 30.000 40 5 No. Mk.	60 60 70 Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	Detecto
-20 30.000 40 5 No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	<b>Limit</b> dBuV/m	<b>Over</b>	Detecto <b>peak</b>
No. Mk.  1 30 2 35	Freq.  MHz 0.9618	Reading Level dBuV 27.57	Correct Factor dB/m -14.55	Measure- ment dBuV/m 13.02	Limit dBuV/m 40.00	O∨er dB -26.98	Detecto peak peak
No. Mk.  1 30 2 35 3 44	Freq.  MHz  0.9618  5.1278	Reading Level dBuV 27.57 29.72	Correct Factor dB/m -14.55 -17.14	Measure- ment dBuV/m 13.02 12.58	Limit dBuV/m 40.00 40.00	Over  dB  -26.98  -27.42	Detector peak peak peak
No. Mk.  1 30 2 35 3 44 4 12	Freq. MHz 0.9618 5.1278 4.7433	Reading Level dBuV 27.57 29.72 32.04	Correct Factor dB/m -14.55 -17.14 -22.16	Measure- ment dBuV/m 13.02 12.58 9.88	Limit  dBuV/m  40.00  40.00  40.00	Over  dB  -26.98  -27.42  -30.12	Detector peak peak peak



Emission Level= Read Level+ Correct Factor

Report No.: TB-FCC145507

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UT:	OBDI	II GPS Track	ker	Model:		T373E	3
emperature:	25 ℃		30	Relative Humidity:			
est Voltage:	DC 1	2V	III	133			
Ant. Pol.	Vertic	cal	62		III		
est Mode:	BLE	TX 2480 Mo	de				
Remark:	Only	worse case	is reported		CITE OF		
80.0 dBuV/m							
					(RF)FCC 15C	3M Radiation	
						Margin -6	dB
30				4			6
			3	X. 5			Marketing
			2 ×	- Ny U		LANGE OF THE PARTY	
Marker Marker	Mahman	, where	2 1	- Ny U	who happen was	rglingthone paramet	
	50 60 70	graphy depring property and property of the second	(MHz)	- Ny U	400 500	600 700	1000.0
20		graphy degree of participants of the control of the	A The second of	~ * * * * * * * * * * * * * * * * * * *			1000.00
20 30.000 40	50 60 70	80 Reading	(MHz)	300 Measure-	400 500	600 700	1000.0i
20 30.000 40 No. Mk.	50 60 70 Freq.	Reading Level	(MHz)  Correct Factor	300 Measure- ment	400 500 Limit	600 700 Over	
20 30.000 40 No. Mk.	Freq.  MHz	Reading Level	(MHz)  Correct Factor  dB/m	300  Measure- ment  dBuV/m	400 500  Limit  dBuV/m	Over	Detect
No. Mk.  1 5 2 12	Freq.  MHz  60.0566	Reading Level dBuV 35.23	(MHz) Correct Factor dB/m -24.40	Measure- ment dBuV/m	400 500  Limit  dBuV/m  40.00	Over dB -29.17	Detect
No. Mk.  1 5 2 12 3 17	Freq.  MHz  60.0566  24.5690	Reading Level dBuV 35.23 40.59	Correct Factor dB/m -24.40 -22.35	Measure- ment dBuV/m 10.83 18.24	400 500  Limit  dBuV/m  40.00  43.50	Over  dB  -29.17  -25.26	Detection peal
No. Mk.  1 5 2 12 3 17 4 23	Freq.  MHz  60.0566  24.5690  75.6516	Reading Level dBuV 35.23 40.59 40.57	(MHz)  Correct Factor  dB/m  -24.40  -22.35  -20.83	300 Measure- ment dBuV/m 10.83 18.24 19.74	Limit  dBuV/m  40.00  43.50  43.50	Over  dB  -29.17  -25.26  -23.76	Detection peal peal peal



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EUT:	OBDII GPS Tracker	Model:	T373B				
Temperature:	<b>25</b> ℃	Relative Humidity:	55%				
Test Voltage:	DC 12V		2				
Ant. Pol.	Horizontal						
Test Mode:	BLE Mode TX 2402 MHz		HILL				
Remark:	No report for the emission which	No report for the emission which more than 10 dB below the					
	prescribed limit.	7					

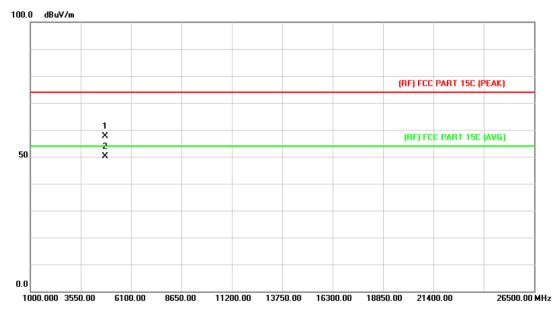


N	o. Mk	. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4803.879	37.33	13.44	50.77	54.00	-3.23	AVG
2		4803.891	44.97	13.44	58.41	74.00	-15.59	peak



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EUT:	OBDII GPS Tracker	Model:	T373B
Temperature:	<b>25</b> ℃	Relative Humidity:	55%
Test Voltage:	DC 12V	CITI'S	19
Ant. Pol.	Vertical		
Test Mode:	BLE Mode TX 2402 MHz		Allen
Remark:	No report for the emission whi	ch more than 10 dB belo	ow the
	prescribed limit.		

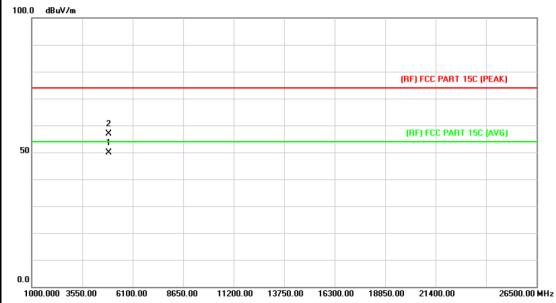


No	o. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4803.821	44.20	13.44	57.64	74.00	-16.36	peak
2	*	4803.984	36.67	13.44	50.11	54.00	-3.89	AVG



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EUT:	OBDII GPS Tracker	Model:	T373B			
Temperature:	<b>25</b> ℃	°C Relative Humidity: 55%				
Test Voltage:	DC 12V		33			
Ant. Pol.	Horizontal	Horizontal				
Test Mode:	BLE Mode TX 2442 MHz	CHILD TO	HILL			
Remark:	No report for the emission which more than 10 dB below the					
	prescribed limit.					

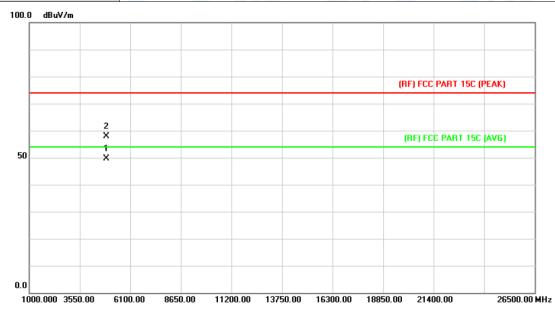


No	. Mk	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4884.014	35.95	13.92	49.87	54.00	-4.13	AVG
2		4884.140	43.06	13.92	56.98	74.00	-17.02	peak



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EUT:	OBDII GPS Tracker	Model:	T373B			
Temperature:	<b>25</b> ℃	Relative Humidity:	55%			
Test Voltage:	DC 12V		19			
Ant. Pol.	Vertical					
Test Mode:	BLE Mode TX 2442 MHz		HILL			
Remark:	No report for the emission which more than 10 dB below the					
	prescribed limit.					

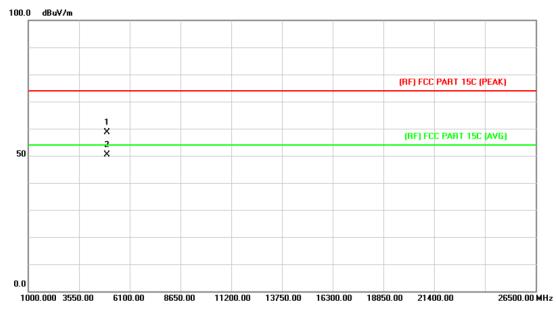


No	. Mk	. Freq.	_	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4883.874	35.75	13.92	49.67	74.00	-24.33	peak
2	*	4883.891	43.96	13.92	57.88	74.00	-16.12	peak



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EUT:	OBDII GPS Tracker	Model:	T373B				
Temperature:	25 ℃	Relative Humidity:	55%				
Test Voltage:	DC 12V						
Ant. Pol.	Horizontal	Horizontal					
Test Mode:	BLE Mode TX 2480 MHz		HILL				
Remark:	No report for the emission which more than 10 dB below the prescribed limit.						
	procensed mine.						



N	o. Mk	. Freq.	-	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4960.137	44.28	14.36	58.64	74.00	-15.36	peak
2	*	4960.157	36.11	14.36	50.47	54.00	-3.53	AVG



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EUT:	OBDII GPS Tracker	T373B				
Temperature:	<b>25</b> ℃	Relative Humidity:	55%			
Test Voltage:	DC 12V		33			
Ant. Pol.	Vertical					
Test Mode:	BLE Mode TX 2480 MHz		HILL			
Remark:	No report for the emission which more than 10 dB below the					
	prescribed limit.					
			·			



No	. Mk	Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4959.874	35.51	14.36	49.87	54.00	-4.13	AVG
2		4960.571	43.28	14.36	57.64	74.00	-16.36	peak



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# 6. Restricted Bands Requirement

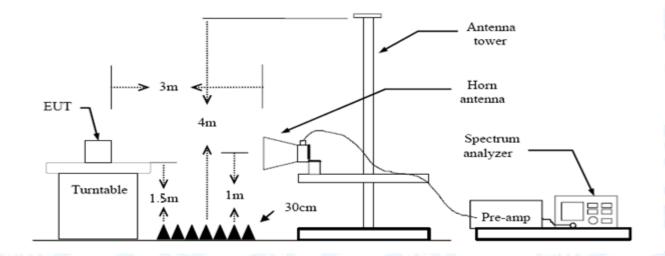
#### 6.1 Test Standard and Limit

6.1.1 Test Standard FCC Part 15.209 FCC Part 15.205

6.1.2 Test Limit

Restricted Frequency	Class B (dBuV/m)(at 3 M)				
Band (MHz)	Peak	Average			
2310 ~2390	74	54			
2483.5 ~2500	74	54			

### 6.2 Test Setup



#### 6.3 Test Procedure

- (1) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1 GHz. The EUT was placed on a rotating 0.8m high above ground, the table was rotated 360 degrees to determine the position of the highest radiation.
- (2) Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.
- (3) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- (4) The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked



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and then Quasi Peak detector mode re-measured.

- (5) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
- (6) Testing frequency range below 1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection.
- (7) Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 KHz with Peak Detector for Average Values.
- (8) For the actual test configuration, please see the test setup photo.

### 6.4 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power.

#### 6.5 Test Data

Remark: During testing above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=1kHz with Peak Detector for Average Values.

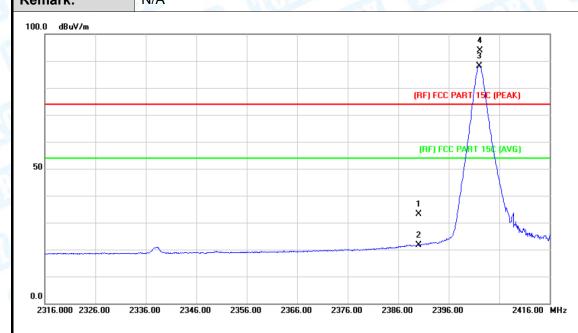
Test data please refer the following pages.



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# (1) Radiation Test

EUT:	OBDII GPS Tracker	Model:	T373B
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 12V	1	
Ant. Pol.	Horizontal		MILL
Test Mode:	BLE Mode TX 2402 MHz	100	3 - 6
Romark:	N/Δ	THE WALL	THE RESERVE



No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	O∨er	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2390.000	32.33	0.77	33.10	74.00	-40.90	peak
2		2390.000	20.93	0.77	21.70	54.00	-32.30	AVG
3	*	2402.100	87.26	0.82	88.08	Fundamental	Frequency	AVG
4	Х	2402.200	93.13	0.82	93.95	Fundamental I	Frequency	peak



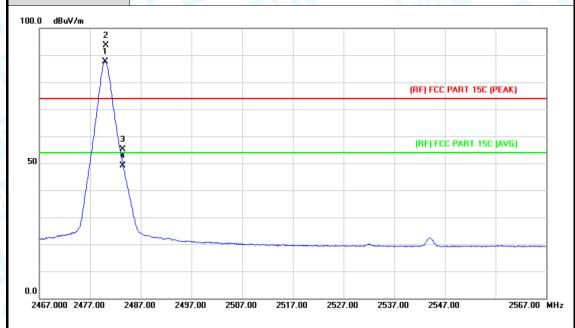
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EUT	T:		OBD	II GPS Track	ker	Model:		T373E	3
Гет	peratui	re:	25 °C		10	Relative	Humidity:	55%	N. P.
Test	t Voltag	e:	DC 1	2V	-	18	CIII	13.3	
۹nt.	. Pol.		Verti	cal	AHO:				
Test	t Mode:		BLE	Mode TX 24	02 MHz	mille		1 1/1/11	Messe
Ren	nark:		N/A	M. Salar	1	6	Tim's	3	_ 1
100.0	) dBuV/m								
50								ART 15C (PEAK	
0.0	16.000 232	6.00 2	336.00	2346.00 2356	5.00 2366.00	2376.00 2	386.00 2396.00	) 2	416.00 MH
N	lo. Mk	. Fre	eq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MF	Hz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detecto
1		2390.	.000	30.19	0.77	30.96	74.00	-43.04	peak
2		2390.	.000	20.68	0.77	21.45	54.00	-32.55	AVG
	*	2402.	.000	86.01	0.82	86.83	Fundamental F	requency	AVG
3						<del>_</del>			_



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EUT:	OBDII GPS Tracker	Model:	T373B
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 12V		13
Ant. Pol.	Horizontal		
Test Mode:	BLE Mode TX 2480 MHz		HILL
Remark:	N/A		

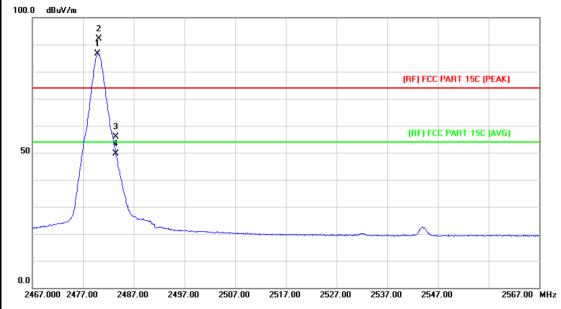


No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	O∨er	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	2480.000	86.43	1.15	87.58	Fundamental	Frequency	AVG
2	Х	2480.100	92.47	1.15	93.62	Fundamental	Frequency	peak
3		2483.500	54.01	1.17	55.18	74.00	-18.82	peak
4		2483.500	48.02	1.17	49.19	54.00	-4.81	AVG

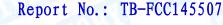


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EUT:	OBDII GPS Tracker	Model:	T373B		
Temperature:	25 ℃	Relative Humidity:	55%		
Test Voltage:	DC 12V	dillin	3		
Ant. Pol.	Vertical	Vertical			
Test Mode:	BLE Mode TX 2480 MHz		ABOVE		
Remark:	N/A				



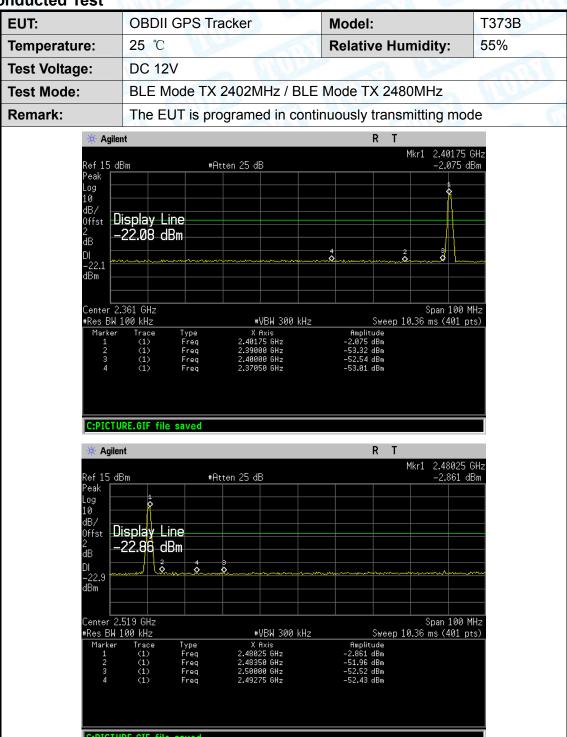
No	. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	O∨er	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	2479.900	85.54	1.15	86.69	Fundamental F	requency	AVG
2	Χ	2480.200	91.02	1.15	92.17	Fundamental F	requency	peak
3		2483.500	54.70	1.17	55.87	74.00	-18.13	peak
4		2483.500	48.40	1.17	49.57	54.00	-4.43	AVG





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### (2) Conducted Test





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# 7. Bandwidth Test

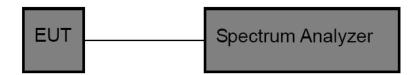
#### 7.1 Test Standard and Limit

7.1.1 Test Standard FCC Part 15.247 (a)(2)

7.1.2 Test Limit

FCC I	FCC Part 15 Subpart C(15.247)/RSS-247						
Test Item	Limit	Frequency Range(MHz)					
Bandwidth	>=500 KHz (6dB bandwidth)	2400~2483.5					

## 7.2 Test Setup



#### 7.3 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) The bandwidth is measured at an amplitude level reduced 6dB from the reference level. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst –case (i.e the widest) bandwidth.
- (3)Measure the channel separation the spectrum analyzer was set to Resolution Bandwidth:100 kHz, and Video Bandwidth:300 kHz, Detector: Peak, Sweep Time set auto.

## 7.4 EUT Operating Condition

The EUT was set to continuously transmitting in each mode and low, middle and high channel for the test.



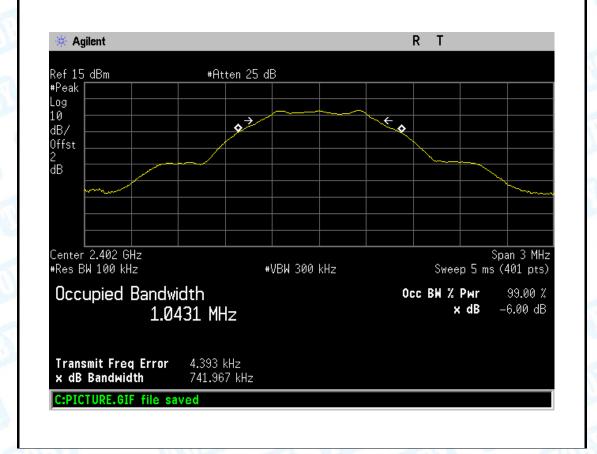
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## 7.5 Test Data

EUT:	OBI	DII GPS Tracker	Model:	T373B			
Temperature:	25	${\mathbb C}$	Relative Humidity:	55%			
Test Voltage:	DC	DC 12V					
Test Mode: BLE TX Mode							
Channel frequency		6dB Bandwidth	6dB Bandwidth 99% Bandwidth				
(MHz)		(kHz)	(kHz)	(kHz)			
2402		741.967	1043.10				
2442		2442 738.579		>=500			
2480	2480 735.332		1040.60				
		BI E Mod	le .				

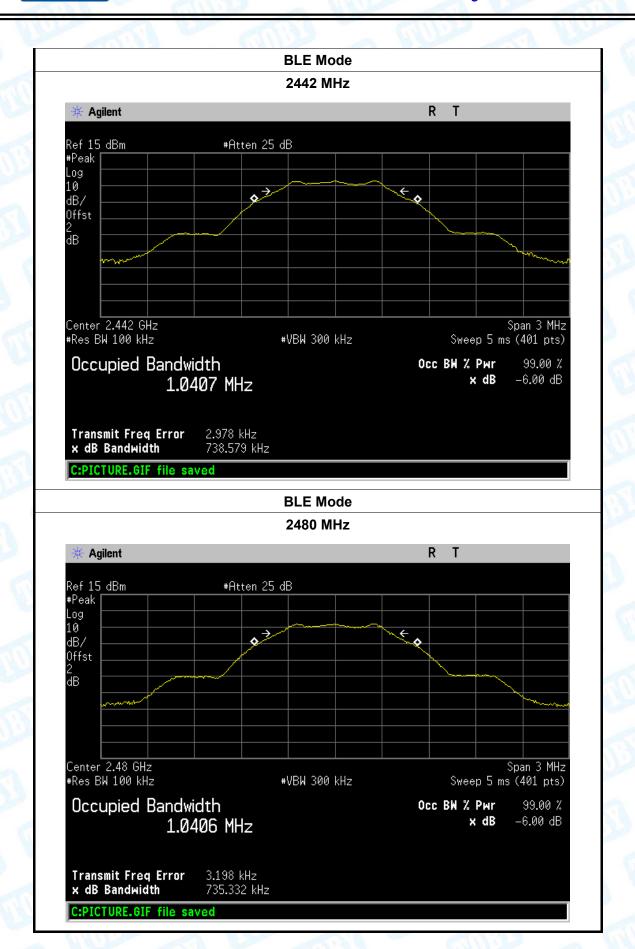
#### **BLE Mode**

#### 2402 MHz





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# 8. Peak Output Power Test

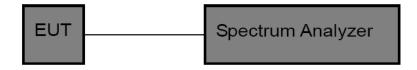
### 8.1 Test Standard and Limit

8.1.1 Test Standard FCC Part 15.247 (b)

8.1.2 Test Limit

FCC Part 15 Subpart C(15.247)/RSS-247					
Test Item	Limit	Frequency Range(MHz)			
Peak Output Power	1 Watt or 30 dBm	2400~2483.5			

## 8.2 Test Setup



#### 8.3 Test Procedure

The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above. The measurement is according to section 9.1.1 of KDB 558074 D01 DTS Meas Guidance v03r03.

- (1) Set the RBW≥DTS Bandwidth
- (2) Set VBW≥3\*RBW
- (3) Set Span≥3\*RBW
- (4) Sweep time=auto
- (5) Detector= peak
- (6) Trace mode= maxhold.
- (7) Allow trace to fully stabilize, and then use peak marker function to determine the peak amplitude level.

## 8.4 EUT Operating Condition

The EUT was set to continuously transmitting in the max power during the test.



M1 S2 S3 FC AA

Center 2.402 GHz #Res BW 1 MHz

C:PICTURE.GIF file saved

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# 8.5 Test Data

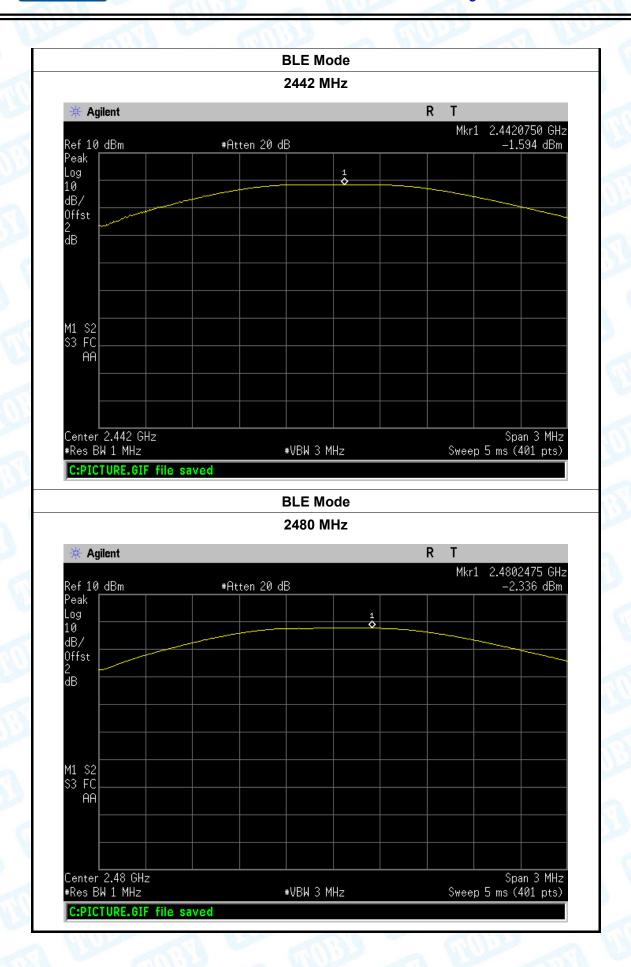
:UT:	OBDII GPS	Tracker	Mode	el:	T373B
emperature:	25 ℃		Rela	tive Humidity:	55%
est Voltage:	DC 12V			The same	Allen
est Mode:	BLE TX Mod	de	1		
Channel freque	ncy (MHz)	Test Resul	lt (dBm)	Limi	t (dBm)
2402		-1.58	36		
2442		-1.59	94		30
2480		-2.33	36		
		BLE M	lode		
		2402 N	ИНz		
<b>※</b> Agilent		2402 N	ИНz	R T	
<b>Agilent</b> Ref 10 dBm  Peak Log	#A	<b>2402 N</b> tten 20 dB	MHz		.4020900 GHz -1.586 dBm

#VBW 3 MHz

Span 3 MHz Sweep 5 ms (401 pts)



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# 9. Power Spectral Density Test

#### 9.1 Test Standard and Limit

9.1.1 Test Standard FCC Part 15.247 (e)

9.1.2 Test Limit

FCC Part 15 Subpart C(15.247)						
Test Item	Limit	Frequency Range(MHz)				
Power Spectral Density	8dBm(in any 3 kHz)	2400~2483.5				

## 9.2 Test Setup



#### 9.3 Test Procedure

The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above. The measurement according to section 10.2 of KDB 558074 D01 DTS Meas Guidance v03r03.

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Set analyser center frequency to DTS channel center frequenyc.
- (3) Set the span to 1.5 times the DTS bandwidth.
- (4) Set the RBW to: 3 kHz(5) Set the VBW to: 10 kHz
- (6) Detector: peak(7) Sweep time: auto
- (8) Allow trace to fully stabilize. Then use the peak marker function to determine the maximum amplitude level.

# 9.4 EUT Operating Condition

The EUT was set to continuously transmitting in each mode and low, Midle and high channel for the test.



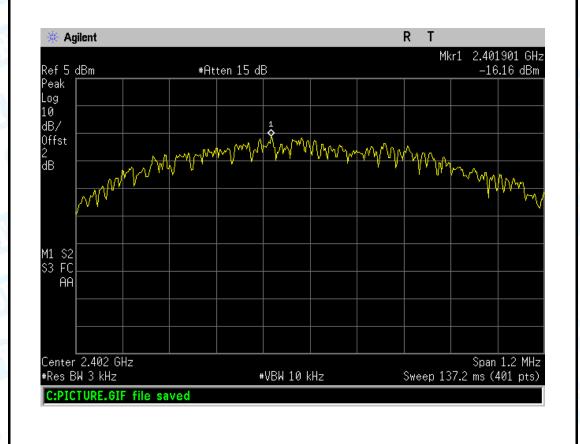
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## 8.5 Test Data

EUT:	OBDII GF	S Tracker	Model:	T373B	
Temperature:	25 ℃		Relative Humidity:	55%	
Test Voltage:	DC 12V	OC 12V			
Test Mode: BLE TX Mode				I Was	
Channel Freque	Channel Frequency		sity	Limit	
(MHz)		(3 kHz/dBı	m)	(dBm)	
2402		-16.16			
2442		-16.18		8	
2480		-16.87			
		BI F Mod	<u>.</u>		

#### DLL WIOGE

#### 2402 MHz





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**BLE Mode** 2442 MHz R Agilent Mkr1 2.441901 GHz Ref 5 dBm #Atten 15 dB -16.18 dBm Peak Log 10 10 dB/ Offst Marker Ma ymmannam wayahayahaha ďΒ **2.4**41901000 GHz -16.18 dBm M1 S2 S3 FC AA Center 2.442 GHz Span 1.2 MHz Sweep 137.2 ms (401 pts) #Res BW 3 kHz #VBW 10 kHz C:PICTURE.GIF file saved **BLE Mode** 2480 MHz Agilent R Mkr1 2.479901 GHz -16.87 dBm Ref 5 dBm Peak #Atten 15 dB Log 10 dB/ Offst ďΒ M1 S2 S3 FC AA Center 2.48 GHz Span 1.2 MHz #Res BW 3 kHz #VBW 10 kHz Sweep 137.2 ms (401 pts) C:PICTURE.GIF file saved



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# 10. Antenna Requirement

## 10.1 Standard Requirement

10.1.1 Standard FCC Part 15.203

### 10.1.2 Requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

#### 10.2 Antenna Connected Construction

The directional gains of the antenna used for transmitting is 0.46 dBi, and the antenna de-signed with permanent attachment and no consideration of replacement. Please see the EUT photo for details.

#### 10.3 Result

The EUT antenna is a PCB Antenna. It complies with the standard requirement.

Antenna Type	
▶ Permanent attached antenna	entil
□ Unique connector antenna	
☐ Professional installation antenna	$M_{i}$