



Test Report No. 9112317224

Applicant: Cadent Ltd

Foot pedal and USB dongle transceivers.

Model: EA03586-B

Pedal FCC ID: UZ2EA03586

Dongle FCC ID: UZ2ED03586

***From The Standards Institution
Of Israel
Industry Division
Telematics Laboratory
EMC Section***



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Model: EA03586-B

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1. Applicant information

Applicant:	Cadent Ltd
Address:	17 Ha'Taasiya Street, POB 1018, Or Yehuda, Israel
Sample for test selected by:	The customer
The date of tests:	21- 22 March, 26 April, 3 May 2011

Equipment under test information

Description of Equipment Under Test (EUT):	Foot pedal and USB dongle transceivers.
Model:	EA03586-B
Serial Number:	NA
Manufactured by:	Cadent Ltd

2. Test performance

Location:	SII EMC Section
Purpose of test:	Apparatus compliance verification in accordance with emission requirements
Test specifications:	47CFR part 15.247

Reference Documents:

- ❖ CFR 47 FCC: Rules and Regulations; Part 15. "Radio frequency devices";
Subpart B: "Unintentional radiators" (2009)
Subpart C: "Intentional radiators" (2009),
Section 15.205. "Restricted bands of operations",
Section 15.209. "Radiated emission limits, general requirements".
"Radiated Emission Limits, Additional Provisions";
Section 15.247. "Operation within the bands 902 - 928 MHz,
2400 - 2483.5 MHz, 5725 - 5875 MHz".

This Test Report contains 47 pages
and may be used only in full.

This Test Report applies only to the specimen tested and may not
be applied to other specimens of the same product.

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3. Summary of test

The EUT was found to be in compliance with requirements of: 47CFR Part 15, §§ 15.247, 15.107, 15.109, 15.205 and 15.207, 15.209.

Transmitter characteristics	Subclasses
Occupied bandwidth, channel frequency separation	15.247(a)(1)
Maximum EIRP output power	15.247(a)(1)
Number of hopping channels, average time of occupancy	15.247(a)(1)(iii)
Out of band spurious emissions radiated	15.205, 15.247(d)
Conducted emissions on AC power line	15.107, 15.207
Radiated emissions below 1 GHz	15.109, 15.209

Telematics Laboratory

31 August 2011

Name: Eng. Yuri Rozenberg
Position: Head of EMC Branch

Name: Michael Feldman
Position: Test Technician

Measurement uncertainty.

Were relevant, the following measurement uncertainty level have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Test description	Expanded uncertainty
<u>Radiated emissions</u> in the open field test site at 3 m measuring distance: 30 MHz – 1.0 GHz 1.0 GHz – 18 GHz	 2 Uc (E) = ± 4.32 dB 2 Uc (E) = ± 4.47 dB

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*The customer provided description.

4.1 General description

The EA03586-B is 2.4 GHz band hopping transmitter system includes 2 parts; one is transceiver that locates in foot pedal and second is Mini USB dongle transceiver which assembled in iTero cart. Foot pedal device is activated for the scanning sequence and responding to screen questions. Foot pedal transceiver is powered from two AA Alkaline 1.5 V batteries. The mini USB dongle is powered via USB port.

EUT technical characteristics

Transmitter technical characteristics.		Note
Assigned frequency range	2400 MHz – 2483.5 MHz	
Operating frequency range	2402 MHz – 2480 MHz	
Spread spectrum technique used	Frequency hopping (FHSS)	
Number of hops	16 (foot pedal)/17 (dongle)	Independence mode.
Dwell time (msec)	14.1/96.3	Foot pedal/Dongle
Channel bandwidth	1 Mbps	
Type of modulation	GFSK	
Antenna information		
Type	Manufacturer	
Internal on PCB	Cadent Ltd	

Example of frequency hopping sequence.

Foot pedal transmitter.

No	Channel No	Frequency, MHz	No	Channel No	Frequency, MHz
1	35	2471	9	16	2433
2	30	2461	10	31	2463
3	33	2467	11	1	2403
4	24	2449	12	5	2411
5	26	2453	13	7	2415
6	28	2457	14	10	2421
7	12	2425	15	14	2429
8	20	2441	16	39	2479

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USB dongle transmitter.

No	Channel No	Frequency, MHz	No	Channel No	Frequency, MHz
1	35	2471	10	31	2463
2	30	2461	11	1	2403
3	33	2467	12	8	2417
4	24	2449	13	5	2411
5	26	2453	14	7	2415
6	28	2457	15	10	2421
7	12	2425	16	14	2429
8	20	2441	17	39	2479
9	16	2433			

5. EUT test configuration

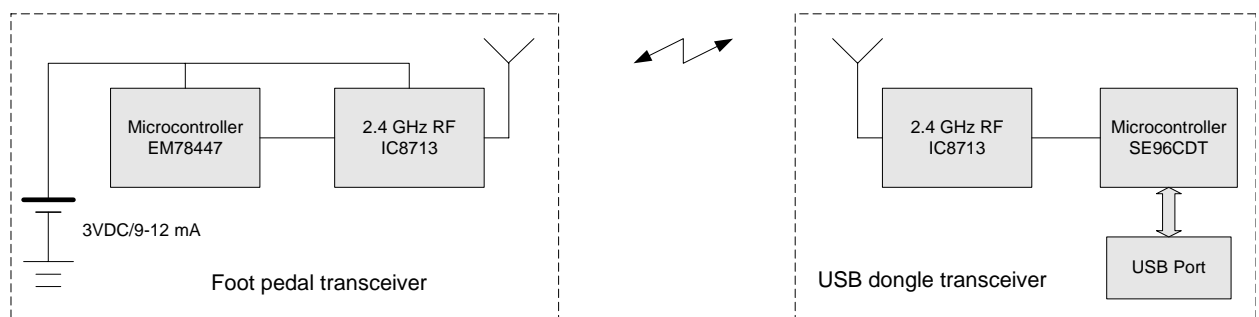


Fig. 1. EUT block diagram.

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Model: EA03586-B

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6. Test results

6.1 Transmitter characteristics

6.1.1 Occupied bandwidth and channel frequencies separation according to § 15.247(a)(1).

Method of measurement DA 00-705 hopping procedure
 Operating Frequency Range 2403 – 2479 MHz
 Ambient Temperature 23⁰ C Relative Humidity 49% Air Pressure 1011 hPa

Tested unit	Carrier frequency MHz	Measured 20 dB bandwidth, MHz	Reference to plots #
Foot pedal	2403	1.26	1
	2441	1.29	2
	2479	1.30	3
USB dongle	2403	1.26	7
	2441	1.29	8
	2479	1.31	9

Tested unit	Frequency range MHz	Channel carrier frequency separation, MHz	Reference to plots #
Foot pedal	2403 - 2479	1.96	6
USB dongle	2403 - 2479	2.07	11

LIMIT

Operating frequency range, MHz	Channel carrier frequency separation
2400-2483.5	25 kHz or 20 dB bandwidth, whichever is greater.

TEST PROCEDURE

The measurements were performed in hopping transmission mode of operation for carrier (channel) frequency at bottom, middle and at the top of 2400 – 2483.5 MHz frequency band and maximum transmitting data rate.

TEST EQUIPMENT USED:

2	3	4	13			
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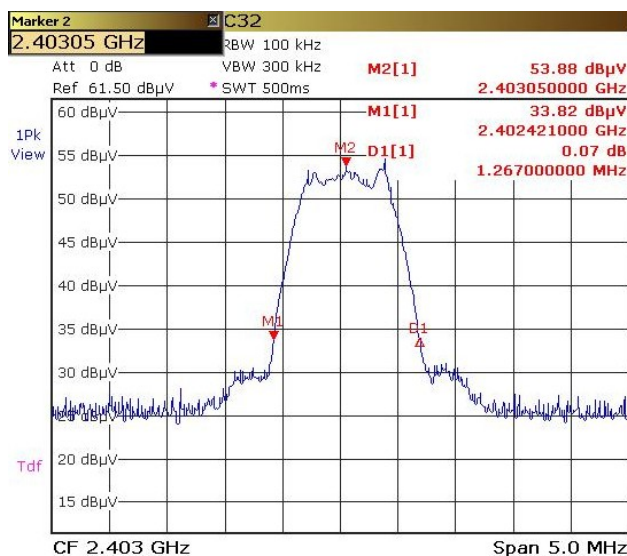
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Title: Foot pedal and USB dongle transceivers.

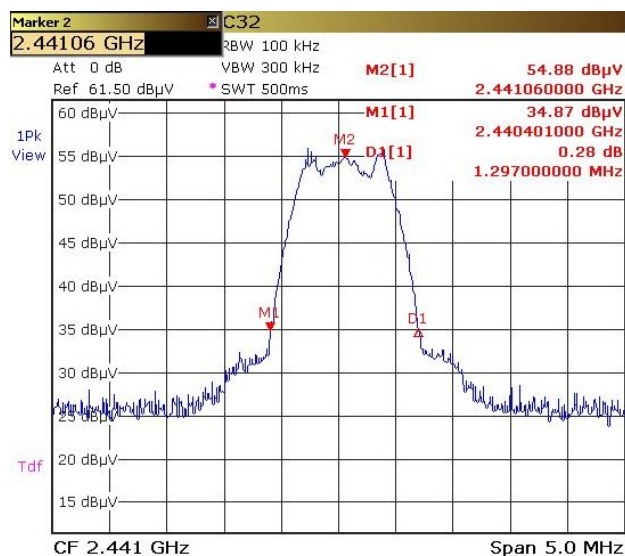
Model: EA03586-B

Pedal FCC ID: UZ2EA03586; Dongle FCC ID: UZ2ED03586

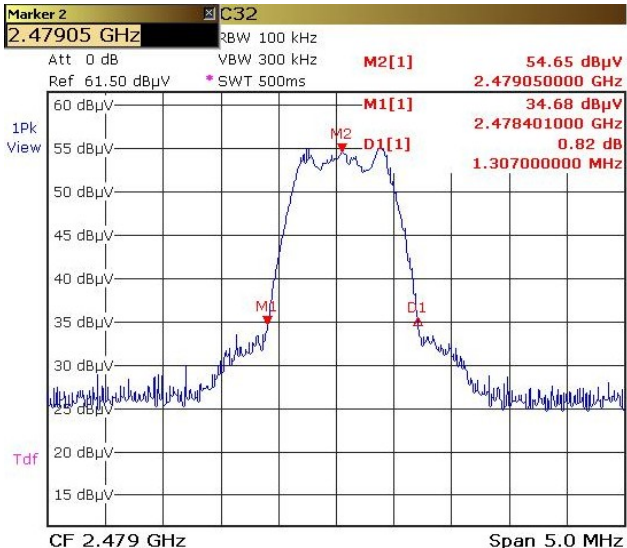
Foot pedal transmitter.



Plot # 1



Plot # 2



Plot # 3

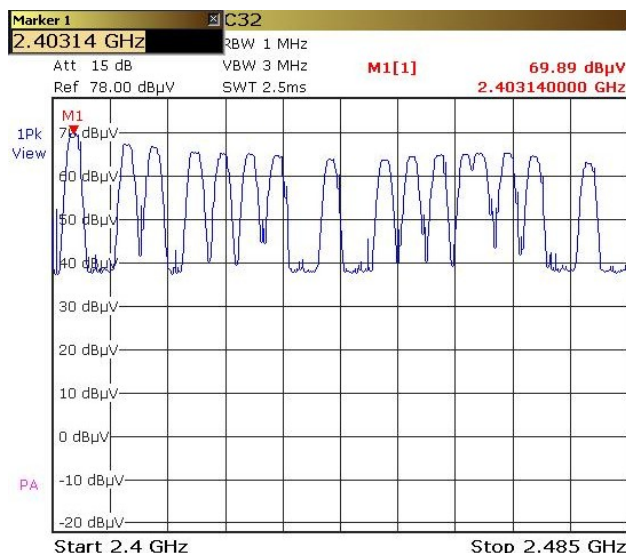
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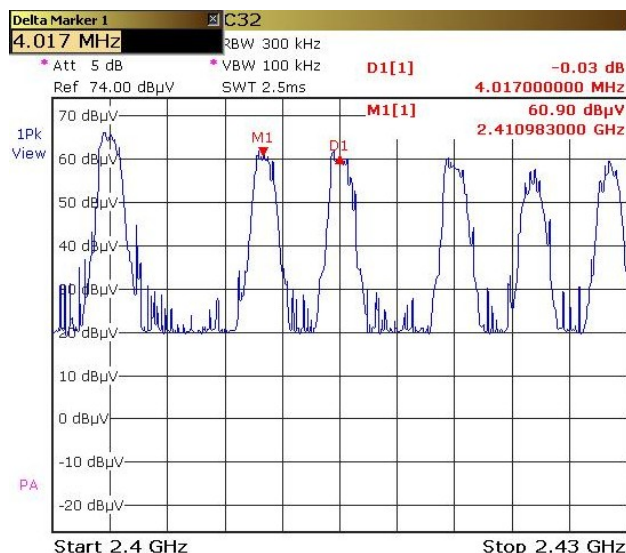
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Model: EA03586-B

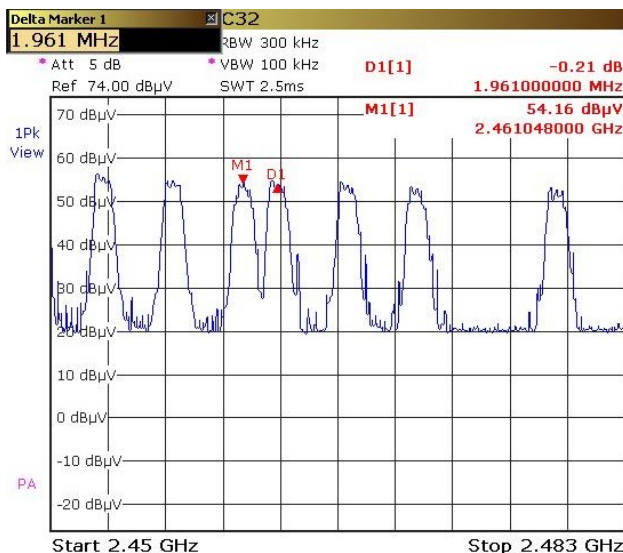
Pedal FCC ID: UZ2EA03586; Dongle FCC ID: UZ2ED03586



Plot # 4



Plot # 5



Plot # 6

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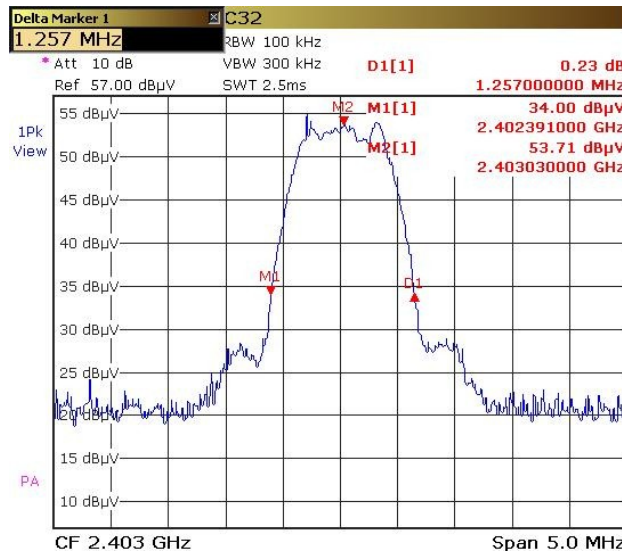
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Title: Foot pedal and USB dongle transceivers.

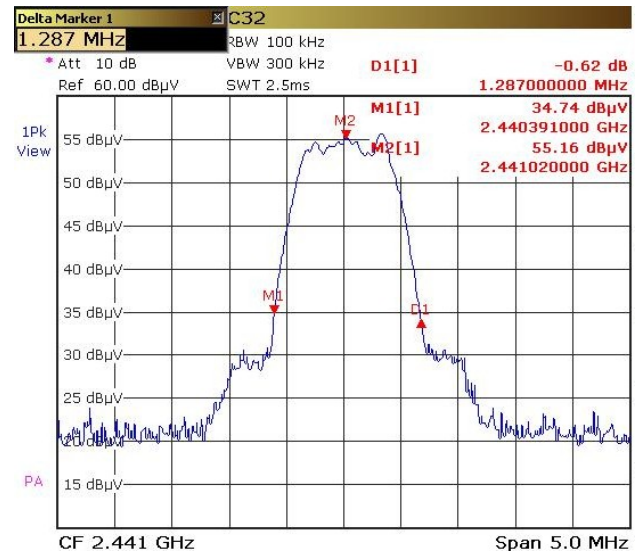
Model: EA03586-B

Pedal FCC ID: UZ2EA03586; Dongle FCC ID: UZ2ED03586

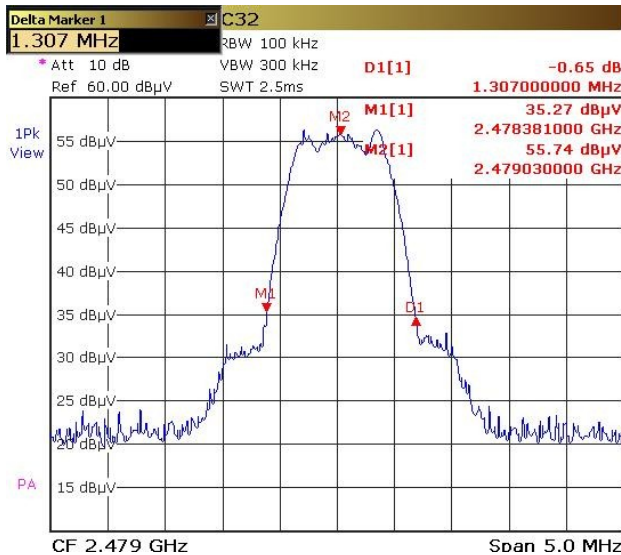
USB dongle transmitter.



Plot # 7



Plot # 8



Plot # 9



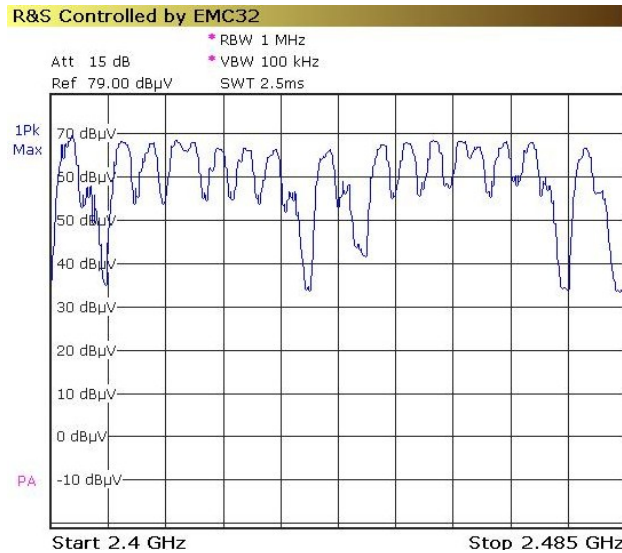
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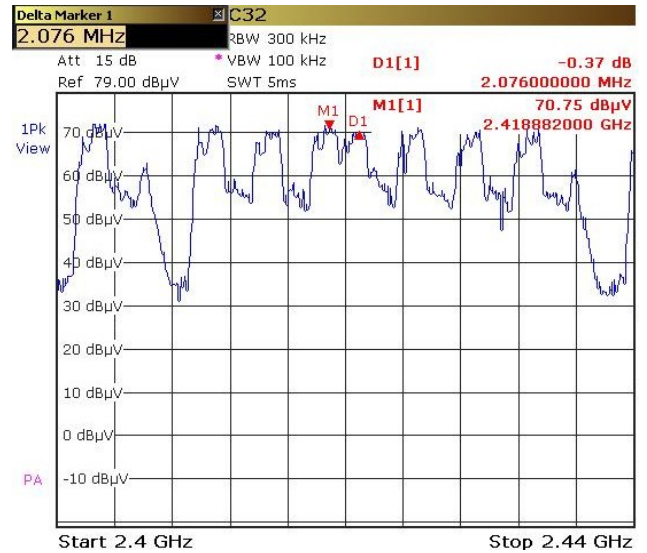
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Model: EA03586-B

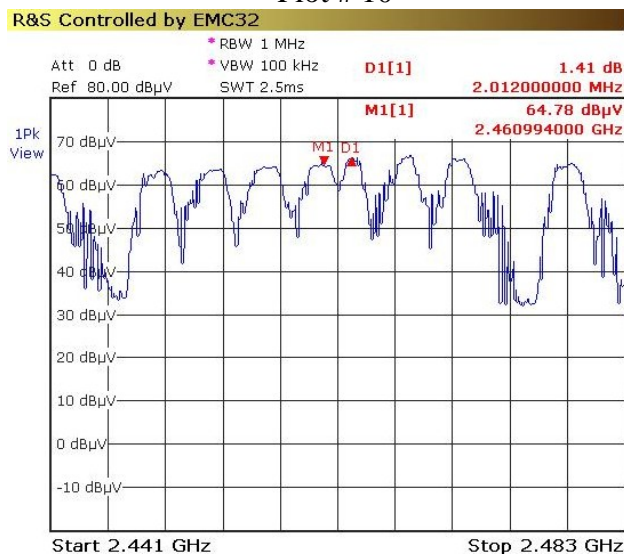
Pedal FCC ID: UZ2EA03586; Dongle FCC ID: UZ2ED03586



Plot # 10



Plot # 11



Plot # 12

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Title: Foot pedal and USB dongle transceivers.

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6.1.2 Maximum EIRP output power test according to §15.247 (a)(1).

Method of measurement DA 00-705 hopping procedure
 Operating Frequency Range 2403 – 2479 MHz
 Ambient Temperature 23⁰ C Relative Humidity 49% Air Pressure 1011 hPa

Foot pedal transmitter.

Carrier frequency, MHz	Peak output power, dBm	Limit, dBm	Reference to plots #
2403	-13.3	21	7
2441	-11.7	21	8
2479	-13.0	21	9

USB dongle transmitter.

Carrier frequency, MHz	Peak output power, dBm	Limit, dBm	Reference to plots #
2403	-18.8	21	7
2441	-18.3	21	8
2479	-20.1	21	9

LIMIT

Operating frequency range, MHz	Maximum output power, W
2400-2483.5	0.125(21 dBm)

TEST PROCEDURE

The measurement provided according to ANSI/TIA-603-C-2004 section 2.2.12 substitution test method. Measurement of transmitter carrier emission was performed. EUT was replaced by generator and substitution antenna. Result calculated from generator output level, substitution antenna gain and loss of connected cable was compared with the limit. Transmitter was operated at continuous transmit mode at bottom, middle and top of the 2400 – 2483.5 MHz frequency band.

TEST EQUIPMENT USED:

1	2	3	4	10	14	
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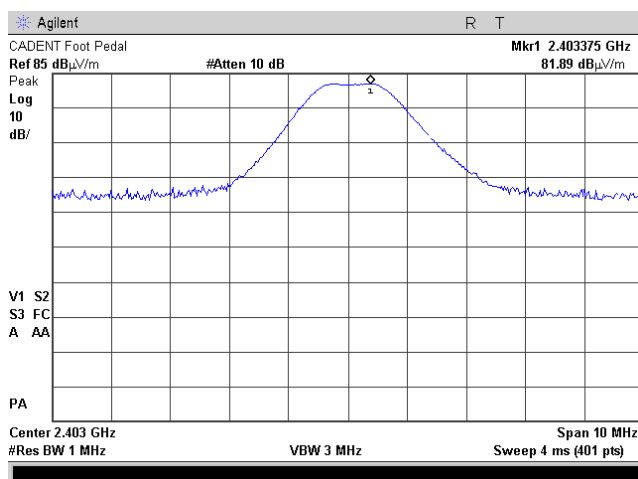
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Title: Foot pedal and USB dongle transceivers.

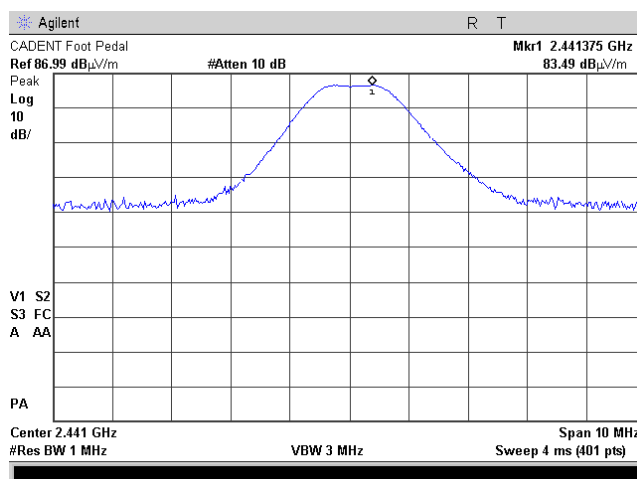
Model: EA03586-B

Pedal FCC ID: UZ2EA03586; Dongle FCC ID: UZ2ED03586

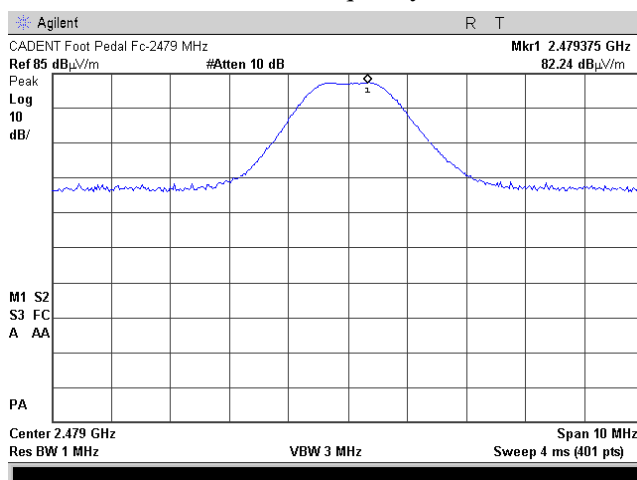
Foot pedal transmitter.



Plot # 13. Carrier frequency – 2403 MHz.



Plot # 14. Carrier frequency – 2441 MHz.



Plot # 15. Carrier frequency – 2479 MHz.

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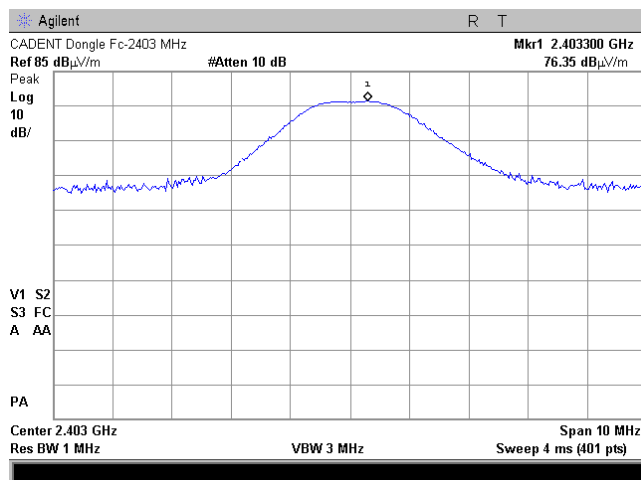
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Title: Foot pedal and USB dongle transceivers.

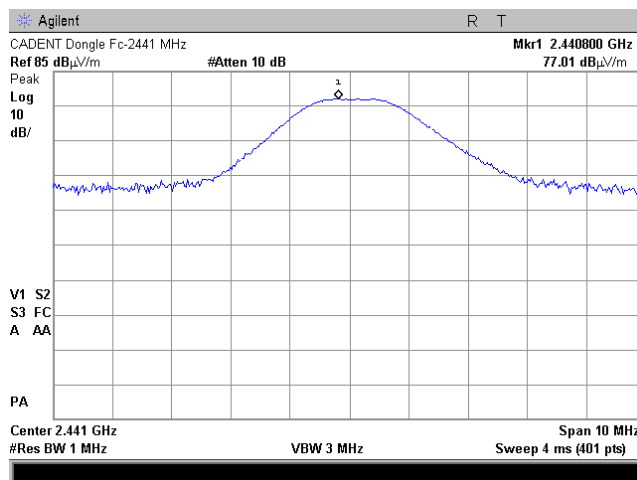
Model: EA03586-B

Pedal FCC ID: UZ2EA03586; Dongle FCC ID: UZ2ED03586

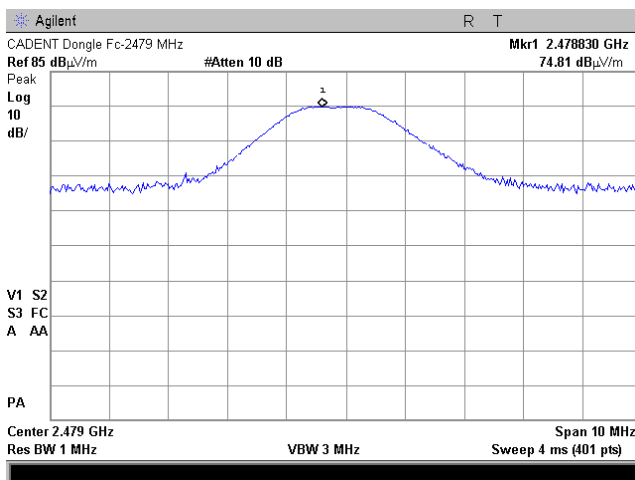
USB dongle transmitter.



Plot # 16. Carrier frequency – 2403 MHz.



Plot # 17. Carrier frequency – 2441 MHz.



Plot # 18. Carrier frequency – 2479 MHz.

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Title: Foot pedal and USB dongle transceivers.

Model: EA03586-B

Pedal FCC ID: UZ2EA03586; Dongle FCC ID: UZ2ED03586

6.1.3 Number of hopping channels and average time occupancy test according to §15.247(a)(1)(iii)

Method of measurement DA 00-705 hopping procedure
 Operating Frequency Range 2403 – 2479 MHz
 Ambient Temperature 23⁰ C Relative Humidity 49% Air Pressure 1009 hPa

Foot pedal transmitter.

Frequency range MHz	Number of hopping frequencies	Average time of occupancy	Reference to plots #
2403 - 2479	16	14.1 msec	19,20, 22, 23

USB dongle transmitter.

Frequency range MHz	Number of hopping frequencies	Average time of occupancy	Reference to plots #
2403 - 2479	17	96.3 msec	24, 25, 27, 28

LIMIT

Operating frequency range, MHz	Number of frequencies	Average time of occupancy
2400-2483.5	≥ 15 non-overlapping channels	≤ 0.4 s within the period of 0.4 sec multiplied by channels number.

TEST PROCEDURE

The test was performed in hopping transmission mode of operation for carrier (channel) frequency at bottom, middle and at the top of 2400 – 2483.5 MHz frequency band and maximum transmitting data rate.

TEST EQUIPMENT USED:

2	3	4	13			
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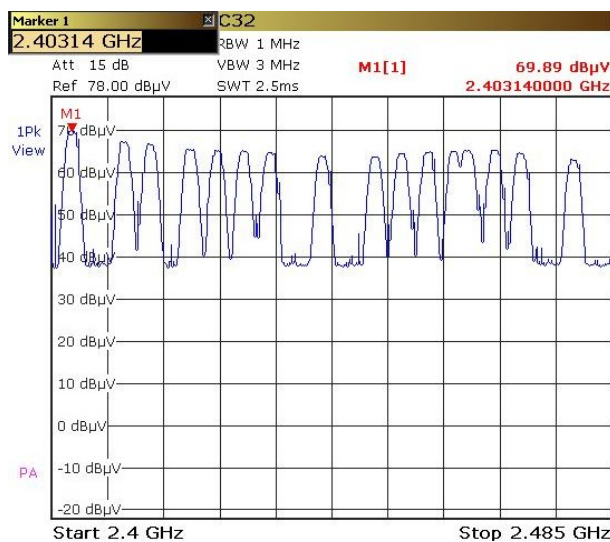
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Title: Foot pedal and USB dongle transceivers.

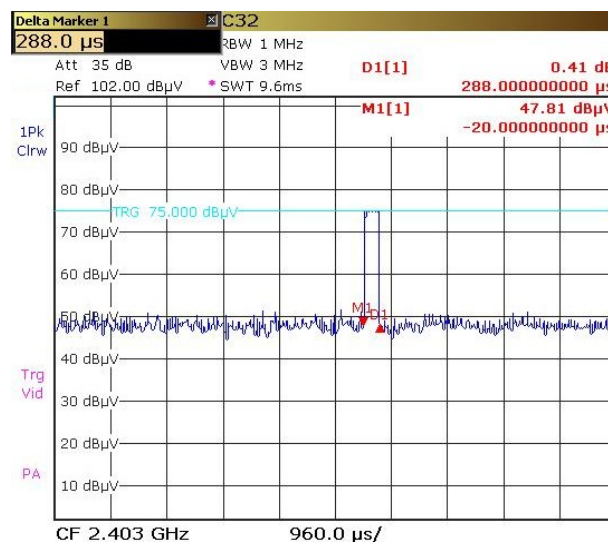
Model: EA03586-B

Pedal FCC ID: UZ2EA03586; Dongle FCC ID: UZ2ED03586

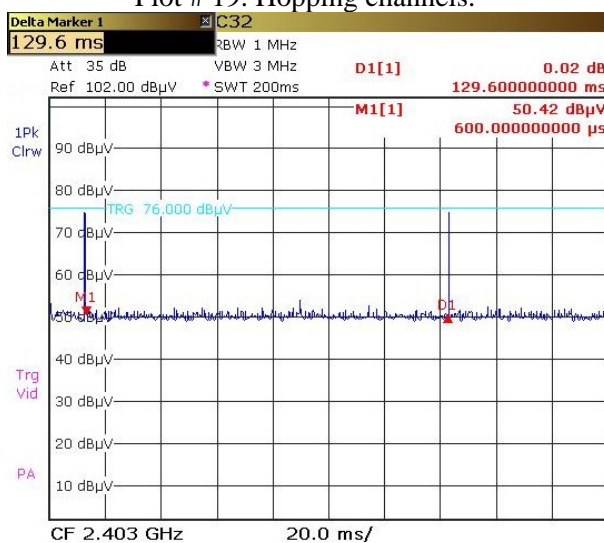
Foot pedal transmitter.



Plot # 19. Hopping channels.



Plot # 20. Transmission time duration.



Plot # 21. Transmission interruption time.

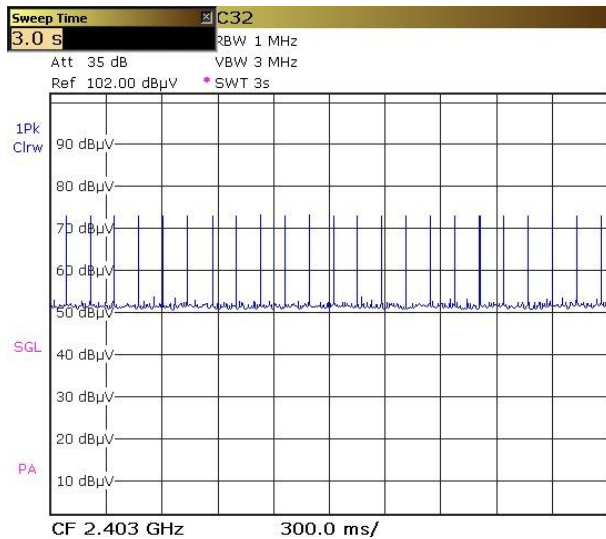
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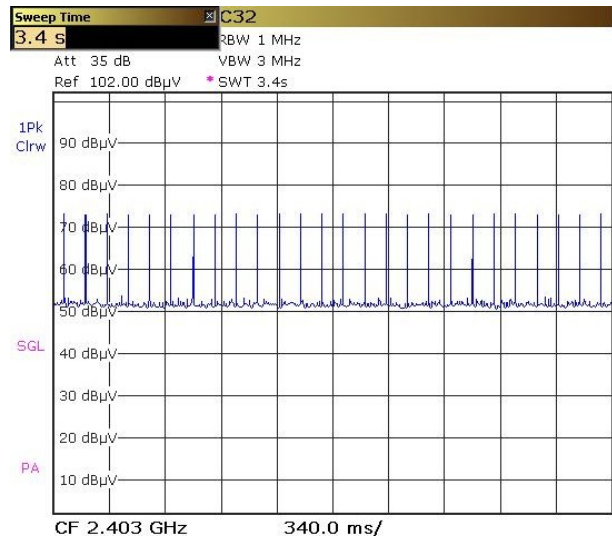
Title: Foot pedal and USB dongle transceivers.

Model: EA03586-B

Pedal FCC ID: UZ2EA03586; Dongle FCC ID: UZ2ED03586



Plot # 22. 23 transmissions in 3 sec interval.



Plot # 23. 26 transmissions in 3.4 sec interval.

Average time of occupancy on any channel within period of 6.4 sec (0.4 sec multiplied by 16 - number channels employed) was calculated as fallow:

One Tx transmission duration x 49 = 0.288 msec x 49 = 14.1 msec.



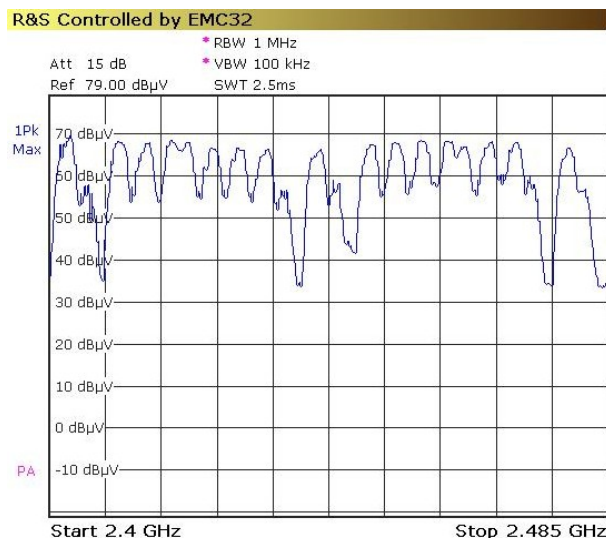
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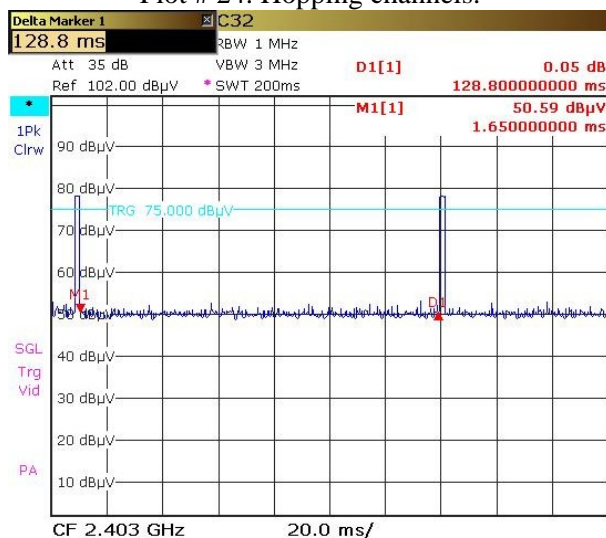
Title: Foot pedal and USB dongle transceivers.

Model: EA03586-B

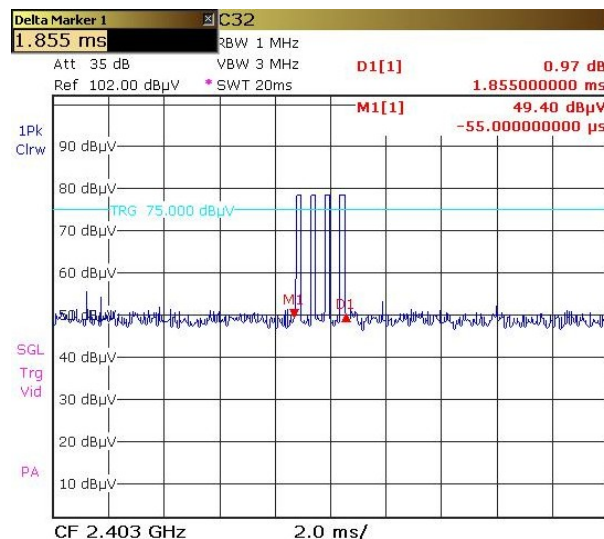
Pedal FCC ID: UZ2EA03586; Dongle FCC ID: UZ2ED03586

USB dongle transmitter.

Plot # 24. Hopping channels.



Plot # 26. Transmission interruption time.



Plot # 25. Transmission time duration.

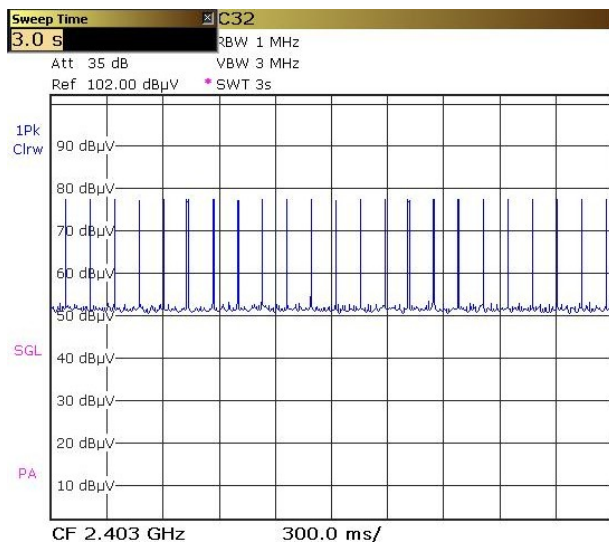
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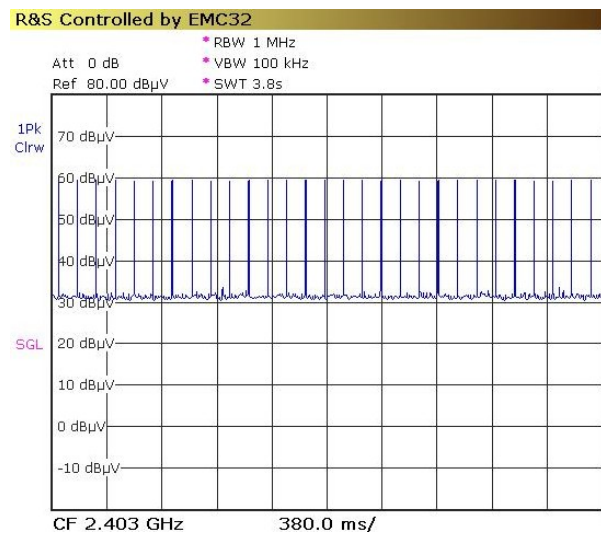
Title: Foot pedal and USB dongle transceivers.

Model: EA03586-B

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Plot # 27. 23 transmissions in 3 sec interval.



Plot # 28. 29 transmissions in 3.8 sec interval.

Average time of occupancy on any channel within period of 6.8 sec (0.4 sec multiplied by 17 - number channels employed) was calculated as follow:

One Tx transmission duration x 52 = 1.85 msec x 52 = 96.3 msec.

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6.1.4 Out of band radiated emissions test according to §15.247(d), 15.205

Method of measurement ANSI 63.4 §13.4
 Operating Frequency Range 2403 – 2479 MHz
 Ambient Temperature 23⁰ C Relative Humidity 56% Air Pressure 1011 hPa

The frequency spectrum was investigated from the lowest radio frequency signal generated in the equipment and up to ten harmonic. The emission levels of the EUT more than 20 dB lower than the specified limit were not recorded in the tables. For the test results refer to tables and plots in this section. Test results for cart dongle transmitter in 30 – 1000 MHz frequency range are recorded in section 7.

Foot pedal transmitter.

Carrier frequency 2403 MHz

Frequency, MHz	Radiated emissions, dBμV/m	Peak limit, dBμV/m	Avg limit, dBμV/m	Margin, dB	Note	Reference to plot#
2345	54.4	74	-	19.6	Detector peak	31
2338	43.4	-	54	10.6	Detector average.	32
4806	55.9	74	-	18.1	Detector peak	34
4806	49.4	-	54	4.6	Detector average	36

Carrier frequency 2441 MHz

Frequency, MHz	Radiated emissions, dBμV/m	Peak limit, dBμV/m	Avg limit, dBμV/m	Margin, dB	Note	Reference to plot#
2324	54.5	74	-	19.5	Detector peak	39
2362	43.4	-	54	10.6	Detector average.	40
4882	55.5	74	-	18.5	Detector peak	43
4882	51.0	-	54	3.0	Detector average	45

Carrier frequency 2479 MHz

Frequency, MHz	Radiated emissions, dBμV/m	Peak limit, dBμV/m	Avg limit, dBμV/m	Margin, dB	Note	Reference to plot#
2976	57.8	74	-	14.2	Detector peak	46
2991	46.5	-	54	7.5	Detector average.	47
4958	50.5	-	54	3.5	Detector average	50

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USB dongle transmitter.

Carrier frequency 2403 MHz

Frequency, MHz	Radiated emissions, dB μ V/m	Peak limit, dB μ V/m	Avg limit, dB μ V/m	Margin, dB	Note	Reference to plot#
2366	55.7	74	-	18.3	Detector peak	59
2366	44.6	-	54	7.4	Detector average.	60
5425	57.8	74	-	16.2	Detector peak	62
5425	47.9	-	54	6.1	Detector average	63

Carrier frequency 2441 MHz

Frequency, MHz	Radiated emissions, dB μ V/m	Peak limit, dB μ V/m	Avg limit, dB μ V/m	Margin, dB	Note	Reference to plot#
2345	56.5	74	-	17.5	Detector peak	66
2348	45.0	-	54	11.0	Detector average.	67
5365	59.4	74	-	14.6	Detector peak	70
5365	48.0	-	54	6.0	Detector average	71

Carrier frequency 2479 MHz

Frequency, MHz	Radiated emissions, dB μ V/m	Peak limit, dB μ V/m	Avg limit, dB μ V/m	Margin, dB	Note	Reference to plot#
2352	56.1	74	-	17.9	Detector peak	74
2352	44.6	-	54	9.4	Detector average.	75
5423	59.9	74	-	14.1	Detector peak	80
5423	47.9		54	6.1	Detector average	81

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The measurements were performed in hopping transmission mode of operation for carrier (channel) frequency at bottom, middle and at the top of 2400 – 2483.5 MHz frequency band and maximum transmitting data rate. To find maximum radiation the turntable was rotated 360°, measuring antenna height was changed from 1 to 4 m, and the antenna polarization was changed from vertical to horizontal.

LIMIT

In any 100 kHz bandwidth outside the frequency band the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below in band highest level desired power. Radiated emissions, which fall in the restricted bands, must comply with the radiated emissions limit specified in section 15.205(c).

TEST SAMMARY

All emissions outside of the 2400 – 2483.5 MHz band were found below 15.247(d) limit. No emissions were found above SA noise floor in 6.5 – 25 GHz frequency band that is at least 30 dB below the section 15.205(c) limit.

TEST EQUIPMENT USED:

3	4	5	6	7	10	12
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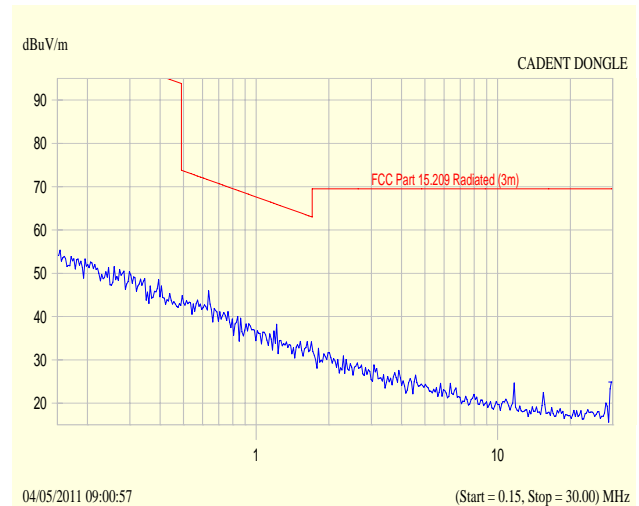
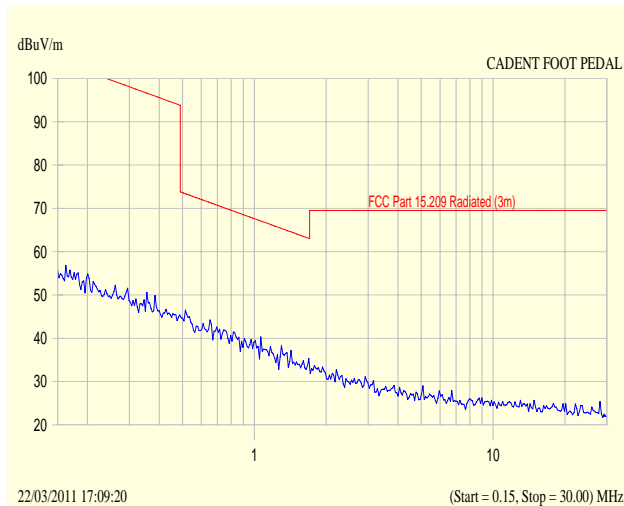
Test report N: 9112317224

Page 22 of 47

Title: Foot pedal and USB dongle transceivers.

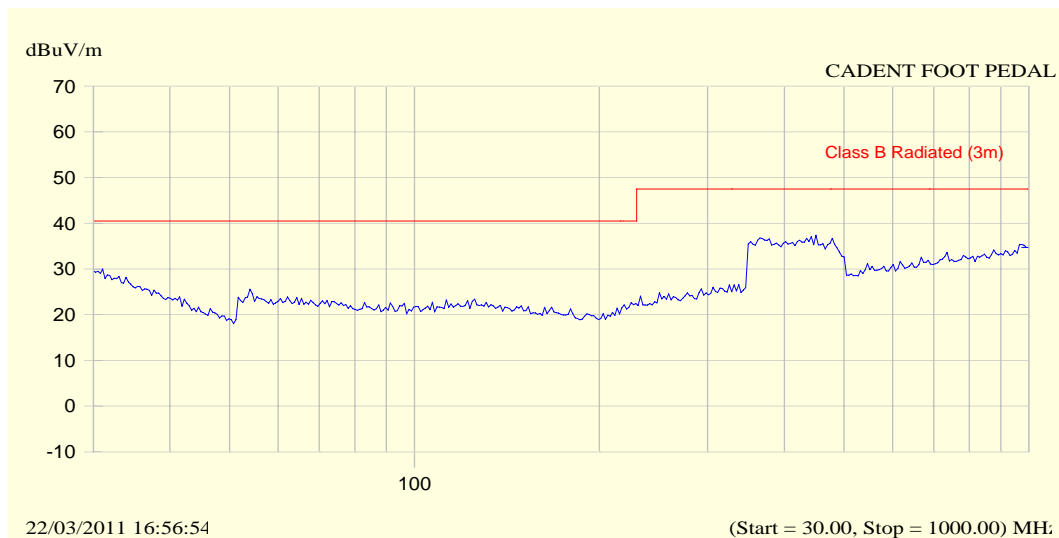
Model: EA03586-B

Pedal FCC ID: UZ2EA03586; Dongle FCC ID: UZ2ED03586



Plot # 29. Investigation result in 0.15 – 30 MHz frequency range.

Foot pedal transmitter.



Plot # 30. Investigation result in 30 - 1000 MHz frequency range.

Test report N: 9112317224

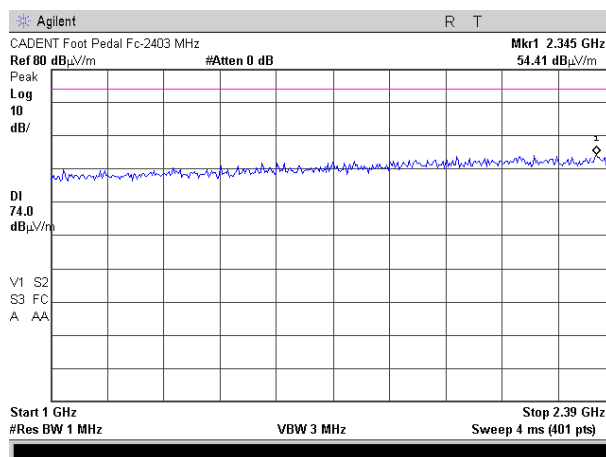
Page 23 of 47

Title: Foot pedal and USB dongle transceivers.

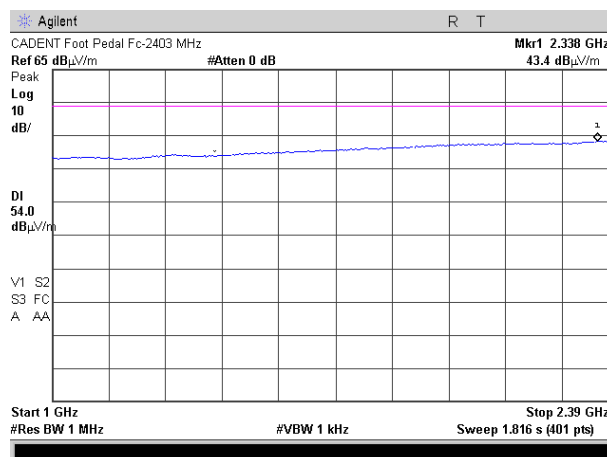
Model: EA03586-B

Pedal FCC ID: UZ2EA03586; Dongle FCC ID: UZ2ED03586

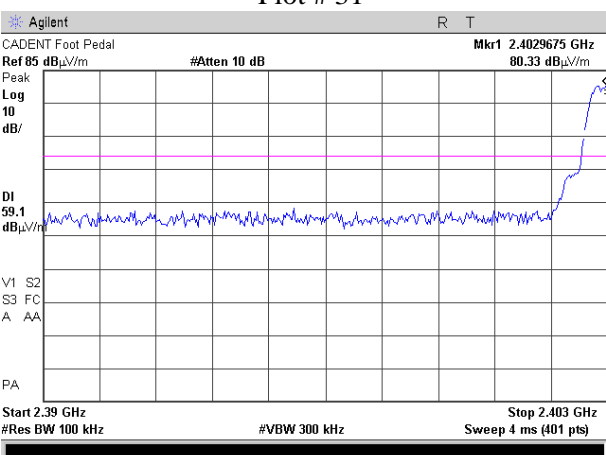
Carrier frequency – 2403 MHz



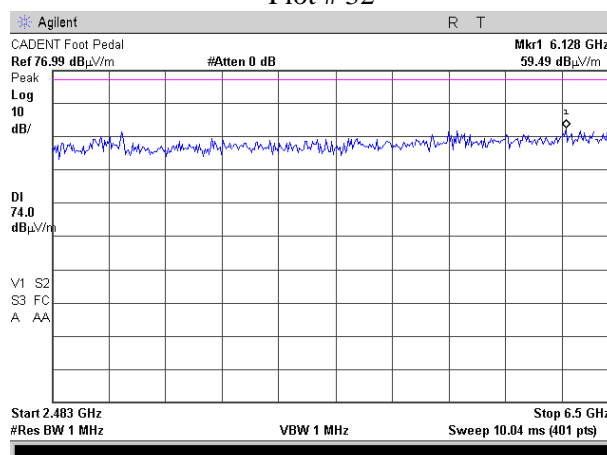
Plot # 31



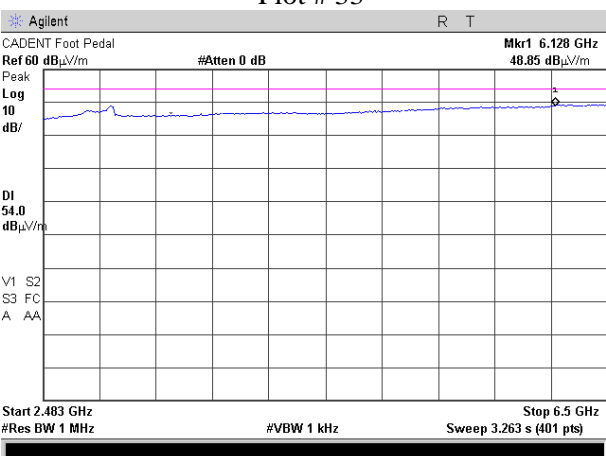
Plot # 32



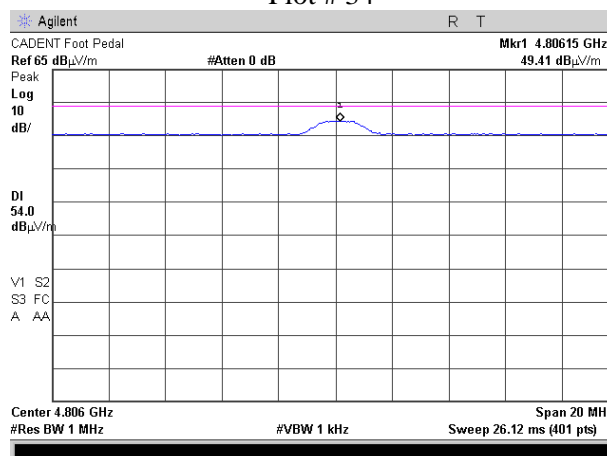
Plot # 33



Plot # 34



Plot # 35



Plot # 36



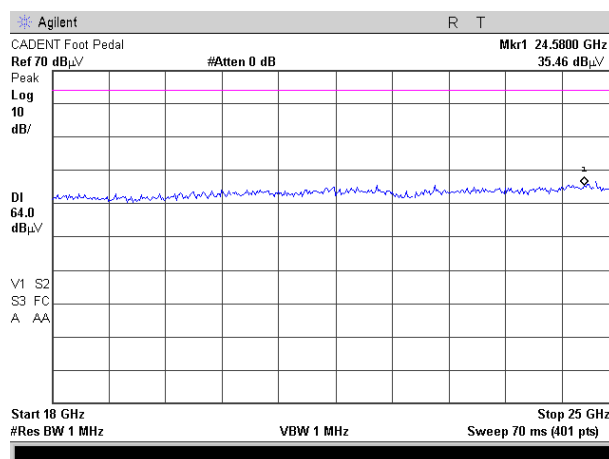
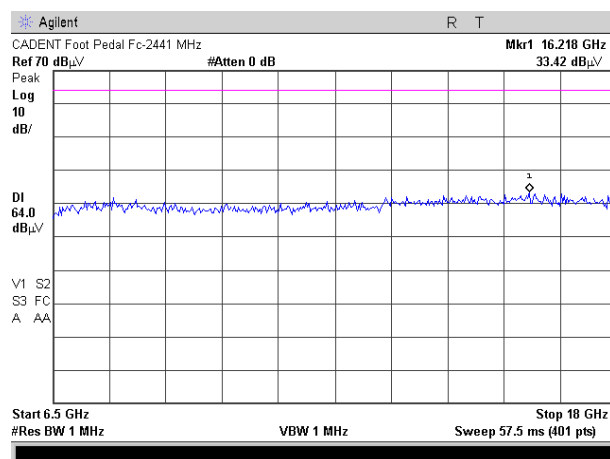
Test report N: 9112317224

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Title: Foot pedal and USB dongle transceivers.

Model: EA03586-B

Pedal FCC ID: UZ2EA03586; Dongle FCC ID: UZ2ED03586





Test report N: 9112317224

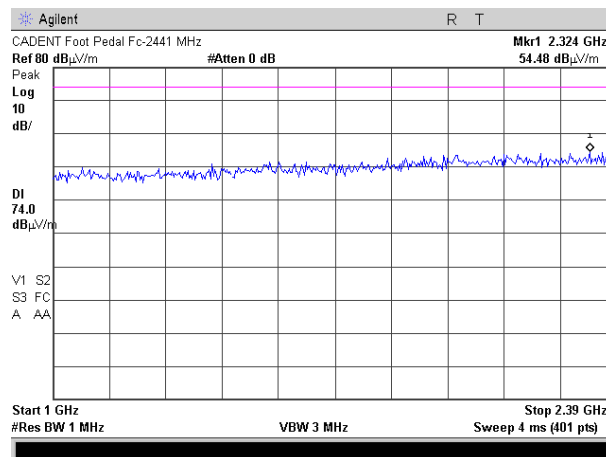
Page 25 of 47

Title: Foot pedal and USB dongle transceivers.

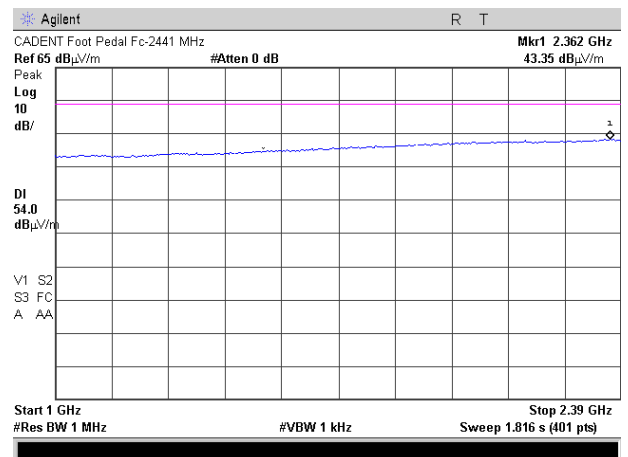
Model: EA03586-B

Pedal FCC ID: UZ2EA03586; Dongle FCC ID: UZ2ED03586

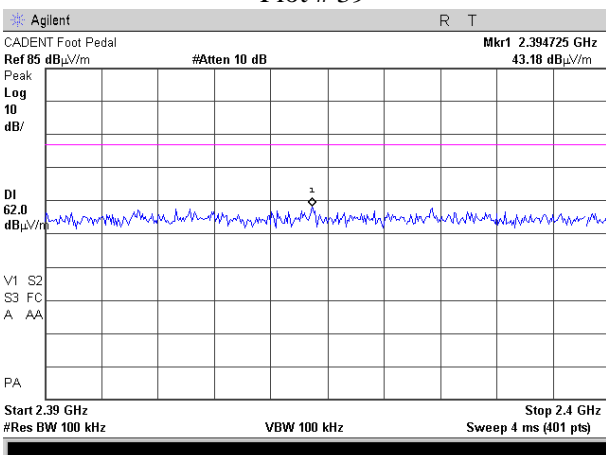
Carrier frequency - 2441 MHz.



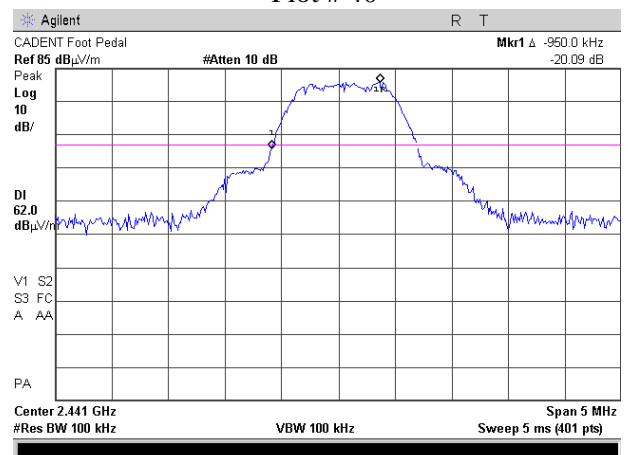
Plot # 39



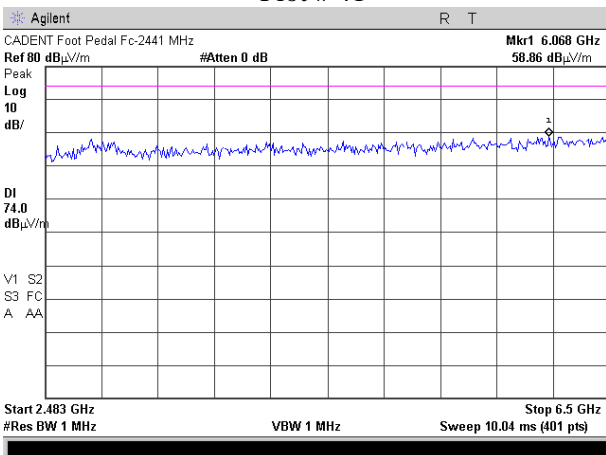
Plot # 40



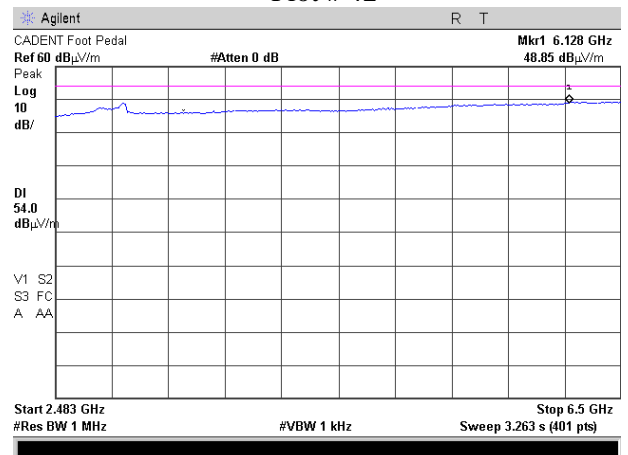
Plot # 41



Plot # 42



Plot # 43



Plot # 44



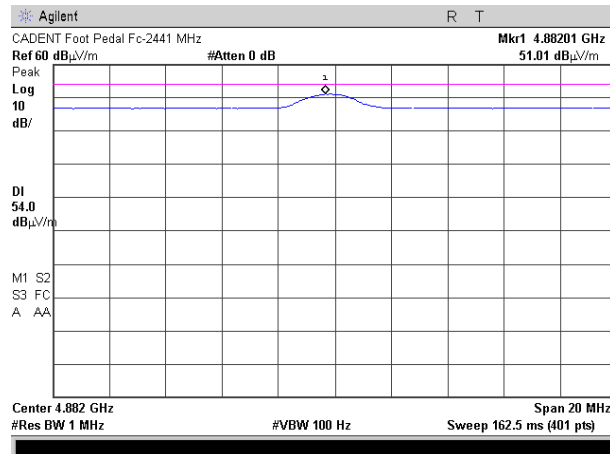
Test report N: 9112317224

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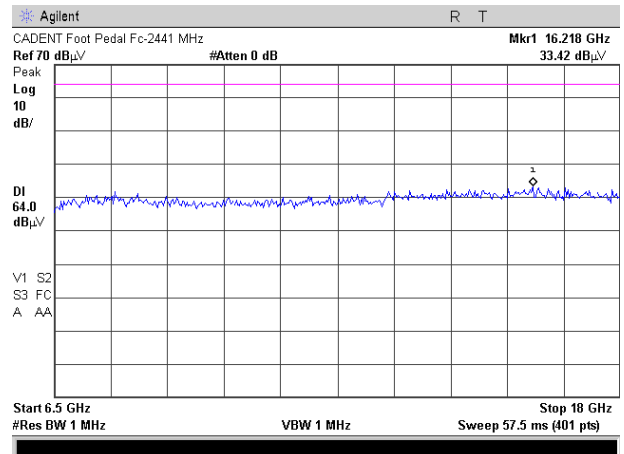
Title: Foot pedal and USB dongle transceivers.

Model: EA03586-B

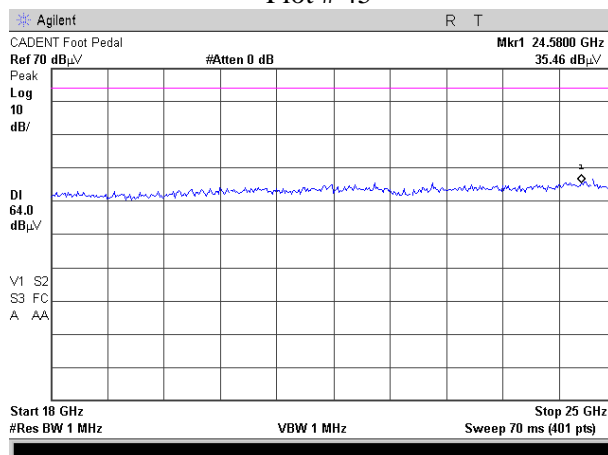
Pedal FCC ID: UZ2EA03586; Dongle FCC ID: UZ2ED03586



Plot # 45



Plot # 46



Plot # 47



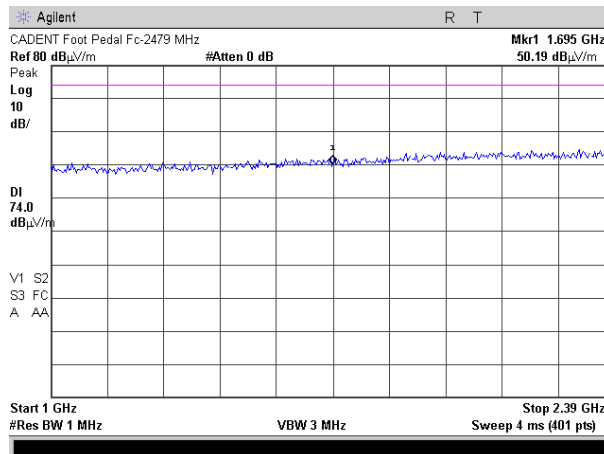
Test report N: 9112317224

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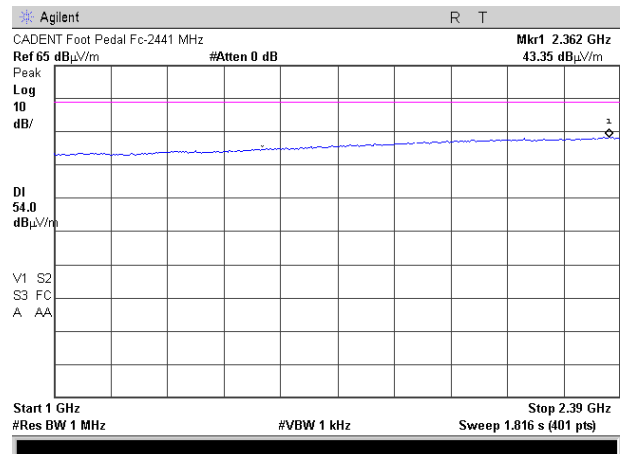
Title: Foot pedal and USB dongle transceivers.

Model: EA03586-B

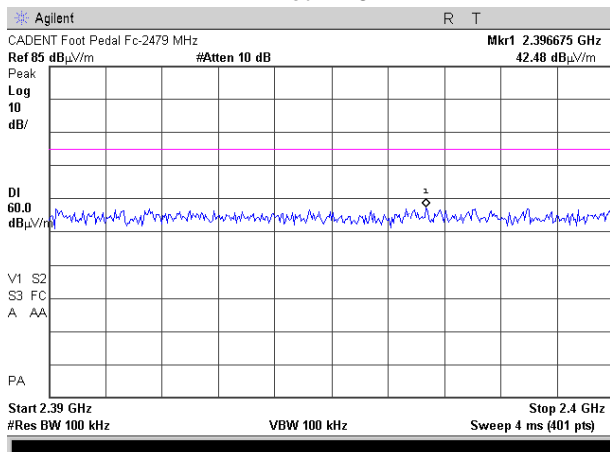
Pedal FCC ID: UZ2EA03586; Dongle FCC ID: UZ2ED03586

Carrier frequency 2479 MHz

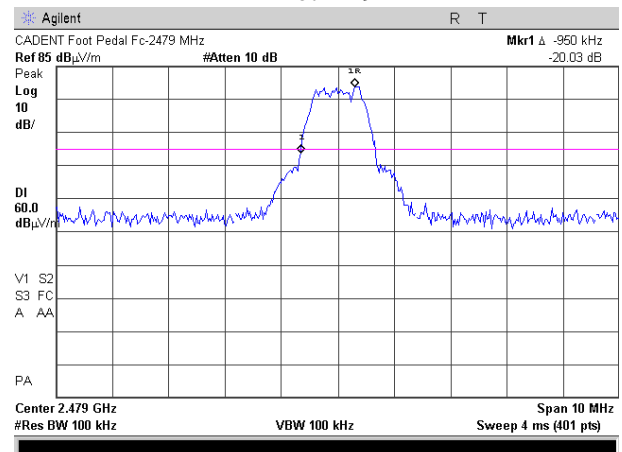
Plot # 48



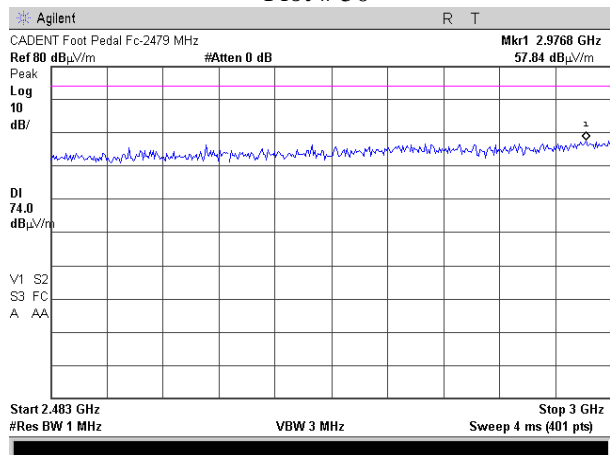
Plot # 49



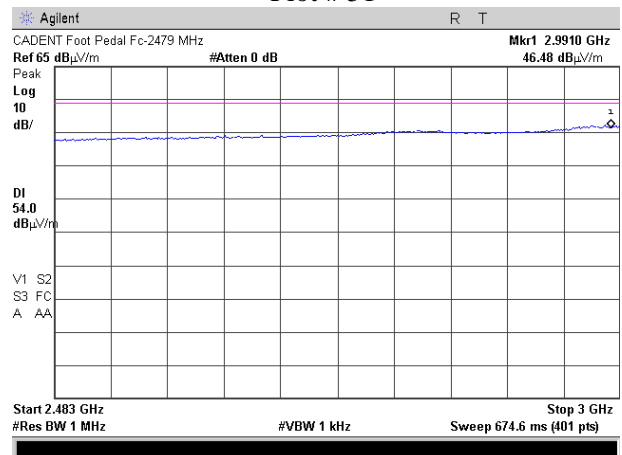
Plot # 50



Plot # 51



Plot # 52



Plot # 53

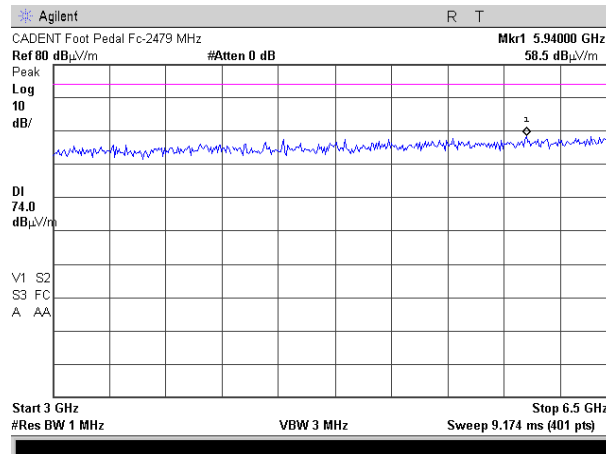
Test report N: 9112317224

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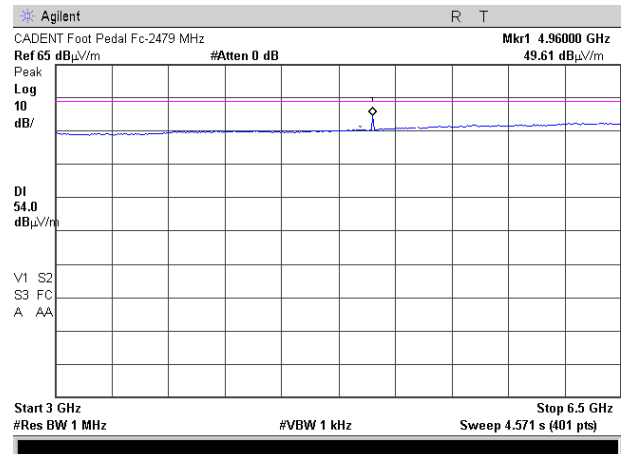
Title: Foot pedal and USB dongle transceivers.

Model: EA03586-B

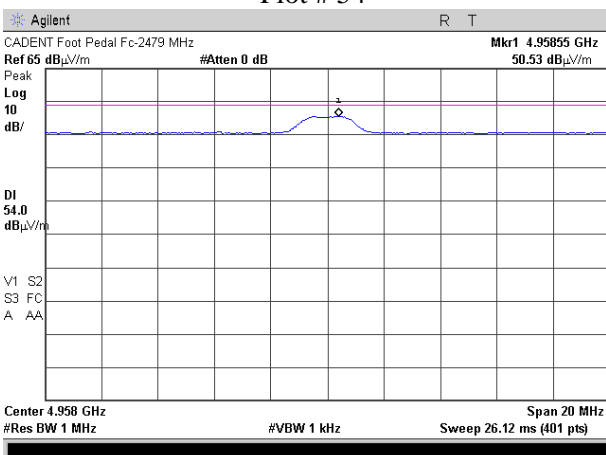
Pedal FCC ID: UZ2EA03586; Dongle FCC ID: UZ2ED03586



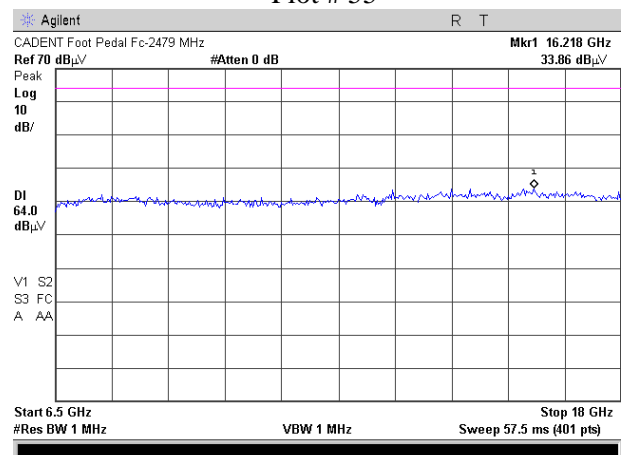
Plot # 54



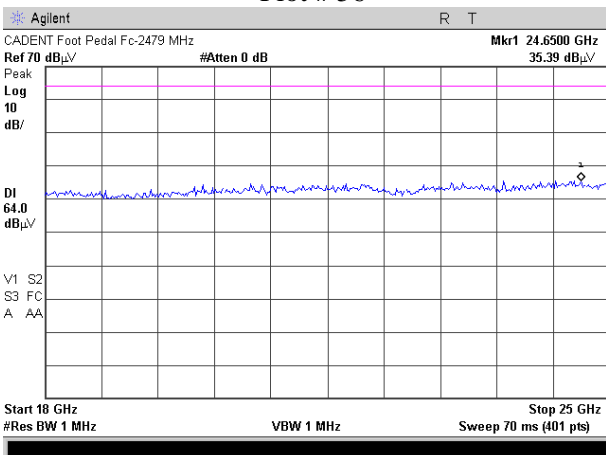
Plot # 55



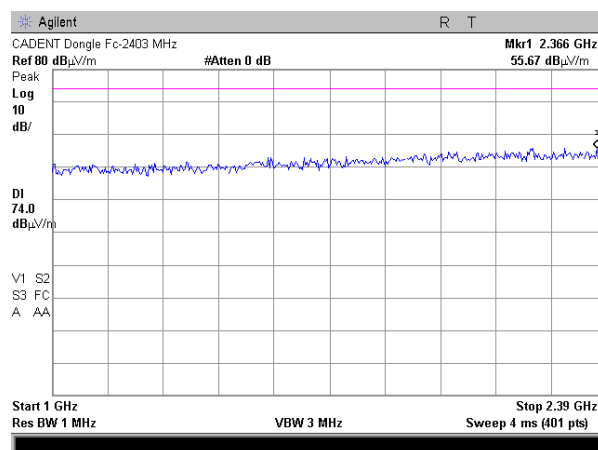
Plot # 56



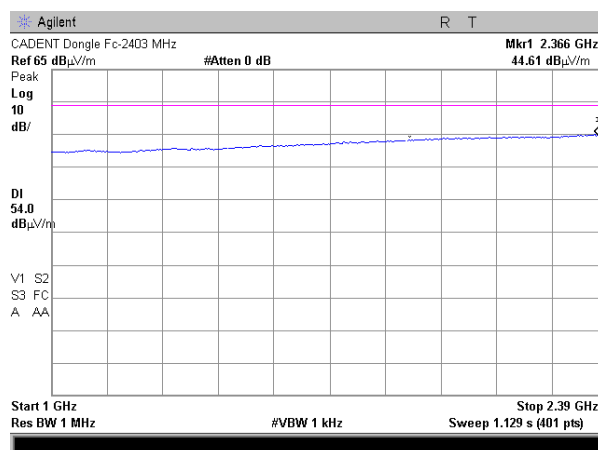
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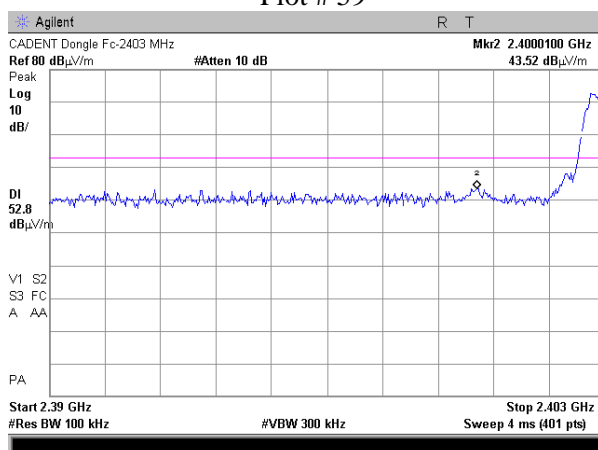
Plot # 58

**Test report N: 9112317224****Page 29 of 47****Title: Foot pedal and USB dongle transceivers.****Model: EA03586-B****Pedal FCC ID: UZ2EA03586; Dongle FCC ID: UZ2ED03586**USB dongle transmitter.Carrier frequency – 2403 MHz

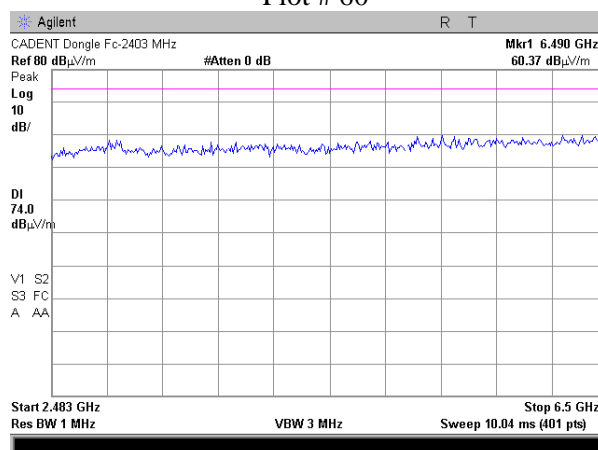
Plot # 59



Plot # 60



Plot # 61



Plot # 62



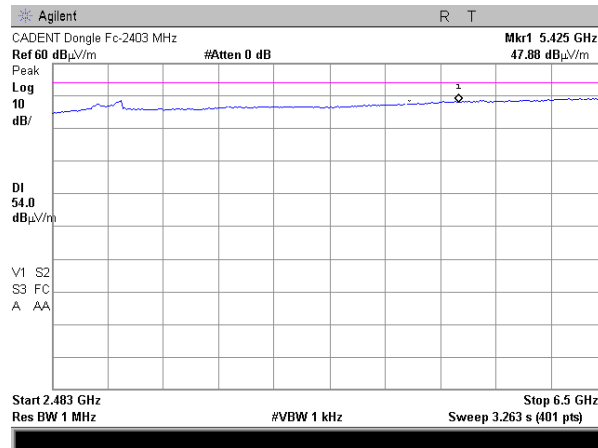
Test report N: 9112317224

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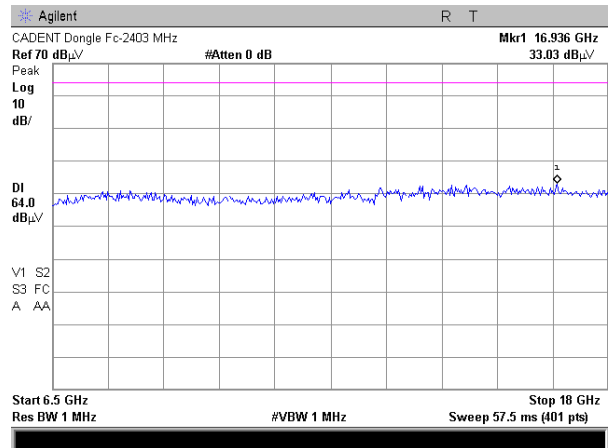
Title: Foot pedal and USB dongle transceivers.

Model: EA03586-B

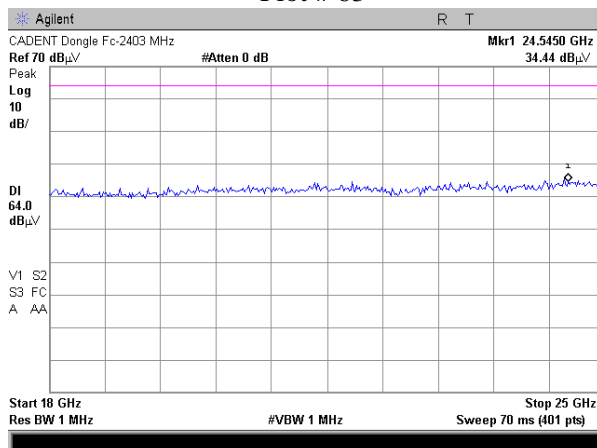
Pedal FCC ID: UZ2EA03586; Dongle FCC ID: UZ2ED03586



Plot # 63



Plot # 64



Plot # 65



Test report N: 9112317224

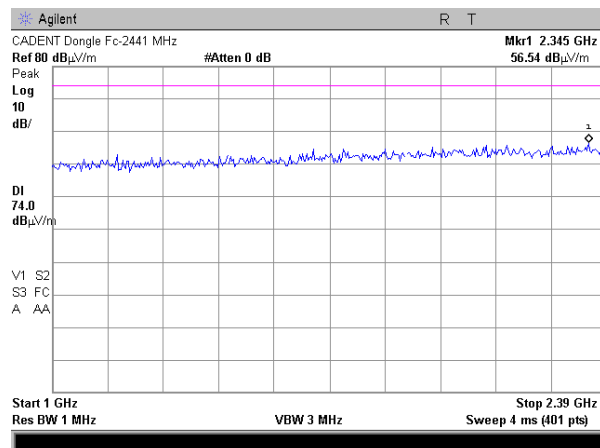
Page 31 of 47

Title: Foot pedal and USB dongle transceivers.

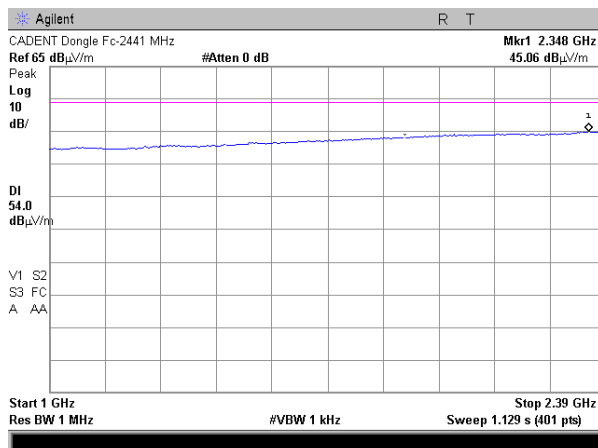
Model: EA03586-B

Pedal FCC ID: UZ2EA03586; Dongle FCC ID: UZ2ED03586

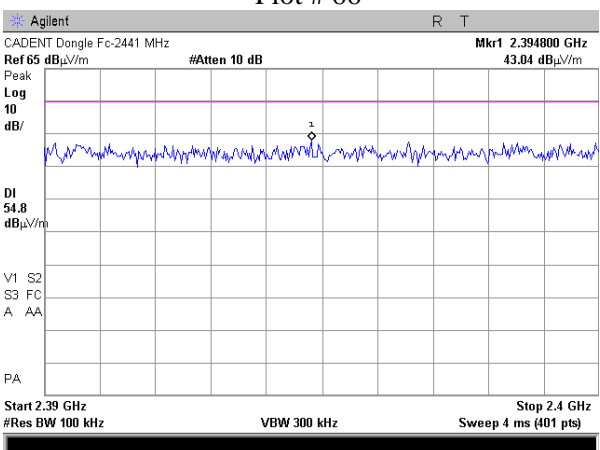
Carrier frequency – 2441 MHz



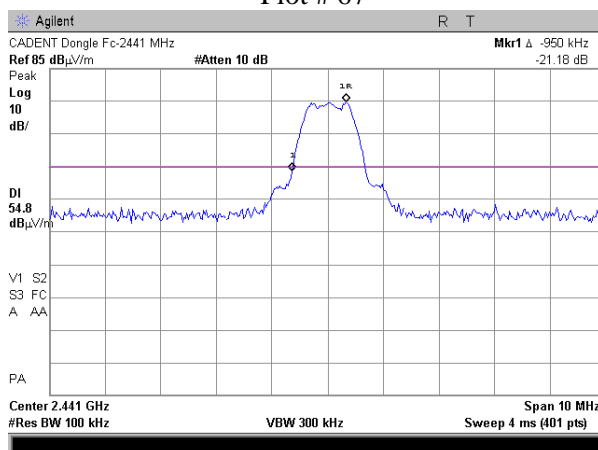
Plot # 66



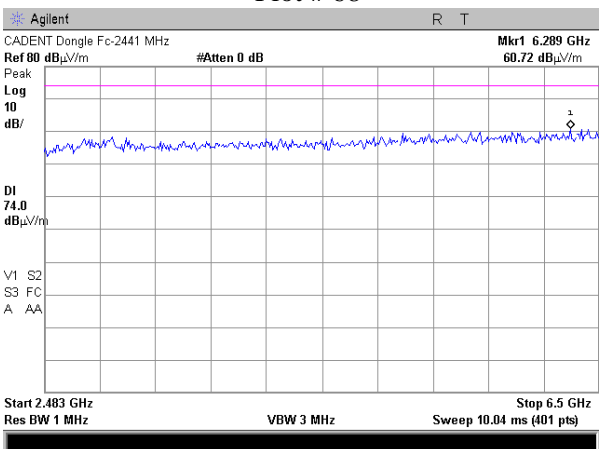
Plot # 67



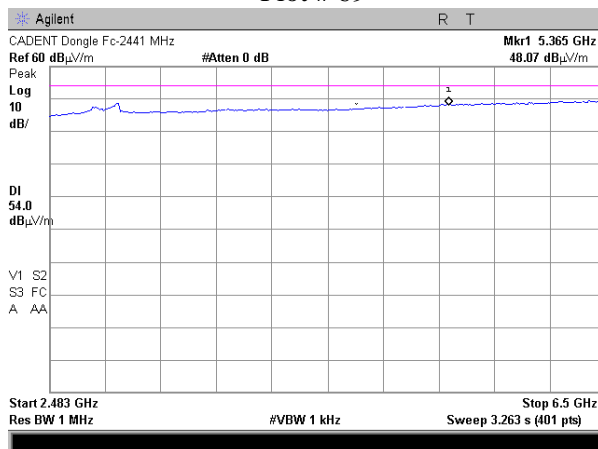
Plot # 68



Plot # 69



Plot # 70



Plot # 71



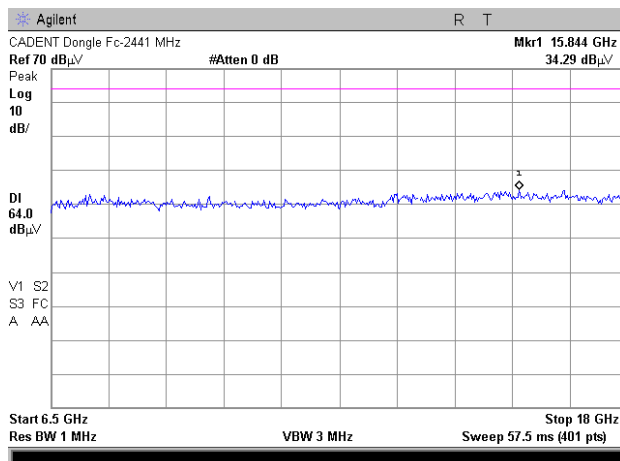
Test report N: 9112317224

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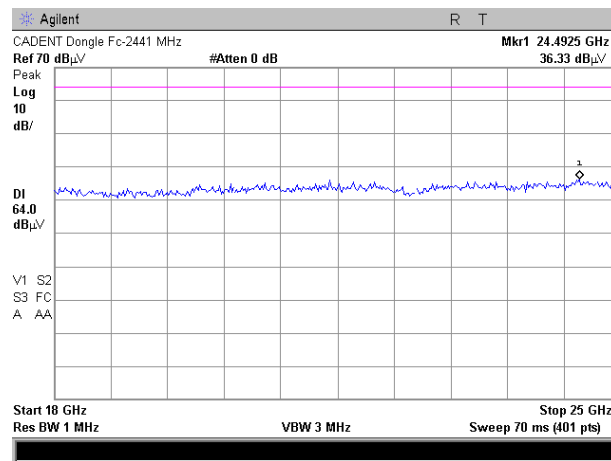
Title: Foot pedal and USB dongle transceivers.

Model: EA03586-B

Pedal FCC ID: UZ2EA03586; Dongle FCC ID: UZ2ED03586



Plot # 72



Plot # 73

Test report N: 9112317224

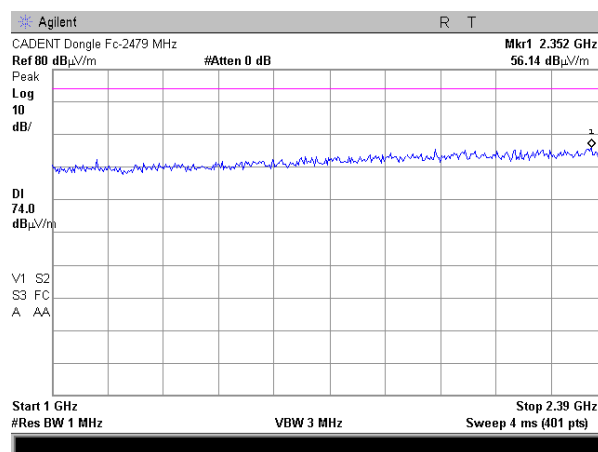
Page 33 of 47

Title: Foot pedal and USB dongle transceivers.

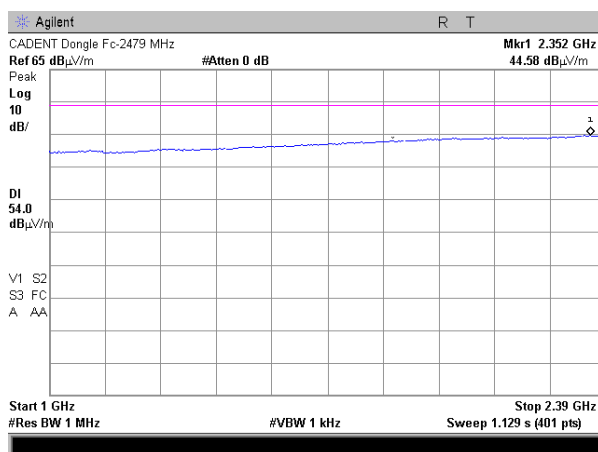
Model: EA03586-B

Pedal FCC ID: UZ2EA03586; Dongle FCC ID: UZ2ED03586

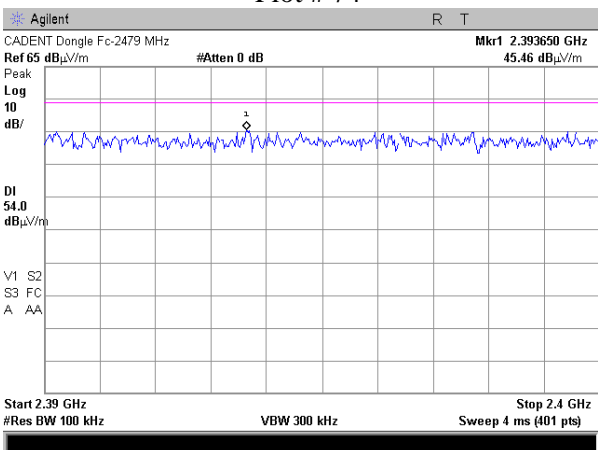
Carrier frequency – 2479 MHz.



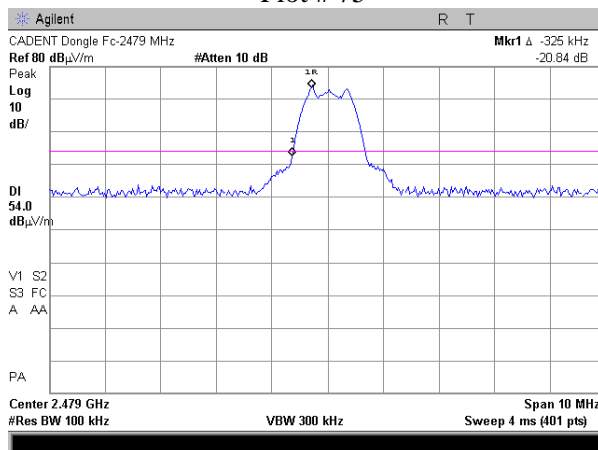
Plot # 74



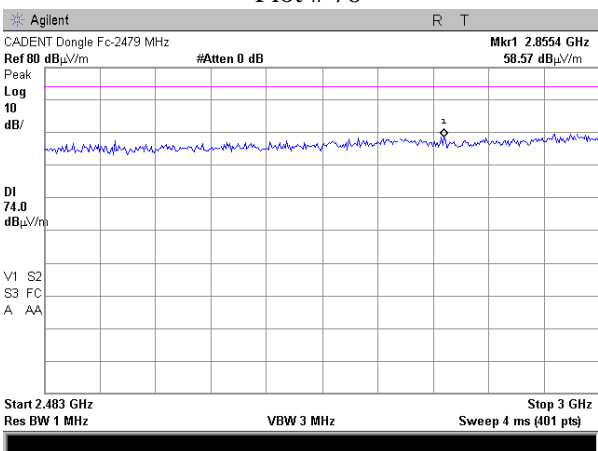
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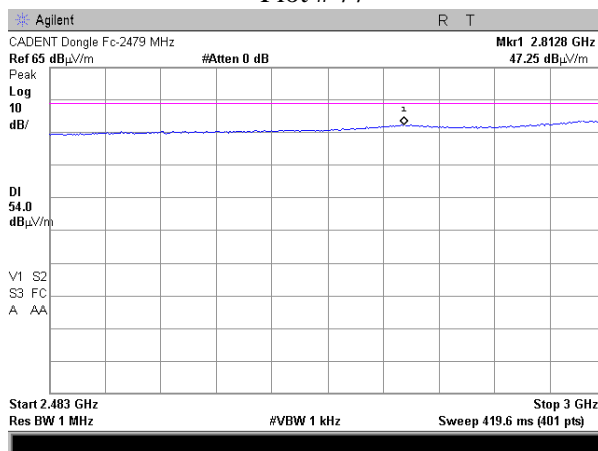
Plot # 76



Plot # 77



Plot # 78



Plot # 79



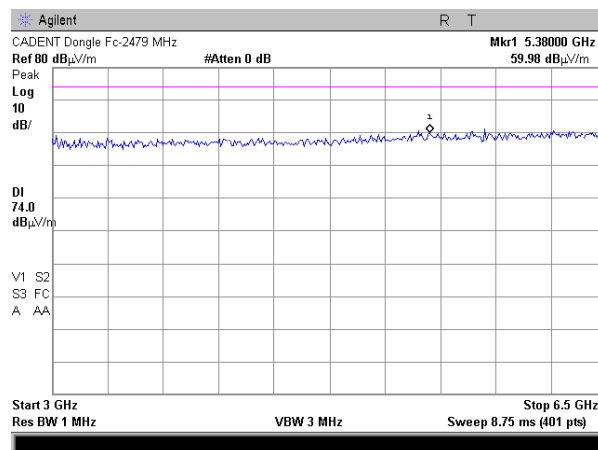
Test report N: 9112317224

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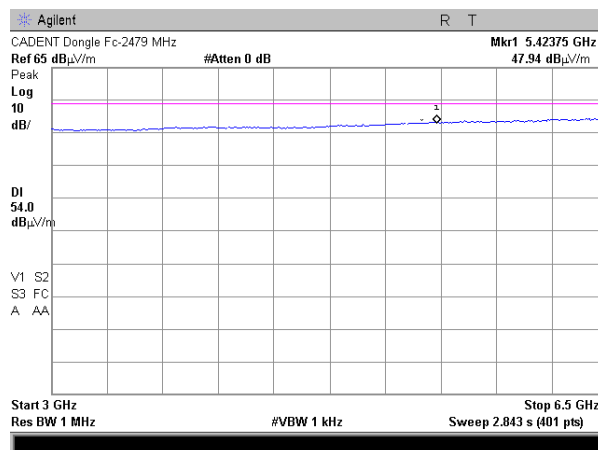
Title: Foot pedal and USB dongle transceivers.

Model: EA03586-B

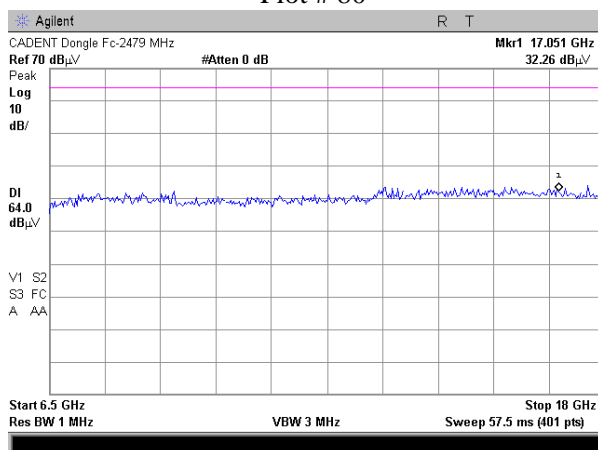
Pedal FCC ID: UZ2EA03586; Dongle FCC ID: UZ2ED03586



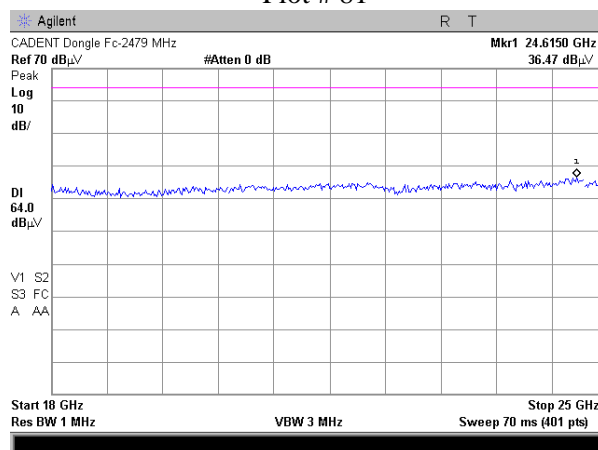
Plot # 80



Plot # 81



Plot # 82



Plot # 83

**Test report N: 9112317224****Page 35 of 47****Title: Foot pedal and USB dongle transceivers.****Model: EA03586-B****Pedal FCC ID: UZ2EA03586; Dongle FCC ID: UZ2ED03586****7. Radiated emissions test according to §§ 15.109, 15.209.**

Method of measurement	ANSI 63.4 §13.4				
Operating Frequency Range	2403 – 2479 MHz				
Ambient Temperature	23 ⁰ C	Relative Humidity	58%	Air Pressure	1009 hPa

TEST DESCRIPTION:

The measurements were performed at the Open Area Test Site at a 10 m test distance. The cart with dongle transmitter was placed on the turn - table. The Biconilog antenna 30 MHz-2 GHz frequency range was used. The frequency range was investigated from 30 MHz to 1.0 GHz and the measurements were performed at each frequency at which the signal was 10 dB below the limit or less. The level was maximized by initially rotating turntable through 360°, varying the antenna height between 1 m and 4 m, rerouting EUT cables and changing antenna polarization from vertical to horizontal.

REQUIREMENTS:

EUT radiated emission shall not exceed value required in sections 15.209 and 15.209.

TEST RESULT:

Test results are presented in the table 1.

Test report N: 9112317224

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Title: Foot pedal and USB dongle transceivers.

Model: EA03586-B

Pedal FCC ID: UZ2EA03586; **Dongle FCC ID:** UZ2ED03586

Table 1. Radiated emission test results.

Frequency (MHz)	Antenna Polariz V/H	Turn- table Angle (°)	Antenna Height (m)	Emission Level Note 1 dBμV/m	Limit @ 3m dBμV/m	Margin Note 2 (dB)	Results
31.9	V	251	1.0	37.4	40.0	2.4	Pass
47.0	V	107	1.0	36.1	40.0	3.9	Pass
52.5	V	336	1.0	38.0	40.0	2.0	Pass
58.6	V	141	1.0	39.0	40.0	1.0	Pass
160.0	V	334	1.0	32.4	43.5	11.1	Pass
300.0	H	184	2.6	33.7	46.0	10.3	Pass

Note 1: Emission level = E Reading (dBμV) + Cable loss (dB) + Antenna Factor (dB/m) + 10 dB
Where 10 dB is an extrapolation distance factor.

For Cable Loss and Antenna Factor refer to Appendix 2.

Note 2: Margin (dB) = Limit (dBμV/m) – Emission level (dBμV/m)

TEST EQUIPMENT USED:

1	6					
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**Test report N: 9112317224****Page 37 of 47****Title: Foot pedal and USB dongle transceivers.****Model: EA03586-B****Pedal FCC ID: UZ2EA03586; Dongle FCC ID: UZ2ED03586****8. Conducted emissions test according to §§ 15.107, 15.207.**

Method of measurement

ANSI 63.4 §13.3

Ambient Temperature

21⁰ C

Relative Humidity

54%

Air Pressure

1008 hPa

Frequency, MHz	Class B equipment, dB (μV)	
	QP	AVRG
0.15 - 0.5	66 - 56*	56 - 46*
0.5 - 5	56	46
5 - 30	60	50

* Decreases linearly with the logarithm of the frequency.

TEST PROCEDURE

EUT was placed on a wooden table in a shielded chamber at a height of 80 cm from the floor and 40 cm from the vertical reference plane. The measurements were performed at mains terminals by means of LISN, connected to spectrum analyzer in the frequency range as referred to in the table above. The measurements were made with quasi-peak (CISPR) and average detectors. The position of the EUT cables was varied to determine maximum emission level.

TEST RESULTS:

Test results present at plots # 84 for line Phase and # 85 for line Neutral.

TEST EQUIPMENT USED:

7	8	9	10			
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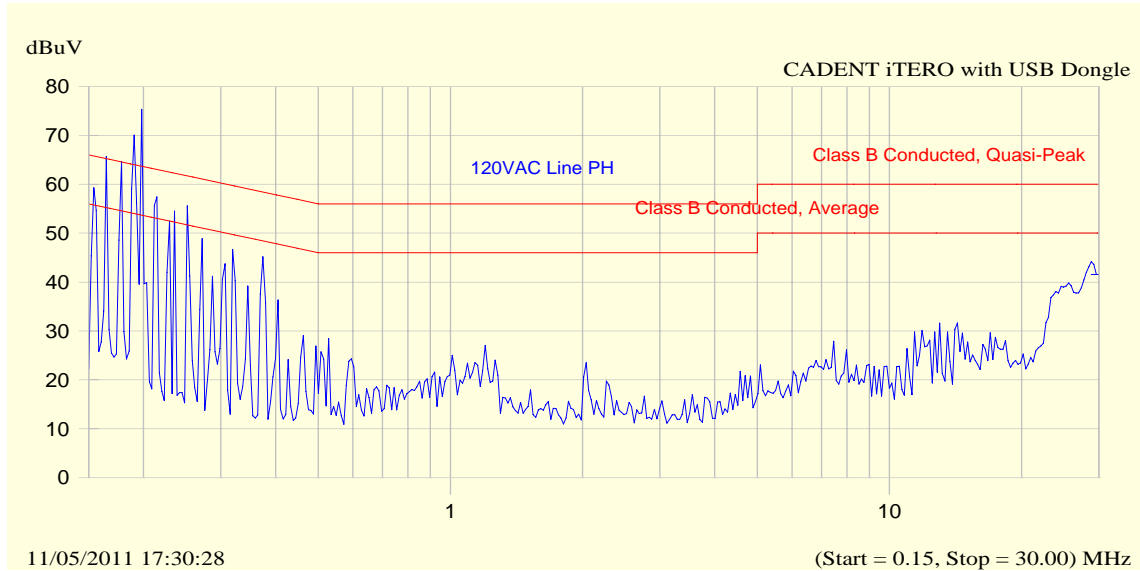
Test report N: 9112317224

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Title: Foot pedal and USB dongle transceivers.

Model: EA03586-B

Pedal FCC ID: UZ2EA03586; Dongle FCC ID: UZ2ED03586



Frequency MHz	QP dBuV	QP Limit dBuV	Margin dB	Avg dBuV	Avg Limit dBuV	Margin dB
0.169	59.9	65.0	5.1	28.1	55.0	26.9
0.207	61.2	63.3	2.1	38.7	53.3	14.6
0.337	50.6	59.3	8.7	25.7	49.3	23.6
24.860	36.6	60.0	23.4	31.2	50.0	18.8
28.969	42.9	60.0	17.1	40.4	50.0	9.6

Plot # 84. AC line conducted emissions test. Line Phase

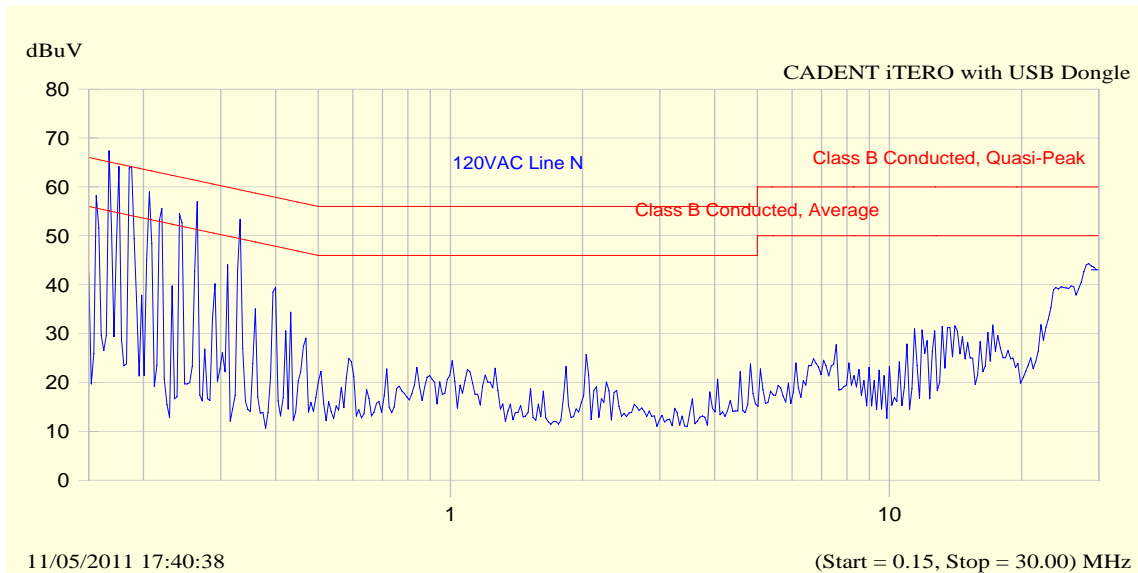
Test report N: 9112317224

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Title: Foot pedal and USB dongle transceivers.

Model: EA03586-B

Pedal FCC ID: UZ2EA03586; Dongle FCC ID: UZ2ED03586



Frequency MHz	QP dB μ V	QP Limit dB μ V	Margin dB	Avg dB μ V	Avg Limit dB μ V	Margin dB
0.169	60.9	65.0	-4.1	26.2	55.0	-28.8
0.194	61.2	63.9	-2.7	40.6	53.9	-13.3
0.259	54.8	61.5	-6.7	29.5	51.5	-22.0
0.337	49.5	59.3	-9.8	24.6	49.3	-24.6
24.860	37.7	60.0	-22.3	32.2	50.0	-17.8
28.968	41.7	60.0	-18.3	38.6	50.0	-11.4

Plot # 85. AC line conducted emissions test. Line Neutral

Test report N: 9112317224

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Title: Foot pedal and USB dongle transceivers.

Model: EA03586-B

Pedal FCC ID: UZ2EA03586; **Dongle FCC ID:** UZ2ED03586

9. APPENDIX A. Photo of the test setups.



Photo 1. iTero cart with USB dongle. Radiated emissions test setup on OATS.



Photo 2. Investigation radiated emissions test of foot pedal transmitter.

Test report N: 9112317224

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Title: Foot pedal and USB dongle transceivers.

Model: EA03586-B

Pedal FCC ID: UZ2EA03586; **Dongle FCC ID:** UZ2ED03586

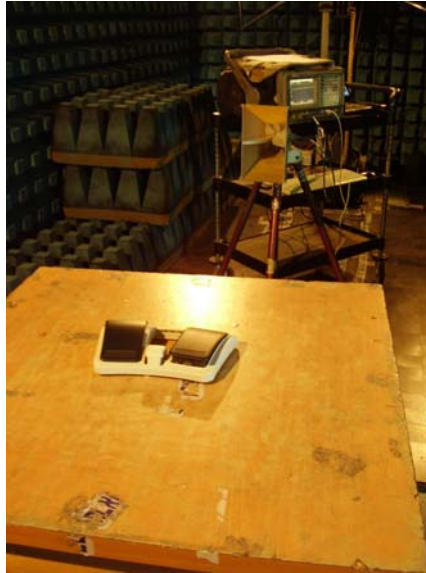


Photo 3. Investigation radiated emissions test of foot pedal transmitter at 1m distance.

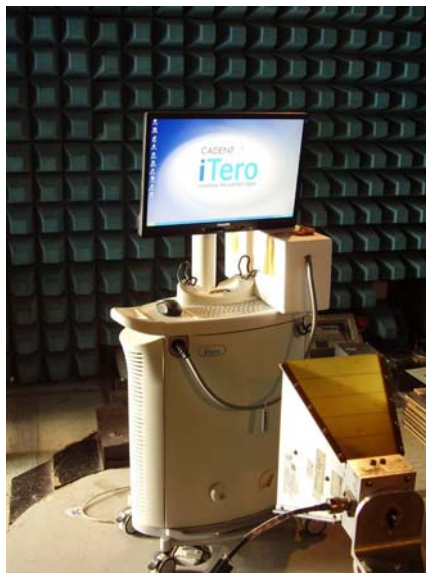


Photo 4. iTero cart with USB dongle. Radiated emissions test setup at 1m distance.

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Title: Foot pedal and USB dongle transceivers.

Model: EA03586-B

Pedal FCC ID: UZ2EA03586; Dongle FCC ID: UZ2ED03586

10. APPENDIX B. Test equipment.

Test equipment used

No	Description	Manufacturer information			Due Calibration date
		Name	Model No	Serial No	
1	Spectrum analyzer 9 KHz-26.5 GHz	HP	E7405A	SII 4944	April 2011
2	Attenuator 3 dB DC – 12 GHz	HP	8491A	50464	August 2010
3	Cable RF 1m	Huber-Suhner	Sucoflex 104	21324/4PE	October 2011
4	Double Ridged Guide Antenna 1 – 18 GHz	EMCO	3115	5802	October 2011
5	Broadband Horn antenna 15 – 40 GHz	Schwarzbeck Mess-Electronik	BBHA 9170	9170-341	October 2011
6	Antenna Biconilog 30 – 2000 MHz	Schaffner-Chase	CBL6112B	23181	October 2011
7	EMI Receiver 9 kHz-6.5 GHz	HP	8546A+85460A	SII 4068	April 2011
8	LISN 9 kHz – 30 MHz	FCC	LISN 250-32-4-16	SII5023	October 2011
9	Transient limiter 0.009-200 MHz	HP	11947A	3107105	October 2011
10	Cable RF 4m	Huber-Suhner	Sucoflex 104PE	21328/4PE	October 2011
11	Cable RF 0.5m	Huber-Suhner	Multiflex 141	520201	October 2011
12	Active Loop antenna 10 kHz – 30 MHz	EMCO	6502	SII 4874	October 2011
13	Spectrum Analyzer 9 kHz - 6 GHz	ROHDE & SCHWARZ	R&S®FSL6	5912	August 2010
14	RF generator 10 MHz-20 GHz	Anritsu	68347B	4898	June 2010

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Title: Foot pedal and USB dongle transceivers.

Model: EA03586-B

Pedal FCC ID: UZ2EA03586; Dongle FCC ID: UZ2ED03586

Cable Loss (10m cable + Mast)

Point	Frequency (MHz)	Cable Loss (dB)	Point	Frequency (MHz)	Cable Loss (dB)
1	30	0.53	21	1000	3.68
2	50	0.75	22	1100	3.82
3	100	1.08	23	1200	4.07
4	150	1.39	24	1300	4.24
5	200	1.61	25	1400	4.43
6	250	1.752	26	1500	4.6
7	300	2.00	27	1600	4.7
8	350	2.15	28	1700	4.85
9	400	2.26	29	1800	4.98
10	450	2.383	30	1900	5.19
11	500	2.52	31	2000	5.34
12	550	2.606	32	2100	5.51
13	600	2.75	33	2200	5.69
14	650	2.856	34	2300	5.89
15	700	3.06	35	2400	6.07
16	750	3.201	36	2500	6.22
17	800	3.27	37	2600	6.28
18	850	3.38	38	2700	6.41
19	900	3.46	39	2800	6.53
20	950	3.55	40	2900	6.84



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Title: Foot pedal and USB dongle transceivers.

Model: EA03586-B

Pedal FCC ID: UZ2EA03586; Dongle FCC ID: UZ2ED03586

Biconilog Antenna, Model Number: CBL-6112D, S/N: 23181.

No.	f / MHz)	AF / dB/m	f / MHz)	AF / dB/m	f / MHz)	AF / dB/m	f / MHz)	AF / dB/m
1	30	17.90	170	9.40	530	17.70	1040	22.20
2	32	16.70	175	9.00	540	18.25	1060	22.50
3	34	15.55	180	8.50	550	18.60	1080	22.50
4	36	14.35	185	8.45	560	14.45	1100	22.40
5	38	13.30	190	8.60	570	18.40	1120	22.60
6	40	12.20	195	8.85	580	18.50	1140	22.45
7	42	11.05	200	8.95	590	18.60	1160	22.50
8	44	9.95	205	8.80	600	18.60	1180	22.40
9	46	8.90	210	8.50	610	18.80	1200	22.80
10	48	8.05	215	8.20	620	18.99	1220	22.95
11	50	7.30	220	8.50	630	19.05	1240	23.10
12	52	6.80	225	9.00	640	19.23	1260	23.40
13	54	6.45	230	9.65	650	19.10	1280	23.35
14	56	6.00	235	10.30	660	19.13	1300	23.62
15	58	5.70	240	11.00	670	19.04	1320	23.64
16	60	5.45	245	11.60	680	19.00	1340	23.86
17	62	5.30	250	12.00	690	19.17	1360	23.95
18	64	5.20	255	12.45	700	19.28	1380	23.90
19	66	5.30	260	12.85	710	19.25	1400	24.45
20	68	5.30	265	12.50	720	19.45	1420	24.74
21	70	5.35	270	12.45	730	19.75	1440	24.93
22	72	5.50	275	12.40	740	19.95	1460	25.03
23	74	5.80	280	12.55	750	20.07	1480	25.45
24	76	6.00	285	12.65	760	19.85	1500	25.30
25	78	6.60	290	12.75	770	19.80	1520	25.25
26	80	6.70	295	12.95	780	19.85	1540	25.36
27	82	7.15	300	13.00	790	19.95	1560	25.58
28	84	7.60	310	13.35	800	20.05	1580	25.50
29	86	8.10	320	13.75	810	20.10	1600	25.65
30	88	8.50	330	13.85	820	20.35	1620	25.60
31	90	8.90	340	14.10	830	20.40	1640	25.70
32	92	9.20	350	14.50	840	20.35	1660	25.83
33	94	9.75	360	14.70	850	20.46	1680	25.97
34	96	9.95	370	14.90	860	20.39	1700	26.10
35	98	10.20	380	15.10	870	20.29	1720	26.25
36	100	10.50	390	15.45	880	20.24	1740	26.04
37	105	11.25	400	16.00	890	20.35	1760	26.14
38	110	11.70	410	16.40	900	20.55	1780	26.20
39	115	11.70	420	16.70	910	20.45	1800	26.40
40	120	11.80	430	16.35	920	20.60	1820	26.64
41	125	11.80	440	16.30	930	20.60	1840	26.86
42	130	11.70	450	16.30	940	20.66	1860	27.12
43	135	11.35	460	16.70	950	20.88	1880	27.00
44	140	10.95	470	17.05	960	21.11	1900	27.25
45	145	10.35	480	17.20	970	20.93	1920	27.36
46	150	10.05	490	17.30	980	21.03	1940	27.68
47	155	9.70	500	17.40	990	21.05	1960	27.10
48	160	9.70	510	17.50	1000	21.10	1980	27.06
49	165	9.45	520	17.60	1020	21.40	2000	27.25

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Title: Foot pedal and USB dongle transceivers.

Model: EA03586-B

Pedal FCC ID: UZ2EA03586; Dongle FCC ID: UZ2ED03586

Antenna Factor

Double Ridged Guide Antenna mfr EMCO model 3115 1m calibration

Point	Frequency (MHz)	Antenna Factor (dB/m)
1	1000	23.9
2	2000	28.3
3	3000	31.0
4	4000	33.1
5	4500	32.5
6	5000	32.4
7	6000	53.7
8	6500	35.6
9	7000	36.4
10	7500	36.9
11	8000	37.0
12	8500	38.0
13	9000	38.6
14	9500	38.4
15	10000	38.4
16	10500	38.4
17	11000	38.9
18	11500	39.6
19	12000	39.4
20	12500	39.2
21	13000	40.3
22	13500	41.0
23	14000	41.2
24	14500	41.3
25	15000	40.0
26	15500	38.0
27	16000	38.1
28	16500	40.3
29	17000	42.2
30	17500	44.6
31	18000	46.2

Cable Loss

Type: Sucoflex 104PE; Ser.No.21328/4PE; 4 m length

Point	Frequency (GHz)	Cable Loss (dB)
1	0.0-1.0	1.7
2	1.0- 3.5	3.2
3	3.5- 5.5	4.0
4	5.5 - 7.5	4.7
5	7.5 - 9.5	5.3
6	9.5 - 10.5	5.6
7	10.5 - 12.5	6.2
8	12.5 - 14.5	6.8
9	14.5 - 16.5	7.5
10	16.5 - 18.0	8.1

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Title: Foot pedal and USB dongle transceivers.

Model: EA03586-B

Pedal FCC ID: UZ2EA03586; Dongle FCC ID: UZ2ED03586

Broadband Horn Antenna model BBHA 9170 1m calibration.

Point	Frequency, GHz	Antenna Factor, dB/m
1	15.0	38.5
2	16.0	37.7
3	17.0	38.1
4	18.0	37.9
5	19.0	38.0
6	20.0	38.0
7	21.0	37.9
8	22.0	38.2
9	23.0	39.6
10	24.0	39.6
11	25.0	39.3
12	26.0	39.5
13	27.0	39.6
14	28.0	39.6
15	30.0	40.1
16	32.0	41.2
17	34.0	41.5
18	35.0	41.9
19	36.0	42.2
20	38.0	43.8
21	40.0	43.2

Active Loop antenna mfr.EMCO mod. 6502 S/N 3424.

Frequency, MHz	Magnetic Antenna factor dBS/m	Electric Antenna factor dB/m
0.009	-31.46	20.07
0.010	-32.34	19.18
0.020	-36.15	15.38
0.050	-38.57	12.96
0.075	-38.78	12.75
0.100	-39.07	12.46
0.150	-39.07	12.45
0.250	-39.18	12.35
0.500	-39.29	12.24
0.750	-39.38	12.14
1.000	-39.57	11.95
2.000	-39.84	11.69
3.000	-40.09	11.44
4.000	-40.13	11.40
5.000	-40.24	11.28
10.000	-40.26	11.27
15.000	-40.70	10.83
20.000	-41.02	10.51
25.000	-41.94	9.59
30.000	-43.39	8.14

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11. APPENDIX C.

Abbreviations and acronyms.

The following abbreviations and acronyms are applicable to this test report:

AC	alternating current
cm	centimeter
dB	decibel
dBm	decibel referred to one milliwatt
dB(μ V)	decibel referred to one microvolt
dB(μ V/m)	decibel referred to one microvolt per meter
EBW	emission bandwidth.
EMC	electromagnetic compatibility
EUT	equipment under test
GHz	gigahertz
H	height
Hz	hertz
kHz	kilohertz
L	length
LNA	low noise amplifier
m	meter
Mbps	megabit per second
MHz	megahertz
NA	not applicable
OFDM	Orthogonal Frequency Division Multiple Access
PRBS	pseudo random binary sequence
QP	quasi-peak
RF	radio frequency
RE	radiated emission
SA	spectrum analyzer
rms	root mean square
W	width

Specification references

47 CFR part 15: 2009	Radio Frequency Devices
ANSI C63.2: 1996	American National Standard for Instrumentation Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz Specifications.
ANSI C63.4: 2009	American National Standard for Method of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz