

Produkte
Products

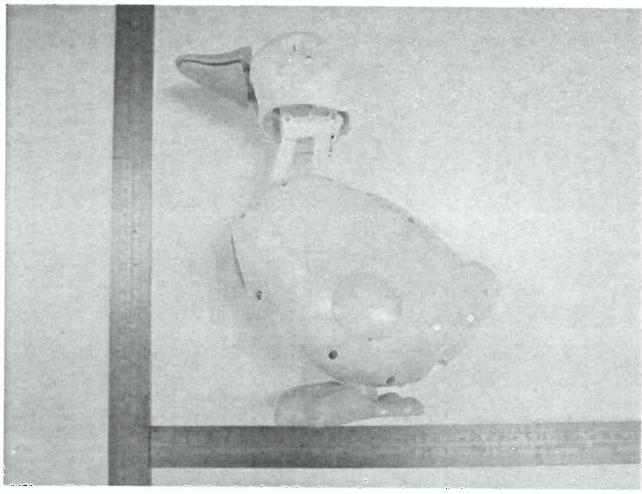
Prüfbericht-Nr.: <i>Test Report No.:</i>	50126856 001	Auftrags-Nr.: <i>Order No.:</i>	144175652	Seite 1 von 20 <i>Page 1 of 20</i>
Kunden-Referenz-Nr.: <i>Client Reference No.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	13.02.2018	
Auftraggeber: <i>Client:</i>	Sproutel, Inc. 60 Valley St Ste 29, Providence, RI 02909, USA			
Prüfgegenstand: <i>Test item:</i>	Short Range Device – Toy duck with Bluetooth connectivity and 13.56MHz RFID reader			
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	F7E2			
Auftrags-Inhalt: <i>Order content:</i>	FCC Certification			
Prüfgrundlage: <i>Test specification:</i>	FCC Part 15 Subpart C ANSI C63.10-2013			
Wareneingangsdatum: <i>Date of receipt:</i>	27.03.2018			
Prüfmuster-Nr.: <i>Test sample No.:</i>	A000709297-001			
Prüfzeitraum: <i>Testing period:</i>	02.04.2018 - 29.05.2018			
Ort der Prüfung: <i>Place of testing:</i>	Hong Kong			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland Hong Kong Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von / tested by:		kontrolliert von / reviewed by:		
 04.06.2018 David Cheng / Test Engineer Datum Name / Stellung Unterschrift Date Name / Position Signature		 04.06.2018 Joey Leung / Project Manager Datum Name / Stellung Unterschrift Date Name / Position Signature		
Sonstiges / Other: FCC ID: 2AN6HF7E2				
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
* Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable N/T = not tested				
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

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Product information

Manufacturers declarations

	BLE Transceiver	RFID Transmitter
Operating frequency range	2402 - 2480 MHz	13.56 MHz
Type of modulation	GFSK	ASK
Number of channels	40	1
Channel separation	2 MHz	N/A
Type of antenna	Integral Antenna	
Antenna gain (dBi)	0 dBi	
Power level	fix	
Type of equipment	stand alone radio device	
Connection to public utility power line	No	
Nominal voltage	$V_{nor.}$: 4.5 VDC	
Independent Operation Modes	Transmitting	

Product function and intended use

The equipment under test (EUT) is a toy duck with Bluetooth Low Energy connectivity and RFID reader. It is intended to educate and entertain the children with cancer.

FCC ID: 2AN6HF7E2

Models	Product description
F7E2	Short Range Device – Toy duck with Bluetooth connectivity and 13.56MHz RFID reader

Submitted documents

Circuit Diagram
Block Diagram
Technical Description
User manual
Label

Independent Operation Modes

The basic operation modes are:

- Transmitting mode.

For further information refer to User Manual

Related Submittal(s) Grants

This is a single application for certification of the transmitter.

Remark

The test results in this test report are only relevant to the tested sample and does not involve any assessment in the production.

Test Set-up and Operation Mode

Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

Test Operation and Test Software

Test operation should refer to test methodology.

- During test, 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 was selected according to the instruction given by the manufacturer. The setting of the RF output power expected by the customer shall be fixed on the firmware of the final end product.

Special Accessories and Auxiliary Equipment

- None

Countermeasures to achieve EMC Compliance

- None

Test Methodology

Radiated Emission

The radiated emission measurements of the transmitter part were performed according to the procedures in ANSI C63.10-2013.

For measurement below 1GHz - the equipment under test (EUT) was placed at the middle of the 80 cm height turntable. For measurement above 1GHz - the EUT was placed at the middle of the 1.5 m height turntable and RF absorbing material was placed on ground plane between turntable and measuring antenna. During the testing, the EUT was operated standalone and arranged for maximum emissions. The EUT was tested in three orthogonal planes.

The investigation is performed with the EUT rotated 360°, the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained.

All radiated tests were performed at an antenna to EUT with 3 meters distance, unless stated otherwise in particular parts of this test report.

Field Strength Calculation

The field strength at 3m was established by adding the meter reading of the spectrum analyzer to the factors associated with antenna correction factor, cable loss, preamplifiers and filter attenuation.

The equation is expressed as follow:

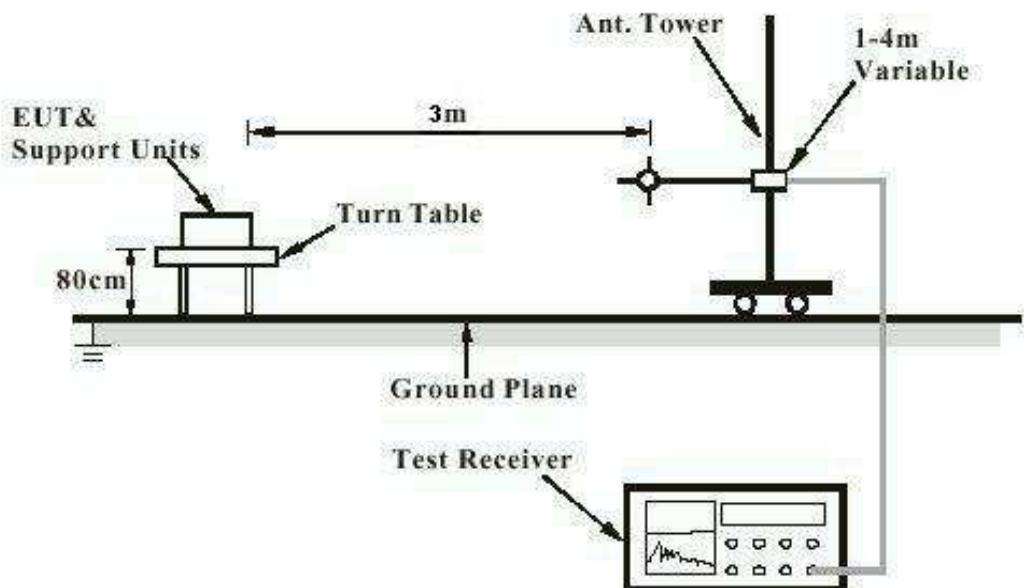
$$FS = R + AF + CF + FA - PA$$

Where FS = Field Strength in dBuV/m at 3 meters.
R = Reading of Spectrum Analyzer in dBuV.
AF = Antenna Factor in dB.
CF = Cable Attenuation Factor in dB.
FA = Filter Attenuation Factor in dB.
PA = Preamplifier Factor in dB.

FA and PA are only be used for the measuring frequency above 1 GHz.

Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



Note: Measurements above 1 GHz are done with a table height of 1.5m. In addition, there is RF absorbing material on the floor of the test site for above 1GHz measurement.

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

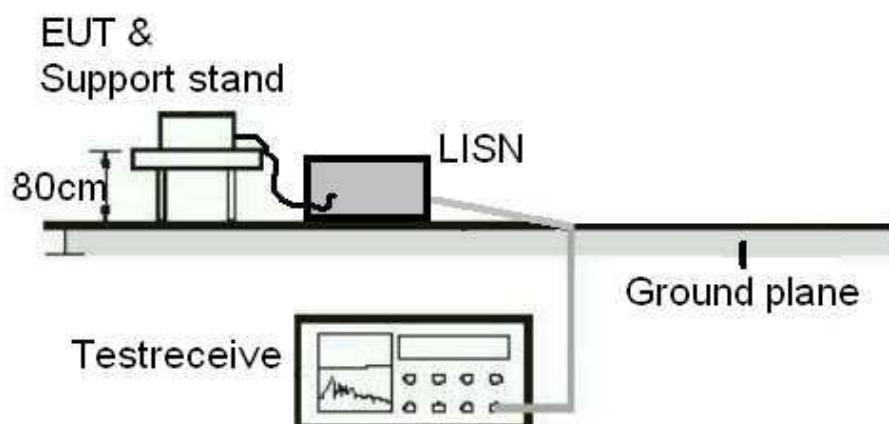
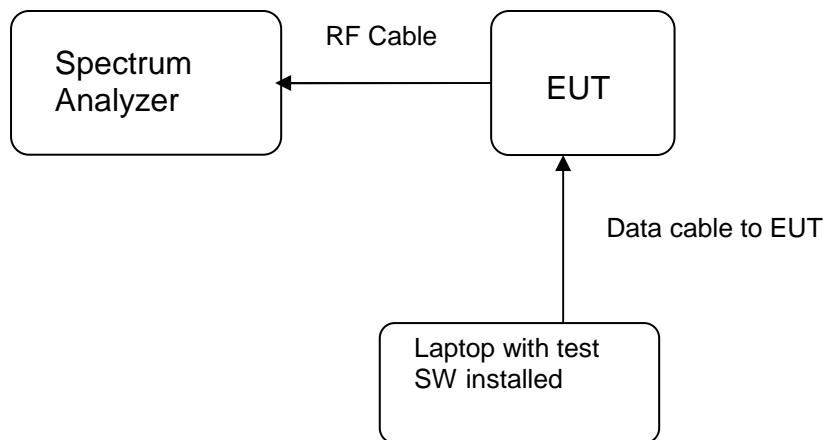


Diagram of Equipment Configuration for Antenna-port Conducted Measurement (if applicable)

Test Facility

Test Laboratory Information

TÜV Rheinland Hong Kong Ltd.

Address: 3-4, 11/F., Fou Wah Industrial Building, 10-16 Pun Shan Street, Tsuen Wan, N.T., Hong Kong

Tel.: +852 2192 1000

Fax: +852 2192 1001

Email service-gc@tuv.com

Web: www.tuv.com

The test facility is recognized or accredited by the following organizations:

Type	: Accredited Test Firm
Designation Number	: HK0013
Test Firm Registration Number	: 371735
Scope	: Intentional Radiators

List of Test and Measurement Instruments

TÜV Rheinland Hong Kong Ltd

Radiated Emission

Equipment	Manufacturer	Type	Cal. Date	Due Date
Semi-anechoic Chamber	Frankonia	Nil	23 Apr 2018	23 Apr 2019
Test Receiver	R & S	ESU40	07 Sep 2017	07 Sep 2018
Active Loop Antenna	EMCO	6502	30 Oct 2017	21 Oct 2018
Bi-conical Antenna	R & S	HK116	21 Mar 2018	21 Mar 2019
Log Periodic Antenna	R & S	HL223	22 Mar 2018	22 Mar 2020
Horn Antenna	EMCO	3115	28 Mar 2018	28 Mar 2020
Double-Ridged Waveguide Horn	EMCO	3116	17 Jun 2016	17 Jun 2018
Double-Ridged Waveguide Horn	EMCO	3117	22 Jun 2016	22 Jun 2018
Coaxial cable	Harbour	LL335	10 Jun 2016	10 Jun 2018
High Frequency Cable	Pasternack	PE3VNA4001-3M	29 Jan 2018	29 Jan 2019
Microwave amplifier 0.5-26.5GHz, 25dB gain	HP	83017A	18 Jul 2016	18 Jul 2018
Preamplifier 18GHz to 40GHz with cable (EMC656)	A.H. Systems, Inc.	PAM-1840VH	29 Jan 2018	29 Jan 2019
High Pass Filter (cutoff freq. =1000MHz)	Trilithic	23042	30 Oct 2017	30 Oct 2019

Radio Test

Equipment	Manufacturer	Type	Cal. Date	Due Date
Spectrum Analyzer	R & S	FSP30	03 May 2018	02 May 2019
Thermometer	Fluke	50S	01 Aug 2017	31 Jul 2018
Temperature Chamber	Binder	MK 240	05 Jul 2017	04 Jul 2018

Measurement Uncertainty

The estimated combined standard uncertainty for power-line conducted emissions measurements is $\pm 2.42\text{dB}$.

The estimated combined standard uncertainty for radiated emissions measurements is $\pm 4.81\text{dB}$ (9kHz to 30MHz) and $\pm 4.62\text{dB}$ (30MHz to 200MHz) and $\pm 5.67\text{dB}$ (200MHz to 1000MHz) and is $\pm 5.07\text{dB}$ (1GHz to 8.2GHz) and $\pm 4.58\text{dB}$ (8.2GHz to 12.4GHz) and $\pm 4.78\text{dB}$ (12.4GHz to 18GHz)

The estimated combined standard uncertainty for antenna conducted emission is $\pm 2.1\text{dB}$

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor of $k=2$, which for the level of confidence is approximately 95%.

Results FCC Part 15 – Subpart C

FCC 15.203 – Antenna Requirement 1		Pass
FCC Requirement:	No antenna other than that furnished by the responsible party shall be used with the device	
Results:	a) Antenna type: b) Manufacturer and model no: c) Peak Gain:	BLE portion Integral PCB antenna N/A 0dBi RFID portion Integral coil antenna N/A N/A
Verdict:	Pass	

FCC 15.204 – Antenna Requirement 2		N/A
FCC Requirement:	An intentional radiator may be operated only with the antenna with which it is authorized. If an antenna is marketed with the intentional radiator, it shall be of a type which is authorized with the intentional radiator.	
Results:	Only one integral antenna can be used.	
Verdict:	N/A	

FCC 15.207 – Conducted Emission on AC Mains		N/A
There is no AC power input or output ports on the EUT.		

FCC 15.215 (c) – 20 dB Bandwidth		Pass		
Requirement:	The intentional radiators must be designed to ensure that the 20dB bandwidth of the emission, is contained within the frequency band designated in the rule section under which the equipment is operated.			
Test Specification : ANSI C63.10-2013				
Test date : 03.05.2018				
Mode of operation : TX Mode				
Supply voltage : 4.5VDC				
Temperature : 23°C				
Humidity : 50%				
Results:	For test protocols refer to Appendix 1.			
Frequency (MHz)	20 dB left (MHz)	Limit (MHz)	20 dB right (MHz)	Limit (MHz)
13.560	13.4540	> 13.110	13.6765	< 14.010

FCC 15.225 (a)(b)(c) – Radiated Emission		Pass	
Test Specification	: ANSI C63.10 – 2013		
Test date	: 25.04.2018		
Mode of operation	: Tx mode		
Port of testing	: Enclosure		
Measurement distance	: 10 meters		
Supply voltage	: 4.5VDC		
Temperature	: 23°C		
Humidity	: 50%		
Requirement:	(a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters. (b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters. (c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.		
Results:	For test protocols refer to Appendix 1.		
Freq. Band (MHz)	Freq. (MHz)	Level (dBuV/m)	Limit/ Detector (dBuV/m)
13.553 – 13.567	13.560	29.7	93.5 / QPK
13.410 – 13.553	No peak found	---	60.0 / QPK
13.567 – 13.710	No peak found	---	60.0 / QPK
13.110 – 13.410	No peak found	---	50.0 / QPK
13.710 – 14.010	No peak found	---	50.0 / QPK

FCC 15.225 (d) – Radiated Emissions		Pass
Test Specification	: ANSI C63.10 – 2013	
Test date	: 25.04.2018	
Mode of operation	: TX mode	
Port of testing	: Enclosure	
Measurement distance	: 10 meters for < 30MHz 3 meters for >= 30MHz	
Frequency range	: 9kHz to 1GHz	
Supply voltage	: 4.5VDC	
Temperature	: 23°C	
Humidity	: 50%	
Requirement:	The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in §15.209.	
Results:	<p>Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate.</p> <p>Simultaneous transmission was investigated and no new emissions were found.</p> <p>All three transmit frequency modes comply with the field strength within the restricted bands. There is no spurious found below 30MHz.</p>	
Vertical Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
194.395	31.10	43.5 / QP
614.020	28.50	46.0 / QP
Horizontal Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
192.670	31.40	43.5 / QP
400.001	21.20	46.0 / QP

FCC 15.225 (e) – Frequency Tolerance		Pass			
Test Specification : ANSI C63.10-2013					
Test date : 04.05.2018					
Mode of operation : Tx mode					
Port of testing : Antenna port					
Requirement:	The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C in 10 degrees C steps at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage or battery end point at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.				
Results:	Pass				
Frequency stability with respect to ambient temperature					
Temp. (°C)	Supply Voltage (VDC)	Frequency (MHz)	Frequency error (%)	Limit (%)	Verdict
50	4.5	13.563525	-0.000700	+/- 0.01	Pass
40	4.5	13.563555	-0.000479	+/- 0.01	Pass
30	4.5	13.563695	0.000553	+/- 0.01	Pass
20	4.5	13.563620	0.000000	+/- 0.01	Reference
10	4.5	13.563655	0.000258	+/- 0.01	Pass
0	4.5	13.563660	0.000295	+/- 0.01	Pass
-10	4.5	13.563640	0.000147	+/- 0.01	Pass
-20	4.5	13.563605	-0.000111	+/- 0.01	Pass

FCC 15.247 (a)(2) – 6dB Bandwidth Measurement		Pass	
FCC Requirement: Systems using digital modulation techniques may operate in the 902 – 928 MHz, 2400 – 2483.5 MHz, and 5725 – 5850 MHz bands. The minimum 6dB bandwidth shall be at least 500kHz.			
Test Specification : ANSI C63.10 – 2013 Test date : 03.05.2018 Mode of operation : Tx mode Port of testing : Temporary antenna port Supply voltage : 4.5VDC Temperature : 23°C Humidity : 50%			
Results: For test protocols please refer to Appendix 1			
Channel frequency (MHz)	6 dB left (MHz)	6 dB right (MHz)	6dB bandwidth (kHz)
2402	2401.628	2402.336	708
2440	2439.640	2440.336	696
2480	2479.634	2480.342	708
FCC 15.247(b)(3) – Maximum Peak Conducted Output Power		Pass	
FCC Requirement: For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850MHz bands: 1 Watt (30dBm)			
Test Specification : ANSI C63.10 – 2013 Test date : 03.05.2018 Mode of operation : Tx mode Port of testing : Temporary antenna port Supply voltage : 4.5VDC Temperature : 23°C Humidity : 50%			
Results: For test protocols please refer to Appendix 1			
Frequency (MHz)	Measured Output Power (dBm)	Limit (W/dBm)	Verdict
2402	2.35	1 / 30.0	Pass
2440	1.98	1 / 30.0	Pass
2480	1.19	1 / 30.0	Pass

FCC 15.247(e) – Power Spectral Density		Pass			
FCC Requirement: For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.					
Test Specification : ANSI C63.10 – 2013 Test date : 03.05.2018 Mode of operation : Tx mode Port of testing : Temporary antenna port Supply voltage : 4.5VDC Temperature : 23°C Humidity : 50%					
Results: For test protocols please refer to Appendix 1.					
Operating frequency (MHz)	Power density (dBm)	Limit (dBm)	Verdict		
2402	2.21	8.0	Pass		
2440	1.83	8.0	Pass		
2480	1.08	8.0	Pass		
FCC 15.247(d) – Spurious Conducted Emissions		Pass			
Test Specification : ANSI C63.10 – 2013 Test date : 04.05.2018 Mode of operation : Tx mode Port of testing : Temporary antenna port Supply voltage : 4.5VDC Temperature : 23°C Humidity : 50%					
FCC Requirement: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.					
Results: Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate. Only the worst cases is shown below. For test protocols refer to Appendix 1					
Operating frequency (MHz)	Spurious frequency (MHz)	Spurious Level (dBm)	Reference value (dBm)	Delta (dB)	Verdict
2402	2400.0	-36.72	2.21	38.72	Pass
2440	2560.0	-43.52	1.83	45.35	Pass
2480	2560.0	-43.28	1.08	44.36	Pass

FCC 15.205 – Radiated Emissions in Restricted Frequency Bands			Pass
Test Specification : ANSI C63.10 – 2013			
Test Specification : 25.04.2018			
Mode of operation : Tx mode			
Port of testing : Enclosure			
Frequency range : 9kHz – 25GHz			
Supply voltage : 4.5VDC			
Temperature : 23°C			
Humidity : 50%			
FCC Requirement: In any 100kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in section 15.205(a), must also comply with the radiated emission limits specified in section 15.205(c).			
Results: Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate. Simultaneous transmission was investigated and no new emissions were found. All three transmit frequency modes comply with the field strength within the restricted bands. There is no spurious found below 30MHz.			
Mode: 2402MHz TX		Vertical Polarization	
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m	
2389.327	50.07	74.0 / PK	
2389.327	34.19	54.0 / AV	
No peak found	---	74.0 / PK	
No peak found	---	54.0 / AV	
Mode: 2402 MHz TX		Horizontal Polarization	
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m	
2389.342	49.02	74.0 / PK	
2389.342	34.16	54.0 / AV	
No peak found	---	74.0 / PK	
No peak found	---	54.0 / AV	
Mode: 2440 MHz TX		Vertical Polarization	
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m	
No peak found	---	74.0 / PK	
No peak found	---	54.0 / AV	
Mode: 2440 MHz TX		Horizontal Polarization	
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m	
No peak found	---	74.0 / PK	
No peak found	---	54.0 / AV	
Mode: 2480MHz TX		Vertical Polarization	
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m	
2483.500	53.67	74.0 / PK	

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2483.500	42.37	54.0 / AV
No peak found	---	74.0 / PK
No peak found	---	54.0 / AV

Mode: 2480 MHz TX

Horizontal Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2483.500	56.11	74.0 / PK
2483.500	43.87	54.0 / AV
No peak found	---	74.0 / PK
No peak found	---	54.0 / AV