

# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

## INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C & E REQUIREMENT REFERENCING TEST DATA ACROSS SEPARATE EQUIPMENT VERIFICATION

OF

**Product Name:** Tablet

**Brand Name:** TomTom

**Model No.:** 4FI722

**Model Difference:** N/A

**FCC ID:** S4L4FI722

**Report No.:** E2/2017/30055

**Issue Date:** Mar. 23, 2017

**FCC Rule Part:** §15.247, Cat: DTS & §15.407

**Prepared for:** TomTom International B.V.  
De Ruijterterkade 154, 1011 AC Amsterdam, The Netherlands

**Prepared by:** SGS Taiwan Ltd.  
Electronics & Communication Laboratory  
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**Manufacturer:**

1. Tech-Com (Shanghai) Computer Co., Ltd  
No. 68, Sanzhuang Road, Songjiang Export Processing Zone, Shanghai 201613, P. R. China
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## VERIFICATION OF COMPLIANCE

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De Ruijterterkade 154, 1011 AC Amsterdam, The Netherlands

**Manufacturer:** 1. Tech-Com (Shanghai) Computer Co., Ltd  
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Processing Zone Shanghai 201613, P. R. China

**Product Name:** Tablet

**Brand Name:** TomTom

**Model No.:** 4FI722

**Model Difference:** N/A

**FCC ID:** S4L4FI722

**File Number:** E2/2017/30055

**Date of test:** Mar. 21, 2017

**Date of EUT Received:** Mar. 17, 2017

## We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10:2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits.

The test results of this report relate only to the tested sample identified in this report.

Test By:

Jerry Lu

Date:

Mar. 23, 2017

Jerry Lu / Sr.Engineer

Prepared By:

Allen Tsai

Date:

Mar. 23, 2017

Allen Tsai / Sr.Engineer

Approved By:

Jim Chang

Date:

Mar. 23, 2017

Jim Chang / Asst. Manager

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## Revision History

Report Number	Revision	Description	Issue Date
E2/2017/30055	Rev.00	Initial creation of document	Mar. 23, 2017

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## 1 GENERAL INFORMATION

### 1.1 Product description

General:

General:

Product Name:	Tablet		
Brand Name:	TomTom		
Model No.:	4FI722		
Model Difference:	N/A		
Hardware Version:	PR1.1		
Software Version:	14.451		
Car charger	Model No.: 4UFI0	Brand: TomTom	
USB cable	Model No.: 4UUC.001.24	Brand: TomTom	
MIC cable	Model No.: P7051-13	Brand: TomTom	
MIC	Model No.: NEIM1100106	Brand: TomTom	
Car cable	Model No.: NA	Brand: TomTom	
Video cradle	Model No.: 4FI75	Brand: TomTom	
Daimler cradle	Model No.: 4FI77	Brand: TomTom	
Basic cradle	Model No.: 4FI74	Brand: TomTom	
Power Supply:	3.8VDC from Rechargeable Li-ion battery, 5VDC from USB port		
	Battery:	Model No.: UZ6	Brand: TomTom

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## 1.2 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247

FCC KDB 558074 D01 DTS Meas. Guidance

FCC Part 15, Subpart E §15.407

FCC KDB 789033 D02 General UNII Test Procedures New Rules

ANSI C63.10:2013

Note: All test items have been performed and record as per the above standards.

## 1.3 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.2, Keji 1st Rd.,  
Guishan District, Taoyuan City, Taiwan 333 (TAF code 0513)

FCC Registration Numbers are: 735305

## 1.4 Special Accessories

There are no special accessories used while test was conducted.

## 1.5 Equipment Modifications

There was no modification incorporated into the EUT.

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## 2 SYSTEM TEST CONFIGURATION

### 2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### 2.2 EUT Exercise

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

### 2.3 Test Procedure

#### 2.3.1 Conducted Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz. The CISPR Quasi-Peak and Average detector mode is employed according to §15.207. The two LISNs provide 50 ohm/ 50 uH of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

#### 2.3.2 Radiated Emissions

The EUT is placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.

### 2.4 Measurement Results Explanation Example

#### For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

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## 2.5 Configuration of Tested System

Fig 2-2 Radiated Emission Configuration



Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	WLAN Test Software	DRTU	N/A	N/A	N/A	N/A
2.	DC Power Supply	Agilent	E3634A	MY53180030	N/A	Un-shield
3.	Notebook	Lenovo	L412	LR-957X7	shield	Un-shield

## 3 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.247(d)	Radiated Spurious Emission	Compliant
§15.407(b)	Undesirable Radiated Emissions	Compliant

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## 4 DESCRIPTION OF TEST MODES

### 4.1 Operated in 2400 ~ 2483.5MHz Band

11 channels are provided for 802.11b, 802.11g and 802.11n HT20

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
1	2412 MHz	7	2442 MHz
2	2417 MHz	8	2447 MHz
3	2422 MHz	9	2452 MHz
4	2427 MHz	10	2457 MHz
5	2432 MHz	11	2462 MHz
6	2437 MHz		

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## 4.2 The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.
3. Investigation has been done base on the worst case of original FCC ID:S4L4FI76.

### RADIATED EMISSION TEST:

RADIATED EMISSION TEST (ABOVE 1 GHz)				
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
802.11g	1 to 11	6	OFDM	6
802.11a	36 to 165	44, 60, 116, 157	OFDM	6

### Note:

The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for 802.11a/b/g/n WLAN Transmitter for channel Low, Mid and High, the worst case H position was reported.

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## 5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
Peak Output Power	+/- 0.84 dB
6dB Bandwidth	+/- 51.33 Hz
100 KHz Bandwidth Of Frequency Band Edges	+/- 0.84 dB
Peak Power Density	+/- 1.3 dB
Temperature	+/- 0.65 °C
Humidity	+/- 4.6 %
DC / AC Power Source	DC= +/- 0.13%, AC= +/- 0.2%

Radiated Spurious Emission:

Measurement uncertainty (Polarization : <b>Vertical</b> )	9kHz – 30MHz: +/- 2.87 dB
	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB

Measurement uncertainty (Polarization : <b>Horizontal</b> )	9kHz – 30MHz: +/- 2.87 dB
	30MHz - 167MHz: +/- 4.22dB
	167MHz -500MHz: +/- 3.44dB
	0.5GHz-1GHz: +/- 3.39dB
	1GHz - 18GHz: +/- 4.08dB
	18GHz - 40GHz: +/- 4.08dB

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

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## 6 RADIATED SPURIOUS EMISSION MEASUREMENT

### 6.1 Measurement Equipment Used:

966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESU 40	100363	04/12/2016	04/11/2017
Loop Antenna	ETS-Lindgren	6502	00143303	12/23/2016	12/22/2017
Broadband Antenna	TESEQ	CBL 6112D	35240	11/03/2016	11/02/2017
Horn Antenna	ETS-Lindgren	3117	00143272	12/15/2016	12/16/2017
Horn Antenna	Schwarzbeck	BBHA9170	185	07/24/2016	07/23/2017
Pre Amplifier	EMC Instruments	EMC330	980096	12/12/2016	12/11/2017
Pre Amplifier	EMC Instruments	EMC0011830	980199	12/12/2016	12/11/2017
Pre Amplifier	R&S	SCU-18	10204	12/12/2016	12/11/2017
Pre Amplifier	R&S	SCU-26	100780	12/12/2016	12/11/2017
Coaxial Cable	Huber+Suhner	RG 214/U	966Rx 9K-30M	12/12/2016	12/11/2017
Coaxial Cable	Huber+Suhner	RG 214/U SUCOFLEX 104	966Rx 30M-3G	12/12/2016	12/11/2017
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Rx 1G-18G	12/12/2016	12/11/2017
Coaxial Cable	Huber+Suhner	mini 141-12 SUCOFLEX 104	966Rx 18G-40G	12/12/2016	12/11/2017
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Tx 30M-18G	12/12/2016	12/11/2017
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	966Tx 18G-40G	12/12/2016	12/11/2017
Attenuator	WOKEN	218FS-10	RF27	12/12/2016	12/11/2017
Site NSA	SGS	966 Chamber C	SAC-C	03/02/2017	03/01/2018
Site VSWR	SGS	966 Chamber C	SAC-C	03/02/2017	03/01/2018
DC Power Supply	HOLA	DP-3003	D7070035	05/04/2016	05/03/2017
Controller	MF	MF-7802	N/A	N.C.R.	N.C.R.
Antenna Master	MF	N/A	N/A	N.C.R.	N.C.R.
Turn Table	MF	N/A	N/A	N.C.R.	N.C.R.
Test Software	World-Pallas	Dr. E	V 3.0 Lite	N.C.R.	N.C.R.

NOTE: N.C.R refers to Not Calibrated Required.

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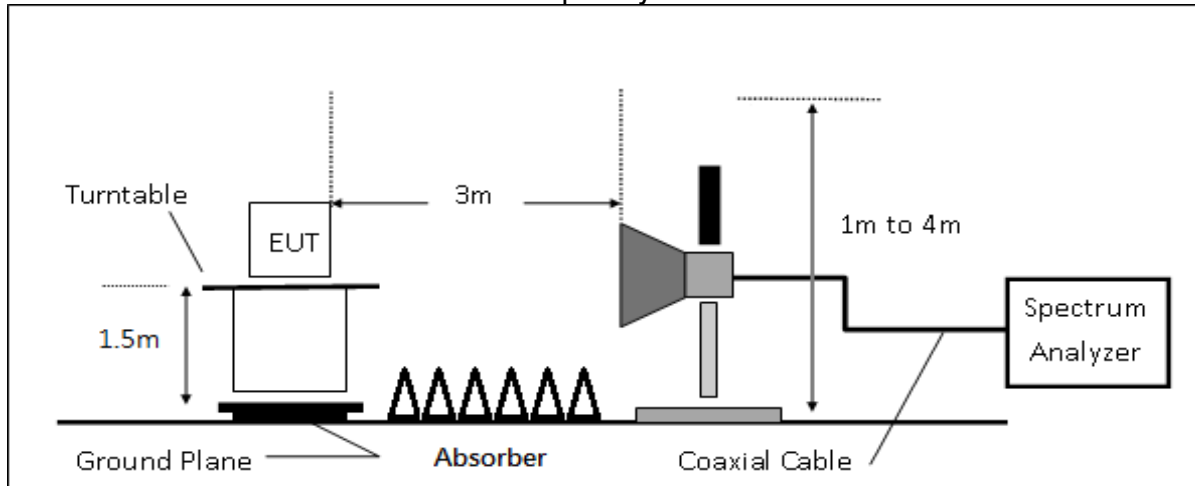
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## 6.2 Test SET-UP

### Radiated Emission Test Set-UP Frequency Over 1 GHz



## 6.3 Measurement Procedure

1. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance .
2. The EUT was placed on a turn table with 1.5m for frequency > 1GHz above ground plane.
3. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
4. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
5. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.
6. Set the spectrum analyzer as RBW=1 MHz, VBW=3 MHz for Peak Detector at frequency above 1 GHz.
7. Set the spectrum analyzer as RBW=1 MHz, VBW=10 Hz (Duty cycle > 98%) or VBW ≥ 1/T (Duty cycle < 98%) for Average Detector at frequency above 1 GHz.
8. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
9. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. On spectrum, change spectrum mode in linear display mode, and reduce VBW = 10Hz if average reading is measured.
10. Repeat above procedures until all default test channel measured were complete.

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## 6.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

### Note :

“F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

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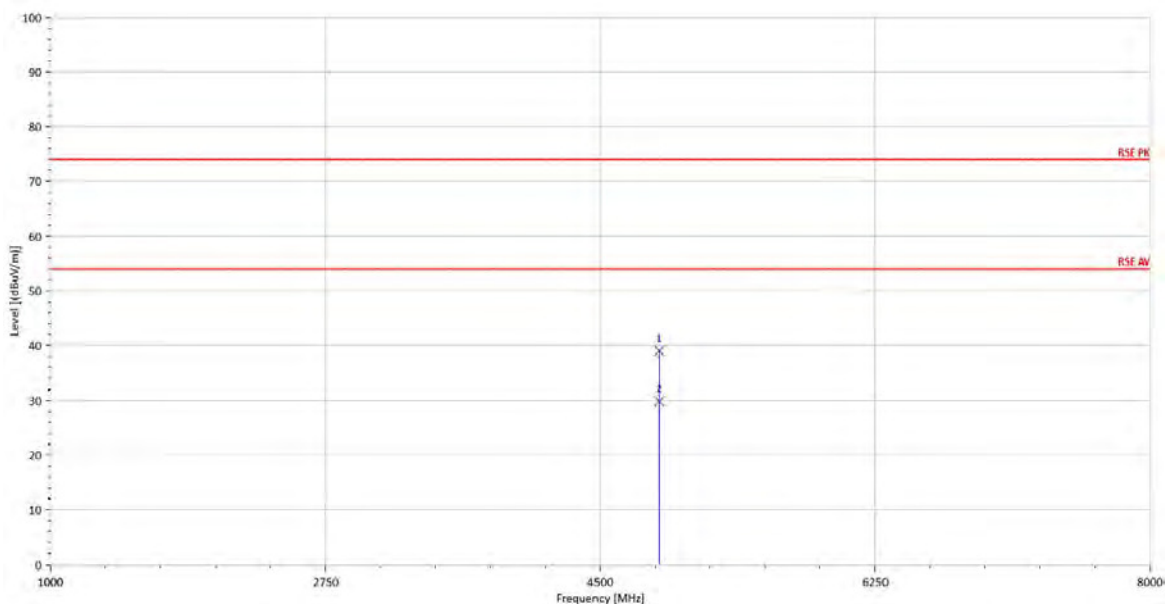
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## 6.5 Measurement Result

### WLAN 2.4GHz (Worst Case)

Project No.		Fundamental Frequency	2437 MHz
IMEI No.		Operation Band	Tx CH Mid
EUT Description		Temp. / Humi.	22.7deg_C/57RH
EUT Model	UZ6A	Measurement Antenna Pol.	Vertical
EUT Name	UZ6A	EUT Pol.	H
Operation Mode	802.11g	Test Engineer	Ashton



Frequency	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBuV/m	dB	dBuV/m	dBuV/m	dB
4874.00	Peak	H	31.16	7.91	39.07	74.00	-34.93
4874.00	Average	H	21.95	7.91	29.86	54.00	-24.14

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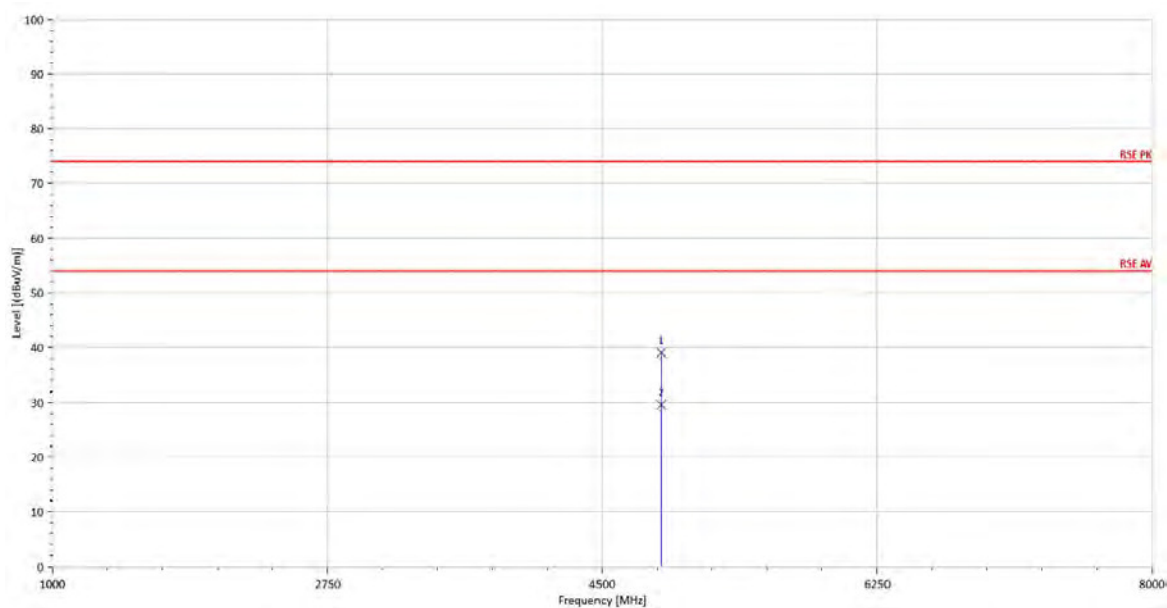
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Project No.		Fundamental Frequency	2437 MHz
IMEI No.		Operation Band	Tx CH Mid
EUT Description		Temp. / Humi.	22.7deg_C/57RH
EUT Model	UZ6A	Measurement Antenna Pol.	Horizontal
EUT Name	UZ6A	EUT Pol.	H
Operation Mode	802.11g	Test Engineer	Ashton



Frequency	Detector	Note	Spectrum	Factor	Actual FS	Limit @3m	Margin
	Mode		Reading				
			Level				

MHz	PK/QP/AV	F/H/E/S	dBuV/m	dB	dBuV/m	dBuV/m	dB
4874.00	Peak	H	31.19	7.91	39.10	74.00	-34.90
4874.00	Average	H	21.64	7.91	29.55	54.00	-24.45

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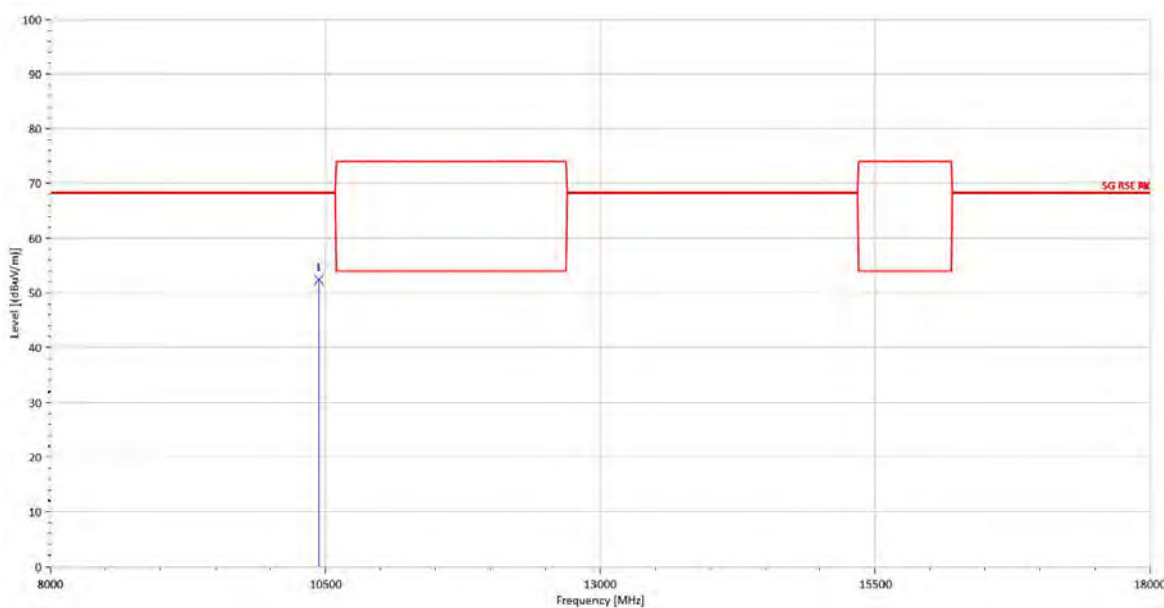
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## WLAN 5GHz (Worst Case)

Project No.		Fundamental Frequency	5220 MHz
IMEI No.		Operation Band	Tx CH Mid
EUT Description		Temp. / Humi.	22.7deg_C/57RH
EUT Model	UZ6A	Measurement Antenna Pol.	Vertical
EUT Name	UZ6A	EUT Pol.	H
Operation Mode	802.11a	Test Engineer	Ashton



Frequency	Detector	Note	Spectrum	Factor	Actual FS	Limit @3m	Margin
	Mode		Reading				
MHz	PK/QP/AV	F/H/E/S	dBuV/m	dB	dBuV/m	dBuV/m	dB
10440.00	Peak	H	32.10	20.29	52.39	68.30	-15.91

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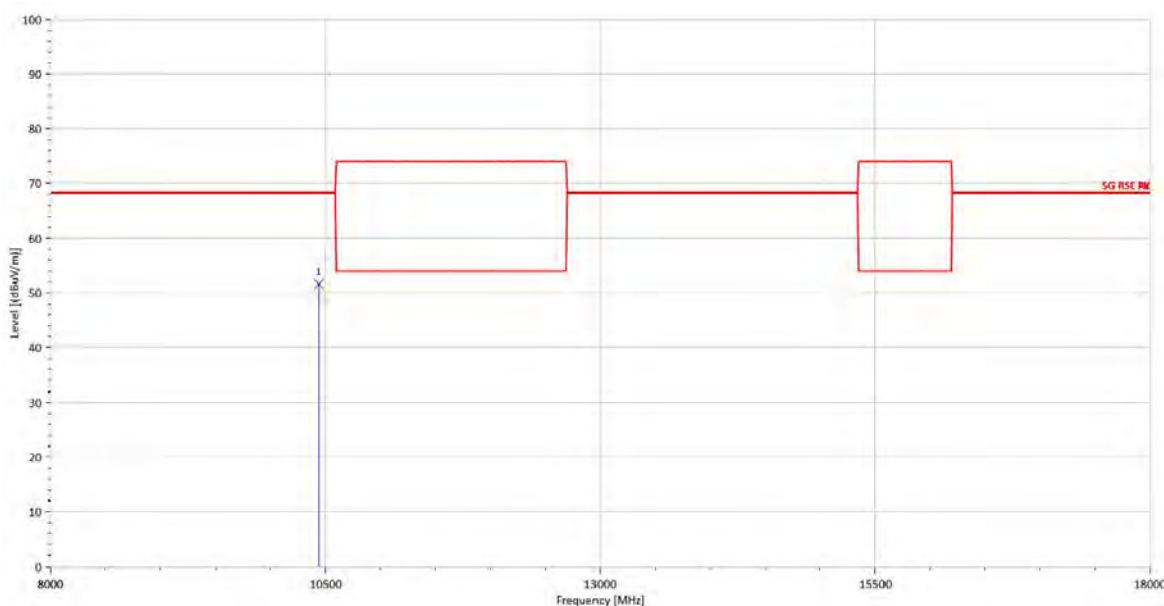
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Project No.		Fundamental Frequency	5220 MHz
IMEI No.		Operation Band	Tx CH Mid
EUT Description		Temp. / Humi.	22.7deg_C/57RH
EUT Model	UZ6A	Measurement Antenna Pol.	Horizontal
EUT Name	UZ6A	EUT Pol.	H
Operation Mode	802.11a	Test Engineer	Ashton



Frequency	Detector	Note	Spectrum	Factor	Actual FS	Limit @3m	Margin
	Mode		Reading				
MHz	PK/QP/AV	F/H/E/S	dBuV/m	dB	dBuV/m	dBuV/m	dB
10440.00	Peak	H	31.31	20.29	51.60	68.30	-16.70

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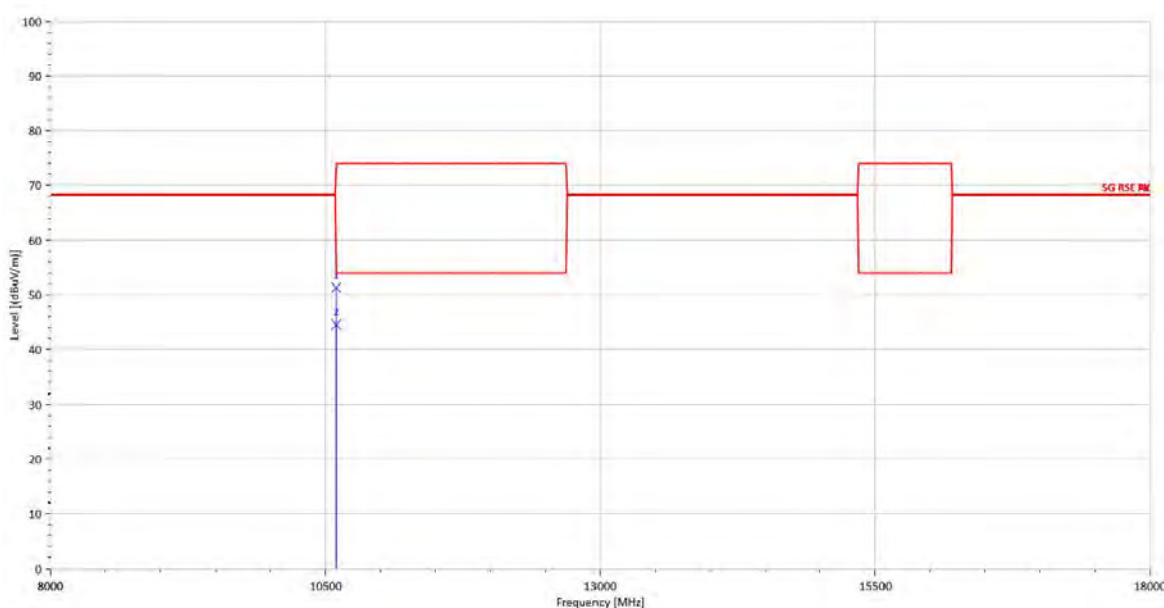
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Project No.		Fundamental Frequency	5300 MHz
IMEI No.		Operation Band	Tx CH Mid
EUT Description		Temp. / Humi.	22.7deg_C/57RH
EUT Model	UZ6A	Measurement Antenna Pol.	Vertical
EUT Name	UZ6A	EUT Pol.	H
Operation Mode	802.11a	Test Engineer	Ashton



Frequency	Detector	Note	Spectrum	Factor	Actual FS	Limit @3m	Margin
	Mode		Reading				
			Level				

MHz	PK/QP/AV	F/H/E/S	dBuV/m	dB	dBuV/m	dBuV/m	dB
10600.00	Peak	H	31.16	20.17	51.33	74.00	-22.67
10600.00	Average	H	24.41	20.17	44.58	54.00	-9.42

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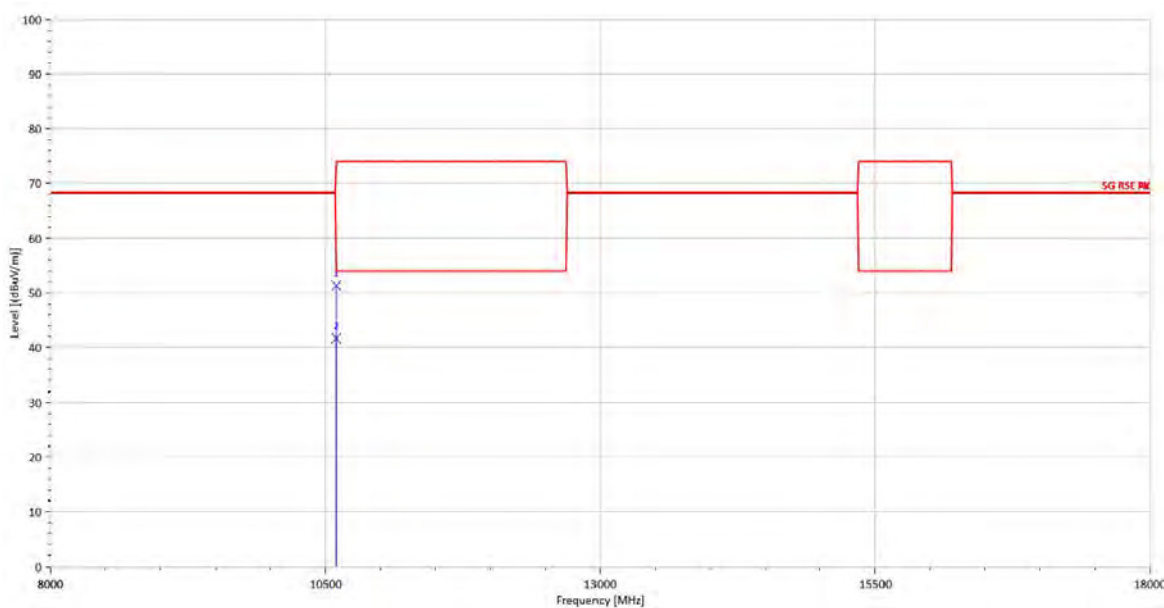
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Project No.		Fundamental Frequency	5300 MHz
IMEI No.		Operation Band	Tx CH Mid
EUT Description		Temp. / Humi.	22.7deg_C/57RH
EUT Model	UZ6A	Measurement Antenna Pol.	Horizontal
EUT Name	UZ6A	EUT Pol.	H
Operation Mode	802.11a	Test Engineer	Ashton



Frequency	Detector	Note	Spectrum	Factor	Actual FS	Limit @3m	Margin
	Mode		Reading				
			Level				

MHz	PK/QP/AV	F/H/E/S	dBuV/m	dB	dBuV/m	dBuV/m	dB
10600.00	Peak	H	31.17	20.17	51.34	74.00	-22.66
10600.00	Average	H	21.54	20.17	41.71	54.00	-12.29

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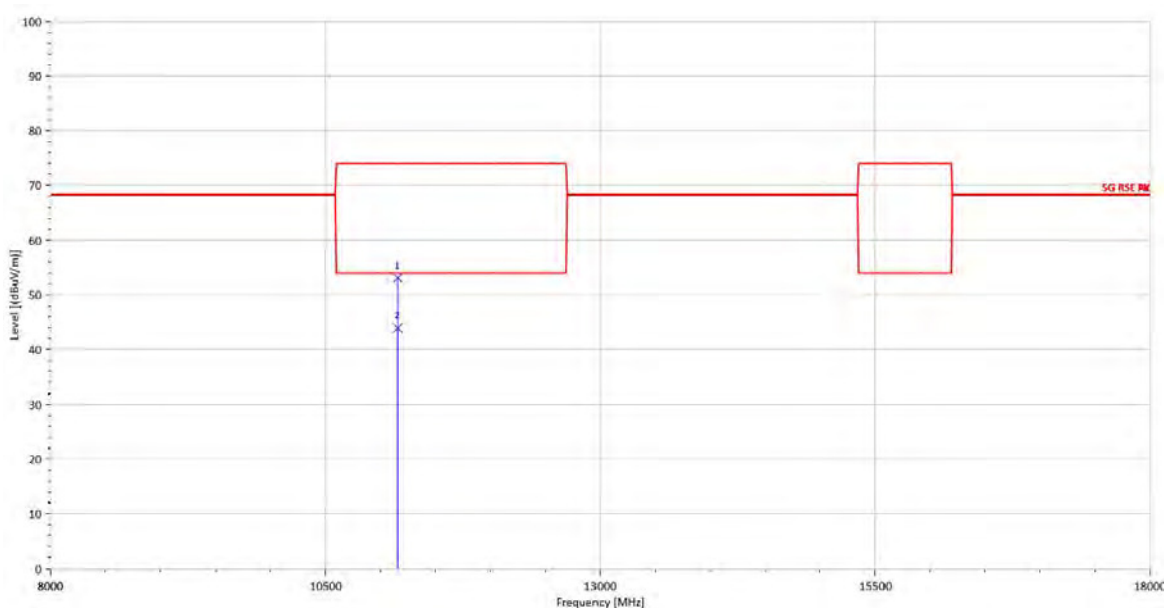
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Project No.		Fundamental Frequency	5580 MHz
IMEI No.		Operation Band	Tx CH Mid
EUT Description		Temp. / Humi.	22.7deg_C/57RH
EUT Model	UZ6A	Measurement Antenna Pol.	Vertical
EUT Name	UZ6A	EUT Pol.	H
Operation Mode	802.11a	Test Engineer	Ashton



Frequency	Detector	Note	Spectrum	Factor	Actual FS	Limit @3m	Margin
	Mode		Reading				
			Level				

MHz	PK/QP/AV	F/H/E/S	dBuV/m	dB	dBuV/m	dBuV/m	dB
11160.00	Peak	H	31.08	22.04	53.12	74.00	-20.88
11160.00	Average	H	21.92	22.04	43.96	54.00	-10.04

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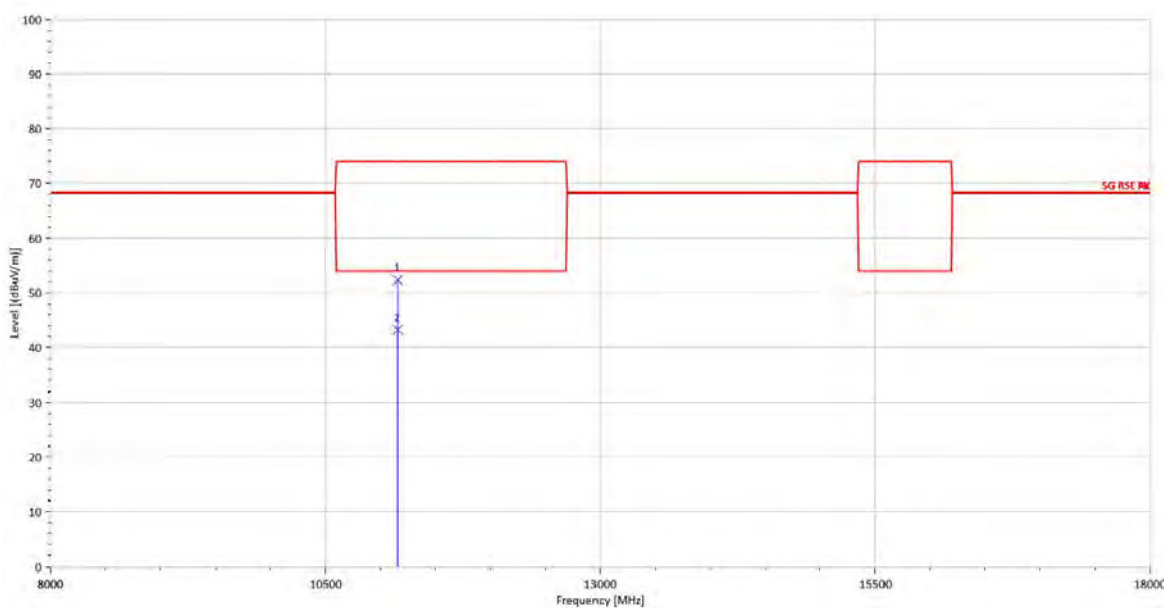
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Project No.		Fundamental Frequency	5580 MHz
IMEI No.		Operation Band	Tx CH Mid
EUT Description		Temp. / Humi.	22.7deg_C/57RH
EUT Model	UZ6A	Measurement Antenna Pol.	Horizontal
EUT Name	UZ6A	EUT Pol.	H
Operation Mode	802.11a	Test Engineer	Ashton



Frequency	Detector	Note	Spectrum	Factor	Actual FS	Limit @3m	Margin
	Mode		Reading				
			Level				

MHz	PK/QP/AV	F/H/E/S	dBuV/m	dB	dBuV/m	dBuV/m	dB
11160.00	Peak	H	30.31	22.04	52.34	74.00	-21.66
11160.00	Average	H	21.22	22.04	43.26	54.00	-10.74

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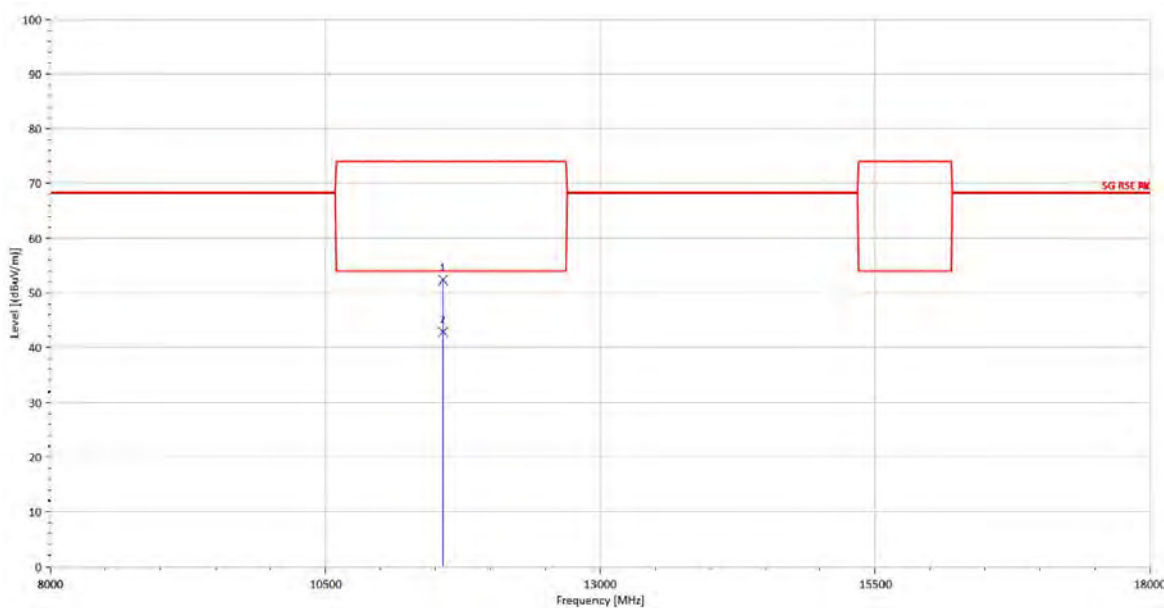
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Project No.		Fundamental Frequency	5785 MHz
IMEI No.		Operation Band	Tx CH Mid
EUT Description		Temp. / Humi.	22.7deg_C/57RH
EUT Model	UZ6A	Measurement Antenna Pol.	Vertical
EUT Name	UZ6A	EUT Pol.	H
Operation Mode	802.11a	Test Engineer	Ashton



Frequency	Detector	Note	Spectrum	Factor	Actual FS	Limit @3m	Margin
	Mode		Reading				
			Level				

MHz	PK/QP/AV	F/H/E/S	dBuV/m	dB	dBuV/m	dBuV/m	dB
11570.00	Peak	H	30.92	21.44	52.36	74.00	-21.64
11570.00	Average	H	21.41	21.44	42.85	54.00	-11.15

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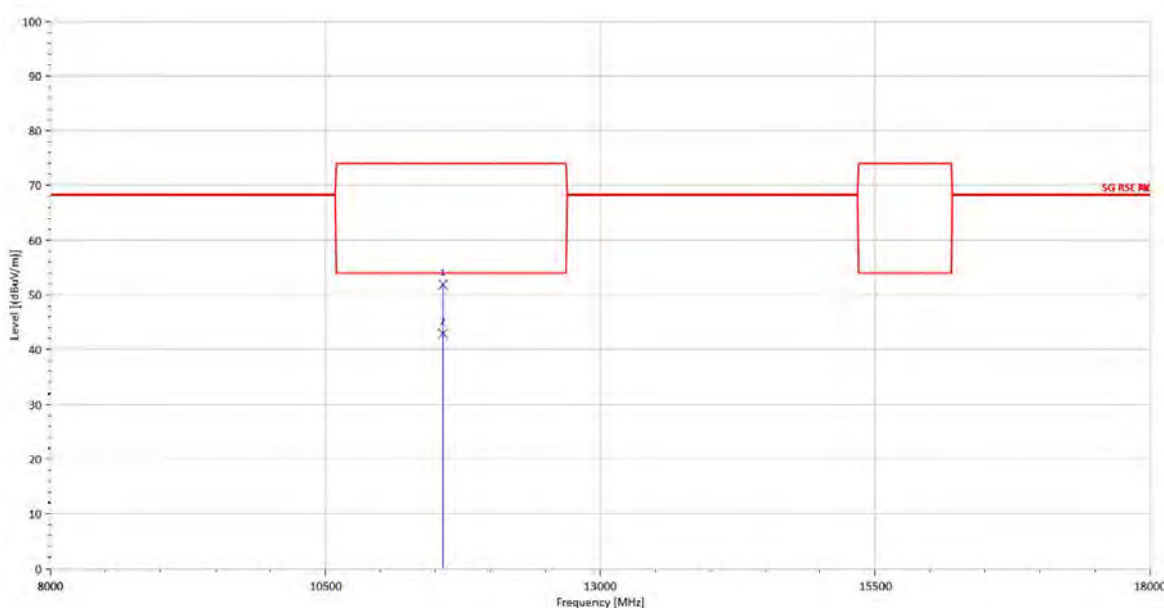
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Project No.		Fundamental Frequency	5785 MHz
IMEI No.		Operation Band	Tx CH Mid
EUT Description		Temp. / Humi.	22.7deg_C/57RH
EUT Model	UZ6A	Measurement Antenna Pol.	Horizontal
EUT Name	UZ6A	EUT Pol.	H
Operation Mode	802.11a	Test Engineer	Ashton



Frequency	Detector	Note	Spectrum	Factor	Actual FS	Limit @3m	Margin
	Mode		Reading				
			Level				

MHz	PK/QP/AV	F/H/E/S	dBuV/m	dB	dBuV/m	dBuV/m	dB
11570.00	Peak	H	30.47	21.44	51.92	74.00	-22.08
11570.00	Average	H	21.45	21.44	42.89	54.00	-11.11

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