

FCC/IC - TEST REPORT

Report Number	:	68.950.12.082.01	Date of Is	sue:	14 September 2012
Model	:	PRSBLE			
Product Type	<u>:</u>	BLE Proximity Key fob			
Applicant	<u>:</u>	Dayton Industrial Co., I	_td.		
Address	<u>:</u>	2-12 Kwai Fat Road, 1	I-A Kwai Chu	ng, Ne	w Territories, Hong Kong
Production Facility	<u>:</u>	Kendy Enterprise Ltd.			
Address	:	2-12 Kwai Fat Road, 1	1-A Kwai Chւ	ung, N⁻	Γ, Hong Kong
Test Result	:	■ Positive □ Neg	ative		
Total pages including					
Appendices	:	36			

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2 Details about the Test Laboratory

Details about the Test Laboratory

Test Site 1

Company name: Jiangsu TÜV Product Service Ltd. – Shenzhen Branch

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No. 4001, Fuqiang Road, Futian District 518048,

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Block Shenzhen, Science & Industry Park,

Nantou, Shenzhen,

Guangdong,

China

Telephone: 86 755 2663 9496 Fax: 86 755 2663 2877

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3 Description of the Equipment Under Test

Description of the Equipment Under Test

Product: BLE Proximity Key fob

Model no.: PRSBLE

Brand Name: Dayton

Options and accessories: NIL

Rating: DC 3V (Supplied by 1pcs 3VDC CR2032 Battery)

RF Transmission

Frequency: 2402MHz-2480MHz

Description of the EUT: NIL

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)	



4 Summary of Test Standards

Test Standards				
FCC Part 15 Subpart C	PART 15 - RADIO FREQUENCY DEVICES			
10-1-2011 Edition	Subpart C - Intentional Radiators			
RSS-Gen Issue 3	General Requirements and Information for the Certification of			
December 2010	Radio Apparatus			
RSS-210 Issue 8	RSS-210 — Licence-exempt Radio Apparatus (All Frequency			
December 2010	Bands): Category I Equipment			



5 Summary of Test Results

Technical Requirements							
FCC Part 15 Subpart C, RSS-Gen, RSS-210							
Test Condition	Pages	Test	Те	st Res	ult		
		Site	Pass	Fail	N/A		
15.207 & RSS-GEN A7.2.4 Conducted Emission AC Power Port		Site 2					
15.247 (b) (1) & RSS-210 A8.4 Conducted peak output power	8	Site 2					
15.247(d) & RSS-210 A8.5 Band edge compliance of RF emissions	10	Site 2					
15.247(d) & RSS-210 A8.5 Spurious RF conducted emissions	16	Site 2	\boxtimes				
15.247(d) & 15.209 & RSS-210 2.5 & RSSGEN 7.2.5 & RSSGEN 6.1 Spurious radiated emissions for transmitter and receiver	24	Site 2					
15.247(a)(2) & RSS-210 A8.2(a) 6dB bandwidth	28	Site 2					
RSSGEN 4.6.1& 4.6.2 99% Occupied Bandwidth and 6dB Bandwidth	32	Site 2	\boxtimes				
15.247(e) & RSS-210 A8.2(b) Power spectral density	36	Site 2	\boxtimes				
15.247(a)(1) & RSS-210 A8.1(a) 20dB bandwidth*		Site 2					
15.247(a)(1) & RSS-210 A8.1(b) Carrier frequency separation*		Site 2					
15.247(a)(1)(iii) & RSS-210 A8.1(d) Number of hopping frequencies*		Site 2					
15.247(a)(1)(iii) & RSS-210 A8.1(c) Dwell Time*		Site 2					

NOTE1 "*" The requirement is not applicable to Bluetooth Low Energy device.



6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: O4GPRSBLE & IC ID: 7666A-PRSBLE complies with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C Rules; and RSS-210.

All the configurations of the product were tested and only the worst test results are listed in the report.

SUMMARY:

ΑII	tests	according	to the	regulations	cited o	n page 5 were

- - Performed
- ☐ Not Performed

The Equipment Under Test

- - Fulfills the general approval requirements.
- □ **Does not** fulfill the general approval requirements.

Sample Received Date: 30 July 2012

Testing Start Date: 1 August 2012

Testing End Date: 7 August 2012

- Jiangsu TÜV Product Service Ltd. - Shenzhen Branch -

Reviewed by:

Prepared by:

Tested by:

Ken Li EMC Project Manager Cookies Bu EMC Project Engineer Leo.Li EMC Test Engineer



7 Technical Requirement

7.1 Conducted peak output power

Test Method

The transmitter output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the peak power detection.

Limits for conducted peak output power measurements

Frequency Range	Limit	Limit
MHz	W	dBm
2400-2483.5	≤1	≤30

Conducted peak output power

Test	$\mathbf{D} \wedge \mathbf{c} \cup \mathbf{d}$	
1 - > 1	\sim	

Frequency MHz	Conducted Peak Output Power dBm	Result
2402	-8.21	Pass
2442	-6.76	Pass
2480	-5.73	Pass



Test Equipment

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL DUE DATE
Spectrum Analyzer	Agilent	E4446A	US44300459	May 07, 2013



Test Method

The band edge compliance of RF radiated emission should be measured by following the guidance in ANSI C63.4 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW and VBW to 1MHz to measure the peak field strength and set RBW to 1MHz and VBW to 10Hz to measure the average radiated field strength.

The conducted RF band edge was measured by using a spectrum analyzer. Set span wide enough to capture the highest in-band emission and the emission at the band edge. Set RBW and VBW to 100kHz, to measure the conducted peak band edge.

Limits

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in 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, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).

Frequency		Limit Average	Limit Peak
MH:	Z	dBuV/m	dBuV/m
Below 2390 Ab	ove 2483.5	54	74

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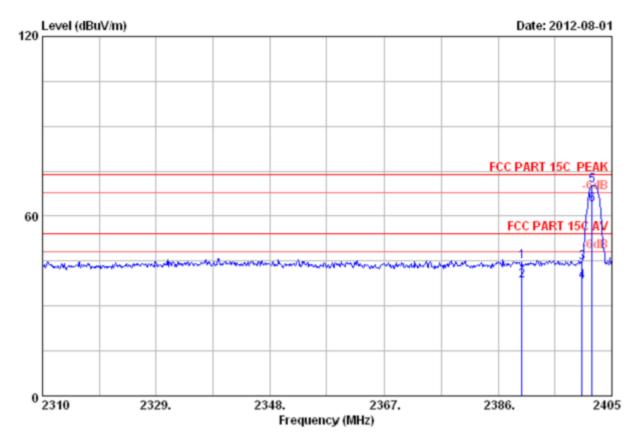


Lower edge Plot:

EUT: BLE Proximity Key fob M/N: PRSBLE

Operating Condition: Tx, 2402MHz

Ant. Polarity: Vertical



	Freq.	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.000	27.96	6.01	34.44	45.22	44.75	74.00	29.25	Peak
2	2390.000	27.96	6.01	34.44	38.93	38.46	54.00	15.54	Average
3	2400.000	27.96	6.01	34.44	44.93	44.46	74.00	29.54	Peak
4	2400.000	27.96	6.01	34.44	38.64	38.17	54.00	15.83	Average
5	2401.675	27.96	6.01	34.44	70.74	70.27	74.00	3.73	Peak
6	2401.675	27.96	6.01	34.44	64.45	63.98	54.00	-9.98	Average

Remarks:

- 1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
- 2. The emission levels that are 20dB below the official limit are not reported.

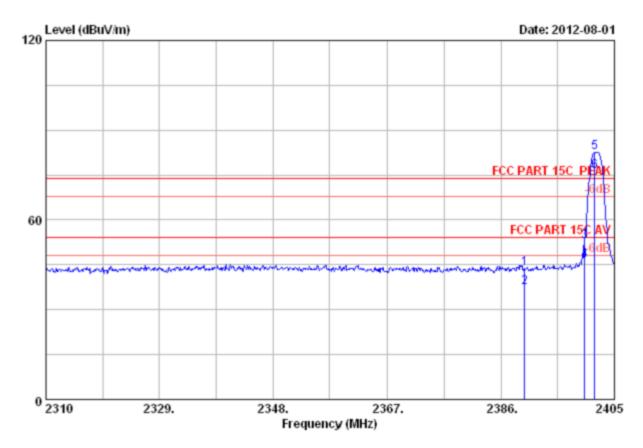


Lower edge Plot:

EUT: BLE Proximity Key fob M/N: PRSBLE

Operating Condition: Tx, 2402MHz

Ant. Polarity: Horizontal



	Freq.	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.000	27.96	6.01	34.44	44.32	43.85	74.00	30.15	Peak
2	2390.000	27.96	6.01	34.44	38.03	37.56	54.00	16.44	Average
3	2400.000	27.96	6.01	34.44	53.12	52.65	74.00	21.35	Peak
4	2400.000	27.96	6.01	34.44	46.83	46.36	54.00	7.64	Average
5	2401.675	27.96	6.01	34.44	83.04	82.57	74.00	-8.57	Peak
6	2401.675	27.96	6.01	34.44	76.75	76.28	54.00	-22.28	Average

Remarks:

- 1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
- 2. The emission levels that are 20dB below the official limit are not reported.

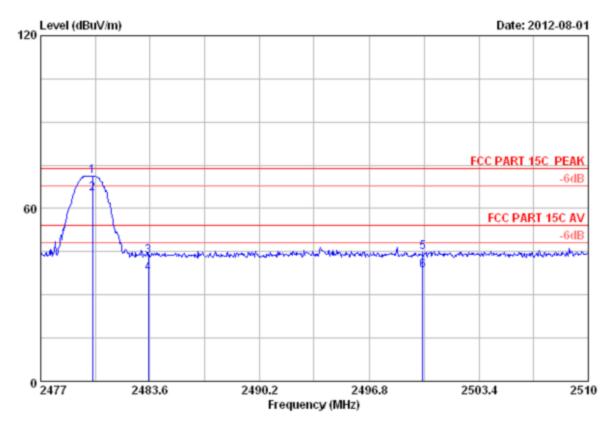


Upper edge Plot:

EUT: BLE Proximity Key fob M/N: PRSBLE

Operating Condition: Tx, 2480MHz

Ant. Polarity: Vertical



Site no. : 3m Chamber Data no. : 23

Dis. / Ant. : 3m 2011 3115 4580 Ant. pol. : VERTICAL

Limit : FCC PART 15C PEAK

Env. / Ins. : 23 *C/54% Engineer : Leo-Li

EUT : Bluetooth low energy Proximity key fob

Power supply : DC 3.0V

Test mode : High chanel 2480MHz Tx

M/N : PRSBLE

	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.135	28.08	6.15	34.45	71.53	71.31	74.00	2.69	Peak
2	2480.135	28.08	6.15	34.45	65.25	65.03	54.00	-11.03	Average
3	2483.500	28.08	6.15	34.45	43.79	43.57	74.00	30.43	Peak
4	2483.500	28.08	6.15	34.45	37.51	37.29	54.00	16.71	Average
5	2500.000	28.10	6.18	34.45	44.82	44.65	74.00	29.35	Peak
6	2500.000	28.10	6.18	34.45	38.54	38.37	54.00	15.63	Average

Remarks:

- 1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
- 2. The emission levels that are 20dB below the official limit are not reported.

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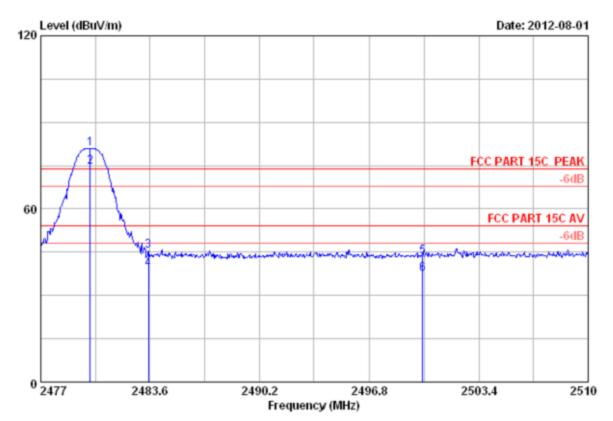


Upper edge Plot:

EUT: BLE Proximity Key fob M/N: PRSBLE

Operating Condition: Tx, 2480MHz

Ant. Polarity: Horizontal



Site no. : 3m Chamber Data no. : 24

Dis. / Ant. : 3m 2011 3115 4580 Ant. pol. : HORIZONTAL

Limit : FCC PART 15C PEAK

Env. / Ins. : 23*C/54% Engineer : Leo-Li

EUT : Bluetooth low energy Proximity key fob

Power supply : DC 3.0V

Test mode : High chanel 2480MHz Tx

M/N : PRSBLE

	Freq.	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
2 24 3 24 4 24 5 25	79.970 83.500 83.500 00.000	28.08 28.08 28.08 28.08 28.10 28.10	6.15 6.15 6.15 6.18	34.45 34.45 34.45 34.45 34.45 34.45	81.11 74.83 45.65 39.37 43.74 37.46	80.89 74.61 45.43 39.15 43.57 37.29	74.00 54.00 74.00 54.00 74.00 54.00	-6.89 -20.61 28.57 14.85 30.43 16.71	Peak Average Peak Average Peak Average

Remarks:

- 1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
- 2. The emission levels that are 20dB below the official limit are not reported.

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Test Equipment List

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL DUE DATE
Spectrum	Agilent	E4446A	US44300459	May 07, 2013
Amp	HP	8449B	3008A02495	May 07, 2013
Antenna	EMCO	3115	9607-4877	May 16, 2013
Bilog Antenna	Schaffner	CBL6111C	2598	Dec.13, 2012
HF Cable	Hubersuhne	Sucoflex104		May 07, 2013



Test Method

The transmitter output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the peak power detection.

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The resolution bandwidth (RBW) and the video bandwidth (VBW) of the spectrum analyzer were respectively set to 100 kHz and 100 kHz.

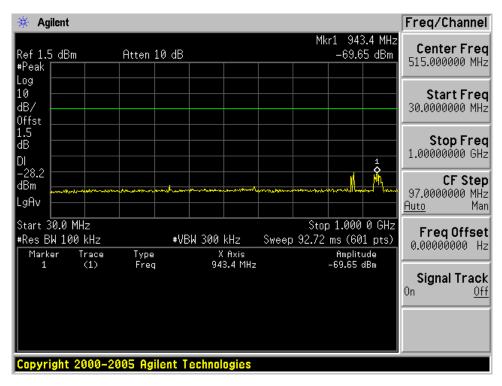
Limit

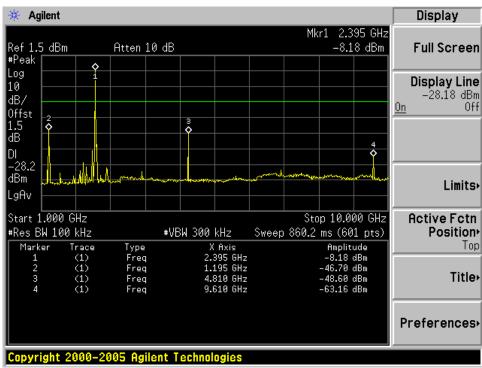
Frequency Range MHz	Limit (dBc)
1000-25000	-20

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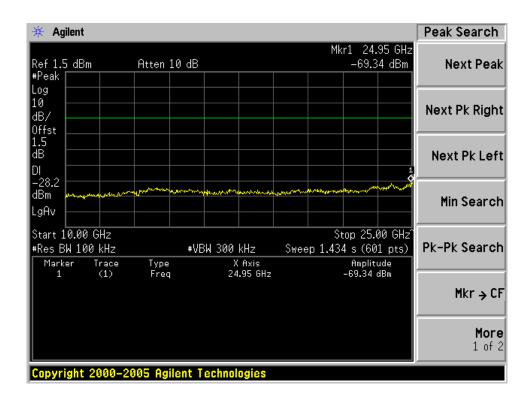


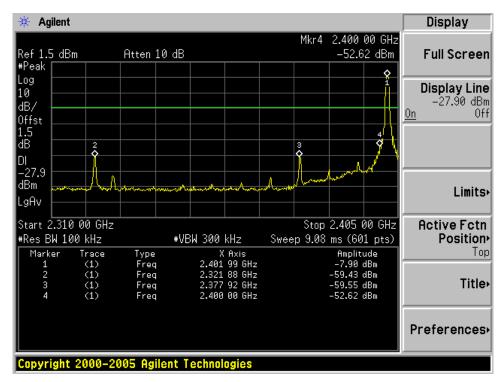
Test Result: 2402MHz





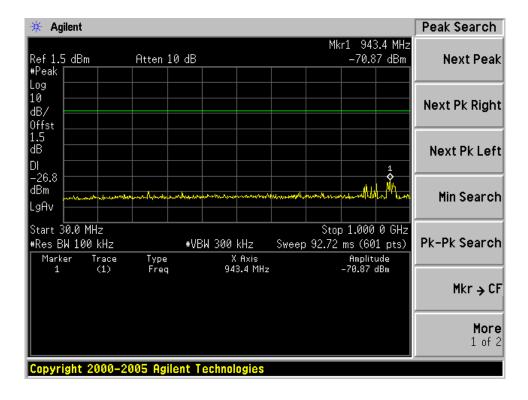


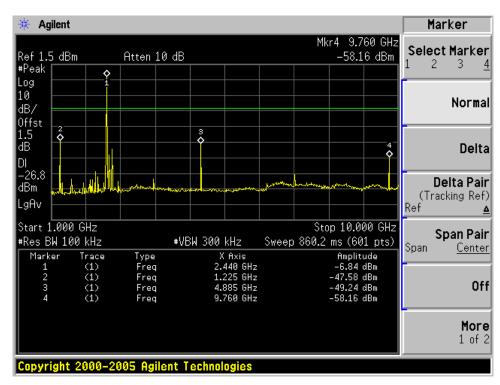




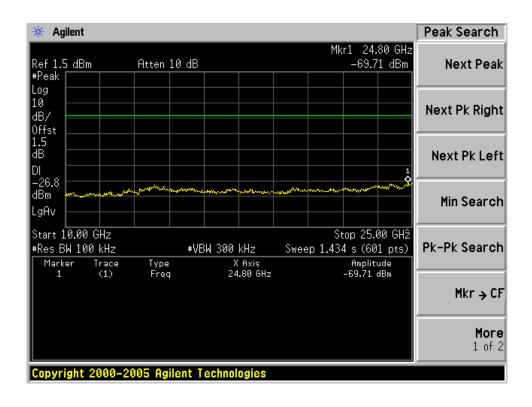


2442MHz

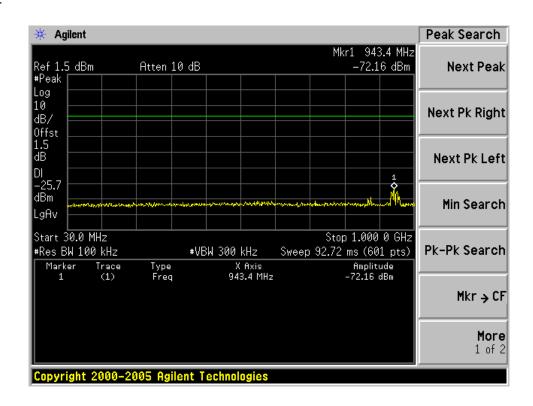




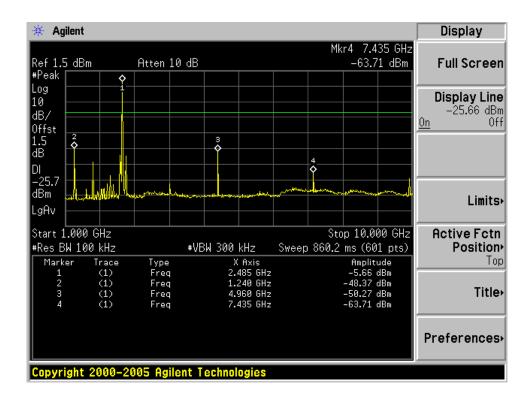


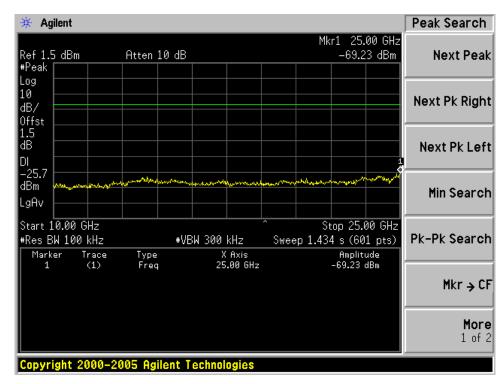


2480MHz

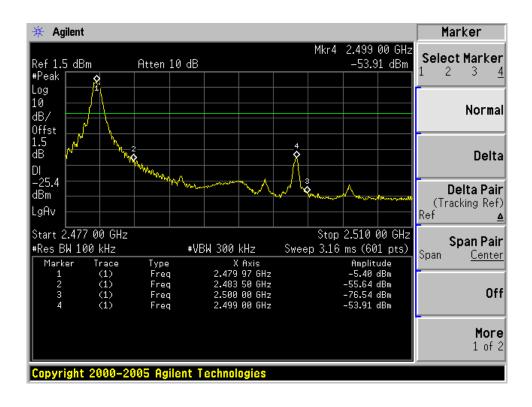














Test Equipment List

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL.DUE.DATE
Spectrum Analyzer	Agilent	E4446A	US44300459	May 07, 2013



7.4 Spurious radiated emissions for transmitter and receiver

Test Method

- 1 The EUT is placed on a turntable, which is 0.8m above ground plane.
- 2 The turntable shall be rotated for 360 degrees to determine the position of maximum emission level
- 3 EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
- 4 Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 5 Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

Limit

Frequency	Field Strength	Field Strength	Detector
MHz	uV/m	dBμV/m	
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK



Spurious radiated emissions for transmitter and receiver

Remark: According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

Transmitting spurious emission test result as below:

2402MHz Test Result:

Frequency	Antenna Factor	Cable Loss	Amp. Factor	Reading	Emission Level	Polarization	Limit	Detector	Result
MHz	dB/m	dB	dB	dΒμV	dBµV/m		dBµV/m		
below 1GHz *	-	-		-	-	-	-	-	Pass
1595.00	25.72	4.76	34.6	43.84	39.72	Vertical	74	PK	Pass
1595.00	-	-	-	-	-	Horizontal	-	-	Pass
4804.00	-	-	-	-	-	Vertical	-	-	Pass
4804.00	32.86	8.52	34.6	41.93	48.71	Horizontal	74	PK	Pass
7206.00	-	-	-	-	-	-	-	-	Pass
7206.00	-	-	-	-	-	-	-	-	Pass

Note "*":Data of measurement within this frequency range shown "-- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

2442MHz Test Result:

Frequency	Antenna Factor	Cable Loss	Amp. Factor	Reading	Emission Level	Polarization	Limit	Detector	Result
MHz	dB/m	dB	dB	dΒμV	dBμV/m		dΒμV/m		
below 1GHz *	-	-		-	-	-	-	-	Pass
1595.00	25.72	4.76	34.6	45.04	40.92	Vertical	74	PK	Pass
1595.00	-	-		-	-	Horizontal	-	-	Pass
4884.00	-	-		-	-	Vertical	-	-	Pass
4884.00	32.98	8.58	34.6	40.62	47.58	Horizontal	74	PK	Pass
7326.00	-	-		-	-	-	-	-	Pass
7326.00	-	-		-	-	-	-	-	Pass

Note "*":Data of measurement within this frequency range shown "-- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

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Spurious radiated emissions for transmitter and receiver

2480MHz Test Result

Frequency	Antenna Factor	Cable Loss	Amp. Factor	Reading	Emission Level	Polarization	Limit	Detector	Result
MHz	dB/m	dB	dB	dΒμV	dBμV/m		dΒμV/m		
below 1GHz *	-	-		-	-	-	-	-	Pass
1595.00	25.72	4.76	34.6	48	43.88	Vertical	74	PK	Pass
1595.00	-	-		-	-	Horizontal	-	-	Pass
4960.00	-	-		-	-	Vertical	-	-	Pass
4960.00	33.14	8.65	34.6	39.34	46.53	Horizontal	74	PK	Pass
7440.00	-	-		-	-	-	-	-	Pass
7440.00	-	-		-	-	-	-	-	Pass

Note "*":Data of measurement within this frequency range shown "-- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

Receiving spurious emission test result as below:

Frequency	Antenna Factor	Cable Loss	Amp. Factor	Reading	Emission Level	Polarization	Limit	Detector	Result
MHz	dB/m	dB	dB	dΒμV	dBμV/m		dΒμV/m		
below 1GHz *	-	-		-	-	-	-	-	Pass
1595.00	25.72	4.76	34.6	46.89	42.77	Vertical	74	PK	Pass
1595.00	-	-		-	-	Horizontal	-	-	Pass

Note "*":Data of measurement within this frequency range shown "-- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.



Test Equipment List

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL DUE DATE
Spectrum	Agilent	E4446A	US44300459	May 07, 2013
Amp	HP	8449B	3008A02495	May 07, 2013
Antenna	EMCO	3115	9607-4877	May 16, 2013
Bilog Antenna	Schaffner	CBL6111C	2598	Dec.13, 2012
HF Cable	Hubersuhne	Sucoflex104		May 07, 2013



7.5 6 dB bandwidth & 99% bandwidth

Test Method

- 1 Place the EUT on the table and set it in the transmitting mode.
- 2 Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3 Mark the peak frequency and -6dB (upper and lower) frequency.

Limit

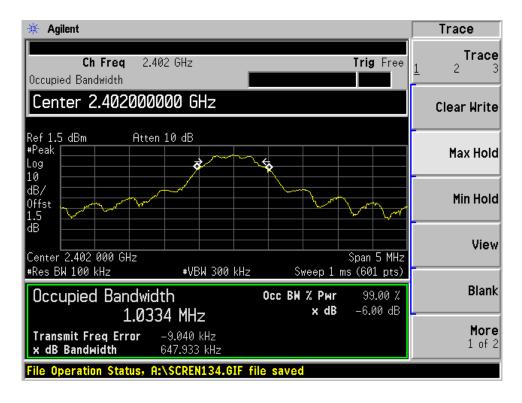
Limit [kHz]
≥ 500



20 dB bandwidth

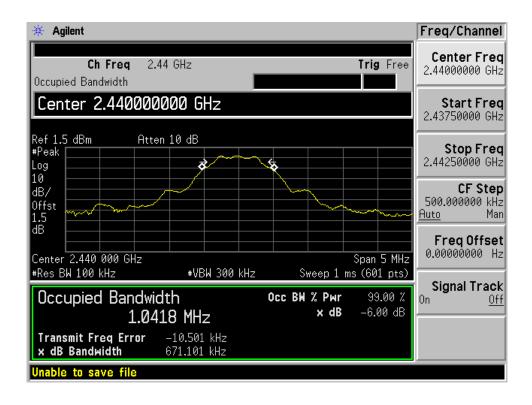
Test result

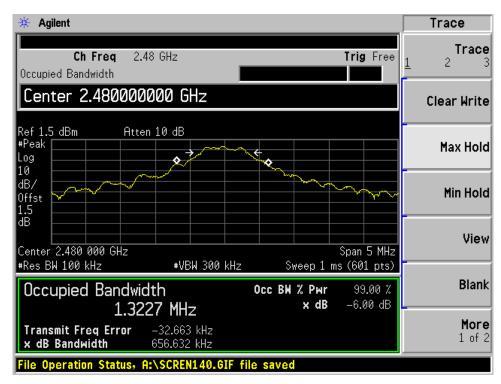
	Frequency	6 dB Bandwidth	Limit	Result
	MHz	kHz	kHz	
·	2402	647.933	≥ 500	Pass
	2442	671.101	≥ 500	Pass
	2480	656.632	≥ 500	Pass
	F	0/00 Dan desidab	1.5	Decel
	Frequency MHz	%99 Bandwidth MHz	Limit kHz	Result
		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		Pass
	MHz	MHz	kHz	





20 dB bandwidth







Test Equipment

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL.DUE.DATE
Spectrum Analyzer	Agilent	E4446A	US44300459	May 07, 2013



7.6 Power spectral density

Test Method

1 Place the EUT on the table and set it in transmitting mode. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

2 Set the spectrum analyzer as RBW = 3 kHz, VBW = 10 kHz, Span = 300 kHz, Sweep = 100 s

3 Record the max reading.

Limit

Limit			
	dBm / 3 kHz		
'	8		

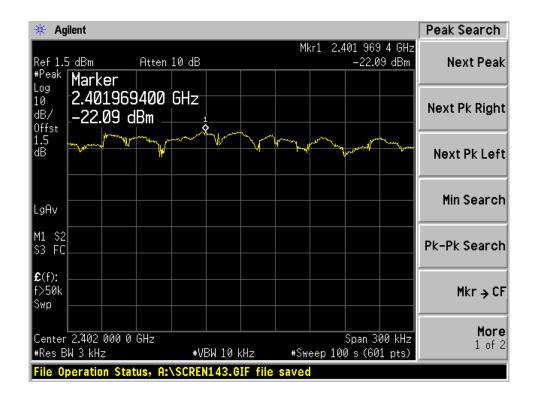
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Power spectral density

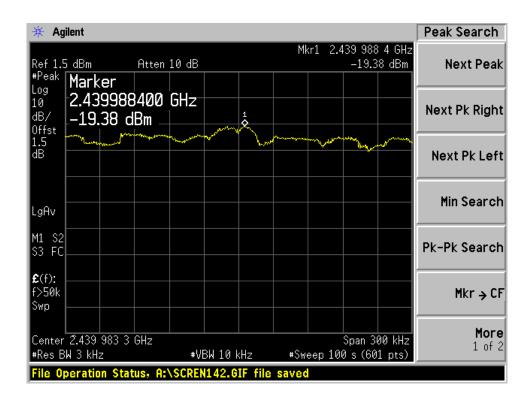
Test Result

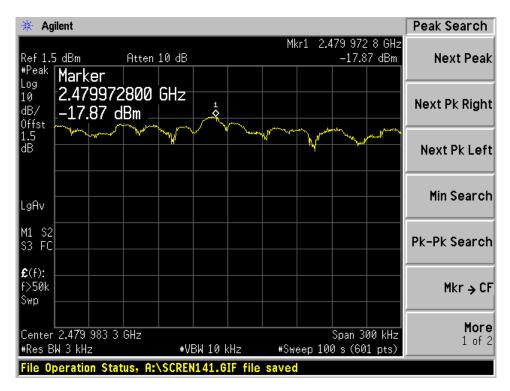
Frequency	Р	Result
MHz	dBm	
2402	-22.09	Pass
2442	-19.38	Pass
2480	-17.87	Pass





Power spectral density







Test Equipment

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL.DUE.DATE
Spectrum Analyzer	Agilent	E4446A	US44300459	May 07, 2013



8 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty

Items		Extended Uncertainty
RE	Field strength (dBµV/m)	U=4.32dB (30MHz-25GHz)
CE	Disturbance Voltage (dBμV)	U=2.4dB