

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT**INTENTIONAL RADIATOR CERTIFICATION TO
FCC PART 15 SUBPART C REQUIREMENT
AND INDUSTRY CANADA RSS 210
CLASS II PC Report**

OF

Product Name of Host: Juno T41/5
Brand Name of Host: Trimble
Marketing Name of Host: RH42G
Model No of Host.: JUNO/T41/5-BWRF
Model Difference: N/A
FCC ID: QV5MERCURY6E-M
IC: 5407A-MERCURY6EM
Report No.: EH/2014/40017
Issue Date: Jun. 09, 2014
FCC Rule Part: §15.247, Cat: DSS
IC Rule Part: RSS-210 issue 8 :2010, Annex 8
Prepared for: Trimble Navigation Limited
345 SW Avery Avenue, Corvallis, OR 97333
SGS Taiwan Ltd.
Electronics & Communication Laboratory
Prepared by: No.134, Wu Kung Road, New Taipei Industrial
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CERTIFICATION OF COMPLIANCE

Applicant: Trimble Navigation Limited
345 SW Avery Avenue, Corvallis, OR 97333

Product Name of Host: Juno T41/5

Brand Name of Host: Trimble

Marketing Name of Host: RH42G

Model No. of Host: JUNO/T41/5-BWRF

Model Difference: N/A

FCC ID: QV5MERCURY6E-M

IC: 5407A-MERCURY6EM

File Number: EH/2014/40017

Date of test: May. 20, 2014 ~ Jun. 09, 2014

Date of EUT Received: May. 20, 2014

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4:2009 and RSS-Gen. issue 3:2010, the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.247 and IC RSS-210 issue 8: 2010 Annex 8.

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

Test By:	<u>Nick Lin</u>	Date:	<u>Jun. 09, 2014</u>
	Nick Lin / Engineer		
Prepared By:	<u>Julia Chang</u>	Date:	<u>Jun. 09, 2014</u>
	Julia Chang / Clerk		
Approved By:	<u>Jim Chang</u>	Date:	<u>Jun. 09, 2014</u>
	Jim Chang / Supervisor		

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Version

Version No.	Date	Description
00	Jun. 09, 2014	Initial creation of document

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1. GENERAL INFORMATION

1.1. Product Description

General of Host:

Product Name:	Juno T41/5	
Brand Name:	Trimble	
Marketing Name:	RH42G	
Model No.:	JUNO/T41/5-BWRF	
Model difference:	N/A	
Hardware Version:	2.0	
Software Version:	2.1	
Data Cable:	Model: A9136939, Supplier: Sinbon	
Power Supply:	3.7Vdc Rechargeable Li-polymer battery or 5Vdc from adapter	
	Battery:	Model No.: S11GD103A, Supplier: LICO
	Adapter:	Model No.: PSA10F-050Q-R, Supplier: PHIHONG TECHNOLOGY CO., LTD
Class II Permissive Change	- The subject approved RFID module is being used in a host system (Product Name: Juno T41/5, Brand name: Trimble, Model No.: JUNO/T41/5-BWRF) RFID Module FCC ID:QV5MERCURY6E-M, IC Model name:M6E-MICRO, IC ID: 5407A-MERCURY6EM - RFID Antenna gain is 0.17dBi of equivalent type. patch (lower than original RFID IC Certificate:6dBi) - RF exposure impact due to collocated transmitter is re-evaluated using the justified basis given in RSS102/KDB 447498 D01, where the analysis to comply with the RF exposure due to simultaneous transmitters is given in SAR report of the submission	

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RFID:

RFID Modular Report:	Test Lab: Curtis-Straus LLC, Report Number: EK2037-2 Applicant: Trimble Navigation Limited, Model Number: M6E-MICRO
Frequency Range:	902.75 – 927.25MHz
Channel number:	50 channels
Modulation type:	PR-ASK
Transmit Power:	29.91dBm (Peak)
Dwell Time:	<= 0.4s
Operating Mode:	Point-to-Point
Antenna Designation:	Part number:MPAC29SE921P-TA, Ceramic Patch Antenna , Gain: 0.17dBi

This test report applies for RFID function.

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1.2. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: QV5MERCURY6E-M** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules and **IC: 5407A-MERCURY6EM** filing to comply with Industry Canada RSS-210 issue 8: 2010 Annex 8. The composite system (digital device) is compliance with Subpart B is authorized under a Doc procedure.

1.3. Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4:2009. Radiated testing was performed at an antenna to EUT distance 3 meters. Tested in accordance with FCC Public Notice DA 00-705

1.4. Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei Country, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2009. FCC Registration Number: 990257. The address of SGS Taiwan Ltd. Electronics & Communication Laboratory 1F, No.134, Wukung Road New Taipei City TAIWAN 24803, Canada Registration Number: 4620A-5.

The 10 m Open Area Test Sites located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No.2, Keji 1st Rd., Guishan Township, Taoyuan County, Taiwan which is constructed and calibrated to meet the CISPR 22/EN 55022 requirements. FCC Registration Number: 455997. The address of SGS Taiwan Ltd. Electronics & Communication Laboratory 1F, No.134, Wukung Road New Taipei City TAIWAN 24803, IC Registration Number: 4620A-6.

1.5. Special Accessories

Not available for this EUT intended for grant.

1.6. Equipment Modifications

Not available for this EUT intended for grant.

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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 a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 7.3.1 of ANSI C63.4:2009 RSS-Gen Issue3: 2010. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and Average detector mode.

2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. 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 hand-held 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 according to the requirements in Section 8 and 13 of ANSI C63.4:2009 and DA 00-705.

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2.4. Configuration of Tested System

Fig. 2-1 Radiated Emission and Conducted (Antenna Port) Configuration

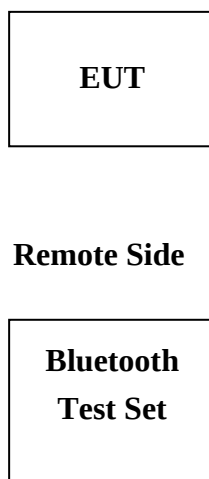


Fig. 2-2 AC Power line Conducted Emission

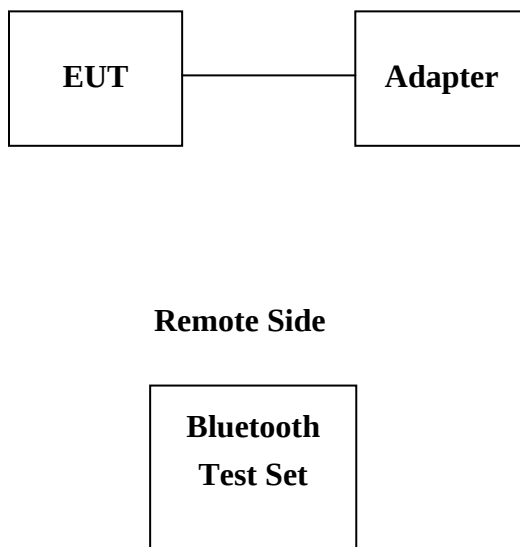


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	Bluetooth Test Set	Anritsu	MT8852B	6k00006107	N/A	N/A

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3. SUMMARY OF TEST RESULTS

FCC/IC Rules	Description Of Test	Result
§15.207(a) RSS-Gen §7.2.4	AC Power Line Conducted Emission	Compliant
§15.247(b)(1) RSS-210 issue 8, §A8.4(1)	Peak Output Power	Compliant
§15.247(d) §15.209(a) (f) RSS-Gen §7.2.5 RSS-210 issue 8, §A8.5	Spurious Emission	Compliant
§15.203, RSS- Gen issue §7.1.2	Antenna Requirement	Compliant

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4. DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.

Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Channel Low(902.75MHz), Mid (915.25MHz) and High (927.25MHz) with were chosen as worst case for full testing.

The field strength of spurious radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for Bluetooth Transmitter for channel Low, Mid and High the worst case E1 position was reported.

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5. MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
Peak Output Power	+/- 1.55 dB
20dB Bandwidth & 99% Power Bandwidth	+/- 123.36 Hz
100 KHz Bandwidth Of Frequency Band Edges	+/- 1.55 dB
Frequency Separation	+/- 123.36 Hz
Number of hopping frequency	+/- 123.36 Hz
Time of Occupancy	+/- 123.36 Hz
Temperature	+/- 0.8 °C
Humidity	+/- 4.7 %
DC / AC Power Source	DC= +/- 1%, AC= +/- 0.2%

Radiated Spurious Emission:

Measurement uncertainty	9kHz - 30MHz: +/- 2.3dB
Measurement uncertainty (Polarization : Vertical)	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB
Measurement uncertainty (Polarization : Horizontal)	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. CONDUCTED EMISSION TEST

6.1. Standard Applicable:

According to §15.207 and RSS-Gen §7.2.4, frequency range within 150 KHz to 30MHz shall not exceed the Limit table as below.

Frequency range MHz	Limits dB(uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note 1.The lower limit shall apply at the transition frequencies 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

6.2. Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCI7	100760	05/26/2014	05/25/2015
LISN	Rolf-Heine	NNB-2/16Z	99012	03/26/2014	03/25/2015
LISN	FCC	FCC-LISN-50/250-25-2-01	04034	03/19/2014	03/18/2015
Coaxial Cables	N/A	WK CE Cable	N/A	11/26/2013	11/25/2014

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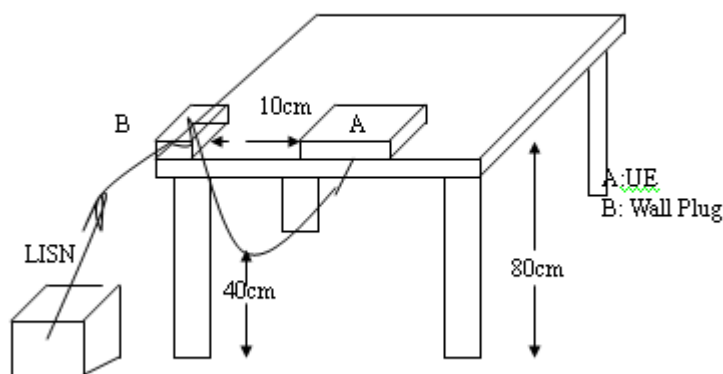
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6.3. EUT Setup:

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.4-2009.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
3. The LISN was connected with 120Vac/60Hz power source.

6.4. Test SET-UP (Block Diagram of Configuration)



6.5. Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

6.6. Measurement Result:

Note: Refer to next page for measurement data and plots.

Note2: The * reveals the worst-case results that closet to the limit.

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AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation Mode			Test Date:	May. 28, 2014
Temperature:	26 °C	Humidity:	60 %	Test By:	Nick

Site	ConductionRoom	Phase:	L1	Temperature:	26 °C
Limit:	FCC Class B Conduction(QP)	Power:	AC 120V/60Hz	Humidity:	60%
EUT:	JunoT41/5	Distance:			
M/N:	Trimble	Mode:	operationmode		
Note:					

ConductedEmission



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	0.5860	41.79	0.08	41.87	56.00	-14.13	peak	
2		0.7343	29.55	0.07	29.62	56.00	-26.38	peak	
3		1.6015	30.15	0.10	30.25	56.00	-25.75	peak	
4		2.6093	29.05	0.10	29.15	56.00	-26.85	peak	
5		8.0546	33.85	0.14	33.99	60.00	-26.01	peak	
6		11.5664	35.22	0.17	35.39	60.00	-24.61	peak	

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Site: ConductionRoom	Phase: N	Temperature: 26 °C
Limit: FCC Class B Conduction(QP)	Power: AC 120V/60Hz	Humidity: 60%
EUT: JunoT41/5	Distance:	
M/N: Trimble	Mode: operationmode	
Note:		

ConductedEmission



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.2242	31.31	0.14	31.45	62.66	-31.21	peak	
2		0.2672	29.73	0.14	29.87	61.20	-31.33	peak	
3	*	0.5860	37.99	0.14	38.13	56.00	-17.87	peak	
4		1.5898	24.78	0.17	24.95	56.00	-31.05	peak	
5		8.1406	29.22	0.21	29.43	60.00	-30.57	peak	
6		11.4647	32.47	0.24	32.71	60.00	-27.29	peak	

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7. PEAK OUTPUT POWER MEASUREMENT

7.1. Standard Applicable:

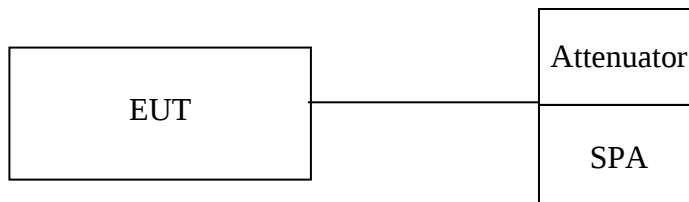
For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of Section 15.247.

According to RSS-210 issue 8, §A8.4(1), For frequency hopping systems operating in the band 902-928 MHz, the maximum peak conducted output power shall not exceed 1.0 W, and the e.i.r.p. shall not exceed 4 W if the hopset uses 50 or more hopping channels; the maximum peak conducted output power shall not exceed 0.25 W, and the e.i.r.p. shall not exceed 1 W if the hopset uses less than 50 hopping channels.

7.2. Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter	Anritsu	ML2495A	1005007	01/13/2014	01/12/2015
Power Sensor	Anritsu	MA2411B	917032	01/13/2014	01/12/2015
Spectrum Analyzer	Agilent	E4446A	MY51100003	05/19/2014	05/18/2015
Spectrum Analyzer	Agilent	E4440A	MY45304525	03/08/2014	03/07/2015
DC Block	Mini-Circuits	BLK-18-S+	1	02/27/2014	02/26/2015
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	01/03/2014	01/02/2015
Attenuator	Mini-Circuit	BW-S10W2+	002	02/27/2014	02/26/2015
Splitter	Agilent	11636B	N/A	02/27/2014	02/26/2015

7.3. Test Set-up:



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7.4. Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter or spectrum. (Max peak function, >20dB bandwidth, >=RBW)
3. Record the max. reading.
4. Repeat above procedures until all frequency measured were complete.

7.5. Measurement Result:

Peak Power:

Frequency (MHz)	Reading Power (dBm)	Output Power (W)	Limit (W)
902.75	29.14	0.82035	1
915.25	29.91	0.97949	1
927.25	29.87	0.97051	1

**Note: offset 11dB*

Note: Refer to next page for plots.

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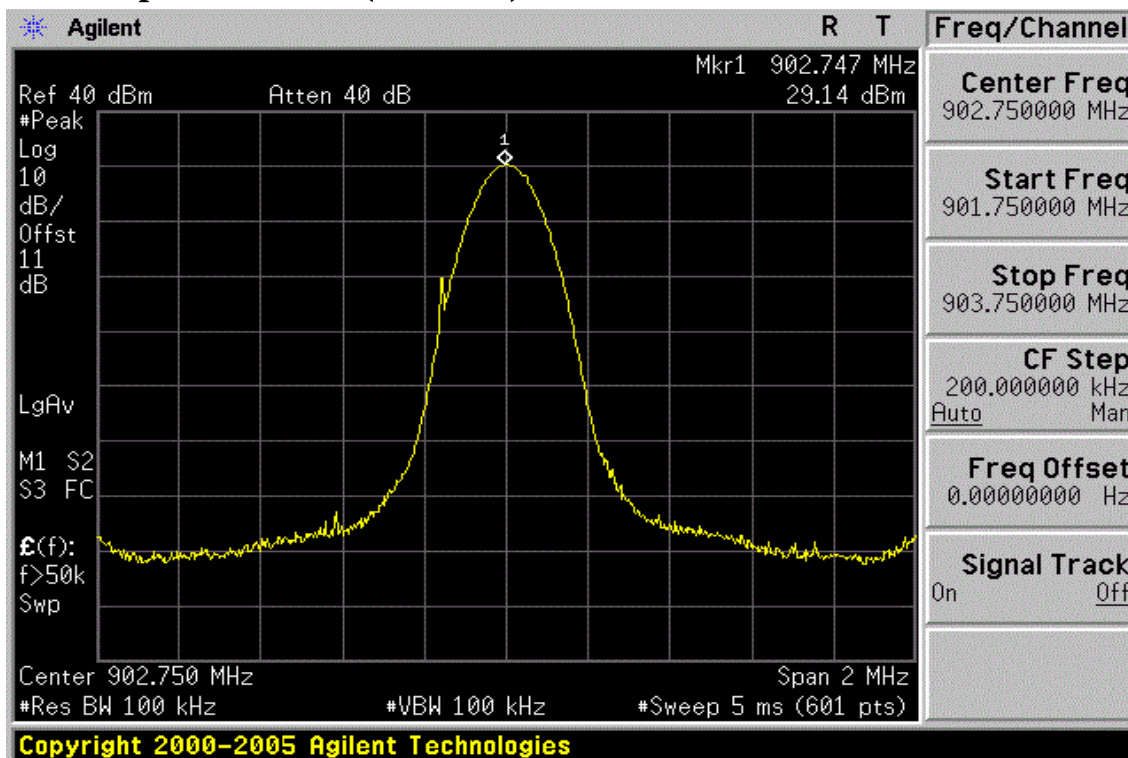
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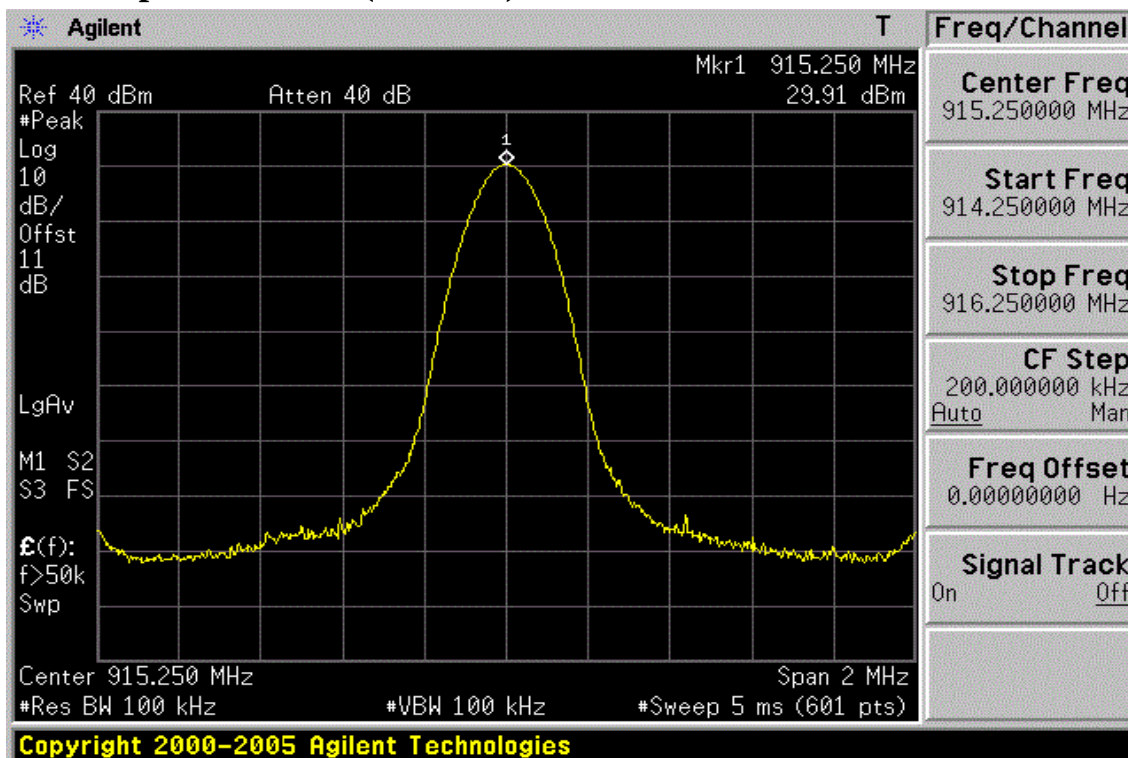
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Peak Power Output Data Plot (CH Low)



Peak Power Output Data Plot (CH Mid)



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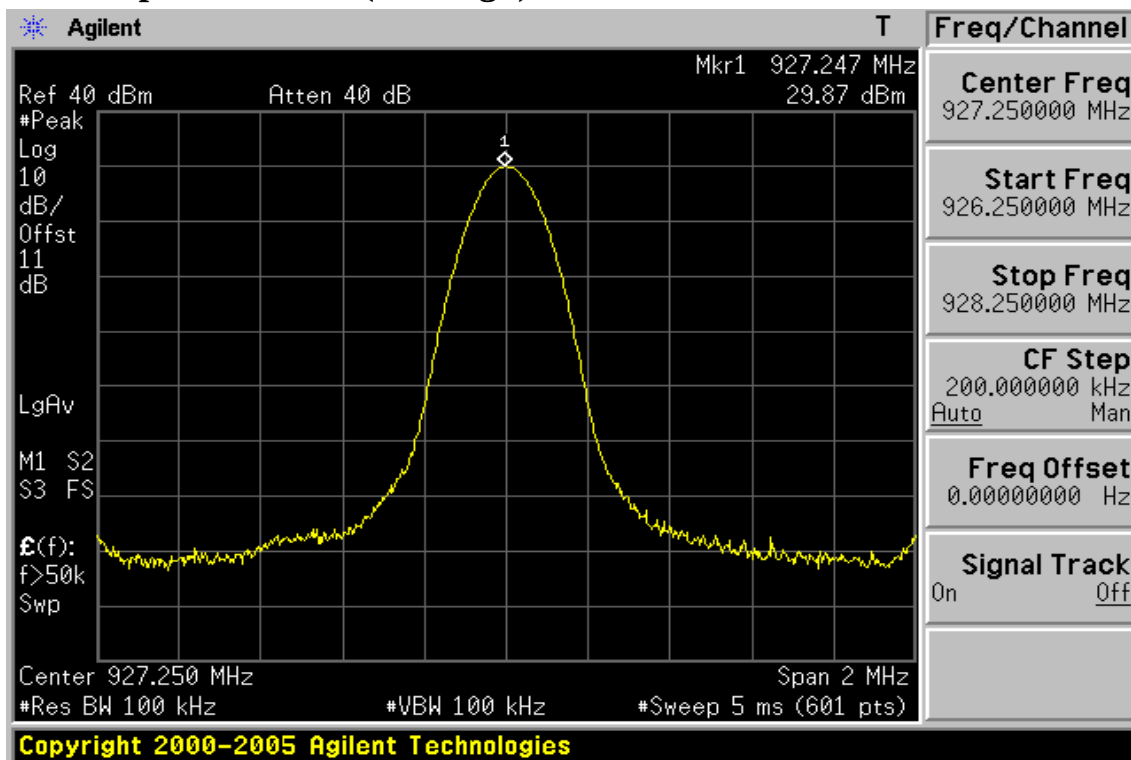
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Peak Power Output Data Plot (CH High)



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9. SPURIOUS EMISSION TEST

9.1. Standard Applicable:

According to §15.247(c), all other emissions outside these bands shall not exceed the general radiated emission limits specified in §15.209(a). And according to §15.33(a)(1), for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

Radiated Spurious Emission

According to RSS-Gen §7.2.5 and RSS-210 issue 8, §A8.5, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 5 and 6 is not required. In addition, radiated emissions which fall in the restricted bands of Table 3 must also comply with the radiated emission limits specified in Tables 5 and 6 of RSS-GEN.

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9.2. Measurement Equipment Used:

9.2.1. Conducted Emission at antenna port:

Refer to section 7.2 for details.

9.2.2. Radiated emission:

966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCI7	100760	05/27/2014	05/26/2015
Spectrum Analyzer	Agilent	E4446A	MY51100003	05/19/2014	05/18/2015
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	01/20/2014	01/19/2015
Spectrum Analyzer	R&S	FSV-30	101398	10/22/2013	10/21/2014
Loop Antenna	ETS.LINDGREN	6502	00148045	07/05/2013	07/04/2014
Bilog Antenna	SCHWAZBECK	VULB9168	378	01/02/2014	01/01/2015
Horn antenna	ETS.LINDGREN	3117	123995	05/19/2014	05/18/2015
Horn Antenna	Schwarzbeck	BBHA9170	184	01/23/2014	01/22/2015
Pre-Amplifier	Agilent	8447D	2944A07676	01/03/2014	01/02/2015
Pre-Amplifier	Agilent	8449B	3008A00578	01/03/2014	01/02/2015
Pre-Amplifier	EMC Instruments Corp.	EMC184045	980135	01/24/2014	01/23/2015
Filter 2400-2483.5 MHz	EWT	EWT-14-0166	M2	02/27/2014	02/26/2015
Attenuator	Mini-Circuit	BW-S10W2+	004	02/27/2014	02/26/2015
Turn Table	HD	DT420	N/A	N.C.R	N.C.R
Antenna Tower	HD	MA240-N	240/657	N.C.R	N.C.R
Controller	HD	HD100	N/A	N.C.R	N.C.R
Low Loss Cable	Huber Suhner	966_Rx	9	01/03/2014	01/02/2015
3m Site NSA	SGS	966 chamber	N/A	07/15/2013	07/14/2014

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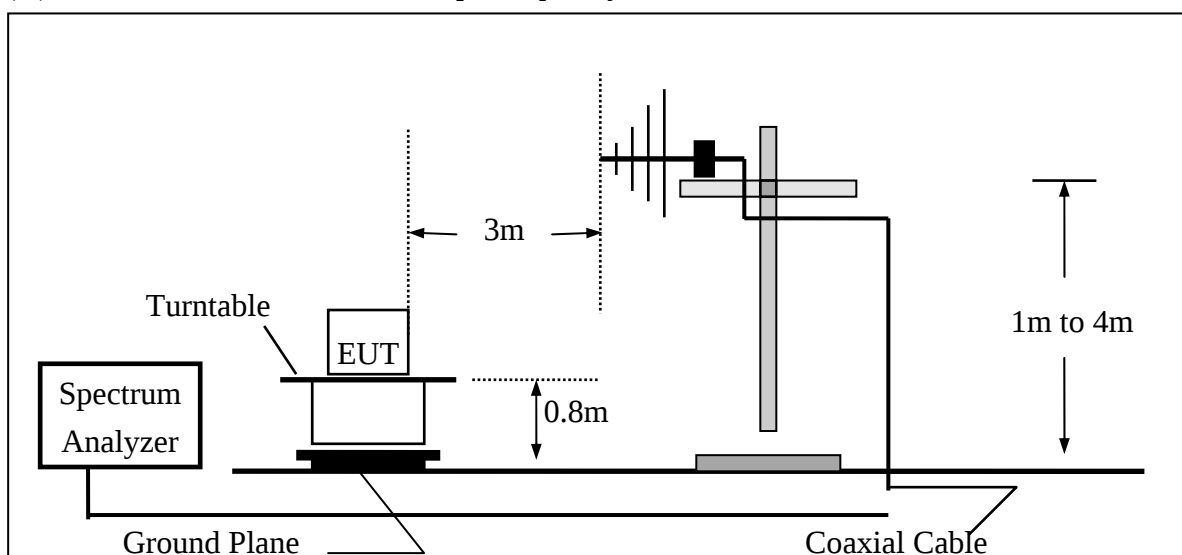
9.3. Test SET-UP:

9.3.1. Conducted Emission at antenna port:

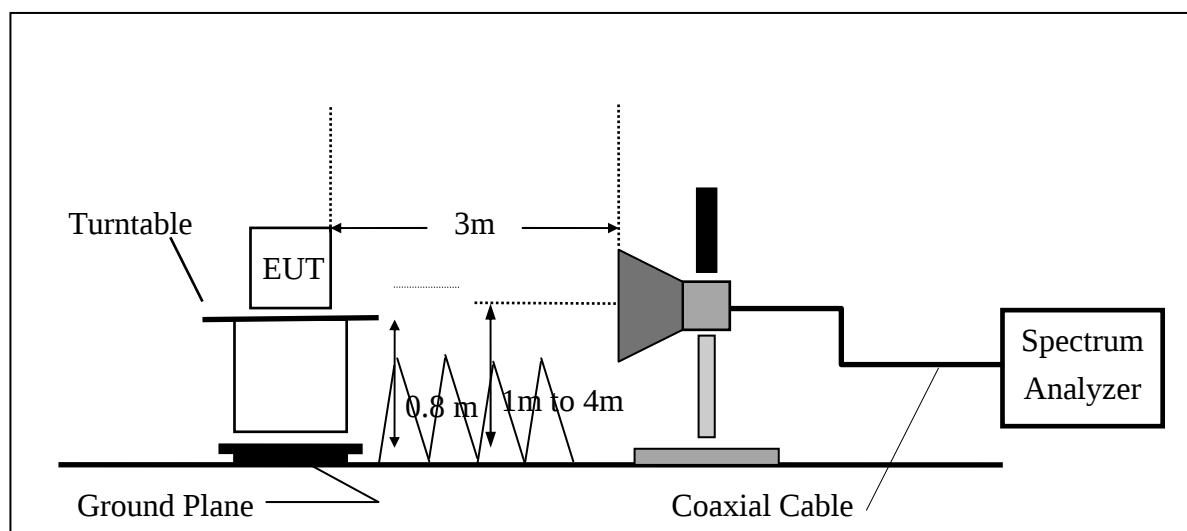
Refer to section 7.3 for details.

9.3.2. Radiated emission:

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-UP Frequency Over 1 GHz



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9.4. Measurement Procedure:

Radiated Emission:

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
4. 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.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. Repeat above procedures until all frequency measured were complete.

Auxiliary Procedure (Setting on Spectrum to capture the reading of emission level):

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz

VBW $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Conducted Emission:

1. To connect Antenna Port of EUT to Spectrum.
2. Set RBW = 100K & VBW = 300K on Spectrum.
3. Sweep the frequency to determine spurious emission as seen on spectrum from span of 30 to 3G, 3G to 8G, 8G to 13G, 13G to 18G and 18G to 26.5GHz.
4. Via Software, combine 5 spans of frequency range into two plots containing the range of 30MHz to 3GHz, and 3GHz to 26.5GHz.

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9.5. 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	

Remark:

1. The limit of the emission level is expressed in dBuV/m, which converts $20 \cdot \log(uV/m)$
2. Factor(dB) = Antenna Factor(dB μ V/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

9.6. Measurement Result:

Conducted Spurious Emission Measurement Result

N/A, Refer to RFID Module Report for more details (page27-32)

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Radiated Spurious Emission Measurement Result

Operation Band	:902.75 MHz	Test Date	:2014-05-27
Fundamental Frequency	:902.75 MHz	Temp./Humi.	:21 deg_C / 54 RH
Operation Mode	:TX LOW	Engineer	:Curry
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:VERTICAL

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.

“---” : denotes Noise Floor.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
34.85	S	Peak	44.74	-13.77	30.97	40.00	-9.03
109.54	S	Peak	39.37	-16.08	23.29	43.50	-20.21
159.01	S	Peak	35.18	-12.65	22.53	43.50	-20.97
383.08	S	Peak	31.03	-9.51	21.52	46.00	-24.48
680.87	S	Peak	28.52	-3.66	24.86	46.00	-21.14
732.28	S	Peak	28.93	-3.64	25.29	46.00	-20.71
1805.50	H	Average	29.26	-0.20	29.06	54.00	-24.94
1805.50	H	Peak	40.22	-0.20	40.02	74.00	-33.98
2708.25	H	---					
3611.00	H	---					
4513.75	H	---					
5416.50	H	---					
6319.25	H	---					
7222.00	H	---					
8124.75	H	---					
9027.50	H	---					

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Operation Band	:902.75 MHz	Test Date	:2014-05-27
Fundamental Frequency	:902.75 MHz	Temp./Humi.	:21 deg_C / 54 RH
Operation Mode	:TX LOW	Engineer	:Curry
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:HORIZONTAL

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.

“---” : denotes Noise Floor.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
34.85	S	Peak	34.60	-13.77	20.83	40.00	-19.17
399.57	S	Peak	29.97	-9.18	20.79	46.00	-25.21
540.22	S	Peak	32.04	-7.63	24.41	46.00	-21.59
600.36	S	Peak	30.04	-5.51	24.53	46.00	-21.47
677.96	S	Peak	28.63	-3.73	24.90	46.00	-21.10
775.93	S	Peak	29.28	-2.82	26.46	46.00	-19.54
1805.50	H	Average	29.55	-0.20	29.35	54.00	-24.65
1805.50	H	Peak	40.81	-0.20	40.61	74.00	-33.39
2708.25	H	---					
3611.00	H	---					
4513.75	H	---					
5416.50	H	---					
6319.25	H	---					
7222.00	H	---					
8124.75	H	---					
9027.50	H	---					

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Operation Band	:915.25 MHz	Test Date	:2014-05-27
Fundamental Frequency	:915.25 MHz	Temp./Humi.	:21 deg_C / 54 RH
Operation Mode	:TX MID	Engineer	:Curry
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:VERTICAL

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.

“---” : denotes Noise Floor.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
34.85	S	Peak	45.18	-13.77	31.41	40.00	-8.59
87.23	S	Peak	41.87	-18.50	23.37	40.00	-16.63
390.84	S	Peak	31.60	-9.38	22.22	46.00	-23.78
589.69	S	Peak	28.66	-5.12	23.54	46.00	-22.46
684.75	S	Peak	28.32	-3.67	24.65	46.00	-21.35
762.35	S	Peak	29.17	-2.73	26.44	46.00	-19.56
1830.50	H	Average	28.33	-0.01	28.32	54.00	-25.68
1830.50	H	Peak	39.02	-0.01	39.01	74.00	-34.99
2745.75	H	---					
3661.00	H	---					
4576.25	H	---					
5491.50	H	---					
6406.75	H	---					
7322.00	H	---					
8237.25	H	---					
9152.50	H	---					

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Operation Band	:915.25 MHz	Test Date	:2014-05-27
Fundamental Frequency	:915.25 MHz	Temp./Humi.	:21 deg_C / 54 RH
Operation Mode	:TX MID	Engineer	:Curry
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:HORIZONTAL

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.

“---” : denotes Noise Floor.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
34.85	S	Peak	34.69	-13.77	20.92	40.00	-19.08
416.06	S	Peak	30.49	-8.91	21.58	46.00	-24.42
540.22	S	Peak	31.21	-7.63	23.58	46.00	-22.42
600.36	S	Peak	30.95	-5.51	25.44	46.00	-20.56
660.50	S	Peak	28.89	-4.30	24.59	46.00	-21.41
774.96	S	Peak	28.44	-2.82	25.62	46.00	-20.38
1830.50	H	Average	27.12	-0.01	27.11	54.00	-26.89
1830.50	H	Peak	39.12	-0.01	39.11	74.00	-34.89
2745.75	H	---					
3661.00	H	---					
4576.25	H	---					
5491.50	H	---					
6406.75	H	---					
7322.00	H	---					
8237.25	H	---					
9152.50	H	---					

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Operation Band	:927.25 MHz	Test Date	:2014-05-27
Fundamental Frequency	:927.25 MHz	Temp./Humi.	:21 deg_C / 54 RH
Operation Mode	:TX HIGH	Engineer	:Curry
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:VERTICAL

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.

“---” : denotes Noise Floor.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
33.88	S	Peak	44.48	-13.83	30.65	40.00	-9.35
87.23	S	Peak	41.46	-18.50	22.96	40.00	-17.04
385.02	S	Peak	30.27	-9.47	20.80	46.00	-25.20
595.51	S	Peak	28.95	-5.32	23.63	46.00	-22.37
695.42	S	Peak	28.77	-3.90	24.87	46.00	-21.13
765.26	S	Peak	28.70	-2.77	25.93	46.00	-20.07
1854.50	H	Average	28.54	0.18	28.72	54.00	-25.28
1854.50	H	Peak	39.74	0.18	39.92	74.00	-34.08
2781.75	H	---					
3709.00	H	---					
4636.25	H	---					
5563.50	H	---					
6490.75	H	---					
7418.00	H	---					
8345.25	H	---					
9272.50	H	---					

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Fundamental Frequency	:927.25 MHz	Temp./Humi.	:21 deg_C / 54 RH
Operation Mode	:TX HIGH	Engineer	:Curry
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:HORIZONTAL

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.

“---” : denotes Noise Floor.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
33.88	S	Peak	34.71	-13.83	20.88	40.00	-19.12
389.87	S	Peak	30.59	-9.39	21.20	46.00	-24.80
540.22	S	Peak	31.17	-7.63	23.54	46.00	-22.46
660.50	S	Peak	29.65	-4.30	25.35	46.00	-20.65
676.99	S	Peak	29.22	-3.78	25.44	46.00	-20.56
779.81	S	Peak	28.49	-2.80	25.69	46.00	-20.31
1854.50	H	Average	28.03	0.18	28.21	54.00	-25.79
1854.50	H	Peak	39.10	0.18	39.28	74.00	-34.72
2781.75	H	---					
3709.00	H	---					
4636.25	H	---					
5563.50	H	---					
6490.75	H	---					
7418.00	H	---					
8345.25	H	---					
9272.50	H	---					

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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10. ANTENNA REQUIREMENT

10.1. Standard Applicable:

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by the responsible party shall be used with the device.

According to RSS-GEN 7.1.2, a transmitter can only be sold or operated with antennas with which it was certified. A transmitter may be certified with multiple antenna types. An antenna type comprises antennas having similar in-band and out-of-band radiation patterns. Testing shall be performed using the highest-gain antenna of each combination of transmitter and antenna type for which certification is being sought, with the transmitter output power set at the maximum level. Any antenna of the same type and having equal or lesser gain as an antenna that had been successfully tested for certification with the transmitter, will also be considered certified with the transmitter, and may be used and marketed with the transmitter. The manufacturer shall include with the application for certification a list of acceptable antenna types to be used with the transmitter.

When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on measurement or on data from the antenna manufacturer. Any antenna gain in excess of 6 dBi (6 dB above isotropic gain) shall be added to the measured RF output power before using the power limits specified in RSS-210 or RSS-310 for devices of RF output powers of 10 milliwatts or less. For devices of output powers greater than 10 milliwatts, except devices subject to RSS-210 Annex 8 (Frequency Hopping and Digital Modulation Systems Operating in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz Bands) or RSS-210 Annex 9 (Local Area Network Devices), the total antenna gain shall be added to the measured RF output power before using the specified power limits. For devices subject to RSS-210 Annex 8 or Annex 9, the antenna gain shall not be added.

10.2. Antenna Connected Construction

The directional gains of antenna used for transmitting is 0.17 dBi, and the antenna connector is designed with unique type RF connector and no consideration of replacement. Please see EUT photo and antenna spec. for details.

~ End of Report ~

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