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TEST REPORT

ACCORDING TO: FCC 47CFR part 15 subpart C § 15.247 (FHSS) and subpart B, RSS-210 issue 8 Annex 8, ICES-003 Issue 4:2004

FOR:

Visonic Ltd.

PIR Detector (915)

Model: Tower-30 AM PG2

FCC ID:WP3TOWER30AMPG2

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1 Applicant information

Client name: Visonic Ltd.

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 E-mail:
 aelshtein@visonic.com

 Contact name:
 Mr. Arick Elshtein

2 Equipment under test attributes

Product name: PIR Detector (915)

Product type: Transceiver

Model(s):Tower-30 AM PG2Hardware version:8-303347 V.01Software release:JS-701966 A0Receipt date8/10/2011

3 Manufacturer information

Manufacturer name: Visonic Ltd.

Address: Habarzel street 24, Tel Aviv 69710, Israel

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 Contact name:
 Mr. Arick Elshtein

4 Test details

Project ID: 22170

Location: Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel

Test started: 8/10/2011 **Test completed:** 9/07/2011

Test specification(s): FCC 47CFR part 15, subpart C, §15.247 (FHSS); subpart B;

RSS-210 issue 8 Annex 8, RSS-Gen issue 3, ICES-003 issue 4:2004



5 Tests summary

Test	Status
Transmitter characteristics	
FCC Section 15.247(a)1, RSS-210 section A8.1(a), The 20 dB bandwidth	Pass
FCC Section 15.247(a)1, RSS-210 section A8.1(b), Frequency separation	Pass
FCC Section 15.247(a)1, RSS-210 section A8.1(c), Number of hopping frequencies	Pass
FCC Section 15.247(a)1, RSS-210 section A8.1(c), Average time of occupancy	Pass
FCC Section 15.247(b), RSS-210 section A8.4(1), Peak output power	Pass
FCC Section 15.247(d), RSS-210 section A8.5, Emissions at band edges	Pass
FCC Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions	Pass
FCC Section 15.203, RSS-Gen section 7.1.2, Antenna requirements	Pass
FCC Section 15.207(a), RSS-Gen section 7.2.4, Conducted emission	Not required
FCC Section 15.247(i), RSS-Gen, section 5.5, RF exposure	Pass, the exhibit to the application of certification is provided
Unintentional emissions	
FCC Section 15.107, Conducted emission at AC power port	Not required
FCC Section 15.109, RSS-Gen section 6.1, ICES-003, Section 5.5, Radiated emission	Pass

Testing was completed against all relevant requirements of the test standard. The results obtained indicate that the product under test complies in full with the requirements tested.

The test results relate only to the items tested. Pass/ fail decision was based on nominal values.

	Name and Title	Date	Signature
Tested by:	Mrs. E. Pitt, test engineer	September 7, 2011	BH
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	September 26, 2011	Chu
Approved by:	Mr. M. Nikishin, EMC and radio group manager	October 18, 2011	48

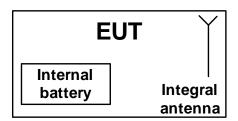


6 EUT description

6.1 General information

The EUT is a PIR Detector for PowerG Communications. The EUT is equipped with an integral antenna and is powered from $3\ V$ internal battery.

6.2 Test configuration



6.3 Changes made in EUT

No changes were implemented in the EUT.



6.4 Test configuration

Type of equipment											
Χ	Stand-alone (Equipment with or without its own control provisions)										
		ment (Equipment wh					in anot	her type of	equipme	ent)	
	Plug-in card (Equ	uipment intended for	r a varie	ty of host s	systems)						
Intend	led use	Condition of	use								
	fixed		istance more than 2 m from all people								
Χ	mobile			stance more than 20 cm from all people							
	portable	May operate	at a dist	at a distance closer than 20 cm to human body							
Assig	ned frequency ran	ges	902 –	928 MHz							
Opera	ting frequencies		912.75	50 – 919.1	06 MHz						
Maxin	num rated output p	oower	At tran	nsmitter 50	Ω RF or	utput connecto	r			dBm	
	Tallou output		Peak of	output pow	er					18.92 dBm	
			Х	No							
						continuous	variab	le			
Is trar	nsmitter output po	wer variable?		Yes		stepped var	riable v	with stepsize	е	dB	
				103	minimu	m RF power				dBm	
					maximu	naximum RF power			dBm		
Anten	na connection										
	unique coupling	sta	ndard co	ard connector X integral with temporary I							
	9			X without tempora			porary f	RF connector			
Anten	na/s technical cha	racteristics									
Туре		Manufac	cturer			el number			Gain		
Interna	al	Visonic		Built-in helical antenna -7 dBi			-7 dBi				
Trans	mitter aggregate d	lata rate/s		50 k	bps						
Туре	of modulation			GFS	SK						
Modu	lating test signal (baseband)		PRE	3S						
Maxin	num transmitter du	uty cycle in norma	l use	0.19	%						
Trans	mitter power sour	ce									
Χ	Battery	Nominal rated vol	ltage		VDC	Battery t	уре	Lithium			
	DC	Nominal rated vol		VD							
	AC mains	Nominal rated vol	ltage	VA	<u>C</u>	Frequen	су				
Comn	non power source	for transmitter and				Χ	_	es		no	
			I			cy hopping (FF					
Spread spectrum technique used			ŀ			ansmission sys	stem (E	OTS)			
	Hybrid										
Sprea	Spread spectrum parameters for transmitters tested per FCC 15.247 only										
EUGG	FHSS Bandwidth per hop Max. separation of hops			50							
гпээ				107.5 kHz 131 kHz							
iviax. Separation of hops				IJIKHZ							



Test specification:	Section 15.247(a)1, RSS-	Section 15.247(a)1, RSS-210 section A8.1(a), 20 dB bandwidth						
Test procedure:	Public notice DA 00-705							
Test mode:	Compliance	Verdict:	PASS					
Date(s):	8/31/2011	verdict.	FASS					
Temperature: 23 °C	Air Pressure: 1010 hPa	Relative Humidity: 41 %	Power Supply: 3 V battery					
Remarks:								

7 Transmitter tests according to 47CFR part 15 subpart C and RSS-210 Annex 8 requirements

7.1 20 dB bandwidth

7.1.1 General

This test was performed to measure 20 dB bandwidth of the transmitter hopping channel. Specification test limits are given in Table 7.1.1.

Table 7.1.1 The 20 dB bandwidth limits

Assigned frequency, MHz	Maximum bandwidth, kHz	Modulation envelope reference points*, dBc
902.0 - 928.0	500	
2400.0 - 2483.5	NA	20
5725.0 – 5850.0	1000	

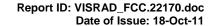
Modulation envelope reference points provided in terms of attenuation below the peak of modulated carrier.

7.1.2 Test procedure

- 7.1.2.1 The EUT was set up as shown in Figure 7.1.1, energized and its proper operation was checked.
- **7.1.2.2** The EUT was set to transmit modulated carrier at maximum data rate.
- **7.1.2.3** The transmitter bandwidth was measured with spectrum analyzer as frequency delta between reference points on modulation envelope and provided in Table 7.1.2 and associated plot.
- **7.1.2.4** The test was repeated for mid and high carrier frequencies.

Figure 7.1.1 The 20 dB bandwidth test setup







Test specification:	Section 15.247(a)1, RSS-	Section 15.247(a)1, RSS-210 section A8.1(a), 20 dB bandwidth					
Test procedure:	Public notice DA 00-705	Public notice DA 00-705					
Test mode:	Compliance	Verdict:	PASS				
Date(s):	8/31/2011	verdict.	FASS				
Temperature: 23 °C	Air Pressure: 1010 hPa	Relative Humidity: 41 %	Power Supply: 3 V battery				
Remarks:							

Table 7.1.2 The 20 dB bandwidth test results

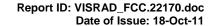
ASSIGNED FREQUENCY BAND: 902-928 MHz
DETECTOR USED: Peak
SWEEP TIME: Auto
VIDEO BANDWIDTH: ≥ RBW

MODULATION ENVELOPE REFERENCE POINTS: 20.0 dBc FREQUENCY HOPPING: Disabled

Carrier frequency, MHz	Type of modulation	Data rate, kbps	Symbol rate, Msymbols/s	20 dB bandwidth, kHz	Limit, kHz	Margin, kHz	Verdict
912.750				107.0	500	-393.0	
915.863	GFSK	50	NA	107.5	500	-392.5	Pass
919.106				107.0	500	-393.0	

Reference numbers of test equipment used

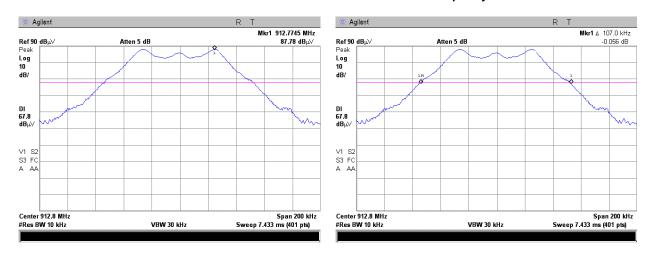
HL 3001				



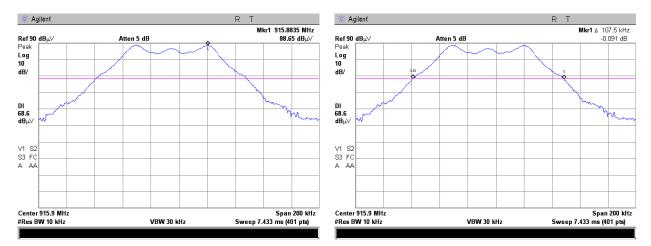


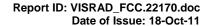
Test specification:	Section 15.247(a)1, RSS	Section 15.247(a)1, RSS-210 section A8.1(a), 20 dB bandwidth					
Test procedure:	Public notice DA 00-705						
Test mode:	Compliance	Verdict: PASS					
Date(s):	8/31/2011	verdict.	FAGG				
Temperature: 23 °C	Air Pressure: 1010 hPa	Relative Humidity: 41 %	Power Supply: 3 V battery				
Remarks:							

Plot 7.1.1 The 20 dB bandwidth test result at low frequency



Plot 7.1.2 The 20 dB bandwidth test result at mid frequency

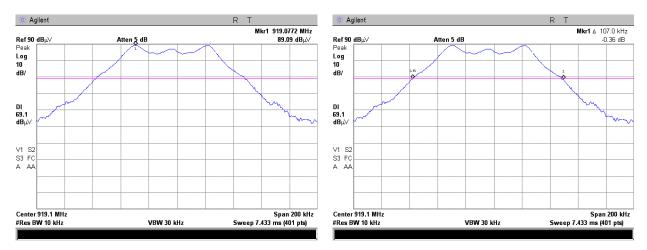






Test specification:	Section 15.247(a)1, RSS	Section 15.247(a)1, RSS-210 section A8.1(a), 20 dB bandwidth					
Test procedure:	Public notice DA 00-705						
Test mode:	Compliance	Verdict:	PASS				
Date(s):	8/31/2011	verdict.	FA33				
Temperature: 23 °C	Air Pressure: 1010 hPa	Relative Humidity: 41 %	Power Supply: 3 V battery				
Remarks:							

Plot 7.1.3 The 20 dB bandwidth test result at high frequency





Test specification:	Section 15.247(a)1, RSS-2	Section 15.247(a)1, RSS-210 section A8.1(b), Frequency separation						
Test procedure:	Public notice DA 00-705							
Test mode:	Compliance	Verdict:	PASS					
Date(s):	8/28/2011	verdict.	FAGG					
Temperature: 23.9 °C	Air Pressure: 1009 hPa	Relative Humidity: 35 %	Power Supply: 3 V battery					
Remarks:								

7.2 Carrier frequency separation

7.2.1 General

This test was performed to measure frequency separation between the peaks of adjacent channels. Specification test limits are given in Table 7.2.1.

Table 7.2.1 Carrier frequency separation limits

Assigned frequency range, MHz	Carrier frequency separation
902.0 - 928.0	25 kHz or 20 dB bandwidth of the hopping channel,
2400.0 - 2483.5	whichever is greater
5725.0 - 5850.0	will chever is greater

7.2.2 Test procedure

- **7.2.2.1** The EUT was set up as shown in Figure 7.2.1, energized with frequency hopping function enabled and its proper operation was checked.
- **7.2.2.2** The spectrum analyzer span was set to capture the carrier frequency and both of adjacent channels, the lower and the higher. The resolution bandwidth was set wider than 1 % of the frequency span.
- **7.2.2.3** The spectrum analyzer was set in max hold mode and allowed trace to stabilize.
- **7.2.2.4** The frequency separation between the peaks of adjacent channels was measured as provided in Table 7.2.2 and the associated plot.

Figure 7.2.1 Carrier frequency separation test setup





Test specification:	Section 15.247(a)1, RSS-	Section 15.247(a)1, RSS-210 section A8.1(b), Frequency separation				
Test procedure:	Public notice DA 00-705	Public notice DA 00-705				
Test mode:	Compliance	Verdict: PASS				
Date(s):	8/28/2011	verdict: PASS				
Temperature: 23.9 °C	Air Pressure: 1009 hPa	Relative Humidity: 35 %	Power Supply: 3 V battery			
Remarks:						

Table 7.2.2 Carrier frequency separation test results

ASSIGNED FREQUENCY: 902-928 MHz
MODULATION: GFSK
BIT RATE: 50 kbps
DETECTOR USED: Peak

RESOLUTION BANDWIDTH: ≥ 1% of the span

VIDEO BANDWIDTH:≥ RBWFREQUENCY HOPPING:Enabled20 dB BANDWIDTH:107.5 kHz

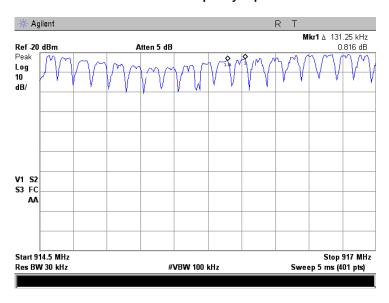
Carrier frequency separation, kHz	Limit, kHz	Margin*	Verdict
131.25	107.5	23.75	Pass

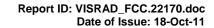
^{* -} Margin = Carrier frequency separation – specification limit.

Reference numbers of test equipment used

HI 0337	HL 2909	HI 3110			
HL 0337	HL 2909	HL 3119			

Plot 7.2.1 Carrier frequency separation







Test specification:	Section 15.247(a)1, RSS-210 section A8.1(c), Number of hopping frequencies					
Test procedure:	Public notice DA 00-705	Public notice DA 00-705				
Test mode:	Compliance	Verdict:	PASS			
Date(s):	8/28/2011	verdict.	PASS			
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 35 % Power Supply: 3 V batter				
Remarks:		•				

7.3 Number of hopping frequencies

7.3.1 General

This test was performed to calculate the number of hopping frequencies used by the EUT. Specification test limits are given in Table 7.3.1.

Table 7.3.1 Minimum number of hopping frequencies

Assigned frequency range, MHz	Number of hopping frequencies
902.0 – 928.0	50 (if the 20 dB bandwidth is less than 250 kHz) 25 (if the 20 dB bandwidth is 250 kHz or greater)
2400.0 - 2483.5	15
5725.0 - 5850.0	75

7.3.2 Test procedure

- **7.3.2.1** The EUT was set up as shown in Figure 7.3.1, energized with frequency hopping function enabled and its proper operation was checked.
- 7.3.2.2 Initially the spectrum analyzer span was set equal to frequency band of operation and the resolution bandwidth was set wider than 1 % of the frequency span. If the separate hopping channels were not clearly resolved the frequency band of operation was broken to sections and the resolution bandwidth was set wider than 1 % of the frequency span of each section.
- **7.3.2.3** The spectrum analyzer was set in max hold mode and allowed trace to stabilize.
- 7.3.2.4 The number of frequency hopping channels was calculated as provided in Table 7.3.2 and associated plots.

Figure 7.3.1 Hopping frequencies test setup





Test specification:	Section 15.247(a)1, RSS-210 section A8.1(c), Number of hopping frequencies					
Test procedure:	Public notice DA 00-705					
Test mode:	Compliance	Verdict:	PASS			
Date(s):	8/28/2011	verdict: PASS				
Temperature: 23 °C	Air Pressure: 1009 hPa Relative Humidity: 35 % Power Supply: 3 V battery					
Remarks:						

Table 7.3.2 Hopping frequencies test results

ASSIGNED FREQUENCY: 902-928 MHz
MODULATION: GFSK
BIT RATE: 50 kbps
DETECTOR USED: Peak

RESOLUTION BANDWIDTH: ≥ 1% of the span

VIDEO BANDWIDTH: ≥ RBW FREQUENCY HOPPING: Enabled

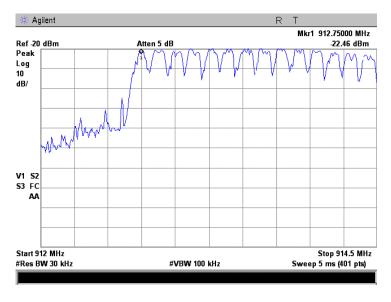
Number of hopping frequencies	Minimum number of hopping frequencies	Margin*	Verdict
50	50	0	Pass

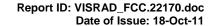
^{* -} Margin = Number of hopping frequencies – Minimum number of hopping frequencies.

Reference numbers of test equipment used

HL 0337	2909 HL 3119					
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Plot 7.3.1 Number of hopping frequencies in the frequency range 912 –914.5 MHz (fourteen)

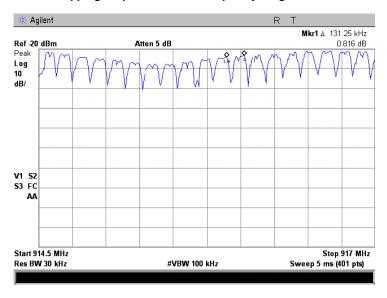




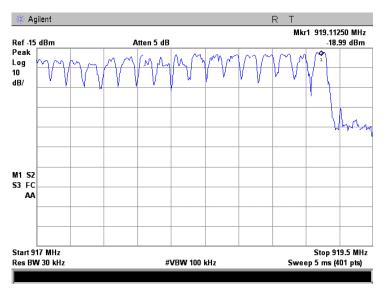


Test specification:	Section 15.247(a)1, RSS-210 section A8.1(c), Number of hopping frequencies					
Test procedure:	Public notice DA 00-705	Public notice DA 00-705				
Test mode:	Compliance	Verdict:	PASS			
Date(s):	8/28/2011	verdict.	PASS			
Temperature: 23 °C	Air Pressure: 1009 hPa	Relative Humidity: 35 % Power Supply: 3 V batter				
Remarks:		•				

Plot 7.3.2 Number of hopping frequencies in the frequency range 914.5 –917.0 MHz (nineteen)



Plot 7.3.3 Number of hopping frequencies in the frequency range 917 –919.5 MHz (seventeen)





Test specification:	Section 15.247(a)1, RSS-210 section A8.1(c), Average time of occupancy					
Test procedure:	Public notice DA 00-705					
Test mode:	Compliance	Verdict: PASS				
Date(s):	8/28/2011	verdict.	FASS			
Temperature: 23.9 °C	Air Pressure: 1009 hPa Relative Humidity: 35 % Power Supply: 3 V batter					
Remarks:						

7.4 Average time of occupancy

7.4.1 General

This test was performed to calculate the average time of occupancy (dwell time) on any frequency channel of the EUT. Specification test limits are given in Table 7.4.1.

Table 7.4.1 Average time of occupancy limits

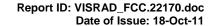
Assigned frequency range, MHz	Maximum average time of occupancy, s	Investigated period, s	Number of hopping frequencies
902.0 - 928.0	0.4	20.0	≥ 50
902.0 - 928.0	0.4	10.0	< 50
2400.0 - 2483.5	0.4	0.4 × N	N (≥ 15)
5725.0 - 5850.0	0.4	30.0	≥ 75

7.4.2 Test procedure

- **7.4.2.1** The EUT was set up as shown in Figure 7.4.1, energized with frequency hopping function enabled and its proper operation was checked.
- **7.4.2.2** The spectrum analyzer span was set to zero centered on a hopping channel.
- **7.4.2.3** The single transmission duration and period were measured with oscilloscope.
- **7.4.2.4** The average time of occupancy was calculated as the single transmission time multiplied by the investigated period and divided by the single transmission period.
- 7.4.2.5 The test was repeated at each data rate and modulation type as provided in Table 7.4.2 and the associated plots.

Figure 7.4.1 Average time of occupancy test setup







Test specification:	Section 15.247(a)1, RSS-210 section A8.1(c), Average time of occupancy					
Test procedure:	Public notice DA 00-705					
Test mode:	Compliance	Verdict:	PASS			
Date(s):	8/28/2011	verdict.	FASS			
Temperature: 23.9 °C	Air Pressure: 1009 hPa	Relative Humidity: 35 %	Power Supply: 3 V battery			
Remarks:		-				

Table 7.4.2 Average time of occupancy test results

ASSIGNED FREQUENCY: 902-928 MHz **GFSK** MODULATION: **DETECTOR USED:** Peak RESOLUTION BANDWIDTH: 1 MHz VIDEO BANDWIDTH: 3 MHz NUMBER OF HOPPING FREQUENCIES: 50 INVESTIGATED PERIOD: 20s FREQUENCY HOPPING: Enabled

Carrier frequency, MHz	Single transmission duration, s	Single transmission period, s	Average time of occupancy*, s	Bit rate, kbps	Limit, s	Margin s**	Verdict
915.863	0.004312	2	0.043	50	0.4	-0.357	Pass

^{* -} Average time of occupancy = (Single transmission duration × Investigated period) / Single transmission period.

Reference numbers of test equipment used

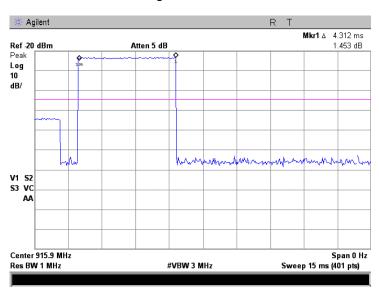
Ī	HL 0337	HL 2909	HL 3119			

^{** -} Margin = Average time of occupancy – specification limit.

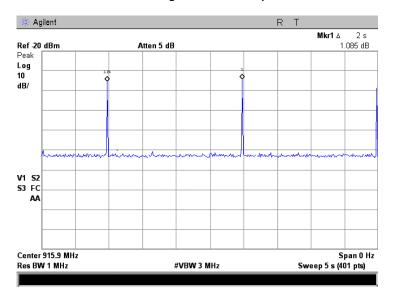


Test specification:	Section 15.247(a)1, RSS-210 section A8.1(c), Average time of occupancy					
Test procedure:	Public notice DA 00-705					
Test mode:	Compliance	Verdict:	PASS			
Date(s):	8/28/2011	verdict.	FASS			
Temperature: 23.9 °C	Air Pressure: 1009 hPa	Relative Humidity: 35 %	Power Supply: 3 V battery			
Remarks:						

Plot 7.4.1 Single transmission duration



Plot 7.4.2 Single transmission period





Test specification:	Section 15.247(b), RSS-	Section 15.247(b), RSS-210 section A8.4(1), Peak output power					
Test procedure:	Public notice DA 00-705						
Test mode:	Compliance	Verdict:	PASS				
Date(s):	9/1/2011	verdict.	PASS				
Temperature: 23 °C	Air Pressure: 1010 hPa	Relative Humidity: 45 %	Power Supply: 3 V battery				
Remarks:							

7.5 Peak output power

7.5.1 General

This test was performed to measure the maximum peak output power radiated by transmitter. Specification test limits are given in Table 7.5.1.

Table 7.5.1 Peak output power limits

Assigned Peak output power*		ut power*	Equivalent field strength	Maximum
requency range			limit @ 3m, dB(μV/m)*	antenna gain, dBi
902.0 - 928.0	1	30	131.2	
2400.0 – 2483.5			122.2 (<75 hopping channels) 131.2 (≥75 hopping channels)	
5725.0 – 5850.0	1.0 (275 hopping channels)	30.0 (275 hopping channels)	131.2 (275 hopping channels)	

^{*-} Equivalent field strength limit was calculated from the peak output power as follows: E=sqrt(30×P×G)/r, where P is peak output power in Watts, r is antenna to EUT distance in meters and G is transmitter antenna gain in dBi.

- by 1 dB for every 3 dB that the directional gain of antenna exceeds 6 dBi for fixed point-to-point transmitters operate in 2400-2483.5 MHz band;
- without any corresponding reduction for fixed point-to-point transmitters operate in 5725-5850 MHz band;
- by the amount in dB that the directional gain of antenna exceeds 6 dBi for the rest of transmitters.

7.5.2 Test procedure

- 7.5.2.1 The EUT was set up as shown in Figure 7.5.1, energized and its proper operation was checked.
- **7.5.2.2** The EUT was adjusted to produce maximum available to end user RF output power.
- **7.5.2.3** The frequency span of spectrum analyzer was set approximately 5 times wider than 20 dB bandwidth of the EUT and the resolution bandwidth was set wider than 20 dB bandwidth of the EUT. To find maximum radiation the turntable was rotated 360° and the measuring antenna height was swept in both vertical and horizontal polarizations.
- **7.5.2.4** The maximum field strength of the EUT carrier frequency was measured as provided in Table 7.5.2 and associated plots.
- **7.5.2.5** The maximum peak output power was calculated from the field strength of carrier as follows:

$$P = (E \times d)^2 / (30 \times G),$$

where P is the peak output power in W, E is the field strength in V/m, d is the test distance and G is the transmitter numeric antenna gain over an isotropic radiator.

The above equation was converted in logarithmic units for 3 m test distance:

Peak output power in dBm = Field strength in dB(μV/m) - Transmitter antenna gain in dBi – 95.2 dB

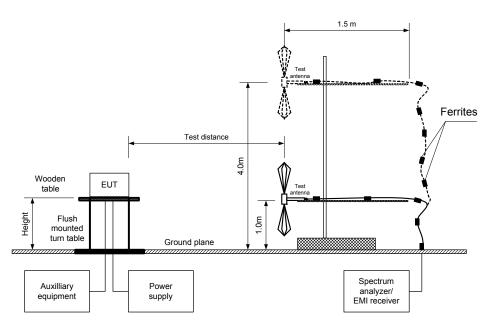
7.5.2.6 The worst test results (the lowest margins) were recorded in Table 7.5.2.

^{**-} The limit is provided in terms of conducted RF power at the antenna connector. If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power limit shall be reduced below the stated value as follows:



Test specification:	Section 15.247(b), RSS-2	Section 15.247(b), RSS-210 section A8.4(1), Peak output power					
Test procedure:	Public notice DA 00-705						
Test mode:	Compliance	Verdict:	PASS				
Date(s):	9/1/2011	verdict.	PASS				
Temperature: 23 °C	Air Pressure: 1010 hPa	Relative Humidity: 45 %	Power Supply: 3 V battery				
Remarks:		-					

Figure 7.5.1 Setup for carrier field strength measurements





Test specification:	Section 15.247(b), RSS-2	Section 15.247(b), RSS-210 section A8.4(1), Peak output power					
Test procedure:	Public notice DA 00-705						
Test mode:	Compliance	Verdict:	PASS				
Date(s):	9/1/2011	verdict.	FASS				
Temperature: 23 °C	Air Pressure: 1010 hPa	Relative Humidity: 45 %	Power Supply: 3 V battery				
Remarks:							

Table 7.5.2 Peak output power test results

ASSIGNED FREQUENCY: 902-928 MHz

TEST DISTANCE: 3 m

TEST SITE: Semi anechoic chamber

EUT HEIGHT: 0.8 m DETECTOR USED: Peak

TEST ANTENNA TYPE: Biconilog (30 MHz – 1000 MHz)

MODULATION: GFSK
BIT RATE: 50 kbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
DETECTOR USED: Peak
RESOLUTION BANDWIDTH: 120 MHz
VIDEO BANDWIDTH: 300 MHz
FREQUENCY HOPPING: Disabled

Frequency, MHz	Field strength dB(μV/m)	Antenna polarization	Antenna height, m	Azimuth, degrees*	EUT antenna gain, dBi	Peak output power, dBm**	Limit, dBm	Margin dB***	Verdict
912.723	102.10	V	1	175	-7	13.90	30	-16.10	Pass
915.885	107.12	V	1	162	-7	18.92	30	-11.08	Pass
919.075	101.83	V	1	185	-7	13.63	30	-16.37	Pass

^{*-} EUT front panel refer to 0 degrees position of turntable.

Note: Maximum peak output power was obtained at Unom input power voltage.

Reference numbers of test equipment used

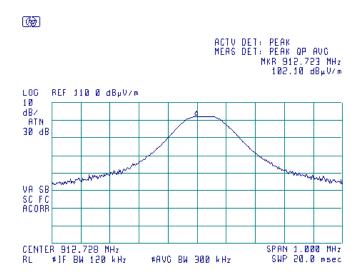
The state of the s							
HL 0521	HL 0604	HL 2871	HL 3623				

^{**-} Peak output power was calculated from the field strength of carrier as follows: $P = (E \times d)^2 / (30 \times G)$, where P is the peak output power in W, E is the field strength in V/m, d is the test distance in meters and G is the transmitter numeric antenna gain over an isotropic radiator. The above equation was converted in logarithmic units for 3 m test distance: Peak output power in dBm = Field strength in dB(μ V/m) - Transmitter antenna gain in dBi – 95.2 dB ***- Margin = Peak output power – specification limit.

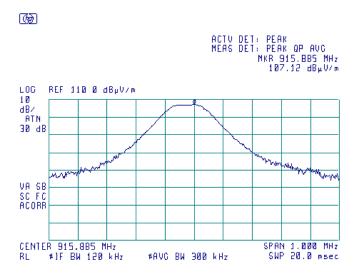


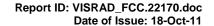
Test specification:	Section 15.247(b), RSS-2	Section 15.247(b), RSS-210 section A8.4(1), Peak output power					
Test procedure:	Public notice DA 00-705						
Test mode:	Compliance	Verdict:	PASS				
Date(s):	9/1/2011	verdict.	FASS				
Temperature: 23 °C	Air Pressure: 1010 hPa	Relative Humidity: 45 %	Power Supply: 3 V battery				
Remarks:							

Plot 7.5.1 Field strength of carrier at low frequency at vertical antenna polarization



Plot 7.5.2 Field strength of carrier at mid frequency at vertical antenna polarization

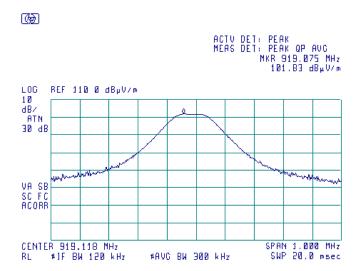






Test specification:	Section 15.247(b), RSS-2	Section 15.247(b), RSS-210 section A8.4(1), Peak output power					
Test procedure:	Public notice DA 00-705						
Test mode:	Compliance	Verdict:	PASS				
Date(s):	9/1/2011	verdict.	FASS				
Temperature: 23 °C	Air Pressure: 1010 hPa	Relative Humidity: 45 %	Power Supply: 3 V battery				
Remarks:							

Plot 7.5.3 Field strength of carrier at high frequency at vertical antenna polarization





Test specification:	Section 15.247(d), RSS-2	Section 15.247(d), RSS-210 section A8.5, Emissions at band edges			
Test procedure:	Public notice DA 00-705				
Test mode:	Compliance	Verdict:	PASS		
Date(s):	9/6/2011	verdict.	FAGG		
Temperature: 24.1 °C	Air Pressure: 1010 hPa	Relative Humidity: 34 %	Power Supply: 3 V battery		
Remarks:					

7.6 Band edge radiated emissions

7.6.1 General

This test was performed to measure emissions, radiated from the EUT at the assigned frequency band edges. Specification test limits are given in Table 7.6.1.

Table 7.6.1 Band edge emission limits

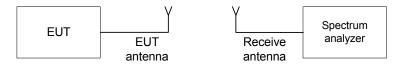
Assigned frequency,	Attenuation below	Field strength at 3 m withir	restricted bands, dB(μV/m)
MHz	carrier*, dBc	Peak	Average
902.0 - 928.0			
2400.0 - 2483.5	20.0	74.0	54.0
5725.0 – 5850.0			

^{* -} Band edge emission limit is provided in terms of attenuation below the peak of modulated carrier measured with the same resolution bandwidth.

7.6.2 Test procedure

- **7.6.2.1** The EUT was set up as shown in Figure 7.6.1, energized normally modulated at the maximum data rate with its hopping function disabled and its proper operation was checked.
- 7.6.2.2 The EUT was adjusted to produce maximum available to end user RF output power at the lowest carrier frequency.
- **7.6.2.3** The spectrum analyzer span was set to capture the carrier frequency and associated modulation products. The resolution bandwidth was set wider than 1 % of the frequency span.
- **7.6.2.4** The spectrum analyzer was set in max hold mode and allowed trace to stabilize. The highest emission level within the authorized band was measured.
- 7.6.2.5 The maximum band edge emission and modulation product outside of the band were measured as provided in Table 7.6.2 and associated plots and referenced to the highest emission level measured within the authorized band.
- **7.6.2.6** The above procedure was repeated with the EUT adjusted to produce maximum RF output power at the highest carrier frequency.
- **7.6.2.7** The above procedure was repeated with the frequency hopping function enabled.

Figure 7.6.1 Band edge emission test setup





Test specification:	Section 15.247(d), RSS-2	Section 15.247(d), RSS-210 section A8.5, Emissions at band edges			
Test procedure:	Public notice DA 00-705				
Test mode:	Compliance	Verdict:	PASS		
Date(s):	9/6/2011	verdict.	PASS		
Temperature: 24.1 °C	Air Pressure: 1010 hPa	Relative Humidity: 34 %	Power Supply: 3 V battery		
Remarks:		-			

Table 7.6.2 Band edge emission test results

ASSIGNED FREQUENCY RANGE: 902 – 928 MHz

DETECTOR USED:

MODULATION:

MODULATING SIGNAL:

BIT RATE:

TRANSMITTER OUTPUT POWER SETTINGS:

RESOLUTION BANDWIDTH:

VIDEO BANDWIDTH:

Peak

FSK

PRBS

by RBS

Maximum

≥ 1% of the span

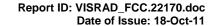
≥ RBW

Frequency, MHz	Band edge emission, dBuV	Emission at carrier, dBuV	Attenuation below carrier, dBc	Limit, dBc	Margin, dB*	Verdict	
Frequency hop	Frequency hopping disabled						
902.455	34.49	87.71	53.22	20.0	33.22	Pass	
927.752	32.95	89.76	56.81	20.0	36.81	Fa55	
Frequency hop	Frequency hopping enabled						
902.097	35.81	87.71	51.90	20.0	31.90	Pass	
927.982	36.52	89.76	53.24	20.0	33.24	Pass	

^{*-} Margin = Attenuation below carrier – specification limit.

Reference numbers of test equipment used

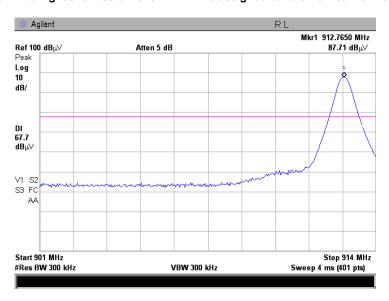
LIL 0227			1	1	I	
HL 0337	HL 1457	HL 2909				



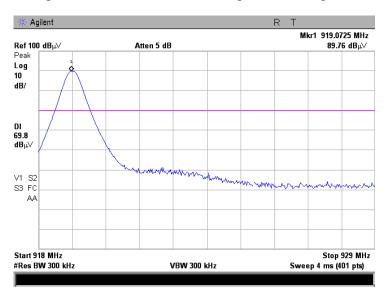


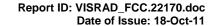
Test specification:	Section 15.247(d), RSS-2	Section 15.247(d), RSS-210 section A8.5, Emissions at band edges			
Test procedure:	Public notice DA 00-705				
Test mode:	Compliance	Verdict:	PASS		
Date(s):	9/6/2011	verdict.	FAGG		
Temperature: 24.1 °C	Air Pressure: 1010 hPa	Relative Humidity: 34 %	Power Supply: 3 V battery		
Remarks:					

Plot 7.6.1 The highest emission level within the assigned band at low carrier frequency



Plot 7.6.2 The highest emission level within the assigned band at high carrier frequency

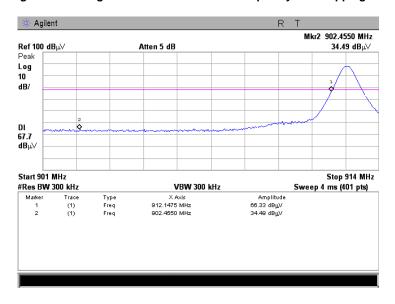




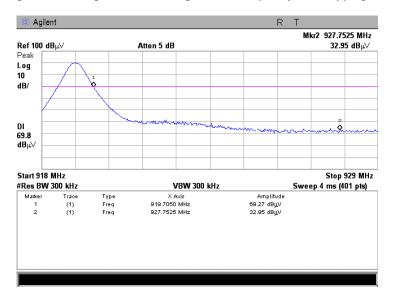


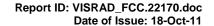
Test specification:	Section 15.247(d), RSS-210 section A8.5, Emissions at band edges			
Test procedure:	Public notice DA 00-705			
Test mode:	Compliance	Verdict:	PASS	
Date(s):	9/6/2011	verdict.	FASS	
Temperature: 24.1 °C	Air Pressure: 1010 hPa	Relative Humidity: 34 %	Power Supply: 3 V battery	
Remarks:				

Plot 7.6.3 The highest band edge emission at low carrier frequency with hopping function disabled



Plot 7.6.4 The highest band edge emission at high carrier frequency with hopping function disabled

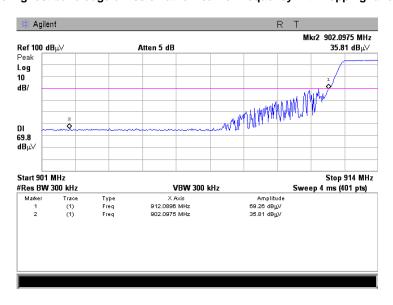




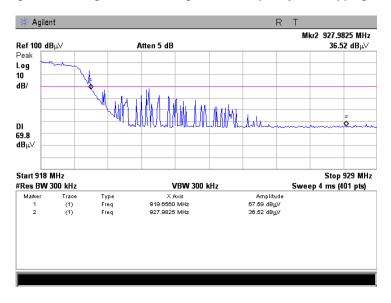


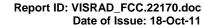
Test specification:	Section 15.247(d), RSS-210 section A8.5, Emissions at band edges			
Test procedure:	Public notice DA 00-705			
Test mode:	Compliance	Verdict:	PASS	
Date(s):	9/6/2011	verdict.	FASS	
Temperature: 24.1 °C	Air Pressure: 1010 hPa	Relative Humidity: 34 %	Power Supply: 3 V battery	
Remarks:				

Plot 7.6.5 The highest band edge emission at low carrier frequency with hopping function enabled



Plot 7.6.6 The highest band edge emission at high carrier frequency with hopping function enabled







Test specification:	Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions				
Test procedure:	Public notice DA 00-705/47 C	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4			
Test mode:	Compliance	Verdict: PASS			
Date(s):	8/31/2011	verdict.	FASS		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 40 %	Power Supply: 3 V battery		
Remarks:		-			

7.7 Field strength of spurious emissions

7.7.1 Genera

This test was performed to measure field strength of spurious emissions from the EUT. Specification test limits are given in Table 7.7.1.

Table 7.7.1 Radiated spurious emissions limits

Frequency, MHz	Field strength at 3 m within restricted bands, dB(μV/m)***			Attenuation of field strength of spurious versus
Troquency,	Peak	Quasi Peak	Average	carrier outside restricted bands, dBc***
0.009 - 0.090	148.5 – 128.5	NA	128.5 – 108.5**	
0.090 - 0.110	NA	108.5 – 106.8**	NA	
0.110 - 0.490	126.8 – 113.8	NA	106.8 - 93.8**	
0.490 - 1.705		73.8 – 63.0**		
1.705 - 30.0*		69.5		20.0
30 – 88	NA	40.0	NA	20.0
88 – 216	INA	43.5	INA	
216 – 960		46.0		
960 - 1000		54.0		
1000 – 10 th harmonic	74.0	NA	54.0	

^{*-} The limit for 3 m test distance was calculated using the inverse square distance extrapolation factor as follows: $\lim_{S_2} = \lim_{S_1} + 40 \log (S_1/S_2)$,

where S₁ and S₂ – standard defined and test distance respectively in meters.

7.7.2 Test procedure for spurious emission field strength measurements in 9 kHz to 30 MHz band

- **7.7.2.1** The EUT was set up as shown in Figure 7.7.1, energized and the performance check was conducted.
- **7.7.2.2** The specified frequency range was investigated with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360° and the measuring antenna was rotated around its vertical axis.
- 7.7.2.3 The worst test results (the lowest margins) were recorded and shown in the associated plots.

7.7.3 Test procedure for spurious emission field strength measurements above 30 MHz

- 7.7.3.1 The EUT was set up as shown in Figure 7.7.2, energized and the performance check was conducted.
- **7.7.3.2** The specified frequency range was investigated with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360°, the measuring antenna height was changed from 1 to 4 m, its polarization was switched from vertical to horizontal.
- 7.7.3.3 The worst test results (the lowest margins) were recorded and shown in the associated plots.

^{**-} The limit decreases linearly with the logarithm of frequency.

^{*** -} The field strength limits applied from the lowest radio frequency generated in the device, without going below 9 kHz up to the tenth harmonic of the highest fundamental frequency.



Test specification:	Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions				
Test procedure:	Public notice DA 00-705/47 C	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4			
Test mode:	Compliance	Verdict: PASS			
Date(s):	8/31/2011				
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 40 %	Power Supply: 3 V battery		
Remarks:					

Figure 7.7.1 Setup for spurious emission field strength measurements below 30 MHz

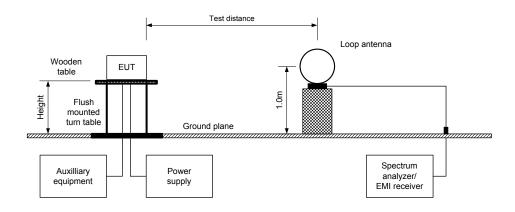
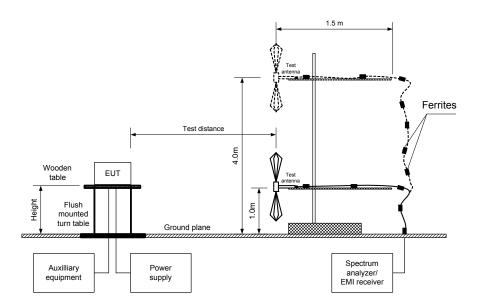
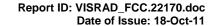


Figure 7.7.2 Setup for spurious emission field strength measurements above 30 MHz







Test specification:	Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions				
Test procedure:	Public notice DA 00-705/47 0	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4			
Test mode:	Compliance	Verdict: PASS			
Date(s):	8/31/2011				
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 40 %	Power Supply: 3 V battery		
Remarks:		-	-		

Table 7.7.2 Field strength of emissions outside restricted bands

ASSIGNED FREQUENCY: 902-928 MHz
INVESTIGATED FREQUENCY RANGE: 0.009 -9200 MHz

TEST DISTANCE: 3 m **GFSK** MODULATION: MODULATING SIGNAL: **PRBS** BIT RATE: 50 kbps 100 % DUTY CYCLE: TRANSMITTER OUTPUT POWER SETTINGS: Maximum DETECTOR USED: Peak 100 kHz RESOLUTION BANDWIDTH: VIDEO BANDWIDTH: 300 kHz

TEST ANTENNA TYPE:

Active loop (9 kHz – 30 MHz)

Biconilog (30 MHz – 1000 MHz)

Double ridged guide (above 1000 MHz)

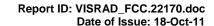
Disabled

FREQUENCY HOPPING:

FREQUENCY HOPPING. Disabled									
Frequency, MHz	Field strength of spurious, dB(μV/m)	Antenna polarization	Antenna height, m	Azimuth, degrees*	Field strength of carrier, dB(μV/m)	Attenuation below carrier, dBc	Limit, dBc	Margin, dB**	Verdict
Low carrier	frequency								
1825.548	54.74	V	1.88	11		47.39		27.39	
5476.315	64.26	V	1.40	280	102.13	37.87	20.0	17.87	Pass
6389.250	54.50	V	1.40	174		47.63		27.63	
Mid carrier	frequency								
1831.671	51.74	V	2.05	180		55.46		35.46	
5495.293	65.91	V	1.40	280	107.20	41.29	20.0	21.29	Pass
6411.041	58.22	V	1.30	172		48.98		28.98	
High carrier	High carrier frequency								
1838.245	53.69	V	1.91	176		48.25		28.25	
5514.746	61.48	V	1.30	280	101.94	40.46	20.0	20.46	Pass
6433.742	55.46	V	1.40	174		46.48		26.48	

^{*-} EUT front panel refers to 0 degrees position of turntable.

^{**-} Margin = Attenuation below carrier – specification limit.





Test specification:	Section 15.247(d), RSS-2	Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions					
Test procedure:	Public notice DA 00-705/47 0	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4					
Test mode:	Compliance	Verdict:	PASS				
Date(s):	8/31/2011	verdict.	FASS				
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 40 %	Power Supply: 3 V battery				
Remarks:							

Table 7.7.3 Field strength of spurious emissions above 1 GHz within restricted bands

ASSIGNED FREQUENCY: 902-928 MHz
INVESTIGATED FREQUENCY RANGE: 0.009 -9200 MHz

TEST DISTANCE: 3 m MODULATION: **GFSK** MODULATING SIGNAL: **PRBS** BIT RATE: 50 kbps **DUTY CYCLE:** 100 % TRANSMITTER OUTPUT POWER SETTINGS: Maximum **DETECTOR USED:** Peak 1000 kHz RESOLUTION BANDWIDTH: TEST ANTENNA TYPE: Double ridged guide

TDEOLENCY LIODDING.

FREQUENCY HOPPING: Disabled

	Anteni	na	A =: 4 la	Peak field s	trength(VB	W=3 MHz)	Average	e field stren	gth(VBW=1	0 Hz)	
requency MHz	Polarization	Height,	Azimuth, degrees*	Measured,	Limit,	Margin,	Measured,	Calculated,	Limit,	Margin,	Verdict
1411 12	Polarization	m	uegrees	dB(μV/m)	$dB(\mu V/m)$	dB**	dB(μV/m)	dB(μV/m)	$dB(\mu V/m)$	dB***	
Low carrie	r frequency										
2738.250	V	1.05	140	58.16	74.0	-15.84	56.90	29.60	54.0	-24.40	
3651.050	Н	1.80	186	56.67	74.0	-17.33	55.10	27.80	54.0	-26.20	
4563.753	Н	1.40	256	60.56	74.0	-13.44	59.41	32.11	54.0	-21.89	Pass
7302.000	Н	1.20	185	55.40	74.0	-18.60	52.80	25.50	54.0	-28.50	
9127.500	V	1.40	181	59.70	74.0	-14.30	57.50	30.20	54.0	-23.80	
Mid carrier	frequency										
2747.564	V	1.05	180	61.31	74.0	-12.69	60.56	33.26	54.0	-20.74	
3663.452	Н	1.80	186	60.53	74.0	-13.47	59.49	32.19	54.0	-21.81	
4579.365	Н	1.40	256	62.29	74.0	-11.71	61.63	34.33	54.0	-19.67	Pass
7326.904	Н	1.20	180	54.50	74.0	-19.50	52.40	25.10	54.0	-28.90	
9158.630	V	1.30	182	61.40	74.0	-12.60	58.80	31.50	54.0	-22.50	
High carrie	r frequency										
2757.293	V	1.30	185	58.50	74.0	-15.50	57.40	30.10	54.0	-23.90	
3676.449	Н	1.80	180	56.35	74.0	-17.65	54.47	27.17	54.0	-26.83	
4595.555	Н	1.40	280	57.85	74.0	-16.15	56.42	29.12	54.0	-24.88	Pass
7352.848	Н	1.20	179	54.00	74.0	-20.00	51.40	24.10	54.0	-29.90	
9191.060	V	1.40	183	57.30	74.0	-16.70	54.60	27.30	54.0	-26.70	

^{*-} EUT front panel refers to 0 degrees position of turntable.

where Calculated field strength = Measured field strength + average factor.

Table 7.7.4 Average factor calculation

Transmission pulse		Transmis	sion burst	Transmission train	Average factor,
Duration, ms	Period, ms	Duration, ms	Period, ms	duration, ms	dB
4.3	2000	NA	NA	NA	-27.3

^{*-} Average factor was calculated as follows

for pulse train shorter than 100 ms: $Average\ factor = 20 \times \log_{10} \left(\frac{Pulse\ duration}{Pulse\ period} \times \frac{Burst\ duration}{Train\ duration} \times Number\ of\ bursts\ within\ pulse\ train} \right)$ for pulse train longer than 100 ms: $Average\ factor = 20 \times \log_{10} \left(\frac{Pulse\ duration}{Pulse\ period} \times \frac{Burst\ duration}{100\ ms} \times Number\ of\ bursts\ within\ 100\ ms} \right)$

^{**-} Margin = Measured field strength - specification limit.

^{***-} Margin = Calculated field strength - specification limit,



Test specification:	Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions					
Test procedure:	Public notice DA 00-705/47 C	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4				
Test mode:	Compliance	Verdict:	PASS			
Date(s):	8/31/2011	verdict.	FASS			
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 40 %	Power Supply: 3 V battery			
Remarks:		•	-			

Table 7.7.5 Field strength of spurious emissions below 1 GHz within restricted bands

ASSIGNED FREQUENCY: 902-928 MHz
INVESTIGATED FREQUENCY RANGE: 0.009 -1000 MHz

TEST DISTANCE: 3 m

MODULATION: GFSK

MODULATING SIGNAL: PRBS

BIT RATE: 50 kbps

DUTY CYCLE: 100 %

TRANSMITTER OUTPUT POWER SETTINGS: Maximum

RESOLUTION BANDWIDTH: 0.2 kHz (9 kHz – 150 kHz)

9.0 kHz (150 kHz – 30 MHz) 120 kHz (30 MHz – 1000 MHz)

VIDEO BANDWIDTH: > Resolution bandwidth
TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)
Biconilog (30 MHz – 1000 MHz)

FREQUENCY HOPPING: Disabled

Frequency Peak		Qua	Antenna	Antenna	Turn-table				
MHz	emission, dB(μV/m)	Measured emission, dB(μV/m)	Limit, dB(μV/m)	Vlargin, dB [']	polarization	height, m	position**, degrees	Verdict	
Low carrier	Low carrier frequency								
	No emissions were found								
Mid carrier	frequency								
	No emissions were found							Pass	
High carrier	High carrier frequency								
No emissions were found						Pass			

^{*-} Margin = Measured emission - specification limit.

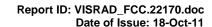
Table 7.7.6 Restricted bands

MHz	MHz	MHz	MHz	MHz	GHz
0.09 - 0.11	8.37625 - 8.38675	73 - 74.6	399.9 - 410	2690 - 2900	10.6 - 12.7
0.495 - 0.505	8.41425 - 8.41475	74.8 - 75.2	608 - 614	3260 - 3267	13.25 - 13.4
2.1735 - 2.1905	12.29 - 12.293	108 - 121.94	960 - 1240	3332 - 3339	14.47 - 14.5
4.125 - 4.128	12.51975 - 12.52025	123 - 138	1300 - 1427	3345.8 - 3358	15.35 - 16.2
4.17725 - 4.17775	12.57675 - 12.57725	149.9 - 150.05	1435 - 1626.5	3600 - 4400	17.7 - 21.4
4.20725 - 4.20775	13.36 - 13.41	156.52475 - 156.52525	1645.5 - 1646.5	4500 - 5150	22.01 - 23.12
6.215 - 6.218	16.42 - 16.423	156.7 - 156.9	1660 - 1710	5350 - 5460	23.6 - 24
6.26775 - 6.26825	16.69475 - 16.69525	162.0125 - 167.17	1718.8 - 1722.2	7250 - 7750	31.2 - 31.8
6.31175 - 6.31225	16.80425 - 16.80475	167.72 - 173.2	2200 - 2300	8025 - 8500	36.43 - 36.5
8.291 - 8.294	25.5 - 25.67	240 - 285	2310 - 2390	9000 - 9200	Above 38.6
8.362 - 8.366	37.5 - 38.25	322 - 335.4	2483.5 - 2500	9300 - 9500	Above 36.6

Reference numbers of test equipment used

HL 0446	HL 0521	HL 0604	HL 1424	HL 1984	HL 2870	HL 2871	HL 2909
HL 3344	HL 3623	HL 3818	HL 3883				

^{**-} EUT front panel refer to 0 degrees position of turntable.





Test specification:	Section 15.247(d), RSS-2	Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions					
Test procedure:	Public notice DA 00-705/47 0	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4					
Test mode:	Compliance	Verdict:	PASS				
Date(s):	8/31/2011	verdict.	FASS				
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 40 %	Power Supply: 3 V battery				
Remarks:							

Plot 7.7.1 Radiated emission measurements at the low carrier frequency

TEST SITE: TEST DISTANCE:

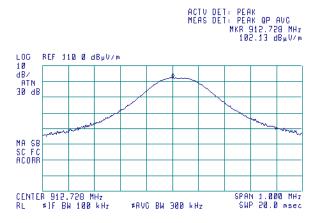
(A)

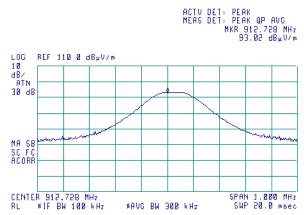
ANTENNA POLARIZATION: Vertical

Semi anechoic chamber

ANTENNA POLARIZATION: Horizontal

(A)





Plot 7.7.2 Radiated emission measurements at the mid carrier frequency

TEST SITE: TEST DISTANCE:

ANTENNA POLARIZATION: Vertical

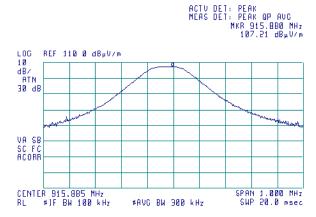
Semi anechoic chamber

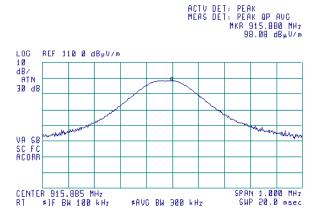
3 m

(B)

ANTENNA POLARIZATION: Horizontal

(B)









Test specification:	Section 15.247(d), RSS-2	Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions					
Test procedure:	Public notice DA 00-705/47 0	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4					
Test mode:	Compliance	Verdict:	PASS				
Date(s):	8/31/2011	verdict.	FASS				
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 40 %	Power Supply: 3 V battery				
Remarks:							

Plot 7.7.3 Radiated emission measurements at the high carrier frequency

TEST SITE: TEST DISTANCE:

(g)

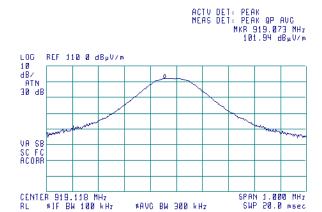
ANTENNA POLARIZATION: Vertical

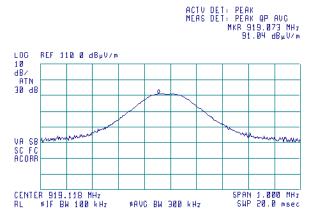
Semi anechoic chamber

3 m

ANTENNA POLARIZATION: Horizontal

(g)







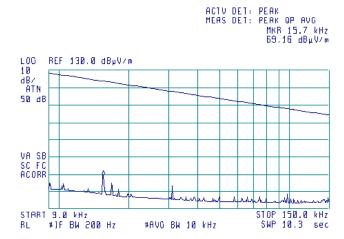
Test specification:	Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions						
Test procedure:	Public notice DA 00-705/47 (Public notice DA 00-705/47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4					
Test mode:	Compliance	Verdict:	PASS				
Date(s):	8/31/2011	verdict.	FASS				
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 40 %	Power Supply: 3 V battery				
Remarks:							

Plot 7.7.4 Radiated emission measurements from 9 to 150 kHz at the low, mid and high carrier frequency

TEST SITE: Semi anechoic chamber

TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



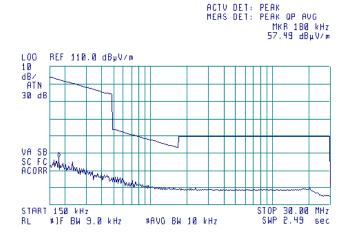


Plot 7.7.5 Radiated emission measurements from 0.15 to 30 MHz at the low, mid and high carrier frequency

TEST SITE: Semi anechoic chamber

TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical







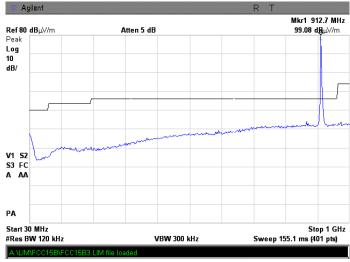
Test specification:	Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/31/2011	verdict.	FASS
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 40 %	Power Supply: 3 V battery
Remarks:			

Plot 7.7.6 Radiated emission measurements from 30 to 1000 MHz at the low carrier frequency

TEST SITE: Anechoic chamber

TEST DISTANCE: 3 m

ANTENNA POLARIZATION: Vertical and Horizontal

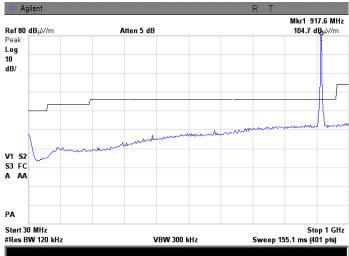


Plot 7.7.7 Radiated emission measurements from 30 to 1000 MHz at the mid carrier frequency

TEST SITE: Anechoic chamber

TEST DISTANCE: 3 m

ANTENNA POLARIZATION: Vertical and Horizontal





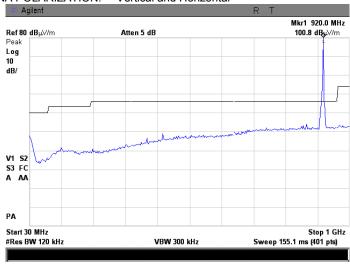
Test specification:	Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/31/2011	verdict.	FASS
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 40 %	Power Supply: 3 V battery
Remarks:			

Plot 7.7.8 Radiated emission measurements from 30 to 1000 MHz at the high carrier frequency

TEST SITE: Anechoic chamber

TEST DISTANCE: 3 m

ANTENNA POLARIZATION: Vertical and Horizontal

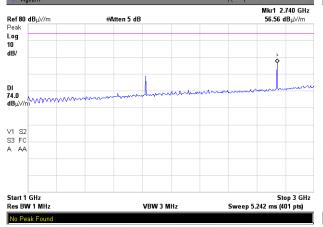


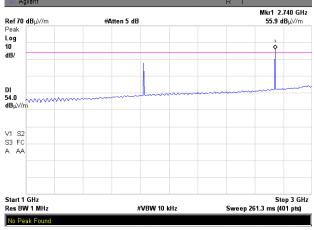
Plot 7.7.9 Radiated emission measurements from 1000 to 3000 MHz at the low carrier frequency

TEST SITE: TEST DISTANCE: ANTENNA POLARIZATION: DETECTOR: Peak Semi anechoic chamber

Vertical and Horizontal

DETECTOR: Average

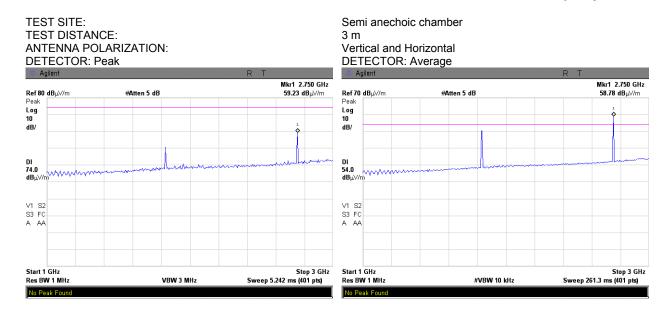






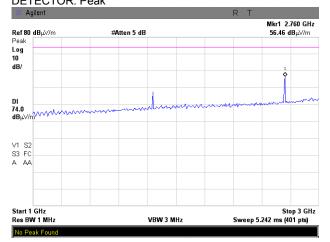
Test specification:	Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/31/2011	verdict.	FASS
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 40 %	Power Supply: 3 V battery
Remarks:			

Plot 7.7.10 Radiated emission measurements from 1000 to 3000 MHz at the mid carrier frequency

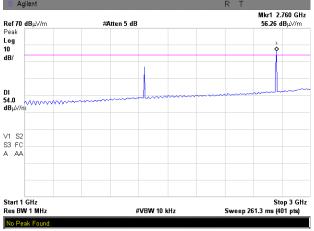


Plot 7.7.11 Radiated emission measurements from 1000 to 3000 MHz at the high carrier frequency

TEST SITE: TEST DISTANCE: ANTENNA POLARIZATION: DETECTOR: Peak



Semi anechoic chamber 3 m Vertical and Horizontal DETECTOR: Average





Test specification:	Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/31/2011	verdict.	FASS
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 40 %	Power Supply: 3 V battery
Remarks:			

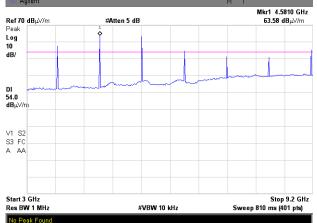
Plot 7.7.12 Radiated emission measurements from 3000 to 9200 MHz at the low carrier frequency

TEST SITE: Semi anechoic chamber TEST DISTANCE: 3 m ANTENNA POLARIZATION: Vertical and Horizontal **DETECTOR:** Peak **DETECTOR:** Average Mkr1 5.4800 GHz Mkr1 5.4800 GHz Ref 80 dBµ√/m Peak Ref 70 dBμV/m Peak Log 10 Log 10 dB/ dB/ DI 74.0 dBμ∀ DI 54.0 dΒμ\// S1 V2 S3 FC A AA V1 S2 S3 FC A AA Start 3 GHz Res BW 1 MHz Stop 9.2 GHz Start 3 GHz Stop 9.2 GHz Sweep 810 ms (401 pts) Sweep 16.25 ms (401 pts) #**VBW** 10 kHz VBW 3 MHz Res BW 1 MHz

Plot 7.7.13 Radiated emission measurements from 3000 to 9200 MHz at the mid carrier frequency

TEST SITE: TEST DISTANCE: ANTENNA POLARIZATION: DETECTOR: Peak

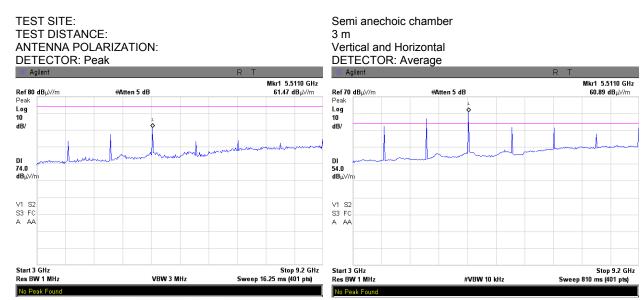
Semi anechoic chamber 3 m Vertical and Horizontal DETECTOR: Average





Test specification:	Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions			
Test procedure:	Public notice DA 00-705/47 C	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS	
Date(s):	8/31/2011	verdict.	FASS	
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 40 %	Power Supply: 3 V battery	
Remarks:				

Plot 7.7.14 Radiated emission measurements from 3000 to 9200 MHz at the high carrier frequency



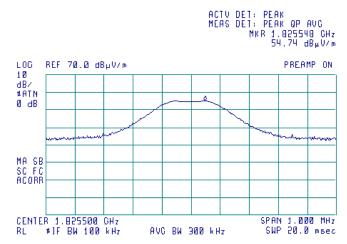
Plot 7.7.15 Radiated emission measurements at the second harmonic of low carrier frequency

TEST SITE: Semi anechoic chamber

TEST DISTANCE: 3 m

ANTENNA POLARIZATION: Vertical and Horizontal







Test specification:	Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions			
Test procedure:	Public notice DA 00-705/47 C	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS	
Date(s):	8/31/2011	verdict.	FASS	
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 40 %	Power Supply: 3 V battery	
Remarks:				

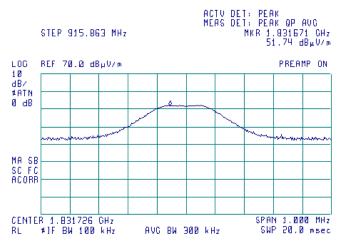
Plot 7.7.16 Radiated emission measurements at the second harmonic of mid carrier frequency

TEST SITE: Semi anechoic chamber

TEST DISTANCE: 3 m

ANTENNA POLARIZATION: Vertical and Horizontal





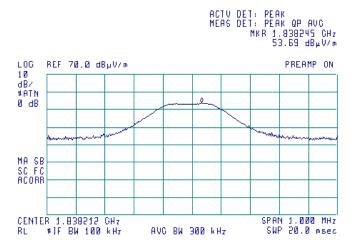
Plot 7.7.17 Radiated emission measurements at the second harmonic of high carrier frequency

TEST SITE: Semi anechoic chamber

TEST DISTANCE: 3 m

ANTENNA POLARIZATION: Vertical and Horizontal

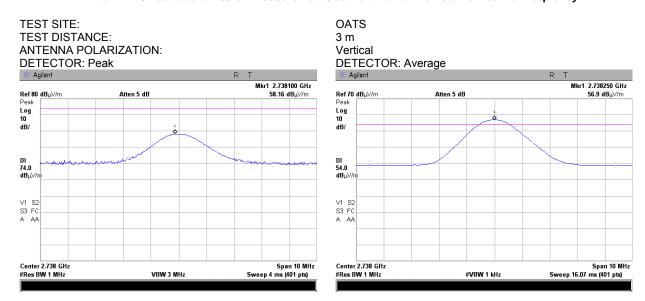




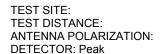


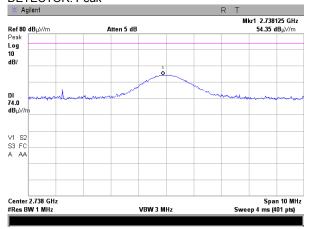
Test specification:	Section 15.247(d), RSS-2	Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions			
Test procedure:	Public notice DA 00-705/47 0	Public notice DA 00-705/47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4			
Test mode:	Compliance	Verdict:	PASS		
Date(s):	8/31/2011	verdict.	FASS		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 40 %	Power Supply: 3 V battery		
Remarks:					

Plot 7.7.18 Radiated emission measurements at the third harmonic of low carrier frequency

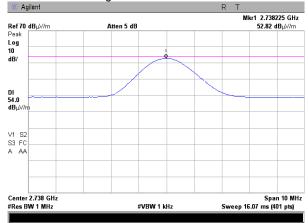


Plot 7.7.19 Radiated emission measurements at the third harmonic of low carrier frequency





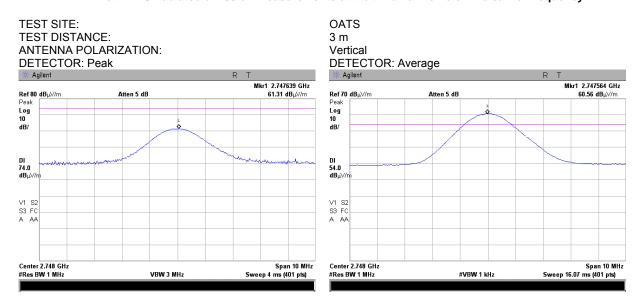






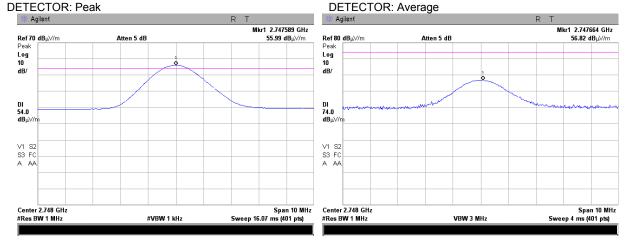
Test specification:	Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/31/2011	verdict.	FASS
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 40 %	Power Supply: 3 V battery
Remarks:			

Plot 7.7.20 Radiated emission measurements at the third harmonic of mid carrier frequency



Plot 7.7.21 Radiated emission measurements at the third harmonic of mid carrier frequency

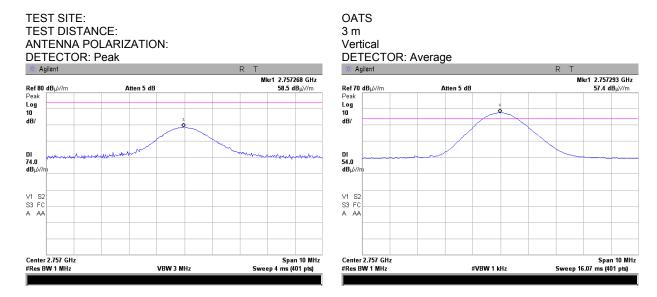
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal





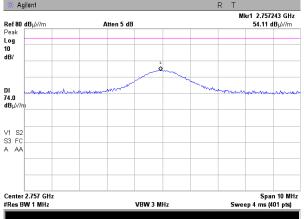
Test specification:	Section 15.247(d), RSS-2	Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions			
Test procedure:	Public notice DA 00-705/47 0	Public notice DA 00-705/47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4			
Test mode:	Compliance	Verdict:	PASS		
Date(s):	8/31/2011	verdict.	FASS		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 40 %	Power Supply: 3 V battery		
Remarks:					

Plot 7.7.22 Radiated emission measurements at the third harmonic of high carrier frequency

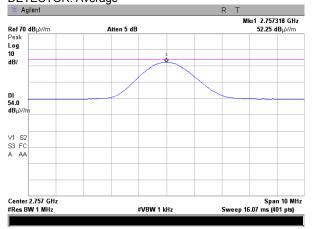


Plot 7.7.23 Radiated emission measurements at the third harmonic of high carrier frequency





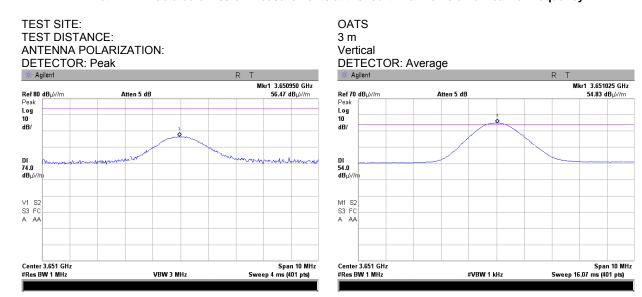




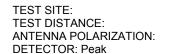


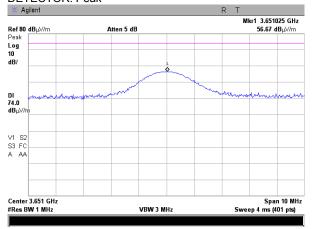
Test specification:	Section 15.247(d), RSS-2	Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions			
Test procedure:	Public notice DA 00-705/47 0	Public notice DA 00-705/47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4			
Test mode:	Compliance	Verdict:	PASS		
Date(s):	8/31/2011	verdict.	FASS		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 40 %	Power Supply: 3 V battery		
Remarks:					

Plot 7.7.24 Radiated emission measurements at the fourth harmonic of low carrier frequency

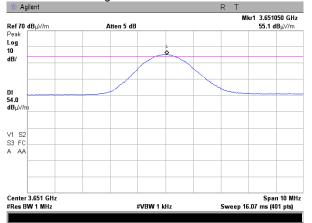


Plot 7.7.25 Radiated emission measurements at the fourth harmonic of low carrier frequency





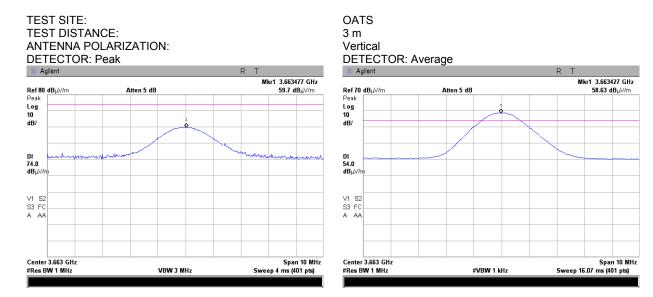




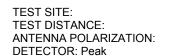


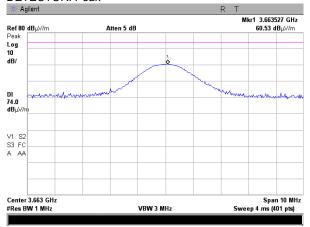
Test specification:	Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions			
Test procedure:	Public notice DA 00-705/47	Public notice DA 00-705/47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS	
Date(s):	8/31/2011	verdict.	FASS	
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 40 %	Power Supply: 3 V battery	
Remarks:		-	-	

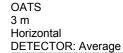
Plot 7.7.26 Radiated emission measurements at the fourth harmonic of mid carrier frequency

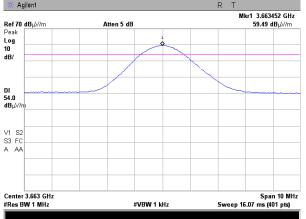


Plot 7.7.27 Radiated emission measurements at the fourth harmonic of low carrier frequency





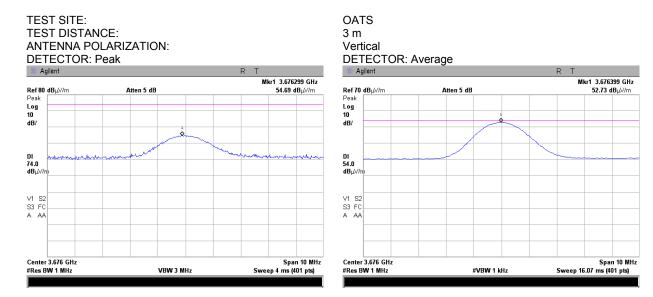




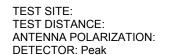


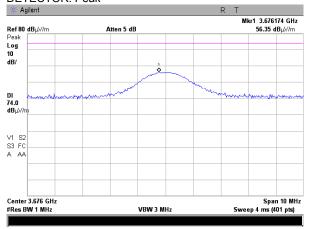
Test specification:	Section 15.247(d), RSS-2	Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions			
Test procedure:	Public notice DA 00-705/47 0	Public notice DA 00-705/47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4			
Test mode:	Compliance	Verdict:	PASS		
Date(s):	8/31/2011	verdict.	FASS		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 40 %	Power Supply: 3 V battery		
Remarks:					

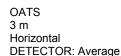
Plot 7.7.28 Radiated emission measurements at the fourth harmonic of high carrier frequency

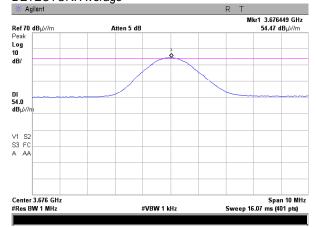


Plot 7.7.29 Radiated emission measurements at the fourth harmonic of low carrier frequency





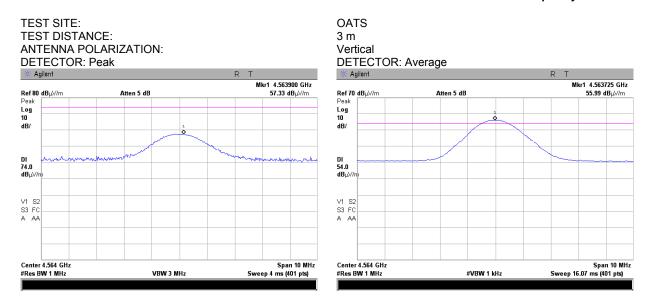




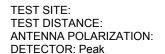


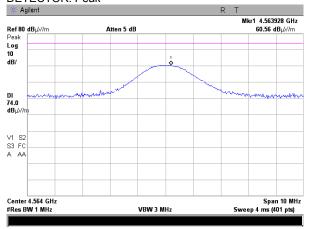
Test specification:	Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/31/2011	verdict.	FASS
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 40 %	Power Supply: 3 V battery
Remarks:			

Plot 7.7.30 Radiated emission measurements at the fifth harmonic of low carrier frequency

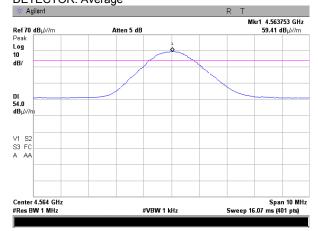


Plot 7.7.31 Radiated emission measurements at the fifth harmonic of low carrier frequency





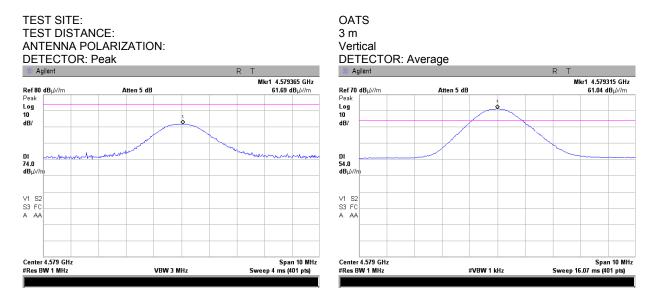




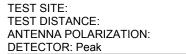


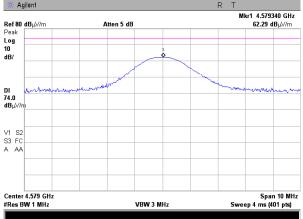
Test specification:	Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/31/2011	verdict.	FASS
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 40 %	Power Supply: 3 V battery
Remarks:			

Plot 7.7.32 Radiated emission measurements at the fifth harmonic of mid carrier frequency

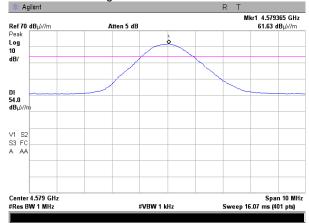


Plot 7.7.33 Radiated emission measurements at the fifth harmonic of mid carrier frequency





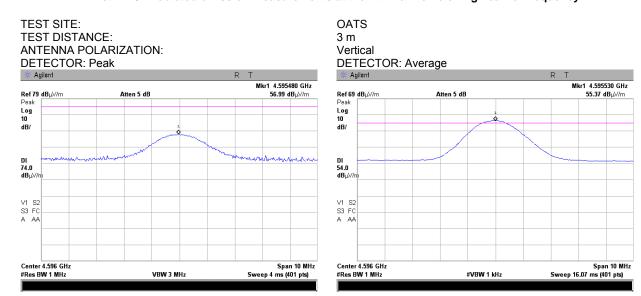




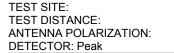


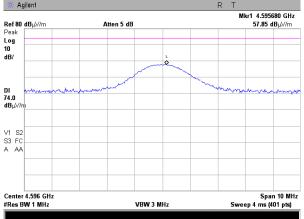
Test specification:	Section 15.247(d), RSS-2	Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions			
Test procedure:	Public notice DA 00-705/47 0	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4			
Test mode:	Compliance	Verdict: PASS			
Date(s):	8/31/2011	verdict.	FASS		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 40 %	Power Supply: 3 V battery		
Remarks:					

Plot 7.7.34 Radiated emission measurements at the fifth harmonic of high carrier frequency

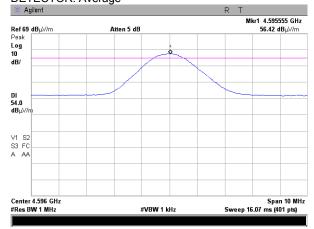


Plot 7.7.35 Radiated emission measurements at the fifth harmonic of high carrier frequency









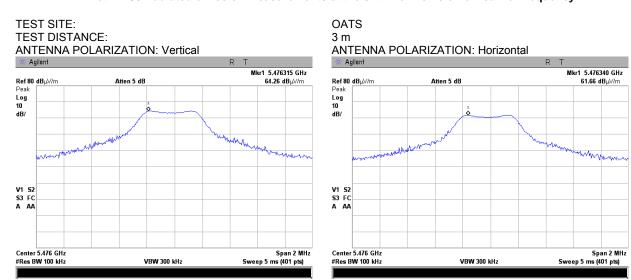




TEST SITE:

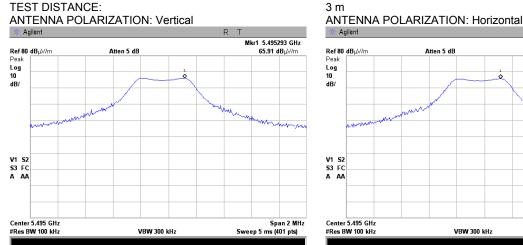
Test specification:	Section 15.247(d), RSS-2	Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions			
Test procedure:	Public notice DA 00-705/47 0	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4			
Test mode:	Compliance	Verdict: PASS			
Date(s):	8/31/2011	verdict.	FASS		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 40 %	Power Supply: 3 V battery		
Remarks:					

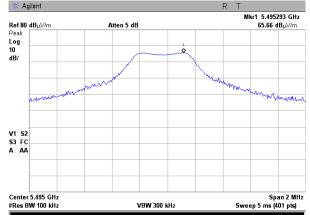
Plot 7.7.36 Radiated emission measurements at the sixth harmonic of low carrier frequency

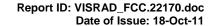


Plot 7.7.37 Radiated emission measurements at the sixth harmonic of mid carrier frequency

OATS



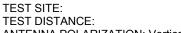




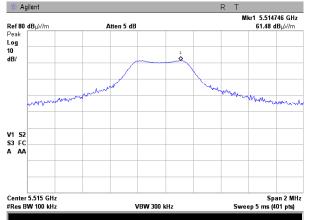


Test specification:	Section 15.247(d), RSS-2	Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions			
Test procedure:	Public notice DA 00-705/47 0	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4			
Test mode:	Compliance	Verdict: PASS			
Date(s):	8/31/2011	verdict.	FASS		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 40 %	Power Supply: 3 V battery		
Remarks:					

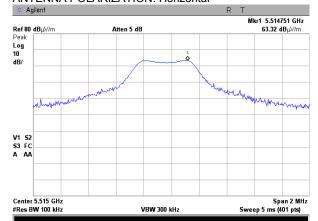
Plot 7.7.38 Radiated emission measurements at the sixth harmonic of high carrier frequency



ANTENNA POLARIZATION: Vertical



OATS 3 m ANTENNA POLARIZATION: Horizontal

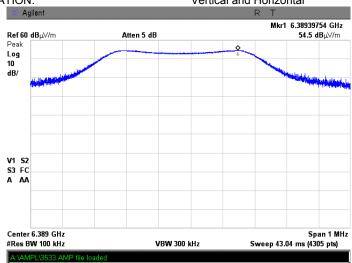




Test specification:	Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/31/2011	verdict.	FASS
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 40 %	Power Supply: 3 V battery
Remarks:			

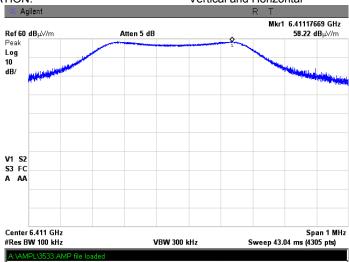
Plot 7.7.39 Radiated emission measurements at the seventh harmonic of low carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Plot 7.7.40 Radiated emission measurements at the seventh harmonic of mid carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



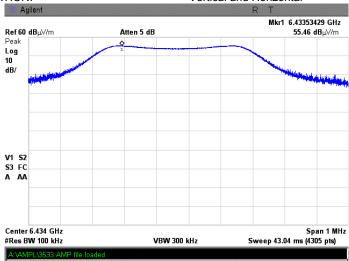


Test specification:	Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions			
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4			
Test mode:	Compliance	Verdict:	PASS	
Date(s):	8/31/2011	verdict.	FASS	
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 40 %	Power Supply: 3 V battery	
Remarks:		•	-	

Plot 7.7.41 Radiated emission measurements at the seventh harmonic of high carrier frequency

TEST SITE: OATS TEST DISTANCE: 3 m

ANTENNA POLARIZATION: Vertical and Horizontal



Plot 7.7.42 Radiated emission measurements at the eighth harmonic of low carrier frequency

TEST SITE: TEST DISTANCE: ANTENNA POLARIZATION: DETECTOR: Peak

OATS 3 m Vertical and Horizontal DETECTOR: Average



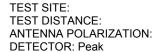


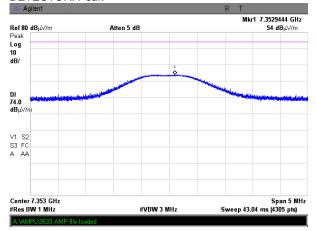
Test specification:	Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/31/2011	verdict.	FASS
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 40 %	Power Supply: 3 V battery
Remarks:			

Plot 7.7.43 Radiated emission measurements at the eighth harmonic of mid carrier frequency

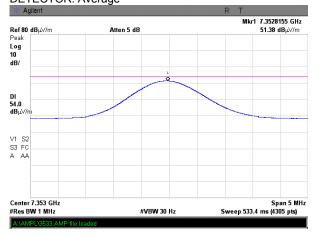
TEST SITE: OATS TEST DISTANCE: 3 m ANTENNA POLARIZATION: Vertical and Horizontal **DETECTOR:** Peak **DETECTOR:** Average Mkr1 7.3265799 GHz 54.54 dBμV/m Mkr1 7.3268529 GHz 52.41 dBμV/m Ref 80 dBµ√/m Peak Atten 5 dB Ref 80 dBµV/m Log 10 Log 10 dB/ dB/ DI 54.0 dBμ∀/r DI 74.0 S3 FC S3 FC A AA Center 7.327 GHz Span 5 MHz Sweep 43.04 ms (4305 pts) Center 7.327 GHz Span 5 MHz Sweep 533.4 ms (4305 pts) #VBW 3 MHz #**VBW** 30 Hz #Res BW 1 MHz

Plot 7.7.44 Radiated emission measurements at the eighth harmonic of high carrier frequency











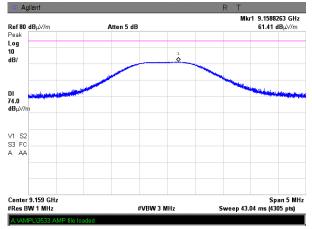
Test specification:	Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions			
Test procedure:	Public notice DA 00-705/47 C	Public notice DA 00-705/47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict: PASS		
Date(s):	8/31/2011	verdict.	FASS	
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 40 %	Power Supply: 3 V battery	
Remarks:				

Plot 7.7.45 Radiated emission measurements at the tenth harmonic of low carrier frequency

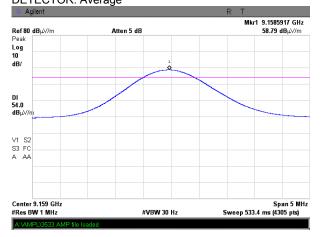
TEST SITE: OATS TEST DISTANCE: 3 m ANTENNA POLARIZATION: Vertical and Horizontal **DETECTOR:** Peak **DETECTOR:** Average Mkr1 9.1277533 GHz 59.74 dBμV/m Mkr1 9.1274733 GHz 57.5 dBµ√/m Ref 80 dBµ√/m Peak Atten 5 dB Ref 80 dBµV/m Log 10 Log 10 dB/ dB/ DI 54.0 dBμ\// DI 74.0 S3 FC S3 FC A AA Center 9.127 GHz Span 5 MHz Sweep 43.04 ms (4305 pts) Center 9.127 GHz Span 5 MHz Sweep 533.4 ms (4305 pts) #VBW 3 MHz #**VBW** 30 Hz #Res BW 1 MHz #Res BW 1 MHz

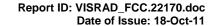
Plot 7.7.46 Radiated emission measurements at the tenth harmonic of mid carrier frequency









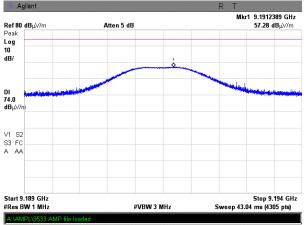




Test specification:	Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict: PASS	PASS
Date(s):	8/31/2011	verdict.	FASS
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 40 %	Power Supply: 3 V battery
Remarks:		-	-

Plot 7.7.47 Radiated emission measurements at the tenth harmonic of high carrier frequency







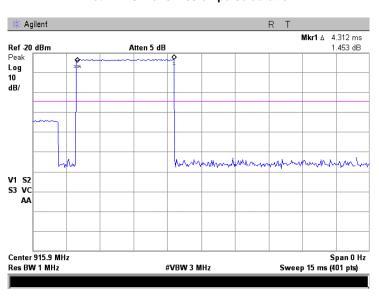
Vertical and Horizontal DETECTOR: Average



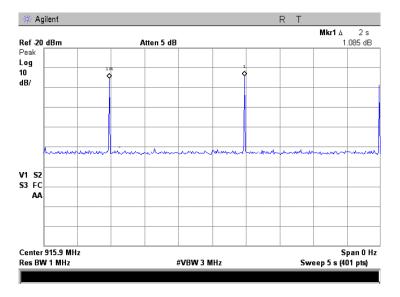


Test specification:	Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions		
Test procedure:	Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	8/31/2011	verdict.	FASS
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 40 %	Power Supply: 3 V battery
Remarks:			

Plot 7.7.48 Transmission pulse duration



Plot 7.7.49 Transmission pulse period





Test specification:	Section 15.203, RSS-Gen section 7.1.2, Antenna requirements			
Test procedure:	Public notice DA 00-705	Public notice DA 00-705		
Test mode:	Compliance	Verdict: PASS		
Date(s):	9/4/2011	verdict.	FASS	
Temperature: 23 °C	Air Pressure: hPa	Relative Humidity: 44 %	Power Supply: 3 V battery	
Remarks:		•	-	

7.8 Antenna requirements

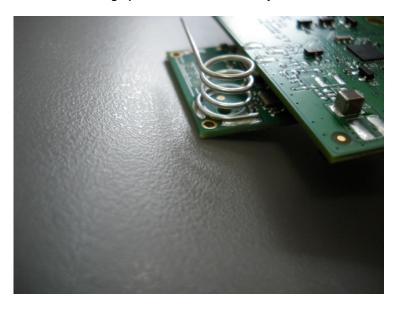
The EUT was verified for compliance with antenna requirements. A transmitter shall be designed to ensure that no antenna other than that furnished by the responsible party will be used with the device. It may be either permanently attached or employs a unique antenna connector for every antenna proposed for use with the EUT. This requirement does not apply to professionally installed transmitters.

The rationale for compliance with the above requirements was either visual inspection results or supplier declaration. The summary of results is provided in Table 7.8.1.

Table 7.8.1 Antenna requirements

Requirement	Rationale	Verdict
The transmitter antenna is permanently attached	Visual inspection	
The transmitter employs a unique antenna connector	NA	Comply
The transmitter requires professional installation	NA	

Photograph 7.8.1 Antenna assembly





Test specification:	Section 15.109, RSS-Gen Section 6.1, ICES-003 Class B, Radiated emission				
Test procedure:	ANSI C63.4, Sections 11.6 ar	ANSI C63.4, Sections 11.6 and 12.1.4			
Test mode:	Compliance	Verdict:	PASS		
Date(s):	9/1/2011	verdict.	PASS		
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 3 V battery		
Remarks:					

8 Unintentional emissions

8.1 Radiated emission measurements

8.1.1 General

This test was performed to measure radiated emissions from the EUT enclosure. Specification test limits are given in Table 8.1.1, Table 8.1.2, Table 8.1.3.

Table 8.1.1 Radiated emission test limits according to FCC Part 15 Section 15.109

Frequency,	Class B lim	it, dB(μV/m)	Class A limit, dB(μV/m)		
MHz	10 m distance	3 m distance	10 m distance	3 m distance	
30 - 88	29.5*	40.0	39.0	49.5*	
88 - 216	33.0*	43.5	43.5	54.0*	
216 - 960	35.5*	46.0	46.4	56.9*	
Above 960	43.5*	54.0	49.5	60.0*	

^{*} The limit for test distance other than specified was calculated using the inverse linear distance extrapolation factor as follows: $Lim_{S2} = Lim_{S1} + 20 log (S_1/S_2)$,

where S_1 and S_2 – standard defined and test distance respectively in meters.

Table 8.1.2 Radiated emission limits according to RSS-Gen Section 6.1

Frequency, MHz	Field strength limit at 3 m test distance, dB(μV/m)
30 - 88	40.0
88 - 216	43.5
216 - 960	46.0
960 - 3 rd harmonic**	54.0

^{** -} harmonic of the highest frequency the EUT generates, uses, operates or tunes to.

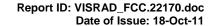
Table 8.1.3 Radiated emissions limits according to ICES-003 Section 5.5 Class B

Frequency, MHz	Limit, dB(μV/m)				
	10 m distance	3 m distance			
30 - 230	30.0	40.0*			
230 - 1000	37.0	47.0*			

^{*} The limit for 3-m test distance shall be increased by 10 dB.

8.1.2 Test procedure

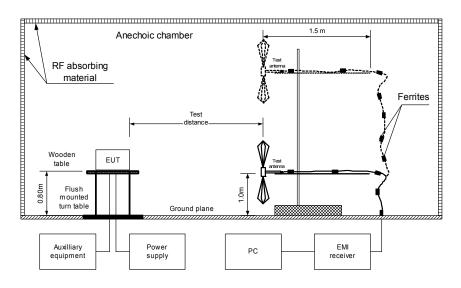
- **8.1.2.1** The EUT was set up as shown in Figure 8.1.1 and associated photograph/s, energized and the performance check was conducted.
- **8.1.2.2** The specified frequency range was investigated with biconilog antenna connected to EMI receiver. To find maximum radiation the turntable was rotated 360°, the measuring antenna height was changed from 1 to 4 m, its polarization was switched from vertical to horizontal and the EUT cables position was varied.
- **8.1.2.3** The worst test results (the lowest margins) were recorded in Table 8.1.4 and shown in the associated plots.





Test specification:	Section 15.109, RSS-Gen Section 6.1, ICES-003 Class B, Radiated emission					
Test procedure:	ANSI C63.4, Sections 11.6 a	ANSI C63.4, Sections 11.6 and 12.1.4				
Test mode:	Compliance	Verdict:	PASS			
Date(s):	9/1/2011	verdict: PASS				
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 3 V battery			
Remarks:						

Figure 8.1.1 Setup for radiated emission measurements in anechoic chamber, table-top equipment



Photograph 8.1.1 Setup for radiated emission measurements





Test specification: Section 15.109, RSS-Gen Section 6.1, ICES-003 Class B, Radiated emission Test procedure: ANSI C63.4, Sections 11.6 and 12.1.4 Test mode: Compliance **Verdict: PASS** Date(s): 9/1/2011 Temperature: 25 °C Air Pressure: 1010 hPa Relative Humidity: 38 % Power Supply: 3 V battery Remarks:

Table 8.1.4 Radiated emission test results

EUT SET UP: **TABLE-TOP** Class B LIMIT:

EUT OPERATING MODE: Receive / Stand-by TEST SITE: ANECHOIC CHAMBER

TEST DISTANCE:

DETECTORS USED: PEAK / QUASI-PEAK FREQUENCY RANGE: 30 MHz - 1000 MHz 120 kHz

RESOLUTION BANDWIDTH:

	Poak	Peak Quasi-peak				Antonno	Turn-table	
Frequency, MHz	emission, dB(μV/m)	Measured emission, dB(μV/m)	ission, Limit, Margin, polarization		Antenna polarization	height, position	position**, degrees	Verdict
	No emissions were found							Pass

DETECTORS USED: PEAK / AVERAGE FREQUENCY RANGE: 1000 MHz - 6000 MHz **RESOLUTION BANDWIDTH:** 1000 kHz

Frequency,		Peak			Average			Antonna	Turn-table	
rrequericy,	Measured	Limit,	Margin,	Measured	Limit,	Margin,	Antenna	height	position**.	
MHz	emission,			emission,			polarization	m	degrees	Vertice
1411 12	dB(μV/m)	dB(μV/m)	dB*	dB(μV/m)	dB(μV/m)	dB*		•••	acgrees	
No emissions were found						Pass				

^{*-} Margin = Measured emission - specification limit.

Reference numbers of test equipment used

			• •				
Ī	HL 2432	HL 2697	HL 2780	HL 2883	HL 3390	HL 4160	

Full description is given in Appendix A.

^{**-} EUT front panel refer to 0 degrees position of turntable.



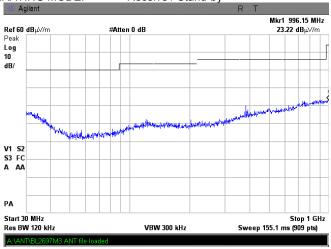
Test specification:	Section 15.109, RSS-Gen Section 6.1, ICES-003 Class B, Radiated emission					
Test procedure:	ANSI C63.4, Sections 11.6 ar	ANSI C63.4, Sections 11.6 and 12.1.4				
Test mode:	Compliance	Verdict:	PASS			
Date(s):	9/1/2011	verdict.	PASS			
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 3 V battery			
Remarks:						

Plot 8.1.1 Radiated emission measurements in 30 - 1000 MHz range according to FCC part 15 and RSS-Gen

TEST SITE: Anechoic chamber

LIMIT: Class B
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical

EUT OPERATING MODE: Receive / Stand-by

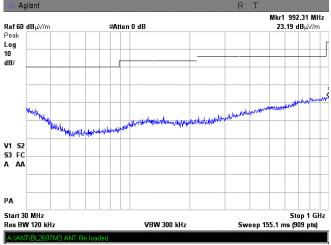


Plot 8.1.2 Radiated emission measurements in 30 - 1000 MHz range according to FCC part 15 and RSS-Gen

TEST SITE: Anechoic chamber

LIMIT: Class B
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal

EUT OPERATING MODE: Receive / Stand-by





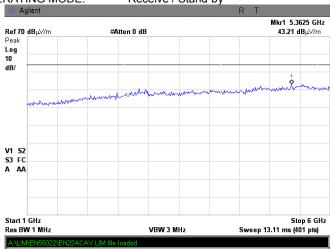
Test specification:	Section 15.109, RSS-Gen Section 6.1, ICES-003 Class B, Radiated emission					
Test procedure:	ANSI C63.4, Sections 11.6 a	ANSI C63.4, Sections 11.6 and 12.1.4				
Test mode:	Compliance	Verdict:	PASS			
Date(s):	9/1/2011	verdict.	PASS			
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 3 V battery			
Remarks:						

Plot 8.1.3 Radiated emission measurements in 1000 - 6000 MHz range according to FCC part 15 and RSS-Gen

TEST SITE: Anechoic chamber

LIMIT: Class B
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical

EUT OPERATING MODE: Receive / Stand-by

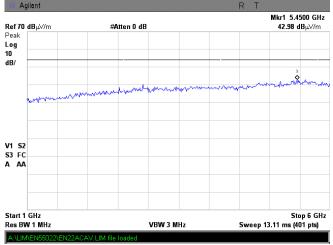


Plot 8.1.4 Radiated emission measurements in 1000 - 6000 MHz range according to FCC part 15 and RSS-Gen

TEST SITE: Anechoic chamber

LIMIT: Class B
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal

EUT OPERATING MODE: Receive / Stand-by



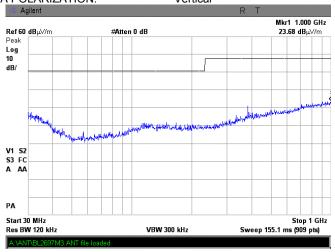


Test specification:	Section 15.109, RSS-Gen Section 6.1, ICES-003 Class B, Radiated emission					
Test procedure:	ANSI C63.4, Sections 11.6 a	ANSI C63.4, Sections 11.6 and 12.1.4				
Test mode:	Compliance	Verdict:	PASS			
Date(s):	9/1/2011	verdict.	FASS			
Temperature: 25 °C	Air Pressure: 1010 hPa	Relative Humidity: 38 %	Power Supply: 3 V battery			
Remarks:		•				

Plot 8.1.5 Radiated disturbance measurements in 30 - 1000 MHz range according to ICES-003

TEST SITE: Anechoic chamber

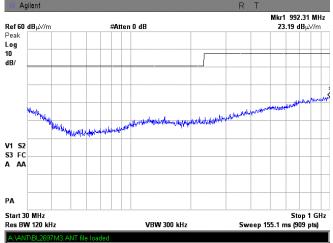
LIMIT: Class B
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical

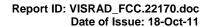


Plot 8.1.6 Radiated disturbance measurements in 30 - 1000 MHz range according to ICES-003

TEST SITE: Anechoic chamber

LIMIT: Class B
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal

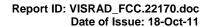






9 APPENDIX A Test equipment and ancillaries used for tests

HL	Description	Manufacturer	Model	Ser. No.	Last Cal./	Due Cal./
No	Description	Manuacturer	Wodei	Ser. No.	Check	Check
0337	Probe Set, Hand held, 5 probes	Electro-Metrics	EHFP-30	238	07-Jun-11	07-Jun-12
0446	Antenna, Loop, Active, 10 kHz - 30 MHz	EMCO	6502	2857	03-Jul-11	03-Jul-12
0521	EMI Receiver (Spectrum Analyzer) with	Hewlett	8546A	3617A	29-Aug-11	29-Sep-12
0021	RF filter section 9 kHz-6.5 GHz	Packard	0040/	00319,	20 / (ag 11	20 OCP 12
				3448A002		
				53		
0604	Antenna BiconiLog Log-Periodic/T Bow-	EMCO	3141	9611-1011	11-Jan-11	11-Jan-12
	TIE, 26 - 2000 MHz					
1424	Spectrum Analyzer, 30 Hz- 40 GHz	Agilent	8564EC	3946A002	25-Sep-11	25-Sep-12
		Technologies		19		
1457	Cable, 1 m	Harbour	MIL	1457	01-Sep-11	01-Sep-12
		Industries	17/60-			
			RG142			
1984	Antenna, Double-Ridged Waveguide	EMC Test	3115	9911-5964	16-Nov-10	16-Nov-11
	Horn, 1-18 GHz, 300 W	Systems	2115		10.11	10.11
2432	Antenna, Double-Ridged Waveguide Horn	EMC Test	3115	00027177	16-Nov-10	16-Nov-11
2697	1-18 GHz Antenna, 30 MHz - 3.0 GHz	Systems Sunol	JB3	A022805	11-Jan-11	11-Jan-12
2031	7 mornia, co mile cio crie	Sciences.	020	7.022000	11 0011 11	11 0011 12
		Corp.				
		Pleasanton,				
0070	Missource Cable Assembly 40 CH	California USA	400.0455	2070	00 1 44	22-Jun-12
2870	Microwave Cable Assembly, 18 GHz,	Huber-Suhner	198-9155-	2870	22-Jun-11	22-Jun-12
2871	6.4 m, SMA - SMA Microwave Cable Assembly, 18 GHz,	Huber-Suhner	00 198-8155-	2871	20-Sep-11	20-Sep-12
2071	6.4 m, SMA - SMA	Huber-Sumer	00	2071	20-3ep-11	20-3ep-12
2883	Cable, 18 GHz N-type, M-F, 3 m	Bird Electronic	TC-	211539	01-Dec-10	01-Dec-11
2000	Cable, 10 Chiz 14 type, WT, 0 III	Corp.	MNFN-3.0	003	01 200 10	01 200 11
2909	Spectrum analyzer, ESA-E, 100 Hz to	Agilent	E4407B	MY414447	08-May-11	08-May-12
	26.5 GHz	Technologies		62	,	
3001	EMC Analyzer, 9 kHz to 3 GHz	Agilent	E7402A	US394401	26-Dec-10	26-Dec-11
		Technologies		80		
3119	Cable, 18 GHz N-type, M-F, 3 m	Bird Electronic	TC-	211539004	03-Oct-10	03-Oct-11
		Corp.	MNFN-3.0			
3344	High Pass Filter, 50 Ohm,	Mini-Circuits	VHF-	NA	04-Oct-10	04-Oct-11
	3400 to 9900 MHz		3100+			
3390	Microwave Cable Assembly, 26.5 GHz,	Suhner	104EA	3390	07-Feb-11	07-Feb-12
2000	1.0 m, N type/N type	Sucoflex	MU 0 47	NIA	40 May 44	40 May 40
3623	Cable RF, 6.0 m, N type-N type,	Belden	MIL C-17	NA	19-May-11	19-May-12
3818	DC-6.5 GHz PSA Series Spectrum Analyzer,	Agilent	E4446A	MY482502	25-Sep-11	25-Sep-12
3010	3 Hz- 44 GHz	Technologies	E4440A	88	25-3ep-11	25-3ep-12
3883	Preamplifier, 0.1 to 18 GHz, Gain 25 dB,	Agilent	87405C	MY470104	30-Dec-10	30-Dec-11
3003	N-type (f) in, N-type (m) out.	Technologies	017000	06	30-560-10	00-D60-11
4160	Preamplifier, 0.1 to 18 GHz, Gain 25 dB,	Agilent	87405C	MY470105	29-Jun-11	29-Jun-12
1	N-type(f) in, N-type(m) out.	Technologies		94		





10 APPENDIX B Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

Test description	Expanded uncertainty
Conducted carrier power at RF antenna connector	Below 12.4 GHz: ± 1.7 dB
	12.4 GHz to 40 GHz: ± 2.3 dB
Conducted emissions at RF antenna connector	9 kHz to 2.9 GHz: ± 2.6 dB
	2.9 GHz to 6.46 GHz: ± 3.5 dB
	6.46 GHz to 13.2 GHz: ± 4.3 dB
	13.2 GHz to 22.0 GHz: ± 5.0 dB
	22.0 GHz to 26.8 GHz: ± 5.5 dB
	26.8 GHz to 40.0 GHz: ± 4.8 dB
Occupied bandwidth	± 8.0 %
Duty cycle, timing (Tx ON / OFF) and average factor measurements	± 1.0 %
Conducted emissions with LISN	9 kHz to 150 kHz: ± 3.9 dB
	150 kHz to 30 MHz: ± 3.8 dB
Radiated emissions at 3 m measuring distance	
Horizontal polarization	Biconilog antenna: ± 5.3 dB
	Biconical antenna: ± 5.0 dB
	Log periodic antenna: ± 5.3 dB
	Double ridged horn antenna: ± 5.3 dB
Vertical polarization	Biconilog antenna: ± 6.0 dB
	Biconical antenna: ± 5.7 dB
	Log periodic antenna: ± 6.0 dB
	Double ridged horn antenna: ± 6.0 dB

Hermon Laboratories is accredited by A2LA for calibration according to present requirements of ISO/IEC 17025 and NCSL Z540-1. The accreditation is granted to perform calibration of parameters that are listed in the Scope of Hermon Laboratories Accreditation.

Hermon Laboratories calibrates its reference and transfer standards by calibration laboratories accredited to ISO/IEC 17025 by a mutually recognized Accreditation Body or by a recognized national metrology institute. All reference and transfer standards used in the calibration system are traceable to national or international standards.

In-house calibration of all test and measurement equipment is performed on a regular basis according to Hermon Laboratories calibration procedures, manufacturer calibration/verification procedures or procedures defined in the relevant standards. The Hermon Laboratories test and measurement equipment is calibrated within the tolerances specified by the manufacturers and/or by the relevant standards.





11 APPENDIX C Test laboratory description

Tests were performed at Hermon Laboratories Ltd., which is a fully independent, private, EMC, safety, environmental and telecommunication testing facility.

Hermon Laboratories is listed by the Federal Communications Commission (USA) for all parts of Code of Federal Regulations 47 (CFR 47), Registration Numbers 90624 for OATS and 90623 for the anechoic chamber; by Industry Canada for electromagnetic emissions (file numbers IC 2186A-1 for OATS, IC 2186A-2 for anechoic chamber, IC 2186A-3 for full-anechoic chamber for RE measurements above 1 GHz), certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-1082 for anechoic chamber, G-27 for full-anechoic chamber for RE measurements above 1 GHz, C-845 for conducted emissions site, T-1606 for conducted emissions at telecommunication ports), has a status of a Telefication - Listed Testing Laboratory, Certificate No. L138/00. The laboratory is accredited by American Association for Laboratory Accreditation (USA) according to ISO/IEC 17025 for electromagnetic compatibility, product safety, telecommunications testing and environmental simulation (for exact scope please refer to Certificate No. 839.01). The FCC Designation Number is US1003.

Address: P.O. Box 23, Binyamina 30500, Israel.

Telephone: +972 4628 8001 Fax: +972 4628 8277 e-mail: mail@hermonlabs.com website: www.hermonlabs.com

Person for contact: Mr. Alex Usoskin, CEO.

12 APPENDIX D Specification references

FCC 47CFR part 15: 2010 Radio Frequency Devices

Public notice DA 00- 705: 2000 Filing and measurement guidelines for frequency hopping spread spectrum systems.

ANSI C63.2: 1996 American National Standard for Instrumentation-Electromagnetic Noise and Field

Strength, 10 kHz to 40 GHz-Specifications

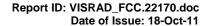
ANSI C63.4: 2003 American National Standard for Methods of Measurement of Radio-Noise Emissions

from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

RSS-210 Issue 8: 2010 Low Power Licence- Exempt Radiocommunication Devices

RSS-Gen Issue 3: 2010 General Requirements and Information for the Certification of Radiocommunication

Equipment

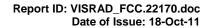




13 APPENDIX E Test equipment correction factors

Antenna factor Active loop antenna Model 6502, S/N 2857, HL 0446

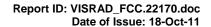
Frequency, MHz	Magnetic antenna factor, dB	Electric antenna factor, dB
0.009	-32.8	18.7
0.010	-33.8	17.7
0.020	-38.3	13.2
0.050	-41.1	10.4
0.075	-41.3	10.2
0.100	-41.6	9.9
0.150	-41.7	9.8
0.250	-41.6	9.9
0.500	-41.8	9.8
0.750	-41.9	9.7
1.000	-41.4	10.1
2.000	-41.5	10.0
3.000	-41.4	10.2
4.000	-41.4	10.1
5.000	-41.5	10.1
10.000	-41.9	9.6
15.000	-41.9	9.6
20.000	-42.2	9.3
25.000	-42.8	8.7
30.000	-44.0	7.5





Antenna factor Biconilog antenna EMCO Model 3141 Ser.No.1011, HL 0604

Frequency, MHz	Antenna Factor, dB(1/m)	Frequency, MHz	Antenna Factor, dB(1/m)		
26	7.8	940	24.0		
28	7.8	960	24.1		
30	7.8	980	24.5		
40	7.2	1000	24.9		
60	7.1	1020	25.0		
70	8.5	1040	25.2		
80	9.4	1060	25.4		
90	9.8	1080	25.6		
100	9.7	1100	25.7		
110	9.3	1120	26.0		
120	8.8	1140	26.4		
130	8.7	1160	27.0		
140	9.2	1180	27.0		
150	9.8	1200	26.7		
160	10.2	1220	26.5		
170	10.4	1240	26.5		
180	10.4	1260	26.5		
190	10.3	1280	26.6		
200	10.6	1300	27.0		
220	11.6	1320	27.8		
240	12.4	1340	28.3		
260	12.8	1360	28.2		
280	13.7	1380	27.9		
	14.7	1400			
300			27.9		
320	15.2	1420	27.9		
340	15.4	1440	27.8		
360	16.1	1460	27.8		
380	16.4	1480	28.0		
400	16.6	1500	28.5		
420	16.7	1520	28.9		
440	17.0	1540	29.6		
460	17.7	1560	29.8		
480	18.1	1580	29.6		
500	18.5	1600	29.5		
520	19.1	1620	29.3		
540	19.5	1640	29.2		
560	19.8	1660	29.4		
580	20.6	1680	29.6		
600	21.3	1700	29.8		
620	21.5	1720	30.3		
640	21.2	1740	30.8		
660	21.4	1760	31.1		
680	21.9	1780	31.0		
700	22.2	1800	30.9		
720	22.2	1820	30.7		
740	22.1	1840	30.6		
760	22.3	1860	30.6		
780	22.6	1880	30.6		
800	22.7	1900	30.6		
820	22.9	1920	30.7		
840	23.1	1940	30.9		
860	23.4	1960	31.2		
880	23.8	1980	31.6		
900	24.1	2000	32.0		
920	24.1		3=.0		





Antenna factor Double-ridged wave guide horn antenna Model 3115, S/N 9911-5964, HL1984

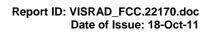
Frequency,	Antenna factor,				
MHz	dB(1/m)				
1000.0	24.7				
1500.0	25.7				
2000.0	27.6				
2500.0	28.9				
3000.0	31.2				
3500.0	32.0				
4000.0	32.5				
4500.0	32.7				
5000.0	33.6				
5500.0	35.1				
6000.0	35.4				
6500.0	34.9				
7000.0	36.1				
7500.0	37.8				
8000.0	38.0				
8500.0	38.1				
9000.0	39.1				
9500.0	38.3				
10000.0	38.6				
10500.0	38.2				
11000.0	38.7				
11500.0	39.5				
12000.0	40.0				
12500.0	40.4				
13000.0	40.5				
13500.0	41.1				
14000.0	41.6				
14500.0	41.7				
15000.0	38.7				
15500.0	38.2				
16000.0	38.8				
16500.0	40.5				
17000.0	42.5				
17500.0	45.9				
18000.0	49.4				





Antenna factor Double-ridged guide horn antenna Model 3115, serial number: 00027177, HL 2432

Frequency,	Antenna factor.
MHz	dB(1/m)
1000.0	24.7
1500.0	25.7
2000.0	27.8
2500.0	28.9
3000.0	30.7
3500.0	31.8
4000.0	33.0
4500.0	32.8
5000.0	34.2
5500.0	34.9
6000.0	35.2
6500.0	35.4
7000.0	36.3
7500.0	37.3
8000.0	37.5
8500.0	38.0
9000.0	38.3
9500.0	38.3
10000.0	38.7
10500.0	38.7
11000.0	38.9
11500.0	39.5
12000.0	39.5
12500.0	39.4
13000.0	40.5
13500.0	40.8
14000.0	41.5
14500.0	41.3
15000.0	40.2
15500.0	38.7
16000.0	38.5
16500.0	39.8
17000.0	41.9
17500.0	45.8
18000.0	49.1





Antenna calibration Sunol Sciences Inc., model JB3, serial number A022805, HL 2697

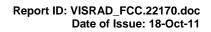
								nc., mode											
Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency,	ACF, dB	Gain, dBi	Num gain	Frequency,	ACF,	Gain, dBi	Num gain	Frequency,	ACF, dB	Gain, dBi	Num gain	Frequency,	ACF, dB	Gain,	Num
MHZ 30	22.2	-22.5	0.01	MHz 620	19.7	6.3	4.27	MHz 1215	dB 24.9	7.0	5.05	MHz 1810	28.3	7.1	5.08	MHz 2405	30.9	dBi 6.9	gain 4.93
35	18.5	-17.4	0.02	625	19.7	6.5	4.42	1220	24.9	7.0	4.99	1815	28.5	6.9	4.91	2410	30.9	6.9	4.89
40 45	14.7	-12.5 -8.1	0.06	630 635	19.6 19.7	6.6	4.57 4.48	1225 1230	25.1 25.2	6.9 6.8	4.91 4.82	1820 1825	28.6 28.7	6.8	4.74 4.75	2415 2420	31.0 31.0	6.9 6.8	4.85 4.82
45 45	11.3	-8.1 -8.1	0.16	640	19.7	6.4	4.48	1235	25.2 25.1	7.0	4.82	1830	28.7	6.8	4.75	2425	31.1	6.8	4.82
50	8.9	-4.7	0.34	645	19.9	6.5	4.45	1240	25.0	7.1	5.09	1835	28.7	6.7	4.72	2430	31.0	6.9	4.87
55 60	7.9 7.8	-2.8 -2.1	0.52	650 655	19.9 19.9	6.5 6.6	4.51 4.60	1245 1250	25.0 25.0	7.1 7.1	5.12 5.15	1840 1845	28.8 28.6	6.7 6.9	4.69 4.90	2435 2440	31.0 31.2	6.9 6.8	4.88 4.74
65	8.5	-2.0	0.63	660	19.9	6.7	4.69	1255	25.0	7.2	5.25	1850	28.4	7.1	5.12	2445	31.1	6.9	4.91
70 75	9.0 8.8	-1.9 -1.1	0.64	665 670	19.9 20.0	6.7	4.70 4.71	1260 1265	24.9 25.0	7.3 7.3	5.36 5.31	1855 1860	28.5 28.6	7.0 7.0	5.07 5.01	2450 2455	31.0 31.0	7.0 7.0	4.96 5.01
80	8.4	-0.2	0.97	675	20.1	6.7	4.71	1270	25.1	7.2	5.26	1865	28.5	7.1	5.17	2460	30.9	7.2	5.19
85 90	8.0 8.2	0.8	1.20	680 685	20.1	6.7	4.71 4.79	1275 1280	25.3 25.5	7.0 6.8	5.05 4.84	1870 1875	28.4 28.4	7.3 7.2	5.33	2465	31.1 31.3	6.9 6.8	4.95 4.76
95	9.2	0.5	1.13	690	20.1	6.9	4.88	1285	25.4	7.0	4.97	1880	28.5	7.2	5.28 5.22	2470 2475	31.4	6.7	4.69
100 110	10.6	-0.4 -1.6	0.92	695	20.2	6.8	4.82 4.75	1290	25.3	7.1 7.3	5.10	1885	28.5	7.2	5.22	2480	31.3	6.8	4.79
120	12.6 13.9	-1.6	0.70	705 715	20.4	6.8	4.75	1300 1310	25.2 25.5	7.1	5.33	1895 1905	28.6 28.5	7.2 7.3	5.24 5.36	2490 2500	31.1 30.9	7.0 7.2	4.99 5.27
125	14.2	-2.0	0.63	720	20.5	6.9	4.85	1315	25.4	7.2	5.23	1910	28.5	7.4	5.45	2505	31.1	7.1	5.15
130 140	14.2 13.4	-1.7 -0.3	0.68	725 735	20.6	6.8	4.81 4.65	1320 1330	25.3 25.6	7.3 7.0	5.36 5.06	1915 1925	28.5 28.6	7.3 7.3	5.38 5.35	2510 2520	31.0 31.2	7.2 7.0	5.22 5.05
150	12.9	0.8	1.21	745	21.0	6.6	4.59	1340	25.7	7.1	5.09	1935	28.5	7.4	5.54	2530	31.0	7.3	5.37
160 165	12.7 12.5	1.6 2.0	1.44	755 760	21.0 21.0	6.8	4.74 4.83	1350 1355	25.7 25.8	7.1 7.0	5.17 5.06	1945 1950	28.5 28.6	7.5 7.4	5.59 5.48	2540 2545	31.2 31.0	7.1 7.3	5.09 5.43
170	12.2	2.6	1.83	765	21.1	6.8	4.73	1360	25.9	6.9	4.95	1955	28.6	7.5	5.57	2550	31.0	7.3	5.39
175	11.8	3.3	2.13	770	21.3	6.7	4.64	1365	26.0	6.9	4.95	1960	28.6	7.5	5.65	2555	31.1	7.2	5.30
180 185	11.6 11.5	3.7 4.0	2.36 2.54	775 780	21.3 21.3	6.7 6.7	4.68 4.72	1370 1375	26.0 26.0	7.0 7.0	4.96 5.01	1965 1970	28.7 28.9	7.4 7.2	5.47 5.29	2560 2565	31.0 30.8	7.4 7.6	5.47 5.70
190	11.6	4.2	2.61	785	21.3	6.8 6.8	4.77	1380	26.0	7.0	5.06	1975 1985	28.9	7.2 7.1	5.22	2570	31.1	7.3 6.9	5.37 4.87
200 205	13.1 12.0	3.2 4.4	2.07	795 800	21.4 21.5	6.8	4.79 4.77	1390 1395	26.1 26.2	6.9 6.9	4.92 4.94	1985 1990	29.1 29.1	7.1	5.11 5.06	2580 2585	31.6 31.6	6.9 6.8	4.87 4.79
210	11.0	5.6	3.66	805	21.6	6.7	4.71	1400	26.2	7.0	4.96	1995	29.1	7.1	5.09	2590	31.6	6.9	4.88
215 220	11.3 11.6	5.6 5.5	3.59 3.52	810 815	21.7 21.7	6.7	4.65 4.72	1405 1410	26.1 26.1	7.0 7.1	5.02 5.09	2000 2005	29.1 29.1	7.1 7.1	5.11 5.16	2595 2600	31.5 31.6	7.0 6.9	4.97 4.86
225	11.6	5.5	3.52	820	21.7	6.8	4.72	1410	26.1	7.1	5.09	2010	29.1	7.1	5.15	2605	31.8	7.2	5.30
230	11.9	5.5	3.57	825	21.7	6.8	4.82	1420	26.3	7.0	4.96	2015	29.2	7.1	5.13	2610	31.4	7.1	5.15
235 240	12.1 12.3	5.5 5.5	3.56 3.54	830 835	21.7	6.9	4.85 4.82	1425 1430	26.2 26.1	7.1 7.2	5.10 5.25	2020 2025	29.2 29.3	7.1	5.18 5.08	2615 2620	31.7 31.6	6.9 7.0	4.88
245	12.3	5.7	3.71	840	21.9	6.8	4.80	1435	26.1	7.2	5.24	2030	29.3	7.0	5.05	2625	31.4	7.1	5.17
250	12.3	5.9	3.88	845	21.9	6.8	4.83	1440	26.2	7.2	5.24	2035	29.3	7.1	5.07	2630	31.6	7.0	5.00
255 260	12.5 12.7	5.9 5.8	3.85	850 855	21.9 22.0	6.9	4.86 4.80	1445 1450	26.3 26.5	7.0	5.11 4.98	2040 2045	29.3 29.2	7.1 7.2	5.13 5.23	2635 2640	31.8 31.7	6.8 7.0	4.82 4.98
265	13.2	5.5	3.54	860	22.1	6.8	4.74	1455	26.4	7.1	5.07	2050	29.2	7.2	5.27	2645	31.7	6.9	4.93
270 275	13.7 13.7	5.2 5.3	3.27	865 870	22.0 21.9	6.9 7.1	4.92 5.11	1460 1465	26.4 26.4	7.1 7.2	5.17 5.19	2055 2060	29.3 29.5	7.2 7.0	5.21 5.02	2650 2655	31.8 31.8	6.9 6.9	4.85 4.85
280	13.7	5.3	3.39	870 875	21.9	7.1	5.11	1465 1470	26.4 26.4	7.2	5.19	2060	29.5 29.4	7.0	5.02	2660 2660	31.8	7.0	4.85 5.02
285	13.7	5.6	3.61	880	22.1	7.0	5.05	1475	26.4	7.1	5.17	2070	29.4	7.1	5.10	2665	32.0	6.7	4.71
290 295	13.7 13.8	5.7 5.8	3.72	885 890	22.1 22.1	7.0 7.0	5.06 5.06	1480 1485	26.5 26.5	7.1 7.1	5.12 5.14	2075 2080	29.5 29.8	7.0 6.8	5.01 4.76	2670 2675	32.0 31.9	6.7 6.8	4.67 4.81
300	13.9	5.8	3.81	895	22.2	7.1	5.09	1490	26.5	7.1	5.17	2085	29.7	6.9	4.89	2680	31.7	7.0	5.04
305	14.0	5.9	3.85	900	22.2	7.1	5.12	1495	26.5	7.2	5.24	2090	29.7	6.9	4.86	2685	31.9	6.8	4.83
310 315	14.1 14.3	5.9 5.9	3.88	905 910	22.3 22.3	7.1 7.0	5.09 5.05	1500 1505	26.5 26.5	7.2 7.2	5.31 5.27	2095 2100	29.8 29.9	6.8	4.78 4.75	2690 2695	32.1 32.1	6.7 6.7	4.72 4.71
320	14.4	5.9	3.90	915	22.4	7.0	4.99	1510	26.6	7.2	5.23	2105	29.8	6.8	4.81	2700	32.0	6.8	4.81
325 330	14.5 14.6	5.9 5.9	3.92	920 925	22.6 22.7	6.9 6.9	4.92 4.85	1515 1520	26.6 26.5	7.2 7.3	5.30 5.38	2110 2115	29.9 29.9	6.8 6.8	4.78 4.76	2705 2710	32.0 32.1	6.8 6.8	4.80 4.79
335	14.7	6.0	4.02	930	22.8	6.8	4.77	1525	26.6	7.3	5.37	2120	29.9	6.8	4.84	2715	32.1	6.7	4.71
340	14.7	6.2	4.12	935	22.8	6.8	4.83	1530	26.6	7.3	5.36	2125	29.9	6.9	4.89	2720	32.4	6.5	4.47
345 350	14.9 15.1	6.1	4.06 3.99	940 945	22.8 22.8	6.9	4.89 4.87	1535 1540	26.6 26.5	7.4 7.4	5.44 5.53	2130 2135	29.9 29.8	6.9 6.9	4.90 4.94	2725 2730	32.2 31.9	6.7 7.0	4.63 5.05
355	15.3	5.9	3.88	950	22.9	6.9	4.85	1545	26.5	7.5	5.58	2140	29.8	7.1	5.08	2735	31.6	7.4	5.44
360 365	15.6 15.5	5.8 5.9	3.78 3.89	955 960	23.0 23.1	6.8	4.81 4.77	1550 1555	26.5 26.7	7.5 7.3	5.63 5.39	2145 2150	29.9 29.9	6.9 7.0	4.92 4.98	2740 2745	31.6 31.9	7.1 7.0	5.46 5.06
370	15.5	6.0	4.01	965	23.1	6.7	4.77	1560	26.9	7.1	5.39	2155	29.9	7.0	5.10	2750	31.9	6.9	4.94
375	15.6	6.1	4.03	970	23.2	6.7	4.69	1565	26.9	7.2	5.23	2160	29.8	7.1	5.09	2755	32.0	7.0	4.98
380 385	15.7 15.7	6.1	4.05 4.15	975 980	23.3 23.5	6.6	4.62 4.54	1570 1575	26.9 27.0	7.2 7.2	5.30 5.23	2165 2170	29.9 29.9	7.0 7.1	5.00 5.07	2760 2765	32.0 32.2	7.0 6.8	5.06 4.80
390	15.7	6.3	4.25	985	23.5	6.6	4.52	1580	27.0	7.1	5.17	2175	29.8	7.2	5.20	2770	32.3	6.8	4.73
395	15.9	6.3	4.22	990	23.6	6.5	4.50	1585	27.0	7.2	5.20	2180	29.8	7.2	5.27	2775	32.3	6.8	4.77
400 405	16.0 16.3	6.2	4.18	995 1000	23.6	6.5 6.5	4.48 4.46	1590 1595	27.0 27.0	7.2 7.2	5.22 5.29	2185 2190	29.8 29.8	7.2 7.2	5.27 5.28	2780 2785	32.3 32.7	6.8	4.82 4.41
410	16.5	6.0	3.96	1005	23.7	6.5	4.51	1600	27.0	7.3	5.36	2195	29.8	7.2	5.30	2790	32.8	6.3	4.25
415 420	16.5 16.6	6.0	4.00	1010 1015	23.7	6.6 6.6	4.57 4.55	1605 1610	27.0 27.0	7.3 7.3	5.38 5.41	2200 2205	29.7 29.7	7.3 7.3	5.38 5.41	2795 2800	32.8 32.5	6.4	4.33 4.66
420	16.6	6.1	4.03	1015	23.7	6.6	4.55	1615	27.1	7.3	5.41	2210	29.7	7.4	5.47	2805	32.5	6.6	4.62
430	16.7	6.2	4.16	1025	23.8	6.6	4.62	1620	27.2	7.2	5.27	2215	29.7	7.4	5.54	2810	32.5	6.7	4.70
435 440	16.9 17.1	6.1 5.9	4.05 3.93	1030 1035	23.7	6.7	4.70 4.81	1625 1630	27.2 27.2	7.2 7.3	5.30 5.33	2220 2225	29.7 29.8	7.5 7.3	5.57 5.43	2815 2820	32.3 32.2	6.9 7.0	4.85 5.01
445	17.2	6.0	3.97	1040	23.6	6.9	4.92	1635	27.2	7.3	5.35	2230	29.8	7.4	5.45	2825	32.3	7.0	4.96
450 455	17.2 17.3	6.0	4.00 4.04	1045 1050	23.7	6.9	4.91 4.91	1640 1645	27.2 27.3	7.3 7.2	5.36 5.22	2235 2240	29.7 29.5	7.5 7.7	5.61 5.86	2830 2835	32.4 32.5	6.8	4.80 4.68
455 460	17.4	6.1	4.04	1050	23.7	7.0	5.01	1650	27.5	7.1	5.22	2240	29.5 29.8	7.4	5.53	2835 2840	32.5	6.8	4.68
465	17.5	6.1	4.05	1060	23.6	7.1	5.11	1655	27.5	7.1	5.11	2250	30.0	7.3	5.35	2845	32.6	6.6	4.62
470 475	17.6 17.7	6.1	4.04 3.99	1065 1070	23.7 23.8	7.0 7.0	5.06 5.01	1660 1665	27.5 27.6	7.1 7.0	5.13 5.06	2255 2260	30.0 30.1	7.2 7.2	5.28 5.24	2850 2855	32.6 32.4	6.7 6.9	4.70 4.88
480	17.9	5.9	3.93	1075	23.8	7.0	5.01	1670	27.7	7.0	4.99	2265	30.1	7.2	5.20	2860	32.4	7.0	4.98
485 490	18.0 18.2	5.9 5.8	3.88	1080 1085	23.9	7.0	5.01 4.96	1675 1680	27.7 27.7	7.0 7.0	5.02	2270 2275	30.2 30.3	7.1 7.0	5.12 5.05	2865 2870	32.8 33.0	6.5 6.3	4.52 4.30
490 495	18.2	6.0	4.02	1085	24.0	6.9	4.96	1680 1685	27.7	7.0	5.05	2275	30.3	7.0	5.05	2870 2875	33.0	6.4	4.30
500	17.9	6.3	4.23	1095	24.1	6.9	4.86	1690	27.8	7.0	4.98	2285	30.3	7.0	5.05	2880	32.5	6.9	4.87
505 510	17.9 18.0	6.3	4.29 4.36	1100 1105	24.2 24.3	6.8	4.82 4.80	1695 1700	27.8 27.8	7.0 7.0	5.01	2290 2295	30.3 30.3	7.1 7.1	5.07 5.13	2885 2890	33.0 33.1	6.4	4.40 4.28
515	18.1	6.4	4.34	1110	24.3	6.8	4.78	1705	27.8	7.1	5.09	2300	30.2	7.2	5.23	2895	33.1	6.4	4.34
520	18.2	6.4	4.32	1115	24.3	6.8	4.79	1710	27.7	7.1	5.16	2305	30.3	7.2	5.20	2900	33.0	6.4	4.41
525 530	18.2 18.3	6.4 6.4	4.36 4.39	1120 1125	24.4 24.3	6.8	4.80 4.90	1715 1720	27.8 27.9	7.1 7.0	5.08	2310 2315	30.2 30.1	7.3 7.4	5.35 5.45	2905 2910	32.9 32.9	6.6 6.5	4.58 4.51
535	18.3	6.4	4.41	1130	24.3	7.0	5.00	1725	28.0	7.0	4.99	2320	30.3	7.2	5.27	2915	33.1	6.4	4.33
540 545	18.4 18.4	6.4	4.41 4.47	1135 1140	24.4 24.5	6.9	4.90 4.81	1730 1735	28.0 28.0	7.0 7.0	4.98 5.02	2325 2330	304 30.4	7.2 7.1	5.22 5.13	2920 2925	33.3 33.0	6.2 6.5	4.16 4.45
545 550	18.4	6.6	4.47	1140 1145	24.5	6.8	4.81	1735 1740	28.0	7.0	5.02	2335	30.4	7.1	5.13	2925	33.0	6.5	4.45 4.51
555	18.6	6.5	4.45	1150	24.7	6.7	4.71	1745	28.0	7.0	5.04	2340	30.5	7.1	5.11	2935	33.0	6.5	4.48
560 565	18.8 18.9	6.4 6.4	4.37	1155 1160	24.7 24.7	6.8	4.76 4.80	1750 1755	28.1 27.9	7.0 7.1	5.01 5.17	2345 2350	30.6 30.5	7.0 7.1	5.07 5.12	2940 2945	33.0 33.1	6.5 6.5	4.52 4.42
570	19.0	6.3	4.33	1165	24.7	6.8	4.80	1760	27.8	7.3	5.34	2355	30.6	7.1	5.12	2950	33.2	6.4	4.32
575	19.1	6.3	4.31	1170	24.7	6.8	4.81	1765	27.9	7.3	5.31	2360	30.9	6.8	4.79	2955	33.3	6.3	4.27
580 590	19.1 19.1	6.4	4.33 4.52	1175 1185	24.8 24.8	6.8	4.84 4.92	1770 1780	27.9 27.9	7.2 7.3	5.28 5.35	2365 2375	31.0 31.1	6.7 6.6	4.66 4.60	2960 2970	33.3 33.3	6.3 6.4	4.30 4.36
595	19.0	6.6	4.62	1190	24.7	7.0	4.99	1785	28.1	7.2	5.21	2380	31.1	6.6	4.61	2975	33.0	6.6	4.60
	19.0	6.7	4.72 4.76	1195 1205	24.7 24.08	7.0 7.1	5.02 5.08	1790 1800	28.2 28.3	7.0 7.0	5.07	2385	31.1	6.7	4.62	2980	32.9 32.9	6.8 6.8	4.74 4.82
600 610	19.1	6.8									5.06	2395	31.2	6.6	4.60	2990			





Cable loss Cable coaxial, Huber-Suhner, 18 GHz, 6.4 m, SMA - SMA, model 198-9155-00, HL 2870

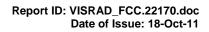
Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.09	5750	2.49	12000	3.71
30	0.17	6000	2.53	12250	3.81
100	0.32	6250	2.58	12500	3.84
250	0.49	6500	2.64	12750	3.88
500	0.70	6750	2.69	13000	3.92
750	0.86	7000	2.75	13250	3.96
1000	1.00	7250	2.80	13500	3.98
1250	1.11	7500	2.87	13750	4.01
1500	1.23	7750	2.93	14000	4.03
1750	1.34	8000	2.94	14250	4.09
2000	1.41	8250	3.00	14500	4.08
2250	1.51	8500	3.04	14750	4.10
2500	1.59	8750	3.08	15000	4.15
2750	1.68	9000	3.14	15250	4.22
3000	1.76	9250	3.16	15500	4.31
3250	1.83	9500	3.22	15750	4.42
3500	1.91	9750	3.26	16000	4.48
3750	1.97	10000	3.36	16250	4.54
4000	2.05	10250	3.41	16500	4.56
4250	2.11	10500	3.46	16750	4.57
4500	2.18	10750	3.50	17000	4.59
4750	2.24	11000	3.54	17250	4.66
5000	2.30	11250	3.58	17500	4.70
5250	2.36	11500	3.63	17750	4.76
5500	2.43	11750	3.66	18000	4.72





Cable loss Cable coaxial, Huber-Suhner, 18 GHz, 6.4 m, SMA - SMA, model 198-8155-00, HL 2871

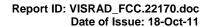
Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.12	5750	2.34	12000	3.55
30	0.14	6000	2.39	12250	3.61
100	0.27	6250	2.46	12500	3.67
250	0.45	6500	2.52	12750	3.74
500	0.63	6750	2.58	13000	3.79
750	0.76	7000	2.64	13250	3.82
1000	0.89	7250	2.68	13500	3.83
1250	1.01	7500	2.73	13750	3.83
1500	1.12	7750	2.78	14000	3.88
1750	1.23	8000	2.83	14250	3.93
2000	1.32	8250	2.88	14500	3.96
2250	1.41	8500	2.94	14750	4.01
2500	1.49	8750	2.97	15000	4.00
2750	1.58	9000	3.02	15250	4.01
3000	1.66	9250	3.07	15500	4.00
3250	1.73	9500	3.13	15750	4.13
3500	1.80	9750	3.18	16000	4.22
3750	1.87	10000	3.21	16250	4.29
4000	1.93	10250	3.26	16500	4.29
4250	2.01	10500	3.30	16750	4.32
4500	2.06	10750	3.36	17000	4.37
4750	2.12	11000	3.39	17250	4.45
5000	2.17	11250	3.44	17500	4.49
5250	2.24	11500	3.48	17750	4.53
5500	2.29	11750	3.52	18000	4.55





Cable loss Cable coaxial, Bird, 18 GHz, N-type, M-F, model TC-MNFN-3.0, S/N 211539 003 HL 2883

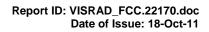
Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.06	5750	1.70	12000	2.46
30	0.12	6000	1.75	12250	2.48
100	0.21	6250	1.80	12500	2.52
250	0.34	6500	1.81	12750	2.50
500	0.47	6750	1.86	13000	2.54
750	0.59	7000	1.86	13250	2.48
1000	0.67	7250	1.92	13500	2.63
1250	0.76	7500	1.96	13750	2.65
1500	0.84	7750	1.98	14000	2.72
1750	0.92	8000	2.02	14250	2.67
2000	0.98	8250	2.03	14500	2.70
2250	1.05	8500	2.05	14750	2.72
2500	1.12	8750	2.11	15000	2.79
2750	1.17	9000	2.17	15250	2.80
3000	1.22	9250	2.17	15500	2.83
3250	1.27	9500	2.20	15750	2.75
3500	1.33	9750	2.19	16000	2.82
3750	1.38	10000	2.22	16250	2.85
4000	1.42	10250	2.25	16500	2.90
4250	1.46	10500	2.30	16750	2.89
4500	1.51	10750	2.28	17000	2.88
4750	1.54	11000	2.32	17250	2.85
5000	1.59	11250	2.34	17500	2.96
5250	1.62	11500	2.39	17750	3.04
5500	1.65	11750	2.42	18000	3.04





Cable loss Cable 18 GHz, N-type, M-F, 3 m, Bird Electronic Corp., model TC-MNFN-3.0, S/N 211539004 HL 3119

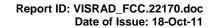
Frequency, MHz	Cable loss, dB								
10	0.06	3600	1.34	7400	2.00	11200	2.48	15100	2.90
30	0.09	3700	1.36	7500	2.01	11300	2.45	15200	2.89
50	0.11	3800	1.37	7600	2.03	11400	2.51	15300	2.91
100	0.23	3900	1.39	7700	2.05	11500	2.45	15400	2.85
200	0.30	4000	1.39	7800	2.07	11600	2.49	15500	2.83
300	0.42	4100	1.42	7900	2.06	11700	2.51	15600	2.89
400	0.39	4200	1.45	8000	2.06	11800	2.50	15700	2.85
500	0.47	4300	1.47	8100	2.09	11900	2.52	15800	2.87
600	0.49	4400	1.49	8200	2.10	12000	2.48	15900	2.91
700	0.63	4500	1.51	8300	2.11	12100	2.53	16000	2.90
800	0.62	4600	1.53	8400	2.15	12200	2.54	16100	2.94
900	0.70	4700	1.55	8500	2.15	12300	2.56	16200	2.91
1000	0.70	4800	1.54	8600	2.17	12400	2.57	16300	2.96
1100	0.77	4900	1.57	8700	2.19	12500	2.57	16400	3.01
1200	0.78	5000	1.60	8800	2.20	12600	2.55	16500	3.01
1300	0.83	5100	1.60	8900	2.21	12700	2.50	16600	2.98
1400	0.86	5200	1.62	9000	2.22	12800	2.57	16700	3.00
1500	0.85	5300	1.65	9100	2.23	12900	2.57	16800	3.01
1600	0.94	5400	1.66	9200	2.25	13000	2.55	16900	3.06
1700	0.90	5500	1.69	9300	2.24	13100	2.62	17000	3.07
1800	0.90	5600	1.70	9400	2.28	13200	2.60	17100	3.09
1900	0.95	5700	1.72	9500	2.28	13300	2.67	17200	3.10
2000	0.97	5800	1.74	9600	2.27	13400	2.66	17300	3.11
2100	1.00	5900	1.75	9700	2.30	13500	2.71	17400	3.16
2200	1.02	6000	1.77	9800	2.30	13600	2.73	17500	3.15
2300	1.05	6100	1.79	9900	2.34	13700	2.73	17600	3.21
2400	1.08	6200	1.82	10000	2.32	13800	2.85	17700	3.21
2500	1.10	6300	1.83	10100	2.31	13900	2.83	17800	3.18
2600	1.13	6400	1.83	10200	2.31	14000	2.83	17900	3.25
2700	1.15	6500	1.87	10300	2.26	14100	2.83	18000	3.14
2800	1.17	6600	1.88	10400	2.32	14200	2.84		
2900	1.21	6700	1.90	10500	2.26	14300	2.90		_
3000	1.22	6800	1.93	10600	2.26	14400	2.84		
3100	1.25	6900	1.92	10700	2.31	14600	2.88		
3200	1.27	7000	1.95	10800	2.24	14700	2.85		
3300	1.29	7100	1.96	10900	2.39	14800	2.92		
3400	1.28	7200	1.99	11000	2.41	14900	2.93		
3500	1.31	7300	2.00	11100	2.46	15000	2.83		





Cable loss Cable coaxial, Microwave Cable Assembly, 104EA, 18 GHz, 1.0 m Suhner Sucoflex, HL 3390

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.03	4800	0.55	9800	0.89	14900	1.07
30	0.04	4900	0.56	9900	0.89	15000	1.07
50	0.05	5000	0.57	10000	0.86	15100	1.08
100	0.07	5100	0.58	10100	0.86	15200	1.07
200	0.10	5200	0.58	10200	0.88	15300	1.09
300	0.12	5300	0.59	10300	0.92	15400	1.10
400	0.14	5400	0.59	10400	0.94	15500	1.10
500	0.16	5500	0.60	10500	0.96	15600	1.12
600	0.17	5600	0.61	10600	0.93	15700	1.15
700	0.18	5700	0.61	10700	0.89	15800	1.15
800	0.20	5800	0.63	10800	0.89	15900	1.17
900	0.21	5900	0.63	10900	0.88	16000	1.14
1000	0.23	6000	0.64	11000	0.92	16100	1.14
1100	0.24	6100	0.64	11100	0.91	16200	1.15
1200	0.25	6200	0.64	11200	0.89	16300	1.14
1300	0.27	6300	0.65	11300	0.88	16400	1.13
1400	0.28	6400	0.65	11400	0.88	16500	1.13
1500	0.28	6500	0.66	11500	0.90	16600	1.13
1600	0.30	6600	0.67	11600	0.94	16700	1.14
1700	0.31	6700	0.67	11700	0.96	16800	1.14
1800	0.32	6800	0.67	11800	0.92	16900	1.14
1900	0.33	6900	0.68	11900	0.92	17000	1.14
2000	0.34	7000	0.67	12000	0.91	17100	1.15
2100	0.35	7100	0.68	12100	0.92	17200	1.14
2200	0.35	7200	0.69	12200	0.95	17300	1.15
2300	0.36	7300	0.69	12300	0.98	17400	1.15
2400	0.37	7400	0.68	12400	0.96	17500	1.16
2500	0.39	7500	0.69	12500	0.99	17600	1.16
2600	0.40	7600	0.70	12600	0.96	17700	1.16
2700	0.41	7700	0.71	12700	0.93	17800	1.19
2800	0.42	7800	0.72	12800	0.94	17900	1.21
2900	0.42	7900	0.72	12900	0.98	18000	1.25
3000	0.43	8000	0.72	13000	0.99		
3100	0.44	8100	0.73	13100	0.99		
3200	0.45	8200	0.74	13200	0.99		
3300	0.46	8300	0.75	13300	0.99		
3400	0.46	8400	0.74	13400	1.00		
3500	0.47	8500	0.73	13500	1.02		
3600	0.47	8600	0.73	13600	1.05		
3700	0.47	8700	0.75	13700	1.03		
3800	0.49	8800	0.77	13800	1.02		
3900	0.49	8900	0.77	13900	1.03		
4000	0.50	9000	0.77	14000	1.03		
4100	0.51	9100	0.77	14100	1.05		
4200	0.52	9200	0.78	14200	1.05		
4300	0.52	9300	0.80	14300	1.04		
4400	0.53	9400	0.82	14400	1.03		
4500	0.53	9500	0.82	14600	1.06		
4600	0.54	9600	0.83	14700	1.07		
4700	0.56	9700	0.89	14800	1.08		





Cable loss Cable coaxial, MIL C-17, N type-N type, 6 m Belden, HL 3623

Frequency,	Cable loss,	Frequency,	Cable loss,	Frequency,	Cable loss,
MHz	dB	MHz	dB	MHz	dB
10	0.13	2600	4.38	5400	7.76
30	0.25	2700	4.53	5500	7.79
50	0.33	2800	4.64	5600	7.88
100	0.49	2900	4.79	5700	7.93
200	0.76	3000	4.93	5800	8.05
300	0.97	3100	5.02	5900	8.03
400	1.18	3200	5.18	6000	8.07
500	1.38	3300	5.27	6100	8.14
600	1.54	3400	5.41	6200	8.21
700	1.71	3500	5.57	6300	8.28
800	1.88	3600	5.65	6400	8.35
900	2.04	3700	5.82	6500	8.43
1000	2.19	3800	5.89		
1100	2.38	3900	6.02		
1200	2.61	4000	6.15		
1300	2.63	4100	6.26		
1400	2.79	4200	6.37		
1500	2.90	4300	6.52		
1600	3.08	4400	6.63		
1700	3.21	4500	6.74		
1800	3.31	4600	6.86		
1900	3.47	4700	6.98		
2000	3.59	4800	7.09		
2100	3.74	4900	7.17		
2200	3.86	5000	7.30		
2300	3.98	5100	7.41		
2400	4.12	5200	7.59		
2500	4.24	5300	7.71		



14 APPENDIX F Abbreviations and acronyms

A ampere

AC alternating current
A/m ampere per meter
AM amplitude modulation
AVRG average (detector)

cm centimeter dB decibel

 $\begin{array}{ll} \text{dBm} & \text{decibel referred to one milliwatt} \\ \text{dB}(\mu V) & \text{decibel referred to one microvolt} \end{array}$

 $\begin{array}{ll} dB(\mu V/m) & \qquad decibel \ referred \ to \ one \ microvolt \ per \ meter \\ dB(\mu A) & \qquad decibel \ referred \ to \ one \ microampere \end{array}$

DC direct current

EIRP equivalent isotropically radiated power

ERP effective radiated power EUT equipment under test

F frequency GHz gigahertz GND ground H height

HL Hermon laboratories

Hz hertz k kilo kHz kilohertz LO local oscillator meter m MHz megahertz minute min millimeter mm ms millisecond μS microsecond ΝA not applicable NB narrow band OATS open area test site

 Ω Ohm

PM pulse modulation PS power supply ppm part per million (10⁻⁶)

QP quasi-peak
RE radiated emission
RF radio frequency
rms root mean square

Rx receive s second T temperature Tx transmit V volt WB wideband

END OF DOCUMENT