TIMCO ENGINEERING, Inc.

849 NW STATE ROAD 45
NEWBERRY, FL 32669 USA
PH: 888.472.2424 OR 352.472.5500
FAX: 352.472.2030
EMAIL: TEI@TIMCOENGR.COM
HTTP://WWW.TIMCOENGR.COM

FCC PART 15.247 FHSS

TEST REPORT

APPLICANT	UNIDEN AMERICA CORPORATION
ADDRESS	181 N. COUNTRY CLUB RD. / PO BOX 580 LAKE CITY, SC. 29560 USA
FCC ID	AMWUP822
MODEL NUMBER	TRU9380
PRODUCT DESCRIPTION	5.8GHz ISM BAND DIGITAL CORDLESS TELEPHONE SYSTEM
DATE SAMPLE RECEIVED	September 14, 2006
DATE TESTED	September 25, 2006
TESTED BY	Nam Nguyen
APPROVED BY	Mario de Aranzeta C.E.T.
TIMCO REPORT NO.	2615AUT6TestReport
TEST RESULTS	☒ PASS ☐ FAIL

A2LA ACCREDITED
Certificate # 0955-01

TABLE OF CONTENTS

STATEMENT OF COMPLIANCE

This equipment has been tested in accordance with the standards identified in the referenced test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report and demonstrate that the equipment complies with the appropriate standards.

I attest that the necessary measurements were made by me or under my supervision, at Timco Engineering, Inc. located at 849 NW State Road 45, Newberry, Florida 32669 USA.

ACCREDITED

Certificate # 0955-01

Authorized by: Mario de Aranzeta

Signature: <*Mario de Aranzeta*>

Function: Engineer

Date: October 3, 2006

Tested by: Nam Nguyen

Signature: on file

Date: September 25, 2006

GENERAL INFORMATION AND EQUIPMENT UNDER TEST

Test Report Purpose:	Compliance of test article with FCC part 15.247		
Applicable Standards:	FCC Part 15.247		
Test Result:	The test results relate only to the items tested.		
Manufacture:	Uniden Electronics		
FCC ID:	AMWUP822		
Model Number:	TRU3980		
Product Description:	Cordless Telephone System		
Operating Frequency:	5725.0 - 5850.0 MHz		
Max. Output Power	☐ Conducted - dBm	☐ ERP	☒ EIRP
Type of Modulation:	FHSS		
Power Supply:	*Primary Power*	BASE: 110VAC/50-60Hz HANDSET: 3.6 VDC	
	Secondary Power	VDC	
Test Item:	Pre-Production		
Type of Equipment:	BASE: Fixed HANDSET: Mobile		
Antenna Type:	Fixed		
Antenna Connector:	Unique Hirose connector		
Modification to the EUT:	None		
Test Facilities	Timco Engineering Inc. 849 N.W. State Road 45, Newberry, FL 32669.		
Test Exercise (e.g. software description, test signal, etc.)	The test article was set in a continuous transmit mode of operation		
Test Conditions	Temperature: 78°F Humidity: 55%		

TEST EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
3/10-Meter OATS	TEI	N/A	N/A	Listed 3/27/04	3/26/07
3-Meter OATS	TEI	N/A	N/A	Listed 1/11/06	1/10/09
Biconnical Antenna	Eaton	94455-1	1057	CAL 12/12/05	12/12/07
Biconnical Antenna	Electro-Metrics	BIA-25	1171	CAL 4/29/05	4/29/07
Analyzer Tan Tower Quasi-Peak Adapter	HP	85650A	3303a01690	CAL 12/8/05	12/8/07
Analyzer Tan Tower RF Preselector	HP	85685A	3221A01400	CAL 12/7/05	12/7/07
Analyzer Tan Tower Spectrum Analyzer	HP	8566B OPT 462	3188A07786 3144A20661	CAL 12/7/05	12/7/07
Analyzer Tan Tower Preamplifier	HP	8449B-H02	3008A00372	CAL 12/8/05	12/8/07
LISN	Electro-Metrics	EM-7820	2682	CAL 4/28/05	4/28/07
Log-Periodic Antenna	Eaton	96005	1243	CAL 12/14/05	12/14/07

TEST PROCEDURES

POWER LINE CONDUCTED INTERFERENCE: The procedure used was ANSI standard C63.4-2003 using a 50uH LISN. Both lines were observed with the DUT transmitting. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed.

POWER OUTPUT: The RF power output was measured using radiated field strength method.

ANTENNA CONDUCTED EMISSIONS: The RBW = 100 kHz, VBW = 300 kHz and the span set to 10 MHz and the spectrum was scanned from 30 MHz to the 10th Harmonic of the fundamental. Above 1 GHz the resolution bandwidth was 1 MHz and the VBW = 3 MHz and the span to 50 MHz.

RADIATION INTERFERENCE: The test procedure used was ANSI standard C63.4-2003 using an Agilent spectrum receiver with preselector. The bandwidth (RBW) of the spectrum receiver was 100 kHz up to 1 GHz and 1 MHz above 1 GHz with an appropriate sweep speed. The VBW was always greater than or equal to the RBW. The analyzer was calibrated in dB above a microvolt at the output of the antenna.

BANDWIDTH 20 dB: The measurements were made with the spectrum analyzer's resolution bandwidth (RBW) = 1 MHz and the video bandwidth (VBW) = 3 MHz and the span set as shown on plot.

BASE PORTION OF TEST REPORT:

POWER LINE CONDUCTED INTERFERENCE - BASE

Rules Part No.: 15.207(a)

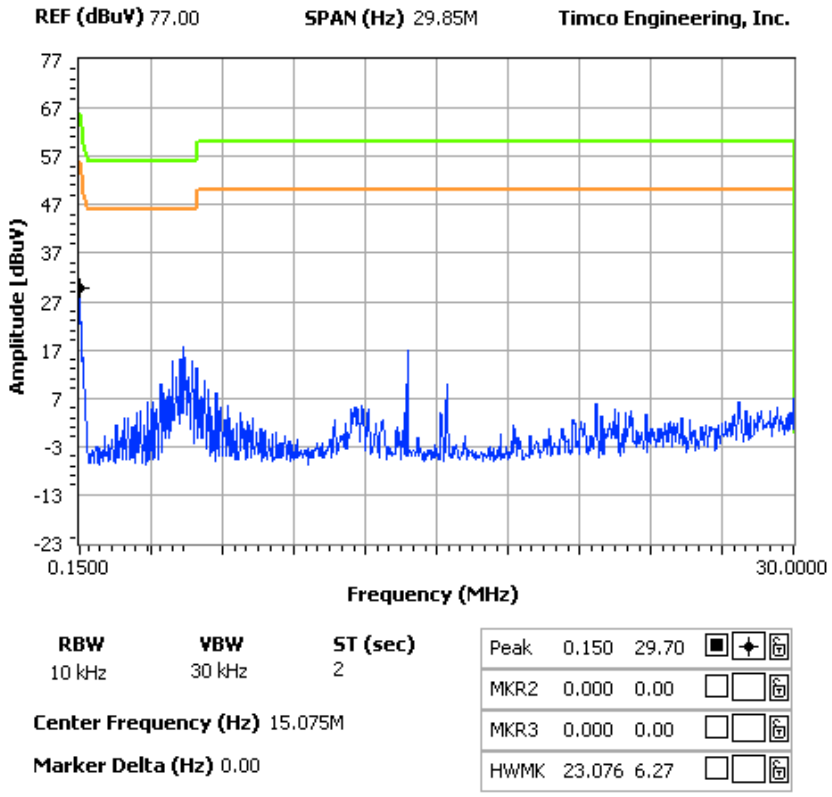
Requirements:

Emission Frequency (MHz)	FCC Conducted Limit (dBµV)	
	Quasi-peak (QP)	Average (AV)
0.15 – 0.5	66 to 56 *	56 to 46 *
0.5 – 5	56	46
5 – 30	60	50
* Decreases with the logarithm of the frequency.		

Test Data:

NOTES:
UNIDEN AMERICA CORPORATION - FCC ID: AMWUP822
POWERLINE CONDUCTED PLOT - LINE 1

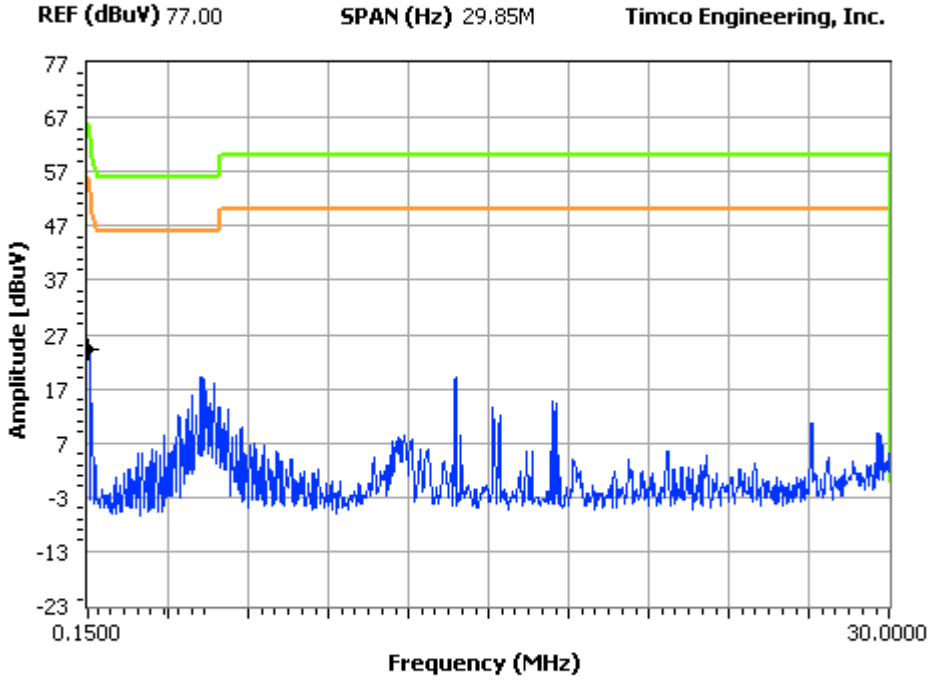
FCC 15.107 Mask Class B



NOTES:

UNIDEN AMERICA CORPORATION - FCC ID: AMWUP822
POWERLINE CONDUCTED PLOT - LINE 2

FCC 15.107 Mask Class B



RBW	VBW	ST (sec)
10 kHz	30 kHz	2

Center Frequency (Hz) 15.075M

Marker Delta (Hz) 0.00

Peak	0.180	24.40
MKR2	0.000	0.00
MKR3	0.000	0.00
HWMK	23.076	6.27

NUMBER OF HOPPING CHANNELS

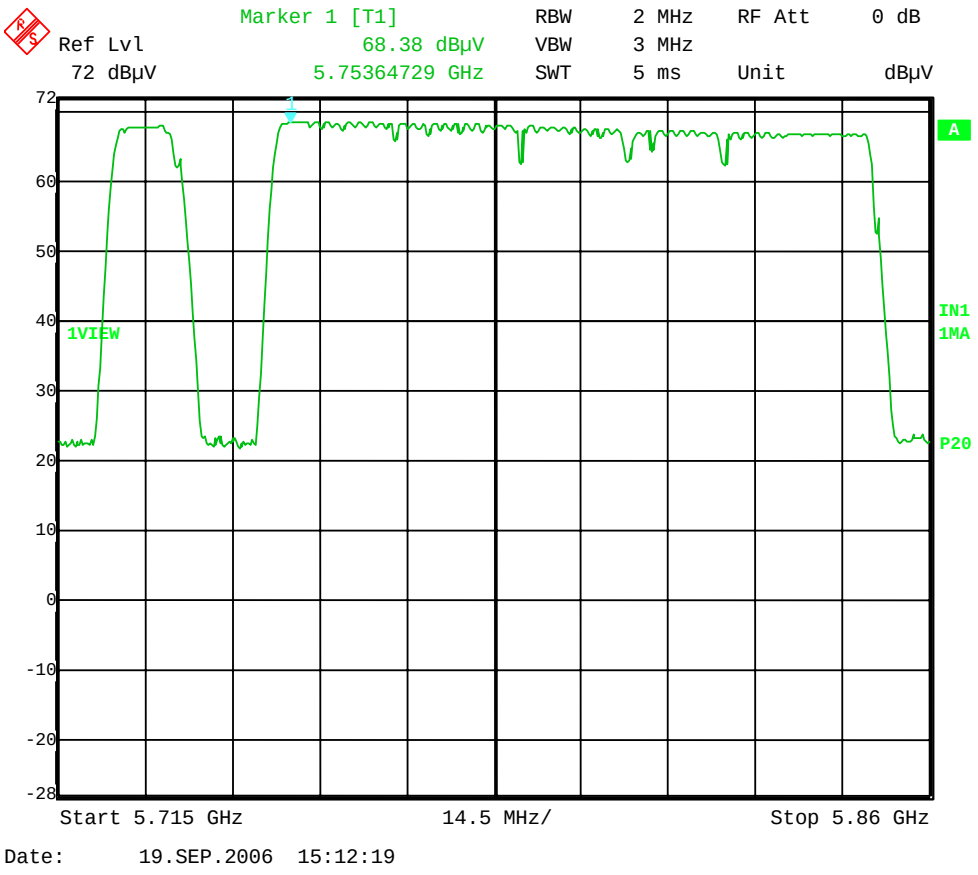
NUMBER OF HOPPING CHANNELS – BASE

Rules Part No.: 15.247(a)(1)

Requirements:

902-928 MHz	If the 20 dB bandwidth is less than 250 kHz, the system shall use at least 50 hopping frequencies.
	If the 20 dB bandwidth is 250 kHz or greater, the system shall use at least 25 hopping frequencies.
2400-2483.5 MHz	At least 15 channels
5725-5850 MHz	At least 75 channels

Test Data: There are 75 hopping channels



DWELL TIME OF A HOPPING CHANNEL - BASE

Rules Part No.: 15.247(a)(1)(i)

Requirements:

902-928 MHz	If 20 dB bandwidth is less than 250 kHz, Dwell time < = 0.4 seconds in a 20 second period.
	If 20 dB bandwidth is 250 kHz or greater, Dwell time < = 0.4 seconds n a 10 second period.
2400-2483.5 MHz	< = 0.4 seconds in a 0.4 seconds multiplied the number of hopping channels employed.
5725-5850 MHz	< = 0.4 seconds in a 30 second period.

Test Data:

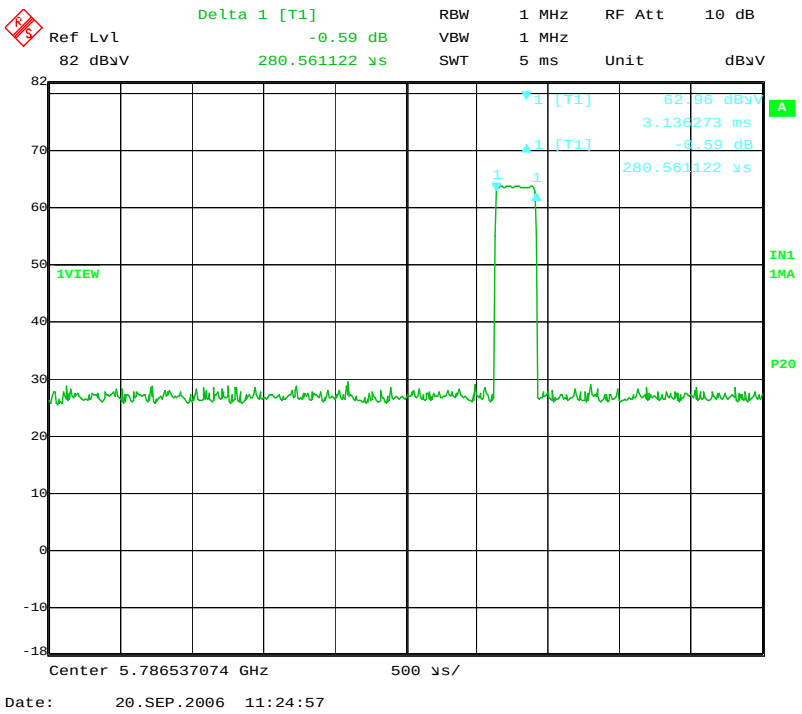
In a 30 second period each frequency channel is exactly 40 times. A slot is 0.9375ms long, therefore the average time of occupancy on any frequency channel in a 30 second period is:

The highest channel occupancy is:

T= 0.9375 ms * 40 * 8 = 300 ms

The lowest channel occupancy is:

T= 0.9375 ms * 40 * 1 = 37.5 ms

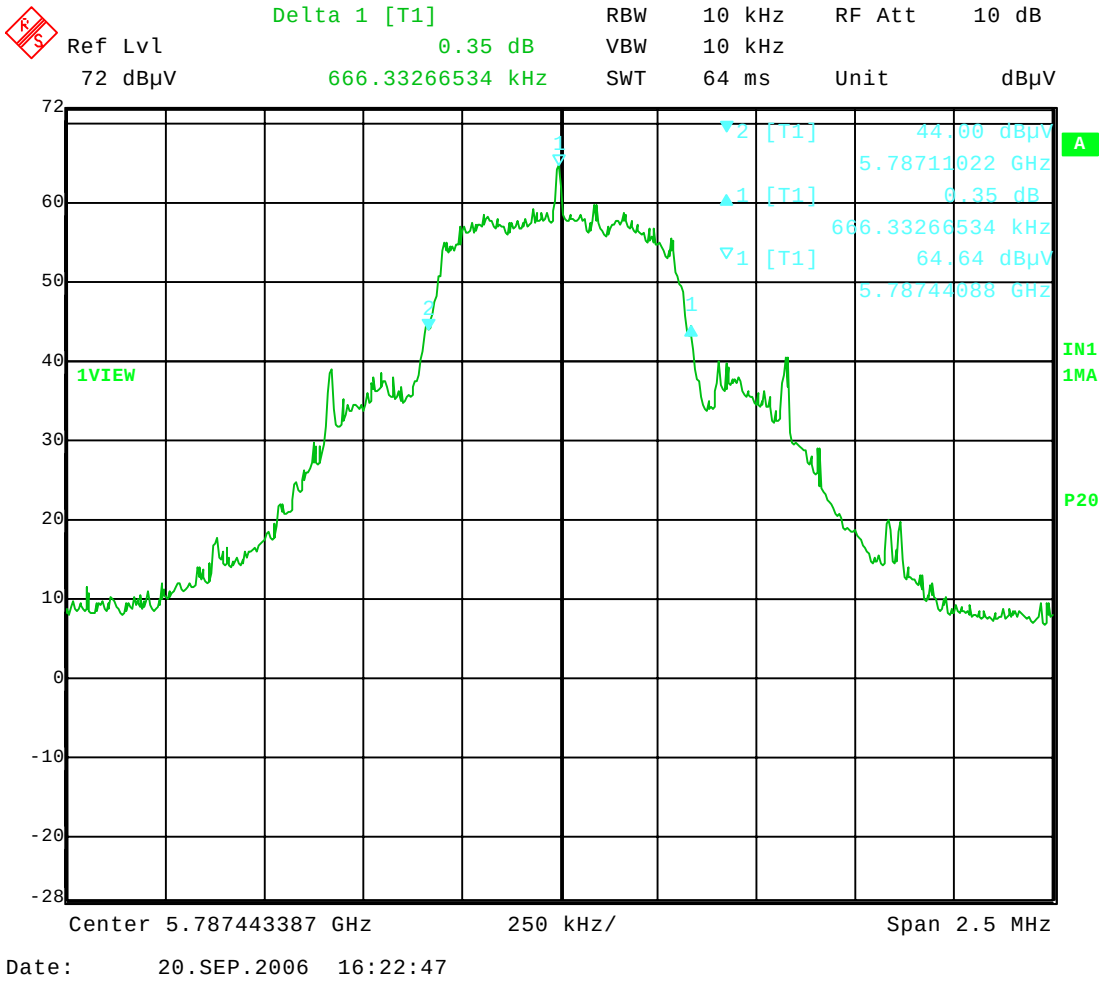


20 dB BANDWIDTH - BASE

Rules Part No.: 15.247(a)(2)

Requirements: The 20 dB bandwidth must be less than 1000 kHz.

Test Data: The 20 dB bandwidth is 666.3 kHz. See the following plot

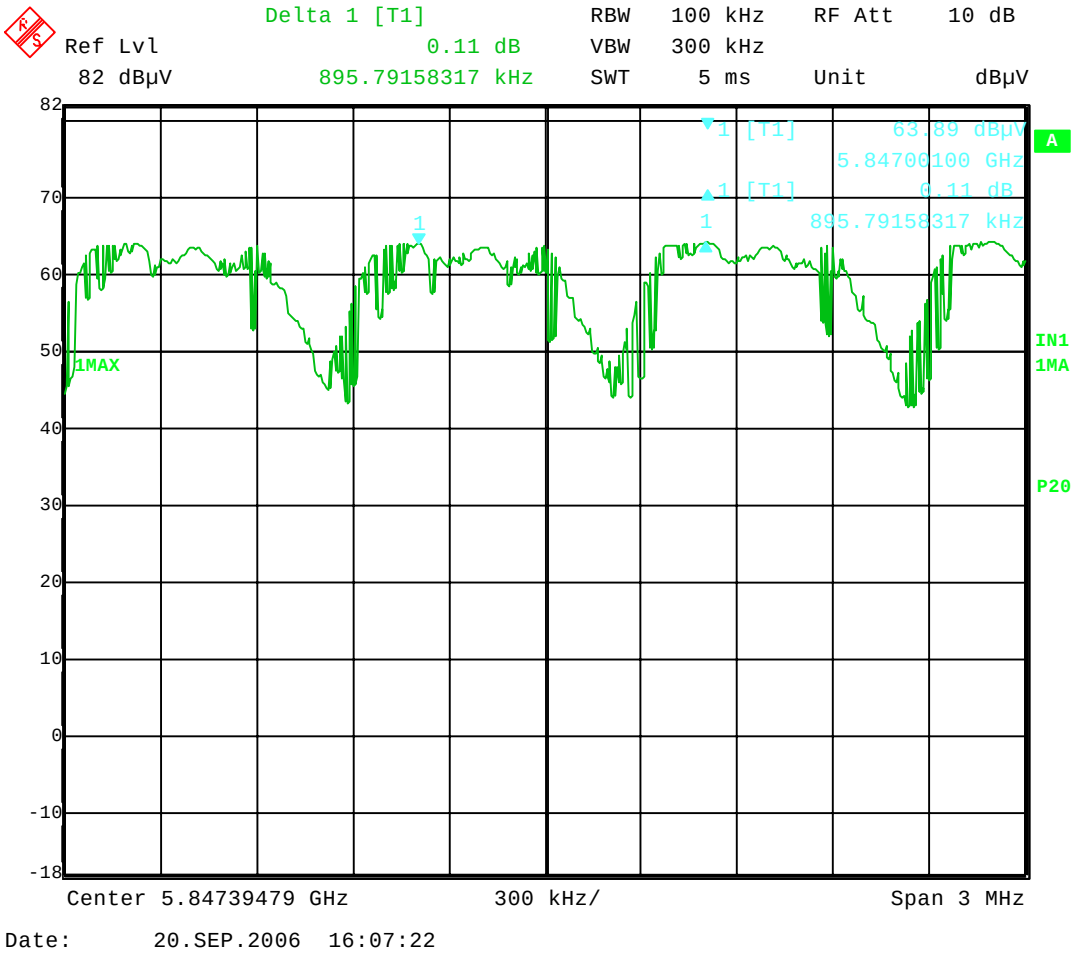


CARRIER FREQUENCY SEPARATION - BASE

Rules Part No.: 15.247(a)(2)

Requirements: The hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Test Data: See the following plot



POWER OUTPUT - BASE

Rules Part No.: 15.247(b)

Requirements: The maximum peak output power shall not exceed 1 watt (30 dBm). If directional transmitting antennas with a gain of more than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test Method: The RF output power report is radiated. See the table below.

Test Data: 272 mWatts EIRP

Three places in the band were measured and the highest power presented above.

Test Data – Fundamental Emissions:

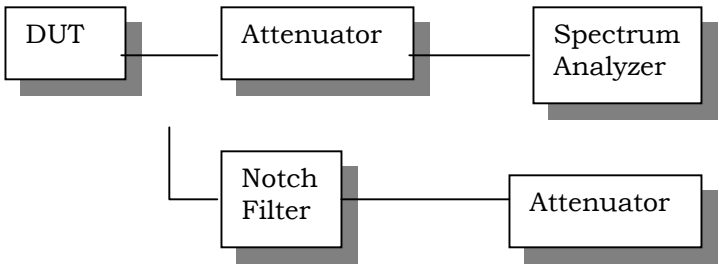
Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	Ant. Polarity	Coax Loss dB	Correction Factor dB/m	Field Strength dBuV/m	dbm	Output Power mW EIRP	Output Power W EIRP
5,726.20	5,726.20	65.1	H	5.22	35.37	105.69			
5,726.20	5,726.20	75	V	5.22	35.37	116.09	20.86	121.93	0.122
5,787.50	5,787.50	63.2	H	5.24	35.45	103.89			
5,787.50	5,787.50	76.7	V	5.24	35.45	117.39	22.16	164.48	0.164
5,849.00	5,849.04	64.4	H	5.25	35.52	105.17			
5,849.00	5,849.04	78.8	V	5.25	35.52	119.57	24.34	271.72	0.272

SPURIOUS EMISSIONS AT ANTENNA TERMINALS - BASE

Rules Part No.: 15.247(c)

Requirements: Emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.

Method of Measuring:



Note: The spectrum was scanned to the tenth harmonic.

Test Data: Not applicable to this device. The antenna for this device are permanently installed.

FIELD STRENGTH OF SPURIOUS EMISSIONS - BASE

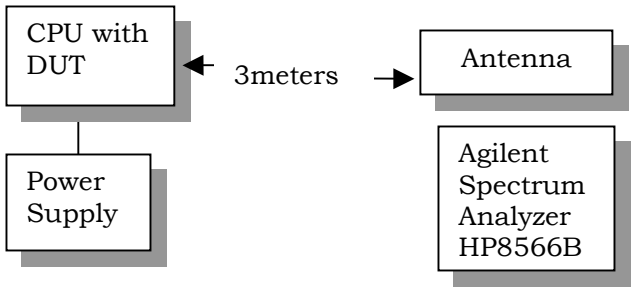
Rules Part No.: 15.247(c), 15.205 &15.209(b)

Requirements:

(Fundamental) Frequency	(Field Strength) Limits
902 – 928MHz	127.37dBuV/m
2.4 – 2.4835GHz	54 dBuV/m @3m
30 - 88 MHz	40 dBuV/m @3M
88 -216 MHz	43.5 dBuV/m @3M
216 -960 MHz	46 dBuV/m @3M
ABOVE 960 MHz	54dBuV/m

Emissions that fall in the restricted bands (15.205) must be less than or equal to 500 uV/m (54 dBuV/m). Spurious not in a restricted band must be 20 dBc.

Test Setup



Equipment placed 80cm above ground on a rotatable platform.

FIELD STRENGTH OF SPURIOUS EMISSIONS – BASE

Rules Part No.: 15.247(c), 15.205 &15.209(b)

Test Data – Harmonics:

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	Ant. Polarity	Coax Loss dB	Correction Factor dB/m	Peak Field Strengh dBuV/m	Duty Cycle (dB)	Average Field Strength dBuV/m	Margin dB
5,726.20	11,452.40	23	H	7.58	29.8	60.38	24.4	35.98	18.02
5,726.20	11,452.40	25.5	V	7.58	29.8	62.88	24.4	38.48	15.52
5,726.20	17,178.60	21.3	H	10.35	35.41	67.06	24.4	42.66	53.43
5,726.20	17,178.60	28.4	V	10.35	35.41	74.16	24.4	49.76	46.33
5,787.50	11,575.00	25	V	7.63	29.8	62.43	24.4	38.03	15.97
5,787.50	11,575.00	25.7	H	7.63	29.8	63.13	24.4	38.73	15.27
5,787.50	17,362.50	19.2	H	10.41	35.5	65.11	24.4	40.71	56.68
5,787.50	17,362.50	28.6	V	10.41	35.5	74.51	24.4	50.11	47.28
5,849.00	11,698.00	23.6	V	7.68	29.8	61.08	24.4	36.68	17.32
5,849.00	11,698.00	24.4	H	7.68	29.8	61.88	24.4	37.48	16.52
5,849.00	17,547.00	18.9	H	10.46	35.59	64.95	24.4	40.55	59.02
5,849.00	17,547.00	28.2	V	10.46	35.59	74.25	24.4	49.85	49.72

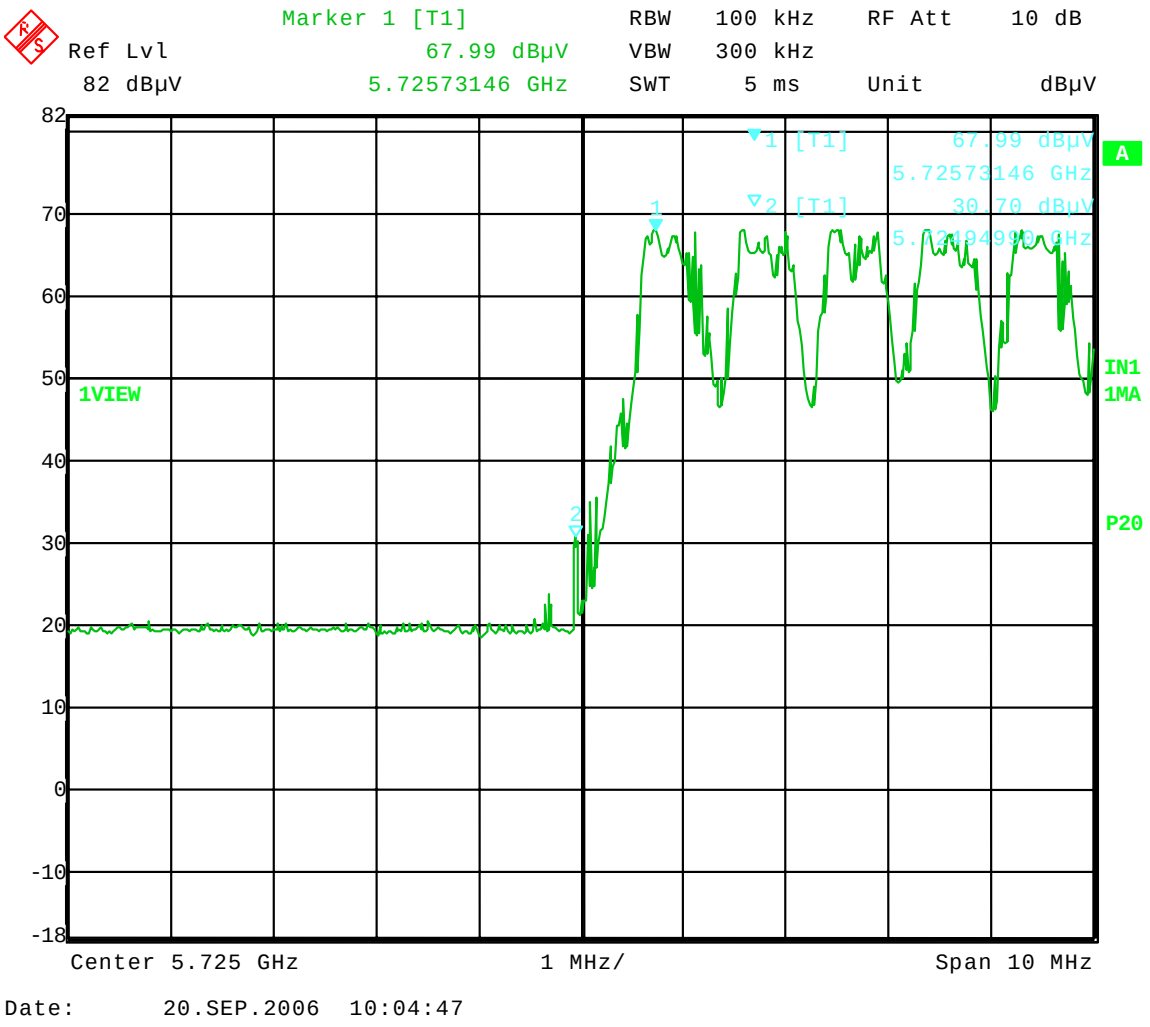
*Harmonics were measured to the 10th harmonic

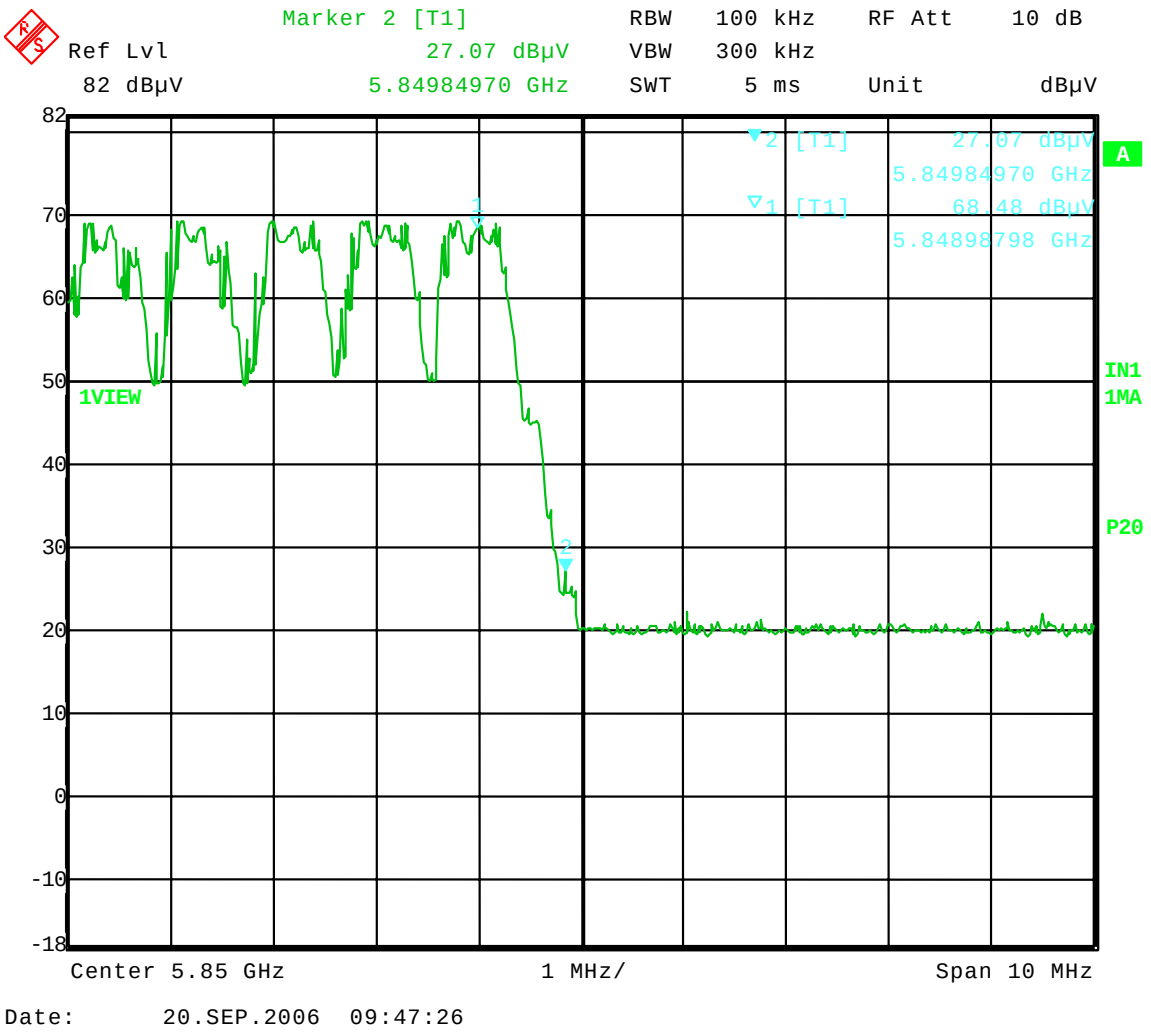
*

RADIATED SPURIOUS EMISSIONS INTO ADJACENT RESTRICTED BAND - BASE

Rule Parts No.: **Part 15.205**

Requirements: Emissions that fall in the restricted bands (15.205). These emissions must be less than or equal to 500 uV/m (54dBuV/m). Emissions not in the restricted band must be 20 dBc.




Marker 2 [T1]
RBW 100 kHz
RF Att 10 dB
Ref Lvl
27.07 dBµV
VBW 300 kHz
82 dBµV
5.84984970 GHz
SWT 5 ms
Unit dBµV
2 [T1]
27.07 dBµV
5.84984970 GHz
1 [T1]
68.48 dBµV
5.84898798 GHz
A
IN1
1MA
P20
1VIEW
82
70
60
50
40
30
20
10
0
-10
-18
Center 5.85 GHz
1 MHz/
Span 10 MHz
Date: 20.SEP.2006 09:47:26

RF EXPOSURE REQUIREMENT - BASE

§15.247 (e), §1.1307 (b)(2), §1.1310, & §2.1093	
Frequency Range (MHz)	Power Density (mW/cm^2)
Limits for Occupational/Controlled Exposures	
0.3 – 3.0	*(100)
3.0 – 30	*($900/f^2$)
30 - 300	1.0
300 - 1500	f/300
1500 – 100,000	5.0
Limits for General Population/Uncontrolled Exposure	
0.3 – 3.0	*(100)
3.0 – 30	*($180/f^2$)
30 - 300	0.2
300 - 1500	f/1500
1500 – 100,000	1.0
f = frequency in MHz * = Place-wave equivalent power density	

MPE Calculation
The calculations on the next page are based on the following:
An output power of 272 mW
An antenna with a gain of 6 dBi
A value for the general population expose limit of 1 mW/cm^2 which in the formaula is designated as S=1 or as calculated from 1500/1500=1

Power output

$Po := 272$ mWatts

$CL := 0$ coax loss

$G := dBd + 2.15 - CL$

$G = 6$ net-gain in dBi

$Gn := 10^{\frac{G}{10}}$ gain numeric

$Gn = 3.981$

$R := \sqrt{\frac{(Po \cdot Gn)}{(4 \cdot \pi \cdot S)}}$

$R = 9.283$ distance in centimeters required for compliance

antenna gain

$dBd := 3.85$

Calculation of S

$f := 1500$ Frequency in MHz

uncontrolled exposure

$S := \frac{f}{1500}$

$S = 1$ $\frac{mW}{cm^2}$

$Rinches := \frac{R}{2.54}$

$Rinches = 3.655$

RADIATION TEST SET UP - BASE

POWERLINE CONDUCTED TEST SET UP – BASE

HANDSET PORTION OF TEST REPORT

POWER LINE CONDUCTED INTERFERENCE - HANDSET

Rules Part No.: 15.207(a)

Requirements:

Emission Frequency (MHz)	FCC Conducted Limit (dBμV)	
	Quasi-peak (QP)	Average (AV)
0.15 – 0.5	66 to 56 *	56 to 46 *
0.5 – 5	56	46
5 – 30	60	50
* Decreases with the logarithm of the frequency.		

Test Data: Not Applicable. This device is battery operated.

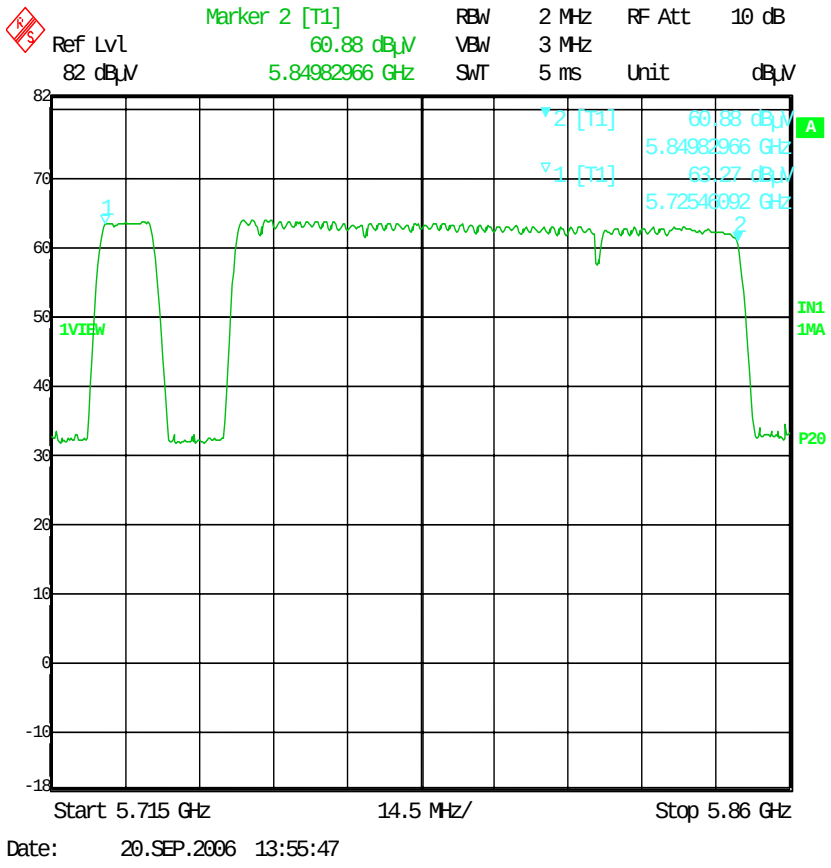
NUMBER OF HOPPING CHANNELS - HANDSET

Rules Part No.: 15.247(a)(1)

Requirements:

902-928 MHz	If the 20 dB bandwidth is less than 250 kHz, the system shall use at least 50 hopping frequencies.
	If the 20 dB bandwidth is 250 kHz or greater, the system shall use at least 25 hopping frequencies.
2400-2483.5 MHz	At least 15 channels
5725-5850 MHz	At least 75 channels

Test Data: There are 75 hopping channels



DWELL TIME OF A HOPPING CHANNEL - HANDSET

Rules Part No.: 15.247(a)(1)(i)

Requirements:

902-928 MHz	If 20 dB bandwidth is less than 250 kHz, Dwell time < = 0.4 seconds in a 20 second period.
	If 20 dB bandwidth is 250 kHz or greater, Dwell time < = 0.4 seconds n a 10 second period.
2400-2483.5 MHz	< = 0.4 seconds in a 0.4 seconds multiplied the number of hopping channels employed.
5725-5850 MHz	< = 0.4 seconds in a 30 second period.

Test Data:

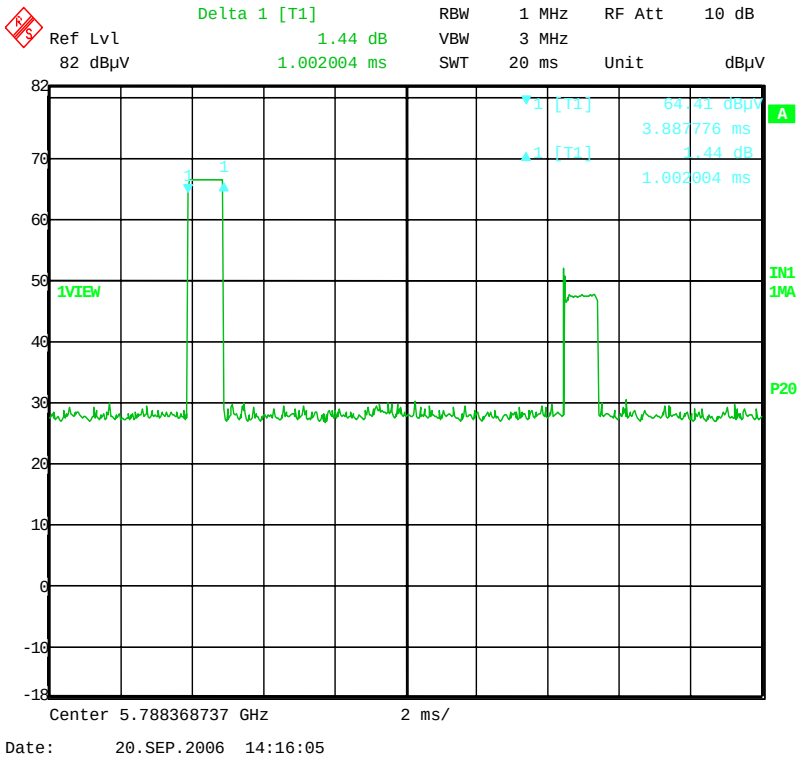
In a 30 second period each frequency channel is exactly 40 times. A slot is 0.9375ms long, therefore the average time of occupancy on any frequency channel in a 30 second period is:

The highest channel occupancy is:

T= 0.9375 ms * 40 * 8 = 300 ms

The lowest channel occupancy is:

T= 0.9375 ms * 40 * 1 = 37.5 ms

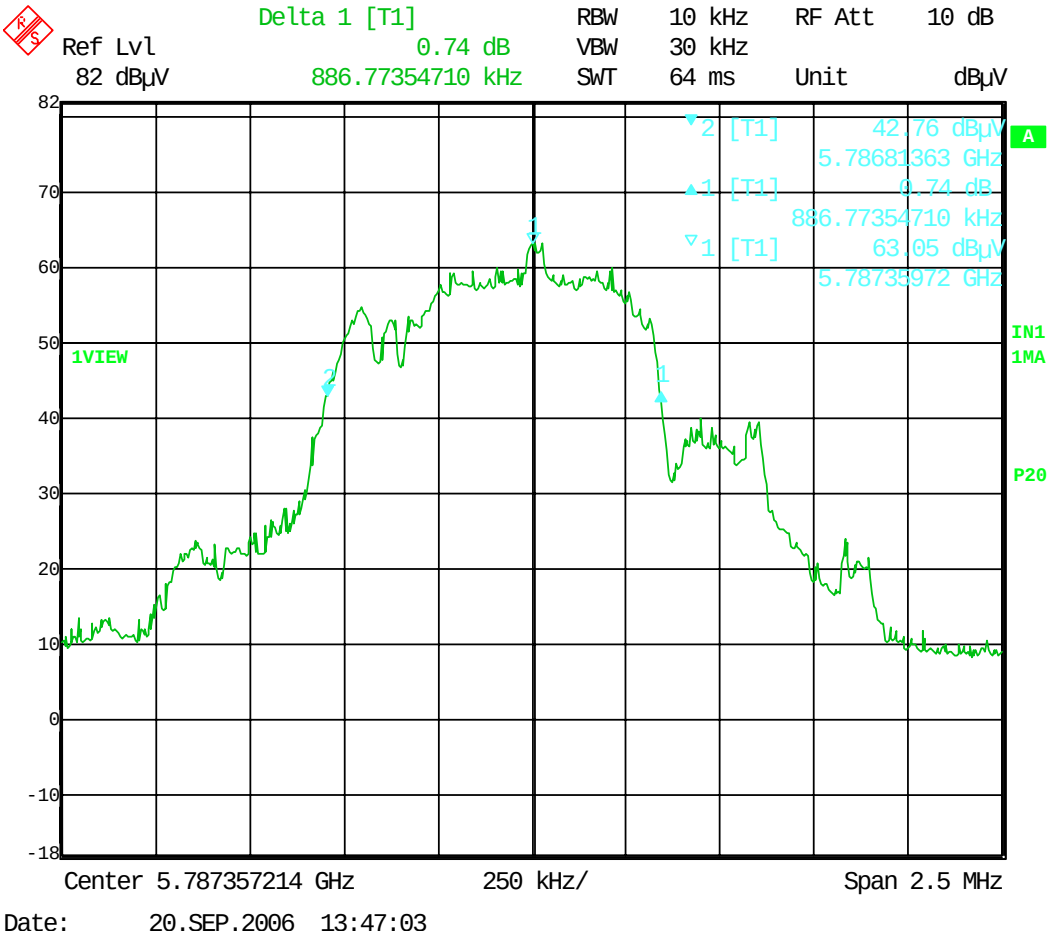


20 dB BANDWIDTH - HANDSET

Rules Part No.: 15.247(a)(2)

Requirements: The 20 dB bandwidth must be less than 1000 kHz.

Test Data: The 20 dB bandwidth is 886 kHz. See the following plot.

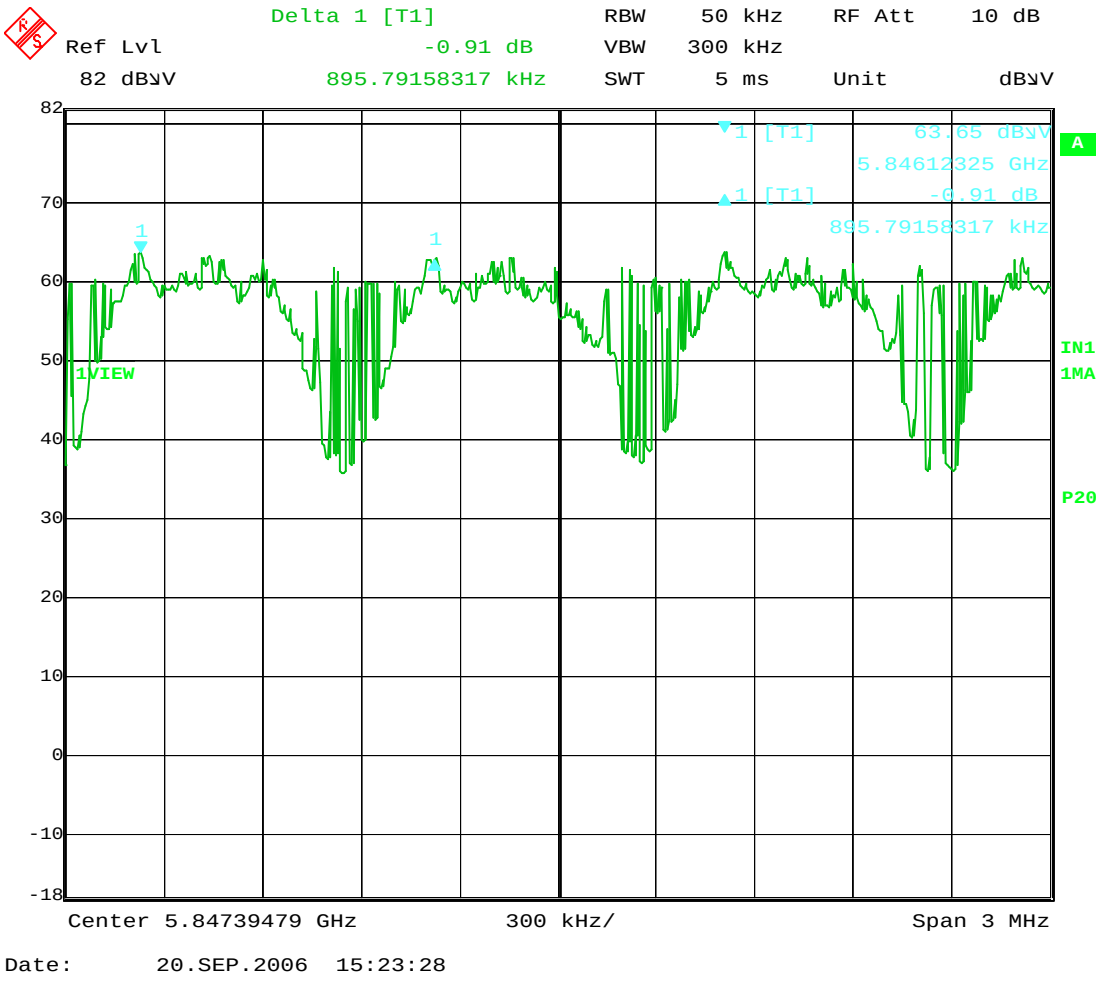


CARRIER FREQUENCY SEPARATION - HANDSET

Rules Part No.: 15.247(a)(2)

Requirements: The hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Test Data: The hopping channel separation is 896 kHz. See the following plot.



POWER OUTPUT - HANDSET

Rules Part No.: 15.247(b)

Requirements: The maximum peak output power shall not exceed 1 watt (30 dBm). If directional transmitting antennas with a gain of more than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test Method: The RF output power reported is radiated and reported in EIRP.
The antenna is fixed.
Please see table below.

Test Data – Fundamental Frequencies:

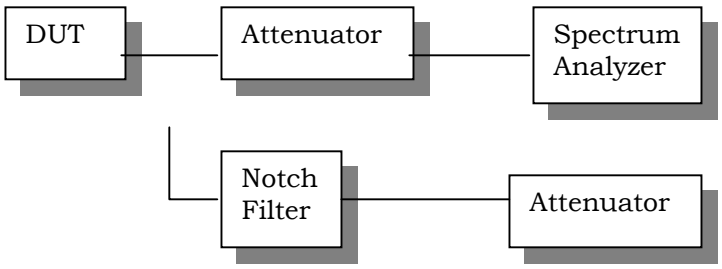
Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	Ant. Polarity V/H	Coax Loss dB	Correction Factor dB/m	Field Strength dBuV/m	dBm EIRP	Output Power mW EIRP	Output Power W EIRP
5,726.20	5,726.20	68.2	H	5.22	35.37	108.79			
5,726.20	5,726.20	78.7	V	5.22	35.37	119.29	24.06	254.75	0.25
5,787.50	5,787.50	68.1	H	5.24	35.45	108.79			
5,787.50	5,787.50	78.1	V	5.24	35.45	118.79	23.56	227.05	0.23
5,849.00	5,849.00	67.5	H	5.25	35.52	108.27			
5,849.00	5,849.00	77.7	V	5.25	35.52	118.47	23.24	210.92	0.21

SPURIOUS EMISSIONS AT ANTENNA TERMINALS - HANDSET

Rules Part No.: 15.247(c)

Requirements: Emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.

Method of Measuring:



Test Data: Not applicable. This device has a fixed antenna.

FIELD STRENGTH OF SPURIOUS EMISSIONS - HANDSET

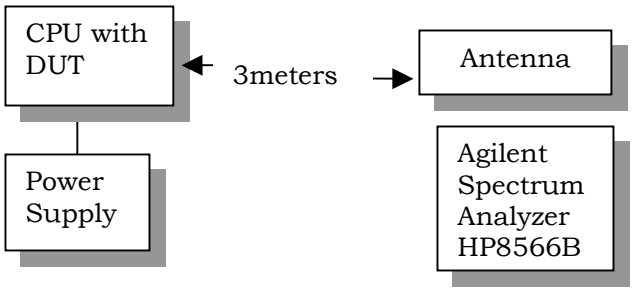
Rules Part No.: 15.247(c), 15.205 &15.209(b)

Requirements:

(Fundamental) Frequency	(Field Strength) Limits
902 – 928MHz	127.37dBuV/m
2.4 – 2.4835GHz	54 dBuV/m @3m
30 - 88 MHz	40 dBuV/m @3M
88 -216 MHz	43.5 dBuV/m @3M
216 -960 MHz	46 dBuV/m @3M
ABOVE 960 MHz	54dBuV/m

Emissions that fall in the restricted bands (15.205) must be less than or equal to 500 uV/m (54 dBuV/m). Spurious not in a restricted band must be 20 dBc.

Test Setup



Equipment placed 80cm above ground on a rotating platform.

FIELD STRENGTH OF SPURIOUS EMISSIONS - HANDSET

Rules Part No.: 15.247(c), 15.205 &15.209(b)

Test Data – Harmonics:

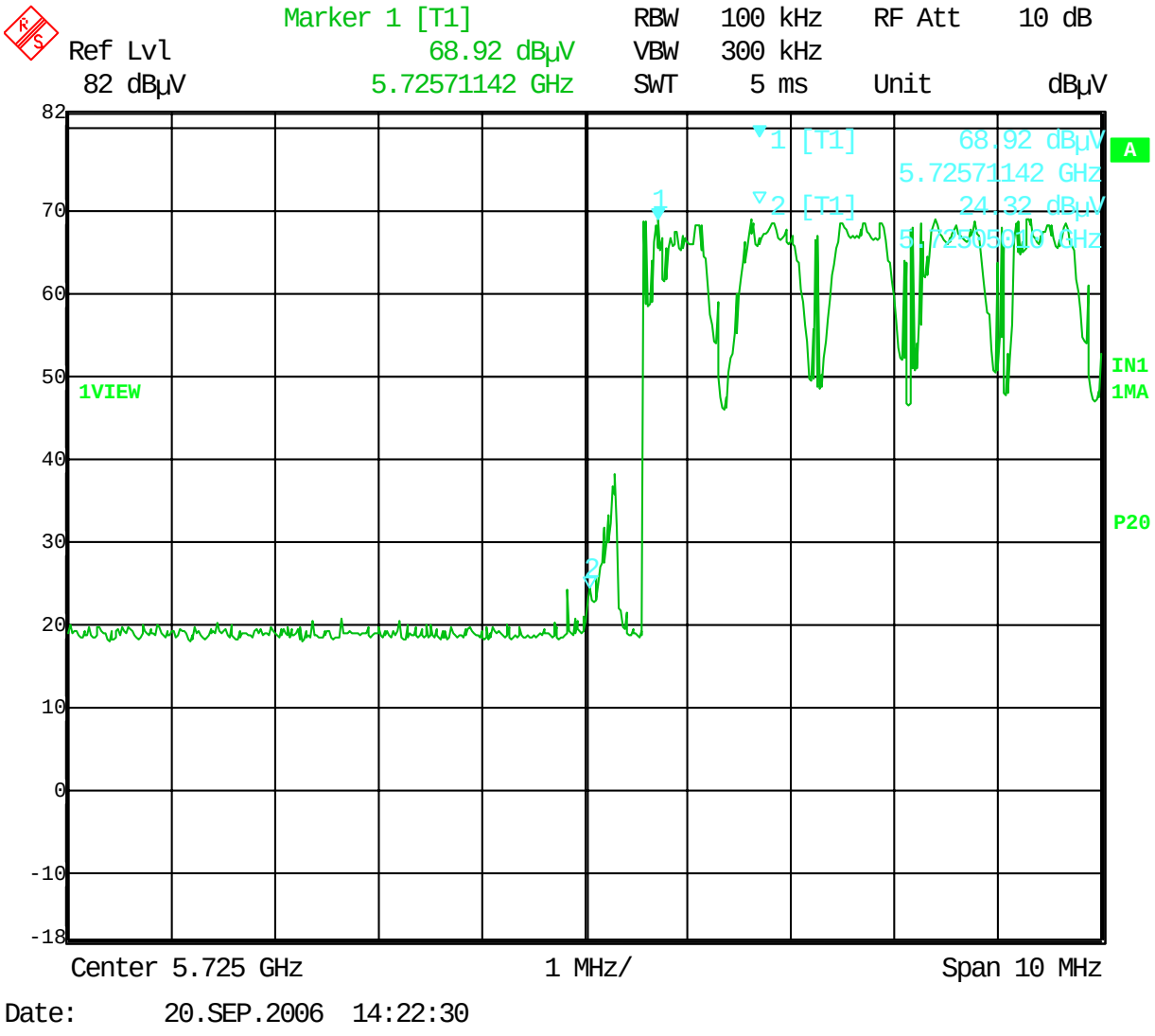
Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	Ant. Polarity	Coax Loss dB	Correction Factor dB	Peak Field Strength dBuV/m	Duty Cycle (dB)	Average Field Strength dBuV/m	Margin dB
5,726.20	11,452.40	26.8	V	7.58	29.8	64.18	24.4	39.8	14.2
5,726.20	11,452.40	27.5	H	7.58	29.8	64.88	24.4	40.5	13.5
5,726.20	17,178.60	22.6	H	10.35	35.41	68.36	24.4	44.0	56.89
5,726.20	17,178.60	27.9	V	10.35	35.41	73.66	24.4	49.3	51.59
5,787.50	11,575.00	29.1	H	7.63	29.8	66.53	24.4	42.1	11.9
5,787.50	11,575.00	29.8	V	7.63	29.8	67.23	24.4	42.8	11.2
5,787.50	17,362.50	22.2	H	10.41	35.5	68.11	24.4	43.7	55.09
5,787.50	17,362.50	30.2	V	10.41	35.5	76.11	24.4	51.7	47.09
5,849.00	11,698.00	28.7	H	7.68	29.8	66.18	24.4	41.8	12.2
5,849.00	11,698.00	30.1	V	7.68	29.8	67.58	24.4	43.2	10.8
5,849.00	17,547.00	24.3	H	10.46	35.59	70.35	24.4	46.0	52.47
5,849.00	17,547.00	31	V	10.46	35.59	77.05	24.4	52.7	45.77

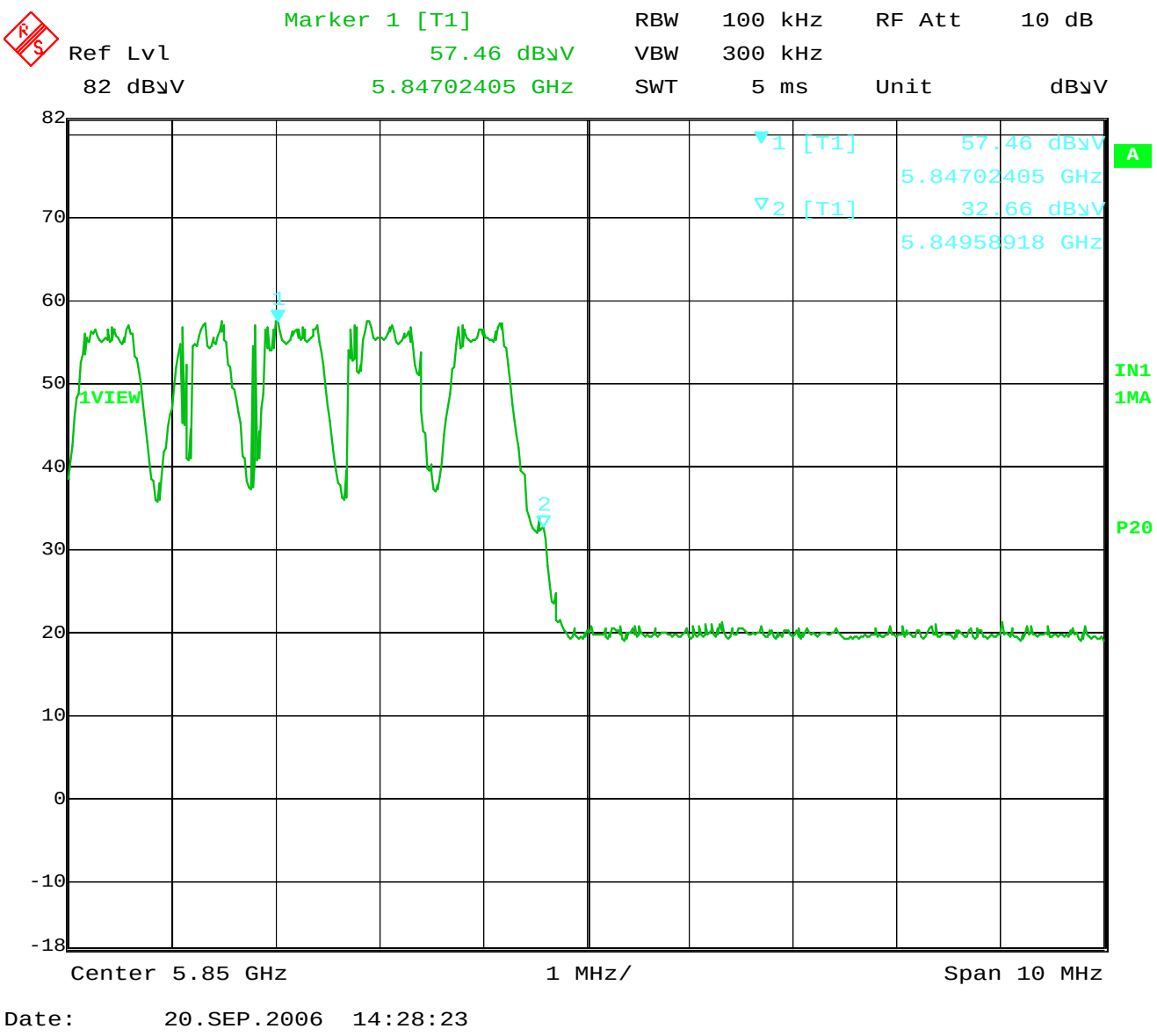
Harmonics were measured to the 10th harmonic

RADIATED SPURIOUS EMISSIONS INTO ADJACENT RESTRICTED BAND - HS

Rule Parts No.: **Part 15.205**

Requirements: Emissions that fall in the restricted bands (15.205). These emissions must be less than or equal to 500 uV/m (54dBuV/m). Emissions not in the restricted band must be 20 dBc.




Marker 1 [T1]
RBW 100 kHz
RF Att 10 dB
Ref Lvl
57.46 dBµV
VBW 300 kHz
82 dBµV
5.84702405 GHz
SWT 5 ms
Unit dBµV
1 [T1] 57.46 dBµV
5.84702405 GHz
2 [T1] 32.66 dBµV
5.84958918 GHz
A
IN1
1MA
P20
1VIEW
82
70
60
50
40
30
20
10
0
-10
-18
Center 5.85 GHz
1 MHz/
Span 10 MHz
Date: 20.SEP.2006 14:28:23

RADIATION TEST SET UP - HANDSET