

EMC

TEST REPORT

Report No. : EME-031103

Model No. : 39280

Issued Date : Dec. 26, 2003

Applicant : SENTON Enterprises Limited
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Fo Tan, Shatin, N.T. Hong Kong

Test By : Intertek Testing Services Taiwan Ltd.
No. 11, Lane 275, Ko-Nan 1 Street, Chia-Tung Li,
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Project Engineer

Jackey Chiu

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Reviewed By

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Table of Contents

Summary of Tests	3
1. General information	4
1.1 Identification of the EUT	4
1.2 Additional information about the EUT	4
1.3 Antenna description	5
1.4 Peripherals equipment	5
2. Test specifications	6
2.1 Test standard	6
2.2 Operation mode	6
2.4 Test equipment	7
3. Radiated emission test FCC 15.249 (C)	8
3.1 Operating environment	8
3.2 Test setup & procedure	8
3.3 Emission limit	9
3.3.1 Fundamental and harmonics emission limits	9
3.3.2 General radiated emission limits	9
3.4 Radiated spurious emission test data	11
3.4.1 Measurement results: frequencies equal to or less than 1 GHz	11
3.4.2 Fundamental & harmonics radiated emission data	13
4. Conducted emission test FCC 15.207	15
4.1 Operating environment	15
4.2 Test setup & procedure	15
4.3 Emission limit	16
4.4 Conducted emission data FCC 15.207	17
5. Radiated emission on the band edge FCC 15.249(C)	20

Summary of Tests**900MHz Cordless Phone-Model: 39280**
FCC ID: PEG39280

Test	Reference	Results
Conducted Emission of AC Power	15.207	Complies
Radiated Emission test	15.249(c), 15.209	Complies

1. General information

1.1 Identification of the EUT

Applicant	: SENTON Enterprises Limited
Product	: 900MHz Cordless Phone
Model No.	: 39280
FCC ID.	: PEG39280
Frequency Range (Base)	: 902.025MHz to 903.975MHz
Frequency Range (Handset)	: 926.025MHz to 927.975MHz
Channel Number	: 40 channels
Frequency of Each Channel (Base)	: 902.025 + 50k MHz, k=0~39
Frequency of Each Channel (Handset)	: 926.025+ 50k MHz, k=0~39
Type of Modulation	: FM
Rated Power (Base)	: 120Vac, 60Hz with adapter
Rated Power (Handset)	: 3.6Vdc battery
Power Cord	: N/A
Sample Received	: Sep. 30, 2003
Test Date(s)	: Sep. 30, 2003 ~ Dec. 22, 2003

1.2 Additional information about the EUT

The EUT is a Cordless Phone, it consists of handset unit and base unit.

For more detail features, please refer to User's manual as file name "Installation guide.pdf"

1.3 Antenna description

The antenna description for Base and Handset unit are the same and listed as below:

The EUT uses a permanently connected antenna.

Antenna Gain : 0dBi

Antenna Type : Copper Wire

Connector Type : N/A

1.4 Peripherals equipment

Peripherals	Manufacturer	Product No.	Serial No.	FCC ID
Exchange board	Teltone	250-00193-07	94948	FCC DoC Approval
Telephone	Tozai	ATC-814	9904000066	FCC DoC Approval

2. Test specifications

2.1 Test standard

The EUT was performed according to the procedures in FCC Part 15 Subpart C Paragraph 15.249 for non-spread spectrum devices.

The test of radiated measurements according to FCC Part15 Section 15.33(a) had been conducted and the field strength of this frequency band were all meet limit requirement, thus we evaluate the EUT pass the specified test.

2.2 Operation mode

During conduction test, it worked in normal operating mode, while in other test it worked in the status of continuously transmitting.

2.4 Test equipment

Equipment	Brand	Frequency range	Model No.	Series No.	Last Cal.Date
EMI Test Receiver	Rohde & Schwarz	9kHz~2.75GHz	ESCS 30	825788/014	Feb. 18, 2003
EMI Test Receiver	Rohde & Schwarz	20Hz~26.5GHz	ESMI	825428/005	June 10, 2003
Spectrum Analyzer	Rohde & Schwarz	9kHz~30GHz	FSP 30	100137	July 10, 2003
Horn Antenna	EMCO	1GHz~18GHz	3115	9906-5890	Sep. 19, 2003
Horn Antenna	SCHWARZBECK	14GHz~40GHz	BBHA 9170	159	June 20, 2003
Bilog Antenna	SCHWARZBECK	25MHz~1.7GHz	VULB 9160	3133	Feb. 21, 2003
Turn Table	HDGmbH	N/A	DS 420S	420/669/01	N/A
Antenna Tower	HDGmbH	N/A	MA 240	240/573	N/A
Microwave Amplifier	Agilent	2GHz~26.5GHz	8348A	3111A00567	Dec. 20, 2003
LISN	Rohde & Schwarz	9KHz~30MHz	ESH3-Z5	EC344	Jan. 20, 2003

Note:

Note: The above equipments are within the valid calibration period.

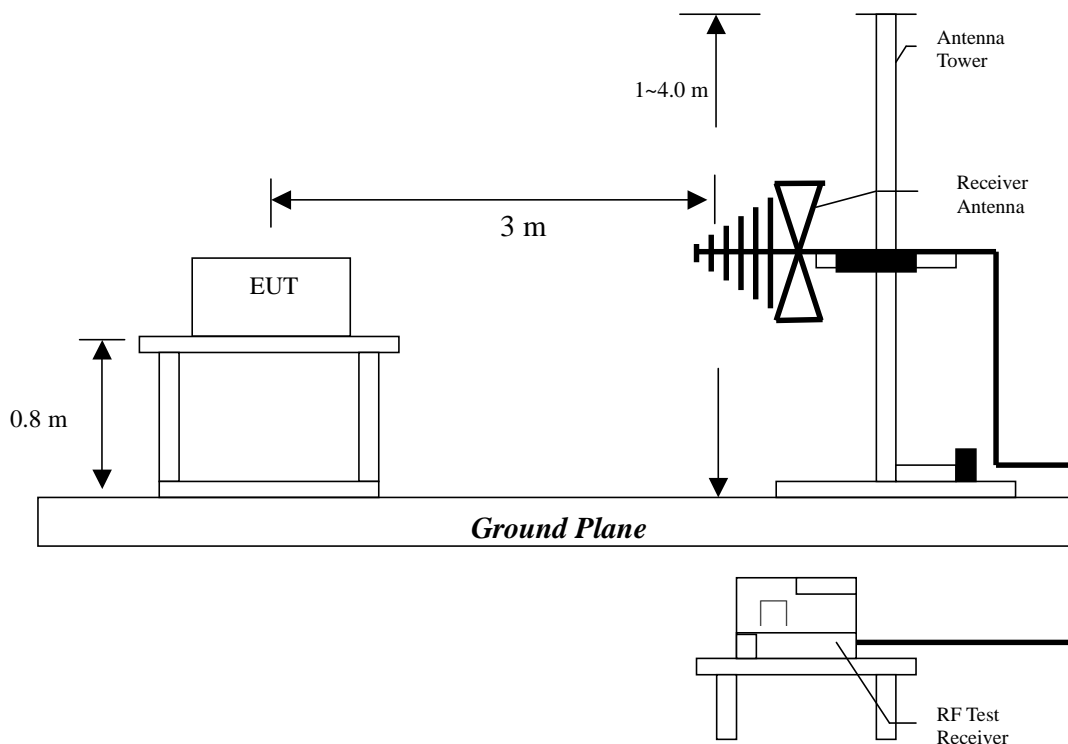
3. Radiated emission test FCC 15.249 (C)

3.1 Operating environment

Temperature:	22	°C	(10-40°C)
Relative Humidity:	56	%	(10-90%)
Atmospheric Pressure	1023	hPa	(860-1060hPa)

3.2 Test setup & procedure

The Diagram below shows the test setup, which is utilized to make these measurements.



The signal is maximized through rotation and placement in the three orthogonal axes. Radiated emissions were investigated cover the frequency range from 30MHz to 1000MHz using a receiver RBW of 120kHz record QP reading, and the frequency over 1GHz using a spectrum analyzer RBW of 1MHz and 10Hz VBW record Average reading. (15.209 paragraph), the Peak reading (1MHz RBW/VBW) recorded also on the report. The EUT for testing is arranged on a wooden turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.

The signal is maximized through rotation and placement in the three orthogonal axes.



Setup 1



Setup 2



Setup 3

The EUT configuration please refer to the “Spurious set-up photo.pdf”.

3.3 Emission limit

3.3.1 Fundamental and harmonics emission limits

Frequency (MHz)	Field Strength of Fundamental		Field Strength of Harmonics	
	(mV/m@3m)	(dBuV/m@3m)	(uV/m@3m)	(dBuV/m@3m)
902.0~928.0	50	94	500	54

3.3.2 General radiated emission limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

Frequency MHz	15.209 Limits (dB μ V/m@3m)
30-88	40
88-216	43.5
216-960	46
Above 960	54

Remark:

1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

Uncertainty was calculated in accordance with NAMAS NIS 81.

Expanded uncertainty (k=2) of radiated emission measurement is ± 4.98 dB.

Expanded uncertainty (k=2) of conducted emission measurement is ± 2.02 dB.

3.4 Radiated spurious emission test data

3.4.1 Measurement results: frequencies equal to or less than 1 GHz

EUT : 39280

Worst Case Condition : Base, Tx at low channel

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
747.900	QP	V	22.60	-0.10	22.50	46.00	-23.50	210	38
779.800	QP	V	23.49	0.21	23.70	46.00	-22.30	108	125
804.000	QP	V	23.89	-0.43	23.46	46.00	-22.54	151	87
815.000	QP	V	23.89	-0.38	23.51	46.00	-22.49	141	285
855.000	QP	V	24.39	0.54	24.93	46.00	-21.07	121	63
936.000	QP	V	25.46	14.89	40.35	46.00	-5.65	125	360
710.120	QP	H	22.22	-0.58	21.64	46.00	-24.36	123	15
755.660	QP	H	23.40	0.18	23.58	46.00	-22.42	231	75
777.870	QP	H	23.49	0.31	23.80	46.00	-22.20	125	360
864.000	QP	H	24.39	-0.48	23.91	46.00	-22.09	137	66
854.310	QP	H	24.39	0.21	24.60	46.00	-21.40	155	21
936.760	QP	H	25.46	14.58	40.04	46.00	-5.96	241	251

Remark:

1. Corrected Level = Reading Level + Correction Factor

2. Correction Factor = Antenna Factor + Cable Loss

EUT : 39280

Worst Case Condition : Handset setup 2, Tx at low channel

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
825.560	QP	V	24.46	-0.05	24.41	46.00	-21.59	101	100
834.910	QP	V	24.46	-0.82	23.64	46.00	-22.36	108	125
868.050	QP	V	24.39	0.27	24.66	46.00	-21.34	101	0
885.130	QP	V	24.51	0.02	24.53	46.00	-21.47	126	171
903.050	QP	V	24.76	-0.69	24.07	46.00	-21.93	100	123
912.710	QP	V	24.76	14.01	38.77	46.00	-7.23	155	188
794.110	QP	H	23.49	-0.57	22.92	46.00	-23.08	103	87
837.020	QP	H	24.46	-0.69	23.77	46.00	-22.23	151	20
853.870	QP	H	24.39	-0.29	24.10	46.00	-21.90	171	0
881.820	QP	H	24.51	0.32	24.83	46.00	-21.17	141	88
899.210	QP	H	24.51	-0.44	24.07	46.00	-21.93	192	256
912.700	QP	H	24.76	8.27	33.03	46.00	-12.97	156	106

Remark:

1. Corrected Level = Reading Level + Correction Factor

2. Correction Factor = Antenna Factor + Cable Loss

3.4.2 Fundamental & harmonics radiated emission data

EUT : 39280

Test Condition : Base, Tx at low channel

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
902.025	PK	V	24.76	32.24	57.00	94.00	-37.00	113.00	78.00
902.025	PK	H	24.76	35.07	59.83	94.00	-34.17	169.00	235.00

EUT : 39280

Test Condition : Base, Tx at high channel

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
903.975	PK	V	24.76	31.28	56.04	94.00	-37.96	128.00	128.00
903.975	PK	H	24.76	35.03	59.79	94.00	-34.21	153.00	12.00

Remark:

1. Corrected Level = Reading Level + Correction Factor
2. Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

For PK:

1GHz-3GHz: 50dBuV

3GHz-14GHz: 54dBuV

14GHz-26.5GHz: 60dBuV

For AV:

1GHz-3GHz: 41.5dBuV

3GHz-14GHz: 46dBuV

14GHz-26.5GHz: 46.5dBuV

EUT : 39280

Test Condition : Handset, Tx at low channel

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
926.025	PK	V	25.46	35.05	60.51	94.00	-33.49	274.00	296.00
926.025	PK	H	25.46	39.38	64.84	94.00	-29.16	100.00	15.00

EUT : 39280

Test Condition : Handset, Tx at high channel

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
927.975	PK	V	25.46	32.92	58.38	94.00	-35.62	227.00	295.00
927.975	PK	H	25.46	35.18	60.64	94.00	-33.36	216.00	41.00

Remark:

1. Corrected Level = Reading Level + Correction Factor
2. Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

For PK:

1GHz-3GHz: 50dBuV

3GHz-14GHz: 54dBuV

14GHz-26.5GHz: 60dBuV

For AV:

1GHz-3GHz: 41.5dBuV

3GHz-14GHz: 46dBuV

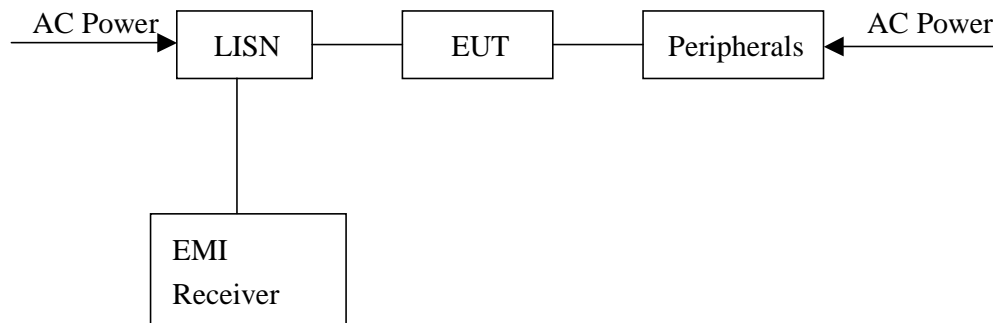
14GHz-26.5GHz: 46.5dBuV

4. Conducted emission test FCC 15.207

4.1 Operating environment

Temperature:	24	°C	(10-40°C)
Relative Humidity:	54	%	(10-90%)
Atmospheric Pressure	1023	hPa	(860-1061hPa)

4.2 Test setup & procedure



The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50 ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination.

Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4/1992 on conducted measurement.

The bandwidth of the field strength meter (R & S Test Receiver ESCS 30) is set at 9kHz.

The EUT configuration please refer to the “Conducted set-up photo.pdf”.

4.3 Emission limit

Freq. (MHz)	Conducted Limit (dBuV)	
	Q.P.	Ave.
0.15~0.50	66 – 56*	56 – 46*
0.50~5.00	56	46
5.00~30.0	60	50

*Decreases with the logarithm of the frequency.

4.4 Conducted emission data FCC 15.207

(1) Line

EUT : 39280

Worst Case Condition : Talk mode

Freq. (MHz)	Reading (dB μ V) QP	Limit (dB μ V) QP	Reading (dB μ V) AV	Limit (dB μ V) AV	Margin (dB)	
					QP	AV
10.750	30.60	60.00	30.20	50.00	-29.40	-19.80
11.150	31.40	60.00	31.30	50.00	-28.60	-18.70
14.334	27.00	60.00	26.60	50.00	-33.00	-23.40
15.230	27.80	60.00	27.50	50.00	-32.20	-22.50
16.126	24.40	60.00	23.80	50.00	-35.60	-26.20
21.502	30.70	60.00	30.40	50.00	-29.30	-19.60

(2) Neutral

EUT : 39280

Test Condition : Talk mode

Freq. (MHz)	Reading (dB μ V) QP	Limit (dB μ V) QP	Reading (dB μ V) AV	Limit (dB μ V) AV	Margin (dB)	
					QP	AV
10.750	30.70	60.00	30.40	50.00	-29.30	-19.60
11.150	31.70	60.00	31.70	50.00	-28.30	-18.30
14.334	27.20	60.00	26.80	50.00	-32.80	-23.20
15.230	27.90	60.00	27.70	50.00	-32.10	-22.30
16.126	24.40	60.00	23.90	50.00	-35.60	-26.10
21.502	30.90	60.00	30.40	50.00	-29.10	-19.60

Remark:

1. The reading value included cable loss and LISN factor.
2. Uncertainty was calculated in accordance with NAMAS NIS 81.
Expanded uncertainty (k=2) of conducted emission measurement is ± 2.6 dB.
3. Please see the plot below.

Intertek Testing Services

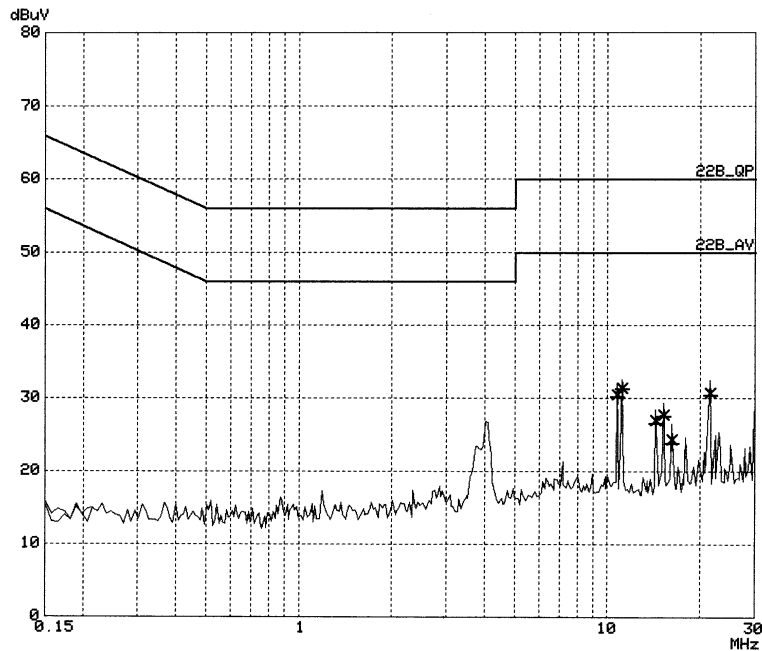
RF VOLTAGE

EUT: 39280
 Manuf: Senton
 Op Cond: LISN-L
 Operator: Jackey
 Test Spec: FCC P15 CLASS B
 Comment: EMI RCV:EC318 LISN:EC320
 120V 60Hz 24'C 54%RH at Talk Mode
 Date: 30. Sep 03 15:27

Scan Settings (1 Range)

Frequencies			Receiver Settings			
Start	Stop	Step	IF BW	Detector	M-Time	Atten Preamp
150k	30M	8k	9k	PK	20ms AUTO LN	OFF

Final Measurement: x QP / + AV
 Meas Time: 1 s



Intertek Testing Services

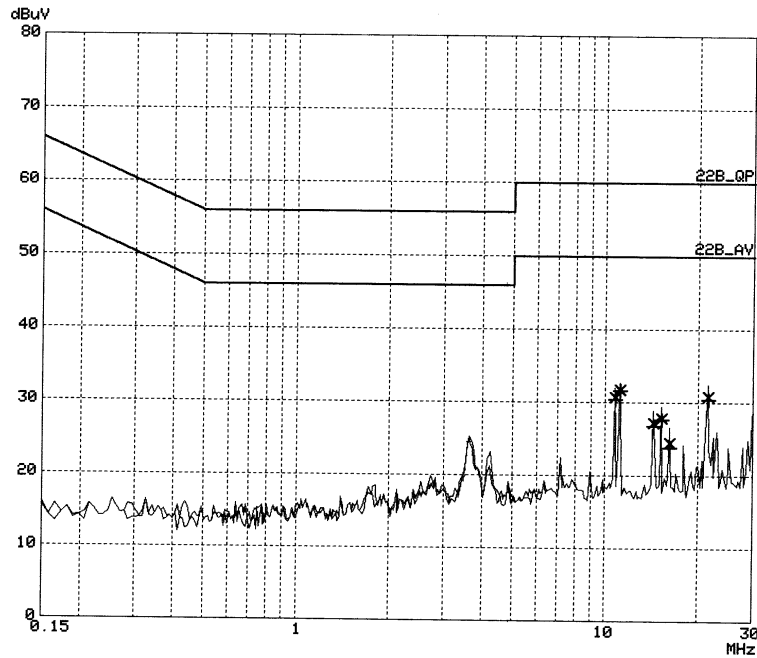
RF VOLTAGE

EUT: 39280
 Manuf: Senton
 Op Cond: LISN-N
 Operator: Jackey
 Test Spec: FCC P15 CLASS B
 Comment: EMI RCV:EC318 LISN:EC320
 120V 60Hz 24'C 54%RH at Talk Mode
 Date: 30. Sep 03 15:34

Scan Settings (1 Range)

Frequencies			Receiver Settings			
Start	Stop	Step	IF BW	Detector	M-Time	Atten Preamp
150k	30M	8k	9k	PK	20ms AUTO LN	OFF

Final Measurement: x QP / + AV
 Meas Time: 1 s

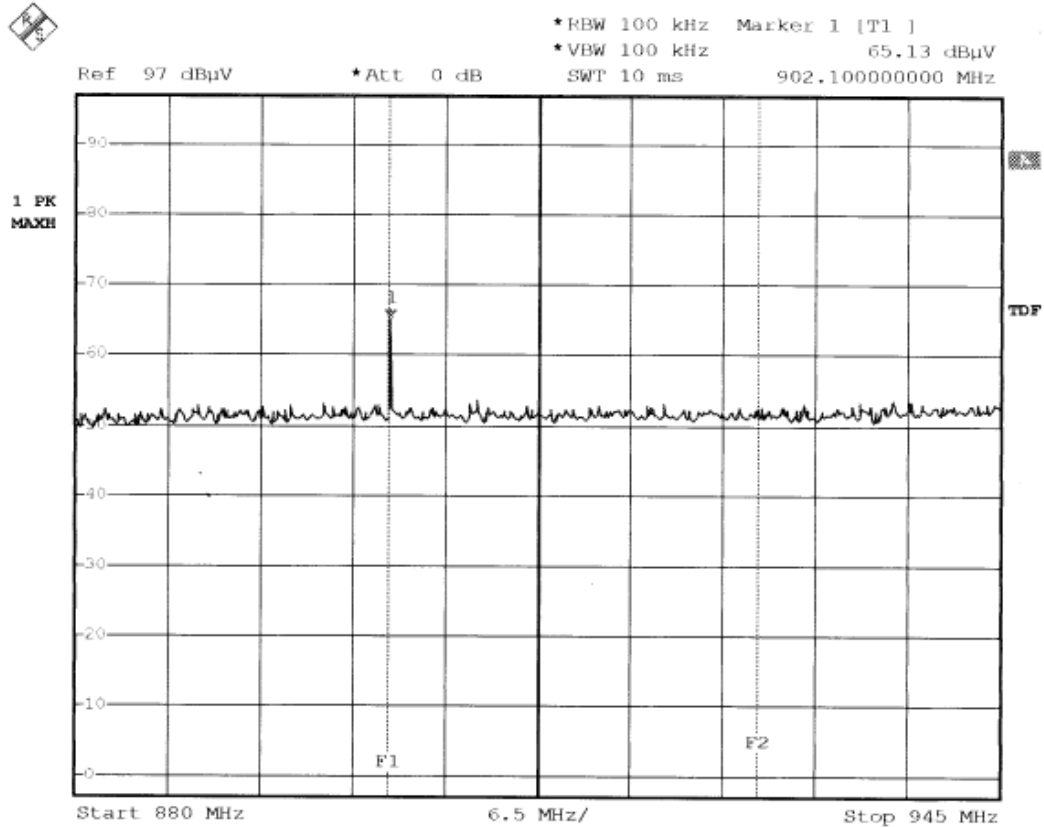


5. Radiated emission on the band edge FCC 15.249(C)

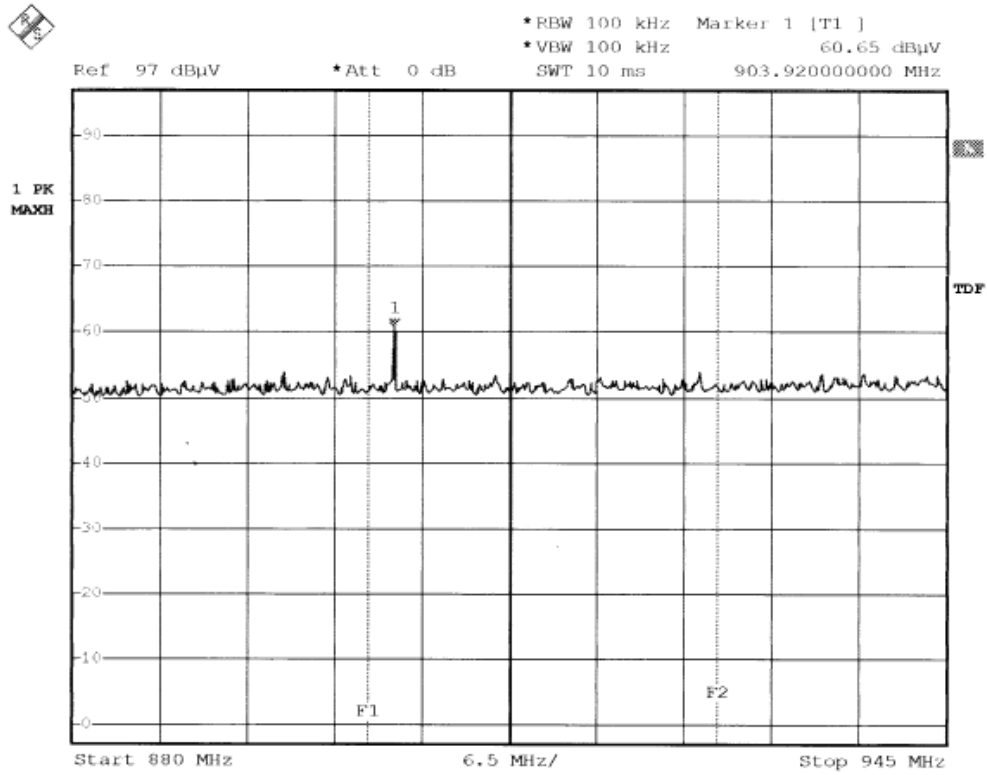
Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental (902~928MHz) or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

Please see the plot below.

Test Condition : Base mode

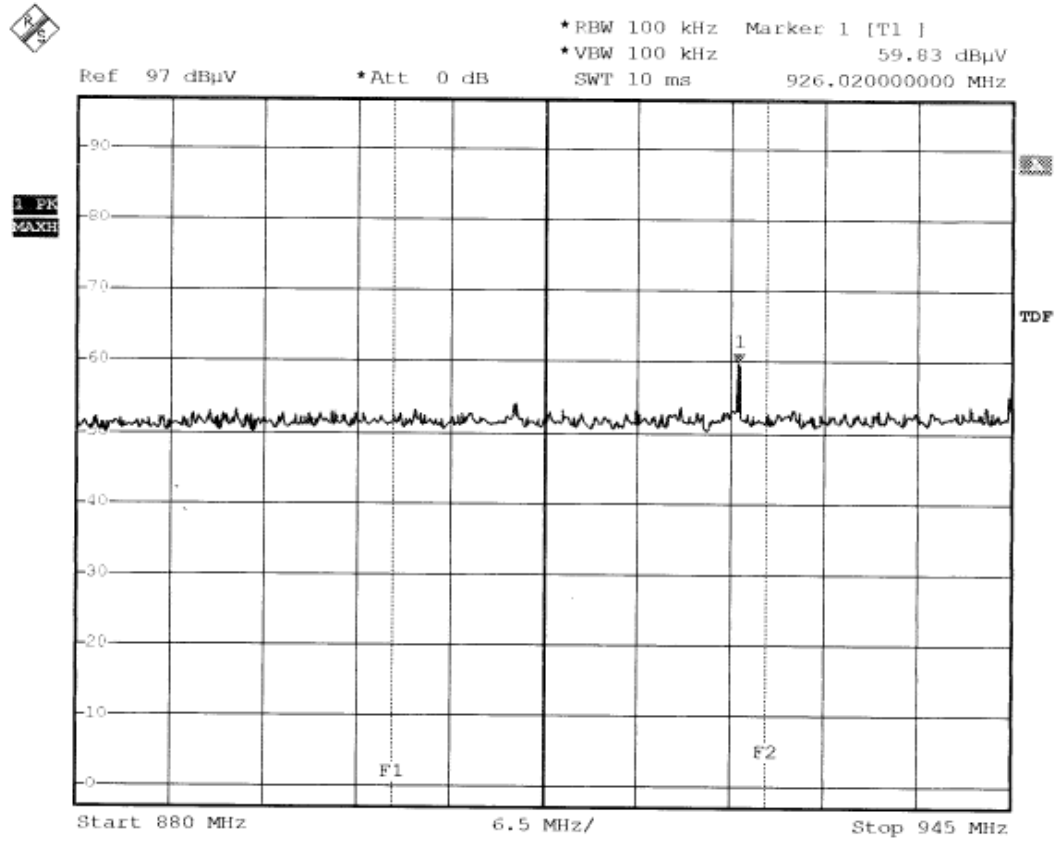


Comment A: Band-edge test at CH01
F1=902MHz F2=928MHz Base

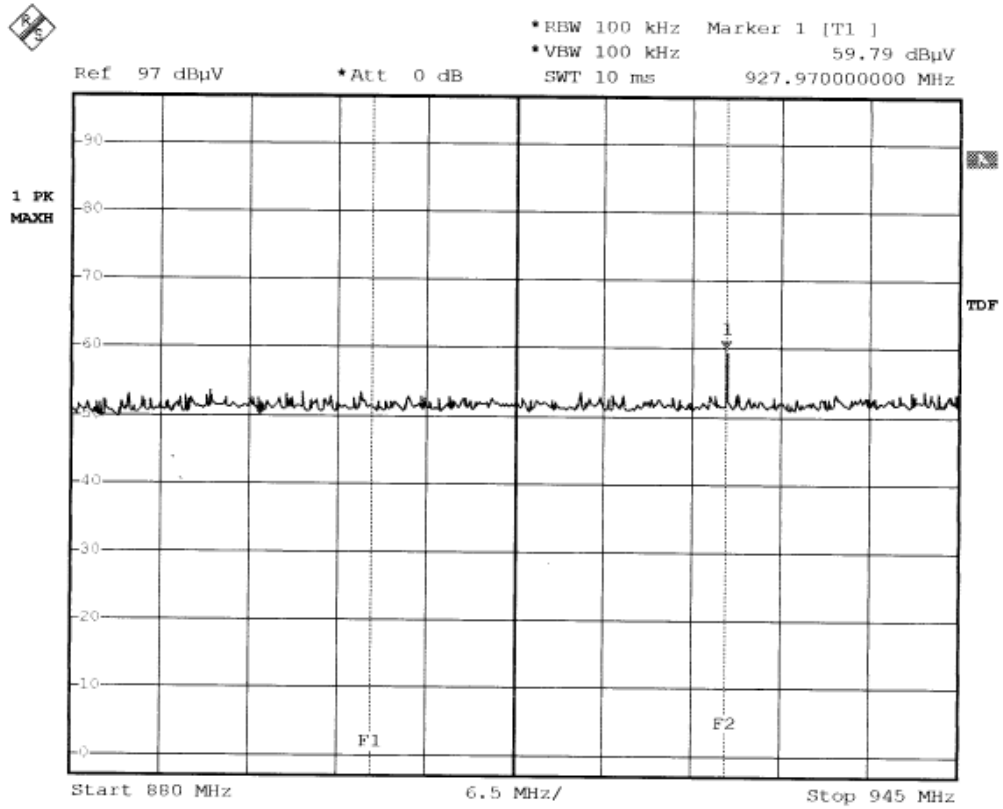


Comment A: Band-edge test at CH40
F1=902MHz F2=928MHz Base

Test Condition : Handset mode



Comment A: Band-edge test at CH01
 F1=902MHz F2=926MHz set_2



Comment A: Band-edge test at CH40
F1=902MHz F2=926MHz set_2