EMISSIONS TEST REPORT

Report Number: 3135908BOX-001
Project Number: 3135908

Testing performed on the

40-Ch 4W Handheld CB Radio with Weather Alert

Model: 21-1679[A]

To

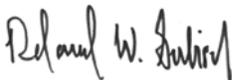**FCC Part 95 Subpart D "Citizen's Band (CB) Radio Service"**

For

Intertek ETL SEMKO – Hong Kong

Test Performed by:	Test Authorized by:
Intertek – ETL SEMKO	RadioShack Corporation
70 Codman Hill Road	300 RadioShack Circle, Mail Stop WF4-136
Boxborough, MA 01719	Fort Worth, TX 76102

Prepared by: _____   Date: 11/16/2007
                    Nicholas Abbondante

Reviewed by: _____   Date: 11-16-2007
                    Roland W. Gubisch

1.0 Job Description

1.1 Client Information

This EUT has been tested at the request of:

Company:	Intertek ETL SEMKO – Hong Kong
	Co #305CA HK
	2/F Garment Center
	576 Castle Peak Road
	Kowloon, Hong Kong
Contact:	Mr. Kiney Lee
Telephone:	85221738351
Fax:	85227411693
Email:	Kiney.lee@intertek.com

1.2 Equipment Under Test

Company:	RadioShack Corporation
	300 RadioShack Circle, Mail Stop WF4-136
	Fort Worth, TX 76102
Contact:	Pat Loehr
Telephone:	817-415-6221
Fax:	817-415-9247
Email:	Pat.loehr@radioshack.com

Equipment Type:	40-Ch 4W Handheld CB Radio with Weather Alert
Model Number(s):	21-1679[A]
Serial number(s):	FCC#2
Manufacturer:	Tandy Electronics (China) Ltd.
EUT receive date:	10/11/2007
EUT received condition:	Prototype in Good Condition
Test start date:	11/09/2007
Test end date:	11/13/2007

1.3 Test Plan Reference: Tested according to the standards listed and ANSI/TIA-603-C-2004.

1.4 Test Configuration

1.4.1 Block Diagram

Antenna

```
          |
          |
 ┌────────┴─┐        ┌──────────────────────────┐
 │          ├────────┤  Audio signal generator  │
 │  EUT     │        └──────────────────────────┘
 │          │  Injection Cable
 │          │  – MIC port
 │          │
 └──────────┘
```
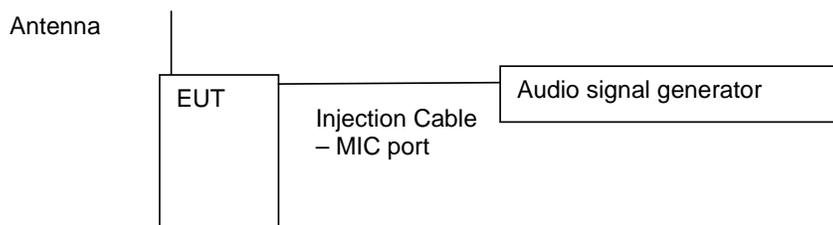
1.4.2. Cables:

Cable	Shielding	Connector	Length (m)	Qty.
No EUT cables*				

* - Since no radiated emissions testing was performed, no EUT cabling was used. An unshielded BNC to 3/32" mono audio jack test cable was used for audio signal injections

1.4.3. Support Equipment:

Name: Radio Shack Power Supply
Model No.:   21-1679A
Serial No.: N/L

1.5 Mode(s) of Operation:

During testing, the EUT was activated from a fresh battery and was operating on channel 20. For relevant testing, both low and high power modes were tested. The power supply was used to charge batteries for testing. The RF output power and frequency tolerance testing was performed with an unmodulated carrier, while the occupied bandwidth and emissions mask testing was performed with a modulated carrier. Modulation was obtained by injecting a 2500 Hz tone at -23.7 dBm into the microphone port. This level is 16 dB higher than that necessary to generate a 50% modulation depth.

1.6 Floor Standing Equipment: Applicable:____   Not Applicable:_X_

2.0 Test Summary

TEST STANDARD	RESULTS	
FCC Part 95 Subpart D		
SUB-TEST	**TEST PARAMETER**	**COMMENT**
RF Output Power FCC §95.639(c)(1), §95.649	RF Output Power must not exceed 4 Watts when transmitting emission type A1D or A3E. No CB unit shall incorporate provisions for increasing its transmitter power to any level in excess of the limits specified in §95.639	Pass
Occupied Bandwidth and Emission Type FCC §95.631(c), §95.633(a)	The emission type must be A1D, H1D, J1D, R1D, A3E, H3E, J3E, or R3D. The authorized bandwidth for emission type A1D or A3E is 8 kHz.	Pass
Frequency Tolerance FCC §95.625(a),(b), §95.655(a)	Each CB transmitter must be maintained within a frequency tolerance of 0.005%. No transmitter will be certificated for use in the CB service if it is equipped with a frequency capability not listed in §95.625.	Pass
Conducted Spurious Emissions, Emissions Mask FCC §95.635(b)(1, 3, 8, 9)	Spurious emissions must be attenuated below the level of the carrier frequency by at least 25 dB on any frequency removed from the center of the authorized bandwidth by between 50-100% of the authorized bandwidth, by 35 dB on any frequency removed from the center of the authorized bandwidth by 100-250% of the authorized bandwidth, by 53+10*LOG(T) dB on any frequency removed from the center of the authorized bandwidth by more than 250%, and by 60 dB on any frequency that is equal to or greater than twice the transmit frequency.	Pass

Notes: Channel 20, 27.205 MHz, was selected for test. The EUT operates in A3E emission mode. EUT cannot operate while battery is being charged.

REVISION SUMMARY – The following changes have been made to this Report:

Date	Project No.	Project Handler	Page(s)	Item	Description of Change

Report Number 3135908BOX-001

3.0 Sample Calculations

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$FS = RA + AF + CF - AG$
Where   FS = Field Strength in dBμV/m
                RA = Receiver Amplitude (including preamplifier) in dBμV
                CF = Cable Attenuation Factor in dB
                AF = Antenna Factor in dB
                AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dBμV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 52.0 dBμV
AF = 7.4 dB/m
CF = 1.6 dB
AG = 29.0 dB
FS = 32 dBμV/m

Level in μV/m = [10(32 dBμV/m)/20] = 39.8 μV/m

The following is how net line-conducted readings were determined:

$NF = RF + LF + CF + AF$
Where NF = Net Reading in dBμV
       RF = Reading from receiver in dBμV
       LF = LISN Correction Factor in dB
       CF = Cable Correction Factor in dB
       AF = Attenuator Loss Factor in dB

To convert from dBμV to μV or mV the following was used:

$UF = 10^{(NF/20)}$ where UF = Net Reading in μV

Example:

$NF = RF + LF + CF + AF = 28.5 + 0.2 + 0.4 + 20.0 = 49.1$ dBμV
$UF = 10^{(48.1\ dBμV / 20)} = 254$ μV/m

3.1 Measurement Uncertainty

Compliance of the product is based on the measured value. However, the measurement uncertainty is included for informational purposes.

The expanded uncertainty (k = 2) for radiated emissions from 30 to 1000 MHz has been determined to be:

±3.5 dB at 10m, ±3.8 dB at 3m

The expanded uncertainty (k = 2) for mains conducted emissions from 150 kHz to 30 MHz has been determined to be:

±2.6 dB

The expanded uncertainty (k = 2) for telecom port conducted emissions from 150 kHz to 30 MHz has been determined to   be:

±3.2 for ISN and voltage probe measurements

±3.1 for current probe measurements

3.2 Site Description

Test Site(s): 2

Our OATS are 3m and 10m sheltered emissions measurement ranges located in a light commercial environment in Boxborough, Massachusetts. They meet the technical requirements of ANSI C63.4-2003 and CISPR 22:1993/EN 55022:1994 for radiated and conducted emission measurements. The shelter structure is entirely fiberglass and plastic, with outside dimensions of 33 ft x 57 ft. The structure resembles a quonset hut with a center ceiling height of 16.5 ft.

The testing floor is covered by a galvanized sheet metal groundplane that is earth-grounded via copper rods around the perimeter of the site. The joints between individual metal sheets are bridged with a 2 inch wide metal strips to provide low RF impedance contact throughout. The sheets are screwed in place with stainless steel, round-head screws every three inches. Site illumination and HVAC are provided from beneath the ground reference plane through flush entry ports, the port covers are electrically bonded to the ground plane.

A flush metal turntable with 12 ft. diameter and 5000 lb. load capacity (12,000 lb. in Site 3) is provided for floor-standing equipment. A wooden table 80 cm high is used for table-top equipment. The turntable is electrically connected to the ground plane with three copper straps. The straps are connected to the turntable at the center of it with ground braid. The copper strap is directly connected to the groundplane at the edges of the turntable. The turntable is located on the south end of the structure and the antennas are mounted 3 and 10 meters away to the north. The antenna mast is a non-conductive with remote control of antenna height and polarization. The antenna height is adjustable from 1 to 4 meters.

All final radiated emission measurements are performed with the testing personnel and measurement equipment located below the ground reference plane. The site has a full basement underneath the turntable where support equipment may be remotely located. Operation of the antenna, turntable and equipment under test is controlled by remote controls that manipulate the antenna height and polarization and with a turntable control. Test personnel are located below the ellipse when measurements are performed, however the site maintains the ability of having personnel manipulate cables while monitoring test equipment. Ambient radiated emissions are 6 dB or more below the relevant FCC emission limits.

AC mains power is brought to the equipment under test through a power line filter, to remove ambient conducted noise. 50 Hz (240 VAC single phase), 60 Hz power (120 VAC single phase, 208 VAC three phase), and 60 Hz (480 VAC three phase) are available. Conducted emission measurements are performed with a Line Impedance Stabilization Network (LISN) or Artificial Mains Network (AMN) bonded to the ground reference plane. A removable vertical groundplane (2 meter X 2 meter area) is used for line-conducted measurements for table top equipment. The vertical groundplane is electrically connected to the reference groundplane.

The EMC Lab has two Semi-anechoic Chambers and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 400, and 480 3-Phase. Large reference groundplanes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

Test Results: Pass

Test Standard: FCC Part 95 Subpart D

Test: RF Output Power, FCC §95.639(c)(1), §95.649

Performance Criterion: RF Output Power must not exceed 4 Watts when transmitting emission type A1D or A3E. No CB unit shall incorporate provisions for increasing its transmitter power to any level in excess of the limits specified in §95.639

Test Environment:

Environmental Conditions During Testing:		Ambient (°C):	20c	Humidity (%):	26%	Pressure (hPa):	1050mB
Pretest Verification Performed		Yes		Equipment under Test:		40-Ch 4W Handheld CB Radio with Weather Alert	
Test Engineer(s):	Nicholas Abbondante			EUT Serial Number:		FCC#2	

Test Equipment Used:

| TEST EQUIPMENT LIST					
Item	Equipment Type	Make	Model No.	Serial No.	Next Cal. Due
1	Digital 4 Line Barometer	Mannix	0ABA116	BAR2	05/20/2008
2	Attenuator, 30dB	Weinschel Corp	47-30-34	BD4327	09/13/2008
3	Spectrum Analyzer	Agilent	E7405A	US40240205	08/09/2008
4	Cable, BNC - BNC, 3.5' long	Pomona	RG-58C/U	CBL019	09/18/2008

Comment [GRW1]: Type in the equipment's asset Numbers in each row of this column (add new columns when needed) and the table will fill in automatically when you press the running man button.

Test Details:

Notes: A 29.37 dB reference level offset was used to compensate for cable and attenuator losses. An unmodulated carrier was measured. There was no control available to modify power settings other than the low/high selector.
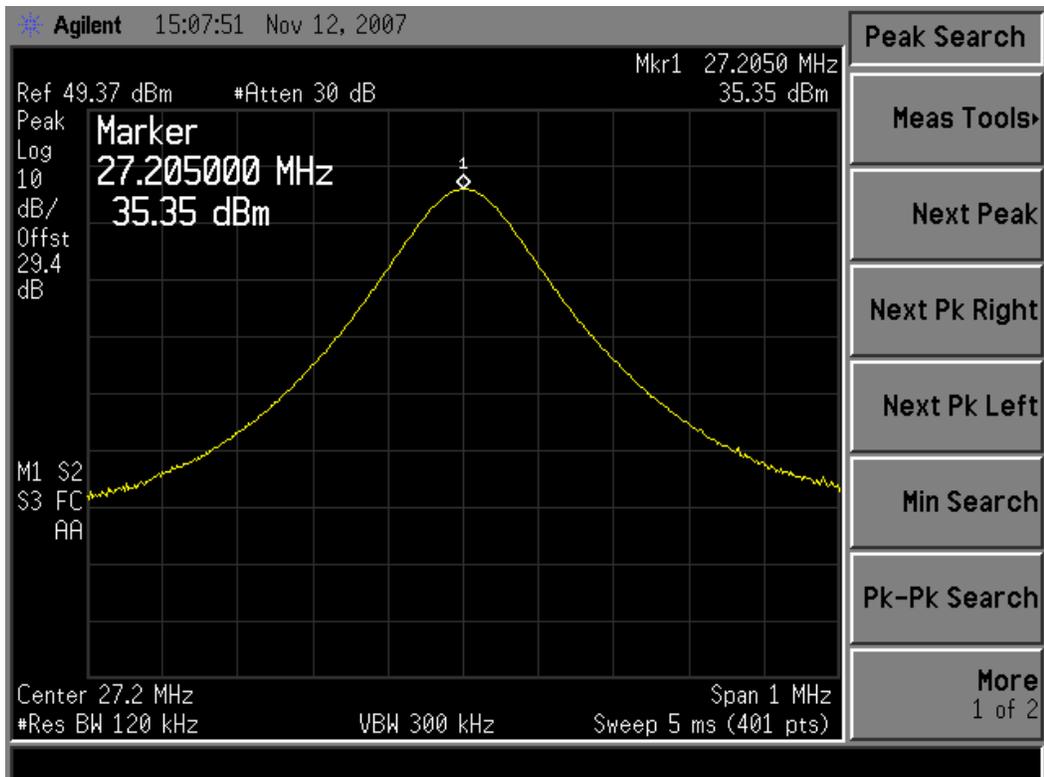
RF Output Power, High Setting, Channel 20, 35.35 dBm (3.43 Watts)
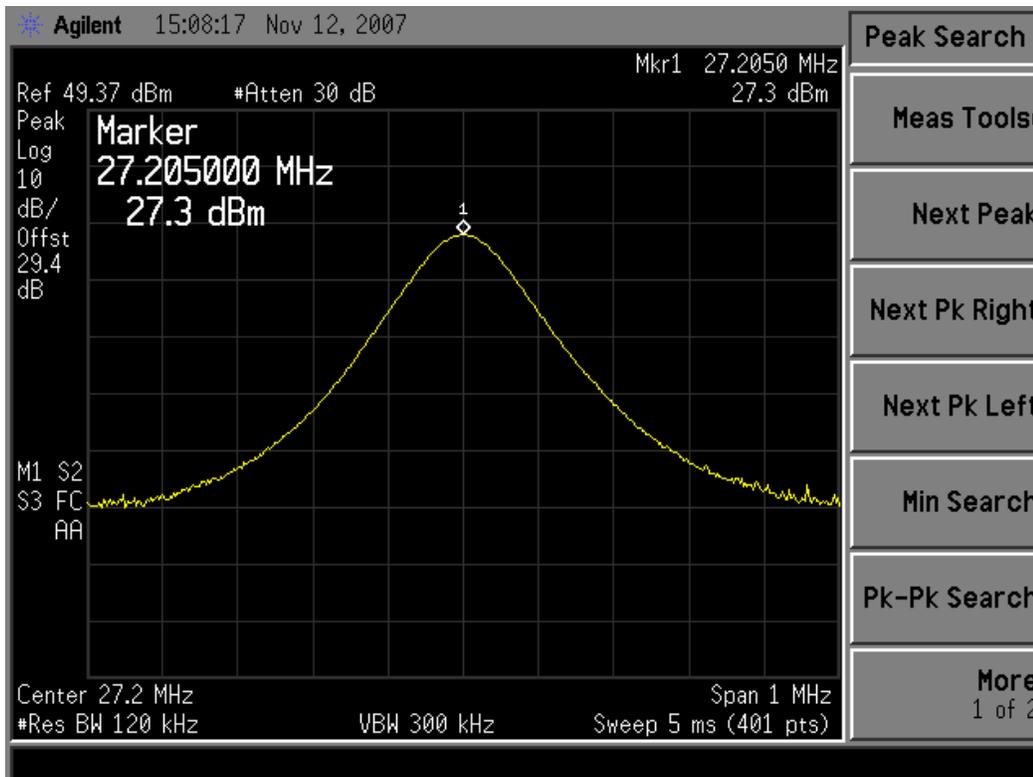
RF Output Power, Low Setting, Channel 20, 27.3 dBm (537 mW)

Test Results: Pass

Test Standard: FCC Part 95 Subpart D

Test: Occupied Bandwidth and Emission Type, FCC §95.631(c), §95.633(a)

Performance Criterion: The emission type must be A1D, H1D, J1D, R1D, A3E, H3E, J3E, or R3D. The authorized bandwidth for emission type A1D or A3E is 8 kHz.

Test Environment:

Environmental Conditions During Testing:		Ambient (°C):	20c	Humidity (%):	26%	Pressure (hPa):	1050mB
Pretest Verification Performed		Yes		Equipment under Test:		40-Ch 4W Handheld CB Radio with Weather Alert	
Test Engineer(s):	Nicholas Abbondante			EUT Serial Number:		FCC#2	

Test Equipment Used:

| TEST EQUIPMENT LIST					
Item	Equipment Type	Make	Model No.	Serial No.	Next Cal. Due
1	Digital 4 Line Barometer	Mannix	0ABA116	BAR2	05/20/2008
2	Attenuator, 30dB	Weinschel Corp	47-30-34	BD4327	09/13/2008
3	Spectrum Analyzer	Agilent	E7405A	US40240205	08/09/2008
4	RF Communications Test Set	Hewlett Packard	8920B	US36141447	03/19/2008
5	Cable, BNC - BNC, 3.5' long	Pomona	RG-58C/U	CBL019	09/18/2008

Comment [GRW2]: Type in the equipment's asset Numbers in each row of this column (add new columns when needed) and the table will fill in automatically when you press the running man button.

Test Details:

Notes: The emission type is A3E, double sideband full AM, using a single analog channel and carrying telephony(voice). A 29.37 dB reference level offset was used to compensate for cable and attenuator losses. The audio input level at 2500 Hz which yielded 50% modulation depth was -39.7 dBm, therefore the level used was 16 dB higher, or -23.7 dBm. The emissions designator is 5K43A3E.
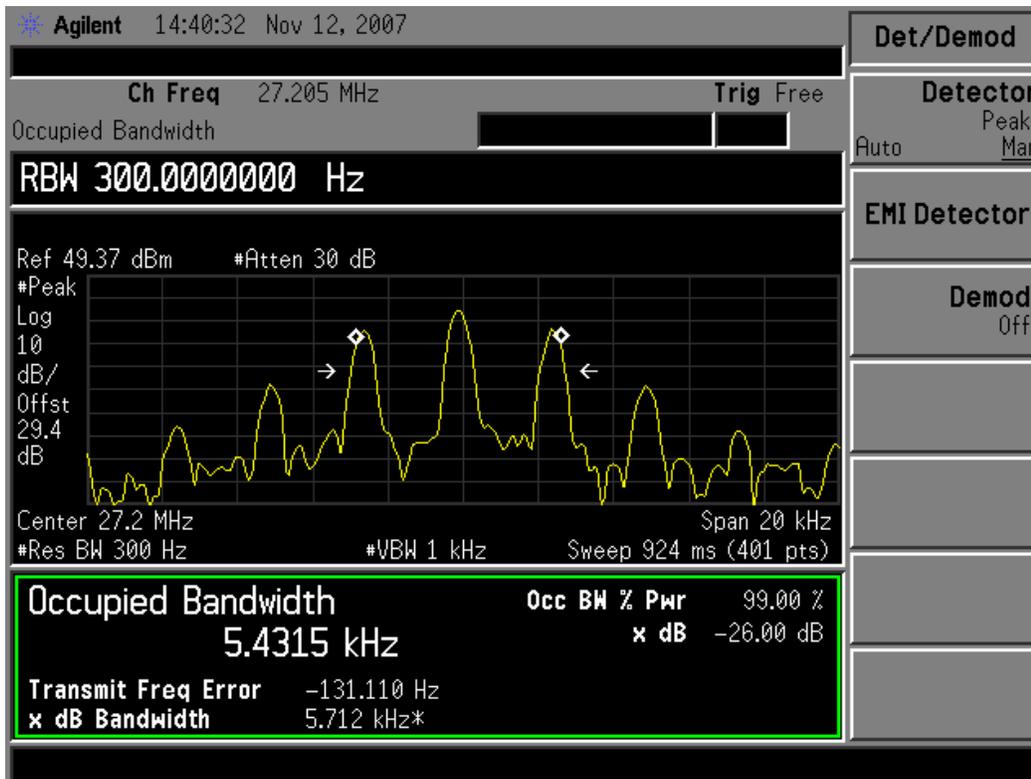
Occupied Bandwidth, High Power, Channel 20, 5.43 kHz
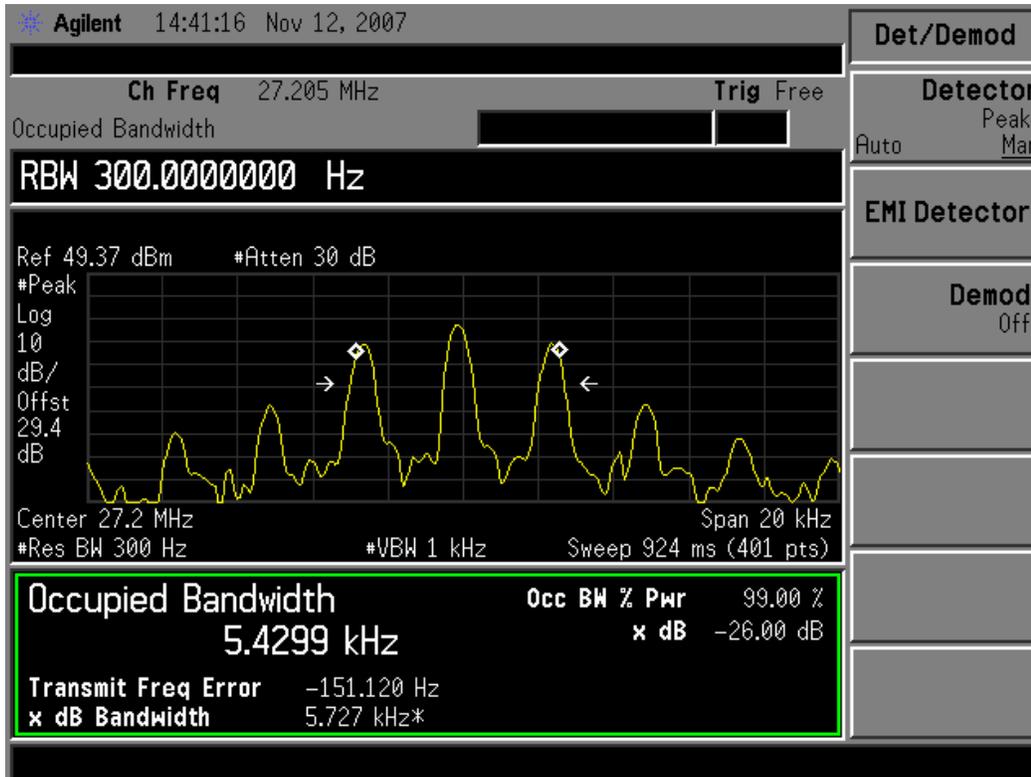
Occupied Bandwidth, Low Power, Channel 20, 5.43 kHz

Test Results: Pass

Test Standard: FCC Part 95 Subpart D

Test: Frequency Tolerance, FCC §95.625(a),(b), §95.655(a)

Performance Criterion: Each CB transmitter must be maintained within a frequency tolerance of 0.005%. No transmitter will be certificated for use in the CB service if it is equipped with a frequency capability not listed in §95.625.

Test Environment:

Environmental Conditions During Testing:		Ambient (°C):	22.8	Humidity (%):	28	Pressure (hPa):	1013
Pretest Verification Performed		Yes		Equipment under Test:		40-Ch 4W Handheld CB Radio with Weather Alert	
Test Engineer(s):	Nicholas Abbondante			EUT Serial Number:		FCC#2	

Test Equipment Used:

TEST EQUIPMENT LIST					
Item	**Equipment Type**	**Make**	**Model No.**	**Serial No.**	**Next Cal. Due**
1	Attenuator, 30dB	Weinschel Corp	47-30-34	BD4327	09/13/2008
2	Spectrum Analyzer	Agilent	E7405A	US40240205	08/09/2008
3	Environmental Test Chamber	Envirotronics	SH27C	08015563-S-11264	02/12/2008
4	Humidity Chart Recorder	Dickson	TH601	191342	09/4/2008
5	Temp/Barometer	Oakton	143T	93784001	04/5/2008
6	Cable, BNC - BNC, 3.5' long	Pomona	RG-58C/U	CBL019	09/18/2008

Comment [GRW3]: Type in the equipment's asset Numbers in each row of this column (add new columns when needed) and the table will fill in automatically when you press the running man button.

Software Utilized:

Name	Manufacturer	Version
EXCEL 2000	Microsoft Corporation	9.0.6926 SP-3
EMI BOXBOROUGH	Intertek	3/07/07 Revision

Test Details:

Frequency Stability

Company: RadioShack Corporation
Model #: 21-1679[A]
Serial #: FCC#2
Engineer(s): Nicholas Abbondante
Project #: 3135908   Date(s): 11/09/07
Standard: FCC Part 95 Subpart D
     Limit: 0.005 %

Test Equipment Used:
AGL001   WEI16   CBL028
ID: ENV1   148-013   147-114   147-236

Location: Littleton

Channel   20   Nominal f: 27.205 MHz   Voltage: 12 VDC

Channel (#)	Nominal f (MHz)	Actual f (MHz)	Deviation (%)	Limit (%)
1	26.965	26.964866	0.000497	0.005
2	26.975	26.974875	0.000463	0.005
3	26.985	26.984898	0.000378	0.005
4	27.005	27.004904	0.000355	0.005
5	27.015	27.014914	0.000318	0.005
6	27.025	27.024924	0.000281	0.005
7	27.035	27.034930	0.000259	0.005
8	27.055	27.054935	0.000240	0.005
9	27.065	27.064947	0.000196	0.005
10	27.075	27.074955	0.000166	0.005
11	27.085	27.084847	0.000565	0.005
12	27.105	27.104843	0.000579	0.005
13	27.115	27.114841	0.000586	0.005
14	27.125	27.124838	0.000597	0.005
15	27.135	27.134833	0.000615	0.005
16	27.155	27.154830	0.000626	0.005
17	27.165	27.164827	0.000637	0.005
18	27.175	27.174824	0.000648	0.005
19	27.185	27.184821	0.000658	0.005
20	27.205	27.204818	0.000669	0.005
21	27.215	27.214814	0.000683	0.005
22	27.225	27.224811	0.000694	0.005
23	27.255	27.254808	0.000704	0.005
24	27.235	27.234806	0.000712	0.005
25	27.245	27.244803	0.000723	0.005
26	27.265	27.264800	0.000734	0.005
27	27.275	27.274798	0.000741	0.005
28	27.285	27.284796	0.000748	0.005
29	27.295	27.294794	0.000755	0.005
30	27.305	27.304791	0.000765	0.005
31	27.315	27.314788	0.000776	0.005
32	27.325	27.324786	0.000783	0.005
33	27.335	27.334784	0.000790	0.005
34	27.345	27.344782	0.000797	0.005
35	27.355	27.354781	0.000801	0.005
36	27.365	27.364780	0.000804	0.005
37	27.375	27.374780	0.000804	0.005
38	27.385	27.384778	0.000811	0.005
39	27.395	27.394777	0.000814	0.005
40	27.405	27.404775	0.000821	0.005

Temp Celsius	Frequency MHz	Deviation %	Limit %
-30	27.205275	0.001011	0.005
-20	27.205275	0.001011	0.005
-10	27.205279	0.001026	0.005
0	27.205249	0.000915	0.005
10	27.205187	0.000687	0.005
20	27.205120	0.000441	0.005
30	27.204965	0.000129	0.005
40	27.204895	0.000386	0.005
50	27.204763	0.000871	0.005

Test Results: Pass

Test Standard: FCC Part 95 Subpart D

Test: Conducted Spurious Emissions, Emissions Masks, FCC §95.635(b)(1, 3, 8, 9)

Performance Criterion: Spurious emissions must be attenuated below the level of the carrier frequency by at least 25 dB on any frequency removed from the center of the authorized bandwidth by between 50-100% of the authorized bandwidth, by 35 dB on any frequency removed from the center of the authorized bandwidth by 100-250% of the authorized bandwidth, by 53+10*LOG(T) dB on any frequency removed from the center of the authorized bandwidth by more than 250%, and by 60 dB on any frequency that is equal to or greater than twice the transmit frequency.

Test Environment:

Environmental Conditions During Testing:		Ambient (°C):	N/A	Humidity (%):	N/A	Pressure (hPa):	N/A
Pretest Verification Performed		Yes		Equipment under Test:		40-Ch 4W Handheld CB Radio with Weather Alert	
Test Engineer(s):	Nicholas Abbondante			EUT Serial Number:		FCC#2	

Test Equipment Used:

TEST EQUIPMENT LIST					
Item	Equipment Type	Make	Model No.	Serial No.	Next Cal. Due
1	Attenuator, 30dB	Weinschel Corp	47-30-34	BD4327	09/13/2008
2	Cable, BNC - BNC, 3.5' long	Pomona	RG-58C/U	CBL019	09/18/2008
3	Spectrum Analyzer	Agilent	E7405A	US40240205	08/09/2008
4	RF Communications Test Set	Hewlett Packard	8920B	US36141447	03/19/2008

Comment [GRW4]: Type in the equipment's asset Numbers in each row of this column (add new columns when needed) and the table will fill in automatically when you press the running man button.

Software Utilized:

Name	Manufacturer	Version
EXCEL 2000	Microsoft Corporation	9.0.6926 SP-3

Test Details:

FCC Part 95D DSB CB Radio Emissions Mask