

# Marstech Limited

11 Kelfield Street, Etobicoke, Ontario, Canada, M9W 5A1  
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TEST REPORT			
REPORT DATE:	July 20, 1998		REPORT NO: 98278D
CONTENTS:	See Table of Contents		
SUBMITTOR:	Thomson Consumer Electronics, Inc. Audio & Communications Product Dev. 101 West 103rd Street Indianapolis, IN 46290-1102 USA		
SUBJECT:	Model No: 2-9917(XXXX) FCC ID: G9H2-9917		
TEST SPECIFICATION	FCC CFR 47 15.233 AND 2.989 Sections: 15.35, 15.107, 15.109, 15.207 and 15.209 NOTE: Tests Conducted Are "Type" Tests.		
DATE SAMPLE RECEIVED:	June 25, 1998	DATE TESTED:	July 10, 1998
RESULTS:	Equipment tested complies with referenced specification.		
ALTERATIONS	None		
Tested by:	<div>Original signed by: Jim Sims <i>Ed Chang per Refen</i> Edward Chang</div> <div> Approved and Certified by: <i>Robert G. Marshall</i> Robert G. Marshall, P. Eng. Date: <i>30 July 98</i></div>		
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Authorized by:  
Professional Engineer  
Ontario



Engineering &  
Administrative



Testing For FCC  
Submissions/Verifications

Industry Canada  
Industrie Canada  
Approved Test Facility



TECHNICAL REPORT - FCC 2.1033(b)

Applicant

Thomson Consumer Electronics, Inc.  
Audio & Communications Product Dev.  
101 West 103rd Street  
Indianapolis, IN  
46290-1102 USA

FCC Identifier

G9H2-9917

Manufacturer

Integrated Display Technology Ltd.  
Block D, Xixian Chen Tian Industrial Estate  
Xixian Town, Bao An City  
China

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EXHIBIT D

(FCC Ref. 2.1033(b)(6))

"Report of Measurements"

EXHIBIT D(1)

DEVICE MEASURED

(FCC Ref. 2.1033(b)(6))

APPLICANT: Thomson Consumer Electronics, Inc.  
Audio & Communications Product Dev.  
101 West 103rd Street  
Indianapolis, IN  
46290-1102 USA

MANUFACTURER: Integrated Display Technology Ltd.  
Block D, Xixian Chen Tian Industrial Estate  
Xixian Town, Bao An City  
China

FCC IDENTIFIER: G9H2-9917

TRADE NAME: GE

MODEL NUMBER: 2-9917(XXXX)

SERIAL NO.: N/M

Marstech Limited  
11 Kelfield Street  
Etobicoke, Ontario  
M9W 5A1 CANADA

TECHNICIANS:  
Jim Sims - Com-Serve Corp.

\_\_\_\_\_  
Robert G. Marshall, P. Eng.

Date: \_\_\_\_\_

EXHIBIT D(2)

TEST FACILITY AND EQUIPMENT LIST

FACILITIES

Radiated      ANSI C63.4 (FCC OET/55) open field 3 meter test range. This test range is protected from the cold and moisture by a non-conductive enclosure.

Conducted     "Ace" double wall copper screen room.

EQUIPMENT

Anritsu 2601 A spectrum analyzer.  
Hewlett-Packard RF generator # 8640 B with an 002 doubler  
Hewlett-Packard 8449B Preamp. (30 dB) .. 1.0 MHz to 26.5 Ghz  
A.H. Systems biconical antenna; ..... 20 MHz to 330 MHz  
A.H. Systems log periodic antenna; ..... 300 MHz to 1.8 GHz  
A.H. Systems log periodic antenna; ..... 1.0 GHz to 12.4 GHz  
Eaton dipole antennas; T1, T2, T3 ..... 25 MHz to 1.0 GHz  
Roberts dipole antennas; T1, T2, T3 & T4 25 MHz to 1.0 GHz  
Compliance Design P950 Preamp (16 dB) ... 25 MHz to 1.0 GHz  
Notch Filter; Model FIL01605001 ..... 30 dB at 920 MHz  
M/A-COM High Frequency Cable Assembly; No. 2026-0600

NOTE:

The Anritsu 2601 A spectrum analyzer and the Advantest R3261A spectrum analyzer are calibrated annually, and that calibration is directly traceable to the National Research Council of Canada. (NRC)  
This equipment is only used by qualified technicians and only for the purpose of EMI measurements.  
The three metre test range has been carefully evaluated to the ANSI document C63.4 and will be remeasured for reflections and losses every three years.

# FEDERAL COMMUNICATIONS COMMISSION

7435 Oakland Mills Road  
Columbia, MD 21046  
Telephone: 301-725-1585 (ext-218)  
Facsimile: 301-344-2050

September 23, 1997

IN REPLY REFER TO  
31040/SIT  
1300F2

Electrohome Electronics Ltd  
809 Wellington Street, North  
Kitchener, Ontario N2G 4J6, Canada

Attention: Gerry Gallagher

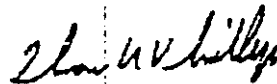
Re: Measurement facility located at Roseville  
(3 meter site)

Gentlemen:

Your submission of the description of the subject measurement facility has been reviewed and found to be in compliance with the requirements of Section 2.948 of the FCC Rules. The description has, therefore, been placed on file and the name of your organization added to the Commission's list of facilities whose measurement data will be accepted in conjunction with applications for certification or notification under Parts 15 or 18 of the Commission's Rules. Our list will also indicate that the facility complies with the radiated and AC line conducted test site criteria in ANSI C63.4-1992. Please note that this filing must be updated for any changes made to the facility, and at least every three years the data on file must be certified as current.

Per your request, the above mentioned facility has been also added to our list of those who perform these measurement services for the public on a fee basis. This list is published periodically and is also available on the Laboratory's Public Access Link as described in the enclosed Public Notice.

Sincerely,



Thomas W. Phillips  
Electronics Engineer  
Customer Service Branch

FCC ID: G9H2-9917  
EXHIBIT D(2)-2  
Marstech Report #98278A

EXHIBIT D(2)

SPECTRUM ANALYZER -

ANRITSU MS2601A S/N MT64544 - NEXT CALIBRATION  
APRIL 1999

**SUMMARY OF RESULTS**COMPLIANCE  
(yes) (no)**FIELD STRENGTH OF THE CARRIER FREQUENCIES**

Headset, Low Channel	( X ) ( )
Headset, High Channel	( X ) ( )
Base Station, Low Channel	( X ) ( )
Base Station, High Channel	( X ) ( )

**SPURIOUS RADIATED EMISSIONS (15.109)**

Headset	( X ) ( )
Base Station	( X ) ( )

**SPURIOUS RADIATED EMISSIONS (15.209/15.249)**

Headset, Low Channel	( X ) ( )
Headset, High Channel	( X ) ( )
Base Station, Low Channel	( X ) ( )
Base Station, High Channel	( X ) ( )

**LINE CONDUCTED SPURIOUS EMISSIONS**

Base Station <u>Telephone mode</u>	( X ) ( )
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**EQUIPMENT REQUIREMENTS AND IDENTIFICATION**

a) Manufacturers or applicants name	(X) ( )
b) Model designation	(X) ( )
c) Serial number	(N/M) ( )
d) Antenna	(X) ( )
e) Operator controls	(X) ( )
f) Security Coding	(X) ( )
g) Equipment/Packaging Marking	(X) ( )



## **CARRIER FREQUENCY FIELD STRENGTH**

### **RESULTS**

#### **Headset**

Low Channel: **Maximum field strength of 14,125  $\mu$ V/M; at 925.300 MHz.**

High Channel: **Maximum field strength of 10,370  $\mu$ V/M; at 927.150 MHz.**

Note: *The remote headset was attached to the handset/controller during carrier level tests.*

#### **Base Station:**

Low Channel: **Maximum field strength of 15,336  $\mu$ V/M; at 902.850 MHz.**

High Channel: **Maximum field strength of 12,960  $\mu$ V/M; at 904.400 MHz.**

Note: *All other channels were checked for carrier frequency field strength levels.*

### **TEST CONDITIONS**

#### **Equipment Positioning:**

Headset: Vertical or upright

Base Station: Standing on its back with the antenna extended in the vertical plane.

#### **Antenna Polarization:**

Headset: Vertical

Base Station: Vertical

Antenna Type: T.4; tuned half wave dipole

Measurement Bandwidth: 100 KHz

#### **Supply Voltages:**

Headset 3.6 VDC from an internal battery.

Base Station 120 VAC/60 Hz to 12 VDC (adaptor)

### **METHODS OF MEASUREMENT**

The headset telephone components were placed in turn on a one metre high, non-metallic turntable and set at maximum output level. Measurements were made in a minimum of 3 positions for the Headset and 2 for the base station. If adjustable, the whip antennas were fully extended.

For each of the above conditions the turntable was rotated through 360 degrees while the receiving antenna, at three (3) metres from the EUT, was varied in height from 1 to 4 metres and set in both planes of polarization to find the maximum signal strength. The level was measured using a spectrum analyzer and a substitution signal from an RF generator. The measured level was converted to a field strength using the antenna correction factors and cable losses.

All base station measurements were made with the equipment under test connected to an artificial telephone line network, with 48 VDC applied.

## **SPURIOUS RADIATED EMISSIONS**

### **RESULTS**

The maximum field strength of any harmonic or spurious emission with respect to the applicable limit, while transmitting or receiving was:

**Headset:**                **Maximum field strength of: 94.3  $\mu$ V/M at 445.73 MHz**  
                                 **Maximum field strength of: NONE FOUND over 1000 MHz**

**Base Station:**                **Maximum field strength of 122.8  $\mu$ V/M at 936.00 MHz**  
                                 **Maximum field strength of: NONE FOUND over 1000 MHz**

*Note:    The remote headset was attached to the handset/controller during spurious emission tests.*

### **TEST CONDITIONS**

**Equipment Positioning:**

Headset                Laying on its side  
Base Station:        Standing on its back with the antenna extended in the vertical plane.

**Antenna Polarization:**

Headset:                Horizontal  
Base Station:            Vertical and horizontal  
Base Station, Receive    Horizontal

**Measurement Bandwidth:**        100/120 KHz(IF) & 1 MHz(IF) for frequencies above 1.0 GHz.

**Supply Voltages:**

Headset                3.6 VDC from an internal battery.  
Base Station        120 VAC/60 Hz to 12 VDC (adaptor)

### **METHODS OF MEASUREMENT**

The headset telephone components were placed in turn on a one metre high, non-metallic turntable. Measurements were made in a minimum of 3 positions for the Headset and 2 for the base station. If adjustable, the whip antennas were fully extended.

For each of the above conditions the turntable was rotated through 360 degrees while the receiving antenna, at three (3) metres from the EUT, was varied in height from 1 to 4 metres and set in both planes of polarization to find the maximum signal strength. The level was measured using a spectrum analyzer and a substitution signal from an RF generator. The measured level was converted to a field strength using the antenna correction factors and cable losses.

All base station measurements were made with the equipment under test connected to an artificial telephone line network, with 48 VDC applied.

**RADIATED EMISSION RESULTS**

BW: 100/120 KHz and 1.0 MHz

Span: 5 to 50 MHz

**HEADSET**

TEST # MODE	FREQ MHz BAND	LEVEL $\mu$ V	ANT. TYPE (PZ)	ANT. FACT.	F.S. $\mu$ V/M	LIMIT $\mu$ V/M	DIFF. TO LIMIT; dB
CARRIER	925.300	316.00	RT.4 V	44.7	14125.2	50,000	-10.98
CARRIER	927.150	232.00	RT.4 V	44.7	10370.4	50,000	-13.66
01 TX	445.73	10.6	L/P H	8.9	94.3	200	-6.53
02 TX	462.31	08.0	L/P H	10.0	80.0	200	-7.96

**BASE STATION**

TEST # MODE	FREQ MHz BAND	LEVEL $\mu$ V	ANT. TYPE (PZ)	ANT. FACT.	F.S. $\mu$ V/M	LIMIT $\mu$ V/M	DIFF. TO LIMIT; dB
CARRIER	902.850	355.0	RT.4 V	43.2	15336.0	50,000	-10.27
CARRIER	904.400	300.0	RT.4 V	43.2	12960.0	50,000	-11.73
01 RX	936.00	03.3	L/P H	37.2	122.8	200	-4.24

## POWER LINE CONDUCTED EMISSIONS

### RESULTS

The largest RF voltages on the AC power lines, over the frequency range of 450 KHz to 30 MHz, was **6.33  $\mu$ V (16.03 dB $\mu$ V) at 2.4 MHz** from the base station while transmitting and/or receiving. (A side of the line in the telephone mode) Refer to the attached results.

### TEST CONDITIONS

<u>Measurement Bandwidth:</u>	9 KHz Q.P. (IF)
<u>AC Test Voltage:</u>	120 VAC (filtered and stabilized)
<u>Mode of Operation:</u>	Telephone

### METHODS OF MEASUREMENT

The base station portion of the headset telephone was placed on a wooden table directly above a 50 ohm line impedance stabilization network.(LISN) If adjustable, the whip antenna was fully extended vertically and the AC power attachment cord went directly down to the LISN. The LISN is grounded directly to the floor of the test facility. Excess AC cord was coiled in a figure eight pattern before connecting directly to the 50 micro-henry LISN.

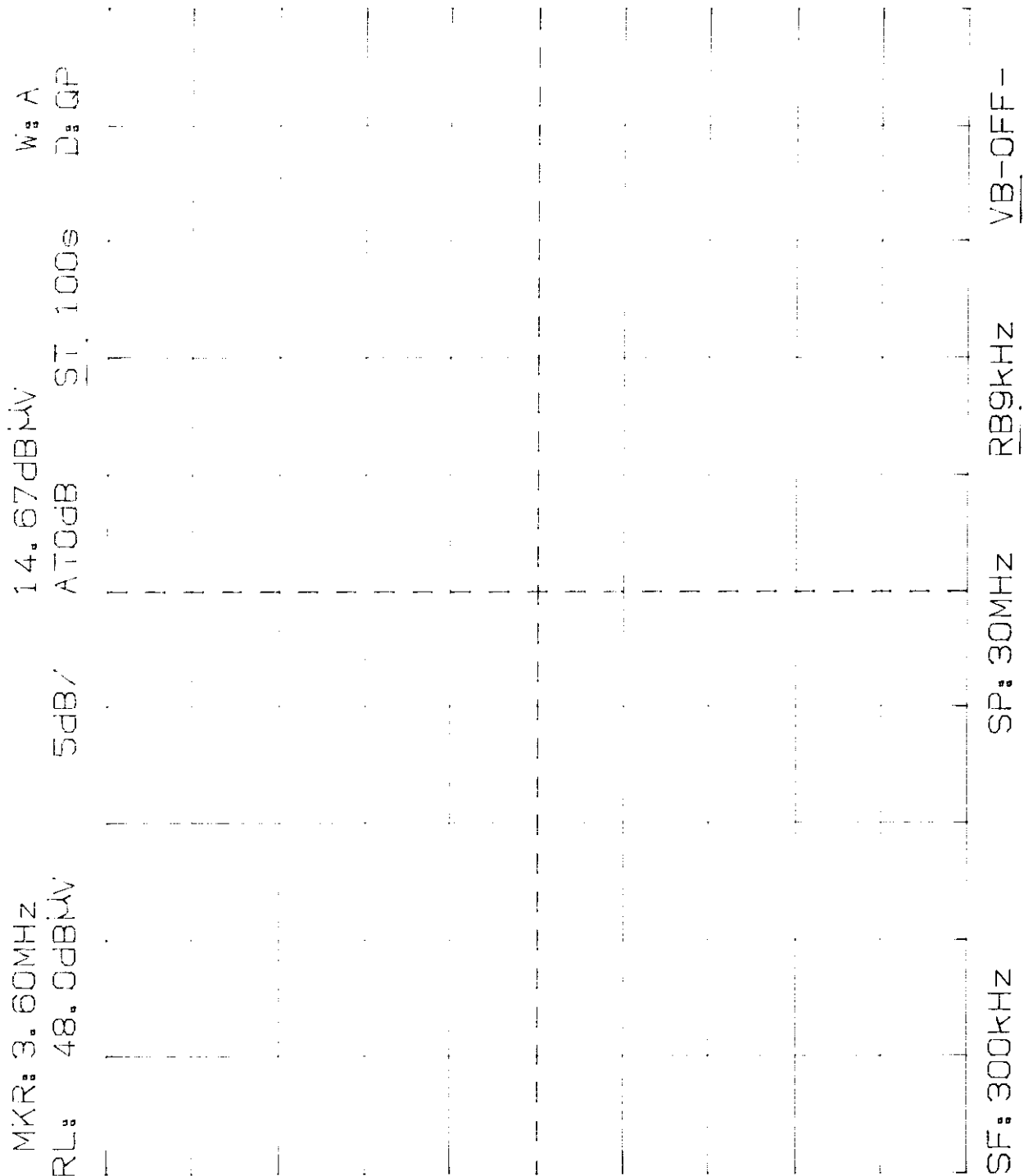
The base station was connected to a simulated 9,000 foot phone line and 48 VDC was applied. The 9,000 foot phone line network was grounded to the nearest AC outlet with a test lead.

A length of low loss RF foam cable was used to couple the RF voltages from the LISN to the spectrum analyzer. The base station transmitter was keyed on by the handset transmitting nearby. All of the RF voltages were recorded and are attached.

The base station was tested in all modes of operation which were applicable to the specific equipment under test. This included operating modes such as "calling/paging", quiescent or receive mode and standard telephone/transmit operation while switching the transmit channels.

If the cordless phone contained an intercom mode of operation, then this test was repeated in that mode. The attached results represent the **worst case results** in each test condition and frequency band.

POWER LINE CONDUCTED EMISSIONS  
MODEL 2-9917(XXXX)  
SIDE: A



POWER LINE CONDUCTED EMISSIONS  
MODEL 2-9917(XXXX)  
SIDE: B

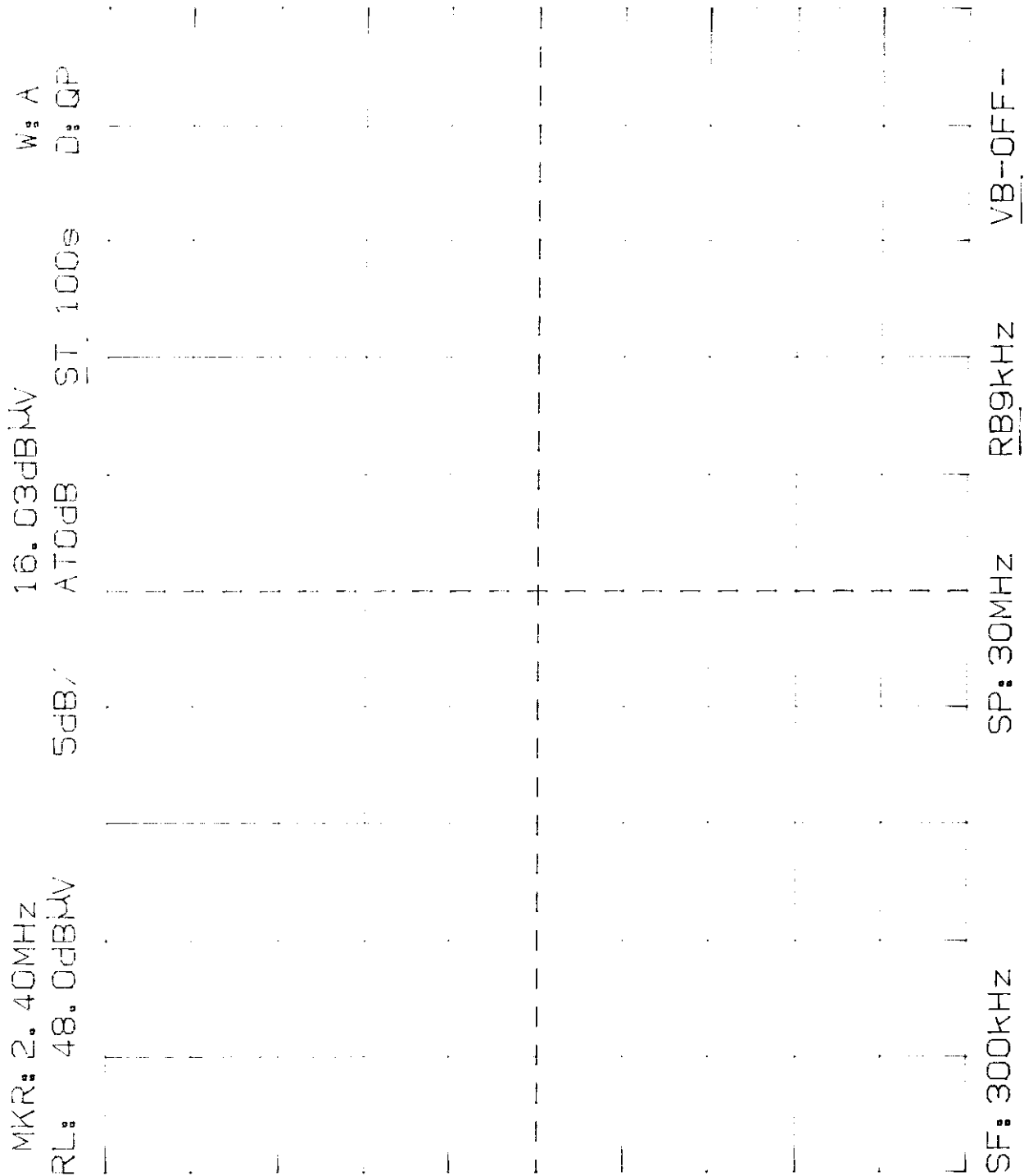


EXHIBIT E  
(FCC Ref. 2.1033(b)(7))

"Photographs"