



**FCC CFR47 PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 8**

CERTIFICATION TEST REPORT

FOR

**GSM/GPRS/EGPRS/WCDMA/HSPA+/DC-HSDPA/LTE radio, IEEE 802.11a/b/g/n and
Bluetooth radio**

MODEL NUMBER: A1428 and A1429

**FCC ID: BCG-E2599A
IC: 579C-E2599A
IC: 579C-E2610A**

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NVLAP LAB CODE 200065-0

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
-	07/27/2012	Original	T. LEE
A	08/07/2012	Added Model A1429	T. LEE

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: APPLE, INC.
1 INFINITE LOOP
CUPERTINO, CA, 95014, U.S.A.

EUT DESCRIPTION: cellular GSM/GPRS/EGPRS/WCDMA/HSPA+/DC-HSDPA/LTE
radio, IEEE 802.11a/b/g/n and Bluetooth radio.

MODEL: A1428 and A1429

SERIAL NUMBER: C39HV0HPF5P5

DATE TESTED: May 23 and July 9, 2012

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-210 Issue 8 Annex 8	Pass
INDUSTRY CANADA RSS-GEN Issue 3	Pass

UL CCS tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For UL CCS By:

Tested By:



TIM LEE
STAFF ENGINEER
UL CCS

CHING PANG
EMC ENGINEER
UL CCS

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 3, and RSS-210 Issue 8.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsemc.com>.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

Model A1428, is a mobile phone with multimedia functions (music, application support, and video), cellular GSM/GPRS/EGPRS/WCDMA/HSPA+/DC-HSDPA/CDMA1xRTT/ EV-DO Rev 0, A, B /1xAdvanced/ LTE radio, IEEE 802.11a/b/g/n radio and Bluetooth radio. The rechargeable battery is not user accessible.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402 - 2480	BLE	11.71	14.825

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PiFA antenna, with a maximum gain as below table.

Frequency (GHz)	Gain (dBi) Type: Pifa
2.400-2.480	-1.4
5.150-5.250	0.14
5.250-5.350	-1.66
5.47-5.725	-0.83
5725-5850	-2.85

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was WL Tool FW 6.10.56.166.

The EUT is also linked in Bluetooth Enable Test mode with Rohde & Schwarz CBT Test box.

5.5. MODEL DIFFERNECE

Model A1428 is identical to Model A1429 except in the license bands. Model A1429 encompasses CDMA technology. Testing conducted on Model A1428 is considered representative for Model A1429

5.6. WORST-CASE CONFIGURATION AND MODE

For Radiated Emissions below 1 GHz and Power line Conducted Emissions, the channel with the highest conducted output power was selected as worst-case scenario.

The worst-position was the EUT with highest emissions. To determine the worst-case, the EUT is a portable device that has three orientations; therefore X, Y and Z orientations have been investigated with and without AC adapter, and the worst case was found to be at Z position without AC Adapter.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	9.90
Middle	2440	9.95
High	2480	10.00

I/O CABLES (Conducted Setup)

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	9.90
Middle	2441	9.95
High	2480	10.00

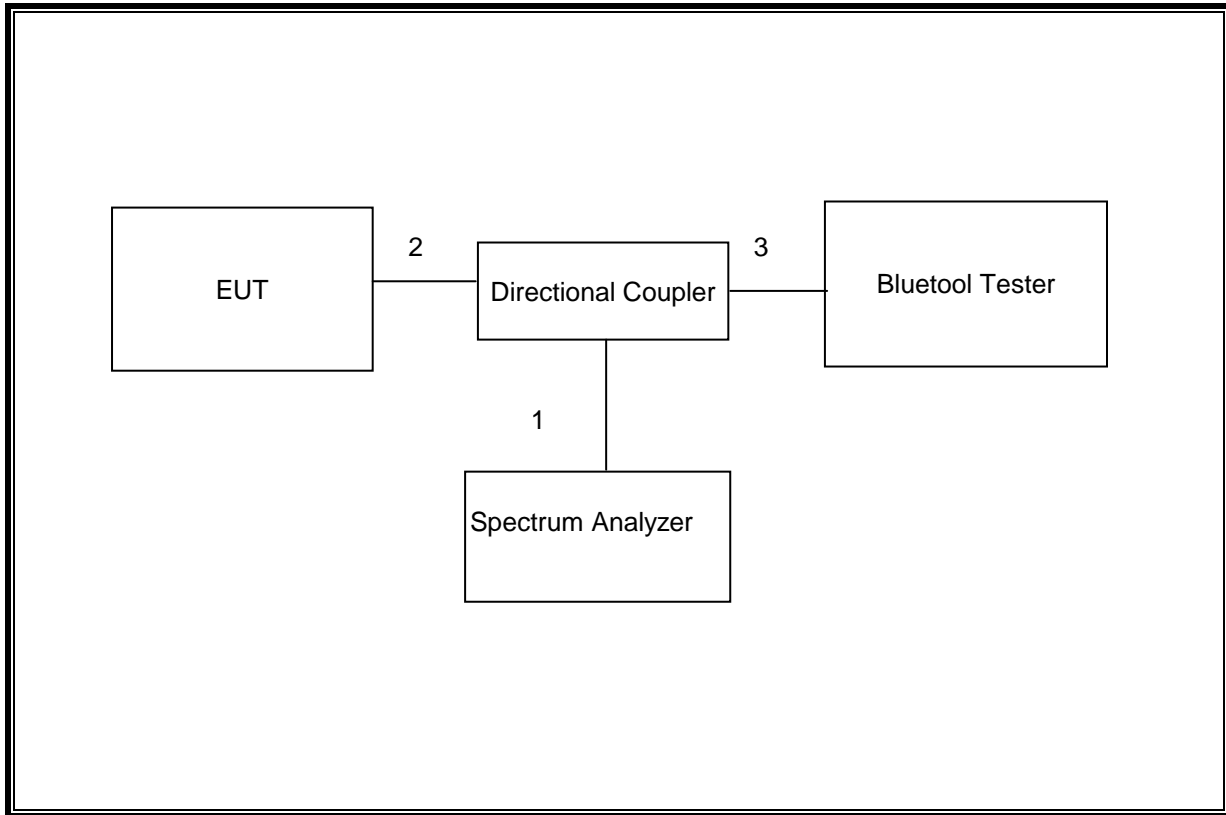
I/O CABLES (Radiated Setup)

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	US115VAC	Shielded	2m	NA
2	DC	1	DC	Shielded	1m	NA
3	Jack	1	Earphone	Shielded	0.5m	NA
4	Antenna Port	1	Horn	Un-shielded	2m	NA

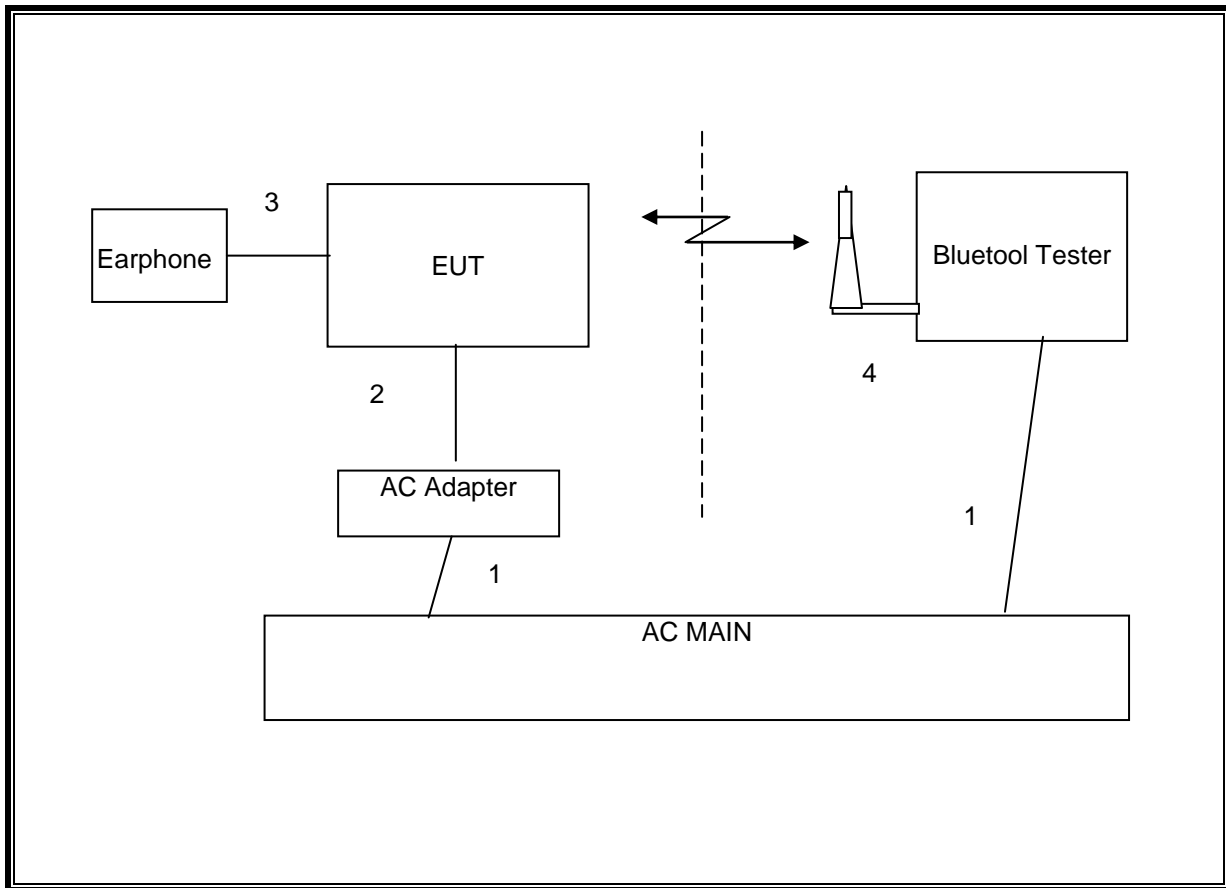
TEST SETUP

The EUT is a stand-alone device.

SETUP DIAGRAM FOR TESTS (CONDUCTED)



SETUP DIAGRAM FOR TESTS (RADIATED)



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Asset	Cal Due
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01159	04/09/13
Antenna, Horn, 18 GHz	EMCO	3115	C00872	05/29/13
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00589	04/28/13
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	04/16/13
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	01/27/13
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	04/12/13
EMI Test Receiver, 9 kHz-7 GHz	R & S	ESCI 7	1000741	07/06/13
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	11/10/12
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRM50702	N02685	CNR
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	12/04/12
Peak Power Meter	Agilent / HP	E4416A	C00963	12/04/12
Bluetooth Tester	R&S	CBT	NA	05/15/13

7. ANTENNA PORT TEST RESULTS

7.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

The minimum 6 dB bandwidth shall be at least 500 kHz.

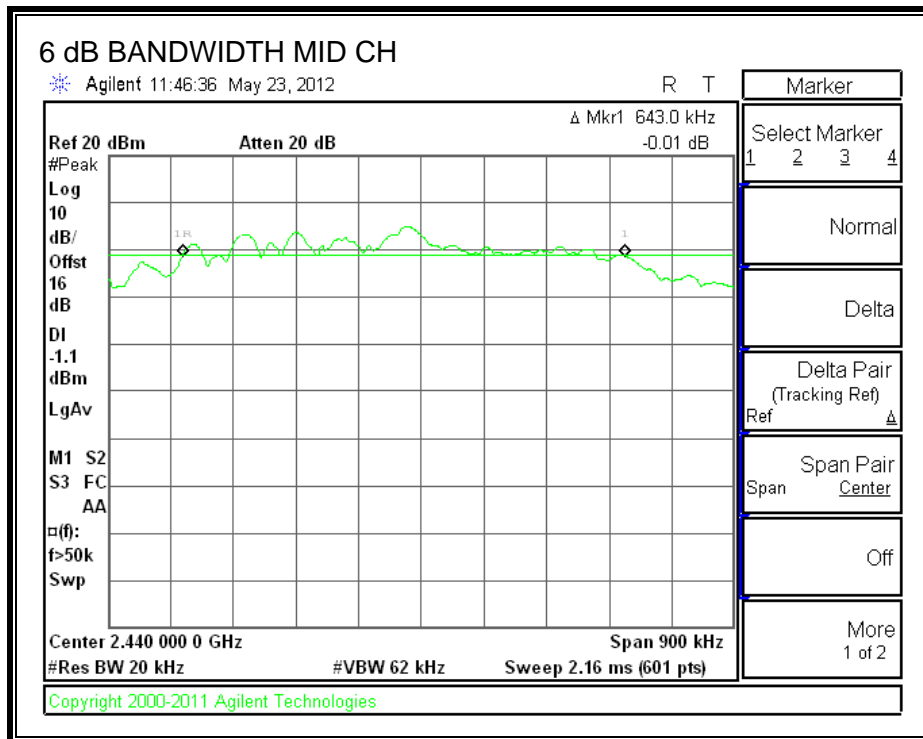
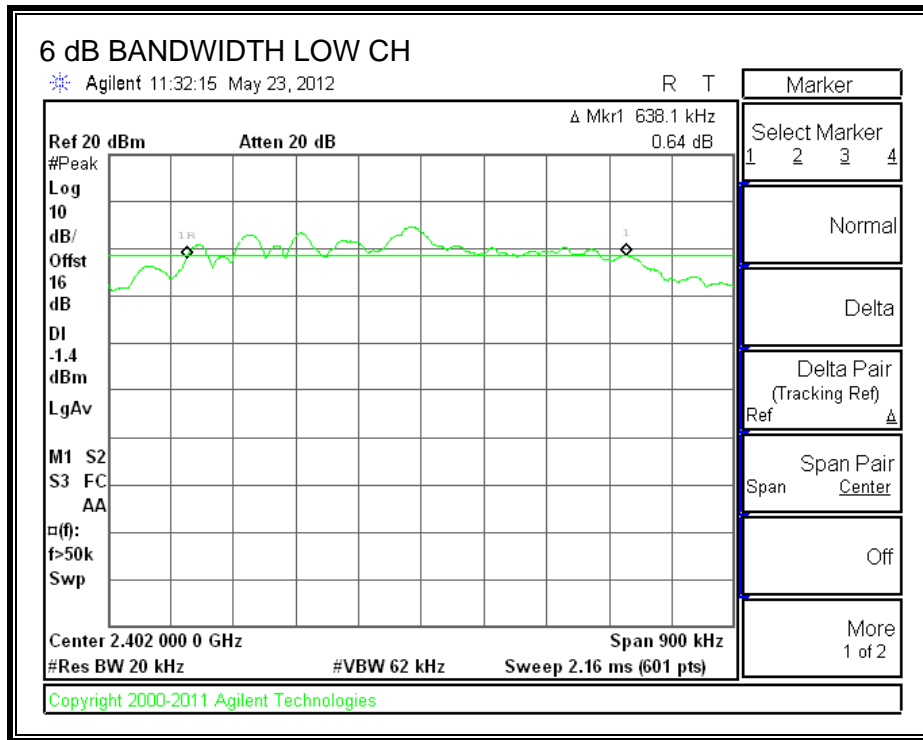
TEST PROCEDURE

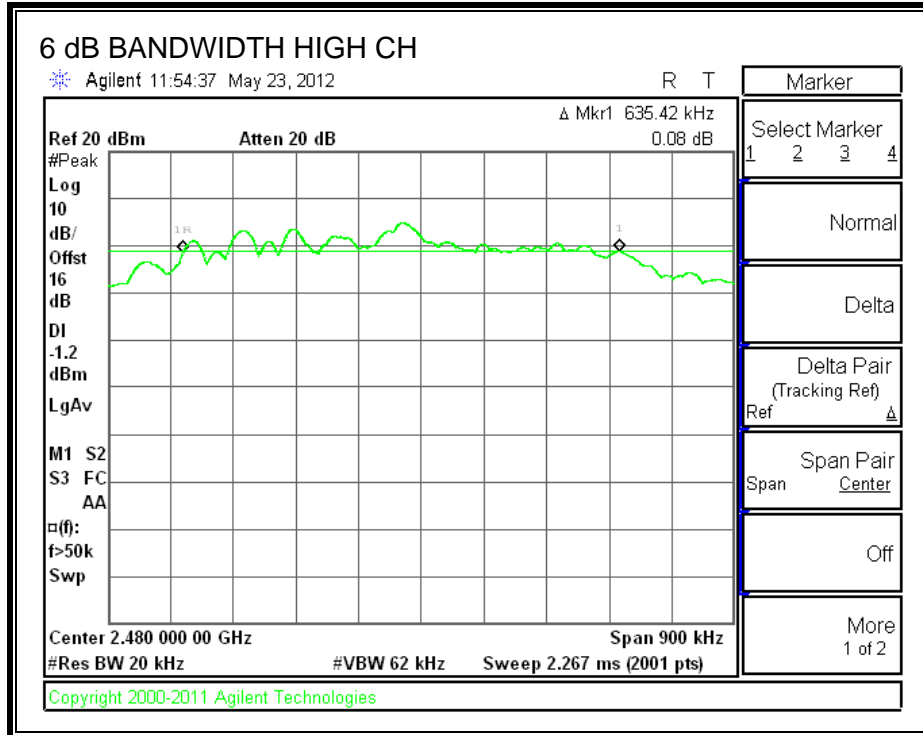
KDB 558074 D01 v01 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247".

RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (KHz)	Minimum Limit (KHz)
Low	2402	638.100	500.0
Middle	2440	643.000	500.0
High	2480	635.420	500.0

6 dB BANDWIDTH





7.2. 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

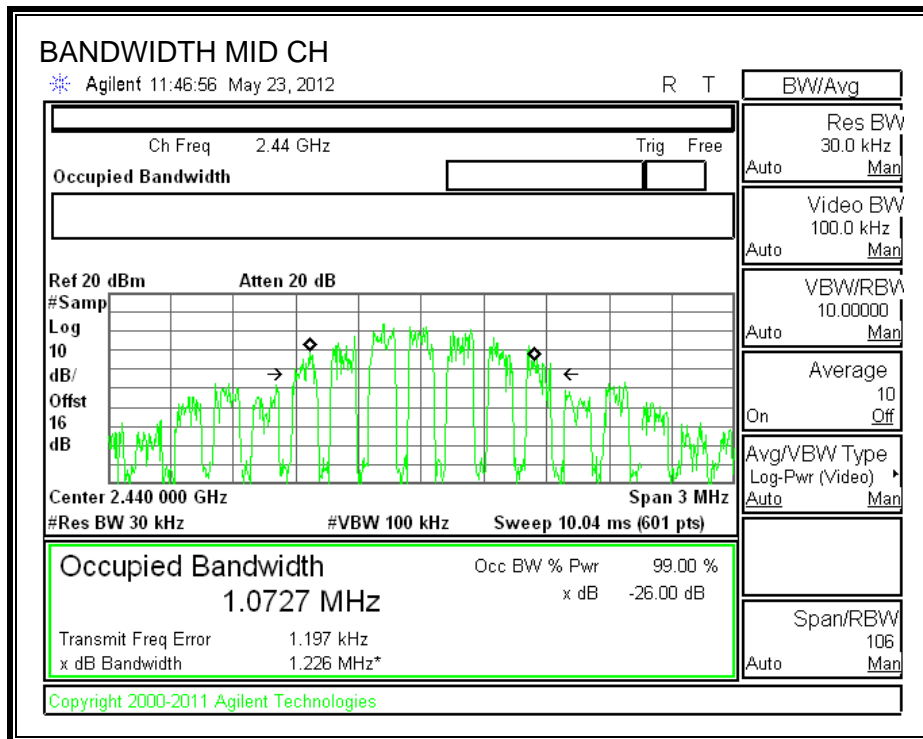
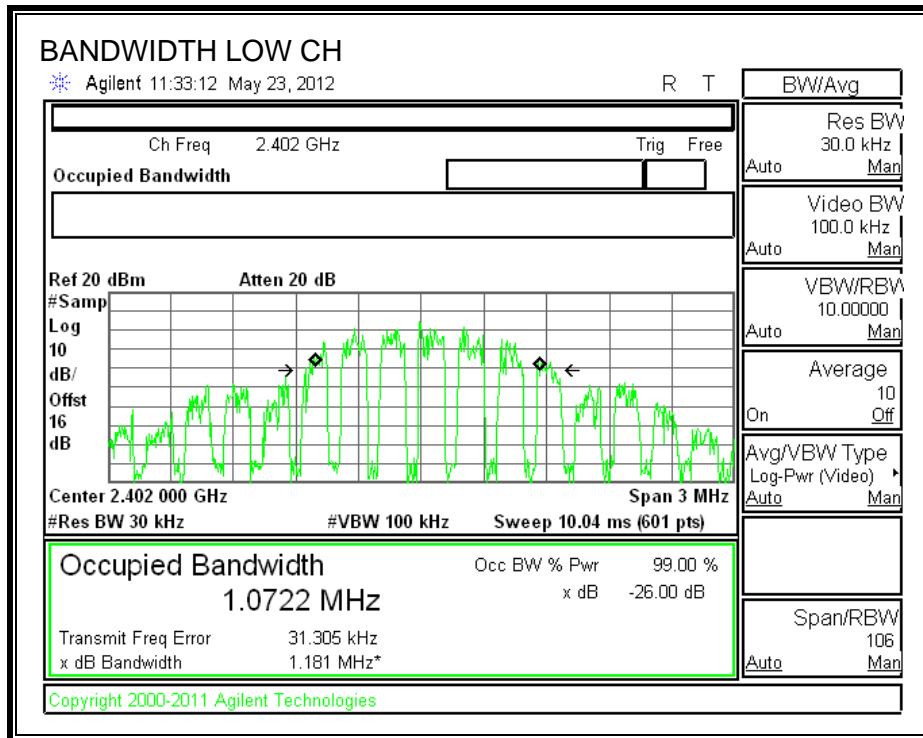
TEST PROCEDURE

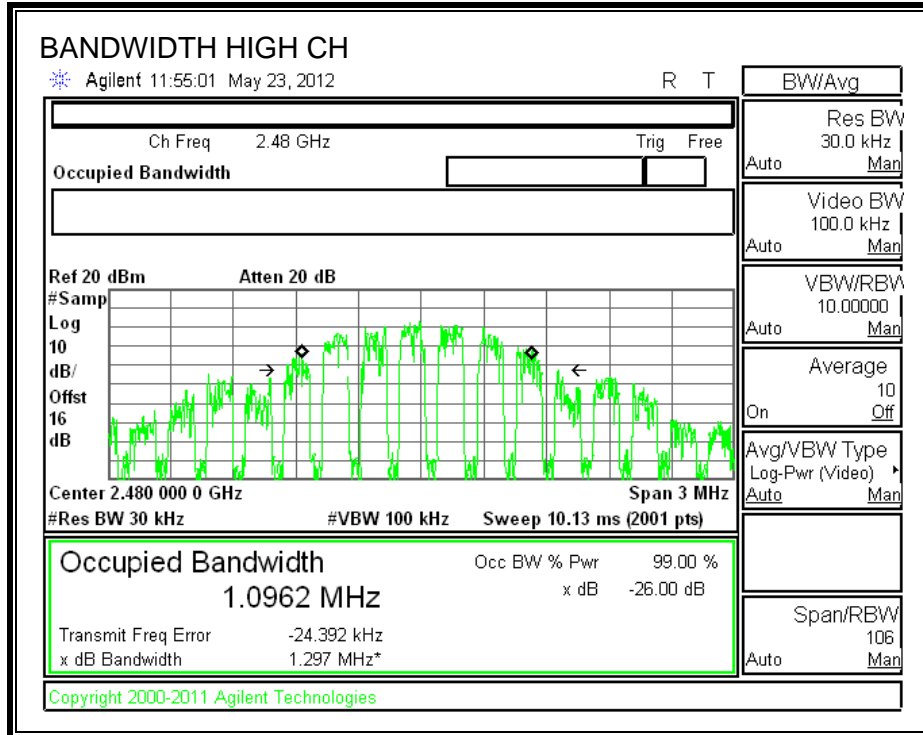
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth and to 1% of the span. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0722
Middle	2440	1.0727
High	2480	1.0962

99% BANDWIDTH





7.3. OUTPUT POWER

LIMIT

§15.247 (b) (1)

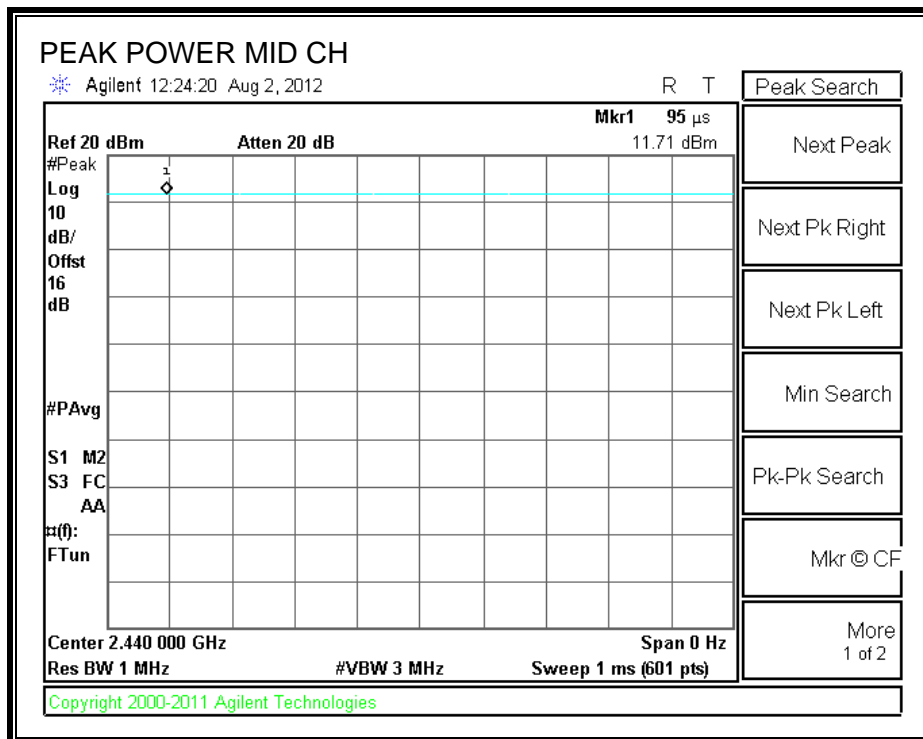
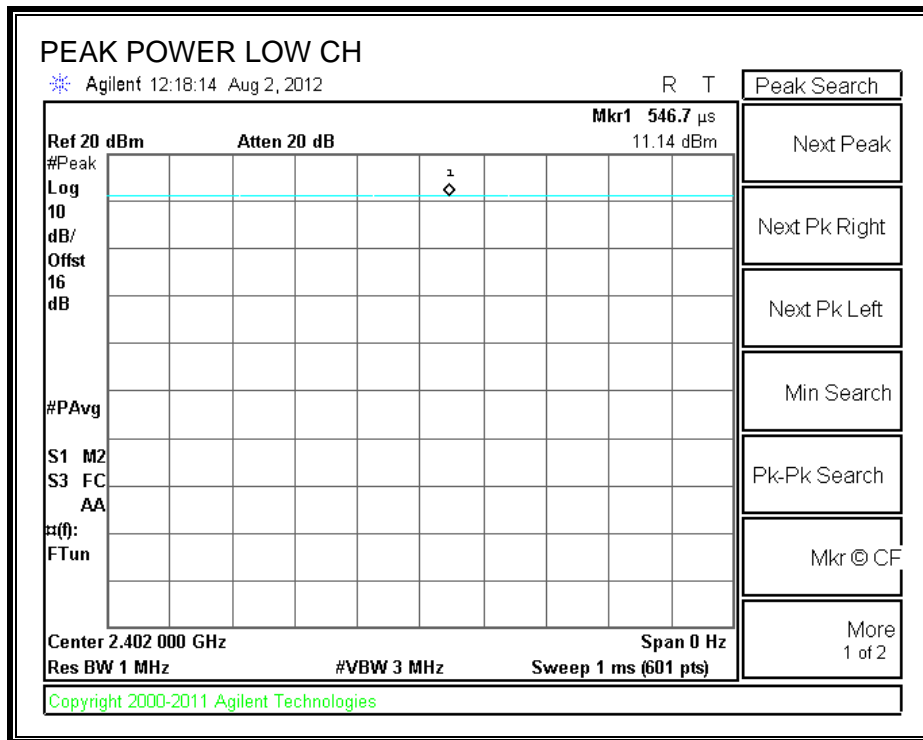
The maximum antenna gain is less than 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

KDB 558074 D01 v01 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247".

RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	11.14	30	-18.86
Middle	2440	11.71	30	-18.29
High	2480	11.62	30	-18.38



7.4. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 16 dB (including 15 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	9.90
Middle	2440	9.95
High	2480	10.00

7.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

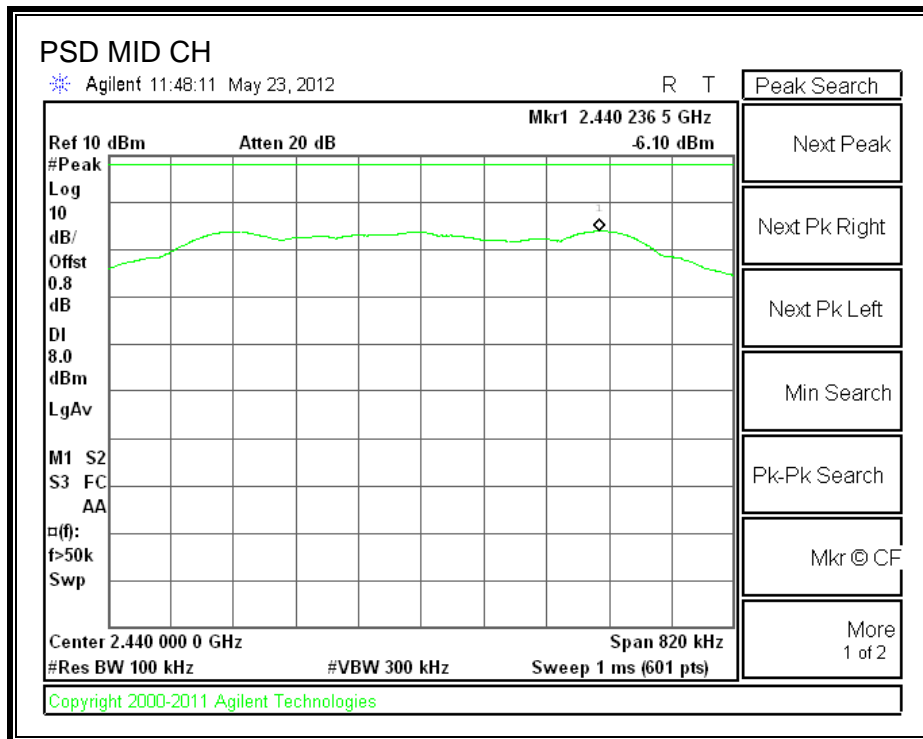
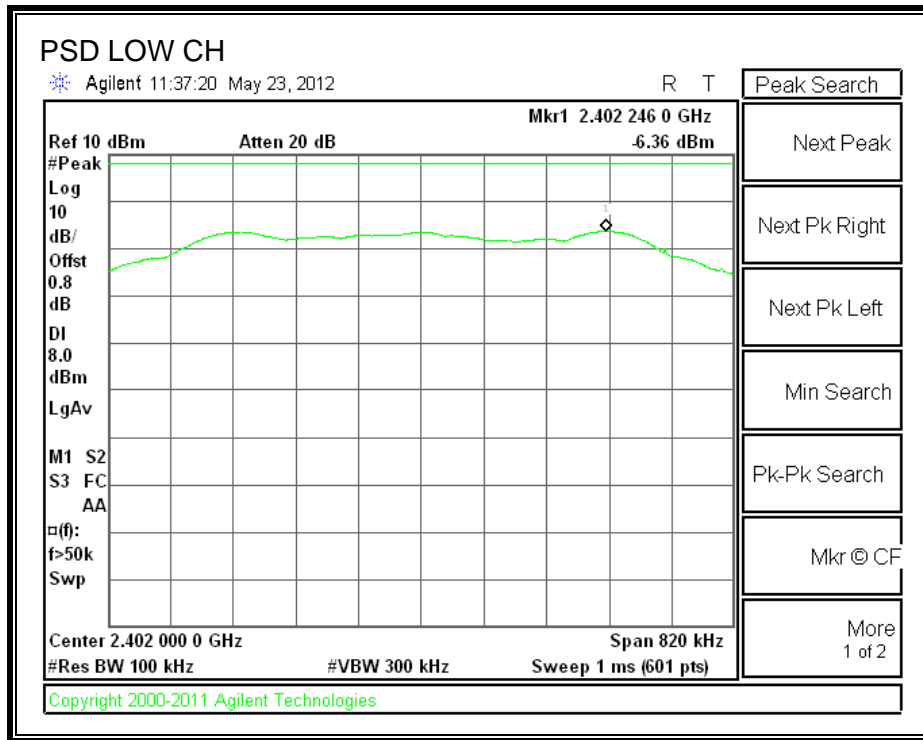
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

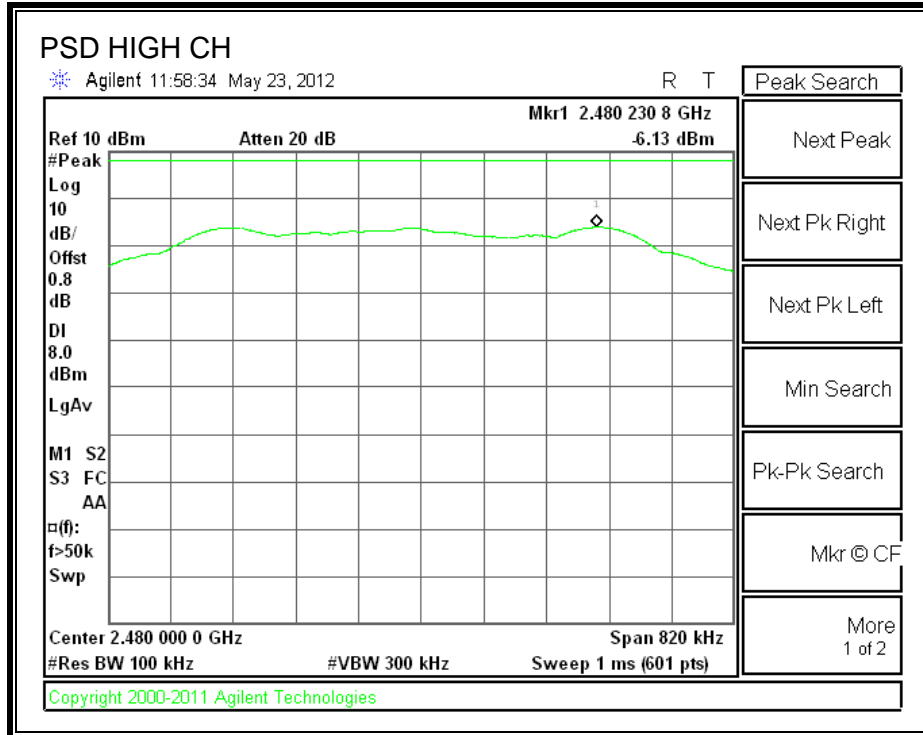
RESULTS

Offset=Attenuation + Cable Loss + $10 \log(3K/100K)=0.8dB$

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-6.36	8	-14.36
Middle	2440	-6.10	8	-14.10
High	2480	-6.13	8	-14.13

POWER SPECTRAL DENSITY





7.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

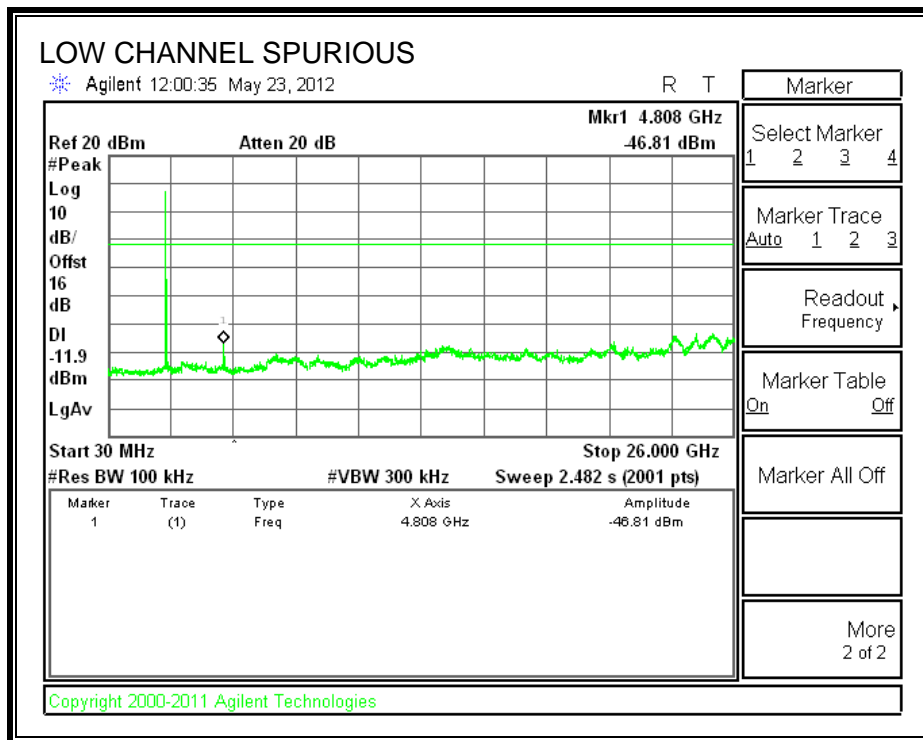
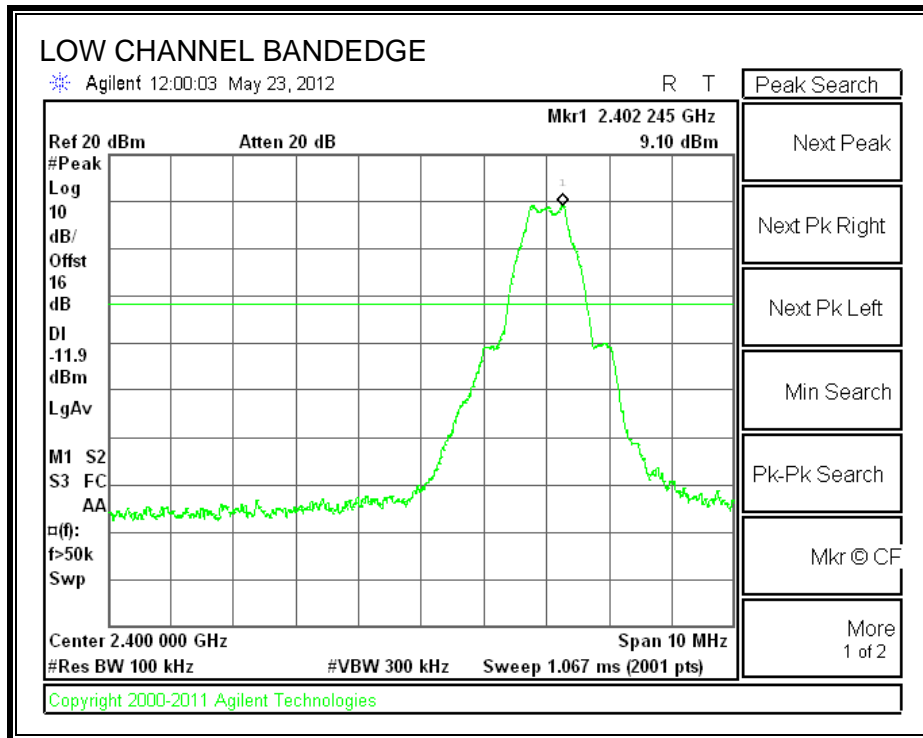
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

TEST PROCEDURE

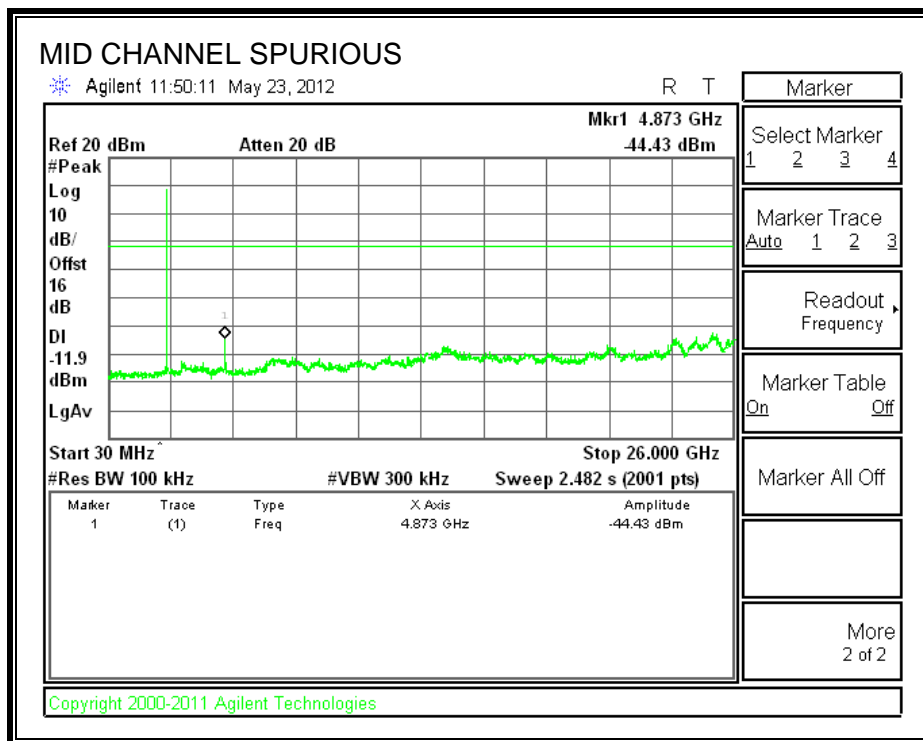
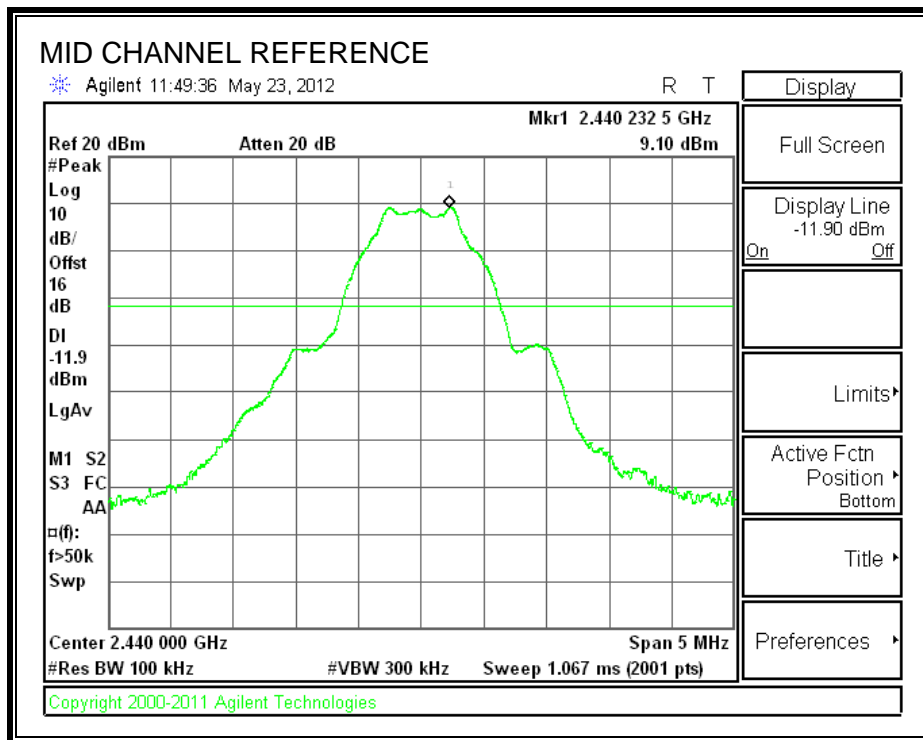
KDB 558074 D01 v01 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247".

RESULTS

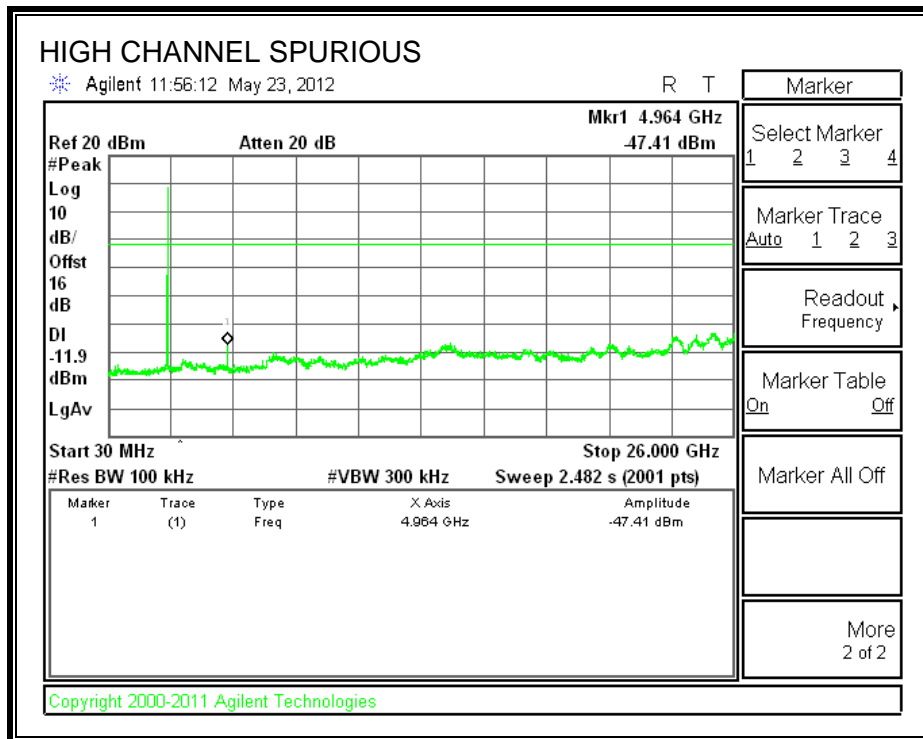
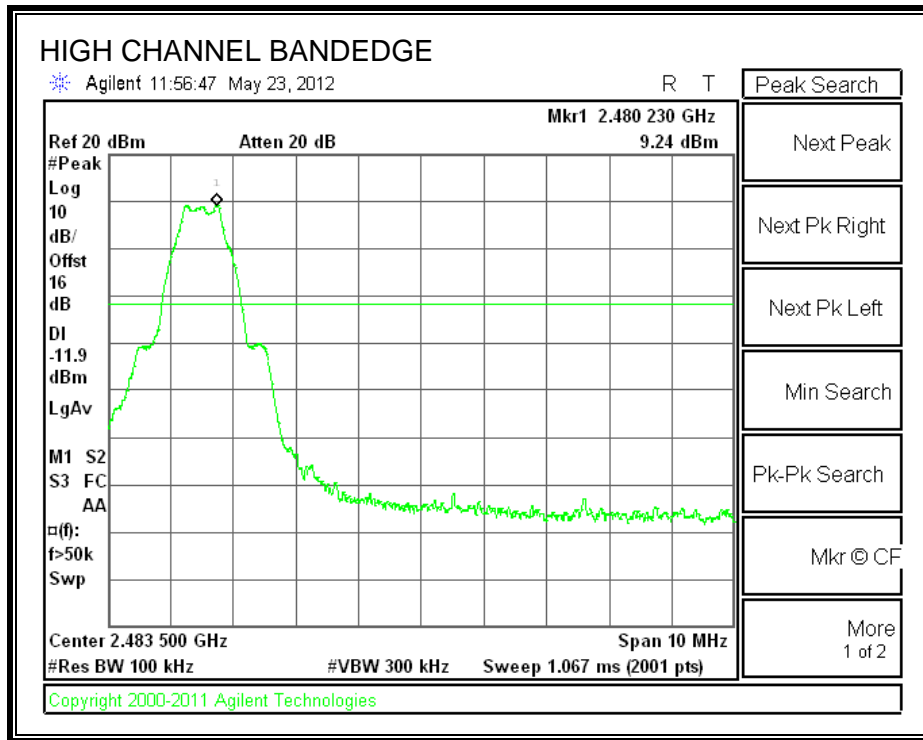
SPURIOUS EMISSIONS, LOW CHANNEL



SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

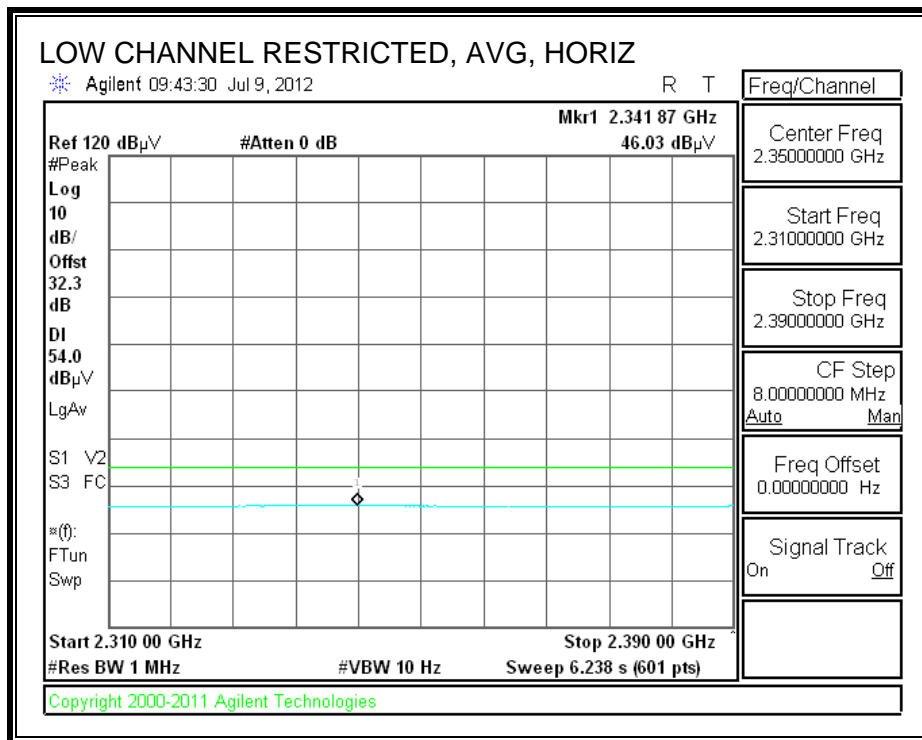
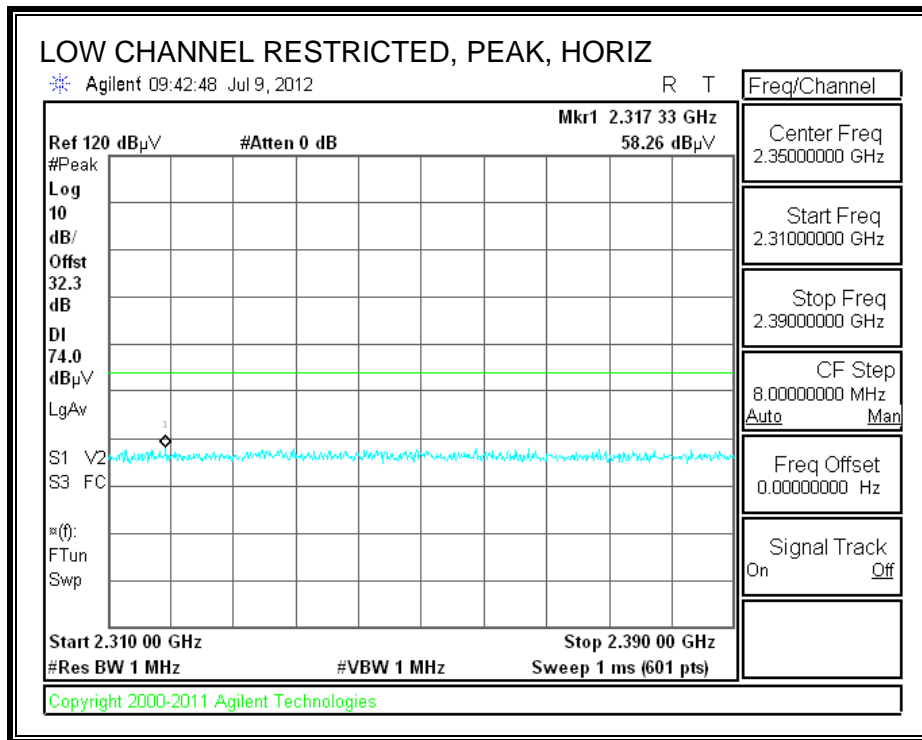
For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

For 2.4 GHz band, the spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

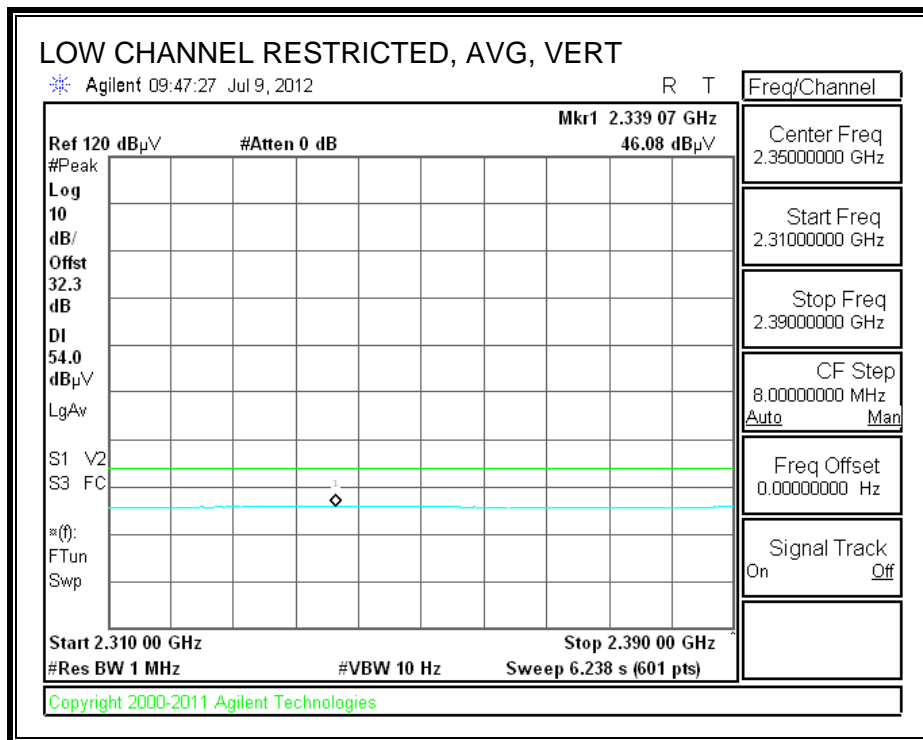
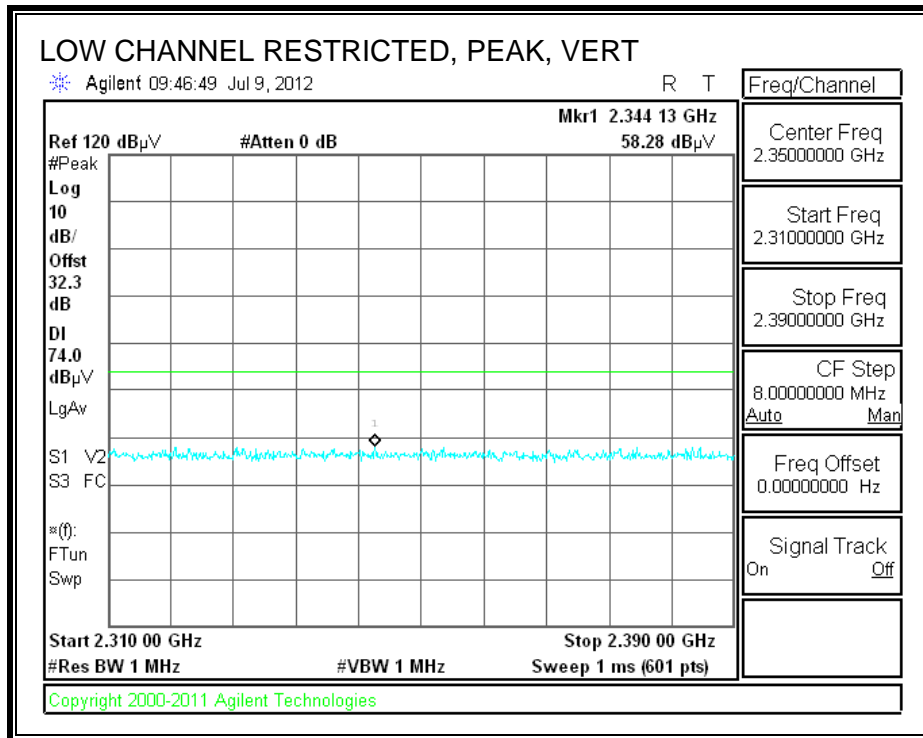
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

8.2. TRANSMITTER ABOVE 1 GHz

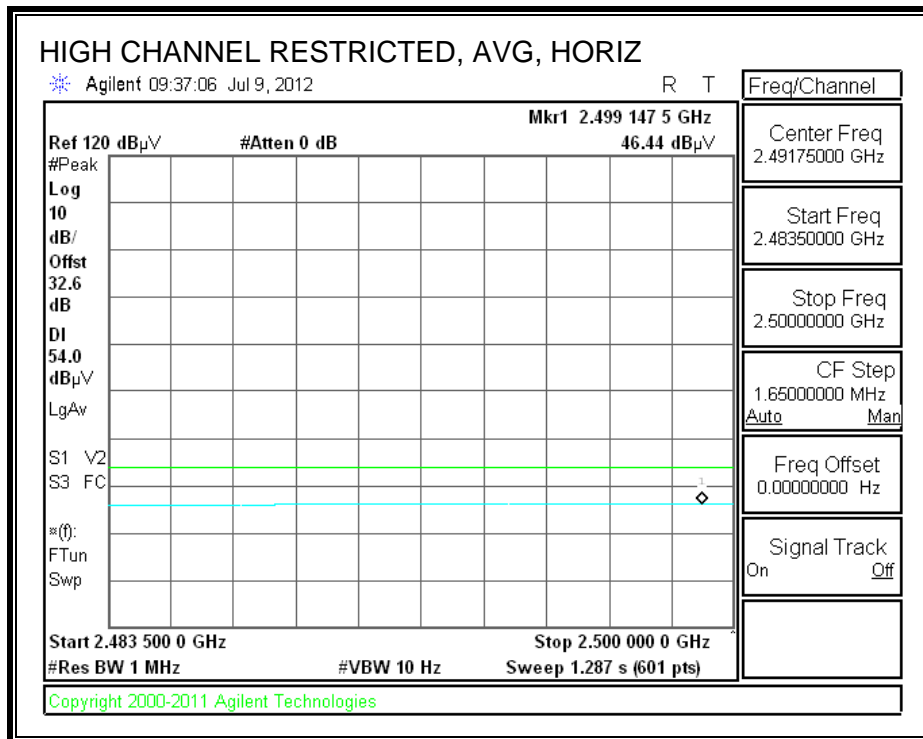
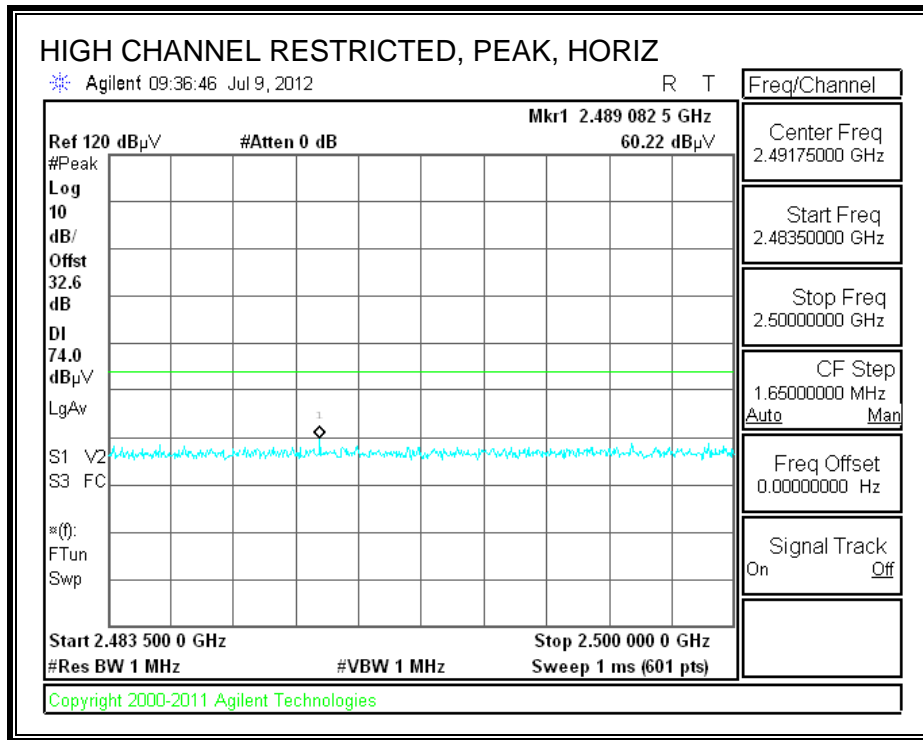
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



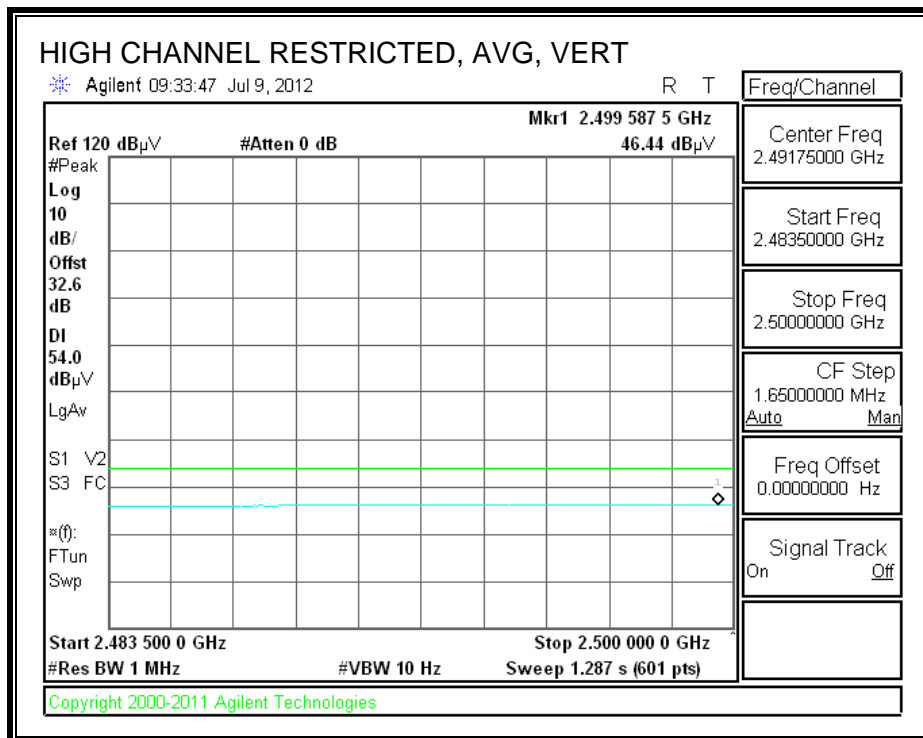
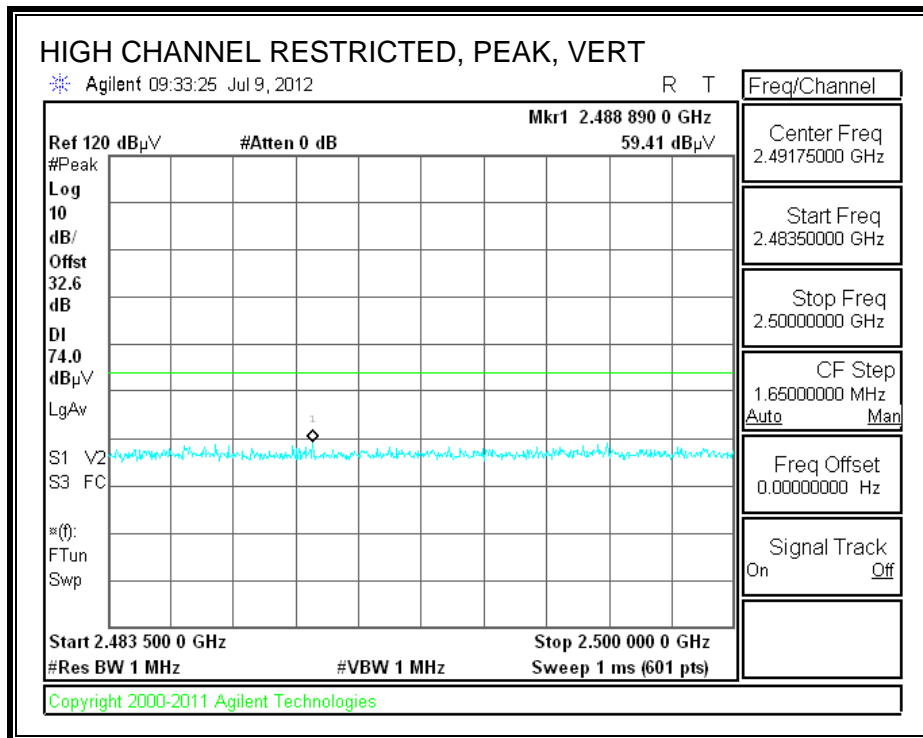
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement													
Compliance Certification Services, Fremont 5m Chamber													
Test Engr:		William Zhuang											
Date:		07/09/12											
Project #:		12U14136											
Company:		Apple											
Test Target:													
Mode Oper:		BTLE, Power Setting:10 dBm, X position											
f	Measurement Frequency	Amp	Preamp Gain	Average Field Strength Limit									
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Peak Field Strength Limit									
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Margin vs. Average Limit									
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Margin vs. Peak Limit									
CL	Cable Loss	HPF	High Pass Filter										

f	Dist	Read	AF	CL	Amp	D Corr	Fltr	Corr.	Limit	Margin	Ant. Pol.	Det.	Notes
GHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
Low Ch. 2402 MHz													
4.804	3.0	43.1	33.1	6.2	-34.8	0.0	0.0	47.6	74.0	-26.4	V	P	
4.804	3.0	33.1	33.1	6.2	-34.8	0.0	0.0	37.5	54.0	-16.5	V	A	
4.804	3.0	44.6	33.1	6.2	-34.8	0.0	0.0	49.1	74.0	-24.9	H	P	
4.804	3.0	33.9	33.1	6.2	-34.8	0.0	0.0	38.4	54.0	-15.6	H	A	
Mid Ch. 2440 MHz													
4.880	3.0	43.9	33.1	6.2	-34.8	0.0	0.0	48.4	74.0	-25.6	V	P	
4.880	3.0	33.3	33.1	6.2	-34.8	0.0	0.0	37.9	54.0	-16.1	V	A	
4.880	3.0	41.2	33.1	6.2	-34.8	0.0	0.0	45.8	74.0	-28.2	H	P	
4.880	3.0	31.2	33.1	6.2	-34.8	0.0	0.0	35.8	54.0	-18.2	H	A	
7.320	3.0	36.4	35.8	8.4	-34.9	0.0	0.0	45.6	74.0	-28.4	H	P	
7.320	3.0	24.1	35.8	8.4	-34.9	0.0	0.0	33.3	54.0	-20.7	H	A	
7.320	3.0	37.7	35.8	8.4	-34.9	0.0	0.0	47.0	74.0	-27.0	V	P	
7.320	3.0	26.3	35.8	8.4	-34.9	0.0	0.0	35.6	54.0	-18.4	V	A	
High Ch. 2480 MHz													
4.960	3.0	45.3	33.2	6.3	-34.8	0.0	0.0	50.0	74.0	-24.0	V	P	
4.960	3.0	35.0	33.2	6.3	-34.8	0.0	0.0	39.7	54.0	-14.3	V	A	
4.960	3.0	43.0	33.2	6.3	-34.8	0.0	0.0	47.7	74.0	-26.3	H	P	
4.960	3.0	33.0	33.2	6.3	-34.8	0.0	0.0	37.7	54.0	-16.3	H	A	
7.440	3.0	37.0	36.0	8.4	-34.9	0.0	0.0	46.5	74.0	-27.5	H	P	
7.440	3.0	24.7	36.0	8.4	-34.9	0.0	0.0	34.2	54.0	-19.8	H	A	
7.440	3.0	37.3	36.0	8.4	-34.9	0.0	0.0	46.8	74.0	-27.2	V	P	
7.440	3.0	24.7	36.0	8.4	-34.9	0.0	0.0	34.2	54.0	-19.8	V	A	

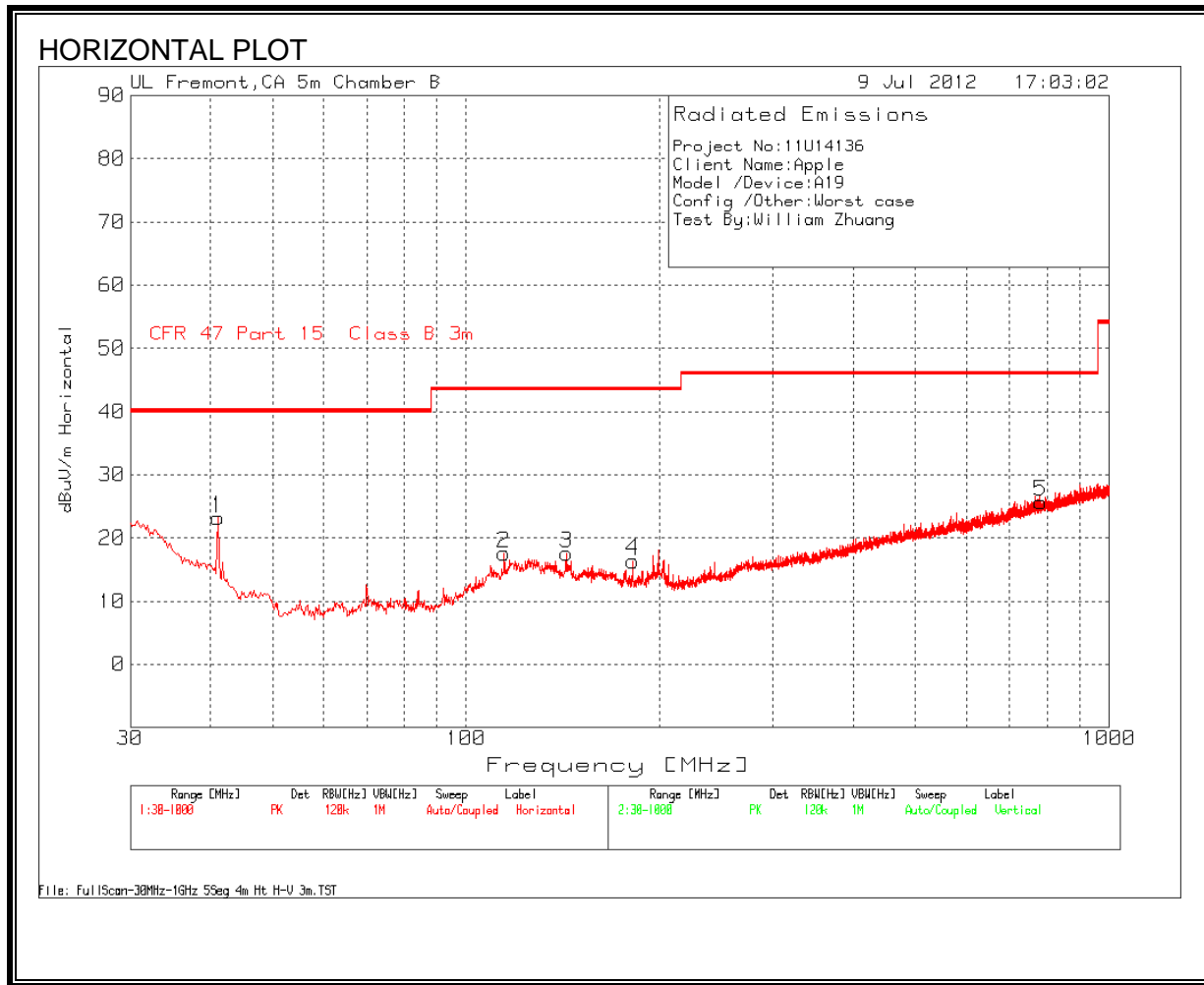
Rev. 4.1.2.7
 Note: No other emissions were detected above the system noise floor.

8.3. RECEIVER ABOVE 1 GHz

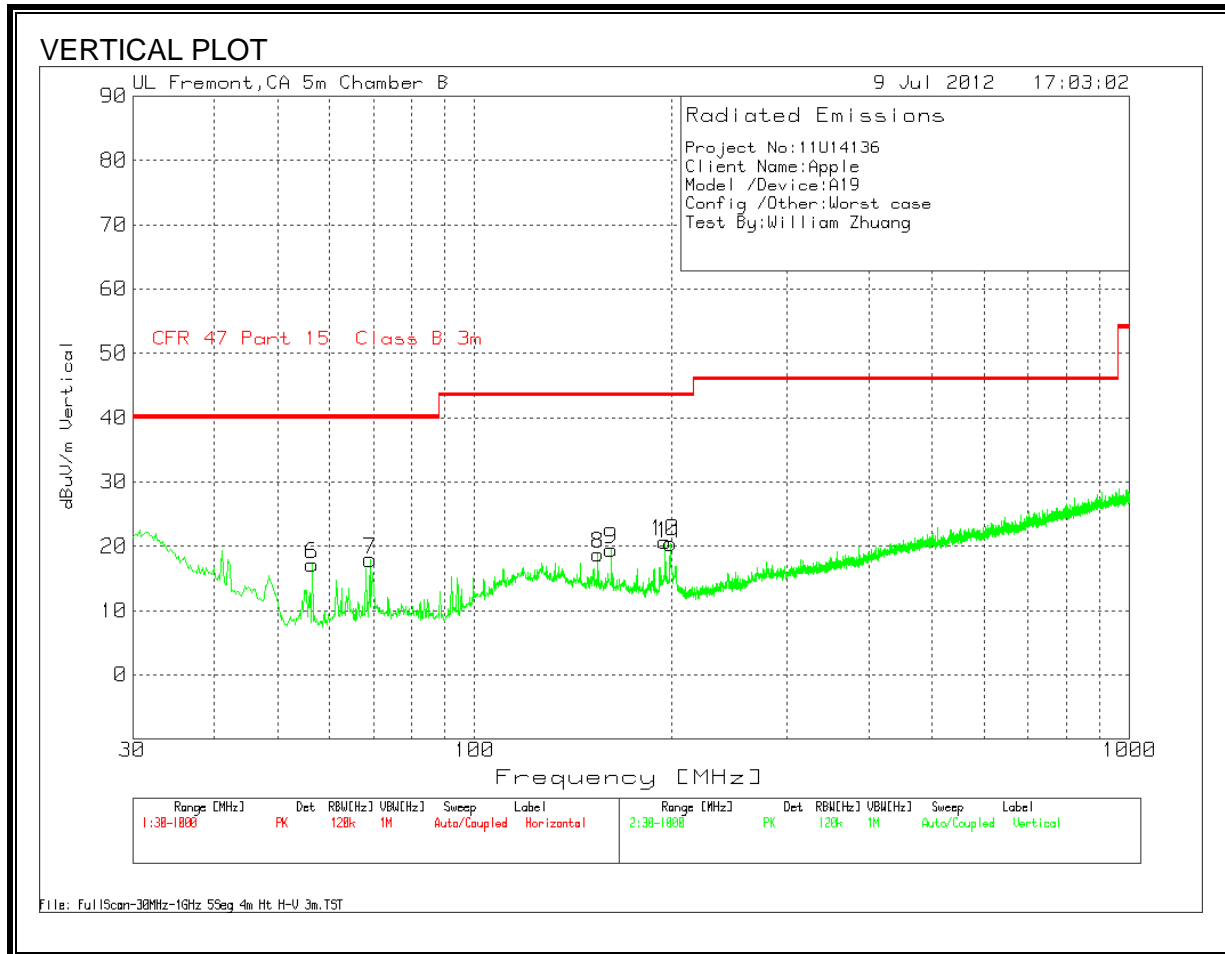
High Frequency Measurement																	
Compliance Certification Services, Fremont 5m Chamber-B																	
Company: Apple																	
Project #: 11U14136																	
Date: 7/09/2012																	
Test Engineer: William Zhuang																	
Configuration: EUT alone																	
Mode: Rx On																	
Test Equipment:																	
Horn 1-18GHz			Pre-amplifer 1-26GHz			Pre-amplifer 26-40GHz			Horn > 18GHz			Limit					
T59; S/N: 3245 @3m			T145 Agilent 3008A005€									RX RSS 210					
Hi Frequency Cables																	
3' cable 22807700			12' cable 22807600			20' cable 22807500			HPF		Reject Filter		Peak Measurements RBW=VBW=1MHz				
3' cable 22807700			12' cable 22807600			20' cable 22807500							Average Measurements RBW=1MHz ; VBW=10Hz				
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)		
1.098	3.0	43.5	30.9	24.3	2.7	-35.9	0.0	0.0	34.6	22.0	74	54	-39.4	-32.0	V		
1.098	3.0	43.3	30.8	24.3	2.7	-35.9	0.0	0.0	34.4	21.9	74	54	-39.6	-32.1	H		
1.857	3.0	41.5	29.5	27.7	3.6	-35.5	0.0	0.0	37.3	25.4	74	54	-36.7	-28.6	H		
1.857	3.0	41.7	29.4	27.7	3.6	-35.5	0.0	0.0	37.5	25.3	74	54	-36.5	-28.7	V		
3.267	3.0	40.0	28.0	31.0	5.1	-35.1	0.0	0.0	40.9	28.9	74	54	-33.1	-25.1	V		
3.267	3.0	41.1	28.0	31.0	5.1	-35.1	0.0	0.0	42.1	28.9	74	54	-31.9	-25.1	H		
Rev. 07.08.11																	
f	Measurement Frequency					Amp	Preamp Gain					Avg Lim	Average Field Strength Limit				
Dist	Distance to Antenna					D Corr	Distance Correct to 3 meters					Pk Lim	Peak Field Strength Limit				
Read	Analyzer Reading					Avg	Average Field Strength @ 3 m					Avg Mar	Margin vs. Average Limit				
AF	Antenna Factor					Peak	Calculated Peak Field Strength					Pk Mar	Margin vs. Peak Limit				
CL	Cable Loss					HPF	High Pass Filter										

8.4. WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)



SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)



HORIZONTAL AND VERTICAL DATA

Project No:11U14136									
Client Name:Apple									
Model /Device: A1428									
Config /Other:Worst case									
Test By:William Zhuang									
Horizontal 30 - 1000MHz									
Test Freq	Meter Rea	Detector	T122	Suno	5mB Amp	dBuV/m	CFR 47 Pa	Margin	Polarity
41.0492	39.36	PK	13		-29.2	23.16	40	-16.84	Horz
114.5164	32.49	PK	13.5		-28.4	17.59	43.5	-25.91	Horz
143.2054	32.78	PK	12.9		-28.1	17.58	43.5	-25.92	Horz
181.5867	32.98	PK	11.1		-27.7	16.38	43.5	-27.12	Horz
783.2814	29.99	PK	21.2		-25.5	25.69	46	-20.31	Horz
Vertical 30 - 1000MHz									
Test Freq	Meter Rea	Detector	T122	Suno	5mB Amp	dBuV/m	CFR 47 Pa	Margin	Polarity
56.3629	38.93	PK	7.2		-29	17.13	40	-22.87	Vert
69.1567	38.74	PK	8.1		-28.9	17.94	40	-22.06	Vert
154.2546	34.3	PK	12.5		-28	18.8	43.5	-24.7	Vert
161.4269	35	PK	12.4		-27.9	19.5	43.5	-24	Vert
195.1559	36.44	PK	11.9		-27.6	20.74	43.5	-22.76	Vert
199.0328	35.32	PK	12.7		-27.6	20.42	43.5	-23.08	Vert

9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
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 PROCEDURE

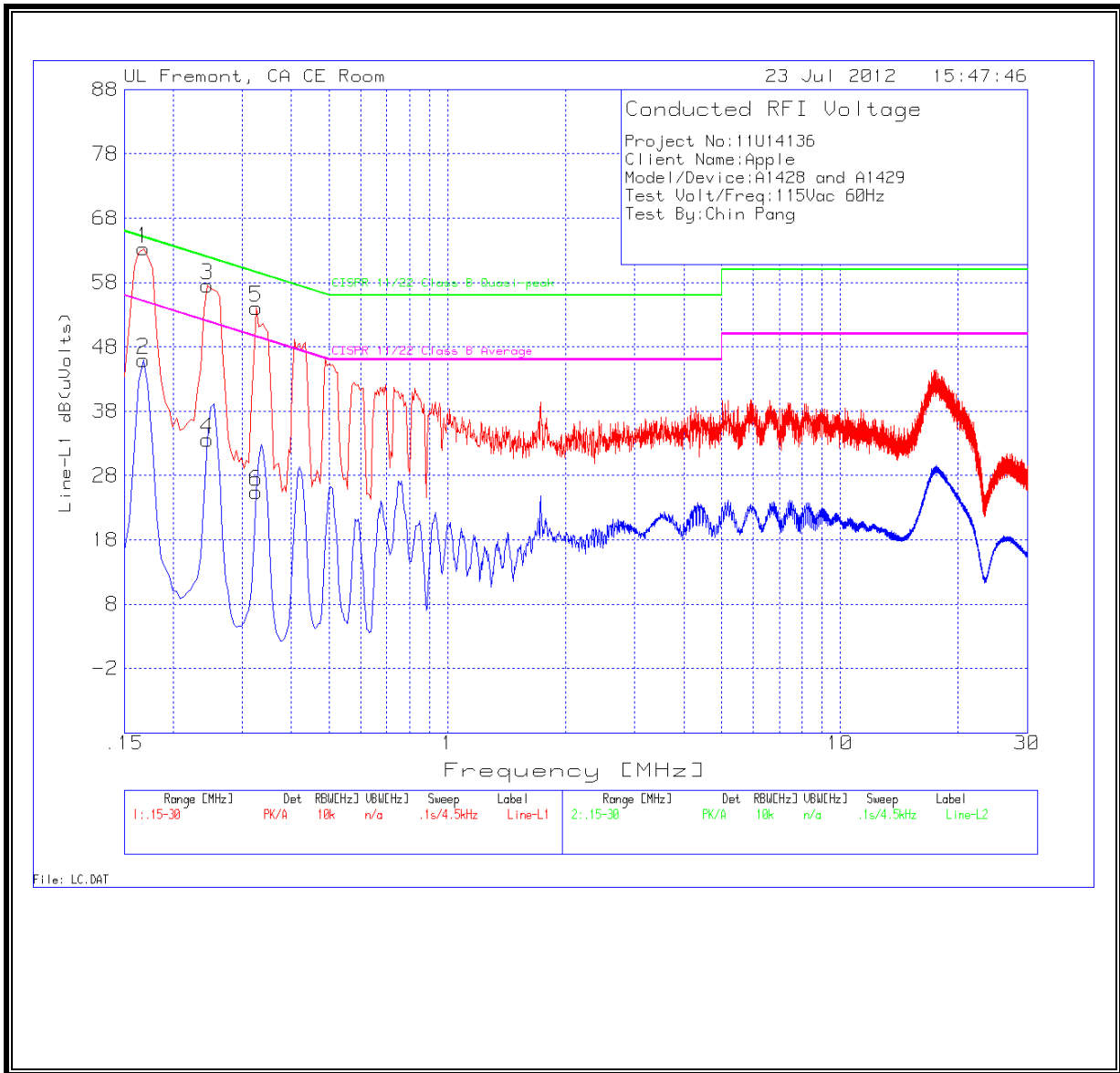
ANSI C63.4

RESULTS

6 WORST EMISSIONS

Project No:11U14136										
Client Name:Apple										
Model/Device:A1428 and A1429										
Test Volt/Freq:115Vac 60Hz										
Test By:Chin Pang										
Line-L1 .15 - 30MHz										
Test Freq	Meter Res	Detector	T24 IL	L1.T	LC Cables	dB(uVolts	CISPR 11/	Margin	CISPR 11/	Margin
0.168	63.2	PK	0.1		0	63.3	65.1	-1.8	-	-
0.168	45.89	Av	0.1		0	45.99	-	-	55.1	-9.11
0.2445	57.43	PK	0.1		0	57.53	61.9	-4.37	-	-
0.2445	33.52	Av	0.1		0	33.62	-	-	51.9	-18.28
0.3255	54.03	PK	0.1		0	54.13	59.6	-5.47	-	-
0.3255	25.37	Av	0.1		0	25.47	-	-	49.6	-24.13
Line-L2 .15 - 30MHz										
Test Freq	Meter Res	Detector	T24 IL	L2.T	LC Cables	dB(uVolts	CISPR 11/	Margin	CISPR 11/	Margin
0.1635	53.72	PK	0.1		0	53.82	65.3	-11.48	-	-
0.1635	32.37	Av	0.1		0	32.47	-	-	55.3	-22.83
0.2445	50.33	PK	0.1		0	50.43	61.9	-11.47	-	-
0.2445	29.13	Av	0.1		0	29.23	-	-	51.9	-22.67
0.321	46.08	PK	0.1		0	46.18	59.7	-13.52	-	-
0.321	21.42	Av	0.1		0	21.52	-	-	49.7	-28.18

LINE 1 RESULTS



LINE 2 RESULTS

