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FCC PART 15.247 TEST REPORT

DIGITAL SPREAD SPECTRUM

Applicant	MOTOROLA, INC.
Address	600 NORTH U.S. HWY 45
	LIBERTYVILLE ILLINOIS 60048-5343 USA
FCC ID	IHDT56JQ1
Model Number	H07XAN6JR7AN
Product Description	i9 IDEN DUAL BAND CELLULAR TRANSCEIVER WITH MOTOTALK, GPS AND BLUETOOTH
Date Sample Received	9/11/2008
Date Tested	9/26/2008
Tested By	Richard Block
Approved By	Mario de Aranzeta
Report Number	2136AUT8TestReport.doc
Test Results	☒ PASS ☐ FAIL

ACCREDITED
Testing Certificate # 0955-01

TABLE OF CONTENT

GENERAL REMARKS

The attached report shall not be reproduced except in full without the written permission of Timco Engineering Inc.

The test results relate only to the items tested.

Summary

The device under test does:
☒ fulfill the general approval requirements as identified in this test report
☐ not fulfill the general approval requirements as identified in this test report

Attestations

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

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025 requirements.

ACCREDITED

Testing Certificate # 0955-01

I attest that the necessary measurements were made, under my supervision, at:

Timco Engineering Inc.
849 NW State Road 45
Newberry, Fl 32669

Authorized Signatory Name:

Mario de Aranzeta C.E.T.
Compliance Engineer/ Lab. Supervisor

Date: 9/29/2008

GENERAL INFORMATION

DUT Specification

Applicable Standard	Part 15.247		
DUT Description	i9 IDEN DUAL BAND CELLULAR TRANSCEIVER WITH MOTOTALK, GPS AND BLUETOOTH		
FCC ID	IHDT56JQ1		
S/N	364VJQ64DF		
Operating Frequency	TX:		
DUT Power Source	☐ 110–120Vac/50– 60Hz		
	☐ DC Power		
	☒ Battery Operated Exclusively		
Test Item	☐ Prototype	☒ Pre-Production	☐ Production
Type of Equipment	☐ Fixed	☐ Mobile	☒ Portable
Test Facility	Timco Engineering Inc. located at 849 NW State Road 45 Newberry, FL 32669 USA.		
Test Conditions	Temperature: 26°C Relative humidity: 50%		
Test Exercise	The DUT was placed in continuous transmit mode of operation.		

Test Supporting Equipment

Supporting Device	Manufacturer	Model / FCC ID	Serial Number
N/A			

EMC EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
3/10-Meter OATS	TEI	N/A	N/A	Listed 3/20/07	3/19/10
3-Meter OATS	TEI	N/A	N/A	Listed 1/11/06	1/10/09
3-Meter Semi-Anechoic Chamber	Panashield	N/A	N/A	Listed 5/11/07	5/10/10
Antenna: Biconnical	Eaton	94455-1	1057	CAL 1/15/08	1/15/10
Antenna: Biconnical	Eaton	94455-1	1096	CAL 10/11/06	10/11/08
Antenna: Biconnical	Electro-Metrics	BIA-25	1171	CAL 7/18/07	7/18/09
Antenna: Double-Ridged Horn	Electro-Metrics	RGA-180	2319	CAL 7/18/07	7/18/09
LISN	Electro-Metrics	ANS-25/2	2604	CAL 10/5/06	10/5/08
LISN	Electro-Metrics	EM-7820	2682	CAL 7/23/07	7/23/09
Antenna: Log-Periodic	Eaton	96005	1243	CAL 12/13/07	12/13/09
Analyzer Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	CAL 11/30/07	11/30/09
Analyzer Tan Tower RF Preselector	HP	85685A	3221A1400	CAL 11/30/07	11/30/09
Analyzer Tan Tower Quasi-Peak Adapter	HP	85650A	3303A01690	CAL 11/30/07	11/30/09
Analyzer Tan Tower Preamplifier	HP	8449B-H02	3008A00372	CAL 11/30/07	11/30/09

TEST PROCEDURES

Radiation Interference: ANSI C63.4-2003 using a spectrum analyzer, a preselector, a quasi-peak adapter, and an appropriate antenna. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100 kHz with an appropriate sweep speed and the video bandwidth was 300 kHz up to 1 GHz and 1 MHz with a video BW of 3 MHz above 1 GHz. When an emission was found, the table was rotated to produce the maximum signal strength. The antenna was placed in both the horizontal and vertical planes and the worse case emissions were reported. The spectrum was searched to at least the tenth (10) harmonic of the fundamental.

Formula Of Conversion Factors: The field strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer plus the coax loss. The antenna correction factors are stated in terms of dB. The gain of the preselector was accounted for in the spectrum analyzer meter reading.

Example:			
Freq (MHz)	Meter Reading	+ ACF	+ CL = FS
33	20 dBuV	+ 10.36 dB	+ 0.5 = 30.86 dBuV/m @ 3m

Power Line Conducted Interference: The procedure used was ANSI C63.4-2003 using a 50uH LISN. Both lines were observed. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed. The spectrum was scanned from 0.15 to 30 MHz.

Occupied Bandwidth: A small sample of the transmitter output was fed into the spectrum analyzer and the attached plot was printed. The vertical scale is set to -10 dBm per division.

Bandwidth 6.0dB: 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.

Power Output: The RF power output was measured at the antenna feed point using a peak power meter.

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.

ANSI C63.4-2003 10.1 Measurement Procedures: The DUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The DUT was placed in the center of the table (1.5m side). The table used for radiated measurements is capable of continuous rotation.

When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes. Emissions attenuated more than 20 dB below the permissible value are not reported.

RADIATION INTERFERENCE

Rules Part No.: 15.247, 15.209

Requirements:

Frequency	Limits
Part 15.209	
9 to 490 kHz	2400/F (kHz) µV/m @ 300 meters
490 to 1705 kHz	24000/F (kHz) µV/m @ 30 meters
1705 kHz to 30 MHz	29.54 dBµV/m @ 30 meters
30 – 88	40.0 dBµV/m @ 3 meters
80 – 216	43.5 dBµV/m @ 3 meters
216 – 960	46.0 dBµV/m @ 3 meters
Above 960	54.0 dBµV/m @ 3 meters
Part 15.247	
Fundamental 902 – 928 MHz	127.37 dBµV/m @ 3 meters
Fundamental 2.4 – 2.4835 MHz	127.37 dBµV/m @ 3 meters
Harmonics	54.0 dBµV/m @ 3 meters

Any emissions that fall in the restricted bands (15.205) must be less than or equal to to 54 dBuV/m. Spurious emissions not in a restricted band must be 20 dBc. Harmonics were checked through the 10th harmonic.

Test Data: All values are peak unless noted.
Items mark with an * designate a frequency in a restricted band.

Tuned Frequency MHz	Frequency MHz	Meter Reading dBuV	Ant. Polarity	Coax Loss dB	Correction Factor dB	Field Strength dBuV/m	Margin dB
2,402.0	**2,402.00**	**58.5**	**H**	**3.18**	**32.25**	**93.93**	**33.45**
2,402.0	**2,402.00**	**60.5**	**V**	**3.18**	**32.25**	**95.93**	**31.45**
2,402.0	**4,804.00**	**4.5**	**H**	**4.90**	**34.10**	**43.50**	**10.50**
2,402.0	**4,804.00**	**6.6**	**V**	**4.90**	**34.10**	**45.60**	**8.40**
2,402.0	**7,206.00**	**7.5**	**V**	**5.72**	**36.04**	**49.26**	**4.74**
2,402.0	**7,206.00**	**7.7**	**H**	**5.72**	**36.04**	**49.46**	**4.54**
2,402.0	**9,608.00**	**3.8**	**H**	**6.78**	**36.71**	**47.29**	**6.71**
2,402.0	**9,608.00**	**6.3**	**V**	**6.78**	**36.71**	**49.79**	**4.21**
2,402.0	**12,010.00**	**4.4**	**H**	**7.81**	**38.71**	**50.92**	**3.08**
2,402.0	**12,010.00**	**4.6**	**V**	**7.81**	**38.71**	**51.12**	**2.88**
2,441.0	**2,441.00**	**54.0**	**H**	**3.21**	**32.35**	**89.56**	**37.82**
2,441.0	**2,441.00**	**57.7**	**V**	**3.21**	**32.35**	**93.26**	**34.12**
2,441.0	**4,882.00**	**5.1**	**H**	**4.94**	**34.10**	**44.14**	**9.86**
2,441.0	**4,882.00**	**9.3**	**H**	**4.94**	**34.10**	**48.34**	**5.66**
2,441.0	**7,323.00**	**5.2**	**H**	**5.79**	**36.06**	**47.05**	**6.95**
2,441.0	**7,323.00**	**5.3**	**V**	**5.79**	**36.06**	**47.15**	**6.85**
2,441.0	**9,764.00**	**4.5**	**V**	**6.83**	**36.86**	**48.19**	**5.81**

TEST DATA CONTD.

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	Ant. Polarity	Coax Loss dB	Correction Factor dB	Field Strength dBuV/m	Margin dB
2,441.0	9,764.00	4.7	H	6.83	36.86	48.39	5.61
2,441.0	12,205.00	2.6	V	7.94	38.86	49.40	4.60
2,441.0	12,205.00	3.5	H	7.94	38.86	50.30	3.70
2,480.0	2,480.00	50.6	H	3.24	32.45	86.29	41.09
2,480.0	2,480.00	55.1	V	3.24	32.45	90.79	36.59
2,480.0	4,960.00	6.2	H	4.98	34.10	45.28	8.72
2,480.0	4,960.00	8.0	V	4.98	34.10	47.08	6.92
2,480.0	7,440.00	6.0	H	5.86	36.09	47.95	6.05
2,480.0	7,440.00	6.1	V	5.86	36.09	48.05	5.95
2,480.0	9,920.00	5.0	V	6.88	37.02	48.90	5.10
2,480.0	9,920.00	5.1	H	6.88	37.02	49.00	5.00
2,480.0	12,400.00	2.6	V	8.08	39.02	49.70	4.30
2,480.0	12,400.00	3.3	H	8.08	39.02	50.40	3.60

BLUETOOTH MODULATION TEST

For TX iDEN 800 MHz band

Bluetooth Signal set to hopping, Tx discrete frequency

	Frequency		Code	Peak	Horizontal		Peak	Vertical			
	Bluetooth	TX		Freq	Reading	E-Field	Freq	Reading	E-Field	Limit	Margin
	MHz	MHz		MHz	dBuV	dBuV/m	MHz	dBuV	dBuV/m	dBuV/m	dB
fbt-ftx	hopping	806.025	A	1612	16.4	**47.71**	1612	17.5	**48.81**	54	**5.19**
		816.025	B	1632	16.0	**47.45**	1632	17.8	**49.25**	54	**4.75**
		825.025	C	1650	16.1	**47.68**	1650	17.0	**48.58**	54	**5.42**
fbt+ftx	hopping	806.025	D	3224	8.1	**44.59**	3224	9.1	**45.59**	54	**8.41**
		816.025	E	3264	8.2	**44.75**	3264	10.2	**46.75**	54	**7.25**
		825.025	F	3300	8.3	**44.89**	3300	8.2	**44.79**	54	**9.21**

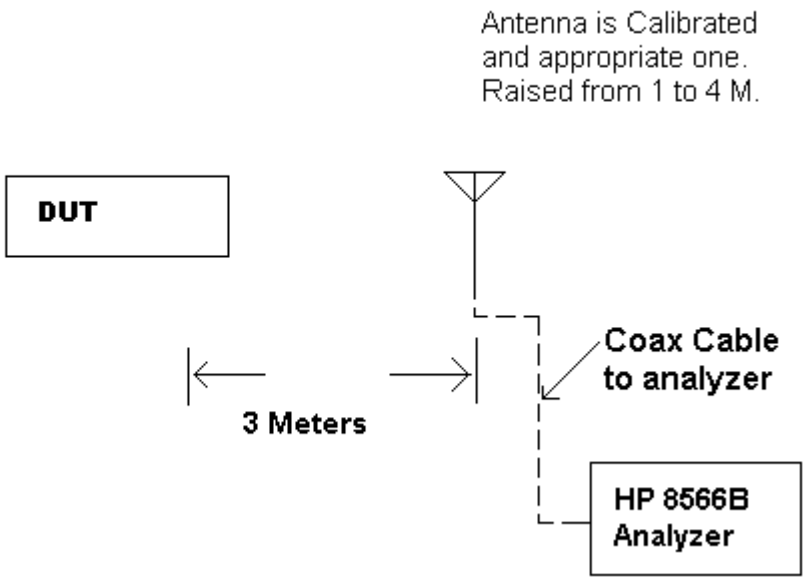
hopping = 2402 to 2480 MHz

For TX iDEN 800 MHz band

Bluetooth and TX signals set to discrete values

	Frequency		Code	Peak	Horizontal		Peak	Vertical			
	Bluetooth	TX		Freq	Reading	E-Field	Freq	Reading	E-Field	Limit	Margin
	MHz	MHz		MHz	dBuV	dBuV/m	MHz	dBuV	dBuV/m	dBuV/m	dB
fbt-ftx	2441	825.025	G	1616	14.3	**46.23**	1616	14.3	**45.63**	54	**7.77**
	2402	825.025	H	1577	14.8	**45.85**	1577	13.8	**44.85**	54	**8.15**
	2480	825.025	I	1655	14.9	**46.51**	1655	16.6	**48.21**	54	**5.79**
fbt+ftx	2441	825.025	G	3266	6.1	**42.65**	3266	7.4	**43.95**	54	**10.05**
	2402	825.025	H	3277	6.0	**42.56**	3277	6.3	**42.86**	54	**11.14**
	2480	825.025	I	3305	5.2	**41.79**	3305	6.0	**42.59**	54	**11.41**

Method of Measuring Radiated Spurious Emissions



METHOD OF MEASUREMENT: The procedure used was ANSI standard C63.4-2003 & the FCC/OET Guidance on Measurements for Spread Spectrum Systems – Public Notice DA 00-705 dated March 30th, 2000.

POWER LINE CONDUCTED INTERFERENCE

Rules Part No.: Part 15.207

Requirements:

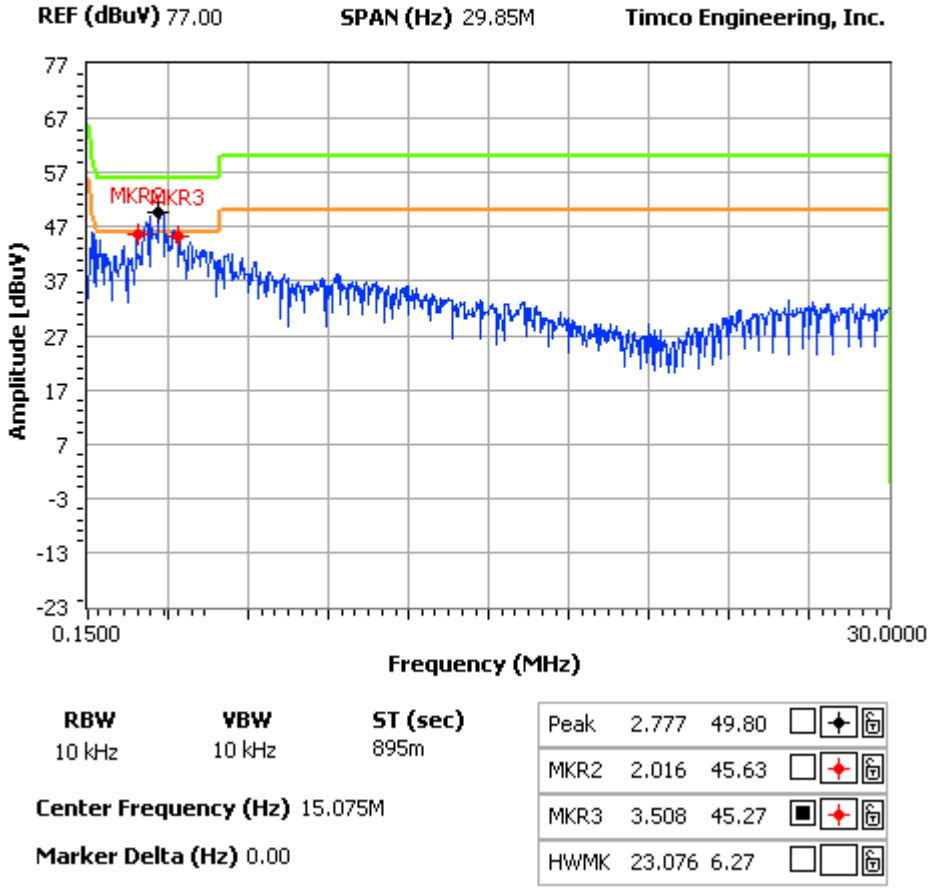
Frequency (MHz)	Quasi Peak Limits (dBuv)	Average Limits (dBuV)
0.15 – 0.5	66 – 56 *	56 – 46 *
0.5 – 5.0	56	46
5.0 – 30	60	50
* Decrease with logarithm of frequency		

Test Data: The following plots represent the emissions read for power line conducted. Both lines were observed.

POWERLINE CONDUCTED PLOT – LINE 1

NOTES:

POWERLINE CONDUCTED -- LINE 1
MOTOROLA, INC. -- FCC ID: IHD T56JQ1



POWERLINE CONDUCTED – LINE 1

QUASI PEAK

FREQUENCY (MHz)	EMMISSION (dBuV)	MARGIN (dB)
2.157	48.27	7.73
2.583	48.22	7.78
2.637	48.12	7.88
2.702	48.61	7.39
2.758	48.74	7.26
2.789	48.12	7.88

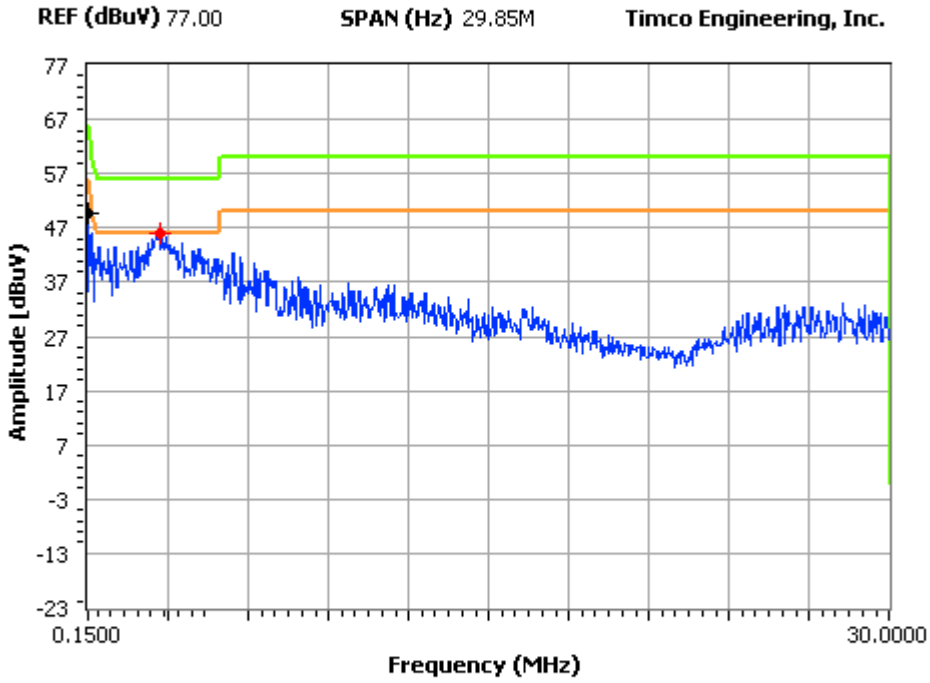
AVERAGE

FREQUENCY (MHz)	EMMISSION (dBuV)	MARGIN (dB)
2.631	41.47	4.53
2.675	41.65	4.35
2.711	41.78	4.22
2.753	41.57	4.43
2.795	41.58	4.42
2.837	41.53	4.47

POWERLINE CONDUCTED PLOT – LINE 2

NOTES:

POWERLINE CONDUCTED -- LINE 2
MOTOROLA, INC. -- FCC ID: IHD T56JQ1



RBW	VBW	ST (sec)
10 kHz	10 kHz	895m

Center Frequency (Hz) 15.075M

Marker Delta (Hz) 0.00

Peak	0.150	49.80
MKR2	2.837	46.00
MKR3	3.508	45.27
HWMK	23.076	6.27

POWERLINE CONDUCTED – LINE 2

QUASI PEAK

FREQUENCY (MHz)	EMMISSION (dBuV)	MARGIN (dB)
2.589	43.10	12.90
2.708	43.31	12.69
2.734	42.81	13.19
2.781	43.14	12.86
2.831	43.10	12.90
2.965	42.87	13.13

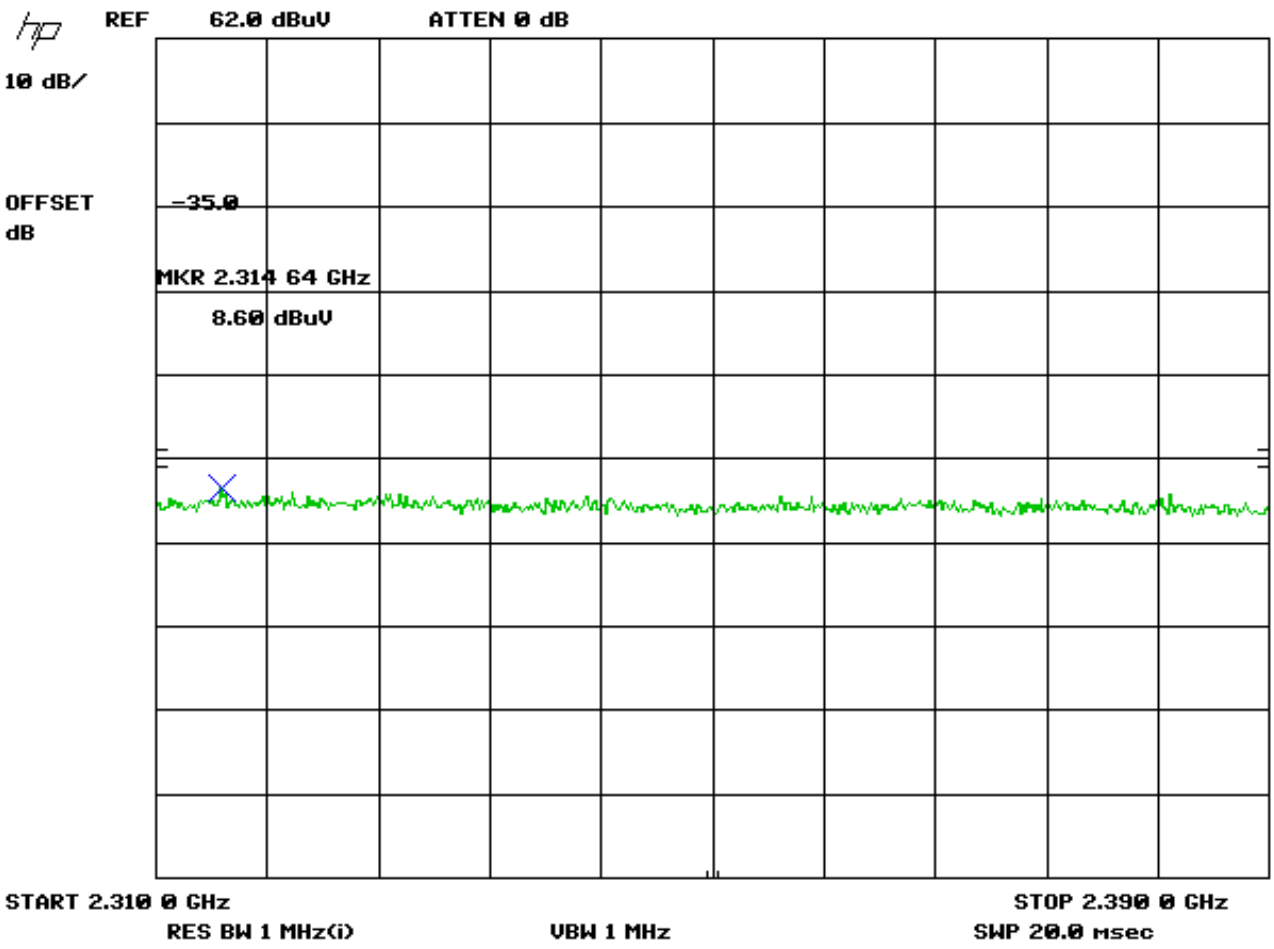
AVERAGE

FREQUENCY (MHz)	EMMISSION (dBuV)	MARGIN (dB)
2.720	32.59	13.41
2.869	32.40	13.60
2.966	32.40	13.60
3.005	32.45	13.55
3.102	32.62	13.38
3.119	32.39	13.61

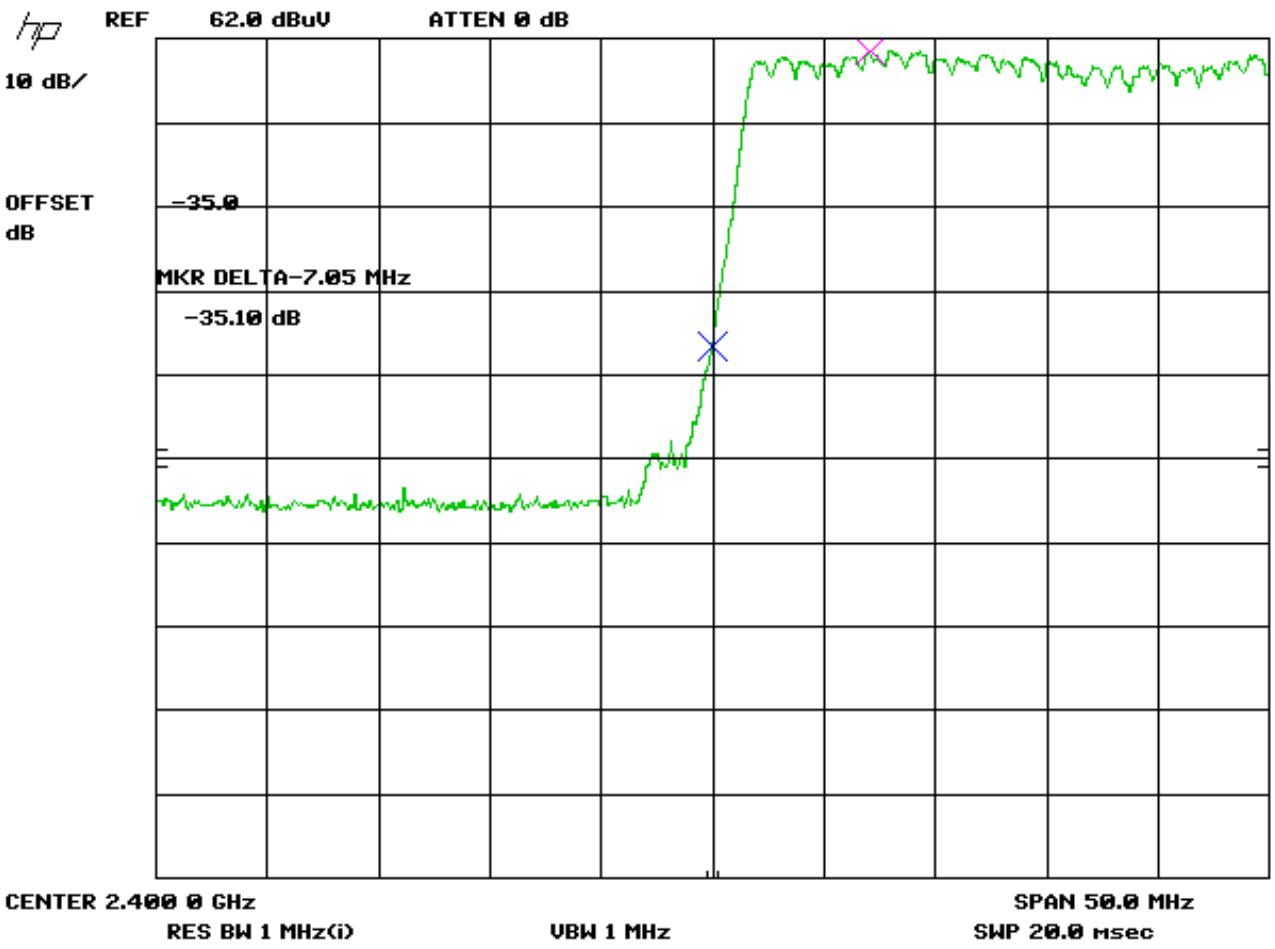
RADIATED SPURIOUS EMISSIONS INTO ADJACENT RESTRICTED BAND

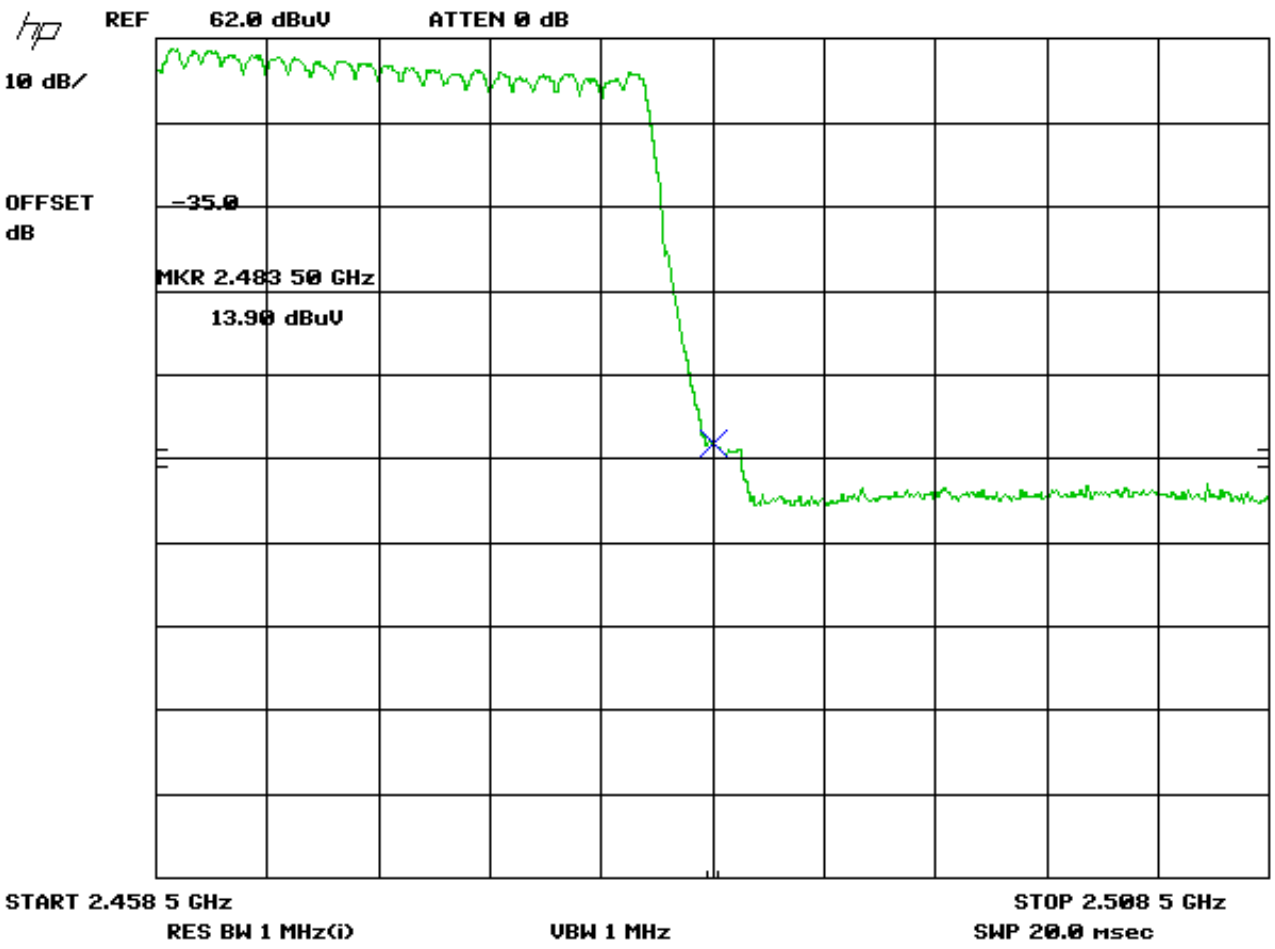
Requirements: Emissions that fall in the restricted bands (15.205). These emissions must be less than or equal to 500 uV/m (54 dBuV/m).

Test Procedure: An in band field strength measurement of the fundamental Emission using the RBW and detector function required by C63.4-2000 and FCC Rules. The procedure was repeated with an average detector and a plot made. The calculated field strength in the adjacent restricted band is presented below.



Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	Ant. Polarity	Coax Loss dB	Correction Factor dB	Field Strength dBuV/m	Margin dB
2,314.6	2,314.64	8.6	V	3.12	32.02	43.74	10.26


REF 62.0 dBuV
ATTEN 0 dB
10 dB/
OFFSET
dB
-35.0
MKR DELTA-7.05 MHz
-35.10 dB
CENTER 2.400 0 GHz
SPAN 50.0 MHz
RES BW 1 MHz(i)
VBW 1 MHz
SWP 20.0 msec



Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	Ant. Polarity	Coax Loss dB	Correction Factor dB	Field Strength dBuV/m	Margin dB
2,483.5	2,483.50	13.9	V	3.24	32.46	49.60	4.40

RADIATED EMISSIONS TEST SET UP PHOTO

POWERLINE EMISSIONS TEST SET UP PHOTO