TIMCO ENGINEERING, Inc.

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FCC PART 15.247 FHSS

TEST REPORT

APPLICANT	DRS Tactical Systems, Inc.
ADDRESS	1110 West Hibiscus Blvd. Melbourne, FL 32901
FCC ID	UGL9800178540001
PRODUCT DESCRIPTION	Bluetooth transceiver
DATE SAMPLE RECEIVED	June 27, 2006
DATE TESTED	June 28, 2006
TESTED BY	Nam Nguyen
APPROVED BY	Mario de Aranzeta C.E.T.
TIMCO REPORT NO.	981AUT6TestReport.doc
TEST RESULTS	☒ PASS ☐ FAIL

ACCREDITED
Certificate # 0955-01

TABLE OF CONTENTS

STATEMENT OF COMPLIANCE

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

I attest that the necessary measurements were made by me or under my supervision, at Timco Engineering, Inc. located at 849 NW State Road 45, Newberry, Florida 32669 USA.

ACCREDITED
Certificate # 0955-01

Authorized by: Mario de Aranzeta

Signature: <*Mario de Aranzeta*>

Function: Engineer

Date: August 7, 2006

Tested by: Nam Nguyen

Signature: on file

Date: July 17, 2006

GENERAL INFORMATION AND EQUIPMENT UNDER TEST

Test Report Purpose:	Compliance of test article with FCC part 15.247		
Applicable Standards:	FCC Part 15.247		
Test Result:	The test results relate only to the items tested.		
Manufacture:	DRS Tactical Systems, Inc. 1110 West Hibiscus Blvd. Melbourne, FL 32901		
FCC ID:	UGL9800178540001		
Product Description:	Bluetooth transceiver		
Operating Frequency:	2402 2480 MHz		
Max. Output Power (conducted):	☒ Conducted – 2 mW	☐ ERP -	☐ EIRP
Type of Modulation:	FHSS (Bluetooth) - GFSK		
Power Supply:	*Primary Power*	110VAC/50-60Hz	
	Secondary Power	Vdc	
Test Item:	Pre-Production		
Type of Equipment:	Mobile		
Antenna Type:	dipole		
Antenna Connector:	unique Hirose connector		
Modification to the EUT:	None		
Test Facilities:	Timco Engineering Inc. 849 N.W. State Road 45, Newberry, FL 32669.		
Test Exercise (e.g. software description, test signal, etc.):	The test article was set in a continuous transmit mode of operation		
Test Conditions:	Temperature: 78°F Humidity: 55%		

TEST EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
3/10-Meter OATS	TEI	N/A	N/A	Listed 3/27/04	3/26/07
3-Meter OATS	TEI	N/A	N/A	Listed 1/11/06	1/10/09
Biconnical Antenna	Eaton	94455-1	1057	CAL 12/12/05	12/12/07
Biconnical Antenna	Electro-Metrics	BIA-25	1171	CAL 4/29/05	4/29/07
Analyzer Tan Tower Quasi-Peak Adapter	HP	85650A	3303a01690	CAL 12/8/05	12/8/07
Analyzer Tan Tower RF Preselector	HP	85685A	3221A01400	CAL 12/7/05	12/7/07
Analyzer Tan Tower Spectrum Analyzer	HP	8566B OPT 462	3188A07786 3144A20661	CAL 12/7/05	12/7/07
Analyzer Tan Tower Preamplifier	HP	8449B-H02	3008A00372	CAL 12/8/05	12/8/07
LISN	Electro-Metrics	EM-7820	2682	CAL 4/28/05	4/28/07
Log-Periodic Antenna	Eaton	96005	1243	CAL 12/14/05	12/14/07

TEST PROCEDURE

POWER LINE CONDUCTED INTERFERENCE: The procedure used was ANSI standard C63.4-2003 using a 50uH LISN. Both lines were observed with the DUT transmitting. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed.

BANDWIDTH 20 dB: 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.

RADIATION INTERFERENCE: The test procedure used was ANSI standard C63.4-2003 using an Agilent spectrum receiver with preselector. The bandwidth (RBW) of the spectrum receiver was 100 kHz up to 1 GHz and 1 MHz above 1 GHz with an appropriate sweep speed. The VBW was also set to be equal to or greater than the RBW. The analyzer was calibrated in dB above a microvolt at the output of the antenna.

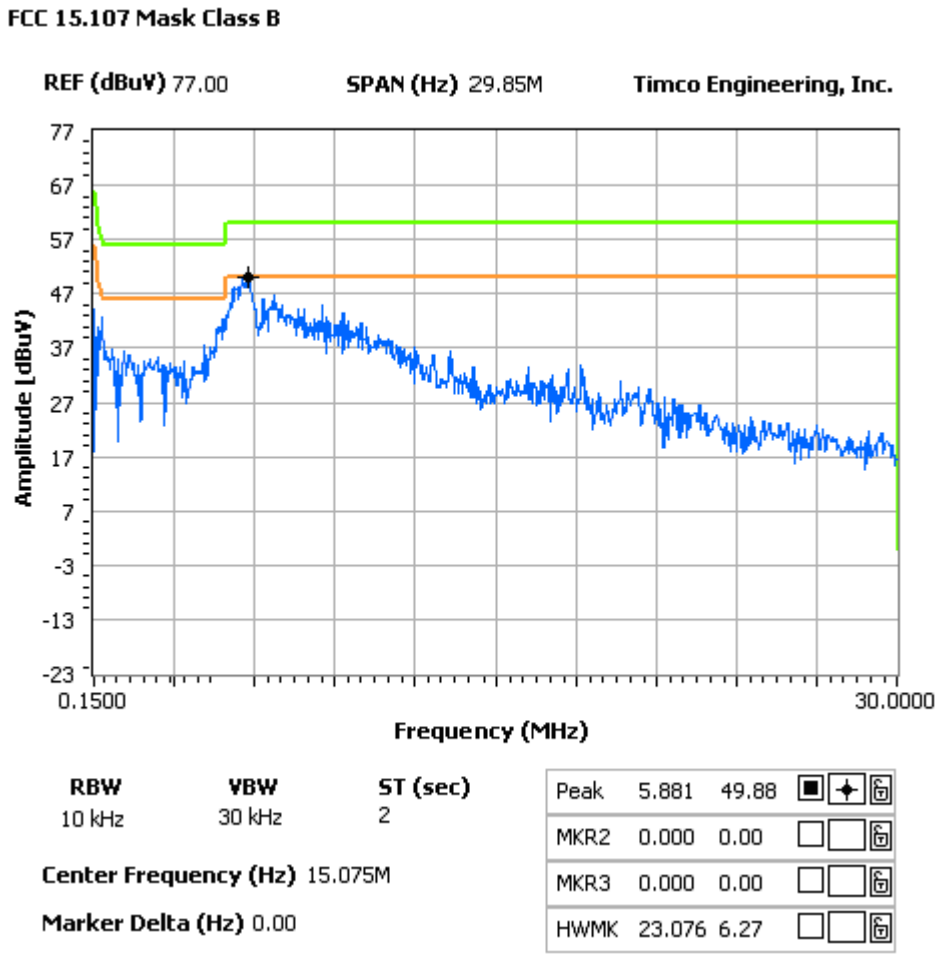
POWER LINE CONDUCTED INTERFERENCE

Rules Part No.: 15.207(a)

Requirements:

Emission Frequency (MHz)	FCC Conducted Limit (dBµV)	
	Quasi-peak (QP)	Average (AV)
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.		

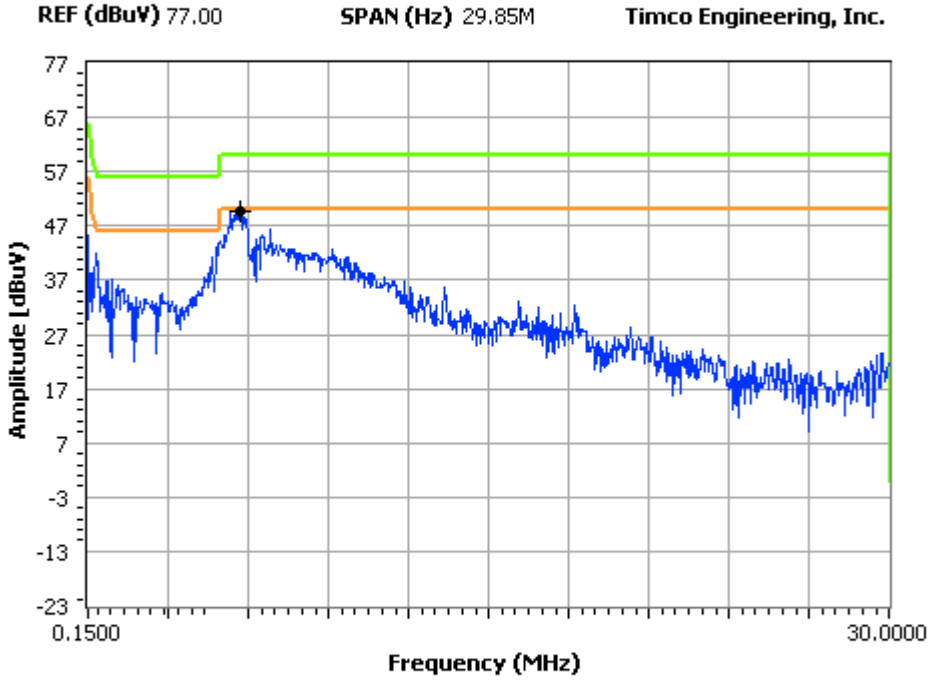
Test Data:



NOTES:

981but6 ac line conducted line 2

FCC 15.107 Mask Class B



RBW	VBW	ST (sec)
10 kHz	30 kHz	2

Center Frequency (Hz) 15.075M

Marker Delta (Hz) 0.00

Peak	5.792	49.60
MKR2	0.000	0.00
MKR3	0.000	0.00
HWMK	23.076	6.27

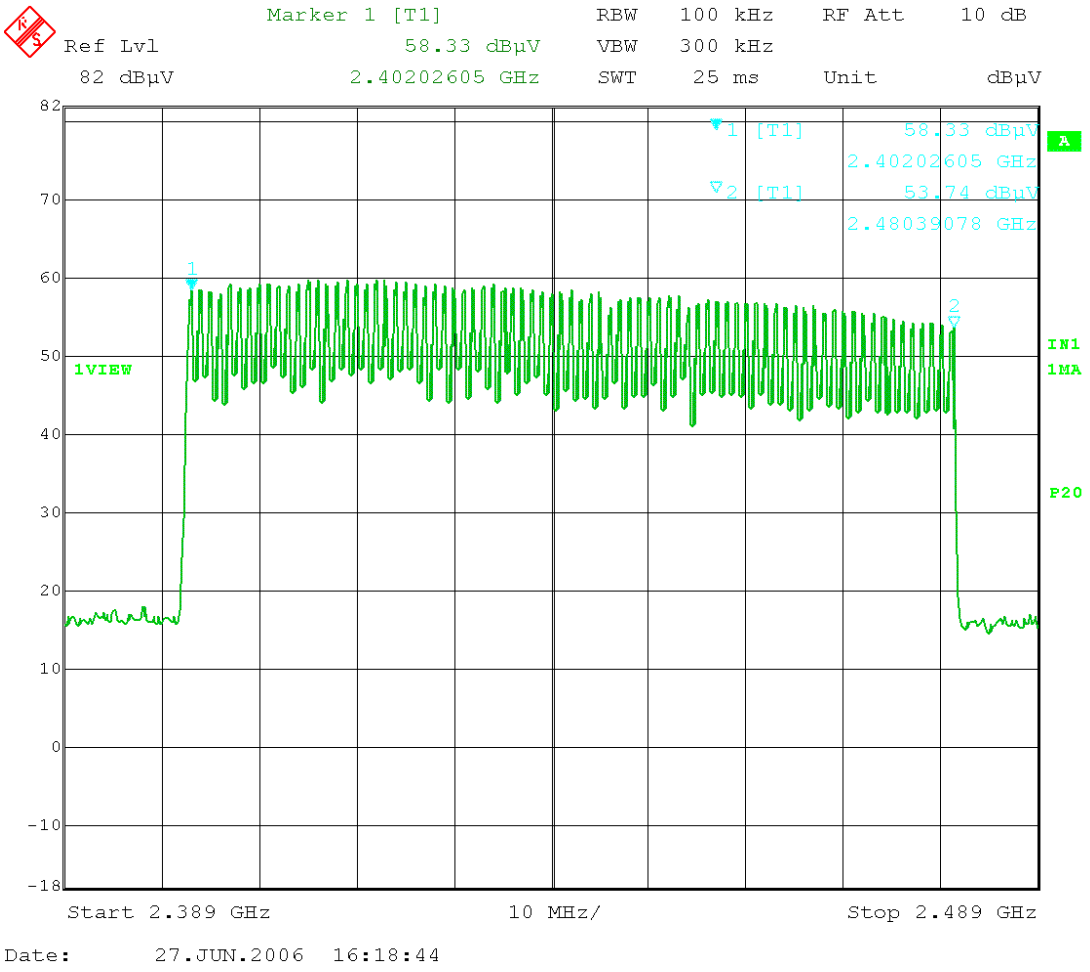
NUMBER OF HOPPING CHANNELS

Rules Part No.: 15.247(a)(1)

Requirements:

902-928 MHz	If the 20 dB bandwidth is less than 250 kHz, the system shall use at least 50 hopping frequencies.
	If the 20 dB bandwidth is 250 kHz or greater, the system shall use at least 25 hopping frequencies.
2400-2483.5 MHz	At least 15 channels
5725-5850 MHz	At least 75 channels

Test Data: There are 79 hopping channels



DWELL TIME OF A HOPPING CHANNEL

Rules Part No.: 15.247(a)(1)(i)

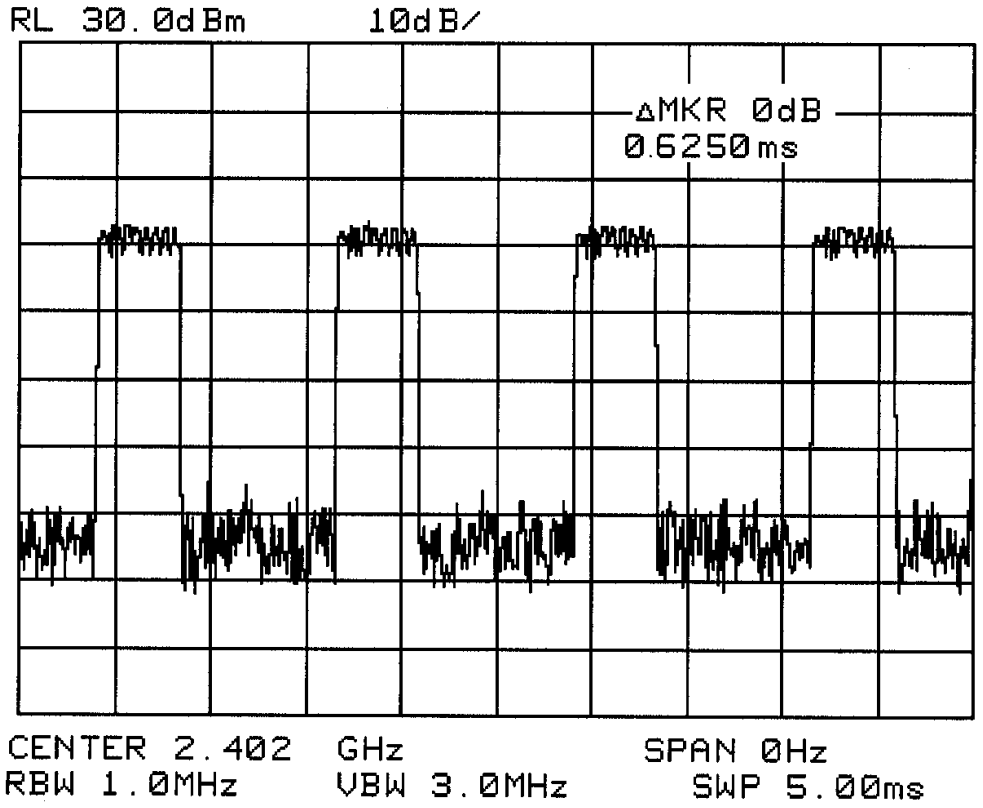
Requirements:

902-928 MHz	If 20 dB bandwidth is less than 250 kHz, Dwell time < = 0.4 seconds in a 20 second period.
	If 20 dB bandwidth is 250 kHz or greater, Dwell time < = 0.4 seconds n a 10 second period.
2400-2483.5 MHz	< = 0.4 seconds in a 0.4 seconds multiplied the number of hopping channels employed.
5725-5850 MHz	< = 0.4 seconds in a 30 second period.

Test Data:

The dwell time is 0.625 msec/hop or 400msec for 640 hops/.4 seconds.

Three places in the band were mesured and the worst case data presented.



20 dB BANDWIDTH

Rules Part No.: 15.247(a)(2)

Requirements:

Test Data: 1.04 MHz

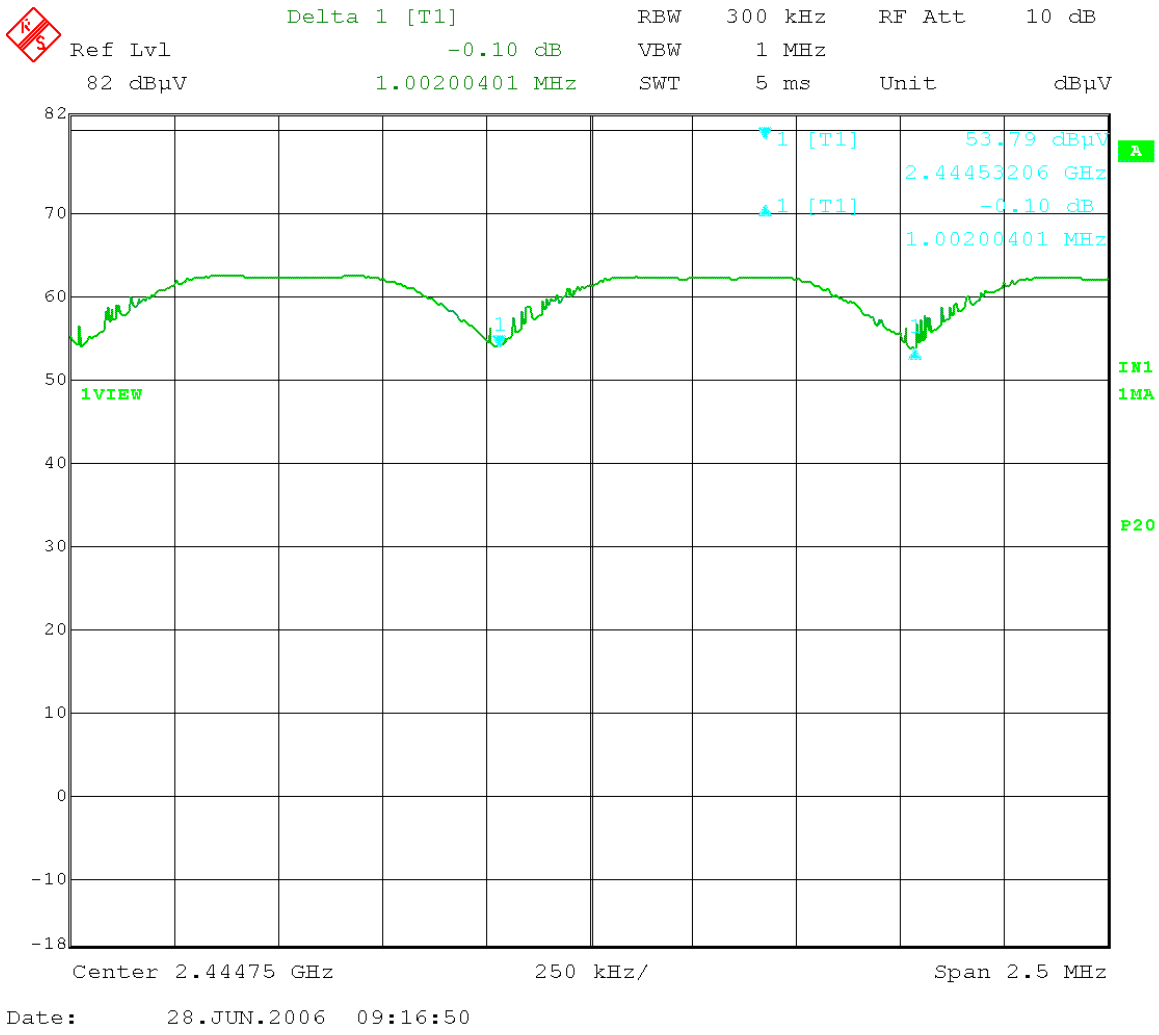
Tested at 2402, 2440, and 2480 MHz. Worst case shown.

CARRIER FREQUENCY SEPARATION

Rules Part No.: 15.247(a)(2)

Requirements: The hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Test Data: See the following plot
1 MHz



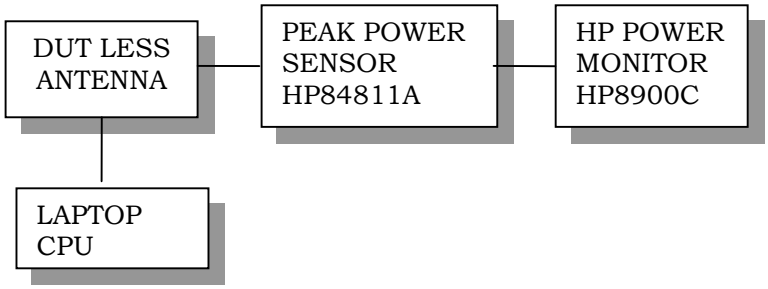
POWER OUTPUT

Rules Part No.: 15.247(b)

Requirements: The maximum peak output power shall not exceed 1 watt (30 dBm). If directional transmitting antennas with a gain of more than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test Method: Power was measured by disconnecting the antennas and measuring across a 50 ohm load as recommended by the manufacturer using a HP peak power meter Model 8900C. The antenna is non-directional and doesn't exceed 6 dBi gain. The power output was measured at three places in the band highest is reported below.

The RF power output was measured at the antenna feed point by removing the permanent antenna and connecting the DUT to a peak power meter, Agilent Model No. 8900C.



Test Data: 2 mWatts conducted

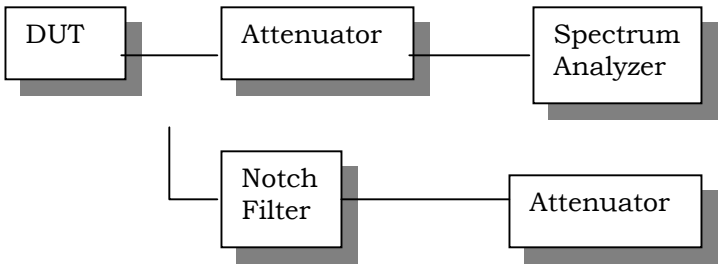
Three places in the band were measured and the highest power presented above.

SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Rules Part No.: 15.247(c)

Requirements: Emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.

Method of Measuring:



Note: The spectrum was scanned to the tenth harmonic.

Test Data:

Low Channel			Middle Channel			High Channel	
Frequency MHz	Reading dBuV		Frequency MHz	Reading dBuV		Frequency MHz	Reading dBuV
2402	109		2440	110		2480	107
4804	67		4882	67		4960	64
7206	47		7322	48		7440	45

FIELD STRENGTH OF SPURIOUS EMISSIONS

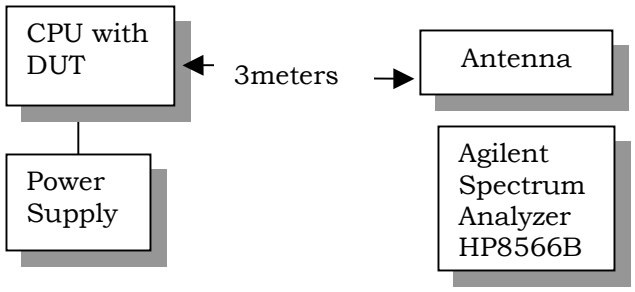
Rules Part No.: 15.247(c), 15.205 &15.209(b)

Requirements:

(Fundamental) Frequency	(Field Strength) Limits
902 – 928MHz	127.37dBuV/m
2.4 – 2.4835GHz	54 dBuV/m @3m
30 - 88 MHz	40 dBuV/m @3M
88 -216 MHz	43.5 dBuV/m @3M
216 -960 MHz	46 dBuV/m @3M
ABOVE 960 MHz	54dBuV/m

Emissions that fall in the restricted bands (15.205) must be less than or equal to 500 uV/m (54 dBuV/m). Spurious not in a restricted band must be 20 dBc.

Test Setup



Equipment placed 80cm above ground on a rotatable platform.

Test Data:

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	Ant. Polarity V/H	Coax Loss dB	Correction Factor dB	Duty Cycle	Field Strength dBuV/m	Margin dB
2,402.00	2,402.00	64.1	V	3.18	32.33	2.27	97.34	30.04
2,402.00	2,402.00	65.8	H	3.18	32.33	2.27	99.04	28.34
2,402.00	4,804.00	14.1	V	4.9	34.34	2.27	51.07	2.93
2,402.00	4,804.00	16.9	H	4.9	34.34	2.27	53.87	0.13
2,402.00	7,206.00	9.1	H	5.72	36.15	2.27	48.70	5.30
2,402.00	7,206.00	10.4	V	5.72	36.15	2.27	50.00	4.00
2,440.80	2,440.80	53.9	V	3.21	32.43	2.27	87.27	40.11
2,440.80	2,440.80	58.4	H	3.21	32.43	2.27	91.77	35.61
2,440.80	4,882.00	14.0	V	4.94	34.41	2.27	51.08	2.92
2,440.80	4,882.04	16.6	V	4.94	34.41	2.27	53.68	0.32
2,440.80	7,322.50	9.4	V	5.79	36.29	2.27	49.21	4.79
2,440.80	7,322.64	10.4	V	5.79	36.29	2.27	50.21	3.79
2,480.00	2,480.00	61.9	V	3.24	32.54	2.27	95.41	31.97
2,480.00	2,480.00	66.9	H	3.24	32.54	2.27	100.41	26.97
2,480.00	4,960.00	13.4	V	4.98	34.47	2.27	50.58	3.42
2,480.00	4,960.00	14.6	H	4.98	34.47	2.27	51.78	2.22
2,480.00	7,440.00	12.4	H	5.86	36.43	2.27	52.42	1.58
2,480.00	7,440.00	13.0	V	5.86	36.43	2.27	53.02	0.98

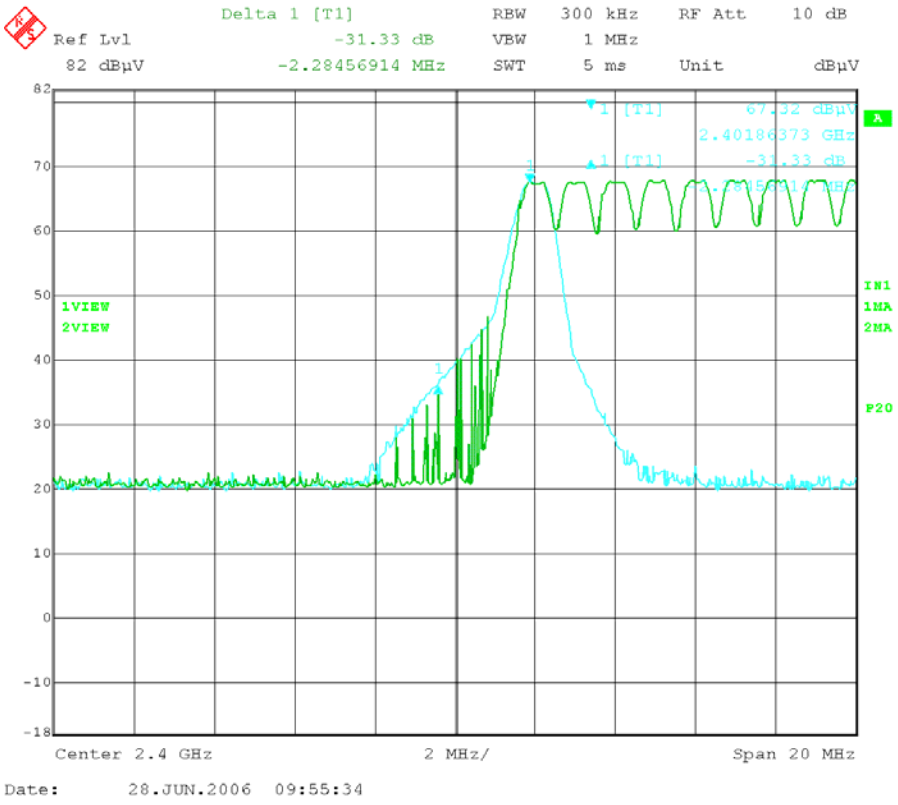
Harmonics were measured to the 10th harmonic

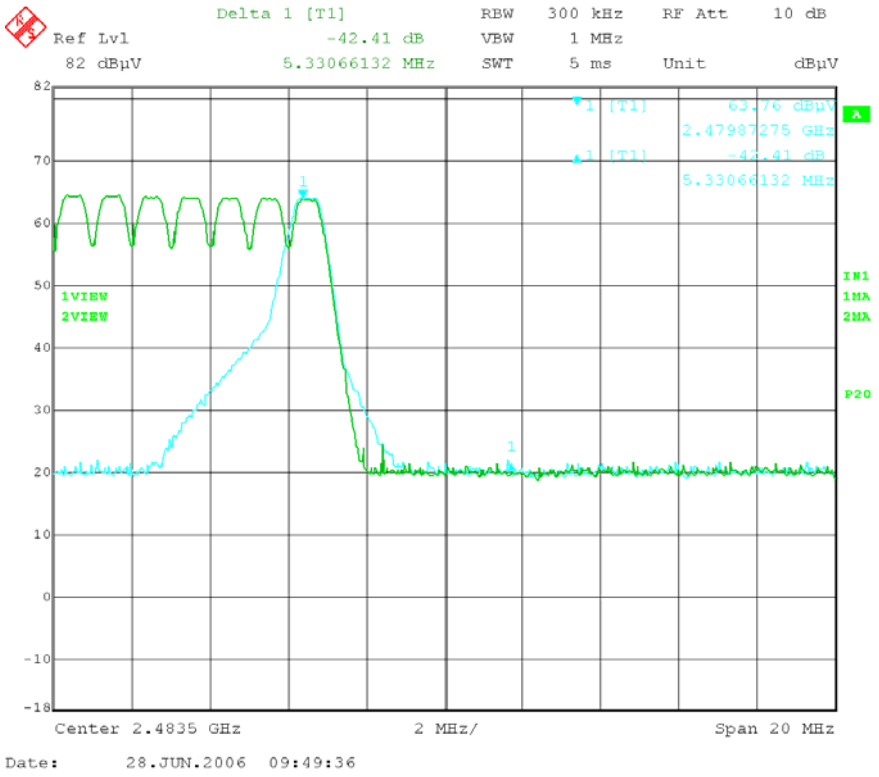
RADIATED SPURIOUS EMISSIONS INTO ADJACENT RESTRICTED BAND

Rule Parts No.: **Part 15.205**

Requirements: Emissions that fall in the restricted bands (15.205). These emissions must be less than or equal to 500 uV/m (54dBuV/m). Emissions not in the restricted band must be 20 dBc.

Emission Frequency MHz	Meter Reading dBuV	Ant. Polarity V/H	Coax Loss dB	Correction Factor dB	Field Strength dBuV/m	Margin dB
2,390.00	14.00	H	3.15	32.30	49.45P	4.55
2483.5	21.41	H	3.24	32.55	57.20P	16.8
2483.5	14.91	H	3.24	32.55	50.70A	3.30


Delta 1 [T1]
RBW 300 kHz
RF Att 10 dB
Ref Lvl
-31.33 dB
VBW 1 MHz
82 dBµV
-2.28456914 MHz
SWT 5 ms
Unit dBµV
1 [T1]
67.32 dBµV
2.40186373 GHz
1 [T1]
-31.33 dB
1VIEW
2VIEW
IN1
1MA
2MA
P20
Center 2.4 GHz
2 MHz/
Span 20 MHz
Date: 28.JUN.2006 09:55:34


Delta 1 [T1]
RBW 300 kHz
RF Att 10 dB
Ref Lvl
-42.41 dB
VBW 1 MHz
82 dBµV
5.33066132 MHz
SWT 5 ms
Unit dBµV
1 [T1]
63.76 dBµV
2.47987275 GHz
1 [T1]
-42.41 dB
5.33066132 MHz
1VIEW
2VIEW
IN1
1MA
2MA
P20
Center 2.4835 GHz
2 MHz/
Span 20 MHz
Date: 28.JUN.2006 09:49:36