Test Report

CURTIS-STRAUS Curtis-Straus LLC, *a wholly owned subsidiary of BV CPS*

Report No	EL1376-1
Client	Escort Inc.
Address	5440 West Chester Road West Chester, OH 45069
Phone	513-870-8535
Items tested	Bluetooth Module
FCC ID	QKLBT1
FRN	0007508732
Equipment Type	DSS
Equipment Code	Part 15, Frequency Hopping Spread Spectrum Transmitter
FCC/IC Rule Parts	47 CFR 15.247
Test Dates	August 29-30th, 2011
Results	As detailed within this report
Prepared by	Matthew Burman – Test Engineer
Authorized by	Mairaj Hussain – EMC Supervisor
Issue Date	November 1, 2011
Conditions of Issue	This Test Report is issued subject to the conditions stated in the '*Conditions of Testing*' section on page 36 of this report.

Contents

Form Final Report REV 7-20-07 (DW)

Summary

This test report supports an application for certification of a modular frequency hopping transmitter operating pursuant to 47 CFR 15.247.

The Bluetooth module is being certified as a limited modular device due to the fact that it will be marketed and installed in other Escort devices.

We found that the product met the above requirements without modification. The test sample was received in good condition.

Test Methodology

Radiated emission and AC Line conducted testing was performed according to the procedures specified in ANSI C63.4 (2009) and FCC public notice DA00-705. Radiated Emissions were maximized by rotating the device around three orthogonal axes as well as varying the test antenna's height and polarity. The device's antenna could not be maximized separately because it is fixed and internal to the device.

The unit runs Bluetooth 2.1 which supports different types of modulations (GFSK, pi/4 DQPSK and 8DPSK) and data rates (1/2/3Mbps), along with different packet types (DH1, DH3 and DH5).

A prescreen was used to determine that the following modulation types and data rates were the worst case, and similarities between other modulations created a redundancy.

GFSK – Modulation, DH5 - Packet Type, 1 – Data Rate

8DPSK – Modulation, DH5 - Packet Type, 3 – Data Rate

Conducted Emissions at the antenna port was performed, as required by rule section.

The product will be configured for the transmission to be in the range of 2402-2480MHz.

The following bandwidths were used during radiated spurious and line conducted emissions.

Frequency	RBW	VBW
0.15-30MHz	9kHz	30kHz
30-1000MHz	120kHz	1MHz
1-25GHz	1MHz	3MHz

Release Control Record

Issue No.	Reason for change	Date Issued
1	Original Release	November 1, 2011

Product Tested - Configuration Documentation

EUT Configuration

Work Order: L1376
Company: Escort Inc.
Company Address: 5440 West Chester Road
West Chester, OH 45069
Contact: Wanda Densford

	MN	PN	SN
EUT:	BT1		Sample 1
EUT Description:	Bluetooth module		
EUT Tx Frequency:	2402 - 2480MHz		

Support Equipment:	MN	SN
PC	PP1LL	5LVS261
USB-SPI converter	DEV-SYS-1808-1A	208423

EUT Ports:

Port Label	Port Type	No. of ports	No. Populated	Cable Type	Shielded	Ferrites	Length	Max Length	In/Out NEBS Type	Unpopulated Reason
none										

Software / Operating Mode Description:

Using BlueTest3 program on support PC to control Bluetooth radio.

Statement of Conformity

The Bluetooth Module has been found to conform to the following parts of 47 CFR as detailed below:

Part 15	Comments
15.15(b)	There are no controls accessible to the user that varies the output power.
15.19	The label is shown in the label exhibit.
15.21	Information to the user is shown in the instruction manual exhibit.
15.27	No special accessories are required for compliance.
15.31	The EUT was tested in accordance with the measurement standards in this section.
15.33	Frequency range was investigated according to this section, unless noted in specific rule section under which the equipment operates.
15.35	The EUT emissions were measured using the measurement detector and bandwidth specified in this section, unless noted in specific rule section under which the equipment operates.
15.203	The antenna for this device is hardwired to the PCB.
15.205 15.209	The fundamental is not in a Restricted band and the spurious and harmonic emissions in the Restricted bands comply with the general emission limits of 15.209.
15.207	EUT meets the AC Line conducted emissions requirements of 15.207. Measurements were made on the AC side of a DC supply.
15.247	The unit complies with the requirements of 15.247

Modifications Required for Compliance

No Modifications were required for compliance.

Test Results

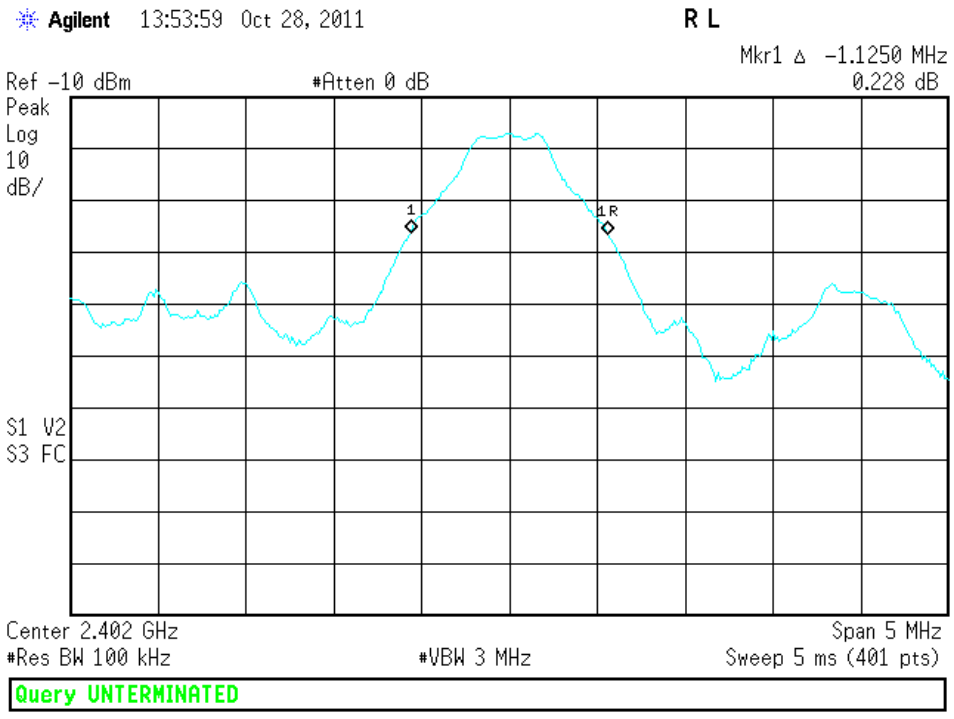
Bandwidth

MEASUREMENTS / RESULTS

20dB Bandwidth		
	Frequency (MHz)	**Reading** (MHz)
GFSK		
low channel	2402.0	1.12500
mid channel	2441.0	1.15000
high channel	2480.0	1.16250
8DPSK		
low channel	2402.0	1.43750
mid channel	2441.0	1.43750
high channel	2480.0	1.42500

PLOTS

GFSK
Low Channel



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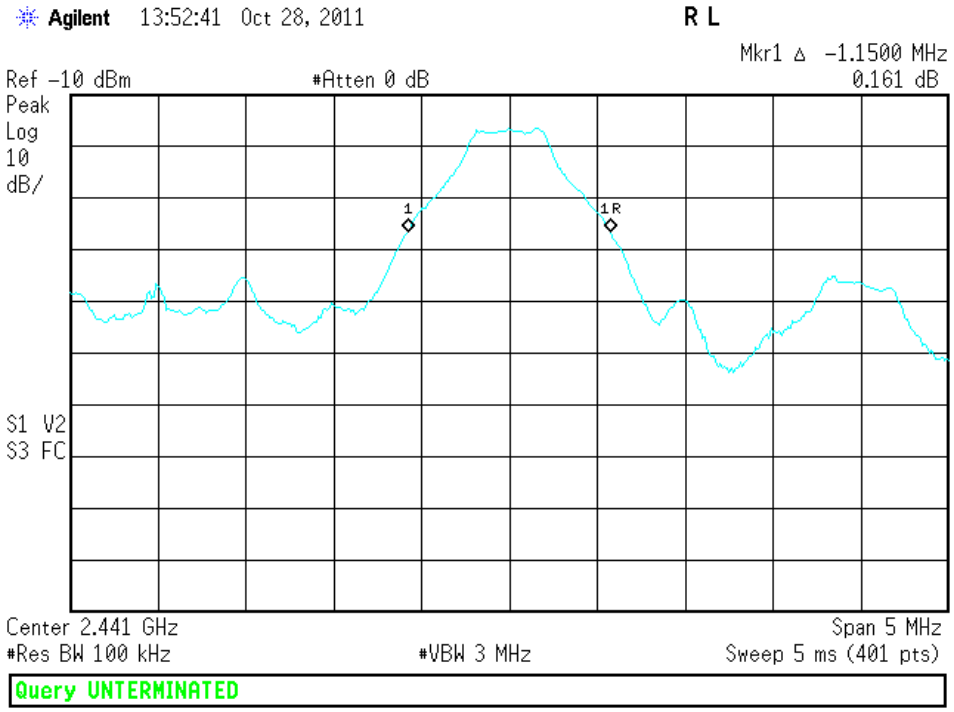
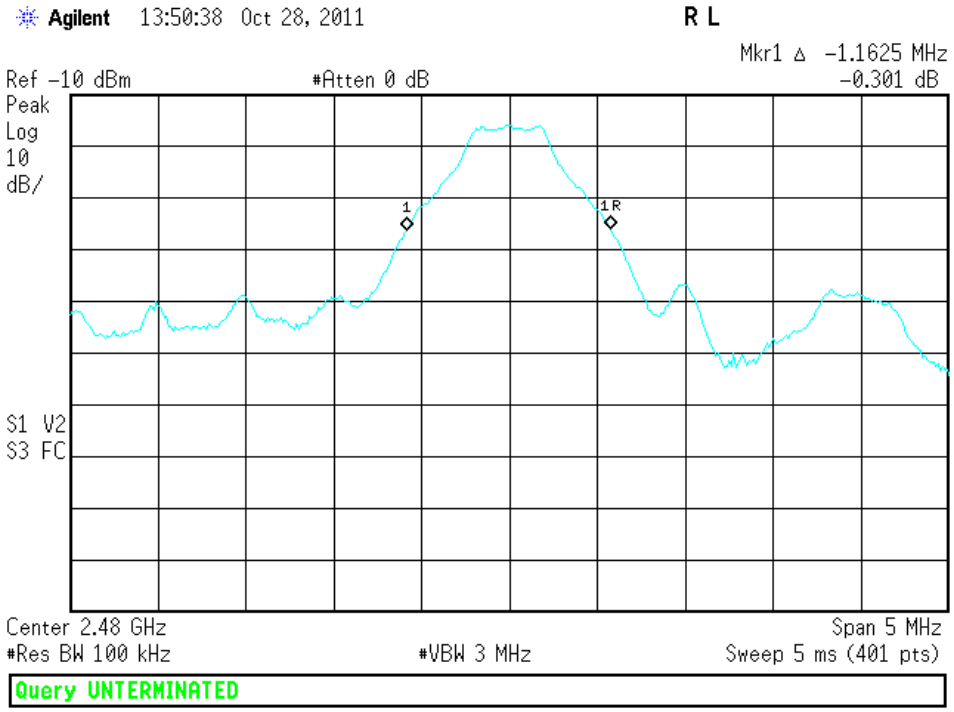
Mid Channel

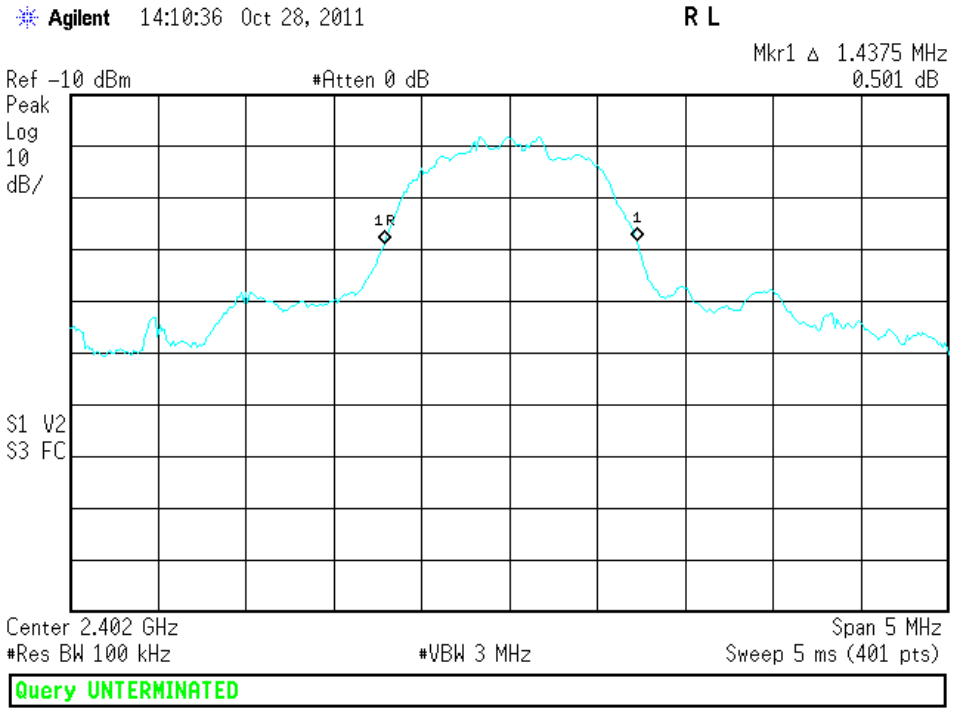


High Channel

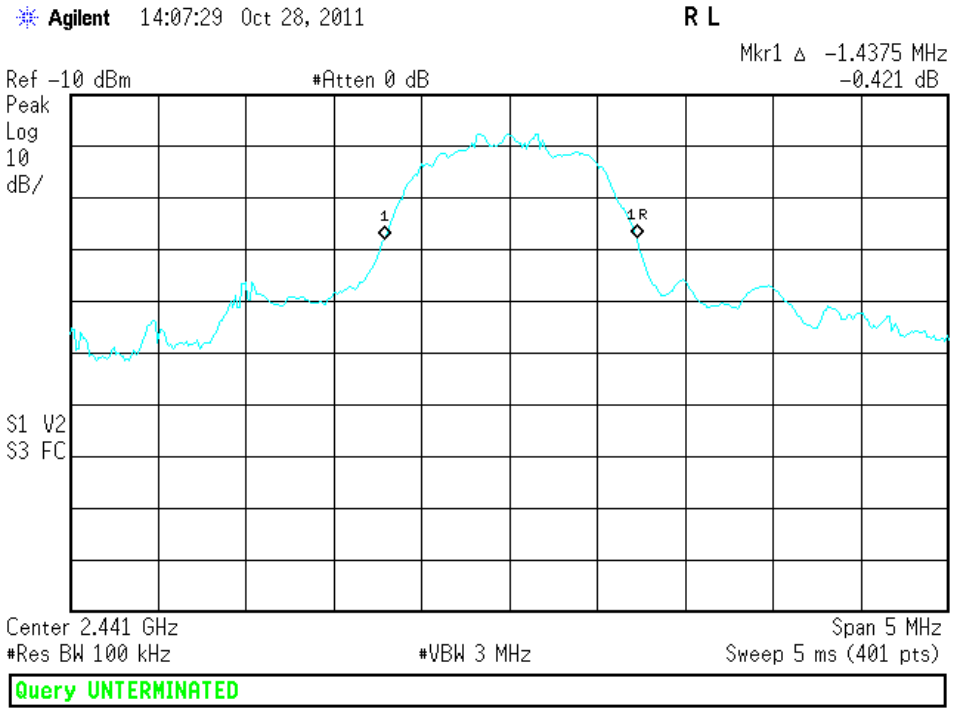


8DPSK

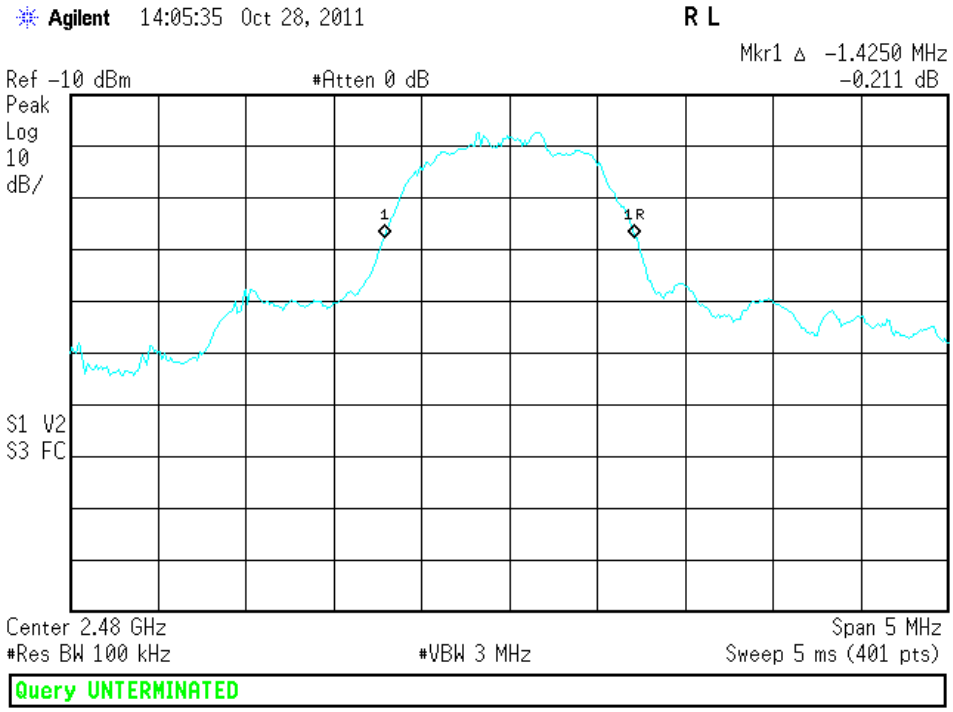
Low Channel



Mid Channel



High Channel



Frequency Hopping Requirements

Channel Spacing

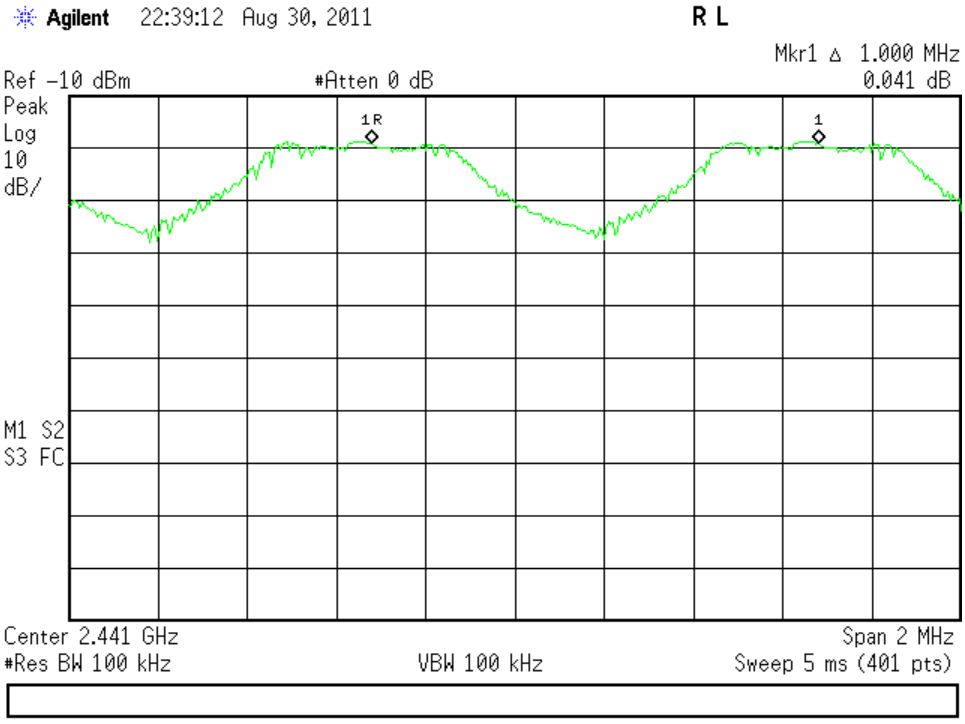
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 2/3rds of 20dB bandwidth of the hopping channel, whichever is greater.

[15.247 (a) (1)]

PLOTS

The widest emission 20dB bandwidth was measured at 1.4375MHz, and 2/3rds of that is equal to 0.95834MHz. The channel spacing is 1MHz, which is greater than 0.95834MHz.

Channel assignment is identical between different modes of transmission; therefore spacing will be the same.



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Number of Channels

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels.

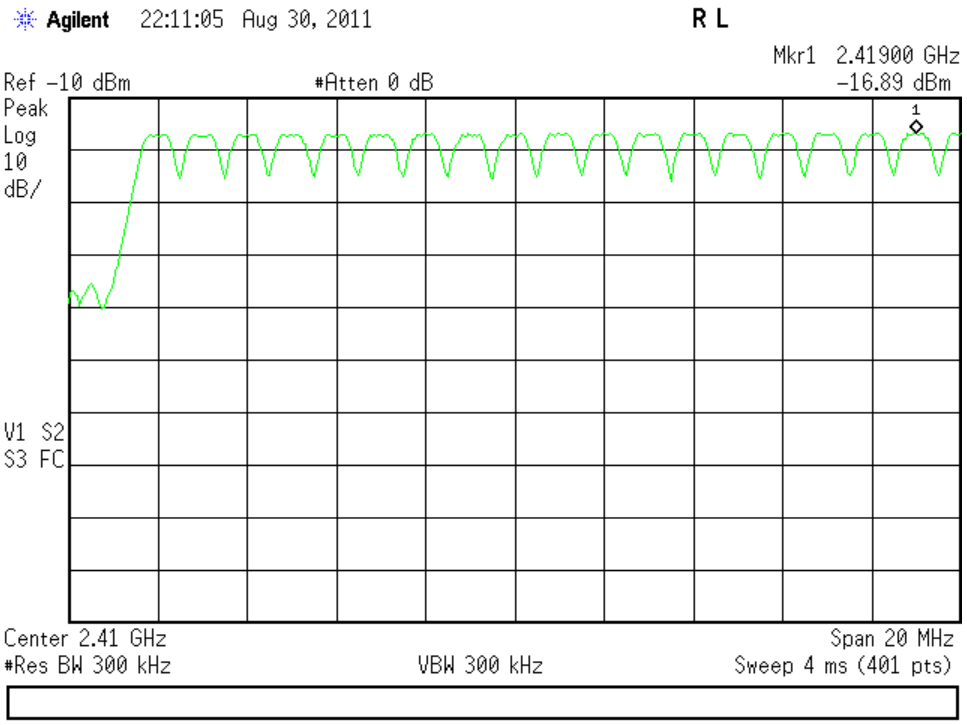
[15.247 (a) (1) (iii)]

Plots

79 channels are employed

Channel assignment is identical between different modes of transmission, therefore spacing will be the same.

2402-2419MHz – 18 Channels



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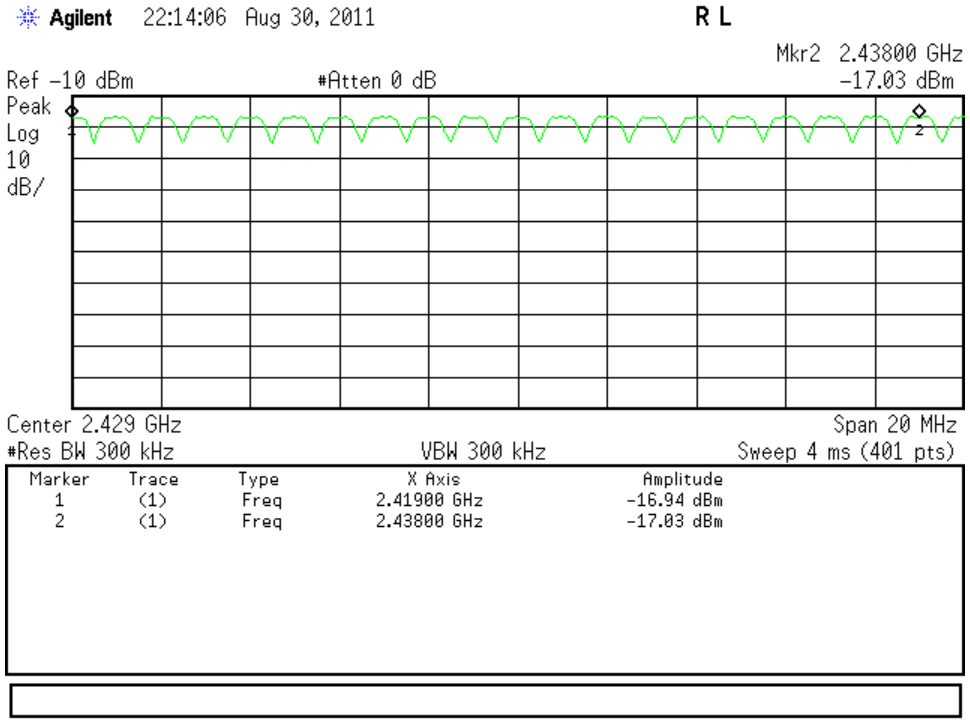
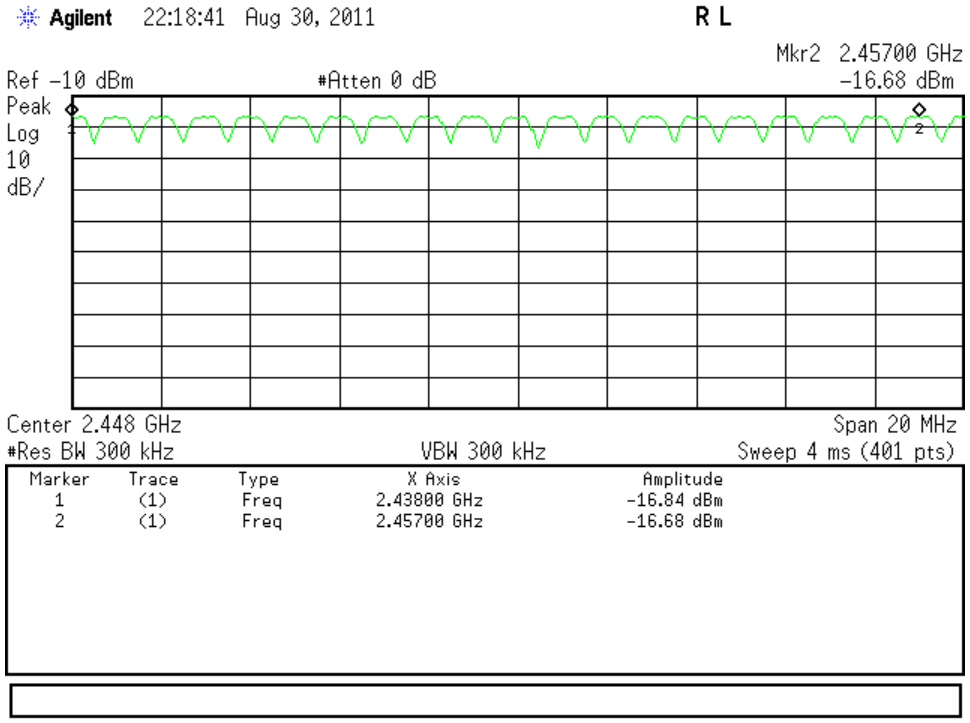
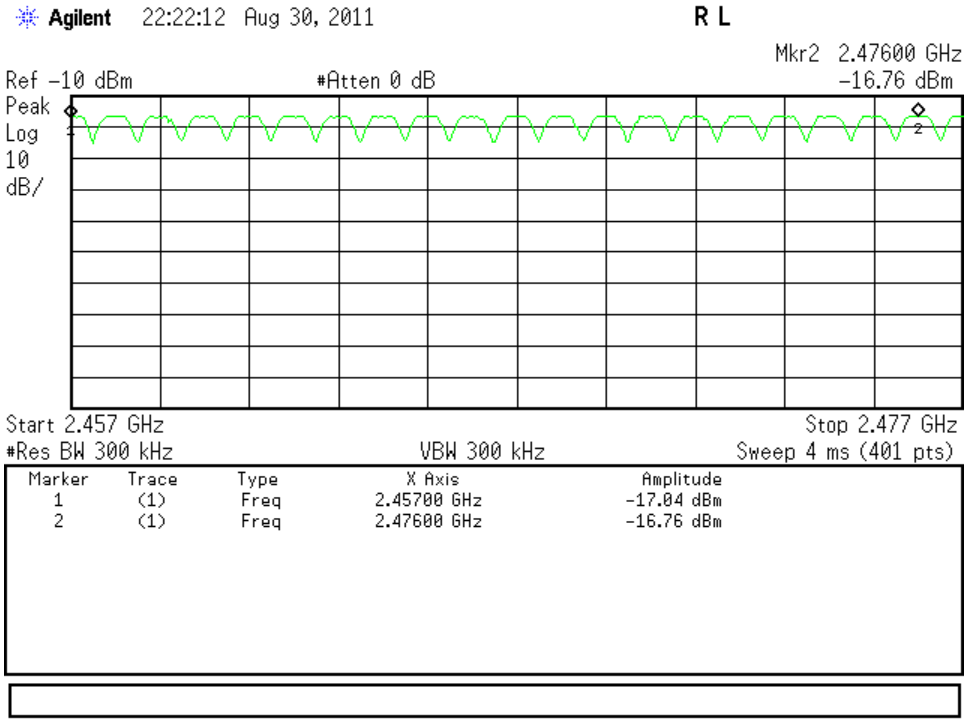
2419-2438MHz – 19 Channels



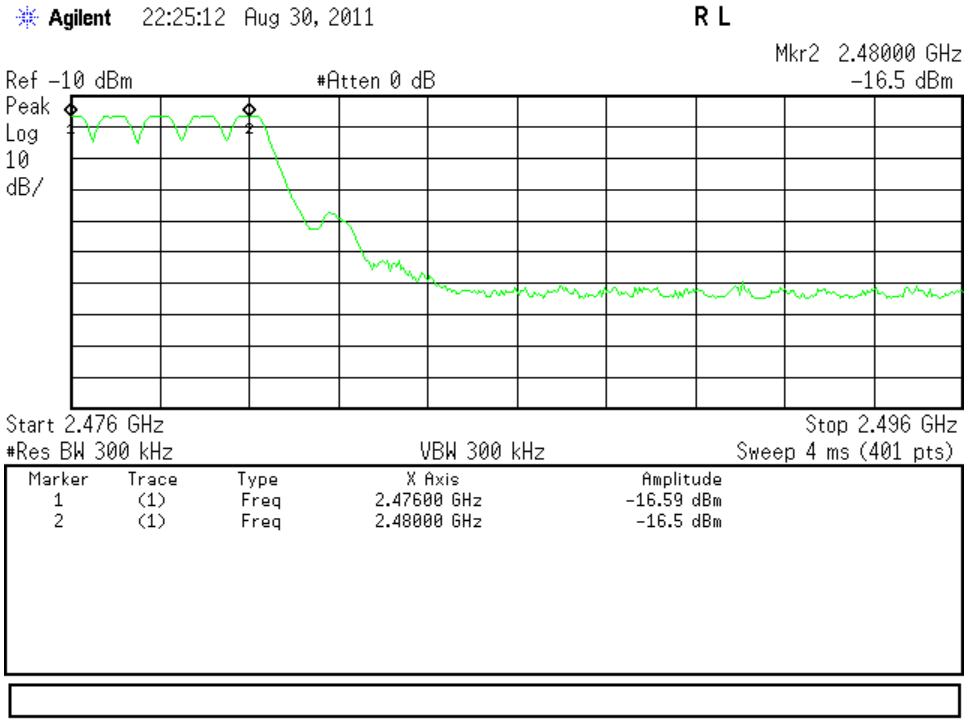
2438 – 2457MHz – 19 Channels



2457 – 2476MHz – 19 Channels



2476 – 2480MHz – 4 Channels



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Occupancy Time

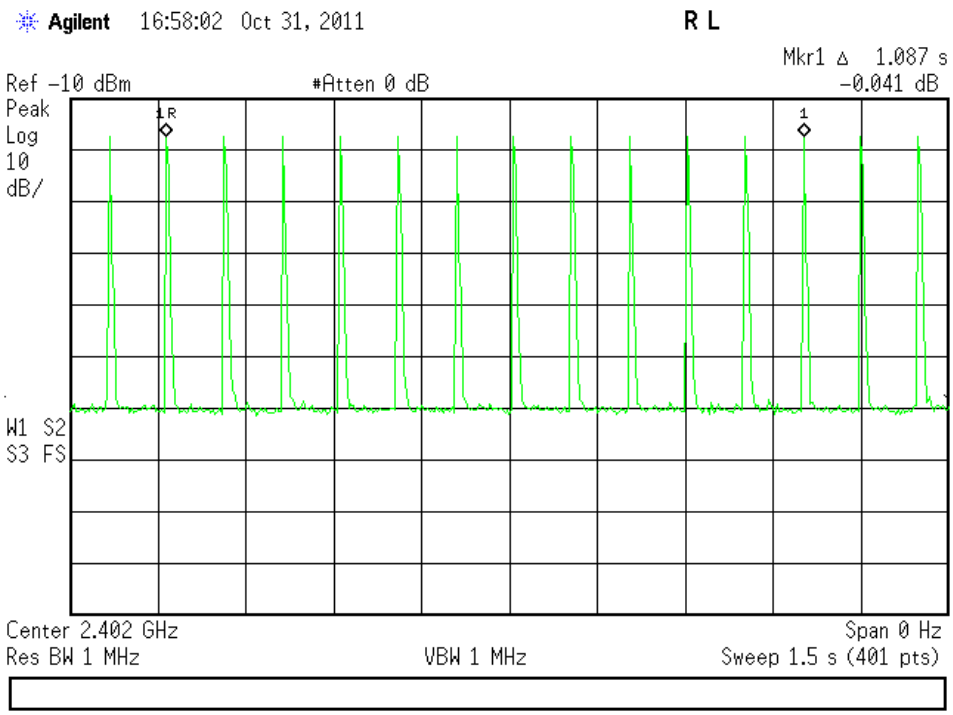
The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.
[15.247 (a) (1) (iii)]

Limit Calculations

79 hopping channels are employed, therefore:

Dwell Time					
	Number of transmissions in 1 second	0.4 seconds multiplied by number of hopping channels employed (seconds)	Number of transmissions in 31.6 seconds	Length of Transmission (ms)	Total length of transmission (ms)
GFSK					
DH1	11.0	31.6	347.6	0.405	140.77800
DH3	6.0	31.6	189.6	1.669	316.44240
DH5	4.0	31.6	126.4	3.0	379.20000
8DPSK					
DH1	11.0	31.6	347.6	0.3975	138.17100
DH3	6.0	31.6	189.6	1.675	317.58000
DH5	4.0	31.6	126.4	2.963	374.52320

Plots
GFSK
DH1



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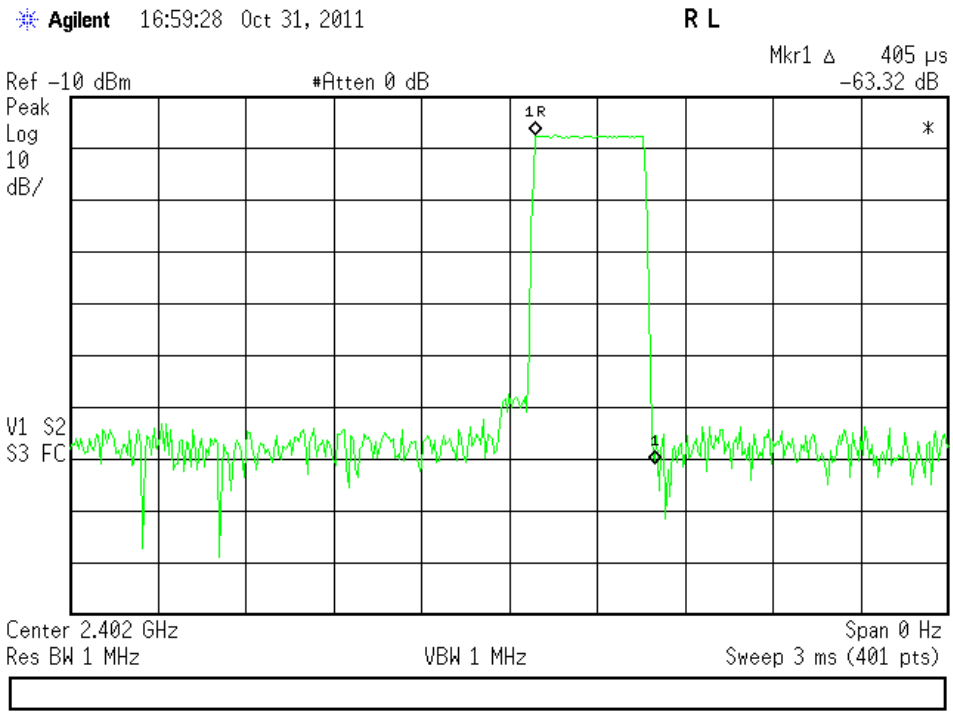
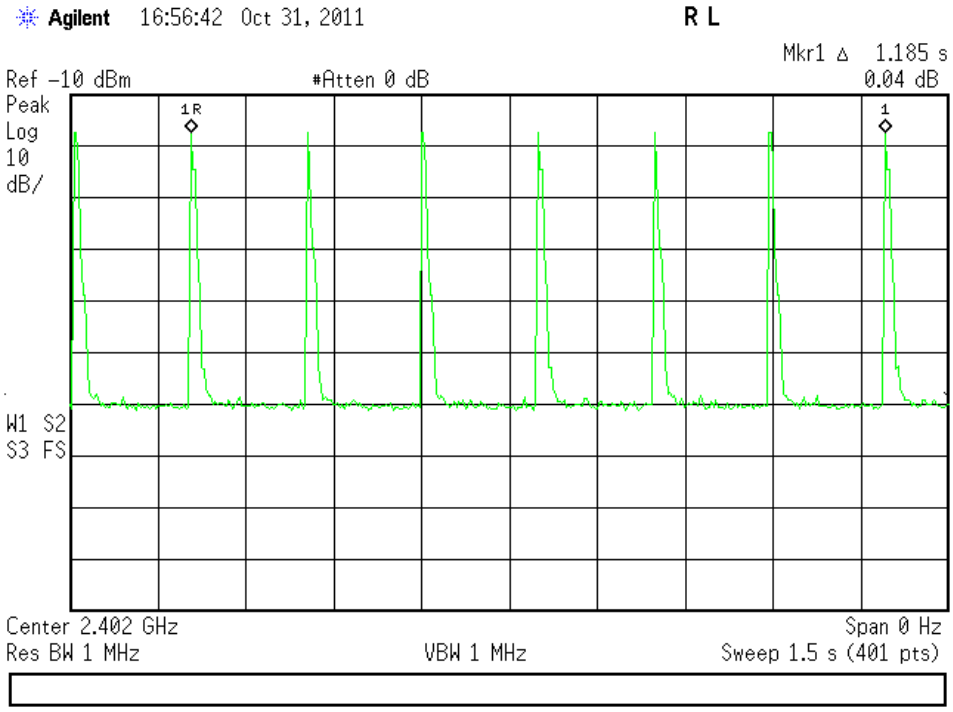


DH3



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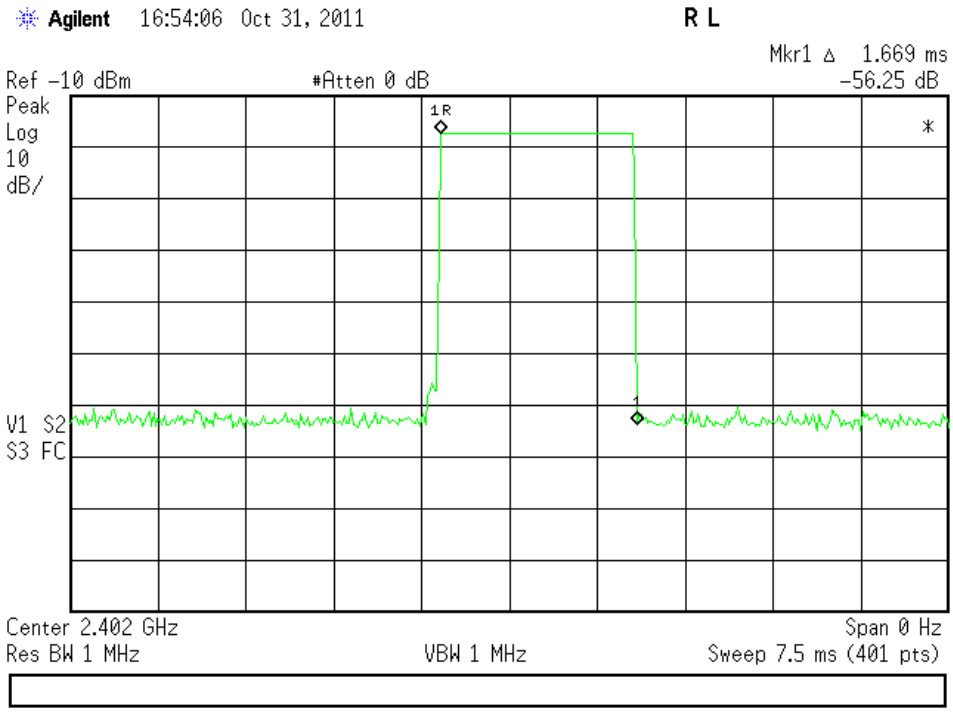
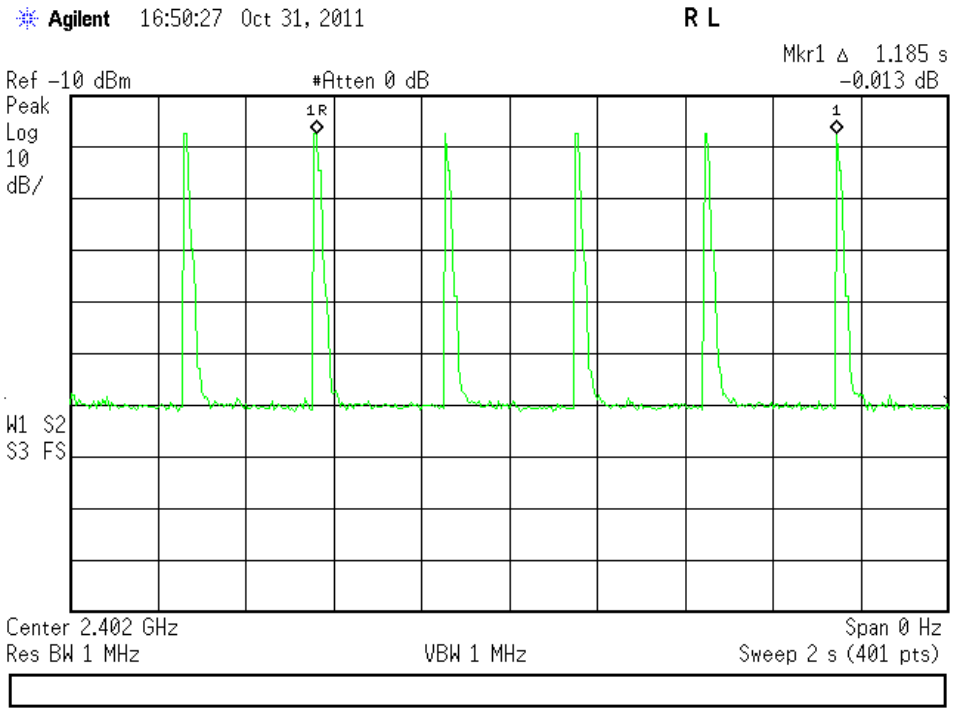


DH5



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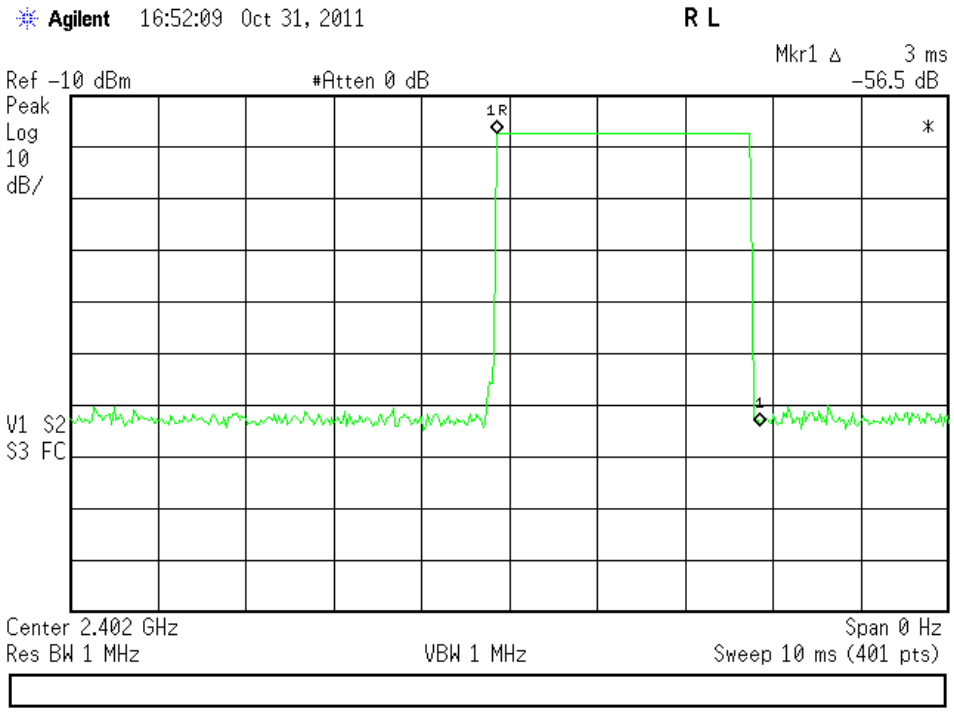
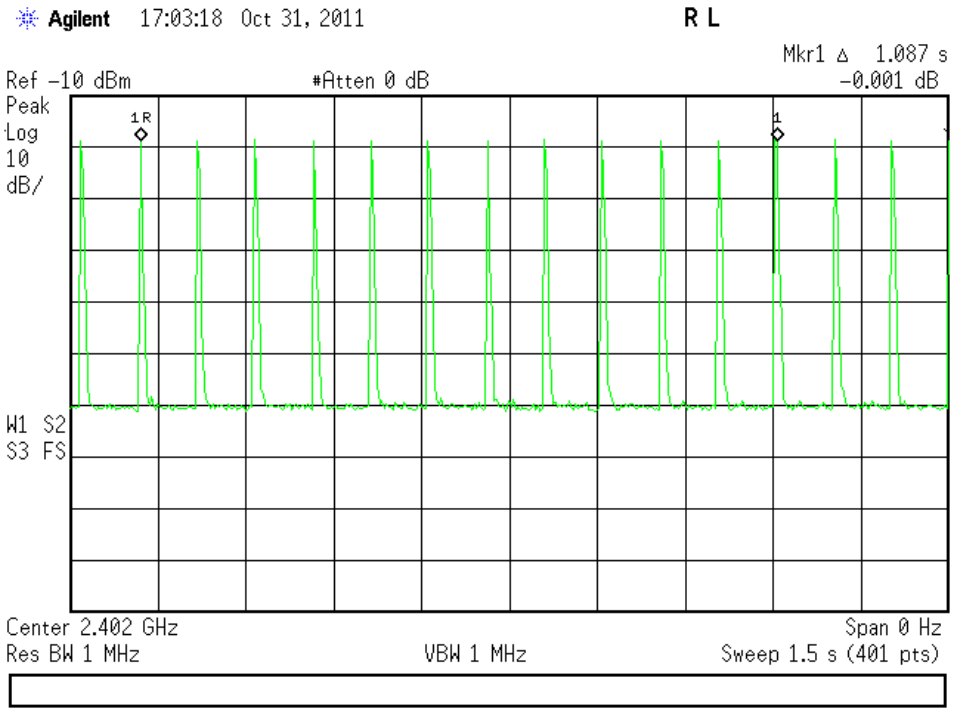


8DPSK
DH1



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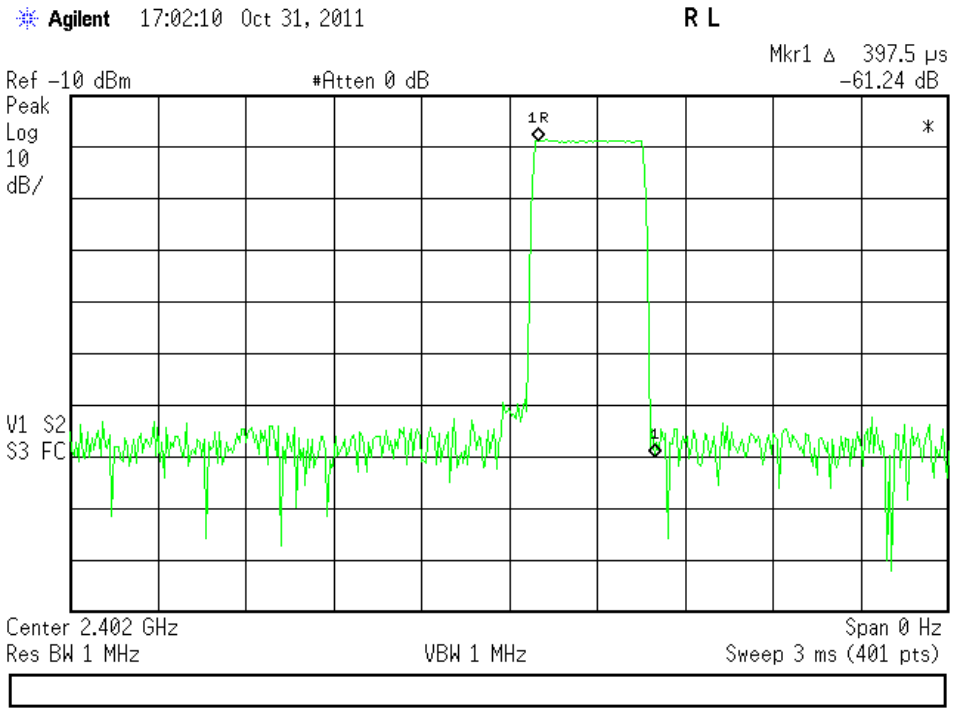
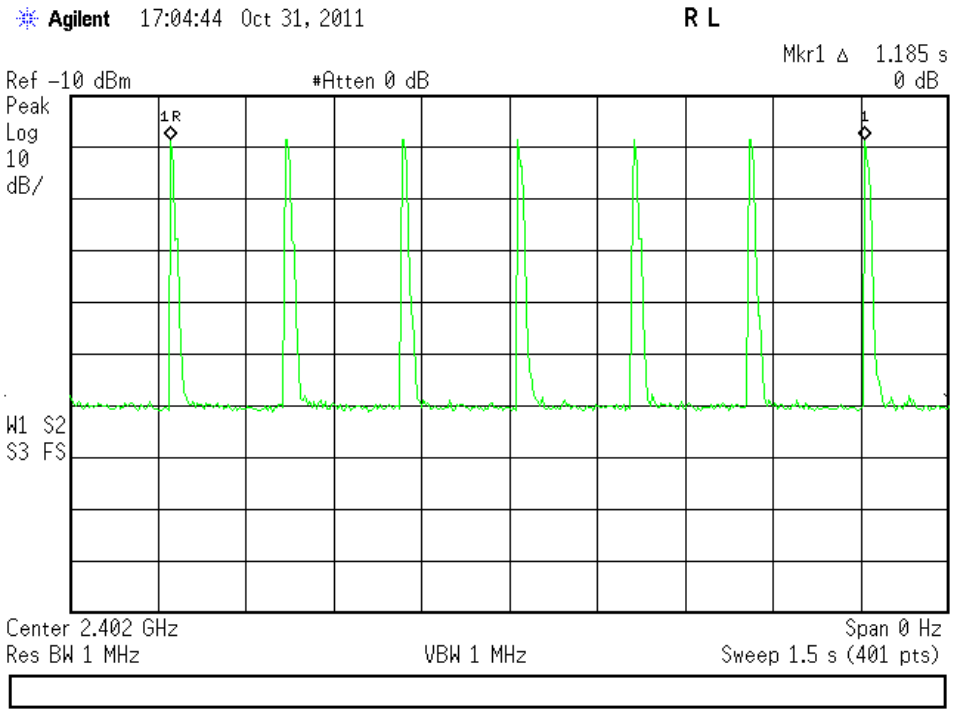


DH3



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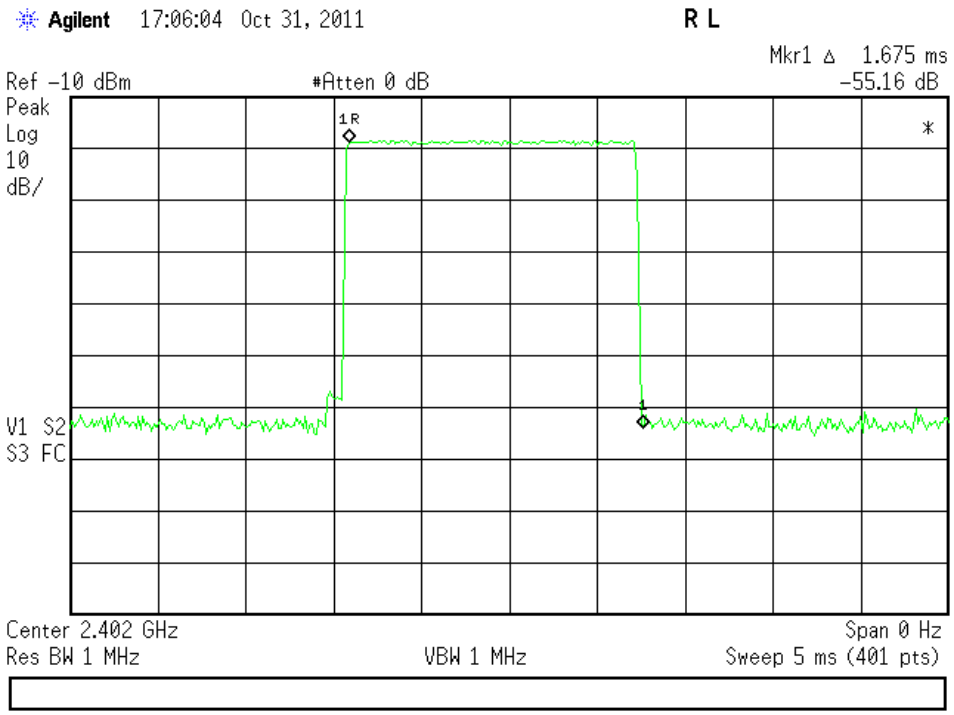
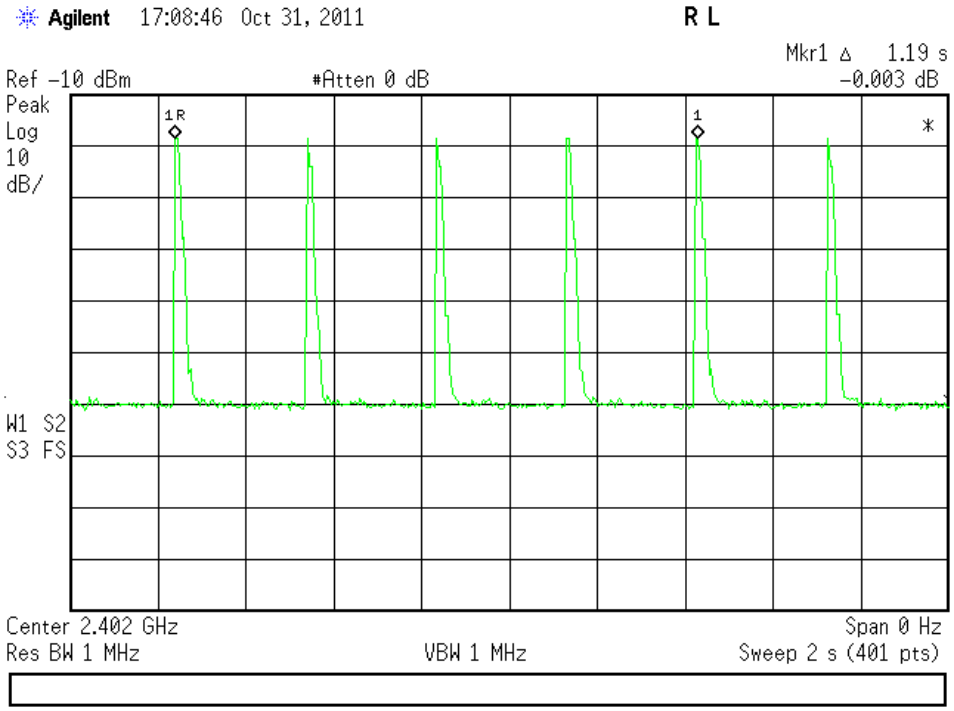


DH5



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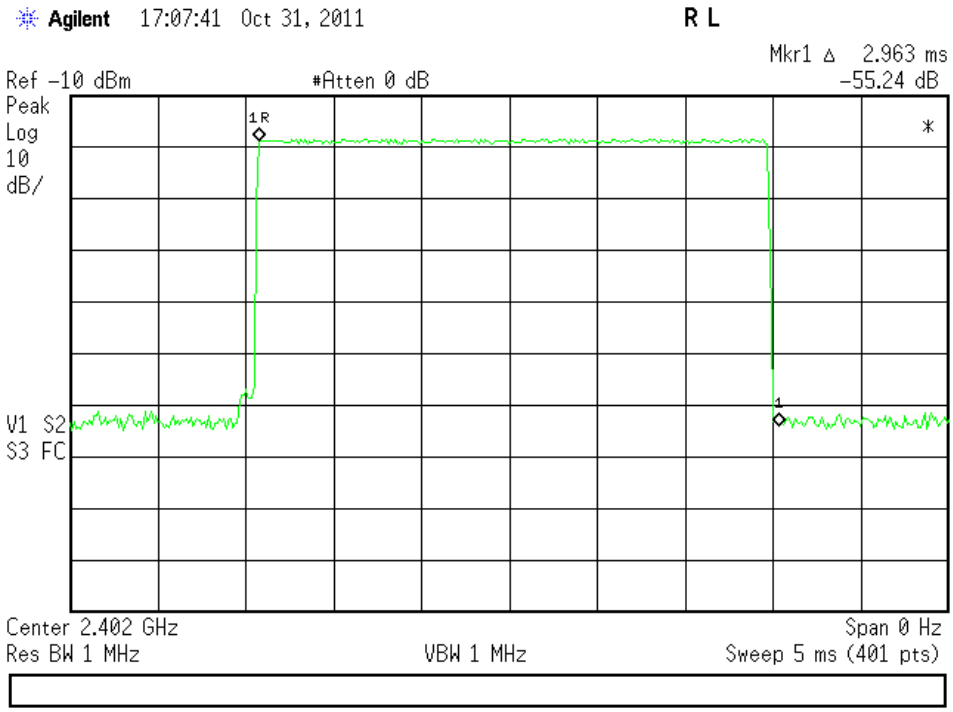

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Peak Power

LIMIT

Conducted Output Power
1 Watt (30dBm)
[15.247(b) (1)]

MEASUREMENTS / RESULTS

Peak Output Power

Date: 30-Aug-11 **Company:** Escort **Work Order:** L1376
Engineer: Matthew Burman **EUT Desc:** QKLBT1 **EUT Operating Voltage/Frequency:** 5Vdc
Temp: 21.8℃ **Humidity:** 44% **Pressure:** 1011mBar
Frequency Range: 2400-2483.5MHz **Measurement Distance:** Conductive
Notes: RBW = 3MHz RBW > 20dB BW
VBW = 3MHz

	Frequency (MHz)	Peak Reading (dBm)	Attenuator Factor (dB)	Adjusted Reading (dBm)	FCC Section 15.247(b(1)) Limit (dBm)	Margin (dB)	Result (Pass/Fail)
GFSK							
low channel	2402.0	-16.990	20.000	3.010	30.0	-26.990	Pass
mid channel	2441.0	-16.390	20.000	3.610	30.0	-26.390	Pass
high channel	2480.0	-15.870	20.000	4.130	30.0	-25.870	Pass
8DPSK							
low channel	2402.0	-17.570	20.000	2.430	30.0	-27.570	Pass
mid channel	2441.0	-16.890	20.000	3.110	30.0	-26.890	Pass
high channel	2480.0	-16.470	20.000	3.530	30.0	-26.470	Pass

Test Site: CEMI4 **Attenuator:** PE7019-20
Analyzer: Asset #1491

Rev: 19-Aug-2011

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Rental SA #5	9kHz-26.5 GHz	E4407B	Agilent	MY44220066	1491	I	17-Mar-2012

Preamps /Couplers Attenuators / Filters	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
HF 20dB 50W Attenuator	0.009-18 GHz	PE 7019-20	Pasternack	1	791	II	1-Jun-2013

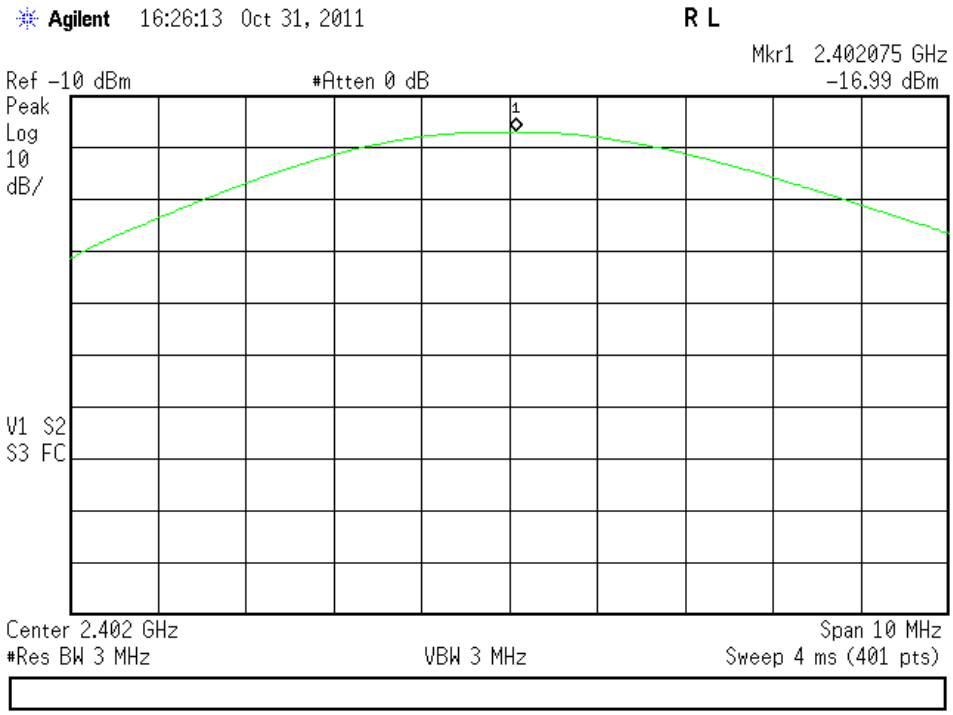
Meteorological Meters	MN	Mfr	SN	Asset	Cat	Calibration Due
Temp./Humidity/Atm. Pressure Gauge	7400 Perception II	Davis	N/A	965	I	4-Apr-2013
CEMI4 Thermohygrometer	35519-044	Control Company	72457728	1339	II	19-Aug-2013

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

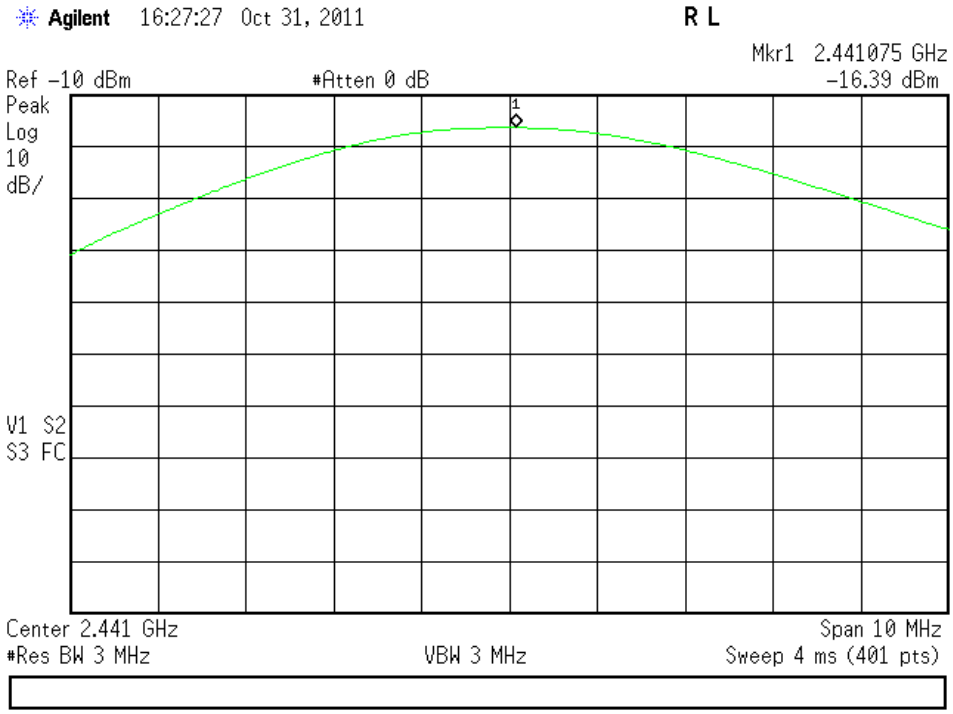
PLOTS

GFSK

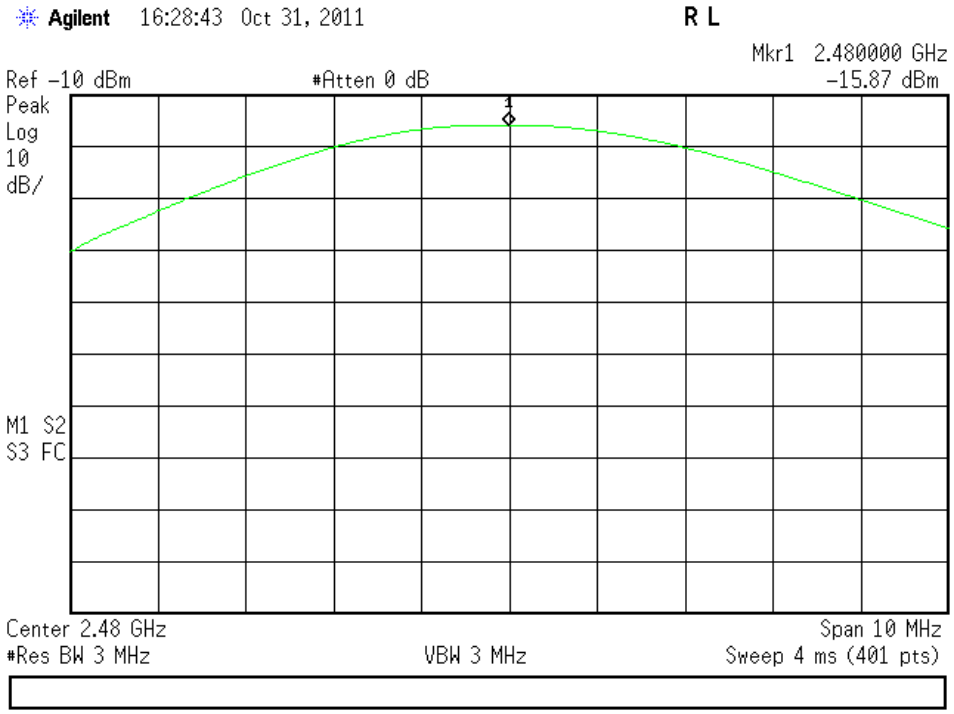
Low Channel



Mid Channel

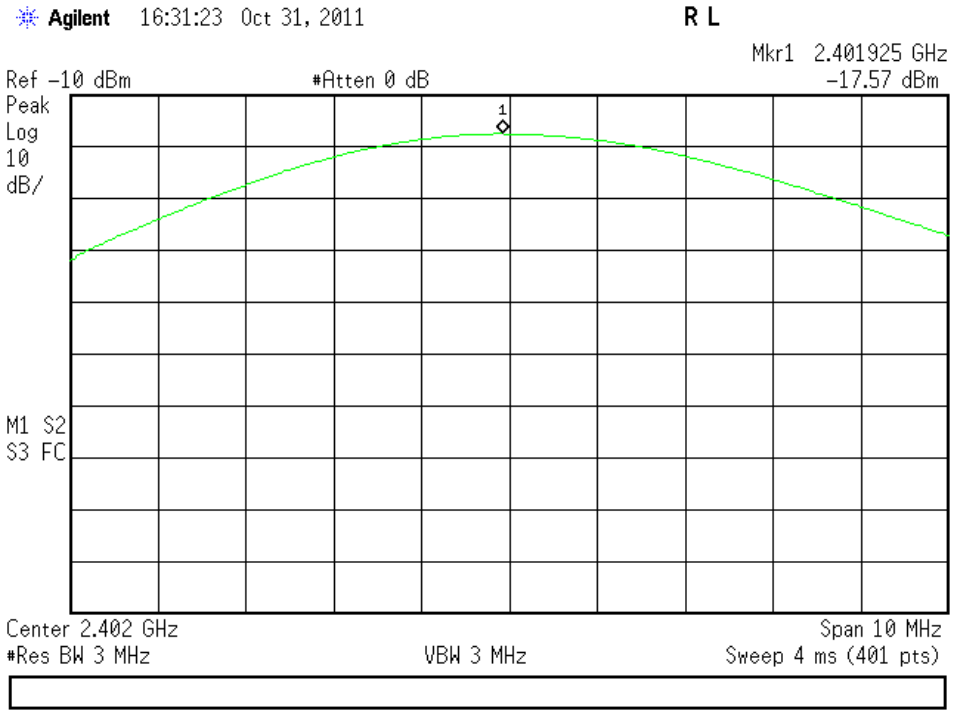


High Channel



8DPSK

Low Channel



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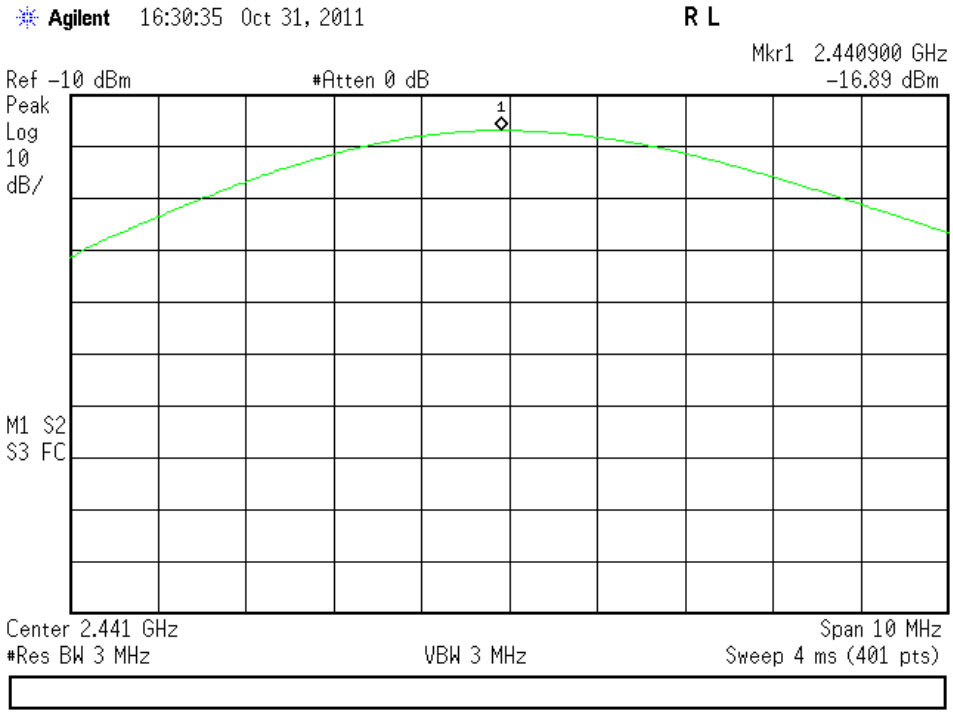
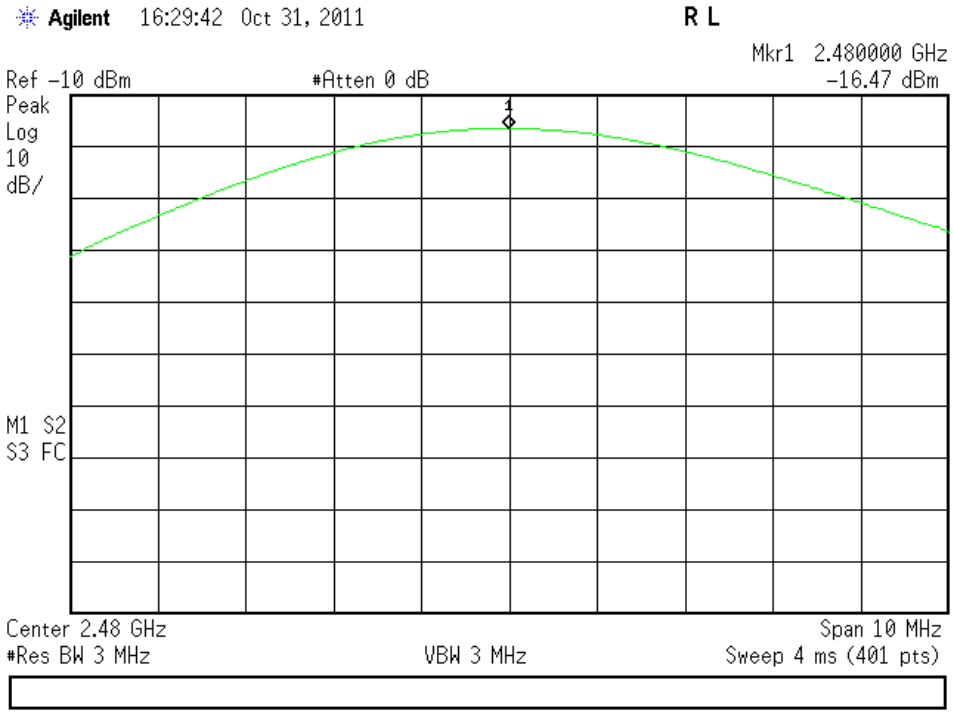
Mid Channel



High Channel



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Band Edge Measurements

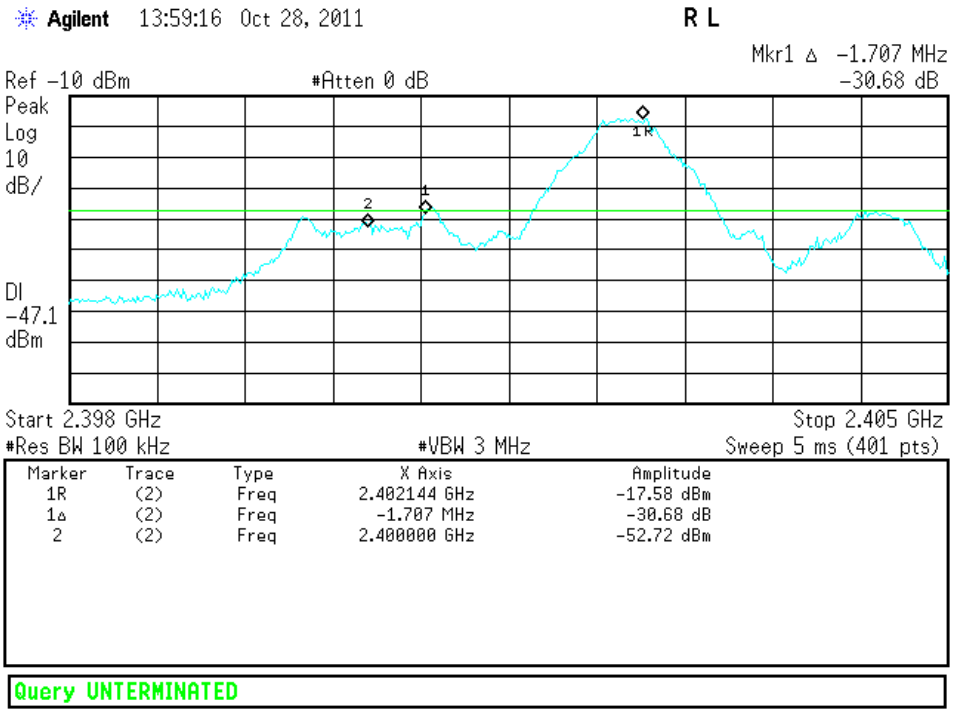
LIMITS

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either a RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.
[15.247(d)]

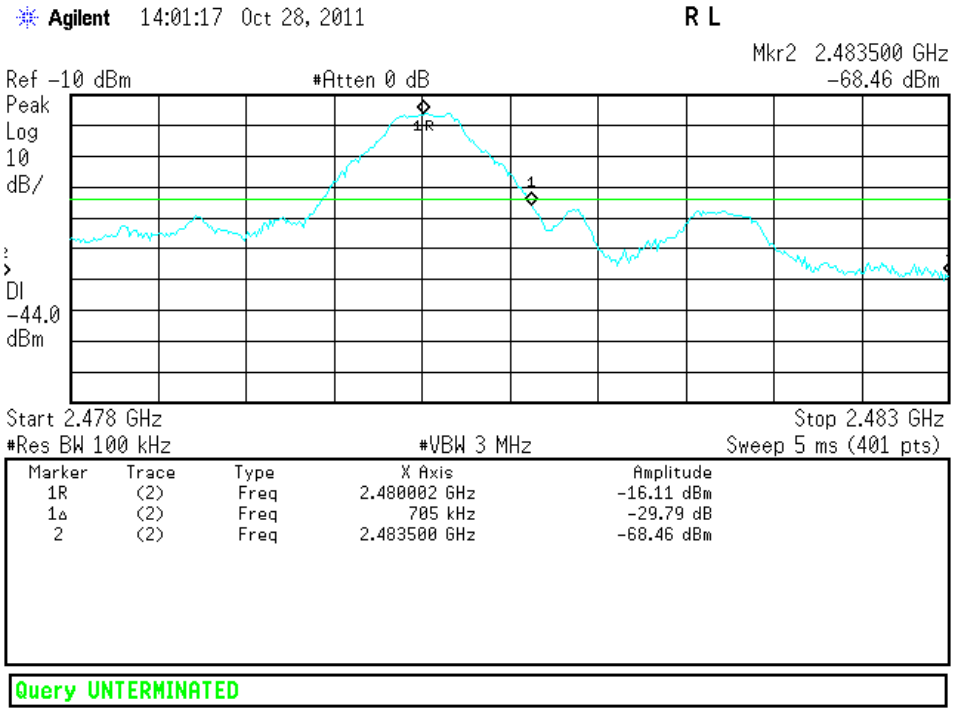
PLOTS

GFSK

Low Channel – Low Band Edge

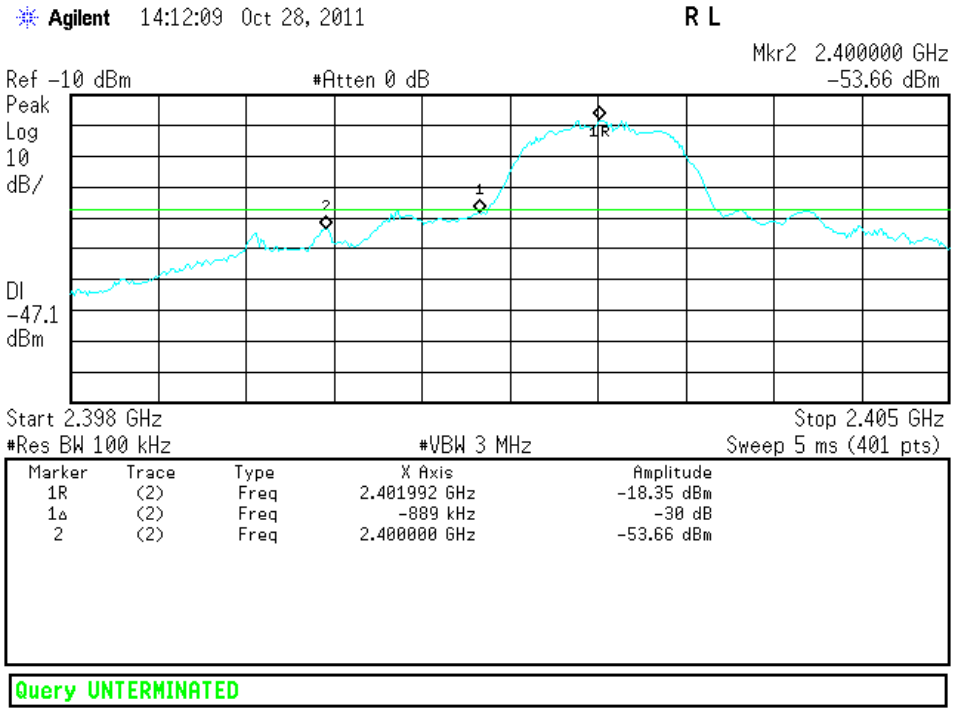


High Channel – High Band Edge

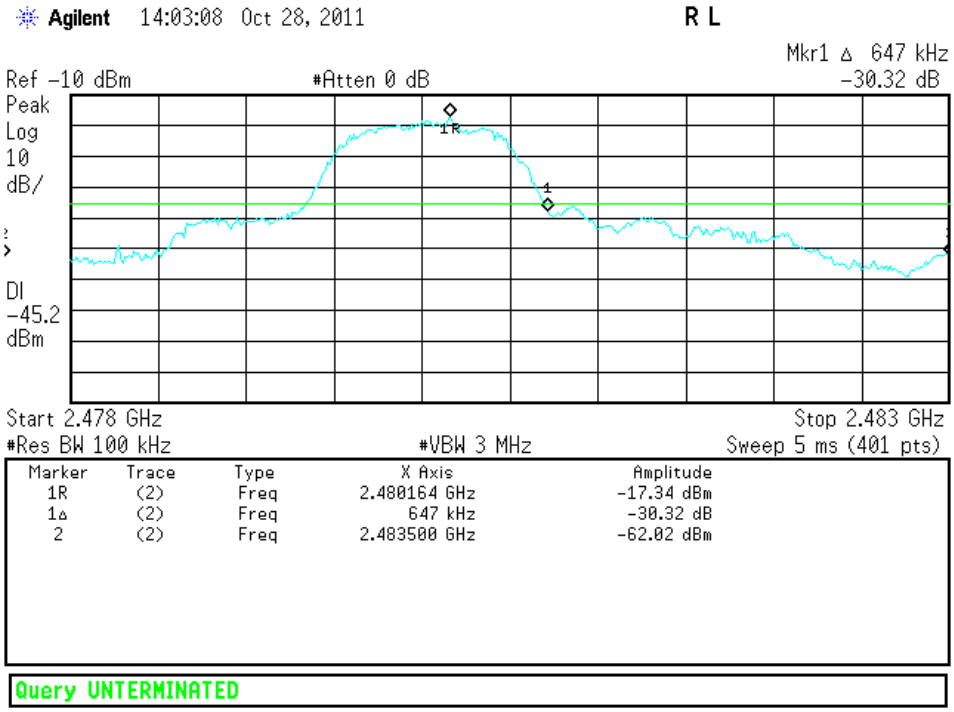


8DPSK

Low Channel – Low Band Edge



High Channel – High Band Edge



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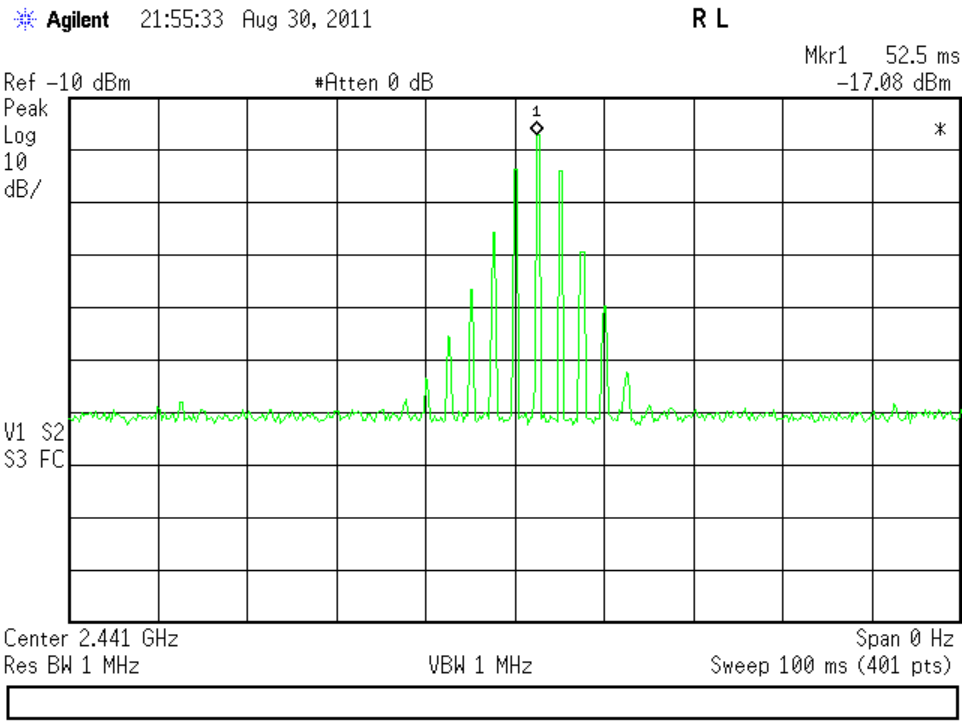
Duty Cycle Correction Factor

The worst case timing was used for duty cycle correction factor.

There is only one transmission every 100ms



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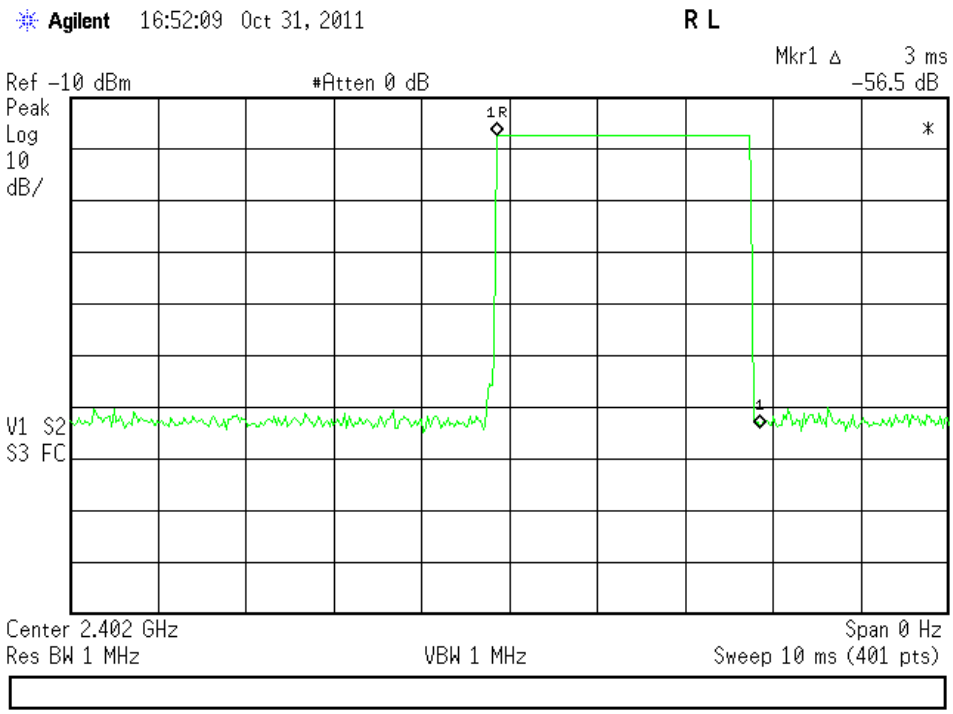

Therefore,

DCCF = 20 x log (3ms/100ms) = -30.46dB

-20dB is applied

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Radiated Spurious Emissions

LIMITS

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).
[15.247(d)]

MEASUREMENTS / RESULTS

Radiated Emissions Table

Date: 29-Aug-11 **Company:** Escort Inc. **Work Order:** L1376
Engineer: Matthew Burman **EUT Desc:** QKLBT1 **EUT Operating Voltage/Frequency:** 5Vdc
Temp: 24.8℃ **Humidity:** 36% **Pressure:** 1003mBar
Frequency Range: 30-1000MHz **Measurement Distance:** 3 m
Notes:

Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBµV/m)	--- Limit (dBµV/m)	--- Margin (dB)	--- Result (Pass/Fail)	FCC Class B Limit (dBµV/m)	FCC Class B Margin (dB)	FCC Class B Result (Pass/Fail)
no emissions found			---	---	---	---	---	---	---	---	---	---

Table Result: --- by --- dB ***Worst Freq:*** --- MHz

Test Site: EMI Chamber 1 **Cable 1:** Asset #1505 **Cable 2:** Asset #1508 **Cable 3:** ---
Analyzer: Asset #1328 **Preamp:** Green **Antenna:** Red-Brown **Preselector:** ---

Radiated Emissions Table

Date: 29-Aug-11 **Company:** Escort Inc. **Work Order:** L1376
Engineer: Matthew Burman **EUT Desc:** QKLBT1 **EUT Operating Voltage/Frequency:** 5Vdc
Temp: 24.8℃ **Humidity:** 36% **Pressure:** 1003mBar
Frequency Range: 1-8GHz **Measurement Distance:** 3 m
Notes: DCCF = 20dB

Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	FCC Class B High Frequency - Peak Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	FCC Class B High Frequency - Average Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
v	4882.0	42.1	22.1	20.3	33.1	5.4	60.3	40.3	74.0	-13.7	Pass	54.0	-13.7	Pass
v	2390.0	29.74	9.7	21.8	28.1	3.9	39.9	19.9	74.0	-34.1	Pass	54.0	-34.1	Pass
h	2483.5	41.4	21.4	21.9	28.4	3.5	51.4	31.4	74.0	-22.6	Pass	54.0	-22.6	Pass
v	7323.0	31.42	11.4	19.2	36.7	6.8	55.7	35.7	74.0	-18.3	Pass	54.0	-18.3	Pass

Table Result: Pass by -13.7 dB ***Worst Freq:*** 4882.0 MHz

Test Site: EMI Chamber 1 **Cable 1:** Asset #1505 **Cable 2:** Asset #1508 **Cable 3:** ---
Analyzer: Asset #1328 **Preamp:** Brown **Antenna:** Yellow Horn **Preselector:** ---

*Measurements made at 2390MHz, the unit was operating at the lowest channel, and 2483.5MHz frequency was measured with the unit operating at the highest channel. There was no difference between the modulations tested, this data table represents the worst case.

Radiated Emissions Table

Date: 29-Aug-11 **Company:** Escort Inc. **Work Order:** L1376
Engineer: Matthew Burman **EUT Desc:** QKLBT1 **EUT Operating Voltage/Frequency:** 5Vdc
Temp: 24.8℃ **Humidity:** 36% **Pressure:** 1003mBar
Frequency Range: 8-13GHz **Measurement Distance:** 1 m
Notes: DCCF = 20dB

Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	FCC Class B High Frequency - Peak Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	FCC Class B High Frequency - Average Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
no emissions found				---	---	---	---	---	---	---	---	---	---	---

Table Result: --- by --- dB ***Worst Freq:*** --- MHz

Test Site: EMI Chamber 1 **Cable 1:** Asset #1505 **Cable 2:** Asset #1508 **Cable 3:** ---
Analyzer: Asset #1328 **Preamp:** Brown **Antenna:** Yellow Horn **Preselector:** ---

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Radiated Emissions Table

Date: 29-Aug-11 **Company:** Escort Inc. **Work Order:** L1376
Engineer: Matthew Burman **EUT Desc:** QKLBT1 **EUT Operating Voltage/Frequency:** 5Vdc
Temp: 24.8°C **Humidity:** 36% **Pressure:** 1003mBar
Frequency Range: 13-18GHz **Measurement Distance:** 1 m
Notes: DCCF = 20dB

Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	FCC Class B High Frequency - Peak			FCC Class B High Frequency - Average		
									Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
no emissions found				---	---	---	---	---	---	---	---	---	---	---

Table Result: --- by --- dB ***Worst Freq:*** --- MHz

Test Site: EMI Chamber 1 **Cable 1:** Asset #1505 **Cable 2:** Asset #1508 **Cable 3:** ---
Analyzer: Rental SA#1 **Preamp:** Brown **Antenna:** Yellow Horn **Preselector:** ---

Radiated Emissions Table

Date: 30-Aug-11 **Company:** Escort Inc. **Work Order:** L1376
Engineer: Matthew Burman **EUT Desc:** QKLBT1 **EUT Operating Voltage/Frequency:** 5Vdc
Temp: 22.7°C **Humidity:** 42% **Pressure:** 1011mBar
Frequency Range: 18-26.5GHz **Measurement Distance:** 1 m
Notes:

Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	FCC Class B High Frequency - Peak			FCC Class B High Frequency - Average		
									Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
no emissions found				---	---	---	---	---	---	---	---	---	---	---

Table Result: --- by --- dB ***Worst Freq:*** --- MHz

Test Site: 1DCC-OATS-3M-II **Cable 1:** EMIR-HIGH-13 **Cable 2:** --- **Cable 3:** ---
Analyzer: Rental SA#5 **Preamp:** 18-26.5GHz **Antenna:** 18-26.5GHz Horn **Preselector:** ---

*radiated emissions were tested with the worst case patterns of 8DPSK and GFSK

Rev: 19-Aug-2011

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
SA EMI Chamber (1328)	9kHz-13.2 GHz	E4405B	Agilent	MY44210241	1328	I	4-Mar-2012
Rental SA #5	9kHz-26.5 GHz	E4407B	Agilent	MY44220066	1491	I	17-Mar-2012

Radiated Emissions Sites	FCC Code	IC Code	VCCI Code			Cat	Calibration Due
1DCC-OATS-3M-II	719150	2762A-10	NA			II	5-Oct-2012
EMI Chamber 1	719150	2762A-6	R-3032, G-106			I	12-Mar-2013

Preamps /Couplers Attenuators / Filters	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Green	0.009-2000MHz	ZFL-1000-LN	CS	N/A	802	II	25-Jul-2012
Brown	1-18GHz	CS	CS	N/A	1523	II	1-Aug-2012
HF (Yellow)	18-26.5GHz	AFS4-18002650-60-8P-4	CS	467559	1266	I	5-Oct-2011

Antennas	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Red-Brown Bilog	30-2000MHz	JB1	Sunol	A0032406	1218	I	25-Aug-2012
Yellow Horn	1-18GHz	3115	EMCO	9608-4898	37	I	17-Jun-2013
HF (White) Horn	18-26.5GHz	801-WLM	Waveline	758	758	I	Verify before Use

Meteorological Meters		MN	Mfr	SN	Asset	Cat	Calibration Due
Temp./Humidity/Atm. Pressure Gauge		7400 Perception II	Davis	N/A	965	I	4-Apr-2013
1DCC-OATS-3M-I Thermohygrometer		35519-044	Control Company	72457635	1334	II	19-Aug-2013
CHAMBER1 Thermohygrometer		35519-044	Control Company	72457642	1345	II	19-Aug-2013

Cables	Range	Mfr			Cat	Calibration Due
Asset #1505	9kHz - 18GHz	Florida RF			II	18-Aug-2012
Asset #1508	9kHz - 18GHz	Florida RF			II	9-Apr-2012
REMI-High-13	9kHz - 26.5GHz	C-S			II	18-Jan-2012

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

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Conducted Spurious Emissions

LIMITS

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth that contains the highest level of desired power…
[15.247(d)]

MEASUREMENTS / RESULTS

Conducted Spurious Emissions

Date: 30-Aug-11 **Company:** Escort **Work Order:** L1376
Engineer: Matthew Burman **EUT Desc:** QKLBT1 **EUT Operating Voltage/Frequency:** 5Vdc
Temp: 21.4°C **Humidity:** 44% **Pressure:** 1011mBar
Frequency Range: 30-25000MHz **Measurement Distance:** Conductive
Notes: RBW = 100kHz
VBW = 1MHz
The limit is 30dB below the fundamental

							FCC Section 15.247(d)		
	Frequency (MHz)	Reading (dBm)					Limit (dBm)	Margin (dB)	Result (Pass/Fail)
	2402	-18.54	---	---	---	---	---	---	---
	3207.5	-68.76	---	---	---	---	-48.5	-20.220	Pass

Test Site: CEMI4 **Attenuator:** PE7019-20
Analyzer: Asset #1491

*spurious emissions was tested on the worst fundamental

Rev: 19-Aug-2011

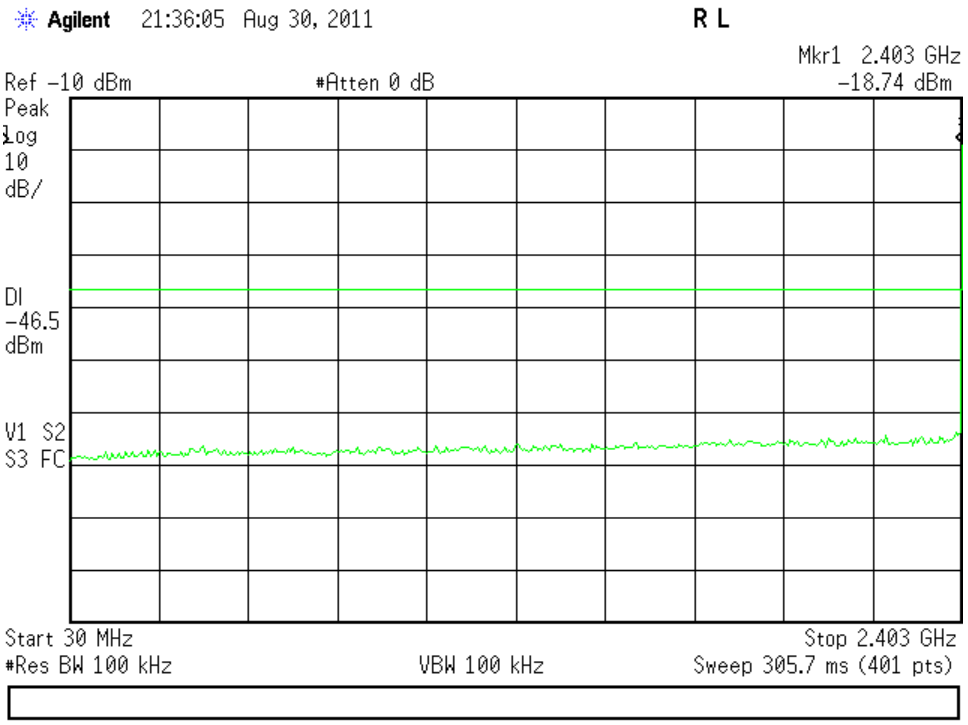
Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Rental SA #5	9kHz-26.5 GHz	E4407B	Agilent	MY44220066	1491	I	17-Mar-2012

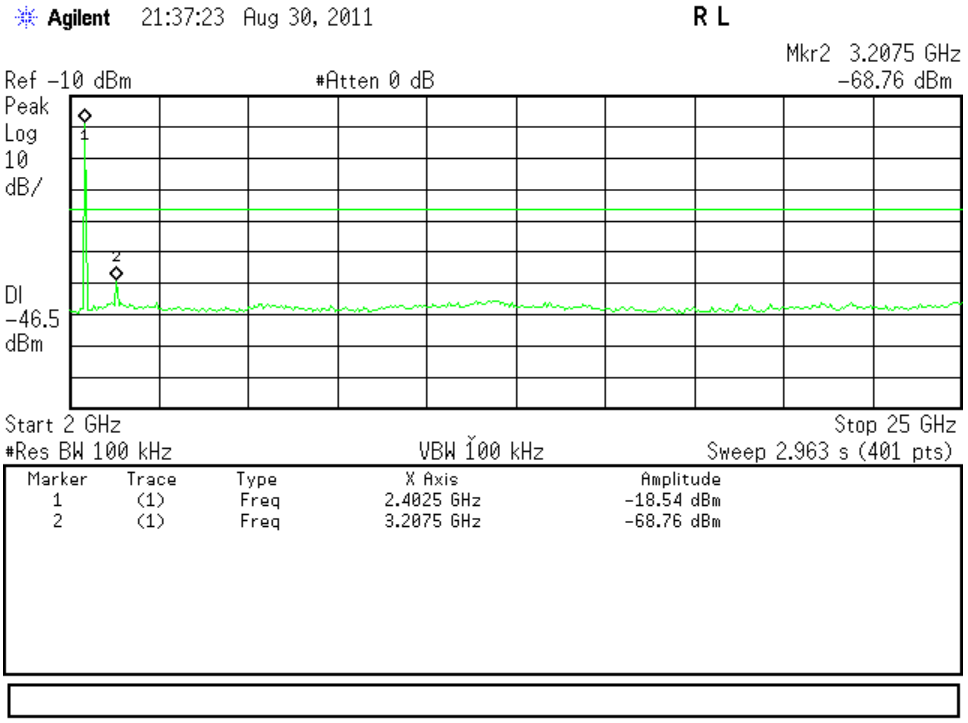
Preamps /Couplers Attenuators / Filters	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
HF 20dB 50W Attenuator	0.009-18 GHz	PE 7019-20	Pasternack	1	791	II	1-Jun-2013

Meteorological Meters	MN	Mfr	SN	Asset	Cat	Calibration Due
Temp./Humidity/Atm. Pressure Gauge	7400 Perception II	Davis	N/A	965	I	4-Apr-2013
CEMI4 Thermohygrometer	35519-044	Control Company	72457728	1339	II	19-Aug-2013

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

PLOTS





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AC Line Conducted Emissions

LIMITS

Frequency of emission (MHz)	Quasi-peak limit (dBµV)	Average limit (dBµV)
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.

[47 CFR 15.207(a)]

MEASUREMENTS / RESULTS

AC Side of DC Supply Conducted Emissions

Date: 30-Aug-11 **Company:** Escort Inc. **Work Order:** L1376
Engineer: Matthew Burman **EUT Desc:** QKLBT1 **Test Site:** CEMI5
Temp: 21.4°C **Humidity:** 44% **Pressure:** 1011mBar
Notes: AC Side of DC Supply - Noise floor
Measurement Device: Yellow LISN **EUT Operating Voltage/Frequency:** 120Vac 60Hz
Range: 0.15-30MHz **Spectrum Analyzer:** Red

	Q.P. Readings		Ave. Readings		Impedance Factor	FCC/CISPR B		FCC/CISPR B		Overall
Frequency (MHz)	QP1 (dBµV)	QP2 (dBµV)	AV1 (dBµV)	AV2 (dBµV)	(dB)	qp Limit (dBµV)	qp Margin dB	AVE Limit (dBµV)	AVE Margin dB	Result (Pass/Fail)
0.15	21.6	21.5	13.1	12.6	20.3	66.0	-24.1	56.0	-22.6	Pass
1.00	22.5	22.5	12.0	12.1	20.1	56.0	-13.4	46.0	-13.8	Pass
5.00	23.1	23.1	11.6	11.5	20.1	56.0	-12.8	46.0	-14.3	Pass
10.00	18.7	18.9	2.9	3.0	20.1	60.0	-21.0	50.0	-26.9	Pass
15.00	17.6	17.4	2.1	2.1	20.2	60.0	-22.2	50.0	-27.7	Pass
20.00	14.2	14.1	1.7	1.7	20.3	60.0	-25.5	50.0	-28.0	Pass

Table Result: Pass by -12.80 dB ***Worst Freq:*** 5.00 MHz

*No difference between any of the transmission schemes, no emissions found

Rev: 19-Aug-2011

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Red	9kHz-1.8GHz	8591E	Agilent	3441A03559	24	I	18-Apr-2012
LISNs/Measurement Probes	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
Yellow LISN	9kHz-50MHz	8012-50-R-24-BNC	Solar	984735	1080	I	28-Jan-2012
Conducted Test Sites (Mains / Telco)	**FCC Code**		**VCCI Code**			**Cat**	**Calibration Due**
CEMI 5	719150		C-3364, T-1579			III	NA
Meteorological Meters		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
Temp./Humidity/Atm. Pressure Gauge		7400 Perception II	Davis	N/A	965	I	4-Apr-2013
CEMI5 Thermohygrometer		35519-044	Control Company	72457633	1341	II	19-Aug-2013
Cables	**Range**		**Mfr**			**Cat**	**Calibration Due**
CEMI-03	9kHz - 2GHz		C-S			II	23-Sep-2011

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Product Documentation

The following documentation has been provided by the client for inclusion in this report.

Conditions Of Testing

[Bureau Veritas Consumer Products Services, Inc., a Massachusetts corporation], and/or its affiliates (collectively, the "Company") will conduct, at the request of the Submitter ("**Client**"), the tests specified on the submitted Test Request Form or equivalent in accordance with, and subject to, the following terms and conditions (collectively, "**Conditions**"):

1. All orders for tests are subject to acceptance by the Company, and no order will constitute a binding commitment of the Company unless and until such order is accepted by it, as evidenced by the issuance of a written report ("**Test Report**") by the Company. The Test Report is issued solely by the Company, is intended for the exclusive use of Client and shall not be published, used for advertising purposes, copied or replicated for distribution to any other person or entity or otherwise publicly disclosed without the prior written consent of the Company. By submitting a request for services to the Company, Client consents to the disclosure to accreditation bodies of those records of Client relevant to the accreditation body's assessment of the Company's competence and compliance with relevant accreditation criteria. The Company shall not be liable for any loss or damage whatsoever resulting from the failure of the Company to provide its services within any time period for completion estimated by the Company. If Client anticipates using the Test Report in any legal proceeding, arbitration, dispute resolution forum or other proceeding, it shall so notify the Company prior to submitting the Test Report in such proceeding. The Company has no obligation to provide a fact or expert witness at such proceeding unless the Company agrees in advance to do so for a separate and additional fee.
2. The Test Report will set forth the findings of the Company solely with respect to the test samples identified therein. Unless specifically and expressly indicated in the Test Report, the results set forth in such Test Report are not intended to be indicative or representative of the quality or characteristics of the lot from which a test sample is taken, and Client shall not rely upon the Test Report as being so indicative or representative of the lot or of the tested product in general. The Test Report will reflect the findings of the Company at the time of testing only, and the Company shall have no obligation to update the Test Report after its issuance. The Test Report will set forth the results of the tests performed by the Company based upon the written information provided to the Company. The Test Report will be based solely on the samples and written information submitted to the Company by Client, and the Company shall not be obligated to conduct any independent investigation or inquiry with respect thereto.
3. The Company may, in its sole discretion, destroy samples which have been furnished to the Company for testing and which have not been destroyed in the course of testing. The Company may delegate the performance of all or a portion of the services contemplated hereunder to an affiliate, agent or subcontractor of the Company, and Client consents to such delegation.
4. These Conditions and the Test Report represent the entire understanding of the parties hereto with respect to the subject matter hereof and of the Test Report, and no modification, variance or extrapolation with respect thereto shall be permitted without the prior written consent of the Company.
5. The names, service marks, trademarks and copyrights of the Company and its affiliates, including the names "**BUREAU VERITAS**," "**BUREAU VERITAS CONSUMER PRODUCTS SERVICES**," "**BVCPS**", "**MTL**", "**ACTS**", "**MTL-ACTS**" and **CURTIS-STRAUS** (collectively, the "**Marks**") are and shall remain the sole property of the Company or its affiliates and shall not be used by Client except solely to the extent that Client obtains the prior written approval of the Company and then only in the manner prescribed by the Company. Client shall not contest the validity of the Marks or take any action that might impair the value or goodwill associated with the Marks or the image or reputation of the Company or its affiliates.
6. Payment in full shall be due 30 days after the date of invoice. Interest shall be due on overdue amounts from the due date until paid at an interest rate of 1.5% per month or, if less, the maximum rate permitted by law. The Company reserves the right, at any time and from time to time, to revoke any credit extended to Client. Client shall reimburse the Company for any costs it incurs in collecting past due amounts, including court costs and fees and expenses of attorneys and collection agencies. The Test Report may not be used or relied upon by Client if and for so long as Client fails to pay when due any invoice issued by the Company or any affiliate of it to Client or any affiliate or subsidiary of Client together with interest and penalties, if any, accrued thereon.
7. The Company disclaims any and all responsibility or liability arising out of or in connection with e-mail transmissions of such information.
8. Client understands and agrees that the Company is neither an insurer nor a guarantor, that the Company does not take the place of Client or any designer, manufacturer, agent, buyer, distributor or transportation or shipping company, and that the Company disclaims all liability in such capacities. Client further understands that if it seeks assurance against loss or damage, it should obtain appropriate insurance.
9. Client agrees that the Company, by providing the services, does not take the place of Client nor any third party, nor does the Company release them from any of their obligations, nor does the Company otherwise assume, abridge, abrogate or undertake to discharge any duty of any third party to Client or any duty of Client or any third party to any other third party, and Client will not release any third party from its obligations and duties with respect to the tested goods.
10. Client shall, on a timely basis, (a) provide adequate instructions to the Company in order to enable the Company to perform properly its services, (b) provide, or cause Client's suppliers and contractors to provide, the Company with all documents necessary to enable the Company to perform its services, (c) furnish the Company with all relevant information regarding Client's intended use and purposes of the tested goods, (d) advise the Company of essential dates and deadlines relevant to the tested goods and (e) fully exercise all rights and remedies available to Client against third parties in respect of the tested goods.
11. The Company shall undertake due care and ordinary skill in the performance of its services to Client, and the Company shall accept responsibility only were such skill has not been exercised and, even in such event, only to the extent of the limitation of liability set forth herein.
12. If Client desires to assert a claim arising from or relating to (i) the performance, purported performance or non-performance of any services by the Company or (ii) the sale, resale, manufacture, distribution or use of any tested goods, it must submit that claim to the Company in a writing that sets forth with particularity the basis for such claim within 60 days from discovery of the potential claim and not more than six months after the date of issuance of the Test Report to Client. Client waives any and all such claims

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including, without limitation, claims that the Test Report is inaccurate, incomplete or misleading or that additional or different testing is required, unless and then only to the extent that Client submits a written claim to the Company within both such time periods.
13. CLIENT SHALL, EXCEPT TO THE EXTENT OF COMPANY'S LIABILITY TO CLIENT HEREUNDER (WHICH IN NO EVENT SHALL EXCEED THE LIMITATION OF LIABILITY HEREIN), HOLD HARMLESS AND INDEMNIFY THE COMPANY, ITS AFFILIATES AND THEIR RESPECTIVE DIRECTORS, OFFICERS, EMPLOYEES, AGENTS AND SUBCONTRACTORS AGAINST ALL ACTUAL OR ALLEGED THIRD PARTY CLAIMS FOR LOSS, DAMAGE OR EXPENSE OF WHATSOEVER NATURE AND HOWSOEVER ARISING FROM OR RELATING TO (i) THE PERFORMANCE, PURPORTED PERFORMANCE OR NON-PERFORMANCE OF ANY SERVICES BY THE COMPANY OR (ii) THE SALE, RESALE, MANUFACTURE, DISTRIBUTION OR USE OF ANY TESTED GOODS.
14. EXCEPT AS MAY OTHERWISE BE EXPRESSLY AGREED TO IN WRITING BY THE COMPANY AND NOTWITHSTANDING ANY PROVISION TO THE CONTRARY CONTAINED HEREIN OR IN ANY TEST REPORT, NO WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE, IS MADE.
15. (A) IN NO EVENT WHATSOEVER SHALL THE COMPANY BE LIABLE FOR ANY CONSEQUENTIAL, SPECIAL, INCIDENTAL, EXEMPLARY OR PUNITIVE DAMAGES IN CONNECTION WITH, RELATING TO OR ARISING OUT OF THE TEST REPORT OR THE SERVICES PROVIDED BY THE COMPANY HEREUNDER, INCLUDING WITHOUT LIMITATION LOSS OF OR DAMAGE TO PROPERTY; LOSS OF INCOME, PROFIT OR USE; OR ANY CLAIMS OR DEMANDS MADE AGAINST CLIENT OR ANY OTHER PERSON BY ANY THIRD PARTY IN CONNECTION WITH, RELATING TO OR ARISING OUT OF THE SERVICES PROVIDED BY THE COMPANY HEREUNDER.

(B)NOTWITHSTANDING ANY PROVISION TO THE CONTRARY CONTAINED HEREIN, AND IN RECOGNITION OF THE RELATIVE RISKS AND BENEFITS TO CLIENT AND THE COMPANY ASSOCIATED WITH THE TESTING SERVICES CONTEMPLATED HEREBY, THE RISKS HAVE BEEN ALLOCATED SUCH THAT UNDER NO CIRCUMSTANCES WHATSOEVER SHALL THE LIABILITY OF THE COMPANY TO CLIENT OR ANY THIRD PARTY IN RESPECT OF ANY CLAIM FOR LOSS, DAMAGE OR EXPENSE, OF WHATSOEVER NATURE OR MAGNITUDE, AND HOWSOEVER ARISING, EXCEED AN AMOUNT EQUAL TO FIVE (5) TIMES THE AMOUNT OF THE FEES PAID TO THE COMPANY FOR THE SPECIFIC SERVICES WHICH GAVE RISE TO SUCH CLAIM OR U.S.$10,000, WHICHEVER IS THE LESSER AMOUNT.
16. The Company shall not be liable for any loss or damage resulting from any delay or failure in performance of its obligations hereunder resulting directly or indirectly from any event of force majeure or any event outside the control of the Company. If any such event occurs, the Company may immediately cancel or suspend its performance hereunder without incurring any liability whatsoever to Client.
17. Company's services, including these Conditions, shall be governed by, and construed in accordance with, the local laws of the country where the Company performs the tests or, in the case of tests performed in the United States of America, the laws of Massachusetts without regard to conflicts of laws principles. If any aspect(s) of these Conditions is found to be illegal or unenforceable, the validity, legality and enforceability of all remaining aspects of these Conditions shall not in any way be affected or impaired thereby. Any proceeding related to the subject matter hereof shall be brought, if at all, in the courts of the country where the Company performs the tests or, in the case of tests performed in the United States of America, in the courts of Massachusetts. Client waives the right to interpose any counterclaim or setoffs of any nature in any litigation arising hereunder.

Rev.160009121(2)_#684340 v13CS

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