

# FCC CFR47 PART 15 SUBPART C INDUSTRY CANADA RSS-210 ISSUE 7 CLASS II PERMISSIVE CHANGE TEST REPORT

**FOR** 

#### **BLUETOOTH TRANSCEIVER MODULE**

**MODEL NUMBER: UGPZ9** 

FCC ID: QDS-BRCM1026

IC: 4324A-BRCM1026

REPORT NUMBER: 07U11314-1B

**ISSUE DATE: OCTOBER 08, 2007** 

Prepared for

BROADCOM CORP. 190 MATHILDA PLACE SUNNYVALE, CA 94086, U.S.A.

Prepared by

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REPORT NO: 07U11314-1B FCC ID: QDS-BRCM1026

# **Revision History**

	Issue		
Rev.	Date	Revisions	Revised By
	10/02/07	Initial Issue	F. Ibrahim
	10/08/07	Correct typo in section 5.5 and section 7.	Hsin Fu Shih

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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME**: BROADCOM CORP.

190 MATHILDA PLACE

SUNNYVALE, CA 94086, USA

**EUT DESCRIPTION:** Bluetooth Transceiver Module

MODEL: UGPZ9

SERIAL NUMBER: AR002

**DATE TESTED:** September 24, 26 and 27, 2007

#### APPLICABLE STANDARDS

**STANDARD** 

**TEST RESULTS** 

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CFR 47 Part 15 Subpart C

No Non-Compliance Noted

RSS-210 Issue 7 Annex 8 and RSS-GEN Issue 2

No Non-Compliance Noted

Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. 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 Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:

Tested By:

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COMPLIANCE CERTIFICATION SERVICES

NINOUS DAVOUDI EMC ENGINEER

Winas Dorouch

COMPLIANCE CERTIFICATION SERVICES

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 2, and RSS-210 Issue 7.

## 3. FACILITIES AND ACCREDITATION

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

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

# 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. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 200 MHz	+/- 3.3 dB
Radiated Emission, 200 to 1000 MHz	+4.5 / -2.9 dB
Radiated Emission, 1000 to 2000 MHz	+4.5 / -2.9 dB
Power Line Conducted Emission	+/- 2.9 dB

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

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## 5. EQUIPMENT UNDER TEST

#### 5.1. DESCRIPTION OF EUT

The EUT is a Bluetooth transceiver operating at 2400-2483.5 MHz.

The radio module is manufactured by Broadcom Corporation.

#### 5.2. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

Adding a new Chip antenna, with a maximum peak gain of 1.32 dBi.

#### 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a chip multilayer antenna manufactured by Murata / LDA 31, with a maximum gain of 1.32 dBi.

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## 5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was BCM\_BTDL\_v1.7.1

The EUT driver software installed in the laptop support equipment during testing was Driver v5.1.0.1400.

The test utility software used during testing was Broadcom Bluetool I v0.9.9.6

#### 5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power. The highest measured output power was at 2441 MHz for both GFSK and 8PSK modulations.

# 5.6. DESCRIPTION OF TEST SETUP

## **SUPPORT EQUIPMENT**

PERIPHERAL SUPPORT EQUIPMENT LIST										
Description	Manufacturer	Model	Serial Number	FCC ID						
Lop Top	HP	Pavilion zv600	CND52705L3	DOC						
AC Adapter	HP	PPP017L	375126-001	DOC						

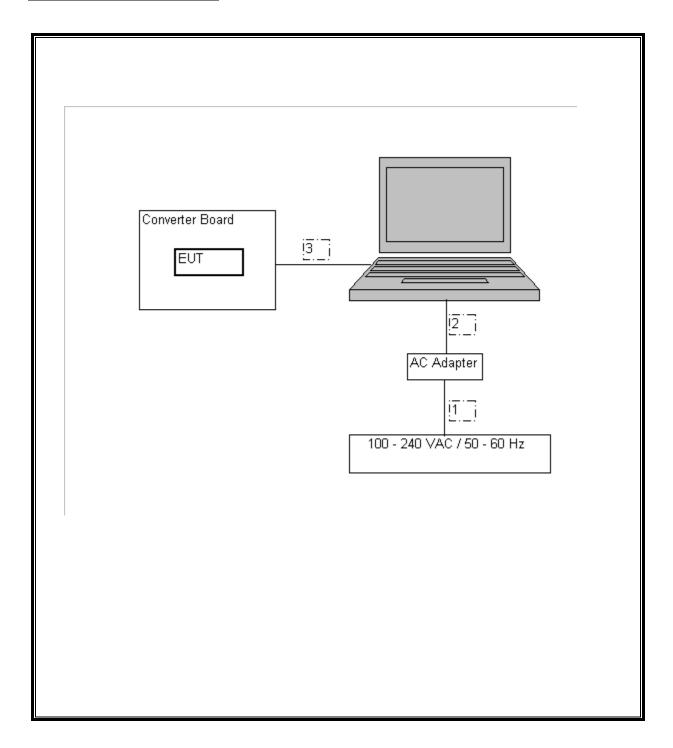
## I/O CABLES

	I/O CABLE LIST											
Cable	Port	# of	Connector	Cable	Cable	Remarks						
No.		Identica	Type	Type	Length							
		Ports										
1	AC	1	US115	Unshielded	1.8m	N/A						
2	DC	1	DC	Unshielded	1.8m	N/A						
3	USB	1	USB	Shielded	1.8m	N/A						

# **TEST SETUP**

The EUT was connected to the host laptop via a converter board. Test software exercised the radio card.

## **SETUP DIAGRAM FOR TESTS**



# 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	Serial Number	Cal Due						
Preamp 30-1000MHz	Sonoma	310N	185623	01/20/08						
Bilog Antenna 30-2000 MHz	Sunol Sciences	JB1	A121003	08/13/08						
Spectrum Analyzer	HP	E4446A	US42510266	10/18/07						
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	6717	04/15/08						
Preamplifier, 1 ~ 26.5 GHz	HP	8449B	3008A00369	10/03/07						
RF Filter Section	Agilent / HP	85420E	3705A00256	06/12/08						
EMI Receiver, 9 kHz ~ 2.9 GHz	Agilent / HP	8542E	3942A00286	06/12/08						

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# 7. ANTENNA PORT TEST RESULTS

For antenna port data, please refer to Cetecom Test Report BROAD\_031\_01001\_15.247BT.

## 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.

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

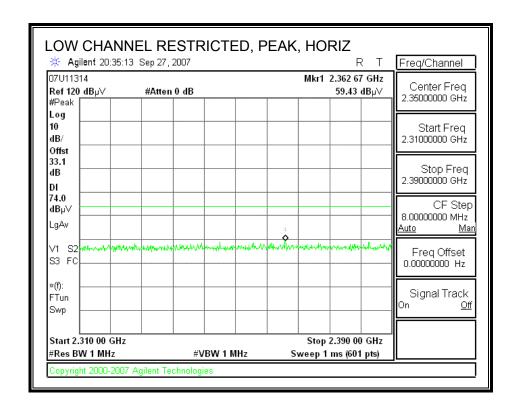
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

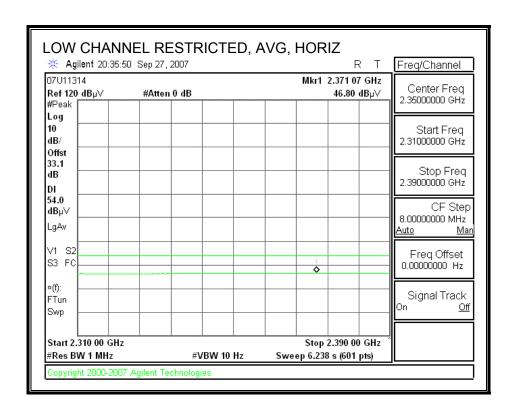
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

## 8.2. TRANSMITTER ABOVE 1 GHz

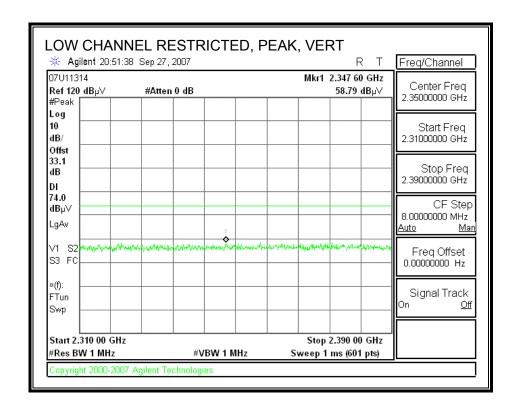
#### 8.2.1. BASIC DATA RATE GFSK MODULATION

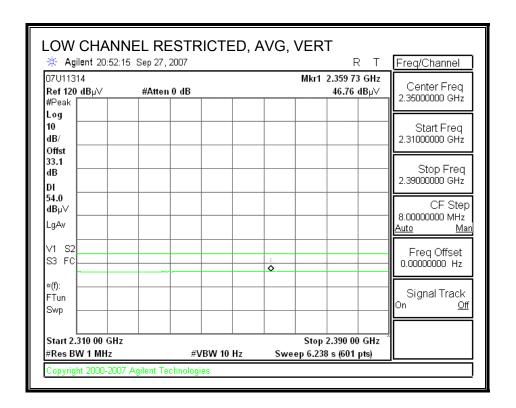
#### RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



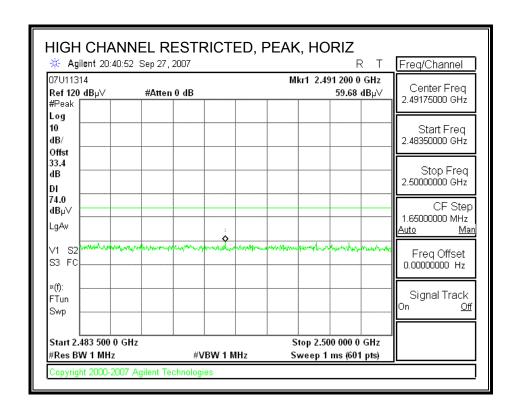


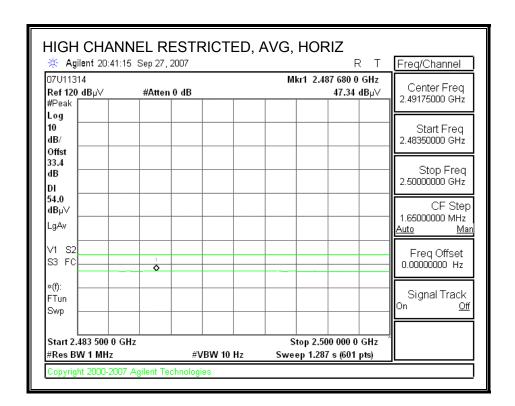
#### RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



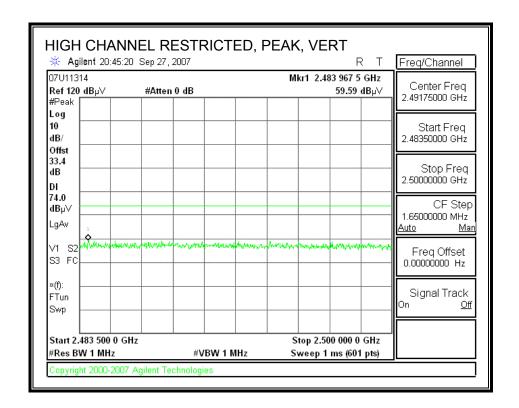


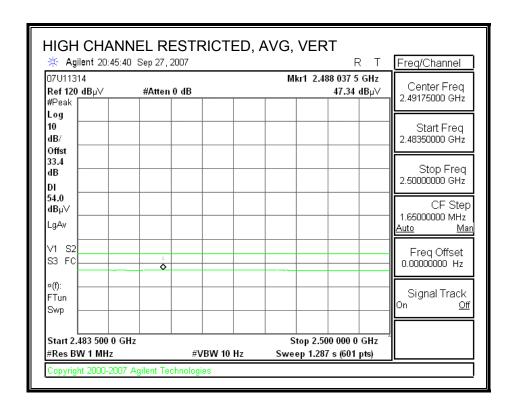
#### RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



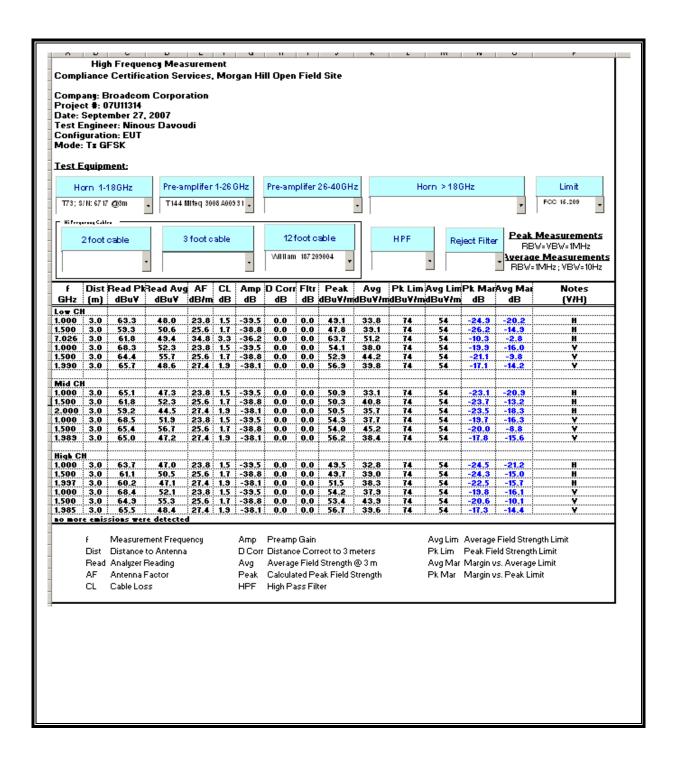


#### RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



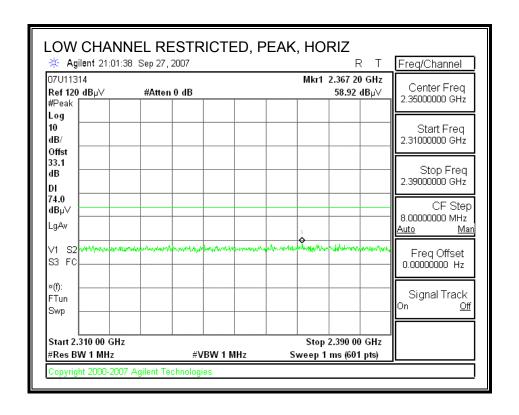


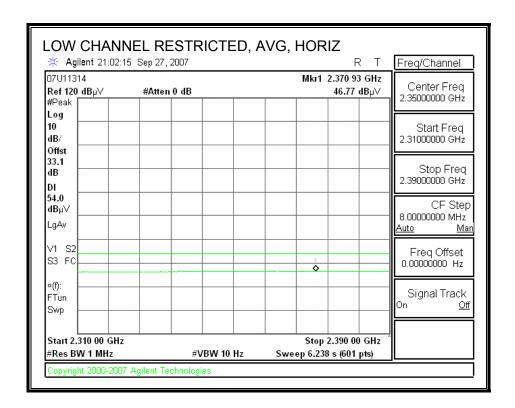
#### **HARMONICS AND SPURIOUS EMISSIONS**



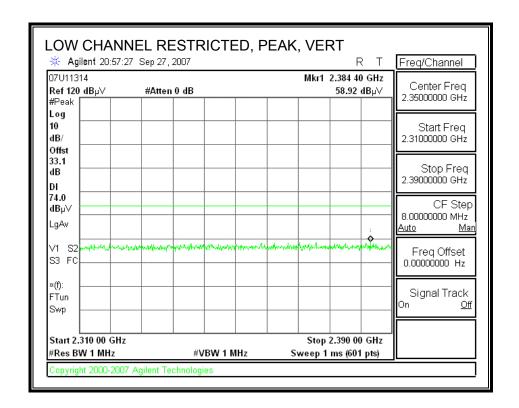
#### 8.2.2. ENHANCED DATA RATE 8PSK MODULATION

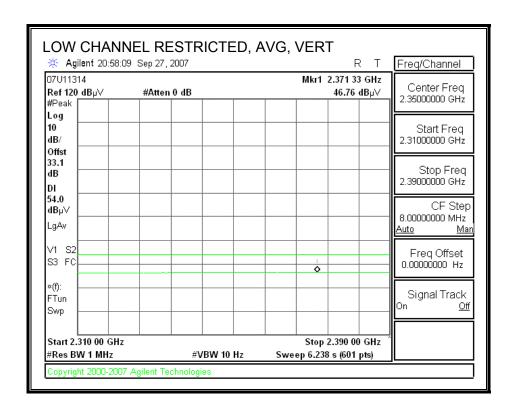
# RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



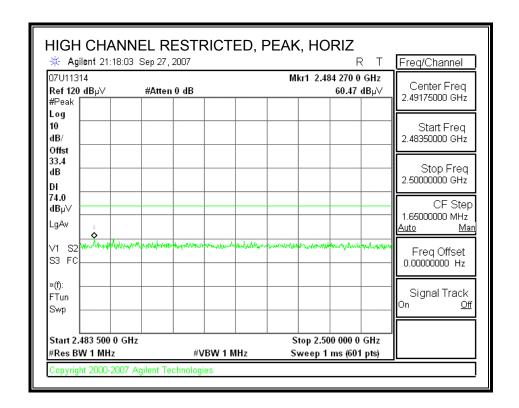


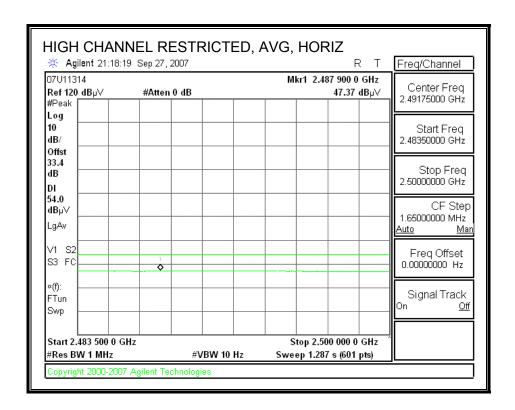
#### RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



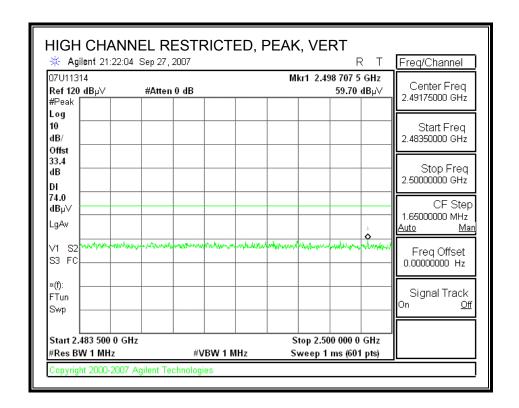


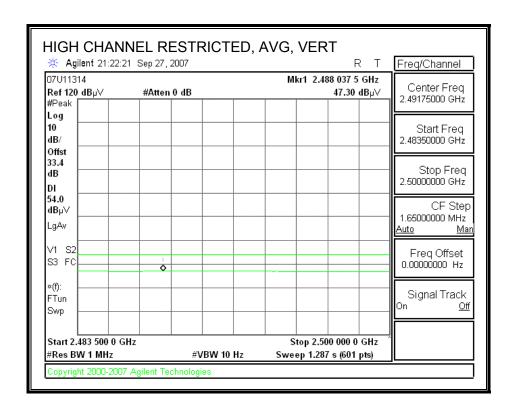
## RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



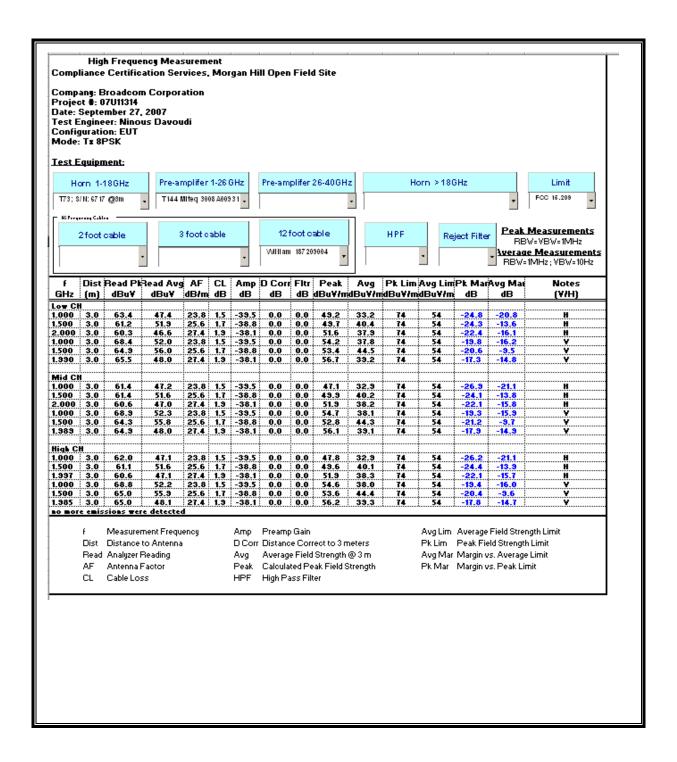


## RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



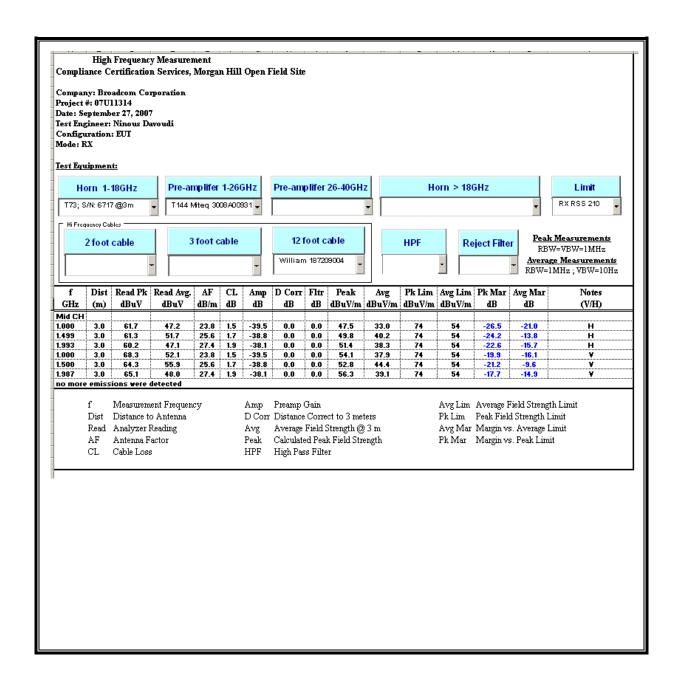


#### HARMONICS AND SPURIOUS EMISSIONS



# 8.3. RECEIVER ABOVE 1 GHz

#### 8.3.1. RECEIVER ABOVE 1 GHz



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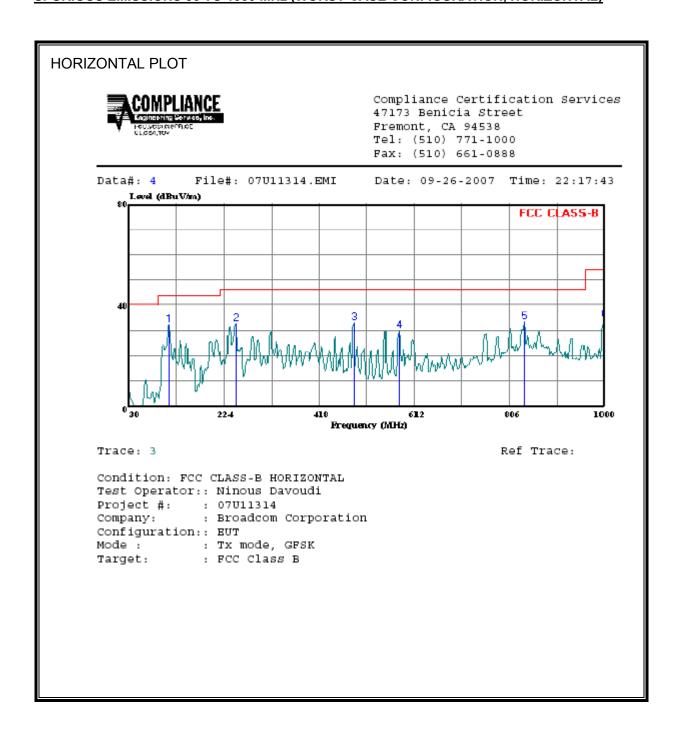
## 8.4. WORST-CASE BELOW 1 GHz

#### **GFSK**

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

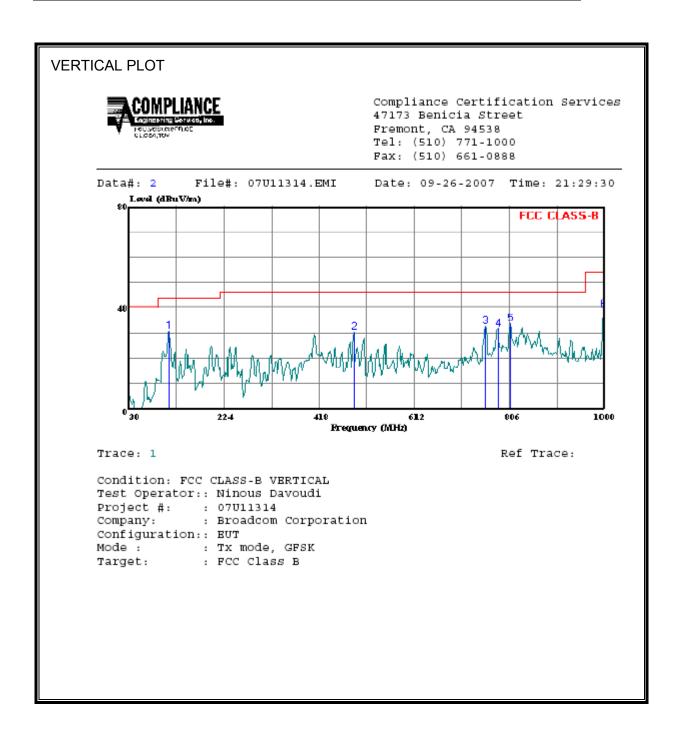
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HORIZONTAL DATA								
	Freq	Read Level		Level		Over Limit		rage: I
_	MHz	dBuV	dB	<u>dBu</u> V/m	$\overline{\mathtt{dBuV}/\mathtt{m}}$	db		
1	111.480	50.95	-18.39	32.56	43.50	-10.94	Peak	
2	247.280							
3	487.840							
4	581.930							
5	837.040							
6	999.030	37.64	-2.91	34.73	54.00	-19.27	reak	

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



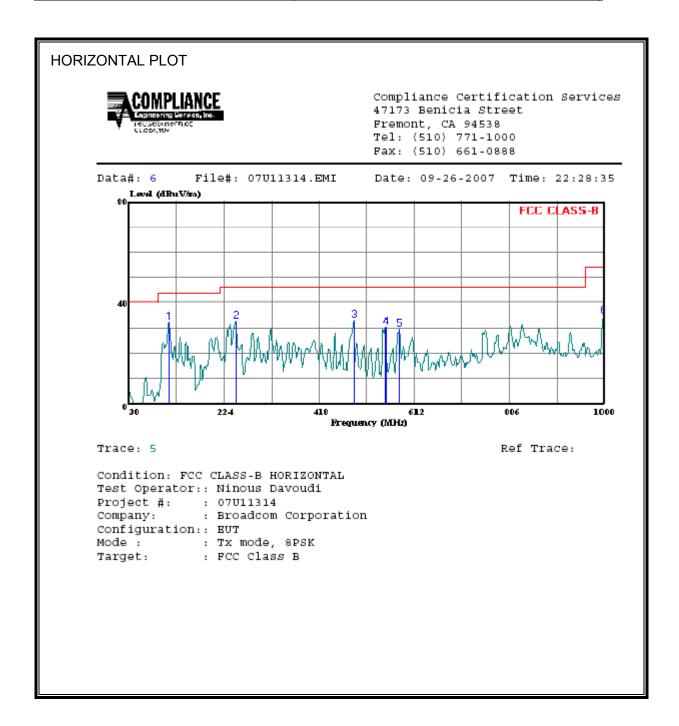
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## **VERTICAL DATA**

		Read			Limit	Over		Page:	1
	Freq		Factor	Level	Line	Limit			
	MHZ	dBuV	đВ	dBuV/m	dBuV/m	dв			
1 2	111.480 487.840								
3 4	756.530 783.690	40.59	-7.59	33.00	46.00	-13.00	Peak		
5	807.940	40.93	-6.82	34.11	46.00	-11.89	Peak		
6	998.060	42.05	-2.88	39.16	54.00	-14.84	Peak		

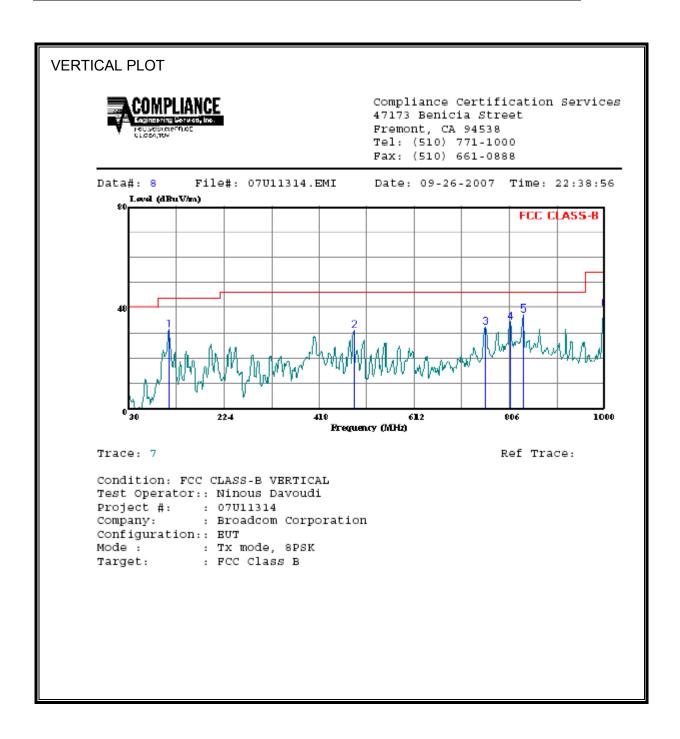
#### 8PSK

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



HORIZONTA	L DATA							Dage	. 1
	Freq	Read Level		Level		Over Limit		Page	: 1
	MHz	dBuV	dB	$\overline{\mathtt{dBuV/m}}$	$\overline{\mathtt{dBuV}/\mathtt{m}}$	db			
1	111.480	50.93	-18.39	32.54	43.50	-10.96	Peak		
2	247.280	50.84	-17.94	32.90	46.00	-13.10	Peak		
3	487.840	44.59	-11.43	33.16	46.00	-12.84	Peak		
4	552.830	40.93	-10.53	30.40	46.00	-15.60	Peak		
5	581.930								
6	997.090	37.94	-2.86	35.08	54.00	-18.92	Peak		

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



## **VERTICAL DATA**

		Read			Limit	Over		Page: 1	
	Freq			Level					
	MHZ	dBuV	đВ	dBuV/m	dBuV/m	dв			
1 2	111.480 487.840								
3	756.530								
4	807.940								
5 6	834.130 999.030								
	999.030	42.40	-2.91	33.43	54.00	-14.51	rean		

# 9. SETUP PHOTOS

## RADIATED RF MEASUREMENT SETUP





**END OF REPORT**