

FCC CFR47 PART 22 SUBPART H FCC CFR47 PART 24 SUBPART E INDUSTRY CANADA RSS-132 ISSUE 2 INDUSTRY CANADA RSS-133 ISSUE 5

CERTIFICATION TEST REPORT FOR PC EXPRESS CARD

> MODEL NUMBER: E351 FCC ID: PKRNVWE351 IC: 3229A-E351

REPORT NUMBER: 11U13890-1 ISSUE DATE: JULY 13, 2011

Prepared for

NOVATEL WIRELESS 4122 SORRENTO VALLEY BLVD #104 SAN DIEGO, CA 92121, U.S.A.

Prepared by

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#### **Revision History**

	Issue		
Rev.	Date	Revisions	Revised By
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## **1. ATTESTATION OF TEST RESULTS**

COMPANY NAME:	NOVATEL WIRELESS 4122 SORRENTO VALLEY BL SAN DIEGO, CA 92121, U.S./	-
EUT DESCRIPTION:	PC EXPRESS CARD	
MODEL:	E351	
SERIAL NUMBER:	170192241	
DATE TESTED:	JULY 11-16, 2011	
	APPLICABLE STANDARDS	
	STANDARD	TEST RESULTS
FCC PA	ART 22 H AND 24 E	Pass
IC RSS <sup>2</sup>	132 AND IC RSS133	Pass

Compliance Certification Services (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.

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Tested By:

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## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with RSS-132, RSS-133, TIA-603-C, FCC CFR 47 Part 2, FCC CFR 47 Part 22H, FCC CFR Part 24E, and FCC Part 27C.

## 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 <u>http://www.ccsemc.com</u>.

## 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:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

## 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

EUT is a PCI Mini Card operates on dual band CDMA2000, 1xRTT and EvDO and LTE band 13.

## 5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted and ERP / EIRP output powers as follows:

Part 22 Cellular Ba	and
---------------------	-----

Frequency range	Modulation	Conducted		ERP	
(MHz)	wouldton	dBm	mW	dBm	mW
824.7 – 848.31	1xRTT (RC1, SO55)	28.82	762.1	30.76	1191.2
824.7 – 848.31	EV-DO - REV A	28.49	706.3	31.16	1306.2

#### Part 24 PCS Band

Frequency range	Modulation	Conducted		EIRP	
(MHz)	wouldtion	dBm	mW	dBm	mW
1851.25 – 1908.8	1xRTT (RC1, SO55)	27.36	544.5	28.62	727.8
1851.25 – 1908.8	EV-DO - REV A	29.14	820.4	29.22	835.6

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## 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a dipole antenna for the 850MHz and 1900MHz bands with a maximum peak gain of 2dBi for cell band and PCS band.

## 5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was

The EUT software installed during testing was

The EUT is linked with Agilent 8960 Communication and CMU500Test Set

## 5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case channel for RF radiated emissions below 1GHz and AC conducted emissions are determined as the channel with the AC Power Adapter Source

Based on the investigation results, the highest peak power and enhanced data rate is the worstcase scenario for all measurements.

Worst-case modes:

- For Cellular and PCS band: 1xRTT (RC1 SO55)
- For Cellular and PCS band: CDMA2000 1xEV-DO Revision A (Rev. A)

The worst-case configuration has been evaluated on EUT with dipole antenna at Y-position for 700MHz, 850MHz, and 1900MHz bands.

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## 5.6. DESCRIPTION OF TEST SETUP

### I/O CABLES (RF CONDUCTED TEST)

	I/O CABLE LIST						
Cable	Port	# of	Connector	Cable	Cable	Remarks	
No.		Identical	Туре	Туре	Length		
		Ports					
1	AC	3	US 115V	Un-shielded	2m	NA	
2	DC	2	DC	Un-shielded	1m	NA	
3	RFOut	1	Directional Coupler	Un-shielded	None	NA	
4	RF In/Out	1	Directional Coupler	Un-shielded	1.2 m	NA	
5	RF In/Out	1	EUT	Un-shielded	0.2m	NA	
6	USB	1	USB	Un-shielded	0.8m	NA	

### I/O CABLES (RF RADIATED TEST)

	I/O CABLE LIST						
Cable No.	Port	# of Identica Ports	Connector Type	Cable Type	Cable Length	Remarks	
1	AC	3	US 115V	Un-shielded	2m	No	
2	DC	2	US 115V	Un-shielded	2m	No	
3	USB	1	Test Jig Card	Un-shielded	1m	Yes	
4	RF	1	Dipole Antenna	Un-shielded	none	Yes	
5	RF In/Out	1	Horn	Un-shielded	2m	Yes	

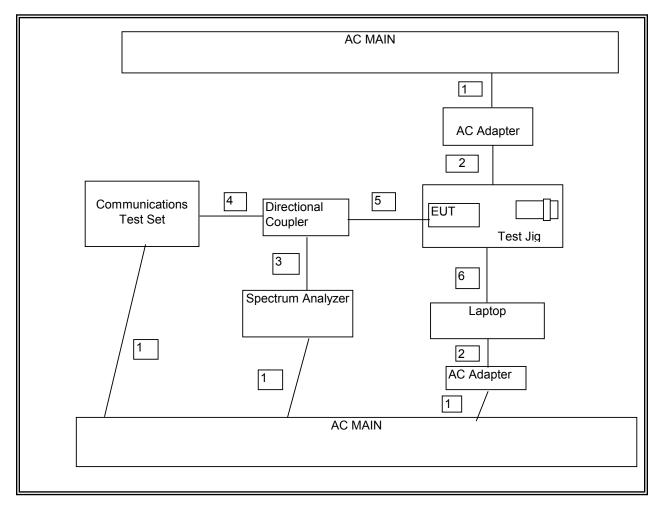
#### SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST					
Description Manufacturer Model Serial Number FCC ID					
Laptop AC Adapter	Dell	LA90PS-00	CN-ODF2667161571K5BFF	DoC	
Jig card	Novatel	NA	NA	NA	
Jig Card AC Adapter	V-Infinity	3A-211DN05	ETS050400UTC-P5P-5C	DoC	

#### TEST SETUP

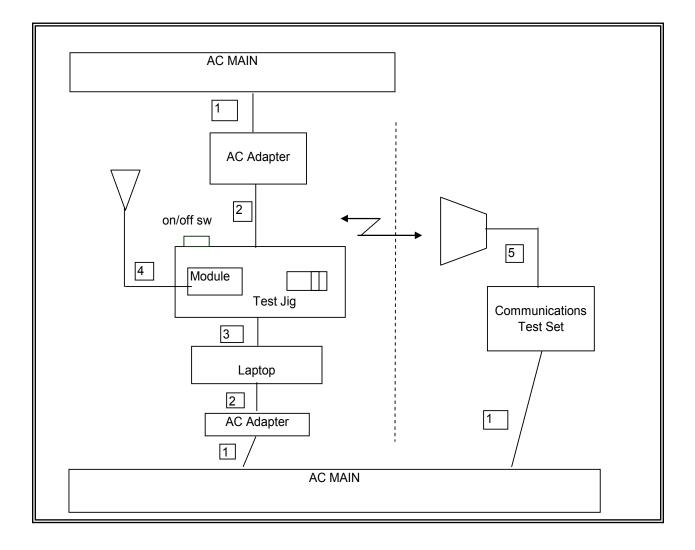
The EUT is a stand-alone device. The Wireless Communication test set exercised the EUT.

#### SETUP DIAGRAM FOR RF CONDUCTED TESTS



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#### SETUP DIAGRAM FOR RADIATED TESTS



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## 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	C01012	06-08-12	
Antenna, Horn, 18 GHz	EMCO	3115	C00872	06-30-12	
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	07-16-12	
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	01-27-12	
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	07-12-12	
EMI Test Receiver, 9 kHz-7 GHz	R & S	ESCI 7	None	07-06-12	
Communication Test Set	Agilent / HP	E5515C	C01086	09-27-12	
Wideband Communication Test Set	R & S	CMW 500	None	04-20-12	
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	11-10-11	
Temperature / Humidity Chamber	Thermotron	SE 600-10-10	C00930	04-20-12	
Highpass Filter, 1.5 GHz	Micro-Tronics	HPM13193	N02689`	CNR	
Highpass Filter, 2.7 GHz	Micro-Tronics	HPM13194	N02687	CNR	
Directional Coupler, 4.2 GHz, 40 dB	A-R	DC7144A	C00983	CNR	
Signal Generator, 20 GHz	Agilent / HP	83732B	C00774	07-14-12	
Antenna, Tuned Dipole 400~1000 MHz	ETS	3121C DB4	C00993	07-16-12	

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## 7. RF POWER OUTPUT VERIFICATION

#### 7.1. **RF POWER OUTPUT FOR 1xRTT**

This procedure assumes the Agilest 8960 Test Set has the following applications installed and with valid license.

Application Rev, License B.13.08, L

CDMA2000 Mobile Test

- Call Setup > Shift & Preset •
- Cell Info > Cell Parameters > System ID (SID) > 18

> Network ID (NID) > 65535

- Protocol Rev > 6 (IS-2000-0)
  - Radio Config (RC) > Please see following table or details
- FCH Service Option (SO) Setup > Please see following table or details •
- Traffic Data Rate > Full •

•

- TDSO SCH Info > F-SCH Parameters > F-SCH Data Rate > 153.6 kbps •
  - > R-SCH Parameters > R-SCH Data Rate > 153.6 kbps
- Rvs Power Ctrl > Active bits Rvs Power Ctrl > All Up bits (Maximum TxPout)

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#### **RF Power Output Results for 1XRTT**

#### **RF Output Power for Cellular Band**

Radio		Сс	onducted Output Power (dl	3m)
Configuration	Service Option	Ch. 1013 / 824.7 MHz	Ch. 384 / 836.52 MHz	Ch. 777 / 848.31 MHz
(RC)	(SO)	Peak	Peak	Peak
RC1	2 (Loopback)	28.45	27.80	28.70
	55 (Loopback)	28.51	27.81	28.82
RC2	9 (Loopback)	28.43	27.77	28.75
	55 (Loopback)	28.50	27.74	28.79
RC3	2 (Loopback)	28.15	27.51	28.58
	55 (Loopback)	28.27	27.51	28.50
	32 (+ F-SCH)	28.10	27.44	28.57
	32 (+ SCH)	28.19	27.53	28.57
RC4	2 (Loopback)	28.26	27.51	28.54
	55 (Loopback)	28.31	27.54	28.51
	32 (+ F-SCH)	28.25	27.47	28.50
	32 (+ SCH)	28.19	27.49	28.49
RC5	9 (Loopback)	28.17	27.49	28.37
	55 (Loopback)	28.19	27.56	28.55

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#### **RF Power Output Results for 1XRTT**

#### **RF Output Power for PCS Band**

Radio		С	onducted Output Power (dBi	m)
Configuration	Service Option	Ch. 25 / 1851.25 MHz	Ch. 600 / 1880 MHz	Ch. 1175 / 1908.75 MHz
(RC)	(SO)	Peak	Peak	Peak
RC1	2 (Loopback)	27.19	27.10	27.18
	55 (Loopback)	27.27	27.39	27.04
RC2	9 (Loopback)	27.23	27.04	26.97
	55 (Loopback)	27.06	27.04	26.92
RC3	2 (Loopback)	26.55	26.47	26.71
	55 (Loopback)	26.72	26.59	26.73
	32 (+ F-SCH)	26.68	26.60	26.69
	32 (+ SCH)	26.70	26.51	26.48
RC4	2 (Loopback)	26.70	26.46	26.71
	55 (Loopback)	26.69	26.49	26.59
	32 (+ F-SCH)	26.72	26.50	26.70
	32 (+ SCH)	26.69	26.49	26.52
RC5	9 (Loopback)	26.56	26.56	26.48
	55 (Loopback)	26.90	26.45	26.43

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# 7.2. RF POWER OUTPUT FOR CDMA2000 1xEV-DO Release 0 (Rel. 0)

This procedure assumes the Agilent 8960 Test Set has the following applications installed and with valid license.

Application	<u>Rev, License</u>
1xEV-DO Terminal Test	A.09.13

EVDO Release 0 - RTAP

- Call Setup > Shift & Preset
- Call Control:
  - Access Network Info > Cell Parameters > Sector ID > 00000000 > Subnet Mask > 0
  - o Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots
- Call Parms:
  - Cell Power > -105.5 dBm/1.23 MHz
  - Cell Band > (Select US Cellular or US PCS)
  - Channel > (Enter channel number)
  - Application Config > Enhanced Test Application Protocol > RTAP
  - RTAP Rate > 153.6 kbps
  - Rvs Power Ctrl > Active bits
  - Protocol Rel > 0 (1xEV-DO)
- Press "Start Data Connection" when "Session Open" appear in "Active Cell"
- Rvs Power Ctrl > All Up bits (Maximum TxPout)

#### EVDO Release 0 - FTAP

- Call Setup > Shift & Preset
- Call Control:
  - Access Network Info > Cell Parameters > Sector ID > 00000000 > Subnet Mask > 0
  - Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots
- Call Parms:
  - Cell Power > -105.5 dBm/1.23 MHz
  - Cell Band > (Select US Cellular or US PCS)
  - Channel > (Enter channel number)
  - Application Config > Enhanced Test Application Protocol > FTAP (default)
  - FTAP Rate > 307.2 kbps (2 Slot, QPSK)
  - Rvs Power Ctrl > Active bits
  - Protocol Rel > 0 (1xEV-DO)
- Press "Start Data Connection" when "Session Open" appear in "Active Cell"
- Rvs Power Ctrl > All Up bits (Maximum TxPout)

#### RF Power Output for CDMA2000 1xEV-DO Release 0 (Rel. 0)

Cell Band

				Conducted power (dBm)	
FTAP Rate	RTAP Rate	Channel	f (MHz)	Average	Peak
307.2 kbps (2 slot, QPSK)		1013	824.70	24.22	27.77
	153.6 kbps	384	836.52	24.17	<mark>28.32</mark>
		777	848.31	23.92	28.16

PCS Band

				Conducted p	oower (dBm)
FTAP Rate	RTAP Rate	Channel	f (MHz)	Average	Peak
307.2 kbps (2 slot, QPSK)	153.6 kbps	25	1851.25	23.70	28.38
		600	1880.00	23.74	<mark>28.85</mark>
		1175	1908.75	23.55	28.77

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# 7.3. RF POWER OUTPUT FOR CDMA2000 1xEV-DO Revision A (Rev. A)

This procedure assumes the Agilent 8960 Test Set has the following applications installed and with valid license.

ApplicationRev. License1xEV-DO Terminal TestA.09.13

EVDO Release A – RETAP

- Call Setup > Shift & Preset
- Cell Power > -60 dBm/1.23 MHz
- Protocol Rev > A (1xEV-DO-A)
- Application Config > Enhanced Test Application Protocol > RETAP
- R-Data Pkt Size > 4096
- Protocol Subtype Config > Release A Physical Layer Subtype > Subtype 2
- > PL Subtype 2 Access Channel MAC Subtype > Default (Subtype 0)
- Access Network Info > Cell Parameters > Sector ID > 00000000 > Subnet Mask > 0
- Generator Info > Termination Parameters > Max Forward Packet Duration >16 Slots
   > ACK R-Data After > Subpacket 0 (All ACK)
- Rvs Power Ctrl > All Up bits (to get the maximum power)

EVDO Release A - FETAP

- Call Setup > Shift & Preset
- Cell Power > -60 dBm/1.23 MHz
- Protocol Rev > A (1xEV-DO-A)
- Application Config > Enhanced Test Application Protocol > FETAP
- F-Traffic Format > 4 (1024, 2,128) Canonical (307.2k, QPSK)
- Protocol Subtype Config > Release A Physical Layer Subtype > Subtype 2
- > PL Subtype 2 Access Channel MAC Subtype > Default (Subtype 0)
- Access Network Info > Cell Parameters > Sector ID > 00000000 > Subnet Mask > 0
- Generator Info > Termination Parameters > Max Forward Packet Duration >16 Slots > ACK R-Data After > Subpacket 0 (All ACK)
- Rvs Power Ctrl > All Up bits (to get the maximum power)

#### RF Power Output Results for CDMA2000 1xEV-DO Revision A (Rev. A)

Cell	Band

				Conducted p	oower (dBm)
FETAP-Traffic Format	RETAP-Data Payload Size	Channel	f (MHz)	Average	Peak
		1013	824.70	24.23	27.92
307.2k, QPSK/ ACK channel is transmitted at all the slots	4096	384	836.52	24.20	<mark>28.49</mark>
		777	848.31	23.95	28.18

PCS Band

				Conducted p	oower (dBm)
FETAP-Traffic Format	RETAP-Data Payload Size	Channel	f (MHz)	Average	Peak
	4096	25	1851.25	23.70	28.58
307.2k, QPSK/ ACK channel is transmitted at all the slots		600	1880.00	24.00	<mark>29.14</mark>
		1175	1908.75	23.84	28.84

## 8. CONDUCTED TEST RESULTS

#### 8.1. **OCCUPIED BANDWIDTH**

#### RULE PART(S)

FCC: §2.1049

### LIMITS

For reporting purposes only

#### **TEST PROCEDURE**

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the low, middle and high channel in each band. The -26dB bandwidth was also measured and recorded.

#### **MODES TESTED**

- 1xRTT RC1, SO55 •
- CDMA2000 1xEV-DO Revision A (Rev. A)

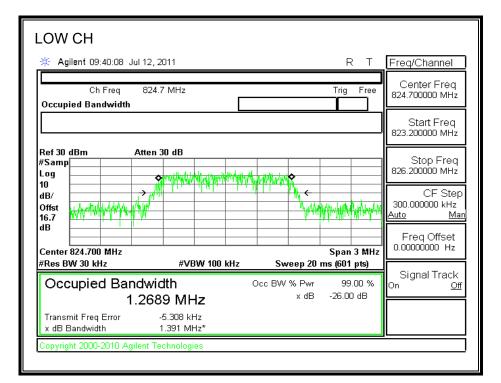
#### RESULTS

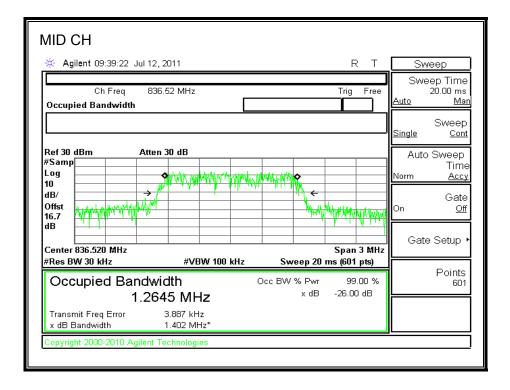
Band	Mode	Channel	f (MHz)	99% BW (MHz)	-26dB BW MHz)
		1013	824.70	1.2689	1.391
	1xRTT	384	836.52	1.2645	1.402
Cellular		777	848.31	1.2628	1.382
Cellular	CDMA2000	1013	824.70	1.2646	1.412
	1xEV-DO Revision A (Rev. A)	384	836.52	1.2651	1.408
		777	848.31	1.2680	1.413
	1xRTT	25	1851.25	1.2727	1.396
		600	1880.0	1.2645	1.402
PCS		1175	1908.75	1.2628	1.382
FC3	CDMA2000	25	1851.25	1.2748	1.402
	1xEV-DO Revision A	600	1880.0	1.2791	1.388
	(Rev. A)	1175	1908.75	1.2712	1.413

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#### CDMA2000 1xRTT Mode (Cellular Band)

#### 99% BANDWIDTH and 26dB



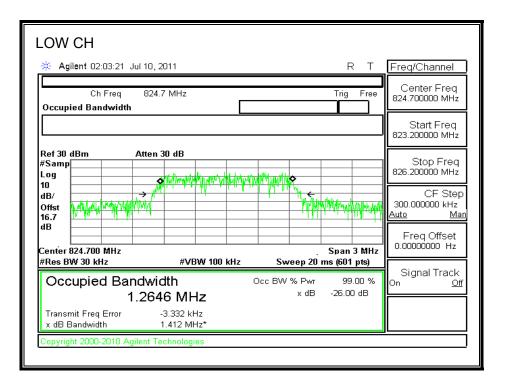


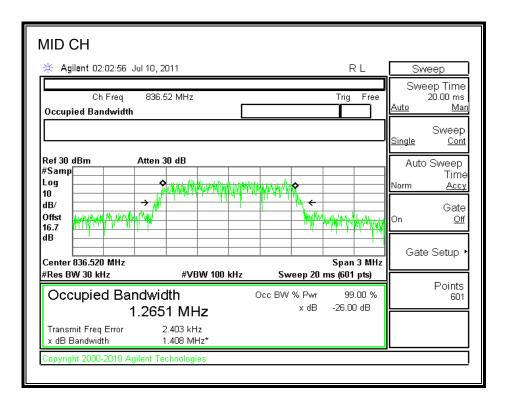
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HIGH CH	Sweep
Ch Freq 848.31 MHz Trig Free Occupied Bandwidth	Sweep Time 20.00 ms <u>Auto Man</u> Sweep
Ref 30 dBm Atten 30 dB #Samp Log 00 dB/ Offst 16.7 dB	<u>Single Cont</u> Auto Sweep Time <u>Norm Accy</u> Gate On <u>Off</u>
Center 848.310 MHz Span 3 MHz #Res BW 30 kHz #VBW 100 kHz Sweep 20 ms (601 pts)	Gate Setup •
Occupied Bandwidth         Occ BW % Pwr         99.00 %           1.2628 MHz         x dB         -26.00 dB           Transmit Freq Error         -1.448 kHz         -26.00 dB           x dB Bandwidth         1.382 MHz*         -26.00 dB	Points 601
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#### CDMA2000 1xEV-DO Revision A (Rev. A) Cellular Band



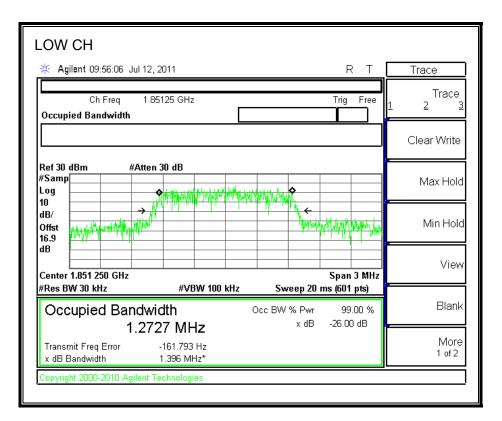


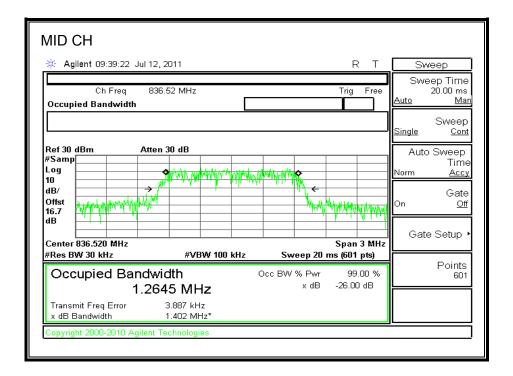
Page 20 of 70

HIGH CH	r t [	Span
Ch Freq 848.31 MHz Occupied Bandwidth	Trig Free	Span 3.00000000 MHz
		Span Zoom
Ref 30 dBm Atten 30 dB #Samp Log 10		Full Span
dB/ Offst 16.7		Zero Span
dB	Span 3 MHz Sweep 20 ms (601 pts)	Last Span
Occupied Bandwidth 1.2680 MHz	Occ BW % Pwr 99.00 % x dB -26.00 dB	
Transmit Freq Error 2.104 kHz x dB Bandwidth 1.413 MHz*		
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#### CDMA2000 1xRTT Mode (PCS Band)



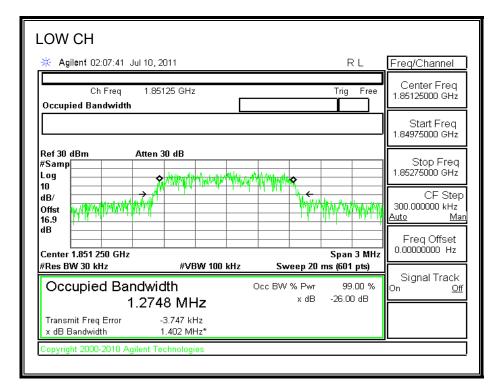


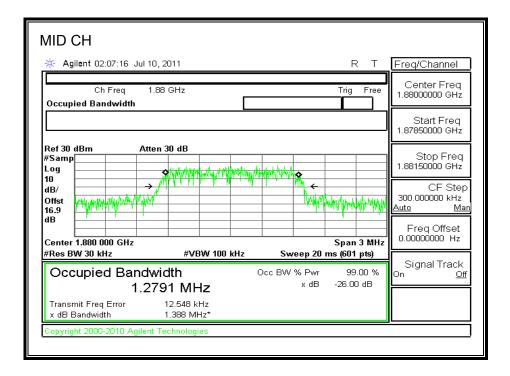
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HIGH CH * Agilent 09:40:42 Jul 12, 2011 R T	Sweep
Ch Freq 848.31 MHz Trig Free Occupied Bandwidth	Sweep Time 20.00 ms <u>Auto Man</u>
Ref 30 dBm Atten 30 dB #Samp	Sweep <u>Single Cont</u> Auto Sweep
Log $O$ 10 dB/ Offst 16.7	Time <u>Norm Accy</u> Gate On <u>Off</u>
dB Center 848.310 MHz #Res BW 30 kHz #VBW 100 kHz Sweep 20 ms (601 pts)	Gate Setup •
Occupied Bandwidth         Occ BW % Pwr         99.00 %           1.2628 MHz         x dB         -26.00 dB	Points 601
Transmit Freq Error       -1.448 kHz         x dB Bandwidth       1.382 MHz*         Copyright 2000-2010 Agilent Technologies	

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#### CDMA2000 1xEV-DO Revision A (Rev. A) Mode (PCS Band)





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Agilent 02:08:09 Jul 10	, 2011		RT	Freq/Channel
Ch Freq 1.9 Occupied Bandwidth	90875 GHz		Trig Free	Center Freq 1.90875000 GHz
				Start Freq 1.90725000 GHz
#Samp Log 10 dB/ Offst 16.9 dB	n 30 dB	· · · · · · · · · · · · · · · · · · ·	YIYIA YIYAYAA	Stop Freq 1.91025000 GHz CF Step 300.000000 kHz <u>Auto Mar</u> Freq Offset 0.0000000 Hz
Center 1.908 750 GHz #Res BW 30 kHz	#VBW 100 kHz	Sweep 20 r	Span 3 MHz ns (601 pts)	
Occupied Bandw 1.27	ridth 12 MHz	Occ BW % Pwr x dB	99.00 % -26.00 dB	Signal Track On <u>Off</u>
Transmit Freq Error x dB Bandwidth	8.844 kHz 1.413 MHz*			

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## 8.2. BAND EDGE

### RULE PART(S)

FCC: §22.359, 24.238, and 27.53(c)(2)

### <u>LIMITS</u>

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

### TEST PROCEDURE

The transmitter output was connected to a Agilent 8960 Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

For each band edge measurement:

- Set the spectrum analyzer span to include the block edge frequency.
- Set a marker to point the corresponding band edge frequency in each test case.
- Set display line at -13 dBm
- Set resolution bandwidth to at least 1% of emission bandwidth.

### MODES TESTED

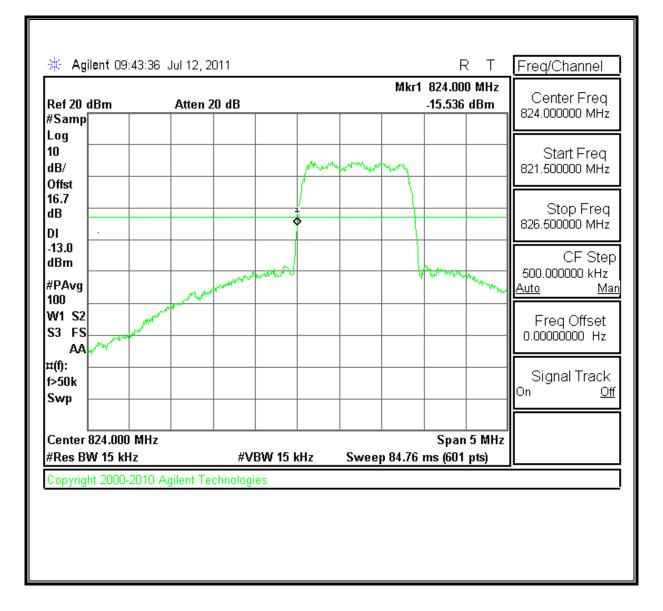
- 1xRTT RC1 SO55
- CDMA2000 1xEV-DO Revision A (Rev. A)

#### RESULTS

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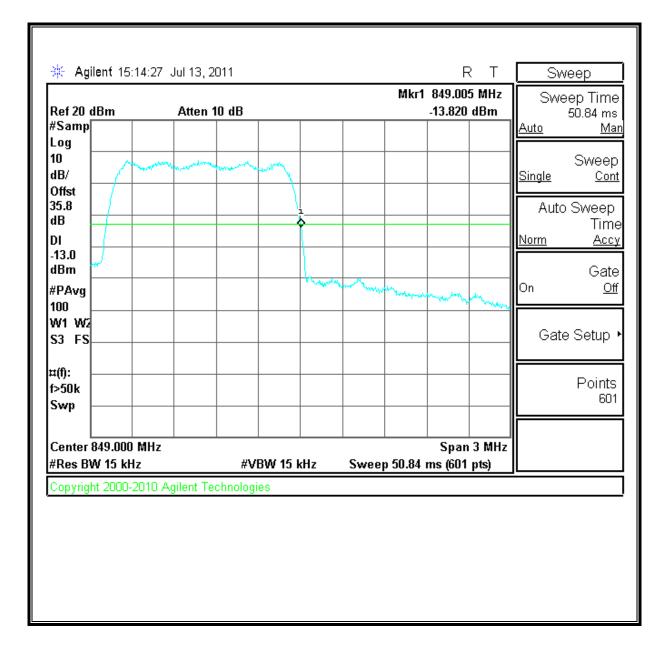
#### CDMA2000 1xRTT mode (Cellular Band)

#### Low Channel Band Edge



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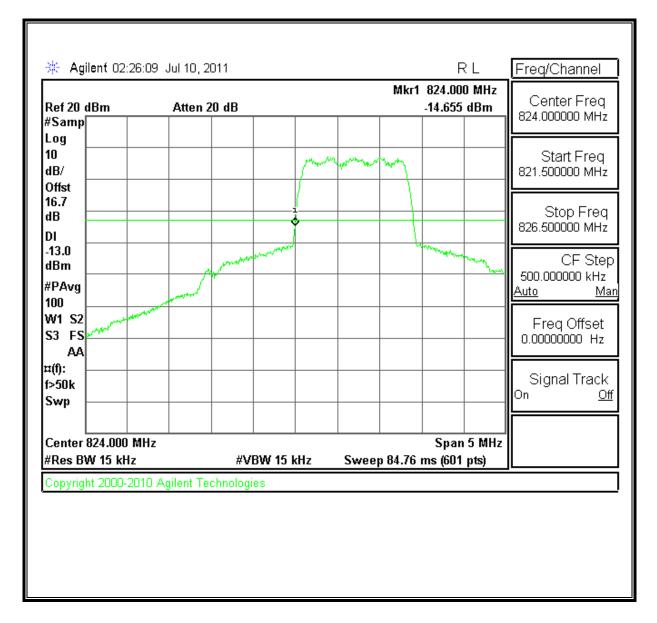
#### **High Channel Band Edge**



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#### CDMA2000 1xEV-DO Revision A (Rev. A) mode (Cellular Band)

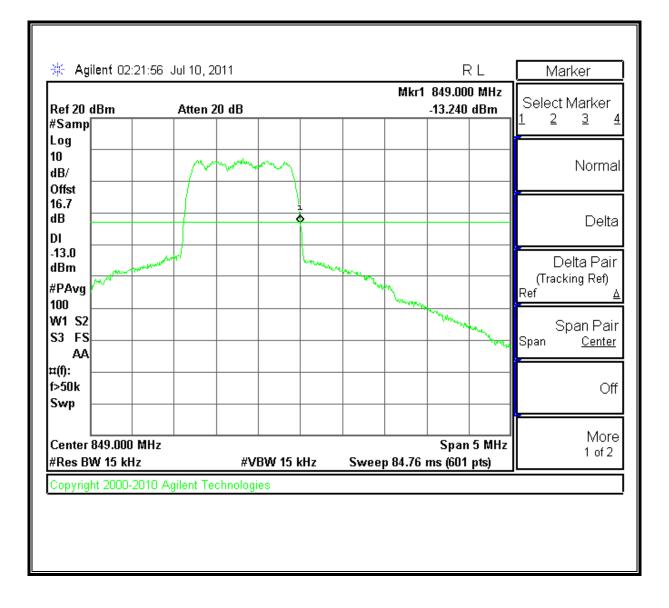
#### Low Channel Band Edge



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#### REPORT NO: 11U13890-1 FCC ID: PKRNVWE351

#### **High Channel Band Edge**

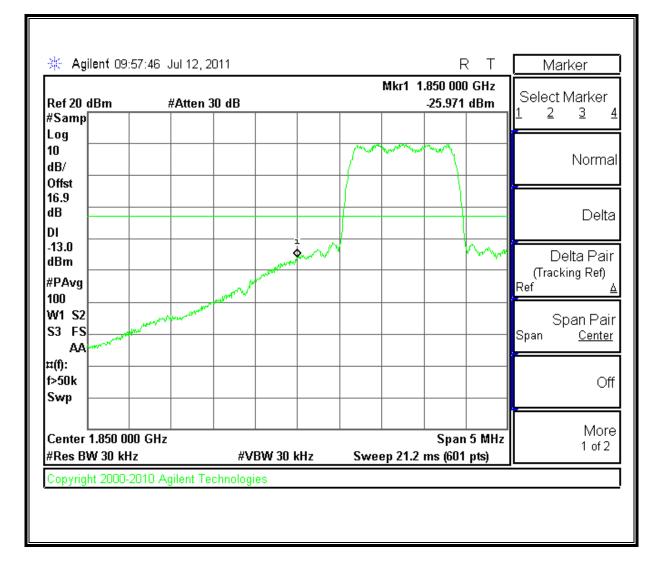


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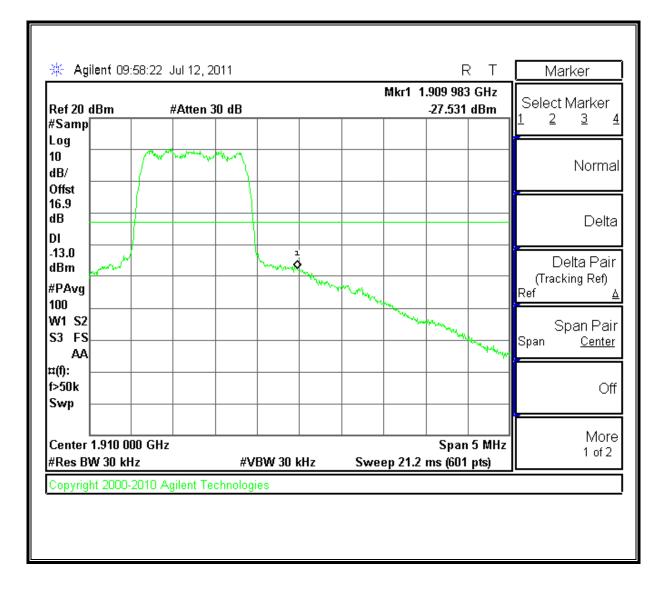
#### CDMA2000 1xRTT mode (PCS Band)

#### Low Channel Band Edge



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#### High Channel Band Edge



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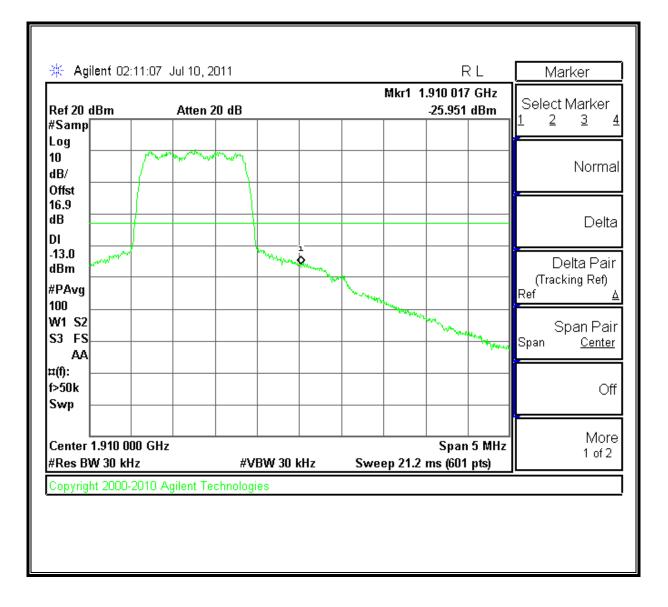
#### CDMA2000 1xEV-DO Revision A (Rev. A) mode (PCS Band)

#### Low Channel Band Edge

ab/ Offst     16.9       dB     1       DI     1       -13.0     1       dBm     1       #PAvg     1       100     1       W1 S2     1       S3 FS     1       AA     1       #t(f):     550k       Swp     1       Center 1.850 000 GHz     Span 5 MHz	🔆 Agilent 02:11	:42 Jul 10, 2011			 R L	Marker
Log         Norma           10         More           0ffst         More           16.9         More           dB         More           DI         More           13.0         More           dBm         More           W1 S2         More           S3 FS         Span 5 MHz           AA         More           tt(f):         Span 5 MHz		Atten 20 dB		۸ 		
dB/ Offst     Image: Center 1.850 000 GHz     <	Log				 ~	
16.9       dB       DI       <	dB/			ļ/ <sup>~</sup> [		Normal
-13.0 dBm #PAvg 100 W1 S2 S3 FS AA #(f): f>50k Swp Center 1.850 000 GHz Sa FS AA Center 1.850 000 GHz Center 1.850 000	16.9					Delta
#PAvg         Ref         Ref </td <td>-13.0</td> <td></td> <td></td> <td></td> <td></td> <td>Delta Pair</td>	-13.0					Delta Pair
S3         FS         Span         Span         Center           AA         Image: Same state stat						
#(f):         f>50k         Of           Swp         Image: Sympositive state st	S3 FS					Span Pair Span <u>Center</u>
Center 1.850 000 GHz More 1 of 2	¤(f): f>50k					Off
· I 1072		GHz			 Span 5 MHz	More
Copyright 2000-2010 Agilent Technologies	#Res BW 30 kHz	#	VBW 30 kHz	Swee	-	1 of 2

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#### **High Channel Band Edge**



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## 8.3. OUT OF BAND EMISSIONS

#### RULE PART(S)

FCC: §2.1053, §22.917, §24.238, §27.53 IC: RSS-132, 4.5; RSS-133, 6.5

#### LIMITS

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log (P) dB$ .

#### TEST PROCEDURE

The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic. Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were caught.

For each out of band emissions measurement:

- Set display line at -13 dBm
- Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz.

#### MODES TESTED

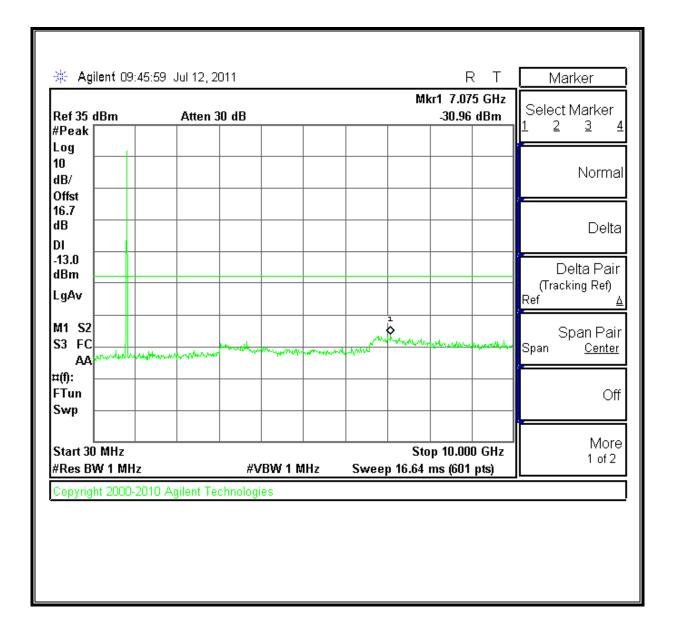
- 1xRTT RC1 SO55
- CDMA2000 1xEV-DO Revision A (Rev. A)

#### **RESULTS**

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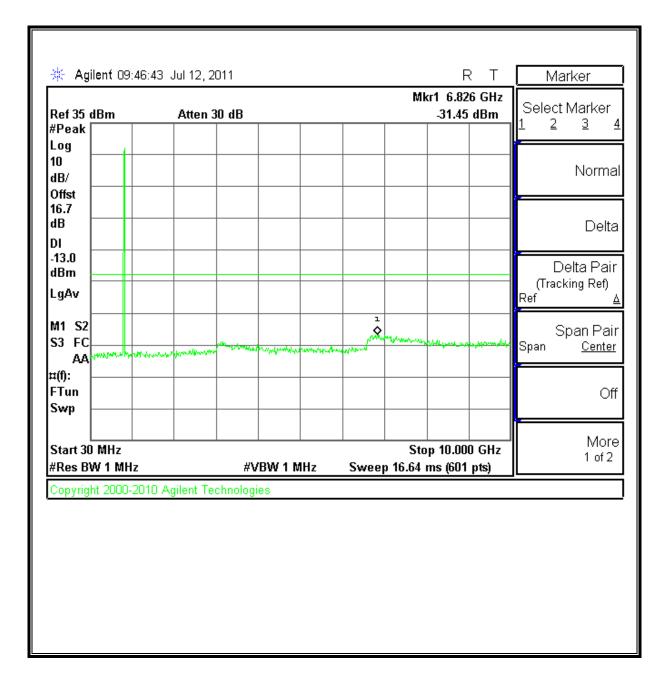
#### 1xRTT Mode (Cellular Band)

#### LOW CHANNEL



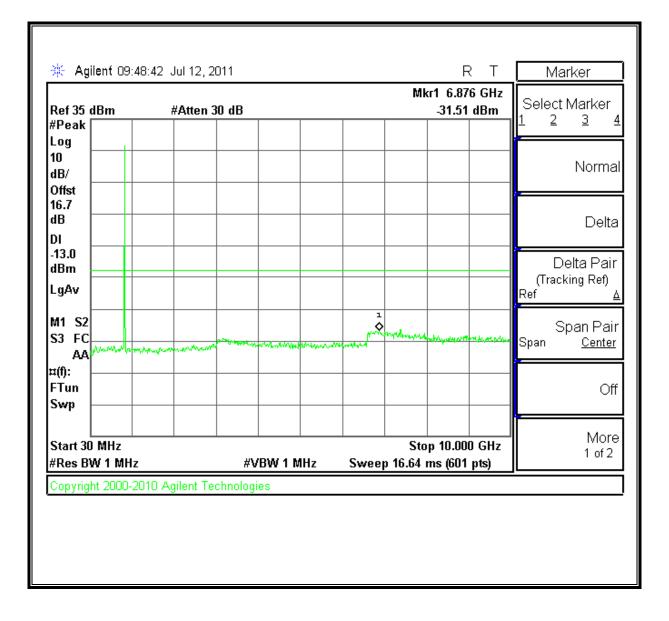
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### **MID CHANNEL**



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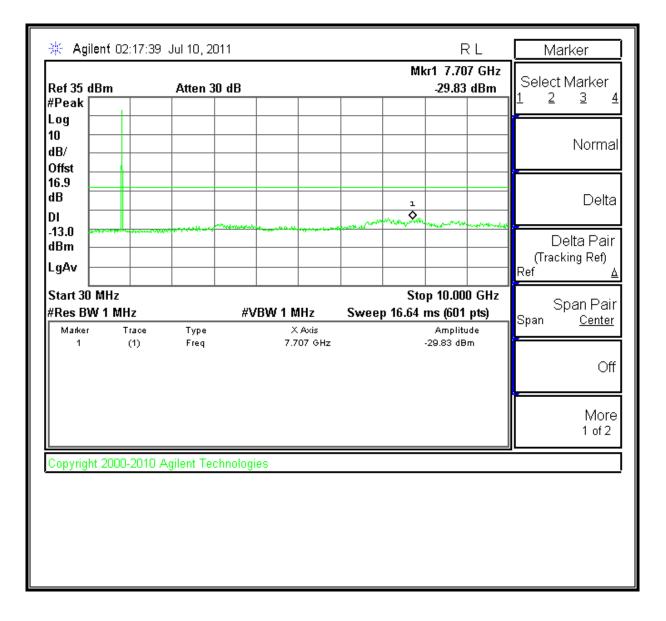
## **High Channel**



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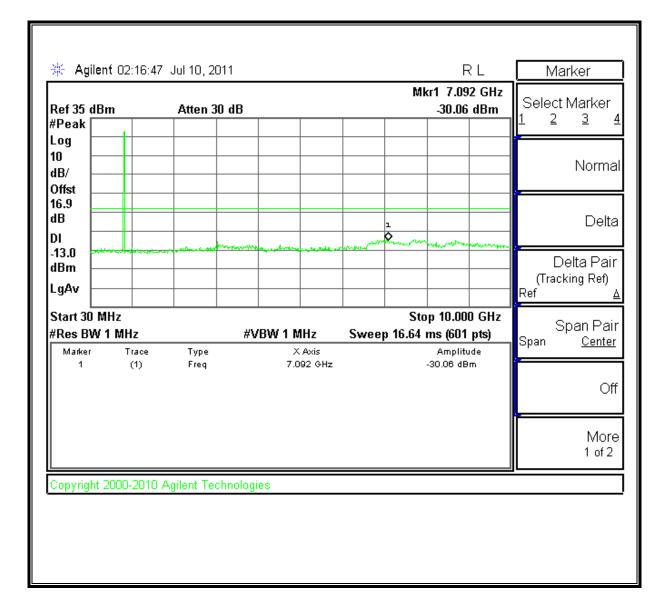
#### CDMA2000 1xEV-DO Revision A (Rev. A) Mode (Cellular Band)

#### LOW CHANNEL



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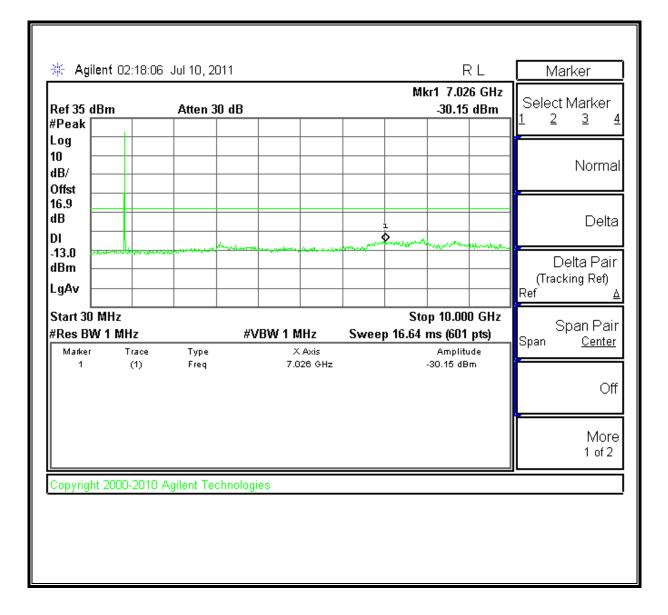
#### **MID CHANNEL**



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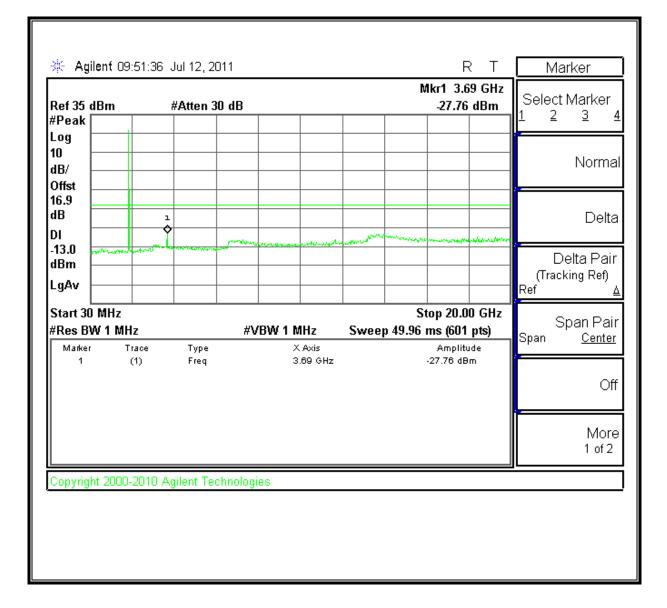
### **HIGH CHANNEL**



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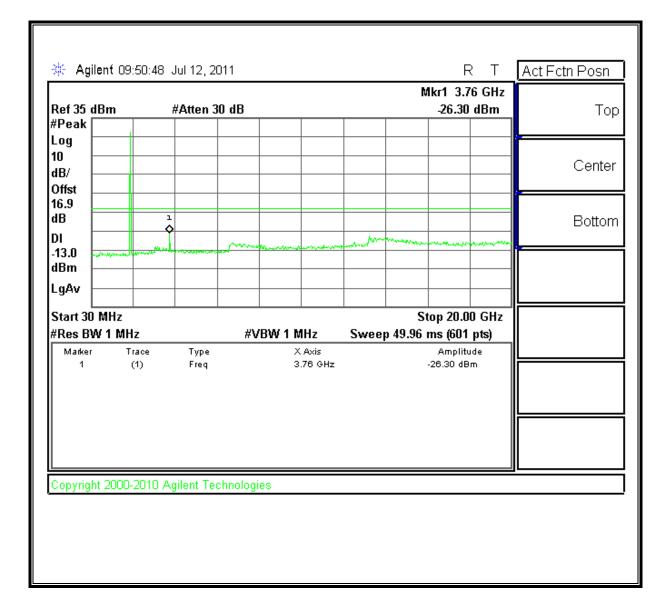
## LOW CHANNEL



DATE: JULY 13, 2011 IC: 3229A-E351

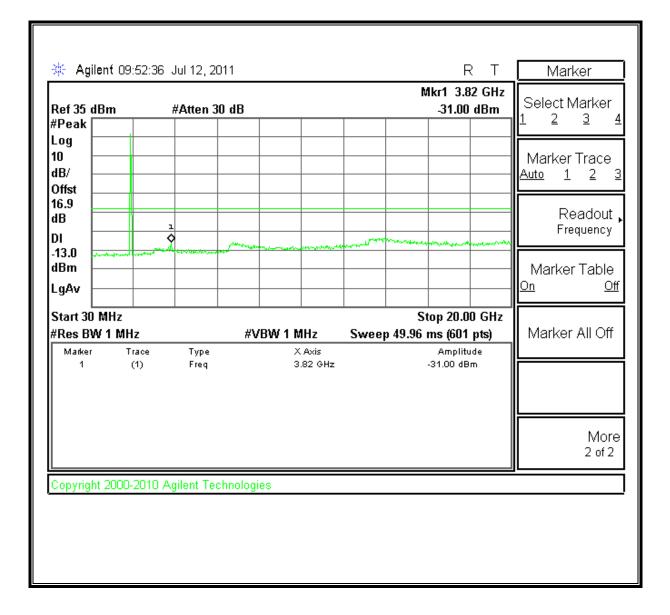
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#### **MID CHANNEL**



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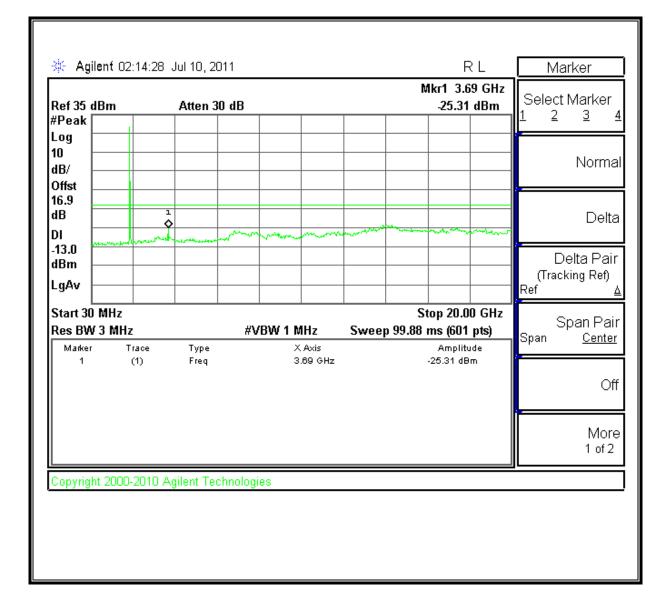
### **HIGH CHANNEL**



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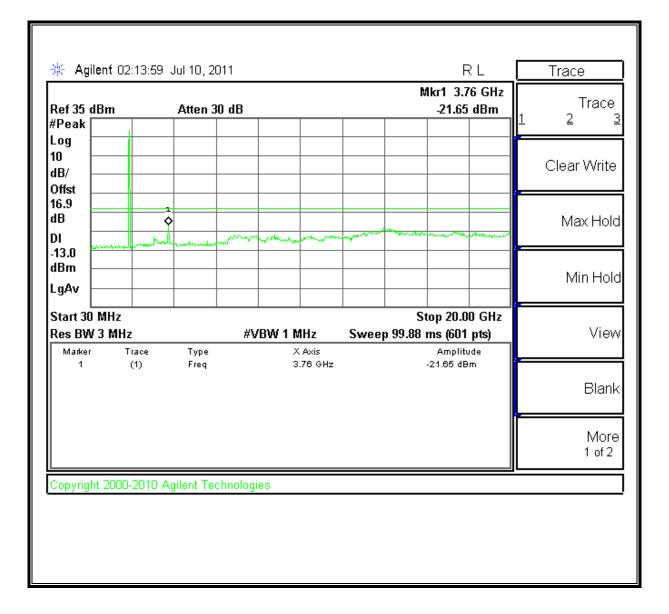
#### CDMA2000 1xEV-DO Revision A (Rev. A) Mode (PCS Band)

## LOW CHANNEL



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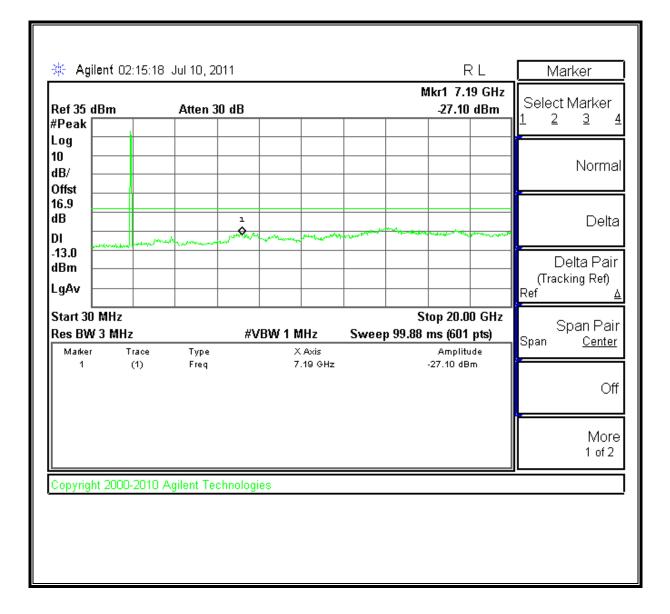
#### **MID CHANNEL**



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### **HIGH CHANNEL**



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# 8.4. FREQUENCY STABILITY

# RULE PART(S)

FCC: §2.1055, §22.355, §24.235, RSS132 & RSS133

## <u>LIMITS</u>

- §22.355 The carrier frequency shall not depart from the reference frequency in excess of ±2.5 ppm for mobile stations.
- §24.235 The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.
- RSS-132 & 133 6.3 The carrier frequency shall not depart from the reference frequency in excess of ±2.5 ppm for mobile stations

## TEST PROCEDURE

Use Agilent 8960 with Frequency Error measurement capability.

- Temp. = −20° to +50°C
- Voltage = 3.00-3.6VDC

## Frequency Stability vs Temperature:

The EUT is place inside a temperature chamber. The temperature is set to 20°C and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until +50°C is reached.

## Frequency Stability vs Voltage:

The peak frequency error is recorded (worst-case).

## MODES TESTED

• CDMA2000 1xEV-DO Revision A (Rev. A)

## **RESULTS**

See the following pages.

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#### CELL CDMA2000 1xEV-DO Revision A (Rev. A) – MID CHANNEL

Bof	oronoo Eroquonovi (	Collular Mid Chann	el 836.519985Hz @ 2	000
Ken		stay +- 2.5 ppm =		Hz
DC Power Supply	Environment		viation Measureed wi	th Time Elapse
(Vdc)	Temperature (°C)	(MHz)	Delta (ppm)	Limit (ppm)
3.30	50	836.519972	0.017	2.5
3.30	40	836.519980	0.007	2.5
3.30	30	836.519982	0.005	2.5
3.30	20	836.519986	0	2.5
3.30	10	836.520000	-0.016	2.5
3.30	0	836.520022	-0.043	2.5
3.30	-10	836.519990	-0.005	2.5
3.30	-20	836.519988	-0.002	2.5
3.30	-30	836.520012	-0.031	2.5
Refe	rence Frequency: Co	ellular Mid Channe	el 836.519986MHz @ :	20ºC
	Limit: to	stay +- 2.5 ppm =		Hz
DC Power Supply	Environment	Frequency Dev	viation Measureed wi	th Time Elapse
(Vdc)	Temperature (°C)	(MHz)	Delta (ppm)	Limit (ppm)
3.30	20	836.519996	0.000	2.5
3.60	20	836.520018	-0.026	2.5
3.00	20	836.520008	-0.014	2.5
2.65( end voltage)	20	836.519961	0.042	2.5

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Re	ference Frequency:	PCS Mid Channel 18	379.9999992MHz @ 20ºC	
Limit: with	nin the authorized bl	ock or +- 2.5 ppm =		Hz
Power Supply	Environment	Frequency De	viation Measureed wit	h Time Elapse
(Vdc)	Temperature (°C)	(MHz)	Delta (ppm)	Limit (ppm)
3.30	50	1879.999996	-0.002	2.5
3.30	40	1880.000012	-0.011	2.5
3.30	30	1879.999985	0.004	2.5
3.30	20	1879.999992	0	2.5
3.30	10	1880.000014	-0.012	2.5
3.30	0	1880.000023	-0.016	2.5
3.30	-10	1879.999991	0.001	2.5
3.30	-20	1879.999982	0.005	2.5
3.30	-30	1879.999978	0.007	2.5
Re	ference Frequency:	PCS Mid Channel 18	379.9999992MHz @ 20ºC	
Limit: with	nin the authorized bl	ock or +- 2.5 ppm =	4700.000	Hz
Power Supply	Environment	Frequency De	viation Measureed wit	h Time Elapse
(Vdc)	Temperature (°C)	(MHz)	Delta (ppm)	Limit (ppm)
3.30	20	1879.999992	0	2.5
3.60	20	1880.000025	-0.018	2.5
3.00	20	1879.999979	0.007	2.5
2.65(end voltage)	20	1879.999867	0.066	2.5

## PCS, CDMA2000 1xEV-DO Revision A (Rev. A) - MID CHANNEL

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# 9. RADIATED TEST RESULTS

# 9.1. RADIATED POWER (ERP & EIRP)

## RULE PART(S)

FCC: §2.1046, §22.913, §24.232 RSS132 & RSS133

## <u>LIMITS</u>

22.913(a) - The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

24.232(c) - Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

#### TEST PROCEDURE

#### ANSI / TIA / EIA 603C

#### MODES TESTED

- 1xRTT RC1, SO55
- CDMA2000 1xEV-DO Revision A (Rev. A)

## **RESULTS for Cellular Band (ERP)**

			EF	RP
Mode	Channel	f (MHz)	dBm	mW
1xRTT	1013	824.70	30.76	1191.24
(RC1, SO55)	384	836.52	29.53	897.43
(RC1, 3055)	777	848.31	29.74	941.89
	1013	824.70	31.16	1306.17
EVDO-REV A	384	836.52	30.53	1129.80
	777	848.31	29.54	899.50

## **RESULTS for PCS Band (EIRP)**

			E	IRP
Mode	Channel	f (MHz)	dBm	mW
1xRTT	25	1851.25	28.26	669.88
(RC1, SO55)	600	1880.00	28.62	727.78
(RC1, 3055)	1175	1908.75	28.28	672.98
	25	1851.25	28.16	654.64
EVDO-REV A	600	1880.00	29.22	835.60
	1175	1908.75	28.48	704.69

#### ERP for 1xRTT Mode (Cellular Band)

	High Frequency Substitution Measurement Compliance Certification Services Chamber B
Company:	Novatel
Company: Project #: Date:	11U13890
Date:	07/12/11
Test Engineer:	Chin Pang
Test Engineer: Configuration:	EUT with Test jig Card
Mode:	Cell Band 1xRTT

#### Test Equipment:

Receiving: Sunol T130, and 3m Chamber N-type Cable (Setup this one for testing EUT) Substitution: Dipole S/N: 00022117, 6ft SMA Cable (SN # 208947003) Warehouse.

f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	ERP	Limit	Margin	Notes
MHz	(dBm)	(H/V)	(dB)	(dBd)	(dBm)	(dBm)	(dB)	
824.70	31.26	V	0.5	0.0	30.76	38.5	-7.7	
824.70	20.55	H	0.5	0.0	20.05	38.5	-18.4	
836.52	30.03	V	0.5	0.0	29.53	38.5	-8.9	
836.52	20.15	Ĥ	0.5	0.0	19.65	38.5	-18.8	
848.31	30.24	V	0.5	0.0	29.74	38.5	-8.7	
848.31	21.47	Н	0.5	0.0	20.97	38.5	-17.5	

#### ERP for CDMA2000 1xEV-DO Revision A (Cellular Band)

		-		titution Measur on Services Cha				
Company	:	Novatel						
Project #		11U13890						
Date:		07-12-11						
Test Eng	ineer:	Chin Pang						
Configura		EUT with Dipo	le Antenna					
Mode:		Cell Band EvD						
	g: Sunol T130,			Cable (Setup thi e (SN # 20894700		-	UT)	
Receivin Substitut f	g: Sunol T130, ion: Dipole S/N SG reading	l: 00022117, Ant. Pol.	6ft SMA Cable Cable Loss	e (SN # 20894700 Antenna Gain	03) Wareh ERP	ouse. Limit	Margin	Notes
Receivin Substitut	g: Sunol T130, ion: Dipole S/N	I: 00022117,	6ft SMA Cable	e (SN # 20894700	03) Wareh	ouse.		Notes
Receivin Substitut f MHz	g: Sunol T130, ion: Dipole S/N SG reading (dBm)	l: 00022117, Ant. Pol.	6ft SMA Cable Cable Loss (dB)	e (SN # 20894700 Antenna Gain	03) Wareh ERP (dBm)	ouse. Limit (dBm)	Margin (dB)	Notes
Receivin Substitut f	g: Sunol T130, ion: Dipole S/N SG reading	I: 00022117, Ant. Pol. (H/∨)	6ft SMA Cable Cable Loss	e (SN # 20894700 Antenna Gain (dBd)	03) Wareh ERP	ouse. Limit	Margin	Notes
Receivin Substitut f MHz 824.70 824.70	g: Sunol T130, ion: Dipole S/N SG reading (dBm) <u>31.66</u> 20.35	I: 00022117, Ant. Pol. (H/∨) V H	6ft SMA Cable Cable Loss (dB) 0.5 0.5	e (SN # 20894700 Antenna Gain (dBd) 0.0	03) Wareh ERP (dBm) 31.16 19.85	ouse. Limit (dBm) 38.5 38.5	Margin (dB) -7.3 -18.6	Notes
Receivin Substitut f MHz 824.70 824.70 836.52	g: Sunol T130, ion: Dipole S/N SG reading (dBm) 31.66 20.35 31.03	I: 00022117, Ant. Pol. (H/∨) V H	6ft SMA Cable Cable Loss (dB) 0.5 0.5	e (SN # 20894700 Antenna Gain (dBd) 0.0 0.0 0.0	03) Wareh ERP (dBm) 31.16 19.85 30.53	ouse. Limit (dBm) 38.5 38.5 38.5	Margin (dB) -7.3 -18.6 -7.9	Notes
Receivin Substitut f MHz 824.70 824.70	g: Sunol T130, ion: Dipole S/N SG reading (dBm) <u>31.66</u> 20.35	I: 00022117, Ant. Pol. (H/∨) V H	6ft SMA Cable Cable Loss (dB) 0.5 0.5	e (SN # 20894700 Antenna Gain (dBd) 0.0 0.0	03) Wareh ERP (dBm) 31.16 19.85	ouse. Limit (dBm) 38.5 38.5	Margin (dB) -7.3 -18.6	Notes
Receivin Substitut f MHz 824.70 824.70 836.52	g: Sunol T130, ion: Dipole S/N SG reading (dBm) 31.66 20.35 31.03	I: 00022117, Ant. Pol. (H/∨) V H	6ft SMA Cable Cable Loss (dB) 0.5 0.5	e (SN # 20894700 Antenna Gain (dBd) 0.0 0.0 0.0	03) Wareh ERP (dBm) 31.16 19.85 30.53	ouse. Limit (dBm) 38.5 38.5 38.5	Margin (dB) -7.3 -18.6 -7.9	Notes

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## EIRP for 1xRTT Mode (PCS Band)

		Compliance	e Certification	n Services Cham	ber B			
Company	:	Novatel						
Project #:		11U13890						
Date:		07-12-11						
Test Engi	ineer:	Chin Pang						
Configura	ation:	EUT with Dipol	e Antenna					
Mode:		TX PCS CDMA	2000, 1xRTT					
Test Equ	ipment:							
			CMA Cables					
Receiving	g: Horn 159, an	d Camber B	SIVIA Cables					
	g: Horn T59, an ion: Horn T60 S			e (208947003) Ware	house			
	•			e (208947003) Ware	house			
	•		6ft SMA Cable	e (208947003) Ware Antenna Gain	ehouse EIRP	Limit	Delta	Notes
	ion: Horn T60 S	Substitution,	6ft SMA Cable	· · ·		Limit (dBm)	Delta (dB)	Notes
Substitut f GHz	on: Horn T60 S SG reading (dBm)	Substitution, Ant. Pol. (H/V)	6ft SMA Cable Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	(dBm)	(dB)	Notes
Substitut f GHz 1.851	ion: Horn T60 S SG reading (dBm) 21.1	Substitution, Ant. Pol. (H/V) V	6ft SMA Cable Cable Loss (dB) 0.85	Antenna Gain (dBi) 8.01	EIRP (dBm) 28.26	(dBm) 33.0	(dB) 4.7	Notes
Substitut f GHz	on: Horn T60 S SG reading (dBm)	Substitution, Ant. Pol. (H/V)	6ft SMA Cable Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	(dBm)	(dB)	Notes
Substitut f GHz 1.851	ion: Horn T60 S SG reading (dBm) 21.1	Substitution, Ant. Pol. (H/V) V	6ft SMA Cable Cable Loss (dB) 0.85	Antenna Gain (dBi) 8.01	EIRP (dBm) 28.26	(dBm) 33.0	(dB) 4.7	Notes
Substitut f GHz 1.851 1.851	SG reading (dBm) 21.1 14.4	Gubstitution, Ant. Pol. (H/∨) V H	6ft SMA Cable Cable Loss (dB) 0.85 0.85	Antenna Gain (dBi) 8.01 8.01	EIRP (dBm) 28.26 21.56	(dBm) 33.0 33.0	(dB) 4.7 -11.4	Notes
Substitut f GHz 1.851 1.851 1.880 1.880	ion: Horn T60 S SG reading (dBm) 21.1 14.4 21.4 14.6	Substitution, Ant. Pol. (H/V) V H V H	6ft SMA Cable Cable Loss (dB) 0.85 0.85 0.85 0.85	Antenna Gain (dBi) 8.01 8.01 8.07 8.07	EIRP (dBm) 28.26 21.56 28.62 21.82	(dBm) 33.0 33.0 33.0 33.0 33.0	(dB) 4.7 .11.4 4.4 .11.2	Notes
Substitut f GHz 1.851 1.851 1.880	ion: Horn T60 S SG reading (dBm) 21.1 14.4 21.4	Substitution, Ant. Pol. (H/∨) V H V	6ft SMA Cable Cable Loss (dB) 0.85 0.85 0.85	Antenna Gain (dBi) 8.01 8.01 8.01	EIRP (dBm) 28.26 21.56 28.62	(dBm) 33.0 33.0 33.0 33.0	(dB) 4.7 -11.4 4.4	Notes

**High Frequency Fundamental Measurement** 

Rev. 1.24.7

I

## EIRP for CDMA2000 1xEV-DO Revision A (PCS Band)

				mental Measure n Services Cham				
Company:		Novatel						
Project #:		11U13890						
Date:		07-12-11						
Test Engi	neer:	Chin Pang						
Configura	tion:	EUT with Dipole	e Antenna					
Mode:		TX PCS, EvDO	Rev A					
Substituti f GHz	on: Horn T60 S SG reading (dBm)	Substitution, 6 Ant. Pol. (H/V)		(208947003) Ware Antenna Gain (dBi)	ehouse EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
0112	(ubiii)	(100)	(00)		(ubiii)		(00)	
1.851	21.0	V	0.85	8.01	28.16	33.0	-4.8	
1.851	13.9	Н	0.85	8.01	21.06	33.0	-11.9	
4 000			0.05		~ ~ ~ ~		~ ~	
1.880 1.880	22.0 14.6	V H	0.85 0.85	8.07	29.22	33.0 33.0	-3.8 -11.2	
1.000	14.0		0.05	0.07	21.02	55.0	-11.2	
1.909	21.2	v	0.85	8.13	28.48	33.0	-4.5	
1.909	14.0	Н	0.85	8.13	21.28	33.0	-11.7	
Rev. 1.24.7								

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# 9.2. FIELD STRENGTH OF SPURIOUS RADIATION

## RULE PART(S)

FCC: §2.1053, §22.917, §24.238 IC: RSS-132, 4.5; RSS-133, 6.5

## <u>LIMIT</u>

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

## TEST PROCEDURE

For Cellular equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

For PCS equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

## MODES TESTED

- 1xRTT RC1, SO55
- CDMA2000 1xEV-DO Revision A (Rev. A)

## **RESULTS**

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## 1xRTT Mode (Cellular Band)

			Cor Above 1GH	mpliance Co Iz High Frec				ement	
Company Project #: Date:		Novatel 11U13890 07-13-11							
Test Engi		Chin Pang							
Configura		EUT with Dipo	le Antenna						
Mode:			CDMA 1xRTT						
Chamber		r	Pre-ar	nplifer		Filter			Limit
5n	n Chamber B	-	T145 8449	в –	Filt	ter 1	-	FCCF	Part 22 🚽
f	SG reading		Distance	Preamp	Filter	ERP	Limit	Delta	Notes
GHz	(dBm)	(H/∨)	(m)	(dB)	(dB)	(dBm)	(dBm)	(dB)	
	nel (824.7MHz)								
1.649	-13.2	V	3.0	35.5	1.0	47.7	-13.0	-34.7	
2.474	-10.8	v	3.0	35.4	1.0	45.2	-13.0	-32.2	
1.649	-15.8	H	3.0	35.5	1.0	-50.3	-13.0	-37.3	
2.474	-15.0	Н	3.0	35.4	1.0	49.4	-13.0	-36.4	
	1el (836.52MHz)								
1.673	-10.7	V	3.0	35.5	1.0	45.2	-13.0	-32.2	
2.510	-11.0	V	3.0	35.4	1.0	45.4	-13.0	-32.4	
1.673	-13.7	Н	3.0	35.5	1.0	-48.3	-13.0	-35.3	
2.510	-13.8	Н	3.0	35.4	1.0	_48.2	-13.0	-35.2	
	nel (848.31MHz)								
High Chan	4.7	V	3.0	35.5	1.0	-39.2	-13.0	-26.2	
1.697	-11.0	V	3.0	35.4	1.0	45.5	-13.0	-32.5	
1.697 2.545		Н	3.0	35.5	1.0	42.7	-13.0	-29.7	
1.697 2.545 1.697	-8.2								
High Chan 1.697 2.545 1.697 2.545	-8.2 -14.6	H	3.0	35.4	1.0	-49.0	-13.0	-36.0	

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#### CDMA2000 1xEV-DO Revision A (Rev. A) Mode (Cellular Band)

Company Project #: Date: Cest Engi Configura Node:	neer: ation:	Novatel 11U13890 07-13-11 Chin Pang EUT with Dipo TX, Cell BANE	le Antenna ) CDMA EvDO, I	Rev A					
	Chambe	r	Pre-ar	mplifer		Filter			Limit
5n	n Chamber B		T145 8449	B -	Fil	ter 1	-	FCC	Part 22 🚽
1			-		,				
f	SG reading		Distance	Preamp	Filter	ERP	Limit	Delta	Notes
GHz	(dBm)	(H/V)	(m)	(dB)	(dB)	(dBm)	(dBm)	(dB)	
	nel (824.7MHz)								
1.649	-11.5	V	3.0	35.5	1.0	46.0	-13.0	-33.0	
2.474	-11.0	٧	3.0	35.4	1.0	45.4	-13.0	-32.4	
1.649	-13.6	H	3.0	35.5	1.0	48.1	-13.0	-35.1	
2.474	-14.2	H	3.0	35.4	1.0	-48.6	-13.0	-35.6	
Mid Charri	nel (836.52MHz)								
nia Chan 1.673	-13.5	v	3.0	35.5	1.0	-48.0	-13.0	-35.0	
2.510	10.8	V	3.0	35.5 35.4	1.0	40.0	-13.0	-35.0	
.673	-10.0	V H	3.0	35.5	1.0	49.1	-13.0	-32.2	
2.510	-14.5	n H	3.0	35.5	1.0	-49.1	-13.0	-30.1	
	-10.1		3.0	33.4	1.0	-30.3	-13.0	-31.3	
ligh Chan	nel (848.31MHz)						•		
.697	-3.4	v	3.0	35.5	1.0	-37.9	-13.0	-24.9	
2.545	-10.0	v	3.0	35.4	1.0	-44.5	-13.0	-31.5	
1.697	-7.8	Ĥ	3.0	35.5	1.0	42.3	-13.0	-29.3	
2.545	-16.1	H	3.0	35.4	1.0	-50.5	-13.0	-37.5	
	7		7	r	<b>,</b>	*		<b>,</b>	•
		•	7	Y		*			
ev. 03.03.	)9						A		
W. US.US.I	her emissions we	ere detected ab	ove the system	noise floor.					

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## 1xRTT Mode (PCS Band)

Company Project #: Date: Test Engi Configura Mode:	neer: ition:	Novatel 11U13890 07-13-11 Chin Pang EUT with Dipo TX, PCS BANI	le Antenna D CDMA2000, 1	×RTT					
	Chambe	r	Pre-ar	nplifer		Filter		Li	mit
5n	n Chamber B	-	T145 8449	B -	Fil	ter 1	-	Part 24	-
f	SG reading	Ant. Pol.	Distance	Preamp	Filter	EIRP	Limit	Delta	Notes
GHz	(dBm) 851.25MHz)	(H/∨)	(m)	(dB)	(dB)	(dBm)	(dBm)	(dB)	
3.703	-1.9	V	3.0	35.4	1.0	-36.2	-13.0	-23.2	
5.554	-7.1	v	3.0	35.4	1.0	41.5	-13.0	-28.5	
3.703	-7.8	Н	3.0	35.4	1.0	42.1	-13.0	-29.1	
5.554	-10.7	Н	3.0	35.4	1.0	45.1	-13.0	-32.1	
Mid Ch, (1	880.0MHz)								
3.759	4.6	V	3.0	35.3	1.0	-29.8	-13.0	-16.8	
5.640	-10.8	V	3.0	35.4	1.0	45.2	-13.0	-32.2	
3.760	4.5	H	3.0	35.3	1.0	-38.8	-13.0	-25.8	
5.640	-0.1	Н	3.0	35.4	1.0	-34.6	-13.0	-21.6	
Hiah Ch. (1	908.75MHz)								
3.818	-1.7	V	3.0	35.3	1.0	-36.0	-13.0	-23.0	
5.726	-7.9	V	3.0	35.4	1.0	42.4	-13.0	-29.4	
3.818	-9.1	Н	3.0	35.3	1.0	43.4	-13.0	-30.4	
5.726	-6.9	Н	3.0	35.4	1.0	41.3	-13.0	-28.3	
	*		<b>*</b>	-		*			
Rev. 03.03. Note: No ot	)g her emissions we	re detected ab	ve the system	noise floor.					

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#### CDMA2000 1xEV-DO Revision A (Rev. A) Mode (PCS Band)

				mpliance Ce z High Freq				ement	
ompany	:	Novatel							
roject #:		11U13890							
Date:		07-13-11							
		Chin Pang							
Configura	ation:	EUT with Dipo	le Antenna						
ode:		TX, PCS BANI	D CDMA2000, E	vDO, Rev A					
	Chambe	r	Pre-ar	nplifer		Filter		Lii	mit
51	n Chamber B		T145 8449	в -	Fil	ter 1	-	Part 24	-
ļ								,	
f	SG reading		Distance	Preamp	Filter	EIRP	Limit	Delta	Notes
GHz	(dBm)	(H/V)	(m)	(dB)	(dB)	(dBm)	(dBm)	(dB)	
	851.25MHz)								
703	2.7	V	3.0	35.4	1.0	-31.6	-13.0	-18.6	
.554	-7.0	V	3.0	35.4	1.0	41.4	-13.0	-28.4	
.703	-7.2	H	3.0	35.4	1.0	41.5	-13.0	-28.5	
	-7.7	Н	3.0	35.4	1.0	-42.1	-13.0	-29.1	
.554			:						
.554 Aid Ch, (1	880.0MHz)								
lid Ch, (1 .759	880.0MHz) 7.5	v	3.0	35.3	1.0	-26.9	-13.0	-13.9	
lid Ch, (1 .759 .640		V	3.0	35.3 35.4	1.0	-26.9 -39.9	-13.0	-26.9	
lid Ch, (1 .759 .640 .760	7.5 -5.5 2.0	V H	3.0 3.0	35.4 35.3	1.0 1.0	-39.9 -32.3	-13.0 -13.0	-26.9 -19.3	
lid Ch, (1 759 640 760	7.5 -5.5	V	3.0	35.4	1.0	-39.9	-13.0	-26.9	
lid Ch, (1 759 640 760 640 igh Ch, (1	7.5 -5.5 2.0 -7.4 908.75MHz)	V H H	3.0 3.0 3.0	35.4 35.3 35.4	1.0 1.0 1.0	-39.9 -32.3 -41.9	-13.0 -13.0 -13.0	-26.9 -19.3 -28.9	
lid Ch, (1 .759 .640 .760 .640 ligh Ch, (1 .818	7.5 -5.5 2.0 -7.4 908.75MHz) 0.7	V H H	3.0 3.0 3.0 3.0	35.4 35.3 35.4 35.3	1.0 1.0 1.0	-39.9 -32.3 -41.9 -33.6	-13.0 -13.0 -13.0 -13.0	-26.9 -19.3 -28.9 -20.6	
lid Ch, (1 .759 .640 .760 .640 .640 ligh Ch, (1 .818 .726	7.5 -5.5 2.0 -7.4 908.75MHz) 0.7 -7.8	V H H V V	3.0 3.0 3.0 3.0 3.0 3.0	35.4 35.3 35.4 35.3 35.4 35.3 35.4	1.0 1.0 1.0 1.0	-39.9 -32.3 -41.9 -33.6 -42.3	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0	-26.9 -19.3 -28.9 -20.6 -29.3	
id Ch, (1 759 640 760 640 640 gh Ch, (1 818 726 818	7.5 5.5 2.0 -7.4 908.75MHz) 0.7 -7.8 6.4	V H H V V	3.0 3.0 3.0 3.0 3.0 3.0 3.0	35.4 35.3 35.4 35.3 35.3 35.4 35.3	1.0 1.0 1.0 1.0 1.0 1.0 1.0	-39.9 -32.3 -41.9 -33.6 -42.3 -40.7	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	26.9 19.3 28.9 20.6 29.3 27.7	
id Ch, (1 759 640 760 640 640 818 726 818 726 818	7.5 -5.5 2.0 -7.4 908.75MHz) 0.7 -7.8	V H H V V	3.0 3.0 3.0 3.0 3.0 3.0	35.4 35.3 35.4 35.3 35.4 35.3 35.4	1.0 1.0 1.0 1.0	-39.9 -32.3 -41.9 -33.6 -42.3	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0	-26.9 -19.3 -28.9 -20.6 -29.3	
id Ch, (1 759 640 760 640 igh Ch, (1 818	7.5 5.5 2.0 -7.4 908.75MHz) 0.7 -7.8 6.4	V H H V V	3.0 3.0 3.0 3.0 3.0 3.0 3.0	35.4 35.3 35.4 35.3 35.3 35.4 35.3	1.0 1.0 1.0 1.0 1.0 1.0 1.0	-39.9 -32.3 -41.9 -33.6 -42.3 -40.7	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	26.9 19.3 28.9 20.6 29.3 27.7	

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# 9.3. **RECEIVER SPURIOUS EMISSIONS**

# <u>LIMIT</u>

RSS-Gen 7.2.2

Spurious Emission Limits for Receivers:

Spurious Frequency (MHz)	Field Strength (microvolts/m at 3 metres)
30-88	100
88-216	150
216-960	200
Above 960	500

## TEST PROCEDURE

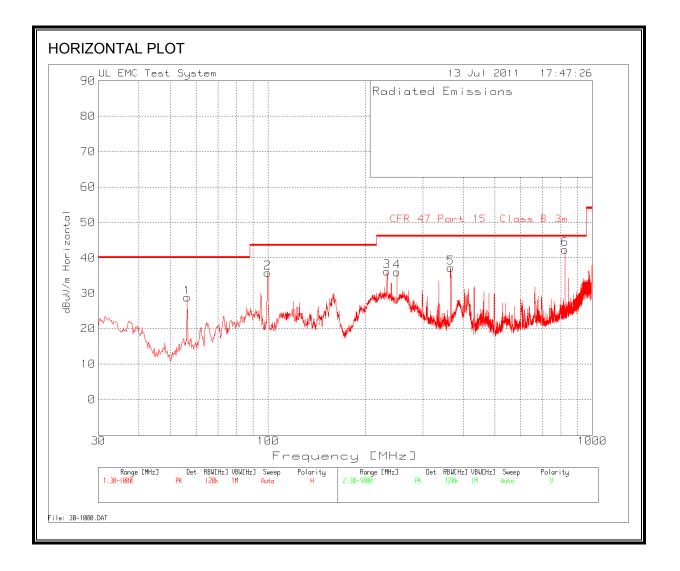
The search for spurious emissions shall be from the lowest frequency internally generated or used in the receiver (local oscillator frequency, intermediate frequency or carrier frequency),

or 30 MHz, whichever is the higher, to at least 3 times the highest tunable and local oscillator frequencies.

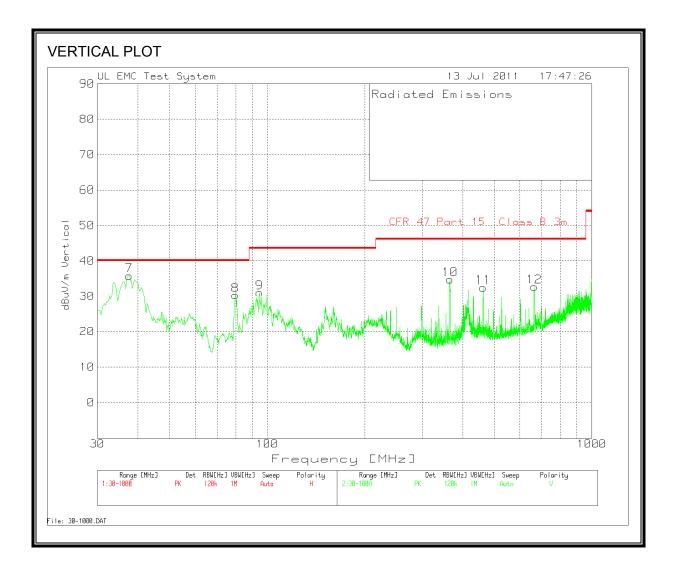
## **RESULTS**

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



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HORIZONTAL AND VERTICAL DATA									
Range 1 3	Range 1 30 - 1000MHz								
			Cable.[dB]	PreAmp[dB]	Bilog Factors[dB]	dBuV/m	Part 15B 3m	Margin	Polarity
56.3629	49.18	PK	1.1	-29.4	7.9	28.78	40	-11.22	Horz
99.5903	53.69	PK	1.4	-29.3	10	35.79	43.5	-7.71	Horz
232.5679	50.99	PK	2.1	-28.8	11.9	36.19	46	-9.81	Horz
250.014	50.7	PK	2.2	-28.7	11.8	36	46	-10	Horz
366.3209	48.92	PK	2.7	-28.8	14.4	37.22	46	-8.78	Horz
824.5703	46.12	PK	4	-28.8	21.1	42.42	46	-3.58	Horz
						[]			
2 30 - 10	JOOMHz								
Frequency	Reading	Detector	Cable.[dB]	PreAmp[dB]	Bilog Factors[dB]	dBuV/m	Part 15B 3m	Margin	Polarity
37.56	48.47	PK	0.9	-29.5	16	35.87	40	-4.13	Vert
79.9151	50.81	PK	1.3	-29.4	7.6	30.31	40	-9.69	Vert
94.7442	50.29	PK	1.4	-29.3	8.7	31.09	43.5	-12.41	Vert
366.1271	46.44	PK	2.7	-28.8	14.4	34.74	46	-11.26	Vert
463.8249	42.62	PK	3	-29.3	16.2	32.52	46	-13.48	Vert
666.199	39.49	PK	3.6	-29.3	18.9	32.69	46	-13.31	Vert
000.100	UJ. 17	1 11	0.0	40.0	10.7	02.00		10.01	ACTI

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### SPURIOUS EMISSIONS ABOVE 1000 MHz (WORST-CASE CONFIGURATION)

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

COMPLIANCE CERTIFICATION SERVICES (UL CCS) 47173 BENICIA STREET, FREMONT, CA 94538, USA Tel: (510) 771-1000 Tel: (510) 771-1000 Tel: (510) 771-1000 Tel: (510) 661-0888 This report shall not be reproduced except in full, without the written approval of UL.CCS.

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# 9.4. POWER LINE CONDUCTED EMISSION

# LIMIT

RSS-Gen 7.2.2

Except when the requirements applicable to a given device state otherwise, for any licenceexempt radio communication device equipped to operate from the public utility AC power supply, either directly or indirectly, the radio frequency voltage that is conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in Table 2. The tighter limit applies at the frequency range boundaries.

Table 2 – AC Power Lines Conducted Emission Limits

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.

## **RESULTS**

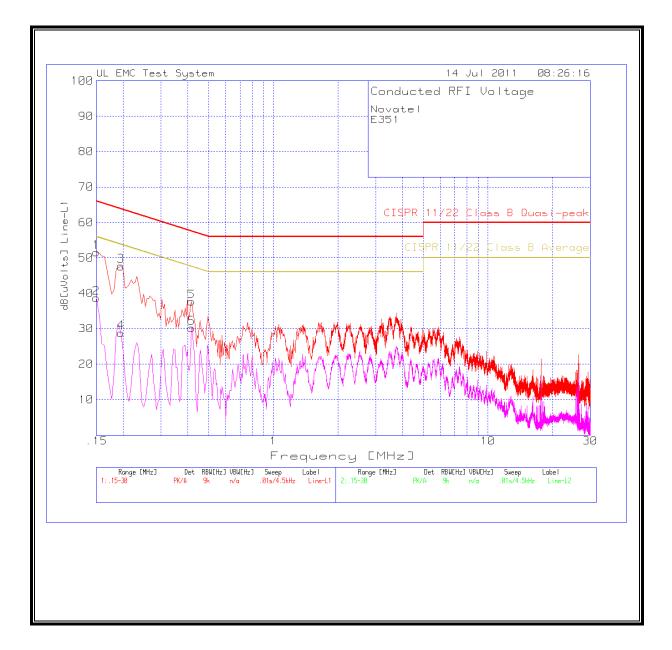
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## **6 WORST EMISSIONS**

Line-L1 .	15 - 30MH	z					
Frequency	Reading	Detector	dB[uVolts]	CISPR 22 B QP	Margin	CISPR 22 B Average	Margin
0.15	51.62	PK	51.62	66	-14.38	56	-4.38
0.15	38.61	Av	38.61	_	_	56	-17.39
0.195	47.67	PK	47.67	63.8	-16.13	53.8	-6.13
0.195	28.78	Av	28.78	-	-	53.8	-25.02
0.4155	37.57	PK	37.57	57.5	-19.93	47.5	-9.93
0.4155	30.14	Av	30.14	-	-	47.5	-17.36
Line-L2 .	15 - 30MH	z					
Frequency	Reading	Detector	dB[uVolts]	CISPR 22 B QP	Margin	CISPR 22 B Average	Margin
0.1545	52.29	PK	52.29	65.8	-13.51	55.8	-3.51
0.1545	32.08	Av	32.08	-	-	55.8	-23.72
0.195	47.51	PK	47.51	63.8	-16.29	53.8	-6.29
0.195	28.48	Av	28.48	-	_	53.8	-25.32
0.4065	38.73	PK	38.73	57.7	-18.97	47.7	-8.97
0.4065	23.58	Av	23.58	_	_	47.7	-24.12

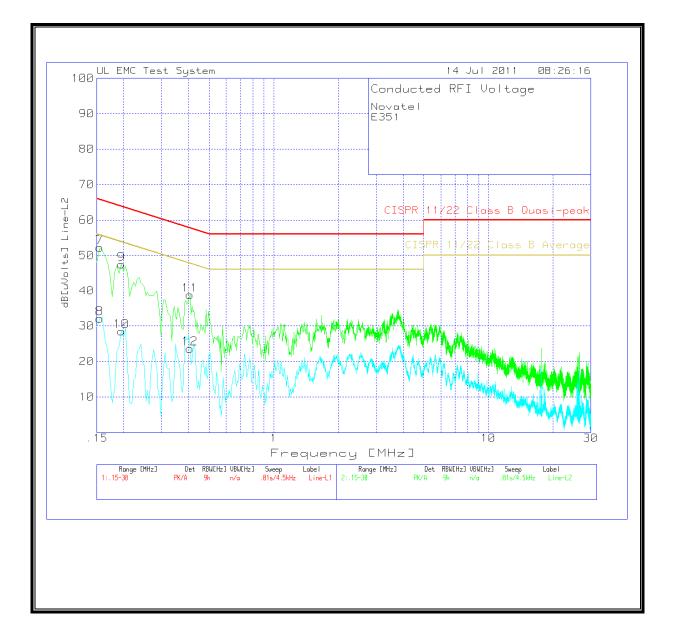
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## LINE 1 RESULTS



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## **LINE 2 RESULTS**



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