

**TEST REPORT**

**Report Number: 3072636-001**

**Project Number: 3072636**

**Evaluation of the  
Exxon Mobile Sled with Symbol PDA  
Model Number: Exxon Mobile Sled with Symbol PDA  
FCC ID:S6JSMT**

**FCC Part 2  
FCC Part 15  
FCC Part 22 Subpart H  
FCC Part 24 Subpart E**

**For**

**Technology Solutions (UK) Ltd.**

Test Performed by:

Intertek  
731 Enterprise Drive  
Lexington, KY 40510

Test Authorized by:

Technology Solutions (UK) Ltd.  
Suite C, Loughborough Technology Center  
Leicestershire,, UK LE11 3GE United Kingdom

**Prepared By:** Jason Centers **Date:** 4/19/2005

Jason Centers, Project Engineer

**Approved By:** Bryan C. Taylor **Date:** 4/19/2005

Bryan C. Taylor, EMC Team Leader

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Evaluation For: Technology Solutions (UK) Ltd.  
Model No: Exxon Mobile Sled with Symbol PDA

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## 1 JOB DESCRIPTION

### 1.1 General Information

<b>Applicant Name / Address:</b>	Technology Solutions (UK) Ltd. Suite C, Loughborough Technology Center Leicestershire, UK LE11 3GE United Kingdom
<b>Name of contact:</b>	David R. Evans
<b>Telephone:</b>	011 44 1509220022
<b>Fax:</b>	011 44 1509220020

<b>FCCID</b>	<b>S6JSMT</b>	
<b>Product</b>	Exxon Mobile Sled with Symbol PDA	
<b>EUT Model Number</b>	Exxon Mobile Sled with Symbol PDA	
<b>EUT Serial Number</b>	None	
<b>Quantity Production Planned</b>	Quantity production is planned.	
<b>Modulation(s)</b>	CDMA Cell and CDMA PCS	
<b>Emission Designators</b>	1M29F9W	
<b>Frequency Tolerance</b>	$\pm 0.00025\%$ (2.5ppm)	
<b>Maximum Conducted RF Output Power (Measured)</b>	24.1dBm (Cell Band); 24.5dBm (PCS Band)	
<b>Frequency Range</b>	824.7 – 848.31 MHz (Cell Band)	1851.25 – 1908.75 MHz (PCS Band)
<b>Antenna &amp; Gain</b>	Galtronics Part Number: 20252076-3070	Gain: 2.71dBi (Cell); 2.95dBi (PCS)
<b>Detachable Antenna</b>	Yes	
<b>Related Submittals / Grants</b>	None	
<b>EUT receive date:</b>	3/21/2005	
<b>EUT receive condition:</b>	The EUT was received in good condition with no apparent damage.	
<b>Test start date:</b>	3/23/2005	
<b>Test completion date:</b>	3/30/2005	
<b>FCC Rule Part(s)</b>	FCC Part 22 Subpart H, Part 24 Subpart E, Part 15, Part 2	
<b>Industry Canada Rule Part(s)</b>	RSS-129, RSS-133, IC ES-003	
<b>Modifications Required For Compliance</b>	No modifications were implemented by the Intertek staff.	

The test results in this report pertain only to the item tested.

### 1.1.1 System Support Equipment

Table 1-1 contains the details of the support equipment associated with the Equipment Under Test during the FCC Part 15 testing.

*Table 1-1: System Support Equipment*

Description	Manufacturer	Model Number	Serial Number
AC Adapter	Technology Solutions	EPA-201D-09	Not Labeled
Pocket PC	Symbol	PPT8860-R3BZ1000	SA0118K07H

### 1.1.2 Cables associated with EUT

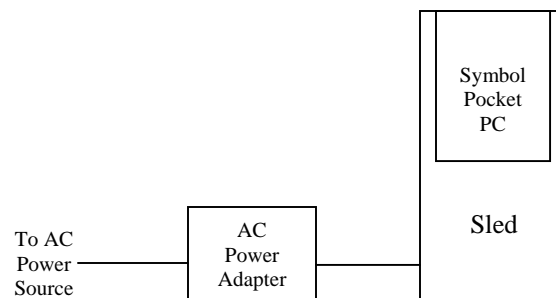
Table 1-2 contains the details of the cables associated with the EUT.

*Table 1-2: Interconnecting cables between modules of EUT*

Cables					
Description	Length	Shielding	Ferrites	Connection	
				From	To
AC Power Cord	4 ft	None	None	AC Power Source	AC Power Adapter
DC Power Cord	5 ft	None	None	AC Power Adapter	Battery Charging Port

### 1.1.3 System Block Diagram

The diagram shown below details the interconnection of the EUT and its accessories during FCC Part 15 testing. For specific layout, refer to the test configuration photograph in the relevant section of this report.



### 1.1.4 Mode(s) of operation

The Exxon Mobile Sled with Symbol PDA was powered by the AC to DC power supply provided with the sample and tested in the stand alone configuration.

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## 2 EXECUTIVE SUMMARY

Testing performed for: Technology Solutions (UK) Ltd.

Equipment Under Test: Exxon Mobile Sled with Symbol PDA

FCC RULE	IC RULE	DESCRIPTION OF TEST	RESULT	PAGE
§2.1046	RSS-129 §7.1, §9.1 RSS-133 §6.2	RF Power Output	<b>Compliant</b>	9
§22.913, §24.232	RSS-129 §7.1, §9.1 RSS-133 §6.2	ERP, EIRP	<b>Compliant</b>	11
§1.1310, §2.1091, §2.1093	RSS-129 §11, RSS- 133 §8	Maximum Permissible Exposure Calculations	<b>Compliant</b>	12
§2.1049 §22.917(b)(d)	RSS-129 §6.3, RSS- 129 §8.1	Emission Limitation, Occupied Bandwidth	<b>Compliant</b>	13
§2.1051 §22.917(e) §22.917(f) §24.238(a)	RSS-129 §6.3, §7.2.2, §8.1.1, §10 RSS-133 §6.3	Out of Band Emissions at Antenna Terminals	<b>Compliant</b>	21
§2.1053, §22.917, §24.238	RSS-129 §8.1	Field Strength of Spurious Radiation	<b>Compliant</b>	28
§15.107, §15.207	IC ES-003	Power Line Conducted Emissions	<b>Compliant</b>	30
§15.109, §15.209	IC ES-003 RSS-129 §10, RSS- 133 §9	Receiver Spurious Emission	<b>Compliant</b>	31
§2.1055, §22.355, §24.235	RSS-133 §7	Frequency Stability vs. Temperature	<b>Compliant</b>	34
§2.1055, §22.355, §24.235	--	Frequency Stability vs. Voltage	<b>Compliant</b>	35

N/S: Not under scope of this evaluation

### 3 TEST FACILITY

The INTERTEK-Lexington is located at 731 Enterprise Drive, Lexington Kentucky, 40510. The radiated emission test site is a 10-meter semi-anechoic chamber. The chamber meets the characteristics of CISPR 16-1: 1993 and ANSI C63.4: 1992. For measurements, a remotely controlled flush-mount metal-top turntable is used to rotate the EUT a full 360 degrees. A remote controlled non-conductive antenna mast is used to scan the antenna height from one to four meters. The Industry Canada filing number for this site is 2055.

*Figure 3-1: 10-Meter EMC Site*



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### 3.1 Test Equipment Used

Description	Manufacturer	Model Number	Serial Number	Calibration due date
Signal Generator	Hewlett Packard	83620B	3614A00199	8/21/2005
Environmental Chamber	Thermotron	SM-8C	32692	1/17/2006
EMI Receiver	Rohde & Schwarz	ESI 26	1088.7490	9/23/2005
Horn Antenna	Antenna Research	DRG-118/A	1086	6/29/2005
Horn Antenna	EMCO	3115	6556	7/21/2005
Horn Antenna	EMCO	3116	9310-2222	3/4/2006
Bilog Antenna	Chase	CBL6112A	2245	4/22/2005
Preamplifier	HP	8449B	3008A00775	12/2005
High Pass Filter	Microwave Circuits	H3G020G2	3986-01 DC0408	2/2006
Power Divider	Weinschel	1506A	E18106	3/25/2006
LISN	Solar Electronics	8616-50-TS-200-N	2146	1/13/2006
LISN	Solar Electronics	8616-50-TS-200-N	2147	1/13/2006
Base Station Simulator	Rohde & Schwarz	CMU-200	1100.0008.02	4/24/2005
Digital Multimeter	Fluke	87	1293	2/3/2006



## 4 CONDUCTED RF POWER

FCC Rule: §2.1046

IC Rule: RSS-129 §7.1, §9.1 and RSS-133 §6.2

### 4.1 Test Procedure

The transmitter output was connected to a calibrated coaxial cable, the other end of which was connected to a CMU-200 Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The EUT was placed into a call and the transmitter output was read off the CMU-200 in dBm. The power output at the transmitter antenna port was determined by adding the value of the cable insertion loss to the CMU-200 power reading.

Tests were performed at three frequencies (low, middle, and high channels) and on the highest power levels, which can be setup on the transmitters.

### 4.2 Test Results

The Exxon Mobile Sled with Symbol PDA met the RF power output requirements of FCC Part 22 Subpart H and FCC Part FCC Part 24 Subpart E. The test results are located in Table 4-1.

*Table 4-1 RF Power Variation with temperature*

Power Variation Vs. Temperature (dBm)						
Temp. (Celcius)	CDMA Cell			CDMA PCS		
	1013	384	777	25	600	1175
60	23.2	23.3	<b>24.1</b>	24.5	<b>24.5</b>	24.4
20	23.4	23.3	23.6	24.0	24.1	24.1
-30	23.4	23.2	23.4	23.93	23.97	23.9

## 5 RADIATED RF POWER

FCC Rule §22.913

FCC Rule §24.232; RSS-133 §6.2

RSS-129 §7.1, §9.1

### 5.1 Test Limits

For the CDMA Cell band the Effective Radiated Power (ERP) of mobile transmitters was not allowed to exceed 7 Watts. For the CDMA PCS band the Equivalent Isotropic Radiated Power (EIRP) was not allowed to exceed 2 Watts.

### 5.2 Test Procedure

The EUT was placed on a non-conductive turntable. The Base Station Simulator was set to force the EUT to its maximum power setting. The radiated emission at the fundamental frequency was measured at 3m with a test antenna and EMI receiver. This was performed with the antenna in both vertical and horizontal polarities.

During the measurement of the EUT, the receiver resolution bandwidth was set to 3 MHz and the video bandwidth was set to 3 MHz. The highest emission was recorded with the rotation of the turntable and the raising and lowering of the test antenna. The receiver reading was recorded (E in dBm).

ERP in the Cell band and EIRP in the PCS band were measured using a substitution method as described in TIA-603-B Section 2.2.17 (Radiated Power Output). The EUT was replaced with a substitution antenna (tuned dipole below 1 GHz; Horn antenna above 1 GHz) and was fed with an input power of 15 dBm. The receiver reading was recorded and EIRP was calculated as follows:

$$\text{EIRP} = E_1 - E_2 + V_{\text{sub}} + G$$

where,

$E_1$  is the receiver reading in dBμV/m when measuring the field strength of the EUT

$E_2$  is the receiver reading in dBμV/m when measured field strength from the generator

$V_{\text{sub}}$  is the power delivered to the substitution antenna (generator output in dBm – cable loss between the generator and the substitution antenna)

$G$  is the gain of the transmitting antenna in dBi.

### 5.3 Test Results

The Exxon Mobile Sled with Symbol PDA met the radiated power requirements of FCC §24.232. The test results are located in Table 5-1. The maximum ERP for the Cell band was 25.42dBm. The maximum EIRP for the PCS band was 27.04dBm.

*Table 5-1 Radiated RF Power*

EUT Mode	TX Channel	Polarity	Measured Frequency (MHz)	Device Reading (dBuV)	Sub. Reading (dBuV)	Cable Loss (dB)	Tx Antenna Gain (dBi)	Signal Generator Output (dBm)	EIRP (dBm)
CDMA Cell	1013	V	824.7	97.76	87.38	2.2	0	15	23.18
CDMA Cell	384	V	836.52	100.02	87.7	2.2	0	15	25.12
CDMA Cell	777	V	848.31	100.14	87.52	2.2	0	15	<b>25.42</b>
CDMA Cell	1013	H	824.7	92.73	90.06	2.2	0	15	15.47
CDMA Cell	384	H	836.52	95.3	89.93	2.2	0	15	18.17
CDMA Cell	777	H	848.31	95.44	89.86	2.2	0	15	18.38
CDMA PCS	25	V	1851.25	87.52	83.91	3.4	8.2	15	23.41
CDMA PCS	600	V	1880	87.57	83.81	3.4	8.2	15	23.56
CDMA PCS	1175	V	1908.75	86.09	83.38	3.4	8.2	15	22.51
CDMA PCS	25	H	1851.25	91.78	84.54	3.4	8.2	15	<b>27.04</b>
CDMA PCS	600	H	1880	90.85	83.71	3.4	8.2	15	23.66
CDMA PCS	1175	H	1908.75	87.12	83.01	3.4	8.2	15	23.91

## 6 MAXIMUM PERMISSIBLE EXPOSURE (MPE) CALCULATIONS

### 6.1 Test Limits

The Radiofrequency radiation exposure limits for FCC Rule § 1.1310 are listed in the table below.

	Frequency Range (MHz)	Power Density Limit (mW/cm <sup>2</sup> )
<b>Limits for Occupational/Controlled Exposures</b>	0.3-3.0	100
	3.0-30	900/ Frequency <sup>2</sup>
	30-300	1.0
	300-1500	Frequency/300
	1500-100,000	5.0
<b>Limits for General Population/Uncontrolled Exposure</b>	0.3-1.34	100
	1.34-30	180/Frequency <sup>2</sup>
	30-300	0.2
	300-1500	Frequency/1500
	1500-100,000	1.0

### 6.2 Test Procedure

The ERP and EIRP were measured in section 5. The radiated RF power was used to calculate the maximum RF exposure at a 20 cm distance using the formula:

$$\text{Maximum RF Exposure at 20cm} = (\text{EIRP in mW}) / (4\pi(20\text{cm})^2)$$

Where ERP was measured in section 5, a 2.15dB conversion factor was added to the reading to convert it to EIRP before applying the Maximum RF Exposure formula above. Once the Maximum RF Exposure calculations were complete the results were compared to the MPE limits above.

### 6.3 Test Results

The following calculations show the Maximum RF Exposure from the Exxon Mobile Sled with Symbol PDA at 20cm for CDMA Cell and PCS bands. Both bands are well below the limits for the general population described in the table above.

$$\text{MPE}_{\text{Cell}} = 348.3\text{mW} / (4\pi(20\text{cm})^2) = .069 \text{ mW/cm}^2$$

$$\text{MPE}_{\text{PCS}} = 505.8\text{mW} / (4\pi(20\text{cm})^2) = 0.10 \text{ mW/cm}^2$$

## 7 EMISSION LIMITATIONS, OCCUPIED BANDWIDTH

CFR 47 §2.1049

RSS-129 §6.3; RSS-129 §8.1

### 7.1 Test Limits

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

### 7.2 Test Procedure

In both CDMA Cell and PCS modes the antenna port of the EUT was connected to a spectrum analyzer using a calibrated coaxial cable and power divider. The EUT was placed into a call using a CMU – 200 base station simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The occupied bandwidth function of the analyzer was used to automatically generate the occupied bandwidth plots below.

### 7.3 Test Results

The following is the occupied bandwidth data for the Exxon Mobile Sled with Symbol PDA .

*Table 7-1: Occupied bandwidth measurements*

Mode	Channel	Resolution Bandwidth	Video Bandwidth	Sweep time	Measured Bandwidth MHz
CDMA Cell	1013	30kHz	1MHz	5s	1.28
CDMA Cell	384	30kHz	1MHz	5s	1.29
CDMA Cell	777	30kHz	1MHz	5s	1.29
CDMA PCS	25	30kHz	1MHz	5s	1.29
CDMA PCS	600	30kHz	1MHz	5s	1.29
CDMA PCS	1175	30kHz	1MHz	5s	1.29

Figure 7-1: Occupied Bandwidth – CDMA Cell Channel 1013

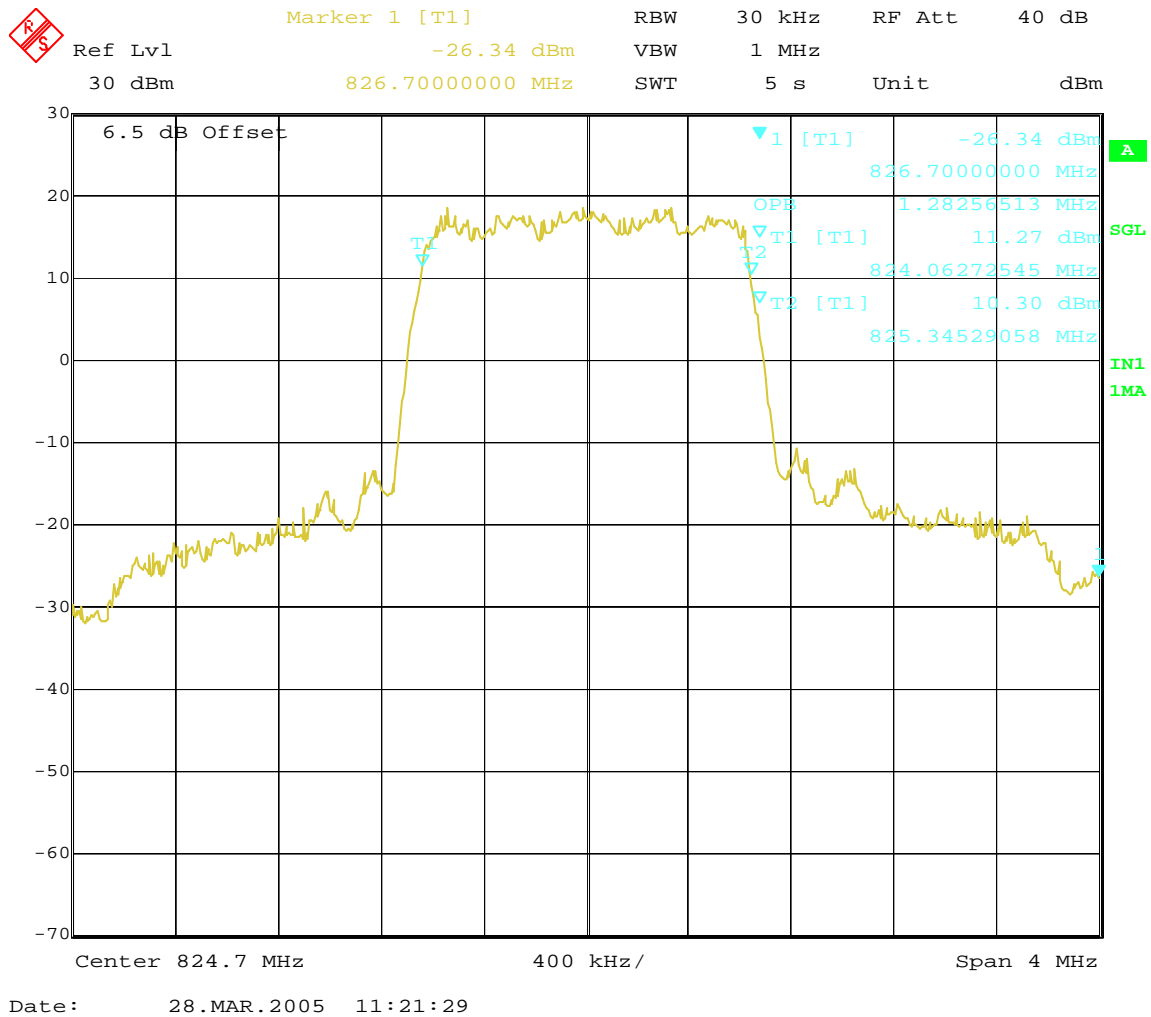


Figure 7-3: Occupied Bandwidth – CDMA Cell Channel 384

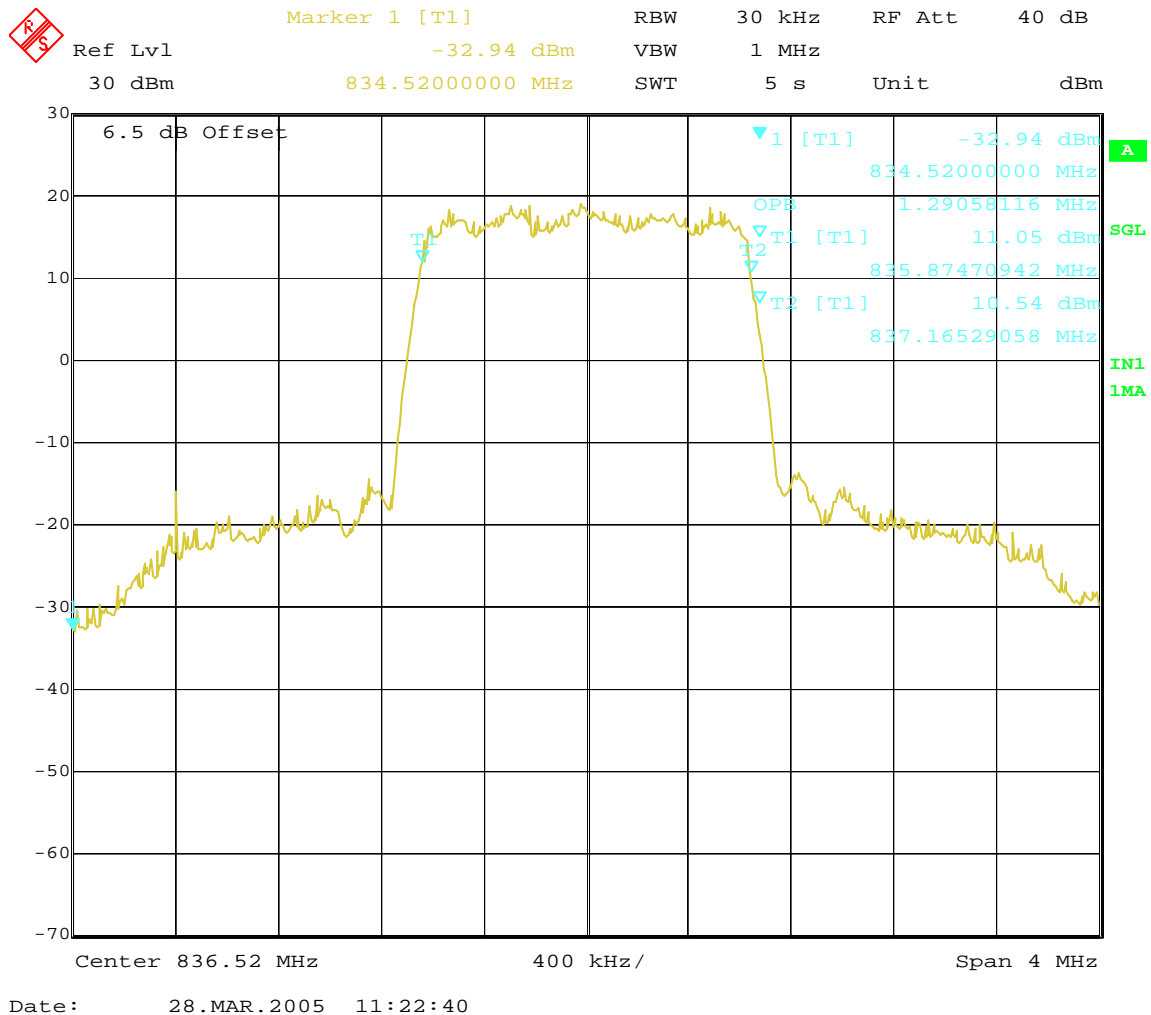


Figure 7-5: Occupied Bandwidth – CDMA Cell Channel 777

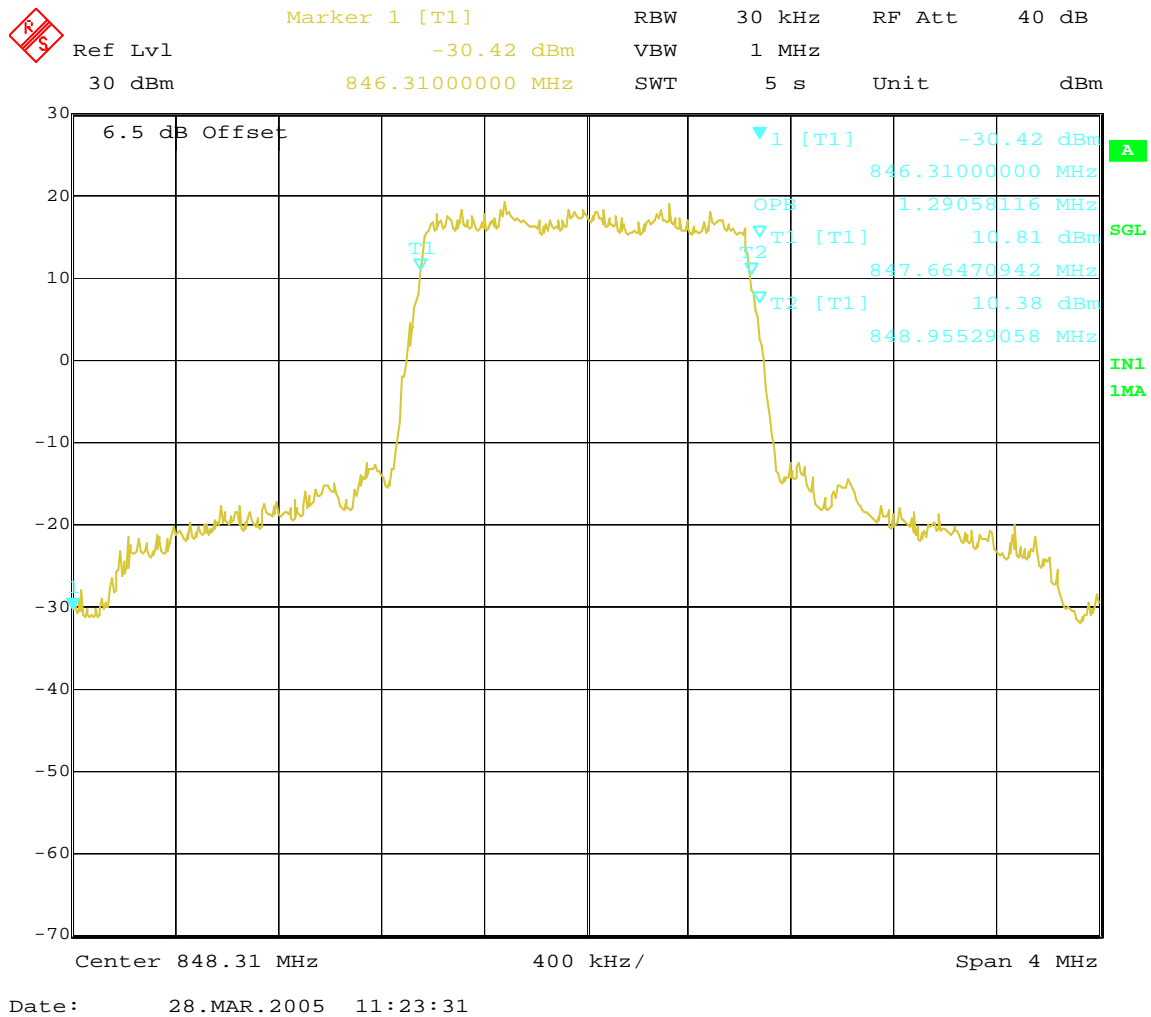




Figure 7-7: Occupied Bandwidth – CDMA PCS Channel 25

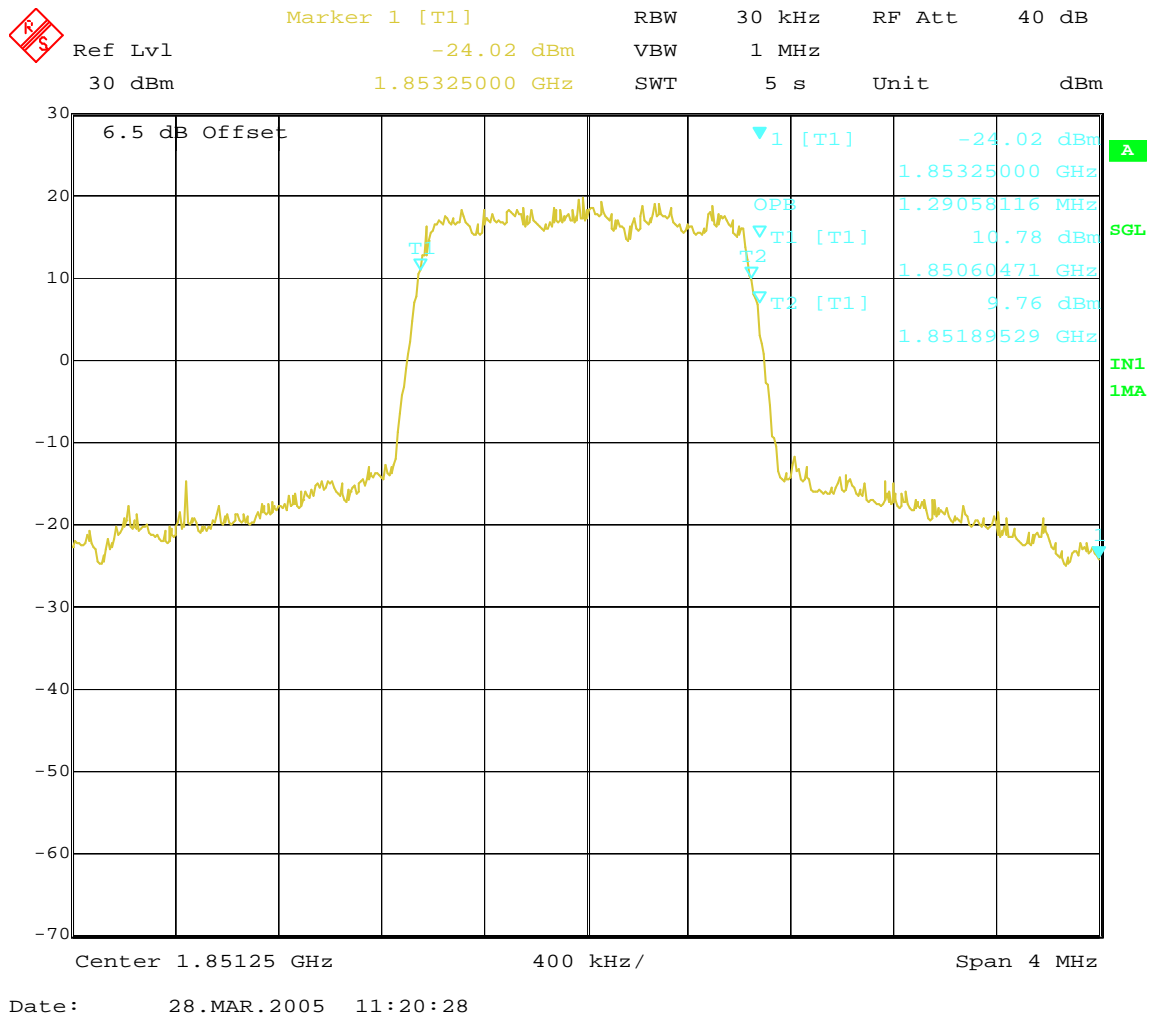


Figure 7-9: Occupied Bandwidth – CDMA PCS Channel 600

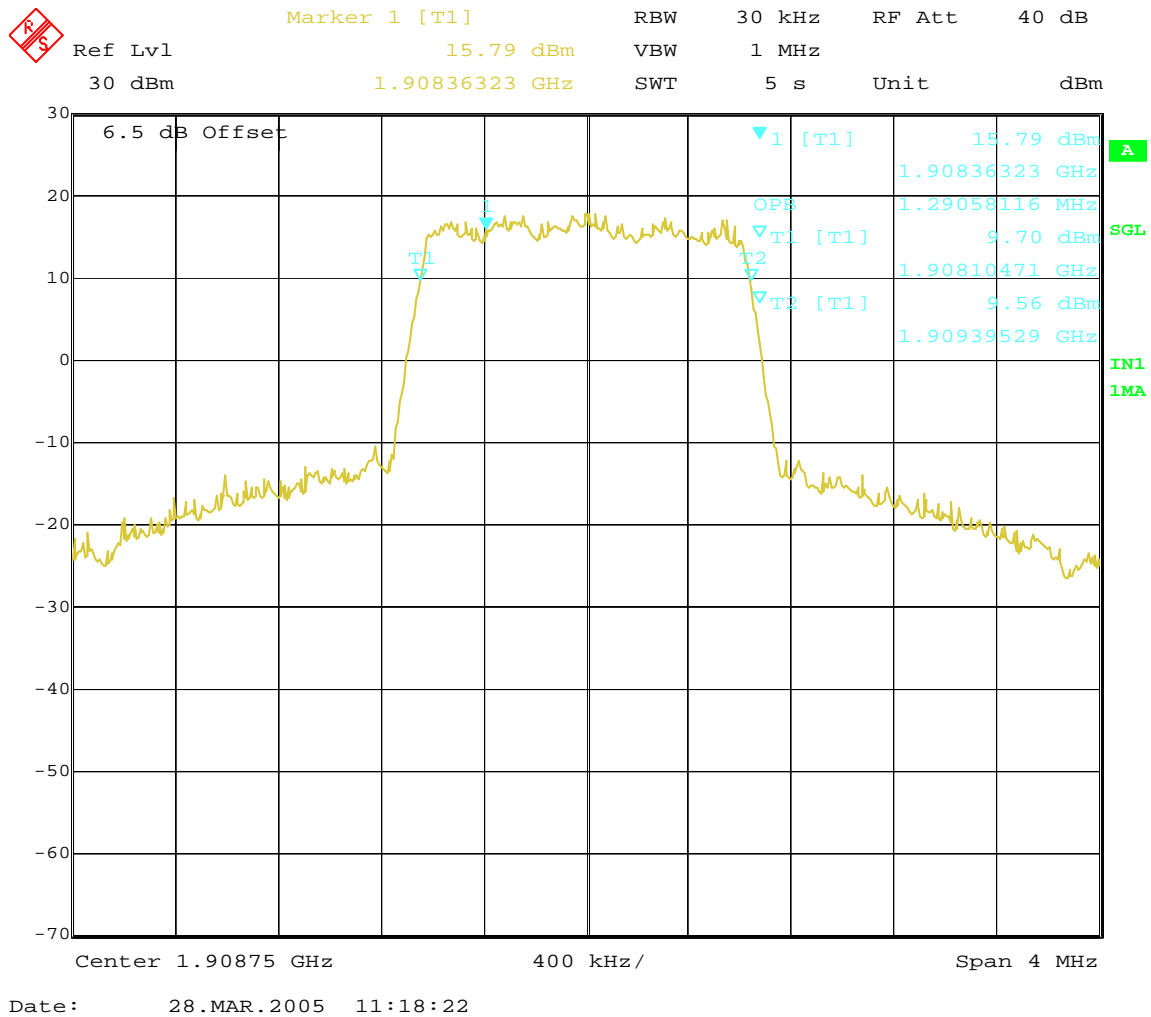
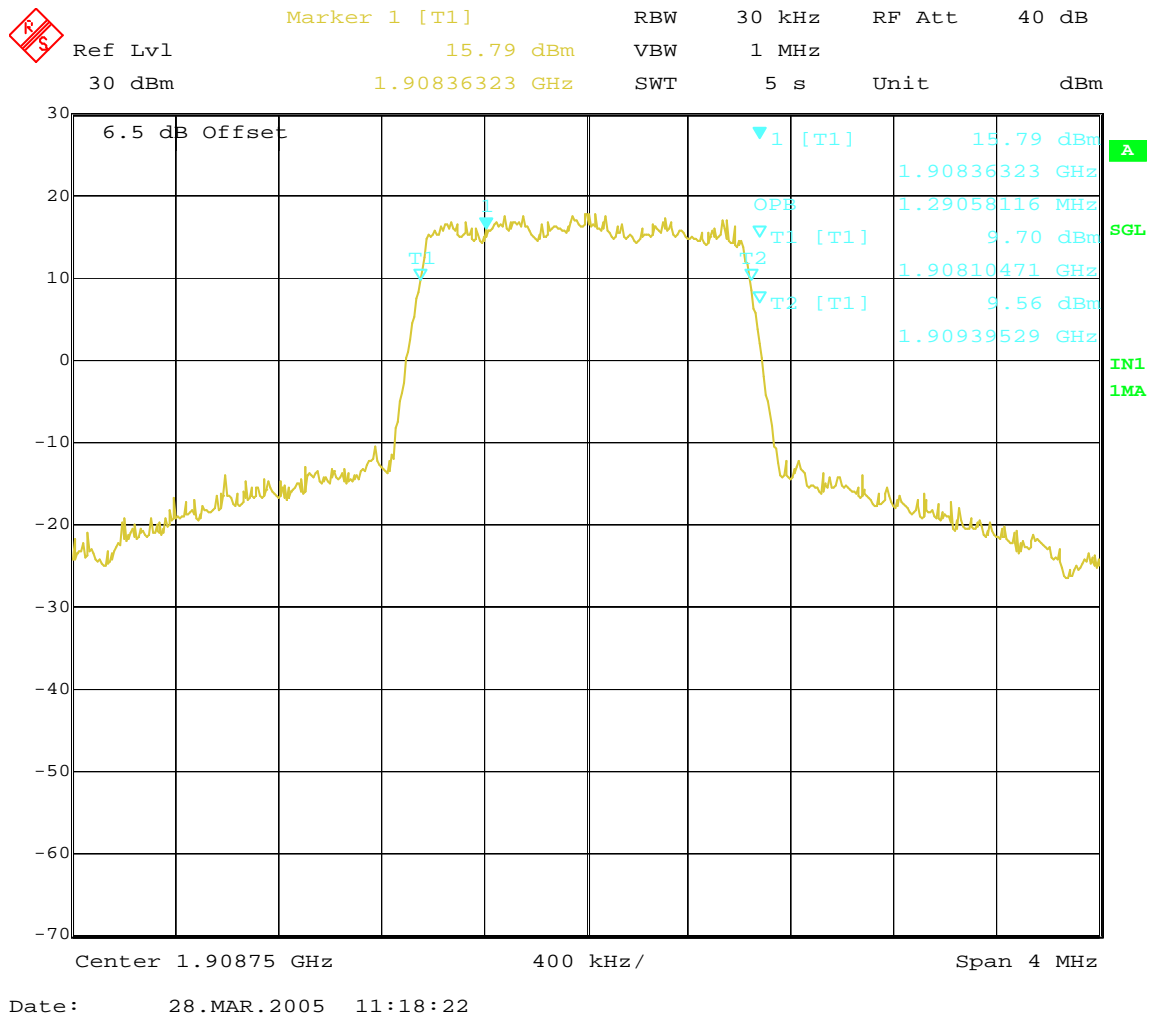


Figure 7-11: Occupied Bandwidth – CDMA PCS Channel 1175



## 8 OUT OF BAND EMISSION AT ANTENNA TERMINALS

FCC §2.1049, FCC §2.1051, §22.917(a), FCC §24.238(a)

RSS-129 §6.3, §7.2.2, §8.1.1, §10

RSS-133 §6.3

### 8.1 Test 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. Therefore, the test limit is defined by the following formula:

$$\text{Test Limit (dBm)} = \text{Tx Power (dBm)} - (43 + 10 \log (\text{Tx Power (Watts)})) = -13\text{dBm}$$

### 8.2 Test Procedure

Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for the Cellular band and 1 MHz or greater in the PCS band. 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.

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The Base Station Simulator was set to force the EUT to its maximum power setting. The resolution bandwidth of the spectrum analyzer was set at 1 MHz. Sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.

### 8.3 Test Results

The Exxon Mobile Sled with Symbol PDA met the out of band emission at antenna terminal requirements.

*Table 8-1: Summary of test result locations*

Location	Mode (Band)	Channel	Description
Figure 8-1	CDMA Cell	1013, 384, 777	Conducted spurious emissions, 30MHz to 20 GHz
Figure 8-2	CDMA Cell	1013, 384, 777	Zoom Graph of the Carrier Frequencies
Figure 8-3	CDMA PCS	25, 600, 1175	Conducted spurious emissions, 30MHz to 20 GHz
Figure 8-4	CDMA PCS	25, 600, 1175	Zoom Graph of the Carrier Frequencies
Figure 8-5	CDMA Cell	1013	Emissions within 1 MHz of band edge
Figure 8-6	CDMA Cell	777	Emissions within 1 MHz of band edge
Figure 8-7	CDMA PCS	25	Emissions within 1 MHz of band edge
Figure 8-8	CDMA PCS	1175	Emissions within 1 MHz of band edge

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Figure 8-1: Out of band emissions at antenna terminals – CDMA Cell Channels 1013, 384, 777

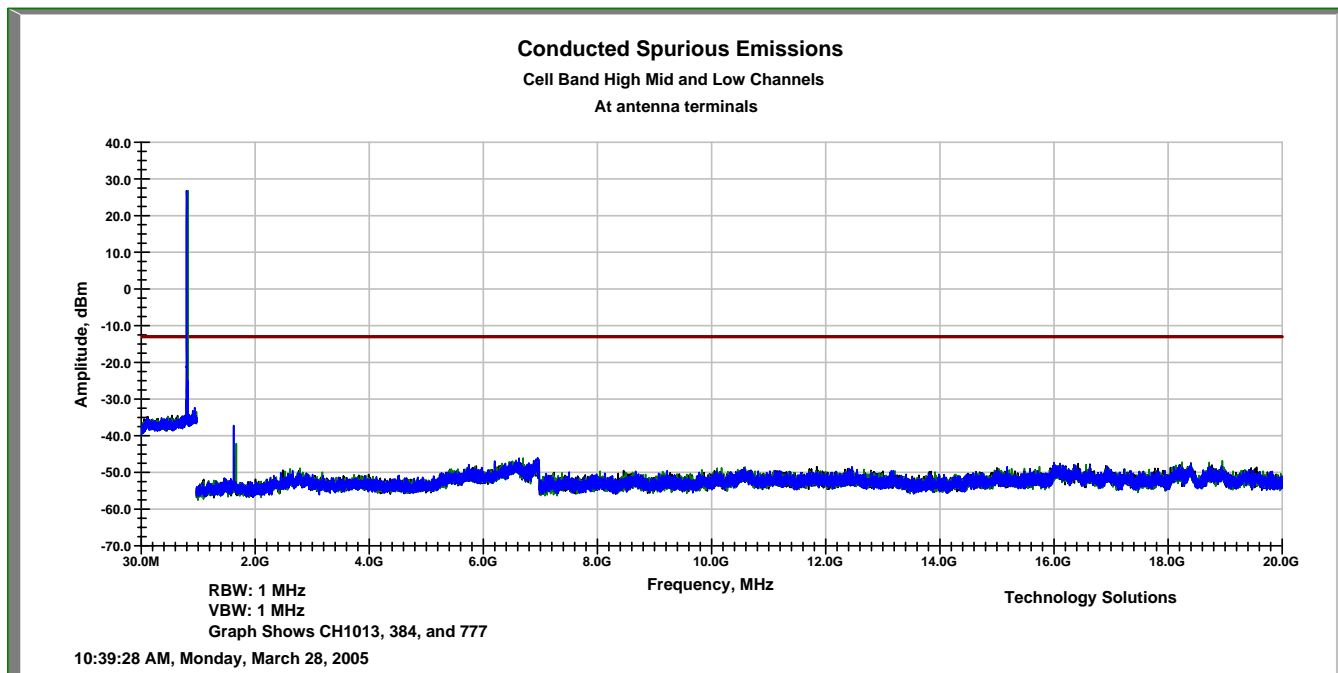


Figure 8-2: Out of band emissions at antenna terminals – CDMA Cell Channels 1013, 384, 777 (Zoomed Around Carrier Frequencies)

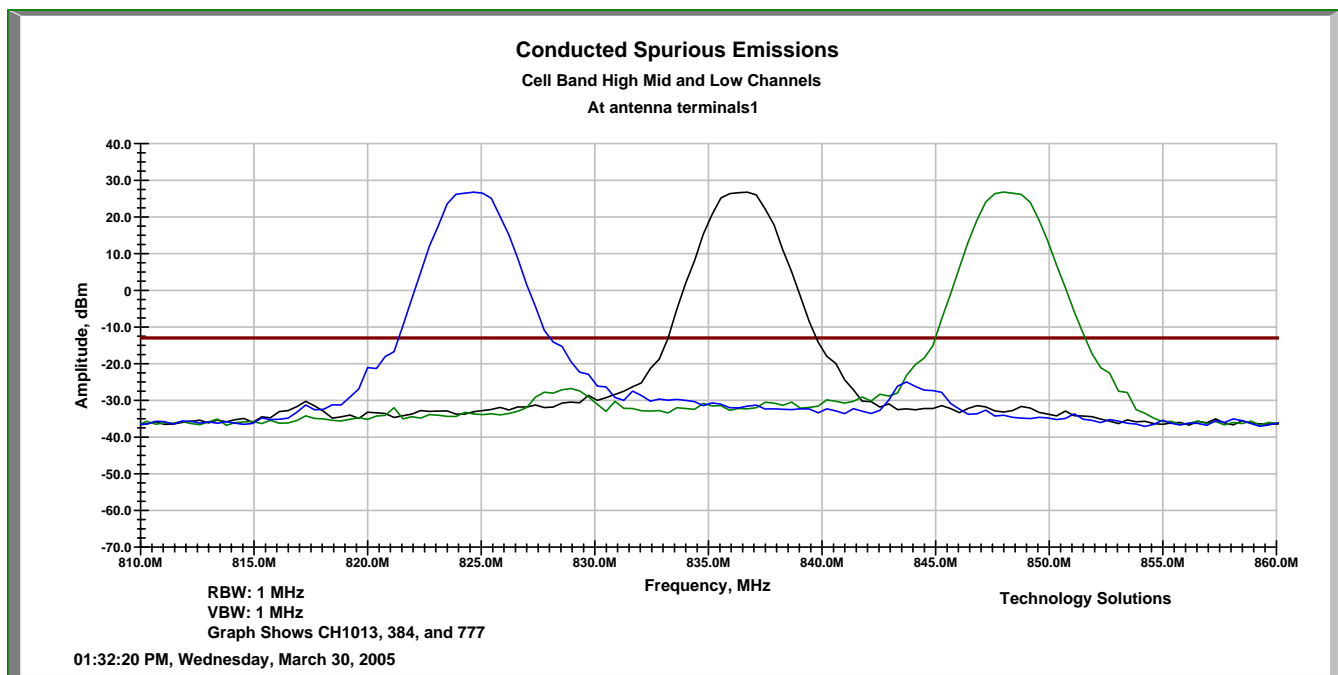


Figure 8-3: Out of band emissions at antenna terminals – CDMA PCS Channels 25, 600, 1175

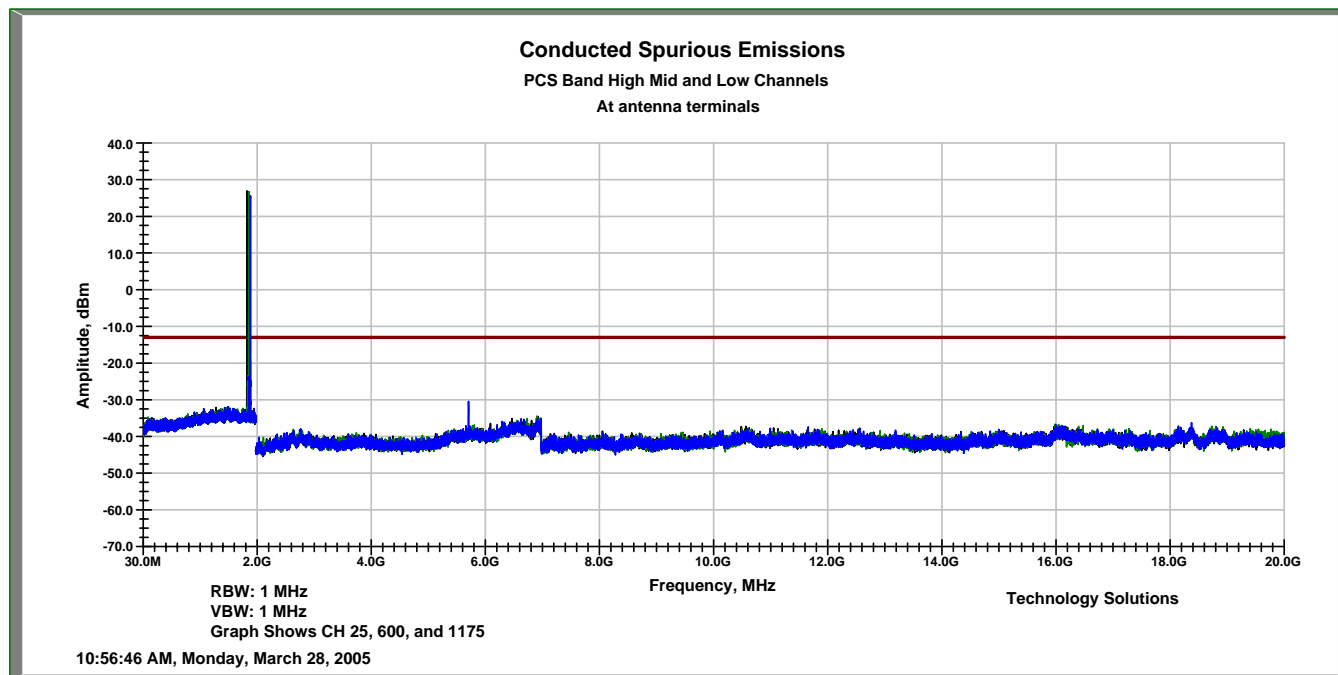


Figure 8-4: Out of band emissions at antenna terminals – CDMA PCS Channels 25, 600, 1175 (Zoomed In on Carrier Frequencies)

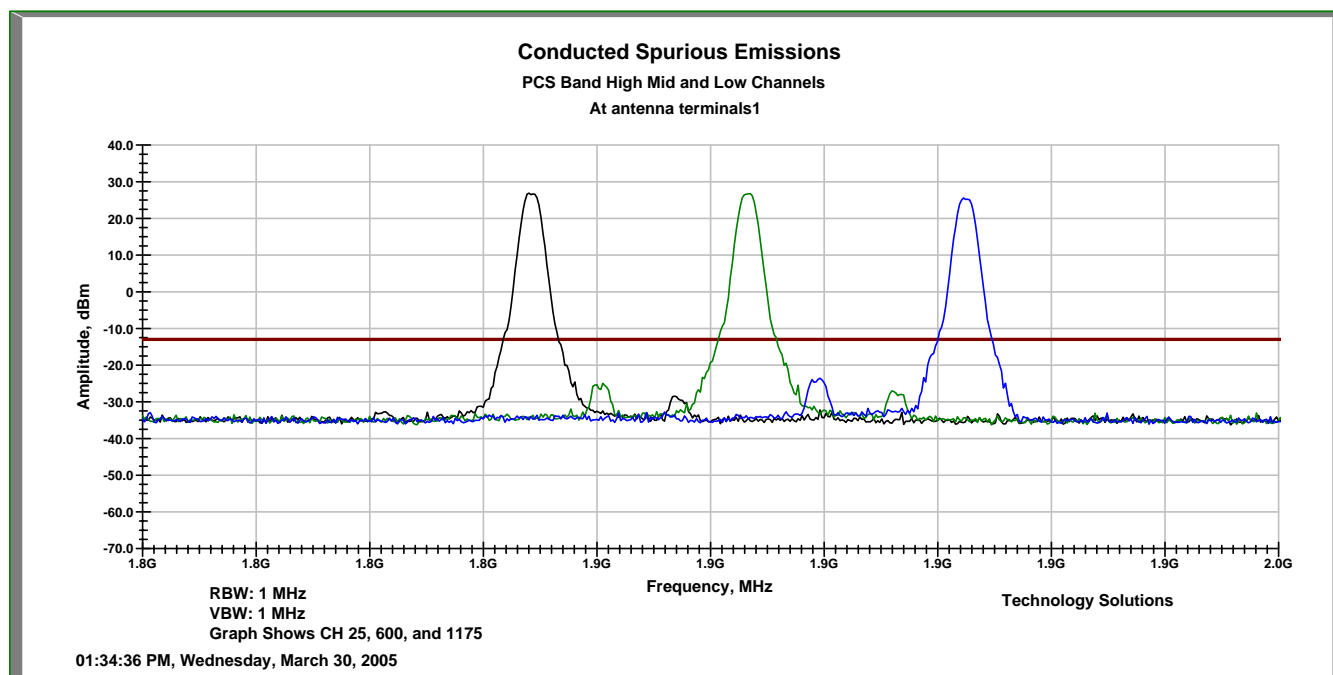


Figure 8-5: Emissions within 1 MHz of band edge, CDMA Cell Lower Band Edge

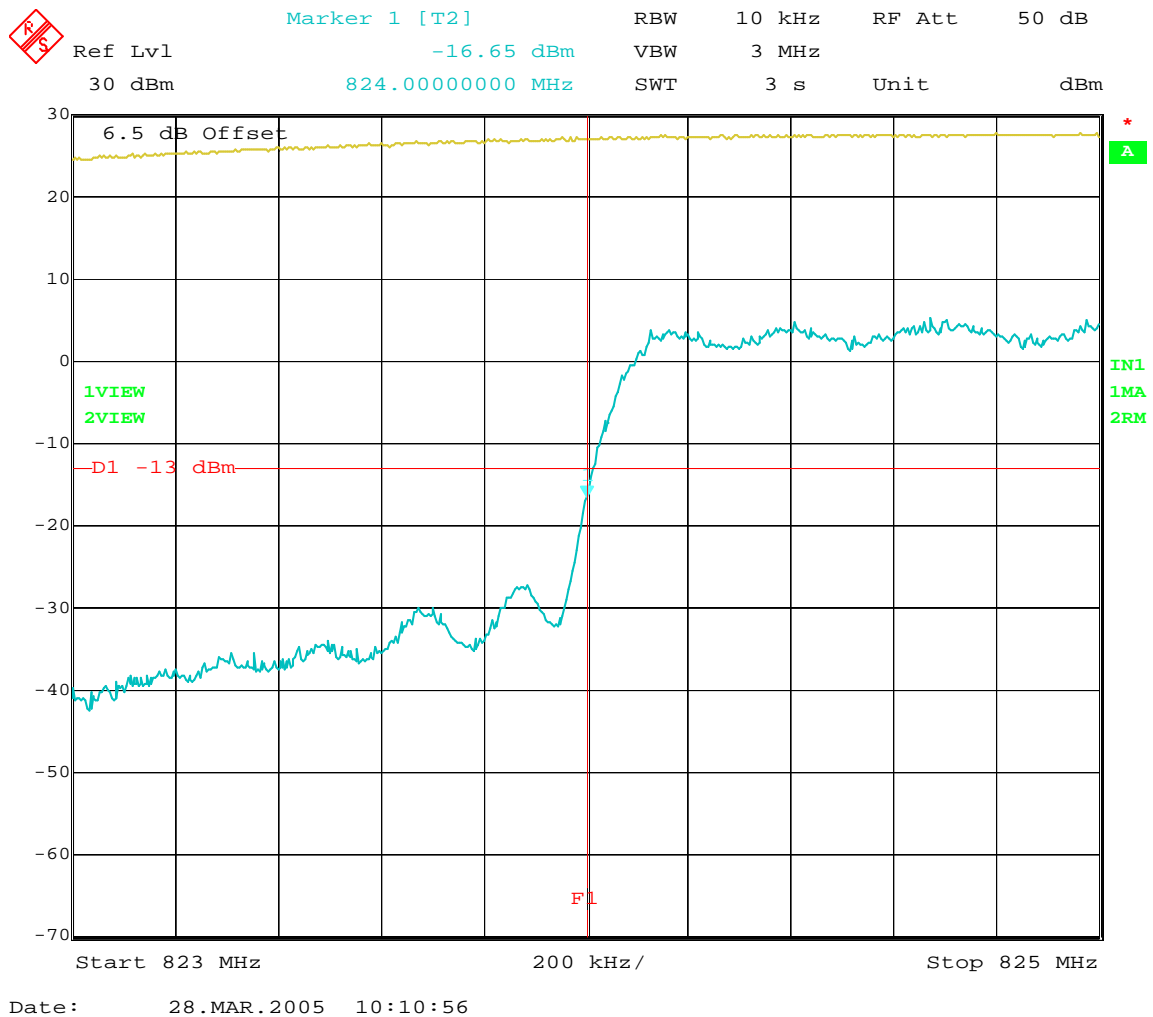
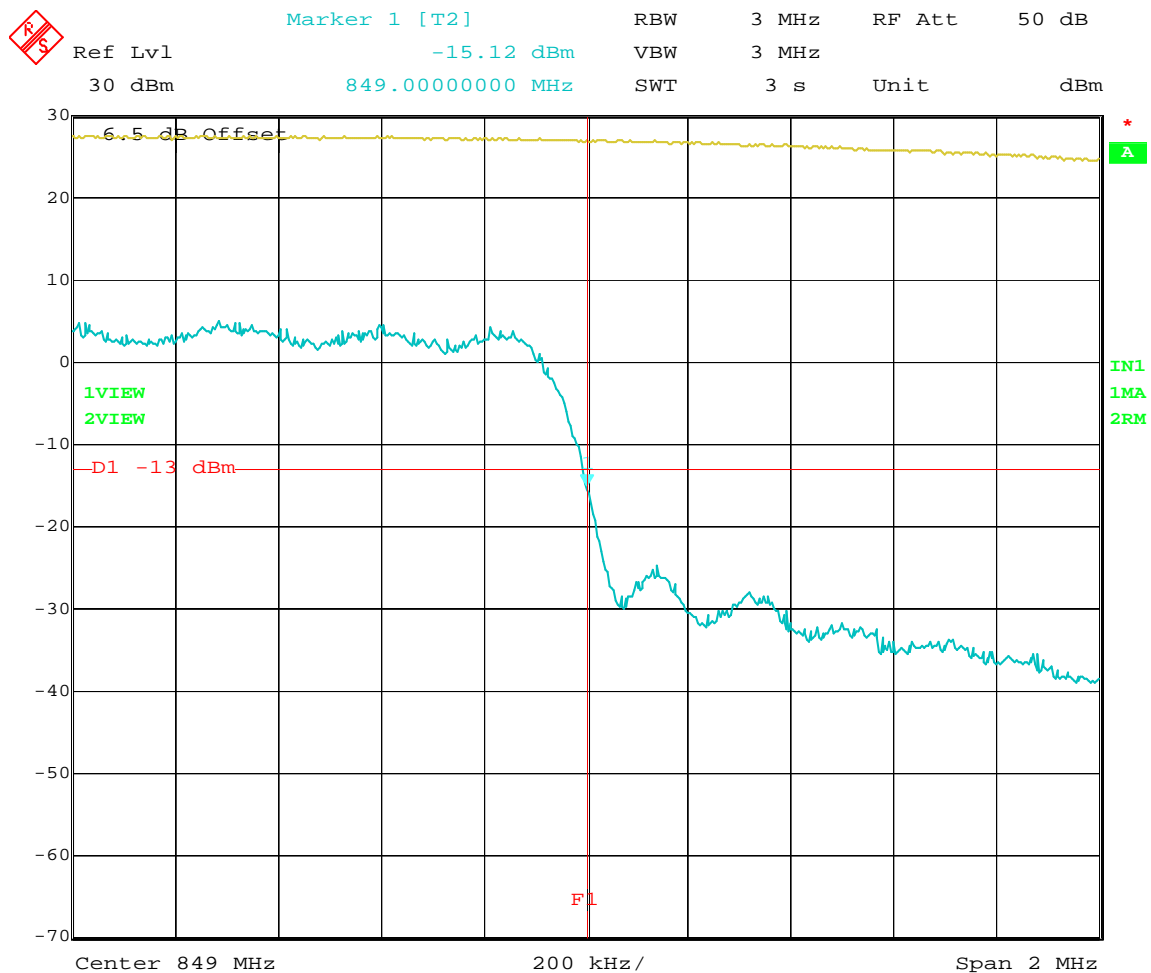




Figure 8-6: Emissions within 1 MHz of band edge, CDMA Cell Upper Band Edge<sup>1</sup>



Date: 28.MAR.2005 10:13:33

<sup>1</sup> To show compliance with the upper band edge requirement, a 10kHz RBW was used. The 3MHz RBW shown in this plot was used for the reference power measurement in order to show that the device was transmitting at maximum output power.

Figure 8-7: Emissions within 1 MHz of band edge, CDMA PCS Lower Band Edge

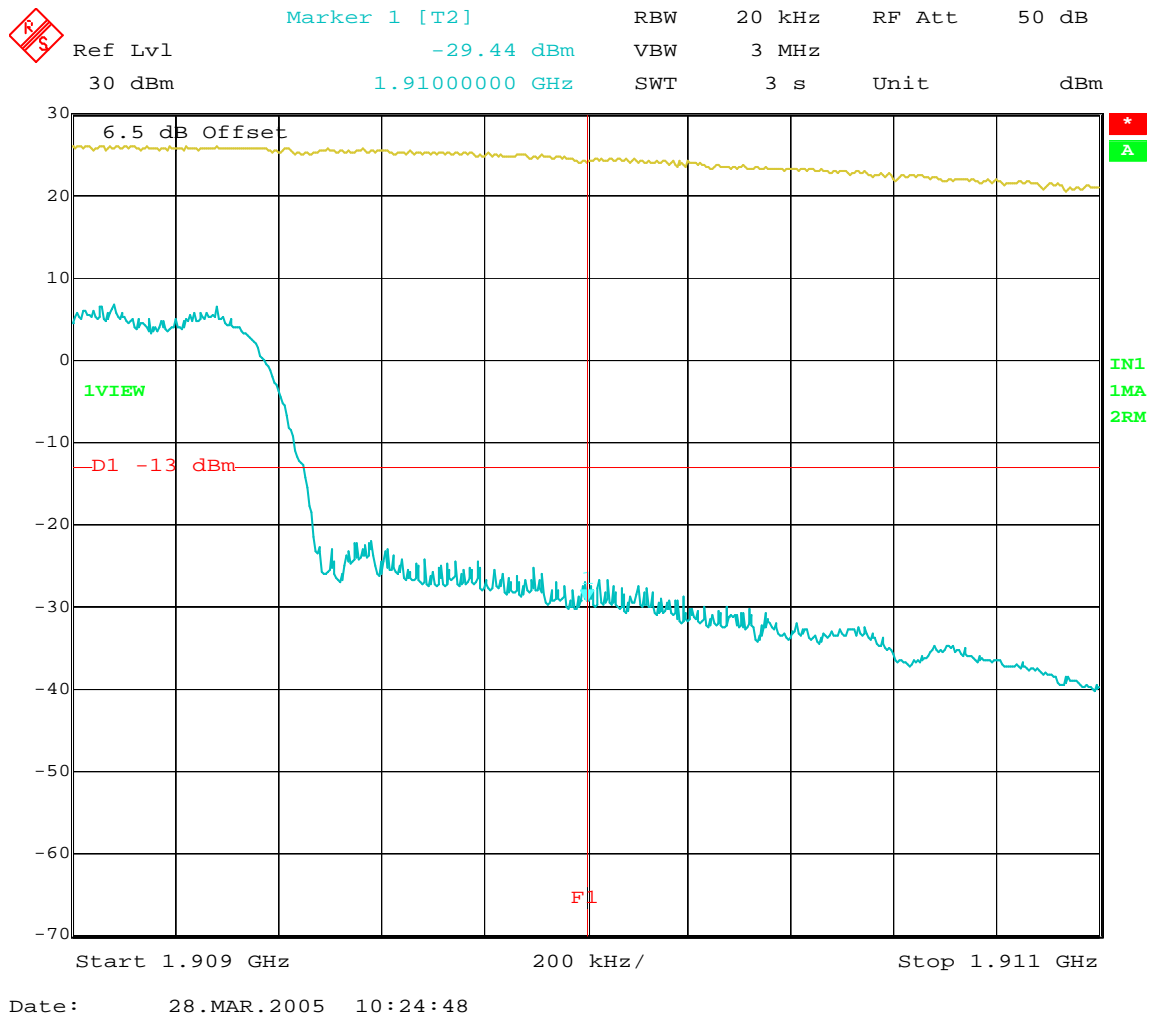
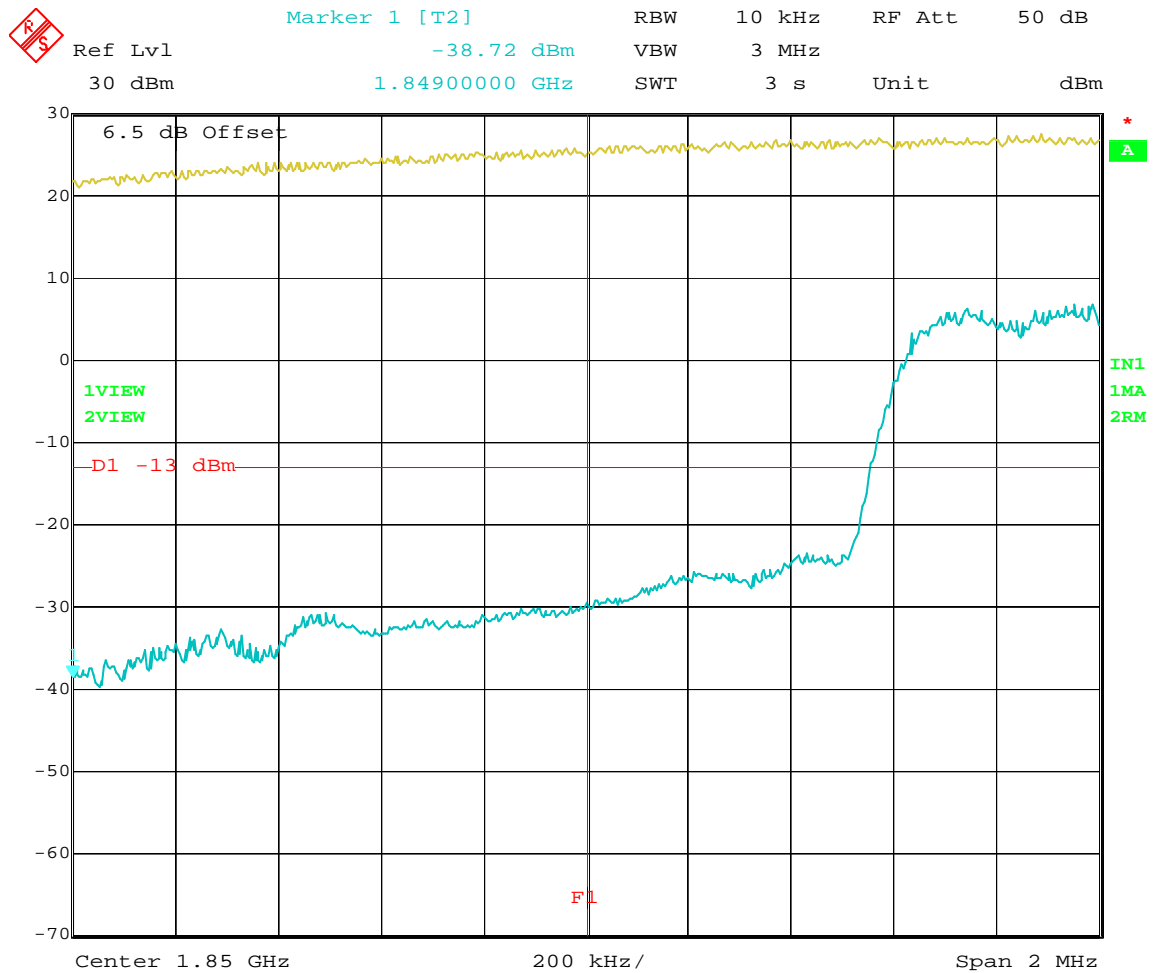


Figure 8-8: Emissions within 1 MHz of band edge, CDMA PCS Upper Band Edge



Date: 28.MAR.2005 10:27:48

## 9 FIELD STRENGTH OF SPURIOUS RADIATION

FCC §2.1053; FCC §22.917; FCC §24.238

RSS-129 §8.1

### 9.1 Test 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. Therefore, the test limit is defined by the following formula:

$$\text{Test Limit (dBm)} = \text{Tx Power (dBm)} - (43 + 10 \log(\text{Tx Power (Watts)})) = -13\text{dBm}$$

### 9.2 Test Procedure

The EUT was placed on a non-conductive turntable. The measurement antenna was placed at a distance of 3 meters from the EUT. The Base Station Simulator was set to force the EUT to its maximum power setting. During the tests, the antenna height and EUT azimuth were varied in order to identify the maximum level of emissions from the EUT.

The frequency range up to tenth harmonic was investigated for each of three fundamental frequencies (low, middle, and high channels) in each operating band. Once spurious emissions were identified, the power of the emission was determined using the substitution method described in TIA-603-B section 2.2.12 (Radiated Spurious Emissions).

The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and at the spurious emissions frequency.

### 9.3 Test Results

The Exxon Mobile Sled with Symbol PDA met the field strength of spurious radiation requirements of FCC §2.1053, FCC §22.917, and FCC §24.238. See Table 9-1 for measured radiated spurious emission power for emissions within 20 dB of the limit. All other emissions not reported are at least 20dB below the limit.

*Table 9-1: Field Strength of Spurious Radiation Substitution Measurements*

EUT Mode	TX Channel	Polarity	Measured Frequency (GHz)	Device Reading (dBuV)	Sub. Reading (dBuV)	Cable Loss (dB)	Tx Antenna Gain (dBi)	Signal Generator Output (dBm)	EIRP (dBm)
CDMA PCS	25	V	3.7022	70.18	112.04	4.9	11.8	15	<b>-19.96</b>
CDMA PCS	25	H	3.7022	71.73	112.38	4.9	11.3	15	<b>-19.25</b>
CDMA PCS	600	V	3.76	64.16	122.22	4.9	11.8	15	<b>-36.16</b>
CDMA PCS	600	H	3.76	71.75	112.31	4.9	11.3	15	<b>-19.16</b>
CDMA PCS	1175	V	3.8176	68.01	112.03	4.9	11.8	15	<b>-22.12</b>
CDMA PCS	1175	H	3.8176	69.69	111.89	4.9	11.3	15	<b>-20.8</b>

## 10 POWER LINE CONDUCTED EMISSIONS

FCC §15.107, FCC §15.207

IC ES-003

### 10.1 Test Limits

Table 10-1 lists the conducted emission limits for both class A and B devices.

*Table 10-1 Conducted Emission Limit for FCC §15.207(a)*

Frequency Range (MHz)	Class A Limits		Class B Limits	
	FCC Part 15.107(a) Quasi Peak Limit (dBuV)	FCC Part 15.107(a) Average Limit (dBuV)	FCC Part 15.107(a) Quasi Peak Limit (dBuV)	FCC Part 15.107(a) Average Limit (dBuV)
0.15 – 0.5	79	66	66 to 56	56 to 46
0.5 – 5.0	73	60	56	46
5.0 - 30	73	60	60	50

### 10.2 Test Procedure

Measurements are carried out using quasi-peak and average detector receivers in accordance with CISPR 16. An AMN is required to provide a defined impedance at high frequencies across the power feed at the point of measurement of terminal voltage and also to provide isolation of the circuit under test from the ambient noise on the power lines. An AMN as defined in CISPR 16 shall be used.

The EUT is located so that the distance between the boundary of the EUT and the closest surface of the AMN is 0.8m.

Where a flexible mains cord is provided by the manufacturer, this shall be 1m long or if in excess of 1m, the excess cable is folded back and forth as far as possible so as to form a bundle not exceeding 0.4m in length.

The EUT is arranged and connected with cables terminated in accordance with the product specification.

Conducted disturbance is measured between the phase lead and the reference ground, and between the neutral lead and the reference ground. Both measured values are reported.

The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. A vertical, metal reference plane is placed 0.4m from the EUT. The vertical metal reference-plane is at least 2m by 2m. The EUT shall be kept at least 0.8m from any other metal surface or other ground plane not being part of the EUT. The table is constructed of non-conductive materials. Its dimensions are 1m by 1.5m, but may be extended for larger EUT.

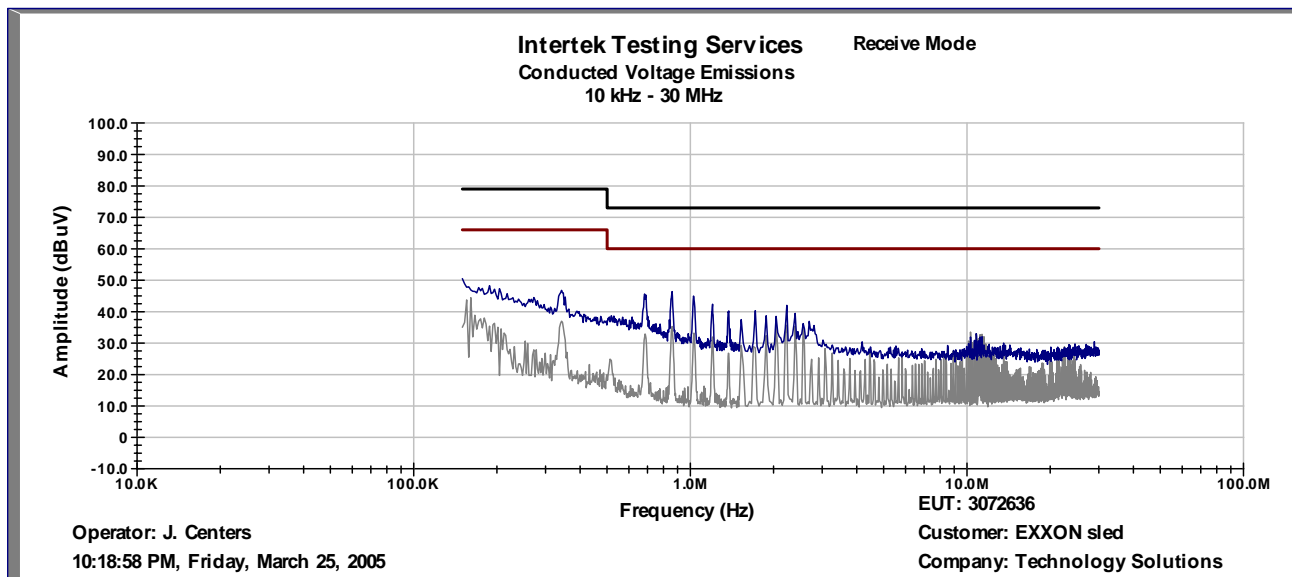
Floor standing EUTs are placed on a horizontal metal ground plane and isolated from the ground plane by 3 to 12 mm of insulating material. The metal ground plane extends at least 0.5m beyond the boundaries of the EUT and has minimum dimensions of 2m by 2m.

Equipment setup for conducted disturbance tests followed the guidelines of ANSI C63.4: 1992.

### 10.3 Test Results

The Exxon Mobile Sled with Symbol PDA met the power line conducted emission requirements of FCC §15.107 and §15.207. The test results are located in Figure 10-1. The graphical data, measured with peak detection, was all below the class A quasi-peak and average limits.

Figure 10-1: FCC §15.107 and §15.207 power line conducted emissions (Lines 1 and 2 )



## 11 RECEIVER SPURIOUS EMISSIONS

FCC §15.109

IC ES-003, RSS-129 §10, RSS-133 §9

### 11.1 Test Limits

Table 11-1 lists the Class A and B limits for spurious using quasi-peak detection below 1GHz and average detection above 1GHz.

*Table 11-1 Radiated Emission Limit for FCC §15.109*

Frequency (MHz)	3 Meter Limits		10 Meter Limits	
	Class A	Class B	Class A	Class B
	Quasi-Peak limits dB(μV/m)	Quasi-Peak limits, dB(μV/m)	Quasi-Peak limits dB(μV/m)	Quasi-Peak limits, dB(μV/m)
30 to 88	49.6	40	39.1	29.5
88 to 216	54.0	43.5	43.5	33.1
216 to 960	56.9	46.0	46.4	35.6
960 and up	60.0	54.0	49.5	43.5

### 11.2 Test Procedure

Measurements are made over the frequency range of 30 MHz to five times the highest frequency operating within the device. The measuring receiver meets the requirements of Section One of CISPR 16 and the measuring antenna correlates to a balanced dipole. From 30 to 1000 MHz, a quasi-peak detector was used for measurement. Above 1000 MHz, average measurements were performed.

Measurements of the radiated field are made with the antenna located at a distance of 3 meters from the EUT. If the field-strength measurements at 3m cannot be made because of high ambient noise level or for other reasons, measurements may be made at a closer distance, for example 1m. An inverse proportionality factor of 20 dB per decade should be used to normalize the measured data to the specified distance for determining compliance.

The antenna is adjusted between 1m and 4m in height above the ground plane for maximum meter reading at each test frequency.

The antenna-to-EUT azimuth is varied during the measurement to find the maximum field-strength readings.

The antenna-to-EUT polarization (horizontal and vertical) is varied during the measurements to find the maximum field-strength readings.

The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. The table is constructed of non-conductive materials. Its dimensions are 1m by 1.5m, but may be extended for larger EUT.

Equipment setup for radiated disturbance tests followed the guidelines of ANSI C63.4: 1992.

### 11.3 Test Results

The Exxon Mobile Sled with Symbol PDA was **compliant** with the radiated disturbance requirements of FCC §15.109 for a **class A** device. The maximized quasi peak data can be found in Figure 11-3.

Figure 11-1 FCC §15.109Worse Case Receiver Spurious Emission (Horizontal)

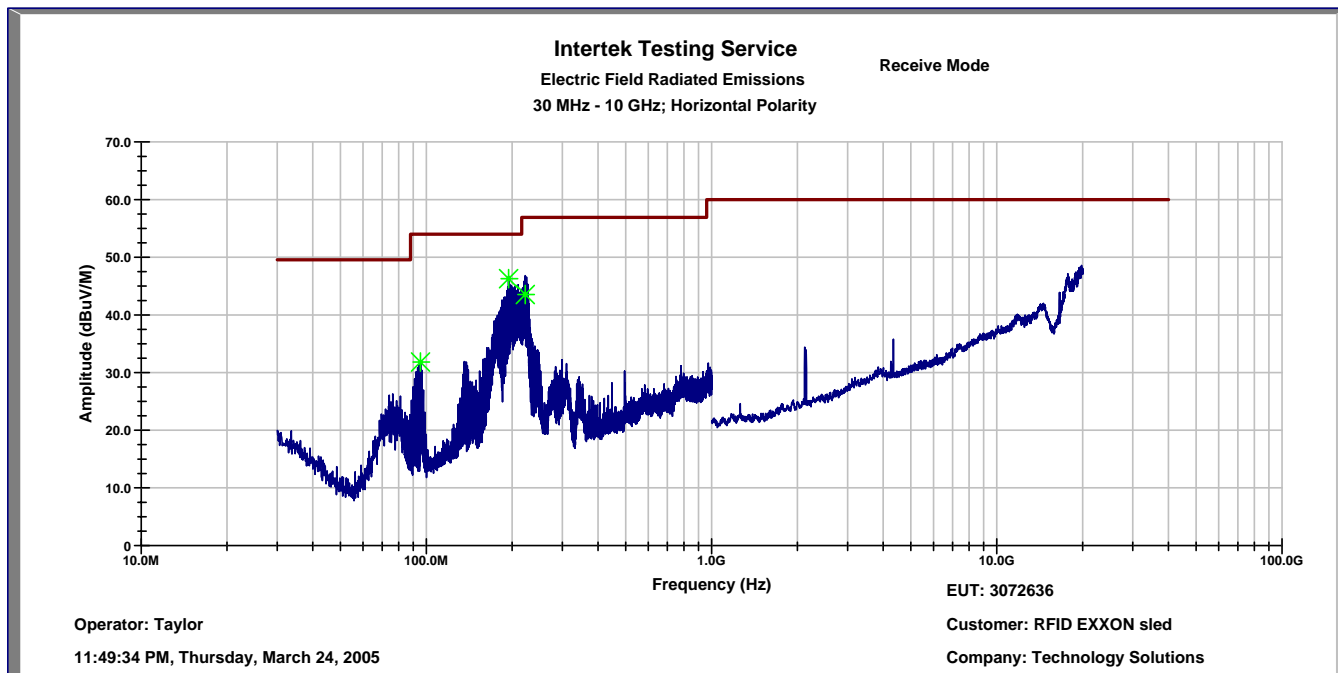
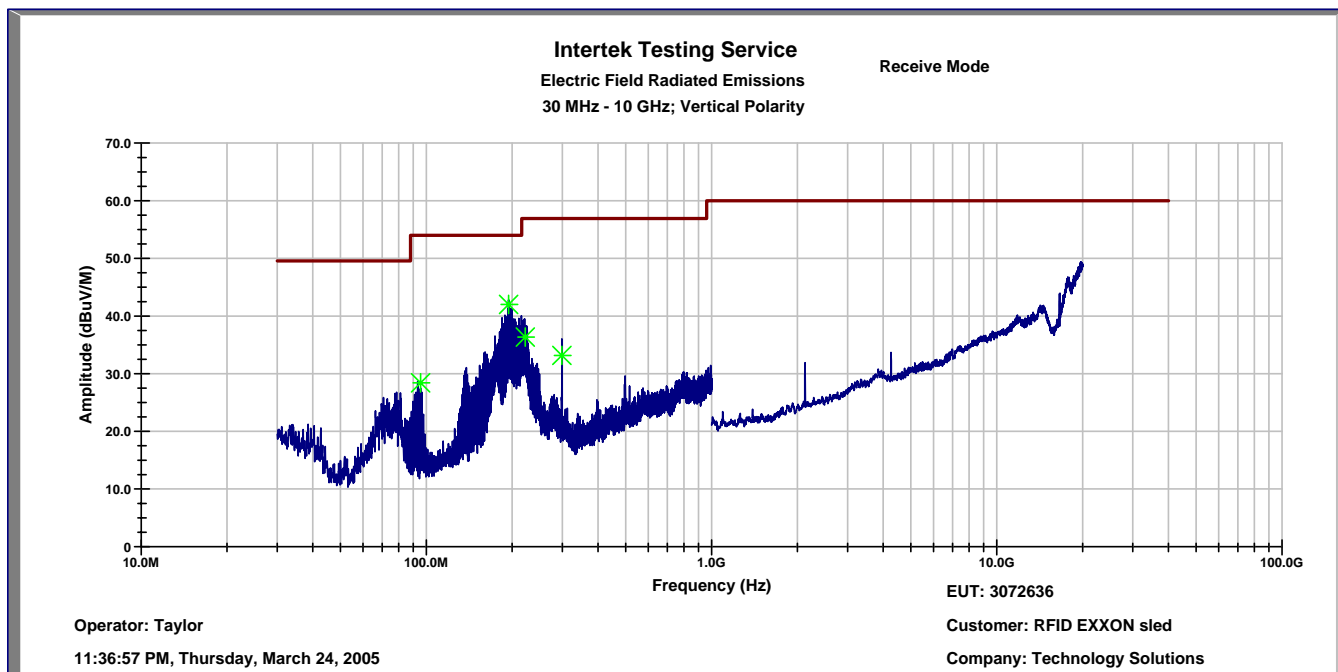


Figure 11-2 FCC §15.109Worse Case Receiver Spurious Emission (Vertical)





Evaluation For: Technology Solutions (UK) Ltd.  
Model No: Exxon Mobile Sled with Symbol PDA

FCC ID: S6JSMT

Figure 11-3 FCC §15.109 Maximized Quasi Peak and Average Emissions (Sorted by Delta)

Frequency (MHz)	Polarity (H/V)	Cab. (dB)	Ant. (dB)	Corr. Reading. (dBuV/m)	Limit (dBuV/m)	Delta (dB)	Azimuth (deg)	Tower (cm)	Results
194.2 MHz	H	1.38	9.4	46.27	53.98	-7.71	62	166	Compliant
194.2 MHz	V	1.38	9.4	41.99	53.98	-11.99	298	99	Compliant
222.3 MHz	H	1.46	9.34	43.54	56.9	-13.36	112	99	Compliant
222.3 MHz	V	1.46	9.34	36.34	56.9	-20.56	264	101	Compliant
95.399 MHz	H	0.81	9.56	31.81	53.98	-22.17	305	297	Compliant
298.6 MHz	V	1.67	13.3	33.17	56.9	-23.73	51	175	Compliant
95.401 MHz	V	0.81	9.56	28.4	53.98	-25.58	264	99	Compliant

## 12 FREQUENCY STABILITY VS TEMPERATURE

FCC §2.1055, FCC §22.355, FCC §24.235

RSS-133 §7

### 12.1 Test Limits

The frequency tolerance shall be maintained within:  $\pm 2.5\text{ppm}$  (or 0.00025MHz)

### 12.2 Test Procedure

The equipment under test was powered and the RF output was connected to a CMU-200 Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The EUT was placed inside the temperature chamber. The RF output cable exited the chamber through an opening made for that purpose. After the temperature stabilized for approximately 30 minutes, the frequency error was read from the CMU-200.

### 12.3 Test Results

The Exxon Mobile Sled with Symbol PDA met the frequency stability requirements of FCC §2.1055, FCC §22.355 and FCC §24.235. The test results are located in Table 12-1.

Table 12-1: Frequency stability vs. Temperature

Frequency Stability Vs. Temperature (Hz)						
Temp. (Celsius)	CDMA Cell			CDMA PCS		
	1013	384	777	25	600	1175
60	-5	-3	1	-17	-20	-16
50	-7	-7	-9	-15	-16	-13
40	3	-8	-3	-10	-18	0
30	-4	6	-7	-6	-2	-4
20	0	0	-1	-17	-15	-11
10	6	4	-1	-9	-13	5
0	8	5	3	-13	6	-2
-10	-4	-1	5	3	8	7
-20	6	7	12	7	10	3
-30	5	1	-3	4	4	1

### 13 FREQUENCY STABILITY VS VOLTAGE

FCC §2.1055, FCC §22.355, FCC §24.235

#### 13.1 Test Limits

The frequency tolerance shall be maintained within:  $\pm 2.5$ ppm (or 0.00025MHz)

#### 13.2 Test Procedure

The battery was replaced with a variable output DC power supply. The Base Station Simulator was set to force the EUT to its maximum power setting. The voltage was set to 115% of the nominal value and was then decreased to 85% of the nominal value. The output frequency was recorded for each input voltage.

#### 13.3 Test Results

The Exxon Mobile Sled with Symbol PDA met the frequency stability requirements of FCC §2.1055, FCC §22.355, and §24.235. The test results are located in Table 13-1.

Table 13-1: Frequency stability vs. input voltage

Frequency Stability Vs. Voltage						
Voltage (V)	CDMA Cell			CDMA PCS		
	1013	384	777	25	600	1175
4.25	-5	-3	6	-8	-4	2
3.7	-3	0	-2	-6	2	-7
3.145	-6	-4	3	5	7	-6