**Exhibit J: Technical Report** 

FCC ID: HN2SB555-2

Spurious Radiated Emissions Test Report from NWEMC

# **Measurement/Technical Report**

# **General Information**

Applicant:	Intermec Corporation
Address:	6001 36 <sup>th</sup> Avenue West
City, State, Zip	Everett, WA 98203-9280
Test Requested By:	Carl Turk
Model:	SB555 Radio in 700C
FCC ID:	HN2SB555-2
First Date of Test:	December 24, 2002
Last Date of Test:	January 2, 2002
Receipt Date of Samples:	December 20, 2002
Job Number	INMC0044

# Scope

Regulatory Authority	Federal Communications Commission
Approval Type	Certification
Equipment Type	Part 24 Licensed Base Station
Rule Parts	47 CFR 22.917(e), 24.238(a)
Rule Exemptions	None
Related Submittals or Grants	None

# **Report Information**

Prepared By	Vicki Albertson, Technical Report and Documentation Manager Northwest EMC, Inc.
Signature	Vicki Albertson
Issued By	Northwest EMC, Inc. 22975 NW Evergreen Parkway, Suite 400 Hillsboro, Oregon 97124 Ph. (503) 844-4066 Fax (503) 844-3826
Report Number	INMC0044
Date Issued	January 6, 2003

# **Test Facility**

The measurement facility used to collect the radiated and conducted data is located at

Northwest EMC, Inc. 22975 NW Evergreen Parkway, Suite 400 Hillsboro, OR 97124 (503) 844-4066 Fax: 844-3826

This site has been fully described in a report filed with the FCC (Federal Communications Commission), and accepted by the FCC in a letter maintained in our files.

#### Laboratory Accreditation

A2LA has granted accreditation Northwest EMC, Inc. to perform the Electromagnetic Compatibility (EMC) tests described in the Scope of Accreditation. Assessment performed to ISO/IEC 17025. Certificate Number: 1936-01, Certificate Number: 1936-02, Certificate Number 1936-03



# Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:	
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Operating Modes Investigated:
PSC Mode
Cellular Mode
PSC Mode simultaneously transmitting with co-located 802.11(b) radio
Cellular Mode simultaneously transmitting with co-located 802.11(b) radio

Antennas Investigated:
PSTGO-1900SCI
PSTGO-900 / 1900SCI

#### Data Rates Investigated:

Maximum

# Power Input Settings Investigated:

Battery

Frequency Range	e Investigated		
Start Frequency	30 MHz	Stop Frequency	25 GHz

Software\Firmware A	Applied During Test		
Exercise software	Sierra SMART	Version	V.046
Description			
The system was tested us	ing special software develo	ped to test all functions of t	he device during the test.

# **Equipment Modifications**

No EMI suppression devices were added or modified. The EUT was tested as delivered.

#### EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
EUT-Radio	Intermec	SB555	6301FEOC
Host Device	Intermec	700C	E02093050443010
Antenna	Mobile Mark	PSTGO-1900SCI	N/A
Antenna	Mobile Mark	PSTGO-900 / 1900SCI	N/A



#### Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
N/A	N/A	N/A	N/A	N/A	N/A
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PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.

#### Measurement Equipment

Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Hewlett-Packard	8566B	AAL	03/19/2002	12 mo
Pre-Amplifier	Amplifier Research	LN1000A	APS	12/03/2001	14 mo
Antenna, Biconilog	EMCO	3141	AXE	12/31/2001	36 mo
Antenna, Horn	EMCO	3115	AHJ	05/23/2002	12 mo
Pre-Amplifier	Miteq	AMF-4D-010120-30-10P	AOP	07/09/2002	12 mo
Spectrum Analyzer	Tektronix	2784	AAO	03/08/2001	24 mo
Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	01/17/2000	36 mo
Antenna, Horn	EMCO	3160-09	AHG	01/15/2000	36 mo
DC Power Supply	Topward	TPS-2000	TPD	NCR	N/A
Signal Generator	Hewlett-Packard	8341B	TGM	01/09/02	12 mo
Antenna, Horn	EMCO	3115	AHF	03/03/02	12 mo

#### **Test Description**

**<u>Requirement:</u>** Per 2.1053, the field strength of spurious radiation was measured in the far-field at an FCC Listed semi-anechoic chamber up to 25 GHz. The applicable limits are 22.917(e) for the cellular band, and 24.238(a) for the PCS band.

Per 22.917(e), the mean power of out of band emissions must be attenuated below the mean power of the unmodulated carrier (P) on any frequency twice or more than twice the fundamental frequency by at least 43 + 10 log (P) dB. (-13 dBm).

Per 24.238(a), on any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB. (-13 dBm).

<u>Configuration</u>: Spectrum analyzer, signal generator, and linearly polarized antennas were used to measure radiated harmonics and spurious emissions. The orientation of the EUT and measurement antenna were manipulated to maximize the level of emissions. The EUT was configured to transmit at the highest output at low, mid, and high channels. The EUT was tested with each antenna. Only one antenna can be used at a time.

The substitution method as described in TIA/EIA-603 Section 2.2.12 was used for the highest spurious emissions. The EUT was tested individually, then while simultaneously transmitting with a co-located radio.

**Test Methodology:** For licensed transmitters, the FCC references TIA/EIA-603 as the measurement procedure standard. TIA/EIA-603 Section 2.2.12 describes a method for measuring radiated spurious emissions that utilizes an antenna substitution method:

At an approved test site, the transmitter is place on a remotely controlled turntable, and the measurement antenna is placed 3 meters from the transmitter. The turntable azimuth is varied to maximize the level of



# **Spurious Radiated Emissions**

spurious emissions. The height of the measurement antenna is also varied from 1 to 4 meters. The amplitude and frequency of the highest emissions are noted. The transmitter is then replaced with a  $\frac{1}{2}$ wave dipole that is successively tuned to each of the highest spurious emissions. A signal generator is connected to the dipole (horn antenna for frequencies above 1 GHz), and its output is adjusted to match the level previously noted for each frequency. The output of the signal generator is recorded, and by factoring in the cable loss to the dipole antenna and its gain; the power (dBm) into an ideal 1/2 wave dipole antenna is determined for each radiated spurious emission.

For the purposes of preliminary measurements, the field strength of the spurious emissions can be measured and compared with a 3 meter limit. The final measurements must be made utilizing the substitution method described above. The 3 meter limit was calculated to be 84.3 dBuV/m at 3 meters. This was based upon an output power of 0.224 W.

Simultaneous Transmission: The EUT will be co-located with two other radios: FCC ID:HN22011B-2 (802.11(b) radio), and FCC ID:HN2ABTM3-3 (Bluetooth radio). Any two of the three radios can transmit simultaneously. All three radios cannot transmit simultaneously. Each radio transmits through its own antenna.

The following is an excerpt from the FCC / TCB Training Q & A, October 2002, Day 2, Question 7:

Assuming that the radios do not share an antenna, only radiated tests for simultaneous transmission is required. If the radios share an antenna, antenna conducted measurements would also be required. Only one set of worst case simultaneous transmission data is going to be requested to be submitted at this time. The test engineer should indicate the worst case condition and provide justification as to why the worst case condition was chosen. The grantee should be reminded that even if the FCC requests one set of data, they are responsible for compliance for all modes of simultaneous transmission.

Since the Bluetooth radio has such a low EIRP (.001W) and is a frequency hopper, the worst case simultaneous transmission mode was determined to be the EUT transmitting simultaneously with the 802.11(b) radio (EIRP = 0.056 W & single channel operation). The EUT was tested in both cellular and PCS modes while simultaneously transmitting with the 802.11(b) radio. Simultaneous low, mid, and high transmit frequencies were investigated from 30 MHz to 25 GHz.

In addition, all the possible combinations of harmonic emissions from the EUT and the 802.11(b) radio were compared numerically. It was determined that only channels 526 (1876 MHz) and 930 (1896 MHz) in PCS mode could have harmonic emissions that coincide with the center frequency of harmonic emissions from the 802.11(b) radio (tuned to channels 1 (2412 MHz) and 6 (2437 MHz) respectively). The frequency range from 10 to 18 GHz was investigated for these channel combinations.

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 – 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

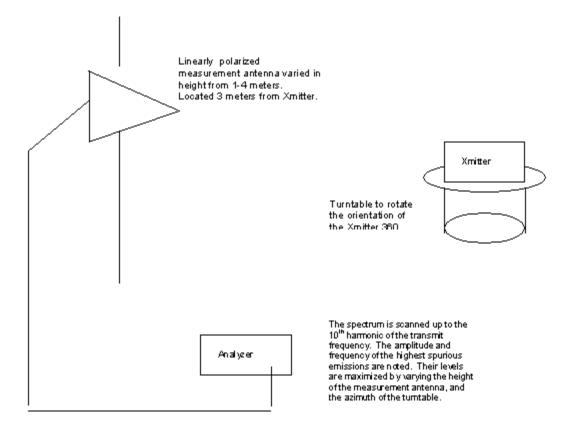
#### **Bandwidths Used for Measurements**

measurements were made using the bandwidths and detectors specified. No video filter was used.



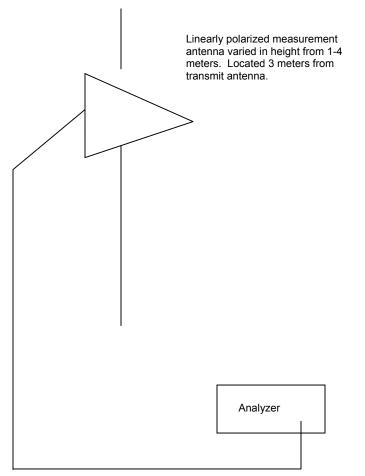
# **Test Setup Diagram**

# **Test Setup for Field Strength Measurements**





# Test Setup for Power Measurements Utilizing the Antenna Substitution Method



During field strength measurements, the amplitude and frequency of the highest emissions are noted. The transmitter is then replaced with a ½ wave dipole (at the same height) that is successively tuned to each of the highest spurious emissions. A signal generator is connected to the dipole (horn antenna for frequencies above 1 GHz), and its output is adjusted to match the level previously noted for each frequency.

Signal Generator

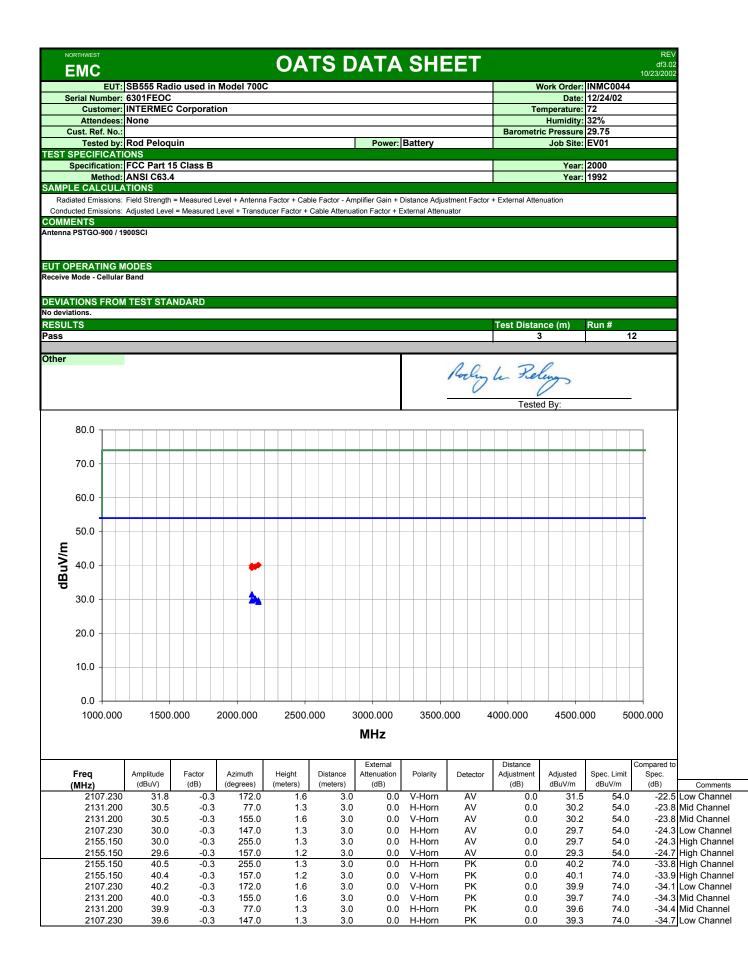
The spectrum analyzer is monitored to verify that the output of the signal generator produces a signal equal in amplitude to a previously measured spurious emission.

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EMC			Ap	pare	nt P	owei	r Data	a Sh	eet			REV df3.02 10/23/2002	
EL	IT: SB555 Ra	dio used in	Model 700	C					W	ork Order:	INMC0044		
	er: 6301FEO										12/24/02		
	er: INTERME	C Corporati	on						Ter	mperature:			
	s: None									Humidity:			
Cust. Ref. N	o.: oy: Rod Pelo	nuin				Bower	Battery		Barometrie	c Pressure Job Site:			
T SPECIFICA		lanı				Power.	Dattery			JOD Sile.			
	n: FCC Part	22.901(d)								Year:	2002		
	d: TIA/EIA-6										1998		
IPLE CALCU													
Radiated Emissio									<ul> <li>External Attenu</li> </ul>	uation			
onducted Emissio MMENTS	ns: Adjusted Lev	ei = Measured	Level + Trans	ducer Factor +	Cable Attenua	tion Factor + I	External Attenu	lator					
enna PSTGO-900	/ 1900SCI												
smitting - Cellula	ar Band												
IATIONS FR	OM TEST OF												
eviations.	SWITEST ST	ANDARD											1
SULTS									Test Distan	ce (m)	Run #		
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Freq			Azimuth	Height			Polarity	Detector		EIRP	Spec. Limit	Spec.	
· · • • •			(degrees)	(meters)				_ 0.0000		(dBm)	(dBm)	(dB)	Comr
(MHz)	00		184.0				H-Horn	PK		-47.2	-13.0		High Ch
1697.4													1
1697.4 1697.4	00		275.0				V-Horn	PK		-50.5			
1697.4 1697.4 1673.4	00 00		161.0	1.2			H-Horn	PK		-51.8	-13.0	-38.8	Mid Cha
1697.4 1697.4	00 00 00			1.2 1.2							-13.0 -13.0	-38.8 -39.9	High Ch Mid Cha Mid Cha Low Ch



ButTl [SB555 Ratio used in Model 700C         Work Over [INMC0044           Seria Number Corporation         Temperature [NMC0044           Cast Runk Rolp         Ferrepresent 73           Attendess         Huminity 36%,           Cast Runk Rolp         Baronenic Present 25.76           Tip 21C FIG / Vol S1         Vair [202           Specification FIC Part 24.6         Vair [202           Method 71 / Kei A 603         Vair [202           Mater 12.8 (Strip 1 - Voir 12.8 (Strip 1	NORTHWEST								Ap	pp	a	re	n		0	W	/e	r	D	at	a	Sh	ee	et							REV df3.02 10/23/2002
Safetia Number:         Solid FEOC         Date         Display         Display <thdisplay< th="">         Display         <thdisplay< th=""></thdisplay<></thdisplay<>		T: S	B555	Radi	io us	sed i	in M	lode	1700	C															W	/ork C	rder	: INM	C004	4	
Attendese:         Ione         Home         Home Barrier         Barrentic Pressure 23.75           Tested by:         Rod Pologuin         Power, Battery         Job Stir, EV01           TSECIE/ACIONS         Power, Battery         Job Stir, EV01           Specification         FOC Part 24E         Vaar           Memory         Vaar         Year           Memory         Total Story         Year           Memory         Name         Year           Memory         Name         Year           Memory         Name         Year           Marking         Name         Year           Marking         Name         Year           Marking         Name         Name           Marking         Name         Name           Marking         Name         Name           Name         Name         Name           Name         Name         Name           Marking         Name         Name           Name         N																													81/02		
Cuts. Rev. No.:         Barometric Prevaing 28,75           Tested by:         Job Site: EVOI           15 B261[GATIO1KS         Vaar 2602           Specification (CC Part 24.         Vaar 2602           Wethod:         TLAFEA 403           Participation (CC Part 24.         Vaar 2602           Wethod:         TLAFEA 403           Participation (CC Part 24.         Vaar 2602           Wethod:         TLAFEA 403           Participation (CC Part 24.         Vaar 2602           Wethod:         TLAFEA 403           Participation (CC Part 24.         Vaar 2602           Wethod:         TLAFEA 403           Participation (CC Part 24.         Vaar 2602           Wethod:         TLAFEA 403           Participation (CC Part 24.         Vaar 2602           Wethod:         TLAFEA 403           Participation (CC Part 24.         Vaar 2602           Wethod:         TLAFEA 403           Participation (CC Part 24.         TLAFEA 403           Wethod:         TLAFEA 403           Participation (CC Part 24.         TLAFEA 403           Wethod:         TLAFEA 403           Participation (CC Part 24.         TLAFEA 403           Partitipation (CC Part 24.         TLAFEA 403 </td <td></td> <td></td> <td></td> <td>NEC</td> <td>Cor</td> <td>pora</td> <td>tior</td> <td>n</td> <td></td> <td>Те</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>				NEC	Cor	pora	tior	n																	Те						
Tracted by:         Rod Pelocyin         Power:         Battery         Job Still:         EV01           SpecificArtish         FGC Part 24E         Vaar. 2002         Vaar. 2002         Vaar. 2002           Method:         Trackel A03         Vaar. 2002         Vaar. 1999         Vaar. 1999           PLE_CACCUATIONS         Mathod:         Vaar. 1999         Vaar. 1999         Vaar. 1999           PLE_CACCUATIONS         Mathod:         Tracked Print         Vaar. 1999         Vaar. 1999           VIEWS         Adjustic Lend:         Tracked Print         Color Adjustic Lend:         Tracked Print           MILE IS         Color Adjustic Lend:         Tracked Print         Tracked Print         Tracked Print           OU         3         14         3         14         3         14           or         3         14         3         14         3         14           or         3         3         14         3         14         3         14           or         3         3         14         3         14         3         14         3         14         3         14         3         14         3         14         3         14         3			one																				_								
To SPECIFICATIONS         Year         2002           Method:         TAVEL         Tavel         Tavel           Max         Tavel		-	od Do	logu	in										1	D	0.00	. B	atta	~			E	saror	netri						
Specification         ICC Part 24E         Year:         2002           Method:         Method:         Year:         2002           MPLE CACUUATIONS         Year:         1998           Related Emission: Adjusted Level + Meanued Level + Traindocer Factor - Cable Atternation Factor + Datemal Atternation         Method:           Method:         Method:         Method:         Method:         Method:           Method:         Method:         Method:         Method:         Method:           Method:         Method:         Method:         Method:         Method:           Method:         Method:         Method:         Method:         Method:           Method:         Method:         Method:         Method: <t< td=""><td></td><td></td><td></td><td>loqu</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>F</td><td>ower</td><td>. D</td><td>alle</td><td>y</td><td></td><td></td><td></td><td></td><td></td><td>300</td><td>Site</td><td>.  </td><td>/1</td><td></td><td></td></t<>				loqu												F	ower	. D	alle	y						300	Site	.	/1		
Method:         TAREE 463         Year:         1998           Predict CANCUNCINS         Predict Presidence Addustment Factor + Cable Pactor - Cable Pactor - Cable Addustment Factor + Datemal Attenuation         Predict Presidence Addustment Factor + Datemal Attenuation           Marking Carl Pacific Addust Addust Addusted Envisions - Cable Addustment Factor + Datemal Attenuation         Predict Presidence Addustment Factor + Datemal Attenuation           Marking In PCS mode and B82.11(b) mode         Test Distance (m)         Rm #           Add Toris FROM TEST STANDARD         Test Distance (m)         Rm #           Verain 1990         Test Distance (m)         Rm #           0.0         Test Distance (m)         Rm #           0.0<				art 24	4E																						Year	: 200	2		
Related Emilions. Field Stering - Measured Level + Transducer Factor - Exite Adjustment Factor - External Attenuation objection Emiliano. Field Stering - Measured Level + Transducer Factor - Exite Adjustment Factor - Exiternal Attenuation objection Emiliano. Factor - Exiternal Attenuation methods - Exiternal Attenuation methods - Exiternal Attenuation MILENTS Test Distance (m) Run # 10 10 10 10 10 10 10 10 10 10	Metho	d: Tl	A/EIA																												
bioladed Level - Massured Level - Massured Level - Tarnaducer Factor - Cable Alterwater External Alterwater MENTS  TOPERATING MODES  marking in PCS moles and 812,11(p) mode  Anticols FROM YEST STANDARD  eveloance  USS  S  S  S  S  S  S  S  S  S  S  S																															
MILENTS         Image PSTGO-080 / 1909SCI           COPERATING MODES           Test Distance (m)           RUN #           S           Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2"           Colspan="2"      Colspan="2"           Colspan="2"           Colspan="2"           Colspan="2"           Colspan="2"           Colspan="2"           Colspan= Colspan="2" <td></td> <td>+ Ext</td> <td>ernal</td> <td>Atten</td> <td>uation</td> <td></td> <td></td> <td></td> <td></td> <td></td>																							+ Ext	ernal	Atten	uation					
OPERATING MODES           Maintagin PCS mode and BIZ-11(0) mode           Tost Distance (m)         NII #           OUTONS FROM TEST STANDARD	MMENTS			Level	= Mea	asure	a Le	vel +	Irans	auce	r Fac	tor +	Cable	Atter	nuatio	n Fa	ctor +	Exte	ernal	Atten	uator	r									
amuting in PCS mode and 802.11(b) mode           ADTIONS FROM TEST STANDARD           and and 802.11(b) mode           SUITS         Tost Distance (m)         Run #           Advice the second of the second	enna PSTGO-900	/ 1900	ISCI																												
ATIONS FROM TEST STANDARD weighted				2.11(	b) mo	de																									
Outling         Test Distance (m)         Run #           er	-			-																											
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s	SULTS																						Te	st <u>D</u> i	ist <u>ar</u>	ice (n	n)	Rur	n#		
Mag W Religy           0.0         Tested By:           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         <	is																													14	
Mag W Religy           0.0         Tested By:           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         0           0.0         <																															
Tested By:           0.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         <	ier					_	_	_	_	_	_	_		_		_			_	_		10	,	-	2	0	_				
Tested By:           0.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         <																					14	orly	h	. 7	Kel	eng					
Tested By:           0.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         <																						0			1	/	5				
0.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0																						- G									
Interference       Azimuth       Height (regress)       Polarity       Detector       EIRP       Spec. Limit (dBm)       Compared till (cBm)         3099.356       71.0       2.0       H-Horn       PK       -17.1       -13.0       -4.         3099.356       71.0       2.0       H-Horn       PK       -17.1       -13.0       -4.         3819.360       20.0       1.9       H-Horn       PK       -17.2       -13.0       -4.         3819.360       344.0       1.0       V-Horn       PK       -18.2       -13.0       -6.																		-													
Interference       Azimuth       Height (regress)       Polarity       Detector       EIRP       Spec. Limit (dBm)       Compared till (cBm)         3099.356       71.0       2.0       H-Horn       PK       -17.1       -13.0       -4.         3099.356       71.0       2.0       H-Horn       PK       -17.1       -13.0       -4.         3819.360       20.0       1.9       H-Horn       PK       -17.2       -13.0       -4.         3819.360       344.0       1.0       V-Horn       PK       -18.2       -13.0       -6.	0.0			, , , , , , , , , , , , , , , , , , ,		, ,																							1		1
20.0 30.0 40.0 50.0 60.0 70.0 1000.000 2000.000 3000.000 4000.000 5000.000 6000.000 7000.000 8000.000 9000.000 10000.000 <b>Freq</b> Azimuth Height (degrees) (meters) 1000.000 2000.000 3000.000 4000.000 5000.000 6000.000 7000.000 8000.000 9000.000 10000.000 <b>Freq</b> Azimuth Height (degrees) (meters) 3699.356 71.0 2.0 H-Hom PK -17.1 -13.0 -4. 3759.348 49.0 1.9 H-Hom PK -17.2 -13.0 -4. 3819.360 20.0 1.9 H-Hom PK -18.2 -13.0 -6. 3819.360 344.0 1.0 V-Hom PK -18.2 -13.0 -5. 3819.360 -5. 3819.360 -5. 3810.360 -5										[																					
20.0 30.0 40.0 50.0 60.0 70.0 1000.000 2000.000 3000.000 4000.000 5000.000 6000.000 7000.000 8000.000 9000.000 10000.000 <b>Freq</b> Azimuth Height (degrees) (meters) 1000.000 2000.000 3000.000 4000.000 5000.000 6000.000 7000.000 8000.000 9000.000 10000.000 <b>Freq</b> Azimuth Height (degrees) (meters) 3699.356 71.0 2.0 H-Hom PK -17.1 -13.0 -4. 3759.348 49.0 1.9 H-Hom PK -17.2 -13.0 -4. 3819.360 20.0 1.9 H-Hom PK -18.2 -13.0 -6. 3819.360 344.0 1.0 V-Hom PK -18.2 -13.0 -5. 3819.360 -5. 3819.360 -5. 3810.360 -5																															
20.0         *         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·         ·	10.0					$\left  \right $		_						$\left  \right $		_	+	_												_	-
Current         Height (degrees)         Polarity (meters)         Detector         EIRP (dBm)         Spec. Linit (dBm)         Compared 1 (Spec. (dB)           3699.356         71.0         2.0         H-Horn         PK         -17.1         -13.0         -4.           3699.356         71.0         2.0         H-Horn         PK         -17.1         -13.0         -4.           3819.360         20.0         1.9         H-Horn         PK         -17.2         -13.0         -4.           3819.360         344.0         1.0         V-Horn         PK         -18.2         -13.0         -5.							-																								+
Z0.0         Compared 1           30.0         40.0           40.0         50.0           50.0         50.0           60.0         50.0           70.0         50.0           1000.000         2000.000           300.0         4000.000           50.0         500.0           60.0         500.0           1000.000         2000.000           3000.000         4000.000           5000.000         7000.000           809.056         71.0           2.0         H-Horn           PK         -17.1           3819.360         20.0           3819.360         344.0           3319.360         344.0           344.0         1.0           V-Horn         PK           -18.2         -13.0           -5         155.0																															
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To.0       Azimuth       Height       Polarity       Detector       EIRP       Spec. Limit (dBm)       Compared to Spec. (dB)         1000.000       2000.000       3000.000       4000.000       5000.000       6000.000       7000.000       8000.000       9000.000       10000.000         Freq       Azimuth       Height       Polarity       Detector       EIRP       Spec. Limit       Compared to Spec. (dB)         3699.356       71.0       2.0       H-Horn       PK       -17.1       -13.0       -4.         3759.348       49.0       1.9       H-Horn       PK       -17.9       -13.0       -4.         3819.360       20.0       1.9       H-Horn       PK       -17.9       -13.0       -5.         3699.356       153.0       1.0       V-Horn       PK       -18.2       -13.0       -5.	-50.0				+	+	-	-			+					+	+	-									$\left  \right $			-	1
To.0       Azimuth       Height       Polarity       Detector       EIRP       Spec. Limit (dBm)       Compared to Spec. (dB)         1000.000       2000.000       3000.000       4000.000       5000.000       6000.000       7000.000       8000.000       9000.000       10000.000         Freq       Azimuth       Height       Polarity       Detector       EIRP       Spec. Limit       Compared to Spec. (dB)         3699.356       71.0       2.0       H-Horn       PK       -17.1       -13.0       -4.         3759.348       49.0       1.9       H-Horn       PK       -17.9       -13.0       -4.         3819.360       20.0       1.9       H-Horn       PK       -17.9       -13.0       -5.         3699.356       153.0       1.0       V-Horn       PK       -18.2       -13.0       -5.																															
To.0       Azimuth       Height       Polarity       Detector       EIRP       Spec. Limit (dBm)       Compared to Spec. (dB)         1000.000       2000.000       3000.000       4000.000       5000.000       6000.000       7000.000       8000.000       9000.000       10000.000         Freq       Azimuth       Height       Polarity       Detector       EIRP       Spec. Limit       Compared to Spec. (dB)         3699.356       71.0       2.0       H-Horn       PK       -17.1       -13.0       -4.         3759.348       49.0       1.9       H-Horn       PK       -17.9       -13.0       -4.         3819.360       20.0       1.9       H-Horn       PK       -17.9       -13.0       -5.         3699.356       153.0       1.0       V-Horn       PK       -18.2       -13.0       -5.	co o																														
B0.0         Azimuth         Height         Polarity         Detector         EIRP (dBm)         Spec. Limit (dBm)         Compared to Spec. (dB)           3699.356         71.0         2.0         H-Horn         PK         -17.1         -13.0         -4.           3759.348         49.0         1.9         H-Horn         PK         -17.9         -13.0         -4.           3819.360         20.0         1.9         H-Horn         PK         -17.9         -13.0         -4.           3819.360         344.0         1.0         V-Horn         PK         -18.2         -13.0         -5.           3699.356         153.0         1.0         V-Horn         PK         -18.2         -13.0         -5.	0.00																														1
B0.0         Azimuth         Height         Polarity         Detector         EIRP (dBm)         Spec. Limit (dBm)         Compared to Spec. (dB)           3699.356         71.0         2.0         H-Horn         PK         -17.1         -13.0         -4.           3759.348         49.0         1.9         H-Horn         PK         -17.9         -13.0         -4.           3819.360         20.0         1.9         H-Horn         PK         -17.9         -13.0         -4.           3819.360         344.0         1.0         V-Horn         PK         -18.2         -13.0         -5.           3699.356         153.0         1.0         V-Horn         PK         -18.2         -13.0         -5.																															
B0.0         Azimuth         Height         Polarity         Detector         EIRP (dBm)         Spec. Limit (dBm)         Compared to Spec. (dB)           3699.356         71.0         2.0         H-Horn         PK         -17.1         -13.0         -4.           3759.348         49.0         1.9         H-Horn         PK         -17.9         -13.0         -4.           3819.360         20.0         1.9         H-Horn         PK         -17.9         -13.0         -4.           3819.360         344.0         1.0         V-Horn         PK         -18.2         -13.0         -5.           3699.356         153.0         1.0         V-Horn         PK         -18.2         -13.0         -5.	70.0																														
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Freq (MHz)         Azimuth (degrees)         Height (meters)         Polarity         Detector         EIRP (dBm)         Spec. Limit (dBm)         Compared t Spec. (dB)           3699.356         71.0         2.0         H-Horn         PK         -17.1         -13.0         -4.           3759.348         49.0         1.9         H-Horn         PK         -17.9         -13.0         -4.           3819.360         20.0         1.9         H-Horn         PK         -17.9         -13.0         -4.           3819.360         20.0         1.9         H-Horn         PK         -18.2         -13.0         -5.           3699.356         153.0         1.0         V-Horn         PK         -18.2         -13.0         -5.		~	000.0	00	~	000	000	0	10	00.	200		F00		0	~	000	00	0		000	000		00.0	000	~	000	000		000	0.000
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Freq (MHz)         Azimuth (degrees)         Height (meters)         Polarity         Detector         EIRP (dBm)         Spec. Limit (dBm)         Spec. (dBm)         Spec. (dBm) <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>_</td> <td></td> <td></td> <td>1</td> <td></td> <td></td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td>-</td> <td></td> <td></td> <td>-</td> <td></td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td>-</td> <td></td> <td></td> <td></td>							_			1			1					-			-		-					-			
(MHz)         (degrees)         (meters)         (meters)         (meters)         (dBm)         (dBm) <td>Freq</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Azim</td> <td>nuth</td> <td>1</td> <td>Heia</td> <td>nt</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Pola</td> <td>ritv</td> <td></td> <td>Detector</td> <td></td> <td></td> <td></td> <td>FI</td> <td>RP</td> <td>Sne</td> <td>c, Limi</td> <td></td> <td></td>	Freq							Azim	nuth	1	Heia	nt							Pola	ritv		Detector				FI	RP	Sne	c, Limi		
X3699.356         71.0         2.0         H-Horn         PK         -17.1         -13.0         -4.           3759.348         49.0         1.9         H-Horn         PK         -17.9         -13.0         -4.           3819.360         20.0         1.9         H-Horn         PK         -19.2         -13.0         -6.           3819.360         20.0         1.9         H-Horn         PK         -19.2         -13.0         -6.           3819.360         344.0         1.0         V-Horn         PK         -18.2         -13.0         -5.           3699.356         153.0         1.0         V-Horn         PK         -18.3         -13.0         -5.																			1 014		'	Jereciol								·	
3759.348         49.0         1.9         H-Horn         PK         -17.9         -13.0         -4.           3819.360         20.0         1.9         H-Horn         PK         -19.2         -13.0         -6.           3819.360         344.0         1.0         V-Horn         PK         -18.2         -13.0         -5.           3699.356         153.0         1.0         V-Horn         PK         -18.3         -13.0         -5.		56											I						H-H	orn	1	PK								0	-4.1
3819.360         344.0         1.0         V-Horn         PK         -18.2         -13.0         -5           3699.356         153.0         1.0         V-Horn         PK         -18.3         -13.0         -5									49.0	)																					-4.9
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EUT: [38555 Radio used in Model 700C     Work Order: [NMC0044]       unber: 6301FEPGC     Date: [1231/02       astomar: [NTERMEC Corporation     Temperature: [3       astomar: [NTERMEC Corporation     Humidity: [34%,       Set No::     Barometric Pressure [29:76       set do by: Rod Peloquin     Power: [Battery       Jie Do bits:     EV01       IEICATIONS     Year: [1998       CUCLATIONS     Year: [1998       UCULATIONS     Year: [1998       UCULATIONS     Year: [1998       Collard used in Model 700C     Year: [1998       UCULATIONS     Year: [1998       UCULATIONS     Year: [1998       Matched: TAVEEA-603     Year: [1998       UCULATIONS     Year: [1998       UCULATIONS     Year: [1998       Matched: TAVEEA-603     Year: [1998       UCULATIONS     Year: [1998       Matched: Stance (m)     Run #       0 400 / 1909SCI     Year: [1900       YING MODES     SFROM TEST STANDARD       YEAR     Year: [100]       Under mode and 802.11(b) mode       S FROM TEST STANDARD
istomer:       INTERMEC Corporation       Temperature:       73         endees:       None       Humidity:       34%         Ref. No.:       Barometric Pressure       29.75         sted by:       Rod Peloquin       Power:       Battery       Job Site:       EV01         IFICATIONS       IFICATIONS       Year:       2002         wethod:       TIA/EIA-603       Year:       1998         ALCULATIONS       Ifald Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation         :missions:       Field Strength = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator         Or 900 / 1900SCI       Test Distance (m)       Run #         3       16
endees:       None       Humidity:       34%         Ref. No:       Barometric Pressure       29.75         sted by:       Rod Peloquin       Power:       Battery       Job Site:       EV01         FICATIONS       fication:       FCC Part 22.901(d)       Year:       2002         Method:       TIA/EIA-603       Year:       1998         ALCULATIONS       missions:       Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation       imissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator         O-900 / 1900SCI       TING MODES       Test Distance (m)       Run #         3       16
Ref. No.:       Barometric Pressure       29.75         sted by: Rod Peloquin       Power: Battery       Job Site: EV01         IFICATIONS       For an intervention of the state of the stat
IFICATIONS fication: FCC Part 22.901(d) Wethod: TIA/EIA-603 Vear: 2002 Method: TIA/EIA-603 Vear: 1998 ALCULATIONS missions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation imissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator O-900 / 1900SCI ATING MODES To Cellular mode and 802.11(b) mode S FROM TEST STANDARD Test Distance (m) Run # 3 16
fitcation:       FCC Part 22.901(d)       Year:       2002         Method:       TIA/EIA-603       Year:       1998         ALCULATIONS       ::missions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation       :missions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator         So       :0-900 / 1900SCI         ATING MODES       :       :         In Cellular mode and 802.11(b) mode       :       :         S FROM TEST STANDARD       :       :         Method:       :       :       :         Model       :       :       :         Model       :       :       :         S FROM TEST STANDARD       :       :       :         Method:       :       :       :       :         Method:       :       :       :       :         S FROM TEST STANDARD       :       :       :       :         Method:       :       :       :       :       :         Mathod:       :       :       :       :       :       :       :       :       :       :       :       :       :       : <t< td=""></t<>
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imissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation imissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator O-900 / 1900SCI ATING MODES 1 Cellular mode and 802.11(b) mode S FROM TEST STANDARD Test Distance (m) Run # 3 16 Maga Maga Maga Maga Maga Maga Maga Maga
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Rocky te Relings
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Azimuth Height Polarity Detector EIRP Spec. Limit Spec.
) (degrees) (meters) (dBm) (dBm) (dB)
573.360 319.0 1.2 V-Horn PK -21.7 -13.0 -8
697.360 113.0 1.3 H-Horn PK -25.0 -13.0 -12
697.360 19.0 1.2 V-Horn PK -22.5 -13.0 -9
649.360 78.0 1.3 H-Horn PK -25.2 -13.0 -12 649.360 116.0 1.2 V-Horn PK -22.8 -13.0 -9
349.300 110.0 1.2 V-Hollin PK -22.8 -13.0 -9

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Conducted Emiss	ions: A	djusted Lev	/el = M	leasured	Leve	el + Trans	sducer F	actor +	Cable At	ttenua	tion Factor -	+ Ext	ternal Attenu	uator									
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(MHz)	000	(dBuV)		(dB)		degrees)		eters)	(mete		(dB)		1111	1	A\/		(dB)	dBu∖		dB	uV/m	(dB)	Cor
4176. 4126.		47.0 46.6		5.9 6.0		16.0 360.0		1.3 1.7		3.0 3.0			H-Horn H-Horn		AV AV		0.0 0.0		52.9 52.6		54.0 54.0		High
4076.		46.3		6.0		86.0		1.3		3.0			V-Horn		AV		0.0		52.0		54.0		Low (
4076.	000	45.3	3	6.0	)	66.0	D	1.8		3.0	0.	.0	H-Horn		AV		0.0		51.3		54.0	) -2.7	Low C
4126.		41.4		6.0		348.0		1.3		3.0			V-Horn		AV		0.0		47.4		54.0		6 Mid C
4176. 4176.		41.3 49.0		5.9 5.9		<u>342.0</u> 16.0		<u>1.1</u> 1.3		3.0			V-Horn H-Horn		AV PK		0.0		47.2 54.9		54.0 74.0		B High
4176. 4076.		49.0		5.9 6.0		86.0		1.3		3.0 3.0			V-Horn		PK		0.0		54.9 54.6		74.0		Low C
4126.	000	48.4	1	6.0	)	360.0	D	1.7		3.0	0.	.0	H-Horn		PK		0.0		54.4		74.0	.19.6	6 Mid C
4076.		48.2		6.0		66.0		1.8		3.0			H-Horn		PK		0.0		54.2		74.0		B Low (
4126.		44.8		6.0		348.0		1.3		3.0			V-Horn		PK		0.0		50.8		74.0		2 Mid C
4176.	000	44.1	I	5.9	,	329.0	J	1.2		3.0	0.	.0	V-Horn		PK		0.0		50.0		74.0	J -24.(	) High

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ι υ		Rod Peloqu	iin				Power:	Battery		Barometr	Job Site:		
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	pecification:		5.247(c)								Year	2001	
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	4076.000	43.7	6.0	226.0	1.1	3.0	0.0	V-Horn	AV	0.0	49.7		
	4176.000	41.9	5.9	57.0	1.2	3.0	0.0	V-Horn	AV	0.0	47.8		
	4176.000	41.4	5.9	143.0	1.3	3.0	0.0	H-Horn	AV	0.0	47.3	54.0	6.
	4126.000	39.5	6.0	135.0	1.2	3.0	0.0	V-Horn	AV	0.0	45.5	54.0	<b>)</b> -8.
	4076.000	38.1	6.0	221.0	1.3	3.0	0.0	H-Horn	AV	0.0	44.1		
	4126.000	50.2	6.0	31.0	1.5	3.0	0.0	H-Horn	PK	0.0	56.2		
	4076.000	46.3	6.0	226.0	1.1	3.0	0.0	V-Horn	PK	0.0	52.3		
	4176.000	45.1	5.9	143.0 135.0	1.3	3.0 3.0	0.0 0.0	H-Horn	PK	0.0	51.0 50.9		
	4126.000	44.9 43.6	6.0 6.0	135.0 221.0	1.2 1.3	3.0 3.0	0.0	V-Horn H-Horn	PK PK	0.0 0.0	50.9 49.6		
			0.0	221.0	1.3	3.0	0.0	11-110111	Γ'N	0.0	49.0	/4.0	J -∠4.
	4076.000 4176.000	42.5	5.9	145.0	1.2	3.0	0.0	V-Horn	PK	0.0	48.4	74.0	) -25.

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(MHz)			(degr	ees)	(meters															Bm)	(	dBm)		(dB)
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16844.000			1	40.0	1	.2						V-H	orn		PK					-39.8		-13.0	)	-26.8

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Attendees:	None													midity:		_	
Cust. Ref. No.: Tested by:	Rod Pole	auin					Dowory	Battery	,		В	aromet			29.75 EV01		
TEST SPECIFICAT		quin					Power:	Бацегу					<b>J</b> 0	b Site:			
Specification:		t 24E												Year:	2002		
	TIA/EIA-	603												Year:	1998		
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17066.000			180.0					H-Hor		PK				-42.2		-13.0	-29.2
17066.000			180.0	1.0				V-Hor	'n	PK				-41.9		-13.0	-28.9

# **RF Conducted Test Report from Sierra Wireless**

# FCC Part 22 and 24 800/1900 MHz CDMA DUAL BAND MODULE Model: SB555-S

Prepared by SIERRA WIRELESS INC. 13811 WIRELESS WAY RICHMOND, BC V6V 3A4 CANADA

**Test Date(s): September 2002** 

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# **1** Introduction and Purpose

This document provides the FCC test data for the SB555-S module. The tests included in this report are limited to all conducted tests required. Other radiated tests were performed at an external test facility.

# 2 Test Summary

FCC RULE	DESCRIPTION OF TEST	RESULT	PAGE
2.1046	RF Power Output	Complies	6
2.1049	Occupied Bandwidth	Complies	15
2.1051, 22.901(d)	Out of Band Emissions at Antenna	Complies	18
22.917(f),	Terminals		
24.238(a)	Mobile Emissions In Base Frequency		
	Range		
2.1053	Field Strength of Spurious Radiation	Complies	See CCS
			Report
2.1055	Frequency Stability vs Temperature	Complies	44
2.1055	Frequency Stability vs Voltage	Complies	45

The tests described in this report were performed by Mr. Sean Hoare, under the supervision of Mr Ron Vanderhelm, P.Eng. at

Sierra Wireless, Inc. 13811 Wireless Way Richmond, B.C. V6V 3A4 Canada

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			0

# **3 Product Description**

The Sierra Wireless Inc. model SB555-S is a dual band CDMA embedded modem.

EUT Type	Cellular and PCS CDMA Embedded Modem	
Whether quantity(>1) production	[X] Yes []No	
is planned		
Standards	CDMA2000	
Types of Emission	1M25F9W	
RF Output Power	824-849 MHz: 23.5 dBm max	
_	1850-1910 MHz: 23.5 dBm max	
	In both bands, power is variable to $-50$ dBm.	
Frequency Range	824-849 MHz, 1850-1910 MHz	

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# 4 Test Configuration

Tests were performed on the radio module alone. For frequency stability versus temperature, testing the module requires a wider range of temperature at the higher extreme to account for the insulating and warming affects of the end-user device. We test up to 70 degrees C for the module alone rather than just 50 deg C for the module in the end user device. For the effect of variation of DC power supply on frequency stability, the DC supply to the module was varied to the extremes of its specified voltage range, 3.15 to 4.2 volts.

Item #	Description	Model No.	Serial No.
1	Module EUT	SB555-S	E0207135003503C

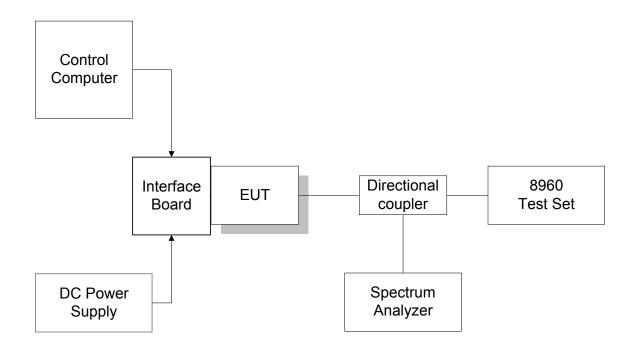
# 5 **RF Power Output**

FCC 2.1046

# 5.1 Test Procedure

The transmitter output was connected to an Agilent 8960 CDMA Test Set and configured to operate at maximum power. The power was measured at three equally spaced operating frequencies in each band and was confirmed by the plots taken on the Spectrum Analyzer.

# <u>Test Setup</u>



# 5.2 Test Equipment

# Instrument List

EQUIPMENT	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DATE
Control Computer	TC	Generic PC	100844	N/A
Wireless Test Set	Agilent	8960	US41070182	09/05/2001
Spectrum Analyzer	Agilent	PSA E4440A	US41421268	2002-01-25
DC Power Supply	HP	HP6632A	3326A-03423	N/A
Interface Board	Shop built	Nest	N/a	N/A
Directional Coupler	Pasternack	PE2209-10	N/A	N/A

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# 5.3 Test Results

Frequency (MHz)	Power (dBm)
824.70	23.28
836.52	23.50
848.31	23.30
1851.25	23.44
1880.0	23.69
1908.75	23.72

#### • Cellular Band (CDMA Mode)

Plot Number	Description
1.1	Low Channel (Ch 1013)
1.2	Middle Channel (Ch 384)
1.3	High Channel (Ch 777)

# • PCS Band (CDMA Mode)

Plot Number	Description
1.4	Low Channel (Ch 25)
1.5	Middle Channel (Ch 600)
1.6	High Channel (Ch 1175)

The Modem was calibrated to a maximum power of 23.5 dBm.

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#### Plot 1.1 Cellular Band (Low Channel)

\* Agilent 16:28:31 Sep 24, 2002

Ref 34 dBm Atten 30 dB Ext PG -17 dB #Norm Log 10 dB/WAY WAY WAY LgAv 20 W1 S2 Center 824.700 MHz Span 3 MHz Res BW 27 kHz #VBW 270 kHz Sweep 3.8 ms (601 pts) Power Spectral Density Channel Power

23.28 dBm / 2.0000 MHz

ower opectial Density

L

-39.73 dBm/Hz

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#### Plot 1.2 Cellular Band (Middle Channel)

🔆 Agilent 16:29:03 Sep 24, 2002

Ref 34 dBm Atten 30 dB Ext PG -17 dB #Norm Log 10 dB/N.W. Walter "NUM" W LgAv 20 W1 S2 Span 3 MHz Center 836.520 MHz Res BW 27 kHz #VBW 270 kHz Sweep 3.8 ms (601 pts) Power Spectral Density Channel Power

23.50 dBm / 2.0000 MHz

-39.51 dBm/Hz

L

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#### Plot 1.3 Cellular Band (High Channel)

🔆 Agilent 16:29:46 Sep 24, 2002

Ref 34 dBm Atten 30 dB Ext PG -17 dB #Norm Log 10 dB/W٧ en land and γw LgAv 20 W1 S2 Center 848.310 MHz Span 3 MHz Res BW 27 kHz #VBW 270 kHz Sweep 3.8 ms (601 pts) Power Spectral Density Channel Power

23.30 dBm / 2.0000 MHz

-39.71 dBm/Hz

L

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## Plot 1.4 PCS Band (Low Channel)

🔆 Agilent 16:25:49 Sep 24, 2002

Ref 34 dBm Atten 30 dB Ext PG -17 dB #Norm Log 10 dB/A HARAN LgAv 20 W1 S2 Center 1.851 250 GHz Span 3 MHz Res BW 27 kHz #VBW 270 kHz Sweep 3.8 ms (601 pts)

Channel Power

Power Spectral Density

L

23.44 dBm / 2.0000 MHz

-39.57 dBm/Hz

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#### Plot 1.4 PCS Band (Middle Channel)

🔆 Agilent 16:24:39 Sep 24, 2002

Ref 34 dBm Atten 30 dB Ext PG -17 dB #Norm Log 10 dB/₩₩ et ye we den den den de LgAv 20 W1 S2 Center 1.880 000 GHz Span 3 MHz Res BW 27 kHz #VBW 270 kHz Sweep 3.8 ms (601 pts) Power Spectral Density Channel Power

23.69 dBm / 2.0000 MHz

wer Spectral Density

L

-39.32 dBm/Hz

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## Plot 1.4 PCS Band (High Channel)

🔆 Agilent 16:26:50 Sep 24, 2002

Ref 34 dBm Atten 30 dB Ext PG -17 dB #Norm Log 10 dB/wat what W WAY WHEN et and the part of LgAv 20 W1 S2 Center 1.908 750 GHz Span 3 MHz Res BW 27 kHz #VBW 270 kHz Sweep 3.8 ms (601 pts) Channel Power

Power Spectral Density

L

23.72 dBm / 2.0000 MHz

-39.29 dBm/Hz

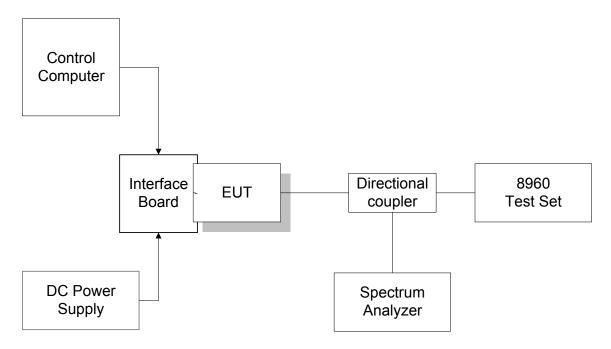
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# 6 Occupied Bandwidth FCC 2.1049

# 6.1 Test Procedure

The transmitter output was connected to a calibrated coaxial cable, the other end of which was connected to a spectrum analyzer. The occupied Bandwidth (defined as the 99% Power Bandwidth) was measured with the Spectrum Analyzer at the center frequency of each band.

# <u>Test Setup</u>



# 6.2 Test Equipment

EQUIPMENT	MANUFACTURER	MODEL NO.	SERIAL NO.	Last CAL.DATE
Spectrum Analyzer	Agilent	PSA E4440A	US41421268	2002-01-25
Interface Board	Shop built	Nest	N/a	N/a
Control Computer	TC	Generic PC	100844	N/a
DC Power Supply	HP	HP6632A	3326A-03423	N/a

# 6.3 Test Results

The performance of 800 MHz cellular band is shown in plots 2.1. Performance of 1900 MHz PCS band is shown in plots 2.3.

The test results shows that the bandwidth in all cases is approximately 1.270 MHz.

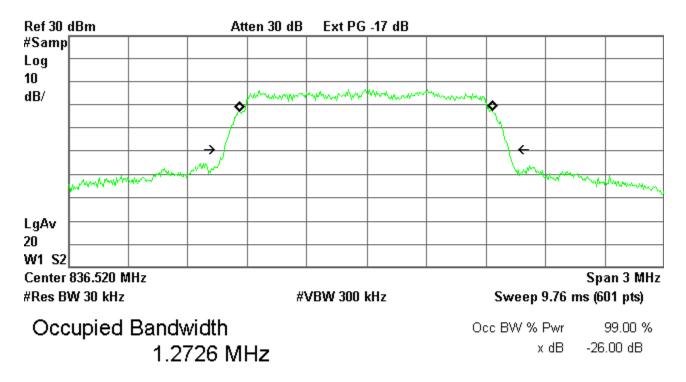
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## Plot 2.1 Cellular Band (Middle Channel)

🔆 Agilent 12:53:44 Sep 24, 2002



L

Transmit Freq Error	-1.760 kHz
x dB Bandwidth	1.432 MHz*

$  \Gamma \cup \Gamma $ and $22 \propto 24   \Gamma S   R C \cup 01   S \cup 0333-5   S \cup 012002   \Gamma B U \cup 012002   C \cup 01202   C \cup 012002$	FCC Part 22 & 24 Test Report	SB555-S	Sept 2002	Page 16 of 43
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#### Plot 2.2 PCS Band (Middle Channel)

🔆 Agilent 12:54:22 Sep 24, 2002

Ref 30 dBm Atten 30 dB Ext PG -17 dB #Samp[ Log 10 dB/ name LgAv 20 W1 S2 Center 1.880 000 GHz Span 3 MHz #Res BW 30 kHz #VBW 300 kHz Sweep 9.76 ms (601 pts) Occupied Bandwidth Occ BW % Pwr 99.00 % -26.00 dB 1.2716 MHz x dB

L

Transmit Freq Error	-106.709 Hz
x dB Bandwidth	1.434 MHz*

# 7 Out of Band Emissions at Antenna Terminals FCC 22.901(d), 22.917(f), 24.238(a)

### Out of Band Emissions:

The mean power of emissions must be attenuated below the mean power of the unmodulated carrier (P) on any frequency outside the frequency band by at least  $(43 + 10 \log P) dB$ , in this case, -13dBm.

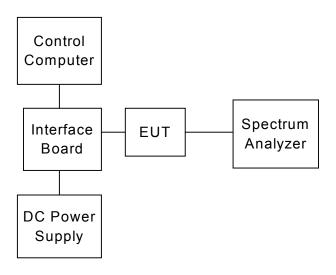
### Mobile Emissions in Base Frequency Range:

The mean power of any emissions appearing in the base station frequency range from cellular mobile transmitters operated must be attenuated to a level not exceed -80 dBm at the transmit antenna connector.

### 7.1 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 10<sup>th</sup> harmonic. The EUT was scanned for spurious emissions from 1MHz to 20GHz with sufficient bandwidth and video resolution. Data plots are included.

### <u>Test Setup</u>



## 7.2 Test Equipment

EQUIPMENT	MANUFACTURER	MODEL NO.	SERIAL NO.	Last CAL. DATE
Spectrum Analyzer	Agilent	PSA E4440A	US41421268	2002-01-25
Interface Board	Shop built	Nest	N/a	N/a
Control Computer	TC	Generic PC	100844	N/a
DC Power Supply	HP	HP6632A	3326A-03423	N/a
Directional Coupler	Pasternack	PE2209-10	N/A	N/A

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### 7.3 Test Results

Refer to the following plots.

#### • Cellular Band

<b>Plot Number</b>	Description
3.1a – 3.1c	Low channel, 824.70 MHz
3.2a - 3.2c	Middle Channel, 836.52 MHz
3.3a - 3.3c	High Channel, 848.31 MHz

#### • PCS Band

Plot Number	Description
3.4a - 3.4c	Low Channel, 1851.25 MHz
3.5a – 3.5c	Middle Channel, 1880 MHz
3.6a – 3.6c	High Channel, 1908.75 MHz

# • Emissions in Base Station Frequency Range, Cellular band

<b>Plot Number</b>	Description
3.7a	Low Channel, 824.70 MHz,
3.8a	Middle Channel, 836.52 MHz
3.9a	High Channel, 848.31 MHz

These plots show that the radiated emission limits requirements are met.

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### Plot 3.1a Out of Band Emissions at Antenna Terminals

Low channel, 824.700 MHz, 1 Mhz to 1 GHz

🔆 Agilent 17:34:57 Sep 18, 2002

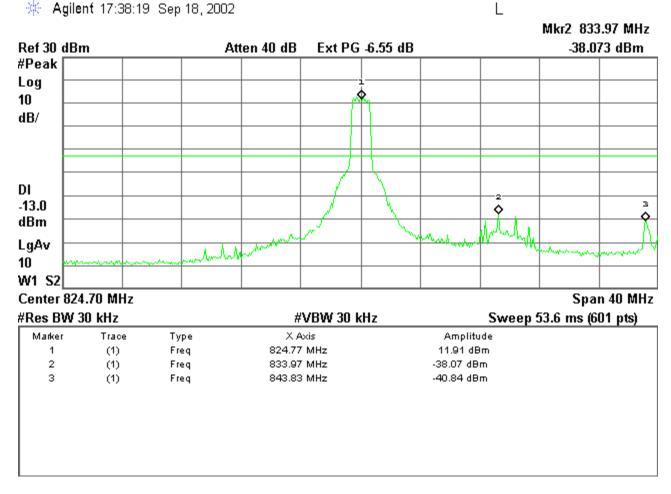
Ref 30 dBm Atten 40 dB Ext PG -6.55 dB #Peak Log 10 dB/ DI -13.0 around rear march march March and March and a state of the second and the second some marked and the second 1-al that we want to the mound dBm LgAv W1 S2 Start 1.0 MHz Stop 1.000 0 GHz Res BW 3 MHz Sweep 1.68 ms (601 pts) VBW 3 MHz Marker Trace Туре X Axis Amplitude 1 (1) Freq 825.2 MHz 26.58 dBm

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### Plot 3.1b Out of Band Emissions at Antenna Terminals

Low channel, 824.700 MHz TX signal +/- 20 MHz

🔆 Agilent 17:38:19 Sep 18, 2002

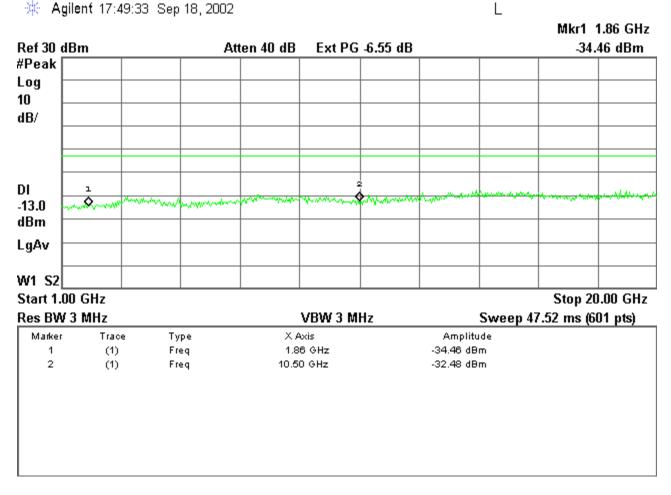


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### Plot 3.1c Out of Band Emissions at Antenna Terminals

Low channel, 824.700 MHz 1 GHz to 20 GHz

🔆 Agilent 17:49:33 Sep 18, 2002

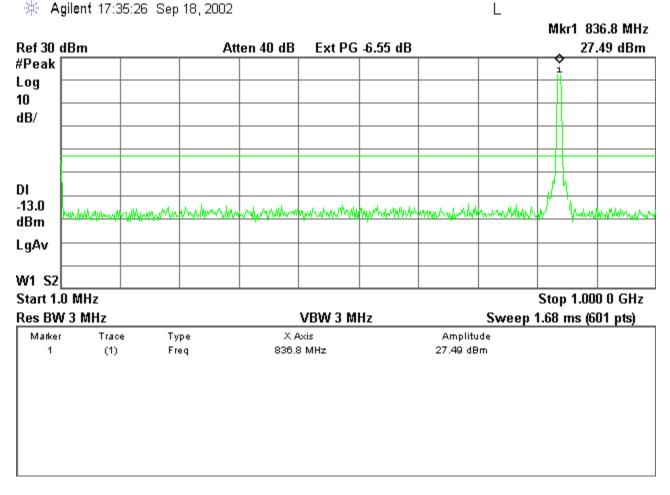


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### Plot 3.2a Out of Band Emissions at Antenna Terminals

Mid Channel, 836.52 MHz 1 MHz to 1 GHz

🔆 Agilent 17:35:26 Sep 18, 2002

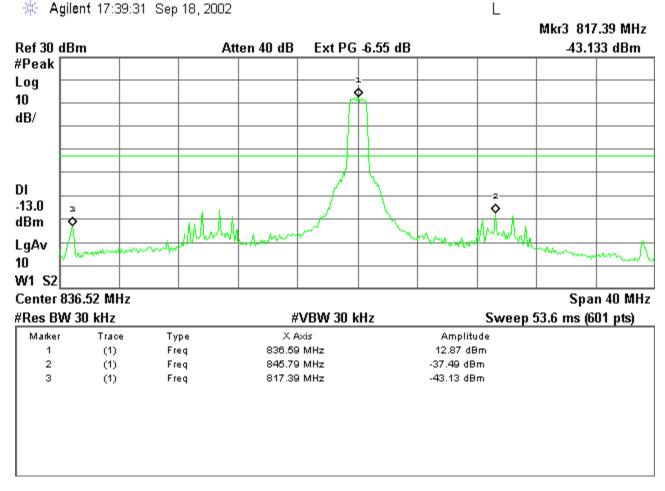


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### Plot 3.2b Out of Band Emissions at Antenna Terminals

Mid Channel, 836.52 MHz TX signal +/- 20 MHz

🔆 Agilent 17:39:31 Sep 18, 2002

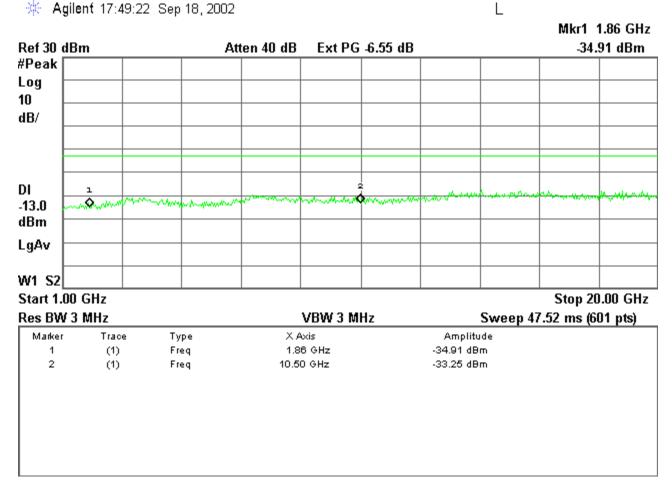


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### Plot 3.2c Out of Band Emissions at Antenna Terminals

Mid Channel, 836.52 MHz 1 GHz to 20 GHz

🔆 Agilent 17:49:22 Sep 18, 2002

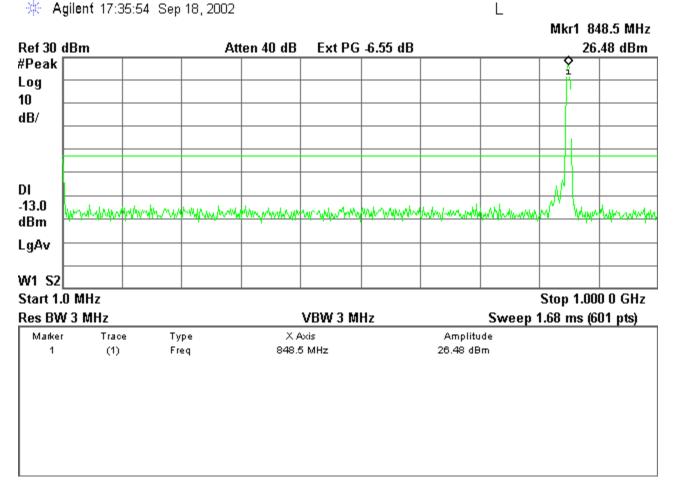


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### Plot 3.3a Out of Band Emissions at Antenna Terminals

High Channel, 848.31 MHz 1 Mhz to 1 GHz

🔆 Agilent 17:35:54 Sep 18, 2002

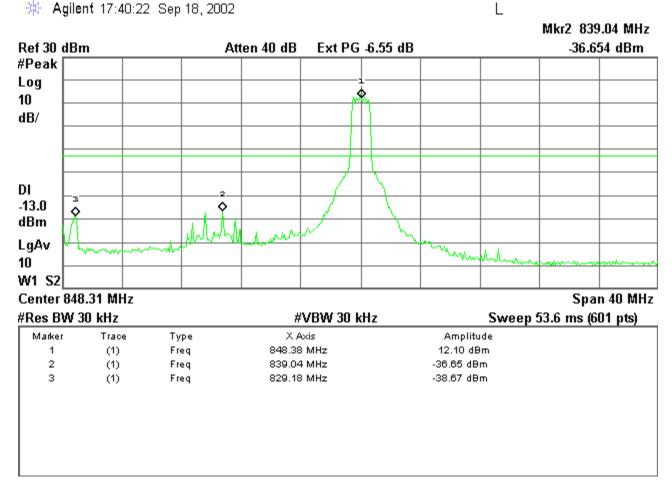


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### Plot 3.3b Out of Band Emissions at Antenna Terminals

High Channel, 848.31 MHz TX signal +/- 20 MHz

🔆 Agilent 17:40:22 Sep 18, 2002



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### Plot 3.3c Out of Band Emissions at Antenna Terminals

High Channel, 848.31 MHz 1 Ghz to 20 GHz

🔆 Agilent 17:49:09 Sep 18, 2002

Mkr1 1.86 GHz Ref 30 dBm Atten 40 dB Ext PG -6.55 dB -34.14 dBm #Peak Log 10 dB/ DI ı Courses. Sim -13.0 approximited the dBm LgAv W1 S2 Start 1.00 GHz Stop 20.00 GHz Res BW 3 MHz VBW 3 MHz Sweep 47.52 ms (601 pts) Marker Trace Туре X Axis Amplitude (1) Freq 1.86 GHz -34.14 dBm 1 2 (1) Freq 10.50 GHz -32.54 dBm

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## Plot 3.4a Out of Band Emissions at Antenna Terminals

Low channel, 1851.25 MHz 1 Mhz to 1 GHz

🔆 Agilent 17:36:19 Sep 18, 2002

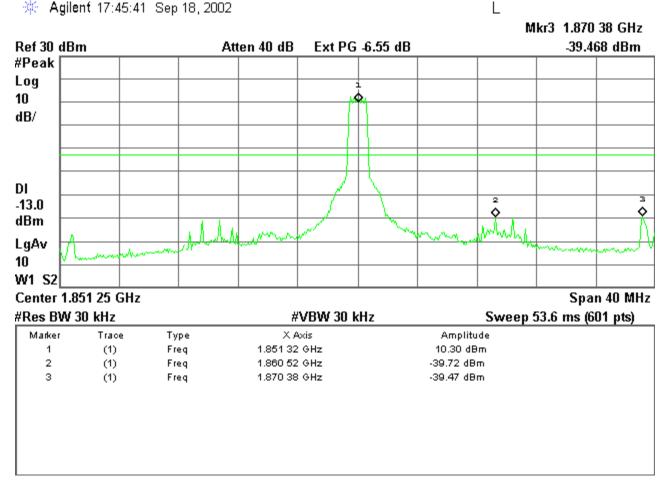
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	(1)		eq	0.00	5 MHz		-36.77 dB			

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### Plot 3.4b Out of Band Emissions at Antenna Terminals

Low channel, 1851.25 MHz TX signal +/- 20 MHz

🔆 Agilent 17:45:41 Sep 18, 2002

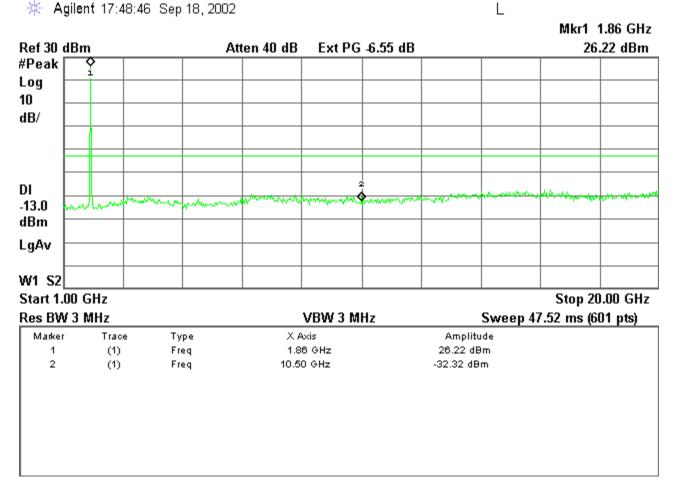


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## Plot 3.4c Out of Band Emissions at Antenna Terminals

Low channel, 1851.25 MHz 1 GHz to 20 GHz

🔆 Agilent 17:48:46 Sep 18, 2002



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## Plot 3.5a Out of Band Emissions at Antenna Terminals

Mid Channel, 1880 MHz 1 Mhz to 1 GHz

🔆 Agilent 17:36:50 Sep 18, 2002

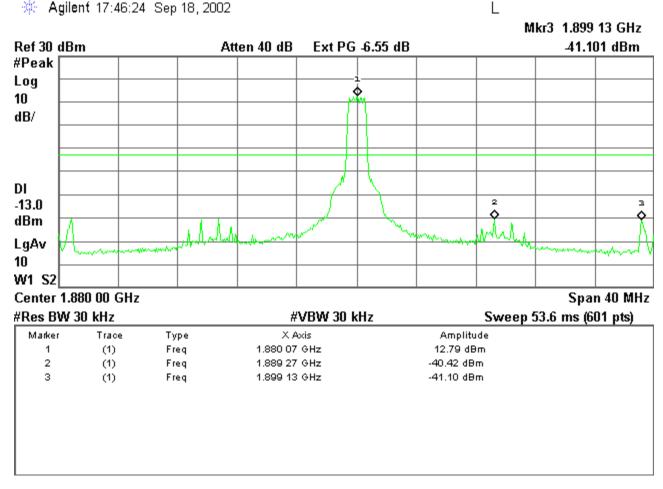
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	Stop 1.000 0 GHz
Av	Stop 1.000 0 GHz
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S2	-
32	-
rt 1.0 MHz	-
larker Trace Type X-Axis Amplitude	Amplitude
1 (1) Freq 848.5 MHz -35.16 dBm	-35.16 dBm

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### Plot 3.5b Out of Band Emissions at Antenna Terminals

Mid Channel, 1880 MHz TX signal +/- 20 MHz

🔆 Agilent 17:46:24 Sep 18, 2002

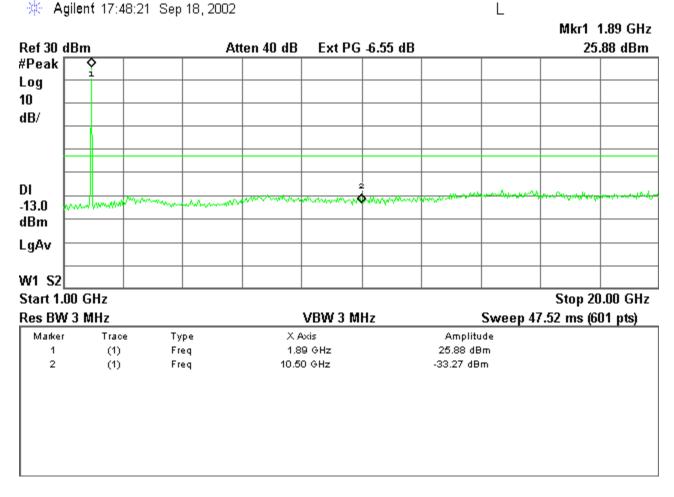


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### Plot 3.5c Out of Band Emissions at Antenna Terminals

Mid Channel, 1880 MHz 1 GHz to 20 GHz

🔆 Agilent 17:48:21 Sep 18, 2002



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## Plot 3.6a Out of Band Emissions at Antenna Terminals

High Channel, 1908.75 MHz 1 Mhz to 1 GHz

🔆 Agilent 17:37:06 Sep 18, 2002

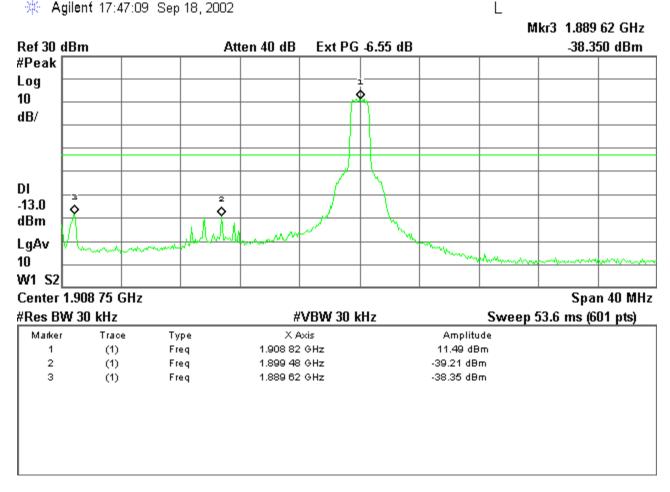
ef 30 d	:IBm		Att	ten 40 dB	Ext PG	-6.55 dB				48.5 MHz .73 dBm
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87										
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	(1)		•							

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### Plot 3.6b Out of Band Emissions at Antenna Terminals

High Channel, 1908.75 MHz TX signal +/- 20 MHz

🔆 Agilent 17:47:09 Sep 18, 2002

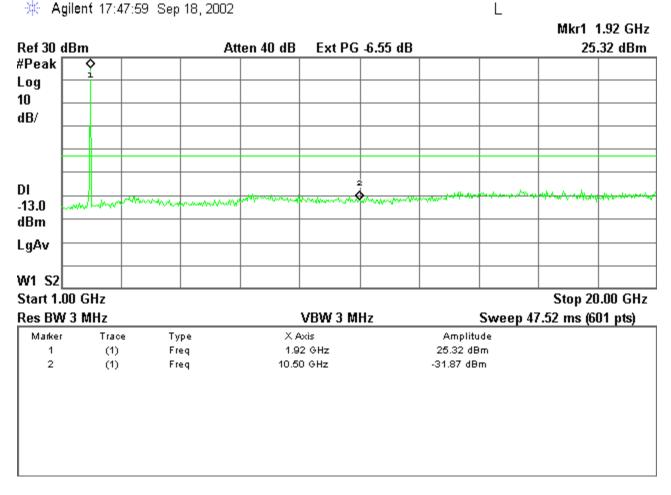


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### Plot 3.6c Out of Band Emissions at Antenna Terminals

High Channel, 1908.75 MHz 1 GHz to 20 GHz

🔆 Agilent 17:47:59 Sep 18, 2002



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#### Plot 3.7a Low Channel, 824.70 MHz

Mkr1 880.88 MHz Ref 0 dBm #Atten 16 dB Ext PG -6.4 dB -93.85 dBm Log 10 dB/ DI -80.0 dBm LgAv W1 S2 S3 FC AA FTun Swp And harder the many the state of the second st WAR ANY here M.M. Start 869.00 MHz Stop 894.00 MHz #Res BW 1 kHz VBW 1 kHz Sweep 30.14 s (601 pts)

🔆 Agilent 17:56:43 Sep 18, 2002

#Peak ¤(f):

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#### Plot 3.7a Middle Channel, 836.52 MHz

L Mkr1 880.88 MHz Ref 0 dBm #Atten 16 dB Ext PG -6.4 dB -93.31 dBm #Peak Log 10 dB/ DI -80.0 dBm LgAv W1 S2 S3 FC AA ¤(f): FTun Swp the books of the for the second and the second and the second and presented with Archard Murally and all was and nn Aml Start 869.00 MHz Stop 894.00 MHz #Res BW 1 kHz VBW 1 kHz Sweep 30.14 s (601 pts)

🔆 Agilent 17:57:31 Sep 18, 2002

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#### Plot 3.7c High Channel, 848.31 MHz

L Mkr1 880.88 MHz Ref 0 dBm -92.75 dBm #Atten 16 dB Ext PG -6.4 dB #Peak Log 10 dB/ DI -80.0 dBm LgAv W1 S2 S3 FC AA ¤(f): FTun Swp ı and allow when we want the way we want the all have by the prove of the second states and the second states an MANYANAWARA ANT ANY Same Start 869.00 MHz Stop 894.00 MHz #Res BW 1 kHz VBW 1 kHz Sweep 30.14 s (601 pts)

🔆 Agilent 17:58:40 Sep 18, 2002

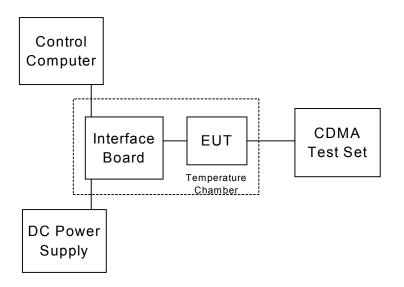
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# 8 Frequency Stability vs Temperature FCC 2.1055

### 8.1 Test Procedure

The SB555-S was placed inside the temperature chamber. The transmitting frequency error is measured at 25 deg C, then the temperature is set to -30 deg 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, then the measurement is repeated. This is repeated until 80 deg C is completed. Frequency metering included averaging of 50 samples per reading to stabilize the reading. Reference power supply voltage for these tests is 3.30 volts.

### Test Setup



## 8.2 Test Equipment

EQUIPMENT	MANUFACTURER	MODEL	SERIAL NO.	Last CAL. DATE
Wireless Test Set	Agilent	8960	US41070182	09/05/2001
DC Power Supply	Hewlett Packard	E3631A	MY40003202	1/11/00
Temperature Chamber	Sigma Systems	M30M	7550	N/a
Control Computer	ACT	Canadien	N/A	N/a
Interface Board	Shop built	Nest	N/a	N/a

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# 8.3 Test Results

PCS band

	1880.00 MHz	
Temperature	Frequency error	Worst case
(degC)	(Hz)	Frequency
		error (ppm)
25	1.83	.001
-30	1.21	001
-20	2.21	0
-10	2.22	.001
0	1.29	002
10	-0.32	002
20	-0.55	001
30	2.22	0
40	1.17	.001
50	1.65	.001
60	2.74	.001
70	1.18	.001
80	-1.89	.002

# 9 Frequency Stability vs Voltage FCC 2.1055

### 9.1 Test Procedure

The SB555-S was connected to a DC Power Supply and a CDMA test set with frequency error measurement capability. The power supply output is adjusted to the test voltage as measured at the input terminals to the module while transmitting. A voltmeter was used to confirm the terminal voltage.

The test voltages are:

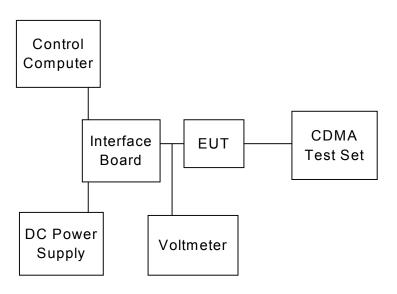
3.15 V, rated voltage

3.2 V, minimum specified operating voltage

4.2 V, maximum specified operating voltage.

The output frequency error was recorded for each voltage setting at one center channel for each band of operation. Frequency metering included averaging of 50 samples per reading to stabilize the reading.

### <u>Test Setup</u>



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### 9.2 Test Equipment

EQUIPMENT	MANUFACTURER	MODEL	SERIAL NO.	Last Cal. DATE
CDMA Test Set	Agilent	8960	US41070182	09/05/2001
DC Power Supply	Hewlett Packard	HP6632A	3326A-03423	N/A
Control Computer	TC	Generic PC	100844	N/a
Interface Board	Shop built	Nest	N/a	N/a
Voltmeter	Fluke	75III	78270326	21/12/01

### 9.3 Test Results

#### **Cellular Band**

Expected Transmitting Frequency : 837.00 MHz

Vcc (Volts)	Measured Frequency Error (Hz)	Measured Frequency Error (ppm) see note 1 below
3.3	2.77	.001 (+/006)
3.2	3.29	002 (+/006)
4.2	0.77	001 (+/006)

### PCS Band

Expected Transmitting Frequency: **1880 MHz** 

Vcc (Volts)	<b>Measured Frequency Error</b>	<b>Measured Frequency Error</b>
	(Hz)	(ppm) see note 1 below
3.3	2.00	0 (+/006)
3.2	1.02	.001 (+/006)
4.2	1.14	.001 (+/006)

Note 1 There is considerable short-term variation of the frequency as measured on an 8960 test set. Without averaging, an actual error of 0 Hz can appear to vary from -50 to +50 Hz from one sample to the next due to the effect of the CDMA modulation. Averaging helps steady this variation down to +/-5 Hz or less, and that is what was used for our tests. Observation of the readings by the test engineer are that the variation is symmetrical around 0 Hz.

This data shows that frequency stability versus voltage meets the requirements.