Exhibit J: Technical Report - Part 1 of 2

FCC ID: HN2ABTM3-3

BLUETOOTH APPROVALS

FCC Procedure Received from Joe Dichoso on 2-15-02

The following exhibit indicates the FCC Spread Spectrum requirements in Section 15.247 for devices meeting the Bluetooth Specifications in the 2.4 GHz band as of February 2001 operating in the USA. The purpose of this exhibit is to help expedite the approval process for Bluetooth devices. This exhibit provides items that vary for each device and also provides a list of items that are common to Bluetooth devices that explains the remaining requirements. The list of common items can be submitted for each application for equipment authorization. This exhibit only specifies requirements in Section 15.247, requirements in other rule Sections for intentional radiators such as in Section 15.203 or 15.207 must be also be addressed. A Bluetooth device is a FHSS transmitter in the data mode and applies as a Hybrid spread spectrum device in the acquisition mode.

For each individual device, the following items, 1-7 will vary from one device to another and must be submitted.

1) The occupied bandwidth in Section 15.247(a)(1)(ii).
2) Conducted output power specified in Section 15.247(b)(1).
3) EIRP limit in Section 15.247(b)(3).
4) RF safety requirement in Section 15.247(b)(4)
5) Spurious emission limits in Section 15.247(c).
6) Processing gain and requirements for Hybrids in Section 15.247(f) in the acquisition mode.
7) Power spectral density requirement in Section 15.247(f) in the acquisition mode.

For all devices, the following items, 1-12, are common to all Bluetooth devices and will not vary from one device to another. This list can be copied into the filing.

1 Output power and channel separation of a Bluetooth device in the different operating modes:

The different operating modes (data-mode, acquisition-mode) of a Bluetooth device don't influence the output power and the channel spacing. There is only one transmitter which is driven by identical input parameters concerning these two parameters.
Only a different hopping sequence will be used. For this reason, the RF parameters in one op-mode is sufficient.

2 Frequency range of a Bluetooth device:

The maximum frequency of the device is: **2402 – 2480 M**Hz.
This is according the Bluetooth Core Specification V 1.0B (+ critical errata) for devices which will be operated in the USA. Other frequency ranges (e.g. for Spain, France, Japan) which are allowed according the Core Specification must **not be** supported by the device.

3 Co-ordination of the hopping sequence in data mode to avoid simultaneous occupancy by multiple transmitters:

Bluetooth units which want to communicate with other units must be organized in a structure called piconet. This piconet consist of max. 8 Bluetooth units. One unit is the master the other seven are the slaves. The master co-ordinates frequency occupation in this piconet for all units. As the master hop sequence is derived from it's BD address which is unique for every Bluetooth device, additional masters intending to establish new piconets will always use different hop sequences.

4 Example of a hopping sequence in data mode:

Example of a 79 hopping sequence in data mode:
40, 21, 44, 23, 42, 53, 46, 55, 48, 33, 52, 35, 50, 65, 54, 67,
56, 37, 60, 39, 58, 69, 62, 71, 64, 25, 68, 27, 66, 57, 70, 59,
72, 29, 76, 31, 74, 61, 78, 63, 01, 41, 05, 43, 03, 73, 07, 75,
09, 45, 13, 47, 11, 77, 15, 00, 64, 49, 66, 53, 68, 02, 70, 06,
01, 51, 03, 55, 05, 04

5 Equally average use of frequencies in data mode and short transmissions:

The generation of the hopping sequence in connection mode depends essentially on two input values:

1. LAP/UAP of the master of the connection
2. Internal master clock

The LAP (lower address part) are the 24 LSB's of the 48 BD_ADDRESS. The BD_ADDRESS is an unambiguous number of every Bluetooth unit. The UAP (upper address part) are the 24 MSB's of the 48 BD_ADDRESS. The internal clock of a Bluetooth unit is derived from a free running clock which is never adjusted and is never turned off. For synchronization with other units, only the offsets are used. It has no relation to the time of the day. Its resolution is at least half the RX/TX slot length of 312.5 µs. The clock has a cycle of about one day (23h30). In most case it is implemented as 28 bit counter. For the deriving of the hopping sequence the entire LAP (24 bits), 4 LSB's (4 bits) (Input 1) and the 27 MSB's of the clock (Input 2) are used. With this input values different mathematical procedures (permutations, additions, XOR-operations) are performed to generate the sequence. This will be done at the beginning of every new transmission.

Regarding short transmissions, the Bluetooth system has the following behavior:
The first connection between the two devices is established, a hopping sequence is generated. For transmitting the wanted data, the complete hopping sequence is not used and the connection ends. The second connection will be established. A new hopping sequence is generated. Due to the fact that the Bluetooth clock has a different value, because the period between the two transmission is longer (and it cannot be shorter) than the minimum resolution of the clock (312.5 µs). The hopping sequence will always differ from the first one.

6 Receiver input bandwidth, synchronization and repeated single or multiple packets:

The input bandwidth of the receiver is 1 MHz.
In every connection, one Bluetooth device is the master and the other one is the slave. The master determines the hopping sequence (see chapter 5). The slave follows this sequence. Both devices shift between RX and TX time slot according to the clock of the master. Additionally the type of connection (e.g. single or multi-slot packet) is set up at the beginning of the connection. The master adapts its hopping frequency and its TX/RX timing is according to the packet type of the connection. Also, the slave of the connection uses these settings. Repeating of a packet has no influence on the hopping sequence. The hopping sequence generated by the master of the connection will be followed in any case. That means, a repeated packet will not be send on the same frequency, it is send on the next frequency of the hopping sequence

7 Dwell time in data mode

The dwell time of 0.3797s within a 30 second period in data mode is independent from the packet type (packet length). The calculation for a 30 second period is a follows:
Dwell time = time slot length * hop rate / number of hopping channels *30s
Example for a DH1 packet (with a maximum length of one time slot)
Dwell time = 625 µs * 1600 1/s / 79 * 30s = 0.3797s (in a 30s period)

For multi-slot packet the hopping is reduced according to the length of the packet.
Example for a DH5 packet (with a maximum length of five time slots)
Dwell time = 5 * 625 µs * 1600 * 1/5 *1/s / 79 * 30s = 0.3797s (in a 30s period)
This is according the Bluetooth Core Specification V 1.0B (+ critical errata) for all Bluetooth devices. Therefore, all Bluetooth devices **comply** with the FCC dwell time requirement in the data mode.
This was checked during the Bluetooth Qualification tests.
The Dwell time in hybrid mode is approximately 2.6 mS (in a 12.8s period)

8 Channel Separation in hybrid mode

The nominal channel spacing of the Bluetooth system is 1Mhz independent of the operating mode.
The maximum "initial carrier frequency tolerance" which is allowed for Bluetooth is fcenter = 75 kHz.
This was checked during the Bluetooth Qualification tests (Test Case: TRM/CA/07-E) for three frequencies (2402, 2441, 2480 MHz).

9 Derivation and examples for a hopping sequence in hybrid mode

For the generation of the inquiry and page hop sequences the same procedures as described for the data mode are used (see item 5), but this time with different input vectors:
**For the inquiry hop sequence, a predefined fixed address is always used. This results in the same 32 frequencies used by all devices doing an inquiry but every time with a different start frequency and phase in this sequence.
**For the page hop sequence, the device address of the paged unit is used as the input vector. This results in the use of a subset of 32 frequencies which is specific for that initial state of the connection establishment between the two units. A page to different devices would result in a different subset of 32 frequencies.
So it is ensured that also in hybrid mode, the frequency is used equally on average.
Example of a hopping sequence in inquiry mode:
48, 50, 09, 13, 52, 54,41, 45, 56, 58, 11, 15, 60, 62, 43, 47, 00, 02, 64, 68, 04, 06, 17, 21, 08, 10, 66, 70, 12, 14, 19, 23
Example of a hopping sequence in paging mode:
08, 57, 68, 70, 51, 02, 42, 40, 04, 61, 44, 46, 63, 14, 50, 48, 16, 65, 52, 54, 67, 18, 58, 56, 20, 53, 60, 62, 55, 06, 66, 64

10 Receiver input bandwidth and synchronization in hybrid mode:

The receiver input bandwidth is the same as in the data mode (1 MHz). When two Bluetooth devices establish contact for the first time, one device sends an inquiry access code and the other device is scanning for this inquiry access code. If two devices have been connected previously and want to start a new transmission, a similar procedure takes place. The only difference is, instead of the inquiry access code, a special access code, derived from the BD_ADDRESS of the paged device will be, will be sent by the master of this connection. Due to the fact that both units have been connected before (in the inquiry procedure) the paging unit has timing and frequency information about the page scan of the paged unit. For this reason the time to establish the connection is reduced.

11 Spread rate / data rate of the direct sequence signal

The Spread rate / Data rate in inquiry and paging mode can be defined via the access code. The access code is the only criterion for the system to check if there is a valid transmission or not. If you regard the presence of a valid access code as one bit of information, and compare it with the length of the access code of 68 bits, the Spread rate / Data rate will be 68/1.

12 Spurious emission in hybrid mode

The Dwell in hybrid mode is shorter than in data mode. For this reason the spurious emissions average level in data mode is worst case. The spurious emissions peak level is the same for both modes.

Spurious Radiated Emissions Test Report from NWEMC

FCC ID: HN2ABTM3-3

Purpose: This exhibit was used for the certification of FCC ID: HN2SB555-2. While simultaneously transmitting, spurious emissions from FCC ID: HN2SB555-2 were compared to 22.917(e) and 24.238(a) limits; and spurious emissions from FCC ID: HN22011B-2 were compared to 15.247(c) limits.

Simultaneous Transmission: FCC ID: HN2ABTM3-3 will be co-located with two other radios: FCC ID:HN2SB555-2 (CDMA radio), and FCC ID:HN22011B-2 (802.11(b) 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 FCCID: HN2ABTM3-3 has such a low EIRP (.001W) and is a frequency hopper, the worst case simultaneous transmission mode was determined to be the CDMA radio transmitting simultaneously with the 802.11(b) radio (EIRP = 0.056 W & single channel operation). The CDMA radio 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 CDMA radio 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.

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:
Low
Mid
High

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 Investigated			
Start Frequency	30 MHz	Stop Frequency	25 GHz

Software\Firmware Applied During Test			
Exercise software	Sierra SMART	Version	V.046
Description			
The system was tested using special software developed to test all functions of the 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

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

Requirement: 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).

Configuration: 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 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 ½ 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 ½ 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.

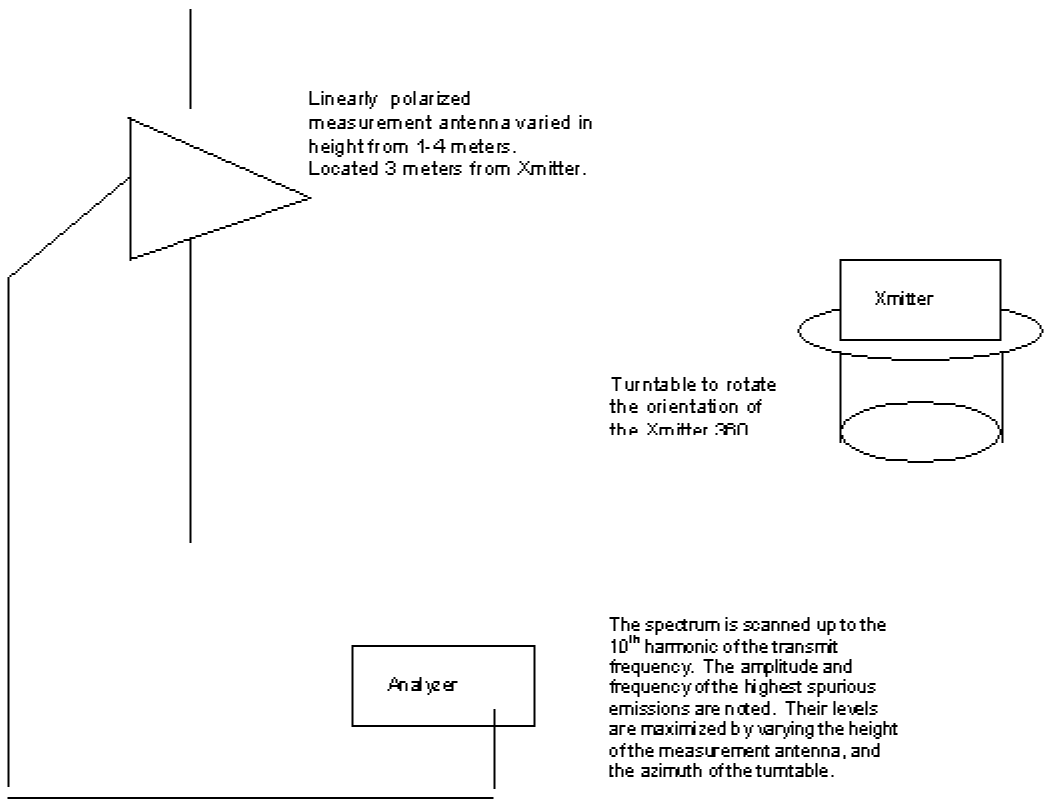
In addition, all the possible combinations of harmonic emissions from the EUT and the 802.11(b) radio were compared numerically. It was determined that only channels 526 (1876 MHz) and 930 (1896 MHz) in PCS mode could have harmonic emissions that coincide with the center frequency of harmonic emissions 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.

Bandwidths Used for Measurements

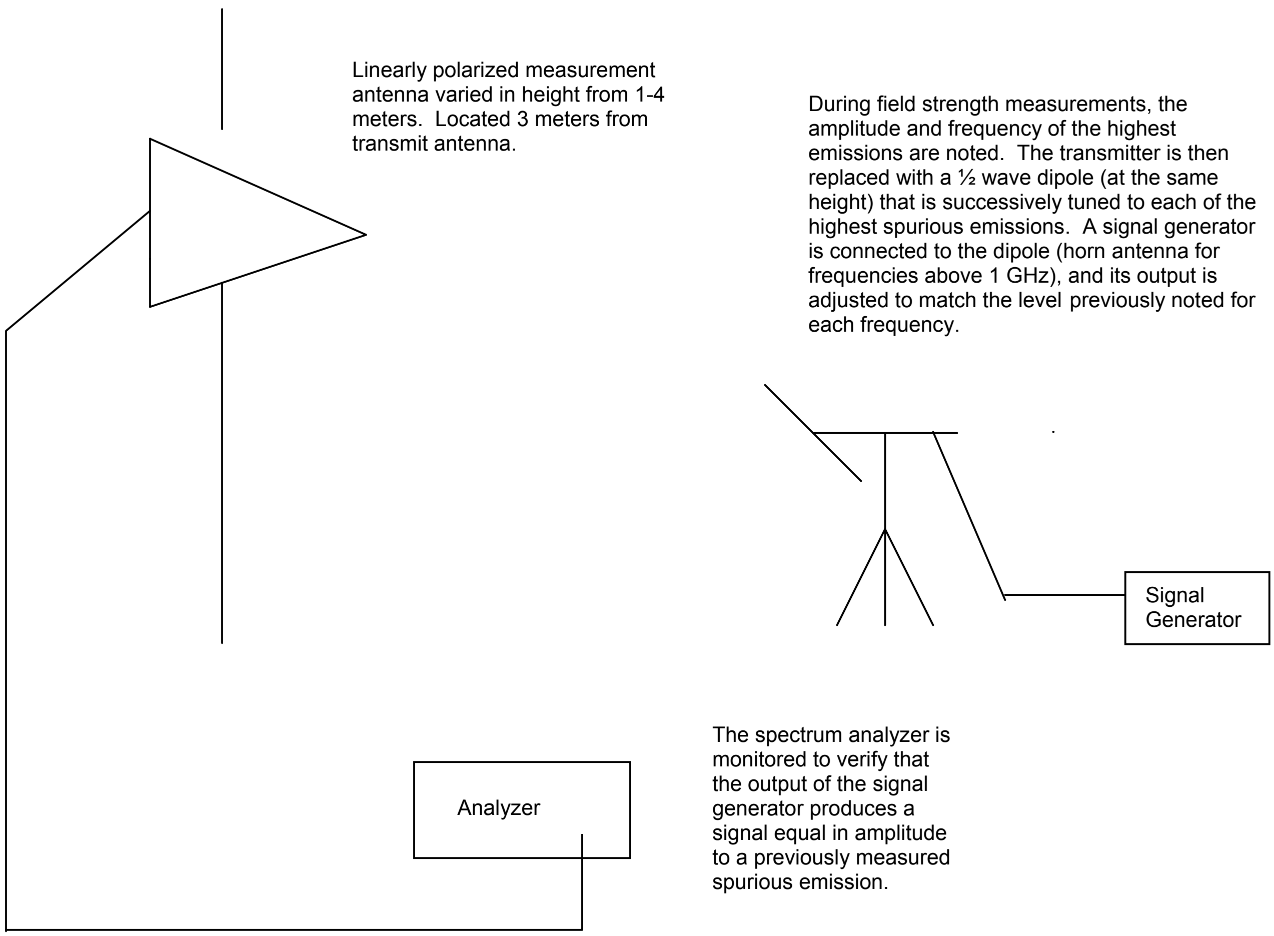
Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 – 0.15	1.0	0.2	0.2
0.15 – 30.0	10.0	9.0	9.0
30.0 – 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0
Measurements were made using the bandwidths and detectors specified. No video filter was used.			

Test Setup Diagram

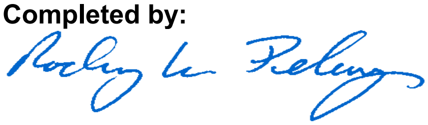
Test Setup for Field Strength Measurements



Test Setup for Power Measurements Utilizing the Antenna Substitution Method



Completed by:



NORTHWEST
EMC

Apparent Power Data Sheet

REV df3.02 10/23/2002

EUT:	SB555 Radio used in Model 700C			Work Order:	INMC0044
Serial Number:	6301FEOC			Date:	12/31/02
Customer:	INTERMEC Corporation			Temperature:	73
Attendees:	None			Humidity:	34%
Cust. Ref. No.:				Barometric Pressure	29.75
Tested by:	Rod Peloquin	Power:	Battery	Job Site:	EV01

TEST SPECIFICATIONS

Specification:	FCC Part 24E	Year:	2002
Method:	TIA/EIA-603	Year:	1998

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS

Antenna PSTGO-900 / 1900SCI

EUT OPERATING MODES

Transmitting in PCS mode and 802.11(b) mode

DEVIATIONS FROM TEST STANDARD

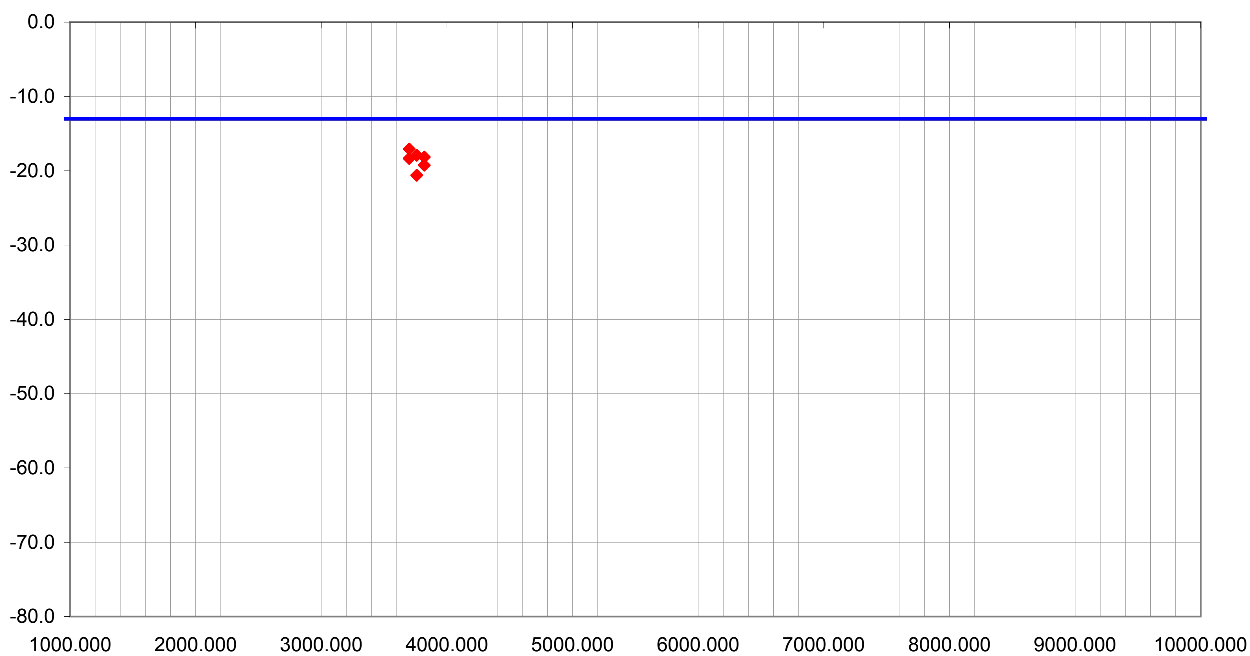
No deviations.

RESULTS

RESULTS	Test Distance (m)	Run #
Pass	3	14

Other

Tested By:



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector		EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
3699.356			71.0	2.0			H-Horn	PK		-17.1	-13.0	-4.1	Low Channel
3759.348			49.0	1.9			H-Horn	PK		-17.9	-13.0	-4.9	Mid Channel
3819.360			20.0	1.9			H-Horn	PK		-19.2	-13.0	-6.2	High Channel
3819.360			344.0	1.0			V-Horn	PK		-18.2	-13.0	-5.2	High Channel
3699.356			153.0	1.0			V-Horn	PK		-18.3	-13.0	-5.3	Low Channel
3759.400			355.0	1.3			V-Horn	PK		-20.6	-13.0	-7.6	Mid Channel

NORTHWEST
EMC

Apparent Power Data Sheet

REV df3.02 10/23/2002

EUT:	SB555 Radio used in Model 700C	Work Order:	INMC0044
Serial Number:	6301FEOC	Date:	12/31/02
Customer:	INTERMEC Corporation	Temperature:	73
Attendees:	None	Humidity:	34%
Cust. Ref. No.:		Barometric Pressure	29.75
Tested by:	Rod Peloquin Power: Battery	Job Site:	EV01

TEST SPECIFICATIONS

Specification:	FCC Part 22.901(d)	Year:	2002
Method:	TIA/EIA-603	Year:	1998

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS

Antenna PSTGO-900 / 1900SCI

EUT OPERATING MODES

Transmitting in Cellular mode and 802.11(b) mode

DEVIATIONS FROM TEST STANDARD

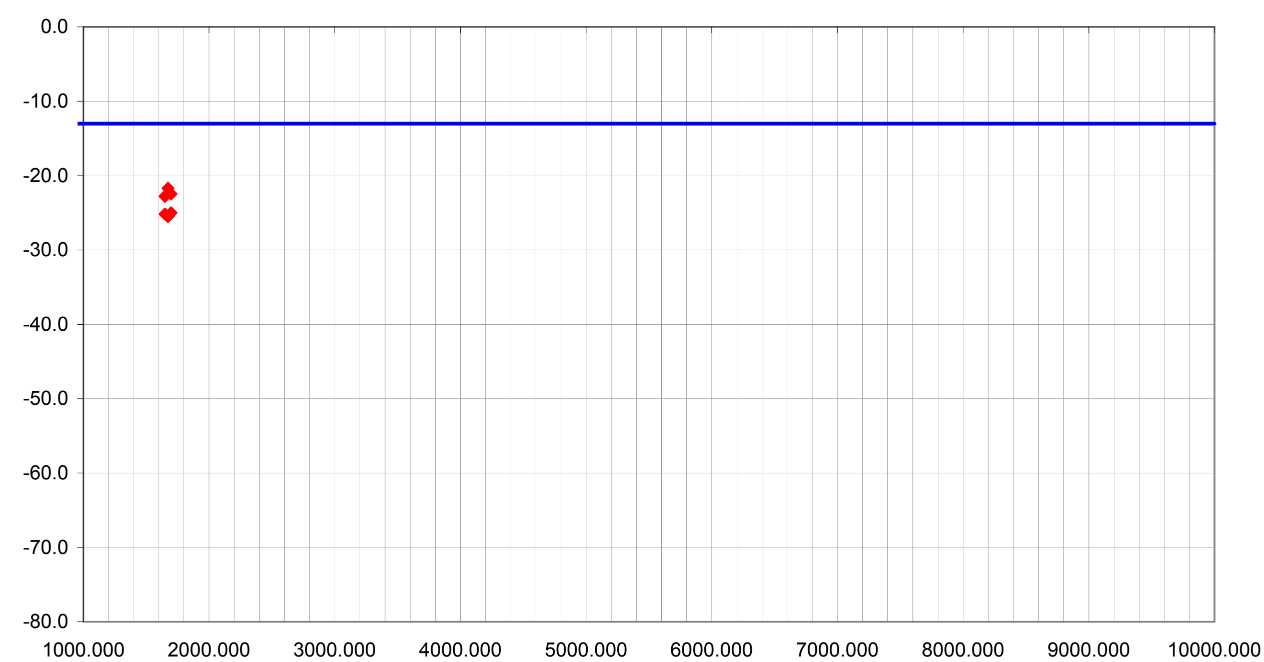
No deviations.

RESULTS

RESULTS	Test Distance (m)	Run #
Pass	3	16

Other

Tested By:



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector		EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
1673.360			319.0	1.2			V-Horn	PK		-21.7	-13.0	-8.7	Mid Channel
1697.360			113.0	1.3			H-Horn	PK		-25.0	-13.0	-12.0	High Channel
1697.360			19.0	1.2			V-Horn	PK		-22.5	-13.0	-9.5	High Channel
1649.360			78.0	1.3			H-Horn	PK		-25.2	-13.0	-12.2	Low Channel
1649.360			116.0	1.2			V-Horn	PK		-22.8	-13.0	-9.8	Low Channel
1673.360			176.0	1.3			H-Horn	PK		-25.5	-13.0	-12.5	Mid Channel

NORTHWEST
EMC

OATS DATA SHEET

REV
df3.02
10/23/2002

EUT:	SB555 Radio used in Model 700C			Work Order:	INMC0044
Serial Number:	6301FEOC			Date:	01/02/03
Customer:	INTERMEC Corporation			Temperature:	72
Attendees:	None			Humidity:	35%
Cust. Ref. No.:				Barometric Pressure	29.92
Tested by:	Rod Peloquin	Power:	Battery	Job Site:	EV01

TEST SPECIFICATIONS

Specification:	FCC Part 15.247(c)	Year:	2001
Method:	ANSI C63.4	Year:	1992

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS

Antenna PSTGO-900 / 1900SCI

EUT OPERATING MODES

Transmitting in Cellular mode and 802.11(b) mode

DEVIATIONS FROM TEST STANDARD

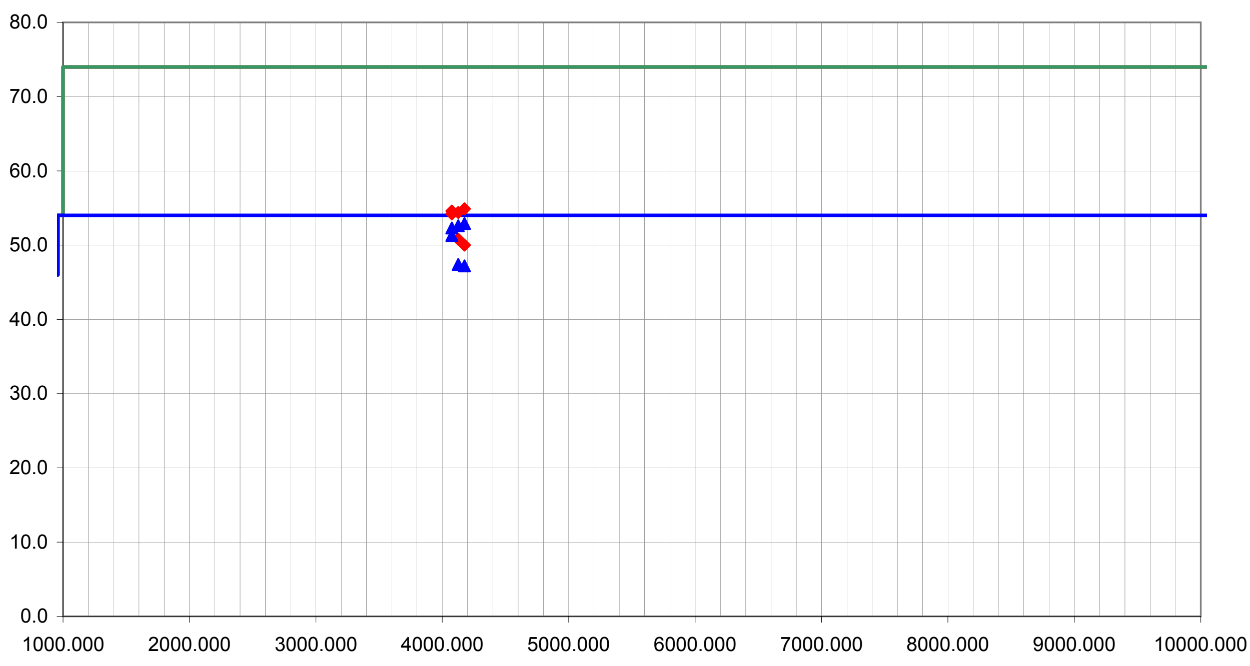
No deviations.

RESULTS

RESULTS	Test Distance (m)	Run #
Pass	3	18

Other

Tested By:



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
4176.000	47.0	5.9	16.0	1.3	3.0	0.0	H-Horn	AV	0.0	52.9	54.0	-1.1	High Channel
4126.000	46.6	6.0	360.0	1.7	3.0	0.0	H-Horn	AV	0.0	52.6	54.0	-1.4	Mid Channel
4076.000	46.3	6.0	86.0	1.3	3.0	0.0	V-Horn	AV	0.0	52.3	54.0	-1.7	Low Channel
4076.000	45.3	6.0	66.0	1.8	3.0	0.0	H-Horn	AV	0.0	51.3	54.0	-2.7	Low Channel
4126.000	41.4	6.0	348.0	1.3	3.0	0.0	V-Horn	AV	0.0	47.4	54.0	-6.6	Mid Channel
4176.000	41.3	5.9	342.0	1.1	3.0	0.0	V-Horn	AV	0.0	47.2	54.0	-6.8	High Channel
4176.000	49.0	5.9	16.0	1.3	3.0	0.0	H-Horn	PK	0.0	54.9	74.0	-19.1	High Channel
4076.000	48.6	6.0	86.0	1.3	3.0	0.0	V-Horn	PK	0.0	54.6	74.0	-19.4	Low Channel
4126.000	48.4	6.0	360.0	1.7	3.0	0.0	H-Horn	PK	0.0	54.4	74.0	-19.6	Mid Channel
4076.000	48.2	6.0	66.0	1.8	3.0	0.0	H-Horn	PK	0.0	54.2	74.0	-19.8	Low Channel
4126.000	44.8	6.0	348.0	1.3	3.0	0.0	V-Horn	PK	0.0	50.8	74.0	-23.2	Mid Channel
4176.000	44.1	5.9	329.0	1.2	3.0	0.0	V-Horn	PK	0.0	50.0	74.0	-24.0	High Channel

NORTHWEST

EMC

OATS DATA SHEET

REV
df3.02
10/23/2002

EUT:	SB555 Radio used in Model 700C	Work Order:	INMC0044
Serial Number:	6301FEOC	Date:	01/02/03
Customer:	INTERMEC Corporation	Temperature:	73
Attendees:	None	Humidity:	34%
Cust. Ref. No.:		Barometric Pressure	29.75
Tested by:	Rod Peloquin Power: Battery	Job Site:	EV01

TEST SPECIFICATIONS

Specification:	FCC Part 15.247(c)	Year:	2001
Method:	ANSI C63.4	Year:	1992

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS

Antenna PSTGO-900 / 1900SCI

EUT OPERATING MODES

Transmitting in PCS mode and 802.11(b) mode

DEVIATIONS FROM TEST STANDARD

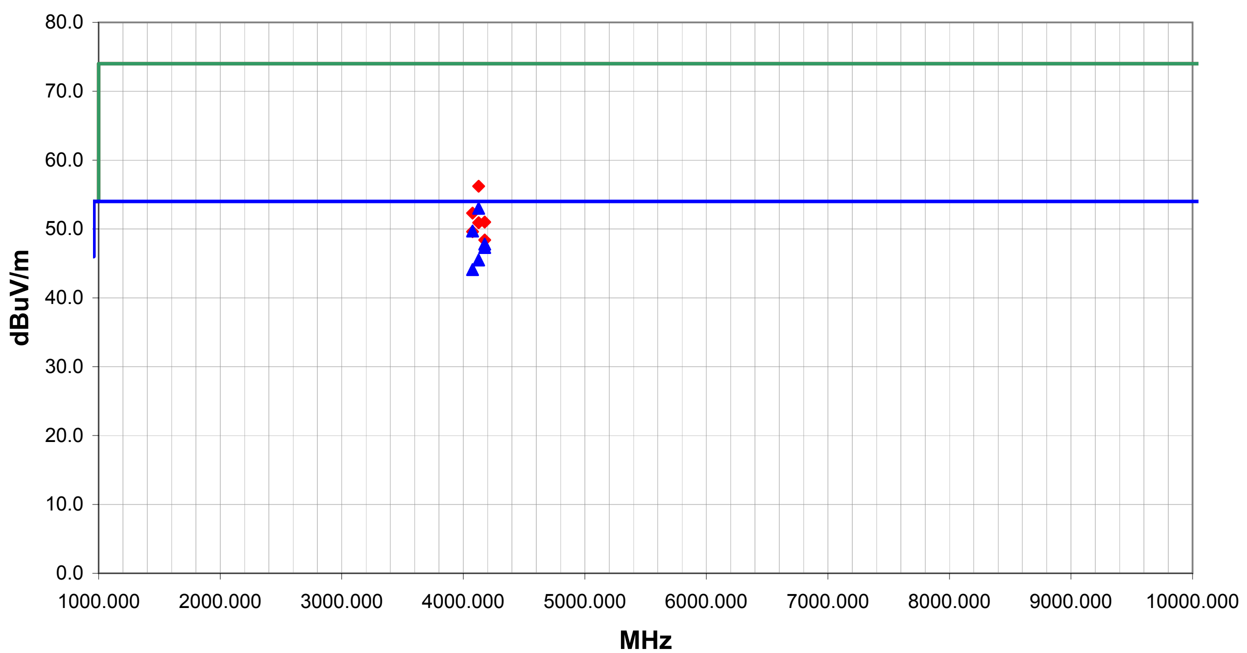
No deviations.

RESULTS

RESULTS	Test Distance (m)	Run #
Pass	3	20

Other

Tested By:



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
4126.000	47.0	6.0	31.0	1.5	3.0	0.0	H-Horn	AV	0.0	53.0	54.0	-1.0	Mid Channel
4076.000	43.7	6.0	226.0	1.1	3.0	0.0	V-Horn	AV	0.0	49.7	54.0	-4.3	Low Channel
4176.000	41.9	5.9	57.0	1.2	3.0	0.0	V-Horn	AV	0.0	47.8	54.0	-6.2	High Channel
4176.000	41.4	5.9	143.0	1.3	3.0	0.0	H-Horn	AV	0.0	47.3	54.0	-6.7	High Channel
4126.000	39.5	6.0	135.0	1.2	3.0	0.0	V-Horn	AV	0.0	45.5	54.0	-8.5	Mid Channel
4076.000	38.1	6.0	221.0	1.3	3.0	0.0	H-Horn	AV	0.0	44.1	54.0	-9.9	Low Channel
4126.000	50.2	6.0	31.0	1.5	3.0	0.0	H-Horn	PK	0.0	56.2	74.0	-17.8	Mid Channel
4076.000	46.3	6.0	226.0	1.1	3.0	0.0	V-Horn	PK	0.0	52.3	74.0	-21.7	Low Channel
4176.000	45.1	5.9	143.0	1.3	3.0	0.0	H-Horn	PK	0.0	51.0	74.0	-23.0	High Channel
4126.000	44.9	6.0	135.0	1.2	3.0	0.0	V-Horn	PK	0.0	50.9	74.0	-23.1	Mid Channel
4076.000	43.6	6.0	221.0	1.3	3.0	0.0	H-Horn	PK	0.0	49.6	74.0	-24.4	Low Channel
4176.000	42.5	5.9	145.0	1.2	3.0	0.0	V-Horn	PK	0.0	48.4	74.0	-25.6	High Channel

NORTHWEST
EMC

Apparent Power Data Sheet

REV
df3.02
10/23/2002

EUT:	**SB555 Radio used in Model 700C**			**Work Order:**	**INMC0044**
Serial Number:	**6301FEOC**			**Date:**	**12/31/02**
Customer:	**INTERMEC Corporation**			**Temperature:**	**75**
Attendees:	**None**			**Humidity:**	**33%**
Cust. Ref. No.:				**Barometric Pressure**	**29.75**
Tested by:	**Rod Peloquin**	**Power:**	**Battery**	**Job Site:**	**EV01**

TEST SPECIFICATIONS

Specification:	**FCC Part 24E**	**Year:**	**2002**
Method:	**TIA/EIA-603**	**Year:**	**1998**

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS

Antenna PSTGO-900 / 1900SCI

EUT OPERATING MODES

Transmitting in Channel 526 (1876MHz) PCS mode and Channel 1 (2412MHz) 802.11(b) mode

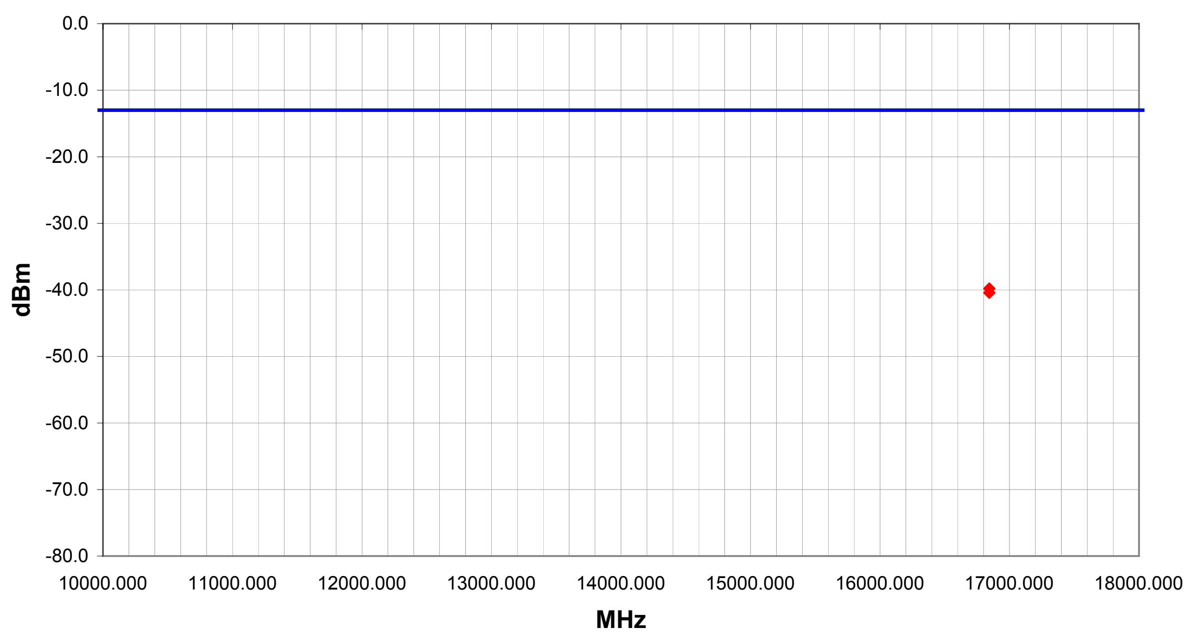
DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS	**Test Distance (m)**	**Run #**
Pass	**1**	**22**

Other

Tested By:



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector		EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
16844.000			135.0	1.2			H-Horn	PK		-40.4	-13.0	-27.4
16844.000			140.0	1.2			V-Horn	PK		-39.8	-13.0	-26.8

NORTHWEST
EMC

Apparent Power Data Sheet

REV
df3.02
10/23/2002

EUT:	SB555 Radio used in Model 700C			Work Order:	INMC0044
Serial Number:	6301FEOC			Date:	12/31/02
Customer:	INTERMEC Corporation			Temperature:	73
Attendees:	None			Humidity:	34%
Cust. Ref. No.:				Barometric Pressure	29.75
Tested by:	Rod Peloquin	Power:	Battery	Job Site:	EV01

TEST SPECIFICATIONS

Specification:	FCC Part 24E	Year:	2002
Method:	TIA/EIA-603	Year:	1998

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS

Antenna PSTGO-900 / 1900SCI

EUT OPERATING MODES

Transmitting in Channel 930 (1896MHz) PCS mode and Channel 6 (2437MHz) 802.11(b) mode

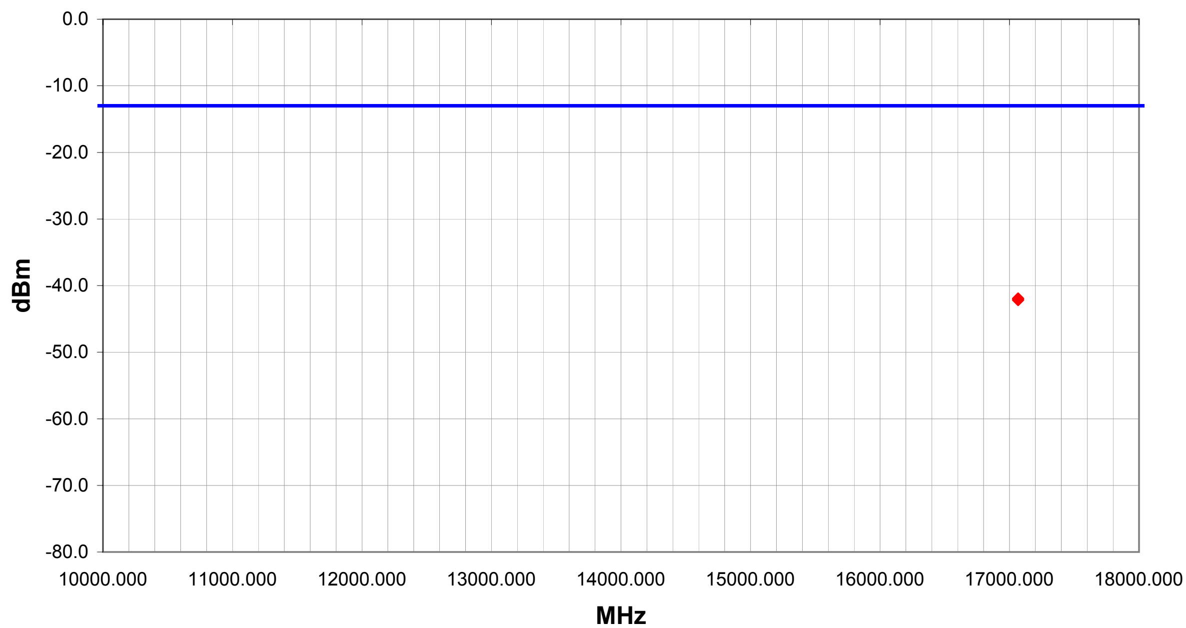
DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS	Test Distance (m)	Run #
Pass	1	24

Other

Tested By:



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector		EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
17066.000			180.0	1.0			H-Horn	PK		-42.2	-13.0	-29.2
17066.000			180.0	1.0			V-Horn	PK		-41.9	-13.0	-28.9

MEASUREMENT/TECHNICAL REPORT

Technologies Corporation
EMC Test Laboratory
Cedar Rapids, IA

Intermec Technologies Corporation
ABTM3 Radio Module

REPORT NO: 20011018-1

DATE: October 18, 2001

This report concerns: ABTM3 Radio Module, Hybrid Mode Operation

Equipment Type: 2400- 2483.5 MHz Frequency Hopping Spread Spectrum Transceiver,
FCC 15.247
Industry Canada RSS-210 Issue 4

Measurement procedure used: FCC Guidance for DSSS Systems FCC 97-114

Report Prepared by:

Dave Fry
Intermec Technologies Corporation
EMC Test Lab
550 Second Street S.E.
Cedar Rapids, Iowa 52401
Phone: (319) 846-2415
FAX: (319) 846-2475

Report Prepared For:

Intermec Technologies Corporation
550 Second Street S.E.
Cedar Rapids, Iowa 52401
Phone: (319) 369-3100
FAX: (319) 369-3299

This report contains data that is outside the NVLAP scope of accreditation.

TABLE OF CONTENTS

xxx = file extension .doc, .xls or .pdf

1.0 COMPLIANCE CERTIFICATION

The electromagnetic compatibility test and data evaluations findings of this report have been prepared by the EMC Test Lab, Intermec Technologies Corporation, in accordance with applicable specifications instructions required per-

FCC SECTION	CANADA RSS-210	TEST NAME
15.247 (f)	6.2.2(o)(c)	Hybrid Systems Process Gain Average Time Channel Occupancy Channel Separation and Bandwidth 20 dB BW 6 dB BW Power Spectral Density

The data, data evaluation and equipment configuration represented herein are a true and accurate representation of the measurements of the test sample's electromagnetic compatibility characteristics as of the dates and at the times of the test under the conditions herein specified. The data presented herein is traceable to the National Institute of Standards and Technology.

This report is not an endorsement of the tested product by NVLAP or any agency of the U.S. Government.

Accredited by the National Institute of Standards and Technology, National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code 100269-0.

The scope of accreditation at the EMC Test Laboratory is limited to NVLAP codes:

12/CIS22 IEC/CISPR 22:1993: Limits and methods of measurement of radio disturbance characteristics of information technology equipment. **12/CIS22a** IEC/CISPR 22:1993: Limits and methods of measurement of radio disturbance characteristics of information technology equipment, Amendment 1:1995, and Amendment 2:1996. **12/CIS22b** CNS 13438:1997: Limits and methods of measurement of radio disturbance characteristics of information technology equipment.
12/F01 FCC Method - 47 CFR Part 15 - Digital Devices. **12/F01a** Conducted Emissions, Power Lines, 450 kHz to 30 MHz. **12/F01b** Radiated Emissions.
12/T51 AS/NZS 3548: Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment.

Intermec Technologies Corporation
EMC Test Laboratory
550 Second Street S.E.
Cedar Rapids, Iowa 52401

EMC 017

Interference Technology International

Date 10/18/01
mm/dd/yy

Dave Fry
Regulatory Engineer II

National Association of Radio and Telecommunications Engineers

1.1 Measurement Uncertainty

Confidence Statement

The measurement uncertainty statements below use a Coverage Factor K = 2.
The Coverage Factor K = 2 equates to an approximate confidence level of 95%.

Receiver and Transmitter Direct Measurements Of Conducted Emissions Using HP8566B Spectrum Analyzer and HP85685A Preselector

0-1.0 GHz has an Expanded Measurement Uncertainty of +/- 2.36 dB.
1.0-2.0 GHz has an Expanded Measurement Uncertainty of +/- 3.50 dB.
2.0-2.5 GHz has an Expanded Measurement Uncertainty of +/- 0.85 dB.

Tektronix TDS460

Amplitude Measurements Expanded Measurement Uncertainty, +/- 1.5% full scale
Time Measurements Expanded Measurement Uncertainty, +/- 0.015%

2.0 REPORT REFERENCE:

The ABTM3 radio module description is contained within reports from CKC Report No.: FC01-057 and is supplemented with Intermec Report No.: 577-500-988.

3.0 HYBRID MODE OPERATION

3.1 OPERATION DESCRIPTION

See Appendix A for details of radio operation.

3.2 PROCESS GAIN

The radio chip within the ABTM3 radio is manufactured by Cambridge Silicon Radio, Part Number BC01B. See Appendix B for the Process Gain Memorandum from CSR.

3.3 TRANSMITTER AVERAGE TIME OF CHANNEL OCCUPANCY

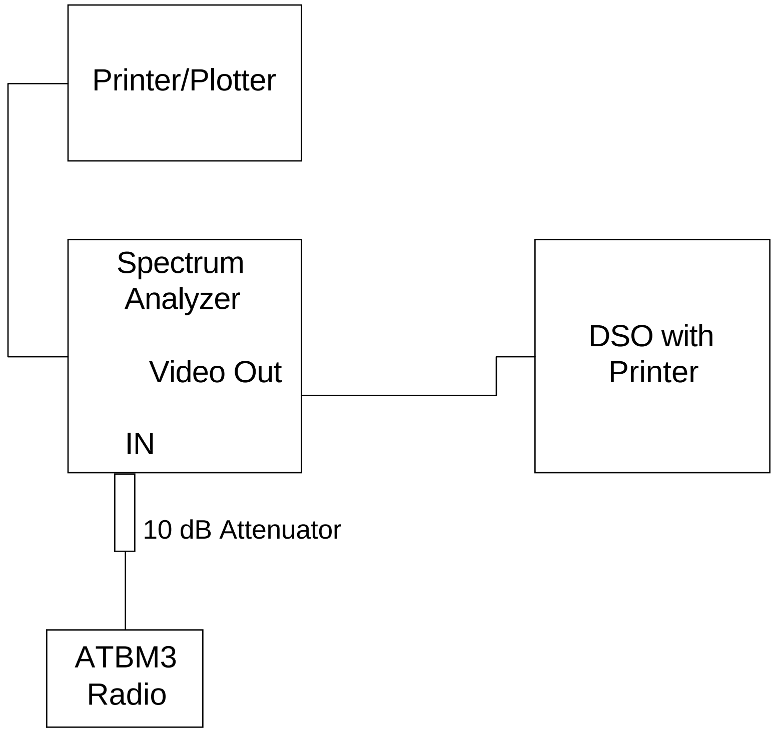
An ABTM3 radio module is modified to direct connect the output of the transmitter to the measurement equipment. The output of the radio is 50 Ohms.

Conditions during testing

Temp: 22C, RH: 40%, BP: 29.8 inches

Performed By: Dave Fry Oct. 17, 2001

Equipment Setup:



See section 4.0 for equipment list.

Test Procedure:

1) Prior to making conducted measurements of the transmitter, verify the cable losses and attenuation for conducted measurements in the frequency band of interest.

2) Connect the modified radio directly to the spectrum analyzer input using the calibrated cable and attenuator. Set the radio to "inquiry" mode and plot the transmitter channels in the permitted band. Use 100kHz resolution and video bandwidths.

3) Repeat for "page" mode operation.

4) To measure the narrow transmission widths accurately connect a digital storage oscilloscope (DSO) to the spectrum analyzer video out.

5) Set the spectrum analyzer on a center frequency of 2441 MHz (Ch. 40) of the transmitter. Using 0 Hz span with 100 kHz RBW and 100kHz VBW plot a 20 msec sweep while the transmitter is operating in inquiry mode in the above configuration. Print this plot that shows the transmission cycle.

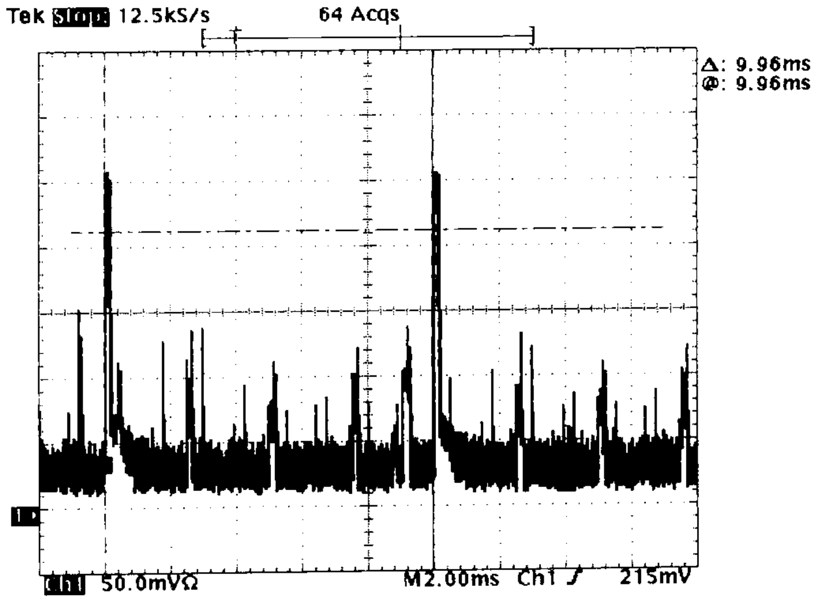
6) While the radio continues to transmit use the DSO to show a similar plot at 2 mS/division. Using the cursors to mark the repetition rate and print this plot.

7) Make a second DSO plot that details the transmission time on channel.

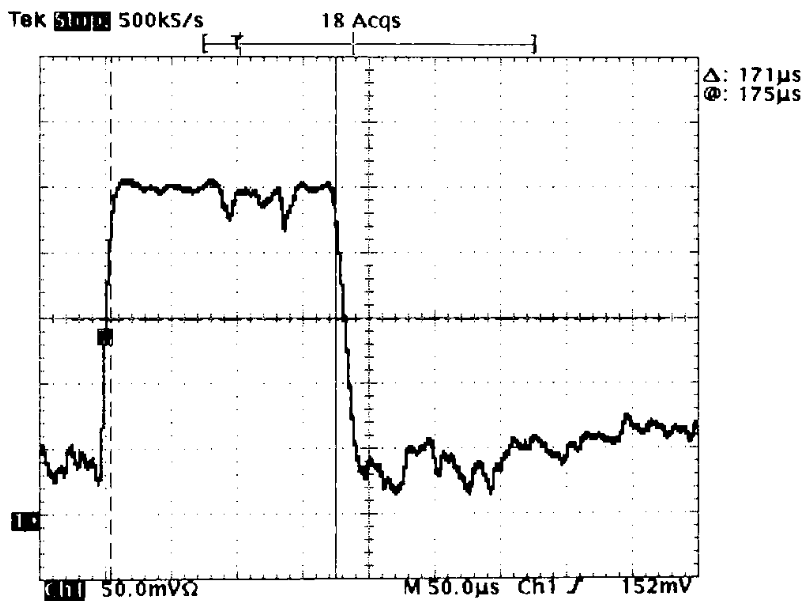
8) Calculate the worst-case average transmitter average occupancy based on the plotted information presented.

Data Plots:

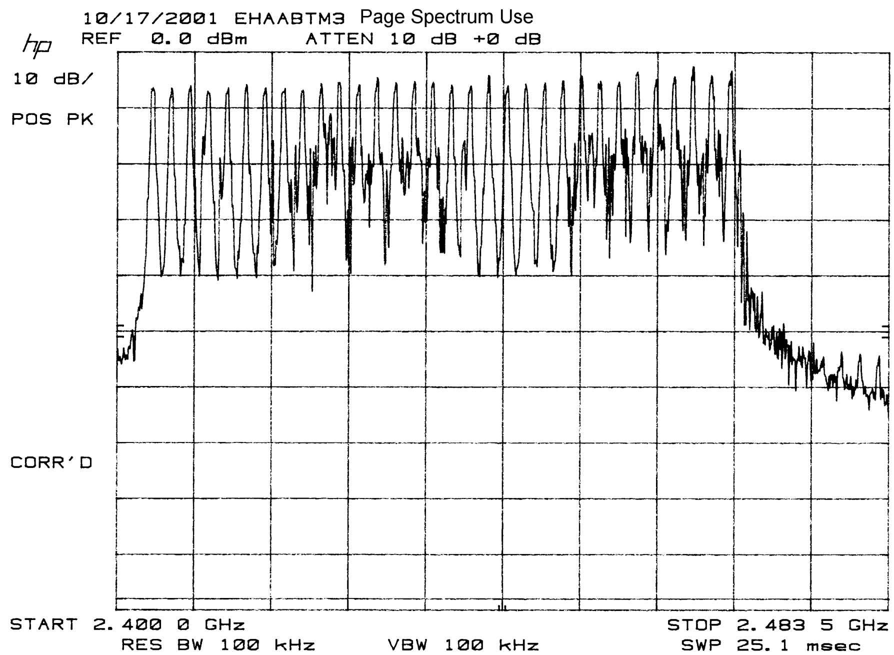
DSO plot of inquiry / page mode channel cycle time



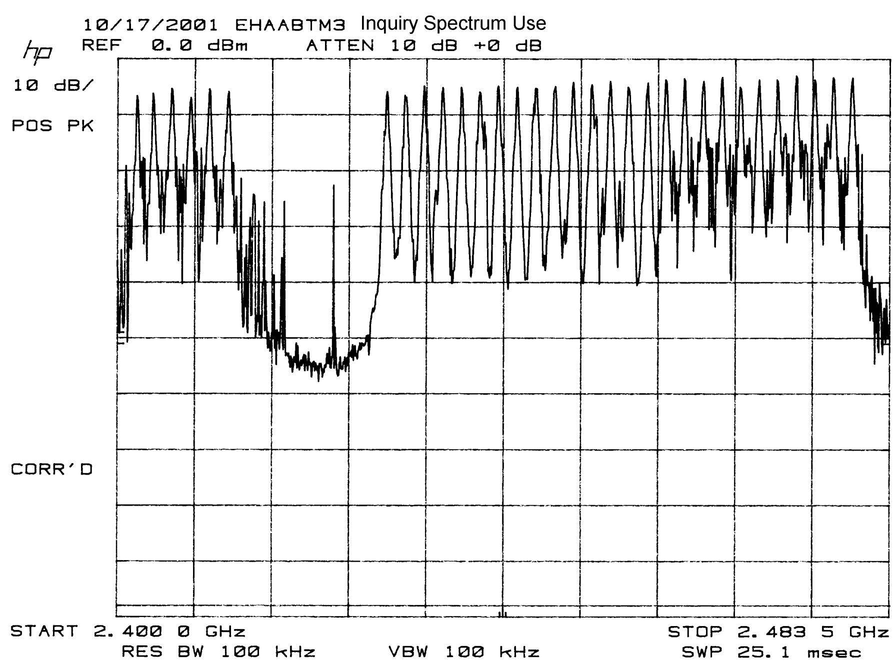
DSO plot of inquiry / page mode channel transmission on time



Page mode number of hopping frequencies



Inquiry mode number of hopping frequencies



Results:

"Page" and "Inquiry" modes operate by first hopping with 16 channels. This "Train A" sequence repeats every 10 mS. Every 1.28 seconds hopping frequencies change and a second Train A starts using different frequencies resulting in 128 transmissions on a frequency or channel. After a maximum of seven "Train A" sequences of 1.28 seconds, 16 new hopping channels is selected, "Train B". If a same frequency is used in both Train A and B, the resulting worst case conditions occur. First 7 x 1.28 x 10mS, the next 7 sequences with Train B, then with other frequencies. Calculating the results below.

1st 128 events x 7 Train A sequences x 10mS = 8.96 seconds
2nd 128 events x 7 Train B sequences x 10mS = 8.96 seconds
3rd series of events uses a different frequency for 8.96 seconds

Or 8.96 x 3 = total of 26.8 seconds

7 x 128 x 171uS, then 8.96 seconds other frequencies, + 7 x 128 x 171uS = .306 seconds within an average 30 second period considering the random selection of hopping sequences over time.

3.4 Channel Separation and Bandwidth
Test Procedure:

1) Prior to making conducted measurements of the transmitter, verify the cable losses and attenuation for conducted measurements in the frequency band of interest.

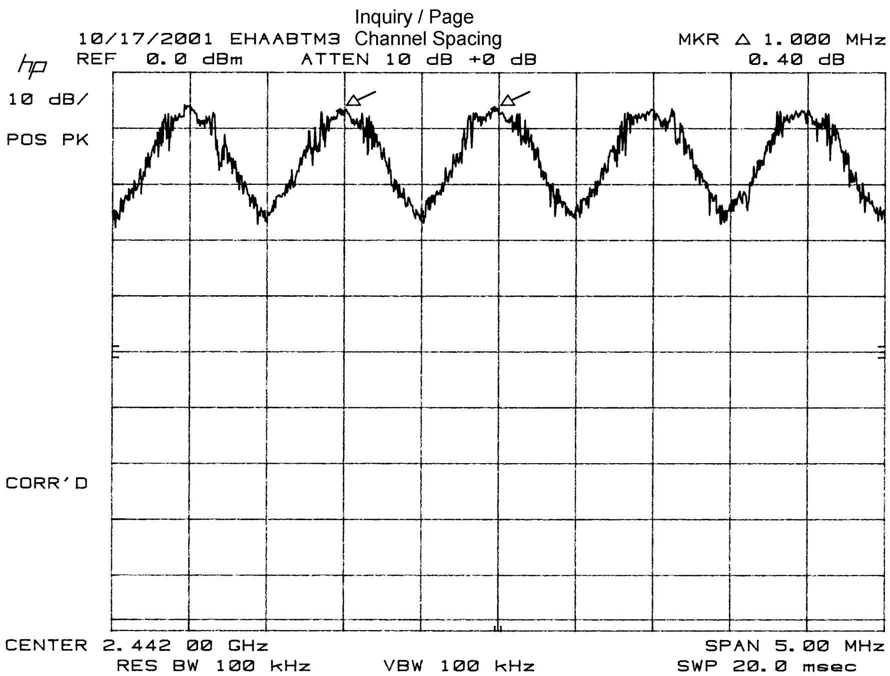
2) Connect the modified radio directly to the spectrum analyzer input using the calibrated cable and attenuator. Use a 5 MHz span 100kHz resolution and video bandwidths. Set the radio to "inquiry" and "page" mode. Show the channel spacing using the delta function of the spectrum analyzer. Plot the transmitter channels.

3) Adjust the spectrum analyzer for a 2 MHz span using 100 kHz resolution and video bandwidths. Plot the spectrum of the transmitter without the hopping mode engaged. Using the peak search mode determine the peak of the channel occupancy. Calculate 6 dB down from the peak and use the display line to show the 6-dB reference. Adjust the marker to the left side of the spectrum to the display line. Using the marker delta function move to show the 6-dB bandwidth of the transmitter spectrum and plot.

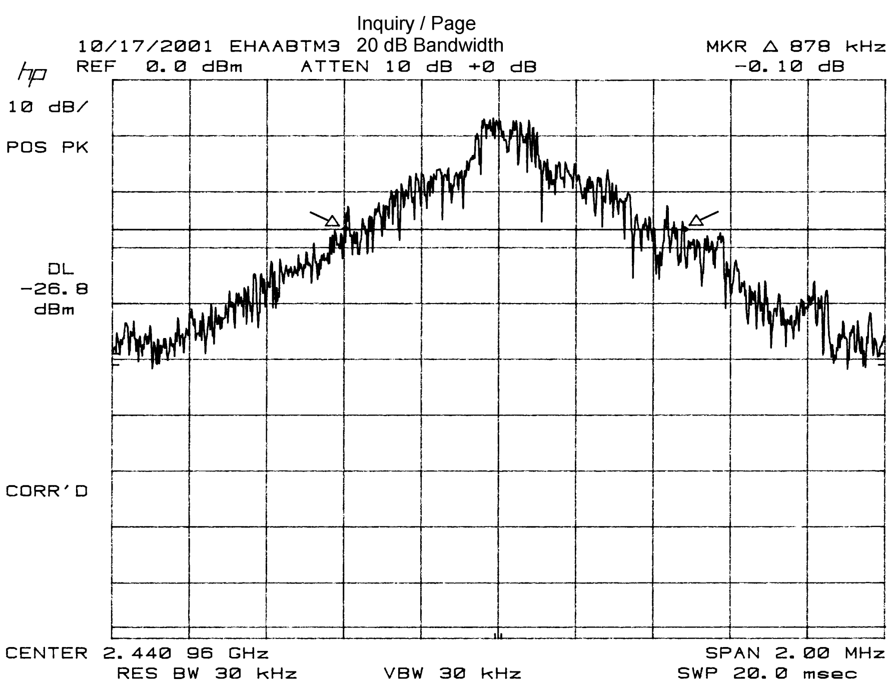
4) Adjust the spectrum analyzer for a 2 MHz span using 30 kHz resolution and video bandwidths. Plot the spectrum of the transmitter without the hopping mode engaged. Using the peak search mode determine the peak of the channel occupancy. Calculate 20-dB down from the peak and use the display line to show the 20-dB reference. Adjust the marker to the left side of the spectrum to the display line. Using the marker delta function move to show the 20-dB bandwidth of the transmitter spectrum and plot.

Data Plots:

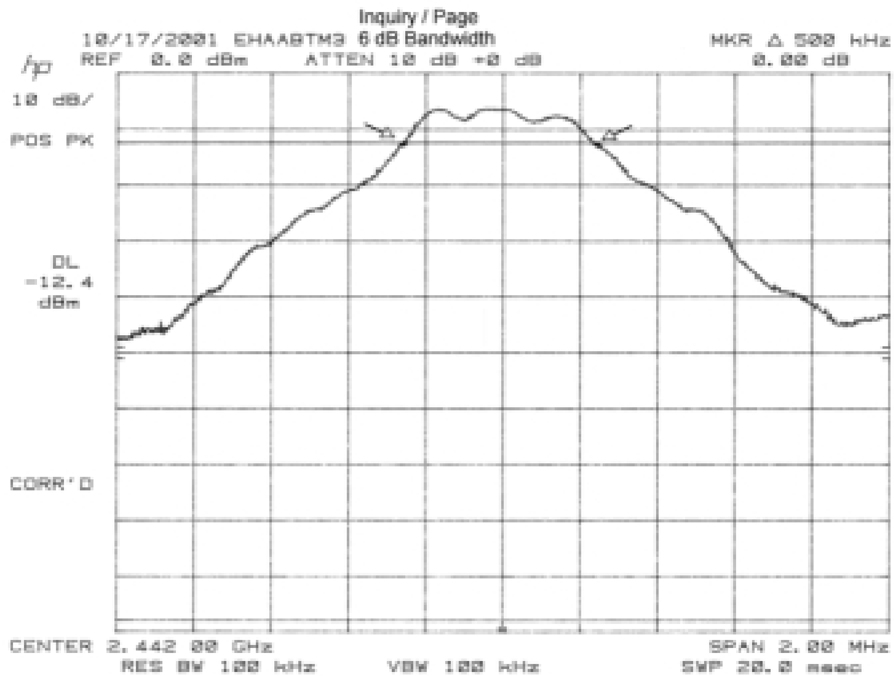
Channel Spacing



20 dB Bandwidth



6 dB Bandwidth



Results:

The channel spacing equals 1 MHz. This does meet the 25 kHz minimum and is near the 878 kHz channel bandwidth.

The 20-dB bandwidth equals 878 kHz for the center channel 2442 MHz. Similar results were observed for the end channels 2402 and 2480 MHz. This meets the requirement of 20-dB bandwidth maximum of 1 MHz.

The 6-dB bandwidth equals 500 kHz for the center channel 2442 MHz. Similar results were observed for the end channels 2402 and 2480 MHz. This meets the requirement of 6-dB bandwidth maximum of 500 kHz.

3.5 Power Spectral Density

Test Procedure:

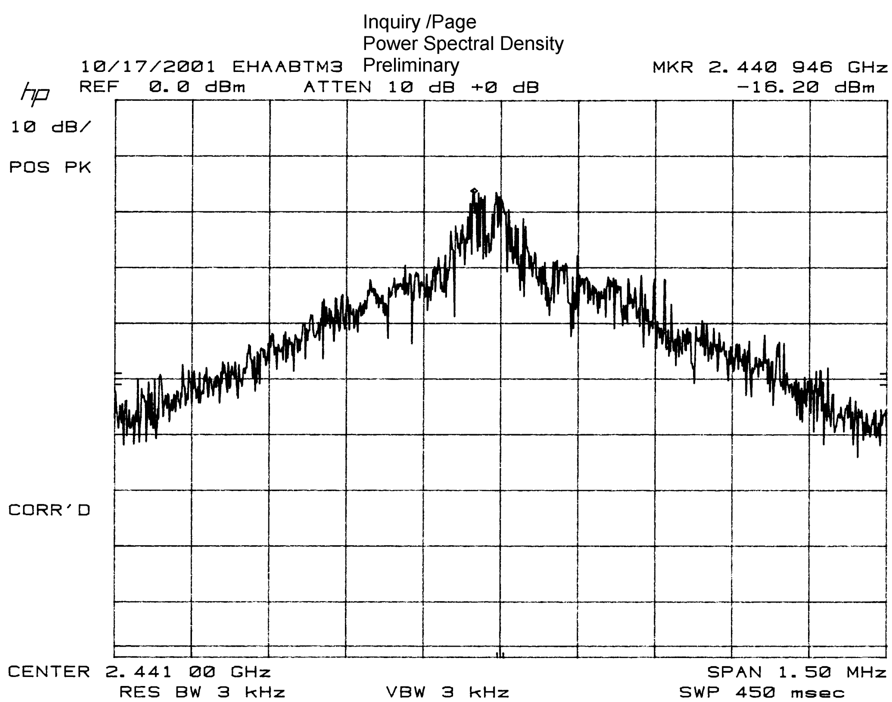
1) Prior to making conducted measurements of the transmitter, verify the cable losses and attenuation for conducted measurements in the frequency band of interest.

2) Connect the modified radio directly to the spectrum analyzer input using the calibrated cable and attenuator. Use 1.5 MHz span, 3 kHz resolution and video bandwidths. Set the radio to "inquiry" and "page" mode. Show the peak of the channel emission using the peak search function of the spectrum analyzer. Plot the transmitter spectrum as the preliminary power spectral density.

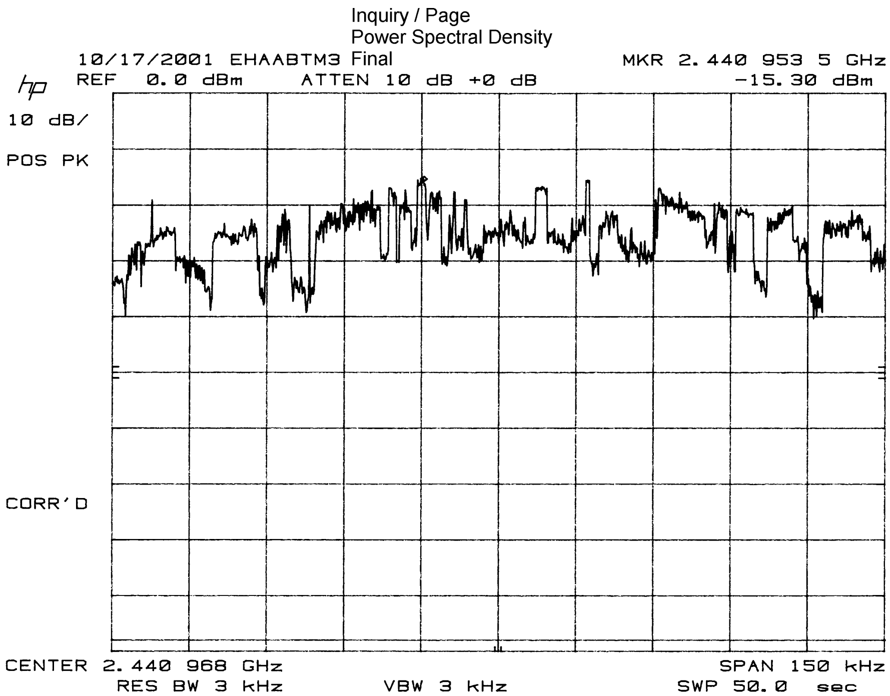
3) Adjust the spectrum analyzer for a 150 kHz span using 3 kHz resolution and video bandwidths and set the sweep time for 50 seconds. Center the peak emission shown in the previous step on the spectrum analyzer. Plot the spectrum of the transmitter without the hopping mode engaged. Using the peak search mode determine the peak power spectral density and plot the final power spectral density.

Data Plots:

PSD Preliminary



PSD Final



Results:

The attenuation for the cable and attenuator is measured as 10.1 dB. The results for power spectral density equals –5.3 dBm. This is well below the specification of +8dBM. Channels at either end of the spectrum also show similar results.

4.0 Measurement Equipment List

EQUIPMENT	MFG/MODEL	SERIAL NO.	CALIBRATION DATE	CALIBRATION CYCLE
Attenuator	HP 8491-10 dB	43380	09/01	12 Mo
Plotter	HP 7470A	2308A27380	On Req.	
RF Preselector	HP 85685A	3221A01427	10/01	12 Mo
Signal Generator	HP 83630A	3250A00322	03/00	24 Mo
Spectrum Analyzer	HP 8566B	2637A03549	10/01	12 Mo
Digital Oscilloscope	Tektronix TDS460	B020349	12/00	16 Mo

On Req. = On Request