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TEST REPORT

FCC ID: **PBWB187R26** (for Base)
PBWB187R26H (for Handset)
IC: **3842A-B187** (Base & Handset)

Equipment Under Test: **VoIP321XY/ZZ** (Base & Handset)
(EUT) **VoIP321C** (Handset Charger)

S/N: MS000608010010 (TS05036610) (Conducted measurement)
S/N: MS000608010008 (TS05036602) (Radiated measurement)
S/N: MS000608010009 (TS05036615) (Radiated measurement)
S/N: MS000608010008 (TS05036602) (Charger)
S/N: MS000608010009 (TS05036615) (Charger)
S/N: MS000608010011 (B187060210001) (SAR)
S/N: MS000608010012 (B187060210002) (SAR)

In Accordance With: **FCC Part 15, Subparts B, C & D / IC RSS-213 & ICES-003**
UPCS / LE-PCS Isochronous Device
Base & Handset: **1921.536 – 1928.448 MHz**
Charger: Unintentional radiator

ANSI C63.17 – 1998 (or 2005 Draft where applicable)

Tested By: **Frank Ma / Jeffrey Yang**

Date: **Feb 08, 2006**

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DOCUMENT CLASSIFICATION		
Rev. No.	Classification	Date mm/dd/yy
1.0	PROPRIETARY – Document shall not be released without a Licence Contract	02/08/06

REVISION HISTORY						
Rev. No.	Changes	Section Affected	Stage	Prepared By	Approved By	Date mm/dd/yy
1.0	First Release	N/A	GA	Frank Ma	Jeffrey Yang	02/08/06

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1 CHANNEL FREQUENCIES

Clause: 15.303 (d) & (g) / 8.0

Requirement: Within 1920 – 1930 MHz band for isochronous devices

UPCS CHANNEL	FREQUENCY (MHz)
Band Edge	1930.000
1 (High)	1928.448
2	1926.720
3 (Mid)	1924.992
4	1923.264
5 (Low)	1921.536
Band Edge	1920.000

Test Condition: Refer to RF Communication Protocol or Test Mode Procedure for the selection of channel in normal and test modes of operation.

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2 ANTENNA REQUIREMENT

Clause: 15.317 (15.203) / 5.5

Requirement: No antenna other than that furnished by the responsible party shall be used with the device

Observation: Base and Handset have each a pre-formed wire antenna permanently attached on the PCB; it is not user replaceable. Base has an additional internal antenna for diversity configuration. There is no external antenna or connector provided on the base or handset for the user to use antenna other than that furnished originally.

Spec of Antenna: As follows
Antenna transmit gain = 1.6 – 2.0 dBi (1.446 – 1.585 numeric) across the band

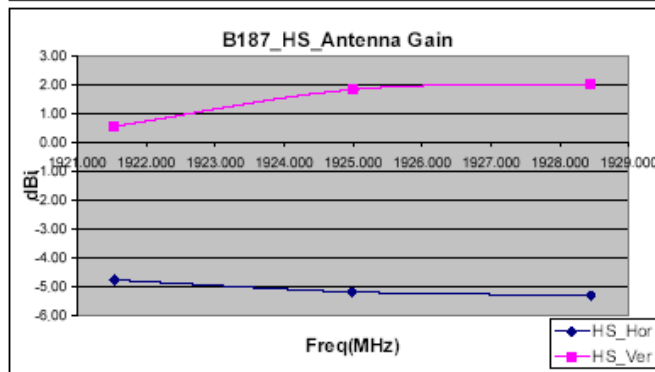
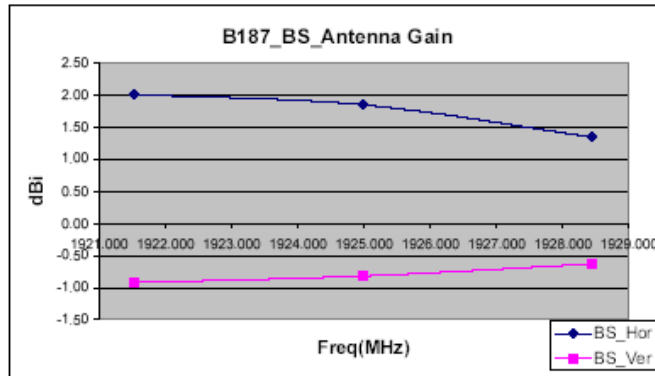
Result: As antenna gain < 3 dBi, no correction factor necessary to be applied to subsequent radiation measurement readings.

GAIN

B187 Antenna Gain for FCC Approval Sample

Ascalade Technologies Inc.
Date: Jan 31, 2006

	Channel	Ch 0	Ch 2	Ch 4
	Freq(MHz)	1928.448	1924.992	1921.536
BS	Hor	1.34	1.84	2.00
	Ver	-0.63	-0.82	-0.92
HS	Hor	-5.28	-5.16	-4.74
	Ver	2.00	1.82	0.55



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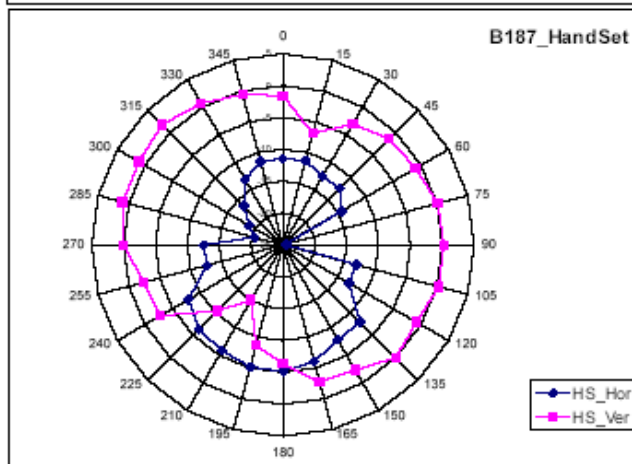
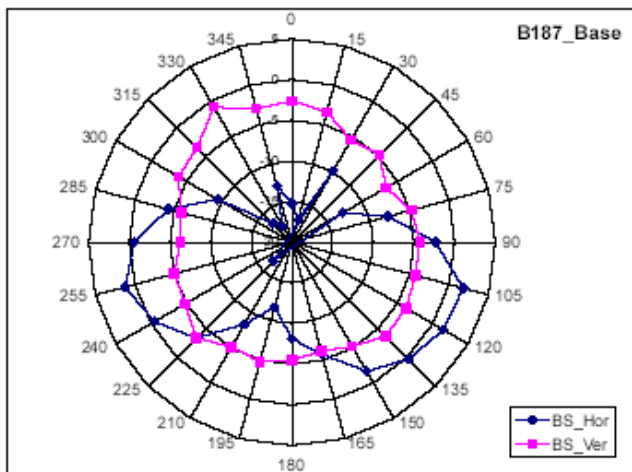
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B187 Antenna Pattern for FCC Approval Sample

Ascalade Technologies Inc.
 Date: Jan 31, 2006

Degree	BS_Hor (dBi)	BS_Ver (dBi)	HS_Hor (dBi)	HS_Ver (dBi)
0	-15.2	-2.61	-11.45	-1.61
15	-17.14	-3.43	-11.34	-6.91
30	-9.84	-5.46	-12.62	-3.1
45	-23.27	-4.8	-12.46	-1.46
60	-12.77	-6.64	-14.38	-0.95
75	-7.79	-4.8	-24.47	0.17
90	-2.33	-4.28	-24.46	0.21
105	1.81	-4.28	-13.03	0.27
120	1.49	-3.78	-13.06	-0.79
135	0.31	-3.71	-7.86	-0.02
150	-1.7	-5.2	-7.82	-2.34
165	-5.7	-6.13	-6.05	-2.78
180	-8.14	-5.46	-5.16	-6.35
195	-11.73	-4.78	-5.19	-8.73
210	-8.31	-5.13	-5.86	-15
225	-3.35	-3.36	-6.35	-10.34
240	-0.49	-4.83	-7.92	-2.79
255	1.26	-5.01	-12.66	-2.36
270	-0.63	-6.29	-12.55	-0.07
285	-4.25	-5.89	-20.36	1.03
300	-9.47	-3.89	-18.9	1.07
315	-16.7	-3.5	-16.3	1.72
330	-17.77	-0.82	-13.15	0.61
345	-12.82	-3.03	-11.45	-0.54
360	-15.58	-2.65	-12.26	-1.45

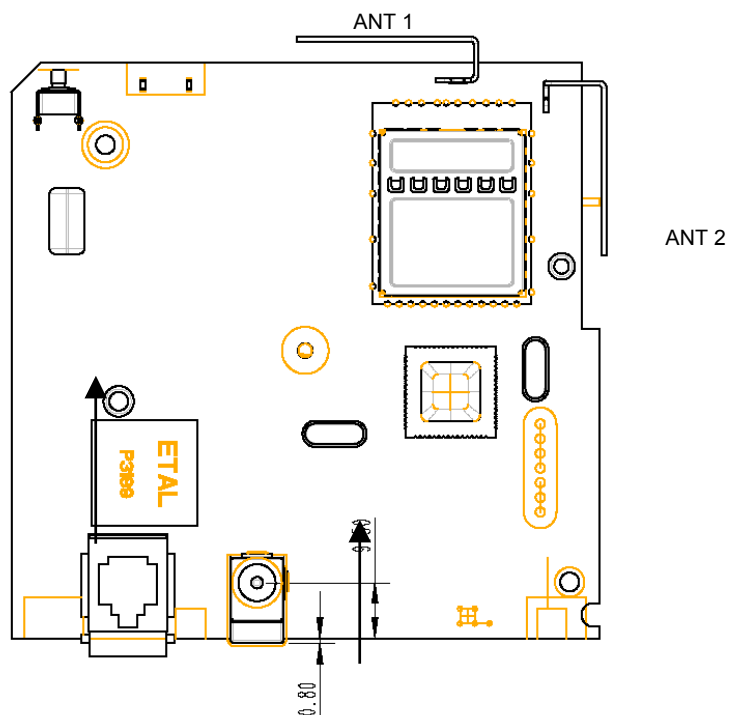
Max(dBi)	1.81	-0.82	-5.16	1.72
Min(dBi)	-23.27	-6.64	-24.47	-15.00
Diff(dB)	25.08	5.82	19.31	16.72



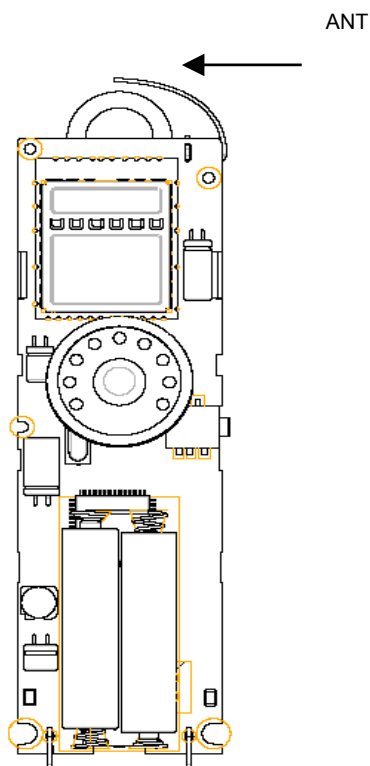
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BASE ANTENNA ASSEMBLY



HANDSET ANTENNA ASSEMBLY



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3 FREQUENCY STABILITY AND JITTER

Clause: 15.323 (e), 15.323(f) / 9.0

Requirement:

- Frame frequency stability ≤ 50 ppm
- TDMA frame frequency stability ≤ 10 ppm over 1 hour or interval between channel access monitoring, whichever is shorter
(That translates to frequency drift of 19.2 kHz for 1920 MHz carrier)
- Frame jitter ≤ 25 μ s
- Carrier frequency stability over -20 to $+50$ $^{\circ}$ C at normal supply voltage, and over 85% to 115% of rated supply voltage (voltage variation not required for battery operated device)

Equipment: ROHDE & SCHWARZ Digital Radio Tester MODEL CTS60
S/N 100407
Last calibrated 2004-7-20
THERMOTRON Environmental Chamber MODEL SM-4S-SL
S/N 23060

Eq. Setting: Offset -18 (for UPCS frequency band)
Data Pattern = Fig 31 (specific for frequency drift and jitter tests), or
0000111100001111 for other stability tests
Attenuation 1 dB (to compensate for cable loss to antenna connector)

Test Result: Complies with requirements

3.1 Base

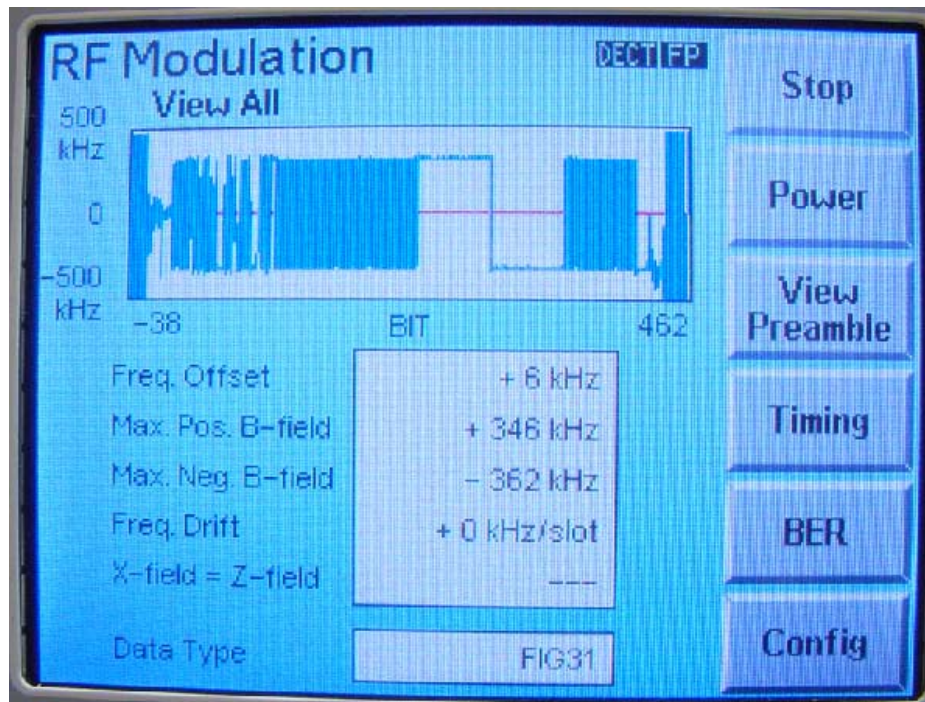
3.1.1 Frame Frequency Drift and Jitter

Test Mode	Channel No.	Frequency (kHz / slot)		Jitter (μ s)	
		Drift	Limit	Meas.	Limit
TBR6	5	0.00	19.2	0.00	25
TBR6	3	0.00	19.2	0.00	25
TBR6	1	0.00	19.2	0.00	25

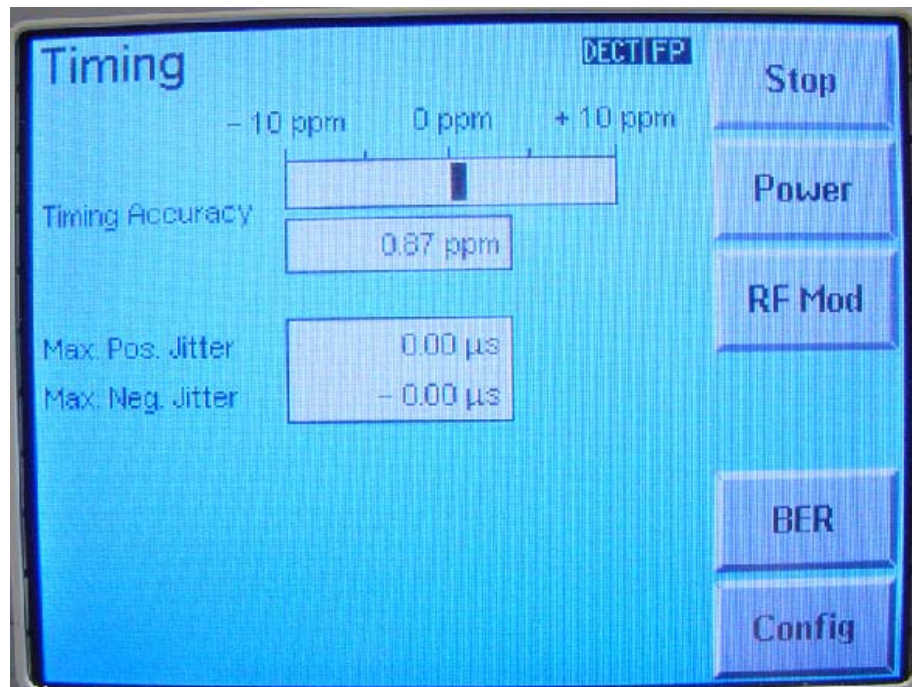
Note: Test Mode TBR6 is built-in per ETSI standard and resides in firmware preceding the FCC test mode in Test Mode Menu.

Photos of worst-case display follow:

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Base Frequency Drift at Mid Channel



Base TDMA Frame Jitter at Mid Channel

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3.1.2 Carrier Frequency Stability with Supply voltage

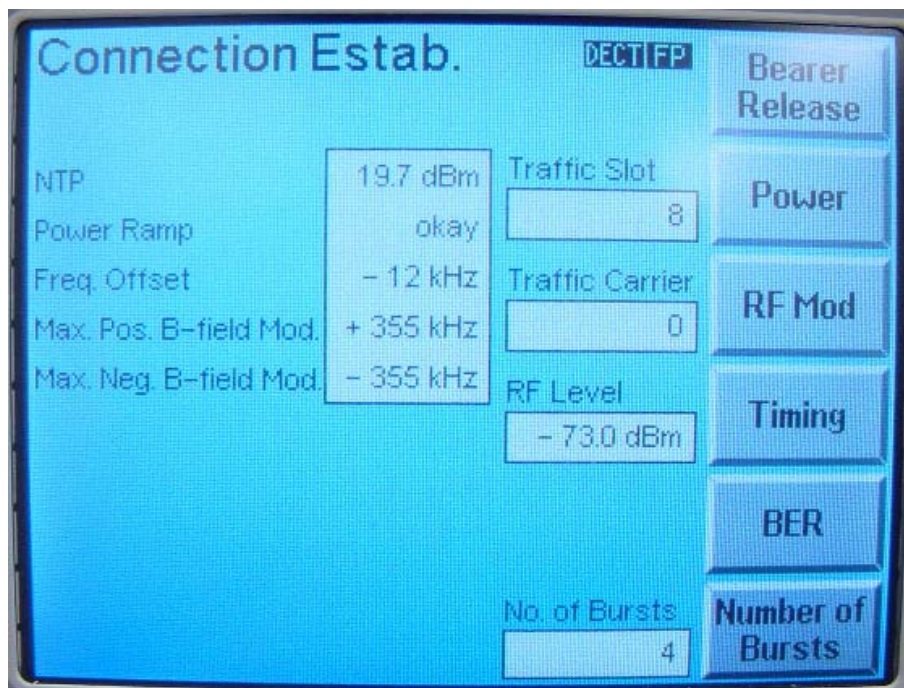
Test Mode	Channel No.	Frequency (kHz / slot)			Limit (kHz / slot)
		4.25 V (85%)	5 V (Norm.)	5.75 V (115%)	
TBR6	5	-10	-11	-11	19.2
TBR6	3	-12	-11	-12	19.2
TBR6	1	-9	-8	-8	19.2

Note: Test Mode TBR6 is built-in per ETSI standard and resides in firmware preceding the FCC test mode in Test Mode Menu.

3.1.3 Carrier Frequency Stability with Temperature and Time

Test Mode	Channel No.	Frequency Offset (kHz)			Limit (kHz)
		-20 °C	25 °C	50 °C	
TBR6	5	-12.0	6.0	-9.0	± 19.2
TBR6	3	-3.0	5.0	-8.0	± 19.2
TBR6	1	-9.0	4.0	-5.0	± 19.2

Test was conducted for duration longer than 1 hour. Photo of worst-case display follows:



Base Carrier Frequency Offset with Temperature

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3.2 Handset

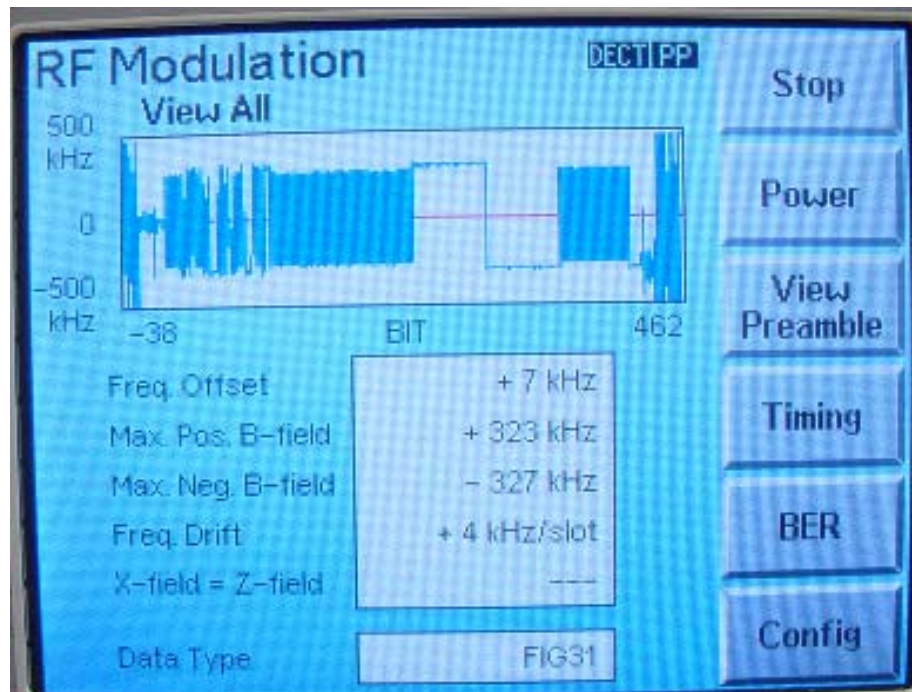
3.2.1 Frame Frequency Drift and Jitter

Test Mode	Channel No.	Frequency (kHz / slot)		Jitter (μs)	
		Drift	Limit	Meas.	Limit
TBR6	1	4.00	19.2	0.00	25
TBR6	3	4.00	19.2	0.08	25
TBR6	5	3.00	19.2	0.00	25

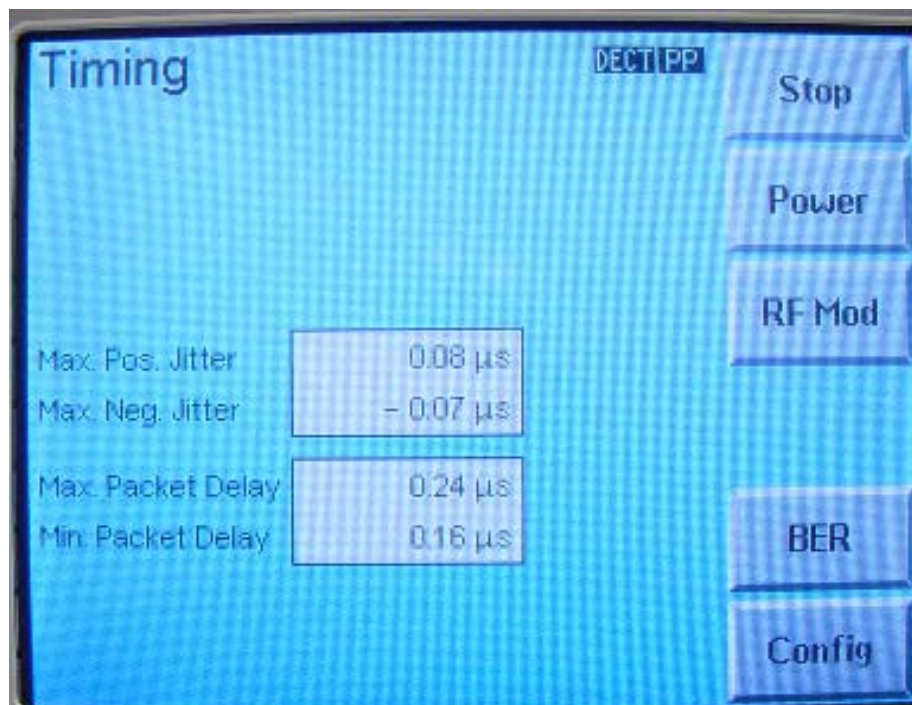
Note: Test Mode TBR6 is built-in per ETSI standard and resides in firmware preceding the FCC test mode in Test Mode Menu.

Photos of worst-case display follow:

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Handset Frequency Drift at Mid Channel



Handset TDMA Frame Jitter

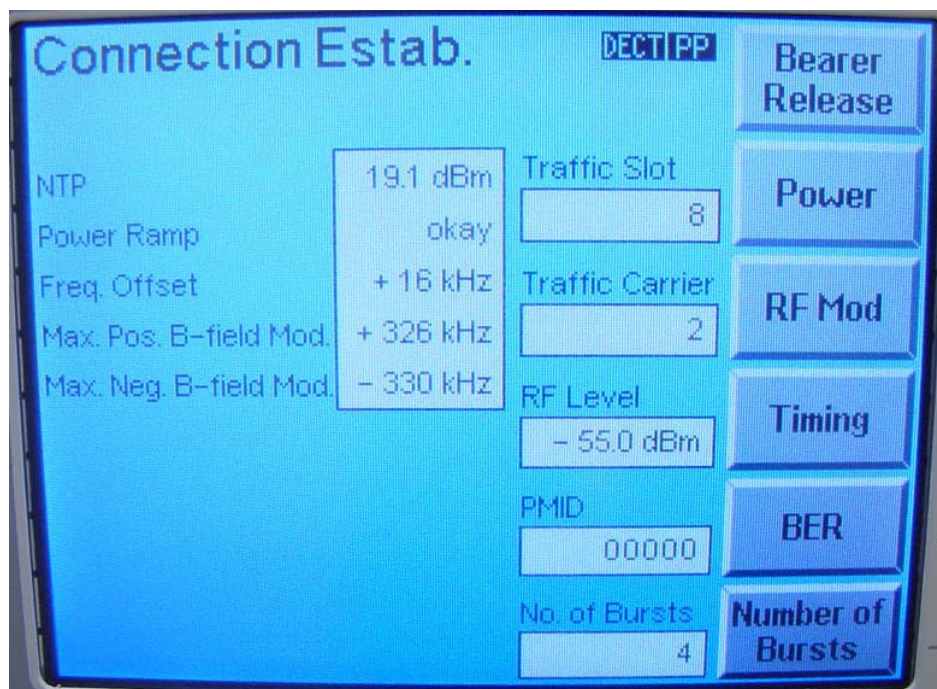
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3.2.2 Carrier Frequency Stability with Temperature and Time

Test Mode	Channel No.	Frequency Offset (kHz)			Limit (kHz)
		-20 °C	25 °C	50 °C	
TBR6	5	10.0	3.0	0.0	± 19.2
TBR6	3	16.0	7.0	0.0	± 19.2
TBR6	1	11.0	6.0	0.0	± 19.2

Note: Test Mode TBR6 is built-in per ETSI standard and resides in firmware preceding the FCC test mode in Test Mode Menu.

Test was conducted for duration longer than 1 hour. Photo of worst-case display follows:



Handset Carrier Frequency Offset with Temperature

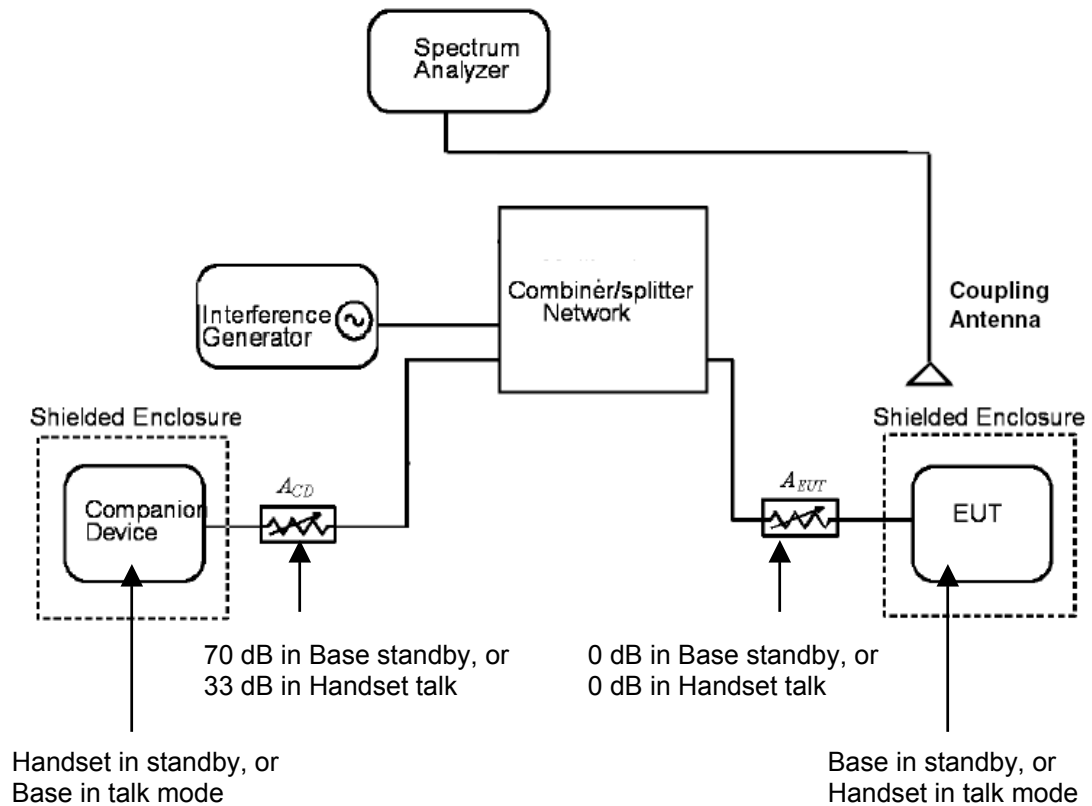
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4 MONITORING THRESHOLD

Clause: 15.323 (c)(5) / 8.4 (c)(5)

Requirement: ≤ -61 dBm for 1.5 MHz BW and 20.5 dBm Tx power derived from formula as follows:
Upper limit = $15 \log B - 184 + 50 - P$ as per ANSI 63.17 Sec. 7.2.1

Test Setup: As shown below per Fig. 8 of 7.1.1 in ANSI C63.17 – 1998



EUT (Base and Handset) modified in

- Tx power purposely reduced by about 10 dB to reduce requirement on external attenuators A_{EUT} and A_{CD}
- Limited 2-channel operation by EEPROM setting

Base and handset are in standby or talk mode as in normal functional operation.

Mode	EUT	A_{EUT} (dB)	Companion Device	A_{CD} (dB)
Standby	Base	0	Handset	70
Talk	Handset	0	Base	33

Test Result: Threshold < -61 dBm

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4.1 Standby

Note:

- Base is the initiator; handset the responding device.
- Main deciding factor in protocol is signal strength RSSI.

Combiner / Coupler insertion loss = 4 dB

Cable loss 1 = 0.8 dB

Cable loss 2 = 1.6 dB

Total insertion loss = 6.4 dB

Measured threshold = Sig Gen reading – Insertion loss
= $-65.0 - 6.4$
= -71.4 dBm

4.2 Talk

Note:

- Handset is the initiator; base the responding device.
- Main deciding factors in protocol are CRC (or BER), sync pulse and clock jitter besides signal strength RSSI.
- Base conveys information on channel conditions to add to that detected by handset before handset decides on initiating channel change.

Measured threshold = $-64.0 - 6.4$
= -70.4 dBm