



# PCTEST ENGINEERING LABORATORY, INC.

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## CERTIFICATE OF COMPLIANCE FCC Part 15.225 Certification

**Applicant Name:**  
Panasonic Corporation of North America  
One Panasonic Way, 4B-8  
Secaucus, NJ 07094  
United States

**Date of Testing:**  
November 11 - 12, 2008  
**Test Site/Location:**  
PCTEST Lab, Columbia, MD, USA  
**Test Report Serial No.:**  
0808221184.ACJ


<b>FCC ID:</b>	<b>ACJ9TGCF-H11</b>
<b>APPLICANT:</b>	<b>Panasonic Corporation of North America</b>

**Model(s):** CF-H1  
**EUT Type:** Toughbook Model: CF-H1  
**Frequency:** 13.56MHz  
**FCC Classification:** Low Power Communications Device Transmitter (DXX)  
**FCC Rule Part(s):** FCC Part 15 Subpart C (15.225)



The device bearing the FCC Identifier specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and has been tested in accordance with the measurement procedures specified in ANSI C63.4-2003 (See Test Report). These measurements were performed with no deviation from the standards.

I authorize and attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

*NVLAP accreditation does not constitute any product endorsement by NVLAP or any agency of the United States Government. This report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government. PCTEST certifies that no party to this application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.*



  
Randy Ortanez  
President



<b>FCC ID:</b> ACJ9TGCF-H11		<b>FCC Pt. 15.225 MEASUREMENT REPORT</b>		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0808221184.ACJ	<b>Test Date(s):</b> November 11 - 12, 2008	<b>EUT Type:</b> Toughbook Model: CF-H1		Page 1 of 23

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# MEASUREMENT REPORT

## FCC Part 15.225



### § 2.1033 General Information

**APPLICANT:** Panasonic Corporation of North America

**APPLICANT ADDRESS:** One Panasonic Way, 4B-8  
Secaucus, NJ 07094  
United States

**TEST SITE:** PCTEST ENGINEERING LABORATORY, INC.

**TEST SITE ADDRESS:** 6660-B Dobbin Road, Columbia, MD 21045 USA

**FCC RULE PART(S):** Part 15 Subpart C (15.225)

**MODEL:** CF-H1

**FCC ID:** ACJ9TGCF-H11

**Test Device Serial No.:** N/A       Production     Pre-Production     Engineering

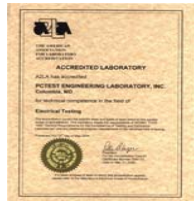
**FCC CLASSIFICATION:** Low Power Communications Device Transmitter (DXX)

**DATE(S) OF TEST:** November 11 - 12, 2008



**TEST REPORT S/N:** 0808221184.ACJ

### Test Facility / Accreditations

Measurements were performed at PCTEST Engineering Lab located in Columbia, MD 21045, U.S.A.



- PCTEST facility is an FCC registered (PCTEST Reg. No. 90864) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules and Industry Canada (IC-2451).
- PCTEST Lab is accredited to ISO 17025 by U.S. National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP Lab code: 100431-0) in EMC, FCC and Telecommunications.
- PCTEST Lab is accredited to ISO 17025-2005 by the American Association for Laboratory Accreditation (A2LA) in Specific Absorption Rate (SAR) testing, Hearing Aid Compatibility (HAC) testing, CTIA Test Plans, and wireless testing for FCC and Industry Canada Rules.
- PCTEST Lab is a recognized U.S. Conformity Assessment Body (CAB) in EMC and R&TTE (n.b. 0982) under the U.S.-EU Mutual Recognition Agreement (MRA).
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC Guide 65 by the American National Standards Institute (ANSI) in all scopes of FCC Rules and Industry Canada Standards (RSS).
- PCTEST facility is an IC registered (IC-2451) test laboratory with the site description on file at Industry Canada.
- PCTEST is a CTIA Authorized Test Laboratory (CATL) for AMPS, CDMA, and EvDO wireless devices and for Over-the-Air (OTA) Antenna Performance testing for AMPS, CDMA, GSM, GPRS, EGPRS, UMTS (W-CDMA), CDMA 1xEVDO, and CDMA 1xRTT.

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<b>Test Report S/N:</b> 0808221184.ACJ	<b>Test Date(s):</b> November 11 - 12, 2008	<b>EUT Type:</b> <b>Toughbook Model: CF-H1</b>		Page 3 of 23

# 1.0 INTRODUCTION

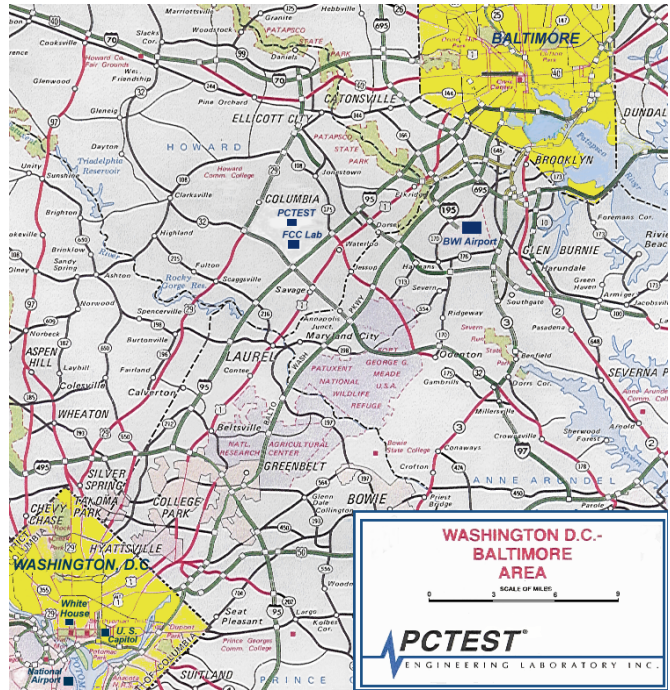
## 1.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission.



## 1.2 PCTEST Test Location

The map at the right shows the location of the PCTEST LABORATORY, its proximity to the FCC Laboratory, the Columbia vicinity area, the Baltimore-Washington Intern'l (BWI) airport, the city of Baltimore and the Washington, DC area. (see Figure 1-1).

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility in New Concept Business Park, Guilford Industrial Park, Columbia, Maryland. The site address is 6660-B Dobbin Road, Columbia, MD 21045. The test site is one of the highest points in the Columbia area with an elevation of 390 feet above mean sea level. The site coordinates are 39° 11'15" N latitude and 76° 49'38" W longitude. The facility is 1.5 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. There are no FM or TV transmitters within 15 miles of the site. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2003 on January 27, 2006 and Industry Canada.



**Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area**

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## 2.0 PRODUCT INFORMATION

### 2.1 Equipment Description

The Equipment Under Test (EUT) is the **Panasonic Toughbook Model: CF-H1 FCC ID: ACJ9TGCF-H11**. The test data contained in this report pertains only to the emissions due to the RFID transmitter of the EUT.

Manufacturer / Model	FCC ID	Description
Panasonic / Model: CF-H1	ACJ9TGCF-H11	Toughbook Model: CF-H1
Omnikey / Model: CardMan 5121	N/A	RFID Module
Alps / Model: UGNZA	N/A	Bluetooth Module
Intel / Model: 512AN_MMW	PD9512ANM	802.11a/b/g/n Wireless LAN Module
Qualcomm / Model: UNDP-1	J9CUNDP-1	GSM/EDGE/WCDMA/CDMA Module

**Table 2-1. EUT Equipment Description**

### 2.2 Operation Mode

The Panasonic Model: CF-H1 FCC ID: ACJ9TGCF-H11 was set to continuously transmit at 13.56MHz. This was performed using manufacturer software loaded in the PC to allow for continuous transmission. Please see Section 8.0 for more information on the test setup.

### 2.3 EMI Suppression Device(s)/Modifications



No EMI suppression device(s) were added and no modifications were made during testing.

### 2.4 Labeling Requirements

Per 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the trade name and FCC ID must be displayed on the device per Section 15.19(b)(2).

Please see attachment for FCC ID label and label location.

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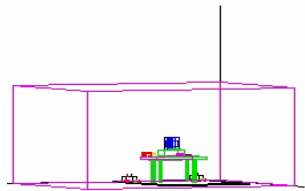
## 3.0 DESCRIPTION OF TEST

### 3.1 Evaluation Procedure

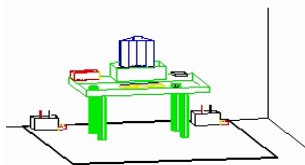
The measurement procedure described in the American National Standard for Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C63.4-2003) was used in the measurement of the **Panasonic Toughbook Model: CF-H1 FCC ID: ACJ9TGCF-H11**.

Deviation from measurement procedure.....None

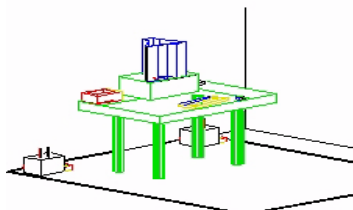
### 3.2 Conducted Emissions



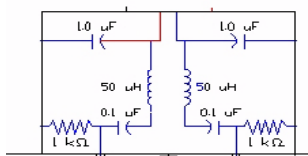
**Figure 3-1. Shielded Enclosure Line-Conducted Test Facility**



**Figure 3-2. Line Conducted Emission Test Set-Up**



**Figure 3-3. Wooden Table & Bonded LISNs**



**Figure 3-4. LISN Schematic Diagram**

The line-conducted facility is located inside a 16'x20'x10' shielded enclosure, manufactured by Ray Proof Series 81 (see Figure 3-1). The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 65-5. A 1m x 1.5m wooden table 80cm high is placed 40cm away from the vertical wall and 1.5m away from the sidewall of the shielded room (see Figure 3-2). Solar Electronics and EMCO Model 3725/2 (10kHz-30MHz) 50Ω/50μH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room (see Figure 3-3). The EUT is powered from the Solar LISN and the support equipment is powered from the EMCO LISN. Power to the LISNs are filtered by a high-current high-insertion loss Ray Proof power line filter (100dB 14Hz-10GHz). The purpose of the filter is to attenuate ambient signal interference and this filter is also bonded to the shielded enclosure. All electrical cables are shielded by braided tinned copper zipper tubing with an inner diameter of ½". If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply line(s) will be connected to the Solar LISN. The LISN schematic diagram is shown (see Figure 3-4). All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion). Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME from the EUT.

The spectrum was scanned from 150kHz to 30MHz with a spectrum analyzer. The detector function was set to CISPR quasi-peak and average mode. The bandwidth of the analyzer was set to 10kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission. Each emission was maximized by: switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable; whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in the test setup photographs. Each EME reported was calibrated using the Agilent E8257D (250kHz – 20GHz) PSG Signal Generator.

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### 3.3 Radiated Emissions



Figure 3-5. 3-Meter Test Site

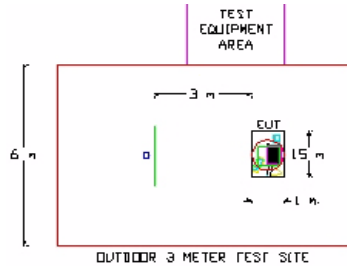


Figure 3-6. Dimensions of Outdoor Test Site

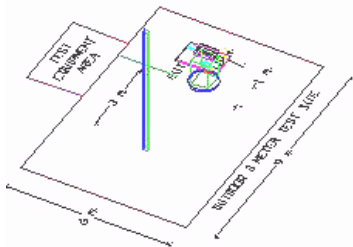


Figure 3-7. Turntable and System Setup

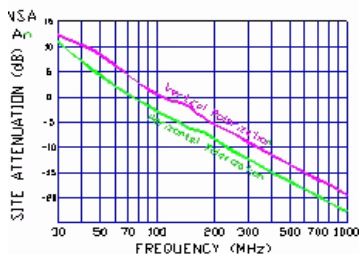


Figure 3-8. Normalized Site Attenuation Curves (H&V)

Preliminary measurements were made in a shielded anechoic chamber at 3-meter using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, and turntable azimuth with respect to the antenna was noted for each frequency found. The spectrum was scanned from 30 to 1000 MHz using a biconilog antenna. Above 1 GHz, linearly polarized double ridge horn antennas were used. For measurements below 30MHz a magnetic loop antenna was used.

Final measurements were made outdoors at 3-meter test range using Roberts™ Dipole antennas or horn antennas (see Figure 3-5) for above 30MHz and a loop antenna for below 30MHz. The test equipment was placed on a wooden and plastic bench situated on a 1.5m x 2m area adjacent to the measurement area (see Figure 3-6). Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The detector function was set to CISPR quasi-peak mode and the bandwidth of the spectrum analyzer was set to 100kHz for frequencies below 1GHz or 1MHz for frequencies above 1GHz. Above 1GHz the detector function was set to average mode (RBW = 1MHz, VBW = 10Hz). Emissions below 30MHz were made with a RBW of 10kHz and a VBW of 10Hz.

The half-wave dipole antenna was tuned to the frequency found during preliminary radiated measurements. The EUT, support equipment and interconnecting cables were re-configured to the set-up producing the maximum emission for the frequency and were placed on top of a 0.8-meter high non-metallic 1 x 1.5 meter table (see Figure 3-7). The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each EME emission. The turntable containing the system was rotated and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by: varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable; and changing the polarity of the antenna, whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in the test setup photographs. Each EME reported was calibrated using the Agilent E8257D (250kHz – 20GHz) PSG Signal Generator. The Theoretical Normalized Site Attenuation Curves for both horizontal and vertical polarization are shown in Figure 3-8.

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## 4.0 ANTENNA REQUIREMENTS



**Excerpt from §15.203 of the FCC Rules/Regulations:**

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.”

- The antennas of the Panasonic Toughbook Model: CF-H1 are **permanently attached**.
- There are no provisions for connection to an external antenna.

**Conclusion:**

The **Panasonic Toughbook Model: CF-H1 FCC ID: ACJ9TGCF-H11** unit complies with the requirement of §15.203.

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## 5.0 SAMPLE CALCULATIONS

### 5.1 Conducted Emission Measurement Sample Calculation

**@ 20.3 MHz**

**Class B limit** = 60.0 dB $\mu$ V (Quasi-peak limit)  
 Reading = - 57.8 dBm (calibrated quasi-peak level)  
 Convert to dB $\mu$ V = - 57.8 + 107 = 49.2 dB $\mu$ V  
  
 Margin = 49.2 - 60.0 = - 10.8 dB  
 = **10.8 dB below limit**

### 5.2 Radiated Emission Measurement Sample Calculation



**@ 66.7 MHz**

**Class B limit** = 100  $\mu$ V/m = 40.0 dB $\mu$ V/m  
 Reading = - 76.0 dBm (calibrated level)  
 Convert to dB $\mu$ V = - 76.0 + 107 = 31.0 dB $\mu$ V  
 Antenna Factor + Cable Loss = 5.8 dB/m  
 Total = 36.8 dB $\mu$ V/m  
  
 Margin = 36.8 - 40.0 = - 3.2 dB  
 = **3.2 dB below limit**

**Note:**

$$\text{Level [dB}\mu\text{V]} = 20 \log_{10} (\text{Level } [\mu\text{V/m}])$$

$$\text{Level [dB}\mu\text{V]} = \text{Level [dBm]} + 107$$



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## 6.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST).

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	263-10dB	(DC-18GHz) 10 dB Attenuator	N/A		N/A	N/A
-	No.165	(30MHz - 1000MHz) RG58 Coax Cable	N/A		N/A	N/A
-	No.166	(1000-26500MHz) Microwave RF Cable	N/A		N/A	N/A
-	No.167	(100kHz - 100MHz) RG58 Coax Cable	N/A		N/A	N/A
Agilent	11713A	Attenuation/Switch Driver	12/13/2007	Annual	12/13/2008	3439A02645
Agilent	8447D	Broadband Amplifier	N/A		N/A	1937A03348
Agilent	8447D	Broadband Amplifier	N/A		N/A	2443A01900
Agilent	8449B	(1-26.5GHz) Pre-Amplifier	12/13/2007	Annual	12/13/2008	3008A00985
Agilent	8495A	(0-70dB) DC-4GHz Attenuator	N/A		N/A	N/A
Agilent	85650A	Quasi-Peak Adapter	3/13/2008	Annual	3/13/2009	2043A00301
Agilent	8566B	(100Hz-22GHz) Spectrum Analyzer	12/13/2007	Annual	12/13/2008	3638A08713
Agilent	8566B	Opt. 462 Impulse Bandwidth	12/13/2007	Annual	12/13/2008	3701A22204
Agilent	8591A	(9kHz-1.8GHz) Spectrum Analyzer	8/19/2008	Annual	8/19/2009	3144A02458
Agilent	E4407B	ESA Spectrum Analyzer	3/13/2008	Annual	3/13/2009	US39210313
Agilent	E4448A	(3Hz-50GHz) Spectrum Analyzer	1/24/2008	Annual	1/24/2009	US42510244
Agilent	E8257D	(250kHz-20GHz) Signal Generator	3/8/2007	Biennial	3/8/2009	MY45470194
Emco	3115	Horn Antenna (1-18GHz)	9/24/2007	Biennial	9/24/2009	9704-5182
Emco	3115	Horn Antenna (1-18GHz)	10/4/2007	Biennial	10/4/2009	9205-3874
Emco	3121C-DB4	Dipole Antenna	1/23/2007	Biennial	1/23/2009	23951
Emco	6502	Active Loop Antenna (10k - 30 MHz)	11/6/2007	Biennial	11/6/2009	9/23/1900
MiniCircuits	VHF-3100+	High Pass Filter	N/A		N/A	30721
Pasternack	PE2209-10	Bidirectional Coupler	N/A		N/A	N/A
Pasternack	PE7000-6	6 dB Attenuator	N/A		N/A	N/A
Rohde & Schwarz	CMU200	Base Station Simulator	5/29/2008	Annual	5/29/2009	836371/0079
Rohde & Schwarz	NRVD	Dual Channel Power Meter	8/20/2008	Biennial	8/20/2010	101695
Rohde & Schwarz	NRVS	Single Channel Power Meter	7/3/2007	Biennial	7/3/2009	835360/0079
Rohde & Schwarz	NRV-Z32	Peak Power Sensor (100uW-2W)	12/21/2006	Biennial	12/21/2008	100155
Rohde & Schwarz	NRV-Z33	Peak Power Sensor (1mW-20W)	11/28/2006	Biennial	11/28/2008	100004
Rohde & Schwarz	NRV-Z53	Power Sensor	7/3/2007	Biennial	7/3/2009	846076/0007
Solar Electronics	8012-50-R-24-BNC	LISN	11/8/2007	Biennial	11/8/2009	310233
Sunol	DRH-118	Horn Antenna (1 - 18GHz)	5/9/2007	Biennial	5/9/2009	A050307

**Table 6-1. Annual Test Equipment Calibration Schedule**


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## 7.0 ENVIRONMENTAL CONDITIONS

The temperature is controlled within range of 15°C to 35°C.

The relative humidity is controlled within range of 10% to 75%.

The atmospheric pressure is controlled within the range 86-106kPa (860-1060mbar).

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## 8.0 TEST DATA

### 8.1 Summary

Company Name: Panasonic Corporation of North America  
 FCC ID: ACJ9TGCF-H11  
 Frequencies Examined: 13.56MHz

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
<b>TRANSMITTER MODE (Tx)</b>					
15.225 (a)	In-Band Emissions	15,848 $\mu$ V/m @ 30m 13.553 – 13.567 MHz	RADIATED	PASS	Section 7.3
2.1049	20 dB Bandwidth	N/A		PASS	Section 7.2
15.225 (b)	In-Band Emissions	334 $\mu$ V/m @ 30m 13.410 – 13.553 MHz 13.567 – 13.710 MHz		PASS	Section 7.3
15.225 (c)	In-Band Emissions	106 $\mu$ V/m @ 30m 13.110 – 13.410 MHz 13.710 – 14.010 MHz		PASS	Section 7.3
15.225 (d) 15.209	Out-of-Band Emissions	Emissions outside of the specified band (13.110 – 14.010 MHz) must meet the radiated limits detailed in 15.209		PASS	Section 7.4
15.225 (e)	Frequency Stability Tolerance	$\pm$ 0.01% of Operating Frequency	Temperature Chamber	PASS	Section 7.6
15.207	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.207 limits or < RSS-Gen table 2 limits	LINE CONDUCTED	PASS	Section 7.5

**Table 8-1. Summary of Test Results**

FCC ID: ACJ9TGCF-H11		FCC Pt. 15.225 MEASUREMENT REPORT		Reviewed by: Quality Manager
Test Report S/N: 0808221184.ACJ	Test Date(s): November 11 - 12, 2008	EUT Type: Toughbook Model: CF-H1	Page 12 of 23	

## 8.2 20dB Bandwidth Measurement

### §2.1049

The 20dB bandwidth is measured with a spectrum analyzer connected via a receive antenna placed near the EUT while the EUT is operating in transmission mode.

Frequency	Occupied Bandwidth
13.56MHz	29.8kHz

Table 8-2. 20dB Bandwidth Measurement

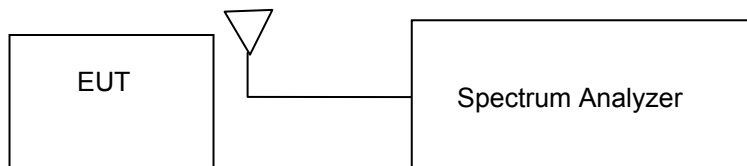


Figure 8-1. Test Instrument & Measurement Setup

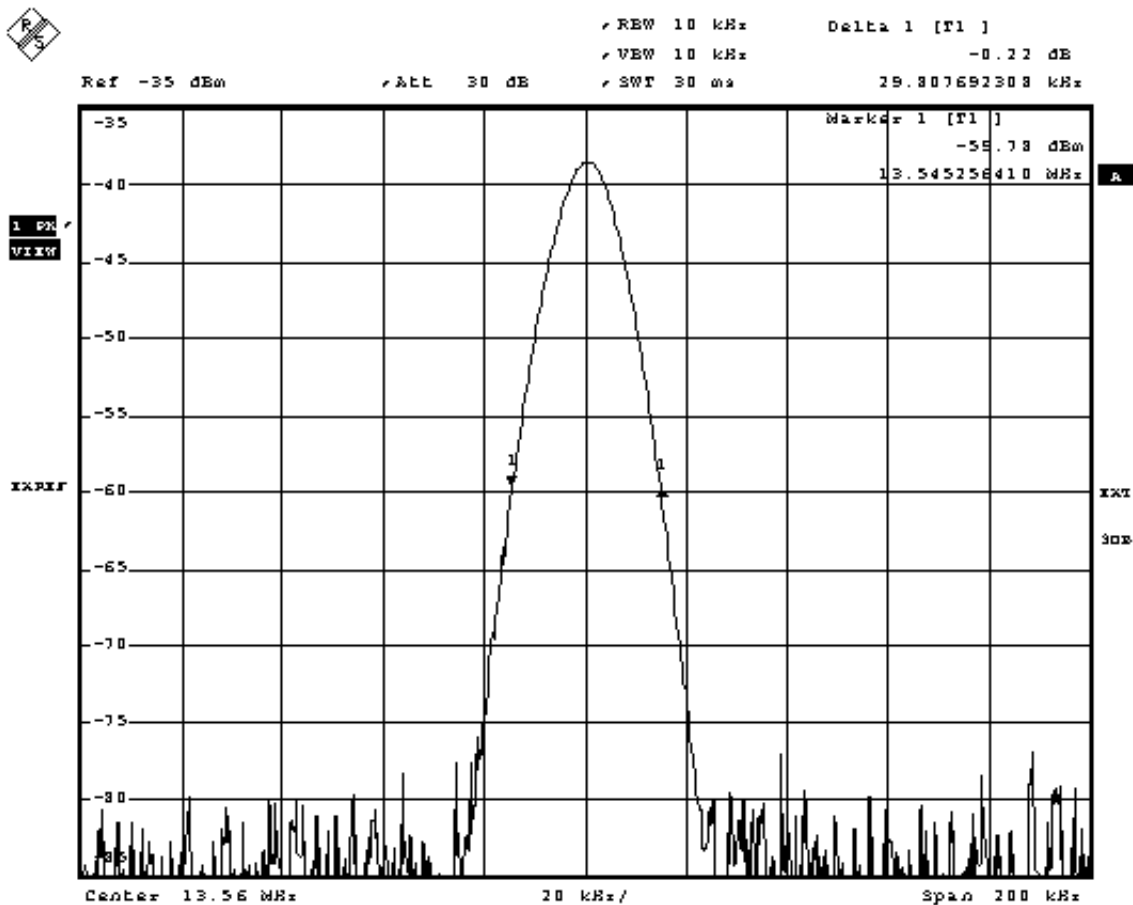


Figure 8-2. Occupied Bandwidth Plot

FCC ID: ACJ9TGCF-H11		FCC Pt. 15.225 MEASUREMENT REPORT		Reviewed by: Quality Manager
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### 8.3 In-Band Radiated Spurious Emission Measurements §15.225(a), (b), (c)

Radiated emissions testing was performed in the band 13.110 – 14.010 MHz.

Frequency: 13.56MHz

Measurement Distance: 3 Meters

Frequency [MHz]	Level [dBm]	AFCL [dB]	Antenna Position	Pol [H/V]	3m Field Strength [dBμV/m]	30m Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
13.400	-86.14	10.84	Y	V	31.70	-8.30	40.51	-48.81
13.529	-73.32	10.84	X	V	44.52	4.52	50.47	-45.95
13.560	-51.00	10.84	Y	V	66.84	26.84	84.00	-57.16
13.576	-70.73	10.84	X	V	47.11	7.11	50.47	-43.36
13.716	-85.09	10.84	X	V	32.75	-7.25	40.51	-47.76



**Table 8-3. In-Band Radiated Measurements**

**NOTES:**

1. All measurements were performed using a loop antenna. The antenna was positioned in three orthogonal positions (X front, Y side, Z top) and the position with the highest emission level was recorded.
2. Measurements were performed at 3m and the data was extrapolated to the specified measurement distance of 30m using the square of an inverse linear distance extrapolation factor (40 dB/decade) as specified in §15.31(f)(2).

$$\text{Extrapolation Factor} = 20 \log_{10}(30/3)^2 = 40\text{dB}$$

3. All measurements were recorded using a spectrum analyzer employing a peak detector.

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## 8.4 Radiated Spurious Emission Measurements, Out-of-Band §15.225(d) / §15.209

The EUT was tested from 9kHz up to the 1GHz excluding the band 13.110 – 14.010 MHz. All measurements were recorded with a spectrum analyzer employing an average detector for emissions below 30MHz. Above 30MHz a Quasi-peak detector was used. All out-of-band emissions must not exceed the limits shown in Table 8-4 per Section 15.209. A loop antenna was used for searching for emissions below 30MHz.

Frequency	Field Strength [ $\mu\text{V/m}$ ]	Measured Distance [Meters]
0.009 – 0.490 MHz	2400/F (kHz)	300
0.490 – 1.705 MHz	24000/F (kHz)	30
1.705 – 30.00 MHz	30	30
30.00 – 88.00 MHz	100	3
88.00 – 216.0 MHz	150	3
216.0 – 960.0 MHz	200	3
Above 960.0 MHz	500	3



**Table 8-4. Radiated Limits – Out of band**

### Sample Calculation

- Field Strength Level  $_{[\text{dB}\mu\text{V/m}]}$  = Analyzer Level  $_{[\text{dBm}]} + 107 + \text{AFCL} \text{ }_{[\text{dB}]} + \text{Duty Cycle Correction} \text{ }_{[\text{dB}]}$

### Notes:

- AFCL = Antenna Factor  $_{[\text{dB}]} + \text{Cable Loss} \text{ }_{[\text{dB}]}$

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## Radiated Spurious Emission Measurements, Out-of-Band (Cont'd)

§15.225(d) / §15.209

Tx Frequency 13.56MHz



Measurement Distance: 3 Meters

Frequency [MHz]	Level [dBm]	AFCL [dB]	PoI [H/V]	3m Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
27.12	-94.34	8.68	V	21.34	69.54	-48.20
40.68	-103.13	14.07	V	17.94	40.00	-22.06
94.92	-97.66	11.37	V	20.71	43.52	-22.81
108.48	-97.63	12.02	V	21.40	43.52	-22.12
176.28	-101.38	14.23	V	19.85	43.52	-23.67
189.84	-99.37	14.31	V	21.94	43.52	-21.59
203.40	-98.33	14.31	V	22.98	43.52	-20.54
216.96	-100.53	14.10	V	20.57	43.52	-22.95
367.10	-82.04	13.91	V	38.87	43.52	-4.65
459.20	-80.04	13.73	V	40.69	46.02	-5.33
500.50	-82.86	17.68	V	41.82	46.02	-4.20
565.90	-91.67	19.63	V	34.95	46.02	-11.07

**Table 8-5. Radiated Measurements**

**NOTES:**

1. All measurements were recorded using a spectrum analyzer employing an average detector for below 30MHz and a Quasi-peak detector for above 30 MHz.
2. Both Vertical and Horizontal polarities of the receive antenna were evaluated with the worst case emissions being reported. Below 30MHz the Loop antenna was positioned in 3 separate radials.
3. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.
4. The spectrum is measured from 9kHz to the 10<sup>th</sup> harmonic and the worst-case emissions are reported.

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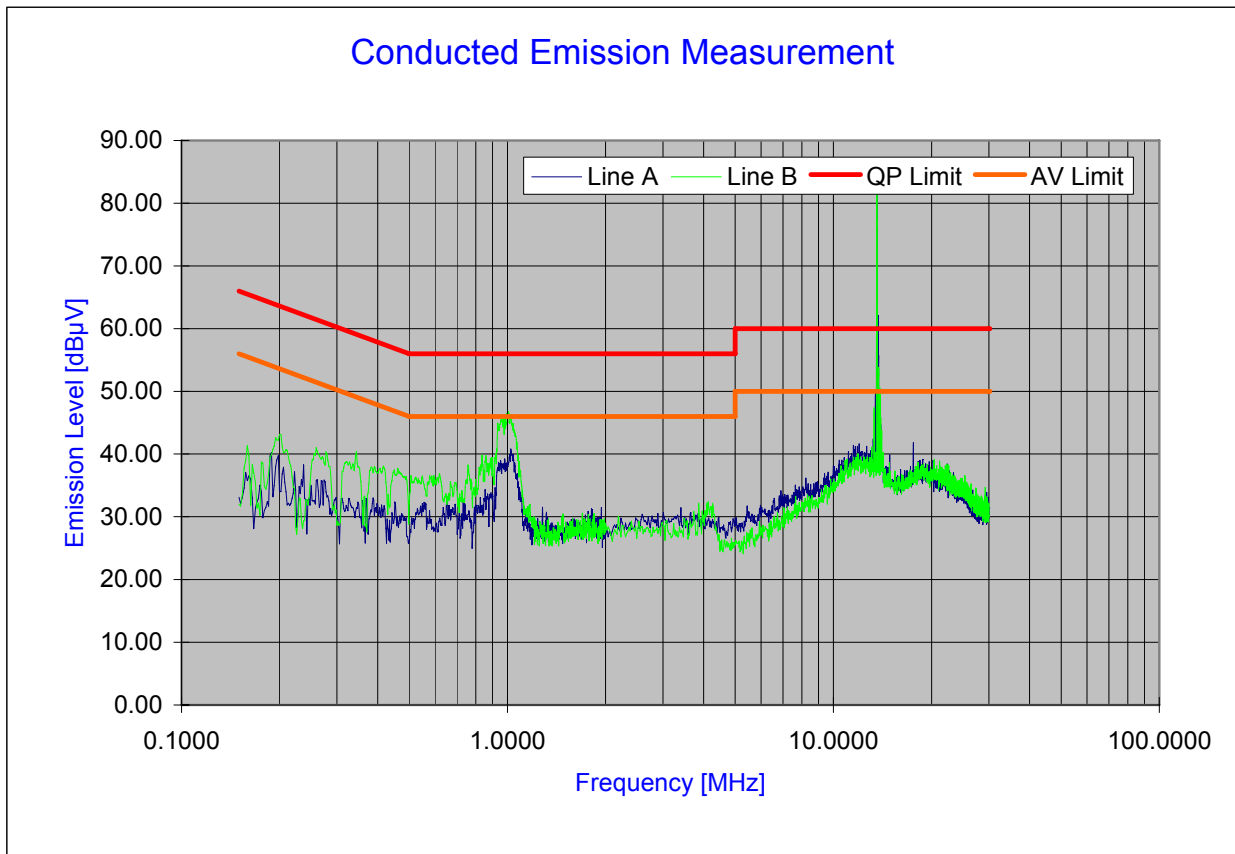
## 8.5 Line Conducted Measurement Data

**§15.207; RSS-Gen (7.2.2)**

# PCTEST Engineering Laboratory Inc.

Company : Panasonic Corporation  
 Model Number : CF-H1  
 FCC ID Code : ACJ9TGCF-H11  
 Standard : FCC Part 15C, 15.207

Power Source : AC120V/60Hz  
 Tested Date : 11/12/2008  
 Note : Tested with RFID On





Ver.1.1 ©PCTEST 2006.08

**Plot 8-1. Line-Conducted Test Plot**

**Notes:**

1. All Modes of operation were investigated and the worst-case emissions are reported.
2. The limit for intentional radiator devices from 150k to 30MHz is specified in Section 15.207 of the Title 47 CFR.
3. Line A = Phase; Line B = Neutral
4. Traces shown in plot are made using a peak detector.
5. RFID antenna is transmitting at maximum power and is shown here to exceed the 15.207 limits.
6. Deviations to the Specifications: None.

FCC ID: ACJ9TGCF-H11		FCC Pt. 15.225 MEASUREMENT REPORT		Reviewed by: Quality Manager
Test Report S/N: 0808221184.ACJ	Test Date(s): November 11 - 12, 2008	EUT Type: Toughbook Model: CF-H1		Page 17 of 23



**Line Conducted Measurement Data (Cont'd)**  
**§15.207; RSS-Gen (7.2.2)**

No.	Line	Frequency [MHz]	Factor [dB]	QP [dBμV]	Limit [dBμV]	Margin [dB]	Average [dBμV]	Limit [dBμV]	Margin [dB]
1	A	1.012	7.32	36.82	56.00	-19.18	23.83	46.00	-22.17
2	A	11.588	7.70	36.61	60.00	-23.39	29.02	50.00	-20.98
3	A	11.961	7.72	36.65	60.00	-23.35	28.93	50.00	-21.07
4	A	12.626	7.76	36.45	60.00	-23.55	29.15	50.00	-20.85
5	A	13.297	7.79	37.45	60.00	-22.55	28.17	50.00	-21.83
6	A	13.553	7.81	62.01	60.00	2.01	41.29	50.00	-8.71
7	A	13.562	7.81	85.27	60.00	25.27	85.28	50.00	35.28
8	A	13.713	7.81	43.47	60.00	-16.53	28.83	50.00	-21.17
9	A	13.922	7.82	35.78	60.00	-24.22	27.12	50.00	-22.88
10	A	17.606	7.99	33.37	60.00	-26.63	25.47	50.00	-24.53
11	B	0.831	7.35	33.05	56.00	-22.95	21.94	46.00	-24.06
12	B	0.862	7.35	32.65	56.00	-23.35	20.54	46.00	-25.46
13	B	0.903	7.34	35.30	56.00	-20.70	22.96	46.00	-23.04
14	B	0.937	7.33	38.46	56.00	-17.54	21.49	46.00	-24.51
15	B	0.956	7.33	41.25	56.00	-14.75	25.68	46.00	-20.32
16	B	0.971	7.33	42.13	56.00	-13.87	25.31	46.00	-20.69
17	B	1.012	7.32	42.44	56.00	-13.56	27.90	46.00	-18.10
18	B	13.416	7.80	42.02	60.00	-17.98	27.19	50.00	-22.81
19	B	13.562	7.81	84.99	60.00	24.99	85.12	50.00	35.12
20	B	13.646	7.81	45.99	60.00	-14.01	28.54	50.00	-21.46

**Table 8-6. Line-Conducted Test Data**

**Notes:**

1. All Modes of operation were investigated and the worst-case emissions are reported.
2. The limit for intentional radiators from 150kHz to 30MHz is specified in Section 15.207 of the Title 47 CFR.
3. Line A = Phase; Line B = Neutral
4. Traces shown in plot are made using a peak detector.
5. RFID antenna is transmitting at maximum power and is shown here to exceed the 15.207 limits.
6. Deviations to the Specifications: None.

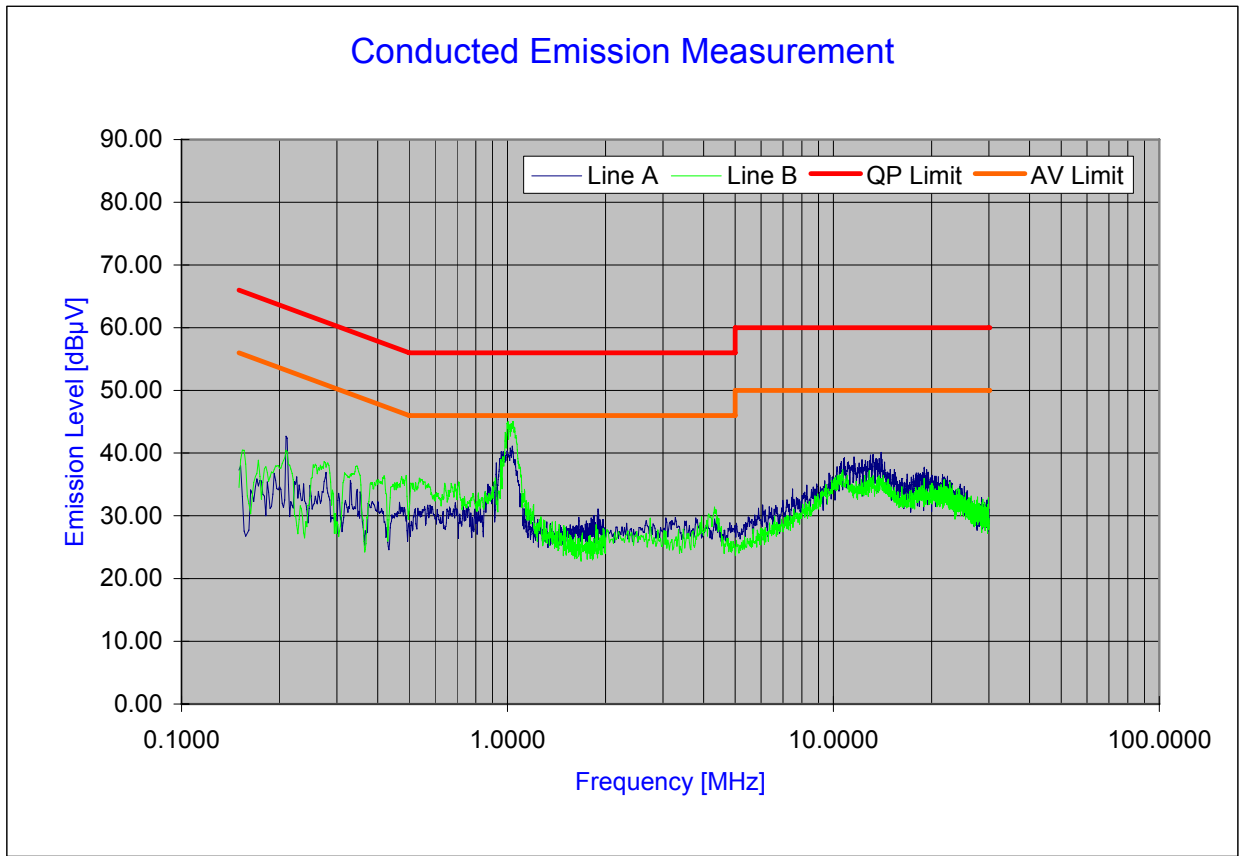
FCC ID: ACJ9TGCF-H11		FCC Pt. 15.225 MEASUREMENT REPORT		Reviewed by: Quality Manager
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**Line Conducted Measurement Data (Cont'd)**  
**§15.207; RSS-Gen (7.2.2)**

# PCTEST Engineering Laboratory Inc.

Company : Panasonic Corporation  
 Model Number : CF-H1  
 FCC ID Code : ACJ9TGCF-H11  
 Standard : FCC Part 15C, 15.207

Power Source : AC120V/60Hz  
 Tested Date : 11/12/2008  
 Note : Tested with RFID antenna port terminated in 50Ω





Ver.1.1 ©PCTEST 2006.08

**Plot 8-2. Line-Conducted Test Plot**

**Notes:**

1. All Modes of operation were investigated and the worst-case emissions are reported.
2. The limit for intentional radiator devices from 150k to 30MHz is specified in Section 15.207 of the Title 47 CFR.
3. Line A = Phase; Line B = Neutral
4. Traces shown in plot are made using a peak detector.
5. RFID antenna port is terminated in 50Ω in this configuration to show compliance.
6. Deviations to the Specifications: None.

<b>FCC ID:</b> ACJ9TGCF-H11		<b>FCC Pt. 15.225 MEASUREMENT REPORT</b>		<b>Reviewed by:</b> Quality Manager
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**Line Conducted Measurement Data (Cont'd)**  
**§15.207; RSS-Gen (7.2.2)**

No.	Line	Frequency [MHz]	Factor [dB]	QP [dBμV]	Limit [dBμV]	Margin [dB]	Average [dBμV]	Limit [dBμV]	Margin [dB]
1	A	0.192	7.97	42.21	63.96	-21.75	28.21	53.96	-25.75
2	A	0.901	7.34	28.45	56.00	-27.55	19.59	46.00	-26.41
3	A	0.906	7.34	26.60	56.00	-29.40	19.47	46.00	-26.53
4	A	0.967	7.33	34.78	56.00	-21.22	21.12	46.00	-24.88
5	A	1.010	7.32	36.83	56.00	-19.17	23.87	46.00	-22.13
6	A	1.025	7.32	37.00	56.00	-19.00	23.74	46.00	-22.26
7	A	11.574	7.70	33.41	60.00	-26.59	25.69	50.00	-24.31
8	A	12.952	7.78	34.41	60.00	-25.59	25.77	50.00	-24.23
9	A	13.208	7.79	34.12	60.00	-25.88	25.94	50.00	-24.06
10	A	13.918	7.82	33.98	60.00	-26.02	25.53	50.00	-24.47
11	B	0.415	7.48	34.56	57.55	-22.99	24.33	47.55	-23.22
12	B	0.484	7.44	33.26	56.27	-23.01	23.38	46.27	-22.89
13	B	0.529	7.42	33.25	56.00	-22.75	23.20	46.00	-22.80
14	B	0.660	7.39	31.12	56.00	-24.88	21.41	46.00	-24.59
15	B	0.692	7.38	30.84	56.00	-25.16	21.37	46.00	-24.63
16	B	0.694	7.38	31.51	56.00	-24.49	21.11	46.00	-24.89
17	B	0.918	7.34	30.85	56.00	-25.15	20.75	46.00	-25.25
18	B	0.970	7.33	36.35	56.00	-19.65	22.43	46.00	-23.57
19	B	1.020	7.32	41.70	56.00	-14.30	27.19	46.00	-18.81
20	B	1.024	7.32	41.73	56.00	-14.27	28.27	46.00	-17.73

**Table 8-7. Line-Conducted Test Data**

**Notes:**

1. All Modes of operation were investigated and the worst-case emissions are reported.
2. The limit for intentional radiators from 150kHz to 30MHz is specified in Section 15.207 of the Title 47 CFR.
3. Line A = Phase; Line B = Neutral
4. Traces shown in plot are made using a peak detector.
5. RFID antenna port is terminated in 50Ω in this configuration to show compliance.
6. Deviations to the Specifications: None.

FCC ID: ACJ9TGCF-H11		FCC Pt. 15.225 MEASUREMENT REPORT		Reviewed by: Quality Manager
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## 8.6 Frequency Stability Test Data

### §15.225

Part 15.225 requires that devices operating in the 13.553 – 13.567 MHz shall maintain the carrier frequency within 0.01% of the operating frequency over the temperature variation of -20 degrees to +50 degrees C at normal supply voltage.



OPERATING FREQUENCY: 13,560,000 Hz

REFERENCE VOLTAGE: 10.65 Vdc

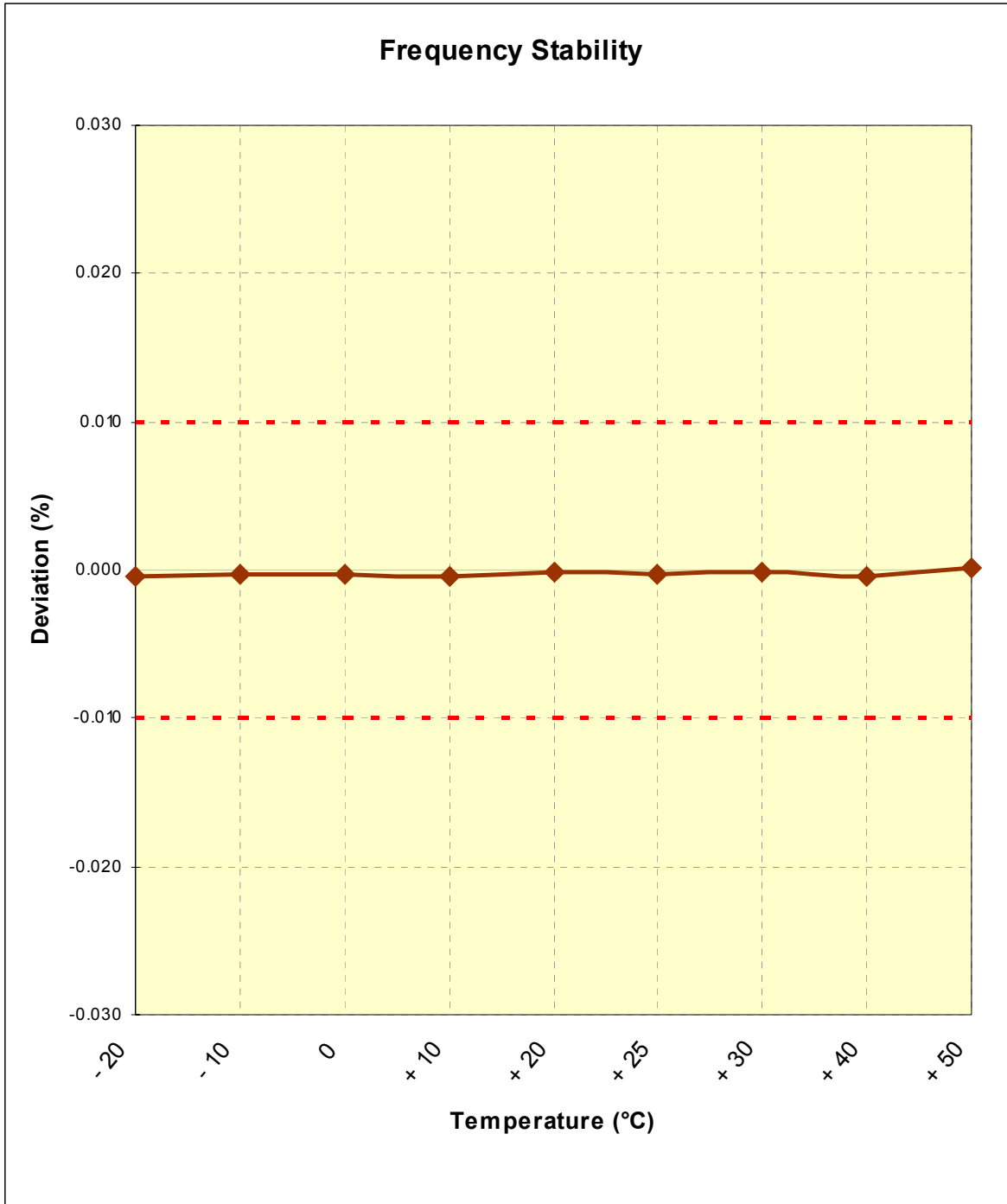
DEVIATION LIMIT: ± 0.01 % = 1356Hz

VOLTAGE (%)	POWER Battery (Vdc)	TEMP (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	10.65	+ 20 (Ref)	13,560,044	44	0.000324
100 %		- 20	13,559,941	-59	-0.000435
100 %		- 10	13,559,962	-38	-0.000282
100 %		0	13,559,959	-41	-0.000299
100 %		+ 10	13,559,943	-57	-0.000421
100 %		+ 20	13,559,976	-24	-0.000178
100 %		+ 25	13,559,955	-45	-0.000331
100 %		+ 30	13,559,974	-26	-0.000192
100 %		+ 40	13,559,948	-52	-0.000387
100 %		+ 50	13,560,011	11	0.000081

Table 8-8. Frequency Stability Test Data

FCC ID: ACJ9TGCF-H11		FCC Pt. 15.225 MEASUREMENT REPORT		Reviewed by: Quality Manager
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**Frequency Stability Test Data (Cont'd)**  
**§15.225**




**Figure 8-3. Frequency Stability Plot**

<b>FCC ID:</b> ACJ9TGCF-H11	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	<b>FCC Pt. 15.225 MEASUREMENT REPORT</b>	<b>Panasonic</b>	<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0808221184.ACJ	<b>Test Date(s):</b> November 11 - 12, 2008	<b>EUT Type:</b> Toughbook Model: CF-H1		Page 22 of 23

## 9.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Panasonic Toughbook Model: CF-H1 FCC ID: ACJ9TGCF-H11** has been tested to show compliance with the requirements specified in §15.225 of the FCC Rules.

<b>FCC ID:</b> ACJ9TGCF-H11	 <b>PCTEST</b> ENGINEERING LABORATORY, INC.	<b>FCC Pt. 15.225 MEASUREMENT REPORT</b>	<b>Panasonic</b>	<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0808221184.ACJ	<b>Test Date(s):</b> November 11 - 12, 2008	<b>EUT Type:</b> <b>Toughbook Model: CF-H1</b>		Page 23 of 23