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**REPORT ON**

FCC Part 15 Testing in support of an Application for Grant of Equipment Authorisation  
of a Symbol MC9050 Mobile Computer  
FCC ID: H9PMC9050

Report No OR611296-2 Issue 2

August 2003

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**REPORT ON**

FCC Part 15C Testing in support of an Application for Grant of  
Equipment Authorisation of a Symbol Gemini MC9050 Mobile  
Computer

FCC ID: H9PMC9050

Report No OR611296-2 Issue 2

August 2003

**PREPARED FOR**

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**DATED**

21-08-03

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## **STATUS**

OBJECTIVE	To undertake measurements to determine the Equipment Under Test's (EUT's) compliance with the specification.
MANUFACTURING DESCRIPTION	Mobile Computer
APPLICANT	Symbol Technologies Inc One Symbol Plaza Holtsville NY 11742-1300 New York United States of America
TYPE NUMBER	MC9050
MANUFACTURERS MODEL NUMBER	MC9050-GJ0JAEBA2WW
SERIAL NUMBER	ALP68681
HARDWARE VERSION	Rev 1
TEST SPECIFICATION NUMBER	FCC Part 15 Subpart C
REGISTRATION NUMBER	OR611296/01
QUANTITY OF ITEMS TESTED	One
SECURITY CLASSIFICATION OF EUT	Unclassified
INCOMING RELEASE SERIAL NUMBER DATE	Declaration of Build Status OR611296
DISPOSAL REFERENCE NUMBER DATE	Held pending disposal N/A N/A
START OF TEST FINISH OF TEST	16 <sup>th</sup> June 2003 15 <sup>th</sup> July 2003
TEST ENGINEERS	S C Hartley A Guy R Henley
RELATED DOCUMENTS	ANSI C63.4 2001. Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz. FCC Public Notice document (DA 00-705 released 30 March 2000)



## TEST RATIONALE

This report has been re-issued because of some typing errors in the original report OR611296-2. This report should be read in place of the original.

The information contained within this report is intended to show verification of compliance of the Symbol Technologies Inc MC9050 Mobile Computer to the requirements of FCC Specification Part 15.

FCC ID H9PMC9050

The unit supplied for testing was a MC9050 Mobile Computer, which offers 2.4GHz 802.11b Wireless LAN and Bluetooth connectivity.

The terminal utilizes the approved LA-4137 Symbol Compact Flash 802.11b RLAN radio card and the 21-58466 Symbol Bluetooth module. FCC ID numbers are detailed below:

<u>Type:</u>	<u>Description</u>	<u>Approval</u>	<u>FCC ID</u>	<u>Date</u>
LA4137	Symbol Compact Flash RLAN Radio	FCC Part15	H9PLA4137	21/03/2000
21-58466	Symbol Bluetooth Module	FCC Part15	H9PSNAPPER	10/11/2002

The radios integrated in this terminal are not designed to operate simultaneously and are therefore tested independently.

Sub-equipped version (RLAN only)

A sub-equipped version of the MC9050 is also available; this version will only offer 802.11b RLAN connectivity as the Symbol Bluetooth module is not included.

This report will also be used as an exhibit for a separate FCC application.

The FCC ID number of version will be: H9PLA4137.

This report details testing carried out in accordance with:

- FCC: Part 15.247(c), Radiated Emission Measurement at the Band Edge (Marker Delta method)
- FCC: Part 15.247(c), Radiated Emissions
- FCC: Part 15.247(b), Maximum Peak Output Power



## **SYSTEM CONFIGURATION DURING EMC TESTING**

The EUT was set-up simulating a typical user installation on the Alternative Open Field Test Site identified on page 37, and tested in accordance with the specification.

The test software in the EUT enabled the Test Engineer to select full power and continuous transmit on the following channels;

### 2.4GHz RLAN functionality

Channel 1: 2412MHz  
Channel 6: 2437MHz  
Channel 11: 2462MHz

The Output Power level (controlled by application software) was set to 169.

### 2.4GHz Bluetooth functionality

Channel 2: 2402MHz  
Channel 41: 2441MHz  
Channel 80: 2480MHz

## TEST SETUP PHOTOGRAPH

The photograph below shows the EUT configuration during Radiated Emission testing.



Photograph 1



## EQUIPMENT INFORMATION

### Equipment under Test (EUT):

<b>Equipment:</b>	Mobile Computer
<b>Manufacturer:</b>	Symbol Technologies Inc
<b>Type No:</b>	MC9050
<b>Model No.</b>	MC9050-GJ0JAEBA2WW
<b>Serial No:</b>	ALP68683
<b>Drawing Revision:</b>	Rev 1

### Instrumentation used for Emission Testing:

<b>Instrument</b>	<b>Manufacturer</b>	<b>Type No</b>	<b>EMC No</b>	<b>Cal to</b>
Screened Enclosure	Siemens	EAC 54300	2533	TU
Turntable & Controller	HD GmbH	HD 050	2528	TU
Antenna Mast	Emco	2070		TU
Antenna Mast Controller	Emco	2090		TU
Test Receiver	Hewlett Packard	8542E	2286	13 Dec 03
Bilog Antenna	Chase	CBL 6143	2860	11 Apr 04
Test Receiver	Rhode and Schwarz	ESIB 40	2917	04 Feb 04
Test Receiver	Rhode and Schwarz	ESH3	1020	17 July 03
Horn (1 - 18GHz)	EMCO	3115	2397	04 July 04
Low Noise Amplifier (1 - 8GHz)	Miteq	AMF-3D-001080-18-13P	2457	TU
3GHz High Pass Filter	RLC Electronics	F-100-3000-5-R	INV 04467	TU
Barometer	Diplex	-	1938	TU
Amplifier 18-26.5GHz	Avantek	AMT 26177-33	2072	26 Jun 04
Horn 18-40GHz	Microtek	AM 180HA-K-TU2	2945	15 Apr 05
Hygrometer	Rotronic	A1	INV2156	28 Nov 03

### Instrumentation used for Maximum Power measurements

Spectrum Analyser	Rohde and Schwarz	FSEM	INV4034	16 Dec 03
Signal Generator	Hewlett Packard	ESG 4000A	INV3709	21 Jan 04
DRG Antenna	EMCO	3115	INV3549	06 July 04
Substitution DRG Antenna	EMCO	3115	INV3777	20 Jan 04
Amplifier			INV4863	21 Feb 04
Cable	Reynolds Industries	269-0088-3000	CS0535	TU
Cable	Rosenberger	FA210B-1-070M	CS0567	TU
Hydrometer	Rotronic	A1	INV4198	07 Apr 04

TU - Traceability Unscheduled





## **RADIATED EMISSIONS: EUT in RLAN Mode**

### **MEASUREMENT AT THE BAND EDGE (Marker Delta Method)**

The following Test Results were obtained using the FCC Public Notice document (DA 00-705 released 30 March 2000) for making measurements at the Band Edge, incorporating the 'Marker Delta Method'.

#### **Step 1**

Bottom Channel Fundamental Field Strength Measurement.

Performed in accordance with ANSI C63.4

Peak measurements performed utilising a Resolution Bandwidth and Video Bandwidth of 1MHz.  
Average measurements performed utilising a Resolution Bandwidth of 1MHz and Video Bandwidth of 10Hz.

Freq	Ant Pol	Hgt	Azi	Peak Field Strength	Average Field Strength
GHz	H/V	cm	deg	dB $\mu$ V/m	dB $\mu$ V/m
2.412	H	129	254	104.0	96.0

#### **Step 2**

Determine Marker Delta amplitude between 2.412GHz fundamental and 2.390GHz the Band Edge under investigation.

Using a span of 30MHz with Resolution Bandwidth and Video Bandwidth of 300kHz.

2.412GHz Peak using above instrument settings = 69.7dB $\mu$ V (uncorrected)

2.390GHz Peak using above instrument settings = 25.0dB $\mu$ V (uncorrected)

Therefore Marker Delta Amplitude (69.7dB $\mu$ V – 25.0dB $\mu$ V) = 44.7dB

#### **Step 3**

Subtracting the Marker Delta obtained from Step 2 from the 2.412GHz Field Strength measurement from Step 1, gives following Result

Peak of 104.0dB $\mu$ V/m – 44.7dB (Delta) = 59.3dB $\mu$ V/m (Limit is 74.0dB $\mu$ V/m = Pass)

Average of 96.0dB $\mu$ V/m – 44.7dB (Delta) = 51.3dB $\mu$ V/m (Limit is 54.0dB $\mu$ V/m = Pass)



## RADIATED EMISSIONS: EUT in RLAN Mode

### MEASUREMENT AT THE BAND EDGE (Marker Delta Method) Continued

#### **Step 1**

Top Channel Fundamental Field Strength Measurement.

Performed in accordance with ANSI C63.4

Peak measurements performed utilising a Resolution Bandwidth and Video Bandwidth of 1MHz.  
Average measurements performed utilising a Resolution Bandwidth of 1MHz and Video Bandwidth of 10Hz.

Freq	Ant Pol	Hgt	Azi	Peak FS	Average FS
GHz	H/V	cm	deg	dB $\mu$ V/m	dB $\mu$ V/m
2.462	H	128	163	104.0	95.7

#### **Step 2**

Determine Marker delta amplitude between 2.462GHz fundamental and 2.4835GHz the Band Edge under investigation.

Using a span of 30MHz with Resolution Bandwidth and Video Bandwidth of 300kHz.

2.462GHz Peak using above instrument settings = 67.4dB $\mu$ V (uncorrected)

2.485GHz Peak using above instrument settings = 23.8dB $\mu$ V (uncorrected)

Therefore Marker Delta Amplitude (67.4dB $\mu$ V – 23.8dB $\mu$ V) = 43.6dB

#### **Step 3**

Subtracting the Marker Delta obtained from Step 2 from the 2.462GHz Field Strength measurement from Step 1, gives following Result

Peak of 104.0dB $\mu$ V/m – 43.6dB (Delta) =60.4dB $\mu$ V/m (Limit is 74.0dB $\mu$ V/m = Pass)

Average of 95.7dB $\mu$ V/m – 43.6dB (Delta) = 52.1dB $\mu$ V/m (Limit is 54.0dB $\mu$ V/m = Pass)

EUT meets the measurement at the Band Edge requirements for the Top and Bottom Channel.

Procedure: Test Performed in accordance with FCC Public Notice document (DA 00-705 released 30 March 2000)

Performed by: A Guy, EMC Engineer.

Signature:

Date: 21<sup>st</sup> June 2003



## **RADIATED EMISSIONS: EUT in RLAN Mode**

### **TEST PROCEDURE**

Testing to the requirements of FCC Part 15 Subpart C, Section 15.247(c), for Radiated Electric Field Emissions was carried out on the Measurement Test Facility detailed on page 37.

A preliminary profile of the Radiated Emissions was obtained by operating the Equipment Under Test (EUT) on a remotely controlled turntable within a semi-anechoic chamber; measurements were taken at a 3m distance unless otherwise stated. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst case emissions together with the EUT azimuth and antenna polarisation.

Using the information from the preliminary profiling of the EUT, a search was made in the frequency range 30MHz to 25GHz. The list of worst case emissions was then confirmed or updated under Open Site conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

30MHz – 1GHz emissions levels were then formally measured using a CISPR Quasi-Peak detector. 1GHz – 25GHz emissions levels were then formally measured using Peak and Average detectors.

(Note: Peak measurements performed using a Resolution and Video Bandwidth of 1MHz, Average measurements performed using a Resolution Bandwidth of 1MHz and a Video Bandwidth of 10Hz)

The EUT was operating off its internal battery; the battery was replaced at regular intervals to ensure optimum performance of the EUT.

Measurements were made with the EUT transmitting on the following channels.

Channel 1: 2412MHz  
Channel 6: 2437MHz  
Channel 11: 2462MHz

Radiated Emissions from 30MHz to 1GHz were made using a HP 8542E Test Receiver.

Radiated Emissions from 1GHz to 25GHz were made using a Rhode and Schwarz ESIB 40 Test Receiver.

The test was performed in accordance with ANSI C63.4.

The measurements were performed at a 3m distance unless otherwise stated.



**RADIATED EMISSIONS TEST RESULTS: EUT in RLAN Mode (cont'd)**

**30MHz – 1GHz Frequency Range**

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC Part 15.247© for Radiated Emissions (30MHz – 1GHz).

**EUT Tx on Bottom Channel (2.412GHz)**

30MHz – 1GHz Alternative Open Area Test Site Results: The levels of the highest emissions measured in accordance with the specification are presented below: -

Emission Frequency	Pol	Hgt	Azm	Field Strength at 3m		Specification Limit	
				MHz	H/V	cm	deg
49.9	V	100	339	24.6	17.0	40.0	100
448.0	V	126	343	32.9	44.2	46.0	200
497.6	V	100	340	30.3	32.7	46.0	200
527.2	V	105	5	30.1	32.0	46.0	200

Table of Results for Radiated Emissions

**EUT Tx on Middle Channel (2.437GHz)**

30MHz – 1GHz Alternative Open Area Test Site Results: The levels of the highest emissions measured in accordance with the specification are presented below: -

Emission Frequency	Pol	Hgt	Azm	Field Strength at 3m		Specification Limit	
				MHz	H/V	cm	deg
49.9	V	100	345	23.8	15.5	40.0	100
448.0	V	100	0	32.7	42.9	46.0	200
497.3	V	100	0	32.1	40.3	46.0	200
526.9	V	100	0	31.9	39.4	46.0	200

Table of Results for Radiated Emissions



**RADIATED EMISSIONS TEST RESULTS: EUT in RLAN Mode (cont'd)**

**30MHz - 1GHz Frequency Range**

**EUT Tx on Top Channel (2.462GHz)**

30MHz – 1GHz Alternative Open Area Test Site Results: The levels of the highest emissions measured in accordance with the specification are presented below: -

Emission Frequency	Pol	Hgt	Azm	Field Strength at 3m		Specification Limit	
				dB $\mu$ V/m	$\mu$ V/m	dB $\mu$ V/m	$\mu$ V/m
50.0	V	105	359	25.9	19.7	40.0	100
447.8	V	100	347	33.4	46.8	46.0	200
498.1	V	100	350	31.1	35.9	46.0	200
528.3	V	100	0	31.8	39.0	46.0	200

Table of Results for Radiated Emissions

**ABBREVIATIONS FOR ABOVE TABLES**

H	Horizontal Polarisation	V	Vertical Polarisation
Pol	Polarisation	Hgt	Height
deg	degree	Azm	Azimuth

Procedure: Test Performed in accordance with ANSI C63.4.

Performed by: A Guy, EMC Engineer.

Signature:  \_\_\_\_\_

Date: 22<sup>nd</sup> June 2003



**RADIATED EMISSIONS TEST RESULTS: EUT in RLAN Mode (cont'd)**

**1GHz - 25GHz Range**

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC Part 15.247(c) for Radiated Emissions (1GHz – 25GHz).

**EUT Tx on Bottom Channel (2.412GHz)**

Frequency	Antenna			Field Strength (Peak) at 3m	Limit (Peak)	Field Strength (Average) at 3m	Limit (Average)
	Polarisation	Height	Azimuth				
GHz	H/V	cm	Deg	dBµV/m	dBµV/m	dBµV/m	dBµV/m
4.075	V	113	87	52.9	74.0	48.7	54.0
6.113	V	122	138	44.6	77.4	/	/

Table of Results for Radiated Emissions

**EUT Tx on Middle Channel (2.437GHz)**

Frequency	Antenna			Field Strength (Peak) at 3m	Limit (Peak)	Field Strength (Average) at 3m	Limit (Average)
	Polarisation	Height	Azimuth				
GHz	H/V	cm	Deg	dBµV/m	dBµV/m	dBµV/m	dBµV/m
4.126	H	100	273	54.8	74.0	50.7	54.0
6.188	V	142	207	46.6	84.0	/	/

Table of Results for Radiated Emissions



**RADIATED EMISSIONS TEST RESULTS: EUT in RLAN Mode (cont'd)**

**1GHz - 25GHz Range**

**EUT Tx on Top Channel (2.462GHz)**

Frequency	Antenna			Field Strength (Peak) at 3m	Limit (Peak)	Field Strength (Average) at 3m	Limit (Average)
	Polarisation	Height	Azimuth				
GHz	H/V	cm	Deg	dBµV/m	dBµV/m	dBµV/m	dBµV/m
4.176	V	100	202	56.1	74.0	52.3	54.0
6.268	V	100	209	46.6	78.0	/	/

Table of Results for Radiated Emissions

Procedure: Test Performed in accordance with ANSI C63.4.

Performed by: A Guy, EMC Engineer.

Signature:  \_\_\_\_\_

Date: 21<sup>st</sup> June 2003



## **MAXIMUM PEAK OUTPUT POWER: RLAN Mode**

### **TEST PROCEDURE**

Testing to the requirements of FCC Part 15 Subpart C, Section 15.247(b)(1), for Maximum Peak Output Power was carried out.

The Spectrum Analyser was tuned to the test frequency. The device Output power setting was controlled via the 'Test Mode' on each handset being set to the conditions specified in the Summary on page 5 of this document. The device was then rotated through 360 degrees until the highest power level was observed in both planes of polarisation. The device was then replaced with a substitution antenna, the signal to the antenna was adjusted to equal the related level detected from the device.

Maximum Peak Output Power measurements were made with the EUT set to continuous transmit at maximum power on the following channels:

Channel 1: 2412MHz  
Channel 6: 2437MHz  
Channel 11: 2462MHz

### **TEST RESULTS**

The EUT met the requirements of FCC Part 15.247(b)(1) for Maximum Peak Output Power, see Table 1.

### **MAXIMUM POWER**

Frequency (MHz)	Raw Result (dBm)	Substitution Level (dBm)	Cable Loss (dB)	Substitution Antenna Gain (dB)	Result ERP (dBm)	Result ERP (mW)
2412	-26.80	14.10	-5.00	7.78	16.88	48.75
2437	-26.93	14.10	-4.89	7.92	17.13	51.64
2462	-26.55	14.40	-4.89	8.06	17.57	57.15

Table 1

Performed by: Ryan Henley, Radio Engineer.

Signature:



Date: 15<sup>th</sup> June 2003





## **RADIATED EMISSIONS: EUT in Bluetooth Mode**

### **MEASUREMENT AT THE BAND EDGE (Marker Delta Method)**

The following Test Results were obtained using the FCC Public Notice document (DA 00-705 released 30 March 2000) for making measurements at the Band Edge, incorporating the 'Marker Delta Method'.

#### **Step 1**

Bottom Channel Fundamental Field Strength Measurement.

Performed in accordance with ANSI C63.4

Peak measurements performed utilising a Resolution Bandwidth and Video Bandwidth of 1MHz.  
Average measurements performed utilising a Resolution Bandwidth of 1MHz and Video Bandwidth of 10Hz.

Freq	Ant Pol	Hgt	Azi	Peak Field Strength	Average Field Strength
GHz	H/V	cm	deg	dB $\mu$ V/m	dB $\mu$ V/m
2.402	V	153	343	74.6	69.4

#### **Step 2**

Determine Marker Delta amplitude between 2.402GHz fundamental and 2.390GHz the Band Edge under investigation.

Using a span of 1MHz with Resolution Bandwidth and Video Bandwidth of 1MHz.

2.402GHz Peak using above instrument settings = 41.6 dB $\mu$ V (uncorrected)

2.390GHz Peak using above instrument settings = 22.5 dB $\mu$ V (uncorrected)

Therefore Marker Delta Amplitude (41.6dB $\mu$ V – 22.5 dB $\mu$ V) = 19.1dB

#### **Step 3**

Subtracting the Marker Delta obtained from Step 2 from the 2.402GHz Field Strength measurement from Step 1, gives following Result

Peak of 74.6dB $\mu$ V/m – 19.1dB (Delta) = 55.5dB $\mu$ V/m (Limit is 74.0dB $\mu$ V/m = Pass)

Average of 69.4dB $\mu$ V/m – 19.1dB (Delta) = 50.3dB $\mu$ V/m (Limit is 54.0dB $\mu$ V/m = Pass)



**RADIATED EMISSIONS: EUT in Bluetooth Mode**

**MEASUREMENT AT THE BAND EDGE (Marker Delta Method) Continued**

**Step 1**

Top Channel Fundamental Field Strength Measurement.

Performed in accordance with ANSI C63.4

Peak measurements performed utilising a Resolution Bandwidth and Video Bandwidth of 1MHz.  
Average measurements performed utilising a Resolution Bandwidth of 1MHz and Video Bandwidth of 10Hz.

Freq	Ant Pol	Hgt	Azi	Peak Field Strength	Average Field Strength
GHz	H/V	cm	deg	dBµV/m	dBµV/m
2.480	H	122	0	76.9	75.7

**Step 2**

Determine Marker Delta amplitude between 2.480GHz fundamental and 2.483GHz the Band Edge under investigation.

Using a span of 30MHz with Resolution Bandwidth and Video Bandwidth of 300kHz.

2.480GHz Peak using above instrument settings = 45.5dBµV (uncorrected)  
2.483GHz Peak using above instrument settings = 23.4dBµV (uncorrected)

Therefore Marker Delta Amplitude (45.5dBµV – 23.4dBµV) = 22.1dB

**Step 3**

Subtracting the Marker Delta obtained from Step 2 from the 2.480GHz Field Strength measurement from Step 1, gives following Result

Peak of 76.9dBµV/m – 22.1dB (Delta) = 54.8dBµV/m (Limit is 74.0dBµV/m = Pass)

Average of 75.7dBµV/m – 22.1dB (Delta) = 53.6dBµV/m (Limit is 54.0dBµV/m = Pass)

EUT meets the measurement at the Band Edge requirements for the Top and Bottom Channel.

Procedure: Test Performed in accordance with FCC Public Notice document (DA 00-705 released 30 March 2000)

Performed by: A Guy, EMC Engineer.

Signature:  \_\_\_\_\_

Date: 19<sup>th</sup> June 2003



## **RADIATED EMISSIONS: EUT in Bluetooth Mode**

### **TEST PROCEDURE**

Testing to the requirements of FCC Part 15 Subpart C, Section 15.247(c), for Radiated Electric Field Emissions was carried out on the Measurement Test Facility detailed on page 37.

A preliminary profile of the Radiated Emissions was obtained by operating the Equipment Under Test (EUT) on a remotely controlled turntable within a semi-anechoic chamber; measurements were taken at a 3m distance unless otherwise stated. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst case emissions together with the EUT azimuth and antenna polarisation.

Using the information from the preliminary profiling of the EUT, a search was made in the frequency range 30MHz to 25GHz. The list of worst case emissions was then confirmed or updated under Open Site conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

30MHz - 1GHz emissions levels were then formally measured using a CISPR Quasi-Peak detector. 1GHz - 25GHz emissions levels were then formally measured using Peak and Average detectors.

(Note: Peak measurements performed using a Resolution and Video Bandwidth of 1MHz, Average measurements performed using a Resolution Bandwidth of 1MHz and a Video Bandwidth of 10Hz)

The EUT was operating off its internal battery, the battery was replaced at regular intervals to ensure optimum performance of the EUT.

Measurements were made with the EUT transmitting on the following channels.

Channel 2: 2402MHz  
Channel 41: 2441MHz  
Channel 80: 2480MHz

Radiated Emissions from 30MHz to 1GHz were made using a HP 8542E Test Receiver.

Radiated Emissions from 1GHz to 25GHz were made using a Rhode and Schwarz ESIB 40 Test Receiver.

The test was performed in accordance with ANSI C63.4.

The measurements were performed at a 3m distance unless otherwise stated.



**RADIATED EMISSIONS TEST RESULTS: EUT in Bluetooth Mode** (cont'd)

**30MHz - 1GHz Frequency Range**

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC Part 15.247(c) for Radiated Emissions (30MHz – 1GHz).

**EUT Tx on Bottom Channel (2.402GHz)**

30MHz – 1GHz Alternative Open Area Test Site Results : The levels of the six highest emissions measured in accordance with the specification are presented below :-

Emission Frequency MHz	Pol H/V	Hgt cm	Azm deg	Field Strength at 3m		Specification Limit	
				dBµV/m	µV/m	dBµV/m	µV/m
49.98	V	100	15	19.0	8.9	40.0	100
431.4	V	100	266	25.4	18.6	46.0	200
448.0	V	108	182	33.8	49.0	46.0	200
527.3	V	100	95	27.5	23.7	46.0	200
541.9	V	100	182	29.6	30.2	46.0	200
608.3	V	100	160	26.0	20.0	46.0	200

Table of Results for Radiated Emissions

**EUT Tx on Middle Channel (2.441GHz)**

30MHz – 1GHz Alternative Open Area Test Site Results : The levels of the six highest emissions measured in accordance with the specification are presented below :-

Emission Frequency MHz	Pol H/V	Hgt cm	Azm deg	Field Strength at 3m		Specification Limit	
				dBµV/m	µV/m	dBµV/m	µV/m
50.0	V	100	0	19.5	9.4	40.0	100
431.3	V	100	278	27.0	22.4	46.0	200
448.0	V	108	189	33.4	46.8	46.0	200
527.3	V	100	0	25.2	18.2	46.0	220
541.9	V	100	172	28.5	26.7	46.0	200
608.3	V	100	164	26.5	21.1	46.0	200

Table of Results for Radiated Emissions



**RADIATED EMISSIONS TEST RESULTS: EUT in Bluetooth Mode (cont'd)**

**30MHz - 1GHz Frequency Range**

**EUT Tx on Top Channel (2.480GHz)**

30MHz – 1GHz Alternative Open Area Test Site Results: The levels of the six highest emissions measured in accordance with the specification are presented below: -

Emission Frequency	Pol	Hgt	Azm	Field Strength at 3m		Specification Limit	
				MHz	H/V	cm	deg
49.99	V	100	15	19.9	9.9	40.0	100
431.30	V	100	256	27.0	22.4	46.0	200
448.00	V	108	181	33.4	46.8	46.0	200
527.30	V	100	98	26.6	21.4	46.0	200
542.90	V	100	184	27.9	24.5	46.0	200
608.50	V	100	175	27.1	22.6	46.0	200

Table of Results for Radiated Emissions

**ABBREVIATIONS FOR ABOVE TABLES**

H	Horizontal Polarisation	V	Vertical Polarisation
Pol	Polarisation	Hgt	Height
deg	degree	Azm	Azimuth

Procedure: Test Performed in accordance with ANSI C63.4.

Performed by: G Lawler, EMC Engineer.

Signature: 

Date: 11<sup>th</sup> June 2003



**RADIATED EMISSIONS TEST RESULTS: EUT in Bluetooth Mode (cont'd)**

**1GHz - 25GHz Range**

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC Part 15.247(c) for Radiated Emissions (1GHz – 25GHz).

**EUT Tx on Bottom Channel (2.402GHz)**

Frequency	Antenna			Field Strength (Peak) at 3m	Limit (Peak)	Field Strength (Average) at 3m	Limit (Average)
	Polarisation	Height	Azimuth				
GHz	H/V	cm	Deg	dBµV/m	dBµV/m	dBµV/m	dBµV/m
4.804	V	102	11	48.0	74.0	41.3	54.0
5.944	H	100	306	51.3	74.0	/	/

Table of Results for Radiated Emissions

**EUT Tx on Middle Channel (2.441GHz)**

Frequency	Antenna			Field Strength (Peak) at 3m	Limit (Peak)	Field Strength (Average) at 3m	Limit (Average)
	Polarisation	Height	Azimuth				
GHz	H/V	cm	Deg	dBµV/m	dBµV/m	dBµV/m	dBµV/m
5.944	H	100	306	51.4	74.0	/	/

Table of Results for Radiated Emissions


**EUT Tx on Top Channel (2.480GHz)**

Frequency	Antenna			Field Strength (Peak) at 3m	Limit (Peak)	Field Strength (Average) at 3m	Limit (Average)
	Polarisation	Height	Azimuth				
GHz	H/V	cm	Deg	dBµV/m	dBµV/m	dBµV/m	dBµV/m
5.944	H	100	306	51.3	74.0	/	/

Table of Results for Radiated Emissions

Procedure: Test Performed in accordance with ANSI C63.4.

Performed by: A Guy, EMC Engineer.

Signature: 

Date: 12<sup>th</sup> June 2003



## MAXIMUM PEAK OUTPUT POWER: EUT in Bluetooth Mode

### TEST PROCEDURE

Testing to the requirements of FCC Part 15 Subpart C, Section 15.247(b)(1), for Maximum Peak Output Power was carried out.

The Spectrum Analyser was tuned to the test frequency. The device Output power setting was controlled via the 'Test Mode' on each handset being set to the conditions specified in the Summary on page 5 of this document. The device was then rotated through 360 degrees until the highest power level was observed in both planes of polarisation. The device was then replaced with a substitution antenna, the signal to the antenna was adjusted to equal the related level detected from the device.

Maximum Peak Output Power measurements were made with the EUT set to continuous transmit at maximum power on the following channels:

Channel 2: 2402MHz  
Channel 41: 2441MHz  
Channel 80: 2480MHz

### TEST RESULTS

The EUT met the requirements of FCC Part 15.247(b)(1) for Maximum Peak Output Power, see Table 1.

### MAXIMUM POWER

Frequency (MHz)	Raw Result (dBm)	Substitution Level (dBm)	Cable Loss (dB)	Substitution Antenna Gain (dB)	Result ERP (dBm)	Result ERP (mW)
2402	-46.17	-34.80	-4.68	7.73	-31.75	0.0007
2441	-40.42	-29.70	-5.00	7.95	-26.75	0.0020
2480	-43.70	-31.60	-4.79	8.17	-28.22	0.0015

Table of Results for Maximum Peak Output Power

Performed by: Ryan Henley, Radio Engineer.

Signature:

Ryan Henley.

Date:

15<sup>th</sup> June 2003



## PHOTOGRAPHS OF THE MC9050



PHOTOGRAPHS OF EQUIPMENT



Photograph 2  
MC9050 Front view

PHOTOGRAPHS OF EQUIPMENT



Photograph 3  
MC9050 Rear View

PHOTOGRAPHS OF EQUIPMENT



Photograph 4  
MC9050 Battery Close up view

PHOTOGRAPHS OF EQUIPMENT



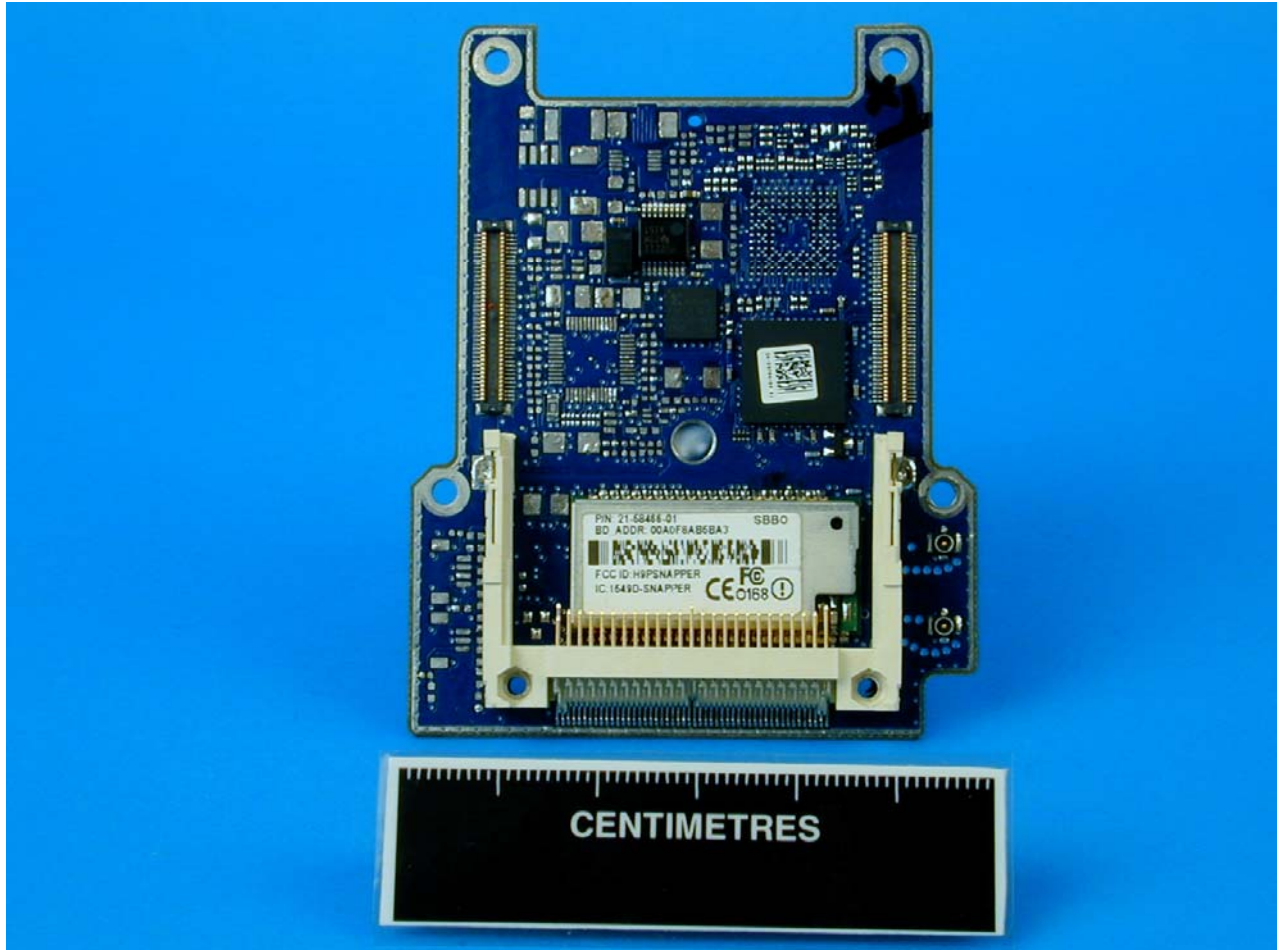
Photograph 5  
MC9050 Internal View

PHOTOGRAPHS OF EQUIPMENT



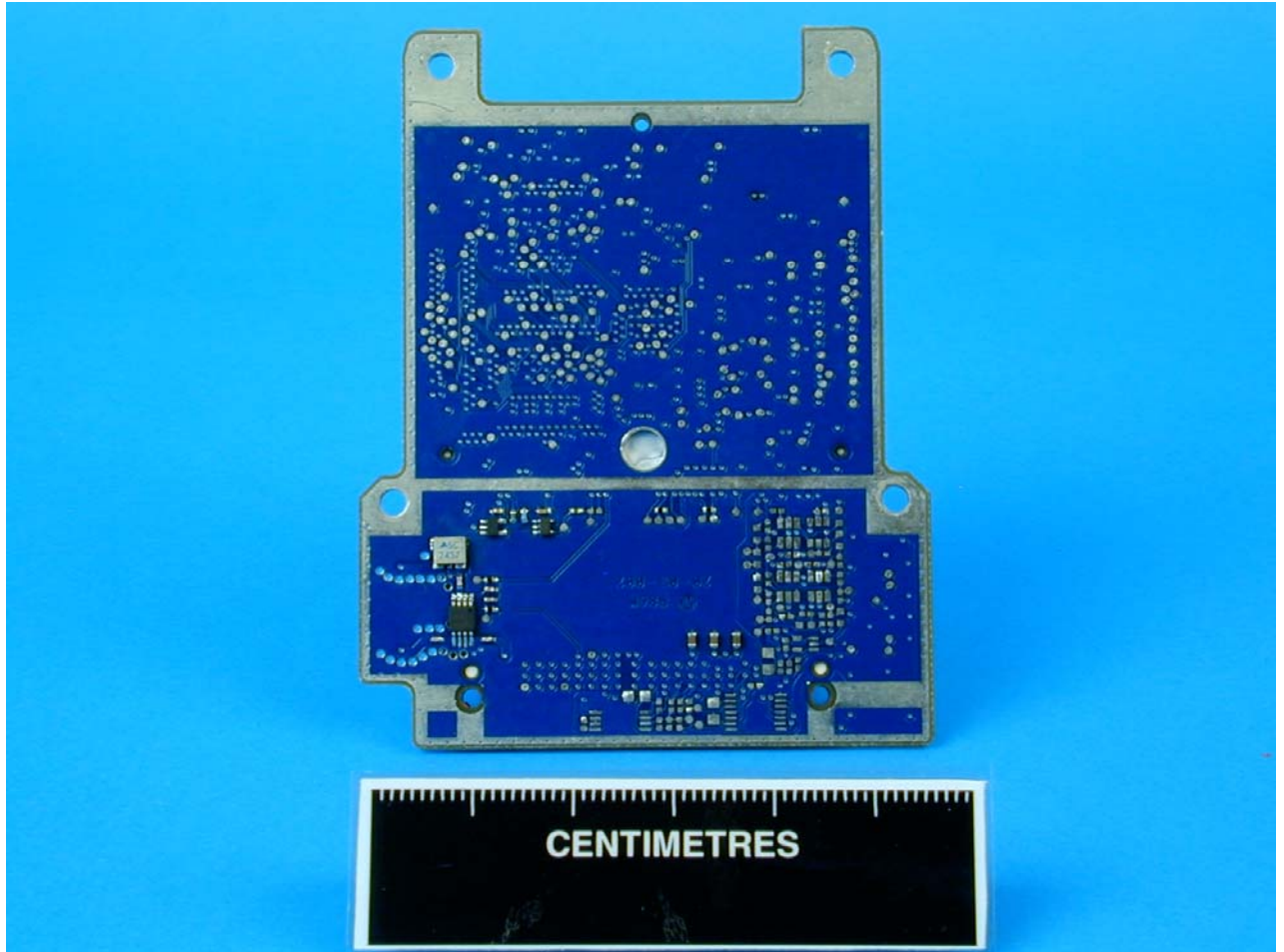
Photograph 6  
MC9050 Internal view

PHOTOGRAPHS OF EQUIPMENT



Photograph 7  
MC9050 Internal View

PHOTOGRAPHS OF EQUIPMENT



Photograph 8  
MC9050 Internal View

PHOTOGRAPHS OF EQUIPMENT



Photograph 9  
MC9050 Internal View



PHOTOGRAPHS OF EQUIPMENT



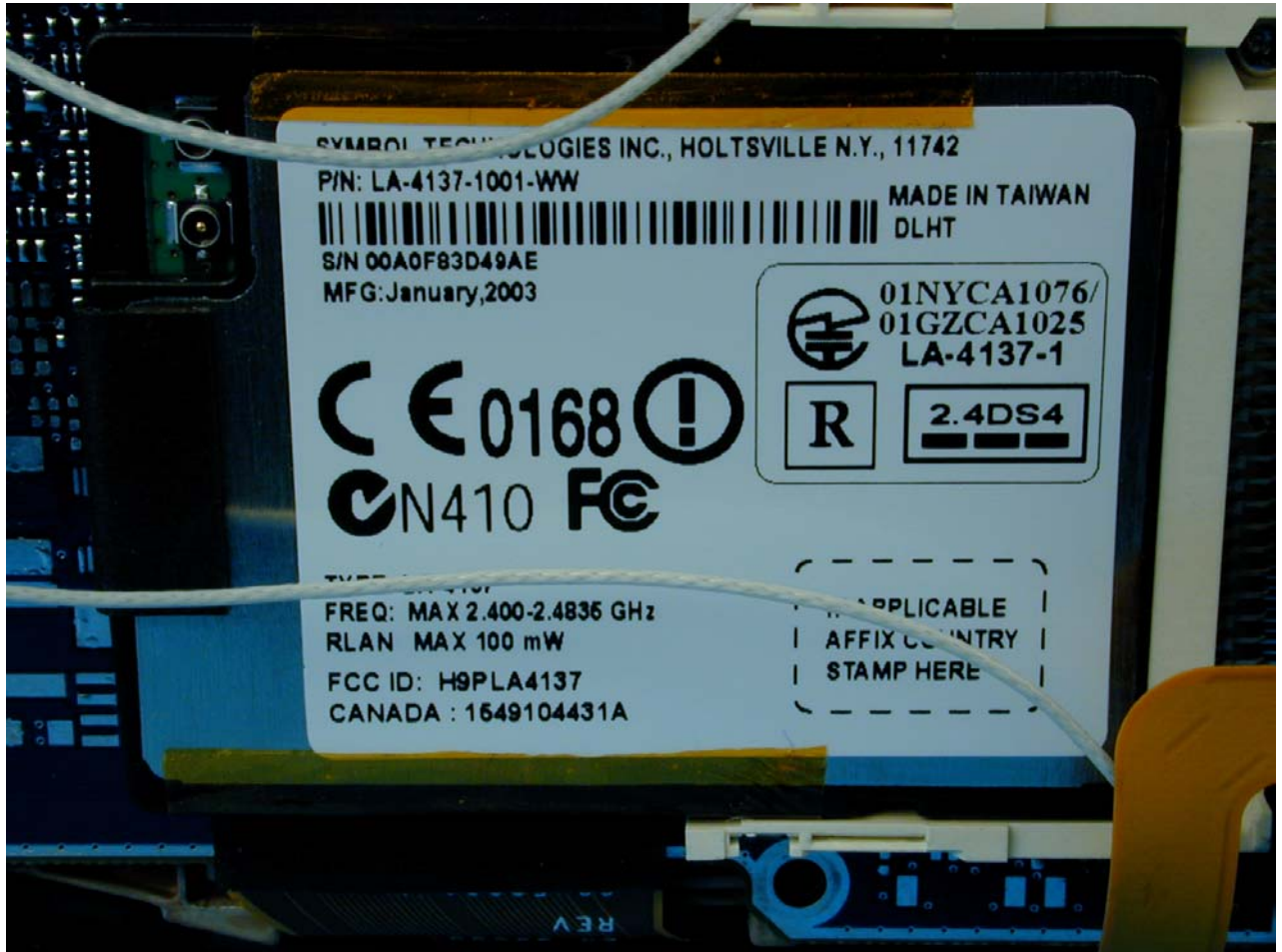
Photograph 10  
MC9050 Internal View

PHOTOGRAPHS OF EQUIPMENT



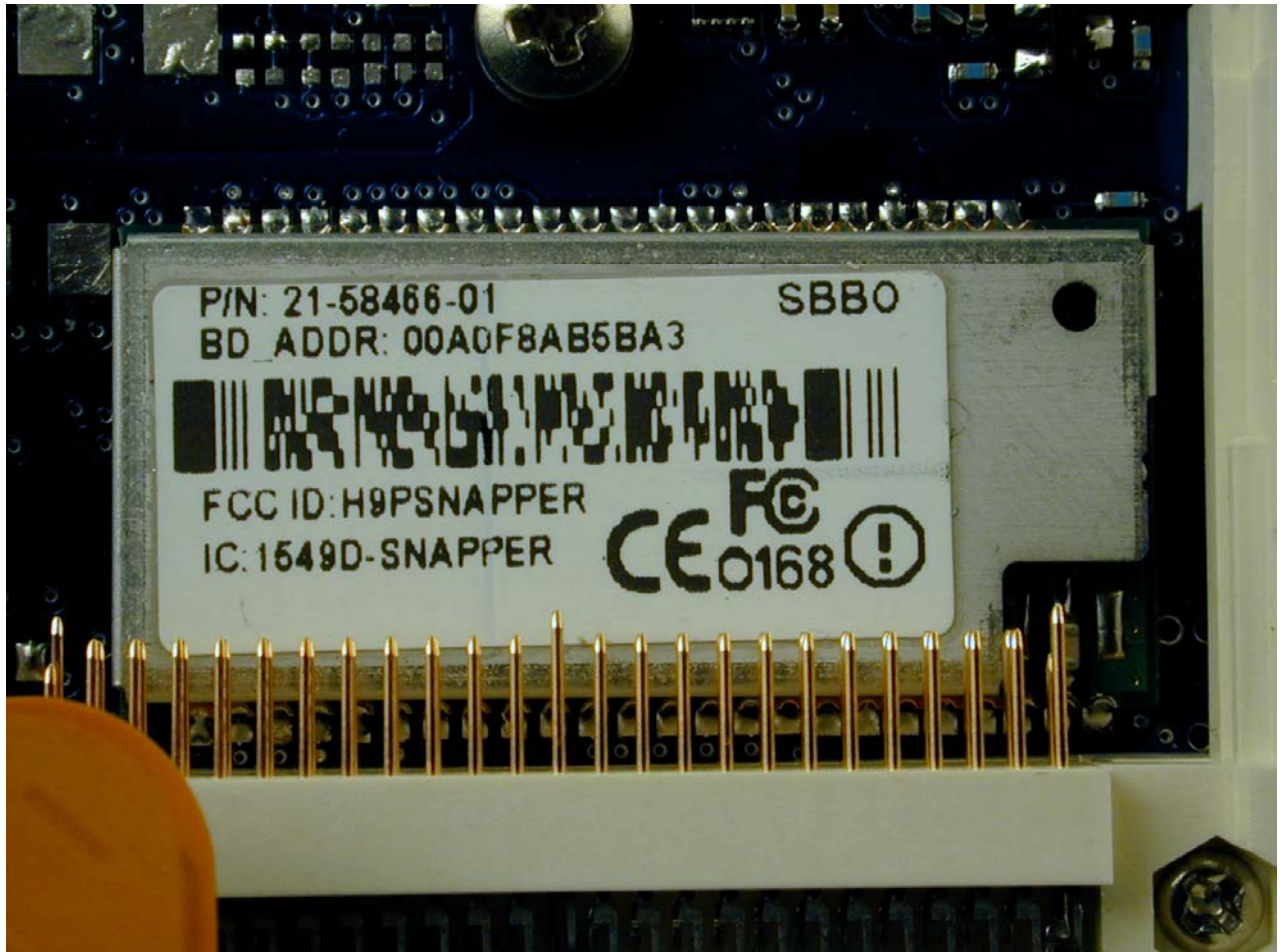
Photograph 11  
MC9050 Internal view

PHOTOGRAPHS OF EQUIPMENT



Photograph 12  
MC9050 View of Symbol LA-4137 RLAN Compact Flash Card

PHOTOGRAPHS OF EQUIPMENT




Photograph 13  
MC9050 View Symbol 21-58466 Bluetooth Module



**MANUFACTURERS LABEL DIAGRAM**

LASERLICHT - NICHT IN DEN STRAHL BLICKEN.  
LASER KLASSE 2  
LUMIÈRE LASER -NE PAS REGARDER DANS  
LE FAISCEAU APPAREIL À LASER DE CLASSE 2.  
CAUTION-LASER LIGHT. DO NOT STARE INTO BEAM.  
CLASS 2 LASER PRODUCT 630-680 nM, 1 mW







**SYMBOL TECHNOLOGIES INC., HOLTSVILLE, N.Y.**  
**P/N: MC9050XXXXX                      MADE IN XXXXXXXX**  
**MFD: XXXXXXXXXX,XXXX                      XXXX**

**(S)S/N:** BAR CODE  
XXXXXXXXXXXX

**BD\_ADDR:**  
BAR CODE  
XXXXXXXXXXXX

**THIS DEVICE CONTAINS APPROVED RF MODULES  
SEE REFERENCE GUIDE FOR PATENT AND RADIO  
INFORMATION**

**TYPE: MC9050                                              11-16V  $\equiv$  /2A**  
**FCC ID: H9PMC9050**  
**IC: 1549D-MC9050**

MC9050 Label View



**FCC SITE COMPLIANCE LETTER**

**FEDERAL COMMUNICATIONS COMMISSION**

**Laboratory Division  
7435 Oakland Mills Road  
Columbia, MD 21046**

**October 18, 2002**

**Registration Number: 90987**

**TUV Product Service Ltd  
Segensworth Road  
Titchfield  
Fareham, Hampshire, PO15 5RH  
United Kingdom  
Attention: Kevan Adsetts**

**Re: Measurement facility located at Titchfield  
Anechoic chamber (3 meters) and 3 & 10 meter OATS  
Date of Listing: October 18, 2002**

**Gentlemen:**

Your request for registration of the subject measurement facility has been reviewed and found to be in compliance with the requirements of Section 2.948 of the FCC rules. The information has, therefore, been placed on file and the name of your organization added to the list of facilities whose measurement data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Please note that the file must be updated for any changes made to the facility and the registration must be renewed at least every three years.

Measurement facilities that have indicated that they are available to the public to perform measurement services on a fee basis may be found on the FCC website [www.fcc.gov](http://www.fcc.gov) under E-Filing, OET Equipment Authorization Electronic Filing, Test Firms.

Sincerely,

**Thomas W Phillips  
Electronics Engineer**



## MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are: -

In the frequency range 30MHz to 1000MHz

For Radiated Emissions, Quasi-Peak Measurements taken in Zero Span using the Hewlett Packard EMI Receiver: -

Frequency	$\pm 2 \times 10^{-7}$ x Centre Frequency
Amplitude	+4.45dB (30-200MHz; 3m Measurements) -4.42dB (30-200MHz; 3m Measurements) +4.80dB (200-1000MHz; 3m Measurements) -3.81dB (200-1000MHz; 3m Measurements)

In the frequency range 1GHz to 25GHz

For Radiated Emissions measurements: -

Frequency	$\pm 2 \times 10^{-7}$ x Centre Frequency
Amplitude	$\pm 3.4$ dB

For Effective Radiated Power (ERP) measurements: -

Amplitude	$\pm 1.45$ dBm
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This report relates only to the actual item/items tested.

UKAS Accreditation's do not cover opinions and interpretations and any expressed herein are outside the scope of any UKAS Accreditation.

Results of tests not yet included in our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).

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