

MEASUREMENT AND TECHNICAL REPORT

HM ELECTRONICS
 6675 Mesa Ridge Road
 San Diego, CA 92121-2937

DATE: 15 March 2000

This Report Concerns:	Original Grant: <input checked="" type="checkbox"/>	Class II Change: <input type="checkbox"/>
Equipment Type:	COM 900 CC Communicator, Model COM 900 CC	
Deferred grant requested per 47 CFR 0.457(d)(1)(ii)?	Yes: <input type="checkbox"/> Defer until:	No: <input checked="" type="checkbox"/>
Company Name agrees to notify the Commission by:	N/A	
of the intended date of announcement of the product so that the grant can be issued on that date.		
Transition Rules Request per 15.37?	Yes: <input type="checkbox"/>	*No: <input type="checkbox"/>
<i>(*) FCC Part 15, Paragraphs 15.205, 15.209 and 15.249</i>		
<p>Report Prepared by:</p> <p>TÜV PRODUCT SERVICE 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 619 546 3999 Fax: 619 546 0364</p>		

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1 GENERAL INFORMATION

1.1 Product Description

COM900CC Communicator, Model COM 900 CC

Components of EUT				
Description	Model Number	Serial Number	FCC ID Number	
900 MHz Collar Communicator	COM 900 CC	0584663	BYM900CC	
OPERATING MODE(S):		Normal		
I/O CABLES				
CONNECTION	Headset Connector			
SHIELD	No			
CONNECTORS	5-pin custom connector			
TERMINATION TYPE	Pin & socket			
LENGTH	1.5'			
REMOVABLE	Yes			
POWER INTERFACE				
FREQUENCY/AC/DC VOLTAGE:		Battery 1.2 Vdc		
OSCILLATOR FREQUENCIES				
FREQUENCY	EUT LOCATION		DESCRIPTION OF USE	
16 MHz TCXO	Main PCB		Crystal Oscillator	
1st LO 858 MHz	Main PCB		--	
2nd LO 44.545 MHz	Main PCB		--	
Xmit frequency (see system spec.)				
POWER SUPPLY				
DESCRIPTION	MANUFACTURER	MODEL #	SERIAL #	SWITCHING/LINEAR FREQ.
Battery				
POWER LINE FILTERS				
MANUFACTURER	MODEL NO.	QTY.	LOCATION ON EUT	
N/A				
CRITICAL EMI COMPONENTS				
DESCRIPTION	MANUFACTURER	PART # OR VALUE	QTY.	LOCATION ON EUT
Shield over main PCB	HME	--	1	Main PCB
DESCRIPTION OF ENCLOSURE:		Main PCB is in a plastic enclosure.		

1 GENERAL INFORMATION (continued)

1.2 Related Submittal/Grant

None

1.3 Tested System Details

The FCC IDs for all equipment, plus descriptions of all cables used in the tested system are:

None

1.4 Part 15 Requirements

Direct sequence spread spectrum transmitters - N/A

Frequency hopping transmitters - N/A

Scanning receivers - N/A

Certification of transmitters operating within the 59.0 to 64.0 GHz band - N/A

1.5 Test Methodology

Purpose of Test: To demonstrate compliance with the ANSI C63.4 setup.

Test Performed:

1. Conducted Emissions, FCC Part 2, Paragraphs 2.985, 2,989, 2.991 & Part 24, Paragraph 24.238
2. Radiated Emissions, EN55022: 1992 Class B limit, 30 - 1,000 MHz, 10 meters
- X 3. Radiated Emission per FCC Part 15, Para. 15.209 and 15.249
4. Engineering evaluations

1.6 Test Facility

The open area test site and conducted measurement data were tested by:

TÜV PRODUCT SERVICE
10040 Mesa Rim Road
San Diego, CA 92121-2912
Phone: 619 546 3999
Fax: 619 546 0364

The Test Site Data and performance comply with ANSI 63.4 and are registered with the FCC, 7435 Oakland Mills Rd, Columbia Maryland 21046. All Measurement Data is acquired according to the content of FCC Measurement Procedure and ANSI C63.4, unless supplemented with additional requirements as noted in the test report.

2. SYSTEM TEST CONFIGURATION

2.1 Justification

The **COM 900 CC** was initially tested for FCC emission in the following configuration:

See test setup photos.

2.2 EUT Exercise Software

None

2.3 Special Accessories

None

2.4 Modification

None

2.5 Configuration of Tested System

See test setup photos.

3 RADIATED EMISSION DATA

The following data lists the significant emission frequencies, measured levels, correction factor (which includes cable and antenna corrections), the corrected reading, and the limit.

See following page(s).

REPORT No: S0078 TESTED BY: J Owen SPEC: FCC Part 15.249 (a)
 CUSTOMER: HM Electronics TEST DIST: 3 Meters
 E U T: Comm 900 CC TEST SITE: 3/1
 EUT MODE: Transmit BICONICAL: N/A
 DATE: 21-Feb-00 LOG: 244
 NOTES: Duty Cycle= OTHER: 453

RBWVBW 100kHz below 1 GHz ; RBWVBW 1 MHz above 1 GHz

FREQ (MHz)	VERTICAL (dBuV)		HORIZONTAL (dBuV)		CORRECTION FACTOR (dB/m)	MAX LEVEL (dBuV/m)		SPEC LIMIT (dBuV/m)		MARGIN (dB)		EUT Rotation	Antenna Height	Notes
	pk	av	pk	av		pk	av	pk	av	pk	av			
925.3	60.8		65.3		27.1	92.4		94		-1.6		256	1	
1852.6	9.2		11.2		29.9	41.1		74	54	-32.9		283	1	
2778.9	16.2		12.6		34.9	51.1		74	54	-22.9		290	1.5	
3705.2	11.4		11.3		39.4	50.8		74	54	-23.2		19	1.5	
4631.5	7.3		7.6		39.9	47.5		74	54	-26.5				ambient
5557.8	6.8		7.6		43.8	51.4		74	54	-22.6				ambient
6484.1	11.5		11.5		45.2	56.7		74	54	-17.3				ambient
7410.4	11.5		11.5		46.0	57.5		74	54	-16.5				ambient
8336.7	12.3		12.3		47.9	60.2		74	54	-13.8				ambient
9263	12.3		12.3		50.1	62.4		74	54	-11.6				ambient
927	60.7		61.3		27.1	88.4		94		-5.6		85	1	
1854	11.5		10.3		29.9	41.4		74	54	-32.6		227	1	
2781	13.7		12.1		34.9	48.6		74	54	-25.4		281	1.5	
3708	13.5		10.8		39.4	52.9		74	54	-21.1		261	1	
4635	7.3		8		39.9	47.9		74	54	-26.1		86	1.5	
5562	7.2		8		43.8	51.8		74	54	-22.2				ambient
6489	11.6		11.9		45.2	57.1		74	54	-16.9				ambient
7416	11.6		12.7		46.0	58.7		74	54	-15.3				ambient
8343	12.7		12.7		47.9	60.6		74	54	-13.4				ambient
9270	12.7		12.7		50.1	62.8		74	54	-11.2				ambient
927.8	60		63.5		27.1	90.6		94		-3.4				
1855.6	10.2		10.4		29.9	40.3		74	54	-33.7			1.5	
2783.4	13.3		10.4		34.9	48.2		74	54	-25.8			1.5	
3711.2	12.6		13.7		39.4	53.1		74	54	-20.9			2	
4639	8.2		7		39.9	48.1		74	54	-25.9			2	ambient
5566.8	7.7		7.8		43.8	51.6		74	54	-22.4				ambient
6494.6	12.5		12.5		45.2	57.7		74	54	-16.3				ambient
7422.4	12.5		12.5		46.0	58.5		74	54	-15.5				ambient
8350.2	12.5		12.5		47.9	60.4		74	54	-13.6				ambient
9278	12.5		12.5		50.1	62.6		74	54	-11.4				ambient

Emissions Test Conditions: RADIATED EMISSIONS, Part 15, Paragraph 15.209(a), 15.249(a)

The *EQUIVALENT RADIATED EMISSIONS* measurements were performed at the following test location :

- Test not applicable

- - Roof (Small Open Area Test Site)
- - Canyon #1 (10- and 30-Meter Open Area Test Site), Carroll Canyon, San Diego

Testing was performed at a test distance of:

- 1 meters
- - 3 meters
- 10 meters

Test Equipment Used :

Model No.	Manufacturer	Description	Serial No.	Prop. No.	Cal Date
3115	EMCO	Antenna, Double Ridge Guide	9412-4363	453	10/01
AFD3-0102-13-ST	Miteq, Inc.	Pre-Amplifier (38 dB gain), 1 to 2 GHz	16429	366	02/00*
AFD3-0208-40-ST	Miteq, Inc.	Pre-Amplifier (30 dB gain), 2 to 8 GHz	155382	367	02/00*
8566B	Hewlett Packard	Spectrum Analyzer	211500842	720	03/00
8566B	Hewlett Packard	Spectrum Analyzer Display	2112A02185	721	03/00
3146	EMCO	Log Periodic Antenna	1063	244	10/00
ESVS30	Rohde & Schwarz	EMI Test Receiver	833825/003	466	12/00

Remarks: (*) Verified prior to test.

3.1 Field Strength Calculation

If a preamplifier was used during the Radiated Emission Testing, it is required that the amplifier gain must be subtracted from the Spectrum Analyzer (Meter) Reading. In addition, a correction factor for the antenna, cable used and a distance factor, if any, must be applied to the Meter Reading before a true field strength reading can be obtained. In the automatic measurement, these considerations are automatically presented as a part of the print out. In the case of manual measurements and for greater efficiency and convenience, instead of using these correlation factors for each meter reading, the specification limit was modified to reflect these correlation factors at each frequency value so that the meter readings can be compared directly to the modified specification limit. This modified specification limit is referred to as the "Corrected Meter Reading Limit" or simply the CMRL, which is the actual field strength present at the antenna. The quantity can be derived in the following manner:

$$\text{Corrected Meter Reading Limit (CMRL)} = \text{SAR} + \text{AF} + \text{CL} - \text{AG} - \text{DC}$$

Where, SAR = Spectrum Analyzer Reading
 AF = Antenna Factor
 CL = Cable Loss
 AG = Amplifier Gain (if any)
 DC = Distance Correction (if any)

Assume the following situation: A meter reading of 29.4 dBuV was obtained from a Class A computing device measured at 83 MHz. Assume an antenna factor of 9.2 dB, a cable loss of 1.4 dB and amplifier gain of 20.0 dB at 83 MHz. The final field strength would be determined as follows:

$$\text{CMRL} = 29.4 \text{ dBuV} + 9.2 \text{ dB} - 1.4 \text{ dB} - 20 \text{ dB/M} - 0.0 \text{ dB}$$

$$\text{CMRL} = 20.0 \text{ dBuV/M}$$

This result is well below the FCC and CSA Class A limit of 29.5 dbuV/m at 83 MHz.

For the manual mode of measurement, a table of corrected meter reading limit was used to permit immediate comparison of the meter reading to determine if the measure emission amplitude exceeded the specification limit at that specific frequency.

4 SUMMARY:

All tests according to the regulations cited on page 1 were

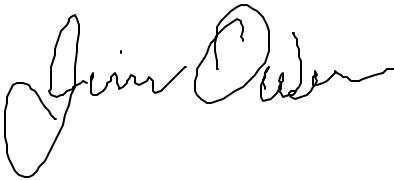
- Performed
- **Not** Performed

The Equipment Under Test

- **Fulfills** the general approval requirements cited on page 1.
 - **Does not** fulfill the general approval requirements cited on page 1.
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- TÜV PRODUCT SERVICE, INC. -

Responsible Engineer:



Jim Owen
(EMC Engineer)