TEST REPORT

In support of the Application for Grant of Equipment Authorisation of the
Intermec Technologies Corporation Series 700C-SMC45 Handheld Computer Terminal

FCC ID: EHA700C-SMC45-1 February 2003

TÜV PRODUCT SERVICE

BABT

BABT. Segensworth Road, Titchfield
Fareham, Hampshire, United Kingdom, PO15 5RH
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Equipment: 700C-SMC45

FCC ID: EHA700C-SMC45-1

Specification: 47 CFR 2 & 47 CFR 24

Applicant: Intermec Technologies Corporation
Norand Mobile Systems Division
550 Second Street S.E.
Cedar Rapids
IOWA 52401
USA

Manufacturer: As above

Manufacturer's Representative: Mr Scott Holub

Approved by:

T Pither
Quality Manager

Dated: 19th February 2003

Start of Test: 24th January 2003

Completion of Test: 25th January 2003

Report Distribution: Intermec Technologies Corporation Mr S Holub Copy No. 1

BABT Copy No's. 2 & 3

Copy No:

ENGINEERING STATEMENT

I ATTEST: the measurements shown in this report were made in accordance with the procedures indicated, and that the emissions from this equipment were found to be within the applicable limits. I assume full responsibility for the accuracy and completeness of these measurements. On the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Part 2, and Part 24 of the FCC Rules under normal use and maintenance.

A. Hubbard
Test Engineer

UKAS TESTING 0141 Group

CONTENTS:-

For copyright details see Page 29 of 29

Introduction

The information contained within this report is intended to show verification of compliance of the Intermec Technologies Corporation 700C-SMC45 to the requirements of 47 CFR 2 and 47 CFR 24. Limited testing has been performed as the 700C-SMC45 contains a Transmitter Module which has previously gained approval to FCC Part 24. The FCC Identifier of this module was QIPMC45, the date of the FCC Grant was 13th September 2002.

Location Of Testing

All testing was conducted at the premises of BABT, Segensworth Road, Fareham, Hampshire, PO15 5RH, by BABT Personnel, Anthony Guy and Anthony Hubbard. Radiated Emissions measurements were performed in a 3 metre Anechoic Chamber (OATS). A complete site description is on file with the FCC Laboratory Division, Registration Number: 90987. See Annex A.

Test Equipment and Ancillaries Used For Test

No	Instrument/Ancillary	Type	Manufacturer	EMC No.	Cal To
1	Screened Enclosure	Siemens/Matsushita	----	2533	T/U
2	Bilog Antenna	Chase	CBL6143	2860	11 Apr 04
3	Turntable & Controller	Emco	HD050	2528	T/U
4	Antenna Mast	Emco	1051	—	T/U
5	Antenna Controller	Emco	2090	—	T/U
6	EMI Receiver	Hewlett Packard	8542E	2286	13 Dec 03
7	Low Noise Amplifier (1-8GHz)	Miteq	AMF-3D-001080-18-13P	2457	T/U
8	Low Noise Amplifier (8-18GHz)	Miteq	AMF-4E-080180-15-10P	2430	T/U
9	Low Noise Amplifier (18-26.5GHz)	Avantek	AMT 26177-33	2072	T/U
10	Spectrum Analyser	Hewlett Packard	8562A	1427	10 Jan 04
11	Horn	EMCO	3115	2297	29 Jun 03
12	Signal Generator	Rohde & Schwarz	SMR 40	2768	23 Feb 03
13	Horn	Flann Microwave Instrument	2024-20	1396	T/U
14	Microwave to co-axial adaptor	Flann Microwave Instrument	20093SF40	S/N 595	T/U
15	3GHz High Pass Filter	RLC Electronics	F-100-3000-5-R	INV4467	T/U

Table 1

Test Equipment and Ancillaries Used For Test (continued)

Note(s)

1) All items are calibrated annually except where labelled T/U (Tracebility Unscheduled). These items are calibrated within the test configurations using calibrated equipment.

INSTRUMENTATION USED FOR EXERCISING THE EUT

Instrument	Manufacturer	Type No	INV No
Universal Radio Communications Tester	Rohde & Schwarz	CMU 200	4858

Table 2

Description of Equipment Under Test

The 700C-SMC45 is a handheld computer terminal with a tri band GSM/GPRS radio module used for inventory control purposes.

The equipment under test is made up of the following component parts.

Module	Vendor	Kit Number	Serial Number
Handheld Computer Terminal	Intermec Technologies Corporation	700C-SMC45	19927020016

Table 3

List of Performed Measurements using the configuration in Table 3

i) Radiated Emissions

Test Case	Radiated Emissions
Test Date	24tth January 2003
Rule Parts	24.238

System Configuration During EMC Testing

The EUT was set-up on the Alternative Open Area Test Site identified in Annex A, and tested in accordance with the specification.

The Intermec 700C with GSM/GPRS Radio Module was powered by its own internal battery.

A communication link was established between the EUT and a Digital Radiocommunications Test Set transmitting on 2 time slots.

Test Procedure

Testing to the requirements of 47 CFR 24.238, Emission Limits, was carried out on the Measurement Test Facility detailed in Annex A.

In order to determine the Radiated Emission Limits, measurements of radiated carrier field strength were first carried out on top and bottom channels using a peak detector and the results are shown in Table 3 below.

A preliminary profile of the Radiated Electric Field 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. 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 20GHz. The list of worst case emissions was then confirmed or updated. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth. Emissions levels were then formally measured using a peak detector. The details of the worst case emissions were then recorded and are presented in Tables 4 and 5.

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

All measurements made at 3m.

Test Case : Radiated Emissions (continued)

Test Date : 24th January 2003

Rule Parts : 24.238

TEST RESULTS

Measurement of radiated carrier field strength on top and bottom channels are detailed in Table 4 below.

Freq MHz	Res BW Hz	Vid BW Hz	Ant Pol V/H	Ant Hgt cm	EUT Arc Deg	Raw PEAK dBµV	Cable loss dB	Antenna Factor dB	Result Peak dBµV/m
Tx Channel 512									
1850.075	1M	3M	V	140	42	96.00	1.34	27.53	124.87
1850.075	1M	3M	H	127	86	97.00	1.34	24.53	125.87
Tx Channel 810									
1909.668	1M	3M	V	107	90	96.33	1.33	27.24	124.90
1909.660	1M	3M	H	159	90	96.83	1.33	24.24	124.40

Table 4

The limit for spurious emissions in accordance with 47 CFR 24.238 is 43dB – 10Log(P) down on the carrier where P is the power in Watts

As the manufacturer's declared power is 1W the spurious limit is 43dB – 10Log(1) = 43dB down on the carrier

Using the results obtained on the two channels the following limits were calculated:

Bottom channel 512: 124.87dBµV/m – 43dB = 81.87dBµV/m

Top channel 810: 124.40dBµV/m – 43dB = 81.40dBµV/m

These figures have been used to determine Pass or Fail on the harmonics detailed in Tables 5 and 6:

Test Case : Radiated Emissions (continued)

Test Date : 24th January 2003

Rule Parts : 24.238

Tx Channel 512

Freq MHz	Res BW Hz	Vid BW Hz	Ant Pol V/H	Ant Hgt cm	EUT Arc Deg	Raw PEAK dBµV	Cable loss / Amp gain dB	Antenna Factor dB	Result Peak dBµV/m	Pass / Fail
3700.400	1M	3M	V	104	95	62.83	-30.50	32.37	64.70	Pass
5550.758	1M	3M	V	100	208	53.67	-30.33	34.17	58.51	Pass
7400.650	1M	3M	H	125	202	55.67	-28.33	37.03	64.37	Pass
9250.900	1M	3M	H	123	84	47.33	022.47	38.34	63.20	Pass
11101.500	1M	3M	H	104	242	53.33	-21.83	38.75	70.25	Pass
12951.300	1M	3M	H	107	71	42.67	-19.50	40.60	63.77	Pass

Table 5

All emissions measured over the frequency range 30MHz to 1GHz were greater than 49.5 dBµV/m below the limit shown above.

Tx Channel 810

Freq MHz	Res BW Hz	Vid BW Hz	Ant Pol V/H	Ant Hgt cm	EUT Arc Deg	Raw PEAK dBµV	Cable loss / Amp gain dB	Antenna Factor dB	Result Peak dBµV/m	Pass / Fail
3819.625	1M	3M	H	156	193	66.50	-31.83	32.17	67.38	Pass
5729.183	1M	3M	V	113	337	52.00	-32.34	35.24	54.90	Pass
7639.217	1M	3M	H	111	208	57.33	-29.84	37.46	64.95	Pass
9549.150	1M	3M	H	107	199	52.17	-23.33	38.34	67.18	Pass
11458.450	1M	3M	H	107	244	59.00	-20.17	39.03	77.86	Pass
13368.242	1M	3M	H	100	125	50.67	-18.90	40.50	72.27	Pass

Table 6

All emissions measured over the frequency range 30MHz to 1GHz were greater than 46.6dBµV/m below the limit shown above.

ABBREVIATIONS FOR ABOVE TABLE

ERP Effective Radiated Power
H Horizontal Polarisation V Vertical Polarisation

Procedure Test Performed in accordance with ANSI C63.4.

TEST SETUP PHOTOGRAPH

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

700C-SMC45
Front

700C-SMC45
Rear

700C-SMC45
Side/End

700C-SMC45
Side/Top

700C-SMC45
Side/Top (SIM cover removed)

700C-SMC45
Rear (battery removed)

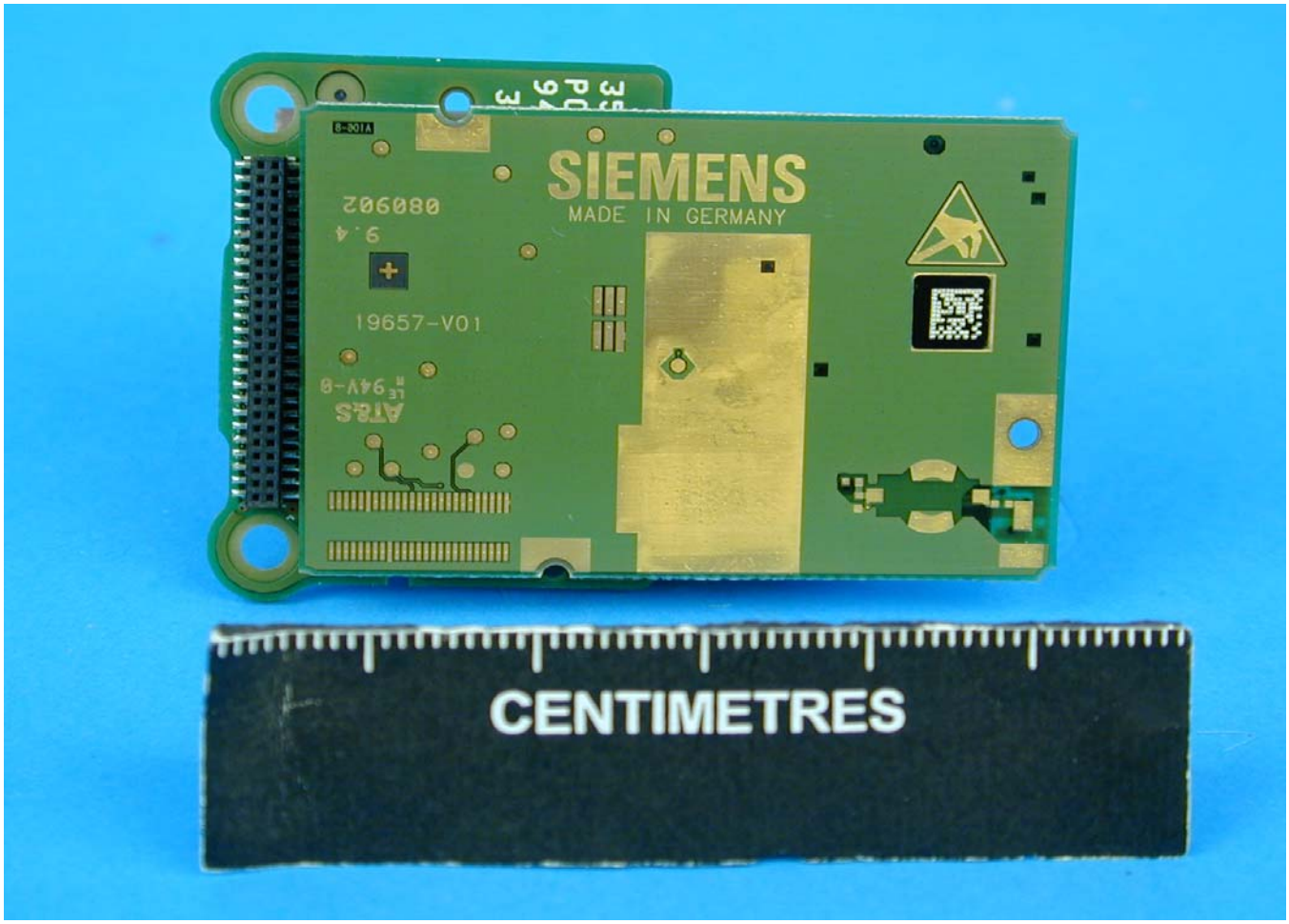
700C-SMC45
Internal 1

700C-SMC45
Internal 2

700C-SMC45
Internal 3

700C-SMC45
Internal 4

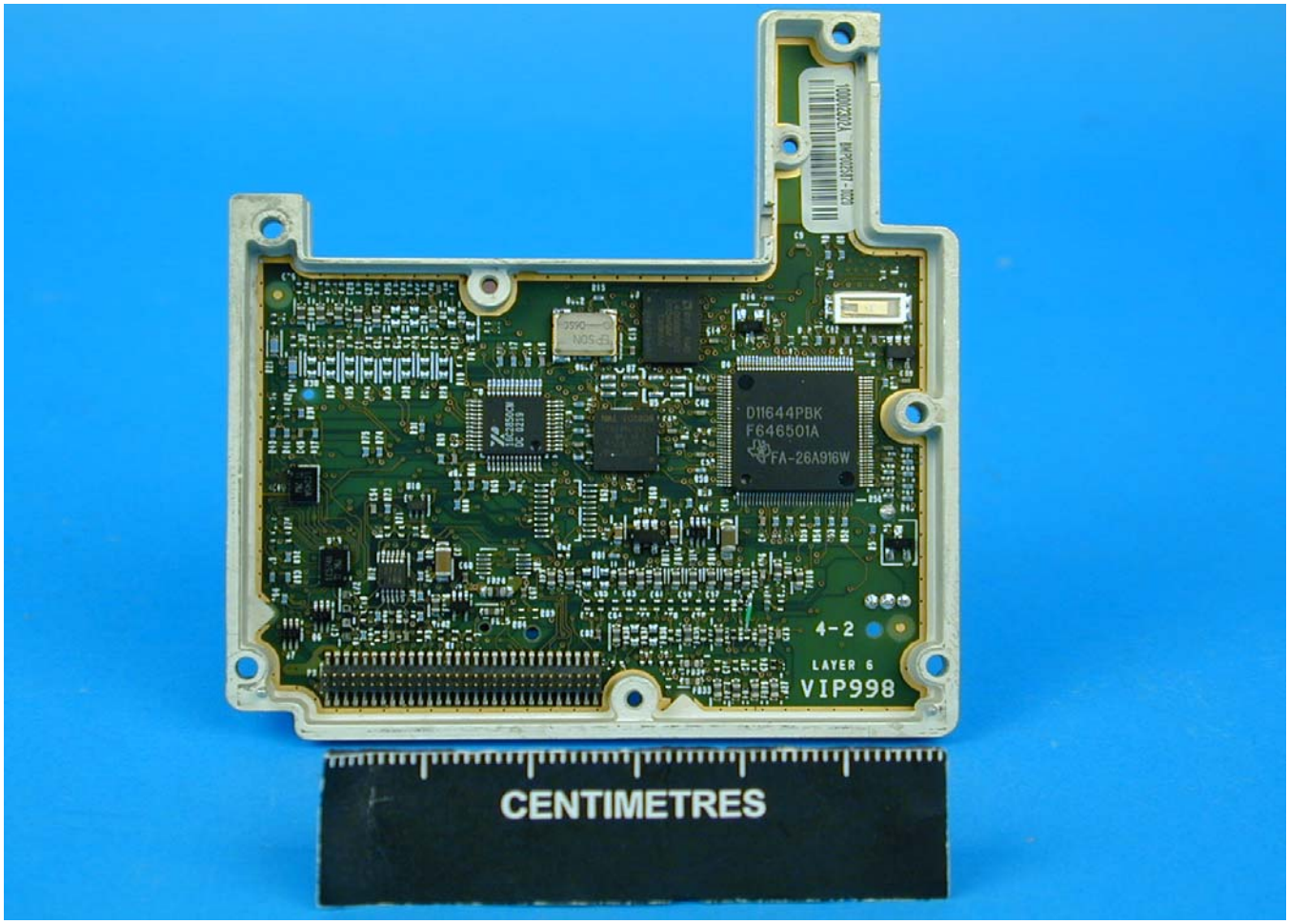
700C-SMC45
Internal 5



700C-SMC45
Internal 6

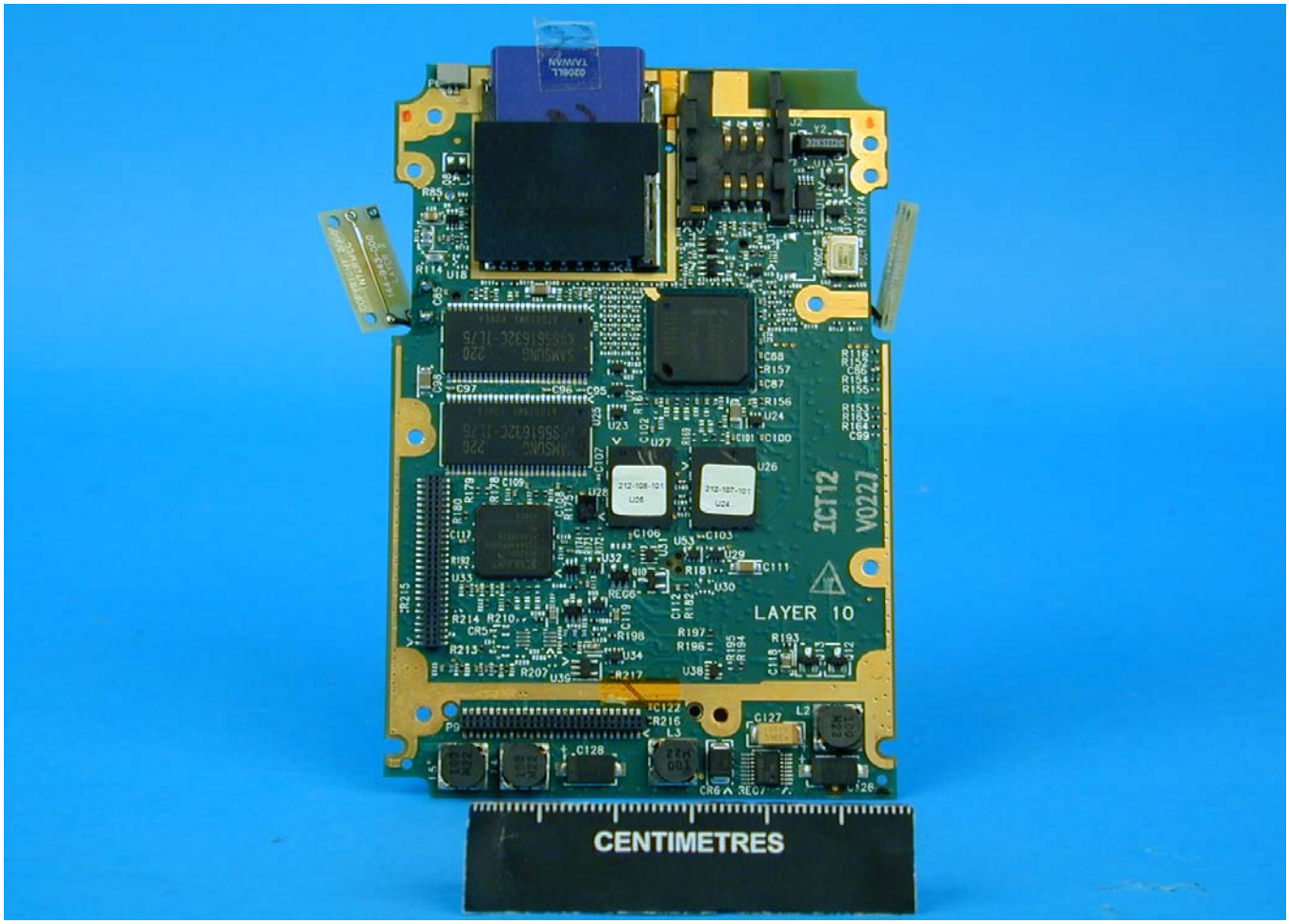
700C-SMC45
Internal 7

700C-SMC45
Internal 8



700C-SMC45
Internal 9

700C-SMC45
Internal 10



700C-SMC45
Internal 11

700C-SMC45
Internal 12

700C-SMC45
Antennas

0141
Group

UKAS Accreditations 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).

Annex A

FCC Measurement Facility Compliance Letter

(comprising of 1 page)

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 under E-Filing, OET Equipment Authorization Electronic Filing, Test Firms.

Sincerely,

Thomas W. Phillips

Thomas W Phillips
Electronics Engineer