TEST REPORT

FCC Part 90 Testing in support of the Application for Grant of Equipment Authorisation of the P4467/S/T2 Argus® 3 Thermal Imaging Camera

FCC ID: PW9P4467-S-T2

Report Number OO610823-5 August 2003

TÜV PRODUCT SERVICE

BABT

TÜV Product Service Limited
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Hampshire, United Kingdom PO15 5RH
Telephone: +44 (0) 1329 443300
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Equipment:	P4467/S/T2 Argus® 3 Thermal Imaging Camera
FCC ID:	PW9P4467-S-T2
Specification:	47 CFR 90: 2002
Prepared for:	E2V Technologies 106 Waterhouse Lane Chelmesford Essex CM1 2QU
Manufacturer's Representative:	G Ball
Approved by:	**C GOULD** UKAS EMC Signatory
Dated:	21-08-03
Start of Test:	5th August 2003
Completion of Test:	6th August 2003
Report Distribution:	E2V — 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 90 of the FCC Rules under normal use and maintenance.

M Larkin
Test Engineer

UKAS TESTING 0141 Group

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STATUS

OBJECTIVE	To undertake measurements to determine the Equipment Under Test's (EUT's) compliance with the specification.
MANUFACTURING DESCRIPTION	Thermal Imaging Camera
APPLICANT	E2V Technologies 106 Waterhouse Lane Chelmesford Essex CM1 2QU United Kingdom
TYPE NUMBER	P4467/S/T2
MANUFACTURERS MODEL NUMBER	Argus® 3
SERIAL NUMBER	20
TEST SPECIFICATION NUMBER	47 CFR Part 90: 2002
REGISTRATION NUMBER	Y610823
QUANTITY OF ITEMS TESTED	One
SECURITY CLASSIFICATION OF EUT	Unclassified
INCOMING RELEASE SERIAL NUMBER DATE	Declaration of Build Status
DISPOSAL REFERENCE NUMBER DATE	Held pending disposal N/A N/A
START OF TEST FINISH OF TEST	5th August 2003 8th August 2003
TEST ENGINEERS	M Larkin
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. Public Notice DA 00-705, March 2000

INTRODUCTION

The information contained within this report is intended to show verification of compliance of the E2V Argus® 3 Thermal Imaging Camera to the requirements of FCC Specification Part 90.

The unit supplied for testing was a handheld P4467/S/T2 Argus® 3 Thermal Imaging Camera

The terminal utilizes the Microtek Electronics Inc. Minilink 2.4TA-901R module (FCC ID: JRR24TA-901R) to offer data connectivity.

This report details testing carried out in accordance with:

- 47 CFR Part 90. 210, Radiated Spurious Emissions

LOCATION OF TESTING

BABT Engineer, Matthew Larkin, conducted all testing at the premises BABT, Segensworth Road, Fareham, Hampshire, PO15 5RH. Radiated Emissions measurements were performed in a 3 metre Anechoic Chamber. 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

Instrument	Manufacturer	Type No	EMC No	Cal to
Screened Enclosure	Siemens	EAC 54300	2533	TU
Turntable & Controller	HD GmbH	HD 050	2528	TU
Antenna Mast	Emco	1051	2182	TU
Antenna Mast Controller	Emco	1050	2090	TU
Test Receiver	Hewlett Packard	8542E	2286	13 Dec 03
Bilog Antenna	Chase	CBL 6143	2860	11 Apr 04
Spectrum Analyser	Hewlett Packard	8562A	2282	05 Apr 04
Horn (1 - 18GHz)	EMCO	3115	2397	29 Jun 03
Horn (18 – 40GHz)	Advanced Microtek	AM180HA-K-TU2	2945	20 May 04
Bandpass Filter	RLL Electronics	F100-4000-S-R	1081	TU
Signal Generator	Hewlett Packard	8672A	411	26 Feb 04
Low Noise Amplifier (1 - 8GHz)	Miteq	AMF-3D-001080-18-13P	2457	TU
Low Noise Amplifier (8 - 18GHz)	Avantek	AWT 18036	1081	TU
Low Noise Amplifier (18 - 26GHz)	Avantek	AMT-26177-33	2072	TU
Attenuator 10dB	Marconi	6534/3	1494	
Attenuator 3dB	Hewlett Packard	8491B	15108	TU
Barometer	Diplex	-	1938	TU
Hygrometer	Rotronic	A1	INV4066	28 Nov 03

Table 1

Note(s)

1) All items are calibrated annually except where labelled TU (Traceability Unscheduled). These items are calibrated within the test configurations using calibrated equipment.

DESCRIPTION OF EQUIPMENT UNDER TEST

The P4467/S/T2 Argus® 3 Thermal Imaging Camera is a hand held Thermal Imaging Camera designed to assist vision in smoke and darkness using Barium Strontium Titanate (BST) infrared detector technology. It offers connectivity utilising a Microtek Minilink 2.4TA-901R radio module.

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

Module	Vendor	Type Number	Serial Number
Argus® 3 Thermal Imaging Camera	E2V Technologies	P4467/S/T2	20

Table 3

LIST OF PERFORMED MEASUREMENTS USING THE CONFIGURATION IN TABLE 3

i) Radiated Emissions

Test Case	Radiated Emissions
Test Date	5th August 2003
Rule Parts	90.210

SYSTEM CONFIGURATION DURING EMC TESTING

The Argus® 3 Thermal Imaging Camera incorporating the Microtek Minilink 2.4TA-910R Radio Module was powered by its own internal battery.

A communication link was established between the EUT and an Argus® 3 Receiver.

TEST PROCEDURE

Testing to the requirements of FCC Part 90, Section 90.210, Emission Limits, was carried out on the Measurement Test Facility detailed in Annex A.

In order to determine the Radiated Emission Limits, the field strength, at a 3m distance, of the nominal transmitter power (P) using a tuned dipole antenna was calculated using the following formula:

Field Strength = $\sqrt{}(30 \times P \times G)/d$ = 1.28V/m = 122.1dBμV/m

where:

P	=	Nominal Power	=	300mW
G	=	Gain of Dipole over Isotropic	=	1.64
d	=	Distance	=	3m

Limit = Field Strength – (43 + 10log P) = 84.4dBμV/m

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 25GHz. The list of worst-case emissions was then confirmed or updated using the FCC listed semi-anechoic chamber. 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 Test was performed with the EUT transmitting on Channel 1 (2.458GHz) and repeated with the EUT transmitting on Channel 2 (2.473GHz).

The details of the worst-case emissions were then recorded and are presented in the following tables.

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

All measurements made at 3m.

Test Case	Radiated Emissions (continued)
Test Date	5th August 2003
Rule Parts	90.210

TEST RESULTS

The limit for spurious emissions in accordance with FCC 47CFR 90.210 is 43 + 10Log(P) down on the carrier where P is the power in Watts.

As the manufacturer's declared power is 300mW the spurious limit is 43 +10Log(0.3) = 37.7dB down on the carrier.

Using the formula described in the Test Procedure the following limit was calculated:

122.1dBµV/m – 37.7dB = 84.4dBµV/m

This limit has been used to determine Pass or Fail for the harmonics measured and detailed in the following tables.

Freq MHz	Res BW Hz	Vid BW Hz	Ant Pol V/H	Ant Hgt cm	EUT Azi Deg	Raw PEAK dBµV	Cable loss / Amp gain dB	Antenna Factor dB	Result Peak dBµV/m
2466.00	1M	1M	V	114	96	39.3	4.0	28.7	72.0
4516.00	1M	1M	V	100	190	55.5	-29.0	32.2	58.7
4948.00	1M	1M	V	100	158	65.3	-29.0	32.6	68.9
6984.00	1M	1M	V	100	162	34.6	-29.0	34.6	60.4
7422.00	1M	1M	H	100	121	66.8	-29.4	36.9	74.3
7424.00	1M	1M	V	100	206	71.7	-29.4	36.9	79.2
9896.00	1M	1M	V	100	171	54.0	-27.7	37.5	64.1
12371.00	1M	1M	V	100	183	60.8	-26.8	40.8	74.8

Table showing Spurious Emissions for the EUT Transmitting on Channel 1 (2.458GHz)

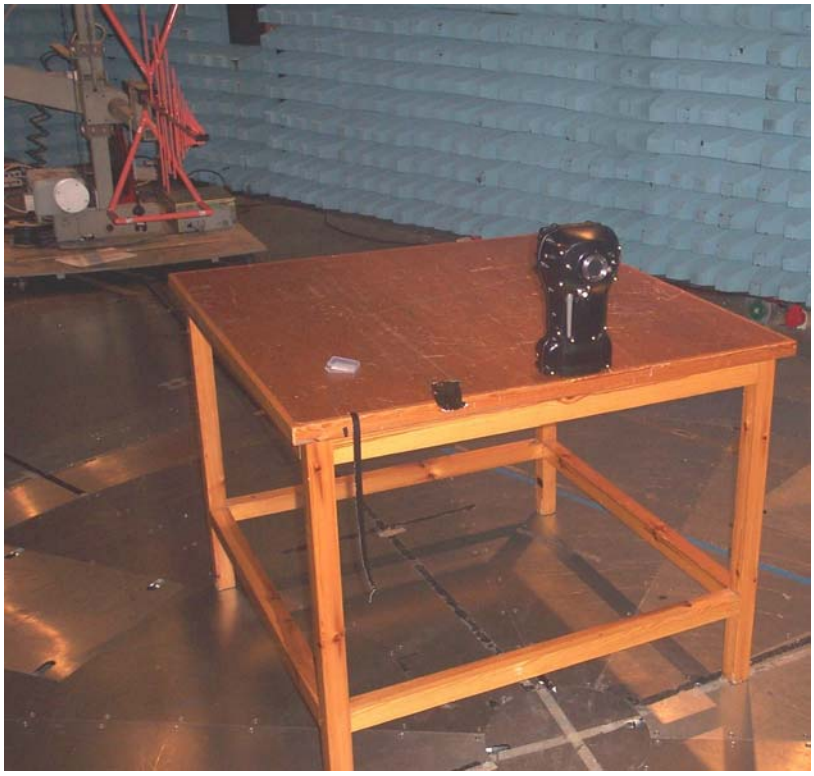
Freq MHz	Res BW Hz	Vid BW Hz	Ant Pol V/H	Ant Hgt cm	EUT Azi Deg	Raw PEAK dBµV	Cable loss / Amp gain dB	Antenna Factor dB	Result Peak dBµV/m
4561.00	1M	1M	V	100	174	45.0	-29.4	32.2	47.8
4915.00	1M	1M	V	100	143	58.0	-29.4	32.6	61.2
7023.00	1M	1M	V	100	143	51.0	-29.4	36.9	58.5
7375.00	1M	1M	V	100	185	63.8	-29.4	36.9	71.3
9833.00	1M	1M	V	100	195	55.5	-27.3	37.5	65.7
12290.00	1M	1M	V	100	191	56.8	-26.8	40.8	70.7

Table showing Spurious Emissions for the EUT Transmitting on Channel 2 (2.473GHz)

Procedure Test Performed in accordance with ANSI C63.4.

TEST SETUP PHOTOGRAPH

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



Photograph 1
Radiated Emissions Set Up

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	±3.4dB

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This report relates only to the actual item/items tested.

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