FCC ID: DO4LIB24

TTI - P-G 089 / 94-11
DAT - P-011 / 91-02

EMI -- T E S T R E P O R T

Test Report No. : **T25687-00-00HU**	02. March 2005 Date of issue

Type / Model Name : Liberty ILX D PAB
& Liberty ILX B SAB (TR4024 family)

Product Description : Electronic Article Surveillance Detection System

Applicant **:** Checkpoint Systems, Inc.

Address : 101 Wolf Drive, Thorofare

New Jersey, USA 08086

Manufacturer **:** Pikatron Feinwerktechnik GmbH & Co. KG

Address : Raiffeisenstr. 10

61252 Usingen, Germany

Licence holder **:** Checkpoint Systems, Inc.

Address : 101 Wolf Drive, Thorofare

New Jersey, USA 08086

Test Result according to the standards listed in clause 1 test standards:	**POSITIVE**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

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Contents

1 TEST STANDARDS 3

2 SUMMARY 4

3 EQUIPMENT UNDER TEST 5

3.1 PHOTO DOCUMENTATION OF THE EUT 5
3.2 FERRITE LOCATIONS 14
3.3 POWER SUPPLY SYSTEM UTILISED 16
3.4 SHORT DESCRIPTION OF THE EQUIPMENT UNDER TEST (EUT) 16

4 TEST ENVIRONMENT 17

4.1 ADDRESS OF THE TEST LABORATORY 17
4.2 ENVIRONMENTAL CONDITIONS 17
4.3 STATEMENT OF THE MEASUREMENT UNCERTAINTY 17
4.4 MEASUREMENT PROTOCOL FOR FCC, VCCI AND AUSTEL 17
4.5 DEVIATIONS OR EXCLUSIONS FROM THE REQUIREMENTS AND STANDARDS 19
4.6 OPERATION IN RESTRICTED BANDS 19

5 TEST CONDITIONS AND RESULTS 21

5.1 CONDUCTED EMISSIONS 21
5.2 FIELD STRENGTH OF THE FUNDAMENTAL WAVE 27
5.3 SPURIOUS EMISSIONS (MAGNECTIC FIELD) 9 KHZ – 30 MHZ 29
5.4 RADIATED EMISSIONS (ELECTRIC FIELD) 30 MHZ – 1 GHZ 31
5.5 EMISSION BANDWIDTH 33
5.6 CORRECTION FOR PULSE OPERATION (DUTY CYCLE) SUBPART 15.35(C) 34

6 USED TEST EQUIPMENT AND ACCESSORIES 36

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1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 15 Subpart C - Intentional Radiators (October 01, 2003)

Part 15, Subpart C, Section 15.223	Operation in the band 1.705-10 MHz §15.223(a) Radiated emissions, Fundamental & Harmonics
Part 15, Subpart C, Section 15.207(a)	AC Line conducted emissions
Part 15, Subpart C, Section 15.209(a)	Radiated emissions, general requirements

2 SUMMARY

GENERAL REMARKS:

The product Liberty ILX D PAB / Liberty ILX B SAB (TR4024 family) has been tested on the following frequencies:
Cont. sweep mode: 8.2 MHz
9.5 MHz

The bandwith requirements are kept.

FINAL ASSESSMENT:

The equipment under test **fulfills** the EMI requirements cited in clause 1 test standards.

Date of receipt of test sample : acc. to storage records of MBPS

Testing commenced on : 01. February 2005

Testing concluded on : 10. February 2005

Checked by:

Thomas Weise
Ich bestätige die Richtigkeit und Integrität dieses Dokuments
2005.03.03 15:33:16 +01'00'

Thomas Weise
Dipl. Ing.(FH)

Tested by:

Markus Huber
Ich bin der Verfasser dieses Dokuments
2005.03.02 16:43:36 +01'00'

Markus Huber

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3 EQUIPMENT UNDER TEST

3.1 Photo documentation of the EuT

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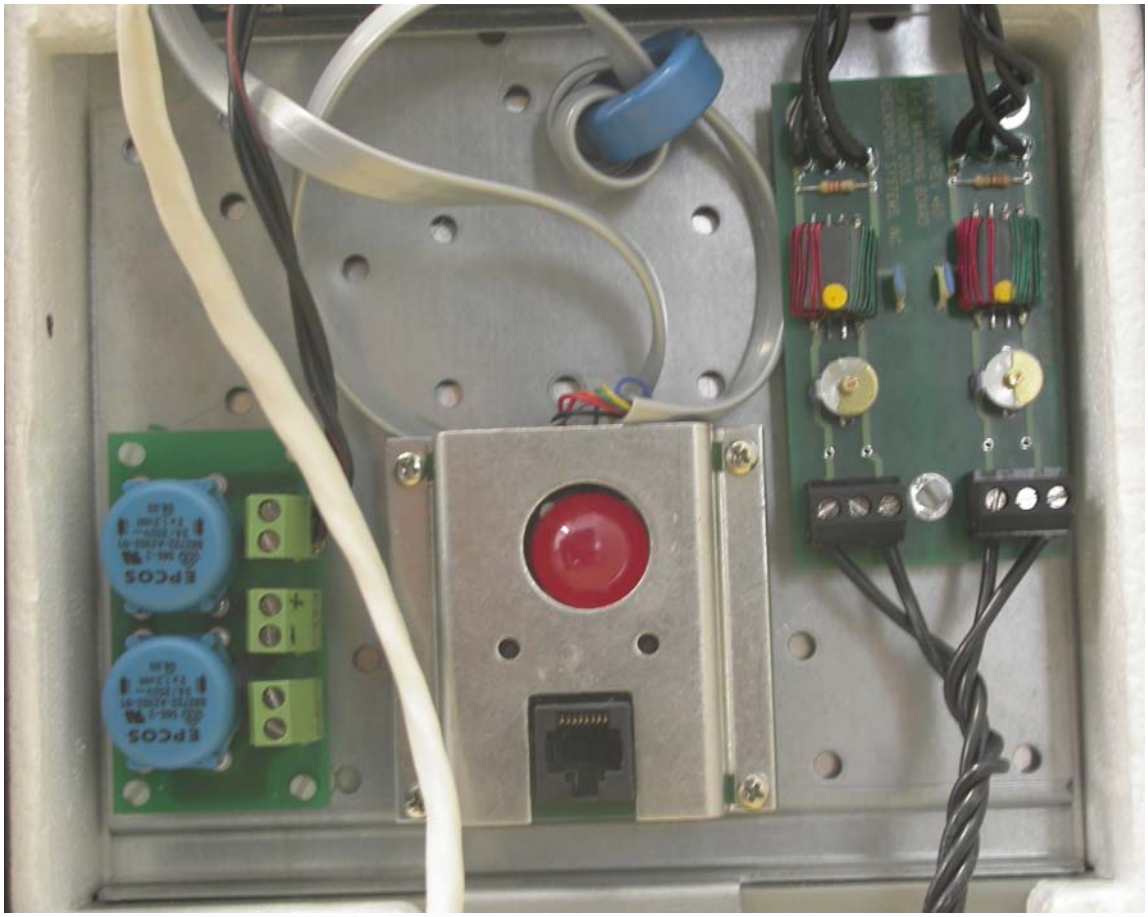

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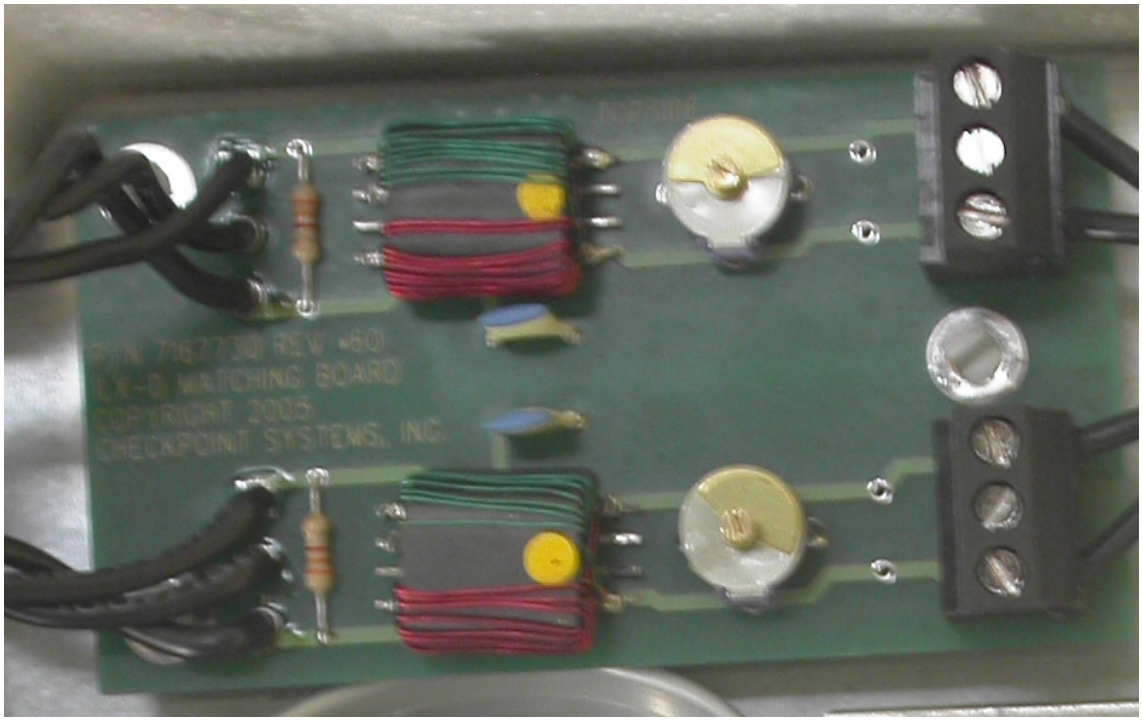
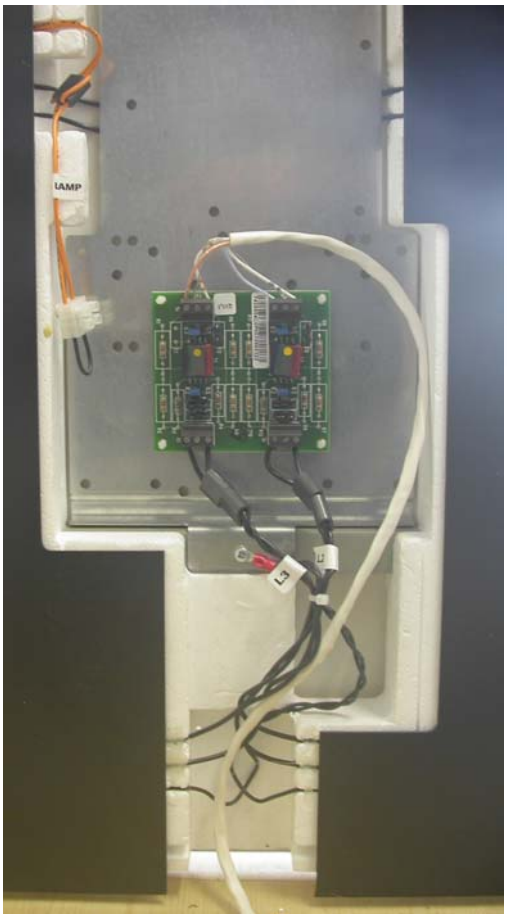
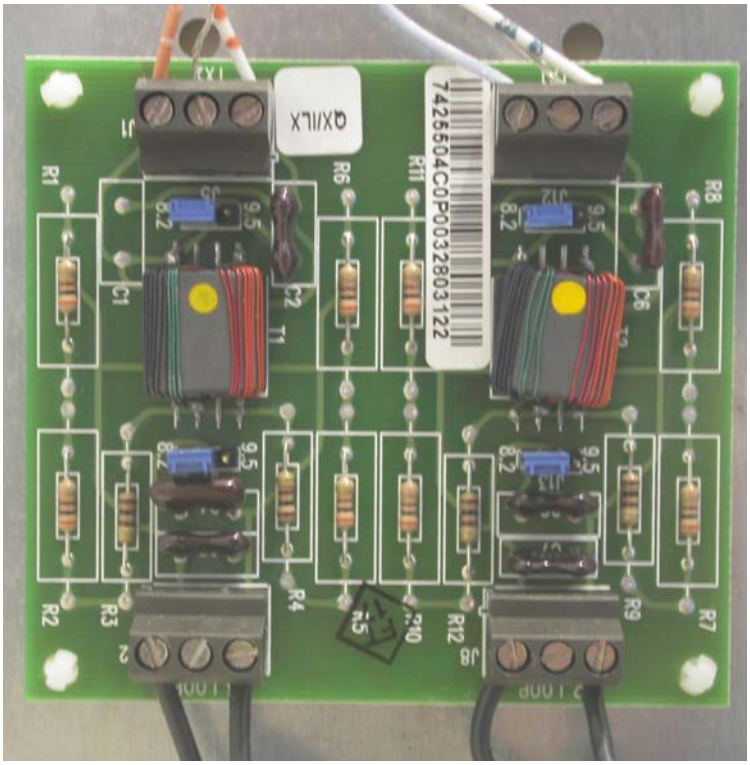
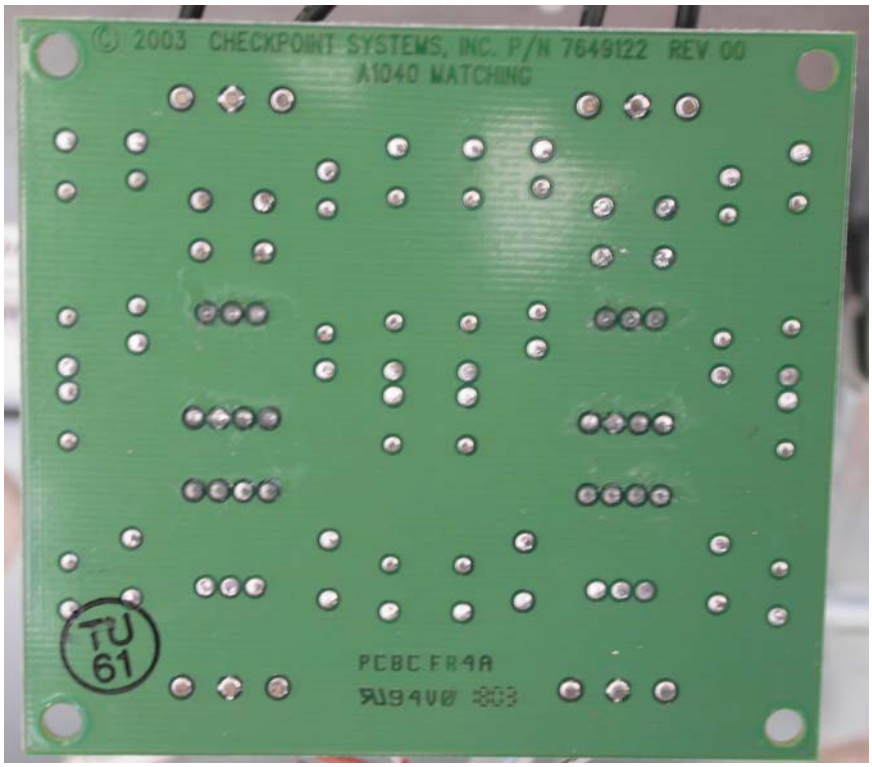

P/N 767730 REV x60
LXI-D MATCHING BOARD
COPYRIGHT 2005
CHECKPOINT SYSTEMS, INC.


LAMP





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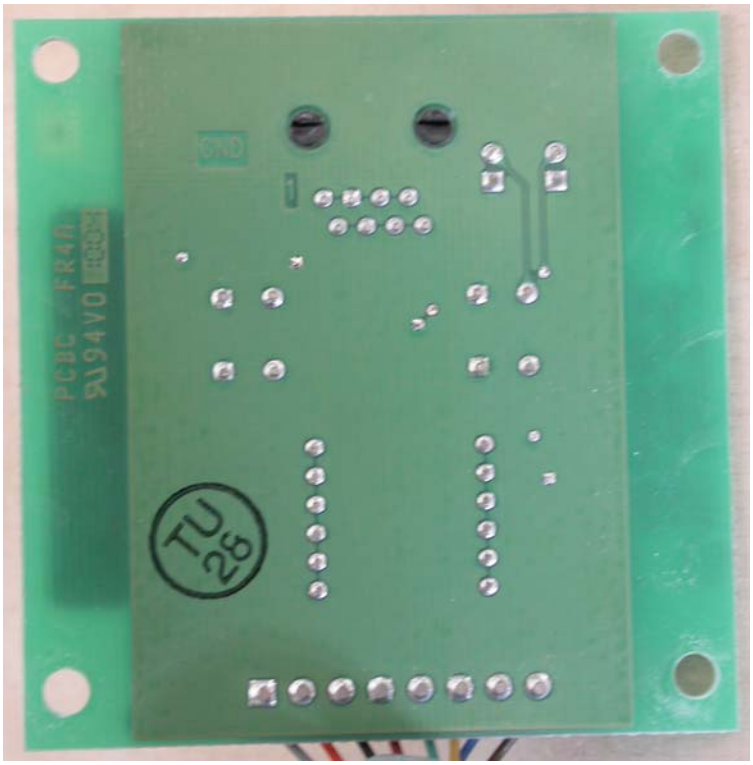
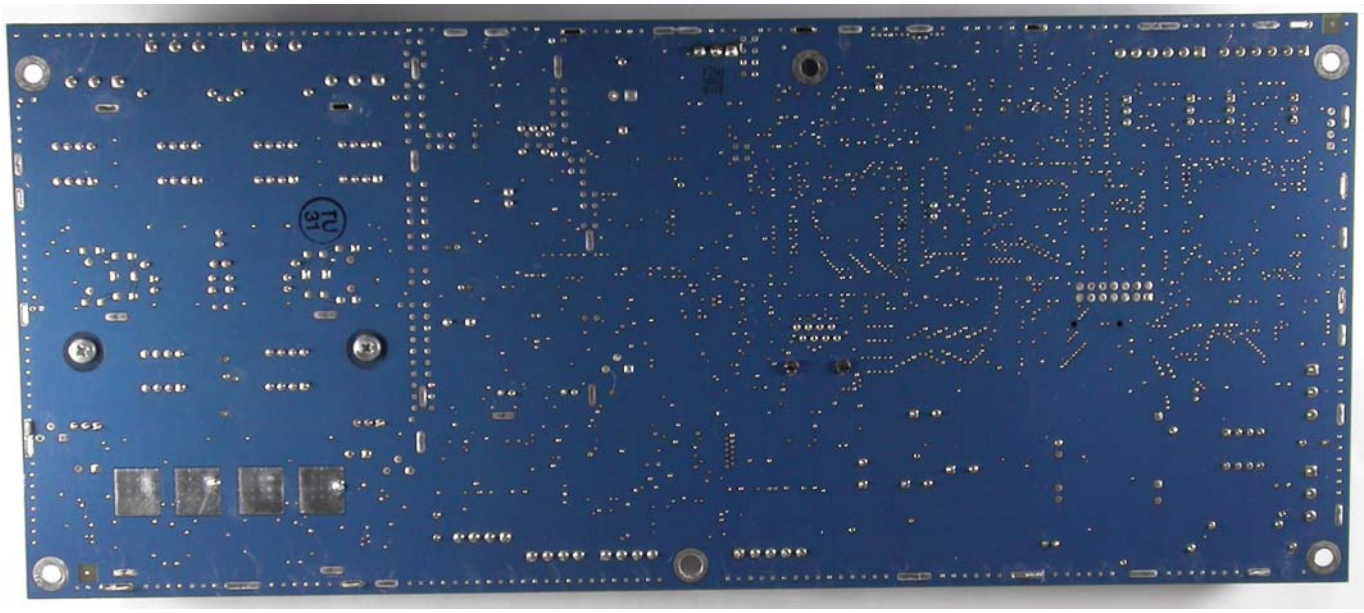
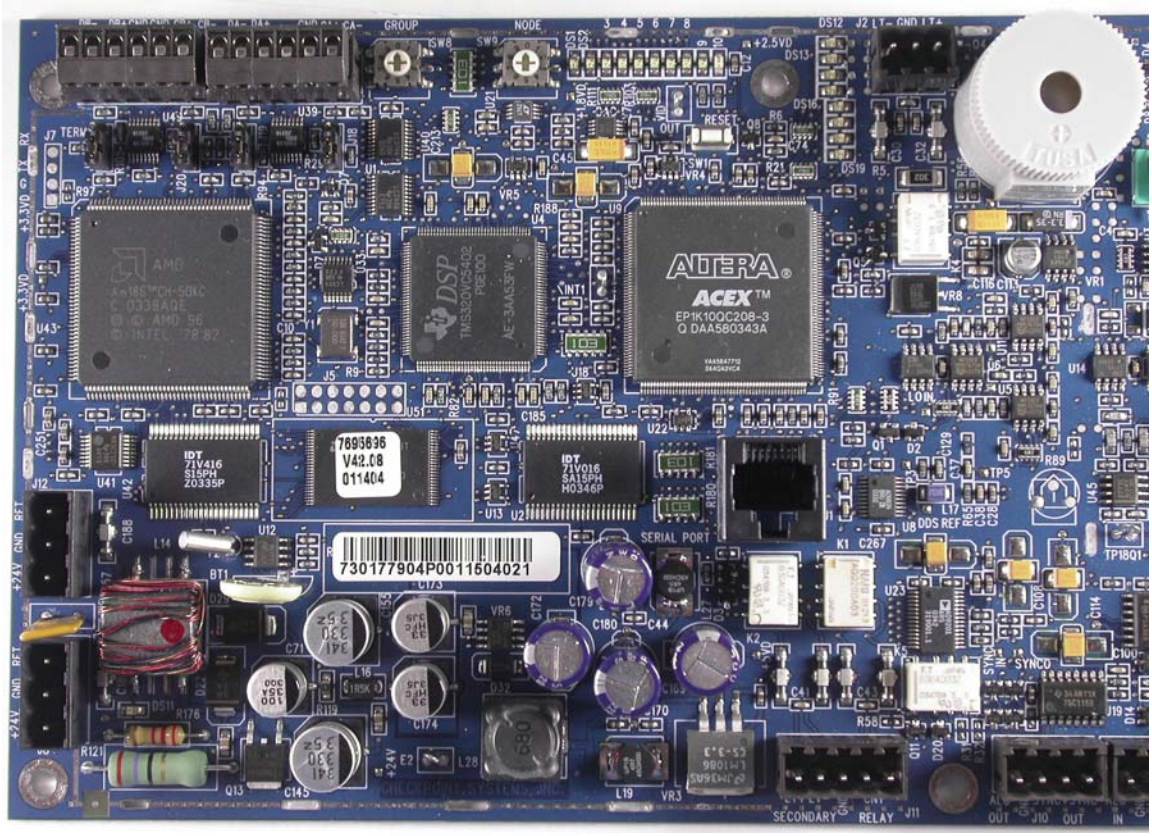
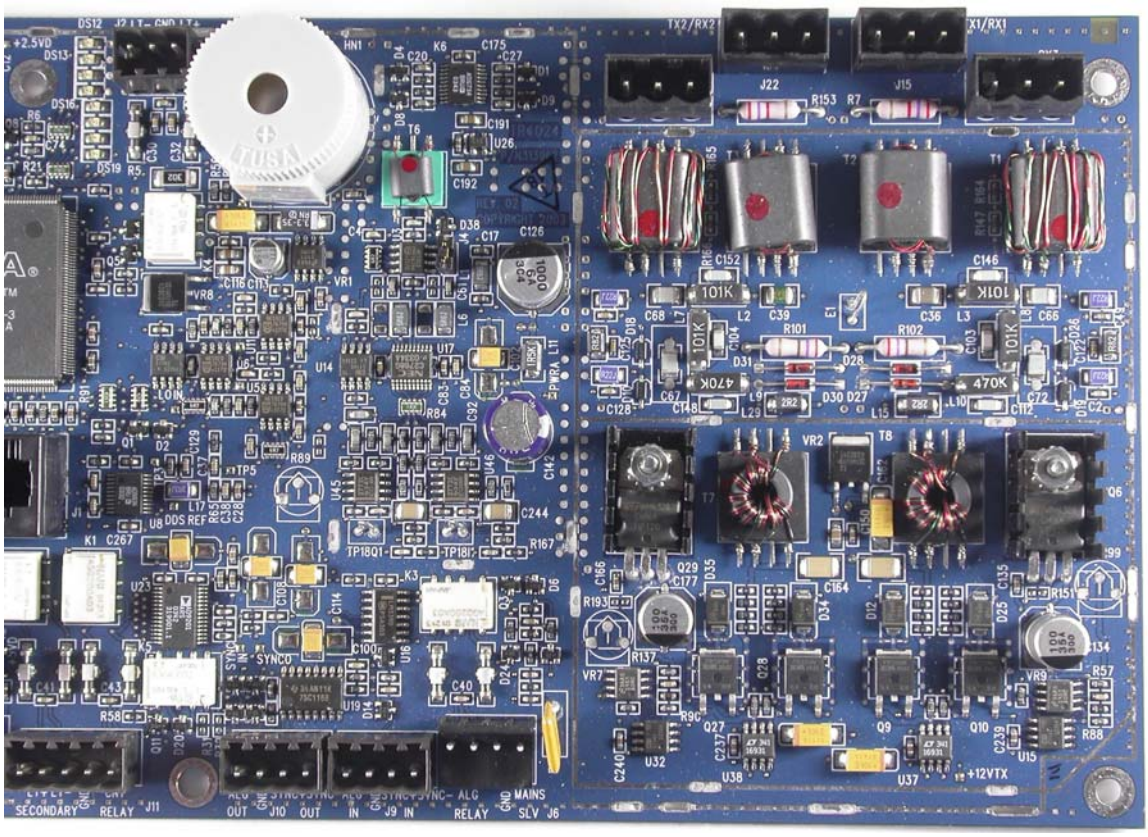
PGM12
SERCLK
J5
J4
R8
D1
C3
U2
0158124
V1.02
033104
DISABLE
SW2
R6
SW1
ENABLE
R7
R9
Q1
DS7
C2
PALM_TX
PALM_RX
GND
VCC
GND
\ALARM_DISABLE
GPIOA
GPIOB
J6
067464300P0040804372


PCBC FR4n
94V0

TR 4024 electronic:







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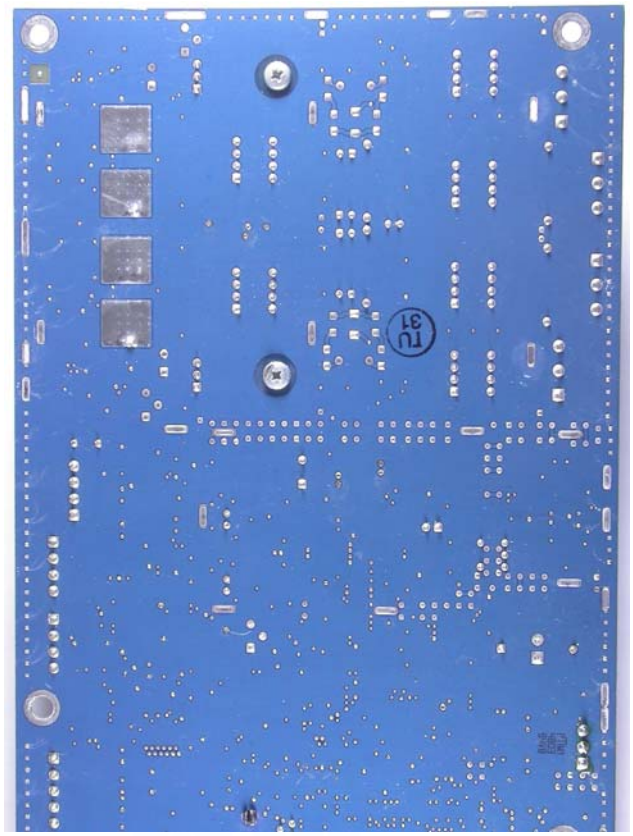
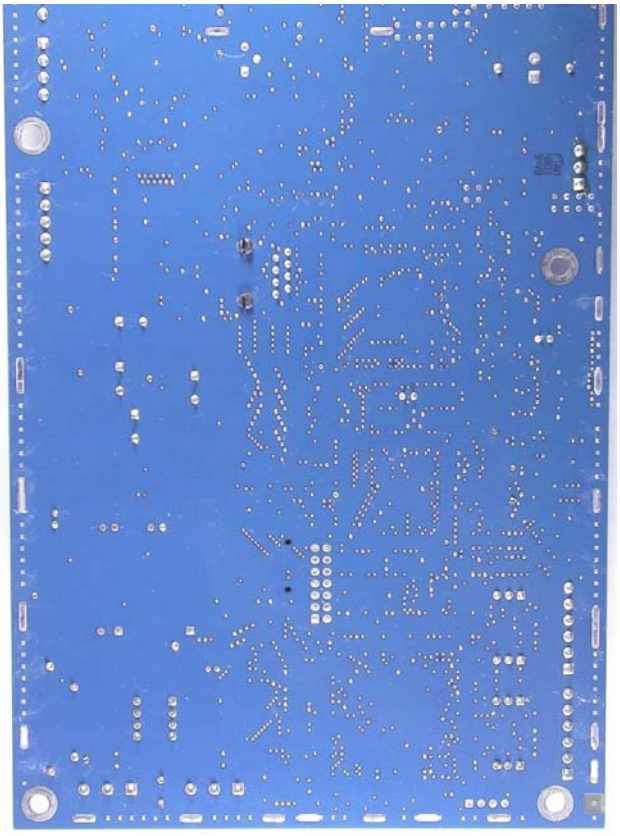
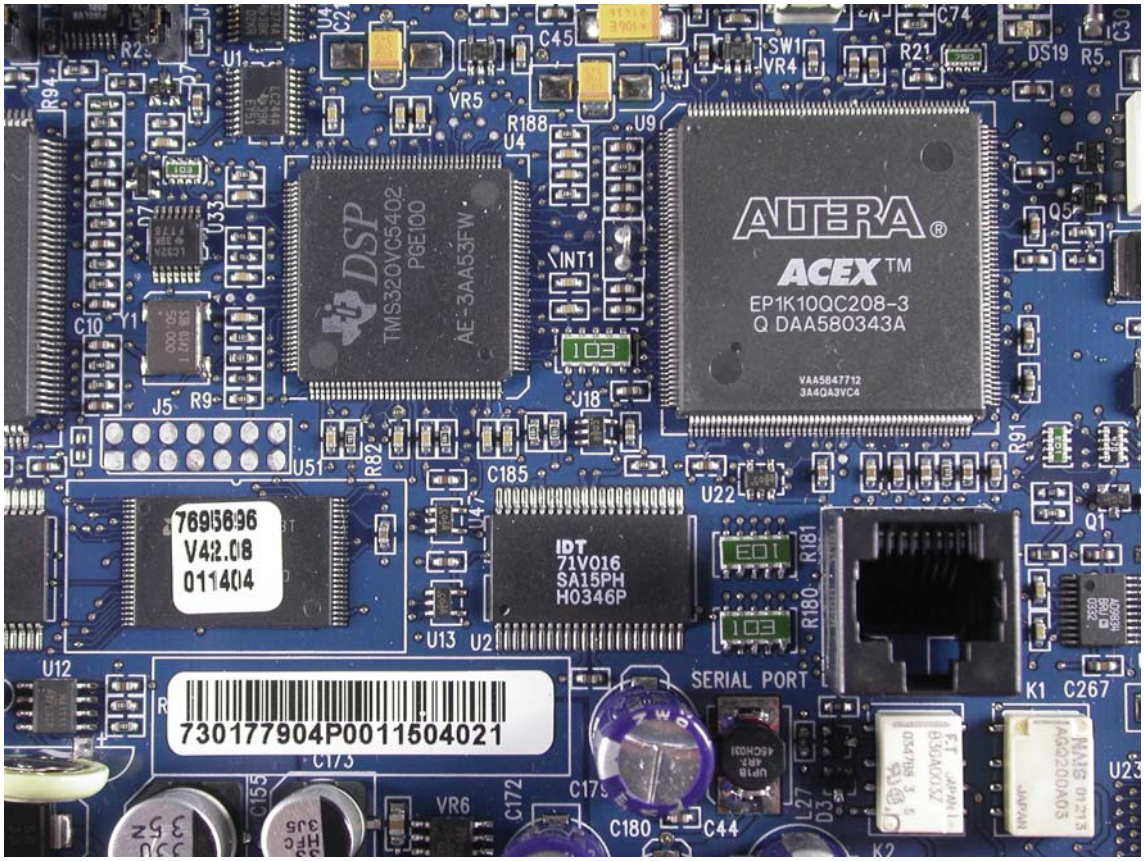
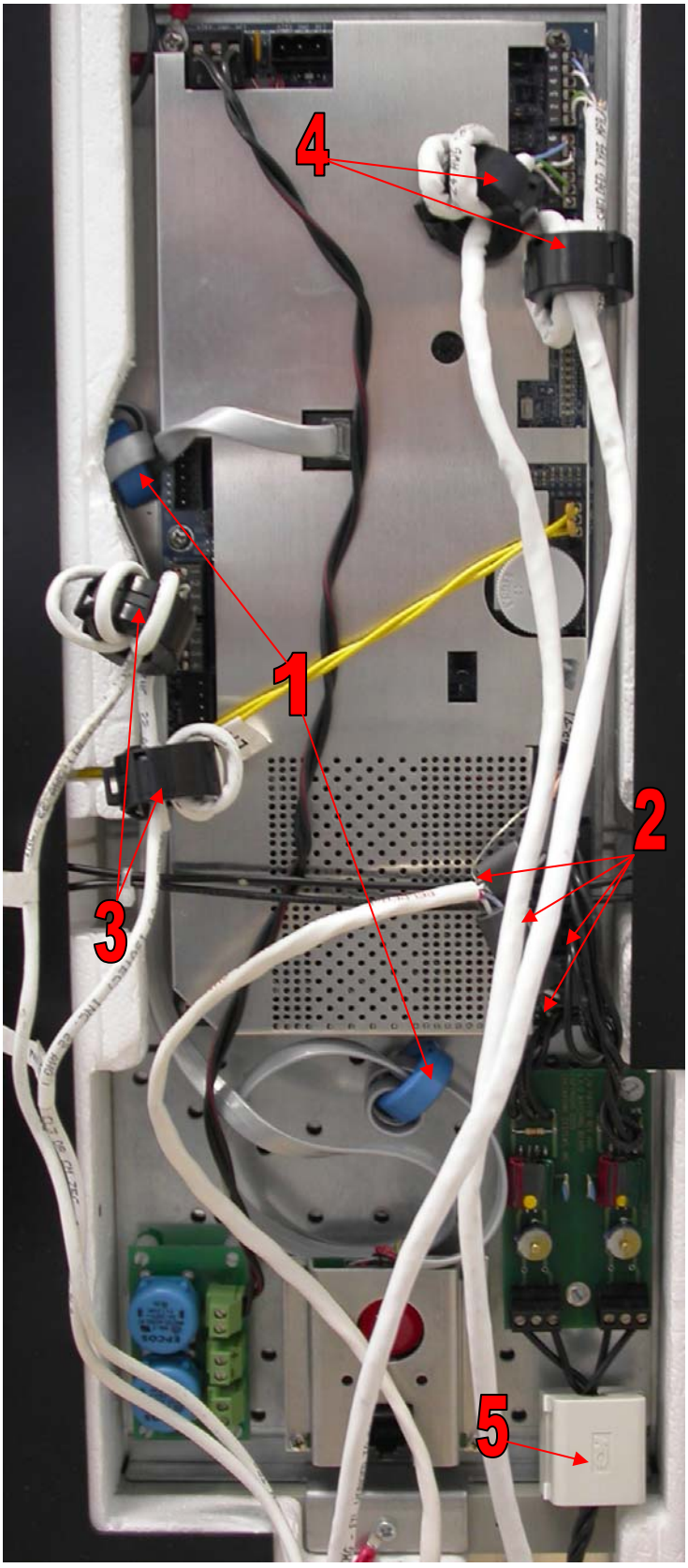





ALTERA
ACEX
EP1K10QC208-3
Q DAA580343A
DSP
TMS320VC5402
PGE100
AE-3AA53FW
IDT
71V016
SA15PH
H0346P
SERIAL PORT
730177904P0011504021

3.2 Ferrite Locations



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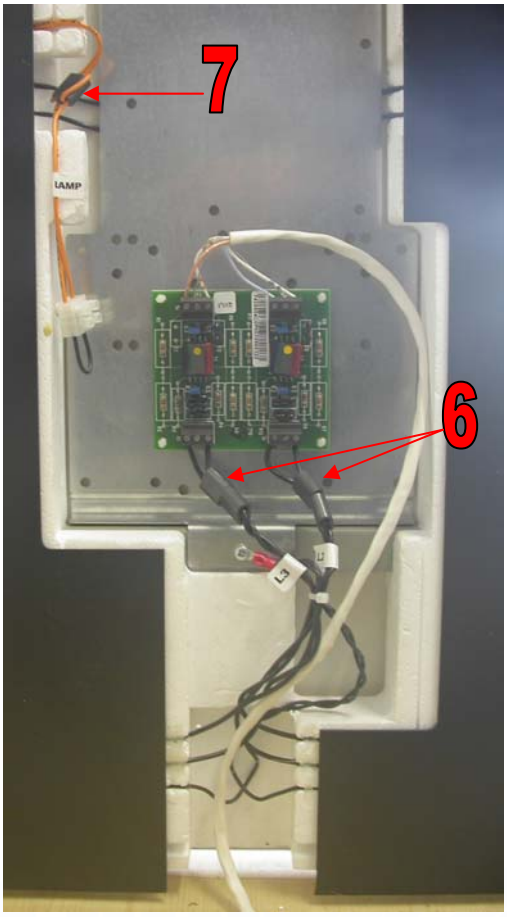

Ferrite Locations:

1. Fair Rite P/N 7118986 (Order No B64290-L618-X35) – Add a ferrite on the end of the patch board cable with three turns.
2. Fair Rite P/N 734020 (Order No 2865-000-202) – Add 2 ferrites on the end of the Rx3 and Rx4 connection with one turn.
3. Fair Rite P/N 284760 (Order No 0443806406) – Add a ferrite on each sync cable with three turns.
4. Fair Rite P/N 284760 (Order No 0443806406) – Add a ferrite on each data communication cable with four turns.
5. Fair Rite P/N 3002453 (Kitagawa SFC–10) – Add a ferrite on the Tx1 and Tx2 cable with one turn.
6. Fair Rite P/N 734020 (Order No 2865-000-202) – Add 2 ferrites on the end of L3 and L2 connection with one turn.
7. Fair Rite P/N 734020 (Order No 2865-000-202) – Add 1 ferrite on the lamp cable with 2 turns through the ferrite.

3.3 Power supply system utilised

Power supply voltage : 115 V / 60 Hz
24 V / DC

3.4 Short description of the Equipment under Test (EuT)

The Liberty ILX D is an Electronic Article Surveillance System (EAS). The system detects target tags attached to merchandise. The targets resonate in the region of 8.2 MHz or 9.5 MHz. When an article of merchandise is purchased, the target is deactivated which causes it to no longer resonate. The Liberty ILX D system monitors an area 3-feet on either side of the antenna in the 7.4 to 10.0 MHz range and triggers an alarm when a non-deactivated target is detected.
The Liberty ILX D system consists of a Liberty ILX D PAB and a Liberty ILX B SAB frame.

Number of tested samples: 1 Liberty ILX D system

Serial number: PAB: S/N 916669960U00265003
SAB: S/N Prototype

EuT operation mode:

The equipment under test was operated during the measurement under the following conditions:

- A security tag was swept through the field of the Liberty ILX D antenna every 2 seconds to initiate a verification cycle

-

-

EuT configuration:

(The CDF filled by the applicant can be viewed at the test laboratory.)

The following peripheral devices and interface cables were connected during the measurements:

- PSU (Power Supply Unit) Model : WW 425 Module #345614
- Filtered mains cable Model : IMX-04
- Standard mains cable Model :
- Model :
- Model :
- Model :

- customer specific cables

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4 TEST ENVIRONMENT

4.1 Address of the test laboratory

MIKES BABT Product Service GmbH
Ohmstrasse 2-4
94342 Strasskirchen
Germany

4.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	86-106 kPa

4.3 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16-4-2 /11.2003 „Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements“ and is documented in the MIKES BABT Product Service GmbH quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

4.4 Measurement Protocol for FCC, VCCI and AUSTEL

4.4.1 GENERAL INFORMATION

4.4.1.1 Test Methodology

Conducted and radiated disturbance testing is performed according to the procedures in International Special Committee on Radio Interference (CISPR) Publication 22 (1997), European Standard EN 55022 and Australian Standard AS 3548 (which are based on CISPR 22).

The Japanese standard, "Voluntary Control Council for Interference (VCCI) by Data Processing Equipment and Electronic Office Machines, Technical Requirements" is technically equivalent to CISPR 22 (1997). For official compliance, a conformance report must be sent to and accepted by the VCCI.

In compliance with FCC Docket 92-152, "Harmonization of Rules for Digital Devices Incorporate International Standards", testing for FCC compliance may be done following the ANSI C63.4-2003 procedures and using the CISPR 22 Limits.

4.4.1.2 Measurement Error

The data and results referenced in this document are true and accurate. The reader is cautioned that there is some measurement variability due to the tolerances of the test equipment that can contribute to a nominal product measurement uncertainty. The measurement uncertainty was calculated for all measurements listed in this test report according to NIS 81/5.1994 “The treatment of uncertainty in EMC measurements” and is documented in the MIKES BABT Product Service GmbH quality system according to DIN EN ISO/IEC 17025. Furthermore, component differences and manufacturing process variability of production units similar to that tested may result in additional product uncertainty. If necessary, refer to the test lab for the actual measurement uncertainty for specific tests. The manufacturer has the sole responsibility of continued compliance of the device.

4.4.1.3 Justification

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral into it’s characteristic impedance or left unterminated. When appropriate, the cables are manually manipulated with respect to each other to obtain maximum disturbances from the unit.

4.4.2 DETAILS OF TEST PROCEDURES

General Standard Information

The test methods used comply with CISPR Publication 22 (1997), EN 55022 (2001) and AS 3548 (1992) - "Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment" and with ANSI C63.4-2003 Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz."

4.5 Deviations or Exclusions from the Requirements and Standards

Measurement of the fundamental – 7.4 to 9.8 MHz – was perfomed by setting a spectrum analyzer to “max-hold”, peak detector. A stopping of the Sweep was not possible.

4.6 Operation in Restricted Bands

The EUT is a digital swept frequency hopping transmitter. The EUT hops on discrete frequencies. The discrete frequencies that can be transmitted by the EUT are as follows:

8.2 MHz sweep tables

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
7600000	7673333	7746667	7820000	7893333	7966667	8040000	8113333	8186667	8260000	8333333	8406667	8480000	8553333	8626667	8700000
7600000	7673333	7746667	7820000	7893333	7966667	8040000	8113333	8186667	8260000	8333333	8406667	8480000	8553333	8626667	8700000
7600000	7660000	7720000	7780000	7840000	7900000	7960000	8020000	8080000	8140000	8200000	8260000	8320000	8380000	8440000	8500000
7600000	7686667	7773333	7860000	7946667	8033333	8120000	8206667	8294100	8380000	8466667	8553333	8640000	8726667	8813333	8900000
7600000	7673333	7746667	7820000	7893333	7966667	8040000	8113333	8186667	8260000	8333333	8406667	8480000	8553333	8626667	8700000
7600000	7673333	7746667	7820000	7893333	7966667	8040000	8113333	8186667	8260000	8333333	8406667	8480000	8553333	8626667	8700000
7600000	7660000	7720000	7780000	7840000	7900000	7960000	8020000	8080000	8140000	8200000	8260000	8320000	8380000	8440000	8500000
7600000	7686667	7773333	7860000	7946667	8033333	8120000	8206667	8294100	8380000	8466667	8553333	8640000	8726667	8813333	8900000
7400000	7486667	7573333	7660000	7746667	7833333	7920000	8006667	8093333	8180000	8266667	8353333	8440000	8526667	8613333	8700000
7400000	7486667	7573333	7660000	7746667	7833333	7920000	8006667	8093333	8180000	8266667	8353333	8440000	8526667	8613333	8700000
7400000	7473333	7546667	7620000	7693333	7766667	7840000	7913333	7986667	8060000	8133333	8206667	8280000	8353333	8426667	8500000
7400000	7500000	7600000	7700000	7800000	7900000	8000000	8100000	8200000	8300000	8400000	8500000	8600000	8700000	8800000	8900000
7800000	7860000	7920000	7980000	8040000	8100000	8160000	8220000	8280000	8340000	8400000	8460000	8520000	8580000	8640000	8700000
7800000	7860000	7920000	7980000	8040000	8100000	8160000	8220000	8280000	8340000	8400000	8460000	8520000	8580000	8640000	8700000
7800000	7846667	7893333	7940000	7986667	8033333	8080000	8126667	8173333	8220000	8266667	8313333	8360000	8406667	8453333	8500000
7800000	7873333	7946667	8020000	8093333	8166667	8240000	8313333	8386667	8460000	8533333	8606667	8680000	8753333	8826667	8900000

8.6 MHz sweep tables

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
7800000	7906667	8013333	8120000	8226667	8333333	8440000	8546667	8653333	8760000	8866667	8973333	9080000	9186667	9293333	9400000
7800000	7906667	8013333	8120000	8226667	8333333	8440000	8546667	8653333	8760000	8866667	8973333	9080000	9186667	9293333	9400000
7800000	7893333	7986667	8080000	8173333	8266667	8360000	8453333	8546667	8640000	8733333	8826667	8920000	9013333	9106667	9200000
7800000	7920000	8040000	8160000	8280000	8400000	8520000	8640000	8760000	8880000	9000000	9120000	9240000	9360000	9480000	9600000
7800000	7906667	8013333	8120000	8226667	8333333	8440000	8546667	8653333	8760000	8866667	8973333	9080000	9186667	9293333	9400000
7800000	7906667	8013333	8120000	8226667	8333333	8440000	8546667	8653333	8760000	8866667	8973333	9080000	9186667	9293333	9400000
7800000	7893333	7986667	8080000	8173333	8266667	8360000	8453333	8546667	8640000	8733333	8826667	8920000	9013333	9106667	9200000
7800000	7920000	8040000	8160000	8280000	8400000	8520000	8640000	8760000	8880000	9000000	9120000	9240000	9360000	9480000	9600000
7600000	7720000	7840000	7960000	8080000	8200000	8320000	8440000	8560000	8680000	8800000	8920000	9040000	9160000	9280000	9400000
7600000	7720000	7840000	7960000	8080000	8200000	8320000	8440000	8560000	8680000	8800000	8920000	9040000	9160000	9280000	9400000
7600000	7706667	7813333	7920000	8026667	8133333	8240000	8346667	8453333	8560000	8666667	8773333	8880000	8986667	9093333	9200000
7600000	7733333	7866667	8000000	8133333	8266667	8400000	8533333	8666667	8800000	8933333	9066667	9200000	9333333	9466667	9600000
8000000	8093333	8186667	8280000	8373333	8466667	8560000	8653333	8746667	8840000	8933333	9026667	9120000	9213333	9306667	9400000
8000000	8093333	8186667	8280000	8373333	8466667	8560000	8653333	8746667	8840000	8933333	9026667	9120000	9213333	9306667	9400000
8000000	8080000	8160000	8240000	8320000	8400000	8480000	8560000	8640000	8720000	8800000	8880000	8960000	9040000	9120000	9200000
8000000	8106667	8213333	8320000	8426667	8533333	8640000	8746667	8853333	8960000	9066667	9173333	9280000	9386667	9493333	9600000

9.0 MHz sweep tables

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
8500000	8566667	8633333	8700000	8766667	8833333	8900000	8966667	9033333	9100000	9166667	9233333	9300000	9366667	9433333	9500000
8500000	8566667	8633333	8700000	8766667	8833333	8900000	8966667	9033333	9100000	9166667	9233333	9300000	9366667	9433333	9500000
8500000	8553333	8606667	8660000	8713333	8766667	8820000	8873333	8926667	8980000	9033333	9086667	9140000	9193333	9246667	9300000
8500000	8580000	8660000	8740000	8820000	8900000	8980000	9060000	9140000	9220000	9300000	9380000	9460000	9540000	9620000	9700000
8500000	8566667	8633333	8700000	8766667	8833333	8900000	8966667	9033333	9100000	9166667	9233333	9300000	9366667	9433333	9500000
8500000	8566667	8633333	8700000	8766667	8833333	8900000	8966667	9033333	9100000	9166667	9233333	9300000	9366667	9433333	9500000
8500000	8553333	8606667	8660000	8713333	8766667	8820000	8873333	8926667	8980000	9033333	9086667	9140000	9193333	9246667	9300000
8500000	8580000	8660000	8740000	8820000	8900000	8980000	9060000	9140000	9220000	9300000	9380000	9460000	9540000	9620000	9700000
8300000	8380000	8460000	8540000	8620000	8700000	8780000	8860000	8940000	9020000	9100000	9180000	9260000	9340000	9420000	9500000
8300000	8380000	8460000	8540000	8620000	8700000	8780000	8860000	8940000	9020000	9100000	9180000	9260000	9340000	9420000	9500000
8300000	8366667	8433333	8500000	8566667	8633333	8700000	8766667	8833333	8900000	8966667	9033333	9100000	9166667	9233333	9300000
8300000	8393333	8486667	8580000	8673333	8766667	8860000	8953333	9046667	9140000	9233333	9326667	9420000	9513333	9606667	9700000
8700000	8753333	8806667	8860000	8913333	8966667	9020000	9073333	9126667	9180000	9233333	9286667	9340000	9393333	9446667	9500000
8700000	8753333	8806667	8860000	8913333	8966667	9020000	9073333	9126667	9180000	9233333	9286667	9340000	9393333	9446667	9500000
8700000	8740000	8780000	8820000	8860000	8900000	8940000	8980000	9020000	9060000	9100000	9140000	9180000	9220000	9260000	9300000
8700000	8766667	8833333	8900000	8966667	9033333	9100000	9166667	9233333	9300000	9366667	9433333	9500000	9566667	9633333	9700000

9.5 MHz sweep tables

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
8900000	8960000	9020000	9080000	9140000	9200000	9260000	9320000	9380000	9440000	9500000	9560000	9620000	9680000	9740000	9800000
8900000	8960000	9020000	9080000	9140000	9200000	9260000	9320000	9380000	9440000	9500000	9560000	9620000	9680000	9740000	9800000
8900000	8946667	8993333	9040000	9086667	9133333	9180000	9226667	9273333	9320000	9366667	9413333	9460000	9506667	9553333	9600000
8900000	8973333	9046667	9120000	9193333	9266667	9340000	9413333	9486667	9560000	9633333	9706667	9780000	9853333	9926667	10000000
8900000	8960000	9020000	9080000	9140000	9200000	9260000	9320000	9380000	9440000	9500000	9560000	9620000	9680000	9740000	9800000
8900000	8960000	9020000	9080000	9140000	9200000	9260000	9320000	9380000	9440000	9500000	9560000	9620000	9680000	9740000	9800000
8900000	8946667	8993333	9040000	9086667	9133333	9180000	9226667	9273333	9320000	9366667	9413333	9460000	9506667	9553333	9600000
8900000	8973333	9046667	9120000	9193333	9266667	9340000	9413333	9486667	9560000	9633333	9706667	9780000	9853333	9926667	10000000
8700000	8773333	8846667	8920000	8993333	9066667	9140000	9213333	9286667	9360000	9433333	9506667	9580000	9653333	9726667	9800000
8700000	8773333	8846667	8920000	8993333	9066667	9140000	9213333	9286667	9360000	9433333	9506667	9580000	9653333	9726667	9800000
8700000	8760000	8820000	8880000	8940000	9000000	9060000	9120000	9180000	9240000	9300000	9360000	9420000	9480000	9540000	9600000
8700000	8786667	8873333	8960000	9046667	9133333	9220000	9306667	9393333	9480000	9566667	9653333	9740000	9826667	9913333	10000000
9100000	9146667	9193333	9240000	9286667	9333333	9380000	9426667	9473333	9520000	9566667	9613333	9660000	9706667	9753333	9800000
9100000	9146667	9193333	9240000	9286667	9333333	9380000	9426667	9473333	9520000	9566667	9613333	9660000	9706667	9753333	9800000
9100000	9133333	9166667	9200000	9233333	9266667	9300000	9333333	9366667	9400000	9433333	9466667	9500000	9533333	9566667	9600000
9100000	9160000	9220000	9280000	9340000	9400000	9460000	9520000	9580000	9640000	9700000	9760000	9820000	9880000	9940000	10000000

The restricted frequency bands (per FCC Part 15 Clause 15.205) in the operating frequency band of the EuT are as follows:

8.291 – 8.294 MHz
8.362 – 8.366 MHz
8.37625 – 8.38675 MHz
8.41425 – 8.41475 MHz

Note: The used hopping frequency 8.2941 MHz is near to the restricted band, but according to FCC Part 15.205 (1) are following devices are exempt from the requirements of this section:
Swept frequency field disturbance sensors operating between 1.705 and 37 MHz provided their emissions onlysweep through the bands listed above, the sweep never stopped with the fundamental emission within this bands and the fundamental emission is outside of the bands more than 99% of the time the device is actively transmitting, without compensation for duty cycle.
The transmitter fulfils these requirements and so this unt is exempt of this section.

5 TEST CONDITIONS AND RESULTS

5.1 Conducted emissions

For test instruments and accessories used see section 6 Part **A 4**.

5.1.1 Description of the test location

Test location: Shielded Room S2

5.1.2 Photo documentation of the test set-up

5.1.3 Description of Measurement

The final level, expressed in dBμV, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the FCC Limit or to the CISPR limit, which is equivalent to the Australian AS 3548 limit.

To convert between dBμV and μV, the following conversions apply:

dBμV = 20(log μV)

μV = Inverse log(dBμV/20)

Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EuT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection, and a Line Impedance Stabilization Network (LISN), with 50Ω/50 μH (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimeter's above the floor and is positioned 40 centimeter's from the vertical ground plane (wall) of the screen room. If the minimum passing margin appears to be less than 20 dB with a peak mode measurement, the emissions are remeasured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

5.1.4 Test result

Frequency range: 0.15 – 30 MHz

Min. limit margin 18.9 dB at 230 kHz

The requirements are **FULFILLED.**

Remarks: _____

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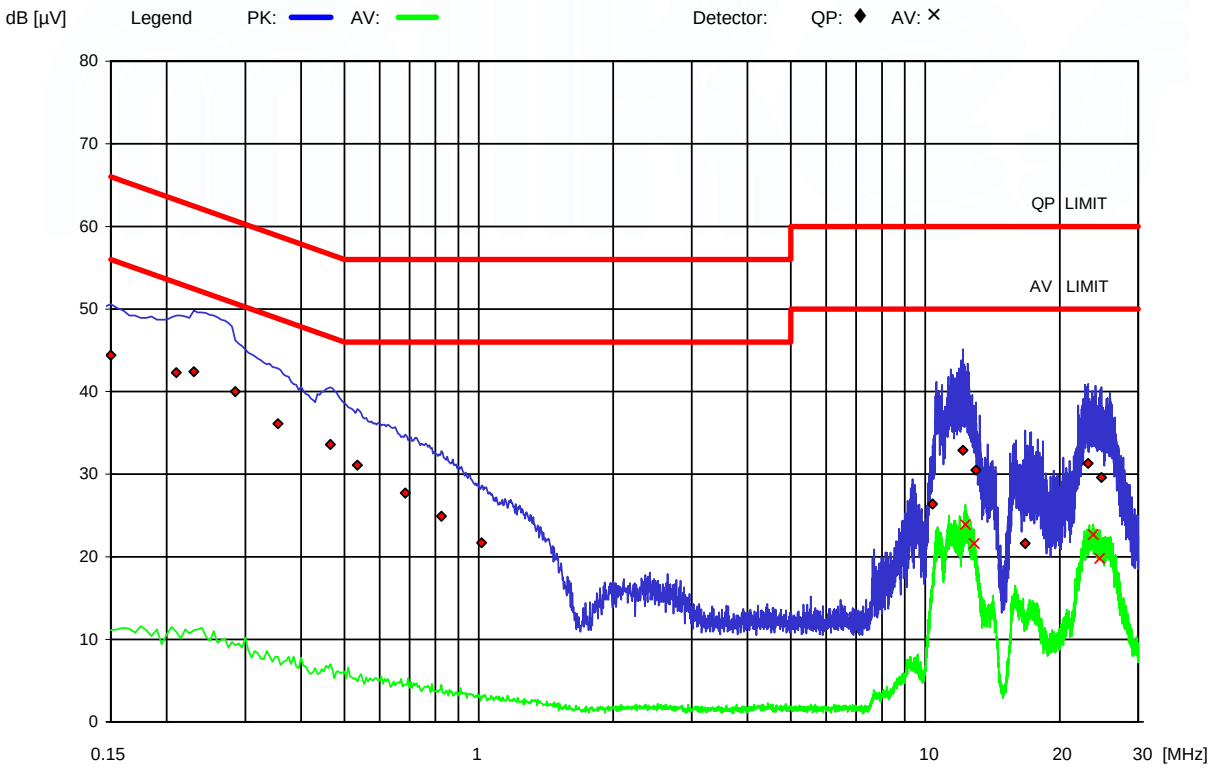
5.1.5 Test protocol

Test point N Result: passed
Operation mode: Cont. sweep mode
Remarks: Tx1 & Tx2: 27, 8.2 MHz
PSU WW 425, normal power cord
With filter board
Date:02. February 2005
Operator:Huber Markus

Freq	QP- L	D -Limit	Freq	AV-L	D -Limit
kHz	dB[µV]	QP [dB]	kHz	dB[µV]	AV [dB]
150	44,4	21,6	12305	23,9	26,1
210	42,3	20,9	12870	21,6	28,4
230	42,4	20,0	23780	22,7	27,3
285	40	20,7	24585	19,8	30,2
355	36,1	22,7			
465	33,6	23,0			
535	31,1	24,9			
685	27,7	28,3			
825	24,9	31,1			
1015	21,7	34,3			
10390	26,4	33,6			
12145	32,9	27,1			
12980	30,5	29,5			
16750	21,6	38,4			
23165	31,3	28,7			

Freq	QP- L	D -Limit	Freq	AV-L	D -Limit
kHz	dB[µV]	QP [dB]	kHz	dB[µV]	AV [dB]
24810	29,6	30,4			

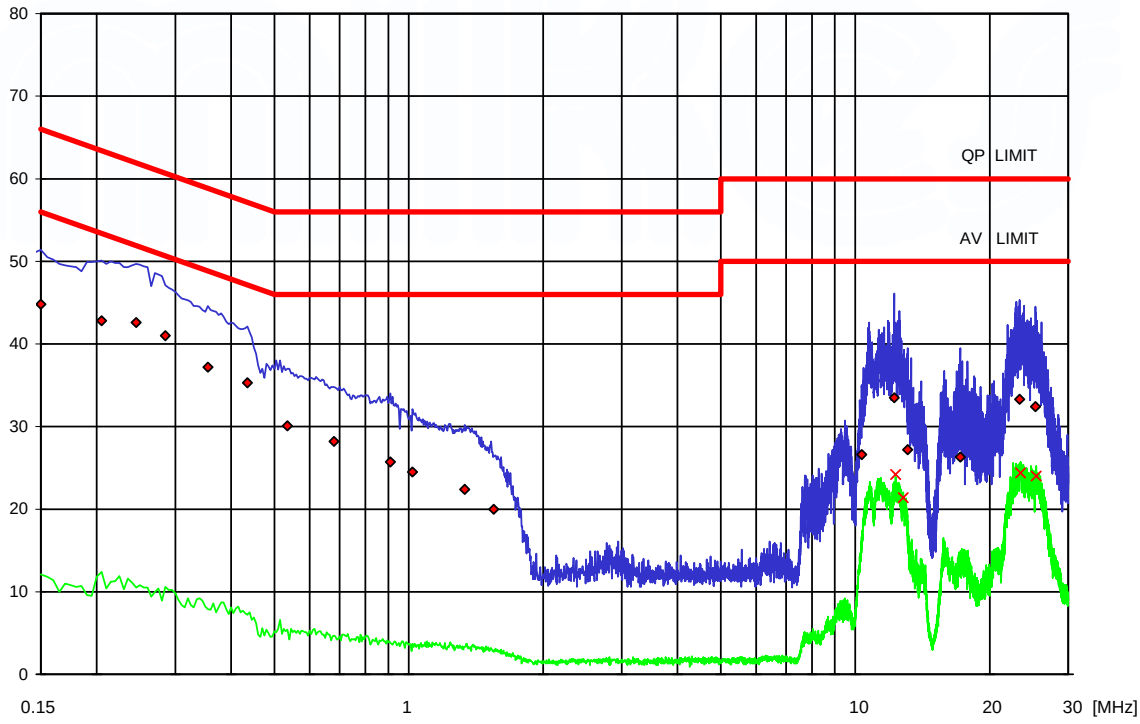


Test point L1 Result: passed
Operation mode: Cont. sweep mode
Remarks: Tx1 & Tx2: 27, 8.2 MHz
PSU WW 425, normal power cord
With filter board
Date:02. February 2005
Operator:Huber Markus

Freq	QP- L	D -Limit	Freq	AV-L	D -Limit
kHz	dB[µV]	QP [dB]	kHz	dB[µV]	AV [dB]
150	44,8	21,2	12320	24,2	25,8
205	42,8	20,6	12805	21,4	28,6
245	42,6	19,3	23460	24,4	25,6
285	41	19,7	25425	24	26,0
355	37,2	21,6			
435	35,3	21,9			
535	30,1	25,9			
680	28,2	27,8			
910	25,7	30,3			
1020	24,5	31,5			
1335	22,4	33,6			
1550	20	36,0			
10340	26,6	33,4			
12225	33,5	26,5			
13110	27,2	32,8			

Freq	QP- L	D -Limit	Freq	AV-L	D -Limit
kHz	dB[µV]	QP [dB]	kHz	dB[µV]	AV [dB]
17185	26,3	33,7			
23345	33,3	26,7			
25345	32,4	27,6			

dB [µV] Legend PK: AV: Detector: QP: ♦ AV: ×



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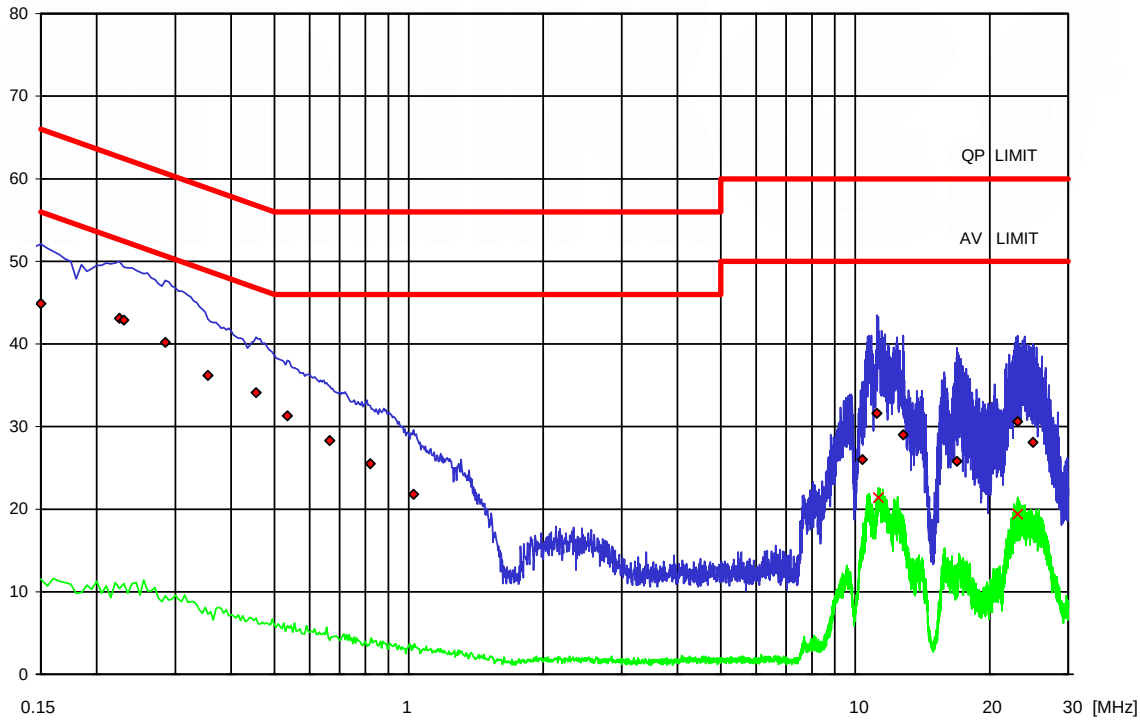
Test point N Result: passed
Operation mode: Cont. sweep mode
Remarks: Tx1 & Tx2: 28, 9.5 MHz
PSU WW 425, normal power cord
With filter board
Date:02. February 2005
Operator:Huber Markus

Freq	QP- L	D -Limit	Freq	AV-L	D -Limit
kHz	dB[µV]	QP [dB]	kHz	dB[µV]	AV [dB]
150	44,9	21,1	11275	21,4	28,6
225	43,1	19,5	23100	19,4	30,6
230	42,9	19,5			
285	40,2	20,5			
355	36,2	22,6			
455	34,1	22,7			
535	31,3	24,7			
665	28,3	27,7			
820	25,5	30,5			
1025	21,8	34,2			
10370	26	34,0			
11185	31,6	28,4			
12805	29	31,0			
16900	25,8	34,2			
23115	30,6	29,4			

Freq	QP- L	D -Limit	Freq	AV-L	D -Limit
kHz	dB[µV]	QP [dB]	kHz	dB[µV]	AV [dB]
25010	28,1	31,9			

dB [µV] Legend PK: AV: Detector: QP: ♦ AV: ×



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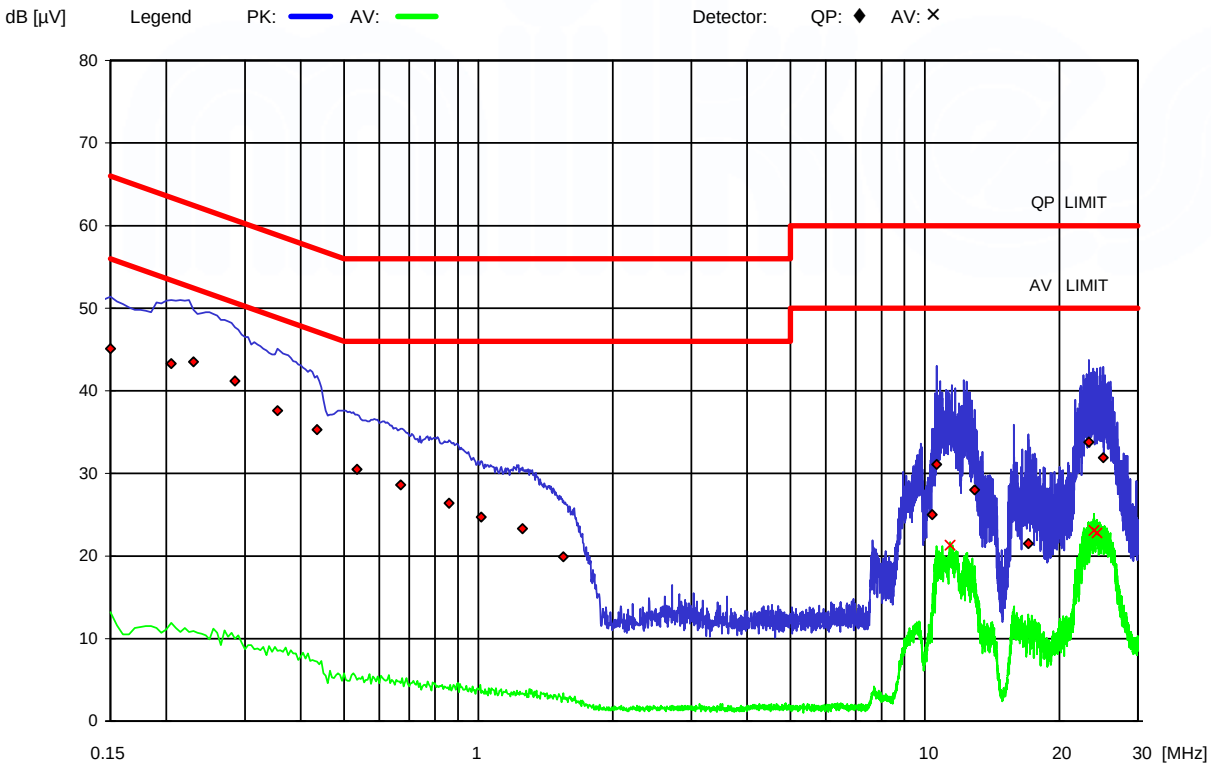
Test point L1 Result: passed
Operation mode: Cont. sweep mode
Remarks: Tx1 & Tx2: 28, 9.5 MHz
PSU WW 425, normal power cord
With filter board
Date:02. February 2005
Operator:Huber Markus

Freq	QP- L	D -Limit	Freq	AV-L	D -Limit
kHz	dB[µV]	QP [dB]	kHz	dB[µV]	AV [dB]
150	45,1	20,9	11385	21,3	28,7
205	43,3	20,1	23910	23,1	26,9
230	43,5	18,9	24310	22,8	27,2
285	41,2	19,5			
355	37,6	21,2			
435	35,3	21,9			
535	30,5	25,5			
670	28,6	27,4			
860	26,4	29,6			
1015	24,7	31,3			
1255	23,3	32,7			
1550	19,9	36,1			
10390	25	35,0			
10630	31,1	28,9			
12920	28	32,0			

Freq	QP- L	D -Limit	Freq	AV-L	D -Limit
kHz	dB[µV]	QP [dB]	kHz	dB[µV]	AV [dB]
17055	21,5	38,5			
23285	33,8	26,2			
25100	31,9	28,1			



5.2 Field strength of the fundamental wave

For test instruments and accessories used see section 6 Part **CPR 1**.

5.2.1 Description of the test location

Test location: OATS1

Test distance: 30 metres

5.2.2 Photo documentation of the test set-up

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5.2.3 Description of Measurement

The final level, expressed in dBµV/m, is arrived at by taking the reading from the EMI receiver (Level dBµV) and adding the antenna correction factor and cable loss factor (Factor dB) to it. This result then has to be compared with the relevant FCC limit.
The resolution bandwidth during the measurement was 9 kHz.

Example:

Frequency (MHz)	Level (dBµV)	+	Factor (dB)	=	Level (dBµV/m)	Limit (dBµV/m)	=	Delta (dB)
1.705	5	+	20	=	25	30	=	5

5.2.4 Test result

Frequency [MHz]	L: PK [dBµV]	L: AV [dBµV]	L: QP [dBµV]	Correct. [dB]	L: PK [dBµV/m]	L: AV [dBµV/m]	L: QP [dBµV/m]	Limit [dBµV/m]	Delta [dB]
8.2	33.90	3.44		20	53.90	23.44		40.0	16.56

Frequency [MHz]	L: PK [dBµV]	L: AV [dBµV]	L: QP [dBµV]	Correct. [dB]	L: PK [dBµV/m]	L: AV [dBµV/m]	L: QP [dBµV/m]	Limit [dBµV/m]	Delta [dB]
9.5	33.75	3.29		20	53.75	23.29		40.0	16.71

Limit according to FCC Part 15 Subpart 15.223, 15.35(b)

Frequency (MHz)	Fieldstrength of fundamental – Average Detector	
	(µV/m)	dB (µV/m)
1.705-10.0	100*	40*

Frequency (MHz)	Fieldstrength of fundamental – Peak Detector	
	(µV/m)	dB (µV/m)
1.705-10.0	1000*	60*

* At a test distance of 30 metres

The requirements are **FULFILLED.**

Remarks: _____

5.3 Spurious emissions (Magnectic field) 9 kHz – 30 MHz

For test instruments and accessories used see section 6 Part **SER 1**.

5.3.1 Description of the test location

Test location: OATS1

Test distance: 30 metres

5.3.2 Photo documentation of the test set-up

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5.3.3 Description of Measurement

Spurious emissions from the EuT are measured in the frequency range of 9 kHz to 30 MHz using a tuned receiver and a shielded loop antenna. The antenna was positioned 3, 10 or 30 meters horizontally from the EuT. Measurements have been made in all three orthogonal axes and the shielded loop antenna was rotated to locate the maximum of the emissions.

The final level, expressed in dBµV/m, is arrived at by taking the reading from the EMI receiver (Level dBµV) and adding the antenna correction factor and cable loss factor (Factor dB) to it. This result then has to be compared with the relevant FCC limit.
The resolution bandwidth during the measurement is as follows:
9 kHz – 150 kHz: ResBW: 200 Hz
150 kHz – 30 MHz: ResBW: 9 kHz

Example:

Frequency (MHz)	Level (dBµV)	+	Factor (dB)	=	Level (dBµV/m)	Limit (dBµV/m)	=	Delta (dB)
1.705	5	+	20	=	25	30	=	5

5.3.4 Test result

TX frequency: 8.2 MHz

Frequency [MHz]	L: PK [dBµV]	L: AV [dBµV]	L: QP [dBµV]	Correct. [dB]	L: PK [dBµV/m]	L: AV [dBµV/m]	L: QP [dBµV/m]	Limit [dBµV/m]	Delta [dB]
0.09 - 30	-	-	-	20	-	-	-	40.0	>20

TX frequency: 9.5 MHz

Frequency [MHz]	L: PK [dBµV]	L: AV [dBµV]	L: QP [dBµV]	Correct. [dB]	L: PK [dBµV/m]	L: AV [dBµV/m]	L: QP [dBµV/m]	Limit [dBµV/m]	Delta [dB]
0.09 - 30	-	-	-	20	-	-	-	40.0	>20

Limit according to FCC Part 15 Subpart 15.209(a), Subpart 15.223(a)

Frequency (MHz)	Field strength of spurious emissions		Measurement distance (meters)
	(µV/m)	dB (µV/m)	
0.009-0.490	2400/F(kHz)	--	300
0.490-1.705	24000/F (kHz)	--	30
1.705-30.0	100	40	30

The requirements are **FULFILLED.**

Remarks: The limits are met, because the margin from the measured values to the limit is > 20dB.

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5.4 Radiated emissions (electric field) 30 MHz – 1 GHz

For test instruments and accessories used see section 6 Part **SER 2**.

5.4.1 Description of the test location

Test location: OATS1

Test distance: 3 metres

5.4.2 Photo documentation of the test set-up

5.4.3 Description of Measurement

Spurious emissions from the EuT are measured in the frequency range of 30 MHz to 10 times the highest used frequency using a tuned receiver and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection. Table top equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Interface cables that are closer than 40 centimetres to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimetres from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. The antenna was positioned 3, 10 or 30 meters horizontally from the EuT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarization`s and the EuT are rotated 360 degrees.

The final level, expressed in dBµV/m, is arrived by taking the reading from the EMI receiver (Level dBµV) and adding the correction factors and cable loss factor (Factor dB) to it. This is done automatically in the EMI receiver, where the correction factors are stored. This result then has the FCC or CISPR limit subtracted from it to provide the Delta which gives the tabular data as shown in the data sheets at page.

Example:

Frequency (MHz)	Level (dBµV)	+	Factor (dB)	=	Level (dBµV/m)	Limit (dBµV/m)	=	Delta (dB)
719	75	+	32.6	=	107.6	110	=	-2.4

5.4.4 Test result

Frequency [MHz]	L: PK [dBµV]	L: AV [dBµV]	L: QP [dBµV]	Correct. [dB]	L: PK [dBµV/m]	L: AV [dBµV/m]	L: QP [dBµV/m]	Limit [dBµV/m]	Delta [dB]
41.68	-	-	17.0	13.0	-	-	30.0	40.0	10.0
57.32	-	-	26.3	11.8	-	-	38.1	40.0	1.9
60.38	-	-	27.0	11.3	-	-	38.3	40.0	1.7
73.03	-	-	19.3	10.8	-	-	30.1	40.0	9.9
178.06	-	-	19.2	14.6	-	-	33.8	43.5	9.7
200.02	-	-	24.9	13.8	-	-	38.7	43.5	4.8
200.60	-	-	21.6	13.8	-	-	35.4	43.5	8.1
202.80	-	-	19.9	13.9	-	-	33.8	43.5	9.7
311.09	-	-	18.3	14.9	-	-	35.9	46.0	10.1
337.50	-	-	20.2	18.1	-	-	38.3	46.0	7.7

Limit according to FCC Part 15 Subpart 15.209(a)

Frequency (MHz)	Field strength of spurious emissions		Measurement distance (meters)
	(µV/m)	dB (µV/m)	
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
960-1000	500	54	3

The requirements are **FULFILLED.**

Remarks: _____

_____

_____

_____

5.5 Emission Bandwidth

For test instruments and accessories used see section 6 Part **MB**.

5.5.1 Description of the test location

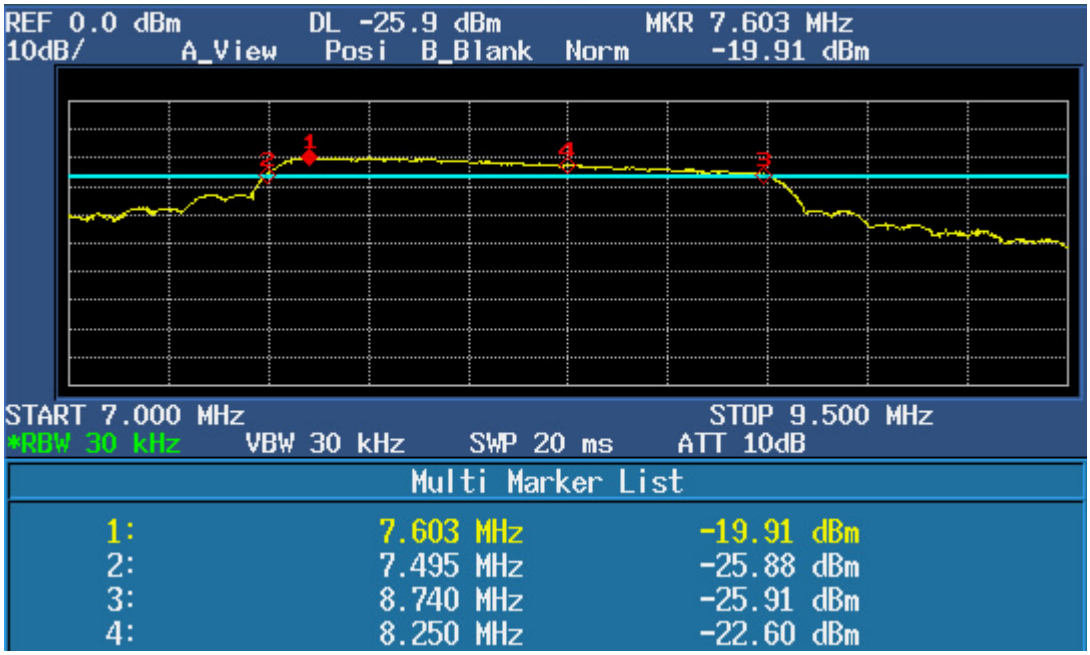
Test location: AREA4

5.5.2 Test result

Max Peak [MHz]	6dB Bandwidth F1 [MHz]	6dB Bandwidth F2 [MHz]	Measured Bandwidth [MHz]
7.603	7.495	8.740	1.245

5.5.3 Test protocol

Emission Bandwidth
FCC Part 15 Subpart 15.223(a)



5.6 Correction for Pulse Operation (Duty Cycle) Subpart 15.35(c)

For test instruments and accessories used see section 6 Part **DC**.

5.6.1 Description of the test location

Test location: AREA4

5.6.2 Test result

The Duty cycle factor, expressed in dB, is arrived by taking the following formula:

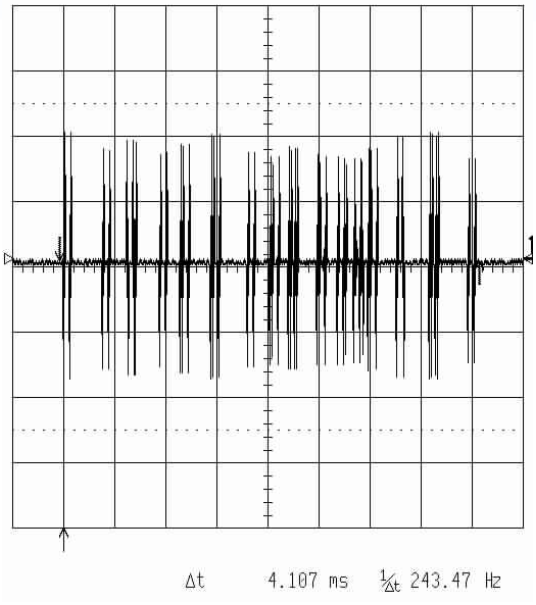
$K_E = 20 \log [(t_{iB} * p)/T_w]$

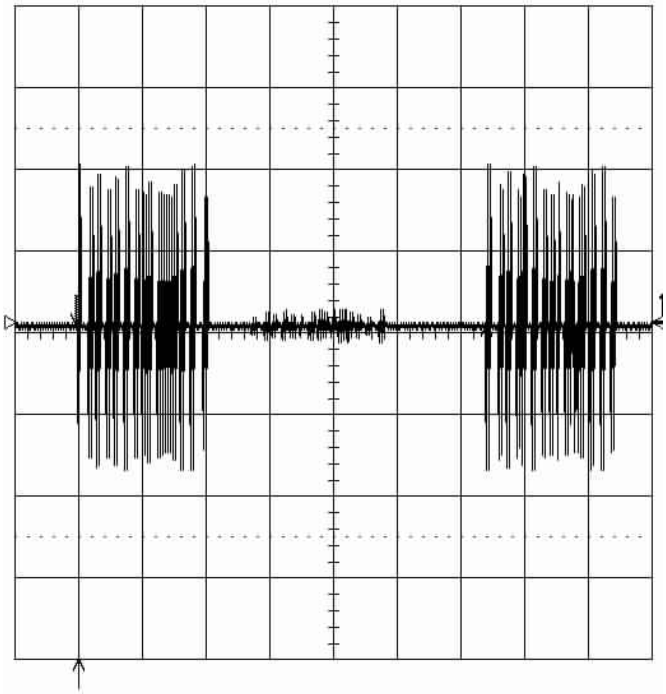
K_E: pulse operation correction factor [dB]
t_{iw} pulse duration for one complete pulse track [msec]
t_{iB} pulse duration for one pulse [µsec]
T_w a period of the pulse track [msec]
p number of pulses in one train

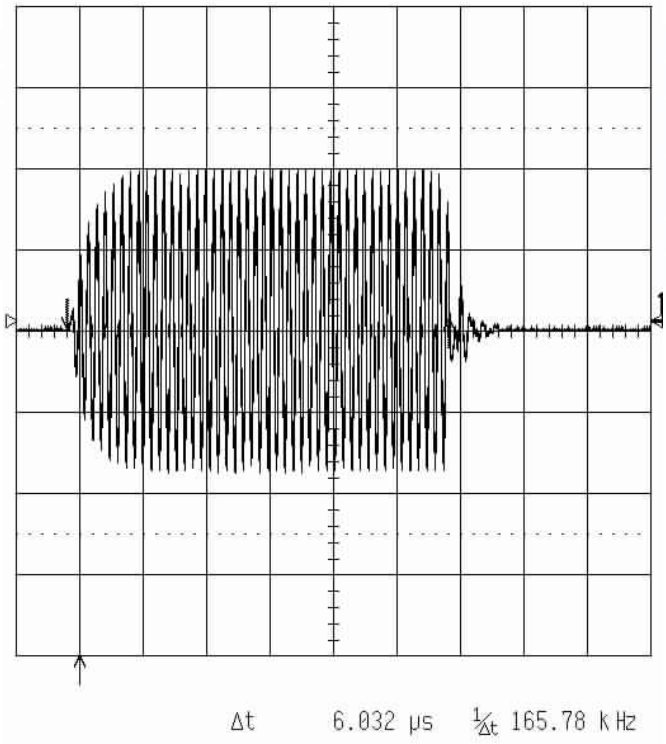
t_{iw} [msec]	T_w [msec]	t_{iB} [µsec]	p	K_E [dB / %]
4.107	12.879	6.032	64	-30.46 / 2.99

Remarks: For detailed results, please see the test protocol below.

5.6.3 Test protocol




Δt 12.879 ms 1/Δt 77.644 Hz


Δt 6.032 µs 1/Δt 165.78 kHz

6 USED TEST EQUIPMENT AND ACCESSORIES

Beginning of Testing: 01. February 2005
End of Testing: 10. February 2005

Test ID	Model Type	Kind of Equipment	Manufacturer	Equipment No.
A4	ESH 2 - Z 5	LISN	Rohde & Schwarz GmbH & Co	04-07/60-03-078
	ESH 3 - Z 2	Pulse Limiter	Rohde & Schwarz GmbH & Co	04-07/60-03-079
	N2000N	RF Cable	Huber + Suhner	04-07/60-04-004
	N4000BNC	RF Cable	Huber + Suhner	04-07/60-04-005
	ESHS 30	Test Receiver	Rohde & Schwarz GmbH & Co	04-07/63-04-002
CPR1	NW-2000-NB	RF Cable	MBPS GmbH	04-07/60-04-205
	ESIB 40	Test Receiver	Rohde & Schwarz GmbH & Co	04-07/63-03-002
	FMZB 1516	Magnetic Field Antenna	Schwarzbeck Mess-Elektronik	99-07/62-03-004
DC	9350	Storage Oscilloscope	LeCroy Europe GmbH	04-07/38-94-054
MB	Tektronix THS 730A	Handheld Scope	Tektronix GmbH	04-07/38-02-001
	HM-8142	Power Supply	Conrad Elektronic GmbH	04-07/49-99-002
	HZ-10	Magnetic Field Antenna	Rohde & Schwarz GmbH & Co	04-07/62-95-320
	R 3162	Spectrum Analyzer	Advantest	04-07/74-00-001
	VLK 04/300	Climatic Chamber	Heraeus -Vötsch GmbH	04-10/90-89-001
SER1	NW-2000-NB	RF Cable	MBPS GmbH	04-07/60-04-205
	ESIB 40	Test Receiver	Rohde & Schwarz GmbH & Co	04-07/63-03-002
	FMZB 1516	Magnetic Field Antenna	Schwarzbeck Mess-Elektronik	99-07/62-03-004
SER2	Sucofeed 7/8	RF Cable	Huber + Suhner	04-07/60-04-089
	NW-2000-NB	RF Cable	MBPS GmbH	04-07/60-04-205
	EF393-21N-15m	RF Cable	Huber + Suhner	04-07/60-04-258
	VULB 9165	Super Broadband Antenn	Schwarzbeck Mess-Elektronik	04-07/62-00-001
	ESVS 30	Test Receiver	Rohde & Schwarz GmbH & Co	04-07/63-04-001