TUV Rheinland of North America, Inc.
12 Commerce Road, Newtown, CT 06470
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Report of Measurements
for
Comtactless Card Access Device
Model T6186A
Applicant:
Motorola

Report of Measurements
by
TUV Rheinland of North America, Inc.
12 Commerce Road
Newtown, CT 06470

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TIMOTHY M. DWYER
Senior Specialist, EMC

Date of Test: 25 May -24 June 1999 November 1998
Date of Report: 3 July 1999

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Test Report Number: P91419.01 Prübericht Nr.			**Test Report Summary**	
Applicant: Auftraggeber	**Motorola Inc** **1301 East Algonquin Rd** **Schaumburg, IL 60196**		Tel: (847) 538-0764 Fax: (847) 538-5090	
Type of Equipment: Gegenstand der Prüfung	**Contactless Card Access Device**			
Model Number: Bezeichnung:	**T6186A**		**Trademark:** Ursprungszeichen	Motorola ®
Standards: Prufgrundlage			**Dates of Test:**	25 May - 24 June 1999
Standard Number	Description	Criteria	Minimum Acceptable Performance Criteria	Summary Result
FCC Part 15 Subpart B	Unlicensed Low Power Transmitters. Operation Within the Band 13.553-13.567 MHz.	Sections 15.225 and 15.209	NA	Complies
Place of Test: Prüfort	TUV Rheinland of North America, 12 Commerce Road, Newtown, CT 06470 USA E-mail: info-new@tuv.com Web: http://www.tuv.com Phone: (203) 426-0888 Fax: (203) 270-8883		NVLAP	Accredited by the National Voluntary Laboratory Accreditation Program for FCC Part 15 and CISPR 22 under Lab Code 200111
Test Result: Prüfergebnis	The unit presented for testing complied with criteria shown above. Additional Information is contained in the following pages.			
Tested By: Der Sachverständige	**Timothy M. Dwyer**		**Checked By:** geprüft	**Bruce Fagley**
_____ **Date, Signature** Datum, Unterschrift			_____ **Date, Signature** Datum, Unterschrift	

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1. General

1.1 Equipment Tested

Contactless Card Access Device
MODEL T6186A

1.2 Applicant/Manufacturer

Motorola Inc
1301 East Algonquin Rd
Schaumburg, IL 60196

1.3 FCCID: *ABZ89FT7601*

1.4 Description

The T6186A Contactless Card Access Device is a fixed terminal device that provides communications with SmartCards when the SmartCard is placed in its proximity. Communication between the two devices is established via a
low power transmitter operating at 13.56 MHz

1.4.1 Physical:

The T6186A consists of two circuit boards approximately 10.3 x 6.7 cm mounted approximately 2.5 cm apart on 4 metal standoffs. The first circuit board contains the logic and RF circuits. The second circuit board contains an antenna.

1.4.2 Functional:

Refer to the Operational Description and Block Diagram provided as exhibits with the FCC filing.

1.4.3 Electrical and EMC Related:

The T6186 is intended to be used as a component of a larger unit and in final operation will be installed in an enclosure with other devices. It is understood that the final equipment configuration will require certification by FCC additional and separate from this submittal. The purpose of this filing is to obtain a grant of approval for the T6186 as a discrete component.

1.5 Description of Circuit Function

Refer to the Operational Description and Block Diagram provided as exhibits with the FCC filing.

1.6 Block Diagram Showing Oscillators

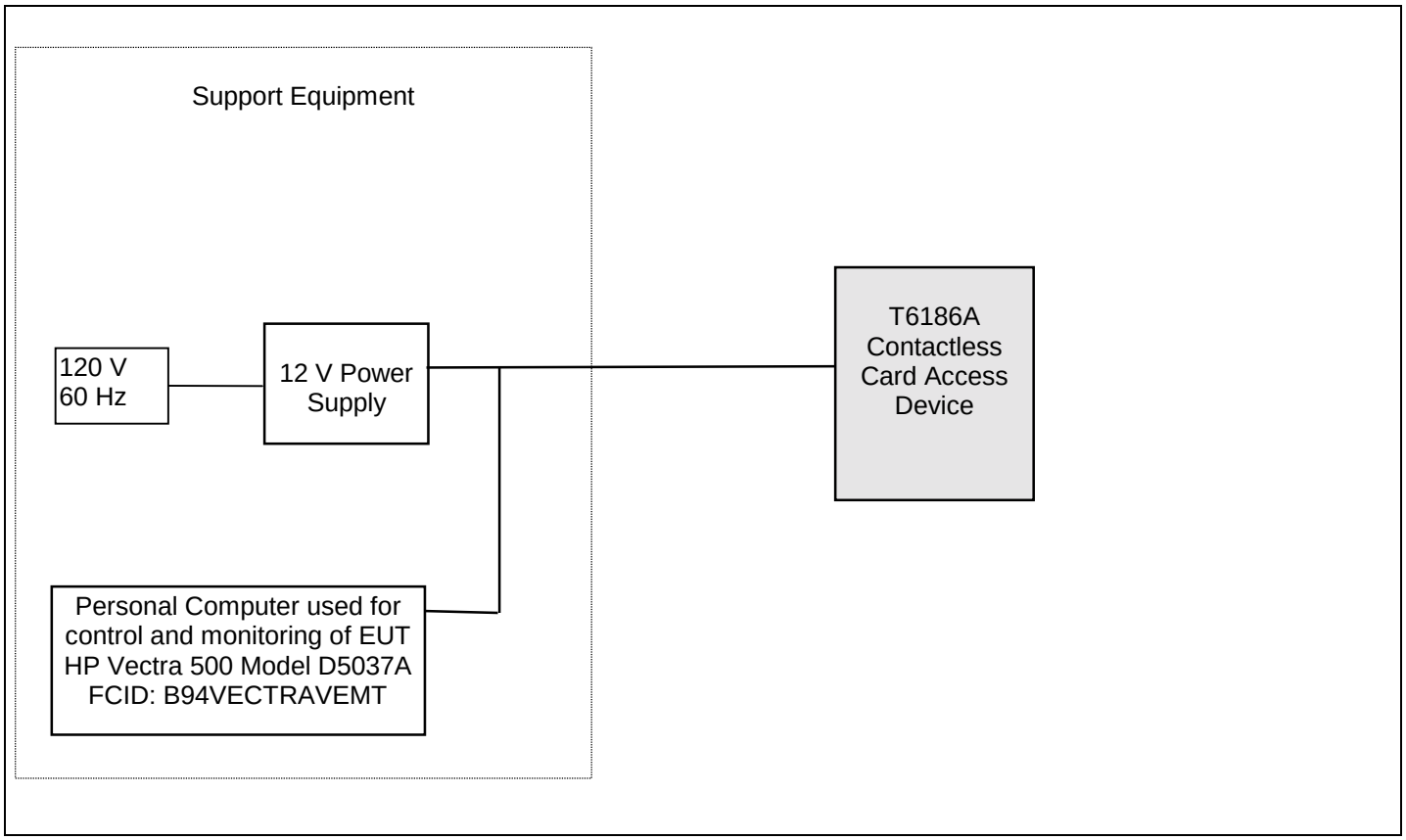
Refer to the Block Diagram provided as an exhibit with the FCC filing.

2. Measurement Equipment Used

Equipment	Frequency Range of Measurements Performed	Manufacturer and Model	Calibration Last
EMI Receiver	450 - 4500 MHz	HP8546A	Jun 99
EMC Spectrum Analyzer	13.56 MHz (used for temperature variation test only)	HP8593EM	Jul 98
Rod Antenna	50 Hz-50 MHz	EMCO 3301B	Dec 98
Antenna, Biconical	30-300 MHz	Schwarzbeck VHBB9124	Sep 98
Antenna, Log Periodic	300-1000 MHz	EMCO	Sep 98

3. Report of Measurements

3.1 Test Configuration Block Diagram



3.2 Radiated Emissions

3.2.1 MODE OF OPERATION:

The T6186 A was enabled and monitored using the FCCTEST.EXE program provided by the applicant. The program enabled the transmitter in a continuous mode at maximum output power for the tests.

3.2.2 PROCEDURE:

Preliminary radiated measurements were made at a distance of 3 meters in a semi-anechoic chamber. The preliminary plots are included in the test data section.

Final radiated measurements were performed on an Open Area Test Site (OATS) at measurement a distance of 3 meters.

Radiated emissions measurements were performed using the ANSI C63.4-1992 measurement procedures as specified in paragraph 15.31(a)(6).

Frequency Range:	13.56 - 1000 MHz	
Detector:	Peak, Quasi Peak and Average	
Measurement bandwidth:		
For measurements below 30 Mhz	Peak	9 kHz
	QP	9 kHz
	Average	30 kHz
For measurements above 30 Mhz:	Peak	120 kHz
	QP	120 kHz
	Average	300 kHz

For measurements at the frequency of operation (13.56 MHz) measurements were performed with the above bandwidths and also at two narrower bandwidths (3 kHz and 1 kHz) in order to demonstrate that the emissions were narrowband and contained within the range from 13.553-13.567 MHz. Quasi-peak and average measurements repeated using the three bandwidths yielded results within 0.5 dB.

Preliminary measurements were made both with the EUT powered but prior to starting the program and after starting the program. Emissions at the frequency of operation and harmonics were slightly higher after starting the program, but emissions at other frequencies were unaffected.

3.2.3 CRITERIA

3.2.4 MEASUREMENT DATA

Tables and plots of the measurements are at section 7.

3.2.4.1 Measurements at frequency of operation

The radiated emission at the frequency of operation of the T6186A was 74.5 dBµV/m QP. This was below the 10,000 µV/m (80 dBµV/m) limit specified in section 15.225 for the frequency of operation (13.56 MHz) Measurements were performed on the OATS at a distance of 3 meters with no adjustment to the limits or measured data due to measurements at a closer distance. The antenna factor for the EMCO 3301B at 13.56 MHz is 5.1 dB and has already been included in the measured results. Cable loss at this frequency is negligible.

3.2.4.2 Measurements at second harmonic

The second harmonic radiated emission at 27.12 MHz was measured at a level of 33.6 dBµV/m at a distance of 3 meters. The 15.209 specified measurement distance for this frequency is 30 meters with a limit of 29.5 dBµV/m. Measurements were made at 3 meters. 15. 31(f)(2) allows a factor of 40 dB to be applied, effectively increasing the limit to 59.5 dBµV/m for 3 meter measurements. The second harmonic emission is below this extrapolated limit by 25.9 dB. The antenna factor for the EMCO 3301B at 27.12 MHz is 6.4 dB and has already been included in the measured results. Cable loss at this frequency is negligible.

3.2.4.3 Measurements at other frequencies

Emissions at and above 30 MHz are shown in the table and plots at section 6. Antenna + cable factors are included in the measurements but are shown in also in a separate column for information. The least margin emission was 30.17 dBµV/m at 40.676 MHz (third harmonic) compared with a limit of 40 dBµV/m.

3.2.5 CALCULATION

Measured Level (dBµV) + Cable Loss (dB)+ Antenna Factor dB = Field Strength (dBµV/m)

3.2.6 RESULT

Radiated emissions from the T6186A were below the limits set forth in sections 15.209 and 15.225.

4. Frequency Variation vs. Temperature

The T6186 was conditioned in an environmental chamber over a range from -20°C to +50°C allowing enough time at each temperature for the frequency to stabilize. The resultant frequency variation was < 0.0002%, well within the ±0.01% specification of 15.225(c) as shown in the table at section 7.

5. Frequency Variation vs. Supply Voltage

The T6186 was operated while the supply voltage was varied over a range from 85% to 115% of the nominal supply voltage of 12 V. No frequency variation was observed. A plot showing the output with supply voltages of 10..2, 12.0 and 13.8 V is at section 7.

6. Modifications to Equipment Tested

No modifications of any kind were made either to the T6186A or to support equipment used for this test. All equipment was tested as received.