

EMI – TEST REPORT

- FCC Part 15.209, RSS-Gen-

Type / Model Name : Minda Immo641

Product Description : Immobilizer System

Applicant : KTM AG

Address : Stallhofnerstraße 3

5230 Mattighofen

AUSTRIA

Manufacturer : Minda Corporation Limited

Address : D6-11, Sector-59,

Noida – 201301

Distt. G.B. Nagar U.P.

INDIA

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

POSITIVE

Test Report No. : T43089-00-05JP

06. February 2018

Date of issue



Deutsche
Akkreditierungsstelle
D-PL-12030-01-01
D-PL-12030-01-02

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.

Contents

1	<u>TEST STANDARDS</u>	<u>3</u>
3	<u>TEST RESULT SUMMARY</u>	<u>5</u>
3.1	Test result summary	5
3.2	Final assessment	5
4	<u>TEST ENVIRONMENT</u>	<u>6</u>
4.1	Address of the test laboratory	6
4.2	Environmental conditions	6
4.3	Statement of the measurement uncertainty	6
4.4	Measurement protocol for FCC/ISED	7
5	<u>TEST CONDITIONS AND RESULTS</u>	<u>9</u>
5.1	Field strength of the fundamental wave	9
5.2	Radiated emission	10
5.3	Emission bandwidth	12
6	<u>USED TEST EQUIPMENT AND ACCESSORIES</u>	<u>14</u>

1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 15, Subpart A - General (December, 2017)

FCC Rules and Regulations Part 15, Subpart C - Intentional Radiators (December, 2017)
Part 15, Subpart C, Section 15.207 Conducted limits

Part 15, Subpart C, Section 15.209 Radiated emission limits, general requirements

Part 15, Subpart C, Section 15.215 Additional provisions to the general radiated emission limitations

RSS-Gen Issue 4, November 2014 General Requirements and Information for the Certification of Radiocommunication Equipment

ANSI C63.10: 2013 Testing Unlicensed Wireless Devices

2 EQUIPMENT UNDER TEST

2.1 Photo documentation of the EUT

For detailed photos see T43089-00-02JP ATTACHMENT B

2.2 Short description of the equipment under test (EUT)

The EuT is an immobilizer system intended for usage in motor cycles. The operating frequency is 125 kHz. The system consists out of the RFID reader, antenna (integrated in the ignition lock) and the TAG (integrated in the vehicles key).

2.3 Variants of the EUT

none

2.4 Operation frequency

Operation frequency is 125 kHz.

2.5 Antenna

Antenna is integrated in the ignition lock.

2.6 Transmit operating modes

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

- continuous TAG reading

2.7 Power supply system utilised

Power supply voltage, V_{nom} : 12V DC (supplied by vehicles battery)

2.8 Peripheral devices and interface cables

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

- none Model : _____

2.9 Determination of worst case conditions for final measurement

Measurements have been made in all three orthogonal axes to find the worst case position. The measured values listed in this report indicates the highest measured values.

3 TEST RESULT SUMMARY

3.1 Test result summary

This report replaces the report T43089-00-02JP.

FCC Rule Part	RSS-Gen	Description	Result
15.207	Clause 8.8	AC power line conducted emissions	Not applicable ¹
15.209	Clause 8.9	Radiated emission limits	passed
15.215	Clause 6.6	Additional provisions (20dB and 99% Bandwidth)	No limit defined

¹Device is not AC supplied and intended for vehicular use.

3.2 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

Testing commenced on : 17 October 2017

Testing concluded on : 30 November 2017

Checked by:

Tested by:

Klaus Gegenfurtner
Teamleader Radio

Jürgen Pessinger

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

**CSA Group Bayern GmbH
Ohmstrasse 1-4
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. It is noted that the expanded measurement uncertainty corresponds to the measurement results from the standard measurement uncertainty multiplied by the coverage factor $k = 2$. The true value is located in the corresponding interval with a probability of 95 %. 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 quality system acc. to DIN EN ISO/IEC 17025. For all measurements shown in this report, the measurement uncertainty of the test laboratory, CSA Group Bayern GmbH, is below the measurement uncertainty as defined by CISPR. Therefore, no special measures must be taken into consideration with regard to the limits according to CISPR. 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.

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
AC Conducted Spurious Emissions	0.15 MHz to 30 MHz	95%	± 3.29 dB
20 dB Bandwidth	Center frequency of EuT	95%	$\pm 2.5 \times 10^{-7}$
99% Occupied Bandwidth	Center frequency of EuT	95%	$\pm 2.5 \times 10^{-7}$
Radiated Spurious Emissions	9 kHz to 30 MHz	95%	± 3.53 dB
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	± 3.71 dB
Radiated Spurious Emissions	1000 MHz to 10000 MHz	95%	± 2.34 dB
Peak conducted output power	Center frequency of EuT	95%	± 3.53 dB
Conducted Spurious Emissions	9 kHz to 10000 MHz	95%	± 2.15 dB

4.4 Measurement protocol for FCC/ISED

4.4.1 General information

4.4.1.1 Test methodology

Conducted and radiated disturbance testing is performed according to the procedures set out in ANSI C63.10.

The Open Area test site is listed under the Canadian Test-Site File-No:

IC 3009A-1

4.4.1.2 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 using the appropriate impedance characteristic or left unterminated. Where appropriate, cables are manually manipulated with respect to each other thus obtaining maximum disturbances from the unit.

4.4.2 Details of test procedures

4.4.2.1 General standard information

The test methods used comply with ANSI C63.10.

4.4.3 Conducted emission

4.4.3.1 Description of measurement

The final level, expressed in dB μ V, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the FCC or RSS limit.

To convert between dB μ V and μ V, the following conversions apply:

$$\begin{aligned} \text{dB}\mu\text{V} &= 20 \cdot \log(\mu\text{V}) \\ \mu\text{V} &= 10^{(\text{dB}\mu\text{V}/20)} \end{aligned}$$

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 50 Ω / 50 μ H (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimetres above the floor and is positioned 40 centimetres from the vertical ground plane (wall) of the screen room. If the minimum limit margin appears to be less than 20 dB with a peak mode measurement, the emissions are re-measured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

4.4.4 Radiated emission

4.4.4.1 Description of measurement

Spurious emission from the EUT is measured according to ANSI C63.10. Table top equipment is placed on a non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. The setup of the equipment under test is established in accordance with ANSI C63.10. To locate maximum emission from the test sample the EUT is rotated 360 degrees.

The final level in dB μ V/m is calculated by add the antenna correction factor and cable loss factor (dB) on the reading from the EMI receiver (dB μ V). The FCC or RSS limit is subtracted from this result in order to provide the delta to limit listed in the measurement protocol.

Example:

Frequency (MHz)	Reading level (dB μ V)	+	Correction Factor (dB/m)	=	Level (dB μ V/m)	-	CISPR Limit (dB μ V/m)	=	Delta (dB)
719.0	75.0	+	32.6	=	107.6	-	110.0	=	-2.4

5 TEST CONDITIONS AND RESULTS

5.1 Field strength of the fundamental wave

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

5.1.1 Description of the test location

Test location: OATS 1

Test distance: 3 m

5.1.2 Photo documentation of the test set-up

For test setup photos see T43089-00-05JP ATTACHMENT A

5.1.1 Applicable standard

FCC Part 15, Section 15.209 and RSS-Gen 8.9:

5.1.2 Description of Measurement

The measurements are performed following the procedures set out in ANSI C63.10.

The resolution bandwidth during the measurement is as follows:

9 kHz – 150 kHz: RBW: 200 Hz

150 kHz – 30 MHz: RBW: 9 kHz

5.1.3 Test result

The measurement was performed on a test distance of 3m. The result was extrapolated to 300m distance by subtracting the factor 40 dB/decade.

f (kHz)	Level Pk@3m (dBμV)	Ant. factor (dB/m)	Field strength Pk@3m dB(μV/m)	Distance corr. 3m to 300m (dB)	Corrected level Pk@300m dB(μV/m)	Limit AV@300m dB(μV/m)	Delta (dB)
125	50.3	20	70.3	-80	-9.7	25.6	-35.3

Limit according to FCC Part 15, Section 15.209 and RSS-Gen 8.9 Table 5:

Frequency (MHz)	Field strength		Measurement distance (metres)
	(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	30	29.5	30

The requirements are **FULFILLED**.

Remarks: Peak level is below the average limit; therefore no average measurement was performed.

--

5.2 Radiated emission

For test instruments and accessories used see section 6 Part **SER 1** and **SER 2**.

5.2.1 Description of the test location

Test location: OATS 1

Test distance: 3 m

5.2.2 Photo documentation of the test setup

For test setup photos see T43089-00-05JP ATTACHMENT A

5.2.3 Applicable standard

FCC Part 15, Section 15.209 and RSS-Gen 8.9:

5.2.4 Description of Measurement

The measurements are performed following the procedures set out in ANSI C63.10.

The resolution bandwidth during the measurement is as follows:

9 kHz – 150 kHz: RBW: 200 Hz
 150 kHz – 30 MHz: RBW: 9 kHz
 30 MHz – 1000 MHz: RBW: 120 kHz

5.2.5 Test result <30MHz

f (kHz)	Level Pk@3m (dBμV)	Ant. factor (dB/m)	Field strength Pk@3m dB(μV/m)	Distance corr. 3m to 300m (dB)	Corrected level Pk@300m dB(μV/m)	Limit AV@300m dB(μV/m)	Delta (dB)
250	34.1	20	54.1	-80	-25.9	19.6	-45.5
375	30.4	20	50.4	-80	-29.6	16.1	-45.7

NOTE: If the measured PK level is below the AV limit, no AV measurement was performed

5.2.6 Test result 30 MHz < f < 1 GHz

Frequency (MHz)	Reading Vert. (dBμV)	Reading Hor. (dBμV)	Correct. Vert. (dB)	Correct. Hor. (dB)	Level Vert. (dBμV/m)	Level Hor. (dBμV/m)	Limit (dBμV/m)	Dlimit (dB)
40,00*	-3,4	-5,9	15,2	15,2	11,8	9,3	40,0	-28,2
125,00*	-2,5	-5,3	11,7	11,7	9,2	6,4	43,5	-34,3
250,00*	-5,2	-5,5	15,2	15,2	10,0	9,7	46,0	-36,0

*Ambient noise, no emissions from the EuT could be detected above 20dBμV/m

Limit according to FCC Part 15, Section 15.209 and RSS-Gen 8.9 Tables 4 and 5:

Frequency (MHz)	Field strength		Measurement distance (metres)
	($\mu\text{V/m}$)	$\text{dB}(\mu\text{V/m})$	
0.009-0.490	2400/F(kHz)	--	300
0.490-1.705	24000/F (kHz)	--	30
1.705-30.0	30	29.5	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

The requirements are **FULFILLED**.

Remarks: The measurement was performed in the frequency range from 9kHz to 1000MHz.

--

5.3 Emission bandwidth

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

5.3.1 Description of the test location

Test location: AREA4

5.3.2 Photo documentation of the test set-up

For test setup photos see T43089-00-05JP ATTACHMENT A

5.3.3 Applicable standard

FCC Part 15, Section 15.215 and RSS-Gen 6.6:

5.3.4 Description of Measurement

Spectrum analyser settings:

RBW: 1 kHz, VBW: 3 kHz, Span: 100 kHz, Trace mode: max. hold, Detector: max. peak;

5.3.5 Test result

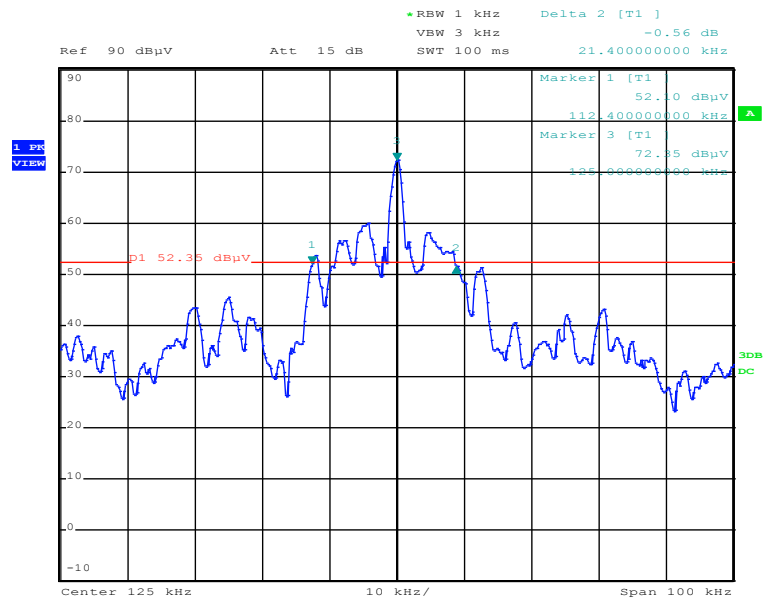
Operating frequency [kHz]	20dB Bandwidth [kHz]	99% Bandwidth [kHz]
125	21.4	37.2

Remarks: No limit defined

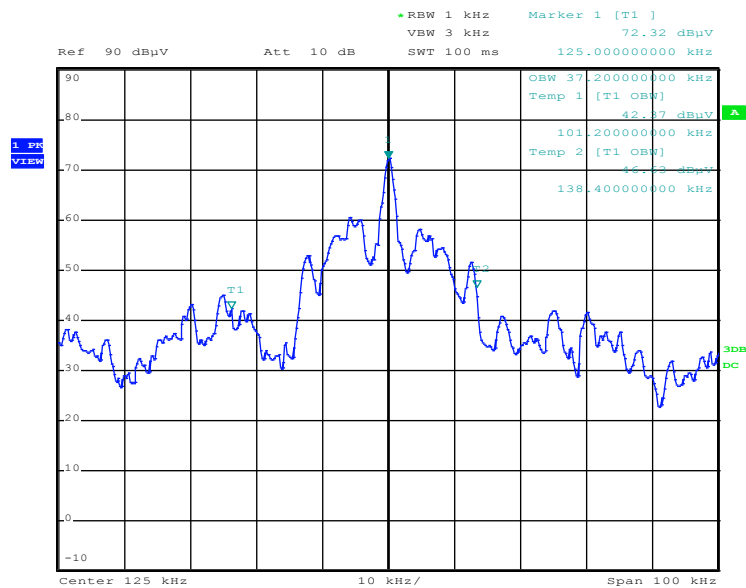
--

5.3.6 Test protocol

20dB Bandwidth



99% Bandwidth



6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used are calibrated and verified regularly. The calibration history is available on request.

Test ID	Model Type	Equipment No.	Next Calib.	Last Calib.	Next Verif.	Last Verif.
CPR 1	ESCI 7	01-02/03-11-001	27/03/2018	27/03/2017		
	HFH 2 - Z 2	02-02/24-15-001	23/03/2018	23/03/2017		
	KK-EF393-21N-16	02-02/50-05-033				
	NW-2000-NB	02-02/50-05-113				
	KK-SD_7/8-2X21N-33,0M	02-02/50-15-028				
MB	ESCI 7	01-02/03-11-001	27/03/2018	27/03/2017		
	HZ-10	02-02/24-05-012	15/11/2018	15/11/2017		
	WK-340/40	02-02/45-05-001	13/04/2018	13/04/2017		
	6543A	02-02/50-05-157				
SER 1	ESCI 7	01-02/03-11-001	27/03/2018	27/03/2017		
	HFH 2 - Z 2	02-02/24-15-001	23/03/2018	23/03/2017		
	KK-EF393-21N-16	02-02/50-05-033				
	NW-2000-NB	02-02/50-05-113				
	KK-SD_7/8-2X21N-33,0M	02-02/50-15-028				
SER 2	ESVS 30	02-02/03-05-006	03/07/2018	03/07/2017		
	VULB 9168	02-02/24-05-005	12/04/2018	12/04/2017	28/03/2018	28/09/2017
	NW-2000-NB	02-02/50-05-113				
	KK-EF393/U-16N-21N20 m	02-02/50-12-018				
	KK-SD_7/8-2X21N-33,0M	02-02/50-15-028				