FCC ID:MYT4073A

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. :	**T24890-01-02XF**	August 03, 2004 Date of issue

Type / Model : 8E0 837 22A, 8E0 837 22C

Model Description : Transmitter of a keyless entry system for automobiles

Applicant : Conti Temic microelectronic GmbH

Address : Ringlerstraße 17

D-85057 Ingolstadt

Manufacturer : Temic Automotive (Phils.), Inc.

Address : Temic Building, Bagsakan Rd., FTI-Estate

1630 Taguig, Metro Manila, Philippines

Licence holder : Conti Temic microelectronic GmbH

Address : Ringlerstraße 17

D-85057 Ingolstadt

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

MIKES BABT Product Service GmbH · Ohmstrasse 2-4 · D-94342 Strasskirchen · Tel.:+49 9424-9407-0 · Fax:+49 9424-9407-60

Contents

1 TEST STANDARDS

The tests were performed according to following standards:

- Part 15 Subpart C (15.231)	Radio Frequency Devices Subpart C for intentional Radiators operating periodic in the band 40.66-40.70MHz and above 70MHz

MIKES BABT Product Service GmbH · Ohmstrasse 2-4 · D-94342 Strasskirchen · Tel.:+49 9424-9407-0 · Fax:+49 9424-9407-60

SUMMARY

GENERAL REMARKS:

All spurious emissions not mentioned in this test report are
from 25-1000MHz: <-65dBm
above 1000MHz: <-60dBm

FINAL ASSESSMENT:

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

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

Testing commenced on : August 01, 2004

Testing concluded on : August 02, 2004

Checked by:

Günter Mikes
Dipl. Ing.(FH)

Tested by:

Xaver Fischer

MIKES BABT Product Service GmbH · Ohmstrasse 2-4 · D-94342 Strasskirchen · Tel.:+49 9424-9407-0 · Fax:+49 9424-9407-60

2 EQUIPMENT UNDER TEST

2.1 Photo documentation of the EuT

Transmitter of a keyless entry system for automobiles

T 24890-01-02XF

External Photo
Front view

FCC ID:MYT4073A

Transmitter of a keyless entry system for automobiles

T 24890-01-02XF

External Photo
Rear view

MIKES BABT Product Service GmbH · Ohmstrasse 2-4 · D-94342 Strasskirchen · Tel.:+49 9424-9407-0 · Fax:+49 9424-9407-60

Transmitter of a keyless entry system for automobiles

T 24890-01-02XF

External Photo
Side view of open key shaft

MIKES BABT Product Service GmbH · Ohmstrasse 2-4 · D-94342 Strasskirchen · Tel.:+49 9424-9407-0 · Fax:+49 9424-9407-60

Transmitter of a keyless entry system for automobiles

T 24890-01-02XF

External Photo
Rear view of open battery cover

MIKES BABT Product Service GmbH · Ohmstrasse 2-4 · D-94342 Strasskirchen · Tel.:+49 9424-9407-0 · Fax:+49 9424-9407-60

FCC ID:MYT4073A

Transmitter of a keyless entry system for automobiles

T 24890-01-02XF

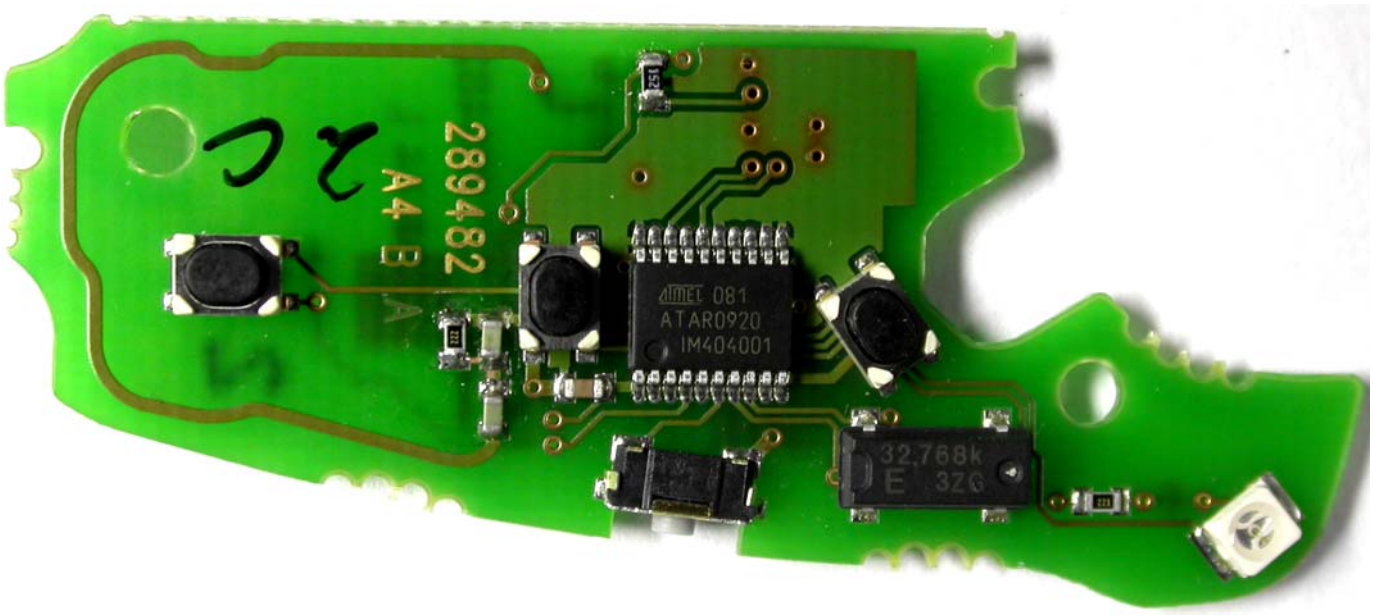
Internal Photo
Open view

MIKES BABT Product Service GmbH · Ohmstrasse 2-4 · D-94342 Strasskirchen · Tel.:+49 9424-9407-0 · Fax:+49 9424-9407-60

Transmitter of a keyless entry system for automobiles

T 24890-01-02XF

Internal Photo
Front view PCB

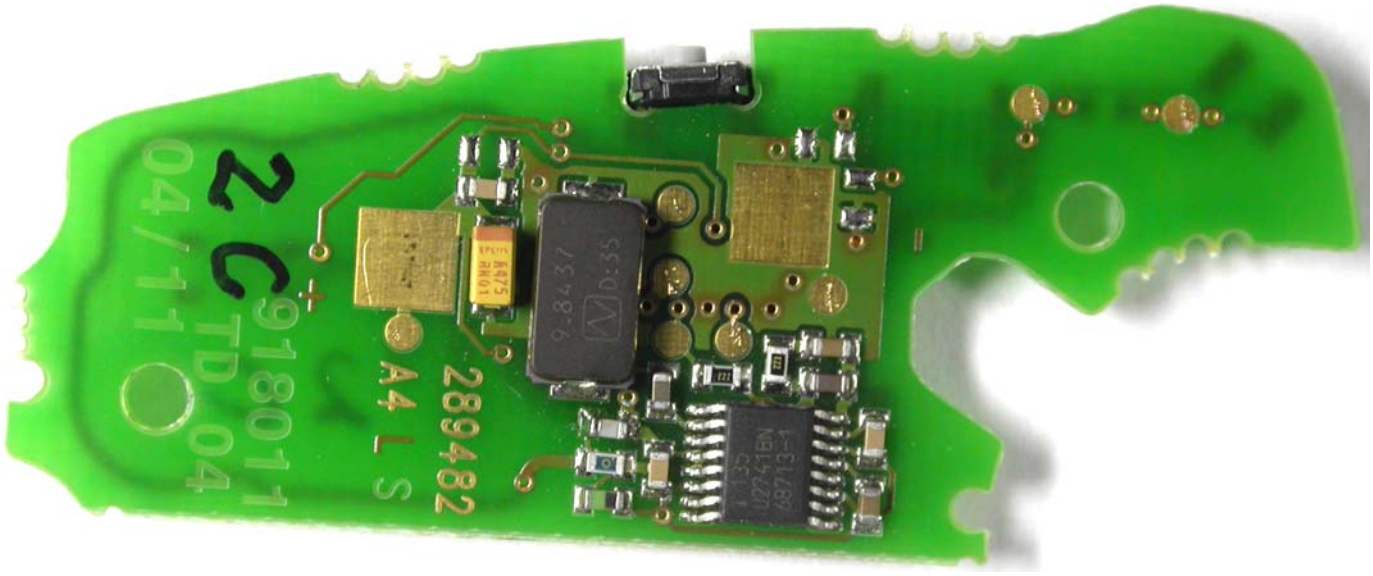


MIKES BABT Product Service GmbH · Ohmstrasse 2-4 · D-94342 Strasskirchen · Tel.:+49 9424-9407-0 · Fax:+49 9424-9407-60

Transmitter of a keyless entry system for automobiles

T 24890-01-02XF

Internal Photo
Rear view PCB



MIKES BABT Product Service GmbH · Ohmstrasse 2-4 · D-94342 Strasskirchen · Tel.:+49 9424-9407-0 · Fax:+49 9424-9407-60

2.2 Power supply system utilised

Power supply voltage : 3V DC

2.3 Short description of the Equipment under Test (EuT)

The EuT is a transmitter of a keyless entry system for vehicles.

Number of tested samples:	1 / USA 315 MHz		
Serial number:	USA 315 MHz with Panic button,	8E0 837 220 A,	00004073A2
	RDW 315 MHz without Panic button,	8E0 837 220 C,	00004067A2

EuT operation mode:

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

- Transmitting mode continuously

- Transmitting mode with normal modulation

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:

- _____ Model : _____
- _____ Model : _____
- _____ Model : _____
- _____ Model : _____
- _____ Model : _____
- _____ Model : _____

3 TEST ENVIRONMENT

3.1 Address of the test laboratory

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

3.2 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

3.3 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.

3.4 Measurement Protocol for FCC, VCCI and AUSTEL

3.4.1 GENERAL INFORMATION

3.4.1.1 Test Methodology

Conducted and radiated disturbance testing is performed according to the procedures in International Special Committee on Radio Interference (CISPR) Publication 22 (1993), 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 (1993). 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 C63.4-1992 procedures and using the CISPR 22 Limits.

3.4.1.2 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.

3.4.1.3 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.

3.4.2 CONDUCTED DISTURBANCE

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 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)

3.4.3 RADIATED DISTURBANCE

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 is done automatically in the EMI receiver, where the correction factor are stored. This result then has the CISPR limit subtracted from it to provide the Delta which gives the tabular data as shown in the data sheets in section 4.2. The CISPR 22 limit is equivalent to the Australian AS 3548 limit.

Example:

Frequency (MHz)	Level (dBμV)	+	Factor (dB)	=	Final (dBμV/m)	-	Limit (dBμV/m)	=	Delta CISPR B (dB)
37.19	10.2	+	12.0	=	22.2	-	40.0		-17.8

3.4.4 DETAILS OF TEST PROCEDURES

3.4.4.1 General Standard Information

The test methods used comply with CISPR Publication 22 (1993), EN 55022 (1987) and AS 3548 (1992) - "Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment" and with ANSI C63.4-1992 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz."

3.4.4.2 Conducted disturbance

Conducted disturbance 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 centimetres above the floor and is positioned 40 centimetres 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.

3.4.4.3 Radiated disturbance

Radiated disturbance from the EUT are measured in the frequency range of 30 to 1000 MHz 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 and measurements above 1000 MHz are made with a 1 MHz/6 dB bandwidth and average 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 polarizations and the EUT are rotated 360 degrees.

4 TEST CONDITIONS AND RESULTS

4.1 Conducted disturbance (Subpart 15.207)

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

4.1.1 Description of the test location

Test location:

4.1.2 Photo documentation of the test set-up

4.1.3 Test result

Frequency range:

Min. limit margin

The requirements are **FULFILLED.**

Remarks: The measurement is not applicable because the EuT is battery powered.

4.2 Radiated Power of the fundamental wave Subpart 15.231(b)

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

4.2.1 Description of the test location

Test location: OATS1

Test distance: 3m

4.2.2 Photo documentation of the test set-up

4.2.3 Test result

Rated output power level (maximum) 75,6 dBµV

Polarisation of the measurement for the larger receiver level Horizontal

Frequency [MHz]	L: QP [dBµV]	L: AV [dBµV]	Bandwidth [kHz]	Correct. [dB]	L: QP [dBµV/m]	L: AV [dBµV/m]	Limit [dBµV/m]	Delta [dB]
315,0	57,9	53,3	120,0	17,7	75,6	71,0	75,6	0,0

Limit according to FCC Subpart 15.231(b)

Frequency (MHz)	Fieldstrength of fundamental		Fieldstrength of spurious emissions	
	(µV/m)	dB (µV/m)	(µV/m)	dB (µV/m)
40,66 – 40,70	2250	67	225	47
70 - 130	1250	62	125	42
130 - 174	1250 to 3750*	62 to 71,4	125 to 375*	42 to 51,4
174 - 260	3750	71,4	375	51,4
260 - 470	3750 to 12500*	71,4 to 81,9	375 to 1250*	51,4 to 61,9
Above 470	12500	81,9	1250	61,9

*Linear interpolations

The requirements are **FULFILLED.**

Remarks: The limits are met.

4.3 Radiated emissions (electric field) 30 MHz - 4 GHz Subpart 15.231(b)

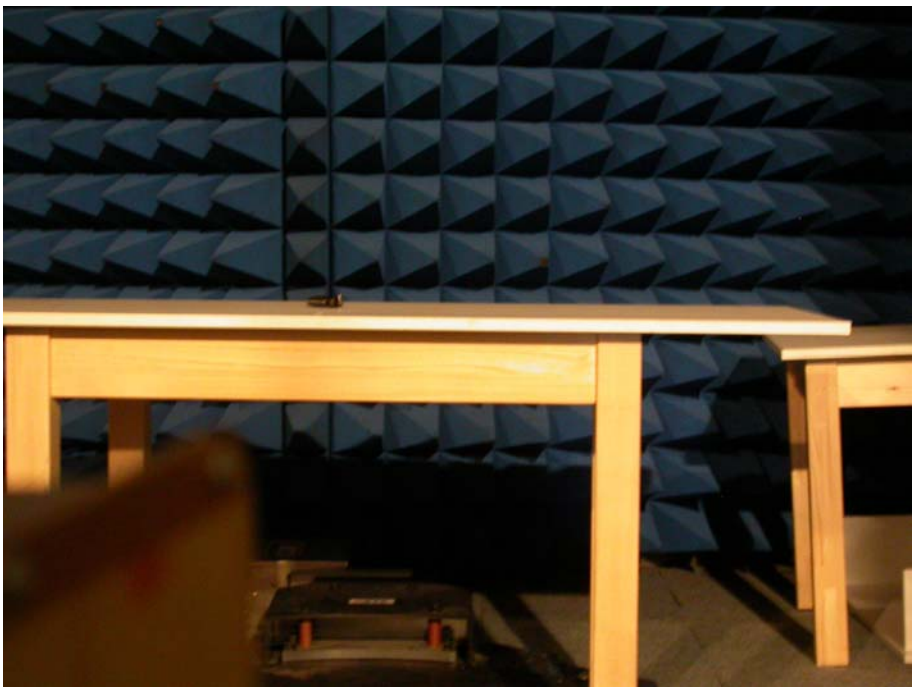
For test instruments and accessories used see section 6 Part **SER2** and **SER3**.

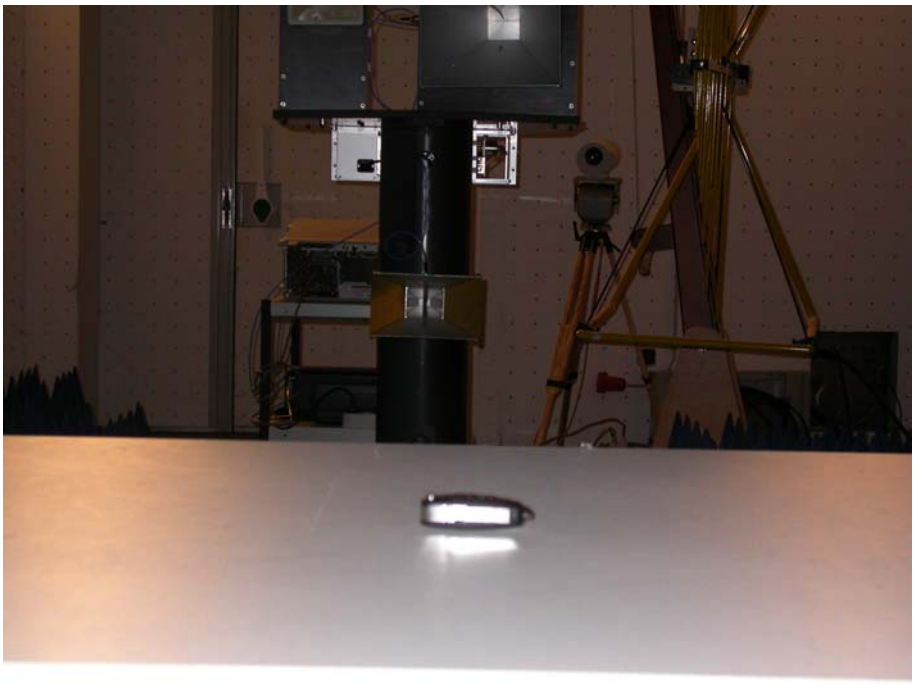
4.3.1 Description of the test location

Test location: OATS1
Anechoic Chamber A2

Test distance: 3m

4.3.2 Photo documentation of the test set-up





4.3.3 Test result <1GHz

Frequency [MHz]	L: QP [dBµV]	L: AV [dBµV]	Bandwidth [kHz]	Correct. [dB]	L: QP [dBµV/m]	L: AV [dBµV/m]	Limit [dBµV/m]	Delta [dB]
630,0	12,5	7,5	120	24,6	37,1	32,1	55,6	-18,5

4.3.4 Test result >1GHz

Frequency [MHz]	L: PK [dBµV]	Corr. Duty Cycle [dB]	L: AV [dBµV]	Band width [kHz]	Correct. [dB]	L: PK [dBµV/m]	L: AV [dBµV/m]	Limit AV [dBµV/m]	Delta [dB]
1260,0	43,8	-3,9	39,9	1000	-14,6	29,2	25,3	55,6	-30,3
1575,0	52,1	-3,9	48,2	1000	-13,6	38,5	34,6	54,0	-19,6
1890,0	62,0	-3,9	58,1	1000	-12,4	49,7	45.7	55,6	-9,9
2205,0	45,9	-3,9	42,0	1000	-11,2	34,7	30,8	54,0	-23,2
2520,0	49,1	-3,9	45,2	1000	-10,4	38,7	34,8	55,6	-20,8
2835,0	41,2	-3,9	37,3	1000	-8,5	32,7	28,8	54,0	-25,2

Limit according to FCC Subpart 15.231(b) Subpart 15.209(a) / Subpart 15.205(a)

Frequency (MHz)	Fieldstrength of fundamental		Fieldstrength of spurious emissions	
	(µV/m)	dB (µV/m)	(µV/m)	dB (µV/m)
40,66 – 40,70	2250	67	225	47
70 - 130	1250	62	125	42
130 - 174	1250 to 3750*	62 to 71,4	125 to 375*	42 to 51,4
174 - 260	3750	71,4	375	51,4
260 - 470	3750 to 12500*	71,4 to 81,9	375 to 1250*	51,4 to 61,9
Above 470	12500	81,9	1250	61,9

*Linear interpolations

Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in the table above or to the general limits shown in the table below according to § 15.209, whichever limit permits a higher field strength.

Frequency [MHz]	15.209 Limits [µV/m]	15.209 Limits [dBµV/m]
30-88	100	40
88-216	150	43,5
216-960	200	46
Above 960	500	54

MIKES BABT Product Service GmbH · Ohmstrasse 2-4 · D-94342 Strasskirchen · Tel.:+49 9424-9407-0 · Fax:+49 9424-9407-60

Restricted bands of operation:

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209

MHz	MHz	GHz
25.5 – 25.67	960 – 1240	4.5 – 5.15
37.5 – 38.25	1300 – 1427	5.35 – 5.46
73 – 74.6	1435 – 1626.5	7.25 – 7.75
74.8 – 75.2	1645.5 – 1646.5	8.025 – 8.5
108 – 121.94	1660 – 1710	9.0 – 9.2
123 – 138	1718.8 – 1722.2	9.3 – 9.5
149.9 – 150.05	2200 – 2300	10.6 – 12.7
156.52475 – 156.52525	2310 – 2390	13.25 – 13.4
156.7 – 156.9	2483.5 – 2500	14.47 – 14.5
162.0125 – 167.17	2655 – 2900	15.35 – 16.2
167.72 – 173.2	3260 – 3267	17.7 – 21.4
240 – 285	3332 – 3339	22.01 – 23.12
322 – 335.4	3345.8 – 3358	23.6 – 24.0
399.9 – 410	3600 – 4400	31.2 – 31.8
608 – 614		36.43 – 36.5

The requirements are **FULFILLED.**

Remarks: The limits are met. During the test, the Eut was set into continuous transmitting mode.

The measurement was performed up to the 10th harmonic (3150MHz).

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

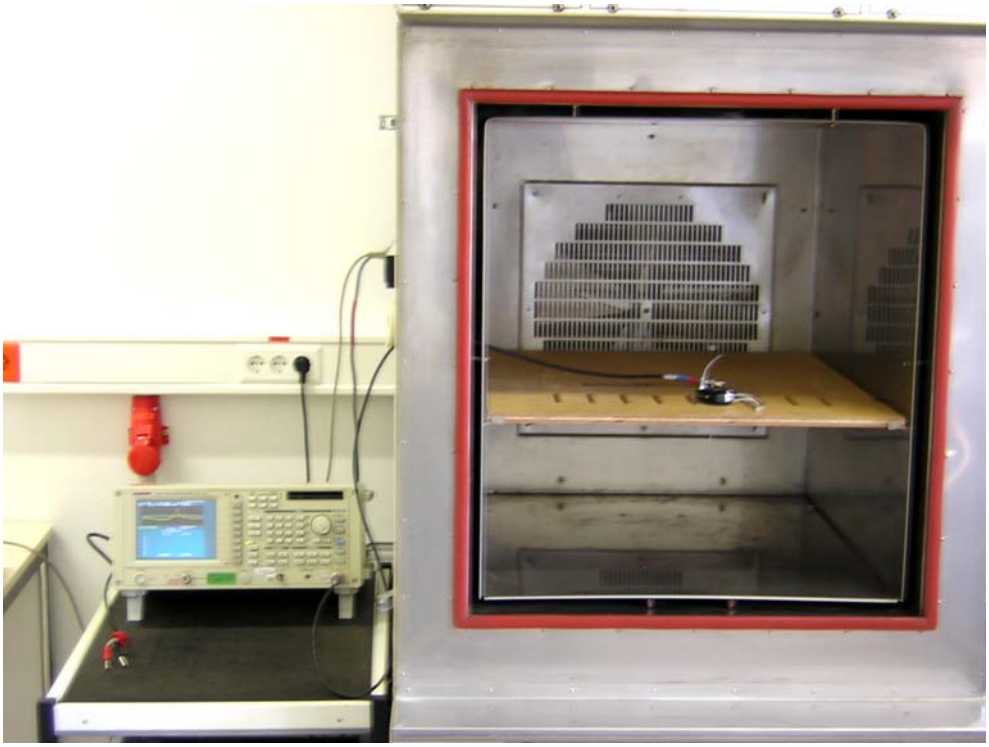
For test instruments and accessories used see section 6 Part **DC**.

4.4.1 Description of the test location

Test location: AREA4

Test distance: 3m

4.4.2 Photo documentation of the test set-up



4.4.3 Test result

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

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

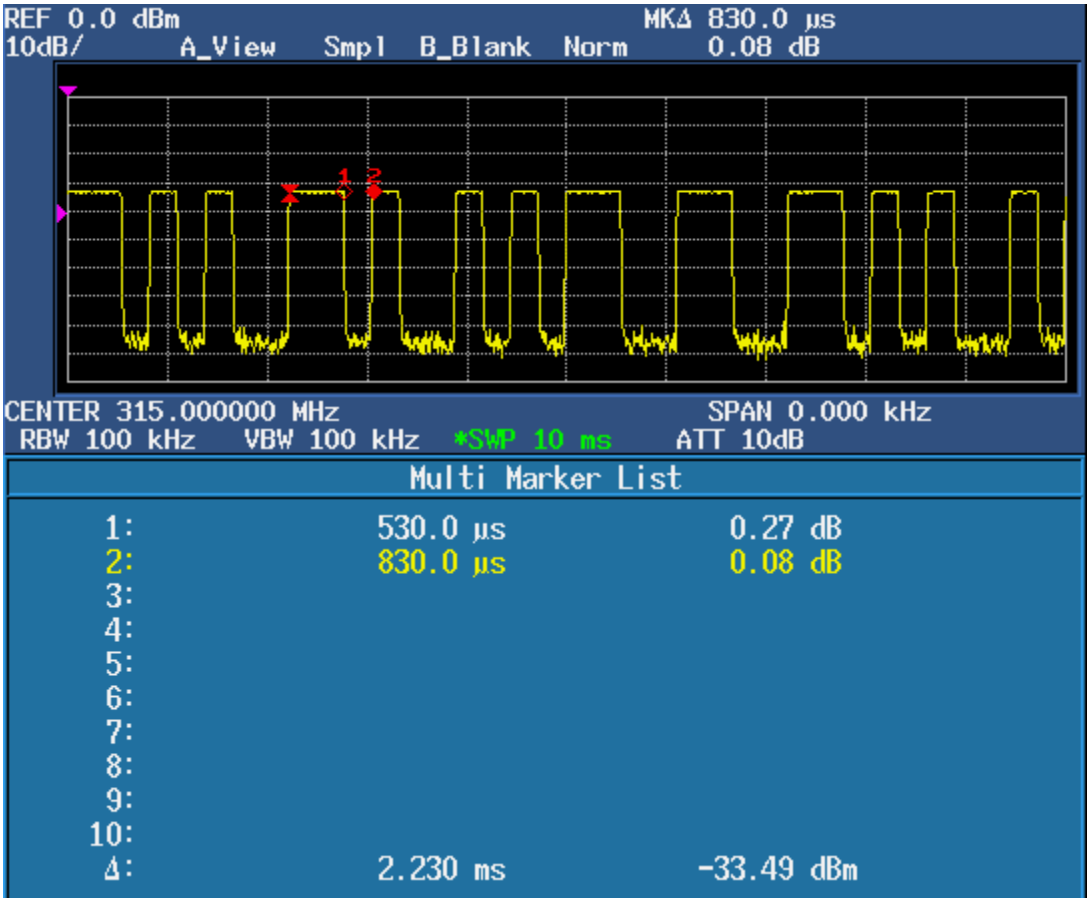
K_E: pulse operation correction factor [dB]
t_{iw} pulse duration for one complete pulse track [msec]
t_{iB} pulse duration for one pulse [µsec]
T_w a period of the pulse track [msec]
T_B a period of one pulse [µsec]

t_{iw} [msec]	T_w [msec]	t_{iB} [µsec]	T_B [µsec]	K_E [dB / %]
1	1	530	830	-3,9 / 63,9

MIKES BABT Product Service GmbH · Ohmstrasse 2-4 · D-94342 Strasskirchen · Tel.:+49 9424-9407-0 · Fax:+49 9424-9407-60

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

4.4.4 Test protocol



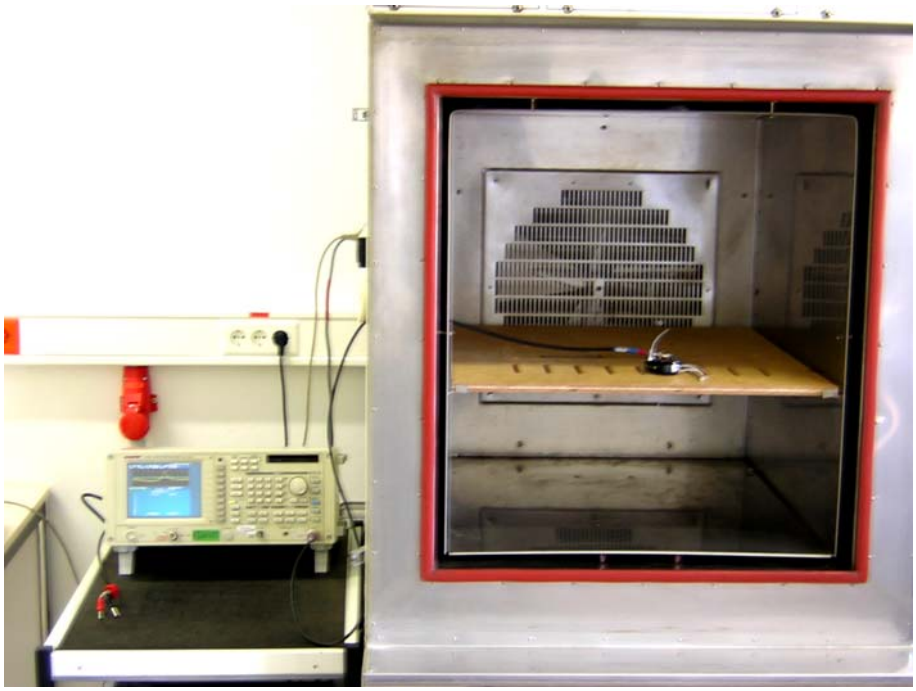
4.5 Emission Bandwidth Subpart 15.231(c)

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

4.5.1 Description of the test location

Test location: AREA4

4.5.2 Photo documentation of the test set-up



4.5.3 Test result

Fundamental [MHz]	Duty Cycle [dB]	20dB Bandwidth F1 [MHz]	20dB Bandwidth F2 [MHz]	Measured Bandwidth [kHz]	LIMIT Fundamental f*0,0025 [kHz]
315	-3,9	315,0009	315,0164	15,5	787,5

Limit according to FCC Subpart 15.231(c)

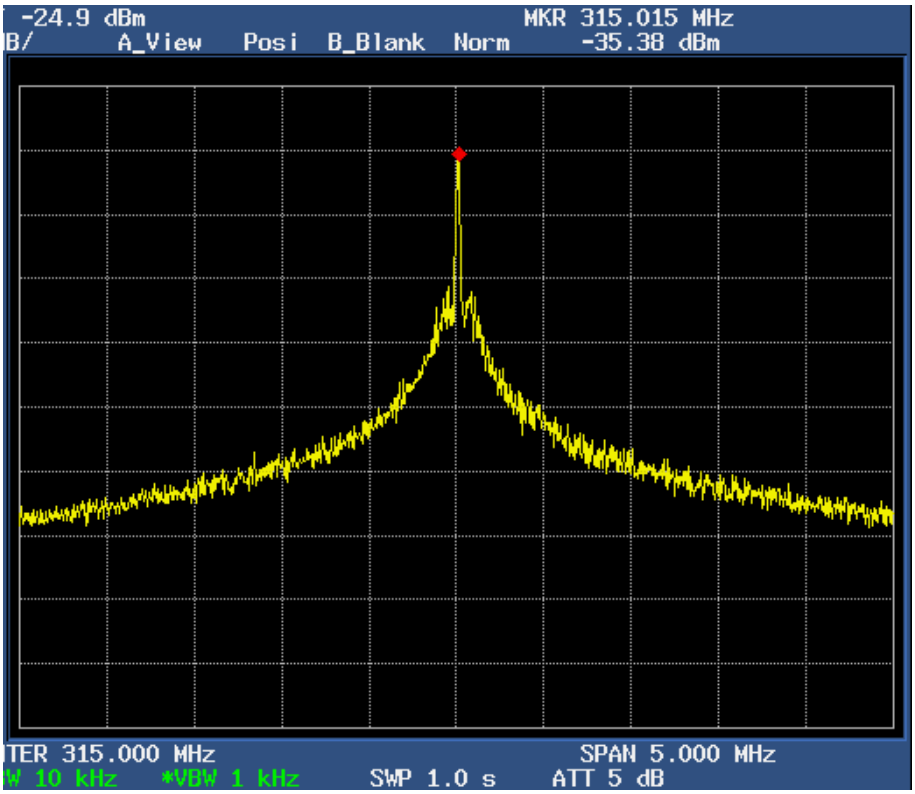
The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

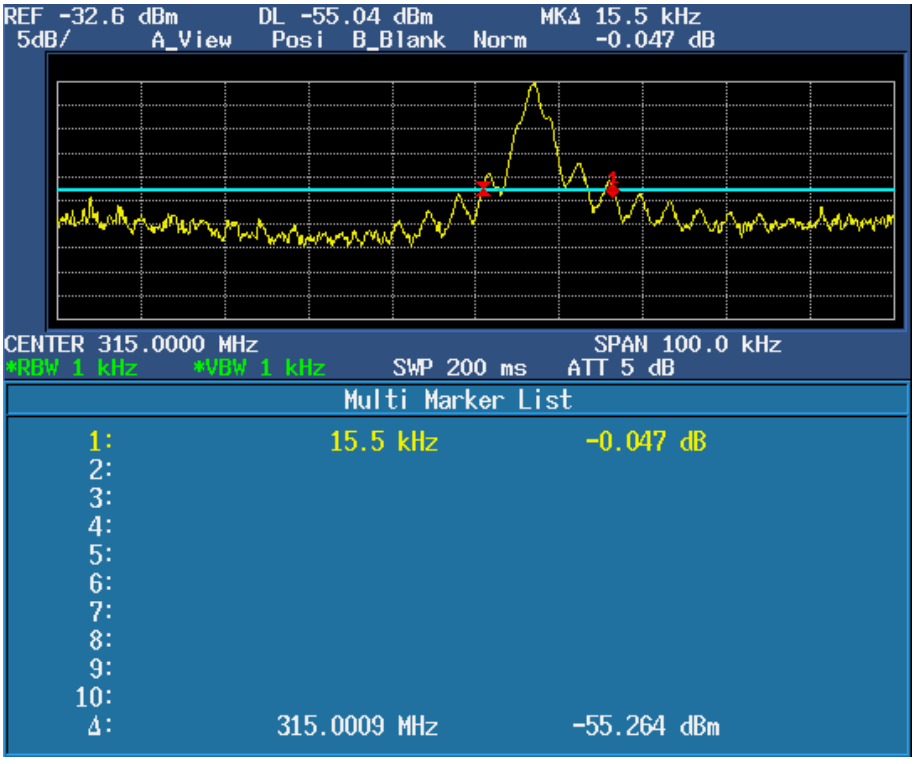
The requirements are **FULFILLED.**

Remarks: The limits are met.

For detailed results, please see the test protocol below.

4.5.4 Test protocol





4.6 Signal Deactivation Subpart 15.231(a)

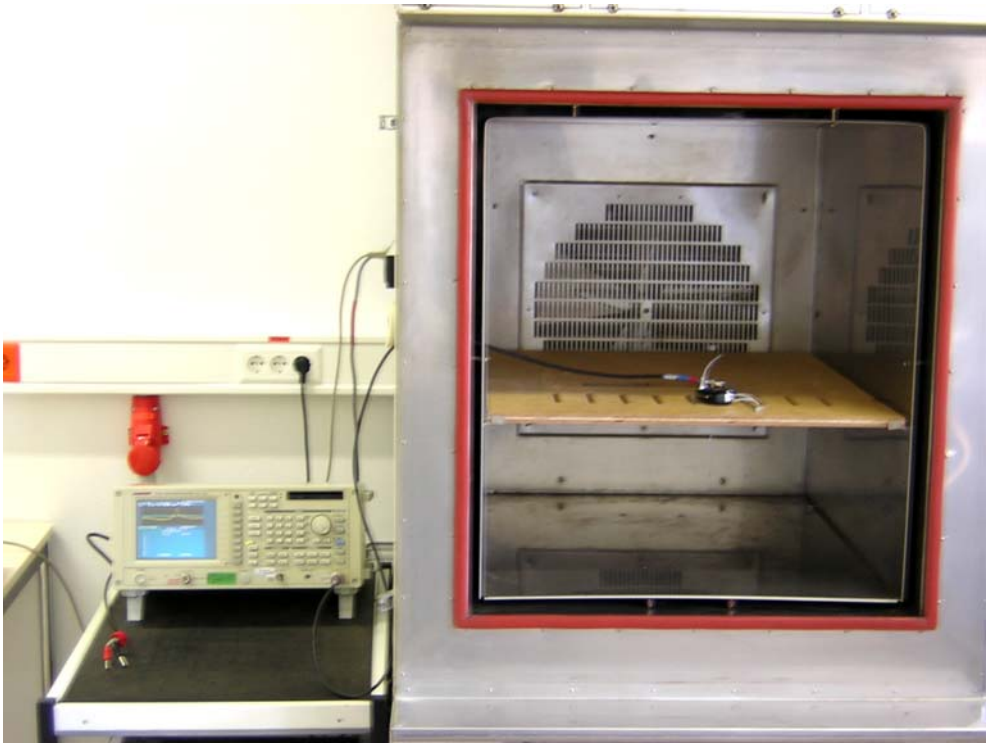
For test instruments and accessories used see section 6 Part **NBW**.

4.6.1 Description of the test location

Test location: AREA4

Test distance: 3m

4.6.2 Photo documentation of the test set-up



4.6.3 Test result

The duration of the transmission is **32,60** milliseconds each time the button is pushed which meets the requirement of ceasing transmission within 5 seconds of the button being released.

Limit according to FCC Subpart 15.231(a)

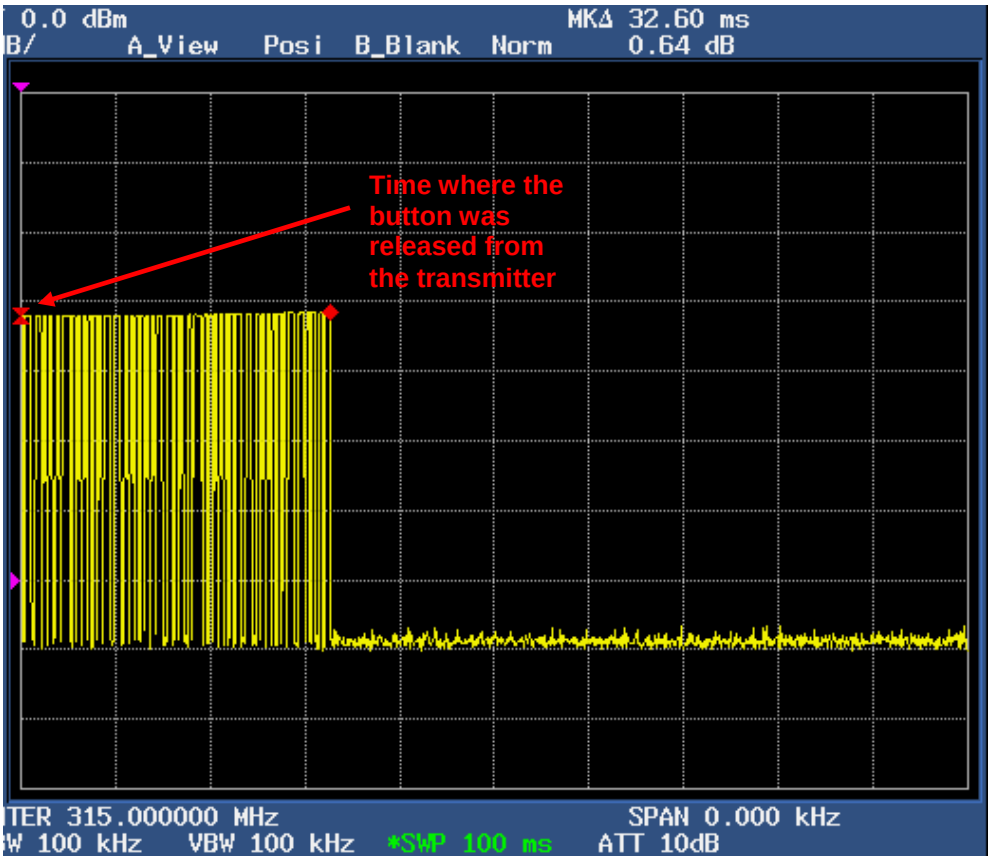
A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released and a transmitter activated automatically shall cease transmission within 5 seconds after activation.

The requirements are **FULFILLED.**

Remarks: The limits are met.

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

4.6.4 Test protocol



5 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used, in addition to the test accessories, are calibrated and verified regularly.

Test ID	Model / Type	Kind of Equipment	Manufacturer	Equipment No.
CPR2	Sucofeed 7/8	RF Cable	Huber+Suhner	04-07/60-04-089
	NW-2000-NB	RF Cable	MBPS GmbH	04-07/60-04-205
	NB-15000-NB	RF Cable	MBPS GmbH	04-07/60-04-207
	VULB 9165	Super Broadband Antenn	Schwarzbeck Mess-Elektronik	04-07/62-00-001
	ESVS 30	Test Receiver	Rohde & Schwarz München	04-07/63-04-001
DC	R 3162	Spectrum Analyzer	Advantest	04-07/74-00-001
NBW	R 3162	Spectrum Analyzer	Advantest	04-07/74-00-001
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
	NB-15000-NB	RF Cable	MBPS GmbH	04-07/60-04-207
	VULB 9165	Super Broadband Antenn	Schwarzbeck Mess-Elektronik	04-07/62-00-001
	ESVS 30	Test Receiver	Rohde & Schwarz München	04-07/63-04-001
SER3	N-1600-N	Microwave Cable	Huber+Suhner	04-07/60-04-202
	N-1600-SMA	Microwave Cable	Huber+Suhner	04-07/60-04-203
	SM 01	Switchmatrix 1-18 GHz	MBPS GmbH	04-07/60-04-215
	Model 3115	Horn Antenna	EMCO Elektronik GmbH	04-07/62-03-003
	ESIB 40	Test Receiver	Rohde & Schwarz München	04-07/63-03-002

MIKES BABT Product Service GmbH · Ohmstrasse 2-4 · D-94342 Strasskirchen · Tel.:+49 9424-9407-0 · Fax:+49 9424-9407-60