



RF - TEST REPORT

- Human Exposure -

Type / Model Name : 60TR13EM011

Product Description : Form Factor Module with BGT60TR13C Radar

Applicant : Infineon Technologies AG

Address : Am Campeon 1-15

85579 NEUBIBERG, GERMANY

Licence holder : Infineon Technologies AG

Address : Am Campeon 1-15

85579 NEUBIBERG, GERMANY

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

POSITIVE

Test Report No. : T46134-04-00HS

02. June 2021

Date of issue



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

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ATTACHMENT A as separate supplement

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.

1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 1, Subpart I - Procedures Implementing the National Environmental Policy Act of 1969

Part 1, Subpart I, Section 1.1310 Radiofrequency radiation exposure limits

Part 1, Subpart 2, Section 2.1091 Radiofrequency radiation exposure evaluation: **mobile devices**.

Part 1, Subpart 2, Section 2.1093 Radiofrequency radiation exposure evaluation: **portable devices**.

KDB 447498 D01 v06 RF Exposure procedures and equipment authorisation policies for mobile and portable devices, October 23, 2015.

ANSI C95.1: 2005 IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz

ETSI TR 100 028 V1.3.1: 2001-03, Electromagnetic Compatibility and Radio Spectrum Matters (ERM);
Uncertainties in the Measurement of Mobile Radio Equipment
Characteristics—Part 1 and Part 2

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2 EQUIPMENT UNDER TEST

2.1 Information provided by the Client

Please note, we do not take any responsibility for information provided by the client or his representative which may have an influence on the validity of the test results.

2.2 Sampling

The customer is responsible for the choice of sample. Sample configuration, start-up and operation is carried out by the customer or according to his/her instructions.

2.3 Photo documentation of the EUT – See ATTACHMENT A

2.4 Equipment type

The EUT is a field disturbance sensor

2.5 Short description of the equipment under test (EUT)

Form Factor Module with BGT60TR13C Radar for use cases such as presence detection.

Number of tested samples: 1
Serial number: B5F695102A222FED
Firmware ID: V1.0.0

EUT configuration:

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

2.6 Variants of the EUT

There are no variants.

2.7 Operation frequency

The operating frequency is 61.0 GHz to 61.5 GHz.
The operation range is used as one channel.

2.8 Transmit operating modes

As soon as the equipment is powered on, TX starts operating independent of a possible connected control PC in last operation mode that was set before the devices switched off.

The device has one operating mode available:

Stand alone:
Primary radar 0.5 GHz OBW

2.9 Antenna

The following integrated antennas are used with the EUT:

- Integrated linear polarised strip patch array antenna, gain 5.0 dBi.

2.10 Power supply system utilised

Power supply voltage, V_{nom} : 5 VDC (USB supply)

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3 TEST RESULT SUMMARY

Operating in the 61.0 GHz – 61.5 GHz band:

FCC Rule Part	RSS Rule Part	Description	Result
KDB 447498, 7.1	RSS 102, 2.5.2	MPE	passed
KDB 447498, 4.3.1	RSS 102, 2.5.1	SAR exclusion consideration	not applicable
KDB 447498, 7.2	RSS102, 3.2	Co-location, Co-transmission	not applicable

The mentioned RSS Rule Parts in the above table are related to:
RSS 102, Issue 5, March 2015

3.1 Final assessment

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

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

Testing commenced on : 19 February 2021

Testing concluded on : 19 February 2021

Checked by:


Jürgen
Pessinger
2021.06.02
09:54:35 +02'00'

Jürgen Pessinger
Radio Team

Tested by:


I am the author of
this document
2021.06.02 09:32:08
+02'00'

Hermann Smetana
Radio Team

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

4.1 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 / 2011 + A1 / 2014 „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.

4.2 Conformity Decision Rule

The conformity decision rule is based on the ILAC G8 published at the time of reporting.

5 HUMAN EXPOSURE

5.1 Maximum permissible exposure (MPE)

For test instruments and accessories used see section 6 Part **CPC 3**.

5.1.1 Description of the test location

Test location: NONE

5.1.2 Applicable standard

According to FCC Part 15, Section 15.247(i):

Systems operating under the provisions of this section shall be operated in a manner that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

The test methods used comply with ANSI/IEEE C95.1, "IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz".

This test report shows the compliance with the limits for Maximum Permissible Exposure (MPE) specified in FCC Part 1, Section 1.1310 and the criteria to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in FCC Part 1, Section 1.1307(b).

5.1.3 Description of Determination

The maximum rated conducted output power included the tune up tolerance is used to calculate the EIRP. Through the Friis transmission formula, the known maximum gain of the antenna and the maximum power, the MPE can be calculated in a defined distance away from the product.

Friis transmission formula:

$$P_d = \frac{P_{out} * G}{4 * \pi * r^2}$$

Where:

P_d = power density (mW/cm²)

P_{out} = output power to antenna (mW)

G = gain of antenna (linear scale)

r = distance between antenna and observation point (cm)

According to FCC Rules 47CFR 2.1093(b) the EUT is not a portable device. The EUT is designed to be used that radiating structures are 20 cm outside of the body of the user. ($r = 20$ cm)

5.1.4 Determination of MPE according FCC

Rated output power conducted: 5.6 dBm 3.6 mW
Tune-up tolerance: 3.00 dB
Maximum output power: 8.6 dBm 7.2 mW
Antenna gain max: 5.00 dBi

Maximum EIRP: 13.6 dBm 22.7 mW
Minimum distance r: 20.0 cm

Frequency	Antgain	EIRP	EIRP	G	EIRP	S	Limit S_{eq}	Margin	Exposure ratio
(GHz)	(dBi)	(dBm)	(mW)	linear	(W)	(mW/cm ²)	(mW/cm ²)	(mW/cm ²)	(%)
61 -61.5	5.0	13.6	22.71	3.16	0.0227	0.0045	1.0	-0.9955	0.45

Limits for maximum permissible exposure (MPE):

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(B) Limits for General Population / Uncontrolled Exposure				
0.3 – 1.34	614	1.63	100	30
1.34 – 30	824/ f	2.19/ f	180/ f^2	30
30 - 300	27.5	0.073	0.2	30
300-1500	---	---	$f/1500$	30
1500-100000	---	---	1.0	30

f = Frequency in MHz

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5.1.5 Determination of MPE according ISED:

Rated output power conducted:	5.6 dBm	3.6 mW
Tune-up tolerance:	3.00 dB	
Maximum output power:	8.6 dBm	7.2 mW
Antenna gain max:	5.00 dBi	
Maximum EIRP:	13.6 dBm	22.7 mW
Minimum distance r:	20.0 cm	

Frequency	Antgain	EIRP	Limit S_{eq}	Margin
MHz	(dBi)	(W)	(W)	(W)
61 -61.5	5.0	0.023	5.000	-4.977

Exemption limits for routine Evaluation – RF exposure evaluation according RSS102, 2.5.2:

At or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance)

The requirements are **FULFILLED**.

Remarks:

5.2 Co-location and Co-transmission

Applicable standard:

OET Bulletin 65, Edition 97-01, Section 2: Multiple-transmitter sites and Complex Environments

The FCC's MPE limits vary with frequency. Therefore, in mixed or broadband RF fields where several sources and frequencies are involved, the fraction of the recommended limit (in terms of power density or square of the electric or magnetic field strength) incurred within each frequency interval should be determined, and the sum of all fractional contributions should not exceed 1.0, or 100 % in terms of percentage.

Remarks: Not applicable, the EUT has one transmitter only.

5.3 SAR test exclusion considerations

5.3.1 Applicable standard

According to RF exposure guidance:

Systems operating under the provisions of this section shall be operated in a manner that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

Remarks: Not applicable, the EUT is fixed equipment.

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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.
-	-	-	-	-	-	-

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