

**FCC TEST REPORT****FCC 47 CFR Part 15C  
Industry Canada RSS-310****License exempt radio equipment****Report Reference No.** ..... : G0M-1611-6080-TFC209LP-V01**Testing Laboratory** ..... : Eurofins Product Service GmbHAddress ..... : Storkower Str. 38c  
15526 Reichenwalde  
Germany

Accreditation ..... :

A2LA Accredited Testing Laboratory, Certificate No.: 1983.01  
FCC Filed Test Laboratory, Reg.-No.: 96970  
IC OATS Filing assigned code: 3470A**Applicant's name** ..... : TE Connectivity Germany GmbHAddress ..... : Pfnorstraße 1  
64293 Darmstadt  
GERMANY**Test specification:**Standard ..... : 47 CFR Part 15C  
RSS-310, Issue 4, 2015-07

Test scope ..... : complete Radio compliance test

**Equipment under test (EUT):**

Product description ARISO Contactless Connectivity (PN 2287598-3, Power Transmitter, Data Transceiver)

Model No. TXM030S012PNP8A, RXM030S012PNP8A

Additional Model(s) None

Brand Name(s) ARISO M30 GPIO Contactless Coupler

Hardware version A2

Firmware / Software version RC15

FCC-ID: 2ADK7-ARISO      IC: 12496A-ARISO

**Test result** **Passed**

Test Report No.: G0M-1611-6080-TFC209LP-V01

Eurofins Product Service GmbH  
Storkower Str. 38c, D-15526 Reichenwalde, Germany

**Possible test case verdicts:**

- neither assessed nor tested ..... : N/N
- required by standard but not appl. to test object ..... : N/A
- required by standard but not tested ..... : N/T
- not required by standard for the test object ..... : N/R
- test object does meet the requirement ..... : P (Pass)
- test object does not meet the requirement ..... : F (Fail)

**Testing:**

Test Lab Temperature ..... : 20 – 23 °C

Test Lab Humidity ..... : 32 – 38 %

Date of receipt of test item ..... : 2016-11-25

Date (s) of performance of tests ..... : 2016-11-28 – 2016-11-29

Compiled by ..... : Sebastian Suckow

Tested by (+ signature) ..... : Wilfried Treffke  
(Responsible for Test)



Approved by (+ signature) ..... : Christian Weber  
(Head of Lab)



Date of issue ..... : 2016-12-21

Total number of pages ..... : 22

**General remarks:**

**The test results presented in this report relate only to the object tested.**

**The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.**

This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

**Additional comments:**

Beside the tested models the following models also exist: TXM030S012PNP2A, RXM030S012PNP2A, TXM030S012PNP8A, RXM030S012PNP8B. The PCBs of all models are identical. Only the number of interface lines varies between the models.

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## Version History

Version	Issue Date	Remarks	Revised by
01	2016-12-21	Initial Release	

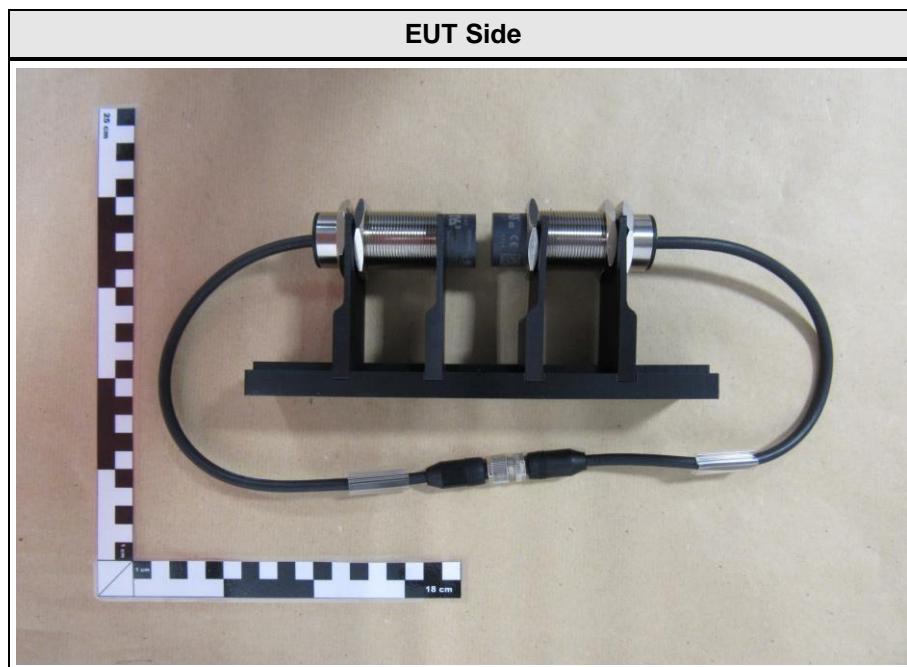
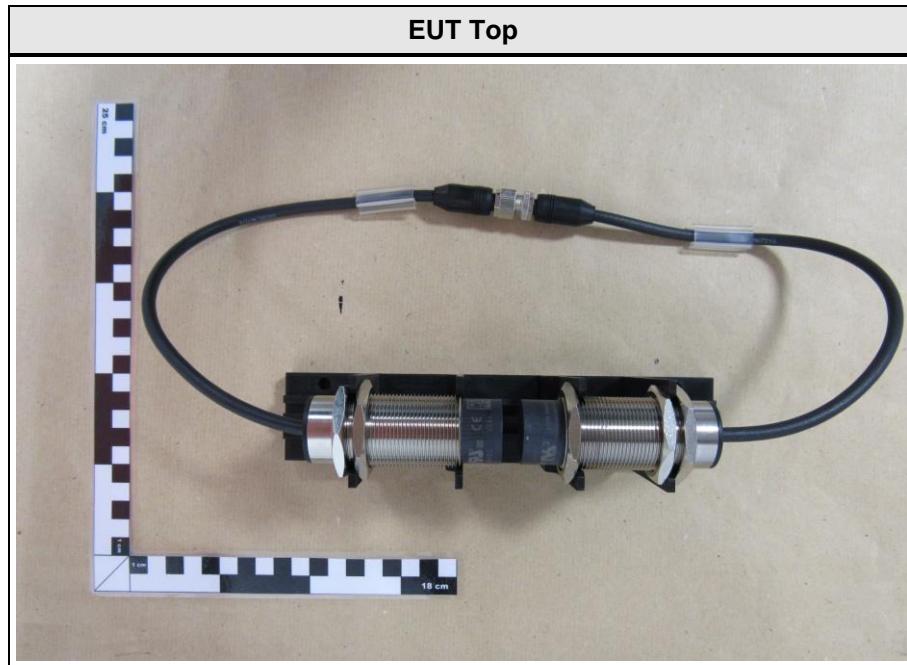
## **REPORT INDEX**

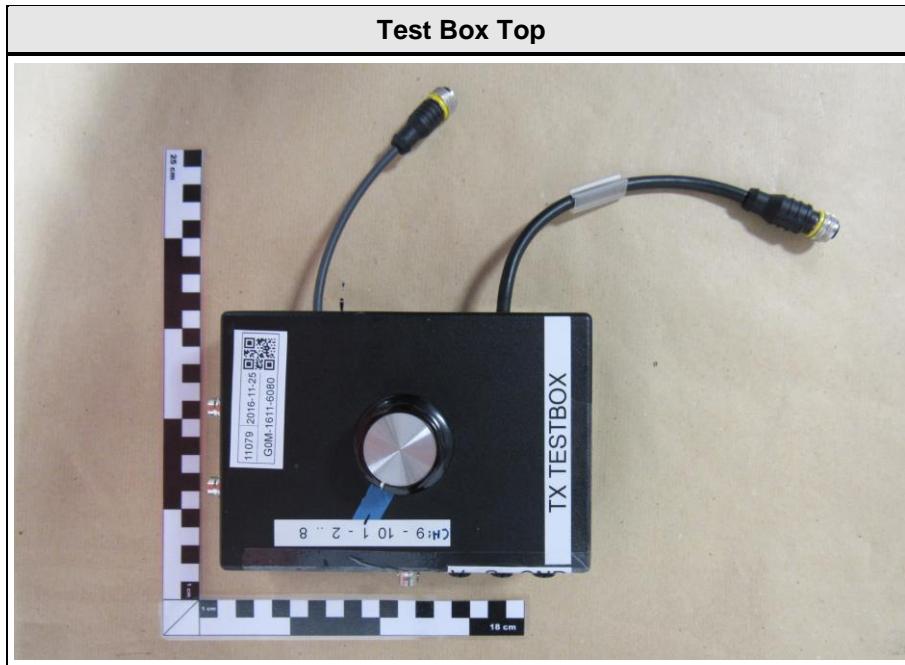
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## 1 Equipment (Test item) Description

<b>Description</b>	ARISO Contactless Connectivity (PN 2287598-3, Power Transmitter, Data Transceiver)	
<b>Model</b>	TXM030S012PNP8A, RXM030S012PNP8A	
<b>Additional Model(s)</b>	None	
<b>Brand Name(s)</b>	ARISO M30 GPIO Contactless Coupler	
<b>Serial number</b>	None	
<b>Hardware version</b>	A2	
<b>Software / Firmware version</b>	RC15	
<b>PMN</b>	N/A	
<b>HVIN</b>	N/A	
<b>FVIN</b>	N/A	
<b>HMN</b>	N/A	
<b>FCC-ID</b>	2ADK7-ARISO	
<b>IC</b>	12496A-ARISO	
<b>Equipment type</b>	End product	
<b>Radio type</b>	Transceiver	
<b>Radio technology</b>	custom	
<b>Operating frequency range</b>	200 kHz	
<b>Frequency range</b>	$F_{MID}$	200 kHz
<b>Modulations</b>	GFSK	
<b>Number of channels</b>	1	
<b>Channel spacing</b>	None	
<b>Number of antennas</b>	1	
<b>Antenna</b>	Type	integrated
	Model	Data Antenna (Power Coil)
	Manufacturer	TE Connectivity Germany GmbH
	Gain	unspecified
<b>Manufacturer</b>	TE Connectivity Germany GmbH Pfnorstraße 1 64293 Darmstadt GERMANY	
<b>Power supply</b>	$V_{NOM}$	24 VDC
	$V_{MIN}$	N/A
	$V_{MAX}$	N/A
<b>AC/DC-Adaptor</b>	Model	N/A
	Vendor	N/A
	Input	N/A
	Output	N/A

## 1.1 Photos – Equipment External



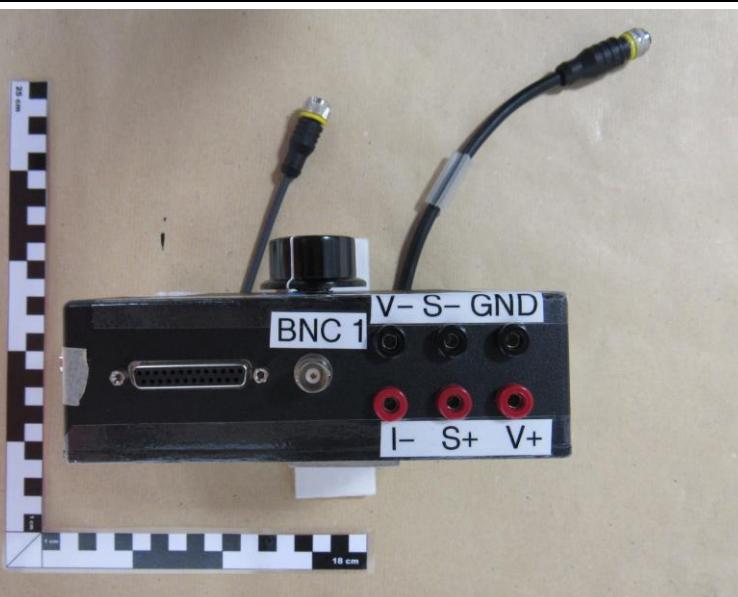
**Adapter Cable****Test Box Top**

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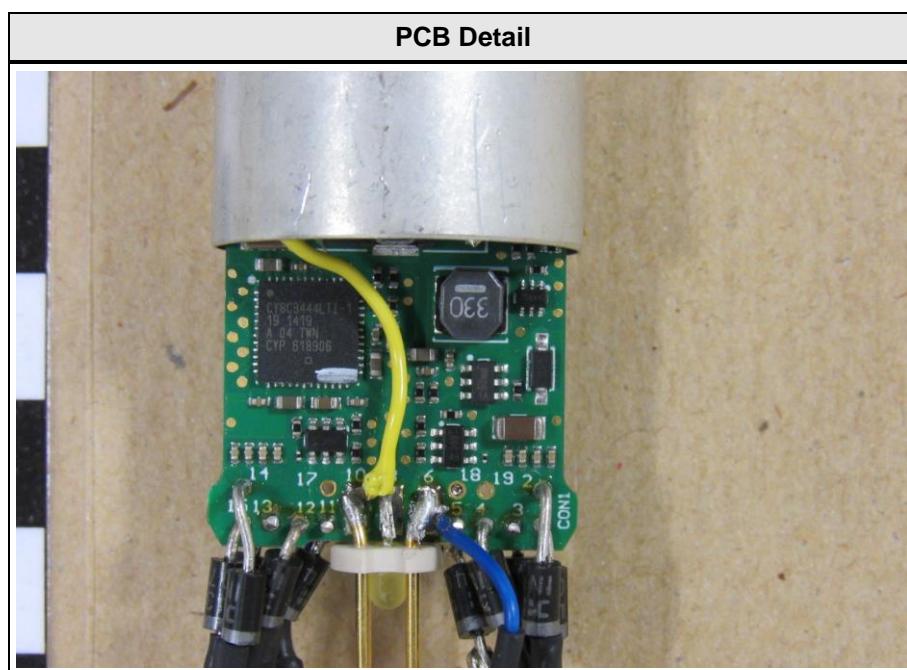
Test Report No.: G0M-1611-6080-TFC209LP-V01

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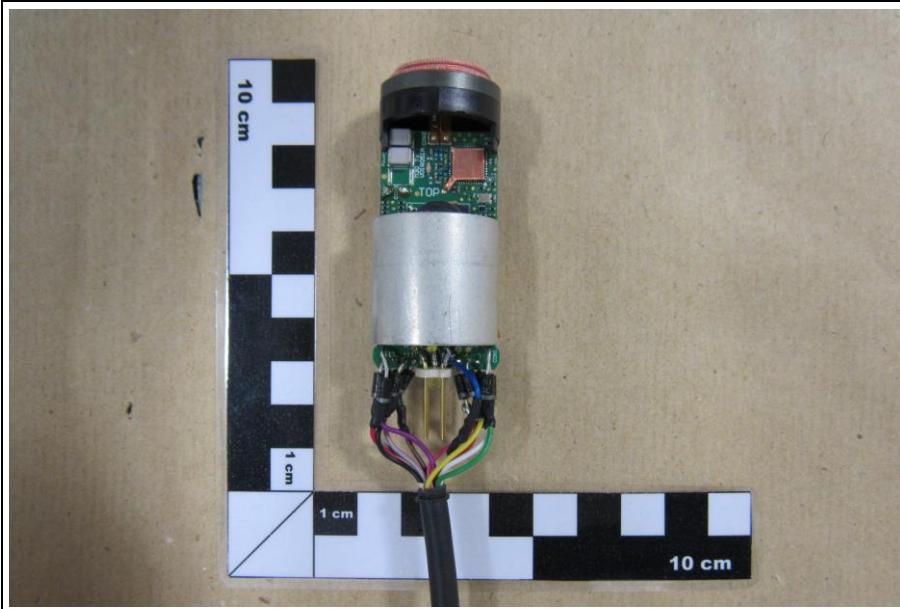
Eurofins Product Service GmbH  
Storkower Str. 38c, D-15526 Reichenwalde, Germany

**Test Box Connection Side 1****Test Box Connection Side 2**

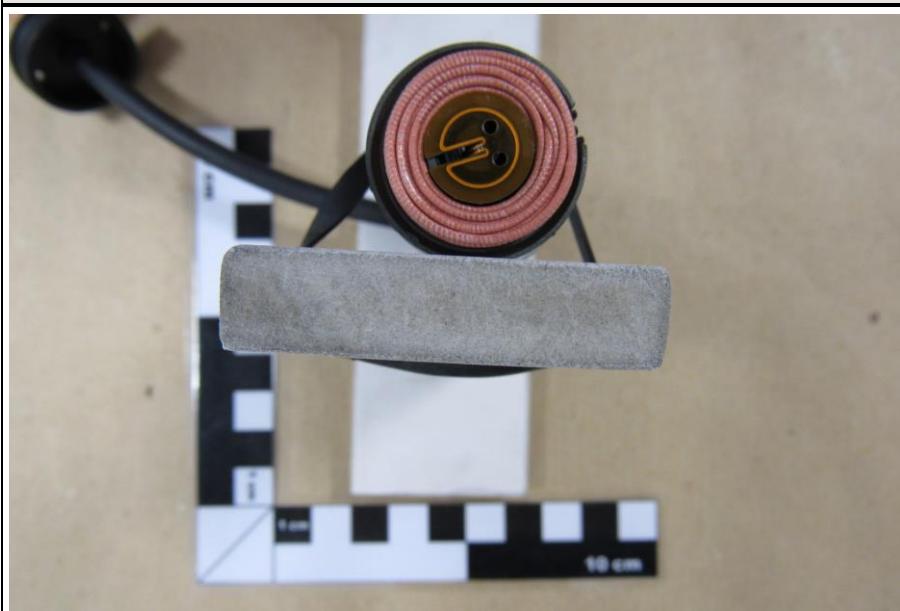
## 1.2 Photos – Equipment internal



PCB Top 2



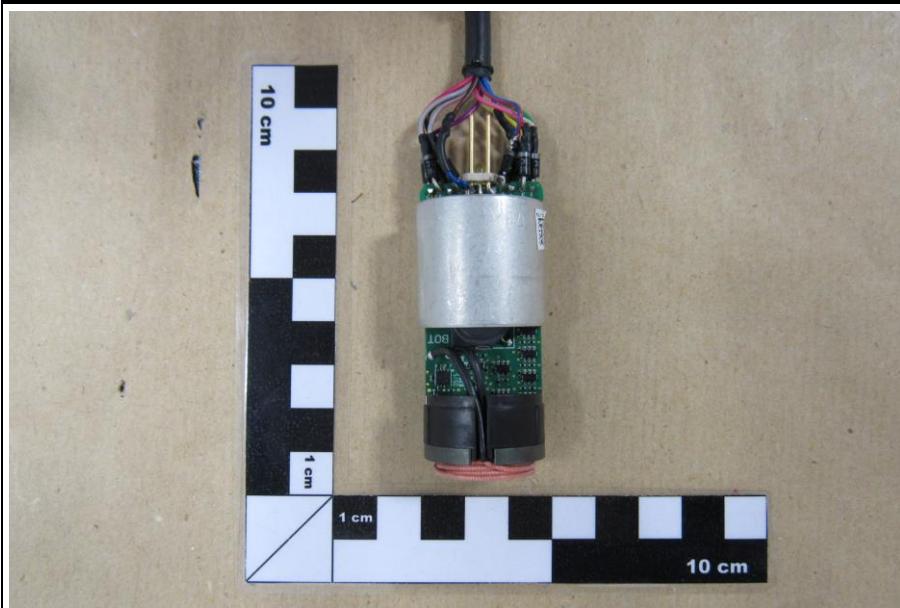
EUT Antenna



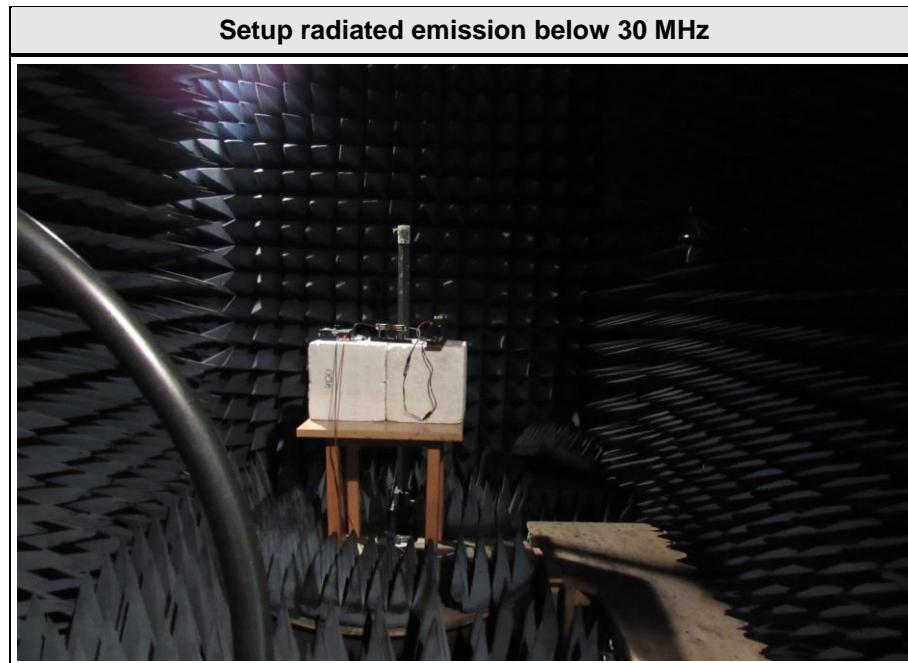
PCB Bottom 1



PCB Bottom 2



### 1.3 Photos – Test setup



**Setup radiated emission above 30 MHz****Setup radiated emission above 30 MHz Detail**

#### 1.4 Supporting Equipment Used During Testing

Product Type*	Device	Manufacturer	Model No.	Comments
AE	TX Test Box	TE Connectivity	-	Used for signaling
CABL	RX M12 Cable +Connector	TE Connectivity	-	-

**\*Note:** Use the following abbreviations:

AE : Auxiliary/Associated Equipment, or

SIM : Simulator (Not Subjected to Test)

CABL : Connecting cables

## 1.5 Test Modes

Mode #	Description	
Single	General conditions:	EUT powered by laboratory power supply
	Radio conditions:	Mode = standalone transmit Modulation = GFSK Power level = Maximum

### 1.6 Test Equipment Used During Testing

<b>Measurement Software</b>			
Description	Manufacturer	Name	Version
EMC Test Software	Dare Instruments	Radimation	2015.2.4

<b>Occupied Bandwidth</b>					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSW43	EF00896	2016-05	2016-12

<b>Field strength emissions</b>					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic chamber	Frankonia	AC 2	EF00196	-	-
Spectrum Analyzer	R&S	FSIQ26	EF00242	2016-04	2017-04
Loop Antenna	R&S	HFH2-Z2	EF00184	2014-11	2016-11

## 1.7 Sample emission level calculation

The following is a description of terms and a sample calculation, as appears in the radiated emissions data table. The numbers used in the calculation are for example only. There is no direct correlation to the specific data taken for the product described in this document:

Reading:

This is the reading obtained on the spectrum analyzer in dB $\mu$ V. Any external preamplifiers used are taken into account through internal analyzer settings.

A.F.:

This is the antenna factor for the receiving antenna. It is a conversion factor, which converts electric fields strengths to voltages, which can be measured directly on the spectrum analyzer. It is treated as a loss in dB. Cable losses have been included with the A.F. to simplify the calculations. The antenna factor is used in calculations as follows:

$$\text{Reading on Analyzer (dB}\mu\text{V)} + \text{A.F. (dB)} = \text{Net field strength (dB}\mu\text{V/m)}$$

Net:

This is the net field strength measurement (as shown above).

Limit:

This is the FCC Class B radiated emission limit (in units of dB $\mu$ V/m). The FCC limits are given in units of  $\mu$ V/m. The following formula is used to convert the units of  $\mu$ V/m to dB $\mu$ V/m:

$$\text{Limit (dB}\mu\text{V/m)} = 20 * \log (\mu\text{V/m})$$

Margin:

This is the margin of compliance below the FCC limit. The units are given in dB. A negative margin indicates the emission was below the limit. A positive margin indicates that the emission exceeds the limit.

Example only:

$$\begin{array}{llll} \text{Reading} & + & \text{AF} & = \\ 21.5 \text{ dB}\mu\text{V} & + & 26 \text{ dB} & = \end{array} \begin{array}{llll} \text{Net Reading} & : & \text{Net reading - FCC limit} & = \text{Margin} \\ 47.5 \text{ dB}\mu\text{V/m} & : & 47.5 \text{ dB}\mu\text{V/m} - 57.0 \text{ dB}\mu\text{V/m} & = -9.5 \text{ dB} \end{array}$$

## 2 Result Summary

FCC 47 CFR Part 15C, IC RSS-310				
Product Specific Standard Section	Requirement – Test	Reference Method	Result	Remarks
RSS-Gen 6.6	Occupied Bandwidth	RSS-Gen 6.6	N/R	Informational only
FCC 15.201(a), FCC 15.209 IC RSS-310 3.7	Field strength emissions	ANSI C63.4	PASS	
IC RSS-310 2.6 IC RSS-Gen 7.1	Receiver radiated spurious emissions	ANSI C63.4	N/R	RX and TX Mode cannot be separated

**Remarks:**

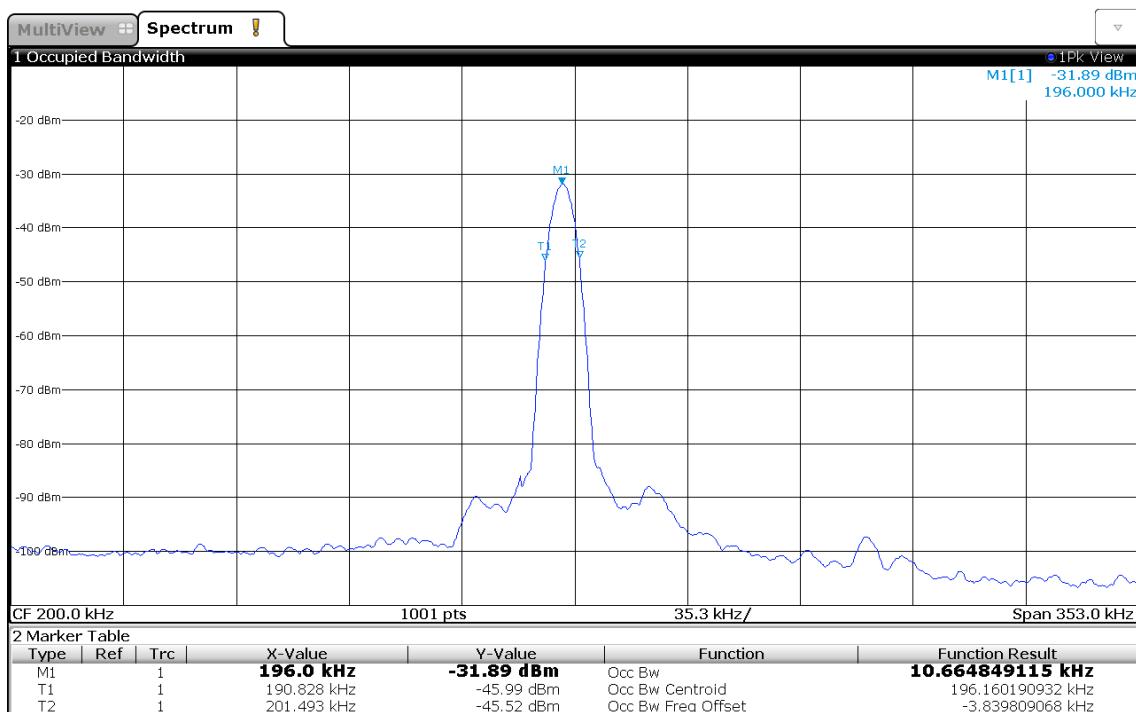
### 3 Test Conditions and Results

#### 3.1 Test Conditions and Results – Occupied Bandwidth

Occupied Bandwidth acc. to IC RSS-Gen		Verdict: PASS
Test according to measurement reference	Reference Method	
	RSS-Gen 6.6	
Test frequency range	Tested frequencies	
	$F_{MID}$	
EUT test mode	Single	
Limits		
None (Informational only)		
Test setup		
		
Test procedure		
<ol style="list-style-type: none"> <li>1. EUT set to test mode (Communication tester is used if needed)</li> <li>2. Span set to at least twice the emission spectrum</li> <li>3. Resolution bandwidth set to 1 % of span</li> <li>4. Occupied Bandwidth (99 %) measurement with spectrum analyzer built in measurement function</li> </ol>		
Test results		
Channel	Frequency [kHz]	Occupied Bandwidth [kHz]
$F_{MID}$	200	10.66
Comments: Measurement is applicable to all variants		

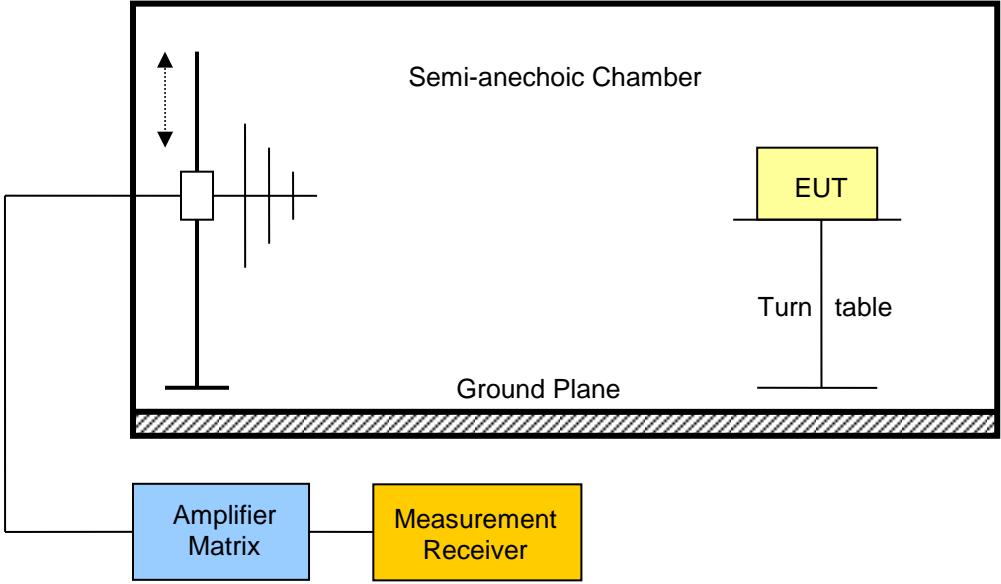
**Occupied Bandwidth -  $F_{MID}$** 
**Occupied Bandwidth 200 kHz SRD**

Project Number: G0M-1611-6080  
 Applicant TE Connectivity Germany GmbH  
 Model Description PN 2287598-3, Power Transmitter, Data Transceiver  
 Model: TXM030S012PNP8A  
 Test Sample ID: 11078  
 Operator: S. Suckow  
 Test Site: Eurofins Product Service GmbH  
 Test Date: 2016-11-28



### 3.2 Test Conditions and Results – Fundamental field strength emissions

Field strength emissions acc. to FCC 47 CFR 15.201 / IC RSS-310		Verdict: PASS		
Test according referenced standards	Reference Method			
	FCC 15.201(a) + 15.209 / IC RSS-310 3.7			
Test according to measurement reference	Reference Method			
	ANSI C63.4			
Test frequency range	Tested frequencies			
	9 kHz – 10 <sup>th</sup> Harmonic			
EUT test mode	Single			
Limits				
Frequency range [MHz]	Detector	Limit [ $\mu$ V/m]	Limit [dB $\mu$ V/m]	Limit Distance [m]
0.009 – 0.490	Quasi-Peak	2400/F[kHz]	48.5 – 13.8	300
0.490 – 1.705	Quasi-Peak	2400/F[kHz]	13.8 – 1.4	30
1.705 – 30	Quasi-Peak	30	29.5	30
30 – 88	Quasi-Peak	100	40	3
88 – 216	Quasi-Peak	150	43.5	3
216 – 960	Quasi-Peak	200	46	3
960 – 1000	Quasi-Peak	500	54	3
> 1000	Average	500	54	3
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.				

Test setup							
							
<b>Test procedure</b>							
<ol style="list-style-type: none"> <li>1. EUT set to test mode</li> <li>2. Span it set according to measurement range</li> <li>3. Resolution bandwidth below 1 GHz is set according to CISPR 16 with peak/quasi-peak detector and RBW of 1 MHz with peak/average detector is used above 1 GHz</li> <li>4. Markers are set to maximum emission levels</li> </ol>							
<b>Test results</b>							
Channel	Frequency [kHz]	Emission [kHz]	Level [dB $\mu$ V/m]	Detector	Limit [dB $\mu$ V/m]	Limit distance [m]*	Margin [dB]
F <sub>MID</sub>	200	100.36	-58.00	pk	27.60	3	-85.56
F <sub>MID</sub>	200	199.64	-62.60	avg	21.60	3	-84.21
Comments: * Physical distance between EUT and measurement antenna.							