

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 GmbH
Address	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 GmbH
Address	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

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.

Version History

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

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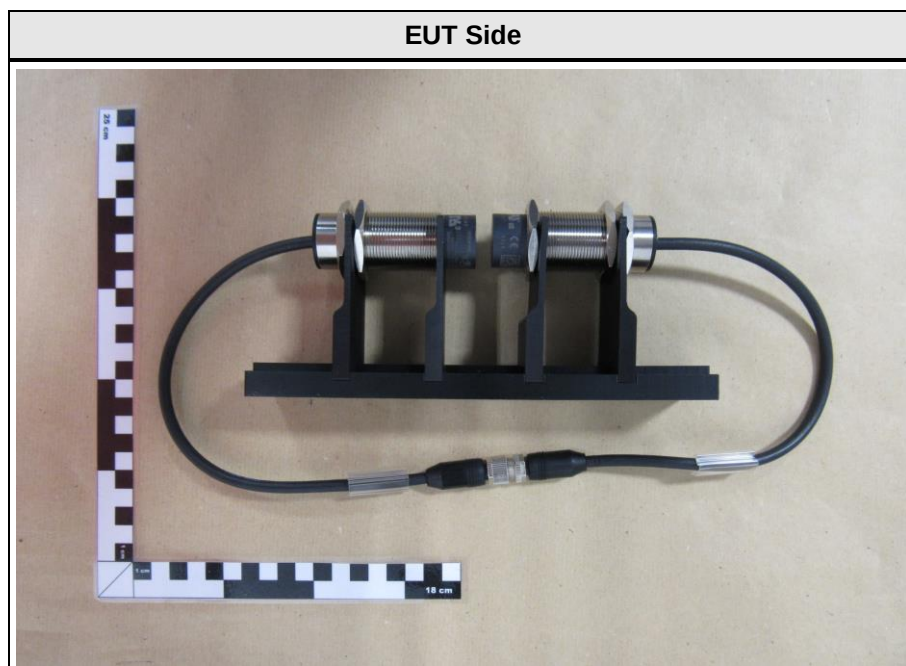
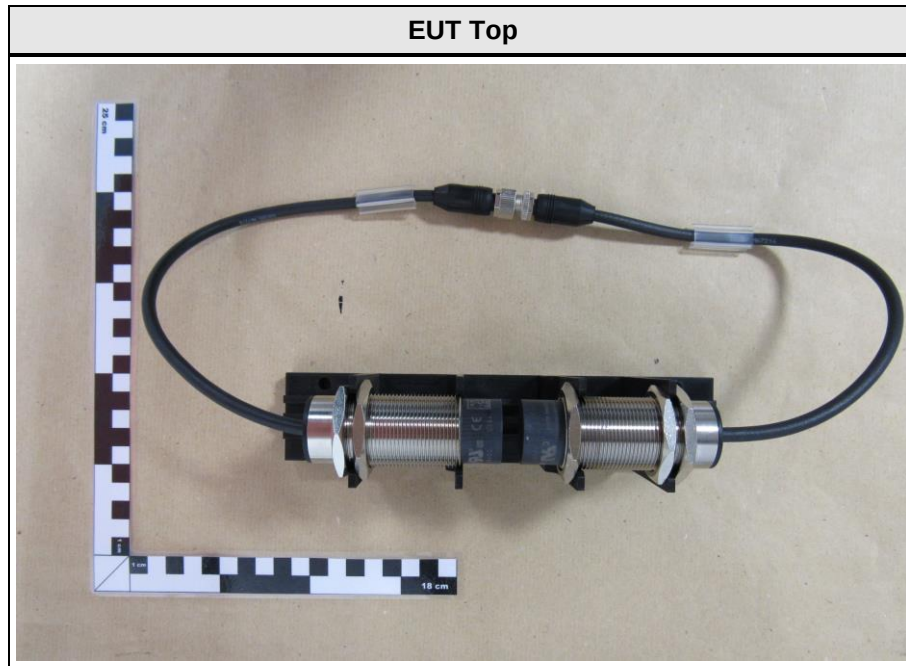
1 Equipment (Test item) Description

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

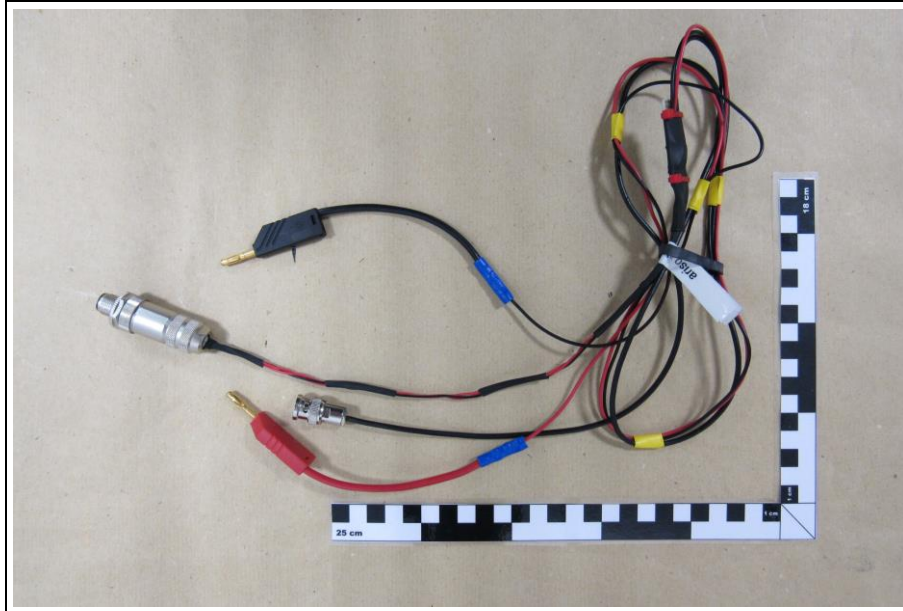
Test Report No.: G0M-1611-6080-TFC209LP-V01

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

1.1 Photos – Equipment External



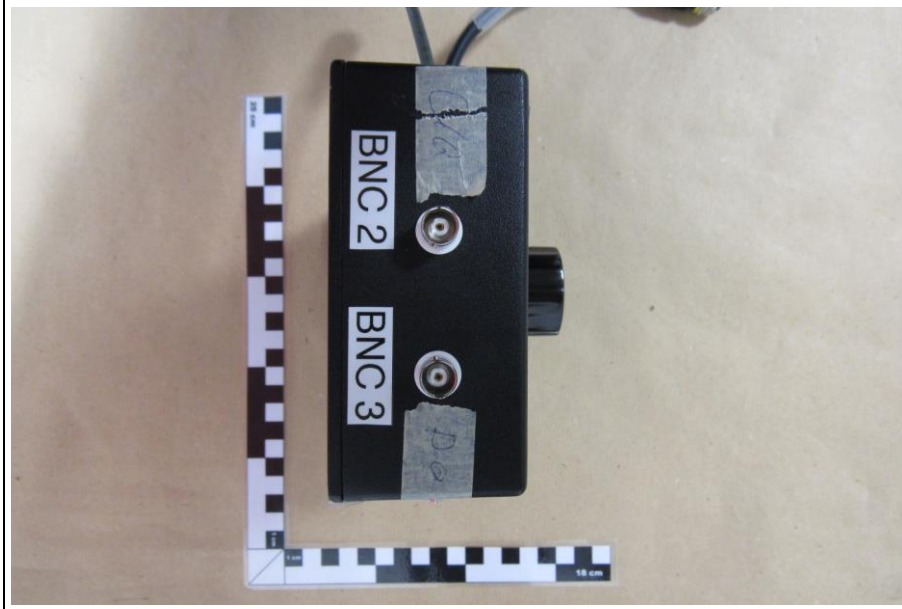
Adapter Cable



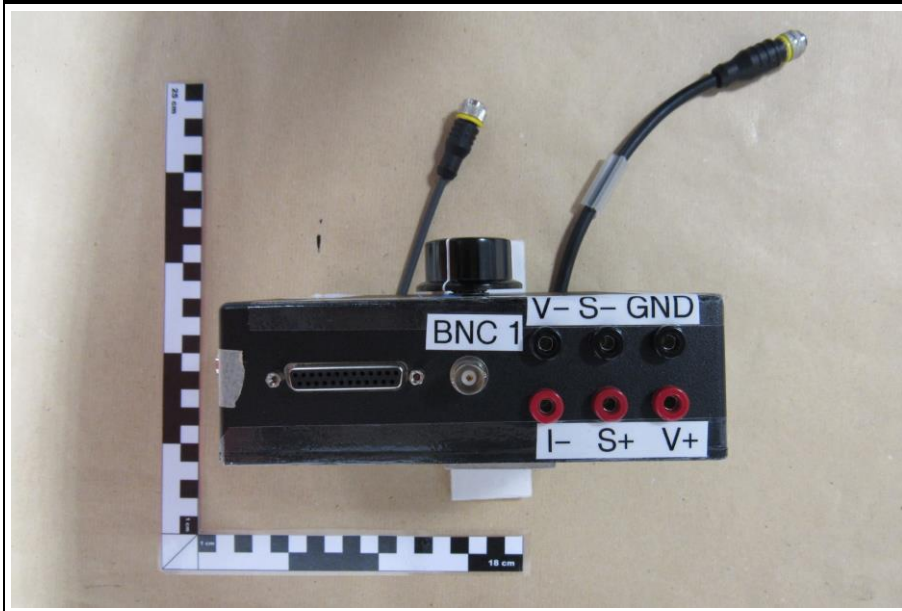
Test Box Top



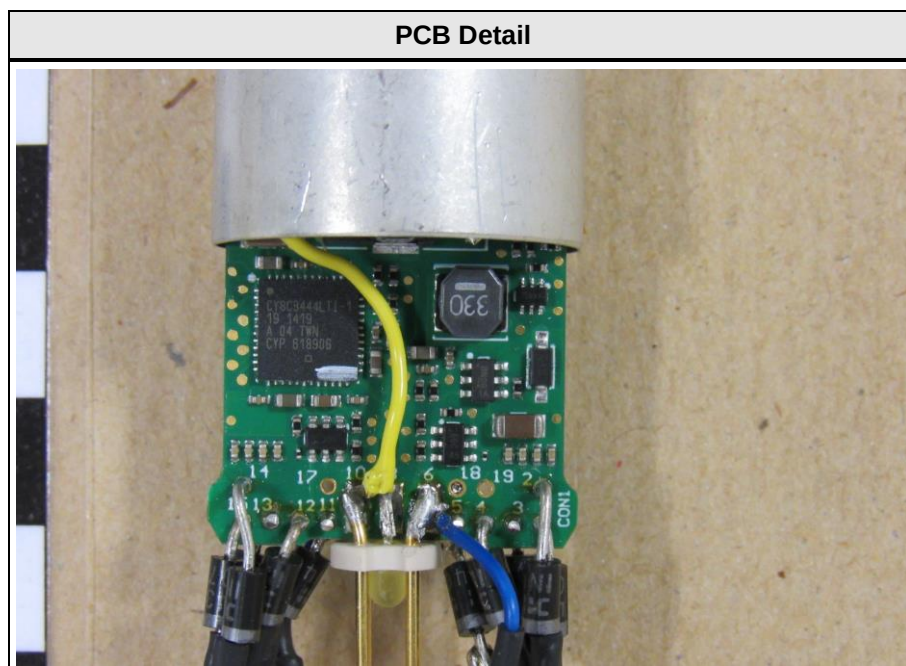
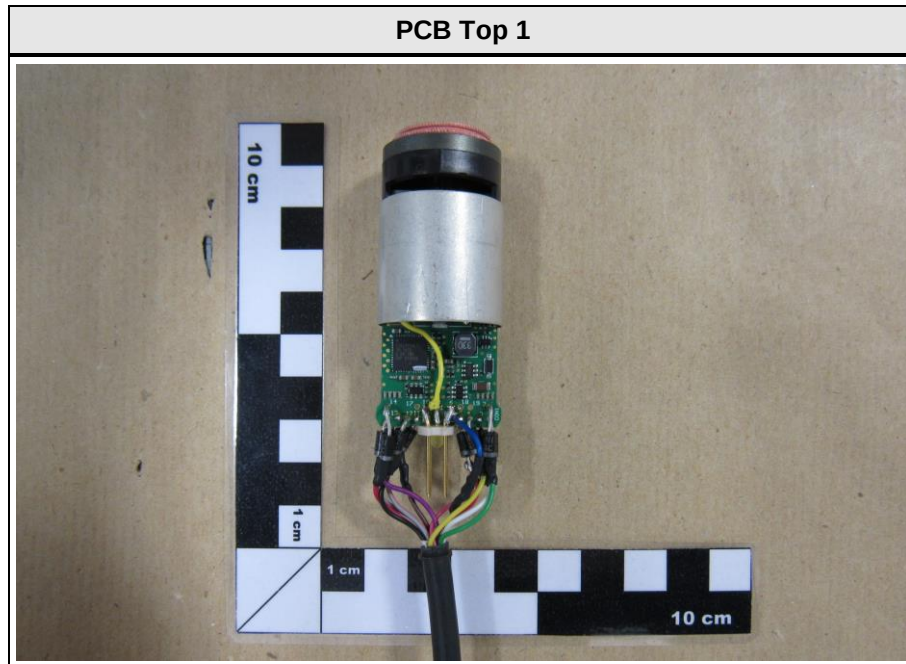
Test Box Connection Side 1



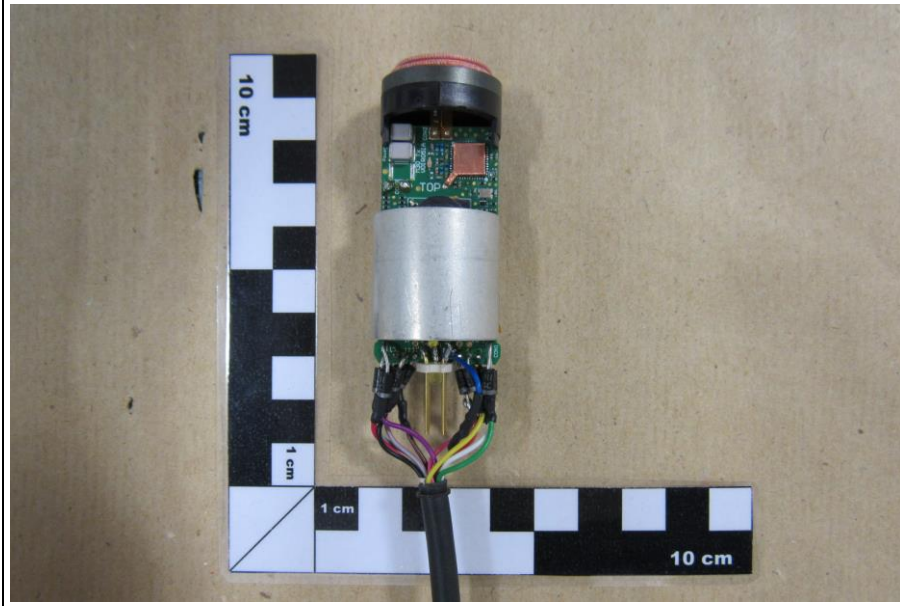
Test Box Connection Side 2



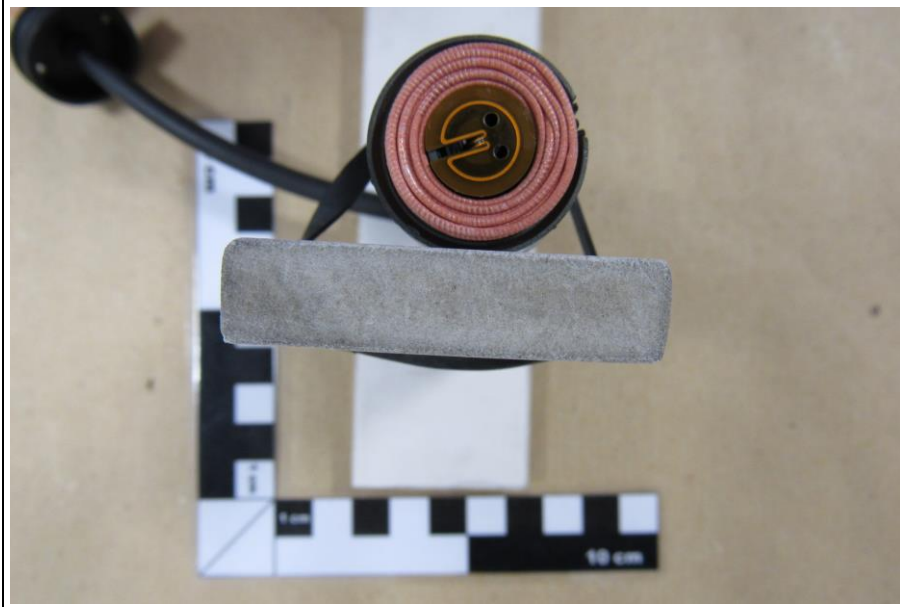
1.2 Photos – Equipment internal



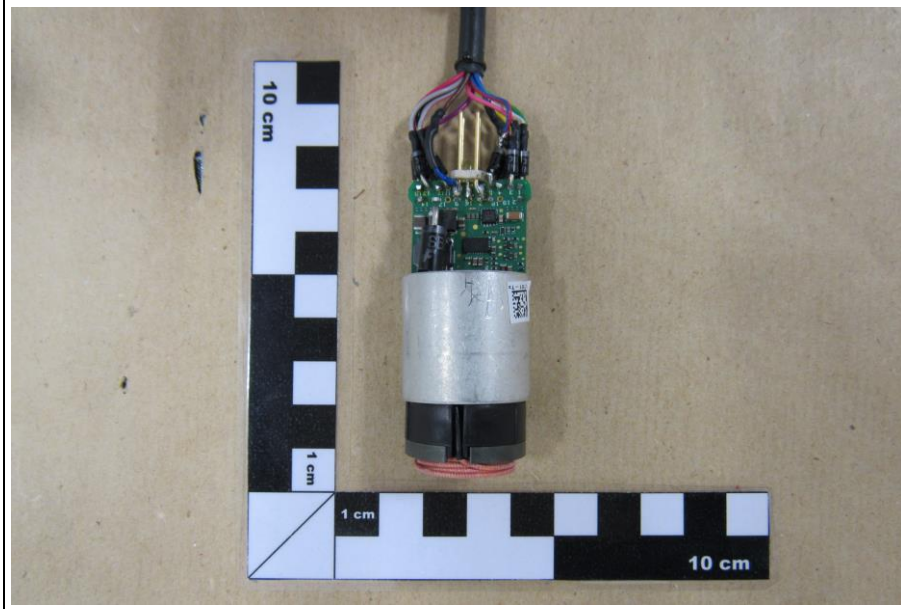
PCB Top 2



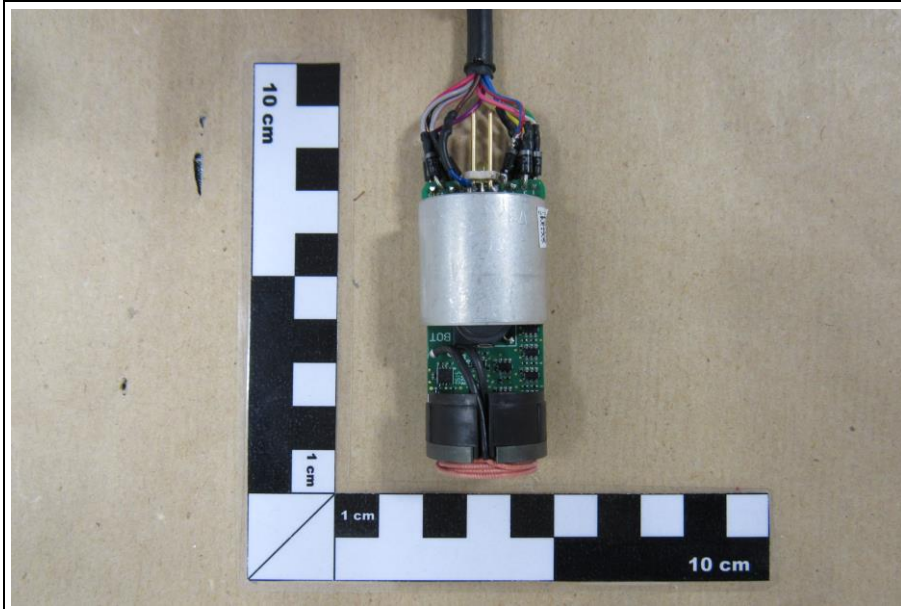
EUT Antenna



PCB Bottom 1



PCB Bottom 2



1.3 Photos – Test setup

Setup radiated emission below 30 MHz



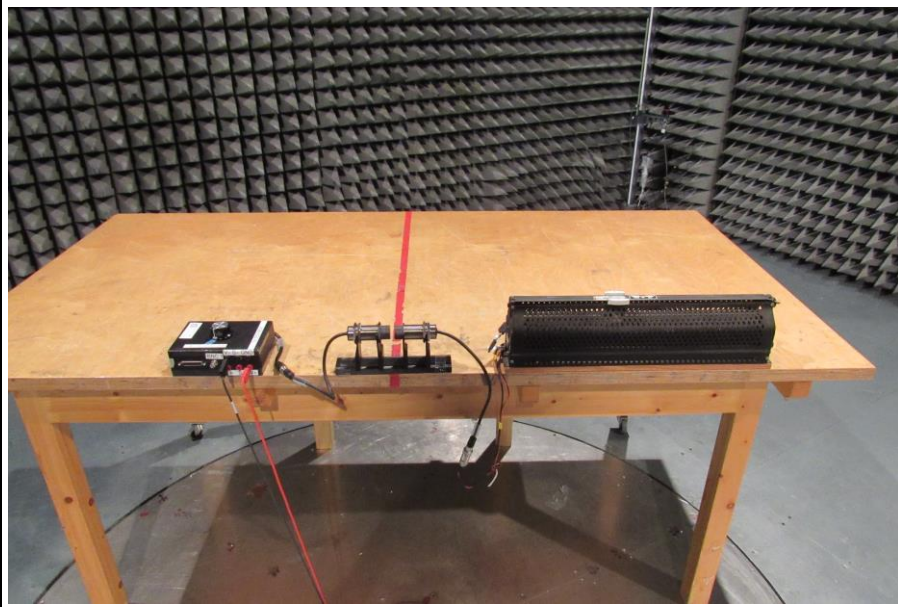
Setup radiated emission below 30 MHz Detail



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

Measurement Software			
Description	Manufacturer	Name	Version
EMC Test Software	Dare Instruments	Radimation	2015.2.4

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

Field strength emissions					
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 μ 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 μ V/m). The FCC limits are given in units of μ V/m. The following formula is used to convert the units of μ V/m to dB μ V/m:

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

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:

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

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

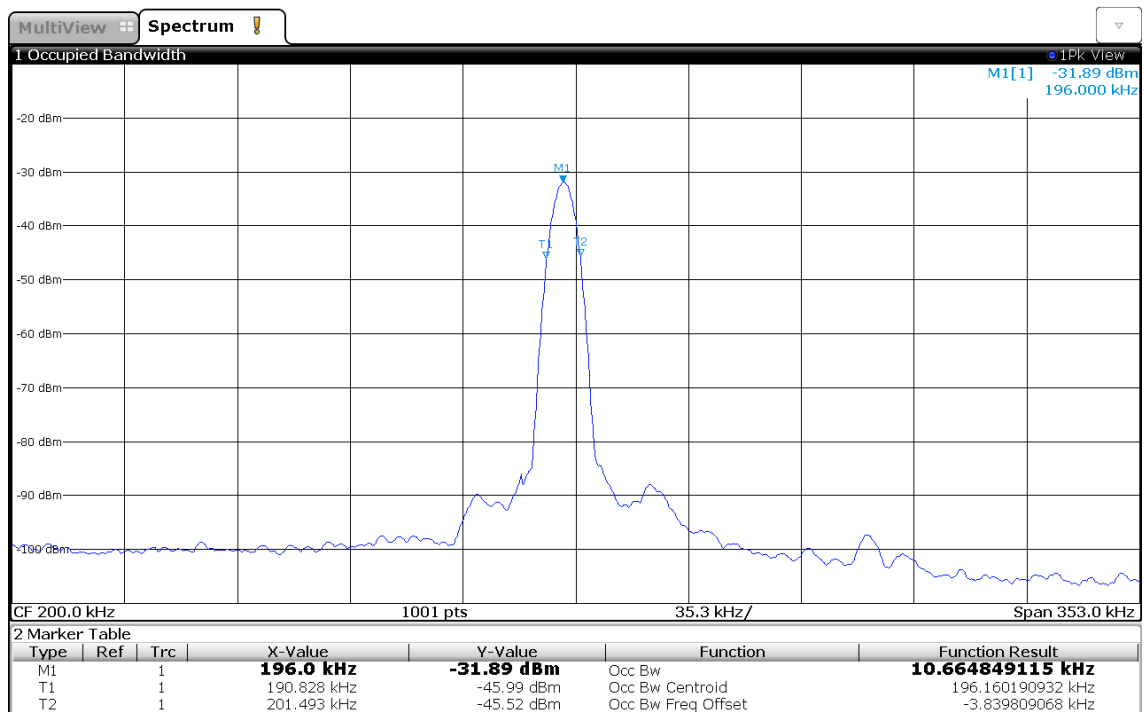
3.1 Test Conditions and Results – Occupied Bandwidth

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			
Spectrum Analyzer EUT			
Test procedure			
1. EUT set to test mode (Communication tester is used if needed) 2. Span set to at least twice the emission spectrum 3. Resolution bandwidth set to 1 % of span 4. Occupied Bandwidth (99 %) measurement with spectrum analyzer built in measurement function			
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

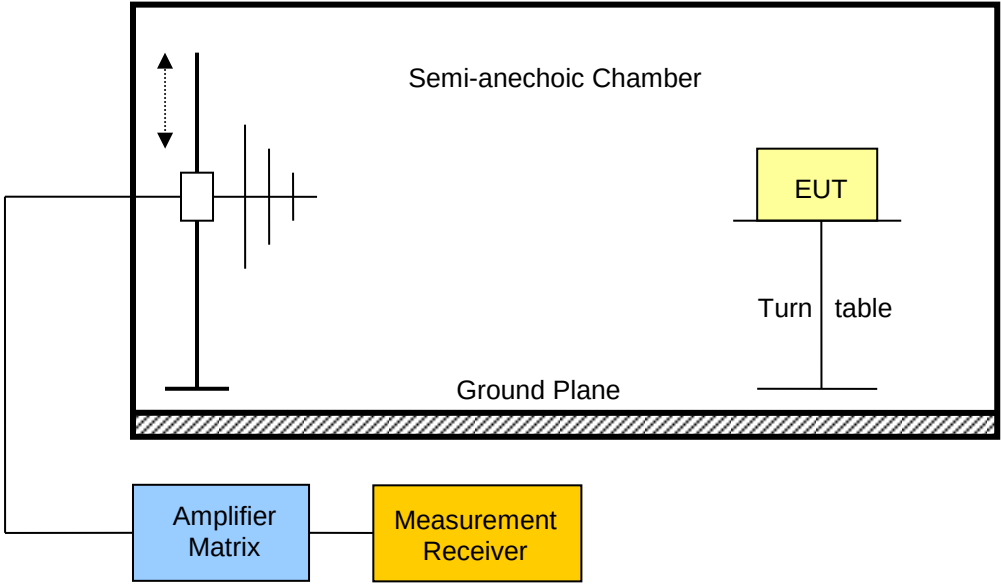
Project Number: G0M-1611-6080
 Applicant: TE Connectivity Germany GmbH
 Model Description: PN 2287598-3, Power Transmitter, Data Transceiver
 Model: TXM030S012PNP8A
 Test Sample ID: 11078
 Operator: S. Suckow
 Test Site: Eurofins Product Service GmbH
 Test Date: 2016-11-28



15:46:45 28.11.2016

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 th Harmonic		
EUT test mode		Single		
Limits				
Frequency range [MHz]	Detector	Limit [µV/m]	Limit [dBµV/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							
							
Test procedure							
1. EUT set to test mode 2. Span it set according to measurement range 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 4. Markers are set to maximum emission levels							
Test results							
Channel	Frequency [kHz]	Emission [kHz]	Level [db μ V/m]	Detector	Limit [db μ V/m]	Limit distance [m]*	Margin [dB]
F _{MID}	200	100.36	-58.00	pk	27.60	3	-85.56
F _{MID}	200	199.64	-62.60	avg	21.60	3	-84.21
Comments: * Physical distance between EUT and measurement antenna.							