

## Test Report

<b>Product</b>	DAB+ receiver		
<b>Name and address of the applicant</b>	Nasjonal kommunikasjonsmyndighet Nygård 1, Postboks 93 4791 Lillesand, Norway		
<b>Name and address of the distributor</b>	TT Micro AS <a href="http://www.ttmicro.no">www.ttmicro.no</a>		
<b>Model</b>	Tiny Audio C3		
<b>Rating</b>	10 - 30 V DC		
<b>Trademark</b>	Tiny Audio		
<b>Serial number</b>	20145200127		
<b>Additional information</b>	DAB+, Class E2, Automotive accessory Receiver Nkom ref. 1505303-32-649		
<b>Tested according to</b>	IEC 62104 Characteristics of DAB receivers		
<b>Order number</b>	305070		
<b>Tested in period</b>	2016.03.01 to 2016.03.07		
<b>Issue date</b>	2016.03.10		
<b>Name and address of the testing laboratory</b>	 Instituttveien 6 Kjeller, Norway	TEL: +47 22 96 03 30 FAX: +47 22 96 05 50	
			
	Prepared by [Bjørn Nordset]		Approved by [Frode Sveinsen]
This report shall not be reproduced except in full without the written approval of Nemko. Opinions and interpretations expressed within this report are not part of the current accreditation. This report was originally distributed electronically with digital signatures. For more information please contact Nemko.			

## CONTENTS

<b>1</b>	<b>INFORMATION</b> .....	<b>3</b>
1.1	Tested Items .....	3
1.2	Test Environment .....	3
1.3	Standards and Regulations .....	3
1.4	Test Engineer(s) .....	3
1.5	Additional Information .....	4
1.6	Other Comments .....	4
<b>2</b>	<b>TEST REPORT SUMMARY</b> .....	<b>5</b>
2.1	Abbreviations .....	5
2.2	Test Summary .....	5
<b>3</b>	<b>TEST RESULTS</b> .....	<b>6</b>
3.1	RF sensitivity .....	6
3.2	Maximum input power .....	7
3.3	Adjacent channel selectivity .....	8
<b>4</b>	<b>MEASUREMENT UNCERTAINTY</b> .....	<b>9</b>
<b>5</b>	<b>PHOTOS OF THE EUT</b> .....	<b>10</b>
<b>6</b>	<b>TEST SETUP PHOTOS</b> .....	<b>11</b>
<b>7</b>	<b>TEST EQUIPMENT USED</b> .....	<b>12</b>

## 1 INFORMATION

### 1.1 Tested Items

EUT Information	
Brand	Tiny Audio
Model number	Tiny Audio C3
Serial number	20145200127
Antenna Connector	SMB
Bluetooth	Yes

The EUT is a Class E2 Automotive accessory Receiver and have a 50  $\Omega$  antenna connector.

The EUT supports DAB+ at VHF Band III.

The EUT has USB, AUX and various other functions that have not been tested here.

### 1.2 Test Environment

#### 1.2.1 Normal test condition

Temperature: 21.9 – 23.7 °C

Relative humidity: 17.5 – 41.5 %

Normal test voltage: 12 V DC

All testing has been carried out with a regulated external power supply.

The values are the limits registered during the test period.

### 1.3 Standards and Regulations

IEC 62104-2015: Characteristics of DAB receivers; Edition 3.0; 2015-07

### 1.4 Test Engineer(s)

Bjørn Nordset

## 1.5 Additional Information

### 1.5.1 Test methods

The test methods have been according to IEC 62104-2015 Edition 3.0 (2015-07).

The tested equipment have SMB 50  $\Omega$  antenna connector. All tests were tested performed at the antenna connector. All tests were performed on VHF Band III.

The tests were performed with a 96kbps DAB+ stream (gross data rate: 2.048 Mbps). Since we had no access to the bit-stream, the tests were performed by listening to the audio signal. For all tests the acoustic signal was defined as impairment free as long as the number of dropouts were less than three per ten seconds.

The Adjacent channel interferer was generated with the arbitrary generator of the BTC tester. The interferer waveform selected was "T-DMB\_DAB\_M1\_V1\_251".

### 1.5.2 Selection Criteria

Test performed in this report were selected by Nasjonal kommunikasjonsmyndighet.

### 1.5.3 Test Equipment

See list of test equipment in clause 5.

## 1.6 Other Comments



### **THIS TEST REPORT APPLIES ONLY TO THE ITEM(S) AND CONFIGURATIONS TESTED.**

Deviations from, additions to, or exclusions from the test specifications are described in "Summary of Test Data".

Nemko Group authorizes the above named company to reproduce this report provided it is reproduced in its entirety and for use by the company's employees only. Any reproduction of parts of this report requires approval in writing from Nemko Group.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Nemko Group accepts no responsibility for damages suffered by any third party as a result of decisions made or actions based on this report.

## 2 TEST REPORT SUMMARY

### 2.1 Abbreviations

The following abbreviations are used in the test summary:

Complies                      The test results are inside the limits in IEC 62104  
Not Compliant                The test results are outside the limits in IEC 62104

### 2.2 Test Summary

	RF sensitivity	Maximum input level	Adjacent channel selectivity
Test result	Complies	Complies	Complies

### 3 TEST RESULTS

#### 3.1 RF sensitivity

IEC 62104 clause 7.4

##### Measured values

Receiver	Measured minimum sensitivity (dBm)		Verdict
	Channel 11A	Channel 13F	
Measured value	-103.7	-103.1	Complies
Limit	≤ -97.7 dBm		

Comment: This test was performed on VHF Band III channels 11A and 13F.

##### Limit

Minimum requirement		
Type E2 receiver	-97.7 dBm or less	VHF Band III

Test equipment used: ....1, 2, 3, 4, 5, 6....

### 3.2 Maximum input power

IEC 62104 clause 7.6

#### Measured values

Receiver	Maximum input power (dBm)	Verdict
	Channel 11A	
Measured value	≥ +15.0	Complies
Limit	≥ -10 dBm	

Comment: This test was performed on VHF Band III channel 11A only. The maximum power from the test instrument is +15 dBm.

#### Limit

Minimum requirement		
Type E2 receiver	≥ -10 dBm	VHF Band III

Test equipment used: ....1, 2, 3, 4, 5, 6....

### 3.3 Adjacent channel selectivity

IEC 62104 clause 7.7

#### Measured values

Freq. Offset (MHz)	Adjacent channel selectivity (dB)						Verdict
	-5.136	-3.428	-1.712	+1.712	+3.428	+5.136	
Measured value	59	52	47	48	58	59	Complies
Limit (dB)	≥ 45	≥ 40	≥ 35		≥ 40	≥ 45	

Comment: This test was performed on VHF Band III channel 11A only.

#### Limit

Minimum requirement			
Frequency offset (MHz)	± 1.712	± 3.428	± 5.136
Requirement (dB)	≥ 35	≥ 40	≥ 45

Test equipment used: ....1, 2, 3, 4, 5, 6....



## 4 Measurement Uncertainty

Measurement Uncertainty Values	
Test Item	Uncertainty
Maximum sensitivity	±1.0 dB
Maximum power level	±0.5 dB
Adjacent channel selectivity	±2.0 dB
Temperature Uncertainty	±1 °C

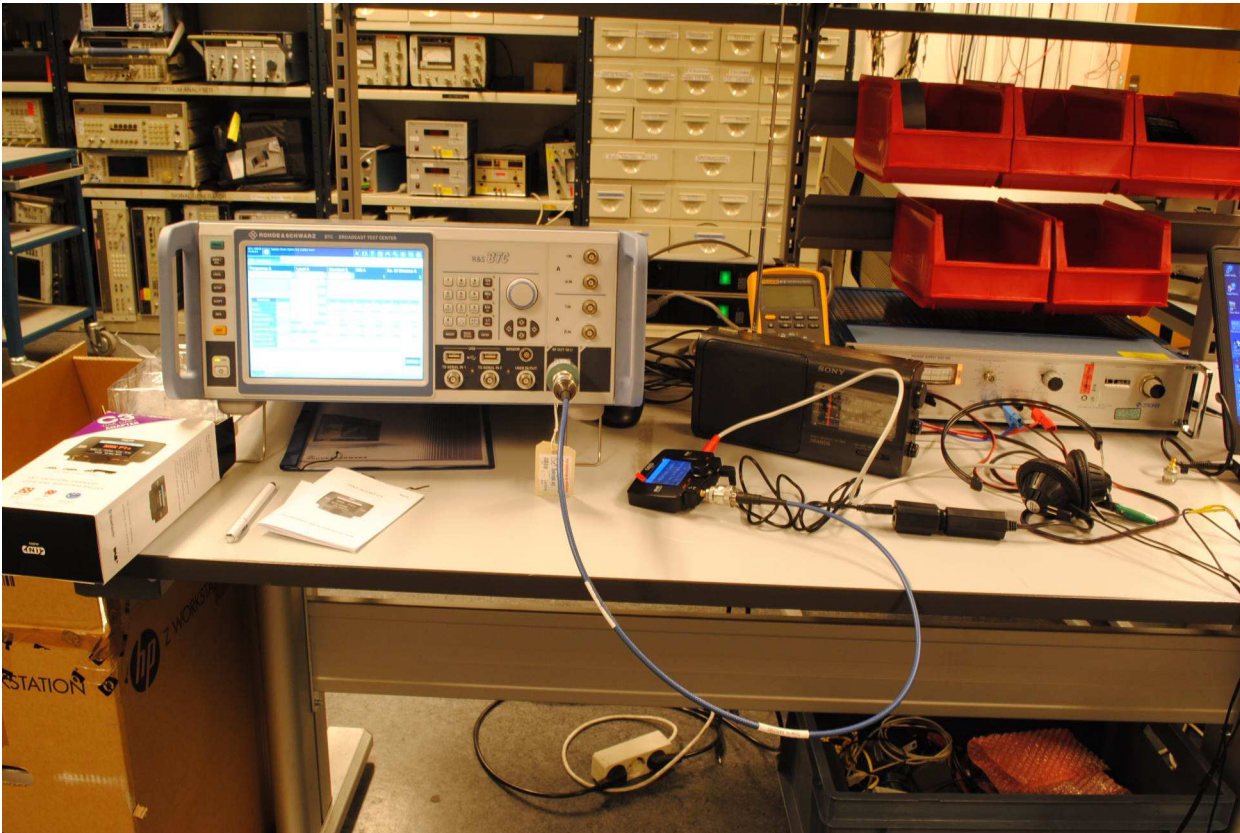
All uncertainty values are expanded standard uncertainty to give a confidence level of 95%, based on coverage factor  $k=2$

## 5 Photos of the EUT



**Tiny Audio C3**

## 6 Test Setup Photos



## 7 Test Equipment Used

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment and ancillaries are identified (numbered) by the testhouse.

No.	Instrument/ancillary	Type of instrument/ancillary	Manufacturer	Ref. no.	Cal Date	Cal Due
1	BTC	Broadcast Test Center	R&S	S.no.: 100138	Cal b4 use	
2	NRP-Z81	Wideband Power Sensor	R&S	LR 1644	2015-10	2016-10
3	Model 87 V	Multimeter	Fluke	LR 1597	2015-10	2016-10
4	B32-10R	Power Supply	Oltronics	LR 015	Cal b4 use	
5	Model 562	Noise Suppressor	Narda	LR 1527	Cal b4 use	
6	FSW26	Spectrum Analyzer	R&S	LR 1640	2015-11	2016-11

## Revision history

Version	Date	Comment	Sign
1.0	2016.03.03	First edition	BN