Produkte
Products

Prüfbericht - Nr.: *Test Report No.:*	**19660062 001**		**Seite 1 von 11** *Page 1 of 11*
Auftraggeber: *Client:*	**ATMEL NORWAY AS** **VESTRE ROSTEN 79** **7075 TILLER** **TRONDHEIM** **NORWAY - 7075**		
Gegenstand der Prüfung: *Test item:*	**ZigBit ATxmega256A3U + RF233**		
Bezeichnung: *Identification:*	**ATZB-X0-256-3-0-C**	**Serien-Nr.:** *Serial No.*	**Engineering Sample**
Wareneingangs-Nr.: *Receipt No.:*	**1803006332**	**Eingangsdatum:** *Date of receipt:*	**10.09.2013**
Prüfort: *Testing location:*	**Refer Page 4 of 11 for test facilities**		
Prüfgrundlage: *Test specification:*	**FCC Part 15, Subpart C**		
Prüfergebnis: *Test Result:*	**Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n).** *The test items passed the test specification(s).*		
Prüflaboratorium: *Testing Laboratory:*	**TÜV Rheinland (India) Pvt. Ltd.** 82/A, 3rd Main, West Wing, Electronic City Phase 1 Hosur Road, Bangalore – 560 100. India **FCC Registration No.: 176555; IC Assigned Code: 3466E**		

geprüft / *tested by:*

08.01.2014	Saibaba Siddapur Engineer	Saibaba
Datum *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*

kontrolliert / *reviewed by:*

10.01.2014	Raghavendra Kulkarni Sr.Manager	Kulkarni
Datum *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*

Sonstiges /*Other Aspects:* **FCC ID : VW4A091731**

Abkürzungen:				***Abbreviations:***			
	P(ass)	=	***entspricht Prüfgrundlage***		***P(ass)***	=	***passed***
	F(ail)	=	***entspricht nicht Prüfgrundlage***		***F(ail)***	=	***failed***
	N/A	=	***nicht anwendbar***		***N/A***	=	***not applicable***
	N/T	=	***nicht getestet***		***N/T***	=	***not tested***

Test Result Summary

Clause	Test Item	Result
FCC 15.209 / FCC 15.205	Spurious Radiated Emissions and Restricted Bands of Operation	Pass

Note:
The Module is certified for FCC with FCC ID: **VW4A091731** with respect to the changes made in the module, Class 2 permissive change is been applied and hence only radiated tests are performed.

Content

List of Type and Measurement Instruments

Equipment	Manufacturer	Model	S/N	Calibration Due Date
EMI Test Receiver	Rohde &Schwarz	ESU 40	100288	04.10.2014
Hybrid Log Periodic antenna	ETS Lindgren	3142D	00081354	10.10.2014
Broadband Horn Antenna	Frankonia	HAX-18	HAX18-802	10.10.2014
Emission Horn Antenna	ETS Lindgren	116706	00107323	01.11.2014
Active Loop Antenna	Frankonia	LAX-10	LAX-10-800	01.11.2014
Spectrum Analyser	Agilent Technologies	E4407B	US41192772	22.03.2014

Testing Facilities:

1) TUV Rheinland (India) Private Limited
No. 108, West Wing
Electronic city Phase I
Bangalore – 560100

General Product Information

Product Function and Intended Use

The ZigBit ATxmega256A3U + RF233 is a ZigBit module with the Atmel ATxmega256A3U microcontroller and AT86RF233 radio transceiver. The AT86RF233 radio transceiver supports the worldwide accessible 2.4GHz ISM band. The system is designed for standard-based applications such as ZigBee/IEEE 802.15.4, ZigBee RF4CE, and 6LoWPAN, as well as high data rate ISM applications. The MS147 connector allows conducting RF performance measurements.

Ratings and System Details

Operating Frequency	2400MHz – 2483.5MHz
No. of channels	16
Channel Spacing	5MHz
Modulation	DSSS (O-QPSK)
Data Rate	250 kbps
Antenna Type	Refer Page 7 of 11
Number of antenna	One
Antenna Gain	Refer antenna dada sheet
Supply Voltage	1.8V to 3.6VDC
Dimensions	33 mm x 20 mm x 0.7mm
Environmental	-20 to +85 degrees C range

Test Conditions:

Voltage: Voltage: 5 V DC (from USB Port)

Environmental conditions:

Temperature: +23 º C **RH:** 62%

Test Set-up and Operation Mode

Principle of Configuration Selection

Transmission was enabled with 100% duty cycle on low, mid and high channel.

Test Operation and Test Software

Test software was used to enable the transmission with 100% duty cycle and channels in 2.4 GHz band on the EUT for the tests in this report.

Special Accessories and Auxiliary Equipment

- None

Countermeasures to achieve EMC Compliance

- None

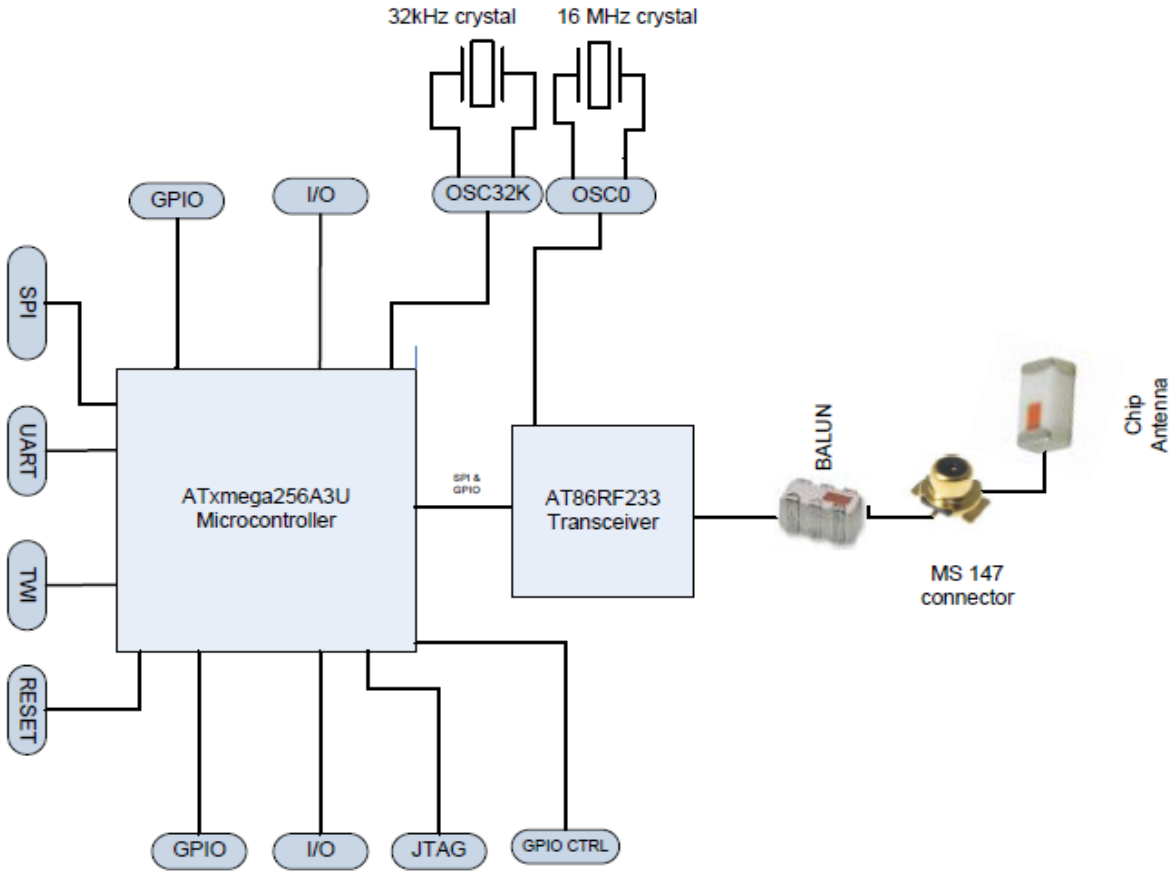
Table of frequencies

Frequency Band	Channel No.	Frequency (MHz)
2400-2483.5 MHz	11	2405
	12	2410
	13	2415
	14	2420
	15	2425
	16	2430
	17	2435
	18	2440
	19	2445
	20	2450
	21	2455
	22	2460
	23	2465
	24	2470
	25	2475
	26	2480

Note: Peak Power Testing carried with different register value for different channel as listed below

Channel	Transmit power Register Value
Low	0x0
Mid	0x0
High	0x12

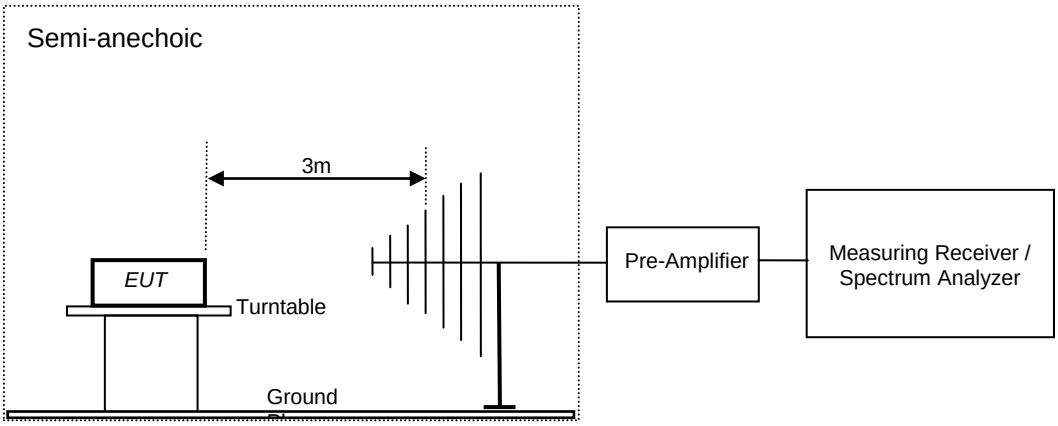
Block Diagram



Test Methodology

Radiated Emission Test

The radiated emission measurement was performed according to the procedures in ANSI C63.4-2003. The equipment under test (EUT) was placed at the middle of the 80 cm high turntable, and the EUT is 3 meters far from the measuring antenna. The turntable was rotated 360° for obtaining the maximum emission. The height of the measuring antennas was scanned between 1m and 4m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained. The measurement above 1000MHz was performed by horn antenna. The measurement below 30MHz was performed by loop antenna.
The EUT was rotated around the X-, Y-, and Z-Axis and the results from worst case axis are recorded.



Test Results

Spurious Radiated Emissions and Restricted Bands of Operation **Section 15.209 and 15.205**

Result **Pass**

Test Specification	FCC Part 15 Subpart C
Measurement Location	Semi Anechoic Chamber
Measuring Distance	3m
Detection	QP for frequency below 1GHz, Peak and Average for frequency above 1GHz
Requirement	As per the limits mentioned in the bellow table

Limit for Radiated Emission of Section 15.209:

Frequency (MHz)	Field strength (μV/m)	Field strength (dBμV/m)	Distance of Measurement (m)
0.009 – 0.490	2400/F(kHz)	48.50 – 13.80	300*
0.490 – 1.705	24000/F(kHz)	33.80 – 23.00	30*
1.705 -30	30	29.54	30*
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

Remark: * the limit shows in the table above of frequency range 0.009 – 0.490, 0.490 – 1.705 MHz and 1.705-30MHz is at 300 meter, 30 meter and 30 meter range respectively, which corresponds to 88, 50 – 53.80, 53.80 – 43.00 and 49.5dBμV/m at 3m range by extrapolation calculation and the measurement of loop antenna.

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 result:

Worst case emissions observed are listed below.

Antenna Polarization	Frequency of Emission (MHz)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Vertical	239.71	28.88	46.00	-17.12
Horizontal	239.81	24.15	46.00	-21.85

Emission above 1 GHz:

Fundamental Frequency (MHz)	Antenna Polarization	Frequency of Emission (MHz)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2405	V	2398.1(Pk)	45.09	74	-28.91
		2390(Av)	29.72	54	-24.28
		2405(Pk)	89.84	*	-
		2405(Av)	87.07	*	-
		4810(Pk)	50.61	74	-23.39
		4810(Av)	38.76	54	-15.24
	H	2390(Pk)	46.57	74	-27.43
		2390(Av)	38.2	54	-15.80
		2405(Pk)	102.2	*	-
		2405(Av)	99.34	*	-
		4810(Pk)	54.14	74	-19.86
		4810(Av)	44.88	54	-09.12
2440	V	2440(Pk)	90.94	*	-
		2440(Av)	87.95	*	-
		4880(Pk)	50.92	74	-23.08
		4880(Av)	39.49	54	-14.51
	H	2440(Pk)	102.97	*	-
		2440(Av)	100.14	*	-
		4880(Pk)	53.22	74	-20.78
		4880(Av)	43.9	54	-10.10
2480	V	2480(Pk)	80.8	*	-
		2480(Av)	77.96	*	-
		2483.5(Pk)	50.12	74	-23.88
		2483.5(Av)	41.83	54	-12.17
	H	2480(Pk)	91.56	*	-
		2480(Av)	88.73	*	-
		2483.5(Pk)	52.87	74	-21.13
		2483.5(Av)	52.87	54	-01.13
		4960(Pk)	50.47	74	-23.53
		4960(Av)	38.48	54	-15.52

* - --> Fundamental Frequency
Pk--> Peak Detector
Av--> Average Detector

Note: Emission measurement from 1GHz to 26GHz was done by rotating the EUT, and changing the antenna in both height and polarization, to maximize the measured emission. The emission was kept within the illumination area of the 3 dB beamwidth of the antenna so that the maximum emission from the EUT was measured.