



THE ARGOS CHIPSET: LESS POWER = LONGER BUOY LIFETIMES

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SCIENTIFIC AND TECHNICAL WORKSHOP
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MOTIVATION FOR CHIPSET DEVELOPMENT

- Need an ARGOS 4 Compatible XMTR
- Low price -> Maximum Integration
- Low Power Consumption
 - Longer lifetime (100k bits -> 1 Mbit data)
- Low Weight and Size (<5g transceiver with external components)
 - Will be dominated by battery
- FLEXIBLE solution for Many Different Applications: fish, bird, mammal, buoy, container, SAR



ARGOS Chipset

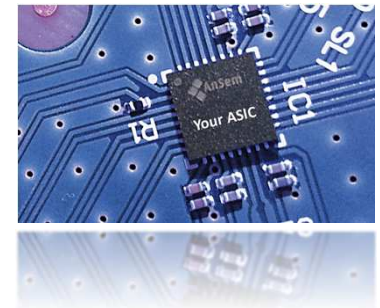
- **Project objective is to design, manufacture and test a prototype of a miniaturized, low-cost ARGOS-3/-4 satellite chipset (ASIC) that enables two way communications and provides improved battery lifetime**
- **Through the ESA Artes-5 program, both the Belgium Space Agency and CNES are supporting the project (2 M€)**
- **ESA submitted a tender in 2012 :**
 - **To develop a low cost Argos 3/4 chipset (5 mm x 5 mm)**
 - **To develop a low cost pop-up tag integrating the Argos chipset**
- **The development consortium selected by ESA:**
 - **ANSEM : Belgium company (primary company of the consortium)**
 - **CLS**
 - **STAR-ODDI : Icelandic company**



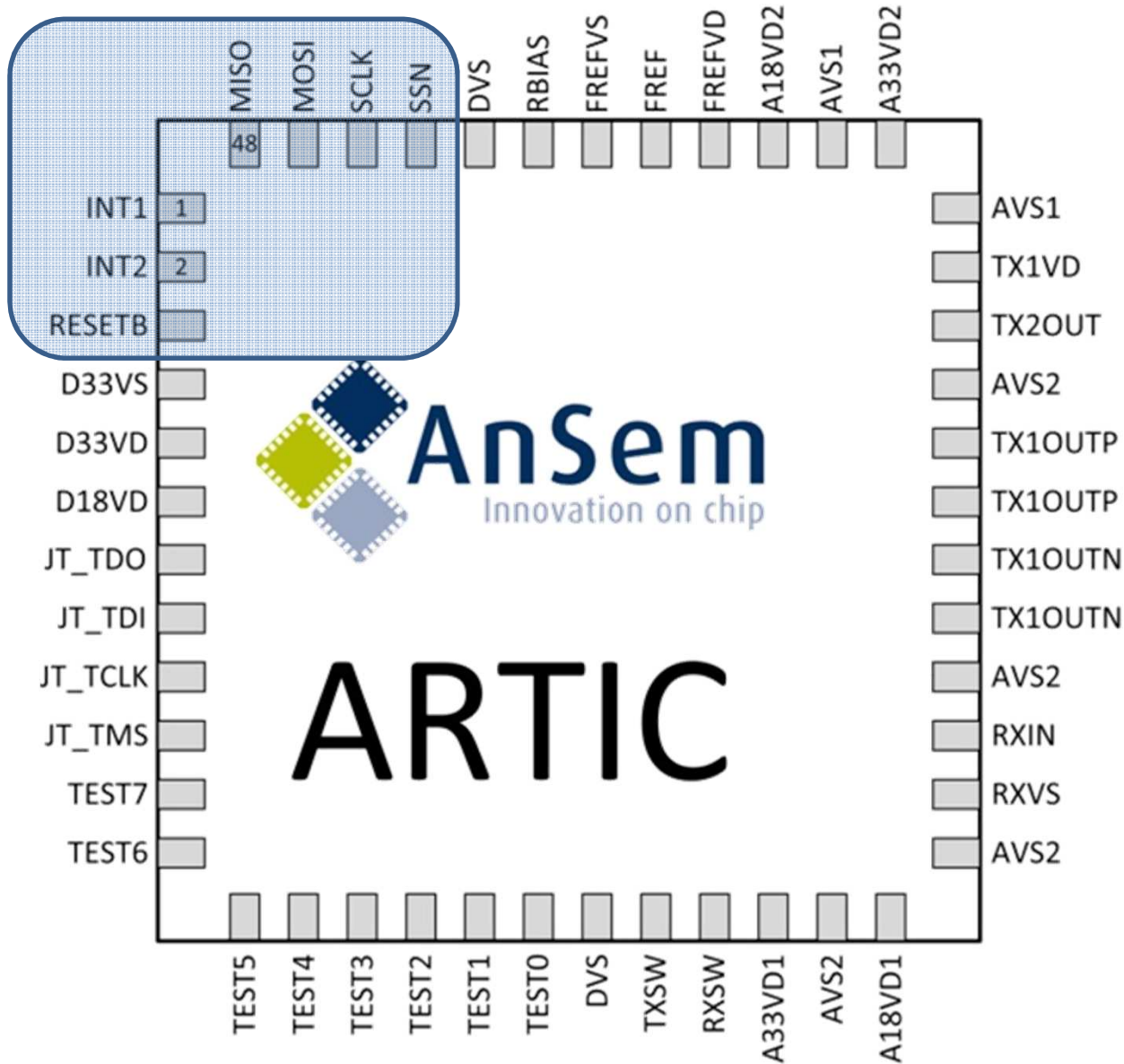
THE PROJECT



- 30-month ESA funded project for the development of a miniature, low-cost Argos-3/4 transceiver
- Will enable two way communications and provide increased battery lifetime
- SHARC: Satellite High-performance ARGOS-3/-4 Receive/Transmit Communication
- Argos-2/3/4 RF module on a single chip
- Product developed by Ansem (Belgium)
- This is a tool not a competitor!



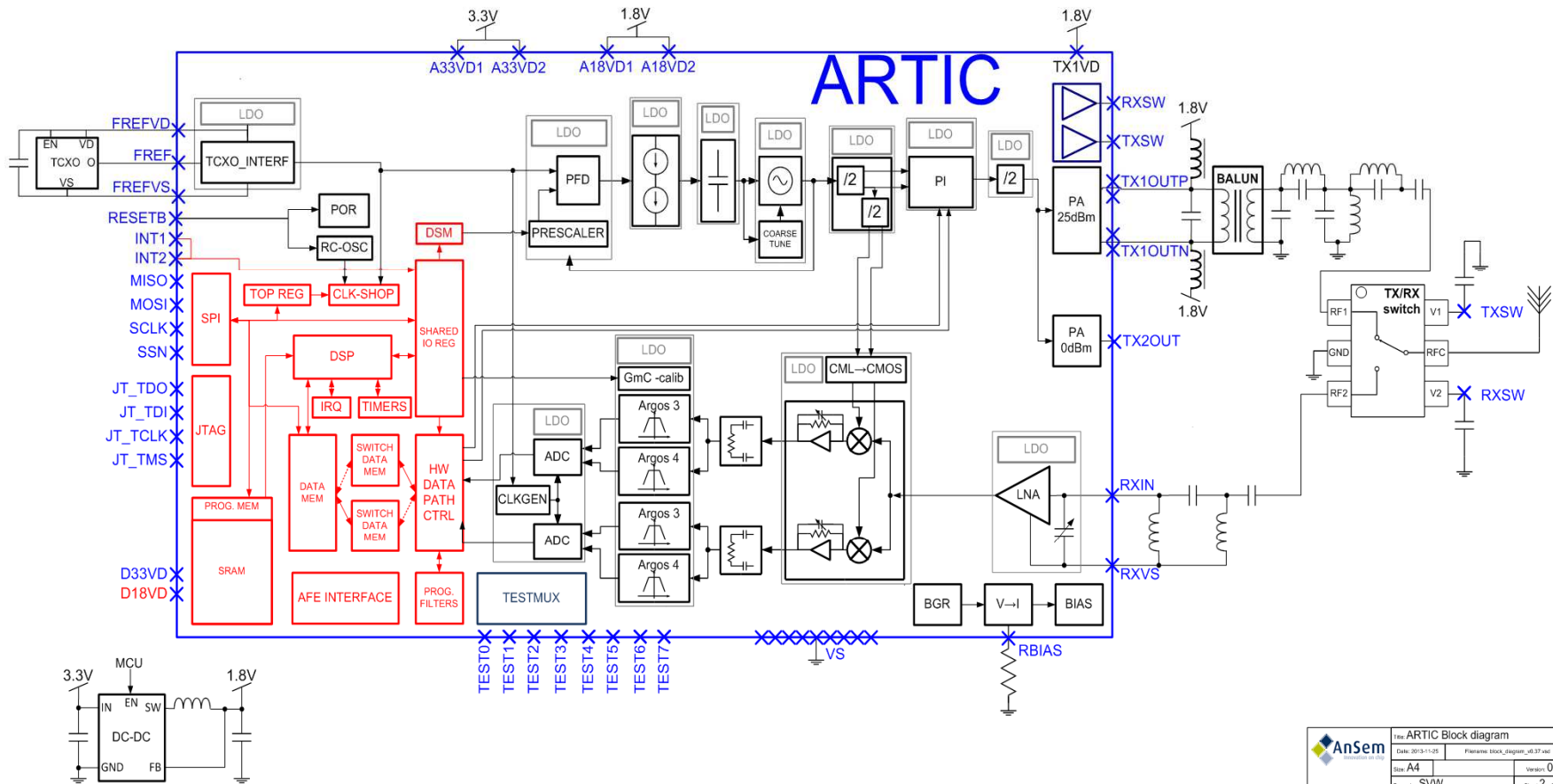
QFN48 , 7X7mm



Interaction with μ C

- SPI
 - Upload transmit payload
 - Download received payload
 - Select TX and RX mode (8 bit instruction)
 - Start transmit or receive command (8 bit instruction)
- Intelligent interrupt system
 - INT1 and INT2 different meaning depending on command
- Receive packet filtering available on board
 - Transparent
 - All cast
 - Individual
 - Group

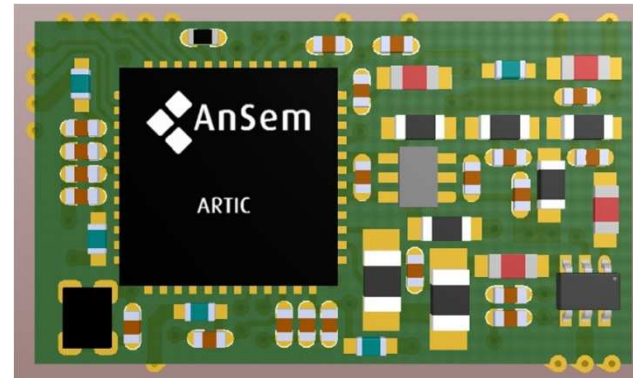
Overall Schematic



	File: ARTIC Block diagram	
	Date: 2013-11-28	Filename: stock_diagram_06.37.vsd
	Size: A4	Version: 0.37
	Drawn by: SVW	Sheet 2 of 2
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PCB (2.0 x 1.15 cm)

- PCB with all transceiver components on
- QFN48 ARTIC
- TCXO
- Balun
- TRX-switch



RCVR/XMTR SPECIFICATIONS

Receiver characteristics	Min	Typ design	Max	Comment
Active power consumption		A3 15mA A4 20mA		
Sleep mode power consumption		<1 μ A		
Receive frequency range (MHz)	465.9725		466.0025	
Overall receive noise figure NF		3dB		
3 dB overall analog bandwidth	1 MHz			From LNA input to sampled ADC output
Sensitivity at LNA		-124dBm		For BPSK modulation @ 400bps
Sensitivity variation due to temp			3 dB	-30 C to +50 C
Data rate tolerance	-1 %		+ 1%	
Receiver input impedance		50 Ω		Before TRX switch and imp. transform

Transmit characteristics	Min	Typ design	Max	Comment
Active power consumption		350mA		Excluding external PA (if used)
Sleep mode power consumption		<1 μ A		
Transmit frequency range (MHz)	399.91		401.68	
Output power (external PA)			5W	External PA (for 3.6W on antenna)
Output power (internal PA)			250 mW	Internal PPA
Phase noise @ 1 kHz		-97dBc/Hz		Unmodulated CW (without PI, Div2, PA)
Output impedance		50 Ω		After TRX switch and impedance match
Quadrature phase accuracy	-4 °	+/-3°	+4 °	QPSK @ 400 sps

ARTIC

- Compatible with all available modes:
 - Argos 4 RX mode
 - Argos 3 RX mode
 - Argos 3 RX backup mode
 - PTT-A2 TX mode
 - PTT-A3 TX mode
 - PTT-ZE TX mode
 - Argos 3 PTT-HD TX mode
 - Argos 4 PTT-HD TX mode
 - Argos 4 PTT-MD TX mode
 - PTT-VLD TX mode

Command Set

8 bit command word	Setting command
00000001	Set Argos 4 RX mode
00000010	Set Argos 3 RX mode
00000011	Set Argos 3 RX backup mode
00000100	Set PTT-A2 TX mode
00000101	Set PTT-A3 TX mode
00000110	Set PTT-ZE TX mode
00000111	Set Argos 3 PTT-HD TX mode
00001000	Set Argos 4 PTT-HD TX mode
00001001	Set Argos 4 PTT-MD TX mode
00001010	Set PTT-VLD TX mode
8 bit command word	Instruction command
01000001	Start continuous reception
01000010	Start receiving 1 message
01000011	Start receiving 2 message
01000110	Start reception for fixed time
01001000	Transmit one package and go to sleep (give Interrupt)
01001001	Transmit one package and start continuous reception
01010000	Go to sleep
01010101	Satellite detection
10XXXXXX	Clear interrupt line 1
11XXXXXX	Clear interrupt line 2

Development Sets Will Be Available

- **Datasheet**
 - Containing all information about ARTIC chip
 - Settings
 - Instructions
- **Evaluation board**
 - Contains complete transceiver with external components
 - Connections to μC
- **ARTIC samples**
- **Demo software for μC in C language**
 - Communication with ARTIC chip
 - Transmit and receive demo program

TAGS that will be used during test phase

- Made by STAR-Oddi
- Contain:
 - Sensors
 - Light
 - Pressure
 - Temperature
 - Tilt
 - Salinity switch
 - Pass prediction software
 - Location calculation based on light

STAR : ODDI
Logging Life Science



TIMING

- Evaluation of first samples – Summer 2014
- Improved version ready for Developer testing: Summer 2015
- Tagging first animals summer 2015

Tuna

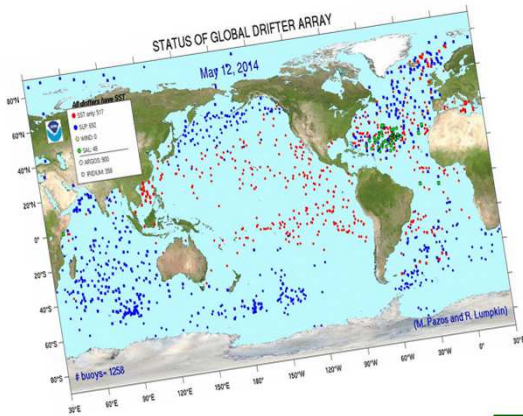


Shark



- Production available from early 2016
- Stand alone version for COSPAS-SARSAT is also being developed

Argos For the Buoy Community



System:

High link budget
Global coverage
Data Timeliness

Transmitting Devices:

Small, light, flexible form factor,

Low power consumption,

Non-GPS positioning,

Dedicated to harsh environmental conditions,

Basic communication protocol,

Transfer of medium datasets (several 10s KB/day)



THANK YOU