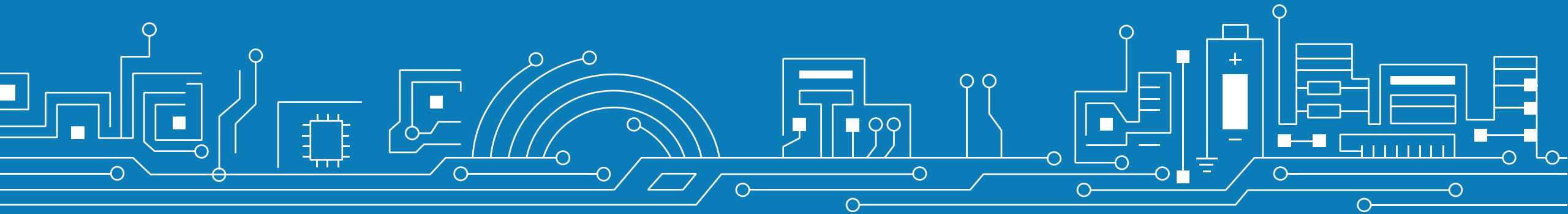# ALLYSTAR Company Profile

About ALLYSTAR

ALLY·STAR

ALLY to associate or connect by some mutual relationship

STAR the truth north, direct to polestar

ALLYSTAR is the group of experienced people in GNSS field to create novel chip/module/algorithm for location technologies

Complete GNSS team with GNSS RF/BB/ALGM and AE experts to provide chip/module solutions

Multi-culture GNSS team with ~200 people from China, Canada, and India
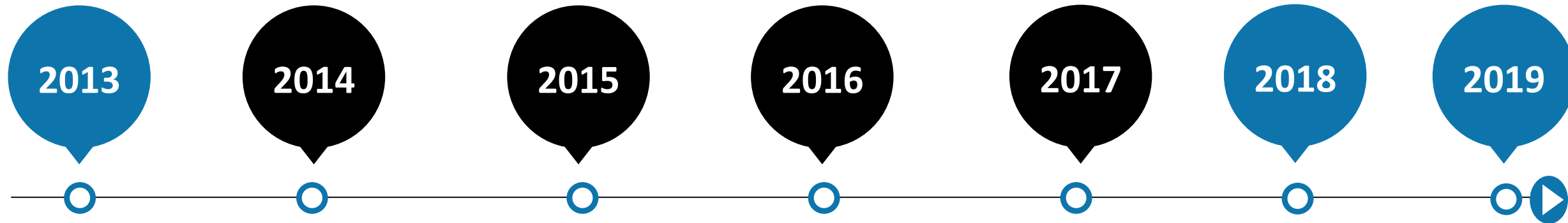
Pioneer GNSS team with leading multi-band GNSS product which supports L1/L2/L5/L6 signals
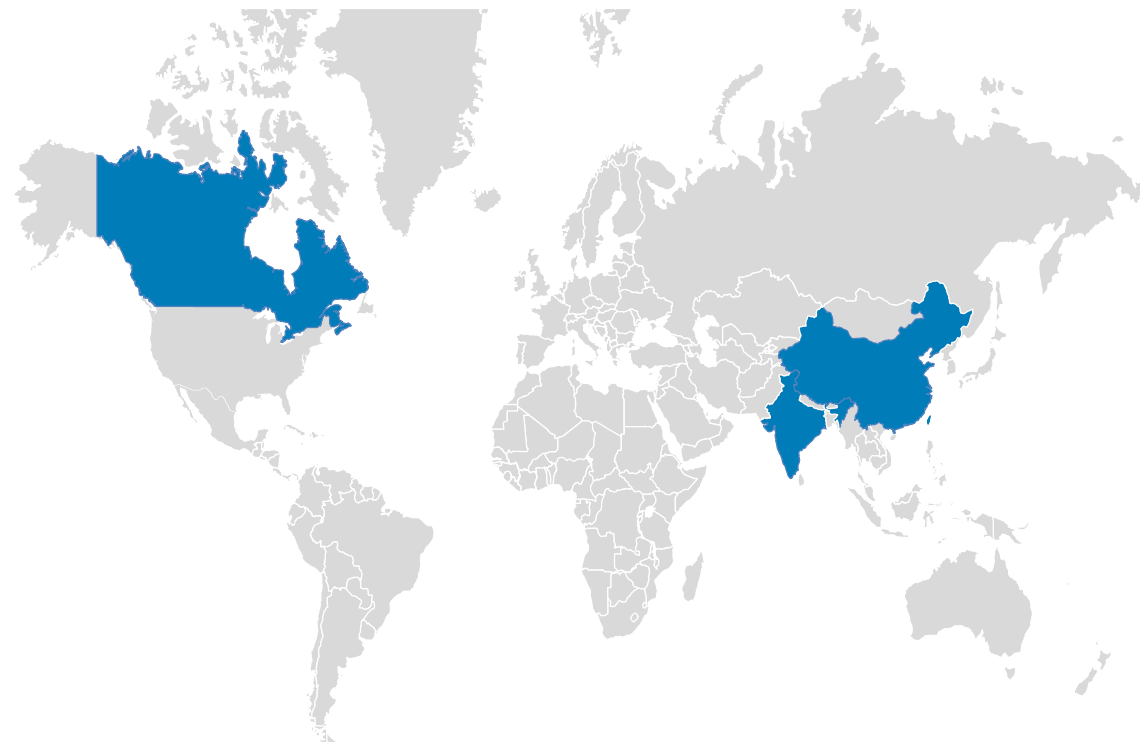
SHENZHEN / BEIJING / HONG KONG / TAIPEI / CALGARY / DELI

Milestones At a Glance

2013   **2014**   **2015**   **2016**   **2017**   **2018**   **2019**

Team established and entered GNSS market

Acquired Fujitsu GNSS team (part of MCU business group); Re-organized HED wireless LAN team; HD8010 (GPS) shipped to Japan and China markets.

1st Beidou SoC supplier in China

BeiDou/GNSS products launched to the market.

HD8020 GNSS chipset in MP

HD8020 Beidou/GNSS SoC chip to China and WW markets

HD8030 GNSS MCU chipset in MP

HD8030 GNSS MCU chip to consumer markets

ALLYSTAR technology established

Launched the world leading multi-frequency and multi-system GNSS SoC chip. HD8040 is the first GNSS chip which supports Beidou-3 satellites.

HD8040 GNSS chipset in MP

HD8040 GNSS chip to consumer markets; design-in LENOVO smartphone 600K+ pcs shipment

GNSS Module in MP

Allystar's production partners

- Working with the world's best supplier for
  - Access to leading IC technology
  - Highest manufacturing quality
  - Reliable supply chain
  - Capacity for a fast volume ramp up

Main wafer fab	Alternative wafer fab	Wafer testing	Packaging and final test
Located in Taiwan	*Located in Japan*	*Located in Taiwan*	*Located in Taiwan*

Innovator in Muti-band GNSS solutions recommended by ABI research @2020

ALLYSTAR

■ Allystar
Multi-Frequency, Multi-Constellation GNSS Chipsets Addressing Mass Market Challenges

❶ Company Background

Established in 2016, Allystar Technology is a Shenzhen based GNSS chipset designer that specializes in multi-band and multi-constellation SoCs targeting a wide variety of mass market applications including consumer and IoT, with a predominant focus on automotive markets to date. The company also provides high-precision antennas for dual-frequency GNSS.

INNOVATOR IN COMPACT, MULTI-BAND GNSS SOLUTIONS

❷ Innovation Outline

Allystar's major innovation comes from its multi-band, multi-constellation GNSS SoCs based on its CYNOSURE III architecture. The CYNOSURE III architecture is capable of supporting 4 GNSS frequency bands (two simultaneously) including L1/L2/L5/L6 on the same chip, alongside support for all constellations including GPS, BeiDou, GLONASS, Galileo, QZSS, IRNSS, and SBAS. In contrast, many other multi-band solutions on the market today are only capable of supporting L1/L5. The major benefit of such a solution is scalability and flexibility, enabling Allystar to effectively meet the varied needs of different customers, from sub-meter to centimeter level accuracy, at lower cost. Alongside this, in contrast to other multi-band GNSS solutions that leverage multiple narrow-band RF front ends, Allystar's multi-band GNSS SoCs leverage a single wide-band RF front end. This allows for a simpler board design, more compact board dimension, and reduced power consumption versus traditional solutions. Allystar claims that its dual-band GNSS module size are smaller than existing solutions, offering dimensions of just 7.60 x 7.60 mm2. Comparable modules from other vendors are normally considerably larger. Allystar's solution also offers low power consumption of just 35mA in full dual band mode, which can be further reduced to 16mA when running GPS only. Power consumption of solutions from other vendors can be more than double this, depending on the package size. Alongside this, the Cynosure III architecture is also futureproof, enabling customers to easily upgrade over time due to pin-to-pin compatibility between different chipsets. For example, a customer could upgrade from a single-band chipset to multi-band without an extensive redesign, allowing them to easily support higher accuracy GNSS over time.

华大北斗 ALLYSTAR

❸ Impact Assessment and Threats

There is a strong desire for more accurate, robust, and reliable GNSS solutions without compromising power consumption. This is to better support a wide range of use cases including augmented reality, navigation, mapping, fitness tracking, asset tracking, surveying, and vehicle automation, among others. With traditional single band GNSS solutions, accuracy is at the meter level at best, while performance can significantly decline within urban canyons. While multi-frequency solutions attempt to address this, many existing solutions have comparably high power consumption, while the board size is often several times larger than is required for mass market adoption. Allystar's solutions directly address these major limitations of traditional GNSS chipsets, and their solutions have already been adopted within Lenovo's Z6 smartphones to enable sub-meter level accuracy. While Allystar will find it difficult to build a strong presence in smartphones in a market that is transitioning towards more integrated platforms from the likes of Qualcomm and Mediatek, among others, the company is likely to find success in other mass market devices where low-power or high precision multi-frequency solutions are required. These include but are not limited to wearables and fitness trackers, precision agriculture, UAVs, automotive, autonomous vehicles, and asset tracking devices.

ALLYSTAR HD8040

❹ Expectations

ABI Research anticipates that Allystar will begin to broaden its horizons outside of the Asia-Pacific region and build its market presence in high precision applications thanks to its strong combination of accuracy, reliability, scalability, low power consumption, compact sizing, and competitive price points. Allystar also has diverse partners across many segments of the market which will help them expand their geographical footprint even further. The company is also expected to continue innovating in order to further reduce power consumption and cost, helping dual-frequency solutions grow even further. The company is very well placed to take advantage of ABI Research's anticipated growth in multi-frequency GNSS solutions in the coming years across many applications.

ALLYSTAR GNSS MODULES

Model	Physical		Grade			GNSS							Accuracy			Features							Interface			
	Image	Size (mm)	Standard	Professional	Automotive	Band	GPS	BDS	GLONASS	Galileo	QZSS	IRNSS	Meter	Sub-Meter	Centi-Meter	Build-in LNA	Data Logging	Programmable(Flash)	D-GNSS	RAW Data	RTK Rover	Dead Reckoning	USB	UART	I2C	SPI
TAU1103		10*10	●			L1	●	●			●		●			●	●	●	●					●	●	
TAU1105			●			L1	●	●	●	●	●		●			●	●	●	●					●	●	
TAU1111		12*16	●			L1	●	●	●	●	●		●			●	●	●	●				●	●	●	●
TAU1201		12*16	●			L1/L5	●	●	●	●	●			●		●	●	●	●	●[1]			●	●	●	
TAU1204			●			L1/L5	●	●	●	●	●	●		●		●	●	●	●				●	●		●
TAU1202		10*10	●			L1/L5	●	●	●	●	●			●		●	●	●	●					●	●	
TAU1205			●			L1/L5	●		●	●	●			●		●	●	●	●					●	●	
TAU1302		12*16		●		L1/L2/L5/L6	●	●	●	●	●				●	●	●	●	●	●	●		●	●	●	

* [1] Customized firmware supports GNSS raw data output.

2020.12.23 updated

ALLYSTAR
Allystar Technology (Shenzhen) Co., Ltd.

ALLYSTAR External Active GNSS Antenna

Model	Support System	Axial Ratio	Polarization	LNA Gain	Noise Figure	Output SWR	Impedance	Voltage	Power consumption	Connector	Water proof	Mounting	Product assortment (Module)	Dimension (mm)	Image
AGR6301-D079AA0	GPS: L1 BDS: B1I/B1C GLONASS: L1 Galileo: E1 QZSS: L1-C	<2dB	RHCP	25dB	≤2dB	<2.5	50Ω	3.0~5.0V	<15mA	SMA	IP67	Magnet	TAU1105 TAU1111	56.5x56.5x21	
AGR6302-D079AA0	GPS: L1, L2C BDS: B1I, B1C, B2I Galileo: E1, E5b GLONASS: L1 QZSS: L1-C/ L2C	<2dB	RHCP	27dB	≤2dB	<2.5	50Ω	3.0~5.0V	<20mA	SMA	IP67	Magnet	TAU1302 TAU1312 TAU1201 TAU1202 TAU1204 TAU1205	D79xH24	
AGR6303-D079AA0	GPS: L1, L1C, L5C BDS: B1I, B1C, B2a Galileo: E1, E5a GLONASS: L1 QZSS: L5 IRNSS: S-L5	<2dB	RHCP	27dB	≤2dB	<2.5	50Ω	3.0~5.0V	<20mA	SMA	IP67	Magnet	TAU1302 TAU1312 TAU1201 TAU1202 TAU1204 TAU1205	D79xH24	
AGR6116-3540AA0-A	GPS: L1, L1C, L5C BDS: B1I, B1C, B2a Galileo: E1, E5a QZSS: L5 IRNSS: S-L5	<3dB	RHCP	28dB	≤2dB	<2.5	50Ω	3.0~5.0V	<15mA	SMA	IP67	Magnet	TAU1201 TAU1202 TAU1204 TAU1205	56.5x56.5x21	

2020.12.09 updated

General Description of TAU11 Series

TAU1105/TAU1111, based on the state of art CYNOSURE III architecture, is a multi-system GNSS positioning module. It supports BDS-3 (BeiDou Navigation Satellite System 3), and are capable of tracking most of the global civil navigation systems (BDS, GPS, GLONASS, Galileo, QZSS and SBAS).

Integrated efficient power management architecture, TAU1105/TAU1111 provides high sensitivity and low power GNSS solutions for navigation applications.

TAU1105
10.1mm*9.7mm*2.5mm

TAU1111
12.2mm*16.0mm*2.4mm

Vehicle Navigation   **Assets Tracking**   **Fleet Management**

General Description of TAU12 Series

TAU12 series is a group of high-performance dual-band GNSS positioning modules, which are based on the state of the art CYNOSURE III architecture and support BDS-3 (BeiDou Navigation Satellite System 3). Besides, they are capable of tracking all global civil navigation systems (BDS, GPS, GLONASS, Galileo, IRNSS, QZSS and SBAS).

With LNA and SAW filter built-in, TAU12 series shows a higher sensitivity and accuracy (sub-meter level) in a complicate urban environment.

12.2*16.0*2.4mm

10.1*9.7*2.5mm

Applications

Vehicle Navigation   Lane-level Navigation   Assets tracking   Smart rearview mirror

GNSS Market & Applications

High precision is 2nd priority

Navigation Market -- Meter Precision

High Precision Market -- Sub-meter Precision

Vehicle

Marine

Person Tracking

Drone

Agriculture

Machine Control

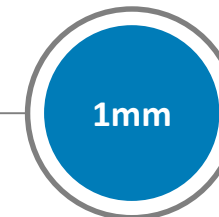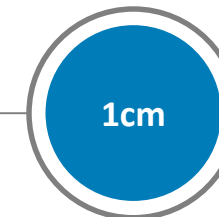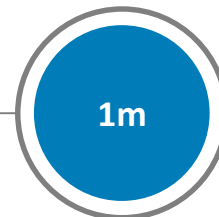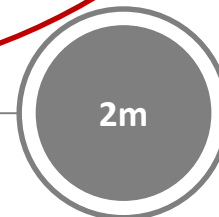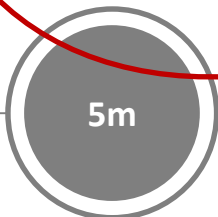Wearable devices

Fleet Management

Asset Tracking

Aviation

Self-Driving

Survey

Allystar's initial focus on Tracking and Telematics

10m 5m 2m 1m 1cm 1mm
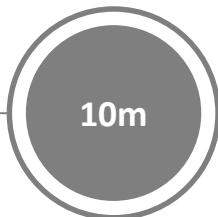
Case #1 Smartphone with Dual-Band GNSS

LENOVO Z6 with ALLYSTAR GNSS (L1+L5)

- Leading dual-band L1+L5 GNSS solution

- Latest BDS-3 & NAVIC signals supported

- Google Android Compatibility Test Suite (CTS) : PASS

- Google Android Vendor Test Suite (VTS) : PASS

- Allystar propriety A-GNSS server

PRODUCT USER HAND BOOK

RECEIVER PROTOCOL HAND BOOK

ANDROID DEVELOPMENT PACKAGE INCLUDING DRIVER AND APPLICATION

ALLYSTAR AGNSS USER GUIDE
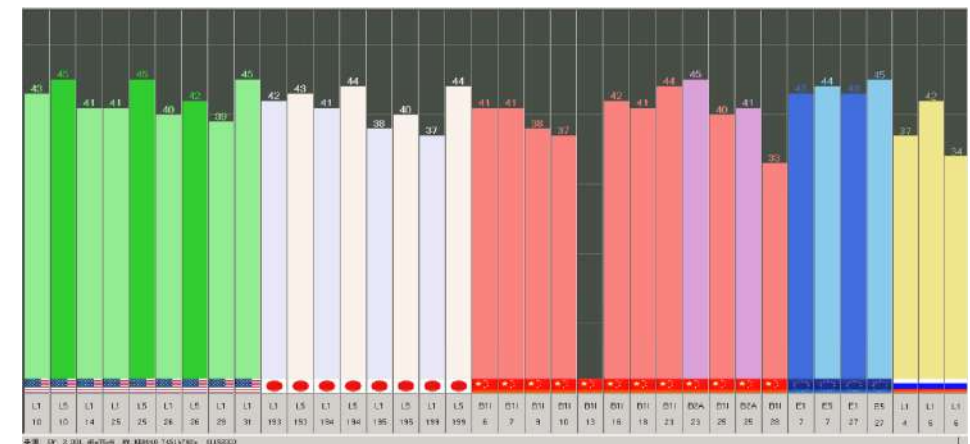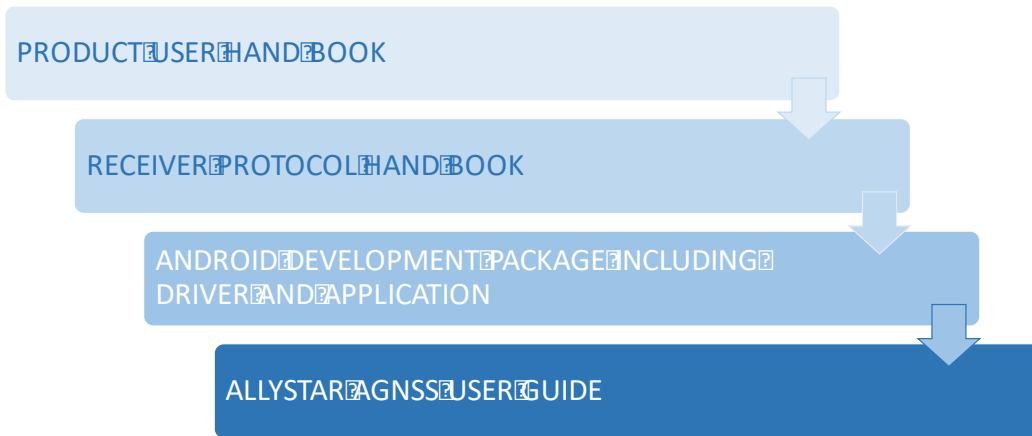
Case #2 Global **TOP** Multi-GNSS Module @**IoT**

AirPrime® XM1210 Specifications

GNSS
`Dual`

- GPS+Glonass, GPS+BeiDou, GPS+Galileo,
- L1 : 1575.42MHz, 1598.0625 ~ 1605.375 MHz, B1 : 1561.098MHz
- QZSS L1, SBAS L1
- Tracking, & Acquisition Channels : (TBC)

Hardware Specs

Dimensions: 9 x 9.5 x 2.1 mm [QFN: 20 pads]
Chipset: HD8021 (Flash)
Main Interfaces
- Serial link: UART, I2C, USB
- Digital: 1PPS, Antenna Detection (Active / Passive)

Built-in Components
- RTC Crystal, TCXO , Additional LNA, Additional SAW-Filter, SMPS

Temperature Ranges
- -40C to +85C (operating class B)
- Storage Temperature: -40C to +85C

Input voltage: 3.0V typical

Key Features

- Compatible with XM11xx Series
- Ultra compact size: 9 x 9.5 x 2.1 mm
- Tracking Sensitivity: -161 dBm
- Tracking power consumption: < 35mA (TBC)
- Positioning Accuracy : <2.0m CEP 50%
- Time-to-first-fix (TTFF): Hot Start : 2s, Warm Start: 30s, Cold Start: 35s
- 1PPS timing accuracy : (TBC)
- Protocols: NMEA standard, Allystar commands
- Development tools: XM1210 development kit, GNSS Evaluation tool

Standard Features
- **Positioning Aids:** A-GPS, SBAS,
- **Security:** Anti-Jamming (TBC)

Certifications and Approvals

- ROHS, REACH

2 Proprietary and Confidential

Thank you