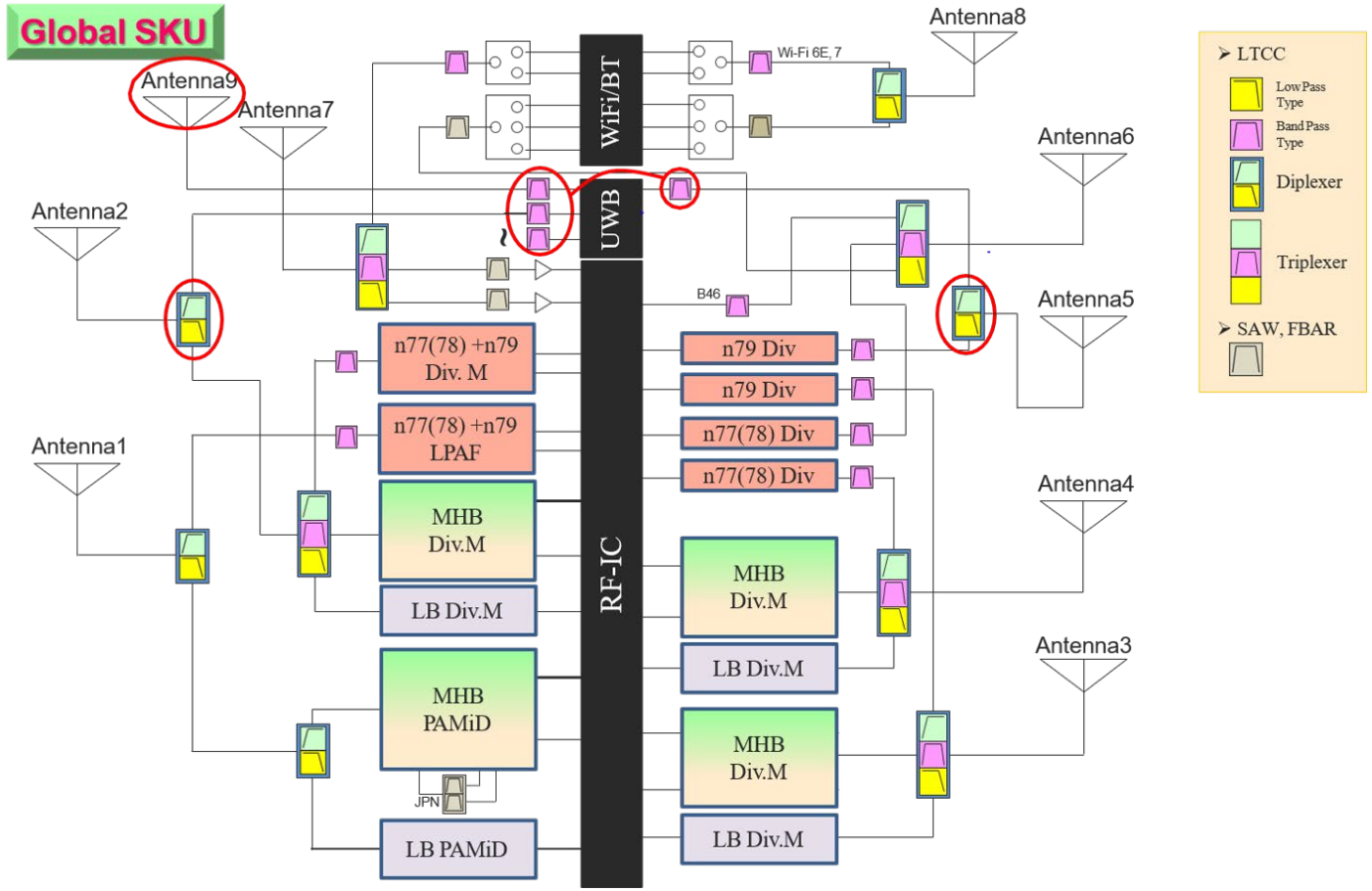
UWB Enabling a Safer and More Convenient Driving Experience

Among the Smallest RF Devices in the Industry
Built on Extensive Experience and Advanced Multilayer Technology

01 UWB Technology Supporting the Evolution of CASE



The automotive industry is undergoing a major transformation driven by CASE (Connected, Autonomous, Shared, and Electric). Among these trends, connected technologies are becoming increasingly important as the foundation for seamlessly linking vehicles, society, and everyday life. According to market research, more than 76 million connected vehicles are expected to enter the market annually by 2030 (Source: Car Connectivity Consortium). At the center of this rapidly expanding market is the growing adoption of **Digital Keys**, which allow smartphones to be used as vehicle keys.

One of the most promising technologies enabling Digital Keys is **Ultra-Wideband (UWB).** Unlike conventional Bluetooth® and NFC technologies, UWB combines centimeter-level positioning accuracy with strong resistance to relay attacks, a vehicle theft method that exploits relayed wireless signals. By delivering both enhanced security and user convenience, UWB is gaining momentum as a key technology for next-generation vehicle access systems (Source: FiRa Consortium). TAIYO YUDEN contributes to the realization of next-generation mobility by providing the RF devices that support UWB technology.

02 TAIYO YUDEN's Strengths in Addressing Key UWB Design Challenges

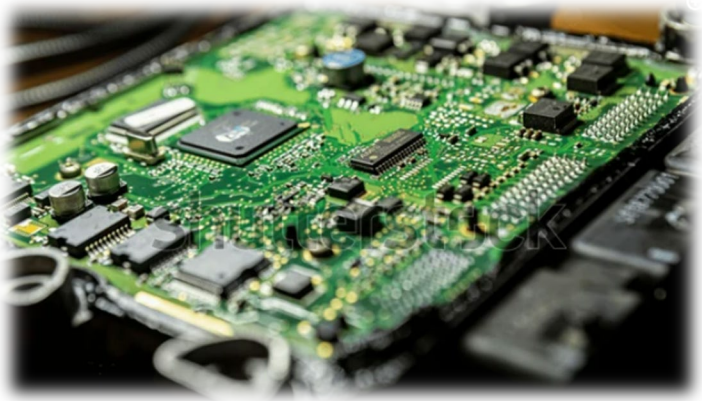
The implementation of automotive UWB systems presents three major technical challenges: miniaturization, radio-frequency interference, and reliability. TAIYO YUDEN addresses these challenges by leveraging its core technological strengths.

【Challenge①】 Demand for Smaller Size and Higher Integration Density

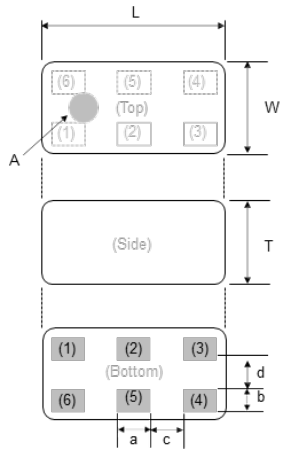
As vehicles become increasingly intelligent, ECUs (Electronic Control Units) and DCUs (Domain Control Units) continue to integrate more functions, driving a steady increase in component count. At the same time, vehicle manufacturers require more compact ECU designs to support sleek vehicle styling, maximize cabin space, and enable optimal antenna placement for 360-degree sensing capabilities. These conflicting demands for greater functionality and smaller form factors require every component within a UWB module to achieve further miniaturization without compromising performance.

TAIYO YUDEN's Solution: Among the Smallest Form Factors in the Industry Enabled by Three Core Technologies

Leveraging its proprietary multilayer technology developed over many years, TAIYO YUDEN utilizes three complementary technologies, FBAR, SAW, and multilayer ceramic technology, to address a wide range of design requirements. In particular, filters based on multilayer ceramic technology achieve form factors among the smallest in the industry. This capability reflects more than compact size alone. It enables TAIYO YUDEN to provide the optimal solution based on performance, size, and cost requirements through a comprehensive RF device portfolio. These miniaturization technologies and extensive product lineup help increase design flexibility and support the development of advanced UWB modules.



1005mm(0402inch)



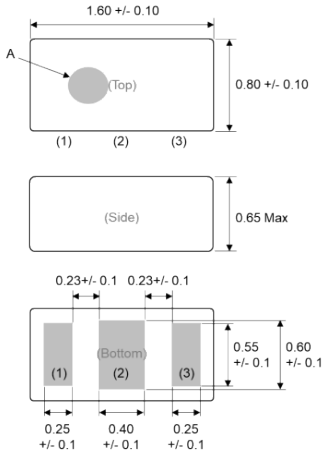
Terminal	
(1)	I/O
(2)	GND
(3)	I/O
(4)	NC
(5)	GND
(6)	NC

Mark	Remark
A	Marking dot

Mark	Dimension	Mark	Dimension
L	1.0 +/- 0.05	a	0.18 +/-0.05
W	0.5 +/- 0.05	b	0.125 +/-0.05
T	0.4 Max	c	0.18 +/-0.05
		d	0.15 +/-0.05

Unit ; mm

1608mm(0603inch)



(1) ; I/O Port
(2) ; GND
(3) ; I/O Port
A ; Marking dot

Unit ; mm

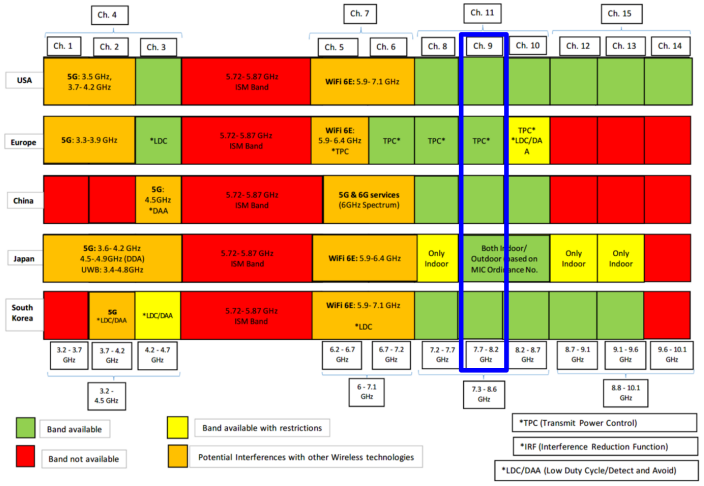
【Challenge②】 Mitigating Radio Interference and Noise

Modern vehicle cabins contain an increasingly complex wireless environment in which multiple radio technologies, including 5G, Wi-Fi, and Bluetooth®, operate simultaneously. The low-power signals used by UWB can be affected by interference from these surrounding wireless transmissions, potentially impacting positioning accuracy and communication reliability. Signal degradation or loss can lead directly to digital key malfunctions and a diminished user experience, making interference mitigation a critical design challenge. Overcoming this challenge requires high-performance filters capable of accurately passing UWB signals while effectively suppressing unwanted noise.

TAIYO YUDEN's Solution: High Quality and Manufacturing Excellence Backed by Extensive Automotive Experience

TAIYO YUDEN applies the world-class manufacturing technologies and production expertise cultivated through its extensive track record in automotive inductors to its RF device portfolio. From development through production, all processes are managed under a highly controlled domestic manufacturing system designed to ensure traceability and stable supply. Built on this robust manufacturing foundation, TAIYO YUDEN filters minimize insertion loss within the UWB frequency band while providing steep attenuation characteristics outside the target band to suppress unwanted signals effectively. These electrical characteristics help maintain stable system performance in noisy wireless environments, supporting reliable operation of automotive UWB systems.

UWB Transmission Channels by Main Country

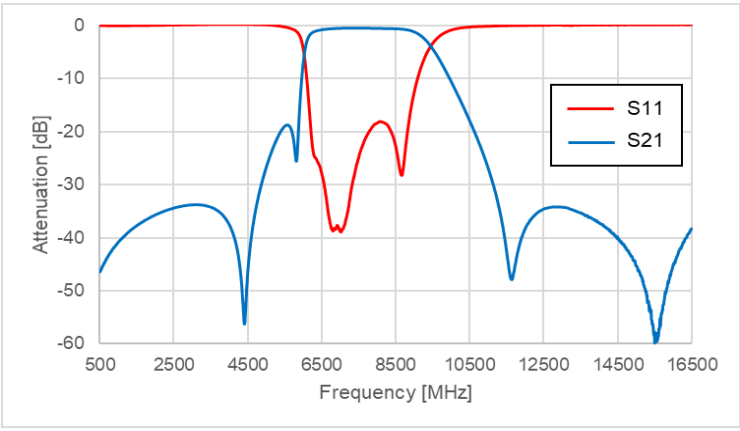


Source: 2024 UWB & Bluetooth report by Techno Systems Research, April 2024

1608mm(0603inch) Band Pass Type

Part Number	TCB1A18D7G24LV0K2TV
System	UWB
Type	Band Pass Type
Passband Freq.[MHz]	6240 to 8250
Loss(max) [dB]	2
Size(mm) [L×W×T]	1.6×0.8×0.65
Temp. [℃]	-40 to 105

UWB CH.5~CH.10



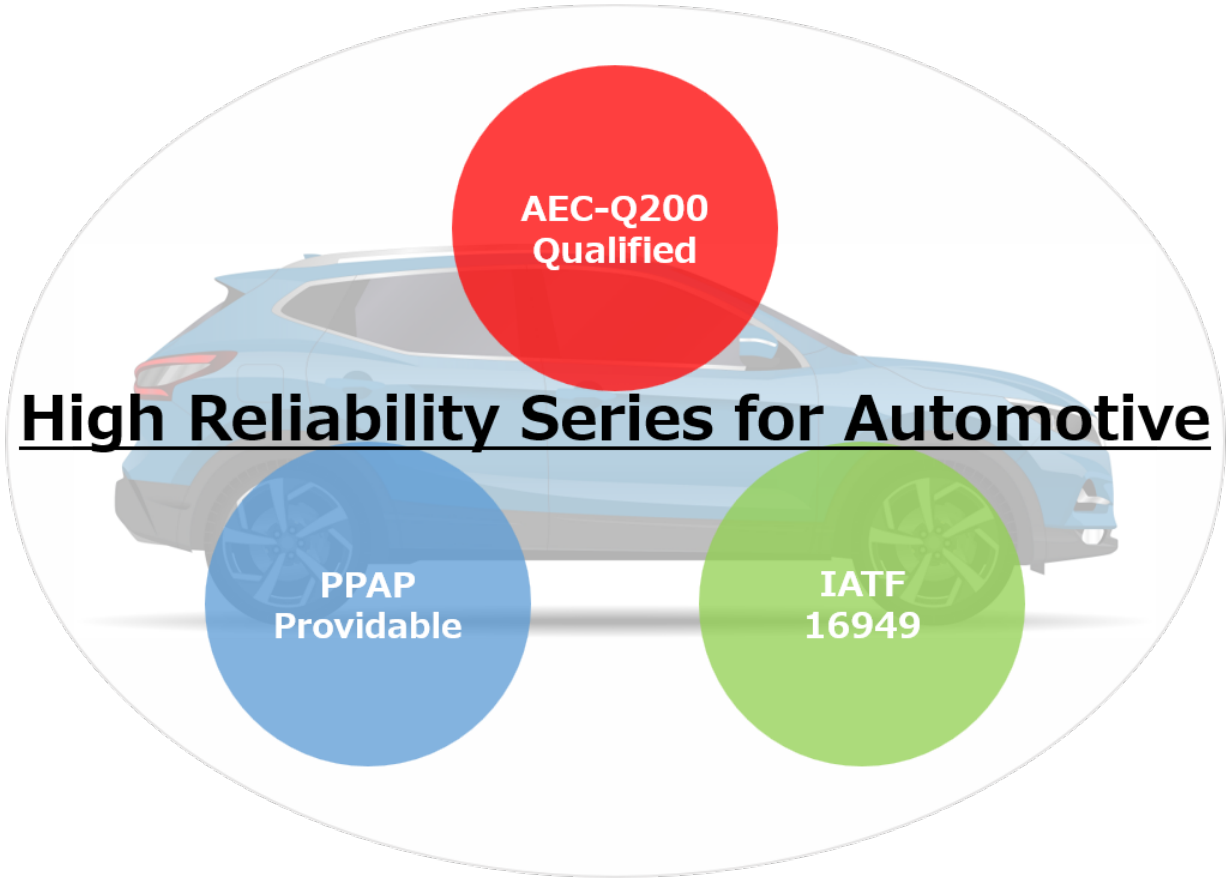
We offer a broad lineup beyond the products featured here.
Please feel free to contact us for additional information and application support.

【Challenge③】 Ensuring Reliability Throughout the Vehicle Lifecycle

Automotive electronic components must operate reliably under harsh environmental conditions, including high temperatures generated by the engine compartment, prolonged exposure to direct sunlight, extremely low temperatures in cold climates, and the shock and vibration associated with rough road conditions. As a result, compliance with international automotive reliability standards and stable performance across a wide operating temperature range are essential requirements for components used in automotive applications.

TAIYO YUDEN's Solution: Robust Automotive-Grade Reliability with Comprehensive Compliance Support

TAIYO YUDEN's automotive products are manufactured at facilities certified to the IATF 16949 international quality management standard and are qualified to AEC-Q200 reliability requirements for passive components. To support customers' design validation and certification processes, automotive qualification specifications compliant with PPAP (Production Part Approval Process) requirements can also be provided. This comprehensive quality assurance framework helps ensure long-term performance, reliability, and safety throughout the vehicle lifecycle.



05 Conclusion

UWB is one of the key technologies driving greater convenience and security in next-generation vehicles. TAIYO YUDEN supports the advancement of automotive UWB systems through RF devices that leverage our strengths in compact design, domestic manufacturing, extensive automotive experience, and robust quality assurance.
As an electronic components manufacturer, we are committed to working alongside our customers to help realize a safer, more convenient, and more connected mobility society.

Item Specs
TY-COMPAS

Contact

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