Fujikura

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Shaping the future with "Tsunagu" Technology.

FUJIKURA NEWS

President's New Year's Message

Looking back on 2021, economic growth was affected by the disrupted supply chain, including for semiconductors, and the impacts of the prolonged COVID-19 pandemic.

Recently, however, we are starting to see signs of recovery in consumption activities driven by the declining number of COVID-19 cases and easing of restrictions. On the other hand, uncertainty persists regarding the future outlook of COVID-19 in Japan considering the worldwide spread of the Omicron variant. Nevertheless, I hope that Japan's economy can get back on track toward normal growth after the supply chain is normalized and personal consumption is boosted through adequate infection control measures.

Next, regarding our earnings forecast for FY2021, the Group's business results for the first half included an operating income to net sales ratio of 5.7% and operating income of 18.6 billion yen. This was driven by demand for data centers and FTTx in each country, which offset the impacts of the worldwide semiconductor shortage and reduced operations at some sites due to the COVID-19 pandemic.

In the second half, it appears that demand for data centers and FTTx along with "nesting" demand will remain firm, but the Automotive Products Business Unit has been impacted by reduced automaker production due to the semiconductor shortage along with the spread of COVID-19 in Southeast Asia. As a result, for the full-year, we expect to see an operating income to net sales ratio of 4.7% and operating income of 30 billion yen.

Fujikura abandoned its 2020 Mid-term Management Plan following significant worsening in our financial results in FY2019. Then we established the 100-day Plan of structural reforms focused on "strengthening governance" and "unreserved selection and concentration of existing businesses," which we have been implementing.

These initiatives are expected to yield 14.5 billion yen at the end of FY2021 in fixed cost reduction effects for our turnaround.

In the next growth phase, we will be reborn as a "new Fujikura." The "new Fujikura" will become a sustainable, promising company to contribute to society through our "Tsunagu (connecting) technology."

We will introduce the information on our group's products through Fujikura News again this year and look forward to your continued patronage.

President & CEO
Masahiko Ito

Development of Waveform Quality Analysis Method in High-speed, In-vehicle LAN

Fujikura has developed a new analysis method enabling highly accurate assessment of waveform quality in high-speed, in-vehicle LAN. This has resulted in reductions in the number of prototypes to be made and lead time for designing wiring for a high-speed, in-vehicle LAN.

With the advancement of driving assistance technology, communication speed needed for in-vehicle electronic components is on increase every year. The protocol of CAN FD(controller area network with flexible data rate), of which communication speed has been increased four- fold to 2Mbps, is just beginning to be adopted in addition to that of 500 kbps CAN (controller area network), which is currently the mainstream.

The CAN FD protocol as well as the CAN protocol are used to construct an in-vehicle LAN by connecting multiple ECUs (electronic control units) to twisted pair cables (TP cables). As shown in Fig. 2, since the communication speed becomes 4 times higher, the time for 1 bit is shortened to a quarter. The requirements for CAN FD waveform quality are severer than those for CAN. The waveform quality of CAN FD largely depends on the properties of ECUs, TP cables and connectors, the location of junctions of TP cables as well as the paths of the wiring harnesses(WHs) that are assembled in vehicles. Therefore, it is necessary to evaluate the waveform quality in a short time at the WH wiring design stage.

To cope with this challenge, we have established high-accuracy waveform quality analysis method. This was enabled by highly accurately modeling the components based on property values using VHDL-AMS (very high-speed integrated circuit hardware description language-analog mixed signal), which is a standard language in the model-based development industry.

The coefficient of correlation between analyzed and measured waveforms is 0.9 or higher (Fig. 4) and has allowed designing WH that secures a good waveform quality in a short time when ECUs are added or the locations are changed.

Furthermore, this analysis method is compatible with the protocol of the next-generation CAN SIC (CAN signal improvement capability) that has a communication speed of 5 Mbps in addition to the CAN FD protocol.

While the advancement of driving assistance and autonomous driving technologies accelerates the communication speed in an in-vehicle LAN and makes the network more complex, we will promote the development that supports the advancement.

Fig. 1 Example of wiring in-vehicle LAN using CAN FD

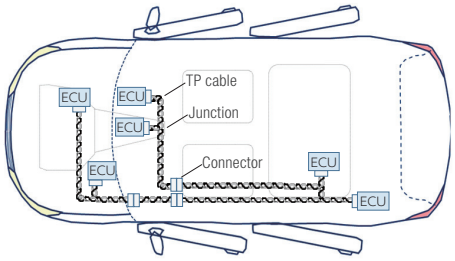


Fig. 2 Comparison of waveforms between CAN and CAN FD

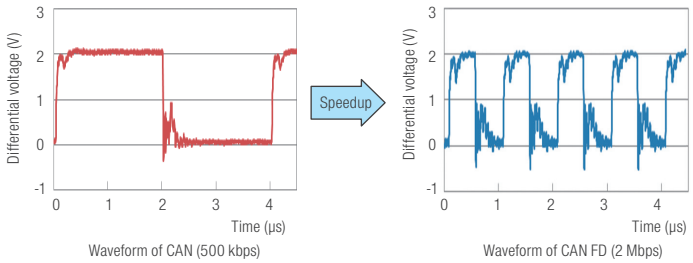


Fig. 3 Analysis of waveform quality

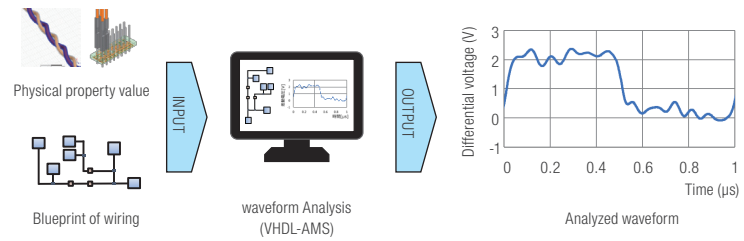
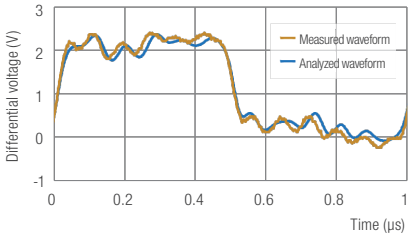


Fig. 4 Comparison of analyzed waveform and measured waveform



Point applicable to SDGs17

Fujikura's analysis method is to solve challenges in speeding up in-vehicle communication and contributes to the advancement of future autonomous driving technologies and creating the foundation of connecting vehicles with people and society.

Automotive Products Business Unit wwwadmin@jp.fujikura.com

Sample shipment starts Cable-type Antenna, the CXPA Series, for RFID Communication in 920 MHz Band

Fujikura Dia Cable Ltd. has developed cable-type antennas, the CXPA series, for RFID (radio frequency identifier) communication in 920 MHz band and start shipping samples.

In recent years, RFID has been attracting attention as one of the IoT (Internet of Things) technologies. In RFID communication, an electronic tag with embedded ID information and an RFID reader-writer communicate with each other using radio waves to transmit information. And it will be a system to manage the "Things" by attaching or incorporating this electronic tag into the "Things". For the example, a leading clothing company manages their products using the product labels with RFID tags.

In order to eliminate the omission of detecting of RFID tags, it is important to wire an antenna optimally according to the arrangement of products.

The newly developed the CXPA is a cable-type antenna (Table 1, Fig. 1) that has a small diameter and can be flexibly bent, so it is possible to manage narrow and long areas specific to cable-type antennas. Furthermore the CXPA can detect almost all thin and wide areas such as a key box by wiring along the objects that need to be managed inside the box.

In addition, the radio wave radiation of CXPA is nearly omnidirectional pattern in the circumferential direction near the antenna, and tags can be detect with high intensity. Also, the tag detecting direction (antenna direction) is perpendicular to the cable axis (Fig. 2).

Cable-type antennas are expected to be used for various purposes such as the management of "Things" at some kinds of shops, storages, and offices, taking advantage of their small diameter, flexibility and high sensitivity. We will continue to widely contribute to the utilization of RFID technology.

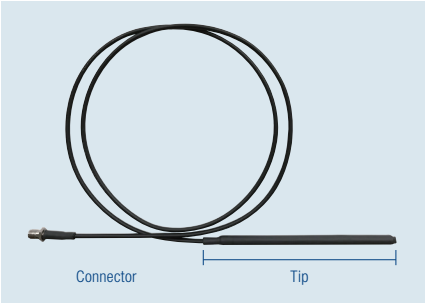
■ Table 1 Properties of the CXPA series (connectors can be chosen according to the installation location)

Product name	CXPA 1.5D SMAJ	CXPA 1.5D SMAP
Diameter of middle part/tip (mm)	Approx. 3/6.3	
Length of tip (mm)	Approx. 120 *2	
Total length (m)	0.5-2.0 (Typ. 1.0)	
Frequency Range (MHz)	915-930	
Maximum antenna gain (dBi) *1	-0.48 (Horizontal)	
Polarization	Linearly polarization	
Nominal Characteristic impedance (Ω)	50	
Connector	SMA-type jack	SMA-type plug

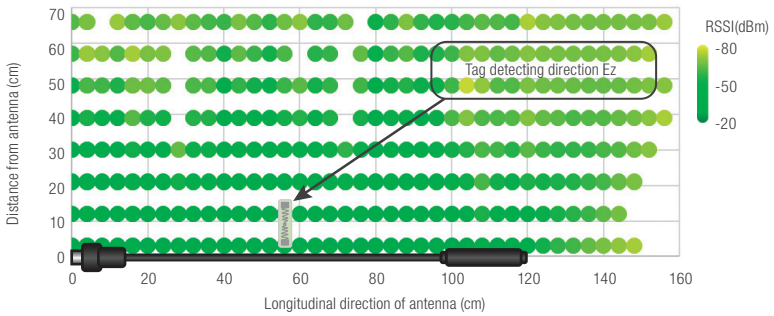
*1 This is a reference value conducted by the test method under Notification No.88 of Ministry of Internal Affairs and Communication based on the attached list No.1-1 (3) of Ordinance on Technical Standards Conformity Certification of Specified Radio Equipment or a test method equivalent to or higher than this. The measurement frequency is 915.9MHz.

*2 The tip does not bend.

■ Fig. 1 Appearance of CXPA 1.5D SMAJ



■ Fig. 2 Distribution of received signal strength indicator (RSSI) on tag in longitudinal direction of antenna (intensity levels view by color gradation)



■ Point applicable to SDGs17

We will contribute to the utilization and development of RFID technologies in various places and fields such as stores, warehouses, factories, offices, etc. by facilitating the management of products using RFID in long and narrow areas using cable-type antennas.

Engineering Department, Fujikura Dia Cable https://www.fujikura-dia.co.jp/contact/

Introduction to Waterproof WEB Series for One-touch Mating

There has been an increasing demand for waterproof connectors to supply electricity to communication devices installed outside buildings such as base stations due to the spread of 5G systems and antenna systems for autonomous driving due to the spread of ITS*.

This product has Fujikura's own one-touch mating structure to consistently reduce working time for connecting connectors. Moreover, the small-sized, waterproof product has achieved space-savings and IP67 waterproof performance and thus helps devices being miniaturized.

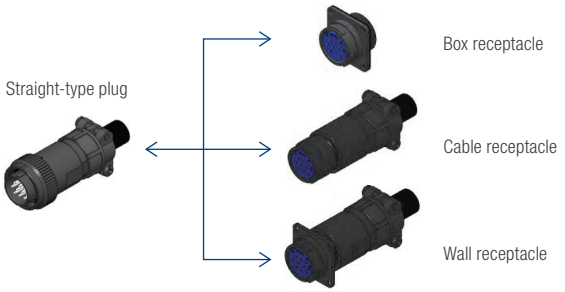
*ITS：Intelligent Transport Systems

■ Table 1 Product specification

Contact diameter		1.0mm	1.6mm
Rated voltage		AC 250V(r.m.s.),DC 350V	
Rated current		5A/pin	10A/pin
Withstanding voltage		AC 1,000 V (r.m.s)/minute	
Insulation resistance		DC 500 V, 1,000 MΩ or higher	
Contact resistance		5 mΩ or lower	
Operating temperature range		-25℃～+85℃	
Mating number		500 times	
Appropriate wire	Conductor diameter	1.0mm or shorter	1.5mm or shorter
	Cross-sectional diameter	0.5mm² or smaller	1.25mm² or smaller

■ Fig. 1 External view

■ Table 2 Combination



■ Points applicable to SDGs17

Fujikura's connectors help improve social infrastructures by adopting a structure that has waterproofness and increases workability on the assumption of exterior use.

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