

HF Band RFID Tags for Toy, Amusement Market

Murata Manufacturing Co., Ltd. provides for the toy and amusement market high frequency (HF) band radio frequency identification (RFID) tags (MAGICSTRAP®) LXTB Series (Photo 1) that can be read by smartphones and portable game machines equipped with near field communication (NFC).

About HF Band RFID

RFID is the technology of automatic recognition through wireless communications, and is used for constructing a system that makes identification and management of various “things” using IC tags. The HF band RFID uses an electromagnetic induction method using the 13.56MHz frequency band, and its communication distance is limited to within 10cm. This distance is shorter than for the ultrahigh frequency (UHF) band (860 to 960MHz), but has excellent features such as being not affected by water. In general, it is widely used in contactless IC cards typified by electronic money, and is often used for payment clearing and settlement and also for personal authentication. Recently, because reading is possible using smartphones and portable game machines, its usage is expanding also for consumer services, such as in amusement facilities.



Photo 1: External image of LXTB Series



Fig. 1: Features of the LXTB Series

Background of Development

RFID was initially used around 2010 as a device that connects the real world and the game world in the toy and amusement market, and is now used in many occasions as often reported. Most of RFID systems actually used follow the standard called NFC, which is a short distance wireless communication standard of the 13.56MHz band. Examples include usage of NFC IC card in card games and embedding of RFID tag inlay (RFID IC joined to antenna) into the base of character figures. By reading these cards and figures with smartphones and readers of home and arcade game machines, characters linked with information on cards and figures may appear and grow in the game. Further, by recording the play information of the game in the memory of the RFID tag, it can also be used by game machines and smartphones of different manufacturers, on which the NFC reader/writer is mounted.

However, because a large size is required for conventional NFC cards that can be read by smartphones and game machines, it is necessary to prepare cards and pedestals as large as 3 to 4cm square to use the NFC function. Products that meet the market demand of RFID tags embedded in character figures have not yet been put to practical use.

Murata has been providing 3.2mm square HF band RFID tags LXM-S33HCNG-134 and LXMS33HCNK-171 since before as standard products of RFID tags (MAGICSTRAP®). They can be read with a dedicated reader, but the small communication distance for the reader of smartphones is a drawback.

Under such circumstances, Murata has developed small HF band RFID tags (MAGICSTRAP®) LXTB Series and the corresponding reader/writer. These tags can be embedded in figures and read with smartphone with NFC function (Fig. 1).

Target Values for Development

The HF Band RFID tag (MAGIC-STRAP®) LXTB Series has been realized by combining the antenna-coil forming technology and a magnetic material with excellent high frequency characteristics. It has been successfully miniaturized down to 1/100 of conventional IC cards in area, maintaining the performance to communicate with the smartphone.

The HF band small RFID tag (MAGIC-STRAP®) LXTB Series features small size of 5.5 × 5.5 × 2.5mm; ABS, PPS embeddable robustness; NFC standard ISO14443/ NFC Forum Type 2 compliant; European Toy Safety Regulation EN71 compliant, and a ferrite core, built-in antenna.

The HF band RFID reader/writer LXR-FZZHAAA Series (Photo 2) features an antenna design optimized for reading HF band compact RFID including LXTB Series; acquired FCC and IC certification for North America, ETRI certification for Europe, and Technical Conformity certification for Japan; SPI interface compatible, and provides starter kit with USB interface and antenna.

Toward Wider Application

The LXTB Series can be used as IC tags to be embedded in toys such as figures and key holders. The possibility of its wider application is now under consideration in various fields because of its advantageous features such as small size, robustness, and excellent communication characteristics.

For example, in the field of brand-name goods and accessories, it can be used for the purpose of anti-counterfeiting by unique identification information recorded in the RFID tag. Further, by holding the smartphone over the tag, buyers are guided toward a web site displaying contents and are provided with necessary information.

Future Development

Sample shipment of the LXTB Series and LXRFFZZHAAA Series shown in Photos 1 and 2 already started and their mass production will begin within the year. Mu-



Photo 2: LXRFFZZHAAA Series

rata will continue to expand its lineup further, and contribute to the improvement of pleasure and comfort for people in various areas by providing Murata's RFID solution.

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