



# TOPPAN



October 15, 2003

## **PRESS RELEASE**

### **Toppan Printing develops RFID system with Singapore research institutes**

***Mass-production of chip, which is ready for 2.45GHz application, will start in April 2004***

SINGAPORE - Toppan Printing Co., Ltd. (Chiyoda-ku, Tokyo, based company headed by Naoki Adachi, President, hereafter called Toppan Printing) has developed a radio frequency identification (RFID) system. Toppan Printing expects to start product sales in April 2004.

Toppan Electronics Co., (Singapore) Pte. Ltd. (TES), a subsidiary wholly owned by Toppan Printing, has developed an original RFID chip, Tesstar (trademark pending), and peripheral devices, including tags and reader/writers, through the collaboration with two Singapore research institutes of the Agency for Science, Technology and Research (A\*STAR) — Institute of Microelectronics (IME) and Institute for Infocomm Research (I²R).

The newly developed Tesstar features read/write memory and anti-collision functions, in addition to using the frequency range of 2.45 GHz, enabling several variations to meet users' needs. Tesstar also features full CMOS specification for superior productivity. In addition, TES provides peripheral systems, such as reader/writers, connectable to existing systems at the same time.

TES will entrust turnkey business partners with trial production and mass-production of a basic system. The basic system will be produced in Singapore. Toppan Printing expects to supply integrated systems combining chips, tags, reader/writers, and other components for use in applications such as entrance and exit control systems at event sites and elsewhere. The annual sales of the system in Japan will reach 2 billion yen (S\$31M) in 2005.

“RFID is an exciting new technology that is receiving global attention with the myriad of application possibilities, and we are glad to be able to tap on Singapore’s established base of research talents and manufacturing industries. These collaborative efforts enabled the development of a practical sample in a short time,” said Mr. Nagata, Managing Director of Toppan Printing Co., Ltd.

Dr. Lim Kiang Wee, Director of A\*STAR's Science and Engineering Research Council, said, "We are happy that Toppan was attracted to A\*STAR's research institutes, IME and I<sup>2</sup>R, when they looked globally for partners. Our researchers, with the key technologies they have developed, have proven that they are up to the challenge. Singapore is able to provide leading edge technology from research to design and manufacturing. Ultimately, our companies benefit as the RFID basic system is manufactured here."

Mr. Tan Chek Ming, Assistant Managing Director of EDB said, "We are glad that Toppan has found in Singapore, talent, technology and manufacturing solutions across the RFID value chain to produce their first RFID product. This is an excellent example of how companies from all over the world, can use Singapore as a platform to deliver products and solutions for the global market"

### **Technical Advantages of Integrated RFID System**

The 2.45-GHz RFID tag, specifically designed through the collaboration between IME and TES, is passively powered by the reader and consists of an antenna and a chip. The tag features an on-chip read/write memory and anti-collision with high data rate. The anti-collision feature prevents data from "clashing" onto one another during the transmission process. This small and complex CMOS-based chip (Tesstar, trademark pending), consists of radio frequency, analog, and digital circuits together with efficient power generation circuits, has been optimised for maximum communication distance. Through this collaboration, new IC design Intellectual Properties (IPs) were created.

Prior to this collaboration, the I<sup>2</sup>R has developed significant Intellectual Property (IP) and expertise in the area of RFID. The two patented technologies from I<sup>2</sup>R were licensed to Toppan for the RFID system through A\*STAR's commercialisation arm, Exploit Technologies Pte Ltd. One of the patented technologies is the system protocol that comes with an anti-collision algorithm while the other is on rectifying antenna circuit. The licensing of the background IP from I<sup>2</sup>R has accelerated the development of Toppan's RFID system and enhanced the final product. In addition, I<sup>2</sup>R also provided Toppan with the RFID reader-tag system level architecture, designed the antenna for the tag as well as developed the reader/writer.

Encl.

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**For media enquiries, please contact:**

Public Relations Department  
Toppan Printing Co., Ltd.  
Tel: (81) 3 3835 5636  
Fax: (81) 3 3837 7675  
E-mail: kouhou@toppan.co.jp

Ms. Janet Chang  
PR Officer  
Institute of Microelectronics  
Tel: (65) 6770 5338  
Fax: (65) 6778 0136  
Email: changsy@ime.a-star.edu.sg

Ms. Patricia Loh  
Assistant Manager, Corporate Communications  
Institute for Infocomm Research  
Tel: (65) 6874 8003  
Fax: (65) 6775 9923  
Email: patricia@i2r.a-star.edu.sg

## **Annex 1**

### **[Background]**

RFID is attracting attention in a wide range of fields such as distribution, security, electronic settlement, traffic control, and amusement. Japan's Ministry of Public Management, Home Affairs, Posts and Telecommunications estimates a maximum economic ripple effect of 31 trillion yen (S\$489 billion) in 2010 in Japan. Active efforts are being made to develop systems and practical applications to make the best use of RFID.

In order to supply feasible systems promptly in the pioneering stage of the Japanese RFID tag market, Toppan Printing has set up a design center in Singapore, leveraging on the extensive RFID development expertise and experience found there.

In developing the system, TES worked with Singapore's A\*STAR. In addition, TES tapped on radio frequency integrated circuit (RFIC) design engineers trained in IME under the Singapore Economic Development Board's Research and Training Programme (RTP). These efforts led to the development of a practical sample in a short time.

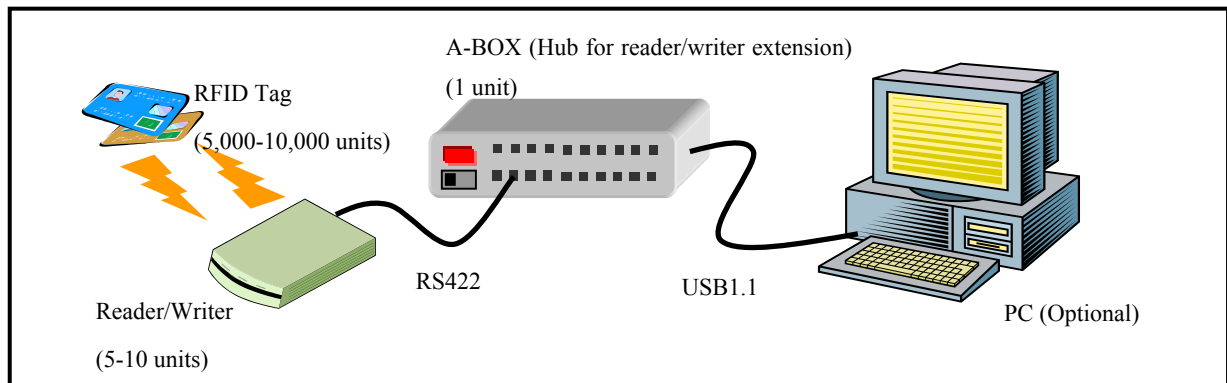
## **Annex 2:**

### **[Plans]**

- Sales of the basic system will start in April 2004. The system will initially be provided for use in entrance and exit control systems at event sites and elsewhere. Its applications will be subsequently expanded to include membership cards, reward cards, production control systems and other systems.
- Toppan Printing plans to proceed from the stand-alone basic system to a network-ready system that can be used for POS applications by 2005. Toppan Printing also plans to incorporate the reader/writer function into a single chip.

## Annex 3:

### [RFID Basic System Configuration]



#### (1) Chip specifications:

- Power Supply: Passive
- Frequency: 2.45 GHz
- Modulation method  
Scanner → Chip: OOK  
Chip → Scanner: Modulated Back-scatter
- Antenna: Externally connected antenna
- Memory: 128 bits, Rewritable memory
- Anti-collision: 3 tags/sec
- Size: 0.9 × 0.9 × 0.15 mm

#### (2) Reader/writer specifications:

- Interface: RS422, RS232C
- Communication distance: 5 to 10 cm
- Power Supply: DC 6 V

#### (3) A-BOX specifications (Hub for reader/writer extension):

- Connection of reader/writers: 20 units maximum
- Host interface: USB 1.1
- Power Supply: DC 6 V

## **Annex 4:**

### **About Toppan Printing Co., Ltd.**

Toppan Printing Co., Ltd. is one of the largest printing companies in the world, was established in Japan in 1900, with sales of over 11.3 Billion dollars. The seed of printing and pre-press technology has branched out into a variety of areas of business including: securities and smart cards, commercial printing, publications printing, packaging, industrial materials, electronics, and e-business. The Electronics Division of Toppan Printing manufactures electronic components by using photofabrication technology, which has been developed in plate making technology. Toppan products are used in semiconductor devices such as photomasks, leadframes, substrates for BGA. Toppan also supplies shadow masks for CRTs and color filters for LCDs display devices.

**(Website: [www.toppan.co.jp](http://www.toppan.co.jp))**

### **About Agency for Science, Technology and Research**

A\*STAR's mission is to foster world-class scientific research and talent for a vibrant knowledge-based Singapore. A\*STAR is organized into four arms: two research councils, the Biomedical Research Council (BMRC) and the Science and Engineering Research Council (SREC), a Corporate Planning and Administration Division (CPAD) and the agency's commercialisation arm, Exploit Technologies Pte Ltd. The two research councils fund and oversee twelve public research institutes in areas such as bioinformatics, genomics, molecular biology, bioengineering, bioprocessing technology, chemical sciences, materials, high performance computing, information technology and communications, manufacturing technology, microelectronics and data storage. IME and I<sup>2</sup>R are two of A\*STAR's Science and Engineering research institutes.

**(Website: [www.a-star.edu.sg](http://www.a-star.edu.sg))**

The **Institute of Microelectronics (IME)**, founded in 1991, conducts R&D through close collaborations with universities, research institutes, and industry partners. R&D at IME cover the semiconductor technology chain, viz integrated circuit design, wafer fabrication process technology, packaging and assembly, and reliability testing and analysis. It also conducts R&D in microsystem applications such as silicon-based micro-electro-mechanical-systems (MEMS). **(Website: [www.ime.a-star.edu.sg](http://www.ime.a-star.edu.sg))**

The **Institute for Infocomm Research (I<sup>2</sup>R)** was created through the merger of the Institute for Communications Research (ICR) and the Laboratories for Information Technology (LIT). I<sup>2</sup>R integrates the R&D strengths of ICR and LIT, bridging the world of communications and information technology to develop holistic solutions across the ICT value chain. The Institute's research capabilities are in wireless and optical communications, and information technology and science. We seek to enable technologies and processes that will drive new and enhanced services for Singapore's knowledge-based economy. **(Website: [www.i2r.a-star.edu.sg](http://www.i2r.a-star.edu.sg))**

**Exploit Technologies Pte Ltd** is the commercialization arm of A\*STAR. Our charter is to identify, protect and exploit promising intellectual property (IP) created by the research institutes (RIs) under A\*STAR. This includes facilitating the IP management process (i.e. the protection of inventions through patents and copyrights etc), analyzing the strength of our IPs and the market that they could serve, and working with companies to commercialize the technologies. **(Website: [www.exploit-tech.com](http://www.exploit-tech.com))**