

# 通过MAGICSTRAP® 来实现印刷电路板的智能化

村田制作所



# Green IT award颁奖 2013.9



株式会社村田制作所のRFID用（电子标签）主要的元件“MAGICSTRAP®”在JEITA（一般社团法人电子信息技术产业协会）的Green IT委员会（原Green IT推进协会）主办的2013Green IT颁奖中，获得了会长奖。

我公司的RFID（射频识别标签）用的关键装置“MAGICSTRAP®”因为使“电子设备的生命周期的可追溯性”成为可能，能够为“通过IT达到社会的节能”作出广泛的贡献因而获得了评价。

# MAGICSTRAP®の原理

- 在电路板中追加最小尺寸的RFID标签功能。
- 被放进机罩中，或者包装后，都能够读取。

## PCBにRFIDタグ機能を!



# MAGICSTRAP®の主要概念

对电子设备的使用寿命从研发初期到寿终正寝进行跟踪追溯。

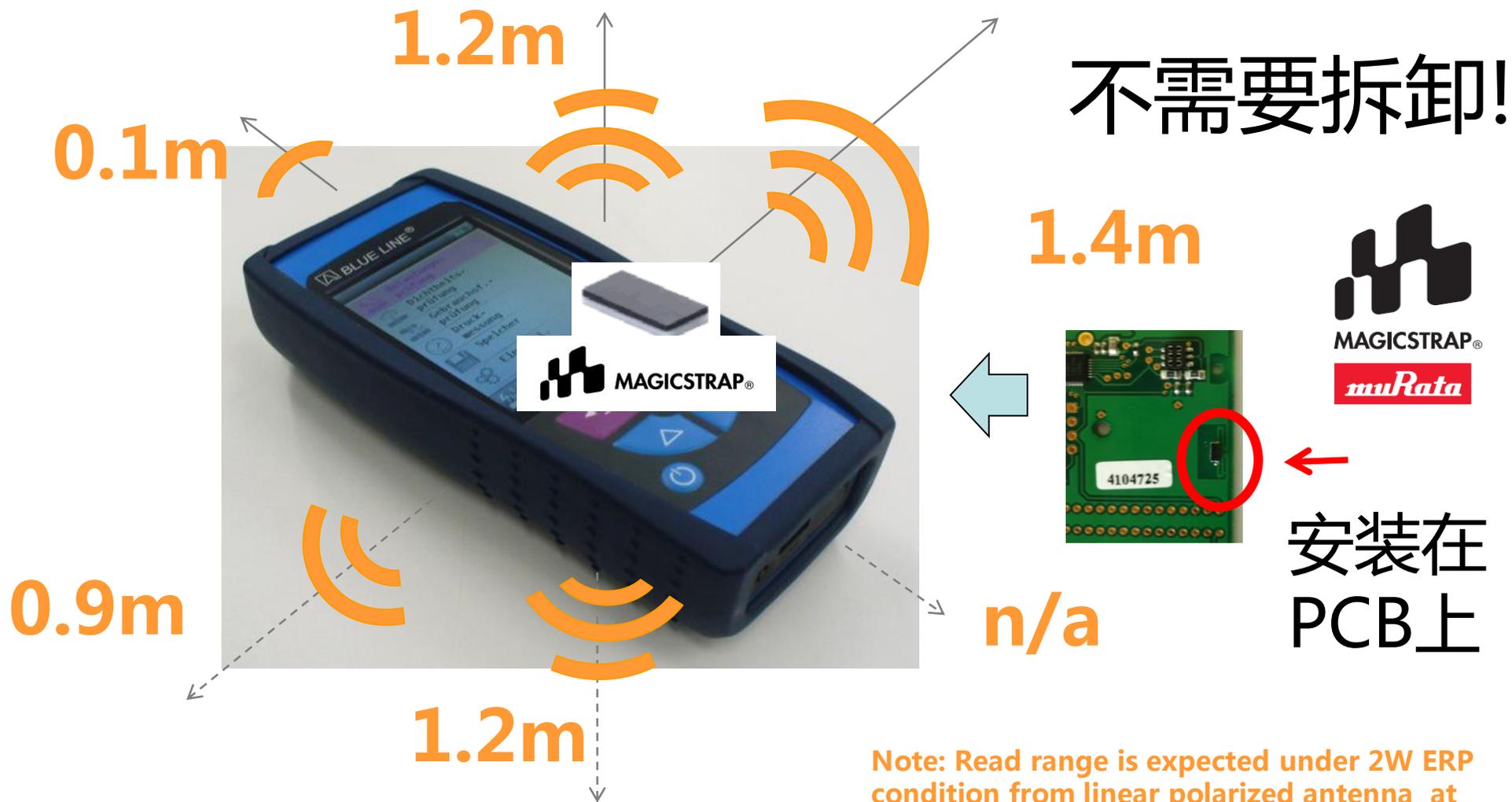


# 组装后的可读范 ( 2 wERP )

X

Z

Y



Note: Read range is expected under 2W ERP condition from linear polarized antenna at 865MHz.

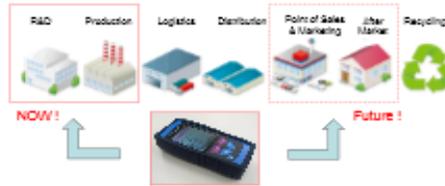
# 客户应用案例-PCB电路板管理

## UHF RFID in Electronics

### Use Cases of SYSTRONIK



## Use case of Systronik



- OEM with own production
- Production partially by subcontractor
- tAU: 10 - 50k pcs
- Closed loop (until now) - RFID only used in preview of OEM

## S2600 Blue Line Series



- Product:
  - Portable Gas Sensor Tightness Checker
  - for regular heating systems check in private houses

## Before



Printed Serial Number on sticker

- Fact:
- Printed serial number on sticker for traceability
  - In IC 1 (in circuit test), serial number was written into memory of controller, by connecting device to IC and then manually typing into memory
- Problems:
- Human errors
  - Sticker lost or unreadable
  - application of sticker only at end of PCBA process (reduced traceability data)

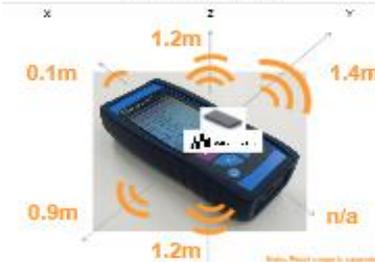
## After



MAGICSTRAP on PCB

- Today:
- MAGICstrap on PCB
  - IC IC linked to components in placing process
  - Write calibration data in user memory of RFID
- Benefits:
- Advanced traceability
  - Calibration data available off-line and re-writable
  - No more human errors

## Read Range



## Screen shot of reader soft



## Conclusion



- All use cases primarily located in production
- Subcontractor using even without selling PCB for higher price to end customer
- Further extension of RFID use already planned
- Step by step evolution
- ROI already through improvements in this step of value chain



And this is all just the beginning...



http://www.muRata.com

http://www.muRata.com/products/rfid.html



# 客户应用案例-PCB电路板管理



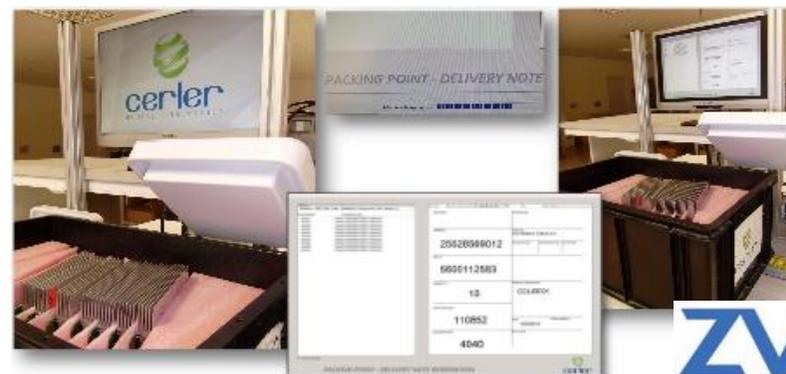
Last year, Jabil proposed using the RFID tags for subpieces, beyond storing board data. It says quickly and it manufacture the solution. PCB was, in opting to use tags is not pl already has.

**CISCO**

Jabil provides an... at 14 locations within its main production fac

**JABIL**

生産効率  
80%改  
善



WHOLE BOX READING AND DELIVERY NOTE GENERATION

## 合作企业的展示

IPC Apex Expo 2013,  
San Diego, USA



Electronica 2012, Munich, Germany



# 试生产电路板中的内置事例



**MAGIC-PCB®**  
Beta LAYOUT

**Antenna design? Not necessary!**

There is no need to design your own antenna in order to use your RFID chip.  
Simply connect the existing PCB ground plane to your RFID chip.  
**Free download of design examples including the connection layout.**

**MAGIC-PCB®**  
Beta LAYOUT

**What next?**



**MAGIC-PCB®**  
Beta LAYOUT

**Acquire an RFID reader**

Read/write the embedded chip using our UHF RFID Reader Kit



**Only with PCB-POOL®!**

Optionally for EVERY circuit board prototype order:

**MAGIC-PCB®**  
The embedded RFID in your circuit board

**FREE!**



**MAGIC-PCB®**  
Beta LAYOUT

In addition to the read/write modules, antennas, chips, and MAGIC-PCBs, our UHF RFID kit includes an extraordinary software package:

**Only available with us!**

**SMART READER APP**

- Read/write alphanumeric characters with a simple key stroke
- Is compatible with software such as Excel, WordPad, or your ERP system, without requiring any additional middleware
- Easy to link a tag memory with any website

**READER SUITE**

Intuitive configuration tools for testing and installation of RFID hardware

Further information:  
[www.magic-pcb.com/software](http://www.magic-pcb.com/software)

**Enhance the range?**

**Up to 5 mm\***  
Without an antenna (as for MAGIC-PCB® overdelivery)

**Increase the read/write range:**

**Up to approximately 10 cm\***  
Capacitive connection to an existing ground plane as an antenna

**Up to several meters\***  
Electrical connection to an existing ground plane as an antenna; the RFID is readable - and written through housing and packaging

**How much?**

**Free of charge** A PCB-POOL® order worth more than €750 entitles you to a free RFID Starter Kit.

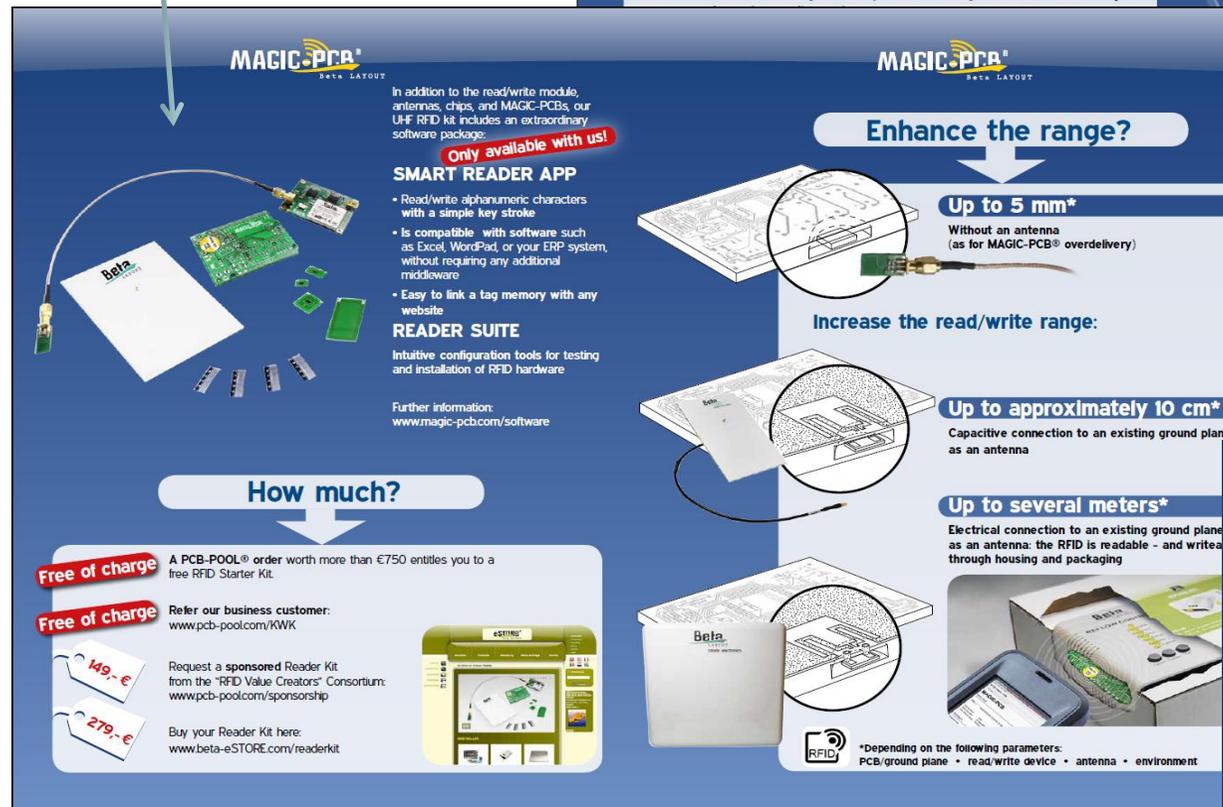
**Free of charge** Refer our business customer: [www.pcb-pool.com/KWK](http://www.pcb-pool.com/KWK)

Request a **sponsored** Reader Kit from the "RFID Value Creators" Consortium: [www.pcb-pool.com/sponsorship](http://www.pcb-pool.com/sponsorship)

Buy your Reader Kit here: [www.beta-eSTORE.com/readerkit](http://www.beta-eSTORE.com/readerkit)

**RFID**

\*Depending on the following parameters:  
PCB/ground plane • read/write device • antenna • environment

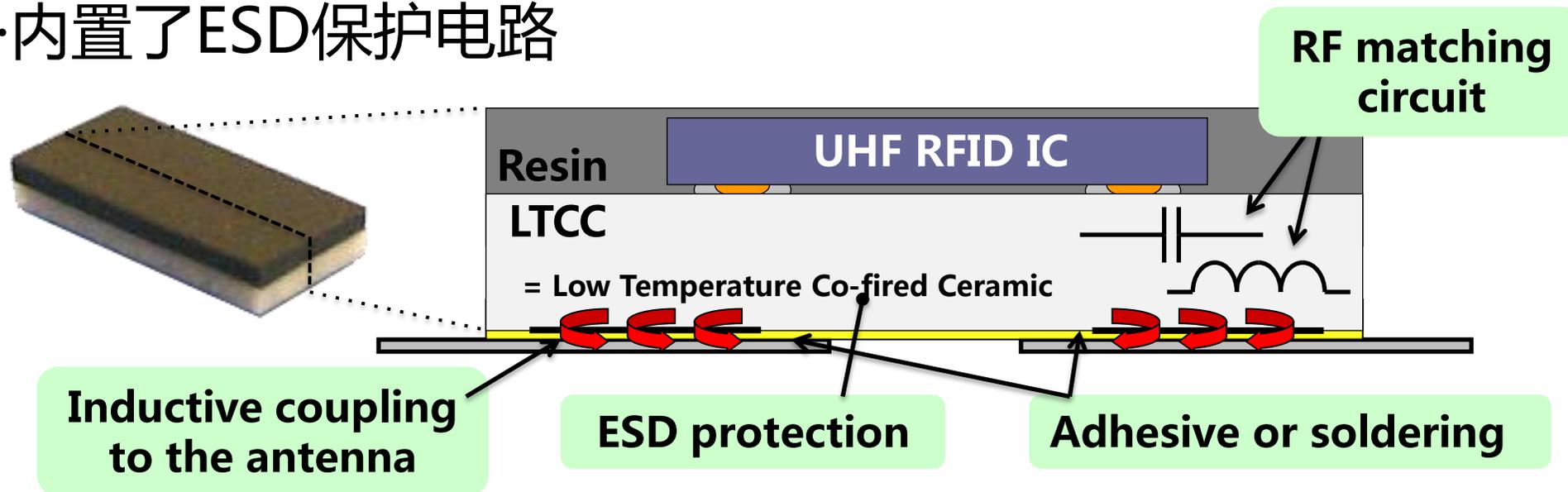


# UHF MAGICSTRAP®

# UHF频带 什么是MAGICSTRAP® ?

是实现了UHF频带电子标签的IC模块。

- 内置的IC符合世界标准EPC/g C1G2规格
- 阻抗变换功能覆盖的频率范围广
- 通过容量性结合可以用非导电性粘合剂来接续
- 内置了ESD保护电路

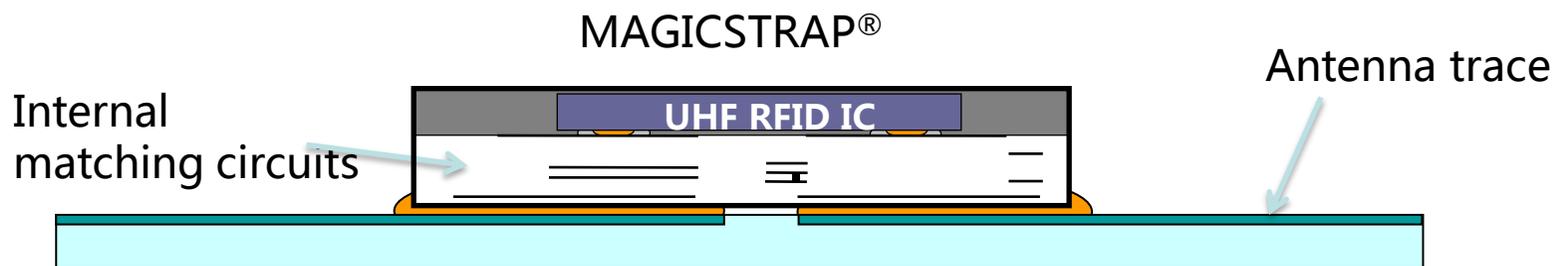


# UHF频带MAGICSTRAP®的特征

MAGICSTRAP®中内置的高频整合电路涵盖了一般的电子标签的大部分的的天线功能。

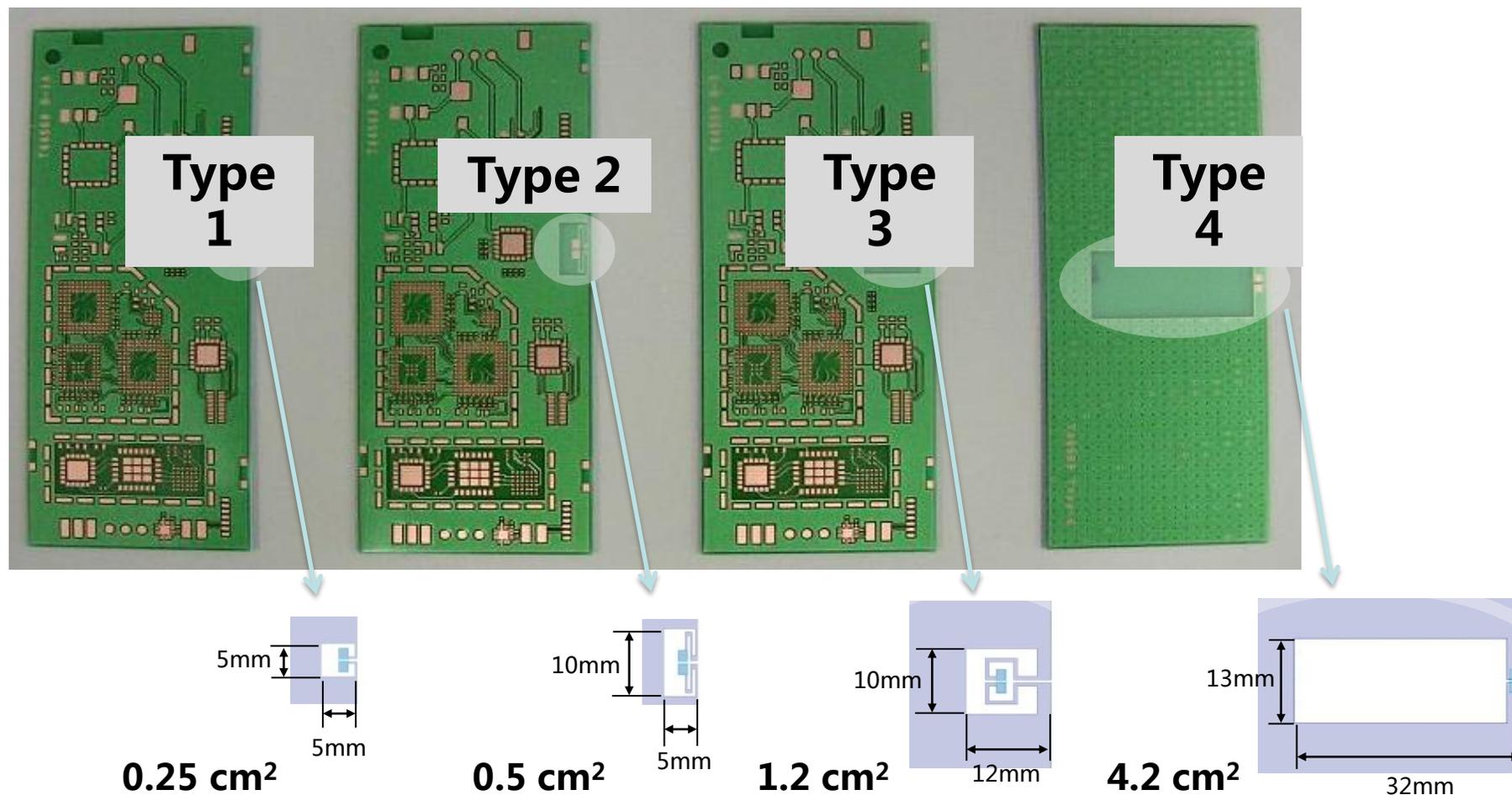
**→外部天线简易化 → 为小型化做贡献**

功能	一般的电子标签	MAGICSTRAP®的电子标签
和空间的无线电波交换	天线	天线
决定中心频率	天线	MAGICSTRAP®
阻抗整合·频带范围广	天线	MAGICSTRAP®



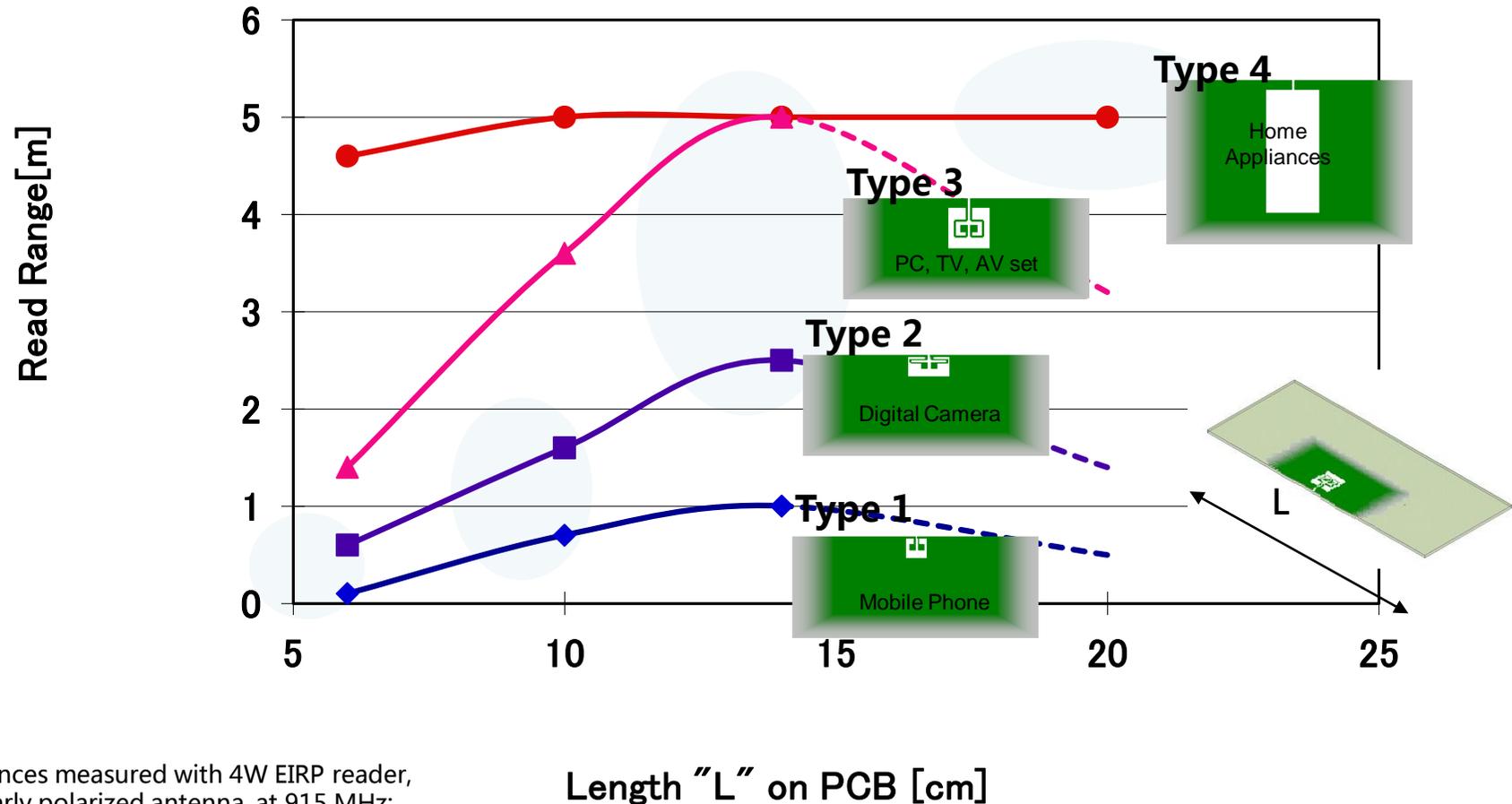
# UHF频带MAGICSTRAP®的安装模式

对应读取距离和安装面积，提供了4种参考设计。



# 可预测的可读距离

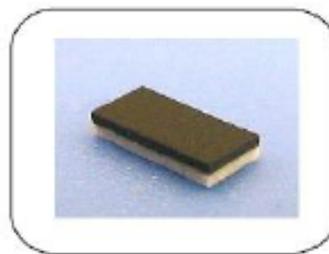
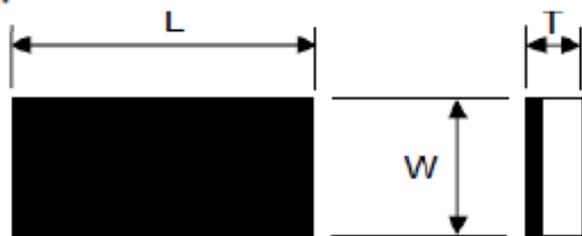
读写距离取决于Type和PCB有效接地面积。



Note: distances measured with 4W EIRP reader, 6dBi circularly polarized antenna, at 915 MHz; MAGICSTRAP® using NXP G2XL/M

Length "L" on PCB [cm]

<Top View>



<Side View>



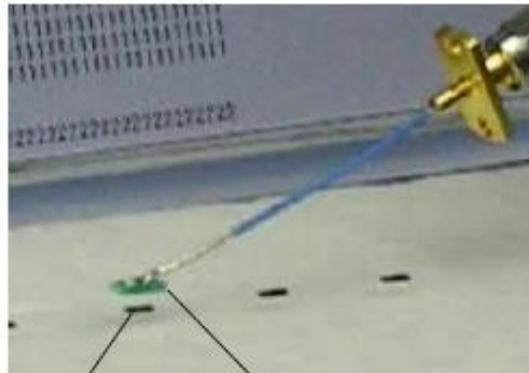
	L	W	T
LXMS31ACNA-***	3.2mm	1.6mm	0.55mm

P/N	Type	Z@866.5MHz	Z@915MHz
-009	Type 1	15-j45	25-j45
-010	Type 2	12-j107	12-j107
-011	Type 3	25-j200	25-j200
-012	Type 4	80-j405	80-j420

IC : NXP G2XM, 512bit user memory

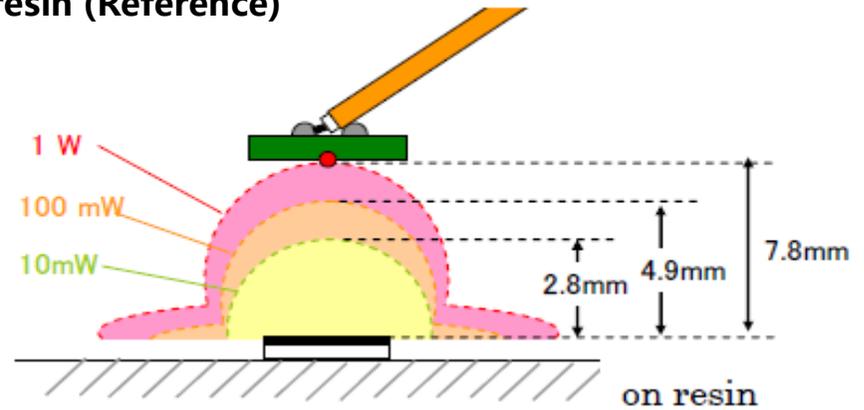
# 无需天线也能读取

近距离的话即使没有外部天线也可以读取

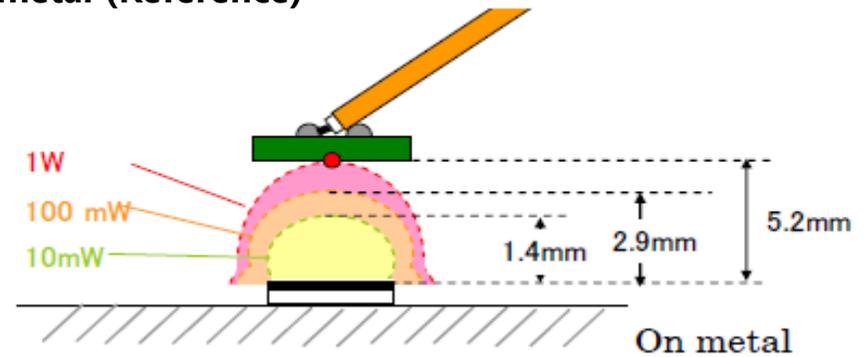


MAGICSTRAP® Antenna of reader (5 × 4mm)

On resin (Reference)



On metal (Reference)



## 稳定的读取性能（在村田已经完成了100%的筛选）

只有合格品才能出货

读取距离的基本一致

## 坚固

耐ESD性能

耐机械冲击

支持塑料成型工序

## 易操作

对安装位置的精确度要求不高（ $\pm 500\mu\text{m}$ ）

可以用焊料等导电性物质焊接，也可以用粘合剂等非导电性物质焊接（安装距离小于 $10\mu\text{m}$ ）

一般的SMD安装程序也能安装

# MAGICSTRAP®与I2C 接口

## 无线设置、数据读取、故障记录



1. 电子设备的电源关闭时进行设置

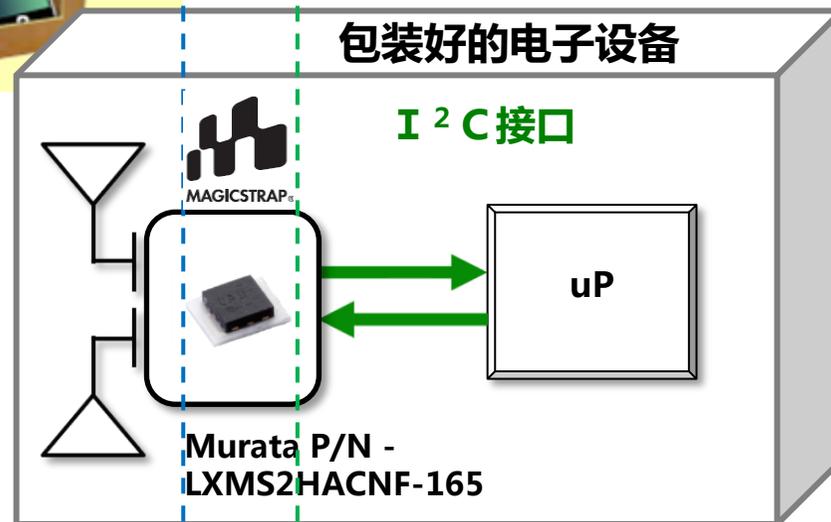


RFID读写器

供电指令和数据



2. 电子设备打开时设置成功并启动



可以替换的内置内存

无线

双向通信

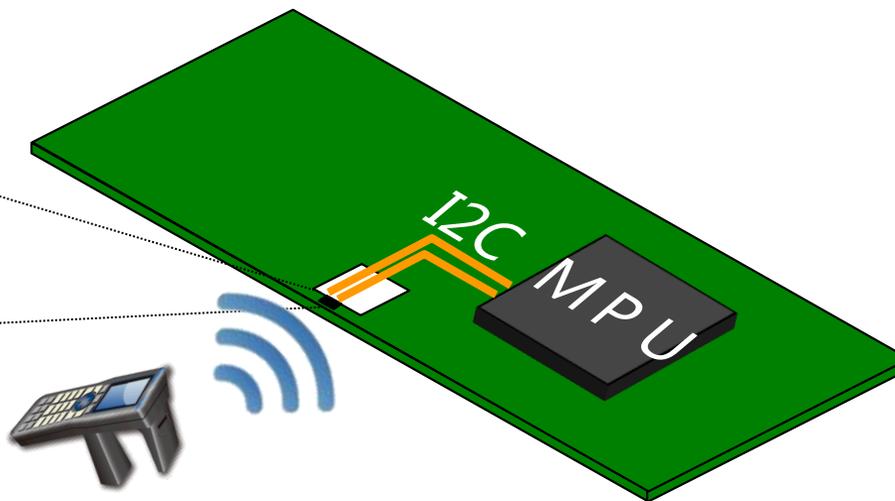
有线

# 功能图示

LXMS2HACNF-165



User memory : 3.3kbit  
Interface : · RFID  
          · I<sup>2</sup>C



RFID读写器



Read  
Write

Antenna

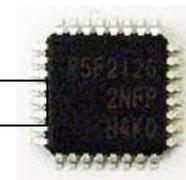
User memory



I2C i/f

Read  
Write

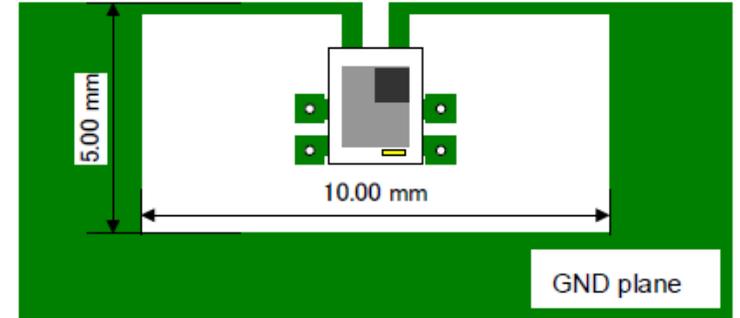
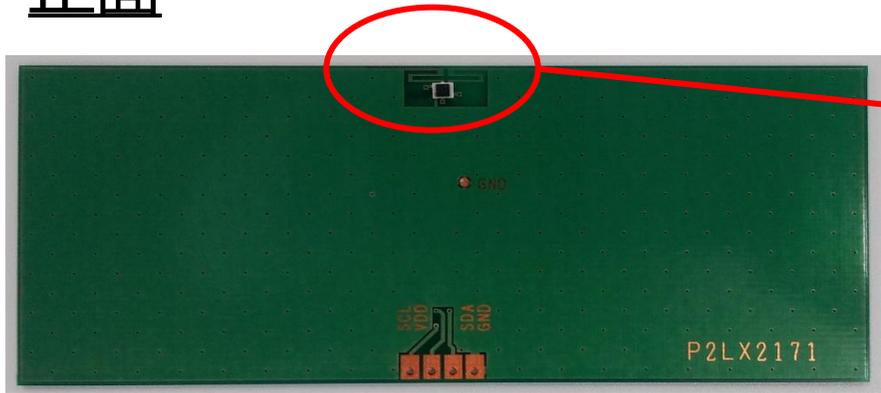
MPU



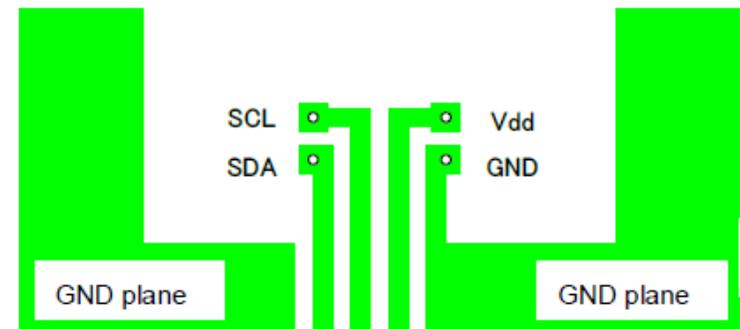
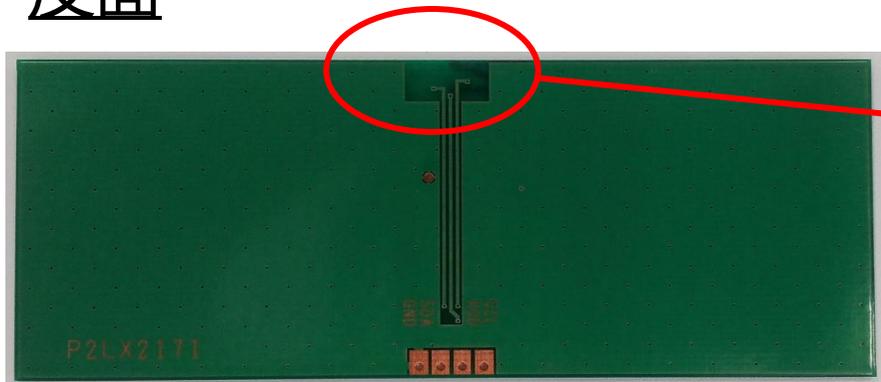
- 1) 用I2C 链接MCU和MAGICSTRAP<sup>®</sup>的内存
- 2) RFID 读写器也会链接MAGICSTRAP<sup>®</sup>的内存

# 安装图示

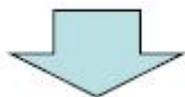
## 正面



## 反面



## RFID的非局限性用途



不论是包装状态还是电源关闭状态都可以改变设置。

带I2C接口的

MAGICSTRAP®



- 应用实例
- 设定地域/语言
- 设定网络
- 设定接口
- 设定功率放大器
- 操作记录
- 设备校正
- 输入启动信号
- 传输原始数据



村田官网上的演示视频

<http://www.murata.co.jp/products/rfid/demonstration/index.html>

# HF频带MAGICSTRAP®

HF MAGICSTRAP®是世界上最小的电子标签。内置天线，并且符合ISO15693标准。

	LXMSAPHA08-136	LXMS33HCNG-134
Appearance		
Standard	ISO15693	
Size	8.5mm x 8.5mm x 0.5mm	3.2mm x 3.2mm x 0.6mm
Thickness	0.5mm typ	0.6mm typ
Read range*	40mm	15mm

# MAGICSTRAP®的用途

## PCB电路板管理



**MAGICSTRAP®**  
Turn your PCB into RFID tag!

Conventional PCB + MAGICSTRAP → Smart PCB with RFID Tag

- Traceability
- Inventory Control
- Anti-Counterfeit

Use case 1

Cloud service

RFID Reader/Writer

Assembly, Test, Shipment, Maintenance / Service, Recycle

**Inside Factory Management**      **After Shipment**

Products subject to change without notice.

**Murata** Murata Manufacturing Co., Ltd.  
Head Office: Nagatsuta-cho, Aichi 466-8555, Japan    [murata@murata.com](mailto:murata@murata.com)    <http://www.murata.com>

## 单个产品管理



**MAGICSTRAP®**  
One of the world smallest RFID tag.

Verification

Anti-counterfeit, Auto counting

For anything small

Tool management, Authentication, Creature management

	LXMS21NC401-147	LXMS21HC401-194
Appearance		
Standard	ISO/IEC 18000-6 Type C, EPC/2 C1G2	ISO15693
Frequency band	UHF	HF
Size	3.2 x 1.2mm	3.2 x 3.2mm
Thickness	0.2mm max.	0.2mm max.
Read range (ISO15693 compliant)	5mm	15mm

Products subject to change without notice.

**Murata** Murata Manufacturing Co., Ltd.  
Head Office: Nagatsuta-cho, Aichi 466-8555, Japan    [murata@murata.com](mailto:murata@murata.com)    <http://www.murata.com>

# 请浏览本公司官网获取更多信息！

## Product Pickup



## Data Sheets & Application Notes

UHF MAGICSTRAP® 3216 size

- UHF MAGICSTRAP® 3216 size Data Sheet (PDF: 280KB) UPDATE Nov, 2012
- UHF MAGICSTRAP® 3216 size Application Notes (PDF: 580KB) UPDATE Nov, 2012
- UHF MAGICSTRAP® 3216 size for antenna less use (PDF: 330KB) UPDATE Nov, 2012

RFID PCB

## Product Demonstration Videos



## Technical Articles & Presentations



## Partners



## MAGICSTRAP® Tutorial

