

Titan Biscuit 13.56

ISO15693/ISO18000-3

Unparalleled Robust Metal Mounting Solution

February 2010

RFcamp Ltd.

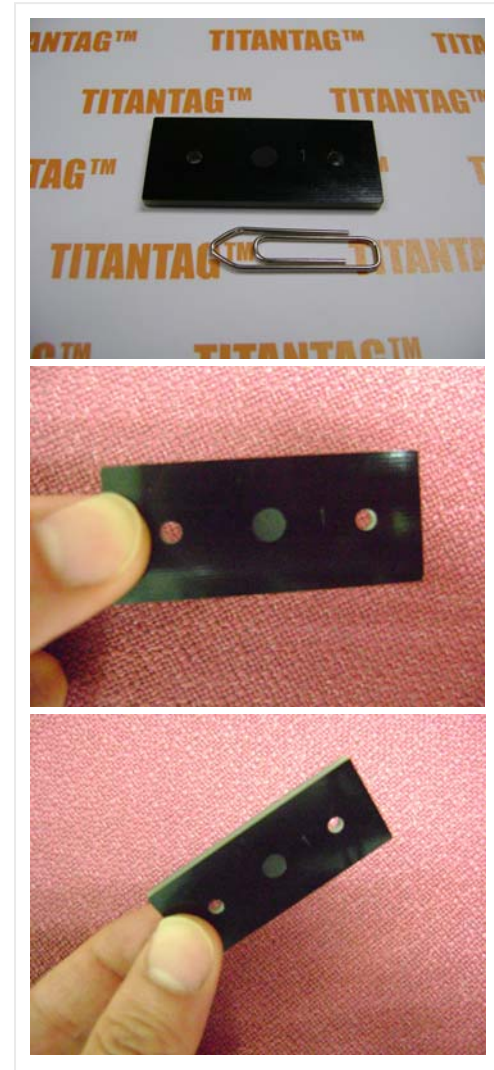


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Titan Biscuit is 13.56MHz metal tags with complying to ISO15693& 18000-3 protocol. This tag is currently being supplied to Japan, US and Korea.

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|-------------------------------|--|
| Date of market release | July 2009 |
| Developed and manufactured by | RFcamp Ltd. |
| Origin | South Korea |
| Applications | <p>Titan Biscuit, with its slim form factor without requiring any additional magnetic layer beneath, performs well on metal. Can be applied to the harshest environments in temperature, mechanical shock and chemical stress. If you would need any tags lasting, then this is it!</p> <p>Electronics and semiconductors, Motors and vehicles, Molding tools, Construction and chemical plant parts, Power plants, Medical autoclaves, etc</p> |
| Regions currently served | US, Japan, Korea |
| Main features | Resists -45C degree up to 200C degree |
| | Resists highest level ingress, air& water pressure, mechanical shock, vibration and chemical stress. |



Below are **Titan Biscuit**'s main specifications. Read range has been measured at anechoic chamber in RFID/USN Center Korea (www.ruc.or.kr), certified by EPC Global. Real read range shall be different due to real RF environment, reader power & antenna gain, etc.

| Dimensions (mm) | Length | Width | Thickness | Hole diameter* |
|----------------------|--------|-------|-----------|----------------|
| Titan Biscuit | 50.0 | 21.0 | 3.2 | 4.0 |

* Two holes for screws are located at diagonal directions on both corner ends.

| Memory (bits) | UID | SFR | User | WAC | EAS |
|---------------|-----|-----|------|-----|--------|
| ICODE SLI | 64 | 32 | 928 | 16 | On/Off |

** Titan Biscuit is with ICODE SLI by NXP. http://www.nxp.com/acrobat_download2/other/identification/SL058031.pdf

| Read range (centimeters) | Fixed reader (1W) | | Handheld reader (0.5W) | |
|--------------------------|-------------------|----------|------------------------|----------|
| | On non-metal | On metal | On non-metal | On metal |
| Titan Biscuit | 25 | 8 | 10 | 4 |

- RFcamp warrants 3 years for all Titan Tags with 1 to 1 free replacement.
- All Titan Tags and all components comply with **RoHS**.

Titan Tags, unlike inlay film based metal tags by competitors, are made of multi layer FR4 PCB antenna with robust and unique chip attachment methods. **Titan tags** have already passed various kinds temperature/humidity tests in US, Japan, UK and Germany and have not received any complaints nor claim from any clients on these issues since August, 2008.

| | |
|---|-----------------------------|
| Humidity chamber test (85°C/95% RH Test) | Pass (May 2009) |
| <ul style="list-style-type: none"> •168 hours' chamber test at 85C degree/ 95% relative humidity •Passes if difference between pre-chamber and post-chamber tag's resonant center frequency is below 200KHz | |
| High temperature test (200°C Test) | Pass (February 2009) |
| <ul style="list-style-type: none"> •6 hours' chamber test at 200C degree •Passes if difference between pre-chamber and post-chamber tag's resonant center frequency is below 200KHz | |
| Thermal cycling test (-45°C ⇔ 85°C Test) | Pass (May 2009) |
| <ul style="list-style-type: none"> •Total 500 cycles with each cycle 90 minutes from -45C degree to 85C degree •Passes if difference between pre-chamber and post-chamber tag's resonant center frequency is below 200KHz | |
| High temperature oil test (200°C Oil Test) | Pass (February 2009) |
| <ul style="list-style-type: none"> •Soaked 6 hours at 200C degree boiling oil •Passes if difference between pre-chamber and post-chamber tag's resonant center frequency is below 200KHz | |

Titan Tags, unlike inlay film based metal tags by competitors, are made of multi layer FR4 PCB antenna with robust and unique chip attachment methods. **Titan tags** have already passed various kinds mechanical shock tests in US, Japan, UK and Germany as well as IP68 test and have not received any complaints nor claim from any clients on these issues since August, 2008.

| Test | Criteria | Descriptions | Pass/Fail |
|----------------------------|----------------------|--|----------------------|
| Ingression | IP68 | <ul style="list-style-type: none"> •Soaked 1.5 meter water depth for 24 hours •Passes if difference between pre-chamber and post-chamber tag's resonant center frequency is below 200KHz | Pass (April 2009) |
| Vibration | IEC60068-2-6/64 | <ul style="list-style-type: none"> •Vibrates tags with various frequency and gravity •Passes if difference between pre-chamber and post-chamber tag's resonant center frequency is below 200KHz | Pass (July 2009) |
| Iron ball free fall | 1 kilogram iron ball | <ul style="list-style-type: none"> •1 Kg iron ball free fall from 1.5 meters' height on tags for 50 times at different angles •Passes if difference between pre-chamber and post-chamber tag's resonant center frequency is below 200KHz | Pass (December 2009) |
| Drop& topple | IEC60068-2-31 | <ul style="list-style-type: none"> •Drop tags from 1.0 meters' height at different angles •Passes if difference between pre-chamber and post-chamber tag's resonant center frequency is below 200KHz | Pass (July 2009) |

Please click URLs right and enjoy and see how robust **Titan tags** are.

<http://www.youtube.com/watch?v=OpIM4aaVUxA>

<http://www.youtube.com/watch?v=tMOYYsY30o>

<http://www.youtube.com/watch?v=5UbWYBieibM>

<http://www.youtube.com/watch?v=kMnfNbJ7NBU>

Titan Tags have passed various chemical tests as below in several countries and have not received any complaints nor claim from any clients on these issues since August, 2008.

| Test | Criteria | Descriptions | Pass/Fail |
|----------------|--------------------------|---|-----------------------|
| Acid | 5% Sulfuric acid | Soaked 24 hours | Pass (July 2009) |
| Alkali | 5% sodium hydroxide | Soaked 24 hours | Pass (July 2009) |
| Salt water | IEC60060-2-11 | Spayed and soaked 24 hours | Pass (September 2009) |
| Kerosene | 99.9% | Soaked 24 hours | Pass (October 2009) |
| Diesel | 99.9% | Soaked 24 hours | Pass (October 2009) |
| Gasoline | 99.9% | Soaked 24 hours | Pass (October 2009) |
| Ethanol | 99.9% | Soaked 24 hours | Pass (October 2009) |
| Methanol | 99.9% | Soaked 24 hours | Pass (October 2009) |
| Medical enzyme | Medical enzyme materials | Soaked 500 hours at different temperature and air pressure | Pass (January 2010) |

RFcamp suggests and provides various kinds tag attachment methods with ultimately strong adhesion on any objects by its 6 years' experience in serving + 350 RFID projects and clients.

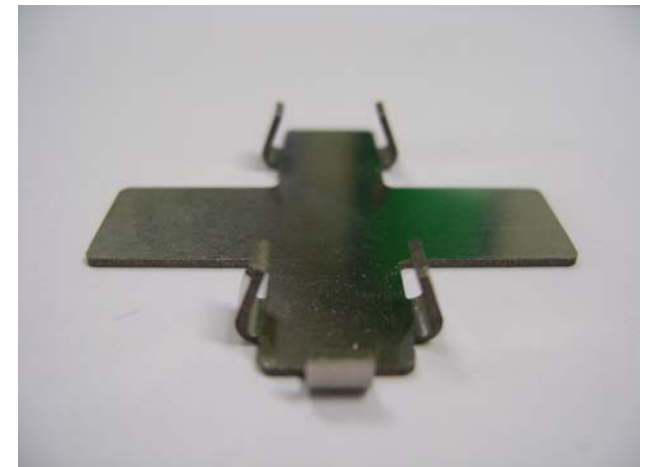
| | | | |
|--|-------------------------|-------------------------|--------------------------|
| [1] Double side coated backing adhesive | < 120C degree | < 200C degree | Harsh environment |
| Suggestions | 3M468MP (or 3M9472LE) | SYT-130DL | 3M VHB 4913 |

| | | |
|------------------------------|---|---|
| [2] Fast curing glues | Double components (24 hours curable) | Single component (Instantly curable) |
| Suggestions | LOCTITE 331 + LOCTITE 7387 | ALTECO |

| | |
|----------------------------|--|
| [3] Rivet or screws | Metallic or polycarbonate screws (made in Japan or Germany) |
|----------------------------|--|

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|--|-------------------------------|
| [4] Customized tag plating fixture* | As requested by client |
|--|-------------------------------|

*RFcamp supplies customized tag plating fixture which would minimize any RF interference, through multiple years' cooperation with metal press / plastic injection molding company in Korea and China.



RFcamp provides price competitive value added service including customized label, direct laser marking and chip pre-programming service as below, even for small quantity orders from clients.

Label

- Water proof poly-synthetic labels with 4 colors offset printing
- 1D or 2D barcode or both with human readable codes with Zebra printers



Laser marking

- Laser etches tag surface into 1D or 2D barcode or both with human readable codes
- Laser etched codes have passed all the same environmental tests Titan Tag have.
- Can not be erased or damaged even under extremely harsh environments.



Chip pre programming

- RFcamp's own developed auto chip encoder can pre program tags in fastest and cheapest ways
- Can encode HEXA or ASCII code, upon clients' request

RFcamp is #1 leading UHF specialty tag maker in Korea for 4 consecutive years and has been exporting Titan Tags to 19 countries all over the world.

- Est. date: September 2004
- # Employees: 40
- Location: Headquartered in Seoul with factory in both Seoul and China
- Geographic coverage (2009)
 - America: US, Canada, Mexico, Brazil, Colombia
 - Europe: UK, Germany, Italy, Austria, Switzerland, Turkey, France
 - Asia: Japan, China, Korea, Singapore, Taiwan, Indonesia, Philippines, Australia
- Main investors: Samsung Ventures, STIC Ventures, BKIC, Tube Investment
- URL www.rfcamp.com

Jerry RYU, CEO& President

RFcamp Ltd. | 4th Floor, Songdo Building, 868-10 Bangbae-dong, Seocho-gu, Seoul, 137060 Korea

Email jerry_ryu@rfcamp.com

Tel +82.2.593.8808 | Fax +82.2.593.8804

Skype [jerry_ryu](https://www.skype.com/people/jerry_ryu)