

Titan Smallest Non-metal

RFID Class1 Gen2

Unparalleled Robust RFID Solution

February 2010

RFcamp Ltd.



Contents

1. Intro
2. Main specifications
3. Reliabilities – Temp.& humidity
4. Radiation Pattern
5. Reliabilities – Ingression& mechanical shock
6. Reliability – Chemical stress
7. Attachment methods
8. Value added service
9. Company intro& contacts

Titan Smallest Non-metal is for non-metal applications, whereas Titan Smallest is for non-metal applications. This product performs very well on any non-metal objects with broadest frequency bandwidth among similar size tags. One tag covers all from 860 to 960MHz.

Date of market release	March 2009
Developed and manufactured by	RFcamp Ltd.
Origin	South Korea
Applications	<p>Titan Smallest Non-metal, with its small and thin form factor, performs well on non-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>Non metal container, inside injection molded products</p>
Regions currently served	USA, Japan, Canada, 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 Smallest Non-metal**'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 Smallest NM	45.0	10.0	3.0	2.0

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

Memory (bits)	EPC	User	Unique TID	Password	Kill	Total
Higgs3**	96 (up to 480)	512	64	32	32	800

** All current Titan tags are with Higgs3 chip by Alien Technology. http://www.alientechnology.com/docs/products/DS_H3.pdf

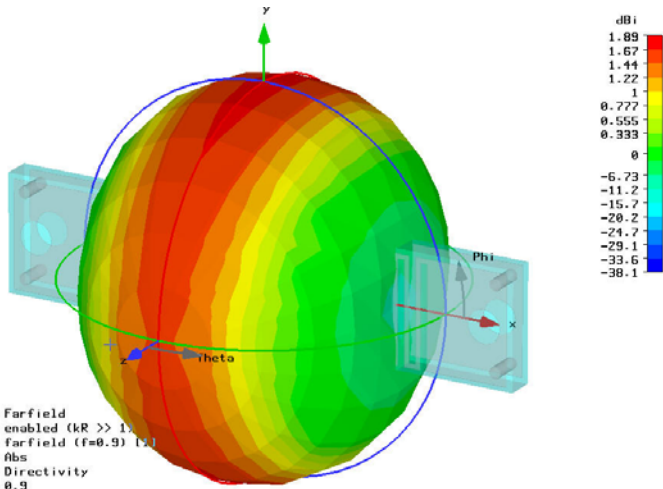
Read range (meters)	Fixed reader (4W EIRP)***		Handheld reader (2W EIRP)****	
	On non-metal	On metal	On non-metal	On metal
Titan Smallest NM	3.5	0.0	1.5	0.0

*** Alien 9800 reader with 9610 circularly polarized antenna.

**** Samsung handheld URP-SK010

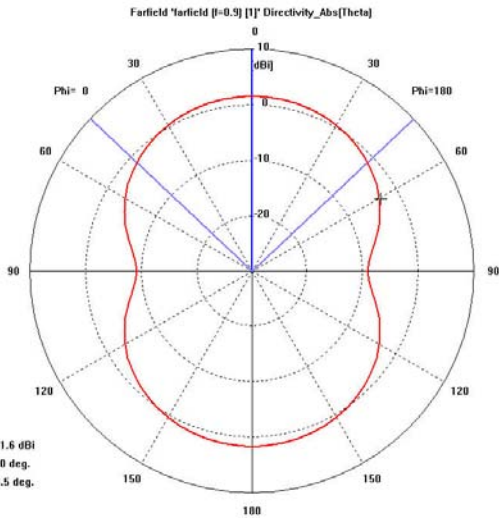
- RFcamp warrants 3 years for all Titan Tags with 1 to 1 free replacement.
- All Titan Tags and all components comply with **RoHS**.

Titan Smallest_NM's Radiation pattern 3D

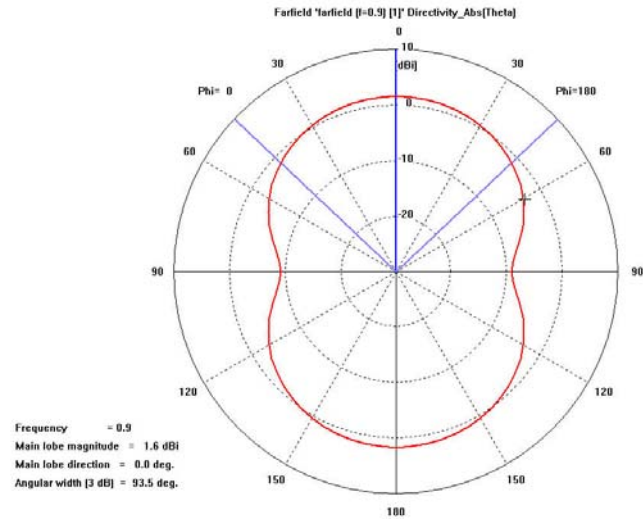


Type = Farfield
 Approximation = enabled (kR >> 1)
 Monitor = Farfield (f=0.9) [1]
 Component = Abs
 Output = Directivity
 Frequency = 0.9
 Rad. effic. = 0.3917
 Tot. effic. = 0.009339
 Dir. = 1.000 dBi

Titan Smallest_NM's Radiation pattern 2D [Phi = 0°]



Titan Smallest_NM's Radiation pattern 2D [Phi = 90°]



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 5MHz 	
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 5MHz 	
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 5MHz 	
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 5MHz 	

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 5MHz 	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 5MHz 	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 5MHz 	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 5MHz 	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.

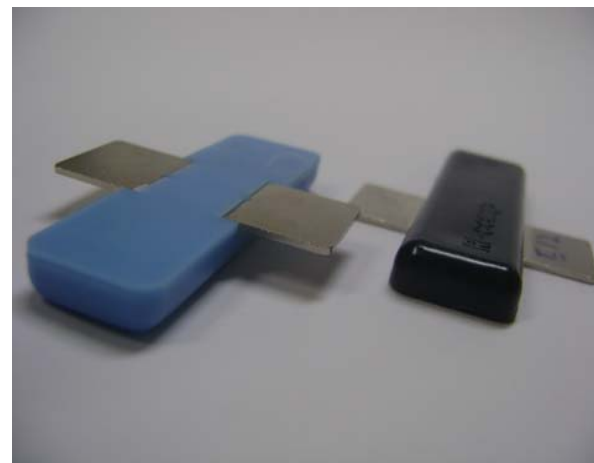
[1] Double side coated backing adhesive	< 200C degree	> 200C degree	Harsh environment
Suggestions	3M468MP (or 3M9472LE)	SYT-130DL	3M VHB 4913

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

[3] Rivet or screws	Polycarbonate screws (made in Japan or Germany)
----------------------------	--

[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](#)