

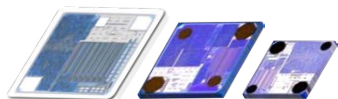


# ALIEN PRODUCTS & SERVICES

TRUSTED PERFORMANCE™

## Alien Technology is the industry's most experienced, quality supplier of RFID innovations, technologies and products.

We provide EPCglobal Gen2 and ISO/IEC 18000-6c compliant UHF passive RFID transceiver chips, tags, inlays & labels, fixed & mobile readers and a full range of related professional services.



### RFID ICs

#### Class leading read and write performance

- Higgs™4 driving industry innovation
- Optimized memory system for mass markets
- **BlastWrite™** and **QuickWrite™** for mass-encoding
- **BlastWrite™** can write 7,000 tags/minute
- Pre-encoded chip-level serialization

### READERS



#### Industry leading ease-of-use

- Class leading read and write performance
- More local processing inside the reader
- Less network traffic/less network infrastructure
- Alien Reader Protocol (and LLRP on ALR-9900+)

## TRUSTED PERFORMANCE™



### INLAYS / TAGS / LABELS

#### The industry's most trusted and widely used tag family

- One of the industry's most extensive range of inlays
- Tags for all applications retail, item-level, transportation, life sciences etc
- Available under license as reference designs
- Custom tag design service (with NRE or volume commitment)

### SERVICES



#### The industry's most well respected RFID training

- Standard, custom or onsite training
- RFID Solution Center – Conveyers, retail etc
- US & EU sites
- Feasibility analysis, system design & testing
- Best Practices

We focus on providing Trusted Performance™ in real-world conditions that other solutions cannot compete with. We are a technology leader with demonstrated expertise in retail/apparel, item level tagging, transportation, life-sciences, asset tracking and more.

## Services

Alien provides a full suite of professional services including the worldwide recognized Alien Academy (RFID hands-on training), custom on-site training, site surveys, feasibility analysis and advice on best practices.

#### US Alien Academy (Dayton, OH):

- August 17-18, December 7-8, 2016

#### EU Alien Academy:

- June 22-23 - Amsterdam, NL

**2016 Alien Global Partner and User Conference:** SAVE THE DATE! October 18-19, 2016 Miami Marriott Biscayne Bay, Florida. More Information here: <http://www.alientechnology.com/2016-conference/>



## Alien Fixed Readers

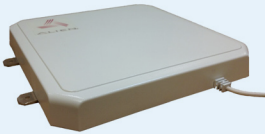
|                                                                                                | Class                                                                   | Operating System | GPIOs                                              | Protocol                                    | Application                                                                                                                                                                                 |
|------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|------------------|----------------------------------------------------|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ALR-F800<br>   | <b>Fifth Generation</b><br>Enterprise 4-port Fixed                      | Linux            | 4 in / 8 out (optically isolated / open collector) | ARP (Alien Reader Protocol) / LLRP (COMING) | Robust enterprise level applications such as warehouse, retail, trucks, supply chain management etc.<br><br><b>Industry's best Power over Ethernet (PoE) transmit power and performance</b> |
| ALR-9900+<br>  | Enterprise 4-port Fixed                                                 | Linux            | 4 in / 8 out (optically isolated / open collector) | ARP (Alien Reader Protocol) / LLRP          | Robust enterprise level applications such as warehouse, retail, trucks, supply chain management etc.                                                                                        |
| ALR-9680<br>   | Commercial 4-Port Fixed<br><b>2</b> YEAR WARRANTY                       | Linux            | 2 in / 2 out (TTL)                                 | ARP                                         | Power-over-ethernet reader for warehouse, retail, and supply chain management.                                                                                                              |
| ALR-9650<br> | Commercial Smart-Antenna (integrated antenna)<br><b>2</b> YEAR WARRANTY | Linux            | 2 in / 2 out (TTL)                                 | ARP                                         | Power-over-ethernet reader with built in antenna for applications that are space sensitive.                                                                                                 |

## Alien Mobile Readers

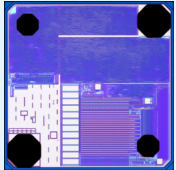
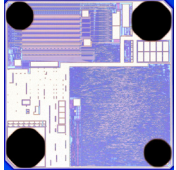
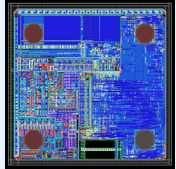
|                                                                                                 | Class              | Operating System             | CPU/Mem                                        | Antenna | Application                                                                                                                                                                              |
|-------------------------------------------------------------------------------------------------|--------------------|------------------------------|------------------------------------------------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ALR-H450<br> | Connected Handheld | Android 4.4 (Kit Kat)        | Quad-Core 1.3GHz<br>1GB RAM<br>4GB Flash       | 4dBic   | This family of "connected" handheld readers enables users to deploy manageable, robust, best-in-class RFID solutions for supply chain, manufacturing, and asset management applications. |
| ALH-90xx<br> | Connected Handheld | Microsoft Windows Mobile 6.5 | Single-Core 820MHz<br>256MB RAM<br>256MB Flash | 3dBic   |                                                                                                                                                                                          |



## Alien Reader Antenna

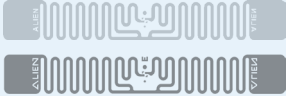
|                                                                                               | Frequency     | Gain                                           | IP Rating | Size                    | Cable/Connector                                                                     |
|-----------------------------------------------------------------------------------------------|---------------|------------------------------------------------|-----------|-------------------------|-------------------------------------------------------------------------------------|
| ALR-8696<br>  | 865 - 960 MHz | 8.5dBic                                        | IP54      | 10.2" x 10.2" x 1.32"   | 20ft LMR-195 cable with RTNC Female at the end. Connected to antenna via a pigtail. |
| ALR-8697<br>  | 865 - 928 MHz | 8.5dBic                                        | IP67      | 10.16" x 10.16" x 1.42" | Inset RTNC male connector                                                           |
| ALR-8698<br> |               | Nominally 10.5dBic<br>11dBic FCC / 10dBic ETSI |           |                         |                                                                                     |

## Higgs™ IC Family

|                                                                                                 | Memory   | EPC bits    | UTID    | Sensitivity              | Serialization                       | Applications                                                                                                                                                                                               |
|-------------------------------------------------------------------------------------------------|----------|-------------|---------|--------------------------|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Higgs 3<br>  | 800 bits | 96-480 bits | 64 bits | Very good (-20dBm)       | Yes - Chip & Non-chip serialization | General purpose, apparel, Automatic Vehicle Identification (AVI), automotive, baggage, books, cases, documents, ID cards, item level tracking, labels, loyalty cards, pharmaceutical, palettes, retail etc |
| Higgs 4<br>  | 512 bits | 128 bits    | 64 bits | Excellent (-20.5dBm)     |                                     |                                                                                                                                                                                                            |
| Higgs-EC<br> | 512 bits | 128 bits    | 80 bits | Best-In-Class (-22.5dBm) |                                     |                                                                                                                                                                                                            |



## Inlays: Squiggle Family

| Product                                                                                                                    | Higgs-3  | Higgs-4                             | Higgs-EC                                                                                      | Antenna Size <sup>1</sup>          | Application                                                                                                                  |
|----------------------------------------------------------------------------------------------------------------------------|----------|-------------------------------------|-----------------------------------------------------------------------------------------------|------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| Squiggle™ (SQ)<br>                         | ALN-9640 | ALN-9740                            | <br>ALN-9840 | 3.732" x 0.319"<br>94.8mm x 8.1mm  | Item/asset tracking including: pallet placards, cases, baggage, denim, poly bags, electronics, apparel tags and boxed items. |
| Squiglette (ST) and Squiglette-E (STE)<br> | ALN-9630 | ALN-9730<br>ALN-9730-E <sup>2</sup> | <br>ALN-9830 | 2.756" x 0.374"<br>70mm x 9.5mm    |                                                                                                                              |
| Short (SH)<br>                             | ALN-9662 | ALN-9762                            | N/A                                                                                           | 2.756" x 0.669"<br>70mm x 17mm     |                                                                                                                              |
| Squig (SG)<br>                            | ALN-9610 | ALN-9710                            | N/A                                                                                           | 1.752" x 0.409"<br>44.5mm x 10.4mm |                                                                                                                              |
| Doc Tag (DOC)<br>                        | N/A      | ALN-9741                            | N/A                                                                                           | 3.74" x 0.32"<br>95mm x 8.15mm     | Paper/cardboard tagging, Documents, file folders (e.g. medical, dental, legal etc), envelopes and booklets                   |

| Product                                                                             | Features                                                                                                                                                                                                                                                         | Benefits                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Squiggle (SQ)<br>Squiglette (ST) and Squiglette-E (STE)<br>Short (SH)<br>Squig (SG) | Squiggle is one of the most widely used general purpose tags.<br>Family extends the Squiggle features into different form-factors.<br>One of the best performing general purpose tag family on the market.<br>Designed to work well in challenging environments. | Well proven design for a broad range of worldwide applications.<br><b>All Alien tags are world-tags and work well in all regions.</b> Tags denoted with an "E" on the model number (and name) are <i>specialty</i> tuned for optimal performance in Europe (but are still world tags).<br>A very robust general purpose tag (for ultimate robustness in high dielectric environments - see Aliens "G" or "BAT" tags). |
| Doc Tag (DOC)                                                                       | Dielectrically matched to papers, cardboards and similar printed stock. Extremely tolerant to close placement of multiple tags.                                                                                                                                  | Allows tags to be placed on documents or files where these documents will be tightly packed together with many tags in close proximity to each other. These tags have minimal chance of shadowing (hiding each other) from the reader.                                                                                                                                                                                |

<sup>1</sup> Sizes are approximate. **These are inlay antenna sizes.** Tags and labels will be larger. Please refer to specific product details available on Alien's website for exact measurements - [www.alientechnology.com](http://www.alientechnology.com)

<sup>2</sup> All Alien tags are world-tags and work well in all regions. However, tags denoted "E" are specially tuned for optimal performance in Europe.



## Inlays: High Dielectric Family / Automotive (Tires, Windshields)

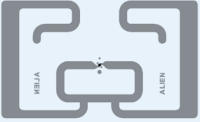
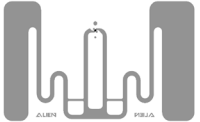
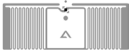
| Product                                                                                              | Higgs-3  | Higgs-4  | Higgs-EC | Antenna Size <sup>1</sup>      | Application                                                                                     |
|------------------------------------------------------------------------------------------------------|----------|----------|----------|--------------------------------|-------------------------------------------------------------------------------------------------|
| G Tag (G)<br>        | ALN-9654 | N/A      | N/A      | 3.66" x 0.748"<br>93mm x 19mm  | High density plastic totes, windshields, batteries etc.                                         |
| BAT (BAT)<br>        | N/A      | ALN-9770 | N/A      | 3.25" x 1.25"<br>82.5mm x 32mm | Automotive batteries, fluid filled objects, plastic containers and metal filled objects.        |
| Wonder Dog™ (WD)<br> | N/A      | ALN-9768 | N/A      | 3.30" x 0.91"<br>86mm x 23mm   | General purpose, automotive metalized windshields/ head lamp and consumer electronic devices.   |
| Bio Tag (BIO)<br>  | N/A      | ALN-9714 | N/A      | 0.67" x 0.59"<br>17mm x 15mm   | Pharmaceuticals, Healthcare, vials/ampules, small glass objects and small liquid filled objects |

| Product          | Features                                                                                                                    | Benefits                                                                                                                                                                                                                                                               |
|------------------|-----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| G Tag (G)        | Exceptional performance for high dielectric mounting.                                                                       | Designed for use on glass, plastics, wood or other materials normally challenging for RF.                                                                                                                                                                              |
| BAT (BAT)        | Highly tuned for read rates and distances when amongst metal/water based objects contained in plastics, glass etc           | Designed for high read and write performance when applied to thin high-dielectric materials especially when these dielectrics contain challenging materials like metal and water based fluids.                                                                         |
| Wonder Dog™ (WD) | Both a good general purpose tag but also excellent near metal or fluids. Excellent with lower power readers (e.g. handheld) | Excellent general purpose high performance tag that can be also be used on metalized windshields, water filled bottles even with a low power handheld reader.                                                                                                          |
| Bio Tag (BIO)    | Small form factor, non-near field read tag and tuned for placement on glass containing water or oil based fluids.           | Offers read/write distances compatible with usage in pharmaceutical production facilities and handheld reader usage for logistics and supply chain. Designed to provide 30 cm / 12" or greater read distance even when applied to vials containing water based fluids. |

<sup>1</sup> Sizes are approximate. **These are inlay antenna sizes.** Tags and labels will be larger. Please refer to specific product details available on Alien's website for exact measurements - [www.alientechnology.com](http://www.alientechnology.com)



## Inlays: Specialized Retail

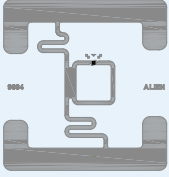
| Product                                                                                               | Higgs-3 | Higgs-4  | Higgs-EC                                                                                   | Antenna Size <sup>1</sup>                            | Application                                                                                                     |
|-------------------------------------------------------------------------------------------------------|---------|----------|--------------------------------------------------------------------------------------------|------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Spider-360 (SP)<br>  | N/A     | ALN-9726 | N/A                                                                                        | 1.97" x 1.18"<br>50mm x 30mm<br><b>aka "30 x 50"</b> | Retail, apparel, hang-tags, joker tags, airline baggage, labels and document tracking.                          |
| Garment Tag (GT)<br> | N/A     | ALN-9728 | ALN-9828  |                                                      | Retail, apparel, hang-tags, joker tags, labels and document tracking                                            |
| HiScan™ (HS)<br>     | N/A     | ALN-9720 | N/A                                                                                        | 1.57" x 0.61"<br>40mm x 15.5mm                       | Specialized tag designed for the most challenging retail and apparel applications and in handheld environments. |
| Glint™ (GL)<br>    | N/A     | ALN-9715 | N/A                                                                                        | 1.06" x 0.38"<br>27mm x 9.7mm                        | Jewelry, Cosmetics and other smaller metal or metalized objects                                                 |

| Product          | Features                                                                                   | Benefits                                                                                                                                                                                                               |
|------------------|--------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Spider-360 (SP)  | An orientation agnostic 30x50mm form-factor tag. Useful when end-on reads are required.    | For use in applications (especially but not limited to retail and airline baggage) where orientation of the tag is of greatest concern. This tag can be read 360 degrees around the plane of the tag.                  |
| Garment Tag (GT) | 30x50mm form-factor and tuned for use in retail with packed shelves or hanging garments.   | Extremely high read performance (distance/rates) in real-life, every day retail environments. Specifically designed and tested with stacked and hanging goods.                                                         |
| HiScan™ (HS)     | Tuned for high-performance reading in lower-power reading environments.                    | Extremely high read-rates in real-life, every day retail environments (e.g. rapid handheld movement, many tags close to each other etc). Especially effective with handheld RFID readers that have low transmit power. |
| Glint™ (GL)      | Very small non-near-field tag designed for close placement to metals or metallic surfaces. | Very small tag. Does not require a long "tail" like some other jewelry tags. Uses the close proximity to metalized objects to increase the range of the tag.                                                           |

<sup>1</sup> Sizes are approximate. **These are inlay antenna sizes.** Tags and labels will be larger. Please refer to specific product details available on Alien's website for exact measurements - [www.alientechnology.com](http://www.alientechnology.com)



## Inlays: Form-factor/Orientation Family

| Product                                                                                              | Higgs-3  | Higgs-4  | Higgs-EC | Antenna Size <sup>1</sup>                                                                                                                                          | Application                                                                                                                 |
|------------------------------------------------------------------------------------------------------|----------|----------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| 2x2<br>             | ALN-9634 | N/A      | N/A      | 1.73" x 1.81"<br>44mm x 46mm                                                                                                                                       | Large items, baggage tagging, apparel and pharmaceutical bottles.                                                           |
| Square (1x1)<br>    | ALN-9629 | N/A      | N/A      | 0.89" x 0.89"<br>22.5mm x 22.5mm                                                                                                                                   | Item level tagging, apparel, pharmaceutical bottles and other high value consumables.                                       |
| SIT (SIT)<br>       | ALN-9613 | ALN-9713 | N/A      | 0.472" x 0.354"<br>12mm x 9mm                                                                                                                                      | Jewelry, pharma, bottles, liquids, foods, DVD's, access control, loyalty cards, and other anti-counterfeiting applications. |
| Slimline™ (SL)<br> | N/A      | ALN-9745 | N/A      | 3.701" x 0.228"***<br>94mm x 5.8mm**<br>***3.701" x 0.12" / 94mm x 3.05mm without inlay chip targets (not electrically significant - used for chip mounting only). | Book spines, door edges, cigarette boxes, small package labels, narrow form factor assets.                                  |

| Product        | Features                                                                         | Benefits                                                                                                                                                                               |
|----------------|----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2x2            | Highest performance in a 2" form factor.                                         | A square form-factor for tracking of larger items.<br>Multiple-frequency sensitivity optimized for high performance in all world regions.                                              |
| Square (1x1)   | High performance when a longer tag form-factor is inappropriate.                 | The Square provides performance close to the 2x2 in a smaller form-factor.                                                                                                             |
| SIT (SIT)      | Ultra Compact. Near field access only. Can be used adjacent to metallic objects. | Fits very small objects normally challenging for RFID. Close proximity read zone for added security. Extended read range enabled through appropriate placement to conductive surfaces. |
| Slimline™ (SL) | Ultra slim form-factor at 5.8mm or 3.05mm thin (3.05mm without inlay targets).   | Extremely narrow form-factor enabling use where RFID is normally not possible. Approaches the well regarded Squiggle/Squigglette performance in an ultra narrow form-factor.           |

<sup>1</sup> Sizes are approximate. **These are inlay antenna sizes.** Tags and labels will be larger. Please refer to specific product details available on Alien's website for exact measurements - [www.alientechnology.com](http://www.alientechnology.com)



Copyright © 2016 Alien Technology LLC. All rights reserved.

Alien, Alien Technology, the Alien Technology logo, FSA, Higgs, Dynamic Authentication, BlastWrite, QuickWrite, Squiggle, and the Squiggle logo are trademarks or registered trademarks of Alien Technology Corporation in the U.S. and other countries.

HANDLING PRECAUTIONS Observe standard handling practices to minimize ESD.

DISCLAIMER Application recommendations are guidelines only - actual results may vary and should be confirmed. This is a general purpose product not designed or intended for any specific application.

IC products are covered by one or more of the following U.S. patents: 7967204, 7931063, 7868766, 7737825, 7716208, 7716160, 7688206, 7671720, 7659822, 7619531, 7615479, 7598867, 7580378, 7576656, 7562083, 7561221, 7559486, 7559131, 7554451, 7551141, 7542301, 7542008, 7522055, 7500610, 7489248, 7453705, 7452748, 7425467, 7417306, 7411503, 7385284, 7377445, 7364084, 7353598, 7342490, 7324061, 7321159, 7301458, 7295114, 7288432, 7265675, 7262686, 7193504, 7172910, 7172789, 7141176, 7113250, 7080444, 7070851, 7068224, 7046328, 6998644, 6988667, 6985361, 6980184, 6970219, 6952157, 6942155, 6933848. Other patents pending.

Tag products are covered by one or more of the following U.S. patents: 7967204, 7931063, 7868766, 7737825, 7716208, 7716160, 7688206, 7659822, 7619531, 7615479, 7598867, 7580378, 7576656, 7562083, 7561221, 7559486, 7559131, 7554451, 7551141, 7542301, 7542008, 7531218, 7522055, 7500610, 7489248, 7453705, 7425467, 7417306, 7411503, 7385284, 7377445, 7364084, 7353598, 7342490, 7324061, 7321159, 7301458, 7295114, 7288432, 7265675, 7262686, 7260882, 7253735, 7244326, 7218527, 7214569, 7199527, 7193504, 7173528, 7172910, 7172789, 7141176, 7113250, 7101502, 7080444, 7070851, 7068224, 7046328, 6998644, 6988667, 6985361, 6980184, 6970219, 6952157, 6942155, 6933848, 6927085, 6816380, 6780696, 6731353, 6693384, 6683663, 6665044, 6657289, 6623579, 6606247, 6606079, 6590346, 6586338, 6566744, 6555408, 6527964, 6479395, 6468638, 6420266, 6316278, 6291896, 6281038. Other patents pending.

Reader products are covered by one or more of the following U.S. patents: 7716208, 7716160, 7688206, 7671720, 7659822, 7619531, 7615479, 7598867, 7580378, 7576656, 7562083, 7561221, 7559486, 7559131, 7554451, 7411503, 7385284, 7377445, 7364084, 7353598, 7342490, 7324061, 7321159, 7301458, 7295114, 7288432, 7265675, 7262686, 7215249, 7214569, 7199527, 7193504, 7173528, 7172910, 7172789, 7141176, 7113250, 7101502, 7080444, 7070851, 7068224, 7046328, 6998644, 6988667, 6985361, 6980184, 6970219, 6952157. Other patents pending.

Reader Products: These products are licensed under patents of Round Rock Research, LLC.

Tag Products: Certain products are licensed under patents of Round Rock Research, LLC, for use solely with UHF RFID Readers (such as Alien reader products) that are licensed under an agreement with Round Rock Research, LLC.

Alien Technology  
845 Embedded Way  
San Jose, CA 95138  
[www.alientechnology.com](http://www.alientechnology.com)



June 17, 2016