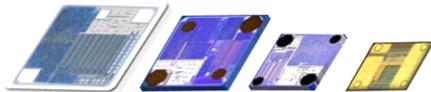


RFID...By Alien Technology^(R) IC, Inlay & Hardware Catalog

Over 25 years of innovation, technology and quality EPCglobal Gen2 and ISO/IEC 18000-6C compliant UHF passive RFID transceiver chips, inlays & tags, fixed & mobile readers and services.

RFID ICs



World-class Read, Write & memory retention

- Higgs™ Sentinel™ bit error correction
- Optimized memory system for mass markets
- *BlastWrite™* and *QuickWrite™* for mass-encoding
- Pre-encoded chip-level serialization

READERS



High performance, ease of use, robust feature set

- Fixed, Handheld, Sled options for all applications
- Featuring on-reader data processing
- Streamlines peripheral enrollment on networks
- Alien Reader Protocol (& LLRP on ALR-F800 / F800-X)

INLAYS / TAGS



Industry's best selling and trusted tag family

- Featuring the pioneering "Squiggle" tag & family
- Inlays for Retail, Transportation, Bio, Security applications and more
- Available under license as reference designs
- Custom tag design service (with NRE or volume commitment)

SERVICES



Industry's first & most respected RFID training

- RFID Academy™ : Standard / Custom / On-Site
- Best Practices
- Practical Product Technical Training
- RFID 101 to Deep Dive, Academy Covers It All

With demonstrated expertise and performance in retail/apparel, transportation, aerospace, authentication, supply chain, item level and life-science applications for almost 20 years, Alien Technology continues to create innovative products and solutions.

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, installation & implementation.

- Please visit www.AlienTechnology.com/Services/Academy-Registration for all current EMEA and US Academy dates, pricing and registration.



Alien Fixed Readers

| | Class | Operating System | GPIOs | Protocol | Application |
|-------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|---------------------|----------------------------------------------------|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ALR-F800-X Series w/ Emissary  | Combines F800 Enterprise Reader with an Edge Server and Emissary Multi-Reader Management and Workflow Management. | Linux with Emissary | 4 in / 8 out (optically isolated / open collector) | ARP (Alien Reader Protocol) / LLRP | Available as -X0 (manages itself), -X (manages up to 4 additional readers) & -X2 (manages up to 8 additional readers) Manages its own network of other readers. Visual workflow creation and multiple reader management. |
| ALR-F800  | Fifth Generation 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. Industry's best Power over Ethernet (PoE) transmit power and performance. |
| ALR-9680  | Commercial 4-Port Fixed | Linux | 2 in / 2 out (TTL) | ARP (Alien Reader Protocol) | Power-over-Ethernet reader for warehouse, retail, and supply chain management. |
| ALR-9650  | Commercial Smart-Antenna (integrated antenna) | Linux | 2 in / 2 out (TTL) | ARP (Alien Reader Protocol) | Power-over-Ethernet reader with built in antenna for applications that are space sensitive. |

Alien Nexus

| | Class | Application |
|-------------------------------------------------------------------------------------------------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ALX-2525  | Multiplexor (MUX) | With plug-and-play capability with any Alien F800-series fixed reader, add up to 8 antennas per antenna port (32 antennas maximum) when connected to ALX-2530 to cover large read zones, smart shelving and any other applications requiring expanded read point accuracy, at a fraction of the cost of traditional H/W deployments |
| ALX-2530  | Controller | Plug-and-play MUX controller for F800-series featuring flexible power options (USB, GPIO or external DC power) and ability to connect & control 2 output & 4 input GPIO peripherals along with the connected multiplexors |



Alien Mobile Readers

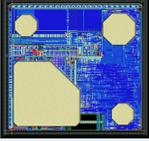
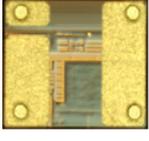
| | Class | Operating System | CPU/Mem | Antenna | Application |
|---------------------------------------------------------------------------------------------------------|---------------------------------|------------------|-----------------------------------------------|---------|----------------------------------------------------------------------------------------------------------------------------------------------|
| ALR-H460 (US Only)  | Enterprise Handheld RFID reader | Android 6.0 | Quad-Core 1.45GHz 2GB RAM 16GB Flash | 4dBic | Enables users to deploy manageable, robust, best-in-class RFID solutions for supply chain, manufacturing, and asset management applications. |

Alien Reader Antenna Selection

| | Frequency | Gain | IP Rating | Size | Cable/Connector |
|------------------------------------------------------------------------------------------------|---------------|------------------------------------------------|-----------|-------------------------|-----------------------------|
| ALR-8697  | 865 - 928 MHz | 8.5dBic | IP67 | 10.16" x 10.16" x 1.42" | Inset RTNC female connector |
| ALR-8698  | | Nominally 10.5dBic 11dBic FCC / 10dBic ETSI | | | |



Higgs™ RFID Integrated Circuit (IC) Family (* sensitivity when measured on 2.15 dBi gain dipole antenna and 50 Ohm source impedance)

| | EPC Memory | User Memory | UTID | Read Sensitivity* | Write Sensitivity* | Serialization | Applications |
|------------------------------------------------------------------------------------------------|-------------|----------------|---------|-------------------|--------------------|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Higgs 3  | 96-480 bits | Up to 512 bits | 64 bits | -18.0 dBm | -13.5 dBm | Yes - Chip & Non-chip serialization | General purpose, aerospace, apparel, Automatic Vehicle Identification (AVI), automotive, baggage, books, cases, documents, ID cards, item level tracking, labels, loyalty cards, pharmaceutical, palettes, retail, etc. |
| Higgs 4  | 128 bits | 128 bits | 64 bits | -19 dBm | -16 dBm | | |
| Higgs-EC  | 128 bits | 128 bits | 48 bits | -20.0 dBm | -17 dBm | | |
| Higgs-9  | 96-496 bits | Up to 688 bits | 48 bits | -20.0 dBm | -18 dBm | | |

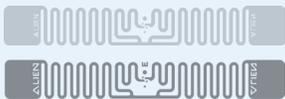
Alien Inlay Family Selection Matrix

| | Squiggle Family | | | | | | Specialized Retail | | | | | High-Dielectric / Automotive / Aviation | | | | Form-factor | | | | | |
|------------------|-----------------|------------|------------------------|------------|--------------|------------|--------------------|------------|------------|-------------|-----------------|-----------------------------------------|--------------|-----------------|------------|-------------|----------|---------------|----------|--------------|----------|
| | Squiggle® (SQ) | Short (SH) | Squiglette (ST) | Squig (SG) | Doc Tag (DT) | Gecko (GE) | Pearl (PE) | Glint (GL) | H5can (H5) | GT-Tag (GT) | GT-W Tag (GT-W) | Spider-360 (SP) | Aviator (AV) | Wonder-Dog (WD) | Tread (TR) | G-Tag (G) | Bio-Tag | SlimLine (SL) | 2x2 | Square (1x1) | SIT (ST) |
| Higgs™9 Model # | ALN-9940 | ALN-9962 | ALN-9930 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | ALN-9954 | N/A | N/A | N/A | N/A | N/A |
| Higgs™EC Model # | ALN-9840 | ALN-9862 | ALN-9830 | N/A | ALN-9841 | ALN-9825 | N/A | ALN-9815 | ALN-9820 | ALN-9828 | ALN-9828-W | N/A | ALN-9850 | N/A | ALN-9874 | N/A | N/A | N/A | N/A | N/A | N/A |
| Higgs™4 Model # | ALN-9740 | ALN-9762 | ALN-9730 ALN-9730-E | ALN-9710 | ALN-9741 | N/A | ALN-9716 | ALN-9715 | ALN-9720 | ALN-9728 | N/A | ALN-9726 | N/A | ALN-9768 | N/A | N/A | ALN-9714 | ALN-9745 | N/A | N/A | ALN-9713 |
| Higgs™3 Model # | ALN-9640 | ALN-9662 | ALN-9630 | ALN-9610 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | ALN-9654 | N/A | N/A | ALN-9634 | ALN-9629 | N/A |



Alien Family of EPC Gen 2 RFID Inlays

Inlays: Squiggle Family

| Product | Higgs-3 | Higgs-4 | Higgs-EC | Higgs-9 | Antenna Size ¹ | Application |
|----------------------------------------------------------------------------------------------------------------------------|----------|-------------------------------------|----------|----------|------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| Squiggle™ (SQ)  | ALN-9640 | ALN-9740 | ALN-9840 | ALN-9940 | 3.732" x 0.319" 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)  | ALN-9630 | ALN-9730 ALN-9730-E ² | ALN-9830 | ALN-9930 | 2.756" x 0.374" 70mm x 9.5mm | |
| Short (SH)  | ALN-9662 | ALN-9762 | ALN-9862 | ALN-9962 | 2.756" x 0.669" 70mm x 17mm | |
| Squig (SG)  | ALN-9610 | ALN-9710 | N/A | N/A | 1.752" x 0.409" 44.5mm x 10.4mm | |
| Doc Tag (DOC)  | N/A | ALN-9741 | ALN-9841 | N/A | 3.74" x 0.32" 95mm x 8.15mm | |

| Product | Features | Benefits |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Squiggle (SQ) Squiglette (ST) and Squiglette-E (STE) Short (SH) Squig (SG) | <p>Squiggle is one of the most widely used general purpose tags.</p> <p>Family extends the Squiggle features into different form-factors.</p> <p>One of the best performing general purpose tag family on the market.</p> <p>Designed to work well in challenging environments.</p> | <p>Well proven design for a broad range of worldwide applications.</p> <p>All Alien tags are world-tags and work well in all regions. 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).</p> <p>A very robust general purpose tag (for ultimate robustness in high dielectric environments - see Aliens "G" or "BAT" tags).</p> |
| 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. |

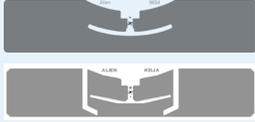
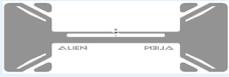
¹ Sizes are approximate. **Dimensions are inlay ANTENNA sizes.** Tags and labels will be larger. Please refer to specific product details available on Alien's website for exact measurements - www.alientechnology.com

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



Alien Family of EPC Gen 2 RFID Inlays

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

| Product | Higgs-3 | Higgs-4 | Higgs-EC | Higgs-9 | Antenna Size ¹ | Application |
|----------------------------------------------------------------------------------------------------------------------|----------|----------|----------|----------|-------------------------------|---------------------------------------------------------------------------------------------------------------|
| G Tag (G) H3 (top) & H9 (bottom)  | ALN-9654 | N/A | N/A | ALN-9954 | 3.66" x 0.748" 93mm x 19mm | High density plastic totes, windshields, batteries etc. |
| Aviator (AV)  | N/A | N/A | ALN-9850 | N/A | 2.99" x 1.49" 76mm x 38mm | Auburn Category U certified for Aviation baggage labels, Aviation assets and general inventory & logistics |
| Tread (TR)  | N/A | N/A | ALN-9874 | N/A | 3.15" x 1.57" 80mm x 40mm | Optimized for retail automotive tire labels, general automotive assets, materials normally a challenge for RF |
| Wonder Dog™ (WD)  | N/A | ALN-9768 | N/A | N/A | 3.30" x 0.91" 86mm x 23mm | General purpose, automotive metalized windshields/ head lamp and consumer electronic devices. |
| Bio Tag (BIO)  | N/A | ALN-9714 | N/A | N/A | 0.67" x 0.59" 17mm x 15mm | Pharmaceuticals, healthcare, vials/ ampoules, small glass objects and small liquid filled objects. |

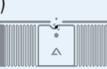
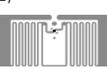
| Product | Features | Benefits |
|------------------|------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| G Tag (G) | Exceptional performance for high dielectric mounting. | Ideal for windscreen/safety glass, standard glass, plastics, wood or other materials normally a challenge for RF. |
| Aviator (AV) | Designed for Aviation baggage labels, assets, and general inventory | Certified by Auburn University for Category U, Aviator is ideal for baggage label use for bag tracking and also for other Aviation focused asset & logistics applications. |
| Tread (TR) | Optimized for automotive tire retail labeling and other difficult to read material normally challenging for RF. | Robust reliability when reading multiple and densely stacked automotive tires and similar dielectric material assets. |
| 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 ideal for challenging dielectric materials while still providing excellent performance with handheld and lower power readers. |
| 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. |

¹ Sizes are approximate. **Dimensions 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



Alien Family of EPC Gen 2 RFID Inlays

Inlays: Specialized Retail

| Product | Higgs-3 | Higgs-4 | Higgs-EC | Antenna Size ¹ | Application |
|---------------------------------------------------------------------------------------------------------|---------|----------|------------|-------------------------------------|------------------------------------------------------------------------------------------|
| Spider-360 (SP)  | N/A | ALN-9726 | N/A | 1.97" x 1.18" | Retail, apparel, hang-tags, joker tags, airline baggage, labels and document tracking. |
| Garment Tag (GT)  | N/A | ALN-9728 | ALN-9828 | 50mm x 30mm aka "30 x 50" | Retail, apparel, hang-tags, joker tags, labels and document tracking. |
| Garment Tag (GT-W)  | N/A | N/A | ALN-9828-W | | Auburn W1, W2, W3, W5, A, B, C, D, G, M, N Q Retail certified for all 30x50 applications |
| HiScan™ (HS)  | N/A | ALN-9720 | N/A | 1.57" x 0.61" 40mm x 15.5mm | Specialized tag designed for the most challenging retail and apparel |
| Glint™ (GL)  | N/A | ALN-9715 | N/A | 1.06" x 0.38" 27mm x 9.7mm | Jewelry, cosmetics and other smaller form factor items. |
| Pearl™ (PE)  | N/A | ALN-9716 | N/A | 0.87" x 0.49" 22mm x 12.5mm | |
| Gecko™ (GE)  | N/A | N/A | ALN-9825 | 1.14" x 0.59" 29mm x 15mm | Retail, apparel, compact form factor assets, dense readability. |

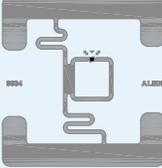
| Product | Features | Benefits |
|--------------------|--------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Spider-360 (SP) | An orientation agnostic 30x50mm form-factor tag. Useful when end-on reads are required. | Designed for 360 degree readability for dynamically changing tag orientation. Ideal for (but not limited to) retail, apparel, airline baggage, etc. |
| Garment Tag (GT) | 30x50mm form-factor and tuned for use in retail with packed shelves or hanging garments. | High performance readability (distance / rates) for real-world retail application environments. Optimized for stacked and hanging goods. |
| Garment Tag (GT-W) | 30x50 form-factor tuned for emerging high-volume Retail Auburn certified categories | Adds Auburn W1, W2, W3, W5, A, B, C, D, G, M, N, Q compliance categories |
| HiScan™ (HS) | Tuned for high-performance reading in lower-power reading environments. | Robust readability in real-world retail application environments including (but not limited to): rapid handheld movement, tags closely spaced together, low transmit power readers etc. |
| Glint™ (GL) | Very small non-near-field tag designed for close placement to metals or metallic surfaces. | Compact tag design for jewelry and other smaller format assets. Utilizes close proximity of metallic objects to increase read range. Offers read/write distances in feet/meters versus inches/centimeters. |
| Pearl™ (PE) | | |
| Gecko™ (GE) | | |

¹ Sizes are approximate. **Dimensions 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



Alien Family of EPC Gen 2 RFID Inlays

Inlays: Form-factor/Orientation Family

| Product | Higgs-3 | Higgs-4 | Higgs-EC | Higgs-9 | Antenna Size ¹ | Application |
|-----------------------------------------------------------------------------------------------------|----------|----------|----------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| 2x2  | ALN-9634 | N/A | N/A | N/A | 1.73" x 1.81" 44mm x 46mm | Large items, baggage tagging, apparel and pharmaceutical bottles. |
| Square (1x1)  | ALN-9629 | N/A | N/A | N/A | 0.89" x 0.89" 22.5mm x 22.5mm | Item level tagging, apparel, pharmaceutical bottles and other high value consumables. |
| SIT (SIT)  | N/A | ALN-9713 | N/A | N/A | 0.472" x 0.354" 12mm x 9mm | Jewelry, pharma, bottles, liquids, foods, DVD's, access control, loyalty cards, and other anti-counterfeiting |
| Slimline™ (SL)  | N/A | ALN-9745 | N/A | N/A | 3.701" x 0.228"*** 94mm x 5.8mm** ***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. 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). | Extreme narrow form-factor enabling use where RFID is normally not possible. Comparable Squiggle/Squiggle level performance in an ultra narrow form-factor. |

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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.

This product is 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, 7544451, 7551141, 7542301, 7542008, 7531218, 7522055, 7500610, 7480248, 7453705, 7425467, 7417306, 7411503, 7385284, 7377445, 7364084, 7353598, 7342490, 7324061, 7321159, 7301458, 7295114, 7288432, 7265675, 7262686, 7260882, 7253735, 7244326, 7218527, 7214569, 7199527, 7192504, 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.

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