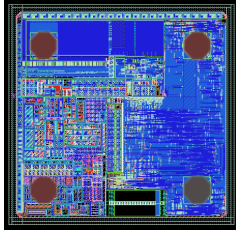




# HIGGS-EC™ WITH SENTINEL™ MEMORY


## HIGH SENSITIVITY EPCGLOBAL GEN 2 RFID TAG IC

Higgs-EC is a ground-breaking **next generation** single chip EPCglobal Gen 2 UHF RFID Tag IC that provides a huge leap in RFID capabilities **and data quality** especially in the **highest volume applications** that demand both **best in industry performance** and **best in industry reliability**.



### Applications

- Retail Item Level Tagging
- Supply Chain Management
- Vehicle Tracking
- Product Authentication
- Asset Inventory and Tracking
- Baggage Handling and Tracking

Feature	Description	Benefit
Sentinel™ Memory 	A <b>unique</b> and robust <b>error correcting</b> memory architecture. This architecture detects <b>and fixes</b> single bit errors and detects and flags dual bit errors.	<b>The most robust memory in the RFID industry.</b> Immune to single bit errors (cosmic rays, chip damage etc). Provides customers reassurance the stored data is protected and data loss/corruption minimized.
Best in class read sensitivity	-22.5 dBm	Allows smaller tags to be designed or larger read & write distances to be realized.
Best in class write sensitivity	-19 dBm	
Best in class memory reliability	<b>200,000 write</b> cycles, two times that of competitors	More robust memory for high-write applications
96 and 128b EPC	Support EPC size up to 128b for flexibility.	Additional 32b allows storing of larger identifying information.
128b user memory	User memory for storage of additional application data.	Enables Higgs-EC to be used in applications where more memory is required unlike many competitive IC's.

### Features:

- › Designed to meet EPCglobal Gen2 (V 1.2.0) and ISO/IEC 18000-6C
- › Worldwide operation in the RFID UHF bands (840-960 MHz)
- › 512-Bits of NVM/RAM Memory
  - Up to 128-EPC Bits (nominally 96 bits)
  - 128 User Bits
  - 80 Bit Unique TID
  - 32 Bit Access and 32 bit Kill Passwords
- › Pre-Programmed with a unique, unalterable 64-bit serial number
- › User Memory can be Block Perma-Locked as well as read password protected in 32 Bit Blocks
- › Low power operation for both read and program
- › QuickWrite™ / BlastWrite™- High-speed chip & mass programming
- › Dynamic Authentication™ - anti-cloning/anti-counterfeit technology
- › Exceptional operating range, up to 13m with appropriate antenna.

### Product Overview:

Higgs-EC offers a new approach to RFID. Higgs-EC leverages from the successful and proven Higgs family from Alien Technology® and now adds the industry's most robust memory architecture. As RFID tag volumes grow, even the small percentage of bit errors inherent to semiconductors becomes problematic. Higgs-EC provides a leapfrog in RFID technology by providing **self-correcting memory**.

Memory in Higgs-EC is protected by the "Sentinel" architecture that guards memory by **both detecting** single bit corruption regardless of cause **and** then **fixing** the error. As far as the tag user is concerned, the error never happened. Additionally Sentinel detects two bits in error and notifies the reader if this ever happens.

Higgs-EC also provides **class-leading read and write sensitivity** enabling smaller tags to be designed or tags to be used across longer distances from the RFID reader antenna. Both read and write sensitivities are enhanced benefiting both types of applications.

Higgs-EC is fully backwards compatible with Alien's other Higgs ICs. For example, Alien's mass-encoding capabilities (**QuickWrite™** and **BlastWrite™**) and Aliens anti-cloning technology (Dynamic Authentication™) are supported.



# HIGGS-EC WITH SENTINEL MEMORY

## HIGH SENSITIVITY EPCGLOBAL CLASS 1 GEN 2 RFID TAG IC

### Operating Conditions & Electrical Characteristics

Symbol	Parameter	Conditions / Capability	Min	Typ	Max	Units
<b>Operating Conditions</b>						
T <sub>A</sub>	Operating Temperature		-50		+85	°C
f <sub>in</sub>	Operating Frequency		840		960	MHz
<b>Electrical Characteristics</b>						
S <sub>R</sub>	Sensitivity during Read	With 2dBi directivity of dipole		-22.5		dBm
S <sub>w</sub>	Sensitivity during Write	With 2dBi directivity of dipole		-19		dBm
I <sub>s</sub>	Interference Signal Suppression			-4		dB
R <sub>p</sub>	Equivalent input parallel resistance	At -22.5 dBm input power		2,500		Ohms
C <sub>p</sub>	Equivalent input parallel Capacitance	At -22.5 dBm input power		0.85		pF
D <sub>ret</sub>	Data Retention			50		Years
P <sub>cycl</sub>	Programming Cycles at 25°C			<b>200,000</b>		Cycles

### Physical Die Characteristics

Dimension	Description	Size	Units
x	Horizontal die length	490	µm
y	Vertical die height	479	µm
z	Die thickness	150 ±10	µm

### Memory Map

Bank	Address	Description	Memory	Bits
User	00h – 7Fh	User	NVM	128
TID	80h – FFh	Device Configuration	ROM-NVM	128
	30h – 7Fh	Unique Tag ID Unalterable	NVM	80
EPC	00h – 2Fh	XTID*/TID EPC/TMD/TMDID/TMN	ROM	48*
	20h – 9Fh	EPC #	NVM	128
	10h – 1Fh	EPC-PC	NVM	16
Reserved	00h – 0Fh	EPC-CRC	RAM	16
	20h – 3Fh	RES-Access Pwd, EPC optional	NVM	32
	00h – 1Fh	RES-Kill Pwd	NVM	32

\*Higgs-EC follows the XTID/TID format which manifests in an additional word between the manufacturer code and the UTID words versus Higgs-3 and Higgs-4. To read the same UTID word in Higgs-EC as in Higgs-4, shift the read location by one word. All other memory banks are identical to Higgs-4 (e.g. Reserved, EPC and User memory are the same as Higgs-4).

### Ordering Information

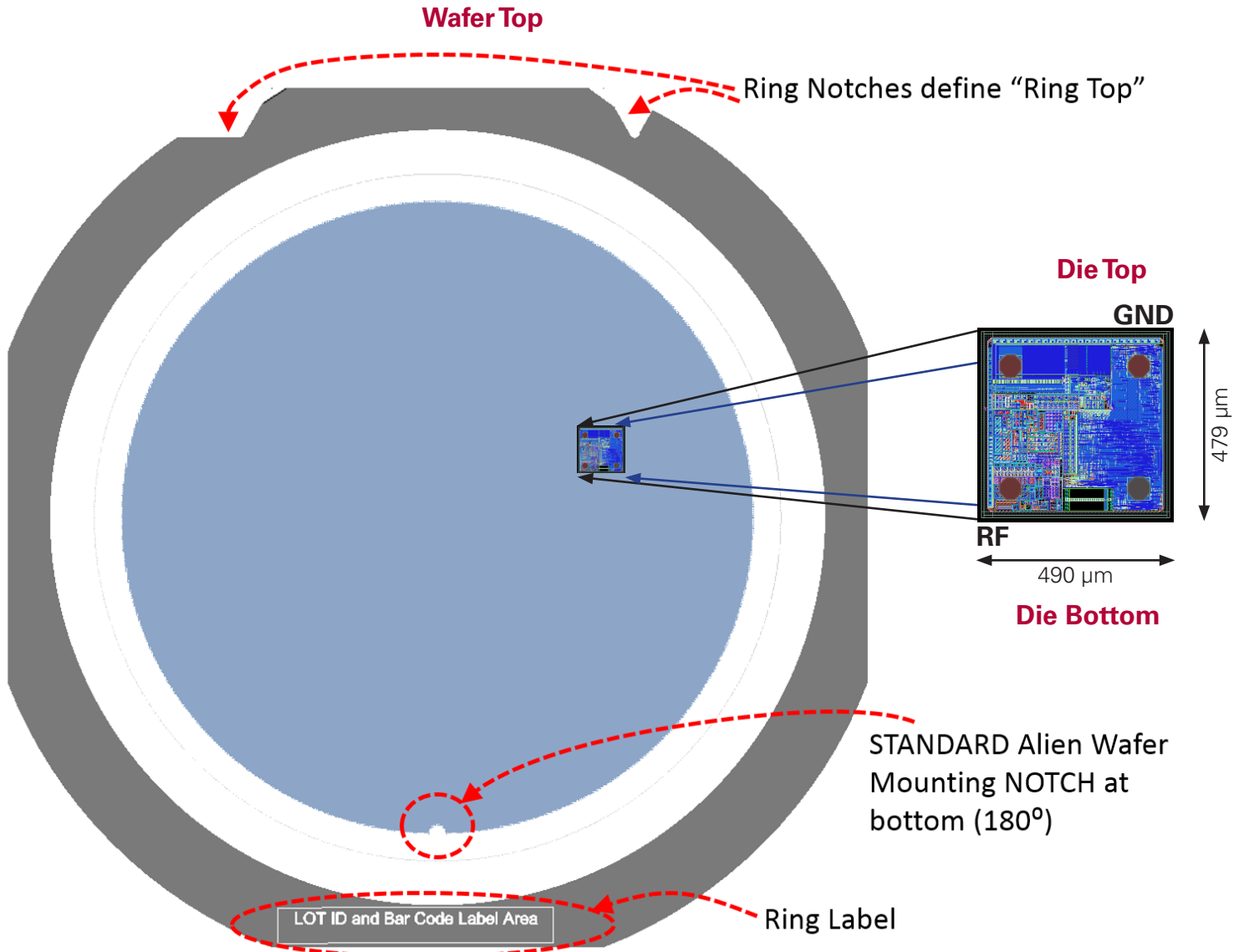
Part	Model Number	Description
Higgs™ EC IC	ALC-380-IC	Bumped, Tested, Ground & Sawed IC's. Provided on 8 Inch Wafer, UV Tape Mounted (SEMI/JIS Standard Metal Film Frame)

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## HIGH SENSITIVITY EPCGLOBAL CLASS 1 GEN 2 RFID TAG IC



### Wafer and Die Size and Orientation



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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, 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, 7173528, 7172910, 7172789, 7141176, 7113250, 7101502, 7080444, 7070851, 7068224, 7046328, 6998644, 6988667, 6985361, 6980184, 6970219, 6952157, 6942155, 6933848. Other patents pending.

This product is 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.

Draft - Subject to Change



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