



Higgs™ 10

High Performance GS1 Class 1 Gen 2 RFID Tag IC

Featuring outstanding **read/write sensitivity**, along with **enhanced backscatter capability**, **Higgs 10™** delivers industry leading **performance & reliability** optimized for high-volume applications.



Featuring



Applications

- High-Volume Retail
- Automotive
- Supply-Chain & Logistics
- High Sensitivity

Feature	Description	Benefit
Sentinel™ Memory	Detects and fixes single bit errors and flags dual bit errors.	Protects data and provides unprecedented immunity to typical sources of single bit errors (chip damage, low power etc.)
Read sensitivity	Up to -21.5 dBm	Allows smaller tags to be designed or larger read & write distances to be realized. Helps eliminate “cross-reads”
Write sensitivity	Up to -19 dBm	
Best in class memory reliability	200,000 write cycles	Robust memory retention (twice that of competition)
96 bit expandable EPC	Supports EPC size up to 128b for flexibility.	Supports popular EPC structures utilizing 96 and 128b lengths
0-32 bit user memory	32b of flexible user memory available for encryption keys, passwords or other asset information	Greater use case flexibility. Provides 32b of user memory with a 96b EPC or may be used for additional EPC length
48b UTID with lower 38b unique serial for SGTIN generation	48b UTID. Lower 38b are duplicated in the EPC for SGTIN generation.	For general serialization, in both Retail and Non-Retail applications
Larger “pads” for improved antenna connectivity	More contact area for antenna connectivity	Far better yield, inlay to inlay, thus providing greater tag reliability

Features:

- › Compliant to GS1 Class 1 Gen 2 and ISO/IEC 18000-6C
- › Global operation in the RFID UHF RF frequency bands (840-960 MHz)
- › 480-Bits of NVM/RAM Memory
 - Up to 128-EPC Bits (nominally 96 bits)
 - Up to 32 User Bits (with 96 bit EPC)
 - **48 Bit Unique TID**
 - 32 BitAccess and 32 bit Kill Passwords
- › Pre-Programmed with a unique, unalterable 48-bit serial number
- › User Memory can be Perma-Locked
- › User Memory can be read password protected
- › Low power operation for both read and program
- › Exceptional operating range, up to 13m

Product Overview:

With leading edge Read and Write sensitivity and enhanced Backscatter performance, Higgs-10, the newest member of the Higgs family of RFID IC's from Alien Technology,® is poised to drive the most challenging of applications in the wide web of the Internet-of-Things.

Ideal for high volume applications, Higgs-10 offers flexible EPC memory structure supporting nominal 96-bit EPC formats, plus a 32-bit expansion for longer EPC formats. Higgs-10 also features up to 32-bits for optional User Memory data. This enables the flexibility to store additional data beyond the EPC level such as encryption keys, additional asset information, and serial numbers.

Like all Alien ICs, Higgs-10 is fully backward compatible with the entire Alien IC and Reader feature-set.



Higgs 10 With Sentinel Memory

High Performance EPCglobal Class 1 Gen 2 RFID Tag IC

Operating Conditions & Electrical Characteristics

Symbol	Parameter	Conditions / Capability	Min	Typ	Max	Units
Operating Conditions						
T_A	Operating Temperature		-50	+25	+85	°C
f_{in}	Operating Frequency		840		960	MHz
Electrical Characteristics						
S_R	Sensitivity during Read	With 2dBi directivity of dipole			-21.5	dBm
S_W	Sensitivity during Write	With 2dBi directivity of dipole			-19	dBm
I_S	Interference Signal Suppression			-4		dB
R_p	Equivalent input parallel resistance	At -22.5 dBm input power		1,300		Ohms
C_p	Equivalent input parallel Capacitance	At -22.5 dBm input power		1.4		pF
D_{ret}	Data Retention			50		Years
P_{cycl}	Programming Cycles at 25°C			200,000		Cycles

Physical Die Characteristics

Dimension	Description	Size	Units
x	Horizontal die length	419.05	µm
y	Vertical die height	382.50	µm
z	Die thickness	150 +/- 10	µm

Memory Map

Bank	Address	Description	Memory	Bits
User	00h – 1Fh	User	NVM	32
TID	60h & above	Device Configuration	ROM-NVM-SRAM	-
	30h – 5Fh	Unique Tag ID Unalterable	NVM	48
	00h – 2Fh	XTID*/TID EPC/TMD/TMDID/TMN	ROM	48*
EPC	20h – 7Fh	EPC #	NVM	96
	10h – 1Fh	EPC-PC	NVM	16
	00h – 0Fh	EPC-CRC	RAM	16
Reserved	20h – 3Fh	RES-Access Password, EPC optional	NVM	32
	00h – 1Fh	RES-Kill Password	NVM	32

*Higgs-10 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-10 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

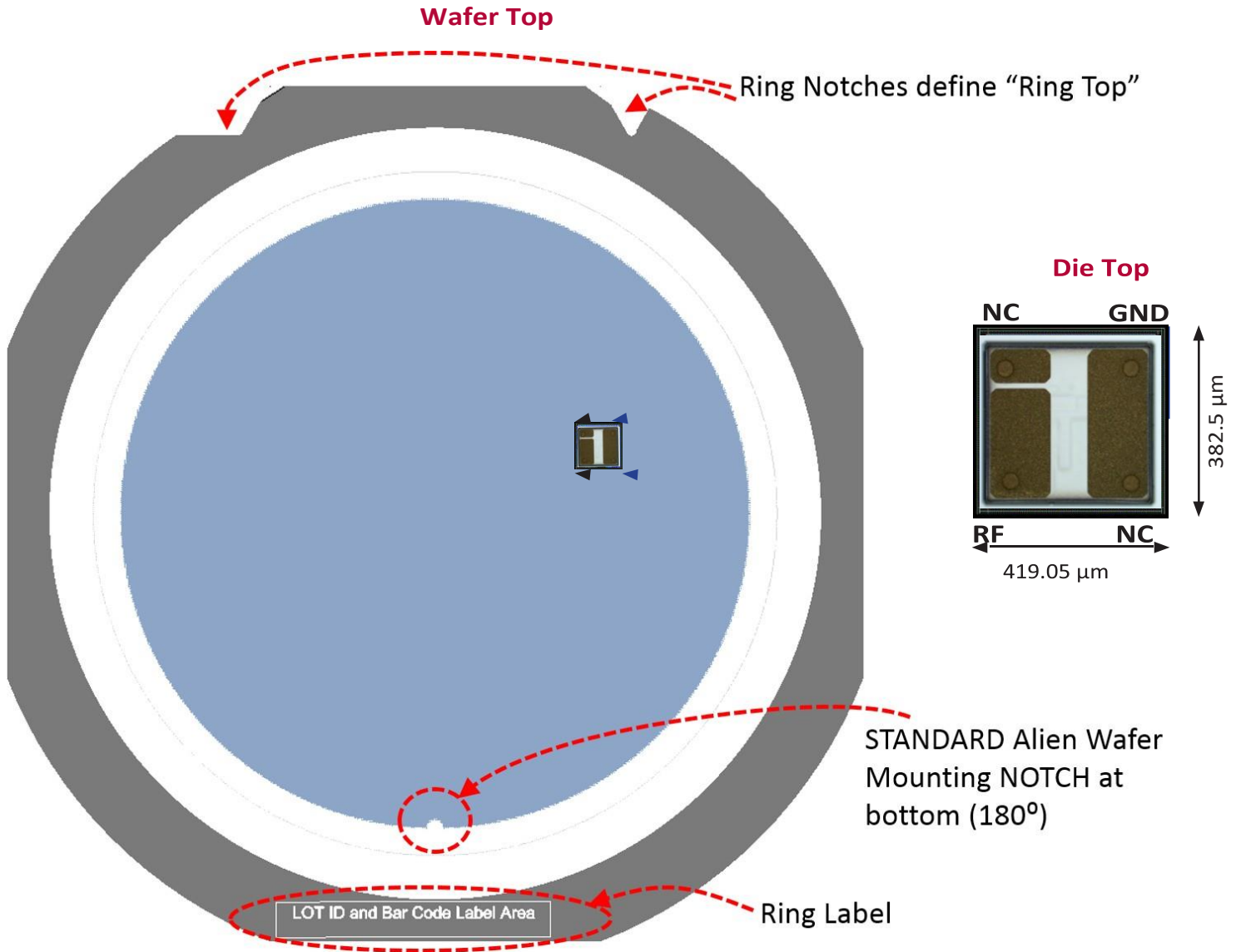
Part	Model Number	Description
Higgs 10™ IC	ALC-400-IC	Bumped, Tested, Ground & Sawed IC's. Provided on 8 Inch Wafer, UV Tape Mounted (SEMI/JIS Standard Metal Film Frame)



Higgs 10 With Sentinel Memory

High Performance EPCglobal Class 1 Gen 2 RFID Tag IC

Wafer and Die Size and Orientation



July 12, 2019 DRAFT

Copyright© 2019 Alien Technology LLC. All rights reserved.

Alien, Alien Technology, the Alien Technology logo, Spider, Higgs, Dynamic Authentication, QuickWrite, BlockWrite, 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.

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, 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.



Alien Technology
845 Embedded Way.
San Jose, CA 95138
www.alientechnology.com