

A Virtual Conference presented by AIM & RAIN 9 - 10 December 2020











RAIN RFID Tag Chip Types for Use with an RFID Printer

GS1 EPC and ISO 18000-63, Memory configurations, Specialty chips





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Personal Introduction



Email: <u>RFID@PrintronixAutoID.com</u> LinkedIn: /in/chris-brown-rfid



Chris Brown RFID Subject Matter Expert

- 20+ years in the Auto ID industry
- Joined Printronix Auto ID in 2019
- Focused on RFID market and technologies
- Active member of RAIN RFID Alliance
- Active member of AIM



Agenda

- Introduction to Concepts and Terms
- GS1 EPC ≠ ISO 18000-63
- RAIN Tag Chip Memory Banks
- RAIN Tag Chip Memory-Size "Categorizations"
- Specialty Chips
- RFID Printer Considerations



Introduction to Concepts and Terms

We are talking about using an RFID-enabled printer to simultaneously print and encode RAIN RFID labels (tags). But will any RAIN tag chip work for your application?

- RAIN RFID tag chip
- RFID-enabled printers



Chip (+ Antenna = Inlay)



RFID Label



RFID-Enabled Printer



GS1 EPC versus ISO 18000-63

Something to be aware of...

- GS1 EPC and ISO 18000-63 have different encoding schemes
- RAIN encompasses both
- "T bit" (PC bit 17h):
 - $0 = GS1 EPC (\rightarrow "EPC number")$
 - 1 = ISO 18000-63 (→ "UII")
- Chips are delivered as one or the other beware!
- But encoders (including RFID printers) can toggle the chip either way





RAIN Tag Chip Memory Banks

- The four memory banks of a RAIN tag chip:
 - Reserved
 - EPC / UII: 96 496* bit
 - TID
 - User: 0 64 kbit
- EPC / UII:
 - Location for traditional "EPC" serial number
 - Limited "extended attributes" can be appended
- User memory:
 - Additional "extended attributes"
 - Custom data
 - "Database on a chip"
- Use of more memory and/or use of different memory banks affects printer and reader performance
- Higher memory chip = higher price



Chip Memory

Bank 11

Bank 10

Bank 01

Bank 00





RAIN Tag Chip Memory-Size "Categorizations"

Approximate, unofficial "categorizations:"

- "Standard" Memory (Alien, Impinj, NXP, EM Micro)
 - 96/128 bits EPC / UII
 - Zero 128 bits User
 - Application: Serial number ("EPC"), usually indexes to a digital twin
- "Mid-Memory" (Alien, Impinj, NXP, EM Micro)
 - 96 496 bits EPC / UII
 - Zero 512 bits User
 - Application: Serial number with some limited additional information, "extended attributes"
 - Additional data can be in EPC / UII or User
- "High-Memory" (Impinj, Tego, Quanray, Fujitsu)
 - 96 496 bits EPC / UII
 - 1k 8 kbits User (up to 64 kbits)
 - May require special encoding/reading commands; e.g., Permalocking ranges of User
 - Application: Maintenance records, limited/no cloud access, ATA2000 / aviation, factory automation











Specialty Chips

Tag chips will not always be selected on memory alone.

- Sensor chips:
 - Asygn, Farsens, Axzon, Johar
 - Temperature; Vibration/movement/strain; Moisture; etc.
 - Internal versus external sensors



Internal Sensors

Current.



Internal Analog Sensor Interface Temperature, ALS, Strain Low Noise Amplifier and 10 bits ADC

- Dual-frequency chips:
 - RAIN and NFC/HF
 - Shared memory





Specialty Chips (continued)

- High-security chips:
 - Standard security versus optional highsecurity encryption features

- Sterilization-proof chips:
 - Autoclave; Gamma-ray; E-beam
- High-memory chips





High-Memory Capacity



Sterilization Proof







RFID Printer Considerations

- Limit to data quantity to EPC / UII bank?
- Limit to data quantity to User bank?
- Is the specific chip pre-configured in the printer?
 - If not, can the memory configuration be manually entered?
- Do you want to read (and print) the TID? "Chipbased serialization"
- Support for advanced commands:
 - "BlockPermalock" / "Permalock Range"
 - ISO encoding: T bit, AFI encoding (PC bits)
 - High-security commands / encryption
 - XPC Words
 - Etc.?







Questions?





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Thank You

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Thank you for Attending



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Presentations will be available on-line soon. You will receive an email with a link when they are available.