UHF RFID Inlays: Dry and Wet

Every UHF RFID label starts as an inlay: a RAIN RFID chip (NXP UCODE 9/9xe, Impinj M700/M800 series or Alien Higgs-9) bonded to an antenna on PET film, operating to ISO/IEC 18000-63 (EPC Gen2v2) in the 860–960 MHz band.

Dry or wet: which inlay format to order

Format	What you receive	Typical next step	Specify
Dry inlay	Chip bonded to an antenna on a thin carrier film, no adhesive, on a roll	Lamination into cards, tickets or hangtags; embedding in tags or wristbands	Carrier, inlay outline, lamination process, pitch, rows across, core
Wet inlay	The same inlay on pressure-sensitive adhesive and a release liner, on a roll	Conversion into labels, or direct application to cartons or items	Adhesive, application surface and temperature, liner, pitch, core
Finished label	A wet inlay under a printable face stock, die-cut to size	Printing and encoding on your RFID printer, or delivered pre-printed and encoded	See UHF RFID labels

Chip options and datasheet figures

Chip	EPC memory	User memory	Read sensitivity (maker's data)	Worth knowing
NXP UCODE 9	96 bits	None	−24 dBm	NXP states UCODE 9 can re-use UCODE 8 inlay antenna designs (NXP)
NXP UCODE 9xe	128 bits	None	−24 dBm	NXP's drop-in replacement for UCODE 9 with a larger EPC; access password hardwired to zero (NXP data sheet)
NXP UCODE Nxm	Up to 496 bits	Up to 752 bits	−24 dBm	880 bits shared between EPC and user memory in three memory maps; NXP says it builds on UCODE 9xm (NXP)
Impinj M730	128 bits	None	−24 dBm	AutoTune V2; rated for 10,000 write cycles and 10-year retention
Impinj M750	96 bits	32 bits	−24 dBm	As M730 but with a 96-bit EPC plus 32 bits of user memory
Impinj M775	128 bits	32 bits	−24 dBm	Impinj Authenticity (Gen2X), which also needs a supporting reader and the Impinj Authentication Service
Impinj M780	496 bits	128 bits	−23.5 dBm	Long EPCs such as SGTIN-198, plus user memory
Impinj M781	128 bits	512 bits	−23.5 dBm	The largest user memory in the M700 series
Impinj M830	128 bits	None	−25.5 dBm	Impinj states it is drop-in compatible with M700 antenna designs
Impinj M850	96 bits	32 bits	−25.5 dBm	As M830 but with a 96-bit EPC plus 32 bits of user memory
Alien Higgs-9	96 bits nominal, expandable to 496	Up to 688 bits	Up to −20 dBm	48-bit unique TID; 200,000 write cycles. EPC and user memory are configurable; confirm the split for your encoding

Antenna design follows the application

Application	What the antenna has to cope with	Tell us
Item-level retail: hangtags, care labels, packaged goods	A small footprint, many tags close together, random orientation	Maximum inlay size, item material, how items are stacked or hung, retailer specification
Cartons and cases	Reading at distance on conveyors and dock doors, with contents affecting the signal	Carton contents, label position, how cartons pass the reader
On plastic	The plastic's type and thickness shift the tuning	Plastic type, wall thickness, placement area
Near liquids or moist goods	Water absorbs UHF energy and detunes the antenna	Liquid, container, fill level, placement; test on filled containers
Race bibs	Paper or Tyvek bibs worn on the body, which detunes a tag pressed against it; folding or piercing can break the tag	Bib material and how the bib printer adds the inlay; see RFID race timing
Directly on metal	A standard inlay does not read reliably on metal	Use a spacer construction or an on-metal tag; see custom RFID tags

Ordering

- Free standard samples; customised samples carry a setup fee.
- Standard lead time is 2–3 weeks.
- Quote-only pricing—send your quantity for a quotation.
- Printing, numbering and encoding options are available for the selected product and material.

Contact

- Email: info@proudtek.com
- WhatsApp: +86 186 6582 0632
- Web: https://proudtek.com/product/uhf-rfid-inlay/

Specifications are supplied for guidance; confirm the exact chip, material and encoding for your project.