

# RFID Systems Product Specifications



## HF Reader ICs

| Part Number             | TRF7960                                                                                                                         | TRF7961                                                                                                                         |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Operating Frequency     | 13.56MHz                                                                                                                        | 13.56MHz                                                                                                                        |
| Supported Protocols     | ISO 15693<br>ISO 18000-3 (Mode 1)<br>ISO 14443A & B<br>Tag-It™ HF                                                               | ISO 15693<br>ISO 18000-3 (Mode 1)<br>Tag-It™ HF                                                                                 |
| Operating Voltage       | 2.7 V to 5.5 VDC                                                                                                                | 2.7 to 5.5 VDC                                                                                                                  |
| Current Consumption     | Transmit: 200mW @ 110 mA, typ.<br>100mW @ 70 mA, typ.<br>Active (RX only): 10 mA, typ.<br>Stand-by: 120 µA<br>Power down: <1 µA | Transmit: 200mW @ 130 mA, typ.<br>100mW @ 70 mA, typ.<br>Active (RX only): 10 mA, typ.<br>Stand-by: 120 µA<br>Power down: <1 µA |
| Transmitter Power       | Adjustable power, 100mW or 200mW at 5 VDC                                                                                       | Adjustable power, 100mW or 200mW at 5 VDC                                                                                       |
| Transmitter Modulation  | ASK, adjustable 8% to 30% OOK                                                                                                   | ASK, adjustable 8% to 30% OOK                                                                                                   |
| Communication Interface | Parallel 8-bit or 4-wire SPI                                                                                                    | Parallel 8-bit or 4-wire SPI                                                                                                    |
| Operating Temperature   | -40°C to +110°C                                                                                                                 | -40°C to +110°C                                                                                                                 |
| Storage Temperature     | -55°C to +150°C                                                                                                                 | -55°C to +150°C                                                                                                                 |
| Package                 | 32 Pin QFN, (5 mm X 5 mm)                                                                                                       | 32 Pin QFN, (5 mm X 5 mm)                                                                                                       |
| Packing / Delivery      | Tape-on Reel, 250 or 3000 per reel                                                                                              | Tape-on Reel, 250 or 3000 per reel                                                                                              |

## LF ReaderTypes

| Part Number         | RI-RFM-006A           | RI-TMS3705A1          | DRG4               | RI-STU-MRD1          | RI-STU-251B   |
|---------------------|-----------------------|-----------------------|--------------------|----------------------|---------------|
| Type                | IC (SO 16)            | IC (SO 16)            | Reader Module      |                      | Reader/Writer |
| Typical Read Range* | up to 20 cm           | up to 20 cm           | up to 30 cm        |                      | up to 200 cm  |
| Interface           | I/O                   | I/O                   | (RS232, TTL level) |                      | RS232/422/485 |
| Operating Frequency | 134.2 kHz             | 134.2 kHz             | 134.2 kHz          |                      | 134.2 kHz     |
| Operating Voltage   | 3.5Vdc...5.5Vdc       | 4.5Vdc...5.5Vdc       | 5Vdc               |                      | 10Vdc...24Vdc |
| Part Number         | RI-RFM-003B           | RI-RFM-007B           | RI-RFM-008B        | RI-ACC-008B          |               |
| Type                | Mini RFM Module       | High Performance RFM  | Remote Antenna RFM | Antenna Tuning Board |               |
| Typical Read Range* | up to 60 cm           | up to 200 cm          | up to 200 cm       | up to 200 cm         |               |
| Interface           | I/O**                 | I/O**                 | I/O**              | Antenna Terminals    |               |
| Operating Frequency | 134.2 kHz             | 134.2 kHz             | 134.2 kHz          | 134.2 kHz            |               |
| Operating Voltage   | 5Vdc                  | 7Vdc...24Vdc          | 7Vdc...24Vdc       |                      |               |
| Part Number         | RI-CTL-MB2B           | RI-CTL-MB6B           |                    |                      |               |
| Type                | Digital Contr. Module | Digital Contr. Module |                    |                      |               |
| Typical Read Range* |                       |                       |                    |                      |               |
| Interface           | RS232, USB            | RS422/485, USB        |                    |                      |               |
| Operating Frequency |                       |                       |                    |                      |               |
| Operating Voltage   | 7Vdc...25Vdc          | 7Vdc...25Vdc          |                    |                      |               |

## LF Transponders

| Part Number            | RI-TRP-R9BK, RI-TRP-W9WK,<br>RI-TRP-M9WK                      | RI-TRP-RR3P, RI-TRP-WR3P<br>RI-TRP-REHP, RI-TRP-WEHP | RI-INL-RR2B, RI-TRP-WR2B<br>RI-INL-DR2B, RI-TRP-RE2B/WE2B | RI-INL-R9QM<br>RI-INL-W9QM   |
|------------------------|---------------------------------------------------------------|------------------------------------------------------|-----------------------------------------------------------|------------------------------|
| Type                   | 12 mm Wedge                                                   | 23 mm Glass                                          | 32 mm Glass                                               | 24 mm Disk                   |
| Memory types available | R/O (64 bit), R/W (80 bit)<br>Multi (32 bit UID, 208 bit R/W) | R/O (64 bit)<br>RW (80 bit)                          | R/O (64 bit), R/W (80 bit)<br>MPT (1360 bit)              | R/O (64 bit)<br>R/W (80 bit) |
| Typical Read Range*    | up to 20 cm                                                   | up to 60 cm                                          | up to 100 cm                                              | up to 50 cm                  |
| Operating Frequency    | 134.2 kHz                                                     | 134.2 kHz                                            | 134.2 kHz                                                 | 134.2 kHz                    |
| Dimensions             | 12 x 6 x 3 mm                                                 | 3.85 x 23.1 mm                                       | 3.85 x 31.2 mm                                            | 24 mm dia.                   |
| Protection Class       | IP68                                                          | Hermetically Sealed                                  | Hermetically Sealed                                       |                              |
| Case Material          | Plastic Compound                                              | Glass                                                | Glass                                                     |                              |

\* Dependent on the configuration used, the RF regulation in country of use and the environmental condition

\*\* Modules RI-CTL-MB2B/RI-CTL-MB6B have to be combined with RFM modules

## LF Transponders (Continued)

| Part Number            | RI-TRP-R9QL<br>RI-TRP-W9QL                  | RI-TRP-R9UR<br>RI-TRP-W9UR                   | RI-TRP-RF0B<br>RI-TRP-WF0B                  | RI-TRP-R4FF<br>RI-TRP-W4FF                   | RI-TRP-R9TD<br>RI-TRP-W9TD                   |
|------------------------|---------------------------------------------|----------------------------------------------|---------------------------------------------|----------------------------------------------|----------------------------------------------|
| Type                   | 30 mm Disk                                  | 85 mm Disk                                   | Keyring Tag                                 | Card                                         | 120 mm Cylindrical                           |
| Memory types available | R/O (64 bit)<br>R/W (80 bit)<br>up to 60 cm | R/O (64 bit)<br>R/W (80 bit)<br>up to 150 cm | R/O (64 bit)<br>R/W (80 bit)<br>up to 60 cm | R/O (64 bit)<br>R/W (80 bit)<br>up to 100 cm | R/O (64 bit)<br>R/W (80 bit)<br>up to 200 cm |
| Typical Read Range*    |                                             |                                              |                                             |                                              |                                              |
| Operating Frequency    | 134.2 kHz                                   | 134.2 kHz                                    | 134.2 kHz                                   | 134.2 kHz                                    | 134.2 kHz                                    |
| Dimensions             | 29.4 x 8.4 mm                               | 85.5 x 5.5 mm                                | 10.5 x 37.5 mm                              | 85.5 x 54 x 1.3 mm                           | 21 x 121 mm                                  |
| Protection Class       | IP67                                        | IP53                                         | Hermetically Sealed                         | ISO 7810                                     | IP67                                         |
| Case Material          | POM                                         | ASA                                          | ABS, Glass                                  | PVC                                          | PEI                                          |

## HF Packaged Transponders

| Part Number         | RF-HDT-DVBE-N0                          | RF-HDT-DVBB-N1                          | RF-TH1-CB1A                                    |
|---------------------|-----------------------------------------|-----------------------------------------|------------------------------------------------|
| Type                | 22 mm Coin Overmolded                   | 22 mm Coin Overmolded                   | Vicinity Card                                  |
| Available Memory    | 256 bits organized in 8 x 32-bit blocks | 2k bits organized in 64 x 32-bit blocks |                                                |
| Operating Frequency | 13.56 MHz ± 300 kHz                     | 13.56 MHz ± 300 kHz                     | 13.56 MHz                                      |
| Dimensions          | Ø 22 ± 0.2 mm x 3 ± 0.2 mm              | Ø 22 ± 0.2 mm x 3 ± 0.2 mm              | 85.6 mm x 54 mm x 0.76 mm (according ISO 7810) |
| Case Material       | PPS, black                              | PPS, black                              | PVC (Polyvinylchloride), white                 |

## Tag-it™ HF-I Plus Transponders Inlay

| Part Number                              | RI-I11-112A-03<br>(square)                                    | RI-I11-112B-03<br>(square) | RI-I02-112A-03<br>(rectangle-lg) | RI-I02-112B-03<br>(rectangle-lg) | RI-I03-112A-03<br>(rectangle-mini) | RI-I15-112B-03<br>(rectangle-med) | RI-I16-112A-03<br>(circular) | RI-I17-112A-03<br>(CD/DVD) |
|------------------------------------------|---------------------------------------------------------------|----------------------------|----------------------------------|----------------------------------|------------------------------------|-----------------------------------|------------------------------|----------------------------|
| Supported Standards                      | ISO 15693, ISO/IEC 18000-3 (Mode 1)                           |                            |                                  |                                  |                                    |                                   |                              |                            |
| Available Memory                         | 2k bits organized in 64 x 32-bit blocks                       |                            |                                  |                                  |                                    |                                   |                              |                            |
| Factory Programmed                       | 64 bits                                                       |                            |                                  |                                  |                                    |                                   |                              |                            |
| Resource Frequency                       | 13.86 MHz                                                     | 14.4 MHz                   | 13.86 MHz                        | 14.4 MHz                         | 13.86 MHz                          | 14.1 MHz                          | 13.7 MHz                     | 13.8 MHz                   |
| Frequency Offset for Lamination Material | Paper                                                         | PVC                        | Paper                            | PVC                              | Paper/PVC                          | Paper/PVC                         | Paper/PVC                    | Paper/PVC                  |
| Antenna Size (mm)                        | 45 x 45                                                       | 45 x 45                    | 45 x 76                          | 45 x 76                          | 22.5 x 38                          | 34 x 65                           | Ø 24.2                       | Ø 32.5                     |
| Foil Width (mm)                          | 48 mm ±0.5 mm                                                 |                            |                                  |                                  |                                    |                                   |                              |                            |
| Delivery                                 | Single row tape with 48-mm foil width wound on cardboard reel |                            |                                  |                                  |                                    |                                   |                              |                            |

## Tag-it™ HF-I Pro Transponder Inlays Features - Password Write/Password Kill Functionality

| Part Number                              | RI-I11-114A-S1<br>(square)                                    | RI-I11-114B-S1<br>(square) | RI-I02-114A-S1<br>(rectangle-lg) | RI-I02-114B-S1<br>(rectangle-lg) | RI-I03-114A-S1<br>(rectangle-mini) | RI-I16-114A-S1<br>(circular) | RI-I17-114A-S1<br>(CD/DVD) |
|------------------------------------------|---------------------------------------------------------------|----------------------------|----------------------------------|----------------------------------|------------------------------------|------------------------------|----------------------------|
| Supported Standards                      | ISO 15693, ISO/IEC 18000-3 (Mode 1)                           |                            |                                  |                                  |                                    |                              |                            |
| Available Memory                         | 256 bits organized in 8 x 32-bit blocks                       |                            |                                  |                                  |                                    |                              |                            |
| Factory Programmed                       | 64 bits                                                       |                            |                                  |                                  |                                    |                              |                            |
| Resource Frequency                       | 13.86 MHz                                                     | 14.4 MHz                   | 13.86 MHz                        | 14.4 MHz                         | 13.86 MHz                          | 13.7 MHz                     | 13.8 MHz                   |
| Frequency Offset for Lamination Material | Paper                                                         | PVC                        | Paper                            | PVC                              | Paper/PVC                          | Paper/PVC                    | Paper/PVC                  |
| Antenna Size (mm)                        | 45 x 45                                                       | 45 x 45                    | 45 x 76                          | 45 x 76                          | 22.5 x 38                          | Ø 24.2                       | Ø 32.5                     |
| Foil Width (mm)                          | 48 mm ±0.5 mm                                                 |                            |                                  |                                  |                                    |                              |                            |
| Delivery                                 | Single row tape with 48-mm foil width wound on cardboard reel |                            |                                  |                                  |                                    |                              |                            |

## Tag-it™ HF-I Standard Transponder Inlays

| Part Number                              | RI-I11-114A-01<br>(square)                                    | RI-I11-114B-01<br>(square) | RI-I02-114A-01<br>(rectangle-lg) | RI-I02-114B-01<br>(rectangle-lg) | RI-I03-114-01<br>(rectangle-mini) | RI-I16-114A-01<br>(circular) | RI-I17-114A-01<br>(CD/DVD) |
|------------------------------------------|---------------------------------------------------------------|----------------------------|----------------------------------|----------------------------------|-----------------------------------|------------------------------|----------------------------|
| Supported Standards                      | ISO 15693, ISO 18000-3                                        |                            |                                  |                                  |                                   |                              |                            |
| Available Memory                         | 256 bits organized in 8 x 32-bit blocks                       |                            |                                  |                                  |                                   |                              |                            |
| Factory Programmed                       | 64 bits                                                       |                            |                                  |                                  |                                   |                              |                            |
| Resource Frequency                       | 13.86 MHz                                                     | 14.2 MHz                   | 13.86 MHz                        | 14.4 MHz                         | 13.86 MHz                         | 13.7 MHz                     | 13.8 MHz                   |
| Frequency Offset for Lamination Material | Paper                                                         | PVC                        | Paper                            | PVC                              | Paper/PVC                         | Paper/PVC                    | Paper/PVC                  |
| Antenna Size (mm)                        | 45 x 45                                                       | 45 x 45                    | 45 x 76                          | 45 x 76                          | 22.5 x 38                         | Ø 24.2                       | Ø 32.5                     |
| Foil Width (mm)                          | 48 mm ±0.5 mm                                                 |                            |                                  |                                  |                                   |                              |                            |
| Delivery                                 | Single row tape with 48-mm foil width wound on cardboard reel |                            |                                  |                                  |                                   |                              |                            |

## Tag-it™ HF-I Family Die

| Part number             | RF-HDT-AJLC-G0<br>RF-HDT-SJLC-G0           | RF-HDT-AJLE-G1<br>RF-HDT-SJLE-G1           | RF-HDT-AJLS-G1<br>RF-HDT-SJLS-G1           |
|-------------------------|--------------------------------------------|--------------------------------------------|--------------------------------------------|
| HF-I Family             | Plus                                       | Standard                                   | Pro                                        |
| Die Supported Standards | ISO/IEC 15693;<br>ISO/IEC 18000-3 (Mode 1) | ISO/IEC 15693;<br>ISO/IEC 18000-3 (Mode 1) | ISO/IEC 15693;<br>ISO/IEC 18000-3 (Mode 1) |
| Available Memory        | 2k bits organized in 64 x 32-bit blocks    | 256 bits organized in 8 x 32-bit blocks    | 256 bits organized in 8 x 32-bit blocks    |
| Die Thickness           | 150µm / 265µm                              | 150µm / 150µm                              | 150µm / 265µm                              |
| Wafer Processing        | Bumped, Sawn, Grinded, Inked               | Bumped, Sawn, Grinded, Inked               | Bumped, Sawn, Grinded, Inked               |
| Bump Material           | Gold (AU)/Nickel-Gold (AU-NI)              | Gold (AU)/Nickel-Gold (AU-NI)              | Gold (AU)/Nickel-Gold (AU-NI)              |
| Part number             | RF-HDT-WNMC-M0                             | RF-HDT-SNLE-G1                             | RF-HDT-WNME-M0                             |
| HF-I Family             | Plus                                       | Standard                                   | Standard                                   |
| Die Supported Standards | ISO/IEC 15693;<br>ISO/IEC 18000-3 (Mode 1) | ISO/IEC 15693;<br>ISO/IEC 18000-3 (Mode 1) | ISO/IEC 15693;<br>ISO/IEC 18000-3 (Mode 1) |
| Available Memory        | 2k bits organized in 64 x 32-bit blocks    | 256 bits organized in 8 x 32-bit blocks    | 256 bits organized in 8 x 32-bit blocks    |
| Die Thickness           | 710-740µm                                  | 150µm                                      | 710-740µm                                  |
| Wafer Processing        | Unprocessed                                | Sawn, Grinded, Inked                       | Unprocessed                                |
| Bump Material           | -                                          | -                                          | -                                          |

## UHF Family

| Part Number            | RI-UHF-00001-01                              | RI-UHF-11111-01           | RI-UHF-STRAP-08         |
|------------------------|----------------------------------------------|---------------------------|-------------------------|
| Type                   | IC - Unprocessed Wafer                       | IC - Bumped, Sawn, Framed | Strap                   |
| IC Supported Standard  | EPC C1G2 and ISO/IEC 18000-6c                |                           |                         |
| IC Operating Frequency | 860-960Mhz                                   |                           |                         |
| EPC Memory             | 96 bits EPC user programmable                |                           |                         |
| TID Memory             | 32 bits factory pre-programmed               |                           |                         |
| Data Retention         | 10 years at +25°C                            |                           |                         |
| Write/Erase Cycles     | 100000 +25°C preliminary                     |                           |                         |
| Operating Temperature  | -40°C to 65°C (Read), -25°C to +65°C (Write) |                           |                         |
| Strap Pitch            |                                              |                           | 4.0mm (+0.1mm, -0.4 mm) |
| Width of Strap         |                                              |                           | 9.0mm (+/- 0.25 mm)     |
| Material/Thickness     | 710-740um                                    | 150um                     | 50um PET substrate      |
| Quantity               | >40,000 IC/wafer                             | >40,000 IC/wafer          | 40,000 per Reel         |

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