

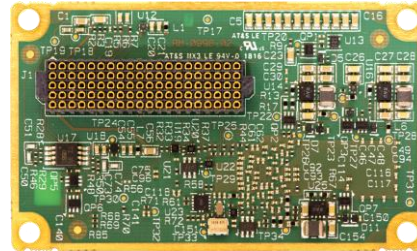
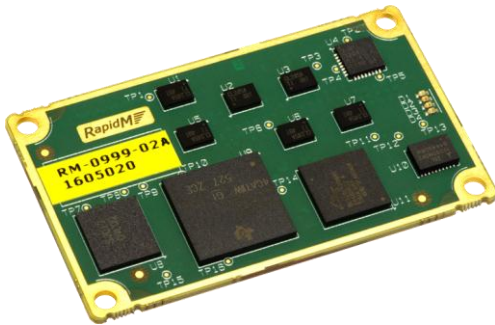
HF Modem

2G ALE

3G ALE

V/UHF Modem

56b, 2400 Vocoder



(Actual Size)

FEATURES & BENEFITS:

- **2G ALE:** MIL-STD-188-141B/C App A & B
- **Linking Protection:** MIL-STD-188-141B/C App B
- **Link Quality Assessment:** LQA
- **Radio Control:** Transceiver Protocol
- **Low Cost:** Hardware Installation
- **Activation Keys:** Unlock Functionality
- **Low Power:** 600 mW (typical)
- **Compact Size:** 33 x 55 x 6 mm

OTHER SOFTWARE OPTIONS (DATASHEETS AVAILABLE):

- **HF Modem:** Up to 9 600 bps SSB, 19 200 bps ISB
- **3G ALE:** STANAG 4538 FLSU & xDL Packet Data
- **Digital Voice:** 2400 bps Vocoder
- **Encryption:** 56-bit for Data/Voice
- **VHF / UHF Modem:** Up to 64 000 bps (15 kHz)

RELATED PRODUCTS (DATASHEETS AVAILABLE):

- **EF-256 Embedded Functions for Secure Voice & Data:**
 - AES-256 Encryption
 - Vocoder (600 – 2400 bps) TWELP* or MELPe**
 - AUTO Data Rate Change, Best-in-class Modem
 - Extended Range, const. amplitude modulation

* TWELP voice coding by DSP Innovations Inc.(www.dspini.com)

** MELPe for US customers only

AUTOMATIC LINK ESTABLISHMENT

The TC4-LP is ideal for radio makers who have previously integrated the older TC4 module into their designs. The TC4-LP adds new functionality, uses less power and offers extended product availability.

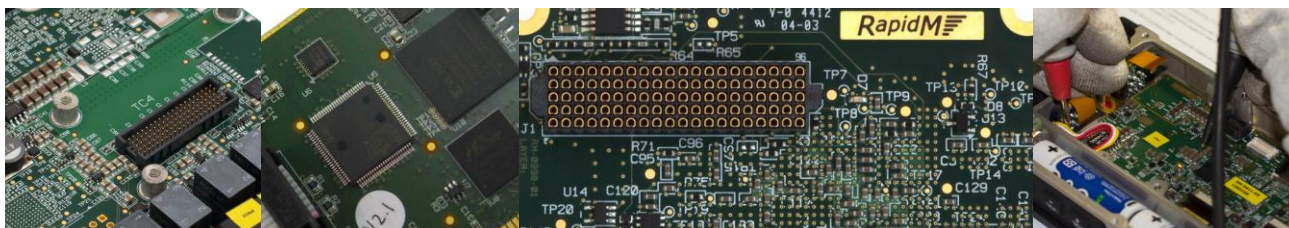
The 2G ALE controller is available as a software option for the TC4-LP. It is intended for integration into HF transceivers and other communication devices. The TC4-LP is optimized for low power consumption.

NO OPERATOR INTERVENTION

Embedded ALE allows linking with other HF stations without operator intervention. A number of frequencies can be used to overcome variable HF propagation conditions.

INTEROPERABILITY STANDARD

2G ALE is the de facto interoperability standard for link setup.



| TC4-LP HARDWARE | | |
|--------------------|--|--|
| SIZE | 33 x 55 x 6 mm (w x d x h) | |
| WEIGHT | 9.1 g | |
| POWER | 3.3 VDC, (Hunt < 650 mW), (Deep-Sleep < 50 mW), (Off < 2 mW) | |
| TEMPERATURE | -40°C to +85°C (operating); -40°C to +85°C (storage) | |
| CONNECTOR | Single 100-way fine pitch connector (Samtec YFT-20-xx-H-05-SB) | |
| PRIMARY INTERFACES | Use | DETAILS |
| UART A | Data, Config, Control, or Raw Data (build option) | Default Rate: 115200 bps (4800 - 115200) Electrical: 3.3V LVTTTL Flow Ctrl (Raw Data): CTS/RTS, XON/XOFF |
| UART B | Radio Control, or Config, Control (build option) | Rate: 4800 to 115200 bps Electrical: 3.3V LVTTTL Flow Ctrl: None |
| AUDIO 1 | Baseband Audio SSB/USB (Analogue) | Tx (output): < 10 Ω unbalanced 2.0 V p-p Rx (input): ~ 20 kΩ unbalanced 2.2 V p-p |
| AUDIO 2 | Baseband Audio LSB (Analogue), or Ear & Mic Audio (Analogue) | Tx (output): < 10 Ω unbalanced 2.0 V p-p Rx (input): ~ 20 kΩ unbalanced 2.2 V p-p |
| McBSP 0 | Data, Config, Control (build option) | Synchronous serial I/F McBSP port |
| McBSP 1 | Digital Baseband Audio (build option), or Digital Ear & Mic Audio (build option) | Synchronous serial I/F McBSP port |
| DISCRETE OUTPUT | Radio Keyline | Active high |
| DISCRETE INPUTS | PTT Sense Input | Active low |
| | PPS (GPS Time Sync.) | Rising edge |
| | Reset / Power Down | Active low |
| SPEED SELECT | Power Saving (Optional) | Active low, 4 pin input |

| AUTOMATIC LINK ESTABLISHMENT | |
|------------------------------|--|
| STANDARD | MIL-STD-188-141C App A, App B Compliant |
| WAVEFORMS | 8-FSK according to MIL-STD-188-141C App A. & FED-STD 1045 Doppler lock and track (capture range up to ± 100 Hz, configurable) Adaptive multi-path tracking, Soft Golay decoding Adaptive triple word-phase synchronization, lock and track Linking probability performance 2-3 dB better than MIL-STD-188-141C specification No LP mode degradation Concurrent operation with other RM waveforms |
| PROTOCOL | Calling (IND, GRP, NET, All, Any, Wildcard Call), UUF, AMD, DTM(with or without CRC), (excluding: DBM, AQC-ALE) Calling POLLING, INLINK, RELINK (ALM support commands) Link Quality Analysis (LQA), Scanning (2 or 5 channels per second), Auto Sounding Automatic Hand-Off to Internal Modem |
| OCCUPANCY DETECTION | Traffic: MS 110A/B, S4539, S4285, S4415, S4529, S4481, 8-FSK, SSB Voice Duration: Variable |

| LINKING PROTECTION | |
|----------------------|---|
| STANDARD | MIL-STD-188-141C App B FED-STD 1049 |
| PROTECTION LEVEL | AL-0 (Clear) AL-1 AL-2 |
| TIME SYNCHRONISATION | GPS as Time Source Time Exchange Protocol (Over the Air) |
| KEY STORAGE | 2 x 32 LP Keys |
| KEY SELECTION | Manual Auto Advance (Daily) |

| RADIO CONTROL | |
|---------------|---|
| PROTOCOL | RAP1/RIPC, or Transceiver Protocol (custom implementation possible) |

| ORDERING INFORMATION | STOCK NUMBER | DESCRIPTION |
|---|-----------------|--|
| TC4-LP (Hardware only) | T4L-02-M-M0-V06 | Module: TC4-LP V2 SDM M0 (H/W) V06 |
| Hardware Activation (Required) | T4L-02-HWAC-KEY | Key: TC4-LP H/W Activation (required) |
| 2G ALE | TC4-SW-O-2G-V06 | SW MDL-2G ALE / MS 141B, App. A, B V06 |
| OTHER SOFTWARE OPTIONS* | STOCK NUMBER | DESCRIPTION |
| HF Modem M1 Software Option | TC4-SW-O-M1-V06 | SW MDL-M1 (HF 110B, F ISB 2x9600) V06 |
| HF Modem M2 Software Option | TC4-SW-O-M2-V06 | SW MDL-M2 (HF S4285, S4539 9600) V06 |
| HF Modem M3 Software Option | TC4-SW-O-M3-V06 | SW MDL-M3 (HF 110A, 4415 2400) V06 |
| HF Modem M4 Software Option | TC4-SW-O-M4-V06 | SW MDL-M4 (HF Mdm S4539 9600 bps) V06 |
| 3G ALE Fast Link Setup | TC4-SW-O-3G-V06 | SW MDL-3G ALE 4538 FLSU, Rad. Ctrl V06 |
| 3G ALE xDL Packet Data | TC4-SW-O-3D-V06 | SW MDL-3G ALE 4538 xDL Pckt Modem V06 |
| Digital Voice 2400 bps | TC4-SW-O-DH-V06 | SW MDL-SDVS 2400bps Vocoder, Modem V06 |
| Encryption 56-bit | TC4-SW-O-ED-V06 | SW MDL-COMSEC 56bt HVM/xDL/Voc V06 |
| V/UHF Modem L1 (Wideband) | TC4-SW-O-L1-V06 | SW MDL-L1 (VHF B≤24kHz ≤128kbps) V06 |
| V/UHF Modem L4 (Narrowband) | TC4-SW-O-L4-V06 | SW MDL-L4 (VHF B≤3kHz ≤16kbps) V06 |
| EVALUATION KIT* | STOCK NUMBER | DESCRIPTION |
| TC4-LP Eval. Kit (Carrier Card, Break-out Cable, PSU) | TC4-EV-0000-SPC | Bundle: TC4 Eval Kit (TC4 excl.) V02 |

* Contact RapidM for Datasheets

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Revision: T4L_ALE2G_EN_02B