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
- **MIL-STD 110C Modes**: 32,000 bps in 6 kHz
- **3G ALE**: STANAG 4538 FLSU & xDL Packet Data
- **VHF / UHF Modem**: Up to 64 000 bps (15 kHz)

AUTOMATIC LINK ESTABLISHMENT

The TC4 offers massive enhancement of radio capabilities with minimal integration cost.

The 2G ALE controller is available as a software option for the TC4. 2G ALE can be combined with LF & HF Modem Options (M1 – M4).

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.

Backward Compatibility

The TC4 2G ALE Software Option allows new transceiver designs backward compatibility with legacy HF radio systems.
**Primary Interfaces**

| UART 1 | Data, Config, Control, Radio Control, or Raw Data (option) | Rate: 4800 to 115200 bps
Electrical: 3.3V LV TTL
Flow Control (Raw data only): CTS, XON/XOFF |
| UART 2 | Radio Control (Transceiver Protocols), or Remote Control (when UART is Raw Data) | Rate: 4800 to 115200 bps
Electrical: 3.3V LV TTL
Flow Control: None |
| Codec 1 | Baseband Audio USB (Analogue) | Tx (output): 40 Ω unbalanced 2.0 V p-p
Rx (input): 10 kΩ unbalanced 1.5 V p-p |
| Codec 2 | Baseband Audio LSB (Analogue) | Tx (output): 40 Ω unbalanced 2.0 V p-p
Rx (input): 10 kΩ unbalanced 1.5 V p-p |
| MC8SP 0 | Data, Config, Control (option) | Synchronous serial (I/F McBSP port) |
| MC8SP 1 | Digital Baseband Audio (option) | Synchronous serial (I/F McBSP port) |

**Discrete Output**

- Radio Keyline: Active high
- Active low
- Rising edge
- Active low

**Power**

| Supply | 3.3 V DC |

**Automatic Line Establishment**

- **STANDARD**: MIL-STD-188-141C App A, App B Compliant

**Waveforms**

- B-PSK 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 RF waveforms

**Protocol**

- Calling (IND, GRP, NET, ATT, Any, Wildcard Call), UHF, AMOS, DTMF(with or without CRC), (excluding: DTM, AQC-ALE)
- Calling POLLING, INLINK, REUNIK (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, 54239, 54285, 54415, 54429, 54481, B-PSK, SSB Voice
- Duration: Variable

**Linking Protection**

- **STANDARD**: MIL-STD-188-141C App B
- FED-STD 1045

**Protection Level**

- AL-2 (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**

- RAP2/RIPC (integrated with modem control), or
- Transceiver Protocol (custom implementation possible)

**Installation**

- **Size**: 33 x 55 x 8mm (w x d x h)
- **Power**: 3.3V DC, <= 1 W (typ.)

**Environmental**

- **Temperature**: -40°C to +85°C (operating)
- -40°C to +90°C (storage)

**Ordering Information**

<table>
<thead>
<tr>
<th><strong>TC4 Hardware</strong></th>
<th><strong>Stock Number</strong></th>
<th><strong>Description</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>TC4-5A-M0-5.3</td>
<td>Module: M0 V5A (B/loader only)</td>
<td>V5.3</td>
</tr>
</tbody>
</table>

**Hardware Activation (Required)**

| **TC4-5A-HMAC-KEY** | Key: TC4 R/W Activation (Required) |

**2G ALE Software Option**

| **TC4-SW-O-2G-5.3** | SW MDL-2G ALE / M0 141B, App. A, B | V5.3 |

**Other TC4 Software Options**

| **TC4-SW-O-M1-5.3** | SW MDL-M1 (HF 110B, F 1BB 2x9600) | V5.3 |
| **TC4-SW-O-M2-5.3** | SW MDL-M2 (HF 42485, 54539 9600) | V5.3 |
| **TC4-SW-O-M3-5.3** | SW MDL-M3 (HF 310A, 4415 2400) | V5.3 |
| **TC4-SW-O-M4-5.3** | SW MDL-M4 (HF MOM 54539 9600 bps) | V5.3 |
| **TC4-SW-O-3G-5.3** | SW MDL-3G ALE 4538 FLSU, Radi. Ctrl | V5.3 |
| **TC4-SW-O-4G-5.3** | SW MDL-3G ALE 4538 xDL Pkt Modem | V5.3 |
| **TC4-SW-O-V1-5.3** | SW MDL-V1 (VHF B524kHz 596000 bps) | V5.3 |
| **TC4-SW-O-V2-5.3** | SW MDL-V2 (VHF B512kHz 548000 bps) | V5.3 |

* Contact RapidM for Datasheets

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