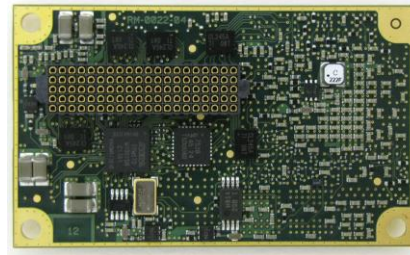


HF Modem

2G ALE

3G ALE

V/UHF Modem



(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
- **VHF / UHF Modem:** Up to 96 000 bps (24 kHz)

AUTOMATIC LINK ESTABLISHMENT

The TC4 is a compact high-performance LF & HF data and voice modem module and ALE controller. It is intended for integration into LF & HF radio transceivers.

For more than a decade, radio maker have used the TC4 in their radio design to provide standards compliant data modem and ALE capabilities.

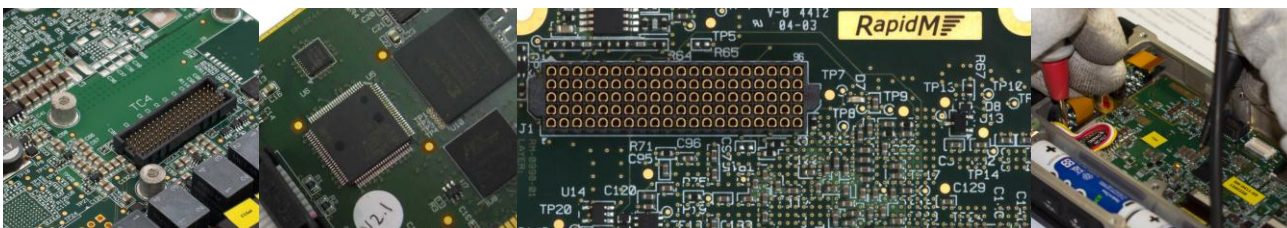
The 2G ALE controller is available as a software option for the TC4. 2G ALE can be combined with LF & HF Modem Options (M1 – M4).

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*	USE	DETAILS
UART 1	Data, Config, Control, Radio Control, or Raw Data (option)	Rate: 4800 to 115200 bps Electrical: 3.3V LVTTTL Flow Control (Raw data only): CTS/RTS, XON/XOFF
UART 2	Radio Control (Transceiver Protocol), or Remote Control (when UART1 is Raw Data)	Rate: 4800 to 115200 bps Electrical: 3.3V LVTTTL 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
McBSP 0	Data, Config, Control (option)	Synchronous serial I/F McBSP port
McBSP 1	Digital Baseband Audio (option)	Synchronous serial I/F McBSP port
DISCRETE OUTPUT	Radio Keyline	Active high
DISCRETE INPUTS	Radio PTT Sense PPS (GPS Time Sync.) Reset / Power Down	Active low Rising edge Active low
SPEED SELECT	Power Saving (Optional)	[3:0], Active low
POWER	Supply	3.3 V DC

* All TC4 interfaces via a single 100-way fine pitch connector (Samtec YFT-20-xx-H-05-SB).

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 (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	STOCK NUMBER	DESCRIPTION
TC4 HARDWARE	TC4-05-M-M0-5.3	Module: M0 V5A (B/loader only) V5.3
HARDWARE ACTIVATION (REQUIRED)	TC4-05-HWAC-KEY	Key: TC4 H/W Activation (Required)
2G ALE SOFTWARE OPTION	TC4-SW-O-2G-5.3	SW MDL-2G ALE / MS 141B, App. A, B V5.3
OTHER TC4 SOFTWARE OPTIONS*	STOCK NUMBER	DESCRIPTION
HF MODEM M1	TC4-SW-O-M1-5.3	SW MDL-M1 (HF 110B, F ISB 2x9600) V5.3
HF MODEM M2	TC4-SW-O-M2-5.3	SW MDL-M2 (HF S4285, S4539 9600) V5.3
HF MODEM M3	TC4-SW-O-M3-5.3	SW MDL-M3 (HF 110A, 4415 2400) V5.3
HF MODEM M4	TC4-SW-O-M4-5.3	SW MDL-M4 (HF MdM S4539 9600 bps) V5.3
3G ALE (STANAG 4538) FAST LINK SETUP	TC4-SW-O-3G-5.3	SW MDL-3G ALE 4538 FLSU, Rad. Ctrl V5.3
3G ALE (STANAG 4538) xDL PACKET DATA	TC4-SW-O-3D-5.3	SW MDL-3G ALE 4538 xDL Pckt Modem V5.3
V/UHF MODEM V1 (24 kHz)	TC4-SW-O-V1-5.3	SW MDL-V1 (VHF B≤24kHz ≤96000 bps) V5.3
V/UHF MODEM V2 (12 kHz)	TC4-SW-O-V2-5.3	SW MDL-V2 (VHF B≤12kHz ≤48000 bps) V5.3

* Contact RapidM for Datasheets

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