

HF WB Modem

VHF WB Modem

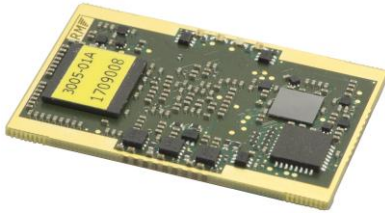


Fig 1.a:
TC5 Top view

Size:
22 x 33 mm x 3.5 mm



Fig 1.b:
TC5 Bottom view

(Actual Size)

FEATURES & BENEFITS:

- **MIL-STD 110C Compliant:** Up to 120 kbps in 24 kHz
- **SSB Data Modem:** 9600 bps in 3 kHz
- **ISB Data Modem:** 19200 bps in 2 x 3 kHz
- **Standards Compliance:** MIL-STD & STANAG
- **SWAP-C:** Optimal size, weight, power and cost
- **Low Cost:** Hardware Installation
- **Activation Keys:** Unlock Functionality
- **Low Power:** Hunt 650 mW, Lock 1100 mW (typ. WBHF)
- **Very Compact Size:** 22 x 33 x 3.5 mm

OTHER SOFTWARE OPTIONS (DATASHEETS AVAILABLE):

- **4G ALE / WALE^(F):** 141D App. G, incl. 2G & 3G
- **Digital Voice:** 700 to 2400 bps Vocoder
- **Encryption:** 56-bit for Data/Voice
- **VHF Modem:** Robust Mobile & LOS, up to 256 kbps, 50 kHz

RELATED PRODUCTS (DATASHEETS AVAILABLE):

- **EF-256 Embedded Functions for Secure Voice & Data:**
 - AES-256 Encryption
 - Vocoder (600 – 2400 bps) TWELP* or MELPe**
- **EF-300V Embedded 300 bps Voice:** TWELP* Vocoder
- **4G-R^(F) WB Modem:** LSU and Pkt (HF / VHF)
- **4G-R^(F) WB Modes:** FF / ECCM

* TWELP voice coding by DSP Innovations Inc.(www.dspini.com)
 ** MELPe for US customers only
 (F) Future feature.

WIDEBAND HF DATA MODEM

The TC5 module is intended for users seeking to fully exploit the available spectrum for the highest speeds of BLOS and HF surface wave communications.

The TC5 can host Wideband HF Modem functions that fully comply with MIL-STD-188-110C App. D up to 24 kHz audio bandwidth.

The modem receiver engine has advanced WB tone excision capability coupled with agile channel estimation and high-performance equalization functions with expanded Doppler and multi-path spread envelopes. The modem BER performance exceeds the specifications by a healthy margin.

NARROWBAND HF DATA MODEM

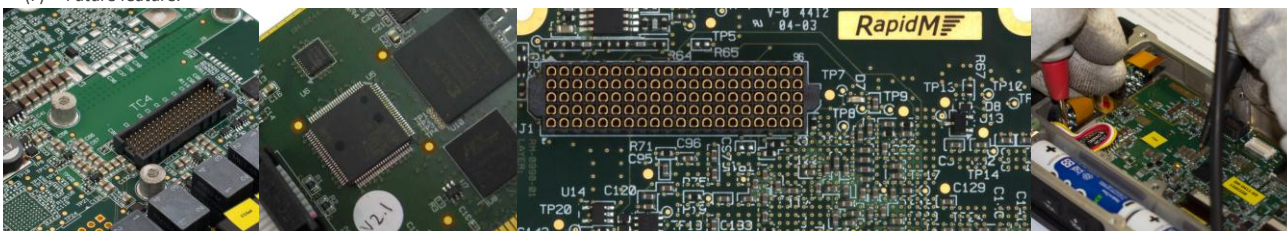
The wideband modem includes pre-existing 3kHz SSB and 2x3 kHz 2-ISB modem modes for backward compatibility with MIL-STD-188-110B, STANAG 4539, 4415 and 4285 modems.

ULTRA-COMPACT HARDWARE

The TC5 hardware is based on RapidM's new ultra-compact module footprint. The module is a plug-in replacement to the TC2. The TC5 extends the capabilities offered by the TC2 by also offering Wideband HF capabilities up to 24 kHz bandwidth. The TC5 also features very low power consumption for a Wideband HF Modem.

EMBEDDED FUNCTIONS FOR SECURE VOICE/DATE, ECCM

The TC5 hardware will be able to host RapidM's own 4G-R embedded software functions in future. The RapidM 4G-R will offer secure voice and data in fixed frequency as well as ECCM modes. The suite will offer HF and VHF waveforms with far greater resistance to noise, adverse channel conditions, interference, detection and jamming.



WIDEBAND HF MODEM SPECIFICATIONS – MS110C APPENDIX D (24 kHz)

B/BWIDTH	WBHF CIRCUIT SWITCHED DATA MODEM (MIL-STD-188-110D APPENDIX D)													SOFTWARE OPTION W1 (24 kHz)	
	0 Walsh	1 BPSK	2 BPSK	3 BPSK	4 BPSK	5 BPSK	6 QPSK	7 8-PSK	8 16-QAM	9 32-QAM	10 64-QAM	11 64-QAM	12 256-QAM		13 QPSK
3 kHz	75	150	300	600	1200	1600	3200	4800	6400	8000	9600	12000	16000	2400	✓
6 kHz	150	300	600	1200	2400	3200	6400	9600	16000	16000	19200	24000	32000		
9 kHz	300	600	1200	2400	-	4800	9600	14400	19200	24000	28800	36000	48000		
12 kHz	300	600	1200	2400	4800	6400	12800	19200	25600	32000	38400	48000	64000		
15 kHz	300	600	1200	2400	4800	8000	16000	24000	32000	40000	48000	57600	76800		
18 kHz	600	1200	2400	4800	-	9600	19200	28800	38400	48000	57600	72000	90000		
21 kHz	300	600	1200	2400	4800	9600	19200	28800	38400	48000	57600	76800	115200		
24 kHz	600	1200	2400	4800	9600	12800	25600	38400	51200	64000	76800	96000	120000		

Skywave Receivable (Fully Compliant)

Groundwave Only Design (Fully Compliant)

NARROWBAND HF MODEM SPECIFICATIONS

ADDITIONAL MODEM WAVEFORMS (INCLUDED WITH WIDEBAND HF MODEMS)	
2-ISB (2x3 kHz)	STANAG 4539 / MIL-STD-188-110B Appendix F
SSB (3 kHz)	STANAG 4539 / MIL-STD-188-110B App. D (TDMA), STANAG 4539 / MIL-STD-188-110B App. C (QAM), MIL-STD-188-110B (QAM), 110A (8-PSK), STANAG 4415, 4481, 4285, 4529, 5065 (LF) and FSK

HARDWARE SPECIFICATIONS

TC5 HARDWARE			
SIZE	22 x 33 x 3.5 mm (w x d x h)	POWER	3.3 VDC, (Hunt < 650 mW), (Off < 1 mW), (Full-Power < 1100 mW)
TEMPERATURE	-40°C to +85°C (operating); -40°C to +85°C (storage)		
CONNECTORS	3x40-way fine pitch connector, Module Side: Hirose DF40C-40DP-0.4V(51), Host Side: DF40C-40DS-0.4V(51)		
PRIMARY INTERFACES	NOMINAL USE	DETAILS	
UART A	Data, Config, Control (Typical) (Customisable)	Default Rate: 115200 bps (300 to 921600 bps) Electrical: 3.3V LVCMOS	
UART B	Radio Control (Typical) (Customisable)	Rate: 50 to 921600 bps, Electrical: 3.3V LVCMOS	
UART C	Spare (Customisable)	Rate: 50 to 921600 bps, Electrical: 3.3V LVCMOS	
USART	DTE (TX, RX, RTS, CTS, DTR, DSR, DCD, TCLK, RCLK, RTCLK)	Rate: 256 000 to 50 bps in sync with modem Electrical: 3.3V LVCMOS (for external EIA-530-A)	
ETHERNET	Data, Config, Control (Optional)	On-board PHY, only requires external connector with integrated magnetics for full 10/100 Base T solution	
McBSP 0	Data, Config, Control (build option)	Synchronous serial I/F McBSP port	
McBSP 1 / McASP	Digital Baseband Audio (build option), and/or Digital Ear & Mic Audio (build option)	Synchronous serial I/F McBSP port	
DISCRETES INPUTS	PTT Sense Deep Sleep	Zeroise PPS (GPS Time Sync.)	Reset Hold-up Battery (RTC, Mem)
DISCRETE OUTPUTS	Radio Keyline Ready		

ORDERING INFORMATION	STOCK NUMBER	DESCRIPTION
TC5 HF Wideband Modem W1 (MS110C, 24 kHz)	TC5-02-M-W1-V06	Module: TC5 W1 (110C 24kHz 120kbps) V06
OTHER SOFTWARE OPTIONS*	STOCK NUMBER	DESCRIPTION
3G ALE Fast Link Setup (MS141C App C, S4538 FLSU)	TC5-SW-O-3G-V06	SW MDL-3G ALE 4538 FLSU, Rad. Ctrl V06
3G Packet Modem (S4538 xDL)	TC5-SW-O-3D-V06	SW MDL-3G ALE 4538 xDL Pckt Modem V06
2G ALE (MS141B App A & B)	TC5-SW-O-2G-V06	SW MDL-2G ALE / MS 141B, App. A, B V06
Digital Voice 700, 1200, 2400 bps (see EF-256 for 600 bps)	TC5-SW-O-D7-V06	SW MDL-DV 700 to 2k4 bps Voc, Mdm V06
Encryption 56-bit (see EF-256 for AES-256)	TC5-SW-O-ED-V06	SW MDL-COMSEC 56bt HVM/xDL/Voc V06
VHF Wideband Modem V5 (50 kHz Mobile & LOS, Proprietary)	TC5-SW-O-V5-V06	SW MDL-V5 (VHF 50kHz 256kbps CL9) V06
VHF Wideband Modem V6 (25 kHz Mobile & LOS, Proprietary)	TC5-SW-O-V6-V06	SW MDL-V6 (VHF 25kHz 128kbps CL9) V06
EVALUATION KIT*	STOCK NUMBER	DESCRIPTION
TC5 EVAL. KIT (CARRIER CARD, BREAK-OUT CABLE, PSU)	TC2-EV-0011-SPC	Bundle: TC2 Eval Kit (TC2 excl.)

* Contact RapidM for Datasheets

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