

HF Modem

2G ALE

3G ALE

56b, 2400 Vocoder



Fig 1.a:
TC2 Top view

Size:
22 x 33 m x 3.5 mm



Fig 1.b:
TC2 Bottom view

(Actual Size)

FEATURES & BENEFITS:

- **SSB Data Modem:** 9600 bps in 3 kHz
- **ISB Data Modem:** 19200 bps in 2 x 3 kHz
- **MIL-STD 110C Modes:** 32,000 bps in 6 kHz
- **Standards Compliance:** MIL-STD & STANAG
- **Low Cost:** Hardware Installation
- **Activation Keys:** Unlock Functionality
- **Low Power:** 600 mW (typical)
- **Compact Size:** 22 x 33 x 3.5 mm

OTHER SOFTWARE OPTIONS (DATASHEETS AVAILABLE):

- **3G ALE:** STANAG 4538 FLSU
- **Packet Modem:** STANAG 4538 xDL
- **Digital Voice:** 2400 bps Vocoder
- **Encryption:** 56-bit for Data/Voice

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

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

** MELPe for US customers only

HIGH PERFORMANCE – LOW POWER

Radio Makers are faced with ever-expanding functional and performance demands when developing HF and V/UHF radios. The TC2 is embeddable modem module providing next generation digital capabilities at minimal integration effort and low overall cost.

The TC2 is optimized for an ultra-compact footprint and low power consumption. It is intended for integration into HF and V/UHF radio transceivers.

SSB & ISB DATA MODEM OPTIONS

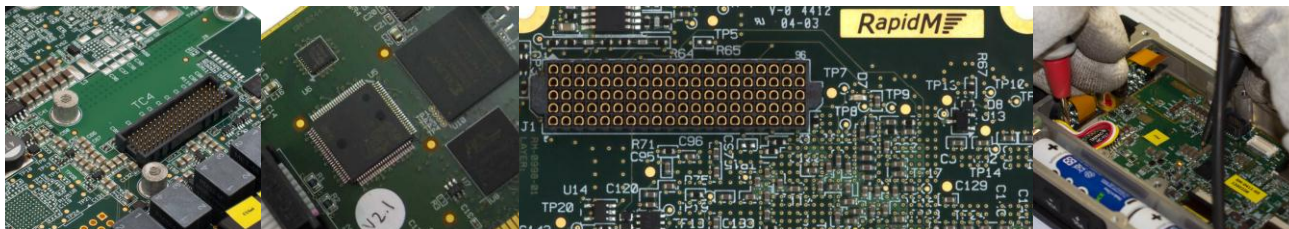
The TC2 can host high-performance SSB, ISB and wideband HF data modems. The waveforms that are included in the TC2 can be customised by choosing the appropriate software option (M1 – M4). Please see the reverse page for more details and ordering information.

MIL-STD 110C DATA MODEM MODES

The wideband MIL-STD-188-110C modem modes for 3 kHz and 6 kHz bandwidth can be hosted on the TC2. The maximum coded data rate is 32,000 bps in a 6 kHz channel. These modes offer a performance advantage over 110A and 110B modems.

DATA MODEM FUNCTION

Adaptive equalization mitigates the effects of channel multipath. Convolutional encoding and soft-decision Viterbi decoding provides forward error correction. Cancellation of narrowband co-channel interference is accomplished via adaptive tone excision capable of eliminating up to four signals.



TC2 HARDWARE MODULE

TC2 HARDWARE		
SIZE	33 x 55 x 6 mm (w x d x h)	
POWER	3.3 VDC, (Hunt < 650 mW), (Deep-Sleep < 50 mW), (Off < 1 mW)	
TEMPERATURE	-40°C to +85°C (operating); -40°C to +85°C (storage)	
CONNECTOR	3x40-way fine pitch 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	Default Rate: 115200 bps (300 to 921600 bps) Electrical: 3.3V LVCMOS
UART B	Radio Control	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: 128 000 to 300 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
ANALOGUE AUDIO	Baseband Audio In	Input: 1.4 Vp-p, ~ 20 kΩ input impedance
	Baseband Audio Out	Output: 2.2 Vp-p, ~ 16 Ω min output load imp.
	Voice Microphone-In	Input: 1.4 Vp-p, ~ 20 kΩ input impedance
	Voice Headphone-Out	Output: 2.2 Vp-p, ~ 16 Ω min output load imp.
	Voice Line-Out	Output: 2.2 Vp-p, ~ 600 Ω min output load imp.
	Microphone Bias	Analogue Input
McBSP 0	Data, Config, Control (build option)	Synchronous serial I/F McBSP port
McBSP 1	Baseband Audio (build option), Ear & Mic Audio (build option)	Synchronous serial I/F McBSP port
DISCRETES INPUT	PTT Sense Deep Sleep Reset	Zeroise PPS (GPS Time Sync.) Hold-up Battery (RTC, Mem)
DISCRETE OUTPUT	Radio Keyline Ready	

TC2 W/FORMS

GENERAL	
CHARACTERISTICS	Carrier capture range ±100 Hz. Sync-on-Data Frequency tracking of up to 3.5 Hz per second (triangular sweep)
AUTOBAUD	All MIL-STD waveforms, STANAG 4539 and STANAG 4415
TONE EXCISION	Narrowband Interference cancellation of up to 4 tones for data rates < 300 bps, FSK cancellation, CW cancellation
PRESET	Factory and Custom Presets

SSB, ISB & 6 KHz 110C MODES - OPTIONS

WAVEFORM STANDARDS	MODULATION	DATA RATES & CHARACTERISTICS	SOFTWARE OPTIONS				
			W2	M1	M2	M3	M4
MIL-STD-188-110C APP D	PSK/QAM	3 kHz: [75, 150, 300, 600, 1200, 1600, 2400, 3200, 4800, 6400, 8000, 9600, 12000, 16000 bps] (Coded) 6 kHz: [150, 300, 600, 1200, 2400, 3200, 6400, 9600, 12800, 16000, 19200, 24000, 32000 bps] (Coded)	✓	-	-	-	-
MIL-STD-188-110B APP C	PSK/QAM	[3200, 4800, 6400, 8000, 9600 bps] (Coded)	-	✓	✓	-	✓
STANAG 4539	PSK/QAM	[75, 150, 300, 600, 1200, 2400, 3200, 4800, 6400, 8000, 9600 bps] (Coded)	-	✓	✓	-	✓
MIL-STD-188-110B	PSK/QAM	[75, 150, 300, 600, 1200, 2400, 3200, 4800, 6400, 8000, 9600 bps] (Coded)	-	✓	✓	-	✓
MIL-STD-188-110B APP F	PSK/QAM	ISB: [9600, 12800, 16000, 19200 bps] (Coded)	-	✓	-	-	-
MIL-STD-188-110A § 5.3	PSK	[75, 150, 300, 600, 1200, 2400 bps] (Coded), 4800 bps	-	✓	✓	✓	✓
STANAG 4415	PSK	NATO robust: 75 bps (Coded)	-	✓	✓	✓	✓
STANAG 4285	PSK	[75, 150, 300, 600, 1200, 2400 bps] (Coded), 1200, 2400, 3600 bps	-	✓	✓	✓	-
STANAG 4529	PSK	[75, 150, 300, 600, 1200 bps] (Coded), 600, 1200, 1800 bps	-	✓	✓	✓	-
STANAG 4481 PSK	PSK	300 bps (Coded)	-	✓	✓	✓	-
STANAG 5065 LF	FSK MSK	75 bps (FSK) 300 bps (MSK) (Coded)	-	✓	-	-	-
STANAG 4481 FSK	FSK	75 bps; (single channel / multi-channel, selectable carrier)	-	✓	✓	✓	-
FSK VARIABLE	FSK	50, 75, 100, 150, 200, 300, 400, 600, 1200 bps; Mark & Space Frequency: 350 to 3000 Hz	-	✓	✓	✓	-

ORDERING INFORMATION	STOCK NUMBER	DESCRIPTION
TC2 (Hardware only)	TC2-04-M-M0-V06	Module: TC2 V4 SDM M0 (H/W) V06
Hardware Activation (Required)	TC2-04-HWAC-KEY	Key: TC2 H/W Activation (required)
HF Modem W2 Software Option	TC2-SW-O-W2-V06	SW MDL-W2 (110C 6kHz 32kbps) V06
HF Modem M1 Software Option	TC2-SW-O-M1-V06	SW MDL-M1 (HF 110B, ISB, 110C 6kHz) V06
HF Modem M2 Software Option	TC2-SW-O-M2-V06	SW MDL-M2 (HF S4285, S4539 9600) V06
HF Modem M3 Software Option	TC2-SW-O-M3-V06	SW MDL-M3 (HF 110A, 4415 2400) V06
HF Modem M4 Software Option	TC2-SW-O-M4-V06	SW MDL-M4 (HF Mdm S4539 9600 bps) V06
OTHER SOFTWARE OPTIONS*	STOCK NUMBER	DESCRIPTION
2G ALE	TC2-SW-O-2G-V06	SW MDL-2G ALE / MS 141B, App. A, B V06
3G ALE Fast Link Setup	TC2-SW-O-3G-V06	SW MDL-3G ALE 4538 FLSU, Rad. Ctrl V06
3G ALE xDL Packet Data	TC2-SW-O-3D-V06	SW MDL-3G ALE 4538 xDL Pckt Modem V06
Digital Voice 2400 bps	TC2-SW-O-DH-V06	SW MDL-SDVS 2400bps Vocoder, Modem V06
Encryption 56-bit	TC2-SW-O-ED-V06	SW MDL-COMSEC 56bt HVM/xDL/Voc V06
EVALUATION KIT*	STOCK NUMBER	DESCRIPTION
TC2 Eval. Kit (Carrier Card, Break-out Cable, PSU)	TC2-EV-0011-SPC	Bundle: TC2 Eval Kit (TC2 excl.) V01

* Contact RapidM for Datasheets

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