



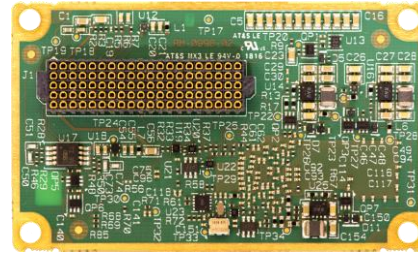
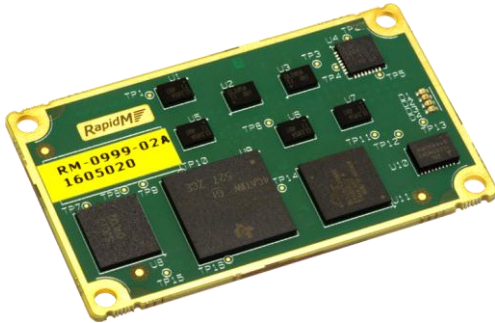
HF Modem

2G ALE

3G ALE

V/UHF Modem

56b, 2400 Vocoder



(Actual Size)

FEATURES & BENEFITS:

- **Digital Voice:** 2400 bps MELPe/TWELP Vocoder
- **Encryption:** 56-bit for Data/Voice
- **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
- **2G ALE:** MIL-STD-188-141B/C App A & B
- **3G ALE:** STANAG 4538 FLSU
- **Packet Modem:** STANAG 4538 xDL
- **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

HIGH-SPEED MODEM MODULE

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.

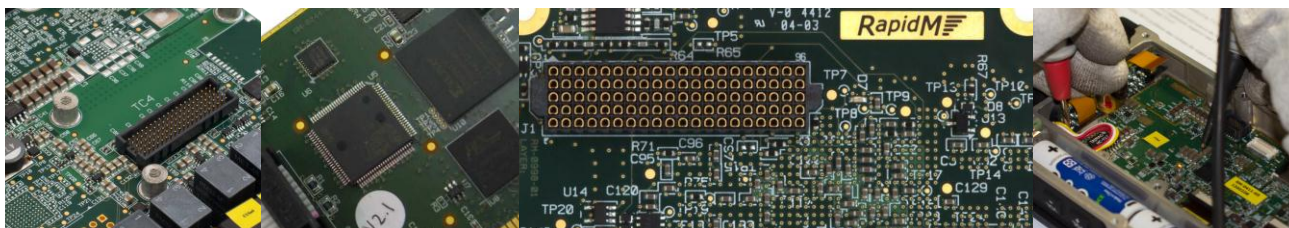
The 2400 bps MELPe/TWELP Vocoder and 56-bit encryption is available as software options for the TC4-LP. The TC4-LP is optimized for low power consumption. It is intended for integration into HF & V/UHF transceivers and other communication devices.

DIGITAL VOICE

The 2400 bps digital MELPe/TWELP vocoder offers the ability to digitally encrypt voice communications. Sound quality is improved on noisy channels.

ENCRYPTION

The 56-bit encryption offers an appropriate level of security for HF & V/UHF communication. Voice and data traffic is encrypted.



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

ENCRYPTION	
KEY LENGTH	56-bit
KEY STORAGE	Up to 256 keys Keys are securely stored (encrypted). Zeroize function to permanently erase all stored keys.
KEY FILL	Key Management System 56-bit (PC Application) or RAP1 control protocol
ENCRYPTED TRAFFIC	Digital Voice, HF Modem Data, 3G Packet Data

DIGITAL VOICE									
VOCODER	MELPe*: TWELP**:	Mixed Excitation Linear Prediction enhanced RapidM Low Rate Vocoder & Modem							
VOCODER RATES	2400 bps								
MODEM	RapidM proprietary digital voice modem. Insures tight coupling between vocoder, encryption and modem.								
PERFORMANCE	VOCODER RATE [bps]	LATENCY [ms]	PESQ	CHANNEL USE	SPEECH QUALITY			UNDERSTAND-ABILITY LIMIT SNR [dB]	
					INTELLIGIBILITY	SPEAKER RECOGNITION	LATENCY & EMOTIONAL CONTENT	CCIR POOR	AWGN
	2 400	450	3.1	Gnd/W	Very Good	Good	Acceptable	V06	0.5
2 400, robust***	1400	3.0	Sky/W	Good	Acceptable	Acceptable	5.0	-0.5	

* TWELP voice coding by DSP Innovations Inc.(www.dspini.com)
** MELPe US & NATO end-users (subject to approval)
*** Future feature

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)
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
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
2G ALE	TC4-SW-O-2G-V06	SW MDL-2G ALE / MS 141B, App. A, B 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
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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