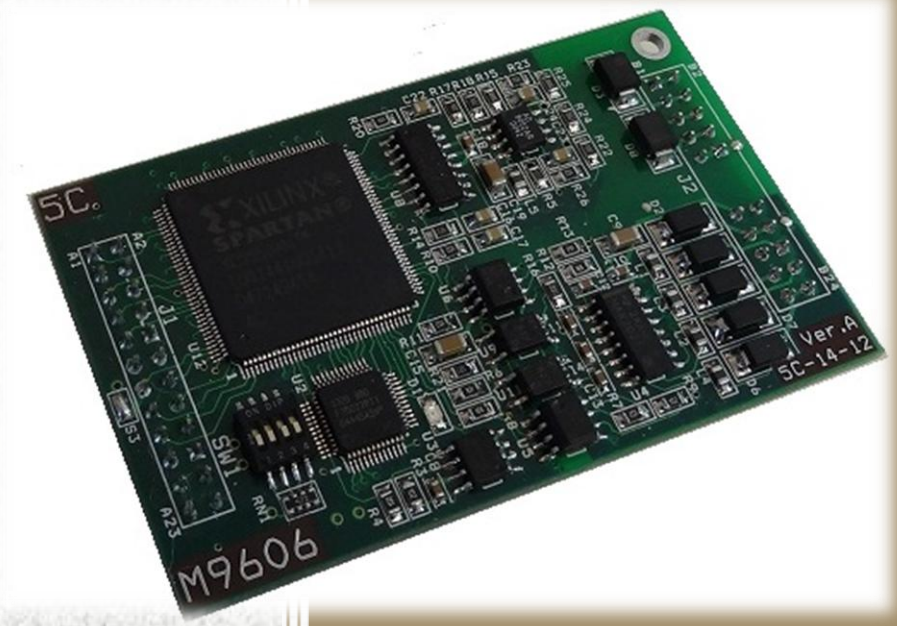
M9606

FSK Modem



5C Communications Inc.

Application

M9606 modem is a voice-frequency telegraphy unit (VFT unit) which operates according to the principle of binary frequency shift keying. It is designed especially for Power Industrial applications. Easy interfaces connect to Digital PLCCs, RTUs and PCs. However it can also be connected to other data terminal equipments because it operates at the interfaces like a universal FSK-modem in the voice-band range (300-3400 Hz) according to CCITT.

M9606 Modems utilize TI's 32bits DSP with the advantages of high integrate, high performance, small size and low power consumption. It offers maximum reliability and flexibility connection for RTUs based on digital PLCC, fiber or microwave analog channels.

Key Features

M9606 modem is compatible to 5C's M9601 modem and gives more features which are highlighted with blue words.

- Central Carrier Frequency: 300Hz~4 kHz, Bandwidth: 120Hz~3.6KHz, user-programmable in steps of 1 Hz or setting according to CCITT R.35/R.37/R.38A/V.23. The high selective (90dB) digital channel filters are included.
- Support the half-duplex / full-duplex, two-wire / four-wire communications
- Data Interface: Synchronization/ Asynchronous RS-232
- Signal rate: 50 baud up to 2400baud user-programmable (24 channels 50 baud, 12 channels 100 baud, 6 channels 200 baud, 2 channels 600 baud, 1 channel 1200 baud, 1 channel 2400 baud).
- Photo-diode isolators with DCE and transfer isolator with transmission lines. TVS diodes & Ferrite Beads provide additional protection against over-voltages, ground potential rise and ground loops beyond standard requirements in the harsh substation environment. According to IEC 61000-4-2/3/4/5.
- A signal quality level (SQL) LED displays modem receiving isochronous distortion.

- Offers an adjustable pre-distortion. It can be set in high-pass or low-pass between 0 and 10 dB.
- M9606 modem can be connected to PC through RS232. It features a very user-friendly software management utility. All essential settings like channel, gain, line operation mode, line termination, transmission rate etc. are configured by management software.
- Power supply: Single +5 VDC.

The mechanical layout of M9606 Modem is 3inch (L) x 1.8inch (W) x 0.6inch (H). It is a daughter board mounted on a simple mother board with dual row 24 pins header. M9606 is a full function modem. The mother board is just composed of the custom required dimension and connectors, not any other components are required.

In M9606 Modem, a DSP is responsible for the conversion of the binary information into the voice band and vice versa. Its high processing capacity allows beside others a high selective channel filtering (90 dB) and thereby an unrestricted channel assignment.

The channels can be assigned in the CCITT raster. Transmitter and receiver can be configured to different baud rates for transfer rates of up to 600 Bit/s. If all channels should be used in any combination and baud rate, the high channel selectivity is to configure. The normal selectivity can be used at separate assignment of transmit- and receive-channels (block configuration) and at least one channel distance between the blocks. A lower transfer time and isochronous distortion is given at normal selectivity. The M9606 modem can monitor the receiving signal for isochronous distortion and indicate by the “signal quality level (SQL)”-alarm a repeated (10x) limit exceeding (40% resp. 50%). The LED SQL indicates for at least four seconds, at greater interferences accordingly longer, the exceeding of the maximum distortion.

The audio-frequency carrier is monitored and indicated respectively alarmed by the DCD signal. The alarm signal of the modem responses at carrier drop-out (DCD direct or delayed), at SQL alarm, or at supply voltage failure. It can be

output to drive an external alarm relay.

To compensate line distortion on critical transmission links the M9606 modem offers the possibility of an adjustable pre-distortion. Depending on the quality condition of the transmission link this pre-distortion can be set in high-pass or low-pass between 0 and 10 dB. The two M9606 modems of a transmission link can be configured for test-transmitter and test-receiver to adjust the correct pre-distortion. The utilized result of the transmitted test pattern indicates the LED EQZ. The flash frequency of the LED EQZ is a degree for the achieved improvement.

The M9606 modem allows connecting up to three transmission lines star-coupled as point-to-point link without repeater. The transmitter output circuit operates hereby as constant current source.

Technical data

Modulation	
Type	Frequency shift keying (FSK) for point-to-point or multi-drop network
Operation modes	4-wire or 2-wire, full duplex operation.
Channel assignment	According to CCITT raster
Channel assignment	According to CCITT raster. Or from 600Hz to 4KHz, user-programmable in steps of 1 Hz
Serial interface to DTE	
Signal definition	V.24 / V.28
Signal lines	TxD D1 / 103 RxD C2 / 104 RTS S2 / 105 CTS M2 / 106 DCD M5 / 109
Interface to transmission line	
Input /Output impedance	600 ohms

Transmission level	-30 dBm to 0 dBm, user-programmable in steps of 0.1dB
Receive level	-58dBm to 0 dBm
Transmitter pre-distortion	In high- / or low-pass 0 … 10 dB
Receiver filter characteristic	90dB
Signal quality level monitor	
Threshold	>40% for 50…1200 bd >50% at 2400 bd isochronous distortion
SQL - LED	ON: > 10 errors with < 4 sec distance OFF: no errors for at least 4 sec.
DCD alarm at half duplex operation	if the carrier is lost for minimum n seconds (depends on baud rate): 50 baud 16 sec 100 baud 8 sec 200 baud 4 sec 600 … 2400 bd 2 sec
Power Supply	
Voltage	+5VDC
Current	<200mA
Alarm contact	
Mechanical layout	
Dimensions	3inch(L) x 1.8inch (W) x 0.6inch(H)
Mounting	daughter board
Connecting type	0.1inch pitch dual row header (12*2 pins)
Environmental conditions	
Nominal operating temperature range: EN 60068-2-1, -2-2, -2-14	0 ℃... 70 ℃
Relative humidity EN 60068-2-30	5 ... 95 % (non condensing)

Data table

Data format	serial, binary, asynchronous					
Traffic mode	Point to Poit, multidrop					
Modulation type	Frequency shift keying (FSK) with carrierswitch-off for multidrop networks					
CCITT channel	R.35	R.37	R.38A	600Bd	V.23	2400 Bd
Bit rate nominal (Baud)	50	100	200	600	1200	2400
Minimum channel distance (Hz)	120	240	480	1440		
Mid-frequency lowest (Hz)	420	480	600	1320	1700	2000
Mid-frequency highest (Hz)	3180	3120	3000	2760	1700	2000
Frequency deviation (Hz)	±30	±60	±120	±210	±400	±500
Number of channels according to CCITT	24	12	6	2	1	1
Transmitter level according to CCITT (dBm)	-22.5	-19.5	-16.5	-12	-8.7	-6
Minimum receiving (dBm)	-53	-53	-52	-51	-55	-46
Channel transfer time (ms)	43	26	15	6	3	3
Isochronous distortion	<5%	<5%	<5%	<7%	<10%	<20%
Channel delay time RTS = ON to DCD = ON (ms)	<60	<30	<18	<8	<6	<6
Channel delay time RTS = OFF to DCD = OFF (ms)	<10	<10	<10	<5	<5	<5