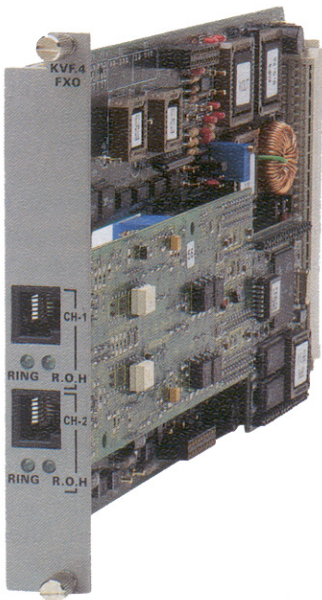


Kilomux-2100/2104

## KVF.4

## 2-Channel Low Bit Rate Voice/Fax Module



Low bit-rate  
compression of two  
analog voice/fax or  
ISDN voice channels

- High quality voice at 4.8, 6.4, 7.2, 9.6 or 12.8 kbps
- Fax Group III support with automatic rate fallback
- Double compression (tandeming)
- Transfers modem data relay at 2.4 kbps
- Integral echo canceller
- Standard ISDN "S" interface operates as either TE or NT

KVF.4 is a Kilomux voice module providing high-quality compression of two voice channels for maximum utilization of the main link bandwidth.

KVF.4 compresses the analog or digital (ISDN) voice signal at selectable rates of 4.8, 6.4, 7.2, 9.6 or 12.8 kbps. The data rate is soft-selectable, according to the quality desired and the available main link bandwidth.

For data rates of 6.4 kbps and above, voice compression is based on the MPMLQ (Multipulse Maximum Likelihood Quantization) speech coding technique, as defined in the ITU G.723.1 Standard. The compression at 4.8 kbps uses a proprietary compression technique.

Toll voice quality (comparable to 32 kbps ADPCM) is achieved when using a digitizing rate of 6.4 kbps and above; very high voice quality is achieved when using 4.8 kbps compression ratio.

KVF.4 is available with a variety of interfaces (see *Table 1* for details).

The 2-wire or 4-wire E&M module supports five signaling types: EIA RS-464 Types I, II, III and V, and British Telecom SSDC5. The E&M signaling is passed inband within the compressed data.

KVF.4 is equipped with an echo canceller for canceling the near-end hybrid echo. The echo canceller enables acceptable voice quality on voice lines with a long delay, such as long distance calls or calls over non-terrestrial links (e.g. satellite). Delay of up to 15 msec is accommodated. The echo canceller can be disabled by the user.

Voice quality is maintained at a channel bit error rate of  $1 \times 10^{-3}$  or better (Hamming code error correction).

Diagnostics include local digital loopback toward the local analog interface and analog loopback toward the remote site. Tone injection for testing is also available. Automatic self-test is performed during power-up and under normal operation.

KVF.4/S0, with digital ISDN interface, supports super-tandem functionality without requiring multiple compression/decompression.



# KVF.4

## 2-Channel Low Bit Rate Voice/Fax Module

Applications requiring double compression are supported (i.e. voice communication between remote locations connected in a star configuration to a central PBX). In such a case, the switching is performed by the PBX and requires compression and decompression to be carried out twice. KVF.4 supports this application for both voice and fax, due to the high quality compression technique (see *Figure 1* and *Figure 3*).

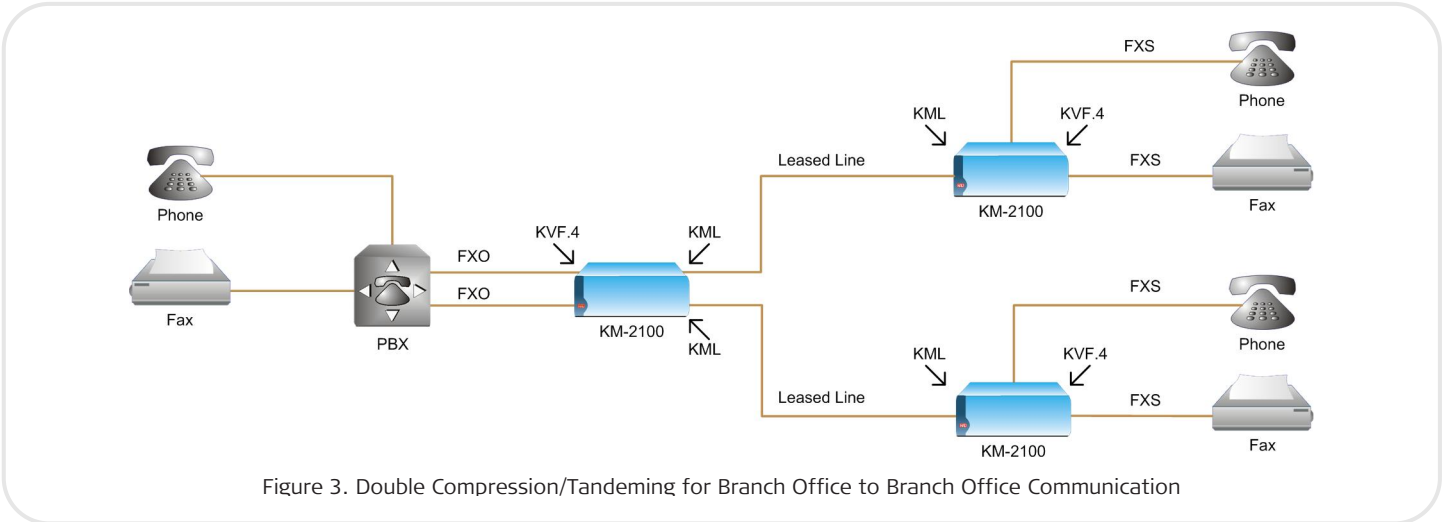
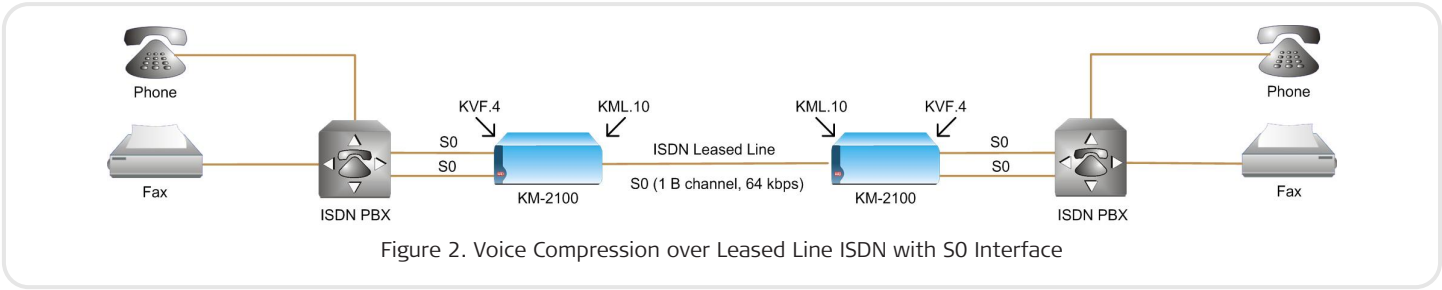
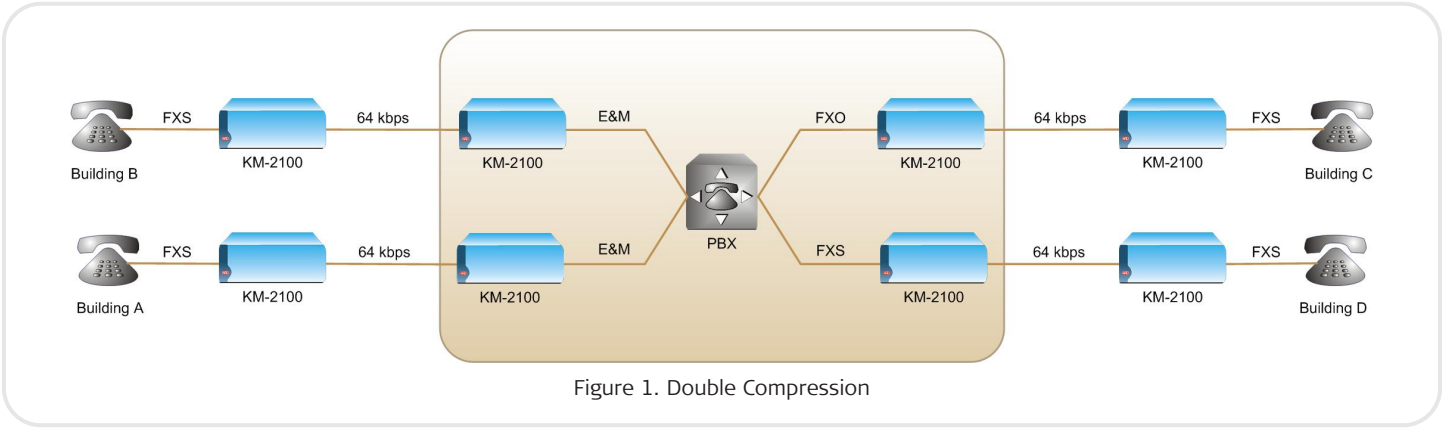
Fax support is provided on both channels. Automatic voice/fax detection ensures that each channel can be used on demand for both voice and fax. By default, the channel operates in the voice mode, but will switch to fax operation mode when a fax transmission is detected. After the fax transmission is over, the channel automatically returns to the voice mode.

The KVF.4 module takes advantage of the cost-effective call-on-demand capabilities provided by Kilomux main link modules (see individual Kilomux main link data sheets for details).

V.22 and V.22bis data support is also provided. Any of the two channels will automatically detect and switch to the data mode when a modem transmission is detected.

Table 1. Module Versions

Version	Interface
E&M	2-wire or 4-wire analog interfaces with E&M signaling. Uses internal -12 VDC as signaling battery source
E&M/E	2 or 4-wire analog interfaces with E&M signaling. Connector for external -48 VDC signaling battery source
FXO	2-wire analog FXO interface with loop-start signaling
FXS	2-wire analog FXS interface with loop-start signaling. Requires external feed voltage source
FXSP	2-wire analog FXS interface with loop-start signaling providing internal feed voltage source. The number of FXSP modules supported in a Kilomux-2100 system is limited by power supply output
S0	2 voice/fax channels with ISDN "S" interface
S0/P	2 voice/fax channels with ISDN "S" interface and internal "phantom feed"



## Specifications

### Number of channels

2

### Digitizing Technique

G.723.1 MPMLQ low bit rate technique at 6.4, 7.2, 9.6 or 12.8 kbps  
Proprietary technique at 4.8 kbps

### Fax Compatibility

Group III according to ITU Rec. V.29, V.27, V.27ter

### Fax Data Rates

2.4 kbps, 4.8 kbps, 7.2 kbps, 9.6 kbps (all with auto-fallback)

### End-To-End Processing Delay

120 msec

### Acceptable Channel Bit Error Rate

$1 \times 10^{-3}$  or better

### Analog Interface

See *Table 1*

### Adaptive Echo Canceller

Echo path length: 15 msec  
Echo return loss compliments (ERLE): >30 dB  
Convergence speed: better than ITU G.165

### D-Channel Bandwidth Allocation (S0 interface only)

Selectable data rates: 4.8 kbps, 6.4 kbps, 7.2 kbps, 9.6 kbps, 12.8 kbps, 16 kbps

### Power Consumption

See *Table 2*

### Diagnostics

Digital loopback (toward local channel)  
Analog loopback (toward remote channel)  
1 kHz tone injection  
Auto self-test

### Indicators (per channel)

E&M E&M/E: E-lead, M-lead  
FXS, FSXP: REM CALL, LOC O.H.  
FXO: RING, REM O.H.  
S0, S0/P: ACT, TST, ALM

### Connectors (per channel)

E&M, E&M/E, S0, S0/P: RJ-45, 8-pin  
FXS, FXO, FXSP: RJ-12, 6-pin

### Configuration

Programmable via Kilomux management system

### Analog Parameters

Nominal level: 0 dBm  
Nominal impedance: 600Ω  
Return loss (300 to 3400 Hz): better than 20 dB

Frequency response (Ref 1020 Hz):

- 0 dB ±0.5 dB, 300-3000 Hz
- 0 dB ±1.1 dB, 250-3400 Hz

Level adjustment (soft-selectable):

- E&M, E&M/E:  
TX: +7 to -17 dBm  
RX: +2 to -17 dBm
- FXS, FXSP:  
TX: +8 to -12 dBm  
RX: +2 to -13 dBm
- FXO:  
TX: +5 to -16 dBm  
RX: -1 to -17 dBm

Steps: 1 dB ±0.5 dB

Signal to total distortion (G.712, G.713 method 2):

- 0 to -30 dBm0: Better than 33 dB
- +3 to -45 dBm0: Better than 22 dB

Idle channel noise: Better than -70 dBm0

Transformer isolation: 1500 VRMS

Table 2. Power Consumption [W]

Interface	+5 VDC	-12 VDC
E&M	4.1	0.72
FXO	4	0.6
FXS	4	0.72
FXSP	7.5	1.8
S0	4.5	0.24

# KVF.4

## 2-Channel Low Bit Rate Voice/Fax Module

### E&M INTERFACE

#### Signaling Methods

User-selectable:

EIA RS-464, Type I

EIA RS-464, Type II with external -48V  
(E&M/E only)

Modified EIA RS-464, Types II, III, and V,  
British Telecom SSDC5, with -12V

#### Dial Pulse Distortion

±2 msec max

### FXS INTERFACE

#### Signaling Method

EIA RS-464 loop-start

#### On-hook/Off-hook Threshold

(at battery voltage -48V)

3V to 38V between TIP and RING at  
off-hook state

40V to 48V between TIP and RING at  
on-hook state

#### Feed Current (with KM-Ringer)

25 mA (±10%) for current feed

#### Ringer (with KM-Ringer)

60 VRMS (±10%), [23 VRMS (±10%) for  
FXSP], overload protected, 22 Hz (±10%),  
1 sec ON, 3 sec OFF

### FXO INTERFACE

#### Signaling Method

EIA RS-464 loop-start

#### DC Impedance

Off-hook: 100Ω at 100 mA feed,  
230Ω at 25 mA feed

On-hook: above 1 MΩ

#### Ring Detector

20 kΩ @ 20 Hz, 70 VRMS

Detection: >20 VRMS, 17-25 Hz

No detection: < 5 VRMS

### SO INTERFACE

#### Receive Level

+1.5 to -7.5 dB relative to the nominal  
amplitude

#### Transmit Level

±750 mV

## KVF.4

### 2-Channel Low Bit Rate Voice/Fax Module

## Ordering

KM-2000M-KVF.4/\*

### Legend

\* Interface:

**E&M** 2-wire or 4-wire E&M

**EM/E** 2-wire or 4-wire E&M with external -48 VDC

**FXS** 2-wire FXS

**FXSP** 2-wire FXS with built-in Ringer

**FXO** 2-wire FXO





**S0** ISDN

**S0/P** ISDN with built-in phantom feed

## OPTIONAL ACCESSORIES

KVF.4/FXS module requires an external -48 VDC source for feed and ring voltages. This power can be provided by KM-Ringer or Ringer-2000 (see *Kilomux Ringer data sheet* for ordering).

Table 3. Kilomux-2100/2104 Voice Modules Comparison Table

	 <b>KVC.1M</b>	 <b>KVF.4</b>	 <b>KVF.6</b>	 <b>KVF.8</b>
No. of Voice Channels	2	2	E1: 16 or 31, T1:12 or 24	8 (4+4)
Interfaces	E&M, FXS, FXSP, FXO	E&M, E&M/E, S0, S0/P, FXO, FXSP	E1 PBX or T1 PBX	E&M, FXS, FXO
Connectors	E&M: RJ-45 FXS, FXO: RJ-11	E&M, E&M/E, S0, S0/P: RJ-45, FXS, FXO, FXSP: RJ-11	8-pin RJ-45	E&M: SCSI 68-pin female FXO, FXS: DB-25, female (adapter cable required)
Channel Rates	16, 24, 32, 64 kbps	4.8, 6.4, 7.2, 9.6, 12.8 kbps	4.8, 6.4, 9.6, 11.2, 12.8, 16 kbps (configured in groups of 4 channels)	4.8, 6.4, 9.6, 11.2, 12.8, 16 kbps (configured in groups of 4 channels)
Voice Codocs	ADPCM/PCM G.721/G.711	MPMLQ G.723.1	MPMLQ G.723.1	MPMLQ G.723.1

**International Headquarters**  
24 Raoul Wallenberg Street  
Tel Aviv 69719, Israel  
Tel. 972-3-6458181  
Fax 972-3-6498250, 6474436  
E-mail market@rad.com

**North America Headquarters**  
900 Corporate Drive  
Mahwah, NJ 07430, USA  
Tel. 201-5291100  
Toll free 1-800-4447234  
Fax 201-5295777  
E-mail market@radusa.com

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