



4-Channel PCM Voice Module



FEATURES

- Supports four analog voice channels
- Toll-quality PCM encoded voice transmission, using A-Law or μ -Law companding
- Supports the following interface options:
 - 2 or 4-wire E&M
 - 2-wire FXS (three types)
 - 2 wire FXO (three types)
- Soft gain control for both receive and transmit level
- Optional in-band signaling with A-Law encoded channels
- Configuration and control via management system
- Fits into any I/O slot of the following Megaplex chassis:
 - MP-2000/2004
 - MP-2100/2104
 - MP-2100B
 - MP-2100F

DESCRIPTION

- The VC-2 modules support toll quality voice transmission. Voice signals are digitized using PCM, in compliance with ITU-T G.711 standards, enabling up to 31 voice channels to be transmitted over an E1 link, or 24 voice channels over a T1 link. Encoding and decoding are in full compliance with ITU-T requirements G.712, G.713 and G.714. Voice channel companding is user-selectable for A-Law or μ -Law.
- VC-2 fits into any I/O slot of the Megaplex chassis, providing connection to four analog voice channels. VC-2 is available in several size versions, for installation in any of the following chassis: MP-2000, MP-2004, MP-2100, MP-2104, MP-2100B and MP-2100F.
- Each of the PCM voice channels is allocated a timeslot on the link in a DS0 compatible format, permitting voice channel switching in a system based on digital cross-connect (DACS).
- Seven analog interface types are available for the VC-2 modules:
 - E&M** interface for supporting different types of E&M signaling: EIA RS-464 Types I, II, III and V (British Telecom SSDC5).
 - FXS-1** FXS interface with loop-start or ground-start. Used for direct connection to a 2-wire telephone in either of the following applications:
 - Off-Premises Extension (OPX), where a local telephone on the PBX can be connected to an off-premises telephone, by dialing only the extension number assigned to the off-premises telephone;

– Private Line, Automatic Ringdown application (PLAR) (also referred to as Hot Line), where two telephones are connected directly via the E1/T1 link. When the telephone on one side goes off-hook, the other telephone rings.

FXS-2 FXS interface with loop-start or ground-start. Used for direct connection to a 2-wire telephone in PSTN applications.

FXS-3 FXS interface supporting 16 kHz metering pulse generation for connection to public payphones. Supports battery polarity reversal for wink-start direct inward dialing (DID) applications.

(Not available for MP-2100B or F)

FXO-1 FXO interface for connection to PBX extension lines, in point-to-point applications. Used opposite a corresponding VC-2/FXS-1 at the remote Megaplex, for connection to the remote extension.

FXO-2 FXO interface for loop-start connection to a telephone exchange subscriber line.

FXO-3 FXO interface, supports 16 kHz pulse metering and battery polarity reversal for wink-start DID applications. Used for point-to-point E1 applications, opposite a corresponding VC-2/FXS-3 at the remote Megaplex.

(Not available for MP-2100B or F)

- Four user-selectable signaling transfer modes are available:
 - Channel Associated Signaling (CAS) transmitted in Timeslot 16, compatible with ITU-T Rec. G.704 (available when using E1 main links only);

VC-2

4-Channel PCM Voice Module

- In-band "Robbed Bit Multiframe" (RBMF) signaling transfer. This method is compatible with ITU-T Rec. G.704 and AT&T Pub. 43801, and is generally used with μ -law companding (method is proprietary when using E1 main links);
- Proprietary "Robbed Bit Frame" (RBF) signaling, which avoids the need for multiframe synchronization. RBF allocates the least significant bit of each channel to its own signaling information. This method allows the transmission of 31 voice channels by a Megaplex system on each E1 link, even when using G.732N framing;
- No signaling (for VC-2/E&M versions only).
- To provide feed and ring voltages, VC-2/FXS interface modules require an external DC power source. These voltages can be supplied from an external Ringer-2000 power supply unit or Ringer-2100R module. For the MP-2000/4 or MP-2100/4 version

modules, the feed and ring voltages are supplied directly into the dedicated DC-connector on each VC-2/FXS module panel. For the MP-2100B or MP-2100F versions, the DC voltages are distributed to the VC-2/FXS modules via the internal voltage bus of the chassis. (See separate data sheet for Ringers ordering information.)

- The VC-2/E&M modules support the EIA RS-464 Type I signaling standard without the need for an external DC power supply. For the other types of signaling standards, the internal -12 VDC provided by chassis is sufficient for connection to most PBX systems.

For full support of Types II, III and V (BT SSSDC5) signaling standards, a -48 VDC power supply is required (can be supplied by a Ringer-2100R or Ringer-2000):

- For the MP-2000/4 or MP-2100/4 version modules, the **E&M/EXT** option, featuring a 3-pin DC-connector, is needed to accept the external -48 VDC power.

- For MP-2100B or F, the standard VC-2/E&M modules can also accept the external -48 VDC power; -12/-48 VDC operation is user-selectable. For these modules, the -48 VDC is distributed via the internal voltage bus of the chassis.

Note: a -48 VDC powered MP-2100B or F chassis does not require an external -48 VDC power supply for this purpose.

- Gain control is soft-adjustable for both the receive and transmit direction, enabling easy installation in all environments.
- All operating parameters (except for jumper-selectable E&M signal type, loop/ground-start, or signal feedback mode) are configurable via the management system for both the local and remote modules.
- Diagnostic features include: local digital loopback towards the analog side; remote analog loopback towards the remote side, activated from local side; 1 kHz tone injection towards remote side; LED activity indicators.

APPLICATIONS

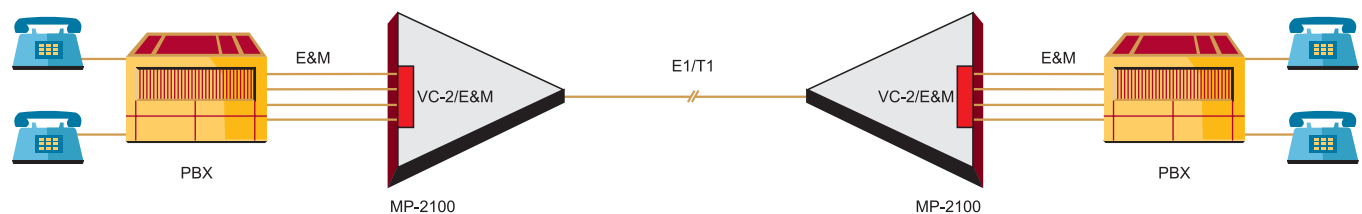


Figure 1. VC-2/E&M connecting Four Tie Lines between PBXs

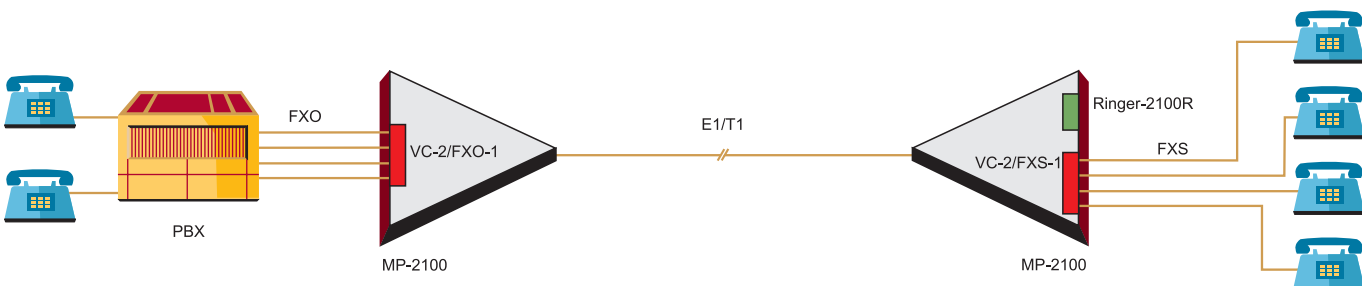


Figure 2. VC-2/FXS-1 and /FXO-1 connecting Four Remote Extensions (Off-Premises Extensions)

4-Channel PCM Voice Module

SPECIFICATIONS

- **Number of Voice Channels**
Four
- **Bandwidth Requirement**
64 kbps per enabled channel (one timeslot)
- **Voice Encoding Technique**
PCM (per ITU-T G.711 and AT&T PUB-43801), μ -Law or A-Law
- **Analog Interface**
Line type:
VC-2/E&M: 4-wire or 2-wire (soft-selectable)
VC-2/FXS, VC-2/FXO: 2-wire
ITU-T standards:
2-wire: G.713
4-wire: G.712, G.714
- **Analog Parameters**
Nominal level: 0 dBm
Nominal impedance: 600 Ω
Return loss (ERL) at 300 to 3400 Hz:
better than 20 dB
Frequency response (Ref: 1020 Hz):
0 dB \pm 0.5 dB, at 300 to 3000 Hz
0 dB \pm 1.1 dB, at 250 to 3400 Hz

Level adjustment (soft-selectable):
E&M: TX: +8 dBm to -17 dBm
RX: +2 dBm to -23 dBm
FXS: TX: +8 dBm to -13 dBm
RX: +2 dBm to -17 dBm
FXO: TX: +7 dBm to -18 dBm
RX: +2 dBm to -23 dBm
Steps: 1 dB (\pm 0.15 dB), nominal
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
(+20 dBnc)

Transformer isolation: 1500 VRMS

- **Signaling**
According to interface type:

E&M

User-selectable by jumper
settings: EIA RS-464 Type I;
EIA RS-464 Types II, III, and
V (British Telecom SSSDC5) using
-12 VDC in place of -48 VDC

Note: For full support of Types II, III,
and V (SSDC5) signaling standards, a
-48 VDC supply is required.
(E&M/EXT option is needed for
MP-2000/4 or MP-2100/4 version modules.)

Pulse dial distortion: \pm 2 msec max.

FXS (all models)

EIA RS-464

Loop-start, ground-start

On-Hook/Off-Hook threshold:

($V_{in} = 48V$ or $24V$)

3V to 80% V_{in} between TIP
and RING at off-hook state,
Higher than 83% V_{in} between TIP
and RING at on-hook state

Feed current:

25 mA (\pm 10%)

Ringer:

60 VRMS (\pm 10%)

Overload protected 23 Hz (\pm 10%),
1 second ON, 3 seconds OFF

FXS-3

Same as for FXS above, with the
addition of metering pulse
generation and battery polarity
reversal support:

Output frequency:

16 kHz (\pm 2 Hz)

Output level: 1.7 VRMS

Reversal polarity pulse
distortion:

6 msec max

Note: VC-2/FXS-1, VC-2/FXS-2 and
VC-2/FXS-3 differ in the way signaling
information is carried by the A and B
bits.

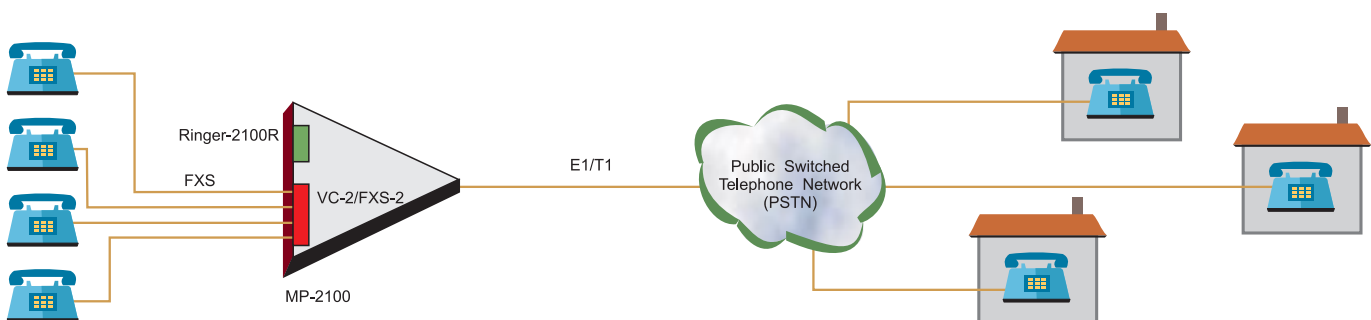


Figure 3. VC-2/FXS-2 and /FXO-2 connecting Four Remote Extensions to PSTN via E1/T1

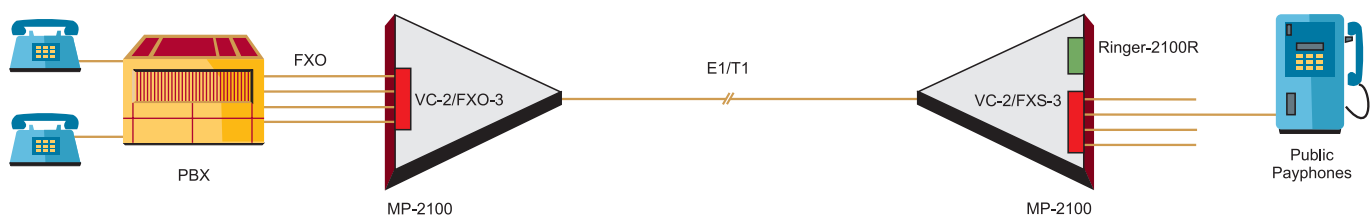


Figure 4. VC-2/FXS-3 and /FXO-3, featuring Battery Polarity Reversal for Wink-Start, and Pulse Metering for connection to Public Payphones

VC-2

4-Channel PCM Voice Module

FXO (all models)

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

FXO-3

Same as for *FXO* above, with the addition of metering pulse detection and battery polarity reversal support:

Output frequency:

16 kHz (±2 Hz)

Output level: 1.7 VRMS

Reversal polarity pulse distortion:

6 msec max

Note: VC-2/FXO-1, VC-2/FXO-2 and VC-2/FXO-3 differ in the way signaling information is carried by the A and B bits.

● **End-to-End Signaling****T1:**

– Robbed bit signaling:

667 samples per second with D4;

333 samples per second with ESF

– Robbed bit frame (proprietary)

signaling: 8000 samples per sec.

E1:

– Channel associated signaling

per ITU-T G.704 para. 3.3.3.2

– Robbed bit multiframe

signaling for up to 31 PCM

channels on E1 link:

500 samples per sec.

– Robbed bit frame (proprietary)

signaling: 8000 samples per sec.

● **Diagnostics**

– Local loopback for each channel, towards the local analog equipment

– Remote loopback for each channel, towards the remote digital equipment

– 1 kHz, 0 dBm0 tone inject for one channel at a time, towards the remote digital equipment

– Self test run automatically for entire system upon power-up

● **Indicators**

(per channel)

E&M: E lead, M lead

FXS: Remote call, Local off-hook

FXO: Ring detect,

Remote off-hook

● **Connectors**

(one per channel)

E&M: 8-pin RJ-45

FXS, FXO: 6-pin RJ-11

ORDERING**MP2000M-VC-2/***

4-Channel PCM Voice Module for MP-2000/2004

MP2100M-VC-2/*

4-Channel PCM Voice Module for MP-2100/2104

* Specify interface:

E&M for E&M interface supporting Type I (supports Types II, III, V and SSDC5 using internal -12 VDC)

E&M/EXT for E&M interface with connector for external -48 VDC (for *full* support of Types II, III, V and SSDC5)

FXS-1 for FXS interface used for point-to-point E1/T1 applications

FXS-2 for FXS interface used for PSTN applications

FXS-3 for FXS interface used for point-to-point E1 applications requiring pulse metering and polarity reversal for wink-start

FXO-1 for FXO interface used for point-to-point E1/T1 applications

FXO-2 for FXO interface used for PSTN applications

FXO-3 for FXO interface used for point-to-point E1 applications requiring pulse metering and polarity reversal for wink-start

MP2100BM-VC-2/#

4-Channel PCM Voice Module for MP-2100B

MP2100FM-VC-2/#

4-Channel PCM Voice Module for MP-2100F

Specify interface:

E&M for E&M interface

(full support of Types I, II, III, V and SSDC5, using either internal -12 VDC or external -48 VDC)

FXS for FXS interface

(jumper-selectable for type FXS-1 or FXS-2)

FXO for FXO interface

(jumper-selectable for type FXO-1 or FXO-2)

Note: a Ringer-2000 or Ringer-2100R is required to provide feed and ring voltages for all FXS type interfaces. E&M applications that need -48 VDC may also require a Ringer. (See separate data sheet for Ringers ordering information.)

RAD

data communications

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