



6-Channel PCM Voice Module



FEATURES

- Supports six analog voice channels
- Fits into any MP-2100/2104 I/O slot
- PCM encoded voice transmission, using A-Law or μ -Law companding
- Supports three interface options:
 - 2-wire or 4-wire E&M
 - 2-wire FXS
 - 2-wire FXO
- Supports different signaling operation modes and signaling profiles
- Soft gain control for both receive and transmit levels
- Optional in-band signaling with A-Law encoded channels
- Configuration settings via terminal or network management system

DESCRIPTION

- The VC-6 voice module supports toll-quality voice transmission. Voice signals are digitized using PCM (in compliance with ITU-T G.711 standards), enabling up to 30 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.
- Each PCM voice channel is allocated a timeslot on the link in a DS-0 compatible format. This permits voice channel switching in systems based on digital cross-connect (DACs).
- The following interface versions are available for the VC-6 modules:

VC-6/E&M for supporting different types of E&M signaling: EIA RS-464 Types I, II, III and V (British Telecom SSSDC5). Both 2-wire and 4-wire lines are supported (user-selectable). This interface is typically used for connection of tie lines between PBXs (see *Figure 1*).

Alternatively, VC-6/E&M can be used to connect analog PBXs, via the Megaplex-2100's main link, to digital (E1/T1) PBX systems (see *Figure 2*).

VC-6/FXS interface for supporting loop-start signaling for direct connection to a 2-wire telephone lines 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 an extension number assigned to the off-premises telephone (see *Figure 3*);
- Private Line, Automatic Ringdown (PLAR, also referred to as Hot Line), where two telephones are connected directly via the E1/T1 link. When a telephone on one side goes off-hook, the other telephone rings;
- Direct connection to a 2-wire telephone in PSTN applications (see *Figure 4*).

VC-6/FXO interface supporting loop-start signaling for direct connection to PBX extension lines. VC-6/FXO works opposite a corresponding VC-6/FXS at the remote Megaplex-2100, for connection to the remote extension.

Additionally, VC-6/FXO modules can be used in PSTN applications, similar to those of VC-6/FXS modules (see *Figure 4*).

- VC-6 supports four signaling operation modes:
 - Channel Associated Signaling (CAS) transmitted in timeslot 16, compatible with ITU-T Rec. G.704 (available for E1 links only);
 - 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 (the method is proprietary for E1 links);

VC-6

6-Channel PCM Voice Module

- 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 proprietary method allows a Megaplex system to transmit 31 voice channels on each E1 link (when using G.732N framing);
- No Signaling (VC-6/E&M only).
- To provide ring and feed voltages, FXS interface modules require a -48 VDC source. This power can be provided from an external Ringer-2000 power supply unit or Ringer-2100R module. The feed and ring voltages are distributed to the modules via the internal voltage bus of the chassis. (See separate data sheet for Ringers ordering information.)

Note: VC-6/FXS modules can operate with any power input between -20 to -56 VDC. This will be sufficient for supporting most applications. However, using input less than the nominal -48 VDC will shorten the range of the loop span. For example, -24 VDC input will only support loop spans that do not exceed 1 km (0.6 mile).

- The VC-6/E&M module supports 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 the 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 source is required. To connect the -48 VDC, VC-6/E&M must be ordered with an optional 3-pin connector on the module panel.

- Gain control is soft-adjustable for both the receive and transmit direction, enabling easy installation in all environments.

- All operating parameters (except E&M signaling type) are configurable via a terminal interface, or via the RADview-PC and RADview-HPOV Management Systems.
- Diagnostic features include local digital loopback towards the local user equipment and remote analog loopback towards the remote user equipment. Test tone injection of 1 kHz, 0 dBm0 towards the remote equipment is also available. Additionally, LED channel activity indicators are provided on the module panel.
- For the VC-6/E&M modules, all channels terminate in a single 50-pin female TELCO connector. For the VC-6/FXS and VC-6/FXO modules, each of the six channels terminate in a separate 6-pin RJ-11 connector.

APPLICATIONS

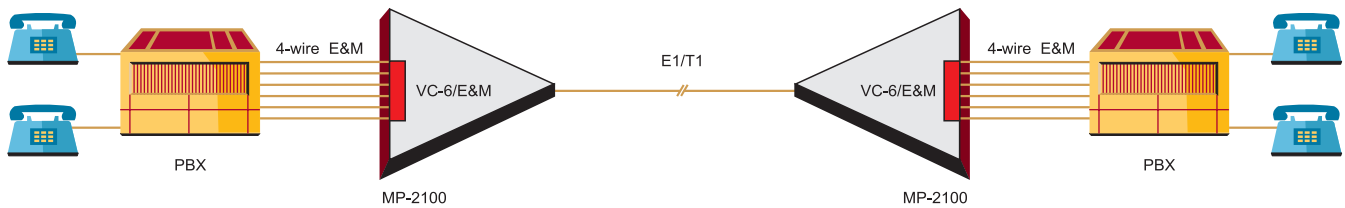


Figure 1. VC-6/E&M Connecting Six Tie Lines Between PBXs

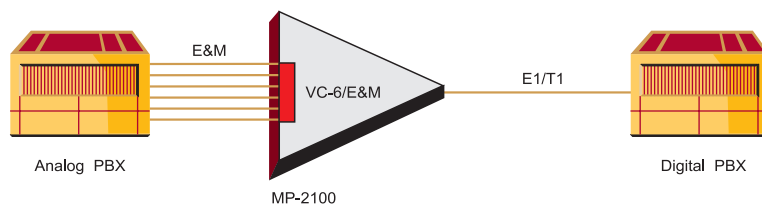


Figure 2. Conversion Between Analog PBX and Digital PBX

6-Channel PCM Voice Module

SPECIFICATIONS

- **Number of Voice Channels**
Six
- **Voice Encoding Technique**
PCM (per ITU-T G.711 and PUB-43801), μ -law or A-law
- **Bandwidth Requirement**
64 kbps (one timeslot) per enabled channel
- **Analog Interface**
Line type:
E&M: 4-wire or 2-wire (soft-selectable)
FXS, 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 at 300 to 3400 Hz:
better than 20 dB
Frequency response (Ref:1020 Hz):
 ± 0.5 dB, at 300 to 3000 Hz
 ± 1.1 dB, at 250 to 3400 Hz

Level adjustment (soft-selectable):

E&M: TX: +8 to -17 dBm

RX: +2 to -23 dBm

FXS: TX: +8 to -13 dBm

RX: +2 to -17 dBm

FXO: TX: +7 to -18 dBm

RX: +1 to -23 dBm

Steps: 1 dB (± 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 -65 dBm0

(+20 dBmnc)

Transformer isolation: 1500 VRMS

- **E&M Interface Characteristics**

Signaling method (user-selectable):

EIA RS-464 Type I;

EIA RS-464 Types II, III, and

V (British Telecom SSDC5) 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.

- **FXS Interface Characteristics**

Signaling method:

EIA RS-464 loop-start

On-Hook/Off-Hook threshold:

($V_{in} = -20$ VDC to -56 VDC)

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:

(with Ringer)

22 mA ($\pm 10\%$)

Ringer:

86 VRMS (when providing 4 REN or

less) to 45 VRMS (when providing

12 REN max), 20 Hz ($\pm 10\%$)

Overload protected,

1 second ON, 3 seconds OFF

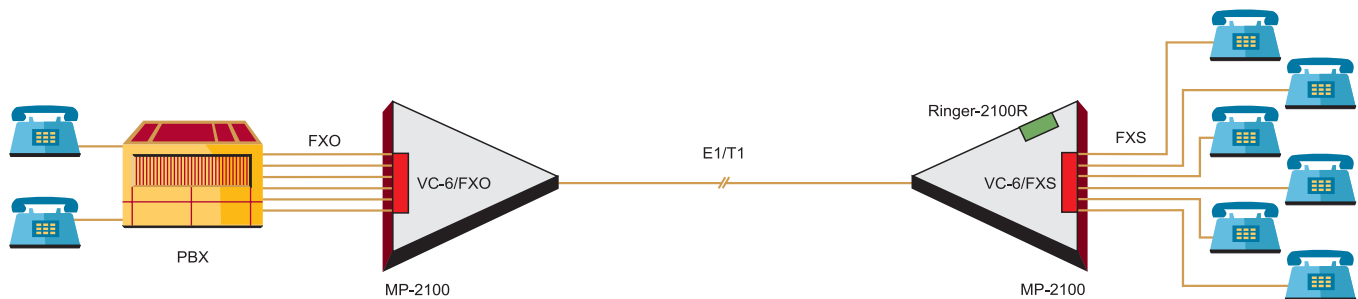


Figure 3. Typical OPX Application for VC-6/FXS and VC-6/FXO Modules

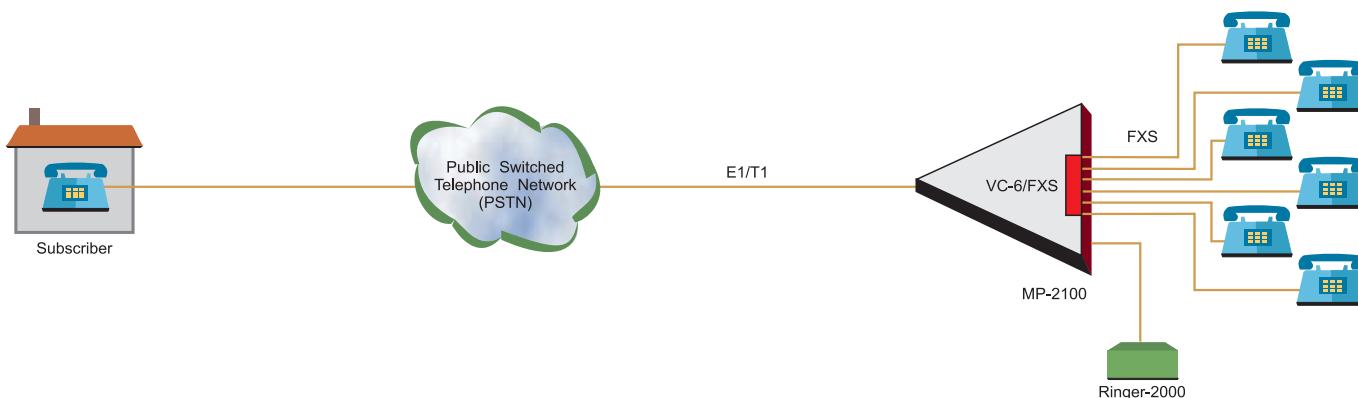


Figure 4. Typical PSTN Application for VC-6/FXS Modules

VC-6

6-Channel PCM Voice Module

- **FXO Interface Characteristics**
 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 to 25 Hz
 No detection:
 <5 VRMS
- **End-to-End Signaling**
 T1:
 - Robbed Bit Multiframing signaling:
 667 samples per second with D4;
 333 samples per second with ESF
 - Robbed Bit Frame (proprietary) signaling: 8000 samples per second
 - No Signaling (VC-6/E&M only)
 E1:
 - Channel Associated Signaling per ITU-T G.704 para. 3.3.32
 - Robbed Bit Multiframing signaling for up to 31 PCM channels on E1 link (proprietary for E1): 500 samples per second
 - Robbed Bit Frame (proprietary) signaling: 8000 samples per second
 - No Signaling (VC-6/E&M only)
- **Diagnostics**
 - Local digital loopback for each channel, towards the local user equipment
 - Remote analog loopback for each channel, towards the remote user equipment
 - 1 kHz, 0 dBm0 test tone inject for one channel at a time, towards the remote user equipment
- **Indicators**
 (per channel)
 E&M: E-lead, M-lead
 FXS: Remote Call, Local Off-Hook
 FXO: Ring Detect, Remote Off-Hook
- **Connectors**
 E&M:
 Single 50-pin female TELCO (for all channels)
 FXS, FXO:
 Six 6-pin RJ-11 (one per channel)
- **Configuration**
 Programmable via terminal interface or RADview Management Systems

 **ORDERING**
MP-2100-VC-6/*

6-channel PCM voice module for MP-2100/2104

- * Specify voice interface:
E&M for E&M interface
FXS for FXS interface
FXO for FXO interface

Note: FXS interfaces require a -48 VDC source for feed and ring voltages. Certain E&M applications may also require -48 VDC. The -48 VDC can be supplied by a Ringer-2100R or Ringer-2000. See separate Ringer data sheet for details and ordering information.

(-48 VDC-powered chassis, or AC-powered MP-2104 chassis with built-in ringer option, will not require a Ringer.)

CBL-VC16

Octopus cable with six RJ-45 male connectors, for connecting the VC-6/E&M's single 50-pin female TELCO connector directly to user equipment. Cable length is 2m (6 ft).



data communications

<http://www.rad.com>

- **Corporate Headquarters**
 12 Hanechoshet Street
 Tel Aviv 69710, Israel
 Tel: (972) 3-6458181
 Fax: (972) 3-6498250, 6474436
 Email: rad@rad.co.il
- **U.S. Main Office**
 900 Corporate Drive
 Mahwah, NJ 07430
 Tel: (201) 529-1100
 Fax: (201) 529-5777
 Email: market@radusa.com

764-116-0700