Fiber Optic "Light to Logic" ™ Receiver

Technical Data

RCV1201-1.2

Features

- **Light to Logic 28-pin DIP Receiver Offers ECL Compatibility**

- **High Sensitivity at Bit Rates up to 1.2 Gbit/s**

- **Hermetically Sealed Package**
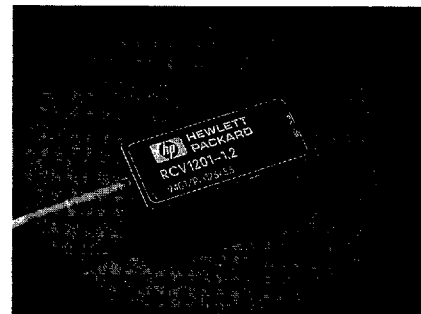
- **Overload > -8 dBm**

Applications

- **Telecommunications Networks**

- **SONET OC24 Compatible**

- **Suitable for High Speed Fiber Channel**

- **Local Area and Metropolitan Area Networks**

- **Military Communications and Control Systems**
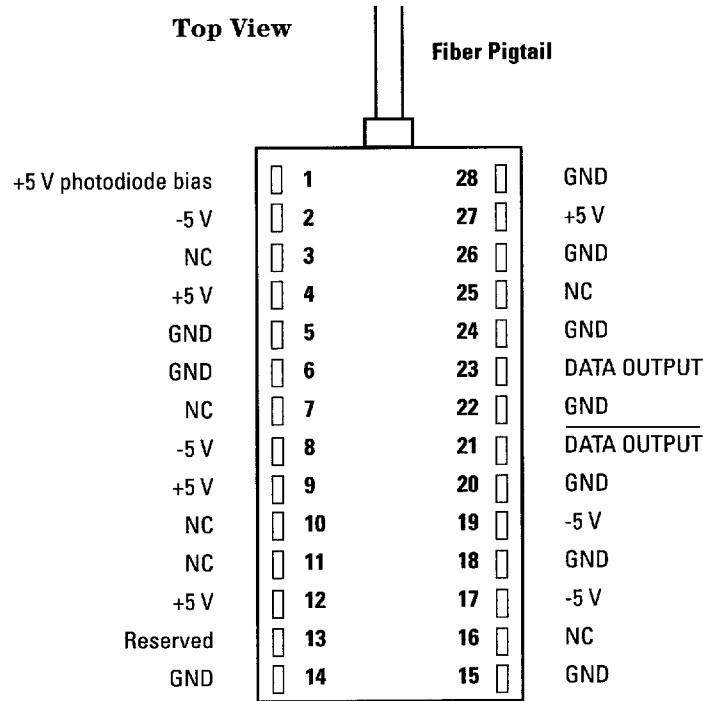
- **Digital Cable TV Networks**

Description

The RCV1201-1.2 is a high speed member of the RCV1200 family. It converts 1200 to 1600 nanometer wavelength lightwave information into an electrical signal at rates up to 1.2 Gbit/s.

The receiver consists of a photodiode, a GaAs transimpedance amplifier and supporting electronics to provide ECL - compatible complementary outputs.

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Connection Diagram

Top View   **Fiber Pigtail**

Left	Pin	Pin	Right
+5 V photodiode bias	1	28	GND
-5 V	2	27	+5 V
NC	3	26	GND
+5 V	4	25	NC
GND	5	24	GND
GND	6	23	DATA OUTPUT
NC	7	22	GND
-5 V	8	21	DATA OUTPUT
+5 V	9	20	GND
NC	10	19	-5 V
NC	11	18	GND
+5 V	12	17	-5 V
Reserved	13	16	NC
GND	14	15	GND

Pin Descriptions

Pin 1 Photodiode Bias:
This pin is connected to the PIN photodiode cathode. It is normally reverse biased with +5 Volt through an appropriate decoupling network. (See Figure 2). Current drawn will be directly proportional to input optical signal level.

Pins 2, 8, 17, 19 -5 Volt Supply:
These pins are connected to the -5 Volt supply. Each pin should be bypassed with a series network of 22 Ω/100 nF (See Figure 2).

Pins 4, 9, 12, 27 +5 Volt Supply:
These pins are connected to the +5 Volt supply. Each pin should be bypassed with a series network of 22 Ω/100 nF (See Figure 2).

Pins 5, 6, 14, 15, 18, 20, 22, 24, 26, 28 GND:
These pins are connected to the circuit board ground plane.

Pins 3, 7, 10, 11, 16, 25 NC:
These pins are not used in the present RCV1201-1.2 design. They should be left as an open circuit.

Pin 13 Reserved:
This pin is reserved for future product enhancements. It should be left as an open circuit.

Pin 21 DATA OUTPUT:
This pin is the inverted data output. It is at ECL Logic LOW during an input optical pulse. It must be ECL terminated. See page 4 for proper operation.

Pin 23 DATA OUTPUT:
This pin is the data output. It is at ECL Logic HIGH during an input optical pulse. It must be ECL terminated. See page 4 for proper operation.

Functional Description

Design

The RCV1201-1.2 receiver contains an InGaAsP photodetector, GaAs IC transimpendance amplifier and interface amplifier circuit. The receiver is designed with a 50/125 micron fiber pigtail to allow maximum flexibility in connector options.

The interface amplifier is capacitively coupled to the preamplifier circuit. The coupling capacitor values are large enough to allow good sensitivity down to 50 KHz.

Noise Immunity

The RCV1201-1.2 receiver has internal components to filter power supply noise from the gain circuits. To obtain maximum performance, it is highly recommended that external filter networks (shown in Figure 2) be utilized as well. The photodiode bias pin is especially sensitive to extraneous noise and a separate decoupling network is shown. The current drain on Pin 1 is directly proportional to the incoming optical signal.

This current will range from approximately 1 µA on a small optical signal to 500 µA on a large optical signal.

Additional external circuitry may be added to monitor the photodiode current for use as a simple signal detection circuit.

As a practical consideration, the majority of current drawn from the positive supply is used in the preamplifier IC. The interface amplifier draws the majority of the current from the negative supply. The series RC networks attached to each pin are intended to insure maximum stability.

Terminating the Outputs

The data outputs of the RCV1201-1.2 are 10 KH compatible. Figure 3 shows three options that are commonly used as terminations. While 50 Ohm terminations are shown, other values can be used as well. Care should be taken to match termination impedances to the interconnect to minimize reflection effects. More information on ECL interconnection, biasing and termination can be found in most ECL manufacturers' data books.

Circuit Layout

The RCV1201-1.2 uses very high bandwidth circuitry to achieve its high level of performance. Care must be taken to ensure stable operation. The use of ground planes and transmission line interconnects is required. The use of a standard evaluation board is highly recommended for those users who are not familiar with these techniques. Evaluation boards for the RCV1201-1.2 are available. A recommended layout per the schematic in Figure 2 is also available.Please contact your local representative for details.

Manufacturing

The RCV1201-1.2 is a fully hermetically sealed component. The fiber pigtail on the device requires normal fiber handling considerations. Care should be taken to avoid tight bends as well as excessive tension on the fiber pigtail.

The allowable temperature range for the RCV1201-1.2 is limited by the material used in the pigtail. Exposure to temperatures over 85°C is not recommended. Low profile sockets or hand soldering is recommended for this part.
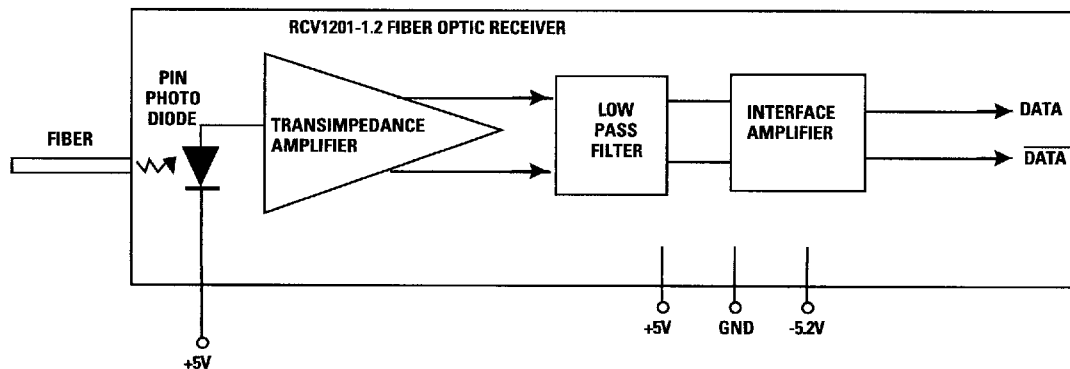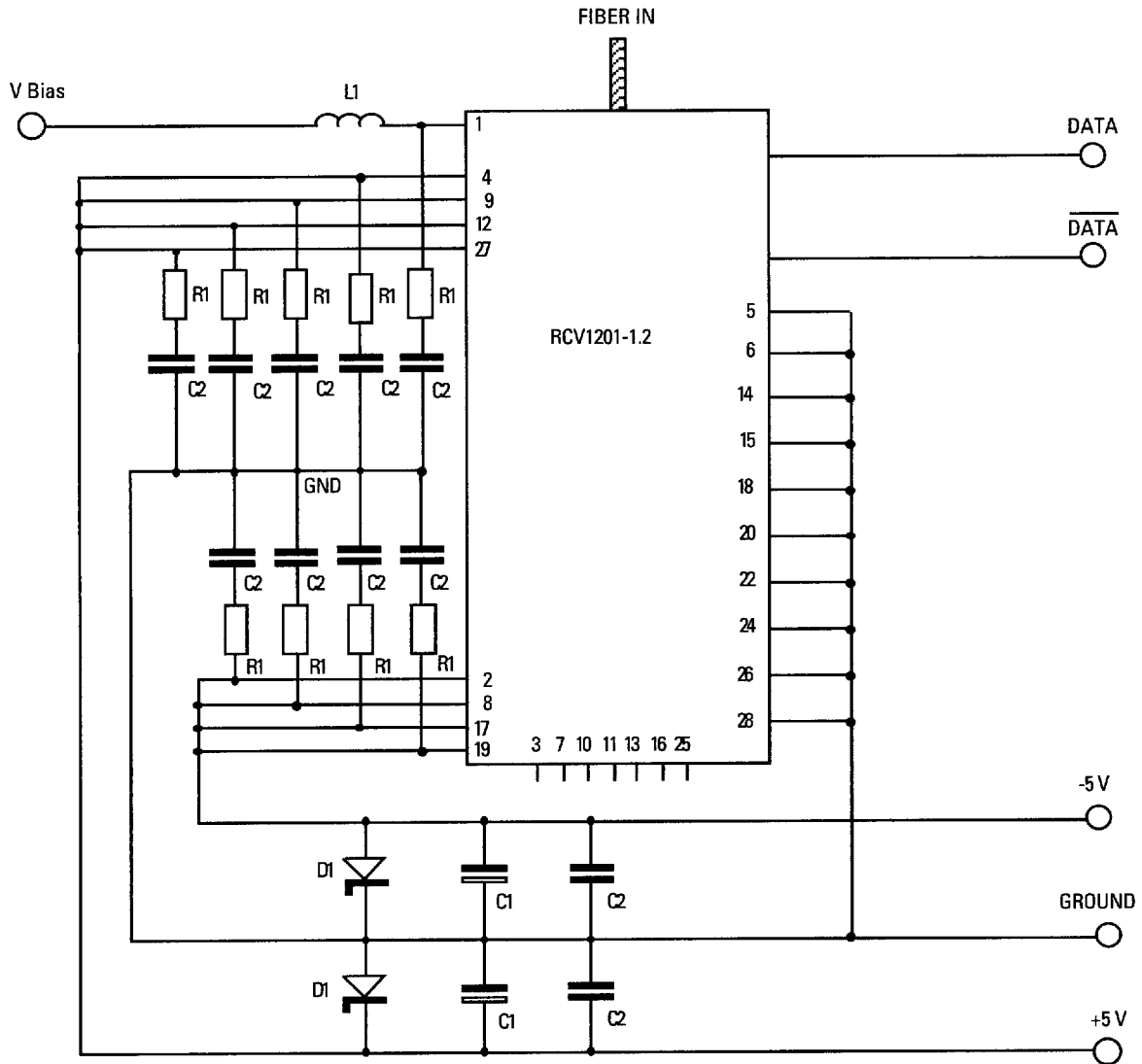
Figure 1 - Block Diagram
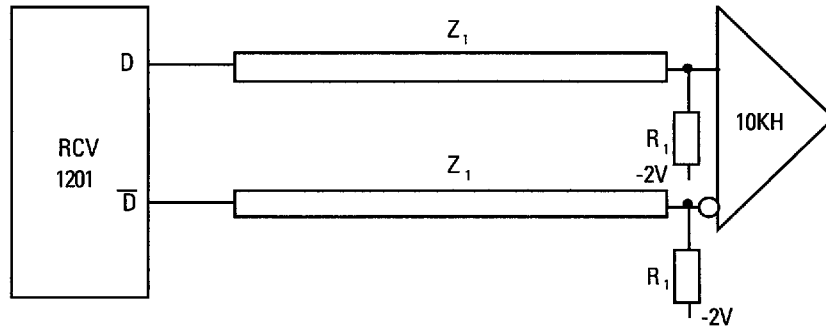
Figure 2 Evaluation Board

Component Values

C_1 10 µF Electrolytic
C_2 100 nF Chip
R_1 22 Ohm Chip
D_1 7.5 Volt Zener Diode
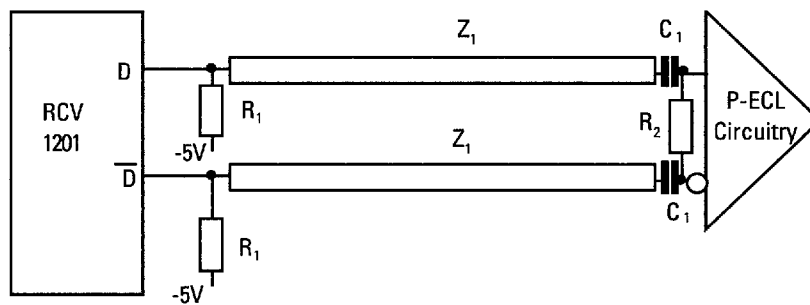L_1 2.2 µH

Figure 3A   Option 1 - (50 Ohms to -2 Volts)

$Z_1 =$ 50 Ohm Interconnect
$R_1 =$ 50 Ohms

Figure 3B   Option 2 - Differential Termination
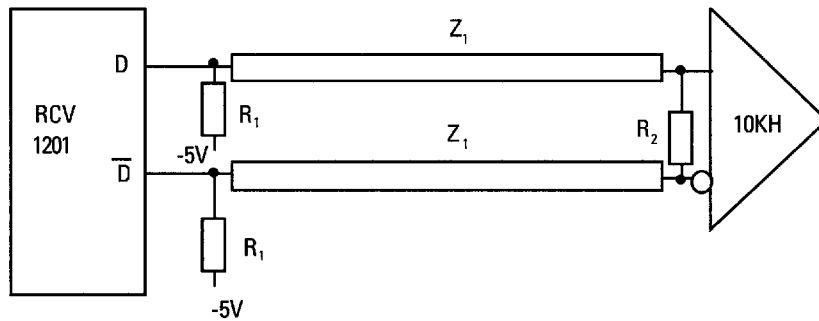
$Z_1 =$ 50 Ohm Interconnect
$R_1 =$ 510 Ohms
$R_2 =$ 100 Ohms

Figure 3C   Option 3 P-ECL Operation (Capacitively Coupled)

$C_1 =$ 100nF
$R_1 =$ 510 Ohms
$R_2 =$ 100 Ohms
$Z_1 =$ 50 Ohm Interconnect

Performance Specifications

Absolute Limiting Ratings

Parameter	Minimum	Maximum	Units	Note
Case Operating Temperature	+10	+40	°C	-
Storage Temperature	-40	+85	°C	-
Supply Voltage +5.2 V	-0.5	+7.0	V	-
-5.0 V	-7.0	+0.5	V	-

Electrical Parameters

Parameter	Minimum	Typical	Maximum	Units	Note
Digital Output	-	10 K ECL	-	-	-
Output Impedance	28	-	60	Ohms	-
Supply Voltage +5.0 V	-	-4.75	5.25	V	-
-5.0 V	-	-4.75	-5.25	V	-
Supply Current -5.0 V	-	40	-	mA	-
+5.0 V	-	30	-	mA	-
MTTF (at 40°C Case Temperature)	-	500,000	-	Hrs	-

Optical Parameters [4]

| Parameter	Minimum	Typical	Maximum	Units	Note
Wavelength Range	1200	-	1600	nm	-
Receiver Sensitivity 1.2 Gbit/s	-	-	-26.5	dBm	1
Maximum I/P Power 1.2 Gbit/s	-8.0	-	-	dBm	2
Fiber Length	-	1	-	m	3

Notes:
1. At 1300 µm wavelength; 10^{-11} BER, 100% modulation depth; $2^{15}-1$ pseudo-random pattern.
2. For 10^{-11} BER
3. 50/125 µm core/cladding (multimode), 900 micron OD acrylate tight buffer.
4. At 25°C unless otherwise specified.

Drawing Dimensions

DIM	MIN	NOM	MAX
A	42.90	-	43.20
B	19.50	-	19.80
C	5.90	-	6.60
D	5.10	-	-
E	-	0.44	-
F	-	25.0	-
G	400	-	800
H	3.20	-	3.64
J	-	2.54	-
K	-	15.20	-
L	-	5.00	-
M	-	9.80	-
N	-	7.60	-

All dimensions in mm

Top View

RCV1201-1.2

Side View

Front View
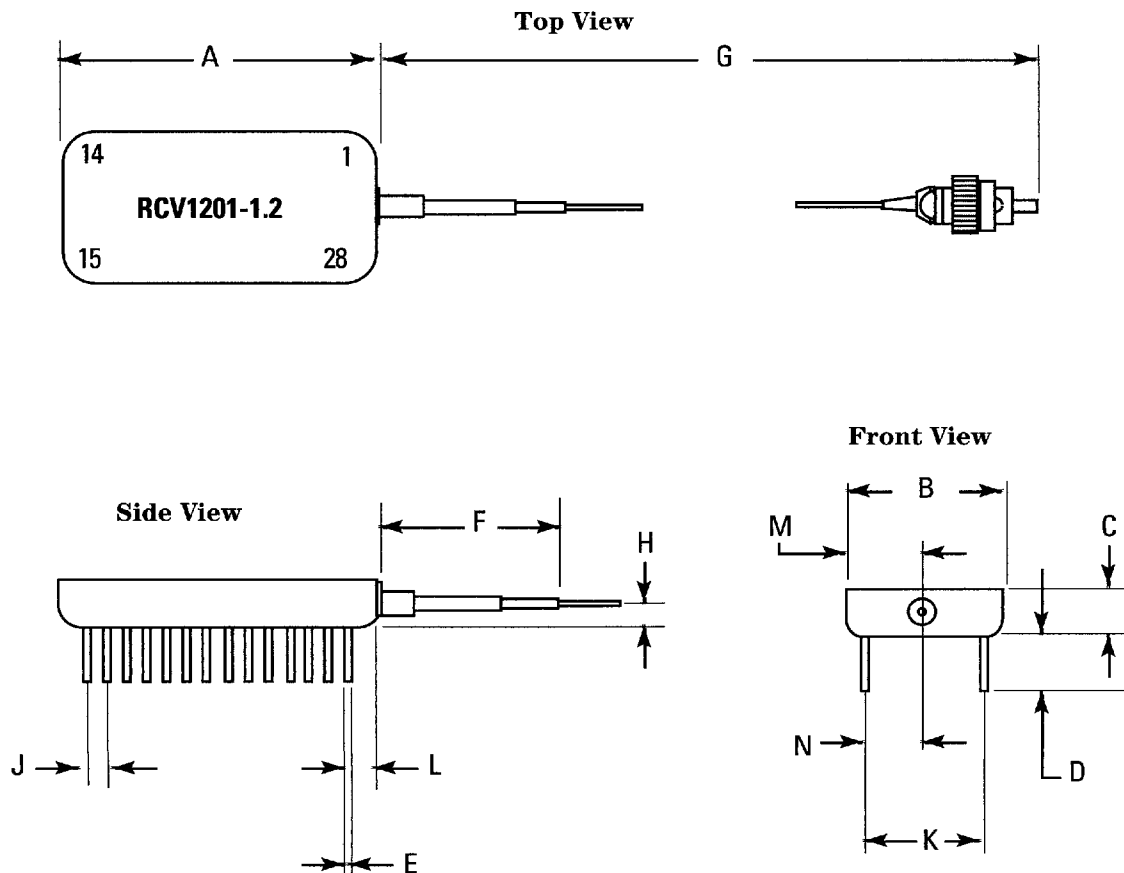
Ordering Information

RCV1201-XXX-XX

                        *Connector Type:
                        FP = FC/PC Polish
                        ST = ST®
                        SC = SC
                        DIN = DN

                        Specified Data Rate:
                        1.2 = 1.2 Gbit/s

                        Model Name:
                        RCV1201

Allowable Part Numbers:
RCV1201-1.2-FP
RCV1201-1.2-ST
RCV1201-1.2-SC
RCV1201-1.2-DN

*Other connectors available upon request.

Handling Precautions

1. The RCV1201-1.2 can be damaged by current surges of overvoltage.
   Power supply transient precautions should be taken.
2. Normal handling precautions for electrostatic sensitive devices should be taken.

For more Information:

*United States:

*Europe:

Far East/Australasia: (65) 290-6305

Canada: (416) 206-4725

Japan: (81) 3 3331 6111

*Call your local HP sales office listed in your telephone directory and ask for a Components representative.

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