Installation Guide

BC1X00

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Metrodata BC1X00
Baseband Converter Range
Installation Guide

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1 INTRODUCTION

1. 1 About the BC1X00 product range

The Metrodata Baseband Converter product range offers a transparent interface conversion between HSSI and EIA-644 LVDS. There are two products in the family, the BC1000 offers a HSSI DTE interface for connection to a Satellite Modem or other such HSSI DCE device, whilst the BC1100 provides a HSSI DCE interface for connection to a Router, or other such HSSI DTE device.

The Baseband Converter operates at data rates up to 51.84MBits and as such enables users to fully utilise their LVDS interface capabilities.

One application is with an LVDS Serial Encryptor. In order to interface the LVDS to real world devices, the BC1X00 offers conversion to the HSSI standard as shown below:

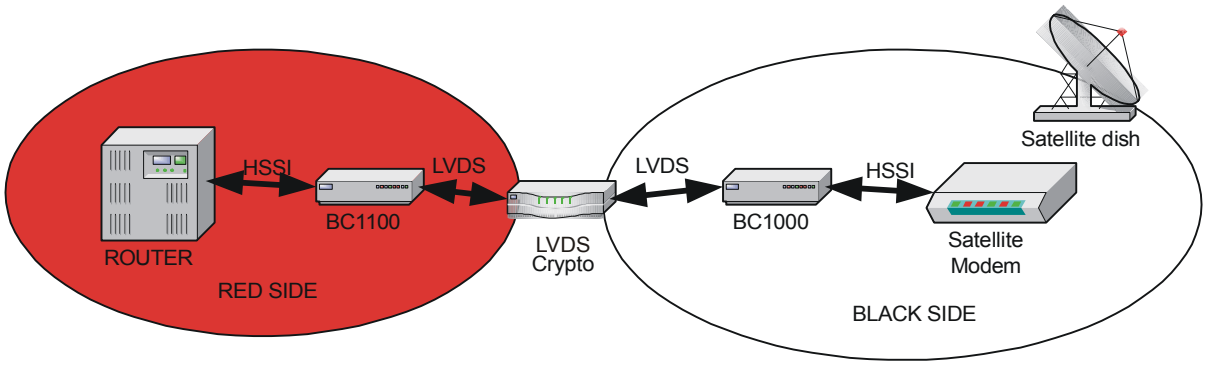

Figure 1. 1 BCX00 application

The BC1X00 range of converters has been designed to be plug and go, conforming to appropriate standards, physically very compact, and rack mountable in sets of 2 using a dual face plate, or 18 units in a rack mount kit for large installations.

Metrodata are continually developing new models, so if the interface combination required is not listed in this guide, please contact Metrodata Sales Dept.

1. 2 Safety

Where electrical signal cabling is connected to BC1X00 models, do not connect to cabling which would be required by BS6701 to be equipped with over-voltage protection.

The following ports are designated SELV (Safety Extra Low Voltage) within the scope of EN 41003:

HSSI port
EIA-644 LVDS DTE port

These ports should only be connected to SELV ports on other equipment in accordance with EN60950 clause 2.3.

1. 3 Electromagnetic Compatibility

In order to ensure EMC compliance all electrical signal and data cables and connectors must use a screened connector shell with a screened cable. The cable screen must be terminated to the screened connector shell and not connected to any pins of the connector. Failure to use the correct connector may compromise EMC compliance.

1. 4 EN55022 Declaration

BC1X00 units are a Class A product. In a domestic environment it may cause radio interference in which case the user may be required to take adequate measures.

1. 5 FCC Declaration

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at its own expense.

1. 6 RoHS Compliance

The BC1X00 is compliant with the EU RoHS directive 2002/95/EC. The RoHs directive bans the use of six hazardous materials in products placed on the market after July 1st 2006. The six banned materials are Lead, Mercury, Hexavalent Chromium, Polybrominated Biphenyls, Polybrominated Diphenyl Ethers and Cadmium.

To ensure product reliability, the RoHS directive exempts Network Infrastructure Equipment including the BC range, allowing the use of standard leaded solder; as such the BC range is manufactured using leaded solder.

1. 7 Power Supply

The BC1X00 is powered by an internal mains-fed power supply. The mains input voltage is 100-250VAC, 50/400Hz with a maximum current of 50mA. The units are fitted with an internal 1A fuse. Mains power is connected via an IEC inlet on the rear panel.

An alternative -48VDC power supply is available on all units as a custom order item. The supply definition of the DC supply is minus 36 to minus 72 VDC, 200-100 mA. DC power is supplied via a 3 pin Buccaneer socket fitted to the rear panel. A Buccaneer plug is supplied with the unit for customer's own wiring. The connections are labelled on the rear panel of the BC1X00 as shown in the schematic below.

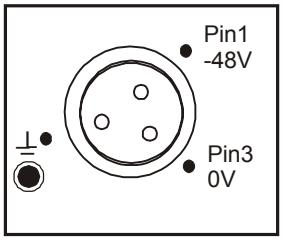

Figure 1. 2 Buccaneer DC socket

The power consumption of each model in the range is shown below, together with the current consumption over the operating voltage ranges.

Product	Watts Power Consumption	Current Range mA for 100-250 VAC	Current Range mA for -40 to -72 VDC
BC1X00	6.0	50 - 25	200 - 100

The BC1X00 must be connected to mains safety earth for correct operation. The BC1X00 power supply should be connected to a supply socket that is physically located close to the unit and is easily accessible.

Safety Notes: Excessive voltages are present inside the unit. There are no user serviceable parts inside the unit, and the cover should not be removed by unqualified personnel. The unit must not be exposed to damp or condensing conditions.

2 BC1X00 HARDWARE

2. 1 BC1X00 rear panels

All connections to and from the BC products are made through the rear panel, examples of which include both DC and AC models are shown below:

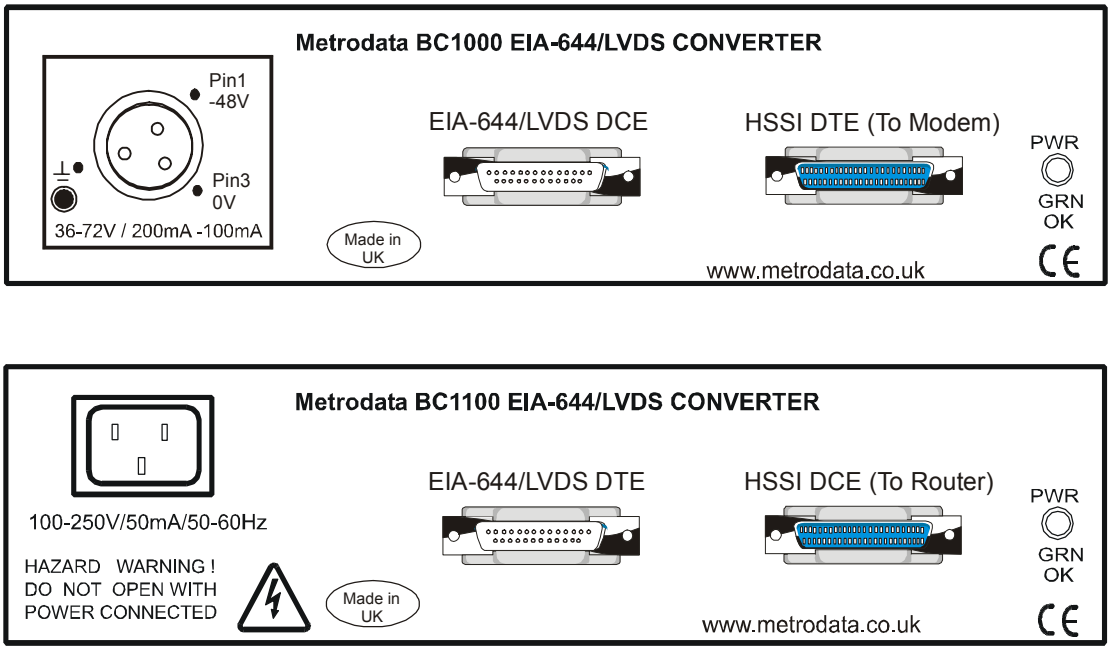

Figure 2. 1 BC1X00 range rear panels showing DC and AC models

2. 2 Unpack and inspect the equipment.

The carton should contain a single Metrodata BC1X00 model and for UK shipments only, a power cable. If there is any visible damage, do not attempt to connect the device. Contact your Supplier or Metrodata Technical Support for advice and assistance. The rear panels of typical BC1X00, units are shown above in this section.

Note that the current rating shown on the rear panel label is the maximum current, which corresponds to the lowest input voltage.

2. 3 LVDS EIA-644/LVDS interface

The LVDS interface is presented on a 25-way female D-type connector. The BC1000 presents a DCE interface on a female connector. The BC1100 presents a DTE interface on a male connector. The rear panel connector layout is shown below:

Pin	Signal name	Symbol	Direction
1	Shield		
2	Send Data(A)	SD(A)	To DCE
3	Receive Data(A)	RD(A)	From DCE
4	Request to Send (A)		To DCE
5	Clear to Send (A)		From DCE
6	Data Set Ready (A)		From DCE
7	Signal Ground	Ground	
8	Data Carrier Detect (A)	RR(A)	From DCE
9	Receive Timing(B)	RT(B)	From DCE
10	Data Carrier Detect (B)	RR(B)	From DCE
11	Terminal Timing(B)	TT(B)	To DCE
12	Send Timing(B)	ST(B)	From DCE
13	Clear to Send (B)		From DCE
14	Send Data(B)	SD(B)	To DCE
15	Send Timing(A)	ST(A)	From DCE
16	Receive Data(B)	RD(B)	From DCE
17	Receive Timing(A)	RT(A)	From DCE
18			
19	Request to Send (B)		To DCE
20	Data Terminal Ready (A)		To DCE
21			
22	Data Set Ready (B)		From DCE
23	Data Terminal Ready (B)		To DCE
24	Terminal Timing(A)	TT(A)	To DCE
25			

Figure 2. 2 EIA/LVDS interface for BC1X00

2 . 3. 1 HSSI DTE Port

The HSSI interface is presented on a 50-way sub-miniature rear panel connector as per EIA-613 with the layout shown in the table below.

Pin (+)	Pin (-)	Signal	Signal name	Direction
1	26	SG	Signal Ground	
2	27	RT	Receive Timing(A)	To DTE
3	28	CA	DCE Available(A)	To DTE
4	29	RD	Receive Data(A)	To DTE
5	30	LC	Loopback C	To DTE
6	31	ST	Send Timing(A)	To DTE
7	32	SG	Signal Ground	
8	33	TA	DTE Available(A)	To DCE
9	34	TT	Terminal Timing(A)	To DCE
10	35	LA	Loopback A	To DCE
11	36	SD	Send Data(A)	To DCE
12	37	LB	Loopback B	To DCE
13	38	SG	Signal Ground	
14	39			
15	40			
16	41			
17	42			
18	43			
19	44	SG	Signal Ground	
20	45			
21	46			
22	47			
23	48			
24	49		Test Mode	To DTE
25	50	SG	Signal Ground	

Figure 2. 3 BC1X00 HSSI interface

Note: The Signals Loopback A/B/C and TM are not used by the BC1X00 with inputs ignored, and outputs set to the normal operational state OFF.

2. 4 Configure the BC1X00

The bit-switches on the underside of the unit must be set for the operation you require. The options for setting up are described in the next section of this guide. Note that set-up instructions are separately described for the BC1000 and the BC1100.

2. 5 Safety note on port connections

Ports that are identified as SELV in this guide must only be connected to SELV ports on other equipment in accordance with EN60950 Clause 2.3.

2. 6 Connect the HSSI port.

The HSSI port of the BC1X00 is presented on an industry standard miniature 50 way connector. The same connector is used for both the BC1000 DTE and BC1100 DCE ports. HSSI is a fault tolerant interface and should not be damaged by connecting similar port types- e.g. DTE to DTE or DCE to DCE. In such circumstances, however, normal operation will not be possible.

2. 7 EIA-644/LVDS port

The LVDS port is presented on a 25-way D type connector. The BC1000 presents a DCE interface on a female connector. The BC1100 presents a DTE interface on a male connector. The LVDS interface may be damaged by incorrect connection.

2. 8 Optional rackmounting procedure

Rackmounting kits may be used to mount two BC1X00 units side by side in a 19” rack. The kit, part number 80-05-256, has a recessed plate to permit cable or fibre bends to be made within the envelope of the 19” cabinet. It has a cut out to provide access to all the connectors on the rear panel of the BC1X00.

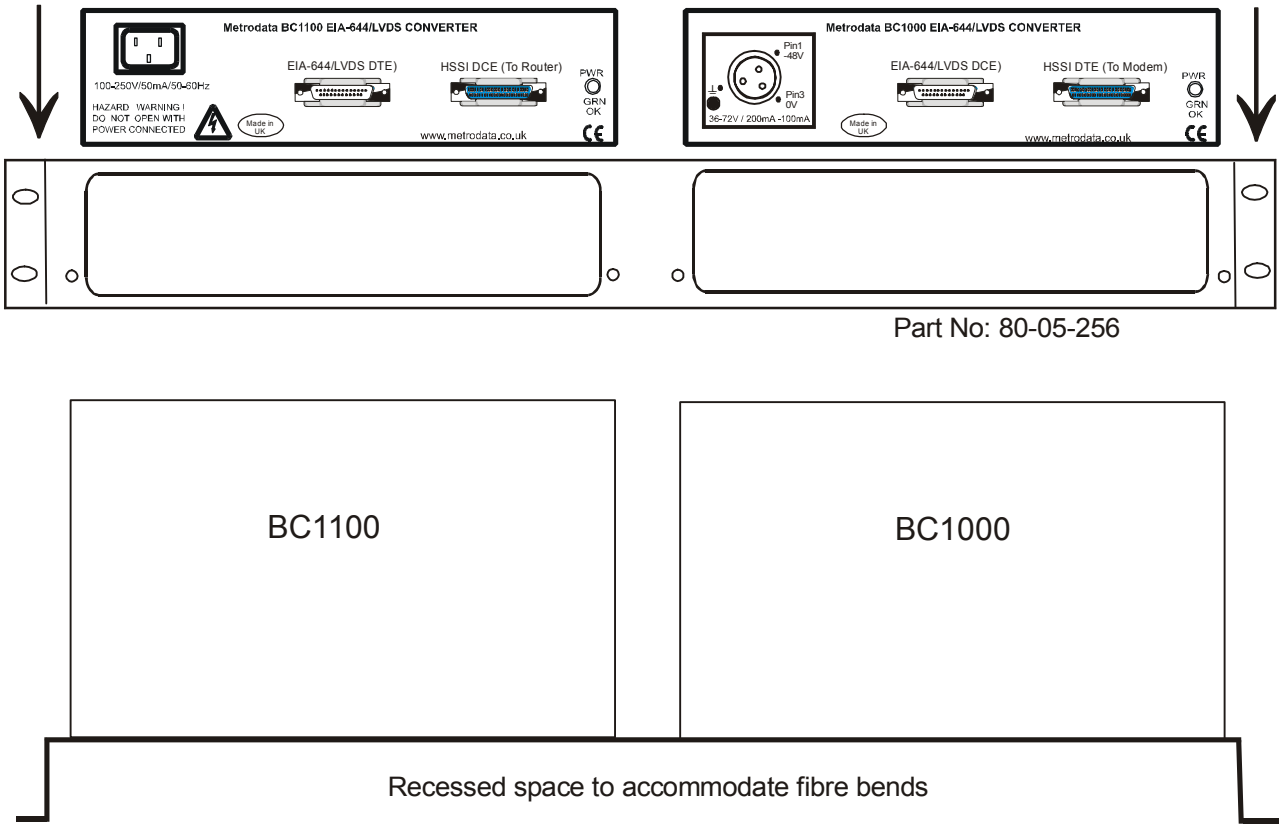

Figure 2. 4 Twin unit rack mounting

To install the BC1X00 first remove the two rear panel screws securing the unit lid. Fasten the BC1X00 into the rack mount adaptor plate using the screws just removed. Then secure the rack mounting plate complete with one or two BC1X00 units into the 19” rack using the locating holes at the ends of the adaptor plate. Ensure that the bit switches are set correctly before installing the rack mount kit.

2. 9 Power up the BC1X00.

The unit requires 100-250 VAC, 50-60 Hz AC supply. An alternative -48VDC power supply is available as a custom order item for all models. See Section 2 for further details of power consumption.

When the power supply is connected, the green PWR LED on the rear panel should be ON to indicate that the unit is operational. If the LED is OFF, mains power is not being supplied to the unit.

3 BC1000 CONFIGURATION & OPERATION

3. 1 BC1000 bit-switch configuration

The base panel bit-switches must be set correctly before making any connections to the unit. There is an explanatory label on the base of the unit defining the bit-switch options. This is shown below:

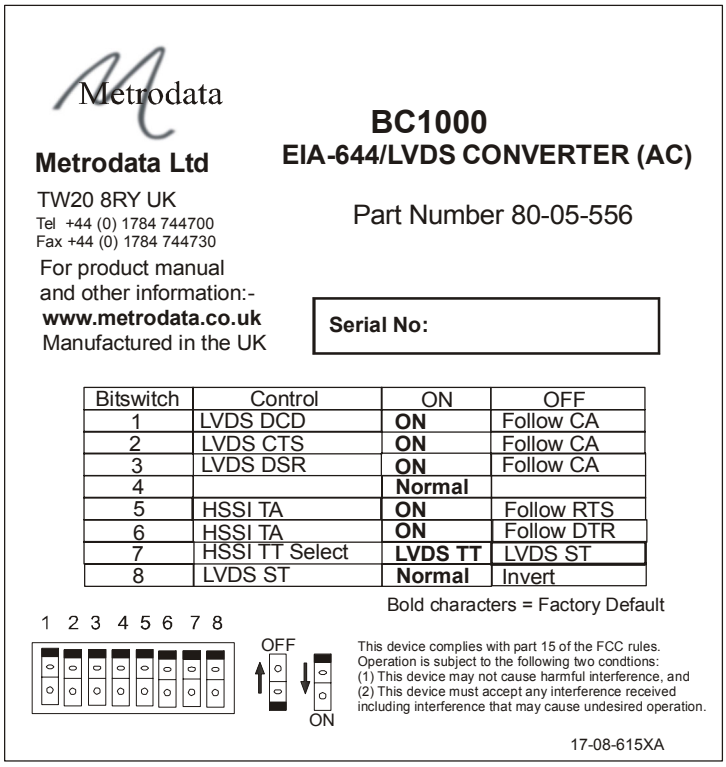

Figure 3.1 BC1000 base label example

3 . 1. 1 LVDS DCD

This selects the operating mode for the LVDs DCD control output. LVDS DCD may be set to the ON state, or alternatively set to follow the state of the DCE supplied HSSI CA control input.

3 . 1. 2 LVDS CTS

This selects the operating mode for the LVDS CTS control output. LVDS CTS may be set to the ON state or alternatively set to follow the state of the DCE supplied HSSI CA control input.

3 . 1. 3 LVDS DSR

This selects the operating mode for the LVDS DSR control output. LVDS DSR may be set to the ON state or alternatively set to follow the state of the DCE supplied HSSI CA control input.

3 . 1. 4 Bit-switch 4

This switch is not used on the BC1000, and should be set to the ON state for normal operation.

3 . 1. 5 HSSI TA

These two switches (5 and 6) select the operating mode for the HSSI TA output. The optional settings are shown in the table below:

Switch 5	Switch 6	HSSI TA Operation
ON	ON	Set TA ON
OFF	ON	Set TA to follow the LVDS RTS input
ON	OFF	Set TA to follow the LVDS DTR input
OFF	OFF	Set TA to follow both RTS and DTR with TA ON when both RTS and DTR are ON

Figure 3.2 HSSI TA operating modes

3 . 1. 6 HSSI TT Select

This selects the source for the HSSI TT output. In the ON position HSSI TT is sourced from the LVDS TT input. In the OFF position the HSSI TT is sourced from the local LVDS ST output.

LVDS ST should only be selected when the LVDS DTE equipment does not provide a source synchronous LVDS TT signal.

3 . 1. 7 LVDS ST

This switch is only used when the HSSI TT select is in the OFF state, selecting LVDS ST as the source for HSSI TT.

At higher speeds the round trip delays introduced by the cable may be such that the data change is coincident with the data sample point. Inverting ST will enable higher speed operation when longer cables are used.

3. 2 BC1000 Operation

The data path through the BC1000 is shown in the figure below:

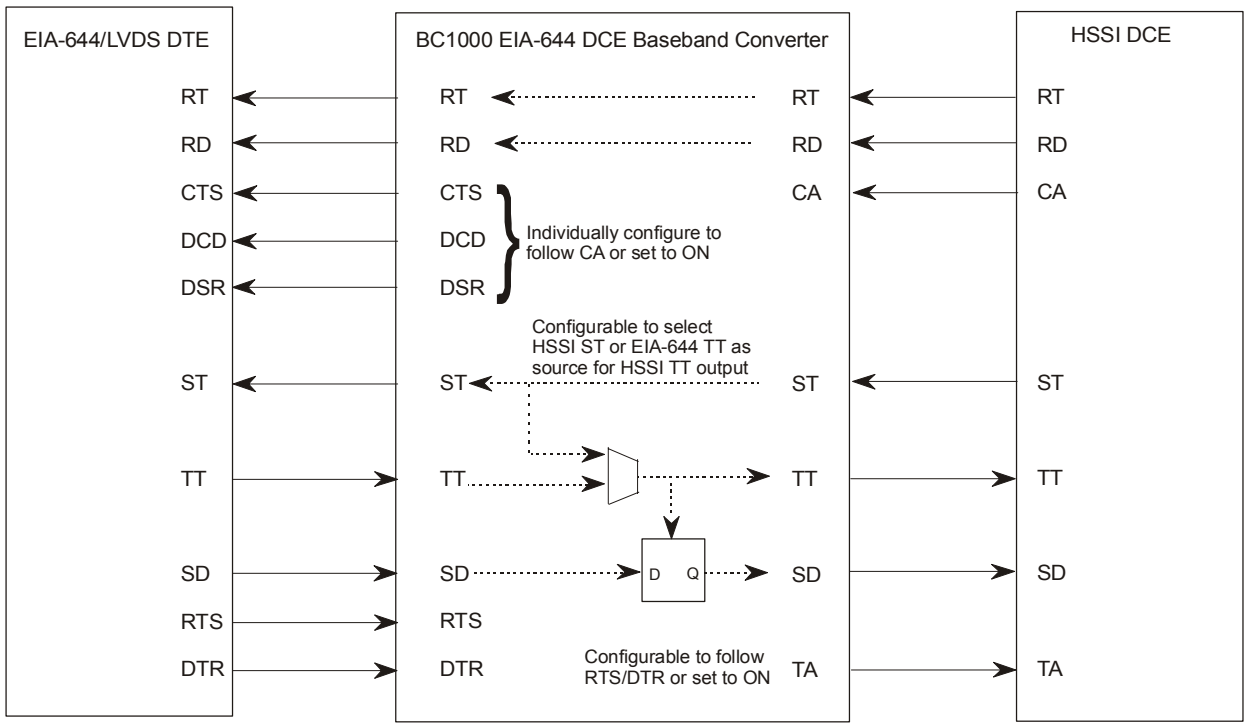

Figure 3.3 BC 1000 Operation diagram

The basic purpose of the BC1000 is to provide a transparent conversion between the HSSI and LVDS interfaces. The BC1000 effectively converts a HSSI DCE into an LVDS DCE. Thus, the BC1000 can effectively provide an LVDS interface for a standard HSSI DCE device such as a satellite modem.

In the receive direction, Receive Data (RD) and Receive Timing (RT) are passed through unchanged. The LVDS control signals CTS/DCD and DSR may either be set to ON, or to enable flow control, to be individually set to follow the state of the HSSI CA state. A common setting will be CTS and DSR set to ON, whilst the DCD is set to follow HSSI CA to indicate to the LVDS device that the Receive Data is valid.

In the transmit direction the BC1000 provides for both Co-Directional and Contra-Directional LVDS operation. For a Co-Directional LVDS interface HSSI ST is passed transparently through the BC1000. The LVDS device will then use this clock to generate the LVDS along with the LVDS SD (Send Data). Data and Clock are then passed through.

Where the LVDS device does not return LVDS TT, the BC1000 uses HSSI ST to sample the data from the LVDS device and to generate the HSSI TT. Contra-Directional interfaces are dependent upon cable lengths and round trip delays, and as such the LVDS ST output may be inverted to overcome cable induced delays.

The HSSI TA control may be set to ON, or to follow RTS or DTR or both signals. A common setting is to follow DTR to indicate that the Terminal is Ready.

4 BC1100 CONFIGURATION & OPERATION

4. 1 BC1100 bit-switch configuration

The base panel bit-switches must be set correctly before making any connections to the unit. There is an explanatory label on the base of the unit defining the bit-switch options.

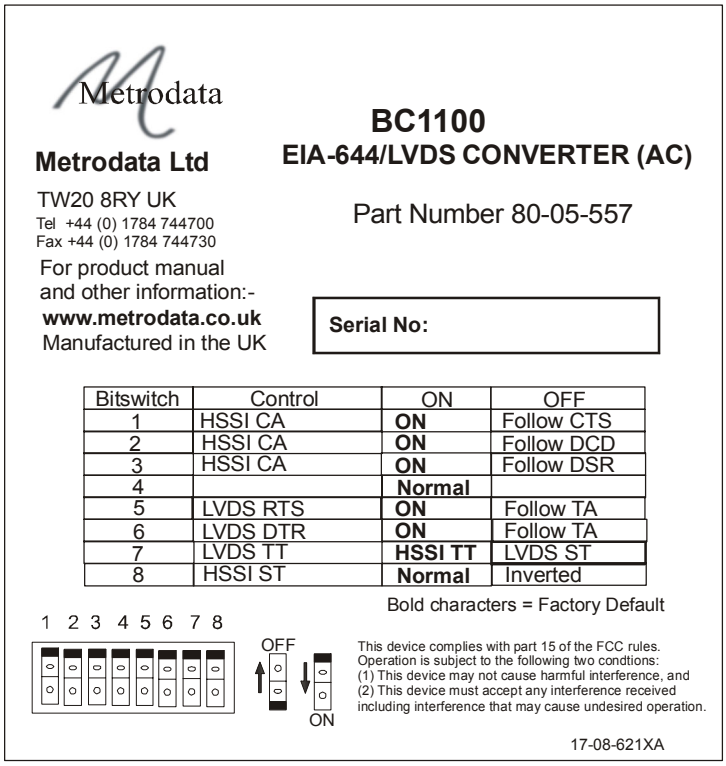

Figure 4.1 BC1100 base label example

4 . 1. 1 HSSI CA

The three bit-switches 1,2 and 3 select the operating mode for the HSSI CA control signal.

Switch 1	Switch 2	Switch 3	HSSI CA State
ON	ON	ON	ON
OFF	ON	ON	Follow the LVDS CTS input
ON	OFF	ON	Follow the LVDS DCD input.
OFF	OFF	ON	Follow CTS and DCD
ON	ON	OFF	Follow LVDS DSR
OFF	ON	OFF	Follow DSR and CTS
ON	OFF	OFF	Follow DSR and DCD
OFF	OFF	OFF	Follow DSR and DCD and CTS

Figure 4.2 HSSI CA states

Note: When multiple controls are selected, HSSI CA will be OFF if any of the inputs are OFF. A common setting is for CA to follow LVDS DCD.

4 . 1. 2 Bit-switch 4

This switch is not used on the BC1100, and should be set to the ON state for normal operation.

4 . 1. 3 LVDS RTS

This switch controls the state of the LVDS RTS output. With the bit-switch set to the ON position, the LVDS RTS is set ON. With the bit-switch in the OFF position, the RTS control is set to follow the HSSI TA input.

4 . 1. 4 LVDS DTR

This switch controls the state of the LVDS DTR output. With the bit-switch set to the ON position, the LVDS DTR is set ON. With the switch in the OFF position, the DTR control is set to follow the HSSI TA input.

4 . 1. 5 LVDS TT

In order to support Contra-Directional LVDS interfaces the source of the LVDS TT output is selectable. With the bit-switch set to the ON position, the LVDS TT is sourced directly from the HSSI TT signal.

With the bit-switch in the OFF position, the incoming HSSI TT is used to latch the data into a buffer, from whence it is clocked out using LVDS ST to provide a Contra-Directional interface.

4 . 1. 6 HSSI ST

In order to support Contra-Directional interface with long cables the HSSI ST output may be inverted.

4. 2 BC1100 Operation

The data path through the BC1000 is shown in the figure below:

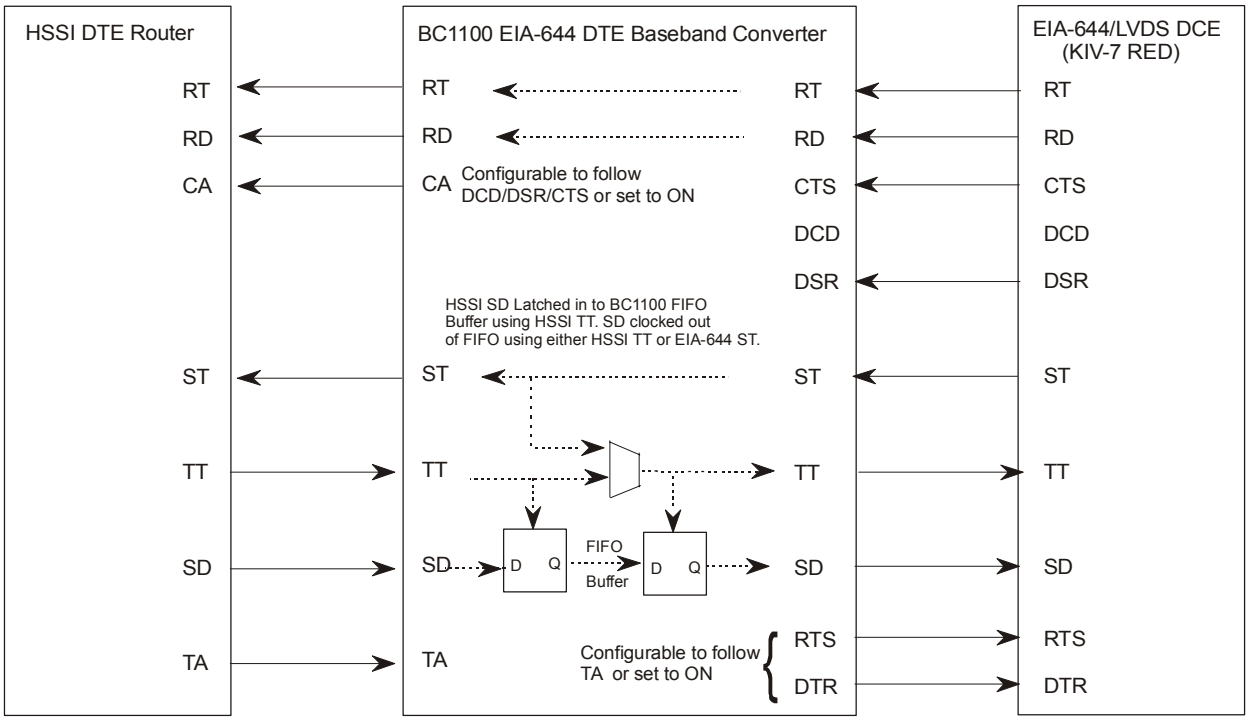

Figure 4.3 BC 1100 Operation diagram

The basic purpose of the BC1100 is to provide a transparent conversion between the HSSI and LVDS interfaces. The BC1100 effectively converts an LVDS DCE into a HSSI DCE which may be connected to a standard HSSI DTE device such as a router.

In the receive direction, Receive Data (RD) and Receive Timing (RT) are passed through unchanged. The HSSI CA control signal may either be set to ON, or to enable flow control, be individually set to follow the state of either LVDS CTS/DCD or DSR. A common setting will be HSSI CA set to follow LVDS DCD to indicate to the LVDS device that the Receive Data is valid.

In the transmit direction the BC1100 provides for both Co-Directional and Contra-Directional LVDS operation. For a Co-Directional LVDS interface LVDS ST is passed transparently through the BC1100. The HSSI device will then use this clock to generate the HSSI TT along with the HSSI SD (Send Data). Data and Clock are then passed through.

Where the LVDS device does not use LVDS TT, the BC1100 uses LVDS ST to re-time the data from the HSSI device and to generate the LVDS TT. Contra-Directional interfaces are dependent upon cable lengths and round trip delays, and as such the HSSI ST output may be inverted to overcome cable induced delays.

The LVDS RTS and DTR controls may be set to ON, or to follow HSSI TA. A common setting is RTS ON and DTR set to follow TA.

5 SPECIFICATIONS

EIA-644 Interface	Definition
Mode	BC1000 DCE
Presentation	25-way Female D-type
Mode	BC1100 DTE
Presentation	25-way Male D-type
HSSI Interface	**Definition**
Mode	BC1000 DTE or BC1100 DCE
Presentation	Miniature 50-way Female connector
General	**Definition**
Power supply	100-250 VAC, 50-60 Hz, 50 mA or minus 36 to minus 72 VDC, 200-100mA
Dimensions	202 x 132 x 44 mm (w x d x h) Enclosure only 202 x 132 x 47 mm (w x d x h) Overall including feet
Environmental	**Range**
Ambient Temperature	0degC to +50degC
Storage Temperature	-20degC to +70degC
Relative Humidity	0% - 95% non condensing
Barometric Pressure	86 KPa - 106 KPa