TECHNICAL & OPERATIONS MANUAL

For

BC720 (SFP)

Dual Channel Data Transceiver Card

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Safety Warning – Important Precautions

To reduce the risk of fire or electric shock, do not expose this equipment to rain, moisture, or wet conditions.

General Safety Guidelines

- Always **disconnect the entire system from the AC mains** before cleaning or servicing.
- The following product frames – **BC100, BC100i, BC101, BC102, BC120, BC160i** – must be connected using a **three-conductor AC mains power cord with an earth ground**. All three conductors must be used at all times to prevent electric shock.
- Do **not** bypass or disable any fuse.
- Only replace fuses with those of the **specified type and rating**.
- Do **not** use flammable or combustible chemicals for cleaning.
- Do **not** pour or spill liquids directly onto the unit.
- Do **not** allow any liquid to enter the unit or wet the internal components.
- Do **not** operate the unit with any cover or panel removed.
- Do **not** obstruct the ventilation slots—**adequate airflow must be maintained**.
- Do **not** operate the unit in environments with **extreme temperatures**.
- Do **not** use or store the unit in **explosive atmospheres**.
- Do **not** attempt to repair the unit yourself. If servicing is required, please contact your local **Bluebell Opticom** distributor.
- **Product Warranty**
- **Bluebell Opticom Ltd** provides warranty coverage as detailed in our general terms and conditions.
  Please note that warranty support is only valid **if product serial numbers remain intact and legible**. Tampering with or removing serial numbers may void your warranty

CE	EN60950	Safety
	EN55103-1: 1996	Emission
	EN55103-2: 1996	Immunity

Bluebell Opticom Ltd FC Tested To Comply With FCC Standards FOR HOME OR OFFICE USE	This device complies with part 15 of the FCC Rules Operation is subject to the following two condition: (1) This device may cause harmful interference, and (2) This device must accept any interference received, including, Interference that may cause undesired operation

Contents

Description

The BC720 is a dual channel copper to fibre data transceiver that provides bi-directional data transmission over fibre.

Data level conversion is provided for each input and output to provide two RS422/ RS485 or four RS232 digital data channels plus four independent GPI digital data channels on each card.

Conversion between 485 duplex, 485 half duplex and RS232 modes is possible.

Incorporates on-board half duplex control circuitry.

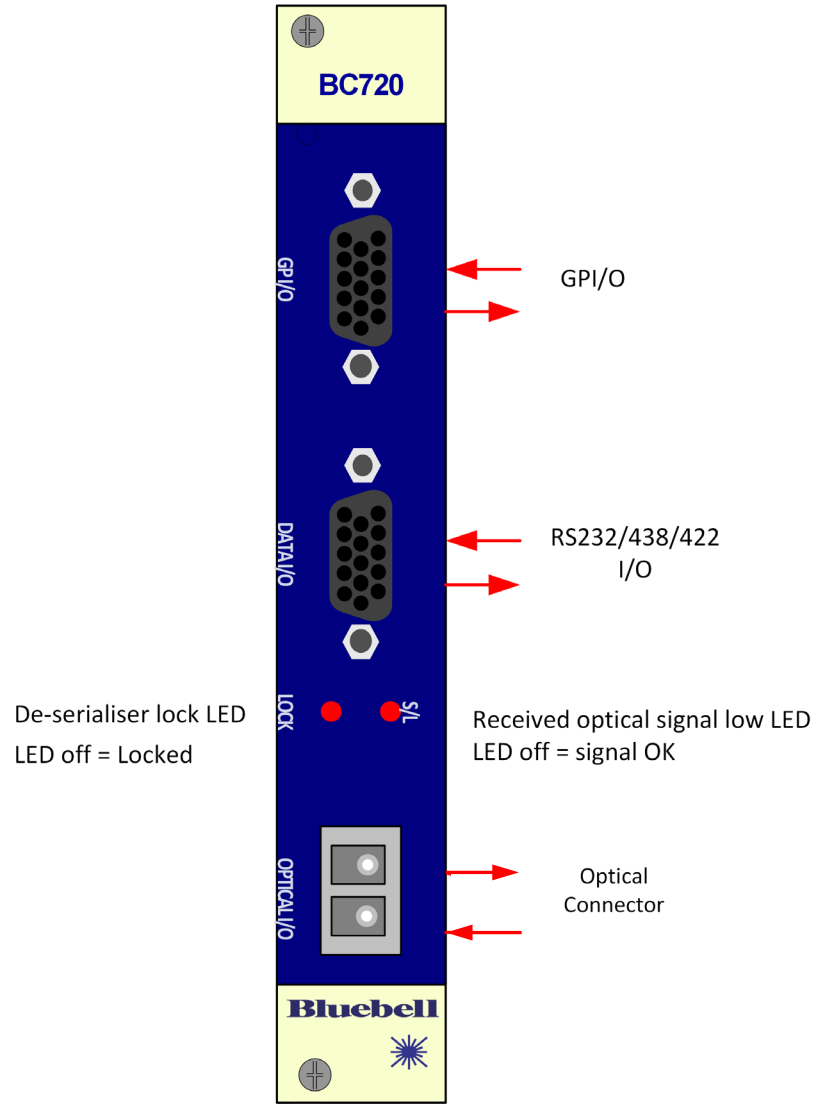
Electrical inputs and outputs are via two 15 Pin D type connectors.

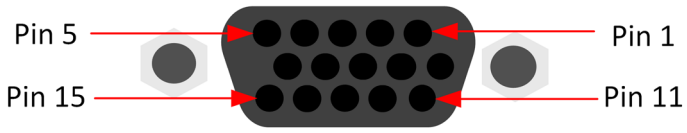
The four GPIO inputs are fed to comparators with link selectable polarity.

The four GPIO outputs are relays with normally open isolated contacts. Optional factory fitted open collector outputs are available.

Fibre optic connectors are made with pluggable SFP modules.

Panel layout





Specifications

General

Depth	74mm incl. connectors
Width	20mm (4HP)
Height	129mm (3RU)
Weight	150g
Operating Temp	-30°C - 70°C
MTTF	69x10E5 hours
Power Supply	5.8v @ 160mA
Signal Detect	LED on for loss of signal
Optical Signal lock	LED on for optical signal not locked

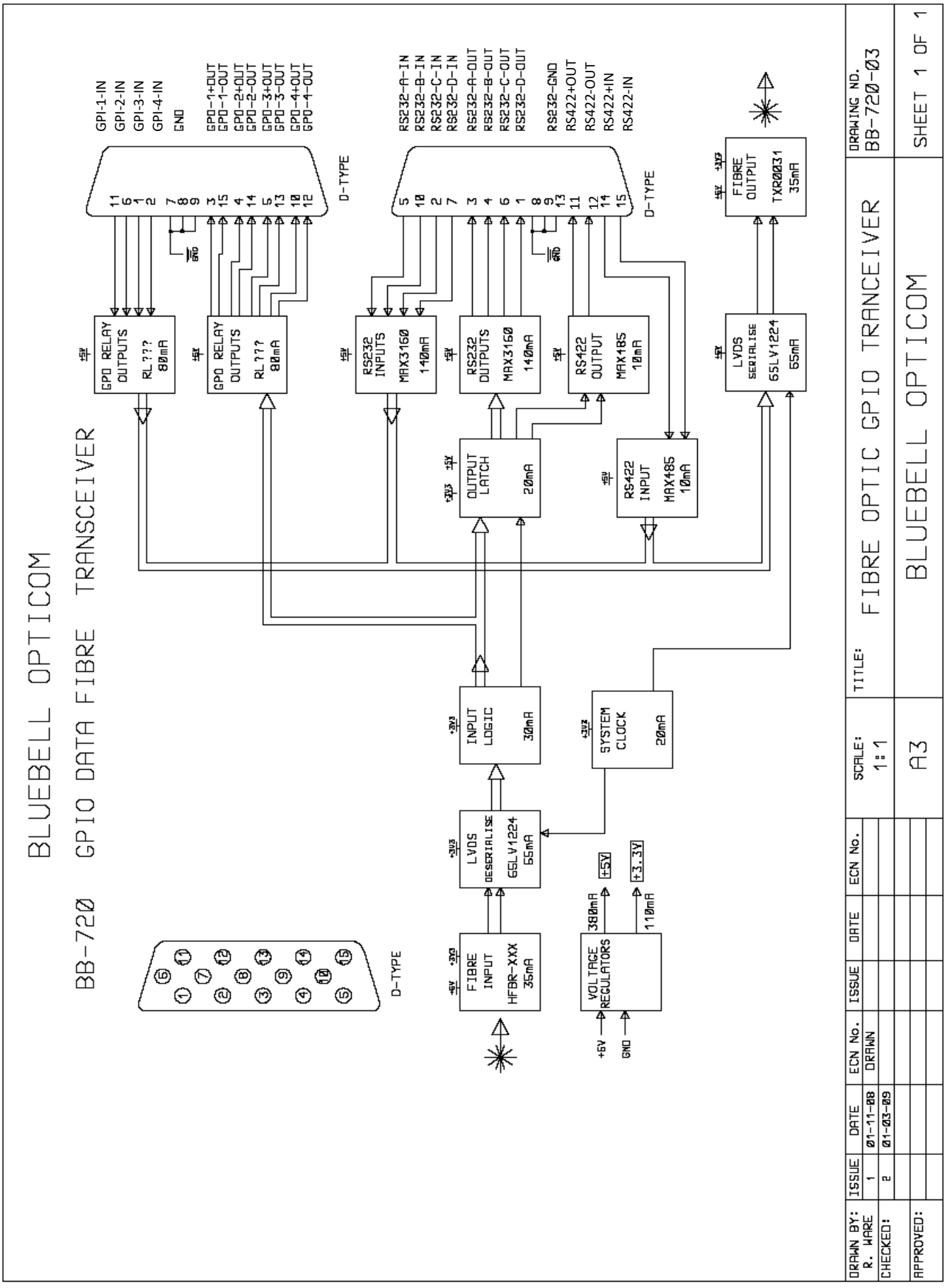
Optical

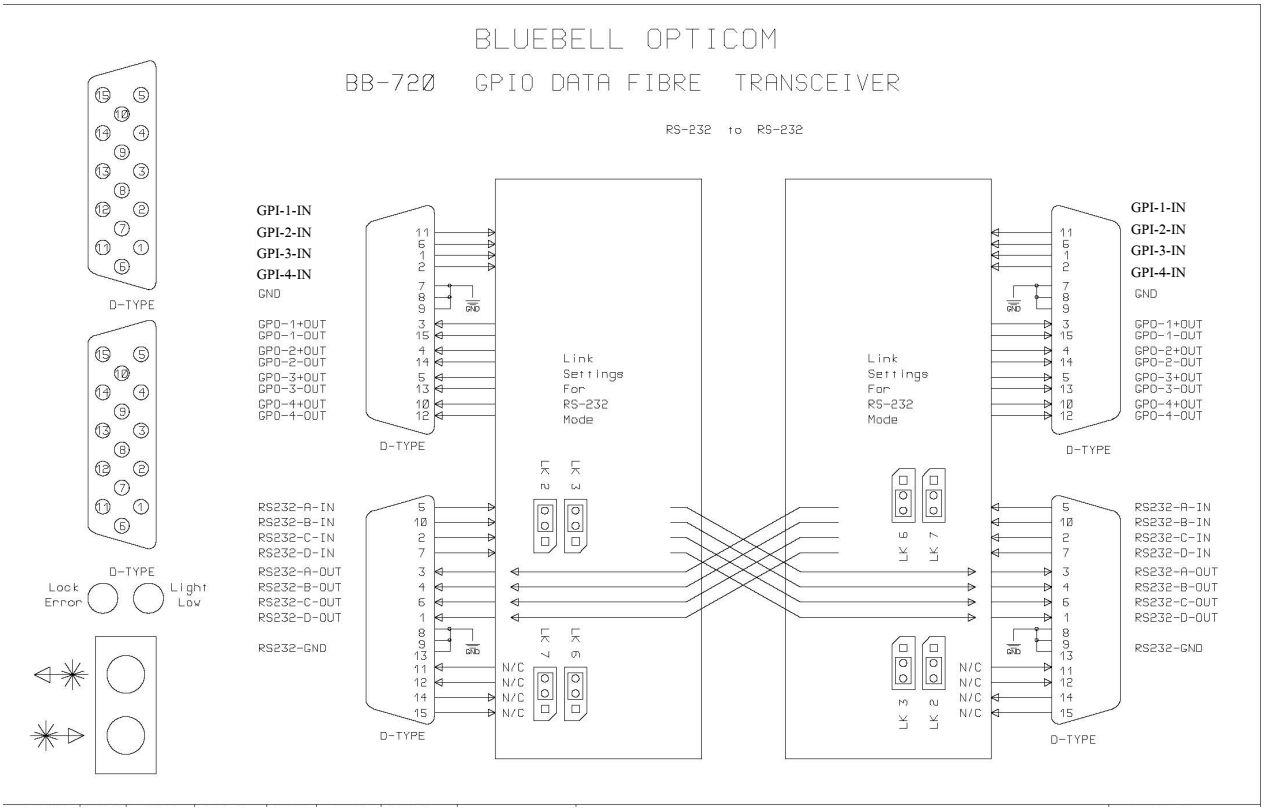
Optical Connectors	SFP pluggable modules

Data

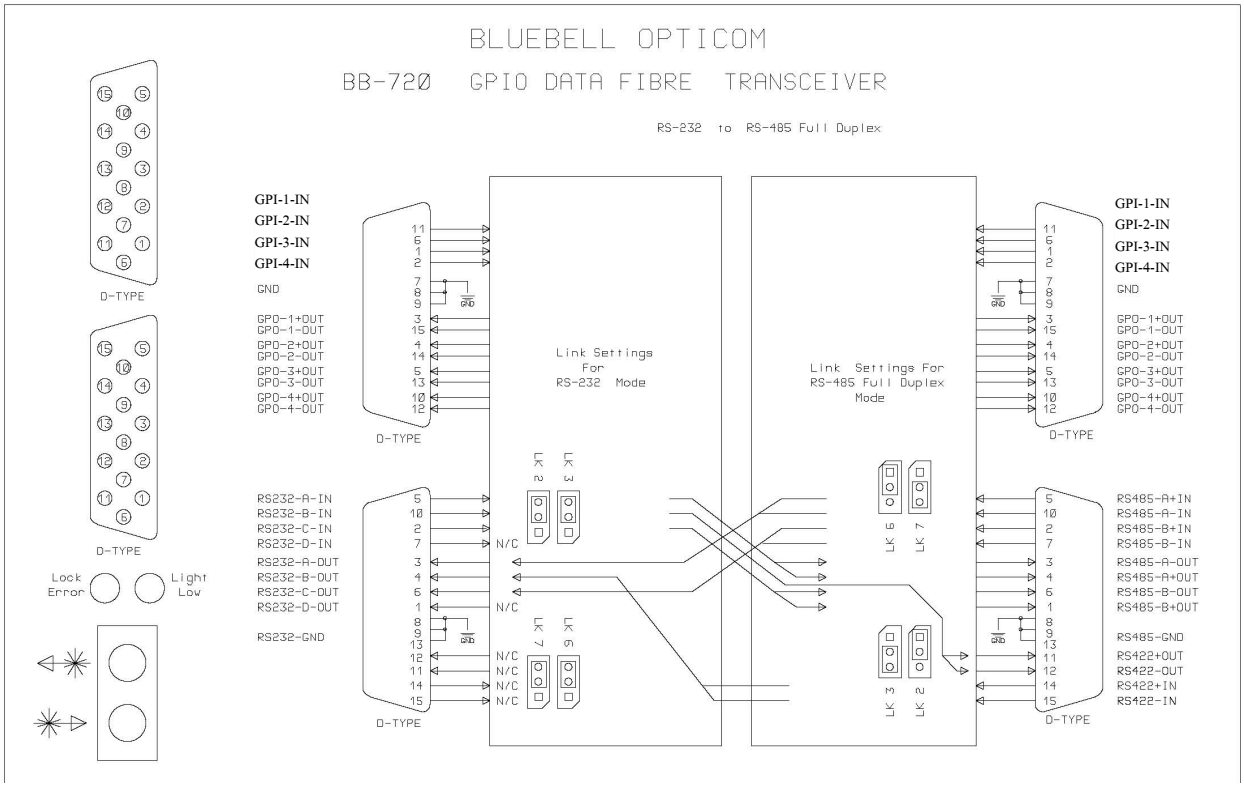
Configurable formats	RS232 Rx Tx - Full duplex (up to 1Mbps) RS485 Full or half duplex (up to 5Mbps) RS422 Full duplex (up to 5Mbps)
GPI	Input trigger polarity selectable high or low (high = 3.3V)
GPO	Relay – normally open.

Block diagram

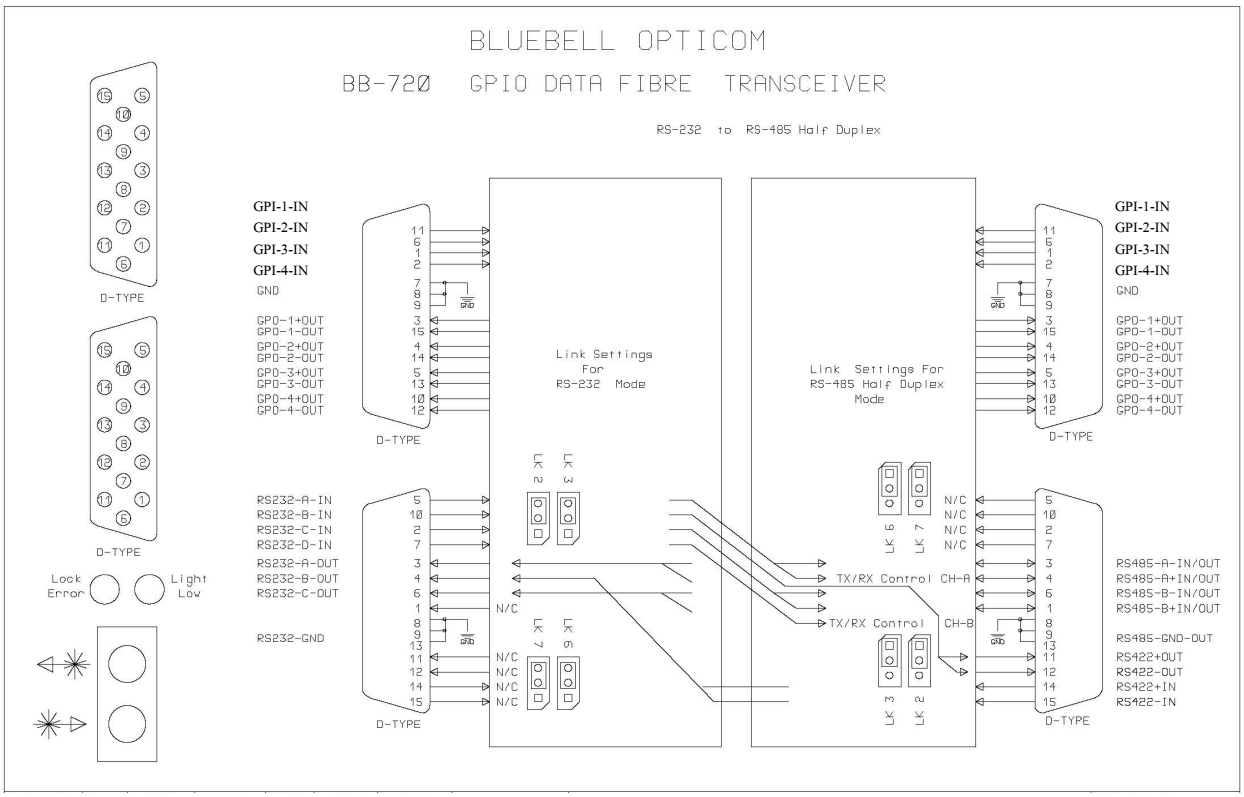




Configuration 1 **RS232 to RS232**

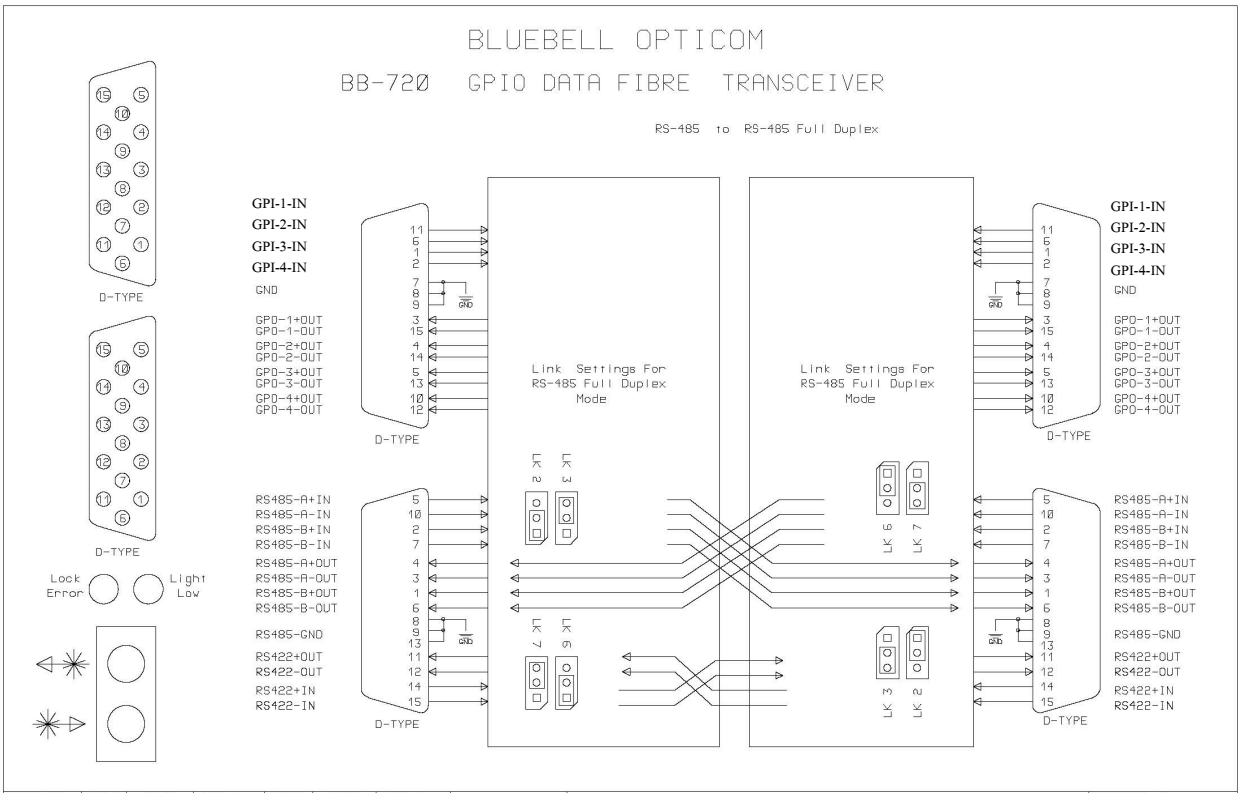


Configuration 2 **RS232 to R485 Full Duplex**



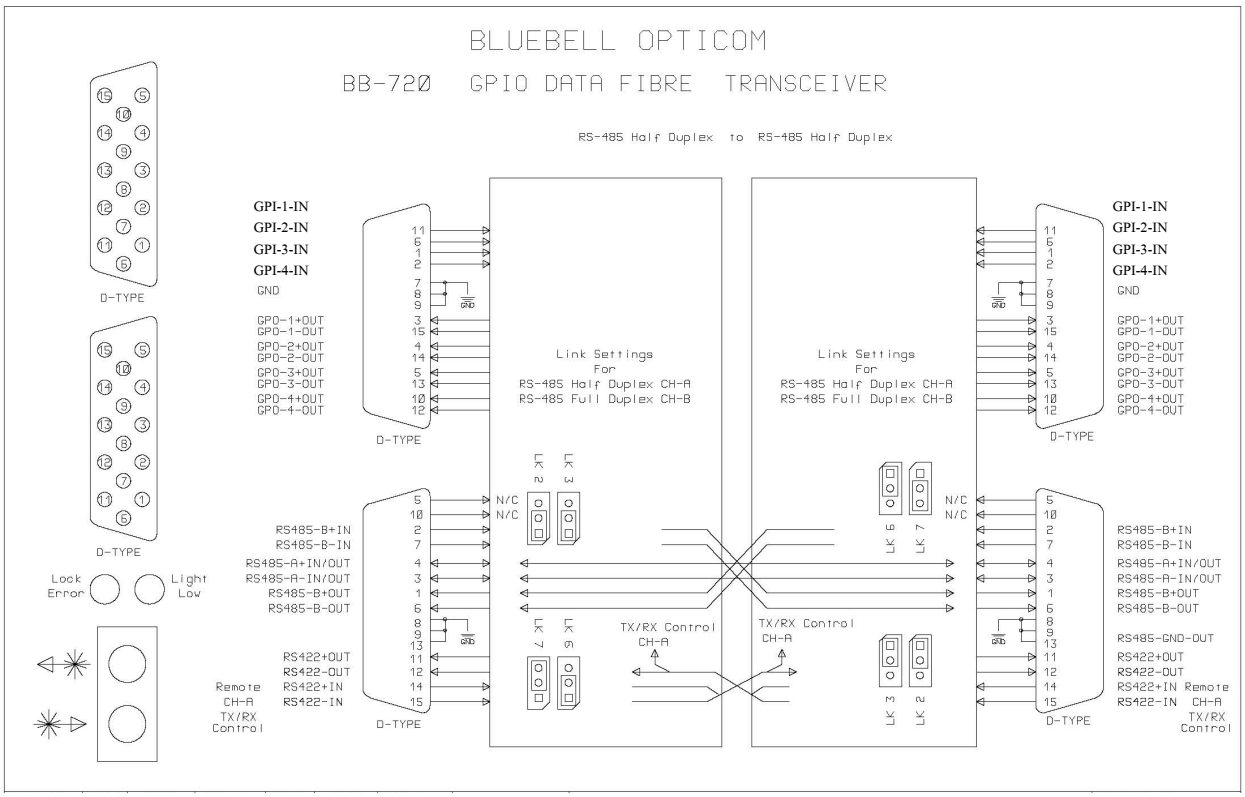
Configuration 3 **RS232 to R485 Half Duplex**

(Control chA can also act as a single channel of Full Duplex RS232 (chB) to RS422)



Configuration 4 **RS485 Full Duplex to R485 Full Duplex**

(Including full duplex RS422)



Configuration 5 RS485 Half & Full Duplex to R485 Half & Full Duplex

Mode	RS232 board channel	becomes	RS485 board channel
RS232 to RS485 Full Duplex (Configuration diagram 2)	RS232 - A	=	RS485 - A
	RS232 - B	=	RS422
	RS232 - C	=	RS485 - B
RS232 to RS485 Half Duplex (Configuration diagram 3)	RS232 - A	=	RS485 - A
	RS232 - B	=	Control for A &/or RS422 Full Duplex
	RS232 - C	=	RS485 - B
	RS232 - D	=	Control B

Half duplex channel notes;
Half duplex control is a differential signal on pins 14 (-), 15 (+)

The + 6 Volts input is filtered by C1 and L5 then fed to regulator IC1. The regulated +3.3V output is on IC1 pins 14/15. Test points are, TP3 (+3.3V) and TP2 (Ground).

The electrical data inputs from the lower D type connector J1 are converted by IC3 and IC4 and can be terminated by SOT resistors R2, R5 and R69.
IC3, IC4, IC17 and IC18 convert the RS-232 or RS-422 level inputs to TTL data levels

LK2 and LK6 allow for selection of RS232 or RS485 input and output format. For RS232 mode, link pins 2 to 3. For RS485 mode, link pins 1 to 2.

LK3 and LK7 allow for selection of half duplex or full duplex mode. For full duplex mode, link pins 2 to 3. For half duplex mode, link pins 1 to 2.

The signals from IC3, IC4, IC17 and IC18 are fed to IC9, IC10 and IC13, and serialised for transmission by IC15 the LED/Laser driver modular fibre transceiver.

OSC1 and IC11 provide the sample rate clock for the serialised data

The received serial signal from IC15 is deserialised by IC5, IC6, IC7 and IC8.

Low light level indication is provided via red LED LD1 and the system status output IP_A_OK.

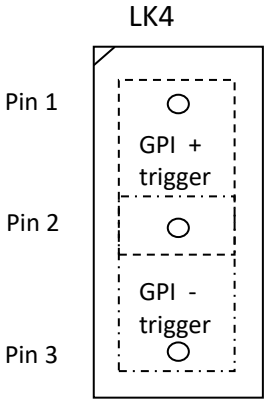
Serial signal lock is indicated by red LED LD2 and the system status output IP_B_OK.

Additional circuitry on PCB iss 4

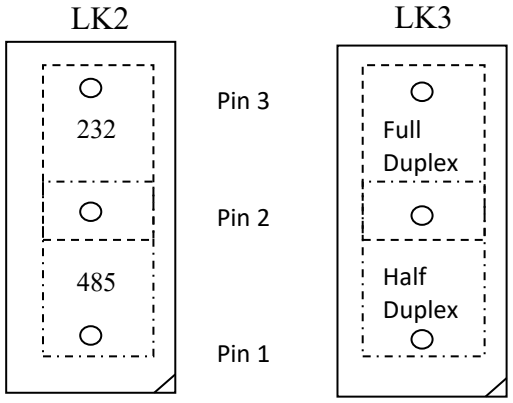
Serial data circuit IC2, IC23, and IC24 converts the motherboard serial data to I2C for the serial number EEPROM, IC22. LK1 is for factory use only, and should be left in its default state (write protected) with pins 1 and 2 linked, or no link at all.

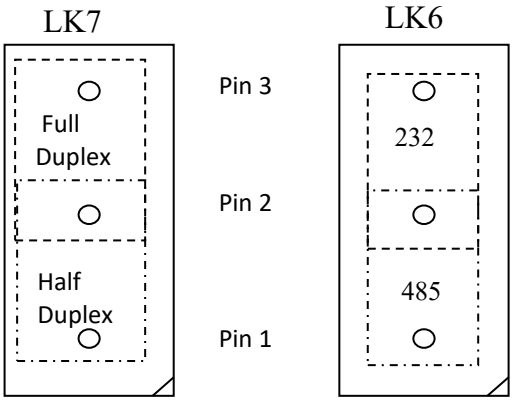
This serial data circuit also allows access to the SFP I2C port for diagnostic data remote monitoring via a BM102 card. Link LK5 should be set for the type of SFP fitted:
The default is to link pins 1 and 2 for MSA, data type SFPs (SDA on SFP pin 4).
Alternatively, link pins 2 to 3 for non-MSA, video type SFPs (SDA on SFP pin 6).

The RS232, RS422/485, and GPI link options are shown here, in very approximate geographical layout.



Default for LK4 is pins 2-3 linked (-ive trigger)





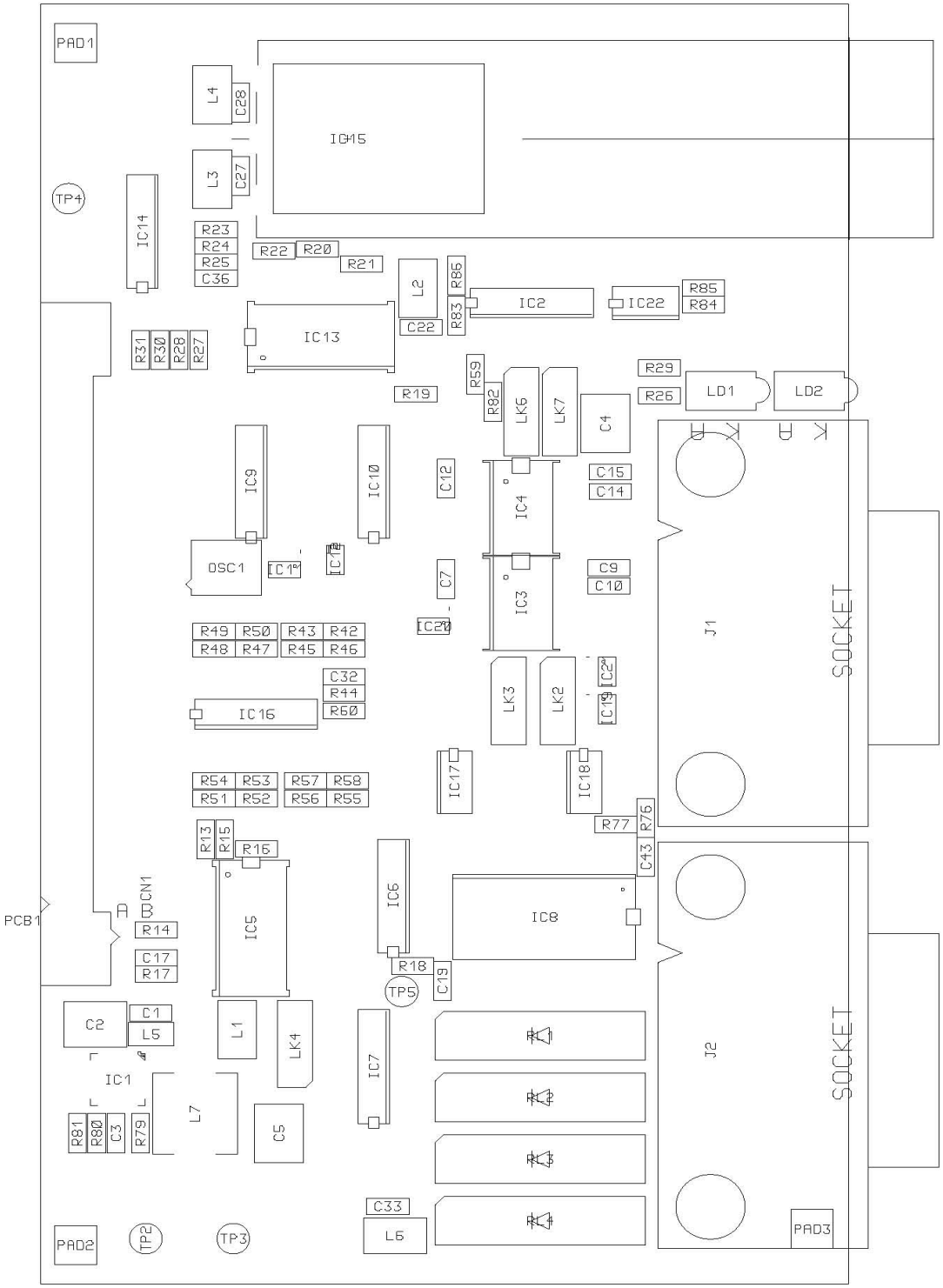
Note: unless specified at the time of order, cards are set by default to RS232 mode.
Note also that in RS232 mode, LK3 and LK7 have no effect.

Other links (added on iss 4 PCBs)

LK1 The I2C EEPROM write enable (Factory use only)
Link pins 1 to 2 (or no link fitted) to disable writes to eeprom (Default).
Link pins 2 to 3 to enable writes to eeprom.

LK5 Selection of SFP type:
link pins 1 to 2 for MSA, data type SFPs (SDA on SFP pin 4) (Default)
link pins 2 to 3 for non-MSA, video type SFPs (SDA on SFP pin 6)

Component Layout



BB720T ISS 3 ASSEMBLY

Link functions (iss 3 and iss 4 PCBs)

LK2	Input RS232 / 485 selection
LK3	Input full / half duplex selection
LK7	Output full / half duplex selection
LK6	Output RS232 / 485 selection
LK4	GPI input polarity select

24C02J		CAT24C02WI-GT3	1	IC22
74HC04		SN74HC04D	1	IC14
74HC125			1	IC2
74HC1G04		74HC1G04GW	1	IC11
74HC273		SN74HC273DW	1	IC8
74HC86		SN74HC86D	4	IC6 IC7 IC9 IC10
74LVC1G97		SN74LVC1G97DCK	4	IC19 IC20 IC21 IC23
74LVC2G07		SN74LVC2G07DCK	1	IC24
74LVC2G74		74LVC2G74	1	IC12
BAR43S		BAR43S	4	D1 D2 D3 D4
BAS216		BAS216	4	D5 D6 D7 D8
BC849C		BC849C	4	TR1 TR2 TR3 TR4
CAGE-SFP		20PIN-CAGE-SFP-	1	SK2
CAP-0603-COG-10%		10pF	3	C1 C3 C47
CAP-0603-X7R-10%		100nF	42	C6 C7 C8 C9 C10 C11 C12 C13 C14 C15 C16 C17 C18 C20 C21 C22 C23 C24 C25 C26 C27 C28 C29 C30 C31 C32 C33 C34 C35 C36 C37 C38 C39 C40 C41 C42 C43 C44 C45 C46 C48 C49
CAP-0603-X7R-10%		SOT	1	C19
CAP-1210-X7R-20%		10uF	3	C2 C4 C5
CHOKE-1210-10uH		10uH	5	L1 L2 L3 L4 L6
CHOKE-2525-10uH		10uH	1	L7
CHOKE-BLM21		BLM21PG331SN1D	1	L5
CONN-DIN41612-32		Total 1	1	CN1
DTYPE-15WAY-HD-S		Total 2	2	J1 J2
HEADER-3x1-2mm		TSM-103-01-S-SV	7	LK1 LK2 LK3 LK4 LK5 LK6 LK7
LED-T1-RED		RED	2	LD1 LD2
LMC339M		LM339M	1	IC16
MAX3160ECAP		MAX3160ECAP	2	IC3 IC4
OCS-12.288MHz-ACT9325		12.288 MHz	1	OSC1
PCB		ISSUE-3	1	PCB1
RELAY-SIL-A		RELAY-SIL-A	4	RL1 RL2 RL3 RL4
RES-0603-1%-0.1W		10K	25	R14 R15 R20 R21 R43 R46 R48 R50 R52 R54 R56 R58 R59 R63 R64 R65 R66 R72 R75 R77 R78 R82 R83 R84 R87
RES-0603-1%-0.1W		10R	11	R1 R3 R4 R6 R13 R17 R22 R32 R33 R76 R80
RES-0603-1%-0.1W		120R	2	R69 R70
RES-0603-1%-0.1W		130R	4	R35 R37 R40 R41
RES-0603-1%-0.1W		1K	2	R23 R71
RES-0603-1%-0.1W		1M	5	R45 R47 R53 R57 R79
RES-0603-1%-0.1W		2K2	1	R86

RES-0603-1%-0.1W		390R	6	R26 R27 R28 R29 R30 R31
RES-0603-1%-0.1W		3K3	6	R42 R44 R49 R51 R55 R60
RES-0603-1%-0.1W		47R	5	R11 R12 R16 R18 R19
RES-0603-1%-0.1W		4K7	1	R85
RES-0603-1%-0.1W		56R	2	R73 R74
RES-0603-1%-0.1W		82R	8	R7 R8 R9 R10 R34 R36 R38 R39
RES-0603-1%-0.1W		SOT	9	R2 R5 R24 R25 R61 R62 R67 R68 R81
SFP-TX-RX		AFCT-5715PZ	1	IC15
SN65LV1023A		SN65LV1023ADB	1	IC13
SN65LV1224B		SN65LV1224BDB	1	IC5
SOCKET-SFP20		20PIN-SFP-AKX-20L	1	SK1
ST3485		ST3485	2	IC17 IC18
TPS62111		TPS62111RSA	1	IC1