

DC3445

User
Manual

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Metrodata DC3445 User Manual

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1 INTRODUCTION

1. 1 About the DC3445

The DC3445 is used to connect high performance bridges and routers to high speed E3 or DS3 services. The DC3445 interfaces an E3 service (34.368 Mbps) or a DS3 service (44.736 Mbps) and Data Terminal equipment presenting a High Speed Serial Interface (HSSI). The E3/DS3 selection is made by setting a bit-switch mounted on the base of the unit. DC3445's are used in pairs, one on either side of a WAN (Wide Area Network) link.

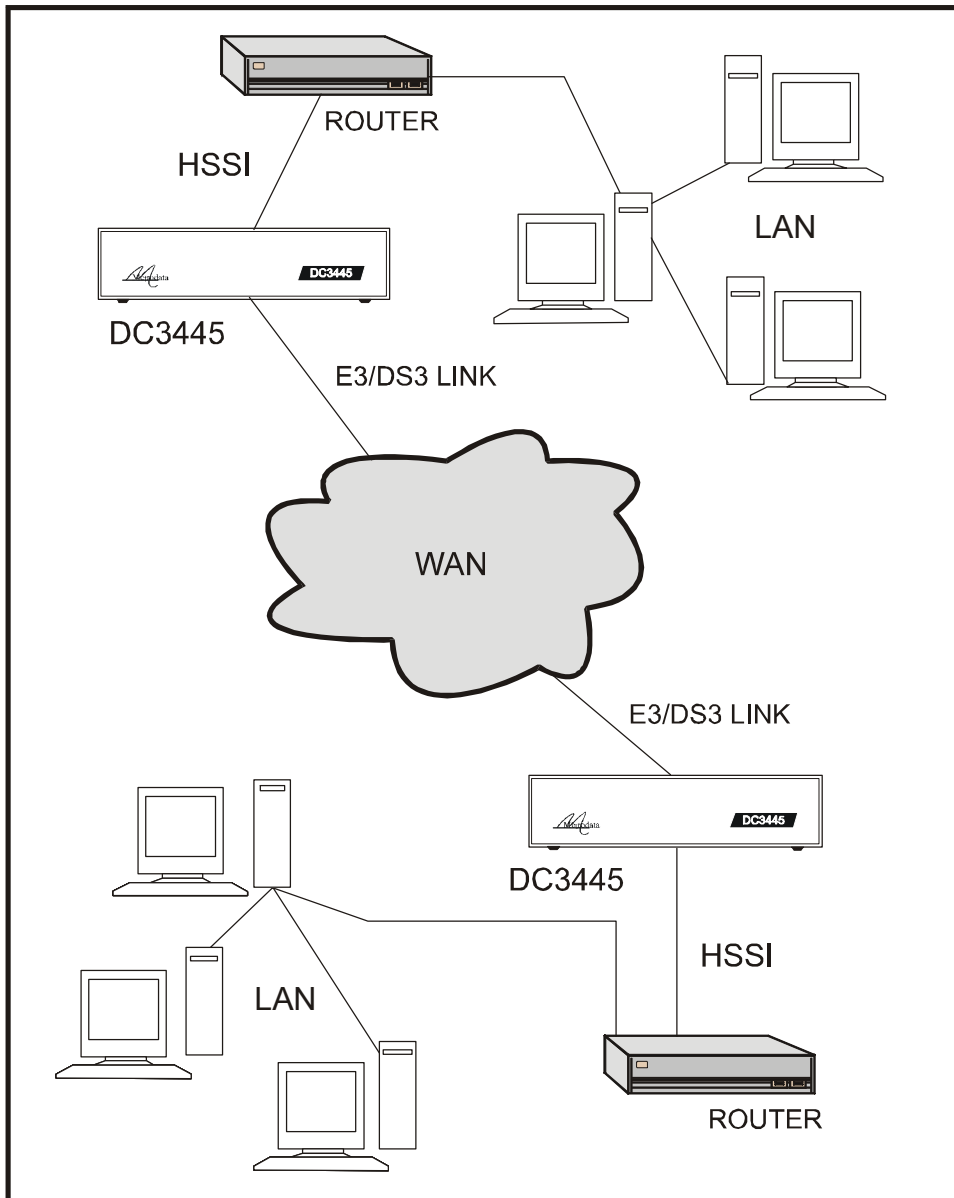


Figure 1. 1 DC3445 installation

1. 2 Safety

The DC3445 should not be connected 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 EN41003:

HSSI port (DTE)
E3 or DS3 port (LINE or WAN)
Alarm extension RJ45 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 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 EN50022 Declaration

The DC3445 is 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 radiocommunications. 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 Power supply

The DC3445 is powered by a mains power supply with an input voltage range 100-250 VAC/ 50-60 Hz.

An alternative -48V DC power supply unit is available.

Further details are given in Section3.

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. The DC3445 must be connected to safety earth for correct operation.

1. 7 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 radiocommunications. 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. 8 Technical Overview

The DC3445 is used on unframed E3/G.703, or unframed DS3/G.703 digital services.

The product conforms with Directive 1999/5/EC (RE & TTE Directive). It also conforms with the following Common Technical Regulations: 72/23/EEC (Low Voltage Directive), 89/336/EEC (EMC Directive) and EN 60950 (Safety).

1 . 8. 1 Signal Transmission

The signal is transmitted on 75 Ohm unbalanced coax. The signal has alternate mark inversion (AMI) characteristics in accordance with G.703. A mark is transmitted as a 0.5 unit interval (UI) wide pulse of amplitude 2.37V (75 ohm). Alternate marks have opposing polarity so that '111' is transmitted as a positive pulse, a negative one and then another positive one. The pulses have a duration of 50% so that strings of '1s' can be identified as a series of pulses. This is because clocking information is derived from the transmitted signal. In addition, strings of zeros are replaced with high-density binary 3 (HDB3) code words to ensure pulse density (and therefore clocking information) and an average DC potential of 0V.

The transmission rate is 34.368 Mbps for E3, and 44.736 Mbps for DS3 connections.

The worst case delay through the DC3445 is 2 milliseconds, and the worst case round trip delay is 8 milliseconds.

2 DESCRIPTION OF PARTS

2.1 Rear panel

All connections into and out of the DC3445 are made through the rear panel. The rear panel is shown in schematic form below.

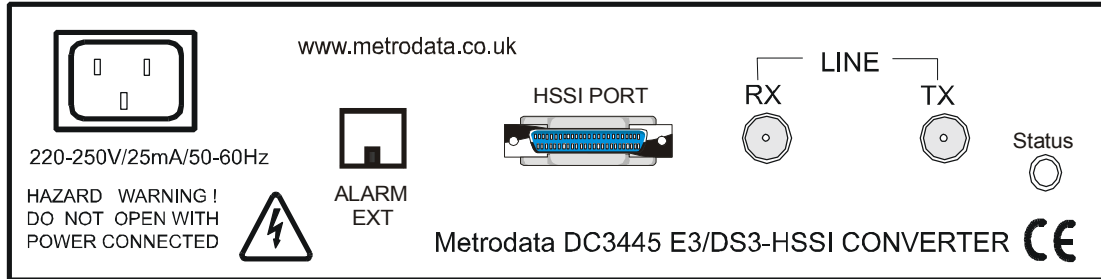


Figure 2. 1 DC 3445 rear panel

2.2 Status display - rear panel

There is a status LED on the right hand side of the rear panel which indicates the status of the unit as shown in the figure below.

Status LED	Meaning
Off	No mains power present
Red steady	LOS
Red/Off flashing	LOS and DTE Alarm
Green/Off flashing	DTE Alarm
Green steady	DC3445 is operating normally

Figure 2. 2 Rear panel status LED

2.3 Power Supply

The DSU is powered by a mains supply with an input voltage of 100-250VAC 50-60Hz and with an input current of 115-45 mA. Input power consumption is approximately 4.5 watts. The DC3445 is provided ex-factory with a 250mA internal fuse. AC Mains power is connected via the IEC inlet on the rear of the unit.

An alternative -48VDC powered unit is available. The input voltage and current ranges are minus 36 to minus 72 volts DC, 150-70 mA. A Buccaneer type socket is fitted to the rear panel, and a plug is provided with the unit for the customer's own wiring. The connections are labelled on the rear panel of the DC3445. On some units, an additional Ground stud may be located on the rear panel to permit a separate Ground connection to be made. The DSU must be connected to mains safety earth for correct operation.

Pin no	Connection
1	-48VDC
2	Ground
3	0VDC

Figure 2. 3 -48VDC connections

2. 4 Unbalanced E3/DS3 Line port (BNC)

The network is connected to the BNC connectors at the rear of the unit as shown below :

Pin	Function
Tip	Signal
Ring	Shield

Figure 2. 4 BNC connection

Cable lengths should be restricted to those defined below:

Cable	E3 Max Length (metres)	DS3 Max Length (metres)
UR202	180	155
RG59U	150	130
BT2002	160	140
BT2003	165	145

Figure 2. 5 Cable lengths

Note: The total maximum attenuation of each of the cables attached to the network port must not exceed 6dB when measured at 17.184 MHz (E3) or 22.368 MHz (DS3). The frequency/attenuation characteristic of the cables attached to the network port shall follow a root frequency law.

2. 5 Alarm Extension (RJ45)

The alarm extension is an RJ45 female socket mounted on the rear panel of the unit. It allows the connection of major and minor alarm relay contacts to a remote indicator such as a bell or a lamp. The alarm relay port is regarded as a SELV port within the scope of EN41003. Mains power failure is registered via Normally Closed contacts as a major alarm.

Pin	Function
1	Major Normally Closed
2	Major Normally Open
3	Major common
4	Not connected
5	Minor Normally Open
6	Minor Normally Closed
7	Minor common
8	Ground

Figure 2. 6 RJ45 alarm extension layout

2. 6 HSSI DTE Port

The HSSI EIA613 DTE port is used to connect to the router. It consists of a female miniature 50-pin AMP connector, whose pins are described below.

AMP connector, part number 749111-4 or should be used for connections to this port.

Note: The HSSI port is regarded as a SELV port within the scope of EN 41003.

+VE Pin No	-VE Pin No	Function	CCT No.
1	26	SG	102
2	27	RT	115
3	28	CA	107
4	29	RD	104
5	30	LC	
6	31	ST	114
7	32	SG	102
8	33	TA	108.2
9	34	TT	113
10	35	LA	141
11	36	SD	103
12	37	LB	140
13	38	SG	102
14-18	39-43	Reserved	
19	44	SG	102
20-23	45-48	Reserved	
24	49	TM	
25	50	SG	102

Figure 2. 7 HSSI port connector layout

3 INSTALLATION & SET-UP

3.1 Setting-up the Bit-switches

It is recommended that the bit-switches on the base of the unit are set-up before making any connections to the unit. There is an explanatory label on the unit's base which defines the bit-switch set-up options and alarms.

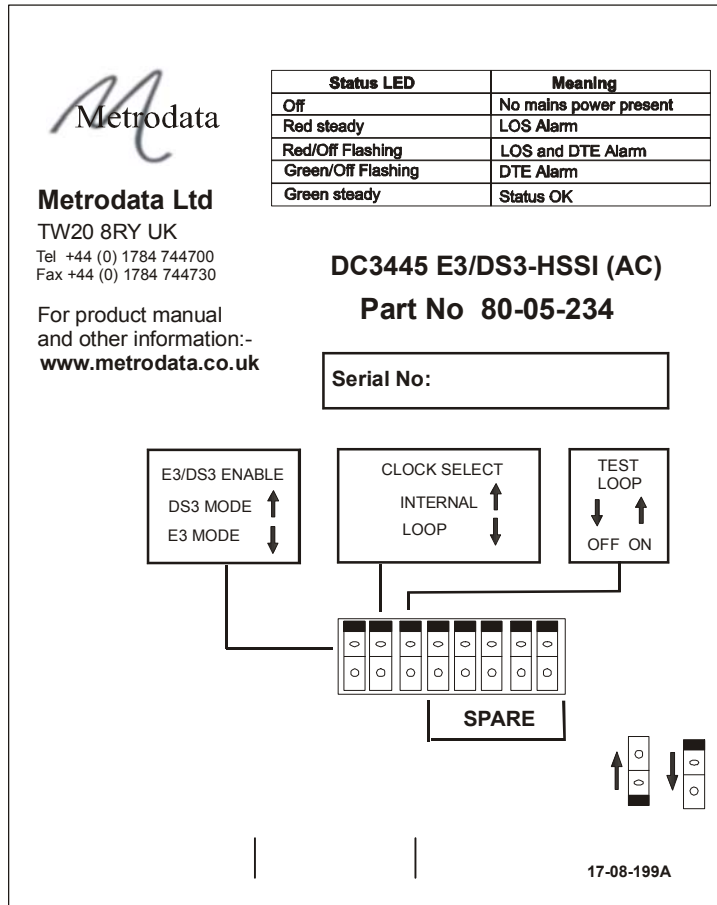


Figure 3.1 DC3445 Base Panel label

Parameter	Label	Unit	Options
E3/DS3	E3/DS3 Enable	Up Down	DS3 or E3
Timing	Clock select	Position	Internal or Loop
Test	Test Loop	On Off	Run Test Loop or No Test

Figure 3.2 Bit-switch definitions

3 . 1. 1 E3/DS3 Enable

This switch is used to select the line (WAN) to be connected to the DC3445. Options are E3 or DS3.

3 . 1. 2 Timing

The E3/DS3 Line TX clock is derived from the DTE using CCT 113 (TT: terminal timing). The HSSI specification requires this signal to be a non-gated version of CCT 114 (ST: send timing).

The E3/DS3 Line Rx clock is always used to generate the CCT 115 timing (RT: receive timing).

With *INTERNAL* timing selected, Send Timing (ST) is derived from the DC3445's own internal oscillator. With *LOOP* timing selected, ST is derived from the E3/DS3 LINE Receive clock.

The recommended timing mode for the DC3445 pair at either side of the WAN is **Internal** at one end of the link and **Loop** at the other end.

3 . 1. 3 Line coding

This setting is automatically selected when the Line is selected (no bit-switch) and cannot be altered. It is *HDB3* (High-Density Binary 3) for E3 and *B3ZS* (Binary 3 Zeros Suppression) for DS3.

3 . 1. 4 Test Loop

This switch is used to initiate loop testing. It is fully described in the next section.

3. 2 Connecting up

Safety Notice: Ports that are identified as SELV in this manual should only be connected to SELV ports on other equipment in accordance with EN 60950 clause 2.3.

Step 1: Mounting.

The DC3445 is housed in a convenient 1U table top enclosure.

Step 2: Set up Bit-switch

The switches are located on the base of the unit and are used to specify the functionality required.

Step 2: DTE

Connect the DC3445 to the DTE using *HSSI PORT* on the rear panel. The DSU should ideally be placed close to the DTE, with no more than 2m of cable connecting the two.

Step 3: E3/DS3 LINE (WAN)

Connect the WAN by means either the two BNC bayonet connectors labelled *LINE Rx* and *LINE Tx*.

Step 5:

Connect the Alarm device to the RJ45 outlet labelled *ALARM EXT*, if you wish to make use of the audible/visual alarm facility.

Step 4: Power Supply

Finally, connect the main power lead and re-check all connections for security. Then turn on the power supply. Check the rear panel status LED to ensure that it is continuously lit (green).

Warning: Do not connect the DC3445 to excessive voltages. Read the safety information before continuing.

4 ALARMS, TROUBLESHOOTING & TESTING

4.1 Alarms

The Status LED on the DC3445 rear panel shows a variety of alarm conditions as shown in the table below.

Status LED	Meaning
Off	No mains power present
Red steady	LOS
Red/Off flashing	LOS and DTE Alarm
Green/Off flashing	DTE Alarm
Green steady	Status OK

Figure 4. 1 Rear panel LED alarms

The definitions of each alarm and the unit's response to them is tabulated below.

Alarm	Alarm Definition	Response
LOS	Loss Of Signal: No data and therefore no clocking information.	LOS alarm signal from LED
DTE	DTE Control signal absent	DTE alarm signal from LED

Figure 4. 2 Alarm definitions & responses

4. 2 Troubleshooting

Step 1: Establish and verify the E3/DS3 WAN link

Check the status LED on the rear panel of the unit at both ends of the link. If either is OFF, power is not present on that unit. Check the mains connection to the unit. If mains supply is satisfactory, we recommend that the unit be taken out of service and returned to a repair centre. Unqualified users should not open the DC3445 .

LINE BNC connectors

If the status LED is *RED* or flashing *RED/OFF*, try swapping the LINE BNC connections at that unit. Also check that the E3/DS3 Mode bit-switch has been set correctly.

If the status LED remains red or flashing red/off, try looping the BNC connections on the unit with a short piece of cable. If the status LED goes steady green or flashes green/off, then the external BNC cabling is faulty. Check for cable continuity and network connections, etc.

Step 2 Establish and verify the DTE link

If the status LED flashes *GREEN/OFF*, check that the local router port status is *UP* and that the local router cable is in place.

If problems persist, check the DTE cabling configuration. Running *TEST LOOPS* will help to isolate the problem area - see next section. Transmit and Receive data connections may be crossed, as may any of the handshaking and/or signalling lines.

Step 3: Bridge/Router configuration

As the DC3445 is used in a variety of locations and with many different manufacturer's equipment it is impossible for us to cover all eventualities here, so please consult other manufacturer's operating manual for further information.

4.3 Test Loop

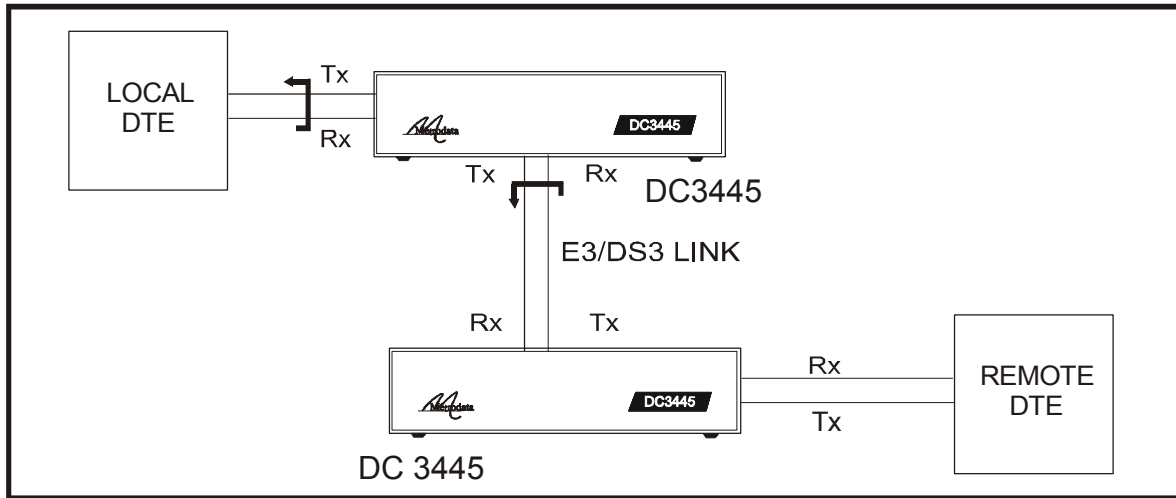


Figure 4.3 Test loop on local DC3445

Set the local DC3445 base panel bit-switch labelled *TEST LOOP* to the *ON* position. When the *TEST LOOP* is activated at the local DC3445, the signal received at the LINE port is passed directly back to the link at the line interface. The signal from the DTE is looped adjacent to the DTE port. This effectively isolates the DC3445 running the test and validates:

- (a) the local DTE cable if the local DTE recognises its own transmissions.
- (b) the remote DTE and its cable, the remote DC3445 and the LINE link if the remote DTE recognises its own transmissions.

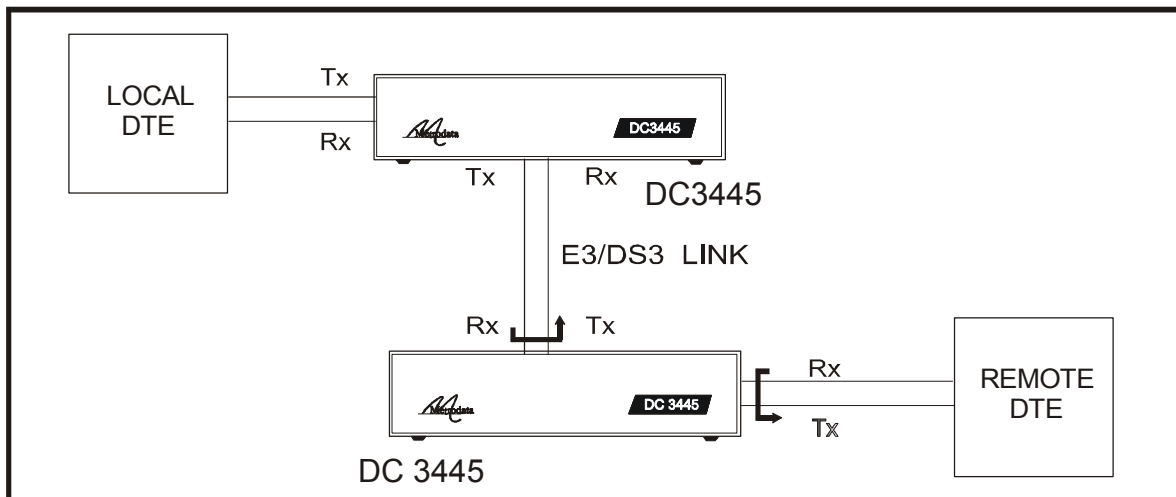


Figure 4.4 Test loop on remote DC3445

Set the remote DC3445 base panel Bit-switch labelled *TEST LOOP* to the *ON* position. The test loop validates:

- (a) the remote DTE cable if the remote DTE recognises its own transmissions.
- (b) the local DTE and its cable, the local DC3445 and the LINE link if the local DTE recognises its own transmissions.

5 DC3445 SPECIFICATIONS

5.1 DC3445 Product Specification

Parameter	Definition
E3/DS3 LINE Interface	G.703 compliant, Sensitivity -10dB. E3 Line coding HDB3. DS-3 Line coding B3ZS Interface type: 75 Ohm unbalanced coax, BNC connectors
Jitter Tolerance	Per G.823.
Barrier	EN 41003 compliant barrier provided on the E3/DS3 LINE interface.
DTE Interface	HSSI: 50 way miniature AMP connector
Clocking options	<u>E3/DS3 LINE port:</u> Circuit 113 (normally slaved to Circuit 114) <u>DTE port (Circuit 114):</u> INTERNAL, LOOP <u>DTE Receive timing RT:</u> Circuit 115 is always sourced from the E3/DS3 Receive clock
Diagnostics	Loop Test initiated by Bit-switch
General	Definition
Power supply	100-250 VAC, 50-60 Hz, 115-45 mA or -36 to -72 VDC, 150-70 mA
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	0 degC to +50 degC
Storage Temperature	-20 degC to +70 degC
Relative Humidity	0% - 95% non condensing
Barometric Pressure	86 KPa - 106 KPa

5.2 DC3445 Clcking Diagram

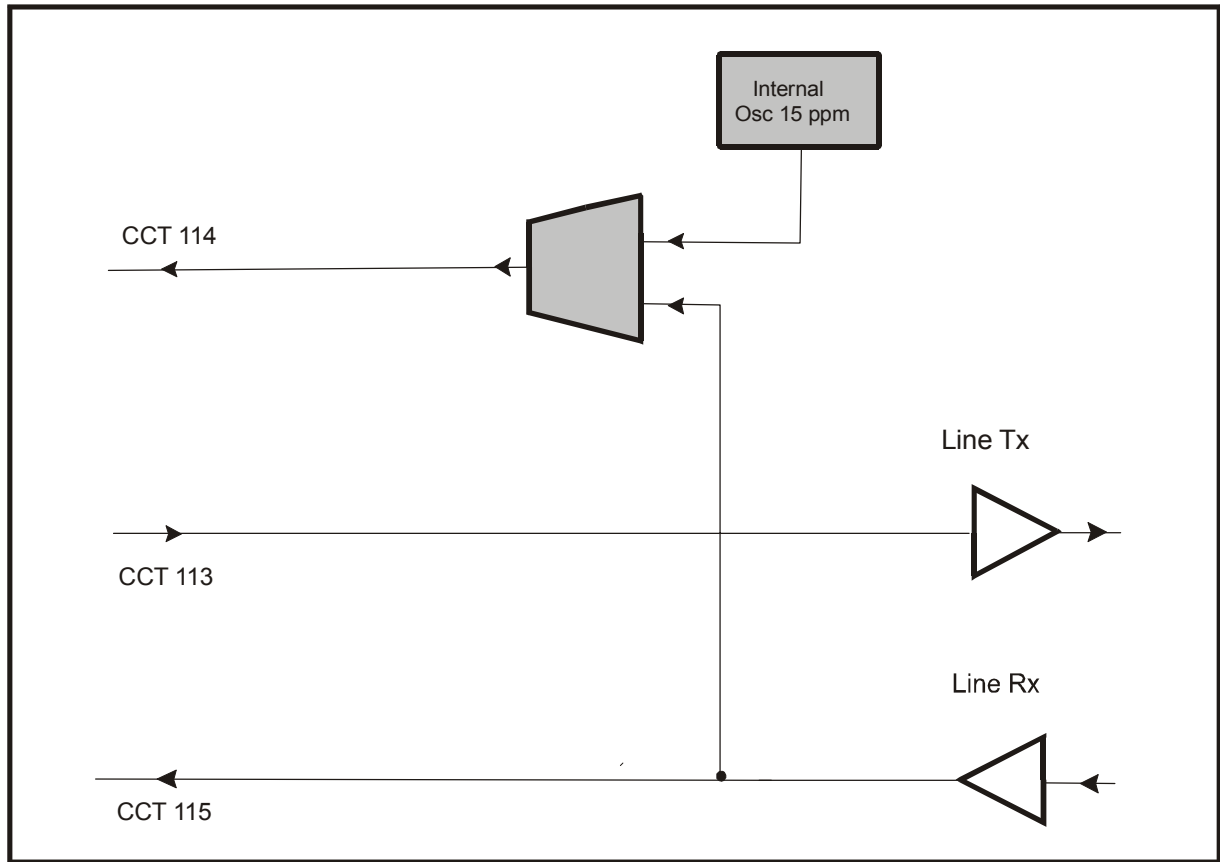


Figure 5. 1 DC3445 Clcking diagram

5.3 Glossary

AIS	Alarm Indication signal
AMI	Alternate Mark Inversion
B3ZS	Binary 3 Zero Suppression
DSU	Data Service Unit
DTE	Data Terminal Equipment
HDB3	High-Density Binary 3
HSSI	High Speed Serial Interface
LAN	Local Area Network
LOS	Loss of Signal alarm
SELV	Safety Extra Low Voltage
WAN	Wide Area Network

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