

BOX90x(X)-y-n-Y

OPTICAL TRANSCEIVER (TRANSMITTER AND RECEIVER)

Application

- ▶ Broadband optical downstream receiver with single/dual optical upstream transmitter for usage in HFC networks

Features

- ▶ Various transmitter types:
 - 1310nm or CWDM DFB laser type
 - +3 or +6dBm optical output power
- ▶ Extremely low noise optical receiver with software configurable RF output level
- ▶ Optical input level controlled
- ▶ Optical input and optical output level supervision
- ▶ Line coding
- ▶ Controlled transmitter output power and pilot controlled optical modulation index (to compensate ageing effects)
- ▶ Ingress control switches ICS for both optical transmitters
- ▶ Various network management capabilities:
 - RS485 network management interface (BOX90x)
 - Transbus NMS (BOX90xT): Integrated transponder for transmission of alarm messaging from fiber nodes
 - LON network management interface (BOX90xL)
 - Dual Management LON and Transbus (BOX90xLT)
- ▶ 1310nm/CWDM multiplexer optionally integrated (one optical input)



Ordering Information

BOX90x(X)-y-nn-Y

x	1	single transmitter type
	2	dual transmitter type
X	-	RS485 interface
	T	Transbus interface
	L	LON interface
	LT	LON and Transbus interface
y-n	1310-03	transmitter wavelength and output power (single transmitter type)
	1310-06	
	C11-03... -C18-03	
	C11-06... -C18-06	
	1310-03/1310-03	transmitter wavelength and output power (dual transmitter type)
	1310-06/1310-06	
	C11-03/C12-03	
	
C17-03/C18-03		
C11-06/C12-06		
....		
C17-06/C18-06		
Y	A	integrated 1310nm/CWDM Multiplexer
	Ann	integrated 1550nm DWDM ch nn / CWDM Multiplexer

Technical Data

Receiver Part

Wavelength	1280...1610 nm
Optical input level	-4 ...+4 dBm (-3 ...+5 dBm for integrated CWDM demultiplexer version)
Optical return loss	≥ 45 dB
RF frequency range	47 ... 870 MHz
RF frequency response	± 0.5 dB
Nominal RF output level for OMI = 4% (adjustable range for total optical input level range)	71.5 dB μ V (within total optical input range)
Output RF impedance	75 Ω
Output RF return loss	≥ 16 dB (≥ 19 dB @ 85 MHz – 1 dB/oct.)
Equivalent thermal noise current for $P_{opt,in} = -4$ dB	4 pA typ., ≤ 5.0 pA/ $\sqrt{\text{Hz}}$
Second and third order linearity CSOA / CTBA *) for $P_{opt,in} = -4$ dBm CSOA / CTBA *) for $P_{opt,in} = +2$ dBm	At 70.5dB μ V/3.6% typ. >80 dB / typ. >80 dB typ. 77 dB / typ. 78 dB

Transmitter Part

Frequency range	5 ... 160 MHz
Frequency response	± 0.7 dB
Nominal input level (OMI = 5 % ±0.5 %)	75 dB μ V ±6 dB (software configurable) with ±1 dB accuracy
Input RF impedance	75 Ω
Input RF return loss	≥ 18 dB
Laser RIN	≤ -143 dB/Hz (typical < -149 dB/Hz)
NPR for 5 - 65 MHz noise signal with notch at 35 MHz (opt. receiver with $P_{opt}=0$ dBm, $S=0.92A/W$ and $I_{ENC}=7pA/\sqrt{Hz}$)	≥ 45 dBpeak (typical 48 dBpeak) ≥ 40 dB (typical 43 dB) for a dynamic range of 15 dB
Intermodulation (4 sine carriers with OMI = 10% each)	≥ 48 dBc
CINR (4 QAM carriers with 2 MHz bandwidth, OMI = 10% each, opt. receiver with $P_{opt}=0$ dBm, $S=0.92A/W$ and $I_{ENC}=7pA/\sqrt{Hz}$)	≥ 52 dB
Testpoint attenuation	20 dB ± 0.7 dB
Optical wavelength (at 25°C room temperature)	1310 nm ±30 nm and 1471 / 1491 / ... / 1611 nm ±3 nm
Optical output power (whole temperature range) nn / mm = 03 nn / mm = 06	+2 ... +4 dBm +5 ... +7 dBm

General Technical Data:

Pilot tone frequency / OMI	615 kHz / 5 % ±0.5 %
Insertion loss of optical multiplexer in single port version	0.8 / 1.4 dB (downstream / upstream)
Power consumption	≤ 7.5 W (BOX901) ≤ 9 W (BOX902)
Dimensions of BK equipment practice	Module width 1
Weight	~1.2 kg

*) 36x FM (-4dB), 33x Video carriers, 2x 64QAM (-10dB), 16x 256QAM (-4dB)

**Integrated 1310nm/CWDM
DEMUX Characteristics**

Parameter		Min	Typ	Max	Unit
Optical Wavelength downstream	λ		1310 or 1550nm DWDM ch nn		nm
Downstream insertion loss	IL			0.8	dB
Downstream passband 1310nm			± 6.5		nm
Downstream passband 1550 nm			± 0.25		nm
DWDM version					
Optical wavelengths upstream	λ		1471, 1491 or 1511, 1531 or 1551, 1571 or 1591, 1611		nm
CWDM passband		± 6.5			nm
CDWM demultiplexer insertion loss	IL			1.5	dB
Optical isolation adjacent channels		30			dB
Optical isolation non adj. channel		45			dB