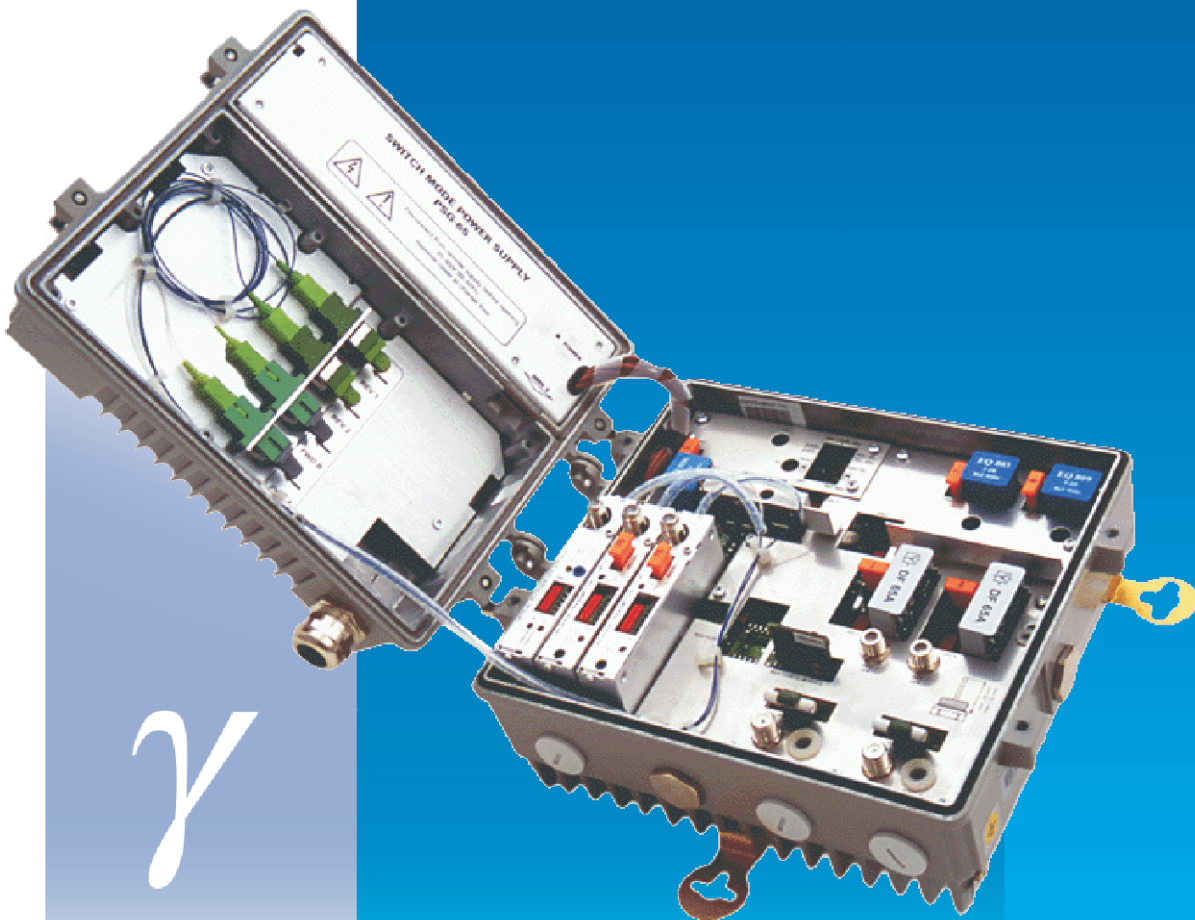




**VECTOR**



*γ*

***broadband distribution node  
GAMMA 08X-22A-AE8/ES/***

## INTRODUCTION

Broadband distribution node GAMMA can be used as a compact, multiport optical node. Its modular design allows flexible configuration and step-by-step development of the system.

The modern GaAs technology applied in GAMMA guarantees very high operational RF levels with low intermodulation distortions while consuming little power. GAMMA used as a compact optical node offers the possibility of full redundancy in forward path with AGC functionality and redundancy in reverse path.

Availability of DWDM technology in compliance with ITU-T recommendation leads to implementation of modern concept of optical access network with passive hub and centralized distribution of services at the same time limiting the number of fibres. GAMMA has the ability to interact with different Network Management Systems and to be remotely configured and controlled as well.

### FIBRE OPTIC

- Optical receiver with redundancy option
- Single, redundant optical reverse path using 1310nm FP or DFB lasers as well as 1550nm DFB lasers

### RF TRANSMISSION

- Very high output level with low power consumption (GaAs technology)
- Interstage adjustments of gain and slope for each output separately
- Plugged-in ingress switch in reverse path

### MONITORING / MANAGEMENT

- Prepared for NMS transponder built in upper cover
- Management of three-state ingress switch for reverse path
- Control of receiver and transmitter's parameters
- Monitoring of voltages, current consumption, temperature inside the housing and external bi-state switches



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## **GAMMA 08X-22A-AE8/ES/**

- Modular optical receiver with redundancy option for forward path
- Modular optical transmitters with redundancy option for reverse path
- Network Management System NMS
- AGC controlled by pilot tone or optical input power to the receiver
- Full and independent control of gain and slope for each of two active outputs (GaAs Power Doubler)
- IP 67 compact housing
- Local power insertion up to 15 A (Power Inserter) and current passing for each RF port up to 12 A

### **OPTICAL PARAMETERS**

<b>PARAMETER</b>	<b>VALUE</b>	<b>COMMENT</b>
Wavelength [nm]	1100 ÷ 1600	
Optical input power range [dBm]	-5 ÷ +2	
Equivalent Input noise [ $\mu\text{A}/\sqrt{\text{Hz}}$ ]	≤ 8	
Optical connector	E2000 / APC	Others on special request
Optical power test point [V/mW]	1 ± 0,1	
RF level at the output of the OFR 870 module [dBμV]	78 ± 1	4,5% OMI/channel, 0dBm input optical power
Optical Power Indicator [dBm]	-5	Green - optical power > -5dBm Red - optical power < -5dBm
RF test point - directional [dB]	-20	Relative to module output signal

### **RF PARAMETERS**

<b>PARAMETER</b>	<b>FWD. PATH</b>	<b>REV. PATH</b>	<b>COMMENT</b>
Bandwidth [MHz]	85 ÷ 862	5 ÷ 65	With plug-in diplex filters DF65A
Reverse gain [dB]	-	18 ± 0.75	Port 2 to reverse transmitter with 0dB pad and equalizer, configuration module RCG 09 and amplifier RAG 29-1
Noise figure [dB]	-	≤ 7	With diplex filters, 0dB pad and equalizer, configuration module RCG 03 and amplifier RAG 29-1
CNR [dB]	56	-	0dBm optical input power, 4.5% OMI/channel, 10dB passive optical loss
Maximum forward RF level at the port of the node [ dBμV ]	2 x 117 ± 1	-	At each output port for 0dBm optical input power and 4.5% OMI/channel
Slope [dB]	± 1	± 1	For optical link
Flatness [dB]	± 1	± 0.75	For optical link



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PARAMETER	FWD. PATH	REV. PATH	COMMENT
Operational output level [dBμV]	2 x 112	95	Forward : 9dB interstage slope, 42 carriers CENELEC (EN 50083-3)
Distortion specification @ Operational output level (typical)			
CTB [dBc]	≤ -64	-	According to EN 50083-3 9dB interstage slope, 42 carriers CENELEC, optical transmitter distortions not included
CSO [dBc]	≤ -60	-	
NPR [dBc]	-	≤ -60	For reverse amplifier module RAG 29-1; 60MHz load @ 27dBμV/Hz
Third order beat IMD3 [dBc] @ 110dBμV	-	≤ -60	According to EN 50083-3
Second order beat IMD2 [dBc] @ 102dBμV	-	≤ -60	According to EN 50083-3
HUM modulation @ 12A [dBc]			
5 ÷ 15 MHz	-	≤ -55	@ 791,25MHz
15 ÷ 65 MHz	-	≤ -60	
85 ÷ 862 MHz	≤ -60	-	
RF return loss [dB]	≤ -18	≤ -18	(EN 50083-3) For f < 40MHz; for f > 40MHz: -18dB +1,5dB/oct
Test points @ output ports 3,4 [dB]	-20 ± 1	-	Directional coupler
Test point @ reverse input [dB]	-	-20 ± 1	Directional coupler

## GENERAL PARAMETERS

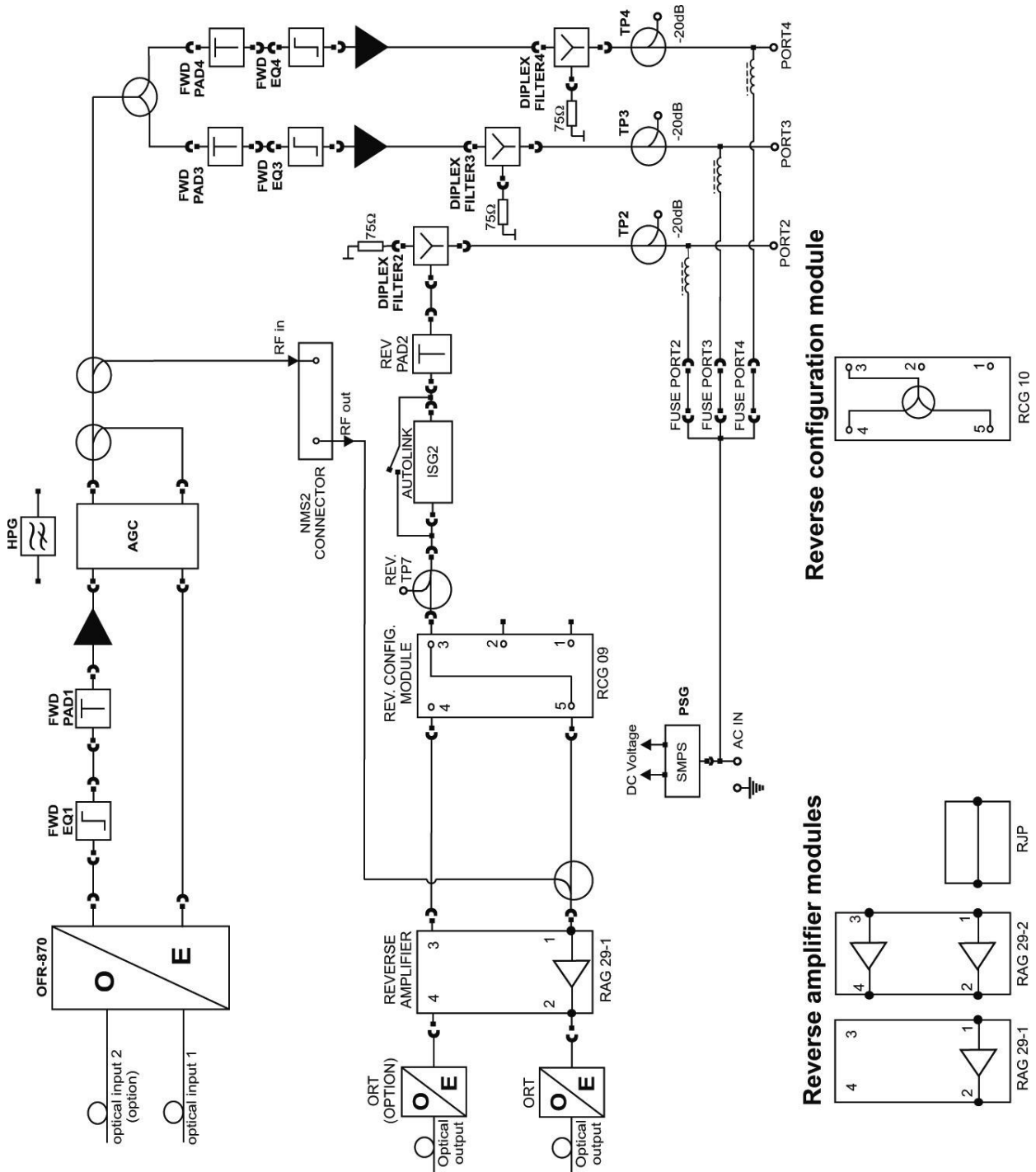
PARAMETER	VALUE	COMMENT	
Number of RF ports	4	Port 1 - reverse auxiliary input 5-210 MHz for transmitter ORT; Port 2,3,4 - RF input / outputs	
RF connectors type	PG11 / IEC M14	Port 2,3,4 - RF input / outputs	
	PG11 / F	Port 1 - reverse auxiliary input 5-210 MHz	
AC voltage range [V]	35 ÷ 65	AC 50 ÷ 60Hz	
Maximum current passing through local power inserter AC in [A]	15		
Max. AC current passing [A]	12	All RF ports except external RF input port 1	
AC current consumption [mA]	35VAC 48VAC 65VAC	1500 1150 850	With reverse amplifier RAG 29-1 and optical receiver OFR 870
AC Power consumption [W]	40	With reverse amplifier RAG 29-1 and optical receiver OFR 870	
	42	With reverse amplifier RAG 29-1 optical receiver OFR 870 and optical transmitter ORT F1310	
Protection class IP	IP 67		
Operating ambient temperature range [°C]	-40 ÷ 60		
MTBF [ years ]	> 30	Ambient temperature T = 25°C, without the transmitter module ORT	
Dimensions (W x L x H) [mm]	245 x 195 x 125		
Weight [kg]	4,3		



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# BLOCK DIAGRAM



Reverse configuration module

Reverse amplifier modules



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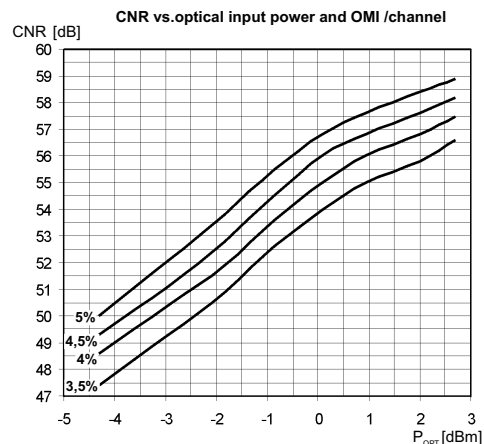
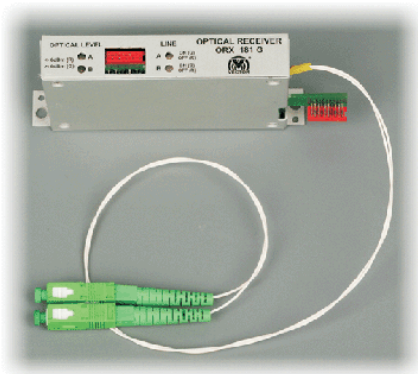
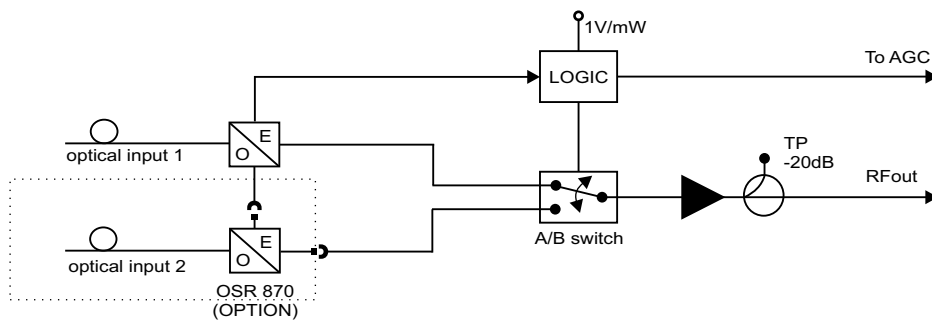
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## OFR 870-SCA , OSR 870-SCA

Optical receiver and optical redundant receiver module

PARAMETER	VALUE	COMMENT
Wavelength [nm]	1100 ÷ 1600	
Optical input power range [dBm]	-5 ÷ +2	
Bandwidth [MHz]	47 ÷ 870	
Equivalent input noise [pA/√Hz ]	≤ 8	
Optical connector	SC/APC	Others on request
Optical power test point [V/mW]	1 ± 10%	
RF level at the output of the module [dBμV]	78 ± 1	4,5% OMI/channel, 0dBm input optical power
Optical Power Indicator [dBm]	-5	Green - optical power > -5dBm Red - optical power < -5dBm
RF test point - directional [dB]	-20	Relative to module output signal

### BLOCK DIAGRAM



**VECTOR**

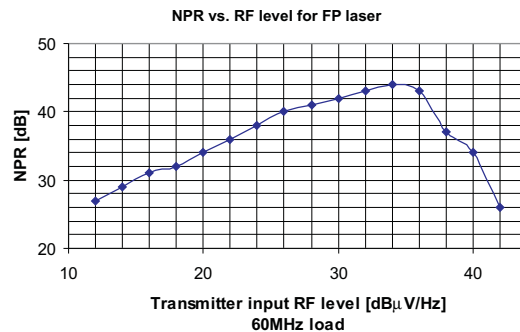
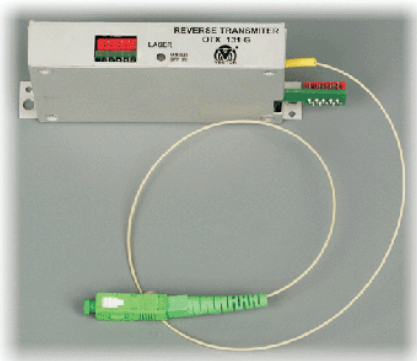
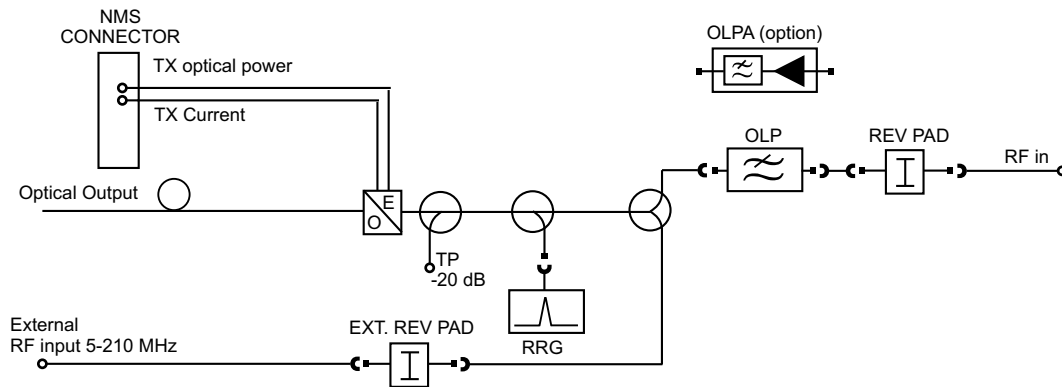
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## ORT-F1310 SCA

Optical transmitter module

PARAMETER	VALUE	COMMENT
Laser type	FP	
Wavelength [nm]	1310 ± 40	
Optical output power [dBm]	0 ± 1	
Bandwidth [MHz]	5 ÷ 210	For external input - port 1
Bandwidth [MHz]	5 ÷ 65	For internal RF input
Minimum input level for NPR > 30dB [dBμV/Hz]	16	RF drive for laser @ 25°C, 5dB optical loss, 60MHz load
NPR > 30dB dynamic range [dB]	20	@ 25°C, 5dB optical loss, 60MHz load
Optical connector	SC/APC	Others on request
Laser power status indicator [dBm]	-3	Green - optical power > -3dBm Red - optical power < -3dBm
RF test point - directional [dB]	-20	Signal level to laser
Insertion loss for external RF input [dB]	-3,5	For external input - port 1
OMI variation over temperature [dB]	±2	

### BLOCK DIAGRAM



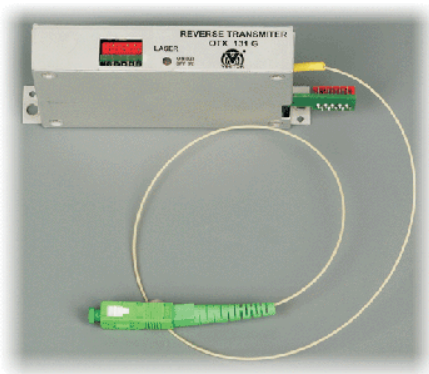
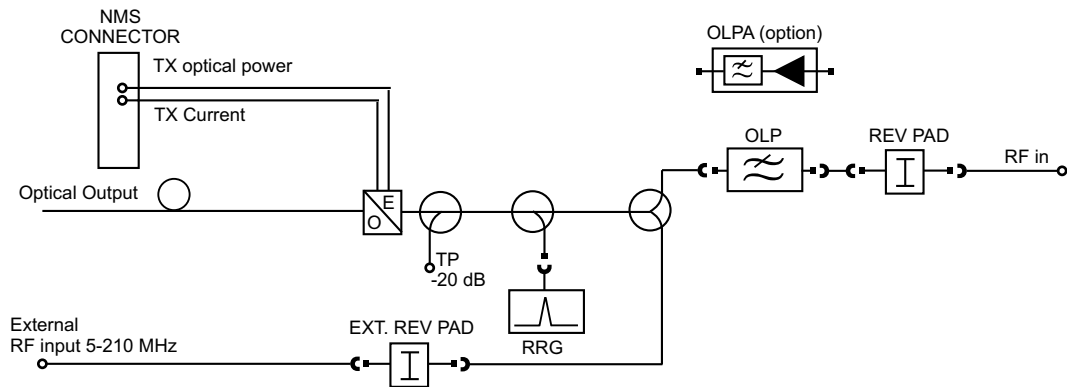
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## ORT-D1310-SCA

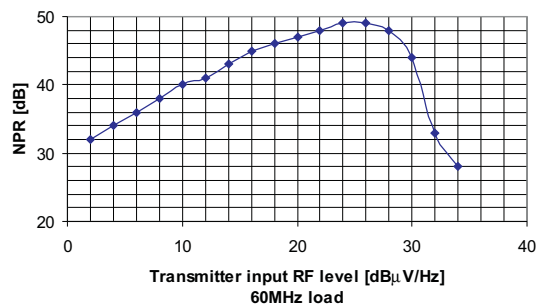
Optical transmitter module

PARAMETER	VALUE	COMMENT
Laser type	DFB	
Wavelength [nm]	1310 ± 40	
Optical output power [dBm]	0 ± 1	
Bandwidth [MHz]	5 ÷ 210	For external input - port 1
Bandwidth [MHz]	5 ÷ 65	For internal RF input
Minimum input level for NPR > 35dB [dBμV/Hz]	10	RF drive for laser @ 25°C, 5dB optical loss, 60MHz load
NPR > 30dB dynamic range [dB]	20	@ 25°C, 5dB optical loss, 60MHz load
Optical connector	SC/APC	Others on request
Laser power status indicator [dBm]	-3	Green - optical power > -3dBm Red - optical power < -3dBm
RF test point - directional [dB]	-20	Signal level to laser
Insertion loss for external RF input [dB]	-3,5	For external input - port 1
OMI variation over temperature [dB]	±2	

### BLOCK DIAGRAM



NPR vs. RF level for DFB



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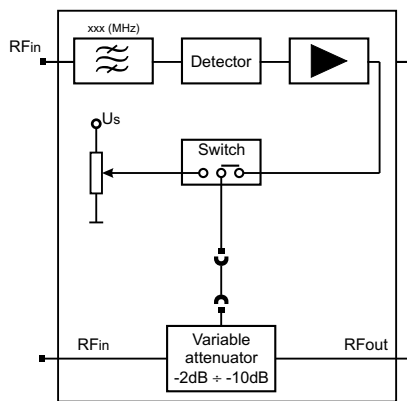
## AGC xxx - 6

Automatic gain control module controlled by pilot tone

### TECHNICAL PARAMETERS

Bandwidth [MHz]	85 ÷ 862	Dynamics [dB]	8
Pilot frequency [dB]	xxx	AGC insertion loss [dB]	2
Video carrier to pilot tone ratio [dB]	0 ÷ 16	Level stability over 8 dB input level change [dB]	± 1
3 dB bandwidth (minimum) [MHz]	4		
20 dB bandwidth [MHz]	15		

### BLOCK DIAGRAM



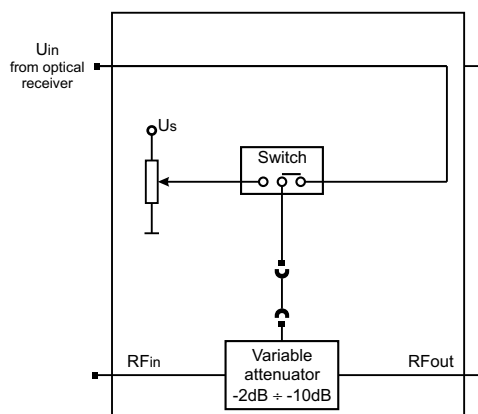
## AGC 000 - 6

Automatic gain control module controlled by input optical power level to optical receiver

### TECHNICAL PARAMETERS

Bandwidth [MHz]	85 ÷ 862	AGC insertion loss [dB]	2
Dynamics [dB]	8	Level stability over 8 dB input level change [dB]	± 1

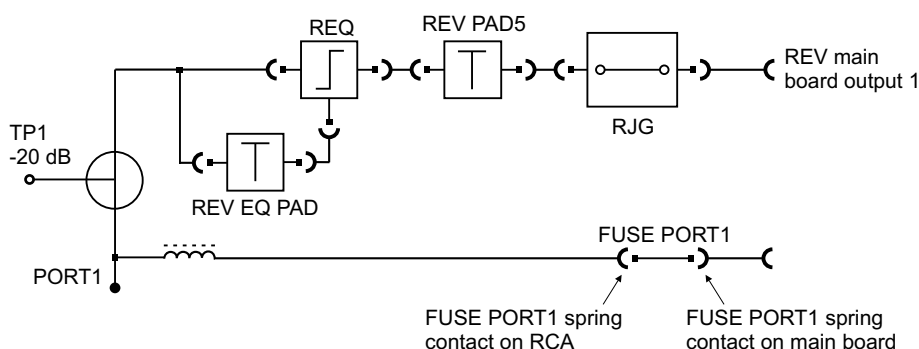
### BLOCK DIAGRAM



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## RCA

Output module for coaxial reverse output



## CKG 01

Optical Node Conversion Kit

### Kit includes:

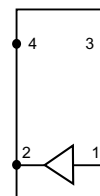
- optical input adapter PG-16
- cover plate
- fibre holders
- mounting screws

## RAG 29-1

Reverse amplifier module with low pass filter for single reverse path

### TECHNICAL PARAMETERS

Maximum gain for configuration module RCG 04 [dB]	30 ± 0,75	Intermodulation distortions:	
Bandwidth [MHz]	5 ÷ 65	• third order beat IMD3 [dBc]	≤ -60
Flatness [dB]	± 0,7dB	• second order beat IMD2 [dBc]	≤ -60
Noise figure for configuration module RCG 04 [dB]	≤ 6dB	• @ 110dBμV [dBc]	
NPR for 60 MHz load @ 27dBμV/Hz [dBc]	≤ -60dBc	• @ 110dBμV [dBc]	
		Power consumption [W]	2,4



## RAG 29-2

Reverse amplifier module with low pass filter for dual reverse path

### TECHNICAL PARAMETERS

Maximum gain for configuration module RCG 04 [dB]	2 x 30 ± 0,75	Intermodulation distortions:	
Bandwidth [MHz]	5 ÷ 65	• third order beat IMD3 [dBc]	≤ -60
Flatness [dB]	± 0,7	• second order beat IMD2 [dBc]	≤ -60
Noise figure for configuration module RCG 04 [dB]	≤ 6	• @ 110dBμV [dBc]	
NPR for 60 MHz load @ 27dBμV/Hz [dBc]	≤ -60	• @ 110dBμV [dBc]	
		Power consumption [W]	2,4

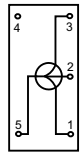


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## RCG 01

### Reverse configuration module

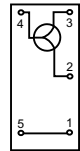
Used for 3-outputs distribution amplifier or 3-outputs optical node with single reverse path.  
Provides equal sum of ports 2, 3 and 4.



## RCG 02

### Reverse configuration module

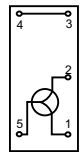
Used for 3-outputs optical node with dual reverse path.  
Provides equal sum of ports 2 and 3. Port 4 is configured as an independent reverse path.



## RCG 03

### Reverse configuration module

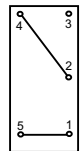
Used for 2-outputs distribution amplifier or 2-outputs optical node with single reverse path as well as for 3-outputs optical node with dual reverse path.  
Provides equal sum of ports 3 and 4. Port 2 is configured as an independent reverse path (for 3-outputs optical node).



## RCG 04

### Reverse configuration module

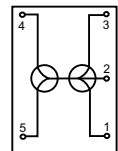
Used for 2-outputs optical node with dual reverse path.  
Ports 3 and 4 are configured as independent reverse paths.



## RCG 05

### Reverse configuration module

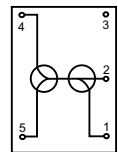
Used for 3-outputs optical node with dual reverse path.  
Allows redundant transmission while using redundant optical transmitter.



## RCG 06

### Reverse configuration module

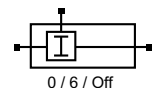
Used for 2-outputs optical node with dual reverse path.  
Allows redundant transmission while using redundant optical transmitter.



## ISG 65

### Ingress switch module

Used while interacting with Network Management System via NMS transponder.  
Allows ingress source detection/preventing by remote control of 3-state ingress switches insertion loss 0 / 6 / 30 dB. There is no need to plug any additional modules, while ingress switch module is not installed - autolink circuit provides connectivity automatically.



## OLPA 65

### Active band-pass filter module 15÷65 MHz for optical transmitter

Provides gain of 20 dB.

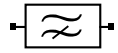


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## RHP 15

High pass filter 15MHz module for reverse path



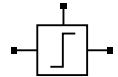
## RRG xxx

Single tone reference generator module  
xxx - frequency tone [MHz]



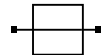
## REQ 65

Reverse path equalizer module  
Equalization is determined by ATG 8xx attenuator (REV EQ PAD)



## RJP

Reverse jumper



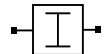
## DF 65 A

Diplex filter module  
Frequency range: 5 ÷ 65 / 85 ÷ 862 MHz



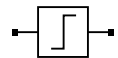
## ATG 800 ÷ ATG 820

Attenuator module  
Used in forward and reverse path. Attenuation range 0 ÷ 20dB with 1dB step



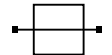
## EQ 801 ÷ EQ 824

Forward path equalizer module  
Equalization range 1 ÷ 24dB with 1dB step



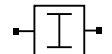
## AT 800

Forward jumper  
Installed in place of diplex filters and/or forward equalizers if they are not used



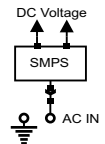
## ATG 075

Terminator 75 Ω



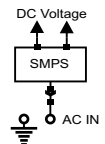
## PSG 65

Switch mode power supply (SMPS) module  
35 ÷ 65 VAC



## PSG 90

Switch mode power supply (SMPS) module  
40 ÷ 90VAC



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