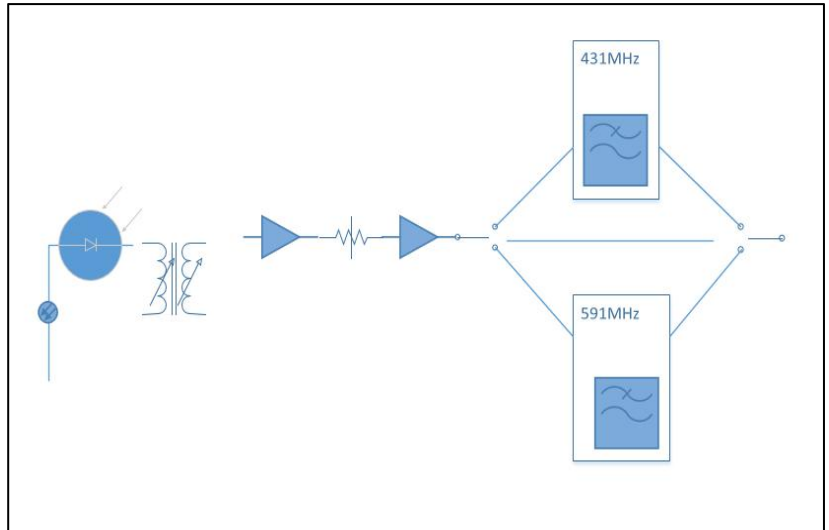


### FEATURES

- Excellent linearity
- Extremely low noise
- Excellent flatness
- Rugged construction
- PWDM
- AGC



### DESCRIPTION

SMOP23 is a low power, but good performance optical receiver. AGC circuitry make output level stably when in the range of -10-0dBm. Small size which can be assembled in a small case.

### QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN	MAX	UNITS
f	Frequency range		45	1000	MHz
S <sub>22</sub>	Output return losses	f=45 to 1000MHz	-	-14	dB
I <sub>out</sub>	Total current consumption(DC)	V <sub>B</sub> =5V	310	350	mA

### HANDLING

Fiberglass optical coupling: maximum tensile strength=5N; minimum bending radius=30mm

### LIMITING VALUES

In accordance with the Absolute Maximum Rating System

SYMBOL	PARAMETER	CONDITION	MIN.	MAX.	UNITS
Pin	Optical input power		-16	+5	dBm
	Optical return loss	0dBm		-35	dB
Tstg	Storage temperature		-40	+85	°C
Tmb	Operating mounting base temperature	continuous	-20	+85	°C
ESD	ESD sensitivity	Human body model; R=1.5KΩ;C=100pF	500	-	V

### CHARACTERISTICS

(Bandwidth 45 to 1000MHz;  $T_{mb}=25^{\circ}\text{C}$ ,  $V_B=5\text{V}$ ,  $Z_S=Z_L=75\Omega$ )

SYMBOL	PARAMETER	UNIT	MIN.	TYP.	MAX.	CONDITIONS
S	responsively	V/W	0.9	-	-	$\lambda=1550\text{nm}$
FL1	Flatness of frequency response	dB	-	$\pm 1.0$	$\pm 1.5$	$f=45$ to 1000 MHz, wide band flatness
FL2	Flatness of frequency	dB	-	-	$\pm 0.4$	Narrow bandwidth per 7MHz
SL	Slope	dB	0	2.0	4.0	From 45-1000MHz
S22	Output Return Loss	dB	-14	-	-	$f=45$ to 1000 MHz
Itot	Total Current Consumption	mA	310	-	350	$V_B=5\text{V}$

Automatic Gain Control Receiving Power: -10-0dBm (According to customer requirements)

Vo1	Output Voltage	dBuV	78	81	83	Popt= -10-0dBm @176.25MHz 42 channels T=25°C OMI=4% per channel
Vo2	Output Voltage	dBuV	77	80	82	Popt= -10-0dBm @176.25MHz 42 channels T=-20°C OMI=4% per channel

SYMBOL	PARAMETER	UNIT	MIN.	TYP.	MAX.	CONDITIONS
CTB	Composite Triple Beat	dB	-	-	-60	Optical power / 0dBm 42channels PAL-D.175.25MHz OMI=4% per channel
CSO	Composite Second Order distortion	dB	-	-	-60	
C-spurious	Carrier to spurious	dB	-	-	-60	
CTB	Composite Triple Beat	dB	-	-	-62	Optical power- 1dBm 42channels PAL-D.175.25MHz OMI=4% per channel
CSO	Composite Second Order distortion	dB	-	-	-60	
C-spurious	Carrier to spurious	dB	-	-	-60	
CNR	Noise carrier rating	dB	46	-	-	Optical power / - 8dBm 42channels PAL-D.176.25MHz OMI=4% per channel

### Description:

Vo1 are according to the optical change from -10dBm-0dBm. For example, In -10dBm the output level is 79dBuV, but in the 0dBm maybe output level is 82dBuV.

Vo2 are according to the temperature change. For example: when the temperature stay -20°C, the output level will lower 1 dB than 25°C. When the temperature stay 45°C, the output level will higher 0.5dB than 25°C.

The minimum of CNR in different optical power

C/N  $\geq$  46 @ -8dBm in the frequency=176.25MHz

C/N  $\geq$  47 @ -7dBm in the frequency=176.25MHz

C/N  $\geq$  48 @ -6dBm in the frequency=176.25MHz

C/N  $\geq$  49 @ -5dBm in the frequency=176.25MHz

C/N  $\geq$  50 @ -4dBm in the frequency=176.25MHz

C/N  $\geq$  51 @ -3dBm in the frequency=176.25MHz

The module normally operates at VB=5±0.25V

### RF-filter Specifications

Filters can be switched on and off via I2C interface. Note that the switch has 3 positions: “filter 1”, “filter 2” and “filters off”. In the filters off position, there is a low-pass filter to block the 2GHz SBS suppression carrier without impacting the CATV frequency band.

Filter specifications are given for filters-only: the filters-off transfer function will be used as the calibration reference. This implies that the slope and flatness of the module is calibrated out of the measurement and the pass band is basically flat at 0dB.

PARAMETER	SYMBOL	UNIT	Min	Typ	Max	Note
<b>Filter 1</b>						
RF pass band	-	MHz	45	-	431	See also filter mask below
RF delta-band(40MHz)	-	MHz	431	-	471	
RF block-band	-	MHz	471	-	890	
Ripple @45...400MHz	-	dB	-	-	±1	
Attenuation @431MHz	-	dB	-	-	3	
Attenuation @471MHz	-	dB	50	-	-	
Attenuation @471...890MHz	-	dB	50	50	-	
<b>Filter 2</b>						
RF pass band	-	MHz	45	-	591	See also filter mask below.
RF delta-band(40MHz)	-	MHz	591	-	631	
RF block-band	-	MHz	631	-	890	
Ripple @45...550MHz	-	dB	-	-	±1	
Attenuation @591MHz	-	dB	-	-	3	
Attenuation @631MHz	-	dB	50	-	-	
Attenuation @631...890MHz	-	dB	50	-	-	
<b>Filters off</b>						
RF pass band	-	MHz	45	-	1000	

Filter masks are for the filters only, i.e. all other module's transfer characteristics have been calibrated out.

### Immunity test

According to ICE61000-4-3standard.

Test was performed in lab using SANLAND SMOP19 measuring equipment according to requirements. All test was conducted in chamber. Distance between DUT and antenna 3m. All test was conducted for two antenna orientation - vertical and horizontal and for three frequency ranges from 80MHz to 1GHz; 1GHz to 2GHz;2GHz to 3GHz three ranges use same antenna.

#### 1、Immunity signal parameters:

- Field strength 3V/m
- Frequency step 1%
- Step time 3s
- 1KHz AM modulation 80%

#### 2、Measuring equipment:

- Spectrum analyzer
- Converter 75R to 50R
- RF cable VIABLUE TVR 2.0 SILVER 120 dB Class A+

#### 3、Spectrum analyzer configuration:

- VBW 10KHz
- RBW 30KHz
- Reference level 80dBuV
- Sweep time 1.5s
- Attenuator 0dB
- Trace max hold

#### 4、DUT configuration

- CATV enable
- DUT in vertical position
- DUT powered by 5V stabilized PSU

#### 5、Test result:

- 80MHz to 1GHz pass
- 1GHz to 2GHz pass
- 2GHz to 3GHz pass

### Certification

The measurement result is according to ANSI\_SCTE 06 2009.ICE61000-4-3.

EN 607286 Cable networks for television signals, sound signals and interactive services.

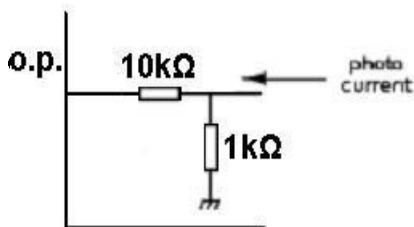
Part6: Optical equipment services

EN 607283 Cable networks for television signals, sound signals and interactive services.

Part3: Active wide band equipment for cable services.

### Photodiode pin monitoring voltage corresponding to the table

O.P.Power	voltage	O.P.Power	voltage	O.P.Power	voltage	O.P.Power	Voltage	O.P.Power	voltage	O.P.Power	voltage
dBm	v	dBm	v	dBm	v	dBm	v	dBm	v	dBm	v
2.00	1.5849	-1.00	0.7943	-4.00	0.3981	-7.00	0.1995	-10.00	0.1000	-13.00	0.0501
1.90	1.5488	-1.10	0.7762	-4.10	0.3890	-7.10	0.1950	-10.10	0.0977	-13.10	0.0490
1.80	1.5136	-1.20	0.7586	-4.20	0.3802	-7.20	0.1905	-10.20	0.0955	-13.20	0.0479
1.70	1.4791	-1.30	0.7413	-4.30	0.3715	-7.30	0.1862	-10.30	0.0933	-13.30	0.0468
1.60	1.4454	-1.40	0.7244	-4.40	0.3631	-7.40	0.1820	-10.40	0.0912	-13.40	0.0457
1.50	1.4125	-1.50	0.7079	-4.50	0.3548	-7.50	0.1778	-10.50	0.0891	-13.50	0.0447
1.40	1.3804	-1.60	0.6918	-4.60	0.3467	-7.60	0.1738	-10.60	0.0871	-13.60	0.0437
1.30	1.3490	-1.70	0.6761	-4.70	0.3388	-7.70	0.1698	-10.70	0.0851	-13.70	0.0427
1.20	1.3183	-1.80	0.6607	-4.80	0.3311	-7.80	0.1660	-10.80	0.0832	-13.80	0.0417
1.10	1.2882	-1.90	0.6457	-4.90	0.3236	-7.90	0.1622	-10.90	0.0813	-13.90	0.0407
1.00	1.2589	-2.00	0.6310	-5.00	0.3162	-8.00	0.1585	-11.00	0.0794	-14.00	0.0398
0.90	1.2303	-2.10	0.6166	-5.10	0.3090	-8.10	0.1549	-11.10	0.0776	-14.10	0.0389
0.80	1.2023	-2.20	0.6026	-5.20	0.3020	-8.20	0.1514	-11.20	0.0759	-14.20	0.0380
0.70	1.1749	-2.30	0.5888	-5.30	0.2951	-8.30	0.1479	-11.30	0.0741	-14.30	0.0372
0.60	1.1482	-2.40	0.5754	-5.40	0.2884	-8.40	0.1445	-11.40	0.0724	-14.40	0.0363
0.50	1.1220	-2.50	0.5623	-5.50	0.2818	-8.50	0.1413	-11.50	0.0708	-14.50	0.0355
0.40	1.0965	-2.60	0.5495	-5.60	0.2754	-8.60	0.1380	-11.60	0.0692	-14.60	0.0347
0.30	1.0715	-2.70	0.5370	-5.70	0.2692	-8.70	0.1349	-11.70	0.0676	-14.70	0.0339
0.20	1.0471	-2.80	0.5248	-5.80	0.2630	-8.80	0.1318	-11.80	0.0661	-14.80	0.0331
0.10	1.0233	-2.90	0.5129	-5.90	0.2570	-8.90	0.1288	-11.90	0.0646	-14.90	0.0324
0.00	1.0000	-3.00	0.5012	-6.00	0.2512	-9.00	0.1259	-12.00	0.0631	-15.00	0.0316
-0.10	0.9772	-3.10	0.4898	-6.10	0.2455	-9.10	0.1230	-12.10	0.0617	-15.10	0.0309
-0.20	0.9550	-3.20	0.4786	-6.20	0.2399	-9.20	0.1202	-12.20	0.0603	-15.20	0.0302
-0.30	0.9333	-3.30	0.4677	-6.30	0.2344	-9.30	0.1175	-12.30	0.0589	-15.30	0.0295
-0.40	0.9120	-3.40	0.4571	-6.40	0.2291	-9.40	0.1148	-12.40	0.0575	-15.40	0.0288
-0.50	0.8913	-3.50	0.4467	-6.50	0.2239	-9.50	0.1122	-12.50	0.0562	-15.50	0.0282
-0.60	0.8710	-3.60	0.4365	-6.60	0.2188	-9.60	0.1096	-12.60	0.0550		
-0.70	0.8511	-3.70	0.4266	-6.70	0.2138	-9.70	0.1072	-12.70	0.0537		
-0.80	0.8318	-3.80	0.4169	-6.80	0.2089	-9.80	0.1047	-12.80	0.0525		
-0.90	0.8128	-3.90	0.4074	-6.90	0.2042	-9.90	0.1023	-12.90	0.0513		



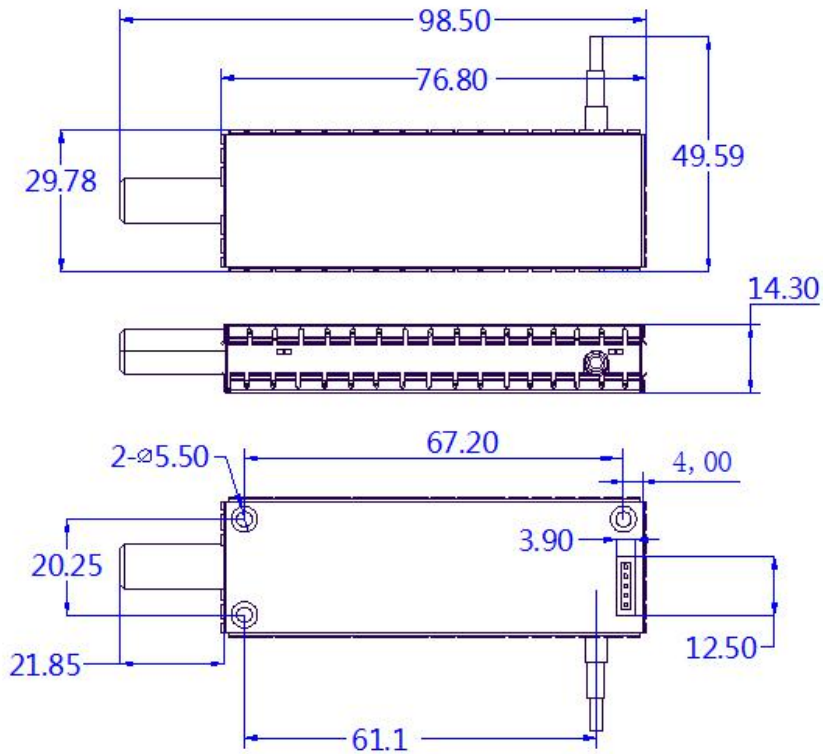
Notes:

The calculation formula of:  $\text{dBm} = 10 \cdot \lg((\text{O.P.}) \cdot \text{mV}/R)$

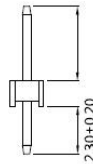
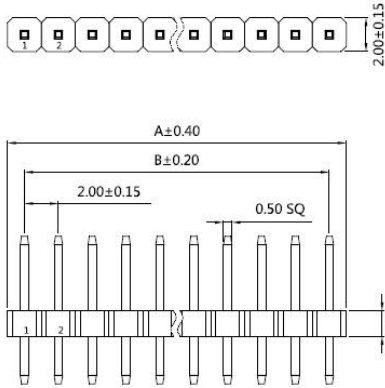
When measured the optical power corresponding to the monitor volt .may cause some tolerance that the range is  $\pm 0.08\text{V}$



### Dimension



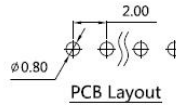
### Pin Dimension



Technical Data  
 Material:  
 Contact material: Brass  
 Plating: Gold Flash  
 Insulator material: Black polyester UL94V-0  
 Standard: PA6T+30%G.F

Electrical:  
 Current rating: 1.5Amps/contact max.  
 Contact resistance:  $\leq 20 \text{ m}\Omega$ /contact  
 Insulation resistance:  $\geq 1000 \text{ M}\Omega$  at  $V=100\text{V}$   
 Withstanding voltage: 450V AC/minute

Mechanical:  
 Soldering temperature:  $+250^\circ\text{C}$ , 4s max  
 UNSPECIFIED TOLERANCE:  $\pm 0.20$



$A = 2.0 \cdot nP \pm 0.40$   
 $B = 2.0 \cdot nP - 2.0 \pm 0.20$   
 Pin Number = 1 ~ 40

### Screw posts dimension

