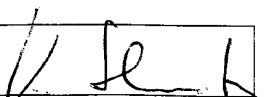


DATA SHEET

SU1200 Satellite Network Interface Module

Approval by :	
Name / Date :	16.08.01



PHILIPS

Satellite Network Interface Module**SU1200 series****Features**

- Super compact size: 67 x 38.5 x 13 mm
- Total power consumption typically 1.6 W
- Multistandard QPSK and BPSK demodulation
- Compliant with DVB-S and DSSTM specification
- Parallel and serial MPEG-2TS data output
- Suitable for fixed and variable bit rates from 1 – 45 Ms/s
- Excellent input signal sensitivity; large dynamic input range
- Switchable baseband lowpass filter bandwidth
- Simple LNB supply control via 3 output ports
- Standard 22 KHz tone and DiSEqCTM 1.0 Modulator output
- Loophrough- and single input versions
- Horizontal- and vertical mounting versions
- Direct conversion tuner concept
- Radiation / Immunity complying to "CENELEC EN55013/EN55020"
- I²C-bus serial bus and repeater
- Selectable tuner address for up to 4 tuners in one box

QUICK REFERENCE DATA

Description	Ordering Number	Symbol Rate Ms/s	Connector Function	Aerial Connector	Mounting
SU 1278/L	3112 297 12861	1 – 45	loop-through	2 x F	vertical
SU1278/S	3112 297 12851	1 – 45	single input	1 x F	vertical
SU1278/SH	3112 297 12871	1 – 45	single input	1 x F	horizontal
SU1278/LVA	3112 297 13011	1 – 45	loop-through	2 x F	vertical
SU1278/SHA	3112 297 13021	1 – 45	single input	1 x F	horizontal

Satellite Network Interface Module**SU1200 series****DC Electrical Data**

SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNIT
V _{+5V}	Supply voltage tuner section pin 4	4.75	5.0	5.25	V
V _{+5V_ENL}	Supply voltage loop-through amplifier pin 3 (/L-types)	4.75	5.0	5.25	V
I _{+5V}	Supply current pin 4 for /S-types /SHA-type	-	210 225	235 250	mA
I _{+5V}	Supply current pin 4 for /L-types	-	180	200	mA
I _{+5V_ENL}	Supply current loop-through amp. pin3 (/L-types) /LVA-type	-	35 50	40 55	mA
V _{+2.5V}	Supply voltage digital section	2.4	2.5	2.6	V
I _{+2.5V}	Supply current (45 Ms/s; M_CLK = 88 MHz; PR=3/4; V _{+2.5V} = 2.5V)	-	225	290	mA
V _T	Tuning supply voltage	28	30	32	V
I _T	Tuning supply current	-	-	1.7	mA
V _{LNB (A/B)}	LNB voltage supply	-	-	20	V
I _{LNB (A/B)}	LNB supply current	-	-	500	mA

Environmental Data

SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNIT
T _{amb}	Operating temperature range	0	-	+60	°C
R _H	Operating humidity (at 40°C)	-	-	85	%
T _{Stor}	Storage temperature range	-20	-	+70	°C
	Storage humidity (at 40°C)	-	-	95	%

GENERAL ELECTRICAL DATA

Unless otherwise specified all electrical values apply at T_{amb} = 25 ± 5%; RH= 60 ± 10%;

V_{+5V}, V_{+5V_ENL} = 5 ± 0.2V; V_{+2.5V} = 2.5 ± 0.1V; V_T = 29.5 ± 0.5 V

Loop-through characteristics for /L- types

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
α _{A-B}	attenuation (from RF A to RF B)		—	3.0	dB
ΔG	loophrough gain in frequency band 950 to 2150 MHz		—	±3.0	dB
ΔG _{B40}	gain deviation in channel	channel width = 40 MHz	—	1.5	dB
V _{osc}	spurious local oscillator at RF A and RF B		-75	-65	dBm

Satellite Network Interface Module**SU1200 series****General characteristics**

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Z _{in}	antenna input impedance		—	75	--	Ohm
VSWR	in-band VSWR		—	1.5	2.3	
V _{osc}	oscillator voltage at aerial input	40 to 2150 MHz	—	-75	-65	dBm
V _i (RF)	RF input level	for /S- and /L-types for /SHA- and /LVA-types	-65 -70	— —	-25 -25	dBm
f _b	tuning range		950	—	2150	MHz
V _{PSM}	surge protection voltage		5.0	—	—	kV
IL	implementation loss (see note 1)	<u>F_s < 2 Ms/s:</u> PR = 1/2 PR = 2/3 PR = 3/4 PR = 5/6 PR = 7/8 <u>F_s = 2 to 35 Ms/s:</u> PR = 1/2, 2/3, 3/4, 5/6, 7/8 <u>F_s > 35 Ms/s:</u> PR = 1/2, 2/3, 3/4, PR = 5/6 PR = 7/8	— — — — — — — — — —	0.3 0.3 0.3 0.5 0.6 0.3 0.3 0.5	0.8 0.8 0.8 1.0 1.2 0.8 0.8 1.2	dB
RF _{min}	minimum RF input level	IL < 0.8 dB for /SHA- and LVA-types	— —	-75 -80	— —	dBm
IM2	2 nd order intermodulation rejection	see note 2	35	42	—	dB
V _{IL} V _{IH}	I ² C-bus low level input voltage I ² C-bus high level voltage		-0.5 2.0	— —	0.8 5.5	V
f _{SCL}	I ² C-bus input clock frequency		—	—	400	KHz

note 1: The implementation loss (IL) is defined as the difference between the theoretical QPSK- C/N threshold for a bit error rate of 2 x 10E-04 (after viterbi) and the threshold given by the NIM.

note 2: The rejection of 2nd order intermodulation products is compliant to the ASTRA (SES) recommendation.

Satellite Network Interface Module

SU1200 series

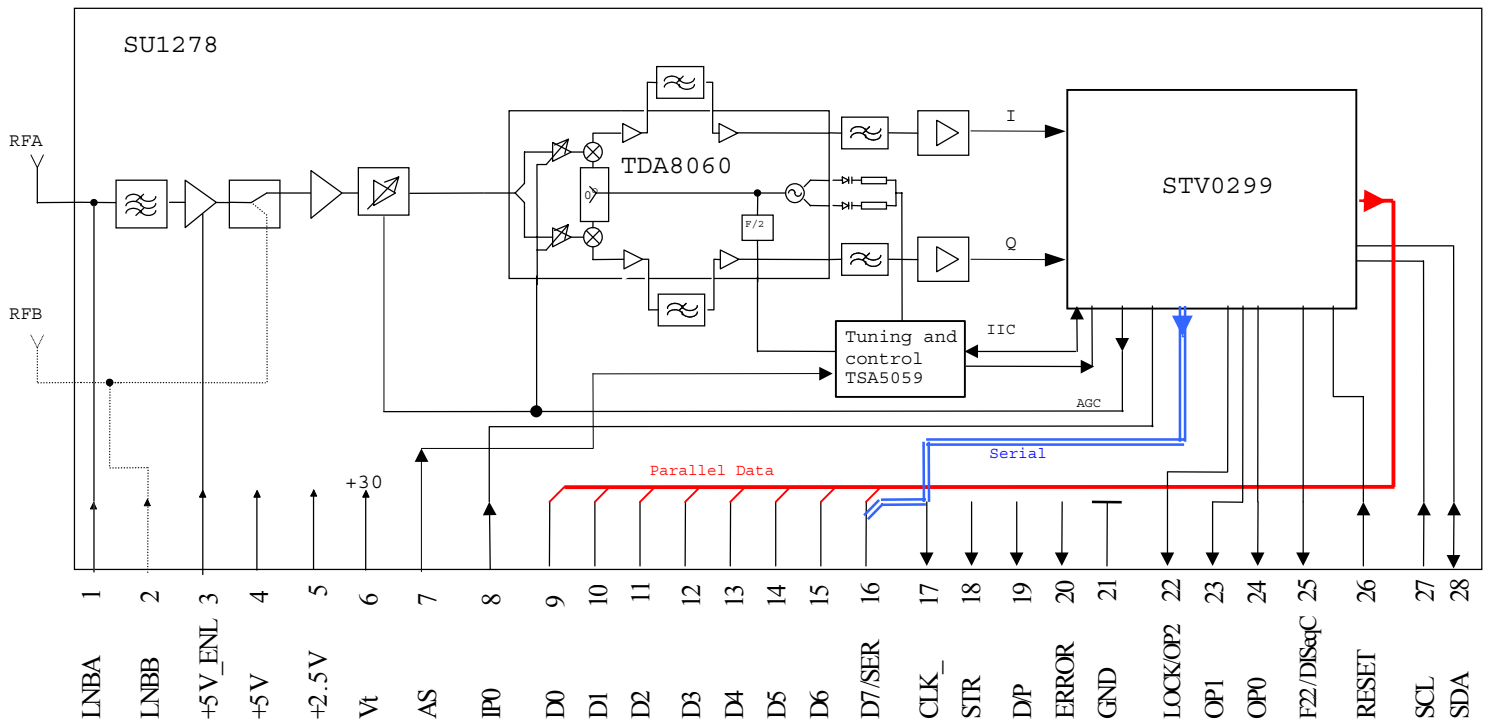
GENERAL TUNER PARAMETER

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
F	noise figure	at maximum gain for /SHA- and /LVA-types	— —	7 5	10 8	dB
	tuner local oscillator phase noise	at 1 kHz offset	—	-75	-65	dBc/Hz
		at 10 kHz offset	—	-80	-70	dBc/Hz
		at 100 kHz offset	—	-95	-90	dBc/Hz

Key components

- TDA8060TS/C2 Philips mixer / oscillator IC
- TSA5059TS/C2 Philips low noise PLL synthesiser
- STV0299BT ST QPSK-channel decoder (SDD)

Block Diagram



Satellite Network Interface Module**SU1200 series****Pinning**

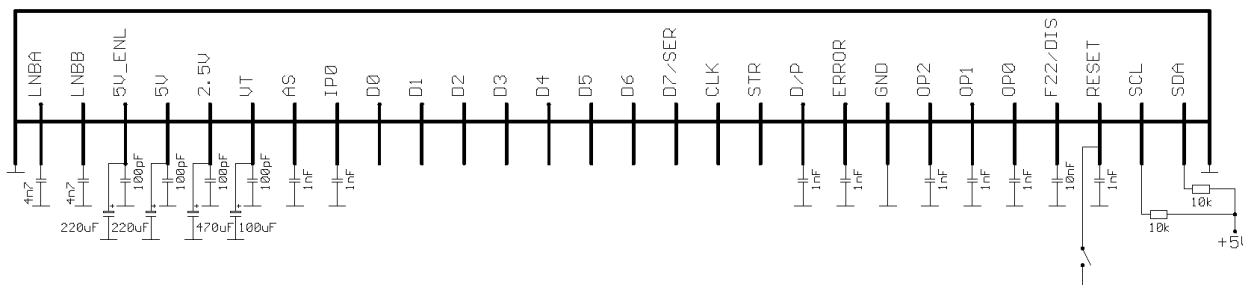
pin	symbol	description
1	LNB A	LNB A supply voltage
2	LNB B	loop-through LNB power supply
3	+5 V_ENL	5 V supply voltage for loop-through amplifier
4	+5 V	5 V supply voltage
5	+2.5 V	2.5 V supply voltage
6	Vt	Tuning supply voltage +30 V
7	AS	Address select of tuner synthesiser
8	IP0	Input Port
9	D0	Output Data bit 0
10	D1	Output Data bit 1
11	D2	Output Data bit 2
12	D3	Output Data bit 3
13	D4	Output Data bit 4
14	D5	Output Data bit 5
15	D6	Output Data bit 6
16	D7 / SER	Output Data bit 7 DATA_OUT in serial mode
17	CLK_OUT	Output Byte Clock Bit clock in Serial Mode
18	STR_OUT	Output 1 st byte Signal (synchro byte clock)
19	D / P	Data / Parity Signal
20	ERROR	Output Error Signal. Set in case of uncorrectable packet
21	GND	Ground
22	LOCK / OP2	Carrier Found or Programmable Output Port
23	OP1	Programmable Output Port
24	OP0	Programmable Output Port
25	F22 / DISEqC™	DISEqC™ modulation, 22 kHz Tone, Programmable output port
26	RESET	Reset, active at low level
27	SCL	Serial Clock (I ² C bus)
28	SDA	Serial Data (I ² C bus)

Satellite Network Interface Module

SU1200 series

APPLICATION INFORMATION

Decoupling proposal of the pins



Control of the tuner-synthesiser TSA5059

The tuner synthesiser is controlled via the STV 0299 I²C-bus repeater function. In low bitrate applications, signal pollution generated by the SDA/SCL-lines of the I²C bus may dramatically worsen the tuner phase noise. In order to avoid this problem, the QPSK demodulator, STV0299B offers an I²C bus repeater so that the SDAT and SCLT are active only when necessary and has to be muted once the tuner frequency has settled.

More information can be found in the data sheets of the STV0299B and the low noise synthesiser TSA5059 from Philips Semiconductors.

The TSA5059 synthesiser is working on the nominal local oscillator frequency.

Read mode

Table 1: Address byte and Status byte

BYTE	BITS							
	7 MSB	6	5	4	3	2	1	0 LSB
Address byte	1	1	0	0	0	MA1=0	MA0=1	R/W=1
Status byte	POR	FL	I2=X	I1=X	I0	A2=0	A1=0	A0=0

Notes:

- MA1=0 , MA0=1 the read address of the tuner, see table 3.
- POR Power On Reset flag, set to logic 1 if the supply voltage to the device has dropped below 3 V.
- FL Phase Lock detect (Flag: 1 = device is phase-locked; 0 = device is unlocked).
- I2, I1 and I0 represent the status of the I/O ports P2, P1 and P0 respectively. A logic 0 indicates a low level and a logic 1 a high level. I2 and I1 are not relevant, X = don't care.
- A2, A1, A0 are 0 since A/D input pin of the synthesiser is grounded.

Satellite Network Interface Module**SU1200 series****WRITE mode****Table 2:**

Address byte, Program divider byte 1 and 2, Control information byte 1 and 2

BYTE	BITS							
	7 MSB	6	5	4	3	2	1	0 LSB
Address byte	1	1	0	0	0	MA1	MA0	R/W=0
Program divider byte 1	0	N14	N13	N12	N11	N10	N9	N8
Program divider byte 2	N7	N6	N5	N4	N3	N2	N1	N0
Control information byte 1	1	N16	N15	PE=0	R3	R2	R1	R0
Control information byte 2	C1	C0	XCE=1	XCS=0	P3=0	P2=0	P1=0	P0

Notes:

MA1, MA0

the write address of the tuner synthesiser (see table 3).

N16 ... N0

programmable divider ratio control bits.

PE

the prescaler enable has to be set to 0!

R3, R2, R1 and R0

programmable reference divider ratio (see table 4).

C1 and C0

charge pump current (see table 5).

XCE, XCS

have to be set to XCE=1, XCS=0 to provide the buffered 4 MHz XTAL frequency to the STV0299B!

P0

baseband bandwidth setting.

Address selection (MA1, MA0)

The module address contains programmable address bits (MA1 and MA0), which offer the possibility of having several synthesisers (up to 4) in one system. The relationship between MA1 and MA0 and the input voltage at pin 7 (AS) is given in the table below:

The address of the Tuner synthesiser is dependent on the voltage at pin 7.

Table 3:

MA1	MA0	Write	Read	Voltage applied at pin 7
0	0	C0	C1	0 to 0.1 · V _{+5V}
0	1	C2	C3	open pin
1	0	C4	C5	0.4 · V _{+5V} to 0.6 · V _{+5V}
1	1	C6	C7	0.9 · V _{+5V} to V _{+5V}

Programmable Divider Settings (N16 to N0):

Divider ratio:

$$N_{div} = (65536 \cdot n_{16}) + (32768 \cdot n_{15}) + (16384 \cdot n_{14}) + (8192 \cdot n_{13}) + (4096 \cdot n_{12}) + (2048 \cdot n_{11}) + (1024 \cdot n_{10}) + (512 \cdot n_{9}) + (256 \cdot n_{8}) + (128 \cdot n_{7}) + (64 \cdot n_{6}) + (32 \cdot n_{5}) + (16 \cdot n_{4}) + (8 \cdot n_{3}) + (4 \cdot n_{2}) + (2 \cdot n_{1}) + n_{0}$$

Satellite Network Interface Module**SU1200 series**

Programmable reference divider ratio:

Table 4:

R3	R2	R1	R0	RATIO	Comp.Freq (kHz)	Step(PE=0) (kHz)
0	0	0	0	2	2000	2000
0	0	0	1	4	1000	1000
0	0	1	0	8	500	500
0	0	1	1	16	250	250
0	1	0	0	32	125	125
0	1	0	1	64	62.5	62.5
0	1	1	0	128	31.25	31.25
0	1	1	1	256	15.625	15.625
1	0	0	0	24	166.67	166.67
1	0	0	1	5	800	800
1	0	1	0	10	400	400
1	0	1	1	20	200	200
1	1	0	0	40	100	100
1	1	0	1	80	50	50
1	1	1	0	160	25	25
1	1	1	1	320	12.5	12.5

charge pump current:

Table 5:

C1	C0	Typical CP current (uA)
0	0	120
0	1	260
1	0	555
1	1	1200

baseband bandwidth setting:

The baseband lowpass bandwidth setting is done by P0.
Recommended bandwidth settings are given in table 6.

Table 6:

Symbol rate [Ms/s]	P0	bandwidth [MHz]
< 4	1	8
≥ 4	0	30

Satellite Network Interface Module

SU1200 series

General application recommendations:

For low symbol rate signals, the reference dividing ratio (see table 4) should be as low as possible for optimum phase noise performance.

That means the phase comparator frequency (the same as the tuning step width) must be as high as possible.

For good phase noise, stable tuning behaviour and high tuning speed, the recommended charge pump settings should be as follows:

- Frequency step value 1MHz. (R3, R2, R1, R0 = 0, 0, 0, 1).
- Charge pump settings :

Frequency range [MHz]	C1	C0
950 to 1250	0	0
>1250 to 1550	0	1
>1550 to 2050	1	0
>2050 to 2150	1	1

CONTROL INFORMATION BYTE 2

TELEGRAM EXAMPLES (WRITE MODE)

- Start - Adr - Ack - Dri - Ack - Dr2 - Ack - Cwi - Ack - Cw2 - Ack - Stop.
- Start - Adr - Ack - Dri - Ack - Dr2 - Ack - Cwi - Ack - Cw2 - Ack - Stop.
- Start - Adr - Ack - Dri - Ack - Dr2 - Ack - Dri - Stop.
- Start - Adr - Ack - Dri - Ack - Dr2 - Ack - Stop.
- Start - Adr - Ack - Cw1 - Ack - Cw2 - Ack - Stop.
- Start - Adr - Ack - Cw1 - Ack - Cw2 - Ack - Stop.
- Start - Adr - Ack - Cw1 - Ack - Cw2 - Ack - Dri - Ack - Stop.

Where:

- Start start condition
- Adr address
- Ack acknowledge
- Dri divider ratio byte 1
- Dr2 divider ratio byte 2
- Cw1 control byte 1
- Cw2 control byte 2
- Stop stop condition.

Satellite Network Interface Module**SU1200 series****Recommended STV0299B register settings**

The following table gives a typical recommended register map, naturally some parameters depend on the application requirements. The table lists up the register which are written. It does not mention the register which are mainly read during the search.

Reg. Addr. (hex)	Reg. Name	R/W	During Search	Value	Comments
00	ID	-	-	-	-
01	RCR	W	F	15	4 MHz at CK-IN, VCO = 352 MHz
02	MCR	W	F	00	M-CLK = 88 MHz
03	ACR	W	F	00	Note 1, AUX-CLK = 0
04	F22FR	W	X	-	Note 1
05	I2CRPT	W	V	05	Bit 7 has to be set for every I ² C communication to the tuner PLL synthesiser.
06/07	DAC	W	V	00/00	Note 1, DAC = 0
08	DiSEqC	W	V	00	Note 1
09	DiSEqC FIFO	W	V	00	-
0A	DiSEqC STATUS	R	V	-	Note 1
0C	IOCFG	W	V	-	Note 1, bit 0 may be inverted during search
0D	AGC1C	W	F	81	-
0E	RTC	W	F	23	-
0F	AGC1R	W	F	94 90	for symbol rates \geq 4Ms/s; LP-bandwidth 30 MHz for symbol rates $<$ 4Ms/s; LP-bandwidth 8 MHz
10	AGC20	W	F	39	-
11	TLSR	W	F	84	-
12	CFD	W	V	39	value toggles between 39 and B9 during search
13	ACLIC	W	F	B5	-
14	BCLIC	W	F	-	Note 2
15	CLDT	W	F	C9	-
1F/21/20	SFR	W	V	-	depend on requested symbol rate
28	FECM	W	F	-	Note 1
29	VTH0	W	F	28	can be reduced to 1E if C/N is always \geq 4 dB
2A	VTH1	W	F	14	
2B	VTH2	W	F	0F	
2C	VTH3	W	F	09	
2D	VTH4	W	F	05	
31	PR	W	F	1F	
32	VSEARCH	W	F	09 or 19	
33	RS	W	F	FC	
34	ERRCNT	W	F	13	

Notes and conventions:

1. The value depends on the hardware configuration and the application.

2. Bit 0 to bit 2 are dependant on symbol rate:

15Ms/s $<$ Fs $<$ 45Ms/s	R14h = 95h
5Ms/s $<$ Fs $<$ 15Ms/s	R14h = 8Fh
2Ms/s $<$ Fs $<$ 5Ms/s	R14h = 89h
1Ms/s $<$ Fs $<$ 2Ms/s	R14h = 86h

F (fixed) : the value is expected to be unchanged during the search algorithm.

V (variable) : the value may be changed by the search algorithm.

Value : gives the typical value once the lock is obtained on a carrier.

Satellite Network Interface Module

SU1200 series

MECHANICAL DATA

AERIAL CONNECTIONS

Standard F sockets female 75Ω.

SOLDERABILITY

The solderability of pins and mounting tags when tested initially and after 16 hour steam ageing in accordance with "IEC 60068-2-20", test Ta, method 1 (solder bath 235°C for 2s), results in a wetted area of 95%. No de-wetting will occur when soldered at 260°C for 5s.

RESISTANCE TO SOLDERING HEAT

The product will not be damaged when tested in accordance with "IEC 60068-2-20", test Tb, method 1A (solder bath 260°C for 10±1 s).

MASS

Approximately 38g.

ROBUSTNESS OF PINS

The pins will not be damaged when tested in accordance with "IEC 60068-2-21":

- Test Ua1, tensile of 10N in axial direction
- Test Ua2, thrust of 4N in axial direction

PUNCHING PATTERN OF CHASSIS PCB

For optimum mounting of the tuner to a PCB, the punching pattern is recommended (see 3139 149 0120).

The tuner must be mounted without clearance between the tuner supporting surface and the printed circuit board (PCB). When mounted in this way, the tuner must be soldered to the PCB. This can be achieved by pressing the unit vertically onto the PCB during soldering.

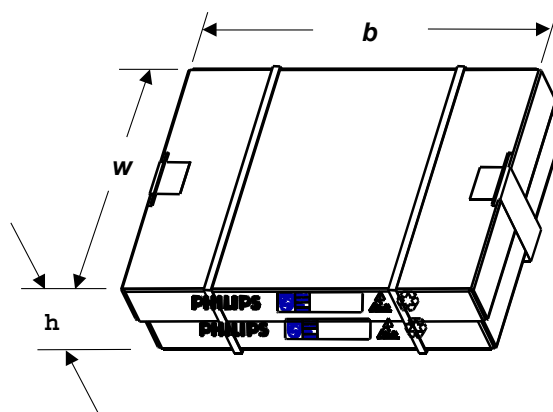
PACKAGING INFO

The products are packed in the carton box and transferred to customers by Pallet Transport.

	Dimension b x w x h (cm)	No. of sets		Gross Wt (Kg)
Carton	46 x 34 x 5,0	68	vertical version	2.75
Carton	46 x 34 x 5,5	51	horizontal version	2.3
Pallet	80 x 120 x 90	5100	vertical version	195
Pallet	80 x 120 x 97,5	3825	horizontal version	150

Carton Boxes are made of Corrugated Fibreboard which are free of environmentally banned substances.

Example of Carton Box:

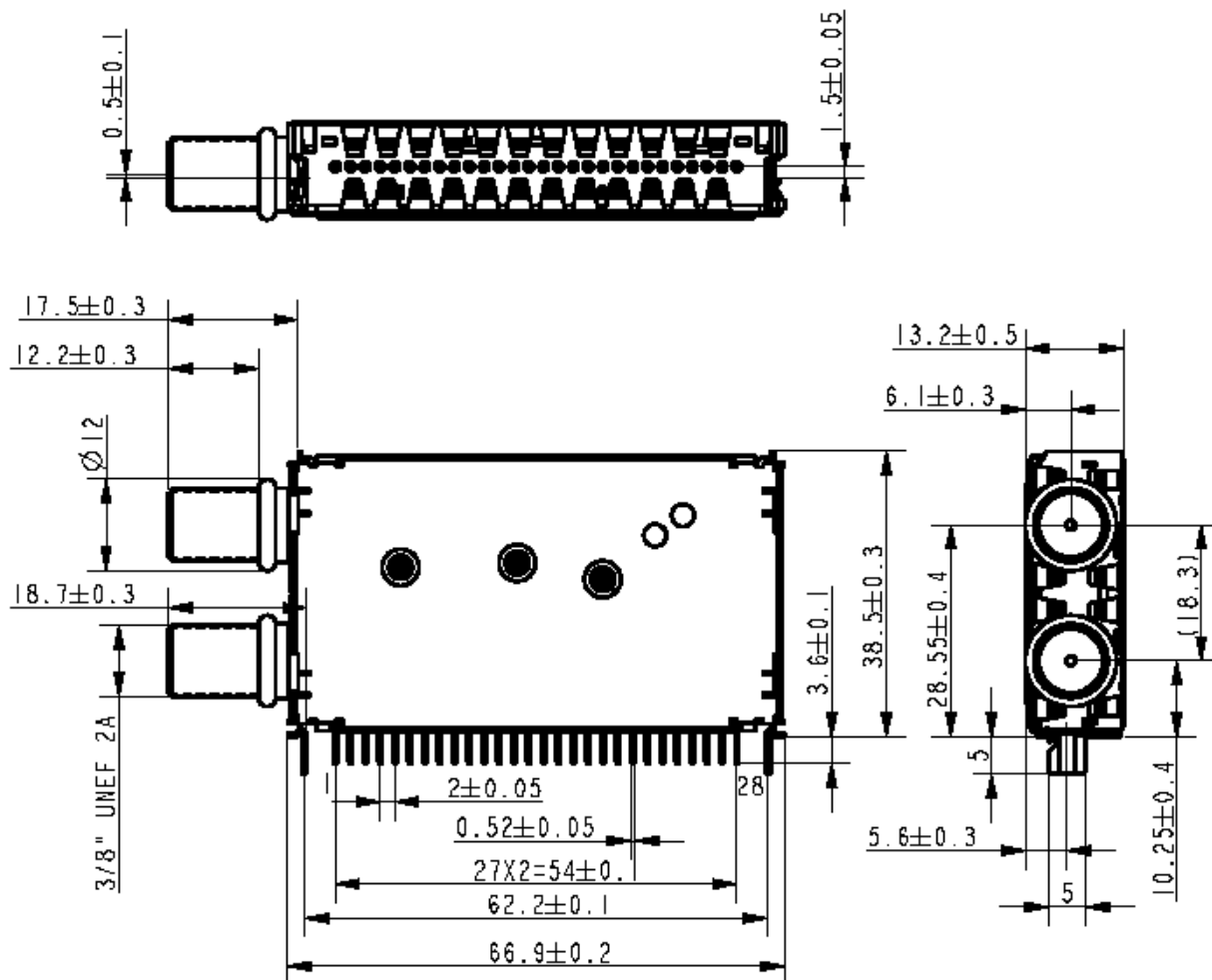


Satellite Network Interface Module

SU1200 series

Mechanical Dimensions (in mm)

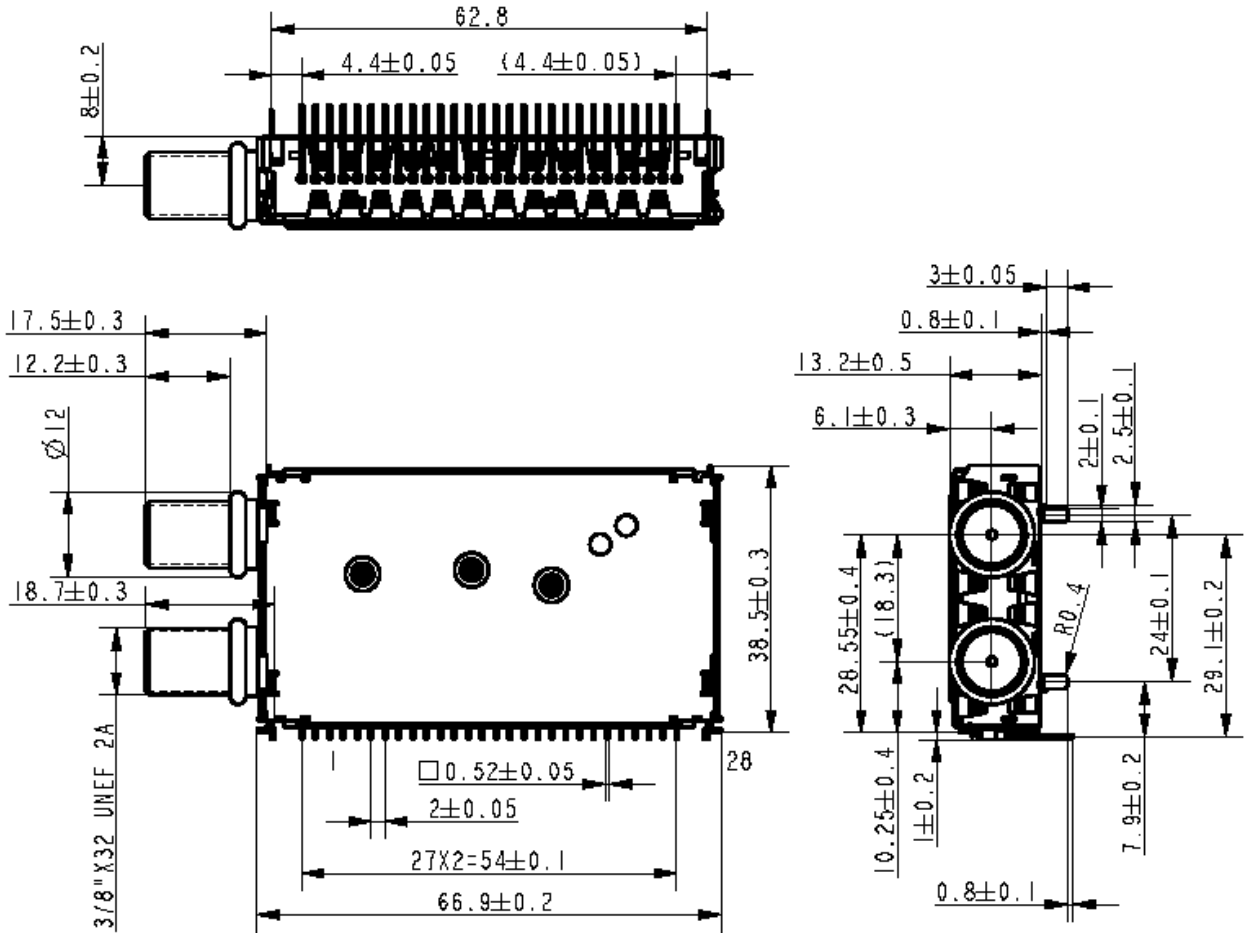
vertical version:



Satellite Network Interface Module

SU1200 series

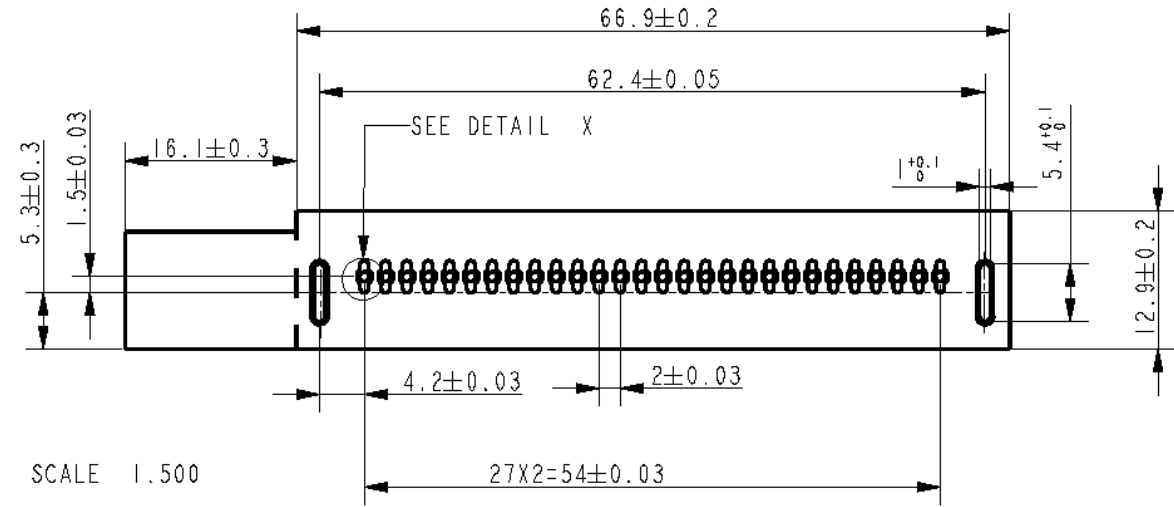
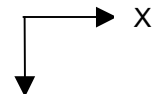
horizontal version:



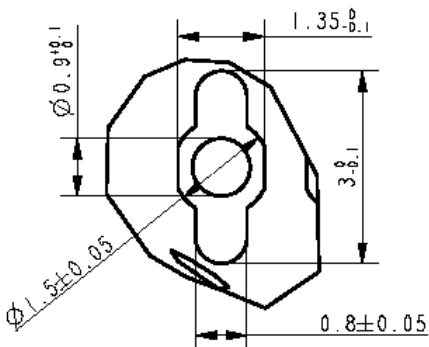
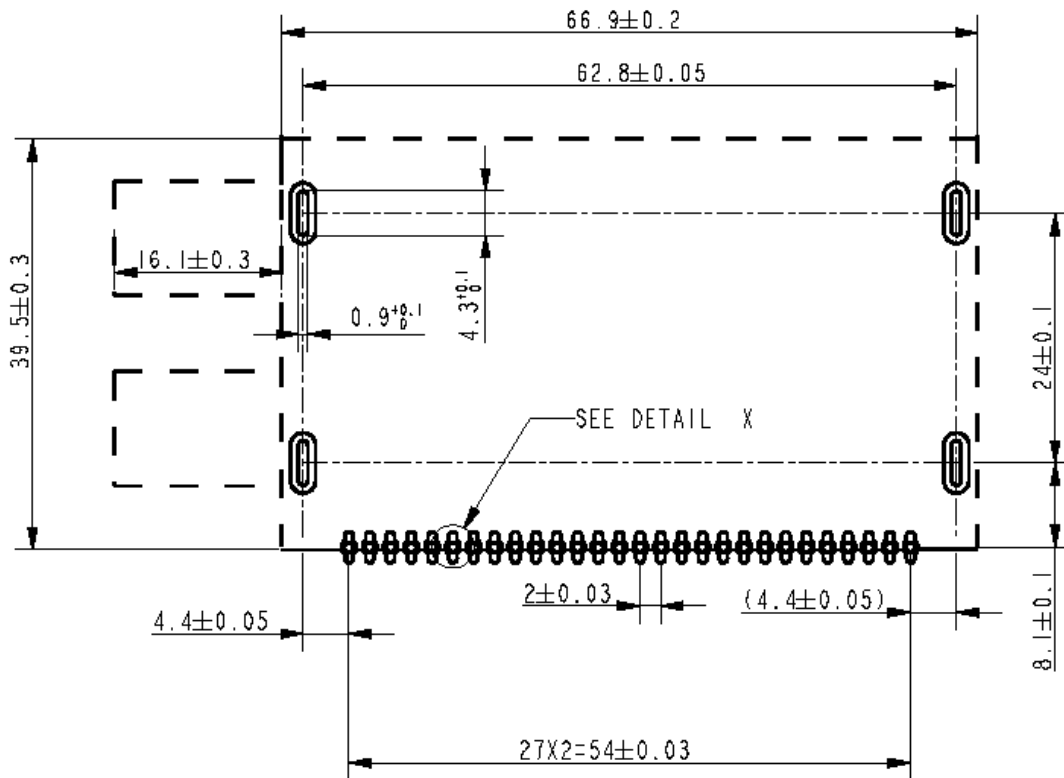
Satellite Network Interface Module

SU1200 series

Punching Pattern (for free xy- wave soldering direction, seen from solder side)



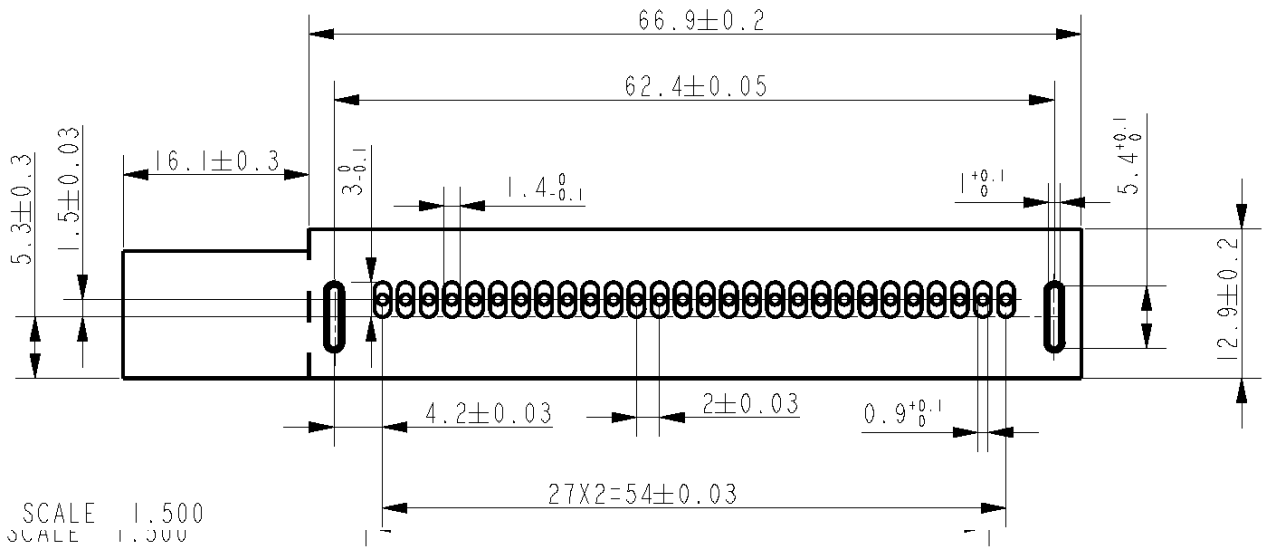
SCALE 1.500



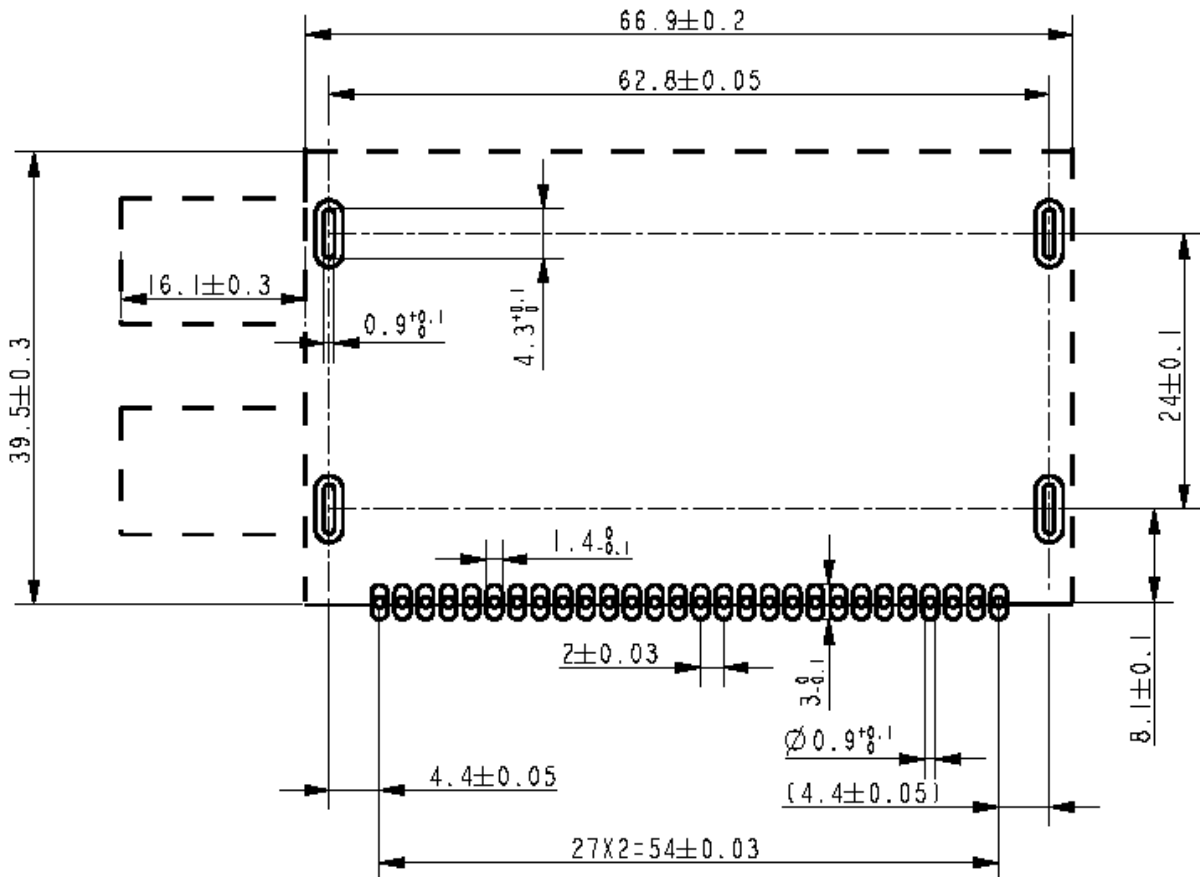
Satellite Network Interface Module

SU1200 series

Punching Pattern (for x- wave soldering direction, seen from solder side)



horizontal version



Satellite Network Interface Module

SU1200 series

DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specification.
Application Information	
Where application information is given, it is advisory and does not form part of the specification	

LIFE SUPPORT APPLICATIONS

These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips for any damages resulting from such improper use or sale.

PURCHASE OF PHILIPS I²C COMPONENTS



Purchase of Philips I²C components conveys a license under the Philips I²C patent to use the components in the I²C systems to the I²C specification defined by Philips. This specification can be ordered using the code 9398 393 40011.

Satellite Network Interface Module

SU1200 series**Philips Components – Business Unit Tuners**

Brazil: Philips Components South America, SAO PAULO,
Tel. +55 11 3841 2211, Fax. +55 11 3841 2399

France: Philips Composants, SURESNES,
Tel. +33 1 4099 6081, Fax. +33 1 4099 6433

Germany: Philips GmbH, Tuners Competence Center Krefeld,
Tel. +49 2151 576 612, Fax. +49 2151 520 588

Hong Kong: Philips Hong Kong, KOWLOON,
Tel. +852 2666 2818, Fax. +852 2666 2814

India: Philips India Ltd., MUMBAI,
Tel. +91 22 691 2000, Fax. +91 22 691 2125

Japan: Philips Components, MINATO-KU, TOKYO,
Tel. +81 3 3740 4377, Fax. +81 3 3740 5232

Korea (Republic of): Philips Electronics (Korea) Ltd., SEOUL,
Tel. +82 2 709 1472, Fax. +82 2 709 1480

Singapore: Philips Components, SINGAPORE,
Tel. +65 350 1814, Fax. +65 255 2493

South Africa: S.A. Philips Pty Ltd., JOHANNESBURG,
Tel. +27 11 471 5400, Fax. +27 11 471 5398

Spain: Philips Components, BARCELONA,
Tel. +34 93 270 4059, Fax. +34 93 270 4012

Sweden: Philips Components AB, STOCKHOLM,
Tel. +46 8 5985 2443, Fax. +46 8 5985 2745

Taiwan: Philips Taiwan Ltd., TAIPEI,
Tel. +886 2 2134 2900, Fax. +886 2 2134 2929

Turkey: Türk Philips Ticaret A.S., UMRANIYE/ISTANBUL,
Tel. +90 216 522 1500, Fax. +90 216 522 18 13

United Kingdom: Philips Components Ltd., DORKING,
Tel. +44 1306 512 054, Fax. +44 1306 875 343

United States:
Philips Components, FARMINGTON HILLS, MI,
Tel. +1 248 553 6080, Fax. +1 248 553 0449

**PHILIPS***Let's make things better.*