



PRAN ELECTRONICS PVT. LTD.

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SPECIFICATION FOR APPROVAL

Customer

Customer's Part

Product Name ADSL SPLITTER

Description ADSL 2+ Splitter for CPE with or without surge protection

Part No. ADSL-002 or ADSL-002-S

Date 30/12/2008

APPROVAL UNIT

Pran Electronics Pvt. Ltd.
Released and approved by:
Anish P. Mehta

Date: 30/12/2008

Customer Approval
Approved by:
Customer Name:

Date:



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1. Introduction:

The ADSL-002/ ADSL-002-S is a splitter module that has been specifically designed to implement the functionality of low pass filter in POTS over ADSL application.

Asymmetric Digital Subscriber Line (ADSL) technology is dedicated , point to point , public network access technology that allows multiple forms of data, voice, and video to be carried over twisted-pair copper wire on the local loop between a network service provider's (NSP'S) central office and the customer site or on local loops created either intra-building or intercampus. Best of all, ADSL delivers this high speed performance over existing copper telephone line all while allowing traditional voice service to coexist without interruption through POTS low pass filters.

The ADSL-002/ ADSL-002-S integrates low pass filter that blocks the high frequency energy from reaching the POTS device and provides isolation from impedance effects of the POTS device on ADSL. In addition, these filter will also attenuate any wideband impulse noise generated by the POTS device due to the interruption of loop current (e.g. pulse dialing or on hook / off hook transfer) because the POTS splitter connects directly to the subscriber loop media, it must also provide some protection for externally induced line hits or faults which could damage any attached equipment or endanger humans interacting with the installed equipment. The circuit protection will be provided mostly by standard central office line protection means and additional protection measures built into pots splitter to protect against line overstress which could damage the splitter itself.

2. Reference:

Ref. 1 : ETS 300 001: Attachment to Public Switched Telephone Network

Ref. 2 : ETSI 101 952-1-1 V1.1.1 Specification of the low pass part of ADSL/POTS splitters

Ref. 3. ITU-T G.992.5. Asymmetric Digital Subscriber Line (ADSL) Transceivers-Extended Bandwidth ADSL2 (ADSL2+)

Ref. 4: ITU-T K.21 Resistibility of telecommunication equipment installed in customer premises to overvoltages and overcurrents.

Ref. 5: ITU-T K.44 Resistibility tests for telecommunication equipment exposed to overvoltages and overcurrents-Basic Recommendation.

3. Abbreviations:

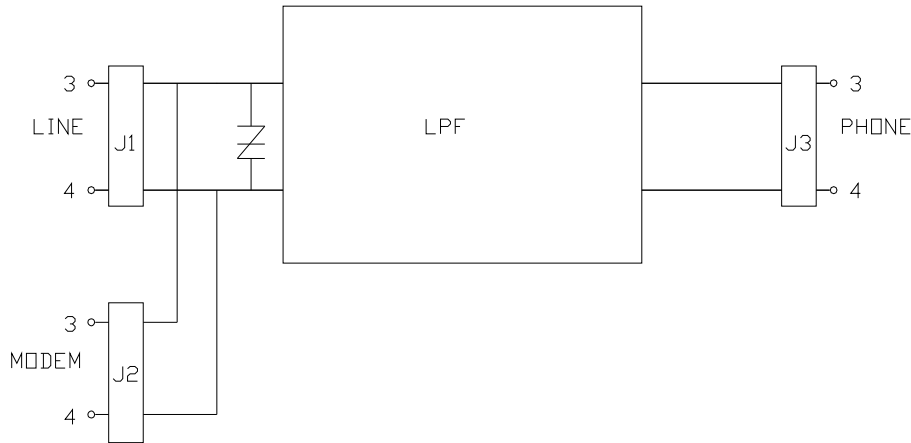
ADSL	Asymmetric Digital Subscriber Line
CO	Central Office
CPE	Customer Premise Equipment.
POTS	Plain Old Telephone Service
RT	Remote Terminal



4. Technical requirements :

4.1. Schematic :

The following drawing shows the block diagram of this product:



4.2. Z_{ADSL-2} definition:

In many of the tests with voice frequencies, the ADSL port of the low pass filter is terminated with an impedance called Z_{ADSL-2} . This impedance model represents the input impedance of the ADSL transceiver (with the HPF), as seen from the low pass filter. This substitute circuit shown in figure 1 is a model which shall be applied to a POTS splitter when verifying requirements of the low pass filter. The model is intended for splitter specification in the context of the present document. The purpose of this model impedance is for splitter specification, it is not a requirement on the input impedance of the ADSL transceiver. From the perspective of practical testing, the impedance model of figure 1 is valid for the case where the splitter already contains blocking capacitors or a third order high pass filter.

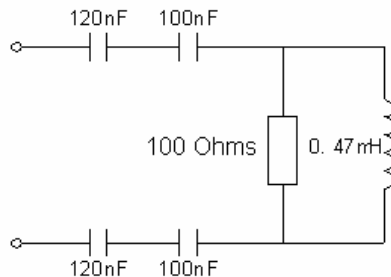


Figure 1. Schematic diagram of the impedance Z_{ADSL-2} for the case where there is a high pass filter or blocking capacitors present in the splitter unit



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4.3. Z_{RHF} definition:

For requirements relating to ADSL frequencies described in the present document, the terminating impedance Z_{RHF} is used to terminate TELE and LINE ports of the low pass filter. This is the European harmonized complex impedance Z_R (*ETSI TS 101 952-1-1 V1.1.1 sub clause 5.2.2*) with the modification. This network is shown in figure 2.

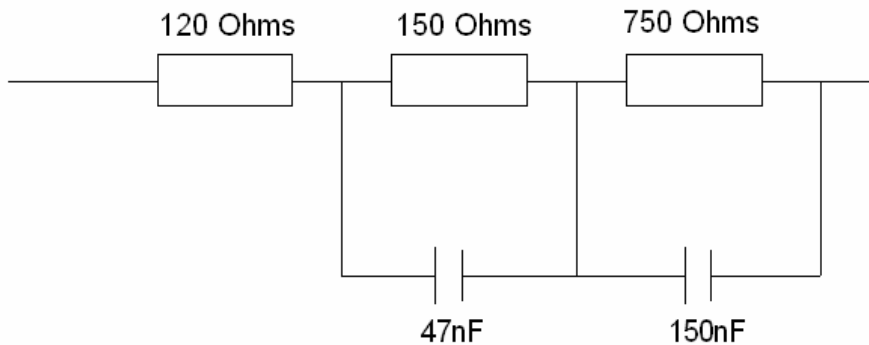


Figure 2. Schematic diagram of the impedance Z_{RHF}



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4.4. Electrical specification :

The low pass filters shall satisfy the following parametric limits with the voice terminals $Z_{real}(1) = 600$ ohms shown in this table. The following requirements are specified for single splitter.

Splitter parameters	Electrical requirements	
	Range	Values
General conditions		
Splitter bandwidth		DC to 17.3 kHz
Nominal voice band		0.3KHz to 4KHz
Billing tone		12 / 16 KHz ± 1 %
Ringing frequency		25Hz to 50Hz
ADSL band		25 KHz to 2208 KHz
Line impedance Z_L	200Hz-4KHz	600 ohms
Co impedance Z_{Tc}	200Hz-4KHz	600 ohms
RT impedance Z_{Tr}	200Hz-4KHz	600 ohms
Modem impedance	25KHz-2208KHz	100 ohms
Operation voltage voice band		
Nominal signal		21mVpp to 5.4Vpp
Billing tone		10Vpp to 30.2Vpp
Ringing signal		100 Vrms
DC voltage		100V
Max. AC voltage		100Vrms with -100VDC offset
Max. differential		250V
Current voice band		
DC Loop current		<100mA
DC requirements		
DC resistance	The sum of A-wire and B-wire resistances from the LINE to the TELE port	< 25 ohms
Isolation resistance, branch-earth	100 VDC	> 20 Mohms
Insertion loss ($Z_{real}(1)$)	@ 1 kHz	< 0.3 dB



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Insertion loss distortion (Zreal(1))	200 Hz to 4 KHz (relative to 1 KHz)	<± 1 dB
Return loss TELE/LINE port (Zreal(1))	300Hz-500Hz	- 14 dB to - 18 dB
	500Hz-2KHz	- 18 dB
	2KHz-3.4KHz	- 18 to -14 dB
Longitudinal balance (LCL & TCL) (Zreal(1))	200Hz-1 KHz	>58dB
	1KHz-3KHz	>53dB
Group delay distortion (Zreal(1))	200Hz-600Hz	< 250 usec
	600Hz-3.2KHz	< 250 usec
	3.2KHz-4KHz	< 250 usec
Frequencies and levels for pulse metering (in 200 Ω)	12/16 KHz ± 1%	< 5 dB
ADSL band characteristic		
Stop band attenuation (Zreal(1) & ZRHF)	25 KHz to 300 KHz	>57dB Objective: >65dB
	300KHz – 2208 KHz	>53dB Objective: >55dB
Loading of ADSL signal path (ZRHF)	25 KHz to 2208 KHz	≤ 0.25 dB



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5. Environmental condition:

5.1. Resistibility to over voltages and over currents:

The splitter has to comply with requirements as per ITU-T K.21.

5.2. Climatic conditions:

5.2.1. Operating temperature:

Application: Indoor

Long time operation guarantee temperature (5 to 40 °C)

Short time operation guarantee temperature (0 to 50 °C)

(According to ETS 300 019, class 3.2)

5.2.2. Storage and transport:

Low ambient temperature - 40 °C

High ambient temperature +85 °C

(According to MIL-STD-202 method 107)

5.2.3. Operation humidity:

Long time operation guarantee humidity (5 to 85 %)

Short time operation guarantee humidity (5 to 90 %)

Short time : within 72 continuous hours and 15 days in a year

6. Reliability conditions:

6.1. Thermal shock :

Temperature from -20 °C to +85 °C for 5 cycles

(According to MIL-STD-202 , method 107)

6.2. Temperature humidity exposure :

+50 °C /95RH , 96hrs

(According to MIL-STD-202 , method 103)

6.3. Vibration test :

Random vibration , frequency 5-500Hz , sweep time :1 hr / axis /

Force : 2.4grams (According to MIL-STD-202 , method 204)



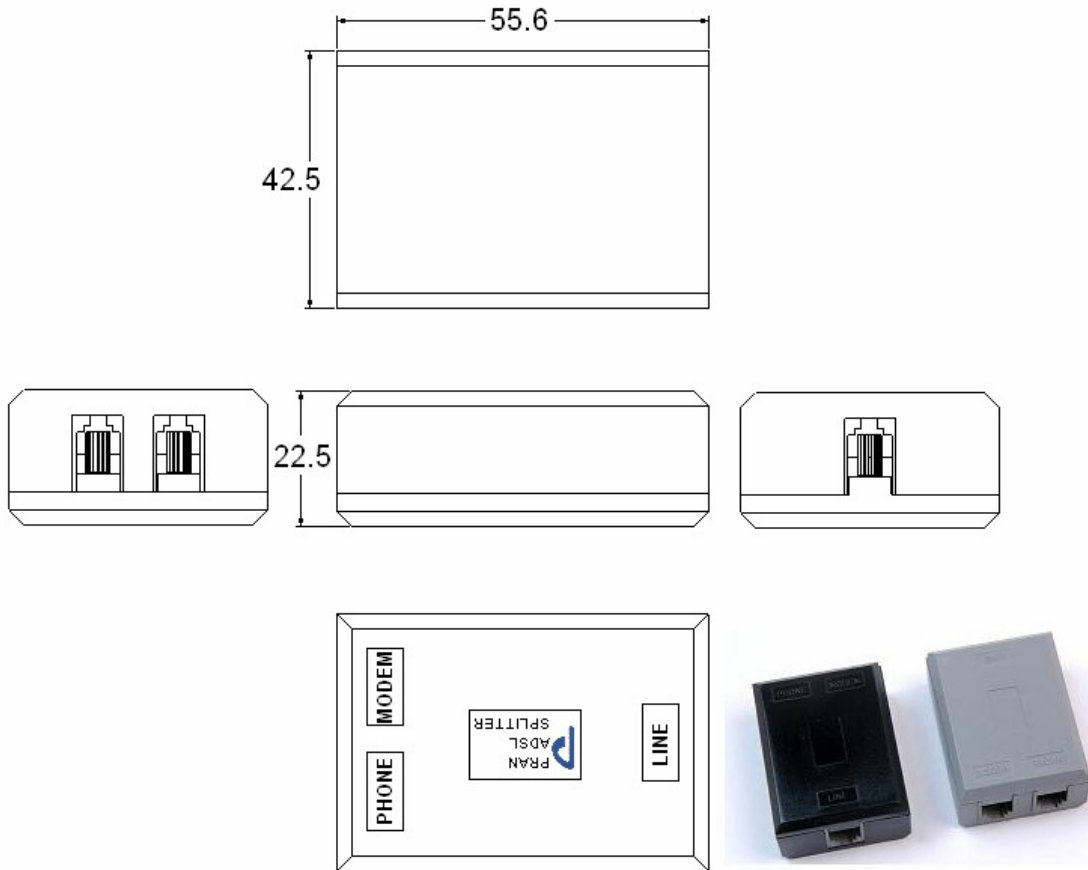
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7. Mechanical condition:

7.1 Dimensions:



Note:

1. Connect LINE port of the splitter to the wall jack, PHONE port of the splitter to the telephone and MODEM port of the splitter to the ADSL modem.
2. Wrong connection will effect the performance and function of splitter.
3. Units: mm and tolerances: +/- 0.2mm
4. Outer casing,dimensions and colour may change from time to time without effecting the functionality or specifications of the splitter. Please check this before ordering.

7.2 Pin assignments:

Position	Type	Tip	Ring
LINE	RJ11 6P2C Jack	PIN 3	PIN 4
PHONE	RJ11 6P2C Jack	PIN 3	PIN 4
MODEM	RJ11 6P2C Jack	PIN 3	PIN 4



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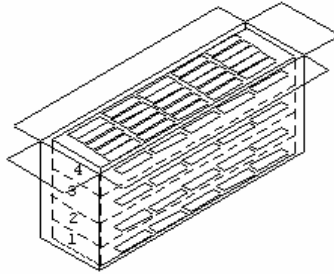
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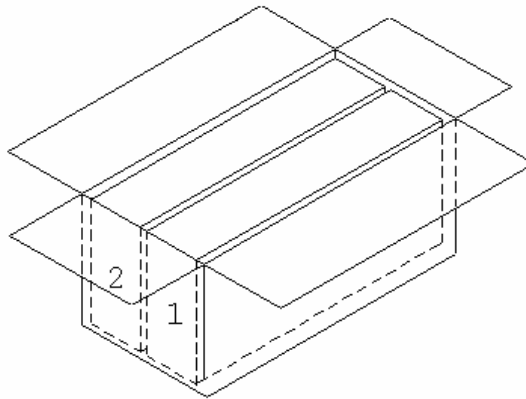
8. PACKING:

Each splitter is packed in plastic bag.

Inner box: 250 nos.
Inner box contains 250 nos. splitters stacked as 25x10.
Inner Box size: 13"x8.5"x9.5"



Outer box: 500 nos.
Outer box contains 2 inner boxes.
Outer box size: 13.5"x18"x10.5"



Packing subject to change without prior intimation.