
**CPE SPLITTER ISDN (2B1Q & 4B3T)
ADSL – ASYMMETRIC DIGITAL SUBSCRIBER LINE**

1 - INTRODUCTION

This document describes an integrated ADSL/ISDN splitter product designed to operate with both 2B1Q & 4B3T ISDN linecodes.



Figure 1

The pn 136963-1 is a splitter which has been designed to implement the functionality of low pass filter in an ADSL over ISDN application.

Asymmetric Digital Subscriber Line (ADSL) is a technology used to transmit broadband information over existing copper wires that connect home and businesses to the Public Switched Telephone Network (PSTN). ADSL is very viable technology to support high-speed access, enabling a theoretical maximum downstream rate of 9Mbps and a maximum upstream rate of 640kbps. ISDN service can coexist with ADSL without interruption or degradation of service due to the filtering action of the ADSL/ISDN splitter.

Overvoltage protection-circuitry is embedded in the splitter design due to the presence on the line of both digital telephone services (ISDN) and ADSL services. An additional ADSL high pass filter is usually integrated at the input of the ADSL modem. The various termination impedances for an ADSL/ISDN design require special adapted filter design process which are not described in this specification.

The pn 136963-1 is functionally a low pass filter which separates the transmission of ISDN signals and ADSL band signals. A second purpose is to isolate poorly balanced ISDN equipment from the line at ADSL band frequencies in order to prevent unnecessary egress (and ingress) from ADSL signals. As the ISDN splitter connects directly to the Subscriber Line 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.

This specification describes the splitter as an OEM-product, focusing on electrical requirements, connectors and mechanical issues.

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2 - PRODUCT PRESENTATION

2.1. Description

Features :

- Low pass filter for ADSL/ISDN
- Consist of passive elements
- Specifications valid with DC current of up to 120mA
- Circuit protection included

2.2. Reference

- ETSI RTS/TM06-006 (to become TS 101 388)
- ETS 300 012
- TS102080 Annexe A/B

3 - GLOSSARY

- ADSL : Asymmetric Digital Subscriber Line
- ATU-C : Adsl Transceiver Unit Central unit
- ATU-R : Adsl Transceiver Unit Remote terminal
- POTS : Plain Old Telephone Service
- PSTN : Public Switched Telephone Network
- CO : Central Office
- RT : Remote terminal
- LT : Line termination
- $Z_{r1/2}$: 2B1Q (135 ohms) / 4B3T (150 ohms) impedances
- LCL : Longitudinal Conversion Loss
- DC : Direct Current
- RMS : Root Mean Square
- LTU : Line Termination Unit
- NTU : Network Termination Unit

4 - NETWORK STRUCTURE

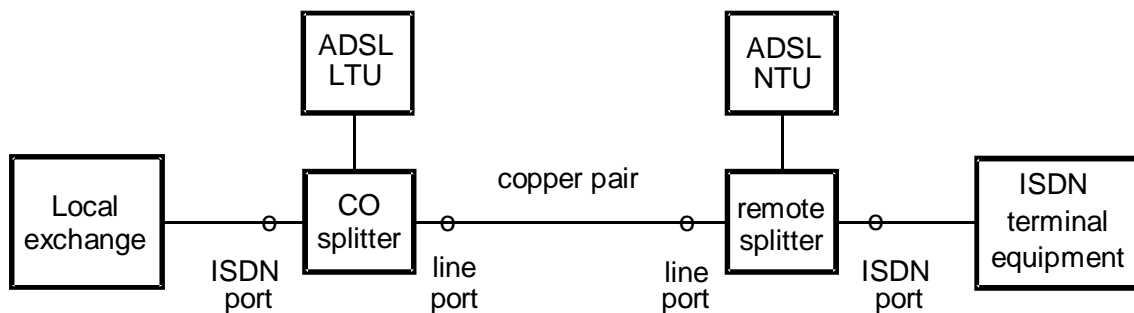


Figure 2

5 - SPLITTER SCHEMATIC

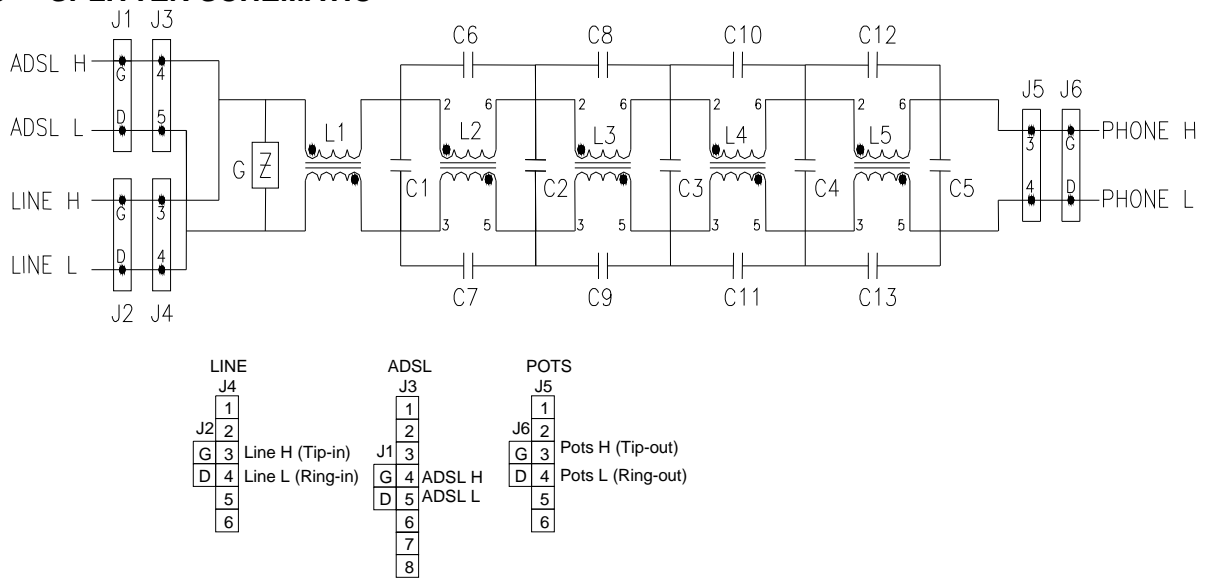
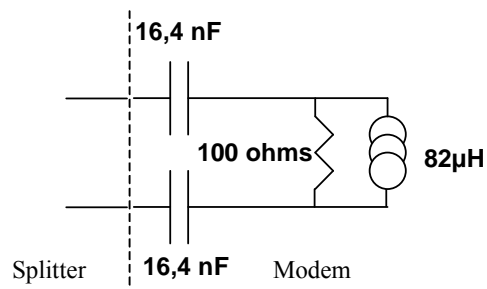


Figure 3

6 - ZHP-R DEFINITION

ZHP-r is defined as the impedance connected to the xDSL port by an ATU-C. The normalised circuit of ZHP-r is showed in Figure 1. The ZHP-r is valid only for voiceband frequencies.

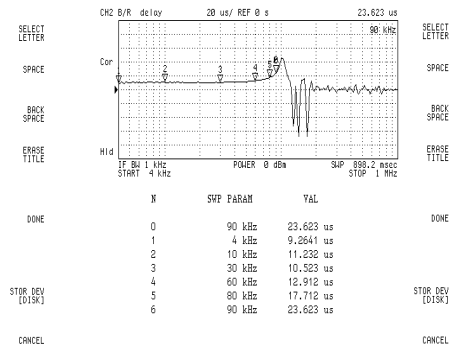
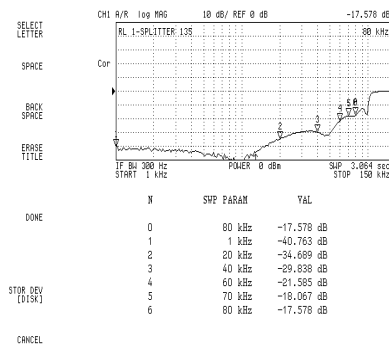
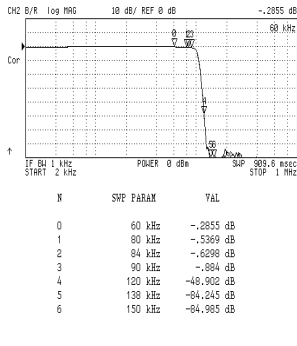


7- ELECTRICAL PERFORMANCE

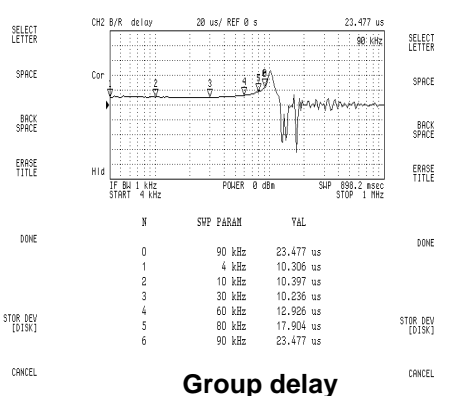
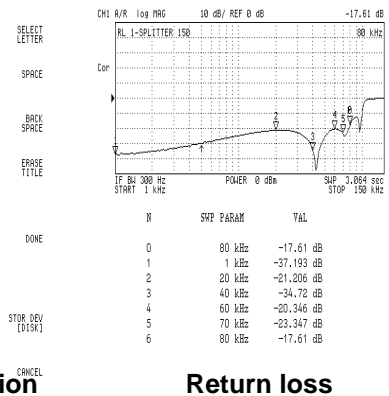
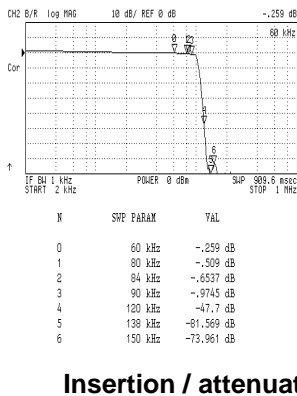
Single splitter (2B1Q)	Performances	ETSI Specification
ISDN port impedance = 135 ohms		
Insertion loss 1-40 KHz	0.6dB	< 0,8 dB
Insertion loss 40-80 KHz	1.1dB	< 2,0 dB
Isolation 150kHz-1104kHz	> 68 dB	> 65 dB
Return loss 1kHz-40khz	20 dB min	> 16 dB
Return loss 40kHz-80khz	18 dB min	>14 dB
Group delay distortion 1kHz-80kHz	18 μs Max	< 20 μs
DC resistance each line	12 Ω	< 12,5 Ω

Single splitter (4B3T)	Performances	ETSI Specification
ISDN port impedance = 150 ohms		
Insertion loss 1-60 KHz	0.6dB	< 1,2 dB
Insertion loss 60-80 KHz	1.1dB	< 2,0 dB
Isolation 150kHz-1104kHz	> 68 dB	> 65 dB
Return loss 1kHz-60khz	18 dB min	> 16 dB
Return loss 60kHz-80khz	16 dB min	>14 dB
Group delay distortion 1kHz-80kHz	18 μs Max	< 20 μs
DC resistance each line	12 Ω	< 12,5 Ω
Isolation résistance (branch to branch)	> 25MΩ with 100VDC	

Splitter Performance Graphs (2B1Q impedance):



Splitter performance Graphs (4B3T impedance)



Insertion / attenuation

Return loss

Group delay

8- SURGE PROTECTION

The lay-out shall provide gas discharge arrestors and fuses at line input/ tip and ring.

The observance of EMC/CE-requirements, especially surge/power contact, has to be guaranteed.

Use of a non (less) radioactive type of Gas-discharge-arrestor is required; the use of TPB270 (ST) or SPG-401M (LSE) between tip/ring-wire is recommended.

9- ENVIRONMENTAL CONDITIONS

9-1 EMC, surge and power contact

The PN 136963-1 is compliant with the following safety standards :

- EN 60950, 2nd ed. (1992), including amendements 1 (1993), 2 (1993), 3 (1995) and 4 (1997)
- IEC 60950, 2nd ed. (1991), including amendements 1 (1992), 2 (1993), 3 (1995) and 4 (1996)
- Line, ADSL and Phone circuit, subjected to overvoltages (TRT3)
- ETS 300 386-1, (1994), equipment engineering; public telecommunication network equipment; EMC requirements; product family overview, compliance criteria and test levels
- ITU-T K21, (1996), resistibility of subscriber’s terminal to overvoltages and overcurrents

9-2 Climatic conditions

Operating temperature (according to ETS 300 019, class 3.2) :

Application	indoor
Low ambient temperature	- 5°C
High ambient temperature	+ 45°C

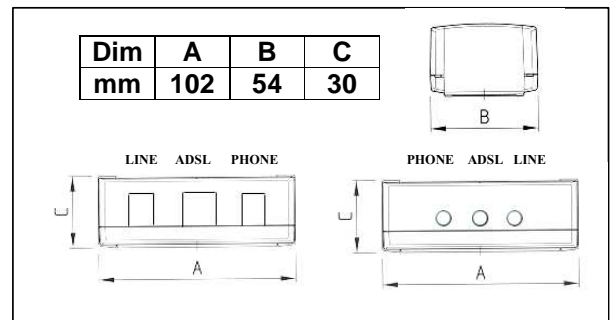
Storage and Transport (according to ETS 300 019, transport: class 2.3, storage : class 1.2) :

Low ambient temperature	- 40°C
High ambient temperature	+ 85°C

9-3 Mechanical conditions

Operation	Specification
Vibration sinusoidal	IEC68 Part 2-6 : 10 to 58Hz – 0,075mm & 58 to 500Hz – 10m/s ² & 1 octaver/mn 3 axis & every 10 cycles
Shock (half sine)	IEC68 Part 2-27 & ≤ 100kg, 100m/s ² , 11ms & 6 directions, every 3 shocks
Handling	Specification
Freefall	IEC68 Part 2-32 Stand alone : < 10kg, 75mm & Built in : 2x ground area
Storage and transport	Specification
Vibration (random)	IEC68 Part 2-64
Vibration (random)	IEC68 Part 2-29
Vibration (random)	IEC68 Part 2-32 <10kg 800mm Twice at any possible - Transport position on concrete floor

10 - PHYSICAL DIMENSIONS (MM ± 0.25)



LINE / PHONE : RJ11 ADSL MODEM : RJ11/45

- Phone /line/ADSL modem : double output configuration RJ and terminal block
- Wall mounting system supplied with the splitter + 2 screw + user manual
- Wire clamp inside the package to fix the Line/phone cable



Number of port per box	1
Dimensions (L x W x H)	54 x 102 x 30
Weight (empty)	100 g
Operating temperature	-5° / +45°C
Storage temperature	-40° / +85°C
Operating humidity	5% / 95%, non-condensing
Pollution degree	2