File No.	RDPS-POTS414	
Document Revision	R1	
System Application	Asymmetric Digital Subscriber Line	
Product Type	POTS Splitter	
Product Name	CPF118F	
Date	Jul. 29th, 2005	
Issued By	Alvin Liou – Design Engineer, R&D_1	
	alvin@ycl.com.tw	
Approved By	Grant Teng – Manager, R&D_1	
	grantteng@ycl.com.tw	
Issued Date		

YCL Electronics Co., Ltd.

No. 95, Feng Jen Road, Feng Shan City, Kaohsiung County, Taiwan

Table of contents

1. Introduction:

The CPF118F 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 allow 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 intra-campus. 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 POTS-splitter on the customer premises side consists of a lowpass section.

The CPF118F integrate low pass filter that block the high frequency energy from reaching the POTS device and provide 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. The electrical and transmission specification is based on ETSI TR 101 728 .

2. References:

Ref. 1 :   ETS 300 019   Environmental conditions and environmental tests for
                                Telecommunications equipment
Ref. 2 :   ETSI 101 728   Network and Customer Installation
Ref. 3 :   ITU-T K21   Resistibility of subscribers terminal to overvoltages
                                and overcurrents.
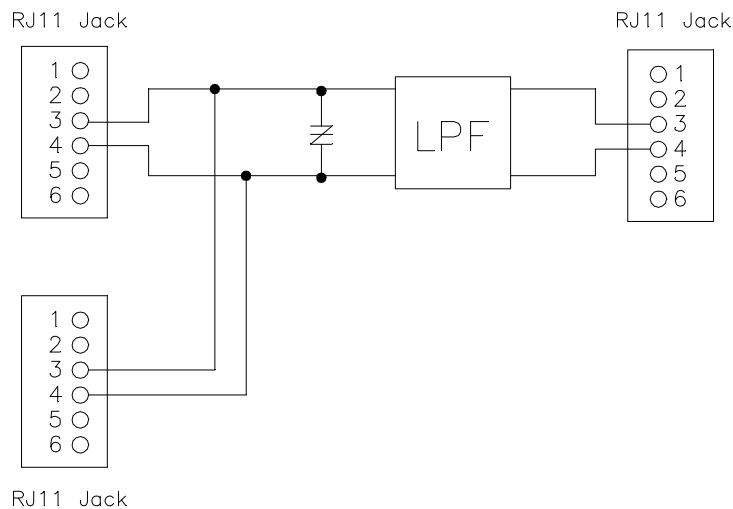
3. Abbreviations:

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

4. Technical requirements:

4.1. Schematic:

The following drawing illustrates the schematic of this product.

4.2. ZHP-r definition:

To facilitate the test of the splitter,the high pass data have to be taken into consideration.
Capacitors of 0.1uF on the NT-side are connected in series with 0.12uF capacitors in the
tip-And ring-line of the ADSL-output of the splitter itself(see block diagram above). The
equivalent circuit diagram of the NT-side is shown below :
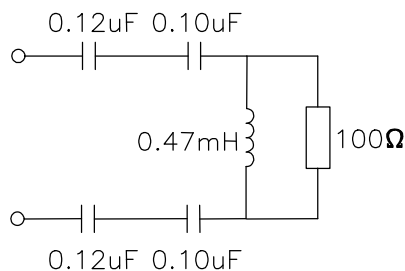
4.3. Electrical specification:

The low pass filter shall satisfy the following parametric limits with a complex impedance ZL shown in this table across the Line side of this device . The following requirement is specified for a single splitter.

Splitter parameter	Electrical requirements	
	Range	values
Frequency range		
Splitter bandwidth		DC to 3.4 kHz
Nominal voice band		0.3 kHz to 3.4 kHz
Billing tone		12 kHz±80 Hz
Ringing frequency		15.3 Hz to 68 Hz
ADSL band		30 kHz to 1104 kHz
Line Impedance ZL		270 ohm + (750 ohm ‖ 150 nF)
CO impedance ZTc		270 ohm + (750 ohm ‖ 150 nF)
RT impedance ZTr		270 ohm + (750 ohm ‖ 150 nF)
Modem impedance	30 kHz< f< 1104 kHz	100 ohm
Operation voltage voice band		
Nominal signal		21 mVpp to 5.4 Vpp
Billing tone		10 Vpp to 30.2 Vpp
Ringing signal	25 Hz	100 Vrms
DC voltage		45 V to 52 V
Max. AC voltage		150 Vrms with −105 VDC offset
Max. differential		320 V
Current voice band		
Loop current		<=80 mA
DC Resistance		
DC Resistance		<=50 ohm
Isolation resistance tip/ring		>5 Mohm
Voice –band characteristic		
Insertion loss(Z_R / 600 ohm)	1004 Hz	<1.0 dB
Attenuation distortion (relative to 1004Hz)	200 Hz<f<4 kHz	<±1.0 dB
Delay distortion	300 Hz<f<600 Hz	<250 usec
	600 Hz<f<3200 Hz	<200 usec

Splitter parameter	Electrical requirements				
	Range		**values**		
	3200 Hz<f<4000 Hz		<250 usec		
Splitter parameter	Range	values	ADSL	Phone	Line
Return loss from POTS port	300 Hz<f<3400 Hz	>=12dB	Z_{ADSL}	Z_{SL}	Z_{SL}
	3400 Hz<f<4000 Hz	>=8 dB	Z_{ADSL}	Z_{SL}	Z_{SL}
	300 Hz<f<3400 Hz	>=12 dB	Z_{ADSL}	Z_R	Z_R
	3400 Hz<f<4000 Hz	>=8 dB	Z_{ADSL}	Z_R	Z_R
Return loss from Line port	300 Hz<f<3400 Hz	>=12 dB	Z_{ADSL}	Z_{SL}	Z_{SL}
	3400 Hz<f<4000 Hz	>=8 dB	Z_{ADSL}	Z_{SL}	Z_{SL}
	300 Hz<f<3400 Hz	>=12 dB	Z_{ADSL}	Z_R	Z_R
	3400 Hz<f<4000 Hz	>=8 dB	Z_{ADSL}	Z_R	Z_R
Longitudinal conversion loss LCL	30 KHz to 1MHz		>50 dB		
	1 MHz to 5 MHz		>30 dB		
ADSL modem interface					
Isolation voltage			>2000 Vrms for 1 minute		
ADSL band characteristic					
ADSL Insertion loss	26-1100 KHz		<0.3 dB		
Stop band attenuation	32 KHz<f<1104 KHz		>55 dB		

5. Environmental conditions:

5.1. Resistibility to overvoltages and overcurrents:
The splitter has to comply with requirements as per ITU-T K.21.

5.2. Climatic conditions:

5.2.1. Operating temperature: ⚠
Application: Indoor

Operation guarantee temperature -20 ^{0}C to +65 ^{0}C

5.2.2. Storage and transportation: ⚠
Low ambient temperature   - 40 ^{0}C

High ambient temperature   +85 ^{0}C

(According to MIL-STD-202 method 107)

5.2.3. Operation humidity: ⚠
Operation guarantee relative humidity 0 to 95% (non-condensing)

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 / Overall: 1.15 g rms

Freq. (Hz): 1 → 4 → 100 → 200

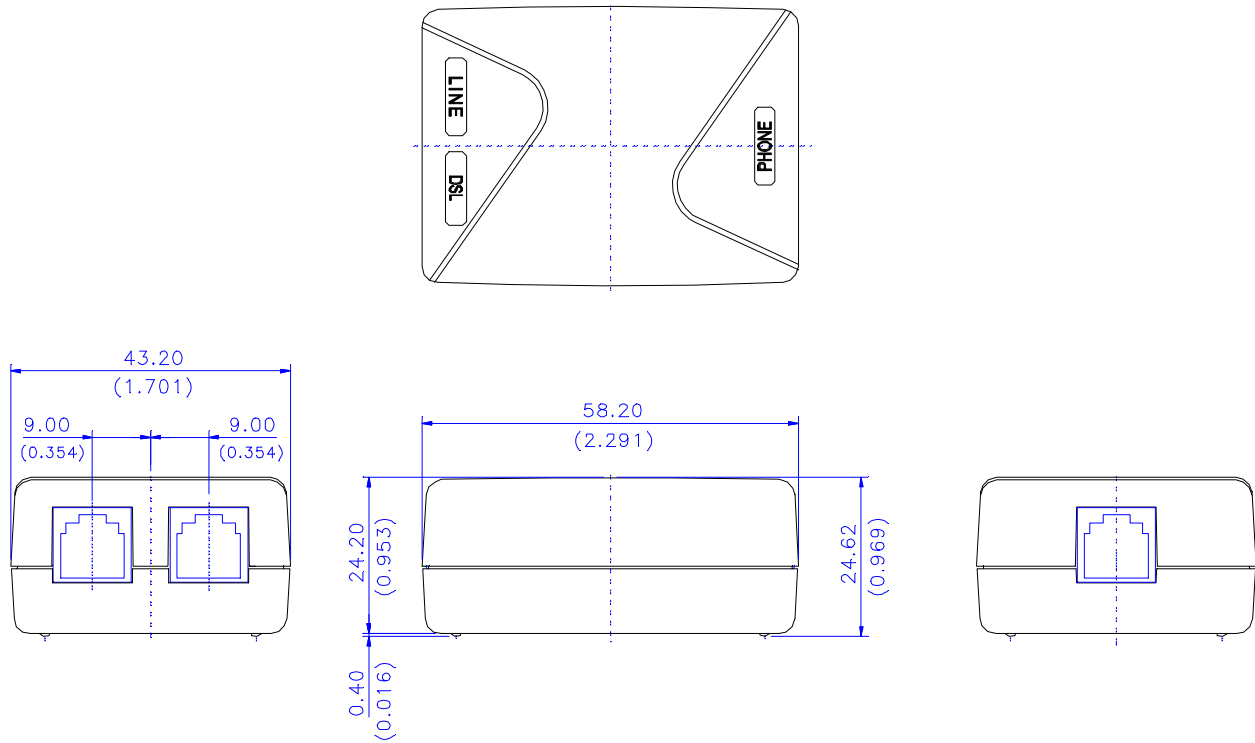PSD (g^2/ Hz): 0.0001 → 0.01 → 0.01 → 0.001

Test Axis / Time: Top / 30 mins   Bottom / 10 mins

                  X axis / 10 mins   Y axis / 10 mins

(According to ISTA PROJECT 2A)

7. Mechanical conditions:

7.1. Dimensions:

Note :

    (1) all tolerance : ± 0.25mm (0.001) inch
    (2) color code for case:91H301B0
    (3) Unit : mm