File No	RDPS-POTS418
Revision	R1
System Application	ISDN Filter for ADSL
Product Type	ISDN Splitter
Product Name	CPF102IG
Date	Oct. 17th, 2002
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1. Introduction:

The CPF102IG is a splitter module that has been specifically designed to implement the functionality of low pass filter in ISDN with 2B1Q/4B3T over ADSL application. The CPF102IG integrate low pass filter that block the high frequency energy from reaching the ISDN device and provide isolation from impedance effects of the ISDN device on ADSL. Because the ISDN 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 splitter to protect against line overstress which could damage the splitter itself.

2. Reference: ⚠

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Ref. 1 :	ETSI TS 101 388	Asymmetric Digital Subscriber Line European specific Requirements
Ref. 2 :	ETSI TS 101 952-1-3	ADSL Splitters for European deployment
Ref. 3 :	ANSI T1.413	Network and customer installation interface.
Ref. 4 :	ITU G.992.1 Annex B	
Ref. 5 :	ITU-T K.21	Resistibility of telecommunication switching equipment to Overvoltages and overcurrents .

3. Abbreviations:

ADSL	Asymmetric Digital Subscriber Line
ISDN	Integrated Service Digital Network
CO	Central Office
CPE	Customer Premise Equipment.
POTS	Plain Old Telephone Service
RT	Remote Terminal
Z_{ADSL}	Network termination of ADSL

4. Technical requirements :

4.1. Schematic :

The following drawing illustrates the schematic of this product.
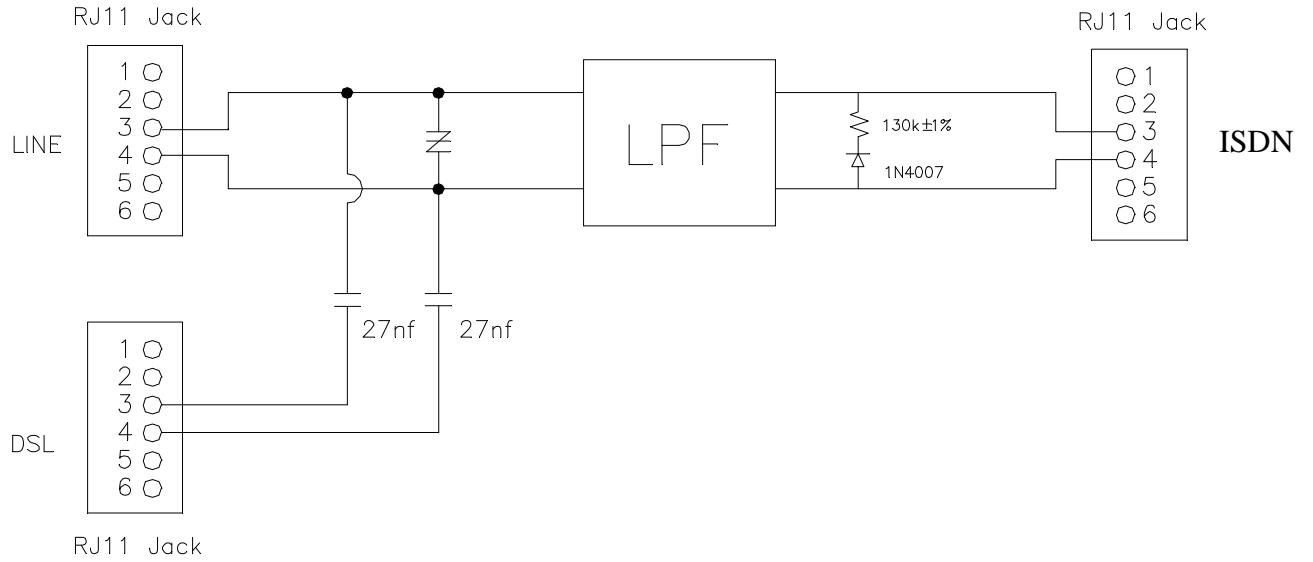
4.2. Electrical Specification :

4.2.1. General requirement : ⚠

All of electrical specifications for ISDN path stated herein must be met and satisfied separately for single individual splitter and also for the complete splitter combination.

Splitter parameter	Electrical requirements	
	Range	values
ISDN band(3dB bandwidth)		DC to 94KHz
Nominal impedance		
Line impedance ZL		135/150 ohm
CO impedance ZTc		135/150 ohm
RT impedance ZTr		135/150 ohm
Modem impedance		100 ohm
Operation voltage ISDN	For 2B1Q/ 4B3T Band	
Current voice band		
Loop current		0-60mA
DC resistance		
DC resistance(single splitter)		<=12.5 ohm
Isolation resistance tip/ring		>5 M ohm
resistance to earth		>20 M ohm
ISDN band characteristic		
Insertion loss(for 2B1Q)	1KHz to 40KHz	<0.8 dB
	40KHz to 80KHz	<2 dB
Insertion loss(for 4B3T)	1KHz to 60KHz	<1.2 dB
	60KHz to 80KHz	<2 dB
Delay distortion	0.1KHz <f<80KHz	<20 usec
Return loss (for 2B1Q)	1KHz to 40KHz	>16 dB
	40KHz to 80KHz	>14 dB
Return loss (for 4B3T)	1KHz to 60KHz	>16 dB
	60KHz to 80KHz	>14 dB
Unbalance about earth	300Hz to 30kHz	>40 dB
	30kHz to 1104kHz	>46 dB
	1104kHz to 5MHz	>40 dB
Line interface		
Attenuation	150KHz to 1104KHz	>65 dB

4.3. Test methodology

4.3.1. Filter insertion loss and attenuation and return loss test :

4.3.1.1. Test equipment :

a : HP4395A Network / Spectrum / Impedance Analyzer

b : HP87512A Transmission / Reflection test set

c : Balun North Hills : 0303LB(50Ω : 135Ω) / 0415LB(50Ω : 150Ω)

4.3.1.2. Test Setup: is shown in Fig.1 .

4.3.1.3. Test procedure : ⚠

a : Set HP4395A in B/R mode for insertion loss and attenuation test while in A/R
   mode for Return loss test.

b : Connecting the Analyzer to the ISDN and LINE sides of splitters through the North
   Hills Balun 0303LB/ 0415LB

c : Set frequency of interest given in specification.

d : Calibrating the HP4395A network Analyzer via the thru for attenuation test while
   open, short, load calibration being performed for Return loss.

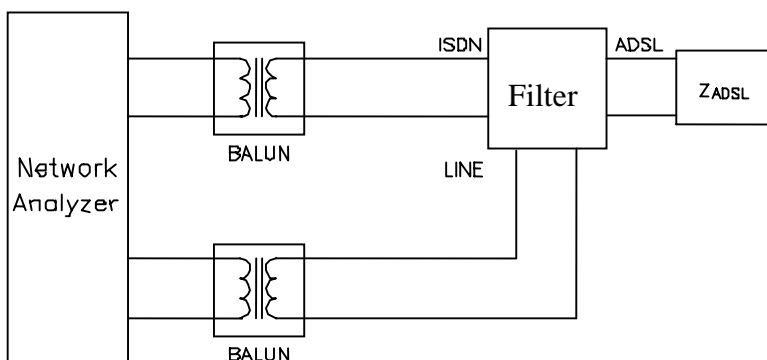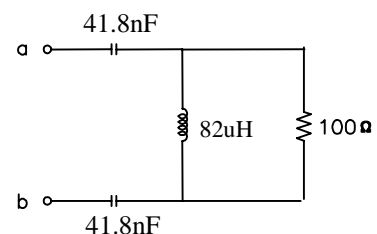e : Measurement insertion loss and attenuation and Return loss.

Fig.1. Test Setup

Fig.1-a Z_{ADSL} Load

5. Environmental condition:

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
Long time operation guarantee temperature (5 to 40 ^{0}C)
Short time operation guarantee temperature (0 to 50 ^{0}C)
(According to ETS 300 019, class 3.2)

5.2.2. Storage and transport:
Low ambient temperature   - 20 ^{0}C
High ambient temperature   +85 ^{0}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 $^\circ$C to +85 $^\circ$C for 5 cycles
(According to MIL-STD-202 , method 107)
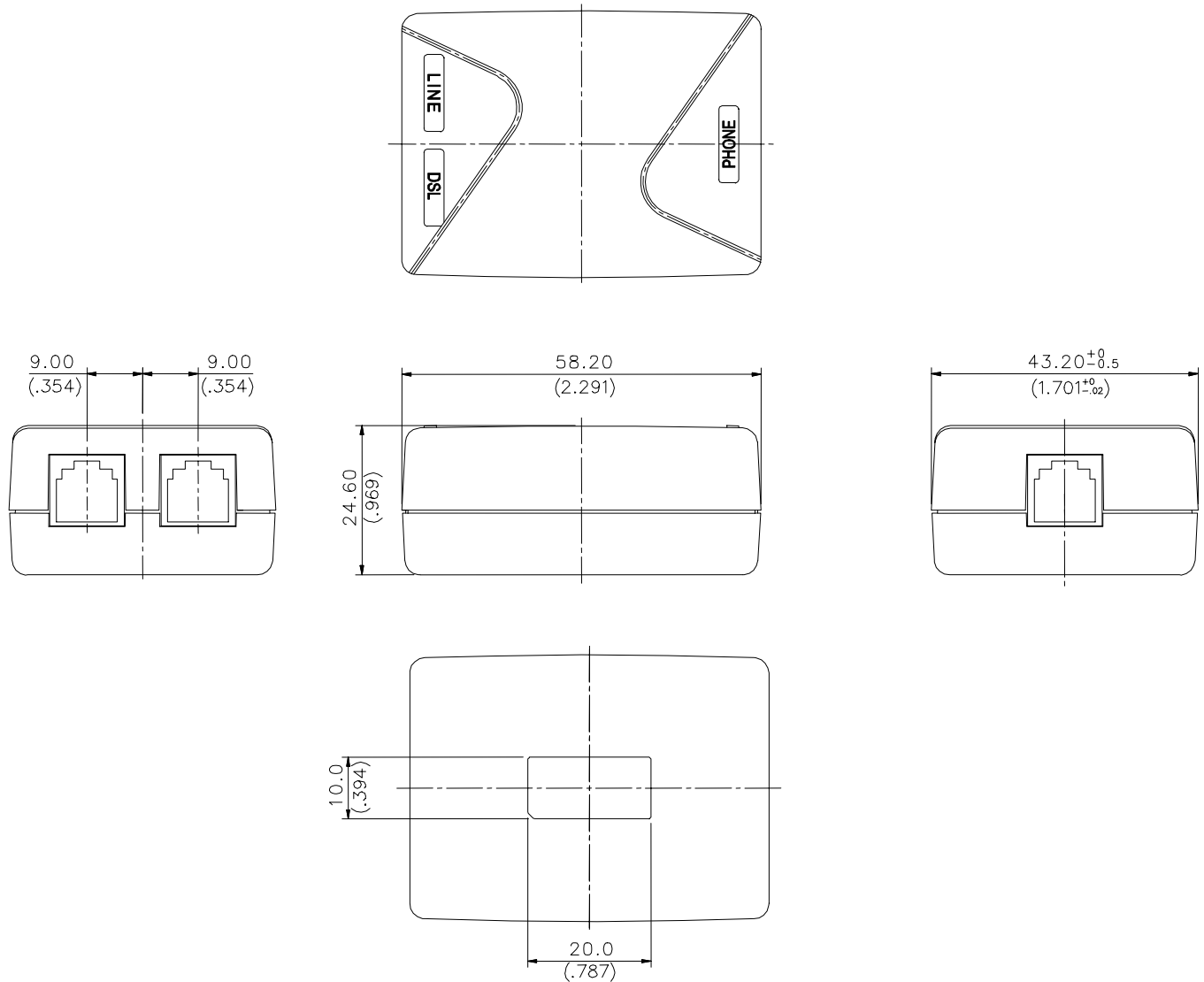
6.2. Temperature humidity exposure :
+50 $^\circ$C /95RH , 96hrs
(According to MIL-STD-202 , method 103)

6.3. Vibration test :
Random vibration , frequency 5-500Hz , sweep time :1 hr / axis /
Force : 2.4grams (According to MIL-STD-202 , method 204)
Note : Z_{ADSL} load can be terminated with load, or open

7. Mechanical condition:

7.1 : PCB dimension :

Notes :
1. Unit : mm
2. Tolerance : $\frac{\pm 0.25mm}{(\pm .010inch)}$