File No	RDPS-MF036	
Revision	R4	
System Application	Asymmetric Digital Subscriber Line	
Product Type	Micro filter	
Product Name	MF608B	
Date	Feb. 26th, 2003	
Issued By	Feilong Chen - Design Engineer, R&D_1 Feilong@ycl.com.tw	
Approved By	Roger Wu – Manager, R&D_1 roger@ycl.com.tw	
Issued Date		

YCL Electronics Co., Ltd.

No.95, Feng Jen Road. Feng Shan City, Kaohsiung, Taiwan, R.O.C.

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1. Introduction:

The MF608B is a “in – line” (or distributed) filter 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 within intra-campus / intra-building networks. 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 MF608B 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 , this 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 filter connects directly to the subscriber loop media , it must 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 filter to protect against line overstress which could damage the filter itself.

2. Reference: △3

Ref. 1 :	ETS 300 001	Attachment to Public Switched Telephone Network
Ref. 2 :	SIN 346 Issue 2.1	BT ADSL INTERFACE DESCRIPTION
Ref. 3 :	K21	Resistibility of subscribers terminal to overvoltages and overcurrents.
Ref. 4 :	ITU G992.1 Annex E Type1 - European	

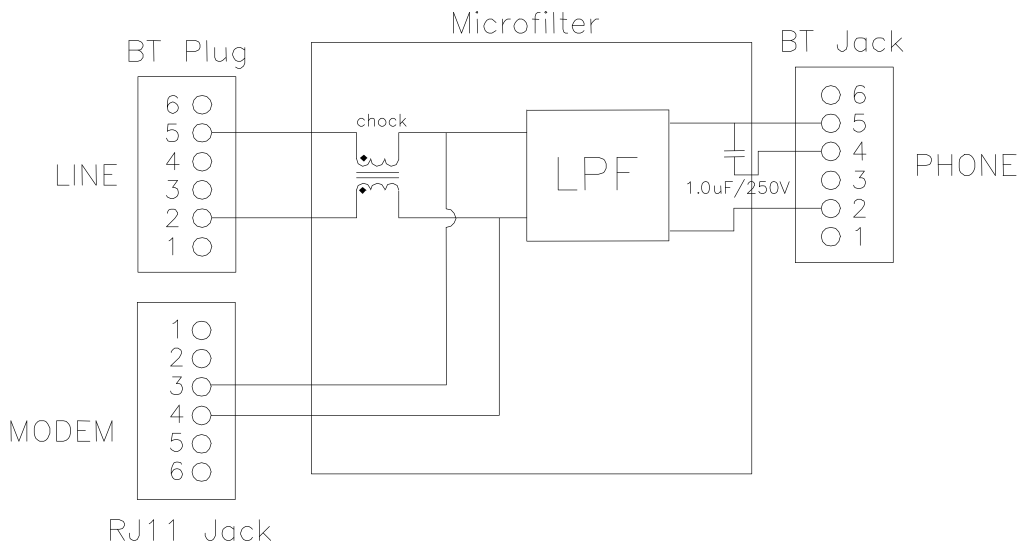
3. Abbreviations:

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: 3

The following drawing illustrate the schematic of this product.



4.2. Electrical specification : △3

Splitter parameter	Electrical requirements	
	Range	values
Frequency range		
Nominal voice band		0.3KHz to 3.4KHz
Billing tone		50Hz
Ringing frequency		25Hz to 50Hz
ADSL band		30KHz to 1104KHz
Line Impedance ZL		320ohm + (1050ohm || 230nF)
CO impedance ZTc		320ohm + (1050ohm || 230nF)
RT impedance ZTr		320ohm + (1050ohm || 230nF)
Modem impedance	30KHz< f< 1104KHz	100 ohm
Operation voltage voice band		
Nominal signal		<3.0 dBm
Billing tone		10Vpp to 30.2Vpp
Ringing signal		<100Vrms
DC voltage		0V to 100V
Max. AC voltage	25Hz < f <50Hz	100Vrms with100VDC offset
Max. differential		242V
Current voice band		
Loop current		<100mA
Transient current(on/off hook)		<150mA
DC Resistance		
DC Resistance		<=50 ohm
Isolation resistance between any wire and earth		>10 Mohm
Isolation resistance between wires		>1Mohm
Voice–band characteristic single filter		
Insertion loss	1KHz	<1.0 dB
Attenuation distortion	200Hz<f<4KHz	<±1 dB
Delay distortion	200Hz<f<4KHz	<200 usec
CLI signal loss	200Hz<f<4KHz	<3.0 dB

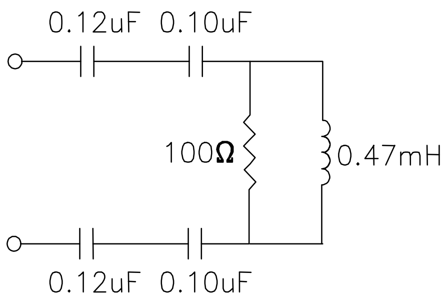
Splitter parameter		Electrical requirements	
		Range	values
Return loss from line side		300Hz< f<500Hz	>=14 dB
		500Hz< f<2KHz	>=18 dB
		2KHz< f<3.4KHz	>=14 dB
Return loss from phone side		300Hz< f<500Hz	>=14 dB
		500Hz< f<2KHz	>=18 dB
		2KHz< f<3.4KHz	>=14 dB
Longitudinal conversion loss LCL		50 to 600Hz	>=46 dB
		600Hz to 3.4 KHz	>=52 dB
Voice–band characteristic for three filters			
Insertion loss		1KHz	<1 dB
Attenuation distortion		200Hz< f <4KHz	±1 dB
Return loss from phone side		200Hz< f <2KHz	>18 dB
		2KHz< f <3.4KHz	>14 dB
ADSL modem interface			
Isolation voltage			>2000Vrms for 1 minute
ADSL band characteristic			
Stop band attenuation	Off-hook	32KHz	>29 dB
		200KHz<f<1104KHz	>55 dB
	On-hook	32KHz	>29 dB
		350KHz<f<1104KHz	>55 dB
Longitudinal balance	Line side	25KHz<f<1104KHz	>40 dB
	Phone side	25KHz<f<1104KHz	>40 dB
Common-mode insertion loss	From Line to phone	26KHz<f<1104KHz	>30 dB
	From Line to ADSL	26KHz<f<1104KHz	>30 dB

4.3. DC characteristic :

All requirement of this specification can be met in the presence of all POTS loop currents from 0mA to 100mA. This in line filter can pass POTS tip-to-ring dc voltages of 0V to 100V and ringing signals of 40V to 100Vrms at any frequency from15.3Hz to 68Hz with a dc component in the range from 0V to 100V. The dc resistance from tip-to-ring at the line port interface with the phone interface shorted, shall be less than or equal to 50 ohms. The DC resistance from tip-to-ground and from ring-to-ground at the POTS interface with the U-R interface open shall be greater than or equal to 5 Megohms. The ground point shall be local building or green wire ground. As an objective , the dc resistance should exceed 10MΩ.

4.4. ZHP-r Definition:

To facilitate testing of the In-Line Filter independently of the actual modem or specific vendor,ZHP-r is defined to allow proper termination of the ADSL port during voice band testing. The ZHP-r is valid only for voice band frequency. The combination of capacitors in the ZHP-r is only representative. The input shall be 27nF however derived. ZHP-r equivalent circuit is shown below.



4.5. Test method :

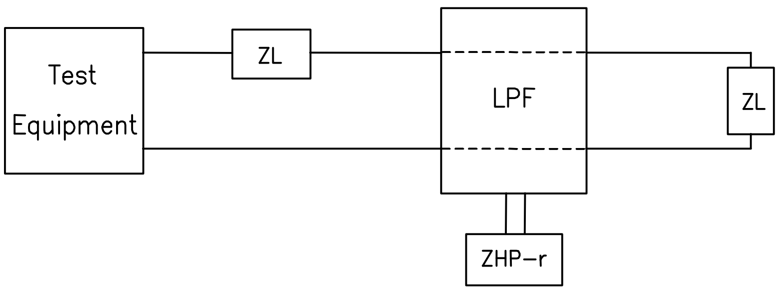
4.5.1 Insertion loss :

The insertion loss of a device connected into a given transmission system is defined as the ratio, expressed in dB, of the load power available(before and after insertion) delivered to the output network beyond the point of insertion at a given frequency. In general , the insertion loss of a device inserted in a given transmission system is mainly caused by internal component resistive loss while all of the impedance between source , load and device interface having been matched. To perform the insertion loss measurement ,thru calibration must be done prior the testing . General Insertion loss equation can be expressed as following. Insertion loss = 20 log $|V2 / V1|$ dB where

V1 = the measured voltage value of load without LPF in circuit.

V2 = the measured voltage value of load with LPF in circuit.

The test setup is shown in drawing below :



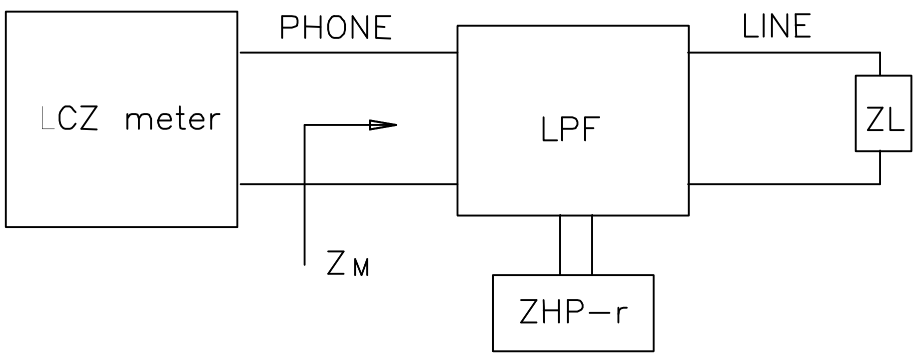
4.5.2 . Return loss :

Return loss measures the amount of lost energy due to reflection resulted from impedance mismatching at the interface. Return loss is essentially defined as the ratio of the incident power upon a given transmission system to the reflective power caused by impedance mismatch with respect to reference impedance at the interface between source and device. Return loss figure is a function of the impedance of the circuit involved and therefore frequency dependent. These impedance must be closely maintained in order to reduce the possibility of undesirable reflection and echoes which results from long distance circuit of the telephone user and may destroy the data being sent. To perform the return loss test , open ,short and load calibration must be done prior measurement while the LCZ impedance analyzer being selected in impedance mode. Return loss is general expressed in decibels.

General return loss equation is listed: Return loss = 20 log $|Z_L + Z_M / Z_L - Z_M|$ dB

Where Z_L = the reference impedance Z_M = the measured impedance

The test setup is shown in drawing below:



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 °C to +85 °C for 5 cycles

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

6.2. Temperature humidity exposure :

+50 °C /95RH , 96hrs

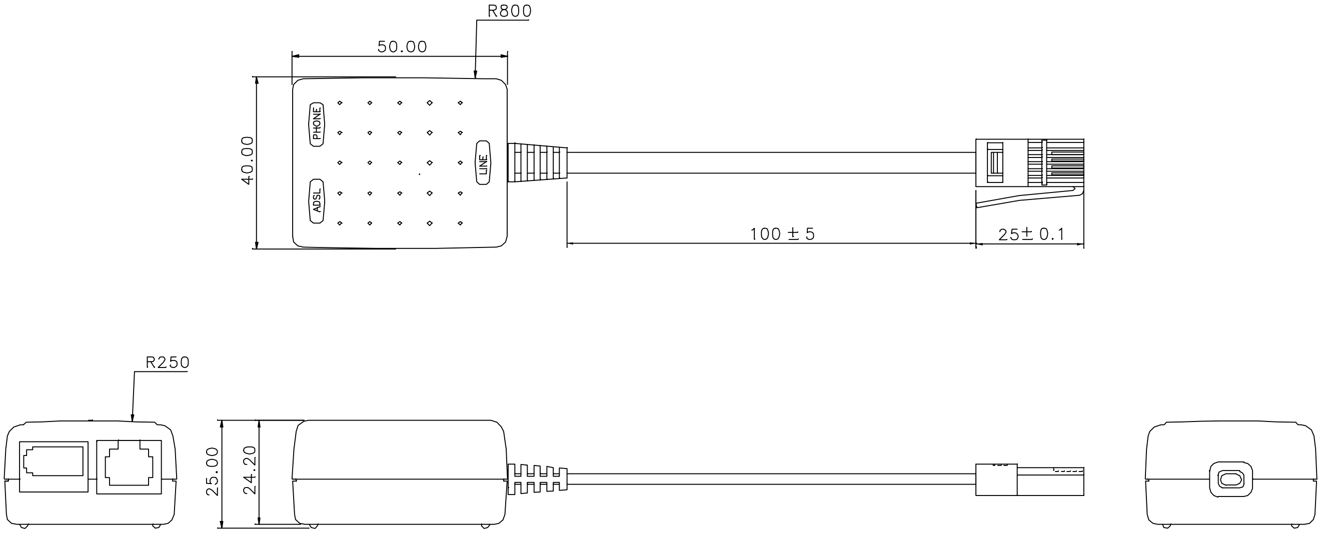
(According to MIL-STD-202 , method 103)

6.3. Vibration test :

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

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

7. Mechanical condition: △4



TOLERANCES	
.	±0.5
.X	±0.2
.XX	±0.10