DATAMASTER

ACCESS
COMMUNICATIONS PTY LTD

ADSL Filter 6P4C
K2310ASH

FEATURES

The K2310ASH is an "in-line" (on distributed) filter that has been specifically designed to implement the functionality of a low pass filter in POTS over ADSL application. Asymmetric Digital Subscriber Line (ADSL) technology is a 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) telephone exchange and the customer site or on local loops created either intra-building or intra-campus. ADSL delivers this high-speed performance over existing copper telephone line while simultaneously allowing a traditional analog service to coexist without interruption via a series of low-pass filters. The low-pass filter on the customer's premises is mounted inside a stand-alone ABS housing.

The K2310ASH integrates a low pass filter which blocks the ADSL high frequency signals from reaching the analog device and provides isolation from any impedance effects of the analog device on the ADSL transmission. The filter also attenuates any wideband impulse noise generated by the analog device due to the interruption of loop current (e.g. pulse-dialing or on hook / off hook conditions).

Because the K2310ASH connects directly to the subscriber's loop media, it must also provide some surge protection from externally induced voltage which could damage any attached equipment or endanger humans interacting with the installed equipment. Additional surge protection measures are built into the K2310ASH to protect against line surges that could damage the filter itself.
Also known as:

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

TECHNICAL DRAWING

```
     RJ11 Plug                                      RJ11 Jack
        ┌──────┐                                    ┌──────┐
        │ 1 ○  │                                    │ ○ 1  │
        │ 2 ○  │          ┌──────────────┐          │ ○ 2  │
LINE    │ 3 ○──┼──────────┤              ├──────────┼──○ 3 │   PHONE
        │ 4 ○──┼──────────┤     LPF      ├──────────┼──○ 4 │
        │ 5 ○  │          │              │          │ ○ 5  │
        │ 6 ○  │          └──────────────┘          │ ○ 6  │
        └──────┘                                    └──────┘
```

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▨▨ Electrical SPECIFICATIONS

SPLITTER PARAMETERS	ELECTRICAL REQUIREMENTS	
	RANGE	VALUES
Frequency Range		
Nominal voice band		0.3KHz to 3.4KHz
Ringing frequency		22Hz ± 28HZ
ADSL band		30KHz to 1104KHz
Line Impedance ZL		220Ω + (820Ω ‖ 115nF)
CO Impedance ZTc		220Ω + (820Ω ‖ 115nF)
RT Impedance ZTr		220Ω + (820Ω ‖ 115nF)
Modem impedance	30KHz < f < 1104KHz	100Ω
Operation voltage voice band		
Normal signal		21mVpp to 5.4 Vpp
Billing tone		10Vpp to 30.2Vpp
Ringing signal		40Vrms to 80Vrms (113Vpp to 227Vpp)
DC voltage		0V to -72V
Max. AC voltage		70Vrms with -72VDC offset
Max. differential		190V
Current voice band		
Loop current		<120mA
Transient current (on/off hook)		<400mA
DC resistance		
DC resistance		<100Ω
Isolation tip/ring		>5MΩ

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////// Electrical SPECIFICATIONS

SPLITTER PARAMETERS	ELECTRICAL REQUIREMENTS	
	RANGE	VALUES
Voice-band characteristics		
Insertion loss for single splitter	1KHz	<1.5dB
	200Hz <f< 3.4KHz	<3.5dB
Insertion loss with 2 parallel filters	1KHz	<1.5dB
	200Hz <f< 3.4KHz	<3.5dB
Delay distortion	200Hz <f< 4KHz	<150u sec
Return loss for single splitter	300Hz <f< 2000Hz	>=15dB
	200Hz <f< 3.4KHz	>=12dB
Return loss for 2 parallel filters	300Hz <f< 2000Hz	>=15dB
	200Hz <f< 3.4KHz	>=12dB
Longitudinal conversion loss LCL	600Hz to 3.4KHz	>=45dB
ADSL modem interface		
Isolation Voltage		>2000Vrms for 1 minute
ADSL band characteristics		
Stop band attenuation (with ZHP-r)	30KHz	>18dB
	100KHz <f< 300KHz	>30dB
	300KHz <f< 1104KHz	>40dB
Stop band attenuation (without ZHP-r)	30KHz	>18dB
	100KHz <f< 300KHz	>30dB
	300KHz <f< 1104KHz	>40dB
Loading of ADSL signal path	300KHz <f< 1104KHz	<0.25dB

ZHP-R DEFINITION

To facilitate the test of the splitter, the high pass data stream has to be considered. ZHP-r (shown below) is defined to allow proper termination of the ADSL port during voice band testing. ZHP-r is valid only for the voice band frequencies. ZHP-r is almost the same as 27nF + 470u H // 100Ω defined in AS/ACIF.

```
        0.12uF 0.10uf

  o──┤├──────┤├───┬─────────┐
                 │         │
             100Ω ▷        ⌇ 0.47mH
                 │         │
  o──┤├──────┤├───┴─────────┘

        0.12uF 0.10uf
```
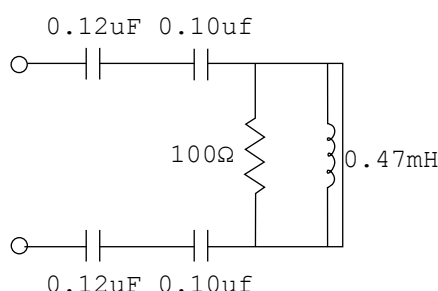
DC CHARACTERISTICS

All requirements of this specification can be met in the presence of POTS loop currents from 0mA to 120mA.

This in-line filter can pass POTS tip-to-ring dc voltages of 0V to 72V and ringing signals of 40V to 80V rms at any frequency from15.3Hz to 68Hz with a dc component in the range from 0V to 72V.

The dc resistance from tip-to-ring at the line port interface with the phone interface shorted, shall be less than or equal to 100 ohms for one filter. 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 MΩ. The ground point shall be local building or green wire ground. The dc resistance should exceed 10MΩ.

TEST METHOD 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 with impedances between the source, the load and the device interfaces having been matched.

To perform the insertion loss measurement, through-calibration must be done prior to testing.
The insertion-loss equation can be expressed as:
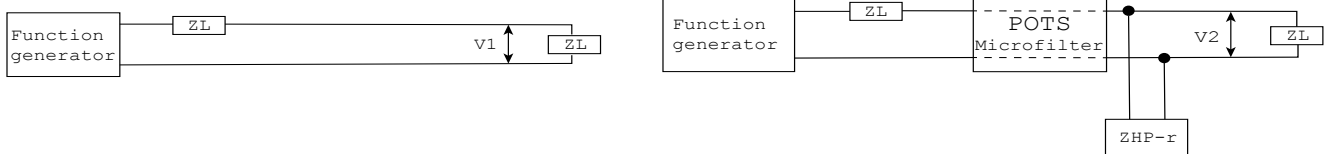Insertion loss = 20 log I I V2 / V1 I dB
        Where: V1 = the measured voltage value of load without LPF in circuit.
                V2 = the measured voltage value of load with LPF in circuit.

The test setup is shown in drawing below :

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TEST METHOD INSERTION LOSS

Return loss measures the amount of lost energy due to reflection that is the result of any impedance mismatching at the interface. Return loss is essentially defined as the ratio of the power incident upon a given transmission system to the power reflected caused by impedance mismatch with respect to reference impedance at the interface between source and device.

The return-loss figure is a function of the impedance of the circuit involved and is therefore frequency dependent. These impedances must be closely maintained in order to reduce the possibility of undesirable reflection and echoes which occur in long distance circuits and effect the data being sent.
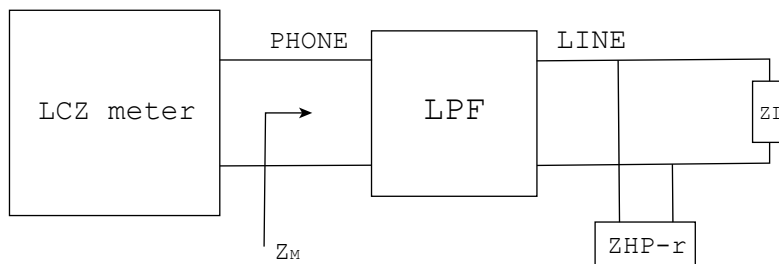
To perform the return loss test, open, short, load-calibration must be done prior measurement with the LCZ impedance analyser being in impedance mode.

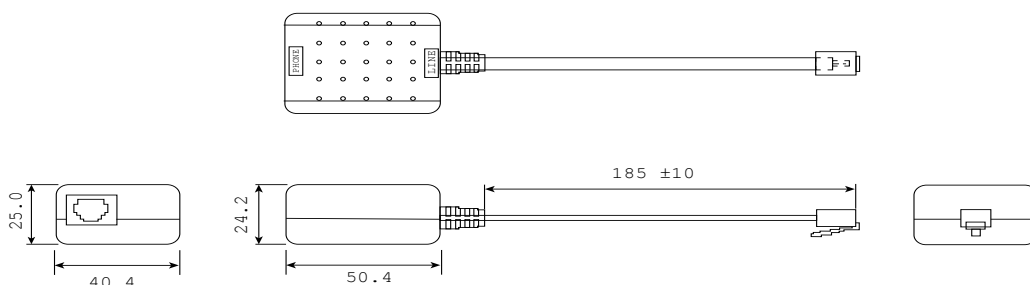Return loss is generally expressed in decibels. The return loss equation is:
Return loss = $20 \log | Z_L + Z_M / Z_L - Z_M | $ dB

Where: Z_L = the reference impedance
Z_M = the measured impedance

DIMENSIONS

ENVIRONMENTAL

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 40oC)
Short time operation guarantee temperature (0 to 50oC)
(According to ETS 300 019, class 3.2)

5.2.2. Storage and transport
Lowest ambient temperature - 20oC
Highest ambient temperature +85oC
(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

RELIABILITY

6.1. Thermal shock
Temperature from -20oC to +85oC for 5 cycles
(According to MIL-STD-202, method 107)

6.2. Temperature humidity exposure
+50oC /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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