

# M-ADSL-FILTER

## Microfilter & Splitter for ADSL Lines



## INTRODUCTION

The **M-ADSL-Filter** has been specifically designed to implement the functionality of a low pass filter using G.Lite Technology. This technology is similar to full rate ADSL but operates at a lower data rate of up to 1.5Mbps downstream and 512Kbps upstream, depending on line conditions and lengths. M-ADSL-Filter is a lower speed alternative version of ADSL that will eliminate the need for telecom to install and maintain a premises based POTS splitter. It was found necessary to include one or more, low pass filters in series with the POTS terminals in order to reliably achieve maximum data rates. For POTS voice band service, the M-ADSL-Filter provides protection from ADSL signals, which may impact through non-line or other remote devices (handset, fax, voice band modem etc) and central office operations. For ADSL signals, it also provides protection from the high frequency transient and impedance effect that occur during POTS operations (ringing transients, on-hook, off-hook transient and so on). Because the POTS splitter in the M-ADSL-Filter connects directly to the subscriber loop media, it also provides some protection for externally induced line hits or faults which could damage any attached equipment or endanger people 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 the POTS splitter to protect against line overstress, which could damage the splitter itself.

## DC CHARACTERISTICS:

All requirements of this specification can be met in the presence of all POTS loop currents from 0 mA to 100 mA. This Single In-Line filter can pass POTS tip-to-ring DC voltages of 0 V to 105 V and ringing signals of 40 Vrms to 150 Vrms at any frequencies from 15.3 Hz to 68 Hz superimposed on DC voltages in the range from 0 V to 105 V. 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 for one filter. The DC resistance from tip-to-ground and from ring-to-ground at the Phone interface with the Line interface open shall be greater than or equal to 10 Megohms. The ground point shall be local building or green wire ground. As an objective, the DC resistance should exceed 10 M $\Omega$ .

# PRODUCT SPECIFICATION

Splitter parameters	Electrical requirements	
	Range	Values
Splitter bandwidth		DC to 4 kHz
Nominal voice band		0.3 kHz to 3.4 kHz
Ringing frequency		15.3 Hz to 68 Hz
ADSL band		30 kHz to 1104 kHz
Line Impedance Z	300 Hz to 3.4 kHz	600 ohms
Line Impedance ZNL-r	300 Hz to 3.4 kHz	1330 ohm // (380 ohm // 0.1 $\mu$ F)
Modem impedance	30 kHz to 1104 kHz	100 ohms
<b>Operation voltage voice band</b>		
Nominal signal		21 mVpp to 5.4 Vpp
Ringing signal		40 Vrms to 150 Vrms ( 113 Vpp to 424 Vpp )
DC voltage		0 V to 105 V
Max. AC voltage		150 Vrms with -105 VDC offset
Max. Differential		320 V
<b>Operation current voice band</b>		
Loop current		< 100 mA
<b>DC resistance</b>		
DC resistance	Tip to Tip and Ring to Ring	< 50 ohms
Isolation resistance	Tip to Tip and Ring to Ring	> 10 Mohms
<b>Differential input blocking impedance</b>		
Line side	20 kHz	> 2 kohms
	30 kHz	> 3 kohms
	5 MHz to 10 MHz	> 2 kohms
	10 MHz to 400 MHz	N/A
<b>Voice band characteristics</b>		
Insertion loss between 600 ohms resistive single filter	1004 Hz	< 0.7 dB
With 5 filters	1004 Hz	< 1.0 dB
Attenuation distortion between 600 ohms resistive single filter	200 to 4 kHz	< 1.0 dB
600 ohms return loss single filter	SRL-L	> 23 dB
	ERL	> 23 dB
	SRL-H	> 23 dB
600 ohms return loss with 5 filters	SRL-L	> 20 dB
	ERL	> 13,5 dB
	SRL-H	> 7 dB
Complex* ZNL-r Return loss single filter	SRL-L	> 26,5 dB
	ERL	> 17 dB
	SRL-H	> 9 dB
Complex* ZNL-r return loss with 5 filters	SRL-L	> 15 dB
	ERL	> 8 dB
	SRL-H	> 2 dB
* 1330 ohms in parallel with the series connection of a 348 ohms resistor and a 100 nF capacitor		
Longitudinal conversion loss (LCL)	200 Hz to 1 kHz	> 58 dB
	1 kHz to 3 kHz	> 53 dB
Delay distortion	200Hz to 4 kHz	< 100 $\mu$ s
Inter-Modulation distortion	2nd	> 57 dB
	3rd	> 60 dB
<b>ADSL band characteristics</b>		
Common mode rejection	40 kHz	> 45 dB
	1.1 Mhz	> 45 dB
ADSL band attenuation	40 kHz	> 24 dB
	1 Mhz	> 65 dB