

Customer Specification File

Customer:

Project : New Zealand in line Filter for ADSL Application

Request from :

Magcom PN: APZ001

Revision	Realized By	Modification Description	Date	Last Pages
A01	Jay Hsieh	New Release	SEP-26-2006	14
A02	Jay Hsieh	Modify 5.1	DEC-26-2006	5

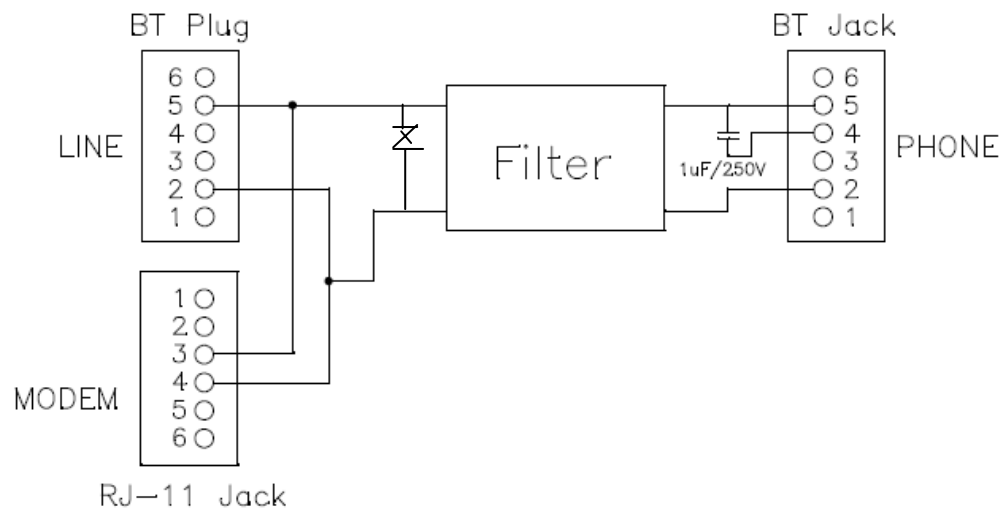
Table of contents

1	Preliminary	4
2	Customer reference documents	4
3	Standard reference documents	4
4	Features	4
5	Design requirements	5
	5.1 Schematic.....	5
	5.2 Electrical Performance.....	6~7
	5.3 Test method.....	8~12
	5.4 Mechanical Conditions.....	13
6	Environmental conditions	14
	6.1 Resistibility to over voltages and over currents.....	14
	6.2 Climatic conditions.....	14
7	Reliability conditions	14
	7.1 Thermal shock.....	14
	7.2. Temperature humidity exposure.....	14
	7.3. Vibration test.....	14
8	Note	14

1 Preliminary:**2 Customer reference documents:****3 Standard reference documents:**

- Specification PTC 280: 2001

4 Features

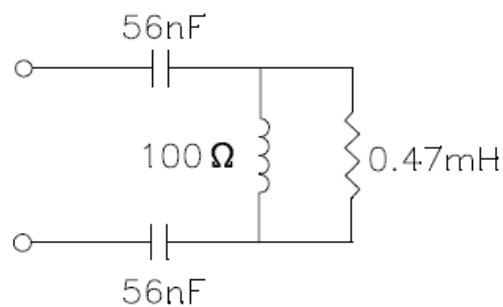
5 Design Requirement**5.1 Schematic :**

5.2 Electrical Performance

5.2.1 General conditions :

General conditions		
	Conditions	Values
Splitter bandwidth		DC – 16 kHz
Voice band		DC - 4 kHz
Ringing frequency		25 Hz ~ 50 Hz
ADSL frequency band		30 kHz ~ 2208 kHz
Line impedance ZL	200 Hz ~ 4 kHz	370 ohm + (620 ohm // 310 nF)
CO impedance ZTc	200 Hz ~ 4 kHz	370 ohm + (620 ohm // 310 nF)
RT impedance ZTr	200 Hz ~ 4 kHz	370 ohm + (620 ohm // 310 nF)
Modem impedance	30 kHz ~ 2208 kHz	100 ohm
ZADSL	30 kHz ~ 2208 kHz	See note
Max. operating voltage to ground		250 VDC
DC Loop current		< 100 mA
Transient current (on / off hook)		< 100 mA

Note : $Z_{ATUR, HF}$ definition :



5.2.2 Electrical Requirement :

Electrical Requirement		
DC requirements		
	Conditions	Values
TIP and RING to Earth	100 VDC	> 10 M Ω
TIP to RING	100 VDC	> 5 M Ω
TIP to RING	POTS port shorted	\leq 100 Ω
Voice band loss requirements		
Insertion loss	1 kHz	\leq 2.0 dB
Attenuation distortion	200 Hz ~ 3.4 kHz	$\leq \pm$ 1.5 dB
Delay distortion	200 Hz ~ 4 kHz	< 200 μ s
Longitudinal conversion loss (LCL)	25 k, 50 k , 100 k ,200 k , 1100 k	\geq 40 dB
Voice band requirements for four filters		
Insertion loss	1 kHz	\leq 2.0 dB
Attenuation distortion	200 Hz ~ 3.4 kHz	$\leq \pm$ 1.5 dB
Echo balance return loss from phone side	Loop 1 (see note)	\geq 9 dB
	Loop 2 (see note)	\geq 7 dB
ADSL band requirements		
Stop band attenuation	25 kHz ~ 50 kHz	\geq 20 dB
	50 kHz ~ 2208 kHz	\geq 25 dB
ADSL band bridge loss	25 kHz ~ 2208 kHz	\leq 2.0 dB

Note :

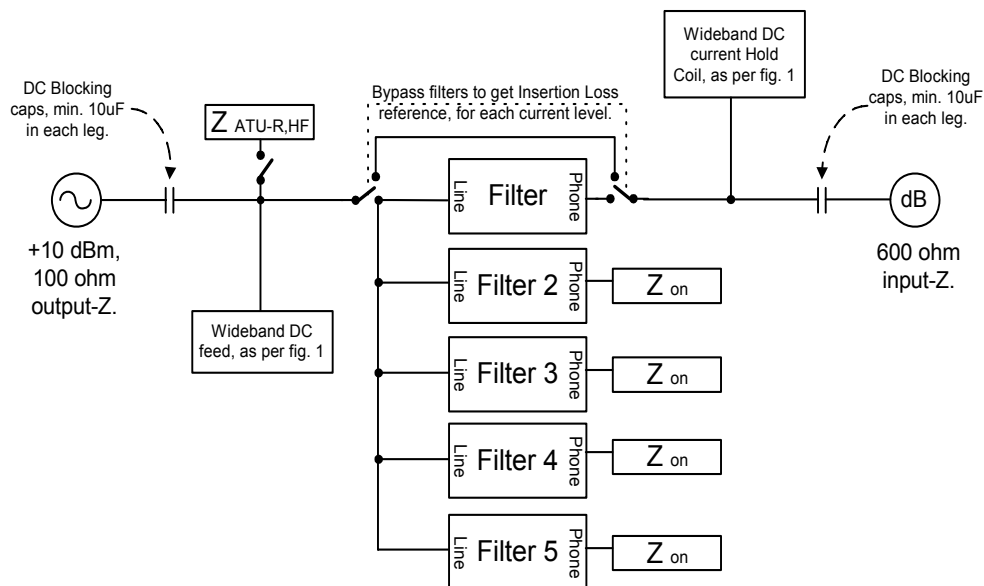
Loop 1 : 200 m , 1500 m , of 0.4 mm PEFUT cable.

Loop 2 : 3600 m of 0.4 mm PEFUT cable.

5.3 Test method :

5.3.1 ADSL band Insertion loss test set up :

- (1) With a +10 dBm signal of frequency 25 to 1100 kHz applied at the line interface from a 100 Ω source, with and without simulated ATU-R hf and five filters connected, the signal across a 600 Ω termination of one filter is measured with 20, 40, 60 and 80 mA DC applied (8 freq range measurements). The other four filters are terminated with 1 M Ω .
- (2) The receive level shall also be measured across 600 Ω with no DC on the line side of the filter, with and without simulated ATU-R, after removal and bypassing the filters. (2 freq range measurements)
- (3) The insertion loss is the measured receive levels with and without simulated ATU-R hf, less the measured receive levels with and without simulated ATU-R hf and the filters removed and bypassed. (8 freq range results)



Insertion loss for 25 to 50 kHz shall be ≥ 20 dB

Insertion loss for 50 to 1100 kHz shall be ≥ 25 dB

Note :

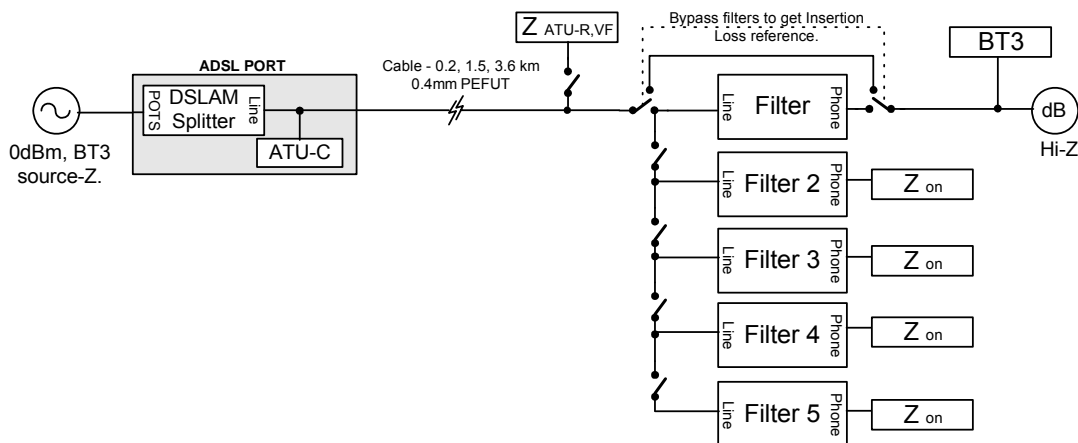
Should the insertion loss change with increased DC, then other tests that include off-hook CPE shall be repeated with 80 mA or the current resulting from application of 60 VDC to the feed circuit of Figure 1. However, where the change of insertion loss with increased DC is significant, it is more likely that the candidate filter will fail some other requirements.

$Z_{ON} = 1 \text{ M}\Omega$

5.3.2 Voice band Insertion loss test set up :

(1) Measured over the range 200 to 3400 Hz, between one filter with simulated ATU-R in parallel, and the DSLAM POTS port via 0.2, 1.5 and 3.6 km of cable. Both ends are terminated with BT3. Measurements are repeated for the three cable lengths with addition of one, two, three and four parallel connected filters, each terminated with 1.0 MΩ.

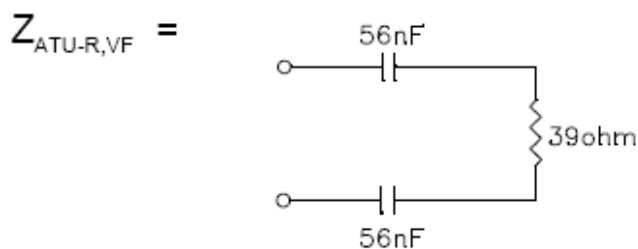
(2) Insertion loss is the measured receive levels for each of the combinations of cable, ATU-R and connected filters (30 measurements), less the received level for the same length of cable and ATU-R connection, but with the filters bypassed and isolated (6 measurements).



For all cable lengths, ATU-R connection and number of filters connected, insertion loss of the filters at 1000 Hz shall be ≤ 2 dB.

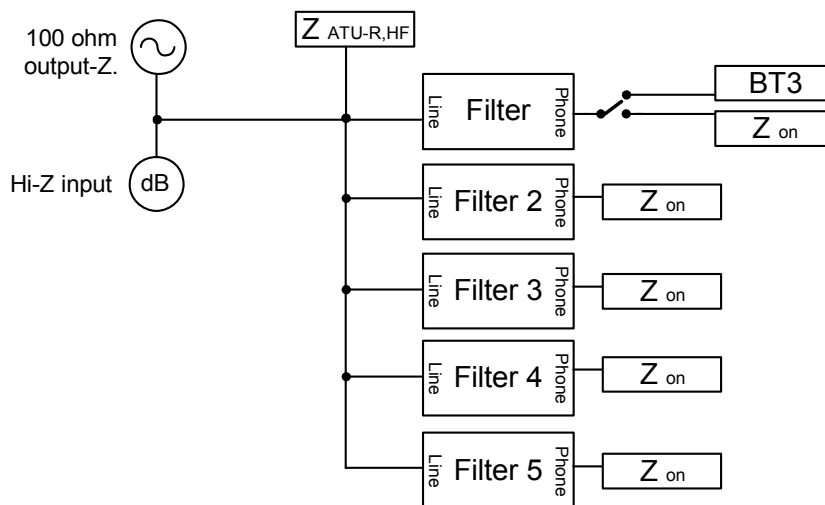
For all above conditions, variation of insertion loss of the filters between 200 and 3400 Hz from that at 1000 Hz shall be $\leq \pm 1.5$ dB.

Note : BT3 = 370 ohm + (620 ohm // 310 nF)



5.3.3 ADSL band bridging loss test set up :

The line interface is supplied with 25 to 1100 kHz from a 100 Ω generator and the bridging level measured across the ADSL frequencies simulated ATU-R. Five filters are connected – firstly all are terminated with 1 M Ω on the phone side and secondly, with one of the terminations changed to BT3. Bridging loss is the difference between the level across ATU-R alone and that for each of the two filter terminations. (2 frequency range results)



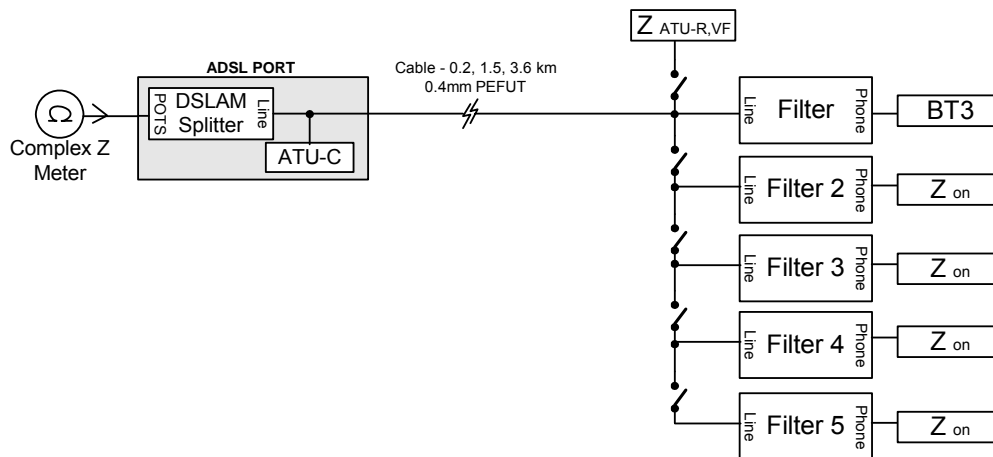
Bridging loss shall be ≤ 2 dB over the frequency range.

5.3.4 Echo balance return loss from Line side test set up :

(1) Balance return loss is measured at the POTS port of the DSLAM line card, against both BT3 and N reference impedances. From this point, the circuit includes 200m, 1500m and 3600m of 0.4mm PEFUT cable to simulated ATU-R with one filter connected in parallel. The first filter is terminated on the phone side with BT3.

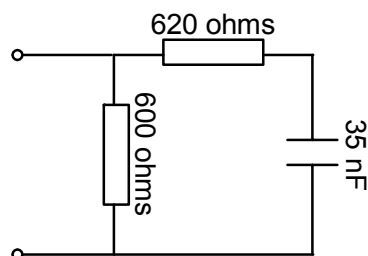
(2) Measurements are repeated for the three cable lengths with the addition of one, two, three and four parallel connected filters, each terminated with 1.0 M Ω .

(3) EBRL is computed from the balance return loss measurements, or those calculated from measurements of complex impedance, for each condition. See definitions under EBRL, for formula.



For all combinations of cable and numbers of filters: EBRL against BT3 and N shall be ≥ 9 dB; except that for 3600 m of cable, EBRL against N may be ≥ 7 dB. (60 results)

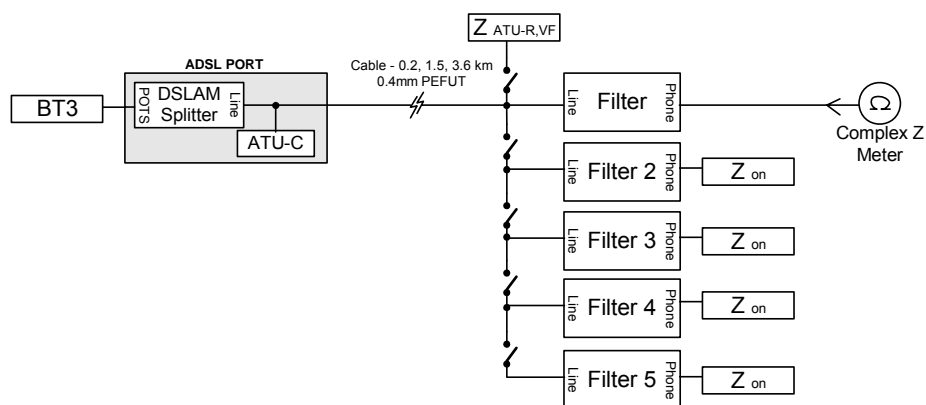
Note N definition :



5.3.5 Echo balance return loss from Phone side test set up :

(1) Test arrangements are the same as for Network Echo Balance Return Loss above, except that the POTS port is terminated with BT3 and balance return loss measurements are made at one filter against only a BT3 reference. As above, measurements are made using the three lengths of cable and with the addition of one, two, three and four parallel connected filters, each terminated with 1.0 M Ω .

(2) EBRL is computed from measured or calculated values of balance return loss, for each condition. See definitions under EBRL, for formula.



For all cases EBRL shall be ≥ 10 dB (30 results).

5.4 Mechanical Conditions :**5.4.1 Dimensions :**

Length = 174.5 mm

Width = 42 mm

High = 24 mm

5.4.2 Pin assignment :

Connector	Function	Style	Tip	Ring
J1	Line	BT-Plug	Pin 5	Pin 2
J2	Phone	BT-Jack	Pin 5	Pin 2
J3	DSL	RJ11-Jack	Pin 3	Pin 4

6 Environmental conditions:

6.1 Resistibility to over voltages and over currents:

Comply with the resistibility requirements per ITU-T Recommendation K.21 electrical safety requirements

6.2 Climatic conditions:

6.2a. Operating temperature:

-20 °C to +60 °C

6.2b. Storage and transportation:

Low ambient temperature – 40 °C

High ambient temperature +80 °C

6.2c. Operation humidity:

0 to 95% (non-condensing)

7 Reliability conditions:

7.1 Thermal shock:

Temperature from -20 °C to +85 °C for 5 cycles

7.2. Temperature humidity exposure:

+50 °C / 95 RH, 96hrs

7.3. Vibration test:

Random vibration / Overall: 1.15 g rms

Freq. (Hz): 1 → 4 → 100 → 200

PSD (g₂/ 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

8 Note :