GETTING THE LEVELS RIGHT: NEW APPROACH TO PROCESSING

Broadcasters Clinic
October 2011

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What's Behind Great Processing?

10,000 hours, or more!

- Malcolm Gladwell, "Outliers"

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What is “Chameleon Technology”?

Is the underlying foundation to the dynamics sections of the Omnia.11

First appeared in APS-1000 as “The Audio Chameleon” around Fall 1989

Four iterations of the design from Fall of 1989 through Summer 2005

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Great Processing Consists Of:

Pleasing level control

Full-proof level detection

Rock solid EQ / tonal balance

Dynamics with LoIMD

Quality Competitive Limiting

Effortless *L-O-U-D-N-E-S-S!*

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OK...How Does One Get There?

Get the levels right...*ALL THE TIME!*

Smart RMS control

Create smooth peak control: dynamically & clipping

Dynamics/Clipping with LoIMD

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Getting The Levels Right!

Create perceived loudness with minimal annoyance

Old School: Limiters/Clippers for loudness, AGC for EQ

This works, but creates lots of IMD ☹

Getting The Levels Right!

Perceived loudness is generated in the AGC

The human ear is a RMS detector

RMS control is the key to loudness!

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Getting The Levels Right!

Limiters are peak responding

Limiters for loudness yield IMD

IMD artifacts result from aggressive action

Loudness, via limiting, requires depth to simulate RMS

Result is smashed, dense, annoying IMD!

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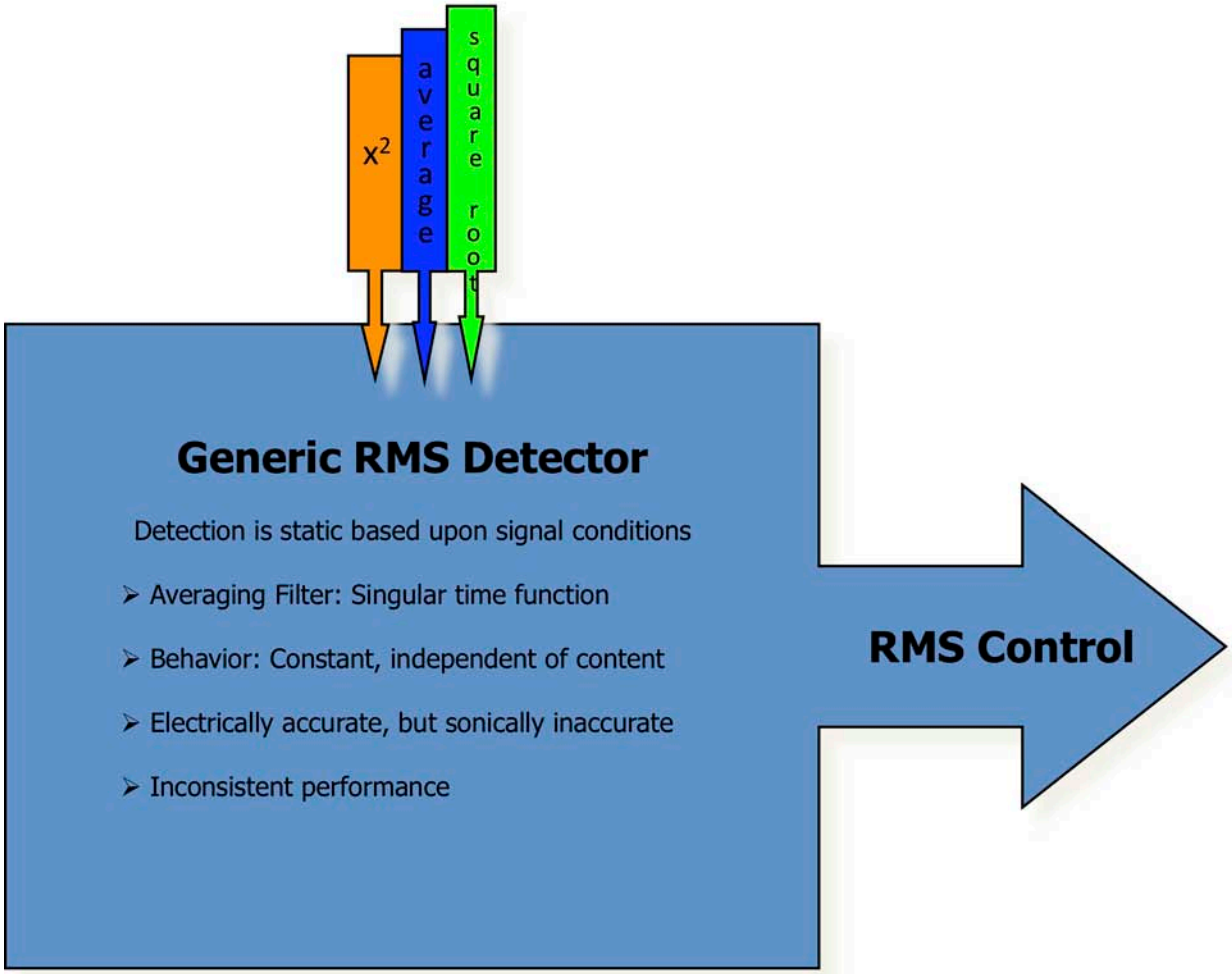
Closer Look At RMS

Common RMS methods work, but inconsistent

This is due to a single ‘averaging’ coefficient

Works most of the time: Inconsistent


x2
average
square root
Generic RMS Detector
Detection is static based upon signal conditions
Averaging Filter: Singular time function
Behavior: Constant, independent of content
Electrically accurate, but sonically inaccurate
Inconsistent performance
RMS Control

Closer Look At RMS

New Method: Self-Adapting RMS

Accelerometer / Decelerometer coefficients

Result: Consistent RMS…ALL THE TIME!!

Loudness foundation created!

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Dynamic Algo Improvements

- Auto Acceleration/Deceleration timing
- Density Detector & Correct
- Unique Inter-Band Synchronization*
- Amazing voice control
- G-Max Bass!!

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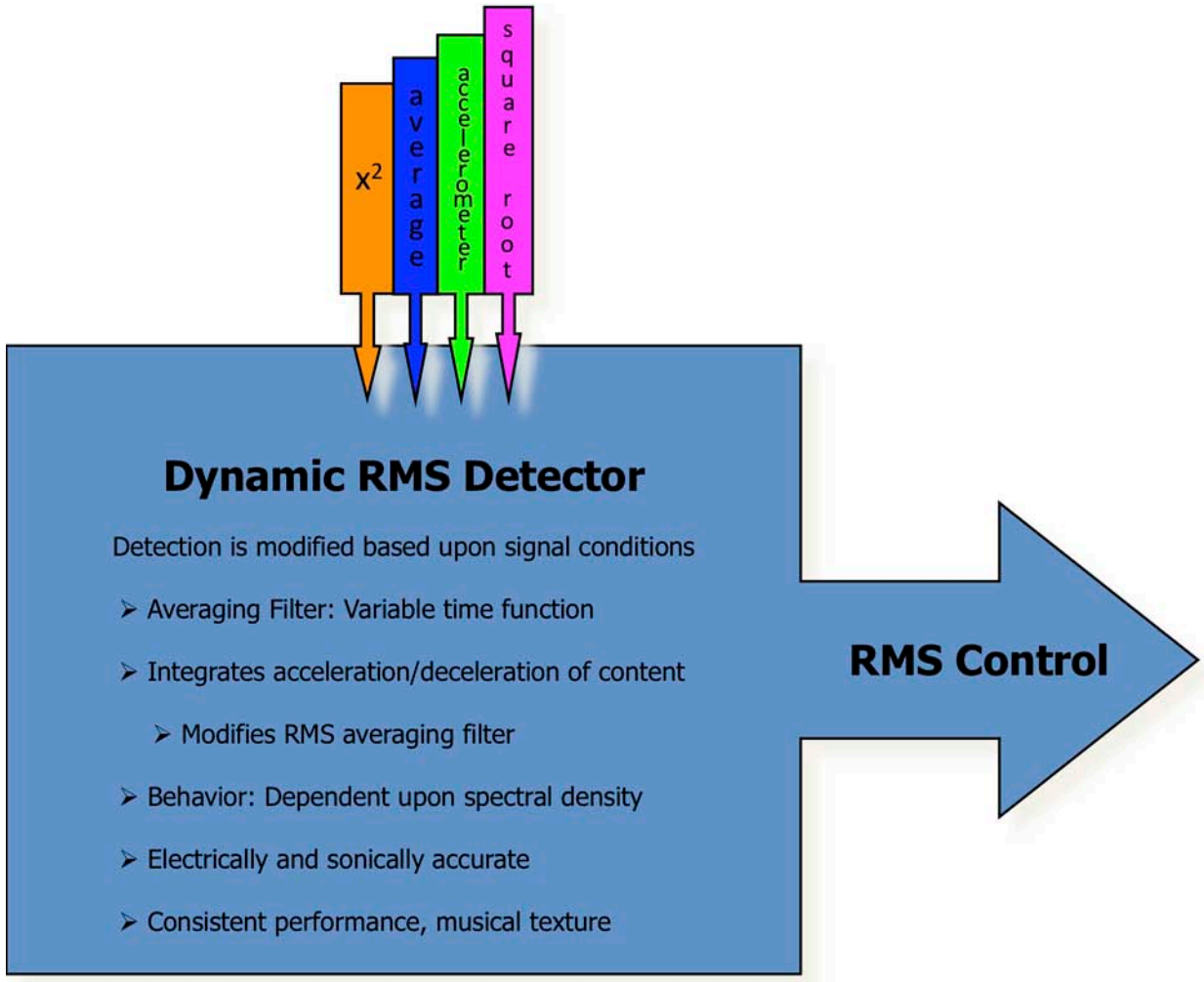
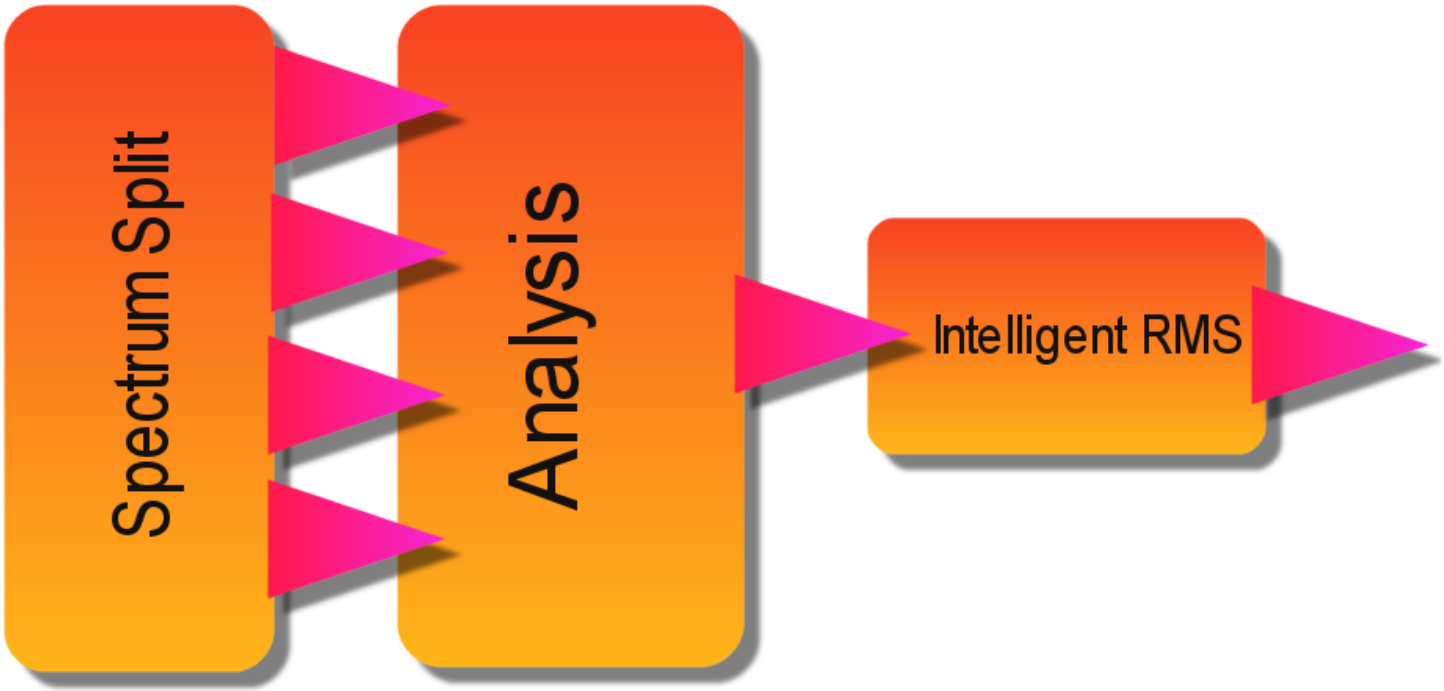

x2
average
accelerometer
square root
Dynamic RMS Detector
Detection is modified based upon signal conditions
Averaging Filter: Variable time function
Integrates acceleration/deceleration of content
Modifies RMS averaging filter
Behavior: Dependent upon spectral density
Electrically and sonically accurate
Consistent performance, musical texture
RMS Control

Chameleon Technology Wideband AGC Scheme



More About RMS

When AGC is ‘correct’, less limiting is required

Limiting predominantly on peak levels only

Deep limiting, a thing of the past!

AGC & Limiter deliver consistency to clipper

Less fatigue!

Speaking Of Limiters...

Peak levels still require control

Suppression of limiter dynamics induced IMD

Result: Smooth peak control, improved detail

Less fatigue! (there's that word...again!)

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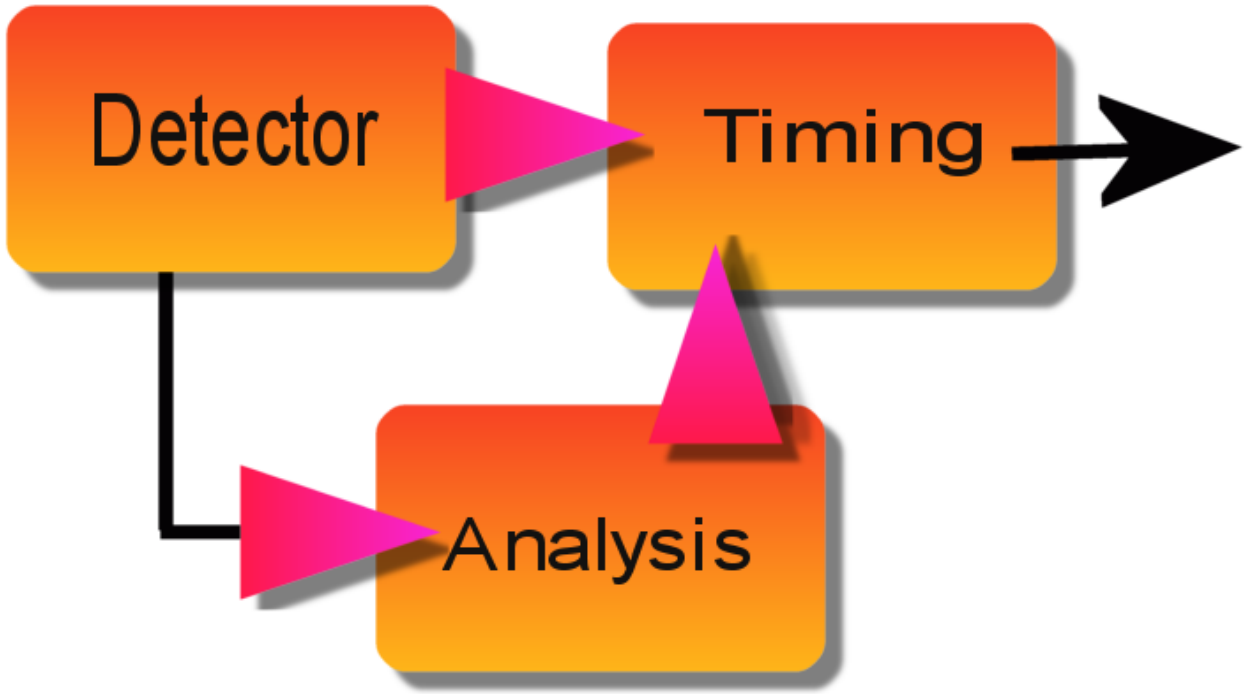
Chameleon Limiter Scheme



Speaking Of Limiters:

Many processors make use of their limiting and clipping sections to generate loudness.

This is accomplished with added amounts of needless intermod distortion.

More bands does not offer improved quality, EQ, detail, and loudness.

Too many limiter bands, driven deep into processing, generates dense, smashed, and annoying audio.

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On the topic of crossovers

X-Over phase errors?

Time-alignment?

Recombination/summation errors?

More than 7 bands = Loss of musical masking effect!

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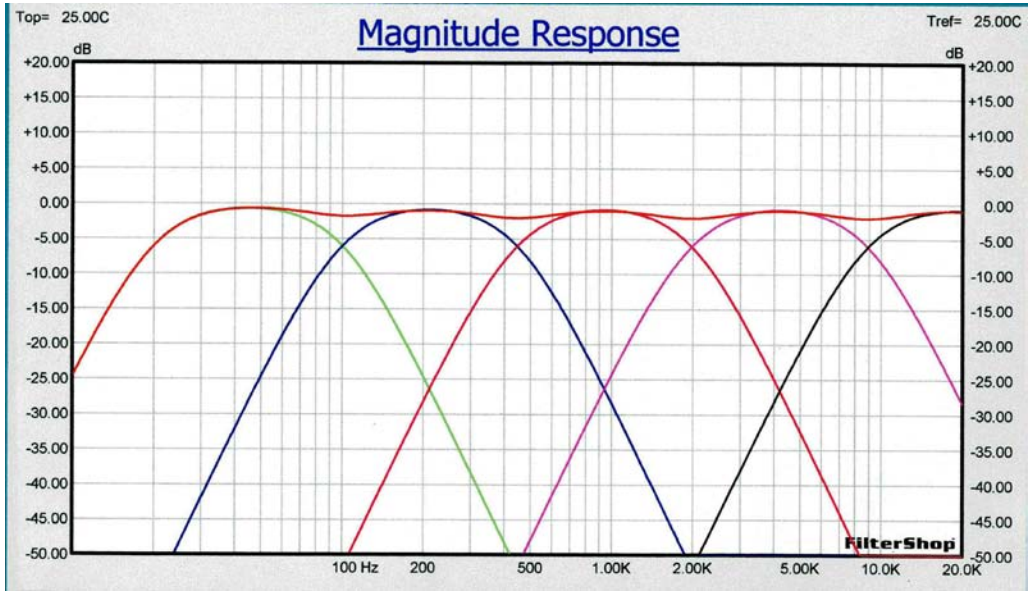
On the topic of crossovers



Five Band 24 dB / Octave Xovr with mild Phase errors

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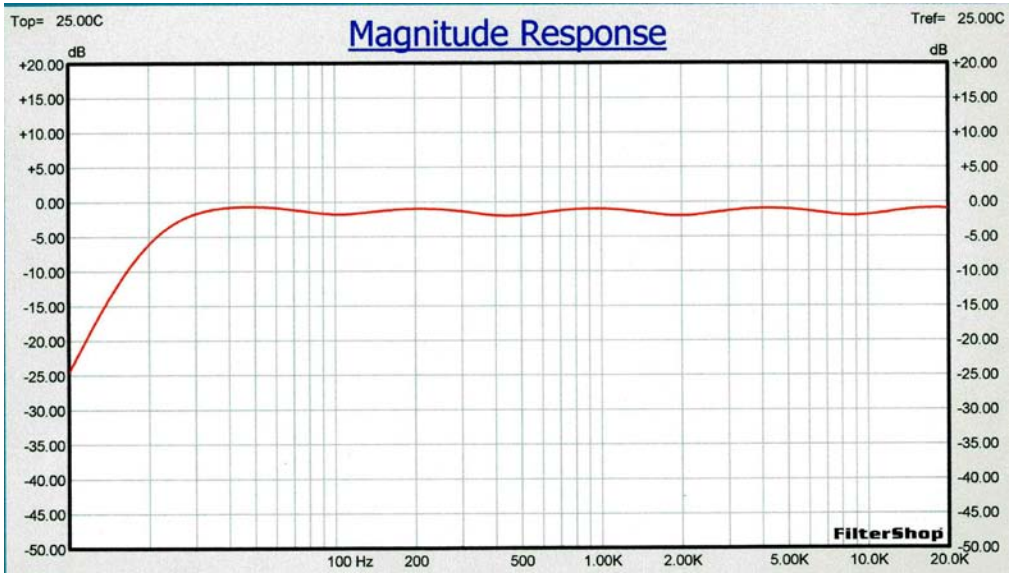
On the topic of crossovers



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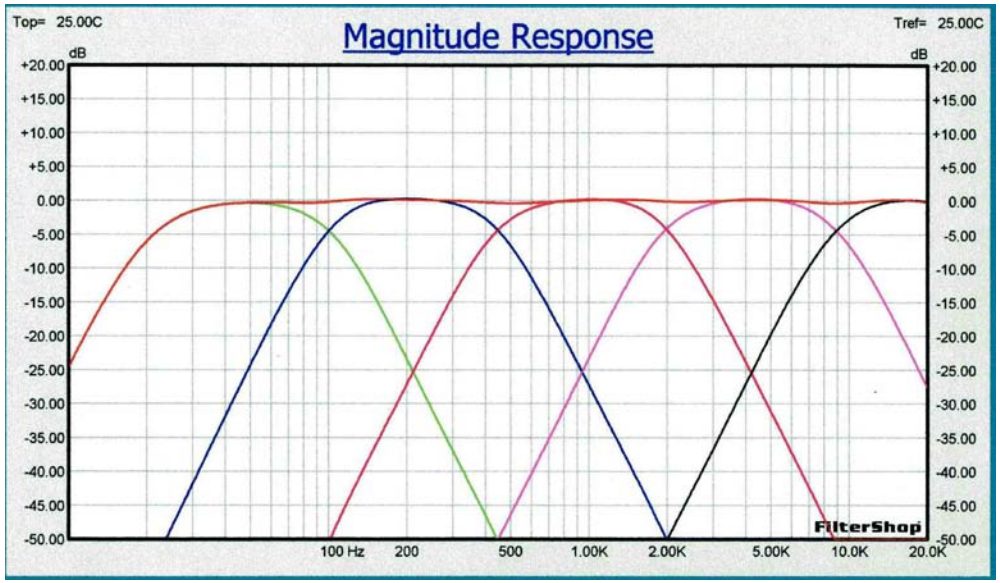

Five Band 24 dB / Octave Xovr With Better Phase Response

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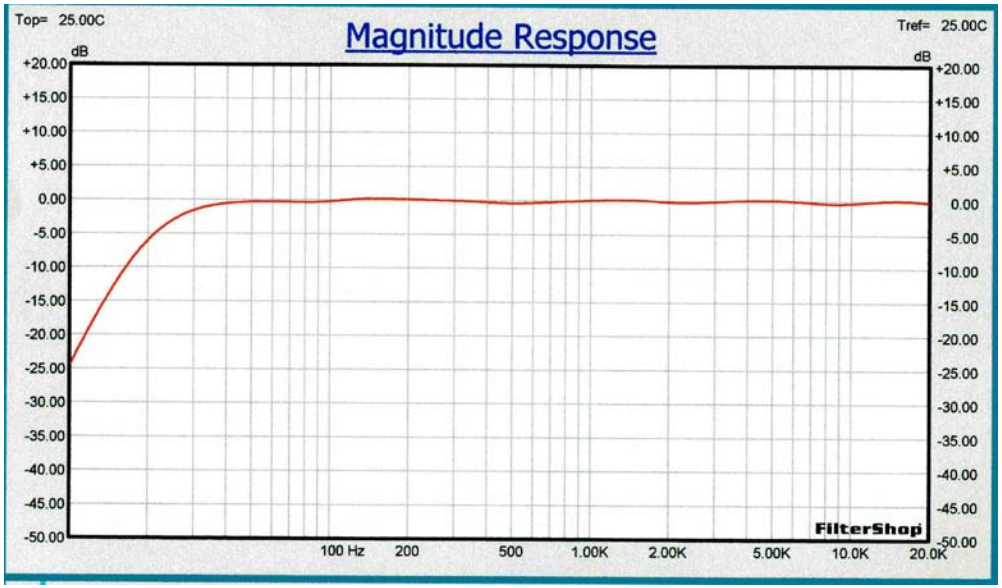
On the topic of crossovers



Five Band 24 dB / Octave Xovr With Better Phase Response

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On the topic of crossovers

FIR filters provide flattest response, but with latency penalty

FIR filters lack familiar sound of analog crossovers

IIR filters have more of an analog sound, but are not phase linear

Omnia.11 features compensation IIR crossovers to provide the best of both filter methods.

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In Conclusion

Loudness is best handled in RMS domain

RMS must use “smart” algorithms for best efficiency

When RMS is properly done, less limiter action is needed

Limiters with IMD compensation = smooth audio

Careful attention to crossover perfomance further enhances performance

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Acknowledgements

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Thank You!

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