ToolMod Pro-Audio Module System

User Manual

TM204

fully parametric 4-Band Stereo-Mastering Equalizer

The ToolMod TM204 is a fully parametric 4-Band Stereo Mastering Equalizer with bypass switches for each band and a master hard-bypass. The module is available with +/- 12 dB or +/- 6 dB boost/cut range. Custom versions with different boost/cut and sweep ranges are possible.

Horizontal and vertical versions of the TM204 are available. Only the faceplate and the orientation of the knobs are different in the vertical and horizontal version. The TM204 can be installed in 1U-high and 4U-high ToolMod frames.

Content

Hint

We assume that you are familiar with the basic principles of pro audio devices. Therefore, the explanations in this manual are limited to the special features and functions of the particular module. General information on many pro audio topics can be found on our web site http://www.adt-audio.com

This manual is a supplement to the **ToolMod User Manual** that contains extensive information and safety instructions on the **ToolMod® Pro-audio Module System** by adt-**audio®**. If you don't have the **ToolMod User Manual** ask for a copy by email or fax, or download a PDF-version from one of our websites. **It is imperative that you take account of the hints and safety instruction in the ToolMod User Manual that are not repeated in this supplement for a particular module.**

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Principle of Operation

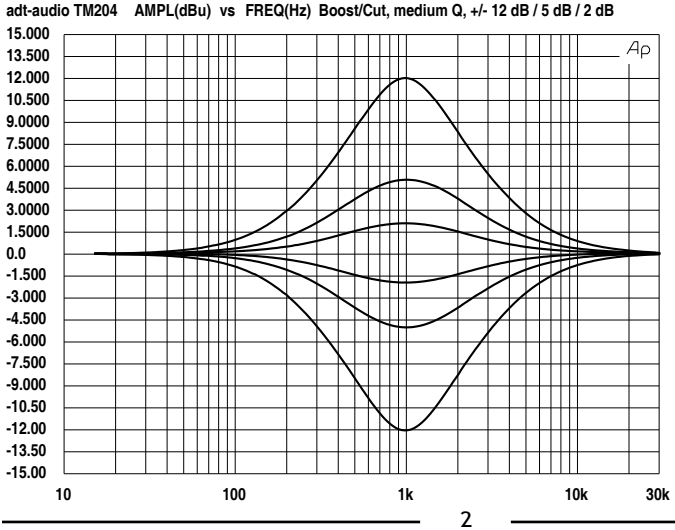
Fully parametric stereo mastering equalizer with four bands, implemented using adt-audio's active 'Vienna-Bridge' circuitry, with bypass switches for each band and master hard bypass.

Versions

Like almost all ToolMod modules, the TM204 is available in horizontal versions for 1U-high frames and vertical versions for 4U-high frames. Both versions can be ordered with +/- 12 dB or +/- 6 dB boost/cut range. The above image shows the 12 dB, horizontal version. The horizontal version with 6 dB range is shown on top of the next page and the vertical version with 12 dB range is shown on the right side of the next page. Information on other boost/cut and sweep ranges, multiband versions with 8 or 12 bands by combinations of the 2 or 3 TM204 modules can be found in the section 'Custom Versions'.

Operation

We don't consider it very helpful to tell you how you should adjust an equalizer; the basic operation of an equalizer is common knowledge as well as the fact that there is no standard setting that can be used universally. However, here are some diagrams that show the boost and cut curves, and the sweep and q-factor ranges.

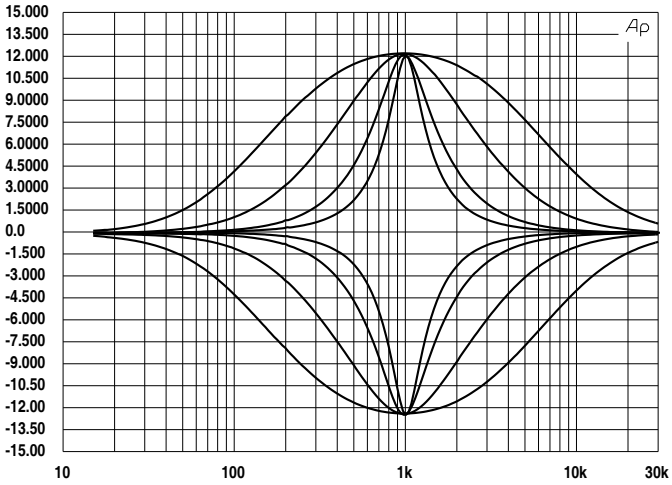


The diagram to the left shows the boost/cut at +/- 2, 5, and 12 dB of a single band with a center frequency set to 1 kHz with medium q-factor.

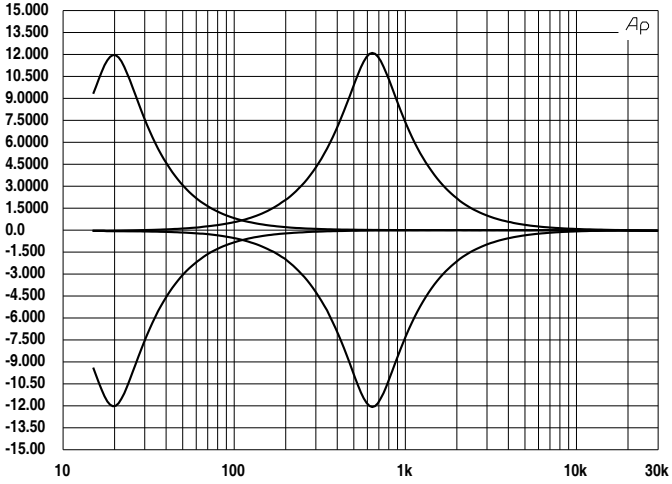
The diagram on top of the next pages shows the range of the q-factor pots at 12 dB boost and cut, again with a center frequency of 1 kHz.

The diagram below shows the sweep range of the low band with + and - 12 dB,

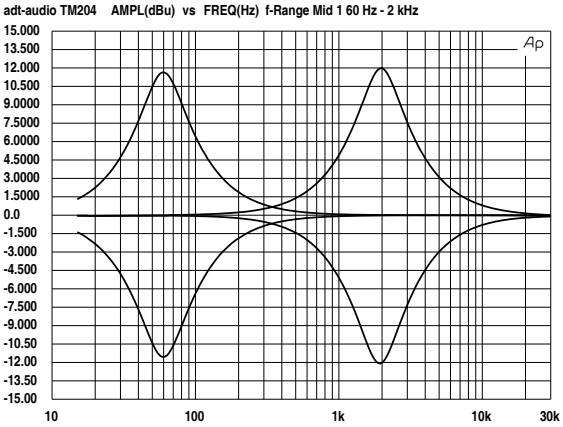
adt-audio TM204 AMPL(dBu) vs FREQ(Hz) Q-Range Q 1 kHz +/- 12 dB

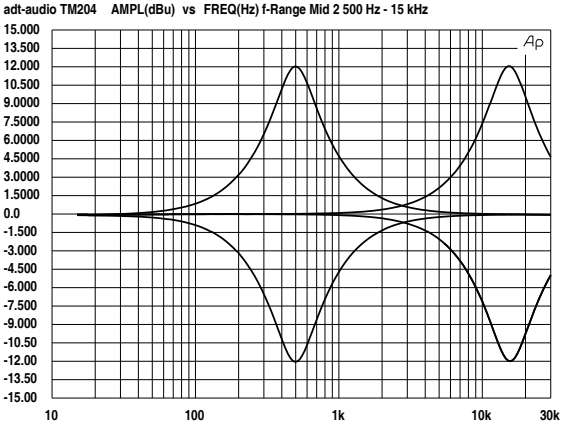


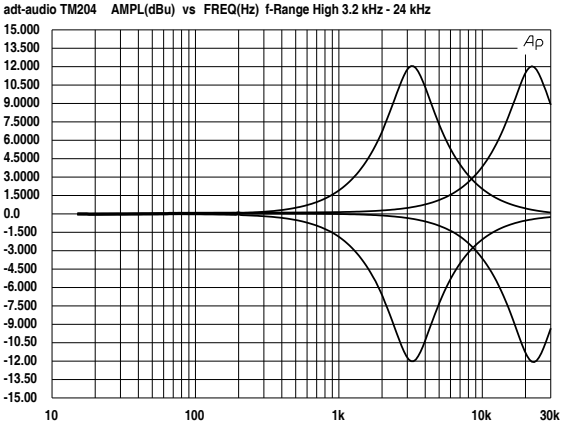
adt-audio TM204 AMPL(dBu) vs FREQ(Hz) f-Range Low 20 Hz - 650 Hz



again with a medium q-factor setting.







The three diagrams on this page show the sweep ranges of the MID1, MID2, and the HI bands, again with medium q-factor setting and 12 dB boost and cut.

Bypass

The EQ switch is the master bypass for the entire module. Unless this switch is pressed, inputs and output are directly connected by relays. The module is no longer in the signal path. Even if the power is switched off, the bypass works and an input signal will not be distorted or modified in any other way. 'EQ ON' is indicated by a LED.

The 4 lever switches marked with OFF/ON bypass the particular eq bands in the OFF position. These switches only affect the particular band and do not hard-bypass the module. If all four switches are set to OFF, the module still remains in the signal path.

Custom Versions

In addition to the 4 standard versions (6 & 12 dB / horizontal & vertical) that are usually available from stock some custom modifications are possible. The versions listed below use the standard faceplates and pcb's and are available at extra charge. Due to our rapid manufacturing shop, the lead time for these custom versions is 2 weeks from order to shipping only.

Different Boost/Cut, Sweep, and Q-Factor Ranges

Any boost/cut range up to +/- 20 dB is possible.

The sweep ranges of all bands can be modified according to your specs as long as the maximum

variation of 1 to 30 (e.g. 200 Hz to 6 kHz) is not exceeded. A sweep range of up to 1 to 30 is also possible for the HI band, that comes with a range from 3.2 to 24 kHz with the standard versions.

Although the q-factor range can be modified as well, the range of the standard versions covers all musically useful settings. However, it is possible to increase or shift the range in both directions. It can be approx. twice as wide and half as narrow as the standard version.

Multiband Versions
TM204 Equalizers can be combined to multiband eq's with 8, 12 or more bands. In the horizontal versions, the sweep ranges of the bands can be placed from low to the left to high to right. Since the circuitry of the bands is basically identical, any combination and any orientation is possible.

Other Knob Colors
Within the bounds of available colors, all combinations are possible without extra charge.

Characteristic
The circuitry of the fully parametric eq bands based on the active Vienna Bridge principle makes it possible to modify the characteristic of each band by a combination of the amplifiers and the compensation. The caracter of each band can be modified from 'soft' to 'transparent' with several steps in between. The standard versions come with 'transparent' Low and Mid1 bands, 'medium' Mid2, and 'soft' High bands. You can taylor the characteristic of each band to your needs and taste and adapt the tonal performance of the equalizer.

Connectors
The TM204 is a 4U ToolMod module that uses two adjacent module compartments in a 1U-high frame or two module compartements above each other in a 4U-high frame. The inputs and outputs use the xlr connector of the two compartments. The TRS jacks are used in parallel to the xlr connectors.

Connector Positions in the 1U-high and 4U-high Frame
The above image shows the rear panel of the compartments 1 and 2 of a 1U-high frame. If the module is installed in these compartment, the connectors are allocated as

follows. If other compartments are used, the allocation simply moves to the corresponding compartments.

Input left:	XLR IN1a	in parallel to	TRS OUT1b !
Output left:	XLR OUT1a	in parallel to	TRS IN 1b !
Input right:	XLR IN2a	in parallel to	TRS OUT2b !
Output right:	XLR OUT2a	in parallel to	TRS IN 2b !

In the 4U-high frame, the location of the connectors is turned counter clockwise. The right channel connectors are located on top; the left channel connectors below.

Technical Specifications

Format
ToolMod Module Size 4U

Versions
TM204-12h - horizontal Faceplate, 12 dB
TM204-12v - vertical Faceplate, 12 dB
TM204-6h - horizontal Faceplate, 6 dB
TM204-6v - vertical Faceplate, 6 dB

Power Supply
Tool-Series Standard
Supply Voltages +/- 25 V Audio and + 48 V Phantom (not used in this Module)
max. Supply Consumption +/- 200 mA *)

Inputs
balanced, grounded (electronically balanced), Stereo

nominal Level	+ 6 dBu - Gain
maximum Level	≥ + 30 dBu - Gain
Input Impedance	20 Hz - 20 kHz, > 6 kΩ
nominal Source Impedance	≤ 50 Ω
CMRR	15 kHz > 65 dB, typical 75 dB
	1 kHz > 80 dB, 40 Hz > 90 dB

Outputs
balanced, grounded (electronically balanced), Stereo

nominal Level	+ 6 dBu
maximum Level	≥ + 30 dBu
Source Impedance	20 Hz - 20 kHz, < 50 Ω
Load Resistance	≥ 1200 Ω for P_{max} + 30 dBu,
	≥ 600 Ω for P_{max} + 27.5 dBu,
	≥ 300 Ω for P_{max} + 22 dBu
Load Capacitance	≤ 6 nF || 2 kΩ @ 20 kHz THD = 1 %, + 30 dBu

		≤ 15 nF || 2 kΩ @ 20 kHz THD = 1 %, + 26 dBu
		≤ 20 nF || 2 kΩ @ 20 kHz THD = 1 %, + 22 dBu
	CMRR (IEC)	> 40 dB, 40 Hz - 15 kHz
Gain	internally calibrated to 0 dB +/- 0.2 dB without regulation, all EQ Band OFF or @ center click position	
Frequency Response	3 dB Limits < 10 Hz to > 150 kHz (without regulation) Power Bandwidth for Headroom ≥ + 30 dBu from 10 Hz to > 50 kHz Linearity ≤ ± 0.2 dB Boost/Cut @ 0 dB or OFF from 20 Hz to 50 kHz	
Phase Response	20 Hz-20 kHz < +10/-15° (without regulation)	
THD	< + 28 dBu, 40 Hz ... 20 kHz, < 0.1 %, max. THD @ + 30 dBu < 1 % without regulation / Boost-Cut @ 0 dB or OFF	
Crosstalk	> 65 dB, 40 Hz ... 15 kHz	
unweighted Noise	<= -90 dBu, all Pots in the 12 o'clock position (RMS Measurement 22Hz-22kHz)	
weighted Noise	<= -94 dBA, all Pots in the 12 o'clock position (Measurement with DIN A-type weighting Filter/AVG)	
Dynamic Range	>= 120 dB all Pots in the 12 o'clock position (RMS Measurement 22Hz-22kHz) >= 124 dB all Pots in the 12 o'clock position (Measurement with DIN A-type weighting Filter/AVG)	
EQ-Bands	4 x fully parametric, with Bypass Switches for each Band	
Regulation	Bell-Equalizer with adjustable Center Frequency and adjustable Q-Factor with active Vienna Bridge Circuitry	
Boost/Cut Range	Standard ± 12 dB or ± 6 dB pro Band or custom Range up to ± 20 dB	
Q-Factor Range	per Band from 4 Octaves to 0.5 Oktaves	
Sweeo Ranges	Low - 20 Hz to 650 Hz Mid1 - 60 Hz to 2 kHz Mid2 - 500 Hz to 15 kHz High - 3.2 kHz to 24 kHz or custom Ranges	
Bypass	Hardbypass by Relay for the entire Module additional Bypass Switches for each Band	

*) The maximum current consumption is the current consumption under real-world operating conditions; i.e. outputs loaded with > 5 kΩ at standard a/d or d/a converter levels of ~ + 18 dBu. If the outputs are loaded with the minium load resistor of 1200 Ω and an output level of + 30 dBu the current consumption increases by 30 mA per output. The standard current consumption should be used to calculated the necessary capacity of the power supply unit.

Postface and Disclaimer
This manual contains general information on the adt-audio® module system ToolMod®.

By no means does this information represent guaranteed particular characteristics or results of use. The information in this manual has been carefully compiled and verified. Due to our policy of continuous product improvement, we reserve the right to make product changes without prior notice. All specifications are subject to change without notice.

Copyright

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CE Declaration of Conformity
Manufacturer: Fa. Karl Juengling
Type of Equipment: Audio Signal Processor
Product: ToolMod Pro-Audio Module System,
consisting of:
Modules, Mounting Frames, Power Supply Units and Accessories
Compliance Engineer: Gerd Juengling
Test Basis:
EN50081-1:1992, EN50082-1:1992, EN61000-3-3:1995, EN60065:1993 Class1, EN61000-3-2:2000, EN60065:2002, EN55013:2001, EN55020:2002, 73/23 EWG; 93/68 EWG

We hereby declare that the construction of the ToolMod system complies with the standards and regulations listed above.

Environmental Protection

This product can be recycled. Products bearing this symbol must not be thrown away with normal household waste. At the end of the product's life, take it to a collection point designated for recycling of electrical and electronical devices. Find out more about return and collection points through your local authorities.The European Waste Electrical and Electronic Equipment (WEEE) Directive was implemented to dramatically reduce the amount of waste going to landfills, thereby reducing the environmental impact on the planet and on human health. Please act responsibly by recycling used products. If this product is still useable, consider giving it away or selling it.
WEEE-Registration: DE 59049716

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