Tunable Multiple FM Notch Filters

Description

Model VR7-FM-2501-(#) is a multiple notch filter that can be configured for two to sixteen tunable notches within the FM band (88-108 MHz). Each notch can be adjusted for frequency and depth. Narrow notch selectivity minimizes loss to neighboring signals. Wide Notch width (>30 kHz) provides good frequency and notch depth stability: Single notch characteristics (depth and 3 dB BW) are shown in table 1. Multiple notch characteristics of (depth, 3 dB BW, and notch width) are shown in Table 2 .

Applications

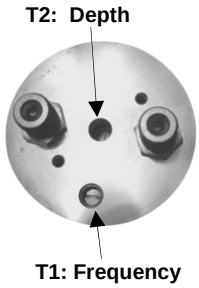
- **Remove FM interference—**attenuate spurs and strong FM carriers causing interference with low impact on adjacent signals.
- **Equalize Broadband FM signal -** reduce level of stronger channels to reduce difference between strong and weak channels for more balanced signal distribution.
- **High FM Signal Rejection -** combine notches for highly selective signal rejection, e.g., five 15 dB notches for >80dB rejection with 3dB BW ± 0.75 MHz
- **Specific FM Spectrum rejection -** combine notches for >50 dB rejection of up to 4 MHz segment of FM spectrum, with low impact on adjacent signals.
- **Single Channel Deletion—**remove single CATV channel for re-use. Available for chs A8 to A6, A5(95) to A1(99).

Specifications

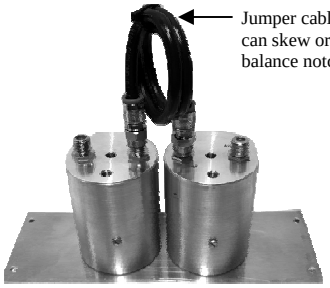
- User specifies all notch frequencies (MHz) & depths (dB) - minimum ±.5 MHz frequency separation recommended
- Operating bandwidth: 5-200 MHz standard. Add option “E” for 5-1000 MHz bandwidth
- Thru loss 8 notches is 1.5 dB (5-200 MHz)
- Thru loss 8 notches plus option E is 2 dB 5-1000 MHz
- VR7-FM 2501 Notch type: Helical Resonator
- Notch tuning: Adjustment of two screws (see photo 1).
- Notch selectivity : 3dB BW ± 0.35 MHz for 12dB notch
- Notch width: 30 KHz ; Multiple notch width: 80 kHz
- Jumper Cables between two notches can be “optimized” for “balanced” or “skewed” 3dB BW, e.g., “skewed” notch has uneven 3 dB BW.
- Connectors & Impedance: F-type female, 75 ohms
- Connectors Options: BNC 50 ohms, BNC 75 ohms
- Operating Temperature: 10 to +40 ° C (20-120 ° F)
- Power pass: 1amp, 60 AC max
- Mounting: Wall or Rack

VR7-FM-2501-# Dimensions (in) and Weight

VR7-FM-2501-3	panel size (in): 3.5 x 7 -up to 3, notches, 1lbs
VR7-FM-2501-8	panel size (in): 3.5 x 19 -up to 8 notches, 4.5 lbs
VR7-FM-2501-16	panel size (in): 5.25 x 19 - up to 16 notches, 7 lbs



1. VR7-FM–2501 Tuners



2. VR7-FM–2501-2 ex: two notch assembly, 5 –250 MHz BW

3. VR7-FM –2501-8E : example of eight FM notch assembly with option “E” for 5 to 1000 MHz bandwidth

Table 1: Example VR7-FM-2501 single notch selectivity

Frequency (MHz)	88	99	108
Notch depth (dB)	11 to 20	12 to 20	13 to20
3dB BW (MHz)	±0.35 to ±0.6	±0.35 to ±0.7	±0.4 to ±0.75

Tuning range: 88 to 108 MHz
Notch width is approx. 40 KHz for 15 dB notch

Table 2: Example VR7-FM-2501 multiple notch selectivity
Approximate Notch Depth * vs 3 dB Bandwidth

Model #	VR7-FM-2501-2	VR7-FM-2501-3	VR7-FM-2501-4	VR7-FM-2501-5
Notches *	2	3	4	5
Attenuation	32 dB	50 dB	65 dB	80 dB
3 dB BW	±0.6	±0.70	±0.75	±0.75
Notch Width	40 kHz	40 kHz	60 kHz	80 kHz

* All notches are approximately 14 dB and tuned around 108 MHz.

Order Information

Quantity of notches

Model # → **VR7-FM-2501-8E ***

Option “E” for 5-1000 MHz BW for OTA & CATV

*** Specify frequency and depth for each notch**

Notch Adjustments, Graphs, Order Info

General Notch Adjustments Instructions

TUNERS T1 & T2

T1 primarily adjusts notch frequency and secondarily affects notch depth.
T2 primarily adjusts notch depth and secondarily affects notch frequency.
To adjust notch to desired frequency and notch depth. Adjust T1 to desired frequency, then, adjust T2 to approximate notch depth, which will detune the notch frequency, then, re-adjust T1 to retune notch back to the desired frequency. VR7-FM-2501 tuning range is between 88 to 108 MHz.

Turn T1 counter-clockwise (to left) for higher frequency;

Turn T1 clockwise (to right) for lower frequency

Turn T2 counter-clockwise (right) for reduce notch depth (also increases notch frequency);

Turn T2 clockwise (left) to increase notch depth (also lowers notch frequency)

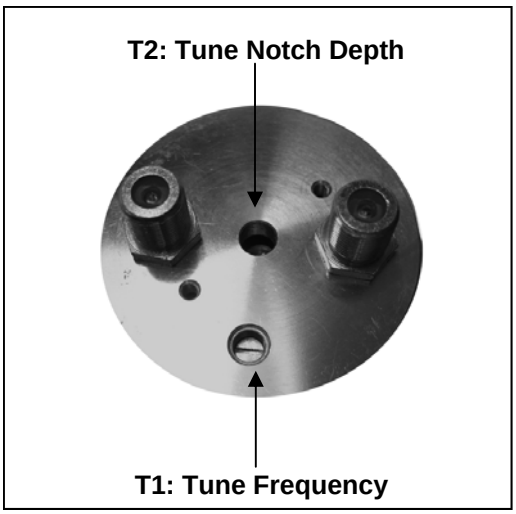
For best results adjust traps with RF analyzer with frequency response viewed at 1-5 MHz span at Fo. Note: Notch Adjustment without suitable equipment is not recommended.

Combining Multiple Notches Adjustments - Adjust each notch the same as for single notch except temporarily detune each previous notch (use T1) to frequency away from desired frequency before tuning current notch, then tune all notches back together at desired frequency, one by one.

Tune one notch at a time to Fo e.g., tune screw T1 to desired frequency for 11-13 dB attenuation (approx.) ,then, tune T2 to the similar position - together T1 and T2 will provide approximately 22-26 dB attenuation.

Fine Trap adjustments - To obtain optimum attenuation - alternately adjust one trap very slightly (1/10 T) in either direction, then do the same with the other trap. Repeat until required notches resonate together at the required Fo for desired attenuation.

Caution: Do not tune screws beyond the FM frequency range, the screws may be damaged.



Tuners for VR7-FM-2501 series —Adjusts Frequency (T1) and Depth (T2) of notch