Transitioning designs from the THAT 4301 to the THAT 4305

While it is unfortunate that the 4301 will be leaving us, replacing the 4301 in existing designs with the 4305 (and three discrete op amps) is relatively straightforward and can result in a design of equal or better performance in the same amount of PCB real estate, at a reduced cost. Hopefully this guideline will help to ease the transition.

Please refer to the 4301 and 4305 data sheets for the full specification details. The following are the key items to keep in mind during the design process when replacing the 4301 in an existing design with the 4305:

1) **The RMS input signal current required for the "0dB Reference" point is slightly different.**

   The "0 dB Reference" current is defined as the magnitude of the RMS detector's input current required to produce 0.0V at the RMS detector's output. The 4305 RMS requires 7.5uA in order to achieve this 0dB point, while the 4301 requires 8.48uA. As a result, the input resistor feeding the 4305's RMS detector should be made 1.13 times larger (8.48uA/7.5uA) than the one used in the original 4301 design. Although the error would be quite small, scaling the 4305's RMS input resistor by 1.13 will insure precise matching to any of the previous design's front panel threshold calibration markings.

2) **No VCA symmetry trim.**

   The 4305 VCA is trimmed internally during the manufacturing process and any symmetry trim components can be removed when transitioning to the 4305.

3) **R-C compensation network required on the 4305 VCA input pin**

   The 4305 VCA should be compensated with an R-C network connected between the VCA's input pin and local ground. Using a 5k1 resistor and a 220pF will insure that the VCA remains unconditionally stable.

4) **The "mV/dB" control voltage scaling is slightly different**

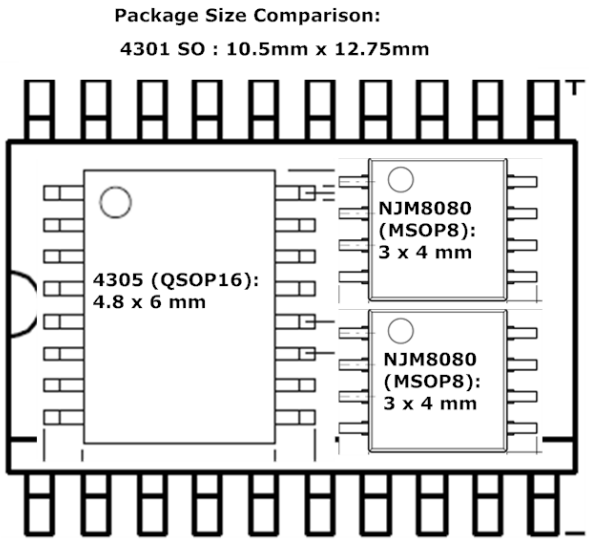
   The gain control constant is 6.2mV/dB for the 4305 and is 6.5mV/dB for the 4301. This difference is typically transparent in most applications since the VCA's sensitivity is perfectly matched to RMS scaling in both the 4305 and the 4301. In a compressor limiter application, this means that infinite compression will still be infinite compression in the new 4305 design without changing any scaling in the CV processing chain.

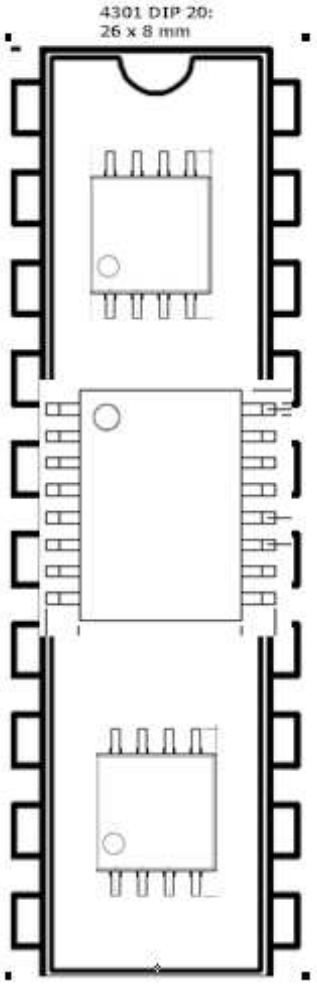
5) **Three new external op amps are required**

Regarding the choice of external op amps for the 4305 design, most reasonably good low noise op amps will work fine, and there are many to choose from. We are recommending the JRC NJM8080 as good choice since it has performance specifications (EIN and THD) slightly better than the op amps found in the 4301. The NJM8080 is relatively inexpensive and is available in a range of small package sizes. We also encourage the designer to consider using audiophile op amps, such as the MUSE02 or MUSE8820, for stellar performance in high end applications.

What about PC real estate?

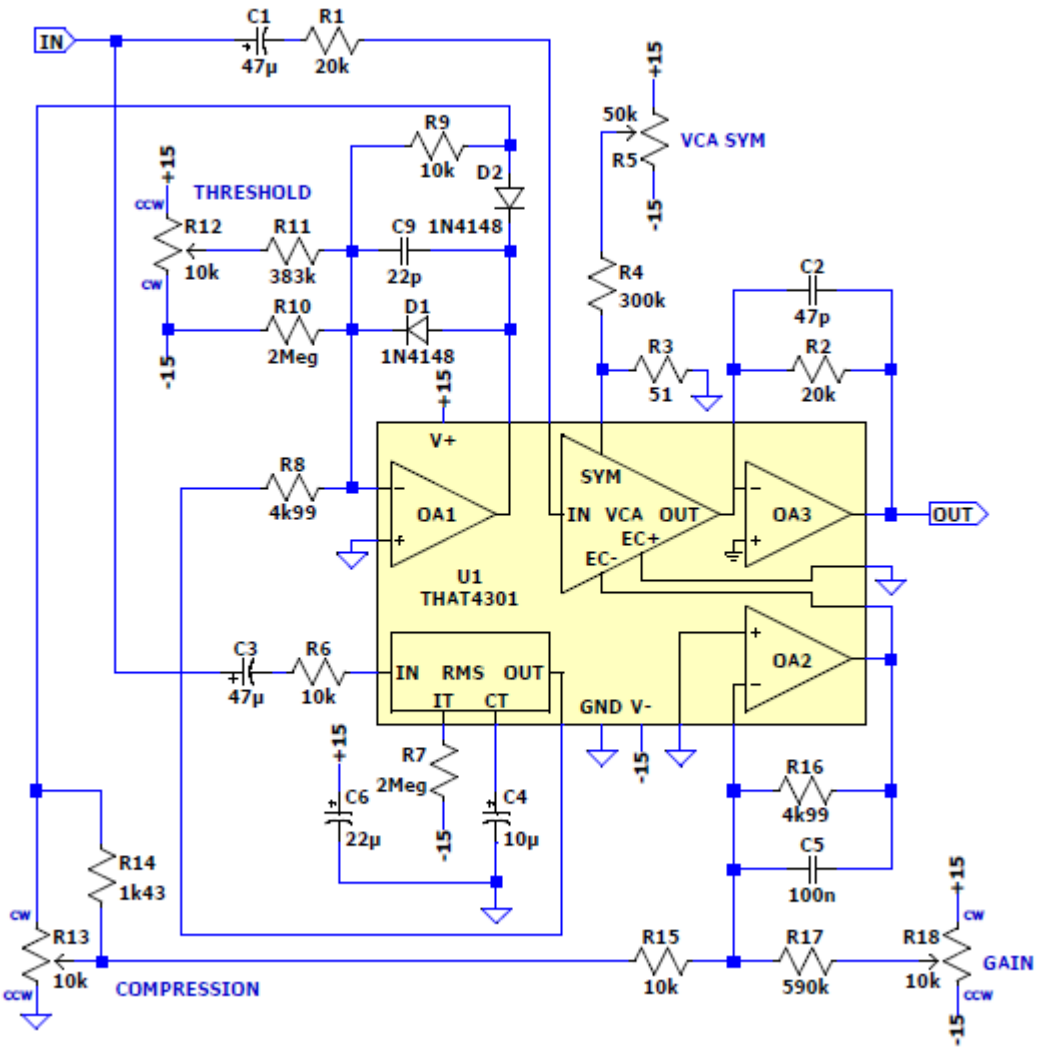
The new design should take up no more PC area if small package op amps are used. Here is a quick sketch showing the approximate package sizes relative to each other. Please keep in mind that this is not a precision scaled drawing is presented only to give the PC designer a feel for required size. Also note that the op amps are in duals, so there is an extra op amp section available for use elsewhere in the design.



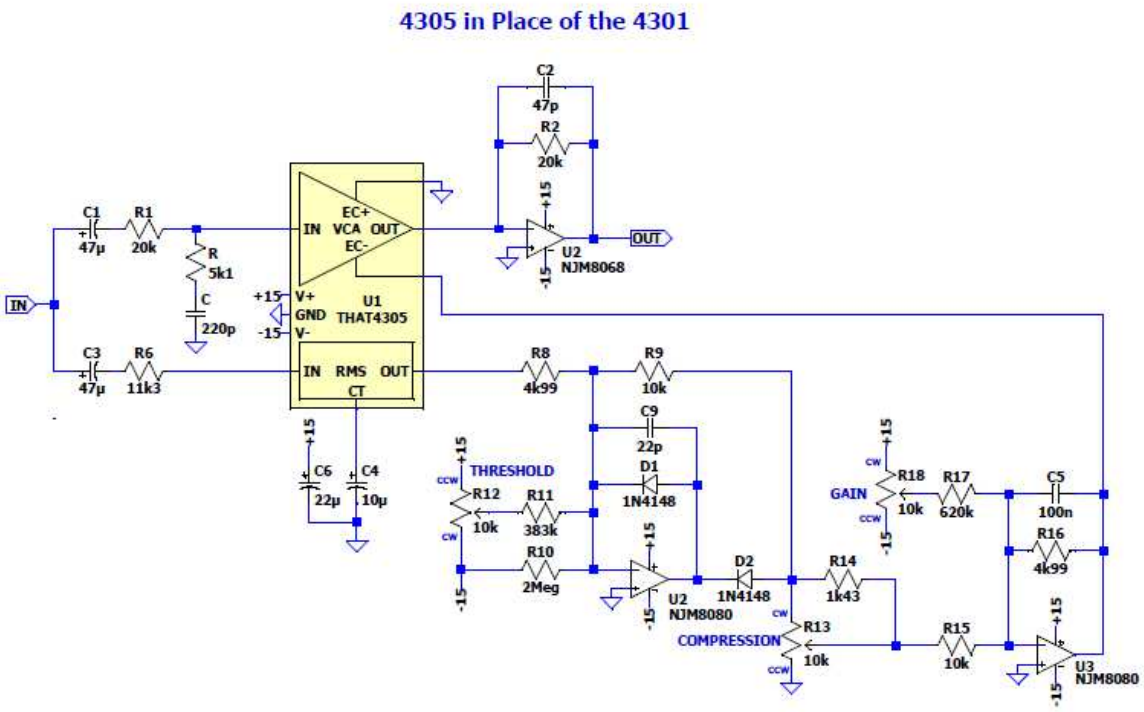


Example compressor/limiter design transition to the 4305

This is the original design, based on the application circuit presented in the 4301 data sheet:



This is the new design using the 4305 and three external op amps:



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