

ANTENNA AMPLIFIER

AA755V

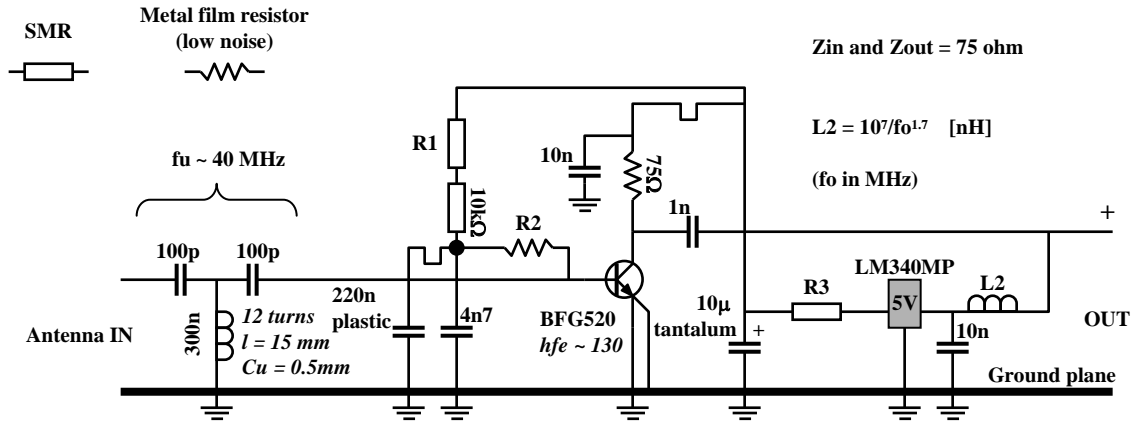
A cheap scanner with a lot of features usually has a terrible disadvantage, namely a low sensitivity at the antenna socket. Such a scanner or receiver is quite insensitive if the minimum input signal passes $1\mu\text{V}$ - but if one in the other hand connects a broadband RF amplifier between the antenna and the scanner - then one suddenly has a cheap scanner with a lot features, plus a high sensitivity (but not in the antenna socket, of course). The popular NE5205 could be an alternative here but is not manufactured these days.

The benefits AA755V has against NE5205 is: higher gain (which also is optional), lower noise and uncritical voltage supply. The downside is that it is somewhat more complicated to build. AA755V is designed for 75 ohm systems. The idea behind using 75 ohm coaxial cable is the price. Thanks to the expansion of cable television are there lots of cheap cables with low attenuation. AA755V also works great for TV antennas! AA755V is based on the NPN transistor BFG520 which has very fine HF data. The principle is a usual common emitter but without a base voltage divider and emitter resistance (HF connections tend to be a bit special in terms of design). One attempt avoiding using resistances in a preamplifier since to many of them causes noise. An emitter resistance is not needed because the transistor has a built-in one (equal to $1/g_m$), which is quite small and therefore must the current in the base also be adjusted so the transistor just begins to conduct. All this means that the circuit is incredibly fast and has low impedance - exactly what is expected by an antenna amplifier. But nothing good that not for anything bad with it... The disadvantage is that the amplification factor follows the ambient temperature, but it is in this connection quite marginally. Investigations of AA755V have shown that U_{ce} differs 0.3V at a change of 20°C when the I_c is below 20mA and 0.8- 1V for the circuit with highest gain (32dB). This allows a gain variation of approximately $\pm 1\text{dB}$ of I_c under 20mA and $\pm 5\text{dB}$ for the 32dB-variant.

Best amplification achieved when it is hot outside and the worst when it's cold outside. In room temperature can one make the necessary adjustment if one set U_{ce} (operating point) of a few tenths of a volt lower than the recommended value.

Users of AA755V must arrange so that the antenna input connector can be fed with a DC voltage between 7- 35V, this plus a small coil and some RF capacitors. Not a remarkable modification in other words. The maximum current consumption is lower than 40mA.

CIRCUIT DIAGRAM AND PLACING OF COMPONENTS



G = 20dB & B = 40 - 900 MHz

R1	~0	ohm
R2	82	ohm
R3	470	ohm

Ic = 8mA, U₇₅ = 0.6V & Uce = 0.6V

G = 25dB & B = 40 - 500 MHz

R1	~3.3	kohm
R2	100	ohm
R3	180	ohm

Ic = 15mA, U₇₅ = 1.1V & Uce = 1.2V

G = 30dB & B = 40 - 300 MHz

R1	~5.6	kohm
R2	150	ohm
R3	47	ohm

Ic = 25mA, U₇₅ = 1.9V & Uce = 1.9V

G = 32dB & B = 40 - 220 MHz

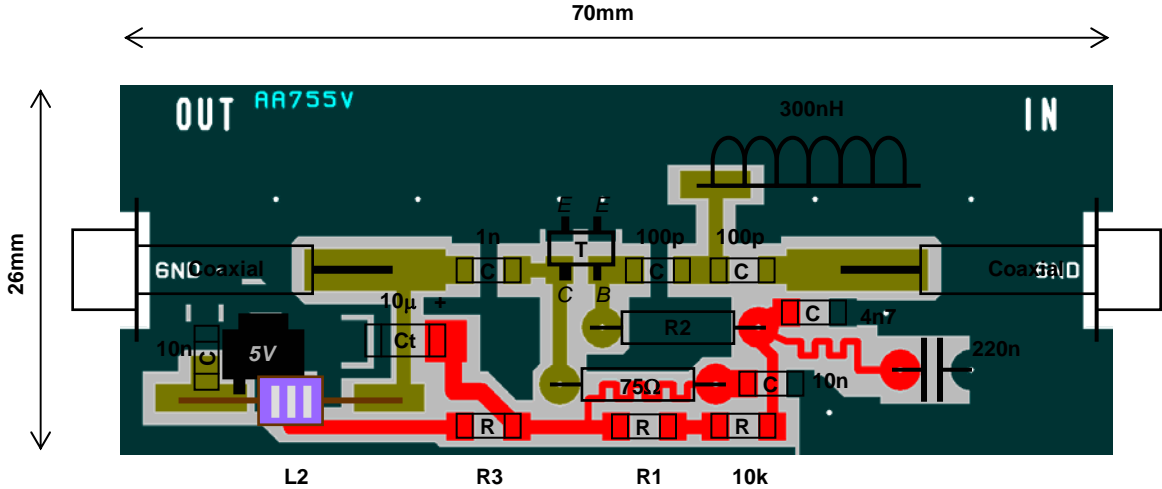
R1	~10	kohm
R2	180	ohm
R3	0	ohm

Ic = 33mA, U₇₅ = 2.5V & Uce = 2.5V

Risk of noise !

The operating point must always be set individually by testing different values of R1 and sometimes even the 10 kohms resistance.

But not when the antenna is connected!



Single or double-sided board. No holes need to be drilled. If one use a double-sided board so can one drill holes into the ground plan and then link the both sides with solder.

The unit should be shielded. Must also be waterproof if it used outdoors. The ends may be round pieces of sheet metal with a hole in the middle for the coaxial cable. The covering member may have the shape of a cylinder which is slipped over the antenna amplifier and secured with some plumb points at the ends. Finally one can paint the plate and sealed it with silicone on the ends.

PROJECT	Antenna amplifier for 75 ohm	
MODULE		
MODEL	AA755V	40 - 900 MHz
AUDIT	A-1	DRAWING: 1 of 1
SUPPLY	≥ +7 VDC	≤ +35 VDC
CURRENT	< 50 mA	
OTHER	Gain: 20, 25, 30 & 32 dB	
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