

6m BEACON

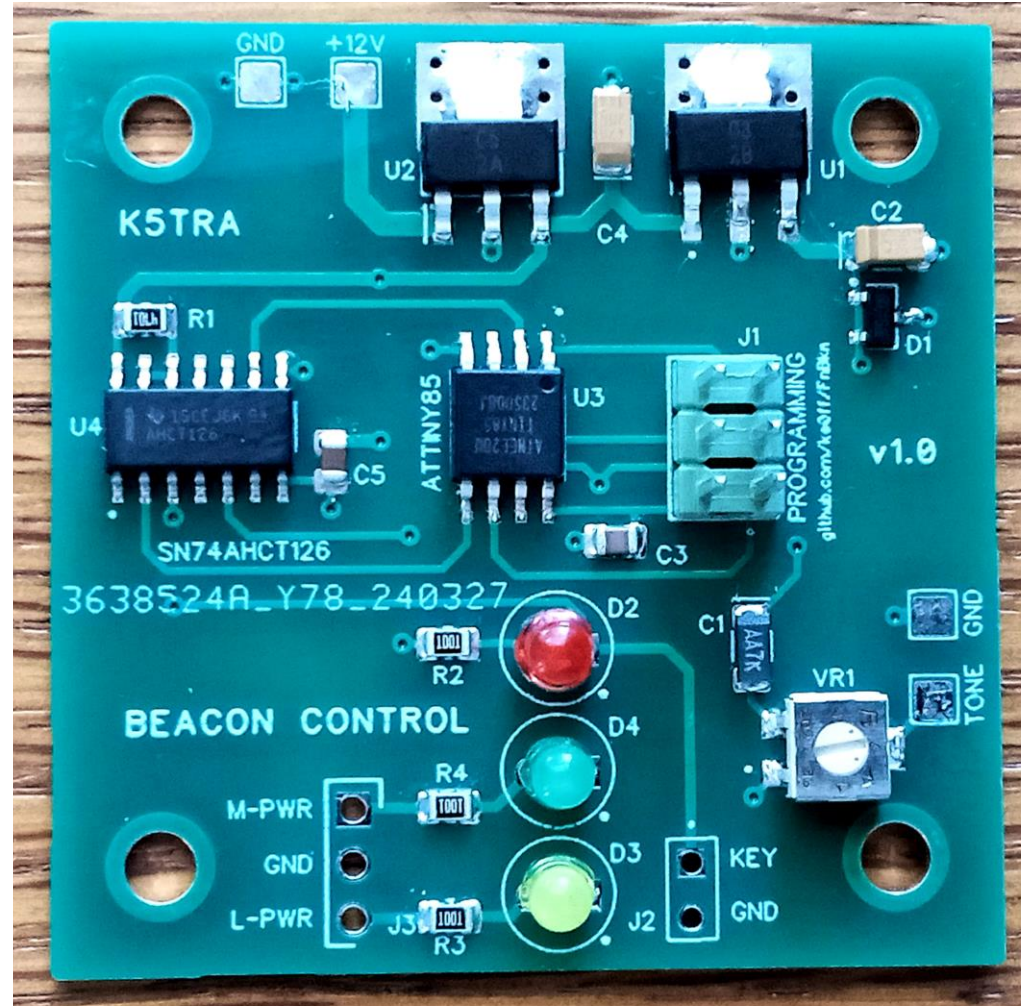
*FREQUENCY PROGRAMMABLE
20W LDMOS FET PA*

OVERVIEW

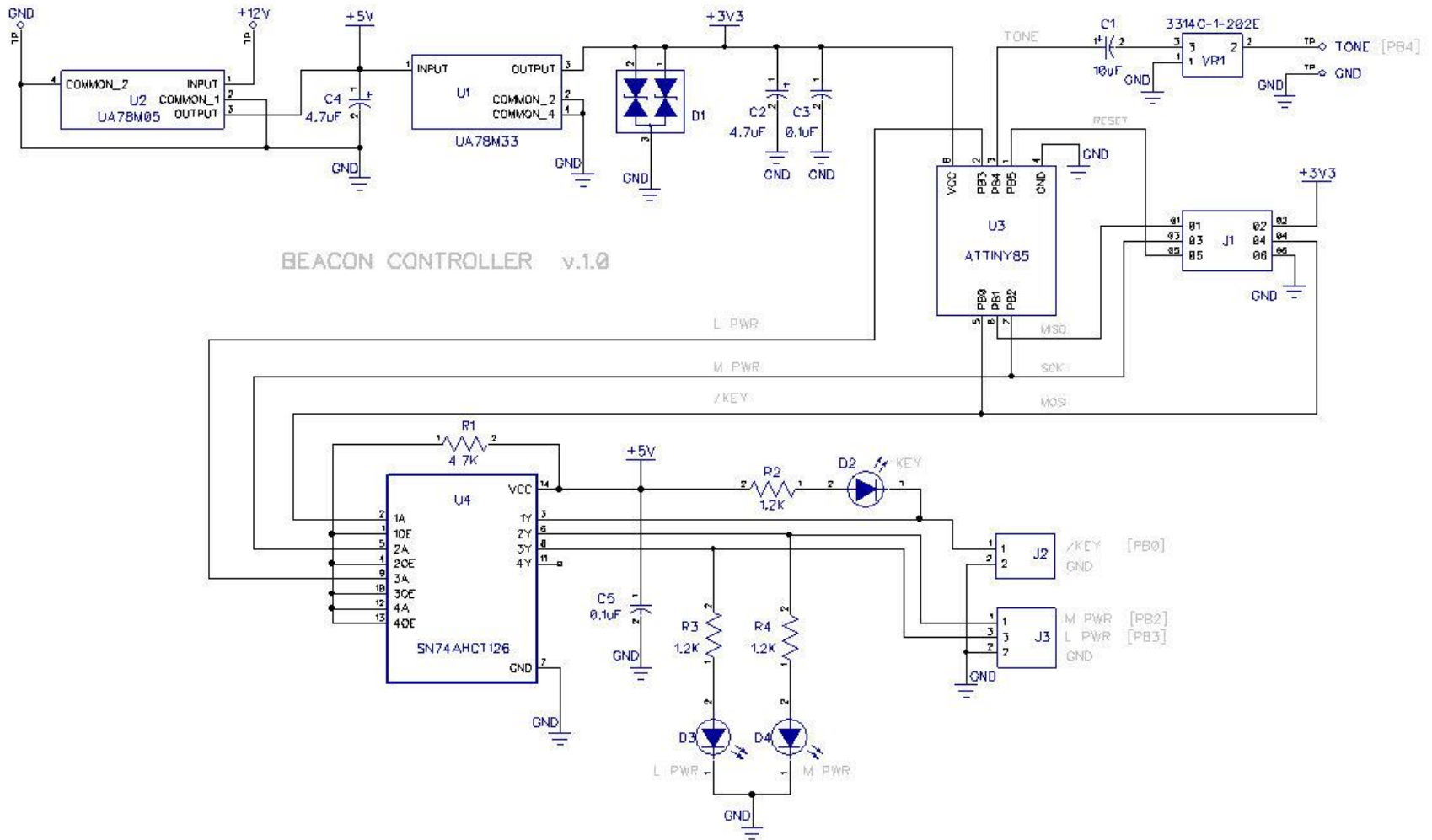
- Beacon is comprised of 3 boards
 - **Controller:** Morse ID, three step power control logic
 - **RF board:** Morse keyed CW at +15 dBm, +5 dBm and -5 dBm, and also Morse keys PA bias
 - **Power amplifier:** Two stage PA with input Pi pad and output LPF
- Frequency programmable beacon RF with Si598 and ATtiny85
- PA uses NXP LDMOS power FET instead Mitsubishi module. This lowers the PA cost and addresses module availability
- Hammond 1590P1FL enclosure
- Heat-sink with fan
- Same physical configuration as previous RMG beacons

BEACON CONTROLLER

- ATtiny85 MCU
- 74AHCT126 buffer
- Morse and level control
- Logic (5v) and tone outputs
- KE0FF MCU code
- Similar functionality to 'Freakin Beacon' controller
- 1.75" x 1.75"

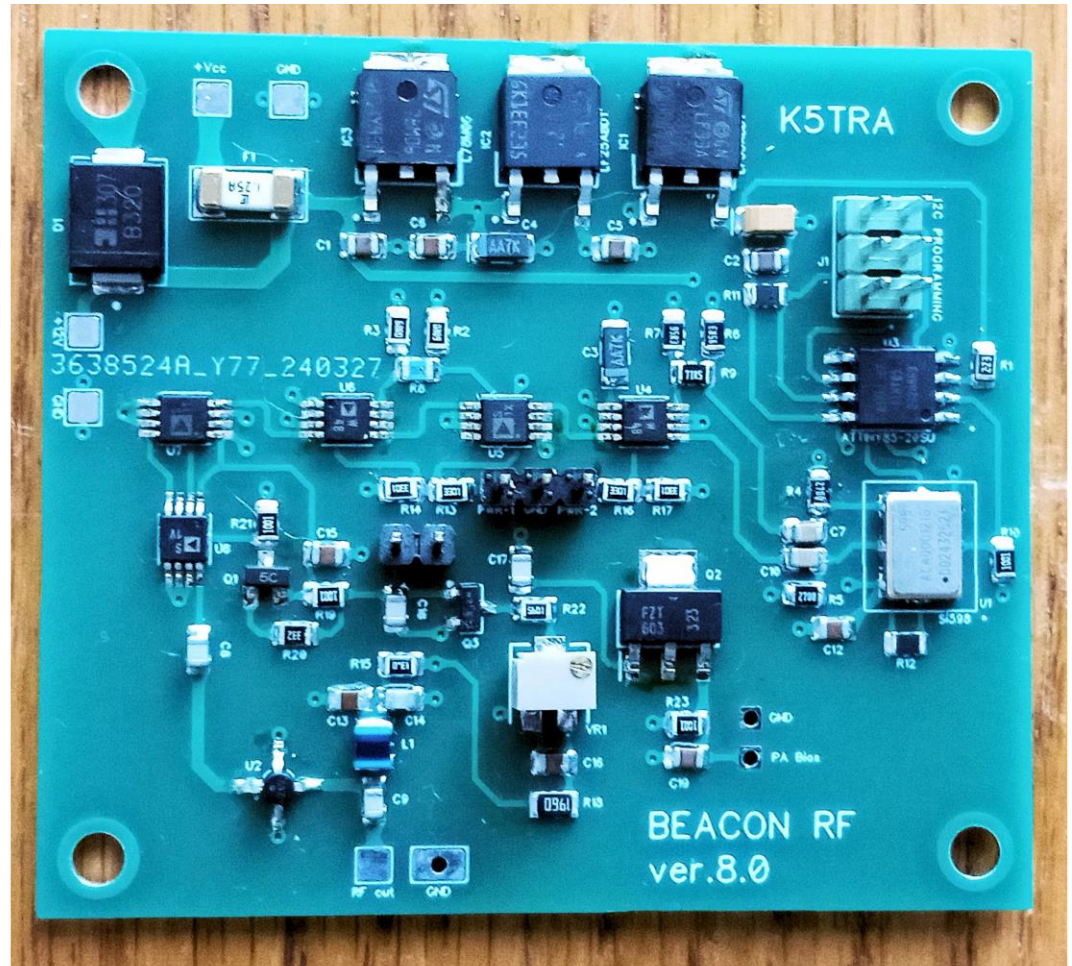


BEACON CONTROLLER SCHEMATIC

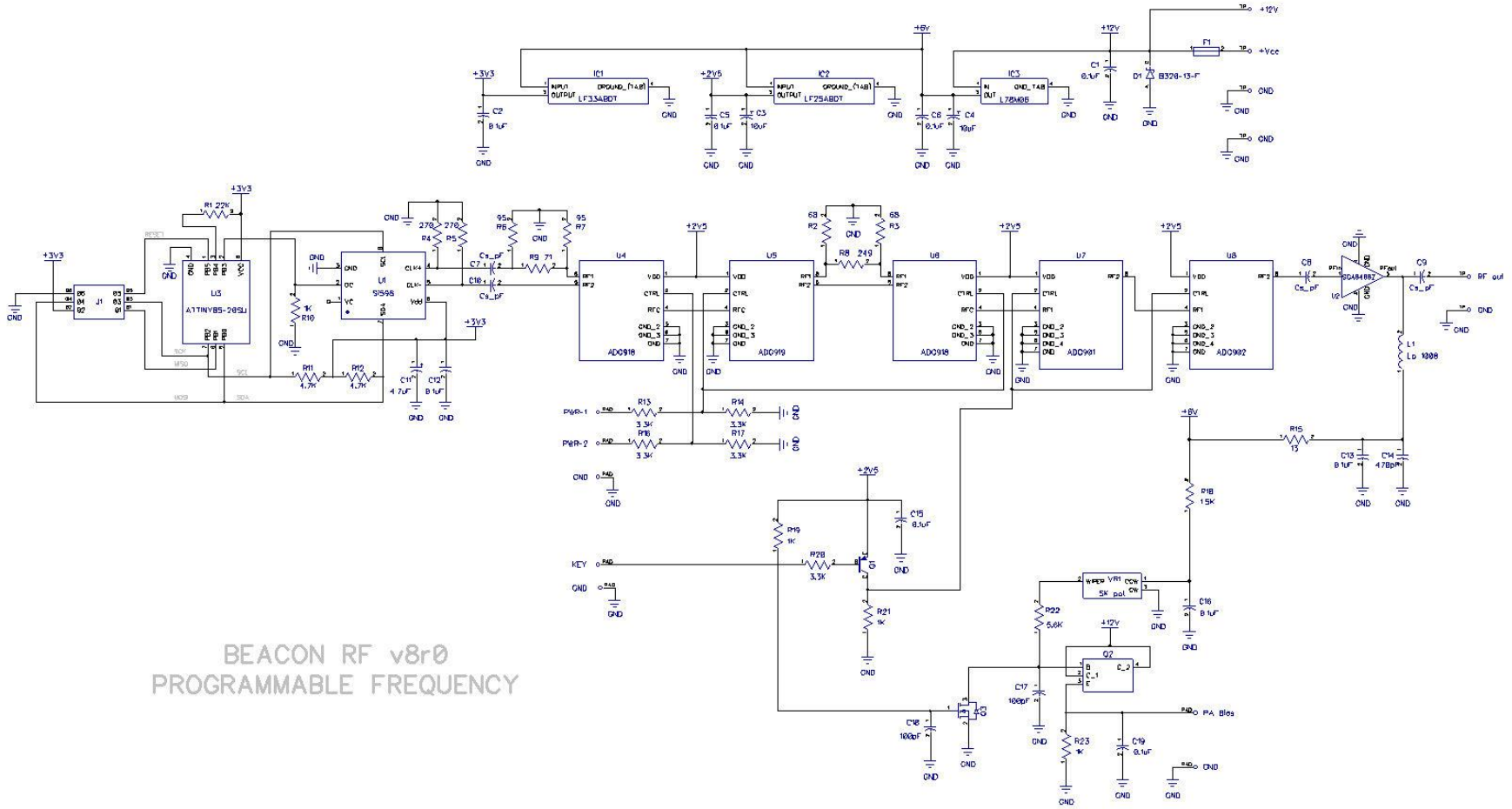


BEACON RF BOARD

- Frequency programmable
- Si598 – ATtiny85
- Three step output levels
- Analog Devices MOS switches for RF keying and level stepping
- PA bias pot and keying
- Based on previous K5TRA RMG beacons
- 2.50" x 2.20"



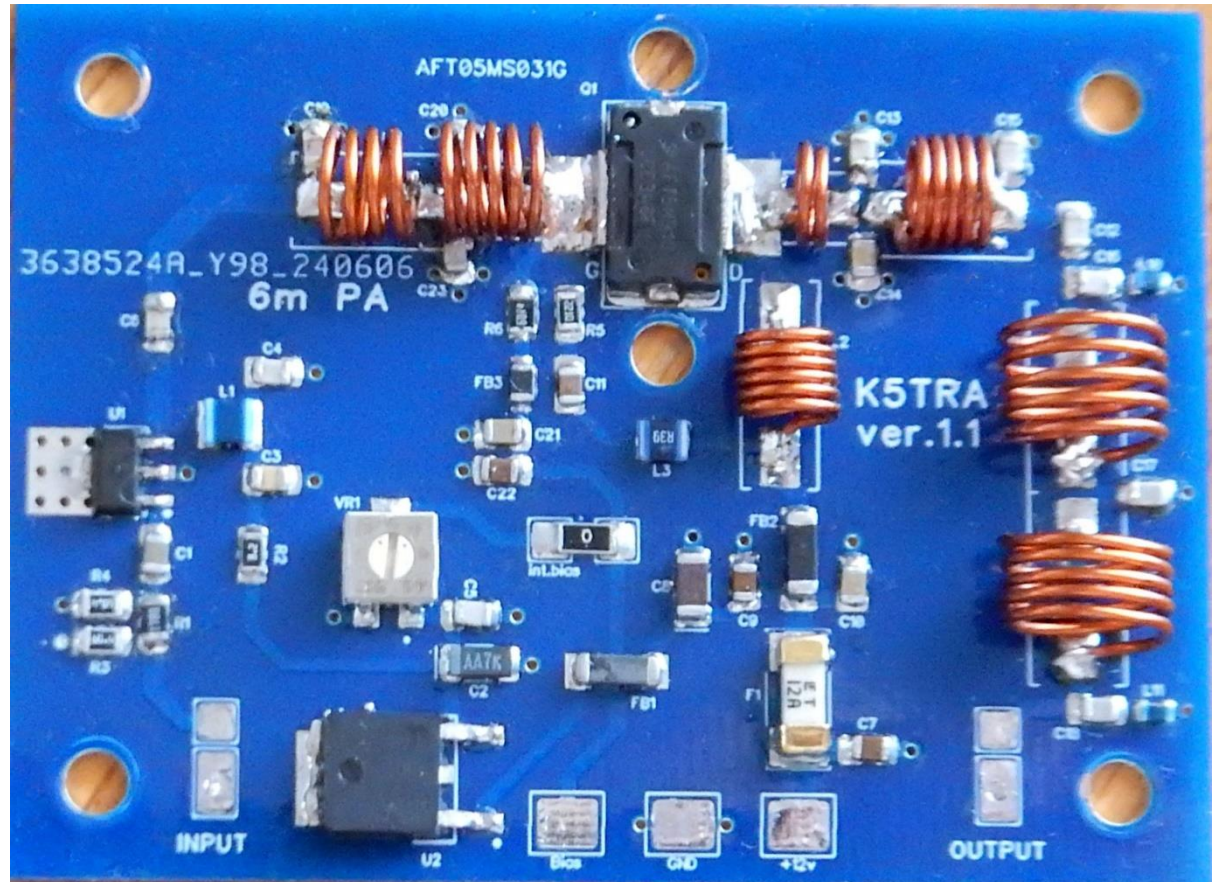
BEACON RF BOARD SCHEMATIC



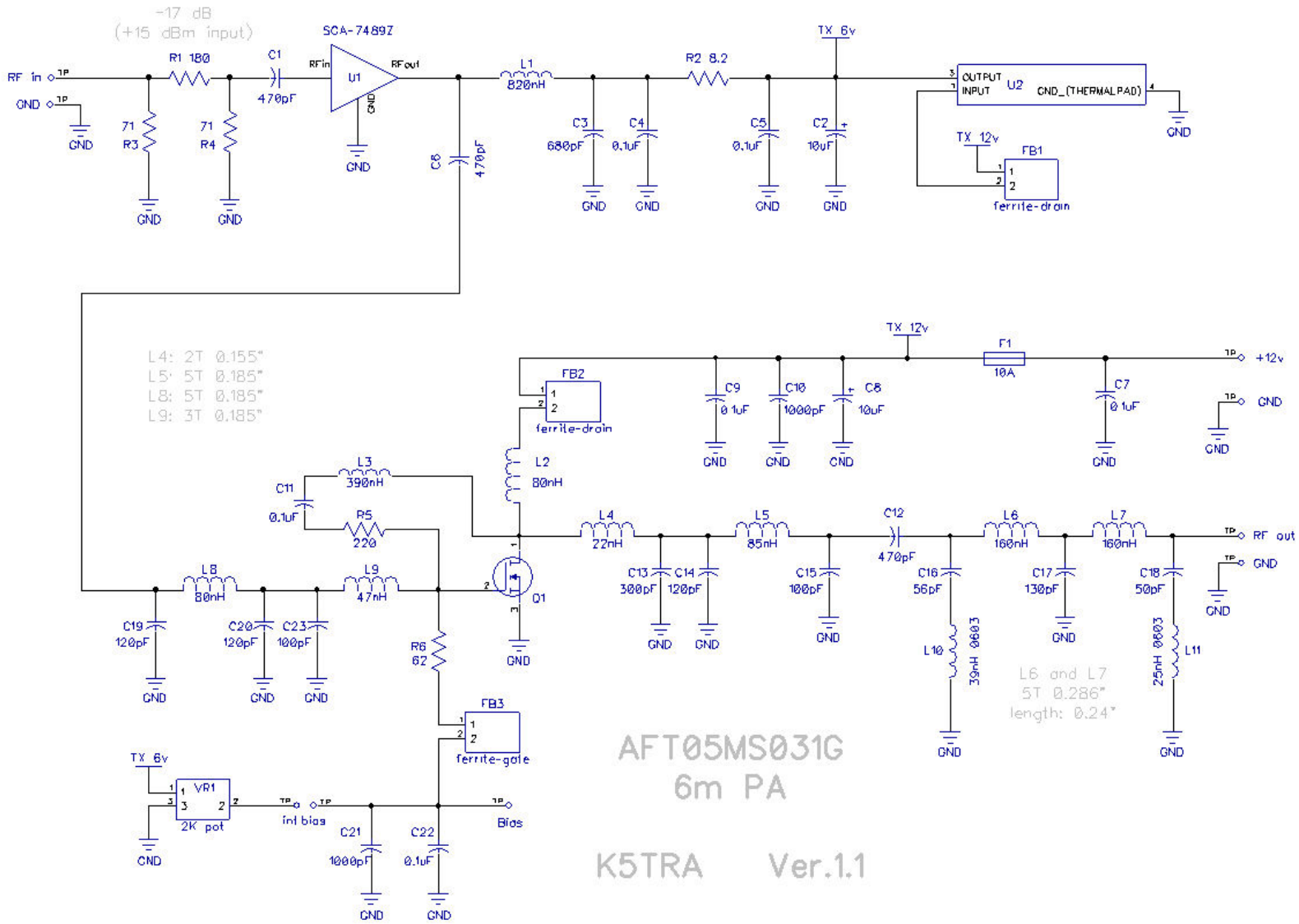
BEACON RF v8r0
PROGRAMMABLE FREQUENCY

20W POWER AMPLIFIER

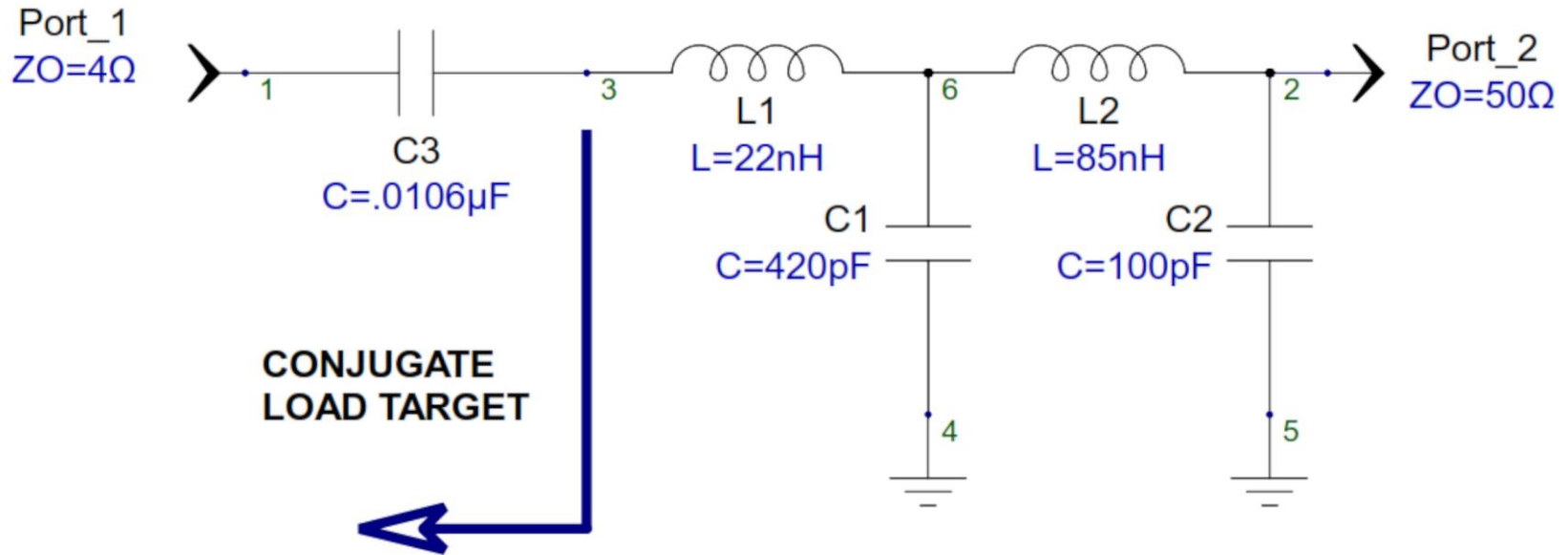
- NXP LDMOS FET
- LPF with harmonic traps
- SGA-7489 driver
- Pi pad input
- On board or external bias option
- Max gain: 43 dB
- Linear power: 20W
- 2.50" x 1.85"



PA SCHEMATIC



OUTPUT MATCH DESIGN

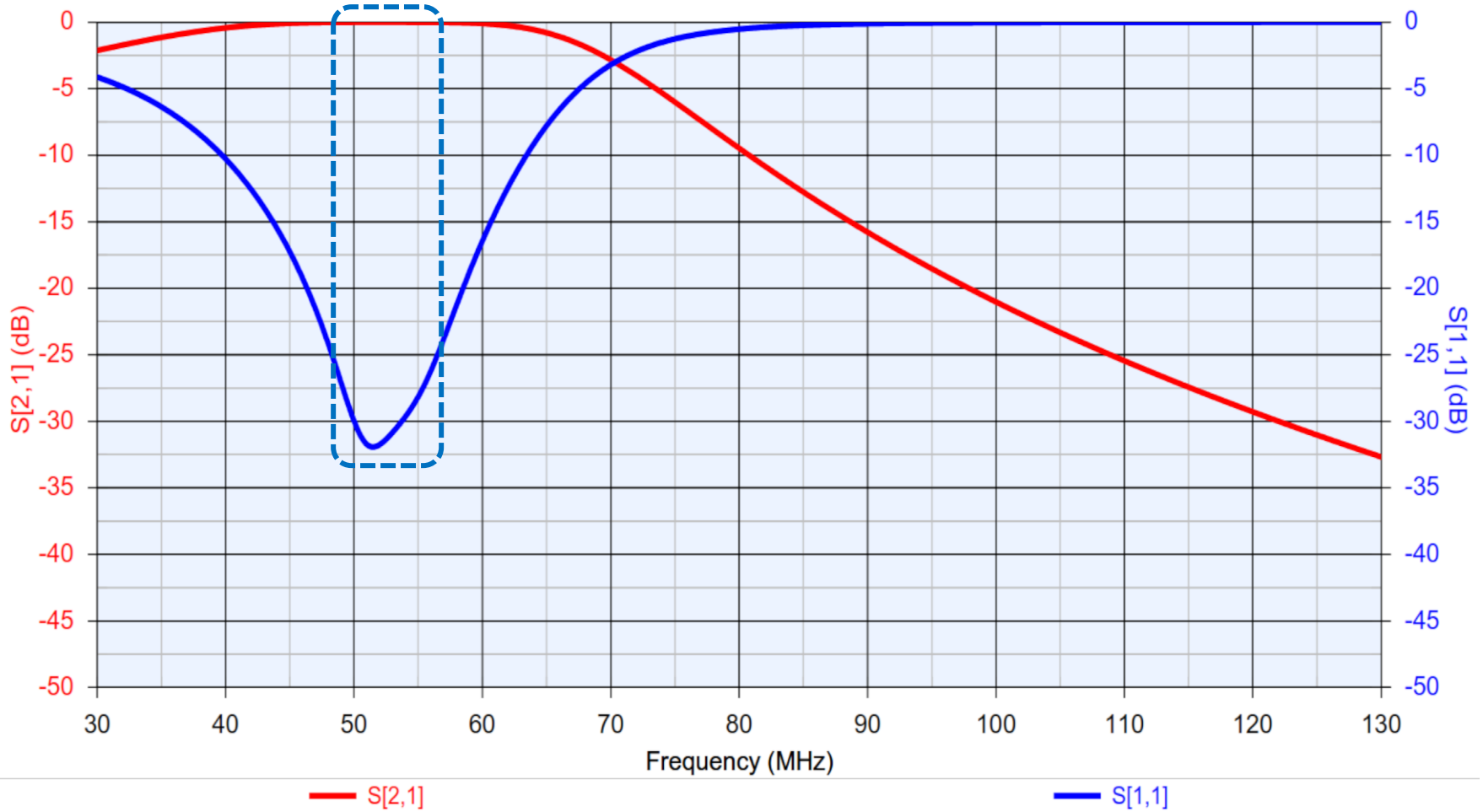


$$R_L = \frac{(V_{dd} - 1)^2}{2 P_{out}} = \frac{12.6^2}{40} = 4 \Omega$$

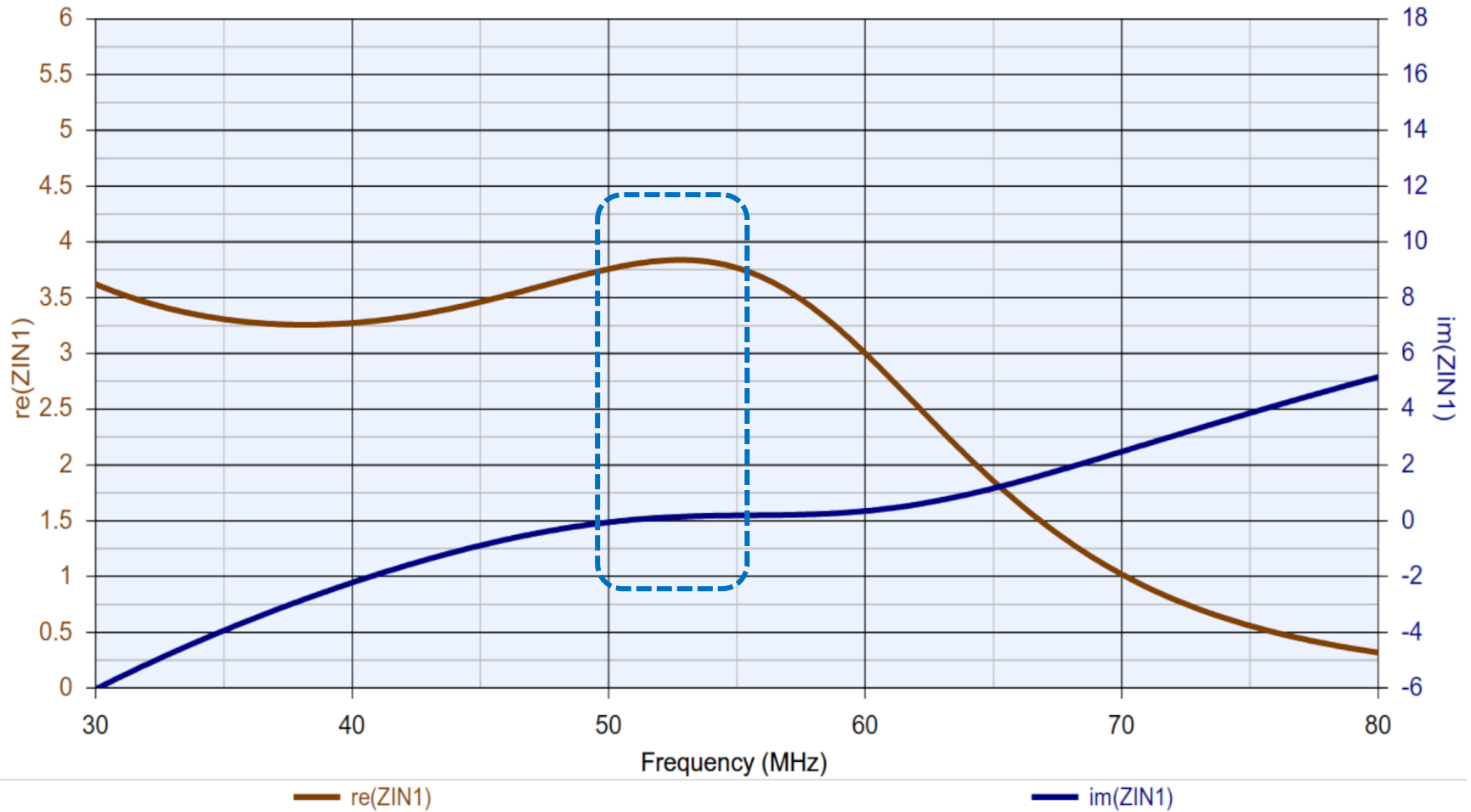
$$C_{OUT} = 50 \text{ pF}$$

SERIES EQUIV: 4 Ω + 0.01 μF

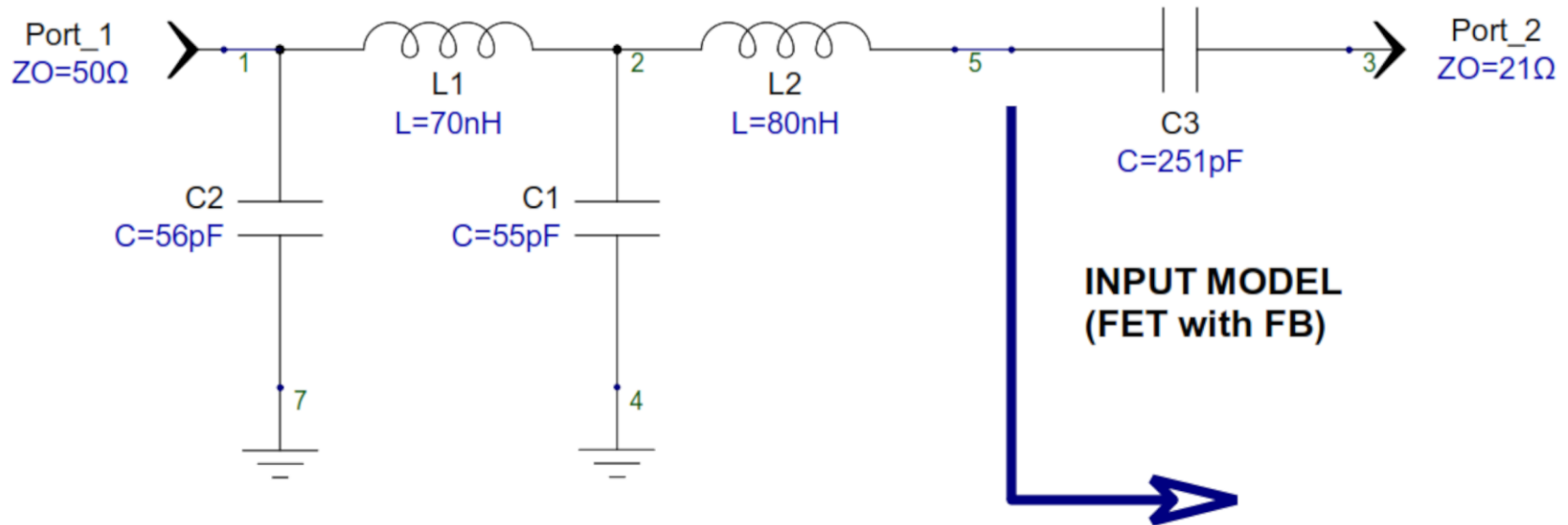
DRAIN (OUTPUT) MATCH



LOAD IMPEDANCE PERFORMANCE

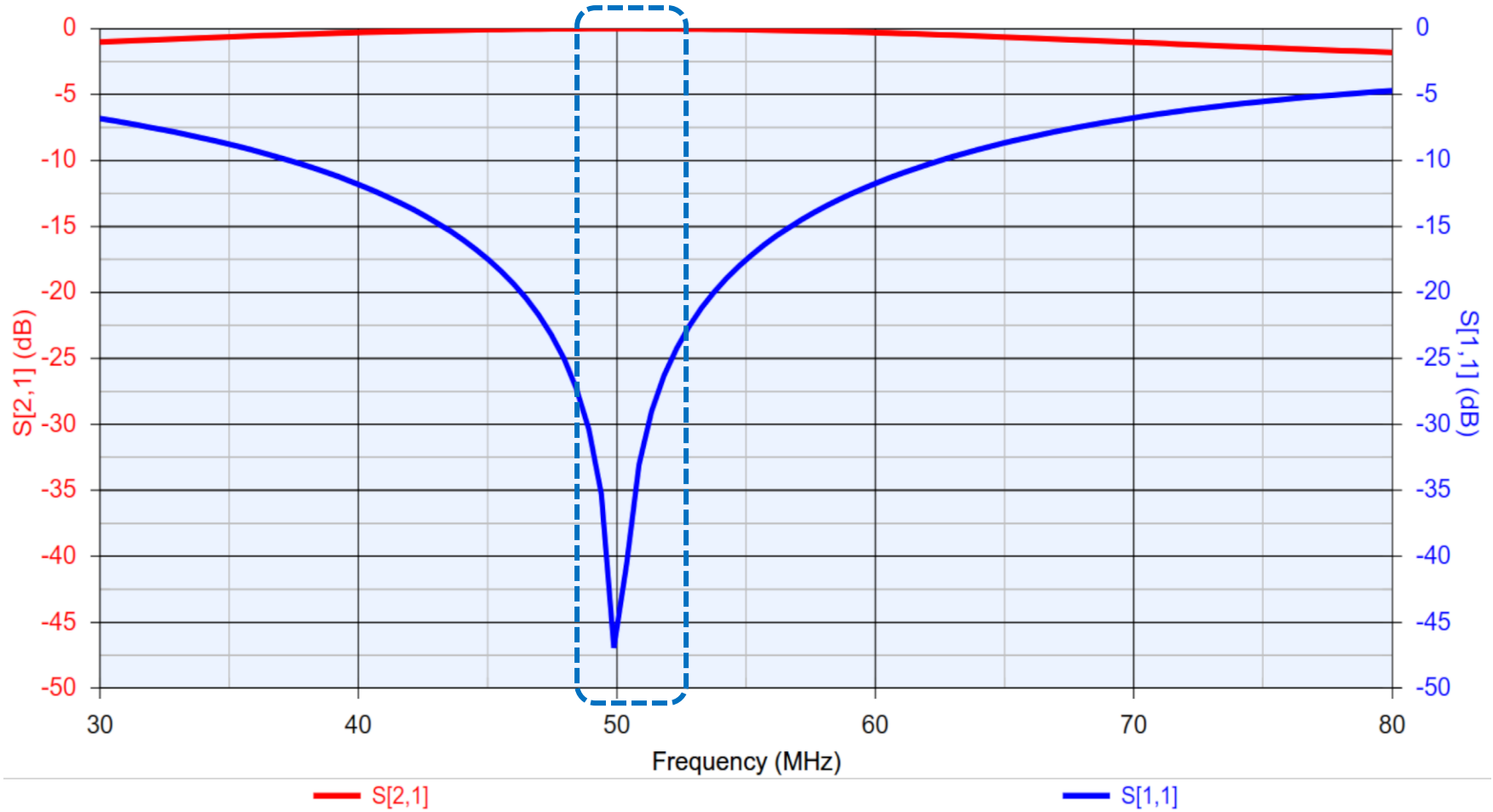


INPUT MATCH DESIGN

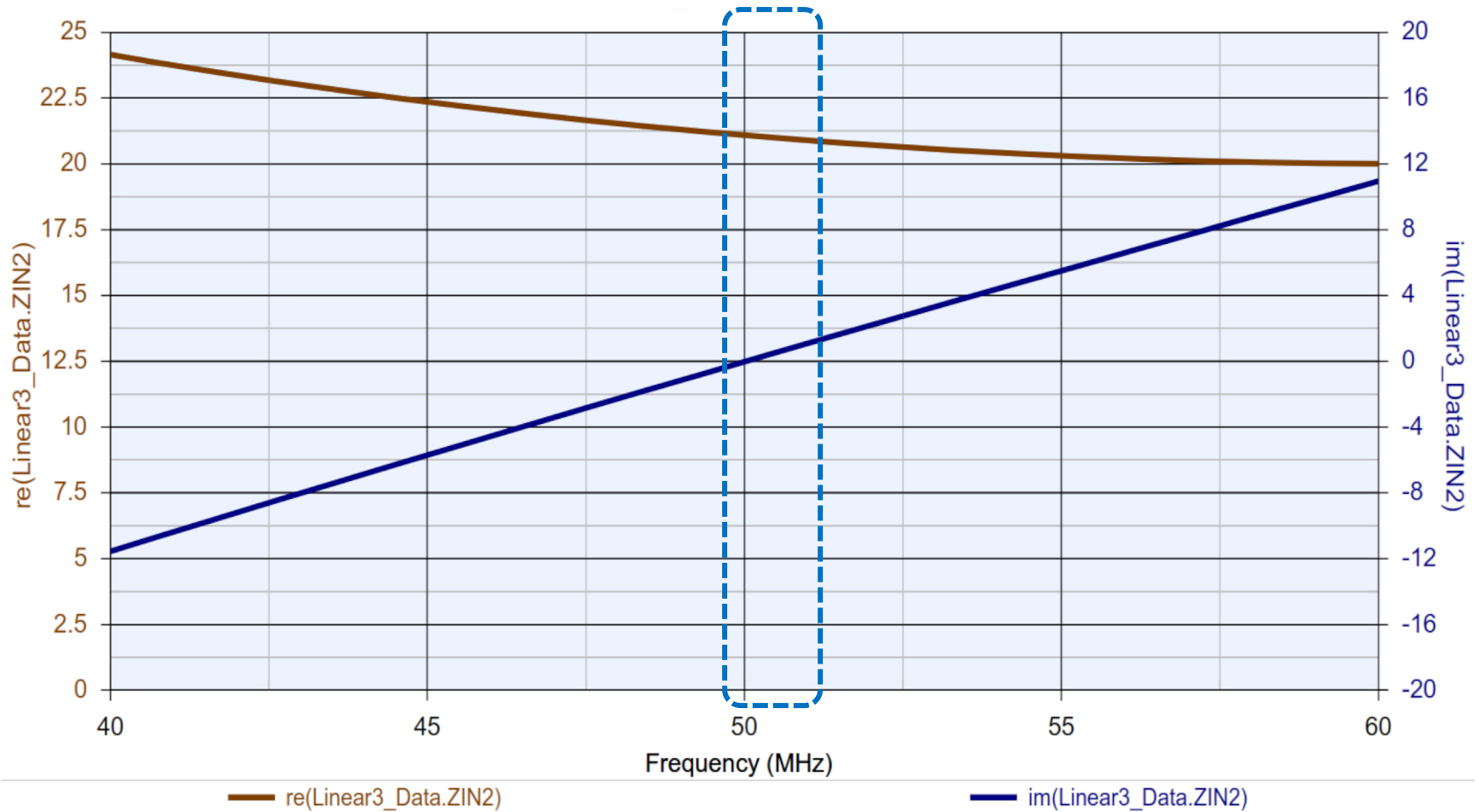


- $21\ \Omega + 251\ \text{pF}$ is FET input (with FB)
- Measured through single section LC prematch
- De-embedded to gate
- Represented in series equivalent impedance form

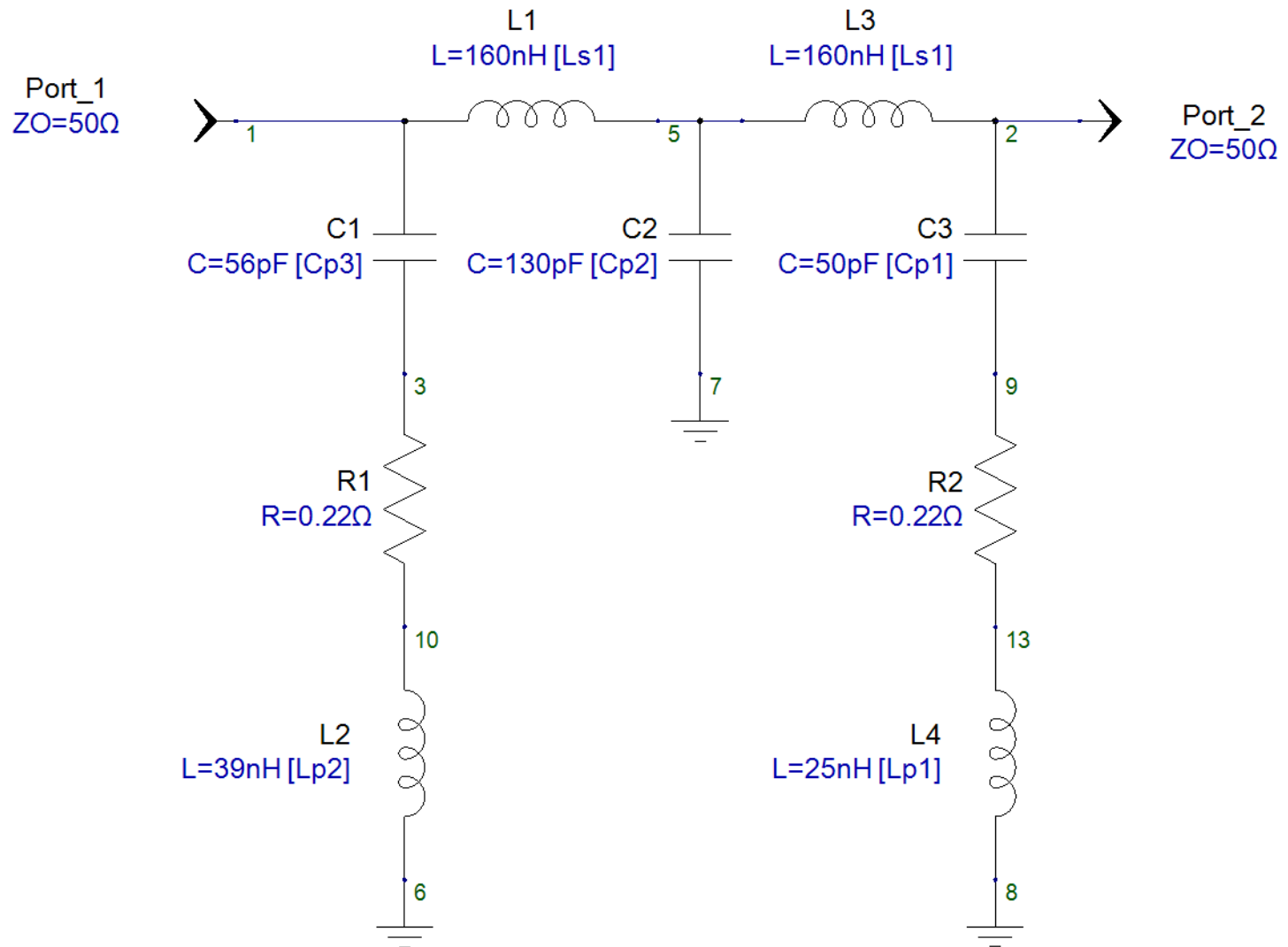
GATE (INPUT) MATCH



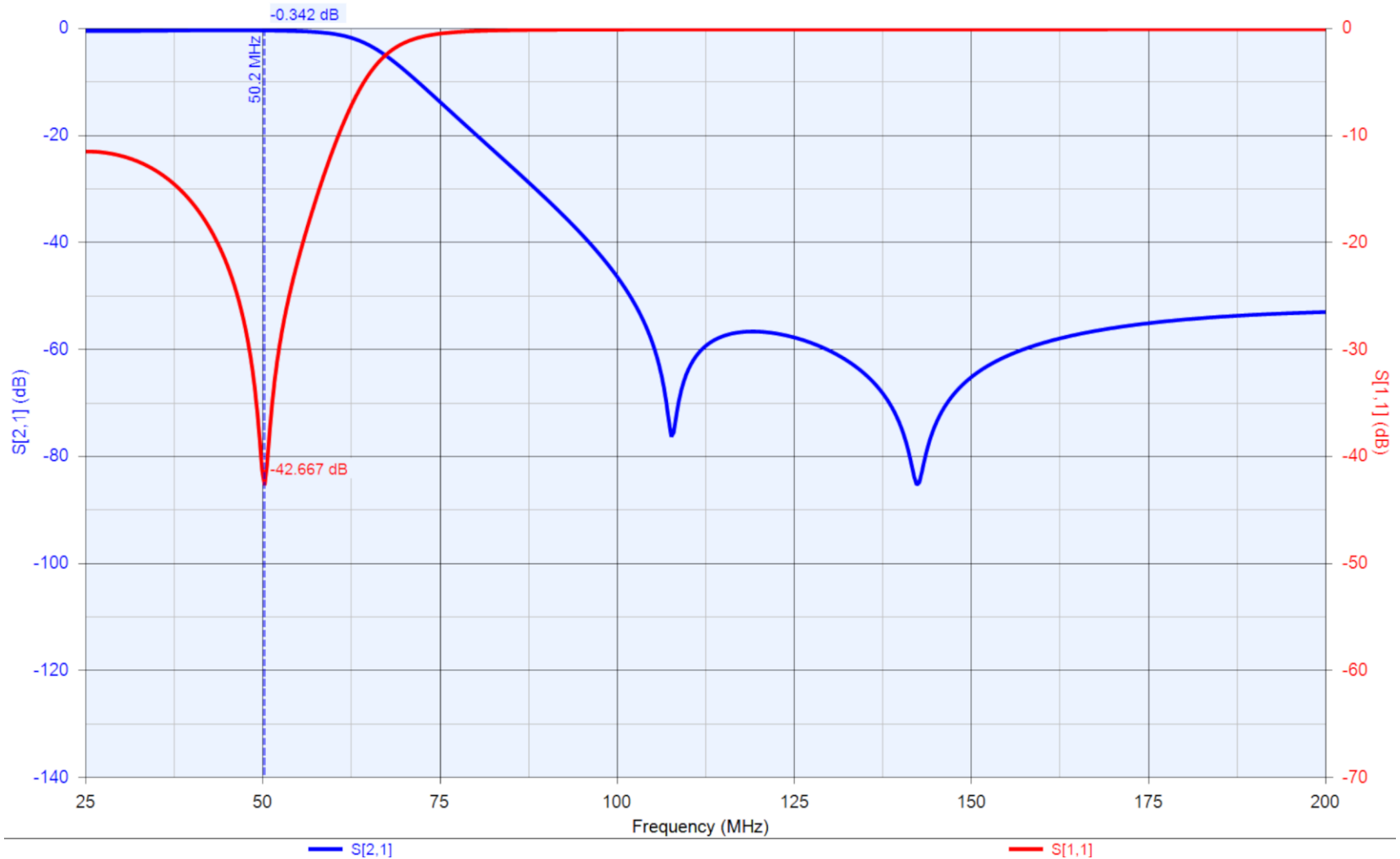
SOURCE IMPEDANCE PERFORMANCE



PA LPF



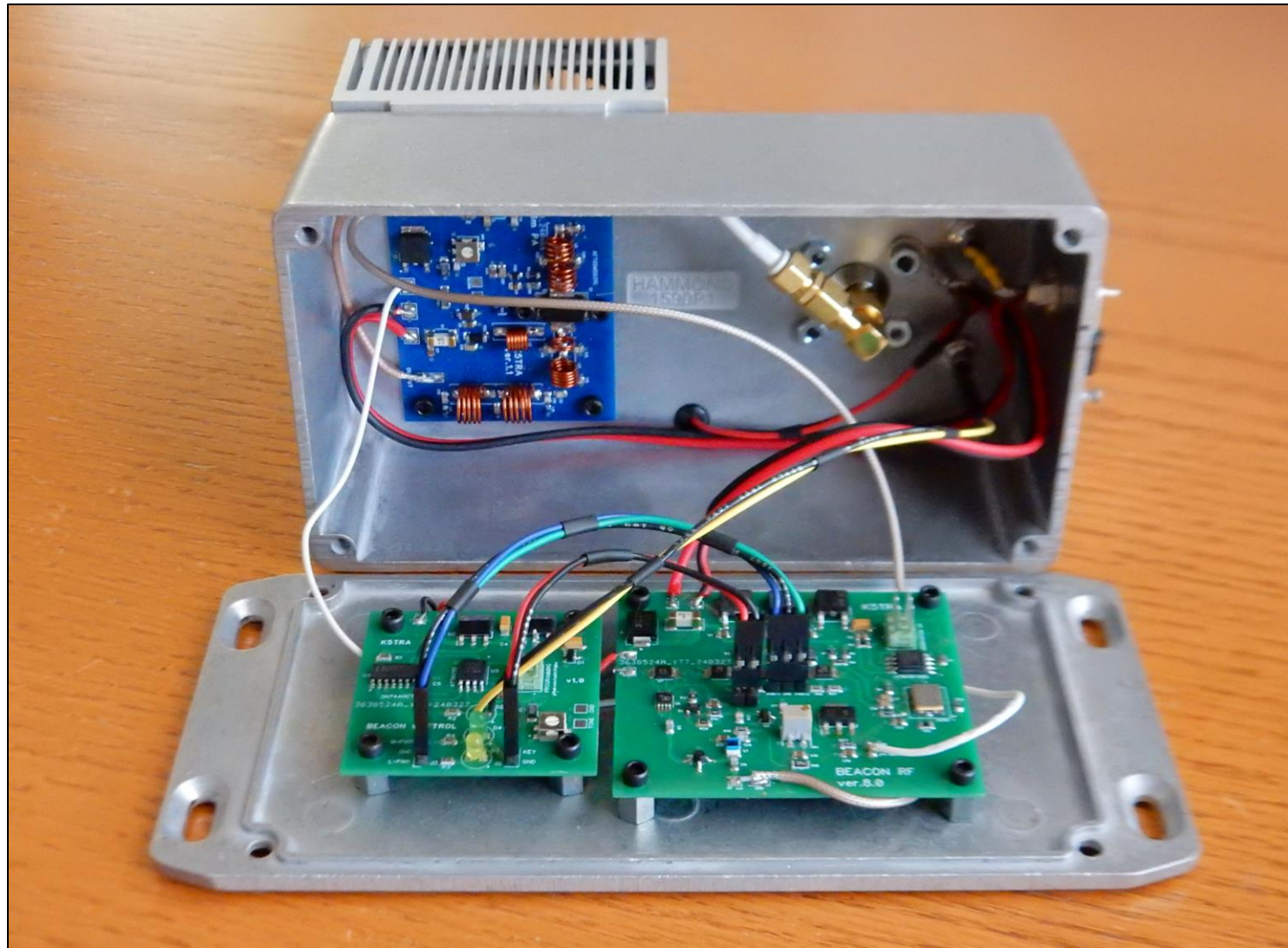
LPF RESPONSE



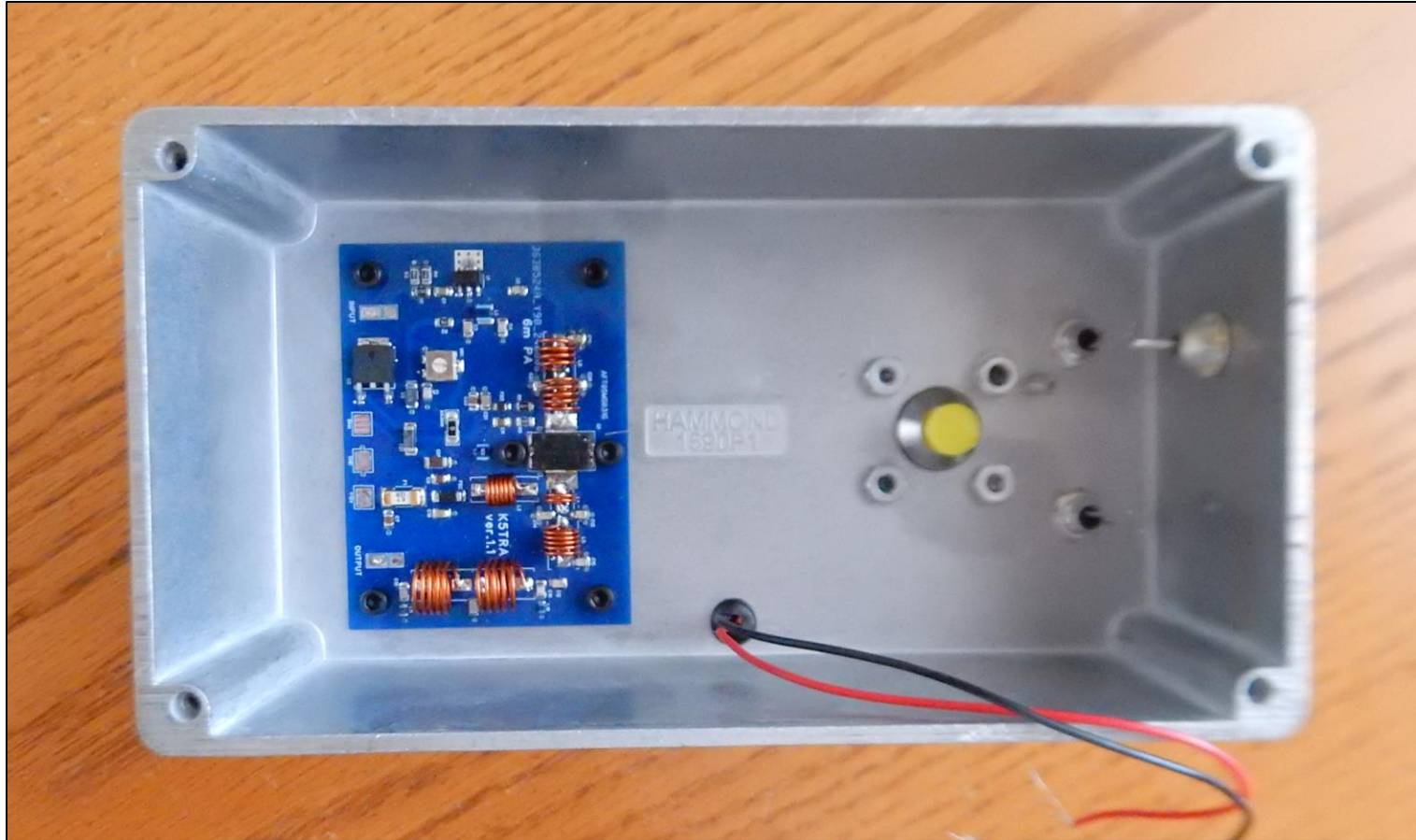
COMPLETED BEACON



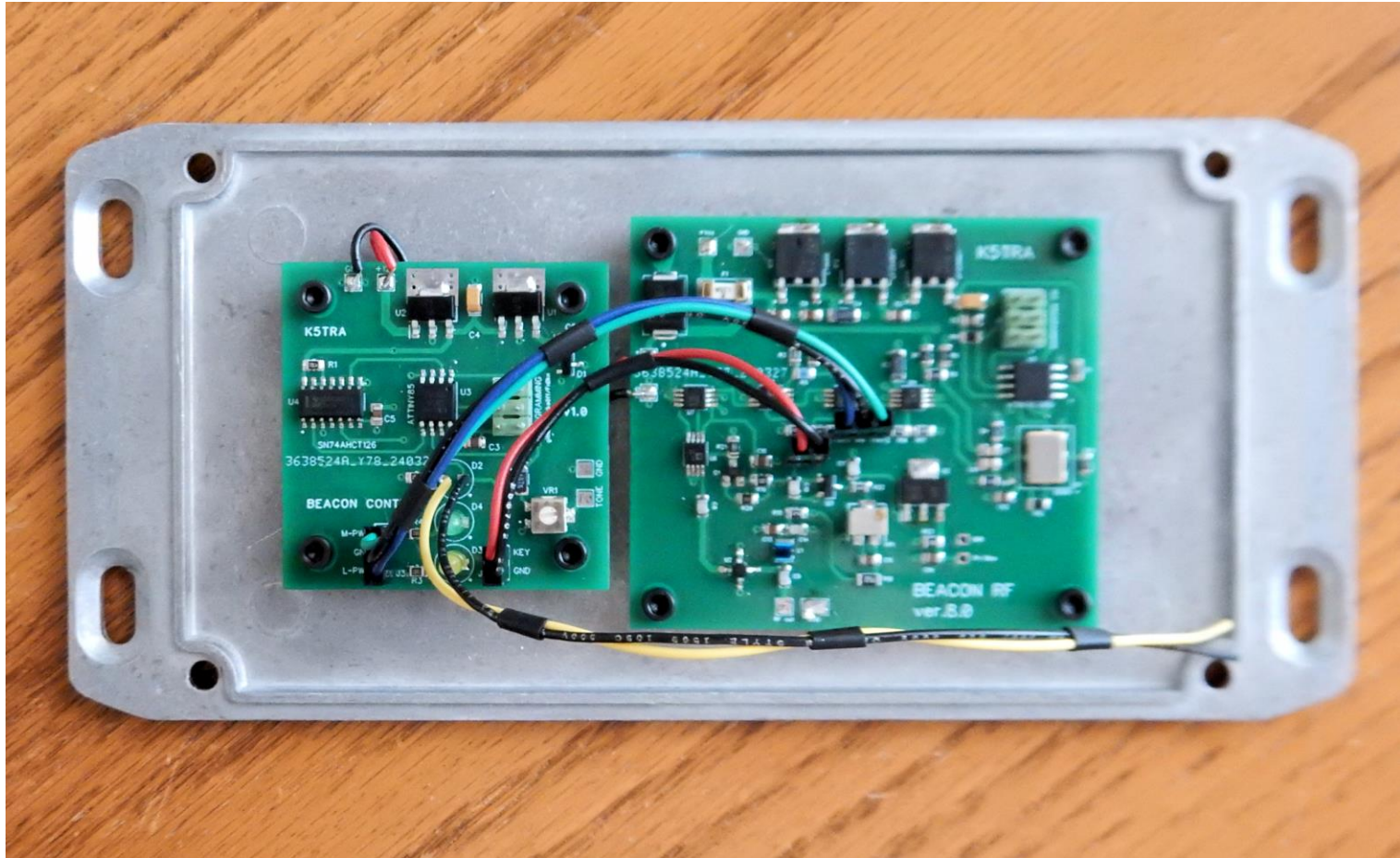
BEACON INTERIOR



BEACON INTERIOR – PA BOARD



BEACON INTERIOR – CONTROLLER & RF BOARD



SUMMARY

- New 6m beacon built with frequency programmable Si598
- Packaged in Hammond 1590P1FL as with previous RMG beacons
- Morse ID and three level output: 20W, 2W, 0.2W
- New PA with NXP AFT05MS031G LDMOS power FET instead Mitsubishi module.
- FET is 30W capable with loading set for 20W output
- Internal filtering shows very clean spectrum