



SSPA FRONT END: RF POWER DETECTION

About the Client

The Client is a unit of Department of Atomic Energy, Government of India, engaged in R & D in non-nuclear front line research areas of Lasers, Particle Accelerators & related technologies.

Summary

RF Power detection and interlocking system for Solid state power amplifier: RF Solid state power amplifier (SSPA) is being used for the most demanding application like Radars, Satellite communication, Missile technology and Airborne. Advantages of Solid state power amplifier over other amplifiers are its reliability as it can sustain for years without degradation, high performance at smaller size and cost effectiveness.

The Challenge

Development of PCB which locks power amplifier and prevent the damage to further circuit based on measurement of Transmitted and reflected power

An efficient and accurate measurement require which lead to prevent any further damage to circuit

Our Solution

As a solution to this, OSPL made RF power measurement PCB which measures RF power in dBm and converts it to voltage and after calibration it gets forwarded to Digital control board for measurement and Display

INDUSTRY

Research & Development

KEY CHALLENGES

- Only discrete components for measurement of RF power and display
- High accurate RF power measurement

SOLUTION

- Measurement of RF power using only Analog and Digital Circuits
- Auto shutdown feature in case of fault occurrence

Benefits

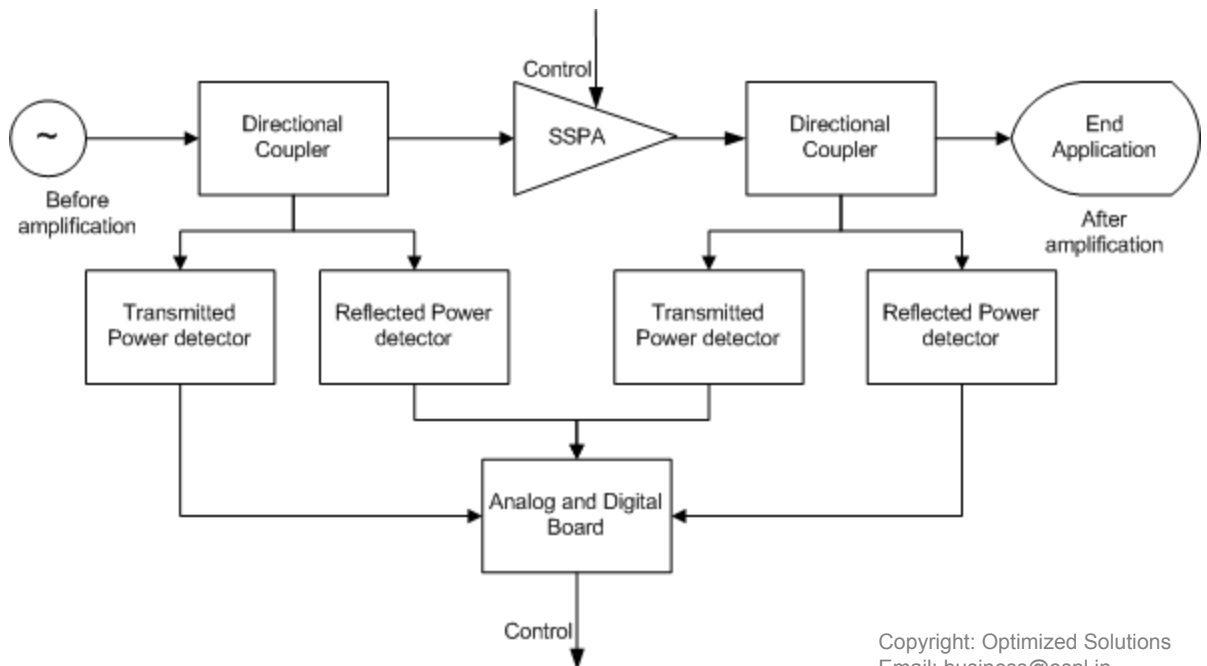
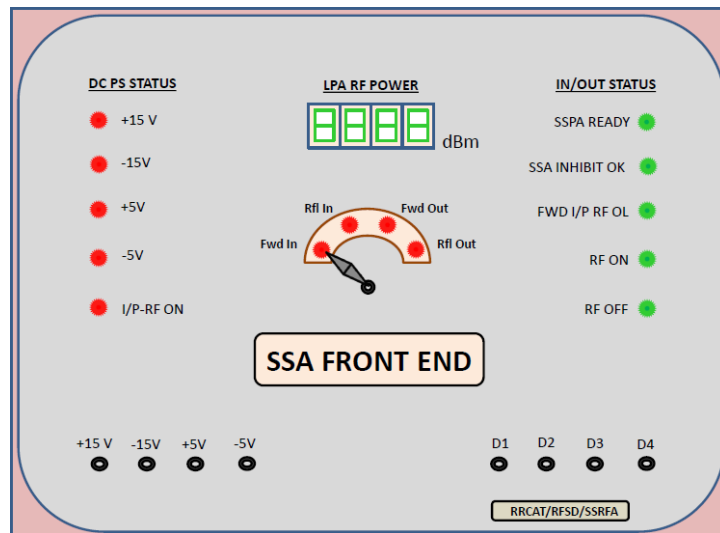
- Low power measurement
- Faster response



Measured RF power is in terms of voltage which feed into the analog calibration circuit. Analog calibration circuit has a HMI via which offset and gain of the measured voltage is converted back to power and shown to the display.

Also all the power levels are given to remote monitoring connectors so user can monitor the power remotely. After the analog calibration circuit signal is given to the digital control board where there is a predefined threshold voltage level.

In case of occurrence of any fault, a digital logic is triggered and the amplifier goes in shutdown mode. Once all the faults are removed only then the system can be RESET and amplifiers will be powered on. RESET needs to be pre pressed after removal of faults to start the device again. RESET can also come as a remote command.





Benefits

RF power measurement and interlocking system benefits are described below:

- Transmitted and reflected RF Power before amplification and after amplification can be measured
- Action need to decide as per measured power value
- Interlocking system will make cutoff if any of the power increase or any major fault happens which can prevent amplifier and other system damage

Benefits against Alternatives

There are two major benefits of Diode based solution over the Thermistor based RF power measurement described below:

- As Thermistor based (Heat generated) solution has limitation of low power measurement, so in this case where the heat would be very low, Diode detector based power measurement is the best solution as it can measure low power up to -56dBm
- In Thermistor based device heat generated with respect to the variation of RF power which has some delay where in diode based detectors are much faster response than Thermistor based device

Our Value Addition

- Complete End to End solution including Design, Development and Enclosure design and manufacturing for the analog and digital PCBs with copper plate
- End to End solution for RF PCBs including Design, Development and Enclosure design for the RF PCBs