Application Note

74-0045-180918

ThinkRF R5500 Real-Time Spectrum Analyzer "Embedded" Chassis Mechanical Integration Guide

The ThinkRF R5500 Real-Time Spectrum Analyzer is designed for OEM product integration. The R5500 embedded chassis may be integrated into a larger OEM hardware product solution. This document sets out guidelines for the integration.

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Contents

Associated Documents

This document references the following associated mechanical assembly drawings:

- 39-0045_R5500-408_EMBEDDED_Rev-04.PDF

And the following mechanical design drawings and manufacturing files:

- 23-0153-01_R5500 CHASSIS BASE AND HEAT SPREADER.PDF
- 23-0154-01_R5500 CHASSIS COVER ASSY.PDF
  23-0231_R5500 EMBEDDED FRONT END PLATE_Rev-02.PDF
- 23-0231_R5500 EMBEDDED FRONT END PLATE_Rev-02.STEP
- 23-0232_R5500 EMBEDDED BACK END PLATE_Rev-02.PDF
- 23-0232_R5500 EMBEDDED BACK END PLATE_Rev-02.STEP

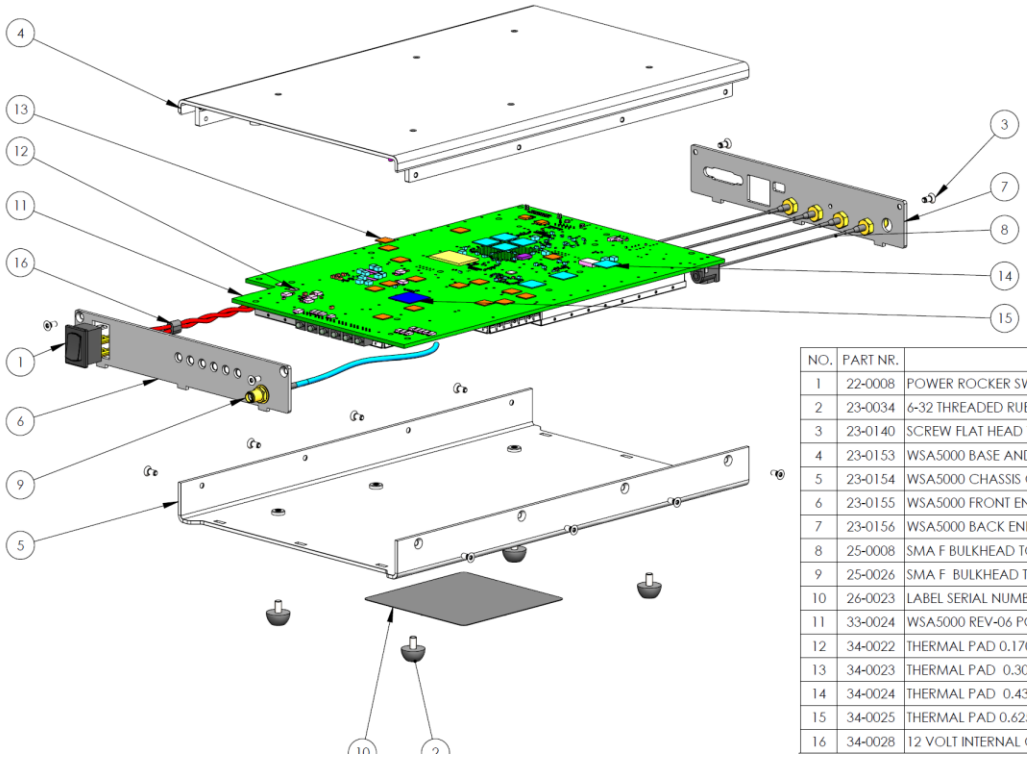
Overview and Limitations

The base models of the R5500 family of products include the 100 MHz to 8 GHz R5500-408, the 18 GHz R5500-418 and the 27 GHz R5500-427. All of these base models have a receiver/digitizer printed-circuit board assembly (PCBA). The R5500 model also includes an additional down-converter PCBA.

ThinkRF typically provides the PCBAs within a chassis that is actively cooled by redundant blower fans. Cooling is achieved in that the receiver/digitizer PCBA is mounted and thermally connected to a machined heat-spreader. The heat-spreader is then cooled by air-convection via the fans in a manner such that the moving air does not enter the inside of the chassis.

Figure 1: Embedded Chassis

ThinkRF also provides an *"embedded"* chassis for mechanical integration and that is passively cooled. Figure 1 is an illustration of the embedded chassis and figure 2 is an excerpt from the *39-0045_R5500-408_EMBEDDED_Rev-04.PDF* file and illustrates a deconstructed view of the embedded chassis.



NO.	PART NR.	DESCRIPTION
1	22-0008	POWER ROCKER SWITCH
2	23-0034	6-32 THREADED RUBBER FOOT
3	23-0140	SCREW FLAT HEAD TORX #4-40 X 0.250
4	23-0153	WSA5000 BASE AND HEAT SPREADER
5	23-0154	WSA5000 CHASSIS COVER ASSY
6	23-0155	WSA5000 FRONT END PLATE 1SMA
7	23-0156	WSA5000 BACK END PLATE
8	25-0008	SMA F BULKHEAD TO MHF1 CABLE, 200MM LONG
9	25-0026	SMA F BULKHEAD TO SMA M CABLE, 7 IN LONG
10	26-0023	LABEL SERIAL NUMBER 3 X 3 X 0.002
11	33-0024	WSA5000 REV-06 PCBA
12	34-0022	THERMAL PAD 0.170 X 0.170 x 0.020
13	34-0023	THERMAL PAD 0.300 X 0.300 X 0.020
14	34-0024	THERMAL PAD 0.430 X 0.430 X 0.020
15	34-0025	THERMAL PAD 0.625 X 0.625 x 0.020
16	34-0028	12 VOLT INTERNAL CABLE ASSEMBLY

Figure 2: Embedded Chassis Assembly Deconstruction

Importantly note that the passively cooled embedded chassis only supports the receiver/digitizer PCBA and thus only supports the 100 MHz to 8 GHz R5500 base model configuration. The 8 GHz Preselection Filter (incorporated in the R5500P), and the 18 GHz and 27 GHz down-converter daughter-board PCBAs are not supported in the embedded chassis.

Heat Dissipation Considerations

The R5500 embedded chassis is designed to appropriately deal with dissipation of the heat generated by the PCBA under normal operation. Any integration of the embedded chassis needs to respect these considerations.

Under normal operation the R5500 PCBA consumes and needs to dissipate approximately 15-20 watts of power. The R5500 is designed to dissipate this heat via conduction through its chassis's top surface and without the need for integrated mechanical fans. It will dissipate heat adequately if it is appropriately located and/or mounted, whether on the desktop or in a rack, cabinet or enclosure, and done so with consideration of the manner in which it dissipates heat.

Heat sensors on the R5500's PCBA may be queried to ensure that the unit is operating properly. The heat sensors can be queried via the R5500's web console at *http://ip-address/status.html*.

The heat sensors should read a PCBA surface temperature of approximately 60 degrees Celsius when the R5500 is being fully exercised (capturing data continuously), and is mounted appropriately considering heat dissipation, and the ambient air temperature around the chassis is 20 degrees

Celsius The PCBA surface temperature will rise proportionally with a rise in ambient air temperature and should be approximately 40 degrees Celsius above the ambient air temperature under normal operation. Under these circumstances, the R5500 is designed to operate in an ambient air temperature up to 50 degrees Celsius.

Embedded Chassis Mounting and Heat Dissipation

The R5500 embedded chassis is designed to be mounted in a cabinet or enclosure. Do not mount the R5500 in exposure to direct sunlight.

When used on a desktop, the rubber feet are inserted in the bottom of the embedded chassis and the heat is dissipated via the heat-spreader through the top of the chassis. Objects that would prevent proper heat-dissipation should not be placed upon the top of the chassis.

Referencing "*23-0153-01_R5500 CHASSIS BASE AND HEAT SPREADER.PDF*", "*23-0154-01_R5500 CHASSIS COVER ASSY.PDF*" and page 2 of "*39-0045_R5500-408_EMBEDDED_Rev-04.PDF*", the R5500 has an identical pattern of six 6-32 threaded mounting holes on both the top and bottom surfaces of it's chassis. The holes accept 6-32 screws to a depth of 0.20".

Referring to the previous section, the R5500 uses a machined aluminum heat-spreader to conduct heat from the bottom surface of the PCBA to the outer upper surface of the embedded chassis, the PCBA being mounted upside down within the embedded chassis.

When mounted in a rack, cabinet or enclosure, one must decide on whether to cool the R5500 by air convection across the embedded chassis's top surface or via heat conduction by mounting the embedded chassis's top surface to an appropriate heat conducting surface.

Embedded Chassis Physical Dimensions

Figure 3 replicates the information from page 2 of "*39-0045_R5500-408_EMBEDDED_Rev-04.PDF*".

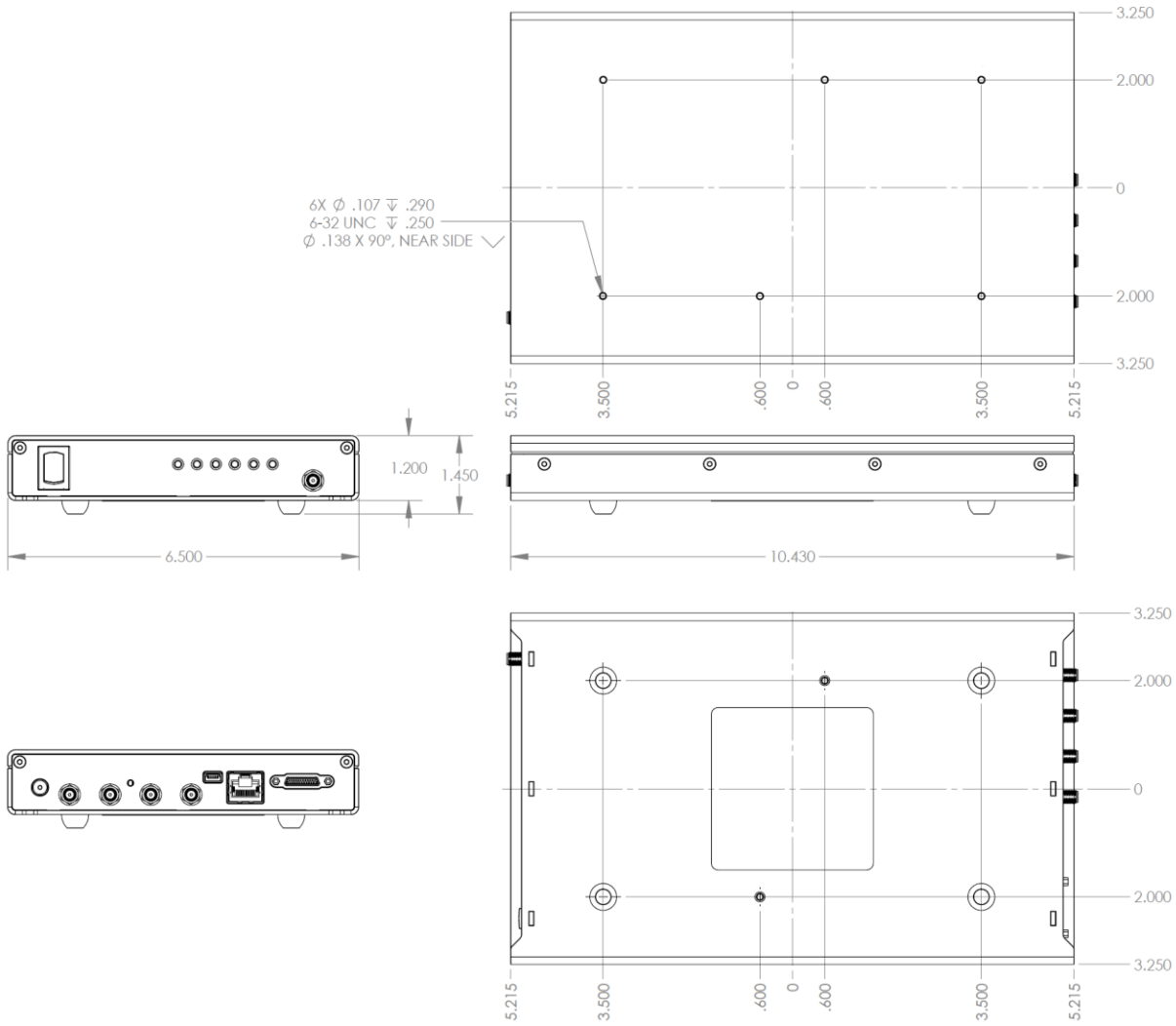


Figure 3: Embedded Chassis Physical Dimensions

Contact us for more information

Please contact us via email at *sales@thinkrf.com* or via phone at +1.613.369.5104.