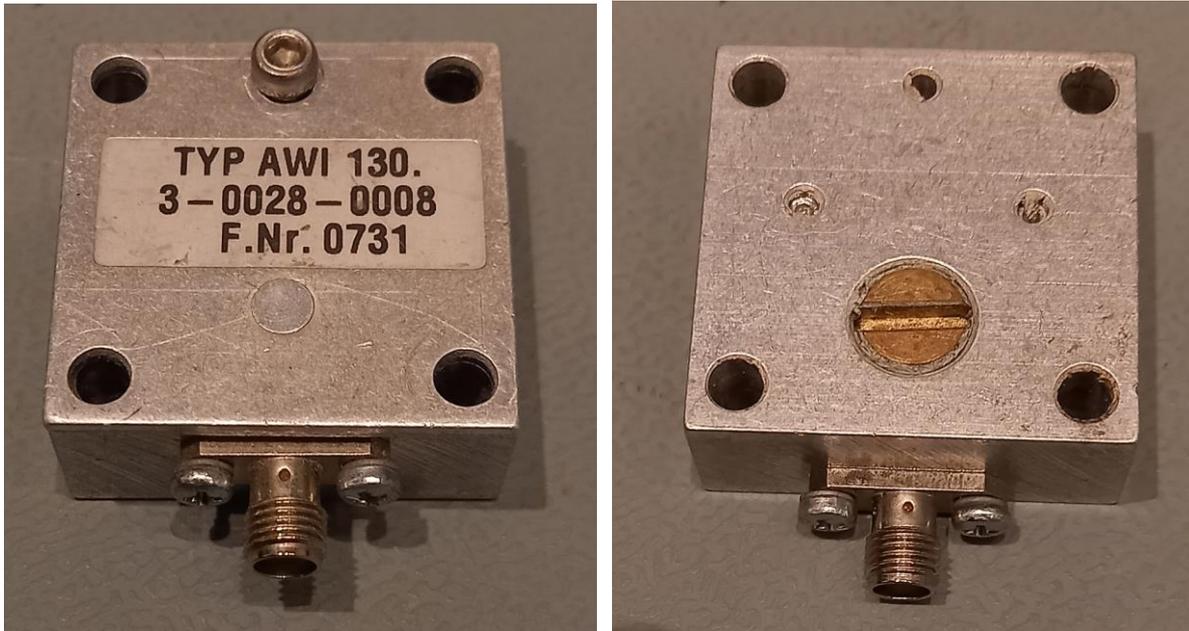


Dummy Load AWI 130.3-0028-0008 based on EMC 5659 resistor

Matthias, DD1US, December 14th 2020, rev 1.0

Hello,

Looking for a suitable termination for a 23cm circulator a friend sent me a dummy load marked as AWI 130.3-0028-0008. I have not found any data online of this device which is housed in a milled aluminum encasing with a female SMA connector. Here are some pictures of the unit:



The encasing has a tuning screw on the backside.

Being curious what's inside I opened the dummy load. The resistor is from EMC type 5659 and is specified for a frequency range up to 2 GHz with a maximum VSWR of 1.25:1 and an average maximum power of 250W. Of course, for this power level the module needs to be mounted on an adequate heatsink.

Here are pictures of the opened device:





The 50 Ohm resistor is housed in a ceramic package made from BeO with a solid flange. It is screwed in the aluminum encasing to ensure a low thermal resistance. The input pin to the resistor is a rather wide terminal lug and the return loss can be tuned with a brass screw from the back of the encasing (changing the capacitive loading of the input).

Here is the specification of the resistor:

PART IDENTIFIER: 5659

DESCRIPTION: HIGH POWER LOAD, BERYLLIA

ASSEMBLY DWG: 1700194

1.0 SPECIFICATIONS:

1.1 ELECTRICAL:

- 1.1.1 RESISTANCE VALUE: 50Ω NOMINAL.
- 1.1.2 INPUT POWER: (AT 100°C HEAT SINK, DERATED LINEARLY TO ZERO POWER AT 150°C).
 - 1.1.2.1 AVERAGE: 250 WATTS.
 - 1.1.2.2 PEAK: 2500 WATTS (BASED ON 100US PULSE WIDTH AND 1% DUTY CYCLE).
- 1.1.3 FREQUENCY RANGE: DC - 2 GHZ.
- 1.1.4 VSWR: DC - 1.0 GHZ - 1.15:1 MAX.
1.0 - 2.0 GHZ - 1.30:1 MAX.

1.2 MECHANICAL:

- 1.2.1 OUTLINE DWG: SEE SHEET 2.
- 1.2.2 WORKMANSHIP: PER MIL-STD-454, REQUIREMENT 9, AND MIL-R-55342.

1.3 ENVIRONMENTAL:

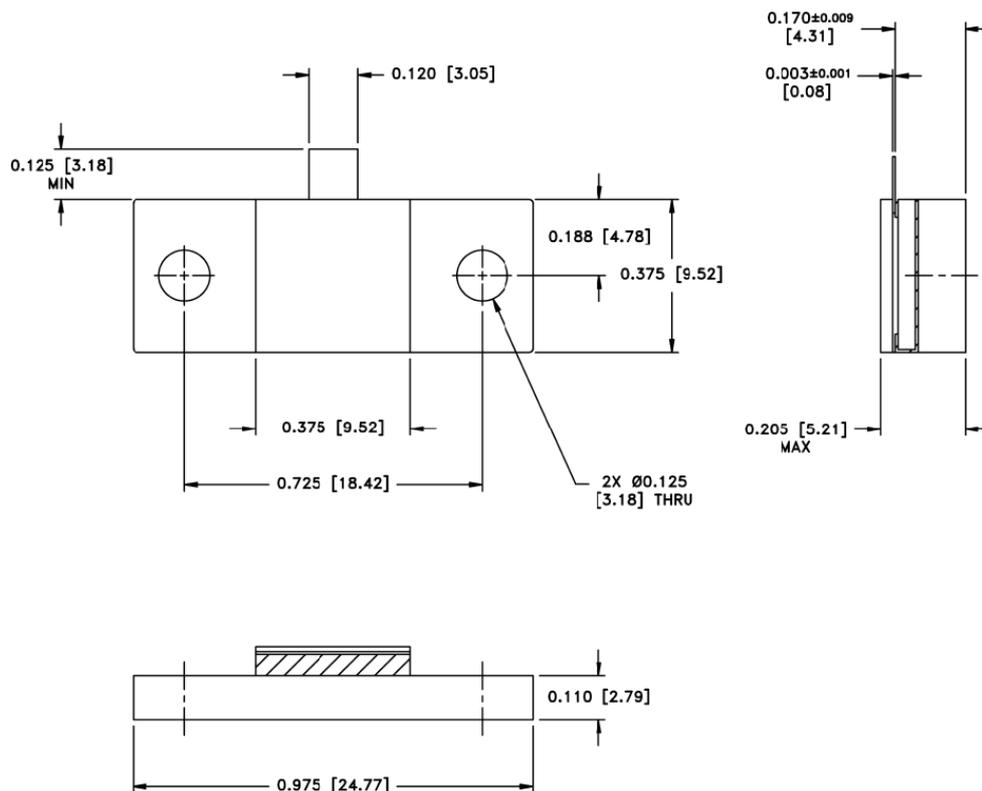
- 1.3.1 TEMPERATURE RANGE:
 - 1.3.1.1 STORAGE: -65°C TO $+150^{\circ}\text{C}$.
 - 1.3.1.2 OPERATING: -55°C TO $+150^{\circ}\text{C}$.

2.0 UNIT MARKING: LOGO AND PART IDENTIFIER
LEGIBILITY AND PERMANENCY PER MIL-STD-130.

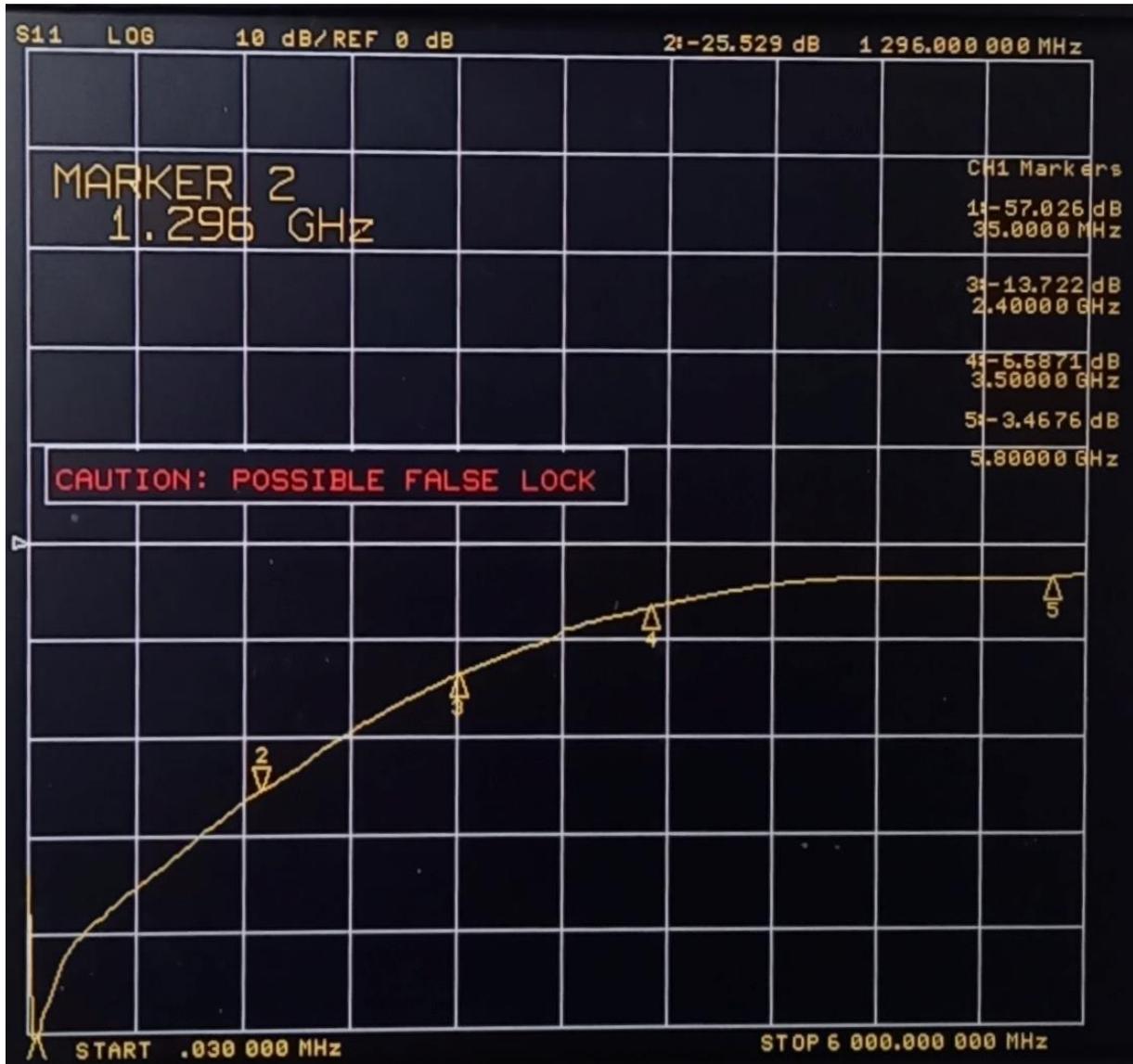
3.0 QUALITY ASSURANCE:

- 3.1 VISUAL AND MECHANICAL PER 824W155.
- 3.2 100% DC RESISTANCE CHECK (GO/NO GO): $50\Omega \pm 5\%$.
- 3.3 DATA REQUIREMENTS:
 - 3.3.1 NO TEST DATA REQUIRED FOR CUSTOMER.
 - 3.3.2 DATA RETENTION - STANDARD.

4.0 PACKAGING: STANDARD PACKING PER 755W002.



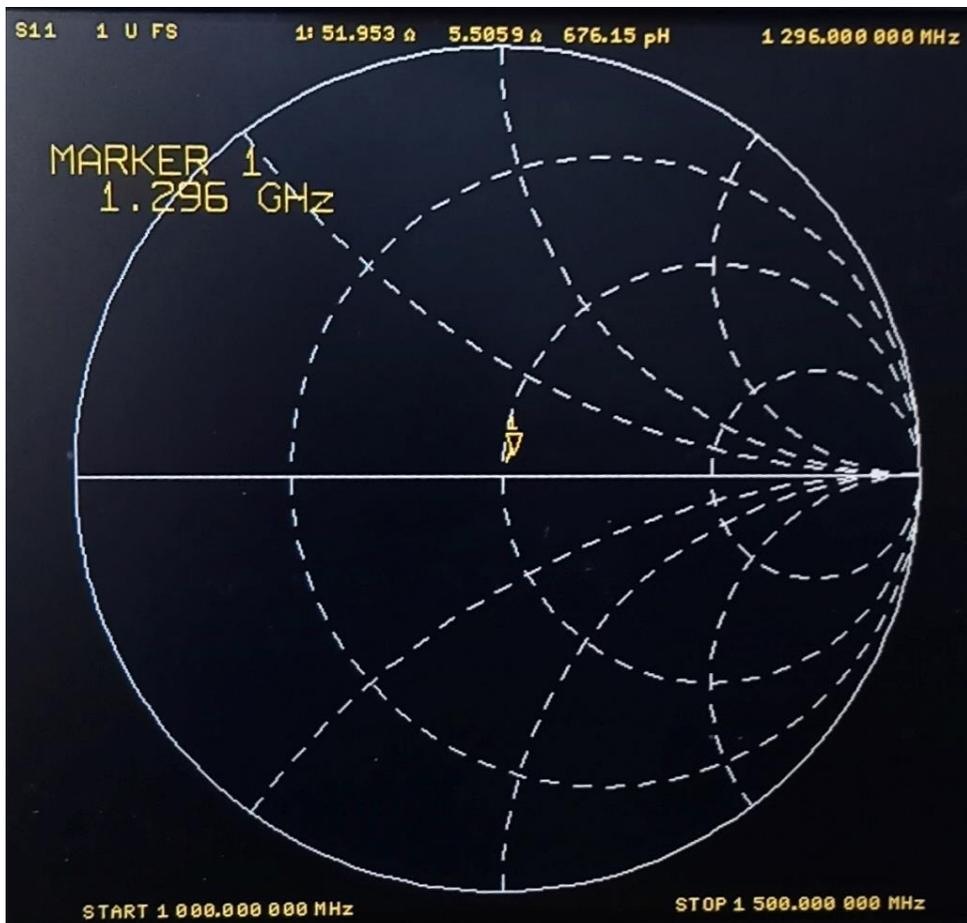
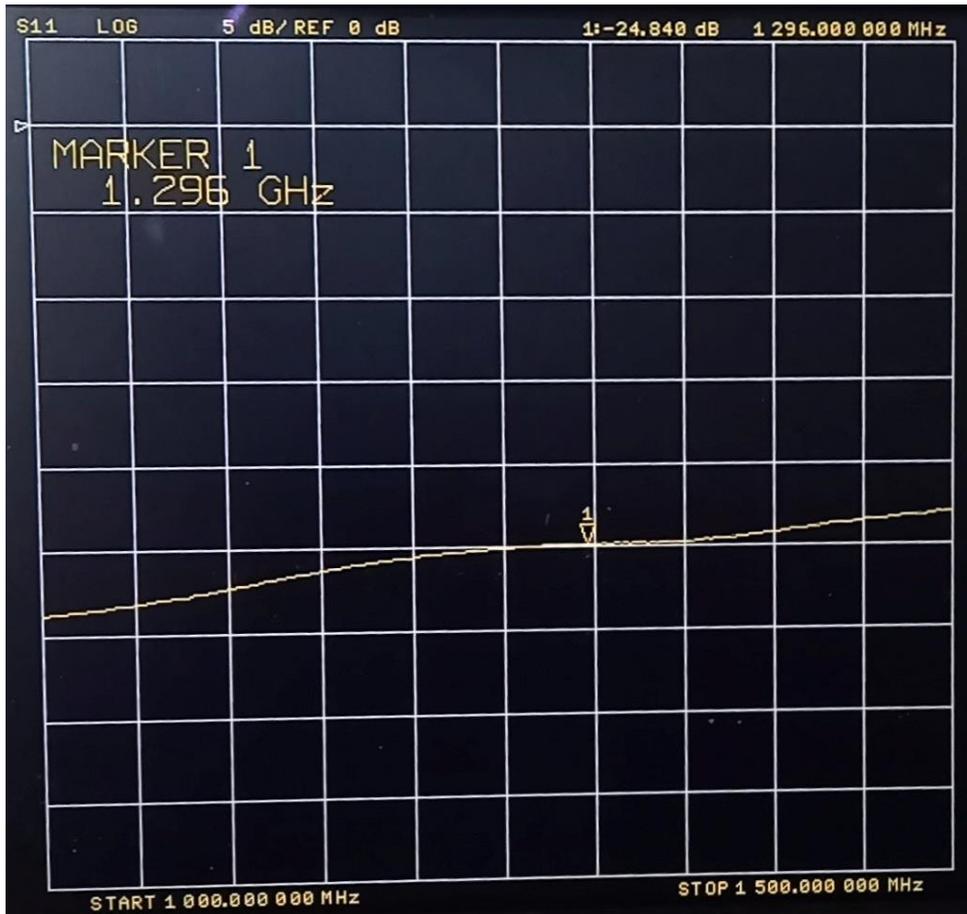
I did not tune the dummy load and made S11 measurements of the device in the frequency range from 0.03MHz to 6GHz. Please note that the measurement setup was not calibrated but the resulting error is not relevant for the measurements of interest.



The return loss S11 at 1296 MHz is 25.5dB and thus makes a perfect termination for my isolator.

At 2.4GHz the return loss is down to about 13dB.

To verify the measured return loss at 1296 MHz I repeated the measurement with a narrow sweep from 1000 to 1500MHz and the setup properly calibrated. As can be seen in the next picture the return loss is 24.8dB.



As I want to use this device for 1296 MHz, I did not try to retune it for 2400 MHz to see how much the return loss in the 13cm band can be improved.

I always appreciate feedback. Many thanks in advance.

Best regards

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