



Calibration Laboratory Cert: 5518.01

## ISO/IEC 17025:2017 and ANSI/NCSL Z540.1-1994 Accredited Calibration Certificate

Customer Address: Rental

Certificate #: A2304122DR

Product: Amplifier

Manufacturer: Empower RF Systems  
Model: 2148-001  
Serial #: 1001

Notes: Frequency Range: 0.5 GHz to 2.7 GHz

Date of Report: 4/12/2023  
Date of Calibration: 4/12/2023  
Next Calibration: \*

*\*The next calibration date is defined by the equipment user/owner.*

The above instrument was tested and found to be within the manufacturer's specification. The results of the tests performed are held on file at The EMC Shop. The calibration was carried out in accordance with the general requirements of ISO/IEC 17025-2017, IEC 61000-4-6 using laboratory standards which are traceable to the SI International System of Quantities through the National Institute of Standards and Technology (NIST), and or other Accredited bodies except where none exist. Tests are carried out in environmental conditions controlled to the extent appropriate to the instrument's specification. This certificate shall not be reproduced except in full without the written approval of the laboratory. The uncertainty results meet the requirements of the ISO/IEC 17025-2017 standard and ILAC Doc.P14.

### Ambient Conditions of Laboratory

Temperature (°C): **22.5**  
Relative Humidity (%): **38**

Technician: **Dan Raines**

Technician Signature: \_\_\_\_\_



Calibration Equipment				
Model	Description	Serial Number	Certificate #	Due Date
ZNB 8	Network Analyzer	102017	7280-311003893	5/21/2024
ZV-Z21	Cal Kit	100800	584251 D-K-15195-01-00	1/26/2024
E4419B	Power Meter	GB40202731	1-17660891762-1	5/24/2023
E9304A	Power Sensor	MY41495729	1-16749846814-1	5/17/2023

Calibration method used: IEC 61000-4-6

VSWR measurements made are not accredited

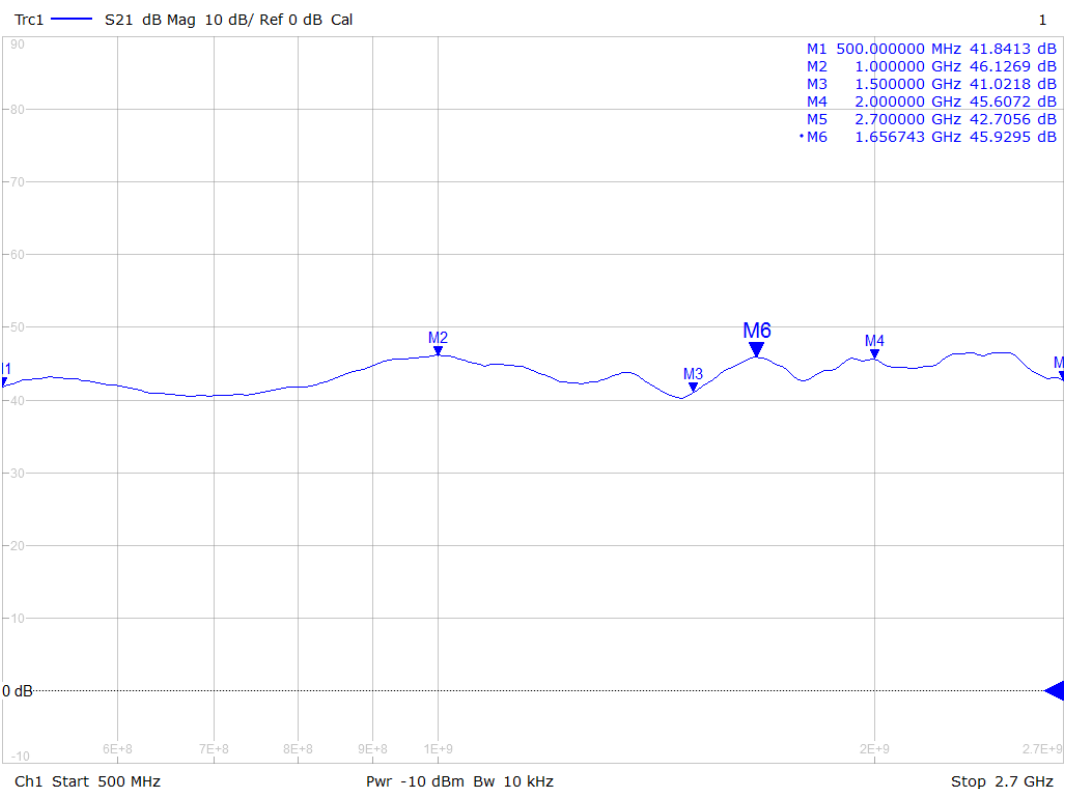
<b>Condition as found:</b>	<b>IN tolerance</b>
<b>Condition as left:</b>	<b>IN tolerance</b>

Measuring Uncertainties	
RF Power Level	<b>± 0.3 dB</b>
Power Amplifier Gain Linearity	<b>± 0.44 dB</b>

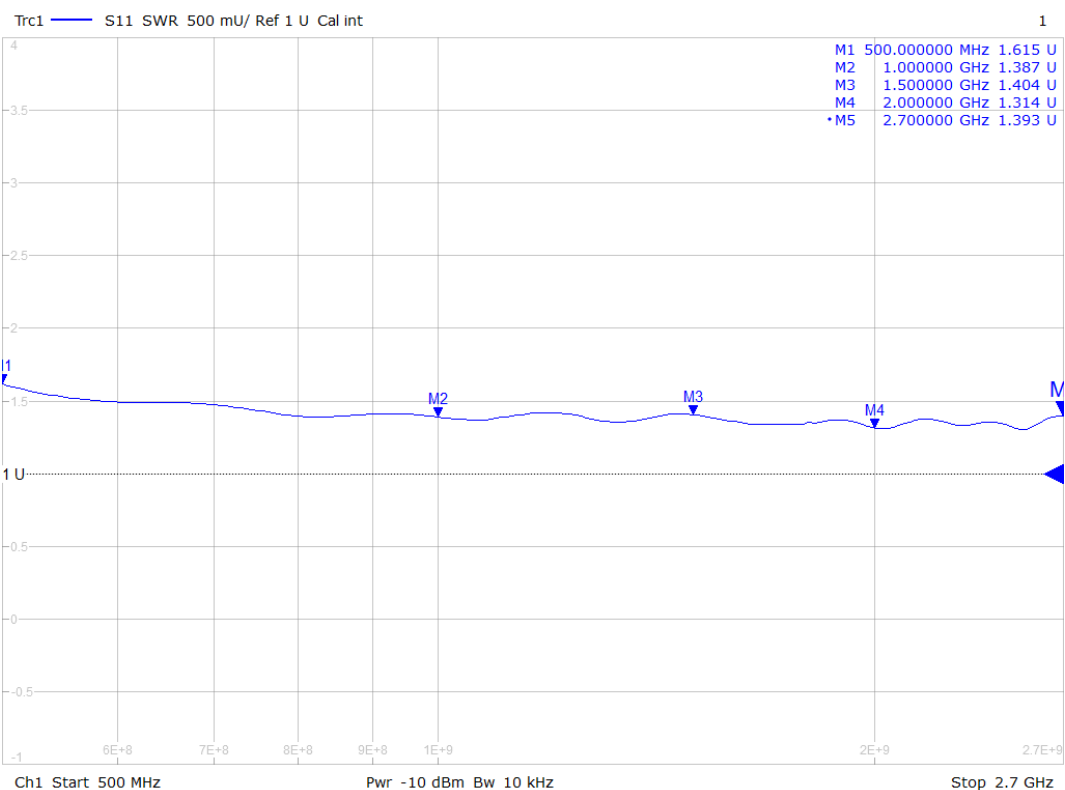
The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k such that the coverage probability corresponds to approximately 95%



### Gain from 500 MHz to 2.7 GHz, -10dBm input , > 40 dB



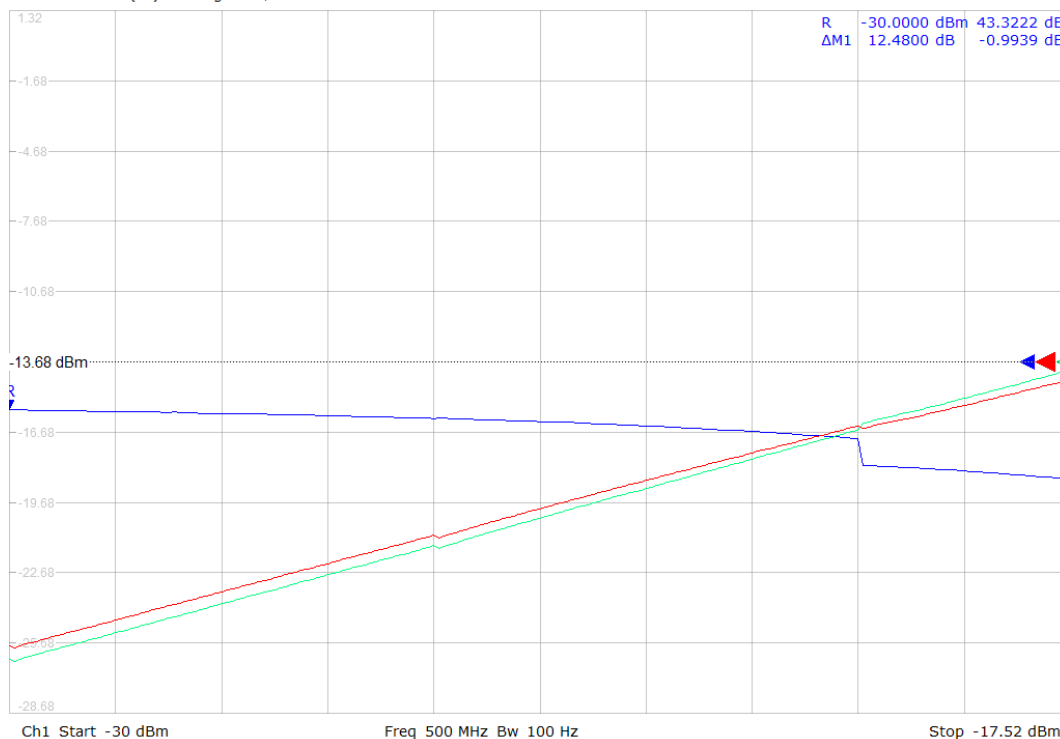
### Input VSWR from 500 MHz to 2.7 GHz, <1.67:1





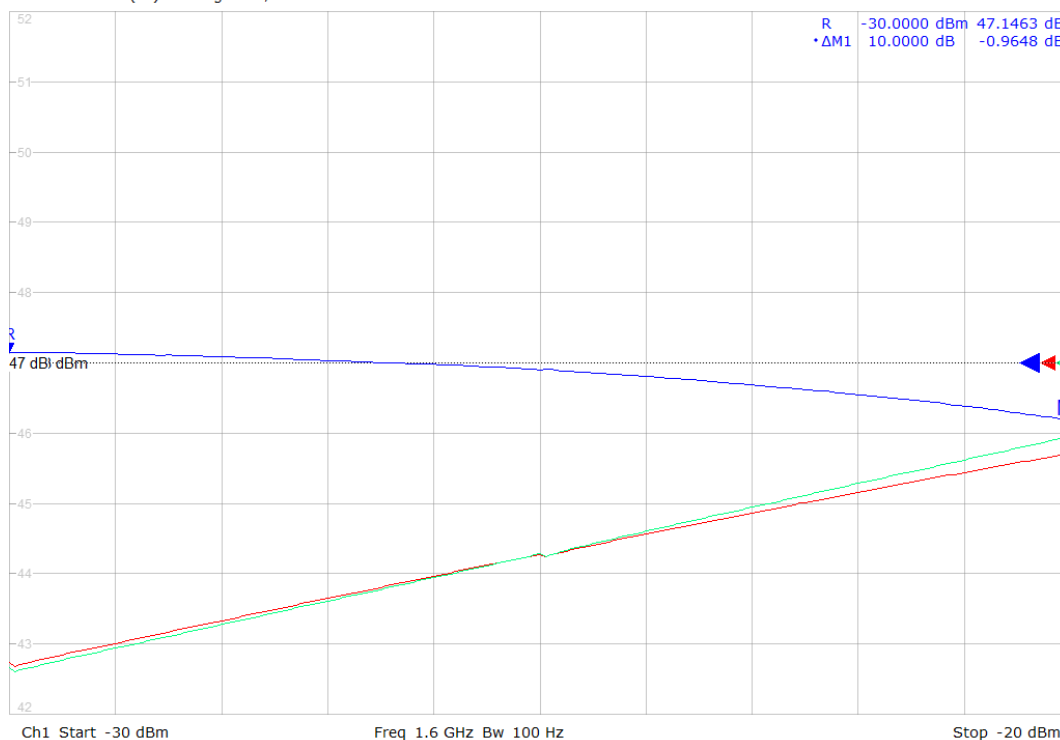
**P1dB, @ 500 MHz, = -17.5 dBm**

Trc1 — S21 dB Mag 1 dB/ Ref 44 dB Offs Trc2 — b2(P1) dB Mag 3 dB/ Ref -13.68 dBm Offs 1  
 Trc3 — a1(P1) dB Mag 3 dB/ Ref -56.43 dBm Offs



**P1dB, @ 1600 MHz, = -20.0 dBm**

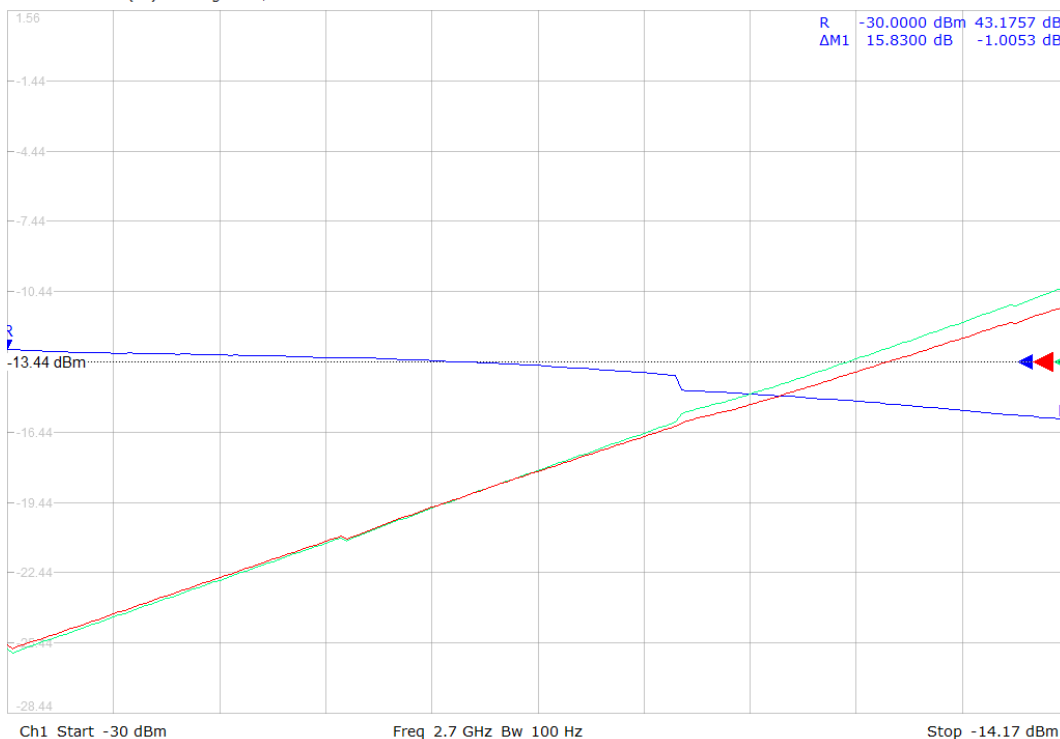
Trc1 — S21 dB Mag 1 dB/ Ref 47 dB Offs Trc2 — b2(P1) dB Mag 3 dB/ Ref -9.51 dBm Offs 1  
 Trc3 — a1(P1) dB Mag 3 dB/ Ref -56.43 dBm Offs





**P1dB, @ 2700 MHz, = -14.2 dBm**

Trc1 — S21 dB Mag 1 dB/ Ref 43 dB Offs Trc2 — b2(P1) dB Mag 3 dB/ Ref -13.44 dBm Offs 1  
 Trc3 — a1(P1) dB Mag 3 dB/ Ref -56.43 dBm Offs





Frequency (Hz)	GAIN (dBm)	VSWR (U)
500000000	41.84	1.62
504233822	42.02	1.61
508503495	42.27	1.60
512809321	42.48	1.59
517151608	42.75	1.58
521530664	42.80	1.57
525946800	42.96	1.56
530400330	42.93	1.56
534891572	43.05	1.55
539420843	43.15	1.54
543988467	43.03	1.54
548594768	43.08	1.53
553240073	42.99	1.53
557924713	42.90	1.52
562649021	42.87	1.52
567413333	42.70	1.51
572217987	42.62	1.51
577063325	42.52	1.50
581949692	42.33	1.50
586877435	42.25	1.50
591846904	42.12	1.50
596858453	42.08	1.49
601912438	41.98	1.49
607009219	41.84	1.49
612149157	41.70	1.49
617332618	41.53	1.49
622559971	41.40	1.49
627831587	41.12	1.49
633147842	40.96	1.49
638509112	40.92	1.49
643915780	40.98	1.49
649368230	40.83	1.49
654866849	40.76	1.49
660412028	40.69	1.49
666004163	40.59	1.49
671643649	40.46	1.49
677330888	40.52	1.48
683066285	40.58	1.48
688850247	40.70	1.48

694683186	40.54	1.48
700565516	40.71	1.47
706497656	40.65	1.47
712480026	40.69	1.46
718513054	40.67	1.46
724597167	40.72	1.46
730732798	40.73	1.45
736920383	40.68	1.45
743160362	40.76	1.44
749453180	40.91	1.44
755799283	41.07	1.43
762199122	41.17	1.42
768653153	41.42	1.42
775161835	41.53	1.41
781725629	41.67	1.40
788345004	41.71	1.40
795020429	41.72	1.40
801752379	41.73	1.39
808541333	41.80	1.39
815387773	41.93	1.39
822292186	42.06	1.39
829255064	42.30	1.39
836276901	42.45	1.39
843358196	42.82	1.39
850499453	43.13	1.39
857701180	43.37	1.40
864963888	43.68	1.40
872288095	43.88	1.40
879674320	44.10	1.40
887123089	44.26	1.41
894634932	44.51	1.41
902210382	44.80	1.41
909849978	45.12	1.41
917554264	45.34	1.41
925323787	45.52	1.41
933159100	45.64	1.41
941060759	45.59	1.41
949029327	45.63	1.41
957065369	45.73	1.41
965169458	45.73	1.40
973342170	45.86	1.40
981584085	45.89	1.40
989895790	46.07	1.39
998277875	46.14	1.39

1006730937	46.08	1.38
1015255576	46.00	1.38
1023852399	45.86	1.38
1032522017	45.60	1.37
1041265046	45.51	1.37
1050082108	45.26	1.37
1058973829	45.02	1.37
1067940843	44.88	1.37
1076983786	44.69	1.37
1086103302	44.89	1.38
1095300038	44.94	1.38
1104574649	44.93	1.39
1113927794	44.73	1.39
1123360138	44.72	1.40
1132872352	44.69	1.40
1142465112	44.59	1.41
1152139100	44.33	1.41
1161895004	44.11	1.42
1171733517	43.65	1.42
1181655340	43.45	1.42
1191661177	43.22	1.42
1201751740	42.87	1.42
1211927746	42.56	1.42
1222189919	42.45	1.41
1232538988	42.32	1.41
1242975689	42.28	1.40
1253500765	42.27	1.39
1264114964	42.35	1.39
1274819039	42.51	1.38
1285613753	42.55	1.37
1296499873	42.78	1.36
1307478173	42.92	1.36
1318549433	43.31	1.36
1329714440	43.54	1.35
1340973989	43.80	1.36
1352328879	43.73	1.36
1363779919	43.58	1.36
1375327922	43.24	1.37
1386973710	42.66	1.38
1398718110	42.27	1.38
1410561957	41.76	1.39
1422506093	41.30	1.40
1434551369	40.96	1.40
1446698639	40.62	1.41



1458948769	40.32	1.41
1471302628	40.22	1.41
1483761095	40.50	1.41
1496325056	40.86	1.40
1508995404	41.41	1.40
1521773040	41.86	1.39
1534658873	42.31	1.39
1547653818	42.82	1.38
1560758800	43.47	1.37
1573974750	44.04	1.37
1587302608	44.40	1.36
1600743322	44.68	1.36
1614297847	45.08	1.35
1627967146	45.39	1.35
1641752193	45.73	1.34
1655653966	45.94	1.34
1669673455	45.81	1.34
1683811655	45.62	1.34
1698069573	45.15	1.34
1712448222	44.83	1.34
1726948625	44.60	1.34
1741571811	44.02	1.34
1756318821	43.40	1.34
1771190704	42.78	1.34
1786188517	42.57	1.34
1801313326	42.80	1.35
1816566206	43.28	1.35
1831948242	43.82	1.35
1847460528	44.02	1.36
1863104166	44.04	1.37
1878880269	44.22	1.37
1894789959	44.77	1.37
1910834366	45.33	1.37
1927014632	45.73	1.36
1943331906	45.63	1.35
1959787349	45.39	1.34
1976382131	45.49	1.33
1993117431	45.68	1.32
2009994440	45.50	1.31
2027014358	44.98	1.31
2044178394	44.59	1.31
2061487770	44.49	1.32
2078943715	44.55	1.33
2096547470	44.44	1.34

2114300288	44.30	1.36
2132203431	44.37	1.37
2150258171	44.54	1.38
2168465792	44.59	1.38
2186827588	44.58	1.37
2205344866	44.81	1.37
2224018942	45.35	1.36
2242851143	45.99	1.35
2261842808	46.29	1.34
2280995288	46.33	1.34
2300309945	46.33	1.33
2319788151	46.49	1.33
2339431291	46.48	1.34
2359240763	46.18	1.34
2379217974	46.11	1.35
2399364346	46.31	1.36
2419681309	46.54	1.35
2440170309	46.53	1.35
2460832803	46.49	1.34
2481670260	46.45	1.32
2502684160	46.04	1.31
2523875999	45.39	1.31
2545247283	44.62	1.30
2566799532	44.00	1.32
2588534277	43.56	1.34
2610453064	43.27	1.36
2632557451	42.98	1.38
2654849011	43.01	1.39
2677329328	43.00	1.40
2700000000	42.71	1.39