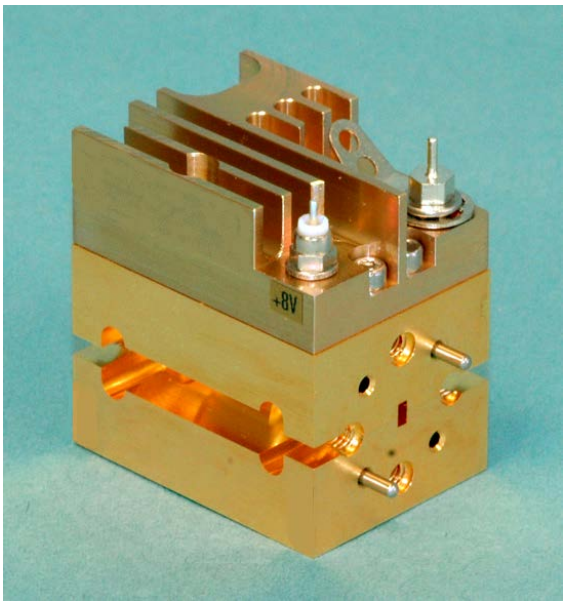
POWER AMPLIFIERS AND DRIVER AMPLIFIERS



FEATURES:

- Wideband coverage
- Modular compact design
- Military or commercial units available
- 2.92, 2.4, 1.85 mm or Waveguide interfaces as required
- Internal voltage regulation and bias circuitry
- State-of-the-art output power performance

APPLICATIONS:

- Transmitters
- LO amplification
- Amplified sources
- Radar front-ends

DESCRIPTION

Millitech's series AMP power amplifiers utilize advanced PHEMT MMICs and transistors to obtain high output power in the 18 to 110 GHz frequency range.

Each amplifier has internal bias circuitry that generates gate control voltages, provides proper voltage sequencing and incorporates reverse voltage protection from a single positive external bias.

The standard amplifier interfaces include coaxial connectors of 2.92 mm (0 to 40 GHz), 2.4 mm (0 to 50 GHz), and 1.85 mm (0 to 65 GHz), as well as waveguide interfaces ranging from WR-42 to WR-10.

Standard products offer sufficient gain and output power for many applications but multiple MMIC amplifier chips can be combined or cascaded for applications that require higher gain or greater output power.

The broad bandwidth and high power of the series AMP power amplifier makes them perfect for a wide range of applications including transceivers and upconverters, EW systems, instrumentation and radar systems. For applications requiring low noise amplification, please refer to series LNA, Millitech's low noise amplifiers.

Heat sinks are available for select models. See series HSK datasheet or the "How to Order" section for more details.

POPULAR MODELS

Model Number	Frequency Range (GHz)	Gain (typ.) (dB)	1dBCP (typ.) (dBm)	P_{SAT} (typ.) (dBm)
AMP-28-40050	32.5 – 35.5	31	35	38
AMP-28-01090	33 - 35	17	30.5	32.5
AMP-15-02100	50 – 66	22	15	20
AMP-15-02640	57 – 70	15	24	28
AMP-15-40120	57 – 66	37	28	31
AMP-12-02280	71 – 76	22	15	18.5
AMP-12-02330	76 – 81	20	13	*
AMP-12-02290	80 – 90	20	14	16
AMP-10-02260	90 – 99	20	13	16
AMP-10-02680	80 – 100	10	20	22.5
AMP-10-03310	80 – 100	9	22.5	25
AMP-10-03290	80 – 105	15	*	15.5
AMP-10-02130	75 – 110	15	*	13

SEE SPECIFICATIONS SHEETS FOR IN-DEPTH MODEL DESCRIPTIONS

SPECIFICATIONS

Power Amplifiers

Model Number	F_{LOW} (GHz)	F_{HIGH} (GHz)	Gain (typ.) (dB)	1dBCP (typ.) (dBm)	Psat (typ.) (dBm)	Connector	Current (A) (typ. at Psat) [3]	Input Voltage (V) (min-max)	Max RF Input Power (dBm)	Outline Drawing
AMP-KK-01190[2]	18	23	23	30	*	2.92/2.4 mm	1.2	9 - 12	26	Fig. 1
AMP-42-01190	18	23	24	30.5	*	WR-42	1.2	9 - 12	26	Fig. 2
AMP-KK-01270[2]	17	24	19	29	*	2.92/2.4 mm	1.2	8.5 - 10	26	Fig. 1
AMP-42-02030	18	26.5	23 to 18	23	*	WR-42	0.8	7.5 - 15	23	Fig. 2
AMP-42-02230	18	26.5	19	26.5	*	WR-42	1.3	8 - 12	23	Fig. 2
AMP-KK-01020[2]	18.5	26.5	11	28	*	2.92/2.4 mm	1.15	8 - 12	*	Fig. 1
AMP-42-01020	18.5	26.5	12	28.5	*	WR-42	1.15	8 - 12	*	Fig. 2
AMP-42-02040	20	26.5	23	21	*	WR-42	0.6	8 - 15	23	Fig. 2
AMP-28-22330	25	27	26	28	*	WR-28	1.35	9 - 12	20	Fig. 4
AMP-KK-02230[2]	18	28	18	26	*	2.92/2.4 mm	1.3	8 - 12	23	Fig. 1
AMP-KK-01200[2]	28	31	21.5	33.5	34	2.92/2.4 mm	3.3	7 - 7.5	26	Fig. 1
AMP-28-01200	28	31	22.5	33.5	34	WR-28	3.3	7 - 7.5	26	Fig. 3
AMP-KK-01050[2]	28	31	20.5	26.5	*	2.92/2.4 mm	0.5	9 - 15	23	Fig. 1
AMP-28-01050	28	31	22	27	*	WR-28	0.5	9 - 15	23	Fig. 3
AMP-KK-01210[2]	28.5	31	18	28.5	29	2.92/2.4 mm	1.1	8 - 12	22	Fig. 1
AMP-28-01210	28.5	31	19.5	29	29.5	WR-28	1.1	8 - 12	22	Fig. 3
AMP-28-01290[5]	29	31	21	*	36	WR-28	1	22 - 26	30	*
AMP-28-61290[5]	29	31	40	*	43	WR-28	7	22 - 26	27	*
AMP-KK-02030[2]	18	32	22 to 16.5	23	*	2.92/2.4 mm	0.8	7.5 - 15	23	Fig. 1
AMP-28-02030	26.5	32	17	24	*	WR-28	0.8	7.5 - 15	23	Fig. 3
AMP-KK-02050[2]	27	35	16.5	22	*	2.92/2.4 mm	0.5	9 - 15	*	Fig. 1
AMP-28-02050	27	35	18	23	*	WR-28	0.5	9 - 15	*	Fig. 3
AMP-KK-01090[2]	31	35	15.5	30	32	2.92/2.4 mm	1.5	8 - 12	27	Fig. 1
AMP-28-01090	31	35	17	30.5	32.5	WR-28	1.5	8 - 12	27	Fig. 3
AMP-28-21180	31	35	37	28	*	WR-28	1.65	8 - 12	12	Fig. 4
AMP-22-01090	33	35	17	30.5	32.5	WR-22	1.5	8 - 12	27	Fig. 5
AMP-28-40040[1]	32.5	35.5	33	37	40	WR-28	22	7.5 - 8	*	*
AMP-28-40050[1]	32.5	35.5	31	35	38	WR-28	8	7.5 - 8	*	*
AMP-28-02320	30	36	21	23	*	WR-28	1.3	8 - 12	23	Fig. 3
AMP-28-01230	32	36	17	33	35	WR-28	4	7.5 - 8	*	Fig. 3
AMP-KK-01170[2]	33	36	13.5	29	30.5	2.92/2.4 mm	1.4	9 - 12	27	Fig. 1
AMP-28-01170	33	36	15	30	31.5	WR-28	1.4	9 - 12	27	Fig. 3

Model Number	F_{LOW} (GHz)	F_{HIGH} (GHz)	Gain (typ.) (dB)	1dBCP (typ.) (dBm)	Psat (typ.) (dBm)	Connector	Current (A) (typ. at Psat) [3]	Input Voltage (V) (min-max)	Max RF Input Power (dBm)	Outline Drawing
AMP-22-01170	33	36	15	30	31.5	WR-22	1.4	9 - 12	27	Fig. 5
AMP-28-01280[5]	33	36	11	*	41	WR-28	2	30 - 34	37	*
AMP-28-41280[5]	33	36	21	*	46.5	WR-28	10	30 - 34	37	*
AMP-28-01260	34	36	17	*	35	WR-28	*	9 - 12	*	Fig. 3
AMP-KK-02410[2]	17	40	20	20	*	2.92/2.4 mm	0.4	8 - 15	20	Fig. 1
AMP-KK-02040[2]	20	40	18	19	*	2.92/2.4 mm	1.3	8 - 15	23	Fig. 1
AMP-28-02410	26	40	22	20	*	WR-28	0.4	8 - 15	20	Fig. 3
AMP-28-02040	26.5	40	24 @ 26.5 GHz 20 @ 40 GHz	24	*	WR-28	1.3	8 - 15	23	Fig. 3
AMP-KK-01180[2]	30	40	13	28	30	2.92/2.4 mm	2	7.5 - 8	24	Fig. 1
AMP-28-01180	30	40	15	28	31	WR-28	2	7.5 - 8	24	Fig. 3
AMP-28-22320	30	40	36	19	*	WR-28	0.35	8 - 15	12	Fig. 4
AMP-22-01180	33	40	15	28	31	WR-22	2	7.5 - 8	24	Fig. 5
AMP-KK-01100[2]	36	40	11	26.5	*	2.92/2.4 mm	1.5	9 - 12	27	Fig. 1
AMP-28-01100	36	40	13	27.5	*	WR-28	1.5	9 - 12	27	Fig. 3
AMP-22-01100	36	40	13	27.5	*	WR-22	1.5	9 - 12	27	Fig. 5
AMP-22-02250	36	42.5	13.5	25.5	*	WR-22	1.1	8 - 12	20	Fig. 5
AMP-28-02460	32	45	14	22.5	25	WR-28	0.45	7.5 - 12	20	Fig. 3
AMP-22-02040	33	45	18	19	*	WR-22	1.3	6 - 15	23	Fig. 5
AMP-22-02070	37	45	20	21.5	*	WR-22	0.6	7.5 - 15	10	Fig. 5
AMP-22-22070	37	45	40	20	*	WR-22	1.2	6 - 12	-10	*
AMP-22-01160	40	45	9	26.5	*	WR-22	1	9 - 10	27	Fig. 5
AMP-22-01120	41	46	13	30	31	WR-22	2.7	8 - 10	29	Fig. 5
AMP-19-01120	41	46	13	30	31	WR-19	2.7	8 - 10	29	Fig. 6
AMP-22-01240	42	47	22	*	32.5	WR-22	*	8 - 10	*	Fig. 5
AMP-VV-02470	42	47	34	30	33	1.85 mm	2	7.5 - 10	10	Fig. 1
AMP-22-40060[1]	42	47	41	*	37.5	WR-22	*	* - *	*	*
AMP-19-40090[1]	47	52	29	18.5	21	WR-19	*	* - *	-10	*
AMP-VV-02420	40	60	17	12.5	*	1.85 mm	0.35	6 - 8	10	Fig. 1
AMP-19-02420	40	60	16	13.5	*	WR-19	0.35	6 - 8	10	Fig. 6
AMP-19-02100	50	60	22	15	*	WR-19	0.25	7.5 - 15	2	Fig. 6
AMP-15-41050[1]	59	63	36	19	*	WR-15	*	7.5 - 12	*	*
AMP-15-03200	60	64	20	*	27.5	WR-15	0.8	7.5 - 10	*	*
AMP-15-02100	50	66	22	15	*	WR-15	0.25	7.5 - 15	2	Fig. 7
AMP-15-02550[4]	55	66	20.5	14.5	17	WR-15	0.2	8 - 15	0	Fig. 7
AMP-15-20060	57	66	14	25.5	28.5	WR-15	1.5	7.5 - 15	0	*
AMP-15-40120[1]	57	66	37 (57 to 63 GHz) 33 @66 GHz	28	31	WR-15	4.5	* - *	6	*

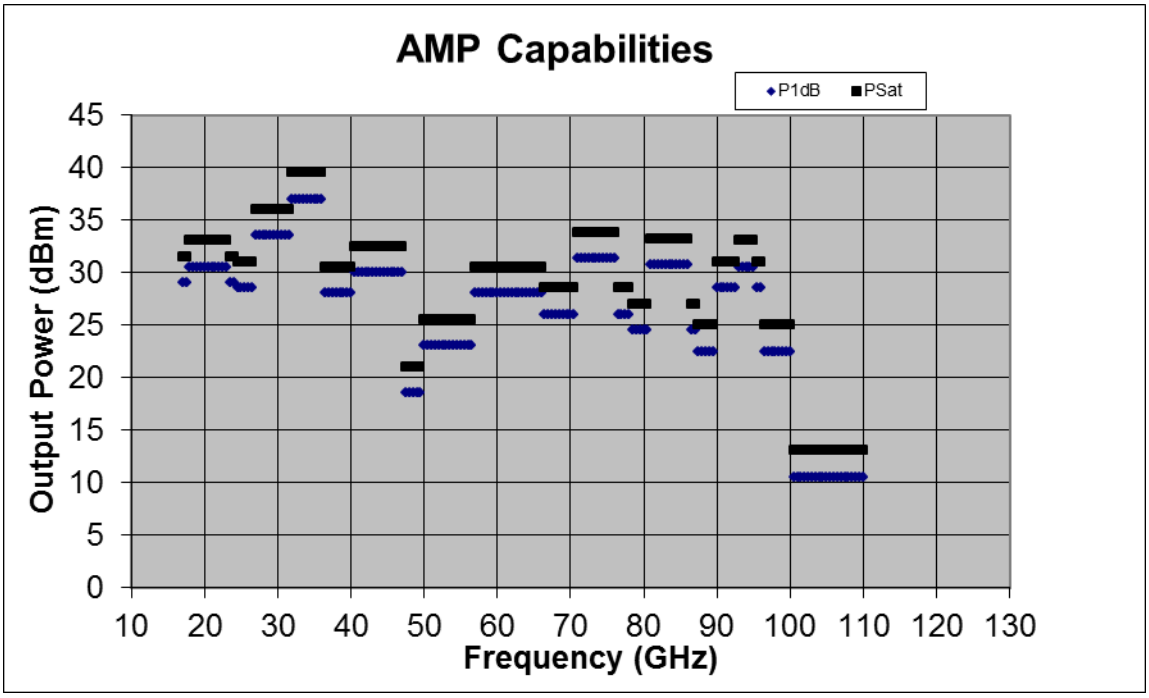
Model Number	F_{LOW} (GHz)	F_{HIGH} (GHz)	Gain (typ.) (dB)	1dBCP (typ.) (dBm)	Psat (typ.) (dBm)	Connector	Current (A) (typ. at Psat) [3]	Input Voltage (V) (min-max)	Max RF Input Power (dBm)	Outline Drawing
AMP-15-03100	60	66	20	17.5	19.5	WR-15	0.5	7.5 - 12	2	*
AMP-15-02390	60	68	20 (60-65 GHz) 17.5 (66-68 GHz)	*	25	WR-15	0.8	6 - 12	*	Fig. 7
AMP-15-03300	60	68	20 (60-65 GHz) 17.5 (66-68 GHz)	*	27.5	WR-15	1.6	6 - 12	0	*
AMP-15-02630	50	70	17	17 (50-60GHz) 21 (60-70GHz)	18 (50-57GHz) 22 (57-70GHz)	WR-15	0.35	7.5 - 15	*	Fig. 7
AMP-15-02640	53	70	20 @ 53 GHz 18 @ 62 GHz 15 @70 GHz	21 @ 53 GHz 24 (57-68 GHz) 23.5 @ 70 GHz	24 @ 53 GHz 26 (57-68 GHz) 25 @ 70 GHz	WR-15	0.75	7.5 - 15	*	Fig. 7
AMP-15-20050	53	70	13 - 22 See plot	25 (53-57 GHz) 27 (57-70 GHz)	26 (53-57 GHz) 28 (57-70 GHz)	WR-15	1.5	7.5 - 15	*	*
AMP-12-02280	71	76	22	15	18.5	WR-12	0.25	7.5 - 15	3	Fig. 8
AMP-12-03120	71	76	20	17.5	21	WR-12	0.5	7.5 - 15	3	*
AMP-12-02480	71	76	11	21.5	23	WR-12	0.5	7.5 - 12	13	*
AMP-12-02530	71	76	17.0 @ 71 GHz 17.0 @ 73.5 GHz 16.0 @ 76 GHz	24.5 @ 71GHz 24.5 @ 73.5 GHz 23.0 @ 76 GHz	27.0 @ 71 GHz 26.5 @ 73.5 GHz 26.0 @ 76 GHz	WR-12	0.73	7.5 - 12	15	Fig. 8
AMP-12-02540	71	76	17.0 @ 71 GHz 17.0 @ 73.5 GHz 16.0 @ 76 GHz	26.0 @ 71 GHz 27.0 @ 73.5 GHz 23.0 @ 76 GHz	29.5 @ 71 GHz 29.0 @ 73.5 GHz 28.0 @ 76 GHz	WR-12	1.5	7.5 - 12	18	*
AMP-12-03270[1]	71	76	33	28.5 @ 71 GHz 29.5 @ 73.5 GHz 28.0 @ 76 GHz	31.5 @ 71 GHz 31.5 @ 73.5 GHz 30.5 @ 76 GHz	WR-12	3.75	7.5 - 9	-5	*
AMP-12-10010[5]	71	76	15.5	26	28.5	WR-12	0.36	14 - 18	*	Fig. 8
AMP-12-20010[5]	71	76	15	28.6	31.1	WR-12	0.71	14 - 18	*	*
AMP-12-41010[5]	71	76	28	31.3	33.8	WR-12	1.78	14 - 18	*	*
AMP-12-02610	71	76	15	19	21	WR-12	0.37	7.5 - 12	12	Fig. 8
AMP-12-02650	68	78	24	24 @ 68 GHz 24 @ 73.5 GHz 22 @ 78 GHz	26 @ 68 GHz 26.5 @ 73.5 GHz 24 @ 78 GHz	WR-12	1	7.5 - 15	*	Fig. 8
AMP-12-20070	68	78	22	26 @ 68 GHz 26 @ 73.5 GHz 24 @ 78 GHz	28 @ 68 GHz 28.5 @ 73.5 GHz 26 @ 78 GHz	WR-12	2	7.5 - 15	*	*
AMP-12-02330	76	81	20	13	*	WR-12	0.2	7.5 - 15	5	Fig. 8
AMP-12-03130	76	84	15	15.5	17.5	WR-12	0.4	7.5 - 15	*	*
AMP-12-02520	81	86	12.5	21.5	24.5	WR-12	0.7	7.5 - 10	16	Fig. 8
AMP-10-02520	81	86	12.5	21.5	24.5	WR-10	0.7	7.5 - 10	16	Fig. 9
AMP-12-02490	81	86	10	21	22.5	WR-12	0.5	7.5 - 12	12	*
AMP-10-02510	81	86	12	24	27	WR-10	1.6	7.5 - 12	19	*
AMP-12-02510	81	86	12	24	27	WR-12	1.6	7.5 - 12	19	Fig. 12
AMP-12-40100[1]	81	86	29	27	29.5	WR-12	*	* - *	*	*
AMP-10-02440	81	86	9	17.5	20.5	WR-10	0.24	7.5 - 15	13	Fig. 9

Model Number	F_{LOW} (GHz)	F_{HIGH} (GHz)	Gain (typ.) (dB)	1dBCP (typ.) (dBm)	Psat (typ.) (dBm)	Connector	Current (A) (typ. at Psat) [3]	Input Voltage (V) (min-max)	Max RF Input Power (dBm)	Outline Drawing
AMP-12-10020[5]	81	86	17.5	25.4	29	WR-12	0.39	14 - 18	*	Fig. 8
AMP-12-20020[5]	81	86	16.5	28	31.6	WR-12	0.77	14 - 18	*	Fig. 12
AMP-12-41020[5]	81	86	32	30.7	34.3	WR-12	1.93	* - *	0	*
AMP-12-02620	81	86	12.5	18.5	20	WR-12	0.4	7.5 - 12	12	Fig. 8
AMP-12-41021[5]	81	86	16	30.7	34.3	WR-12	1.6	* - *	0	*
AMP-12-02310	75	87	21 @ 75 GHz 16 @ 87 GHz	12	15	WR-12	0.2	7.5 - 15	5	Fig. 8
AMP-10-02310	75	87	21 @ 75 GHz 16 @ 87 GHz	12	15	WR-10	0.2	7.5 - 15	5	Fig. 9
AMP-12-02660	76	87	18 @ 76 GHz 20 @ 81 GHz 17 @ 87 GHz	20 @ 76 GHz 23 @ 81 GHz 22 @ 87 GHz	22 @ 76 GHz 25 @ 80 GHz 24 @ 87 GHz	WR-12	0.9	7.5 - 15	*	Fig. 8
AMP-12-20080	76	87	17 @ 75 GHz 19 @ 81 GHz 16 @ 87 GHz	22.5 @ 76 GHz 25.5 @ 81 GHz 24.5 @ 87 GHz	24.5 @ 76 GHz 27.5 @ 80 GHz 26.5 @ 87 GHz	WR-12	1.8	7.5 - 15	*	*
AMP-12-02670	69	89	21	14 to 18 (69-85 GHz) 18 to 16 (85-90 GHz)	16 to 20 (69-85 GHz) 20 to 17 (85-90 GHz)	WR-12	0.3	7.5 - 15	2	Fig. 8
AMP-12-20090	69	89	19	16 to 20 (69-85 GHz) 20 to 18 (85-90 GHz)	18 to 22 (69-85 GHz) 22 to 19 (85-90 GHz)	WR-12	0.9	7.5 - 15	8	*
AMP-12-02500	75	90	15	10	13	WR-12	0.25	7.5 - 15	10	Fig. 8
AMP-12-02290	80	90	20	14	16	WR-12	0.25	7.5 - 15	3	Fig. 8
AMP-10-02290	80	90	20	14	16	WR-10	0.25	7.5 - 15	3	Fig. 9
AMP-10-02150	91	95	9	*	22	WR-10	0.3	7.5 - 15	15	Fig. 9
AMP-10-22191	91	95	30	*	22	WR-10	0.6	7.5 - 15	5	Fig. 10
AMP-10-40080[1]	91	95	15	*	27	WR-10	1.5	* - *	*	*
AMP-10-03220	92	95	9	22	24.5	WR-10	0.7	7.5 - 15	15	*
AMP-10-03250	93	95	10	30.5	33	WR-10	6	7.5 - 8.5	15	*
AMP-10-03260	93.5	95	18	27	30	WR-10	5	7 - 8.5	5	*
AMP-10-10030[5]	90	96	14	23.5	29	WR-10	0.35	14 - 18	*	Fig. 9
AMP-10-20030[5]	90	96	13	26	31.6	WR-10	0.7	14 - 18	*	*
AMP-10-41030[5]	90	96	27	28.5	34	WR-10	1.75	14 - 18	*	*
AMP-10-02370	92	96	14.5	17	20	WR-10	0.3	7.5 - 15	12	Fig. 9
AMP-10-22381	92	96	33	17	20	WR-10	0.6	7.5 - 15	*	Fig. 10
AMP-10-01300[5]	92	96	15	*	30	WR-10	0.4	19 - 23	25	*
AMP-10-41300[5]	92	96	29	*	35	WR-10	2	19 - 23	25	*
AMP-10-22361	84	98	26 @ 84GHz 32 @ 90 GHz 43 @ 98 GHz	16.5	18.5	WR-10	0.5	7.5 - 15	-14	Fig. 10
AMP-10-03230	92	98	20	18.5	21	WR-10	0.6	7.5 - 15	8	*
AMP-10-40130[1]	92	98	38	*	21	WR-10	1.5	* - *	*	*
AMP-10-02260	90	99	20	13	16	WR-10	0.3	7.5 - 15	5	Fig. 9

Model Number	F_{LOW} (GHz)	F_{HIGH} (GHz)	Gain (typ.) (dB)	1dBCP (typ.) (dBm)	Psat (typ.) (dBm)	Connector	Current (A) (typ. at Psat) [3]	Input Voltage (V) (min-max)	Max RF Input Power (dBm)	Outline Drawing
AMP-10-02680[5]	80	100	10	20	22.5	WR-10	0.9	7.5 - 15	23	Fig. 9
AMP-10-22311[5]	80	100	20	20	22.5	WR-10	1.8	7.5 - 12	10	Fig. 10
AMP-10-03310[5]	80	100	9	22.5	25	WR-10	1.8	7.5 - 12	25	*
AMP-10-03290	80	105	15	*	15.5	WR-10	0.4	7.5 - 10	2	*
AMP-10-02580	80	105	16	*	13.5	WR-10	0.2	7.5 - 10	0	Fig. 9
AMP-10-02130	75	110	17 @ 75 GHz 12.5 @ 95 GHz 12.0 @ 110 GHz	*	13.5 @ 75 GHz 12.5 @ 95 GHz 13.5 @ 110 GHz	WR-10	0.2	7.5 - 15	10	Fig. 9
AMP-10-03280	75	110	16 @ 75 GHz 11.5 @ 95 GHz 11.0 @ 110 GHz	*	15.5 @ 75 GHz 14.5 @ 95 GHz 15.5 @ 110 GHz	WR-10	0.4	7.5 - 15	12	*

*** Contact Millitech for details.**
1. These models require an additional negative bias at -5V, not exceeding 500 mA.
2. For 2.4 mm, substitute "QQ" for "KK" in the model number.
3. Quiescent current is 50-70% of current at Psat.
4. Doubles as an LNA with 5 dB NF.
5. Preliminary data. Final specs to come soon.

****Some model numbers are ITAR controlled. Please call Millitech for details.****



OUTLINE DRAWINGS

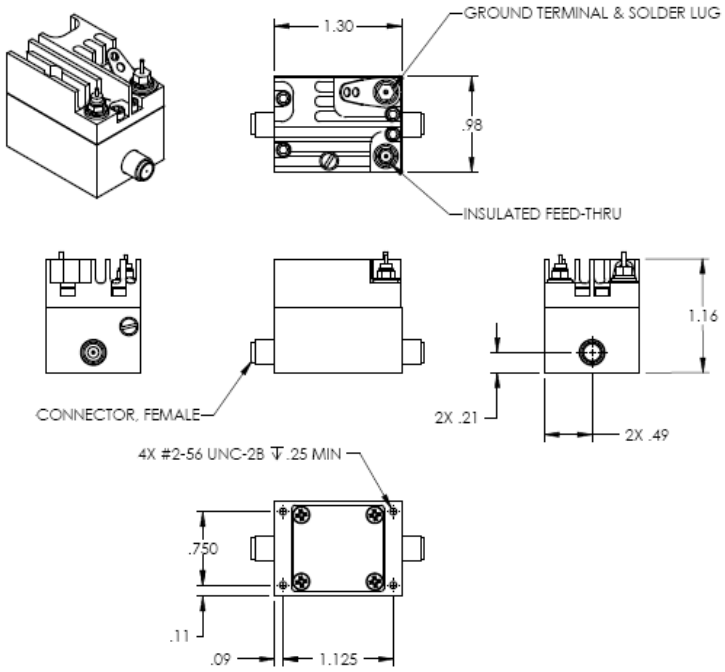


Figure 1

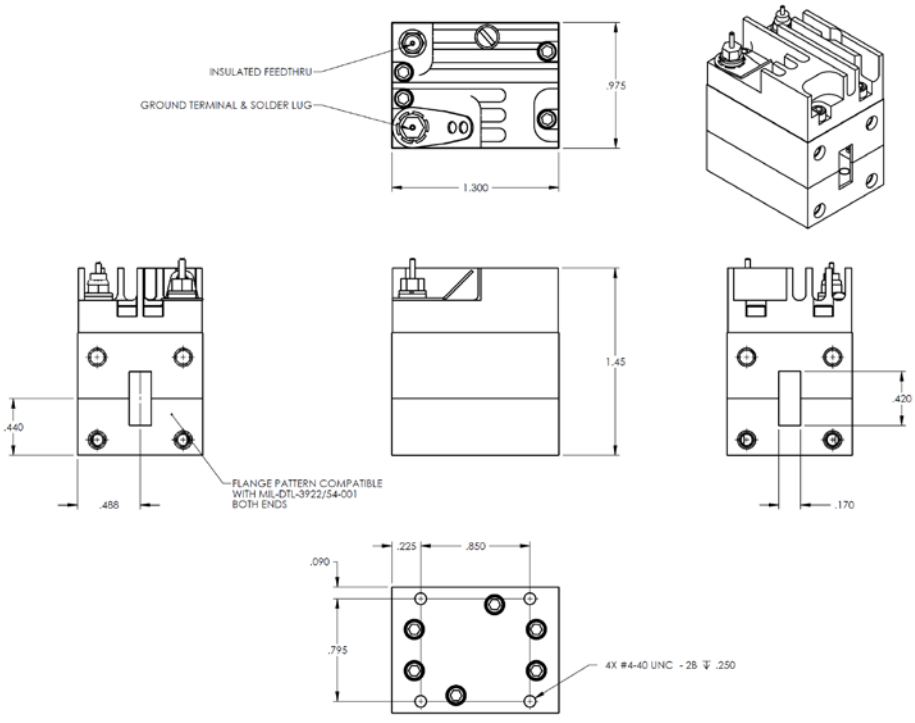


Figure 2

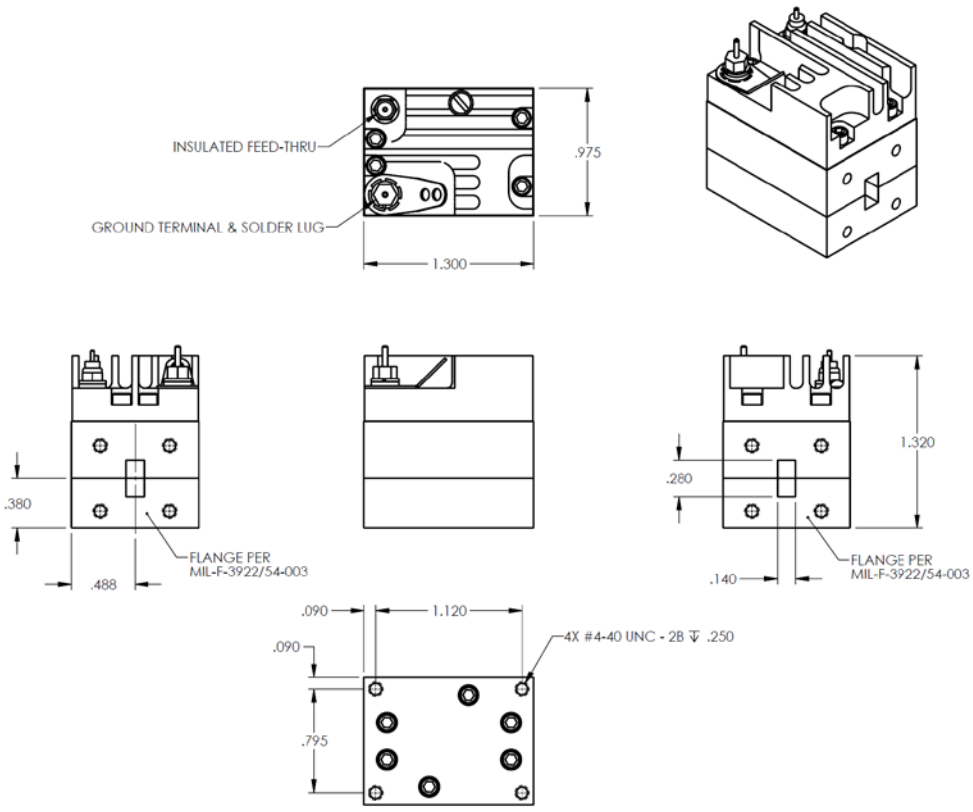


Figure 3

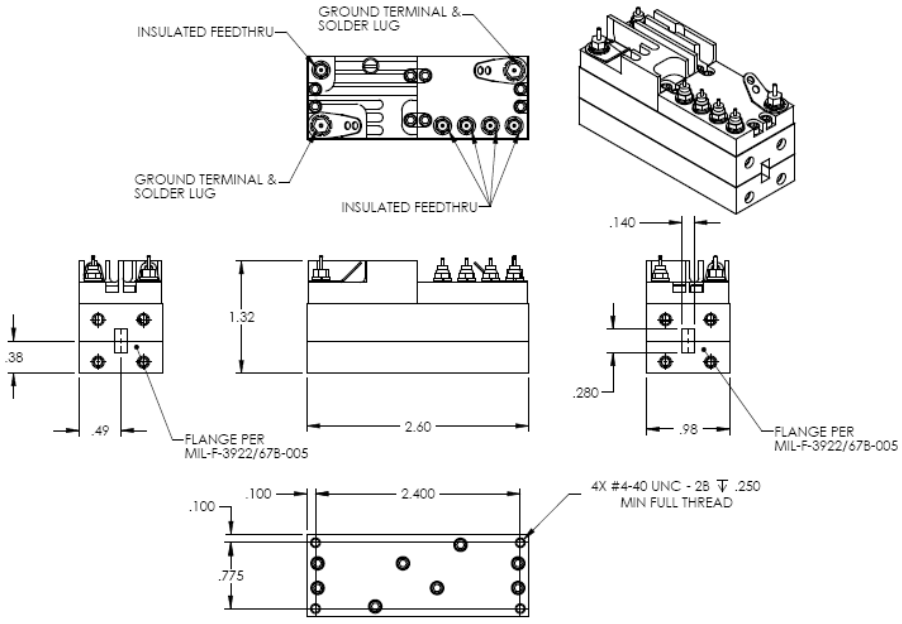


Figure 4

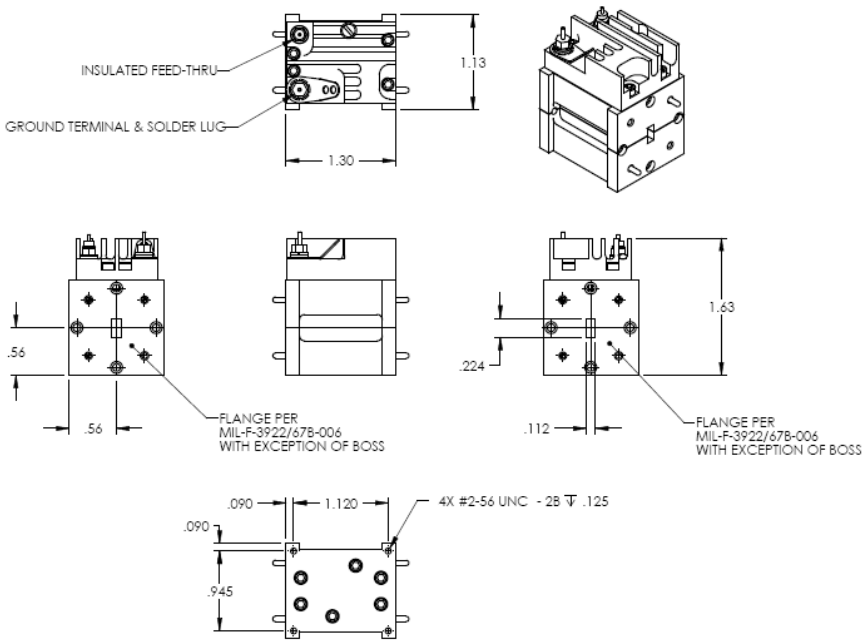


Figure 5

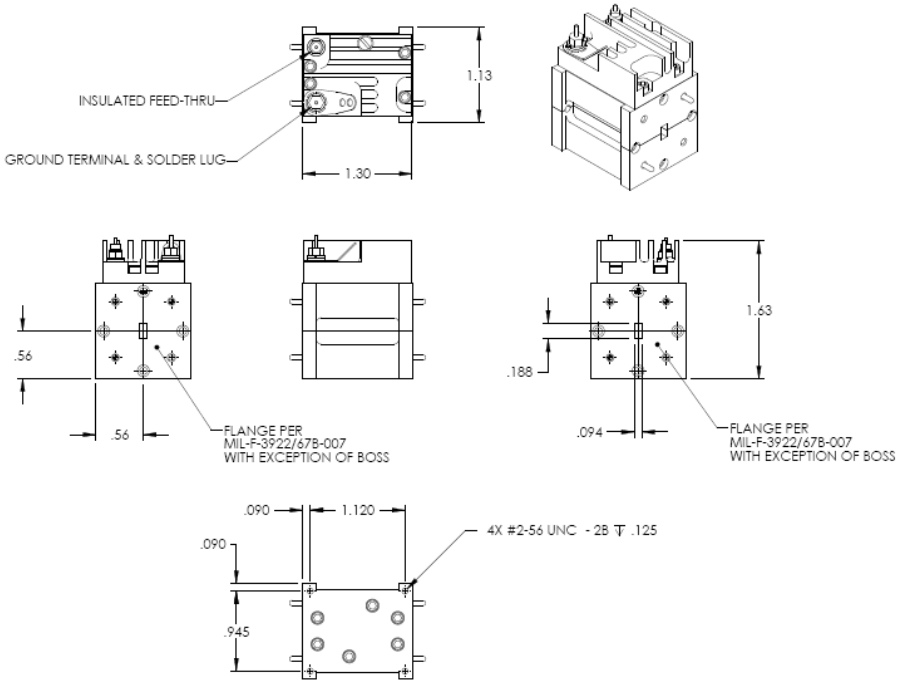


Figure 6

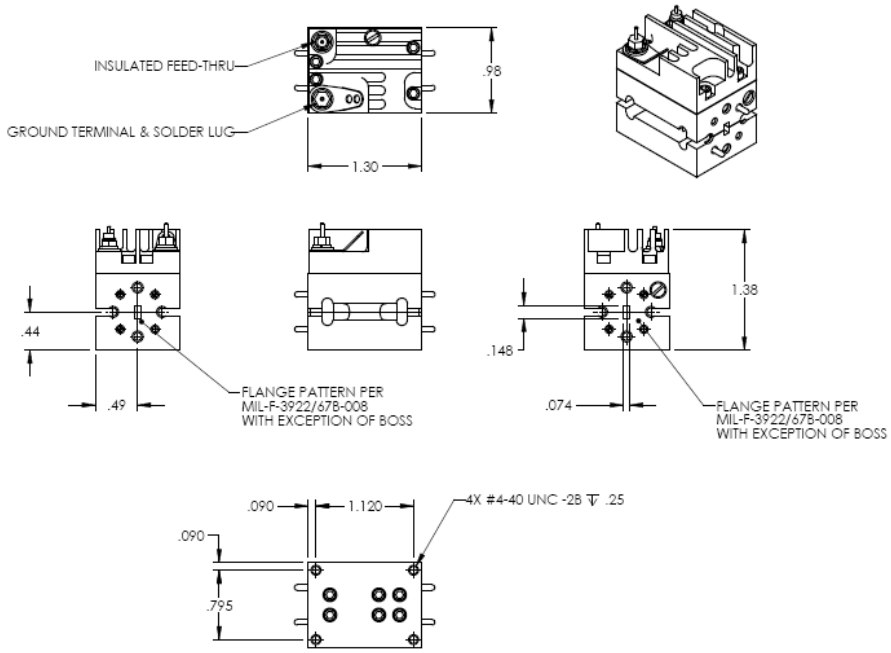


Figure 7

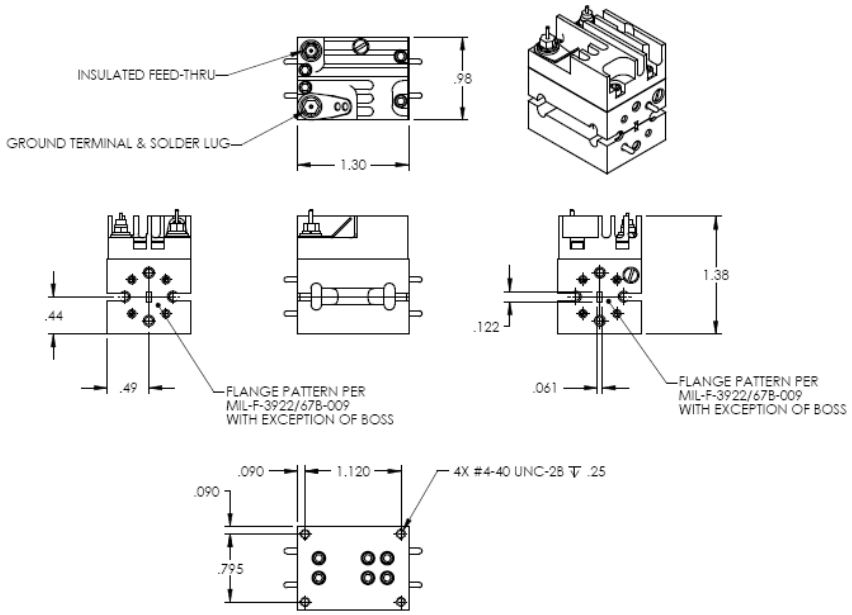


Figure 8

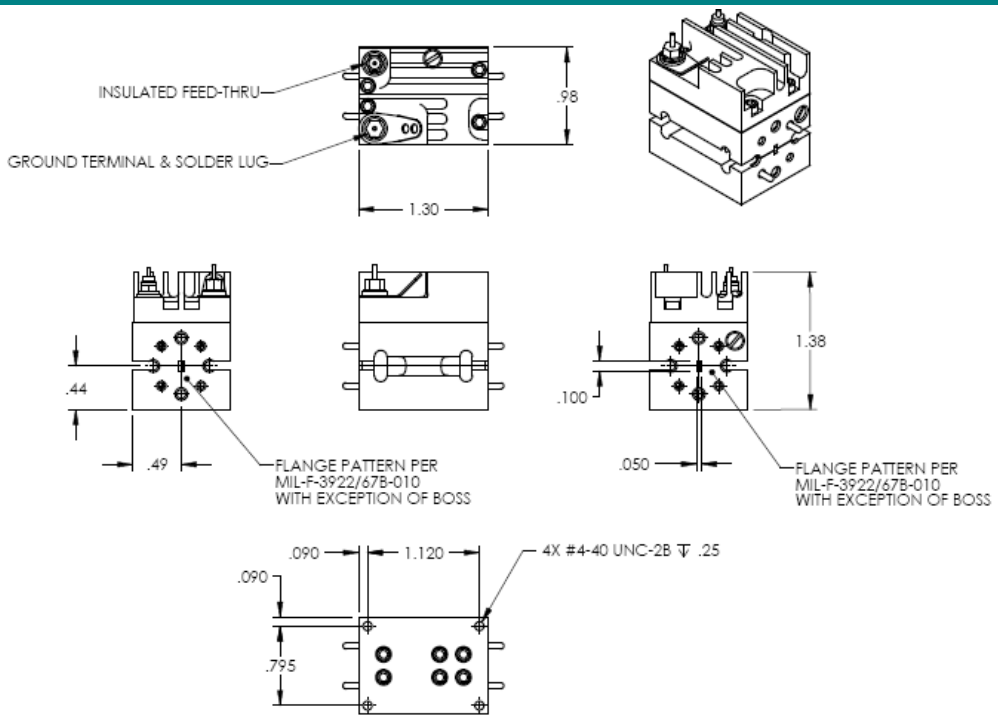


Figure 9

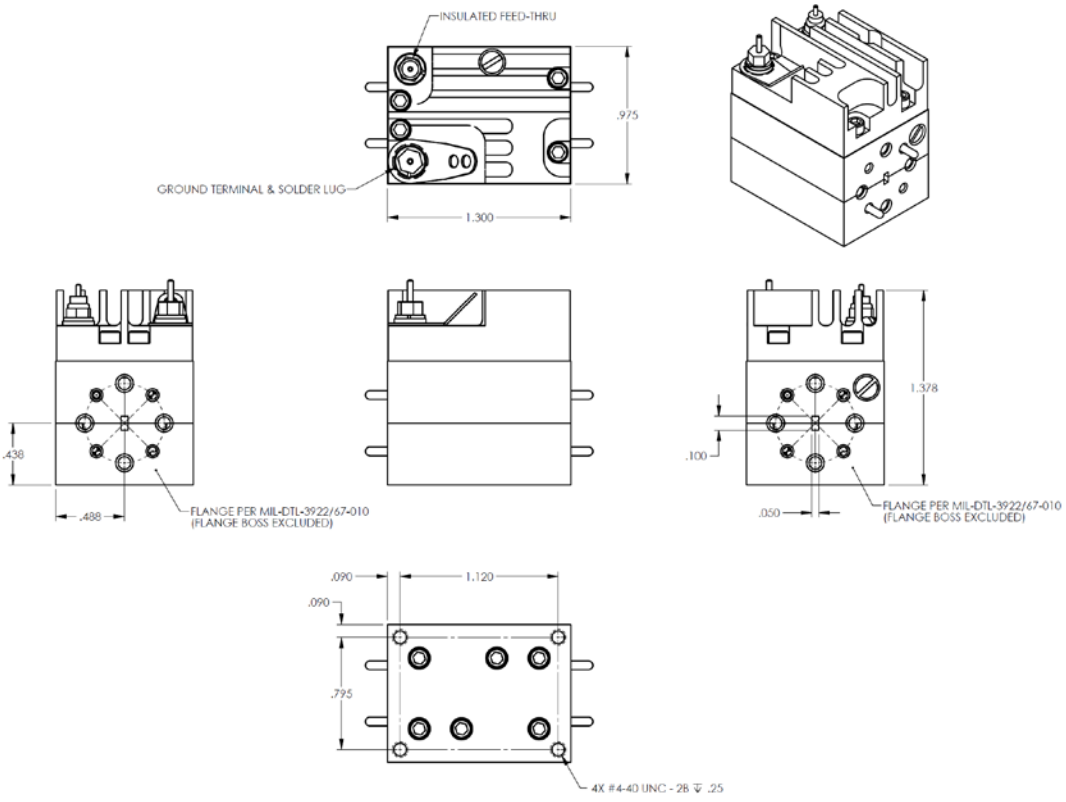


Figure 10

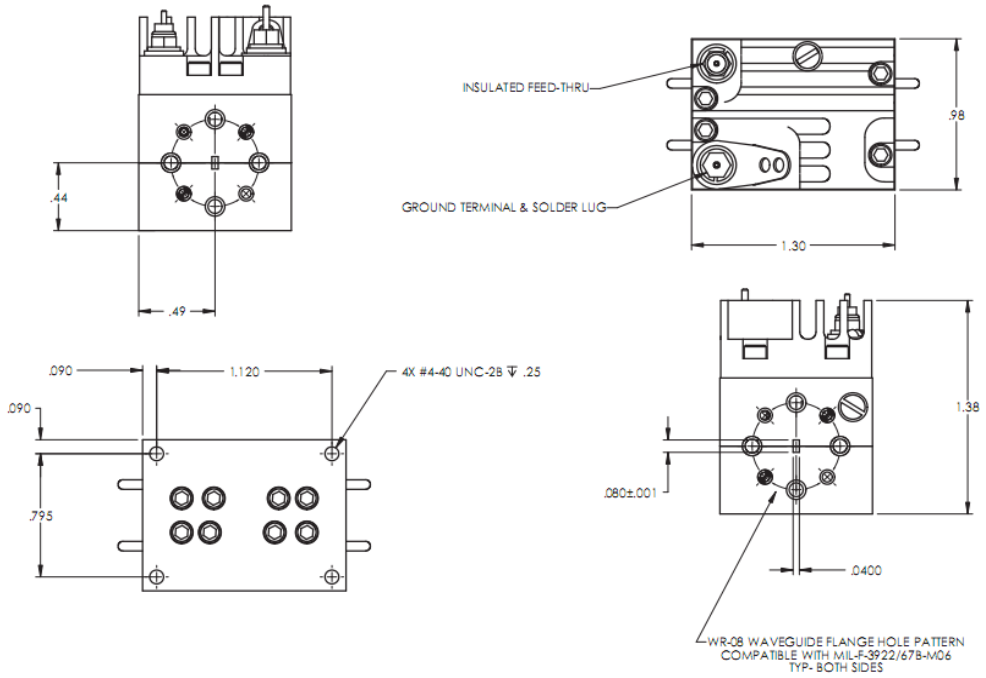


Figure 11

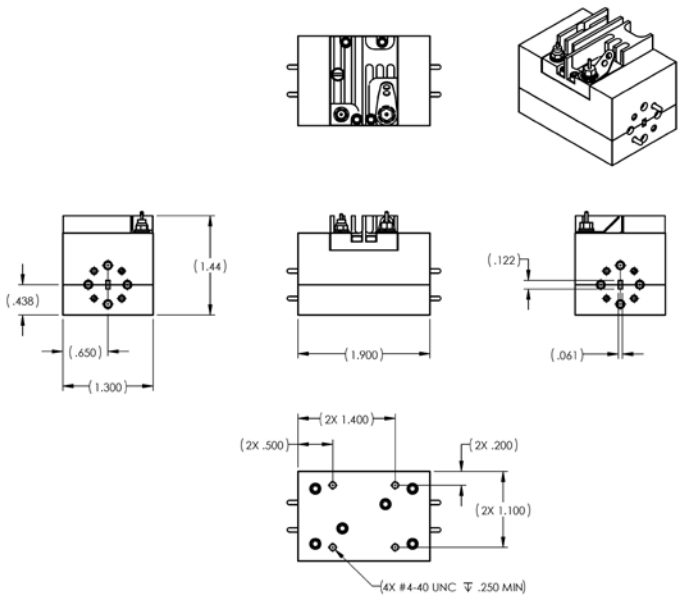


Figure 12

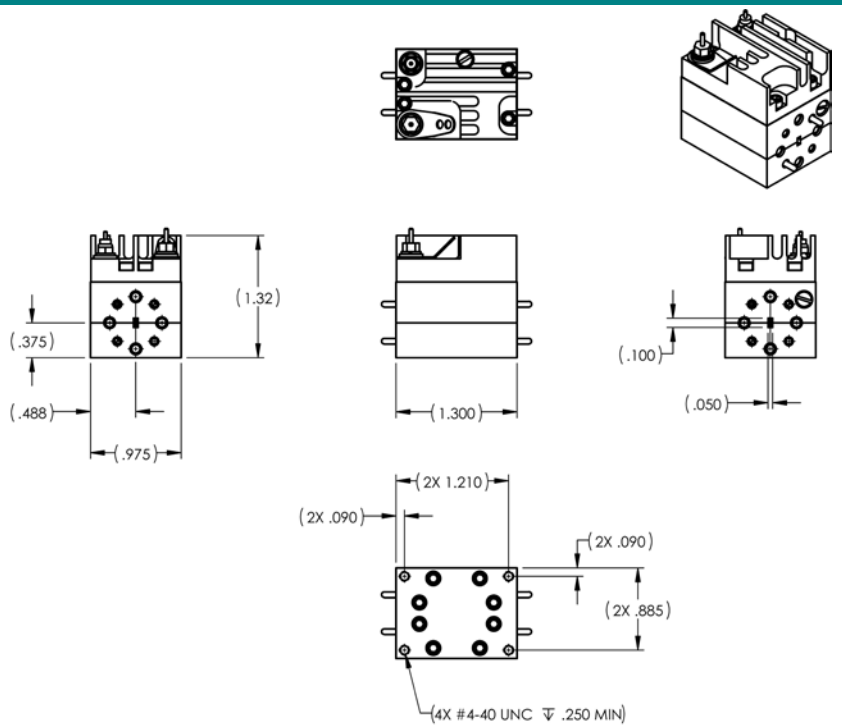


Figure 13

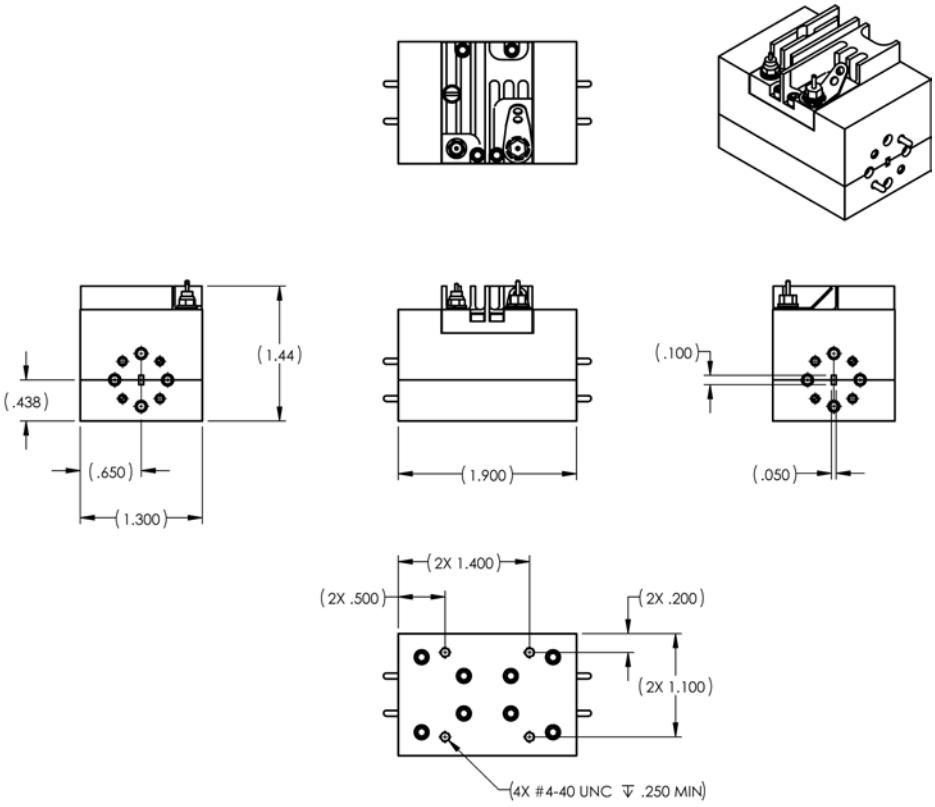


Figure 14

Note: Measurements are in inches.

How To Order

Specify Model Number AMP-XX-AAAAA
XX = Standard Connector **KK** – 2.92 mm connector **QQ** – 2.4 mm connector **VV –** 1.85 mm connector **42** – WR-42 waveguide **28** – WR-28 waveguide **22** – WR-22 waveguide **19** – WR-19 waveguide **15** – WR-15 waveguide **12** – WR-12 waveguide **10** – WR-10 waveguide **08** – WR-08 waveguide
AAAAA = Standard Model Number Choose a standard model number from our product list above. If none of these products meet your requirements, please feel free to contact Millitech for a special order.
Please specify frequency range for all narrowband units.

Heat Sink Information**	
Heat Sink Model Number	**AMP Outline Drawing Number**
HSK-002	Fig. 10, Fig. 12, Fig. 13, Fig. 14
HSK-003	Fig. 1, Fig. 2, Fig. 3, Fig. 5, Fig. 6, Fig. 7, Fig. 8, Fig. 9, Fig. 11, Fig. 13
HSK-004	Fig. 4

**** / Heat sinks are sold separately. For AMP models drawing 5 watts or more, Millitech recommends purchasing a heat sink. Please see Millitech's series HSK datasheet or contact Millitech for more details.**