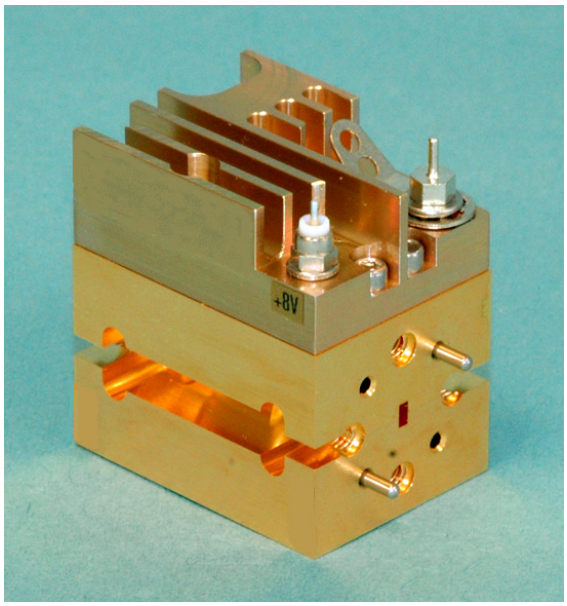
POWER AMPLIFIERS AND DRIVER AMPLIFIERS



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.

SPECIFICATIONS

Power Amplifiers

Model Number	FLow	FHigh	Gain (typ.) (dB)	1dBCP (typ.) (dBm)	Psat (typ.) (dBm)	Connector	Current (A) (typ. at Psat)[4]	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	1.20	9 – 12	26	Fig.1
AMP-42-01190	18	23	24	30.5	*	WR-42	1.20	9 – 12	26	Fig.2
AMP-42-02030	18	26.5	23 to 18[3]	23	*	WR-42	0.80	7.5 – 15	23	Fig.2
AMP-42-02230	18	26.5	19	26.5	*	WR-42	1.30	8 – 15	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	0.60	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	1.30	8 – 15	23	Fig.1
AMP-KK-01080[2]	26	31	21.5	32.5	33	2.92/2.4 mm	4.00	7 – 7.5	24	Fig.1
AMP-28-01080	26.5	31	23	33.5	34	WR-28	4.00	7 – 7.5	24	Fig.3
AMP-KK-01200[2]	28	31	21.5	33.5	34	2.92/2.4 mm	3.30	7 – 9	26	Fig.1
AMP-28-01200	28	31	22.5	33.5	34	WR-28	3.30	7 – 9	26	Fig.3
AMP-KK-01050[2]	28	31	20.5	26.5	*	2.92/2.4 mm	0.50	9 – 15	23	Fig.1
AMP-28-01050	28	31	22	27	*	WR-28	0.50	9 – 15	23	Fig.3
AMP-KK-01210[2]	28	31	18	28.5	29	2.92/2.4 mm	1.10	8 – 12	22	Fig.1
AMP-28-01210	28	31	19.5	29	29.5	WR-28	1.10	8 – 12	22	Fig.3
AMP-KK-02030[2]	18	32	22 to 16.5[3]	23	*	2.92/2.4 mm	0.80	7.5 – 15	23	Fig.1
AMP-28-02030	26.5	32	17	24	*	WR-28	0.80	7.5 – 15	23	Fig.3
AMP-KK-02050[2]	27	35	16.5	22	*	2.92/2.4 mm	0.50	9 – 15	*	Fig.1
AMP-28-02050	27	35	18	23	*	WR-28	0.50	9 – 15	*	Fig.3
AMP-KK-01090[2]	31	35	15.5	30	32	2.92/2.4 mm	1.50	8 – 13	27	Fig.1
AMP-28-01090	31	35	17	30.5	32.5	WR-28	1.50	8 – 13	27	Fig.3

Model Number	FLow	FHigh	Gain (typ.) (dB)	1dBCP (typ.) (dBm)	Psat (typ.) (dBm)	Connector	Current (A) (typ. at Psat) [4]	Input Voltage (V) (min-max)	Max RF Input Power (dBm)	Outline Drawing
AMP-28-21180	31	35	37	28	*	WR-28	1.65	8 – 13	12	Fig.4
AMP-22-01090	33	35	17	30.5	32.5	WR-22	1.50	8 – 13	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 - 13	*	*
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	4.00	7.5 – 8.5	*	Fig.3
AMP-KK-01170[2]	33	36	13.5	29	30.5	2.92/2.4 mm	1.40	9 – 13	27	Fig.1
AMP-28-01170	33	36	15	30	31.5	WR-28	1.40	9 – 13	27	Fig.3
AMP-22-01170	33	36	15	30	31.5	WR-22	1.40	9 – 13	27	Fig.5
AMP-KK-02380[TC]	34	36	26	23	26	2.92/2.4 mm	0.80	8 – 15	6	Fig. 1
AMP-28-02380[TC]	34	36	26	23	26	WR-28	0.80	8 – 15	6	Fig. 3
AMP-KK-02410[2]	17	40	20	20	*	2.92/2.4 mm	0.40	8 – 15	20	Fig.1
AMP-KK-02040[2]	20	40	18	19	*	2.92/2.4 mm	1.30	8 – 15	23	Fig.1
AMP-28-02410	26	40	22	20	*	WR-28	0.40	8 – 15	20	Fig.3
AMP-28-02040	26.5	40	19	20	*	WR-28	1.30	8 – 15	23	Fig.3
AMP-22-01180	30	40	15	30	31	WR-22	2.00	7.5 – 11	24	Fig.5
AMP-KK-01180[2]	30	40	13	29	30	2.92/2.4 mm	2.00	7.5 – 11	24	Fig.1
AMP-28-01180	30	40	15	30	31	WR-28	2.00	7.5 – 11	24	Fig.3
AMP-28-22320	30	40	36	19	*	WR-28	0.35	8 – 15	12	Fig.4
AMP-KK-01100[2]	36	40	11	26.5	*	2.92/2.4 mm	1.50	9 – 12	27	Fig.1
AMP-28-01100	36	40	13	27.5	*	WR-28	1.50	9 – 12	27	Fig.3
AMP-22-01100	36	40	13	27.5	*	WR-22	1.50	9 – 12	27	Fig.5
AMP-22-02250	36	42.5	13.5	25.5	*	WR-22	1.10	8 – 12	20	Fig.5
AMP-28-02460	32	45	14	22.5	25	WR-28	0.45	8 – 12	20	Fig. 3
AMP-22-02040	33	45	18	19	*	WR-22	1.30	8 – 12	23	Fig.5
AMP-22-02070	37	45	20	21.5	*	WR-22	0.60	7.5 – 12	10	Fig.5
AMP-22-01160	40	45	9	26.5	*	WR-22	1.00	9 – 10	27	Fig.5
AMP-22-01120	41	46	13	30	31	WR-22	2.70	8 – 10	29	Fig.5
AMP-22-02340	43	46	16	21	*	WR-22	0.22	7.5 – 15	*	Fig.5
AMP-19-02340	43	46	16	21	*	WR-19	0.22	7.5 – 15	*	Fig.6
AMP-22-01240	42	47	22	*	32.5	WR-22	*	7 – 10	*	Fig.5

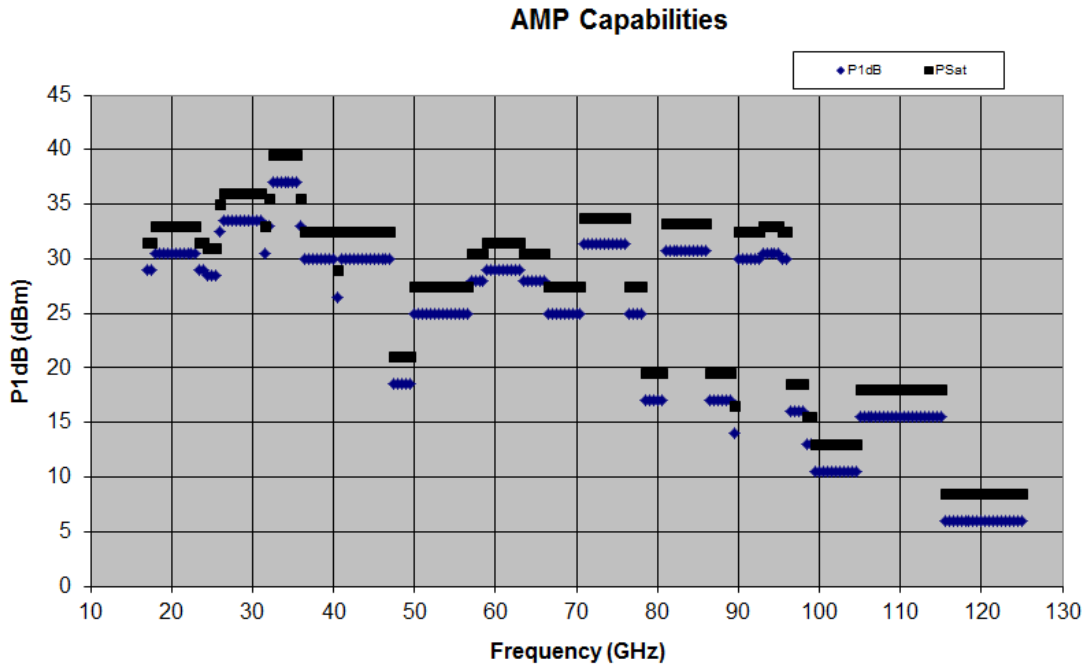
Model Number	FLow	FHigh	Gain (typ.) (dB)	1dBCP (typ.) (dBm)	Psat (typ.) (dBm)	Connector	Current (A) (typ. at Psat) [4]	Input Voltage (V) (min-max)	Max RF Input Power (dBm)	Outline Drawing
AMP-VV-02470	42	47	34	30	33	1.85 mm	2	7.5 – 10	10	Fig. 1
AMP-22-40060[1]	42	47	41	*	37.5	WR-22	*	7.5 – 8	*	*
AMP-19-40090[1]	47	52	29	18.5	21	WR-19	*	7.5 – 8	*	*
AMP-VV-02420	40	60	17	15	*	1.85 mm	0.35	5 – 8	10	Fig. 1
AMP-19-02100	50	60	22	15	*	WR-19	0.25	7.5 – 15	2	Fig.6
AMP-15-01250	59	63	15.6@59GHz, 18.8@60GHz, 16.2@61GHz, 16.6@62GHz, 11.6@63GHz	*	26.5@59GHz, 28.0@60GHz, 29.5@61GHz, 28.0@62GHz, 26.0@63GHz	WR-15	1.62	8 – 12	*	Fig.7
AMP-15-40070[1]	59	63	28.2@59GHz, 34.6@60GHz, 29.4@61GHz, 30.2@62GHz, 20.2@63GHz	*	31.5@59GHz, 33@60GHz, 34.5@61GHz, 33@62GHz, 31@63GHz	WR-15	*	*	*	*
AMP-15-02100	50	66	22	15	*	WR-15	0.25	7.5 – 15	2	Fig.7
AMP-15-02550[5]	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	*	*
AMP-15-40120	57	66	27	28	31	WR-15	3.75	7.5 – 15	*	*
AMP-15-03100	60	66	21	17.5	19.5	WR-15	0.50	7.5 - 12	2	*
AMP-15-02390	60	68	20, 17.5 from 66-68 GHz	*	25	WR-15	0.8	8 - 15	*	Fig.7
AMP-15-02630	50	70	17	11 (50-60 GHz) 17 (60-70 GHz)	15 (50-57 GHz) 19 (57-70 GHz)	WR-15	0.35	7.5 - 15	*	Fig.7
AMP-15-02640	50	70	15	23	24 (50-57 GHz) 26 (57-70 GHz)	WR-15	0.75	7.5 - 15	*	Fig.7
AMP-15-20050	50	70	13	25	26 (50-57 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-12-02480	71	76	11	21.5	23	WR-12	0.5	7.5 – 12	11	Fig. 12
AMP-12-03120	71	76	20	17.5	21	WR-12	0.50	7.5 - 15	3	Fig. 12
AMP-12-02530	71	76	17@71GHz, 17@73.5GHz, 16@76GHz	24.5@71.0GHz, 24.5@73.5GHz, 23.0@76.0GHz	27.0@71.0GHz, 26.5@73.5GHz, 26.0@76.0GHz	WR-12	0.75	7.5 – 12	15	Fig.8
AMP-12-02540	71	76	16.5	26.0@71.0GHz, 27.0@73.5GHz, 25.5@76.0GHz	29.5@71.0GHz, 29.0@73.5GHz, 29.0@76.0GHz	WR-12	1.5	7.5 – 12	15	Fig. 12
AMP-12-03270[1]	71	76	33	28.5@71.0GHz, 29.5@73.5GHz, 28.0@76.0GHz	32.0@71.0GHz, 32.0@73.5GHz, 31.5@76.0GHz	WR-12	3.75	7.5 – 9	-5	*
AMP-12-10010[6]	71	76	17.5@71GHz, 15.5@74GHz, 14.8@76GHz	26.0	28.5	WR-12	0.36	14 – 18	*	Fig.8

Model Number	FLow	FHigh	Gain (typ.) (dB)	1dBCP (typ.) (dBm)	Psat (typ.) (dBm)	Connector	Current (A) (typ. at Psat)[4]	Input Voltage (V) (min-max)	Max RF Input Power (dBm)	Outline Drawing
AMP-12-20010[6]	71	76	17.0@71GHz, 15.0@74GHz, 14.3@76GHz	28.6	31.1	WR-12	0.71	14 – 18	*	Fig. 12
AMP-12-41010[6]	71	76	33.0@71GHz, 29.0@74GHz, 27.6@76GHz	31.3	33.8	WR-12	1.78	14 – 18	*	*
AMP-12-02650	68	78	24	24@68GHz, 24@73.5GHz, 22@78GHz	26.5	WR-12	0.9	7.5 – 15	*	Fig.8
AMP-12-20070	68	78	22	26@68GHz, 26@73.5GHz, 24@78GHz	28.5	WR-12	1.8	7.5 – 15	*	Fig. 12
AMP-12-02330	76	81	17 - 21	13	*	WR-12	0.20	7.5 – 15	*	Fig.8
AMP-12-03130	76	84	15	15.5	17.5	WR-12	0.40	7.5 - 15	*	*
AMP-12-02490	81	86	10	21	22.5	WR-12	0.5	7.5 – 12	12	*
AMP-12-02520	81	86	12.5	21.5	24.5	WR-12	0.7	7.5 – 12	16	Fig.8
AMP-10-02510	81	86	12	24	27	WR-10	1.4	7.5 – 9	16	Fig. 8
AMP-12-40100[1]	81	86	23	26.5	29.5	WR-12	*	7.5 – 9	*	Fig. 12
AMP-10-02440	81	86	9	17.5	20.5	WR-10	0.24	7.5 – 15	13	Fig.9
AMP-12-10020[6]	81	86	18.0@82.5GHz, 18.5@84GHz, 17.0@85.5GHz	25.4	29.0	WR-12	0.39	14 – 18	*	Fig. 8
AMP-12-20020[6]	81	86	17.0@82.5GHz, 17.5@84GHz, 16.0@85.5GHz	28.0	31.6	WR-12	0.77	14 – 18	*	Fig.14
AMP-12-41020[6]	81	86	33.0@82.5GHz, 34.0@84GHz, 31.0@85.5GHz	30.7	34.3	WR-12	1.93	14 – 18	*	*
AMP-12-02310	75	87	16	10	12.5	WR-12	0.20	7.5 – 15	*	Fig.8
AMP-10-02310	75	87	16	10	12.5	WR-10	0.20	7.5 – 15	*	Fig.9
AMP-12-02660	76	87	25	*	24.0@76GHz, 26.0@80GHz, 23.0@87GHz	WR-12	0.9	7.5 – 15	*	Fig.8
AMP-12-20080	76	87	23	*	26.0@76GHz, 28.0@80GHz, 25.0@87GHz	WR-12	1.8	7.5 – 15	*	Fig. 12
AMP-12-02670	69	89	21	14 to 18 (69-85GHz) 18 to 16 (85 to 90 GHz)	16 to 20 (69-85GHz) 20 to 17 (85 to 90 GHz)	WR-12	0.3	7.5 – 15	*	Fig.8
AMP-12-20090	69	89	19	16 to 20 (69-85GHz) 20 to 18 (85 to 90 GHz)	18 to 22 (69-85GHz) 22 to 19 (85 to 90 GHz)	WR-12	0.6	7.5 – 15	*	Fig. 12
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-10-22350	84	92	35	14	17	WR-10	0.50	7.5 – 15	5	Fig.10
AMP-10-02150	91	95	9	*	22	WR-10	0.30	7.5 – 15	15	Fig.9
AMP-10-22190	91	95	30	*	22	WR-10	0.60	7.5 – 15	5	Fig.10
AMP-10-40080[1]	91	95	15	*	27	WR-10	*	*	*	*
AMP-10-03220	92	95	9	*	24.5	WR-10	0.70	7.5 – 14	15	Fig.14
AMP-10-03250	93	95	17	*	33	WR-10	6.00	8 – 8.5	15	*
AMP-10-10030[6]	90	96	15.0@90GHz, 15.0@93GHz, 13.0@96GHz	24.7	29.0	WR-10	0.35	14 – 18	*	Fig.9
AMP-10-20030[6]	90	96	14.0@90GHz, 14.0@93GHz, 12.0@96GHz	27.3	31.6	WR-10	0.70	14 – 18	*	Fig.14
AMP-10-41030[6]	90	96	27.0@90GHz,	30.0	34.3	WR-10	1.75	14 – 18	*	*

			27.0@93GHz, 23.0@96GHz							
AMP-10-22360	84	98	38	13	16	WR-10	0.50	7.5 – 15	5	Fig.10
AMP-10-22300	92	98	40	14	17	WR-10	0.50	7.5 – 15	5	Fig.10
AMP-10-03230	92	98	19	16	19	WR-10	0.60	7.5 – 14	5	Fig.14
AMP-10-02260	90	99	20	13	16	WR-10	0.30	7.5 – 15	5	Fig.9
AMP-10-03290[6]	80	105	15	*	15.5	WR-10	0.30	7.5 – 12	*	*
AMP-10-02580[5]	80	105	16	*	13.5	WR-10	0.15	7.5 – 12	*	Fig. 9
AMP-10-02130	75	110	17.0@75GHz, 12.5@95GHz, 12.0@110GHz	*	13.5@75GHz, 12.5@95GHz, 13.5@110GHz	WR-10	0.23	7.5 – 15	10	Fig.9
AMP-10-03280	75	110	16.0@75GHz, 11.5@95GHz, 11.0@110GHz	*	15.5@75GHz, 14.5@95GHz, 15.5@110GHz	WR-10	0.46	7.5 – 12	10	*
AMP-08-40110	105	115	20	*	18.5@110GHz	WR-08	*	7.5 – 9	*	*
AMP-08-02450	90	125	13@90GHz, 12@110GHz, 8.5@125GHz	*	12.5@90GHz, 13.5@110GHz,	WR-08	0.26	7.5 – 15	10	Fig. 11

*** 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. Descends with frequency.
4. Quiescent current is 50-70% of current at Psat.
5. Doubles as an LNA with 5 dB NF.
6. Preliminary data. Final specs to come soon.
TC. These models are temperature compensated to achieve <0.03 dB/°C gain variation from -30 to +65°C

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



OUTLINE DRAWINGS

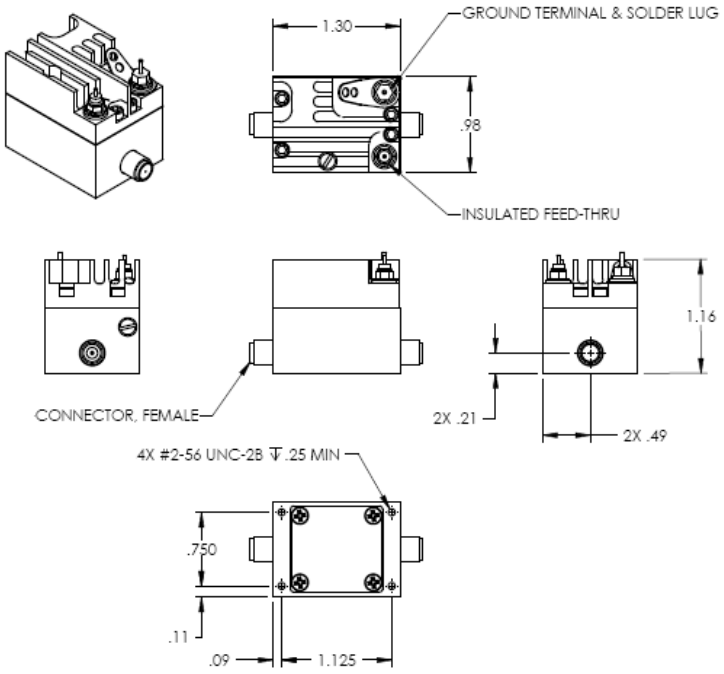


Figure 1

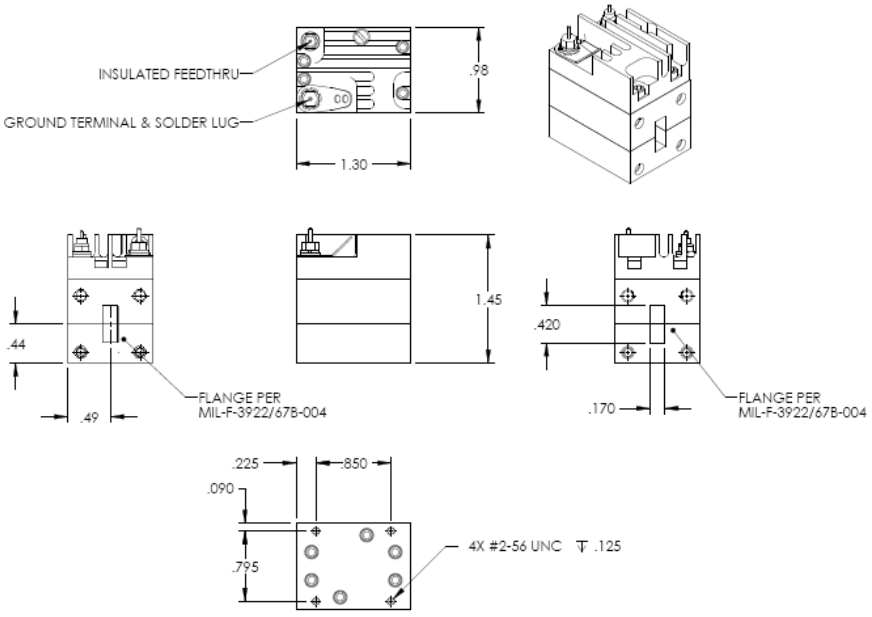


Figure 2

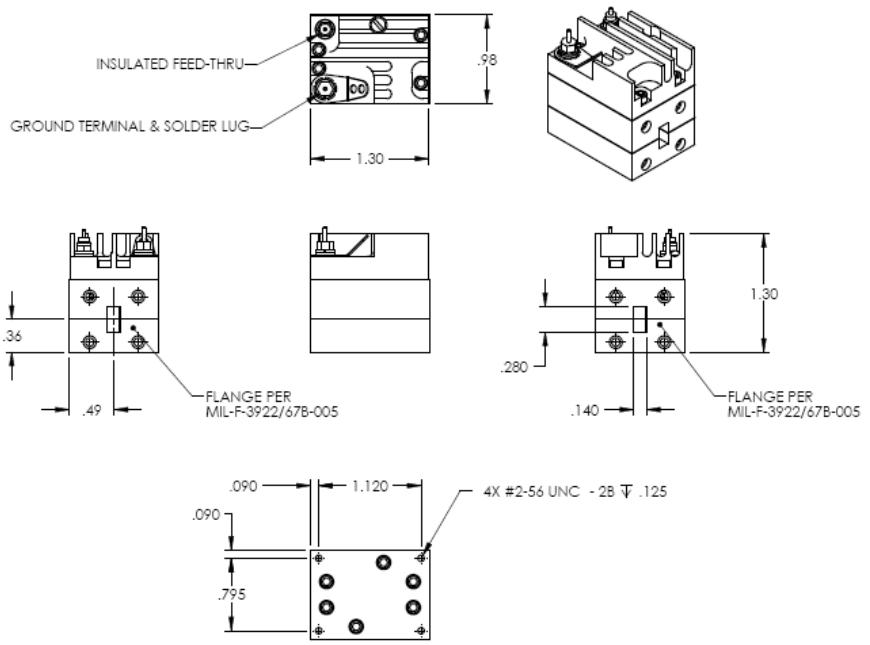


Figure 3

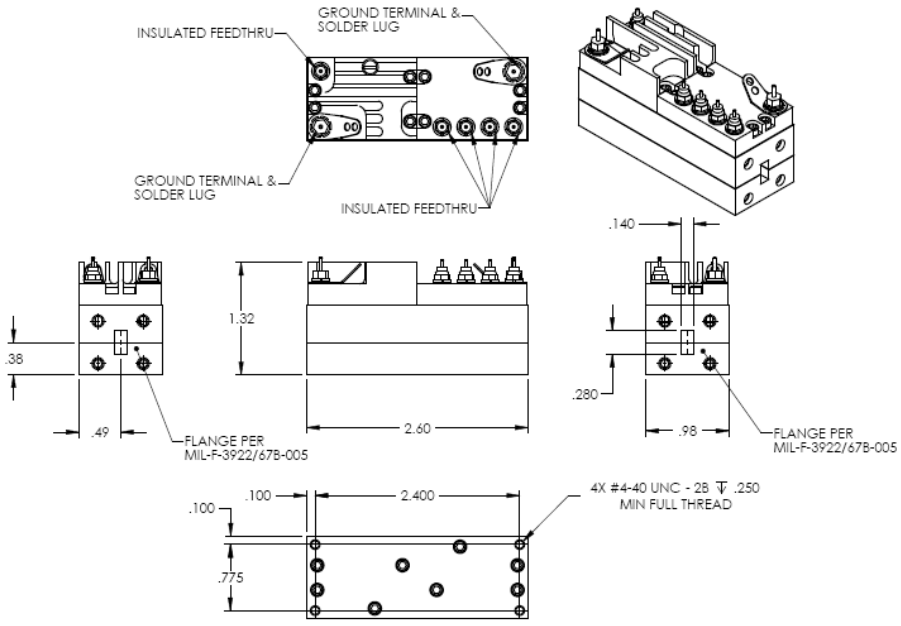


Figure 4

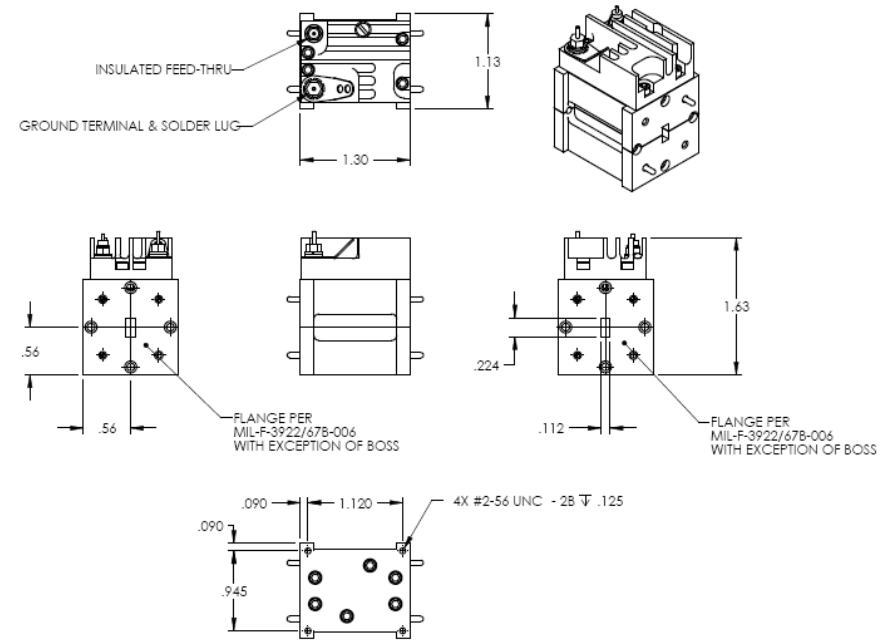


Figure 5

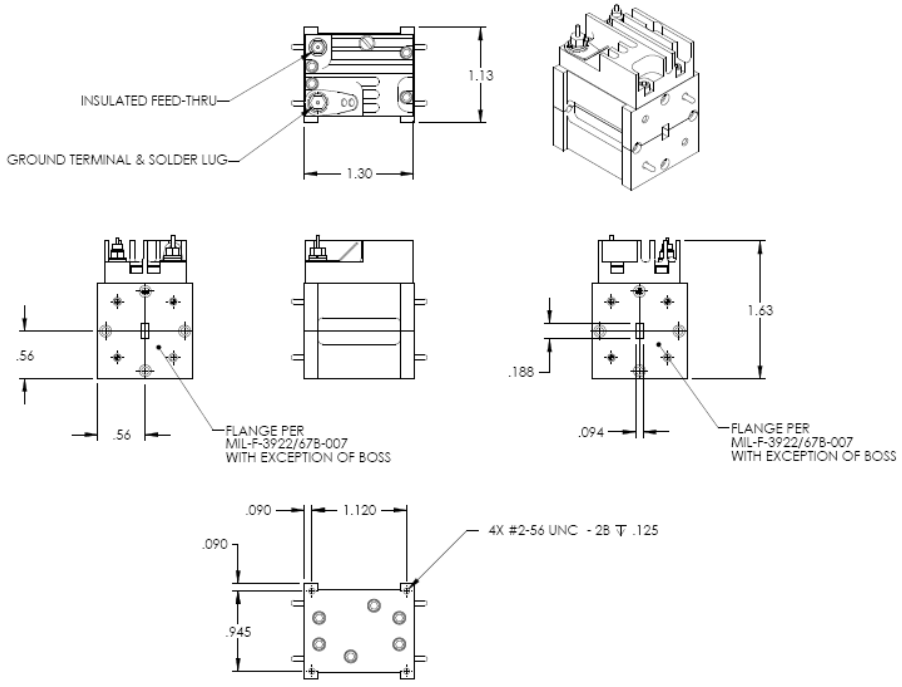


Figure 6

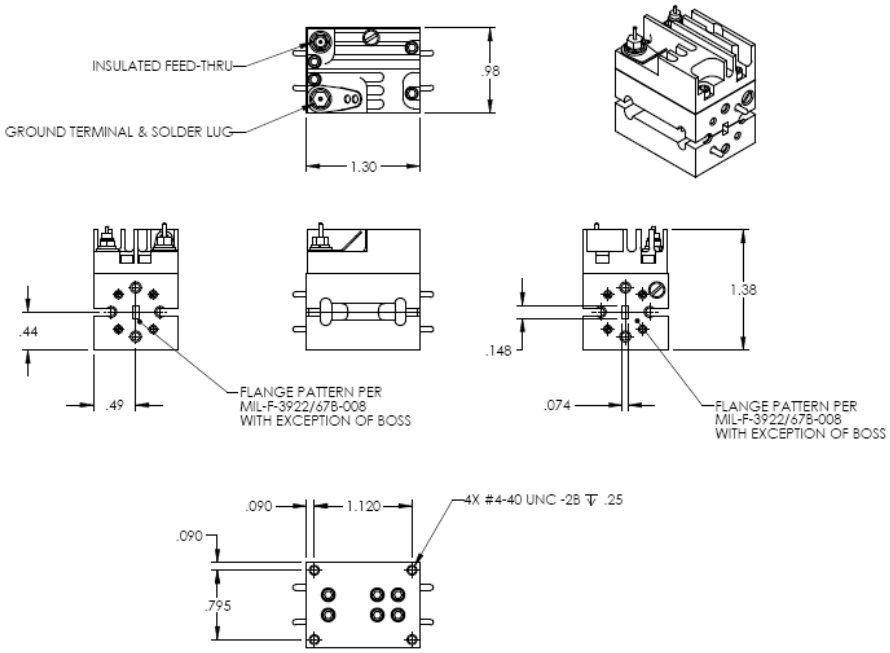


Figure 7

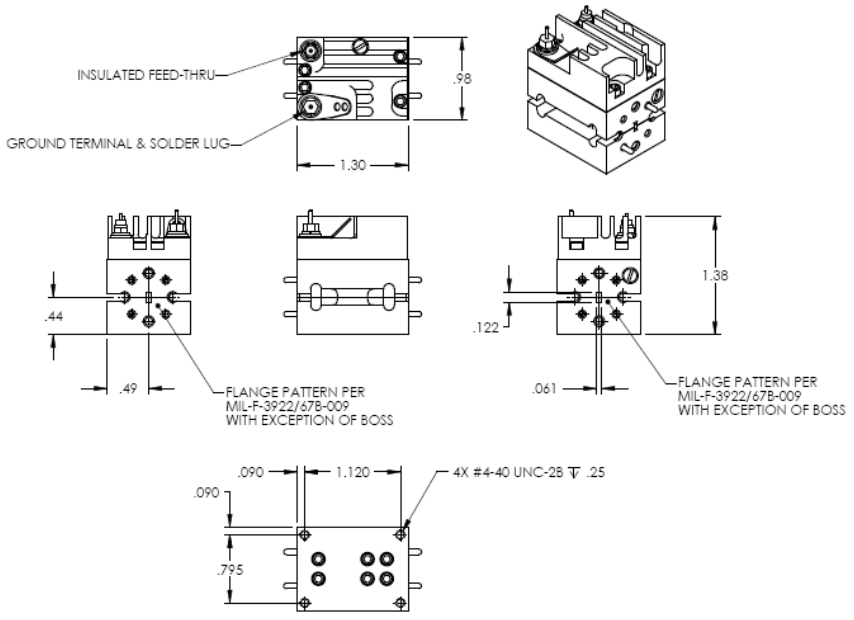


Figure 8

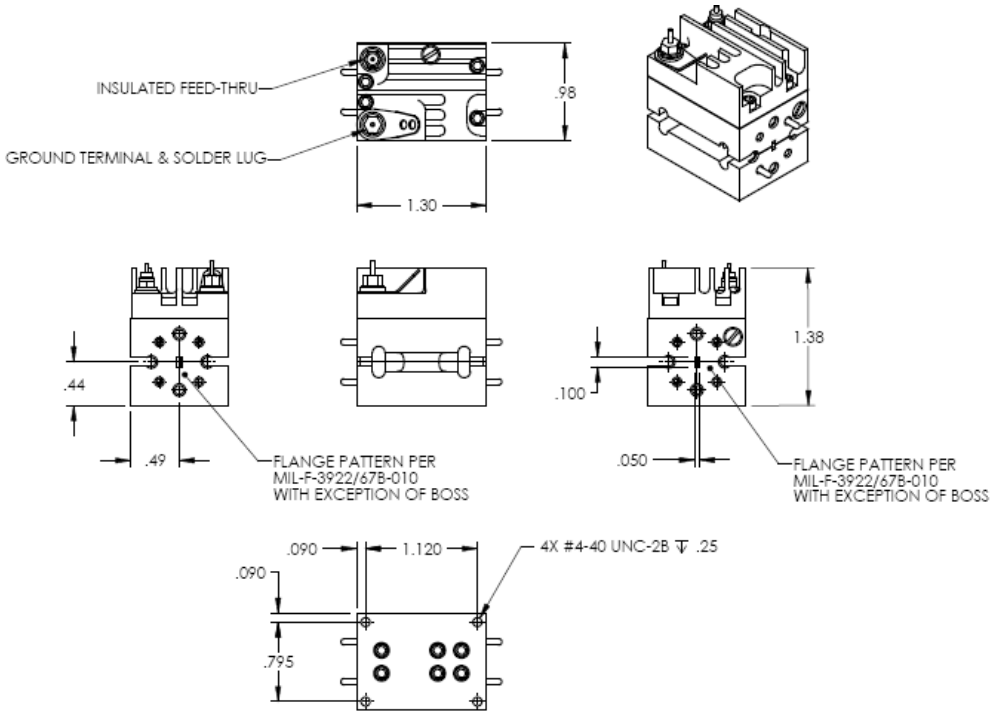


Figure 9

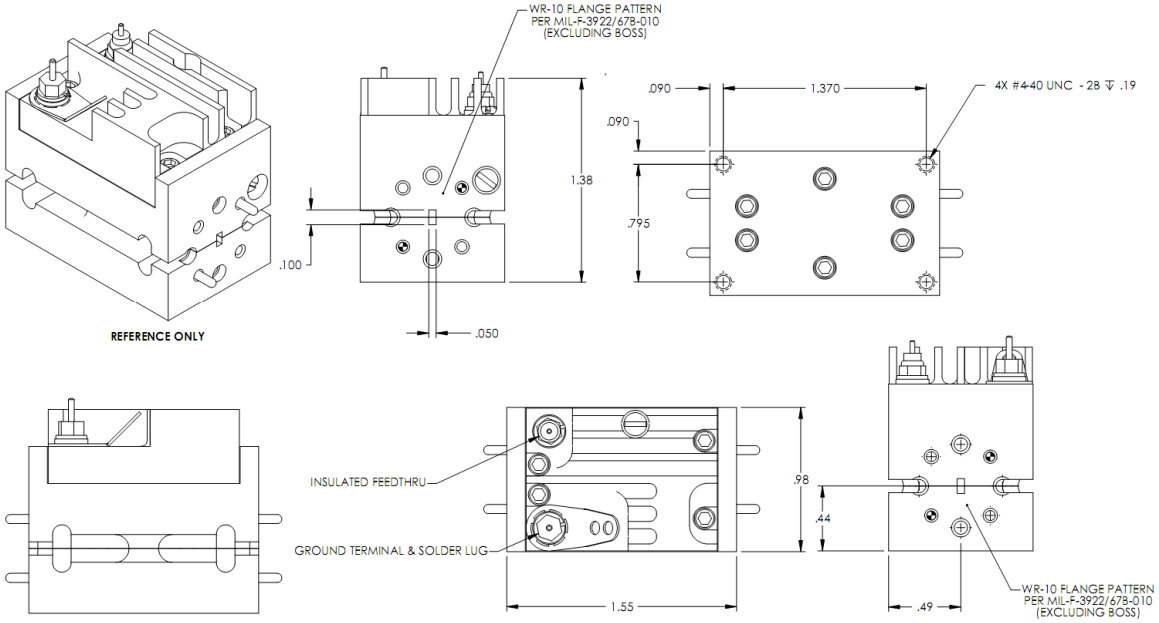


Figure 10

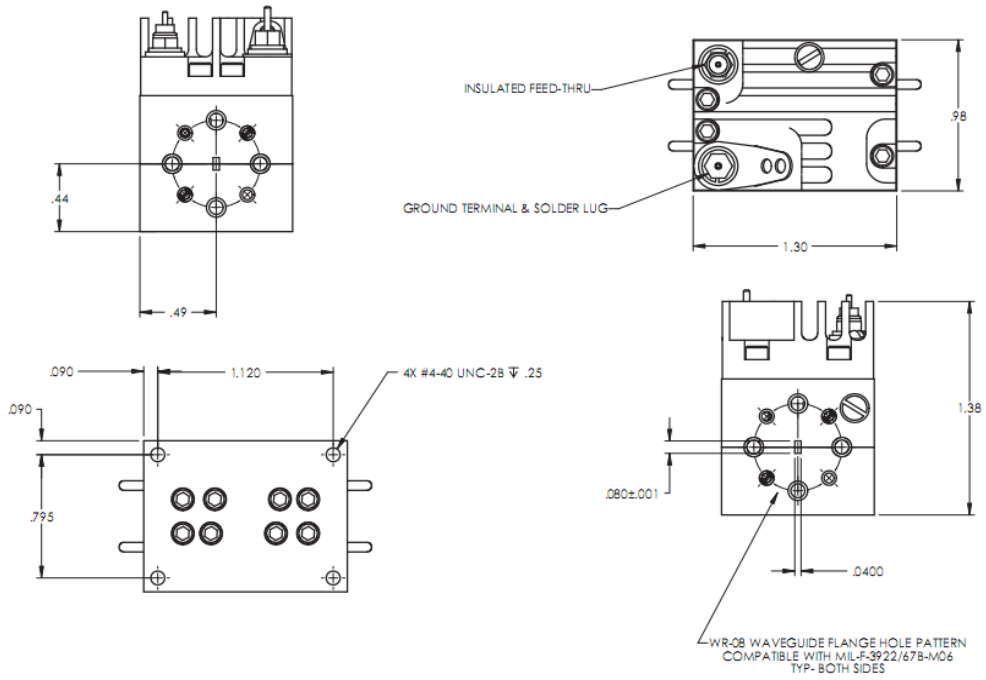


Figure 11

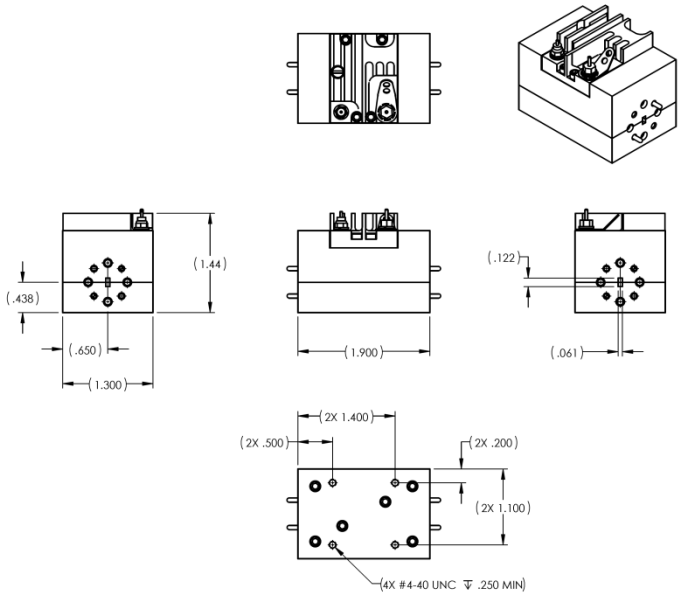


Figure 12

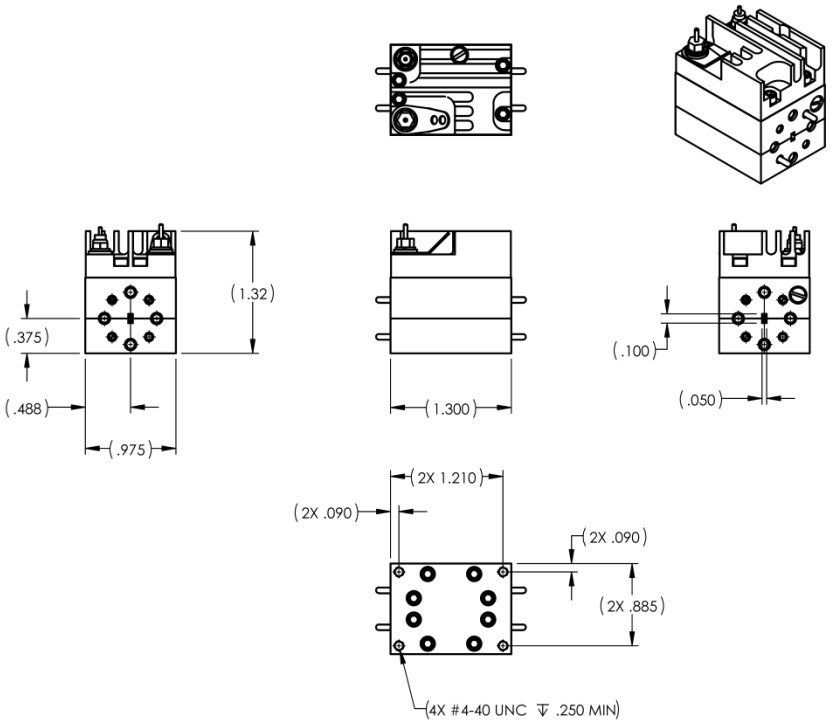


Figure 13

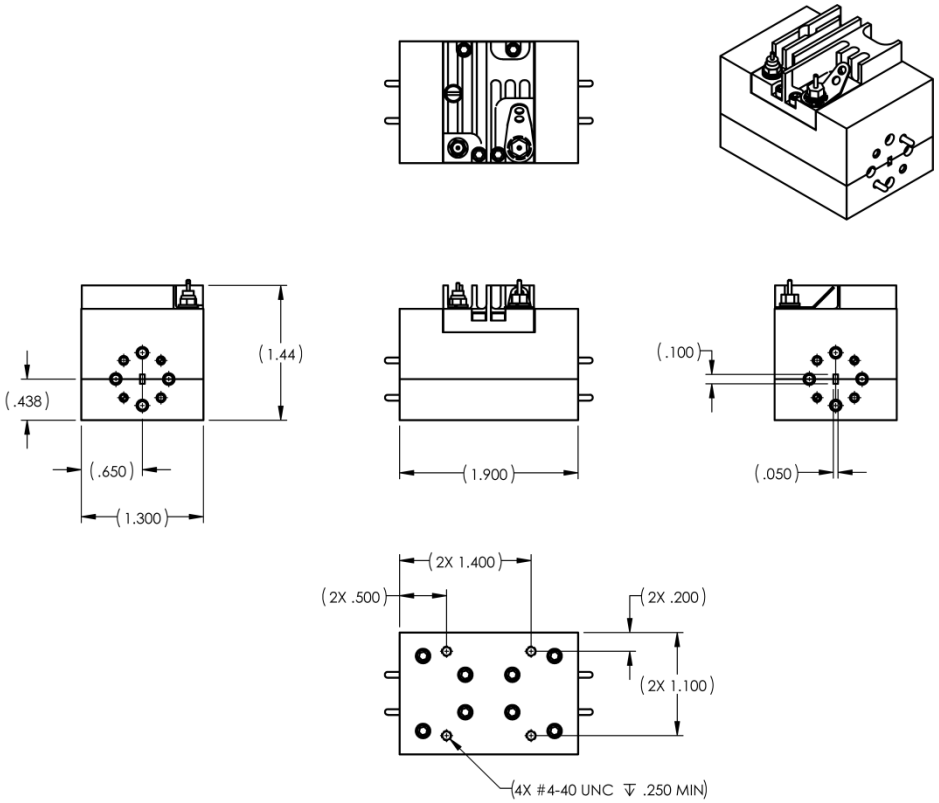


Figure 14

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.**