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## Low Voltage Cascadable Amplifiers in TO-8 and TO-12 Packages

Power Supply +5 Vdc; Models Listed By Increasing Frequency

Model	Frequency Response (MHz) Minimum	Gain (dB) Minimum	Gain Flatness (±dB) Typical	Noise Figure (dB) Maximum (*Typical)	Power Output at 1dB Gain Comp. (dBm) Minimum	3rd-Order Intercept (IP3) (dBm) Typical	Current (mA) Typical
UTO-103	10-100	25.5	1.0	2.1	+9.5	+22	15
UTO-104	10-150	24.0	1.0	2.3	+9.0	+22	20
UTO-250	5-200	30.0	1.0	4.0	-3.0	+14	13
GPD-251	5-200	25.0	1.0	4.0*	+1.0	+10	30
GPD-252	5-200	15.0	1.0	4.0*	0.0	+12	11
UTO-443	10-400	12.5	0.7	4.5	+4.5	+19	10
UTO-444	10-400	12.5	0.7	5.0	+8.0	+22	15
UTO-520	5-500	14.0	0.7	4.5	+11.0	+22	33
UTO-550	30-500	21.0	0.75	3.0	+9.0	+21	16
UTO-552	5-500	13.5	0.7	4.0	+6.5	+21	18
UTO-554	5-500	28.0	0.7	3.0	+9.0	+21	40
UTO-558	5-500	28.0	0.7	3.2	+13.5	+23	70
UTO-1007	5-1000	12.5	0.7	5.0	+11.0	+21	33
UTO-1052	5-1000	13.0	0.7	5.0	+6.0	+18	18
UTO-1054	5-1000	23.5	0.7	4.0	+9.5	+21	40
UTO-1058	5-1000	23.5	0.7	4.2	+13.0	+22	70
UTO-2052	5-2000	9.0	0.7	5.0	+5.5	+16	18
UTO-2055	10-2000	8.5	0.7	6.0	+10.0	+22	32

## Low Voltage Cascadable Amplifiers in Surface Mount Packages

Power Supply +5 Vdc; Models Listed By Increasing Frequency

Model	Frequency Response (MHz) Minimum	Gain (dB) Minimum	Gain Flatness (±dB) Typical	Noise Figure (dB) Maximum	Power Output at 1dB Gain Comp. (dBm) Minimum	3rd-Order Intercept (IP3) (dBm) Typical	Current (mA) Typical
PSA-103	10-100	25.5	1.0	2.1	+9.5	+22	15
PSA-104	10-150	24.0	1.0	2.3	+9.0	+22	20
PSA-250	5-200	30.0	1.0	4.0	-3.0	+14	13
PSA-443	10-400	12.5	0.7	4.5	+4.5	+19	10
PSA-444	10-400	12.5	0.7	5.0	+8.0	+22	15
PSA-520	5-500	14.0	0.7	4.5	+11.0	+22	33
PSA-550	30-500	21.0	0.75	3.0	+9.0	+21	16
PSA-552	5-500	13.5	0.7	4.0	+6.5	+21	18
PSA-554	5-500	28.0	0.7	3.0	+9.0	+21	40
PSA-558	5-500	28.0	0.7	3.2	+13.5	+23	70
PSA-1007	5-1000	12.5	0.7	5.0	+11.0	+21	33
PSA-1052	5-1000	13.0	0.7	5.0	+6.0	+18	18
PSA-1054	5-1000	23.5	0.7	4.0	+9.5	+21	40
PSA-1058	5-1000	23.5	0.7	4.2	+13.0	+22	70
PSA-2052	5-2000	9.0	0.7	5.0	+5.5	+16	18
PSA-2055	10-2000	8.5	0.7	6.0	+10.0	+22	32

For UTC Series connectorized versions of these models, please see page 9.

Need High Reliability Screened Versions? See page 22 for details.

# Featured Products: LOW NOISE



## Low Noise Cascadable Amplifiers in TO-8 Packages

Noise Figure  $\leq 3$  dB; Models Listed By Increasing Frequency

Model	Frequency Response (MHz) Minimum	Gain (dB) Minimum	Gain Flatness ( $\pm$ dB) Typical	Noise Figure (dB) Maximum	Power Output at 1dB Gain Comp. (dBm) Minimum	3rd-Order Intercept (IP3) (dBm) Typical	Current (mA) Typical
UTO-101	10-100	26.5	1.0	2.2	+14.5	+26	20 (15.0V)
UTO-103	10-100	25.5	1.0	2.1	+9.5	+22	15 (5.0V)
UTO-111	10-100	10.5	0.3	1.7	+15.5	+28 <sup>1</sup>	14 (15.0V)
UTO-104	10-150	24.0	1.0	2.3	+9.0	+22	20 (5.0V)
GPD-201 <sup>3</sup>	5-200	30.0	1.0	3.0	+5.0	+13	30 (15.0V)
UTO-514	30-200	15.0	0.75	2.0	-3.0	+7	8 (15.0V)
UTO-210	10-200	8.0	1.0	2.0	+11.0	+29	15 (15.0V)
UTO-221	10-200	27.0	0.7	2.5	+13.5	+23	29 (15.0V)
UTO-211	10-200	7.5	1.0	2.7	+17.0	+28	30 (15.0V)
UTO-1509	10-1500	11.5	1.0	3.0 <sup>2</sup>	+22.0	+35	100 (15.0V)

**Notes:**

1. Guaranteed at 0° to 50°C minimum.
2. Specification applies at F greater than 100 MHz; Noise Figure at 10 MHz = 8.0dB typical.
3. Available in TO-12 package only.

## Low Noise Cascadable Amplifiers in Surface Mount Packages

Noise Figure  $\leq 3$  dB; Models Listed By Increasing Frequency

Model	Frequency Response (MHz) Minimum	Gain (dB) Minimum	Gain Flatness ( $\pm$ dB) Typical	Noise Figure (dB) Maximum	Power Output at 1dB Gain Comp. (dBm) Minimum	3rd-Order Intercept (IP3) (dBm) Typical	Current (mA) Typical
PSA-101	10-100	26.5	1.0	2.2	+14.5	+26	20 (15.0V)
PSA-103	10-100	25.5	1.0	2.1	+9.5	+22	15 (5.0V)
PSA-111	10-100	10.5	0.3	1.7	+15.5	+28 <sup>1</sup>	14 (15.0V)
PSA-104	10-150	24.0	1.0	2.3	+9.0	+22	20 (5.0V)
PSA-514	30-200	15.0	0.75	2.0	-3.0	+7	8 (15.0V)
PSA-210	10-200	8.0	1.0	2.0	+11.0	+29	15 (15.0V)
PSA-221	10-200	27.0	0.7	2.5	+13.5	+23	29 (15.0V)
PSA-211	10-200	7.5	1.0	2.7	+17.0	+28	30 (15.0V)
PSA-1509	10-1500	11.5	1.0	3.0 <sup>2</sup>	+22.0	+35	100 (15.0V)

**Notes:**

1. Guaranteed at 0° to 50°C minimum.
2. Specification applies at F greater than 100 MHz; Noise Figure at 10 MHz = 8.0dB typical.

For UTC Series connectorized versions of these models, please see page 9.  
Need High Reliability Screened Versions? See page 22 for details.

# Featured Products: HIGH GAIN

## High Gain Cascadable Amplifiers in TO-8 and TO-12 Packages

Gain  $\geq$  25 dB; **Power Supply  $\pm 5$  Vdc**; Models Listed By Increasing Frequency

Model	Frequency Response (MHz) Minimum	Gain (dB) Minimum	Gain Flatness ( $\pm$ dB) Typical	Noise Figure (dB) Maximum (*Typical)	Power Output at 1dB Gain Comp. (dBm) Minimum	3rd-Order Intercept (IP3) (dBm) Typical	Current (mA) Typical
UTO-103	10-100	25.5	1.0	2.1	+9.5	+22	15
UTO-250	5-200	30.0	1.0	4.0	-3.0	+14	13
GPD-251	5-200	25.0	1.0	4.0*	+1.0	+10	30
UTO-554	5-500	28.0	0.7	3.0	+9.0	+21	40
UTO-558	5-500	28.0	0.7	3.2	+13.5	+23	70

## High Gain Cascadable Amplifiers in TO-8 and TO-12 Packages

Gain  $\geq$  25 dB; **Power Supply +15 Vdc**; Models Listed By Increasing Frequency

Model	Frequency Response (MHz) Minimum	Gain (dB) Minimum	Gain Flatness ( $\pm$ dB) Typical	Noise Figure (dB) Maximum (*Typical)	Power Output at 1dB Gain Comp. (dBm) Minimum	3rd-Order Intercept (IP3) (dBm) Typical	Current (mA) Typical
GPD-201	5-200	30.0	1.0	3.0*	+5.0	+13	30
GPD-202	5-200	25.0	1.0	5.5*	+11.0	+18	60
GPM-552	5-500	33.0	0.2	4.5*	0.0	+14	34
UTO-101	10-100	26.5	1.0	2.2	+14.5	+26	20
UTO-221	10-200	27.0	0.7	2.5	+13.5	+23	29
UTO-222	20-200	28.0	0.7	3.6	+18.0	+28	47
UTO-521	5-500	27.0	1.0	4.0	+6.0	+18	38
UTO-524	5-500	30.0	1.0	4.0	+14.0	+27	70
UTO-526	10-500	26.5	0.7	4.0	+19.0	+28	93
UTM-1053	5-1000	27.0	2.0	9.0	+5.0	+21	90
UTM-1056	10-1000	25.5	2.0	6.5	+12.0	+26	135
UTM-1057	10-1000	26.0	2.0	6.5	+14.0	+29	170

## High Gain Cascadable Amplifiers in Surface Mount Packages

Gain  $\geq$  25 dB; **Power Supply +5 Vdc**; Models Listed By Increasing Frequency

Model	Frequency Response (MHz) Minimum	Gain (dB) Minimum	Gain Flatness ( $\pm$ dB) Typical	Noise Figure (dB) Maximum	Power Output at 1dB Gain Comp. (dBm) Minimum	3rd-Order Intercept (IP3) (dBm) Typical	Current (mA) Typical
PSA-103	10-100	25.5	1.0	2.1	+9.5	+22	15
PSA-250	5-200	30.0	1.0	4.0	-3.0	+14	13
PSA-554	5-500	28.0	0.7	3.0	+9.0	+21	40
PSA-558	5-500	28.0	0.7	3.2	+13.5	+23	70

## High Gain Cascadable Amplifiers in Surface Mount Packages

Gain  $\geq$  25 dB; **Power Supply  $\pm 15$  Vdc**; Models Listed By Increasing Frequency

Model	Frequency Response (MHz) Minimum	Gain (dB) Minimum	Gain Flatness ( $\pm$ dB) Typical	Noise Figure (dB) Maximum	Power Output at 1dB Gain Comp. (dBm) Minimum	3rd-Order Intercept (IP3) (dBm) Typical	Current (mA) Typical
PSA-101	10-100	26.5	1.0	2.2	+14.5	+26	20
PSA-221	10-200	27.0	0.7	2.5	+13.5	+23	29
PSA-222	20-200	28.0	0.7	3.6	+18.0	+28	47
PSA-521	5-500	27.0	1.0	4.0	+6.0	+18	38
PSA-526	10-500	26.5	0.7	4.0	+19.0	+28	93
PSA-1053	5-1000	27.0	2.0	9.0	+5.0	+21	90
PSA-1056	10-1000	25.5	2.0	6.5	+12.0	+26	135
PSA-1057	10-1000	26.0	2.0	6.5	+14.0	+29	170

For UTC Series connectorized versions of these models, please see page 9.

Need High Reliability Screened Versions? See page 22 for details.

# IF/RF THIN-FILM CASCADABLE AMPLIFIERS



## Description

Avnet MTS UTO/PSA/UTC cascable amplifiers are designed for the best possible performance under difficult operating conditions. They offer unconditional stability and guaranteed performance over the specified frequency response range and temperature extremes. Since these units are cascable modules, both the input and output of each device is optimized for the best 50 Ohm impedance match. These amplifiers are ideal for pulse amplification, radar and avionic military systems, and high-speed fiber optic systems.

## IF/RF Amplifiers

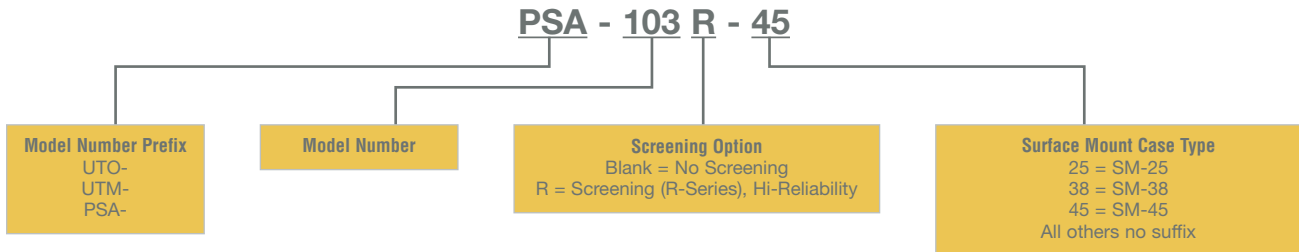
Guaranteed Specifications at 0° to 50°C Case Temperature

Model	Frequency Response (MHz)	Gain (dB)	Noise Figure (dB)	Power Output at 1dB Gain Comp. (dBm)	Gain Flatness (±dB)	3rd-Order Intercept Point (dBm)	Input Power (±1% Reg.) Voltage (VDC)	Current (mA)	Case* Type
	Minimum	Minimum	Maximum	Minimum	Maximum	Typical	Typical		
<b>10 to 150 MHz (Listed in Order of Increasing Noise Figure)</b>									
UTO or PSA-111	10-100	10.5	1.7	+15.5	0.3	+287	+15	14	TO-8T or SM-45
UTO or PSA-103	10-100	25.5	2.1	+9.5	1.0	+22	+5	15	TO-8T or SM-45
UTO or PSA-101	10-100	26.5	2.2	+14.5	1.0	+26	+15	20	TO-8T or SM-45
UTO or PSA-104	10-150	24.0	2.3	+9.0	1.0	+22	+5	20	TO-8T or SM-45
UTO or PSA-102	20-150	23.5	3.2	+18.0	1.0	+32	+15	31	TO-8T or SM-45
<b>5 to 200 MHz (Listed in Order of Increasing Noise Figure)</b>									
UTO or PSA-514	30-200	15.0	2.0	-3.0	0.75	+7	+15	8	TO-8U or SM-45
UTO or PSA-210	10-200	8.0	2.0	+11.0	1.0	+29	+15	15	TO-8T or SM-45
UTO or PSA-221	10-200	27.0	2.5	+13.5	0.7	+23	+15	29	TO-8T or SM-45
UTO or PSA-211	10-200	7.5	2.7	+17.0	1.0	+28	+15	30	TO-8T or SM-45
UTO or PSA-222	20-200	28.0	3.6	+18.0	0.7	+28	+15	47	TO-8T or SM-45
UTO or PSA-250	5-200	30.0	4.0	-3.0	1.0	+14	+5	13	TO-8T or SM-45
<b>10 to 400 MHz (Listed in Order of Increasing Noise Figure)</b>									
UTO or PSA-443 <sup>3</sup>	10-400	12.5	4.5	+4.5	0.7	+19	+5	10	TO-8T or SM-38/SM-45
UTO or PSA-440 <sup>3</sup>	10-400	12.5	4.5	+8.0	0.7	+23	+15	15	TO-8T or SM-38/SM-45
UTO or PSA-441 <sup>3</sup>	20-400	13.5	4.5	+15.0	0.7	+32	+15	32	TO-8T or SM-38/SM-45
UTO or PSA-444 <sup>3</sup>	10-400	12.5	5.0	+8.0	0.7	+22	+5	15	TO-8T or SM-38/SM-45
UTO or PSA-442 <sup>3</sup>	20-400	13.0	5.5	+20.0	0.7	+33	+15	62	TO-8T or SM-38/SM-45

**Notes:**

See notes on page 8.

## Ordering Information



\* For UTC Series connectorized versions of these models, please see page 9.  
Need High Reliability Screened Versions? See page 22 for details.

# IF/RF THIN-FILM CASCADABLE AMPLIFIERS



IF/RF Amplifiers (continued) Guaranteed Specifications at 0° to 50°C Case Temperature

Model	Frequency Response (MHz) Minimum	Gain (dB) Minimum	Noise Figure (dB) Maximum	Power Output at 1dB Gain Comp. (dBm) Minimum	Gain Flatness (±dB) Maximum	3rd-Order Intercept Point (dBm) Typical	Input Power (±1% Reg.) Voltage (VDC)	Current (mA) Typical	Case* Type
<b>2 to 500 MHz (Listed in Order of Increasing Noise Figure)</b>									
UTO or PSA-511	5-500	15.0	2.5	-2.0	1.0	+12	+15	10	TO-8U or SM-45
UTO or PSA-517	5-500	22.0	2.5	+5.0	1.0	+15	+15	22	TO-8U or SM-45
UTO or PSA-543 <sup>1</sup>	10-500	10.0	2.5	+6.0	1.0	+22	+15	25	TO-8T or SM-45
UTO or PSA-512	5-500	20.0	3.0	+7.0	1.0	+20	+15	23	TO-8U or SM-45
UTO or PSA-554	5-500	28.0	3.0	+9.0	0.7	+21	+5	40	TO-8T or SM-45
UTO or PSA-544 <sup>1</sup>	10-500	10.0	3.0	+12.0	1.0	+28	+15	36	TO-8T or SM-45
UTO or PSA-547 <sup>1</sup>	10-500	11.5	3.5	+18.0	0.7	+31	+15	55	TO-8T or SM-45
UTO or PSA-550	30-500	21.0	3.0	+9.0	0.75	+21	+5	16	TO-8T or SM-45
UTO or PSA-558	5-500	28.0	3.2	13.5	0.7	+23	+5	70	TO-8T or SM-45
UTO or PSA-572 <sup>4</sup>	50-500	18.0	3.5	+11.0	0.5	+24	+15	32	TO-8T or SM-45
UTO or PSA-521	5-500	27.0	4.0	+6.0	1.0	+18	+15	38	TO-8U or SM-45
UTO or PSA-526	10-500	26.5	4.0	+19.0	0.7	+28 <sup>7</sup>	+15	93	TO-8T or SM-45
UTO or PSA-552	5-500	13.5	4.0	+6.5	0.7	+21	+5	18	TO-8T or SM-45
UTO or PSA-501	5-500	14.0	4.0	+1.0	1.0	+2	+15	10	TO-8T or SM-45
UTO or PSA-502	5-500	14.0	4.0	+7.0	1.0	+21	+15	23	TO-8U or SM-45
UTO or PSA-571 <sup>4</sup>	50-500	14.5	4.0	+10.0	0.5	+24	+15	32	TO-8T or SM-45
UTO or PSA-524	5-500	30.0	4.0	+14.0	1.0	+27	+15	70	TO-8T or SM-45
UTO or PSA-573 <sup>4</sup>	10-500	13.0	4.3	+11.0	0.5	+23	+15	33	TO-8U or SM-45
UTO or PSA-516	5-500	14.0	4.5	+10.0	1.0	+23	+15	35	TO-8U or SM-45
UTO or PSA-520	5-500	14.0	4.5	+11.0	0.7	+22	+5	33	TO-8T or SM-45
UTO or PSA-533	5-500	16.0	5.0	+14.0	0.7	+30	+15	53	TO-8T or SM-45
UTO or PSA-545 <sup>1</sup>	10-500	10.0	5.0	+17.0	0.5	+32	+15	60	TO-8T or SM-45
UTO or PSA-519	5-500	13.0	5.5	+18.0	0.7	+29	+15	70	TO-8T or SM-45
UTO or PSA-509	5-500	13.0	5.5	+20.0	0.7	+30 <sup>7</sup>	+15	90	TO-8T or SM-45
UTO or PSA-513	5-500	16.0	6.0	+14.0	1.0	+29	+24	50	TO-8U or SM-45
UTO or PSA-518	5-500	13.0	6.0	+22.5	0.7	+35	+15	130	TO-8T or SM-45
UTO or PSA-523	5-500	23.0	7.0	+12.0	1.0	+25	+15	80	TO-8U or SM-45
UTO or PSA-503	5-500	9.0	7.0	+13.0	1.0	+29	+24	50	TO-8U or SM-45
UTO or PSA-515	2-500	12.0	7.0	+14.0	0.5	+24	+15	65	TO-8U or SM-45
UTO or PSA-505	10-500	9.0	7.0	+18.0	1.0	+29	+15	100	TO-8T or SM-45
UTO or PSA-546 <sup>3</sup>	20-500	10.0	8.0	+23.0	0.5	+38	+15	110	TO-8T or SM-45
UTO or PSA-561 <sup>2</sup>	10-500	11.0	9.0	+26.0	0.7	+39	+15	190	TO-8T or SM-45
CTO-565 <sup>8,9</sup>	10-500	17.0	12.0	+28.0	0.7	+41	+18	450	TO-3
UTO-565 <sup>9</sup>	10-500	17.5	11.5	+28.0	0.7	+41	+18	450	TO-3
UTO or PSA-504	5-500	6.0	11.0	+17.0	1.0	+34	+24	100	TO-8U or SM-45
<b>2 to 1000 MHz (Listed in Order of Increasing Noise Figure)</b>									
UTO or PSA-1011	2-1000	14.0	3.5	-5.0	0.7	+10	+15	8	TO-8U or SM-45
UTO or PSA-1012	5-1000	15.0	4.0	+4.0	1.0	+17	+15	18	TO-8U or SM-45
UTO or PSA-1043 <sup>1</sup>	10-1000	10.0	4.0	+6.0	1.0	+19	+15	25	TO-8T or SM-45
UTO or PSA-1002	5-1000	14.0	4.0	+7.0	1.0	+21	+15	23	TO-8U or SM-45
UTO or PSA-1054	5-1000	23.5	4.0	+9.5	0.7	+21	+5	40	TO-8T or SM-45
UTO or PSA-1058	5-1000	23.5	4.2	+13.0	0.7	+22	+5	70	TO-8T or SM-45
UTO or PSA-1013	5-1000	15.0	4.5	+9.0	1.0	+20	+15	29	TO-8U or SM-45
UTO or PSA-1044 <sup>1</sup>	20-1000	10.0	4.5	+12.0	1.0	+22 <sup>7</sup>	+15	35	TO-8T or SM-45
UTO or PSA-1021	5-1000	22.0	4.5	+12.0	1.0	+25	+15	85	TO-8U or SM-45
UTO or PSA-1001	5-1000	14.0	5.0	-2.0	1.0	+12	+15	10	TO-8U or SM-45
UTO or PSA-1052	5-1000	13.0	5.0	+6.0	0.7	+18	+5	18	TO-8T or SM-45
UTO or PSA-1007	5-1000	12.5	5.0	+11.0	0.7	+21	+5	33	TO-8T or SM-45
UTO or PSA-1076 <sup>4</sup>	10-1000	11.5	5.5	+10.0	0.5	+22	+15	34	TO-8U or SM-45
UTO or PSA-1006	5-1000	11.0	6.0	+17.0	1.0	+27	+15	70	TO-8T or SM-45
UTO or PSA-1005	5-1000	11.0	6.0	+20.0	1.0	+30	+15	90	TO-8T or SM-45

Notes: See notes on following page.

# IF/RF THIN-FILM CASCADABLE AMPLIFIERS



## IF/RF Amplifiers (continued) Guaranteed Specifications at 0° to 50°C Case Temperature

Model	Frequency Response (MHz) Minimum	Gain (dB) Minimum	Noise Figure (dB) Maximum	Power Output at 1dB Gain Comp. (dBm) Minimum	Gain Flatness (±dB) Maximum	3rd-Order Intercept Point (dBm) Typical	Input Power (±1% Reg.) Voltage (VDC)	Current (mA) Typical	Case* Type
<b>2 to 1000 MHz, continued (Listed in Order of Increasing Noise Figure)</b>									
UTM or PSA-1056 <sup>9</sup>	10-1000	25.5	6.5	+12.0	2.0	+26	+15	135	TO-8T or SM-45
UTM or PSA-1057 <sup>9</sup>	10-1000	26.0	6.5	+14.0	2.0	+29	+15	170	TO-8T or SM-45
UTO or PSA-1033	5-1000	10.0	6.5	+14.0	1.0	+28	+15	48	TO-8T or SM-45
UTO or PSA-1024	10-1000	12.0	6.5	+22.5 <sup>5</sup>	1.0	+32	+15	155	TO-8T or SM-45
UTO or PSA-1023	10-1000	12.0	8.5	+24.5 <sup>6</sup>	1.0	+32 <sup>7</sup>	+15	205	TO-8T or SM-45
UTM or PSA-1053	5-1000	27.0	9.0	+5.0	2.0	+21	+15	90	TO-8T or SM-45
CTO-1065 <sup>8,9</sup>	10-1000	12.5	11.0	+28.5	1.0	+40	+18	470	TO-3
UTO-1065 <sup>9</sup>	10-1000	12.5	11.0	+28.0	1.0	+40	+18	470	TO-3
<b>5 to 1500 MHz (Listed in Order of Increasing Noise Figure)</b>									
UTO or PSA-1509	10-1500	11.5	3.0 <sup>11</sup>	+22.0	1.0	+35	+15	100	TO-8U or SM-45
UTO or PSA-1524	10-1500	21.0	4.5	+7.0	1.5	+19	+15	60	TO-8U or SM-45
UTO or PSA-1511	5-1500	10.0	4.5	-9.0	0.5	+1	+15	7	TO-8U or SM-45
UTO or PSA-1576 <sup>4</sup>	10-1500	10.5	5.0	+9.0	0.5	+20	+15	30	TO-8U or SM-45
UTO or PSA-1522	5-1500	18.0	5.5	+11.0	1.5	+23	+15	85	TO-8U or SM-45
UTO or PSA-1501	5-1500	9.0	5.5	-3.0	0.5	+10	+15	10	TO-8U or SM-45
UTO or PSA-1502	5-1500	9.0	7.5	+6.0	0.5	+19	+15	23	TO-8U or SM-45
<b>1 to 2000 MHz (Listed in Order of Increasing Noise Figure)</b>									
UTO or PSA-2031	1-2000	9.0	5.5	+2.0	1.0	+14	+15	16	TO-8U or SM-45
UTO or PSA-2032	1-2000	9.0	6.0	+7.0	1.0	+17	+15	25	TO-8U or SM-45
UTO or PSA-2033	1-2000	8.0	8.5	+14.0	1.0	+30	+15	50	TO-8T or SM-45
<b>5 to 6000 MHz (Listed in Order of Increasing Noise Figure)</b>									
UTO or PSA-2009	10-2000	10.5	4.0 <sup>10</sup>	+26.5	1.0	+40	+15	190	TO-8T or SM-45
UTO or PSA-2012 <sup>2</sup>	500-2000	9.0	4.0	+12.0	1.0	+23	+15	50	TO-8U or SM-45
UTO or PSA-2021	10-2000	9.0	4.5	+2.0	1.0	+14	+15	16	TO-8U or SM-45
UTO or PSA-2025	100-2000	9.5	4.5	+25.0	1.0	+33 <sup>7</sup>	+15	175	TO-8T or SM-45
UTO or PSA-2509	10-2500	9.0	4.0 <sup>10</sup>	+27.0	0.5	+40	+15	190	TO-8T or SM-45
UTO or PSA-2510	10-2500	9.0	4.5 <sup>10</sup>	+27.0	1.0	+40	+12	190	TO-8T or SM-45
UTO or PSA-2052	5-2000	9.0	5.0	+5.5	0.7	+16	+5	18	TO-8T or SM-45
UTO or PSA-2024	5-2000	15.0	5.5	+5.0	1.0	+18	+15	38	TO-8U or SM-45
UTO or PSA-2013 <sup>2</sup>	500-2000	9.0	5.5	+19.0	1.0	+33	+15	100	TO-8U or SM-45
UTO or PSA-2022	5-2000	9.0	6.0	+7.0	1.0	+17	+15	25	TO-8U or SM-45
UTO or PSA-2055	10-2000	8.5	6.0	+10.0	0.7	+22	+5	32	TO-8T or SM-45
UTO or PSA-2020	10-2000	17.0	6.0	+14.5	1.0	+20 <sup>7</sup>	+15	52	TO-8T or SM-45
UTO or PSA-2026	10-2000	13.5	7.0	+19.0	1.0	+31	+15	155	TO-8T or SM-45
UTO or PSA-2027	10-2000	13.5	7.0	+16.0	1.0	+30	+15	108	TO-8T or SM-45
UTO or PSA-2023	10-2000	8.0	8.5	+14.0	1.0	+25	+15	50	TO-8T or SM-45
PSA-4132	1000-4000	20.0	5.5	+17.0	1.0	+29	+8	150	SM-38
PSA-6232	2000-6000	18.0	5.0	+17.0	1.0	+27	+8	150	SM-38
UTO or PSA-2311	1700-2300	8.0	5.0	-3.0	0.5	+10	+15	15	TO-8U or SM-45
UTO or PSA-2302	1700-2300	8.0	6.5	+3.0	0.5	+13	+15	18	TO-8U or SM-45
UTO or PSA-2303	1700-2300	8.0	8.0	+10.0	0.5	+20	+15	30	TO-8U or SM-45
UTO or PSA-2321	1700-2300	14.0	8.0	+10.0	1.0	+20	+15	70	TO-8U or SM-45

### Notes:

- Both RF input and RF output pins are at DC ground — no blocking capacitor.
- RF input pin is at DC ground — no input blocking capacitor.
- A portion of any DC voltage applied to the RF input pin will appear at the RF output pin (i.e., a resistive DC path exists between pins). There is no input or output blocking capacitor.
- High reverse isolation, Min.  $S_{12} = -40\text{dB}$ .
- From 10-500 MHz, Power Output for 1 dB Comp = +24.5 dBm.
- From 10-500 MHz, Power Output for 1 dB Comp = +26 dBm.
- Guaranteed at 0° to 50° C min.
- Minimum and maximum performance specifications guaranteed at 25° C only.
- Model numbers are not temperature compensated.
- Specification applies at F greater than 100 MHz; Noise Figure at 10 MHz = 8.0 dB typical.



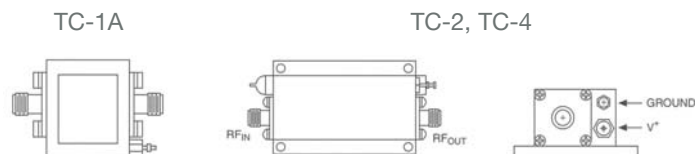
# UTC SERIES THIN-FILM AMPLIFIERS

Guaranteed Specifications at 0° to 50°C Case Temperature, V = +15 VDC

Model	Frequency Range (MHz)	Gain (dB) Minimum	Noise Figure (dB) Maximum	Power Output at 1dB Gain Comp. (dBm) Minimum	Gain Flatness (±dB) Maximum	3rd-Order Intercept Point (dBm) Typical	VSWR 50 Ohms In/Out :1 Maximum	Input Bias Current (mA) Typical	Case* Type
<b>10 to 500 MHz</b>									
UTC5-200-X	10-500	25	2.7	+6.0	1.5	+22	2.0	35	TC-2
UTC5-201-X	10-500	35	2.7	+7.0	1.5	+20	2.0	33	TC-2
UTC5-202-X	10-500	48	2.7	+6.0	1.5	+18	2.0	60	TC-2
UTC5-203-X	10-500	62	2.7	+6.0	2.0	+18	2.0	70	TC-4
UTC5-210-X	10-500	26	3.0	+14.0	1.5	+30	2.0	78	TC-2
UTC5-211-X	10-500	36	3.5	+14.0	1.5	+30	2.0	76	TC-2
UTC5-212-X	10-500	45	2.7	+14.0	1.5	+27	2.0	80	TC-2
UTC5-213-X	10-500	52	2.7	+14.0	2.0	+27	2.0	92	TC-2
UTC5-214-X	10-500	65	2.7	+14.0	2.0	+27	2.0	103	TC-4
UTC5-220-X	10-500	23	3.5	+22.5	1.5	+30	2.0	165	TC-2
UTC5-221-X	10-500	33	3.0	+22.5	2.0	+30	2.0	190	TC-4
UTC5-222-X	10-500	44	3.0	+22.5	2.0	+30	2.0	193	TC-4
UTC5-223-X	10-500	58	3.0	+22.5	2.0	+30	2.0	210	TC-4
<b>10 to 1000 MHz</b>									
UTC10-210-X	10-1000	20	4.5	+11.0	2.0	+28	2.0	60	TC-2
UTC10-211-X	10-1000	29	3.7	+9.0	1.5	+20	2.0	37	TC-2
UTC10-212-X	10-1000	39	3.7	+9.0	2.0	+20	2.0	62	TC-4
UTC10-213-X	10-1000	50	3.7	+12.0	2.0	+27	2.0	101	TC-4
UTC10-220-X	20-1000	21	5.0	+20.0	1.5	+30	2.0	125	TC-2
UTC10-221-X	10-1000	31	4.5	+20.0	2.0	+30	2.0	150	TC-4
UTC10-222-X	10-1000	40	3.7	+20.0	2.0	+30	2.0	155	TC-4
UTC10-223-X	10-1000	47	3.7	+20.0	2.0	+30	2.0	163	TC-4
<b>10 to 2000 MHz</b>									
UTC20-210-X	10-2000	18	5.0	+7.0	1.5	+17	2.2	41	TC-2
UTC20-211-X	10-2000	26	5.0	+14.0	2.0	+29	2.2	91	TC-4
UTC20-212-X	10-2000	32	6.0	+14.0	2.0	+29	2.2	104	TC-4
UTC20-213-X	10-2000	38	6.0	+12.0	2.0	+29	2.2	126	TC-4

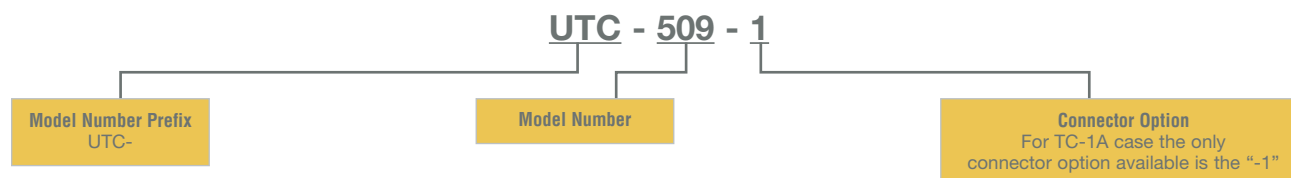
Connector Option Table For TC-2, TC-4

Dash No.	Type	RF In	RF Out
-1	SMA	FEMALE	FEMALE
-2	N	FEMALE	FEMALE
-3	BNC	FEMALE	FEMALE
-4	TNC	FEMALE	FEMALE
-5	SMA	MALE	MALE
-6	SMA	MALE	FEMALE
-7	SMA	FEMALE	MALE
-8	SMA/N	FEMALE	FEMALE



## Ordering Information

Individual models (ie. UTOs, UTFs) can be placed in TC series cases.



**Notes:**

The TC series cases are non-hermetic.

## GPD/GPM Series Features

- 0.1 to 1500 MHz Frequency Coverage
- High Performance-to-Cost Ratio
- Ideal for Mixer Post Amplification

## Description

Avnet MTS GPD and GPM amplifiers, available in TO-12 (4-pin) and TO-39 (3-pin) packages, are designed for applications which require the highest performance-to-cost ratio or where size is an important factor. Some versions are equipped with internal coupling and bypass capacitors. The GPM modules contain Silicon MMICs, while the GPD modules are discrete hybrid devices.

## GPD Series Amplifiers, TO-39 Package<sup>1</sup>

Typical Specifications at 25°C

Model	Frequency Response (MHz) Minimum	Gain Over 0° to 50°C (dB) Minimum	Gain <sup>2</sup> Over -55° to +85°C (dB) Minimum	Noise Figure (dB) Typical	Power Output at 1dB Gain Comp. (dBm) Typical	Gain Flatness (±dB) Typical	3rd-Order Intercept Point (dBm) Typical	Input Power (±1% Reg.) Voltage (VDC) Typical	Current (mA) Typical
GPD-110	0.1-400	--	12	4.0	-2.0	1.0	+12	2.5	10
GPD-120	0.1-400	--	13	5.5	+8.0	1.0	+24	5.5	25
GPD-130	0.1-400	--	12	7.0	+17.0	1.0	+27	6.0	60
GPD-310	0.1-1000	8	7	5.0	-1.0	1.0	+11	2.3	10
GPD-311	0.1-1000	12	11	4.5	+3.0	1.0	+15	2.7	15
GPD-321	0.1-1000	12	11	4.7	+8.0	1.0	+20	3.5	25
GPD-320	0.1-1000	8	7	5.0	+8.0	1.0	+18	3.0	25
GPD-331	0.1-1000	10	9	6.0	+16.0	1.0	+28	5.5	60
GPD-330	0.1-1000	7	6	6.5	+16.0	1.0	+26	4.5	60
GPD-410	0.1-1500	12	11	4.2	+2.5	1.0	+15	2.5	15
GPD-420	0.1-1500	11	10	4.7	+8.0	1.0	+20	2.8	25
GPD-430	0.1-1500	10	9	6.3	+16.0	1.0	+28	5.0	60

### Notes:

1. Three external capacitors (input, output coupling and RF bypass) are required to establish low frequency roll-off. An external bias resistor, with a value determined by the available bias voltage ( $R_D = [V_{CC} - V_D] / I_D$ ), where  $R_D$  is the value of the bias resistor (Ohms),  $V_{CC}$  is the available source voltage.  $V_D$  is the required device bias voltage (per specification) and  $I_D$  is the device current (per specification).
2. Military temperature conditions: -55° to +85°C.

## GPD/GPM Series Amplifiers, TO-12 Package

Guaranteed Specifications at 0° to 50°C Case Temperature, Typical Values at 25°C

Model	Frequency Response (MHz) Minimum	Gain (dB) Minimum	Gain <sup>2</sup> (dB) Minimum	Noise Figure (dB) Typical	Power Output at 1dB Gain Comp. (dBm) Typical	Gain Flatness (±dB) Typical	3rd-Order Intercept Point (dBm) Typical	Input Power (±1% Reg.) Voltage (VDC) Typical	Current (mA) Typical
GPD-201	5-200	30	26	3.0	+5.0	1.0	+13	+15.0	30
GPD-202	5-200	25	23	5.5	+11.0	1.0	+18	+15.0	60
GPD-251	5-200	25	23	4.0	+1.0	1.0	+10	+5.0	30
GPD-252	5-200	15	14	4.0	0.0	1.0	+12	+5.0	11
GPD-401/-461 <sup>1</sup>	5-400	13	12	4.0	-2.0	1.0	+9	+15.0	10
GPD-411	5-400	12	11	3.2	-6.0	1.0	+4	+15.0	7
GPD-402/-462 <sup>1</sup>	5-400	13	12	8.0	+8.0	1.0	+18	+15.0	24
GPD-403/-463 <sup>1</sup>	5-400	9	8	7.5	+16.0	1.0	+25	+24.0	65
GPD-404/-464 <sup>1</sup>	5-400	9	8	7.5	+17.0	1.0	+26	+15.0	70
GPD-405	10-400	13	12	6.5	+23.0	1.0	+36	+15.0	90
GPM-552	5-500	33	32	4.5	0.0	0.2	+14	+15.0	34
GPD-1001/-1061 <sup>1</sup>	5-1000	12	11	6.0	0.0	1.0	+12	+15.0	15
GPD-1002/-1062 <sup>1</sup>	5-1000	12	11	7.0	+6.0	1.0	+16	+15.0	27
GPM-1052	5-1000	20	20	7.0	+8.0	0.3	+20	+15.0	60
GPD-1003/-1063 <sup>1</sup>	5-1000	10	9	7.0	+14.0	1.0	+25	+15.0	55

### Notes:

1. The 60 Series is the same as the standard series except that three external capacitors are required to establish low frequency roll-off.
2. Military temperature conditions: -55° to +85° C.

## UTD/PSD Series Features and Description

Avnet MTS offers two major categories of detectors: analog level detectors and adjustable threshold detectors. Analog level detectors provide a video output proportional to the input power. Adjustable threshold detectors provide a TTL output that is high or low depending on the RF input power and its relationship to the preset threshold level. Threshold level can be set with a single external resistor or, in some cases, an external voltage. Temperature compensation, impedance matching, internal amplifier circuitry and guaranteed specifications provide easy-to-use, drop-in solutions for the systems designer.

## Analog Level Detectors

Guaranteed Specifications at 0 to 50°C Case Temperature

Model	Frequency Range (MHz)	Detected Voltage (mV) Minimum	Input Flatness (dB) Maximum	Input Impedance (Ohms)	Input VSWR Maximum	Output Offset Voltage (mV) Maximum	Differential Voltage Tracking (mV) Typical	Case Type
UTD or PSD-1000	10-1000	-90 <sup>1</sup>	±1.0	50	1.7	±15	±5	TO-8F or SM-45DA
UTD or PSD-1001	10-1000	-90 <sup>1</sup>	±1.0	300	--	±15	±5	TO-8F or SM-45DA
PSD-2001	20-2000	+900 <sup>2</sup>	±0.3	50	1.8	±15	±10	SM-25DA
PSD-4001	10-4000	90 <sup>3</sup>	±0.6	50	2.0	±1	--	SM-25DA
PSD-6001	1500-6000	90 <sup>3</sup>	±0.6	50	2.0	±1	--	SM-25DA

**Notes:**

1. @ P<sub>IN</sub> = -10 dBm
2. @ P<sub>IN</sub> = 0 dBm
3. @ P<sub>IN</sub> = -15 dBm

## TTL Output Threshold Detectors

Guaranteed Specifications at 0 to 50°C Case Temperature

Model	Frequency Range (MHz)	Input Flatness (dB) Maximum	Operating Range (dBm) Typical	Input VSWR Maximum (:1)	Control Level Typical	Voltage Range Min/Max	Current at 15 VDC (mA) Typical	Case Type
UTD or PSD-2002	10-2000	±0.7	-10 to +10	1.7	0-1 Volts 300-3000 Ohms	+11 to +16	12	TO-8F or SM-45DD
UTD or PSD-2004	10-2000	±1.0	-25 to -10	2.0 <sup>1</sup>	50-2000 Ohms	+5 to +20	5	TO-8F or SM-45DD
PSD-6002	100-6000	±1.0	-10 to +10	2.0	220-3100 Ohms	+15	12	SM-25DD
PSDC-18021-1	100-18000	±1.5	-25 to -10	3.0	400-12000 Ohms	+5	5 <sup>3</sup>	CA-1 <sup>2</sup>

**Notes:**

1. P<sub>IN</sub> = <-20 dBm
2. Available in SMA connectorized package only; contact local Avnet sales office for details.
3. Current @ +5 Vdc (mA), typical.

Complete data sheets for products in this catalog can be found on our Web site at: [www.em.avnet.com/mts](http://www.em.avnet.com/mts)

## UTF/PSF Series Features

- 5 to 4000 MHz Frequency Coverage
- Provides Flexible Gain Control
- Repeatable VSWR Performance
- Provides Long-term Attenuation Stability
- Ideal for IF Gain Control and Signal Source Leveling
- Surface Mount

## Description

The Avnet MTS UTF/PSF Series of thin-film precision, broadband voltage-controlled attenuators are specifically designed to provide flexible gain control in a cascade of modular amplifiers, such as the UTO Series. Consistent input and output impedance allows several UTF/PSF modules to be cascaded for an even wider attenuation range. The designer can elect to install one near the input (for widest control range) or near the output (for best noise figure). Long-term stability of the thin-film attenuator means that a UTF/PSF attenuator can be used as a “trimmer” to precisely match the performance of two or more amplifier cascades. With a well-regulated control and voltage source, UTF/PSF Series attenuators will maintain their gain match without constant adjustment. The UTF-035 contains an internal linearizer to provide linear control over the complete range of attenuation.

## UTF/PSF Series Signal Attenuators

Guaranteed Specifications at 0° to 50°C Case Temperature

Model	Frequency Range (MHz)	Insertion Loss Maximum (dB)	Attenuation Minimum (dB)	Typical Switching Speed 10 to 90%	VSWR Maximum	Control Bias Typical	Input Bias Typical	Case Type
UTF or PSF-015 UTFC-015	5-1000	2.0 (5-500 MHz) 2.5 (500-1000 MHz)	15	0.5 msec	2.0	0 to -10 VDC, 0 to 7 mA	+15 VDC, 7 mA	TO-8F or SM-45F TC-1
UTF or PSF-025 UTFC-025	5-500 500-1000 1000-2000	2.5 2.5 3.3	30 25 20	75.0 µsec 75.0 µsec 75.0 µsec	2.0 2.0 2.5	0 to +15 VDC, 0 to 7 mA	+15 VDC, 15 mA	TO-8F or SM-45F TC-1
UTF-030 PSF-030-45 UTFC-030	100-500 500-1000 1000-2000	2.5 3.0 3.5	40 35 25	0.5 µsec 0.5 µsec 0.5 µsec	2.0 2.0 2.0	0 to +15 VDC, 0 to 10 mA	+15 VDC, 8 mA	TO-8F SM-45F TC-1
PSF-030-25	100-1000 1000-2000 2000-4000	3.0 3.0 3.0	40 35 25	0.5 µsec 0.5 µsec 0.5 µsec	2.0 2.0 2.0	0 to +15 VDC, 0 to 10 mA	+15 VDC, 8 mA	SM-25F
UTF or PSF-035 UTFC-035	50-2000	2.5 (50-1000 MHz) 3.0 (1000-2000 MHz)	23.5	5.0 µsec	2.0	-2 to -10 VDC, 10 to 35 mA	+15 VDC, 45 mA	TO-8F or SM-45F TC-1
UTF or PSF-040 UTFC-040	10-1000	2.2 (10-500 MHz) 2.5 (500-1000 MHz)	40 (30-250 MHz) 35 (10-500 MHz) 30 (10-1000 MHz)	0.4 msec	2.0, 10-500 MHz 2.5, 10-1000 MHz	0 to -12 VDC, 0 to 75 mA	+15 VDC	TO-8F or SM-45F TC-1

For UTC Series connector options, see page 9.

Need High Reliability Screened Versions? See page 22 for details.

# VOLTAGE CONTROLLED LIMITERS

## UTL/PSL Series Features

- Voltage Programmable Output Levels
- Low Insertion Loss
- Low Input/Output VSWR
- Recovery Time <50 nS
- Surface Mount

## Description

Avnet MTS thin-film limiters feature voltage programmable output levels for input levels as high as +26 dBm. They have VSWR of less than 2:1, low insertion loss, excellent second and third harmonic suppression, and very low AM-to-PM conversion. Recovery from fully saturated input levels is less than 50 nanoseconds.

## UTL/PSL Series, Voltage Controlled Signal Limiters

Guaranteed Specifications at 25°C Case Temperature

Model	Frequency Range (MHz)	Input Power Limited Range (dBm) Minimum	Saturated Output Power (dBm) Maximum	Insertion Loss (dBm) Maximum	Operating Bias (VDC) Nominal	Case Type
UTL or PSL-1001	50-1000	0 to +20	-5 to +2 <sup>1</sup>	3.7 <sup>1</sup>	+5 to +20	TO-8U or SM-45
UTL or PSL-1002	5-1000	0 to +20	-5 to +2 <sup>1</sup>	3.7 <sup>1</sup>	+5 to +20	TO-8U or SM-45

### Notes:

1. Determined by bias voltage.

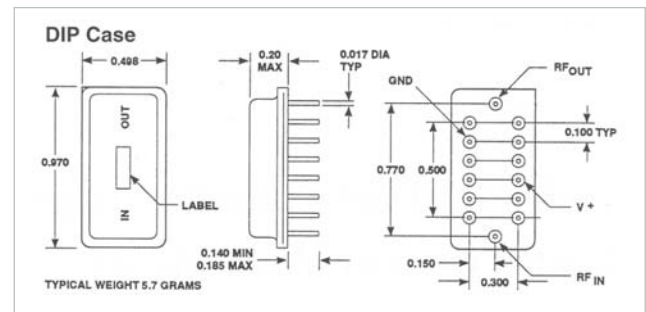
# IF/RF LIMITING AMPLIFIERS

## UDL/UTL/PSL Series Features

- 5 to 500 MHz Frequency Coverage
- Low Phase Shift Variation
- High Even-Harmonic Suppression
- Surface Mount

## Description

Complex systems require some method of either removing amplitude modulation from an FM signal or preventing the overdrive of a detection circuit. Limiting amplifiers are ideal for these types of applications, especially when wide input range and fast limiting recovery is required.



## UDL/UTL/PSL Series, Voltage Controlled Signal Limiters

Guaranteed Specifications at 0° to 50°C Case Temperature

Model	Frequency Range (MHz)	Input Power Limited Range (dBm) Minimum	Saturated Output Power (dBm) Minimum	Output Power Flatness (dBm) Maximum	Noise Figure (dBm) Maximum	Operating Bias (VDC)	Case Type
UTL or PSL-502	5-500	-3 to +7	-4.0	±0.5	11.0	+15, -15	TO-8F or SM-45
UTL or PSL-503	5-500	-5 to +7	-4.0	±1.0	10.0	+15	TO-8U or SM-45
UDL-503	5-500	-30 to +10	-2.0	±1.0	10.0	+15	DIP

# IF/RF GAIN CONTROL AMPLIFIER MODULES

## AGC Series Features

- Temperature Compensated
- Internal Power Supply Filtering
- Combines Amplification and Voltage-Controlled Attenuation
- Ideal for IF Gain Control and Signal Source Leveling

## Description

The AGC Series combines amplification and voltage-controlled attenuation functions in one package, providing an easy-to-use complete AGC function. Typical applications are IF gain control, signal source leveling or, with use of a D/A circuit, digital controlled gain switching. The products are designed with temperature compensation and have internal power supply filtering circuitry.

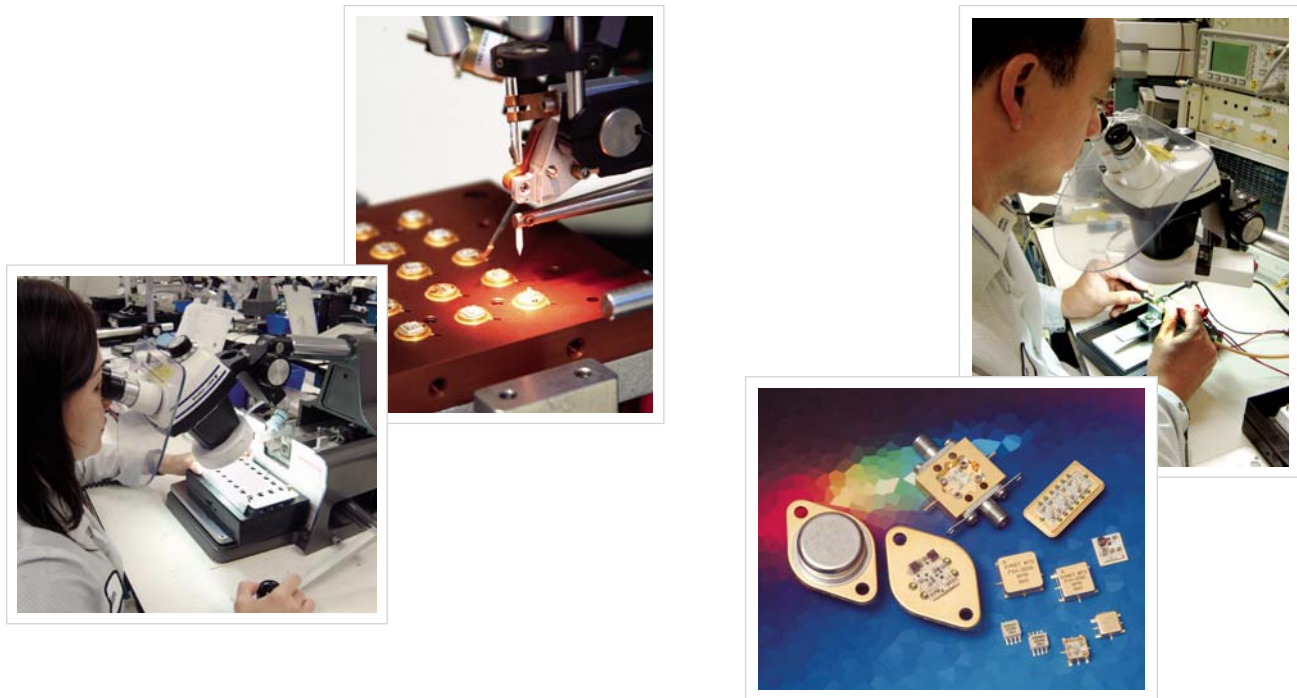
## AGC Series

Guaranteed Specifications at 25°C Case Temperature

Model	Frequency Range (MHz)	Gain (dB) Typ/Min	AGC Range (dB) Typical	AGC Voltage Range (Volts)	AGC Current Range (mA)	Maximum <sup>1</sup> Noise Figure (dB) Typ/Max	Power Output at 1 dB Gain Comp. (dBm) Minimum	Typical Response Time (µsec)	Bias Voltage (VDC)	Bias Current (mA)	Typical VSWR	Case Type
AGC-330	5-300	22/20	36	0 to 5	0 to 60	4.0/5.0	0	1.5	+15	25	<2.0	TO-3
AGC-553	10-500	44/40	45	0 to 5	0 to 12	6.0/8.0	-4	25.0	+15	50	<2.0	TO-8F
AGC-1053	10-1000	22/18	35	0 to 5	0 to 12	11.0/12.0	+5	25.0	+15	90	<2.0	TO-8F

### Notes:

1. At 0 Volts AGC.



Complete data sheets for products in this catalog can be found on our Web site at: [www.em.avnet.com/mts](http://www.em.avnet.com/mts)

For UTC Series connector options, see page 9.  
Need High Reliability Screened Versions? See page 22 for details.

# MOUNTING HARDWARE

To aid the user in achieving optimum performance and to provide flexibility in the use of hybrid components, we offer hardware accessories. This page provides dimensional and ordering information for the hardware and accessories available. Note: All of the hardware described below is available only as indicated; the individual kit components, such as screws, washers, or mounting rings will not be available separately. All of the following hardware is available off-the-shelf.

## TO-39 and TO-12 Accessory Pak Mounting Hardware

- Order Kit No. 330006756001  
 Consisting of:  
 2 ea 0-80 x 1/4 Pan Head Slotted  
 2 ea #0 Washer, Flat Reduced OD  
 2 ea #0 Washer, Split Lock  
 2 ea #0 Nut, S.P.  
 1 ea GPD Mounting Ring

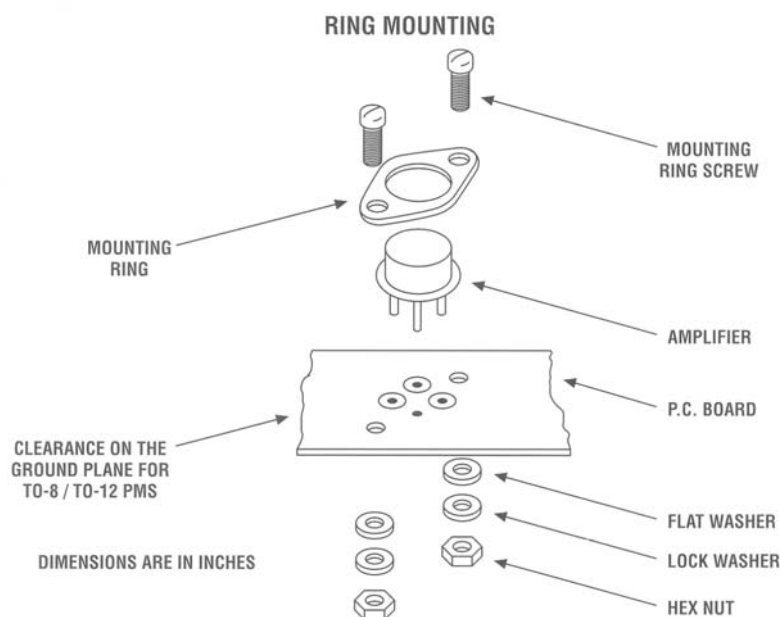
## TO-8 Accessory Pak Mounting Hardware

- Order Kit No. 330001951001  
 Consisting of:  
 2 ea 0-80 x 1/4 Pan Head Slotted  
 2 ea #0 Washer, Flat Reduced OD  
 2 ea #0 Washer, Split Lock  
 2 ea #0 Nut, S.P.  
 1 ea UTO Mounting Ring

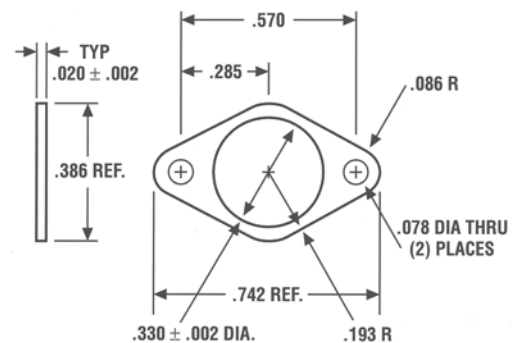
## Products for Which Mounting Hardware is Available

Listed in alphabetical order

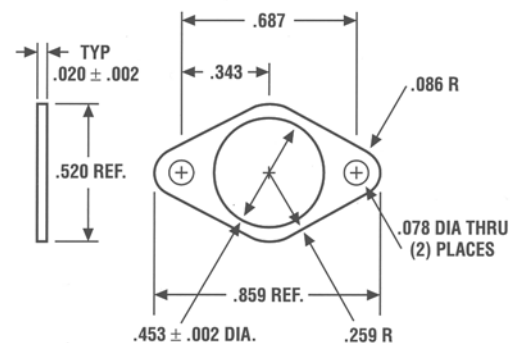
Prefix	Product Type	Case Style
AGC	Amplifier	TO-8
GPD	Amplifier	TO-39
GPD	Amplifier	TO-12
GPM	Amplifier	TO-12
UTD	Detector	TO-8
UTF	Attenuators	TO-8
UTL	Limiting Amplifier/Limiter	TO-8
UTM	MOD Amplifier	TO-8
UTO	Amplifier	TO-8



### TO-12/TO-39 MOUNTING RING

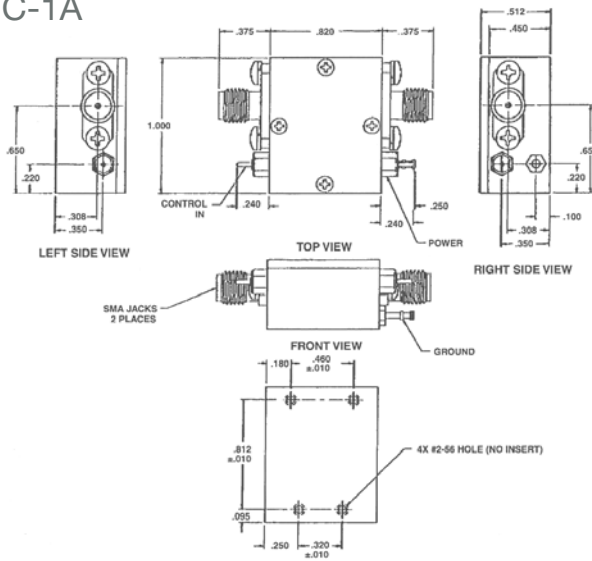


### TO-8 MOUNTING RING

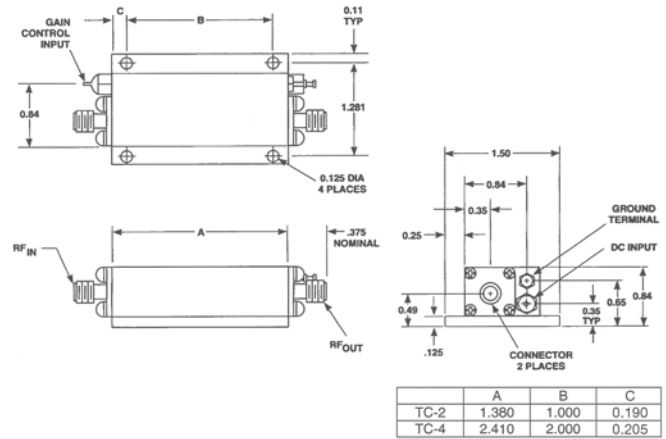




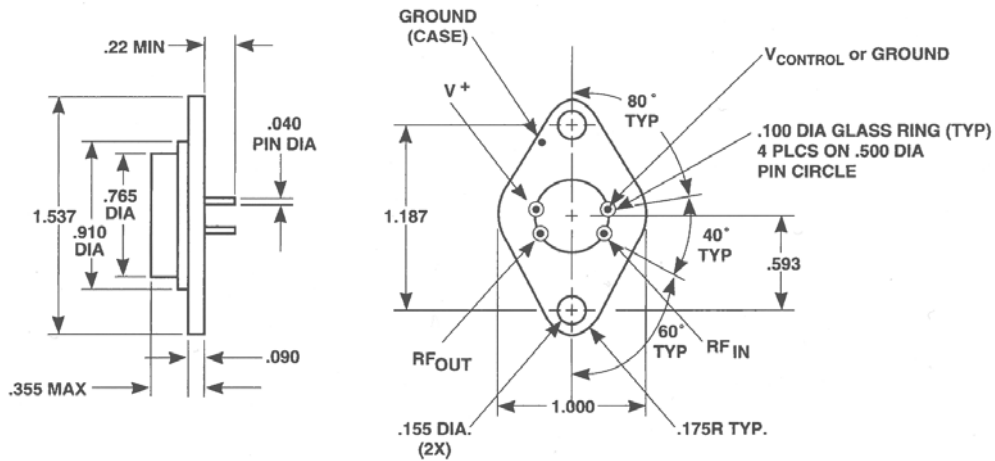
## TC-1A



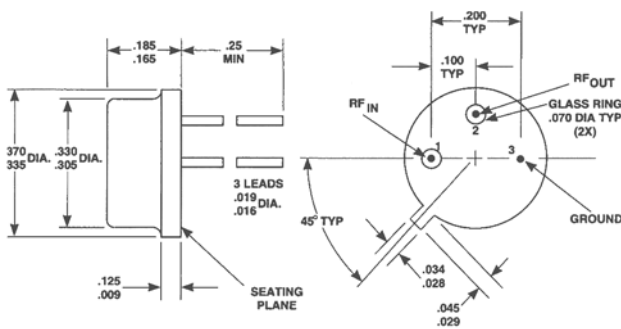
## TC-2, TC-4



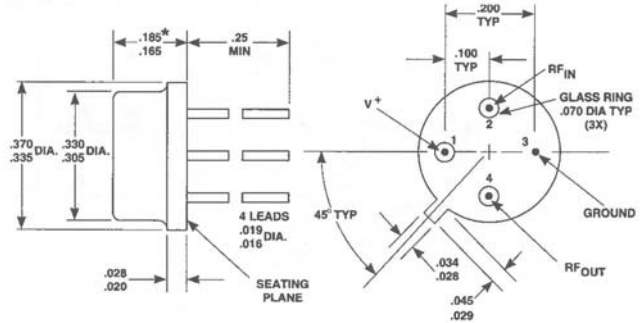
## TO-3



## TO-39



## TO-12

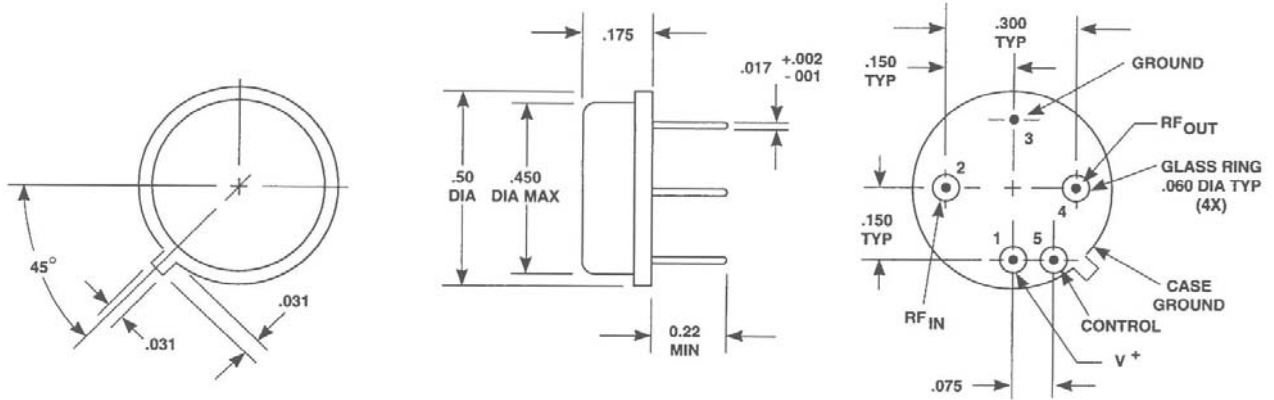


### Notes (unless otherwise specified):

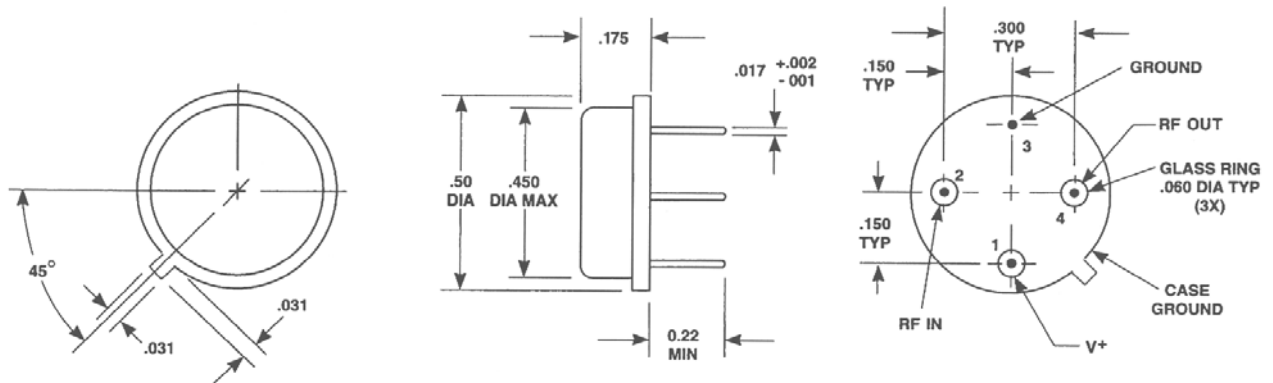
1. Dimensions are specified in inches.
2. Tolerances: xx±0.02, xxx±0.010



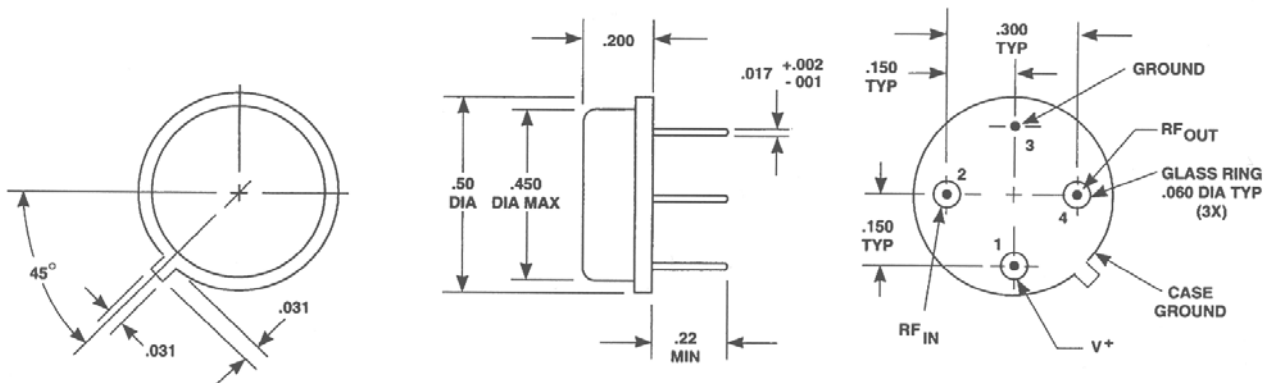
## TO-8F



## TO-8U



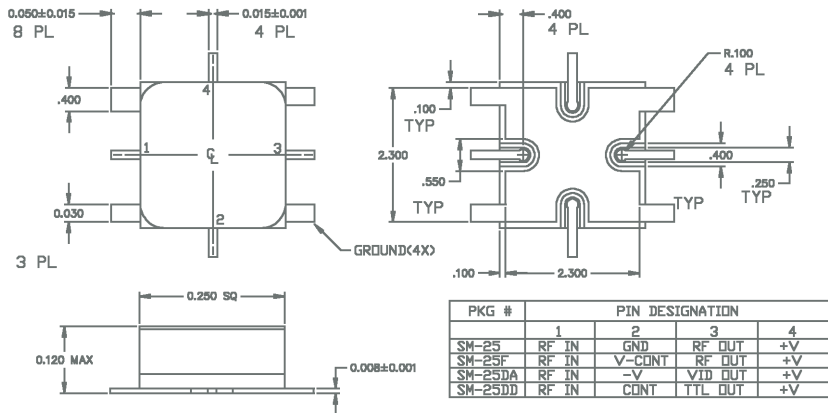
## TO-8T



**Notes (unless otherwise specified):**

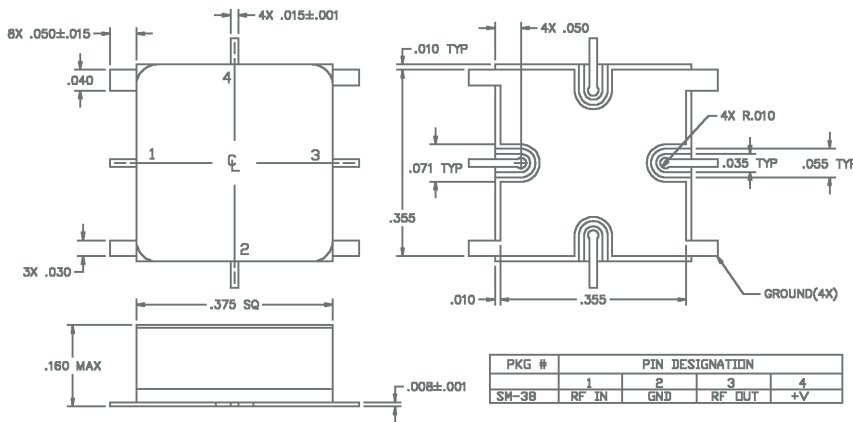
1. Dimensions are specified in inches.
2. Tolerances: xx±0.02, xxx±0.010

## SM-25



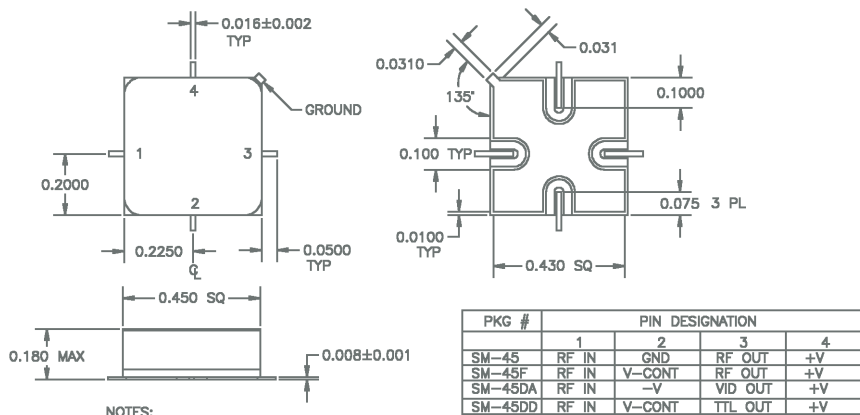
- NOTES:
1. MAXIMUM TEMPERATURE EXPOSURE 1S  
260 °C FOR 10 SECONDS.
  2. DIMENSIONS IN INCHES. TOL. : XX +/--.01, XXX +/--.005
  3. GROUND CONNECTION TO BACKSIDE OF PACKAGE..

## SM-38



- NOTES:
1. MAXIMUM TEMPERATURE EXPOSURE 1S  
260 °C FOR 10 SECONDS.
  2. DIMENSIONS IN INCHES. TOL. : XX +/--.01, XXX +/--.005
  3. GROUND CONNECTION TO BACKSIDE OF PACKAGE..

## SM-45



- NOTES:
1. MAXIMUM TEMPERATURE EXPOSURE 1S  
260 °C FOR 10 SECONDS.
  2. DIMENSIONS IN INCHES. TOL. : XX +/--.01, XXX +/--.005
  3. GROUND CONNECTION TO BACKSIDE OF PACKAGE..

# HIGH RELIABILITY SERVICES AND END-OF-LIFE SOLUTIONS

## Avnet MTS Services:

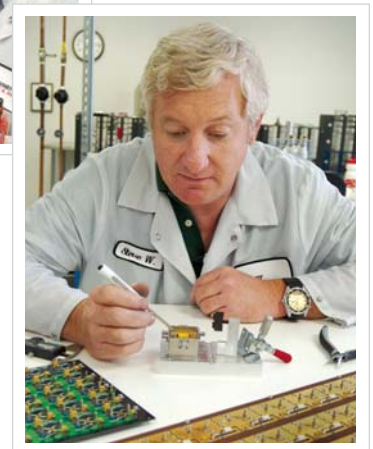
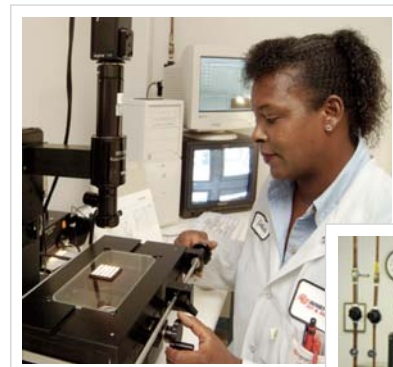
- Screening programs
- Custom packaging
- Creating new device/package combinations
- Product upscreening
- Off-the-shelf devices available

Over the past decade, military and aerospace engineers have been faced with ever-increasing dilemmas in the procurement of high-reliability RF and microwave components. In some instances components have been discontinued. In other instances components may not be available in the original packaging and are often no longer screened for military and aerospace applications. In addition, most military and aerospace applications involve long design and production cycles. As a result, the cost of redesigning components is prohibitive. And, with many components destined for use in some of our nation's most strategic military satellite, communications and weapon systems, schedule delays can present a greater challenge.

Avnet Microwave Technical Solutions (Avnet MTS) High-Reliability Products and Services group is a full service MIL-PRF-19500 and MIL-STD-883 environmental test laboratory and program management organization. This group, dedicated to serving the military and aerospace communities, routinely conducts screening programs to standard military and customer proprietary specifications (SCDs), including "S" level for space applications. Screening services are offered for both franchised and non-franchised products; products may be provided by Avnet Electronics Marketing or supplied by the customer.

As a manufacturer of thin-film hybrid components, Avnet MTS can utilize its hybrid manufacturing operation to custom package commercially available die and provide environmental programs to ensure products meet performance and quality standards. Avnet MTS can also create entirely new device/package combinations, such as hermetic packaging for products available only in plastic, to allow customers the greatest degree of design flexibility.

Avnet MTS performs product upscreening on commercially available products from Hewlett-Packard and other semiconductor manufacturers. Additionally, Avnet MTS offers its own line of standard off-the-shelf upscreened MMIC amplifiers, transistors, frequency dividers and active mixers with operating frequencies up to 6 GHz. These products have been proven to be reliable alternatives to devices no longer available from the original manufacturers.



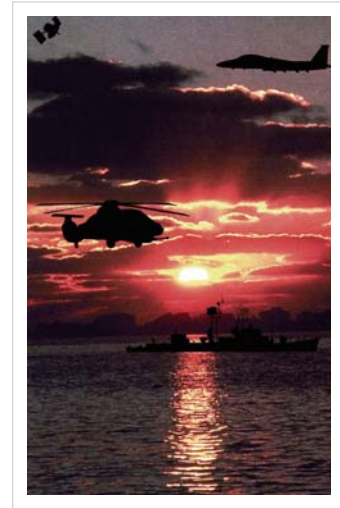
# HIGH RELIABILITY PRODUCTS

Avnet MTS has a long heritage of providing high reliability services to the aerospace community (both military and space level requirements).

These services include:

- Screening of previously manufactured to specific customer requirements or the requirements of MIL-PRF-19500, MIL-PRF-38534 or MIL-PRF-38535.
- Assembly and screening to the requirements of MIL-PRF-19500, MIL-PRF-38534 and/or MIL-PRF-38535.
- Element Evaluations (Lot Acceptance Testing) to MIL-PRF-38534 when the product is to be used in the die form.

The following is a partial list of components that have successfully passed one of the above processes:



OEM P/N	Mfgr	Description
RF2667	RF Micro	AGC & Demodulator
AG101	WJ	Amplifier
ECG-006	EIC	Amplifier
FMM5805GJ1	Fujitsu	Amplifier
FMM5811GJ1	Fujitsu	Amplifier
INA-01170	Agilent	Amplifier
INA-02170	Agilent	Amplifier
INA-03170	Agilent	Amplifier
MGA-82563	Agilent	Amplifier
MGA-86576	Agilent	Amplifier
MSA-0135	Agilent	Amplifier
MSA-0235	Agilent	Amplifier
MSA-0270	Agilent	Amplifier
MSA-0335	Agilent	Amplifier
MSA-0370	Agilent	Amplifier
MSA-0420	Agilent	Amplifier
MSA-0435	Agilent	Amplifier
MSA-0470	Agilent	Amplifier
MSA-0520	Agilent	Amplifier
MSA-0635	Agilent	Amplifier
MSA-0670	Agilent	Amplifier
MSA-0686	Agilent	Amplifier
MSA-0770	Agilent	Amplifier
MSA-0786	Agilent	Amplifier
MSA-0835	Agilent	Amplifier
MSA-0870	Agilent	Amplifier
MSA-0910	Agilent	Amplifier

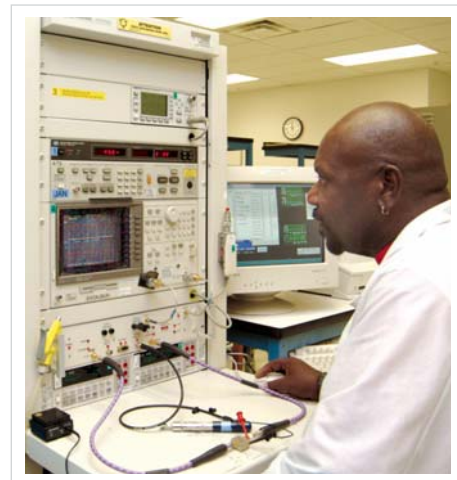
OEM P/N	Mfgr	Description
MSA-1110	Agilent	Amplifier
MSA-1120	Agilent	Amplifier
MSA-420	Agilent	Amplifier
MSA-520	Agilent	Amplifier
NBB-300	RFMD	Amplifier
NBB-400	RFMD	Amplifier
RF2361	RF Micro	Amplifier
RF2376	RF Micro	Amplifier
SNA-176	Sirenza	Amplifier
SNA-200	Sirenza	Amplifier
SNA-500	Sirenza	Amplifier
HSCH-5314	Agilent	Diode, Beam Lead
HSCH-5340	Agilent	Diode, Beam Lead
HSCH-5341	Agilent	Diode, Beam Lead
HSCH-5512	Agilent	Diode, Beam Lead
HSCH-9101	Agilent	Diode, Beam Lead
HSCH-9201	Agilent	Diode, Beam Lead
CND2047-DAF/00	United Monolithic	Divider
FMM1103VJ	Fujitsu	Divider
UPC2758TB	NEC	Down Converter
ATF-10170	Agilent	FET
ATF-13170	Agilent	FET
ATF-25170	Agilent	FET
ATF-46171	Agilent	FET
FHX04X	Fujitsu	FET
FHX35FA	Fujitsu	FET
FLK022	Fujitsu	FET

List continued on next page.

List of Components (continued):

OEM P/N	Mfgr	Description
FSX027X	Fujitsu	FET
LP7612	Filtronics	FET
NE33200	NEC	FET
FLC057WG	Fujitsu	FET, Power
FLC107WG	Fujitsu	FET, Power
854823	Sawtek	Filter
KFF6133A	CTS	Filter
KFF6538A	CTS	Filter
TDFM2A-1090C-11	TOKO	Filter
TDFM3C-2332J-10	TOKO	Filter
HMC220MS8	Hittite	Mixer
IAM-81028	Agilent	Mixer
IAM-82028	Agilent	Mixer
HMMC-5022	Agilent	MMIC Amplifier
HMMC-5040	Agilent	MMIC Amplifier
HMMC-5200	Agilent	MMIC Amplifier
HMMC-5618	Agilent	MMIC Amplifier
HMMC-5620	Agilent	MMIC Amplifier
MAAM37000	M/A-COM	MMIC Amplifier
MAAM71200	M/A-COM	MMIC Amplifier
TGA8810	Triquent	MMIC Amplifier
MASW6010G	M/A-COM	MMIC Switch
5082-0012	Agilent	PIN Diode
5082-3080	Agilent	PIN Diode
5082-3081	Agilent	PIN Diode
5082-3138	Agilent	PIN Diode
HPND-4005	Agilent	PIN Diode
MA4P203-134	M/A-COM	PIN Diode
MA4SW110	M/A-COM	PIN Diode Switch
FLK057WG	Fujitsu	Power FET
HMMC-3022	Agilent	Pre-scaler
HMMC-3124	Agilent	Pre-scaler
IFD-53010	Agilent	Pre-scaler
RF2422	RF Micro	Quadrature Modulator
RF2485	RF Micro	Quadrature Modulator
5082-2303	Agilent	Schottky Diode
5082-2811	Agilent	Schottky Diode
5082-2835	Agilent	Schottky Diode
HSCH-9551	Agilent	Schottky Diode
HSMS-0002	Agilent	Schottky Diode
HSMS-285B	Agilent	Schottky Diode
MP2X6682	M-Pulse	Schottky Diode

OEM P/N	Mfgr	Description
AT-41410	Agilent	Transistor
AT-41435	Agilent	Transistor
AT-41470	Agilent	Transistor
AT-42010	Agilent	Transistor
AT-42035	Agilent	Transistor
AT-42070	Agilent	Transistor
AT-64000	Agilent	Transistor
AT-64023	Agilent	Transistor
MRF-544	Motorola	Transistor
NE02100	NEC	Transistor
NE02133	NEC	Transistor
NE3005B-20	NEC	Transistor
NE88935S	NEC	Transistor
NE97833	NEC	Transistor
MRF-10005	Motorola	Transistor, Power
MRF-10350	Motorola	Transistor, Power
MRF-10500	Motorola	Transistor, Power
MRF-392	Motorola	Transistor, Power
MRF-904	Motorola	Transistor, Power
LV113UM	MODCO	VCO
V590ME01	Z-Comm Inc.	VCO
V800ME15	Z-Comm Inc.	VCO
V956ME01	Z-Comm Inc.	VCO



## “R” Series Process Flow

Optional reliability screening is available for the Thin-Film Hybrid Assemblies (thru hole and surface mount). This standard screening is called “R” series. The table below describes the test method and conditions used for “R” series screening.

### MIL-STD-883

Assembly	Method	Conditions	Comments <sup>3</sup>
Pre Cap Visual			per AWS-014355-800/ Avnet MTS procedures <sup>1</sup>
Stabilization Bake	1008	B	Ta = +125° C, 24 hrs., min.
Temperature Cycle	1010	B	-55° C to +125° C, 10 cycles
Constant Acceleration	2001	D	Y1 only, 20 Kg's <sup>4</sup>
Seal, Fine Leak	1014	A	
Seal, Gross Leak	1014	C	
Burn-in	1015	B	t = 168 hrs. min., Tc = +71° C to +125° C
Final Test		Per Catalog	+25° C Tests <sup>2</sup>
External Visual	2009		JI-000236 per Avnet MTS procedures

**Notes:**

1. Avnet MTS Workmanship Standard AWS-014355-800 is written to meet the intent of Method 2017 for Microwave hybrid microcircuits and processes are controlled by an SPC system.
2. Performed per individual catalog requirements.
3. For UTD-2004 maximum temperature is +100° C.
4. Condition A (5Kg) for Surface Mount.

“R” series screening was developed to satisfy a market segment requiring screened thin-film products. The “R” series processing has proven to be an effective program for reducing infant mortality and assuring reliability. To order this screening program add the suffix “R” after the standard part number.

Materials are traceable to individual wafer(s). Traceability is maintained by using specific documentation sheets that list all processing. Where “R” series screening is not sufficient for your needs, we offer the full range of MIL-SPEC screening on a special quotation and order basis.

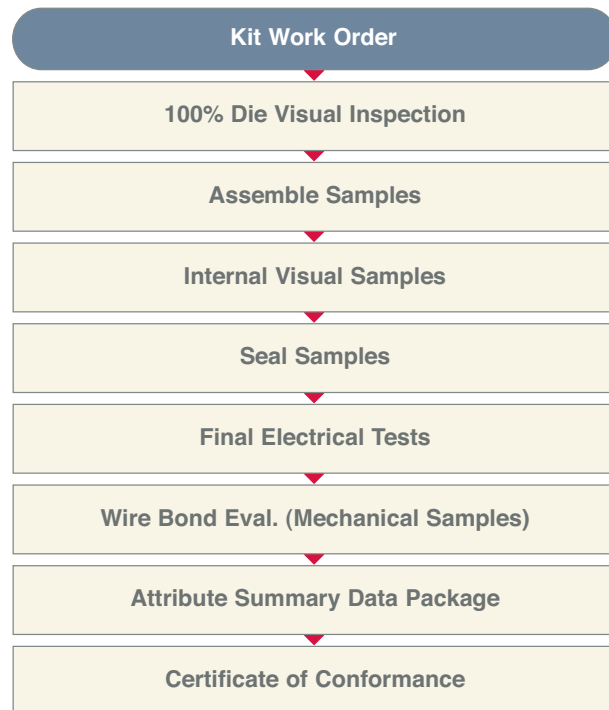
## Element Evaluations (Lot Acceptance Testing)

Element Evaluation is a methodology used to verify that procured materials and devices are adequate to perform as intended under the conditions experienced in the application. Avnet MTS can conduct element evaluations on RF semiconductor die to help ensure that these devices exhibit characteristics consistent with military and commercial space end use. Custom flows are available for all products, including beam lead diodes. Avnet MTS offers the following standard programs. (Specific Electrical Test Parameters, Burn-In Conditions, Life Test Temperature and Bias Conditions are determined by device data.)

### Avnet MTS's LAT Flows

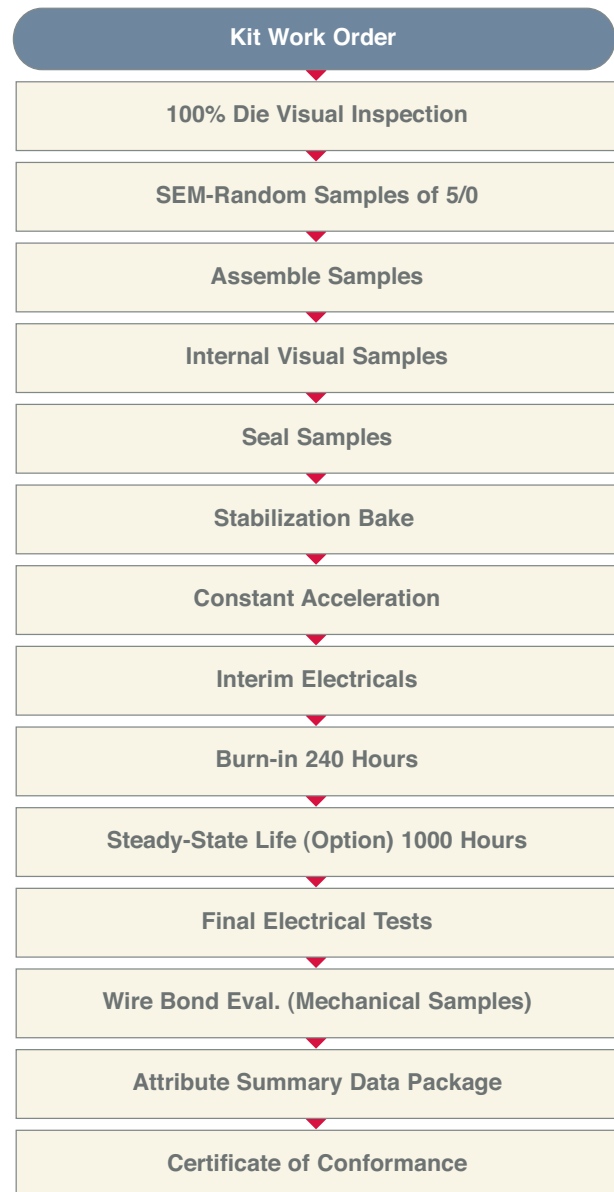
#### “Class B Level”

**Programs: Military Environments**  
RF semiconductor die for “B” product.  
Sample selection per MIL-PRF-38534.



#### “Class S Level”

**Programs: Military Environments**  
RF semiconductor die for “S” product.  
Sample selection per MIL-PRF-38534.





# HIGH RELIABILITY SCREENING SERVICES

## Avnet MTS Can Perform a Full Range of Screening

Avnet MTS possesses a MIL-STD-750 and MIL-STD-883 Environmental Laboratory to support Hi-Rel programs.

### Product Types

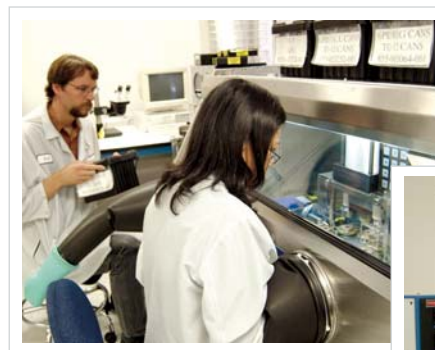
- Amplifiers
- Die (element evaluation)
- Packaged Transistors and MMICs
- Diodes, Axial
- Diodes, Beam Lead
- Frequency Dividers
- Mixer/IF Amp
- Custom packaged devices (see below)

### In House Capabilities

- Internal Visual (on assembled units)
- Stabilization Bake
- Temperature Cycle
- Constant Acceleration
- PIND (Particle Impact Noise Detection)
- HTRB (High Temperature Reverse Bias)
- Burn-In
- Electrical Parameter Testing (DC and RF to 40+ GHz)
- Seal (Fine/Gross Leak)
- X-Ray (Outsourced)
- External Visual
- Bond Pull/Die Shear
- Die Attach
- Wire Bonding
- Solderability
- Lead Integrity Testing
- Solder Dip
- Tape and Reel

### Avnet MTS Creates Custom Products

- On site hybrid manufacturing
- Assemble die in ceramic packages
- Recreate "obsolete" configurations
- Build unique chip/package
- Provide material traceability
- Dedicated program management
- Gantt charts available



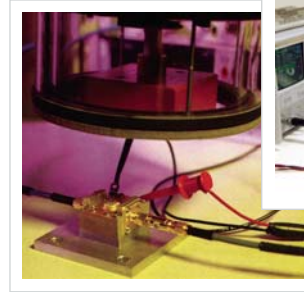


One-Stop Shopping for RF and Microwave Value-Added Services  
Servicing Commercial, Military and Space end-use requirements.

- Device Related (Package, Test, Sort and Select)
- RF Test to 40 GHz
- Power Tests (200 watt CW drive to 2.8 GHz)
- Assemble transistor and/or MMIC die into high-end packages
- Environmental Screening
- Element Evaluation

## Materials Related

- Tape and Reel
- Lead Trim/Form
- Solder Dip
- Color Marking/Dotting
- Tape and Reel Marking



## VALUE-ADDED SERVICES: IDENTIFYING A NEED

### Symptoms

- Pre-production non-value activities (e.g. labeling, part ID, kitting, solder-dipping, lead forming, tape and reel)
- In house RF test/sort of devices required prior to production
- Excessive tuning and/or alignment to meet specifications
- Failures at final test
- Rework on finished units
- Field returns

### Solution

- Contact your local Avnet sales office. Avnet MTS is providing customized Value-Added Services to major OEMs worldwide.
- An incremental investment in purchased material, either supplied by Avnet or provided by the customer, can minimize high cost of rework/scrap. The solution? Start with material that will consistently result in high production yields.

### Benefits

- Increase production rate
- Increase production yield
- Reduce labor content
- Reduce scrap
- Reduce rework and/or tuning
- Reduce field returns
- Reduce use of “custom” products

### Conclusion

- Avnet MTS Value-Added Services:  
A solution worth considering



## RF Power Test, Selection and Sort

- 80 MHz to 2800 MHz
- CW to 200 Watts
- Pulse; Single, Multiple or Burst formats
- Test Parameters: Pout, Power Gain, PAE
- Custom Test Capability: e.g. High Frequency, IP3, Load Pull, Mismatch/VSWR

## DC Test; MMIC and Transistors

- FET: Idss, Vp, Gm, Breakdown Voltage, IGSS
- MMIC: IDD
- BiPolar: ICBO, IEBO, Junction Breakdowns,  $h_{FE}$

## RF Test; MMIC, Transistors and Hybrids (100 kHz to 20 GHz)

- SSG, P-1dB, PSAT, VSWR, NF, IP3, Harmonic
- Options may include: Phase and/or amplitude matching; Over Temperature tests
- S-parameter testing

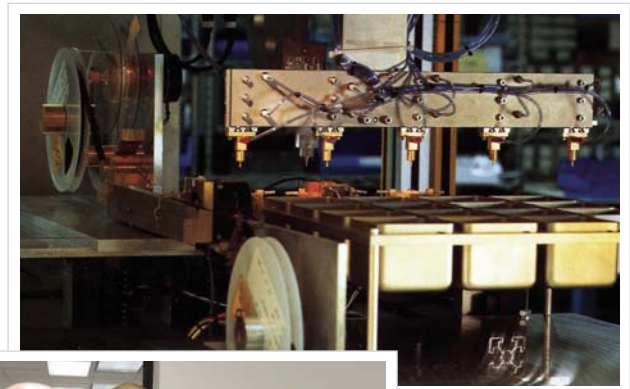
## RF Test; MMIC, Transistors and Hybrids (to 40 GHz)

- SSG, VSWR and S21 phase
- Options may include: Over Temperature tests

## Additional Product Test Capabilities include:

- Voltage Controlled Attenuators
- Detectors
- Power Dividers
- Filters
- Mixers
- Prescalers

Please refer to High Reliability Section for Environmental Test Capabilities.



# CABLE ASSEMBLY CAPABILITIES OVERVIEW

Avnet MTS manufactures cost-effective, high-quality precision cable assemblies intended for use at RF and Microwave frequencies. Standard Assemblies DC to 26.5 GHz, Custom to 40 GHz.

## STANDARD Cable Assemblies, “Off-the-Shelf”

(Typical Ship = 3 days ARO)

- Conformable; cable type = .086 (.085) & .141, see page 28
- Flexible; Commercial Grade cable type = RG316, see page 29
- Flexible; Instrument Grade cable type = SB142, see page 29
- Additional Information: see pages 30, 31 and 32



## STANDARD Cable Assemblies, “Create Your Own”

(Typical Ship = 3 days to 3 weeks ARO)

- Conformable; 7 Connector Options, 2 Cable Types
- Flexible; 10 Connector Options, 7 Cable Types
- Cable vs. Connector Type; see page 30
- P/N System; see page 30
- Additional Information: see page 31 and 32

## SEMI-RIGID Cable Assemblies

- Stock Cable Sizes = .085, .141
- All Connector configurations built
- Please submit your drawings for quote

## CUSTOM Cable Assemblies

- To 40 GHz
- Please submit requirements for quote



## GENERAL CAPABILITIES

### Cable Engineering

- Technical Support is available

### Electrical Test

- Insertion Loss and VSWR to 40 GHz
- Phase and Group Delay to 40 GHz
- Phase Match and Track available
- Measured Data available with each assembly

### Mechanical Test

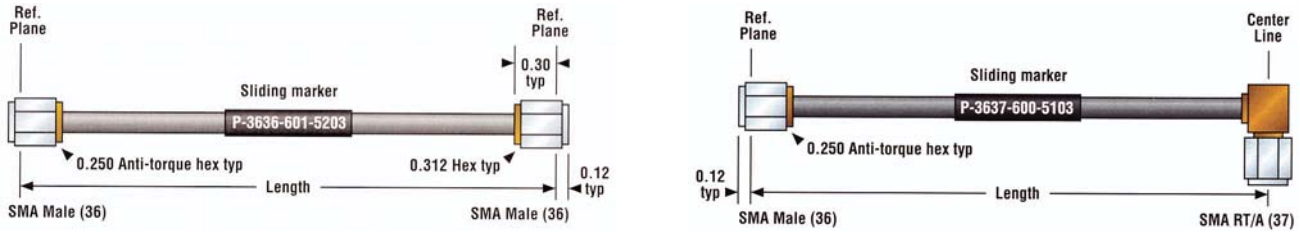
- Pull Test (Flexible)
- Environmental Screening Available

### Manufacturing Equipment

- Computerized Auto-Bender (Semi-Rigid)
- Computerized Cable Strippers (Flexible)
- Induction Heaters for Soldering (Semi-Rigid)
- Semi-Automatic Cable Cutters and Strippers (Semi-Rigid, Conformable)
- Semi-Automatic Crimping Machine (Semi-Rigid, Flexible)
- Computerized Label Machine (all types)



# STANDARD CONFORMABLE CABLE ASSEMBLIES



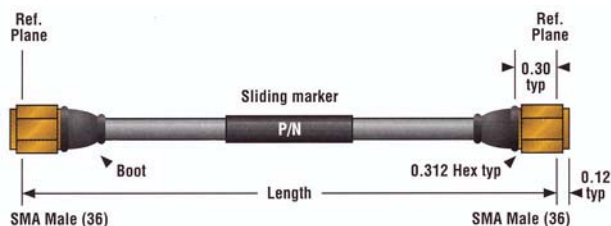
## “Off-the-Shelf” Conformable Cable Assemblies

Part Number	Length (in.)	Length (±)	Weight (oz.)	Maximum VSWR (:1) at Frequency (GHz)						Maximum Insertion Loss (dB) at Frequency (GHz)					
				<1	1-2	2-4	4-6	6-12	12-18	<1	1-2	2-4	4-6	6-12	12-18
P-3637-600-5103	3.00	0.05	0.30	1.06	1.10	1.20	1.30	1.40	----	0.15	0.19	0.26	0.31	0.44	----
P-3637-600-5106	6.00	0.10	0.40	1.06	1.10	1.20	1.30	1.40	----	0.20	0.27	0.38	0.46	0.66	----
P-3637-600-5109	9.00	0.10	0.40	1.06	1.10	1.20	1.30	1.40	----	0.26	0.36	0.50	0.62	0.89	----
P-3637-600-5112	12.00	0.15	0.50	1.06	1.10	1.20	1.30	1.40	----	0.32	0.44	0.63	0.77	1.12	----
P-3637-600-5118	18.00	0.15	0.50	1.06	1.10	1.20	1.30	1.40	----	0.43	0.60	0.87	1.07	1.58	----
P-3637-600-5124	24.00	0.15	0.60	1.06	1.10	1.20	1.30	1.40	----	0.55	0.77	1.11	1.38	2.04	----
P-3637-600-5136	36.00	0.20	0.80	1.06	1.10	1.20	1.30	1.40	----	0.78	1.10	1.60	2.00	2.95	----
P-3637-601-5103	3.00	0.05	0.30	1.06	1.10	1.20	1.30	1.40	----	0.13	0.15	0.21	0.25	0.35	----
P-3637-601-5106	6.00	0.10	0.40	1.06	1.10	1.20	1.30	1.40	----	0.16	0.20	0.28	0.34	0.49	----
P-3637-601-5109	9.00	0.10	0.40	1.06	1.10	1.20	1.30	1.40	----	0.19	0.25	0.35	0.43	0.63	----
P-3637-601-5112	12.00	0.15	0.50	1.06	1.10	1.20	1.30	1.40	----	0.22	0.30	0.43	0.52	0.77	----
P-3637-601-5118	18.00	0.15	0.50	1.06	1.10	1.20	1.30	1.40	----	0.29	0.39	0.57	0.70	1.05	----
P-3637-601-5124	24.00	0.15	0.60	1.06	1.10	1.20	1.30	1.40	----	0.35	0.49	0.71	0.89	1.33	----
P-3637-601-5136	36.00	0.20	0.80	1.06	1.10	1.20	1.30	1.40	----	0.48	0.68	0.98	1.25	1.90	----
P-3636-600-5203	3.00	0.05	0.20	1.06	1.10	1.14	1.17	1.20	1.35	0.14	0.17	0.25	0.29	0.40	0.52
P-3636-600-5206	6.00	0.10	0.30	1.06	1.10	1.14	1.17	1.20	1.35	0.19	0.26	0.36	0.44	0.63	0.81
P-3636-600-5209	9.00	0.10	0.30	1.06	1.10	1.14	1.17	1.20	1.35	0.25	0.34	0.48	0.59	0.86	1.10
P-3636-600-5212	12.00	0.15	0.40	1.06	1.10	1.14	1.17	1.20	1.35	0.31	0.42	0.61	0.74	1.09	1.39
P-3636-600-5218	18.00	0.15	0.40	1.06	1.10	1.14	1.17	1.20	1.35	0.42	0.59	0.85	1.05	1.54	1.98
P-3636-600-5224	24.00	0.15	0.50	1.06	1.10	1.14	1.17	1.20	1.35	0.54	0.76	1.09	1.35	2.00	2.56
P-3636-600-5236	36.00	0.20	0.70	1.10	1.15	1.20	1.25	1.30	1.35	0.77	1.09	1.58	1.87	2.92	3.73
P-3636-601-5203	3.00	0.05	0.20	1.06	1.10	1.14	1.17	1.20	1.35	0.11	0.14	0.19	0.22	0.31	0.41
P-3636-601-5206	6.00	0.10	0.30	1.06	1.10	1.14	1.17	1.20	1.35	0.15	0.19	0.26	0.32	0.45	0.59
P-3636-601-5209	9.00	0.10	0.30	1.06	1.10	1.14	1.17	1.20	1.35	0.18	0.24	0.33	0.41	0.59	0.77
P-3636-601-5212	12.00	0.15	0.40	1.06	1.10	1.14	1.17	1.20	1.35	0.21	0.28	0.41	0.50	0.73	0.96
P-3636-601-5218	18.00	0.15	0.40	1.06	1.10	1.14	1.17	1.20	1.35	0.28	0.38	0.55	0.68	1.02	1.32
P-3636-601-5224	24.00	0.15	0.50	1.06	1.10	1.14	1.17	1.20	1.35	0.34	0.48	0.69	0.86	1.30	1.69
P-3636-601-5236	36.00	0.20	0.70	1.10	1.15	1.20	1.25	1.30	1.35	0.46	0.65	0.95	1.18	1.80	2.36

**Notes:**

1. Commonly Ordered and Stocked Cables: Minimum quantity is 10, if cable is not in stock.
2. Labeled with part number.
3. Tests are “go/no-go” to verify guaranteed performance. See above.
4. Connectors are SMA Male passivated stainless steel. MTS reserves the right to substitute gold plated connectors.
  - 0.086 (0.085) = Anti-Torque, non-captive contact
  - 0.141 = Anti-Torque, no separate contact
5. Refer to page 32 for detailed mechanical/electrical specifications.
6. Quick delivery available on 3" to 24" in 1" increments. To specify length desired, change the last two digits in assembly Part Number (e.g. 03 = 3", 04 = 4", 10 = 10", etc.)
7. Maximum specifications are product maximum plus measuring system uncertainty. All specifications apply at 73° F, sea level and 20-80% relative humidity.

Need a different length, cable type or connector configuration? See page 30.



## “Off-the-Shelf” Commercial Grade Cable Assemblies RG316

Single Shielded

Part Number	Length (in.)	Previous P/N	Maximum VSWR (:1) at Frequency (GHz)						Maximum Insertion Loss (dB) at Frequency (GHz)					
			<1	1-2	2-4	4-6	6-12	12-18	<1	1-2	2-4	4-6	6-12	12-18
P-3636-623-3203	3.00	PCBL-S9130-C	1.10	1.15	1.25	1.35	1.50	----	0.28	0.33	0.38	0.45	0.55	----
P-3636-623-3206	6.00	PCBL-S9160-C	1.10	1.15	1.25	1.35	1.50	----	0.35	0.45	0.55	0.70	0.85	----
P-3636-623-3209	9.00	PCBL-S9190-C	1.10	1.15	1.25	1.35	1.50	----	0.43	0.58	0.77	0.95	1.15	----
P-3636-623-3212	12.00	PCBL-S9101-C	1.10	1.15	1.25	1.35	1.50	----	0.51	0.70	0.95	1.20	1.50	----
P-3636-623-3224	24.00	PCBL-S9102-C	1.10	1.15	1.25	1.35	1.50	----	0.82	1.30	1.70	2.20	2.50	----
P-3636-623-3236	36.00	PCBL-S9103-C	1.10	1.15	1.25	1.35	1.50	----	1.18	1.80	2.40	3.20	3.50	----
P-3636-623-3248	48.00	PCBL-S9104-C	1.10	1.15	1.25	1.35	1.50	----	1.50	2.30	3.10	4.20	4.70	----
P-3636-623-3260	60.00	PCBL-S9105-C	1.10	1.15	1.25	1.35	1.50	----	1.75	2.70	3.80	5.20	5.70	----
P-3636-623-3272	72.00	PCBL-S9106-C	1.10	1.15	1.25	1.35	1.50	----	2.06	3.20	4.50	6.20	6.50	----

## “Off-the-Shelf” Instrument Grade Cable Assemblies SB142

Double Shielded RG142 .195" O.D. Nominal

Part Number	Length (in.)	Previous P/N	Maximum VSWR (:1) at Frequency (GHz)						Maximum Insertion Loss (dB) at Frequency (GHz)					
			<1	1-2	2-4	4-6	6-12	12-18	<1	1-2	2-4	4-6	6-12	12-18
P-3636-616-3212	12.00	PCBL-S9101-I	1.08	1.10	1.15	1.25	1.35	1.45	0.35	0.41	0.52	0.60	0.80	0.92
P-3636-616-3224	24.00	PCBL-S9102-I	1.08	1.10	1.15	1.25	1.35	1.45	0.49	0.62	0.84	1.00	1.40	1.64
P-3636-616-3236	36.00	PCBL-S9103-I	1.08	1.10	1.15	1.25	1.35	1.45	0.64	0.82	1.16	1.40	2.00	2.36
P-3636-616-3248	48.00	PCBL-S9104-I	1.08	1.10	1.15	1.25	1.35	1.45	0.78	1.04	1.48	1.80	2.60	3.10
P-3636-616-3260	60.00	PCBL-S9105-I	1.08	1.10	1.15	1.25	1.35	1.45	0.93	1.25	1.80	2.20	3.20	3.80
P-3636-616-3272	72.00	PCBL-S9106-I	1.08	1.10	1.15	1.25	1.35	1.45	1.07	1.46	2.12	2.60	3.80	4.50

**Notes:**

1. Commonly Ordered and Stocked Cables: Minimum quantity is 10, if cable is not in stock.
2. Labeled with part number as purchased.
3. Tests are “go/no-go” to verify guaranteed performance. See above.
4. Connectors are SMA Male straight gold plated non-captivated contact. MTS reserves the right to substitute passivate stainless steel connectors.
5. Tolerance are ±0.25.
6. Maximum specifications are product maximum plus measuring system uncertainty. All specifications apply at 73° F, sea level and 20-80% relative humidity.



# CREATE YOUR OWN AVNET MTS CABLE PART NUMBER

Select your connector types and construction, cable type and length, and test requirements from the tables below to create your own standard cable assembly part number.

**P - XX XX - 6 XX - X X XX**

Configurations	CONNECTOR CODES							
	BNC	TNC	N	MCX	MMCX	SMC	SMB	SMA
Straight Plug	13	17	<b>18</b>	<b>27</b>	<b>40</b>	<b>30</b>	<b>33</b>	<b>36</b>
Right Angle Plug	----	----	----	<b>28</b>	<b>41</b>	----	----	<b>37</b>
Straight Jack	----	----	19	<b>26</b>	----	----	32	----
Jack Bulkhead Feedthrough	14	15	<b>20</b>	----	----	29	31	<b>34</b> <sup>1</sup>
Maximum Frequency (GHz)	1.0	15.0	18.0	6.0	4.0	4.0	4.0	26.5

Length in Whole Inches Cable Length Tolerance Length	
Up to 12"	0.10
1' - 3'	0.20
3' up	0.30

**Notes:**

1. 18 Maximum
2. For SMC/SMB, Plug = Female, Jack = Male

CABLE TYPE					
Code	Type	Max. Freq. (GHz)	Code	Type	Max. Freq. (GHz)
<b>00</b>	<b>.086 conformable</b>	<b>26.5</b>	20	RG188	1.0
<b>01</b>	<b>.141 conformable</b>	<b>26.5</b>	21	RG214	4.0
<b>02</b>	<b>U405 low loss flex.086</b>	<b>22.0</b>	22	RG223	1.0
<b>03</b>	<b>U402 low loss flex.141</b>	<b>22.0</b>	<b>23</b>	<b>RG316</b>	<b>1.0</b>
<b>13</b>	<b>RG58</b>	<b>1.0</b>	<b>24</b>	<b>RD316</b>	<b>1.0</b>
14	RG141	12.0	28	RG179	3.0 GHz, 75 Ω
<b>15</b>	<b>RG142</b>	<b>12.0</b>	33	RG393	11.0
<b>16</b>	<b>SB142</b>	<b>26.5</b>	35	RG400	12.0
18	RG174	1.0	36	Cable 00 w/full length sleeve	26.5
19	RG178	1.0	37	Cable 01 w/full length sleeve	26.5

**Notes:**

1. All cables are 50 Ω unless indicated otherwise.

TESTING REQUIREMENTS (Test Freq. in GHz) 100% Guaranteed Through	
Code	Test Freq. (GHz)
1	12.4
2	18.0
3	26.5 (SMA Only)
4	8.0
5	6.0
6	4.0
7	1.0
8	Phase matched freq. cable dependent
0	Continuity only (no freq. guarantee)

CONNECTOR CONSTRUCTION	
Code	Contact
2	Captive contact
<b>3</b>	<b>Non-captive contact</b>
<b>5</b>	<b>Anti-torque non-captive contact (SMA straight plug only 0.086)</b>
<b>5</b>	<b>Anti-torque non-separate contact (SMA straight plug only 0.141)</b>

**Cable Part Number Example:  
P-3637-603-2612**

Consists of Connectors:

- SMA straight plug
- SMA right angle plug with captive contact

Cable Type:

- U402 low loss flexible
- 12" length

Testing:

- Through 4 GHz

Typical Ship is three days to three weeks for options in bold.

## Connector and Cable Combinations Resulting in Typical Ship of Three Days to Three Weeks

Cable	Type	CONNECTOR TYPE													
		SMA Straight Plug	SMA Bulkhead Jack	SMA Rt. Angle Plug	MCX Straight Plug	MCX Straight Jack	MCX Rt. Angle Plug	MMCX Straight Plug	MMCX Rt. Angle Plug	SMC Straight Plug	SMB Straight Plug	SMB Rt. Angle Plug	N Straight Plug	N Bulkhead Jack	TNC Plug
Conformable	0.086 (0.085)	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Conformable	0.141	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Flexible	U405	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Flexible	U402	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Flexible	RG-316	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Flexible	RD-316	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Flexible	RG-58	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Flexible	RG-142	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Flexible	SB-142	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆

# ATTENUATION & POWER RATINGS FOR COAXIAL CABLES

## Attenuation Rating

Typical dB/100 Ft. at Frequency

Cable	100MHz	200MHz	400MHz	1GHz	3GHz	5GHz	10GHz	18GHz
RG58	4.6	6.9	10.5	17.5	37.5	60.0	>100.0	----
RG141	3.9	5.6	8.0	13.5	27.0	39.0	70.0	----
RG142	3.9	5.6	8.0	13.5	27.0	39.0	70.0	----
SB142	----	----	8.8	14.6	27.2	36.8	56.6	68.2
RG174	8.9	12.0	17.5	30.0	64.0	99.0	>100.0	----
RG178	14.0	19.0	28.0	46.0	85.0	>100.0	>100.0	----
RG188	11.4	14.2	16.7	31.0	60.0	82.0	>100.0	----
RG214	2.3	3.3	5.0	8.8	18.0	27.0	45.0	----
RG223	4.8	7.0	10.0	16.5	30.5	46.0	>100.0	----
RG/RD316	11.4	14.2	16.7	31.0	60.0	82.0	>100.0	----
CF.086	----	----	----	23.0	42.0	56.0	83.0	117.0
CF.141	----	----	----	13.0	22.0	30.0	45.0	73.0
U405	----	----	14.0	23.0	39.0	52.0	80.0	110.0
U402	----	----	8.0	13.0	23.0	30.0	45.0	64.0

## Power Rating

Maximum Watts at Frequency

Cable	100MHz	200MHz	400MHz	1GHz	3GHz	5GHz	10GHz	18GHz
RG58	300	200	135	80	40	20	----	----
RG141	1,700	1,200	830	450	220	140	65	----
RG142	1,800	1,300	800	530	265	175	100	----
SB142	1,800	1,300	800	530	265	175	100	----
RG174	110	80	60	35	15	10	----	----
RG178	240	180	120	75	40	----	----	----
RG188	400	325	275	150	80	55	----	----
RG214	780	550	360	200	100	65	40	----
RG223	480	320	215	120	60	40	----	----
RG/RD316	400	325	275	150	80	55	----	----
CF.086	----	----	210	130	----	54	35	22
CF.141	----	----	600	459	----	180	----	80
U405	----	----	210	----	----	----	----	1
U402	----	----	660	450	----	----	----	80

# CONFORMABLE CABLE ASSEMBLY

## TECHNICAL DATA

General Electrical Specifications		
Impedance Nominal	50	Ohms
Capacitance Nominal	29.40	pf/Foot
Velocity of Propagation Nominal	70.7	%
Relative Shielding	-100	dB Min
Insulation Resistance	1000	Megohms Min.
Dielectric Withstanding Voltage	1000	Vrms Min.
Electrical Delay	1.44	nS/Foot
Electrical Delay	120	pS/Inch
Max Pulse Rf Power	1250	Watts

Materials and Finishes		
Cable Jacket	Copper Braid	Tin Coated
Marker & Boot	MIL-I-23053/5	Blue/Black
Solder	QQ-S-571	None
Flux	MIL-F-14256, RMA	None
SMA Contacts	ASTM B196 BeCu	MIL-G-45204 Gold Plated
Insulators	ASTM D1457 PTFE	None
SMA Body	ASTM A582 303 S.S.	MIL-G-45204 Gold Plated
SMA Nut	ASTM A582 303 S.S.	QQ-P-35 Passivated
SMA Gasket	ZZ-R-765 Silicon Rubber	Red
Solvents	NO OZONE DEPLETING MATERIALS ARE USED	

0.141 Conformable Cable (601), Mechanical/Electrical Specifications		
Cable Max. Diameter	0.145	Inches
Min. Bend Radius	0.19	Inches
Preferred Bend Radius	0.50	Inches
Connector Retention	50	Pounds Min.
Temperature Range	-65/+105	Degrees C
Mating Torque	7-10	Inch Pounds
SMA Connector Interface	MIL-STD-348	Page 310.1

0.085 Conformable Cable (600), Mechanical/Electrical Specifications		
Cable Max. Diameter	0.090	Inches
Min. Bend Radius	0.13	Inches
Preferred Bend Radius	0.38	Inches
Connector Retention	30	Pounds Min.
Temperature Range	-65/+105	Degrees C
Mating Torque	7-10	Inch Pounds
SMA Connector Interface	MIL-STD-348	Page 310.1

Into a 50 $\Omega$ System, With Duty Cycle Less Than CW Rating						
Freq. (GHz)	1.0	2.0	4.0	6.0	12.0	18.0
Max Cw (W)	450	310	215	170	96	80

Into a 50 $\Omega$ System, With Duty Cycle Less Than CW Rating						
Freq. (GHz)	1.0	2.0	4.0	6.0	12.0	18.0
Max Cw (W)	130	95	62	48	30	22

