

RF Components

M/A-COM Technology Solutions

RF and Microwave Components



macomtech.com

RF and Microwave Components



M/A-COM Technology Solutions is an industry leader in the design and manufacture of RF and microwave signal-processing components. For more than 60 years our components have been designed into sophisticated defense electronic systems, satellite communication systems, and high-end commercial applications. M/A-COM Tech's broad product portfolio includes many known brands, such as Watkins-Johnson, Stellex Microwave Systems, Phoenix Microwave, Anzac, Omni Spectra, RHG, and, of course, M/A-COM.

Customers can select from more than 500 standard products as well as discuss their unique requirements with our sales and engineering teams.

Cascadable Amplifiers

- RF and microwave amplifiers with frequency range of 10 kHz to 6 GHz
- Unconditionally stable with excellent cascadability
- Predominantly hybrid approach uses thin film technology to obtain the highest level of electrical performance, repeatability, reliability, and cost effectiveness
- Emphasis on using silicon bipolar, pHEMT and GaAs FET devices to meet goals
- Each thin-film cascadable amplifier is a complete amplifier with stable DC biasing circuits and internal power supply decoupling, maintaining excellent electrical performance over -55°C to +100°C

Mixers

- RF and microwave mixers covering 10 kHz to 26 GHz
- Low level and high level in multiple configurations, including surface mount, SMA connectorized, and microstrip compatible packaging

- Three types of designs: double balanced, triple balanced and load-insensitive
- Most utilize packaged quad and discrete Schottky diodes
- RF mixers utilize HMIC™ diode technology
- Well matched wide-band ferrite or printed dielectric baluns (transformers) provide optimum performance for conversion loss, noise figure, isolation, and intermodulation products

Attenuators

- Frequency range of 0.005 to 4 GHz
- Optimum insertion loss, maximum attenuation, VSWR and switching speed
- Hybrid approach uses thin film technology to obtain the highest levels of electrical performance, repeatability, reliability, and cost effectiveness

Limiters and Limiting Amplifiers

- Frequency range of 0.005 to 4 GHz
- Optimum insertion loss, gain, limiting level, and AM to PM conversion
- Hybrid approach uses thin film technology to obtain the highest levels of electrical performance, repeatability, reliability, and cost effectiveness

Ordering

Specify by M/A-COM Tech part number. If special features are required, describe them completely. Custom versions of many of the components listed in this catalog may be available to meet your unique system requirements.

Please visit our website at macomtech.com for more information including a list of the sales offices in your area and our distribution partners.



M/A-COM Tech's standard screened line RF and microwave components (S-Series and T1B for amplifiers, limiters, and voltage controlled attenuators; and -200 and T1A series for passive components) provide an economical and time effective approach to meet the requirements commonly found on airborne applications and high MTBF ground based equipment. These units also serve well in the development phases of higher scope programs.

When program screening requirements call for more than our standard catalog screening, custom screening programs can be created by either adding screening options to the standard screening or by generating a program specific sequence. Many screening options are available and include:

- 100% non-destruct, bond pull, pre burn-in electricals, mechanical shock, x-ray, PIND, extended burn-in, and delta calculations.
- Specific testing requirements from Group A, B, C, and inspections per MIL-STD-883, Method 5008 (for amplifier products) and Group B inspection per MIL-M-28837 (for passive products)

The environmental screening sequence and available add-on options are described in the flow chart on page 4.

M/A-COM Tech S-Series (methods refer to MIL-STD-883 and MIL-PRF-38534)

Test	Method	Condition
Process control and monitors	38534, 2011, 2019	Sample 1
Preseal electrical test	Per applicable document	
Production internal visual	M/A-COM Tech internal document	100% B 1
Quality assurance internal visual	M/A-COM Tech internal document	100% B1
Stabilization bake	1008	B, 24 hours, +125°C
Temperature cycle	1010	B, -55°C to +125°C
Constant acceleration	2001	B, 10000 Gs Y1 axis
Seal tests, fine and gross leak	1014	A1 and C; 5 x 10 ⁻⁸ ATM-CC/sec max 100%
Burn-in	1015	B, 160 hours, T +71°C to +125°C
Final electrical and group A test	Per applicable document	
External visual	2009	100%
PDC evaluation	M/A-COM Tech internal document	

- Notes:
1. As defined or modified by M/A-COM Tech standard procedures for microwave hybrid microcircuits.
 2. The S-Series screening process differs from MIL-STD-883, Class B as follows: 1) internal visual inspection is performed in accordance with SM 146505 instead of method 2017; 2) Stabilization bake and temperature cycling are conducted per Condition B instead of Condition C of the respective methods;
 - 3) Constant acceleration is conducted per Condition B instead of condition E method 2001; and 4) The 96-hour time constraint between burn-in and final electrical testing per Method 1015 is not guaranteed.

-200/-201 series screening sequence for mixer and doubler products is based on MIL-M-28837 and is outlined in the following table:

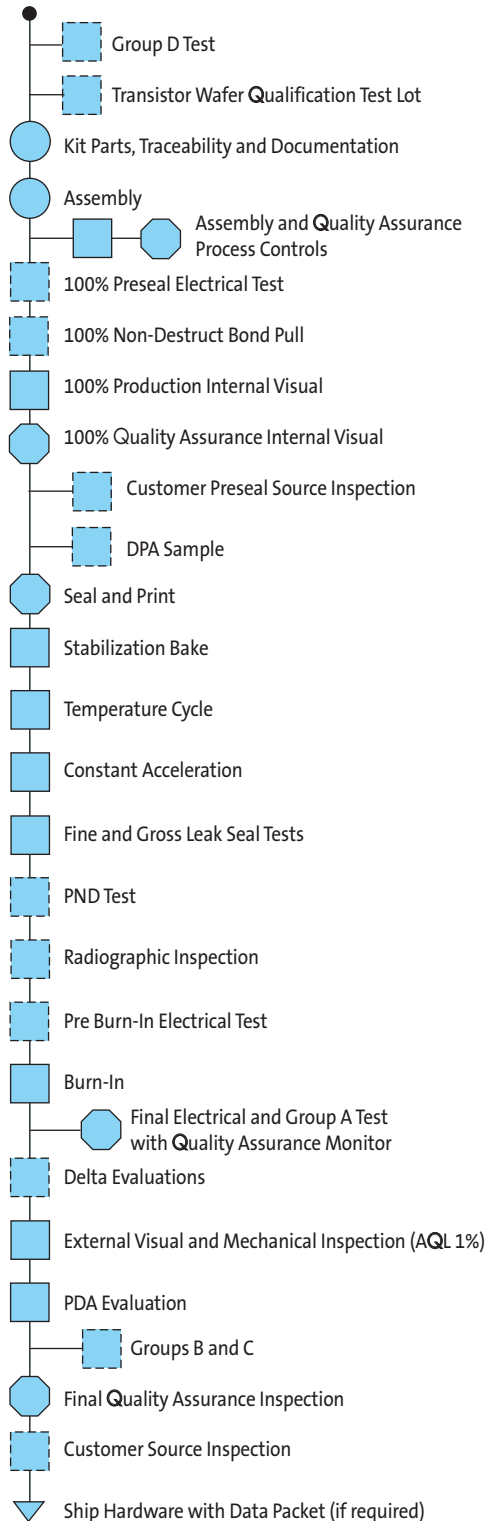
Test	MIL-STD-202 Method	Condition	MIL-STD-105 Level II AQL
Seal tests, fine and gross leak	112	C and D	100%
Bake		24 hours at +100°C	100%
Burn-in		96 hours	100%
Electrical test		M/A-COM Tech internal document	100%
Visual and mechanical inspection		M/A-COM Tech internal document	1.0
Thermal shock	107	B	1.0
Vibration	204	D	1.0
Seal tests, fine and gross leak	112	C and D	1.0
Final electrical test		M/A-COM Tech catalog specifications	1.0
Final quality inspection		M/A-COM Tech in-house inspection criteria	100%

RF and Microwave Components

Manufacturing and Screening Flow Charts

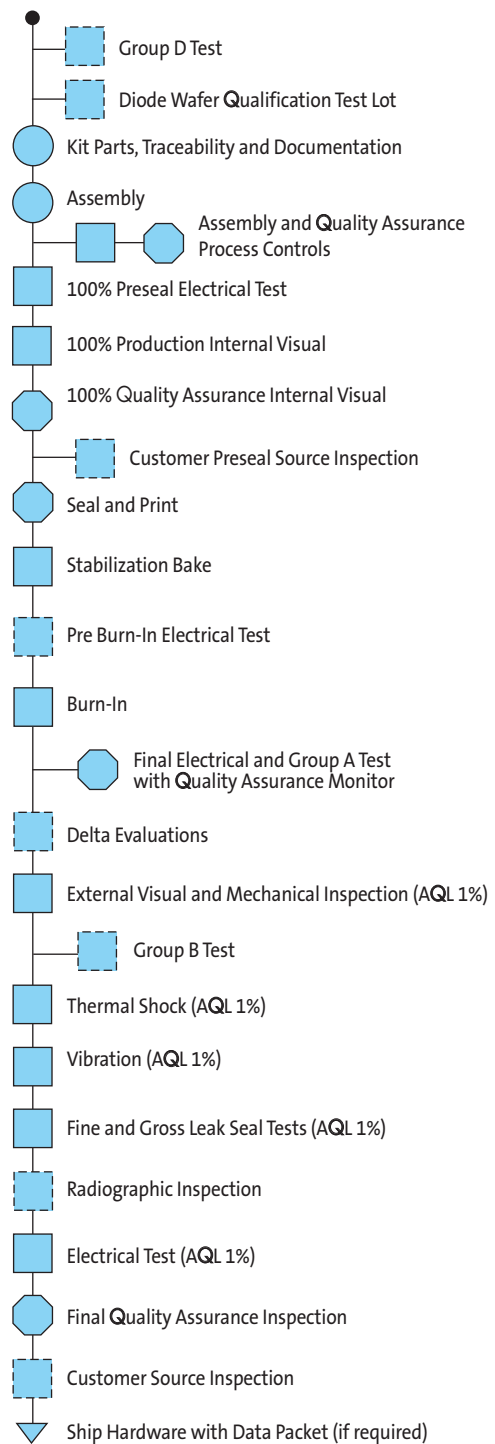
Thin Film Assembly Hermetic Packages*

(amplifiers, limiting amplifiers, limiters, attenuators)



Solder Assembly Hermetic Packages*

(mixers, frequency doublers)



Note: Dashed boxes represent optimal screening beyond the standard catalog test plan

* In accordance with MIL-PRF-38534, Class H (MIL-STD-883, Method 5008)

** In accordance with MIL-M-28837 and MIL-STD-202

High Performance TO-8 Cascadable Amplifiers¹

Part Number	Frequency Range (MHz)	Small Signal Gain (dB)			Gain Flatness (±dB)		Noise Figure (dB)			Power Output at 1 dB Compression (dBm)			Rev. Iso. dB Typ.	IP3 (dBm) Typ.	VSWR In/Out		DC		Package Type ^{2,3,4}
		Typ.	Min. 0/50°C	Min. -54/85°C	Max. 0/50°C	Max. -54/85°C	Typ.	Max. 0/50°C	Max. -54/85°C	Typ.	Min. 0/50°C	Min. -54/85°C			Max. 0/50°C	Max. -54/85°C	Volts Nom.	mA Typ.	
A80-1	10 - 200	27.3	26.0	25.0	0.7	1.0	2.0	2.5	3.0	16.0	14.5	14.0	33	28	1.8	2.0	15	30	TO/SM/CA
A70	10 - 250	8.0	7.3	6.8	0.5	0.7	1.6	2.3	2.8	8.0	7.5	7.0	11	24	2.1	2.3	15	10	TO/SM/CA
A70-1	10 - 250	8.0	7.5	7.0	0.5	0.7	1.8	2.3	2.8	14.0	13.0	12.5	11	28	2.1	2.3	15	15	TO/SM/CA
A70-3	20 - 250	8.0	7.0	6.5	0.5	1.0	2.8	3.2	3.7	21.0	20.5	20.0	11	40	2.1	2.3	15	37	TO/SM/CA
A70-2	10 - 250	8.0	7.0	6.5	0.5	0.7	2.2	2.7	3.2	19.0	18.0	17.5	11	38	2.1	2.3	15	25	TO/SM/CA
A181	10 - 250	16.5	15.5	14.5	0.7	0.8	3.8	4.5	5.0	22.0	20.0	19.5	22	35	1.9	2.1	15	95	TO/SM/CA
A71	10 - 250	18.0	16.5	16.0	0.8	1.0	2.1	2.5	2.8	-2.5	-3.0	-3.5	22	10	1.9	2.0	15	9	TO/SM/CA
A82-1	20 - 250	19.0	17.5	17.0	0.7	1.0	2.8	3.5	4.0	15.0	14.0	13.0	34	26	1.9	2.0	15	50	TO/SM/CA
A75-2	5 - 250	21.0	20.0	19.0	0.7	1.0	4.2	4.5	5.0	8.0	7.0	6.5	28	19	1.7	2.0	15	24	TO/SM/CA
A82	20 - 250	24.5	23.0	22.5	0.7	1.0	2.8	3.5	4.0	20.0	19.0	18.0	29	31	1.7	1.9	15	50	TO/SM/CA
A81-1	20 - 250	25.0	24.0	23.5	0.5	0.7	2.5	3.3	3.8	13.5	12.5	12.0	31	27	1.9	2.0	15	25	TO/SM/CA
A81	20 - 250	25.5	24.5	24.0	0.5	0.7	3.0	3.5	4.0	17.0	16.0	15.5	31	28	1.9	2.0	15	33	TO/SM/CA
A231	10 - 250	26.0	25.0	24.0	0.5	0.8	1.7	2.4	2.8	10.0	9.0	8.5	32	22	1.8	2.0	5	16	TO/SM/CA
A74-1	5 - 250	31.0	30.0	29.0	0.7	1.0	4.5	5.0	5.5	8.5	7.5	7.0	40	21	1.7	2.0	15	40	TO/SM/CA
A83-1	10 - 250	35.5	34.0	33.0	0.5	0.8	2.5	3.0	3.5	-1.5	-2.5	-3.5	43	9	1.8	2.0	5	13	TO/SM/CA
A78	5 - 300	14.0	13.0	12.5	0.7	1.0	3.5	4.5	5.0	19.5	18.0	17.5	17	35	1.9	2.0	15	65	TO/SM/CA
A79	5 - 300	14.0	13.0	12.5	0.7	1.0	4.0	5.0	5.5	22.0	20.5	20.0	18	38	1.9	2.0	15	88	TO/SM/CA
A87-2	10 - 300	16.0	15.0	14.5	0.5	0.8	2.9	3.5	4.0	11.0	9.0	8.5	20	24	1.8	2.0	5	15	TO/SM/CA
A88-1	5 - 300	18.5	17.5	17.0	0.6	0.8	3.8	5.0	5.5	18.5	17.0	16.5	22	30	1.7	1.9	15	52	TO/SM/CA
A87	10 - 400	14.0	13.0	12.5	0.5	0.7	3.8	4.5	5.0	17.5	16.5	16.0	20	33	2.0	2.2	15	33	TO/SM/CA
A51	10 - 400	15.0	14.0	13.0	0.7	1.0	2.7	3.0	3.5	-3.0	-3.5	-3.5	20	10	1.7	2.0	15	7	TO/SM/CA
A411	10 - 400	15.8	15.0	14.5	0.5	0.8	3.0	3.5	4.0	10.0	9.0	8.5	20	24	1.8	2.0	5	16	TO/SM/CA
A87-1	10 - 400	16.0	15.0	14.5	0.6	0.8	3.4	4.0	4.5	17.0	15.5	15.0	20	31	1.8	2.0	15	33	TO/SM/CA
A56	5 - 400	26.0	24.0	23.0	1.0	1.0	5.5	7.0	7.5	13.5	12.5	12.0	38	27	1.9	2.0	15	69	TO/SM/CA
A54	5 - 400	27.5	26.0	24.0	0.8	1.0	4.5	5.5	6.0	8.0	6.5	5.5	37	19	1.9	2.0	15	34	TO/SM/CA
A58	5 - 500	11.5	10.5	10.0	0.7	1.0	4.0	5.0	5.5	19.0	18.0	17.5	16	34	1.9	2.0	15	65	TO/SM/CA
A59	5 - 500	11.5	10.5	10.0	0.7	1.0	4.3	5.5	6.0	22.0	20.5	20.0	16	36	1.9	2.0	15	88	TO/SM/CA
PA511**	10 - 500	12.5	11.5	11.0	0.5	0.8	4.3	5.0	5.5	24.5	23.5	23.0	17	36	1.8	2.0	15	118	TO/SM/CA
A57	10 - 500	14.7	14.0	13.0	0.8	1.0	4.8	6.0	6.5	14.0	13.0	12.5	18	28	1.9	2.0	15	44	TO/SM/CA
A55	10 - 500	14.7	14.0	13.5	0.8	1.0	5.0	6.0	6.5	11.0	9.0	8.0	20	24	1.9	2.0	15	30	TO/SM/CA
A5	5 - 500	14.8	14.0	13.5	0.7	0.7	4.5	5.5	6.0	8.5	7.5	7.0	17	22	1.8	2.0	15	25	TO/SM/CA
A53	10 - 500	15.0	14.0	13.5	0.8	1.0	3.0	3.5	4.0	3.5	2.0	1.5	20	16	2.0	2.1	15	12	TO/SM/CA
A72	5 - 500	15.0	14.0	13.5	0.7	1.0	3.3	4.0	4.5	12.5	11.5	11.0	20	26	1.7	1.8	5	31	TO/SM/CA
A5-5	5 - 500	15.5	14.0	13.5	0.5	0.7	4.0	5.0	5.5	9.0	7.0	6.5	21	21	1.5	1.6	15	24	TO/SM/CA
A1	5 - 500	16.0	15.0	14.5	0.7	1.0	2.4	3.0	3.5	-1.0	-2.0	-3.0	19	11	1.8	2.0	15	9	TO/SM/CA
A180	10 - 500	16.5	16.0	15.5	0.7	0.8	3.4	4.0	4.5	18.0	16.0	15.0	21	33	1.9*	2.1*	15	63	TO/SM/CA
A77	5 - 500	16.5	16.0	15.0	0.7	1.0	4.5	5.0	5.5	16.5	15.0	14.5	17	30	1.7	2.0	15	50	TO/SM/CA
A511**	10 - 500	17.0	16.0	15.5	0.8	1.0	3.5	4.2	4.7	21.0	20.0	19.5	16	34	1.9	2.0	15	52	TO/SM/CA
A81-3	20 - 500	17.0	16.0	15.5	0.5	0.7	4.0	4.5	5.0	8.0	7.5	7.0	36	20	1.8	2.0	15	29	TO/SM/CA
A88	5 - 500	18.7	18.0	17.5	0.5	0.7	6.5	7.5	8.0	20.5	19.5	19.0	19	30	1.8	2.0	15	79	TO/SM/CA
A75-3	10 - 500	20.5	19.5	19.0	0.5	0.7	1.7	2.3	2.8	3.0	2.0	1.5	25	16	1.8	2.0	15	14	TO/SM/CA
A75	5 - 500	21.0	19.5	19.0	0.5	0.7	2.1	2.7	3.0	9.0	8.0	7.0	25	21	1.8	2.0	15	24	TO/SM/CA
A81-2	20 - 500	24.5	23.0	22.5	0.5	0.7	3.0	3.5	4.0	15.0	14.0	13.5	33	28	1.8	2.0	15	29	TO/SM/CA
A74-2	5 - 500	26.0	25.0	24.0	1.0	1.2	3.8	4.3	4.8	-1.0	-2.0	-2.0	36	10	1.9	2.0	5	13	TO/SM/CA
A76	5 - 500	28.0	27.0	26.0	0.7	1.0	3.0	3.5	4.0	14.7	14.0	13.5	37	28	1.8	2.0	15	60	TO/SM/CA
A80	20 - 500	29.0	27.5	26.5	0.7	1.0	2.3	3.0	3.4	14.3	13.0	12.5	39	27	2.1	2.3	15	45	TO/SM/CA
A83	10 - 500	30.0	29.0	28.0	0.5	0.8	3.0	3.5	4.0	-1.0	-2.0	-4.0	40	10	1.8	2.0	5	13	TO/SM/CA
A74	5 - 500	30.0	28.0	27.0	0.7	1.0	3.0	4.0	4.5	8.5	7.5	7.0	40	20	1.8	2.0	15	40	TO/SM/CA
RA89-1	10 - 500	30.0	29.0	28.0	0.7	1.0	3.2	4.5	5.0	21.5	20.0	20.0	36	36	1.8	2.0	15	130	TO/SM/CA
A531	2 - 500	31.7	30.0	29.0	0.8	1.0	2.0	2.5	3.0	2.5	1.5	0.5	38	14	1.8	2.0	5	17	TO/SM/CA
A73	5 - 500	32.0	30.0	29.0	0.7	1.0	3.5	4.0	4.5	1.5	1.0	0.5	37	15	1.8	2.0	15	20	TO/SM/CA

Notes: 1. Typical and guaranteed specifications measured in a 50-ohm system at the nominal power supply voltage
 2. To order a product in a surface mount version simply add "SM" before the part number
 3. To order a SMA connectorized version simply add "C" before the part number
 4. TO (TO-8); SM (surface mount); CA (SMA connectorized)

*See data sheet for complete specification limits
 **Preliminary Specifications

RF and Microwave Components

High Performance TO-8 Cascadable Amplifiers¹ (continued)

Part Number	Frequency Range (MHz)	Small Signal Gain (dB)			Gain Flatness (±dB)		Noise Figure (dB)			Power Output at 1 dB Compression (dBm)			Rev. Iso. dB Typ.	IP3 (dBm) Typ.	VSWR In/Out		DC		Package Type ^{2,3,4}
		Typ.	Min. 0/50°C	Min. -54/85°C	Max. 0/50°C	Max. -54/85°C	Typ.	Max. 0/50°C	Max. -54/85°C	Typ.	Min. 0/50°C	Min. -54/85°C			Max. 0/50°C	Max. -54/85°C	Volts Nom.	mA Typ.	
RA76	10 - 500	40.5	38.5	37.5	0.9	1.2	3.0	3.8	4.3	15.0	13.3	12.3	52	26	1.8	2.0	15	81	TO/SM/CA
A611	5 - 600	15.0	14.0	13.5	0.6	0.8	3.2	3.8	4.5	12.5	11.0	10.5	20	24	1.8	1.9	5	31	TO/SM/CA
A67-1	10 - 600	15.0	14.0	13.5	0.6	0.8	3.7	4.3	4.5	17.0	16.5	16.0	17	30	2.0	2.1	15	36	TO/SM/CA
A5-6	5 - 600	16.0	15.0	14.5	0.7	0.7	3.2	4.0	4.5	8.5	8.0	7.0	20	21	1.8	2.0	15	24	TO/SM/CA
A77-1	5 - 600	16.0	15.0	14.5	0.7	1.0	5.0	6.5	7.0	16.5	15.0	14.5	17	30	1.8	2.0	15	50	TO/SM/CA
A59-1	10 - 700	10.5	9.5	9.0	0.8	1.0	6.0	7.5	8.0	22.0	20.5	20.0	16	36	1.9	2.0	15	88	TO/SM/CA
A67	10 - 800	14.0	13.0	12.5	0.6	0.7	4.0	4.3	4.5	16.0	15.5	15.0	17	30	2.0	2.2	15	32	TO/SM/CA
A89	100 - 800	22.0	21.0	20.5	0.8	1.0	4.5	5.5	6.0	17.5	16.5	16.0	29	30	2.0	2.2	15	42	TO/SM/CA
A19-1	10 - 1000	11.5	10.5	10.0	0.6	0.8	5.5	6.5	7.0	22.5	20.5	20.0	16	35	1.7	2.0	15	90	TO/SM/CA
A17	10 - 1000	12.0	10.5	10.0	0.7	1.0	6.0	6.5	7.0	15.3	14.0	13.5	16	27	1.8	2.0	15	44	TO/SM/CA
A11	5 - 1000	14.7	14.0	13.5	1.0	1.2	3.1	3.5	4.0	-2.0	-3.0	-4.0	20	10	1.8	2.0	15	9	TO/SM/CA
A18-1	10 - 1000	14.7	14.0	13.5	0.5	1.0	3.8	5.0	5.5	16.0	15.0	14.5	17	30	1.8	2.0	15	46	TO/SM/CA
A11-2	5 - 1000	16.0	15.0	14.0	0.9	1.0	2.5	3.0	3.5	-1.0	-3.0	-3.5	21	10	1.9	2.0	15	9	TO/SM/CA
A12	10 - 1000	16.0	15.0	14.5	0.7	1.0	2.8	3.5	3.9	8.0	7.0	6.5	20	22	1.9	2.0	15	22	TO/SM/CA
A63	5 - 1000	16.0	15.0	14.5	0.7	1.0	3.0	4.0	4.5	4.0	2.0	1.5	20	15	1.9	2.0	15	14	TO/SM/CA
A1021**	10 - 1000	26.0	25.0	24.0	0.7	0.9	3.8	4.5	5.0	14.5	14.0	13.0	35	26	1.9	2.0	5	60	TO/SM/CA
RA69	10 - 1000	25.0	24.0	23.0	0.7	1.0	4.5	5.5	6.0	23.0	20.5	20.0	33	34	1.9	2.0	15	130	TO/SM/CA
A66-3	10 - 1000	26.0	24.5	24.0	0.7	1.0	3.0	3.5	4.0	3.0	1.5	1.0	36	13	1.8	2.0	5	16	TO/SM/CA
A66-1	10 - 1000	27.5	26.0	25.5	0.7	1.0	2.9*	3.5*	4.0*	15.0	14.5	14.0	33	28	1.8	2.0	15	66	TO/SM/CA
A1031	10 - 1000	28.5	26.5	26.0	0.8	1.0	2.7	3.5	4.0	10.0	9.0	8.5	35	22	1.9	2.0	5	36	TO/SM/CA
RA66	10 - 1000	37.0	35.0	34.0	1.0	1.3	3.5	4.5	5.0	15.5	14.0	13.0	45	30	1.8	2.0	15	81	TO/SM/CA
A16-2	10 - 1200	13.0	12.0	11.5	0.5	0.7	3.5	4.0	4.5	6.0	5.0	4.5	16	18	1.9	2.0	5	15	TO/SM/CA
A1212	100 - 1200	14.0	12.5	11.5	1.0	1.2	1.8	2.3	2.7	19.0	17.0	16.0	23	29	2.1	2.3	5	70	TO/SM/CA
A1211	10 - 1200	14.0	12.5	12.0	0.6	0.8	2.8	3.5	4.0	6.0	5.0	4.5	16	20	1.9	2.0	5	15.5	TO/SM/CA
A21-1	5 - 1200	15.5	14.0	13.5	0.5	1.0	2.4	3.5	3.9	-1.0	-2.0	-3.0	20	11	1.9	2.0	15	10	TO/SM/CA
A66	10 - 1200	23.5	22.0	21.0	0.7	1.0	4.0	5.0	5.5	15.0	14.0	13.5	32	28	1.9	2.0	15	64	TO/SM/CA
A64	10 - 1200	26.0	24.0	23.0	0.8	1.0	3.4	4.3	4.8	8.0	7.0	6.5	32	20	1.9	2.0	15	35	TO/SM/CA
A27	10 - 1500	8.5	7.5	7.0	0.6	1.0	7.5	9.0	9.5	15.5	14.0	13.5	15	28	1.9	2.0	15	50	TO/SM/CA
A29-1	10 - 1500	9.0	8.5	7.5	0.5	1.0	5.5	6.5	7.0	22.0	20.0	19.0	14	32	1.9	2.0	15	90	TO/SM/CA
A25	5 - 1500	10.0	9.0	8.0	0.6	1.0	6.0	7.5	8.0	9.0	7.0	6.5	20	21	2.0	2.1	15	24	TO/SM/CA
A28	10 - 1500	11.0	10.0	9.5	0.6	1.0	5.5	6.0	7.0	15.0	14.0	13.5	17	29	2.0	2.1	15	45	TO/SM/CA
A25-1	2 - 1500	13.5	13.0	12.5	0.5	0.7	3.0*	3.5*	4.0*	9.0	8.0	7.5	18	22	1.9	2.0	15	24	TO/SM/CA
A28-2	10 - 1500	14.0	13.0	12.5	0.5	1.0	3.5	4.5	5.0	10.5*	9.5*	8.5*	18	24	1.9	2.0	5	27	TO/SM/CA
A24	5 - 1500	20.0	19.0	18.0	0.8	1.0	4.2	5.3	5.8	8.0	7.0	6.5	30	20	1.9	2.0	15	34	TO/SM/CA
A26	10 - 1500	20.5	19.0	18.5	0.6	0.8	5.0	5.5	6.0	16.0*	15.0*	14.5*	28	27	1.7	2.0	15	68	TO/SM/CA
RA26	10 - 1500	27.5	26.0	25.0	0.8	1.2	5.5	6.0	6.5	14.5	13.5	12.5	42	27	1.9	2.0	15	82	TO/SM/CA
A39	10 - 2000	7.5	6.5	6.0	0.7	1.0	8.5*	9.5*	10.0*	22.0	20.0	19.5	14	34	2.2	2.3	15	90	TO/SM/CA
A33	10 - 2000	9.5	8.5	8.0	0.8	1.0	4.5	5.5	6.0	3.0	2.5	2.0	15	15	2.0	2.2	15	14	TO/SM/CA
A38	10 - 2000	9.5	8.5	7.5	0.7	1.0	6.5*	7.7*	8.2*	19.0*	18.0*	17.5*	15	30	2.2	2.3	15	65	TO/SM/CA
A37	10 - 2000	10.0	8.5	8.0	0.8	1.0	6.8	7.5	8.0	15.0	14.0	13.5	14	28	2.0	2.1	15	47	TO/SM/CA
A32-1	100 - 2000	10.0	9.0	8.5	0.7	1.0	2.5	3.0	3.5	15.5	13.5	12.5	20	25	2.1	2.3	5	44	TO/SM/CA
A32	100 - 2000	10.0	9.0	8.5	0.7	1.0	3.5	4.0	4.5	21.0	19.0	18.0	20	32	2.1	2.3	15	94	TO/SM/CA
PA38	200 - 2000	10.0	8.5	8.0	0.7	1.0	4.0	4.7	5.2	23.0	21.5	21.0	17	34	1.9	2.0	15	150	TO/SM/CA
A35	10 - 2000	10.0	9.0	8.5	0.6*	0.8*	5.0	6.5	7.0	9.0	7.0	6.5	16	21	2.0*	2.2*	15	24	TO/SM/CA
A31-1	10 - 2000	11.5	11.0	10.5	0.7	1.0	3.5	4.0	4.5	-2.0	-4.0	-4.5	17	9	1.9	2.0	15	9	TO/SM/CA
A34	100 - 2000	16.0	15.0	14.0	0.7	1.0	5.5	6.5	7.0	7.0	6.0	5.0	35	18	1.9	2.0	15	35	TO/SM/CA
A36	100 - 2000	16.5	15.5	14.5	0.8	1.0	5.5	7.0	7.5	12.0	11.0	10.5	29	23	1.9	2.0	15	63	TO/SM/CA
RA36	100 - 2000	24.0	23.0	22.0	0.9	1.0	5.5	6.5	7.0	13.0	12.0	11.5	45	22	1.8	2.0	15	76	TO/SM/CA
A34-1	1500 - 2300	14.5	13.7	12.5	0.6	0.8	5.7	6.8	7.3	8.0	6.5	6.0	29	20	2.0	2.1	15	34	TO/SM/CA
A36-1	100 - 2300	16.2	15.0	14.0	0.7	1.2	6.0	7.0	7.5	12.0	11.0	10.5	29	23	2.0	2.2	15	63	TO/SM/CA
A33-1	2 - 2400	9.0	8.2	7.8	0.6	0.8	4.0*	5.0*	5.5*	6.0	4.5	4.0	15	19	1.9	2.0	15	19	TO/SM/CA

Notes: 1. Typical and guaranteed specifications measured in a 50-ohm system at the nominal power supply voltage
2. To order a product in a surface mount version simply add "SM" before the part number
3. To order a SMA connectorized version simply add "C" before the part number
4. TO (TO-8); SM (surface mount); CA (SMA connectorized)

*See data sheet for complete specification limits
**Preliminary Specifications

High Performance TO-8 Cascadable Amplifiers¹ (continued)

Part Number	Frequency Range (MHz)	Small Signal Gain (dB)			Gain Flatness (±dB)		Noise Figure (dB)			Power Output at 1 dB Compression (dBm)			Rev. Iso. dB Typ.	IP3 (dBm) Typ.	VSWR In/Out		DC		Package Type ^{2,3,4}	
		Min.	Min.	Min.	Max.	Max.	Max.	Max.	Typ.	Min.	Min.	Max.			Max.	Max.	Max.	Volts		mA
		Typ.	0/50°C	-54/85°C	0/50°C	-54/85°C	Typ.	0/50°C	-54/85°C	Typ.	0/50°C	-54/85°C			Typ.	0/50°C	-54/85°C	Typ.		0/50°C
A35-1	2 - 2400	9.0	8.5	8.0	0.6	0.8	4.2*	5.0*	5.5*	9.5	8.5	8.0	16	23	1.9	2.0	15	28	TO/SM/CA	
A3010	.010 - 2500	9.5	8.5	8.0	1.0	1.2	4.5*	5.5*	6.0*	19.0	17.0	16.5	16	35	2.2	2.3	12*	160*	TO/CA	
PA38-2	200 - 2600	8.5	7.5	7.0	0.7	1.0	4.5	5.5	6.0	23.5*	22.0*	21.4*	16	33	1.9	2.0	15	150	TO/SM/CA	
A36-2	100 - 2600	15.0	14.0	13.0	0.8	1.2	7.0	7.5	8.0	14.0*	12.5*	12.0*	28	30	2.2	2.3	15	63	TO/SM/CA	
A43	100 - 3200	11.5	10.5	9.8	0.7	1.0	7.0	7.5	8.0	8.5	7.0	6.5	27	21	2.3	2.4	15	45	TO/SM/CA	
A4011**	1000 - 4000	15.5	13.0	12.5	0.7	1.0	2.0	2.7	3.2	18.3	16.5	16.0	16	29	2.0	2.2	5	65	TO/SM/CA	
PA48	1000 - 4000	16.0	14.0	13.5	0.7	0.8	5.5	7.0	7.5	24.0	22.5	21.5	33	34	1.9*	2.1*	15	225	TO/SM/CA	
A45-1	1000 - 4000	17.5	16.5	15.5	0.8	1.0	4.0	5.0	5.5	13.0	12.5	12.0	36	26	1.9	2.0	5	65	TO/SM/CA	
A45	1000 - 4000	17.5	16.5	15.5	0.8	1.0	4.0*	5.0*	5.5*	19.5	18.0	17.0	36	29	2.1	2.2	15	120	TO/SM/CA	
RA46	1000 - 4000	25.5	24.0	23.5	0.8	1.0	4.5	5.2	5.7	19.0	17.0	16.5	50	30	2.0	2.1	12	175	TO/SM/CA	
A61	2000 - 6000	7.5	6.5	6.0	0.7	0.9	3.2	4.3	4.8	12.5	11.0	10.5	14	25	2.0	2.1	5	35	TO/SM/CA	
A6011**	2000 - 6000	14.8	13.5	12.5	0.9	1.1	1.5	2.5	3.0	18.0*	16.5*	16.0*	16	30	2.1*	2.2*	5	58	TO/SM/CA	
RA62	2000 - 6000	16.0	14.0	13.5	0.7	1.0	4.0	5.0	5.5	13.0	12.0	11.5	30	28	1.9	2.0	5	65	TO/SM/CA	
RA63-1	2000 - 6000	22.0	19.0	18.0	1.0	1.2	5.5	7.0	7.5	16.0	13.0	12.5	50	32	2.0*	2.0*	5	120	TO/SM/CA	

Notes: 1. Typical and guaranteed specifications measured in a 50-ohm system at the nominal power supply voltage
 2. To order a product in a surface mount version simply add "SM" before the part number
 3. To order a SMA connectorized version simply add "C" before the part number
 4. TO (TO-8); SM (surface mount); CA (SMA connectorized)

*See data sheet for complete specification limits
 **Preliminary Specifications

Low Voltage TO-8 Cascadable Amplifiers¹

Noise voltage = less than 8 volts

Part Number	Frequency Range (MHz)	Small Signal Gain (dB)			Gain Flatness (±dB)		Noise Figure (dB)			Power Output at 1 dB Compression (dBm)			Rev. Iso. dB Typ.	IP3 (dBm) Typ.	VSWR In/Out		DC		Package Type ^{2,3,4}	
		Min.	Min.	Min.	Max.	Max.	Max.	Max.	Typ.	Min.	Min.	Max.			Max.	Max.	Max.	Volts		mA
		Typ.	0/50°C	-54/85°C	0/50°C	-54/85°C	Typ.	0/50°C	-54/85°C	Typ.	0/50°C	-54/85°C			Typ.	0/50°C	-54/85°C	Typ.		0/50°C
A231	10 - 250	26.0	25.0	24.0	0.5	0.8	1.7	2.4	2.8	10.0	9.0	8.5	32	22	1.8	2.0	5	16	TO/SM/CA	
A83-1	10 - 250	35.5	34.0	33.0	0.5	0.8	2.5	3.0	3.5	-1.5	-2.5	-3.5	43	9	1.8	2.0	5	13	TO/SM/CA	
A87-2	10 - 300	16.0	15.0	14.5	0.5	0.8	2.9	3.5	4.0	11.0	9.0	8.5	20	24	1.8	2.0	5	15	TO/SM/CA	
A411	10 - 400	15.8	15.0	14.5	0.5	0.8	3.0	3.5	4.0	10.0	9.0	8.5	20	24	1.8	2.0	5	16	TO/SM/CA	
A72	5 - 500	15.0	14.0	13.5	0.7	1.0	3.3	4.0	4.5	12.5	11.5	11.0	20	26	1.7	1.8	5	31	TO/SM/CA	
A74-2	5 - 500	26.0	25.0	24.0	1.0	1.2	3.8	4.3	4.8	-1.0	-2.0	-2.0	36	10	1.9	2.0	5	13	TO/SM/CA	
A76-1	5 - 500	27.5	26.0	25.0	0.8	1.0	3.0	4.0	4.5	12.7	12.0	11.0	36	25	1.9	2.0	5	48	TO/SM/CA	
A83	10 - 500	30.0	29.0	28.0	0.5	0.8	3.0	3.5	4.0	-1.0	-2.0	-4.0	40	10	1.8	2.0	5	13	TO/SM/CA	
A531	2 - 500	31.7	30.0	29.0	0.8	1.0	2.0	2.5	3.0	2.5	1.5	0.5	38	14	1.8	2.0	5	17	TO/SM/CA	
A611	5 - 600	15.0	14.0	13.5	0.6	0.8	3.2	3.8	4.5	12.5	11.0	10.5	20	24	1.8	1.9	5	31	TO/SM/CA	
A1021**	10 - 1000	26.0	25.0	24.0	0.7	0.9	3.8	4.5	5.0	14.5	14.0	13.0	35	26	1.9	2.0	5	60	TO/SM/CA	
A66-3	10 - 1000	26.0	24.5	24.0	0.7	1.0	3.0	3.5	4.0	3.0	1.5	1.0	36	13	1.8	2.0	5	16	TO/SM/CA	
A1031	10 - 1000	28.5	26.5	26.0	0.8	1.0	2.7	3.5	4.0	10.0	9.0	8.5	35	22	1.9	2.0	5	36	TO/SM/CA	
A16-2	10 - 1200	13.0	12.0	11.5	0.5	0.7	3.5	4.0	4.5	6.0	5.0	4.5	16	18	1.9	2.0	5	15	TO/SM/CA	
A1212	100 - 1200	14.0	12.5	11.5	1.0	1.2	1.8	2.3	2.7	19.0	17.0	16.0	23	29	2.1	2.3	5	70	TO/SM/CA	
A1211	10 - 1200	14.0	12.5	12.0	0.6	0.8	2.8	3.5	4.0	6.0	5.0	4.5	16	20	1.9	2.0	5	16	TO/SM/CA	
A28-2	10 - 1500	14.0	13.0	12.5	0.5	1.0	3.5	4.5	5.0	10.0	7.5*	7.0*	16	24	1.9	2.0	5	27	TO/SM/CA	
A32-1	100 - 2000	10.0	9.0	8.5	0.7	1.0	3.0	3.5	4.0	13.0	11.5	11.0	20	25	2.1	2.3	5	44	TO/SM/CA	
A4011**	1000 - 4000	16	13.0	12.5	0.7	1.0	2.0*	2.7*	3.2*	18.3	16.5	16.0	16	29	2.0*	2.2*	5	65	TO/SM/CA	
A45-1	1000 - 4000	17.5	16.5	15.5	0.8	1.0	4.0	5.0	5.5	13.0	12.5	12.0	36	26	1.9	2.0	5	65	TO/SM/CA	
A61	2000 - 6000	7.5	6.5	6.0	0.7	0.9	3.2	4.3	4.8	12.5	11.0	10.5	14	25	2.0	2.1	5	35	TO/SM/CA	
A6011**	2000 - 6000	14.8	13.5	12.5	0.9	1.1	1.5	2.5	3.0	18.0*	16.5*	16.0*	16	30	2.1*	2.2*	5	58	TO/SM/CA	
RA62	2000 - 6000	16.0	14.0	13.5	0.7	1.0	4.0	5.0	5.5	13.0	12.0	11.5	30	28	1.9	2.0	5	65	TO/SM/CA	
RA63-1	2000 - 6000	19.5	16.5	15.5	1.0	1.2	5.5	7.0	7.5	16.0	13.0	12.5	50	32	2.0*	2.1*	5	120	TO/SM/CA	

RF and Microwave Components

Low Noise TO-8 Cascadable Amplifiers¹

Noise voltage = less than 3.0 dB Typical

Part Number	Frequency Range (MHz)	Small Signal Gain (dB)			Gain Flatness (±dB)		Noise Figure (dB)			Power Output at 1 dB Compression (dBm)			Rev. Iso. dB Typ.	IP3 (dBm) Typ.	VSWR In/Out		DC		Package Type ^{2,3,4}
		Typ.	Min. 0/50°C	Min. -54/85°C	Max. 0/50°C	Max. -54/85°C	Typ.	Max. 0/50°C	Max. -54/85°C	Typ.	Min. 0/50°C	Min. -54/85°C			Max. 0/50°C	Max. -54/85°C	Volts Nom.	mA Typ.	
A80-1	10 - 200	27.3	26.0	25.0	0.7	1.0	2.0	2.5	3.0	16.0	14.5	14.0	33	28	1.8	2.0	15	30	TO/SM/CA
A70	10 - 250	8.0	7.3	6.8	0.5	0.7	1.6	2.3	2.8	8.0	7.5	7.0	11	24	2.1	2.3	15	10	TO/SM/CA
A70-1	10 - 250	8.0	7.5	7.0	0.5	0.7	1.8	2.3	2.8	14.0	13.0	12.5	11	28	2.1	2.3	15	15	TO/SM/CA
A70-2	10 - 250	8.0	7.0	6.5	0.5	0.7	2.2	2.7	3.2	19.0	18.0	17.5	11	38	2.1	2.3	15	25	TO/SM/CA
A70-3	20 - 250	8.0	7.0	6.5	0.5	1.0	2.8	3.2	3.7	21.0	20.5	20.0	11	40	2.1	2.3	15	37	TO/SM/CA
A71	10 - 250	18.0	16.5	16.0	0.8	1.0	2.1	2.5	2.8	-2.5	-3.0	-3.5	22	10	1.9	2.0	15	9	TO/SM/CA
A82-1	20 - 250	19.0	17.5	17.0	0.7	1.0	2.8	3.5	4.0	15.0	14.0	13.0	34	26	1.9	2.0	15	50	TO/SM/CA
A82	20 - 250	24.5	23.0	22.5	0.7	1.0	2.8	3.5	4.0	20.0	19.0	18.0	29	31	1.7	1.9	15	50	TO/SM/CA
A81-1	20 - 250	25.0	24.0	23.5	0.5	0.7	2.5	3.3	3.8	13.5	12.5	12.0	31	27	1.9	2.0	15	25	TO/SM/CA
A81	20 - 250	25.5	24.5	24.0	0.5	0.7	3.0	3.5	4.0	17.0	16.0	15.5	31	28	1.9	2.0	15	33	TO/SM/CA
A231	10 - 250	26.0	25.0	24.0	0.5	0.8	1.7	2.4	2.8	10.0	9.0	8.5	32	22	1.8	2.0	5	16	TO/SM/CA
A83-1	10 - 250	35.5	34.0	33.0	0.5	0.8	2.5	3.0	3.5	-1.5	-2.5	-3.5	43	9	1.8	2.0	5	13	TO/SM/CA
A87-2	10 - 300	16.0	15.0	14.5	0.5	0.8	2.9	3.5	4.0	11.0	9.0	8.5	20	24	1.8	2.0	5	15	TO/SM/CA
A51	10 - 400	15.0	14.0	13.0	0.7	1.0	2.7	3.0	3.5	-3.0	-3.5	-3.5	20	10	1.7	2.0	15	7	TO/SM/CA
A411	10 - 400	15.8	15.0	14.5	0.5	0.8	3.0	3.5	4.0	10.0	9.0	8.5	20	24	1.8	2.0	5	16	TO/SM/CA
A53	10 - 500	15.0	14.0	13.5	0.8	1.0	3.0	3.5	4.0	3.5	2.0	1.5	20	16	2.0	2.1	15	12	TO/SM/CA
A1	5 - 500	16.0	15.0	14.5	0.7	1.0	2.4	3.0	3.5	-1.0	-2.0	-3.0	19	11	1.8	2.0	15	9	TO/SM/CA
A75-3	10 - 100	20.5	19.5	19.0	0.5	0.7	1.7	2.3	2.8	3.0	2.0	1.5	25	16	1.8	2.0	15	14	TO/SM/CA
A75	5 - 500	21.0	19.5	19.0	0.5	0.7	2.1	2.7	3.0	9.0	8.0	7.0	25	21	1.8	2.0	15	24	TO/SM/CA
A81-2	20 - 500	24.5	23.0	22.5	0.5	0.7	3.0	3.5	4.0	15.0	14.0	13.5	33	28	1.8	2.0	15	29	TO/SM/CA
A76-A	5 - 500	27.5	26.0	25.0	0.8	1.0	3.0	4.0	4.5	12.7	12.0	11.0	36	25	1.9	2.0	5	48	TO/SM/CA
A76-A	5 - 500	28.0	27.0	26.0	0.7	1.0	3.0	3.5	4.0	14.7	14.0	13.5	37	28	1.8	2.0	15	60	TO/SM/CA
A80	20 - 500	29.0	27.5	26.5	0.7	1.0	2.3	3.0	3.4	14.3	13.0	12.5	39	27	2.1	2.3	15	45	TO/SM/CA
A83	10 - 500	30.0	29.0	28.0	0.5	0.8	3.0	3.5	4.0	-1.0	-2.0	-4.0	40	10	1.8	2.0	5	13	TO/SM/CA
A74	5 - 500	30.0	28.0	27.0	0.7	1.0	3.0	4.0	4.5	8.5	7.5	7.0	40	20	1.8	2.0	15	40	TO/SM/CA
A531	2 - 500	31.7	30.0	29.0	0.8	1.0	2.0	2.5	3.0	2.5	1.5	0.5	38	14	1.8	2.0	5	17	TO/SM/CA
RA76	10 - 500	40.5	38.5	37.5	0.9	1.2	3.0	3.8	4.3	15.0	13.3	12.3	52	26	1.8	2.0	15	81	TO/SM/CA
A12	10 - 1000	16.0	15.0	14.5	0.7	1.0	2.8	3.5	3.9	8.0	7.0	6.5	20	22	1.9	2.0	15	22	TO/SM/CA
A11-2	5 - 1000	16.0	15.0	14.5	0.9	1.0	2.5	3.0	3.5	-1.0	-3.0	-3.5	21	10	1.9	2.0	15	9	TO/SM/CA
A63	5 - 1000	16.0	15.0	14.5	0.7	1.0	3.0	4.0	4.5	4.0	2.0	1.5	20	15	1.9	2.0	15	14	TO/SM/CA
A64	10 - 1000	26.0	24.0	23.0	0.8	1.0	3.0	3.8	4.3	8.0	7.0	6.5	34	20	1.7	1.8	15	35	TO/SM/CA
A66-3	10 - 1000	26.0	24.5	24.0	0.7	1.0	3.0	3.5	4.0	3.0	1.5	1.0	36	13	1.8	2.0	5	16	TO/SM/CA
A66-1	10 - 1000	27.5	26.0	25.5	0.7	1.0	2.9*	3.5*	4.0*	15.0	14.5	14.0	33	28	1.8	2.0	15	66	TO/SM/CA
A1031	10 - 1000	28.5	26.5	26.0	0.8	1.0	2.7	3.5	4.0	10.0	9.0	8.5	35	22	1.9	2.0	5	36	TO/SM/CA
A21-1	5 - 1200	15.5	14.0	13.5	0.5	1.0	2.4	3.5	3.9	-1.0	-2.0	-3.0	20	11	1.9	2.0	15	10	TO/SM/CA
A1211	10 - 1200	14.0	12.5	12.0	0.6	0.8	2.8	3.5	4.0	6.0	5.0	4.5	16	20	1.9	2.0	5	15.5	TO/SM/CA
A1212	100 - 1200	14.0	12.5	11.5	1.0	1.2	1.8	2.3	2.7	19.0	17.0	16.0	23	29	2.1	2.3	5	70	TO/SM/CA
A25-1	2 - 1500	13.5	13.0	12.5	0.5	0.7	3.0*	3.5*	4.0*	9.0	8.0	7.5	18	22	1.9	2.0	15	24	TO/SM/CA
A32-1	100 - 2000	10.0	9.0	8.5	0.7	1.0	2.5	3.0	3.5	15.5	13.5	12.5	20	25	2.1	2.3	5	44	TO/SM/CA
A4011**	1000 - 4000	14.0	13.5	13.0	0.8	1.0	2.0*	2.5*	3.0*	18.0	17.5	17.0	16	29	2.0*	2.2*	5	55	TO/SM/CA
A6011**	2000 - 6000	14.0	13.0	12.5	1.0	1.2	2.0	2.5	3.0	18.0*	17.5*	17.0*	16	29	2.0*	2.2*	5	55	TO/SM/CA

Notes: 1. Typical and guaranteed specifications measured in a 50-ohm system at the nominal power supply voltage
 2. To order a product in a surface mount version simply add "SM" before the part number
 3. To order a SMA connectorized version simply add "C" before the part number
 4. TO (TO-8); SM (surface mount); CA (SMA connectorized)

*See data sheet for complete specification limits
 **Preliminary Specifications

Medium Power TO-8 Cascadable Amplifiers¹

Output power = greater than +20 dBm Typical volts

Part Number	Frequency Range (MHz)	Power Output Small Signal Gain (dB)			Gain Flatness (±dB)		Noise Figure (dB)			at 1 dB Compression (dBm)			Rev. Iso. dB Typ.	IP3 (dBm) Typ.	VSWR In/Out		DC		Package Type ^{2,3,4}
		Typ.	Min. 0/50°C	Min. -54/85°C	Max. 0/50°C	Max. -54/85°C	Typ.	Max. 0/50°C	Max. -54/85°C	Typ.	Min. 0/50°C	Min. -54/85°C			Max. 0/50°C	Max. -54/85°C	Volts Nom.	mA Typ.	
A70-3	20 - 250	8.0	7.0	6.5	0.5	1.0	2.8	3.2	3.7	21.0	20.5	20.0	11	40	2.1	2.3	15	37	TO/SM/CA
A181	10 - 250	16.5	15.5	14.5	0.7	0.8	3.8	4.5	5.0	22.0	20.0	19.5	22	35	1.9	2.1	15	95	TO/SM/CA
A82	20 - 250	24.5	23.0	22.5	0.7	1.0	2.8	3.5	4.0	20.0	19.0	18.0	29	31	1.7	1.9	15	50	TO/SM/CA
A79	5 - 300	14.0	13.0	12.5	0.7	1.0	4.0	5.0	5.5	22.0	20.5	20.0	18	38	1.9	2.0	15	88	TO/SM/CA
A59	5 - 500	11.5	10.5	10.0	0.7	1.0	4.3	5.5	6.0	22.0	20.5	20.0	16	36	1.9	2.0	15	88	TO/SM/CA
PA511	10 - 500	12.7	11.5	11.0	0.5	0.8	4.6	5.0	5.5	24.8	23.5	23.0	17	40	1.8	2.0	15	118	TO/SM/CA
A511	10 - 500	17.0	16.0	15.5	0.8	1.0	3.5	4.2	4.7	21.0	20.0	19.5	16	34	1.9	2.0	15	52	TO/SM/CA
A88	5 - 500	18.7	18.0	17.5	0.5	0.7	6.5	7.5	8.0	20.5	19.5	19.0	19	30	1.8	2.0	15	79	TO/SM/CA
RA89	5 - 500	26.5	25.5	25.0	0.7	1.0	3.7	4.5	5.0	21.5	20.5	20.0	36	35	1.8	2.0	15	130	TO/SM/CA
RA889-1	10 - 500	30.0	29.0	28.0	0.7	1.0	3.2	4.5	5.0	21.5	20.0	20.0	36	36	1.8	2.0	15	130	TO/SM/CA
A59-1	10 - 700	10.5	9.5	9.0	0.8	1.0	6.0	7.5	8.0	22.0	20.5	20.0	16	36	1.9	2.0	15	88	TO/SM/CA
A19-1	10 - 1000	11.5	10.5	10.0	0.6	0.8	5.5	6.5	7.0	22.5	20.5	20.0*	16	35	1.7	2.0	15	90	TO/SM/CA
RA69	10 - 1000	25.0	24.0	23.0	0.7	1.0	4.5	5.5	6.0	23.0	20.5	20.0	33	34	1.9	2.0	15	130	TO/SM/CA
A29-1	10 - 1500	9.0	8.5	7.5	0.5	1.0	8.0*	9.0*	9.5*	22.0	20.0	19.0	14	32	1.9	2.0	15	90	TO/SM/CA
A39	10 - 2000	7.5	6.5	6.0	0.7	1.0	8.5*	9.5*	10.0*	22.0	20.0	19.5*	14	34	2.2	2.3	15	90	TO/SM/CA
PA38	200 - 2000	10.0	8.5	8.0	0.7	1.0	4.0	4.7	5.2	23.0	21.5	21.0	17	34	1.9	2.0	15	150	TO/SM/CA
A32	100 - 2000	10.0	9.0	8.5	0.7	1.0	3.5	4.0	4.5	21.0	19.0	18.0	20	32	2.1	2.3	15	94	TO/SM/CA
PA38-2	200 - 2600	8.5	7.5	7.0	0.7	1.0	4.5	5.5	6.0	22.5*	20.5*	20.0*	16	33	1.9	2.0	15	150	TO/SM/CA
PA48	1000 - 4000	16.0	14.0	13.5	0.7	0.8	5.5	7.0	7.5	24.0	22.5	21.5	33	34	1.9*	2.1*	15	225	TO/SM/CA

Signal Limiters¹

Part Number	Frequency Range (MHz)	Insertion Loss (dB)			Limiting Level (Typ.) (dB)			Input VSWR In/Out		Output VSWR In/Out		DC Volts Nom.	DC mA Typ.	Package Type ^{2,3,4}
		Typ.	Min. 0/50°C	Min. -54/85°C	Typ.	Max. 0/50°C	Max. -54/85°C	Max. 0/50°C	Max. -54/85°C	Max. 0/50°C	Max. -54/85°C			
L1	5 - 1000	2.0	3.0	3.5	2.5	4.0	4.5	1.9	2.1	2.0*	2.2*	15	7	TO/SM/CA
	1000 - 3000	3.0	4.5	5.5	4.5	4.0*	4.5*	1.9	2.1	2.0*	2.2*	15	7	
L42	50 - 3000	3.5	4.5	5.0	2.5	4.0*	4.5*	1.9	2.1	2.3	2.5	15	7	TO/SM/CA
	3000 - 4000	4.0	5.0	6.0	4.5	4.0*	4.5*	1.9	2.1	2.3	2.5	15	7	

Limiting Amplifiers¹

Part Number	Frequency Range (MHz)	Small Signal Gain (dB)			Gain Flatness (±dB)		Noise Figure (dB)			Power Output at 1 dB Compression (dBm)			Output Limiting Level (dBm)		VSWR In/Out		DC		Package Type ^{2,3,4}
		Typ.	Min. 0/50°C	Min. -54/85°C	Max. 0/50°C	Max. -54/85°C	Typ.	Max. 0/50°C	Max. -54/85°C	Typ.	Min. 0/50°C	Min. -54/85°C	Max. 0/50°C	Max. -54/85°C	Max. 0/50°C	Max. -54/85°C	Volts Nom.	mA Typ.	
AL7	50 - 300	13.0	12.0	11.0	0.5	0.7	5.0	6.0	6.5	-1.5	-5.0	-7.0	1.5	2.5	1.7*	1.8*	15	54	TO/SM/SMA
	300 - 500	13.0	12.0	11.0	0.5	0.7	5.5	6.5	7.0	-1.5	-5.0	-7.0	1.5	2.5	1.7*	1.8*	15	54	
LA7	50 - 300	12.5	12.0	11.0	0.5	0.7	7.0	8.0	8.5	12.0	11.0	8.0	16.0	17.0	1.7	2.0	15	54	TO/SM/SMA
	300 - 500	12.5	12.0	11.0	0.5	0.7	7.5	8.5	9.0	11.5	10.0	7.0	16.0	17.0	1.7	2.0	15	54	
LA17	10 - 1000	11.5	10.5	9.5	0.5	0.7	5.8	6.7	7.2	10.0	7.0	5.0	16.0	17.0	1.9	2.0	15	55	TO/SM/SMA
LA45	1000 - 4000	11.5	10.0	9.0	0.8	1.0	8.0	9.5	10.0	14.0	12.5	11.5	17.0	17.5	2.0*	2.1*	15	110	TO/SM/SMA
LA45-1	1000 - 4000	14.0	13.0	12.0	0.8	1.0	7.5	9.0	9.5	17.0	15.5	14.5	20.5	21.0	2.0*	2.1*	15	110	TO/SM/SMA

Notes: 1. Typical and guaranteed specifications measured in a 50-ohm system at the nominal power supply voltage
 2. To order a product in a surface mount version simply add "SM" before the part number
 3. To order a SMA connectorized version simply add "C" before the part number
 4. TO (TO-8); SM (surface mount); CA (SMA connectorized)

*See data sheet for complete specification limits
 **Preliminary Specifications

RF and Microwave Components

Voltage Controlled Attenuators¹

Part Number	Frequency Range (MHz)	Insertion Loss (dB)			Max. Attenuation (dB)			VSWR In/Out		Switching Speed (µsec) 10-90%		Bias		Control		Package Type ^{2,3,4}
		Typ.	Max. 0/50°C	Max. -54/85°C	Typ.	Min. 0/50°C	Min. -54/85°C	0/50°C	Max. -54/85°C	Max. 0/50°C	Max. -54/85°C	V Nom.	mA Typ.	V Nom.	mA Typ.	
G1	5 - 1000	2.0	2.5	2.8	36.0*	31.0*	30.0*	2.2	2.3	120	140	15	10	0 - +15	4	TO/SM/CA
	1000 - 2000	2.5	3.0	3.3	23.0	18.0	17.0	2.2	2.3	120	140					
G2	5 - 1000	2.3	3.0	3.5	34.0*	31.0*	30.0*	2.2	2.3	50	60	5	5	0 - +15	4	TO/SM/CA
	1000 - 2000	2.8	3.5	4.0	22.0	20.0	18.0	2.2	2.3	50	60					
G30	100 - 1000	2.1*	2.8*	3.0*	50.0*	40.0*	37.0*	2.0*	2.0*	0.4	0.6	15	7	0 - +15	7	TO/SM/CA
	1000 - 2000	3.0	3.5	3.8	38.0	30.0	27.0	2.0*	2.0*	0.4	0.6					
G40	500 - 1000	2.2	3.0	3.5	39.0*	34.0*	33.0*	2.2	2.3	0.8	0.9	15	9.5	0 - +15	6	TO/SM/CA
	1000 - 4000	2.7	3.5	4.0	30.0*	25.0*	24.0*	2.2	2.3	0.8	0.9					

Attenuator Linearizers¹

Part Number		Typical Current Drain						Linearity Specifications				Package Type ^{2,3,4}
		Minimum Attenuation			Maximum Attenuation			25°C		-54/85°C		
		-V	+V	Vcon	-V	+V	Vcon	Typ.	Max.	Typ.	Max.	
LG1	Linearizer (Specifications apply to LG1 used in conjunction with G1 attenuator)	5 mA	31 mA	15 mA	5 mA	21 mA	2.5 mA	< ±1 dB	< ±1.5 dB	< ±1.5 dB	< ±2.0 dB	TO/SM/CA
LG30	Linearizer (Specifications apply to LG30 used in conjunction with G30 attenuator)	3 mA	12 mA	6 mA	15 mA	21 mA	12 mA	< ±1 dB	< ±1.5 dB	< ±1.5 dB	< ±2.0 dB	TO/SM/CA

- Notes: 1. Typical and guaranteed specifications measured in a 50-ohm system at the nominal power supply voltage
 2. To order a product in a surface mount version simply add "SM" before the part number
 3. To order a SMA connectorized version simply add "C" before the part number
 4. TO (TO-8); SM (surface mount); CA (SMA connectorized)

*See data sheet for complete specification limits
 **Preliminary Specifications

RF Switches¹

Part Number	Frequency Range (MHz)	Insertion Loss (dB)			Isolation (dB)			Switching Speed (µsec)		VSWR In/Out		DC Volts Nom.	DC mA Typ.	Package Type ²
		Typ.	Min. 0/50°C	Min. -54/85°C	Typ.	Max. 0/50°C	Max. -54/85°C	Max. 0/50°C	Max. -54/85°C	Max. 0/50°C	Max. -54/85°C			
S10	10 - 100	1.7	2.3	2.7	67	54	52	5	6	2.4	2.6	+0.7/-0.7	+20/-20	TO
	100 - 300	2.0	2.6	3.0	62	50	48	5	6	2.4	2.6	+0.7/-0.7	+20/-20	
	300 - 500	2.5	4.0	4.5	48	39	36	5	6	2.4	2.6	+0.7/-0.7	+20/-20	
S11	10 - 100	1.7	2.3	2.7	67	54	52	20	20	2.4	2.6	5	45	TO
	100 - 300	2.0	2.6	3.0	62	50	48	20	20	2.4	2.6	5	45	
	300 - 500	2.5	4.0	4.5	48	39	36	20	20	2.4	2.6	5	45	

- Notes: 1. Typical and guaranteed specifications measured in a 50-ohm system at the nominal power supply voltage
 2. TD (TO-8), TO-88 and TO-5)

RF Mixers¹

Frequency = DC to 5 GHz

Part Number	Frequency Range (MHz)			LO Power Nominal (dBm)	Conversion Loss Noise Figure (dB)		Isolation Typical (dB)				Input IP3 (dBm) Typ.	Package Type ⁴
	RF	LO	IF		Typ. ²	Max. ³	L-R Typ. ²	L-R Min. ³	L-I Typ. ²	L-I Min. ³		
M6D-50	0.05 - 200	0.05 - 200	DC - 200	7	7.0	8.5	50	35	43	30	10	PC
SM6D	0.05 - 200	0.05 - 200	DC - 200	7	7.0	8.5	53	35	48	30	13	SM
M93	1 - 400	1 - 400	DC - 400	27	7.0	9.0	40	25	45	25	32	PC
M6E-50	5 - 500	5 - 500	DC - 500	7	7.5	9.0	43	30	38	25	10	PC
M98C	0.5 - 500	0.5 - 500	DC - 500	17	7.0	9.0	52	35	43	25	23	PC
M6V	0.4 - 500	0.4 - 500	DC - 500	7	6.5	7.5	47	30	37	20	13	TO
SM6V	0.4 - 500	0.4 - 500	DC - 500	7	6.5	7.5	47	30	37	20	13	SM
M6EH	5 - 500	5 - 500	DC - 500	20	6.0	8.5	47	20	42	18	28	PC
M6R	10 - 1000	10 - 1200	DC - 1000	7	7.0	9.5	38	20	28	15	13	TO
M2E	10 - 1000	10 - 1000	DC - 600	20	8.0	11.0	33	18	33	14	30	TO
SM2E	10 - 1000	10 - 1000	DC - 600	20	8.0	11.0	33	18	33	14	30	SM
M2EC	10 - 1000	10 - 1000	DC - 600	20	8.5	11.5	33	18	33	14	30	SMA
M2A	10 - 1500	10 - 1500	DC - 800	7	7.5	9.0	40	25	32	18	12	TO
M2AC	10 - 1500	10 - 1500	DC - 800	7	8.0	9.5	40	25	32	18	12	SMA
M4A	10 - 1500	10 - 1500	DC - 1000	7	7.5	9.5	35	35	30	30	13	FP
SM4A	10 - 1500	10 - 1500	DC - 1000	7	7.5	9.5	35	35	30	30	13	SM
M4B	10 - 1500	10 - 1500	DC - 1000	13	7.5	9.5	35	35	30	30	22	FP
SM4B	10 - 1500	10 - 1500	DC - 1000	13	7.5	9.5	35	35	30	30	22	SM
M2BC	10 - 1600	10 - 1600	DC - 800	13	7.5	9.0	43	25	32	18	22	TO
M2BC	10 - 1600	10 - 1600	DC - 800	13	8.0	9.5	43	25	32	18	22	SMA
M9H	10 - 1500	10 - 1600	DC - 600	20	8.0	9.5	29	20	27	13	24	TO
M9HC	10 - 1500	10 - 1600	DC - 600	20	8.5	10.0	29	20	27	13	24	SMA
M2T	10 - 2400	10 - 2400	1 - 1000	13	8.0	10.0	40	35	40	30	22	TO
M2TC	10 - 2400	10 - 2400	1 - 1000	13	8.5	10.5	40	35	40	30	22	SMA
M4G	800 - 2400	800 - 3500	DC - 1500	7	7.5	9.0	32	20	25	18	13	FP
SM4G	800 - 2400	800 - 3500	DC - 1500	7	7.5	9.0	32	20	25	18	13	SM
M2G	1000 - 2200	800 - 3500	DC - 1500	7	8.0	9.5	28	17	25	20	12	TO
M2GC	1000 - 2200	800 - 3500	DC - 1500	7	8.5	10.0	28	17	25	20	12	SMA
M4T	1 - 3400	1 - 3400	1 - 2000	10	8.0	10.5	35	25	35	25	18	FP
SM4T	1 - 3400	1 - 3400	1 - 2000	10	8.0	10.5	35	25	35	25	18	SM
M4TH	1 - 3400	1 - 3400	1 - 2000	23	8.0	10.5	35	26	38	27	29	FP
SM4TH	1 - 3400	1 - 3400	1 - 2000	23	8.0	10.5	35	26	38	27	29	SM
SM4T17	1 - 3400	1 - 3400	1 - 2400	17	8.0	10.5	35	25	35	25	24	SM
M8T	1 - 3400	1 - 3400	1 - 2000	10	7.0	10.5	38	25	38	25	18	TO
M8TC	1 - 3400	1 - 3400	1 - 2000	10	7.5	11.0	38	25	38	25	18	SMA
M8TH	1 - 3400	1 - 3400	1 - 2000	23	7.5	10.5	36	22	38	25	29	TO
M8THC	1 - 3400	1 - 3400	1 - 2000	23	8.0	11.0	36	22	38	25	29	SMA
M8H-3	3700 - 4200	2000 - 6000	DC - 2000	7	5.0	7.0	40	25	21	16	13	TO
M8HC-3	3700 - 4200	2000 - 6000	DC - 2000	7	5.5	7.5	40	25	21	16	13	SMA
M5T*	50 - 5000	50 - 5000	50 - 3000	10	8.0	11.3	32	23	38	25	18	FP
SM5T*	50 - 5000	50 - 5000	50 - 3000	10	7.5	10.5	32	23	38	25	18	SM
SM5T17*	50 - 5000	50 - 5000	50 - 3000	17	7.5	10.5	32	23	38	25	24	SM
SM5TH*	50 - 5000	50 - 5000	50 - 3000	23	7.7	10.5	32	23	38	25	29	SM

Notes: 1. Typical and guaranteed specifications measured in a 50-ohm system at the nominal power supply voltage
 2. To order a product in a surface mount version simply add "SM" before the part number
 3. To order a SMA connectorized version simply add "C" before the part number
 4. TO (TO-8); SM (surface mount); CA (SMA connectorized)

*See data sheet for complete specification limits
 **Preliminary Specifications

RF and Microwave Components

Microwave Mixers¹

Frequency = 1 to 5 GHz

Part Number	Frequency Range (MHz)			LO Power Nominal (dBm)	Conversion Loss Noise Figure (dB)		Isolation Typical (dB)				Input IP3 (dBm) Typ.	Package Type ⁴
	RF	LO	IF		Typ. ²	Max. ³	L-R Typ. ²	L-R Min. ³	L-I Typ. ²	L-I Min. ³		
M63	2.5 - 5.5	2.5 - 7.0	DC - 15	9	5.5	7.0	40	30	28	17	11	MPAC
M63C	2.5 - 5.5	2.5 - 7.0	DC - 15	9	5.5	7.0	40	30	28	17	11	SMA
MY63	2.5 - 5.5	2.5 - 7.0	DC - 15	9	5.5	7.0	40	30	28	17	11	VPAC
MY63C	2.5 - 5.5	2.5 - 7.0	DC - 15	9	5.5	7.0	40	30	28	17	11	SMA
M63H	2.5 - 6.5	2.5 - 7.5	DC - 15	20	6.0	7.5	37	26	21	13	22	MPAC
M63HC	2.5 - 6.5	2.5 - 7.5	DC - 15	20	6.0	7.5	37	26	21	13	22	MA
MY63H	2.5 - 6.5	2.5 - 7.5	DC - 15	20	6.0	7.5	37	26	21	13	22	VPAC
MY63HC	2.5 - 6.5	2.5 - 7.5	DC - 15	20	6.0	7.5	37	26	21	13	22	SMA
MZ6310	2.5 - 6.5	2.5 - 7.0	DC - 15	10	6.5	9.0	37	20	25	12	15	VPAC
MZ6310C	2.5 - 6.5	2.5 - 7.0	DC - 15	10	6.5	9.0	37	20	25	12	15	SMA
M8H-7	2.4 - 6.0	2.0 - 6.0	DC - 2.0	7	6.0	9.0	40	25	21	16	13	TO
M8HC-7	2.4 - 6.0	2.0 - 6.0	DC - 2.0	7	6.5	9.5	40	25	21	16	13	SMA
M76	4.5 - 9.5	2.5 - 11.5	DC - 2.0	10	6.0	8.0	35	20	23	10	13	MPAC
M76C	4.5 - 9.5	2.5 - 11.5	DC - 2.0	10	6.0	8.0	35	20	23	10	13	SMA
MY76	4.5 - 9.5	2.5 - 11.5	DC - 2.0	10	6.0	8.0	35	20	23	10	13	VPAC
MY76C	4.5 - 9.5	2.5 - 11.5	DC - 2.0	10	6.0	8.0	35	20	23	10	13	SMA
M76H	4.5 - 9.5	2.5 - 11.5	DC - 2.0	20	7.0	9.5	35	22	26	15	24	MPAC
M76HC	4.5 - 9.5	2.5 - 11.5	DC - 2.0	20	7.0	9.5	35	22	26	15	24	SMA
MY76H	4.5 - 9.5	2.5 - 11.5	DC - 2.0	20	7.0	9.5	35	22	26	15	24	VPAC
MY76HC	4.5 - 9.5	2.5 - 11.5	DC - 2.0	20	7.0	9.5	35	22	26	15	24	SMA
MY84	1.8 - 10.0	1.8 - 10.0	DC - 1.0	9	6.5	8.5	39	20	30	18	11	VPAC
MY84C	1.8 - 10.0	1.8 - 10.0	DC - 1.0	9	6.5	8.5	39	20	30	18	11	SMA
M12A	4.0 - 12.0	2.0 - 12.0	0.05 - 4.0	13	6.5	9.0	25	15	30	18	20	SMA
M77	8.0 - 12.5	7.0 - 15.0	DC - 2.5	10	5.5	8.0	35	20	25	10	15	MPAC
M77C	8.0 - 12.5	7.0 - 15.0	DC - 2.5	10	5.5	8.0	35	20	25	10	15	SMA
MY77	8.0 - 12.5	7.0 - 15.0	DC - 2.5	10	5.5	8.0	35	20	25	10	15	VPAC
MY77C	8.0 - 12.5	7.0 - 15.0	DC - 2.5	10	5.5	8.0	35	20	25	10	15	SMA
M14A	6.0 - 14.0	4.0 - 16.0	DC - 2.0	7	6.5	9.0	32	15	31	12	10	SMA
M67	9.0 - 15.0	7.0 - 17.0	DC - 2.5	10	6.5	9.0	35	10	25	15	11	MPAC
M67C	9.0 - 15.0	7.0 - 17.0	DC - 2.5	10	6.5	9.0	35	10	25	15	11	SMA
MZ7407	6.0 - 18.0	4.0 - 18.0	DC - 3.0	7	6.5	9.0	34	18	30	16	10	VPAC
MZ7407C	6.0 - 18.0	4.0 - 18.0	DC - 3.0	7	6.5	9.0	34	18	30	16	10	SMA
M74	7.0 - 18.0	5.0 - 18.0	DC - 3.0	10	6.5	9.0	35	10	25	15	11	MPAC
M74C	7.0 - 18.0	5.0 - 18.0	DC - 3.0	10	6.5	9.0	35	10	25	15	11	SMA
MZ7410	6.0 - 18.0	4.0 - 18.0	DC - 3.0	10	6.5	9.0	34	18	35	20	14	VPAC
MZ7410C	6.0 - 18.0	4.0 - 18.0	DC - 3.0	10	6.5	9.0	34	18	35	20	14	SMA
MZ7420	6.0 - 18.0	5.0 - 18.0	DC - 3.0	20	7.5	10.0	33	18	31	17	21	VPAC
MZ7420C	6.0 - 18.0	5.0 - 18.0	DC - 3.0	20	7.5	10.0	33	18	31	17	21	SMA
M79	7.0 - 18.0	5.0 - 18.0	DC - 3.0	10	7.0	9.0	32	15	29	12	14	MPAC
M79C	7.0 - 18.0	5.0 - 18.0	DC - 3.0	10	7.0	9.0	32	15	29	12	14	SMA
M79H	7.0 - 18.0	5.0 - 18.0	DC - 3.0	20	7.5	10.0	33	20	31	17	24	MPAC
M79HC	7.0 - 18.0	5.0 - 18.0	DC - 3.0	20	7.5	10.0	33	20	31	17	24	SMA
M80	6.0 - 18.0	4.0 - 18.0	DC - 3.0	7	6.5	9.0	34	18	33	16	10	MPAC
M80C	6.0 - 18.0	4.0 - 18.0	DC - 3.0	7	6.5	9.0	34	18	33	16	10	SMA
M86	6.0 - 18.0	3.5 - 18.0	DC - 3.0	7	7.0	9.0	34	18	33	16	10	MPAC
M86C	6.0 - 18.0	3.5 - 18.0	DC - 3.0	7	7.0	9.0	34	18	33	16	10	SMA
M85	2.0 - 18.0	2.0 - 18.0	DC - 1.0	7	8.0	10.5	35	22	20	15	10	MPAC
M85C	2.0 - 18.0	2.0 - 18.0	DC - 1.0	7	8.0	10.5	35	22	20	15	10	SMA
MY85	2.0 - 18.0	2.0 - 18.0	DC - 1.0	7	8.0	10.5	35	22	20	15	10	VPAC
MY85C	2.0 - 18.0	2.0 - 18.0	DC - 1.0	7	8.0	10.5	35	22	20	15	10	SMA
M93	2.0 - 18.0	2.0 - 18.0	0.03 - 4.0	7	8.0	11.0	29	15	34	16	16	MPAC
M93C	2.0 - 18.0	2.0 - 18.0	0.03 - 4.0	10	8.0	11.0	29	15	34	16	16	SMA
MY93	2.0 - 18.0	2.0 - 18.0	0.03 - 4.0	10	8.0	11.0	29	15	34	16	16	VPAC
MY93C	2.0 - 18.0	2.0 - 18.0	0.03 - 4.0	10	8.0	11.0	29	15	34	16	16	SMA

Microwave Mixers¹ (continued)

Frequency = 1 to 5 GHz

Part Number	Frequency Range (MHz)			LO Power Nominal (dBm)	Conversion Loss Noise Figure (dB)		Isolation Typical (dB)				Input IP3 (dBm) Typ.	Package Type ⁴
	RF	LO	IF		Typ. ²	Max. ³	L-R Typ. ²	L-R Min. ³	L-I Typ. ²	L-I Min. ³		
MZ9310	2.0 - 18.0	2.0 - 18.0	0.03 - 5.0	10	7.5	10.5	23	12	30	16	15	VPAC
MZ9310C	2.0 - 18.0	2.0 - 18.0	0.03 - 5.0	10	7.5	10.5	23	12	30	16	15	SMA
MZ9313	2.0 - 18.0	2.0 - 18.0	0.03 - 5.0	10	7.0	10.5	24	12	30	17	17	VPAC
MZ9313C	2.0 - 18.0	2.0 - 18.0	0.03 - 5.0	13	7.0	10.5	24	12	30	17	17	SMA
M83	1.0 - 18.0	2.0 - 18.0	0.03 - 5.0	13	7.5	10.0	25	16	30	20	18	MPAC
M83C	1.0 - 18.0	2.0 - 18.0	0.03 - 5.0	13	7.5	10.0	25	16	30	20	18	SMA
MY82	2.0 - 18.0	2.0 - 18.0	0.03 - 5.0	13	8.0	10.5	25	16	30	20	18	VPAC
MY82C	2.0 - 18.0	2.0 - 18.0	0.03 - 5.0	13	8.0	10.5	25	16	30	20	18	SMA
MY83H	2.0 - 18.0	2.0 - 18.0	0.03 - 5.0	20	8.5	11.0	21	12	30	20	25	VPAC
MY83HC	2.0 - 18.0	2.0 - 18.0	0.03 - 5.0	20	8.5	11.0	21	12	30	20	25	SMA
M89	1.0 - 18.0	2.0 - 18.0	1.0 - 8.0	10	8.0	10.5	28	15	32	16	16	MPAC
M89C	1.0 - 18.0	2.0 - 18.0	1.0 - 8.0	10	8.0	10.5	28	15	32	16	16	SMA
MY89	2.0 - 18.0	2.0 - 18.0	1.0 - 8.0	10	8.0	10.5	28	15	32	16	16	VPAC
MY89C	2.0 - 18.0	2.0 - 18.0	1.0 - 8.0	10	8.0	10.5	28	15	30	16	16	SMA
MZ8810	2.0 - 18.0	2.0 - 18.0	1.0 - 8.0	10	7.5	11.0	25	15	28	16	14	VPAC
MZ8810C	2.0 - 18.0	2.0 - 18.0	1.0 - 8.0	10	7.5	11.0	25	15	28	16	14	SMA
M88	1.0 - 18.0	2.0 - 18.0	1.0 - 8.0	13	8.0	11.0	28	15	32	16	20	MPAC
M88C	1.0 - 18.0	2.0 - 18.0	1.0 - 8.0	13	8.0	11.0	28	15	32	16	20	SMA
MY88	2.0 - 18.0	2.0 - 18.0	1.0 - 8.0	13	8.0	11.0	28	15	32	16	20	VPAC
MY88C	2.0 - 18.0	2.0 - 18.0	1.0 - 8.0	13	8.0	11.0	28	15	32	16	20	SMA
MZ8813	2.0 - 18.0	2.0 - 18.0	1.0 - 8.0	13	7.0	11.0	25	15	28	16	14	VPAC
MZ8813C	2.0 - 18.0	2.0 - 18.0	1.0 - 8.0	13	7.0	11.0	25	15	28	16	14	SMA
M88H	1.0 - 18.0	2.0 - 18.0	2.0 - 18.0	21	8.0	10.5	28	15	32	17	25	MPAC
M88HC	1.0 - 18.0	2.0 - 18.0	2.0 - 18.0	21	8.0	10.5	28	15	32	17	25	SMA
MY88H	2.0 - 18.0	2.0 - 18.0	2.0 - 18.0	21	8.0	10.5	28	15	32	17	25	VPAC
MY88HC	2.0 - 18.0	2.0 - 18.0	2.0 - 18.0	21	8.0	10.5	28	15	32	17	25	SMA
M87	2.0 - 18.0	2.0 - 18.0	0.03 - 5.0	13	9.0	12.0	24	10	32	22	17	MPAC
M87C	2.0 - 18.0	2.0 - 18.0	0.03 - 5.0	13	9.0	12.0	24	10	32	22	17	SMA
MY87	2.0 - 19.0	2.0 - 19.0	0.03 - 5.0	13	9.0	12.0	24	10	32	22	17	VPAC
MY87C	2.0 - 19.0	2.0 - 19.0	0.03 - 5.0	13	9.0	12.0	24	10	32	22	17	SMA
M52	2.0 - 24.0	2.0 - 24.0	0.1 - 5.0	10	8.0	12.5	22	15	25	15	16	MPAC
M52C	2.0 - 24.0	2.0 - 24.0	0.1 - 5.0	10	8.0	12.5	22	15	25	15	16	SMA
MY52	2.0 - 24.0	2.0 - 24.0	0.1 - 5.0	10	8.0	12.5	22	15	25	15	16	VPAC
MY52C	2.0 - 24.0	2.0 - 24.0	0.1 - 5.0	10	8.0	12.5	22	15	25	15	16	SMA
MZ5210	2.0 - 24.0	2.0 - 24.0	0.1 - 5.0	10	9.0	12.0	20	12	25	17	15	VPAC
MZ5210C	2.0 - 24.0	2.0 - 24.0	0.1 - 5.0	10	9.0	12.0	20	12	25	17	15	SMA
M53	2.0 - 26.0	2.0 - 26.0	0.1 - 6.0	10	8.0	12.5	22	15	25	15	16	MPAC
M53C	2.0 - 26.0	2.0 - 26.0	0.1 - 6.0	10	8.0	12.5	22	15	25	15	16	SMA
M50A	2.0 - 18.0	2.0 - 26.0	1.0 - 12.0	10	8.0	10.5	26	15	26	15	15	MPAC
M50AC	2.0 - 18.0	2.0 - 26.0	1.0 - 12.0	10	8.0	10.5	26	15	26	15	15	SMA
MY50A	2.0 - 18.0	2.0 - 26.0	1.0 - 12.0	10	8.0	10.5	26	15	26	15	15	VPAC
MY50AC	2.0 - 18.0	2.0 - 26.0	1.0 - 12.0	10	8.0	10.5	26	15	26	15	15	SMA
M51	2.0 - 24.0	2.0 - 24.0	1.0 - 15.0	10	8.0	11.5	25	15	26	15	15	MPAC
M51C	2.0 - 24.0	2.0 - 24.0	1.0 - 15.0	10	8.0	11.5	25	15	26	15	15	SMA
MY51	2.0 - 24.0	2.0 - 24.0	1.0 - 15.0	10	8.0	11.5	25	15	26	15	15	VPAC
MY51C	2.0 - 24.0	2.0 - 24.0	1.0 - 15.0	10	8.0	11.5	25	15	26	15	15	SMA
M50	2.0 - 26.0	2.0 - 26.0	1.0 - 15.0	10	8.0	11.5	26	15	26	15	15	MPAC
M50C	2.0 - 26.0	2.0 - 26.0	1.0 - 15.0	10	8.0	11.5	26	15	26	15	15	SMA
MY50	2.0 - 26.0	2.0 - 26.0	1.0 - 15.0	10	8.0	11.5	26	15	26	15	15	VPAC
MY50C	2.0 - 26.0	2.0 - 26.0	1.0 - 15.0	10	8.0	11.5	26	15	26	15	15	SMA
MZ5010	2.0 - 26.0	2.0 - 26.0	1.0 - 15.0	10	9.0	13.0	33	15	28	12	16	VPAC
MZ5010C	2.0 - 26.0	2.0 - 26.0	1.0 - 15.0	10	9.0	13.0	33	15	28	12	16	SMA

Notes: 1. Typical and guaranteed specifications measured in a 50-ohm system at the nominal LO drive and down converter application only, unless otherwise specified
 2. Typical values are measured at +25°C and are not guaranteed
 3. Maximum and minimum values are measured at +25°C and are guaranteed
 4. TO (TO-8 and TO-5); SM (surface mount); FP (flatpack); SMA (SMA connectorized); PC (relay can)

RF and Microwave Components

Open Carrier Mixers¹

Input Frequency = 2 to 16 GHz

Part Number	Frequency Range (MHz)			LO Power Nominal (dBm)	Conversion Loss Noise Figure (dB)		Isolation Typical (dB)				Input IP3 (dBm) Typ.	Package Type ⁴
	RF	LO	IF		Typ. ²	Max. ³	L-R Typ. ²	L-R Min. ³	L-I Typ. ²	L-I Min. ³		
MC2110	3.4 - 4.7	3.4 - 4.7	DC - 1.0	10	5.9	7.5	42	25	39	25	12.0	OC
MC2210	4.5 - 7.0	4.4 - 7.0	DC - 1.0	10	5.4	8.0	42	30	43	30	14.0	OC
MC2307	3.4 - 7.0	2.2 - 8.0	DC - 2.0	7	5.9	8.2	32	18	31	13	10.5	OC
MC2310	3.4 - 7.0	2.2 - 8.0	DC - 2.0	10	5.9	8.2	32	18	31	13	13.5	OC
MC2313	3.4 - 7.0	2.2 - 8.0	DC - 2.0	13	5.9	8.2	32	18	31	13	16.5	OC
MC2320	3.4 - 7.0	2.2 - 8.0	DC - 2.0	20	5.9	8.2	32	18	31	13	23.5	OC
MC2407	4.5 - 7.0	4.5 - 7.0	DC - 2.0	7	5.3	7.0	34	20	30	15	10.0	OC
MC2410	4.5 - 7.0	4.5 - 7.0	DC - 2.0	10	5.3	7.0	34	20	30	15	13.0	OC
MC2413	4.5 - 7.0	4.5 - 7.0	DC - 2.0	13	5.3	7.0	34	20	30	15	16.0	OC
MC2420	4.5 - 7.0	4.5 - 7.0	DC - 2.0	20	5.3	7.0	34	20	30	15	23.0	OC
MC2707	10 - 15	10 - 15	DC - 2.0	7	5.8	8.5	40	30	35	22	11.0	OC
MC2710	10 - 15	10 - 15	DC - 2.0	10	5.8	8.5	40	30	35	22	14.0	OC
MC2713	10 - 15	10 - 15	DC - 2.0	13	5.8	8.5	40	30	35	22	17.0	OC
MC2720	10 - 15	10 - 15	DC - 2.0	20	5.8	8.5	40	30	35	22	24.0	OC
MC3013	2 - 16	2 - 16	1.0 - 8.0	13	7.5	11.0	22	12	22	13	17.0	OC

- Notes:
1. Typical and guaranteed specifications measured in a 50-ohm system with nominal input power
 2. Typical values are measured at +25°C and are not guaranteed
 3. Maximum conversion loss and minimum harmonic suppression measured at +25°C and guaranteed
 4. OC (open carrier)

Open Carrier Frequency Doublers¹

Input Frequency = 1.5 to 8 GHz

Part Number	Input Range (GHz)	Input Power Nominal (dBm)	Conversion Loss (dB)		Harmonic Suppression (dBc)				Package Type ⁴
			Typ. ²	Max. ³	1xFin Typ. ²	1xFin Max. ³	3xFin Typ. ²	3xFin Max. ³	
FDC2310	1.5 - 8.0	10	11.0	14.0	35	19.5	40	20	OC
FDC2710	3.5 - 8.0	10	11.5	13.5	35	28.0	50	40	OC

- Notes:
1. Typical and guaranteed specifications measured in a 50-ohm system with nominal input power
 2. Typical values are measured at +25°C and are not guaranteed
 3. Maximum conversion loss and minimum harmonic suppression measured at +25°C and guaranteed
 4. OC (open carrier)

Frequency Doublers¹

Input Frequency = 0.005 to 12 GHz

Part Number	Input Range (GHz)	Input Power Nominal (dBm)	Conversion Loss (dB)		Harmonic Suppression (dBc)				Package Type ⁵
			Typ. ²	Max. ³	1xFin Typ. ²	1xFin Max. ³	3xFin Typ. ²	3xFin Max. ³	
FD25	0.005 - 2.4	10	11.5	13.0	27	16	42	25	TO
SFD25	0.005 - 2.4	10	11.5	13.0	27	16	42	25	SM
FD25C	0.005 - 2.4	10	11.5	13.0	27	16	42	25	SMA
FD25E	0.005 - 2.4	10	11.5	13.0	27	16	42	25	FP
FD25H	0.005 - 2.4	23	12.0	13.5	27	16	37	25	TO
FD25HC	0.005 - 2.4	23	12.0	13.5	27	16	37	25	SMA
SFD25H	0.005 - 2.4	23	12.0	13.5	27	16	37	25	SM
FD26	0.050 - 3.3	10	12.5	15.5	22	17	23	17	TO
FD26C	0.050 - 3.3	10	12.5	15.5	22	17	23	17	SMA
FD26E	0.050 - 3.3	10	12.5	15.5	22	17	23	17	FP
SFD26	0.050 - 3.3	10	12.5	15.5	22	17	23	17	SM
FD93	2.0 - 9.0	12	11.0	14.0	25 (3)	18 (3)	25	17	MPAC
FD93C	2.0 - 9.0	12	11.0	14.0	25 (3)	18 (3)	25	17	SMA
FD93H	2.0 - 9.0	19	11.5	14.0	25 (3)	18 (3)	25	16	MPAC
FD93HC	2.0 - 9.0	19	11.5	14.0	25 (3)	18 (3)	25	16	SMA
FDZ5013	3.0 - 12.0	13	12.0	14.5	13	8	23	17	VPAC
FDZ5013C	3.0 - 12.0	13	12.0	14.5	13	8	23	17	SMA

- Notes:
1. Typical and guaranteed specifications measured in a 50-ohm system with nominal input power
 2. Typical values are measured at +25°C and are not guaranteed
 3. This is a fundamental isolation referenced to the input signal (measured in dB)
 4. Maximum conversion loss and minimum harmonic suppression measured at +25°C and guaranteed
 5. MPAC (Minpac); VPAC (Versapac); SMA (SMA connectorized); TO (TO-8); SM (surface mount); FP (flatpack)

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