电子元器件系列

www.rf-china.com **RF-Micom co.,Ltd**

EMail:sales@rf-china.com

Sale Phone:86-592-5713956

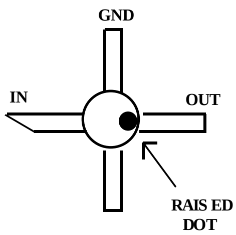
MINI-CIRCUITS / AVANTEK MONOLITHIC AMPLIFIERS
(DC TO 8GHz) 10GHz Usable

MARKING IDENTIFICATION / EQUIVALENT

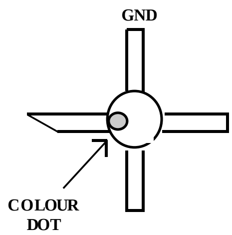
Model Plastic Mini-circuits	Equivalent SMD Mini-Circuits	Equivalent 83mil HP/Avantek	Equivalent Plastic HP/Avantek	Equivalent SMD HP/Avantek	Other Known Equivalents Avantek	Marking Mini-Circuits	Colour Dot
MAR-1	MAR-1SM	MSA-0135	MSA0185	MSA-0186	MSA-0170	A01	Brown
MAR-2	MAR-2SM	MSA-0235	MSA0285	MSA-0286	MSA-0270	A02	Red
MAR-3	MAR-3SM	MSA-0335	MSA0385	MSA-0386		A03	Orange
MAR-4	MAR-4SM	-	MSA0485		-	A04	Yellow
MAR-6	MAR-6SM	-	MSA0685	MSA-0686	MSA-2111	A06	White
MAR-7	MAR-7SM	MSA-0735		MSA-0786	MSA-0711	A07	Violet
MAR-8	MAR-8SM	MSA-0835	MSA0885	MSA-0886	MSA-0870	A08	Blue
MAV-1	-		MSA0104		-	1	-
MAV-2	-		MSA0204		-	2	-
MAV-3	-		MSA0304		-	3	-
MAV-4	-		MSA0404		-	4	-
			MSA0504		-	5	-
			MSA0604		-	6	-
			MSA0704		-	7	-
			MSA0804		-	8	-
MAV-11	MAV-11SM	-	MSA01104	MSA-1105	-	A	-

Model Plastic Mini-Circuits	Equivalent SMD Mini-Circuits	Possible Equivalent SOT-89 Mini-Circuits	Marking Identification
ERA-1	ERA-1SM	Gali-1	E1 / 01
ERA-2	ERA-2SM	Gali-2	E2 / 02
-	ERA-21SM	Gali-21	21
ERA-3	ERA-3SM	Gali-3	E3 / 03
-	ERA-33SM	Gali-33	33
ERA-4	ERA-4SM	Gali-4	E4 / 04
-	-	Gali-4F	4F
ERA-5	ERA-5SM	Gali-5	E5 / 05
-	-	Gali-5F	5F
-	ERA-50SM	-	50
-	ERA-51SM	Gali-51	51
-	-	Gali-51F	51F
-	-	Gali-52	52
-	-	Gali-55	55
ERA-6	ERA-6SM	Gali-6	E6 / 06
-	-	Gali-6F	6F
-	-	Gali-S66	66

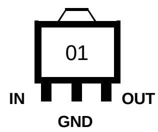
MAV / -04
(4-pac Plastic)



MAR / ERA / -85
(85mil Plastic)



FRONT VIEW



Gali SOT-89 (Plastic)

Generally most equivalents listed above can be used, but can have slightly different performance curves due to the different packaging of the devices. Mini-Circuits types like the RAM / VAM, are different package types of the MAR types. Eg RAM-1 = MAR-1. Mini-Circuits GAL types have now been renamed Gali. The New Gali types seem to be a low cost SOT- 89 package of the ERA types. Suggested Amplifier Models & Applications show the commonly available packaged devices, & are recommended for general purpose Amateur Radio use.

SUGGESTED APPLICATIONS

Application	Mini-Circuits Model
High Freq Gain	ERA1 Usable to 10GHz ERA2 Usable to 6GHz
Very Low Noise	Gali52 / GaliS66 (2GHz)
Low Noise Amp	MAR6 / MAR8 / MAV11 (To 1.2GHz)
Medium Noise	ERA3 / ERA5 (To 2.4GHz)
High Dynamic range	MAV11 / ERA4 / 5
Stable High Gain	MAR1 / ERA3 / 5
Medium Output	MAV11 / MAR3 / MAR4
High Output	MAV11 / ERA4 / 5 / 6

Max Power Out (1dB comp) = The point where the amplifier starts to compress the signal & becomes non linear

IP3 dBm = Third Order Intercept Point

Dynamic Range = The power range over which an amplifier provides linear operation, with the Lower limit dependant on the Noise Figure & the upper limit a function of the 1dB compression point

MAR-8 Potentially Unstable, Use an ERA-3

MINI-CIRCUITS AMPLIFIER GAIN / OUTPUT / NOISE FIGURE SELECTION

	Gain Typical dB at Freq GHz								Maximum Power Out 1dB Comp @ 1GHz	Noise Figure @ 1GHz	IP3 dBm
Model	**0.1**	**0.5**	**1**	**2**	**3**	**4**	**6**	**8**			
MAR-1	18.5	17.5	15.5	-	-	-	-	-	+1.5dBm	5.5	+14.0
MAR-2	12.5	12.3	12.0	11.0	-	-	-	-	+4.5dBm	6.5	+17.0
MAR-3	12.5	12.2	12.0	11.5	-	-	-	-	+10.0dBm	6.0	+23.0
MAR-4	8.3	8.2	8.0	-	-	-	-	-	+12.5dBm	6.5	+25.5
MAR-6	20.0	18.5	16.0	11.0	-	-	-	-	+2.0dBm	3.0	+14.5
MAR-7	13.5	13.1	12.5	11.0	-	-	-	-	+5.5dBm	5.0	+19.0
MAR-8	32.5	28.0	22.5	-	-	-	-	-	+12.5dBm	3.3	+27.0
MAV-11	12.7	12.0	10.5	-	-	-	-	-	+17.5dBm	3.6	+30.0
ERA-1	-	-	-	11.6	11.2	-	10.5	9.6	+13.0dBm (2GHz)	7.0 (2GHz)	+26.0
ERA-2	16.0	-	-	14.9	13.9	-	11.8	-	+14.0dBm (2GHz)	6.0 (2GHz)	+27.0
ERA-3	22.2	-	-	20.2	18.2	-	-	-	+11.0dBm (2GHz)	4.5 (2GHz)	+23.0
ERA-4	13.8	-	14.0	13.9	13.9	13.4	-	-	+19.1dBm	5.2	+36.0
ERA-5	20.4	-	20.0	19.0	17.6	15.8	-	-	+19.6dBm	4.0	+36.0
ERA-6	11.1	-	11.1	11.3	11.5	11.3	-	-	+18.5dBm	8.4	+36.5
Gali-1	12.7	-	12.5	11.8	11.3	10.5	10.5	11.0	+12.2dBm (2GHz)	4.5 (2GHz)	+27.0
Gali-21	14.3	-	13.9	13.1	12.4	11.5	11.9	12.4	+12.6dBm (2GHz)	4.0 (2GHz)	+27.0
Gali-2	16.2	-	15.8	14.8	13.7	12.7	13.2	15.1	+12.9dBm (2GHz)	4.6 (2GHz)	+27.0
Gali-33	19.3	-	18.7	17.5	16.3	15.5	15.8	-	+13.4dBm (2GHz)	3.9 (2GHz)	+28.0
Gali-3	22.4	-	21.1	19.1	17.3	16.1	15.8	-	+12.5dBm (2GHz)	3.5 (2GHz)	+25.0
Gali-6F	12.1	-	12.0	11.6	11.4	10.9	12.3	-	+15.8dBm	4.5	+35.5
Gali-4F	14.3	-	14.0	13.4	13.0	12.3	13.2	-	+15.3dBm	4.0	+32.0
Gali-51F	18.0	-	17.3	15.9	14.8	13.4	13.3	-	+15.9dBm	3.5	+32.0
Gali-5F	20.4	-	19.3	17.4	16.0	14.8	15.1	-	+15.7dBm	3.5	+31.5
Gali-55	21.9	-	20.6	18.5	17.0	15.5	15.7	-	+15.0dBm (2GHz)	3.3 (2GHz)	+28.5
Gali-52	22.9	-	20.8	17.8	15.9	14.4	-	-	+15.5dBm	2.7	+32.0
Gali-6	12.2	-	12.2	11.8	11.3	11.4	12.3	-	+18.2dBm	4.5	+35.5
Gali-4	14.4	-	14.1	13.5	12.9	12.5	13.1	-	+17.5dBm	4.0	+34.0
Gali-51	18.1	-	17.5	16.1	14.7	13.7	13.4	-	+18.0dBm	3.5	+35.0
Gali-5	20.6	-	19.4	17.5	16.0	14.9	15.1	-	+18.0dBm	3.5	+35.0
Gali-S66	22.0	-	20.3	17.3	15.5	-	-	-	+2.8dBm	2.7 (2GHz)	+18.0

BIAS CONFIGURATION

SUGGESTED RESISTOR BIAS VALUES

Model	ImA	Vd	+5Vcc	+9Vcc	+12Vcc	+13.8Vcc	P / Watts Resistor (+12Vcc)
MAR-1	17	5.00	-	220ohm	470ohm	560ohm	0.119W
MAR-2	25	5.00	-	150ohm	270ohm	390ohm	0.175W
MAR-3	35	5.00	-	120ohm	200ohm	270ohm	0.245W
MAR-4	50	5.25	-	75ohm	150ohm	180ohm	0.338W
MAR-6	16	3.50	100ohm	390ohm	560ohm	680ohm	0.136W
MAR-7	22	4.00	47ohm	220ohm	390ohm	470ohm	0.176W
MAR-8	36	7.80	-	33ohm	120ohm	180ohm	0.151W
MAV-11	60	5.50	-	56ohm	120ohm	150ohm	0.390W
ERA-1	40	3.60	35ohm	130ohm	220ohm	255ohm	0.336W
ERA-2	40	3.60	35ohm	130ohm	220ohm	255ohm	0.336W
ERA-3	35	3.50	43ohm	157ohm	243ohm	300ohm	0.298W
ERA-4	65	5.00	-	62ohm	109ohm	130ohm	0.462W
ERA-5	65	4.90	-	62ohm	109hm	130ohm	0.462W
ERA-6	70	5.50	-	50ohm	93ohm	136ohm	0.455W
Gali-1	40	3.40	40ohm	140ohm	220ohm	260ohm	0.344W
Gali-2	40	3.50	37.5ohm	137ohm	215ohm	260ohm	0.344W
Gali-3	35	3.30	47ohm	162ohm	249ohm	300ohm	0.305W
Gali-4	65	4.60	-	68ohm	110ohm	143ohm	0.480W
Gali-5	65	4.40	-	68ohm	110ohm	143ohm	0.480W
Gail-6	70	5.00	-	56ohm	100ohm	120ohm	0.490W

TYPICAL BIASING CONFIGURATION

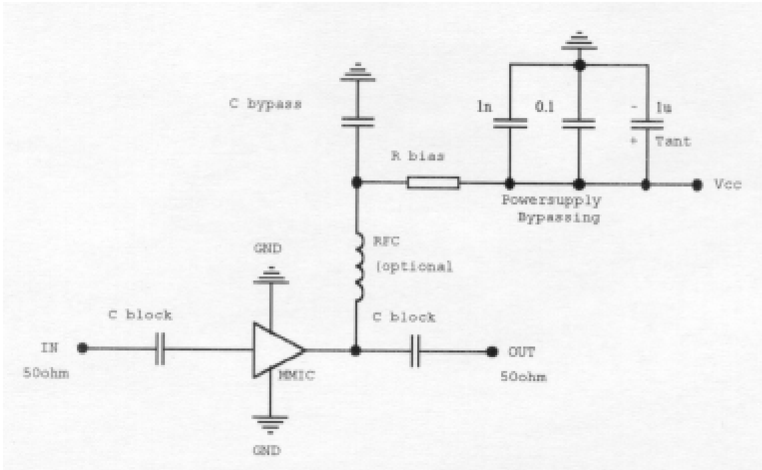
MSA = Monolithic Silicon Amp
MMIC= Monolithic Microwave Integrated Circuit

R bias = $\frac{Vcc - Vd}{I\ bias}$

Vcc = The supply Voltage
Vd = The Device Voltage
I bias = The Bias Current In mA (ImA)

P Watts = V x I

P Watts = Power Rating Of R bias
V = Volts across R bias
I = Current Through R bias



C block: Determines the low frequency cut off of the amplifier circuit. The Capacitors value is chosen to suit the frequency that the amplifier circuit is going to be used for. On frequencies above 2.4GHz ATC Porcelain Chip Capacitors are normally used for low loss. On 10GHz & higher, ¼ wave stripline couplers are commonly used for low loss.

100MHz (1nF)	**400MHz (100pF)**	**1.2GHz (10pF)**	**2.5GHz (5pF)**	**10GHz (1 - 2pF)**

RFC (Optional): Is used to isolate the bias resistor so that it does not appear in parallel with the output load of the amplifier, degrading the output match of the amplifier. The impedance of the choke at the lowest frequency of operation of the amplifier plus the value of the bias resistor should be at least 500ohms

100MHz (10uH choke)

400MHz (3 turns 0.315mm TCW on a FB-43-101 ferrite bead)

1.2GHz (100uH SMD choke or, 6 turns 0.315mm ECW 3mm dia closewound airspaced)

2.4GHz (47uH SMD choke or 1/4wave Striplines on the PC board)

>2.4GHz (1/4Wave Striplines on the PC Board)

C bypass: A Capacitor should be used in conjunction with the RFC to present a low impedance path to ground for any signal that manages to get past the RFC. The Capacitor should be connected at the junction of the R bias resistor & the RFC to ground. On 2.4GHz or higher ATC Porcelain Capacitors or similar may be required for effective bypassing.

100MHz (1nF)	**400MHz (100pF)**	**1.2GHz (10pF)**	**> 2.4GHz 5 to 10pF ATC Chip Capacitor & or a Microstrip Radial Line Stub**

Powersupply Bypassing: Suitable Capacitors should be used on the Vcc rail to effectively bypass low & high frequencies.

Suggested Values	**1uF Tantalum**	**0.1uF**	**1nF (Use all in parallel)**

This Data was assembled from a number of different sources including the Mini-Circuits & Hewlett Packard WEB sites. It is assumed to be reasonably accurate, & is intended as a quick reference guide for Engineers & Experimenters. For more detailed Data please refer to the Manufacturers WEB sites. This Data may be updated at any time due to changes from Manufactures, or errors. Other Manufacturers producing similar Products have not been added to this Data as their products are currently not readily available for Experimenters to buy.

Mini-Circuits Products are available in Australia from www.minikits.com.au

www.rf-china.com

RF-Micom co.,Ltd

EMail:sales@rf-china.com

Sale Phone:86-592-5713956