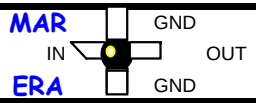
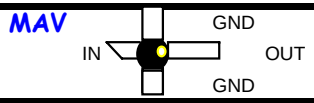
# MMIC utiles F6CXO




Message de F1FRV

Utilisez des resistances au CARBONE

| Modèle | Equivalent | Code | Couleur | G à 0,1 | G à 0,5 | Gain à 1 | Gain à 2 | Gain à 3 | Gain à 4 | Gain à 6 | Gain à 8 | Max P 1dB à 1 G | NOISE | I mA | Vd | Résistance d'alimentation 5V | 6V | 8V | 9V | 12V |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CGY50** | | | | 10 | | 10 | 10 | 10 | | | | +16 | 3 | 60 | 4,5 | 8,2 | 25 | 58 | 75 | 125 |
| **ERA-1** | | E1 | | | | | 11,6 | 11,2 | | 10,5 | 9,6 | +13 @ 2GHz | 7, @ 2 GHz | 40 | 3,6 | 35 | 60 | 110 | 130 | 220 |
| **ERA-2** | | E2 | | 16 | | | 14,9 | 13,9 | | 11,8 | | +14 @ 2GHz | 6 @ 2 GHz | 40 | 3,6 | 35 | 60 | 110 | 130 | 220 |
| **ERA-3** | | E3 | | 22,2 | | | 20,2 | 18,2 | | | | +11 @ 2GHz | 4,5 @ 2 GHz | 35 | 3,5 | 43 | 62 | 128 | 157 | 243 |
| **ERA-4** | | E4 | | 13,8 | | 14 | 13,9 | 13,9 | 13,4 | | | +19,1 | 5,2 @ 2 GHz | 65 | 5 | | 15 | 47 | 62 | 109 |
| **ERA-5** | | E5 | | 20,4 | | 20 | 19 | 17,6 | 15,8 | | | +19,6 | 4 @ 2 GHz | 65 | 4,9 | | 17 | 48 | 62 | 109 |
| **ERA-6** | | E6 | | 11,1 | | 11,1 | 11,3 | 11,5 | 11,3 | | | +18,5 | 8,4 @ 2 GHz | 70 | 5,5 | | 7 | 21 | 50 | 93 |
| **INA 03184** | | | | 25 | | 25 | 25 | 22 | | | | -2 | 2,6 | 10 | 4 | | 200 | 400 | 500 | 800 |
| **INA 10386** | | | | 26 | | 26 | 23 | 20 | 15 | | | +10 | 3,7 | 45 | 6 | | | 45 | 67 | 134 |
| **MAR-1** | MAV-1 MSA0185 | A01 | brun | 18,5 | 17,5 | 15,5 | | | | | | +1,5 dBm | 5,5 | 17 | 5 | | 59 | 176 | 220 | 470 |
| **MAR-2** | MAV-2 MSA0285 | A02 | rouge | 12,5 | 12,3 | 12 | 11 | | | | | +4,5 | 6,5 | 25 | 5 | | 40 | 120 | 150 | 270 |
| **MAR-3** | MAV-3 MSA0385 | A03 | orange | 12,5 | 12,2 | 12 | 11,5 | | | | | +10 | 6 | 35 | 5 | | 28 | 85 | 120 | 200 |
| **MAR-4** | MAV-4 MSA0485 | A04 | jaune | 8,3 | 8,2 | 8 | | | | | | +12,5 | 3 | 50 | 5,25 | | 15 | 55 | 75 | 150 |
| **MAR-6** | | A06 | blanc | 20 | | 16 | 11 | | | | | +2 @ 500 MHz | 3 @ 500 MHz | 16 | 3,5 | 94 | 156 | 282 | 344 | 532 |
| **MAR-7** | | A07 | violet | 13,5 | | 12,5 | 11 | | | | | +5,5 @ 1 GHz | 5 @ 2 GHz | 22 | 4 | 46 | 91 | 182 | 227 | 367 |
| **MAR-8** | MSA0885 | A08 | bleu | 32,5 | | 22,5 | 17 | | | | | +12,5 @ 1 GHz | 3,3 | 36 | 7,8 | | | 5,6 | 33 | 117 |
| **MAV-1** | MSA 0104 | 1 | | 18,5 | | 15 | | | | | | +1,5 | 6 | 17 | 5 | | 59 | 177 | 235 | 412 |
| **MAV-3** | MSA 0204 | 3 | | 12,5 | | 11 | | | | | | +10 | 6 | 35 | 5 | | 29 | 86 | 115 | 200 |
| **MAV-4** | MSA 0404 | 4 | | 8,3 | 0 | 7,7 | | | | | | +11,5 | 7 | 50 | 5,3 | | 14 | 54 | 74 | 134 |
| **MAV-11** | MSA01104 | A | | 12,7 | 12 | 10,5 | | | | | | +17 | 3,6 | 60 | 5,5 | | 15 | 50 | 56 | 120 |
| **MGA 86563** | | | | ~12 | | 21 | 22,5 | | | | | ~4 | 1,8 | 14 | 5 | | 72 | 214 | 286 | 500 |
| **MGA 86576** | | | | | | | | | 23 | | | +6,4 | 2@ 4 GHz | 16 | 5 | | 63 | 188 | 250 | 438 |
| **MGA 87563** | | | | ~11 | | 14,6 | 12,5 | | 10,3 | | | -2 | 1,7 | 4,5 | 3 | 445 | 667 | 1111 | 1334 | 2000 |

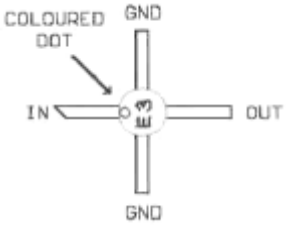
# MINI-CIRCUITS / AVANTEK MONOLITHIC AMPLIFIERS ( DC TO 8GHz )

## MARKING IDENTIFICATION / EQUIVALENT

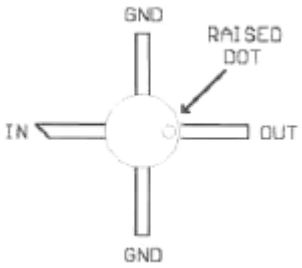
| Model | Equivalent | Equivalent | Alphanumeric | Colour |
|---|---|---|---|---|
| **Mini-circuits** | **MAR/MAV** | **Avantek** | **Dot** | **Equivalent** |
| MAR-1 | MAV-1 | MSA0185 | A01 | Brown |
| MAR-2 | MAV-2 | MSA0285 | A02 | Red |
| MAR-3 | MAV-3 | MSA0385 | A03 | Orange |
| MAR-4 | MAV-4 | MSA0485 | A04 | Yellow |
| MAR-6 | | MSA0685 | A06 | White |
| MAR-7 | | | A07 | Violet |
| | | MSA0735 | | |
| MAR-8 | | MSA0885 | A08 | Blue |
| | | MSA0835 | | |
| MAV-1 | MAR-1 | MSA0104 | 1 | - |
| MAV-2 | MAR-2 | MSA0204 | 2 | - |
| MAV-3 | MAR-3 | MSA0304 | 3 | - |
| MAV-4 | MAR-4 | MSA0404 | 4 | - |
| | | MSA0504 | 5 | - |
| | | MSA0604 | 6 | - |
| | | MSA0704 | 7 | - |
| | | MSA0804 | 8 | - |
| MAV-11 | | MSA01104 | A | - |
| ERA-1 | | | E1 | |
| ERA-2 | | | E2 | |
| ERA-3 | | | E3 | |
| ERA-4 | | | E4 | |
| ERA-5 | | | E5 | |
| ERA-6 | | | E6 | |

## COMPONENT PINOUT

**MAR / ERA / -85 ( 85mil Plastic )**




**MAV / -04 ( 4-pac Plastic )**




## MINI-CIRCUITS AMPLIFIER GAIN / OUTPUT / NOISE FIGURE SELECTION

| | Gain Typical dB at Freq GHz | | | | | | | | Maximum Power Out 1dB Comp @ 1GHz | Noise Figure | 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 | +13dBm (2GHz) | 7.0 | +26.0 |
| ERA-2 | 16.0 | - | - | 14.9 | 13.9 | - | 11.8 | - | +14dBm (2GHz) | 6.0 | +27.0 |
| ERA-3 | 22.2 | - | - | 20.2 | 18.2 | - | - | - | +11dBm (2GHz) | 4.5 | +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 |

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

**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 ERA-3

## SUGGESTED APPLICATIONS

| Application | Model |
|---|---|
| High Freq Gain | ERA1 Usable to 10GHz |
| Low Noise Amp | MAR6 / MAR8 / MAV11 |
| Medium Noise | ERA3 / ERA5 |
| High Dynamic range | MAV11 |
| Stable High Gain | MAR1 / ERA3 |
| Medium Output | MAV11 / MAR3 / MAR4 |
| High Output | MAV11 / ERA4 / 5 |
| Multiplier | ERA3 Clean Harmonics |

## 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 |

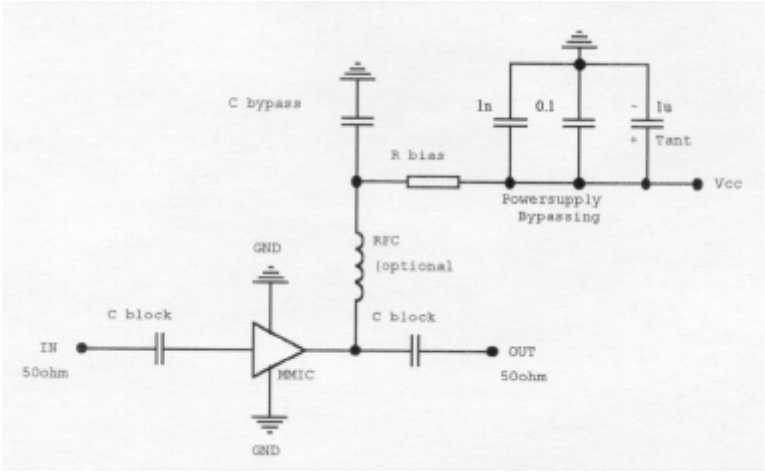
## TYPICAL BIASING CONFIGURATION

**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.

**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 ) 400MHz ( 3 turns 0.315mm TCW on a FX1112 ferrite bead )**

**1.2GHz ( 6 turns 0.315mm ECW 3mm dia closewound airspaced ) > 2GHz ( printed 1/4wave lines on 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.

**100MHz ( 1nF ) 400MHz ( 100pF ) 1.2GHz ( 10pF ) > 2.5GHz ( printed on the PC board )**

**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 )**

MSA = Monolithic Silicon Amp
MMIC= Monolithic Microwave
Integrated Circuit