

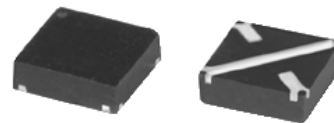
Surface Mount

Monolithic Amplifier

0.05-2 GHz

Product Features

- Medium gain
- Output power, 18.5 dBm typ.
- Aqueous washable



MAV-11A+

CASE STYLE: DH820
PRICE: Contact Sales Dept.

+RoHS Compliant

The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

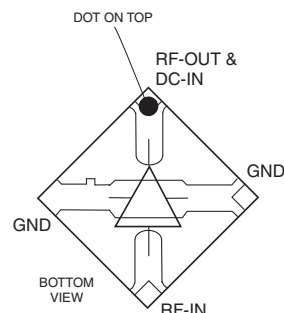
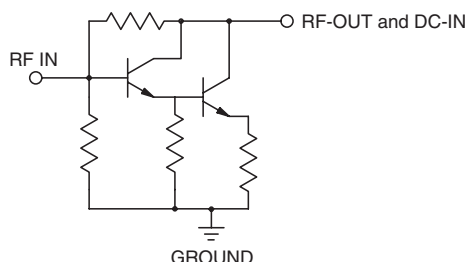
Typical Applications

- Cellular
- Cable
- Defense communications
- UHF TV

General Description

MAV-11A+ (RoHS compliant) is a wideband amplifier offering high dynamic range. It has repeatable performance from lot to lot. It is enclosed in a plastic molded package. MAV-11A+ uses Darlington configuration and is fabricated using silicon technology. Expected MTBF is 300 years at 85°C case temperature.

simplified schematic and pin description



Function	Pin Number	Description
RF IN	1	RF input pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation.
RF-OUT and DC-IN	3	RF output and bias pin. DC voltage is present on this pin; therefore a DC blocking capacitor is necessary for proper operation. An RF choke is needed to feed DC bias without loss of RF signal due to the bias connection, as shown in "Recommended Application Circuit".
GND	2,4	Connections to ground. Use via holes as shown in "Suggested Layout for PCB Design" to reduce ground path inductance for best performance.

Notes

- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp



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REV. B
M108520
MAV-11A+
170110
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Electrical Specifications at 25°C and 60mA, unless noted

Parameter	Min.	Typ.	Max.	Units
Frequency Range*	0.05		2	GHz
Gain	f=0.1 GHz f=1 GHz f=2 GHz	12.5 11.5 10.2		dB
Input Return Loss	f=0.05 to 2 GHz	15.5		dB
Output Return Loss	f=0.05 to 2 GHz	26.5		dB
Output Power @ 1 dB compression	f=1 GHz	+18.5		dBm
Output IP3	f=1 GHz	+35		dBm
Noise Figure	f=1 GHz	4.8		dB
Recommended Device Operating Current		60		mA
Device Operating Voltage		5.5		V
Thermal Resistance, junction-to-case ¹		130		°C/W

*Guaranteed specification 0.05-2 GHz. Low frequency cut off determined by external coupling capacitors.

Absolute Maximum Ratings

Parameter	Ratings
Operating Temperature*	-25°C to 85°C
Storage Temperature	-65°C to 100°C
Operating Current	80mA
Power Dissipation	550mW
Input Power	13dBm

Note: Permanent damage may occur if any of these limits are exceeded.
These ratings are not intended for continuous normal operation.

¹Case is defined as ground leads.

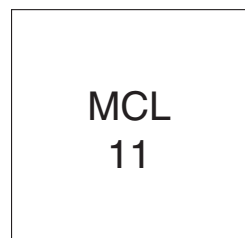
²Full operating temperature range

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Product Marking



Additional Detailed Technical Information

Additional information is available on our web site. To access this information enter the model number on our web site home page.

Performance data, graphs, s-parameter data set (.zip file)

Case Style: DH820

Plastic molded 5x5 mm package, lead finish: tin/silver/nickel

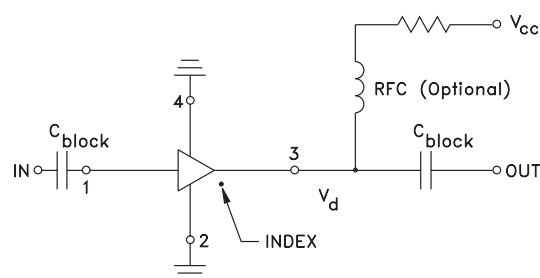
Tape & Reel: F59

Suggested Layout for PCB Design: PL-169

Evaluation Board: TB-412-11A+

Environmental Ratings: ENV08T7

Recommended Application Circuit



R BIAS	
Vcc	"1%" Res. Values (ohms) for Optimum Biasing
7	28.0
8	45.3
9	61.9
10	78.7
11	95.3
12	113
13	127
14	143
15	158

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ESD Rating

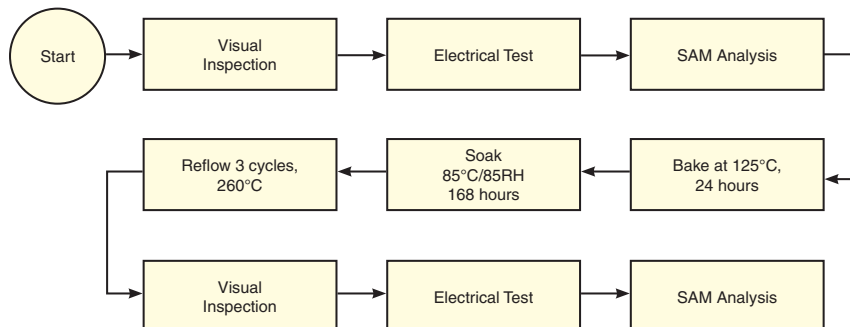
Human Body Model (HBM): Class 1B (500 v to < 1000 v) in accordance with ANSI/ESD STM 5.1 - 2001

Machine Model (MM): Class M1 (< 100 v) in accordance with ANSI/ESD STM 5.2 - 1999

MSL Rating

Moisture Sensitivity: MSL1 in accordance with IPC/JEDECJ-STD-020C

No.	Test Required	Condition	Standard	Quantity
1	Visual Inspection	Low Power Microscope Magnification 40x	MIP-IN-0003 (MCT spec)	92 units
2	Electrical Test	Room Temperature	SCD (MCL spec)	92 units
3	SAM Analysis	Less than 10% growth in term of delamination	J-Std-020C (Jedec Standard)	92 units
4	Moisture Sensitivity Level 1	Bake at 125°C for 24 hours Soak at 85°C/85%RH for 168 hours Reflow 3 cycles at 250°C peak	J-Std-020C (Jedec Standard)	92 units

MSL Test Flow Chart**Notes**

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MMIC Amplifier

MAV-11A+

Typical Performance Data

FREQUENCY (MHz)	GAIN (dB) 60 mA	ISOLATION (dB) 60 mA	RETURN LOSS IN (dB) 60 mA	RETURN LOSS OUT (dB) 60 mA
50	12.97	16.66	16.45	18.28
100	12.61	16.56	20.73	25.00
150	12.52	16.56	22.18	29.23
200	12.47	16.59	22.67	31.88
250	12.43	16.62	22.63	32.57
300	12.39	16.66	22.38	32.01
350	12.35	16.70	22.04	31.06
400	12.31	16.75	21.60	29.94
500	12.22	16.84	20.85	28.68
600	12.12	16.92	20.18	27.57
700	12.01	17.00	19.43	26.80
800	11.89	17.08	18.81	26.08
900	11.76	17.16	18.15	25.59
1000	11.64	17.23	17.64	25.07
1100	11.50	17.31	17.05	24.73
1200	11.36	17.36	16.63	24.41
1300	11.23	17.42	16.19	24.03
1400	11.10	17.47	15.83	23.79
1500	10.96	17.54	15.46	23.47
1600	10.82	17.59	15.18	23.23
1700	10.69	17.65	14.90	22.99
1800	10.56	17.70	14.68	22.75
1900	10.43	17.76	14.47	22.46
2000	10.30	17.82	14.29	22.15
2200	10.04	17.94	13.97	21.60
2400	9.79	18.07	13.72	21.05
2600	9.53	18.21	13.51	20.65
3000	9.03	18.54	13.19	20.26
3500	8.45	18.93	13.21	19.45
4000	7.90	19.42	13.20	18.65
4500	7.47	19.99	12.72	17.99
5000	7.07	20.47	11.77	17.07
5500	6.75	20.93	10.09	16.08
6000	6.42	21.03	8.34	15.00
6500	6.14	21.02	6.90	14.34
7000	5.64	21.08	5.73	14.16
8000	4.20	20.27	3.81	10.99

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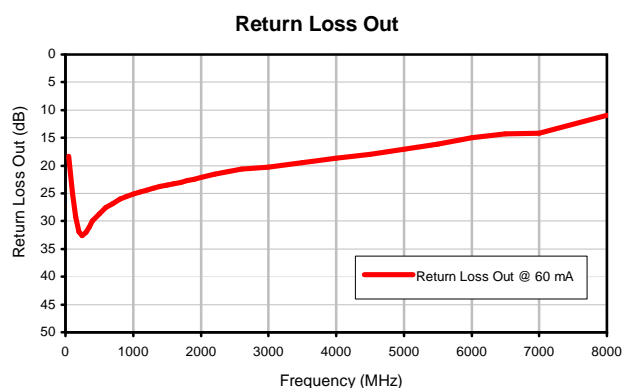
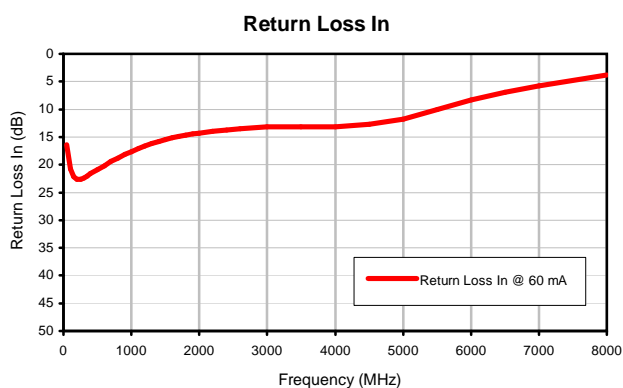
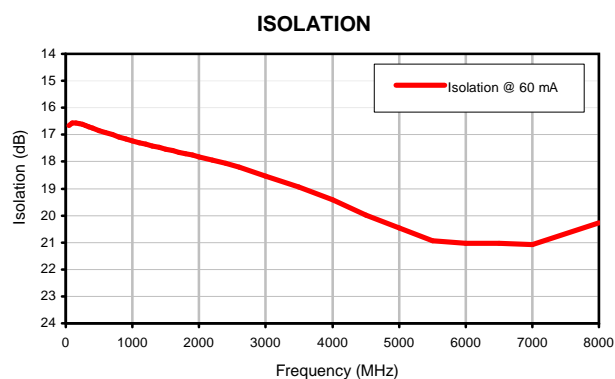
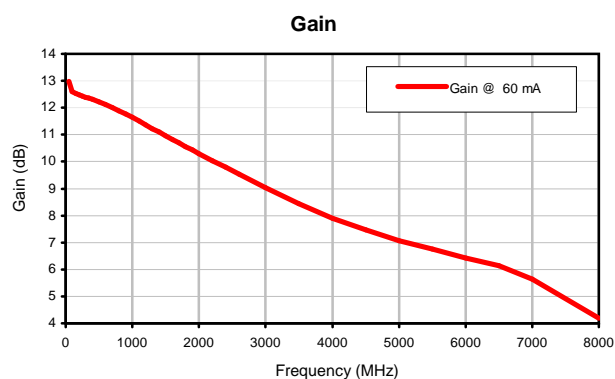
IF/Rf MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant

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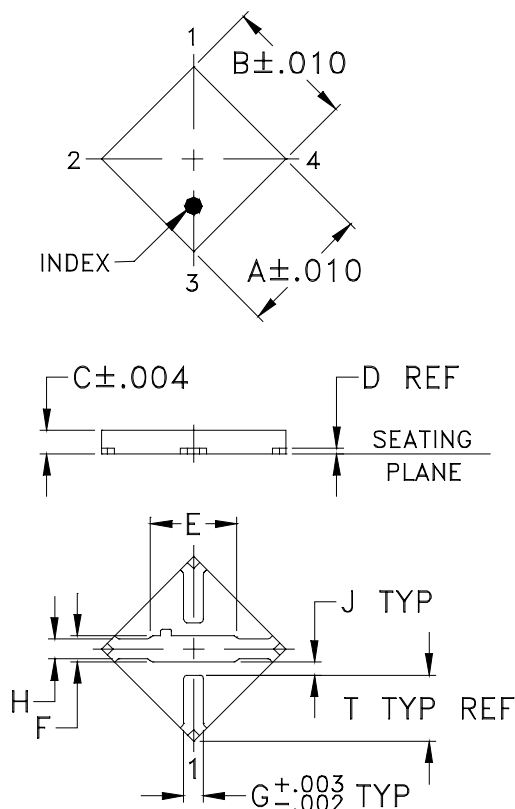
The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



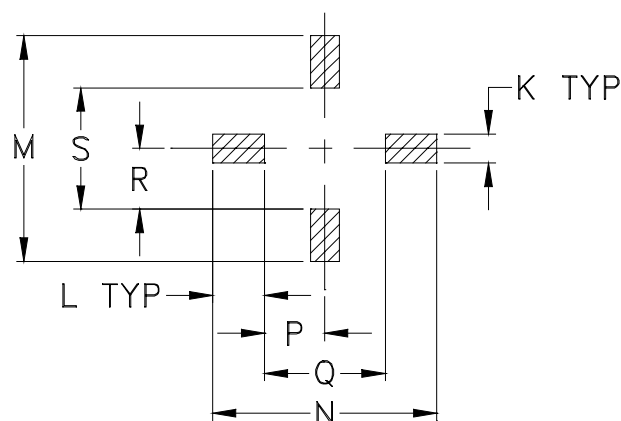
Typical Performance Curves



Outline Dimensions



PCB Land Pattern



Suggested Layout,
Tolerance to be within $\pm.002$

CASE #	A	B	C	D	E	F	G	H	J	K	L	M
DH820	.197 (5.00)	.197 (5.00)	.035 (0.89)	.008 (0.20)	.130 (3.30)	.039 (0.99)	.030 (0.76)	.030 (0.76)	.020 (0.51)	.040 (1.02)	.072 (1.83)	.310 (7.87)

CASE #	N	P	Q	R	S	T	WT. GRAM
DH820	.310 (7.87)	.084 (2.13)	.167 (4.24)	.084 (2.13)	.167 (4.24)	.100 (2.54)	.06

Dimensions are in inches (mm). Tolerances: 2 Pl. $\pm .01$; 3Pl. $\pm .004$

Notes:

- Case material: Plastic.
- Termination finish:
For RoHS Case Styles: Tin-Silver-Nickel plate. All models, (+) suffix.
For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.



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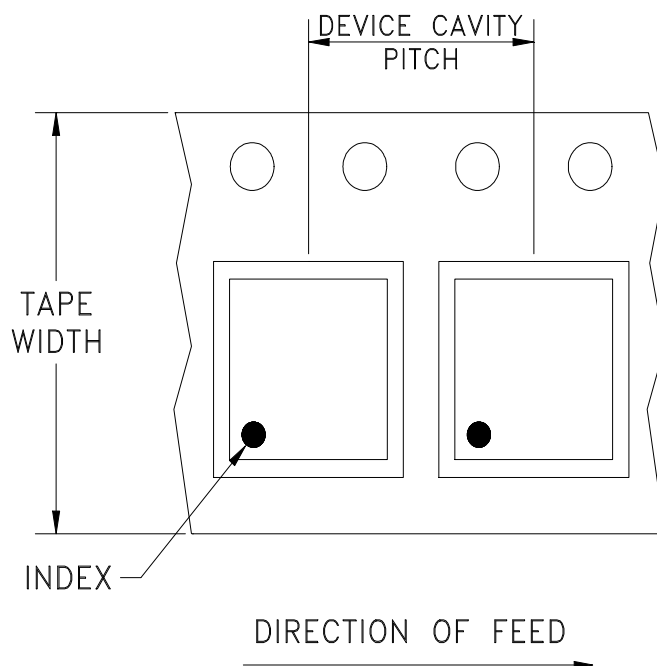
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Tape & Reel Packaging TR-F59

DEVICE ORIENTATION IN T&R



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
12	8	7	1000

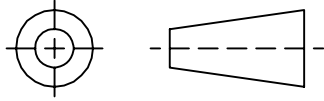
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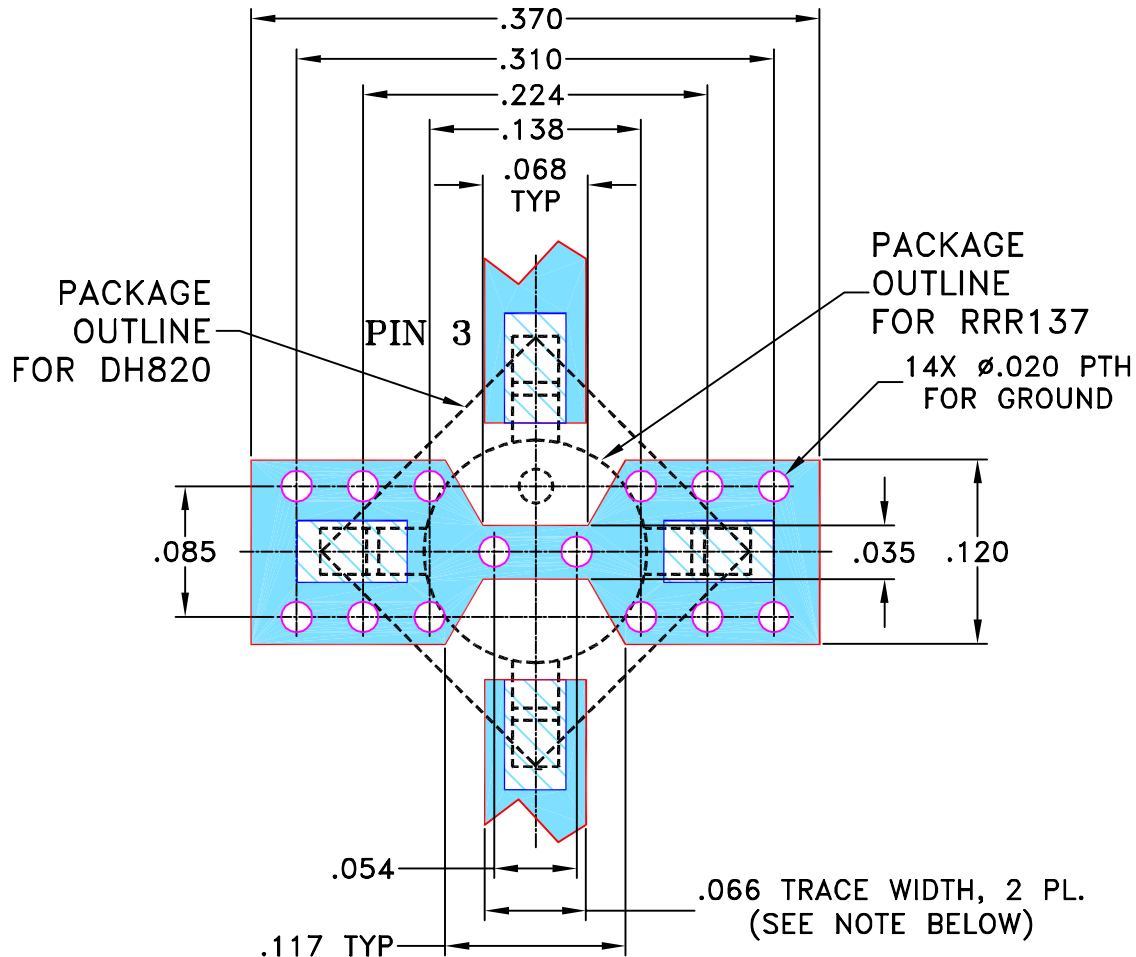
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M94379	NEW RELEASE	09/22/05	AV	MM
A	M102713	ADDED "...WITH SMOBC"	01/12/06	GF	IL
B	M108434	UPDATED DRAWING PER TB-412+	11/14/06	PW	IG

SUGGESTED MOUNTING CONFIGURATION FOR DH820/RRR137 CASE STYLES, "cb" PIN CONNECTION



- NOTE: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS $.030'' \pm .002''$; COPPER: 1/2 OZ. EACH SIDE.
FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.



DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)



DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

UNLESS OTHERWISE SPECIFIED

INITIALS

DATE

DIMENSIONS ARE IN INCHES

TOLERANCES ON:

2 PL DECIMALS \pm 3 PL DECIMALS $\pm .005$ ANGLES \pm FRACTIONS \pm

DRAWN

AV

09/16/04

CHECKED

IL

09/22/05

APPROVED

MM

09/22/05



Mini-Circuits®

13 Neptune Avenue
Brooklyn NY 11235

PL, cb, DH820/RRR137, MAV, TB-412-XXX+

SIZE

A

CODE IDENT

15542

DRAWING NO:

98-PL-169

REV:

B

FILE:

98PL169

SCALE:

8:1

SHEET:

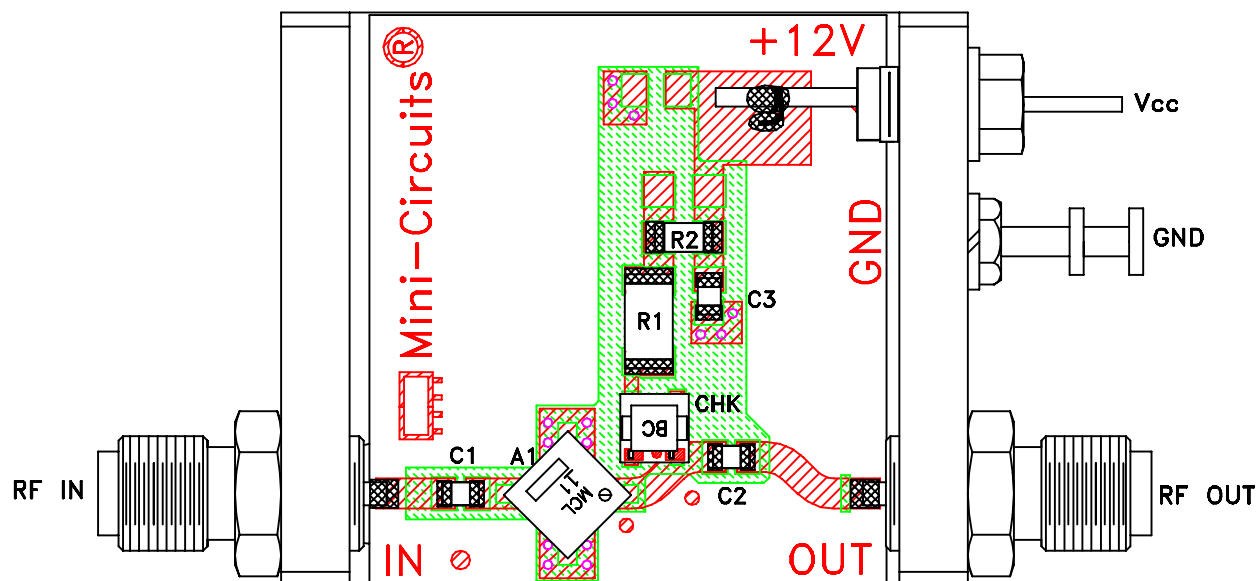
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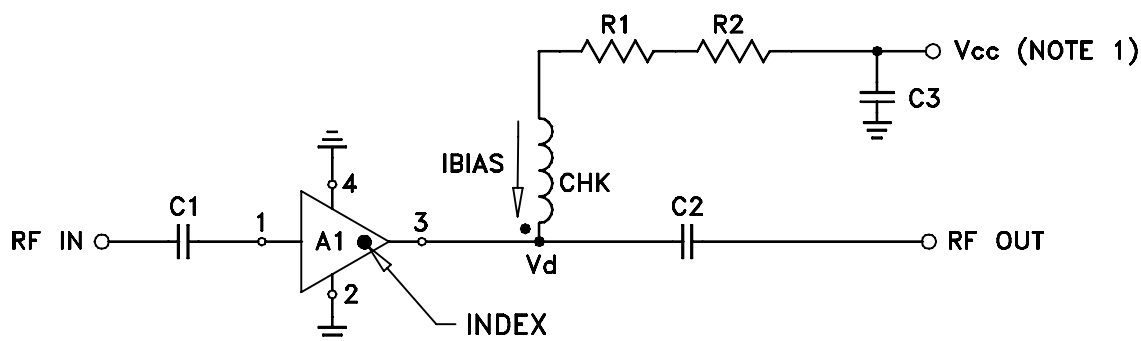
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ASHEETA1.DWG REV:A DATE:01/12/95

Evaluation Board and Circuit



TB-412-11A+




COMPONENT	VALUE
A1	MAV-11A(+)
C1 (NOTE 4)	2400 pF
C2 (NOTE 4)	2400 pF
C3 (bypass)	0.1 uF
R1	100 Ohms, 0.75W
R2	8.25 Ohms, 0.25W
CHK	Mini-Circuits TCCH-80+

Schematic Diagram

NOTE:

1. Vcc voltage: $+12 \pm 0.2V$.
2. SMA Female connectors.
3. PCB material: Rogers R04350 or equivalent, dielectric constant=3.5, dielectric thickness=.030 inch.
4. Capacitors, C1 & C2 should be free of resonance up to the highest frequency specified.

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Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-25° to 85°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-65° to 150° C Ambient Environment	Individual Model Data Sheet
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Mechanical Shock	1.5Kg, 0.5 ms, 5 shock pulses, Y1 direction only	MIL-STD-883, Method 2002, Condition B, except Y1 direction only
Vibration (Variable Frequency)	50g peak	MIL-STD-883, Method 2007, Condition B
Autoclave	15 psig, 100% RH, 121°C, 96 hours	JESD22-A102, Condition C
HAST	130°C, 85% RH, 96 hours	JESD22-A110
Solderability	10X Magnification	J-STD-002, 95% Coverage
Solder Reflow Heat	Sn-Pb Eutetic Process: 240°C peak Pb-Free Process: 260°C peak	J-STD-020, Table 4-1, 4-2 and 5-2; Figure 5-1
Moisture Sensitivity: Level 1	Bake at 125°C for 24 hours Soak at 85°C/85% RH for 168 hours, Reflow 3 cycles at 260°C peak	J-STD-020
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether +	MIL-STD-202, Method 215



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Specification	Test/Inspection Condition	Reference/Spec
	monoethanolamine at 63°C to 70°C	