MMIC WIDEBAND

Gain Equalizer

EQY-15-24+

50Ω 6 to 20 GHz

THE BIG DEAL

- 15.7 dB Slope
- Small Package 2.5 x 2.5 mm 8L MCLP
- Wide Bandwidth, 6-20 GHz
- Excellent Return Loss, 20 dB typ.

Generic photo used for illustration purposes only

CASE STYLE: JV3002

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

APPLICATIONS

- Fixed Satellite
- Mobile
- Military Systems
- ELINT
- EW
- ECM

PRODUCT OVERVIEW

Mini-Circuits EQY-15-24+ is a MMIC gain equalizer fabricated using highly repeatable GaAs IPD MMIC process incorporating resistors, capacitors and inductors to accomplish a positive attenuation slope vs. Frequency. EQY-15-24+ has a nominal attenuation slope of 15.7dB and can be applied to compensate for the negative gain slope of amplifiers to achieve relative gain flatness for the overall system. It is packaged in a tiny 2.5x 2.5mm, 8-Lead MCLP package .

KEY FEATURES

Feature	Advantages
Positive Attenuation Slope vs. Frequency	Positive Attenuation Slope vs. Frequency
Wideband Operation, 6 to 20 GHz	Supports a wide variety of applications including wireless cellular, microwave communications, satellite, defense and aerospace, medical and optical applications.
Excellent Power Handling Capability	Enables the product to be used at the output of an amplifier.
Small Size and simple to use (2.5 mm x 2.5 mm)	As a single chip solution, the EQY-15-24+ Series occupies less board space than a lumped element approach, minimizes component count and ensures repeatable performance over wide frequency range.

*GaAs IPD (Gallium Arsenide Integrated Passive Device)

REV. C
ECO-011107
EQY-15-24+
CM/CP/PS
220118

ELECTRICAL SPECIFICATIONS[1] AT 25°C, 50Ω, UNLESS OTHERWISE NOTED.

Parameter	Condition (GHz)	Min.	Typ.	Max.	Units
Frequency Range		6		20	GHz
Insertion Loss	6	15.3	17.0	18.6	dB
	10	9.7	10.9	11.9	
	14	4.8	5.6	6.0	
	18	-	2.2	-	
	20	-	1.3	-	
VSWR	6 - 10	-	1.22	-	:1
	10 - 14	-	1.19	-	
	14 - 18	-	1.25	-	
	18 - 20		1.22	-	

1. Measured on Mini-Circuits Characterization Test Board TB-EQY-15-24+. See Characterization Test Circuit (Fig. 1)

MAXIMUM RATINGS[2]

Parameter	Ratings
Operating Case Temperature	-55°C to 105°C
Storage Temperature	-65°C to 150°C
RF Input Power[3]	31 dBm

2. Permanent damage may occur if any of these limits are excedeed.
3. Derates linearly to 22 dBm at 105°C

SIMPLIFIED SCHEMATIC

PAD DESCRIPTION

TOP VIEW

Function	Pad Number	Description
RF-IN	2	Input Pad
RF-OUT	6	Output Pad
NC	4,8	No Connection Connects to ground on TB
GND	1,3,5,7 & Paddle	Ground

CHARACTERIZATION TEST CIRCUIT

Fig 1. Block Diagram of Test Circuit used for characterization. Test Board TB-EQY-15-24+. Condition: Attenuation & Return Loss Pin =0dBm

PRODUCT MARKING

Marking may contain other features or characters for internal lot control

ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASH BOARD. TO ACCESS CLICK HERE

Performance Data	Data Table Swept Graphs S-Parameter (S3P Files) Data Set (.zip file)
Case Style	JV3002 Plastic package, exposed paddle, lead finish: Matt Tin
Tape & Reel **Standard quantities available on reel**	TR-F68 7" reels with 20, 50, 100, 200, 500 or 1K devices
Suggested Layout for PCB Design	PL-718
Evaluation Board	TB-EQY-15-24+ (Without Connectors) TB-EQY-15-24C+ (With Connectors)
Environmental Ratings	ENV129

ESD RATING

Human Body Model (HBM): Class 1C (Pass 1000V) in accordance with ANSI/ESD STM 5.1 - 2001 Machine.

MSL TEST FLOW CHART

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

MMIC Gain Equalizer

EQY-15-24+

Typical Performance Data

FREQ.	INSERTION LOSS			INPUT VSWR			OUTPUT VSWR		
(MHz)	(dB)			(:1)			(:1)		
	@-55˚C	@25°C	@+105°C	@-55˚C	@25°C	@+105°C	@-55˚C	@25°C	@+105°C
10	23.19	23.13	23.11	1.20	1.21	1.21	1.19	1.20	1.20
20	23.20	23.14	23.12	1.18	1.18	1.19	1.16	1.18	1.18
30	23.20	23.14	23.12	1.17	1.18	1.18	1.16	1.17	1.17
40	23.20	23.14	23.12	1.17	1.18	1.18	1.15	1.17	1.17
50	23.20	23.15	23.13	1.17	1.18	1.18	1.15	1.17	1.17
60	23.20	23.14	23.12	1.17	1.17	1.18	1.15	1.17	1.17
70	23.21	23.15	23.13	1.17	1.17	1.18	1.15	1.16	1.17
80	23.20	23.15	23.13	1.17	1.17	1.18	1.15	1.16	1.17
90	23.20	23.15	23.13	1.17	1.17	1.18	1.15	1.16	1.17
100	23.20	23.15	23.13	1.17	1.17	1.18	1.15	1.16	1.17
1000	23.01	22.97	22.95	1.22	1.22	1.22	1.22	1.22	1.22
2000	22.33	22.29	22.27	1.27	1.28	1.29	1.29	1.29	1.30
3000	21.31	21.26	21.23	1.27	1.27	1.28	1.28	1.27	1.29
4000	20.04	19.98	19.94	1.22	1.21	1.20	1.21	1.19	1.18
5000	18.59	18.53	18.50	1.13	1.12	1.11	1.09	1.09	1.08
6000	17.06	17.01	16.98	1.04	1.05	1.06	1.07	1.08	1.08
7000	15.55	15.52	15.48	1.18	1.19	1.18	1.20	1.19	1.18
8000	14.05	14.01	13.97	1.30	1.29	1.28	1.29	1.26	1.25
9000	12.47	12.42	12.38	1.30	1.27	1.25	1.25	1.22	1.21
10000	10.86	10.84	10.80	1.14	1.11	1.09	1.10	1.08	1.06
11000	9.36	9.35	9.32	1.06	1.08	1.09	1.08	1.09	1.10
12000	8.01	8.01	7.99	1.23	1.23	1.24	1.22	1.22	1.21
13000	6.81	6.80	6.76	1.40	1.37	1.35	1.38	1.34	1.32
14000	5.59	5.59	5.54	1.46	1.42	1.37	1.46	1.39	1.35
15000	4.38	4.41	4.39	1.30	1.28	1.24	1.28	1.25	1.22
16000	3.38	3.43	3.44	1.18	1.14	1.14	1.11	1.07	1.08
17000	2.63	2.71	2.74	1.21	1.22	1.22	1.16	1.20	1.18
18000	2.21	2.30	2.31	1.45	1.43	1.38	1.45	1.45	1.39
19000	1.80	1.82	1.83	1.39	1.25	1.18	1.48	1.35	1.29
20000	1.38	1.50	1.56	1.20	1.20	1.22	1.33	1.31	1.32
21000	1.40	1.57	1.62	1.58	1.51	1.43	1.62	1.54	1.48
22000	1.37	1.67	1.80	1.42	1.49	1.48	1.43	1.48	1.47
23000	1.70	1.99	2.25	1.64	1.59	1.68	1.58	1.51	1.60
24000	2.48	2.80	2.98	2.00	1.92	1.90	1.80	1.79	1.76
25000	3.17	3.61	3.66	2.12	2.12	1.96	2.01	2.03	1.89
26000	3.94	4.09	4.23	2.34	2.11	2.00	2.34	2.11	2.02

Typical Performance Curves

Case Style JV

Outline Dimensions

JV3002

SUGGESTED LAYOUT
FOR PCB LAND PATTERN
PATTERN TO BE WITHIN ±.002

BOTTOM VIEW

METALLIZATION

CASE #	A	B	C	D	E	F	G	H	J	K	L	M
JV3002	.098 (2.50)	.098 (2.50)	.035 (.90)	.010 (.25)	.007 (.18)	.047 (1.20)	.043 (1.10)	.049 (1.25)	.037 (.95)	.012 (.30)	.014 (.35)	.010 (.25)

CASE #	N	P	Q	R	S	T	U	V	W	Y	Z	WEIGHT (GRAMS)
JV3002	.014 (.35)	.118 (3.01)	.118 (3.01)	.014 (.35)	.037 (.95)	.047 (1.20)	.010 (.25)	.024 (.60)	.035 (.90)	.043 (1.10)	.012 (.30)	0.016

Dimensions are in inches (mm). Tolerances: 3 Pl. ±.002[.050]

Notes:

1. Open style, Plastic.
2. Termination finish: **as shown below or indicated on Data Sheet.**
   For RoHS Case Styles: Matte-Tin plate.
3. Pad tolerance is non-cumulative. Minimum spacing between each pad is .004.
4. Pin numbers do not appear on unit. For reference only.

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THIRD ANGLE PROJECTION

REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	ECO-010217	NEW RELEASE	10/20/21	ITG	IL

SUGGESTED MOUNTING CONFIGURATION FOR JV3002 CASE STYLE

NOTES:

1. TRACE WIDTH AND GAP ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .0066±.0007"; COPPER: 1/2 OZ. EACH SIDE.
   FOR OTHER MATERIALS LINE WIDTH AND GAP 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	DRAWN	ITG	10/20/21
TOLERANCES ON:	CHECKED	GF	10/20/21
2 PL DECIMALS ±	APPROVED	IL	10/20/21
3 PL DECIMALS ± .003			
ANGLES ±			
FRACTIONS ±			

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

Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, JV3002, TB-EQY-15-24+

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-718	OR

FILE:	SCALE:	SHEET:
98PL718	10:1	1 OF 1

Evaluation Board and Circuit

DETAIL "A"
(SCALE 5:1)

SCHEMATIC DIAGRAM
(SCALE 5:1)

Function	Pad
RF-IN	2
RF-OUT	6
GND	1,3,5,7
NOT USED	4,8

Notes:

1. PCB Material: Roger RO4350B or equivalent, Dielectric constant=3.5, Thickness=0.0066 inch

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Evaluation Board and Circuit

DETAIL "A"
(SCALE 5:1)

SCHEMATIC DIAGRAM
(SCALE 5:1)

Function	Pad
RF-IN	2
RF-OUT	6
GND	1,3,5,7
NOT USED	4,8

Notes:

1. 2.4mm Female Connectors.
2. PCB Material: Roger RO4350B or equivalent, Dielectric constant=3.5, Thickness=0.0066 inch

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Environmental Specifications ENV129

All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-40° to 85° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-65° to 150° C Ambient Environment	Individual Model Data Sheet
Temperature Cycling	-65° C to 150°C, 500 cycles Dwell Time: 10 min	JESD22-A104E,Test Condition C
Autoclave	29.7 psia, 100% RH, 121°C, 96 Hours	JESD22-A102E, Test Condition C
HAST	150°C, 168 Hours	JESD22-A103E, Test Condition B
Solderability (Dip&Look Method	SnAgCu Solder Pot: 245°C, Steam: 93°C, 8 Hours	JESD22-B102E, Method 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-020E, Level 1

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