MMIC Surface Mount

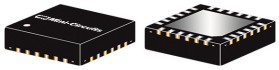
Directional Coupler

EDC21-24+

50Ω 21 dB 4 to 20 GHz

The Big Deal

- Wideband, 4-20 GHz
- Excellent coupling flatness 21±2 dB typ.
- Highly repeatable performance (GaAs based design)
- Small Size, 4 x 4 mm
- No external termination required



CASE STYLE: DG1847

Product Overview

Mini-Circuits' EDC21-24+ is a 21 dB directional coupler that operates from 4 to 20 GHz packaged in MCLP 4 x 4mm, 24-lead package. It provides excellent coupling flatness over a broad bandwidth and good return loss. This coupler also provides a quadrature phase shift between the signal at the through port and coupler port. Manufacturing using GaAs Technology, this model results in relatively high repeatablility in performance.

Key Features

Feature	Advantages
Wideband, 4-20 GHz	EDC21-24+ can be used in many applications, saving component count. Also ideal for wideband applications such as military and instrumentation.
Excellent coupling flatness	Excellent coupling flatness yields higher accuracy.
Small size, 4x4 MCLP package.	Tiny footprint saves space in dense layouts while providing low inductance, repeatable transitions, and excellent thermal contact to the PCB.

MMIC Surface Mount

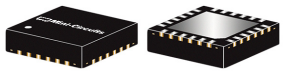
Directional Coupler

EDC21-24+

50Ω 21 dB 4 to 20 GHz

Features

- low mainline loss, 0.7 dB typ.
- excellent coupling flatness, ±2dB
- small size, 4x4 mm
- highly repeatable performance (GaAs based design)
- no external termination required.



CASE STYLE: DG1847

+RoHS Compliant

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

Applications

- satellite communications
- wireless infrastructure
- test and measurements

Electrical Specifications at 25°C

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Unit
Frequency Range		4000		20000	MHz
Mainline Loss[1]	4000 - 8000	—	0.4	1.0	dB
	8000 - 10000	—	0.7	1.4	
	10000 - 15000	—	0.8	1.5	
	15000 - 20000	—	0.9	2.0	
Nominal Coupling	4000 - 8000	18.7	22	25.8	dB
	8000 - 10000	17.8	21	24.6	
	10000 - 15000	18.0	21	24.8	
	15000 - 20000	17.5	21	24.2	
Coupling Flatness(±)	4000 - 20000	—	2.0	—	dB
Directivity	4000 - 8000	17.2	21	—	dB
	8000 - 10000	12.5	19	—	
	10000 - 15000	11	16	—	
	15000 - 20000	9.1	14	—	
Return Loss (Input)	4000 - 8000		26		dB
	8000 - 10000		16		
	10000 - 15000		17		
	15000 - 20000		21		
Return Loss (Output)	4000 - 8000		26		dB
	8000 - 10000		16		
	10000 - 15000		17		
	15000 - 20000		21		
Return Loss (Coupled)	4000 - 8000		19		dB
	8000 - 10000		16		
	10000 - 15000		15		
	15000 - 20000		21		

Maximum Ratings

Parameter	Ratings
Operating Temperature	-40°C to 85°C
Storage Temperature	-65°C to 150°C
Input Power	32.5 dBm (5 minute max.) 29.5 dBm (continuous)
Power at internal termination	15 dBm (5 minute max.) 12 dBm (continuous)

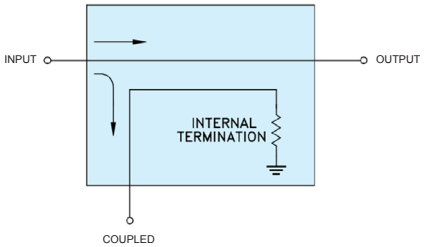
Permanent damage may occur if any of these limits are exceeded.

* ESD rating
Human body model (HBM): Class 1B(500V) in accordance with ANSI/ESD 5.1-2007

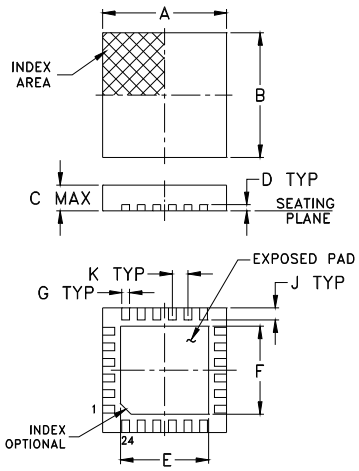
Pad Connections

Function	Pad Number
INPUT	3
COUPLED	7
OUTPUT	16
GROUND	1,2,4-6,8-15, 17-24 & paddle

Electrical Schematic

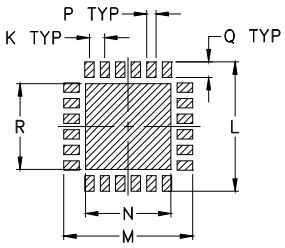


Outline Drawing



Lead Finish: Matte-Tin

PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

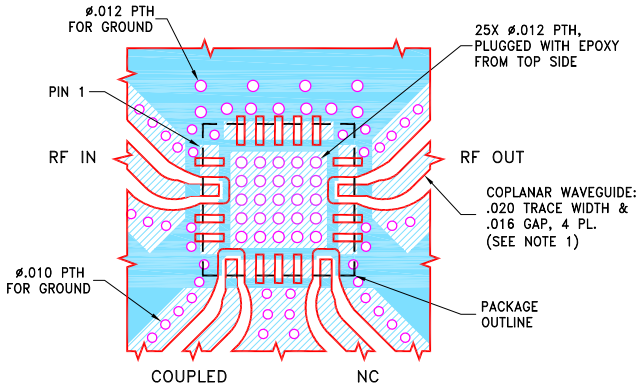
Product Marking

Outline Dimensions (inch / mm)

A	B	C	D	E	F	G	H	J
.157	.157	.039	.008	.104	.104	.009	--	.016
4.0	4.0	1.0	0.20	2.64	2.64	0.23	--	0.41

K	L	M	N	P	Q	R	wt
.020	.166	.166	.102	.012	.020	.102	grams
0.50	4.22	4.22	2.59	0.30	0.51	2.59	0.04

Demo Board MCL P/N: TB-978+
Suggested PCB Layout (PL-532)



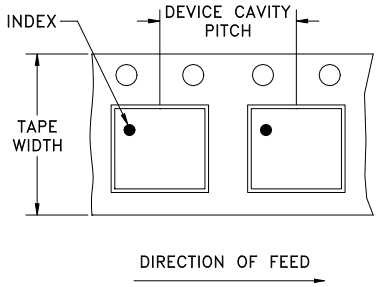
NOTES:
1. TRACE WIDTH & GAP PARAMETERS ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .010"±.001". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH & GAP MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

Tape and Reel (F68)

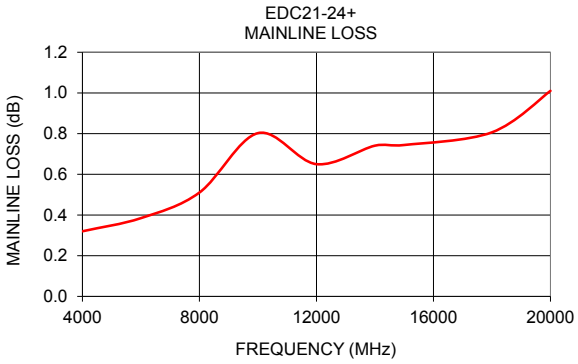
DEVICE ORIENTATION IN T&R

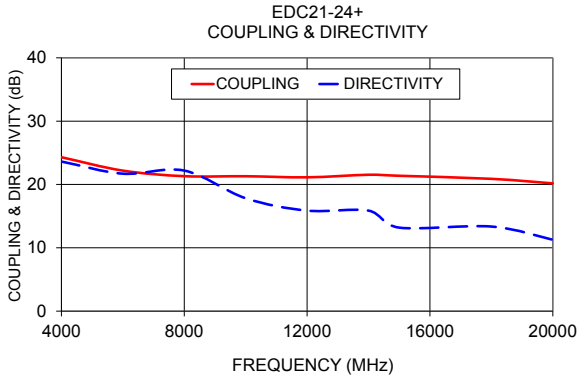


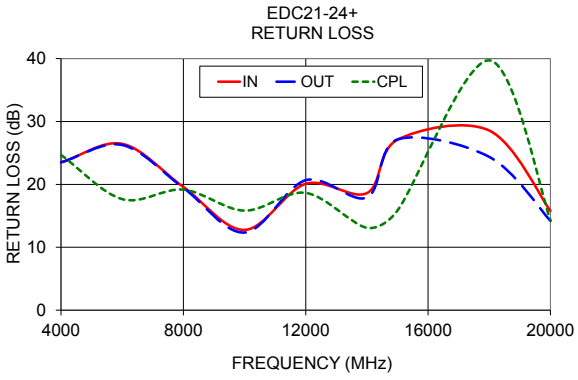
Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel see note	
12	8	7	Small quantity standard	20
				50
				100
				200
				500
		7	Standard	1000
		13	Standard	2000
				3000
				4000

Typical Performance Data

Frequency (MHz)	Mainline Loss (dB) In-Out	Coupling (dB) In-Cpl	Directivity (dB)	Return Loss (dB) In	Out	Cpl
4000	0.32	24.30	23.62	23.47	23.52	24.68
6000	0.38	22.19	21.70	26.44	26.26	17.66
8000	0.51	21.31	22.20	19.59	19.45	19.17
10000	0.80	21.30	17.82	12.76	12.34	15.83
12000	0.65	21.13	15.88	20.09	20.67	18.65
14000	0.74	21.54	15.87	18.61	17.91	13.09
15000	0.74	21.37	13.19	27.10	27.14	15.85
18000	0.81	20.89	13.36	28.56	24.37	39.71
20000	1.01	20.17	11.27	15.77	14.20	14.33







Additional 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