



Mini-Circuits

SURFACE MOUNT

Power Splitter/Combiner

AMT-52+

50 Ω (2 Way-0°/ 180°) 50 to 500 MHz

KEY FEATURES

- Low Insertion Loss, 0.9 dB Typ.
- Low Amplitude Unbalance, 0.5 dB Typ.
- Good Power Handling
- High Isolation, 40 dB Typ.

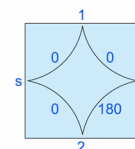


Generic photo used for illustration purposes only

APPLICATIONS

- Communication System
- IF Receiver
- FM Broadcast

FUNCTIONAL DIAGRAM



- S-J ports, isolation 40 typical
- Amplitude unbalance defined by input S or J ports to output 1 and 2

PRODUCT OVERVIEW

Mini-Circuits' AMT-52+ is a wideband 50 Ω 2 Way 0°/180° surface mount magic T splitter/combiner. It provides very low amplitude and phase unbalance with good isolation over the full frequency range. It handles up to 0.5W of input power and comes in a small case with excellent thermal performance (-40°C to 85°C operating).

ELECTRICAL SPECIFICATIONS AT +25°C

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Units
Frequency Range		50	—	500	MHz
Insertion Loss (above 3 dB)	S-1, S-2	50 - 500	—	0.9	dB
	J-1, J-2	50 - 500	—	1.6	
Isolation	J-S	50 - 250	30	40	dB
		250 - 500	20	30	
	1-2	50 - 250	23	34	
		250 - 500	18	28	
Phase Unbalance ($\pm$)	50 - 100	—	1	3	Degree
	100 - 500	—	2	5	
Amplitude Unbalance ($\pm$)	50 - 500	—	0.5	1.2	dB
Return Loss (Port S) (Port J)	50 - 500	—	17.7	—	dB
Return Loss (Port 1-2)	50 - 500	—	16.5	—	dB

ABSOLUTE MAXIMUM RATINGS¹

Operating Case Temperature		-40°C to +85°C
Storage Temperature		-55°C to +100°C
Input Power	as splitter	0.5 W
	as combiner per port	0.125 W

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





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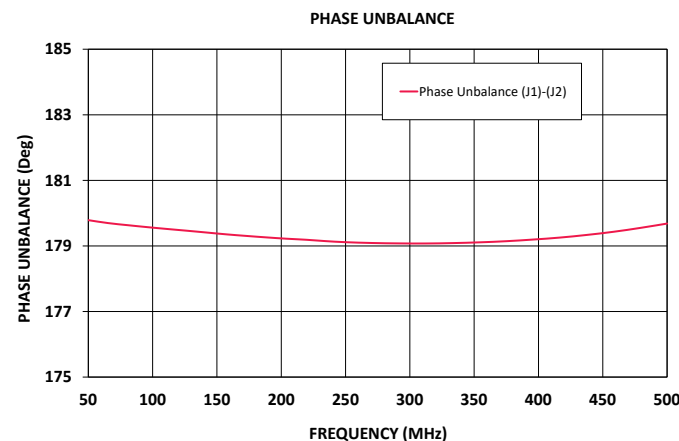
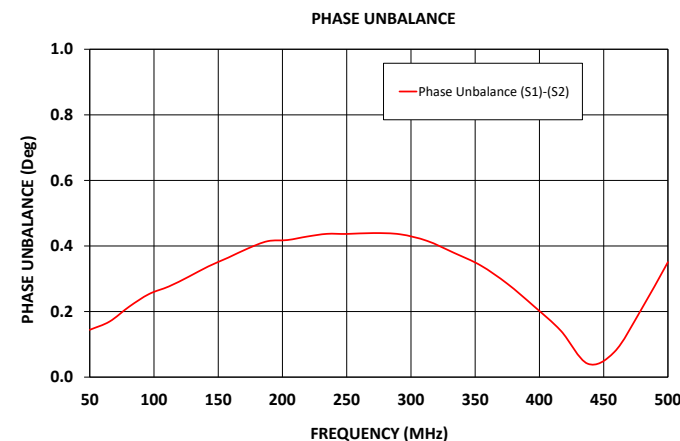
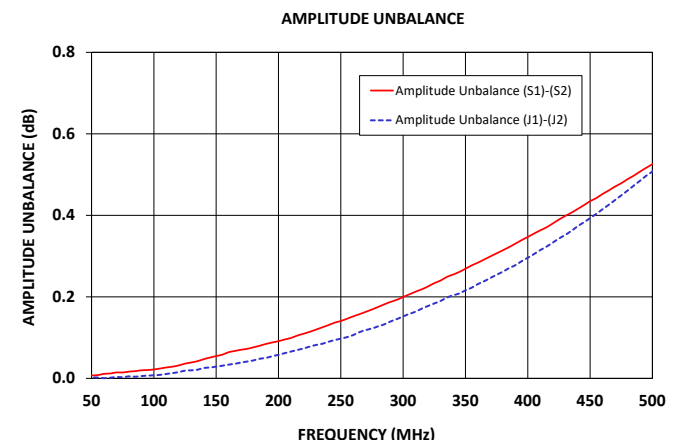
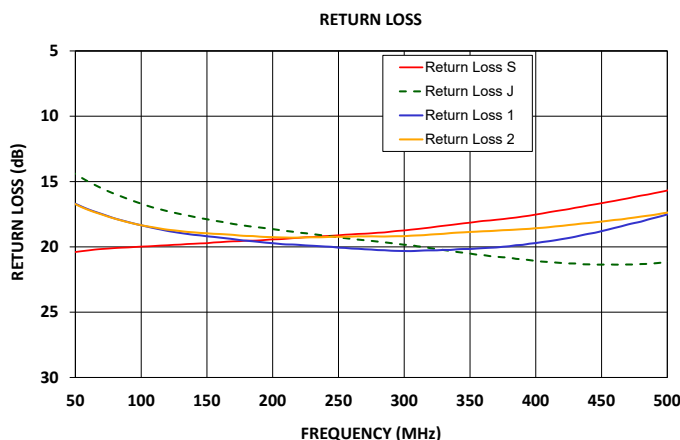
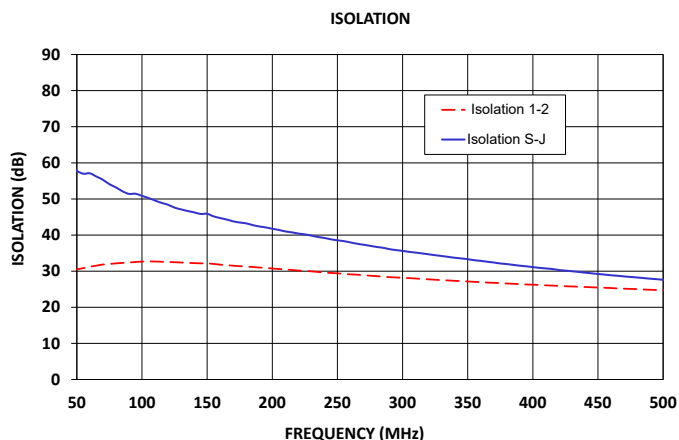
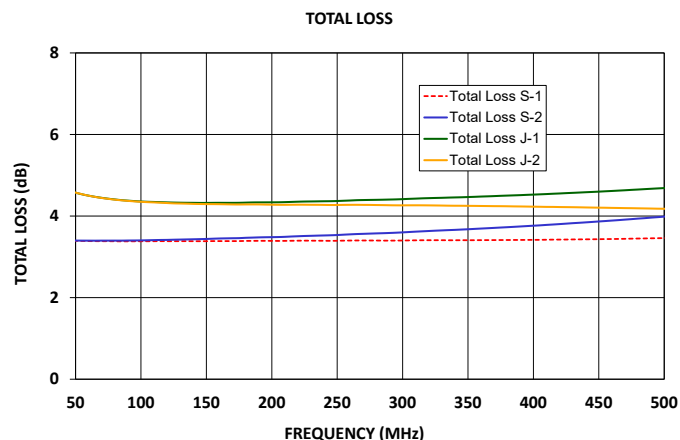
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Power Splitter/Combiner

AMT-52+

50Ω (2 Way-0°/ 180°) 50 to 500 MHz

TYPICAL PERFORMANCE GRAPHS





Power Splitter/Combiner

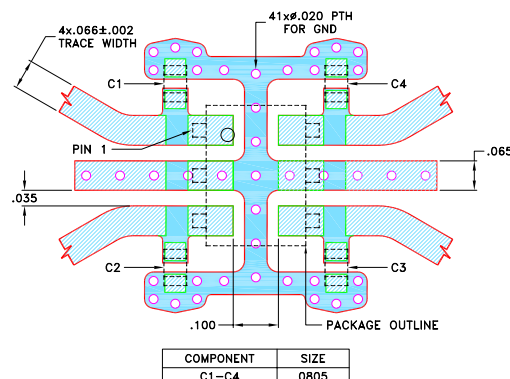
AMT-52+

50Ω (2 Way-0°/ 180°) 50 to 500 MHz

- Figure 1. AMT-52+ Functional Diagram**

Function	Pad Number	Description
Sum Port	3	Connects to Sum Port
Port 1	6	Connects to 1 Port
Port 2	4	Connects to 2 Port
Port J	1	Connects to J Port
Ground	2,5	Connects to Ground
Ext. Capacitor C1 - 2.7 pF	—	Pad 1 to Ground
Ext. Capacitor C2 - 1.8 pF	—	Pad 3 to Ground
Ext. Capacitor C3 - 1.2 pF	—	Pad 4 to Ground
Ext. Capacitor C4 - 2.2 pF	—	Pad 6 to Ground

SUGGESTED MOUNTING CONFIGURATION
FOR CD636 CASE STYLE



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

 DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK

Figure 2. Suggested PCB Layout PL-854

PCB LAND PATTERN

.310

.055

.220

.100

.030 TYP

.162 MAX

.272 ± .01

.026 REF

.100 TYP

.100 TYP

.065 TYP

.265 REF

.300

SUGGESTED LAYOUT,
TOLERANCE TO BE WITHIN ±.002

Dimensions are in inches (mm). Tolerances: 2Pl ± .01 [0.25]; 3Pl ± .005 [.127]

*Marking may contain other features or characters for internal lot control.



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ADDITIONAL DETAILED INFORMATION IS AVAILABLE ON OUR DASHBOARD

[CLICK HERE](#)

Performance Data & Graphs	Data Graphs S-Parameter (S4P Files) Data Set (.zip file) De-embedded to device pads
Case Style	CD636 Lead Finish: Tin over Nickel Plate
RoHS Status	Compliant
Tape and Reel	F34
Suggested Layout for PCB Design	PL-854
Evaluation Board	TB-AMT-52+ Gerber File
Environmental Rating	ENV02T1

NOTES

- 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.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- 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/terms/viewterm.html



2 Way-0°/180° Power Splitter/Combiner

AMT-52+

Typical Performance Data

FREQ. (MHz)	TOTAL LOSS ¹				AMPLITUDE UNBALANCE		ISOLATION		RETURN LOSS			
	(dB)				(dB)		(dB)		(dB)			
	S-1	S-2	J-1	J-2	(S1)-(S2)	(J1)-(J2)	1-2	S-J	S	J	1	2
5	3.48	3.48	5.74	5.73	0.00	0.01	17.12	69.68	17.41	6.63	10.00	10.00
10	3.48	3.47	5.19	5.18	0.00	0.00	21.98	73.06	20.02	9.91	12.86	12.87
20	3.43	3.44	4.94	4.94	0.00	0.00	26.39	66.87	20.73	12.10	14.76	14.78
30	3.42	3.42	4.80	4.80	0.00	0.00	28.30	61.49	20.66	13.03	15.57	15.60
40	3.40	3.41	4.67	4.68	0.01	0.00	29.58	58.93	20.51	13.78	16.18	16.21
50	3.39	3.40	4.57	4.58	0.01	0.00	30.50	57.73	20.39	14.42	16.70	16.73
60	3.39	3.40	4.50	4.50	0.01	0.00	31.24	57.10	20.27	15.02	17.14	17.18
70	3.38	3.40	4.45	4.44	0.01	0.00	31.84	55.31	20.16	15.52	17.49	17.52
80	3.38	3.40	4.41	4.40	0.02	0.01	32.16	53.20	20.09	15.95	17.83	17.84
90	3.38	3.40	4.38	4.37	0.02	0.01	32.41	51.40	20.05	16.34	18.10	18.12
100	3.38	3.40	4.36	4.35	0.02	0.01	32.66	50.84	19.98	16.69	18.35	18.34
110	3.38	3.41	4.35	4.34	0.03	0.01	32.67	49.56	19.93	17.02	18.57	18.52
120	3.38	3.42	4.34	4.32	0.03	0.02	32.55	48.40	19.88	17.27	18.78	18.69
130	3.38	3.42	4.33	4.31	0.04	0.02	32.40	47.11	19.82	17.49	18.94	18.80
140	3.38	3.43	4.32	4.30	0.05	0.03	32.23	46.29	19.76	17.70	19.08	18.89
150	3.38	3.44	4.32	4.29	0.05	0.03	32.14	45.89	19.72	17.89	19.19	18.96
160	3.39	3.45	4.33	4.29	0.06	0.03	31.80	44.72	19.64	18.06	19.29	19.02
170	3.39	3.46	4.32	4.29	0.07	0.04	31.51	43.80	19.58	18.25	19.41	19.08
180	3.39	3.47	4.33	4.29	0.08	0.04	31.28	43.24	19.52	18.39	19.53	19.16
190	3.39	3.48	4.34	4.29	0.08	0.05	31.01	42.38	19.51	18.52	19.63	19.22
200	3.39	3.48	4.34	4.28	0.09	0.06	30.73	41.75	19.43	18.64	19.72	19.26
210	3.39	3.49	4.34	4.28	0.10	0.07	30.48	41.01	19.38	18.78	19.81	19.29
225	3.40	3.51	4.36	4.28	0.11	0.08	30.08	40.19	19.26	18.96	19.89	19.28
230	3.40	3.52	4.36	4.28	0.12	0.08	29.95	39.85	19.25	19.02	19.92	19.27
240	3.39	3.52	4.36	4.27	0.13	0.09	29.65	39.20	19.18	19.14	19.98	19.25
250	3.39	3.54	4.37	4.27	0.14	0.10	29.40	38.54	19.12	19.28	20.06	19.23
260	3.40	3.55	4.38	4.28	0.15	0.11	29.11	37.96	19.04	19.39	20.13	19.21
270	3.40	3.56	4.39	4.27	0.16	0.12	28.89	37.32	18.99	19.49	20.18	19.20
280	3.40	3.58	4.40	4.27	0.18	0.13	28.61	36.71	18.92	19.60	20.25	19.20
290	3.40	3.59	4.41	4.27	0.19	0.14	28.34	36.09	18.83	19.71	20.30	19.19
300	3.40	3.60	4.42	4.26	0.20	0.15	28.15	35.61	18.74	19.84	20.32	19.18
305	3.40	3.61	4.42	4.26	0.21	0.16	28.07	35.36	18.68	19.87	20.32	19.15
310	3.41	3.62	4.43	4.26	0.21	0.16	27.98	35.14	18.63	19.96	20.30	19.12
315	3.41	3.63	4.43	4.26	0.22	0.17	27.81	34.92	18.58	20.01	20.28	19.10
320	3.41	3.63	4.44	4.26	0.23	0.18	27.74	34.67	18.52	20.10	20.27	19.06
325	3.41	3.64	4.44	4.26	0.23	0.18	27.62	34.43	18.44	20.16	20.26	19.03
330	3.41	3.65	4.45	4.26	0.24	0.19	27.53	34.20	18.38	20.24	20.23	19.00
335	3.41	3.66	4.45	4.25	0.25	0.20	27.43	33.96	18.33	20.31	20.24	18.95
340	3.41	3.66	4.46	4.25	0.25	0.20	27.33	33.71	18.27	20.39	20.19	18.91
345	3.41	3.67	4.46	4.25	0.26	0.21	27.25	33.53	18.20	20.45	20.16	18.89
350	3.41	3.68	4.47	4.25	0.27	0.22	27.15	33.32	18.15	20.51	20.16	18.86
355	3.41	3.69	4.47	4.25	0.28	0.22	27.05	33.04	18.08	20.59	20.13	18.84
360	3.41	3.69	4.48	4.25	0.28	0.23	26.96	32.86	18.01	20.63	20.10	18.81
365	3.41	3.70	4.48	4.25	0.29	0.24	26.84	32.62	17.98	20.71	20.07	18.79
370	3.41	3.71	4.49	4.24	0.30	0.25	26.78	32.40	17.92	20.76	20.05	18.76
375	3.41	3.72	4.50	4.24	0.31	0.25	26.69	32.13	17.87	20.80	19.99	18.72
380	3.41	3.73	4.50	4.24	0.31	0.26	26.58	31.97	17.81	20.82	19.95	18.71
385	3.41	3.74	4.51	4.24	0.32	0.27	26.50	31.74	17.75	20.92	19.87	18.68
390	3.41	3.75	4.51	4.24	0.33	0.28	26.41	31.52	17.68	20.95	19.85	18.64
395	3.42	3.75	4.52	4.23	0.34	0.29	26.32	31.34	17.61	21.01	19.76	18.62
400	3.42	3.76	4.53	4.23	0.35	0.30	26.26	31.13	17.53	21.08	19.71	18.57
405	3.42	3.77	4.53	4.23	0.36	0.30	26.17	30.92	17.44	21.13	19.63	18.54
410	3.42	3.78	4.54	4.22	0.36	0.31	26.08	30.76	17.35	21.16	19.57	18.49
415	3.42	3.79	4.55	4.22	0.37	0.32	26.00	30.59	17.26	21.20	19.49	18.43
420	3.42	3.80	4.55	4.22	0.38	0.33	25.93	30.32	17.19	21.24	19.40	18.39
425	3.42	3.81	4.56	4.22	0.39	0.34	25.83	30.15	17.11	21.27	19.32	18.33
430	3.43	3.83	4.57	4.22	0.40	0.35	25.77	29.98	17.01	21.27	19.23	18.28
435	3.43	3.84	4.58	4.21	0.41	0.36	25.69	29.79	16.93	21.33	19.11	18.21
440	3.43	3.85	4.58	4.21	0.42	0.37	25.61	29.59	16.83	21.34	19.00	18.18
445	3.43	3.86	4.59	4.21	0.42	0.38	25.55	29.41	16.75	21.35	18.92	18.12
450	3.43	3.87	4.60	4.21	0.43	0.39	25.46	29.22	16.66	21.36	18.80	18.06
500	3.46	3.99	4.69	4.18	0.53	0.51	24.74	27.61	15.69	21.15	17.52	17.38

¹Total Loss = Insertion Loss + 3dB Splitter Loss

2 Way-0°/180° Power Splitter/Combiner

AMT-52+

Typical Performance Data

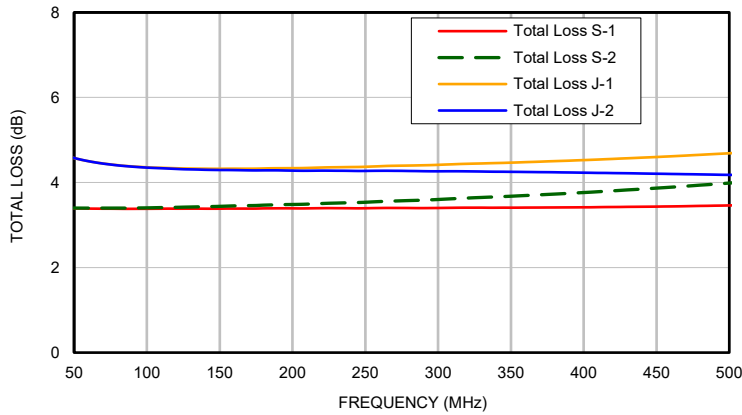
FREQ. (MHz)	PHASE UNBALANCE (deg.)	
	(S1)-(S2)	(J1)-(J2)
50.00	0.14	179.79
65.38	0.17	179.70
80.77	0.22	179.63
96.15	0.25	179.57
100.00	0.26	179.56
111.54	0.28	179.52
126.92	0.31	179.46
142.31	0.34	179.41
157.69	0.36	179.35
173.08	0.39	179.30
188.46	0.41	179.26
203.85	0.42	179.22
219.23	0.43	179.19
234.62	0.44	179.15
250.00	0.44	179.11
270.83	0.44	179.09
291.67	0.44	179.08
312.50	0.42	179.07
333.33	0.38	179.09
354.17	0.34	179.11
375.00	0.28	179.14
395.83	0.22	179.19
416.67	0.14	179.26
437.50	0.04	179.34
458.33	0.08	179.43
479.17	0.21	179.55
500.00	0.35	179.68

2 Way-0°/180° Power Splitter/Combiner

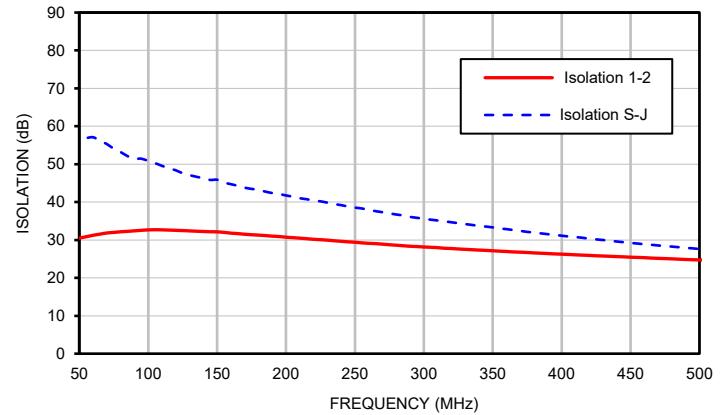
AMT-52+

Typical Performance Curves

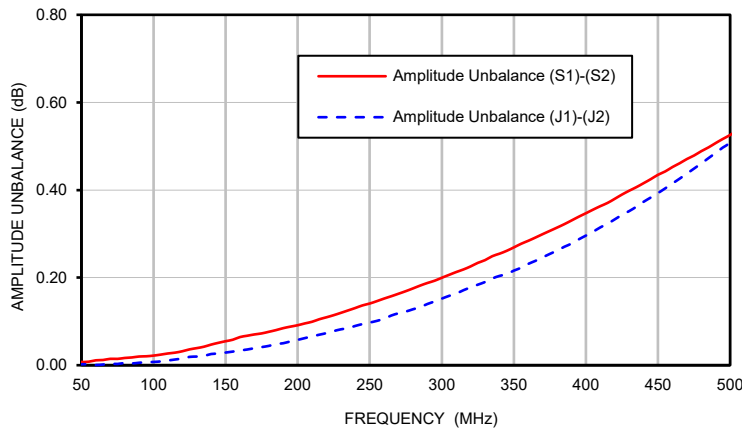
TOTAL LOSS



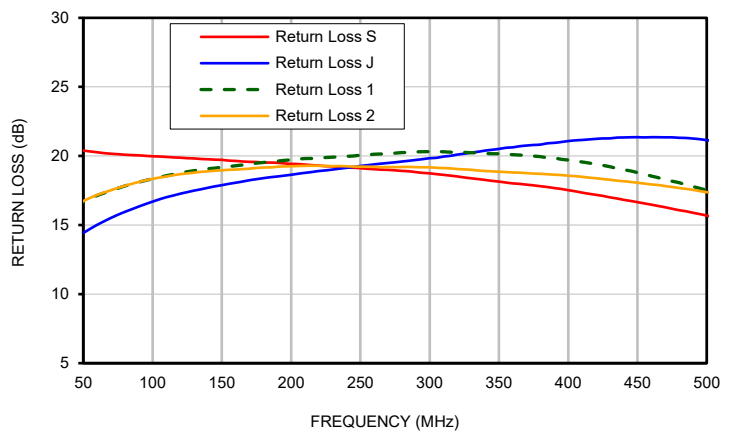
ISOLATION



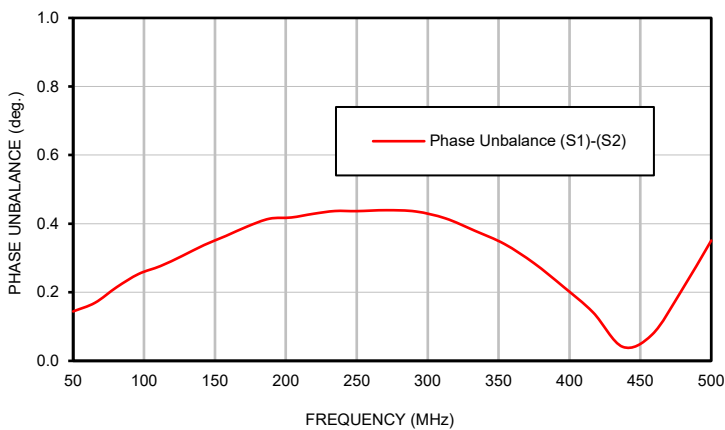
AMPLITUDE UNBALANCE



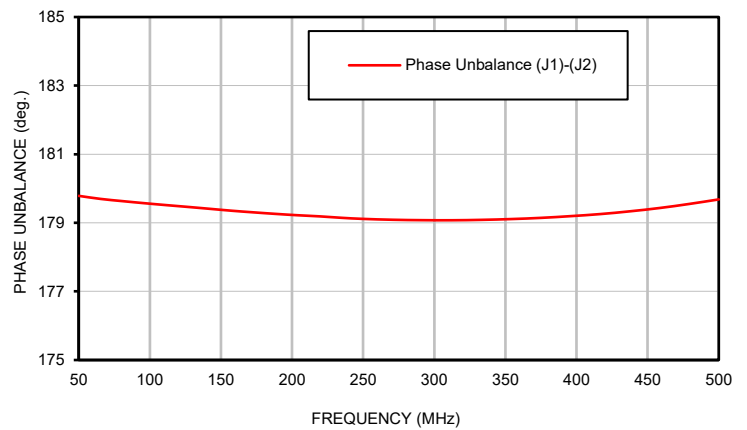
RETURN LOSS



PHASE UNBALANCE

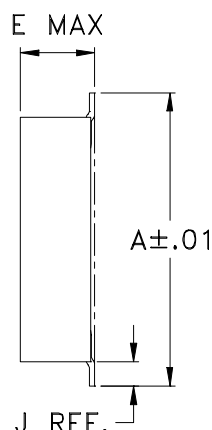
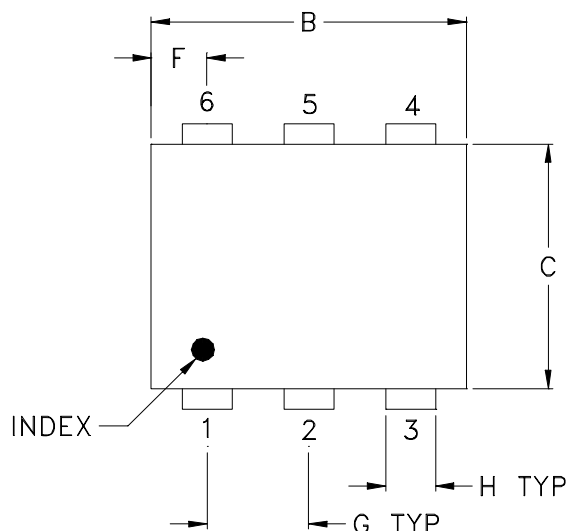


PHASE UNBALANCE

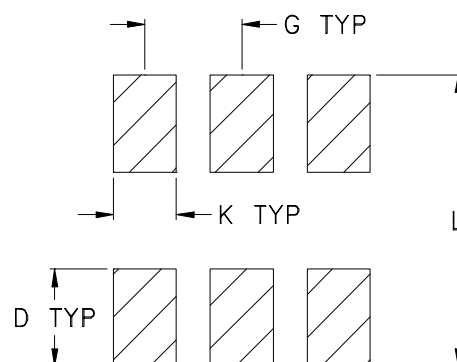


CD541
CD542
CD636
CD637

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	WT, GRAM
CD541					.082 (2.08)							.15
CD542	.272 (6.91)	.310 (7.87)	.220 (5.58)	.100 (2.54)	.112 (2.84)	.055 (1.40)	.100 (2.54)	.030 (0.76)	.026 (0.66)	.065 (1.65)	.300 (7.62)	.20
CD636					.162 (4.11)							.25
CD637					.206 (5.23)							.40

Dimensions are in inches (mm). Tolerances: 2 Pl. $\pm .01$; 3 Pl. $\pm .005$

Notes:

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



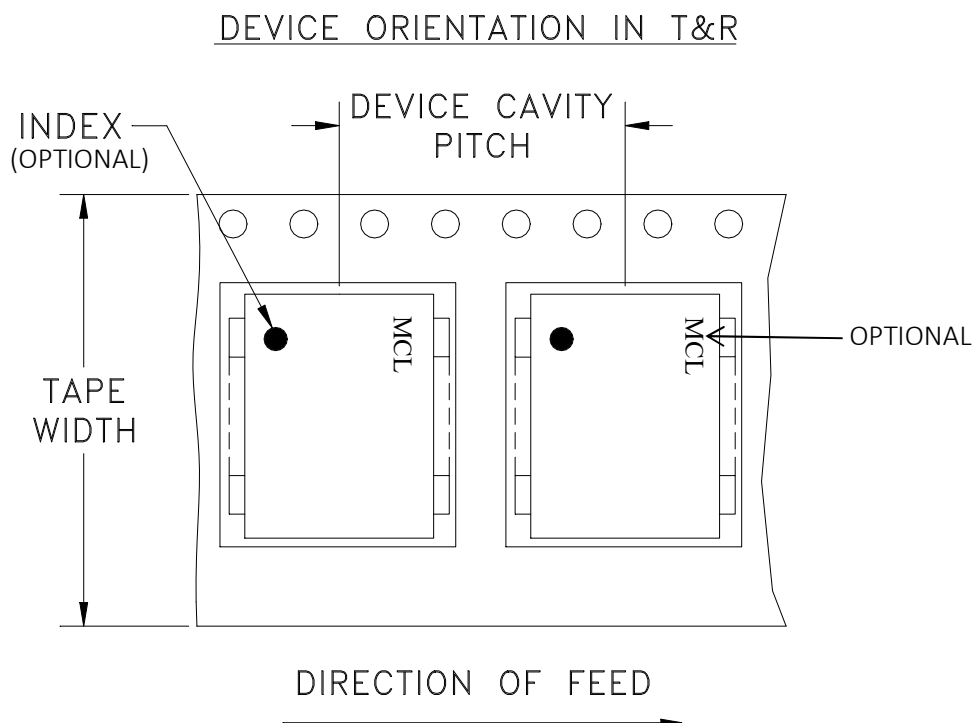
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Mini-Circuits ISO 9001 & ISO 14001 Certified

Tape & Reel Packaging TR-F34



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel see note	
16	12	7	Small quantity standard (see note)	20
				50
				100
				200
		13	Standard	500
				1000

Note: Availability of small reel quantity varies by model.
Refer to pricing and availability on individual model dashboard.

Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

Go to: www.minicircuits.com/pages/pdfs/tape.pdf



INTERNET <http://www.minicircuits.com>

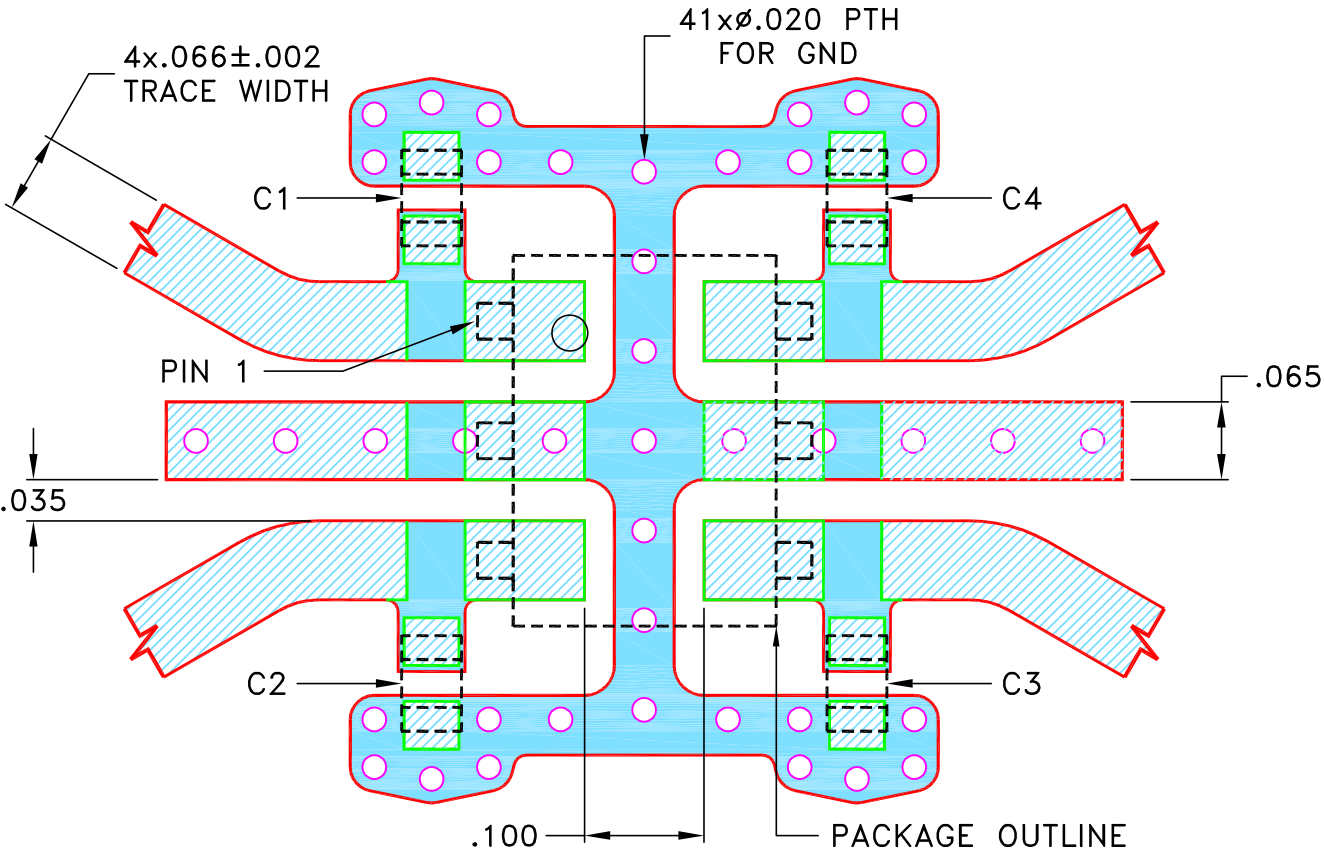
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THIRD ANGLE PROJECTION		REVISIONS				
		REV	ECN No.	DESCRIPTION	DATE	DR
		OR	NP0-005989	NEW RELEASE	FEB 26	SKH

SUGGESTED MOUNTING CONFIGURATION
FOR CD636 CASE STYLE



COMPONENT	SIZE
C1-C4	0805

NOTES:

- TRACE WIDTH IS SHOWN FOR ROGERS (R04350B) WITH DIELECTRIC THICKNESS $\varnothing.030\pm.002$; COPPER: 1/2 Oz ON EACH SIDE.
FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
- BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
- CHIP COMPONENT FOOT PRINT SHOWN FOR REFERENCE.
FOR COMPONENT VALUE REFER TO INDIVIDUAL MODEL EVALUATION BOARD.



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



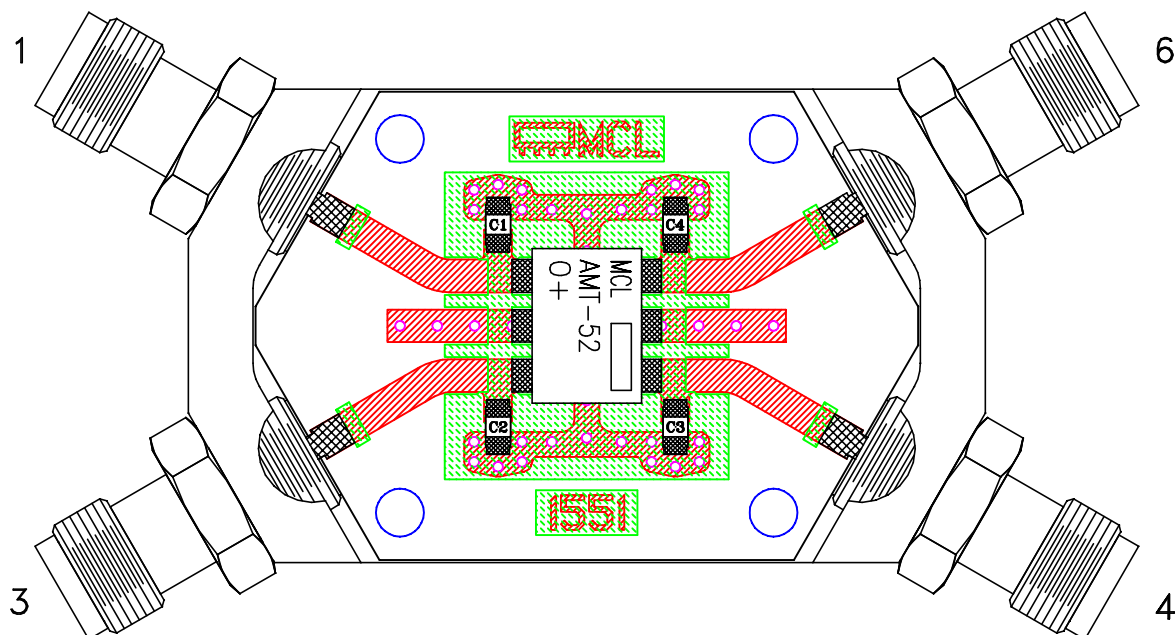
DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE	Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235 PL, 50, CD636, TB-1324			
DIMENSIONS ARE IN INCHES TOLERANCES ON: 2 PL DECIMALS ± 3 PL DECIMALS ± .005 ANGLES ± FRACTIONS ±	DRAWN	SKH	19 FEB 26				
	CHECKED	MD	19 FEB 26				
	APPROVED	MKS	19 FEB 26				
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ASHEETA1.DWG REV:A DATE:01/12/95				FILE:98-PL-854	SCALE: 6:1	SHEET: 1 OF 1	

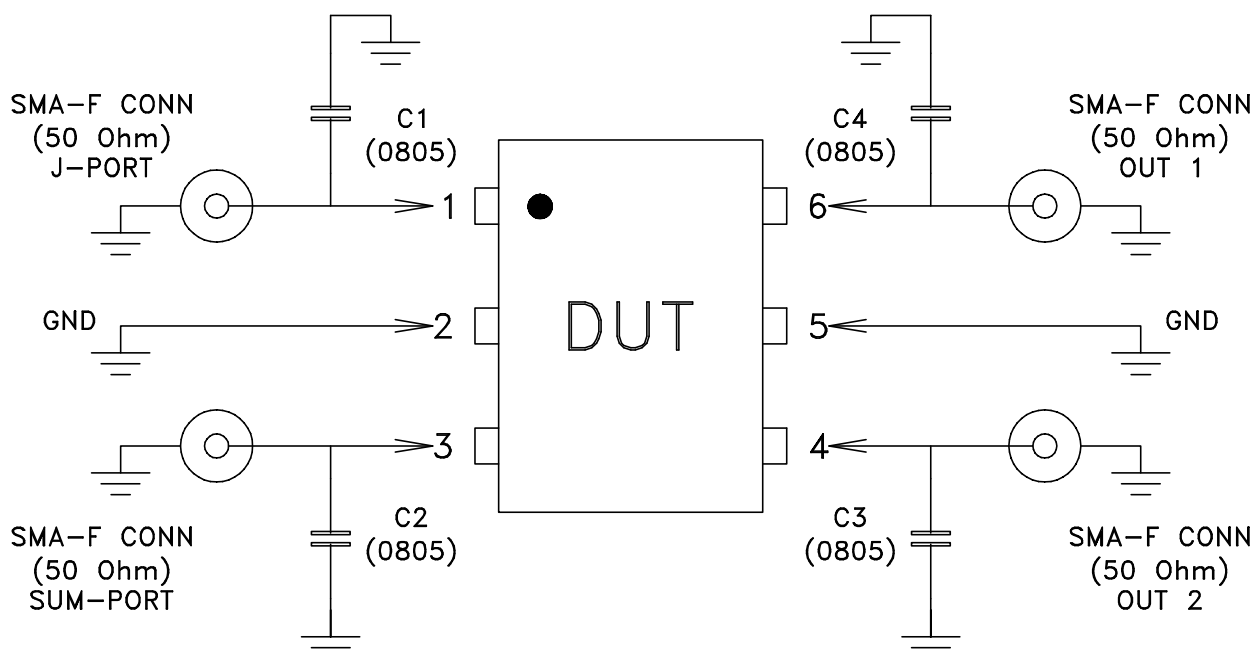
Evaluation Board and Circuit

TB-AMT-52+

Refer data sheet of the model for pin connections



Schematic diagram



Notes:

1. PCB Material: ROGERS (R04350B) OR Equivalent, Dielectric Constant=3.48
Thickness=.030±.002 inch
2. 50 Ohm SMA Female Connectors.

 **Mini-Circuits®**



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	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Humidity	90 to 95% RH, 240 hours, 50°C	MIL-STD-202, Method 103, Condition A, Except 50°C and end-point electrical test done within 12 hours
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Solder Reflow Heat	Sn-Pb Eutetic Process: 225°C peak Pb-Free Process 245° - 250°C peak	J-STD-020, Table 4-1, 4-2 and 5-2, Figure 5-1
Solderability	10X Magnification	J-STD-002, 95% Coverage
Vibration (High Frequency)	20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36)	MIL-STD-202, Method 204, Condition D
Mechanical Shock	50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes	MIL-STD-202, Method 213, Condition A
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215