



LTCC SURFACE MOUNT

Directional Coupler

HPCJ-30-43+

50Ω 3300 to 4000 MHz 30 dB

THE BIG DEAL

- High Input Power Handling, Max, 50 W
- Mainline Loss, Typ. 0.11 dB
- Coupling, Typ. 30.5 dB
- Directivity, Typ. 18 dB
- Small size: 0.125" x 0.2" x 0.047"

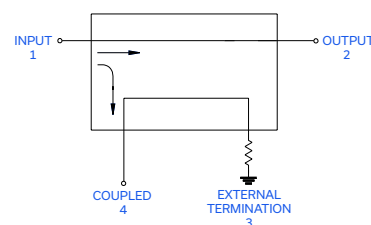


Generic photo used for illustration purposes only

APPLICATIONS

- 5G Sub6, MIMO, n78 Wireless Infrastructure Systems
- Microwave Backhaul Radio Systems
- Radar Systems
- Satellite Communications

FUNCTIONAL DIAGRAM



PRODUCT OVERVIEW

Mini-Circuits' HPCJ-30-43+ is an LTCC directional coupler from 3300 to 4000 MHz, supporting a variety of applications. This model provides 0.11 dB typical mainline loss, 30.5 dB coupling, and 18 dB directivity. It handles up to 50 W RF input power and provides a wide operating temperature range from -55 to +125°C. Housed in a small 0.125" x 0.2" x 0.047" form factor, the coupler is ideal for dense PCB layouts and with minimal performance variation due to parasitics.

KEY FEATURES

Features	Advantages
High Power Handling, 50 W Maximum	Capable of operating up to 50 W maximum, the construction of HPCJ-30-43+ makes this directional coupler a robust, rugged product that can be used effectively in either the transmit or receive paths.
Low Mainline Loss, 0.11 dB	Capable of being used to sample the power amplifier output with minimal loss.
Directivity, 18 dB	Directivity minimizes coupling of reverse power and enables accurate sampling of thru-signal.
High operating temperature range, -55 to +125°C	Operation up to +125°C allows the coupler to be used near power amplifiers with minimal change in performance.

REV. OR
ECO-027041
HPCJ-30-43+
MCL NY
250922





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50Ω 3300 to 4000 MHz 30 dB

ELECTRICAL SPECIFICATIONS^{1,2} AT +25°C

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Units
Frequency Range		3300		4000	MHz
Mainline Loss ³	3300 - 4000		0.11	0.14	dB
Coupling	3300 - 4000	28	30.5	33	dB
Directivity	3300 - 4000		18		dB
Return Loss (Input, Output, Coupled)	3300 - 4000	20	28		dB

1. Tested on Evaluation Board TB-HPCJ-30-43C+. De-embedded to the device reference plane using TRL.

2. Symmetrical, all ports are interchangeable. See Pad Configuration Table and S-Parameters for actual performance.

3. Mainline Loss includes coupling loss.

ABSOLUTE MAXIMUM RATINGS⁴

Parameter	Ratings
Operating Temperature	-55 °C to +125 °C
Storage Temperature	-55 °C to +125 °C
Input Power ⁵	50 W at +25 °C

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

5. At +25°C derate linearly to 17 W at +125 °C.





LTCC SURFACE MOUNT

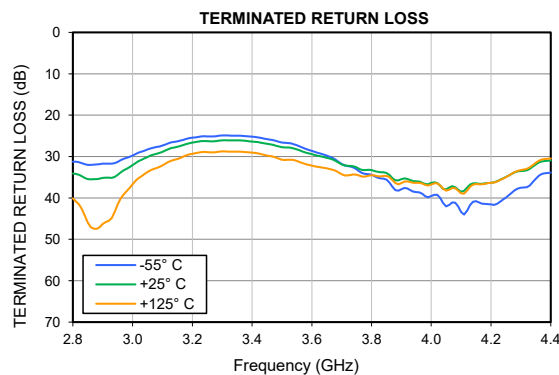
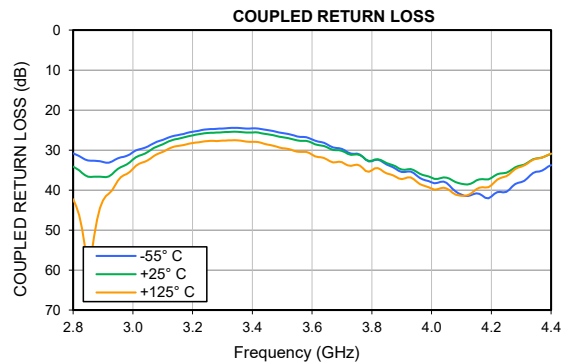
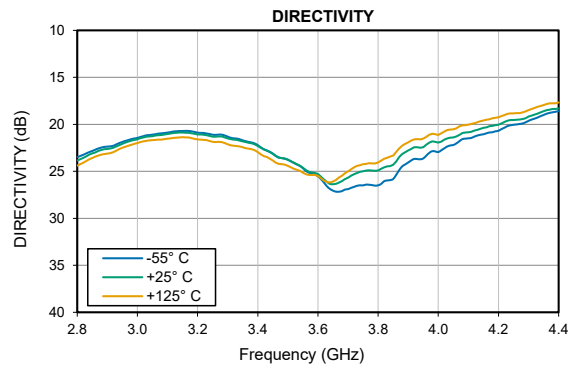
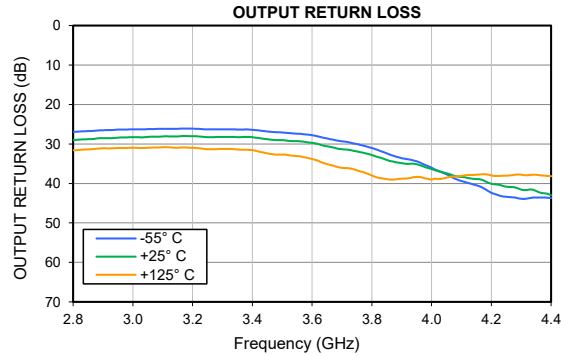
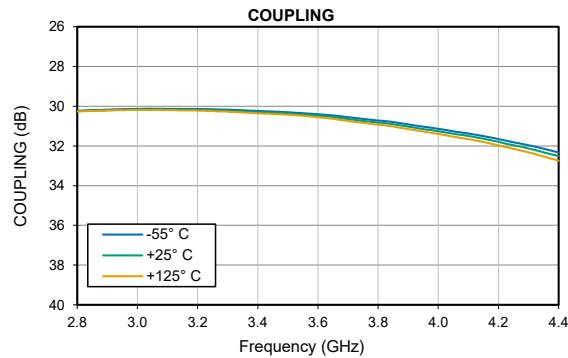
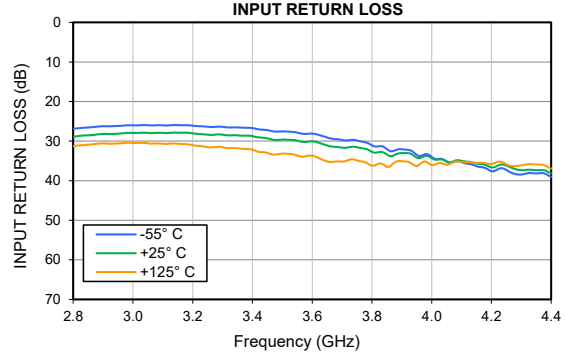
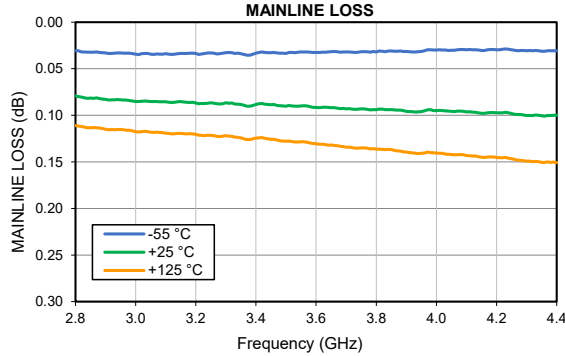
Directional Coupler

HPCJ-30-43+

Mini-Circuits

50Ω 3300 to 4000 MHz 30 dB

TYPICAL PERFORMANCE GRAPHS



Mini-Circuits

FUNCTIONAL DIAGRAM

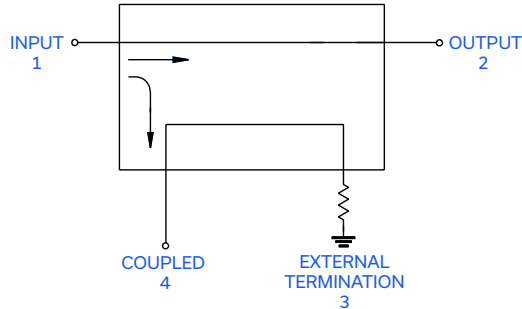
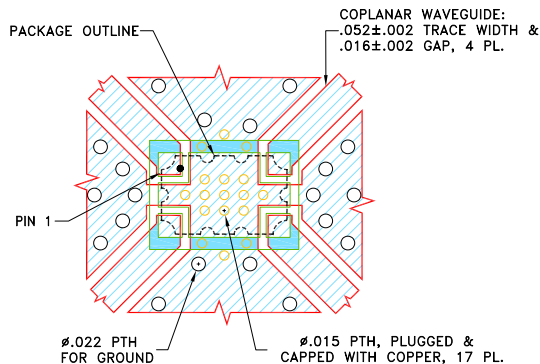


Figure 1. HPCJ-30-43+ Functional Diagram

PAD DESCRIPTION/CONFIGURATION

Function	Pad Number	Description
Input	1	Connects to RF Input Port
Output	2	Connects to RF Output Port
Termination	3	Connects to External Termination
Coupled	4	Connects to Coupled Port

SUGGESTED PCB LAYOUT (PL-834)



NOTES:

1. TRACE WIDTH & GAP ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS: .030±.002; COPPER: 1/2 OZ. ON EACH SIDE.
FOR OTHER MATERIALS TRACE WIDTH & GAP MAY NEED TO BE MODIFIED.

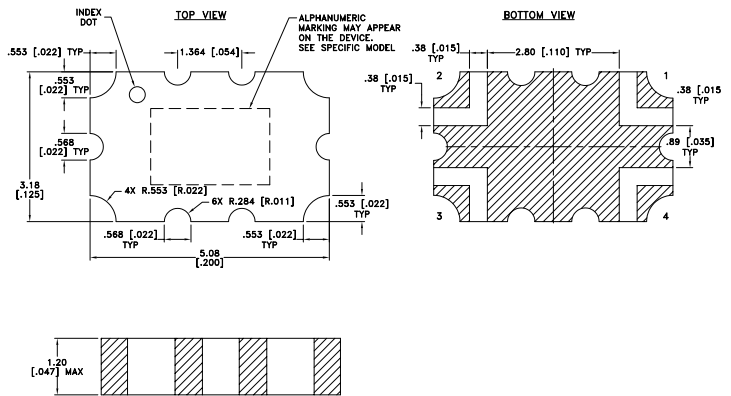
FOR OTHER MATERIALS TRACE WIDTH & GAP MAY NEED TO BE MODIFIED.

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

 DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

 DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

CASE STYLE DRAWING

 DENOTES METALLIZATION

Weight: 0.049 grams

Dimensions are in mm [inches]. Tolerances: 2 PL± 0.25; 3 PL± 0.127 mm

PRODUCT MARKING*: Z2

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

Figure 2. Suggested PCB Layout PL-834



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ADDITIONAL DETAILED INFORMATION IS AVAILABLE ON OUR DASHBOARD.

[CLICK HERE](#)

Performance Data & Graphs	Data Graphs S-Parameter (SXP Files) Data Set (.zip file) De-embedded to device pads
Case Style	AAE3610-1 Lead Finish: Tin over Nickel Plating
RoHS Status	Compliant
Tape and Reel	F110
Suggested Layout for PCB Design	PL-834
Evaluation Board	TB-HPCJ-30-43C+ Gerber File
Environmental Rating	ENV06T10

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-Circuits' applicable established test performance criteria and measurement instructions.
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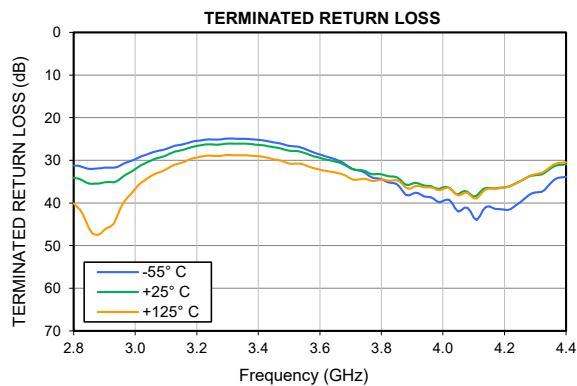
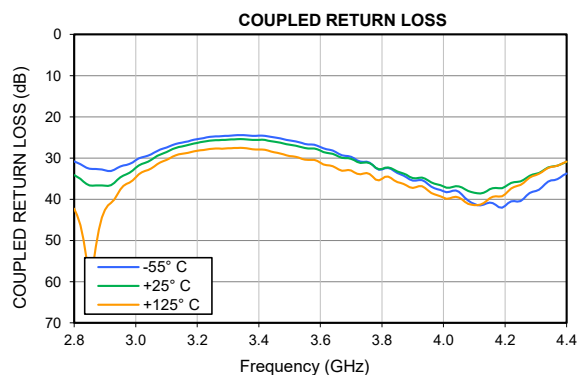
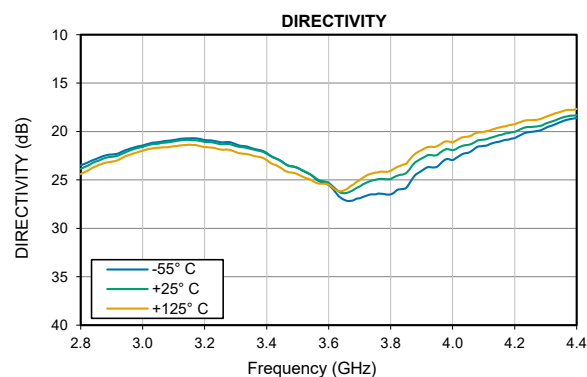
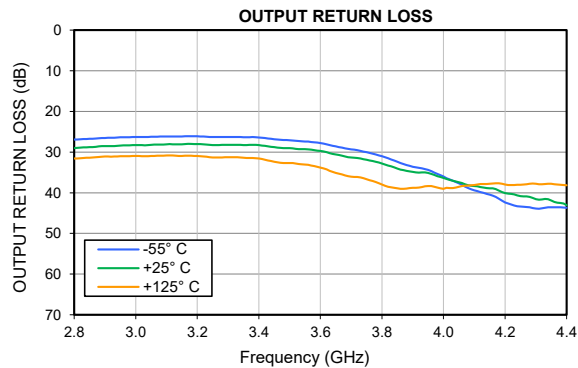
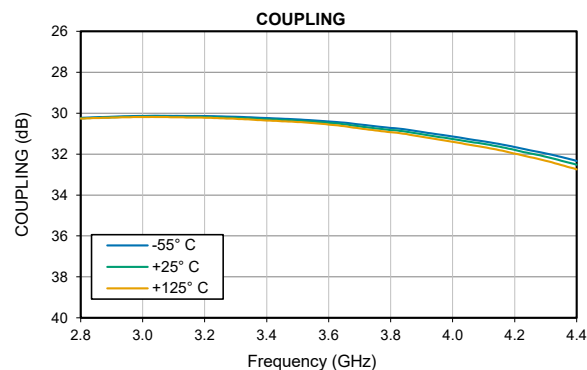
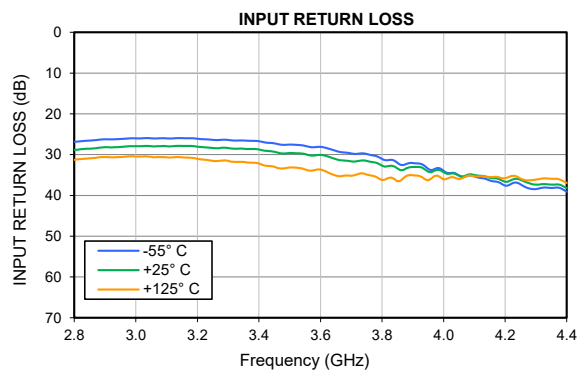
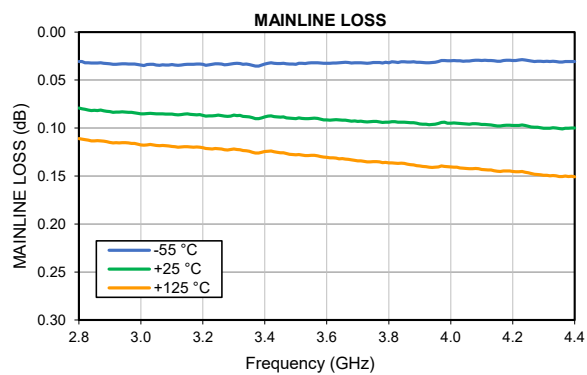
Directional Coupler

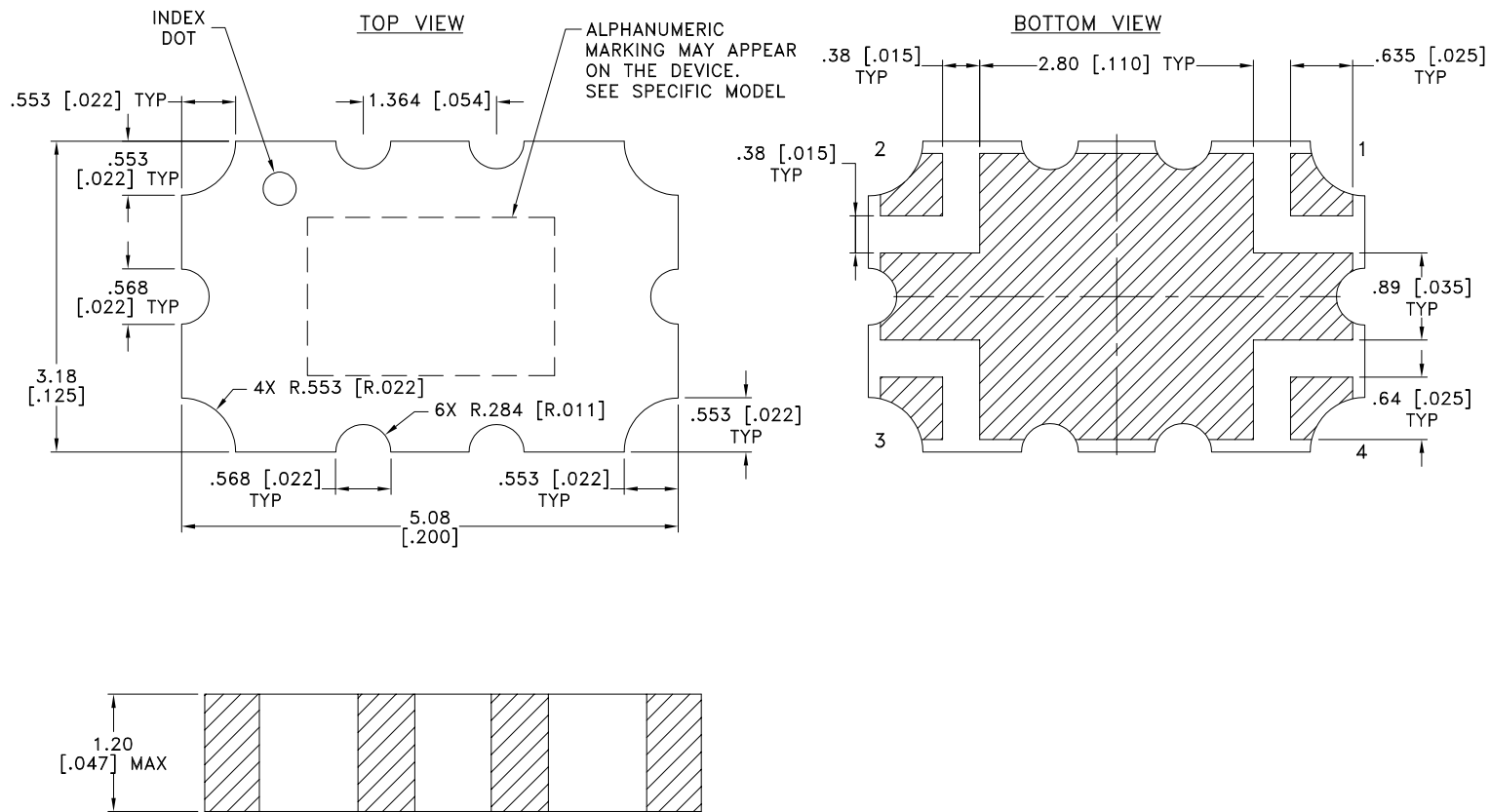
HPCJ-30-43+

Typical Performance Data

FREQUENCY (GHz)	MAINLINE LOSS (dB)	COUPLING (dB)	DIRECTIVITY (dB)	INPUT RETURN LOSS (dB)	OUTPUT RETURN LOSS (dB)	COUPLED RETURN LOSS (dB)	TERMINATED RETURN LOSS (dB)
2.00	0.063	31.459	23.200	31.160	31.264	30.219	30.134
2.05	0.065	31.318	22.954	30.972	31.121	30.121	29.921
2.10	0.067	31.198	22.885	30.711	30.847	29.701	29.377
2.15	0.068	31.083	23.009	30.446	30.774	29.217	28.592
2.20	0.068	30.974	23.024	30.289	30.650	28.456	28.122
2.25	0.069	30.872	23.129	30.280	30.613	27.871	27.576
2.30	0.070	30.776	23.327	30.063	30.353	27.337	27.024
2.35	0.072	30.698	23.649	29.922	30.268	26.916	26.661
2.40	0.072	30.623	24.124	30.170	30.288	26.426	26.367
2.45	0.074	30.548	24.622	30.233	30.193	26.589	26.500
2.50	0.076	30.480	25.119	29.875	29.974	26.694	26.565
2.55	0.076	30.419	25.774	29.585	29.673	26.938	26.832
2.60	0.078	30.376	25.869	29.727	29.690	27.630	27.701
2.65	0.076	30.343	25.536	29.802	29.502	28.759	29.034
2.70	0.079	30.312	25.145	29.060	29.294	30.362	30.429
2.75	0.080	30.278	24.495	28.787	29.039	32.550	32.004
2.80	0.079	30.253	23.844	28.866	28.992	34.110	34.110
2.85	0.082	30.225	23.097	28.531	28.801	36.661	35.454
2.90	0.083	30.202	22.609	28.180	28.518	36.746	35.187
2.95	0.083	30.181	22.068	28.125	28.385	34.664	34.427
3.00	0.085	30.169	21.585	27.942	28.272	32.359	32.074
3.05	0.085	30.164	21.246	27.932	28.228	30.443	30.091
3.10	0.085	30.171	21.033	27.949	28.083	28.543	28.869
3.15	0.085	30.178	20.875	27.874	28.093	27.202	27.639
3.20	0.087	30.184	21.074	28.052	28.036	26.319	26.640
3.25	0.087	30.206	21.302	28.385	28.251	25.705	26.263
3.30	0.087	30.229	21.501	28.393	28.219	25.543	26.075
3.35	0.088	30.267	21.817	28.548	28.247	25.413	26.091
3.40	0.088	30.302	22.311	28.731	28.270	25.588	26.359
3.45	0.089	30.333	23.143	29.291	28.789	26.043	26.922
3.50	0.090	30.369	23.759	29.616	29.022	26.779	27.757
3.55	0.090	30.413	24.632	29.875	29.295	27.583	28.257
3.60	0.092	30.473	25.291	30.050	29.707	28.212	29.429
3.65	0.092	30.543	26.376	31.090	30.601	29.298	30.284
3.70	0.093	30.646	25.667	31.648	31.341	30.191	31.887
3.75	0.093	30.741	24.998	31.520	31.907	31.089	32.634
3.80	0.094	30.827	24.913	32.706	32.823	32.653	33.265
3.85	0.094	30.908	24.291	33.415	34.036	33.254	33.946
3.90	0.096	31.034	22.780	33.024	34.881	34.882	35.447
3.95	0.096	31.148	22.435	34.192	35.110	35.418	35.977
4.00	0.095	31.262	21.948	34.349	36.332	36.876	36.365
4.05	0.096	31.385	21.378	35.151	37.397	36.880	37.935
4.10	0.096	31.500	20.839	34.980	38.334	38.433	38.507
4.15	0.098	31.635	20.374	35.658	38.880	37.598	36.435
4.20	0.097	31.795	20.034	36.666	40.116	36.991	36.329
4.25	0.098	31.966	19.540	36.180	40.819	35.644	34.924
4.30	0.100	32.131	19.179	37.367	41.590	33.848	33.469
4.35	0.101	32.323	18.589	37.366	41.899	32.088	31.887
4.40	0.100	32.522	18.309	38.214	43.026	30.964	30.934
4.45	0.100	32.746	18.081	39.684	44.055	29.553	29.978
4.50	0.101	32.950	17.896	39.553	45.040	29.536	29.273
4.55	0.102	33.169	17.882	41.805	45.897	28.623	28.786
4.60	0.103	33.412	17.456	40.729	46.982	28.790	28.740
4.65	0.104	33.678	17.105	43.941	50.404	28.599	28.848
4.70	0.104	33.945	16.531	46.627	53.195	29.171	29.916
4.75	0.105	34.197	16.226	46.040	55.550	30.085	30.083
4.80	0.107	34.472	15.473	46.997	51.865	30.947	31.851
4.85	0.107	34.798	14.829	45.980	48.484	32.537	30.985
4.90	0.108	35.137	14.185	48.073	46.388	33.512	31.609
4.95	0.108	35.459	13.568	43.492	44.724	33.356	31.601
5.00	0.110	35.826	13.042	41.039	42.017	30.633	30.536

Typical Performance Curves





DENOTES METALLIZATION

Weight: 0.049 grams

Dimensions are in mm [inches]. Tolerances: 2 PL ± 0.25 ; 3 PL ± 0.127 mm

Notes:

1. Case material - Ceramic.
2. Termination finish - Tin over Nickel Plating.

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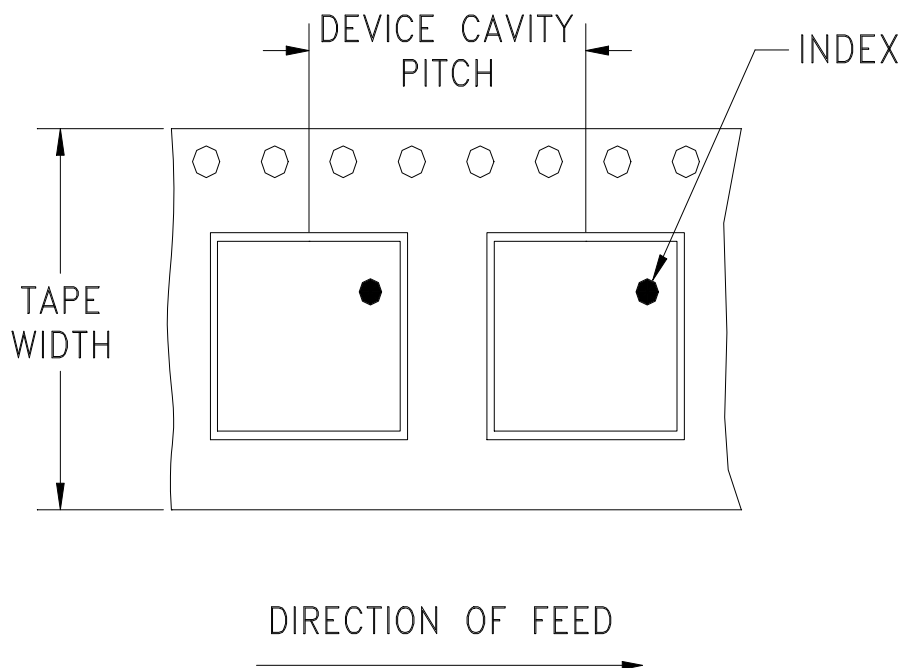
The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com

RF/IF MICROWAVE COMPONENTS



Tape & Reel Packaging TR-F110

DEVICE ORIENTATION IN T&R



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

Note: Please consult individual model datasheet to determine device per reel availability

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.

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OR	ECO-026852	NEW RELEASE	09/05/25	ITG	IL
A	ECO-027246	UPDATED ITEM NAME	10/08/25	ITG	TK

PACKAGE OUTLINE

PIN 1

COPLANAR WAVEGUIDE:
 $.052 \pm .002$ TRACE WIDTH &
 $.016 \pm .002$ GAP, 4 PL.

$\phi .022$ PTH FOR GROUND

$\phi .015$ PTH, PLUGGED & CAPPED WITH COPPER, 17 PL.

1. TRACE WIDTH & GAP ARE SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS:
.030±.002; COPPER: 1/2 OZ. ON EACH SIDE.
FOR OTHER MATERIALS TRACE WIDTH & GAP MAY NEED TO BE MODIFIED.



UNLESS OTHERWISE SPECIFIED	INITIALS		DATE
DIMENSIONS ARE IN INCHES	DRAWN	ITG	09/05/25
TOLERANCES ON:	CHECKED	GF	09/05/25
2 PL DECIMALS ±	APPROVED	IL	09/05/25
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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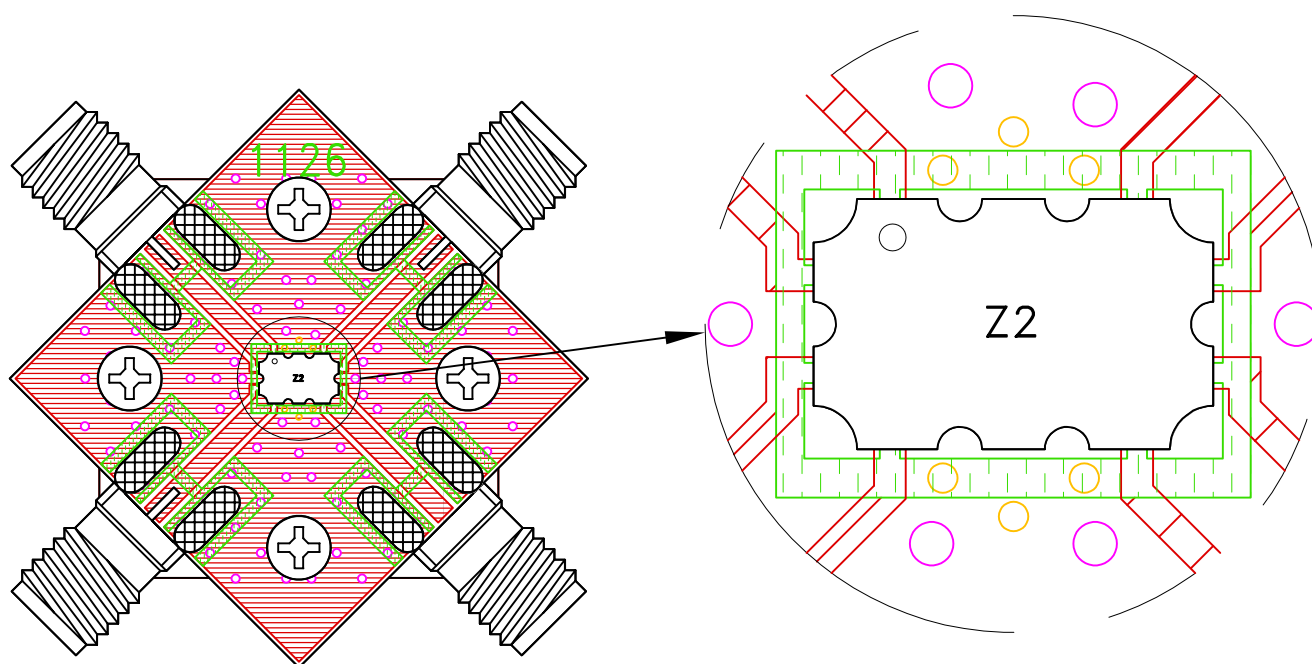


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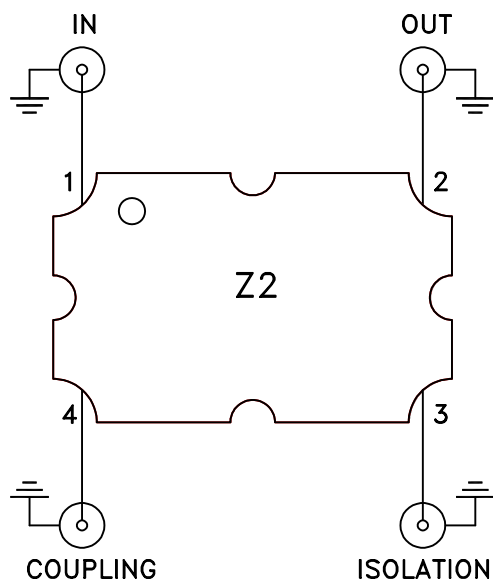
PL, AAE3610-1, TB-HPCJ-XX-43+

SIZE A	CODE IDENT 15542	DRAWING NO: 98-PL-834		REV: A
FILE: 98PL834		SCALE: 7:1	SHEET: 1 OF 1	

Evaluation Board and Circuit



TB-HPCJ-30-43C+



Schematic Diagram

1. 50 Ohm SMA Female end Launch connectors.
2. PCB Material: ROGERS R04350B or equivalent,
Dielectric Constant= 3.48 Thickness=.030 inch.

 **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	-55° to 125° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 125° 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
Solder Reflow Heat	Sn-Pb Eutectic Process 225°C peak Pb-Free Process 245° - 250°C peak	J-STD-020C, Table 4-1, 4-2 and 5-2, Figure 5-1
Solderability	10X Magnification	J-STD-002, Test B,B1, 95% Coverage
Thermal Shock	-55° to +125°C, 15 min dwell,250 cycles	MIL-STD-202, Method 107
Bend Test	1mm, deflection for 5 seconds Span of bending: 2.75"	--
High Temp Storage	125°C to 1000 Hrs	---