

Suspended Substrate Stripline Filters and Multiplexers

50Ω DC to 40 GHz

The Big Deal

- Low insertion loss
- Ultra-wide passband width
- Fast roll-off with wide stopband
- Good power handling and temperature stability
- Passband up to 40 GHz
- Stopband up to 40 GHz



Product Overview

Mini-Circuits' Suspended Substrate Stripline filters offer low insertion loss by implementing printed circuit board suspended between two parallel ground planes, providing high Q. Low insertion loss combined with wide stopband makes them an excellent choice for wideband instruments and systems like ECM, ECCM, ELINT and ultra-broadband receivers.

Low pass, high pass, band pass, band stop, diplexer and multiplexer designs can be realized with this technology. Advanced filter design and construction can achieve stopband width greater than 6x the center frequency, and temperature stability will be better than other printed circuit realizations because the fields are mainly in the air rather than in a dielectric. The inside walls of the housing hold the circuit and prevent movement that could be caused by vibration or mechanical shock, making these designs excellent candidates for harsh operating environments.

Suspended substrate stripline filters can be realized in small form factors with high-quality, precise machining for applications where size is critical. Excellent repeatability across units is achieved through precise tuning and process control.

Key Features

Feature	Advantages
Low insertion loss	Low signal loss results in better SNR in receiver front end and better power delivery to antenna in transmitters
Fast roll-off	Higher selectivity results in better adjacent channel rejection and dynamic range
Wide stopband	Wide, spur-free stop band results in better receiver sensitivity
High power handling	Well suited for transmitter applications
Excellent temperature stability	Ensures minimal variation in electrical performance across temperature

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

Suspended substrate stripline High Pass Filter

50Ω 24000 to 40000 MHz

ZHSS-K24G+



Generic photo used for illustration purposes only

CASE STYLE: UJ2936

Connectors	Model
2.92mm-F	ZHSS-K24G+

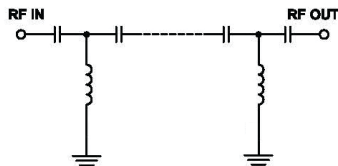
Features

- Wider passband up to 40000 MHz
- Low insertion loss of 1 dB typical
- Sharp rejection of 90 dB typical
- Connectorized package

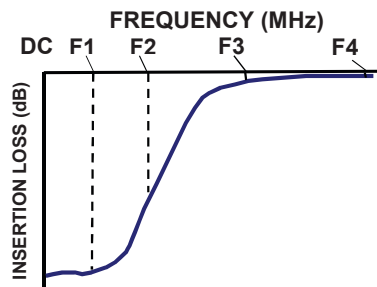
Applications

- 5G
- Very wideband test and instrumentation
- Satellite communication
- Transmitter / Receiver

Functional Schematic



Typical Frequency Response



+RoHS Compliant

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

Electrical Specifications at 25°C

Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Stop Band	Insertion Loss	DC-F1	DC - 15000	60	80	-	dB
		F1-F2	15000 - 18500	20	40	-	dB
Pass Band	Insertion Loss	F3-F4	24000 - 40000	-	1.5	2.5	dB
	VSWR	F3-F4	24000 - 40000	-	2	-	:1

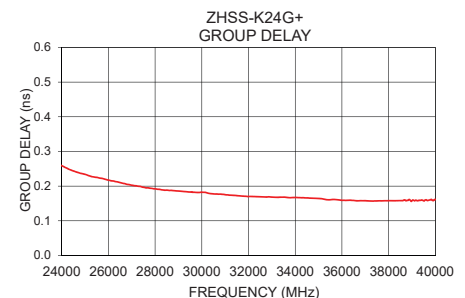
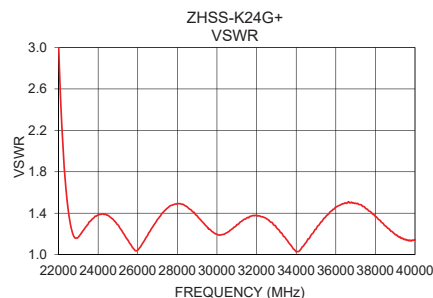
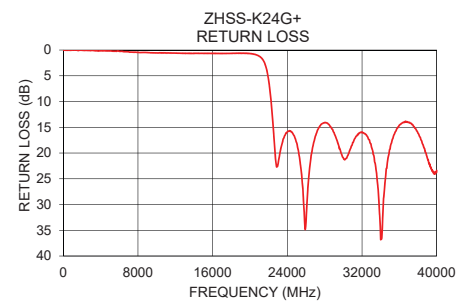
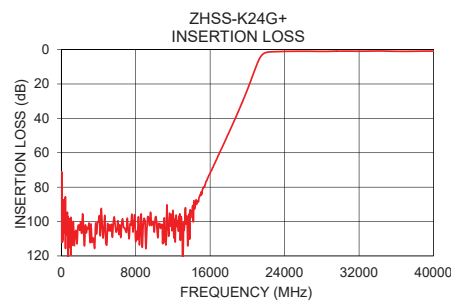
Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	2 W @ 25°C

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

Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Group Delay (ns)
10	83.78	889.49	24000	0.26
100	85.48	2666.43	24800	0.24
1000	102.66	484.16	25000	0.23
2000	105.05	382.39	26400	0.21
3000	101.18	216.82	27200	0.20
5000	101.34	88.71	28000	0.19
10000	106.07	32.12	28800	0.19
15000	84.75	25.69	29600	0.18
17000	60.16	27.28	30000	0.18
18500	42.48	30.11	31200	0.17
19800	26.04	27.26	32000	0.17
20700	13.28	18.67	32800	0.17
22100	1.57	2.57	33600	0.17
24000	1.07	1.36	34400	0.17
25000	0.96	1.23	35000	0.16
27000	0.98	1.31	36000	0.16
30000	0.91	1.25	36800	0.16
32000	0.95	1.37	37600	0.16
35000	0.88	1.27	38400	0.16
40000	0.89	1.17	40000	0.16



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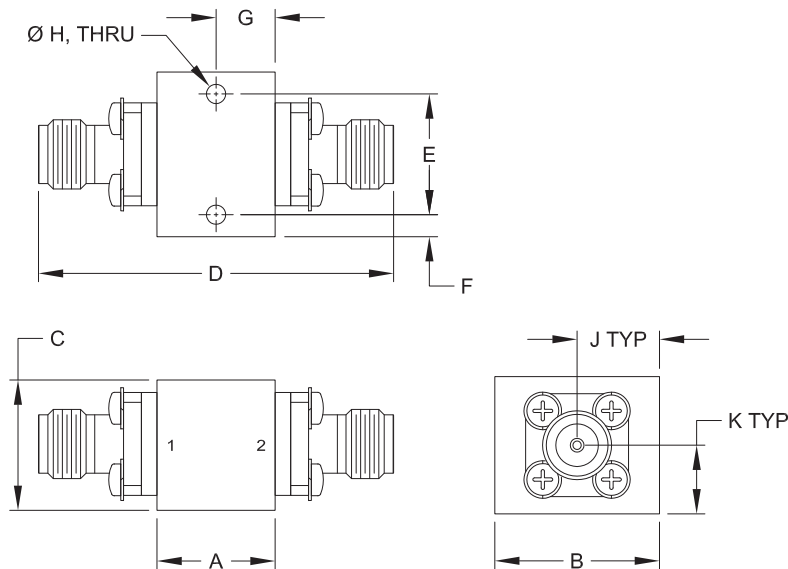
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REV.A
ECO-003577
ZHSS-K24G+
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200805
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Coaxial Connections

PORT - 1	2.92mm-Female
PORT - 2	2.92mm-Female

Outline Drawing



Outline Dimensions ($\frac{\text{inch}}{\text{mm}}$)

A	B	C	D	E	F
.43	.60	.48	1.30	.440	.08
10.9	15.2	12.1	33.0	11.18	2.0
G	H	J	K	Wt.	
.22	.070	.30	.25	grams	
5.5	1.78	7.6	6.4	21	

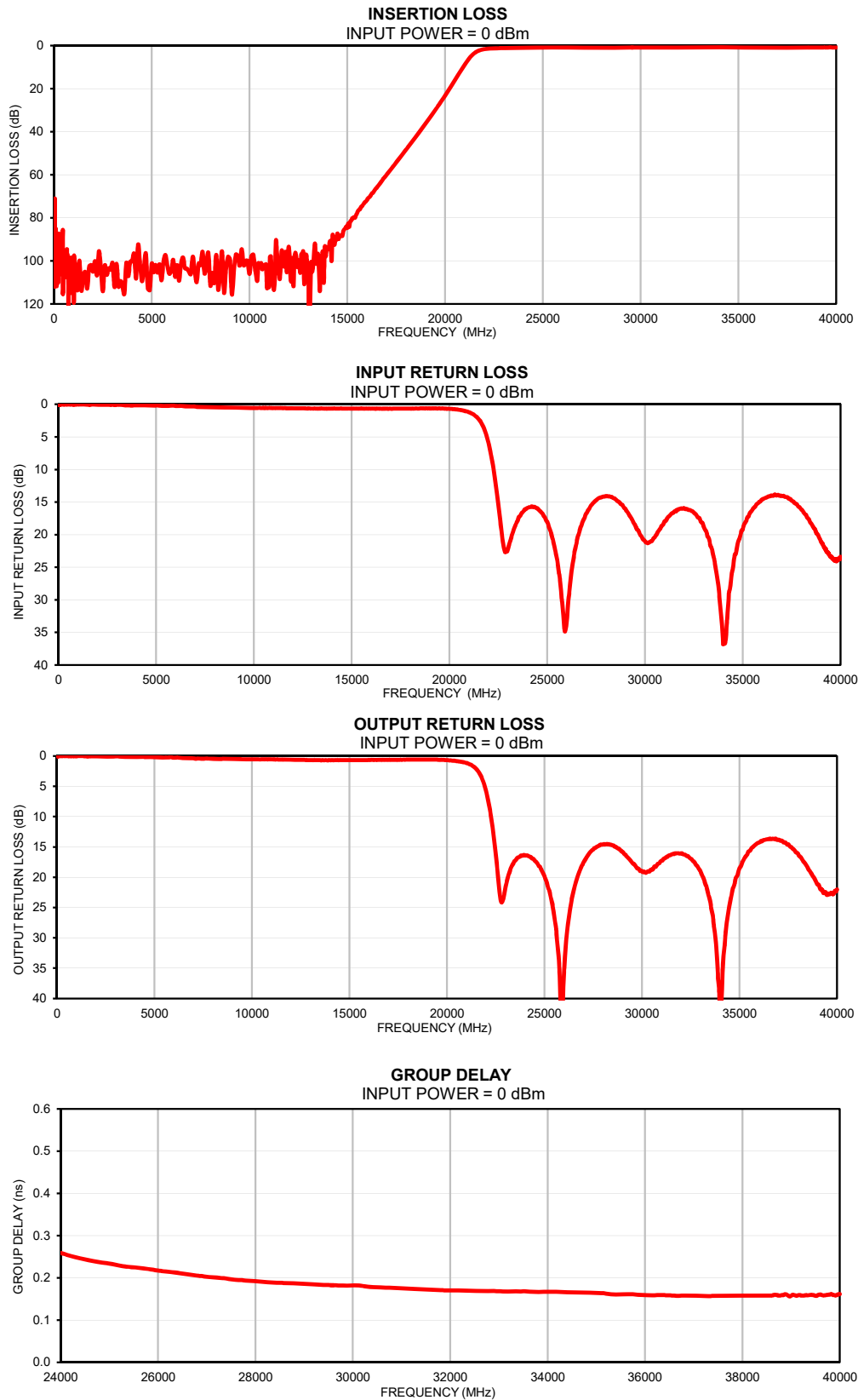
Note: Please refer to case style drawing for details

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Typical Performance Data

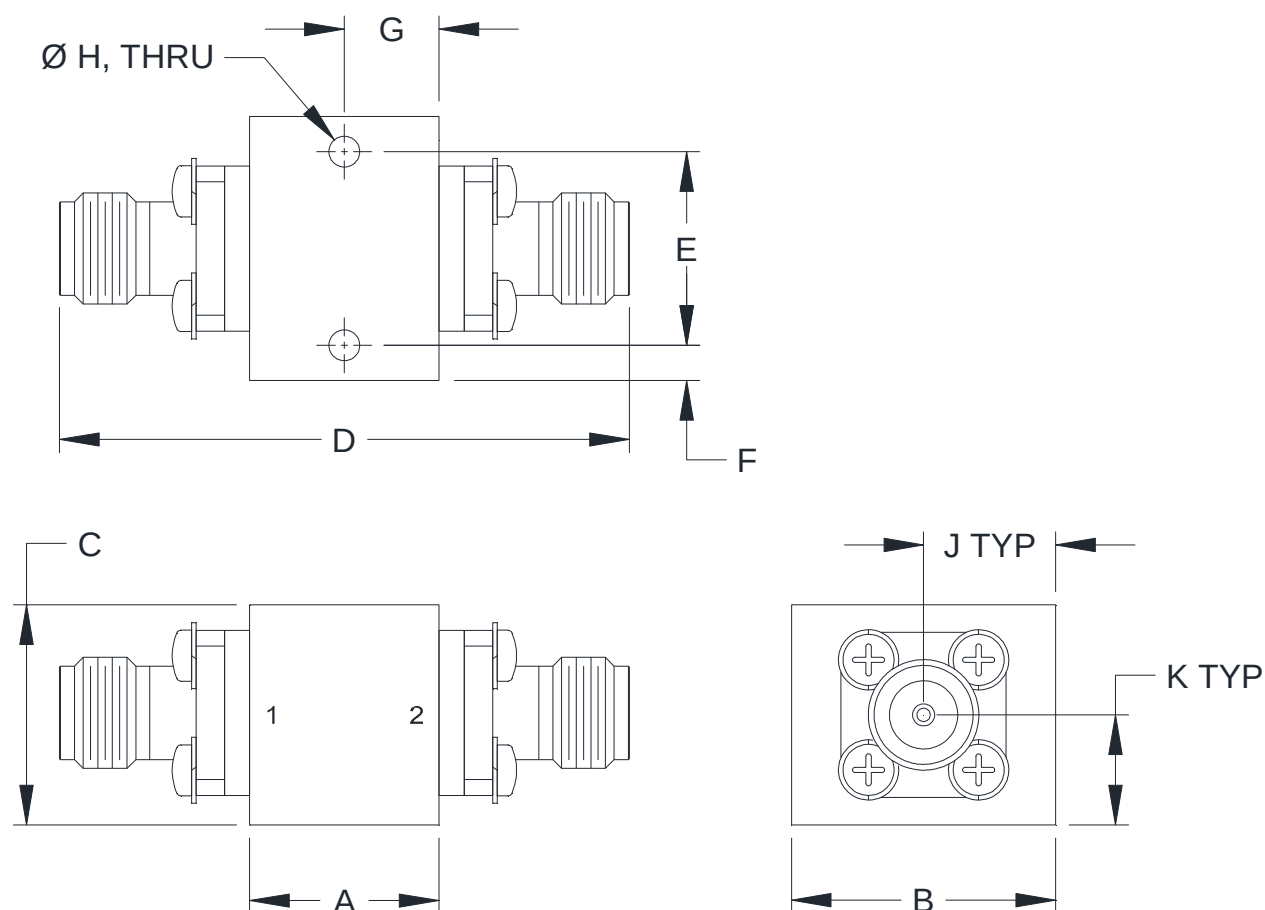
FREQ.	Insertion Loss	Input Return Loss	Output Return Loss	FREQ.	Group Delay
(MHz)	(dB)	(dB)	(dB)	(MHz)	(ns)
10	83.78	0.02	0.02	24000	0.26
50	71.12	0.01	0.00	24250	0.25
100	85.48	0.01	0.01	24500	0.24
500	105.32	0.01	0.01	24750	0.24
750	101.07	0.01	0.02	25000	0.23
1000	102.66	0.02	0.04	25250	0.23
2000	105.05	0.05	0.05	25500	0.23
3000	101.18	0.08	0.08	25750	0.22
4000	100.28	0.15	0.15	26000	0.22
5000	101.34	0.17	0.20	26250	0.21
6000	104.30	0.25	0.29	26500	0.21
7000	106.15	0.34	0.38	26750	0.21
8000	111.47	0.45	0.47	27000	0.20
9000	99.39	0.48	0.47	27250	0.20
10000	106.07	0.55	0.54	27500	0.20
10500	101.70	0.54	0.54	27750	0.19
11000	112.20	0.57	0.55	28000	0.19
11500	104.54	0.59	0.57	28250	0.19
12000	93.64	0.59	0.61	28500	0.19
12500	99.94	0.61	0.64	28750	0.19
13000	103.51	0.63	0.67	29000	0.19
13500	96.72	0.63	0.69	29250	0.18
14000	94.45	0.66	0.68	29500	0.18
14500	87.32	0.64	0.68	29750	0.18
15000	84.75	0.64	0.68	30000	0.18
15500	77.97	0.62	0.66	30250	0.18
16000	71.93	0.64	0.65	30500	0.18
17000	60.16	0.67	0.64	30750	0.18
17500	54.35	0.65	0.63	31000	0.18
18000	48.48	0.64	0.59	31250	0.17
18500	42.48	0.62	0.58	31500	0.17
19000	36.34	0.61	0.57	31750	0.17
19500	30.01	0.62	0.60	32000	0.17
20000	23.33	0.68	0.68	32250	0.17
20500	16.22	0.84	0.83	32500	0.17
21000	8.99	1.22	1.17	32750	0.17
21500	3.58	2.27	2.12	33000	0.17
22000	1.70	5.92	5.74	33250	0.17
22500	1.32	15.32	16.13	33500	0.17
23000	1.22	22.18	21.64	33750	0.17
23500	1.16	17.77	17.23	34000	0.17
24000	1.07	15.89	16.40	34250	0.17
25000	0.96	18.01	19.88	34500	0.17
26000	0.96	33.41	35.70	34750	0.16
27000	0.98	16.74	17.54	35000	0.16
28000	1.05	14.09	14.61	35250	0.16
29000	0.99	16.02	15.78	35500	0.16
30000	0.91	20.96	19.03	35750	0.16
31000	0.93	17.97	17.28	36000	0.16
32000	0.95	15.91	16.09	36250	0.16
33500	0.84	23.24	24.06	36500	0.16
34000	0.82	36.80	42.90	36750	0.16
34500	0.84	25.15	24.27	37000	0.16
35000	0.88	19.23	18.50	37250	0.16
35500	0.94	16.17	15.71	37500	0.16
36000	1.00	14.57	14.28	37750	0.16
36500	1.03	14.00	13.71	38000	0.16
37000	1.02	14.04	13.82	38250	0.16
38000	0.96	16.15	16.10	38500	0.16
40000	0.89	23.39	22.01	40000	0.16

Typical Performance Curves



Outline Dimensions

UJ2936



CASE#	A	B	C	D	E	F
UJ2936	.43 (10.9)	.60 (15.2)	.48 (12.1)	1.30 (33.0)	.440 (11.18)	.08 (2.0)

CASE#	G	H	J	K	WT. GRAMS
UJ2936	.22 (5.5)	.070 (1.78)	.30 (7.6)	.25 (6.4)	21

Dimensions are in inches (mm). Tolerances: 2 Pl. $\pm .100$; 3 Pl. $\pm .015$

Notes:

1. Case material: Brass.
2. Case Finish: Powder coated.
3. Refer to the individual model data sheet for the type of connectors available.



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RF/IF MICROWAVE COMPONENTS



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 Temperature	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet