Fixed Amplitude Mismatch, Wideband

NON-CATALOG

Electronic Line Stretcher

ELS-950

50Ω 360° Voltage Variable 400 to 950 MHz



CASE STYLE: K18

Connectors	Model
SMA	ELS-950-S
BRACKET (OPTION "B")	

Maximum Ratings

Operating Temperature	0°C to 50 °C
Storage Temperature	-40°C to 100°C
RF Input Power	13dBm
Control Voltage	0.5V to 30V

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

Coaxial Connections

RF IN	1
MONITOR OUT*	2
CONTROL	3

* Monitor out port should be connected to a 50-ohm load

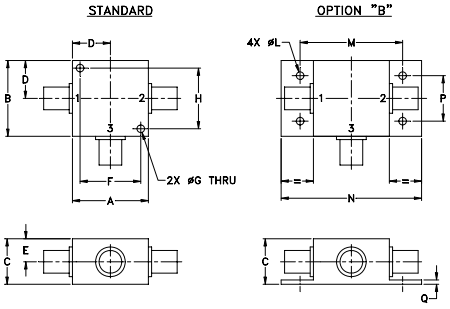
Features

- over 360° phase shift of the reflected signal
- normalized and stable magnitude of the reflected signal
- voltage controlled for automated applications
- protected under US Patent 6,479,977

Applications

- automated load-pull measurement of oscillators[1]

Outline Drawing



Outline Dimensions (inch / mm)

A	B	C	D	E	F	G	H
1.25	1.25	.75	.63	.38	1.00	.125	1.000
31.75	31.75	19.05	16.00	9.65	25.40	3.18	25.40

J	K	L	M	N	P	Q	wt
--	--	.125	1.688	2.18	.75	.07	grams
--	--	3.18	42.88	55.37	19.05	1.78	70.0

Electrical Specifications

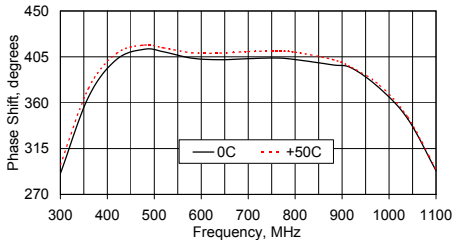
FREQUENCY RANGE (MHz) f_L-f_U	INPUT POWER (dBm) Max.	PHASE RANGE (Degrees) Min.	RETURN LOSS (dB) Typ.	CONTROL VOLTAGE (V)
400-950	10	360	10-12	0.5-25

1. See Application Note AN-45-002 on our web site.

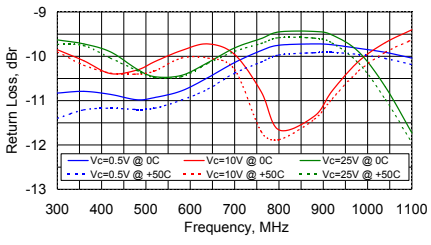
Typical Performance Data

FREQ. (MHz)	PHASE SHIFT (Deg.)		RETURN LOSS (dBr)					
	0°C	50°C	Vc=0.5V @ 0°C	Vc=10V @ 0°C	Vc=25V @ 0°C	Vc=0.5V @+ 50°C	Vc=10V @+50°C	Vc=25V @ +50°C
300	290.51	299.06	-10.83	-9.85	-9.63	-11.40	-9.90	-9.73
360	365.70	374.24	-10.79	-10.10	-9.72	-11.21	-10.20	-9.76
420	402.47	408.38	-10.86	-10.39	-9.90	-11.17	-10.38	-10.04
480	412.55	416.59	-10.98	-10.31	-10.29	-11.20	-10.40	-10.32
520	409.93	413.82	-10.93	-10.12	-10.46	-11.17	-10.33	-10.48
580	403.67	408.94	-10.78	-9.87	-10.43	-10.99	-10.04	-10.46
640	402.14	408.69	-10.48	-9.72	-10.14	-10.74	-10.04	-10.16
700	403.23	410.19	-10.14	-9.96	-9.81	-10.38	-10.30	-9.89
760	403.87	410.63	-9.87	-10.80	-9.60	-10.13	-11.70	-9.71
800	402.32	409.49	-9.75	-11.66	-9.45	-9.97	-11.88	-9.58
880	397.09	402.32	-9.72	-11.35	-9.44	-9.92	-11.42	-9.59
920	394.06	394.63	-9.74	-10.78	-9.52	-9.91	-10.96	-9.70
980	374.13	377.19	-9.82	-10.11	-9.90	-9.96	-10.33	-10.16
1040	343.98	345.70	-9.91	-9.69	-10.69	-10.05	-9.91	-10.98
1100	293.33	294.33	-10.04	-9.40	-11.73	-10.19	-9.63	-11.96

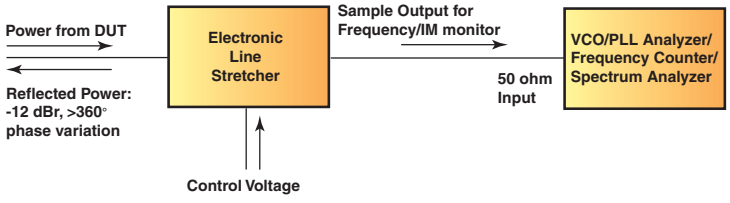
Maximum Phase Shift vs. Frequency
at temperature extremes
@ Pin=+7dBm



Return Loss vs. Frequency
at temperature extremes
@ Pin=+7dBm



Application Block Diagram



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.
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Electronic Line Stretcher ELS-950

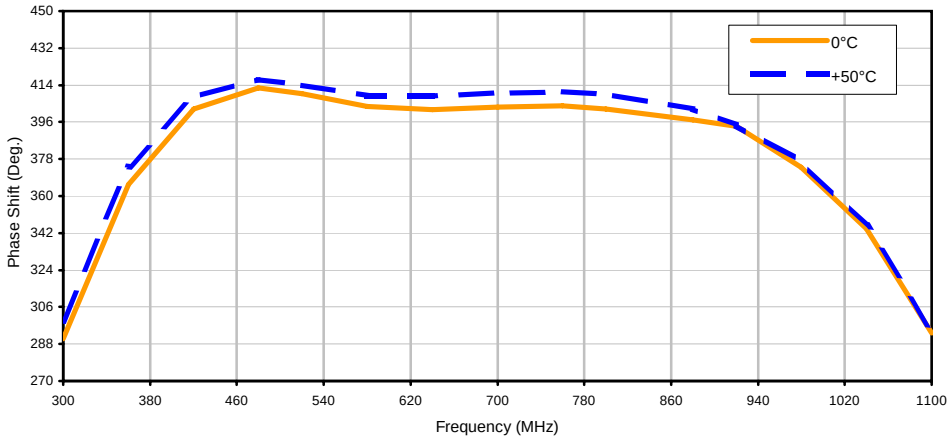
Typical Performance Data

FREQUENCY (MHz)	PHASE SHIFT (Deg.)		RETURN LOSS (dBr)					
	0°C	50°C	Vc=0.5V @ 0°C	Vc=10V @ 0°C	Vc=25V @ 0°C	Vc=0.5V @ +50°C	Vc=10V @ +50°C	Vc=25V @ +50°C
300.0	290.51	299.06	-10.83	-9.85	-9.63	-11.40	-9.90	-9.73
360.0	365.70	374.24	-10.79	-10.10	-9.72	-11.21	-10.20	-9.76
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980.0	374.13	377.19	-9.82	-10.11	-9.90	-9.96	-10.33	-10.16
1040.0	343.98	345.70	-9.91	-9.69	-10.69	-10.05	-9.91	-10.98
1100.0	293.33	294.33	-10.04	-9.40	-11.73	-10.19	-9.63	-11.96

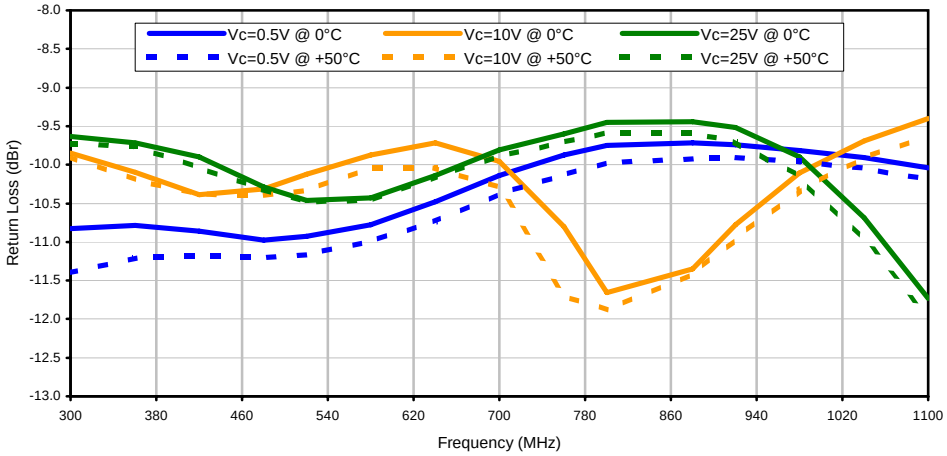
Electronic Line Stretcher ELS-950

Typical Performance Curves

Phase Shift @ Pin=+7dBm



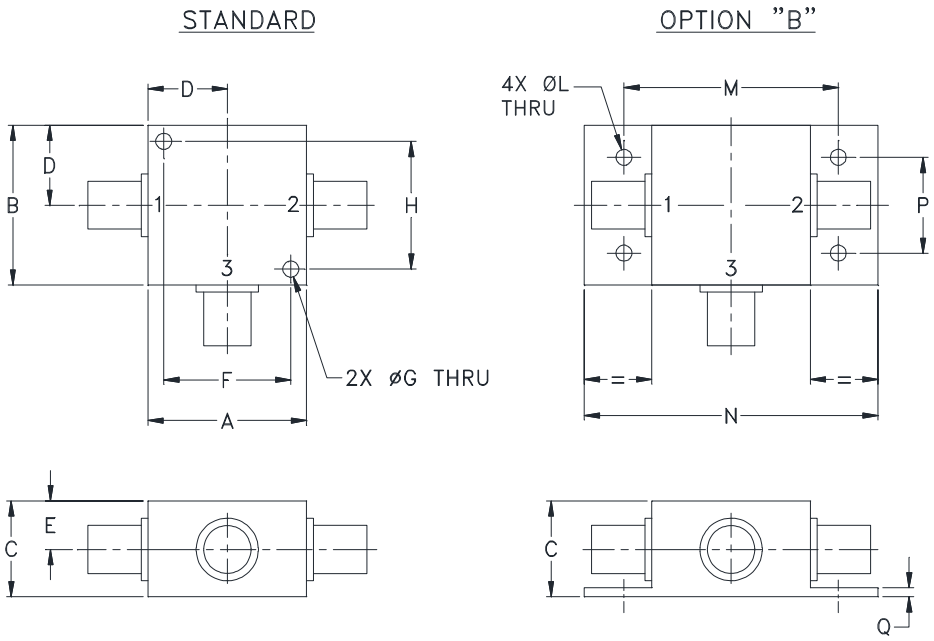
Return Loss @ Pin=+7dBm



Case Style K

K18

Outline Dimensions



CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N
K18	1.25 (31.75	1.25 (31.75)	.75 (19.05)	.63 (16.00)	.38 (9.65)	1.000 (25.40)	.125 (3.18)	1.000 (25.40)	-- --	-- --	.125 (3.18)	1.688 (42.88)	2.18 (55.37)

CASE#	P	Q	WT. GRAMS
K18	.75 (19.05)	.07 (1.78)	70.0

Dimensions are in inches (mm). Tolerances: 2 Pl. ± .03; 3 Pl. ± .015

Notes:

1. Case material: Aluminum alloy.
2. Case finish:
   For RoHS Case Styles: Clear chemical conversion coating, non-chrome or trivalent chrome based.
3. Mounting bracket available on request. Add suffix B to part number.
4. For port marking 1, 2, and 3 see specifications data sheet.
5. For bracket version, option B, dimension "C" changes from .75 to .94 inches when connectors are type N.
6. Refer to the individual model data sheet for the type of connectors available.

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Environmental Specifications **ENV28T1**

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	-0° to 50° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-40° to 100° C Ambient Environment	Individual Model Data Sheet
Barometric Pressure	100,000 Feet	MIL-STD-202, Method 105, Condition D
Humidity	90% RH, 65°C Units may require bake-out after humidity to restore full performance.	MIL-STD-202, Method 103
Thermal Shock	-65° to 125°C, 5 cycles	MIL-STD-202, Method 107, Condition B
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	100g, 6ms sawtooth, 3 shocks each direction 3 axes (total 18)	MIL-STD-202, Method 213, Condition I

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