NON-CATALOG

Surface Mount

Voltage Variable Equalizer

VAEQ-1000-75+

75Ω **50 to 1000 MHz**

The Big Deal

- Adjustable attenuation slope
- IP3 +48 dBm typical
- Minimal deviation from linear loss, ± 0.6dB

CASE STYLE: HE1354

Product Overview

The VAEQ-1000-75+ is a 75Ω Voltage Variable Equalizer built into a shielded case (size of .394”x.394”x.150”) This model offers excellent performance over a wide frequency range of 50 to 1000 MHz with the variable slope providing great flexibility in a small package.
The VAEQ-1000-75+ is often used to compensate RF chain gain flatness or cable loss versus frequency.

Key Features

Feature	Advantages
Low power consumption: • Supply voltage +5V_{DC} at max 16mA • Control voltage 0-10V at max 20mA	Allows for use in applications with power constraints.
Adjustable attenuation slope (Control voltage of 0V to 10V)	Allows adjusting the slope to compensate for the precise loses encountered.
High linearity (IP3 +48 dBm typ.)	Low distortion enabling improved system performance.
Minimal deviation from linear loss over frequency range: ±0.6dB	Provides low signal distortion over the passband.

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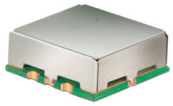
75Ω 50 to 1000 MHz

Features

- Wide bandwidth
- Low insertion loss
- Low deviation from linear loss, ± 0.6 dB typ.
- High IP3 +48 dBm typ.
- Shielded case
- Aqueous washable



CASE STYLE: HE1354

Applications

- CATV
- Cable loss compensation
- Instrumentation

+RoHS Compliant

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

Electrical Specifications at 25°C, V+=5V$_{DC}$ unless otherwise noted

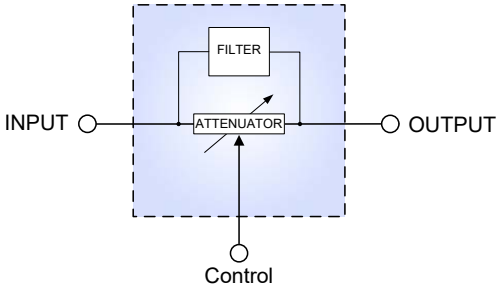
Parameter	Condition	Min.	Typ.	Max.	Units
Frequency Range		50		1000	MHz
Insertion Loss	50 MHz, Control Voltage, 0 - 10V 1000 MHz, Control Voltage, 0 - 10V		14.6 - 1.5 5.3 - 3.0		dB
Deviation from Linear Loss	50 - 1000 MHz, Control Voltage 0 - 10V		± 0.6		dB
IP3	50 - 1000 MHz, Control Voltage, 2.5 - 10V	+35	+48		dBm
0.2 dB Compression	50 - 1000 MHz, Control Voltage, 0 - 10V		+30		dBm
Input Return Loss	50 - 1000 MHz, Control Voltage, 0 - 10V		15.0		dB
Output Return Loss	50 - 1000 MHz, Control Voltage, 0 - 10V		12.5		dB
Supply Voltage (V+)	50 - 1000 MHz, Control Voltage, 0 - 10V		5.0		V
Supply Current	50 - 1000 MHz, Control Voltage, 8.6V 50 - 1000 MHz, Control Voltage, 0V		0 8	 16	mA
Control Current	50 - 1000 MHz, Control Voltage, 10V 50 - 1000 MHz, Control Voltage, 2.5V		15 0	20	mA

Maximum Ratings

Parameter	Ratings
Operating Temperature	0°C to 85°C
Storage Temperature	-55°C to 100°C
Input Power	+23dBm
Control voltage	12V
Supply Voltage (V+)	7V

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

Simplified Functional Diagram



Pad Connections

Function	Pin Number
RF IN	1
RF OUT	6
V CONTROL	3
V+	4
GROUND	2,5

Notes
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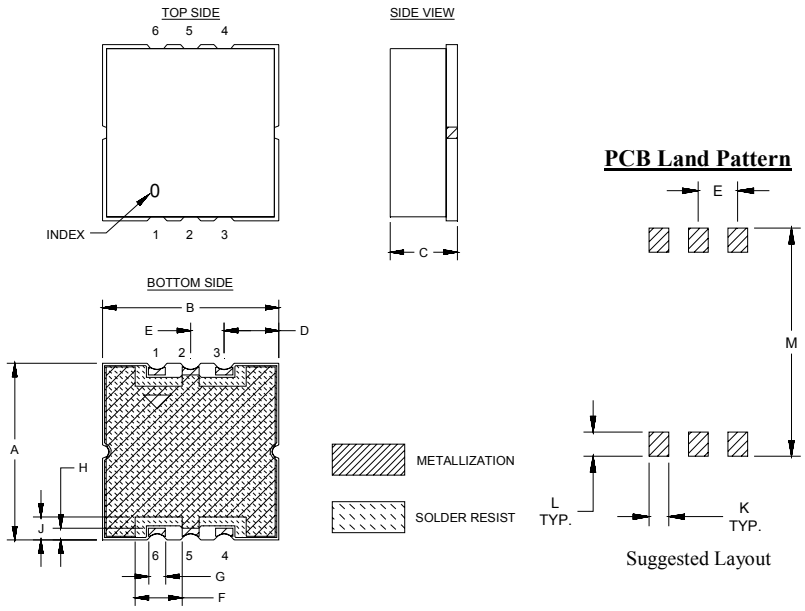
Voltage Variable Equalizer VAEQ-1000-75+

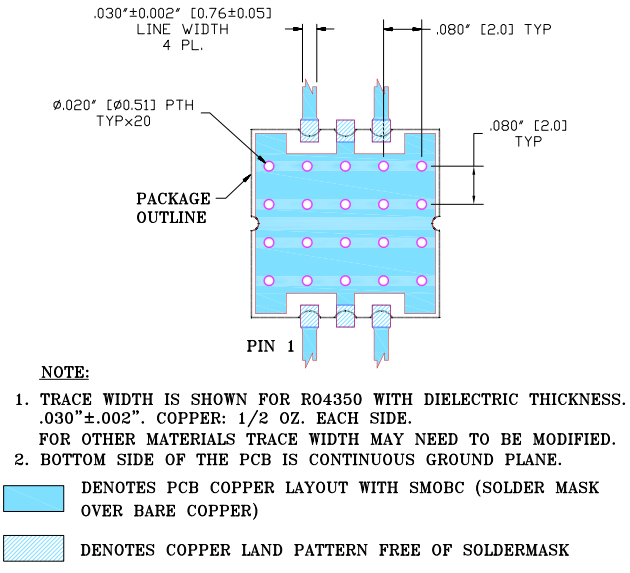
Outline Drawing



Outline Dimensions (inch / mm)

A	B	C	D	E	F	G	H	J	K	L	M	wt.
.394	.394	.150	.122	.075	.098	.038	.026	.051	.038	.046	.434	grams
10.01	10.01	3.81	3.10	1.90	2.49	0.97	0.66	1.29	0.97	1.17	11.02	0.7

Demo Board MCL P/N: TB-1052+
Suggested PCB Layout (PL-315)



NOTE:

1. TRACE WIDTH IS SHOWN FOR RO4350 WITH DIELECTRIC THICKNESS. .030"±.002". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH 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 SOLDERMASK

Pad Connections

Function	Pin Number
RF IN	1
RF OUT	6
V CONTROL	3
V+	4
GROUND	2,5

Typical Performance Data

VAEQ-1000-75+

Frequency (MHz)	Insertion Loss (dB)		Input Return Loss (dB)		Output Return Loss (dB)		Deviation from Linear Loss (dB)		Insertion Phase (deg)		Input IP3 (dBm)	
	Vcontrol		Vcontrol		Vcontrol		Vcontrol		Vcontrol		Vcontrol	
	0V	2.7V	0V	2.7V	0V	2.7V	0V	2.7V	0V	2.7V	0V	2.7V
50	14.58	14.47	23.84	23.86	23.15	24.74	1.31	1.24	20.22	19.83	46.14	50.99
100	13.78	13.69	24.74	24.70	23.33	24.70	1.01	0.96	14.35	13.90	53.35	50.17
150	13.03	12.96	24.32	24.21	22.70	23.31	0.75	0.72	12.27	11.77	54.98	50.63
200	12.20	12.16	24.83	24.70	21.70	21.82	0.42	0.42	10.05	9.54	56.27	52.16
250	11.38	11.36	23.01	22.98	20.31	19.97	0.10	0.11	7.01	6.54	54.28	52.06
300	10.57	10.56	22.25	22.27	18.96	18.50	0.21	0.20	3.09	2.68	56.76	53.11
350	9.83	9.84	20.28	20.27	17.34	16.83	0.45	0.43	1.62	1.98	56.08	54.12
400	9.13	9.13	19.04	19.00	15.67	15.22	0.66	0.63	6.94	7.23	55.47	54.47
450	8.52	8.54	17.16	17.17	14.51	14.10	0.76	0.73	12.75	12.97	53.63	53.41
500	7.96	7.98	15.68	15.72	13.05	12.71	0.83	0.80	18.96	19.10	54.32	54.63
550	7.49	7.51	14.28	14.31	12.04	11.77	0.80	0.78	25.45	25.52	53.63	52.45
600	7.04	7.06	12.95	12.94	10.81	10.61	0.75	0.73	32.00	32.01	52.69	53.29
650	6.70	6.72	11.86	11.85	9.88	9.72	0.59	0.58	38.90	38.87	53.62	52.55
700	6.33	6.34	10.61	10.62	8.96	8.84	0.47	0.46	45.64	45.56	52.38	52.19
750	6.12	6.12	9.83	9.83	8.14	8.05	0.18	0.18	52.69	52.58	53.19	52.00
800	5.81	5.81	8.76	8.75	7.45	7.40	0.01	0.00	59.62	59.50	52.10	51.29
850	5.70	5.70	8.10	8.10	6.74	6.70	0.40	0.39	66.56	66.43	51.37	52.40
900	5.44	5.44	7.24	7.24	6.17	6.15	0.64	0.61	73.52	73.38	51.24	51.19
1000	5.22	5.22	6.05	6.04	5.08	5.08	1.42	1.38	86.98	86.82	50.29	50.30

Frequency (MHz)	Insertion Loss (dB)		Input Return Loss (dB)		Output Return Loss (dB)		Deviation from Linear Loss (dB)		Insertion Phase (deg)		Input IP3 (dBm)	
	Vcontrol		Vcontrol		Vcontrol		Vcontrol		Vcontrol		Vcontrol	
	6V	10V	6V	10V	6V	10V	6V	10V	6V	10V	6V	10V
50	4.06	1.48	12.72	22.56	11.34	22.18	0.04	0.27	2.17	0.25	45.69	47.15
100	4.00	1.44	12.90	22.19	11.58	22.42	0.02	0.14	9.35	6.69	49.74	51.69
150	3.99	1.45	13.12	20.87	11.72	21.19	0.05	0.07	15.53	12.13	52.59	54.84
200	3.96	1.47	13.40	19.68	11.76	19.49	0.06	0.00	21.42	17.40	52.35	57.91
250	3.95	1.51	13.67	18.25	12.06	18.27	0.08	0.04	27.18	22.49	55.08	58.79
300	3.90	1.55	13.92	17.18	12.08	16.85	0.07	0.08	32.91	27.71	55.82	57.66
350	3.87	1.64	14.41	16.23	12.36	15.85	0.08	0.08	38.52	32.64	54.72	55.52
400	3.80	1.70	14.62	15.35	12.53	14.64	0.05	0.10	44.12	37.79	53.69	56.13
450	3.73	1.81	15.31	14.83	12.93	14.15	0.02	0.08	49.48	42.52	52.46	52.91
500	3.64	1.90	15.42	14.03	13.16	13.26	0.03	0.08	54.93	47.26	54.31	54.43
550	3.56	2.02	16.22	13.86	13.35	12.82	0.08	0.04	60.16	51.71	53.33	52.33
600	3.43	2.09	15.96	13.11	13.51	12.16	0.17	0.05	65.34	55.73	54.39	54.04
650	3.37	2.23	16.50	13.20	13.31	11.73	0.19	0.00	70.51	59.89	53.68	52.62
700	3.26	2.29	15.75	12.63	13.24	11.45	0.26	0.03	75.63	63.32	51.15	51.49
750	3.28	2.46	15.74	12.95	12.57	11.11	0.21	0.06	80.59	67.45	54.43	53.90
800	3.25	2.50	14.54	12.57	12.02	11.04	0.19	0.02	85.53	70.91	52.92	52.63
850	3.36	2.62	14.07	12.84	11.06	10.69	0.05	0.05	90.40	75.18	54.23	54.00
900	3.42	2.63	13.12	12.56	10.33	10.53	0.05	0.03	95.89	79.34	52.96	52.13
1000	4.00	3.04	11.91	12.42	8.81	9.85	0.70	0.22	107.25	88.90	53.31	52.57

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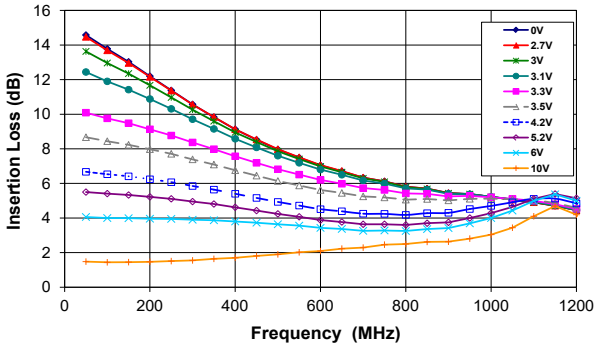
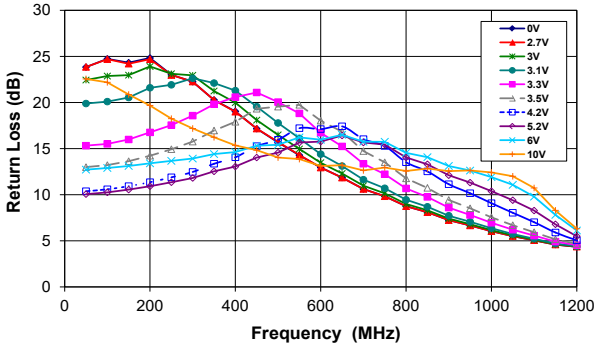
Typical Performance Curves

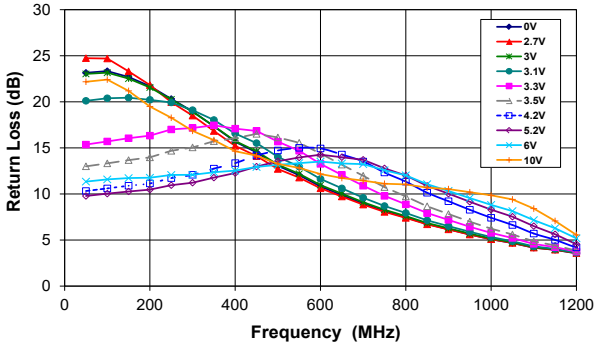
VAEQ-1000-75+
INSERTION LOSS Vs. FREQUENCY
OVER CONTROL VOLTAGES



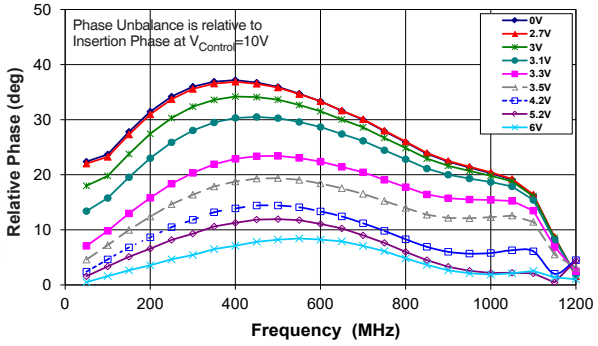
VAEQ-1000-75+
INPUT RETURN LOSS Vs. FREQUENCY
OVER CONTROL VOLTAGES



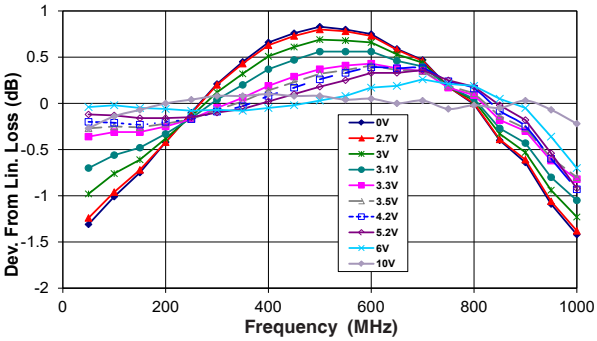
VAEQ-1000-75+
OUTPUT RETURN LOSS Vs. FREQUENCY
OVER CONTROL VOLTAGES



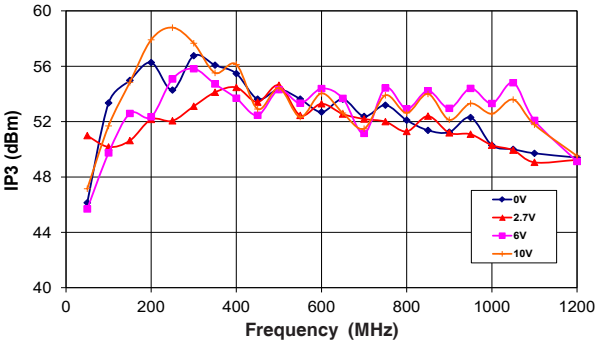
VAEQ-1000-75+
PHASE UNBALANCE Vs. FREQUENCY
OVER CONTROL VOLTAGES



VAEQ-1000-75+
DEVIATION FROM LINEAR LOSS Vs. FREQUENCY
OVER CONTROL VOLTAGES



VAEQ-1000-75+
IP3 Vs. FREQUENCY
OVER CONTROL VOLTAGES



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