

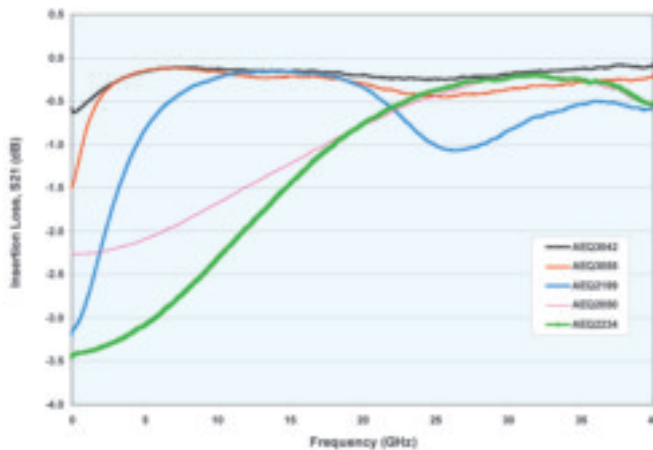


Gain Equalizer

Functional Application

- Equalizer compensates for module Gain Slope Broadband communications, radar, phased arrays
- SONET modules to 40+ GHz
- RADAR applications to >67 GHz

Performance

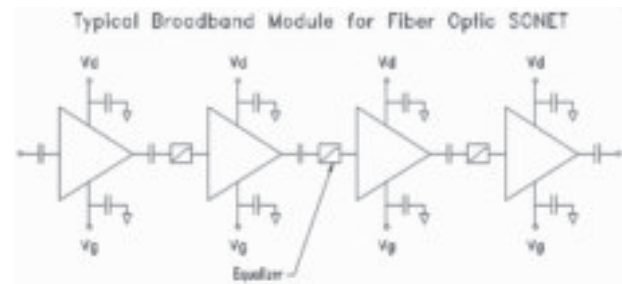


Excellent, repeatable microwave performance is achieved by application of precision thin film fabrication and DLI Hi-K Ceramic materials. DLI's unique design solution provides near Ideal R-C frequency response, far superior to "Stacked R-C chip" Assemblies.

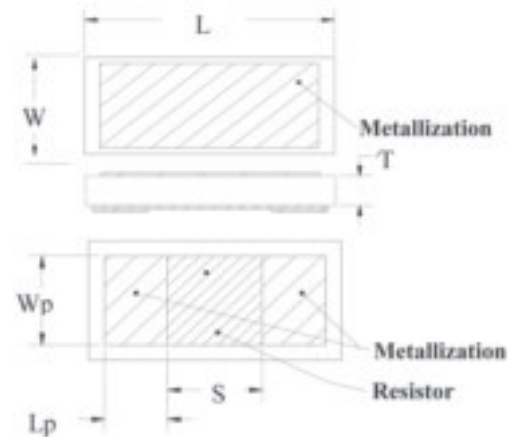
Benefits

- Superior microwave performance
- Excellent repeatability
- Ease of assembly, reduced size and cost

Equivalent Schematic Representation



Physical Characteristics



Part #	Resistor (R)	Low Frequency Insertion Loss, 50 ohm system (dB)	Equivalent Capacitance (pF)	F ₀ (GHz)	Mounting Attachment material: S=solder E=epoxy	L	W	T
AEQ 2199	43 Ω	-3.0	1.15	16	E	0.028" ± .002" (.711 ± .051 mm)	0.016" ± .002" (.406 ± .051 mm)	0.007" ± .001" (.178 ± .025 mm)
AEQ 2050	30 Ω	-2.2	0.33	34	E	0.030" ± .002" (.762 ± .051 mm)	0.016" ± .002" (.406 ± .051 mm)	0.005" ± .001" (.127 ± .025 mm)
AEQ 2234	50 Ω	-3.5	0.31	32	E	0.032" ± .002" (.813 ± .051 mm)	0.018" ± .002" (.457 ± .051 mm)	0.005" ± .001" (.127 ± .025 mm)
AEQ 3042	9 Ω	-0.8	12.5	7	S	0.040" ± .002" (1.02 ± .051 mm)	0.020" ± .002" (.508 ± .051 mm)	0.006" ± .001" (.152 ± .025 mm)
AEQ 3055	20 Ω	-1.6	9.0	7	S	0.040" ± .002" (1.02 ± .051 mm)	0.020" ± .002" (.508 ± .051 mm)	0.006" ± .001" (.152 ± .025 mm)

Gain Equalizer

Mounting attachment material:

Epoxy
Solder

Metallization:

Epoxy mount:

Top side: 100 μ inch Au min. over 300 Angstroms TiW min.

Bottom side: 100 μ inch Au min. over 300 Angstroms TiW min. over TaN resistor

Solder mount:

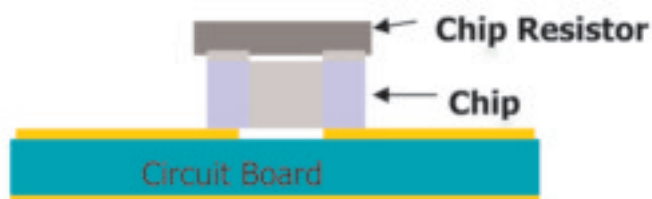
Top side: 100 μ inch min. over 50 μ inch NiV min. over 300 Angstroms TiW min.

Bottom side: 25 μ inch min. over 50 μ inch NiV min. over 300 Angstroms TiW min. over TaN resistor

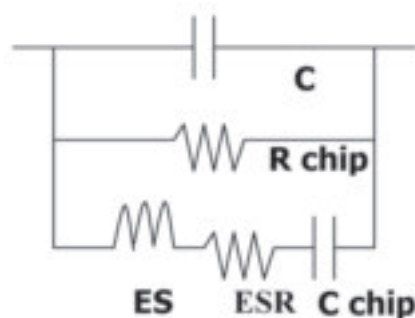
Die attachment recommendations:

The gap in the microstrip line should nominally be equal to dimension "S" (see equalizer outline on page 23).

DLI's miniature Thin Film Gain Equalizers have a microwave frequency response which is so close to ideal that it can be modeled by the simple parallel R-C circuit shown on the preceding page. This is a convenient model for Spice (time domain) simulations. Other common equalizer implementations using stacked R-C chips are not accurately modeled by this circuit. For highest accuracy frequency domain simulations, S-parameters are recommended.



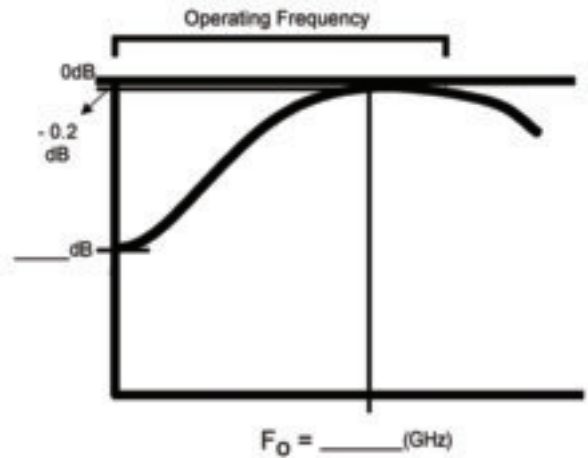
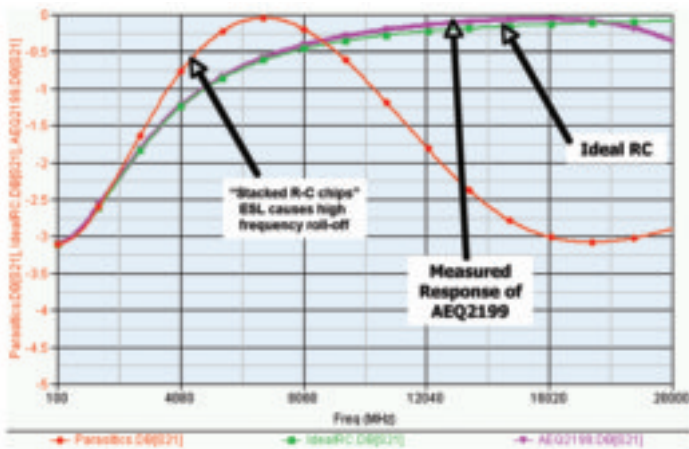
The "stacked R-C chip" implementation, illustrated in the figure below has many issues in both design and manufacturing which lead to lower performance and higher product cost. The equivalent circuit model below more accurately predicts the frequency response of the stacked chips. At microwave frequencies, the additional parasitic circuit elements are required. The effect of ESL, the equivalent inductance of the chip capacitor is particularly important as it causes a more peaked response as seen in the figure on the next page.



Gain Equalizer

DLI's gain equalizer frequency response is compared with that of an ideal R-C, and stacked R-C chips in the figure below. The stacked R-C chip model utilizes the same Rchip and Cchip values as in the ideal R-C model. The key point is that the chip component R and C

values used in a stacked chip equalizer are generally not the ideal values for specifying the DLI single chip gain equalizer. The next section discusses specifying the part by frequency response parameters, or in terms of the ideal R-C values.



Custom Equalizer Design Inputs:

- Low frequency loss or resistance value
- F_0 - minimum loss frequency or capacitance determined using equivalent circuit model on page 24
- Case size restrictions - 50 ohm microstrip line width is a typical maximum case width objective

Case Size (inches)	Preferred: _____ Maximum Length: _____ Maximum Width _____
Minimum Loss Frequency (GHz)	F_0 _____ GHz
Low Frequency Loss (dB), 50 ohm system	Design Resistance (ohms): _____ Loss(dB): _____
Operating Temperature Range (C°)	Minimum Temperature: _____ Maximum Temperature: _____
Power Dissipation (mw)	
Assembly Method (SMT or Epoxy)	Conductive Epoxy attach: _____ Solder attach: _____ Solder type: _____
Board Material	Material: _____ Dielectric constant: _____ Thickness: _____