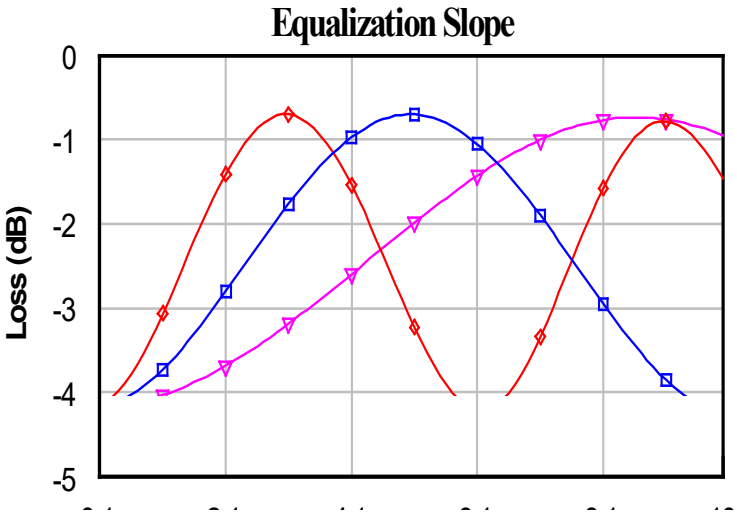
The Florida RF / EMC Labs family of Surface Mount Equalizers operate using a unique filter structure resulting in parabolic shaped S21 responses. Standard filter slopes are available between 1.0 and 3.0 dB with start and stop bands from 0.5 GHz to 10.0 GHz respectively. The device architecture can be scaled in both amplitude and frequency to create equalization slopes matched to your unique requirement.



Features/Benefits

- RoHS Compliant
- 130 x 130 mil Footprint
- Standard and Custom Devices
- 0.5 to 15.0 GHz Applications
- Low Profile (10 mil)
- Temp. Range (-40C to 125C)
- Positive and Negative Slopes

Equalizer Applications

- Amplifier Gain Equalization
- RF Cable Equalization
- PCB Trace Equalization
- Multi Channel Equalization
- Broadband Channel Equalization

Description

Gain equalizers are used in applications that require signal level control. Level control can be accomplished by either reflecting a portion of the input signal back to its source or by absorbing some of the signal in the equalizer itself. The latter case is often preferred because the mismatch that results from using a reflective equalizer can create problems for other devices in the system such as nonsymmetrical two-port amplifiers. It is for this reason that absorptive passive components are more popular, particularly in microwave applications.

The Florida RF / EMC frequency equalizer is a passive microwave component with an attenuation characteristic that varies as a function of frequency while stable with temperature. The equalizer consists of a filter network where thick and thin film passive values may be changed to generate different magnitude responses that vary with frequency. The S21 response is a repeating periodic parabolic curve whose corresponding minima and maxima may be shifted in frequency and magnitude to produce the desired positive or negative slope in the band of interest. Standard values are available listed under “Ordering Information” at the end of this publication. Custom devices can be produced to match a specific application’s equalization requirements. Consult your Florida RF Labs / EMC representative for feasibility and quotation.

As an example, a family of equalization slopes with minima at 5.0 GHz is shown in figure 1 below. These curves are representative of the equalizer's S-parameter performance. The S21 characteristics of these devices are such that the slope response tends to flatten with reduction in slope value and alternately resembles a downward opening parabola with increasingly larger equalization slopes. It is seen that the best fit to a linear slope response occurs for values between 2dB and 4dB.

The negative slope equalizer's VSWR is maximum at the low frequency start band and increases with increasing nominal slope value as shown in figure 2. Equalization slope values of greater than 4 dB will have a Maximum VSWR of greater than 2:1. A tradeoff can be made to improve VSWR at the expense of insertion loss. Increasing insertion loss will not affect the equalization slope (S21) shape. Alternately, a designer may add a series resistor or attenuator in line with the equalizer to improve VSWR at the expense of transmitted power.

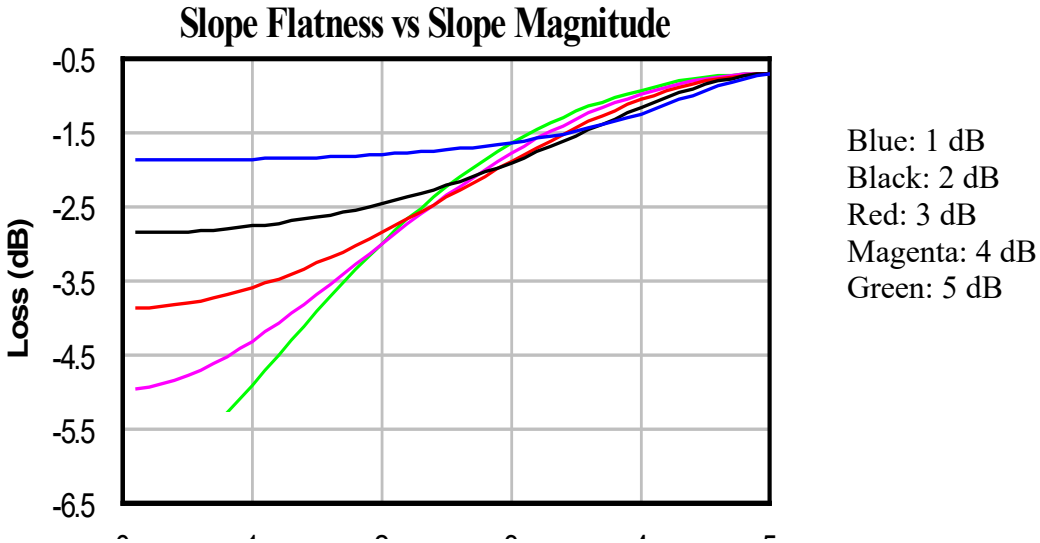


Figure 1: Typical S21 Response vs. Slope Magnitude (dB).

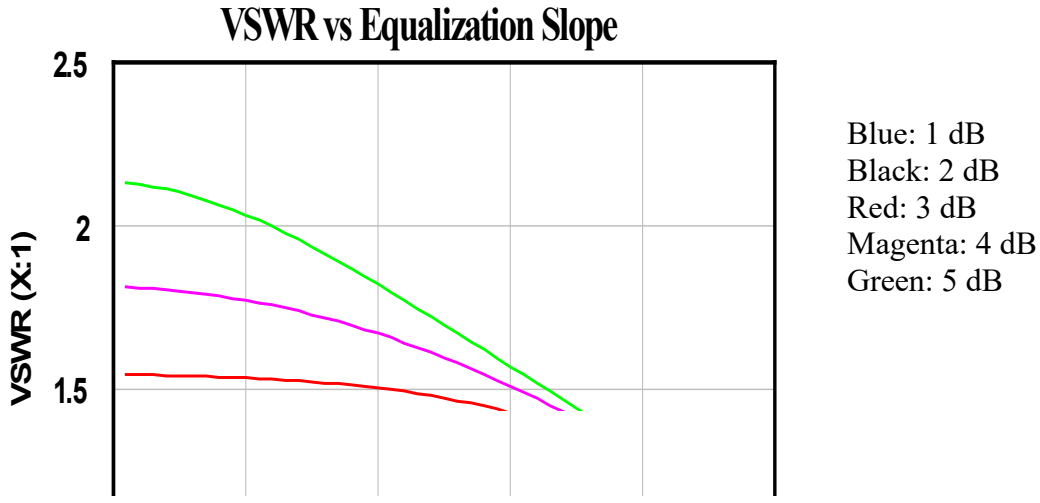
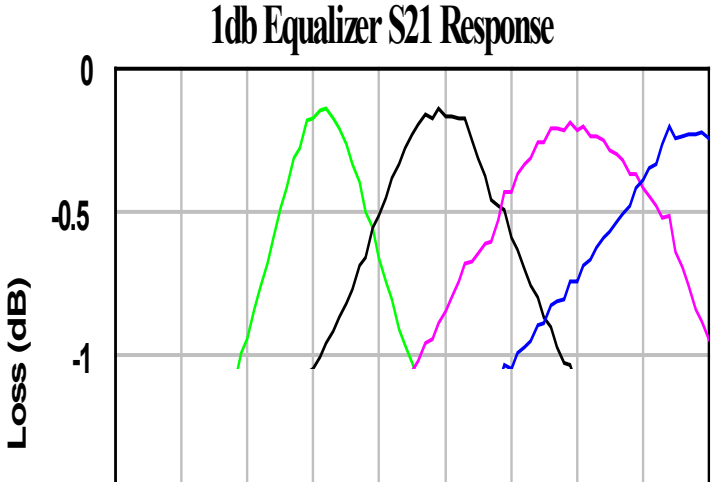


Figure 2: Typical VSWR vs. Slope Magnitude (dB).

Typical Electrical Performance



1dB Slope Equalizer

From Left to Right:

Green:
CE1020N040SMTF
Black:
CE1030N055SMTF
Magenta:
CE1035N075SMTF
Blue:
CE1050N095SMTF

2dB Slope Equalizer

From Left to Right:

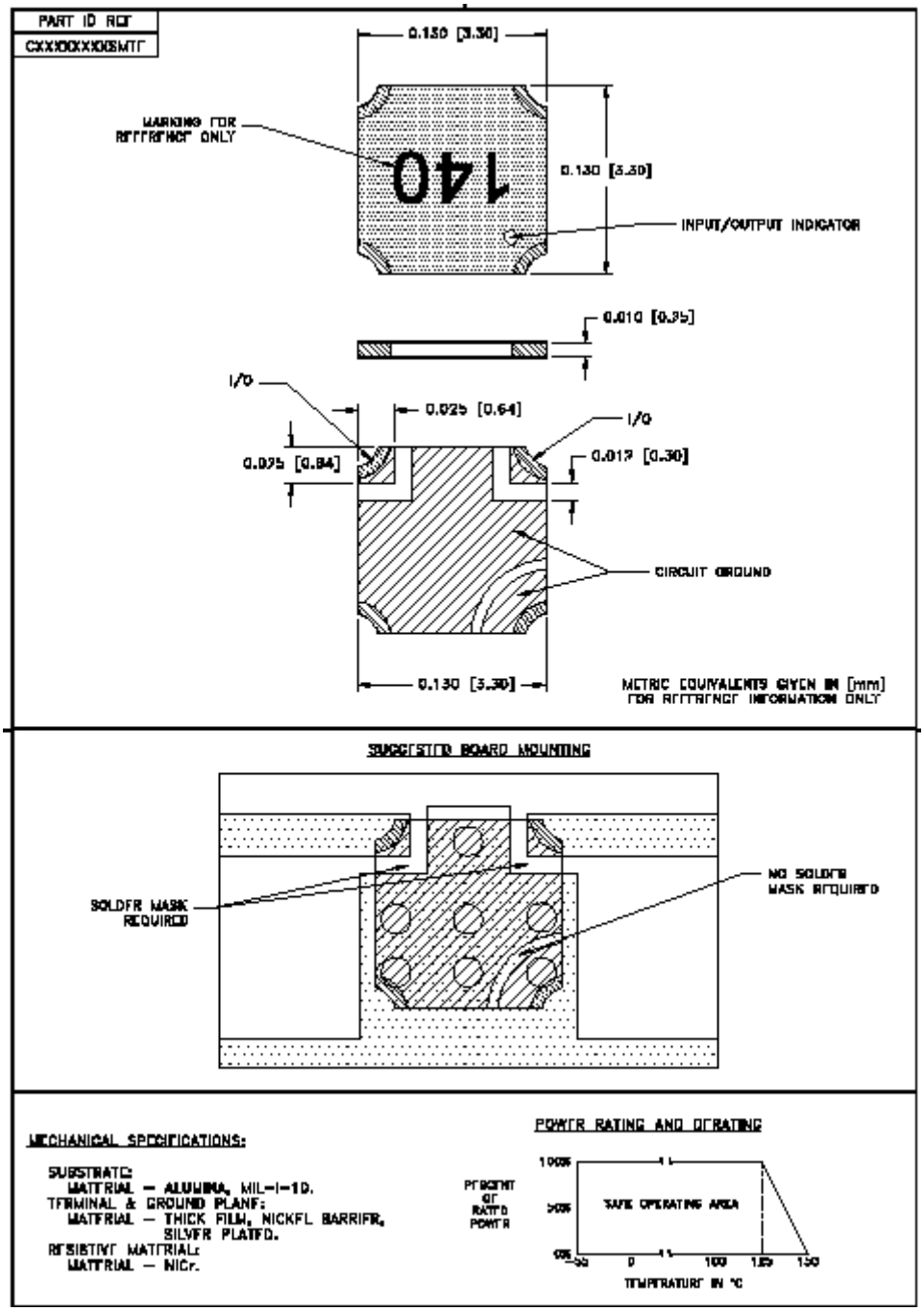
Green:
CE2010N035SMTF
Black:
CE2020N055SMTF
Magenta:
CE2025N070SMTF
Blue:
CE2030N090SMTF

3dB Slope Equalizer

From Left to Right:

Green:
CE3008N035SMTF
Black:
CE3030N055SMTF
Magenta:
CE3015N070SMTF
Blue:
CE3020N090SMTF

Mechanical Specifications and Recommended Mounting



Ordering Information:

Part Numbering Code for CE Series (Omit spacing in part number when ordering)

Standard Equalizer Values					
Part Number	SLOPE (dB) Negative	Part Mark Code	Start Frequency (GHz)	Stop Frequency (GHz)	ΔF (GHz)
CE 1 015 N 029 SMTF	1	140	1.5	2.9	1.4
CE 1 015 N 035 SMTF	1	130	1.5	3.5	2.0
CE 1 020 N 040 SMTF	1	127	2.0	4.0	2.0
CE 1 025 N 045 SMTF	1	125	2.5	4.5	2.0
CE 1 030 N 055 SMTF	1	120	3.0	5.5	2.5
CE 1 035 N 070 SMTF	1	115	3.5	7.0	3.5
CE 1 040 N 075 SMTF	1	112	4.0	7.5	3.5
CE 1 050 N 095 SMTF	1	110	5.0	9.5	4.5
CE 2 007 N 028 SMTF	2	240	0.7	2.8	2.1
CE 2 010 N 035 SMTF	2	230	1.0	3.5	2.5
CE 2 010 N 040 SMTF	2	227	1.0	4.0	3.0
CE 2 015 N 045 SMTF	2	225	1.5	4.5	3.0
CE 2 020 N 055 SMTF	2	220	2.0	5.5	3.5
CE 2 020 N 065 SMTF	2	215	2.0	6.5	4.5
CE 2 025 N 070 SMTF	2	212	2.5	7.0	4.5
CE 2 030 N 090 SMTF	2	210	3.0	9.0	6.0
CE 3 005 N 027 SMTF	3	340	0.5	2.7	2.2
CE 3 008 N 035 SMTF	3	330	0.8	3.5	2.7
CE 3 010 N 040 SMTF	3	327	1.0	4.0	3.0
CE 3 010 N 045 SMTF	3	325	1.0	4.5	3.5
CE 3 015 N 055 SMTF	3	320	1.5	5.5	4.0
CE 3 015 N 065 SMTF	3	315	1.5	6.5	5.0
CE 3 015 N 070 SMTF	3	312	1.5	7.0	5.5
CE 3 020 N 090 SMTF	3	310	2.0	9.0	7.0

Example: Part Number CE3010N055SMTF Definition Below

CE	X	XXX	X	XXX	XXX	X
CE	3	010	N	055	SMT	F
CHIP EQUALIZER FAMILY	Slope Magnitude	Band Start f1: 1.0 GHz	Negative Slope	Band Stop f2: 5.5 GHz	Surface Mount Package	RoHS Compliant