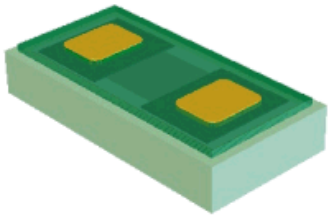
Thin Film Technology Corp.

Product Family: Equalizer - Single Ended Bessel Loss

Part Number Series: EF-10B Series



Construction:

- High Purity Polished Alumina Ceramic
- Nickel alloy thin-film resistive element
- Epoxy-resin overcoat
- Gold terminations
  (RoHS compliant and Pb Free)

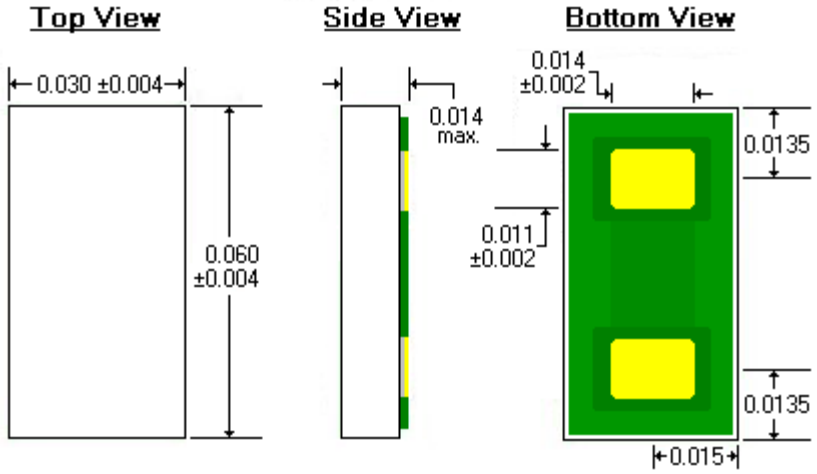
Features:

- 0603 package size (0402 footprint)
- Data rates of 2.5, 3.125, 5.0, 6.25, 10.0 and 12.5 Gb/s
- Compensates for Bessel losses of 3, 6, and 9dB
- 1.0dB maximum ripple
- High volume production suitable for commercial and special applications

Description:

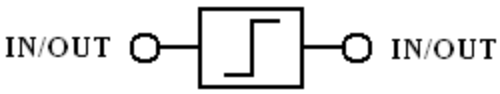
These networks compensate for the loss in high speed data transmission media. This part series was originally developed to compensate for loss in high speed cables, backplanes, test equipment and optical modules. This series covers application data rates of 2.5, 3.125, 5.0, 6.25, 10.0 and 12.5 Gb/s to equalize ideal Bessel function loses of 3, 6, and 9dB to a resultant function with less than 1.0dB of ripple through the pass band. This component is a 0603 package with an 0402 footprint intended for SMT assembly. Custom values may be available by calling the factory.

Product Dimensions and Schematic:



Note: Dimensions in inches

Schematic:



Parts are fully symmetrical
(Input/Output can be reversed)

EF-05A Series Part Numbering: Ex: EF2A51A050E10B-T10

Product Designator	Element Quantifier	Circuit Type	Impedance	Package Size Code	Date Rate	50 MHz Loss Designator	Maximum Ripple	Media Function	Packaging Tape & Reel
EF	**2** = two elements	**A** = RC Schunt	**5** = 50Ω	**1A** = 0603 package with 0402 footprint	**025** = 2.5 Gb/s **031** = 3.125 Gb/s **050**= 5.0 Gb/s **063** = 6.25 Gb/s **100** = 10.0 Gb/s **125** = 12.5 Gb/s	**E** = -3dB **K** = -6dB **Q** = -9dB	**10** = 1.0dB	**B** = Bessel	-**T10**=1,000 pcs/ reel -**T50**=5,000 pcs/ reel

Product Offering Matrix:

Data Rate	50 MHz Loss		
	E = 3dB	K = 6dB	Q = 9dB
025 = 2.50 Gb/s	EF2A51A025E10B	EF2A51A025K10B	EF2A51A025Q10B
031 = 3.125 Gb/s	EF2A51A031E10B	EF2A51A031K10B	EF2A51A031Q10B
050 = 5.0 Gb/s	EF2A51A050E10B	EF2A51A050K10B	EF2A51A050Q10B
063 = 6.25 Gb/s	EF2A51A063E10B	EF2A51A063K10B	EF2A51A063Q10B
100 = 10.0 Gb/s	EF2A51A100E10B	EF2A51A100K10B	
125 = 12.5 Gb/s	EF2A51A125E10B		

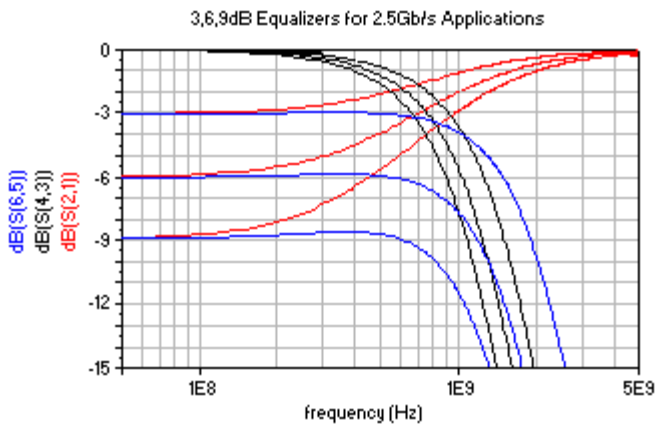
Electrical Specifications:

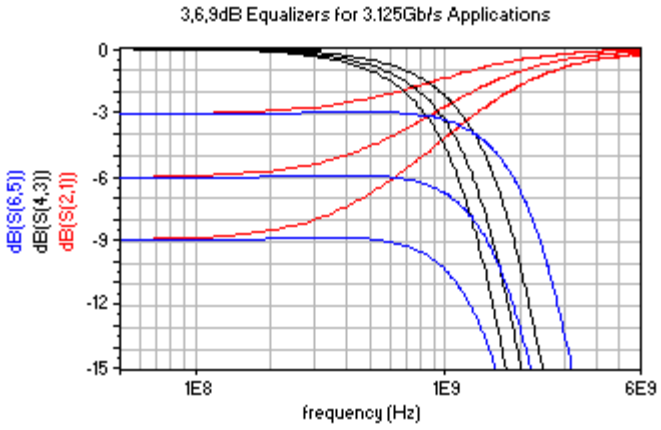
Parameter	Specification
Type	Absorptive Low Pass
Attenuation at 50 MHz (Low Frequency Attenuation)	-3, -6, -9 dB (tolerance: +/- 1.0 dB)
Attenuation at (bit rate)	-1.0 dB max
Bandwidth	20 GHz (-1.0 dB Max)
Resultant Max Ripple thru 1/4 Bit Rate	1.0 dB
Reference Impedance	50 Ω
Rated Power	0.10 Watt
Insulation Resistance	> 100 MΩ @ 50 Vdc
Operating Temperature	-40 to +125°C
Storage Temperature	-55 to +125°C

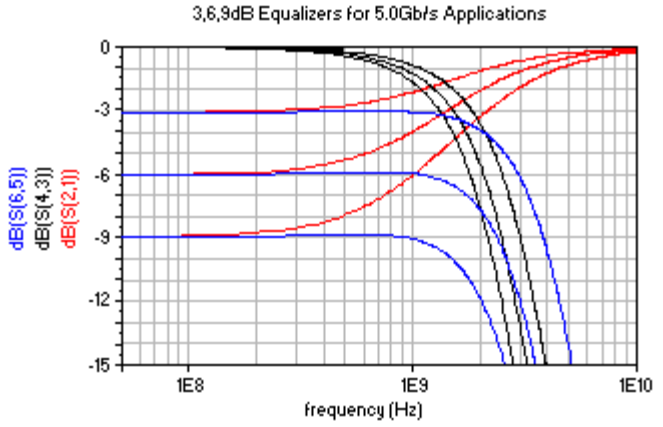
Typical Electrical Performance Characteristics:

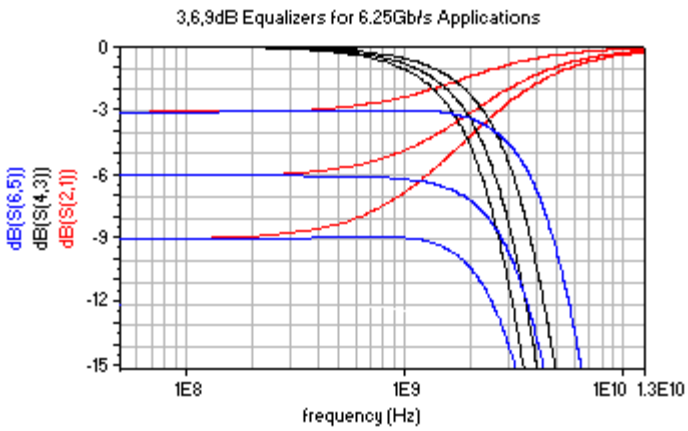
Part Number	Data Rate	Attenuation @ 50MHz	Attenuation @ 1/4 Bit Rate	Attenuation @ 1/2 Bit Rate	Attenuation @ Bit Rate
EF2A51A025E10B	2.5 Gb/s	3.0 dB	1.8 dB	1.0 dB	0.5 dB
EF2A51A031E10B	3.125 Gb/s	3.1 dB	1.6 dB	0.8 dB	0.4 dB
EF2A51A050E10B	5.0 Gb/s	3.0 dB	1.6 dB	0.8 dB	0.5 dB
EF2A51A063E10B	6.25 Gb/s	2.9 dB	1.7 dB	0.9 dB	0.4 dB
EF2A51A100E10B	10.0 Gb/s	2.8 dB	1.8 dB	1.0 dB	0.5 dB
EF2A51A125E10B	12.5 Gb/s	3.1 dB	1.9 dB	1.0 dB	0.6 dB
EF2A51A025K10B	2.5 Gb/s	6.6 dB	3.1 dB	1.8 dB	0.7 dB
EF2A51A031K10B	3.125 Gb/s	6.6 dB	3.0 dB	1.3 dB	0.6 dB
EF2A51A050K10B	5.0 Gb/s	6.5 dB	4.0 dB	2.1 dB	1.0 dB
EF2A51A063K10B	6.25 Gb/s	6.1 dB	3.4 dB	1.6 dB	0.7 dB
EF2A51A100K10B	10.0 Gb/s	5.8 dB	3.5 dB	1.7 dB	0.6 dB
EF2A51A025Q10B	2.5 Gb/s	8.9 dB	4.4 dB	2.1 dB	0.8 dB
EF2A51A031Q10B	3.125 Gb/s	9.5 dB	5.6 dB	3.0 dB	1.3 dB
EF2A51A050Q10B	5.0 Gb/s	8.4 dB	4.9 dB	2.4 dB	1.1 dB
EF2A51A063Q10B	6.25 Gb/s	9.4 dB	5.6 dB	3.0 dB	1.5 dB

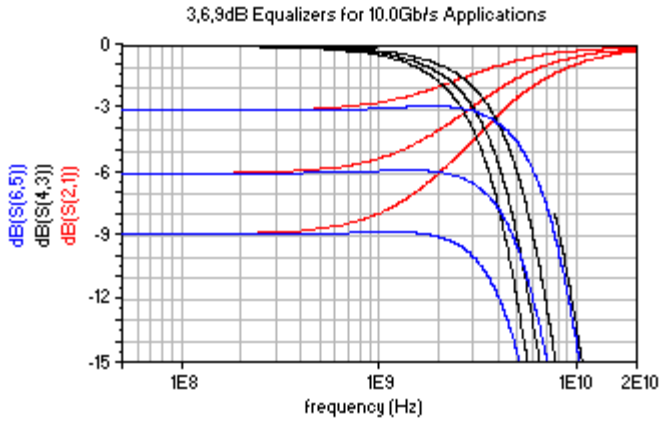
Simulation Plots:

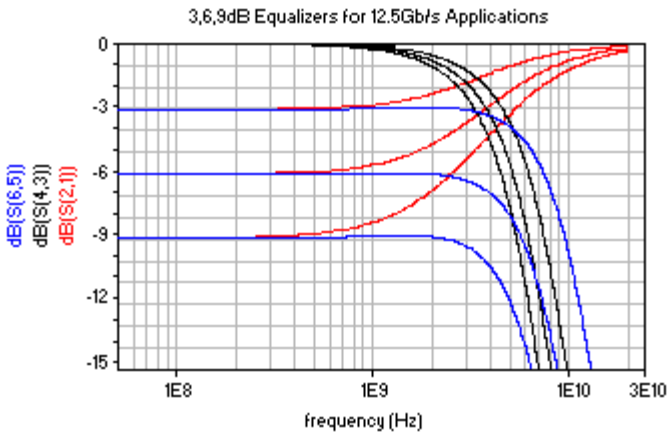






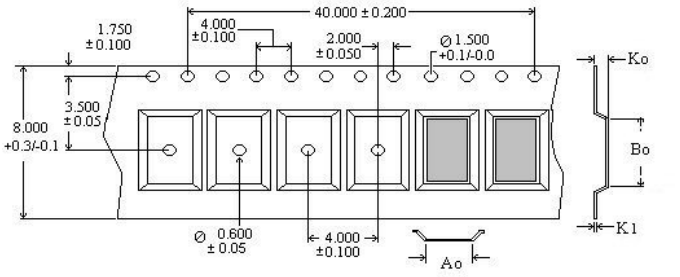






Packaging:

Tape Dimensions:

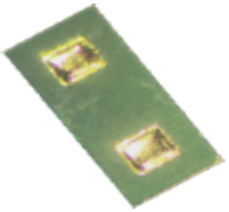


Dimensions:mm

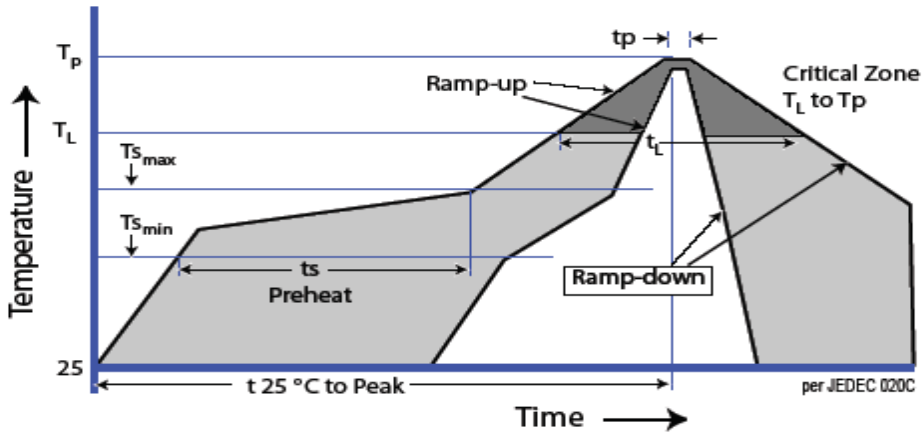
Packaging Specification	General Guidelines & Recommendations
General Notes	All dimensions are in mm. Not drawn to scale
Drawing Dimensional Call-outs	Ao = 0.970 ± 0.100 mm Bo =1.650 ± 0.100 mm Ko = 0.410 ± 0.100 mm K1 = 0.229 ± 0.100 mm
Packaging Materials	Carrier tape part #: 3MUS017931. Cover tape part #: Vendor determined. Reel size: Quantity dependent
Packaging Requirements	All taping done in accordance with EIA 481 standards. Pieces taped with the electrode pads facing down. All orders under 100pcs, will be put on cut tape only with no leader or trailer. Orders 100 pcs or larger are packaged on tape and reel in either 1,000 or 5,000 pc reels. See part number break down for ordering information.
Labeling Requirements	Labels will contain the TFT part number and quantity of pieces taped.

Mounting Recommendation:

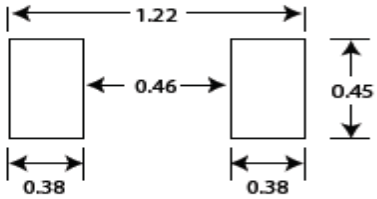
SOLDERING PROFILE



Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average Ramp-Up Rate (Ts_{max} to Tp)	3 °C/second max.	3 °C/second max.
Preheat - Temperature Min (Ts_{min}) - Temperature Max (Ts_{max}) - Time (ts_{min} to ts_{max})	 100 °C 150 °C 60-120 seconds	 150 °C 200 °C 60-180 seconds
Time maintained above: - Temperature (T_L) - Time (t_L)	 183 °C 60-150 seconds	 217 °C 60-150 seconds
Peak Temperature (T_p)	240 +0/-5 °C	260 +0 °C
Time within 5 °C of actual Peak Temperature (tp)	10-30 seconds	20-40 seconds
Ramp-Down Rate	6 °C/second max.	6 °C/second max.
Time 25 °C to Peak Temperature	6 minutes max.	8 minutes max.

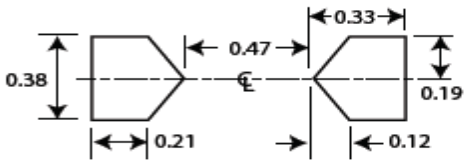


MOUNTING PAD



millimeter

STENCIL OPENING



millimeter

Assembly Considerations:

- Type 3 solder paste, use 0.005 inch stencil thickness.
- Nitrogen purge is recommended during solder reflow.
- This is a Pb-free part. Both Sn-Pb eutectic and Pb-free profiles are shown.

This is a recommendation based on third party testing. Each end user should test and determine their own optimum conditions.