



Flex Max® 331 1 GHz Multipurpose Line Extender (ALC) Technical Specification

42/54 MHz Specifications (ALC Version)

Characteristic	Forward	Return
General		
Bandwidth, MHz	54 to 1002	5 to 42
AC Current Passing, Amp ¹	15	15
Typical Operating Conditions		
Operational Gain, dB ²	35	18
Channels, Number of NTSC ³	79	6
Operating Levels (recommended)		
Frequency, MHz	1002/870/750/550/54	42/5
Input, dBmV, min. ⁴	17/15.4/14.4/12.6/10.2	17/17
Output, dBmV ^{5,6}	52/49.5/47.5/44/35	35/35
Performance Specifications @ Recommended Levels (Temperature Range: -40 to 60°C)		
Carrier-to-Interference Ratio, dB		
Composite Triple Beat	77	84
Cross Modulation (per NCTA std.) ⁷	72	74
Composite 2IM	75	80
Composite Intermodulation Noise (CIN) ⁸	73	—
Composite Intermodulation Noise (CIN) ⁹	79	—
Noise, 4 MHz, 75Ω ¹⁰	68/66.4/65.4/63.6/59.2	70.5
Noise Figure, dB (without EQ) ¹⁰	7/7/7/7/9	5.5
Full Gain, dB (without EQ and ALC)	39.5	19
Factory Alignment (with ALC reserve, without EQ)		
Cable Loss, dB @ 1002 MHz	13	—
Flat Loss, dB	23	19
Gain Slope, dB	-0.25 to 0.75	-0.5 to 0.5
Flatness, dB	±0.5	±0.5
Return Loss, dB, min., all entry ports ¹¹	16	16

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42/54 MHz Specifications (ALC Version)

Powering Requirements, max./typ. ¹²	With Active Return, EMT, and Return Switch		With Active Return	
	@ 90V	@ 60V	@ 90V	@ 60V
AC Voltage, 60Hz				
AC Power, Watts	26.7/26.1	26.2/25.6	24.9/24.4	24.4/23.9
AC Current, mA	370/355	600/570	340/335	535/520
DC Current, mA @ 24V ± 0.5V	935/915	935/915	870/850	870/850
Automatic Level Control				
Range, dB @ 1002MHz	+3.5/-4.5		—	
Accuracy (-40 to 60°C), dB	±0.5		—	
Operating Level Range (from specified levels), dB	±4.5		—	
Pilot Frequency Band (recommended), MHz	499.25 (single channel)		—	
Testpoints¹³ (internal balancing, -20dB or -25 dB directional coupler type)				
Accuracy, dB, (frequency range)	±0.5 (54 to 550MHz) ±1.0 (551 to 1002MHz)		±0.5 (5 to 42MHz)	
Gain Control				
Plug-in PAD	NPB-xxx		NPB-xxx	
Equalization				
Plug-in Equalizers	SEQ-1G-xx		MEQ-42-x	
Chrominance/Luminance Delay, max.				
Channel 2, ns/3.58MHz	35		—	
Channel 3, ns/3.58MHz	14		—	
Channel 4, ns/3.58MHz	7		—	
Channel 5, ns/3.58MHz	3.6		—	
Return Group Delay, max.				
5.5-7 MHz, ns	—		52	
10-11.5 MHz, ns	—		6	
35-36.5 MHz, ns	—		10	
38.5-40MHz, ns	—		23	
Hum Modulation, time domain @ 15A¹				
5-10MHz, -dBc	—		55	
11-750MHz, -dBc	60		60	
751-1002MHz, -dBc	55		—	

Specification Document Number 1500171 Rev P

Notes:

- AC current passing is shown with factory complete line extenders. AC current passing is 13A for Flex Max331 RF modules used to upgrade E700 series line extenders.
- Spacing is at the highest frequency with SEQ-1G-xx installed. Return spacing includes losses due to housing, diplex filters, and MEQ-42-xx.
- NTSC video channels occupying the appropriate frequency spectrum per specified number of channels.
- Recommended minimum forward input level at 1002MHz including loss due to equalizer.
- Recommended maximum return output level at 42MHz including loss due to equalizer.
- At specified Operational Tilt, maximum Output Level for 1GHz or 870MHz loading is 56.5dBmV@HF.
- Cross modulation specification number indicates typical cascade performance.
- System operating with digitally compressed channels or equivalent broadband noise from 550 to 1002MHz at levels 6dB below equivalent video channels will experience a composite distortion (CIN) appearing as noise in the 54 to 550MHz frequency spectrum.
- System operating with digitally compressed channels or equivalent broadband noise from 550 to 870MHz at levels 6dB below equivalent video channels will experience a composite distortion (CIN) appearing as noise in the 54 to 550MHz frequency spectrum.
- The Noise Figure and C/N specifications are typical within the specified passband.
- Return loss can be degrade by as much as 1.5dB when used with housing option M and also when using kit assembly number 1504044-001.
- Power supply is internal to RF module. Refer to drawing #333995-32. For 60V_{AC} powering: AC Power consumption in Watts divided by a factor of 43 = Amps required. For 90V_{AC} powering: For ≤ 67V_{AC}, 1.03 x (AC power consumption in watts divided by voltage) = Amps required. For 67 - 90V_{AC}, AC power consumption in Watts divided by 65 = Amps required.
- The external testpoints associated with the RF housing are for station troubleshooting only

65/85 MHz Specifications (ALC Version)

Characteristic	Specification	
	Forward	Return
Passband, MHz	85 to 1002	5 to 65
Housing, MHz	1002	—
AC Current Passing, Amp ¹	15	15
Typical Operating Conditions		
Operational Gain, dB ² (-0, + dB)	35	18
Channels, Number of PAL ³	60	6
Operating Levels (recommended)		
Frequency, MHz	1002/870/750/600/85	65/5
Input, dBmV, min. ⁴	17/15.4/14.4/13/10.5	17/17
Output, dBmV ^{5,6}	52/49.5/47.5/45/35.5	35/35
Performance Specifications @ Recommended Levels⁷ (Temperature Range: -40 to 60°C)		
Carrier-to-Interference Ratio, dB		
Composite Triple Beat	77	84
Cross Modulation (per NCTA std.)	72	74
Composite 2IM	75	80
Composite Intermodulation Noise (CIN) ⁸	73	—
Composite Intermodulation Noise (CIN) ⁹	79	—
Noise, 5 MHz, 75 Ohm ¹⁰	67/65.4/64.4/63/58.2	70.5
Noise Figure, dB (without EQ) ¹⁰	7/7/7/7/9	5.5
Full Gain, dB (without EQ and ALC)	39.5	19
Factory Alignment (with ALC reserve, without EQ)		
Cable Loss, dB @ 1002 MHz	13	—
Flat Loss, dB	23	19
Gain Slope, dB	-0.25 to 0.75	-0.5 to 0.5
Flatness, dB	±0.5	±0.5
Return Loss, dB, min., all entry ports ¹¹	16	16

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65/85 MHz Specifications (ALC Version)

Characteristic	Specification			
	With Active Return, Transponder, and Reverse Switch		With Active Return	
Powering Requirements, max./typ.¹²	@ 90V	@ 60V	@ 90V	@ 60V
AC Voltage, 60Hz				
AC Power, Watts	26.7/26.1	26.2/25.6	24.9/24.4	24.4/23.9
AC Current, mA	370/355	600/570	340/335	535/520
DC Current, mA @ 24V ± 0.5V	935/915	935/915	870/850	870/850
Testpoints¹³(Internal balancing, –20dB or –25 dB directional coupler type)				
Accuracy, dB, (frequency range)	±0.5 (85 to 550MHz) ±1.0 (551 to 1002MHz)		±0.5 (5 to 65MHz)	
Automatic Level Control				
Range, dB @ 1002MHz	+3.5/–4.5		—	
Accuracy (–40 to 60°C), dB	±0.5		—	
Operating Level Range (from recommended), dB	±4.5		—	
Pilot Frequency (recommended), MHz	499.25 (single channel)		—	
Gain Control				
	Forward		Return	
Plug-in PAD	NPB-xxx		NPB-xxx	
Equalization				
Plug-in Equalizers	SEQ-1G-xx		MEQ-65-x	
Chrominance/Luminance Delay, max.				
Channel 52, (PAL) ns/4.43MHz	5		—	
Channel 53, (PAL) ns /4.43MHz	4		—	
Channel 95, (NTSC) ns/3.58MHz	10		—	
Channel 96, (NTSC) ns/3.58MHz	7		—	
Return Group Delay, max.				
5.5–7MHz, ns	—		52	
10–11.5MHz, ns	—		8	
62–63.5MHz, ns	—		21	
63.5–65MHz, ns	—		34	

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65/85 MHz Specifications (ALC Version)

Characteristic	Specification	
Hum Modulation, time domain @ 15A¹		
5–10MHz, –dBc	—	55
11–750MHz, –dBc	60	60
751–1002MHz, –dBc	55	—

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1. Modules used to upgrade FlexNet 700 Line Extenders pass 13A maximum of continuous current due to existing centerseizure assemblies.
2. Spacing at the highest frequency with SEQ-1G-xx installed. Return spacing includes losses due to housing, duplex filters, and MEQ-65-x.
3. PAL video channels occupying the appropriate frequency spectrum per specified number of channels.
4. Recommended minimum forward input level at 1002MHz including loss due to equalizer.
5. Recommended maximum return output level at 65MHz including loss due to equalizer.
6. At specified Operational Tilt, maximum Output Level for 1 GHz or 870MHz loading is 56.5 dBmV @ HF.
7. Distortion performance derated accordingly to account for the influence of the digitally compressed channels operating at levels 6dB below equivalent video levels in the applicable frequency spectrum above analog channels.
8. Systems with digitally compressed channels or equivalent broadband noise from 600 to 1002MHz at levels 6dB below equivalent video channels will experience a composite distortion (CIN) appearing as noise in the 85 to 600MHz frequency spectrum.
9. System with digitally compressed channels or equivalent broadband noise from 600 to 870MHz at levels 6dB below equivalent video channels will experience a composite distortion (CIN) appearing as noise in the 85 to 600MHz frequency spectrum.
10. The Noise Figure and C/N specifications are typical within the specified passband.
11. Return loss can be degrade by as much as 1.5dB when used with housing option M and also when using kit assembly number 1504044-001.
12. Power supply is internal to RF module. For 60V_{AC} Powering: AC Power consumption in Watts divided by a factor of 43 = Amps required. For 90V_{AC} AC Powering: For ≤67 VAC, 1.03 X (AC Power consumption is watts divided by voltage) = Amps required. For 67-90V_{AC}, AC Power consumption in Watts divided by 65 = Amps required.
13. The external testpoints associated with the RF housing are for station troubleshooting only.

85/105 MHz Specifications (ALC Version)

Characteristic	Specification	
	Forward	Return
General Specifications		
Passband, MHz	105 to 1002	5 to 85
Housing, MHz	1002	—
AC Current Passing, Amp ¹	15	15
Typical Operating Conditions		
Operational Gain, dB ²	35	18
Channels, Number of NTSC ³	79	6
Operating Levels (Recommended)		
Frequency, MHz	1002/870/750/550/105	85/5
Input, dBmV, min. ⁴	17/15.4/14.4/12.6/10.6	17/17
Output, dBmV ^{5,6}	52/49.5/47.5/44/35.5	35/35

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85/105 MHz Specifications (ALC Version) (Continued)

Characteristic	Specification			
Performance Specifications @ Recommended Levels⁷ (Temperature Range: -40 to 60°C)				
Carrier-to-Interference Ratio, dB				
Composite Triple Beat	77		84	
Cross Modulation (per NCTA std.)	72		74	
Composite 2IM	75		80	
Composite Intermodulation Noise (CIN) ⁸	73		—	
Composite Intermodulation Noise (CIN) ⁹	79			
Noise, 4 MHz, 75 Ohm ¹⁰	68/66.4/65.4/63.6/59.2		70.5	
Noise Figure, dB (without EQ) ¹⁰	7/7/7/7/9		5.5	
Full Gain, dB (without EQ and ALC)	39.5		19	
Factory Alignment (with ALC reserve, without EQ)				
Cable Loss, dB @ 1002 MHz	13		—	
Flat Loss, dB	23		19	
Gain Slope, dB	-0.25 to 0.75		-0.5 to 0.5	
Flatness, dB	0.5		0.5	
Return Loss, dB, min., all entry ports ¹¹	16		16	
Powering Requirements, max./typ.¹²	With Active Return, Transp, and Reverse Switch		With Active Return	
AC Voltage, 60Hz	@ 90V	@ 60V	@ 90V	@ 60V
AC Power, Watts	26.7/26.1	26.2/25.6	24.9/24.4	24.4/23.9
AC Current, mA	370/355	600/570	340/335	535/520
DC Current, mA @ 24V ± 0.5V	935/915	935/915	870/850	870/850
Automatic Level Control				
Range, dB @ 1002 MHz	+3.5/-4.5			
Accuracy, dB (-40°C to 60°C)	± 0.5			
Operating Level Range, dB (from recommended)	± 4.5			
Pilot Frequency (recommended, MHz)	499.25 (single channel)			
Testpoints¹³ (Internal balancing, -20 dB or -25 dB directional coupler type)				
Accuracy, dB, (frequency range)	± 0.5 (105 to 550 MHz)		± 0.5 (5 to 85 MHz)	
	± 1.0 (551 to 1002 MHz)			

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85/105 MHz Specifications (ALC Version) (Continued)

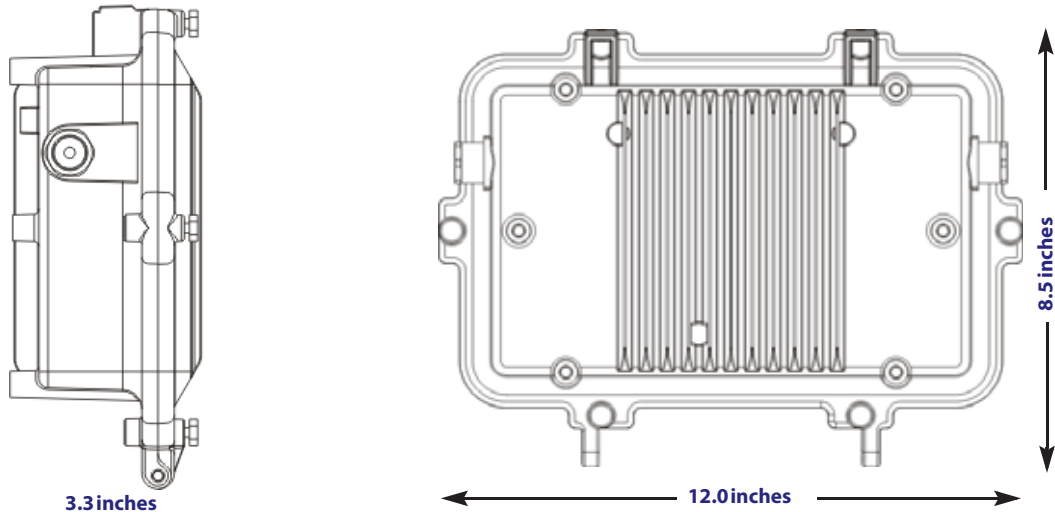
Characteristic	Specification	
Gain Control		
Plug-in PAD	NPB-xxx	NPB-xxx
Equalization		
Plug-in Equalizers	SEQ-1G-xx	MEQ-85-xx
Chrominance/Luminance Delay, max.		
Channel 98, ns/3.58MHz	15	—
Channel 99, ns/3.58MHz	9	—
Return Group Delay, max.		
5.5–7MHz, ns	—	49
10–11.5MHz, ns	—	8
82–83.5MHz, ns	—	16
83.5–85MHz, ns	—	20
Hum Modulation, time domain @ 15A¹		
5–10MHz, –dBc	—	55
11–750MHz, –dBc	60	60
751–1002MHz, –dBc	55	—

Specification Document Number 1504153 Rev A

1. Modules used to upgrade FlexNet 700 Series Line Extenders pass 13 A maximum of continuous current due to existing centerseizure assemblies.
2. Spacing is at the highest frequency with SEQ-1G-xx installed. Return spacing includes losses due to housing, diplex filters, and MEQ-85-xx.
3. NTSC video channels occupying the appropriate frequency spectrum per specified number of channels.
4. Recommended minimum forward input level at 1002MHz including loss due to equalizer.
5. Recommended maximum return output level at 85MHz including loss due to equalizer.
6. At specified Operational Tilt, maximum Output Level for 1GHz or 870MHz loading is 56.5 dBmV @HF.
7. Distortion performance is derated accordingly to account for the influence of the digitally compressed channels operating at levels 6dB below equivalent video levels in the applicable frequency spectrum above analog channels.
8. Systems operating with digitally compressed channels or equivalent broadband noise from 550 to 1002MHz at levels 6dB below equivalent video channels will experience a composite distortion (CIN) appearing as noise in the 105 to 550MHz frequency spectrum.
9. Systems operating with digitally compressed channels or equivalent broadband noise from 550 to 870MHz at levels 6dB below equivalent video channels will experience a composite distortion (CIN) appearing as noise in the 105 to 550MHz frequency spectrum.
10. The noise figure and C/N specifications are typical within the specified passband.
11. Return loss can be degraded by as much as 1.5dB when used with housing option M and also when using kit assembly number 1504044-001.
12. Power supply is internal to RF module. Refer to drawing #333995-32. For 60VAC Powering: AC Power consumption in Watts divided by a factor of 43 = Amps required. For 90VAC Powering: For ≤ 67VAC, 1.03 x (AC Power consumption in watts divided by voltage) = Amps required. For 67 - 90VAC, AC Power consumption in watts divided by 65 = Amps required.
13. The external testpoints associated with the RF housing are for station troubleshooting only.

Thermal Level Control (TLC) and No Level Control (NLC) model options are also available. Please refer to the FlexMax331 Technical Overview Document or the Flex Max331 Multipurpose Line Extender Equipment Manual (P/N 1504129) for complete specifications.

Flex Max331 Dimensions



Opti Max2100 Dimensions

Characteristic	Specification
Uncrated (W x H x D)	12.0 x 8.5 x 3.3 inches (30.5 x 8.3 x 19.1 cm)
Crated (W x H x D)	12.5 x 8.5 x 10 inches (31.8 x 21.6 x 25.4 cm)
Crated weight, approx.	17.72 lbs. (8.04 kg)

Ordering Information

To configure a product that meets your specific needs, or for any questions, please contact your ARRIS Sales Professional. You may also use our Product Wizard, located at support.arrisi.com (User ID and password required). If you do not have a user ID and password or have forgotten your password, please use the Sign In Help section indicated.