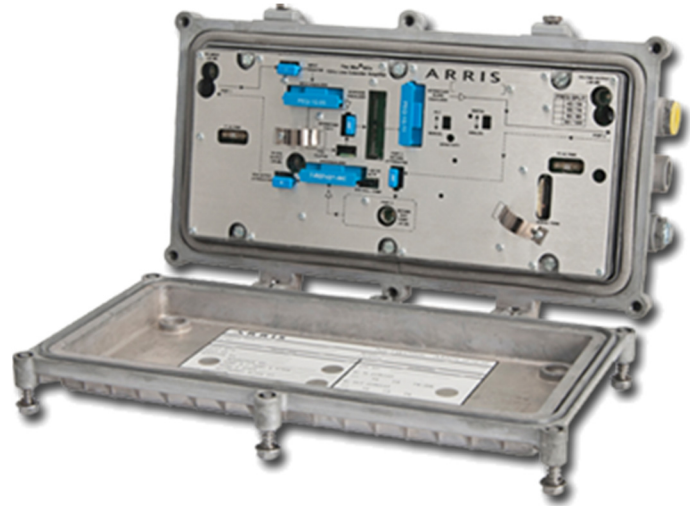


# Flex Max<sup>®</sup> RF Amplifiers

## FM601e-LE 1 GHz Line Extender Amplifiers

### FEATURES

- Simplify plant upgrades with modular RF design
- Maintain current amplifier spacing with high output GaAs technology
- Maintain installed base with RF module support for 9-NH15 and legacy 9-NH housings
- Expand return path bandwidth with plug-in diplex filter support to 85 MHz
- Minimize RF drift over temperature with standard analog or QAM ALC



### PRODUCT OVERVIEW

For cable operators looking to ensure maximum backwards compatibility and scalability and to protect network investments, ARRIS offers solutions that deliver new services with minimal CAPEX, enhance network efficiency, and increase subscriber satisfaction.

ARRIS Flex Max<sup>®</sup> FM601e-LE 1 GHz Line Extender Amplifiers are designed to easily and cost effectively increase bandwidth from 750/870 MHz to 1 GHz in legacy Philips networks. Featuring 1 GHz GaAs technology, the FM601e-LE is available as a complete unit for greenfield deployments or as a drop-in RF module for Philips 9-NH15 and 9-NH series housings. In addition, the FM601e-LE is compatible with 750/870 MHz EQs and Pads, allowing operators to extend or upgrade Philips amplifier networks quickly and easily using common plug-ins. The unit features return input pad location, and auxiliary forward interstage pad location, and customer accessible surge terminator for easy installation and maintenance.



ARRIS also offers a QAM Channel Automatic Level Control (ALC) Pilot Frequency option, which is available with or without a gain hold feature, for Flex Max Amplifiers. An option with the gain hold feature enables an amplifier to adjust output levels to the mid-range automatically if its pilot level drops by 10 dB or more. The ALC Pilot Frequency option allows operators to choose between 609 MHz or 711 MHz pilot frequencies.

PLATFORM COMPATIBILITY		
Platform	Philips Diamond Line III (G3A61X)	FM601-LE
Upgrade to FM601e-LE	Yes*	Yes
*Requires 15A Seizure Pin (PN 0512842-3)		

HOUSING COMPATIBILITY			
Housing	7-NH	9-NH	9-NH15
Upgrade to FM601e	Yes*	Yes*	Yes
*Requires 15A Seizure Pin (PN 0512842-3)			

RELATED PRODUCTS	
FM321e-LE	STARLINE RF Amplifiers
FM901e-T/B	FM331-LE
Installation Services	FM601e-T/B

SPECIFICATIONS – GaAs (ALC)			
Specifications <sup>11</sup>	Units	Forward	Return
Frequency Split	MHz	54 – 1002 85 – 1002	5 – 42 5 – 65
Flatness	dB	± 0.8	± 0.8
Full Gain (without EQ and ALC)	dB	37	19
Operation Gain (-0,+1.0 dB) <sup>1,2</sup>	dB	33	18
ALC Control Range	dB	± 3.0	NA
Noise Figure (without EQ) <sup>3</sup>	dB	10/9.5/9/10	15.5
Standard Slope Reference Frequency	MHz	1002/870/550/54	F <sub>MAXRTN</sub> /5
Reference Output Level <sup>5,6</sup>	dBmV	52/49.5/44/35	35/35
Operating Tilt	dB	17	NA
Carrier to Interference Ratio			
Channels, Number of NTSC <sup>4</sup>		79	6
Composite Triple Beat (CTB)	-dBc	72	80
Cross Modulation (XM)	-dB	66	74
Composite Second Order (CSO)	-dBc	69	82
Carrier to Intermodulation Noise (CIN) <sup>7</sup>	dB	71	—
Channels, Number of 256 QAM <sup>8</sup>		154	—
Carrier to Intermodulation Noise (CIN) <sup>9</sup>	dB	63	—
Test Point Accuracy (-20 dB)	dB		
Input Test Point		± 0.5 (54 – 550), ± 1.0 (551 – 1002)	± 0.75 (5 – F <sub>MAXRTN</sub> )
Output Test Point		± 0.5 (54 – 550), ± 1.0 (551 – 1002)	± 0.5 (5 – F <sub>MAXRTN</sub> )
Return Loss	dB	16	16
Hum Modulation @ 15A	-dBc		
5 – 10 MHz		—	55
11 – F <sub>MAXRTN</sub> MHz		—	65
54 – 1002 MHz		60	—
DC Voltage	VDC		24 ± 0.5
Current DC Max./Typical	mA		965/890
Power Consumption Max./Typical	W		29/24.5
Input Voltage Range	VAC		
90 VAC HFC			45 – 90
HFC AC Current Draw Max./Typical <sup>10</sup>	A		
@ 90 VAC			0.405/.34
@ 60 VAC			.655/.555
AC Bypass Current (all ports)	A		15
Chrominance/Luminance Delay	ns/3.58 MHz		
Channel 2		28	—
Channel 3		12	—
Channel 4		7	—
Channel 5		4	—
Return Group Delay	ns		
5.5 – 7 MHz		—	55
10 – 11.5 MHz		—	10
35 – 36.5 MHz		—	10
38.5 – 40 MHz		—	30

## SPECIFICATIONS – MECHANICAL

Specifications	Units	Forward	Return
Operating Temperature Range	°C °F		-40 to +60 -40 to +140
Housing Dimensions, L x W x D	inches mm		15.5 L x 9.1 W x 5.3 D 394 L x 231 W x 135 D
Weight	lb kg		15.9 7.2

## NOTES:

- Forward spacing at highest frequency with PEQ-1G-xx equalizer installed.
- Return spacing is with a 0 dB attenuator installed in the return EQ location. Return EQ circuitry is built into main PCB. As the attenuator value increases, the return equalization insertion loss at  $F_{MAXRTN}$  MHz also increases.
- The noise figure specification is "Typical" within specified passband.
- Analog channels occupying the 54 to 550 MHz frequency range with 256-QAM channels to 1002 MHz at -6 dBc below equivalent video channels.
- Recommended maximum return output level includes loss due to equalizer.
- At specified operational tilt, maximum equivalent analog output level for 1 GHz loading is 56.5 dBmV @ HF for GaAs.
- Systems operating with digitally compressed channels or equivalent broadband noise from 550 to 1002 MHz at levels 6 dB below equivalent video channels will experience a composite intermodulation distortion (CIN) appearing as noise in the 54 to 550 MHz frequency spectrum.
- 256-QAM channels occupy 54 to 1002 MHz with 3 channels replaced by analog channels for CCNR measurement.
- Systems operating with digitally compressed channels from 54 to 1002 MHz at levels 6 dB below equivalent video channels will experience a composite intermodulation distortion (CIN) appearing as noise relative to any remaining analog channels.
- The power supply is internal to the RF module. Refer to drawing #333995-37.  
For 60 VAC powering: AC power consumption in watts divided by a factor of 43 = Amps required.  
For 90 VAC powering: 67 VAC, 1.03 x (AC power consumption in watts divided by voltage) = Amps required.  
For 67 to 90 VAC, AC power consumption in watts divided by 65 = Amps required.
- Full list of specifications available in document 1507332, FM601e-LE Line Extender Equipment Manual.

## REQUIRED ACCESSORIES

Part Number	Description
PEQ-1G-00 PEQ-1G-XX PCS-1G-XX	One of the following per FM601e Forward 1002 MHz equalizer (0 dB) -or- Forward 1002 MHz equalizer (values 2 to 20 dB in 1 dB steps) -or- Cable simulator (values 2 to 12 dB in 1 dB steps)
7-REFxx/x-WC	Plug-in Return Equalizer (values 1 to 9 dB in 1 dB steps)
10Axx.0-WC	Plug-in Attenuators (values 0 to 26 dB in 1 dB steps)

## OPTIONAL ACCESSORIES

Part Number	Description
0512842-3	FM601/TNA/GNA/DL – 15 Amp Seizure Pin with spacer

**Note:** Specifications are subject to change without notice.

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RF Amplifiers-FM601e-LE

## Customer Care

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