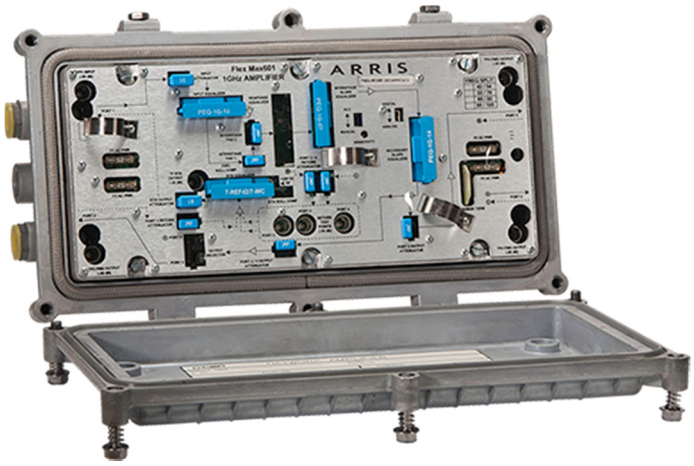
Flex Max® RF Amplifiers

FM601e-T/B

1 GHz Trunk and Bridger Amplifiers

FEATURES

- Simplify plant upgrades with modular RF design
- Improve amplifier reach with optional GaN technology and increased station tilt
- Maintain current amplifier spacing with high output GaAs technology
- 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 protect network investments, ARRIS offers solutions that deliver new services with minimal CAPEX, enhance network efficiency and increase subscriber satisfaction.

ARRIS Flex Max® FM601e-T/B 1 GHz Trunk and Bridger Amplifiers utilize the Philips 9-NH15 style housing base. Featuring 1 GHz GaAs technology, the FM601e-T/B is available as a complete unit for greenfield deployments or as a drop-in RF module for Philips 9-NH series housings. Units include one active high level trunk output and one active high level bridger output configurable to two outputs via an output port distribution accessory. The FM601e-T/B also provides two active high level outputs configurable to three outputs via an output port distribution accessory. Optional GaN (Gallium Nitrite) technology for higher output capability is available on the FM601e Bridger. In addition, the FM601e-T/B is compatible with 750/870 MHz EQs and Pads, allowing operators to extend or upgrade GNA/TNA or G3A/T3A/G4A amplifier networks quickly and easily using common plug-ins.

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 I (T3A)	6-TNA	Philips Diamond Line II (G3A,G4A)	6-GNA	FM601
Upgrade to FM601e	Yes*	Yes*	Yes*	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	

BRIDGER SPECIFICATIONS – GaAs (ALC)

Specifications [15]	Units	Forward	Return
Frequency Split	MHz	54 – 1002 85 –1002 105 –1002[14]	5 – 42 5 – 65 5 – 85
Flatness	dB	± 1.0	± 0.75
Full Gain (without EQ and ALC)	dB	48	19
Operation Gain (-0,+1.0 dB) [1,2]	dB	43	18
ALC Control Range	dB	+3.3/-4.0	NA
Noise Figure (without EQ) [3]	dB	9/9/8/10.8	15.5
Standard Slope Reference Frequency	MHz	1002/870/550/54	$F_{MAXRTN}/5$
Reference Output Level [5,6]	dBmV	52/49.5/44/35	35/35
Operating Tilt	dB	17 ± 1.0	NA
Carrier to Interference Ratio			
Channels, Number of NTSC [4]		79	6
Composite Triple Beat (CTB)	–dBc	75	80
Cross Modulation (XM)	–dB	69	74
Composite Second Order (CSO)	–dBc	73	82
Carrier to Intermodulation Noise (CIN) [8]	dB	63	—
Channels, Number of 256 QAM [9]		154	—
Carrier to Intermodulation Noise (CIN) [10]	dB	63	—
Test Point Accuracy (-20 dB)	dB		
Input, Output Test Point		± 0.5 (54 – 550), ± 1.0 (550 – 1002)	± 0.75 (5 – F_{MAXRTN})
Return Loss [11]	dB	16	16
Hum Modulation @ 15A	-dBc		
5 – 10 MHz		—	55
11 – 750 MHz		65	65
751 – 1002 MHz		60	—
DC Voltage	VDC	24 ± 0.5	
Current DC Max.	mA	1650	
Power Consumption Max.	W	27	
Input Voltage Range	VAC		
90 VAC HFC		45 – 90	
HFC AC Current Draw Max. [13]	A		
@ 90 VAC		0.677	
@ 60 VAC		1.02	
AC Bypass Current (all ports)	A	15	
Chrominance/Luminance Delay	ns/3.58 MHz		
Channel 2		28	—
Channel 3		11	—
Channel 4		7	—
Channel 5		3.6	—
Return Group Delay	ns		
5.5 – 7 MHz		—	55
10 – 11.5 MHz		—	11
35 – 36.5 MHz		—	10
38.5 – 40 MHz		—	30

BRIDGER SPECIFICATIONS – GaN (ALC)

Specifications [15]	Units	Forward	Return
Frequency Split	MHz	54 – 1002 85 –1002 105 –1002[14]	5 – 42 5 – 65 5 – 85
Flatness	dB	± 1.0	± 0.75
Full Gain (without EQ and ALC)	dB	48	19
Operation Gain (-0,+1.5 dB) [1,2]	dB	43	18
ALC Control Range	dB	+3.3/-4.0	NA
Noise Figure (without EQ) [3]	dB	9/9/8/10.8	15.5
Standard Slope Reference Frequency	MHz	1002/870/550/54	$F_{MAXRTN}/5$
Reference Output Level [5,7]	dBmV	56/53.5/48/39	35/35
Operating Tilt	dB	17 ± 1.0	NA
Carrier to Interference Ratio			
Channels, Number of NTSC [4]		79	6
Composite Triple Beat (CTB)	–dBc	73	80
Cross Modulation (XM)	–dB	64	74
Composite Second Order (CSO)	–dBc	72	82
Carrier to Intermodulation Noise (CIN) [8]	dB	56	—
Channels, Number of 256 QAM [9]		154	—
Carrier to Intermodulation Noise (CIN) [10]	dB	56	—
Test Point Accuracy (-20 dB)	dB		
Input, Output Test Point		± 0.5 (54 – 550), ± 1.0 (550 – 1002)	± 0.75 (5 – F_{MAXRTN})
Return Loss [11]	dB	16	16
Hum Modulation @ 15A	-dBc		
5 – 10 MHz		—	55
11 – 750 MHz		65	65
751 – 1002 MHz		60	—
DC Voltage	VDC	24 ± 0.5	
Current DC Max.	mA	1650	
Power Consumption Max.	W	27	
Input Voltage Range	VAC		
90 VAC HFC		45 – 90	
HFC AC Current Draw Max. [13]	A		
@ 90 VAC		0.677	
@ 60 VAC		1.02	
AC Bypass Current (all ports)	A	15	
Chrominance/Luminance Delay	ns/3.58 MHz		
Channel 2		28	—
Channel 3		11	—
Channel 4		7	—
Channel 5		3.6	—
Return Group Delay	ns		
5.5 – 7 MHz		—	55
10 – 11.5 MHz		—	11
35 – 36.5 MHz		—	10
38.5 – 40 MHz		—	30

TRUNK SPECIFICATIONS – GaAs (ALC)

Specifications[15]	Units	Forward		Return
		Trunk	Bridger	
Frequency Split	MHz	54 – 1002 85 –1002 105 –1002[14]		5 – 42 5 – 65 5 – 85
Flatness	dB	± 1.0		± 0.75
Full Gain (without EQ and ALC)	dB	36	45	19
Operation Gain (-0,+1.0 dB) [1,2]	dB	32	41	18
ALC Control Range	dB	+3.3/-4.0		NA
Noise Figure (without EQ) [3]	dB	9/9/8.5/10.5		15.5
Standard Slope Reference Frequency	MHz	1002/870/550/54		$F_{MAXRTN}/5$
Reference Output Level [5,6]	dBmV	40.5/39/34/27	49.5/48/43/36	35/35
Operating Tilt	dB	17 ± 1.0		NA
Carrier to Interference Ratio				
Channels, Number of NTSC [4]		79	79	6
Composite Triple Beat (CTB)	–dBc	81	72	80
Cross Modulation (XM)	–dB	76	67	74
Composite Second Order (CSO)	–dBc	78	73	82
Carrier to Intermodulation Noise (CIN) [8]	dB	79	63	—
Channels, Number of 256 QAM [9]		154	154	—
Carrier to Intermodulation Noise (CIN) [10]	dB	63	63	—
Test Point Accuracy (-20 dB)	dB			
Input, Output Test Point		± 0.5 (54 – 550), ± 1.0 (550 – 1002)		± 0.75 (5 – F_{MAXRTN})
Return Loss [11]	dB	16		16
Hum Modulation @ 15A	-dBc			
5 – 10 MHz		—		55
11 – 750 MHz		65		65
751 – 1002 MHz		60		—
DC Voltage	VDC	24 ± 0.5		
Current DC Max.	mA	1650		
Power Consumption Max.	W	27		
Input Voltage Range	VAC			
90 VAC HFC		45 – 90		
HFC AC Current Draw Max. [13]	A			
@ 90 VAC		0.677		
@ 60 VAC		1.02		
AC Bypass Current (all ports)	A	15		
Chrominance/Luminance Delay	ns/3.58 MHz			
Channel 2		28		—
Channel 3		11		—
Channel 4		7		—
Channel 5		3.6		—
Return Group Delay	ns			
5.5 – 7 MHz		—		55
10 – 11.5 MHz		—		11
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:

1. Forward spacing at highest frequency with PEQ-1G-xx equalizer installed.
2. 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.
3. The noise figure specification is "Typical" within specified passband.
4. Analog channels occupying the 54 to 550 MHz frequency range with 256-QAM channels to 1002 MHz at –6 dBc below equivalent video channels.
5. Recommended maximum return output level includes loss due to equalizer.
6. At specified operational tilt, maximum equivalent analog output level for 1 GHz loading is 56.5 dBmV @ HF for GaAs.
7. At specified operational tilt, maximum equivalent analog output level for 1 GHz loading is 59 dBmV @ HF for GaN.
8. 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.
9. 256-QAM channels occupy 54 to 1002 MHz with 3 channels replaced by analog channels for CCNR measurement.
10. 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.
11. Output return loss may derate to 15 dB above 600 MHz.
12. Test point tolerance is with input attenuator position terminated into 75 Ω.
13. 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.
14. For frequency split 85/105 MHz roll-off from 105 MHz to 102 MHz < 1.0 dB. Group delay from 103.25 MHz to 105.25 MHz is < 22 ns
15. Full list of specifications available in document 1505333, FM601e Bridger Equipment Manual and in document number 1506232, FM601e Trunk 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

Customer Care

Contact Customer Care for product information and sales:

- United States: 866-36-ARRIS
- International: +1-678-473-5656

Note: Specifications are subject to change without notice.

FM601eTB_DS_26OCT16

(rev 10-2016)