

# MBV3 1 GHz Amplifier

STARLINE® SERIES



Motorola's 1 GHz STARLINE® Mini-Bridger® series amplifier, model MBV3\*, leads the industry in features and performance and is designed to meet the needs of today's expanding broadband communication networks. This two-way capable triple output amplifier offers high gain, three balanced high output levels, ergonomics, superior distortion performance, multiple diplex filter options, 16 dB return loss, and Bode equalization. The MBV3 also allows optional advanced features such as ingress control switching and status monitoring. The MBV3 can be used as a direct replacement for the MBE87 amplifier with proper attenuation to create a trunk output.

***The MBV3 Three balanced output amplifier offers 1 GHz bandwidth capability, high gain, high output level, ergonomics, and superior distortion performance.***

## ENHANCED GALLIUM ARSENIDE

The MBV3 uses Enhanced Gallium Arsenide (E-GaAs) hybrids. This second generation technology provides superior distortion performance in CTB and CSO over the standard GaAs technology. Compared to silicon and competing GaAs technology, E-GaAs distortion performance remains linear at significantly higher output levels. This higher output level allows the customer to maximize system performance and reduce system costs. We encourage our customers to contact their Motorola Account Representative to determine the optimal levels for their systems.

## HIGH GAIN

The MBV3 also offers high gain, which allows the operator to hold existing amplifier locations during system upgrades thereby reducing system costs such as maintenance, installation and powering.



## BENEFITS INCLUDE:

- 1003 MHz Enhanced Gallium Arsenide (E-GaAs) power doubling technology
- High gain
- High output level
- Multiple diplex filter options
- N-split (5-85/104-1003 MHz) availability
- Ease-of-use ergonomics
- 16 dB return loss
- 60/90 V powering
- Meets Telcordia GR-1098-Core voltage surge requirements using surge waveforms as described in IEEE C62.41
- FCC, CENELEC and CCC approved
- RoHS compliant
- Standard FTEC transient surge protection included
- Bode equalization (thermal or auto controlled)
- 15 Ampere AC capability
- Optional return path ingress control and status monitor
- Power factor corrected power supply
- Directional coupler -20 dB test points

## **BACKWARD COMPATIBILITY**

The MBV3 electronics package can be made backward compatible with the 10-Amp MB\*/\* housing by installing the MB-15A Kit or the MB-15A Kit II. These kits contain 50 mil gold plated platform assemblies. This makes it possible for the amplifier to carry 15 Amperes continuous through the input or output ports.

## **FORWARD PATH**

The operational gain of the MBV3 is 42 dB, with 16 dB return loss. Output level control is achieved through the use of an interstage Bode equalizer, which compensates for coaxial cable attenuation changes due to temperature. Equalization may be controlled manually, with a thermal drive unit (TDU), or with a single pilot closed loop automatic drive unit, model ADU-\* (analog pilot) or QADU-\* (QAM pilot). Both the ADU and QADU boards are new to the STARLINE family of amplifiers. These new plug-ins are unique to the MBV3 design as a vertical plug-in module. ADUs utilize Surface Acoustic Wave (SAW) filters for determining pilot frequency. This improves amplifier stability over temperature.

To further ensure system flexibility, installation ease and maintenance, the amplifier is engineered for compatibility with standard accessories, such as attenuators, equalizers, return amplifiers, automotive fuses and FTEC crowbar circuits.

The MBV3 uses modular diplex filters, which can be changed for a different frequency split as required. The amplifier is available with S-split filters for a 5-40 MHz return and a 52-1003 MHz forward band. K-splits (5-42 MHz/54-1003 MHz), J-splits (5-55 MHz/70-1003 MHz), A-splits (5-65 MHz/85-1003 MHz), and N-split (5-85 MHz/104-1003 MHz) are also available. These same filters can be used for all US-style Motorola RF distribution amplifiers (models BLE, MB, and BT).

## **RETURN PATH**

High gain return amplifier kits can be ordered which provide 17 dB minimum station gain. Return path equalizers from 0 to 12 dB can be customer selected. Optional features include thermal compensation and ingress control switching. Thermal compensation comes in the form of a plug-in JXP-TH\*C, which stabilizes gain and match over temperature extremes.

Also available is Ingress Control Switching (ICS) in 3 states. This pin diode attenuator circuit can lower levels by 6 dB or by 38 dB with a controlled slew rate for minimum bit errors. The LIFELINE® Mini-Bridger amplifier transponder (available directly from AM Networks) is required to operate the Ingress Control Switch from a remote location.

## **Model Availability**

To reduce customer costs and to accommodate customer specific needs, the STARLINE MBV3 can be ordered in a variety of different models. *Please refer to the MBV3 ordering information below for options.*

## MBV3 Specifications

All specifications stated as worst-case over temperature unless otherwise noted.

### STARLINE® Enhanced Gallium Arsenide 1 GHz 3 port MiniBridger Amplifier

### 3 Balanced Output Minibridger

#### MBV3-100S Specifications

PARAMETER		UNITS	NOTE	FORWARD	RETURN
Passband		MHz	1	52-1003	5-40
Flatness		dB	2	± 0.5	± 0.5
Minimum Full Gain		dB	3	46	NA
Operational Gain		dB	4	42	20
Manual Bode Slope Control Range		dB	5	± 4	NA
Interstage Equalizer Slope		dB	6	14 ±1	NA
Noise Figure 40/52/1003MHz		dB	7	NA / 10 / 10	8 / NA / NA
Test Point (all)		dB	13	20 ±1.0	
Return Loss		dB	14	16	
Hum Modulation		dBc	15,20	60	
DC Voltage		VDC	16	24 ±0.25	
Current DC		mA	17	1900	
DC Ripple		mV		15 p-p	
Power Consumption		W		62	
AC Input Voltage Range		VAC		38 - 90	
AC Current Draw	@90 VAC	A	18	0.64	
	@75 VAC	A		0.8	
	@60 VAC	A		1.0	
	@53 VAC	A		1.13	
	@45 VAC	A		1.35	
	@38 VAC	A		1.65	
AC Bypass Current	All Ports	A	18	15	
Group Delay (max)			19		
55.25 to 59.68 MHz		nSec		32	NA
5.0 to 6.5 MHz		nSec		NA	45
10.0 to 11.5 MHz		nSec		NA	10
33.5 to 35.0 MHz		nSec		NA	12
38.5 to 40.0 MHz		nSec		NA	32
Housing Dimensions				15.4"L x 5.5"W x 9.6"D	39.1cm x 13.97cm x 24.3 cm
Weight				15 Pounds	6.8 kg
Ambient Operating Temperature				-40° to +140° F	-40° to +60° C

## Distortions

<b>NTSC</b>		Units	Bridger out	Trunk out (-9dB)	Notes
	Reference Frequency	MHz	1003/550/52	1003/550/52	8
	Output level	dBmV	45/44/37	36/35/28	
	Channel loading		79 NTSC	79 NTSC	
	Data loading	MHz	450	450	
	CTB	dBc	76.5	86	9,21,23
	CSO	dBc	71	76	10,21
	XM	dB	68.5	78	9,11,21
	CIN	dBc	70	70	12

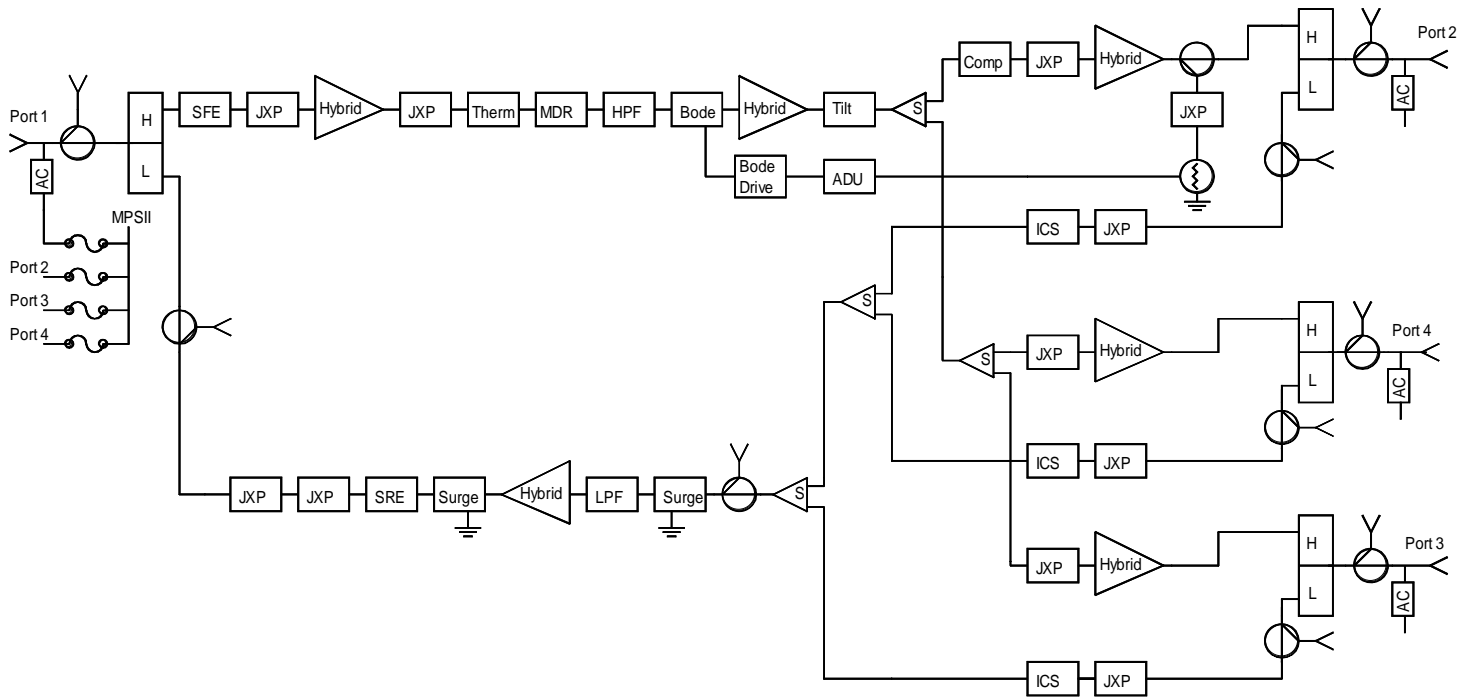
<b>PAL-B/G</b>			Bridger out	Trunk out (-9dB)	
	Reference Frequency	MHz	1003/599/48	1003/599/48	8
	Output level	dBmV	45/45/37	36/36/28	
	Channel loading		65 B/G	65 B/G	
	Data loading	MHz	400 MHz	400 MHz	
	CTB	dBc	76.5	86.5	9,21,23
	CSO	dBc	71	76	10,21
	XM	dB	68.5	78.5	9,11,21
	CIN	dBc	65	70	12

<b>PAL-D/K</b>			Bridger out	Trunk out (-9dB)	
	Reference Frequency	MHz	1003/599/112	1003/599/112	8
	Output level	dBmV	45/45/38	36/36/29	
	Channel loading		61 D/K	61 D/K	
	Data loading	MHz	400 MHz	400 MHz	
	CTB	dBc	76.5	86.5	9,21,23
	CSO	dBc	71	76	10,21
	XM	dB	68.5	78.5	9,11,21
	CIN	dBc	65	70	12

**Specification Notes:**

1. Operating passband of station. Duplex filters are plugged into the electronic chassis.
2. Referenced to the average gain across the stated passband.
3. Minimum full gain at 1003 MHz includes loss of equalizer but Bode slope reserves have not been set. Return gain includes loss of SRE-4 return equalizer.
4. Operational gain includes loss of slope reserves as well as equalizer.
5. Amount of Bode slope control range from midpoint (typical setting is -4 dB at 1003 MHz @ 20°C). This control should not be used for gain reduction.
6. Amount of slope created and cable equivalence of fixed interstage equalizer. Interstage equalizer is a plug-in.
7. Noise Figure is specified at the cable entry facility of the housing and includes the loss of 1 dB for the pre-stage equalizer. The return Noise Figure includes the station loss preceding the RF hybrid.
8. Frequencies that relate the picture carriers or passband edges to the specified output levels and tilts.
9. Measured with CW carriers and spectrum analyzer over specified temperature range. References the worst-case channel. Specifications are compliant with the test methods as stated in NCTA RECOMMENDED PRACTICES FOR MEASUREMENTS ON CABLE TELEVISION SYSTEMS.
10. Measured with wave analyzer and synchronous, 100% depth modulated channels. References the worst-case channels over specified temperature range. Specifications are compliant with the test methods as stated in NCTA RECOMMENDED PRACTICES FOR MEASUREMENTS ON CABLE TELEVISION SYSTEMS.
11. Composite Second Order distortion refers only to those beat clusters that fall +0.75 MHz and +1.25 MHz above the subject picture carrier. CSO beat clusters that have a -0.75 MHz and -1.25 MHz relationship to the subject picture carrier are not included in this specification.
12. Carrier / Composite Intermodulation Noise Ratio
13. Test points should be used with GFAL adaptor.
14. Match measurement at the station input and output, cable-entry facilities, at the specified passbands for operational gain.
15. Measured with the stated AC Bypass Current.
16. Measured at the power connector.
17. Current draw at +24.0 VDC.
18. AC current is stated in RMS continuous.
19. Group Delay is specified for standard NTSC video, where delay is the delta from picture carrier to 3.58 MHz color subcarrier. Reverse delay is in a 1.5 MHz bandwidth.
20. Distortion numbers are worst case over temperature in a cascade.
21. The compressed data loading is QAM carriers and are -6 dB relative to the analog CW carriers.
22. Note placeholder
23. CTB (Composite Triple Beat). At the specified channel loading, Enhanced Gallium Arsenide performance varies on a two point three-for-one (2.3:1) basis with amplifier output level.

## MBV3 Block Diagram

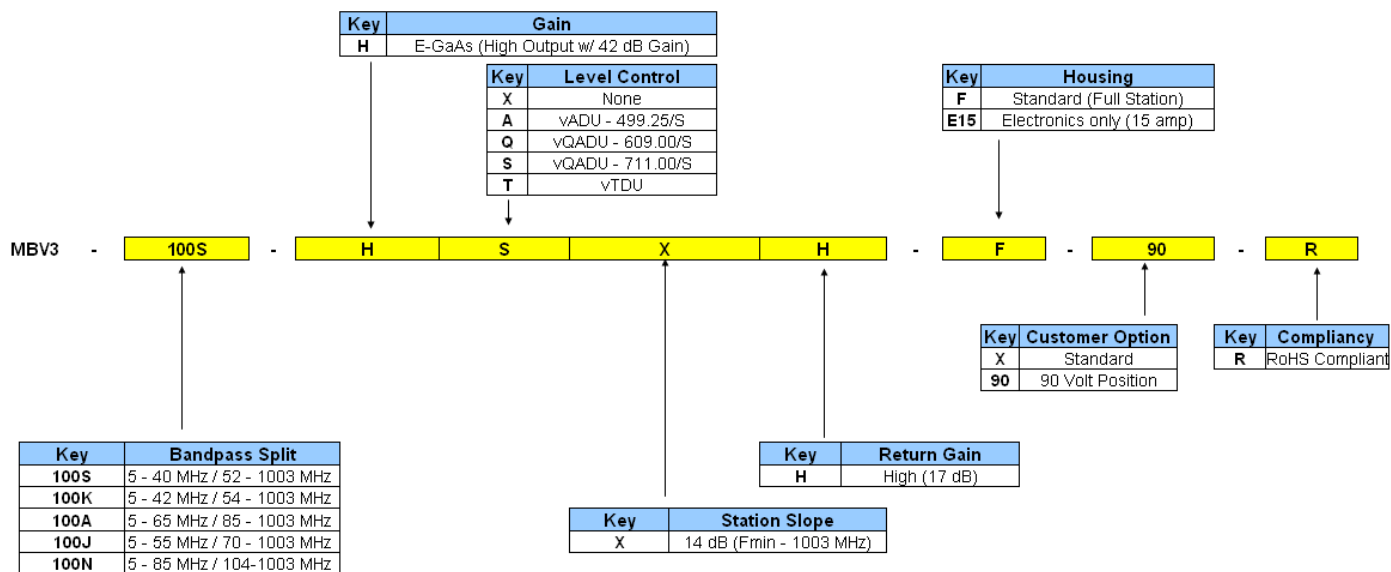


## MBV3 Ordering Information

Part Number	Model	Description
831000-001-00	MBV3-100K-HXXH-F-90-R	Starline ergonomic 1 GHz MB with 5-42 / 54-1003 MHz K-split, 3-output, 42 dB operational gain, manual gain control, 14 dB internal slope, high gain return, 20A fuses, FTEC surge protector, full station - 90 Volt configured - RoHS Compliant
831000-002-00	MBV3-100S-HSXXH-F-X-R	Starline ergonomic 1 GHz MB with 5-40 / 52-1003 MHz S-split, 3-output, 42 dB operational gain, QAM ADU 711 MHz gain control, 14 dB internal slope, high gain return, 20A fuses, FTEC surge protector, full station - RoHS Compliant
831000-003-00	MBV3-100K-HXXH-F-X-R	Starline ergonomic 1 GHz MB with 5-42 / 54-1003 MHz K-split, 3-output, 42 dB operational gain, manual gain control, 14 dB internal slope, high gain return, 20A fuses, FTEC surge protector, full station - RoHS Compliant
831000-004-00	MBV3-100A-HXXH-F-X-R	Starline ergonomic 1 GHz MB with 5-65 / 85-1003 MHz A-split, 3-output, 42 dB operational gain, manual gain control, 14 dB internal slope, high gain return, 20A fuses, FTEC surge protector, full station - RoHS Compliant
831000-005-00	MBV3-100A-HXXH-E15-X-R	Starline ergonomic 1 GHz MB with 5-65 / 85-1003 MHz A-split, 3-output, 42 dB operational gain, manual gain control, 14 dB internal slope, high gain return, 20A fuses, FTEC surge protector, 15A electronics module only (no housing) - RoHS Compliant
831000-006-00	MBV3-100N-HXXH-F-X-R	Starline ergonomic 1 GHz MB with 5-85 / 104-1003 MHz N-split, 3-output, 42 dB operational gain, manual gain control, 14 dB internal slope, high gain return, 20A fuses, FTEC surge protector, full station - RoHS Compliant
831000-007-00	MBV3-100N-HXXH-E15-X-R	Starline ergonomic 1 GHz MB with 5-85 / 104-1003 MHz N-split, 3-output, 42 dB operational gain, manual gain control, 14 dB internal slope, high gain return, 20A fuses, FTEC surge protector, 15A electronics module only (no housing) - RoHS Compliant
831000-008-00	MBV3-100S-HXXH-F-90-R	Starline ergonomic 1 GHz MB with 5-40 / 52-1003 MHz S-split, 3-output, 42 dB operational gain, manual gain control, 14 dB internal slope, high gain return, 20A fuses, FTEC surge protector, full station - 90 Volt configured - RoHS Compliant
831000-009-00	MBV3-100S-HAXH-F-90-R	Starline ergonomic 1 GHz MB with 5-40 / 52-1003 MHz S-split, 3-output, 42 dB operational gain, ADU 499.25 MHz gain control, 14 dB internal slope, high gain return, 20A fuses, FTEC surge protector, full station - 90 Volt configured - RoHS Compliant
831000-010-00	MBV3-100K-HAXH-F-90-R	Starline ergonomic 1 GHz MB with 5-42 / 54-1003 MHz K-split, 3-output, 42 dB operational gain, ADU 499.25 MHz gain control, 14 dB internal slope, high gain return, 20A fuses, FTEC surge protector, full station - 90 Volt configured - RoHS Compliant
831000-011-00	MBV3-100S-HSXXH-F-90-R	Starline ergonomic 1 GHz MB with 5-40 / 52-1003 MHz S-split, 3-output, 42 dB operational gain, QAM ADU 711 MHz gain control, 14 dB internal slope, high gain return, 20A fuses, FTEC surge protector, full station - 90 Volt configured - RoHS Compliant
831000-012-00	MBV3-100K-HSXXH-F-90-R	Starline ergonomic 1 GHz MB with 5-42 / 54-1003 MHz K-split, 3-output, 42 dB operational gain, QAM ADU 711 MHz gain control, 14 dB internal slope, high gain return, 20A fuses, FTEC surge protector, full station - 90 Volt configured - RoHS Compliant
535723-001	SFE-100-0-R	Starline Forward 1003 MHz equalizer (0 dB) -or-

531124-001 to -022	SFE-100-1-R to -22-R	Starline Forward 1003 MHz equalizer (values 1 to 22 dB in 1 dB steps) -or-
531161-001 to -010	SCS-1-R to SCS-10-R	Starline Cable Simulator (values 1 to 10 dB in 1 dB steps)
531163-XXX-00	SRE-*-R	Starline Return Equalizer, 5-40 MHz (S-split), 5-42 (K-split), 5-55 (J-split), 5-65 (A-split), values 0-12 dB in 1 dB steps for S-split (2 dB steps for all other frequency splits)
531186-XXX-00	JXP-*B-R	Plug-in attenuator/pad (values 0 to 26 dB, in 1 dB steps)
535723-001	SFE-100-0-R	Starline Forward 1003 MHz equalizer (0 dB) -or-
558958-001-00	QADU-609/V-R	QADU-609.00S/V-R,MBV3 VERTICAL AUTOMATIC DRIVE UNIT WHICH USES QAM CHANNEL AS PILOT SIGNAL. SAW FILTER DESIGN, CONFIGURABLE OPTION, 609 MHZ FREQUENCY - ROHS COMPLIANT FINISHED GOOD
558958-002-00	QADU-711/V-R	QADU-711.00S/V-R,MBV3 VERTICAL AUTOMATIC DRIVE UNIT WHICH USES QAM CHANNEL AS PILOT SIGNAL. SAW FILTER DESIGN, CONFIGURABLE OPTION, 711 MHZ FREQUENCY - ROHS COMPLIANT FINISHED GOOD
558958-003-00	ADU-499.25/V-R	ADU-499.25S/V-R,MBV3 VERTICAL AUTOMATIC DRIVE UNIT WHICH USES ANALOG CHANNEL AS PILOT SIGNAL. SAW FILTER DESIGN, CONFIGURABLE OPTION, 499.25 MHZ FREQUENCY - ROHS COMPLIANT FINISHED GOOD

## Ordering guide/matrix.



### Notes:

- 1) Not all combinations in the model guide are available. This is a guide only. Please see list of available models in Customer Print Sheet.
- 2) FTECs are included in all models as standard.
- 3) 20A fuses are included in all amplifiers as standard.
- 4) ICS and status monitor transponders will be available as an accessory option.