Introduction

An amplifier is an electronic device used to increase the magnitude of voltage/current/power of an input signal. It accepts a weak signal at the input terminal and produces an amplified signal at the output, though the output signal is identical to the input signal. The amount of amplification performed by the amplifier is determined by a factor known as gain of the amplifier.

There are many forms of amplifiers, from Operational Amplifiers and Small Signal Amplifiers up to Large Signal and Power Amplifiers. The classification of an amplifier depends upon the size of the signal, large or small, its physical configuration and how it processes the input signal, that is the relationship between input signal and current flowing in the load.

There are several types of signal amplifiers, each capable of conditioning different signal types. Here is a list of some common signal amplifiers found in today's industrial use:

- Differential amplifiers
- RF amplifiers
- DC Voltage amplifiers
- High Voltage Amplifiers
- High Frequency amplifiers

Choice of the amplifier depends on the specific application requirements, including frequency range, gain, power output, and noise performance.

Differential Amplifiers: Differential amplifiers amplify the difference between two input signals, while rejecting any common-mode signals. They are commonly used in applications that require high common-mode rejection, such as instrumentation and communication systems.

Radio Frequency (RF) Amplifiers: RF amplifiers are specifically designed to amplify radio frequency signals used in wireless communication, broadcasting, radar systems, and other RF applications. They operate in the RF frequency range and often have specific characteristics tailored to the intended application.

DC Power Amplifiers: DC power amplifiers are used to amplify the power of a PWM (Pulse Width Modulated) signals. They are used in electronic control systems which need high power signals to drive motors or actuators. They take input from microcontroller systems, increase their power, and feed the amplified signal to DC motors or Actuators.

High-Voltage amplifier: High voltage amplifiers amplify low voltage electrical signals to high voltage levels. High voltage amplifiers are commonly used in scientific experiments and laboratory setups such as particle accelerators, mass spectrometers, and nuclear and plasma research, laser systems and in Automotive and Medical industry where high voltage is required to stimulate actuators, MEMS Sensors, ferroelectric and piezoelectric device.

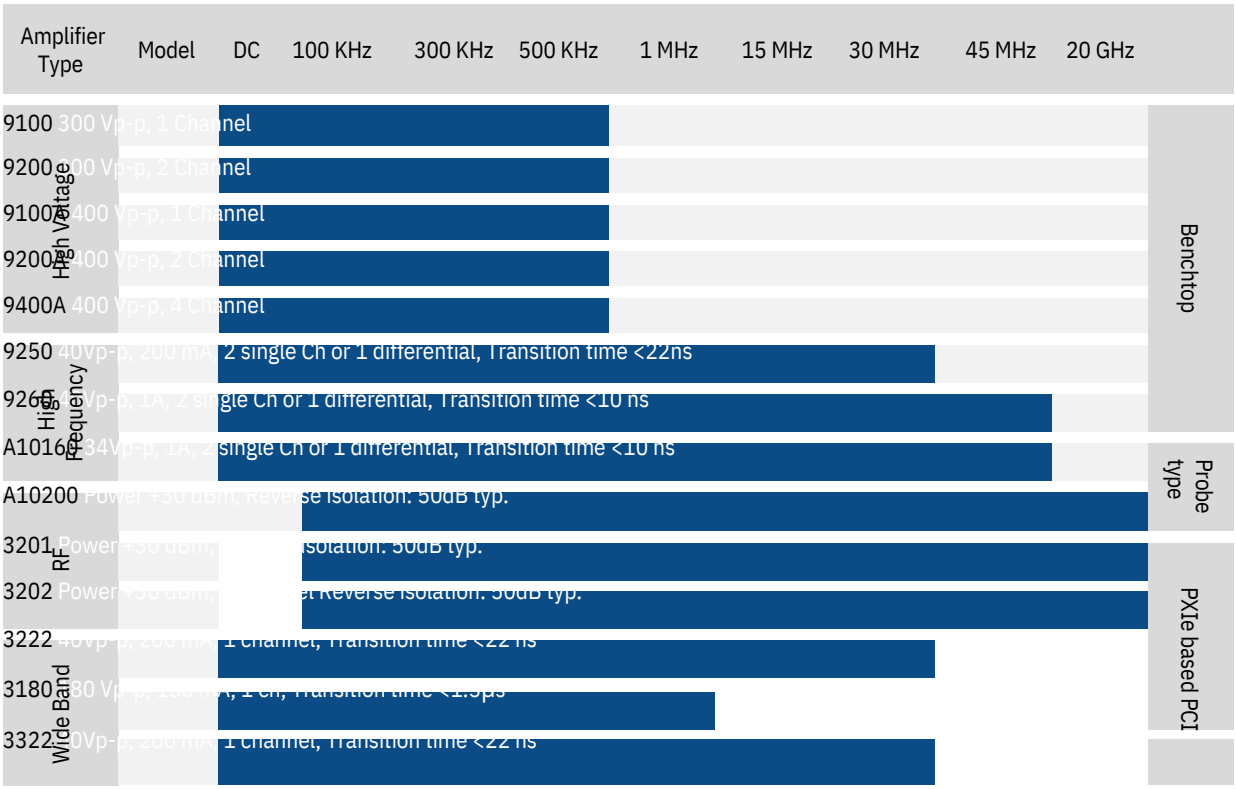
High-frequency amplifier: High-frequency amplifiers are designed to amplify signals at high frequencies, typically in the radio frequency (RF) and microwave range. These amplifiers play a crucial role in various applications, including wireless communication systems, radar systems, satellite communications, and other high-frequency electronic circuits.

Selecting Amplifier

Signal Amplifiers are crucial in applications where high voltage throughput as well as complex signals are needed. Such combination is rare and costly in high performance instrument, therefore external amplification devices must be used to achieve this task. The Tabor amplifiers are designed to operate in conjunction with any waveform generators thus providing the ultimate solution for High voltage, High power wideband applications.

Tabor offers wide selection of Amplifiers categorizing as High Voltage Amplifiers, High Frequency Amplifiers and RF Amplifiers. From Basic to Advance, each amplifier delivers benchmark performance in its class to address the signal amplification requirements in R&D, design and manufacture of RF transceivers and their components; and applications ranging from amplification of low-frequency navigation signals, through cellular mobile radio, radar, satellite systems to automotive and medical use.

Frequency and voltage coverage for Tabor Amplifiers



When choosing a waveform amplifier these criteria of the signal amplifier's performance must be considered:

- Output voltage/power
- Input & Output Impedance,
- Gain, Bandwidth (BW),
- Slew Rate (SR),
- Total Harmonic Distortion (THD)
- Load

This guide provides an overview and side-by-side comparisons to help you determine which Amplifier is right for you. It is intended to supplement online selection tools available at https://www.taborelec.com/Signal-Amplifiers .

Key Specifications Comparison - High Voltage Amplifiers

MODEL NUMBER	9100|9200	9100A|9200A	9400
PRODUCT IMAGE			
TYPE	High Frequency, High current, low distortion signal Amplifier	General Purpose, Wide band High Voltage Amplifier	
COMPATIBLE WITH	Waveform Generator or Pulse Generator from Any make - Tabor, Keysight, Tektronix, Rohde & Schwarz, GwInstek, Rigol, Siglent , B K Precision etc.		
CHANNEL	1 Ch | 2 Ch	1 Ch | 2 Ch	4 Ch
LARGE SIGNAL BANDWIDTH	DC to >500kHz	DC to >500kHz	DC to >500kHz
SMALL SIGNAL BANDWIDTH	1.5 MHZ	1.5 MHZ	1.5 MHZ
VOLTAGE OUTPUT	300Vp-p	400Vp-p	400Vp-p
OUTPUT CURRENT	150mA|100 mA	125mA|100mA	50mA
TRANSITION TIME	< 1.5µs	< 1µs	< 1µs
POWER	60W	120W	120W
SLEW RATE	200V/µs	400V/µs	400V/µs
INPUT IMPEDANCE	1MΩ, DC coupled	1MΩ	1MΩ
OUTPUT IMPEDANCE	0.1Ω, DC coupled	0.1Ω	0.1Ω
GAIN	X15 fixed (optional X10 or X20) upon request)	X50 fixed (custom gain upon request)	X50 fixed (custom gain upon request)
FORM FACTOR	Bench top	Bench top	Bench top
FEATURES	Custom configuration: Special Unipolar Mode for MEMS engine drivers	- Gain for MEMS engine - Signal ground drivers (9200A)	Special Unipolar Mode for
WARRANTY	3 years standard warranty		
COMMON APPLICATIONS	- Control & Automation: Generate MEMS control signals, Piezo and Ferroelectric transducer discs, Micro comb-array actuators - Education & Research: Generating Oscillating electric fields, Nuclear and Plasma research - Automotive & Transport: Underwater Sonar transducers, Engine control unit simulations, special Unipolar Mode for MEMS engine drivers. - Industrial & Power: Three phase power simulations		
USER INDUSTRY	Educational Universities and Colleges, Research organization, Healthcare Equipment Manufacturers, Defense, Automotive, Aerospace, Power Industry, Electronics Manufacturers etc		

Key Specifications Comparison - High Frequency Amplifiers

MODEL NUMBER	9250	9260	10160
PRODUCT IMAGE			
TYPE	General Purpose, Wide band High Voltage Amplifier	General Purpose, Wide band High Voltage Amplifier	High Frequency Amplifier, High Current
COMPATIBLE WITH	Waveform Generator or Pulse Generator from Any make - Tabor, Keysight, Tektronix, Rohde & Schwarz, GwInstek, Rigol, Siglent , B K Precision etc.		
CHANNEL	2 single Ch or 1 differential	2 single Ch or 1 differential	1 Ch
LARGE SIGNAL BANDWIDTH	DC to 15MHz	DC to 30MHz	DC to >500kHz
SMALL SIGNAL BANDWIDTH	30 MHz	45 MHz	1.5 MHZ
VOLTAGE OUTPUT	40Vp-p	34Vp-p into 50Ω	400Vp-p
OUTPUT CURRENT	200mA	1A	50mA
TRANSITION TIME	< 22ns	<10ns	< 1µs
POWER	25W	25W	120W
SLEW RATE	500V/µs	400V/µs	
INPUT IMPEDANCE	50Ω/ 75Ω/ 1MΩ	50Ω/ 75Ω/ 1MΩ	1MΩ
OUTPUT IMPEDANCE	50Ω/ 75Ω/ 600Ω	2.5Ω/ 50Ω/ 75Ω	0.1Ω
GAIN	10X fixed (or Custom) upon request)	10X (or Custom)	X50 fixed (custom gain
FORM FACTOR	Bench top	Bench top	Small Footprint
FEATURES	Custom configuration: - Gain - Input Impedance - Output Impedance - Output configuration	Custom configuration: - Gain - Input Impedance - Output configuration	Custom configuration: - Gain
WARRANTY	3 years standard warranty		
COMMON APPLICATIONS	- Education & Research - Automotive & Transport Engine control unit simulations Railway test system - Serial testing & Digital Design: Test MilBus- Network characteristics Manchester coding - Industrial & Power: Three phase power simulations Magnetic transducer testing		
USER INDUSTRY	Educational Universities and Colleges, Research organization, Healthcare Equipment Manufacturers, Defense, Automotive, Aerospace, Power Industry, Electronics Manufacturers etc		

Key Specifications Comparison - RF Amplifier

PARAMETERS	A10120	3201	3202
PRODUCT IMAGE			
TYPE	PXIe based, High frequency, High Power Amplifier	PXIe based, High frequency, High Power Amplifier	PXIe based, High frequency, High Power Amplifier
COMPATIBLE WITH	Signal Source of any make: Tabor, Keysight, R&S, Rigol, Siglent etc.	Compatible with PXI chassis from Tabor, Keysight, NI (National Instrument)	
CHANNEL	1	1	2
FREQUENCY	100 KHz to 20 GHZ	100 kHz to 20GHz	100 kHz to 20GHz
RF CONNECTOR	RF connector 2.92 mm (K)	RF connector 2.92 mm (K)	RF connector 2.92 mm (K)
POWER	+30 dBm into 50Ω	+30 dBm into 50Ω	+30 dBm into 50Ω
NOISE FIGURE	9 dB	10dB	10dB
REVERSE ISOLATION	50dB typ. (40 dB Min)	50dB typ. (35dB Min.)	50dB typ. (35dB Min.)
INPUT RETURN LOSS	14 dB typ (11dB min)	14dB typ. (9dB Min.)	14dB typ. (9dB Min.)
OUTPUT RETURN LOSS	12 dB typ (8dB min)	12dB typ. (6dB Min.)	12dB typ. (6dB Min.)
INPUT IMPEDANCE	P1dB: 27dBm	P1dB: 26dBm	P1dB: 26dBm
RF INPUT POWER	27dBm max	20dBm Max.	10dBm Max.
GAIN	Gain in dB: (typ) 100kHz to 100MHz: 12 100MHz to 3GHz:12.5 3GHz to 9GHz: 10 9GHz to 20GHz: 8	Gain in dB: (typ) 100kHz to 100MHz: 12 100MHz to 3GHz:12.5 3GHz to 9GHz: 10 9GHz to 20GHz: 8 Cascaded Channels of TE3202 Gain in dB: (typ) 100kHz to 100MHz: 12 100MHz to 3GHz:12.5 3GHz to 9GHz: 10 9GHz to 20GHz: 8	Gain in dB: (typ) 100kHz to 100MHz: 12 100MHz to 3GHz:12.5 3GHz to 9GHz: 10 9GHz to 20GHz: 8
FORM FACTOR	Small footprint Modular PXIe based	Modular PXIe based	
FEATURES	Reverse polarity protection; over voltage, under voltage, over current and open-shot load protection	Reverse Polarity, Over Voltage, Under Voltage, Over Current, and Short Load	Over Reverse Polarity, Voltage, Under Voltage, Over Current, and Open-Short Load
APPLICATIONS	Receiver testing, multi-tone testing, general electronics, and scientific application		
USER INDUSTRY	Receiver testing & multi-tone testing in Wireless communication, General Electronics, Aerospace and Defense, Educational Universities and Colleges, Research organization etc.		

Key Specifications Comparison - PCI PXI Amplifier

PARAMETERS	3222	3322	3180
PRODUCT IMAGE			
TYPE	PXI Bus, low distortion wide band Amplifier	PCI Bus, low distortion wide band Amplifier	PXI Bus, Wide band Amplifier
COMPATIBLE WITH	Compatible with PCI PXI chassis from Tabor, Keysight, NI (National Instrument)		
CHANNEL	1 single-ended output	1 single-ended output	1 single-ended output
LARGE SIGNAL BANDWIDTH	DC to 15 MHz	DC to 15 MHz	DC to 300kHz
SMALL SIGNAL BANDWIDTH	30 MHZ	30 MHZ	1MHz
VOLTAGE OUTPUT	40 Vp-p into high impedance	40 Vp-p into high impedance	180Vp-p
OUTPUT CURRENT	200mA into 50Ω	200mA into 50Ω	150mA
TRANSITION TIME	<22ns	<22ns	<1.5µs
POWER	7.2W max.	7.2W max.	11W max.
SLEW RATE	500V/µs	500V/µs	120V/µs
INPUT IMPEDANCE	50Ω or 1MΩ	50Ω or 1MΩ	50Ω
OUTPUT IMPEDANCE	50Ω, 75Ω, or 600Ω	50Ω, 75Ω, or 600Ω	0.1Ω
GAIN	x10, fixed	x10, fixed	x20, fixed
FEATURES	Custom Configuration of: Gain Output impedance Output configuration	Custom Configuration of: Gain Input impedance Output impedance Output configuration	Custom Configuration of: Gain Input impedance x10, x15, x20, x25, x50 *custom gain can be ordered
APPLICATIONS	- Control & Automation: Generate MEMS control signals, Piezo transducer discs, Micro – comb – array actuators - Defense and Aviation Industry: Higher voltage levels are required to route signals throughout the aircraft body. - Automotive Industry: Engine control unit simulations where signals need to be in the 12V to 28V range.		
USER INDUSTRY	Educational Universities and Colleges, Research organization, Healthcare Equipment Manufacturers, Aviation, Defense, Automotive, Aerospace, Electronics Manufacturers etc		

For more detailed specifications, kindly refer to the product datasheet.

This guide provides an overview and side-by-side comparisons to help you determine which Amplifier is right for you. It is intended to supplement online selection tools available at https://www.taborelec.com/Signal-Amplifiers .
Note: PCI/PXIe amplifiers are not sold through online distributors.