



## 7810 Series

### High-Power, High-Precision AC/DC Linear Power Amplifiers

#### Features

- Stable when driving a wide range of resistive, inductive or capacitive loads
- Four-quadrant operation (source and sink)
- Field-selectable controlled-voltage or controlled-current modes of operation
- Protection circuitry protects the amplifier from input overloads, improper output connection (including shorted and improper loads), over-temperature, over-current, and supply voltages that are too high or low

AE Techron's **7810 Series** AC power amplifiers are durable, four-quadrant, DC-enabled, low-noise, wide-bandwidth amplifiers. This combination of features and capabilities makes them a great choice for a large number of research and industrial applications. 7810 series amplifiers are a great solution if bandwidth and/or system noise is a problem. They are able to drive low-impedance loads at frequencies of up to 60kHz. Because they utilize a linear circuit topology, AE Techron 7810 series amplifiers have no switching noise in their output and very low radiated EMI. This results in THD and noise floors that are much lower than what is possible with traditional switch mode amplifiers, making them ideal for applications that require either high precision or, because of sensitive measurements, cannot tolerate the radiated noise associated with switch mode amplifiers.

7810 series amplifiers are tough, both physically and electrically. 7810 series models have been used for conducting experiments on a Navy warship, controlling a magnetic field in a fusion experiment, and driving DUTs while absorbing back EMF when there is a failure.

The 7810 series is designed and built for applications where large surge currents or long duration power is needed. This makes them ideal for applications where power or duty cycle requirements are greater than is possible with consumer- or pro-audio-grade amplifiers. Because power ratings are continuous, AE Techron

#### Key Performance Capabilities:

|               |                                                                         |
|---------------|-------------------------------------------------------------------------|
| Output Power: | Up to 10 kVA continuous, 20 kVA short-term                              |
| Current:      | Up to 200A continuous, 400A short-term                                  |
| Voltage:      | Up to $\pm 350$ Vp                                                      |
| Bandwidth:    | DC to 60 kHz, $\pm 3$ dB                                                |
| Slew Rate:    | 40 V/ $\mu$ s                                                           |
| THD:          | Less than 0.25% (DC to 20 kHz)                                          |
| DC Drift:     | Less than $\pm 400$ $\mu$ V (from room temperature to thermal shutdown) |

amplifiers often produce between 4 and 8 times more power than a similarly rated consumer amplifier.

The 7810 Series consists of three amplifier models: 7810-50-200, 7810-100-100 and 7810-200-50.s Each model has been optimized for specific load impedances, from 0.1 ohm to 8 ohms. Customized versions can be ordered with special amplifier configurations and/or with extra rack space to install additional equipment. Contact us today; let us see if we can create a custom configuration specifically to meet your needs.

### 7810-50-200 AC Output

| Ohms   | PEAK OUTPUT                      |      |                               |      |                            |      | RMS OUTPUT                    |      |                            |      |       |
|--------|----------------------------------|------|-------------------------------|------|----------------------------|------|-------------------------------|------|----------------------------|------|-------|
|        | 40 mSec Pulse,<br>20% Duty Cycle |      | 5 Minutes,<br>100% Duty Cycle |      | 1 Hour,<br>100% Duty Cycle |      | 5 Minutes,<br>100% Duty Cycle |      | 1 Hour,<br>100% Duty Cycle |      |       |
|        | Volts                            | Amps | Volts                         | Amps | Volts                      | Amps | Volts                         | Amps | Volts                      | Amps | Watts |
| 4      | 98                               | 26   | 98                            | 26   | 97                         | 26   | 69                            | 18   | 69                         | 18   | 1242  |
| 2      | 95                               | 46   | 95                            | 46   | 95                         | 46   | 66                            | 32   | 66                         | 32   | 2112  |
| 1      | 88                               | 88   | 88                            | 88   | 88                         | 88   | 60                            | 60   | 60                         | 60   | 3600  |
| 0.5    | 81                               | 162  | 81                            | 162  | 81                         | 162  | 56                            | 112  | 56                         | 112  | 6272  |
| 0.25   | 72                               | 288  | 72                            | 288  | 72                         | 288  | 50                            | 200  | 50                         | 200  | 10000 |
| 0.125  | 50                               | 420  | 32                            | 268  | 32                         | 268  | 23                            | 182  | 23                         | 182  | 4186  |
| 0.0625 | 23                               | 394  | 23                            | 388  | 23                         | 382  | 16                            | 266  | 16                         | 260  | 4160  |

Note: Testing performed into resistive loads as specified. Performance reported is typical into the specified load up to 20 kHz frequency levels. Performance may be affected when operating into highly reactive loads or above 20 kHz, reducing maximum voltage, current and power output.

### 7810-100-100 AC Output

| Ohms | PEAK OUTPUT                      |      |                               |      |                            |      | RMS OUTPUT                    |      |                            |      |       |
|------|----------------------------------|------|-------------------------------|------|----------------------------|------|-------------------------------|------|----------------------------|------|-------|
|      | 40 mSec Pulse,<br>20% Duty Cycle |      | 5 Minutes,<br>100% Duty Cycle |      | 1 Hour,<br>100% Duty Cycle |      | 5 Minutes,<br>100% Duty Cycle |      | 1 Hour,<br>100% Duty Cycle |      |       |
|      | Volts                            | Amps | Volts                         | Amps | Volts                      | Amps | Volts                         | Amps | Volts                      | Amps | Watts |
| open | 181                              | 0    | 181                           | 0    | 181                        | 0    | 128                           | 0    | 128                        | 0    | 0     |
| 8    | 159                              | 24   | 159                           | 20   | 159                        | 20   | 112                           | 14   | 112                        | 14   | 1568  |
| 4    | 159                              | 38   | 154                           | 38   | 154                        | 38   | 109                           | 26   | 109                        | 26   | 2834  |
| 2    | 158                              | 78   | 152                           | 76   | 152                        | 76   | 107                           | 54   | 107                        | 54   | 5778  |
| 1    | 157                              | 158  | *                             | *    | 141                        | 142  | *                             | *    | 100                        | 100  | 10000 |
| 0.75 | 148                              | 198  | *                             | *    | 71                         | 142  | *                             | *    | 50                         | 100  | 5000  |
| 0.5  | 140                              | 280  | *                             | *    | 71                         | 142  | *                             | *    | 50                         | 100  | 5000  |
| 0.25 | 106                              | 418  | *                             | *    | 63                         | 254  | *                             | *    | 45                         | 180  | 8100  |

\* Testing not performed.

Note: Testing performed into resistive loads as specified. Performance reported is typical into the specified load up to 20 kHz frequency levels. Performance may be affected when operating into highly reactive loads or above 20 kHz, reducing maximum voltage, current and power output.

### 7810-200-50 AC Output

| Ohms | PEAK OUTPUT                      |      |                               |      |                            |      | RMS OUTPUT                    |      |                            |      |       |
|------|----------------------------------|------|-------------------------------|------|----------------------------|------|-------------------------------|------|----------------------------|------|-------|
|      | 40 mSec Pulse,<br>20% Duty Cycle |      | 5 Minutes,<br>100% Duty Cycle |      | 1 Hour,<br>100% Duty Cycle |      | 5 Minutes,<br>100% Duty Cycle |      | 1 Hour,<br>100% Duty Cycle |      |       |
|      | Volts                            | Amps | Volts                         | Amps | Volts                      | Amps | Volts                         | Amps | Volts                      | Amps | Watts |
| open | 362                              | 0    | 362                           | 0    | 362                        | 0    | 256                           | 0    | 256                        | 0    | 0     |
| 32   | 318                              | 12   | 318                           | 10   | 318                        | 10   | 224                           | 7    | 224                        | 7    | 1568  |
| 16   | 318                              | 19   | 308                           | 19   | 308                        | 19   | 218                           | 13   | 218                        | 13   | 2834  |
| 8    | 316                              | 39   | 304                           | 38   | 304                        | 38   | 214                           | 27   | 214                        | 27   | 5778  |
| 4    | 314                              | 79   | *                             | *    | 282                        | 71   | *                             | *    | 200                        | 50   | 10000 |
| 3    | 296                              | 99   | *                             | *    | *                          | *    | *                             | *    | *                          | *    | *     |
| 2    | 280                              | 140  | *                             | *    | 142                        | 71   | *                             | *    | 100                        | 50   | 5000  |
| 1    | 212                              | 209  | *                             | *    | 126                        | 127  | *                             | *    | 90                         | 90   | 8100  |

\* Testing not performed.

Note: Testing performed into resistive loads as specified. Performance reported is typical into the specified load up to 20 kHz frequency levels. Performance may be affected when operating into highly reactive loads or above 20 kHz, reducing maximum voltage, current and power output.

### 7810-50-200

**Output Range:** -95Vp to +95Vp

**Output Current:** 0A to 200A RMS continuous

**Maximum Continuous Output Power:** 10 kW RMS

**Peak Current:** 420A for 40 ms

**Slew Rate:** 40 V/ $\mu$ s

**Supply Voltage:** 3-phase 208V  $\pm$ 10%, 60A, 50/60 Hz; 400V, 30A version available

**Dimensions (HxWxD):** 40.1 x 22.6 x 31.6 in. (101.9 x 57.4 x 80.3 cm)

**Weight:** Approximately 380 lbs. (172 kg)

### 7810-100-100

**Output Range:** -180Vp to +180Vp

**Output Current:** 0A to 100A RMS continuous

**Maximum Continuous Output Power:** 10 kW RMS

**Peak Current:** 280A for 40 ms

**Bandwidth (-3dB):** DC to 60 kHz

**Supply Voltage:** 3-phase 208V  $\pm$ 10%, 60A, 50/60 Hz; 400V, 30A version available

**Dimensions (HxWxD):** 40.1 x 22.6 x 31.6 in. (101.9 x 57.4 x 80.3 cm)

**Weight:** Approximately 380 lbs. (172 kg)

### 7810-200-50

**Output Range:** -360Vp to +360Vp

**Output Current:** 0A to 50A RMS continuous

**Maximum Continuous Output Power:** 10 kW RMS

**Peak Current:** 200A for 40 ms

**Slew Rate:** 40 V/ $\mu$ s

**Supply Voltage:** 3-phase 208V  $\pm$ 10%, 60A, 50/60 Hz; 400V, 30A version available

**Dimensions (HxWxD):** 40.1 x 22.6 x 31.6 in. (101.9 x 57.4 x 80.3 cm)

**Weight:** Approximately 380 lbs. (172 kg)

## Common Data (all models)

### Performance

Testing performed at 208V/415V AC. 7800 series amplifiers can operate from 400V AC  $\pm$ 10%. Since these amplifiers have an unregulated power supply, low line conditions may slightly affect the maximum voltage potential.

All testing was performed in Controlled-Voltage (CV) mode. Accuracy was measured when driven into a 10-ohm load with between 0.1V DC and 6V DC or between 0.2V AC and 5V AC presented at its inputs.

**Bandwidth (-3dB):** DC to 60 kHz

**Phase Response (10 Hz - 10 kHz):**  $\pm$ 8.3 degrees

**Unit to Unit Phase Error:**  $\pm$ 0.1 degrees at 60 Hz

**Output Offset:**  $<\pm$ 200  $\mu$ V

**Output Offset Current:**  $<$ 10 mA, DC

**Residual Noise, 10 Hz to 20 kHz:**  $<$ 250  $\mu$ V ( $<$ 0.25 mV)

**THD (DC - 20 kHz):**  $<$ 0.25%

**DC Drift,**

**From Cold to Maximum Operating Temperature:**

$<\pm$ 400  $\mu$ V

**After 20 Minutes of Operation:**  $\pm$ 200  $\mu$ V

**Output Impedance:** 3.2 m $\Omega$  in Series with 2.2  $\mu$ H

**Input Characteristics:** Unbalanced BNC connector, 10 k $\Omega$  single-ended

**Gain,**

**Voltage Mode:** 40 volts/volt

**Current Mode:** 40 amperes/volt

**Gain Linearity (over input signal, from 0.2V to 5V),**

**DC:** 0.0125%

**AC:** 0.030%

**Max Input Voltage:**  $\pm$ 10V, balanced or unbalanced

**Input Impedance:** 20 k $\Omega$  differential

**Input Sensitivity:** 3.0V input for 3800W output into 1 ohm, adjustable

**Common Mode Rejection Range:**  $\pm$ 11V DC maximum

**Common Mode Rejection Ratio:** Better than 70 dB

### Status Display, Control, I/O

**Front Panel LED Displays indicate:** Ready, Standby, Fault  
Soft Touch Switches for: Run, Stop, Reset

**LCD Display:** Can be configured for up to four simultaneous displays reporting one, two, or all four of the following:  $V_p$ ,  $V_{RMS}$ ,  $A_p$ ,  $A_{RMS}$ . Also reports any fault conditions that occur and suggests corrective action.

**Back Panel Power Connection:** Barrier strip

**Signal Output:** Back-panel high-current connectors

**Signal Input:** Back-panel unbalanced BNC

### Communication Capabilities

**Reporting:** System Fault, Over Temp, Over Voltage, Over Load

### Protection

**Over/Under Voltage:**  $\pm$ 10% from specified supply voltage  
amplifier is forced to Standby

**Over Current:** Breaker protection on both main power and low-voltage supplies

**Over Temperature:** Separate output transistor, heat sink, and transformer temperature monitoring and protection

### Physical Characteristics

**Chassis:** Black powder-coated heavy-duty steel frame and panels

**Operating Temperature:** 10°C to 50°C (50°F to 122°F), maximum output power de-rated above 30°C (86°F.)

**Humidity:** 70% or less, non-condensing

**Cooling:** Forced air cooling from front to back through filters via six 100ft<sup>3</sup>/min. fans.

 400V versions of  
this product bear the CE mark