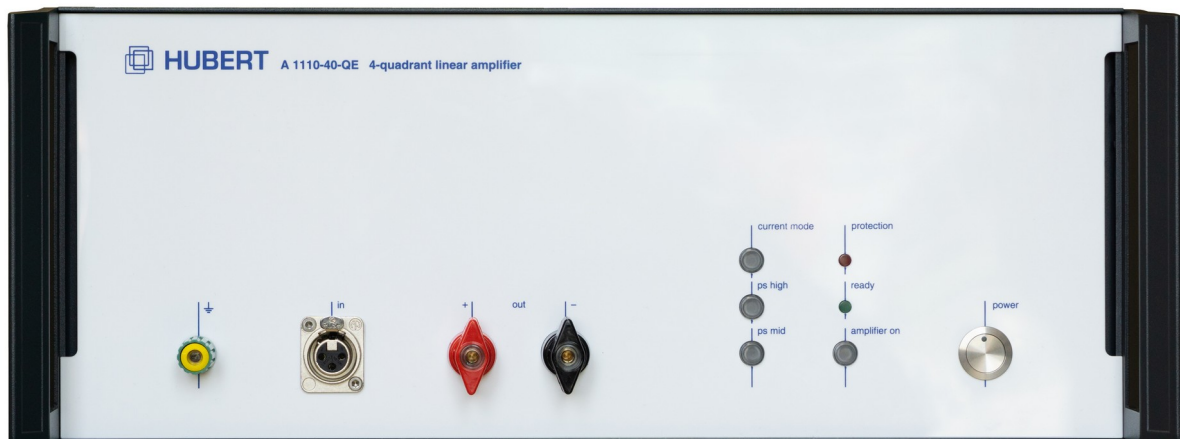




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Datasheet



A1110-40-QE-70-16

4-Quadrant Voltage and Current Amplifier
DC – 1 MHz



1 Product Description

The A1110-40-QE-70-16 is a linear, extreme-broadband, precision power amplifier with optimized voltage ranges for automotive wiring system simulation.

The A1110-40-QE-70-16 can be operated as a voltage amplifier or current amplifier. The current amplifier offers a constant, frequency-invariant output current for inductive loads.

Three optional operating voltages per polarity are available for high-voltage/low-current or low-voltage/high-current applications. The voltage switch-over can be implemented optionally as manual or automatic. Especially in case of very low-impedance loads, the operating voltage can be reduced to 1/10 which is associated with a corresponding reduction of the power loss.

Output voltage and output current can be limited and observed on low-impedance monitor outputs.

The device is equipped with a temperature-controlled, quietly-running fan. As well as an over-temperature protection, a power-loss calculation and an absolute-current monitoring guarantees perfect short-circuit and overload protection.

An interlock offers the possibility of a remote-controlled security system.

The device can be operated by using elements on the front panel. Additionally the device can be controlled with the supplied A1110 Control Software via an USB connection.

The device's functionality can even be extended by several product options.

Please find the latest release of this datasheet on our website:
www.drhubert.com



2 Features

- 4-quadrant voltage and current amplifier
- Fully configurable and operable by means of the supplied software
- Output voltage max. $75 V_{\text{peak}}$
- Output current max. $40 A_{\text{peak}}$
- Output current $80 A_{\text{peak}} / 10 \text{ ms}$
- Symmetrical input
- Series / parallel input connection in case of higher voltage / current requirements
- USB port as standard (LAN interface optional)
- Auto-commutating voltage supply
- Interlock
- Voltage / current monitor output
- Sensing Inputs
- Up to 6 configurable compensation networks for inductive loads in current amplifier mode. Five general-purpose networks are onboard per default.

3 Applications

- General lab applications for research, development and testing
- EMC testing
- Material testing
- MRI
- Component tests
- Plunger coil drives
- Piezo actuation
- Generation of magnetic fields (e.g. with Helmholtz coils)
- Medical engineering
- Laser technology
- Plasma technology



4 Control Software

The scope of delivery includes an application software that ensures fully remote-controlled operation and comprehensive configuration of the amplifier via the USB or LAN interface. In this context, disclosure of the line commands guarantee trouble-free integration of existing automated test systems.

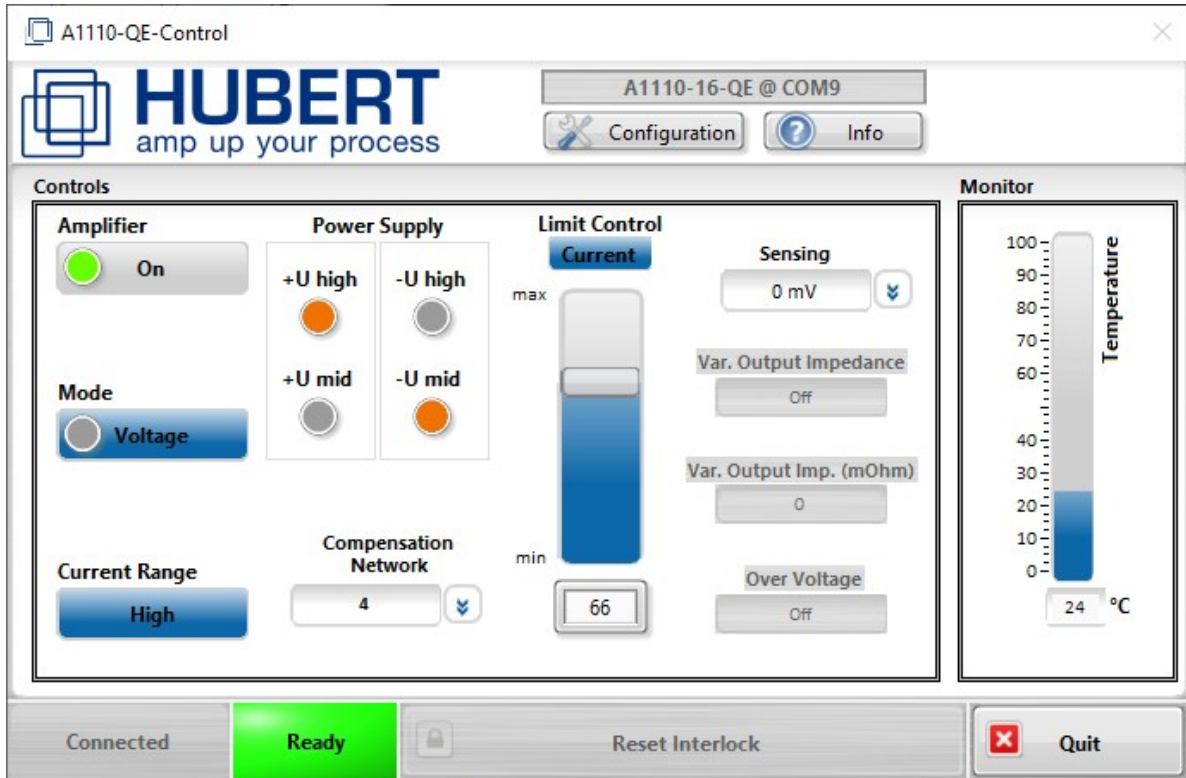


Figure 1: A1110-QE-Control Main Menu

5 Pictures



Figure 2: Back panel elements



6 Current Amplifier

In current control mode, the A1110-40-QE-70-16 behaves like a voltage-controlled current source and delivers a nearly frequency-independent constant load current to an inductive load.

The following five compensation networks are equipped ex works.

No	Load	Rc	Cc	Current Range
1	1 Ohm + 500 uH	100 kOhm	10 nF	high
2	0,1 Ohm + 200 uH	68 kOhm	4,7 nF	high
3	1 Ohm + 1mH	150 kOhm	22 nF	high
4	4 Ohm + 1,8 mH	200 kOhm	1 nF	high
5	0,078 R + 88 uH	80 kOhm	6,8 nF	high
6	<i>Reserved for Option-01</i>			

Table 3: Compensation networks

The selection is made by our A1110-QE-Control software. Please also note the corresponding recommended current measuring range.

If none of the above compensation networks is suitable for your application, please order your amplifier with Option-01: Custom Current Amplifier. Our engineers will design a custom compensation network specific for your needs. You can add additional networks to your amplifier. Up to six custom networks are possible as existing ones can be removed.

We would be pleased to assist you in the realization of a compensation network for your application.



7 Specifications

Parameters	Specification	Conditions
	Controlled Voltage Mode	20° C ambient temperature
Input Impedance	100 kOhm	Unbalanced, 1 kHz
	200 kOhm	Balanced, 1 kHz
Small Signal Bandwidth	DC-600 kHz	+0, -3 dB, @ 10 kOhm High Voltage
Large Signal Bandwidth	DC-200 kHz	+0, -3 dB, 10 Ohm High Voltage
Slew Rate	60 V/μs	@10 kOhm
DC-Offset	< 1 mVDC	
THD+N	< 0,2 %	10 V _p /100 Hz @ 0,06 Ohm; < 80 kHz Bandwidth
Residual Noise	< -69 dBV < -62 dBV	10 Hz - 22 kHz 10 Hz - 500 kHz
Max Output Voltage ...Range I (Low Voltage) ...Range II (Mid Voltage) ...Range III (High Voltage)	+18/-16 Vdc +27/-16 Vdc +70/-16 Vdc	
Max Output Current	40 Ap	
Current, Pulse, 500ms, 5% Duty Cycle, unipolar	80 Ap	Auto Mode, rise-/fall-time >20us
Max Output Power	1 kW	
Voltage Monitor	±1 V ≅ 10 V ± 0.5%	< 200 kHz
Current Monitor	±1 V ≅ 10 A ± 1%	< 100 kHz
Gain		
Controlled Voltage Mode	1 V / 10 V; ± 0.1%	U _{in} / U _{out}
Interface	USB 2.0, LAN	
AC Power	1x230 VAC / 1x16 A / 50 Hz /	



7.1 Pulse Response

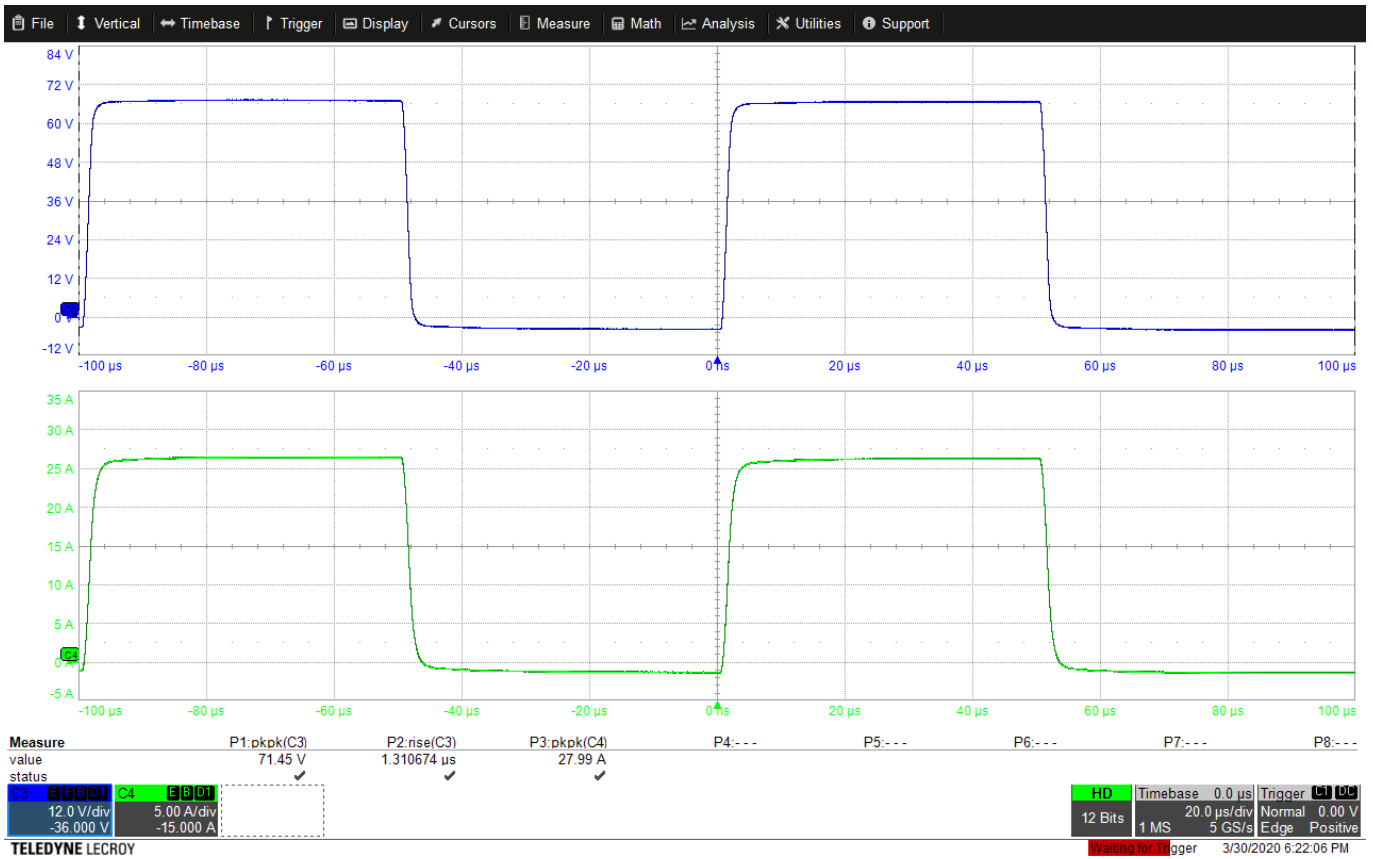


Figure 3: C3: Output Voltage; C4: Output Current; V_{in} : 10 kHz, Load: 2,5 Ohm



7.2 Output Current Capability via Output Voltage

Output Voltage Range:	Output Voltage, [Vpeak]	Max. Continuous Output Current, [A _{dc}]	Max. Continuous Output Current, [A _{ac_peak}]	Peak Output Current [A] for 500ms, dc=5%
1.Range: +18V/-16V				
1. Quadrant: 0 to +18Vpeak	18	40	40	80
	16	40	40	80
	14	40	40	80
	12	40	40	80
	10	40	40	80
	8	34	40	80
	6	30	40	80
	4	28	40	80
2.Quadrant: 0 to -16Vpeak	-16	14	28	40
	-14	15	29	40
	-12	16	31	40
	-10	17	33	40
	-8	18	35	40
	-6	19	37	40
	-4	20	40	40
	-2	11	40	40
3.Quadrant 0 to -16Vpeak	-16	-40	-40	-80
	-14	-40	-40	-80
	-12	-40	-40	-80
	-10	-40	-40	-80
	-8	-36	-40	-80
	-6	-32	-40	-80
	-4	-28	-40	-80
	-2	-26	-40	-80
4.Quadrant 0 to +18Vpeak	18	-21	-40	-83
	16	-22	-40	-60
	14	-24	-40	-61
	12	-26	-40	-60
	10	-28	-40	-60
	8	-32	-40	-60
	6	-36	-40	-60
	4	-40	-40	-60



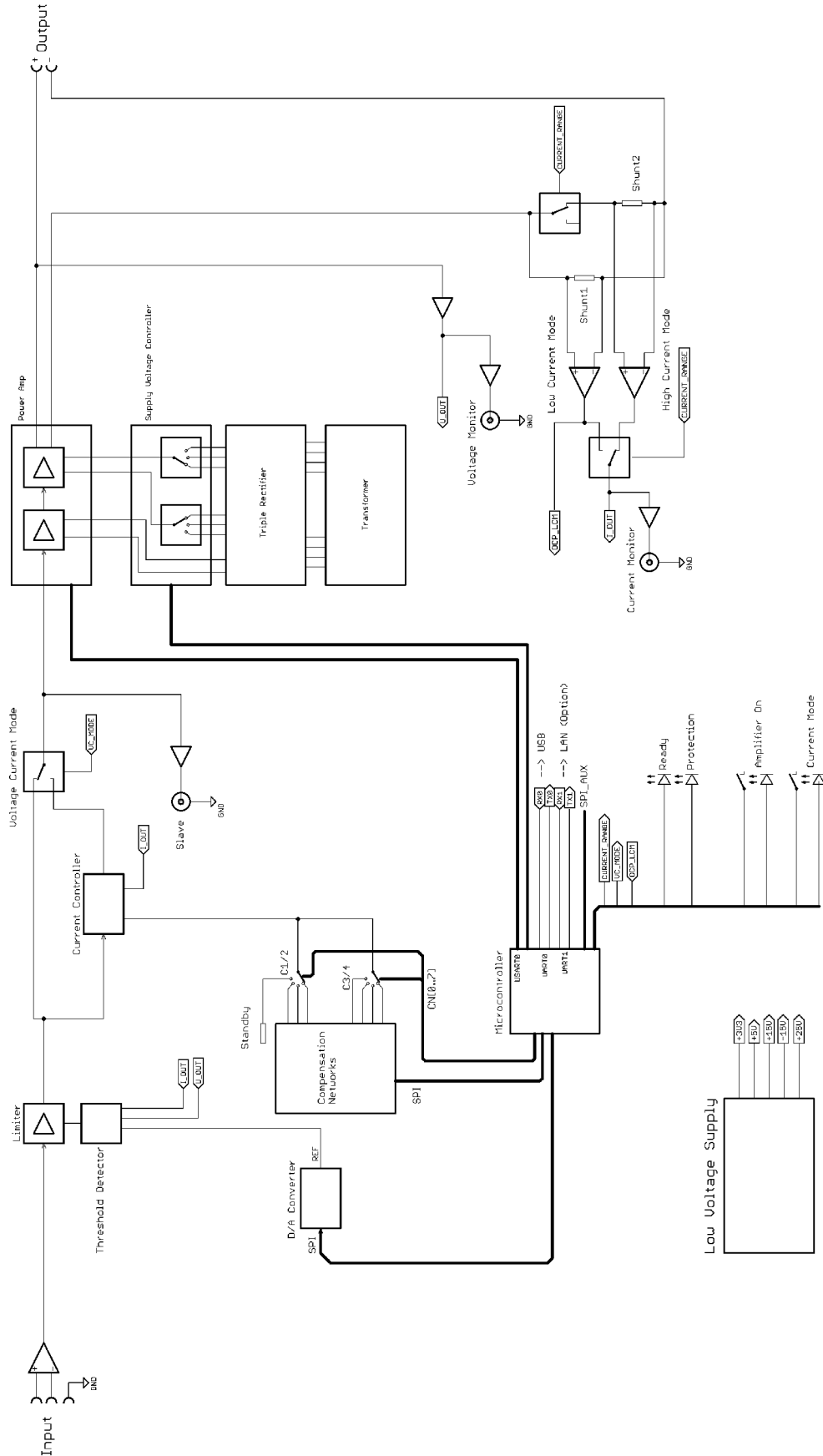
Output Voltage Range:	Output Voltage, [Vpeak]	Max. Continuous Output Current, [Adc]	Max. Continuous Output Current, [Aac_peak]	Peak Output Current for 500ms, dc=5%[Adc]
2.Range: +27V/-16V				
1. Quadrant: 0 to +27Vpeak	27	40	40	80
	24	40	40	80
	20	38	40	80
	18	40	40	60
	16	40	40	60
	14	40	40	60
	12	40	40	60
	10	40	40	60
	8	34	40	60
	6	32	40	60
	4	28	40	60
2.Quadrant: 0 to -16Vpeak	-16	14	28	40
	-14	15	29	40
	-12	16	31	40
	-10	17	33	40
	-8	18	35	40
	-6	19	37	40
	-4	20	40	40
	-2	11	40	40
3. Quadrant: 0 to -16Vpeak	-16	-40	-40	-80
	-14	-40	-40	-80
	-12	-40	-40	-79
	-10	-40	-40	-60
	-8	-36	-40	-61
	-6	-32	-40	-62
	-4	-28	-40	-63
	-2	-26	-40	-64
4. Quadrant: 0 to +27Vpeak	27	-16	-32	-40
	24	-17	-34	-40
	20	-20	-38	-40
	18	-21	-40	-50
	16	-22	-40	-50
	14	-24	-40	-70
	12	-26	-40	-71
	10	-29	-40	-72
	8	-32	-40	-73
	6	-36	-40	-74
	4	-40	-40	-75



Output Voltage Range:	Output Voltage, [Vpeak]	Max. Continuous Output Current, [Adc], Auto-Mode	Max. Continuous Output Current, [Aac_peak]	Peak Output Current for 500ms, dc=5%[Adc]
3.Range: +70V/-16V				
1. Quadrant: 0 to +70Vpeak	70	15	30	60
	65	15	32	60
	60	15	32	60
	55	15	31	60
	50	14	27	60
	48	12	26	60
	40	11	22	60
	35	10	20	60
	27	40	18	80
	24	40	17	80
	20	38	16	80
	18	40	15	80
	16	40	15	80
	14	40	14	80
	12	40	14	80
	10	40	13	80
	8	34	13	80
6	32	13	80	
4	28	13	80	
2. Quadrant: 0 to -16Vpeak	-16	14	28	40
	-14	15	29	40
	-12	16	31	40
	-10	17	33	40
	-8	18	35	40
	-6	19	37	40
	-4	20	40	40
	-2	11	40	40
3. Quadrant: 0 to -16Vpeak	-16	-40	-40	-80
	-14	-40	-40	-80
	-12	-40	-40	-80
	-10	-40	-40	-80
	-8	-36	-40	-80
	-6	-32	-40	-80
	-4	-28	-40	-60
	-2	-26	-40	-60
4. Quadrant: 0 to +70Vpeak	70	-7	-14	-30
	65	-7	-15	-30
	60	-8	-16	-30
	55	-9	-17	-30
	50	-9	-18	-30
	48	-10	-19	-30
	40	-11	-22	-40
	35	-13	-26	-40
	27	-16	-32	-40
	24	-17	-34	-40
	20	-20	-38	-40
	18	-21	-40	-40
	16	-22	-40	-60
	14	-24	-40	-60
	12	-26	-40	-60
	10	-29	-40	-80
	8	-32	-40	-80



8 Block Diagram





9 Product Options

The following product options are available at the time of placing the order. Upgrades of existing devices are not possible.

Article Name	Article Description	Order Number
A1110-40-QE-70-16	4-Quadrant Voltage and Current Amplifier	11100160
Option-01: Custom Current Amplifier	Additional compensation network for one specified load. The device is equipped with five general-purpose networks by default.	11101010
Option-03: Ultra Stable Gain	Gain $10 \pm 0,1\%$ ($\pm 25\text{ppm}/\text{C}^\circ$); Offset $\pm 1\text{mV}$ ($\pm 25\text{uV}/\text{C}^\circ$)	11101030
Option-05: Isolation Amplifier	For potential isolation of input and output	11101050
Option-06: Ethernet Interface	For connection to a computer (RJ45)	11101060
Option-10: Internal Current Measurement	High-performance current transformer; Precision DC $\pm 0.1\%$; Output BNC bush, galvanically isolated from the amplifier	11101100
Option-11: Voltage and Current Displays	Display in front panel (monitor outputs)	11101110
Option-12: Adjustable Output Resistance	R: $0\text{ m}\Omega - 200\text{ m}\Omega$; Resolution $1\text{ m}\Omega$; Accuracy 0.5%	11101120
Option-14: Overvoltage Protection	For protection of amplifier outputs	11101210

10 Contact

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11 Document History

Revision	Date	Changes
2.0	March 2020	First publication in new layout