

AUTOMATION



IT



AUTOMOTIVE



RESEARCH/  
DEVELOPMENT



SEMICONDUCTORS



AVIONICS



SOLAR/WIND



INDUSTRY

**TECHNOLOGY | TEST | RESEARCH | DEVELOPMENT**

**DC and arbitrary power supplies  
Arbitrary and function generators  
4-quadrant and broadband amplifiers  
Special instruments**

Developed and manufactured in  
**Germany**

**LINECARD**

**TOELLNER®**

# Applications

Industry, automotive, research, aviation, aerospace, railways, IT sector, automation, photovoltaics, laser, particle accelerator, general electronics.

**The product range comprises:**

Device series	Highlights
Laboratory power supplies	Linear and switch mode 150 W to 400 W
High-performance power supplies	1 kW to 10 kW
Arbitrary power supplies	160 W to 5200 W – incl. WaveControl software
Function generators	Up to 63 W output power – DC to 44 MHz
Arbitrary generators	1 million sampling points – DC to 40 MHz
Broadband amplifiers	DC to 5 MHz – up to 63 W output power
4-quadrant power supplies	160 W to 3200 W source and sink power – DC to 100 kHz/400 kHz
Electronic switches	Up to 60 V / 100 A – tr/ff < 500 ns

## Systems for carrying out standardized tests

e.g. in the automotive industry

Including comprehensive library of waveforms in the inherent WaveControl software

### Selection of supported standardized tests in the automotive industry:

BMW GS 95024-2-1	LV124	MBN 10615	MBN LV124-1	VW80000-1
BMW GS 95026	LV148	VDA 320	VW 82148	e.t.c.

### Services:

- Free demo devices of all popular models
- Technical support
- Calibration and repair service
- Hire equipment and leasing offers



### Certification:

DIN ISO 9001

Developed and manufactured in  
**Germany**

**TOELLNER**<sup>®</sup>

# Laboratory, high-performance and arbitrary power supplies 4-quadrant power supplies Function and arbitrary generators

All units feature state-of-the-art technology and sophisticated circuit technology. They satisfy all demands placed nowadays on cutting edge equipment. Ingenuity in detail, finishing and assembly carried out perfectly by hand, unmatched precision of mechanics and electronics.

Series	Image	Number of outputs	Max. W total	Max. V per output	Max. I per output	Interface (partially optional)	Highlights
TOE 8730		2 – 5	150 W	48 V	5 A	Analog	Dual-output, triple-output and quintuple-output power supplies. Linear control. Extremely low residual ripple: 50 µV. Very compact design.
TOE 8850		1 – 2	320 W	130 V	20 A	GPIB RS 232 Analog	Single-output and dual-output power supplies, system-compatible, V/A settings using incremental spinwheel. Sensing as standard. Linear control. Low residual ripple.
TOE 8950		1 – 2	400 W	130 V	40 A	GPIB USB + LAN RS 232 Analog	Automatic setting to existing line voltage 115 V or 230 V, autoranging, outputs at front and rear, sensing, very compact, numerous safety functions. Arbitrary mode, WaveControl arbitrary software.
TOE 8870		1	1.500 W	400 V	100 A	GPIB RS 232 Analog	Autoranging, active PFC, system-compatible, high slew rates. High endurance, even under extreme load conditions. Best EMC characteristics. Arbitrary mode, WaveControl arbitrary software.
TOE 8805 bis TOE 88165		1	160 W bis 5.200 W	100 V	320 A	GPIB Analog	Very fast arbitrary power supplies, generate any voltage and current characteristics, accept real-time signals, high slew rate: approx. 2 V/µs, brief load currents up to 1000 A, internal sink up to 16,000 W, AC superimposition up to 70 kHz, user-friendly WaveControl arbitrary software.
TOE 7621		1	320 W	± 100 V	± 40 A	Analog	320 W source and sink power, brief load current $3 \times I_{rated}$ (optional), analog control input 0 to ± 5 V or 0 to ± 10 V, rise/fall time < 2.5 µs in CV mode, sensing, outputs at front and rear. Optimally suitable for immunity testing of components against vehicle electric systems ripple. ***Power expansion to 3200W using parallel operation (up to 10 devices).
Series	Image	Frequency		Max. V	Max. W	Interface	Highlights
		Min.	Max.				
TOE 7761		1 µHz	40 MHz	20 V <sub>SS</sub>	0,5 W	GPIB RS232	Arbitrary function generator with 1 000 000 sampling points, 80 MS/s sampling rate and 14-bit resolution

# Vehicle / avionics electric systems simulation

TOELLNER®

System components e.g.

- Arbitrary power generators 160 W – 5.200 W
- 4-quadrant power supplies/amplifiers 320 W – 3.200 W
- Microswitch for brief interruptions < 500 ns (LV124: E10+E13)
- Reference resistance kit etc.

**WaveControl software** – intuitive operation – comprehensive library of waveforms for controlling the power supplies, amplifiers and switches

## New high-speed switch

**for brief interruptions in power supply and ground lines**

- Input voltage Up to 60 V
- Output current Up to 100 A
- Interruption of supply and ground lines
- Rise and fall time < 500 ns
- Short-circuit-proof
- Discharging of load current circuit
- 4 signal line switches
- Control by any signal generator (TTL level)

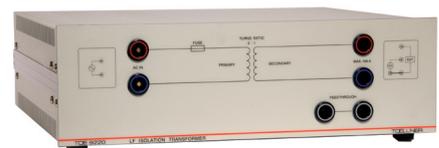


**Particularly suitable for automotive tests**

12 V vehicle electric system	48 V vehicle electric system
BMW GS 95024-2-1	BMW GS 95026
LV124	LV148
Mercedes-Benz MBN 10615	VDA 320
Mercedes-Benz MBN LV 124-1	VW82148
VW 80000-1	

## Coupling network

Superimposition of an AC signal on a power supply circuit  
e.g. for LV123, MIL-STD-461F/CS 101, Ford EMC-CS-2009-1/CI 250 etc.



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**320 W source + sink**  
**DC ... 100 kHz / 400 kHz**



# HIGH SPEED POWER

4-Quadrant Power Supply **TOE 7621**

**4-quadrant power supplies or 4-quadrant amplifiers are electronic modules which generate both positive and negative voltages, and which can also deliver and receive positive and negative currents. They can therefore be used as a source or sink.**

**Power supplies for laboratory use are mostly only power sources. They are only able to deliver power with one single polarity, i.e. these instruments only work in one quadrant of the voltage/current diagram.**

**Common amplifiers deliver voltages with both polarities but are generally unable to absorb the same power comparable to that which they can deliver. They therefore mainly work as 2-quadrant instruments.**

**All four-quadrant power supplies of the TOE 7621 series are additionally able to absorb power with both polarities corresponding to the delivered powers.**

**A 4-quadrant power supply of the TOE 7621 series is thus a bipolar voltage and current source as well as a current sink in one instrument. Use as a bipolar power amplifier is also possible.**

## Equipment features

### Voltage and current mode: CV / CC

The 4-quadrant power supply series TOE 7621 can be operated as a constant voltage source (CV mode) or as a constant current source (CC mode).

### Selectable input voltage range

The selectable input voltage range allows switching between an input voltage of  $\pm 5$  V or  $\pm 10$  V for full scale output. Therefore, no further external adaptation of the control voltage is necessary.

### Selectable bandwidth

In CV mode it is possible to preselect a transmission bandwidth of 100 kHz, 10 kHz, 1 kHz or 100 Hz. In CC mode the selectable cut-off frequencies are 10 kHz, 1 kHz, and 100 Hz.

### Variable gain

The range of variation is approx.  $\pm 10\%$  of the rated gain, in CV or CC mode.

### Variable DC offset

Using the adjustable DC offset it is possible to directly set a basic voltage (up to  $\pm V_{\text{rated}}$ ) or a basic current (up to  $\pm I_{\text{rated}}$ ). This function is particularly suitable for superimposing an externally generated noise signal (e.g. from a function generator) on a constant voltage or current. This makes it easy to replicate ripple on vehicle electrics or charging and discharging processes of batteries.

### Adjustable output impedance

The internal impedance of the power output is adjustable in CV mode in a range from zero to  $0.5 \times (V_{\text{rated}}/I_{\text{rated}})$ .

### Increased short term load current

All 4-quadrant power supplies of the TOE 7621 series can be equipped with the TOE 7620/113 option. They are then able to deliver three times the rated current for a short period. This option is activated using a switch on the rear panel.

### Maximum sink power

The MAX SINK POWER function enables extended run time in sink mode at maximum sink power. The overload shutdown is delayed. The working range of this function is from DC to 1 kHz.

### Safety functions

#### OTP (overtemperature protection):

A thermostatically controlled switch switches off the instrument when a certain temperature is reached. In the process, the output circuit is interrupted by means of a power relay.

#### OVP (overvoltage protection):

Voltage limits adjustable from 0 V to  $\pm 1.02 V_{\text{rated}}$

#### OCP (overcurrent protection):

Current limits adjustable from 0 A to  $\pm 1.02 I_{\text{rated}}$

The limit functions can be set separately in the positive and negative range and can be used in both CV mode and CC mode.

# 4-Quadrant Power Supply TOE 7621

## Sensing

A precise sensing circuit not only keeps the voltage supplied to your load extremely constant, but it also even protects sensitive loads if there is a break in a sensor line. The sensing inputs are available at the rear and can be activated on the front panel using a key. The correctable voltage drop is approx. 1V per line.

## Interlock / Inhibit

The output of a 4-quadrant power supply device of the TOE 7621 series can be deactivated or activated via a control input at the rear of the device. The Interlock and Inhibit control function can be selected using a switch at the rear. In particular, the Interlock function is suitable for integrating the device into a safety chain when a TOE 7621 is installed in a larger system.

## Monitor output for voltage and current

The respective monitor voltage is:

$0 \dots \pm 5 \text{ V}$  for  $0 \dots \pm V_{\text{rated}}$   
 $0 \dots \pm 5 \text{ V}$  for  $0 \dots \pm I_{\text{rated}}$

## Output ON / OFF

The output deactivation function, which allows you to switch the voltage and current off immediately in the Output OFF position, is a user-friendly feature. The output signal path is electrically interrupted.

## Parallel mode

Up to 10 TOE 7621 units of the same type can be operated in parallel to increase the power. A parallel switching adapter is available optionally. Units connected in parallel are also available installed in 19" racks.

## Bridge connection

An equal number of identical TOE 7621 units can be operated in a bridge connection (maximum 2 x 10 units). The respective inputs and outputs are located at the rear. A switching adapter for the bridge connection is available optionally.

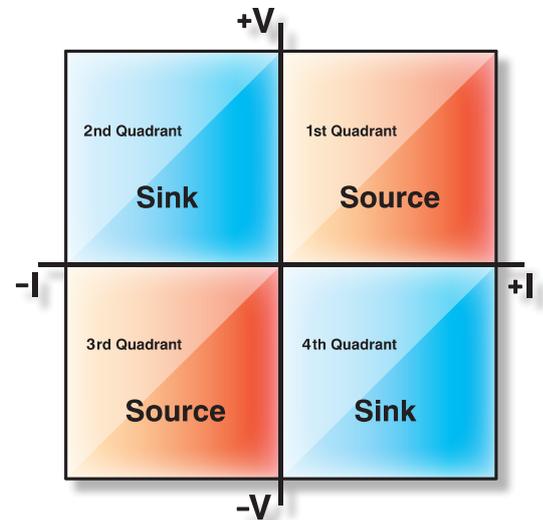


# Special features TOE 7621 series

## Special features

- 320 W source and sink power
- Power increase using parallel operation
- Increased short term load current  $3 \times I_{\text{rated}}$  (optional)
- Analog control input 0 to 5 V or 0 to 10 V
- Rise/fall time typ.  $< 2.5 \mu\text{s}$  in CV mode
- Adjustable output impedance in CV mode
- Sensing
- Output at front and rear
- 19" width, 3 HU
- Ideally suitable for electrical noise testing of components against vehicle electrics ripple

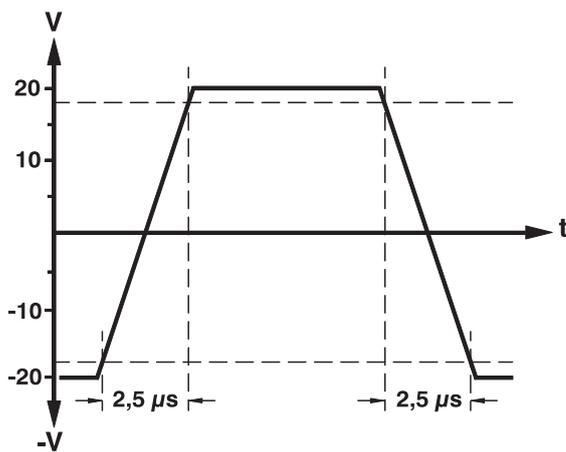
## 4-quadrant mode



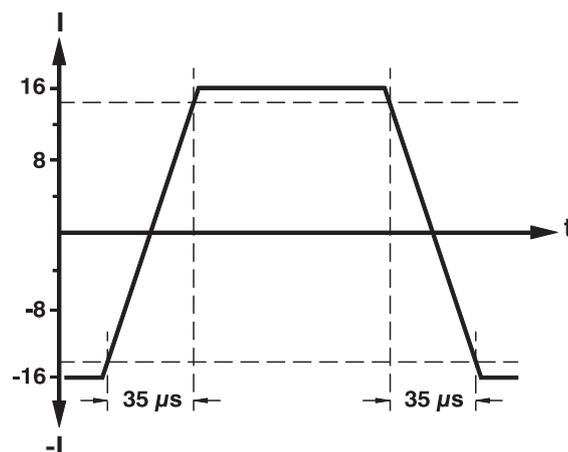
Developed and manufactured in  
**GERMANY**

# Overview

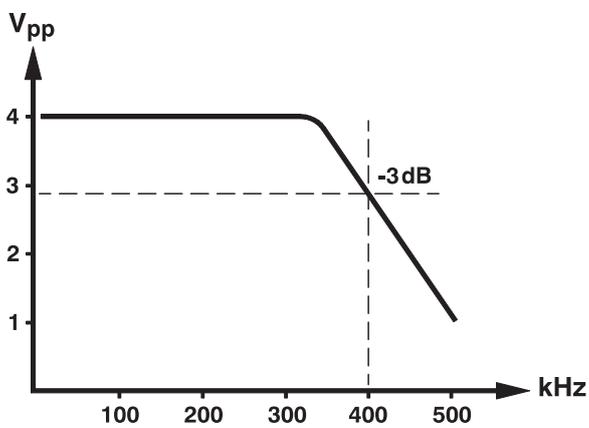
Model	Output voltage	Output current	Output power
TOE 7621- 6	$\pm 6$ V	$\pm 40$ A	240 W
TOE 7621- 10	$\pm 10$ V	$\pm 30$ A	300 W
TOE 7621- 20	$\pm 20$ V	$\pm 16$ A	320 W
TOE 7621- 32	$\pm 32$ V	$\pm 10$ A	320 W
TOE 7621- 40	$\pm 40$ V	$\pm 8$ A	320 W
TOE 7621- 60	$\pm 60$ V	$\pm 5.3$ A	320 W
TOE 7621- 80	$\pm 80$ V	$\pm 4$ A	320 W
TOE 7621-100	$\pm 100$ V	$\pm 3.2$ A	320 W



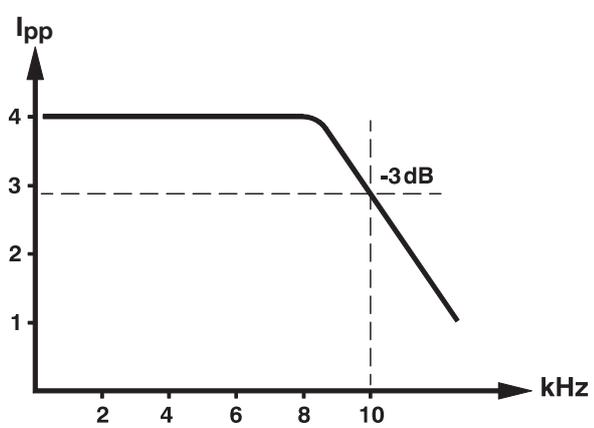
Rise/fall time (CV) with TOE 7621-20



Rise/fall time (CC) with TOE 7621-20



Small signal bandwidth (CV) with TOE 7621-20



Small signal bandwidth (CC) with TOE 7621-20

# Technical specifications TOE 7621

	TOE 7621-10	TOE 7621-20	TOE 7621-32	TOE 7621-40	TOE 7621-60	TOE 7621-80	TOE 7621-100
<b>Output voltage</b>	± 10 V	± 20 V	± 32 V	± 40 V	± 60 V	± 80 V	± 100 V
<b>Output current</b>	± 30 A	± 16 A	± 10 A	± 8 A	± 5.3 A	± 4 A	± 3.2 A
<b>Power</b> (continuous at $I_{max}$ )							
Source mode	300 W			320 W			
Sink mode	300 W			320 W			
<b>Input impedance</b>	100 kΩ						
<b>CV mode</b>							
<b>Frequency range</b>							
DC/AC input coupling	0 Hz - 100 kHz / 2 Hz - 100 kHz						
Adjustable bandwidth limit	100 Hz / 1 kHz / 10 kHz / 100 kHz						
<b>Transmission factor/gain</b>							
Input voltage ±5 V	2 V/V	4 V/V	6.4 V/V	8 V/V	12 V/V	16 V/V	20 V/V
Input voltage ±10 V	1 V/V	2 V/V	3.2 V/V	4 V/V	6 V/V	8 V/V	10 V/V
Adjustable	± 10 %	± 10 %	± 10 %	± 10 % ±	± 10 %	± 10 %	± 10 %
<b>Rise/fall time</b> (10% – 90%) typ.	< 2.5 μs	< 2.5 μs	< 2.5 μs	< 2.5 μs	< 2.5 μs	< 3 μs	< 3 μs
<b>Harmonic distortion</b>							
Up to 1 kHz	< 0.25 %			< 0.1 %			
Up to 100 kHz	< 1.00 %			< 0.8 %			
<b>Interfering signals</b> (humming and noise)							
Up to 1 kHz	< 1 mV <sub>eff</sub>	< 1 mV <sub>eff</sub>	< 1 mV <sub>eff</sub>	< 1 mV <sub>eff</sub>	< 1 mV <sub>eff</sub>	< 2 mV <sub>eff</sub>	< 2 mV <sub>eff</sub>
Up to 10 kHz	< 1 mV <sub>eff</sub>	< 1 mV <sub>eff</sub>	< 1 mV <sub>eff</sub>	< 1 mV <sub>eff</sub>	< 1 mV <sub>eff</sub>	< 2 mV <sub>eff</sub>	< 2 mV <sub>eff</sub>
<b>CC mode</b>							
<b>Frequency range</b>							
DC/AC input coupling	0 Hz - 10 kHz / 2 Hz - 10 kHz						
Adjustable bandwidth limit	100 Hz / 1 kHz / 10 kHz						
<b>Transmission factor</b>							
Input voltage ±5 V	6 A/V	3.2 A/V	2 A/V	1.6 A/V	1.06 A/V	0.8 A/V	0.64 A/V
Input voltage ±10 V	3 A/V	1.6 A/V	1 A/V	0.8 A/V	0.53 A/V	0.4 A/V	0.32 A/V
Adjustable	± 10 %	± 10 %	± 10 %	± 10 %	± 10 %	± 10 %	± 10 %
<b>Rise/fall time</b> (10% – 90%) typ.	35 μs	35 μs	35 μs	35 μs	35 μs	35 μs	35 μs
<b>Harmonic distortion</b>							
Up to 1 kHz	< 0.25 %			< 0.1 %			
Up to 100 kHz	< 1.00 %			< 0.8 %			

# General data / accessories

<b>Output</b>	Floating; insulation $\pm 260$ V against ground
<b>Line voltage</b>	115 V/230 V $\pm 10\%$ ; 47 Hz to 63 Hz
<b>Line fuse</b>	115 V: T8L 230 V: T4L in accordance with IEC 127-2/III, DIN 41662
<b>Power consumption</b>	Max. approx. 750 VA
<b>Protective measures</b>	Protection class I in accordance with DIN EN 61010-1
<b>Operating temperature</b>	0 °C to 40 °C
<b>Storage temperature</b>	-20 °C to 70 °C
<b>Reference temperature</b>	23 °C $\pm 1$ °C
<b>Cooling</b>	Thermostatically-controlled fan
<b>Dimensions</b>	
<b>(W x H x D)</b>	434 x 132 x 429 mm
<b>with feet</b>	434 x 147 x 429 mm
<b>19" system</b>	System-compatible with 19", 3 HU
<b>Weight</b>	Approx. 20 kg
<b>Housing</b>	Aluminium

## Ordering data

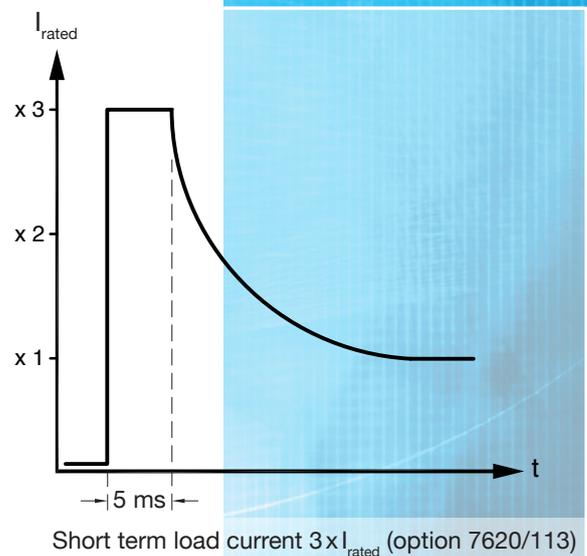
TOE 7621 - 6	DC - 100 kHz, $\pm 6$ V / $\pm 40$ A
TOE 7621 - 10	DC - 100 kHz, $\pm 10$ V / $\pm 30$ A
TOE 7621 - 20	DC - 100 kHz, $\pm 20$ V / $\pm 16$ A
TOE 7621 - 32	DC - 100 kHz, $\pm 32$ V / $\pm 10$ A
TOE 7621 - 40	DC - 100 kHz, $\pm 40$ V / $\pm 8$ A
TOE 7621 - 60	DC - 100 kHz, $\pm 60$ V / $\pm 5.3$ A
TOE 7621 - 80	DC - 100 kHz, $\pm 80$ V / $\pm 4$ A
TOE 7621 - 100	DC - 100 kHz, $\pm 100$ V / $\pm 3.2$ A

## Supplied accessories

- 1 power cord
- 1 instruction manual

## Options / accessories

TOE 7620/101	Circuitry for bridge connection
TOE 7620/102 ... 110	Parallel switching adapter 2 ... 10 x TOE 7620
TOE 7620/113	Short term load current $3 \times I_{\text{rated}}$
TOE 7620/017	Floating input DC - 100 kHz
TOE 9513	19" adapter, 3 HU



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