THURLBY THANDAR INSTRUMENTS

LD300

DC Electronic Load, 80A, 80V, 300W

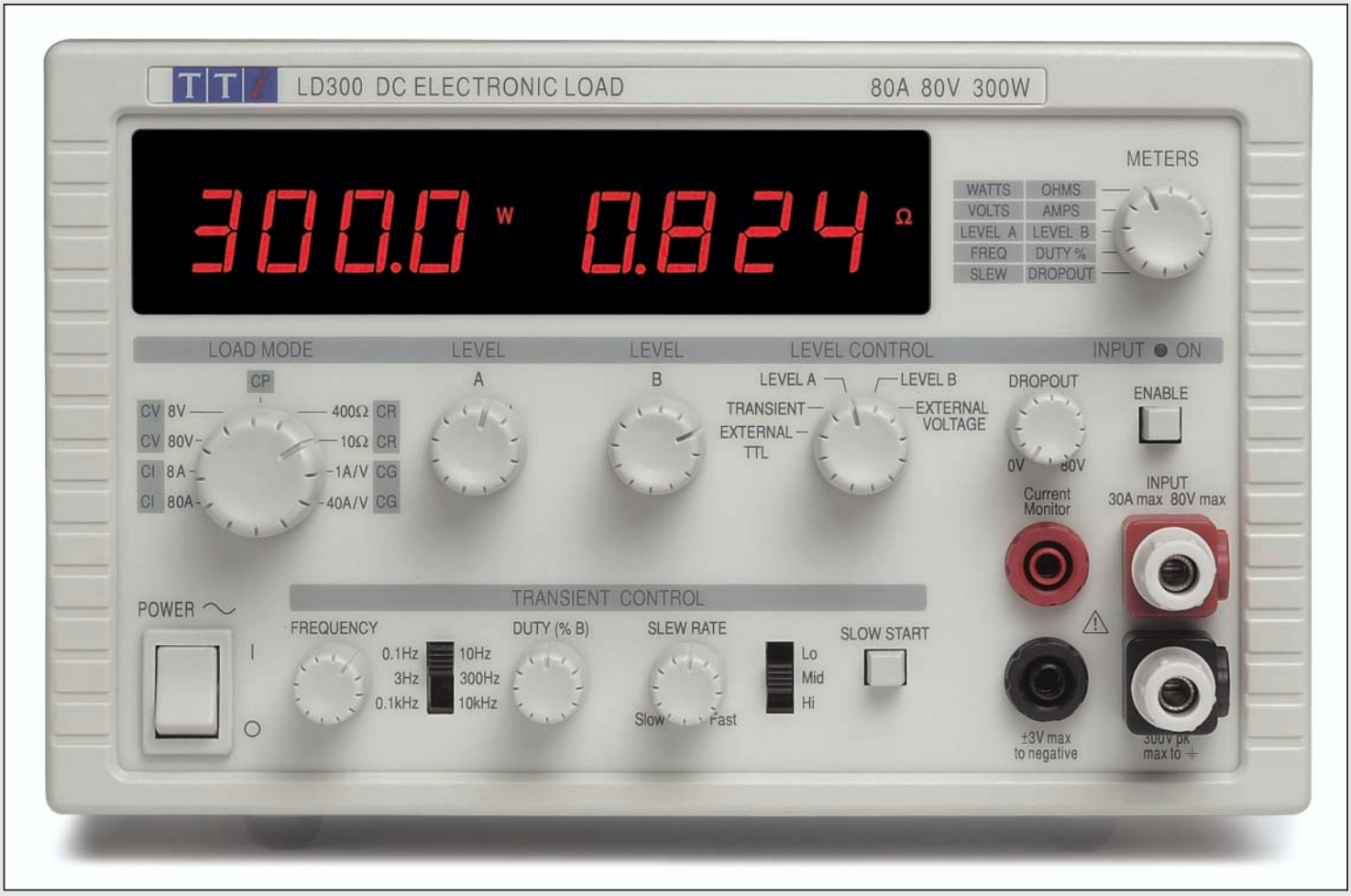
constant current, resistance, voltage and power

transient generator, variable slew rate, soft start

current monitor output, analogue remote control

LD300 Electronic DC Load

80 amps, 80 volts, 300 watts



- *Versatile solution for testing dc power sources*
- *Constant current, resistance, conductance, voltage and power modes*
- *Wide voltage and current range, 0 to 80 volts and 0 to 80 amps.*
- *300 watts continuous dissipation at 40 °C*
- *Low minimum operating voltage of <1V at 40A*
- *Ten turn controls for level setting*
- *Built-in transient generator with variable slew*
- *Current monitor output for waveform viewing*
- *Variable drop-out voltage for battery testing*
- *Analogue remote control capability*

Compact electronic DC load

The LD300 is an inexpensive electronic load which is suitable for testing and characterising a wide variety of dc power sources.

It can be used to investigate the behaviour of many different types of power source such as batteries, solar cells, fuel cells or wind generators, as well as electronic power supply units.

Its wide voltage/current range, multiple operating modes and built-in transient generator give it the versatility to offer test solutions from the design laboratory through to the component test area.

Low minimum operating voltage

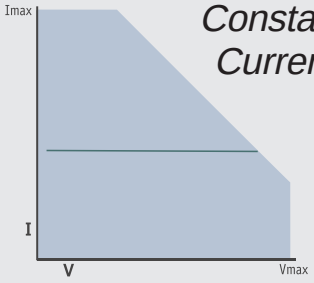
The LD300 can operate at voltages below 500mV for currents up to 10 amps. At higher currents the fixed internal resistance of 25mΩ gradually raises the minimum operating voltage, but it remains below 1 volt up to 40 amps and below 2 volts up to 80 amps.

This low operating voltage allows it to be used for many low voltage applications for which other electronic loads are unsuitable.

CI, CR, CG, CV and CP modes

transient generator, variable slew rate

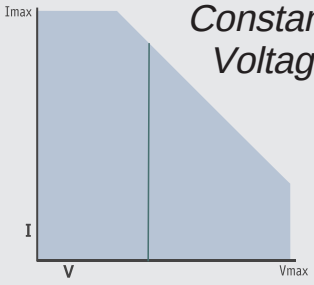
Multiple modes of operation



Constant Current

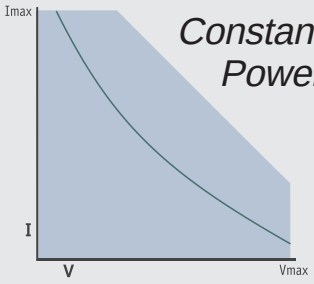
Constant current mode is used for load testing of normal voltage-source power supplies and for constant current discharge testing of batteries.

This mode provides rapid measurement of power source regulation (V/I characteristics).



Constant Voltage

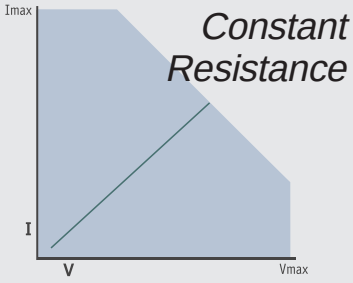
Constant voltage mode is used for load testing of constant current power supplies. The unit operates as a high power shunt regulator.



Constant Power

Constant power mode simulates a load whose power consumption is independant of the applied voltage. This is true of many types of equipment that incoporate switchmode regulators.

This mode may be particularly suitable for testing power sources of portable devices such as Lithium-ion batteries.



Constant Resistance

Constant resistance mode simulates a standard resistive load by providing a current drain proportional to voltage. Settings are displayed in Ohms or milli-Ohms.

Unlike fixed resistors or rheostats, the load provides a precisely controllable resistance with high power dissipation over a wide value range.

Constant Conductance

Constant conductance (CG) mode is also incorporated. As well as showing settings in amps per volt, this mode provides better resolution when setting very low equivalent resistance values.

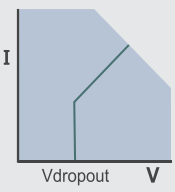
Adjustable voltage drop-out

Some power sources, such as rechargeable batteries, can be damaged if their output voltage falls below a certain level.

The LD300 provides automatic protection by incoprorating fully variable voltage dropout (CI, CR, CG and CP modes).

Resistive discharge (conductance mode) with voltage dropout.

Note that in CR mode the load performs the equation I = (V -Vd)/R where Vd is the drop-out voltage.

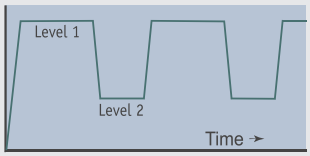


If the voltage applied to the load falls below a preset level, the load current is rapidly reduced to zero.

Transient generator and variable slew

The LD300 incorporates a full variable frequency, variable duty cycle transient generator.

Switching between the two preset levels can be done at any frequency between 0.1Hz and 10kHz.



The transient generator can be used in all operating modes.

The rate of change between levels (slew rate) is controllable over a wide range.

Slew rate control applies to all changes of level including remote control and manual changes between level A and level B.

A slow-start function can be selected for situations where latching would otherwise occur at switch-on.

High resolution setting & measurement

The levels for each operating mode are set using high quality ten turn potentiometers for both level A and level B.

Levels are displayed using four digit meters which provide resolution down to 1mA, 1mV and 1mΩ.

Settings for slew rate, transient frequency, duty cycle and drop-out voltage can also be displayed.

In measurement mode the meters have an accuracy of 0.1% for voltage and 0.2% for current.

Remote control

The LD300 incorporates analogue remote control for all modes of operation. When "external voltage" is selected the level becomes linearly proportional to the voltage applied to the remote control inputs on the rear panel.

Any waveform can be used as the control voltage allowing complex load conditions to be simulated using, for example, an arbitrary waveform generator.

Alternatively, a logic signal can be used to switch between levels. When "external TTL" is selected, the level is switched between the two preset levels in response to an external logic signal.

The remote control inputs have a wide common mode range allowing the control voltage to be referenced independently of the load terminal voltages.

Current waveform monitor

It is often important to be able to observe the load current waveform on an oscilloscope. The LD300 provides a calibrated monitor output for this purpose as well as a sync output from the transient generator.

The monitor output has several volts of compliance with respect to the load input, thus allowing it to be connected to a grounded oscilloscope without current divertion.

Technical Specifications

RATINGS

Voltage and Current:	80 volts maximum, 80 amps maximum.
Power Dissipation:	320 watts maximum continuous at 28°C. Derating to 300 watts continuous at 40°C.
Min. Operating Volts:	Increases with current, <0.5V at 10A, <1V at 40A, <2V at 80A.

OPERATING MODES

Constant Current Mode

Setting Range:	0 to 80A in 2 ranges, set by 10 turn control.
Meter Resolution:	1mA on 8A range, 10mA on 80A range.
Setting Accuracy:	± (0.2% + 20mA).
Regulation:	<30mA for a 20W to 280W power change.
Slew Rate Range:	<8mA/ms to >2500A/ms

Constant Resistance Mode

Setting Range:	0.04Ω to 100Ω in 2 ranges, set by 10 turn control.
Meter Resolution:	10mΩ on 10Ω range, 100mΩ on 400Ω range.
Setting Accuracy:	± (0.5% + 2 digits).
Regulation:	<2% for a 20W to 280W power change.
Slew Rate Range:	<3.3Ω/s to >4000Ω/ms

Constant Conductance Mode

Setting Range:	0.01A/V to 40A/V in 2 ranges, set by 10 turn control.
Meter Resolution:	0.001A/V or 0.01A/V depending on range.
Setting Accuracy:	± (0.5% + 2 digits).
Regulation:	<2% for a 20W to 280W power change.
Slew Rate Range:	<33mA/V/s to >400A/V/ms

Constant Voltage Mode

Setting Range:	Vmin to 80V in 2 ranges, set by 10 turn control. Vmin varies with current - see Ratings.
Meter Resolution:	1mV on 8V range, 10mV on 80V range.
Setting Accuracy:	± (0.2% + 2 digits).
Regulation:	<30mV for a 20W to 280W power change.
Slew Rate Range:	<2.5V/s to >800V/ms

Constant Power Mode

Setting Range:	0 to 320W, set by 10 turn control.
Meter Resolution:	1W.
Setting Accuracy:	± (0.5% + 2 W).
Regulation:	<2% for a 20W to 280W power change.
Slew Rate Range:	<0.1W/ms to >3,200W/ms

LEVEL CONTROL

Control Modes:

Level A, Level B, Transient Internal (switching between A and B using the built-in generator), Transient External (switching between A and B using an external switching signal), and Remote (level proportional to an external voltage).

Level A, Level B:

Each set by 10-turn potentiometer. Range, resolution and setting accuracy as shown above.

Slew Rate Control

All changes of level are subjected to slew rate control which is adjustable over a 30,000:1 range by a 3 position switch and vernier.

Input Enable

Latching switch which turns the load condition on.

Slow Start

Engages slew rate control to limit the speed of the ON transition when the input is enabled.

Dropout Voltage

Defines a minimum voltage below which the load current will reduce to zero (as may be required for testing batteries or power sources that can not be short circuited). Adjustable from 0V to 80V.

TRANSIENT GENERATOR

Pulse Repetition Rate: 0.1Hz to 10kHz in 3 overlapping ranges.

Setting Resolution:	0.1Hz, 1Hz, 10Hz depending on range.
Setting Accuracy:	± 2% of range.
Pulse Duty Cycle:	1% to 99% continuously variable.
Sync Output:	Pulse synchronous with transient level change.

DISPLAYS and METERING

Dual 4 digit LED displays showing a variety of settings or measurements as set by a five position switch.

Setting Displays:	Level A and Level B, Frequency and Duty Cycle, Slew Rate and Drop Out.
Measurements:	Amps and Volts, Watts and Ohms (calculated from V and I measurements).
Meter Accuracy:	Voltage ±(0.1% + 1 digit), Current ±(0.2% + 20mA).

REMOTE VOLTAGE SENSE

Remote or Local voltage sensing can be selected via a rear panel switch. Sense connections are on the rear panel terminal block.

Input Impedance:	680kΩ (each input) to load negative.
Max. Voltage Drop:	6 volts.

REMOTE CONTROL

Analogue - the level for any mode can be set by an external analogue voltage (4V full scale).

TTL - the change between the Level A and Level B settings for any mode can be done in response to an external logic signal.

The inputs for analogue or TTL have an impedance of 400kΩ to the power negative terminal and a common mode range of ±100V.

Remote Disable - when the front panel input enable switch is in the on position, this input can be used to turn the load on or off in response to an external logic signal. Fully opto isolated input.

CURRENT MONITOR

An analogue signal representing the current waveform is available for connection to an oscilloscope or external meter. Scaling is 50mV/Amp and compliance is ±3V with respect to the load negative terminal.

PROTECTION

The load incorporates both a power limiter circuit and a fault trip which responds to excess voltage, current, power or temperature. The trip puts the load into a high impedance state. Surge suppressors are incorporated to limit transient voltage spikes.

GENERAL

Rear Terminals:	Input via 6mm terminal/binding posts. Remote sense, current monitor, remote control via terminal block.
Front Terminals:	Input via 4mm terminal/binding posts (30A max.). Current monitor via 4mm sockets.
Power Requirement:	220V - 240V or 110V - 120V ±10%, 50/60Hz. Installation Category II. Consumption 30VA max.
Operating Range:	+5°C to +40°C, 20% to 80% RH.
Storage Range:	-40°C to +70°C.
Environmental:	Indoor use at altitudes up to 2000m. Pollution degree 2.
Safety and EMC:	Complies with EN61010-1 and EN61326.
Size:	130 x 212 x 435mm [HxWxD], (3U x half rack).
Weight:	6kg.
Option:	19-inch rack mount kit.

Accuracy specifications apply for 18°C to 28°C and 50W power.

Thurlby Thandar Instruments Ltd. operates a policy of continuous development and reserves the right to alter specifications without prior notice.

Designed and built in Europe by:

Thurlby Thandar Instruments Ltd.
Glebe Road, Huntingdon. Cambs. PE29 7DR United Kingdom (UK)
Tel: +44 (0)1480 412451 Fax: +44 (0)1480 450409
Email: sales@tti-test.com **Web: www.tti-test.com**

82100-0094