5A 18V bipolar current source
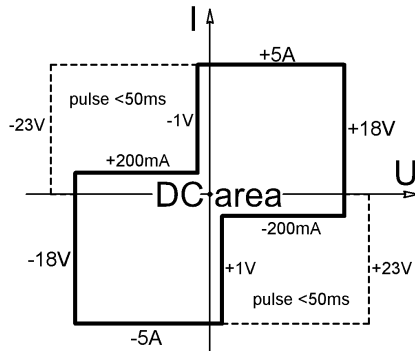
✔ **High Resolution: 19 bits, 20µA**
✔ **Low Noise: 30µAp-p**
✔ **Low drift: ±24ppm within 8 hours**

Main features

- True 4-quadrant current source with programmable saturation voltage.

- Large safe operating area convenient for any inductive load ranging from 0 up to 200mH, no tuning required.
- Programmable current slope.
- Small step settling time at 99,9%: 10ms.
- "Tracking" output signal available for the monitoring of the current settling to a programmable interval

1mA step up and down

tracking down to 20µA within 25ms
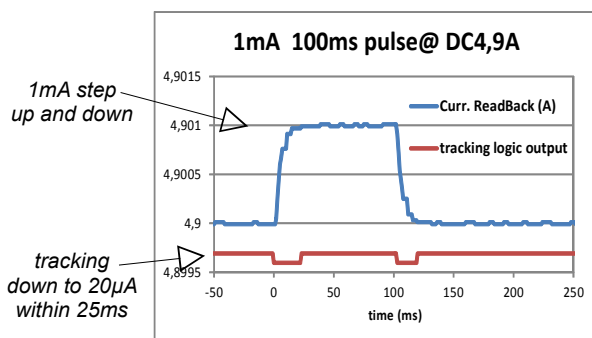
- Synchronization between sources using either network software trigger or hardware trigger input.
- Current setting waveform generator with synchronized current measurement buffer.
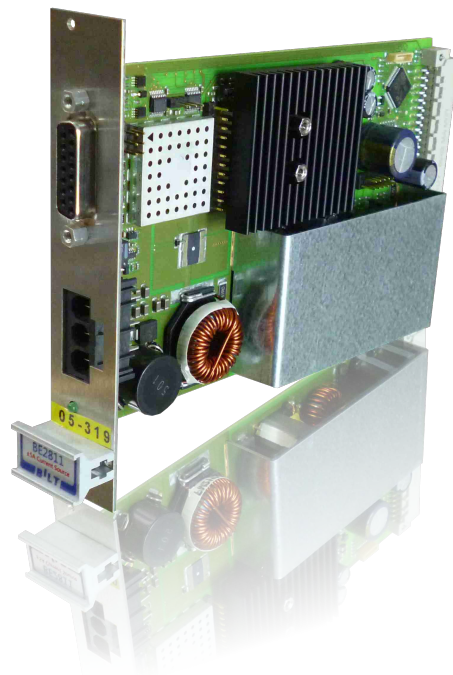
Bilt system features

- Up to 13 BE2811 source modules into a 19" Bilt chassis.
- Host connections at chassis level including Ethernet and USB.
- Complete software package provided, including a turnkey PC software, Labview driver, and tools for developers like C++ Library.

Application examples

- Accurate driving of beam position corrector magnet.
- Laser diode aging test.
- Superconducting coil.

BE2811 module specifications

Operating range

Parameters	Conditions/Comments	Min	Max
Current setting range		-5A	+5A
Saturation voltage setting range	Quadrant I&III, DC operation, see note(1)	1V	18V
Power clamping voltage	Lmax Imax cut off, Quadrant II&IV, pulse < 50ms	22V	23V
Load inductance range	no trimming required	0mH	200mH
Load resistor range		0Ω	50Ω
DC output power	cutoff after 50ms over the limit (Quadrant I&III)		90W
DC sink power limitation	cutoff after 50ms over the limit (Quadrant II&IV)		200mA or 1V
Power efficiency @ Pmax	at chassis level, i.e related to mains input power	55%	
Isolation voltage	Between the source ground and the earth		±1,2V

note(1): for safety purpose only, actual saturation voltage is current dependent: +1,5V maximum gap occurs at open circuit.

Current setting performances

Parameters	Conditions/Comments	Specification
Setting resolution	including polarity bit	19bit (1LSB = 20µA = 4ppm)
Differential linearity error		2ppm
Integral linearity error		40ppm
Long term drift	after 30mn self-heating, Tamb = ±0,5°C, for 8 hours	24ppm
Thermal drift	after 30mn self-heating, within the 16°C-26°C range	±15ppm/°C
Absolute accuracy	guaranteed over 1 year, offset + gain	±1mA ±500ppm of the value

Dynamic performances

All parameters for a 24mH 2Ω load, unless otherwise noted.

| Parameters	Conditions/Comments	Specification
Small step settling time	to 99%, 100mA step, no overshoot to 1 LSB, 1mA step	< 10ms < 50ms
Current slope	programmable	1mA/ms to 100mA/ms
Current Noise	0,1Hz-10Hz, whatever the load or current, p-p 10Hz-10kHz, p-p At switching frequency, 130kHz, p-p	8ppm 20ppm < 4ppm
Spurious free dynamic range	sine wave 10Hz 10mA p-p sine wave 1Hz 2A p-p	> 50dBc > 85dBc
Current glitch at setting update	for 3ms max.	<80µA
Current setting sampling rate	network proceeding continuous setting update	100Hz
	internal buffer reading a waveform	200Hz
Source cutoff time	whatever the load or current	50ms
Hardware trigger in digital delay	delayed current setting, synchronous update	1,2ms

Read-back measurements

Parameters	Conditions/Comments	Specification
Current	measurement and setting have exactly the same specifications and performances (19 bit)	
Voltage	resolution / absolute accuracy	16 bit, LSB= 0,7mV / ±10mV
Sampling period	Current Voltage	3ms 25ms

BE2811 module features

Current setting control

A logic level "tracking" signal indicates that the output update is in progress.
It is set to 1 when the output has settled within a programmable gap tracking interval.
When operating with a noise-free load, the typical small step settling time is 15ms, using a gap tracking interval of ±1 LSB = ±20µA.
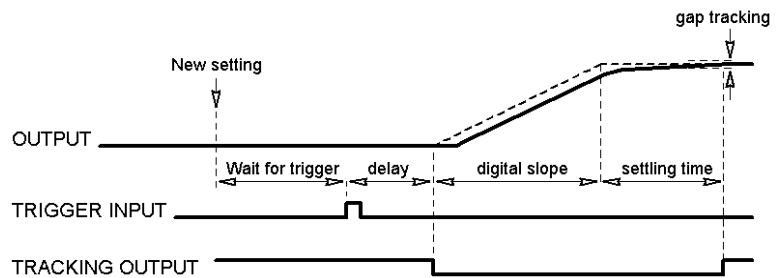
When required, the output update can be delayed by:
- a programmable digital slope/slew rate limitation, useful for maintaining linear operation with large steps and large inductors
- an additional programmable digital delay (0 to 1000ms)
- a wait for external hardware or software trigger; both are available at module level and at chassis level.

Start & Stop

START is processed using slew-rate limitation, in the same way that any setting update at run time.
STOP is processed within 50ms, whatever the current level and the inductance value up to 200mH, using internal power clamp circuitry.

In addition, after the completion of the stop, an internal relay closes the output with a short-circuit to ground: therefore, no output glitch can occur when the device is powered up and down.
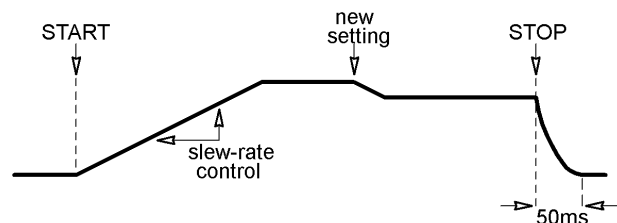
Current waveform generator and current measurement buffer

The waveform buffer contents up to 1024 samples.
The sampling period is programmable from 5ms up to 100ms.
The reading can be one shot or loop for ever.
It starts after a valid software or hardware trigger.
The waveform is processed according to the slew-rate limitation.

The measurement buffers uses also the same trigger:
the writing starts after a valid software or hardware trigger.
3 measurement buffers are available, using different sampling periods: 1ms, 10ms and 100ms, and providing a record duration of 500ms, 5s and 50s.
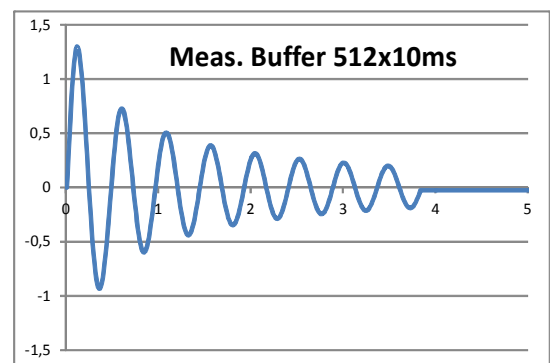
Connections

The front panel of the module is fitted with 2 connectors:

- A 3 pin "SABRE" header from Molex for power output.

- A Dsub15-S connector with both power signals and control signals including:
- Remote voltage measurement
- "ON/OFF" state logic output
- "TRACKING" logic output
- "TRIG IN" input for hardware trigger at module level
- Trigger Out, Tune-, Tune+ spares connections for future purposes

BE2811 module related products and documents

Including this BE2811 model, a range of different modules are available for the purpose of magnet supplying:

Model	Current	Voltage	DC power	Inductance range	Settling	Ripple	Drift	Module size
BE548	±10A	24V	120W	0,5mH - 5mH (tuning required)	60µs	100ppm	100ppm	double
BE549	±2A	50V	40W	50mH - 900mH (tuning required)	75µs	100ppm	100ppm	double
BE2811	±5A	18V	90W	0mH - 200mH (no tuning required)	20ms	7ppm	24ppm	single
BE2812	±15A	8V	120W	0mH - 10mH (no tuning required)	20ms	7ppm	24ppm	double

According to the customer needs, any other combination of specification can be used to design a new model.

Example of Bilt chassis fitted with proper power items convenient for a set of BE2811 modules:

Chassis reference	Module qty per chassis	Rack size (W, H, D)	AC input power	DC output power
BN100 + power Kit BN084	10 modules	19" x 4U x 360mm	1KW 220V	550W
BN100 + power Kit BN073	10 modules	19" x 4U x 360mm	725W 90V-240V	390W
BN103	5 modules	half 19" x 4U x 260mm	330W 90V-240V	180W

note: (Total DC output power << module Qty x maximum module output power)

Documentation			
BE2811 Brochure	1.1	2014/06/12	module data sheet / specifications and main features
BE2811 User Manual	1.1	2014/05/20	module user manual including chassis, network, software, connections description
TE2890 User Manual	1.1	2014/05/20	BE281x modules functional test specification and user manual
BE2811_applinote_A1			
http://www.bilt-system.com/			bilt user manual and any other Bilt modules specification

Standards, Calibration,Warranty, Maintenance & Integration

Bilt system is compliant with CE Standards.
Each module comes with a two-years initial guarantee, which can be increased on request.
Each module is fitted with an on-board memory for complete part tracking, software calibration and test report edition.
iTest develops integrated test benches dedicated for each module, and therefore can proceed on request to on-site check and periodic calibration. The recommended periodicity for regular calibration is two years.
According to the customer requirements, iTest can offer either on-site maintenance or return to workshop maintenance.
When delivering large or dedicated systems, iTest performs on site integration and training for both software and hardware.

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