iC-HS Series

Ultra Short Pulse Laser Drivers

Description

The iC-HS02 and iC-HS05 are high-speed laser diode drivers.

The pulse width can be set from 100 ps to 5 ns. A coarse selector allows pulse width configuration in steps of typically 250 ps. For each coarse step, a fine selector allows further pulse width selection with a resolution of typically 1 ps.

The output pulses are highly independent of supply voltage, temperature and process variations due to internal compensation. For longer pulses, the output driver can be directly controlled via the trigger input.

The output driver delivers up to 200 mA (iC-HS02) or up to 500 mA (iC-HS05) output current. The pulse current amplitude is configured by a 10-bit D/A converter.

A synchronization signal is output either in LVDS or TTL mode. A configurable time delay can be assigned to the synchronization signal.

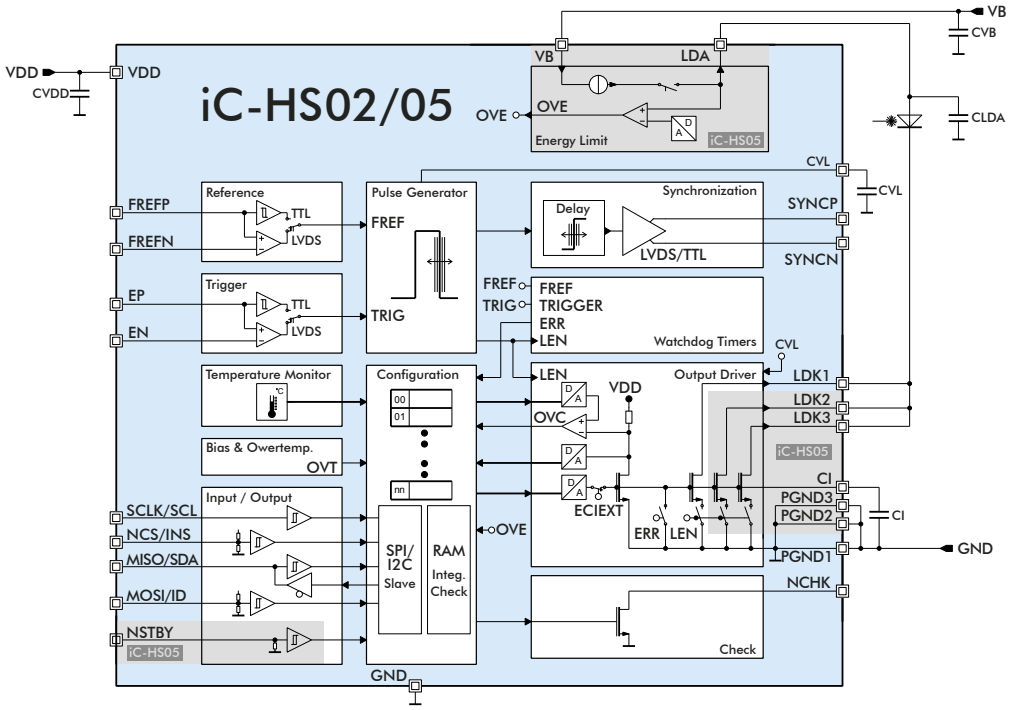
Features

- Pulse width from 100 ps up to 5 ns with 1 ps resolution
- Temperature-stabilized on-chip pulse generation
- Peak laser current up to 200 mA (iC-HS02) or 500 mA (iC-HS05)
- LVDS or TTL synchronization output with programmable delay
- LVDS or TTL trigger input
- Up to 200 MHz repetition frequency in LVDS mode
- Overtemperature and overcurrent safety laser shutdown
- Overenergy safety feature (iC-HS05 only)
- Internal temperature monitor with typically 1°C resolution
- Serial programming interface (SPI or I²C)
- Configuration content verification and validation
- Low power standby mode
- Power supply from 3.3 to 5 V

Applications

- TOF Range Finders
- LIDAR
- Fluorescence spectroscopy
- 3D scanning

Block Diagram



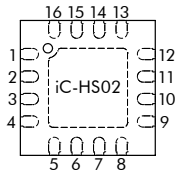
iC-HS Series
Ultra Short Pulse Laser Drivers

Functional Details

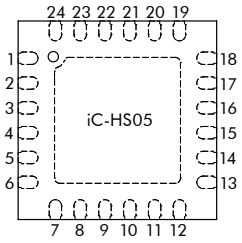
The iC-HS02/05 is configured via either SPI or I²C. I²C supports four device IDs.
The memory configuration is monitored for integrity with the RAM Integrity Check. In case of a RAM integrity violation, a memory error is generated and the driver output is switched off. Memory configuration changes are executed atomically (all at once) by command. This allows full configuration of different registers prior to application to the functional blocks.
An 8-bit digital temperature monitor with typically 1°C resolution is included. iC-HS02/05 has an overtemperature (OVT) safety module. This block shuts down the laser output driver if the internal temperature exceeds 150 °C.
The output current amplitude is monitored by the iC-HS02/05. A safety current limit can be configured. If the pulse current exceeds this limit, an overcurrent (OVC) event is triggered and the laser is shut down.
iC-HS02/05 includes watchdog timers (WDT), monitoring the input reference frequency FREF and the PLL feedback signals. A warning is output when no activity is detected. The pulse-width WDT is enabled when direct access to the output driver through the trigger input is selected. This timer warns if the output pulse width is too large.
iC-HS05 also includes an Energy Limit feature for additional safety. If an overenergy (OVE) event occurs, the laser is automatically shut down.
OVC, OVT, OVE (iC-HS05 only), memory error, and WDT alarms are signalled at pin NCHK.
iC-HS02/05 features a low power stand-by mode.

Pin Configuration

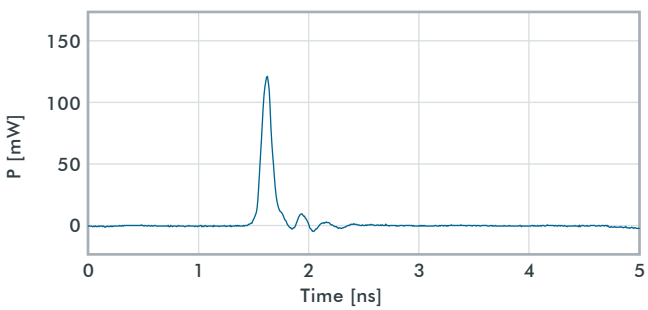
QFN16-3×3



QFN24-4×4



Pulse Sample



Pin Functions iC-HS02

No.	Name	Function
1	CVL	Logic voltage bypass capacitor
2	EN	Trigger, negative LVDS input
3	EP	Trigger, positive LVDS input/Trigger, TTL input
4	NCHK	Check request, active low
5	SCLK/SCL	SPI/I²C Clock
6	NCS/INS	SPI Chip Select, active low I²C or SPI selection input
7	MISO/SDA	SPI Master In Slave Out/I²C Data
8	MOSI/ID	SPI Master Out Slave In/I²C ID
9	FREFP	FREF, positive LVDS input/FREF, TTL input
10	FREFN	FREF, negative LVDS input
11	SYNCP	Synchronization, positive LVDS output Synchronization, TTL output
12	SYNCN	Synchronization, negative LVDS output
13	GND	Ground
14	LDK	Laser Diode Cathode
15	PGND	Power Ground
16	VDD	Supply Voltage
	TP	Thermal Pad

Pin Functions iC-HS05

No.	Name	Function
1	VDD	Supply Voltage
2	CVL	Logic ouput-voltage bypass capacitor
3	CI	CI capacitor
4	EN	Trigger negative LVDS input
5	EP	Trigger positive LVDS input/Trigger TTL input
6	NCHK	Check request, active low
7	SCLK/SCL	SPI/I²C Clock
8	NCS/INS	SPI Chip Select, active low I²C or SPI selection input
9	NSTBY	Stand-by, active low
10	MISO/SDA	SPI Master In Slave Out/I²C Data
11	MOSI/ID	SPI Master Out Slave In
12	GND	Signal Ground
13	FREFP	FREF positive LVDS input/FREF TTL input
14	FREFN	FREF negative LVDS input
15	VB	Energy Limit supply voltage
16	LDA	Laser Diode Anode
17	SYNCP	Synchronization positive LVDS output Synchronization TTL output
18	SYNCN	Synchronization negative LVDS output
19	PGND2	Power Ground channel 2
20	LDK2	Laser Diode Cathode channel 2
21	LDK1	Laser Diode Cathode channel 1
22	PGND1	Power Ground channel 1
23	LDK3	Laser Diode Cathode channel 3
24	PGND3	Power Ground channel 3
	TP	Thermal Pad

Am Kuemmerling 18 · D-55294 Bodenheim, Germany
Phone: +49 (6135) 9292-300 · Fax: +49 (6135) 9292-192
www.ichaus.com