

# iC-HN

## SHORT PULSE 1.4A LASER DRIVER

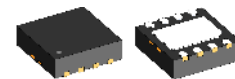
### FEATURES

- ◆ Pulsed operation with up to 1.4 A
- ◆ Spike-free switching of the laser current
- ◆ Operates as switched, voltage-controlled current sink
- ◆ Up to 30 V laser supply voltage
- ◆ LVDS switching input

### APPLICATIONS

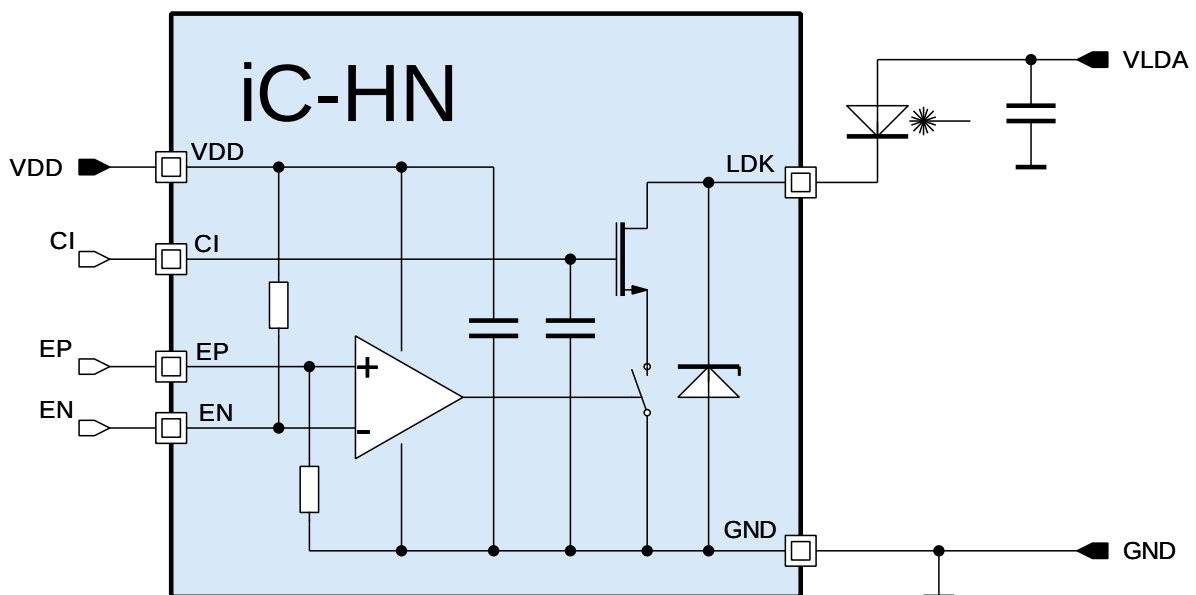
- ◆ TOF Range Finders
- ◆ LIDAR
- ◆ 3D scanning
- ◆ Gesture recognition
- ◆ IR security illumination

### PACKAGES



DFN8  
3 mm x 3 mm x 0.9 mm  
RoHS compliant

### BLOCK DIAGRAM



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### DESCRIPTION

Laser Switch iC-HN enables the spike-free switching of laser diodes with well-defined current pulses.

Pulse width adjustable down to 2 ns.

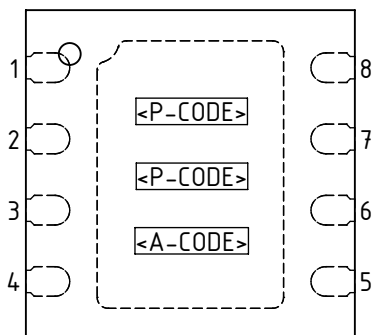
The diode current is determined by the voltage at pin CI.

The switch is controlled via LVDS inputs.

The output channel can be operated up to 1400 mA pulsed current depending on the frequency, duty cycle and heat dissipation.

### PACKAGING INFORMATION

#### PAD LAYOUT



#### PAD FUNCTIONS

##### No. Name Function

|   |     |                               |
|---|-----|-------------------------------|
| 1 | CI  | Current control voltage       |
| 2 | VDD | Supply voltage                |
| 3 | EP  | Positive LVDS switch input    |
| 4 | EN  | Negative LVDS switch input    |
| 5 | GND | Ground                        |
| 6 | GND | Ground                        |
| 7 | LDK | Laser diode cathode           |
| 8 | LDK | Laser diode cathode           |
|   | BP  | Backside Paddle <sup>1)</sup> |

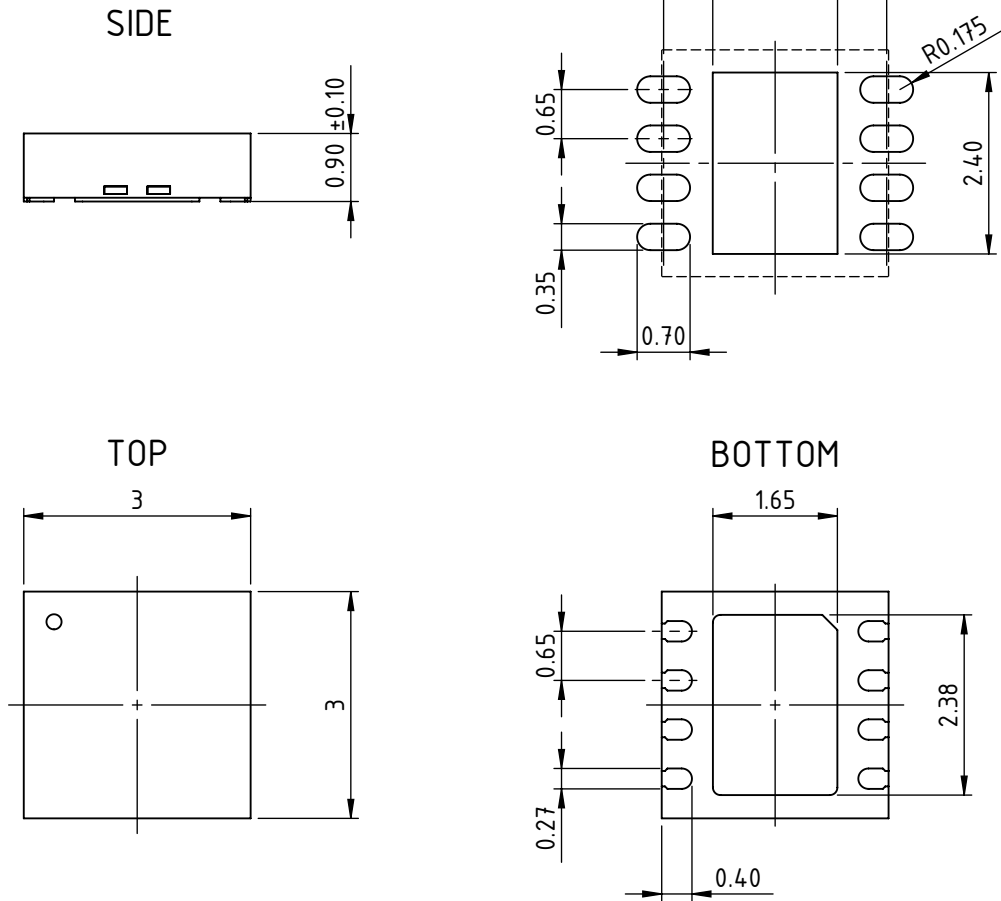
IC top marking: <P-CODE> = product code, <A-CODE> = assembly code (subject to changes);  
 1) The backside paddle is to be connected to a *Ground Plane* (GND) on the PCB.

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## PACKAGE DIMENSIONS

### RECOMMENDED PCB-FOOTPRINT



All dimensions given in mm. Tolerances of form and position according to JEDEC MO-229.

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### ABSOLUTE MAXIMUM RATINGS

Beyond these values damage may occur; device operation is not guaranteed.

| Item No. | Symbol | Parameter                      | Conditions                           | Min.   Max. |      | Unit |
|----------|--------|--------------------------------|--------------------------------------|-------------|------|------|
|          |        |                                |                                      | Min.        | Max. |      |
| G001     | VDD    | Voltage at VDD                 |                                      | -0.2        | 6    | V    |
| G002     | V(LDK) | Voltage at LDK                 |                                      | -0.2        | 30.5 | V    |
| G003     | V()    | Voltage at EP, EN, CI          |                                      | -0.3        | 6    | V    |
| G004     | Vd()   | ESD Susceptibility at all pins | HBM 100 pF discharged through 1.5 kΩ |             | 2    | kV   |
| G005     | Tj     | Operating Junction Temperature |                                      | -40         | 125  | °C   |
| G006     | Ts     | Storage Temperature Range      |                                      | -40         | 150  | °C   |

### THERMAL DATA

| Item No. | Symbol | Parameter                           | Conditions | Min.   Typ.   Max. |      |      | Unit |
|----------|--------|-------------------------------------|------------|--------------------|------|------|------|
|          |        |                                     |            | Min.               | Typ. | Max. |      |
| T01      | Ta     | Operating ambient temperature range |            | -40                |      | 105  | °C   |

All voltages are referenced to ground unless otherwise stated.

All currents flowing into the device pins are positive; all currents flowing out of the device pins are negative.

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## SHORT PULSE 1.4A LASER DRIVER



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### ELECTRICAL CHARACTERISTICS

Operating Conditions: VDD = 3.0...5.5 V, Tj = -40...105 °C unless otherwise stated

| Item No.                     | Symbol    | Parameter                           | Conditions                                       |      |      |           | Unit |
|------------------------------|-----------|-------------------------------------|--|------|------|-----------|------|
|                              |           |                                     |  | Min. | Typ. | Max.      |      |
| <b>Total Device</b>          |           |                                     |  |      |      |           |      |
| 001                          | VDD       | Permissible supply voltage          |  | 3    |      | 5.5       | V    |
| 002                          | I(VDD)    | Supply current in VDD               | static   |      |      | 7         | mA   |
| 003                          | Vc(LDK)hi | Clamp voltage hi at LDK             | I() = 100 mA, t < 100 ms<br>I(LDK) = 2 mA        | 32   | 35.5 | 40        | V    |
|                              |           |                                     |  | 30.5 |      | 38        | V    |
| 004                          | Vc()lo    | Clamp voltage lo at LDK, VDD        | I() = -10 mA                                     | -1.6 |      | -0.2      | V    |
| 005                          | Vc()hi    | Clamp voltage hi at CI, EP, EN      | I() = 1 mA, t < 100 ms                           | 7    | 8    | 9         | V    |
| 006                          | Vc()lo    | Clamp voltage lo at CI, EP, EN      | I() = -1 mA                                      | -1.6 |      | -0.3      | V    |
| <b>Laser switch LDK, CI</b>  |           |                                     |  |      |      |           |      |
| 101                          | I(LDK)    | Permissible pulse current in LDK    | Min. Pulse-Pause Ratio 1:10                      |      |      | 1.4       | A    |
| 102                          | Vs(LDK)   | Saturation voltage at LDK           | I(LDK) = 1.26 A,<br>V(CI) = V(CI)@I(LDK) = 1.4 A |      |      | 2         | V    |
| 103                          | I0(LDK)   | Leakage current in LDK              | V(LDK) < 30 V                                    |      |      | 100       | µA   |
| 104                          | tr()      | LDK current rise time               | Iop(LDK) = 1.4 A, I(LDK): 10% → 90% Iop          |      |      | 1         | ns   |
| 105                          | tf()      | LDK current fall time               | Iop(LDK) = 1.4 A, I(LDK): 90% → 10% Iop          |      |      | 1         | ns   |
| 106                          | tp()      | Propagation delay<br>V(EP) → I(LDK) | Differential LVDS Rise and Fall Time < 0.5 ns    |      | 5    |           | ns   |
| 107                          | V(CI)     | Permissible voltage at CI           |  | 0    |      | 5.5       | V    |
| 108                          | Vt(CI)    | Threshold voltage at CI             | I(LDK) < 20 mA                                   | 0.4  |      | 1.2       | V    |
| 109                          | V(CI)     | Operating voltage at CI             | I(LDK) = 1.4 A, V(LDK) > 2.3 V                   |      |      | 3         | V    |
| 110                          | Rpd(CI)   | Pull-down resistor at CI            |  | 200  | 500  | 1250      | kΩ   |
| 111                          | C(CI)     | Capacitance at CI                   |  |      | 1    |           | nF   |
| <b>LVDS Interface EP, EN</b> |           |                                     |  |      |      |           |      |
| 201                          | Rpd(EP)   | Pull-down resistor at EP            |  | 80   | 200  | 500       | kΩ   |
| 202                          | Rpu(EN)   | Pull-up resistor at EN              |  | 80   | 200  | 500       | kΩ   |
| 203                          | Vdiff     | Differential voltage LVDS           | Vdiff =  V(EP) – V(EN)                           | 200  |      |           | mV   |
| 204                          | V()       | Input voltage range LVDS            |  | -0.2 |      | VDD + 0.2 | V    |
| 205                          | tp()      | Pulse width at EP, EN               | Differential LVDS Rise and Fall Time < 0.5 ns    | 2    |      | 500       | ns   |
| <b>Power On</b>              |           |                                     |  |      |      |           |      |
| 301                          | VON       | Power-on voltage VDD                | rising voltage                                   |      |      | 2.9       | V    |
| 302                          | VOFF      | Power-down voltage VDD              | falling voltage                                  | 1.2  |      |           | V    |
| 303                          | Vhys      |                                     |  | 50   |      | 800       | mV   |

**LASER OUTPUT**

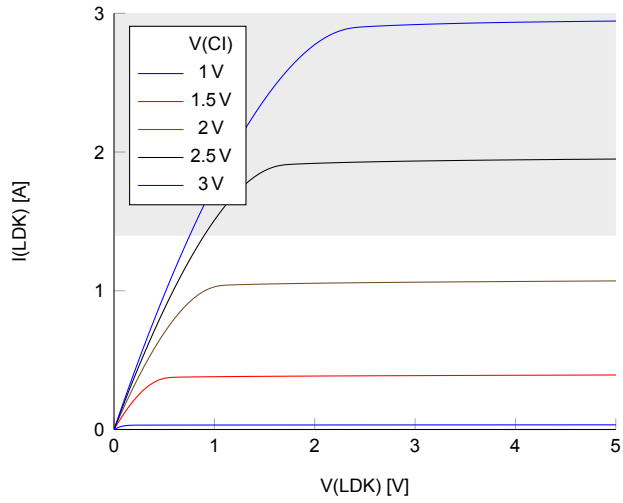


Figure 1: Output characteristics of LDK

**ANALOG CURRENT**

The voltage at pin CI sets the current in pin LDK. Figures 2 and 3 show the temperature dependency of the LDK output current versus the voltage at CI for a *typical*

device. Figures 4 and 5 show the min., typ. and max. variations between devices at 27 °C temperature. The voltage at pin LDK is 2.5 V.

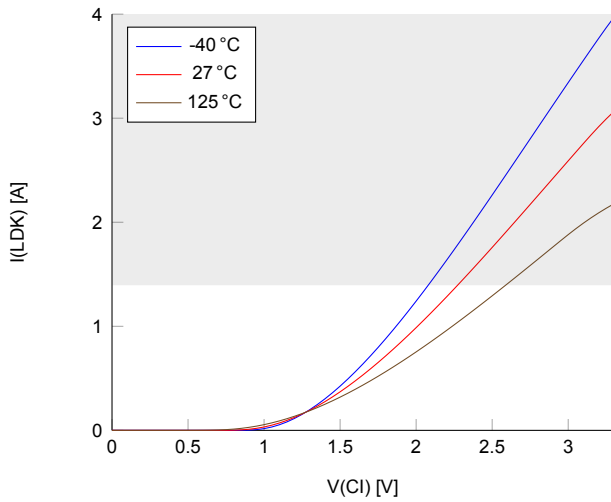


Figure 2: I(LDKx) vs. V(CIx) at VDD = 3.3 V

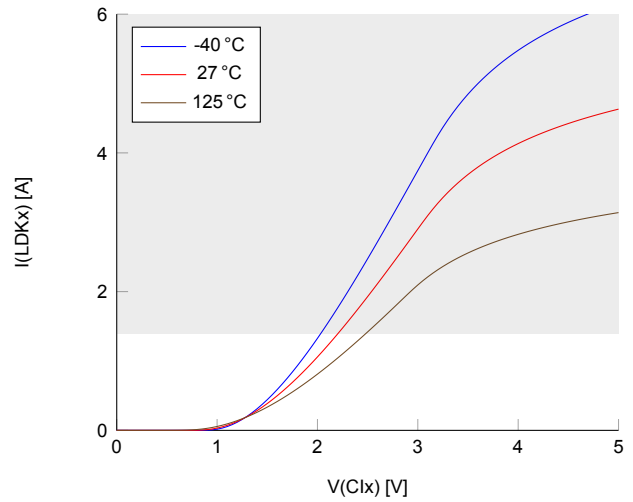


Figure 3: I(LDKx) vs. V(CIx) at VDD = 5 V

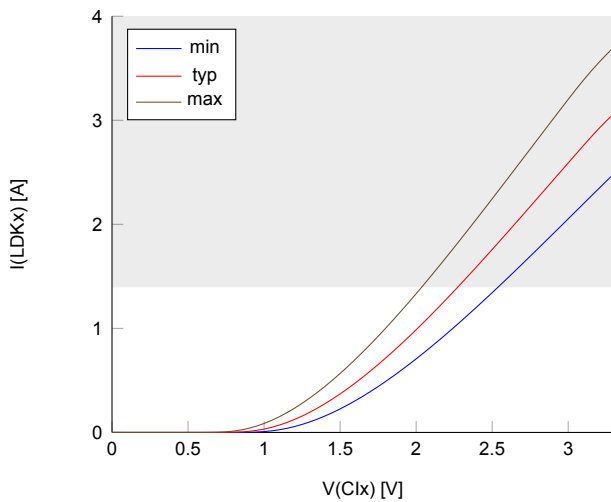


Figure 4: I(LDKx) vs. V(CIx) at VDD = 3.3 V

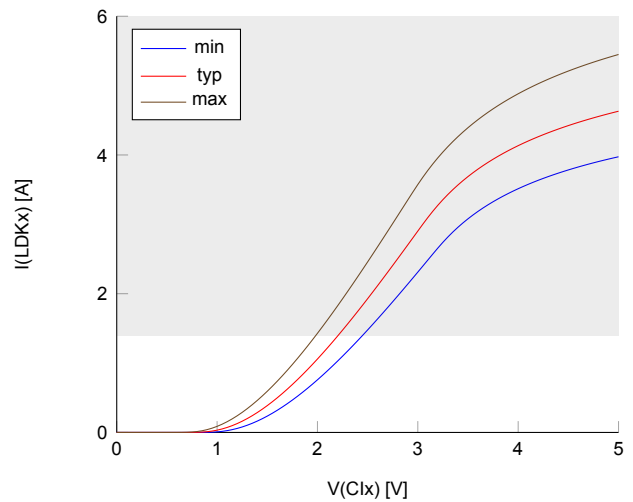


Figure 5: I(LDKx) vs. V(CIx) at VDD = 5 V

### DESIGN REVIEW: Notes On Chip Functions

| HN No. | Chip release Y, W<br>Function, Parameter/Code | Description and Application Hints |
|--------|---|-----------------------------------|
|        |   | None at time of printing.         |

Table 1: Design review

### REVISION HISTORY

| Rel. | Rel. Date * | Chapter | Modification    | Page |
|------|-------------|---------|-----------------|------|
| A1   | 2017-11-21  |         | Initial release |      |

| Rel. | Rel. Date * | Chapter                    | Modification       | Page |
|------|-------------|----------------------------|--------------------|------|
| B1   | 2018-06-05  | BLOCK DIAGRAM              | Pin VLDA removed   | 1    |
|      |             | PACKAGING INFORMATION      | Pad layout changed | 2    |
|      |             | ABSOLUTE MAXIMUM RATINGS   | VLDA removed       | 3    |
|      |             | ELECTRICAL CHARACTERISTICS | VLDA removed       | 4    |

| Rel. | Rel. Date * | Chapter                                | Modification         | Page |
|------|-------------|--|----------------------|------|
| C1   | 2023-10-25  | ELECTRICAL CHARACTERISTICS             | Item No. 111 updated | 5    |
|      |             | LASER OUTPUT                           | New                  | 6    |
|      |             | ANALOG CURRENT                         | New                  | 7    |
|      |             | DESIGN REVIEW: Notes On Chip Functions | New                  | 8    |

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\* Release Date format: YYYY-MM-DD



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### ORDERING INFORMATION

| Type                | Package   | Order Designation |
|---------------------|---|-------------------|
| iC-HN               | 8-pin DFN, 3 mm x 3 mm,<br>0.9 mm thickness<br>RoHS compliant | iC-HN DFN8-3x3    |
| Evaluation<br>Board | High-speed module for laser diodes                            | iC-HN iCSY HN1M   |

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