iC-HK

155MHz LASER SWITCH

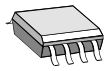
FEATURES

- Laser switch for frequencies from CW up to 155MHz
- Spike-free switching of the laser current
- Dual switching inputs with independent current control
- Operates as a voltage-controlled current source
- Pulsed operation with up to 700mA per channel
- CW operation with up to 150mA per channel
- Simple power control at pin CI
- Control to the mean of the laser power in conjunction with iC-WK (CW laser diode driver)
- Supplement to iC-WK for pulsed operation
- Thermal shutdown
- Protection against ESD
- Extended temperature range available as an option

APPLICATIONS

- Data transmission
- Laser scanning devices
- Optical storage devices

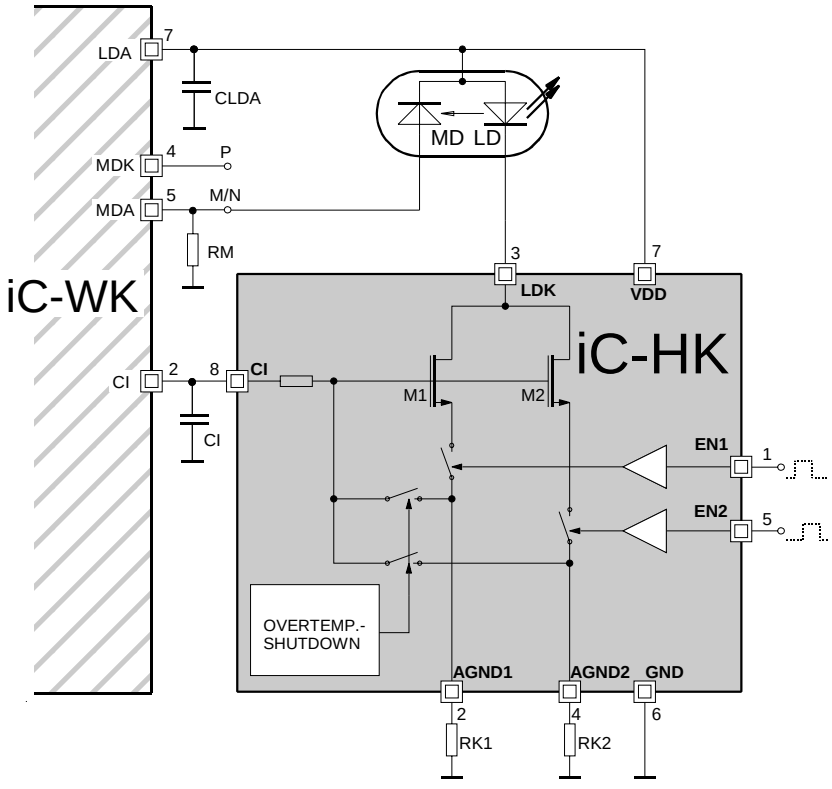
PACKAGES



SO8
thermal pad

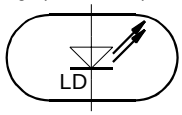
MSOP8
thermal pad

BLOCK DIAGRAM



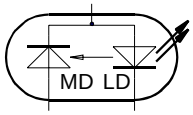
Suitable laser diode configurations:

Operation with constant voltage (uncontrolled):



Operation in conjunction with iC-WK (power controlled):

N



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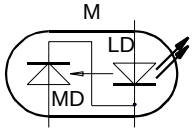

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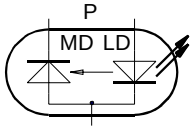

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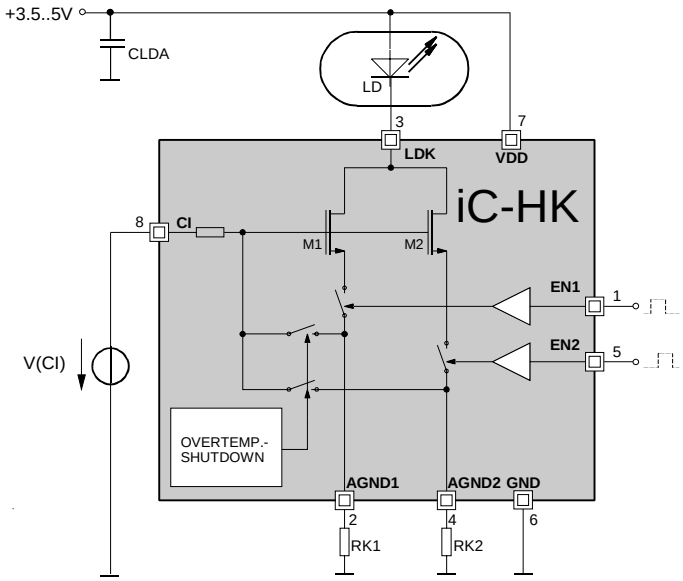
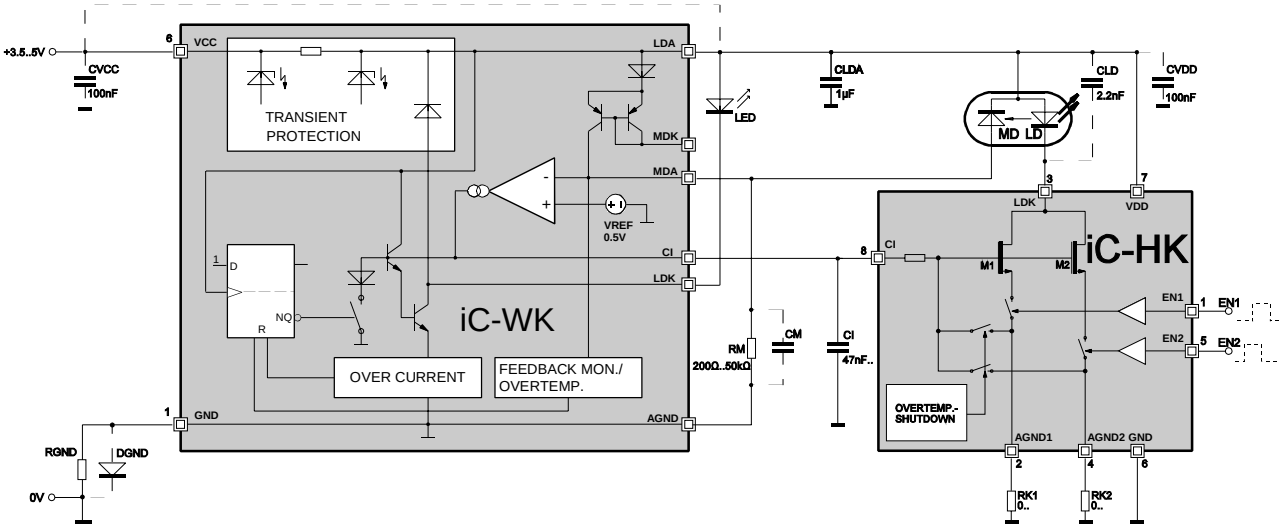
DESCRIPTION

Laser Switch iC-HK enables the spike-free switching of laser diodes with well-defined current pulses at frequencies ranging from DC to 155MHz.
The diode current is determined by the voltage at pin CI and by the resistors RK1 and RK2. The two fast switches are controlled independently via CMOS inputs EN1 and EN2. The laser diode can thus be turned on and off or switched between different current levels defined by the ratio of RK1 and RK2.
Each channel can be operated on 150mA DC and up to 700mA pulsed current depending on the frequency, duty cycle and heat dissipation.
The integrated thermal shutdown feature prevents damage from excessive temperature.



Operation as a voltage-controlled current source

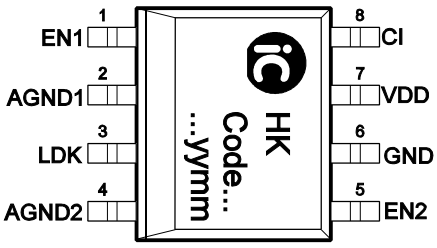
iC-HK supplements the laser diode driver iC-WK which uses the monitor current of the laser diode to control the laser power. iC-WK therefore controls the voltage at pin CI in such a way that the mean value of the emitted laser power is constant (APC), providing there is a constant duty cycle and a switching frequency of greater than 100kHz.



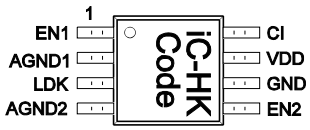
Operation of iC-HK in conjunction with CW driver iC-WK (see application information for optional parts/connections)

PACKAGES SO8tp, MSOP8tp to JEDEC-Standard

PIN CONFIGURATION SO8tp (with thermal pad)
(top view)



PIN CONFIGURATION MSOP8tp 3mm (with thermal pad)
(top view)



PIN FUNCTIONS

No.	Name	Function
1	EN1	Channel 1 Switching Input
2	AGND1	Channel 1 Reference Ground
3	LDK	Driver Output (LD Cathode)
4	AGND2	Channel 2 Reference Ground
5	EN2	Channel 2 Switching Input
6	GND	Ground
7	VDD	+5V Supply Voltage
8	CI	Voltage Reference for Current Control

ABSOLUTE MAXIMUM RATINGS

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

Item	Symbol	Parameter	Conditions	Fig.	Min.	Max.	Unit
G001	VDD	Voltage at VDD			-0.7	6	V
G002	I(VDD)	Current in VDD			-10	150	mA
G003	V(CI)	Voltage at CI			-0.7	6	V
G004	I(LDK)	Current in LDK	DC current		-10	300	mA
G005	I(AGND1)	Current in AGND1	DC current		-150	10	mA
G006	I(AGND2)	Current in AGND2	DC current		-150	10	mA
G007	V()	Voltage at LDK, EN1, EN2, AGND1 and AGND2			-0.7	6	V
EG01	Vd()	Susceptibility to ESD at all pins	Mil. Std. 883, Method 3015, HBM 100pF discharged through 1.5kΩ			1	kV
TG01	Tj	Operating Junction Temperature			-40	150	°C
TG02	Ts	Storage Temperature Range			-40	150	°C

THERMAL DATA

Operating Conditions: VDD= 3.5..5.5V

Item	Symbol	Parameter	Conditions	Fig.	Min.	Typ.	Max.	Unit
T1	Ta	Operating Ambient Temperature Range (extended range on request)			-25		85	°C
T1	Rthja	Thermal Resistance Chip/Ambient (SO8)	soldered to PCB, no additional cooling areas				170	K/W
			therm. pad soldered to approx. 2cm² cooling area			30	50	K/W
T2	Rthja	Thermal Resistance Chip/Ambient (TSSOP8)	soldered to PCB, therm. pad soldered to approx. 2cm² cooling area			30	60	K/W

All voltages are referenced to ground unless otherwise stated.
All currents into the device pins are positive; all currents out of the device are negative.

ELECTRICAL CHARACTERISTICS

Operating Conditions: VDD= 3.5..5.5V, Tj= -25..125°C unless otherwise stated

Item	Symbol	Parameter	Conditions	Tj °C	Fig.	Min.	Typ.	Max.	Unit
Total Device									
001	VDD	Permissible Supply Voltage				3.5		5.5	V
002	I(VDD)	Supply Current in VDD	CW operation			0		80	µA
003	I(VDD)	Supply Current in VDD	pulsed operation, f(EN1, EN2)= 150MHz			0		150	mA
004	V(LDK)	Permissible Voltage at LDK				0		5.5	V
005	Vc(CI)hi	Clamp Voltage hi at CI	Vc(CI)= V(CI)- VDD, I(CI)= 10mA, other pins open			0.4		1.25	V
006	Vc(EN)hi	Clamp Voltage hi at EN1, EN2	Vc(EN)= V(EN)- VDD, I(EN)= 1mA, other pins open			0.4		1.25	V
007	Vc()lo	Clamp Voltage lo at VDD, LDK, CI, EN1, EN2, AGND1, AGND2	I()= -10mA, other pins open			-1.25		-0.4	V
008	Ipd()	Pull-Down Current at CI, EN1, EN2				1		5	µA
009	Toff	Overtemperature Shutdown				120		150	°C
Laser Control LDK, CI, EN1, EN2									
101	Icw(LDK)	Permissible CW Current in LDK (per channel)						150	mA
102	Ipk(LDK)	Permissible Pulsed Current in LDK (per channel)	f > 100kHz, t_{hi}/T > 1:10					700	mA
103	I(LDK)rk	Current in LDK in reference to resistor RK (per channel)	V(CI)= 1.75V, Tj= 27°C; ton= 1ms RKx= 0Ω RKx= 1Ω RKx= 2Ω RKx= 5Ω RKx= 10Ω RKx= 50Ω		2	 54 47 40 28 20 3.8	 80 64 57 41 28 10	 115 95 79 56 36 13	 mA mA mA mA mA mA
104	I(LDK)ci	Current in LDK in reference to the voltage at CI (per channel)	RKx= 0Ω, Tj= 27°C; ton= 1ms V(CI)= 1.5V V(CI)= 1.75V V(CI)= 2V V(CI)= 3V V(CI)= 4V V(CI)= 5V		2-6	 28 54 85 275 456 655	 45 80 120 340 590 835	 70 115 168 410 788 1050	 mA mA mA mA mA mA
105	tk	I(LDK) Temperature Coefficient					0.5		%/K
106	Vs(LDK)	Saturation Voltage at LDK	I(LDK)= 40mA I(LDK)= 60mA I(LDK)= 150mA					1.2 1.3 1.5	V V V
107	I0(LDK)	Leakage Current in LDK	ENx= lo, V(LDK)= VDD				0	10	µA
108	tr()	LDK Current Rise Time	Iop= 150mA, I(LDK): 10% → 90%Iop		1			1.5	ns
109	tf()	LDK Current Fall Time	Iop(LDK)= 150mA, I(LDK): 90% → 10%Iop		1			1.5	ns
110	tp()	Propagation Delay V(ENx) → I(LDK)	ENx hi ↔ lo, V(50%) → I(50%)			1		3	ns
111	Vt(ENx)	Input Threshold Voltage				33	50	77	%VDD
112	V(CI)	Permissible Voltage at CI				0		5.5	V
113	Vt(CI)	Threshold Voltage at CI	I(LDK)< 5mA			0.75		1.15	V
114	CR()	Current Matching Channel1/Channel2	V(CI)= 0..VDD, I(LDK)= 30..300mA, RK1= RK2			0.95	1	1.05	

ELECTRICAL CHARACTERISTICS DIAGRAMS

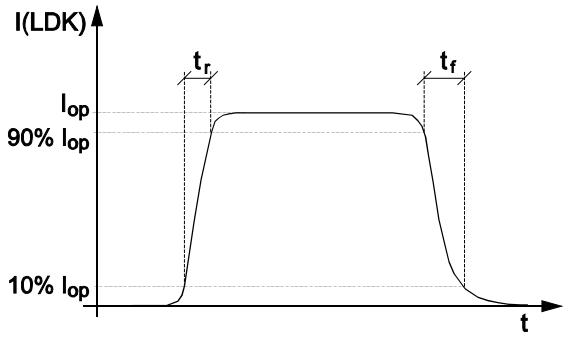


Fig. 1: Laser current pulse in LDK

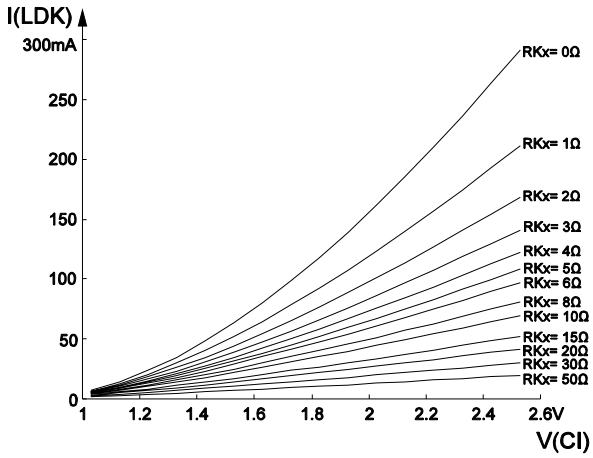


Fig. 2: Diode current vs V(Cl) at Tj= 27°C

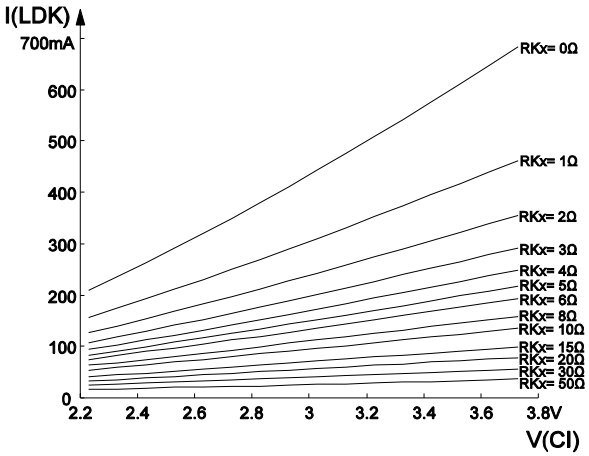


Fig. 3: Diode current vs V(Cl) at Tj= 27°C

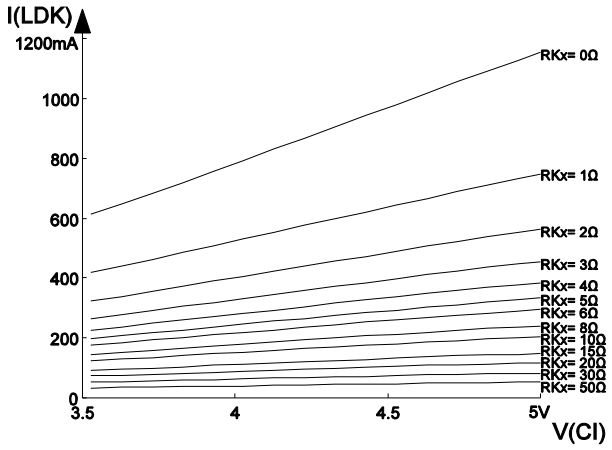


Fig. 4: Diode current vs V(Cl) at Tj= 27°C

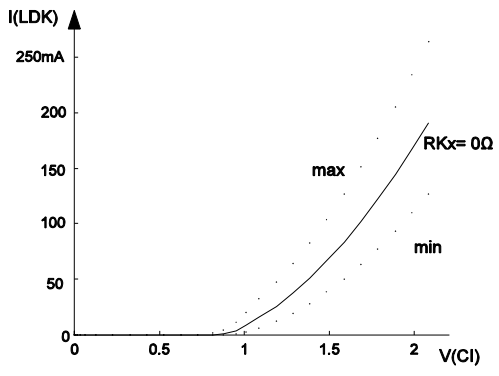


Fig. 5: Diode current variation vs V(Cl) at V(LDK)= 3V

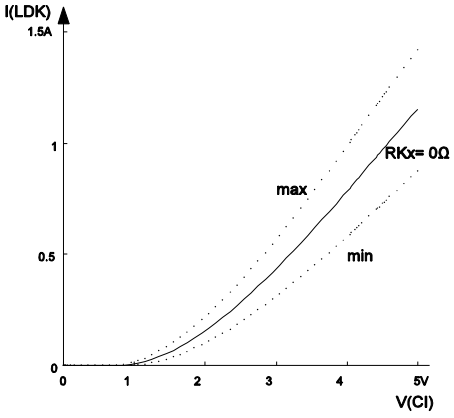


Fig. 6: Diode current variation vs V(Cl) at V(LDK)= 3V

DESCRIPTION OF FUNCTIONS

Laser current dependency of V(Cl), RK1, RK2
Depending on the laser diode different diode currents are necessary to obtain the required laser power.
The values for V(Cl), RK1 and RK2 can be determined for the required diode current at room temperature from the opposite diagram. A parallel to the x axis must be drawn through the desired diode current. Either RKx can be obtained for a required value of V(Cl) or the respective value of V(VI) can be achieved for a given RKx.

Thermal Shutdown
iC-HK is protected by an integrated thermal shutdown feature. When the shutdown temperature is reached both channels are locked.

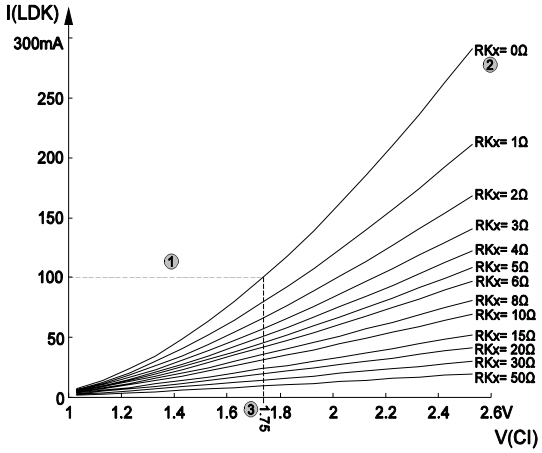


Fig. 7: Diode current vs V(Cl) at Tj= 27°C

APPLICATION NOTES

Application notes for iC-HK are available as a separate document.

ORDERING INFORMATIONS

Type	Package	Order designation
iC-HK	SO8tp MSOP8tp	iC-HK SO8 iC-HK MSOP8

For information about prices, terms of delivery, other packaging options etc., please contact:

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