iC-HK, iC-HKB
155 MHz LASER SWITCH

FEATURES

♦ Laser switch for frequencies from CW up to 155 MHz
♦ 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 700 mA per channel
♦ CW operation with up to 150 mA per channel
♦ Simple power control at pin CI
♦ Thermal shutdown
♦ Protective ESD circuitry
♦ **iC-HKB** for driving **blue laser diodes**
♦ Option: extended temperature range

APPLICATIONS

♦ Data transmission
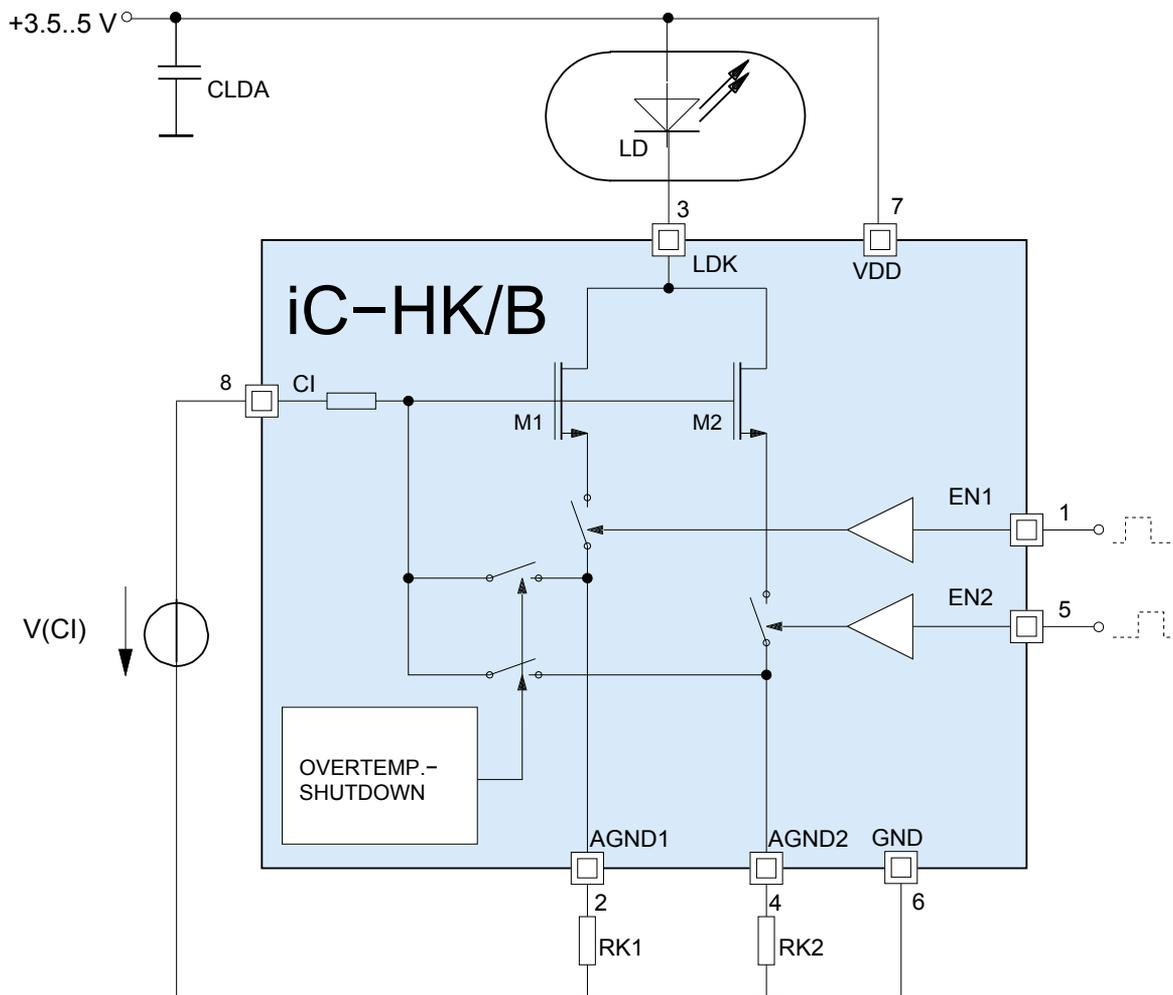♦ Laser scanning devices
♦ Optical storage devices

PACKAGES

SO8
thermal pad

MSOP8
thermal pad

BLOCK DIAGRAM

iC-HK, iC-HKB
155 MHz LASER SWITCH

DESCRIPTION

Laser Switch iC-HK/B enables the spike-free switching of laser diodes with well-defined current pulses at frequencies ranging from DC to 155 MHz.

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 at 150 mA DC and up to 700 mA pulsed current depending on the frequency, duty cycle and heat dissipation.

The integrated thermal shutdown feature prevents damage from excessive temperature.

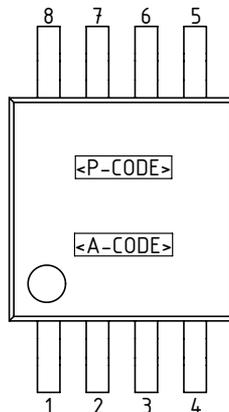## PACKAGING INFORMATION SO8-TP, MSOP8-TP to JEDEC

PIN CONFIGURATION SO8-TP

PIN CONFIGURATION MSOP8-TP
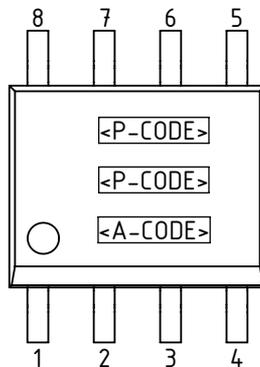
PIN FUNCTIONS

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	+5 V Supply Voltage
8	CI	Voltage Reference for Current Control

The *Thermal Pad* is to be connected to a Ground Plane on the PCB.

iC-HK, iC-HKB
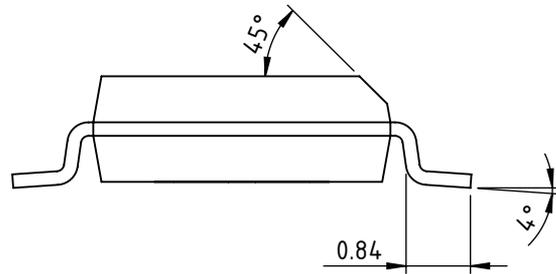## 155 MHz LASER SWITCH

iC-Haus

PACKAGE DIMENSIONS SO8-TP

SIDE
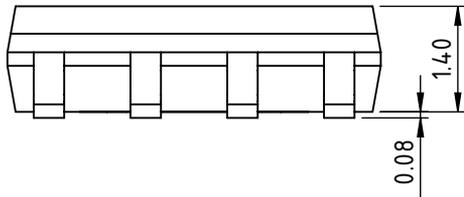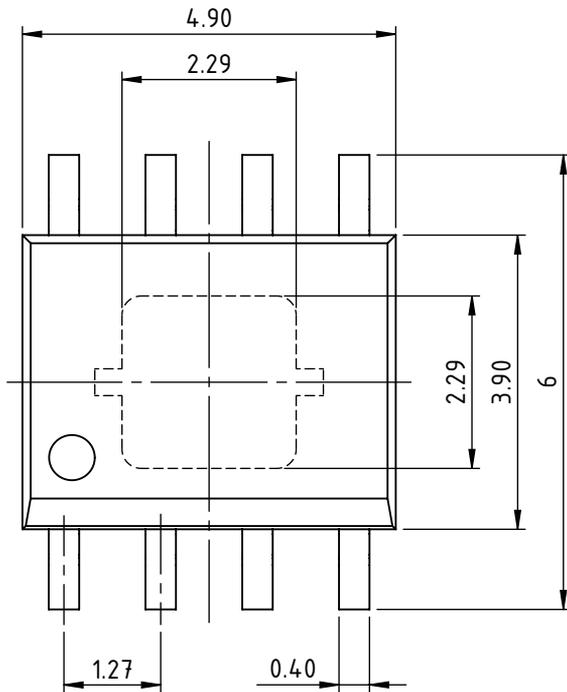
1.40
0.08

FRONT

45°
4°
0.84

TOP

4.90
2.29
2.29
3.90
6
1.27
0.40

RECOMMENDED PCB-FOOTPRINT

2.40
2.40
5.40
1.27
0.60
1.90
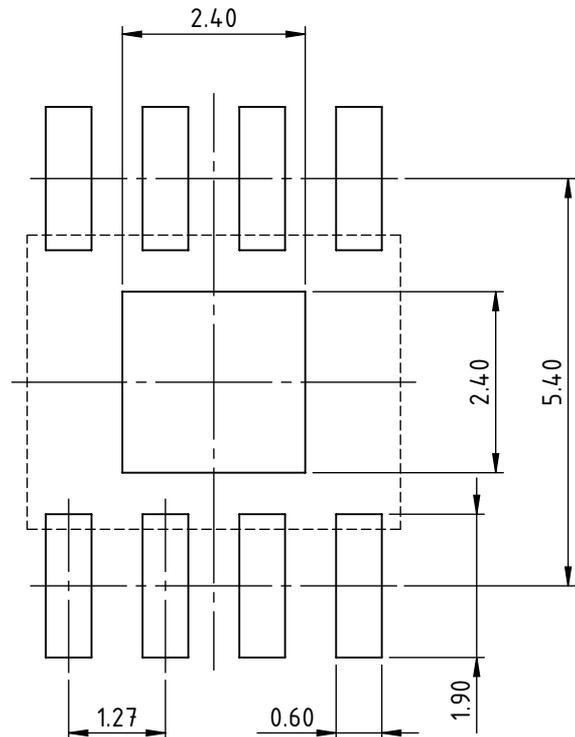
All dimensions given in mm. Tolerances of form and position according to JEDEC MS-012

dra_so8-tp-3_pack_1, 10:1

iC-HK, iC-HKB
155 MHz LASER SWITCH

PACKAGE DIMENSIONS MSOP8-TP

SIDE

0.85

0.08

FRONT

0.60

4°

TOP

3

2.39

1.73

3

4.90

0.65

0.30

RECOMMENDED PCB-FOOTPRINT

2.40

1.75

4

1.60

0.65

0.40
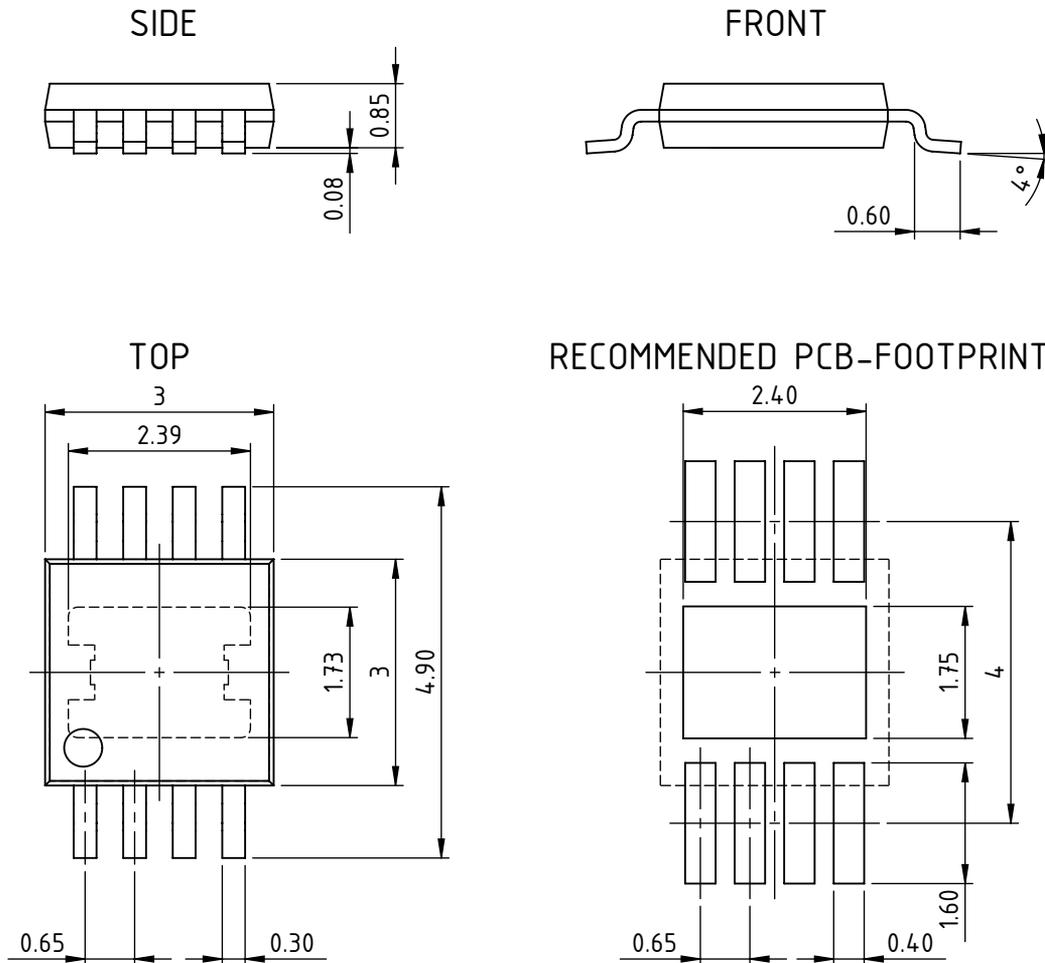
All dimensions given in mm. Tolerances of form and position according to JEDEC MO-187.   dra_msop8-tp-1_pack_1, 10:1

iC-HK, iC-HKB
155 MHz LASER SWITCH

ABSOLUTE MAXIMUM RATINGS

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

Item No.	Symbol	Parameter	Conditions	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 EN1, EN2, AGND1 and AGND2		-0.7	6	V
G008	V(LDK)	Voltage at LDK	**iC-HK**	-0.7	6	V
			iC-HKB	-0.7	15	V
G009	Vd()	Susceptibility to ESD at all pins	HBM, 100 pF discharged through 1.5 kΩ		1	kV
G010	Tj	Operating Junction Temperature		-40	150	°C
G011	Ts	Storage Temperature Range		-40	150	°C

THERMAL DATA

Operating Conditions: VDD = 3.5...5.5 V

Item No.	Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
T01	Ta	Operating Ambient Temperature Range (extended range on request)		-25		85	°C
T02	Rthja	Thermal Resistance Chip/Ambient (SO8)	soldered to PCB, no additional cooling areas therm. pad soldered to approx. 2 cm² cooling area		30	170 50	K/W K/W
T03	Rthja	Thermal Resistance Chip/Ambient (MSOP8)	soldered to PCB, therm. pad soldered to approx. 2 cm² cooling area		30	60	K/W

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.

iC-HK, iC-HKʙ
155 MHz LASER SWITCH

ELECTRICAL CHARACTERISTICS

Operating Conditions: VDD = 3.5...5.5 V, Tj = -40...125 °C unless otherwise stated

Item No.	Symbol	Parameter	Conditions	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) = 150 MHz	0		150	mA
004	V(LDK)	Permissible Voltage at LDK	**iC-HK** **iC-HKB**	0 0		5.5 12	V V
005	Vc(CI)hi	Clamp Voltage hi at CI	Vc(CI) = V(CI) – VDD, I(CI) = 10 mA, 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) = 1 mA, other pins open	0.4		1.25	V
007	Vc()lo	Clamp Voltage lo at VDD, LDK, CI, EN1, EN2, AGND1, AGND2	I() = -10 mA, other pins open	-1.25		-0.4	V
008	Ipd()	Pull-Down Current at CI, EN1, EN2		1		5	µA
009	Toff	Overtemperature Shutdown		110		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 > 100 kHz, thi/T < 1:10			700	mA
107	Vs(LDK)	Saturation Voltage at LDK	I(LDK) = 40 mA I(LDK) = 60 mA I(LDK) = 150 mA, **iC-HK** I(LDK) = 150 mA, **iC-HKB**			1.2 1.3 1.5 1.8	V V V V
108	I0(LDK)	Leakage Current in LDK	ENx = lo, V(LDK) = VDD		0	10	µA
109	tr()	LDK Current Rise Time	Iop = 150 mA, I(LDK): 10% → 90%Iop, cf. Fig. 3			1.5[*]	ns
110	tf()	LDK Current Fall Time	Iop(LDK) = 150 mA, I(LDK): 90% → 10%Iop, cf. Fig. 3			1.5[*]	ns
111	tp()	Propagation Delay V(ENx) → I(LDK)	ENx hi ↔ lo, V(50%) → I(50%)	1[*]		3[*]	ns
112	Vt(ENx)	Input Threshold Voltage		33	50	67	%VDD
113	V(CI)	Permissible Voltage at CI	 RKx ≤ 1 Ω	0 0		3.5 5.5	V V
114	Vt(CI)	Threshold Voltage at CI	I(LDK) < 5 mA Tj = -40 °C	0.75		1.15 1.25	V V
115	CR()	Current Matching Channel1/Channel2	V(CI) = 0...VDD, I(LDK) = 30...300 mA, RK1 = RK2 Tj = -40 °C	0.9	1	1.1 1.2	

---

[*] Projected values by sample characterization

iC-HK, iC-HKʙ
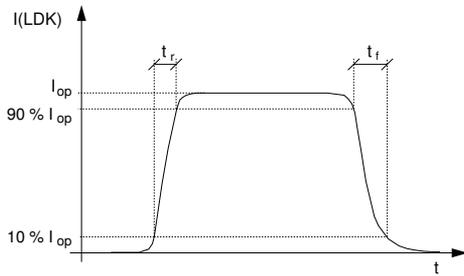## 155 MHz LASER SWITCH

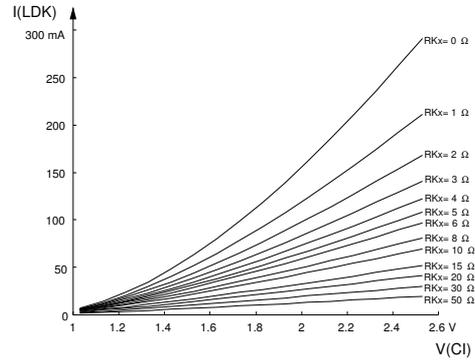## ELECTRICAL CHARACTERISTICS DIAGRAMS

Figure 1: Laser current pulse in LDK
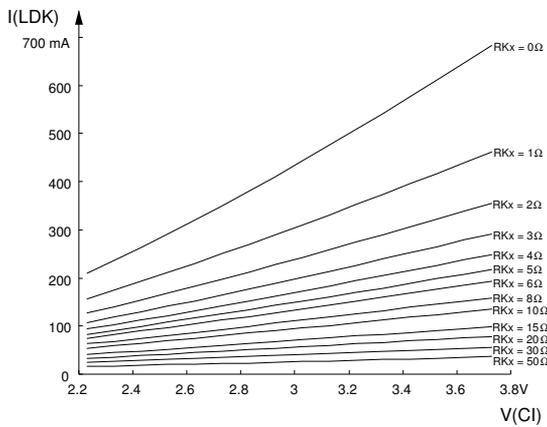
Figure 2: Diode current vs. V(CI) at Tj = 27 °C
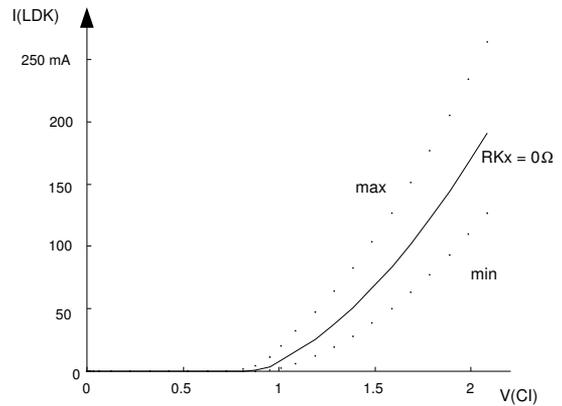
Figure 3: Diode current vs. V(CI) at Tj = 27 °C

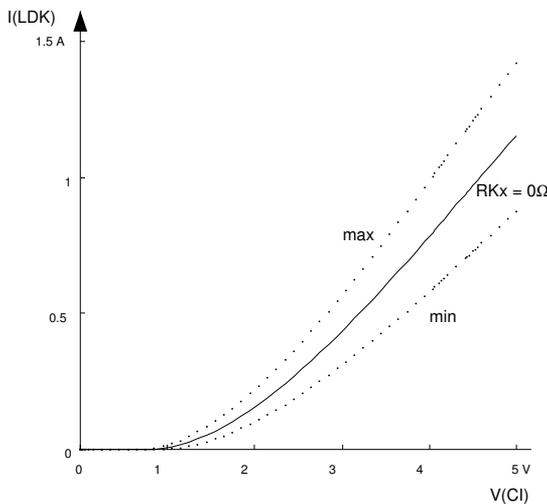Figure 4: Diode current variation vs. V(CI) at V(LDK) = 3 V

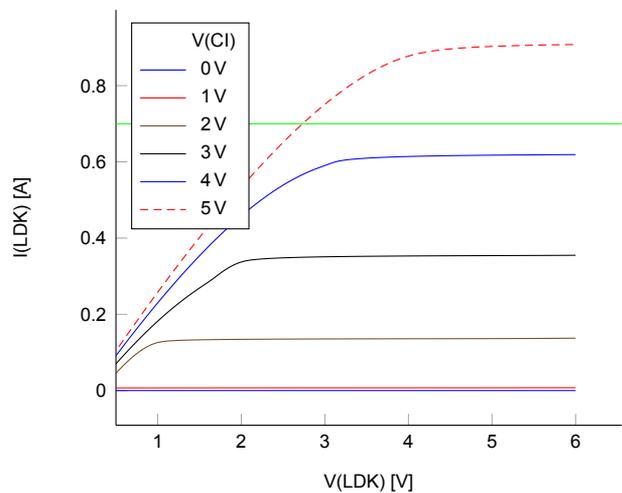Figure 5: Diode current variation vs. V(CI) at V(LDK) = 3 V

Figure 6: Output Characteristics of LDK

iC-HK, iC-HKB
155 MHz LASER SWITCH

DESCRIPTION OF FUNCTIONS

Laser current dependency of V(CI), RK1, RK2

Depending on the laser diode different diode currents are necessary to obtain the required laser power. The values for V(CI), 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(CI) or the respective value of V(CI) can be achieved for a given RKx. For RKx > 1 Ω V(CI) must be limited to 3.5 V (cf. Electrical Characteristics No. 113).

Thermal Shutdown

iC-HK/B is protected by an integrated thermal shutdown feature. When the shutdown temperature is reached both channels are unconditionally switched off.
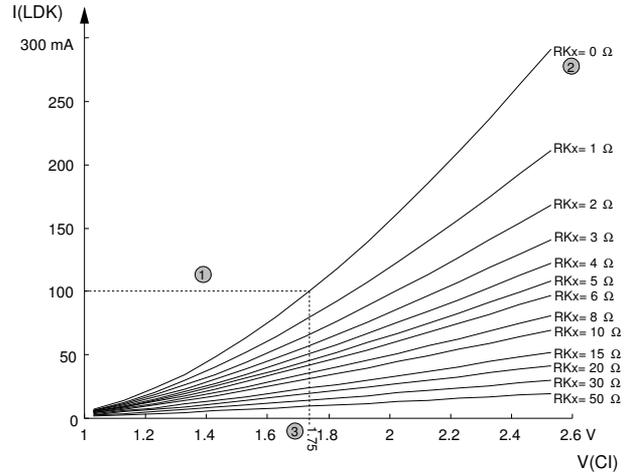
Figure 7: Diode current vs. V(CI) at Tj = 27 °C

APPLICATION NOTES

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

REVISION HISTORY

Rel.	Rel. Date†	Chapter	Modification	Page
F2	2015-04-22	FEATURES	Combination with iC-WK/L removed	1
F2		PACKAGES	Drawings exchanged for more recent ones	1
F2		BLOCK DIAGRAM	Combination with iC-WK/L removed	1
F2		DESCRIPTION	Obsolete schematics removed	2
F2		PACKAGING INFORMATION	Drawings exchanged for more recent ones	2
		PACKAGING INFORMATION	Package Dimensions added	3, 4
F2		ELECTRICAL CHARACTERISTICS	109, 110, 111: Footnotes regarding test coverage added	6
F2		ELECTRICAL CHARACTERISTICS	Output characteristics added	8
F2		ORDERING INFORMATION	Updated order designations	10

Rel.	Rel. Date†	Chapter	Modification	Page
G1	2020-05-12	ELECTRICAL CHARACTERISTICS	Operating Conditions: Tj_{min} reduced to -40 °C	6
		ELECTRICAL CHARACTERISTICS	Max value added for Items 114 and 115 at Tj = -40 °C	6

† Release Date format: *YYYY-MM-DD*

iC-HK, iC-HKʙ
155 MHz LASER SWITCH

ORDERING INFORMATION

Type	Package	Options	Order Designation
iC-HK	SO8	Thermal Pad	iC-HK SO8-TP
iC-HK	MSOP8	Thermal Pad	iC-HK MSOP8-TP
iC-HKB	SO8	Thermal Pad	iC-HKB SO8-TP
iC-HKB	MSOP8	Thermal Pad	iC-HKB MSOP8-TP

Please send your purchase orders to our order handling team:

Fax: +49 (0) 61 35 - 92 92 - 692
E-Mail: dispo@ichaus.com

For technical support, information about prices and terms of delivery please contact:

iC-Haus GmbH
Am Kuemmerling 18
D-55294 Bodenheim
GERMANY

Tel.: +49 (0) 61 35 - 92 92 - 0
Fax: +49 (0) 61 35 - 92 92 - 192
Web: http://www.ichaus.com
E-Mail: sales@ichaus.com

Appointed local distributors: http://www.ichaus.com/sales_partners