

Features

- Current-controlled Output Current Source with 4 Input Channels
- Two Selectable Outputs for Grounded Laser Diodes
- Output A Suited for Blue Laser Diodes: $V_{LD} \leq 6\text{ V}$ ($V_{CCH} \leq 8\text{ V}$)
- LVDS/CMOS Compatible Inputs Channel 2, 3, and 4
- Output Current per Channel up to 350 mA
- Total Output Current up to 500 mA
- On-chip RF Oscillator
- Control of 2 Different Frequencies and Swings by Use of 4 External Resistors
- Oscillator Frequency Range from 200 MHz to 500 MHz
- Maximum Oscillator Current Amplitude 100 mApp
- Small Pb-free QFN24 4 mm × 4 mm Package



Applications

- DVD Blue Laser
- DVD-RAM/DVD-RW/DVD+RW with CD-RW Capability
- Recordable Optical Drives

Description

The ATR0842 is a laser diode driver designed to operate two differently grounded laser diodes. The output, IOUTA, can be used for a blue laser diode (400 nm) with up to 6 V voltage drop by applying 8 V at pin VCCH. The other output, IOUTB, supports legacy laser diodes for DVD-RW/+RW/RAM (650 nm) and CD-RW (780 nm). The device includes four channels for four different optical power levels. The write channels (channel 2 to 4) can be controlled either by fast LVDS (Low Voltage Differential Signaling) or by single-ended standard CMOS logic. In case of single-ended use, each of the enable inputs (NEx or Ex) can be used, the complementary input may be left open. There is no need for blocking or connection to a reference voltage.

The read function of the channel is to generate a continuous output current, channels 2 to 4 are designed as write channels with very fast switching speed. All channels are summed together and routed to one of the two outputs, IOUTA or IOUTB, controlled by the select input SELA. Each write channel (channels 2 to 4) can contribute up to 350 mA to the total output current of up to 500 mA. The read channel can contribute up to 150 mA. Total gain of 100 (read channel) and 250 (channel 2, 3 and 4), respectively, are provided between each reference current input and the selected output. Although the reference inputs are current inputs, voltage control is possible by using external resistors. An on-chip RF oscillator is available to reduce laser-mode hopping noise during read mode. The oscillator current amplitude can be set independently for the two selectable outputs with two different resistors. Oscillation is enabled by a high signal at the ENOSC pin. Complete shut down of the output currents is achieved by a low signal at the ENABLE input.

In case of uncertain (balanced) enable signals, a built-in protection circuit keeps the laser diode output current within the defined range.



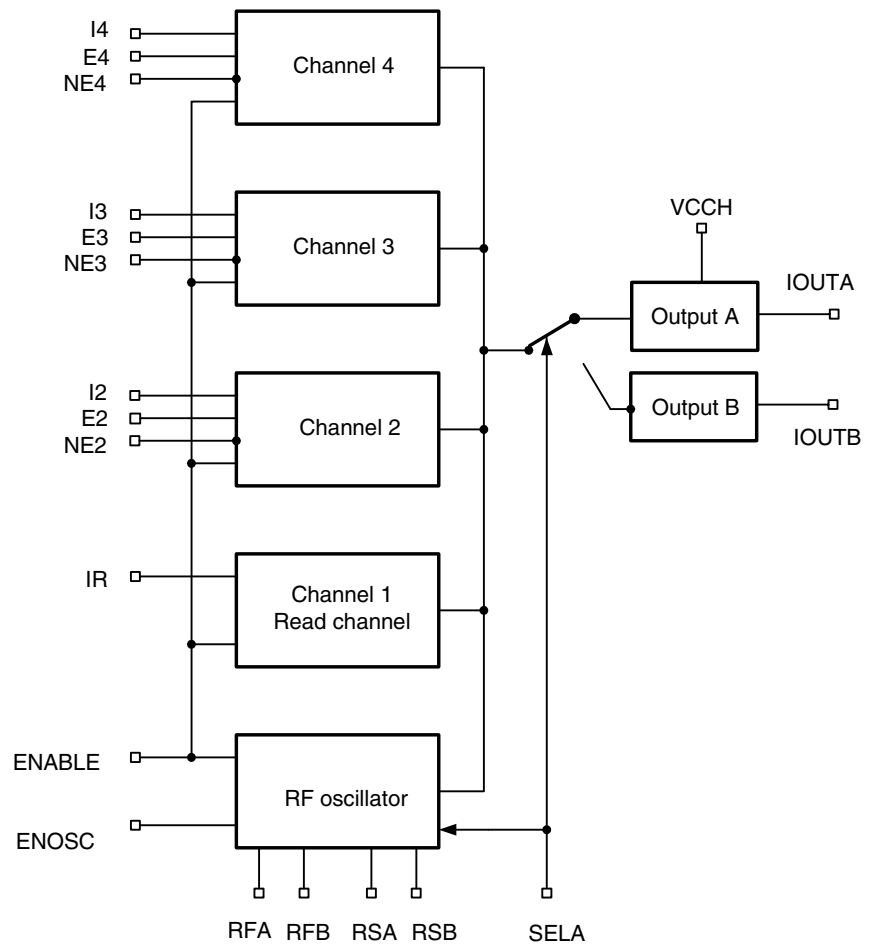
4-channel LVDS Laser Diode Driver with High Voltage Output for Blue Laser

ATR0842

Summary

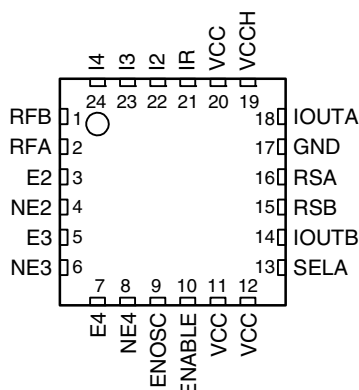
Figure 1. Block Diagram

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Pin Configuration

Figure 2. Pinning QFN24



Pin Description

Pin	Symbol	Type	Function
1	RFB	Analog	External resistor to ground sets frequency of oscillator B
2	RFA	Analog	External resistor to ground sets frequency of oscillator A
3	E2	Digital	Digital control of channel 2 (high active)
4	NE2	Digital	Digital control of channel 2 (low active)
5	E3	Digital	Digital control of channel 3 (high active)
6	NE3	Digital	Digital control of channel 3 (low active)
7	E4	Digital	Digital control of channel 4 (high active)
8	NE4	Digital	Digital control of channel 4 (low active)
9	ENOSC	digital	Enables RF oscillator (high active)
10	ENABLE	Digital	Enables output current (high active)
11	VCC	Supply	+5 V power supply
12	VCC	Supply	+5 V power supply
13	SELA	Digital	High: selects IOUTA, RSA, RFA Low: selects IOUTB, RSB, RFB
14	IOUTB	Analog	Output current source B for laser diode
15	RSB	Analog	External resistor to ground sets swing of oscillator B
16	RSA	Analog	External resistor to ground sets swing of oscillator A
17	GND	Supply	Ground
18	IOUTA	Analog	Output current source A for blue laser diode
19	VCCH	Supply	≤8 V power supply for IOUTA
20	VCC	Supply	+5V power supply
21	IR	Analog	Reference current input read channel (input impedance 500 Ω to ground)
22	I2	Analog	Reference current input channel 2 (input impedance 500 Ω to ground)
23	I3	Analog	Reference current input channel 3 (input impedance 500 Ω to ground)
24	I4	Analog	Reference current input channel 4 (input impedance 500 Ω to ground)
Paddle	GND	Supply	Ground

Absolute Maximum Ratings

Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Parameters	Symbol	Value	Unit
Supply voltage	V_{CC}	-0.5 to +6.1	V
High supply voltage	V_{CC}	V_{CC} to $V_{CC} + 2$	V
Input voltage at any input	V_{in}	-0.5 to $V_{CC} + 0.5$	V
Power dissipation	P_{max}	0.7 ⁽¹⁾ to 1 ⁽²⁾	W
Output voltage I_{outB}	V_{outB}	-0.5 to $V_{CC} - 1$	V
Output voltage I_{outA}	V_{outB}	-0.5 to $V_{CC} - 1.0$	V
Junction temperature	T_j	150	°C
Storage temperature	T_{stg}	-65 to +125	°C

- Notes: 1. $R_{thJA} \leq 115$ K/W at $T_{amb} = 70^\circ\text{C}$
2. $R_{thJA} \leq 115$ K/W at $T_{amb} = 25^\circ\text{C}$

Thermal Resistance

Parameters	Symbol	Value	Unit
Junction ambient, QFN24	R_{thJA}	50 ⁽¹⁾	K/W

- Note: 1. Measured with multi-layer test board (JEDEC standard)

Recommended Operating Range

Parameters	Symbol	Value	Unit
Supply voltage	V_{CC}	4.5 to 5.9	V
High supply voltage	V_{CCH}	V_{CC} to $V_{CC} + 2.5$	V
Input current	$I_{IR}, I_{I2}, I_{I3}, I_{I4}$	< 2.5	mA
External resistor to GND to set oscillator frequency	RFA, RFB	> 3	kΩ
External resistor to GND to set oscillator swing	RSA, RSB	> 1	kΩ
Operating temperature range	T_{amb}	0 to +70	°C

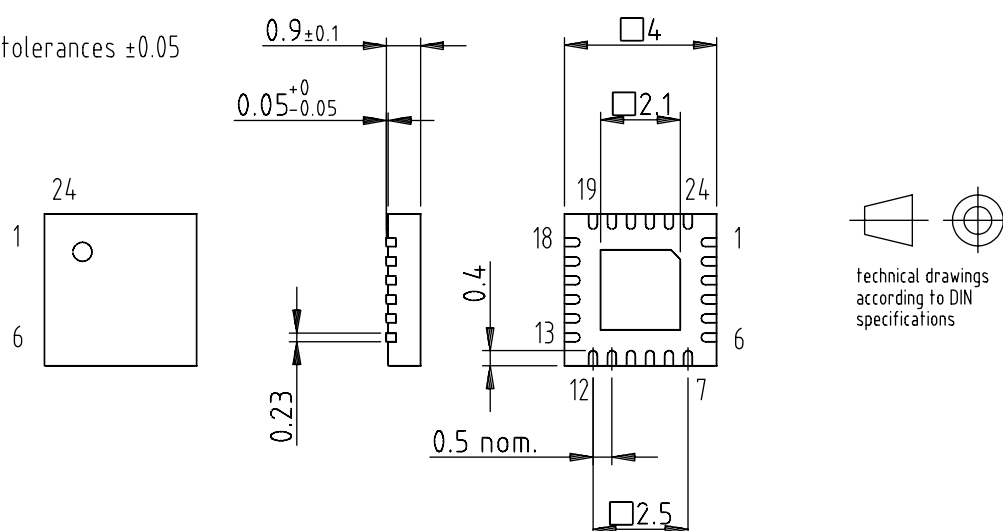
Ordering Information

Extended Type Number	Package	Remarks
ATR0842-PFQG	Lead free QFN24, 4 mm × 4 mm	Taped and reeled

Package Information

Package: QFN 24 - 4x4
Exposed pad 2.1x2.1
(acc. JEDEC OUTLINE No. MO-220)
Dimensions in mm

Not indicated tolerances ± 0.05



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