

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

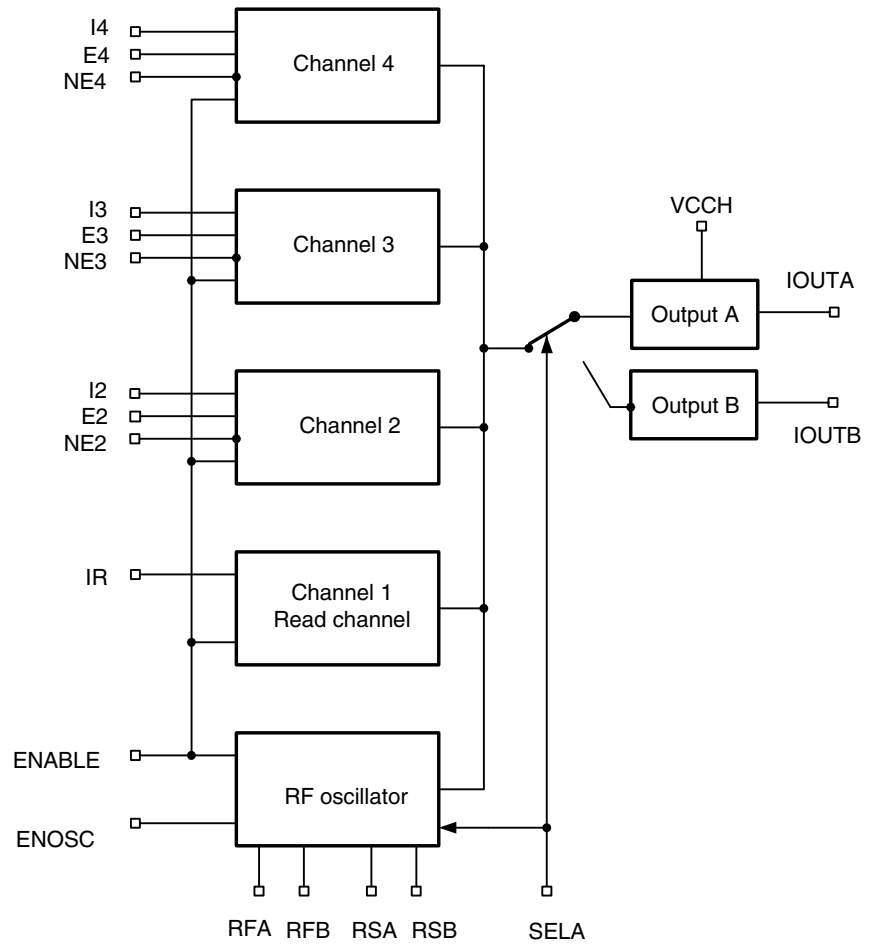
ATR0842

Summary

Rev. 4819AS-DVD-09/04

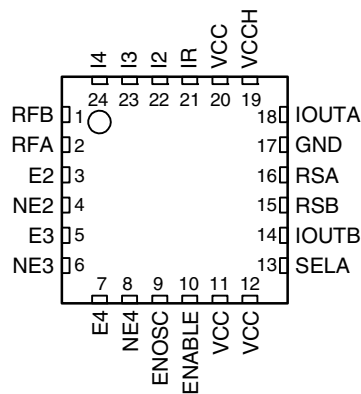


Figure 1. Block Diagram



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. $R_{thJA} \leq 15$ K/W at $T_{amb} = 70^\circ\text{C}$
 2. $R_{thJA} \leq 15$ 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 | k Ω |
| External resistor to GND to set oscillator swing | RSA, RSB | > 1 | k Ω |
| Operating temperature range | T_{amb} | 0 to +70 | °C |

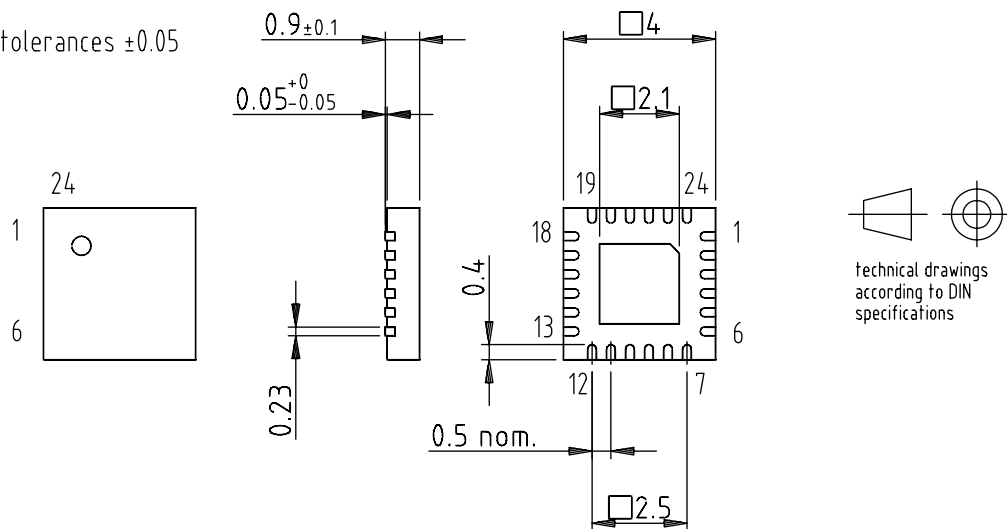
Ordering Information

| Extended Type Number | Package | Remarks |
|----------------------|------------------------------|------------------|
| ATR0842-PFQG | Lead free QFN24, 4 mm x 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



Drawing-No.: 6.543-5101.01-4
 Issue: 2; 16.06.03



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4819AS-DVD-09/04

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