Features

- **Current-controlled Output Current Source, 3 Input Channels**
- **Two Selectable Outputs for Grounded Laser Diodes**
- **Output Current per Channel up to 250 mA**
- **Total Output Current to 300 mA (Minimum)**
- **Rise Time 1.0 ns, Fall Time 1.1 ns**
- **On-chip RF Oscillator**
- **Control of 2 Different Swings by Use of 2 external Resistors**
- **Oscillator Frequency Range from 200 MHz to 600 MHz**
- **Oscillator Swing to 100 mA**
- **Single 5 V Power Supply**
- **Common Enable/Disable Input**
- **TTL/CMOS Control Signals**
- **Small SSO16 Package**

Applications

- **DVD-ROM with CD-RW Capability (Combo Drives)**
- **Combo Drives with CD and DVD Writing Capability**

Description

The T0806 is a laser diode driver for the operation of two different grounded laser diodes for DVD-RAM (650 nm) and CD-RW (780 nm) drives. It includes three channels for three different optical power levels which are controlled by a separate IC. The read channel generates a continuous output level whereas channels 2 and 3 are provided as write channels with very fast switching speeds. Write current pulses are enabled when a low signal is applied to the NE pins. All channels are summed together and switched to one of the two outputs IOUTA or IOUTB by the select input SELA. Each channel can contribute up to 250 mA to the total output current of up to 300 mA. A total gain of 100 is 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.

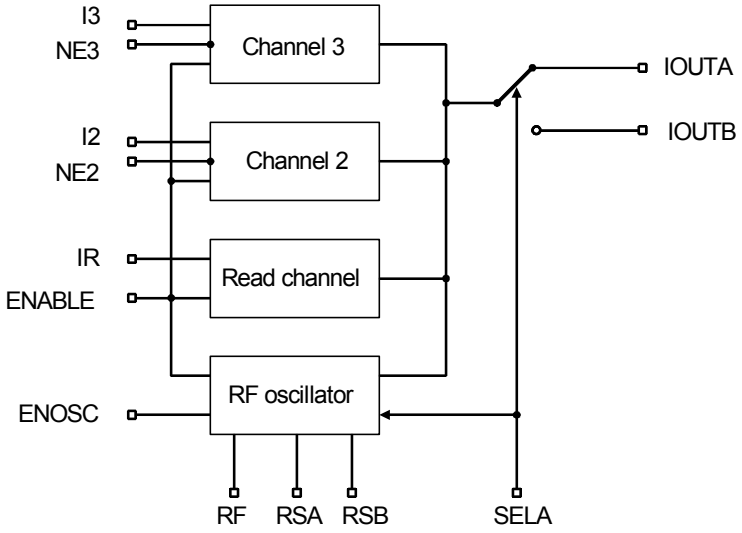
An on-chip RF oscillator is provided to reduce laser mode hopping noise during read mode. Swing can be set independently for the two selectable outputs with two different resistors. Oscillation is enabled by a high signal at the ENOSC pin. Complete output current and oscillator switch-off is achieved by a ‘low’ signal at the ENABLE input.

3-Channel Laser Driver with RF Oscillator and 2 Outputs

T0806

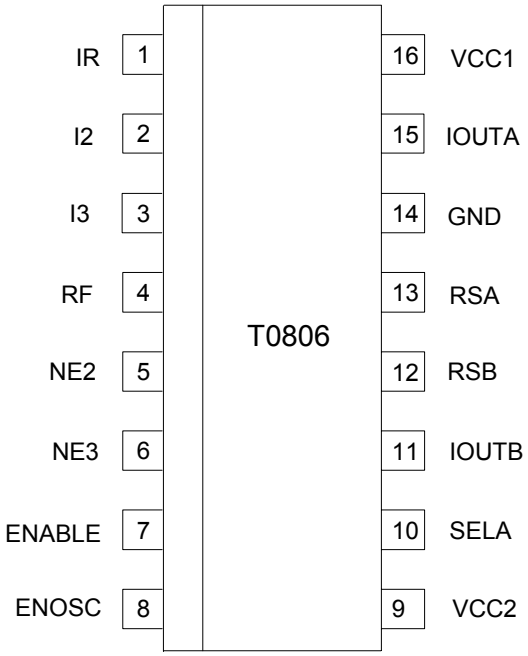
Rev. 4522B–DVD–06/02

Figure 1. Block Diagram



Pin Configuration

Figure 2. Pinning SSO16



Pin Description

Pin	Symbol	Type	Function
1	IR	analog	Input current, bias voltage approximately GND
2	I2	analog	Input current, bias voltage approximately GND
3	I3	analog	Input current, bias voltage approximately GND
4	RF	analog	External resistor to GND sets oscillator frequency of oscillator A
5	NE2	digital	Digital control of channel 2 (low active)
6	NE3	digital	Digital control of channel 3 (low active)
7	ENABLE	digital	Enables output current (high active)
8	ENOSC	digital	Enables RF oscillator (high active)
9	VCC2	supply	+ 5 V power supply for IOUT
10	SELA	digital	High: selects IOUTA, RSA Low: selects IOUTB, RSB
11	IOUTB	analog	Output current source B for laser diode
12	RSB	analog	External resistor to GND sets swing of oscillator B
13	RSA	analog	External resistor to GND sets swing of oscillator A
14	GND	supply	Ground
15	IOUTA	analog	Output current source A for laser diode
16	VCC1	supply	+ 5 V power supply for IOUT and circuit

Absolute Maximum Ratings

Parameters	Symbol	Value	Unit
Supply voltage	V_{CC}	–0.5 to +6.0	V
Input voltage at IR, I2, I3	V_{IN1}	–0.5 to +1.0	V
Input voltage at NE2, NE3, ENOSC	V_{IN2}	–0.5 to V_{CC} +0.5	V
Output voltage	V_{OUT}	–0.5 to V_{CC} –1	V
Total output current	I_{OUT}	350	mA
Output current per channel	$I_{OUT\ (IR,\ I2,\ I3)}$	300	mA
Power dissipation	P_{MAX}	0.7 (1) to 1 (2)	W
Junction temperature	T_J	150	°C
Storage temperature range	T_{Stg}	–65 to +125	°C

Notes: 1. $R_{thJA} \leq 115$ K/W, $T_{amb} = 70°C$
2. $R_{thJA} \leq 115$ K/W, $T_{amb} = 25°C$

Thermal Resistance

Parameters	Symbol	Value	Unit
Junction ambient	R_{thJA}	135	K/W

Recommended Operating Conditions

Parameters	Symbol	Value	Unit
Supply voltage range	V_{CC}	4.5 to 5.5	V
Input current	$I_{IR}/I_{I2}/I_{I3}$	< 3.0	mA
External resistor to GND to set oscillator frequency	RF	> 3	kΩ
External resistor to GND to set oscillator swing	RSA, RSB	> 1	kΩ
Operating temperature range	T_{amb}	0 to +70	°C

Electrical Characteristics: General

V_{CC} = 5 V, T_{amb} = 25°C, ENABLE = High, NE2 = NE3 = High, ENOSC = Low, unless otherwise specified.

No.	Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit	Type*
1	**Power Supply**								
1.1	Supply current, power down	ENABLE = Low, NE2 = NE3 = Low	9, 16	ICC_{PD2}		0.3		mA	A
1.2	Supply current, read mode, oscillator disabled	$I_{IR} = I_{I2} = I_{I3}$ = 500 µA	9, 16	ICC_{R1}		90		mA	A
1.3	Supply current, read mode, oscillator enabled, output A, selected	$I_{IR} = I_{I2} = I_{I3}$ = 500 µA, ENOSC = High, RS = 8.2 kΩ, RF = 6.8 kΩ, SELA = High	9, 16	ICC_{R2}		93		mA	A
1.4	Supply current, write mode	$I_{IR} = I_{I2} = I_{I3}$ = 500 µA, NE2 = NE3 = Low	9, 16	ICC_{W}		180		mA	A
1.5	Supply current, input off	$I_{IR} = I_{I2} = I_{I3}$ = 0 µA	9, 16	ICC_{off}		17		mA	A
2	**Digital Inputs**								
2.1	NE2/NE3 low voltage		5, 6	VNE_{LO}			1.3	V	A
2.2	NE2/NE3 high voltage		5, 6	VNE_{HI}	2.0			V	A
2.3	SELA low voltage		10	$VSELA_{LO}$			0.5	V	A
2.4	SELA high voltage		10	$VSELA_{HI}$	3.0			V	A
2.5	ENABLE low voltage		7	VEN_{LO}			0.5	V	A
2.6	ENABLE high voltage		7	VEN_{HI}	2.7			V	A
2.7	ENOSC low voltage		8	VEO_{LO}			0.5	V	A
2.8	ENOSC high voltage		8	VEO_{HI}	3.0			V	A
3	**Current at Digital Inputs**								
3.1	NE2/NE3 low current	NE = 0 V	5, 6	INE_{LO}	–300			µA	A
3.2	NE2/NE3 high current	NE = 5 V	5, 6	INE_{HI}			800	µA	A
3.3	SELA low current	SELA = 0 V	10	$ISELA_{LO}$	–50			µA	A
3.4	SELA high current	SELA = 5 V	10	$ISELA_{HI}$			150	µA	A
3.5	ENABLE low current	ENABLE = 0 V	7	IEN_{LO}	–150			µA	A

*) Type means: A = 100% tested, B = 100% correlation tested, C = Characterized on samples, D = Design parameter

Electrical Characteristics: General (Continued)

V_{CC} = 5 V, T_{amb} = 25°C, ENABLE = High, NE2 = NE3 = High, ENOSC = Low, unless otherwise specified.

No.	Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit	Type*
3.6	ENABLE high current	ENABLE = 5 V	7	IEN_{HI}			100	µA	A
3.7	ENOSC low current	ENOSC = 0 V	8	IEO_{LO}	–100			µA	A
3.8	ENOSC high current	ENOSC = 5 V	8	IEO_{HI}			800	µA	A

*) Type means: A = 100% tested, B = 100% correlation tested, C = Characterized on samples, D = Design parameter

Electrical Characteristics: Laser Amplifier

V_{CC} = 5 V, T_{amb} = 25°C, ENABLE = High, unless otherwise specified.

No.	Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit	Type*
4	**Outputs IOUTA and IOUTB**								
4.1	Total output current	Output is sourcing	11, 15	I_{OUT}	300	350		mA	A
4.2	Output current per channel	Output is sourcing	11, 15	I_{OUTR}	250			mA	A
4.3	Best fit current gain	Any channel (1)	11, 15	GAIN	90	100	130	mA/mA	A
4.4	Best fit current offset	Any channel (1)	11, 15	IOS	-8		+4	mA	A
4.5	Output current linearity	Any channel (1)	11, 15	ILIN	-3		+3	%	A
4.6	I_{IN} input impedance	R_{IN} is to GND	1, 2, 3	R_{IN}	150	200	250	Ω	A
4.7	NE threshold	Temperature stabilized	5, 6	VTH		1.68		V	C
4.8	Output off current 1	ENABLE = Low	11, 15	$IOFF_1$			1	mA	A
4.9	Output off current 2	NE2 = NE3 = High, I_{IR} =0 µA, I_{I2} = I_{I3} = 500 µA	11, 15	$IOFF_2$			1	mA	A
4.10	Output off current 3	NE2 = NE3 = Low, I_{IR} = I_{I2} = I_{I3} = 0 µA	11, 15	$IOFF_3$			5	mA	A
4.11	I_{OUT} supply sensitivity, read mode	I_{OUT} = 40 mA, V_{CC} = 5 V ± 10%, read only	11, 15	VSE_R	-5		+1	%/V	A
4.12	I_{OUT} supply sensitivity, write mode	I_{OUT} = 80 mA, 40 mA read + 40 mA write, V_{CC} = 5 V ±10%	11, 15	VSE_W	-6		0	%/V	A
4.13	I_{OUT} current output noise	I_{OUT} = 40 mA, ENOSC = Low	11, 15	INO_O		3		nA/rt-Hz	C
4.14	I_{OUT} temperature sensitivity, read mode	I_{OUT} = 40 mA, read only	11, 15	TSE_R		500		ppm/°C	C
4.15	I_{OUT} temperature sensitivity, write mode	I_{OUT} = 80 mA, 40 mA read + 40 mA write	11, 15	TSE_W		500		ppm/°C	C

*) Type means: A = 100% tested, B = 100% correlation tested, C = Characterized on samples, D = Design parameter

Note: 1. Linearity of the amplifier is calculated using a best fit method at three operating points of I_{OUT} at 20 mA, 40 mA, and 60 mA. $I_{OUT} = (I_{IN} \times GAIN) + I_{OS}$

Electrical Characteristics: Laser Amplifier AC Performance

V_{CC} = + 5 V, I_{OUT} = 40 mA DC with 40 mA pulse, T_A = 25°C unless otherwise specified.

No.	Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit	Type
5	**Outputs IOUTA and IOUTB, AC Performance**								
5.1	Write rise time	I_{OUT} = 40 mA (read) + 40 mA (10% to 90%) (1)	11, 15	t_{RISE}		1.0	2.0	ns	C
5.2	Write fall time	I_{OUT} = 40 mA (read) + 40 mA (10% to 90%) (1)	11, 15	t_{FALL}		1.1	2.0	ns	C
5.3	Output current overshoot	I_{OUT} = 40 mA (read) + 40 mA (1)	11, 15	OS		5		%	C
5.4	I_{OUT} ON propagation delay	NE 50% High-Low to I_{OUT} at 50% of final value	11, 15	t_{ON}		2		ns	C
5.5	I_{OFF} OFF propagation delay	NE 50% Low-High to I_{OUT} at 50% of final value	11, 15	t_{OFF}		2		ns	C
5.6	Disable time	ENABLE 50% High-Low to I_{OUT} at 50% of final value	11, 15	t_{DIS}		20		ns	C
5.7	Enable time	ENABLE 50% Low-High to I_{OUT} at 50% of final value	11, 15	t_{EN}		20		ns	C
5.8	SELA delay	SELA 50% Low-High to I_{OUT} at 50% of final value	11, 15	T_{SAH}		20			C
5.9	SELA delay	SELA 50% High-Low to I_{OUT} at 50% of final value	11, 15	T_{SAL}		20			C
5.10	Amplifier bandwidth	I_{OUT} = 50 mA, all channels, –3 dB value	11, 15	BW_{LCA}		16		MHz	C
6	**Oscillator**								
6.1	Oscillator frequency	RF = 7.5 kΩ	11, 15	F_{OSC}	255	300	350	MHz	A
6.2	Oscillator temperature coefficient	RF = 7.5 kΩ	11, 15	TC_{OSC}		-150		ppm/°C	C
6.3	Disable time oscillator	ENOSC 50% High-Low to I_{OUT} , at 10%/90% of final value	11, 15	T_{DISO}		4		ns	C
6.4	Enable time oscillator	ENOSC 50% Low-High to I_{OUT} , at 10%/90% of final value	11, 15	T_{ENO}		2		ns	C

*) Type means: A = 100% tested, B = 100% correlation tested, C = Characterized on samples, D = Design parameter

Note: 1. Load resistor at IOUT 6.8 Ω, measurement with 50-Ω oscilloscope and 39-Ω series resistor.

Characteristics Curves

Figure 3. Oscillator Frequency vs. Resistor RF (RS = 7.5 kΩ)

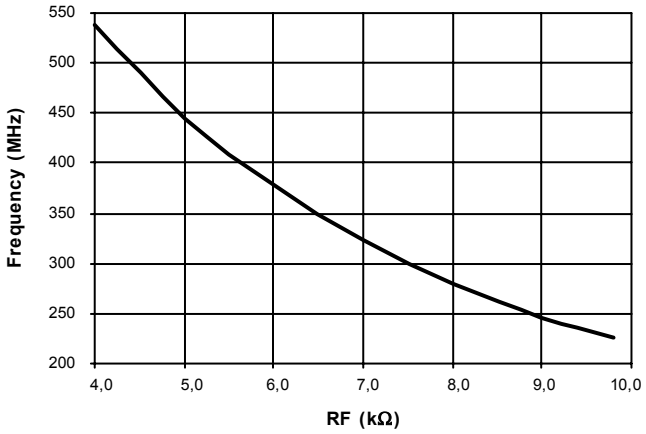


Figure 4. Oscillator Swing vs. Resistor RS (RF = 7.5 kΩ)

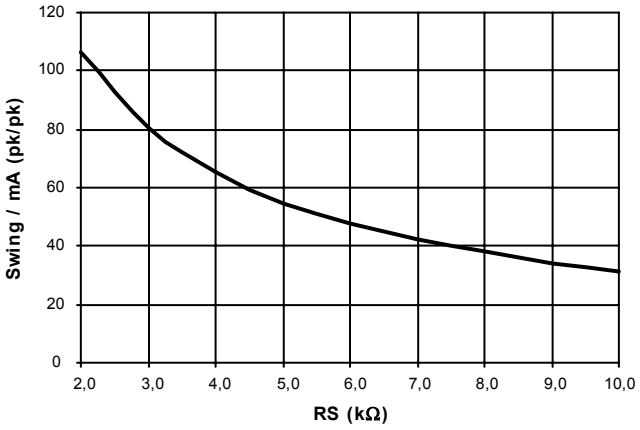


Figure 5. Oscillator Frequency Dependency of Swing

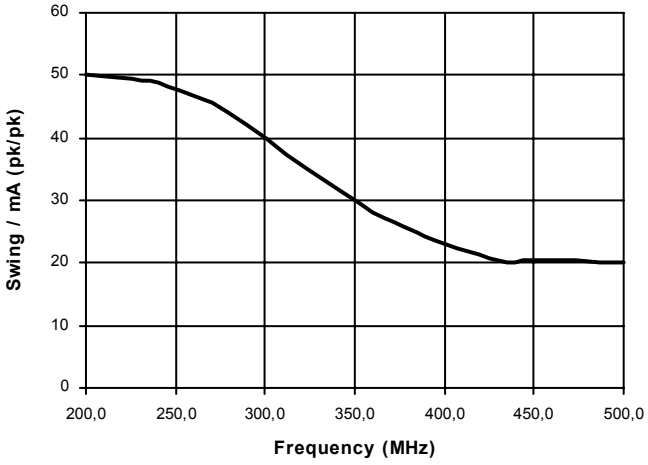


Figure 6. Transfer Characteristic of all Channels (Gain = 110.7)

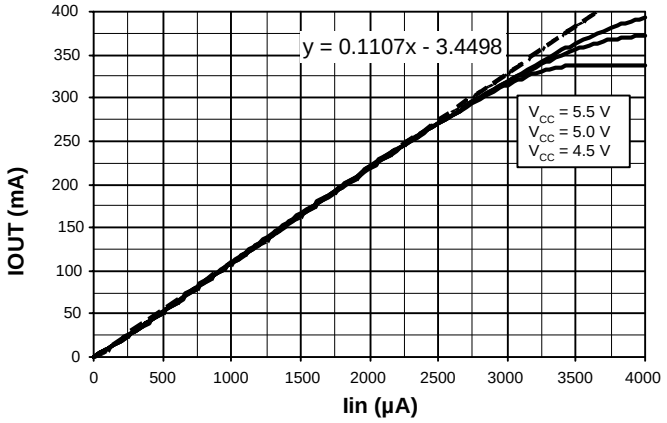


Figure 7. Voltage Compliance R (IOUT to VCC)= 5.9 Ω

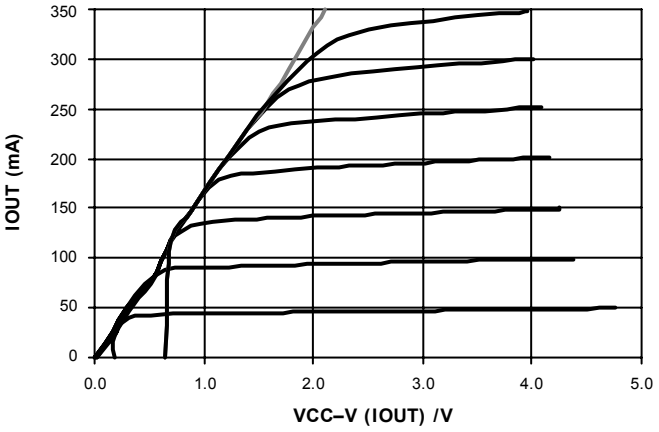


Figure 8. Step Response, Read Channel: 50 mA, Channel 2: 50 mApp

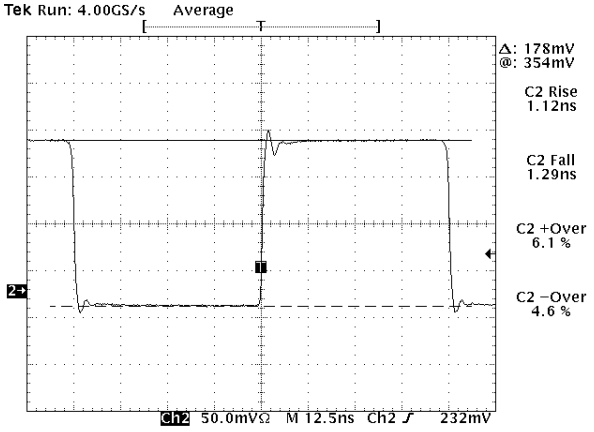
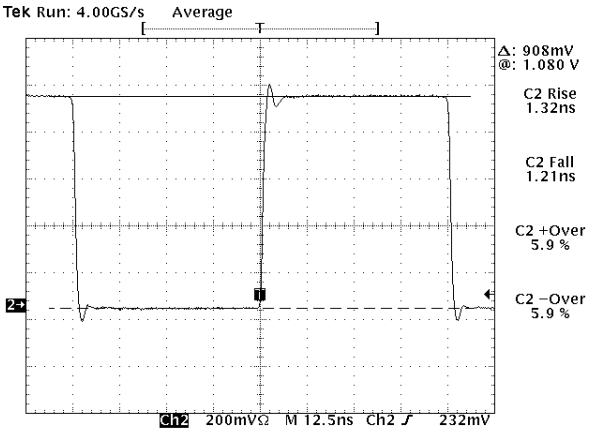
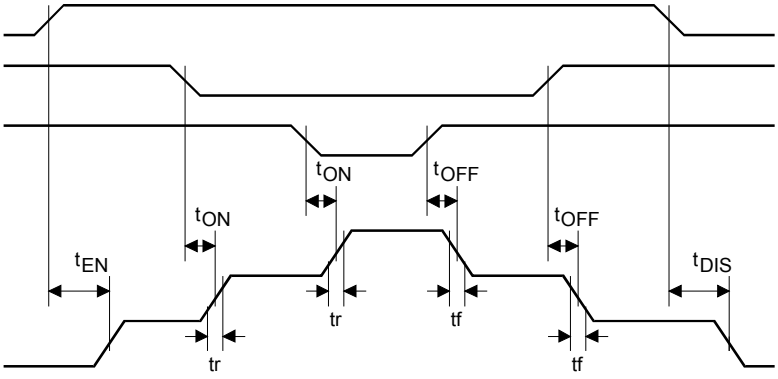


Figure 9. Step Response, Read Channel: 50 mA, Channel 2: 250 mApp



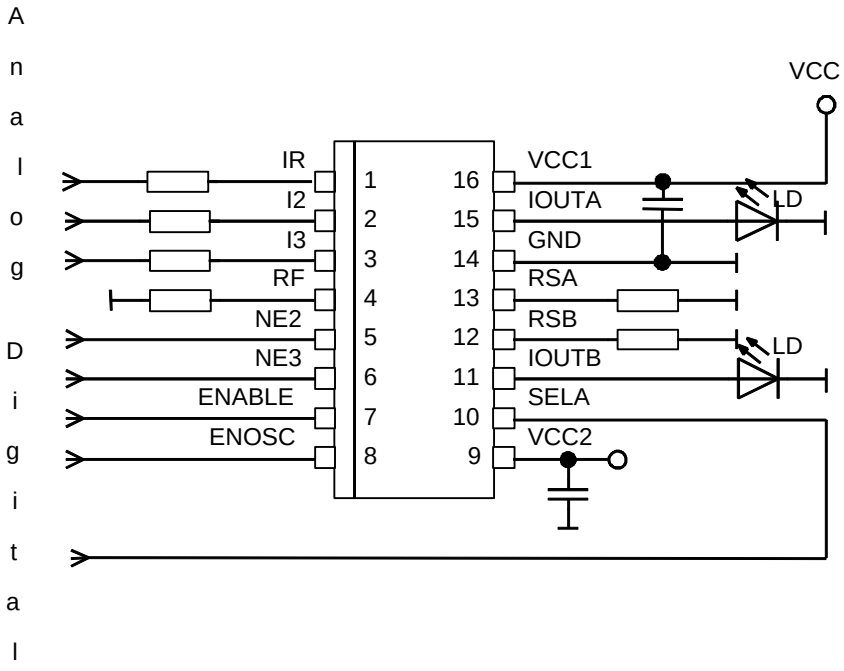
Timing Diagram

Figure 10. Timing Diagram of IOUTA/IOUTB



Typical Application Circuit

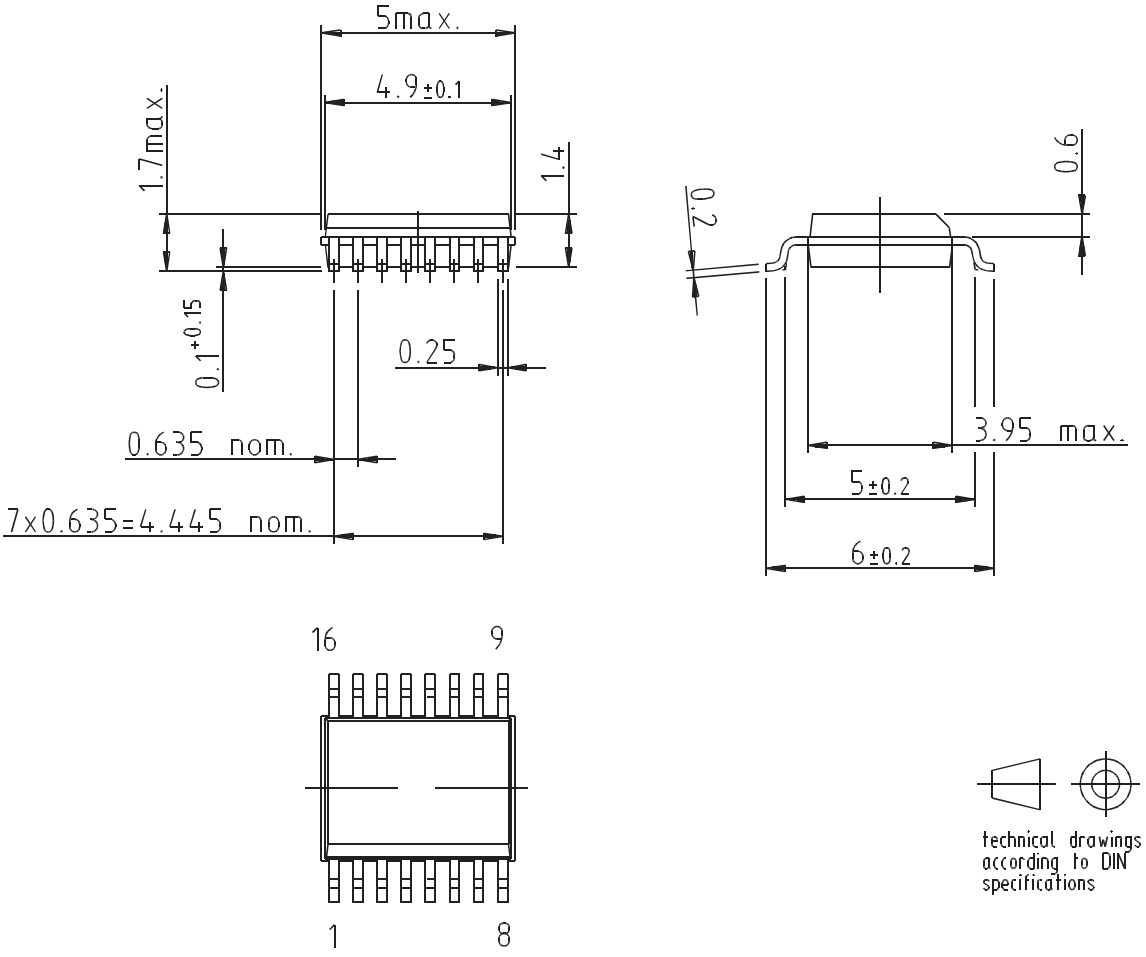
Figure 11. Application Circuit



Ordering Information

Extended Type Number	Package	Remarks
T0806-TCQ	SSO16	Taped and reeled

Package Information



Drawing refers to following types: SSO16
Package acc. JEDEC MO 137 AB

Drawing-No.: 6.543-5060.01-4
Issue: 2; 05.02.99

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