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)**
- **On-chip RF Oscillator**
- **Control of 2 Different Swings by Use of 2 external Resistors**
- **Oscillator Frequency Range from 100 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)**

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.

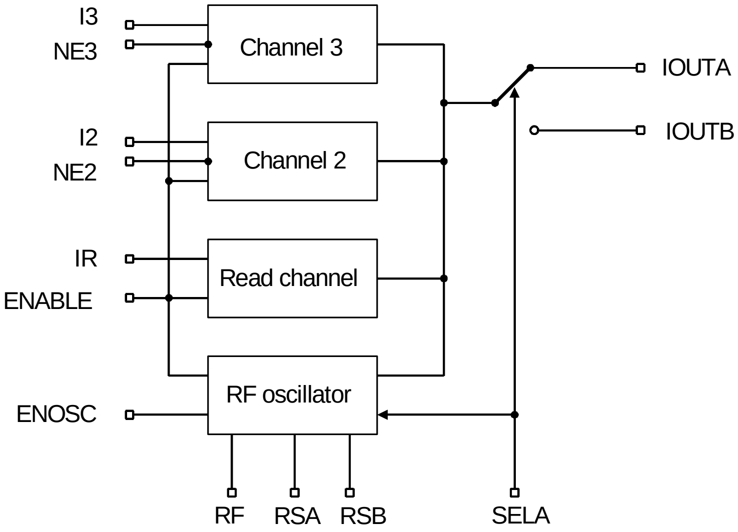
3-Channel Laser Driver with RF Oscillator and 2 Outputs

T0806

Preliminary

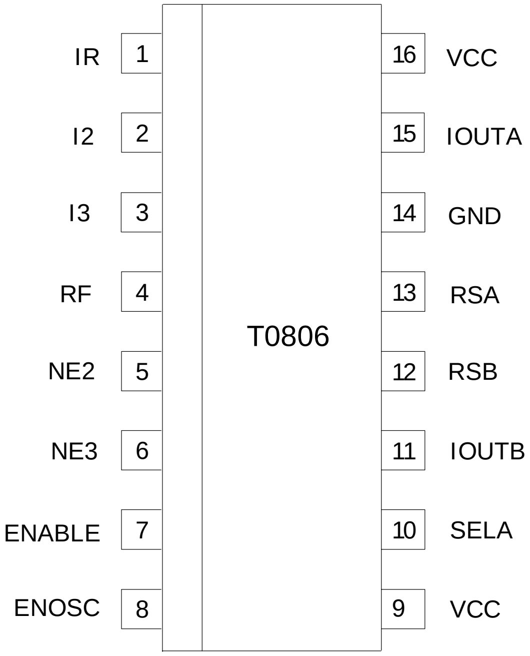
Rev. 4522A–DVD–02/02

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	VCC	supply	+ 5 V power supply
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	VCC	supply	+ 5 V power supply

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	VCC	supply	+ 5 V power supply
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	VCC	supply	+ 5 V power supply

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 +2.0	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
Power dissipation	P_{MAX}	1 (1)	W
Junction temperature	T_J	150	°C
Storage temperature range	T_{STG}	–65 to +125	°C

Note: 1. $R_{thJA} \leq 80$ K/W

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	$I_{IR}/I_{I2}/I_{I3}$	< 2.5	mA
External to GND to set oscillator frequency	RFA, RFB	> 3	kΩ
External to GND to set oscillator swing	RSA, ESB	> 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.

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
Power Supply						
Supply current, power down	ENABLE = Low, NE2 = NE3 = Low	ICC_{PD2}		0.3		mA
Supply current, read mode, oscillator disabled	$I_{IR} = I_{I2} = I_{I3} = 500$ µA	ICC_{R1}		90		mA
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	ICC_{R2}		93		mA
Supply current, write mode	$I_{IR} = I_{I2} = I_{I3} = 500$ µA, NE2 = NE3 = Low	ICC_W		180		mA
Supply current, input off	$I_{IR} = I_{I2} = I_{I3} = 0$ µA	ICC_{off}		17		mA
VCC shutdown voltage		V_{SHUT}		2.4		V

Electrical Characteristics: General (Continued)

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

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
Digital Inputs						
NE2/NE3 low voltage		VNE_{LO}			1.3	V
NE2/NE3 high voltage		VNE_{HI}	2.0			V
SELA low voltage		$VSELA_{LO}$			0.5	V
SELA high voltage		$VSELA_{HI}$	3.0			V
ENABLE low voltage		VEN_{LO}			0.5	V
ENABLE high voltage		VEN_{HI}	2.7			V
ENOSC low voltage		VEO_{LO}			0.5	V
ENOSC high voltage		VEO_{HI}	3.0			V
Current at Digital Inputs						
NE2/NE3 low current	NE = 0 V	INE_{LO}	–300			µA
NE2/NE3 high current	NE = 5 V	INE_{HI}			800	µA
SELA low current	SELA = 0 V	$ISELA_{LO}$	–50			µA
SELA high current	SELA = 5 V	$ISELA_{HI}$			150	µA
ENABLE low current	ENABLE = 0 V	IEN_{LO}	–150			µA
ENABLE high current	ENABLE = 5 V	IEN_{HI}			100	µA
ENOSC low current	ENOSC = 0 V	IEO_{LO}	–100			µA
ENOSC high current	ENOSC = 5 V	IEO_{HI}			800	µA

Electrical Characteristics: Laser Amplifier

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

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
Outputs IOUTA and IOUTB						
Total output current	Output is sourcing	I_{OUT}	300	350		mA
Output current per channel	Output is sourcing	I_{OUTR}	250			mA
Best fit current gain	Any channel (1)	GAIN		100		mA/mA
Best fit current offset	Any channel (1)	IOS	-8		+4	mA
Output current linearity	Any channel (1)	ILIN	-3		+3	%
Input current range	Input is sinking	IDAC	0		2	mA
I_{IN} input impedance	R_{IN} is to GND	R_{IN}	150	200	250	Ω
NE threshold	Temperature stabilized	VTH		1.68		V
Output off current 1	ENABLE = Low	$IOFF_1$			1	mA
Output off current 2	NE2 = NE3 = High, I_{IR} =0 µA, $I_{I2} = I_{I3}$ = 500 µA	$IOFF_2$			1	mA
Output off current 3	NE2 = NE3 = Low, $I_{IR} = I_{I2} = I_{I3}$ = 0 µA	$IOFF_3$			5	mA
I_{OUT} supply sensitivity, read mode	I_{OUT} = 40 mA, V_{CC} = 5 V ± 10%, read only	VSE_R	–4		1	%/V

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 (Continued)

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

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
I_{OUT} supply sensitivity, write mode	I_{OUT} = 80 mA, 40 mA read + 40 mA write, V_{CC} = 5 V ±10%	VSE_W	–6		0	%/V
I_{OUT} current output noise	I_{OUT} = 40 mA, ENOSC = Low	INO_O		3		nA/rt-Hz
I_{OUT} temperature sensitivity, read mode	I_{OUT} = 40 mA, read only	TSE_R		100		ppm/°C
I_{OUT} temperature sensitivity, write mode	I_{OUT} = 80 mA, 40 mA read + 40 mA write	TSE_W		100		ppm/°C

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. $I_{OUT} = (I_{IN} \times \text{GAIN}) + I_{OS}$

Electrical Characteristics: Laser Current Amplifier Outouts AC Performance

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

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
Output IOUTA and IOUTB						
Write rise time	I_{OUT} = 40 mA (read) + 40 mA (10% to 90%) (1)	t_{RISE}		1.0	2.0	ns
Write fall time	I_{OUT} = 40 mA (read) + 40 mA (10% to 90%) (1)	t_{FALL}		1.1	2.0	ns
Output current overshoot	I_{OUT} = 40 mA (read) + 40 mA (1)	OS		5		%
I_{OUT} ON propagation delay	NE 50% High-Low to I_{OUT} at 50% of final value	t_{ON}		2		ns
I_{OFF} OFF propagation delay	NE 50% Low-High to I_{OUT} at 50% of final value	t_{OFF}		2		ns
Disable time	ENABLE 50% High-Low to I_{OUT} at 50% of final value	t_{DIS}		20		ns
Enable time	ENABLE 50% Low-High to I_{OUT} at 50% of final value	t_{EN}		20		ns
Disable time	ENOSC 50% High-Low to I_{OUT} at 50% of final value	T_{DISO}		3		ns
Enable time	ENOSC 50% Low-High to I_{OUT} at 50% of final value	Tt_{ENO}		20		ns
SELA delay	SELA 50% Low-High to I_{OUT} at 50% of final value	T_{SAH}				
SELA delay	SELA 50% High-Low to I_{OUT} at 50% of final value	T_{SAL}				
Amplifier bandwidth	I_{OUT} = 50 mA, all channels, –3 dB value	BW_{LCA}		16		MHz
Oscillator						
Oscillator frequency	RF = 7.5 kΩ	F_{OSC}	255	300	350	MHz
Oscillator temperature coefficient	RF = 7.5 kΩ	TC_{OSC}		–150		ppm/°C
Disable time oscillator	ENOSC 50% High-Low to I_{OUT} at 50% of final value	T_{DISO}		4		ns
Enable time oscillator	ENOSC 50% Low-High to I_{OUT} at 50% of final value	T_{ENO}		2		ns

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)

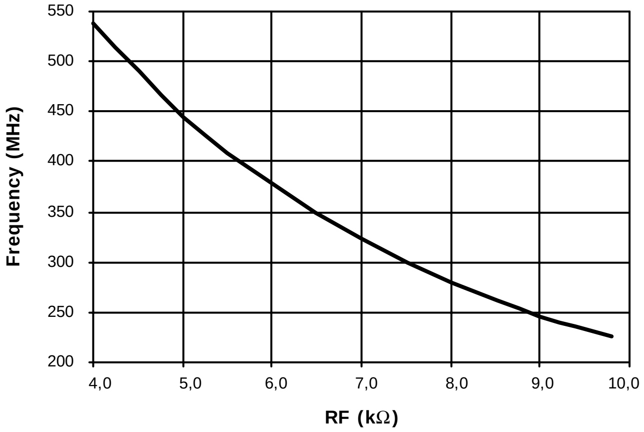


Figure 4. Oscillator Swing vs. Resistor RS (RF = 7.5 kΩ)

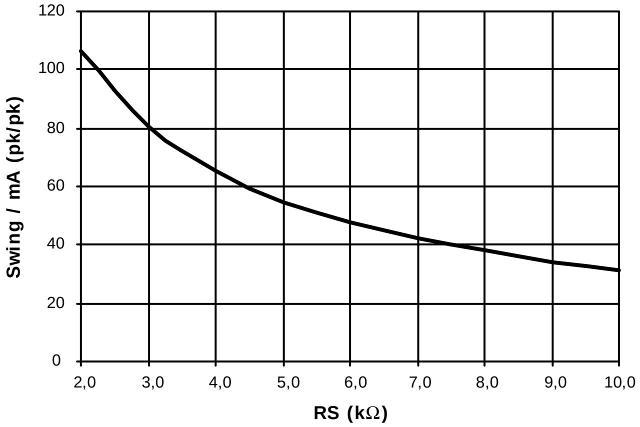


Figure 5. Oscillator Frequency Dependency of Swing

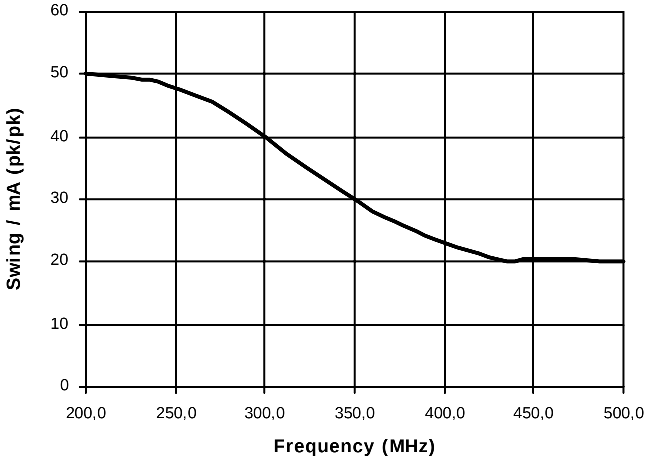


Figure 6. Transfer Characteristic of all Channels (Gain = 444)

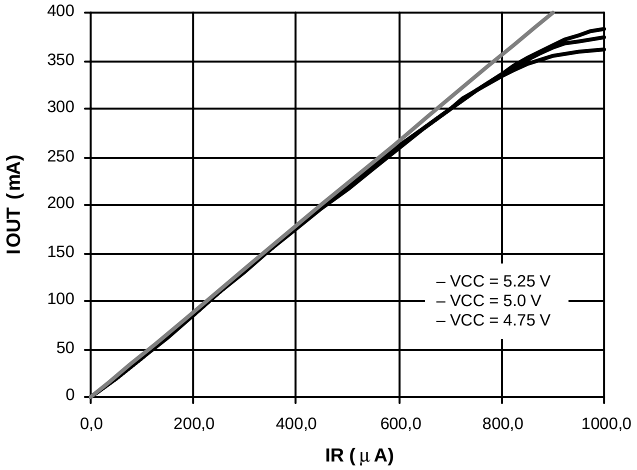


Figure 7. Voltage Compliance R (IOUT to VCC)= 5.9 Ω

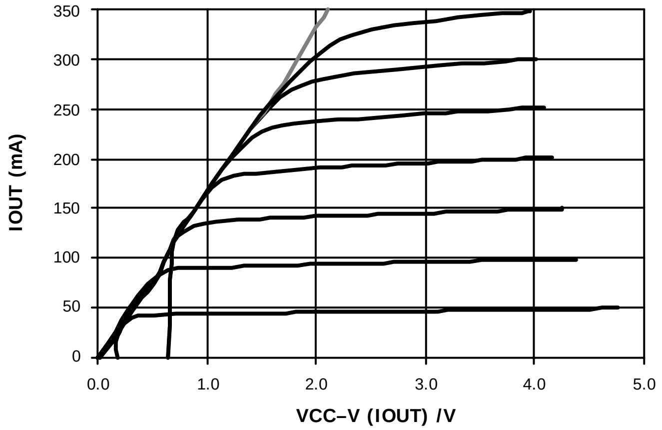


Figure 8. Step Response, Read Channel: 50 mA, Channel 2: 50 mApp

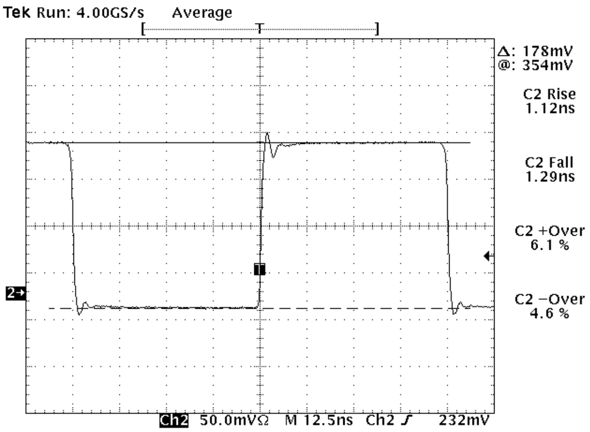
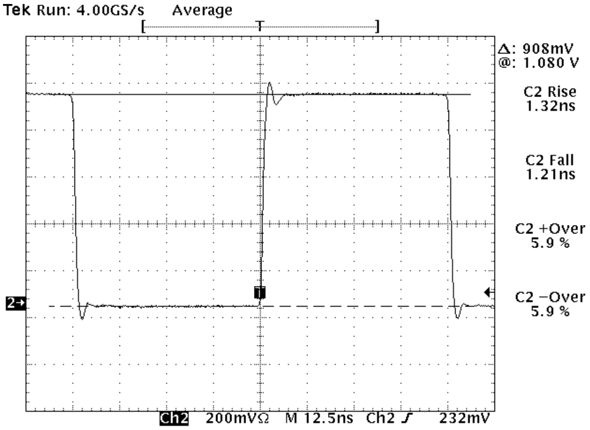
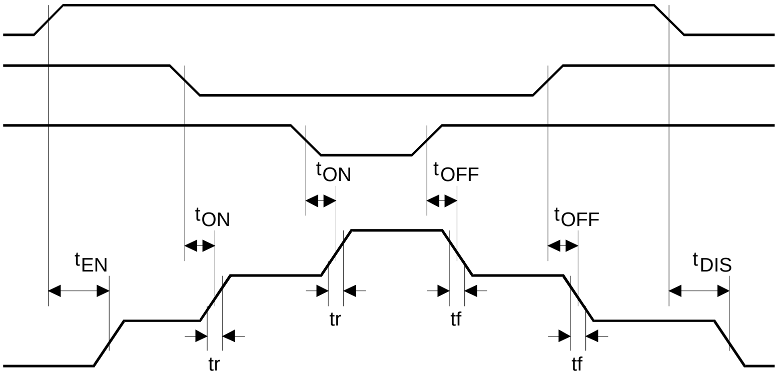


Figure 9. Step Response, Read Channel: 50 mA, Channel 2: 250 mApp



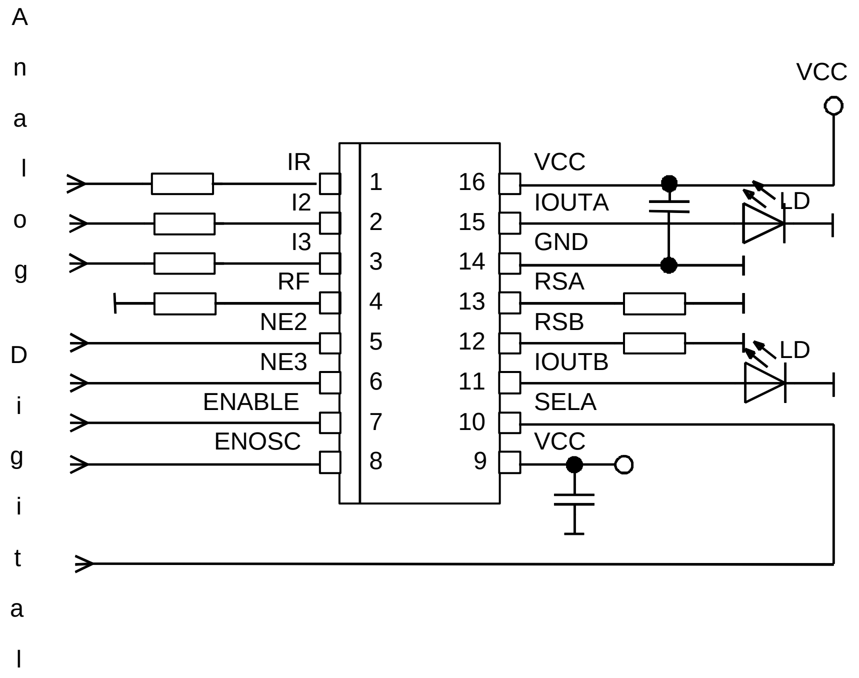
Timing Diagram

Figure 10. Timing Diagram of IOUTA/IOUTB



Typical Application Circuit

Figure 11. Application Circuit



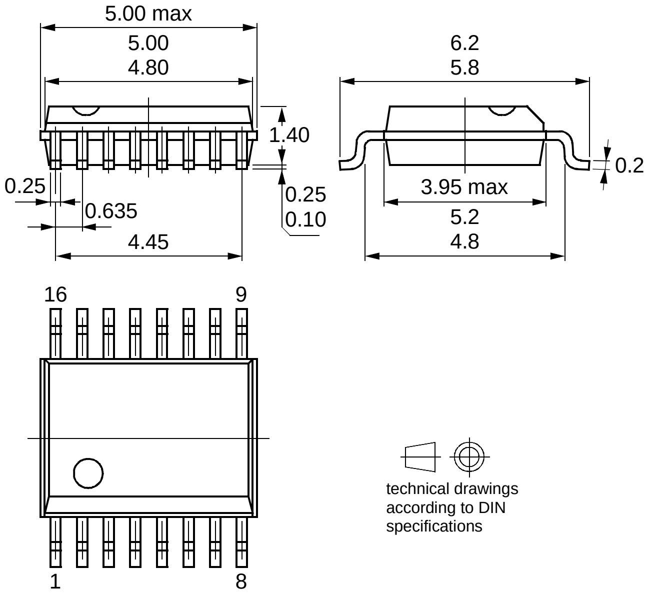
Ordering Information

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

Package Information

Package SSO16

Dimensions in mm



Atmel Headquarters

Corporate Headquarters
2325 Orchard Parkway
San Jose, CA 95131
TEL 1(408) 441-0311
FAX 1(408) 487-2600

Europe
Atmel SarL
Route des Arsenaux 41
Casa Postale 80
CH-1705 Fribourg
Switzerland
TEL (41) 26-426-5555
FAX (41) 26-426-5500

Asia
Atmel Asia, Ltd.
Room 1219
Chinachem Golden Plaza
77 Mody Road Tsimhatsui
East Kowloon
Hong Kong
TEL (852) 2721-9778
FAX (852) 2722-1369

Japan
Atmel Japan K.K.
9F, Tonetsu Shinkawa Bldg.
1-24-8 Shinkawa
Chuo-ku, Tokyo 104-0033
Japan
TEL (81) 3-3523-3551
FAX (81) 3-3523-7581

Atmel Operations

Memory
Atmel Corporate
2325 Orchard Parkway
San Jose, CA 95131
TEL 1(408) 436-4270
FAX 1(408) 436-4314

Microcontrollers
Atmel Corporate
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San Jose, CA 95131
TEL 1(408) 436-4270
FAX 1(408) 436-4314

Atmel Nantes
La Chantrerie
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RF/Automotive
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Theresienstrasse 2
Postfach 3535
74025 Heilbronn, Germany
TEL (49) 71-31-67-0
FAX (49) 71-31-67-2340

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1150 East Cheyenne Mtn. Blvd.
Colorado Springs, CO 80906
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FAX 1(719) 540-1759

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Atmel Grenoble
Avenue de Rochepleine
BP 123
38521 Saint-Egreve Cedex, France
TEL (33) 4-76-58-30-00
FAX (33) 4-76-58-34-80

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e-mail
literature@atmel.com

Web Site
http://www.atmel.com

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