

DATA SHEET

TZA1045

Photodiode and amplifier IC
for CD and DVD applications

Preliminary specification
Supersedes data of 2002 Mar 26

2002 Nov 27

Photodiode and amplifier IC for CD and DVD applications

TZA1045

FEATURES

- High frequency RF amplifiers (typical bandwidth = 240 MHz)
- Suitable for all CD (785 nm) and DVD (655 nm) read/write applications
- Four high bandwidth central outputs (A, B, C, and D), four satellite outputs (E, F, G, and H) and one high bandwidth differential output (RFP, RFN)
- Internal current clamp and current fold back (power reduction)
- Versatile programmable gain switches (CD/DVD, H/L, and R/W)
- Single 5 V supply
- Current outputs for optimum signal transport over flex cable
- Small outline package SSOP16T with good positional tolerance.

APPLICATIONS

- CD and DVD read/write applications.

GENERAL DESCRIPTION

The TZA1045 is a single optical pick-up IC for read/write systems and is suitable for CD and DVD applications.

The device contains eight RF amplifiers for the central and satellite diodes and one differential RF amplifier (RFP and RFN) which handles the sum of the four A, B, C, and D central diode signals.

Programming the gain is a very versatile way to optimize interfacing between the TZA1045 and the pre-amplifier. The gain can be programmed for CD or DVD media with the gain switch CD/DVD.

The H/L switch can be used for CD-R or CD-RW discs.

Gain switch R/W is used to reduce the gain during writing. During writing, the high peak signals for the central and satellite segments are clamped internally and the output currents of the A, B, C, D, E, F, G, and H segments are reduced to almost zero (fold back) to minimize the power consumption.

All outputs are current outputs that can supply a maximum of 8 mA. In CD-R writing mode, the clipping level of the output currents is between 5 and 8 mA.

The SSOP16T package has a low spread on the Z tolerance. The Z tolerance is measured between the diodes (chip surface) and the bottom of the leads. The diodes have an offset of 54 μm in the 'y' direction with respect to the leadframe centre and a tolerance of $\pm 50 \mu\text{m}$ in both 'x' and 'y' directions.

ORDERING INFORMATION

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
TZA1045TS	SSOP16T	plastic shrink small outline package/transparent; 16 leads (straight); body width 4.4 mm	SOT734-1

Photodiode and amplifier IC for CD and DVD applications

TZA1045

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Supplies						
V_{DD1}	supply voltage front-end		4.5	5.0	5.5	V
V_{DD2}	supply voltage back-end		4.5	5.0	5.5	V
I_{DD1}	supply current front-end	dark conditions				
		writing DVD+R	–	17.4	–	mA
		writing CD-R	–	41.2	–	mA
		writing DVD+RW	–	17.2	–	mA
		writing CD-RW	–	15.2	–	mA
		reading DVD-ROM	–	42.5	–	mA
		reading CD-ROM	–	41.8	–	mA
		reading DVD+RW	–	42.2	–	mA
		reading CD-RW	–	41.2	–	mA
I_{DD2}	supply current back-end	dark conditions	–	6.0	–	mA
Temperature range						
T_{amb}	ambient temperature		0	–	70	°C
RF bandwidth						
$B_{-3dB(cen)}$	RF bandwidth central channels A, B, C, and D	$I_o = 1.5$ mA				
		writing DVD+R	–	170	–	MHz
		writing CD-R	–	205	–	MHz
		writing DVD+RW	–	360	–	MHz
		writing CD-RW	–	150	–	MHz
		reading DVD-ROM	–	211	–	MHz
		reading CD-ROM	–	128	–	MHz
		reading DVD+RW	–	205	–	MHz
		reading CD-RW	–	109	–	MHz
$B_{-3dB(dif)}$	RF bandwidth differential channels RFP and RFN	$I_o = 1$ mA				
		writing DVD+R	–	171	–	MHz
		writing CD-R	–	289	–	MHz
		writing DVD+RW	–	360	–	MHz
		writing CD-RW	–	148	–	MHz
		reading DVD-ROM	–	191	–	MHz
		reading CD-ROM	–	130	–	MHz
		reading DVD+RW	–	188	–	MHz
		reading CD-RW	–	110	–	MHz

Photodiode and amplifier IC for CD and DVD applications

TZA1045

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT	
B _{-3dB(sat)}	RF bandwidth satellite channels E, F, G and H	I _o = 0.5 mA					
		writing DVD+R	—	171	—	MHz	
		writing CD-R	—	97	—	MHz	
		writing DVD+RW	—	360	—	MHz	
		writing CD-RW	—	148	—	MHz	
		reading DVD-ROM	—	111	—	MHz	
		reading CD-ROM	—	54	—	MHz	
		reading DVD+RW	—	97	—	MHz	
		reading CD-RW	—	48	—	MHz	
Settling time							
t _{set(cen)}	settling time central segment outputs	CD-R write mode; 2% accuracy of read level (60 μA); ΔI _o = 3 mA to 60 μA; note 1	—	15	—	ns	
t _{set(sat)}	settling time satellite segment outputs	CD-R write mode; 2% accuracy of read level (15μA); ΔI _o = 0.75 mA to 15 μA; note 1	—	30	—	ns	
Sensitivity							
S _{DVD+R}	output current sensitivity for DVD+R	writing; λ = 655 nm					
		I _{o(cen)}	—	1.47	—	A/W	
		I _{o(sat)}	—	5.63	—	A/W	
		I _{o(RFP)}	—	1.36	—	A/W	
		I _{o(RFN)}	—	1.39	—	A/W	
S _{CD-R}	output current sensitivity for CD-R	writing; λ = 785 nm					
		I _{o(cen)}	—	37.5	—	A/W	
		I _{o(sat)}	—	142	—	A/W	
		I _{o(RFP)}	—	2.99	—	A/W	
		I _{o(RFN)}	—	3.14	—	A/W	
S _{DVD+RW}	output current sensitivity for DVD+RW	writing; λ = 655 nm					
		I _{o(cen)}	—	2.89	—	A/W	
		I _{o(sat)}	—	11.1	—	A/W	
		I _{o(RFP)}	—	2.73	—	A/W	
		I _{o(RFN)}	—	2.78	—	A/W	
		reading; λ = 655 nm					
		I _{o(cen)}	—	42.8	—	A/W	
		I _{o(sat)}	—	163	—	A/W	
		I _{o(RFP)}	—	48.3	—	A/W	
		I _{o(RFN)}	—	44.3	—	A/W	

Photodiode and amplifier IC for CD and DVD applications

TZA1045

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
S _{CD-RW}	output current sensitivity for CD-RW	writing; $\lambda = 785$ nm				
		$I_{o(cen)}$	–	5.35	–	A/W
		$I_{o(sat)}$	–	20.4	–	A/W
		$I_{o(RFP)}, I_{o(RFN)}$	–	5.05	–	A/W
		$I_{o(RFP)}, I_{o(RFN)}$	–	5.13	–	A/W
		reading; $\lambda = 785$ nm				
		$I_{o(cen)}$	–	151	–	A/W
		$I_{o(sat)}$	–	590	–	A/W
S _{DVD-ROM}	output current sensitivity for DVD-ROM	reading; $\lambda = 655$ nm				
		$I_{o(cen)}$	–	21.6	–	A/W
		$I_{o(sat)}$	–	83.6	–	A/W
		$I_{o(RFP)}$	–	21.0	–	A/W
		$I_{o(RFN)}$	–	21.0	–	A/W
S _{CD-ROM}	output current sensitivity for CD-ROM	reading; $\lambda = 785$ nm				
		$I_{o(cen)}$	–	74.8	–	A/W
		$I_{o(sat)}$	–	289	–	A/W
		$I_{o(RFP)}$	–	80.0	–	A/W
		$I_{o(RFN)}$	–	82.0	–	A/W

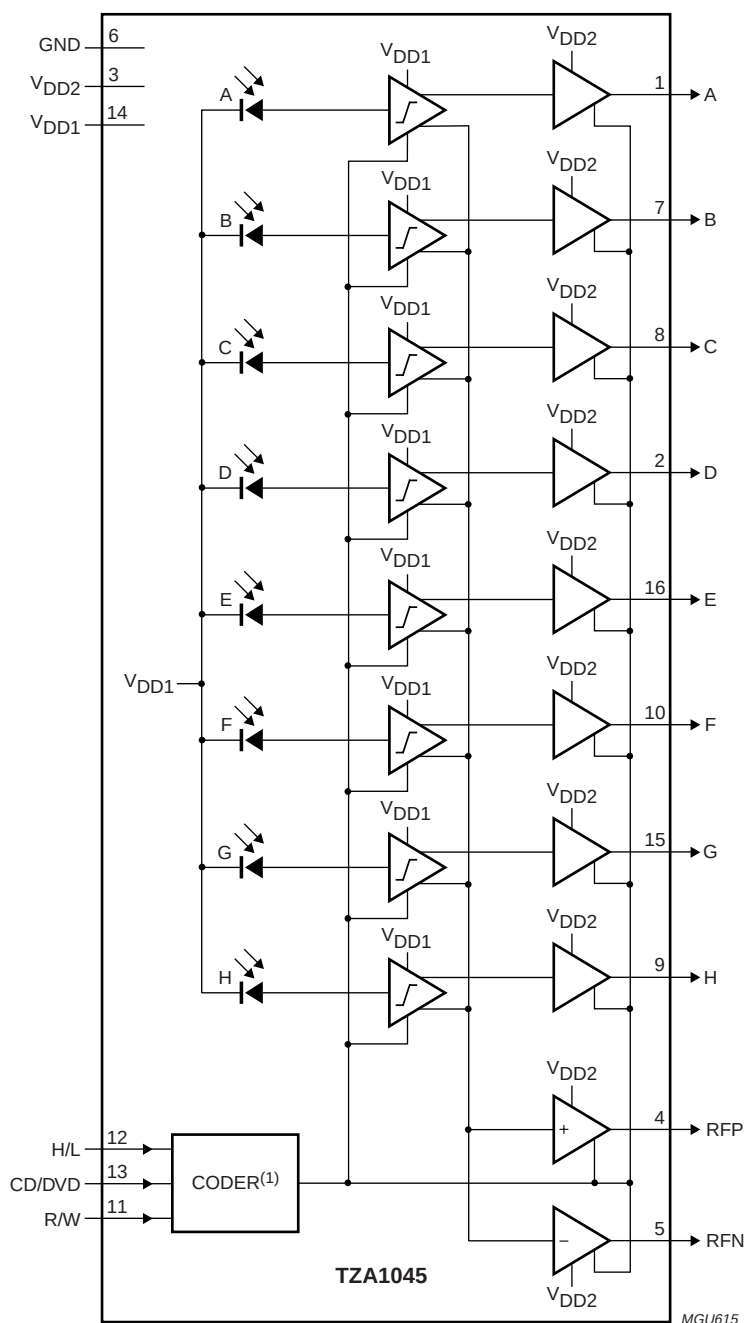
Note

1. The settling time includes the recovery time.

Photodiode and amplifier IC for CD and DVD applications

TZA1045

BLOCK DIAGRAM



- (1) The coder translates the three digital inputs into the appropriate gain level of each amplifier. The limiter is switched on only for CD-R writing for the segment outputs.

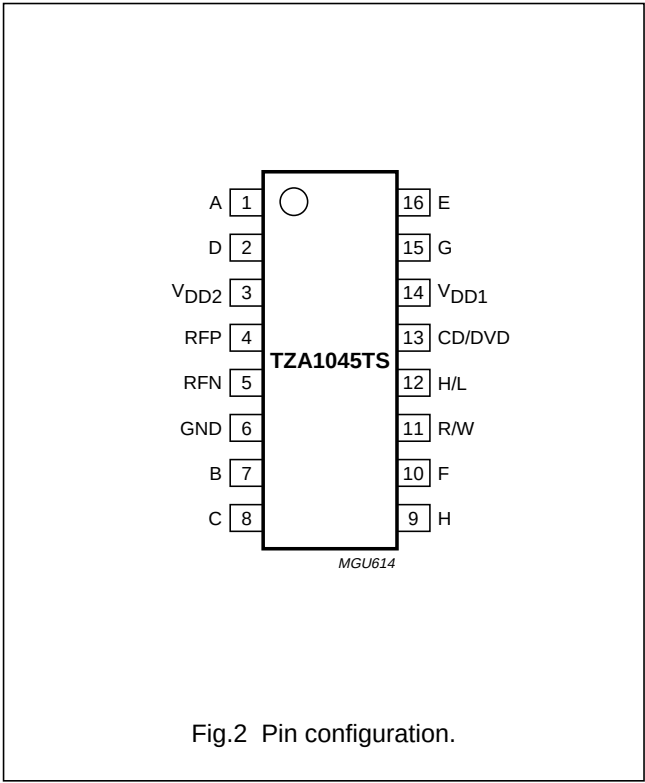
Fig.1 Block diagram.

Photodiode and amplifier IC
for CD and DVD applications

TZA1045

PINNING

SYMBOL	PIN	DESCRIPTION
A	1	central segment output A
D	2	central segment output D
V _{DD2}	3	supply voltage back-end
RFP	4	positive RF output
RFN	5	negative RF output
GND	6	ground
B	7	central segment output B
C	8	central segment output C
H	9	satellite segment output H
F	10	satellite segment output F
R/W	11	gain select switch for reading or writing
H/L	12	gain select switch for high or low reflective media
CD/DVD	13	gain select switch for CD or DVD
V _{DD1}	14	supply voltage front-end
G	15	satellite segment output G
E	16	satellite segment output E



MODE SELECTION

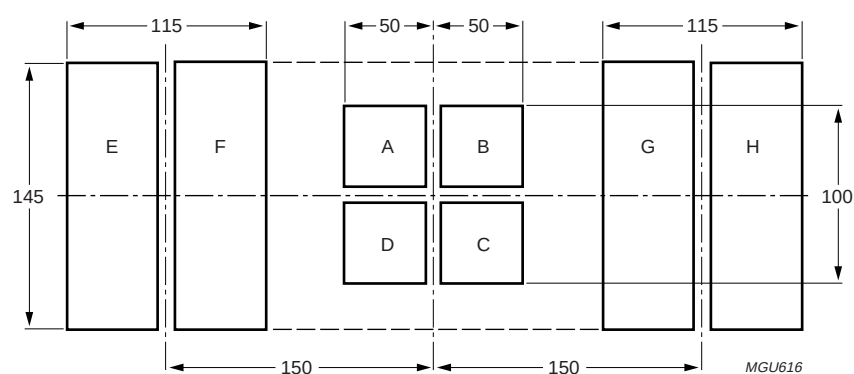
Table 1 Coder switching

PIN LEVEL			MODE
R/W	H/L	CD/DVD	
LOW	LOW	LOW	DVD+R; writing
LOW	LOW	HIGH	CD-R; writing
LOW	HIGH	LOW	DVD+RW; writing
LOW	HIGH	HIGH	CD-RW; writing
HIGH	LOW	LOW	DVD-ROM; reading
HIGH	LOW	HIGH	CD-ROM; reading
HIGH	HIGH	LOW	DVD+RW; reading
HIGH	HIGH	HIGH	CD-RW; reading

Photodiode and amplifier IC for CD and DVD applications

TZA1045

MECHANICAL DATA

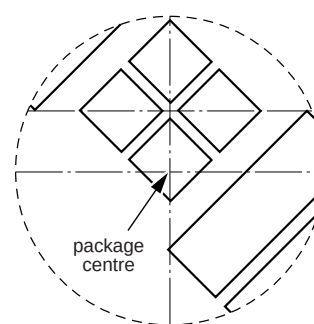
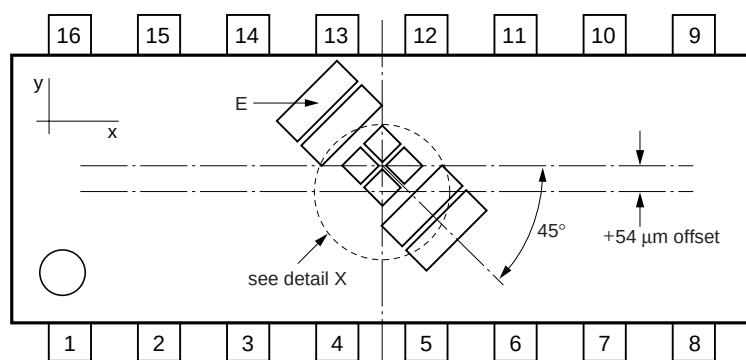


Dimensions in μm .

Space between central segments: $<1 \mu\text{m}$.

Space between satellite segments: $<1 \mu\text{m}$.

Fig.3 Photodiode configuration.



45° angle is with respect to the leadframe.

Drawing is not to scale.

Package window is not shown.

Fig.4 Diagram showing position of the photodiode array with respect to the package (top view).

Photodiode and amplifier IC for CD and DVD applications

TZA1045

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 60134).

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V_{DD1}	supply voltage front-end	-0.3	+5.5	V
V_{DD2}	supply voltage back-end	-0.3	+5.5	V
ΔV_{DD1}	supply voltage difference with respect to V_{DD2}	$V_{DD2} - 0.3$	$V_{DD2} + 0.3$	V
ΔV_{DD2}	supply voltage difference with respect to V_{DD1}	$V_{DD1} - 0.3$	$V_{DD1} + 0.3$	V
V_n	voltage at pins			
	A, B, C, D, E, F, G, H, RFP and RFN	-0.3	$V_{DD2} + 0.3$	V
	CD/DVD, H/L and R/W	-0.3	$V_{DD1} + 0.3$	V

CHARACTERISTICS

$V_{DD1} = V_{DD2} = 5$ V; pin R/W = LOW; pin H/L = LOW; pin CD/DVD = HIGH; V_A to $V_H = 2.5$ V; $V_{RFP} = V_{RFN} = 2.5$ V; measured in dark conditions; $T_{amb} = 25$ °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Supplies						
V_{DD1}	supply voltage front-end	note 1	4.5	5.0	5.5	V
V_{DD2}	supply voltage back-end	note 1	4.5	5.0	5.5	V
I_{DD1}	supply current front-end	dark conditions; note 2				
		writing DVD+R	12.8	17.4	21.3	mA
		writing CD-R	30.9	41.2	51.5	mA
		writing DVD+RW	12.9	17.2	21.5	mA
		writing CD-RW	11.4	15.2	19.0	mA
		reading DVD-ROM	31.9	42.5	53.1	mA
		reading CD-ROM	31.3	41.8	52.2	mA
		reading DVD+RW	31.7	42.2	52.8	mA
		reading CD-RW	30.9	41.2	51.5	mA
I_{DD2}	supply current back-end	dark conditions; $T_{amb} = 0$ to 70 °C; note 2	4.5	6.0	7.5	mA
Temperature range						
T_{amb}	ambient temperature		0	–	70	°C
Central segment outputs; pins A, B, C, and D						
B_{-3dB}	channel A, B, C, and D RF bandwidth	$I_o = 1.5$ mA				
		writing DVD+R	140	170	200	MHz
		writing CD-R	170	205	235	MHz
		writing DVD+RW	300	360	420	MHz
		writing CD-RW	125	150	175	MHz
		reading DVD-ROM	195	211	245	MHz
		reading CD-ROM	110	128	150	MHz
		reading DVD+RW	170	205	235	MHz
		reading CD-RW	90	109	130	MHz

Photodiode and amplifier IC for CD and DVD applications

TZA1045

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
t _{set}	settling time	CD-R write mode; ΔI _o = 3 mA to 60 μA; 2% accuracy of read level (60 μA); note 3	–	15	–	ns
Δt _{d(g)}	group delay variation	I _o = 1.5 mA; f _o = 13 to 130 MHz reading DVD-ROM	–	0.5	–	ns
		reading CD-ROM	–	0.75	–	ns
		reading DVD+RW	–	0.5	–	ns
		reading CD-RW	–	0.9	–	ns
M _{sens}	channel A, B, C and D matching sensitivity	note 4	–5	–	+5	%
V _o	output voltage range		1	–	V _{DD2} – 1	V
I _o	output current		0	3	8	mA
I _o (offset)	output offset current	dark conditions; T _{amb} = 0 to 70 °C	–15	–	+7	μA
I _o (clip)	output current clipping level	CD-R writing; note 5	5	–	8	mA
I _{n(o)}	spot noise output current	I _o = 2.0 mA; f _o = 50 MHz reading DVD-ROM	–	480	–	pA/√Hz
		reading CD-ROM	–	1660	–	pA/√Hz
		reading DVD+RW	–	685	–	pA/√Hz
		reading CD-RW	–	2500	–	pA/√Hz
Differential RF outputs; pins RFP and RFN						
B _{–3dB}	channel RFP and RFN RF bandwidth	I _o = 1 mA				
		writing DVD+R	140	171	200	MHz
		writing CD-R	240	289	340	MHz
		writing DVD+RW	300	360	420	MHz
		writing CD-RW	125	148	175	MHz
		reading DVD-ROM	160	191	220	MHz
		reading CD-ROM	110	130	150	MHz
		reading DVD+RW	160	188	220	MHz
reading CD-RW	90	110	130	MHz		
t _{set}	settling time	CD-R write mode; ΔI _o = 2 mA to 40 μA; 2% accuracy of read level (40 μA); note 3	–	15	–	ns
Δt _{d(g)}	group delay variation	I _o = 1 mA; f _i = 13 to 130 MHz reading DVD-ROM	–	0.5	–	ns
		reading CD-ROM	–	0.75	–	ns
		reading DVD+RW	–	0.5	–	ns
		reading CD-RW	–	0.9	–	ns

Photodiode and amplifier IC for CD and DVD applications

TZA1045

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
CMR	common mode ripple	$I_o = 2$ mA (peak); up to 130 MHz; note 6	–	–30	–	dB
V_o	output voltage range		1	–	$V_{DD2} - 1$	V
I_o	output current		0	2	8	mA
$I_{o(\text{offset})}$	output offset current	dark conditions; $T_{\text{amb}} = 0$ to 70 °C pin RFP pin RFN	–13 +14	– –	0 0	μA μA
$I_{n(o)}$	spot noise differential output current	$I_o = 3$ mA; $f_o = 50$ MHz reading DVD-ROM reading CD-ROM reading DVD+RW reading CD-RW	– – – –	360 1250 515 1850	– – – –	$\text{pA}/\sqrt{\text{Hz}}$ $\text{pA}/\sqrt{\text{Hz}}$ $\text{pA}/\sqrt{\text{Hz}}$ $\text{pA}/\sqrt{\text{Hz}}$
Satellite segment outputs; pins E, F, G and H						
$B_{-3\text{dB}}$	channel E, F, G and H RF bandwidth	$I_o = 0.5$ mA writing DVD+R writing CD-R writing DVD+RW writing CD-RW reading DVD-ROM reading CD-ROM reading DVD+RW reading CD-RW	140 80 300 125 90 45 80 40	171 97 360 148 111 54 97 48	200 115 420 175 130 65 115 55	MHz MHz MHz MHz MHz MHz MHz MHz
t_{set}	settling time	CD-R write mode; $\Delta I_o = 0.75$ mA to 15 μA ; 2% accuracy of read level (15 μA); note 3	–	30	–	ns
M_{sens}	channel E, F, G and H matching sensitivity	note 7	–5	–	+5	%
V_o	output voltage range		1	–	$V_{DD2} - 1$	V
I_o	output current		0	0.75	8	mA
$I_{o(\text{offset})}$	output offset current	dark conditions; $T_{\text{amb}} = 0$ to 70 °C	–31	–	+25	μA
$I_{o(\text{clip})}$	current clipping level	CD-R writing; note 5	5	–	8	mA
Control inputs; pins R/W, H/L and CD/DVD						
$Z_{i(\text{pd})}$	pull-down input impedance		–	230	–	k Ω
V_{IL}	LOW-level input voltage		–0.2	–	+1	V
V_{IH}	HIGH-level input voltage		2.1	–	$V_{DD2} + 0.2$	V
$t_{t(\text{G})}$	gain transition time		–	2	–	μs

Photodiode and amplifier IC for CD and DVD applications

TZA1045

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Sensitivity ; note 8						
S _{DVD+R}	output current sensitivity for DVD+R	writing; $\lambda = 655$ nm; note 9				
		I _{o(cen)}	–	1.47	–	A/W
		I _{o(sat)}	–	5.63	–	A/W
		I _{o(RFP)}	–	1.36	–	A/W
		I _{o(RFN)}	–	1.39	–	A/W
S _{CD-R}	output current sensitivity for CD-R	writing; $\lambda = 785$ nm; note 10				
		I _{o(cen)}	–	37.5	–	A/W
		I _{o(sat)}	–	142	–	A/W
		I _{o(RFP)}	–	2.99	–	A/W
		I _{o(RFN)}	–	3.14	–	A/W
S _{DVD+RW}	output current sensitivity for DVD+RW	writing; $\lambda = 655$ nm; note 9				
		I _{o(cen)}	–	2.89	–	A/W
		I _{o(sat)}	–	11.1	–	A/W
		I _{o(RFP)}	–	2.73	–	A/W
		I _{o(RFN)}	–	2.78	–	A/W
		reading; $\lambda = 655$ nm; note 11				
		I _{o(cen)}	–	42.8	–	A/W
		I _{o(sat)}	–	163	–	A/W
		I _{o(RFP)}	–	48.3	–	A/W
		I _{o(RFN)}	–	44.3	–	A/W
S _{CD-RW}	output current sensitivity for CD-RW	writing; $\lambda = 785$ nm; note 9				
		I _{o(cen)}	–	5.35	–	A/W
		I _{o(sat)}	–	20.4	–	A/W
		I _{o(RFP)} , I _{o(RFN)}	–	5.05	–	A/W
		I _{o(RFP)} , I _{o(RFN)}	–	5.13	–	A/W
		reading; $\lambda = 785$ nm; note 11				
		I _{o(cen)}	–	151	–	A/W
		I _{o(sat)}	–	590	–	A/W
		I _{o(RFP)} , I _{o(RFN)}	–	164	–	A/W
		I _{o(RFP)} , I _{o(RFN)}	–	168	–	A/W
S _{DVD-ROM}	output current sensitivity for DVD-ROM	reading; $\lambda = 655$ nm; note 11				
		I _{o(cen)}	–	21.6	–	A/W
		I _{o(sat)}	–	83.6	–	A/W
		I _{o(RFP)}	–	21.0	–	A/W
		I _{o(RFN)}	–	21.0	–	A/W

Photodiode and amplifier IC for CD and DVD applications

TZA1045

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
S _{CD-ROM}	output current sensitivity for CD-ROM	reading; $\lambda = 785$ nm; note 11				
		$I_{o(cen)}$	–	74.8	–	A/W
		$I_{o(sat)}$	–	289	–	A/W
		$I_{o(RFP)}$	–	80.0	–	A/W
		$I_{o(RFN)}$	–	82.02	–	A/W

Notes

- The supplies are connected internally by diodes. Differences between the supply voltages should not exceed 0.3 V.
- Estimated average power consumption (typical value):
 $P = V_{DD} \times (1.4 \times I_{o(AV)} \times 9 + I_{DD1} + I_{DD2})$ where $I_{o(AV)}$ is the average output current.
 Conditions: $V_{DD} = V_{DD1} = V_{DD2}$ and $I_o < 8$ mA.
- The settling time includes the recovery time.
- Outputs A, B, C, and D: $I_o = 3$ mA output current. Definition of matching:
$$\frac{I_{o(max)} - I_{o(min)}}{(I_A + I_B + I_C + I_D) \times \frac{1}{4}}$$
- The clipping function is active in the CD-R write mode for the segment outputs (not for outputs RFP and RFN) and in the read mode for all outputs. In the read mode, the clipping level is increased to 8 mA.
- Definition:
$$20 \log \times \frac{I_{RFP} + I_{RFN}}{I_{RFP} - I_{RFN}}$$
- Outputs E, F, G, and H outputs: $I_o = 1.5$ mA output current. Definition of matching:
$$\frac{I_{o(max)} - I_{o(min)}}{(I_E + I_F + I_G + I_H) \times \frac{1}{4}}$$
- The sensitivity of the TZA1045 is specified in A/W because it has current outputs. In the application diagram (see Fig.5) the resistors of 150 Ω convert the currents into voltages (V/W). The maximum absolute spread is $\pm 10\%$.
- Writing without clipping.
- Writing with clipping in CD-R mode for all segment outputs (not outputs RFP and RFN).
- Reading with clipping active and switched to a level of typ. 8 mA.

Photodiode and amplifier IC for CD and DVD applications

TZA1045

APPLICATION INFORMATION

An application example for the TZA1045 is shown in Fig.5. The satellite segment pins are cross-coupled to be suitable for rewritable applications.

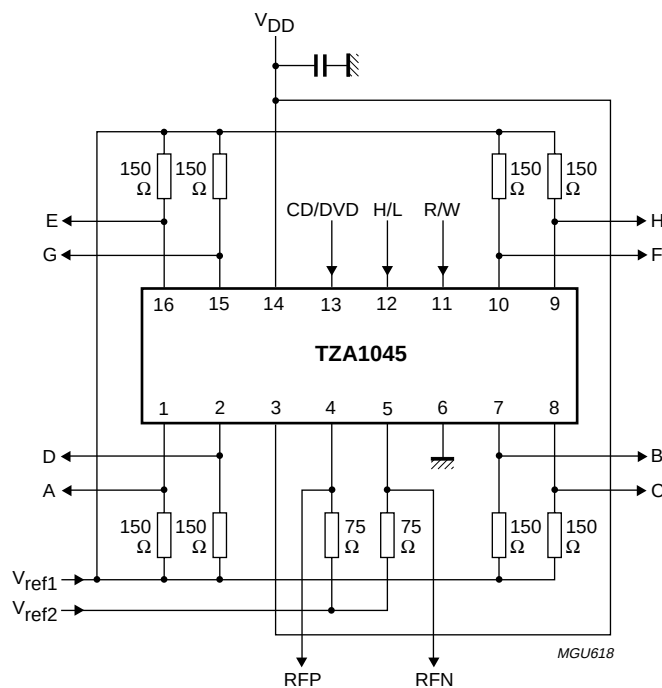


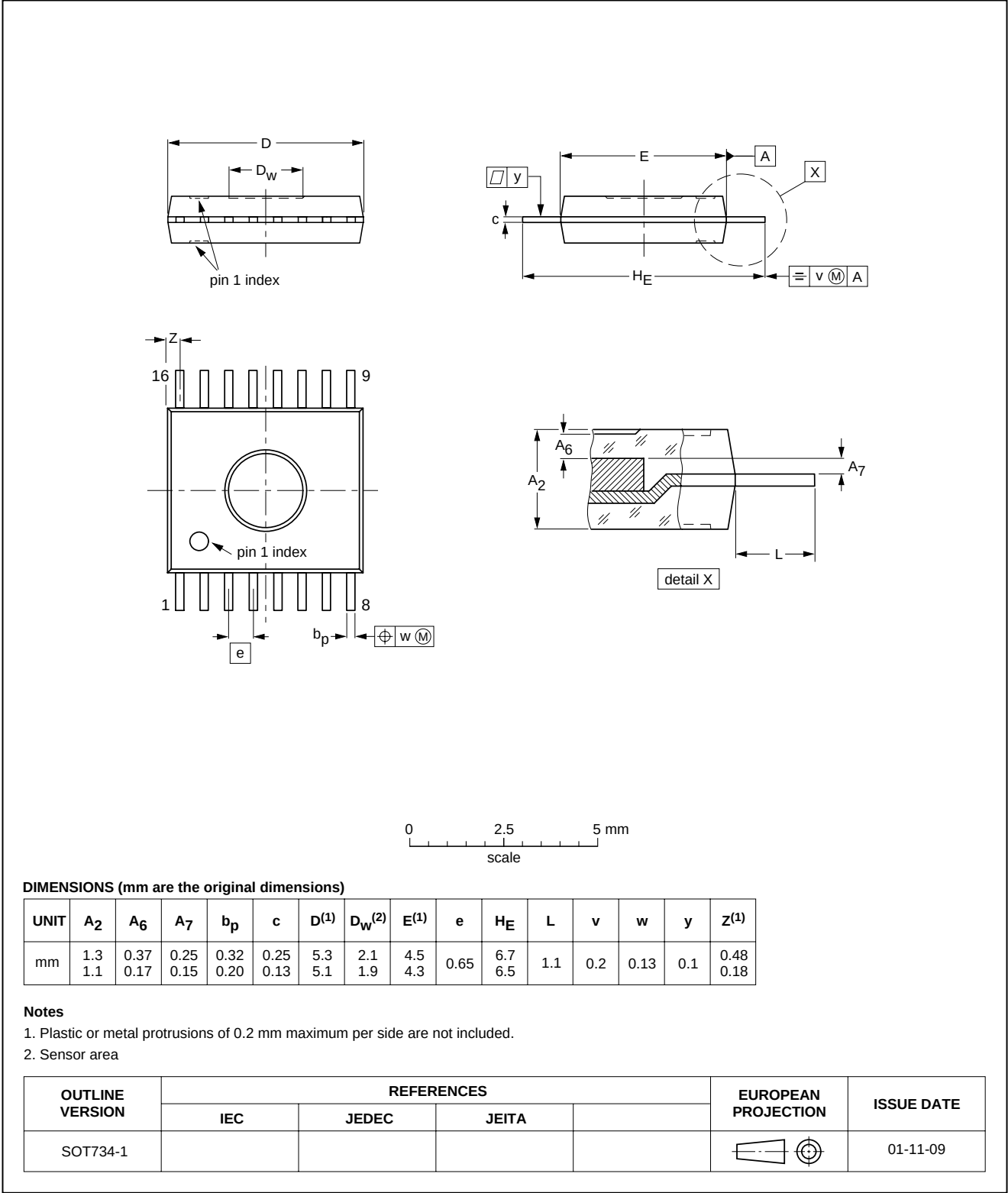
Fig.5 Application example.

Photodiode and amplifier IC
for CD and DVD applications

TZA1045

PACKAGE OUTLINE

SSOP16T: plastic shrink small outline package/transparent; 16 leads (straight); body width 4.4 mm SOT734-1



Photodiode and amplifier IC for CD and DVD applications

TZA1045

SOLDERING

Introduction to soldering surface mount packages

This text gives a very brief insight to a complex technology. A more in-depth account of soldering ICs can be found in our *"Data Handbook IC26; Integrated Circuit Packages"* (document order number 9398 652 90011).

There is no soldering method that is ideal for all surface mount IC packages. Wave soldering can still be used for certain surface mount ICs, but it is not suitable for fine pitch SMDs. In these situations reflow soldering is recommended.

Reflow soldering

Reflow soldering requires solder paste (a suspension of fine solder particles, flux and binding agent) to be applied to the printed-circuit board by screen printing, stencilling or pressure-syringe dispensing before package placement.

Several methods exist for reflowing; for example, convection or convection/infrared heating in a conveyor type oven. Throughput times (preheating, soldering and cooling) vary between 100 and 200 seconds depending on heating method.

Typical reflow peak temperatures range from 215 to 250 °C. The top-surface temperature of the packages should preferably be kept below 220 °C for thick/large packages, and below 235 °C for small/thin packages.

Wave soldering

Conventional single wave soldering is not recommended for surface mount devices (SMDs) or printed-circuit boards with a high component density, as solder bridging and non-wetting can present major problems.

To overcome these problems the double-wave soldering method was specifically developed.

If wave soldering is used the following conditions must be observed for optimal results:

- Use a double-wave soldering method comprising a turbulent wave with high upward pressure followed by a smooth laminar wave.
- For packages with leads on two sides and a pitch (e):
 - larger than or equal to 1.27 mm, the footprint longitudinal axis is **preferred** to be parallel to the transport direction of the printed-circuit board;
 - smaller than 1.27 mm, the footprint longitudinal axis **must** be parallel to the transport direction of the printed-circuit board.

The footprint must incorporate solder thieves at the downstream end.

- For packages with leads on four sides, the footprint must be placed at a 45° angle to the transport direction of the printed-circuit board. The footprint must incorporate solder thieves downstream and at the side corners.

During placement and before soldering, the package must be fixed with a droplet of adhesive. The adhesive can be applied by screen printing, pin transfer or syringe dispensing. The package can be soldered after the adhesive is cured.

Typical dwell time is 4 seconds at 250 °C.

A mildly-activated flux will eliminate the need for removal of corrosive residues in most applications.

Manual soldering

Fix the component by first soldering two diagonally-opposite end leads. Use a low voltage (24 V or less) soldering iron applied to the flat part of the lead. Contact time must be limited to 10 seconds at up to 300 °C.

When using a dedicated tool, all other leads can be soldered in one operation within 2 to 5 seconds between 270 and 320 °C.

Photodiode and amplifier IC for CD and DVD applications

TZA1045

Suitability of surface mount IC packages for wave and reflow soldering methods

PACKAGE ⁽¹⁾	SOLDERING METHOD	
	WAVE	REFLOW ⁽²⁾
BGA, LBGA, LFBGA, SQFP, TFBGA, VFBGA	not suitable	suitable
HBCC, HBGA, HLQFP, HSQFP, HSOP, HTQFP, HTSSOP, HVQFN, HVSON, SMS	not suitable ⁽³⁾	suitable
PLCC ⁽⁴⁾ , SO, SOJ	suitable	suitable
LQFP, QFP, TQFP	not recommended ⁽⁴⁾⁽⁵⁾	suitable
SSOP, TSSOP, VSO	not recommended ⁽⁶⁾	suitable

Notes

- For more detailed information on the BGA packages refer to the “(LF)BGA Application Note” (AN01026); order a copy from your Philips Semiconductors sales office.
- All surface mount (SMD) packages are moisture sensitive. Depending upon the moisture content, the maximum temperature (with respect to time) and body size of the package, there is a risk that internal or external package cracks may occur due to vaporization of the moisture in them (the so called popcorn effect). For details, refer to the Drypack information in the “Data Handbook IC26; Integrated Circuit Packages; Section: Packing Methods”.
- These packages are not suitable for wave soldering. On versions with the heatsink on the bottom side, the solder cannot penetrate between the printed-circuit board and the heatsink. On versions with the heatsink on the top side, the solder might be deposited on the heatsink surface.
- If wave soldering is considered, then the package must be placed at a 45° angle to the solder wave direction. The package footprint must incorporate solder thieves downstream and at the side corners.
- Wave soldering is suitable for LQFP, TQFP and QFP packages with a pitch (e) larger than 0.8 mm; it is definitely not suitable for packages with a pitch (e) equal to or smaller than 0.65 mm.
- Wave soldering is suitable for SSOP and TSSOP packages with a pitch (e) equal to or larger than 0.65 mm; it is definitely not suitable for packages with a pitch (e) equal to or smaller than 0.5 mm.

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TZA1045

DATA SHEET STATUS

LEVEL	DATA SHEET STATUS ⁽¹⁾	PRODUCT STATUS ⁽²⁾⁽³⁾	DEFINITION
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
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Short-form specification — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

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for CD and DVD applications

TZA1045

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