

## VERTICAL DEFLECTION CIRCUIT (110°)

### GENERAL DESCRIPTION

The TDA3652 is an integrated power output circuit for vertical deflection in systems with deflection currents up to 3 A peak to peak.

### Features

- Driver
- Output stage and protection circuits
- Flyback generator
- Voltage stabilizer

### QUICK REFERENCE DATA

Supply voltage (pin 9)	$V_{9-4} = V_p$	0 to 40 V
Peak output voltage during flyback (pin 5)	$V_{5-4M}$	< 55 V
Output current (peak-to-peak value)	$I_{5(p-p)}$	max. 3 A
Operating junction temperature	$T_j$	max. 150 °C
Thermal resistance from junction to mounting base	$R_{th j-mb}$	max. 4 K/W

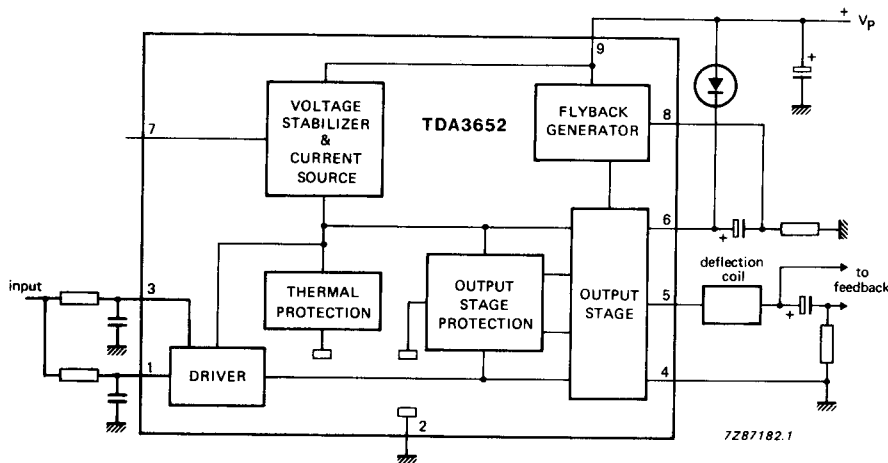


Fig. 1 Block diagram.

### PACKAGE OUTLINES

TDA3652: 9-lead SIL; plastic (SOT-131).

TDA3652Q: 9-lead SIL bent to DIL; plastic (SOT-157).

**RATINGS**

Limiting values in accordance with the Absolute Maximum System (IEC 134)

**Voltages** (pins 4 and 2 externally connected to ground)

Output voltage (pin 5)	$V_{5-4}$	0 to 55 V
Supply voltage (pin 9)	$V_{9-4} = V_P$	0 to 40 V
Supply voltage output stage (pin 6)	$V_{6-4}$	0 to 55 V
Driver input voltage (pin 1)	$V_{1-2}$	0 to $V_P$ V*
Switching circuit input voltage (pin 3)	$V_{3-2}$	0 to 5,6 V

**Currents**

Repetitive peak output current (pin 5)	$\pm I_{5RM}$	max.	1,5 A
Non-repetitive peak output current (pin 5)	$\pm I_{5SM}$	max.	3 A**
Repetitive peak flyback generator output current (pin 8)	$I_{8RM}$	max.	-1,5 A +1,6 A
Non-repetitive peak flyback generator output current (pin 8)	$\pm I_{8SM}$	max.	3 A**

**Temperatures**

Storage temperature range	$T_{stg}$	-65 to +150 °C
Operating ambient temperature range	$T_{amb}$	-25 to +65 °C
Operating junction temperature range	$T_j$	-25 to +150 °C

\* The maximum input voltage should not exceed the supply voltage ( $V_P$  at pin 9). In most applications pin 1 is connected to pin 3; the maximum input voltage should then not exceed 5,6 V.

\*\* Non-repetitive duty factor maximum 3,3%.

**CHARACTERISTICS**

$V_p = 26 \text{ V}$ ;  $T_{amb} = 25 \text{ }^\circ\text{C}$ ; pins 4 and 2 externally connected to ground; unless otherwise specified

parameter	symbol	min.	typ.	max.	unit
<b>Supply</b>					
Supply voltage; pin 9	$V_p$	10	—	40	V*
Supply voltage output stage; pin 6	$V_{6-4}$	—	—	55	V*
Supply current (no load and no quiescent current); pin 9	$I_p$	—	9	12	mA
Quiescent current (see Fig. 2)	$I_4$	25	40	65	mA
Variation of quiescent current with temperature	$\Delta I_4$	—	-0,04	—	mA/K
<b>Output current</b>					
Output current (pin 5) (peak-to-peak value)	$I_{5(p-p)}$	—	2,5	3,0	A
Output current flyback generator (pin 8)	$-I_8$	—	1,35	1,6	A
Output current flyback generator (pin 8)	$I_8$	—	1,25	1,5	A
<b>Output voltage</b>					
Peak voltage during flyback	$V_{5-4M}$	—	—	55	V
Saturation voltage to supply at $-I_5 = 1,5 \text{ A}$	$-V_{5-6sat}$	2,0	2,6	3,3	V
Saturation voltage to ground at $I_5 = 1,5 \text{ A}$	$V_{5-4sat}$	2,0	2,6	3,3	V
Saturation voltage to supply at $-I_5 = 1 \text{ A}$	$-V_{5-6sat}$	1,7	2,2	2,7	V
Saturation voltage to ground at $I_5 = 1 \text{ A}$	$V_{5-4sat}$	1,7	2,2	2,7	V
<b>Flyback generator</b>					
Saturation voltage at $-I_8 = 1,6 \text{ A}$	$V_{9-8sat}$	0,9	1,5	2,1	V
Saturation voltage at $I_8 = 1,5 \text{ A}$	$V_{8-9sat}$	1,1	2,5	3,0	V
Saturation voltage at $-I_8 = 1,1 \text{ A}$	$V_{9-8sat}$	0,6	1,4	1,9	V
Saturation voltage at $I_8 = 1 \text{ A}$	$V_{8-9sat}$	0,9	2,3	2,8	V
Flyback generator active if:	$V_{5-9}$	4	—	—	V
Leakage current at pin 8	$-I_8$	—	5	100	$\mu\text{A}$
Input current for $I_5 = 4 \text{ A}$ at pin 1 (peak-to-peak value)	$I_{1(p-p)}$	190	240	400	$\mu\text{A}$
Input voltage during scan (pin 1)	$V_{1-2}$	1,3	2,0	3,5	V
Input current during scan (pin 3)	$I_3$	0,01	—	1,0	mA

\* The maximum supply voltage should be chosen such that during flyback the voltage at pin 5 does not exceed 55 V.

**CHARACTERISTICS (continued)**

parameter	symbol	min.	typ.	max.	unit
<b>Flyback generator (continued)</b>					
Input voltage during scan (pin 3)	V <sub>3-2</sub>	0,9	—	5,6	V
Input voltage during flyback (pin 3)	V <sub>3-2</sub>	0	—	0,2	V
<b>General data</b>					
Junction temperature of switching on the thermal protection	T <sub>j</sub>	158	175	192	°C
Thermal resistance from junction to mounting base	R <sub>th j-mb</sub>	—	—	4	K/W
Total power dissipation	P <sub>tot</sub>	see Fig. 3			
Open-loop gain at 1 kHz	G <sub>o</sub>	—	36	—	dB
Frequency response (−3 dB) at R <sub>L</sub> = 1 kΩ	f	—	50	—	kHz

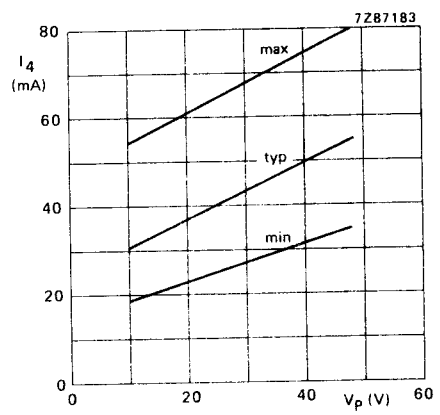


Fig. 2 Quiescent current ( $I_4$ ) as a function of supply voltage ( $V_p$ ).

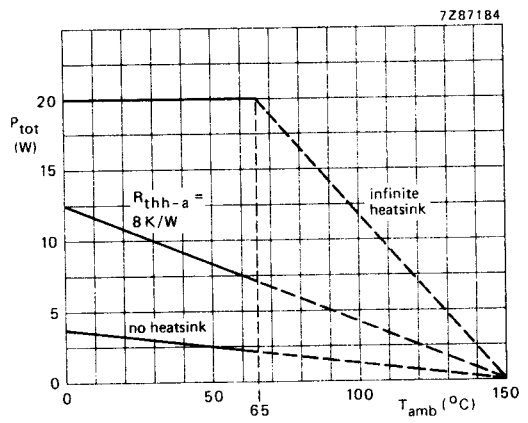


Fig. 3 Power derating curve.

## APPLICATION INFORMATION

The function is described against the corresponding pin number.

### 1. Driver

This is the input for the driver of the output stage.

### 2. Negative supply (ground)

### 3. Switching circuit

This pin is normally connected via external resistors to pin 1. It is also possible to use this pin to drive the switching circuit for different applications. This switching circuit rapidly turns off the lower output stage at the end of scan and also allows for a quick start of the flyback generator.

### 4. Output stage ground

### 5 and 6. Output stage and protection circuits

Pin 5 is the output pin and pin 6 is the output stage supply pin. The output stage is a class-B type with each transistor capable of delivering 1,5 A maximum. The "upper" output transistor is protected against short-circuit currents to ground. The base of the "lower" power transistor is connected to ground during flyback and so it is protected against too high flyback pulses which may occur during adjustments. In addition the output transistors are protected by a special layout of the internal circuit. The circuit is protected thermally against excessive dissipation by a circuit which operates at temperatures of 175 °C upwards causing the output current to drop to a value such that the dissipation cannot increase.

### 7. Voltage stabilizer

The internal voltage stabilizer provides a stabilized supply voltage of 6 V for drive of the output stage, so the drive current is not influenced by the various voltages of different applications.

### 8 and 9. Flyback generator

Pin 8 is the output pin of the flyback generator. Depending on the value of the external resistor at pin 8, the capacitor at pin 6 will be charged to a fixed level during the scan period. The maximum height of this level is equal to the supply voltage at pin 9 ( $V_p$ ). When the flyback starts and the flyback pulse at pin 5 exceeds the supply voltage, the flyback generator is activated and then the supply voltage is connected in series (via pin 8) with the voltage across the capacitor. The voltage at the supply pin (pin 6) of the output stage will then be not more than twice the supply voltage.

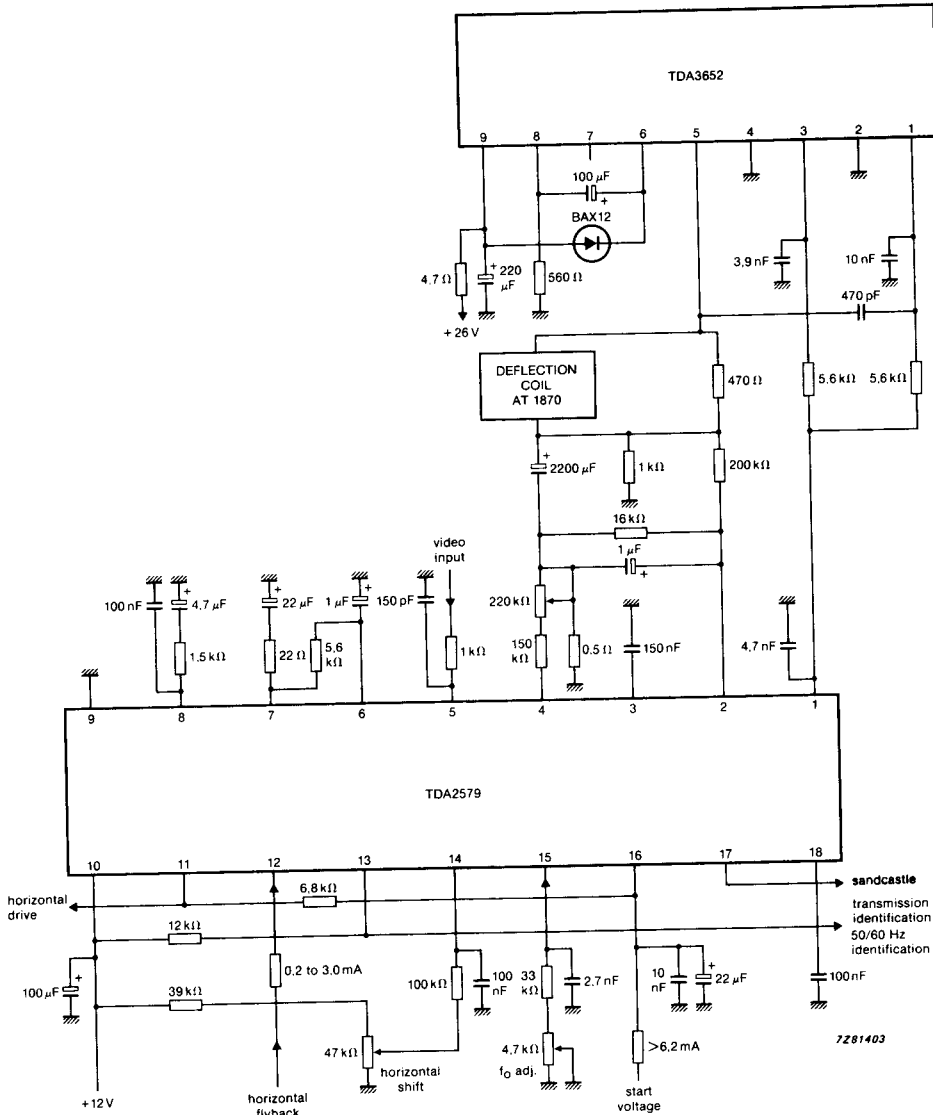


Fig. 4 Application circuit diagram in combination with TDA2579.