Signetics

TDA2653A
Vertical Deflection

Product Specification

Linear Products

DESCRIPTION

The TDA2653A is a monolithic integrated circuit for vertical deflection in video monitors and large screen color television receivers, e.g. 30AX and PIL-S4 systems.

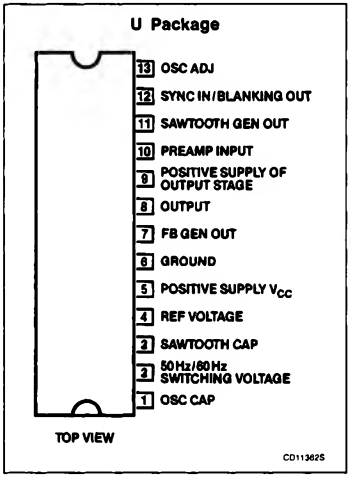
FEATURES

- **Oscillator; switch capability for 50Hz/60Hz operation**
- **Synchronization circuit**
- **Blanking pulse generator with guard circuit**
- **Sawtooth generator with buffer stage**
- **Preamplifier with fed-out inputs**
- **Output stage with thermal and short-circuit protection**
- **Flyback generator**
- **Voltage stabilizer**

APPLICATIONS

- **Video monitor**
- **Television receiver**

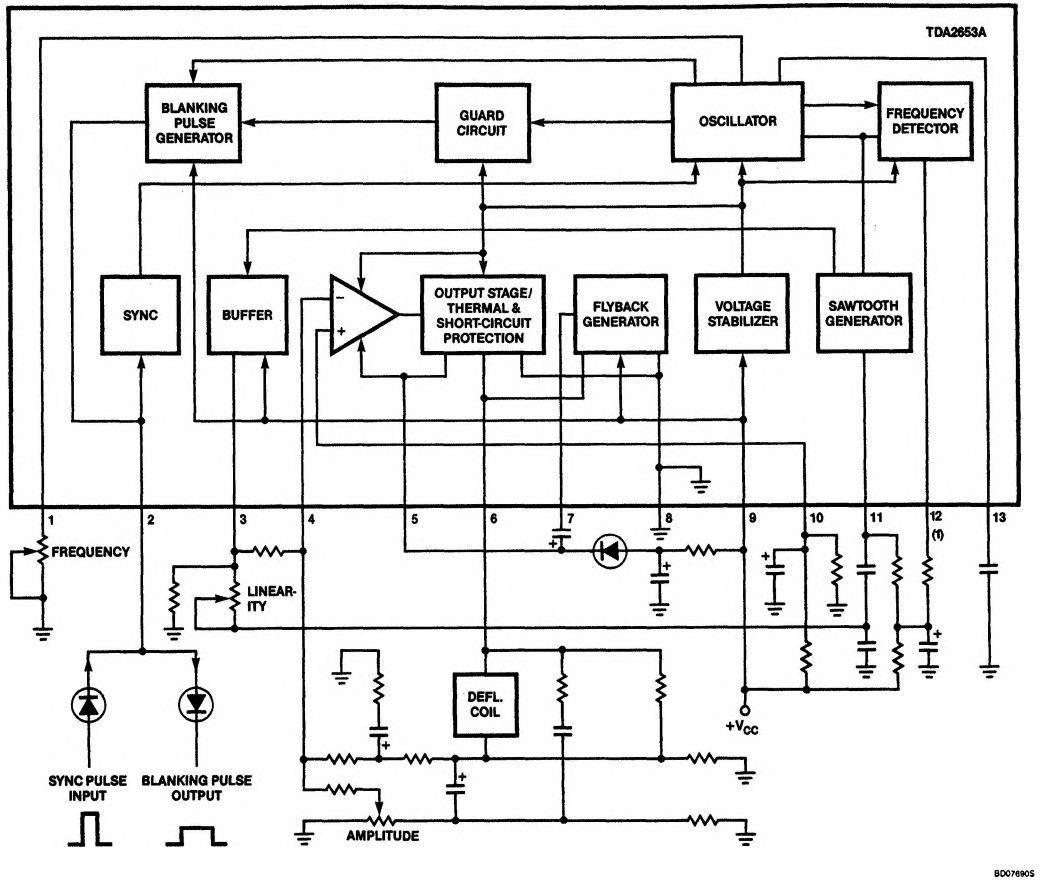
PIN CONFIGURATION



ORDERING INFORMATION

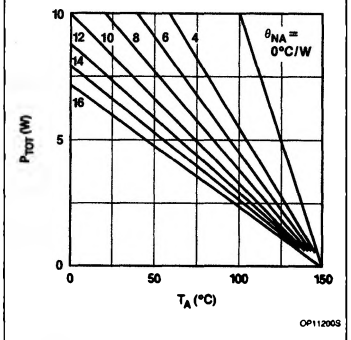
DESCRIPTION	TEMPERATURE RANGE	ORDER CODE
13-Pin Plastic SIP power package (SOT-141B)	−20°C to +85°C	TDA2653AU

BLOCK DIAGRAM



NOTE:
1. Condition for Pin 12: LOW voltage level = 50Hz; HIGH voltage level = 60Hz.

PIN NO.	DESCRIPTION
1, 13	Oscillator The oscillator frequency is determined by a potentiometer at Pin 1 and a capacitor at Pin 13.
2	Sync input/blanking output Combination of sync input and blanking output. The oscillator has to be synchronized by a positive-going pulse between 1V and 12V. The integrated frequency detector delivers a switching level at Pin 12. The blanking pulse amplitude is 20V with a load of 1mA.
3	Sawtooth generator output The sawtooth signal is fed via a buffer stage to Pin 3. It delivers the signal which is used for linearity control, and drive of the preamplifier. The sawtooth is applied via a shaping network to Pin 11 (linearity) and via a resistor to Pin 4 (preamplifier).
4	Preamplifier input The DC voltage is proportional to the output voltage (DC feedback). The AC voltage is proportional to the sum of the buffered sawtooth voltage at Pin 3 and the voltage, with opposite polarity, at the feedback resistor (AC feedback).
5	Positive supply of output stage This supply is obtained from the flyback generator. An electrolytic capacitor between Pins 7 and 5, and a diode between Pins 5 and 9 have to be connected for proper operation of the flyback generator.
6	Output of class-B power stage The vertical deflection coil is connected to this pin, via a series connection of a coupling capacitor and a feedback resistor, to ground.
7	Flyback generator output An electrolytic capacitor has to be connected between Pins 7 and 5 to complete the flyback generator.
8	Negative supply (ground) Negative supply of output stage and small signal part.
9	Positive supply The supply voltage at this pin is used to supply the flyback generator, voltage stabilizer, blanking pulse generator and buffer stage.
10	Reference voltage of preamplifier External adjustment and decoupling of reference voltage of the preamplifier.
11	Sawtooth capacitor This sawtooth capacitor has been split to realize linearity control.
12	50Hz/60Hz switching level This pin delivers a LOW voltage level for 50Hz and a HIGH voltage level for 60Hz. The amplitudes of the sawtooth signals can be made equal for 50Hz and 60Hz with these levels.



NOTE:
θ_{HA} includes θ_{MBH} which is expected when heatsink compound is used. $\theta_{JMB} \leq 5°C/W$.

Figure 1. Total Power Dissipation

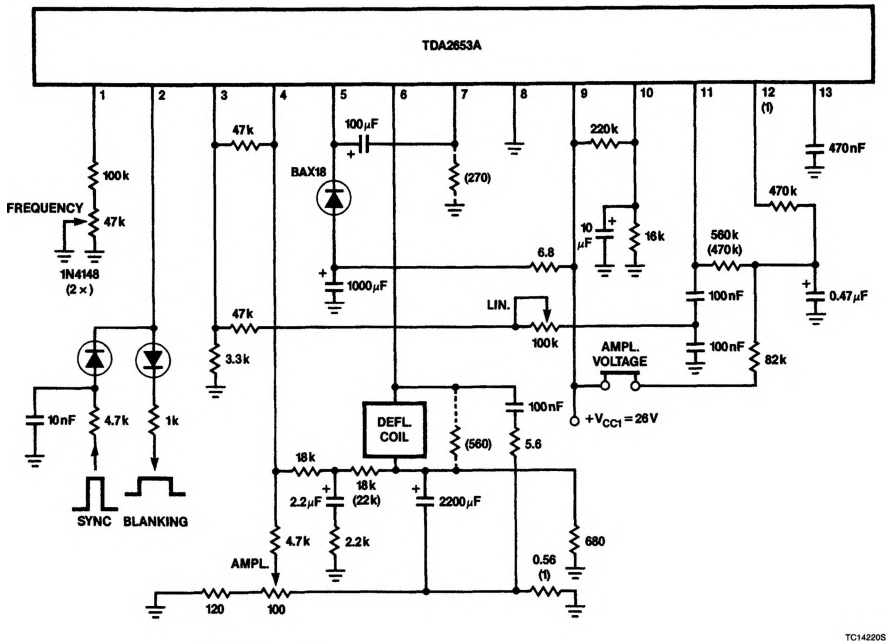
ABSOLUTE MAXIMUM RATINGS

SYMBOL	PARAMETER	RATING	UNIT
$V_9 = V_{CC}$	Supply voltage (Pin 9)	40	V
V_5	Supply voltage output stage (Pin 5)	58	V
Voltages			
V_3	Pin 3	7	V
V_{13}	Pin 13	7	V
$V_{4;\ 10}$	Pins 4 and 10	24	V
V_6	Pin 6	58	V
$-V_6$		0	V
$V_{7;\ 11}$	Pins 7 and 11	40	V
Currents			
I_1	Pin 1	0	mA
$-I_1$		1	mA
$\pm I_2$	Pin 2	10	mA
IP_3	Pin 3	0	mA
$-I_3$		5	mA
I_7	Pin 7	1.2	A
$-I_7$		1.5	A
I_{11}	Pin 11	50	mA
$-I_{11}$		1	mA
I_{12}	Pin 12	3	mA
$-I_{12}$		0	mA
T_{STG}	Storage temperature range	−25 to +150	°C
T_A	Operating ambient temperature range	−20 to limiting value	°C

NOTES:
1. Pins 5, 6 and 8: internally limited by the short-circuit protection circuit.
2. Total power dissipation: internally limited by the thermal protection circuit.

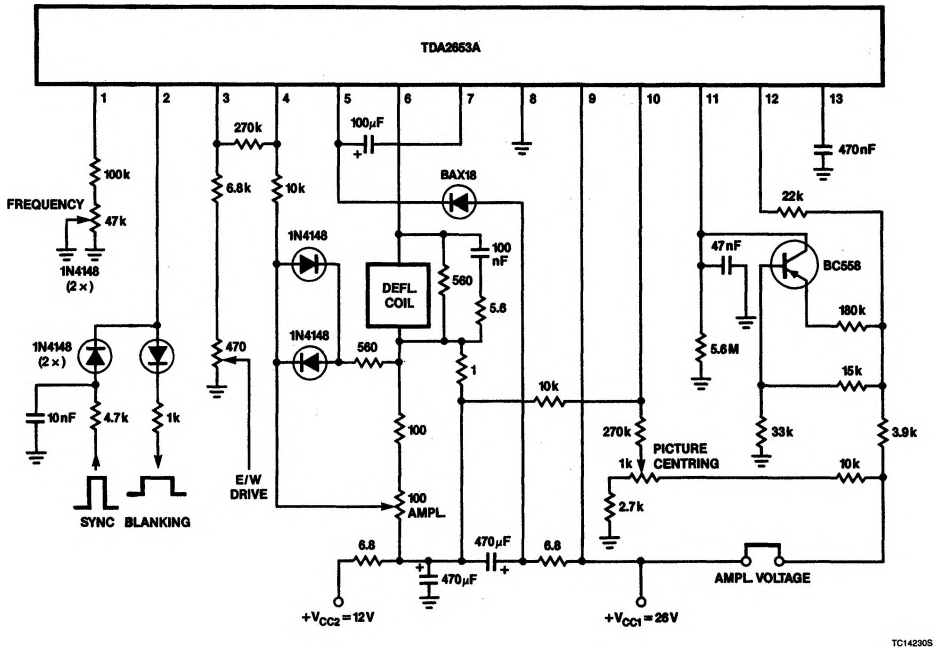
DC ELECTRICAL CHARACTERISTICS T^A = 25°C, unless otherwise specified.

SYMBOL	PARAMETER	LIMITS			UNIT
		Min	Typ	Max	
$V_9 = V_{CC}$	Supply voltage	9		30	
V_6 V_6	Output voltage at $-I_6 = 1.1A$ at $I_6 = 1.1A$	$V_5-2.2$	$V_5-1.9$ 1.3	 1.6	V V
V_7	Flyback generator output voltage at $-I_6 = 1.1A$		$V_{CC}-2.2$		V
$\pm I_6$	Peak output current			1.2	A
$\pm I_7$	Flyback generator peak current			1.2	A
Feedback					
$-I_{4, 10}$	Input quiescent current		0.1		μA
Synchronization					
V_2	Sync input pulse	1		12	V
	Tracking range		28		%
Oscillator/sawtooth generator					
V_1	Oscillator frequency control input voltage	6		9	V
V_3 V_{11}	Sawtooth generator output voltage	0 0		V_{CC-1} V_{CC-2}	V V
$-I_3$ I_{11}	Sawtooth generator output current	0 −2		4 +30	mA μA mA
$(\Delta f/f)/\Delta T_{CASE}$	Oscillator temperature dependency T_{CASE} = 20 to 100°C		10^4		°C
$(\Delta f/f)/\Delta V_S$	Oscillator voltage dependency V_S = 10 to 30V		4×10^4		V^{-1}
Blanking pulse generator					
V_2	Output voltage at V_S = 24V; I_2 = 1mA		18.5		V
$-I_2$	Output current			3	mA
R_2	Output resistance		410		Ω
t_B	Blanking pulse duration at 50Hz sync		1.4 ± 0.07		ms
50Hz/60Hz switch capability					
V_{12}	Saturation voltage; LOW voltage level		1		V
I_{12}	Output leakage current		1		μA



NOTES:
1. Condition for Pin 12: LOW voltage level = 50Hz; HIGH voltage level = 60Hz.
2. The values given in parentheses and the dotted components are valid for the PIL-S4 system.

Figure 2. Typical Vertical Deflection Circuit for 30AX System (26V)



NOTES:
1. Condition for Pin 12: LOW voltage level = 50Hz; HIGH voltage level = 60Hz.
2. V_{CC1} = 26V, V_{CC2} = 12V in Quasi-bridge Connection.

Figure 3. Typical Vertical Deflection Circuit for 30AX System

Data Measured in Figures 2 and 3

SYMBOL	PARAMETER		30AX SYSTEM (26V) (Figure 2)	30AX SYSTEM (26 V/12V) (Figure 3)	PIL-S4 SYSTEM (Figure 2)
V_{S1} V_{S2}	System supply voltages	typ typ	26	26 12	26V – V
I_{S1} I_{S2}	System supply currents	typ typ	315	330 – 35	195mA – mA
V_{6-8}	Output voltage	typ	14	14.6	13.5V
V_{6-8}	Output voltage (peak value)	typ	42	42	49V
$I_{6(P-P)}$	Deflection current (peak-to-peak value)	typ	2.2	2.2	1.32A
t_{FL}	Flyback time	typ	1	0.9	1.1ms
P_{TOT}	Total power dissipation per package	typ max	4.1 4.8	4 4.8	3W 3.4W[1]
f	Oscillator frequency unsynchronized	typ	46.5	46.5	46.5Hz

NOTE:
1. Calculated with $\Delta V_S = +5\%$ and $\Delta R_{YOKE} = -7\%$.