

BAND SELECTOR AND WINDOW DETECTOR

GENERAL DESCRIPTION

The TDA3791 is a monolithic integrated circuit intended for application in search-tuning systems for video recorders. It is designed to select one out of four tuners, each representing a particular band. Band selection tuning is indicated by a variable voltage V_{AFC} .

Features

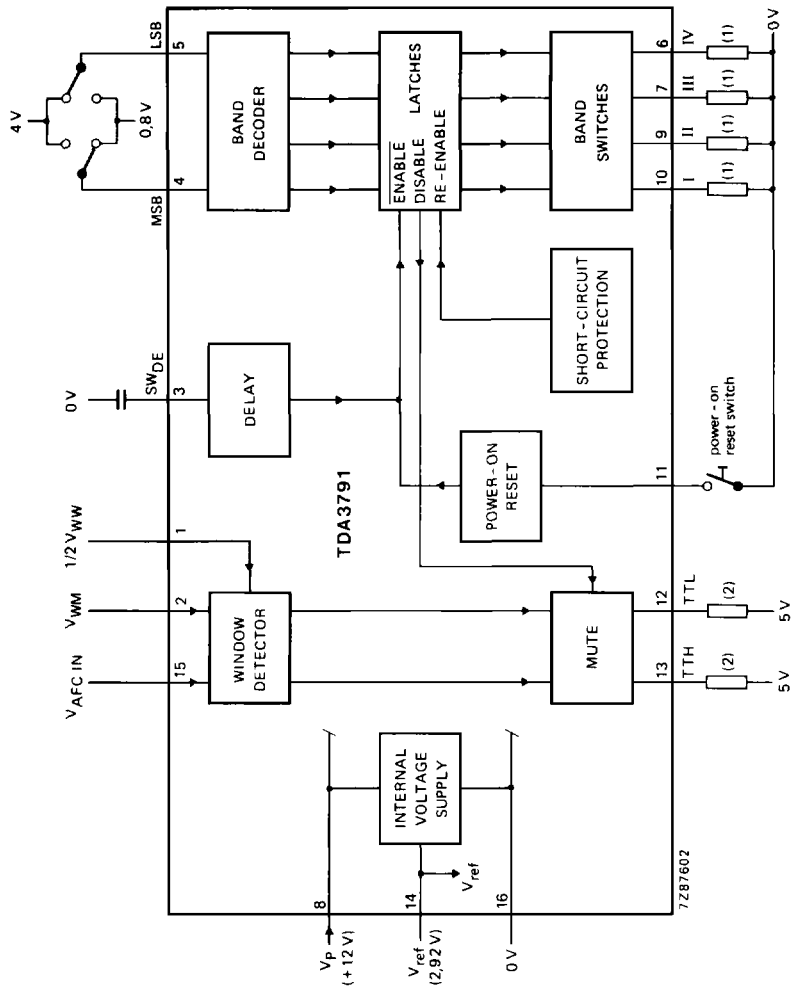
- Voltage window detector
- Band switch selector
- 4 short-circuit protected band switches
- Muting circuit
- Delay circuit
- Short-circuit protection circuit
- Power-on reset

QUICK REFERENCE DATA

Supply voltage (pin 8)	$V_P = V_{8-16}$	typ.	12 V
Supply current (pin 8)	$I_P = I_8$		
unloaded band switches ON		typ.	25 mA
all band switches OFF		typ.	12 mA
Power dissipation	P_{tot}	max.	1,8 W
Storage temperature range	T_{stg}		-65 to +150 °C
Operating ambient temperature range	T_{amb}		0 to 70 °C

PACKAGE OUTLINE

16-lead DIL; plastic with internal heat spreader (SOT38).



$$(1) R = \frac{10 \text{ V}}{35 \text{ mA}} \quad (2) R = \frac{5 \text{ V}}{2 \text{ mA}}$$

Fig. 1 Block diagram.

FUNCTIONAL DESCRIPTION**Voltage window detector** (see Table 1)

The voltage window is dependent upon two inputs; V_{WM} (pin 2) and $1/2V_{WW}$ (pin 1), which represent the centre of the window and the (window width)/2 respectively.

The voltage window range is from $V_{WM} - 1/2V_{WW}$ to $V_{WM} + 1/2V_{WW}$. A variable input voltage $V_{AFC IN}$ (pin 15) is compared with these window edges.

Table 1 Truth table; window detector

inputs	outputs	
$V_{AFC IN} = V_{15-16}; V_{WM} = V_{2-16}; V_{WW} = V_{1-16}$	V_{12-16}	V_{13-16}
$V_{AFC IN} < V_{WM} - 1/2V_{WW}$	HIGH	LOW
$V_{WM} - 1/2V_{WW} < V_{AFC IN} < V_{WM} + 1/2V_{WW}$	HIGH	HIGH
$V_{AFC IN} > V_{WM} + 1/2V_{WW}$	LOW	HIGH

Where: V_{12-16} = tuning too low (TTL); V_{13-16} = tuning too high (TTH).

During transitions of the outputs (V_{12-16} and V_{13-16}), a hysteresis value of approximately 20 mV is applied at the window edges.

Band-switch selector (see Table 2)

Selection of the band switches is determined by the input voltage levels of MSB (pin 4) and LSB (pin 5).

- If MSB or LSB > 4 V, the input is HIGH
- If MSB or LSB $< 0,8$ V, the input is LOW.

The band switches are selected as confirmed by Table 2.

Table 2 Truth table; band switch selector

MSB (V_{4-16})	LSB (V_{5-16})	switch	HIGH output
HIGH	HIGH	I	V_{10-16}
HIGH	LOW	II	V_{9-16}
LOW	HIGH	III	V_{7-16}
LOW	LOW	IV	V_{6-16}

Short-circuit protected band switches

A selected band switch has a minimum output voltage of $V_p - 0,3$ V provided the current is not more than 35 mA (I_{10}, I_9, I_7, I_6). If the output voltage at pins 10, 9, 7 or 6 is less than 9 V a short-circuit condition exists, and the output current will not be more than 80 mA. In this event the band switch is switched off, after an externally determined delay.

Muting

The muting circuit is active when a selected band switch is switched off. Both outputs TTL (pin 12) and TTH (pin 13) will then be LOW.

FUNCTIONAL DESCRIPTION (continued)

Delay circuit

After selection of a band switch, it will be in a conducting state. If after selection and a delay, the output voltage has not reached 9 V, the band is switched off. This delay is determined by an external capacitor on output SW_{DE} (pin 3).

Short-circuit protection

The short-circuit protection of each switch is provided by a flip-flop. If the condition of a band switch $V_O < 9\text{ V}$ is detected, its flip-flop will be set and the band switch is switched off.

In the event of an incidental short-circuit to a band switch output, the band switch can be reset by applying 0 V to the power-on reset input (pin 11) or 0 V to the switch delay output SW_{DE} (pin 3).

Power-on reset

Before the voltage supply reaches 9,6 V, the short-circuit protection flip-flops are reset to enable the selection of a band switch.

The power-on reset circuit also supplies the voltage level for short-circuit detection.

RATINGS

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

Supply voltage (pin 8)	$V_P = V_{G.16}$	max.	13,2 V
Total power dissipation	P_{tot}	see Fig. 2	
Storage temperature range	T_{stg}	–55 to +150 °C	
Operating ambient temperature range	T_{amb}	0 to +70 °C	

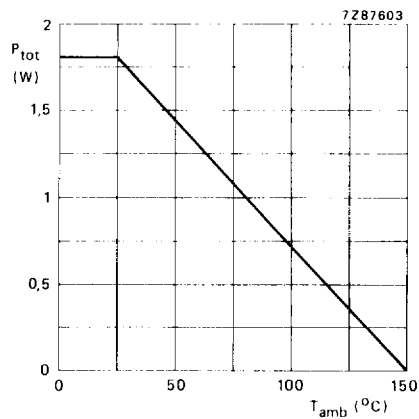


Fig. 2 Power derating curve.

CHARACTERISTICS

$V_P = V_{8-16} = 12\text{ V}$; $T_{\text{amb}} = 25\text{ }^{\circ}\text{C}$; measured in Fig. 1; unless otherwise specified

parameter	symbol	min.	typ.	max.	unit
Supply					
Supply voltage (pin 8)	$V_P = V_{8-16}$	10	12	13,2	V
Supply current (pin 8)					
unloaded band switches ON	$I_P = I_8$	18	25	38	mA
all band switches OFF	$I_P = I_8$	9	12	16	mA
Voltage range					
$1/2V_{WW}$ (pin 1)	V_{1-16}	0,1	—	4,5	V
V_{WM} (pin 2)	V_{2-16}	1,8	—	10,5	V
$V_{WM} + 1/2V_{WW}$ at $V_{8-16} = 1,4\text{ V}$	$V_{2-16} \pm V_{1-16}$	1,7	—	10,6	V
$V_{AFC\text{ IN}}$ (pin 15)	V_{15-16}	0,5	—	11,5	V
Input current					
$1/2V_{WW}$ (pin 1)	$-I_1$	—	—	2	μA
V_{WM} (pin 2)	I_2	—	—	0,2	μA
$V_{AFC\text{ IN}}$ (pin 15)	I_{15}	—	0,2	0,4	μA
Hysteresis voltage V_{AFC}^*	ΔV_{15-16}	—	20	50	mV
Delta current at $V_{AFC\text{ IN}}^*$	ΔI_{15}	—	—	25	nA
Temperature coefficient $I_{AFC\text{ IN}}$	$TC(I_{15})$	—	-0,42	—	nA/ $^{\circ}\text{C}$
Temperature coefficient I_{WM}	$TC(I_2)$	—	-0,27	—	nA/ $^{\circ}\text{C}$
Deviation of applied voltage (pin 1)					
at $V_{1-16} = 100\text{ mV}$	ΔV_{1-16}	-35	—	+35	mV
at $V_{1-16} = 4,0\text{ V}$; $V_{2-16} = 6\text{ V}$	ΔV_{1-16}	-200	—	+200	mV
Input current (pin 4)					
at $MSB < 0,8\text{ V}$	I_4	—	—	0,1	μA
at $MSB > 4\text{ V}$	I_4	—	—	1,0	μA
Input current (pin 5)					
at $LSB > 4\text{ V}$	I_5	—	—	1,0	μA
at $LSB < 0,8\text{ V}$	I_5	—	—	0,1	μA
Voltage level (pin 4)					
at $MSB\text{ HIGH}$	V_{4-16}	4	—	—	V
at $MSB\text{ LOW}$	V_{4-16}	—	—	0,8	V
Voltage level (pin 5)					
at $LSB\text{ HIGH}$	V_{5-16}	4	—	—	V
at $LSB\text{ LOW}$	V_{5-16}	—	—	0,8	V
Short-circuit current of band switches					
I, II, III, IV (pins 10, 9, 7, 6)	$-I_{10, 9, 7, 6}$	35	50	80	mA
Voltage drop of band switches					
I, II, III, IV (pins 10, 9, 7, 6)					
at $I_{O(\text{max})} = 35\text{ mA}$; $V_P = 10\text{ V}$	$V_{10, 9, 7, 6-16}$	—	—	0,3	V

* During switching of outputs V_{12-16} and/or V_{13-16} .

CHARACTERISTICS (continued)

parameter	symbol	min.	typ.	max.	unit
Voltage level short-circuit detection at 0,75Vp	V _{10, 9, 7, 6-16}	8,0	9,0	9,5	V
Output voltage (pin 13) TTH at I ₁₃ = 2 mA (LOW)	V ₁₃₋₁₆	—	—	0,3	V
Output voltage (pin 12) TTL at I ₁₂ = 2 mA (LOW)	V ₁₂₋₁₆	—	—	0,3	V
Leakage current (pin 13) TTH at V ₁₃₋₁₆ = 13,2 V	I ₁₃	—	—	10	μA
Leakage current (pin 12) TTH at V ₁₂₋₁₆ = 13,2 V	I ₁₂	—	—	10	μA
Output current (pin 3) SW _{DE} at V ₃₋₁₆ = 6 V	—I ₃	5	12	20	μA
Maximum value of delay capacitor	C ₃	—	—	40	nF
Maximum delay time at ± C ₃ (nF)/(I ₃ /10) ms	t _d	—	—	50	ms
Power-on-reset voltage	V ₈₋₁₆	6	—	9,6	V
Leakage current unswitched band switches at V _{10, 9, 7, 6-16} = -12 V	I _{10, 9, 7, 6}	—	—	5	μA