

MULTIFUNCTION SYSTEM FOR TAPE PLAYERS

NOT FOR NEW DESIGN

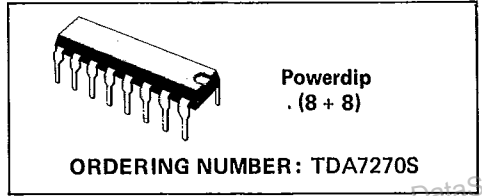
The TDA7270S is a multifunction monolithic integrated circuit in a 16-lead dual in-line plastic package specially designed for use in car radios cassette players, but suitable for all applications requiring tape playback.

It has the following functions:

- Motor speed regulator
- Automatic stop
- Manual stop
- Pause
- Cassette ejection
- Radio - Playback automatic switching.

The circuit incorporates also:

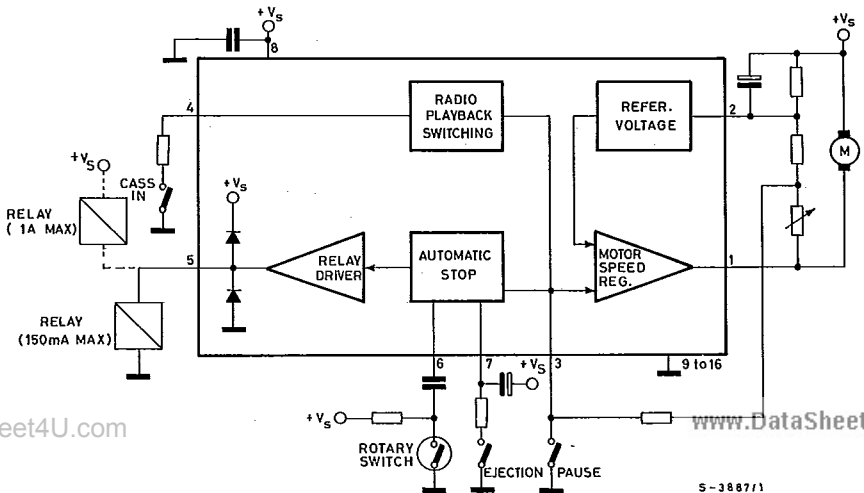
- Thermal protection
- Short circuit protection to ground (all the pins).



ABSOLUTE MAXIMUM RATINGS

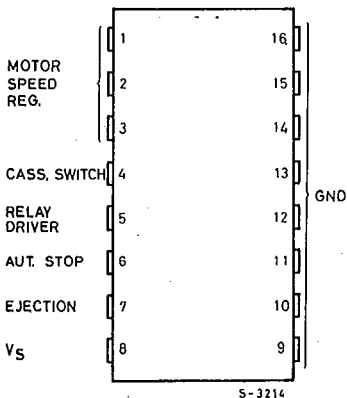
V_s	Supply voltage	20	V
I_1	Sink peak current at pin 1	2	A
I_5	Sink peak current at pin 5	2	A
P_{tot}	Power dissipation at $T_{amb} \leq 80^\circ\text{C}$	1	W
T_{stg}, T_j	Storage and junction temperature	-40 to 150	$^\circ\text{C}$

BLOCK DIAGRAM



5-3887/1

CONNECTION DIAGRAM (Top view)



THERMAL DATA

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$R_{th\ J-amb}$	Thermal resistance junction-ambient	max	70	°C/W
$R_{th\ J-case}$	Thermal resistance junction-pins	max	15	°C/W

ELECTRICAL CHARACTERISTICS (Refer to the test circuit; $T_{amb} = 25^{\circ}\text{C}$; $V_s = 14\text{V}$; S_7 at B, unless otherwise specified)

Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_s	Supply voltage	6		18	V
I_d	Quiescent drain current	Automatic stop- S_3 at B; S_4 at B	5	10	mA
		Pause - S_3 at A; S_4 at A	9	15	
I_s	Maximum output current for relay driving	150			mA
T_{sd}	Thermal shut-down case temperature	$P_{tot} = 1\text{W}$ $(\frac{\Delta V_{ref}}{V_{ref}} = -5\%)$	105	125	°C

CHARACTERISTICS (continued)

Parameter		Test conditions	Min.	Typ.	Max.	Unit
MOTOR SPEED CONTROL						
I_{MS}	Starting current (pin 1)		1			A
V_{ref}	Reference voltage (pin 2-3)	$I_M = 100 \text{ mA}$	1.15	1.25	1.35	V
$\frac{\Delta V_{ref}}{V_{ref}} / \Delta V_s$		$I_M = 100 \text{ mA}$ $V_s = 8 \text{ to } 18 \text{ V}$		0.1	0.4	%/V
$\frac{\Delta V_{ref}}{V_{ref}} / \Delta I_M$		$I_M = 50 \text{ to } 400 \text{ mA}$		0.01	0.03	%/mA
$\frac{\Delta V_{ref}}{V_{ref}} / \Delta T$		$I_M = 100 \text{ mA}$ $T_{amb} = -20 \text{ to } 70^\circ \text{C}$		0.01		%/°C
V_2	Operating voltage	$I_M = 100 \text{ mA}$ $\frac{\Delta V_{ref}}{V_{ref}} = -5\%$	2.4			V
K	Reflection coeff. ($K = I_M / I_T$ see fig. 12)	$I_M = 100 \text{ mA}$	18	20	22	—
$\frac{\Delta K}{K} / \Delta V_s$		$I_M = 100 \text{ mA}$ $V_s = 8 \text{ V to } 18 \text{ V}$		0.3	1	%/V
$\frac{\Delta K}{K} / \Delta I_M$		$I_M = 50 \text{ to } 400 \text{ mA}$		0.005	0.02	%/mA
$\frac{\Delta K}{K} / \Delta T$		$I_M = 100 \text{ mA}$ $T_{amb} = -20 \text{ to } 70^\circ \text{C}$		0.01		%/°C

PAUSE						
I_3	Current consumption	S_4 at A	1.4			mA
V_{8-1}		S_4 at A			0.2	V

EJECTION						
I_7		S_2 in A	20			μA
V_{5-8}	Saturation voltage	$I_5 = 100 \text{ mA}$		2.1	3	V
V_5	Saturation voltage	$I_{5-8} = 1.5 \text{ A}$		2.2	3	V
V_4	(Pause condition)	S_1 at A S_3 at A S_4 at A	6			V
V_4	(Radio)	S_1 at A S_3 at B S_4 at B	6	9		V
V_4	(Tape)	S_1 at A S_3 at A S_4 at B			1.7	V
R_0	Output impedance at pin 4	S_3 at B		16	22	$\text{K}\Omega$

AUTOMATIC STOP						
V_{8-1}	Saturation voltage	S_1 at B S_2 at B S_3 at B				μA
I_6	Minimum current to avoid stop	S_1 at C			1	μA
I_{7-8}	Load current for delay circuit	$I_6 = 0$ S_7 at A S_2 at B	10.5	15	19.5	μA

The TDA7270S incorporates four different functional blocks:

- 1) Motor speed control.
- 2) Autostop circuit.
- 3) Radio/Playback switching
- 4) Relay driver.

The **motor speed control** is a conventional circuit providing correction for the internal losses of the motor. Fig. 1 shows the external circuit. The values of R_T , R_S and R_K determine the regulation characteristics and motor speed.

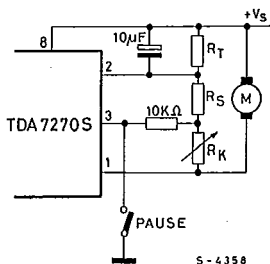
$$R_T = K \cdot R_M$$

where K is the IC regulator reflection coefficient and R_M is motor internal resistance.

The following condition must be always satisfied

$$R_S \leq 4 R_T$$

Fig. 1



The voltage applied across the motor is given by

$$V_{8-1} = V_{ref} \left[1 + \frac{R_T}{R_S} \left(1 + \frac{1}{K} \right) + \frac{R_K}{R_S} \right]$$

and this is proportional to R_K which therefore adjust the speed.

The voltage between pin 2 and the supply must not fall below 0.3V and so

$$\left[V_{ref \text{ min}} \left(\frac{R_T}{R_S} \right) + I_{M \text{ min}} \left(\frac{R_T}{K_{max}} \right) \right] > 0.3V$$

The "pause" condition corresponds to $V_{3-1} < 50mV$; in this condition the motor will stop ($V_{1-8} < 0.2V$), the capacitor C_2 on the autostop circuit (see below) will no longer be charged and the pin 4 (cassette/radio switch output) will be pulled high.

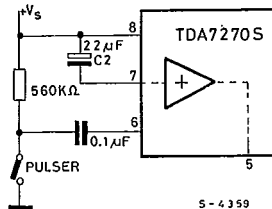
The **autostop circuit** is shown in Fig. 2

In normal operation the capacitor C_2 ($22\mu F$) is slowly charged by a constant current drawn by pin 7 of $15\mu A$, and each time the pulser (a switch on the cassette take-up speed shaft) closes, C_2 is discharged. If the cassette stops, and the pulse stops, the voltage on pin 7 falls.

This switches the power amplifier state and pin 5 goes low. Pin 5 can be used for one of two purposes:

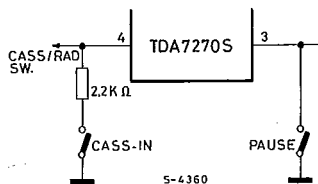
- 1) to drive a stop warning light connected from pin 5 supply V_S ;
- 2) to actuate a solenoid wired either to ground (to release the cassette) or to supply (to eject the cassette).

Fig. 2



The **pause and/or cassette/radio switching** shown in Fig. 3 has an input/output on pin 4. If pin 4 is not used it should be grounded.

Fig. 3



This pin has the following logic.

Cass IN	Pause	Pin 4	Function
Open	Open	> 6V	motor off/radio on
Open	Close	> 6V	motor off/radio on
Close	Open	< 1.7V	motor on/cass. on
Close	Close	> 6V	pause/radio on