SGS-THOMSON MICROELECTRONICS

TDA7270S

S G S-THOMSON 30E D

MULTIFUNCTION SYSTEM FOR TAPE PLAYERS

NOT FOR NEW DESIGN

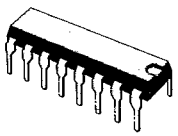
The TDA7270S is a multifunction monolithic integrated circuit in a 16-lead dual in-line plastic package specially designed for use in car radios cassette players, but suitable for all applications requiring tape playback.

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).



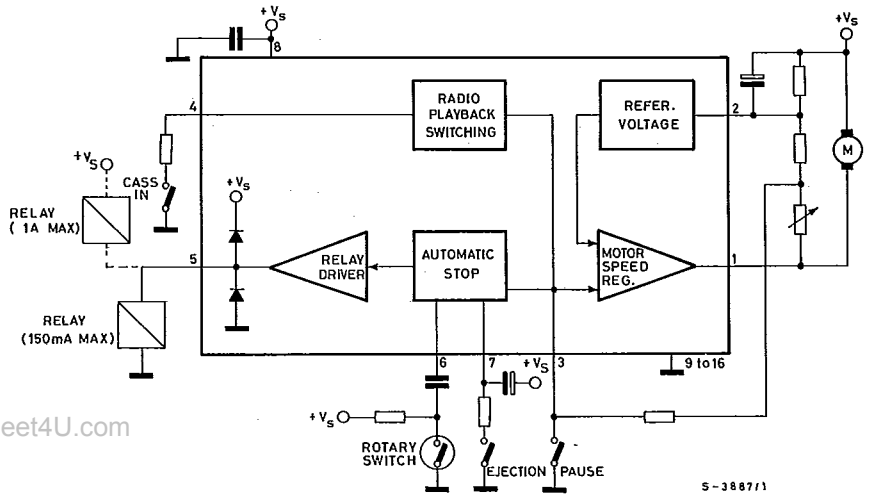
Powerdip
(8 + 8)

ORDERING NUMBER: TDA7270S

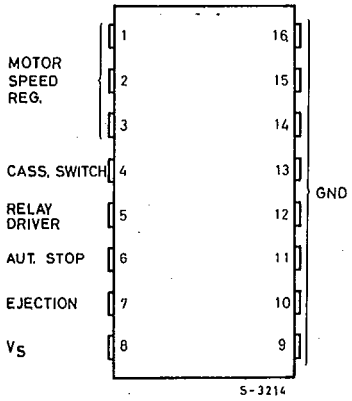
ABSOLUTE MAXIMUM RATINGS

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 $T_{amb} \leqslant 80°C$	1	W
$T_{stg}; T_j$	Storage and junction temperature	-40 to 150	°C

BLOCK DIAGRAM



CONNECTION DIAGRAM
(Top view)



THERMAL DATA

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

ELECTRICAL CHARACTERISTICS (Refer to the test circuit; T_{amb}= 25°C; V_s = 14V; 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_5	Maximum output current for relay driving		150			mA
T_{sd}	Thermal shut-down case temperature	P_{tot} = 1W ($\frac{\Delta V_{ref}}{V_{ref}}$ = –5%)	105	125		°C

ELECTRICAL 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 mA	1.15	1.25	1.35	V
$\frac{\Delta V_{ref}}{V_{ref}}/\Delta V_s$		I_M= 100 mA V_s = 8 to 18V		0.1	0.4	%/V
$\frac{\Delta V_{ref}}{V_{ref}}/\Delta I_M$		I_M= 50 to 400 mA		0.01	0.03	%/mA
$\frac{\Delta V_{ref}}{V_{ref}}/\Delta T$		I_M= 100 mA T_{amb}= -20 to 70°C		0.01		%/°C
V_2	Operating voltage	I_M= 100 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 mA	18	20	22	—
$\frac{\Delta K}{K}/\Delta V_s$		I_M= 100 mA V_s= 8V to 18V		0.3	1	%/V
$\frac{\Delta K}{K}/\Delta I_M$		I_M= 50 to 400 mA		0.005	0.02	%/mA
$\frac{\Delta K}{K}/\Delta T$		I_M= 100 mA T_{amb}= -20 to 70°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 mA		2.1	3	V
V_5	Saturation voltage	I_{5-8}= 1.5A		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_o	Output impedance at pin 4	S_3 at B		16	22	KΩ
AUTOMATIC STOP						
V_{8-1}	Saturation voltage	S_1 at B S_2 at B S_3 at B			1	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

APPLICATION INFORMATION

The TDA7270S incorporates four different functional blocks:

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

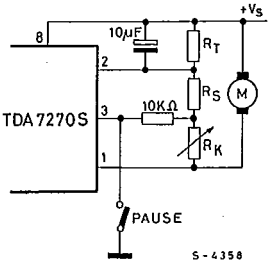
The motor speed control is a conventional circuit providing correction for the internal looses of the motor. Fig. 1 shows the external circuit.
The values of R_T, R_S and R_K determine the regulation characteristics and motor speed.

$$R_T = K \cdot R_M$$

where K = the IC regulator reflection coefficient and R_M = motor internal resistance.
The following condition must be always satisfied

$$R_S \leqslant 4\ R_T$$

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

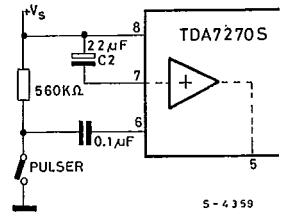
$$\left[V_{ref\ min}\left(\frac{R_T}{R_S}\right) + I_{M\ min}\left(\frac{R_T}{K_{max}}\right)\right] > 0.3V$$

The "pause" condition corresponds to $V_3 <$ 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 (22µF) is slowly charged by a constant current drawn by pin 7 of 15µA, 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:

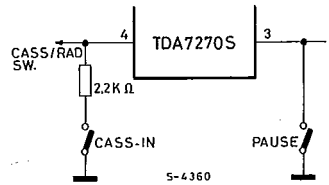
1) to drive a stop warning light connected from pin 5 supply V_s;
2) to actuate a solenoid wired either to ground (to release the cassette) or to supply (to eject the cassette).

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