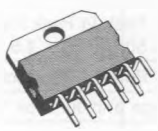
SGS-THOMSON MICROELECTRONICS

TDA2170

TV VERTICAL DEFLECTION OUTPUT CIRCUIT

The functions incorporated are :
- POWER AMPLIFIER
- FLYBACK GENERATOR
- REFERENCE VOLTAGE
- THERMAL PROTECTION



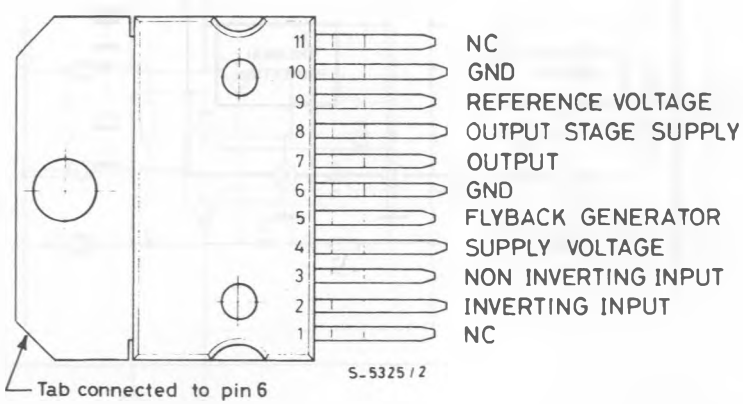
MULTIWATT 11

ORDER CODE : TDA2170

DESCRIPTION

The TDA 2170 is a monolithic integrated circuit in 11-lead Multiwatt® package. It is a high efficiency power booster for direct driving of vertical windings of TV yokes. It is intended for use in Colour are B & W television receivers as well as in monitors and displays.

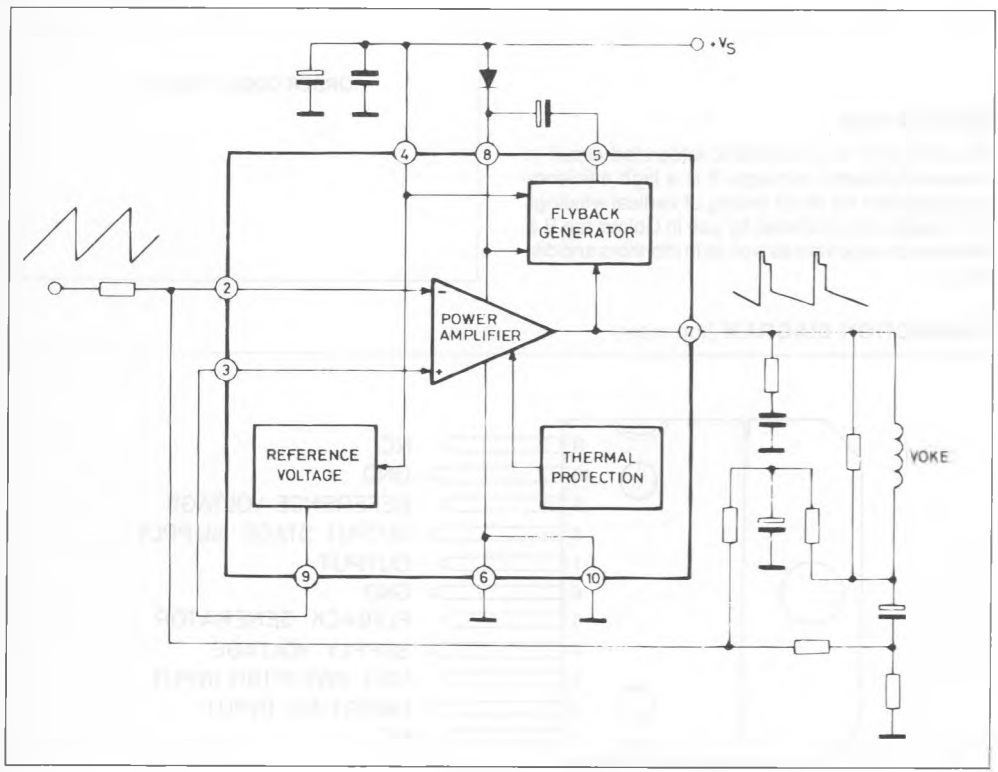
CONNECTION DIAGRAM (top view)



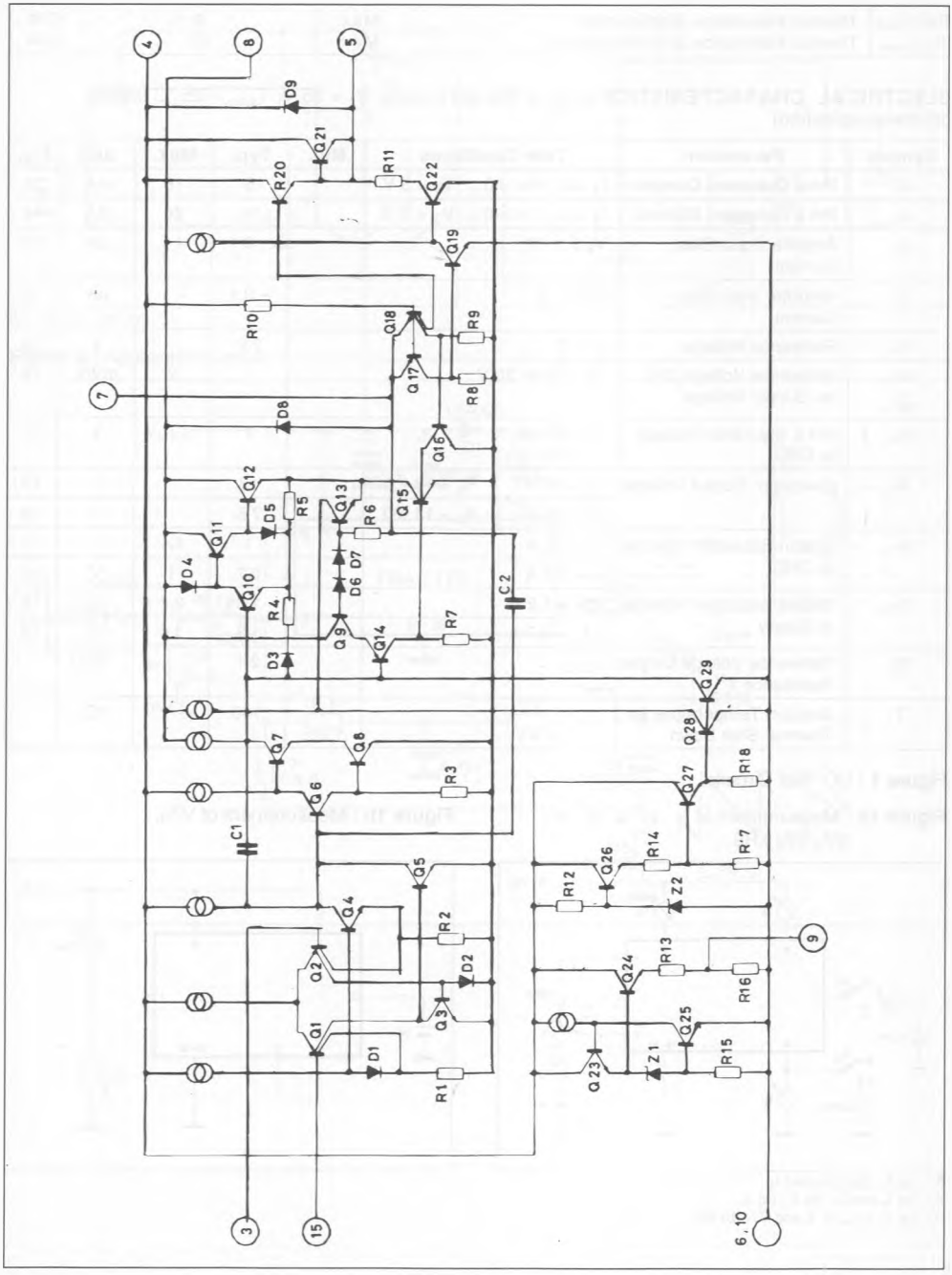
ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_s	Supply Voltage (pin 4)	35	V
V_7, V_8	Flyback Peak Voltage	60	V
V_5	Voltage at Pin 5	$+ V_s$	
V_2, V_3	Amplifier Input Voltage	$+ V_s$ $- 0.5$	V
I_o	Output Peak Current (non repetitive, t = 2 msec)	2.5	A
I_o	Output Peak Current at f = 50 Hz, $t \leq 10$ µsec	3	A
I_o	Output Peak Current at f = 50 Hz, $t > 10$ µsec	2	A
I_5	Pin 5 DC Current at $V_7 < V_4$	100	mA
I_5	Pin 5 Peak to Peak Flyback Current at f = 50 Hz, $t_{fly} \leq 1.5$ msec	3	A
P_{tot}	Total Power Dissipation at T_{case} = 60 °C	30	W
T_{stg}, T_j	Storage and Junction Temperature	– 40 to 150	°C

BLOCK DIAGRAM



SCHEMATIC DIAGRAM



THERMAL DATA

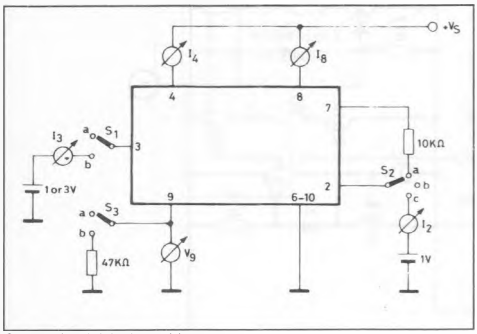
$R_{th\ j-case}$	Thermal Resistance Junction-case	Max	3	°C/W
$R_{th\ j-amb}$	Thermal Resistance Junction–ambient	Max	40	°C/W

ELECTRICAL CHARACTERISTICS (refer to the test circuits, V_s = 35 V, T_{amb} = 25 °C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit	Fig.
I_4	Pin 4 Quiescent Current	$I_5 = 0$; $I_7 = 0$; $V_3 = 3$ V		8	16	mA	1a
I_8	Pin 8 Quiescent Current	$I_5 = 0$; $I_7 = 0$; $V_3 = 3$ V		16	36	mA	1a
I_3	Amplifier Input Bias Current	$V_3 = 1$ V		– 0.1	– 1	µA	1a
I_2	Amplifier Input Bias Current	$V_2 = 1$ V		– 0.1	– 1	µA	1a
V_9	Reference Voltage	$I_9 = 0$		2.2		V	1a
$\frac{\Delta V_9}{\Delta V_s}$	Reference Voltage Drift vs. Supply Voltage	Vs = 15 to 30 V		1	2	mV/V	1a
V_{5L}	Pin 5 Saturation Voltage to GND	I_5 = 20 mA		1		V	1c
V_7	Quiescent Output Voltage	V_s = 35 V ; R_a = 13 KΩ		18		V	1d
		Vs = 15 V ; R_a = 13 KΩ		7.5		V	1d
V_{7L}	Output Saturation Voltage to GND	I_7 = 1.2 A		1	1.4	V	1c
		I_7 = 0.7 A		0.7	1	V	1c
V_{7H}	Output Saturation Voltage to Supply	– I_7 = 1.2 A		1.6	2.2	V	1b
		– I_7 = 0.7 A		1.3	1.8	V	1b
R_9	Reference Voltage Output Resistance			2.1		KΩ	
T_j	Junction Temperature for Thermal Shut Down			140		°C	

Figure 1 : DC Test Circuits.

Figure 1a : Measurement of I_2 ; I_3 ; I_4 ; I_8 ; I_9 ; $\Delta V_9/\Delta V_S$; R9.



S_1 : (a) I_2 ; (b) I_3, I_4 and I_8.
S_2 : (a) I_4 and I_8 ; (b) I_3 ; (c) I_2.
S_3 : (a) I_2, I_3, I_4, I_8, I_9 and V_9 ; (b) R9.

Figure 1b : Measurement of V_{7H}.

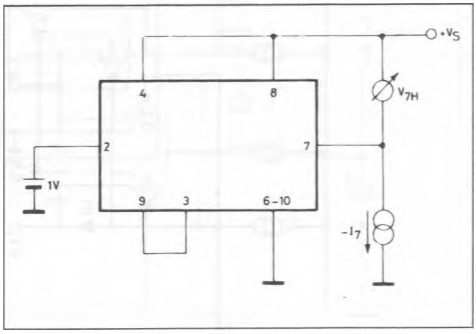
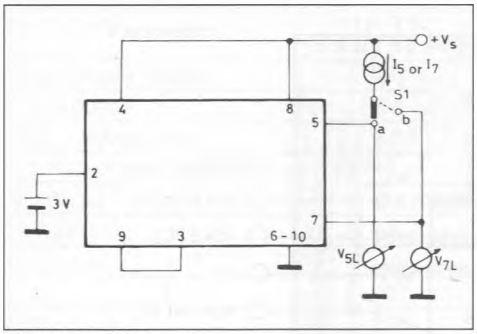


Figure 1c : Measurement of V_{5L}, V_{7L}.



S1 : (a) V_{5L} ; (b) V_{7L}.

Figure 1d : Measurement of V_7.

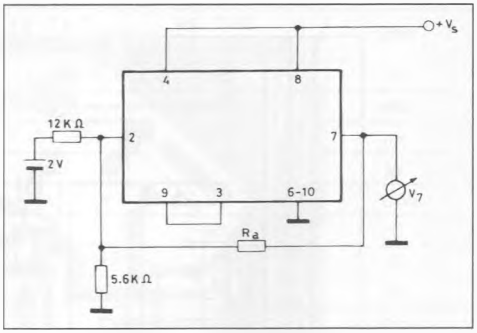


Figure 2 : Application Circuit.

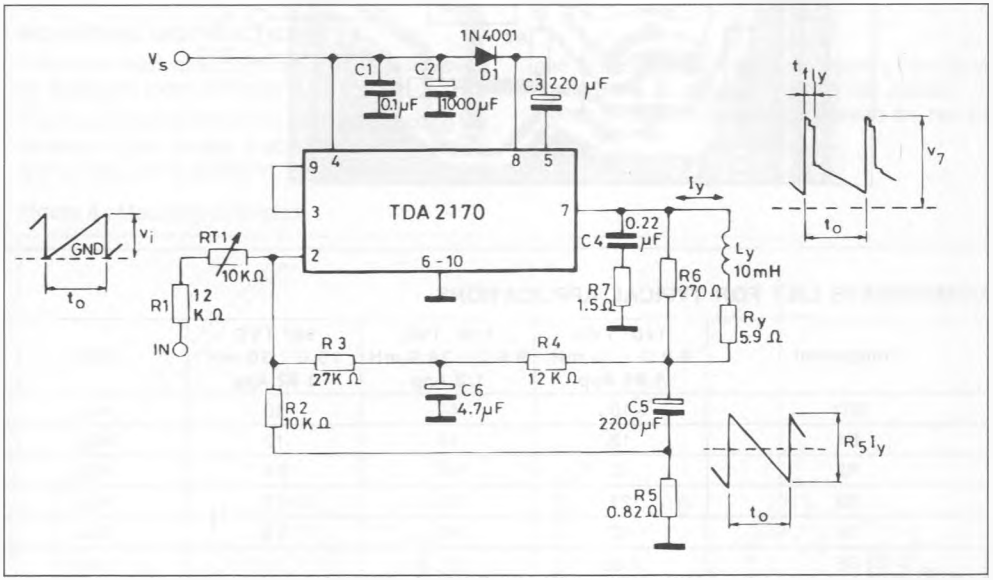
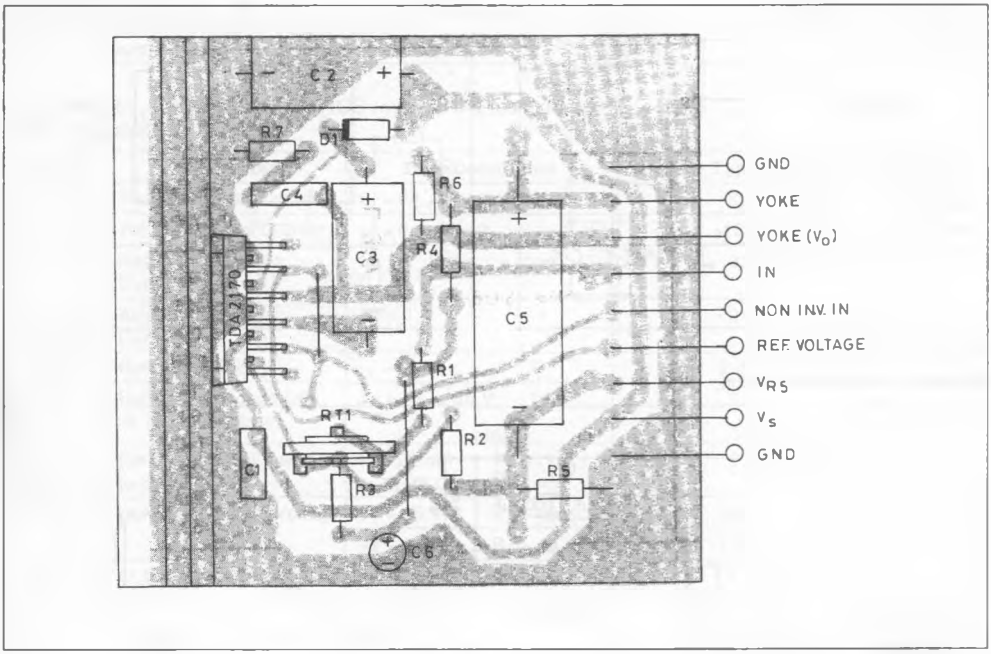


Figure 3 : PC Board and Component Layout (1:1 scale).



COMPONENTS LIST FOR TYPICAL APPLICATIONS

Component	110° TVC 5.9 Ω / 10 mH 1.95 App	110° TVC 9.6 Ω / 24.6 mH 1.2 App	90° TVC 15 Ω / 30 mH 0.82 App	Unit
RT1	10	4.7	10	KΩ
R1	12	10	12	KΩ
R2	10	5.6	5.6	KΩ
R3	27	12	18	KΩ
R4	12	8.2	5.6	KΩ
R5	0.82	1	1	Ω
R6	270	330	330	Ω
R7	1.5	1.5	1.5	Ω
D1	1N 4001	1N 4001	1N 4001	–
C1	0.1	0.1	0.1	µF
C2 el.	1000/25 V	470/25 V	470/25 V	µF
C3 el.	220/25 V	220/25 V	220/25 V	µF
C4	0.22	0.22	0.22	µF
C5 el.	2200/25 V	2200/25 V	1000/16 V	µF
C6 el.	4.7/16 V	4.7/16 V	10/16 V	µF

TYPICAL PERFORMANCES

Parameter	110° TVC 5.9 Ω / 10 mH	110° TVC 9.6 Ω / 27 mH	90° TVC 15 Ω / 30 mH	Unit
V_s – Supply Voltage	24	22.5	25	V
I_s – Current	280	175	125	mA
t_{fly} – Flyback Time	0.6	1	0.7	ms
* P_{tot} – Power Dissipation	4.2	2.5	2.05	W
* $R_{th\ c-a}$ – Heatsink	7	13	16	°C/W
T_{amb}	60	60	60	°C
$T_{j\ max}$	110	110	110	°C
t_o	20	20	20	ms
V_i	2.5	2.5	2.5	Vpp
V_7	50	47	52	Vp

* Worst case condition.

MOUNTING INSTRUCTIONS

The power dissipated in the circuit must be removed by adding an external heatsink.

Thanks to the MULTIWATT® package attaching the heatsink is very simple, a screw or a compression spring (clip) being sufficient. Between the heatsink and the package it is better to insert a layer of silicon grease, to optimize the thermal contact ; no electrical isolation is needed between the two surfaces.

Figure 4 : Mounting Examples.

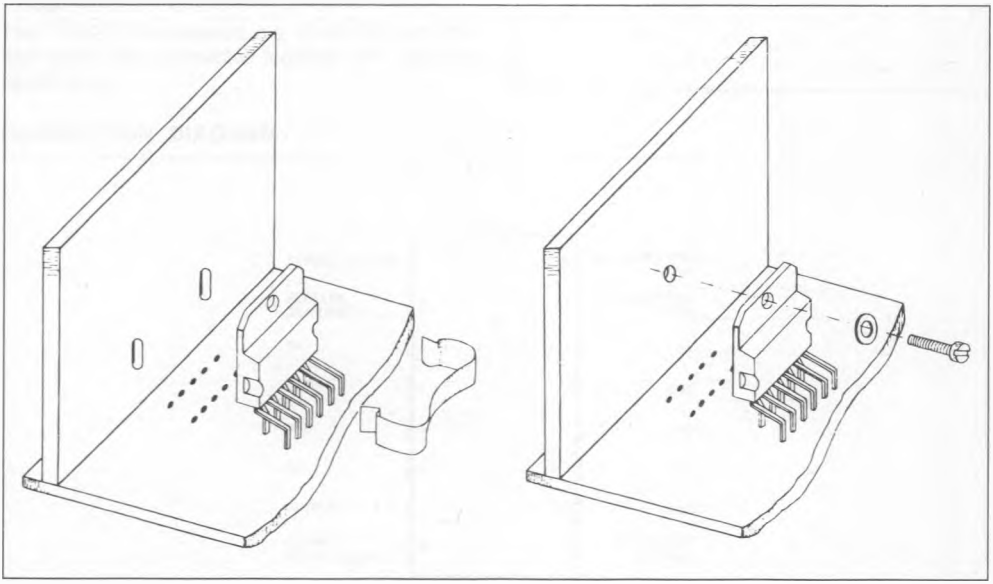


Figure 5 : Maximum Allowable Power Dissipation vs. Ambient Temperature.