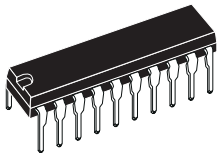
TDA7480

10W MONO CLASS-D AMPLIFIER

- 10W OUTPUT POWER:
  R_L = 8Ω/4Ω; THD = 10%
- HIGH EFFICIENCY
- NO HEATSINK
- SPLIT SUPPLY
- OVERVOLTAGE PROTECTION
- ST-BY AND MUTE FEATURES
- SHORT CIRCUIT PROTECTION
- THERMAL OVERLOAD PROTECTION



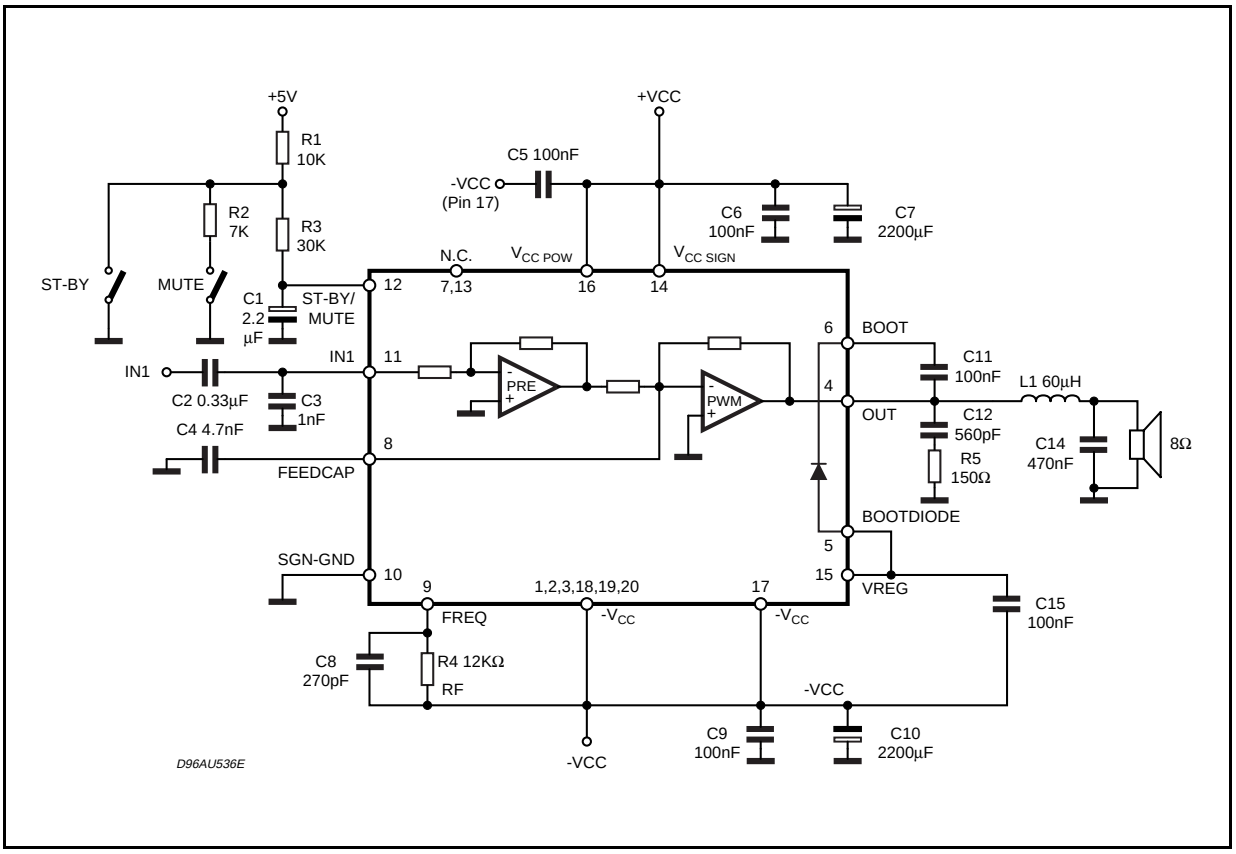
PDIP20 (14+3+3)

ORDERING NUMBER: TDA7480

DESCRIPTION

The TDA7480 is an audio class-D amplifier assembled in Power DIP package specially designed for high efficiency applications mainly for TV and Home Stereo sets.

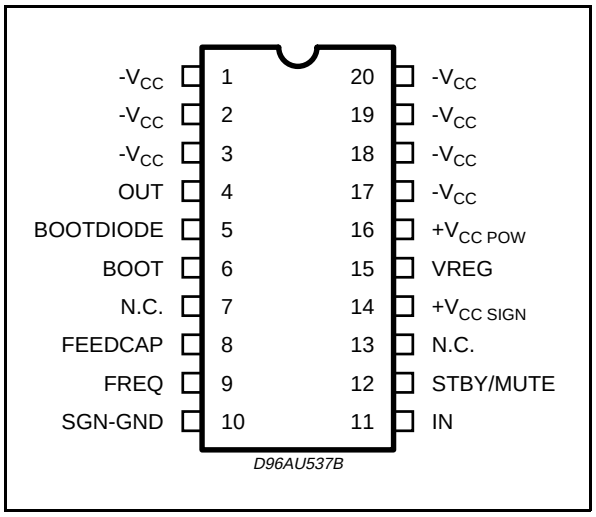
Figure 1: Test and Application Circuit.



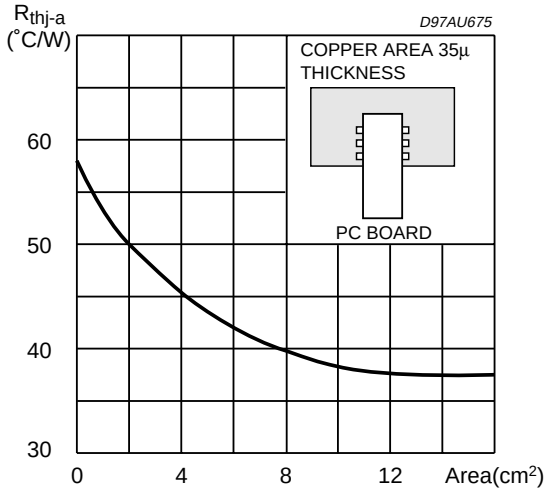
ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	DC Supply Voltage	±20	V
T_{stg}, T_j	Storage and Junction Temperature	–40 to 150	°C
V_{FREQ}	Maximum Voltage Across VFREQ (Pin 9)	8	V
T_{op}	Operating Temperature Range	-20 to 70	°C
ESD	Maximum ESD on Pins	±1.8	kV

PIN CONNECTION (Top view)



Rth with "on board" Square Heatsink vs. copper area.



THERMAL DATA

Symbol	Parameter		Value	Unit
$R_{th\ j\text{-}amb}$	Thermal Resistance Junction to ambient		80	°C/W
$R_{th\ j\text{-}pin}$	Thermal Resistance Junction to Pin	Max.	12	°C/W

PIN FUNCTIONS

N.	Name	Function
1	-V_{CC}	NEGATIVE SUPPLY.
2	-V_{CC}	NEGATIVE SUPPLY.
3	-V_{CC}	NEGATIVE SUPPLY.
4	OUT	PWM OUTPUT
5	BOOTDIODE	BOOTSTRAP DIODE ANODE
6	BOOT	BOOTSTRAP CAPACITOR
7	NC	NOT CONNECTED
8	FEEDCAP	FEEDBACK INTEGRATING CAPACITANCE
9	FREQUENCY	SETTING FREQUENCY RESISTOR
10	SGN-GND	SIGNAL GROUND
11	IN	INPUT
12	ST-BY-MUTE	ST-BY/ MUTE CONTROL PIN
13	NC	NOT CONNECTED
14	+V_{CC} SIGN	POSITIVE SIGNAL SUPPLY
15	VREG	10V INTERNAL REGULATOR
16	+V_{CC} POW	POSITIVE POWER SUPPLY
17	-V_{CC}	NEGATIVE SUPPLY (TO BE CONNECTED TO PIN 16 VIA C5)
18	-V_{CC}	NEGATIVE SUPPLY
19	-V_{CC}	NEGATIVE SUPPLY
20	-V_{CC}	NEGATIVE SUPPLY

ELECTRICAL CHARACTERISTICS (Refer to the test circuit, V_{CC} = ±14V; R_L = 8Ω; R_S = 50Ω; R_f = 12KΩ; Demod.. filter L = 60µH, C = 470nF; f = 1KHz; T_{amb} = 25°C unless otherwise specified.)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_S	Supply Range		±10		±16	V
I_q	Total Quiescent Current	R_L = ∞; NO LC Filter		25	40	mA
V_{OS}	Output Offset Voltage	Play Condition	–50		+50	mV
P_O	Output Power	THD = 10% THD = 1%	8.5 6	10 7		W W
		R_L = 4Ω V_{CC} = ±10.5V THD = 10% THD = 1%		 10 7		 W W
P_d (*)	Dissipated Power at 1W Output Power	R_f = 12KΩ P_O = 1W		1		W
P_{DMAX}	Maximum Dissipated Power	P_O = 10W THD 10% $R_{th\text{-}j\text{-}amb}$ = 38°C/W (Area 12cm^2)		1.8		W
η	Efficiency ≡ $\frac{P_O}{P_O + P_D} \equiv \frac{P_O}{P_I}$ (**)	THD 10% $R_{th\text{-}j\text{-}amb}$ = 38°C/W (Area 12cm^2)	80	85		%
THD	Total Harmonic Distortion	R_L = 8Ω; P_O = 0.5W		0.1		%
I_{max}	Overcurrent Protection Threshold	R_L = 0	3.5	5		A
T_j	Thermal Shut-down Junction Temperature			150		°C
G_V	Closed Loop Gain		29	30	31	dB
e_N	Total Input Noise	A Curve f = 20Hz to 22KHz		7 12		µV µV
R_i	Input Resistance		20	30		KΩ
SVR	Supply Voltage Rejection	f = 100Hz; V_r = 0.5	46	60		dB
T_r, T_f	Rising and Falling Time			50		ns
R_{DSON}	Power Transistor on Resistance			0.4		Ω
F_{SW}	Switching Frequency		100	120	140	KHz
F_{SW_OP}	Switching Frequency Operative Range		100		200	KHz
B_F	Zero Signal Frequency Constant (***)			1.4x10^9		HzΩ
R_F	Frequency Controller Resistor Range (****)		7	12	14	KΩ
MUTE & STAND-BY FUNCTIONS						
$V_{ST\text{-}BY}$	Stand-by range				0.8	V
V_{MUTE}	Mute Range		1.8		2.5	V
V_{PLAY}	Play Range (1)		4			V
A_{MUTE}	Mute Attenuation		60	80		dB
$I_{qST\text{-}BY}$	Quiescent Current @ Stand-by			3	5	mA

*: The output average power when the amplifier is playing music can be considered roughly 1/10 of the maximum output power. So it is useful to consider the dissipated power in this condition for thermal dimensioning.

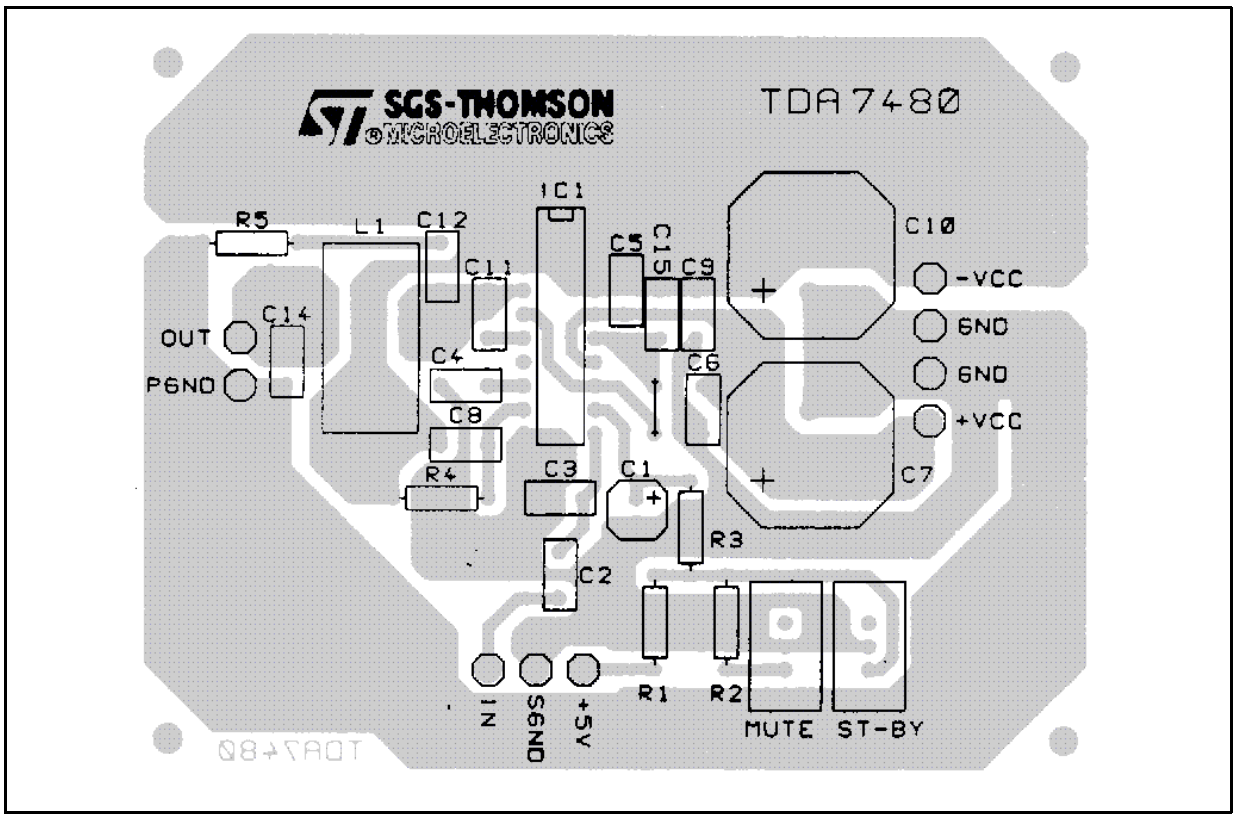
**: P_O = measured across the load using the following inductor:
COIL 58120 MPPA2 (magnetics) TURNS: 28 ∅ 1mm
COIL77120 KOOL Mµ (magnetics) TURNS: 28 ∅ 1mm

***: The zero-signal switching frequency can be obtained using the following expression: $F_{SW} = B_F/R_F$

****: The maximum value of R_F is related to the maximum possible value for the voltage drop on R_F itself.

(1): For V_{12} >5.2V, an input impedance of 10KΩ is to be considered.

Figure 2: Recomended P.C. Board and Component Layout of the Circuit of Figure1 (1.25:1 scale).



Note: Capacitor C5 must be as close as possible to device's pins 16 and 17

Figure 3: Stereo Application in Single Supply.

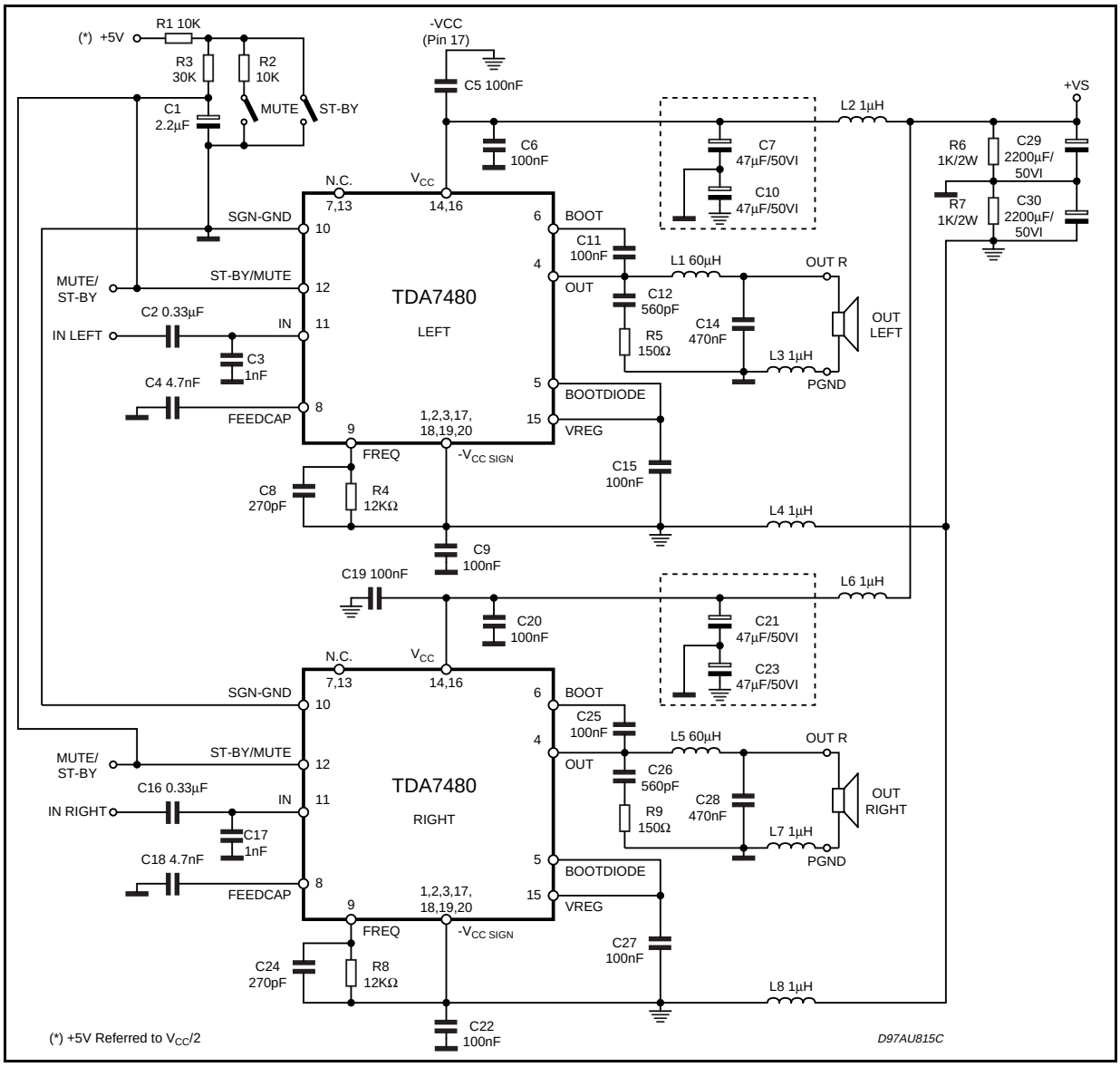
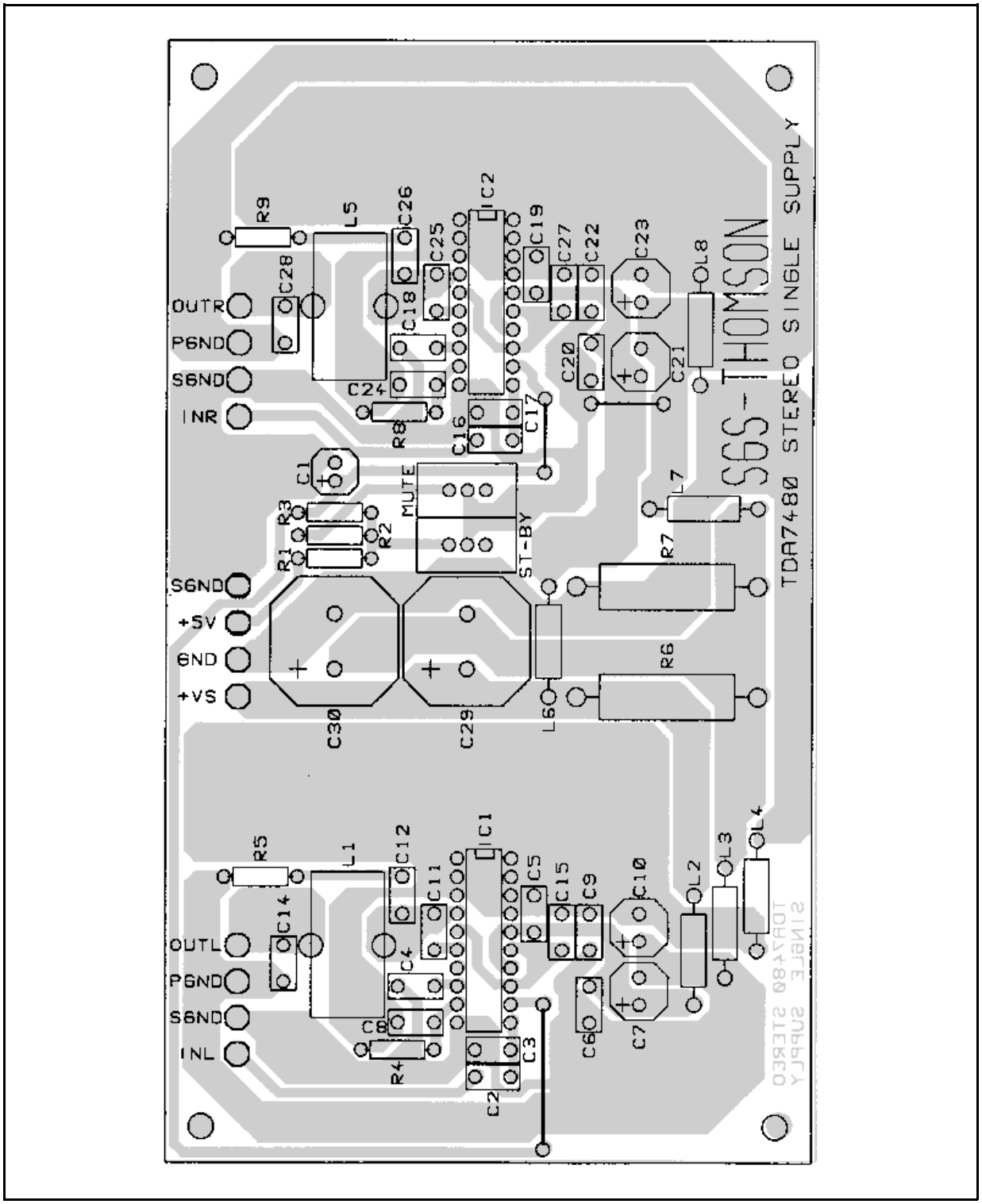


Figure 4: PC Board and component Layout of the Circuit of Figure 3.



TYPICAL CHARACTERISTICS (Application Circuit of fig 1 unless otherwise specified)

Figure 5. Output Power vs. Supply Voltage

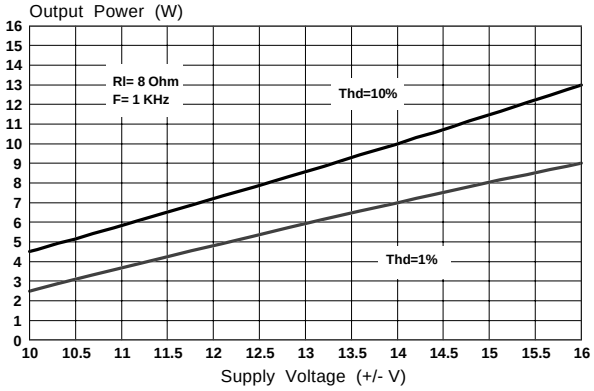


Figure 6. Distortion vs. Output Power

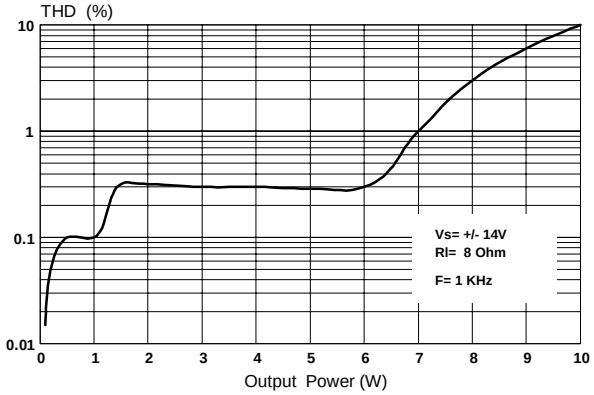


Figure 7. Distortion vs. Output Power

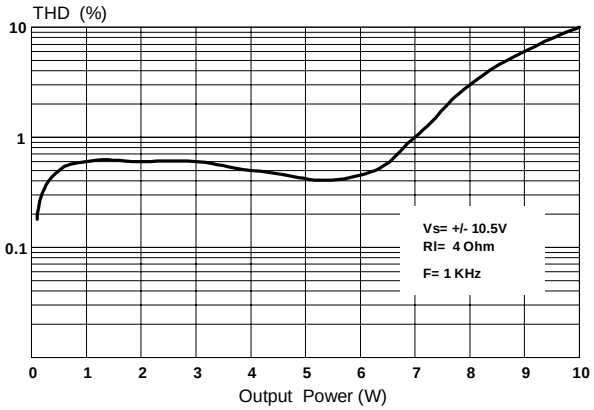


Figure 8. Power Dissipation and Efficiency vs. Output Power

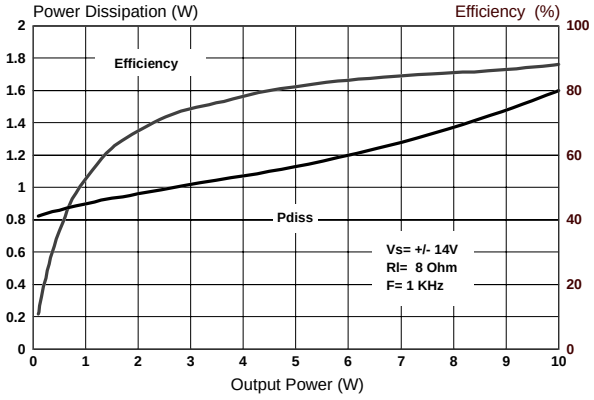


Figure 9. Power Dissipation and Efficiency vs. Output Power

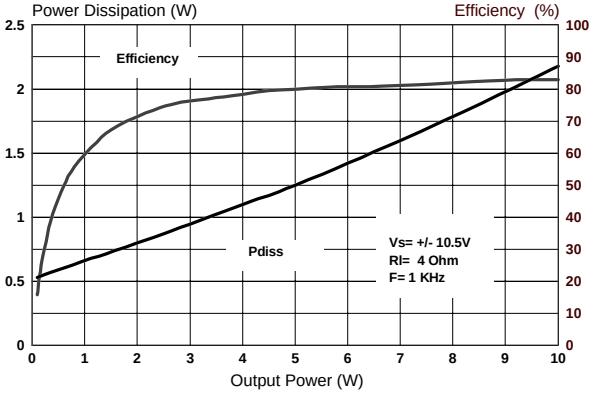


Figure 10. Mute Attenuation vs. Vpin 12

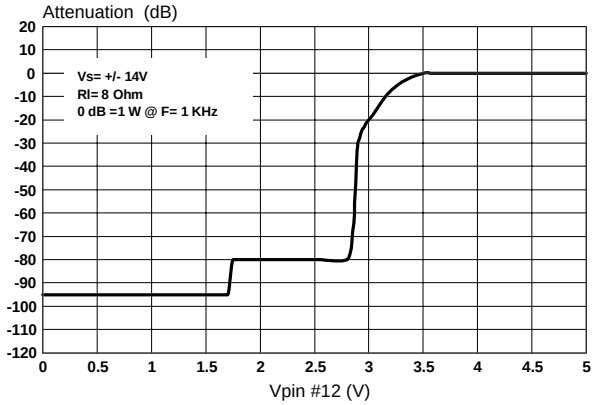
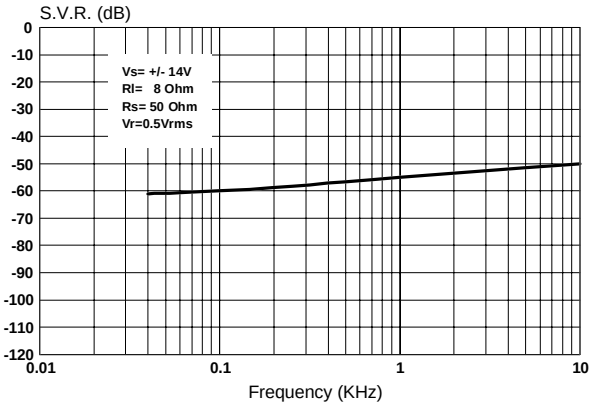


Figure 11. Supply Voltage Rejection vs. Frequency



POWERDIP20 PACKAGE MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
a1	0.51			0.020		
B	0.85		1.40	0.033		0.055
b		0.50			0.020	
b1	0.38		0.50	0.015		0.020
D			24.80			0.976
E		8.80			0.346	
e		2.54			0.100	
e3		22.86			0.900	
F			7.10			0.280
I			5.10			0.201
L		3.30			0.130	
Z			1.27			0.050