SGS TDA2010

LINEAR INTEGRATED CIRCUITS

NOT FOR NEW DESIGN

12W Hi-Fi AUDIO AMPLIFIER

The TDA 2010 is a monolithic integrated operational amplifier in a 14-lead quad in-line plastic package, inteded for use as a low frequency class B power amplifier. Typically it provides 12W output power (d = 1%) at ± 14V/4Ω; at V_s = ± 14V the guaranteed output power is 10W on a 4Ω load and 8W on a 8Ω load (DIN norm 45500). The TDA 2010 provides high output current (up to 3.5 A) and has very low harmonic and cross-over distortion. Further, the device incorporates an original (and patented) short circuit protection system, comprising an arrangement for automatically limiting the dissipated power so as to keep to working point of the output transistors within their safe operating area. A conventional thermal shut-down system is also included. The TDA 2010 is pin to pin equivalent to TDA 2020.

ABSOLUTE MAXIMUM RATINGS

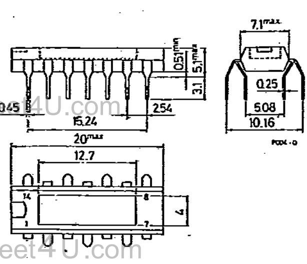
V_s	Supply voltage	± 18	V
V_i	Input voltage	V_s	
V_i	Differential input voltage	± 15	V
I_o	Output peak current (internally limited)	3.5	A
P_{tot}	Power dissipation at $T_{case} \leq 95°C$	18	W
T_{stg}, T_j	Storage and junction temperature	-40 to 150	°C

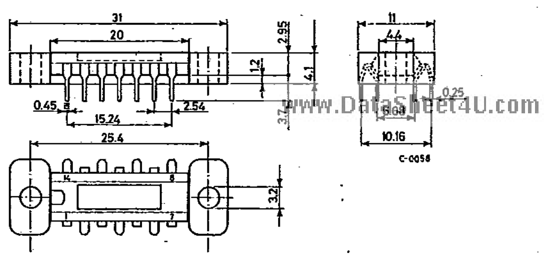
ORDERING NUMERS:

TDA 2010 B82	dual in-line plastic package
TDA 2010 B92	quad in-line plastic package
TDA 2010 BC2	dual in-line plastic package with spacer
TDA 2010 BD2	quad in-line plastic package with spacer

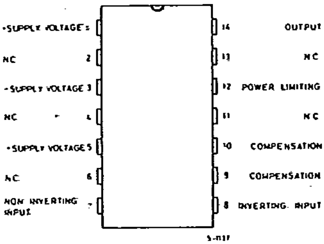
MECHANICAL DATA

Dimensions in mm

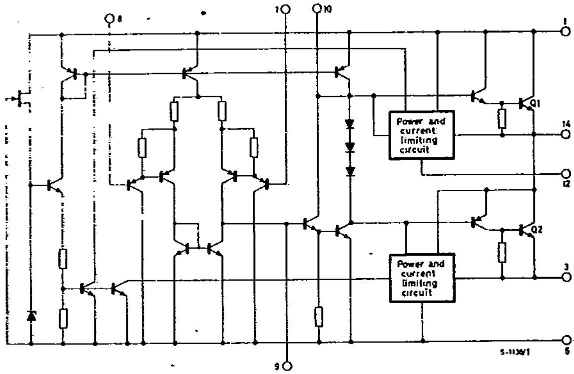




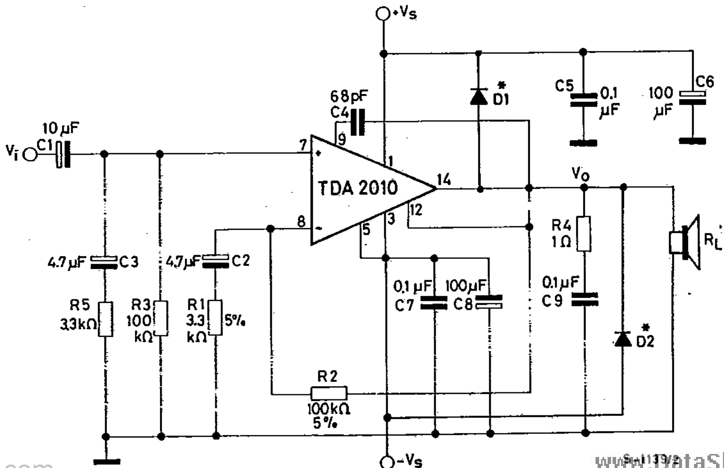
CONNECTION AND SCHEMATIC DIAGRAMS
(top view)



The copper slug is electrically connected to pin 5 (substrate)



TEST CIRCUIT



*1N 4001 OR EQUIVALENT

THERMAL DATA

$R_{th\ j\text{-}case}$	Thermal resistance junction-case	max	3	°C/W

ELECTRICAL CHARACTERISTICS

(Refer to the test circuit, $V_s = \pm 14V$, $T_{amb} = 25°C$ unless otherwise specified)

Parameter		Test conditions	Min.	Typ.	Max.	Unit
V_s	Supply voltage		± 5		± 18	V
I_d	Quiescent drain current	$V_s = \pm 18V$		45		mA
I_b	Input bias current	$V_s = \pm 17V$		0.15		μA
V_{os}	Input offset voltage	$V_s = \pm 17V$		5		mV
I_{os}	Input offset current	$V_s = \pm 17V$		0.05		μA
V_{os}	Output offset voltage	$V_s = \pm 17V$		10	100	mV
P_o	Output power	d = 1% $T_{case} \leqslant 70°C$ f = 40 to 15 000 Hz $R_L = 4\ \Omega$ $R_L = 8\ \Omega$	 10 8	 12 9		 W W
		d = 10% $T_{case} \leqslant 70°C$ f = 1 kHz $R_L = 4\ \Omega$ $R_L = 8\ \Omega$		 15 12		 W W
V_i	Input sensitivity	f = 1 kHz $P_o = 10$ W $R_L = 4\ \Omega$ $P_o = 8$ W $R_L = 8\ \Omega$		 220 250		 mV mV
B	Frequency response (-3dB)	$R_L = 4\ \Omega$ C4 = 68 pF		10 to 160 000		Hz
d	Distortion	P_o = 100 mW to 10 W $R_L = 4\ \Omega$ $T_{case} \leqslant 70°C$ f = 1 kHz f = 40 to 15 000 Hz		 0.1 0.3	 1	 % %
		P_o = 100 mW to 8 W $R_L = 8\ \Omega$ $T_{case} \leqslant 70°C$ f = 1 kHz f = 40 to 15 000 Hz		 0.1 0.2	 1	 % %
R_i	Input resistance (pin 7)			5		MΩ
G_v	Voltage gain (open loop)	$R_L = 4\ \Omega$ f = 1 kHz		100		dB
G_v	Voltage gain (closed loop)	$R_L = 4\ \Omega$ f = 1 kHz	29.5	30	30.5	dB
e_N	Input noise voltage	$R_L = 4\ \Omega$ B (-3 dB) = 22 Hz to 22 KHz		4		μV
i_N	Input noise current	$R_L = 4\ \Omega$ B (-3 dB) = 22 Hz to 22 KHz		0.1		nA

ELECTRICAL CHARACTERISTICS (continued)

Parameter		Test conditions	Min.	Typ.	Max.	Unit
SVR	Supply voltage rejection	$R_L = 4\ \Omega$ $f_{ripple} = 100$ Hz		50		dB
I_d	Drain current	$P_o = 12$ W $R_L = 4\ \Omega$ $P_o = 9$ W $R_L = 8\ \Omega$		0.8 0.5		A A
T_{sd}	Thermal shut-down junction temperature			145		°C
T_{sd}	(*) Thermal shut-down case temperature	$P_{tot} = 10.5$ W		120		°C

(*) See fig. 14.

Fig. 1 – Output power vs. supply voltage

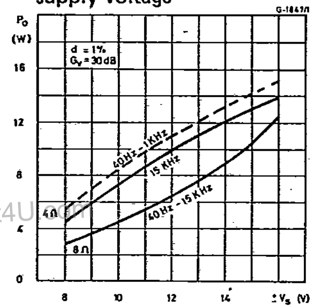


Fig. 2 – Output power vs. supply voltage

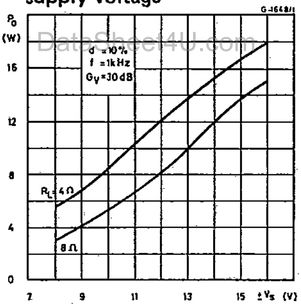


Fig. 3 – Distortion vs. output power

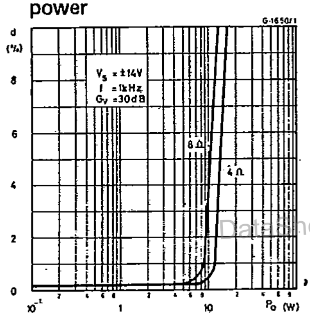


Fig. 4 – Distortion vs. output power ($R_L = 4\ \Omega$)

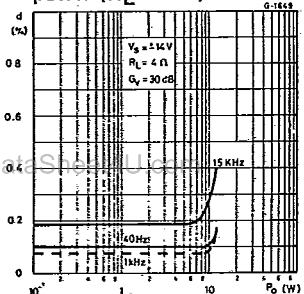


Fig. 5 – Distortion vs. output power ($R_L = 8\ \Omega$)

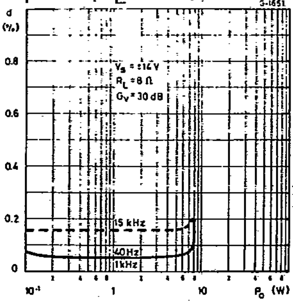


Fig. 6 – Distortion vs. frequency

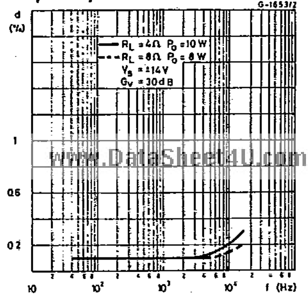


Fig. 7 - Output power vs. frequency

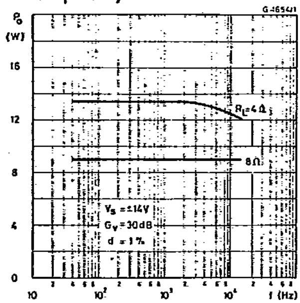


Fig. 8 - Sensitivity vs. output power ($R_L = 4\ \Omega$)

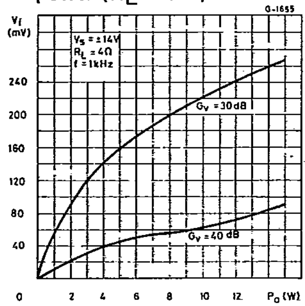


Fig. 9 - Sensitivity vs. output power ($R_L = 8\ \Omega$)

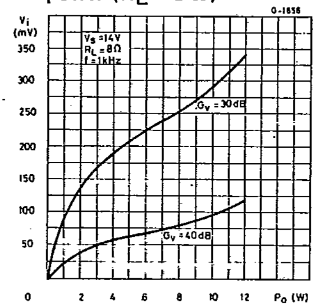


Fig. 10 - Open loop frequency response with different values of the rolloff capacitor C4

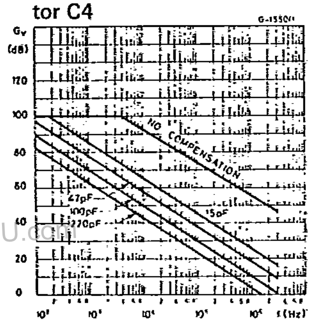


Fig. 11 - Value of C4 vs. voltage gain for different bandwidths

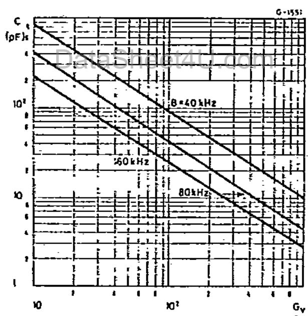


Fig. 12 - Quiescent current vs. supply voltage

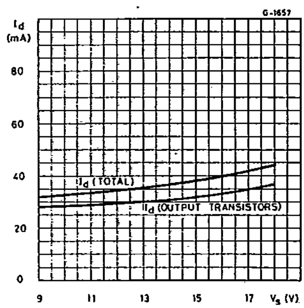


Fig. 13 - Supply voltage rejection vs. voltage gain

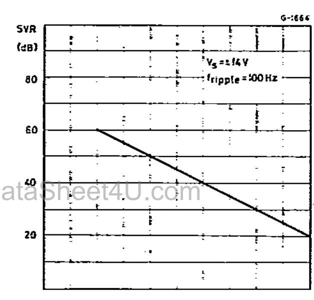


Fig. 14 - Power dissipation and efficiency vs. output power

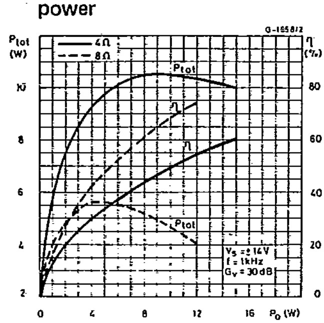


Fig. 15 - Maximum power dissipation vs. supply voltage (sine wave operation)