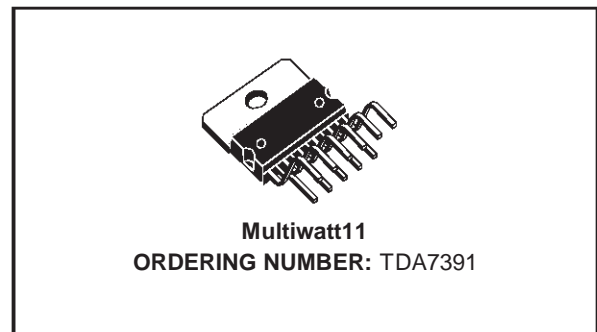


## 35W BRIDGE CAR RADIO AMPLIFIER

- HIGH POWER CAPABILITY:
  - 40W/4Ω MAX
  - 35W/4Ω EIAJ
  - 45W/3.2Ω MAX
  - 40W/3.2Ω EIAJ
  - 32W/3.2Ω @  $V_s = 14.4V, f = 1KHz, d = 10\%$
  - 26W/4Ω @  $V_s = 14.4V, f = 1KHz, d = 10\%$
- DIFFERENTIAL INPUTS (EITHER SINGLE ENDED OR DIFFERENTIAL INPUT SIGNAL ARE ACCEPTED)
- MINIMUM EXTERNAL COMPONENT COUNT:
  - NO BOOTSTRAP CAPACITORS
  - NO BOUCHEROT CELLS
  - INTERNALLY FIXED GAIN (30dB)
  - NO SVR CAPACITOR
- ST.-BY FUNCTION (CMOS COMPATIBLE)
- PROGRAMMABLE TURN-ON/OFF DELAY
- NO AUDIBLE POP DURING MUTE AND ST-BY OPERATIONS

### PROTECTIONS:

- SHORT CIRCUIT (TO GND, TO  $V_s$ , ACROSS THE LOAD)
- VERY INDUCTIVE LOADS
- CHIP OVERTEMPERATURE
- LOAD DUMP
- OPEN GND



- ESD

### DESCRIPTION

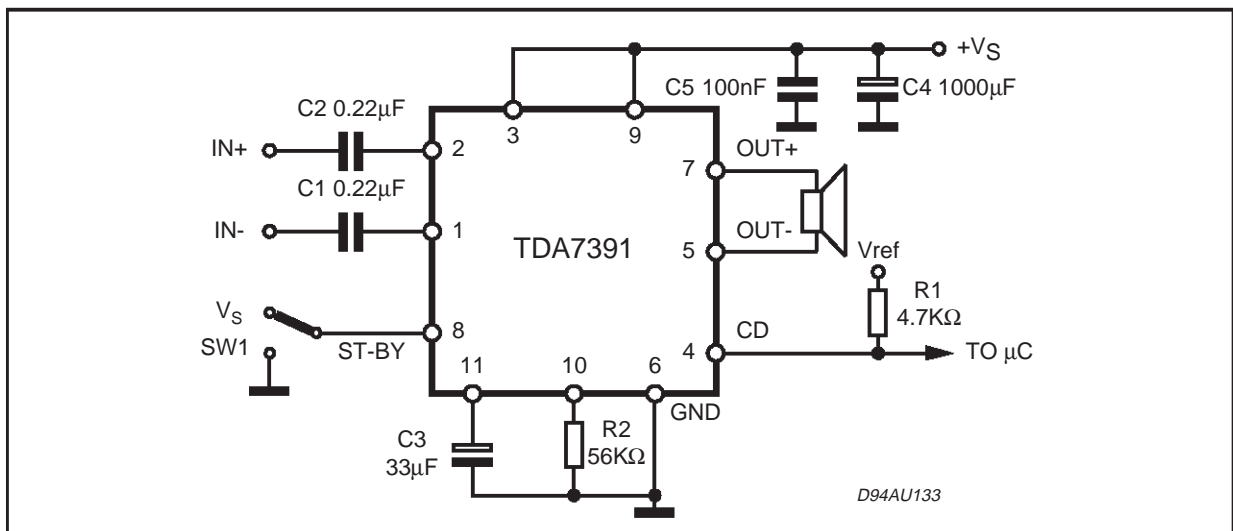
The TDA7391 is a BRIDGE class AB audio power amplifier specially intended for car radio High Power applications.

The high power capability together with the possibility to operate either in DIFFERENTIAL INPUT MODE or SINGLE ENDED INPUT MODE makes it suitable for boosters and high end car radio equipments.

The exclusive fully complementary output stage and the internal fixed gain configuration drop the external component count.

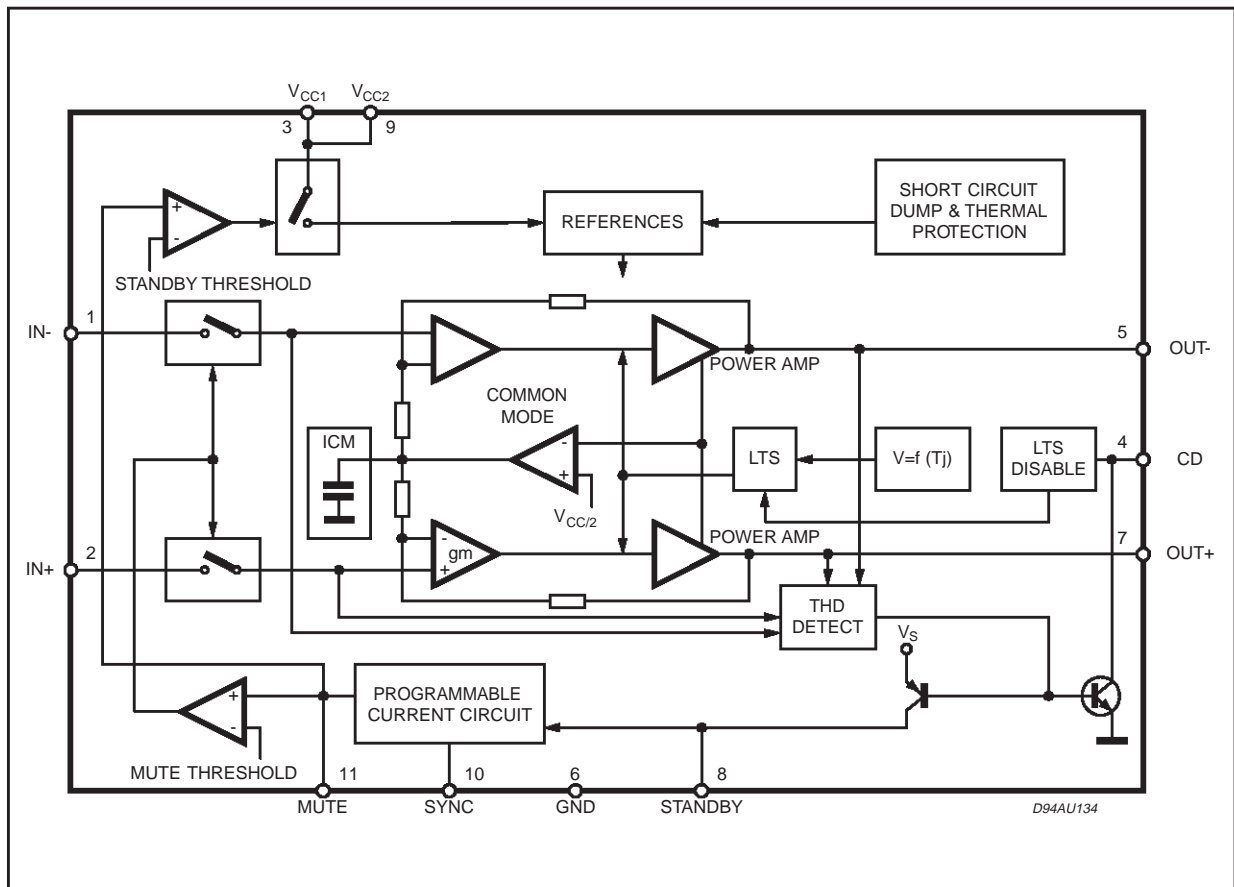
The on board clipping detector allows easy implementation of gain compression systems.

**Figure 1:** Test And Application Circuit

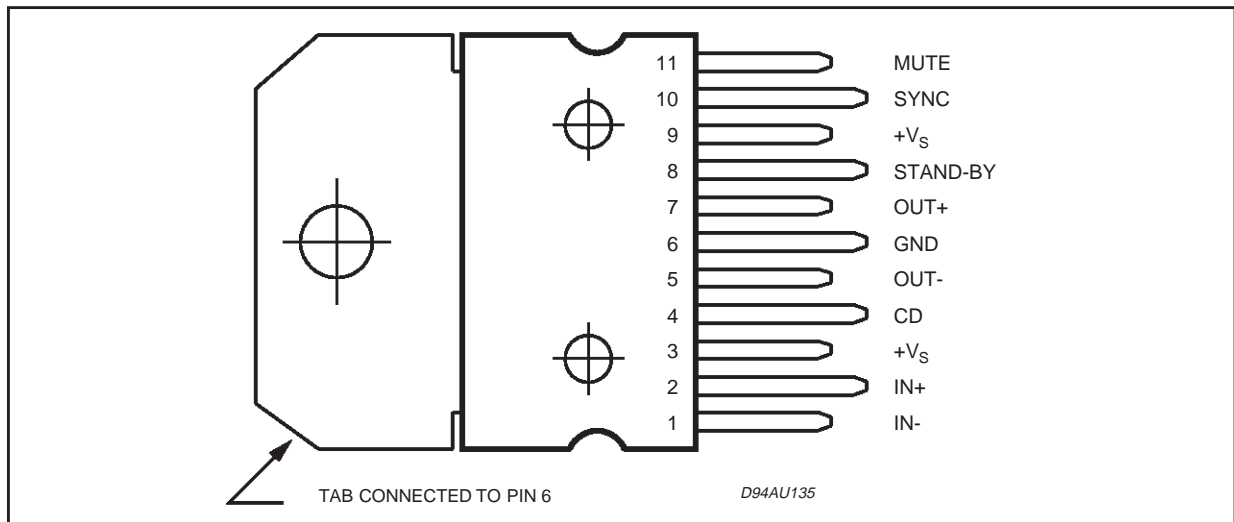


# TDA7391

Figure 2: Block Diagram



## PIN CONNECTION (Top view)



## THERMAL DATA

Symbol	Description	Value	Unit
$R_{th\ j-case}$	Thermal Resistance Junction-case	Max	1.8 °C/W

## ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V <sub>S</sub>	DC Supply Voltage	28	V
V <sub>OP</sub>	Operating Supply Voltage	18	V
V <sub>PEAK</sub>	Peak Supply Voltage (t = 50ms)	50	V
I <sub>O</sub>	Output Peak Current repetitive (f > 10Hz) Output Peak Current non repetitive	4.5 6	A A
P <sub>tot</sub>	Power Dissipation (T <sub>CASE</sub> = 85°C)	43	W
T <sub>stg</sub> , T <sub>j</sub>	Storage and Junction-Case Temperature	-40 to 150	°C

ELECTRICAL CHARACTERISTICS (V<sub>S</sub> = 14.4V; R<sub>L</sub> = 4Ω, f = 1KHz, T<sub>amb</sub> = 25°C, unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V <sub>S</sub>	Supply Voltage Range		8		18	V
I <sub>q</sub>	Total Quiescent Current			60	150	mA
V <sub>OS</sub>	Output Offset Voltage				120	mV
I <sub>SB</sub>	ST-BY Current	V <sub>ST-BY</sub> = 1.5V			100	μA
I <sub>SBin</sub>	ST-BY Input Bias Current	V <sub>ST-BY</sub> = 5V			10	μA
V <sub>SBon</sub>	ST-BY On Threshold Voltage				1.5	V
V <sub>SBoff</sub>	ST-BY Off threshold Voltage		3.5			V
ATT <sub>ST-BY</sub>	ST-BY Attenuation			90		dB
I <sub>M in</sub>	Mute Input Bias Current	(V <sub>MUTE</sub> = 5V)			10	μA
A <sub>M</sub>	Mute Attenuation			90		dB
P <sub>O</sub>	Output Power	d = 10% d = 1% d = 10%; R <sub>L</sub> = 3.2Ω	20	26 21 32		W W W
P <sub>O EIAJ</sub>	EIAJ Output Power (*)	V <sub>S</sub> = 13.7V; R <sub>L</sub> = 3.2Ω		40		W
P <sub>O MAX</sub>	MAX Output Power (*)	V <sub>S</sub> = 14.4V; R <sub>L</sub> = 3.2Ω		45		W
d	Distortion	P <sub>O</sub> = 0.1 to 15W		0.06 0.03		% %
G <sub>V</sub>	Voltage Gain		29.5	30	30.5	dB
f <sub>H</sub>	High Frequency rolloff	P <sub>O</sub> = 1W; -3dB	75			KHz
R <sub>IN</sub>	Input Impedance	Differential	36	60		KΩ
		Single Ended	30	55		KΩ
E <sub>IN</sub>	Input Noise Voltage	R <sub>g</sub> = 0Ω ; f = 22Hz to 22KHz		4		mV
CMRR	Input Common Mode Rejection	f = 1KHz; V <sub>IN</sub> = 1Vrms		65		dB
SVR	Supply Voltage Rejection	R <sub>g</sub> = 0Ω; V <sub>r</sub> = 1Vrms		60		dB
CDL	Clipping Detection Level		5	10	15	%
T <sub>sd</sub>	Absolute Thermal Shutdown Junction Temperature			160		°C

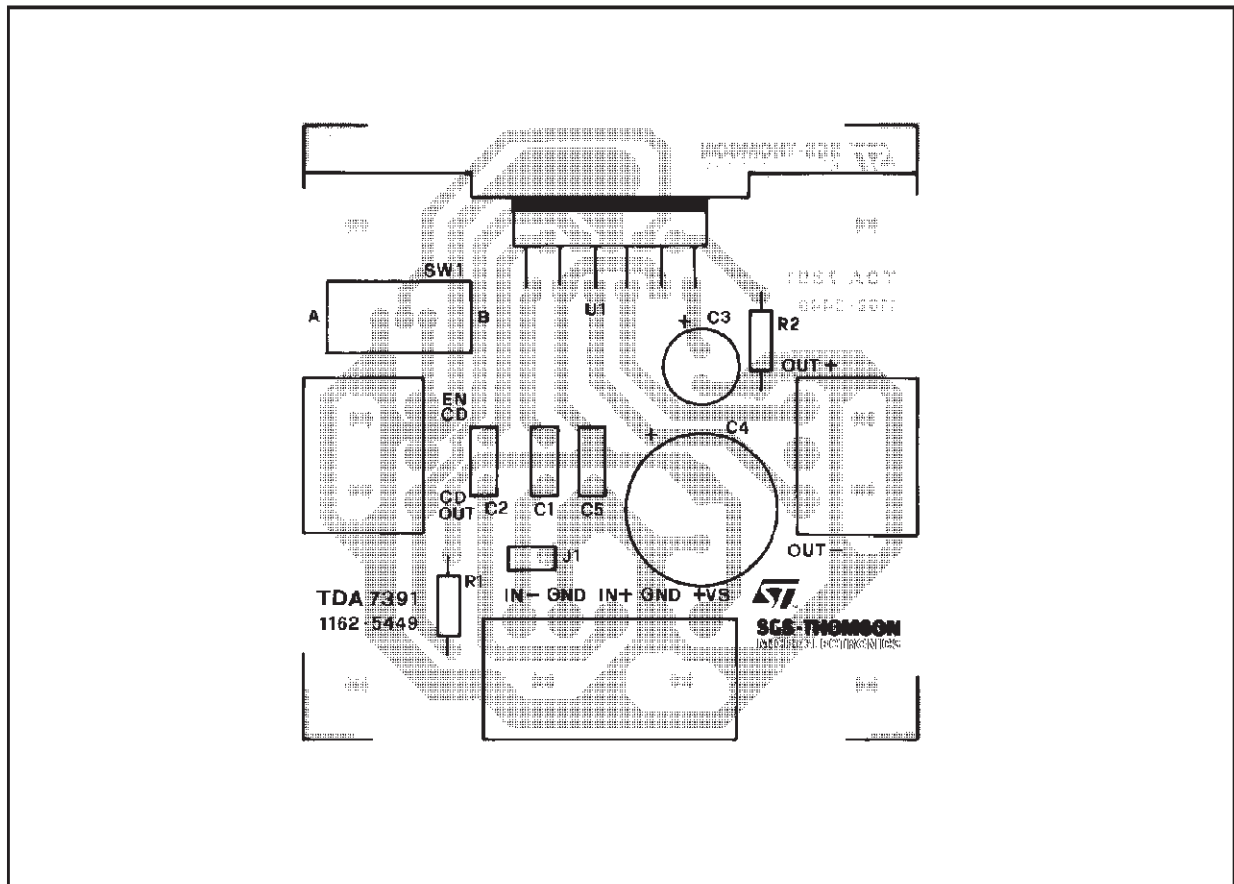
(\*) Saturated square wave output.

# TDA7391

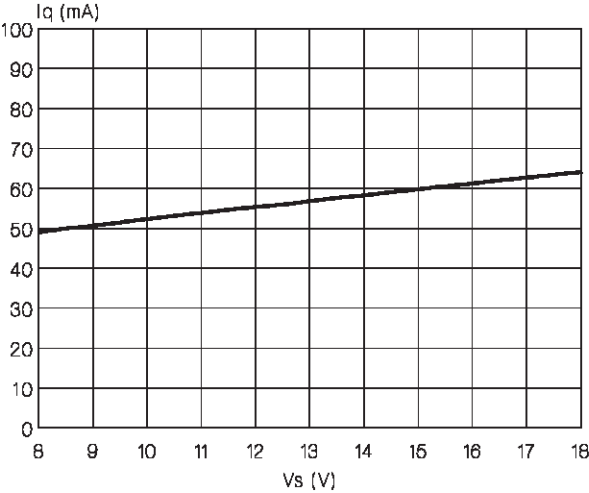
## FUNCTIONAL DESCRIPTION

Pin	Function	Description
1, 2	INPUTS	The input stage is a high impedance type also capable of operation in single ended mode with one input capacitively coupled to the signal GND. The impedance seen by the inverting and non inverting input pins must be matched.
3,9	+V <sub>S</sub>	Supply Voltage.
4	CD	The TDA7391 is equipped with a diagnostic circuitry able to detect the clipping in the Output Signal (distortion = 10%). The CD pin (open collector) gives out low level signal during clipping.
5, 7	OUTPUTS	The output stage is a bridge type able to drive loads as low as 3.2Ω. It consists of two class AB fully complementary PNP/NPN stages fully protected. A rail to rail output voltage swing is achieved without need of bootstrap capacitors. No external compensation is necessary.
6	GND	Ground.
8	STAND-BY	The device features a ST-BY function which shuts down all the internal bias supplies when the ST-BY pin is low. In ST-BY mode the amplifier sinks a small current (in the range of few μA). When the ST-BY pin is high the IC becomes fully operational.
10	SYNC	A resistor (R <sub>2</sub> ) has to be connect between pin 10 and GND in order to program the current that flows in the C <sub>3</sub> capacitor (pin 11). The values of C <sub>3</sub> and R <sub>2</sub> determine the time required to bias the amplifier.
11	MUTE	The pin will have a capacitor (C <sub>3</sub> ) tied to GND to set the MUTE/STAND-BY time. An automatic Mute during turn on/off is provided to prevent noisy transients.

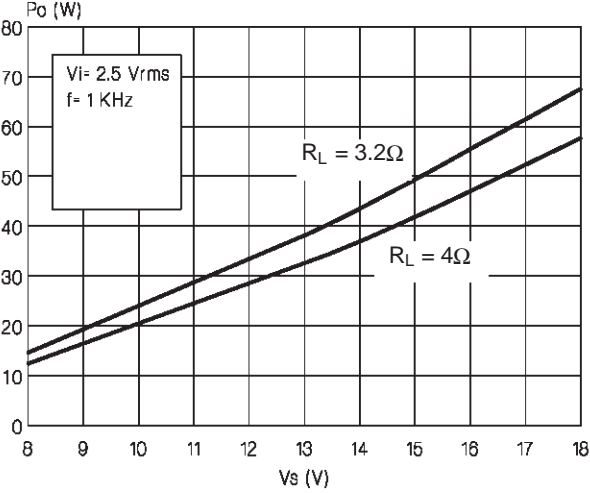
**Figure 3:** P.C. Board and Component Layout of the Fig. 1 (1:1 scale).



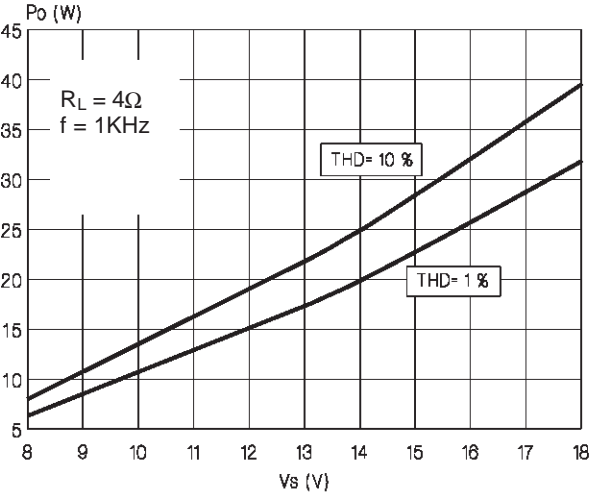
**Figure 4:** Quiescent Current vs Supply Voltage



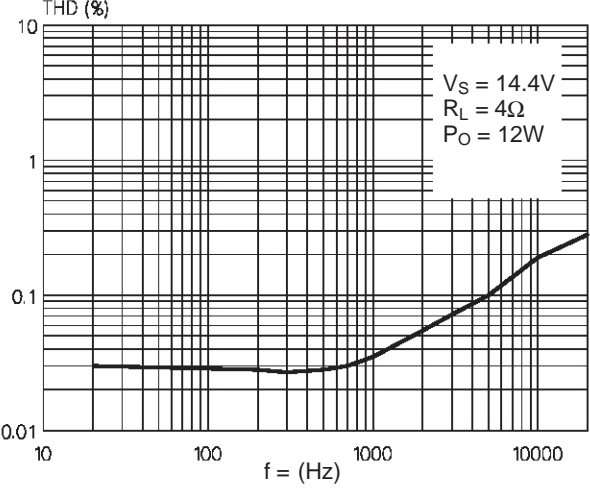
**Figure 5:** EIAJ power vs Supply Voltage



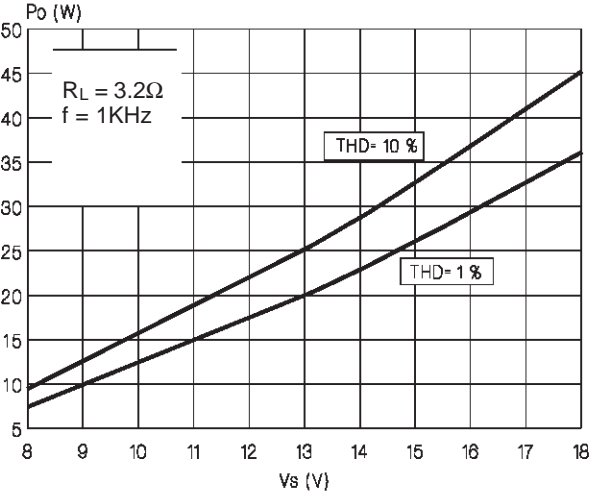
**Figure 6:** Output Power vs Supply Voltage (@ RL = 4Ω)



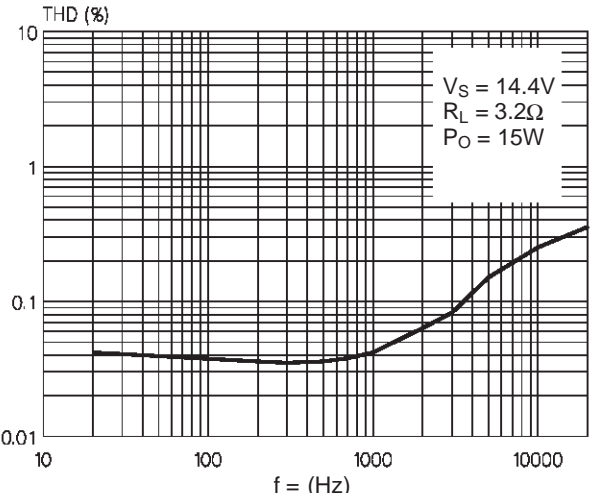
**Figure 7:** Distortion vs Frequency (@ RL = 4Ω)



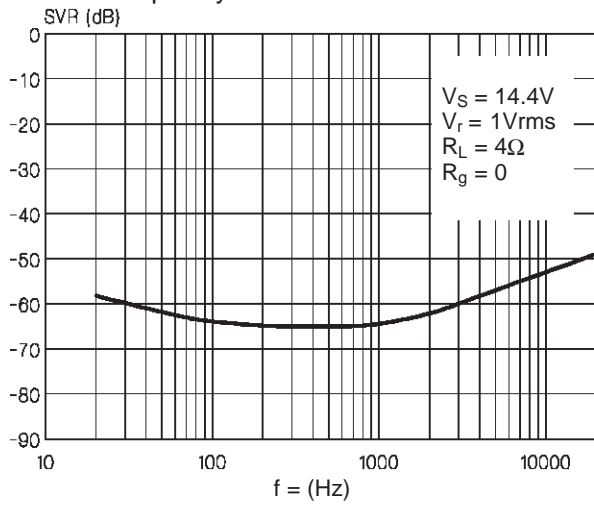
**Figure 8:** Output Power vs Supply Voltage (@ RL = 3.2Ω)



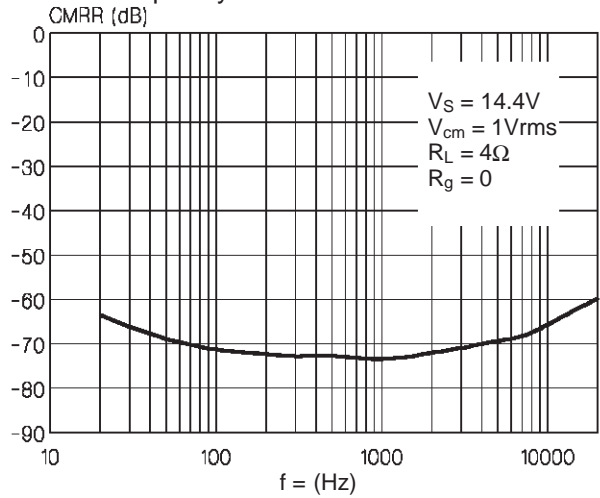
**Figure 9:** Distortion vs Frequency (RL = 4Ω)



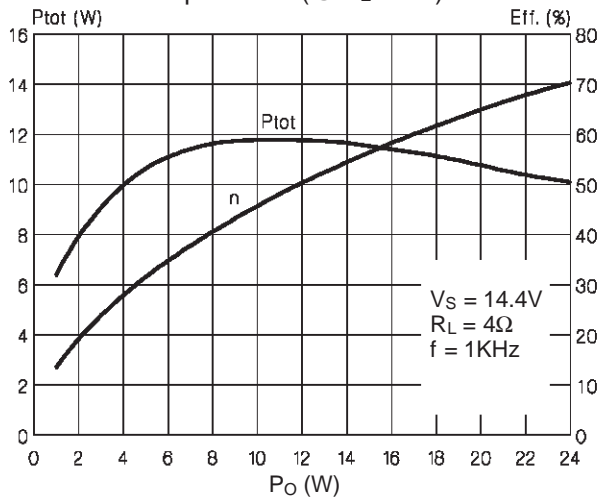
**Figure 10: Supply Voltage Rejection vs Frequency**



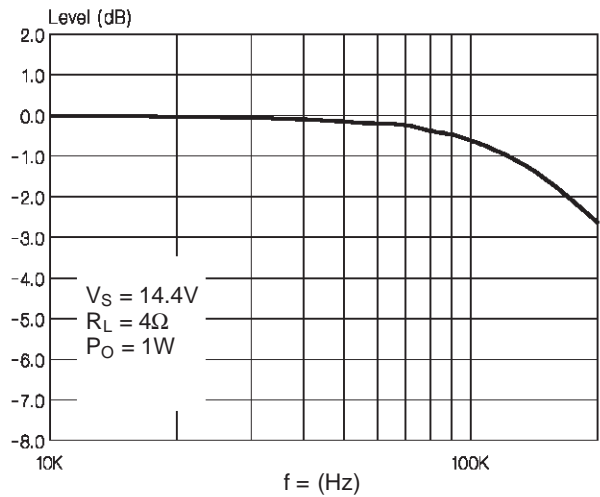
**Figure 11: Common Mode Rejection vs. Frequency**



**Figure 12: Total Power Dissipation & Efficiency vs. Output Power (@  $R_L = 4\Omega$ )**

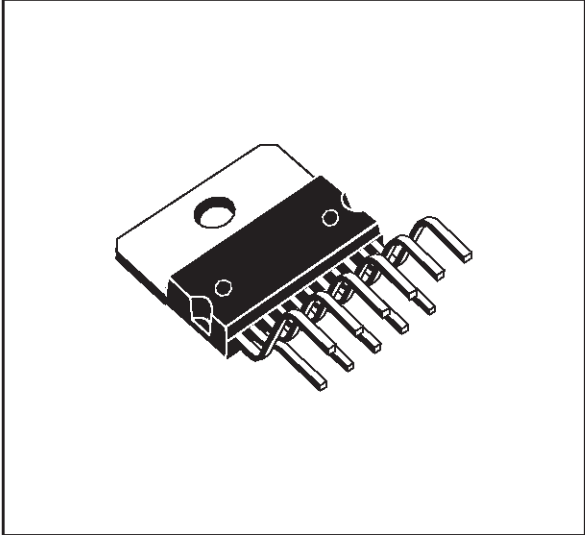


**Figure 13: Power Bandwidth**

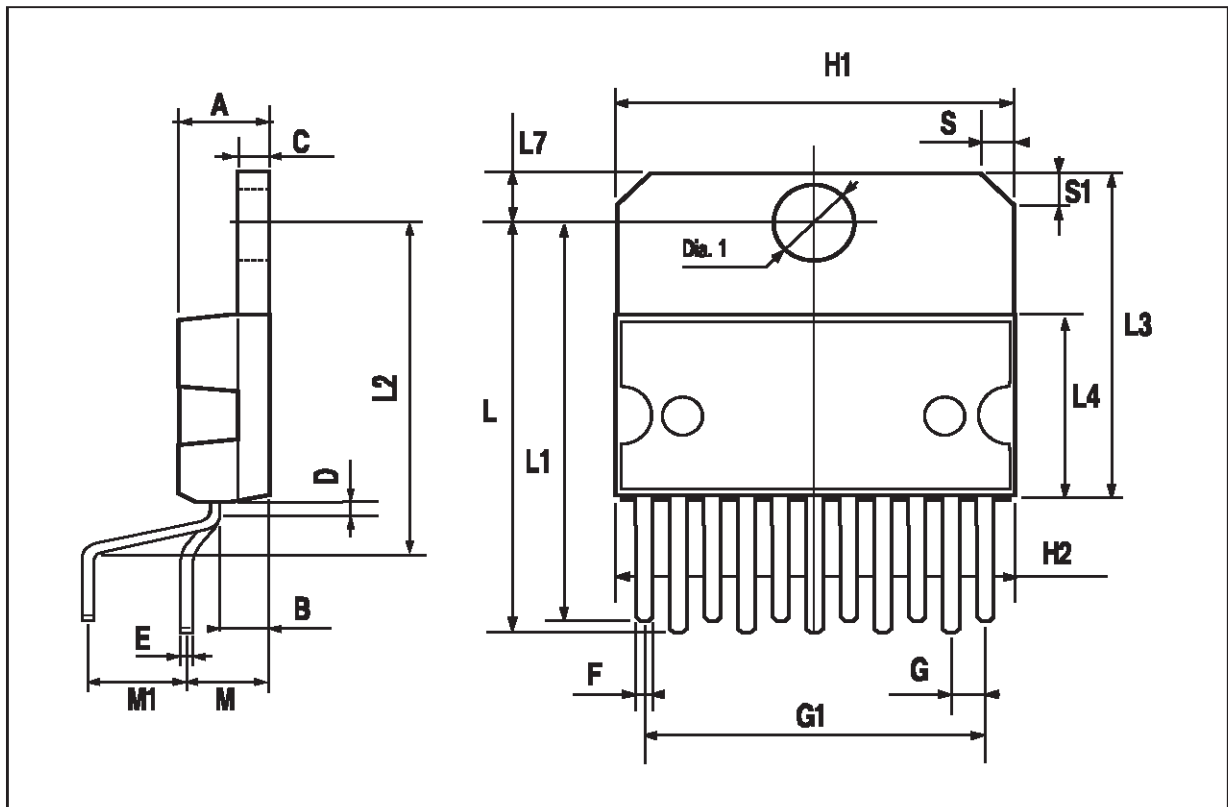


DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			5			0.197
B			2.65			0.104
C			1.6			0.063
D		1			0.039	
E	0.49		0.55	0.019		0.022
F	0.88		0.95	0.035		0.037
G	1.45	1.7	1.95	0.057	0.067	0.077
G1	16.75	17	17.25	0.659	0.669	0.679
H1	19.6			0.772		
H2			20.2			0.795
L	21.9	22.2	22.5	0.862	0.874	0.886
L1	21.7	22.1	22.5	0.854	0.87	0.886
L2	17.4		18.1	0.685		0.713
L3	17.25	17.5	17.75	0.679	0.689	0.699
L4	10.3	10.7	10.9	0.406	0.421	0.429
L7	2.65		2.9	0.104		0.114
M	4.25	4.55	4.85	0.167	0.179	0.191
M1	4.73	5.08	5.43	0.186	0.200	0.214
S	1.9		2.6	0.075		0.102
S1	1.9		2.6	0.075		0.102
Dia1	3.65		3.85	0.144		0.152

**OUTLINE AND MECHANICAL DATA**



**Multiwatt11 V**



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