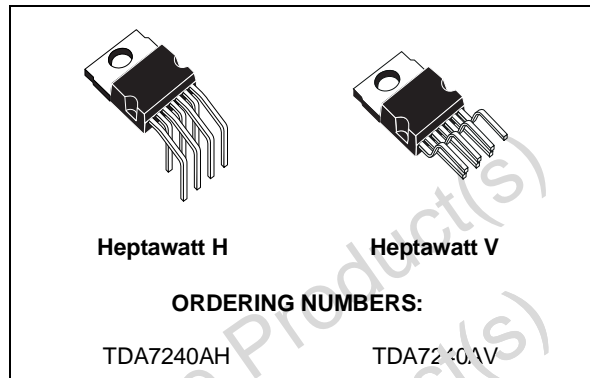


## 20W BRIDGE AMPLIFIER FOR CAR RADIO

- COMPACT HEPTAWATT PACKAGE
- FEW EXTERNAL COMPONENTS
- OUTPUT PROTECTED AGAINST SHORT CIRCUITS TO GROUND AND ACROSS LOAD
- DUMP TRANSIENT
- THERMAL SHUTDOWN
- LOUDSPEAKER PROTECTION
- HIGH CURRENT CAPABILITY
- LOW DISTORTION/LOW NOISE

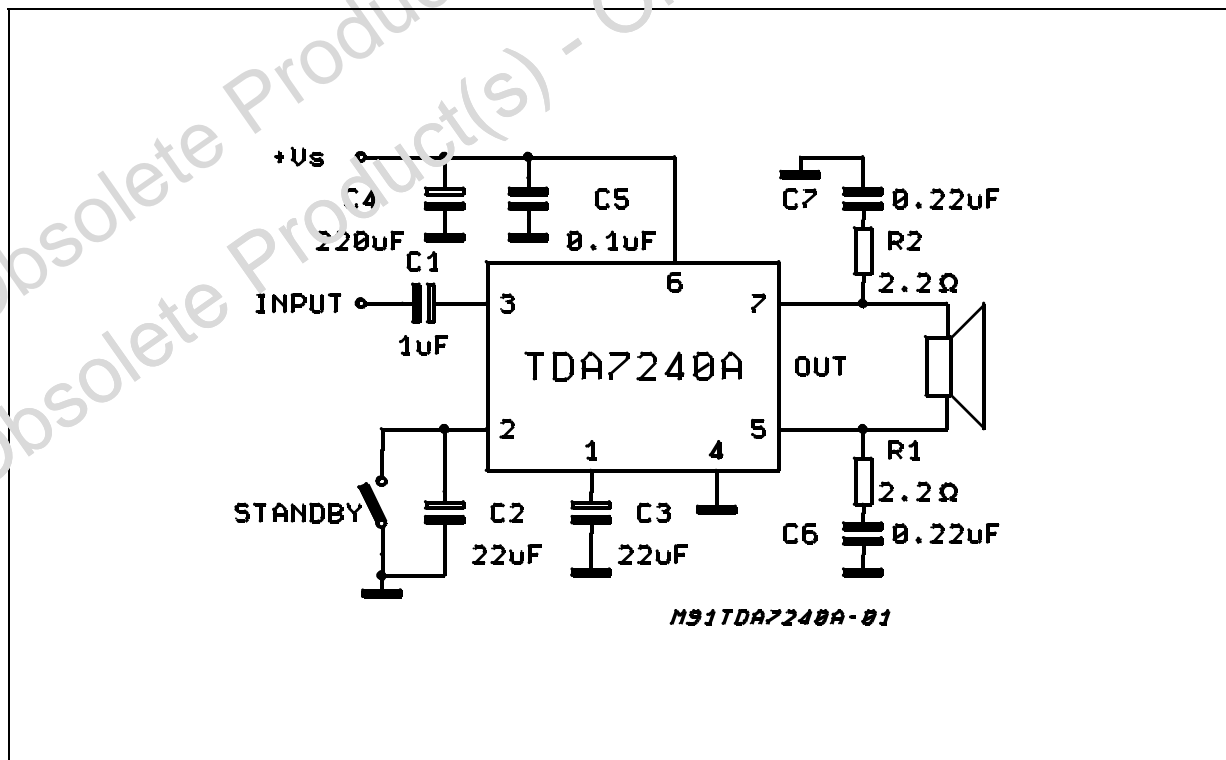


### DESCRIPTION

The TDA7240A is a 20W bridge audio amplifier IC designed specially for car radio applications. Thanks to the low external part count and compact Heptawatt 7-pin power package the TDA7240A occupies little space on the printed circuit board.

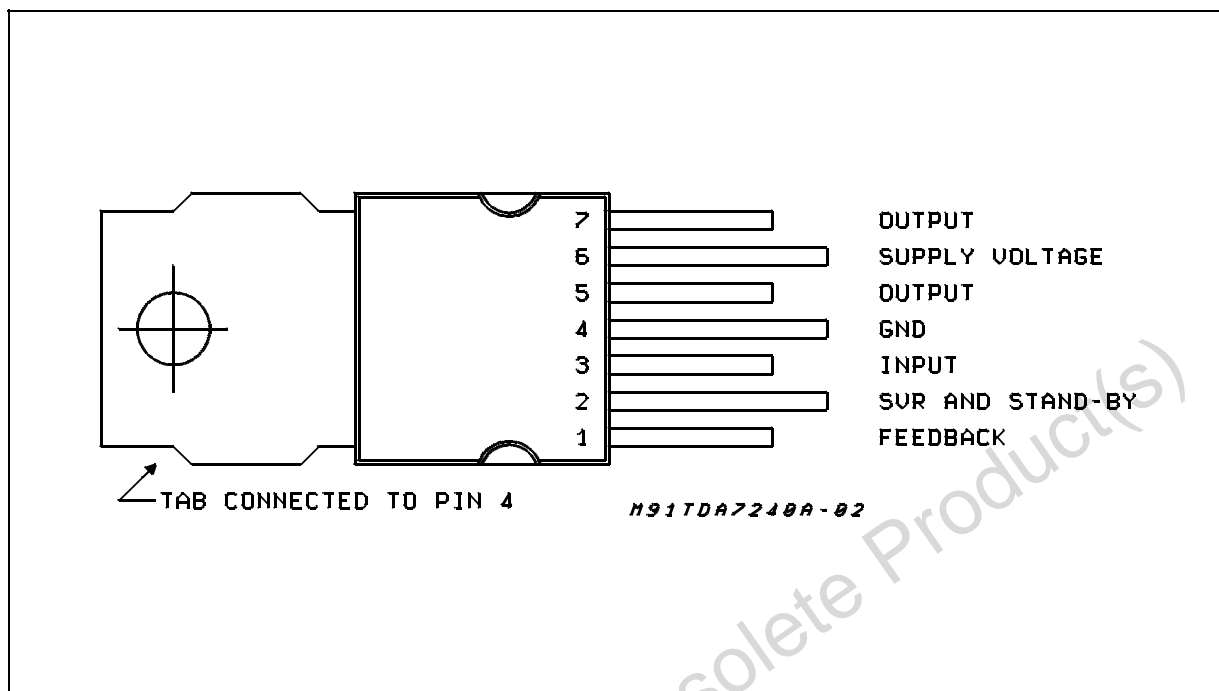
Reliable operation is guaranteed by a comprehensive array of on-chip protection features. These include protection against AC and DC output short circuits (to ground and across the load), load dump transients, and junction overtemperature. Additionally, the TDA7240A protects the loudspeaker when one output is short-circuited to ground.

**Figure 1:** Test and Application Circuit



## TDA7240A

### PIN CONNECTION (Top view)



### ABSOLUTE MAXIMUM RATINGS

| Symbol         | Parameter  | Value      | Unit             |
|----------------|--|------------|------------------|
| $V_s$          | Operating Supply Voltage                                 | 18         | V                |
| $V_s$          | DC Supply Voltage  | 28         | V                |
| $V_s$          | Peak Supply Voltage (for 50ms)                           | 40         | V                |
| $I_o$ (*)      | Peak Output Current (non repetitive $t = 0.1\text{ms}$ ) | 4.5        | A                |
| $I_o$ (*)      | Peak Output Current (repetitive $f \geq 10\text{Hz}$ )   | 3.5        | A                |
| $P_{tot}$      | Power Dissipation at $T_{case} = 85^\circ\text{C}$       | 16         | W                |
| $T_{stg}, T_j$ | Storage and Junction Temperature                         | -40 to 150 | $^\circ\text{C}$ |

(\*) Internally limited

### THERMAL DATA

| Symbol           | Parameter                        | Value  | Unit |
|------------------|----------------------------------|--------|------|
| $R_{th\ j-case}$ | Thermal Resistance Junction-case | Max. 4 | V    |

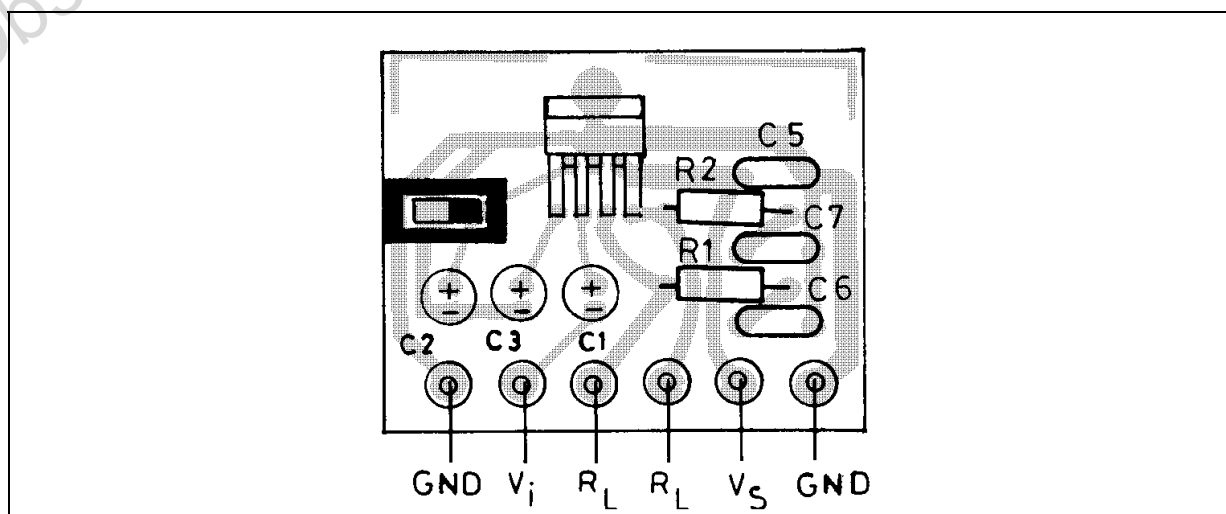
**ELECTRICAL CHARACTERISTICS** (refer to the circuit of fig. 1,  $T_{amb} = 25^{\circ}\text{C}$ ,  $R_{th}(\text{heatsink}) = 4^{\circ}\text{C/W}$ ,  $V_s = 14.4\text{V}$ )

| Symbol                | Parameter                      | Test Conditions  | Min.     | Typ.     | Max. | Unit                           |
|-----------------------|--------------------------------|--|----------|----------|------|--------------------------------|
| $V_s$                 | Supply Voltage                 |  |          |          | 18   | V                              |
| $V_{os}$              | Output Offset Voltage          |  |          |          | 150  | mV                             |
| $I_d$                 | Total Quiescent Current        | $R_L = 4\Omega$  |          | 65       | 120  | mA                             |
| $P_o$                 | Output Power                   | $f = 1\text{kHz}; d = 10\%$<br>$R_L = 4\Omega$<br>$R_L = 8\Omega$          | 18<br>10 | 20<br>12 |      | W<br>W                         |
| $d$                   | Distortion                     | $R_L = 4\Omega$<br>$P_o = 50\text{mW to } 12\text{W}$<br>$f = 1\text{kHz}$ |          | 0.1      | 0.5  | %                              |
|                       |                                | $R_L = 8\Omega$<br>$P_o = 50\text{mW to } 12\text{W}$<br>$f = 1\text{kHz}$ |          | 0.05     | 0.5  | %                              |
| GV                    | Voltage Gain                   | $f = 1\text{KHz}$  | 39.5     | 40       | 40.5 | dB                             |
| SVR                   | Supply Voltage Rejection       | $f = 100\text{Hz}$ $R_g = 10\text{K}\Omega$                                | 35       | 40       |      | dB                             |
| $E_N$                 | Total Input Noise              | $R_g = 10\text{K}\Omega$<br><br>(*)<br>(**)                                |          | 2<br>3   | 10   | $\mu\text{V}$<br>$\mu\text{V}$ |
| $\eta$                | Efficiency                     | $R_L = 4\Omega$ $f = 1\text{KHz}$  |          | 65       |      | %                              |
| $I_{sb}$              | Stand-by Current               |  |          | 200      |      | $\mu\text{A}$                  |
| $R_i$                 | Input Resistance               | $f = 1\text{kHz}$  | 70       |          |      | $\text{k}\Omega$               |
| $V_i$                 | Input Sensitivity              | $f = 1\text{kHz}; P_o = 2\text{W}; R_L = 4\Omega$                          |          | 28       |      | mV                             |
| $f_L$                 | Low Frequency Roll Off (-3dB)  | $P_o = 15\text{W}; R_L = 4\Omega$  |          |          | 30   | Hz                             |
| $f_H$                 | High Frequency Roll Off (-3dB) | $P_o = 15\text{W}; R_L = 4\Omega$  | 25       |          |      | kHz                            |
| $A_s$                 | Stand-by Attenuation           | $V_o = 2\text{Vrms}$   | 70       | 90       |      | dB                             |
| $V_{TH}(\text{pin2})$ | Stand-by Threshold             |  |          |          | 1    | V                              |

(\*) B= Curve A

(\*\*) B = 22Hz to 22 KHz

**Figure 2** : P.C. Board and Components layout of the Circuit of Fig. 1.(1:1scale)



# TDA7240A

## APPLICATION SUGGESTION

The recommended values of the components are those shown on application circuit of Fig. 1. Different values can be used, the following table can help the designer.

| Component | Recommended Value | Purpose                       | Larger Than                                      | Smaller Than                                    |
|-----------|-------------------|-------------------------------|--|---|
| R1, R2    | 2.2Ω              | Frequency Stability           | Danger of High Frequency Oscillation             |   |
| C1        | 1μF               | Input DC Decoupling           | Higher Turn On and Stand-by Delay                | Higher Turn On Pop. Higher Low Frequency Cutoff |
| C2        | 22μF              | Ripple Rejection              | Increase of SVR<br>Increase of the Turn On Delay | Degradation of SVR                              |
| C3        | 22μF              | Feedback low Frequency Cutoff |  | Higher Low Frequency Cutoff                     |
| C6, C7    | 0.22μF            | Frequency Stability           |  | Danger of Oscillation                           |
| C4        | 220μF             | Supply Filter                 |  | Danger of Oscillation                           |
| C5        | 0.1μF             | Supply Bypass                 |  | Danger of Oscillation                           |

Figure 3 : Output Power vs. Supply Voltage.

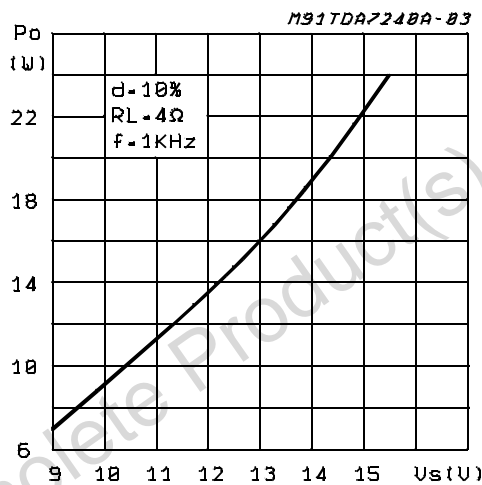


Figure 4 : Distortion vs. Output Power.

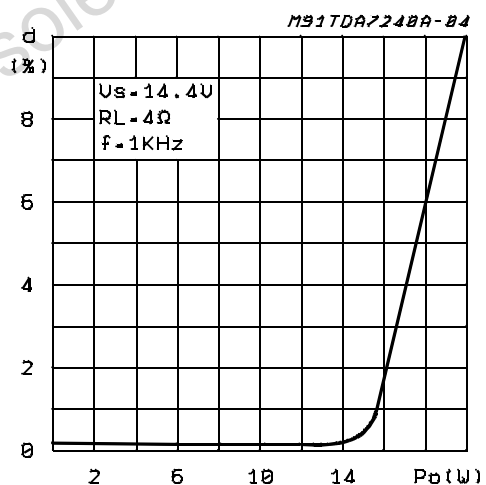


Figure 5 : Output Power vs. Supply voltage.

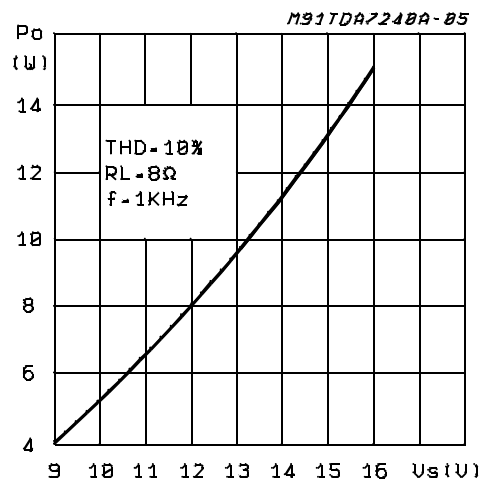


Figure 6 : Distortion vs. Output Power.

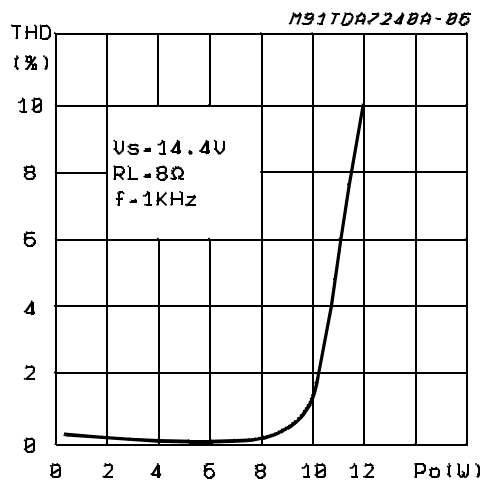


Figure 7 : Distortion vs. Frequency.

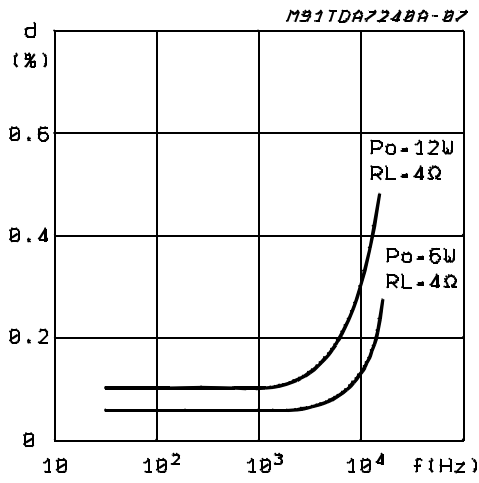


Figure 8 : Supply Voltage Rejection vs. Frequency.

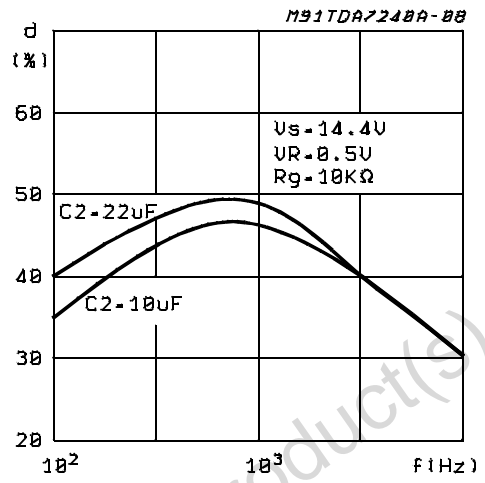


Figure 9 : Power Dissipation and Efficiency vs. Output Power.

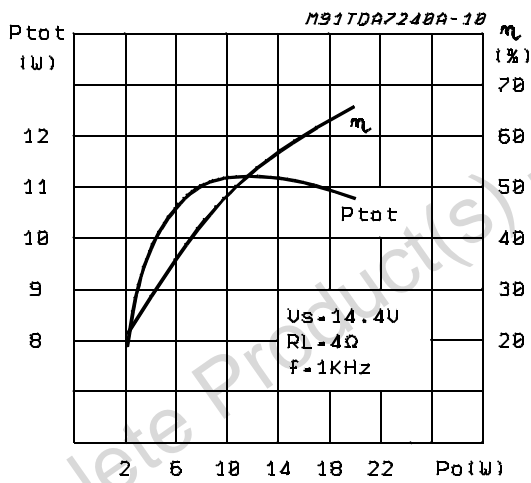
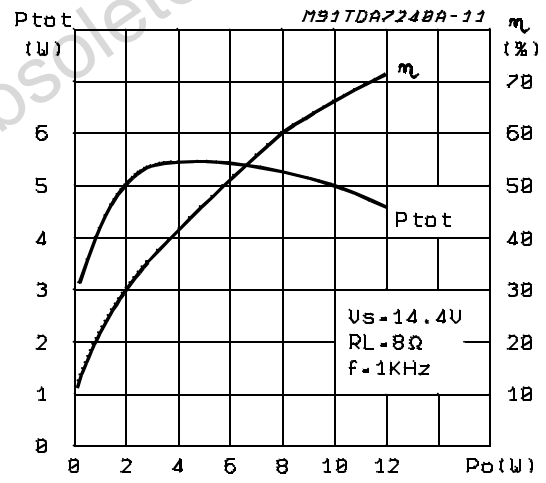


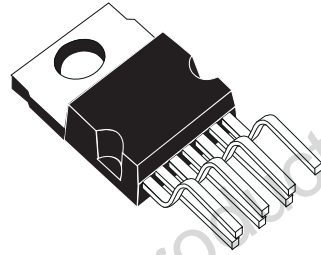
Figure 10 : Power Dissipation and Efficiency vs. Output Power.



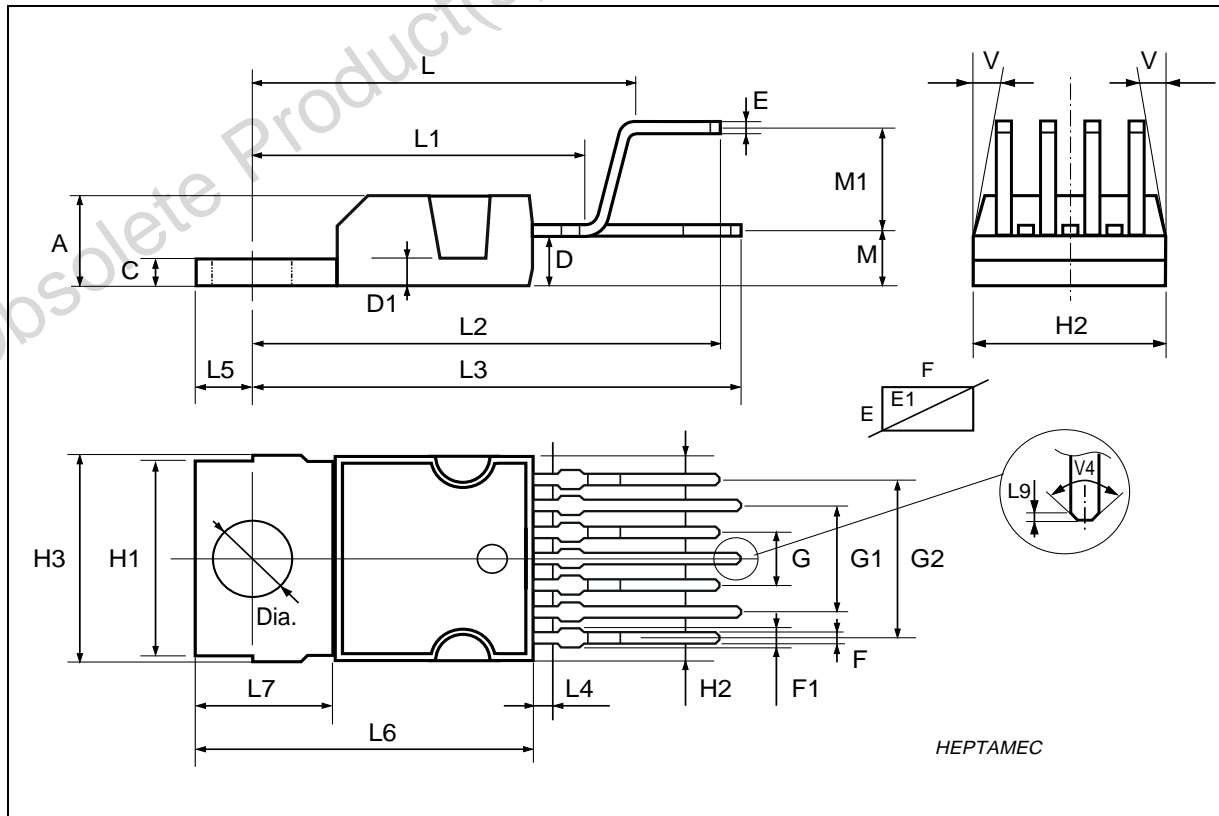
# TDA7240A

| DIM. | mm         |       |       | inch  |       |       |
|------|------------|-------|-------|-------|-------|-------|
|      | MIN.       | TYP.  | MAX.  | MIN.  | TYP.  | MAX.  |
| A    |            |       | 4.8   |       |       | 0.189 |
| C    |            |       | 1.37  |       |       | 0.054 |
| D    | 2.4        |       | 2.8   | 0.094 |       | 0.110 |
| D1   | 1.2        |       | 1.35  | 0.047 |       | 0.053 |
| E    | 0.35       |       | 0.55  | 0.014 |       | 0.022 |
| E1   | 0.7        |       | 0.97  | 0.028 |       | 0.038 |
| F    | 0.6        |       | 0.8   | 0.024 |       | 0.031 |
| F1   |            |       | 0.9   |       |       | 0.035 |
| G    | 2.34       | 2.54  | 2.74  | 0.095 | 0.100 | 0.105 |
| G1   | 4.88       | 5.08  | 5.28  | 0.193 | 0.200 | 0.205 |
| G2   | 7.42       | 7.62  | 7.82  | 0.295 | 0.300 | 0.307 |
| H2   |            |       | 10.4  |       |       | 0.409 |
| H3   | 10.05      |       | 10.4  | 0.396 |       | 0.409 |
| L    | 16.7       | 16.9  | 17.1  | 0.657 | 0.668 | 0.673 |
| L1   |            | 14.92 |       |       | 0.587 |       |
| L2   | 21.24      | 21.54 | 21.84 | 0.386 | 0.848 | 0.860 |
| L3   | 22.27      | 22.52 | 22.77 | 0.877 | 0.891 | 0.896 |
| L4   |            |       | 1.29  |       |       | 0.051 |
| L5   | 2.6        | 2.8   | 3     | 0.102 | 0.110 | 0.118 |
| L6   | 15.1       | 15.5  | 15.8  | 0.594 | 0.610 | 0.622 |
| L7   | 6          | 6.35  | 6.6   | 0.236 | 0.250 | 0.260 |
| L9   |            | 0.2   |       |       | 0.008 |       |
| M    | 2.55       | 2.8   | 3.05  | 0.100 | 0.110 | 0.120 |
| M1   | 4.83       | 5.08  | 5.33  | 0.190 | 0.200 | 0.210 |
| V4   | 40° (typ.) |       |       |       |       |       |
| Dia  | 3.65       |       | 3.85  | 0.144 |       | 0.152 |

## OUTLINE AND MECHANICAL DATA

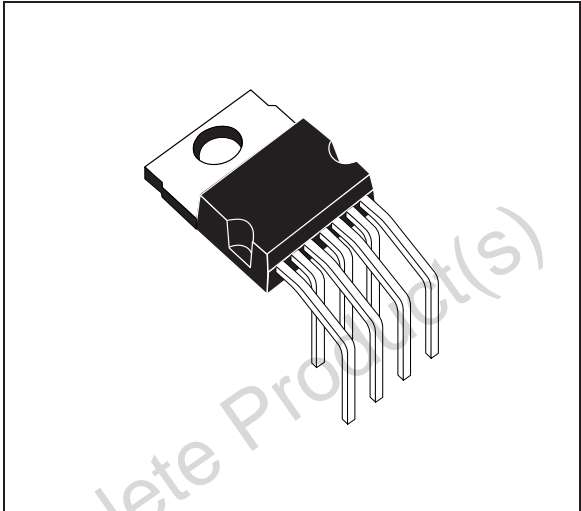


## Heptawatt V

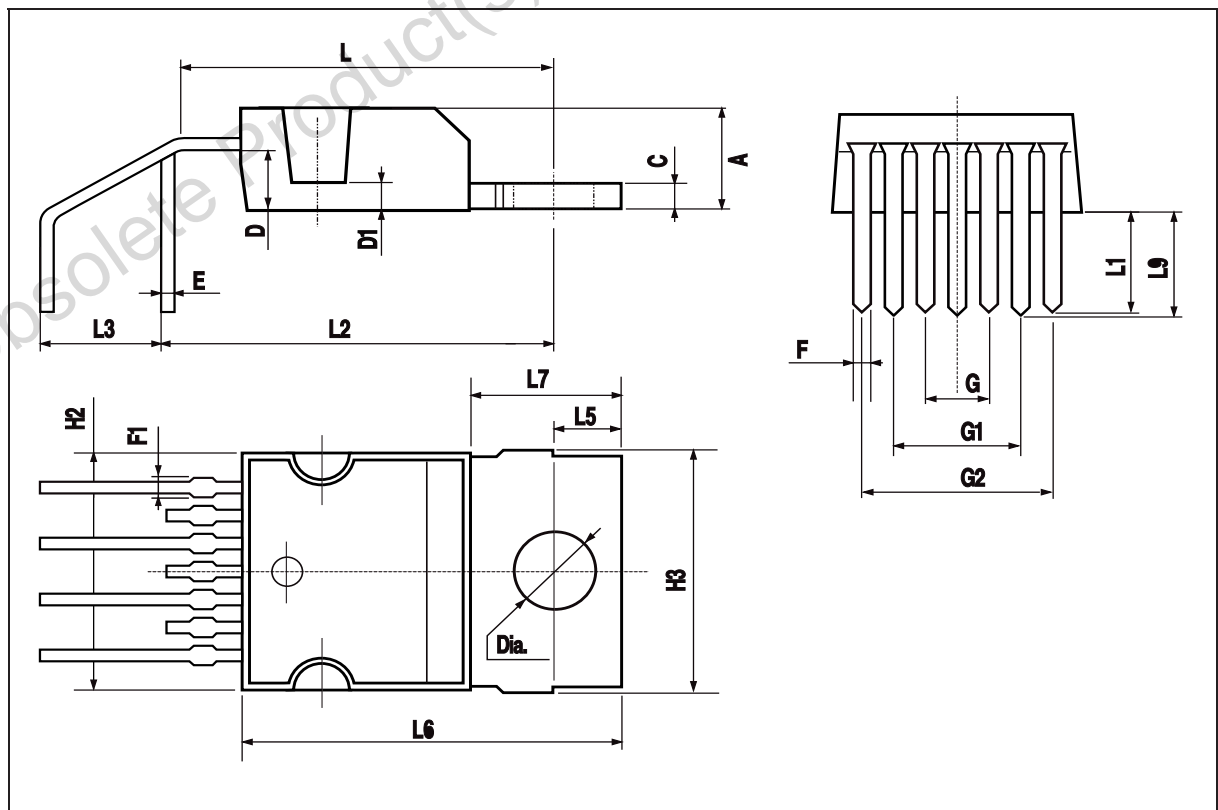


| DIM. | mm    |      |      | inch  |       |       |
|------|-------|------|------|-------|-------|-------|
|      | MIN.  | TYP. | MAX. | MIN.  | TYP.  | MAX.  |
| A    |       |      | 4.8  |       |       | 0.189 |
| C    |       |      | 1.37 |       |       | 0.054 |
| D    | 2.4   |      | 2.8  | 0.094 |       | 0.110 |
| D1   | 1.2   |      | 1.35 | 0.047 |       | 0.053 |
| E    | 0.35  |      | 0.55 | 0.014 |       | 0.022 |
| F    | 0.6   |      | 0.8  | 0.024 |       | 0.031 |
| F1   |       |      | 0.9  |       |       | 0.035 |
| G    | 2.41  | 2.54 | 2.67 | 0.095 | 0.100 | 0.105 |
| G1   | 4.91  | 5.08 | 5.21 | 0.193 | 0.200 | 0.205 |
| G2   | 7.49  | 7.62 | 7.8  | 0.295 | 0.300 | 0.307 |
| H2   |       |      | 10.4 |       |       | 0.409 |
| H3   | 10.05 |      | 10.4 | 0.396 |       | 0.409 |
| L    |       | 14.2 |      |       | 0.559 |       |
| L1   |       | 4.4  |      |       | 0.173 |       |
| L2   |       | 15.8 |      |       | 0.622 |       |
| L3   |       | 5.1  |      |       | 0.201 |       |
| L5   | 2.6   |      | 3    | 0.102 |       | 0.118 |
| L6   | 15.1  |      | 15.8 | 0.594 |       | 0.622 |
| L7   | 6     |      | 6.6  | 0.236 |       | 0.260 |
| L9   |       | 4.44 |      |       | 0.175 |       |
| Dia  | 3.65  |      | 3.85 | 0.144 |       | 0.152 |

**OUTLINE AND MECHANICAL DATA**



**Heptawatt H**



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