

## MULTIFUNCTION VOLTAGE REGULATOR FOR CAR RADIO

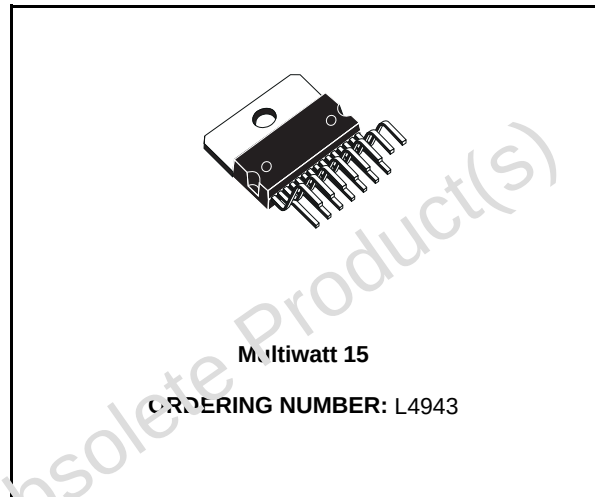
- 3 PROGRAMMABLE OUTPUTS:
  - ◆ 3 TO 11V (500mA);
  - ◆ 3 TO 11V (500mA);
  - ◆ 3 TO 7V (500mA) STANDBY
- OUT1 AND OUT2 WITH INDEPENDENT ENABLE CONTROL FOR STAND-BY MODE
- 0.4A HIGH SIDE DRIVER
- LOAD DUMP PROTECTION
- THERMAL SHUTDOWN

### DESCRIPTION

The L4943 contains a triple voltage regulator and a high side driver.

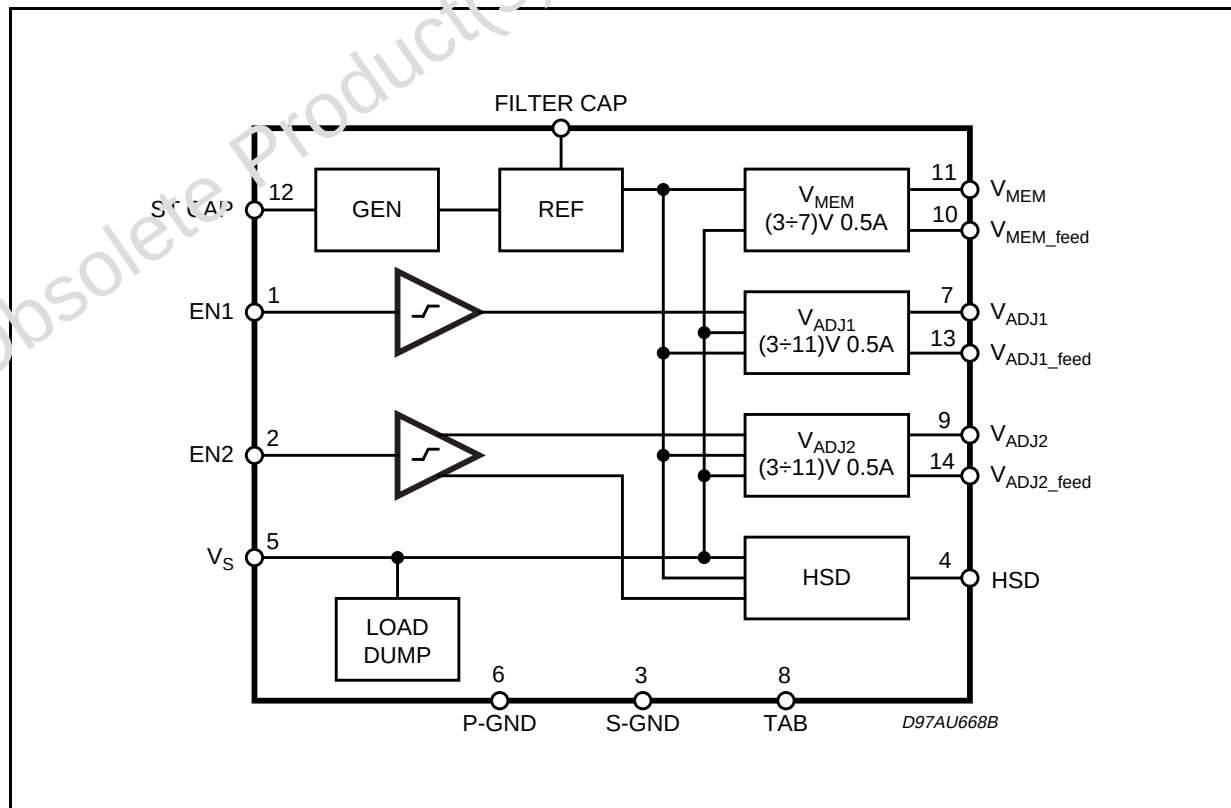
In stand-by the output is active as long as possible even when in thermal shutdown or under any other fault conditions.

The STCAP pin allows the use of a reserve supply capacitor that will hold enough energy for the



5V Stand-by line to allow the  $\mu$ P to store data.

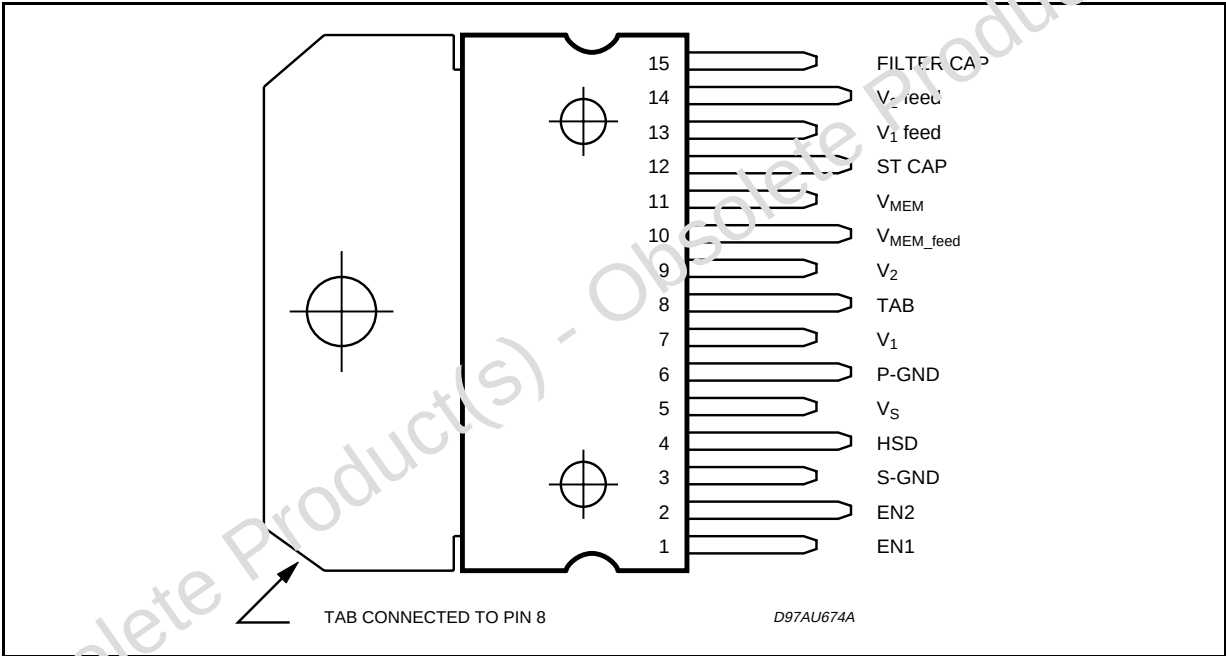
### BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

| Symbol    | Parameter                                      | Value              | Unit        |
|-----------|------------------------------------------------|--------------------|-------------|
| $V_S$     | DC Operating Supply Voltage                    | -0.6 to 30         | V           |
|           | Transient Supply Overvoltage (50ms)            | 50                 | V           |
| $I_O$     | Voltage Regulator Output Current               | Internally limited |             |
| $V_{in}$  | Input Voltage (EN1, EN2)                       | 0 to 6             | V           |
| RESR      | Output Capacitor Series Eq. Resistance         | 0.2 to 10          | $\Omega$    |
| $P_{tot}$ | Power Dissipation ( $T_{case} = 85^{\circ}C$ ) | 33                 | W           |
| $T_{op}$  | Operating Temperature Range                    | -40 to 85          | $^{\circ}C$ |
| $T_{stg}$ | Storage Temperature Ranges                     | -55 to 150         | $^{\circ}C$ |

PIN CONNECTION (t.b.d.)



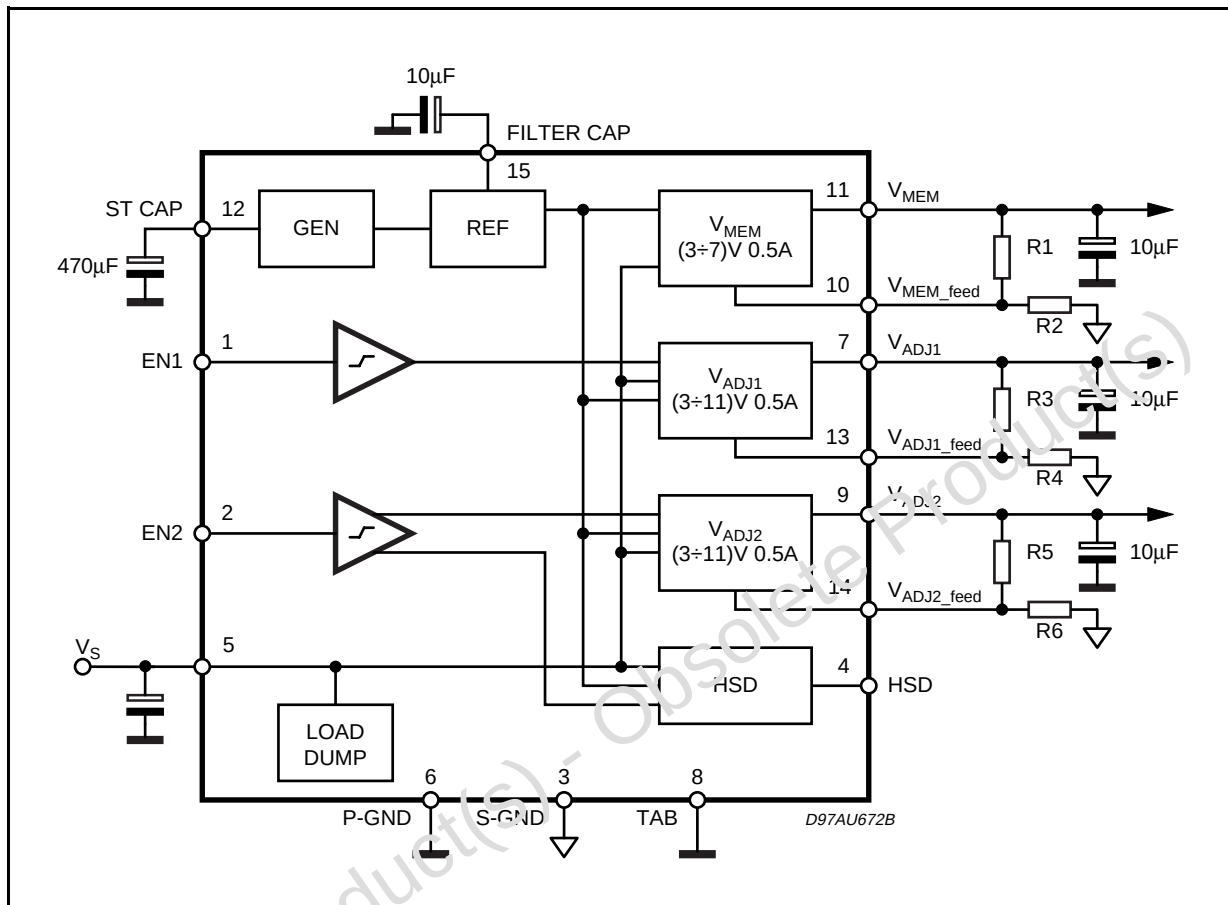
THERMAL DATA

| Symbol           | Parameter                           | Value | Unit          |
|------------------|-------------------------------------|-------|---------------|
| $R_{Th\ j-case}$ | Thermal Resistance Junction to Case | 2     | $^{\circ}C/W$ |

**ELECTRICAL CHARACTERISTICS** (Referred to Test & Application Circuit;  $V_S = 14.4V$ ;  $T_{amb} = 25^{\circ}C$ ; unless otherwise specified).

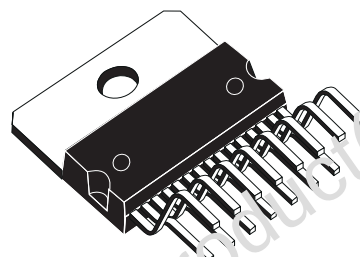
| Symbol                   | Parameter                  | Test Condition                                                                  | Min.  | Typ.       | Max.      | Unit     |
|--------------------------|----------------------------|---------------------------------------------------------------------------------|-------|------------|-----------|----------|
| 5V STAND-BY              |                            |                                                                                 |       |            |           |          |
| V <sub>out Mem</sub>     | Output Voltage             | no load; 1+R1/R2 = 2.4                                                          | 2.85  | 3          | 3.15      | V        |
|                          |                            | no load; 1+R1/R2 = 4                                                            | 4.75  | 5          | 5.25      | V        |
|                          |                            | no load; 1+R1/R2 = 5.6                                                          | 6.65  | 7          | 7.35      | V        |
| ΔV <sub>line</sub>       | Line Regulation            | no load; 11<V <sub>S</sub> <18V                                                 |       | 5          | 50        | mV       |
| ΔV <sub>load</sub>       | Load Regulation            | 5mA < I <sub>O</sub> < 500mA                                                    |       | 8          | 80        | mV       |
| V <sub>dropout</sub>     | Dropout Voltage            | I <sub>O</sub> = 200mA, V <sub>O</sub> = 5V                                     |       | 0.36       | 0.5       | V        |
|                          |                            | I <sub>O</sub> = 500mA, V <sub>O</sub> = 5V                                     |       | 0.9        | 1.25      | V        |
| I <sub>lim</sub>         | Current Limit              | Out short to GND                                                                | 550   | 800        | 1000      | mA       |
| I <sub>qst-by</sub>      | Quiescent Current          | I <sub>O</sub> = 100μA; EN1 = EN2 = 0<br>I <sub>O</sub> = 500mA; EN1 = EN2 = 5V |       | 0.35<br>10 | 0.5<br>25 | mA<br>mA |
| ADJUSTABLE REG1 SWITCHED |                            |                                                                                 |       |            |           |          |
| V <sub>outadj</sub>      | Output Voltage             | no load; 1+R3/R4 = 2.4                                                          | 2.85  | 3          | 3.15      | V        |
|                          |                            | no load; 1+R3/R4 = 4                                                            | 4.75  | 5          | 5.25      | V        |
|                          |                            | no load; 1+R3/R4 = 8.8                                                          | 10.45 | 11         | 11.55     | V        |
| ΔV <sub>line</sub>       | Line Regulation            | no load                                                                         |       | 0.7        | 7         | mV/V     |
| ΔV <sub>load</sub>       | Load Regulation            | 5mA < I <sub>O</sub> < 500mA                                                    |       | 8          | 80        | mV       |
| V <sub>dropout</sub>     | Dropout Voltage            | I <sub>O</sub> = 200mA, V <sub>O</sub> = 5V                                     |       | 0.45       | 0.6       | V        |
|                          |                            | I <sub>O</sub> = 500mA, V <sub>O</sub> = 5V                                     |       | 1.1        | 1.5       | V        |
|                          |                            | I <sub>O</sub> = 200mA, V <sub>O</sub> = 11V                                    |       | 0.4        | 0.55      | V        |
|                          |                            | I <sub>O</sub> = 500mA, V <sub>O</sub> = 11V                                    |       | 1          | 1.4       | V        |
| I <sub>lim</sub>         | Current Limit              | Out short to GND                                                                | 550   | 800        | 1000      | mA       |
| I <sub>q2</sub>          | Quiescent Current          | I <sub>O</sub> = 500mA                                                          |       | 10         | 25        | mA       |
| SVR                      | Supply Voltage Rejection   | f = 0.1 to 10kHz, V <sub>O</sub> = 5V                                           | 45    | 55         |           | dB       |
| EN1 on                   | EN ADJ1 ON                 |                                                                                 | 2     |            |           | V        |
| EN1 off                  | EN ADJ1 OFF                |                                                                                 |       |            | 1         | V        |
| ADJUSTABLE REG2 SWITCHED |                            |                                                                                 |       |            |           |          |
| V <sub>outadj</sub>      | Output Voltage             | no load; 1+R3/R4 = 2.4                                                          | 2.85  | 3          | 3.15      | V        |
|                          |                            | no load; 1+R5/R6 = 4                                                            | 4.75  | 5          | 5.25      | V        |
|                          |                            | no load; 1+R3/R4 = 8.8                                                          | 10.45 | 11         | 11.55     | V        |
| ΔV <sub>line</sub>       | Line Regulation            | no load                                                                         |       | 0.7        | 7         | mV/V     |
| ΔV <sub>load</sub>       | Load Regulation            | 5mA < I <sub>O</sub> < 500mA                                                    |       | 12         | 80        | mV       |
| V <sub>dropout</sub>     | Dropout Voltage            | I <sub>O</sub> = 200mA, V <sub>O</sub> = 5V                                     |       | 0.45       | 0.6       | V        |
|                          |                            | I <sub>O</sub> = 500mA, V <sub>O</sub> = 5V                                     |       | 1.1        | 1.5       | V        |
|                          |                            | I <sub>O</sub> = 200mA, V <sub>O</sub> = 11V                                    |       | 0.4        | 0.55      | V        |
|                          |                            | I <sub>O</sub> = 500mA, V <sub>O</sub> = 11V                                    |       | 1          | 1.4       | V        |
| I <sub>lim</sub>         | Current Limit              | Out short to GND                                                                | 550   | 800        | 1100      | mA       |
| I <sub>q3</sub>          | Quiescent Current          | I <sub>O</sub> = 500mA                                                          |       | 10         | 25        | mA       |
| SVR                      | Supply Voltage Rejection   | f = 0.1 to 10kHz, V <sub>O</sub> = 5V                                           | 45    | 55         |           | dB       |
| EN2H on2                 | EN ADJ2 ON                 |                                                                                 | 1.3   |            |           | V        |
| EN2H off2                | EN ADJ2 OFF                |                                                                                 |       |            | 0.5       | V        |
| 400mA HSD SWITCHED       |                            |                                                                                 |       |            |           |          |
| V <sub>dropout</sub>     | Dropout Voltage            | I <sub>O</sub> = 400mA, 9V < V <sub>S</sub> < 16V                               |       | 0.2        | 0.6       | V        |
| I <sub>lim</sub>         | Current Limit              |                                                                                 | 0.45  | 0.65       | 0.8       | A        |
| I <sub>qhsd</sub>        | Quiescent Current          | I <sub>O</sub> = 400mA                                                          |       | 10         | 25        | mA       |
| EN2 on H                 | EN HSD ON                  |                                                                                 | 2.5   |            |           | V        |
| EN2 off H                | EN HSD OFF                 |                                                                                 |       |            | 1.7       | V        |
| EN2 Gap                  | EN HSD ON minus EN ADJ2 ON |                                                                                 |       | 1          |           | V        |

Figure 1. Application circuit.

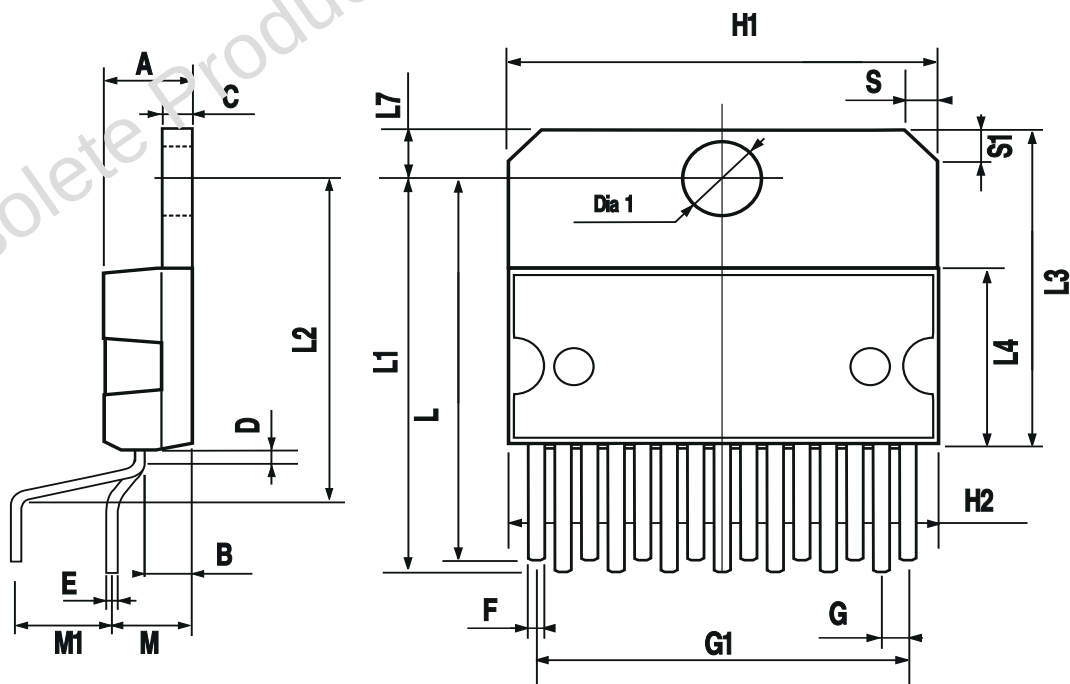


| DIM. | mm    |       |       | inch  |       |       |
|------|-------|-------|-------|-------|-------|-------|
|      | MIN.  | TYP.  | MAX.  | MIN.  | TYP.  | MAX.  |
| A    |       |       | 5     |       |       | 0.197 |
| B    |       |       | 2.65  |       |       | 0.104 |
| C    |       |       | 1.6   |       |       | 0.063 |
| D    |       | 1     |       |       | 0.039 |       |
| E    | 0.49  |       | 0.55  | 0.019 |       | 0.022 |
| F    | 0.66  |       | 0.75  | 0.026 |       | 0.030 |
| G    | 1.02  | 1.27  | 1.52  | 0.040 | 0.050 | 0.060 |
| G1   | 17.53 | 17.78 | 18.03 | 0.690 | 0.700 | 0.710 |
| 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 | 0.870 | 0.886 |
| L2   | 17.65 |       | 18.1  | 0.695 |       | 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   | 4.63  | 5.08  | 5.53  | 0.182 | 0.200 | 0.218 |
| 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



**Multiwatt15 V**



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