

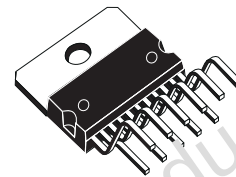


## MULTIFUNCTION VOLTAGE REGULATOR FOR HOME AUDIO

- 4 OUTPUTS:  
12V (1.3A); 12V (0.8A); 8.6V (0.6A); 5.6V (0.25A) STANDBY
- OUT1 12V(a), OUT2 12V(b) AND OUT3 8.6V WITH INDEPENDENT ENABLE CONTROL FOR STAND-BY MODE
- SHORT-CIRCUIT PROTECTION TO GROUND
- THERMAL SHUTDOWN

### DESCRIPTION

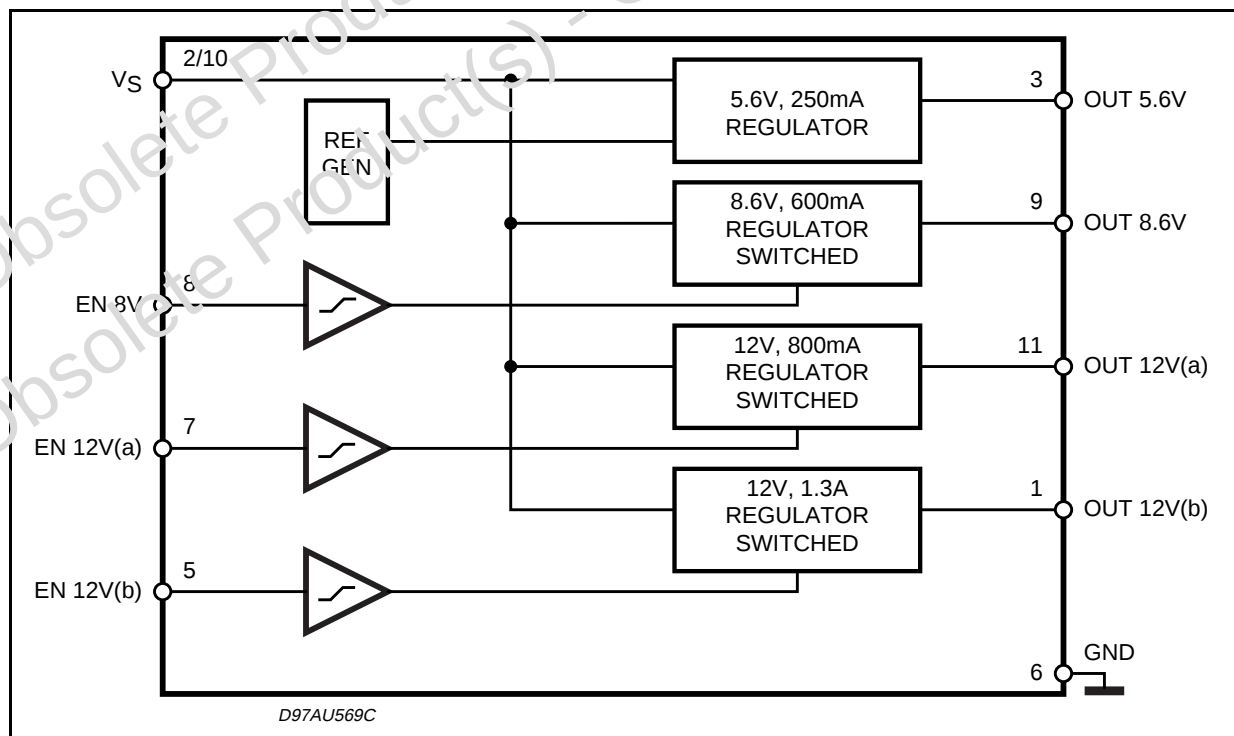
The L4959 is a monolithic Multifunction Voltage Regulator, designed mainly for supplying Home Audio systems. The L4959 contains one unswitched linear 5.6V regulator for Micro, two switched regulators 8.6V and 12V, suitable to feed CD or CD players and LED, Signal Process. An additional 12V regulator for Solenoid Motor an CD\_TRAY Driven is also available.



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ORDERING NUMBER: L4959

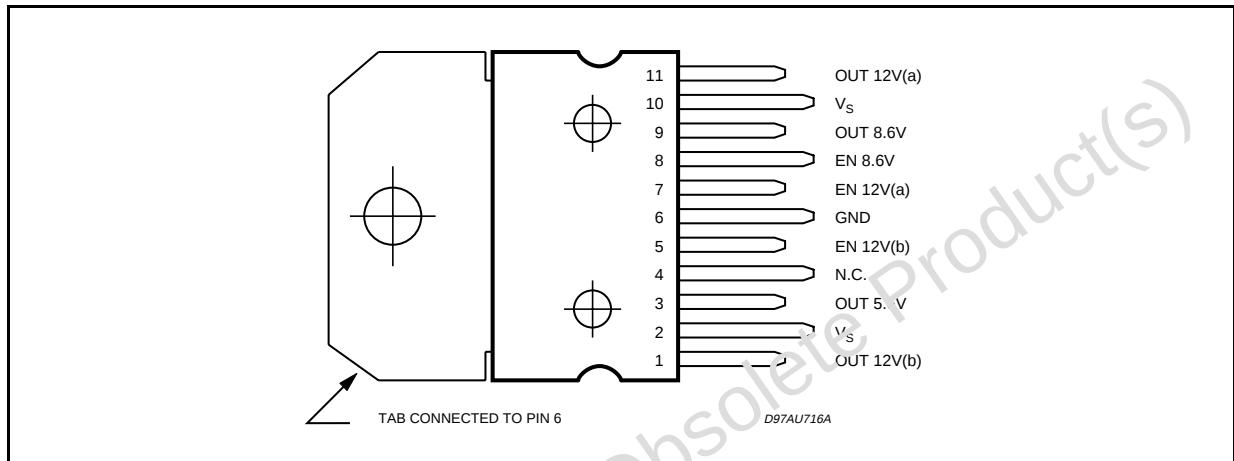
### BLOCK DIAGRAM



## ABSOLUTE MAXIMUM RATINGS

| Symbol    | Parameter                   | Value              | Unit |
|-----------|-----------------------------|--------------------|------|
| $V_S$     | DC Supply Voltage           | 35                 | V    |
| $I_O$     | Output Current              | internally limited |      |
| $T_{op}$  | Operating Temperature Range | 0 to +70           | °C   |
| $T_{stg}$ | Storage Temperature         | −40 to 150         | °C   |

## PIN CONNECTION (Top view)



## PIN DESCRIPTION

| Pin | Pins        | Description                              |
|-----|-------------|------------------------------------------|
| 1   | OUT 12V (b) | 12V/1.3A SWITCHED OUTPUT VOLTAGE         |
| 2   | $V_S$       | Supply Voltage                           |
| 3   | OUT 5.6V    | 5.6V/250mA OUTPUT VOLTAGE                |
| 4   | N.C.        | not connected                            |
| 5   | EN 12V (b)  | Enable 12V/1.3A SWITCHED OUTPUT VOLTAGE  |
| 6   | GND         | Ground                                   |
| 7   | EN 12V (a)  | Enable 12V/0.8A SWITCHED OUTPUT VOLTAGE  |
| 8   | EN 8.6V     | Enable 8.6V/0.6A SWITCHED OUTPUT VOLTAGE |
| 9   | OUT 8.6     | 8.6V/0.6A SWITCHED OUTPUT VOLTAGE        |
| 10  | $V_S$       | Supply Voltage                           |
| 11  | OUT 12V (a) | 12V/0.8A SWITCHED OUTPUT VOLTAGE         |

## QUICK REFERENCE DATA

| Symbol          | Parameter           | Test Condition                             | Typ. | Unit |
|-----------------|---------------------|--------------------------------------------|------|------|
| $V_{out\ 5V}$   | 5V Output Voltage   | $I_O = 125mA$                              | 5.6  | V    |
|                 |                     | $14.4V < V_S < 21.6V$<br>$5mA < I < 0.25A$ | 5.6  | V    |
| $V_{out\ 8V}$   | 8.6V Output Voltage | $I_O = 300mA$                              | 8.6  | V    |
|                 |                     | $14.4V < V_S < 21.6V$<br>$5mA < I < 0.6A$  | 8.6  | V    |
| $V_{out\ 12Va}$ | 12V Output Voltage  | $I_{out} = 400mA$                          | 12   | V    |
|                 |                     | $14.4V < V_S < 21.6V$<br>$5mA < I < 0.8A$  | 12   | V    |
| $V_{out\ 12Vb}$ | 12V Output Voltage  | $I_{out} = 650mA$                          | 12   | V    |
|                 |                     | $14.4V < V_S < 21.6V$<br>$5mA < I < 1.3A$  | 12   | V    |

## THERMAL DATA

| Symbol           | Parameter                        | Value | Unit |
|------------------|----------------------------------|-------|------|
| $R_{th\ j-case}$ | Thermal Resistance Junction-case | 2     | °C/W |

ELECTRICAL CHARACTERISTICS ( $V_S = 18V$ ,  $T_{case} = 25^\circ C$ , unless otherwise specified.)

| Symbol | Parameter                | Test Condition                             | Min. | Typ. | Max. | Unit    |
|--------|--------------------------|--------------------------------------------|------|------|------|---------|
| $V_S$  | Operating Supply Voltage | no load                                    | 15   | 22   | 30   | V       |
|        |                          | loaded (*)                                 | 14.4 | 18   | 21.6 | V       |
| $E_n$  | Output Noise Voltage     | Any reg. supply,<br>$f = 100Hz$ to $20KHz$ |      | 200  | 400  | $\mu V$ |
| $I_q$  | Quiescent Current        |                                            |      | 8    |      | mA      |

## 5.6V/250mA OUTPUT VOLTAGE

|                   |                   |                                           |      |      |     |    |
|-------------------|-------------------|-------------------------------------------|------|------|-----|----|
| $V_{out\ 5V}$     | 5V Output Voltage | $I_O = 125mA$                             | 5.45 |      | 5.9 | V  |
|                   |                   | $14.4V < V_S < 21.6V$<br>$5mA < I < 0.25$ | 5.40 |      | 6   | V  |
| $\Delta V_{line}$ | Line Regulation   | $14.4V < V_S < 21.6V$                     |      | 5    | 50  | mV |
| $\Delta V_{load}$ | Load Regulation   | $5mA < I_O < 250mA$                       |      | 50   | 150 | mV |
| $V_{dropout}$     | Dropout Voltage   | $I_{out} = 250mA$                         |      | 2.05 | 2.7 | V  |
| $I_{lim}$         | Current Limit     | $V_S = 21.6V$                             | 250  | 325  |     | mA |

## 8.6V/0.6A SWITCHED OUTPUT VOLTAGE

|                   |                     |                                        |     |      |     |    |
|-------------------|---------------------|----------------------------------------|-----|------|-----|----|
| $V_{out\ 8V}$     | 8.6V Output Voltage | $I_O = 300mA$                          | 8.4 |      | 9.1 | V  |
|                   |                     | $14.4V < V_S < 21.6V$ $5mA < I < 0.6A$ | 8.3 |      | 9.2 | V  |
| $\Delta V_{line}$ | Line Regulation     | $14.4V < V_S < 21.6V$                  |     | 5    | 50  | mV |
| $\Delta V_{load}$ | Load Regulation     | $5mA < I_O < 0.6A$                     |     | 50   | 350 | mV |
| $V_{dropout}$     | Dropout Voltage     | $I_{out} = 0.6A$                       |     | 2.05 | 2.7 | V  |
| $I_{lim}$         | Current Limit       | $V_S = 21.6V$                          | 0.6 | 0.8  |     | A  |
| SWon              | Switch ON           |                                        |     | 2.31 | 3.5 | V  |
| SW off            | Switch OFF          |                                        | 1.5 | 2.11 |     | V  |
| SW hyst           | Switch Hysteresis   |                                        |     | 200  |     | mV |

## 12V/0.8A SWITCHED OUTPUT VOLTAGE

|                   |                          |                                           |          |      |      |    |
|-------------------|--------------------------|-------------------------------------------|----------|------|------|----|
| $V_{out12Va}$     | 12V Output Voltage       | $I_{out} = 400mA$                         | 11.7     |      | 12.7 | V  |
|                   |                          | $14.4V < V_S < 21.6V$<br>$5mA < I < 0.8A$ | 11.6     |      | 12.8 | V  |
| $\Delta V_{line}$ | Line Regulation          | $14.4V < V_S < 21.6V$                     |          | 10   | 50   | mV |
| $\Delta V_{load}$ | Load Regulation          | $5mA < I_O < 0.8A$                        |          | 100  | 350  | mV |
| $V_{dropout}$     | Dropout Voltage          | $I_{out} = 0.8A$                          |          | 2.13 | 2.7  | V  |
| $I_{lim}$         | Current Limit            | $V_S = 21.6V$                             | 0.8      | 1.1  |      | A  |
| SVR               | Supply Voltage Rejection | $f = 100Hz$<br>$f = 10KHz$                | 55<br>40 | 75   |      | dB |
| SWon              | Switch ON                |                                           |          | 2.31 | 3.5  | V  |
| SW off            | Switch OFF               |                                           | 1.5      | 2.11 |      | V  |
| SW hyst           | Switch Hysteresis        |                                           |          | 200  |      | mV |

## 12V/1.3A SWITCHED OUTPUT VOLTAGE

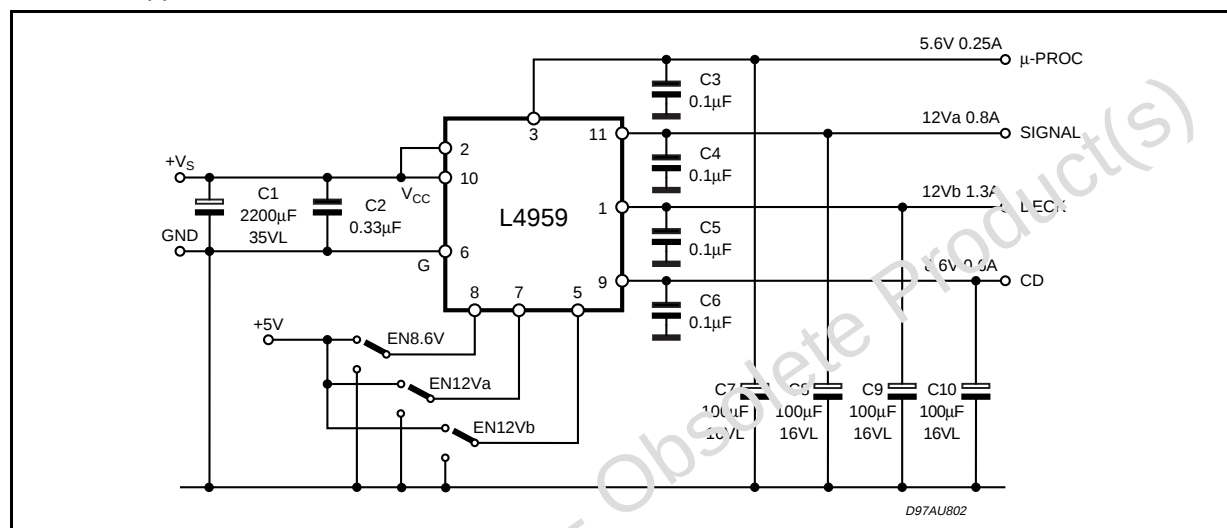
|                   |                    |                                           |      |      |      |    |
|-------------------|--------------------|-------------------------------------------|------|------|------|----|
| $V_{out12Vb}$     | 12V Output Voltage | $I_{out} = 650mA$                         | 11.6 |      | 12.6 | V  |
|                   |                    | $14.4V < V_S < 21.6V$<br>$5mA < I < 1.3A$ | 11.5 |      | 12.7 | V  |
| $\Delta V_{line}$ | Line Regulation    | $14.4V < V_S < 21.6V$                     |      | 10   | 50   | mV |
| $\Delta V_{load}$ | Load Regulation    | $5mA < I_O < 1.3A$                        |      | 200  | 450  | mV |
| $V_{dropout}$     | Dropout Voltage    | $I_{out} = 1.3A$                          |      | 2.15 | 2.7  | V  |
| $I_{lim}$         | Current Limit      | $V_S = 21.6V$                             | 1.3  | 1.7  |      | A  |

## ELECTRICAL CHARACTERISTICS (continued)

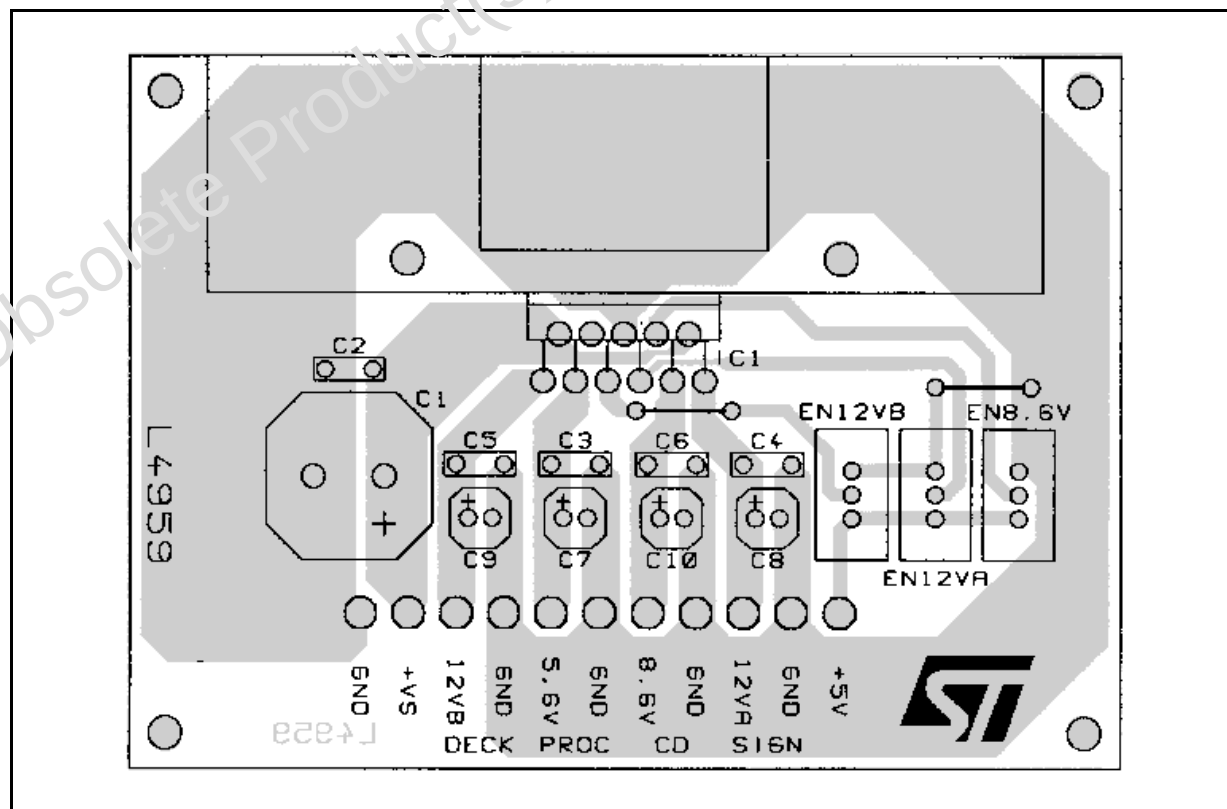
| Symbol  | Parameter                | Test Condition                           | Min.     | Typ. | Max. | Unit |
|---------|--------------------------|------------------------------------------|----------|------|------|------|
| SVR     | Supply Voltage Rejection | $f = 100\text{Hz}$<br>$f = 10\text{KHz}$ | 55<br>40 | 75   |      | dB   |
| SWon    | Switch ON                |                                          |          | 2.31 | 3.5  | V    |
| SW off  | Switch OFF               |                                          | 1.5      | 2.11 |      | V    |
| SW hyst | Switch Hysteresis        |                                          |          | 200  |      | mV   |

(\*) The max value is limited by the power dissipation

**Figure 1:** Application and Test Circuit.

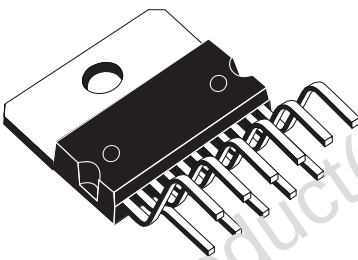


**Figure 2:** PCB and Components layout of the Figure 1.

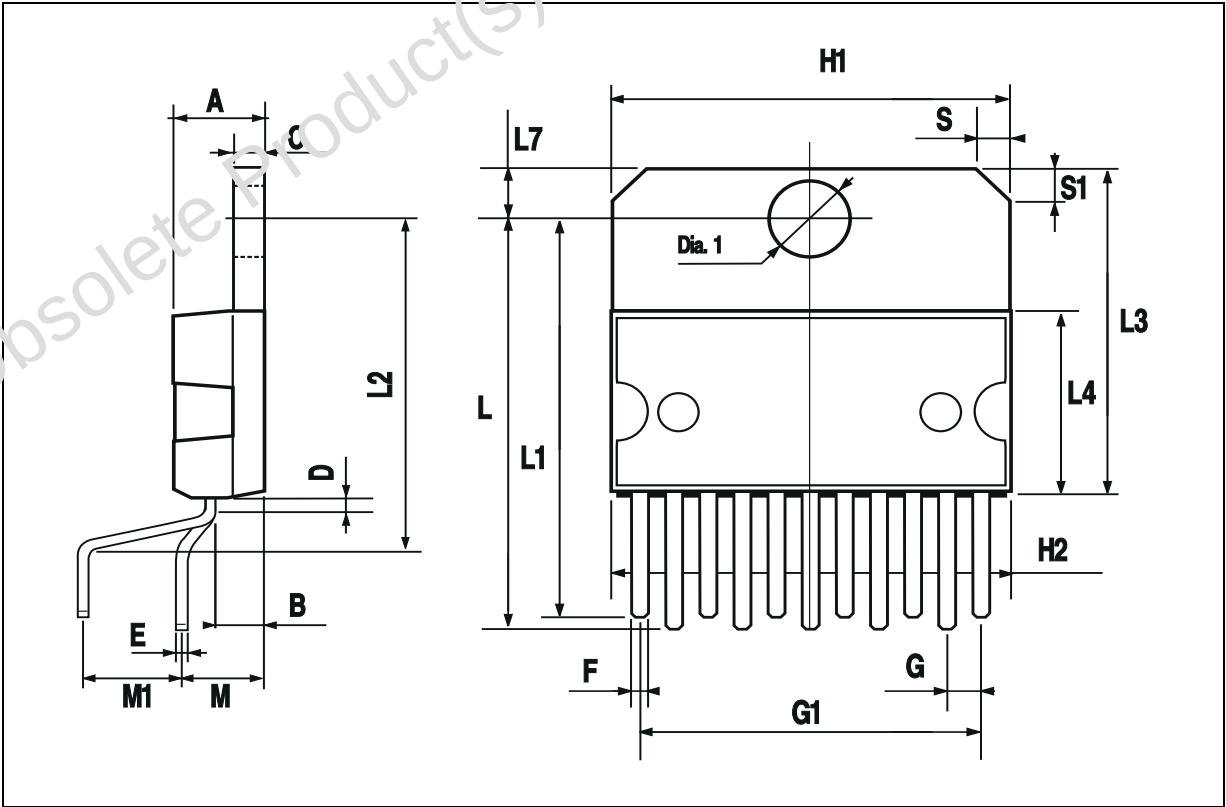


| DIM. | mm    |      |       | inch  |       |       |
|------|-------|------|-------|-------|-------|-------|
|      | MIN.  | TYP. | MAX.  | MIN.  | TYP.  | MAX.  |
| A    |       |      | 5     |       |       | 0.197 |
| B    |       |      | 2.65  |       |       | 0.104 |
| C    |       |      | 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



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