MULTIFUNCTION VOLTAGE REGULATOR FOR CAR RADIO

- **3 OUTPUTS:**
  - 9.2V (500mA);
  - 5V (1A);
  - 5V (100mA)

- **OUT1 (9.2V) AND OUT2 (5V) WITH INDEPENDENT ENABLE CONTROL FOR STANDBY MODE**

- **2A HIGH SIDE DRIVER WITH CLAMPED OUTPUT (16V)**
  - Logic output for:
    - SUPPLY UNDERVOLTAGE (LVW)
    - OVERVOLTAGE (FAULT)
    - THERMAL PROTECTION (FAULT)

- **RESET FUNCTION**

- **IGNITION COMPARATOR**

- **REVERSE BATTERY AND LOAD DUMP PROTECTION**

- **THERMAL SHUTDOWN**

**DESCRIPTION**
The L4953G contains a triple voltage regulator and a power switch. The IC includes a monitoring circuit to warn if a low voltage or no voltage condition is occurring. In stand-by output is active as long as possible even when in thermal shutdown or 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 µP to store data.

**BLOCK DIAGRAM**
## ABSOLUTE MAXIMUM RATINGS

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{\text{SDC}}$</td>
<td>DC Operating Supply Voltage</td>
<td>–0.6 to 28</td>
<td>V</td>
</tr>
<tr>
<td>$V_{\text{STR}}$</td>
<td>Transient Supply Voltage</td>
<td>50</td>
<td>V</td>
</tr>
<tr>
<td>$I_O$</td>
<td>Output Current</td>
<td>internally limited</td>
<td></td>
</tr>
<tr>
<td>$T_{\text{OP}}$</td>
<td>Operating Temperature Range</td>
<td>–40 to 85</td>
<td>°C</td>
</tr>
<tr>
<td>$T_{\text{Tstg}}$</td>
<td>Storage Temperature</td>
<td>–55 to 150</td>
<td>°C</td>
</tr>
</tbody>
</table>

## PIN CONNECTION (Top view)

![Pin Connection Diagram]

- TAB CONNECTED TO PIN 8

## THERMAL DATA

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R_{\text{th j-case}}$</td>
<td>Thermal Resistance Junction-case</td>
<td>Max.</td>
<td>2 °C/W</td>
</tr>
</tbody>
</table>
### ELECTRICAL CHARACTERISTICS

(VS = 14V, Tamb = 25°C, unless otherwise specified.)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Test Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS</td>
<td>Operating Supply Voltage</td>
<td>11</td>
</tr>
<tr>
<td>En</td>
<td>Output Noise Voltage</td>
<td>Any reg. supply, f = 100Hz to 200KHz</td>
</tr>
</tbody>
</table>

#### 5V STAND-BY OUTPUT VOLTAGE

| VS<sub>st-by</sub> | Stand-by Output Voltage | 4.75 | 5 | 5.25 | V |
| ΔV<sub>line</sub> | Line Regulation | 11V < VS < 16V | 5 | 50 | mV |
| ΔV<sub>load</sub> | Load Regulation | 5mA < I<sub>out</sub> < 100mA | 12 | 100 | mV |
| V<sub>dropout</sub> | Dropout Voltage | I<sub>out</sub> = 100mA, VS = 5.5V | 0.2 | 0.6 | V |
| I<sub>qst-by</sub> | Quiescent Current @ Stand-by | I<sub>Load</sub> = 5mA | 0.3 | 0.65 | mA |

#### 5V/1000mA SWITCHED OUTPUT VOLTAGE

| VS<sub>out5</sub> | 5V Output Voltage | no load | 4.75 | 5 | 5.25 | V |
| ΔV<sub>line</sub> | Line Regulation | 7V < VS < 18V | 5 | 50 | mV |
| ΔV<sub>load</sub> | Load Regulation | 5mA < I<sub>out</sub> < 1A | 12 | 50 | mV |
| V<sub>dropout</sub> | Dropout Voltage | I<sub>out</sub> = 1A, VS = 5.5V | 1 | 1.5 | V |
| I<sub>q</sub> | Quiescent Current | 75mA < I<sub>out</sub> < 1A | 30 | 100 | mA |
| I<sub>lim</sub> | Current Limit | Output Shorted to GND | 1 | 1.3 | A |
| SW<sub>on</sub> | Switch ON | 3.5 | V |
| SW<sub>off</sub> | Switch OFF | 1.5 | V |
| SW hyst | Switch Hysteresis | 100 | 200 | 350 | mA |
| R<sub>in</sub> | Input Impedance | 10 | 40 | KΩ |

#### 9.2V/500mA SWITCHED OUTPUT VOLTAGE

| VS<sub>out9.2</sub> | 9.2V Output Voltage | no load | 9.2±5% | V |
| ΔV<sub>line</sub> | Line Regulation | 11V < VS < 18V | 5 | 50 | mV |
| ΔV<sub>load</sub> | Load Regulation | 5mA < I<sub>out</sub> < 500mA | 12 | 50 | mV |
| V<sub>dropout</sub> | Dropout Voltage | 5.5V < VS < 9.2V, I<sub>out</sub> = 500mA | 0.4 | 0.9 | V |
| I<sub>q</sub> | Quiescent Current | 50mA < I<sub>out</sub> < 500mA | 10 | 25 | mA |
| I<sub>lim</sub> | Current Limit | Output Shorted to GND | 500 | 600 | mA |
| SVR | Supply Voltage Rejection | f = 3KHz | 45 | 75 | dB |
| SW<sub>on</sub> | Switch ON | 3.5 | V |
| SW<sub>off</sub> | Switch OFF | 1.5 | V |
| SW hyst | Switch Hysteresis | 100 | 200 | 500 | mA |
| R<sub>in</sub> | Input Impedance | 10 | 40 | KΩ |

#### HIGH SIDE DRIVER WITH CLAMPED OUTPUT (16V)

| VS<sub>out16</sub> | Max. Output Voltage | VS = 18V | 14.6 | 16.2 | V |
| I<sub>O</sub> | Output Continuous Current | VS = 16V | 2 | A |
| V<sub>dropout</sub> | Dropout Voltage | 5V < V<sub>in</sub> < 15V, I<sub>out</sub> = 2A | 0.5 | 1 | V |
| SW<sub>on</sub> | Switch ON | 3.5 | V |
| SW<sub>off</sub> | Switch OFF | 1.5 | V |
| SW hyst | Switch Hysteresis | 100 | 200 | 500 | mA |
| R<sub>in</sub> | Input Impedance | 10 | 40 | KΩ |
### ELECTRICAL CHARACTERISTICS (continued)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Test Condition</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>TH_{fault}</td>
<td>Fault Threshold</td>
<td></td>
<td>7</td>
<td>8.5</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>HYST_{fault}</td>
<td>Fault Threshold Hysteresis</td>
<td></td>
<td>100</td>
<td>200</td>
<td>400</td>
<td>mV</td>
</tr>
<tr>
<td>OUT_{fault}</td>
<td>Fault Output Voltage</td>
<td></td>
<td>1.5</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I_{leak}</td>
<td>Fault Leakage Current</td>
<td></td>
<td>50</td>
<td>μA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>THON_{reset}</td>
<td>Reset ON Threshold</td>
<td>MIN @ V_{MEM} = 4.75V MAX @ V_{MEM} = 5.25V</td>
<td>0.938</td>
<td>0.97</td>
<td>Vst-by</td>
<td></td>
</tr>
<tr>
<td>THOFF_{reset}</td>
<td>Reset OFF Threshold</td>
<td></td>
<td>0.97</td>
<td>0.99</td>
<td>Vst-by</td>
<td></td>
</tr>
<tr>
<td>HYST_{reset}</td>
<td>Reset Threshold Hysteresis</td>
<td></td>
<td>75</td>
<td>175</td>
<td>300</td>
<td>mV</td>
</tr>
<tr>
<td>OUT_{reset}</td>
<td>Reset Output Voltage</td>
<td>I_{LOAD} = 2mA</td>
<td>1.5</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I_{leak}</td>
<td>Reset Leakage Current</td>
<td></td>
<td>50</td>
<td>μA</td>
<td></td>
<td></td>
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<tr>
<td>TH_{ign}</td>
<td>Ign Comparator Positive Threshold</td>
<td></td>
<td>5.5</td>
<td>6</td>
<td>7.5</td>
<td>V</td>
</tr>
<tr>
<td>HYST_{ign}</td>
<td>Ign Comparator Threshold Hysteresis</td>
<td></td>
<td>100</td>
<td>300</td>
<td>500</td>
<td>mV</td>
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<tr>
<td>IGN_{high}</td>
<td>Ignition Comparator Output High</td>
<td></td>
<td>3.5</td>
<td>Vst-by</td>
<td>V</td>
<td></td>
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<tr>
<td>IGN_{low}</td>
<td>Ignition Comparator Output Low</td>
<td></td>
<td>-0.5</td>
<td>1.5</td>
<td>V</td>
<td></td>
</tr>
</tbody>
</table>
### OUTLINE AND MECHANICAL DATA

- **Dimensions (mm and inch):**

<table>
<thead>
<tr>
<th>DIM.</th>
<th>MIN.</th>
<th>TYP.</th>
<th>MAX.</th>
<th>MIN.</th>
<th>TYP.</th>
<th>MAX.</th>
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</thead>
<tbody>
<tr>
<td>A5</td>
<td>0.197</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>B</td>
<td>2.65</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>1.6</td>
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<tr>
<td>D</td>
<td>1</td>
<td></td>
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<td>0.039</td>
<td></td>
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</tr>
<tr>
<td>E</td>
<td>0.49</td>
<td>0.55</td>
<td>0.019</td>
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<td>0.022</td>
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<tr>
<td>F</td>
<td>0.66</td>
<td>0.75</td>
<td>0.026</td>
<td></td>
<td>0.030</td>
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</tr>
<tr>
<td>G</td>
<td>1.02</td>
<td>1.27</td>
<td>1.52</td>
<td>0.040</td>
<td>0.050</td>
<td>0.060</td>
</tr>
<tr>
<td>G1</td>
<td>17.53</td>
<td>17.78</td>
<td>18.03</td>
<td>0.690</td>
<td>0.700</td>
<td>0.710</td>
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<tr>
<td>H1</td>
<td>19.6</td>
<td></td>
<td></td>
<td>0.772</td>
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<tr>
<td>H2</td>
<td>21.9</td>
<td>22.2</td>
<td>22.5</td>
<td>0.862</td>
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</tr>
<tr>
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<td>21.7</td>
<td>22.1</td>
<td>22.5</td>
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<td>0.886</td>
</tr>
<tr>
<td>L2</td>
<td>17.65</td>
<td></td>
<td>18.1</td>
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<td></td>
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<tr>
<td>L3</td>
<td>17.25</td>
<td>17.5</td>
<td>17.75</td>
<td>0.679</td>
<td>0.689</td>
<td>0.699</td>
</tr>
<tr>
<td>L4</td>
<td>10.3</td>
<td>10.7</td>
<td>10.9</td>
<td>0.406</td>
<td>0.421</td>
<td>0.429</td>
</tr>
<tr>
<td>L7</td>
<td>2.65</td>
<td></td>
<td>2.9</td>
<td>0.104</td>
<td></td>
<td>0.114</td>
</tr>
<tr>
<td>M</td>
<td>4.25</td>
<td>4.55</td>
<td>4.85</td>
<td>0.167</td>
<td>0.179</td>
<td>0.191</td>
</tr>
<tr>
<td>M1</td>
<td>4.73</td>
<td>5.08</td>
<td>5.43</td>
<td>0.186</td>
<td>0.200</td>
<td>0.214</td>
</tr>
<tr>
<td>S</td>
<td>1.9</td>
<td></td>
<td>2.6</td>
<td>0.075</td>
<td></td>
<td>0.102</td>
</tr>
<tr>
<td>S1</td>
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<td></td>
<td>2.6</td>
<td>0.075</td>
<td></td>
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</tr>
<tr>
<td>Dia1</td>
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<td>3.85</td>
<td>0.144</td>
<td></td>
<td>0.152</td>
</tr>
</tbody>
</table>

- **Multiwatt15 (Vertical):**

![Multiwatt15 Diagram]