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LV5693P

Bi-CMOS IC

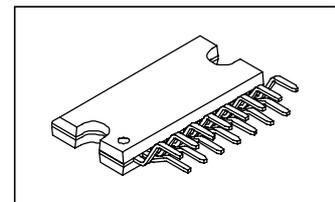
System Power Supply IC for Automotive Infotainment Multiple Output Linear Voltage Regulator

Overview

The LV5693P is a multiple output linear regulator IC, which allows reduction of quiescent current. The LV5693P is specifically designed to address automotive infotainment systems power supply requirements. The LV5693P integrates 5 linear regulator outputs, a linear regulator controller which gives USB supply with external P-channel FET, a high side power switch, over current protection, overvoltage protection and thermal shutdown circuitry.

Function

- Five channel regulator and one channel P-FET pre-driver (for USB-power)
 - For VDD: V_{OUT} is 5.7V, I_{Omax} is 300mA
 - For DSP: V_{OUT} is 3.3V, I_{Omax} is 300mA
 - For CD: V_{OUT} is 8.0V, I_{Omax} is 1300mA
 - For illumination: V_{OUT} is 8.4V, I_{Omax} is 500mA
 - For audio systems: V_{OUT} is 8.4V, I_{Omax} is 500mA
 - For USB (controller) :
 - V_{OUT} is flexible (configurable with external resistor),
 - I_{Omax} is 1000mA
- High side switch: Voltage difference between input and output is 0.5V, I_{Omax} is 500mA
- Over current protector
- Overvoltage protector (Without VDD-OUT) Clamp voltage is 21V (typical)
- Thermal Shut down 175°C (typical)
- Quiescent current 50µA (Typ. when only VDD is in operation)



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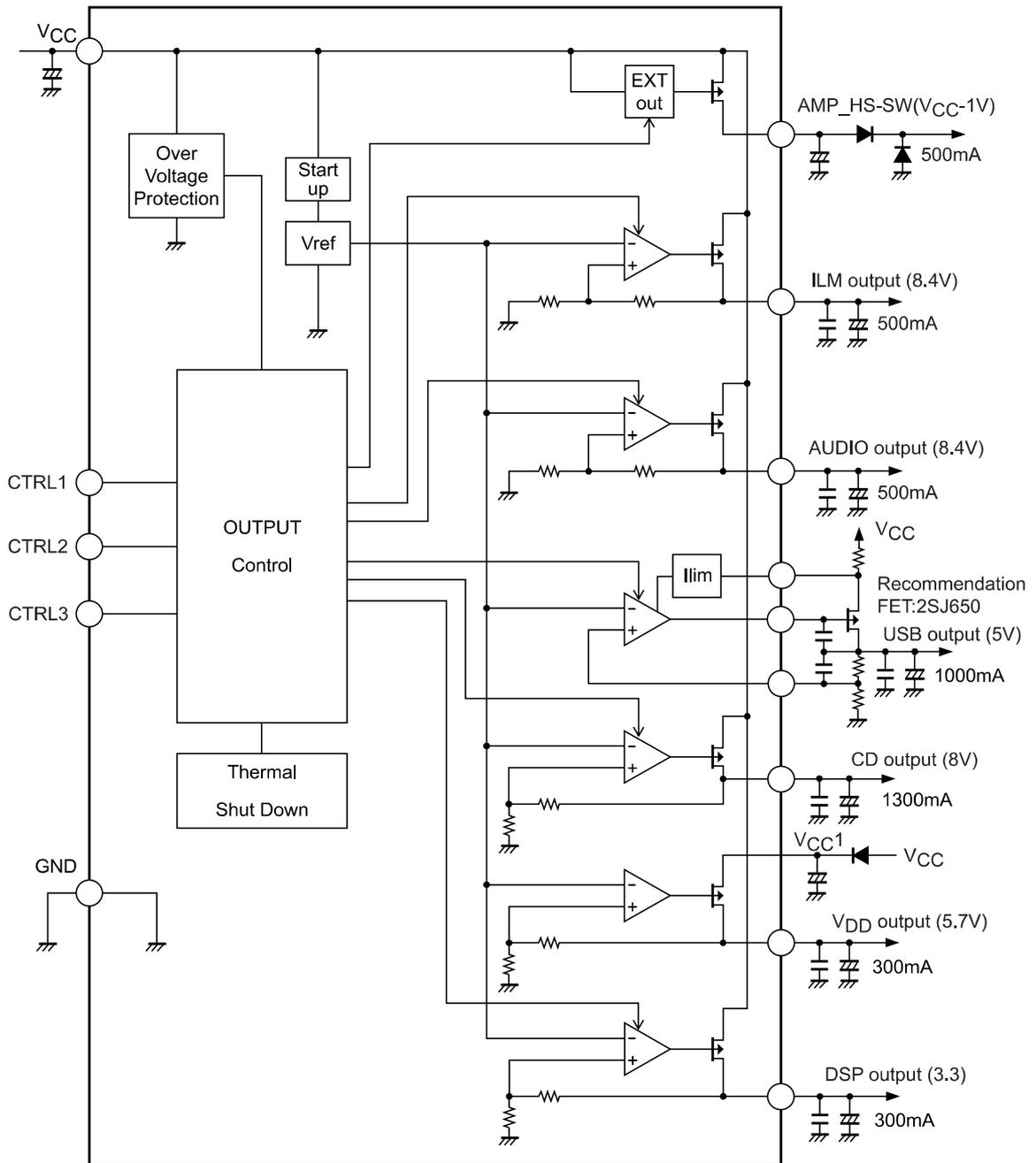
(Warning) The protector functions only improve the IC's tolerance and they do not guarantee the safety of the IC if used under the conditions out of safety range or ratings. Use of the IC such as use under over current protection range or thermal shutdown state may degrade the IC's reliability and eventually damage the IC.

ORDERING INFORMATION

See detailed ordering and shipping information on page 16 of this data sheet.

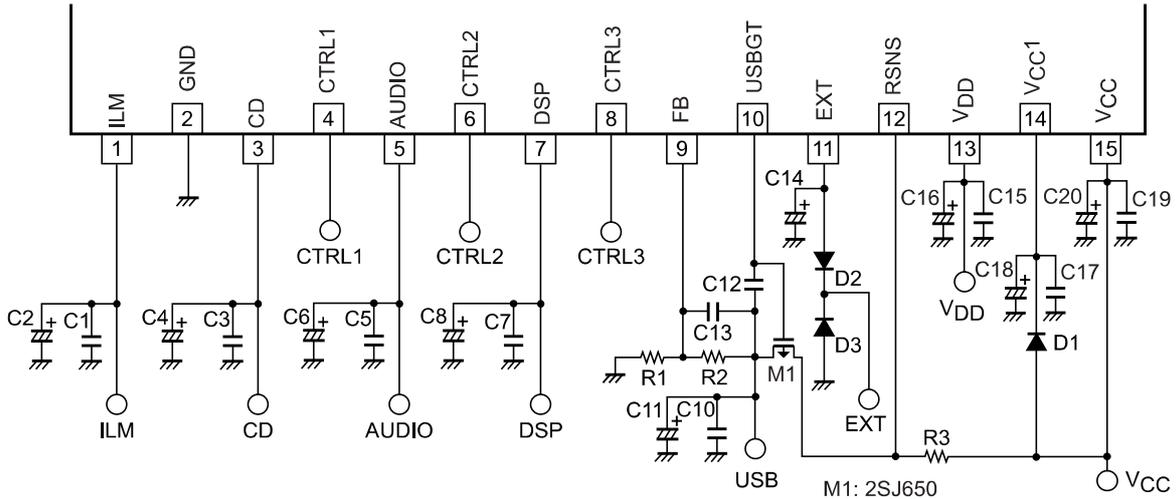
LV5693P

● Block Diagram



LV5693P

Recommended Operation Circuit



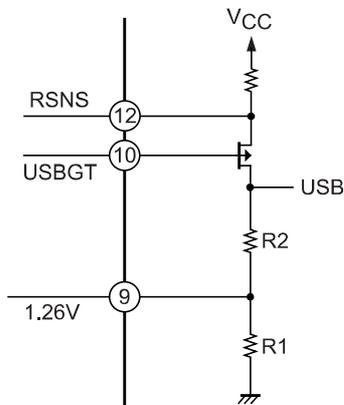
Peripheral parts list

| Name of part | Description | Recommended value | Remarks |
|--------------------------|---------------------------------------|--|---|
| C2, C4, C6, C8, C11, C16 | Output stabilization capacitor | 10 μ F or more* | Electrolytic capacitor |
| C1, C3, C5, C7, C10, C15 | Output stabilization capacitor | 0.22 μ F or more* | Ceramic capacitor |
| C12, C13 | Capacity for phase amends | C12=1000pF (C13=0pF: TBD) | Ceramic capacitor |
| C18, C20 | Power supply bypass capacitor | 100 μ F or more | These capacitors must be placed near the V _{CC} and GND pins. |
| C17, C19 | Oscillation prevention capacitor | 0.22 μ F or more | |
| C14 | EXT output stabilization capacitor | 2.2 μ F or more | |
| R1, R2 | Resistor for ILM voltage adjustment | R1/R2=9.1k Ω /27k Ω for 5.0V | A resistor with resistance accuracy as low as less than $\pm 1\%$ must be used. |
| R3 | Resistor for AUDIO voltage setting | 0.1 Ω for I _{peak} =3A | Panasonic ERJB1CFR10U(Reference) |
| M1 | USB output Pch-FET | 2SJ650 | |
| D1 | Diode for prevention of backflow | | |
| D2, D3 | Diode for internal element protection | SB1003M3 | |

note)The circuit diagram and the values are only tentative which are subject to change.

* : Make sure that the capacitors of the output pins are 10 μ F or higher and ESR is 10 Ω or lower in total and temperature characteristics and accuracy are taken into consideration. Also the E-cap should have good high frequency characteristics.

• USB output voltage setting method



Formula for USB voltage calculation

$$USB = \frac{1.26[V]}{R_1} \times R_2 + 1.26[V]$$

$$\frac{R_2}{R_1} = \frac{(USB - 1.26)}{1.26}$$

Please design so that the ratio of R1 and R2 may fill the above-mentioned expression for the set USB voltage.

$$\frac{R_2}{R_1} = \frac{(5.0 - 1.26)}{1.26} \cong 2.968$$

$$\frac{R_2}{R_1} = \frac{27k\Omega}{9.1k\Omega} \cong 2.967$$

The FB voltage is determined by the internal band gap voltage of the IC (typ = 1.26V)

$$USB = 1.26V \times 2.967 + 1.26V \cong 4.998V$$