

STEREO CASSETTE PLAYER AND MOTOR SPEED CONTROLLER

- WIDE OPERATING SUPPLY VOLTAGE (1.8V to 6V)
- HIGH OUTPUT POWER (30mW/32Ω/3V)
- LOW DISTORTION DC VOLUME CONTROL
- NO BOUCHEROT CELL
- LOW QUIESCENT CURRENT (15mA)
- NO INPUT CAPACITORS FOR PREAMPLIFIERS
- LOW MOTOR REFERENCE VOLTAGE (200mV)

DESCRIPTION

The TDA7285 is a monolithic integrated circuit designed for the portable players market and assembled in a plastic DIP20 and SO20. The internal functions are: preamplifier, DC volume con-

BLOCK DIAGRAM



trol, headphone driver and motor speed controller.



PIN CONNECTION (Top view)



ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|-----------------------------------|---|------------|------|
| Vs | Supply Voltage | 8 | V |
| I _{Omax} | Maximum Output Current | 70 | mA |
| I _{m max} | Maximum Motor Current | 700 | mA |
| P _{tot} | Total Power Dissipation T _{amb} = 90°C | 0.9 | W |
| T _{op} | Operating Temperature | -20 to +70 | °C |
| T _{stg} , T _j | Storage and Junction Temperature | -40 to 150 | °C |

THERMAL DATA

| Symbol | Description | SO20 | DIP20 | Unit |
|-----------|-------------------------------------|------|-------|------|
| Rth j-amb | Thermal Resistance Junction-ambient | 150 | 100 | °C/W |

DC CHARACTERISTICS ($T_{amb} = 25^{\circ}C$; $V_S = 3V$; $R_L = 32\Omega$ (Headphone) and $R_L = 10K\Omega$ (Preamplifier); $V_i = 0$; VOL. Control = V_{ref}).

| Terminal No | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|-----------------|---|-----|-----|-----|-----|-----|-----|---|-----|----|-----|----|----|-----|-----|-----|-----|-----|-----|-----|
| Term. Volt. (V) | 0 | 1.5 | 1.5 | 1.5 | 1.5 | 2.7 | 1.4 | 0 | 2.8 | 0 | 1.6 | 3 | 3 | 1.4 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |





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ELECTRICAL CHARACTERISTICS (V_S = 3V; R_L = 32Ω , Vol. Control = 2/3 V_{ref (pin 20)}; T_{amb} = 25° C; f = 1KHz; unless otherwise specified

| Symbol | Parameter | Test Condition | Min. | Тур. | Max. | Unit |
|----------------|-------------------------------|----------------|------|------|------|------|
| Vs | Supply Range | | 1.8 | | 6 | V |
| l _d | Total Quiescent Drain Current | | | 15 | 22 | mA |

PLAYBACKAMPLIFIER

| G _{vo} | Open Loop Gain | | | 70 | | dB |
|-----------------|---------------------------|---|-----|------|------|----|
| Gv | Close Loop Gain | | | 33 | | dB |
| Vo | Output Voltage | THD = 1% | 600 | 750 | | mV |
| THD | Total Harmonic Distortion | V _O = 330mVrms | | 0.05 | 0.25 | % |
| I _b | Bias Current | | | 3 | | μA |
| Ct | Cross Talk | $R_S = 2.2K\Omega; V_O = 330mVrms$ | | 74 | | dB |
| e _n | Total Input Noise | $R_S = 2.2K\Omega$; B = 22Hz to 22KHz | | 1.2 | | μV |
| SVR1 | Ripple Rejection | $R_{S} = 2.2K\Omega$; Vr = 100mVrms f = 100Hz; C _{SVR} = 100µF | | 50 | | dB |

HEADPHONE DRIVER

| V _{DC} | Output DC Voltage | | | 1.4 | | V |
|-----------------|---------------------------|--|----|-----|---|----|
| Po | Output Power | THD = 10% | 20 | 30 | | mW |
| P ₀₁ | Transient Output Power | THD = 10% R _L = 16Ω | | 50 | | mW |
| Gv | Close Loop Gain | $P_0 = 5mW$ | | 31 | | dB |
| | Volume Control range | | 66 | 75 | | dB |
| THD | Total Harmonic Distortion | $P_0 = 5mW$ | | 0.3 | 1 | % |
| Ct | Cross Talk | $P_0 = 5mW; R_S = 10K\Omega$ | | 50 | | dB |
| SVR2 | Ripple Rejection | $R_{S} = 600\Omega; Vr = 100mV$ f = 100Hz; $C_{SVR} = 100\mu F$ | | 47 | | dB |

MOTOR SPEED CONTROL

| V _{ref} | Motor Reference Voltage (pin 12) | | 0.18 | 0.20 | 0.22 | V |
|--|---|--|------|-------|------|------|
| К | Shunt Ratio | I _m = 100mA | 45 | 50 | 55 | - |
| V _{sat} | Residual Voltage | I _m = 100mA | | 0.13 | 0.30 | V |
| $\frac{\Delta V_{\text{ref}}}{V_{\text{ref}}} / \Delta V_{\text{S}}$ | Line Regulation | I _m = 100mA; V _S = 1.8 to 6V | | 0.20 | 0.8 | %/V |
| $\frac{\Delta K}{K} \Delta V_{S}$ | Voltage Characteristics of Shunt Ratio | I _m = 100mA; V _S = 1.8 to 6V | | 0.80 | 3 | %/V |
| $\frac{\Delta V_{\text{ref}}}{V} / \Delta I_{\text{m}}$ | Load Regulation | I _m = 30 to 200mA | | 0.015 | 0.08 | %/mA |
| $\frac{\underline{\lambda}^{\text{rR}}}{K} / \Delta I_{\text{m}}$ | Current Characteristics of Shunt Ratio | I _m = 30 to 200mA | | 0.03 | 0.1 | %/mA |
| $\frac{\Delta V_{ref}}{V_{ref}} / \Delta T_{amb}$ | Temperature Characteristics of Reference Voltage | $I_m = 100mA$ $T_{amb} = -20$ to +60°C | | 0.04 | | %/°C |
| $\frac{\Delta K}{K} / \Delta T_{amb}$ | Temperature Characteristics of Shunt Ratio | $I_m = 100mA$ $T_{amb} = -20 \text{ to } +60^{\circ}\text{C}$ | | 0.02 | | %/°C |













Figure 3: Quiescent Drain Current vs. Supply Voltage

Figure 5: Closed Loop Gain vs. Frequency (PREAMPLIFIER)









Figure 4: Reference voltage V_S/2 (pin 20) vs.



Figure 8: Quiescent Output Voltage vs. Supply Voltage (DRIVER)











Figure 13: Supply Voltage Rejection vs. Frequency (DRIVER









Figure 14: Volume Control (0dB = 10mW; $V_S = 3V$; $R_{VOL} = 50K\Omega$; $R_L = 32\Omega$; f = 1KHz) (DRIVER)



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Figure 15: Reference Voltage (Pin 12) vs. Supply Voltage (MOTOR)



Figure 17: Sunt Ratio vs. Load Current (MOTOR)







Figure 16: Shunt Ratio vs. Supply Voltage (MO-TOR)



Figure 18: Saturation Voltage vs. Load Current (MOTOR)



Figure 20: Speed Variations vs. Motor Current (MOTOR)





APPLICATION INFORMATION

Figure 21.



$$E_{g} = R_{T} I_{d} + I_{M} \left(\frac{R_{T}}{K} - R_{M} \right) + V_{ref}$$

$$\left[1 + \frac{R_{b}}{R_{S}} + \frac{R_{T}}{R_{S}} \left(1 + \frac{1}{K} \right) \right]$$

 $R_{\rm S}$ has to be adjusted so that the applied voltage $V_{\rm M}$ is suitable for a given motor, the speed is then linearly adjustable varing $R_{\rm B}.$

The value R_T is calculated so that

 $R_{T (max.)} > K_{(min.)} * R_{M (min.)}$

if R_{T (max.)} > K * R_M, instability may occur.

The values of C15 (4.7 μ F typ.) and C14 (1 μ F typ.) depend on the type of motor used. C15 adjusts WOW and flutter of the system. C14 suppresses motor spikes.

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| ЫМ | | mm | | inch | | | | | |
|----|----------|-------|-------|-------|-------|-------|--|--|--|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. | | | |
| А | | | 2.65 | | | 0.104 | | | |
| a1 | 0.1 | | 0.3 | 0.004 | | 0.012 | | | |
| a2 | | | 2.45 | | | 0.096 | | | |
| b | 0.35 | | 0.49 | 0.014 | | 0.019 | | | |
| b1 | 0.23 | | 0.32 | 0.009 | | 0.013 | | | |
| С | | 0.5 | | | 0.020 | | | | |
| c1 | | | 45 (| typ.) | | | | | |
| D | 12.6 | | 13.0 | 0.496 | | 0.512 | | | |
| E | 10 | | 10.65 | 0.394 | | 0.419 | | | |
| е | | 1.27 | | | 0.050 | | | | |
| e3 | | 11.43 | | | 0.450 | | | | |
| F | 7.4 | | 7.6 | 0.291 | | 0.299 | | | |
| L | 0.5 | | 1.27 | 0.020 | | 0.050 | | | |
| М | | | 0.75 | | | 0.030 | | | |
| S | 8 (max.) | | | | | | | | |

SO20 PACKAGE MECHANICAL DATA



DIP20 PACKAGE MECHANICAL DATA

| DIM | | mm | | inch | | | | | |
|-----|-------|-------|------|-------|-------|-------|--|--|--|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. | | | |
| a1 | 0.254 | | | 0.010 | | | | | |
| В | 1.39 | | 1.65 | 0.055 | | 0.065 | | | |
| b | | 0.45 | | | 0.018 | | | | |
| b1 | | 0.25 | | | 0.010 | | | | |
| D | | | 25.4 | | | 1.000 | | | |
| E | | 8.5 | | | 0.335 | | | | |
| е | | 2.54 | | | 0.100 | | | | |
| e3 | | 22.86 | | | 0.900 | | | | |
| F | | | 7.1 | | | 0.280 | | | |
| I | | | 3.93 | | | 0.155 | | | |
| L | | 3.3 | | | 0.130 | | | | |
| Z | | | 1.34 | | | 0.053 | | | |



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