

Dual common-mode rejection differential line receiver

TDA8577

FEATURES

- Excellent common-mode rejection, up to high frequencies
- Elimination of source resistance dependency in the common-mode rejection
- Few external components
- High supply voltage ripple rejection
- Low noise
- Low distortion
- All pins protected against electrostatic discharge
- AC and DC short-circuit safe to ground and V_{CC}
- Fast DC settling.

GENERAL DESCRIPTION

The TDA8577 is a two channel differential amplifier with 0 dB gain and low distortion. The device has been primarily developed for car radio applications where long connections between signal sources and amplifiers (or boosters) are necessary and where ground noise has to be eliminated. The device is intended to be used to receive line inputs in audio applications that require a high level of common-mode rejection. The device is contained in a 9-pin single in-line package.

QUICK REFERENCE DATA

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|----------|---------------------------------|------------------|------|------|------|------------|
| V_{CC} | supply voltage | | 5.0 | 8.5 | 18 | V |
| I_{CC} | supply current | $V_{CC} = 8.5$ | – | 11 | 14 | mA |
| G_v | voltage gain | | –0.5 | 0 | +0.5 | dB |
| SVRR | supply voltage ripple rejection | | 55 | 60 | – | dB |
| V_{no} | noise output voltage | | – | 3.7 | 5.0 | μV |
| $ Z_i $ | input impedance | | 100 | 240 | – | k Ω |
| CMRR | common-mode rejection ratio | $R_s = 0 \Omega$ | – | 80 | – | dB |

ORDERING INFORMATION

| EXTENDED TYPE NUMBER | PACKAGE | | | |
|----------------------|---------|--------------|----------|--------|
| | PINS | PIN POSITION | MATERIAL | CODE |
| TDA8577 | 9 | SIL9 | plastic | SOT142 |

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BLOCK DIAGRAM

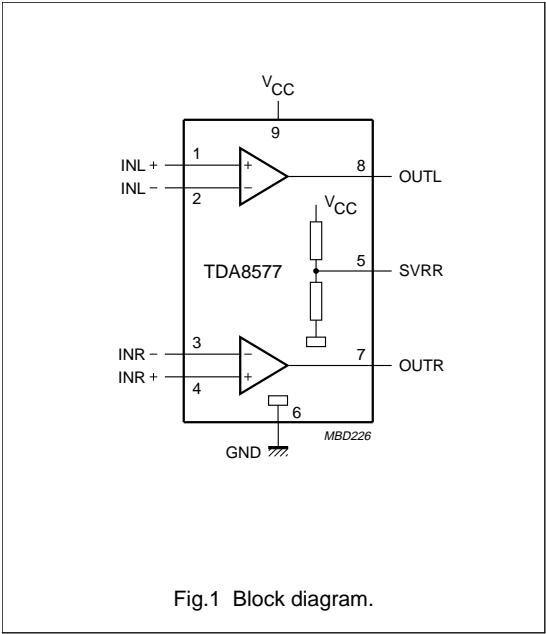


Fig.1 Block diagram.

FUNCTIONAL DESCRIPTION

The TDA8577 contains two identical differential amplifiers with a voltage gain of 0 dB. The device is intended to receive line input signals for audio applications. The TDA8577 has a very high level of common-mode rejection and thus eliminates ground noise. The common-mode rejection remains constant up to high frequencies (the amplifier gain is fixed at 0 dB). The inputs have a high input impedance. The output stage is a class AB stage with a low output impedance. For a large common-mode rejection, also at low frequencies, an electrolytic capacitor connected to the negative input is advised. Because the input impedance is relatively high, this results in a large settling time of the DC input voltage. Therefore a quick-charge circuit is included to charge the input capacitor within 0.2 seconds.

All input and output pins are protected against high electrostatic discharge conditions (4000 V, 150 pF, 150 Ω).

PINNING

| SYMBOL | PIN | DESCRIPTION |
|--------|-----|----------------------|
| INL+ | 1 | positive input left |
| INL- | 2 | negative input left |
| INR- | 3 | negative input right |
| INR+ | 4 | positive input right |
| SVRR | 5 | half supply voltage |
| GND | 6 | ground |
| OTR | 7 | output right |
| OUTL | 8 | output left |
| VCC | 9 | supply voltage |

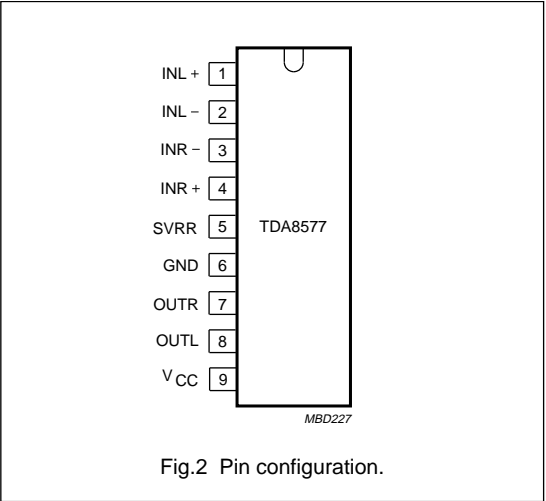


Fig.2 Pin configuration.

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TDA8577**LIMITING VALUES**

In accordance with the Absolute Maximum Rating System (IEC 134).

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|------------------|--------------------------------------|------------|------|------|------|
| V _{CC} | supply voltage | operating | – | 18 | V |
| I _{ORM} | repetitive peak output current | | – | 40 | mA |
| V _{sc} | AC and DC short-circuit safe voltage | | – | 18 | V |
| T _{stg} | storage temperature | | –55 | +150 | °C |
| T _{amb} | operating ambient temperature | | –40 | +85 | °C |
| T _j | maximum junction temperature | | – | +150 | °C |

THERMAL RESISTANCE

| SYMBOL | PARAMETER | THERMAL RESISTANCE |
|---------------------|--------------------------------------|--------------------|
| R _{th j-a} | from junction to ambient in free air | 80 K/W |

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CHARACTERISTICS

$V_{CC} = 8.5 \text{ V}$; $T_{amb} = 25 \text{ }^{\circ}\text{C}$; $f = 1 \text{ kHz}$; measured in test circuit of Fig.3; unless otherwise specified.

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|--------------------|---|---|------|------|------|------------------|
| V_{CC} | supply voltage | | 5.0 | 8.5 | 18 | V |
| I_{CC} | supply current | | — | 11 | 14 | mA |
| V_O | DC output voltage | note 1 | — | 4.3 | — | V |
| t_{set} | DC input voltage settling time | | — | 0.2 | — | s |
| G_v | voltage gain | | −0.5 | 0 | +0.5 | dB |
| α_{CS} | channel separation | $R_s = 5 \text{ k}\Omega$ | 70 | 80 | — | dB |
| $ \Delta G_v $ | channel unbalance | | — | — | 0.5 | dB |
| f_L | low frequency roll-off | −1 dB; note 2 | 20 | — | — | Hz |
| f_H | high frequency roll-off | −1 dB | 20 | — | — | kHz |
| $ Z_i $ | input impedance | | 100 | 240 | — | $\text{k}\Omega$ |
| $ Z_o $ | output impedance | | — | — | 10 | Ω |
| $V_{i(max)}$ | maximum input voltage | THD = 1% | — | 2 | — | V |
| V_{no} | noise output voltage | $R_s = 0 \text{ }\Omega$; note 3 | — | 3.7 | 5.0 | μV |
| $V_{CM(rms)}$ | common-mode input voltage (RMS value) | | — | — | 1 | V |
| CMRR | common-mode rejection ratio | $R_s = 5 \text{ k}\Omega$ | 66 | 70 | — | dB |
| | | $R_s = 0 \text{ }\Omega$; note 4 | — | 80 | — | dB |
| SVRR | supply voltage ripple rejection | note 5 | 55 | 65 | — | dB |
| | | note 6 | — | 60 | — | dB |
| THD | total harmonic distortion | $V_i = 1 \text{ V}$; | — | 0.02 | — | % |
| | | $V_i = 1 \text{ V}$; $f = 20 \text{ Hz to } 20 \text{ kHz}$ | — | — | 0.1 | % |
| THD _{max} | total harmonic distortion at maximum output current | $V_i = 1 \text{ V}$; $R_L = 150 \text{ }\Omega$ | — | — | 1 | % |

Notes

1. The DC output voltage with respect to ground is approximately $0.5V_{CC}$.
2. The frequency response is externally fixed by the input coupling capacitors.
3. The noise output voltage is measured in a bandwidth of 20 Hz to 20 kHz (unweighted).
4. The common-mode rejection ratio is measured at the output with a voltage source of 1 V (RMS) in accordance with the test circuit (see Fig.3) while V_{iNL} and V_{iNR} are shorted-circuited. Frequencies between 100 Hz and 100 kHz.
5. The ripple rejection is measured at the output, with $R_s = 2 \text{ k}\Omega$, $f = 1 \text{ kHz}$ and a ripple amplitude of 2 V (p-p).
6. The ripple rejection is measured at the output, with $R_s = 0 \text{ to } 2 \text{ k}\Omega$, $f = 100 \text{ Hz to } 20 \text{ kHz}$ and a maximum ripple amplitude of 2 V (p-p).

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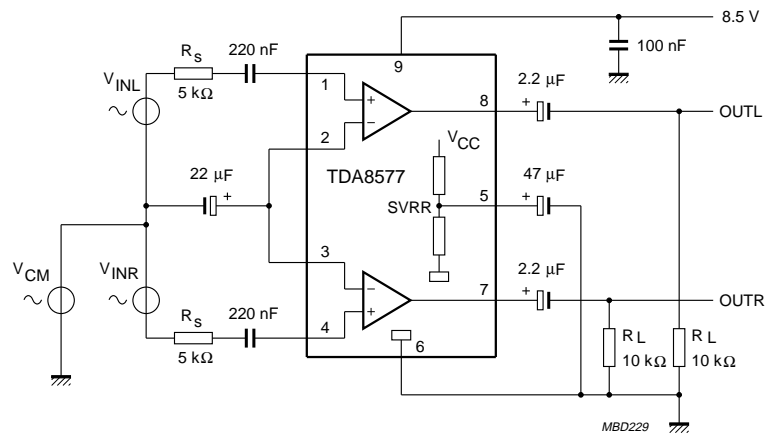


Fig.3 Test circuit.

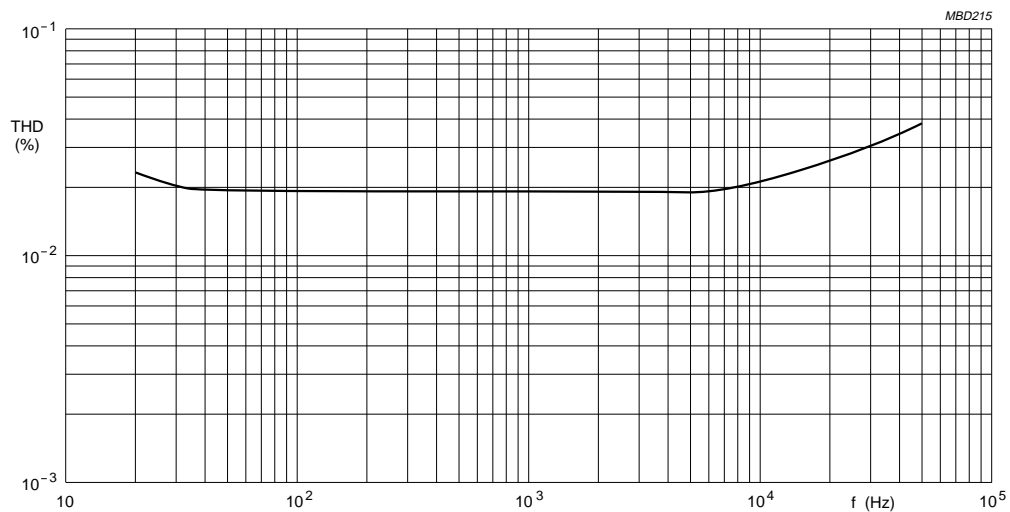
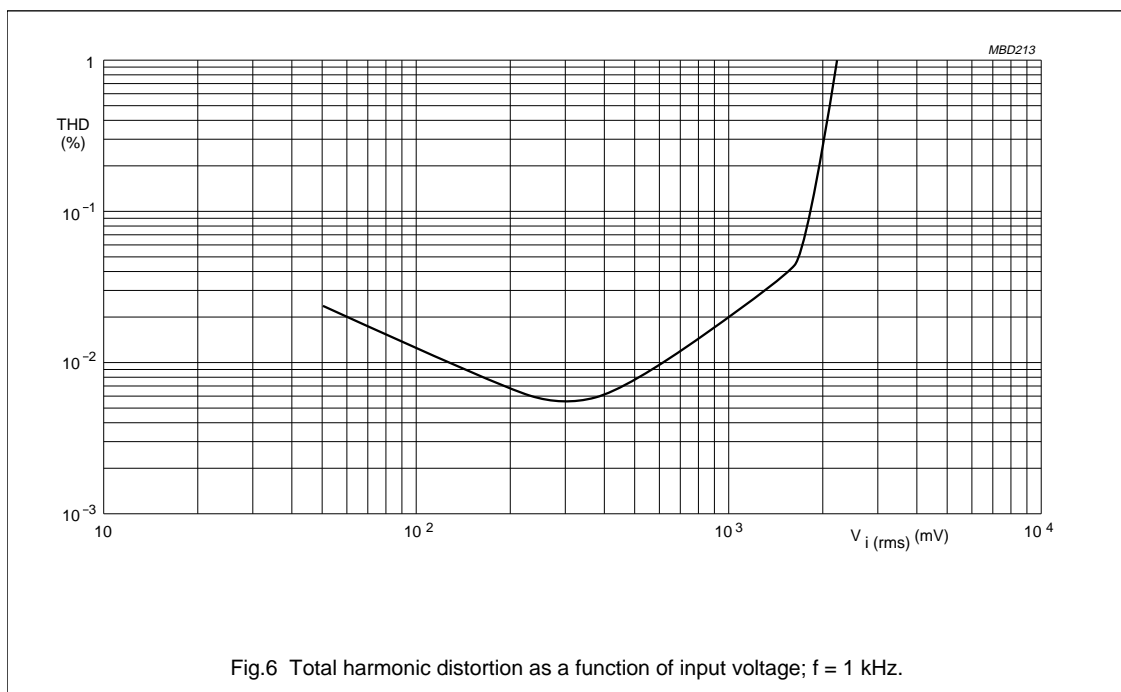
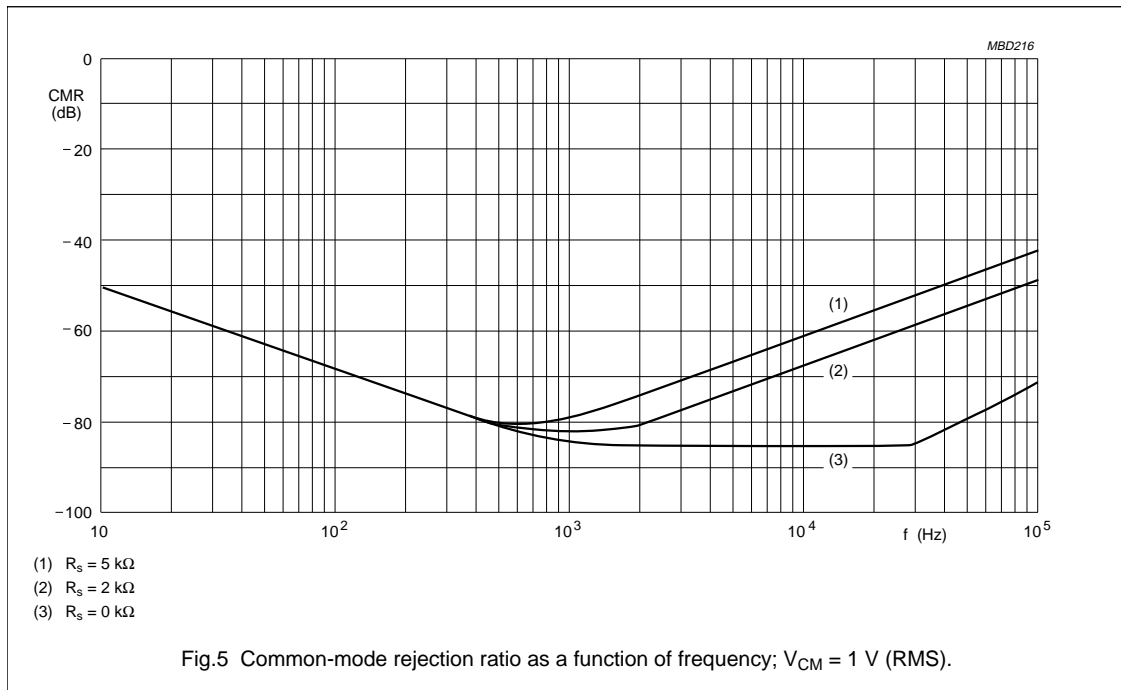


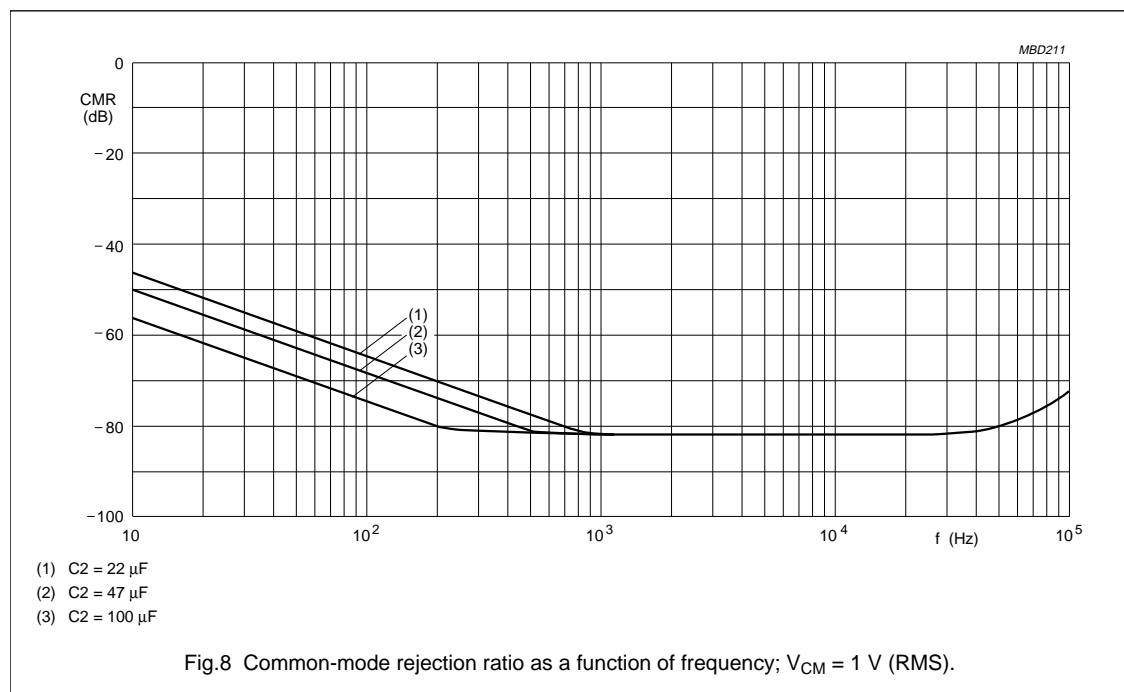
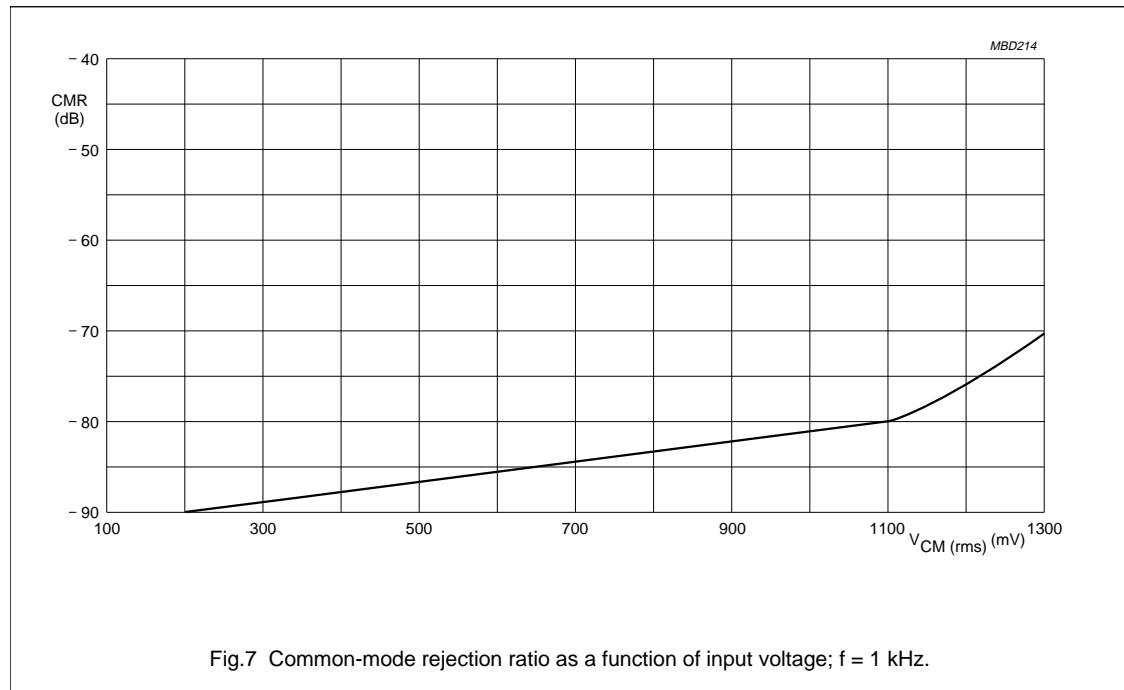
Fig.4 Total harmonic distortion as a function of frequency; $V_i = 1\text{ V}$ (RMS).

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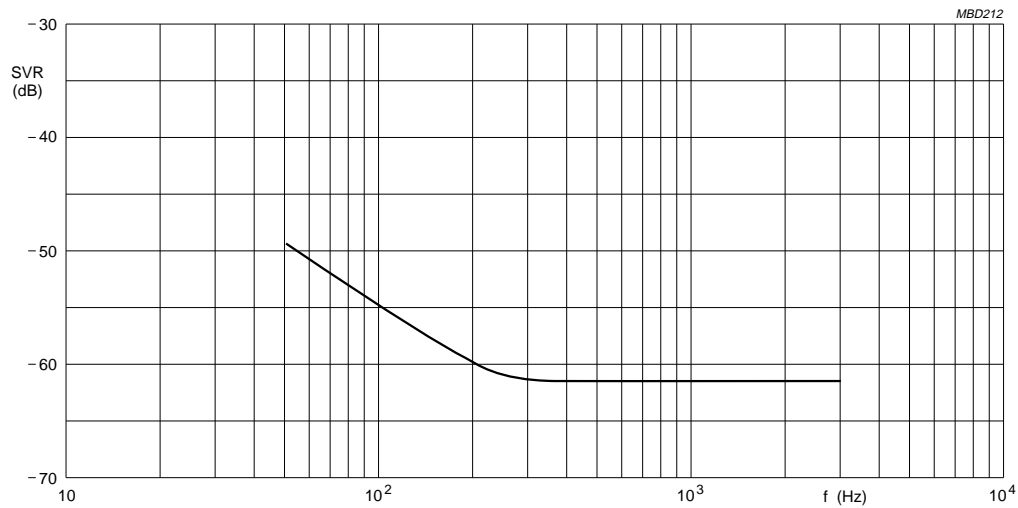


Fig.9 Supply voltage ripple rejection as a function of frequency; $V_{\text{ripple}} = 2 \text{ V (p-p)}$, $R_s = 2 \text{ k}\Omega$.

APPLICATION INFORMATION

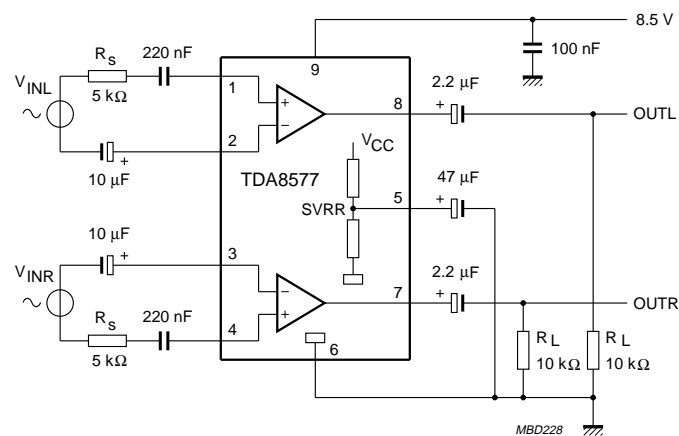
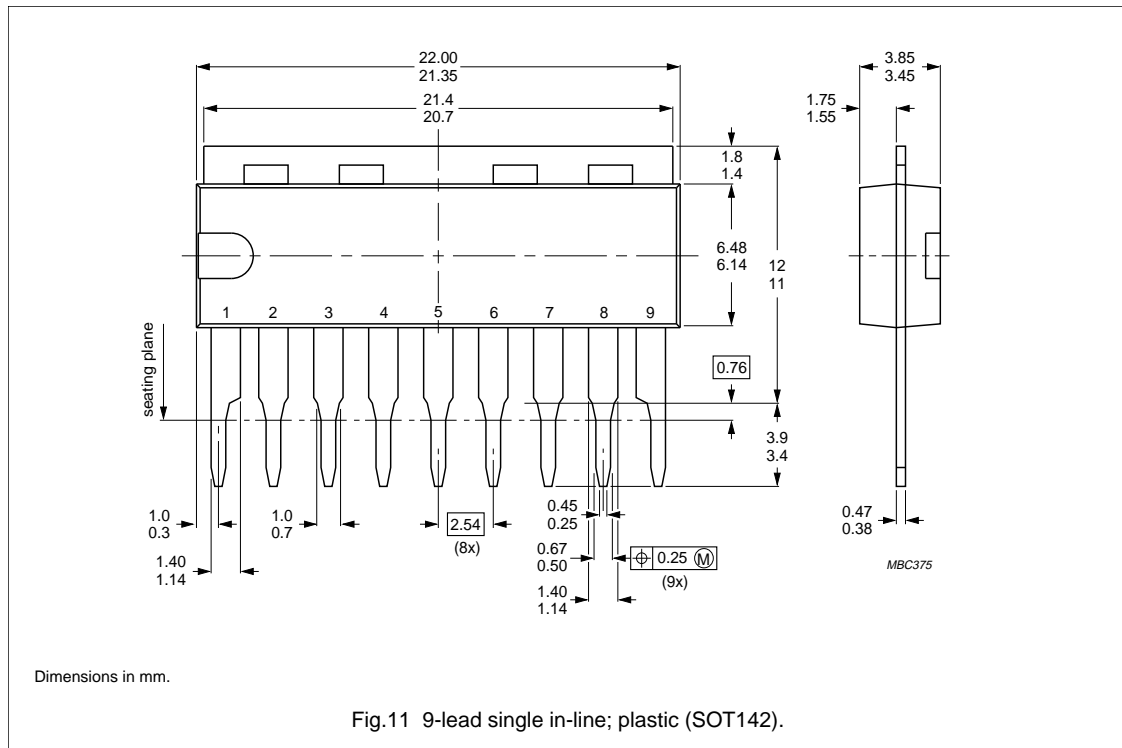


Fig.10 Application circuit with balanced signal source

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PACKAGE OUTLINE



SOLDERING

Plastic single in-line packages

BY DIP OR WAVE

The maximum permissible temperature of the solder is 260 °C; this temperature must not be in contact with the joint for more than 5 s. The total contact time of successive solder waves must not exceed 5 s.

The device may be mounted up to the seating plane, but the temperature of the plastic body must not exceed the specified storage maximum. If the printed-circuit board has been pre-heated, forced cooling may be necessary immediately after soldering to keep the temperature within the permissible limit.

REPAIRING SOLDERED JOINTS

Apply the soldering iron below the seating plane (or not more than 2 mm above it). If its temperature is below 300 °C, it must not be in contact for more than 10 s; if between 300 and 400 °C, for not more than 5 s.

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DEFINITIONS

| Data sheet status | |
|---|---|
| Objective specification | This data sheet contains target or goal specifications for product development. |
| Preliminary specification | This data sheet contains preliminary data; supplementary data may be published later. |
| Product specification | This data sheet contains final product specifications. |
| Limiting values | |
| Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability. | |
| Application information | |
| Where application information is given, it is advisory and does not form part of the specification. | |

LIFE SUPPORT APPLICATIONS

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