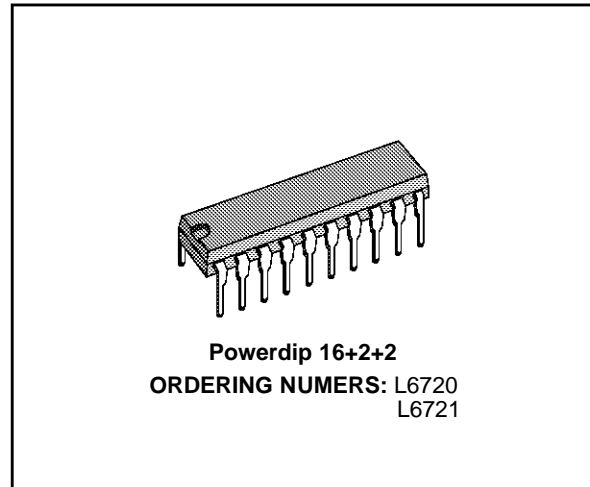


**MINITEL INTERFACE**

ADVANCE DATA

- ONE NON INVERTING LINE DRIVER
- ONE NON INVERTING LINE RECEIVER
- LINE TRANSCEIVER: (TOWARDS PERIPHERALS)
  - non inverter from Minitel to peripherals
  - inverter from peripherals to Minitel
- POWER SUPPLY
  - not regulated output voltage
  - internal low drop power switch with antisaturation circuit
  - output protected against short circuit
  - standby mode operation with an external signal
- AUDIO AMPLIFIER
  - one input, one output
  - one pin for supply rejection
  - internal fixed gain
- THERMAL SHUTDOWN

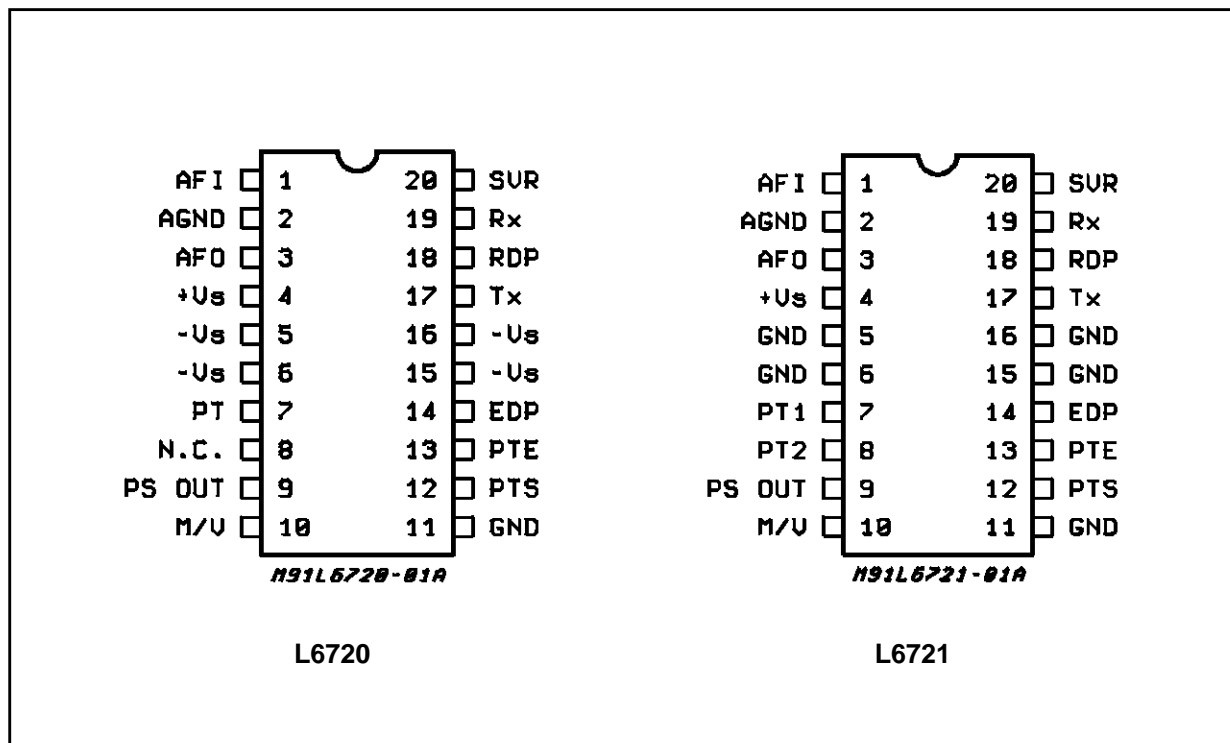


It integrates one line driver, one line receiver, one line transceiver, a power supply for peripherals, and an audio amplifier, Two version are provided:  
 - L6720 which needs a negative supply.  
 - L6721 which doesn't use a negative supply.

**DESCRIPTION**

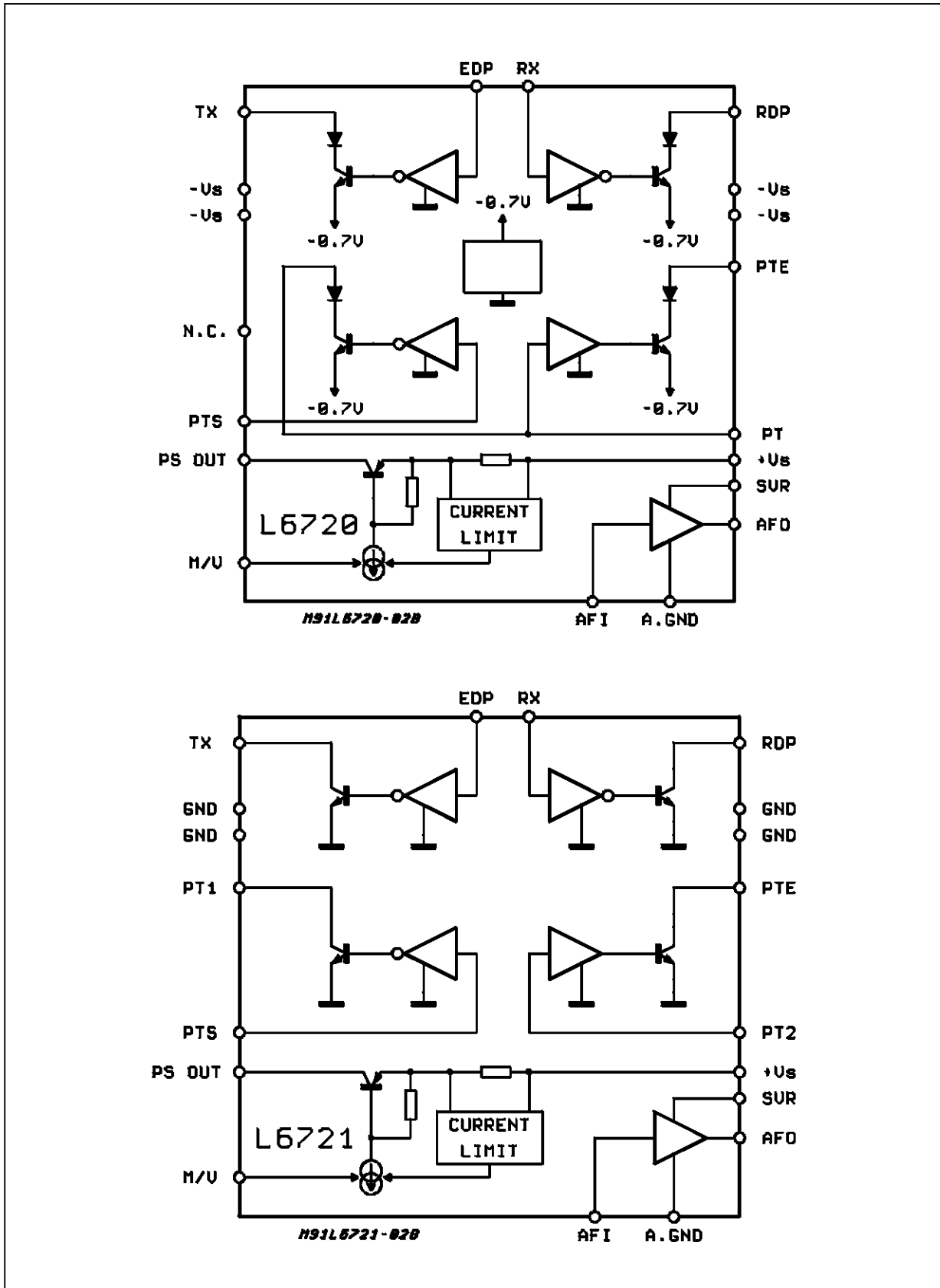
This device performs the functions of a complete interface for Minitel peripheral plug.

**PIN CONNECTIONS**



L6720 - L6721

BLOCK DIAGRAMS



**ABSOLUTE MAXIMUM RATINGS**

| Symbol                              | Parameter  | Test Conditions | Unit |
|-------------------------------------|--|-----------------|------|
| +V <sub>s</sub> , (V <sub>s</sub> ) | Positive Supply Voltage                            | +15             | V    |
| -V <sub>s</sub>                     | Negative Supply Voltage                            | -13             | V    |
| V <sub>OC</sub>                     | Open Collectors Voltage                            | max 20          | V    |
| I <sub>OC</sub>                     | Open Collectors Current                            | max 10          | mA   |
| P <sub>tot</sub>                    | Total Power Dissipation at T <sub>amb</sub> = 70°C | 1.25            | W    |
| T <sub>J</sub>                      | Junction Temperature                               | 150             | °C   |
| T <sub>Op</sub>                     | Operating Temperature Range                        | 0 to 70         | °C   |

**THERMAL DATA**

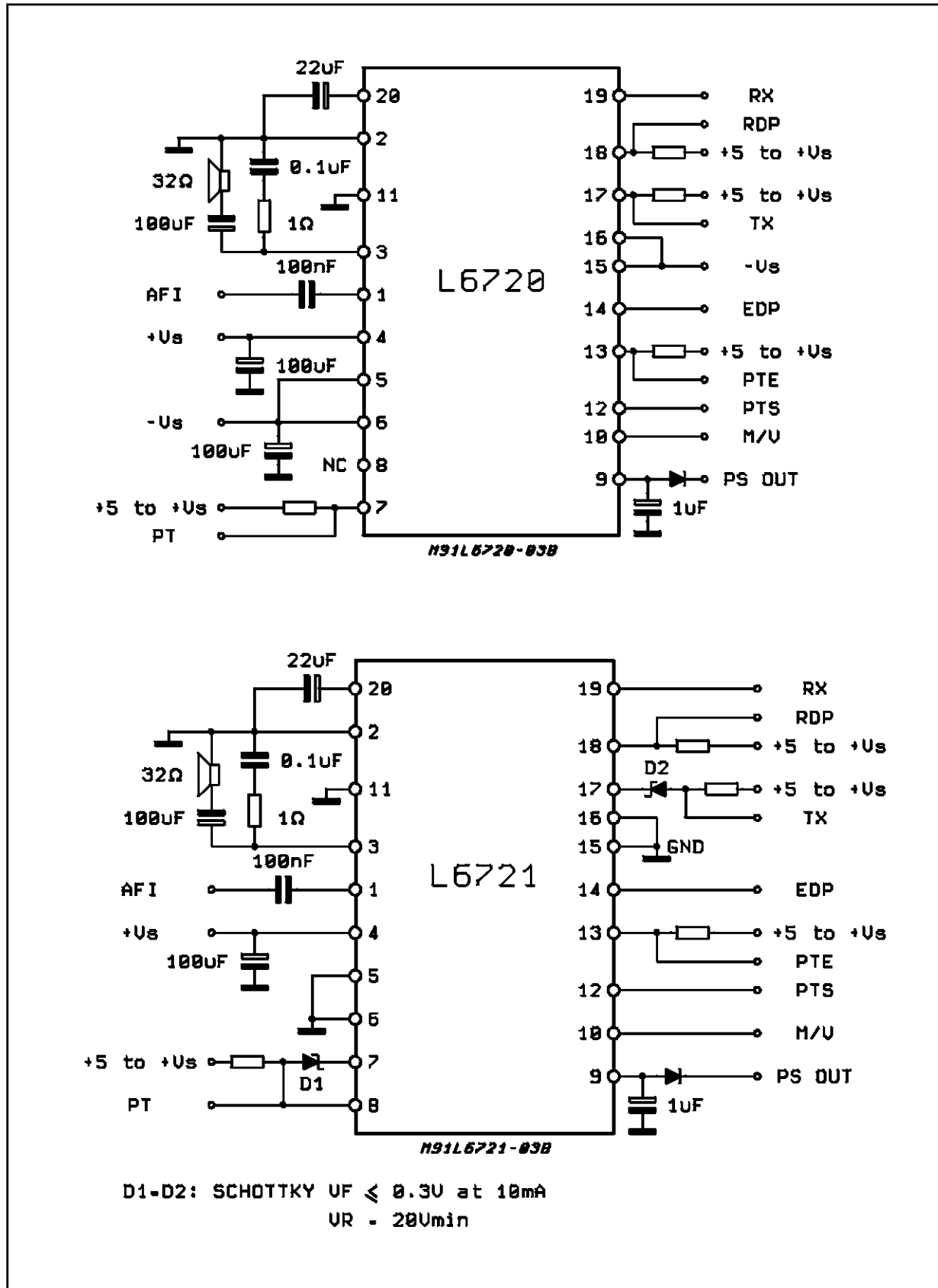
| Symbol                | Description                         |     | Value | Unit |
|-----------------------|-------------------------------------|-----|-------|------|
| R <sub>thj-case</sub> | Thermal Resistance Junction-case    | Max | 14    | °C/W |
| R <sub>thj-amb</sub>  | Thermal Resistance Junction-ambient | Max | (*)65 | °C/W |

(\*) Mounted on board with minimized dissipating copper area

**PIN FUNCTIONS**

| Pin | Name                                | Function                              |
|-----|-------------------------------------|---------------------------------------|
| 1   | AFI                                 | Audio Frequency input                 |
| 2   | AGND                                | Audio Amplifier Ground                |
| 3   | AFO                                 | Audio amplifier output                |
| 4   | +V <sub>s</sub> , (V <sub>s</sub> ) | Power Supply Input (to plug)          |
| 5   | -V <sub>s</sub> , (GND)             | Negative Supply (GND for L6721)       |
| 6   | -V <sub>s</sub> , (GND)             | Negative Supply (GND for L6721)       |
| 7   | PT                                  | Transceiver Input/Output (L6720)      |
| 8   | N.C.                                | Not Connected (L6720)                 |
| 7   | PT1                                 | Transceiver Output (to plug) (L6721)  |
| 8   | PT2                                 | Transceiver Input (from plug) (L6721) |
| 9   | PSout                               | Power Supply Output (to plug)         |
| 10  | M/V                                 | Inhibition of peripheral output power |
| 11  | GND                                 | Ground pin                            |
| 12  | PTS                                 | Line Transceiver Input (from Minitel) |
| 13  | PTE                                 | Line Transceiver Output (to Minitel)  |
| 14  | EDP                                 | Line Driver Input (from Minitel)      |
| 15  | -V <sub>s</sub> , (GND)             | Negative Supply (GND for L6721)       |
| 16  | -V <sub>s</sub> , (GND)             | Negative Supply (GND for L6721)       |
| 17  | T <sub>x</sub>                      | Line Driver Output (to plug)          |
| 18  | RDP                                 | Line Receiver Output (to Minitel)     |
| 19  | R <sub>x</sub>                      | Line Receiver Input                   |
| 20  | SVR                                 | Supply Voltage Rejection              |

APPLICATION DIAGRAMS



**ELECTRICAL CHARACTERISTICS****I) LINE DRIVER, LINE RECEIVER, LINE TRANCEIVER****L6720: with negative supply**Test Conditions:  $10V < +V_s < 12V$ ,  $-8V < -V_s < -4V$ ,  $T_j = 25^\circ\text{C}$  unless otherwise specified

| Symbol             | Parameter                                  | Test Condition                                  | Min. | Typ. | Max. | Unit             |
|--------------------|--|---|------|------|------|------------------|
| $V_{IL}$           | Input Low Level (Pins Rx, EDP, PTS, PT)    |   |      |      | 0.8  | V                |
| $V_{IH}$           | Input High Level (pins Rx, EDP, PTS, PT)   |   | 2    |      |      | V                |
| $I_G$              | Pull-up Current Generator on Pins Rx, PT   |   | 160  | 250  | 340  | $\mu\text{A}$    |
| $Z_I$              | Input Impedance on pins Rx, Tx, PT         | Pins $V_s$ and $-V_s$ open                      | 68   |      |      | $\text{K}\Omega$ |
| $V_{OL}$           | Output Low Level (pins Tx, PT, PTE)        | $I_{LOAD} = 6\text{mA}$                         |      |      | 0.4  | V                |
| $I_R$              | Output Leakage Current (pins Tx, RDP, PTE) |   |      |      | 10   | $\mu\text{A}$    |
| $t_{PLH}, t_{PHL}$ | Propagation Delay Time                     | $I_{LOAD} = 6\text{mA}$ $C_{out} = 50\text{pF}$ |      | 3    | 5    | $\mu\text{s}$    |
| $t_r, t_f$         | Output Rise and Fall Time                  |   |      | 1    |      | $\mu\text{s}$    |

**L6721: without negative supply**Test Conditions:  $10V < V_s < 12V$ ,  $T_j = 25^\circ\text{C}$  unless otherwise specified

| Symbol             | Parameter                                       | Test Condition                                  | Min. | Typ. | Max. | Unit             |
|--------------------|---|---|------|------|------|------------------|
| $V_{IL}$           | Input Low Level (Pins Rx, EDP, PTS, PT2)        |   |      |      | 0.8  | V                |
| $V_{IH}$           | Input High Level (pins Rx, EDP, PTS, PT2)       |   | 2    |      |      | V                |
| $I_G$              | Pull-up Current Generator on Pins Rx, PT2       |   | 160  | 250  | 340  | $\mu\text{A}$    |
| $Z_I$              | Input Impedance on pins Rx, Tx, PT2             | Pins $V_s$ and GND open                         | 68   |      |      | $\text{K}\Omega$ |
| $V_{OL}$           | Output Low Level (pins Tx, PT1)                 | $I_{LOAD} = 6\text{mA}$                         |      |      | 0.15 | V                |
| $V_{OL}$           | Output Low Level (pins RDP, PTE)                | $I_{LOAD} = 6\text{mA}$                         |      |      | 0.4  | V                |
| $I_R$              | Output Leakage Current (pins Tx, RDP, PT1, PTE) |   |      |      | 10   | $\mu\text{A}$    |
| $t_{PLH}, t_{PHL}$ | Propagation Delay Time                          | $I_{LOAD} = 6\text{mA}$ $C_{out} = 50\text{pF}$ |      | 3    | 5    | $\mu\text{s}$    |
| $t_r, t_f$         | Output Rise and Fall Time                       |   |      | 1    |      | $\mu\text{s}$    |

**II) POWER SUPPLY**L6720:  $+V_s = 12V$ ,  $-V_s = -8V$ L6721:  $V_s = 12V$  $T_j = 25^\circ\text{C}$  unless otherwise specified

| Symbol           | Parameter                  | Test Condition                                      | Min. | Typ. | Max.     | Unit                       |
|------------------|----------------------------|---|------|------|----------|----------------------------|
| $V_I - V_O$      | Dropout Voltage            | $I_{LOAD} = 1\text{A}$                              |      | 0.4  | 0.8      | V                          |
| $I_{SC}$         | Short Circuit Current      |   | 1    | 1.1  | 1.2      | A                          |
| M/V <sub>L</sub> | Low Level Disable Pin (1)  |   |      |      | 0.8      | V                          |
| M/V <sub>H</sub> | High Level Disable Pin (1) |   | 2    |      |          | V                          |
| $I_L$            | Disable Pin Input Current  | M/V = 0   |      |      | 100      | $\mu\text{A}$              |
| $I_Q$            | Quiescent Current          | $I_{LOAD} = 1\text{A}$<br>$I_{LOAD} = 0.25\text{A}$ |      |      | 60<br>23 | $\text{mA}$<br>$\text{mA}$ |

Note (1) Power supply is disabled when a zero level voltage is applied on M/V Pin

## L6720 - L6721

### III) AUDIO AMPLIFIER (2)

L6720:  $+V_s = 12V$ ,  $-V_s = -8V$

L6721:  $V_s = 12V$

$T_j = 25^\circ C$  unless otherwise specified

| Symbol | Parameter       | Test Condition   | Min. | Typ. | Max. | Unit      |
|--------|-----------------|--|------|------|------|-----------|
| $Z_i$  | Input Impedance |  | 20   |      |      | $K\Omega$ |
| AV     | Voltage Gain    |  | 28   | 30   | 32   | dB        |
| BW     | Bandwidth       |  | 10   |      |      | KHz       |
| $P_o$  | Output Power    | Distortion = 10%, $f = 1KHz$<br>$R_{LOAD} = 32\Omega$ , $10V < V_{CC} < 14V$ | 250  |      |      | mW        |

Note (2): The output of the audio amplifier is protected against short circuits toward positive power supply and ground

### IV) PROTECTIONS

#### 1) L6720 (With negative supply)

Pins Rx, Tx, PT are protected against any DC voltage ranging from  $-18V$  to  $+18V$ , with the device supplied or not, without extra components.

#### 2) L6721 (Without negative supply)

Pins Tx, PT1 are not protected: an external schottky diode must be added to protect them from  $-18V$  to  $+18V$  (see application diagram).

Pins Rx, PT2 are protected against any DC voltage ranging from  $-18V$  to  $+18V$ .

#### 3) In Both Options

P. Supply pin is not protected: an external diode must be inserted to protect it (see application diagram).

The suggested electrical characteristic of the external diode are:

- $V_{REVERSE} > 20V$
- Voltage drop at 1A max. 1.2V

#### 4) Thermal Protection

This protection is operating when the chip temperature typically raises above  $150^\circ C$  (hysteresis  $20^\circ C$  Typ; this indicated value is valid with the application circuit on pag. 4), turning off both the power switch and the audio amplifier.

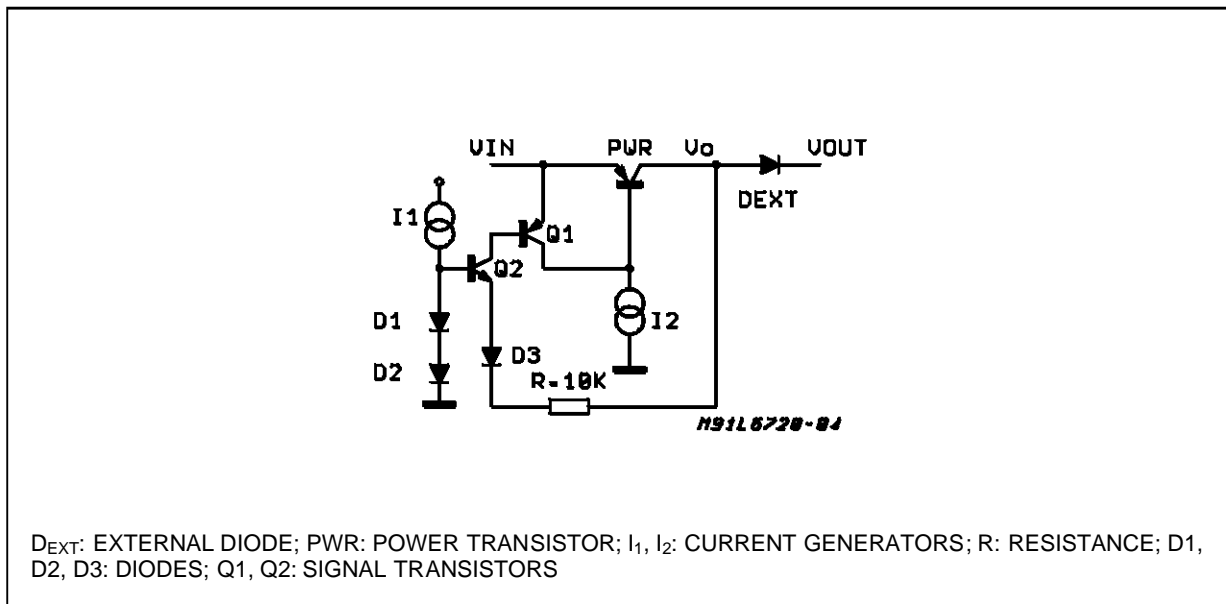
### APPLICATION INFORMATION

The external diode on the output of the power switch has the fundamental function of protecting this pin against positive overvoltages.

However the voltage drop on this diode is also important in the correct definition of the thermal hysteresis. This can be understood by considering the circuit applied on the output of the power switch, which has the function of withstanding negative overvoltages.

Let's refer to fig. 1:

Figure 1



When  $V_{OUT} = 0.7V$  Q2 and D3 turn on and also Q1 whose saturation turns off the power PWR. In this condition ( $BV_{CBO}$ ) it can withstand the maximum negative overvoltage (-18V).

If we now have an overload on  $V_{OUT}$  (after the diode) for example with  $V_{IN} = 12V$ ,  $V_{OUT} = 8V$ ,  $P_d = 4W$ , the temperature of the chip increases to the thermal shutdown intervention, so that  $V_{OUT} = 0$ . However Q1 and Q2 cannot turn on because we have 2 diodes (D1 and D2) against 3 diodes (D3,  $D_{EXT}$ , Base-Emitter of Q2).

If the over load is on point  $V_O$  (before the external diode) as before the chip temperature increases until shutdown. But in that condition (with  $V_{OUT} = 0$ ) we have now 2 diodes (D1, D2) against other 2 diodes (D3, Q2 Base-Emitter); than the power switch doesn't turn on because of a slight difference between the thermal coefficient of the 4 diodes.

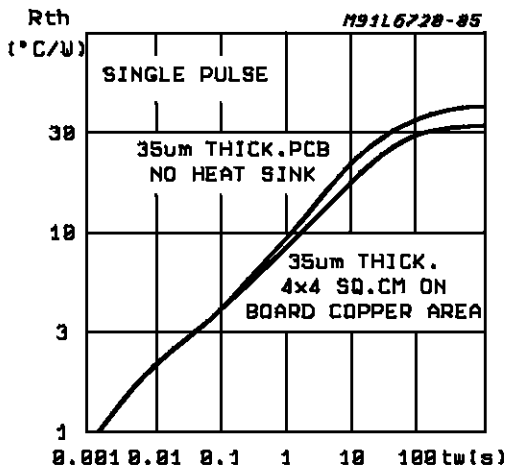
We will have the new switching-on of power switch only when the chip temperature decreases of about  $80^{\circ}C$  (being kept off by Q1 and Q2).

In conclusion with or without the external diode the absolute value of the thermal shutdown is the same, but the hysteresis is higher without the external diode.

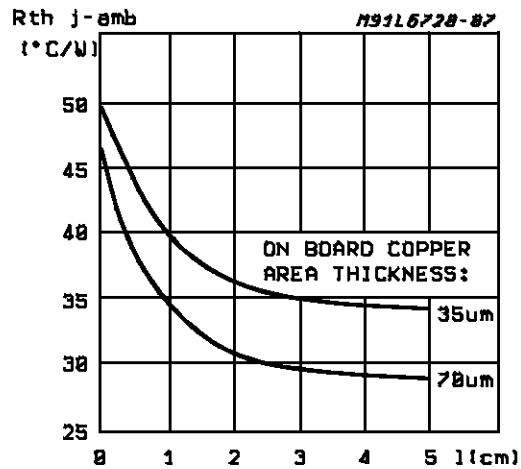
**THERMAL CHARACTERISTICS**

The transient thermal resistance of the 16+2+2 powerdip package is shown in Fig. 2: a typical  $R_{th\ j-amb}$  of  $50^{\circ}C/W$  roughly can be seen. To be able to well sink out the heat from the inside of the package, the four control pins can be closely connected to a p.c.b. copper side. By considering the two square sides of Fig. 4, the thermal resistance junction-ambient can be reduced according to Fig. 3.

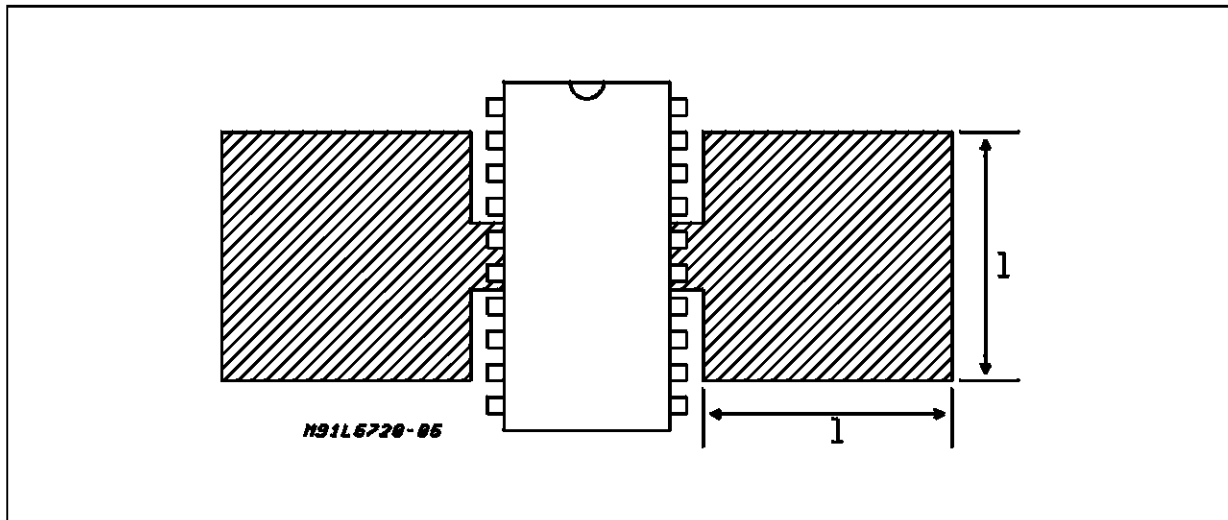
**Figure 2:** DIP 16+2+2 Transient Thermal Resistance for single pulses.



**Figure 3:** Typical  $R_{th\ j-a}$  of Powerdip 16+2+2 vs side 1 for heat sink on the PCB lower side.

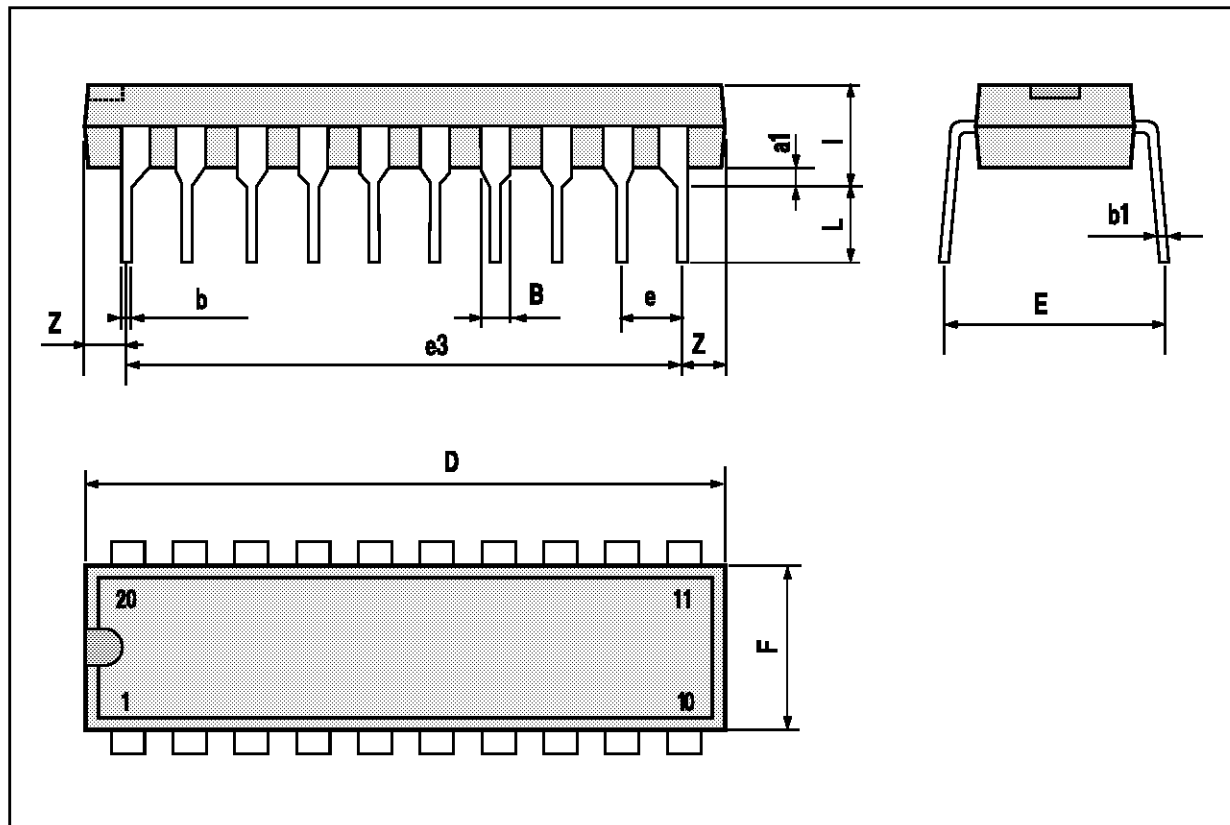


**Figure 4:** Two "On Board" square heat sink



POWERDIP20 PACKAGE MECHANICAL DATA

| DIM. | mm   |       |       | inch  |       |       |
|------|------|-------|-------|-------|-------|-------|
|      | MIN. | TYP.  | MAX.  | MIN.  | TYP.  | MAX.  |
| a1   | 0.51 |       |       | 0.020 |       |       |
| B    | 0.85 |       | 1.40  | 0.033 |       | 0.055 |
| b    |      | 0.50  |       |       | 0.020 |       |
| b1   | 0.38 |       | 0.50  | 0.015 |       | 0.020 |
| D    |      |       | 24.80 |       |       | 0.976 |
| E    |      | 8.80  |       |       | 0.346 |       |
| e    |      | 2.54  |       |       | 0.100 |       |
| e3   |      | 22.86 |       |       | 0.900 |       |
| F    |      |       | 7.10  |       |       | 0.280 |
| l    |      |       | 5.10  |       |       | 0.201 |
| L    |      | 3.30  |       |       | 0.130 |       |
| Z    |      |       | 1.27  |       |       | 0.050 |



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