



**LA1800**

**FM/AM Single-Chip Radio**

**Functions**

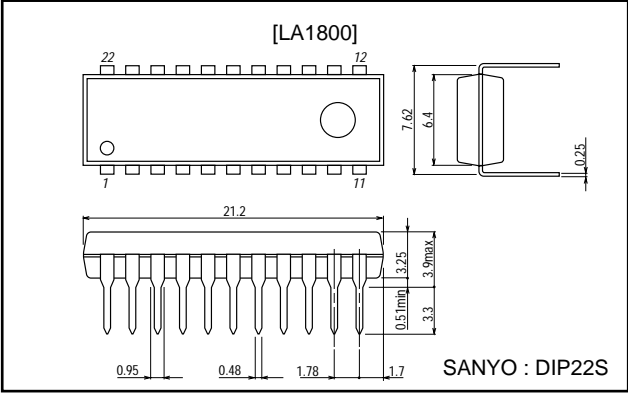
- FM : Front end, low-pass filter, IF amp, quadrature detector, muting.
- AM : RF amp, detector.
- AM : AF driver (earphone driver).

**Features**

- Minimum number of external parts required : One tuning circuit each for FM, AM
- Low current dissipation : 5.6mA/FM, 3.2mA/AM
- Low-voltage operation :  $V_{CC \text{ min}}=2.5V$

**Package Dimensions**

unit : mm  
**3059-DIP22S**



**Specifications**

**Maximum Ratings** at  $T_a=25^\circ C$

| Parameter                   | Symbol               | Conditions | Ratings     | Unit       |
|-----------------------------|----------------------|------------|-------------|------------|
| Maximum supply voltage      | $V_{CC \text{ max}}$ | Pin 3      | 6.0         | V          |
| Allowable power dissipation | $P_d \text{ max}$    |            | 200         | mW         |
| Operating temperature       | $T_{opr}$            |            | -20 to +70  | $^\circ C$ |
| Storage temperature         | $T_{stg}$            |            | -40 to +125 | $^\circ C$ |

**Operating Conditions** at  $T_a=25^\circ C$

| Parameter                     | Symbol              | Conditions | Ratings    | Unit |
|-------------------------------|---------------------|------------|------------|------|
| Recommended operating voltage | $V_{CC}$            |            | 3.0        | V    |
| Operating voltage range       | $V_{CC \text{ op}}$ |            | 2.5 to 5.0 | V    |

**Operating Characteristics** at  $T_a=25^\circ C$ ,  $V_{CC}=3V$ , See Test Circuit

| Parameter      | Symbol    | Conditions | Ratings |     |     | Unit |
|----------------|-----------|------------|---------|-----|-----|------|
|                |           |            | min     | typ | max |      |
| <b>[AM]</b>    |           |            |         |     |     |      |
| Current drain  | $I_{cco}$ |            |         | 3.6 | 5.5 | mA   |
| Pin 2 voltage  | $V_2$     |            | 1.9     | 2.4 | 2.9 | V    |
| Pin 14 voltage | $V_{14}$  |            | 0.4     | 0.9 | 1.6 | V    |
| Pin 21 voltage | $V_{21}$  |            | 0.6     | 0.9 | 1.2 | V    |
| <b>[FM]</b>    |           |            |         |     |     |      |
| Current drain  | $I_{cco}$ |            |         | 5.6 | 8.0 | mA   |
| Pin 2 voltage  | $V_2$     |            | 1.9     | 2.6 | 2.9 | V    |
| Pin 4 voltage  | $V_4$     |            | 1.7     | 2.3 | 2.9 | V    |
| Pin 5 voltage  | $V_5$     |            | 1.7     | 2.3 | 2.9 | V    |

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# LA1800

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| Parameter      | Symbol          | Conditions | Ratings |      |     | Unit |
|----------------|-----------------|------------|---------|------|-----|------|
|                |                 |            | min     | typ  | max |      |
| Pin 6 voltage  | V <sub>6</sub>  |            | 1.1     | 1.7  | 2.3 | V    |
| Pin 7 voltage  | V <sub>7</sub>  |            | 1.1     | 1.7  | 2.3 | V    |
| Pin 8 voltage  | V <sub>8</sub>  |            | 1.1     | 1.7  | 2.3 | V    |
| Pin 9 voltage  | V <sub>9</sub>  |            | 1.9     | 2.6  | 2.9 | V    |
| Pin 10 voltage | V <sub>10</sub> |            | 1.8     | 2.5  | 2.9 | V    |
| Pin 13 voltage | V <sub>13</sub> |            |         | 0    | 0.6 | V    |
| Pin 14 voltage | V <sub>14</sub> |            | 0.5     | 1.0  | 1.7 | V    |
| Pin 16 voltage | V <sub>16</sub> |            | 1.6     | 2.3  | 2.9 | V    |
| Pin 17 voltage | V <sub>17</sub> |            | 1.6     | 2.3  | 2.9 | V    |
| Pin 19 voltage | V <sub>19</sub> |            | 0.6     | 0.86 | 14  | V    |
| Pin 20 voltage | V <sub>20</sub> |            | 0.6     | 0.86 | 14  | V    |
| [AF]           |                 |            |         |      |     |      |
| Pin 11 current | I <sub>11</sub> |            | 0.5     | 1.0  | 1.5 | mA   |
| Pin 12 voltage | V <sub>12</sub> |            |         | 0    | 0.5 | V    |

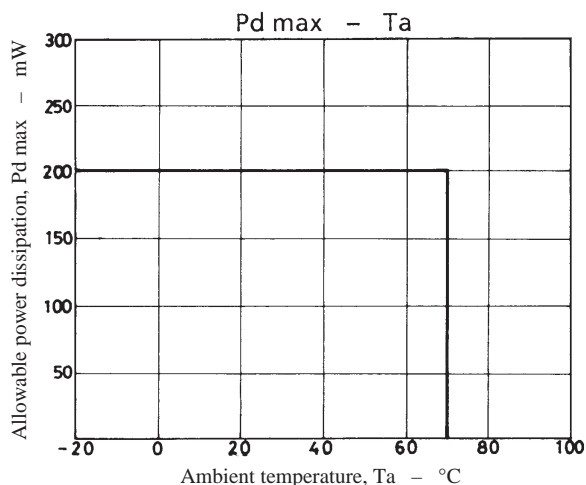
[Reference characteristics]

## Operating Characteristics at Ta=25°C, V<sub>CC</sub>=3V, See Test Circuit 2

| Parameter   | Symbol           | Conditions                      | Ratings |     |     | Unit |
|---|------------------|---------------------------------|---------|-----|-----|------|
|   |                  |                                 | min     | typ | max |      |
| [AM : f <sub>C</sub> =1MHz, f <sub>m</sub> =400Hz]  |                  |                                 |         |     |     |      |
| Current drain                                       | I <sub>cco</sub> | Quiescent                       |         | 3.6 |     | mA   |
| Detection output                                    | V <sub>O1</sub>  | V <sub>IN</sub> =40dBμ, 30% mod |         | 10  |     | mV   |
|   | V <sub>O2</sub>  | V <sub>IN</sub> =70dBμ, 30% mod |         | 100 |     | mV   |
| Signal to noise ratio                               | S/N              | V <sub>IN</sub> =70dBμ, 30% mod |         | 47  |     | dB   |
| [FM : f <sub>C</sub> =90MHz, f <sub>m</sub> =400Hz] |                  |                                 |         |     |     |      |
| Current drain                                       | I <sub>cco</sub> | Quiescent                       |         | 5.6 |     | mA   |
| Input limiting sensitivity                          | -3dBLS.          | 3dB down, 30% mod               |         | 16  |     | dBμ  |
| Demodulation output                                 | V <sub>O</sub>   | V <sub>IN</sub> =80dBμ, 30% mod |         | 90  |     | mV   |
| Total harmonic distortion                           | THD              | V <sub>IN</sub> =80dBμ, 30% mod |         | 0.8 |     | %    |
| Signal to noise ratio                               | S/N              | V <sub>IN</sub> =80dBμ          |         | 59  |     | dB   |
| [AF : f <sub>m</sub> =400Hz]                        |                  |                                 |         |     |     |      |
| Voltage gain  | VG               | V <sub>O</sub> =50mV            |         | 24  |     | dB   |
| Total harmonic distortion                           | THD              | V <sub>O</sub> =50mV            |         | 0.3 |     | %    |

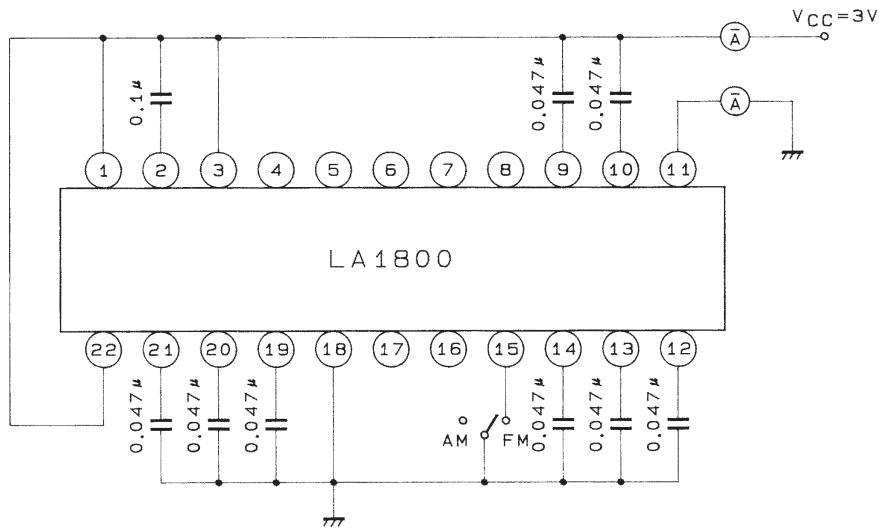
Note : 1. Current drain for FM, AM includes current of AF driver stage.

2. When handling the IC, be careful not to cause dielectric breakdown.



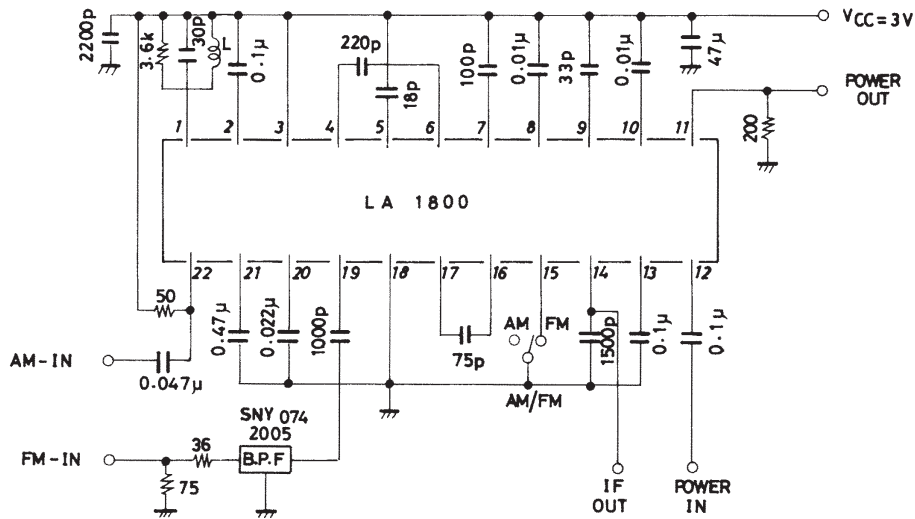
# LA1800

## DC Test Circuit



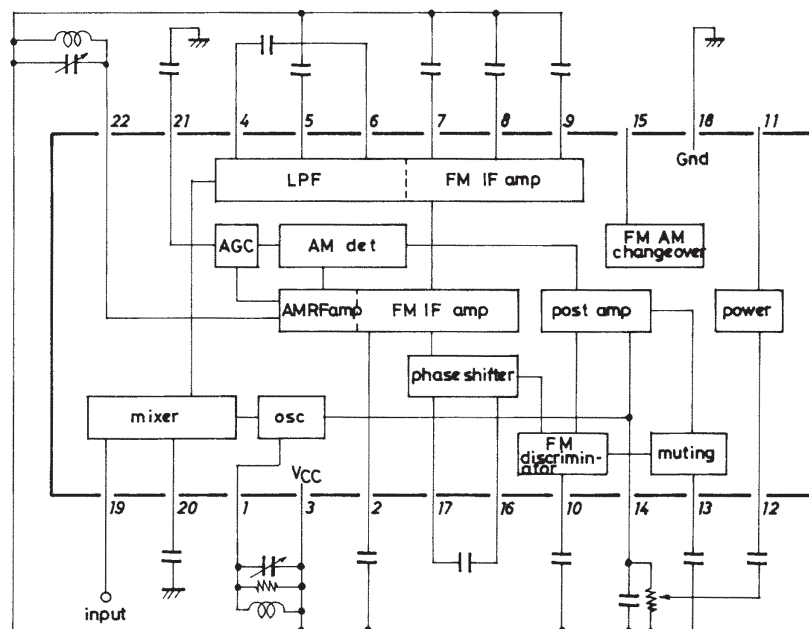
Unit (resistance :  $\Omega$ , capacitance : F)

## AC Test Circuit



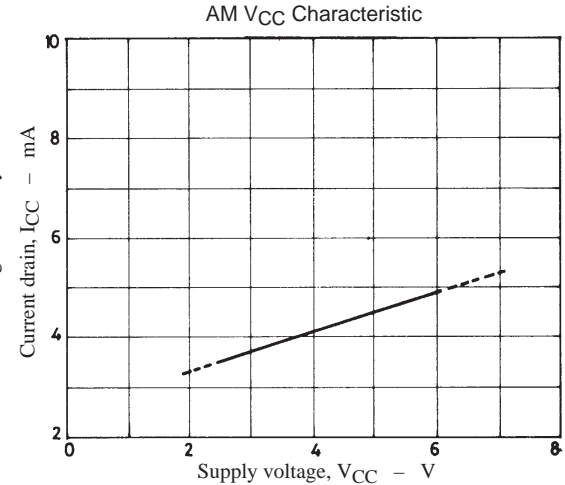
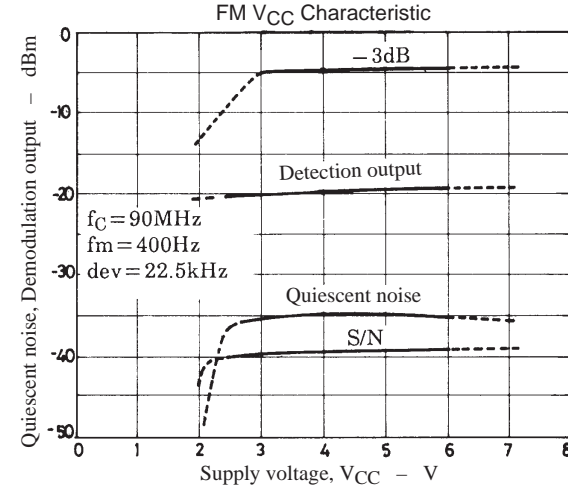
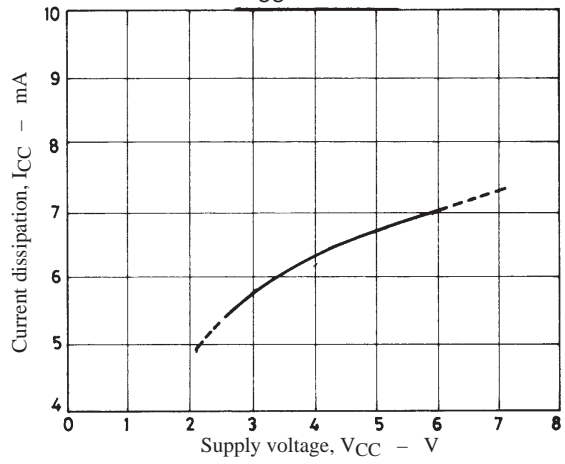
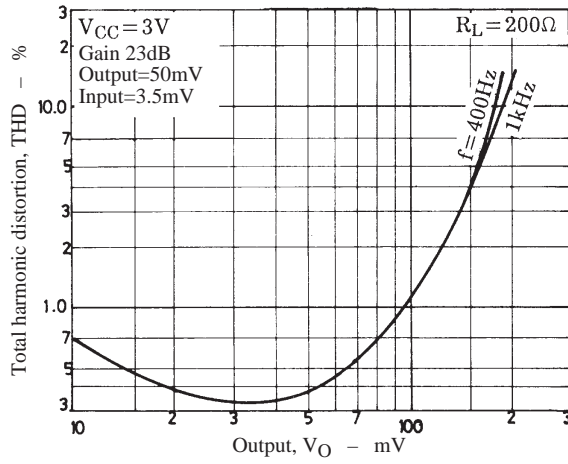
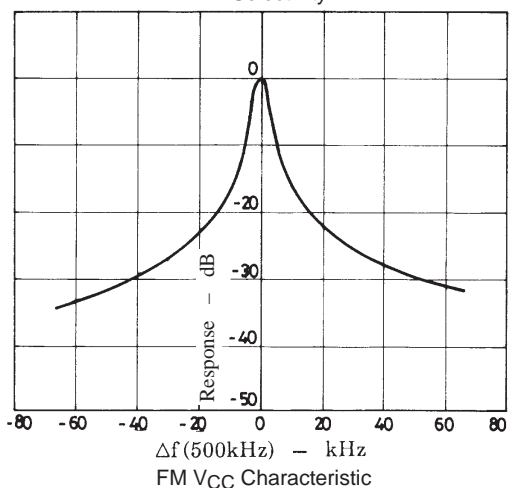
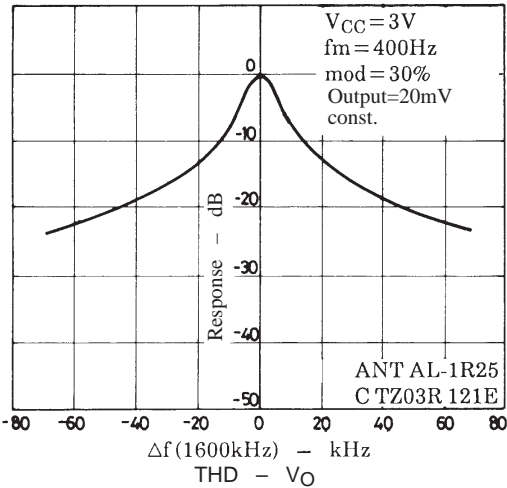
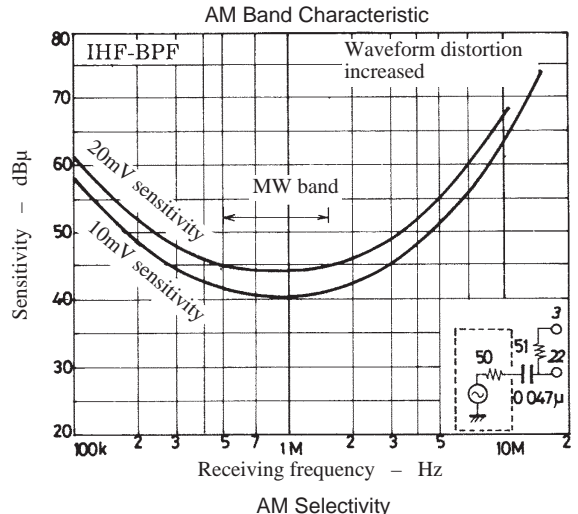
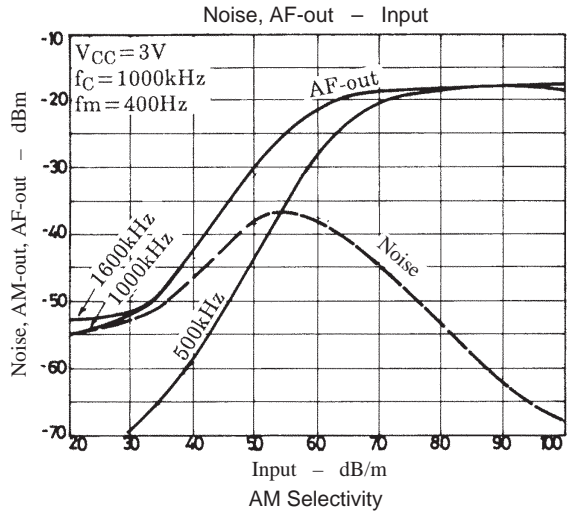
Unit (resistance :  $\Omega$ , capacitance : F)

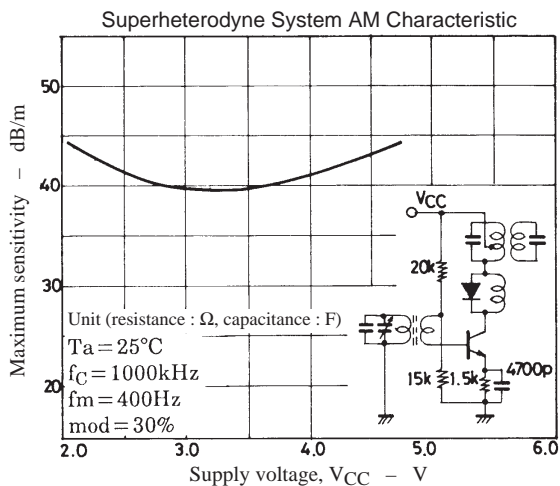
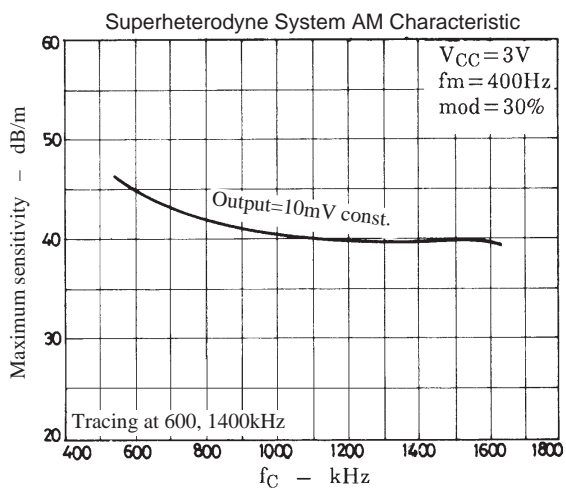
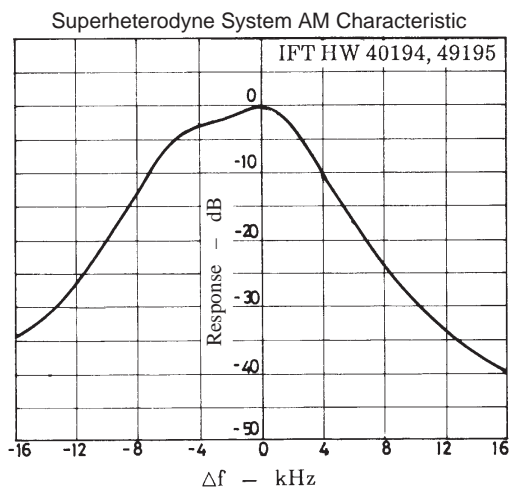
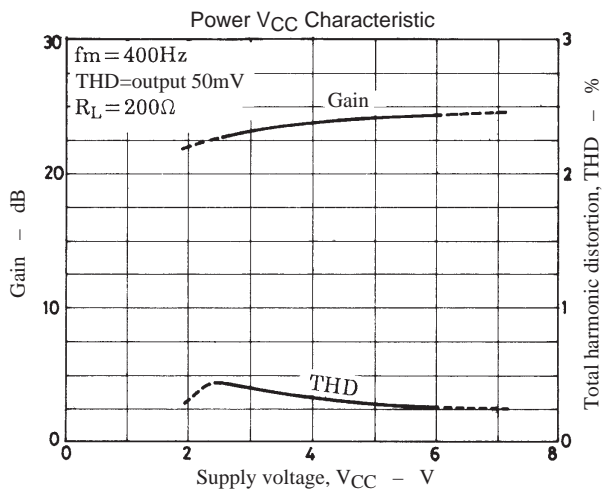
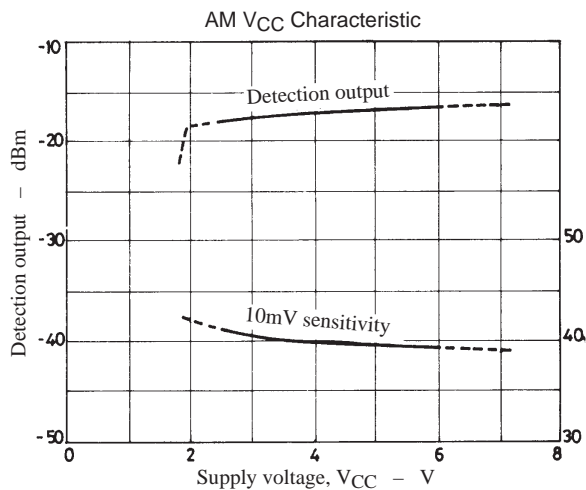
## Equivalent Circuit Block Diagram



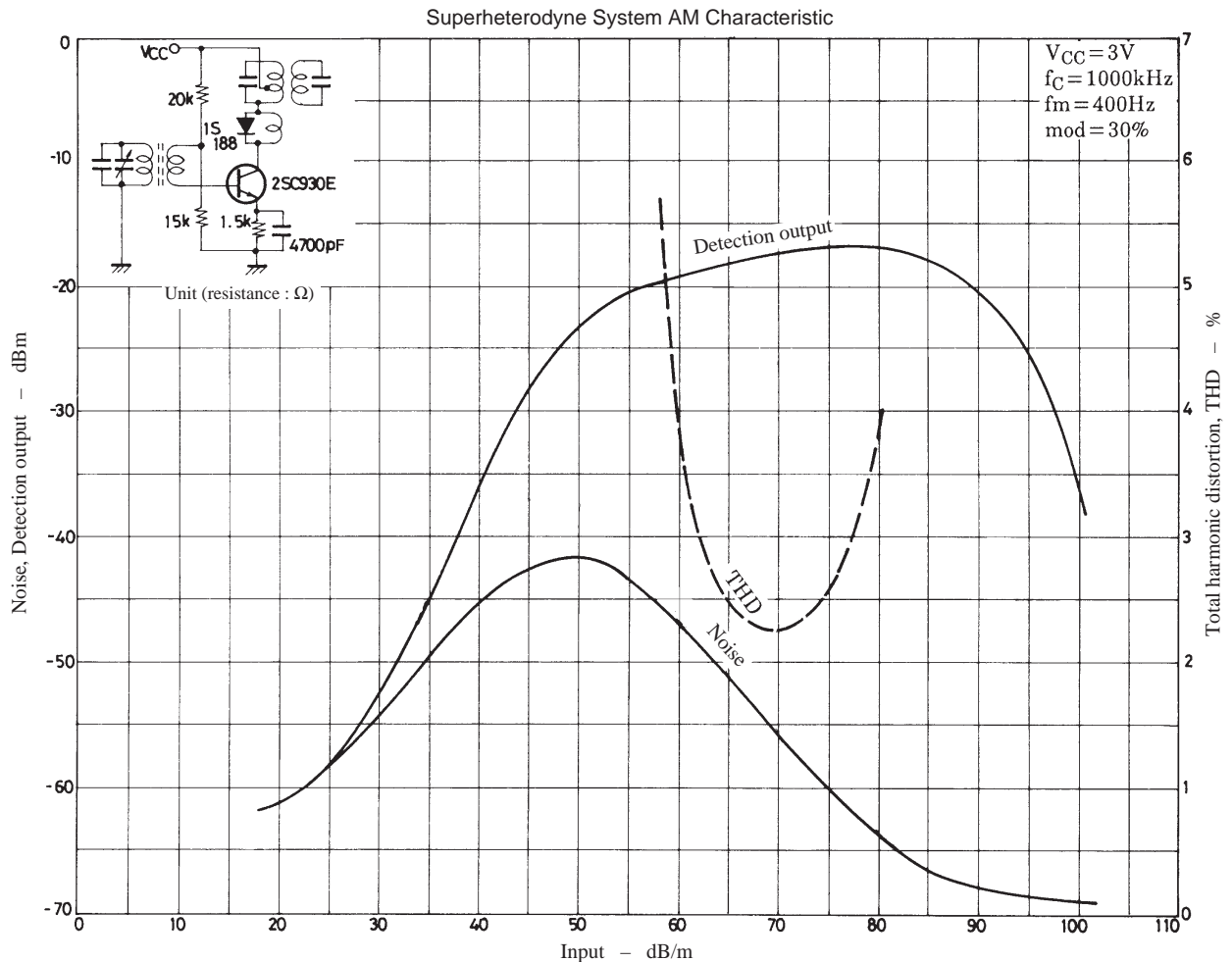








# LA1800



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