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# ON Semiconductor DATA SHEET

## 2SB631, 631K/ 2SD600, 600K

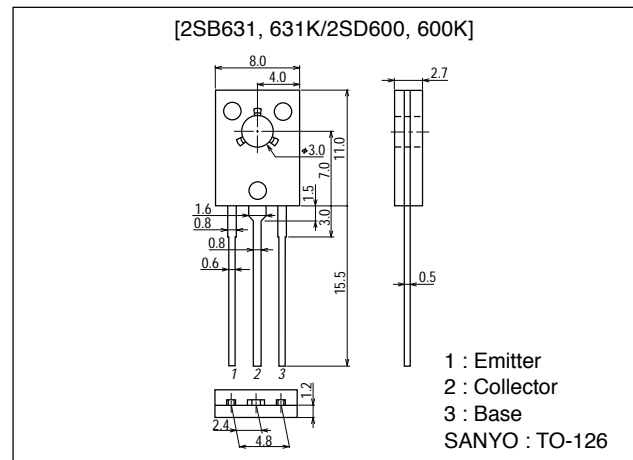
PNP/NPN Epitaxial Planar Silicon Transistors  
**100V/120V, 1A Low-Frequency  
Power Amplifier Applications**

### Features

- High breakdown voltage  $V_{CEO}$  100/120V, High current 1A.
- Low saturation voltage, excellent  $h_{FE}$  linearity.

### Package Dimensions

unit:mm  
2009B



( ) : 2SB631, 631K

### Specifications

Absolute Maximum Ratings at  $T_a = 25^\circ\text{C}$

| Parameter                    | Symbol    | Conditions             | 2SB631, D600 | 2SB631K, D600K | Unit             |
|------------------------------|-----------|------------------------|--------------|----------------|------------------|
| Collector-to-Base Voltage    | $V_{CBO}$ |                        | (-)100       | (-)120         | V                |
| Collector-to-Emitter Voltage | $V_{CEO}$ |                        | (-)100       | (-)120         | V                |
| Emitter-to-Base Voltage      | $V_{EBO}$ |                        |              | (-)5           | V                |
| Collector Current            | $I_C$     |                        |              | (-)1           | A                |
| Collector Current (Pulse)    | $I_{CP}$  |                        |              | (-)2           | A                |
| Collector Dissipation        | $P_C$     |                        |              | 1              | W                |
|                              |           | $T_c=25^\circ\text{C}$ |              | 8              | W                |
| Junction Temperature         | $T_j$     |                        |              | 150            | $^\circ\text{C}$ |
| Storage Temperature          | $T_{stg}$ |                        |              | -55 to +150    | $^\circ\text{C}$ |

Electrical Characteristics at  $T_a = 25^\circ\text{C}$

| Parameter                              | Symbol        | Conditions                         | Ratings      |        |      | Unit          |
|--|---------------|------------------------------------|--------------|--------|------|---------------|
|  |               |                                    | min          | typ    | max  |               |
| Collector-to-Base Breakdown Voltage    | $V_{(BR)CBO}$ | $I_C=(-)10\mu\text{A}, I_E=0$      | B631, D600   | (-)100 |      | V             |
|  |               |                                    | B631K, D600K | (-)120 |      | V             |
| Collector-to-Emitter Breakdown Voltage | $V_{(BR)CEO}$ | $I_C=(-)1\text{mA}, R_{BE}=\infty$ | B631, D600   | (-)100 |      | V             |
|  |               |                                    | B631K, D600K | (-)120 |      | V             |
| Emitter-to-Base Breakdown Voltage      | $V_{(BR)EBO}$ | $I_E=(-)10\mu\text{A}, I_C=0$      | (-)5         |        | V    |               |
| Collector Cutoff Current               | $I_{CBO}$     | $V_{CB}=(-)50\text{V}, I_E=0$      |              |        | (-)1 | $\mu\text{A}$ |
| Emitter Cutoff Current                 | $I_{EBO}$     | $V_{EB}=(-)4\text{V}, I_C=0$       |              |        | (-)1 | $\mu\text{A}$ |

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# 2SB631, 631K/2SD600, 600K

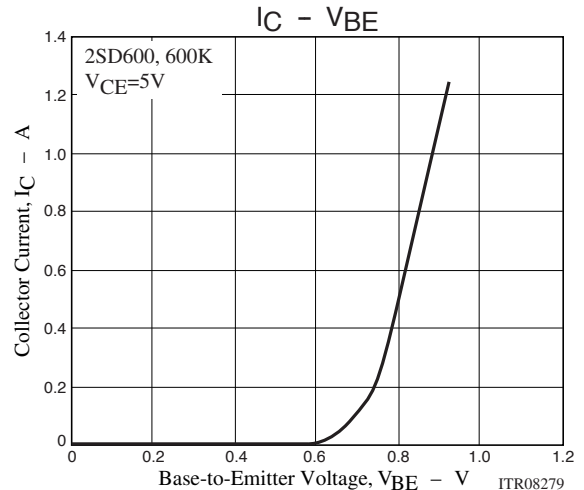
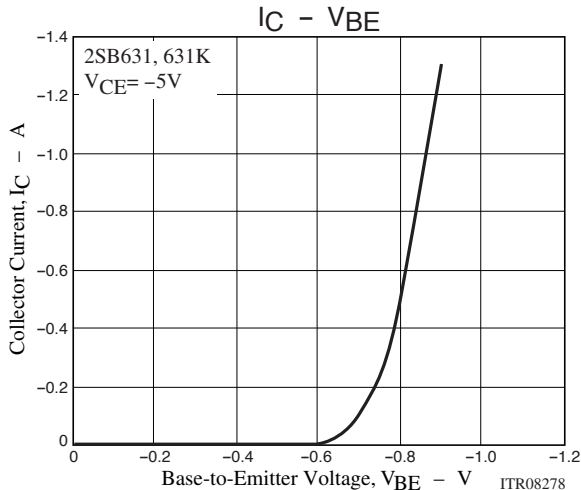
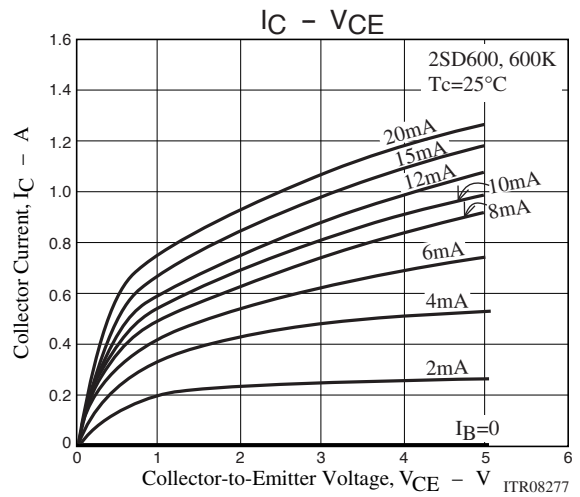
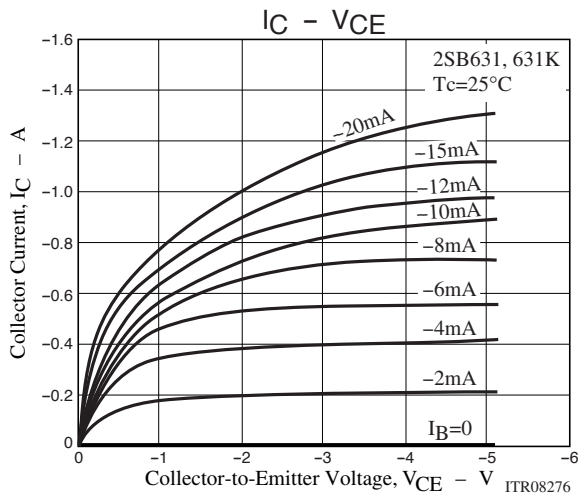
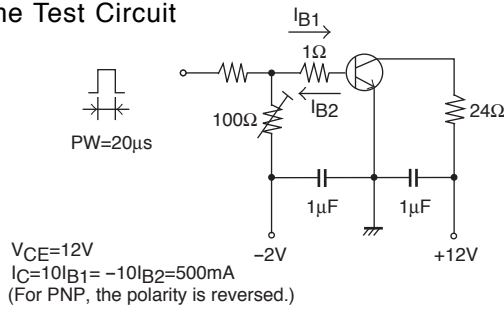
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| Parameter                               | Symbol        | Conditions                   | Ratings |              |        | Unit       |
|---|---------------|------------------------------|---------|--------------|--------|------------|
|   |               |                              | min     | typ          | max    |            |
| DC Current Gain                         | $h_{FE1}$     | $V_{CE}=(-)5V, I_C=(-)50mA$  | 60*     |              | 320*   |            |
|   | $h_{FE2}$     | $V_{CE}=(-)5V, I_C=(-)500mA$ | 20      |              |        |            |
| Gain-Bandwidth Product                  | $f_T$         | $V_{CE}=(-)10V, I_C=(-)50mA$ |         | (110)<br>130 |        | MHz<br>MHz |
| Output Capacitance                      | $C_{ob}$      | $V_{CB}=(-)10V, f=1MHz$      |         | (30)20       |        | pF         |
| Collector-to-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C=(-)500mA, I_B=(-)50mA$  |         | (-)0.15      | (-)0.4 | V          |
| Base-to-Emitter Saturation Voltage      | $V_{BE(sat)}$ | $I_C=(-)500mA, I_B=(-)50mA$  |         | (-)0.85      | (-)1.2 | V          |
| Fall Time                               | $t_f$         | See specified Test Circuit   |         | (80)         |        | ns         |
|   |               |                              |         | 100          |        | ns         |
| Turn-OFF Time                           | $t_{off}$     | See specified Test Circuit   |         | (100)        |        | ns         |
|   |               |                              |         | 500          |        | ns         |
| Storage Time                            | $t_{stg}$     | See specified Test Circuit   |         | (600)        |        | ns         |
|   |               |                              |         | 700          |        | ns         |

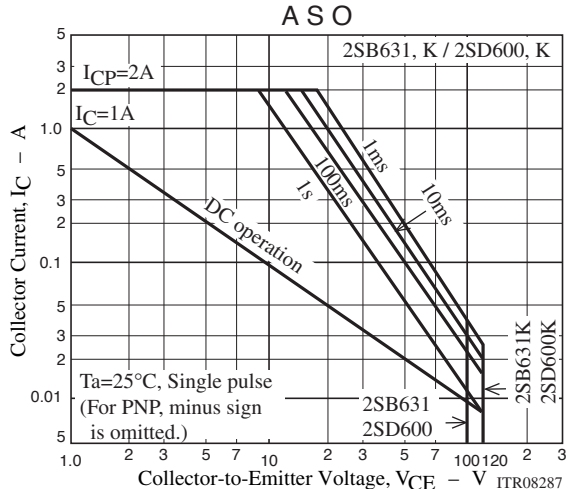
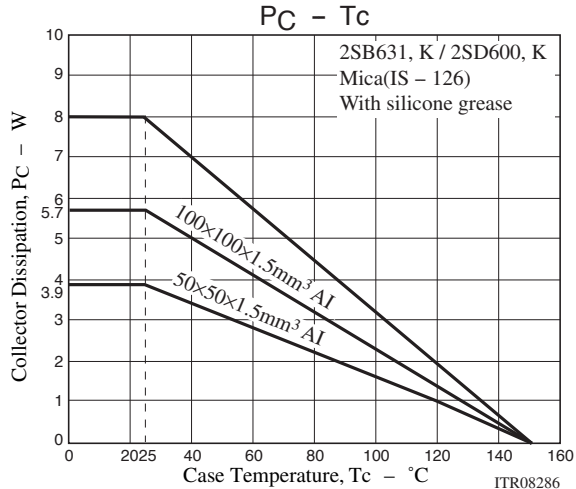
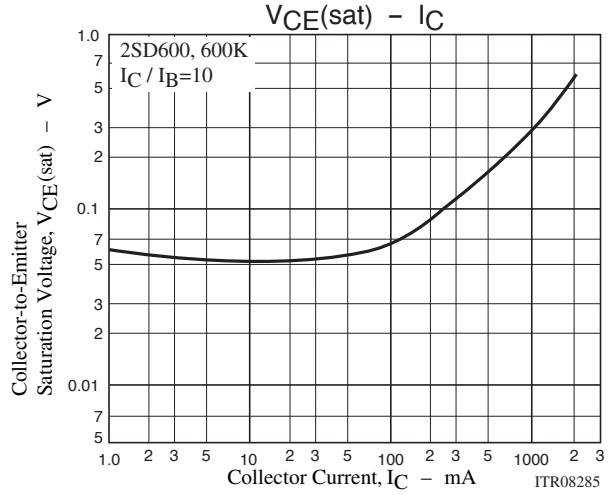
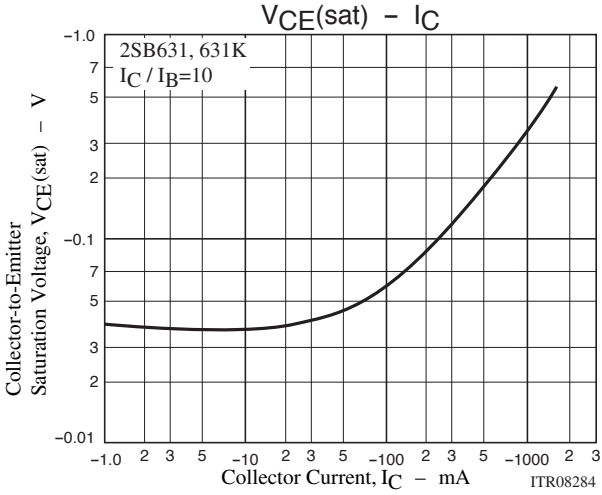
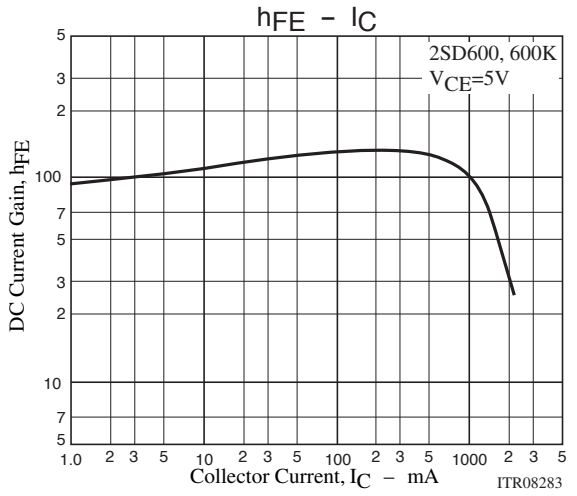
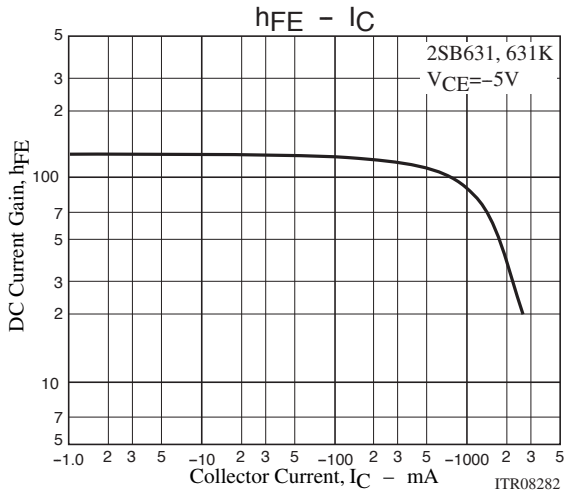
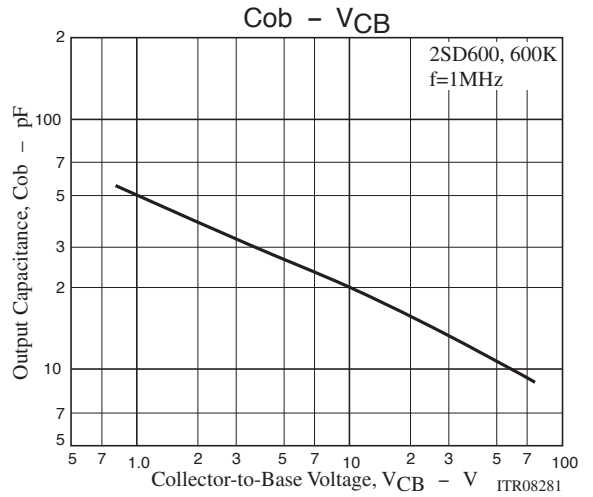
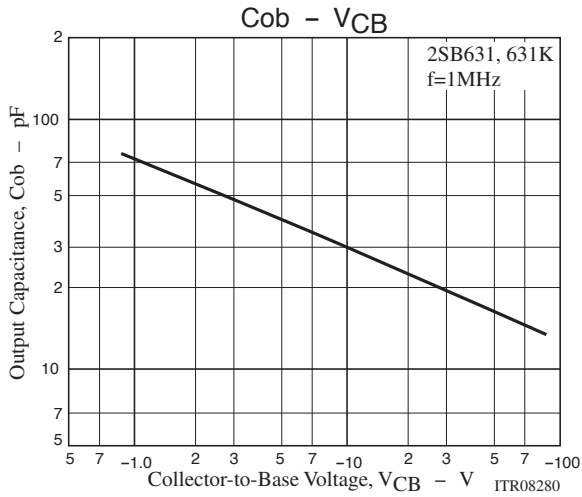
\* : The 2SB631/2SD600 are classified by 50mA  $h_{FE}$  as follows :

| Rank     | D         | E          | F          |
|----------|-----------|------------|------------|
| $h_{FE}$ | 60 to 120 | 100 to 200 | 160 to 320 |

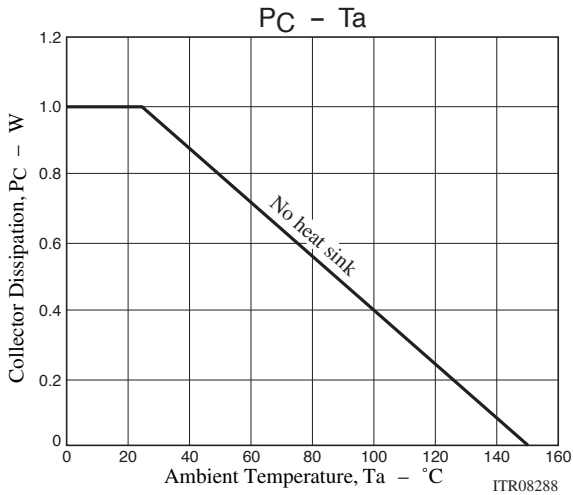
## Switching Time Test Circuit



# 2SB631, 631K/2SD600, 600K



## 2SB631, 631K/2SD600, 600K



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