



## 2SA2013/2SC5566

### DC/DC Converter Applications

#### Applications

- Relay drivers, lamp drivers, motor drivers, strobes.

#### Features

- Adoption of FBET and MBIT processes.
- High current capacitance.
- Low collector-to-emitter saturation voltage.
- High-speed switching.
- Ultrasmall package facilitates miniaturization in end products.
- High allowable power dissipation.

#### Specifications

( ) : 2SA2013

##### Absolute Maximum Ratings at Ta = 25°C

| Parameter                    | Symbol    | Conditions   | Ratings     | Unit |
|------------------------------|-----------|--|-------------|------|
| Collector-to-Base Voltage    | $V_{CBO}$ |  | (-50)80     | V    |
| Collector-to-Emitter Voltage | $V_{CEO}$ |  | (-50)       | V    |
| Emitter-to-Base Voltage      | $V_{EBO}$ |  | (-6)        | V    |
| Collector Current            | $I_C$     |  | (-4)        | A    |
| Collector Current (Pulse)    | $I_{CP}$  |  | (-7)        | A    |
| Base Current                 | $I_B$     |  | (-600)      | mA   |
| Collector Dissipation        | $P_C$     | Mounted on a ceramic board (250mm <sup>2</sup> ×0.8mm) | 1.3         | W    |
|                              |           | $T_c=25^\circ\text{C}$                                 | 3.5         | W    |
| Junction Temperature         | $T_j$     |  | 150         | °C   |
| Storage Temperature          | $T_{stg}$ |  | -55 to +150 | °C   |

##### Electrical Characteristics at Ta = 25°C

| Parameter                | Symbol    | Conditions                                  | Ratings |        |      | Unit |
|--------------------------|-----------|---|---------|--------|------|------|
|                          |           |   | min     | typ    | max  |      |
| Collector Cutoff Current | $I_{CBO}$ | $V_{CB}=(-)40\text{V}, I_E=0$               |         |        | (-1) | μA   |
| Emitter Cutoff Current   | $I_{EBO}$ | $V_{EB}=(-)4\text{V}, I_C=0$                |         |        | (-1) | μA   |
| DC Current Gain          | $h_{FE}$  | $V_{CE}=(-)2\text{V}, I_C=(-)500\text{mA}$  | 200     |        | 560  |      |
| Gain-Bandwidth Product   | $f_T$     | $V_{CE}=(-)10\text{V}, I_C=(-)500\text{mA}$ |         | (360)  |      | MHz  |
|                          |           |   |         | 400    |      | MHz  |
| Output Capacitance       | $C_{ob}$  | $V_{CB}=(-)10\text{V}, f=1\text{MHz}$       |         | (24)15 |      | pF   |

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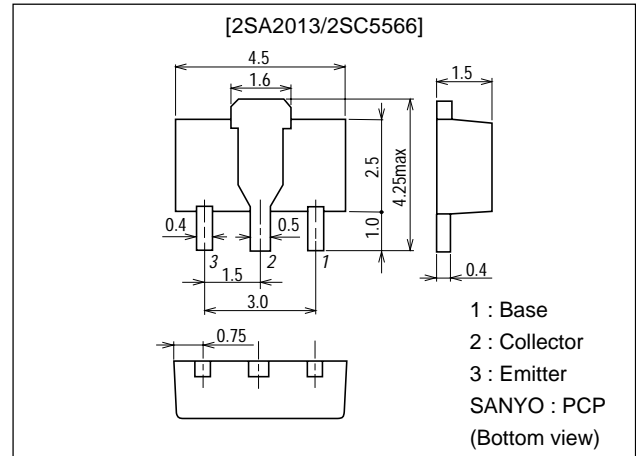
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#### Package Dimensions

unit:mm

2038A

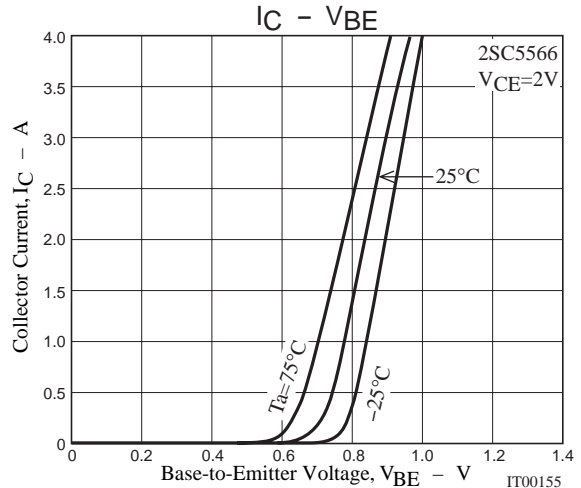
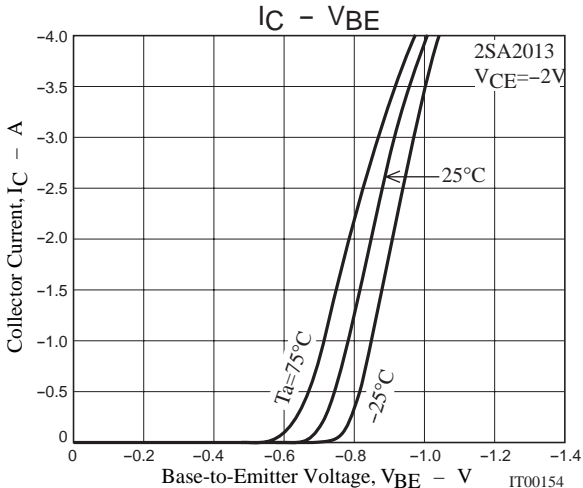
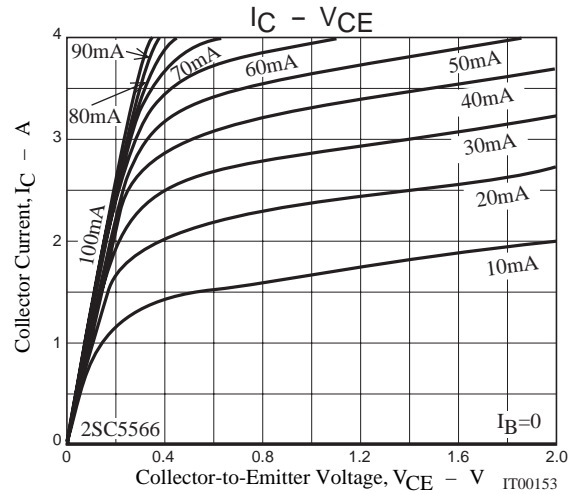
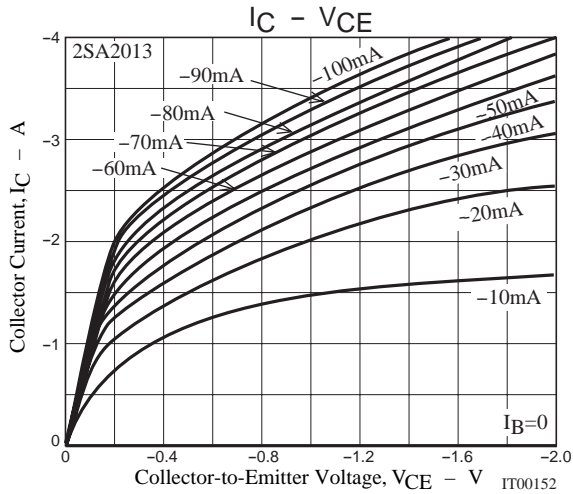
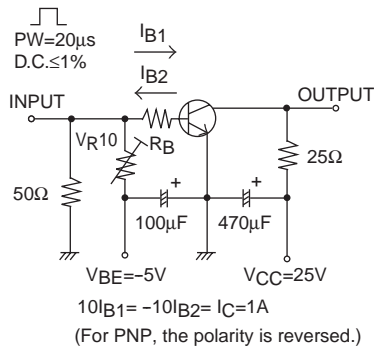


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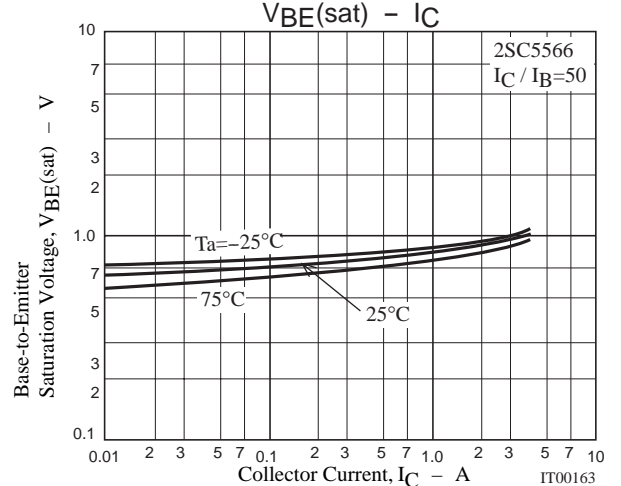
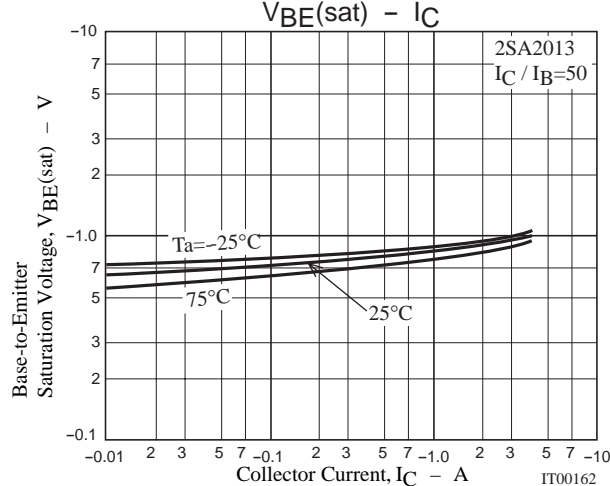
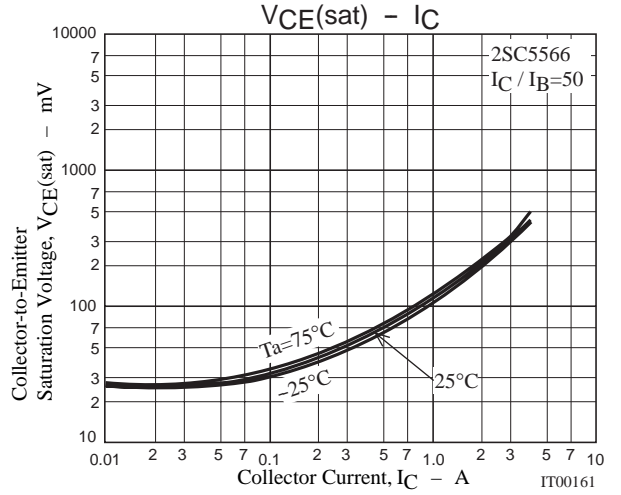
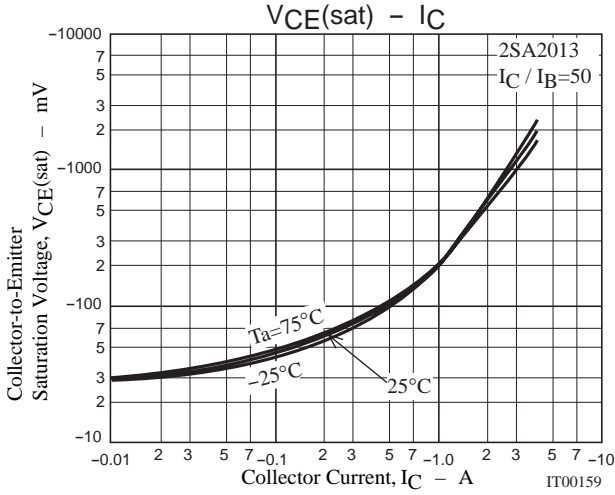
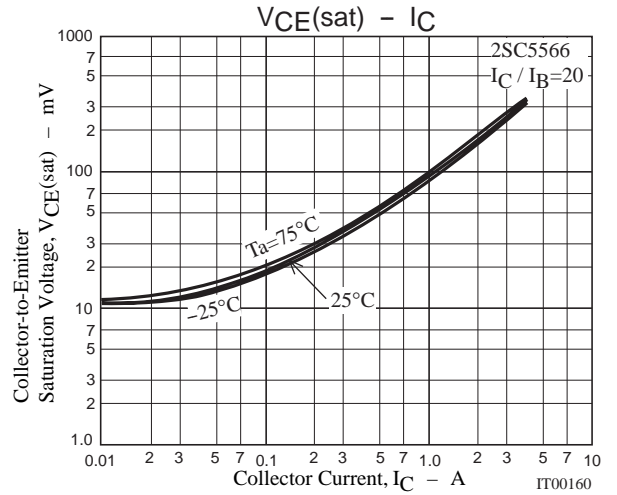
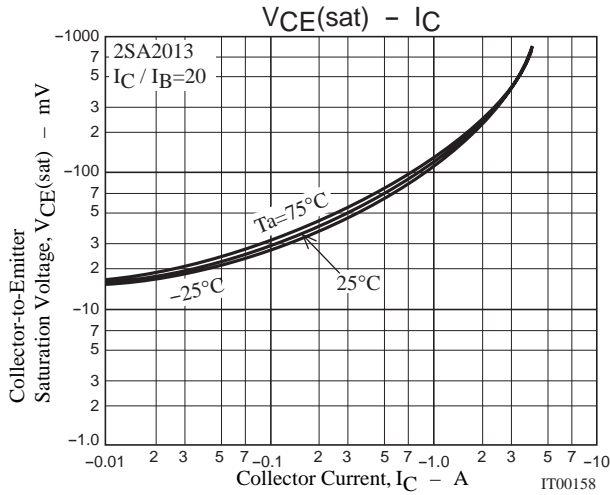
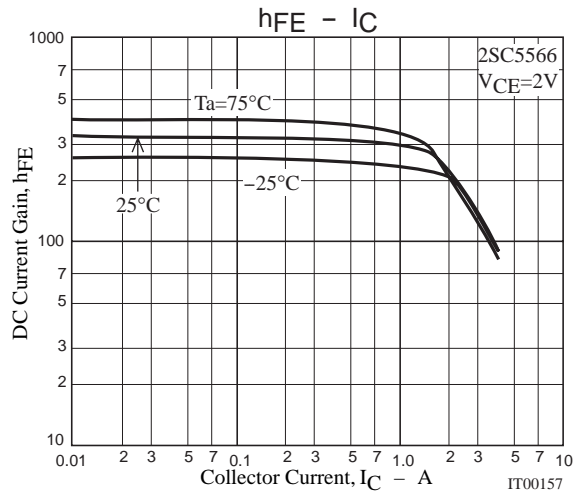
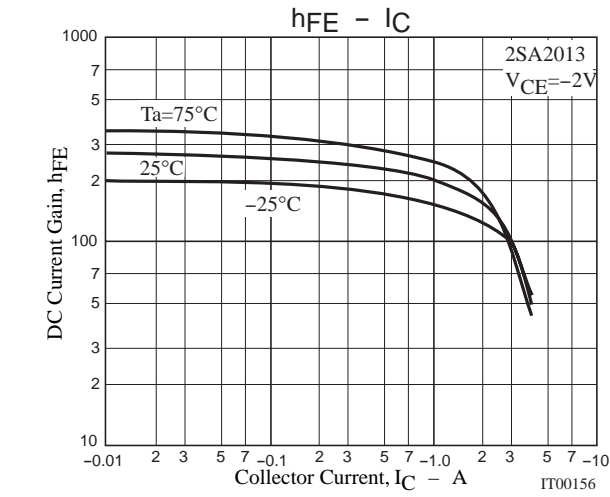
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| Parameter                               | Symbol        | Conditions                  | Ratings |         |        | Unit |
|---|---------------|-----------------------------|---------|---------|--------|------|
|   |               |                             | min     | typ     | max    |      |
| Collector-to-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C=(-)1A, I_B=(-)50mA$    |         | (-105)  | (-180) | mV   |
|   |               |                             |         | 85      | 130    | mV   |
|   |               |                             |         | (-200)  | (-340) | mV   |
|   |               | $I_C=(-)2A, I_B=(-)100mA$   |         | 150     | 225    | mV   |
| Base-to-Emitter Saturation Voltage      | $V_{BE(sat)}$ | $I_C=(-)2A, I_B=(-)100mA$   |         | (-)0.89 | (-)1.2 | V    |
| Collector-to-Base Breakdown Voltage     | $V_{(BR)CBO}$ | $I_C=(-)10\mu A, I_E=0$     | (-50)   |         |        | V    |
|   |               |                             | 80      |         |        | V    |
| Collector-to-Emitter Breakdown Voltage  | $V_{(BR)CEO}$ | $I_C=(-)1mA, R_{BE}=\infty$ | (-)50   |         |        | V    |
| Emitter-to-Base Breakdown Voltage       | $V_{(BR)EBO}$ | $I_E=(-)10\mu A, I_C=0$     | (-)6    |         |        | V    |
| Turn-ON Time                            | $t_{on}$      | See specified Test Circuit  |         | (30)35  |        | ns   |
| Storage Time                            | $t_{stg}$     | See specified Test Circuit  |         | (230)   |        | ns   |
|   |               |                             |         | 300     |        | ns   |
| Fall Time                               | $t_f$         | See specified Test Circuit  |         | (15)20  |        | ns   |

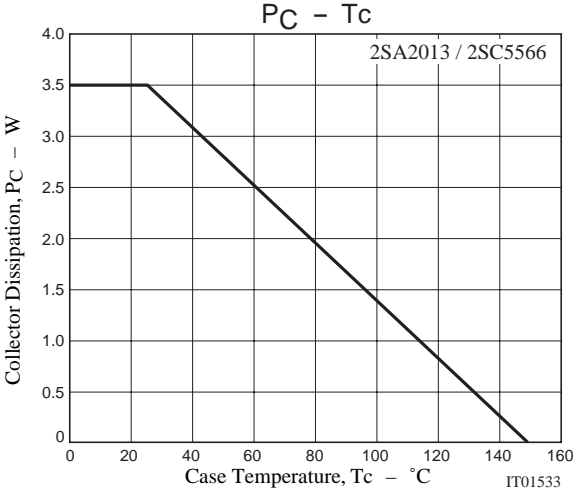
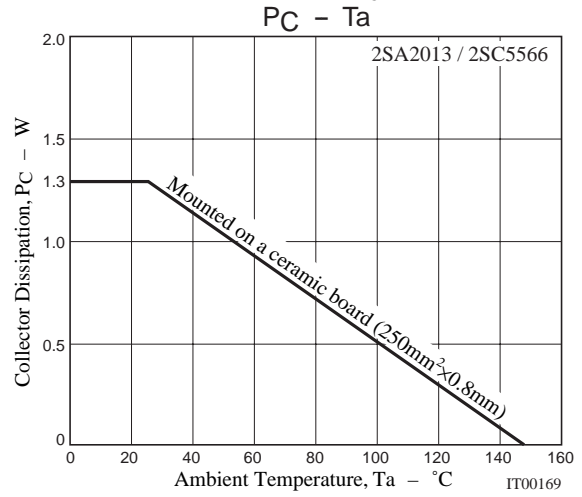
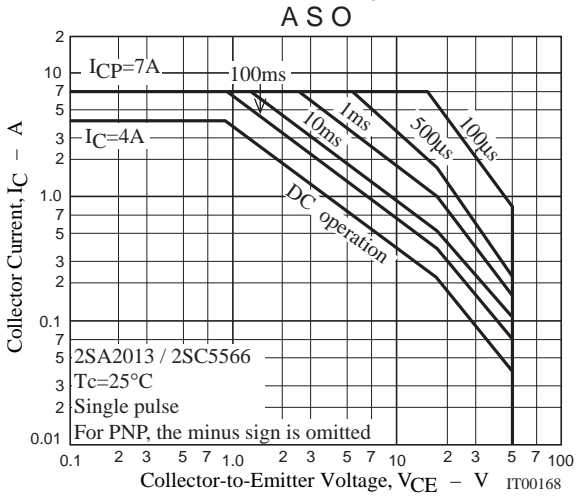
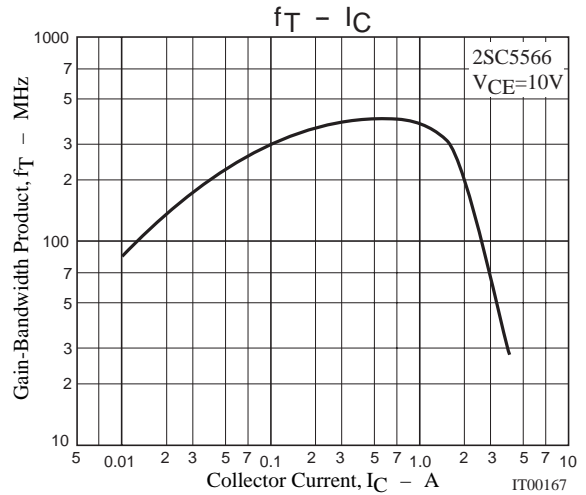
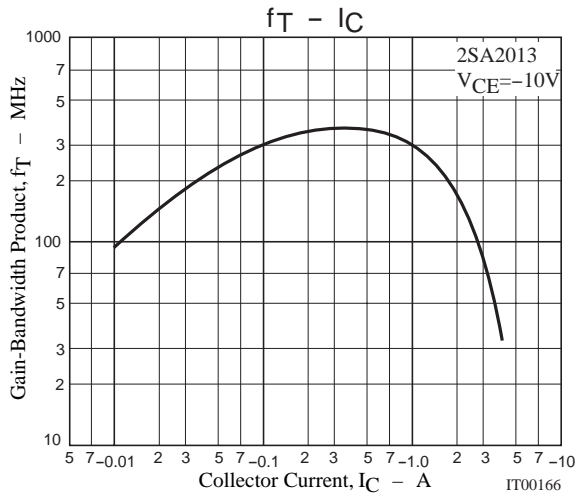
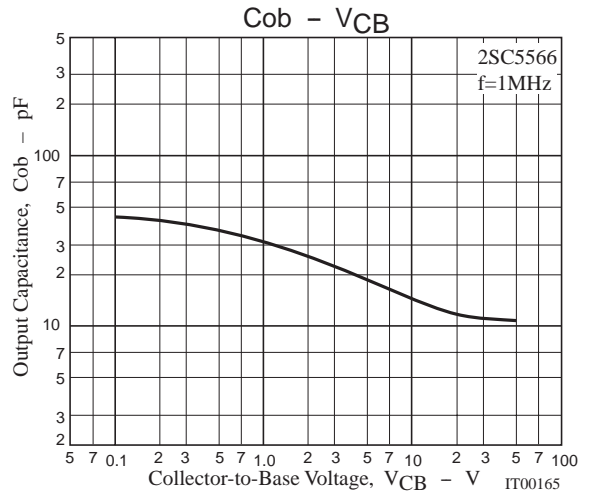
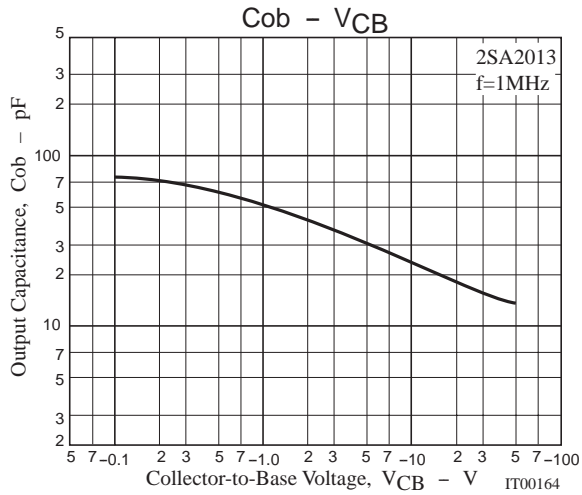
## Switching Time Test Circuit



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