

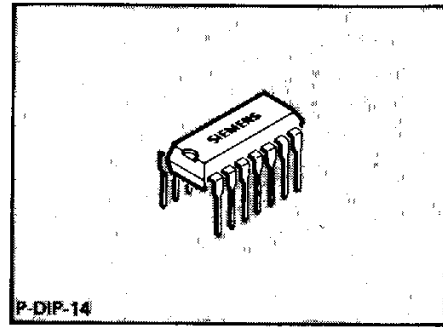
SIEMENS

SIEMENS AKTIENGESELLSCHAFT

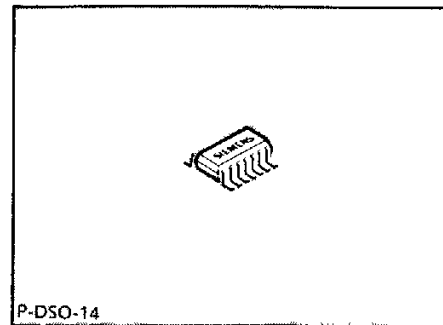
T-43-25

Transistor Array with 5 NPN Transistors**TCA 671****TCA 871****TCA 971****TCA 991****Bipolar IC****Features**

- Versatile use
- Slight V_{BE} and B deviations
- High output current
- Good thermal matching
- TCA 971; G/TCA 991; G compatible with 3045/46/86 and 3146

**4**

| Type | Ordering Code | Package |
|------------|---------------|----------------|
| STCA 671 | Q67000-T1 | P-DIP-14 |
| STCA 671 G | Q67000-A2366 | P-DSO-14 (SMD) |
| STCA 871 | Q67000-T2 | P-DIP-14 |
| STCA 871 G | Q67000-A2367 | P-DSO-14 (SMD) |
| STCA 971 | Q67000-T11 | P-DIP-14 |
| STCA 971 G | Q67000-A8075 | P-DSO-14 (SMD) |
| STCA 991 | Q67000-T12 | P-DIP-14 |
| STCA 991 G | Q67000-A8076 | P-DSO-14 (SMD) |



TCA 671, TCA 871, TCA 971, and TCA 991 are monolithic integrated transistor arrays each consisting of five NPN transistors. The arrays are well suited for switching and amplifying applications up to approx. 30 MHz. Due to a uniform design, the transistor characteristics show only slight deviations. The arrays are preferably intended for lamp drivers, amplifiers, pulse generators, and types TCA 971 and TCA 991 especially for discrete differential amplifiers.

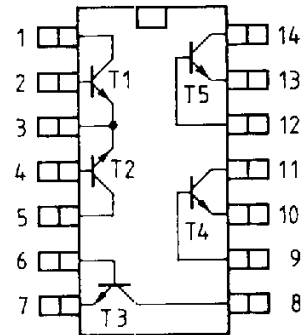
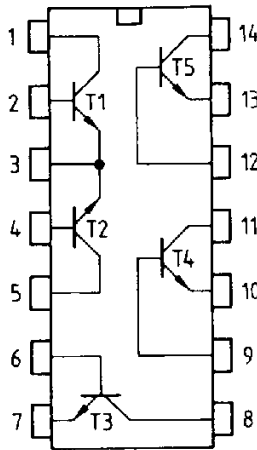
Pin Configurations
(top view)

TCA 671, TCA 871
TCA 971, TCA 991

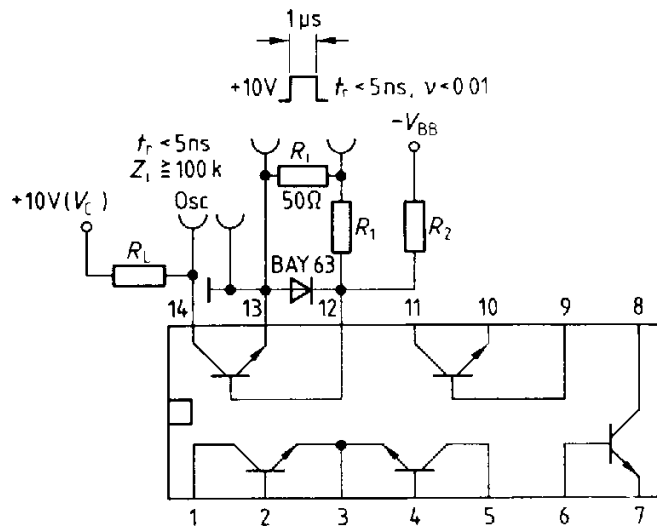
substrate = pin 3
substrate = pin 13

TCA 671 G, TCA 871 G,
TCA 971 G, TCA 991 G

Substrate connection has to be on the most negative potential.



Test Circuit for Switching Times



Switching Times

$I_C \quad I_{B1} \quad -I_{B2} \approx 10 : 1.1 \text{ mA}; R_1 = 5 \text{ k}\Omega; R_2 = 5 \text{ k}\Omega; V_{BB} = 3.5 \text{ V}; R_L = 990 \Omega$
 $t_{ON} 85 (< 150) \text{ ns} \quad t_{OFF} 480 (< 800) \text{ ns}$
 $I_C: I_{B1} \quad -I_{B2} \approx 100 : 10 : 10 \text{ mA}, R_1 = 500 \Omega; R_2 = 700 \Omega, V_{BB} = 5 \text{ V}; R_L = 98 \Omega$
 $t_{ON} 55 (< 150) \text{ ns} \quad t_{OFF} 450 (< 800) \text{ ns}$

Absolute Maximum Ratings

| Parameter | Symbol | Limit Values | | Unit |
|--|-------------|--------------------|--------------------|------|
| | | TCA 671 TCA 971 | TCA 871 TCA 991 | |
| Collector-base breakdown voltage | V_{CB0} | 45 | 35 | V |
| Collector-emitter breakdown voltage | V_{CE0} | 42 | 32 | V |
| Emitter-base breakdown voltage | V_{EB0} | 6 | 6 | V |
| Collector-substrate voltage ($I_C = 100 \mu\text{A}$) | V_{CS} | 70 | 60 | V |
| Collector current | I_C | 200 | 200 | mA |
| Base current | I_B | 10 | 10 | mA |
| Permissible power dissipation for a single transistor | P_{tot} | 300 | 300 | mW |
| Junction temperature | T_J | 150 | 150 | °C |
| Storage temperature range | T_{stg} | -40 to 125 | -40 to 125 | °C |
| Thermal resistance system - air | $R_{th SA}$ | 85 | 85 | K/W |
| TCA 671 G; TCA 871 G; TCA 971 G; TCA 991 G | $R_{th SA}$ | 145 | 145 | K/W |

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Operating Range

| Ambient temperature | T_A | -25 to 85 | -25 to 85 | °C |
|---------------------|-------|-----------|-----------|----|
| | | | | |

Characteristics $T_A = 25^\circ\text{C}$

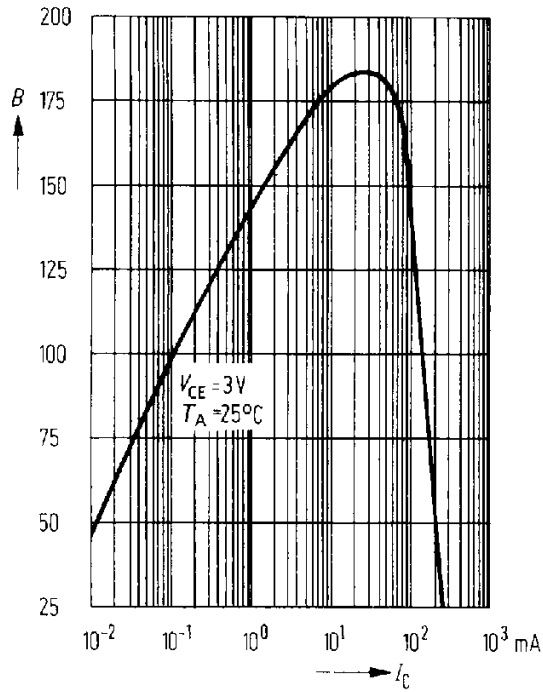
| Parameter | Symbol | Limit Values TCA 671 TCA 971 | | | Limit Values TCA 871 TCA 991 | | | Unit |
|---|----------------------------------|------------------------------------|------|------|------------------------------------|------|------|---------------|
| | | min. | typ. | max. | min. | typ. | max. | |
| Differential base current for transistors T1 = T2 at $V_{CE} = 3 \text{ V}$, $I_C = 1 \text{ mA}$ | I_{BD} | | 0.5 | 1 | | 1 | | μA |
| Base-emitter voltage at $V_{CE} = 3 \text{ V}$, $I_C = 1 \text{ mA}$ | V_{BE} | | 0.65 | | | 0.65 | | V |
| Differential base-emitter voltage for transistors T1 + T2 at $V_{CE} = 3 \text{ V}$, $I_C = 1 \text{ mA}$ | V_{BED} | | 2 | 5 | | 4 | | mV |
| Differential base-emitter voltage for transistors T3 to T5 at $V_{CE} = 3 \text{ V}$, $I_C = 1 \text{ mA}$ | V_{BED} | | 4 | 10 | | 6 | | mV |
| Temperature coefficient of base-emitter voltage at $V_{CE} = 3 \text{ V}$, $I_C = 1 \text{ mA}$ | $\frac{\Delta V_{BE}}{\Delta T}$ | | -2 | | | -2 | | mV/K |
| Transition frequency | f_T | 300 | 550 | | 300 | 550 | | MHz |

Characteristics $T_A = 25^\circ\text{C}$

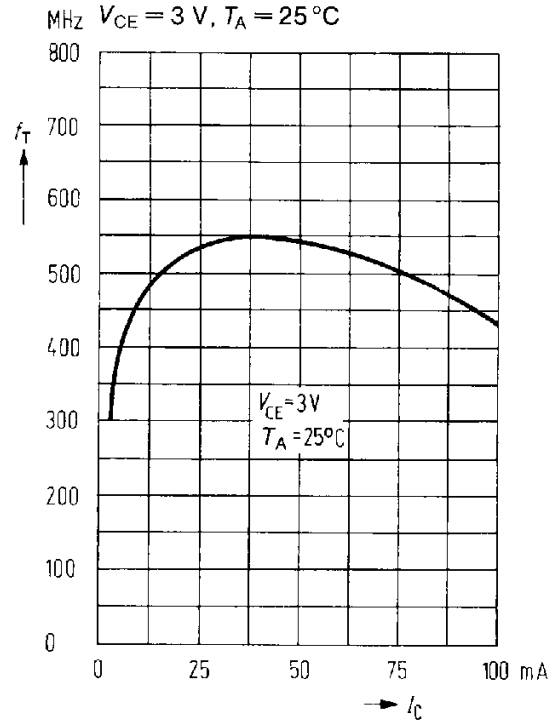
| Parameter | Symbol | Limit Values TCA 671 TCA 971 | | | Limit Values TCA 871 TCA 991 | | | Unit |
|---|---------------------|------------------------------------|------|------|------------------------------------|------|------|---------------|
| | | min. | typ. | max. | min. | typ. | max. | |
| Collector-base breakdown voltage at $I_C = 100\ \mu\text{A}$, $I_E = 0$ | V_{CB0} | 45 | | | 35 | | | V |
| Collector-emitter breakdown voltage at $I_C = 100\ \mu\text{A}$, $I_B = 0$ | V_{CE0} | 42 | | | 32 | | | V |
| Collector-substrate breakdown voltage at $I_C = 100\ \mu\text{A}$, $I_{CS} = 0$ | V_{CS} | 70 | | | 60 | | | V |
| Emitter-base breakdown voltage at $I_E = 100\ \mu\text{A}$, $I_C = 0$ | V_{EB0} | 6 | | | 6 | | | V |
| Collector-emitter saturation voltage at $I_C = 50\ \text{mA}$; $I_B = 5\ \text{mA}$ | $V_{CE\text{ Sat}}$ | | 200 | 350 | | 200 | 350 | mV |
| Collector-base cutoff current at $V_{CB} = 25\ \text{V}$, $I_E = 0$ | I_{CB0} | | 0.02 | 1 | | 0.02 | 10 | μA |
| Collector-emitter cutoff current at $V_{CE} = 25\ \text{V}$, $I_B = 0$ | I_{CE0} | | | 1 | | | 10 | μA |
| Static current gain at $V_{CE} = 3\ \text{V}$, $I_C = 100\ \mu\text{A}$ | B | 40 | 80 | | 40 | 80 | | |
| at $V_{CE} = 3\ \text{V}$, $I_C = 1\ \text{mA}$ | | 100 | 140 | | 100 | 140 | | |
| at $V_{CE} = 3\ \text{V}$, $I_C = 10\ \text{mA}$ | | 100 | 160 | | 100 | 160 | | |
| at $V_{CE} = 3\ \text{V}$, $I_C = 100\ \text{mA}$ | | 40 | 100 | | 40 | 100 | | |

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Current gain versus collector current
 $V_{CE} = 3\text{ V}, T_A = 25^\circ\text{C}$

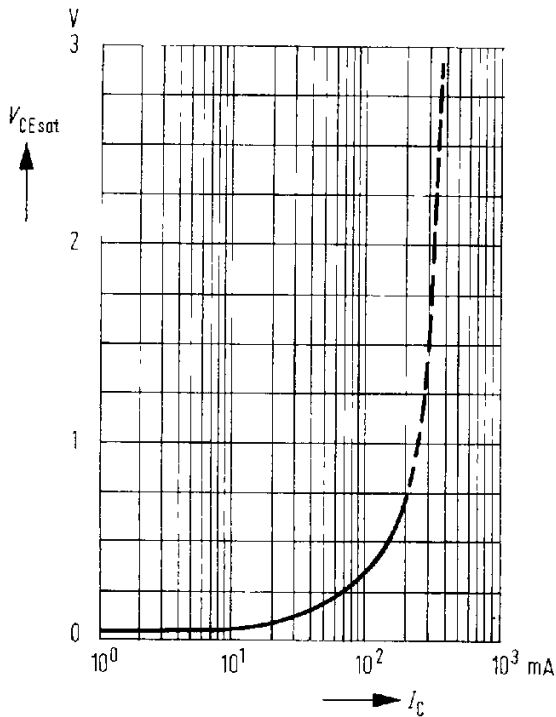


Transition frequency versus collector current
 $V_{CE} = 3\text{ V}, T_A = 25^\circ\text{C}$

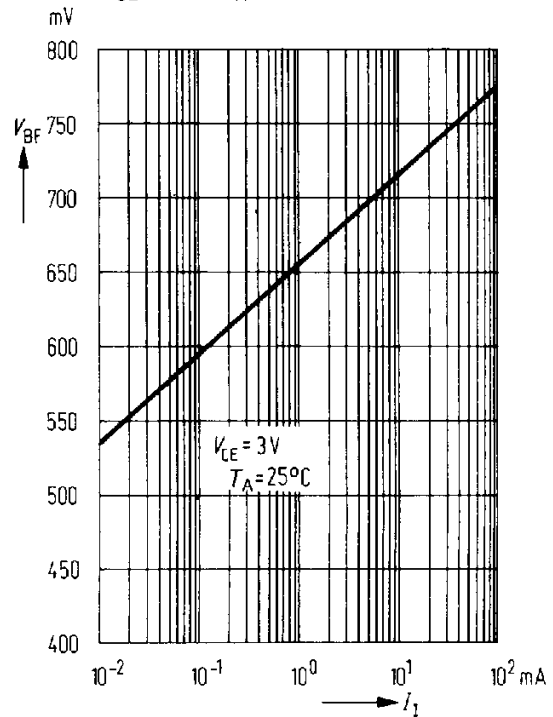


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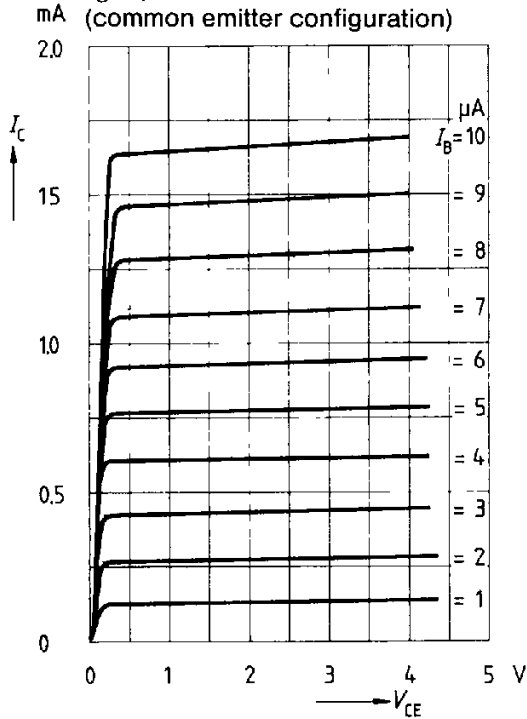
Collector-emitter saturation voltage versus collector current
 $B = 20$



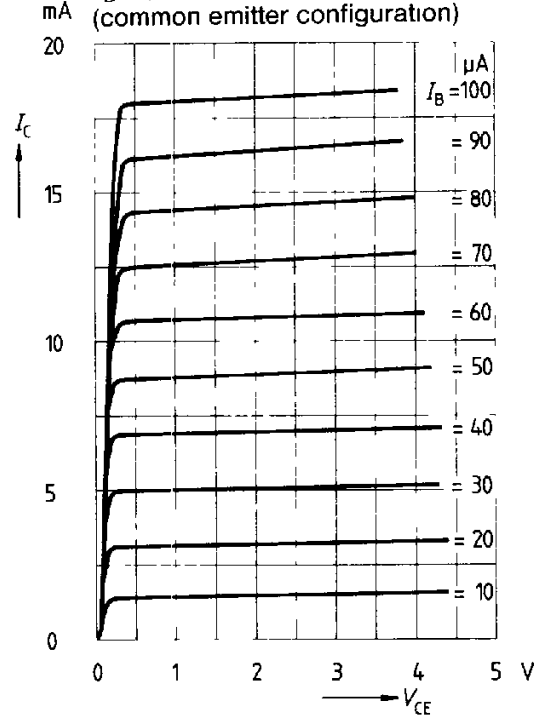
Base-emitter voltage versus input current
 $V_{CE} = 3\text{ V}; T_A = 25^\circ\text{C}$



Output characteristics
Collector current versus
collector-emitter voltage
 $I_B = \text{parameter}$
 (common emitter configuration)



Output characteristics
Collector current versus
collector-emitter voltage
 $I_B = \text{parameter}$
 (common emitter configuration)



Output characteristics
Collector current versus
collector-emitter voltage
 $I_B = \text{parameter}$
 (common emitter configuration)

