# Power transistor (–60V, –2A)

## 2SA2093

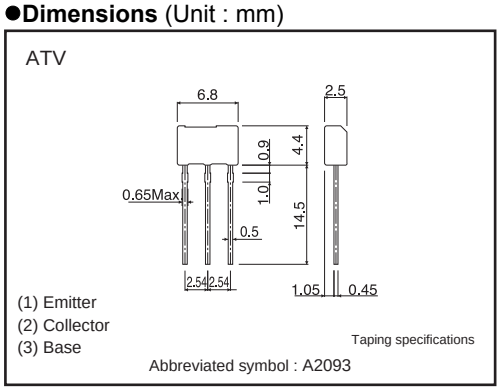
### ●Features

1) High speed switching.
   (tf : Typ. : 30ns at $I_C$ = −2A)
2) Low saturation voltage, typically
   (Typ. : −200mV at $I_C$ = −1.0A, $I_B$ = −0.1A)
3) Strong discharge power for inductive load and capacitance load.
4) Complements the 2SC5880

### ●Applications

Small signal low frequency amplifier
High speed switching

### ●Dimensions (Unit : mm)




### ●Structure

PNP epitaxial planar silicon transistor

### ●Packaging specifications

| | | |
|---|---|---|
| Type | Package | Taping |
| | Code | TV2 |
| | Basic ordering unit (pieces) | 2500 |
| 2SA2093 | | ◯ |

### ●Absolute maximum ratings (Ta=25°C)

| Parameter | | Symbol | Limits | Unit |
|---|---|---|---|---|
| Collector-base voltage | | $V_{CBO}$ | –60 | V |
| Collector-emitter voltage | | $V_{CEO}$ | –60 | V |
| Emitter-base voltage | | $V_{EBO}$ | –6 | V |
| Collector current | DC | $I_C$ | –2.0 | A |
| | Pulsed | $I_{CP}$ | –4.0 | A * |
| Power dissipation | | $P_C$ | 1.0 | W |
| Junction temperature | | Tj | 150 | °C |
| Range of storage temperature | | Tstg | –55 to 150 | °C |

*Pw=10ms

## ●Electrical characteristics (Ta=25°C)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Condition |
|---|---|---|---|---|---|---|
| Collector-emitter breakdown voltage | $BV_{CEO}$ | –60 | – | – | V | $I_C$= –1mA |
| Collector-base breakdown voltage | $BV_{CBO}$ | –60 | – | – | V | $I_C$= –100μA |
| Emitter-base breakdown voltage | $BV_{EBO}$ | –6 | – | – | V | $I_E$= –100μA |
| Collector cut-off current | $I_{CBO}$ | – | – | –1.0 | μA | $V_{CB}$= –40V |
| Emitter cut-off current | $I_{EBO}$ | – | – | –1.0 | μA | $V_{EB}$= –4V |
| Collector-emitter saturation voltage | $V_{CE\ (sat)}$ | – | –200 | –500 | mV | $I_C$= –1.0A<br>$I_B$= –100mA |
| DC current gain | $h_{FE}$ | 120 | – | 390 | – | $V_{CE}$= –2V<br>$I_C$= –100mA |
| Transition frequency | $f_T$ | – | 310 | – | MHz | $V_{CE}$= –10V *<br>$I_E$=100mA<br>f=10MHz |
| Corrector output capacitance | Cob | – | 25 | – | pF | $V_{CB}$= –10V<br>$I_E$=0mA<br>f=1MHz |
| Turn-on time | Ton | – | 25 | – | ns | $I_C$= –2.0A * |
| Storage time | Tstg | – | 120 | – | ns | $I_{B1}$= –200mA<br>$I_{B2}$=200mA |
| Fall time | Tf | – | 30 | – | ns | $V_{CC}$≒ –25V |

*Single non repetitive pulse

## ●$h_{FE}$ RANK

| Q | R |
|---|---|
| 120–270 | 180–390 |

## ●Electrical characteristic curves

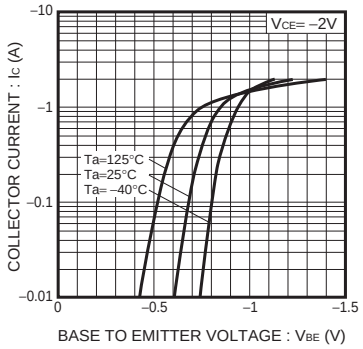



Fig.1 Grounded Emitter Propagation Characteristics

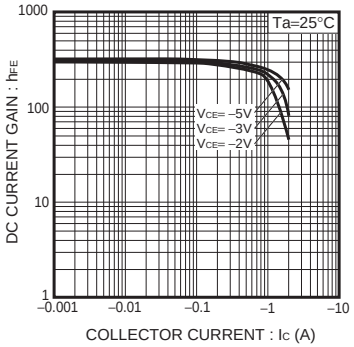



Fig.2 DC Current Gain vs. Collector Current (I)

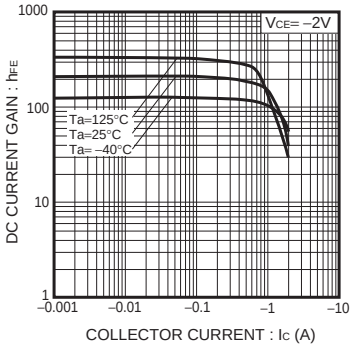



Fig.3 DC Current Gain vs. Collector Current (II)

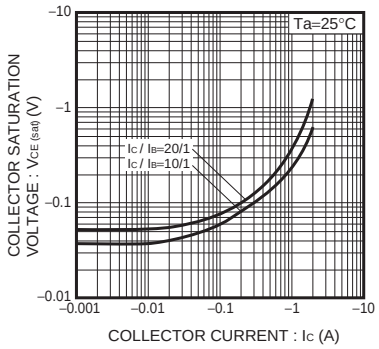



Fig.4 Collector-Emitter Saturation Voltage vs. Collector Current (I)

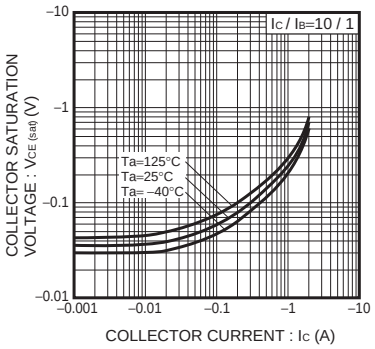



Fig.5 Collector-Emitter Saturation Voltage vs. Collector Current (II)

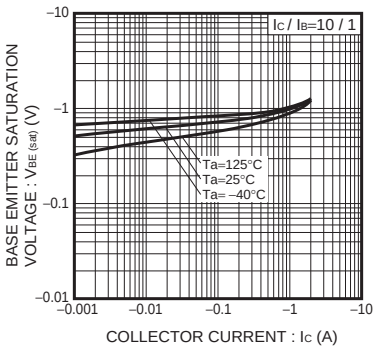



Fig.6 Base-Emitter Saturation Voltage vs. Collecter Current

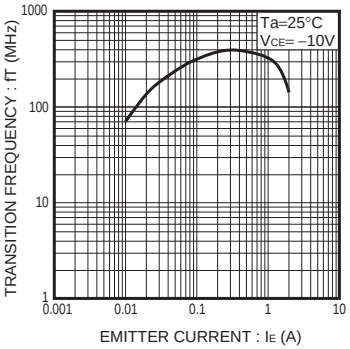



Fig.7 Transition Frequency

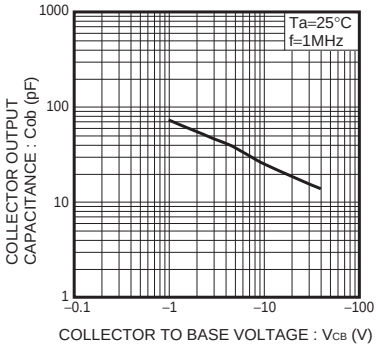



Fig.8 Collector Output Capacitance

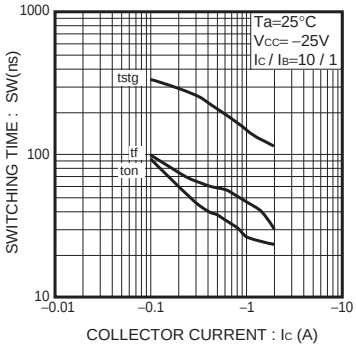
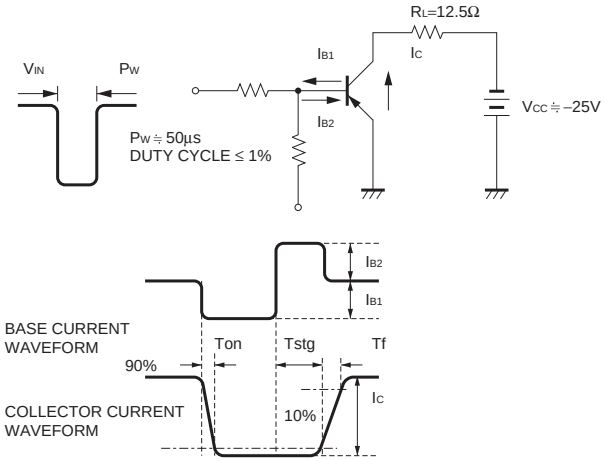



Fig.9 Switching Time

## ●Switching characteristics measurement circuits



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