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# General purpose transistor (isolated transistor and diode)

# QSZ4

A 2SB1706 and a 2SD2671 are housed independently in a TSMT5 package.

**●Applications**

DC / DC converter
Motor driver

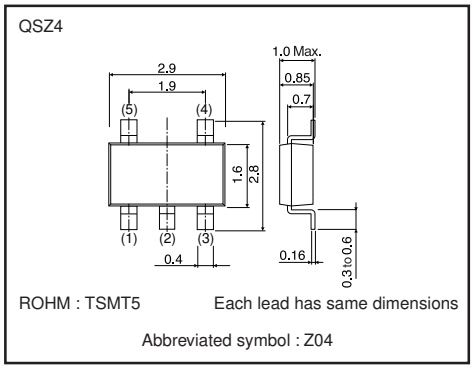
**●Features**

1) Low $V_{CE}$(sat)
2) Small package

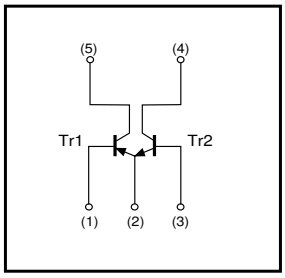
**●Structure**

Silicon epitaxial planar transistor

**●Dimensions** (Unit : mm)




**●Equivalent circuit**




**●Packaging specifications**

| Type | QSZ4 |
|---|---|
| Package | TSMT5 |
| Marking | Z04 |
| Code | TR |
| Basic ordering unit(pieces) | 3000 |

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

Tr1

| Parameter | Symbol | Limits | Unit |
|---|---|---|---|
| Collector-base voltage | $V_{CBO}$ | −30 | V |
| Collector-emitter voltage | $V_{CEO}$ | −30 | V |
| Emitter-base voltage | $V_{EBO}$ | −6 | V |
| Collector current | $I_C$ | −2 | A |
| | $I_{CP}$ | −4 | A *1 |
| Power dissipation | Pc | 500 | mW/Total *2 |
| | | 1.25 | W/Total *3 |
| | | 0.9 | W/Element *3 |
| Junction temperature | Tj | 150 | °C |
| Range of storage temperature | Tstg | −55 to +150 | °C |

*1 Single pulse, Pw=1ms.
*2 Each terminal mounted on a recommended land.
*3 Mounted on a 25×25×0.8mm ceramic substrate.

Tr 2

| Parameter | Symbol | Limits | Unit |
|---|---|---|---|
| Collector-base voltage | $V_{CBO}$ | 30 | V |
| Collector-emitter voltage | $V_{CEO}$ | 30 | V |
| Emitter-base voltage | $V_{EBO}$ | 6 | V |
| Collector current | $I_C$ | 2 | A |
| | $I_{CP}$ | 4 | A *1 |
| Power dissipation | Pc | 500 | mW/Total *2 |
| | | 1.25 | W/Total *3 |
| | | 0.9 | W/Element *3 |
| Junction temperature | Tj | 150 | °C |
| Range of storage temperature | Tstg | −55 to +150 | °C |

*1 Single pulse, Pw=1ms.
*2 Each terminal mounted on a recommended land.
*3 Mounted on a 25×25×0.8mm ceramic substrate.

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

Tr1

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| Collector-base breakdown voltage | $BV_{CBO}$ | −30 | – | – | V | $I_C$= −10μA |
| Collector-emitter breakdown voltage | $BV_{CEO}$ | −30 | – | – | V | $I_C$= −1mA |
| Emitter-base breakdown voltage | $BV_{EBO}$ | −6 | – | – | V | $I_E$= −10μA |
| Collector cutoff current | $I_{CBO}$ | – | – | −100 | nA | $V_{CB}$= −30V |
| Emitter cutoff current | $I_{EBO}$ | – | – | −100 | nA | $V_{EB}$= −6V |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | – | −180 | −370 | mV | $I_C$= −1.5A, $I_B$= −75mA |
| DC current gain | $h_{FE}$ | 270 | – | 680 | – | $V_{CE}$= −2V, $I_C$= −200mA* |
| Transition frequency | $f_T$ | – | 280 | – | MHz | $V_{CE}$= −2V, $I_E$=200mA, f=100MHz* |
| Collector output capacitance | Cob | – | 20 | – | pF | $V_{CB}$= −10V, $I_E$=0A, f=1MHz |

* Pulsed

Tr 2

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| Collector-base breakdown voltage | $BV_{CBO}$ | 30 | – | – | V | $I_C$=10μA |
| Collector-emitter breakdown voltage | $BV_{CEO}$ | 30 | – | – | V | $I_C$=1mA |
| Emitter-base breakdown voltage | $BV_{EBO}$ | 6 | – | – | V | $I_E$=10μA |
| Collector cutoff current | $I_{CBO}$ | – | – | 100 | nA | $V_{CB}$=30V |
| Emitter cutoff current | $I_{EBO}$ | – | – | 100 | nA | $V_{EB}$=6V |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | – | 180 | 370 | mV | $I_C$=1.5A, $I_B$=75mA |
| DC current gain | $h_{FE}$ | 270 | – | 680 | – | $V_{CE}$=2V, $I_C$=200mA* |
| Transition frequency | $f_T$ | – | 280 | – | MHz | $V_{CE}$=2V, $I_E$= −200mA, f=100MHz* |
| Collector output capacitance | Cob | – | 20 | – | pF | $V_{CB}$=10V, $I_E$=0A, f=1MHz |

* Pulsed

**●Electrical characteristic curves**

Tr1(PNP)

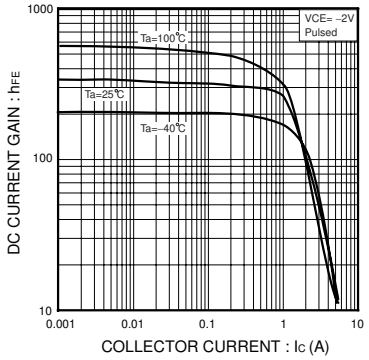



Fig.1 DV current gain vs. collector current

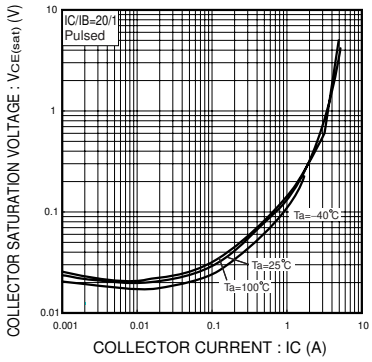



Fig.2 Collector-emitter saturation voltage vs. collector current

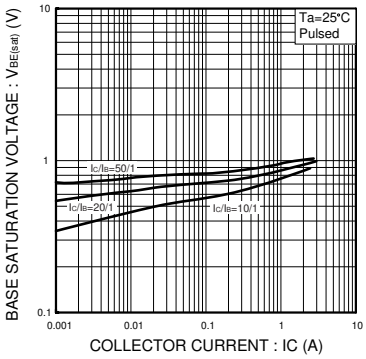



Fig.3 Base-emitter saturation voltage vs. collectir current

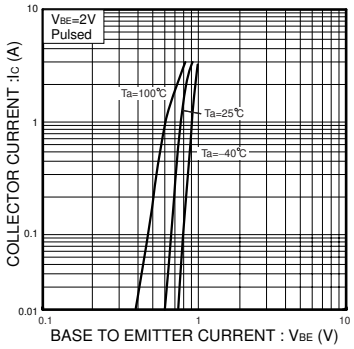



Fig.4 Grounded emitter propagation characteristics

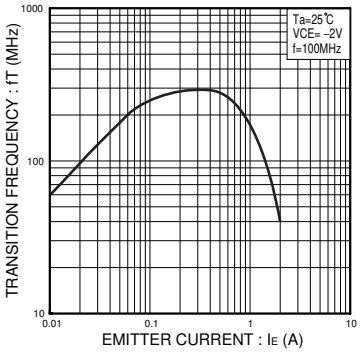



Fig.5 Gain bandwidth product vs. emitter curent

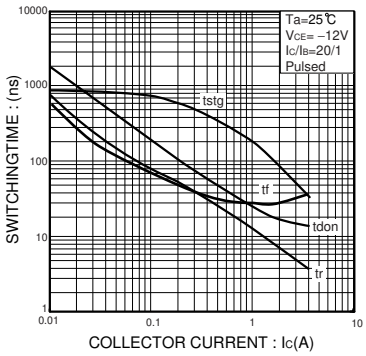



Fig.6 Switching time

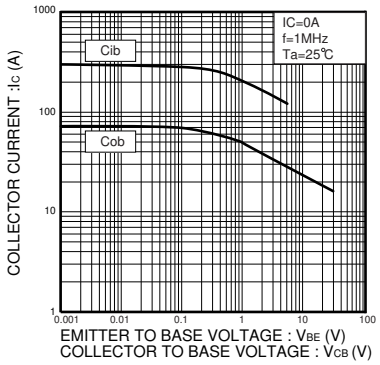



Fig.7 Collector output capacitance vs. collector-base voltage
Emitter input capacitance vs. emitter-base voltage

Tr2(NPN)

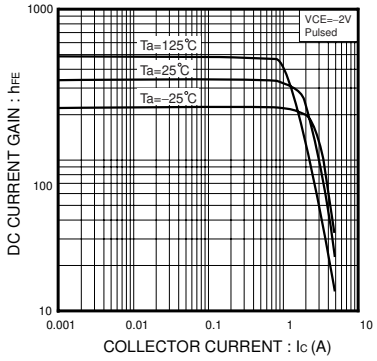



Fig.8 DC current gain
vs. collector current

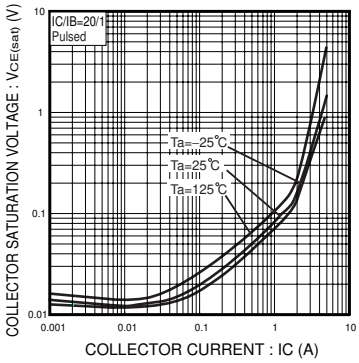



Fig.9 Collector-emitter saturation voltage
base-emitter saturation voltage
vs. collector current

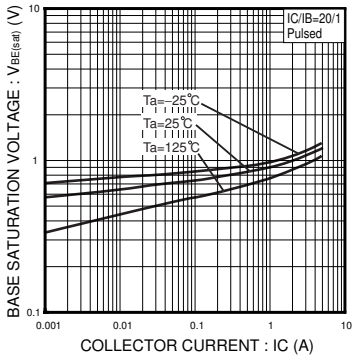



Fig.10 Base-emitter saturation voltage
vs. collector current

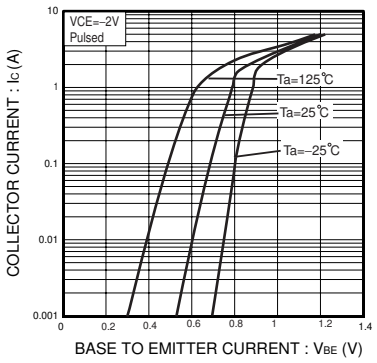



Fig.11 Grounded emitter propagation
characteristics

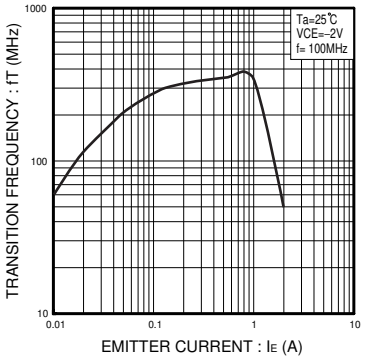



Fig.12 Gain bandwidth product
vs. emitter current

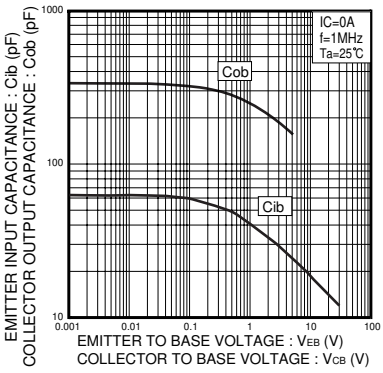



Fig.13 Collector output chapacitance
vs. collector-base voltage
Emitter input capacitance
vs. emitter-base voltage

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ROHM CO., LTD. 21 Saiin Mizosaki-cho, Ukyo-ku, Kyoto 615-8585, Japan
TEL : +81-75-311-2121
FAX : +81-75-315-0172