

## Transistors

# 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

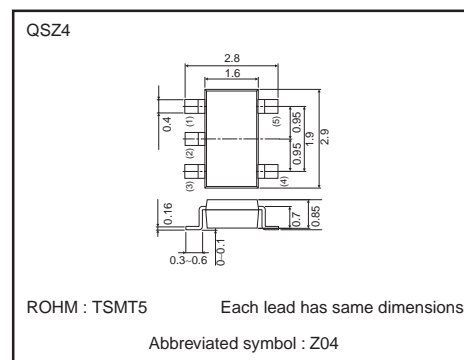
### ●Features

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

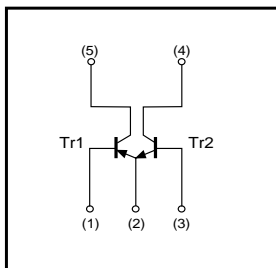
### ●Structure

Silicon epitaxial planar transistor

### ●External dimensions (Unit : mm)



### ●Equivalent circuit



### ●Packaging specifications

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

## Transistors

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

## Tr1

Parameter	Symbol	Limits	Unit
Collector-base voltage	V <sub>CB0</sub>	-30	V
Collector-emitter voltage	V <sub>CE0</sub>	-30	V
Emitter-base voltage	V <sub>EB0</sub>	-6	V
Collector current	I <sub>C</sub>	-2	A
	I <sub>CP</sub>	-4	A *1
Power dissipation	P <sub>C</sub>	500	mW/Total *2
		1.25	W/Total *3
		0.9	W/Element *3
Junction temperature	T <sub>j</sub>	150	°C
Range of storage temperature	T <sub>stg</sub>	-55 to +150	°C

\*1 Single pulse, Pw=1ms.

\*2 Each terminal mounted on a recommended land.

\*3 Mounted on a 25×25×<sup>1</sup>0.8mm ceramic substrate.

## Tr 2

Parameter	Symbol	Limits	Unit
Collector-base voltage	V <sub>CB0</sub>	30	V
Collector-emitter voltage	V <sub>CE0</sub>	30	V
Emitter-base voltage	V <sub>EB0</sub>	6	V
Collector current	I <sub>C</sub>	2	A
	I <sub>CP</sub>	4	A *1
Power dissipation	P <sub>C</sub>	500	mW/Total *2
		1.25	W/Total *3
		0.9	W/Element *3
Junction temperature	T <sub>j</sub>	150	°C
Range of storage temperature	T <sub>stg</sub>	-50 to +150	°C

\*1 Single pulse, Pw=1ms.

\*2 Each terminal mounted on a recommended land.

\*3 Mounted on a 25×25×<sup>1</sup>0.8mm ceramic substrate.

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

## Tr1

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-base breakdown voltage	BV <sub>CB0</sub>	-30	-	-	V	I <sub>C</sub> =-10μA
Collector-emitter breakdown voltage	BV <sub>CE0</sub>	-30	-	-	V	I <sub>C</sub> =-1mA
Emitter-base breakdown voltage	BV <sub>EB0</sub>	-6	-	-	V	I <sub>E</sub> =-10μA
Collector cutoff current	I <sub>CB0</sub>	-	-	-100	nA	V <sub>CB</sub> =-30V
Emitter cutoff current	I <sub>EB0</sub>	-	-	-100	nA	V <sub>EB</sub> =-6V
Collector-emitter saturation voltage	V <sub>CE(sat)</sub>	-	-180	-370	mV	I <sub>C</sub> =-1.5A, I <sub>B</sub> =-75mA
DC current gain	h <sub>FE</sub>	270	-	680	-	V <sub>CE</sub> =-2V, I <sub>C</sub> =-200mA*
Transition frequency	f <sub>T</sub>	-	280	-	MHz	V <sub>CE</sub> =-2V, I <sub>E</sub> =200mA, f=100MHz*
Collector output capacitance	C <sub>ob</sub>	-	20	-	pF	V <sub>CB</sub> =-10V, I <sub>E</sub> =0A, f=1MHz

\* Pulsed

## Tr 2

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-base breakdown voltage	BV <sub>CB0</sub>	30	-	-	V	I <sub>C</sub> =10μA
Collector-emitter breakdown voltage	BV <sub>CE0</sub>	30	-	-	V	I <sub>C</sub> =1mA
Emitter-base breakdown voltage	BV <sub>EB0</sub>	6	-	-	V	I <sub>E</sub> =10μA
Collector cutoff current	I <sub>CB0</sub>	-	-	100	nA	V <sub>CB</sub> =30V
Emitter cutoff current	I <sub>EB0</sub>	-	-	100	nA	V <sub>EB</sub> =6V
Collector-emitter saturation voltage	V <sub>CE(sat)</sub>	-	180	370	mV	I <sub>C</sub> =1.5A, I <sub>B</sub> =75mA
DC current gain	h <sub>FE</sub>	270	-	680	-	V <sub>CE</sub> =2V, I <sub>C</sub> =200mA*
Transition frequency	f <sub>T</sub>	-	280	-	MHz	V <sub>CE</sub> =2V, I <sub>E</sub> =-200mA, f=100MHz*
Collector output capacitance	C <sub>ob</sub>	-	20	-	pF	V <sub>CB</sub> =10V, I <sub>E</sub> =0A, f=1MHz

\* Pulsed

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●Electrical characteristic curves

Tr1(PNP)

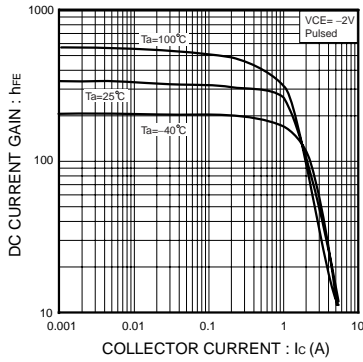


Fig.1 DV current gain vs. collector current

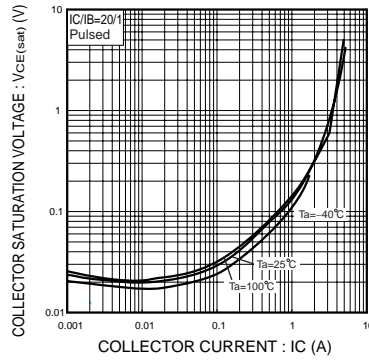


Fig.2 Collector-emitter saturation voltage vs. collector current

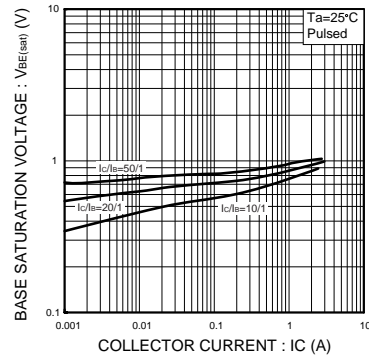


Fig.3 Base-emitter saturation voltage vs. collector current

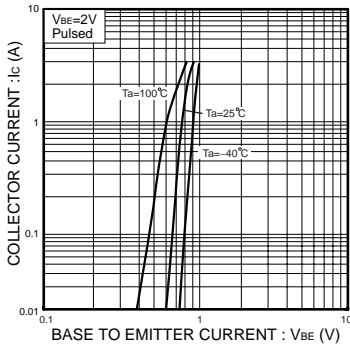


Fig.4 Grounded emitter propagation characteristics

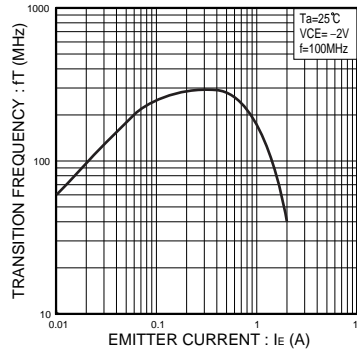


Fig.5 Gain bandwidth product vs. emitter current

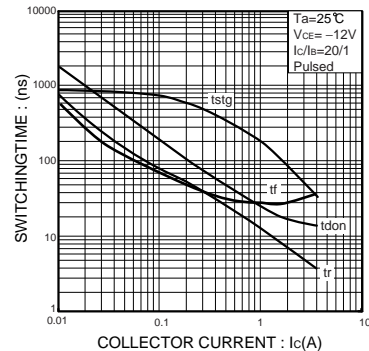


Fig.6 Switching time

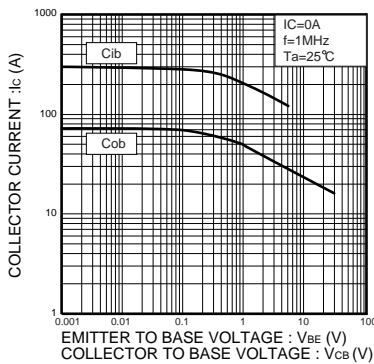


Fig.7 Collector output capacitance vs. collector-base voltage  
Emitter input capacitance vs. emitter-base voltage

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Tr2(NPN)

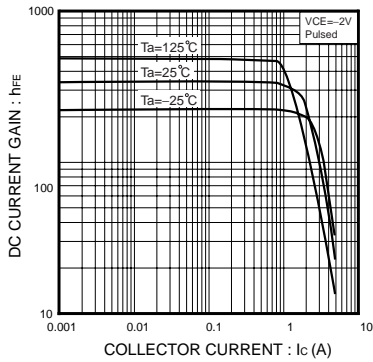


Fig.8 DC current gain vs. collector current

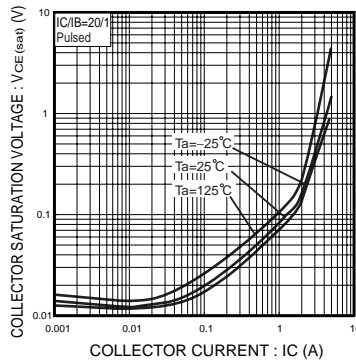


Fig.9 Collector-emitter saturation voltage base-emitter saturation voltage vs. collector current

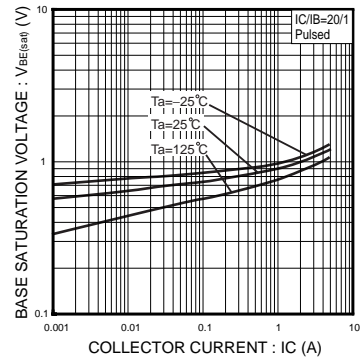


Fig.10 Base-emitter saturation voltage vs. collector current

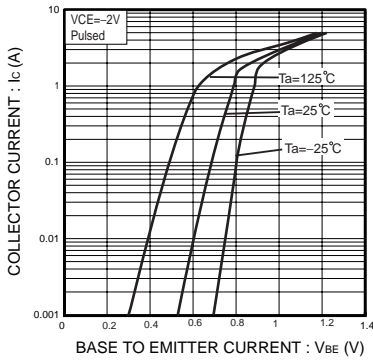


Fig.11 Grounded emitter propagation characteristics

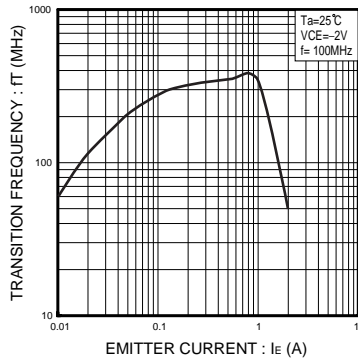


Fig.12 Gain bandwidth product vs. emitter current

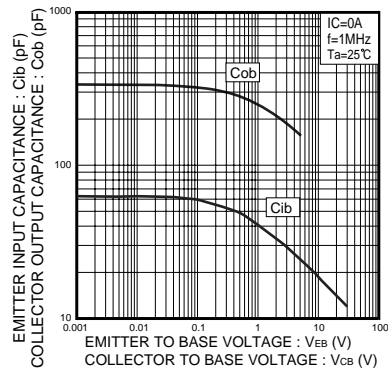


Fig.13 Collector output capacitance vs. collector-base voltage  
Emitter input capacitance vs. emitter-base voltage

## Appendix

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