

# General purpose transistor

## QSZ2

A 2SB1695 and a 2SD2657 are housed independently in a TSMT5 package.

**●Applications**

DC / DC converter  
Motor driver

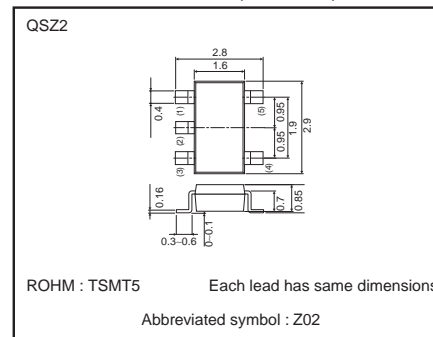
**●Features**

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

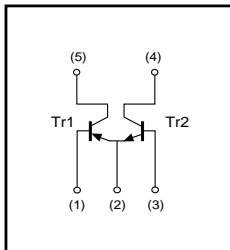
**●Structure**

Silicon epitaxial planar transistor

**●External dimensions (Unit : mm)**



**●Equivalent circuit**



**●Packaging specifications**

Type	QSZ2
Package	TSMT5
Marking	Z02
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>EBO</sub>	-6	V
Collector current	I <sub>c</sub>	-1.5	A
	I <sub>CP</sub>	-3	A *1
Collector 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
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 25mm × 25mm × 0.8mm ceramic substrate.

Tr2

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>EBO</sub>	6	V
Collector current	I <sub>c</sub>	1.5	A
	I <sub>CP</sub>	3	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 25mm × 25mm × 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>EBO</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>EBO</sub>	-	-	-100	nA	V <sub>EB</sub> =-6V
Collector-emitter saturation voltage	V <sub>CE(sat)</sub>	-	-200	-370	mV	I <sub>c</sub> =-1mA, I <sub>B</sub> =-50mA
DC current transfer ratio	h <sub>FE</sub>	270	-	680	-	V <sub>CE</sub> =-2V, I <sub>c</sub> =-100mA*
Transition frequency	f <sub>r</sub>	-	280	-	MHz	V <sub>CE</sub> =-2V, I <sub>E</sub> =100mA, f=100MHz*
Output capacitance	C <sub>ob</sub>	-	13	-	pF	V <sub>CB</sub> =-10V, I <sub>E</sub> =0mA, f=1MHz

\* Pulsed

Tr2

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>EBO</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>EBO</sub>	-	-	100	nA	V <sub>EB</sub> =6V
Collector-emitter saturation voltage	V <sub>CE(sat)</sub>	-	140	350	mV	I <sub>c</sub> =1A, I <sub>B</sub> =50mA
DC current gain	h <sub>FE</sub>	270	-	680	-	V <sub>CE</sub> =2V, I <sub>c</sub> =100mA*
Transition frequency	f <sub>r</sub>	-	300	-	MHz	V <sub>CE</sub> =2V, I <sub>E</sub> =-100mA, f=100MHz*
Corrector output capacitance	C <sub>ob</sub>	-	11	-	pF	V <sub>CB</sub> =10V, I <sub>E</sub> =0A, f=1MHz

\* Pulsed

Transistors

● Electrical characteristic curves

Tr1

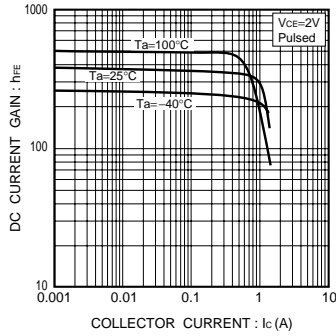


Fig.1 DC current gain vs. collector current

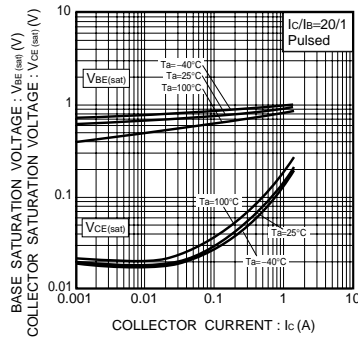


Fig.2 Collector-emitter saturation voltage base-emitter saturation voltage vs. collector current

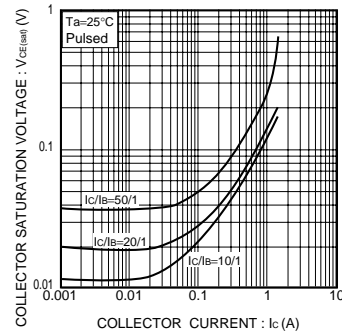


Fig.3 Collector-emitter saturation voltage vs. collector current

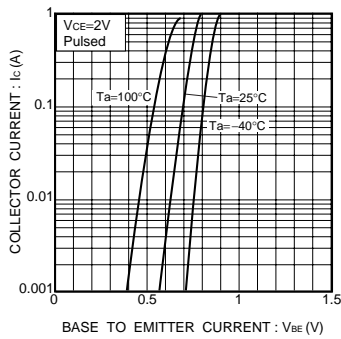


Fig.4 Grounded emitter propagation characteristics

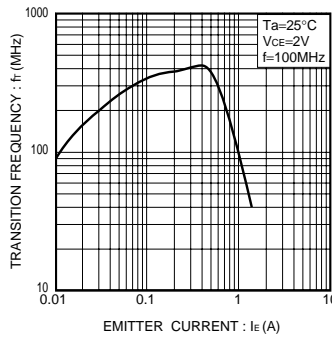


Fig.5 Gain bandwidth product vs. emitter current

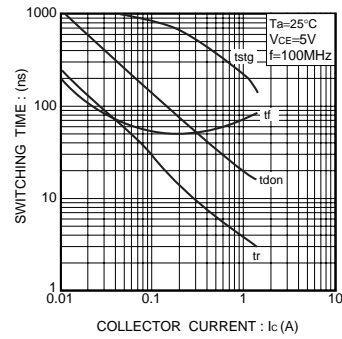


Fig.6 Switching time

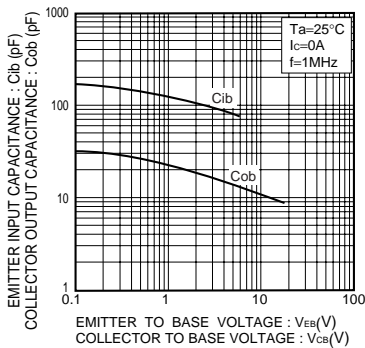


Fig.7 Collector output capacitance vs. collector-base voltage Emitter input capacitance vs. emitter-base voltage

Transistors

Tr2

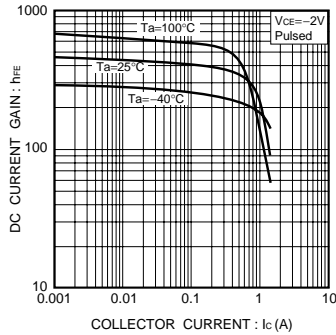


Fig.8 DC current gain vs. collector current

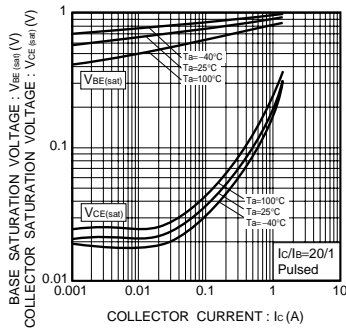


Fig.9 Collector-emitter saturation voltage base-emitter saturation voltage vs. collector current

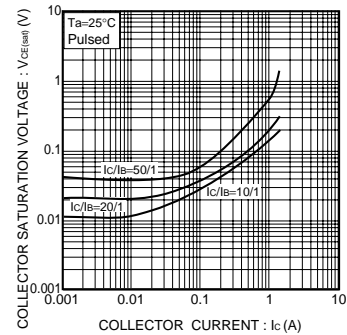


Fig.10 Collector-emitter saturation voltage vs. collector current

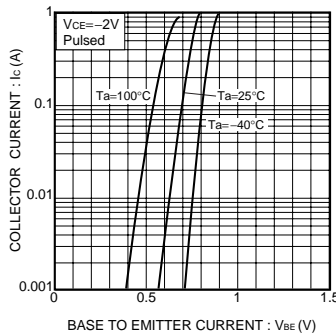


Fig.11 Grounded emitter propagation characteristics

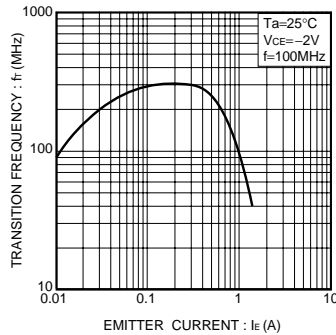


Fig.12 Gain bandwidth product vs. emitter current

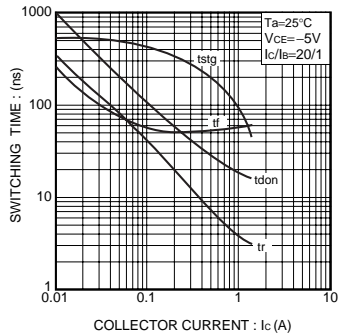


Fig.13 Switching time

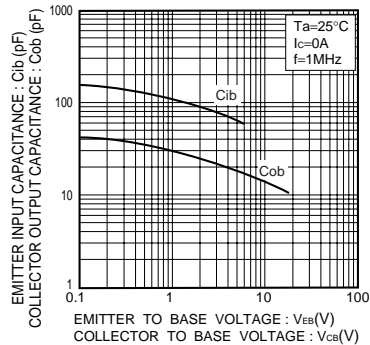


Fig.14 Collector output capacitance vs. collector-base voltage  
Emitter input capacitance vs. emitter-base voltage

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