

# Dual digital transistors

## QSH29

### ●Features

In addition to the standard features of digital transistor, this transistor has:

- 1) Low collector saturation voltage, typically  
 $V_{CE(sat)} = 100\text{mV}$  for  $I_C / I_B = 100\text{mA} / 1\text{mA}$  (Typ.)
- 2) High current gain, minimum  
 $h_{FE} = 500\text{mA}$  for  $V_{CE} = 5\text{V}$ ,  $I_C = 200\text{mA}$ .
- 3) Built in Zener diode for protection against surges when connected to inductive load.

### ●Structure

NPN silicon epitaxial planar transistor

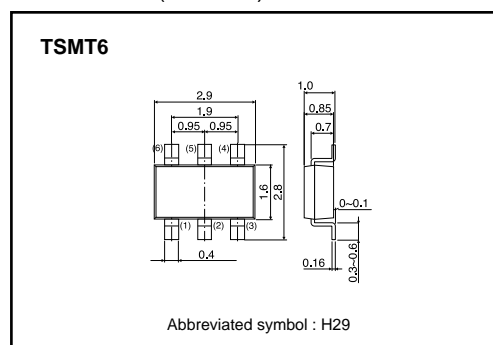
### ●Applications

Driver

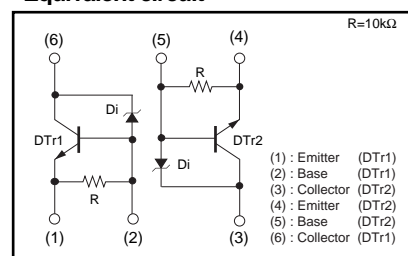
### ●Packaging specifications and $h_{FE}$

Type	Package	TSMT6
	Packaging type	Taping
	Code	TR
	Basic ordering unit (pieces)	3000
QSH29		○

### ●Dimensions (Unit : mm)



### ●Equivalent circuit



### ●Absolute maximum ratings ( $T_a = 25^\circ\text{C}$ )

<< DTr1 >> << DTr2 >>

Parameter	Symbol	Limits	Unit
Collector-base voltage	$V_{CBO}$	$60 \pm 10$	V
Collector-emitter voltage	$V_{CEO}$	$60 \pm 10$	V
Emitter-base voltage	$V_{EBO}$	5	V
Collector current	Continuous	$I_C$	500 mA
	Pulsed	$I_{CP}$	1 A *1
Power dissipation	$P_D$	1.25	W/TOTAL *2
		0.9	W/1 ELEMENT *2
Junction temperature	$T_J$	150	$^\circ\text{C}$
Range of storage temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$

\*1  $P_w = 10\text{ms}$  1 Pulse

\*2 Each terminal mounted on a ceramic board

## Transistor

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

&lt;&lt;DTr1&gt;&gt; &lt;&lt;DTr2&gt;&gt;

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-emitter breakdown voltage	BV <sub>CEO</sub>	50	–	70	V	I <sub>C</sub> =50μA
Collector-base breakdown voltage	BV <sub>CBO</sub>	50	–	70	V	I <sub>C</sub> =50μA
Emitter-base breakdown voltage	BV <sub>EBO</sub>	5.0	–	–	V	I <sub>E</sub> =720μA
Collector cut-off current	I <sub>CBO</sub>	–	–	0.5	μA	V <sub>CB</sub> =40V
Emitter cut-off current	I <sub>EBO</sub>	300	–	580	μA	V <sub>EB</sub> =4V
Collector-emitter saturation voltage	V <sub>CE (sat)</sub>	–	100	300	mV	I <sub>C</sub> =100mA, I <sub>B</sub> =1mA
DC current gain	h <sub>FE</sub>	500	–	–	–	V <sub>CE</sub> =5V, I <sub>C</sub> =200mA
Emitter-base resistance	R	7	10	13	kΩ	–

## Transistor

## ●Electrical characteristic curves

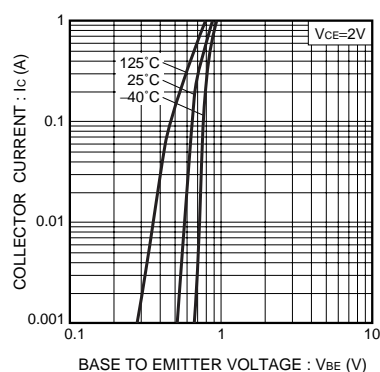


Fig.1 Grounded Emitter Propagation Characteristics

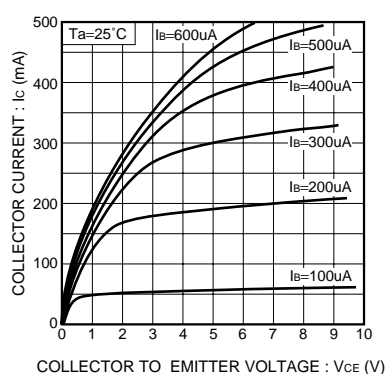


Fig.2 Typical Output Characteristics

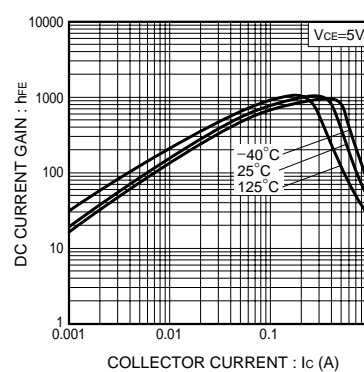


Fig.3 DC Current Gain vs. Collector Current

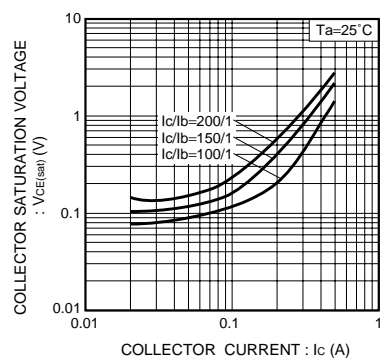


Fig.4 Collector-Emitter Saturation Voltage vs. Collector Current (I)

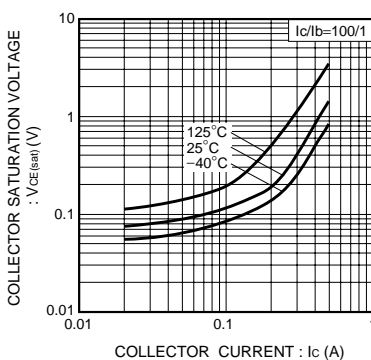


Fig.5 Collector-Emitter Saturation Voltage vs. Collector Current (II)

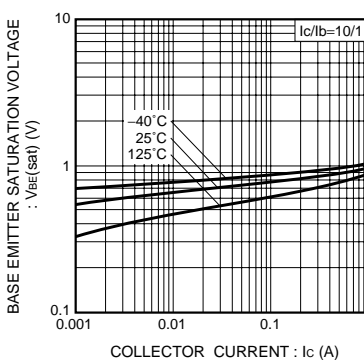


Fig.6 Base-emitter Saturation Voltage vs. Collector Current

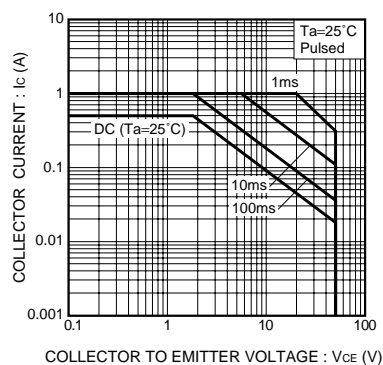


Fig.7 Safe Operating Area

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