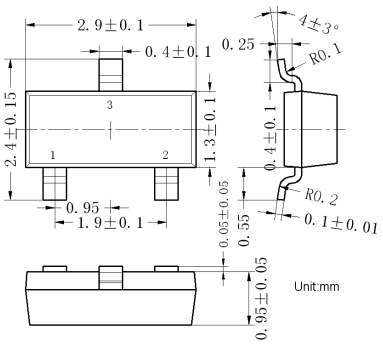
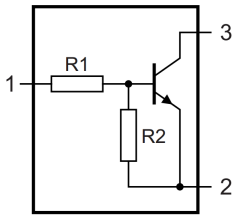
SOT-23 Plastic-Encapsulate Transistors

PBRN123YT NPN Transistors

800mA, 40V BISS RET; R1 = 2.2 kΩ, R2 = 10 kΩ





1. Input (Base)
2. GND (Emitter)
3. Output (Collector)

Features

- 800mA repetitive peak output current
- High current gain h_{FE}
- Built-in bias resistors
- Simplifies circuit design
- Reduces component count
- Reduces pick and place costs
- ±10% resistor ratio tolerance
- Low collector-emitter saturation voltage V_{CEsat}

Applications

- Medium current peripheral driver
- Switching loads
- Digital application in automotive and industrial segments

Description

800 mA NPN low V_{CEsat} Breakthrough In Small Signal (BISS) Resistor-Equipped Transistors (RET) family in small plastic packages.

Marking: 7Q1

*: "7Q" - Device Type

*: "1" - Polarity: NPN, " " - Polarity: PNP

Maximum Ratings (T_a=25°C unless otherwise noted)

Symbol	Parameter		Value	Unit
V_{CBO}	Collector Base Voltage		40	V
V_{CEO}	Collector Emitter Voltage		40	V
V_{EBO}	Emitter Base Voltage		5	V
V_I	Input Voltage	Positive	+22	V
		Negative	-5	V
I_O	Output Current 1)		600	mA
	2), 3)		700	mA
I_{ORM}	Repetitive Peak Output Current @ $t_p \le 1ms$; $\delta \le 0.33$		800	mA
P_{tot}	Total power dissipation $T_{amb} \le 25$ °C	1)	250	mW
		2)	370	mW
		3)	570	mW
T_j	Junction temperature		150	° C
T_{stg}	Storage temperature		-65~150	° C
T_{amb}	Ambient temperature		-55~150	° C
$R_{\theta JA}$	Thermal resistance from junction to ambient	1)	500	K/W
		2)	338	K/W
		3)	219	K/W
$R_{\theta JS}$	Thermal resistance from junction to solder point		105	K/W

Electrical Characteristics (T_a=25°C unless otherwise specified)

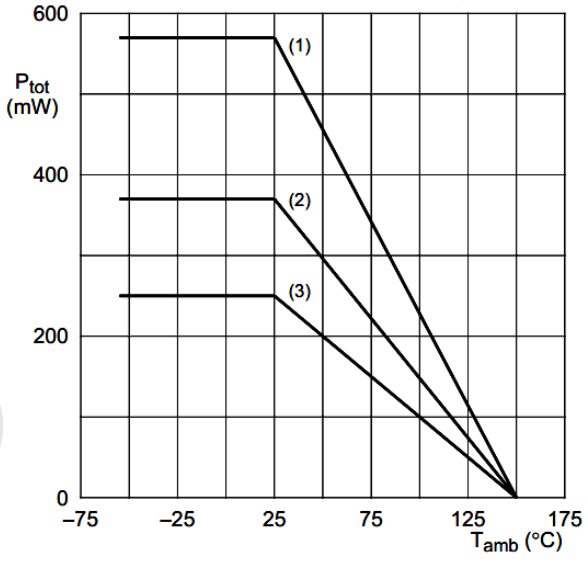
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
I_{CBO}	Collector-base cut-off current	V_{CB} = 30V,I_E = 0			100	nA
I_{CEO}	Collector-emitter cut-off current	V_{CE} = 30V,I_B = 0			0.5	μA
I_{EBO}	Emitter-base cut-off current	V_{EB} = 5V,I_C = 0			0.65	mA
h_{FE}	DC current gain	V_{CE} = 5V, I_C = 50mA	150			
$V_{CE(sat)}$	Collector-emitter saturation voltage	I_C = 50mA,I_B = 2.5mA			0.3	V
$V_{I(off)}$	Off-state input voltage	V_{CE} = 5V,I_C = 100μA	0.4	0.6	1	V
$V_{I(on)}$	On-state input voltage	V_{CE} = 0.3V,I_C = 20mA	0.5	0.8	1.4	V
R1	Bias resistor 1 (input)		1.54	2.2	2.86	kΩ
R2/R1	Bias resistor ratio		4.1	4.55	5	
Cc	Collector capacitance	V_{CB} = 10V,I_E = ie = 0,f = 1MHz		7		pF

1) Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

2) Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm2.

3) Device mounted on a ceramic PCB, Al_2O_3, and standard footprint.

Typical Characteristics

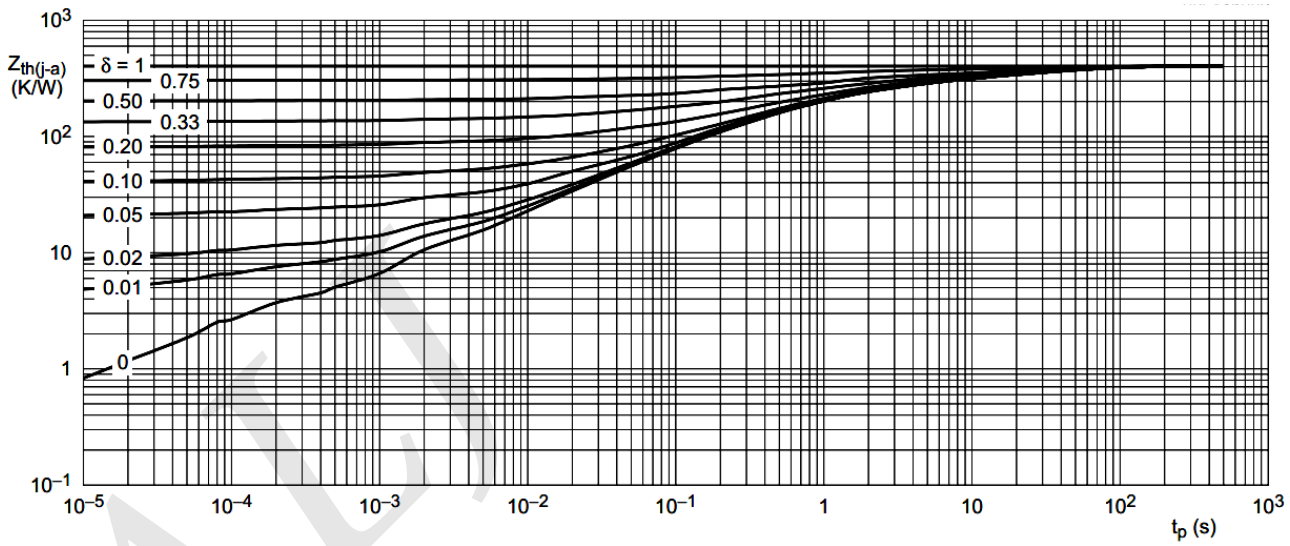


(1) Ceramic PCB, Al_2O_3 standard footprint

(2) FR4 PCB, mounting pad for collector 1 cm^2

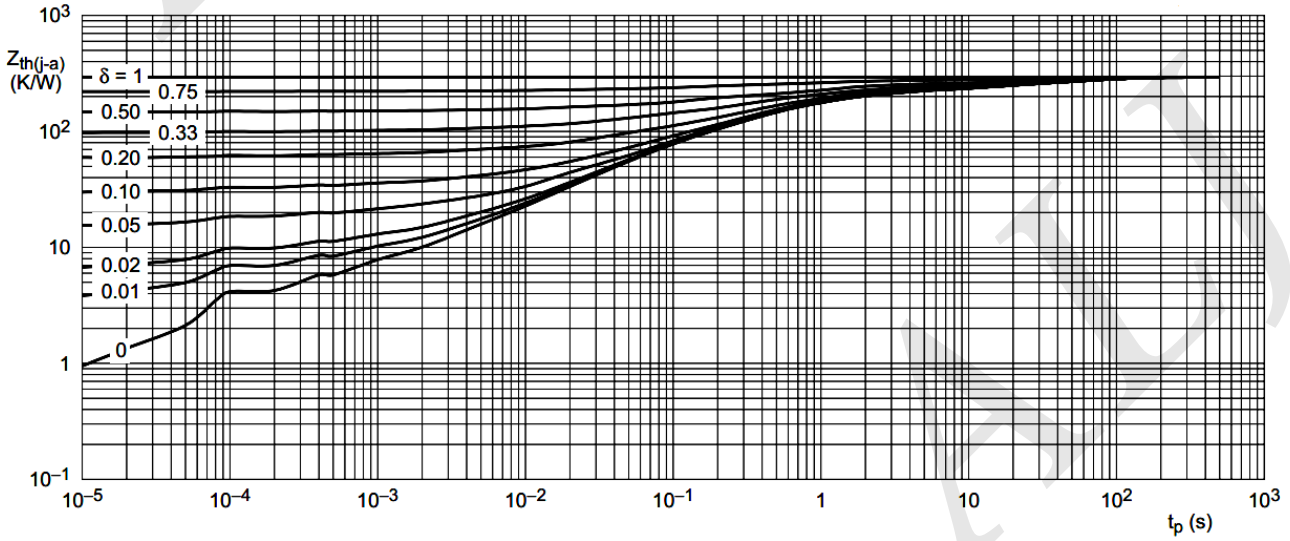
(3) FR4 PCB, standard footprint

Fig 1. Power derating curves for SOT-23



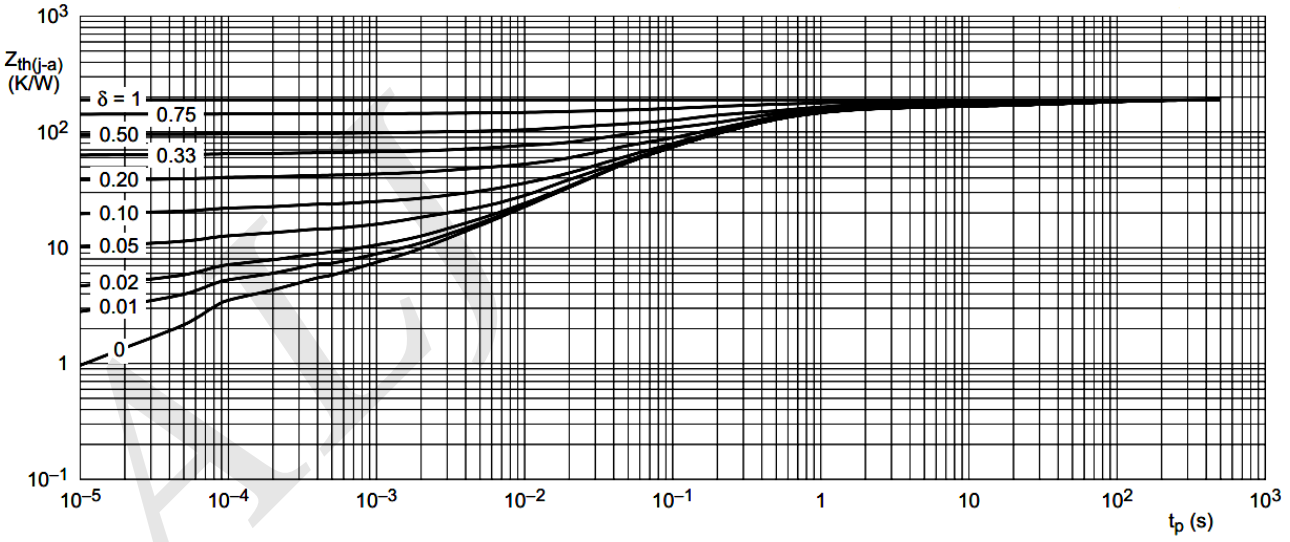
FR4 PCB, standard footprint

Fig 2. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT-23



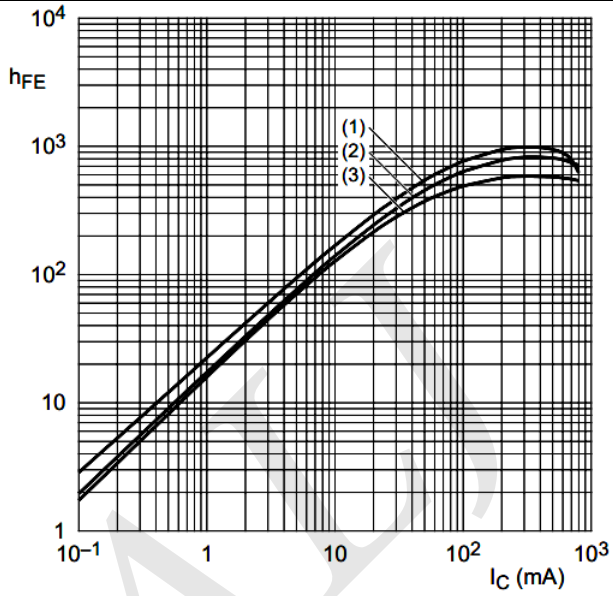
FR4 PCB, mounting pad for collector 1 cm2

Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT-23



Ceramic PCB, Al_2O_3 standard footprint

Fig 4. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT-23



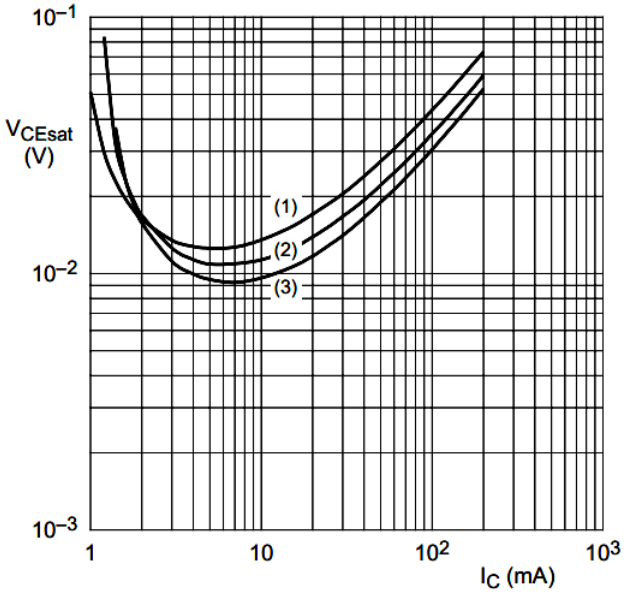
V_{CE} = 5 V

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −40 °C

Fig 5. DC current gain as a function of collector current; typical values



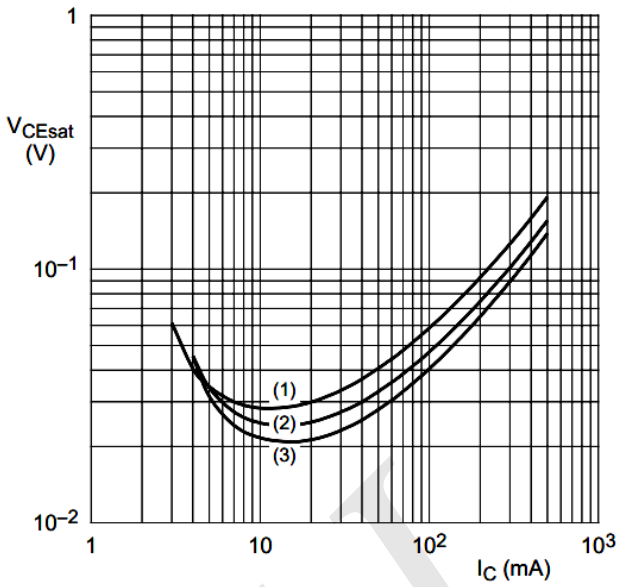
I_C/I_B = 20

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −40 °C

Fig 6. Collector-emitter saturation voltage as a function of collector current; typical values



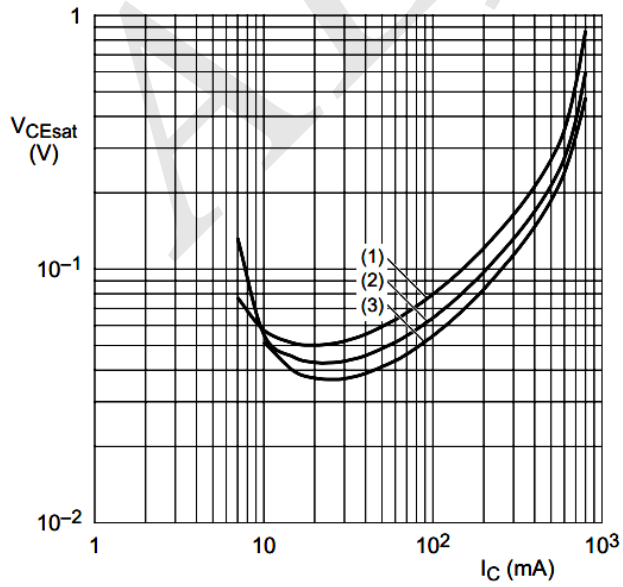
I_C/I_B = 50

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −40 °C

Fig 7. Collector-emitter saturation voltage as a function of collector current; typical values



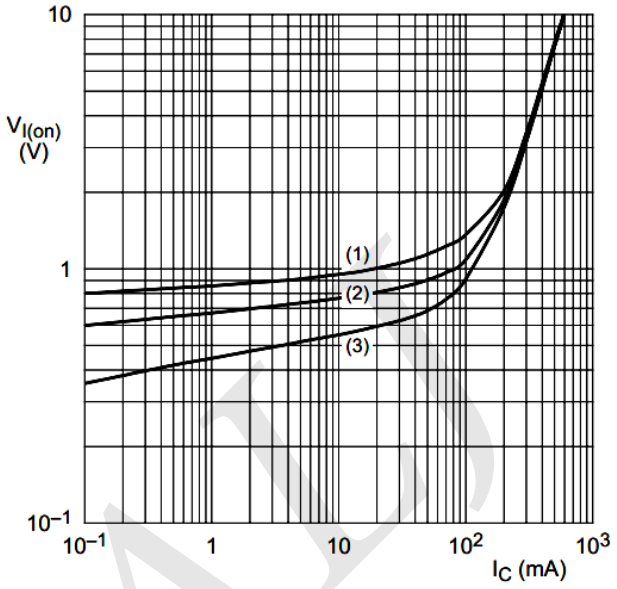
I_C/I_B = 100

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −40 °C

Fig 8. Collector-emitter saturation voltage as a function of collector current; typical values



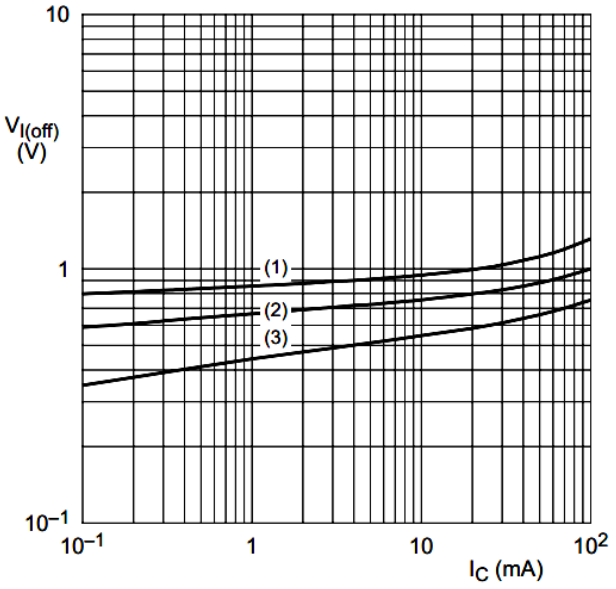
V_{CE} = 0.3 V

(1) T_{amb} = −40 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 100 °C

Fig 9. On-state input voltage as a function of collector collector current; typical values



V_{CE} = 5 V

(1) T_{amb} = −40 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 100 °C

Fig 10. Off-state input voltage as a function of current; typical values