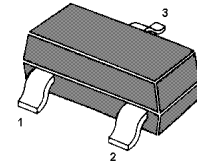
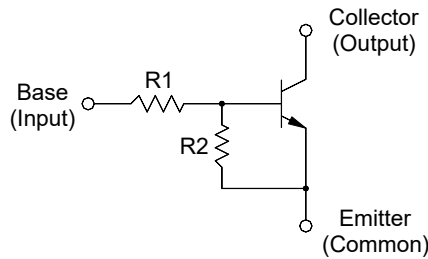


MMBTRC101SS~MMBTRC106SS-AH

NPN Silicon Epitaxial Planar Digital Transistors

Features

- AEC-Q101 Qualified
- With built-in bias resistors
- Simplify circuit design
- Reduce a quantity of parts and manufacturing process
- Halogen and Antimony Free(HAF), RoHS compliant



1. Base 2. Emitter 3. Collector
SOT-23 Plastic Package

Applications

- For switching and interface circuit and drive circuit applications

Resistor Values

Type	R1 (KΩ)	R2 (KΩ)	Type	R1 (KΩ)	R2 (KΩ)
MMBTRC101SS	4.7	4.7	MMBTRC104SS	47	47
MMBTRC102SS	10	10	MMBTRC105SS	2.2	47
MMBTRC103SS	22	22	MMBTRC106SS	4.7	47

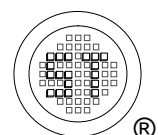
Absolute Maximum Ratings ($T_a = 25\text{ }^\circ\text{C}$)

Parameter		Symbol	Value	Unit
Collector Base Voltage		V_{CBO}	50	V
Collector Emitter Voltage		V_{CEO}	50	V
Emitter Base Voltage	MMBTRC101SS	V_{EBO}	20, -10	V
	MMBTRC102SS		30, -10	
	MMBTRC103SS		40, -10	
	MMBTRC104SS		40, -10	
	MMBTRC105SS		12, -5	
	MMBTRC106SS		20, -5	
Collector Current		I_C	100	mA
Peak Collector Current, Pulsed		I_{CM}	100	mA
Total Power Dissipation		P_{tot}	200	mW
Operating Junction Temperature Range		T_j, T_{stg}	- 55 to + 150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Max.	Unit
Thermal Resistance from Junction to Ambient ¹⁾	$R_{\theta JA}$	625	$^\circ\text{C/W}$

¹⁾ Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.

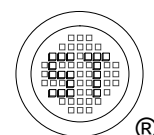


MMBTRC101SS~MMBTRC106SS-AH

Characteristics at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Min.	Typ.	Max.	Unit
DC Current Gain at $V_{CE} = 5\text{ V}$, $I_C = 10\text{ mA}$	MMBTRC101SS MMBTRC102SS MMBTRC103SS MMBTRC104SS MMBTRC105SS MMBTRC106SS	30 50 70 80 80 80	- - - - - -	- - - - - -	- - - - - -
Collector Base Breakdown Voltage at $I_C = 10\text{ }\mu\text{A}$	$V_{(BR)CBO}$	50	-	-	V
Collector Emitter Breakdown Voltage at $I_C = 1\text{ mA}$	$V_{(BR)CEO}$	50	-	-	V
Collector Base Cutoff Current at $V_{CB} = 50\text{ V}$	I_{CBO}	-	-	500	nA
Collector Emitter Cutoff Current at $V_{CE} = 50\text{ V}$	I_{CEO}	-	-	500	nA
Emitter Base Cutoff Current at $V_{EB} = 5\text{ V}$	MMBTRC101SS MMBTRC102SS MMBTRC103SS MMBTRC104SS MMBTRC105SS MMBTRC106SS	- - - - - -	- - - - - -	1.8 0.88 0.36 0.18 3.6 1.8	mA
Collector Emitter Saturation Voltage at $I_C = 10\text{ mA}$, $I_B = 0.5\text{ mA}$	$V_{CE(sat)}$	-	-	0.3	V
Input Voltage (ON) at $V_{CE} = 0.2\text{ V}$, $I_C = 5\text{ mA}$	MMBTRC101SS MMBTRC102SS MMBTRC103SS MMBTRC104SS MMBTRC105SS MMBTRC106SS	- - - - - -	- - - - - -	2 2.4 3 5 1.1 1.3	V
Input Voltage (OFF) at $V_{CE} = 5\text{ V}$, $I_C = 0.1\text{ mA}$	MMBTRC101SS~104SS MMBTRC105SS~106SS	1 0.5	- -	- -	V
Transition Frequency at $V_{CE} = 10\text{ V}$, $I_C = 5\text{ mA}$	$f_T^{1)}$	-	200	-	MHz
Input Resistance	MMBTRC101SS MMBTRC102SS MMBTRC103SS MMBTRC104SS MMBTRC105SS MMBTRC106SS	-30%	4.7 10 22 47 2.2 4.7	+30%	K Ω
Resistance Ratio	MMBTRC101SS~104SS MMBTRC105SS MMBTRC106SS	0.8 17 8	1 21 10	1.2 26 12	- - -

¹⁾ Characteristic of transistor only.



MMBTRC101SS~MMBTRC106SS-AH

Electrical Characteristics Curves: MMBTRC101SS

Fig. 1 Collector Current vs. $V_{I(ON)}$, Input Voltage

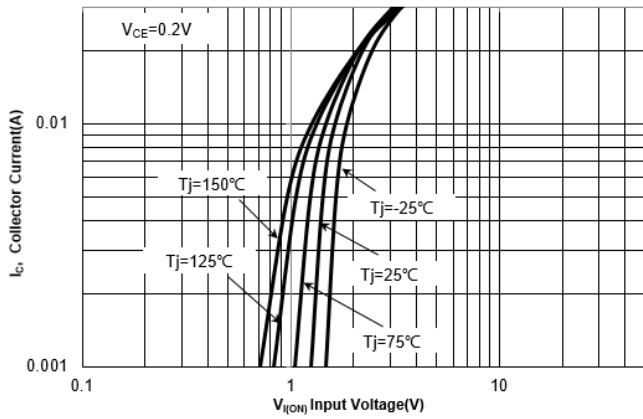


Fig. 2 Collector Current vs. $V_{I(OFF)}$, Input Voltage

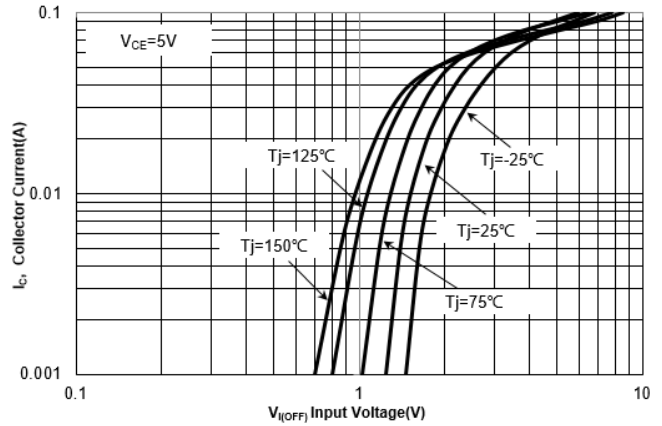


Fig. 3 DC Current Gain vs. Collector Current

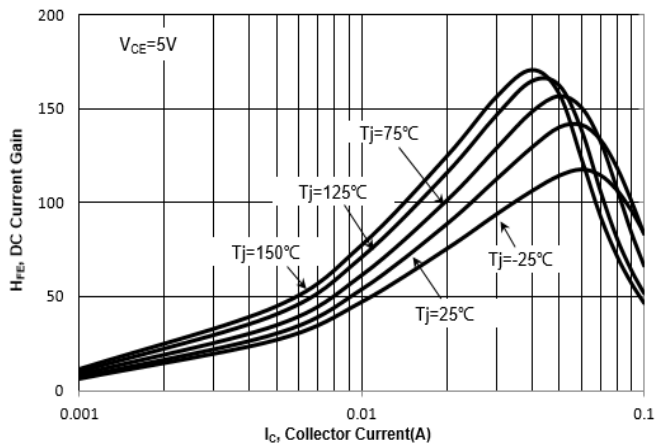
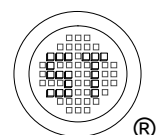
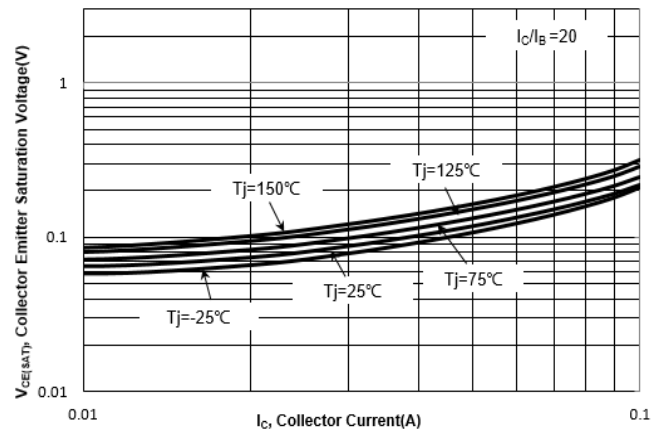


Fig. 4 $V_{CE(SAT)}$ vs. Collector Current



MMBTRC101SS~MMBTRC106SS-AH

Electrical Characteristics Curves: MMBTRC102SS

Fig. 1 Collector Current vs. $V_{I(ON)}$, Input Voltage

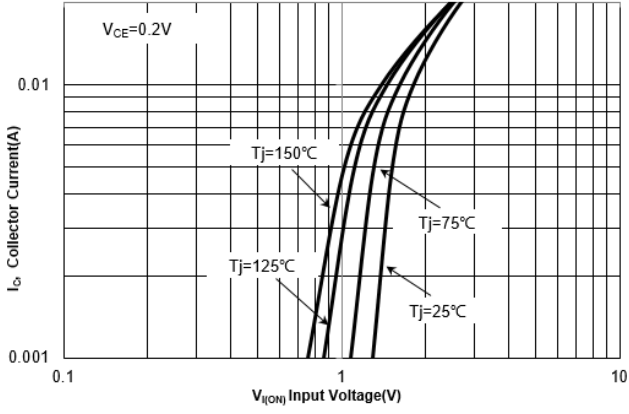


Fig. 2 Collector Current vs. $V_{I(OFF)}$, Input Voltage

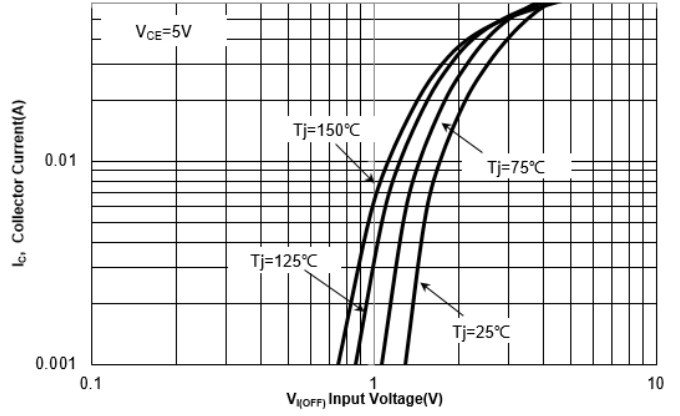


Fig. 3 DC Current Gain vs. Collector Current

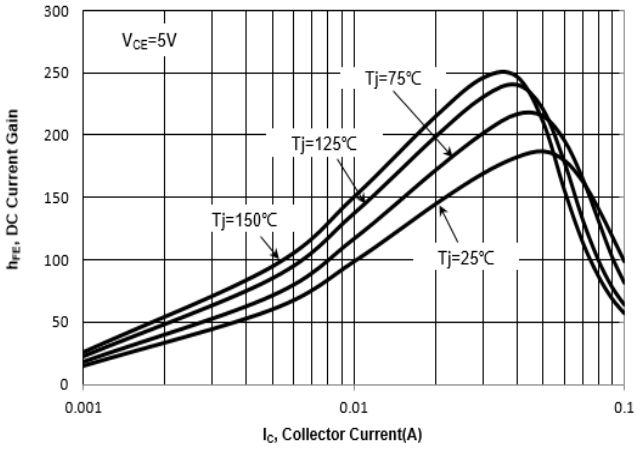
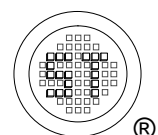
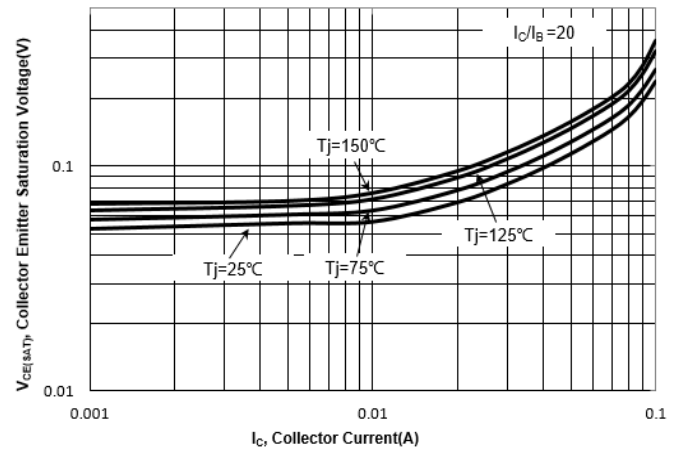


Fig. 4 $V_{CE(SAT)}$ vs. Collector Current



MMBTRC101SS~MMBTRC106SS-AH

Electrical Characteristics Curves: MMBTRC103SS

Fig. 1 Collector Current vs. $V_{I(ON)}$, Input Voltage

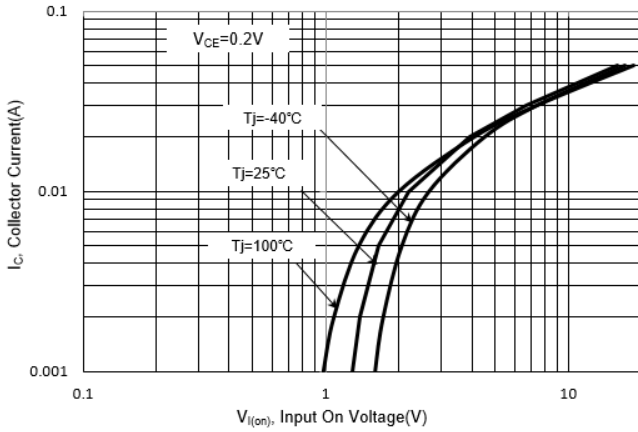


Fig. 2 Collector Current vs. $V_{I(OFF)}$, Input Voltage

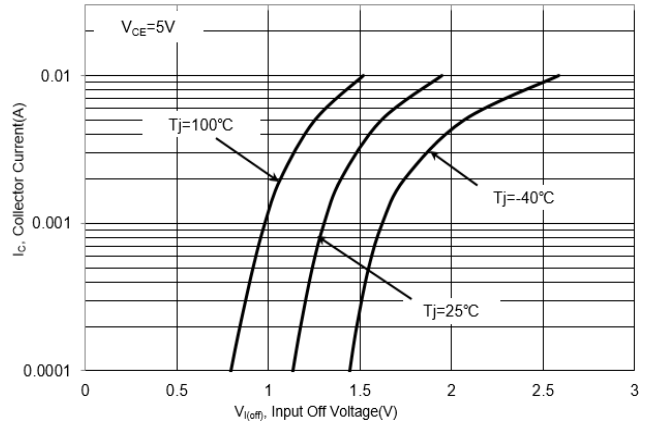


Fig. 3 DC Current Gain vs. Collector Current

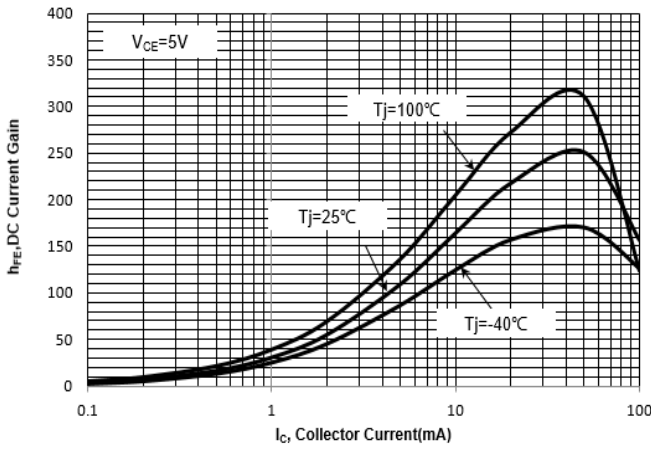
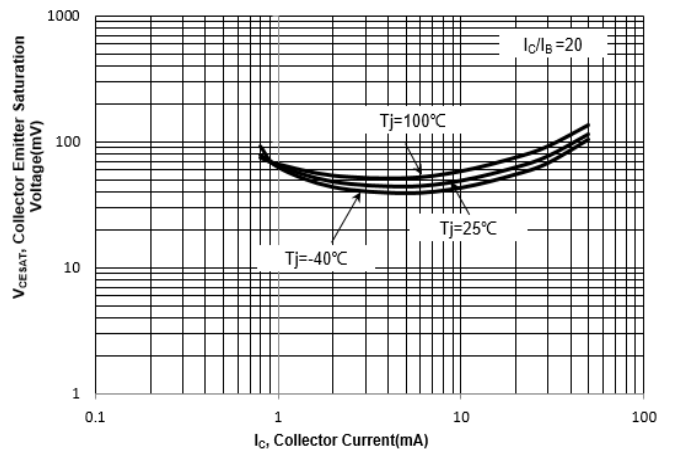


Fig. 4 V_{CESAT} vs. Collector Current



MMBTRC101SS~MMBTRC106SS-AH

Electrical Characteristics Curves: MMBTRC104SS

Fig. 1 Collector Current vs. $V_{I(ON)}$, Input Voltage

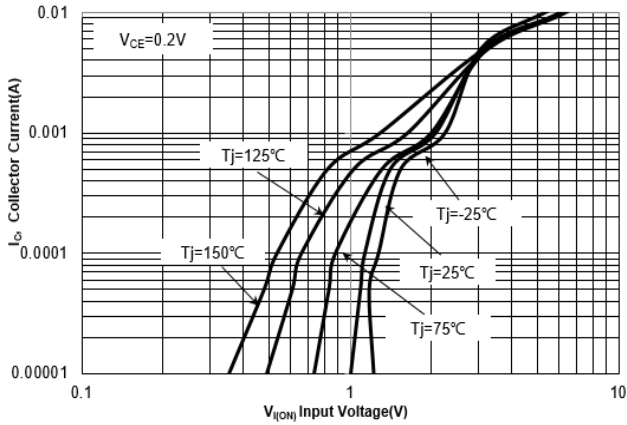


Fig. 2 Collector Current vs. $V_{I(OFF)}$, Input Voltage

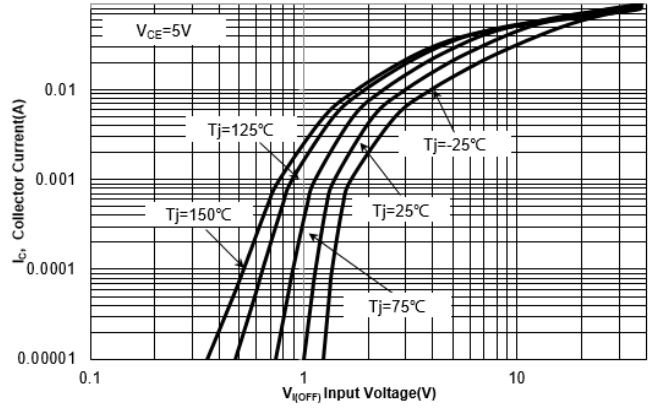


Fig. 3 DC Current Gain vs. Collector Current

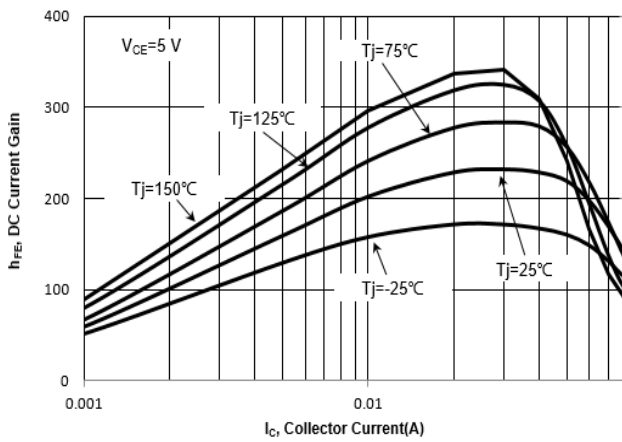
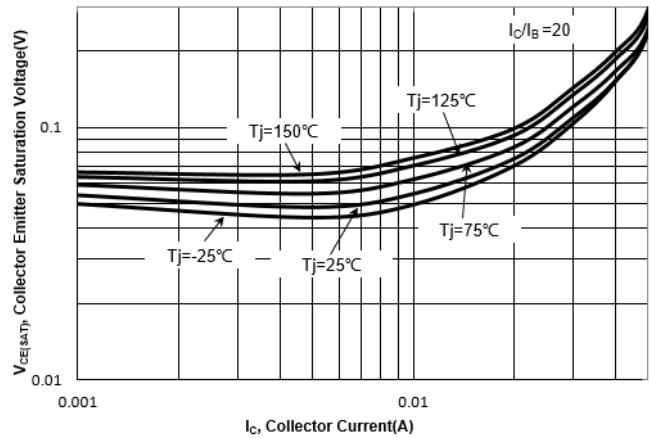


Fig. 4 V_{CESAT} vs. Collector Current



MMBTRC101SS~MMBTRC106SS-AH

Electrical Characteristics Curves: MMBTRC105SS

Fig. 1 Collector Current vs. $V_{I(ON)}$, Input Voltage

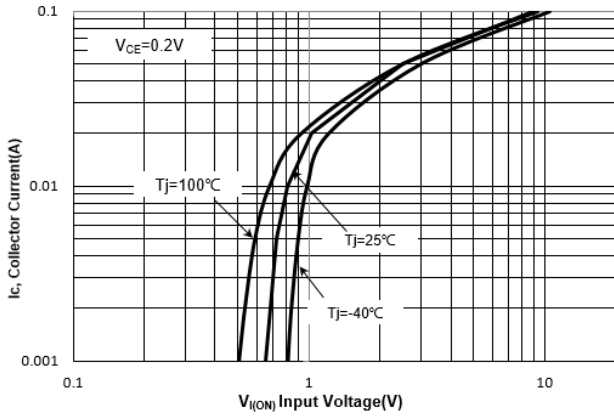


Fig. 2 Collector Current vs. $V_{I(OFF)}$, Input Voltage

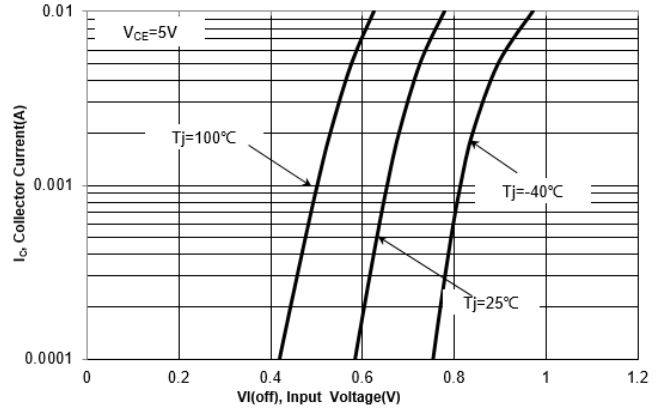


Fig. 3 DC Current Gain vs. Collector Current

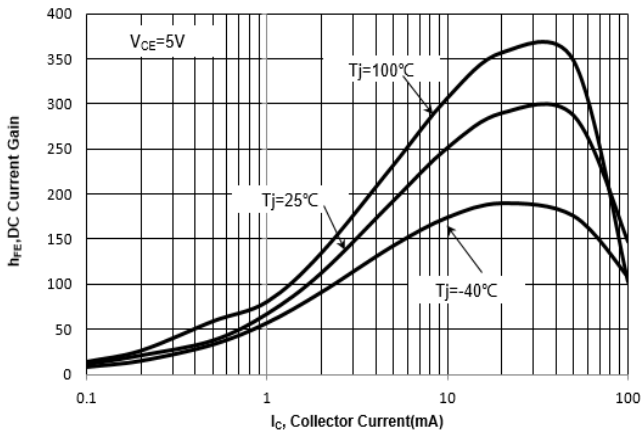
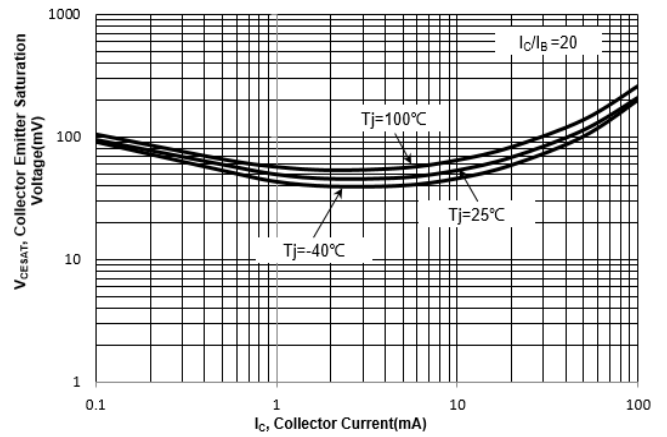


Fig. 4 V_{CESAT} vs. Collector Current



MMBTRC101SS~MMBTRC106SS-AH

Electrical Characteristics Curves: MMBTRC106SS

Fig. 1 Collector Current vs. $V_{I(ON)}$, Input Voltage

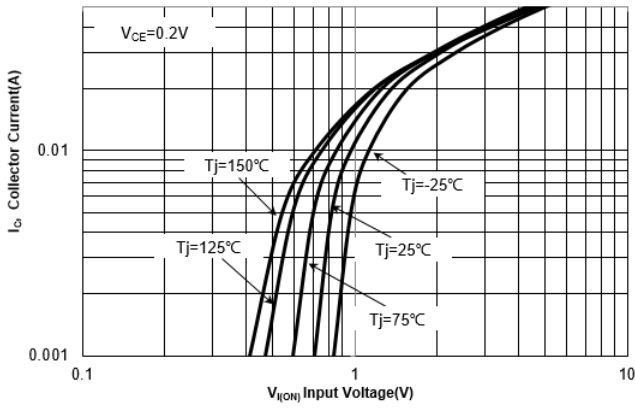


Fig. 2 Collector Current vs. $V_{I(OFF)}$, Input Voltage

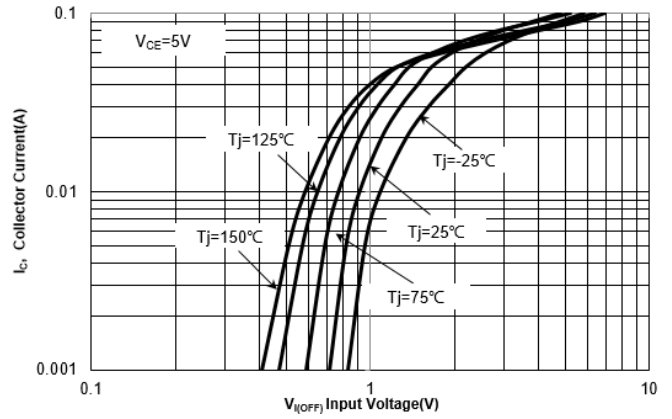


Fig. 3 DC Current Gain vs. Collector Current

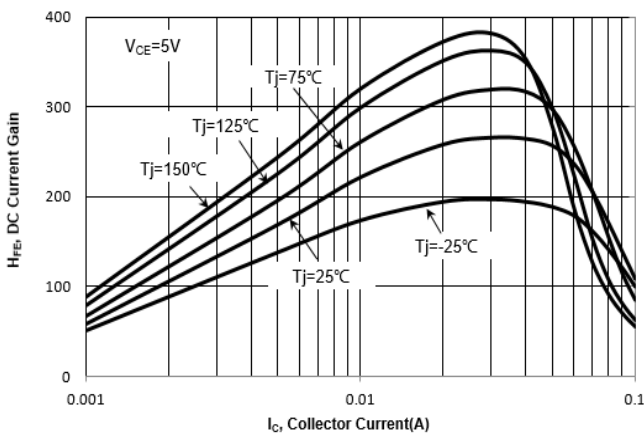
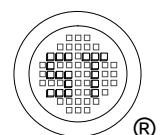
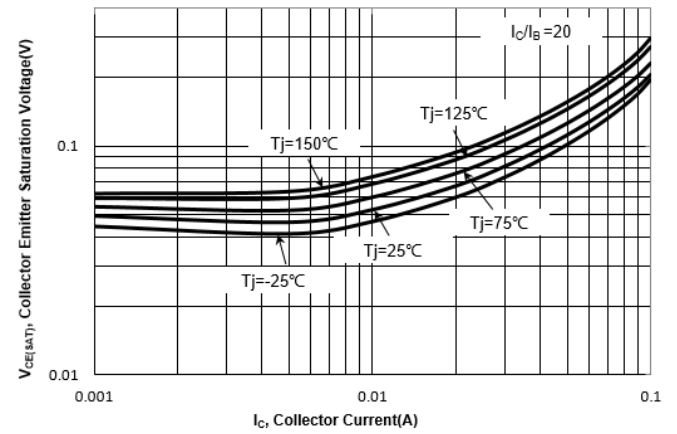


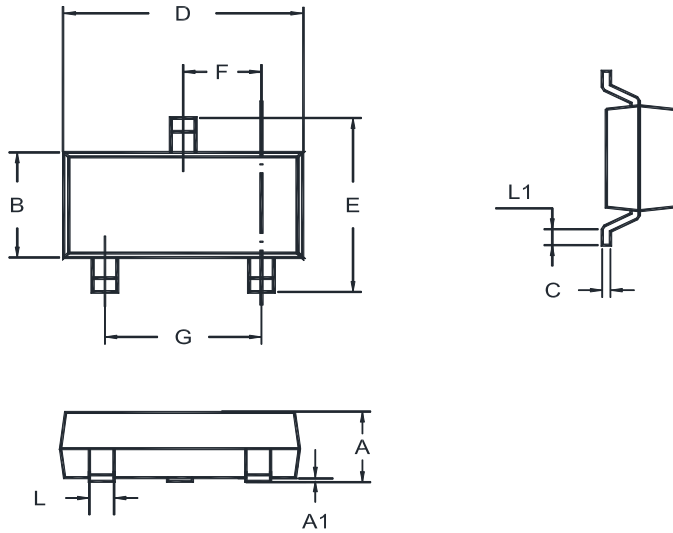
Fig. 4 $V_{CE(SAT)}$ vs. Collector Current



MMBTRC101SS~MMBTRC106SS-AH

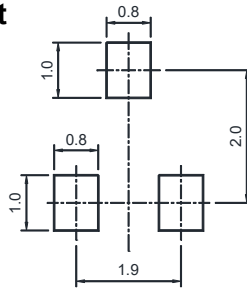
Package Outline (Dimensions in mm)

SOT-23



Unit	A	A1	B	C	D	E	F	G	L	L1
mm	1.20	0.100	1.40	0.19	3.04	2.6	1.02	2.04	0.51	0.2
	0.89	0.013	1.20	0.08	2.80	2.2	0.89	1.78	0.37	MIN

Recommended Soldering Footprint



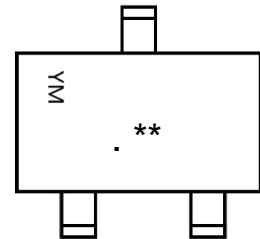
Packing information

Package	Tape Width (mm)	Pitch		Reel Size		Per Reel Packing Quantity
		mm	inch	mm	inch	
SOT-23	8	4 ± 0.1	0.157 ± 0.004	178	7	3,000

Marking information

"**" = Part No.

Type	Marking	Type	Marking	Type	Marking
MMBTRC101SS	HP	MMBTRC103SS	HR	MMBTRC105SS	HY
MMBTRC102SS	HN	MMBTRC104SS	HX	MMBTRC106SS	HZ



"•" = HAF (Halogen and Antimony Free)

"YM" = Date Code Marking

"Y" = Year

"M" = Month

Font type: Arial

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