

2SA2013Q-HAF

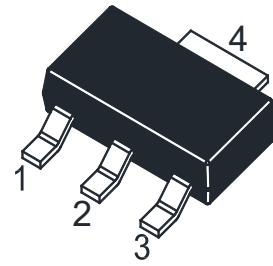
PNP Silicon Epitaxial Planar Power Transistor

Features

- Low Saturation Voltage
- Halogen and Antimony Free(HAF), RoHS compliant

Applications

- Motor Driving
- Line Switching
- High Side Switches
- Subscriber Line Interface Cards (SLIC)



1.Base 2.Collector 3.Emitter 4.Collector
SOT-223 Plastic Package

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

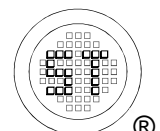
Parameter	Symbol	Value	Unit
Collector Base Voltage	$-V_{CB0}$	140	V
Collector Emitter Voltage	$-V_{CEO}$	100	V
Emitter Base Voltage	$-V_{EBO}$	7	V
Collector Current	$-I_c$	5	A
Peak Collector Current, Pulsed	$-I_{CM}$	10	A
Power Dissipation ¹⁾	P_D	1.6	W
Operating Junction and Storage Temperature Range	T_j, T_{stg}	- 55 to + 150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance from Junction to Ambient ¹⁾	$R_{\theta JA}$	78	$^\circ\text{C/W}$
Thermal Resistance-Junction to Case ²⁾	$R_{\theta JC}$	13.8	$^\circ\text{C/W}$

¹⁾ Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate.

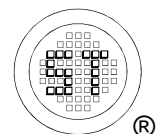
²⁾ Thermal resistance from junction to top of the case.



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

Parameter	Symbol	Min.	Typ.	Max.	Unit
DC Current Gain at $-V_{CE} = 1\text{ V}$, $-I_C = 10\text{ mA}$ at $-V_{CE} = 1\text{ V}$, $-I_C = 1\text{ A}$ at $-V_{CE} = 1\text{ V}$, $-I_C = 3\text{ A}$ at $-V_{CE} = 1\text{ V}$, $-I_C = 4\text{ A}$ at $-V_{CE} = 1\text{ V}$, $-I_C = 10\text{ A}$	h_{FE} h_{FE} h_{FE} h_{FE}	100 100 25 15 -	- - - - 5	- 300 - - -	- - - - -
Collector Base Cutoff Current at $-V_{CB} = 100\text{ V}$	$-I_{CBO}$	-	-	20	nA
Collector Base Breakdown Voltage at $-I_C = 100\text{ }\mu\text{A}$	$-V_{(BR)CBO}$	140	-	-	V
Collector Emitter Breakdown Voltage at $-I_C = 1\text{ mA}$	$-V_{(BR)CEO}$	100	-	-	V
Emitter Base Breakdown Voltage at $-I_E = 100\text{ }\mu\text{A}$	$-V_{(BR)EBO}$	7	-	-	V
Collector Emitter Saturation Voltage at $-I_C = 100\text{ mA}$, $-I_B = 10\text{ mA}$ at $-I_C = 1\text{ A}$, $-I_B = 100\text{ mA}$ at $-I_C = 2\text{ A}$, $-I_B = 200\text{ mA}$ at $-I_C = 4\text{ A}$, $-I_B = 400\text{ mA}$	$-V_{CE(sat)}$	- - - -	- - - -	30 90 150 340	mV
Base Emitter Saturation Voltage at $-I_C = 4\text{ A}$, $-I_B = 400\text{ mA}$	$-V_{BE(sat)}$	-	-	1.1	V
Base Emitter Turn-on Voltage at $-I_C = 4\text{ A}$, $-V_{CE} = 1\text{ V}$	$-V_{BE(on)}$	-	-	1.05	V
Transition Frequency at $-V_{CE} = 10\text{ V}$, $-I_C = 100\text{ mA}$, $f = 50\text{ MHz}$	f_T	-	125	-	MHz
Output Capacitance at $-V_{CB} = 10\text{ V}$, $f = 1\text{ MHz}$	C_{obo}	-	42	-	pF
Turn-on Time at $-V_{CC} = 50\text{ V}$, $-I_C = 1\text{ A}$, $I_{B1} = -I_{B2} = -100\text{ mA}$	t_{on}	-	42	-	ns
Turn-off Time at $-V_{CC} = 50\text{ V}$, $-I_C = 1\text{ A}$, $I_{B1} = -I_{B2} = -100\text{ mA}$	t_{off}	-	540	-	ns



Electrical Characteristics Curves

Fig. 1 Output Characteristics Curve

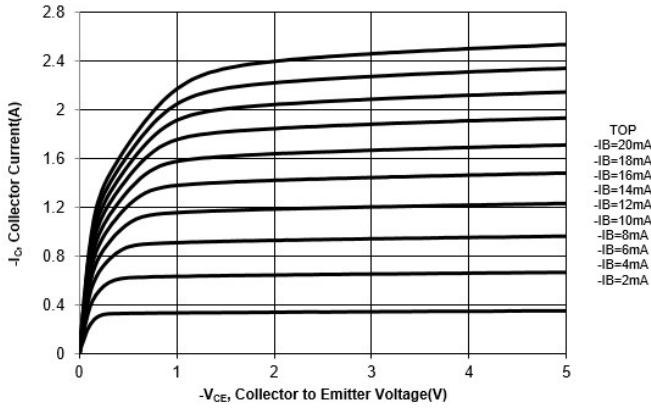


Fig. 2 Collector Current vs. Base to Emitter Voltage

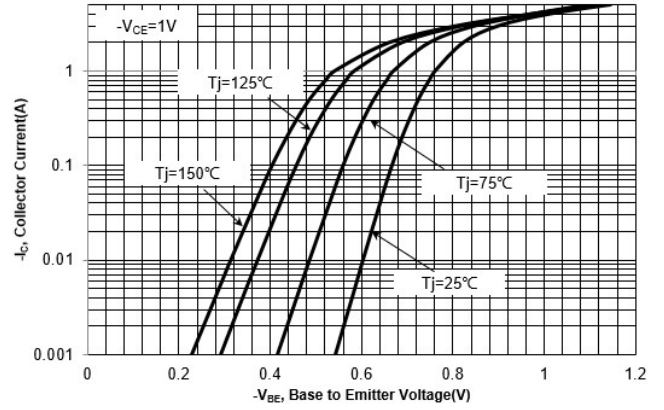


Fig. 3 DC Current Gain vs. Collector Current

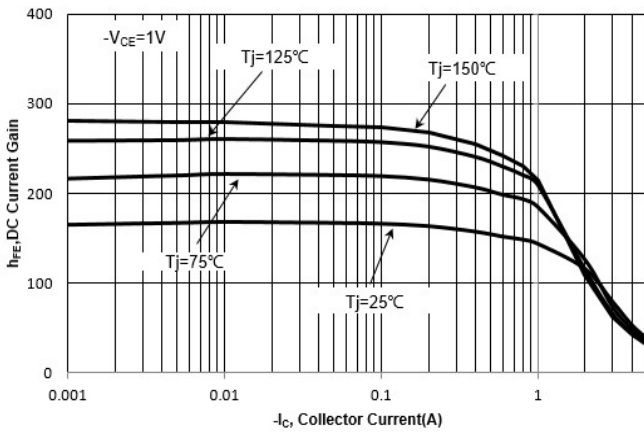
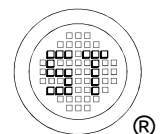
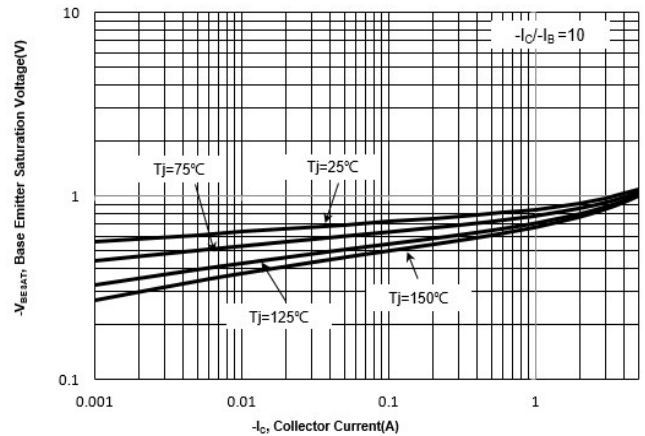


Fig. 4 V_{BESAT} vs. Collector Current



Electrical Characteristics Curves

Fig. 5 V_{CESAT} vs. Collector Current

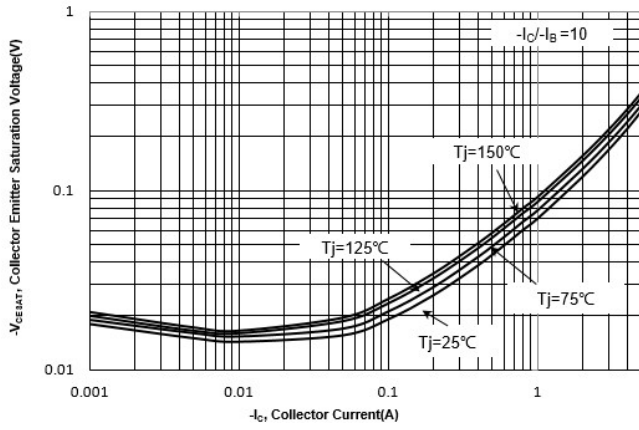


Fig. 6 Output Capacitance

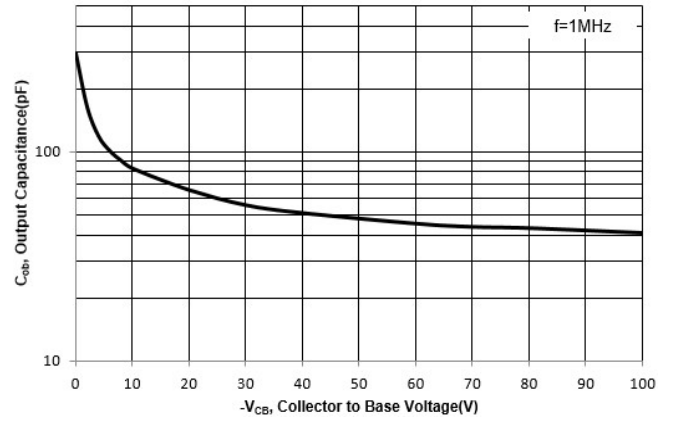
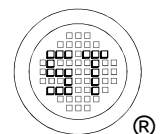
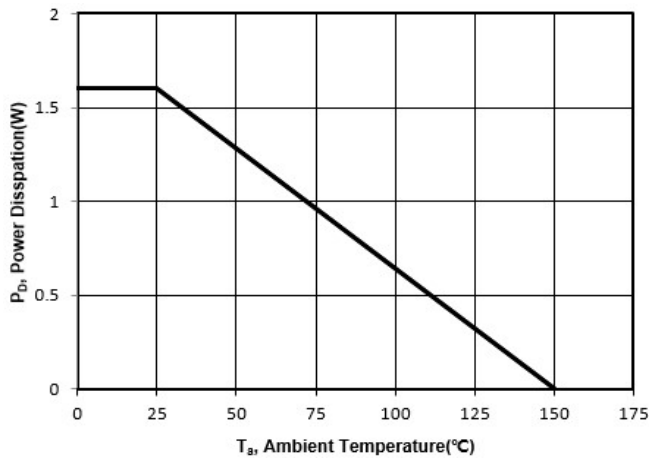


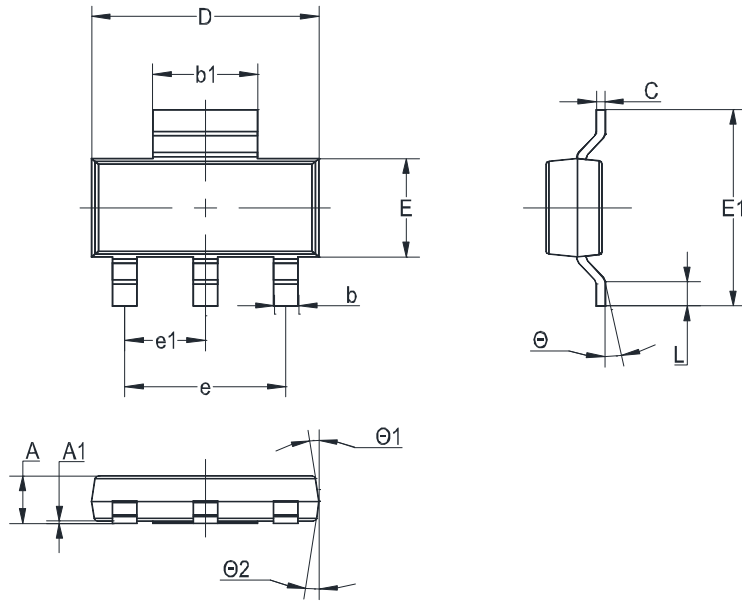
Fig. 7 Power Derating Curve



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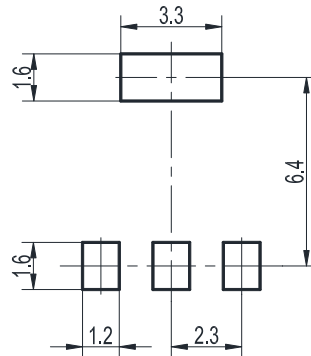
Package Outline (Dimensions in mm)

SOT-223



Unit	A	A1	b	b1	C	D	E	E1	e	e1	L	θ	$\theta1$	$\theta2$
mm	1.8	0.1	0.8	3.1	0.32	6.7	3.7	7.3	4.6	2.3	1.1	10°	7°	7°
	1.5	MAX	0.6	2.9	0.22	6.3	3.3	6.7	TYP	TYP	0.7	0°	0°	0°

Recommended Soldering Footprint



Packing information

Package	Tape Width (mm)	Pitch		Reel Size		Per Reel Packing Quantity
		mm	inch	mm	inch	
SOT-223	12	8 ± 0.1	0.315 ± 0.004	330	13	3,000

Marking information

" 2SA2013Q " = Part No.

" ***** " = Date Code Marking

Font type: Arial

