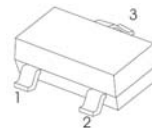




FEATURES

- High Collector Current.
- Complementary to S9012.
- Excellent hFE Linearity.

SOT-23



1.BASE
2.EMITTER
3.COLLECTOR

Marking

Type number	Marking code
S9013	J3

MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CEO}	25	Vdc
Collector–Base Voltage	V_{CBO}	40	Vdc
Emitter–Base Voltage	V_{EBO}	5.0	Vdc
Collector Current — Continuous	I_C	500	mAdc

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR– 5 Board, (1) $T_A = 25^\circ\text{C}$	P_D	300	mW
Junction and Storage Temperature	T_J, T_{stg}	– 55 to + 150	$^\circ\text{C}$

CLASSIFICATION OF h_{FE}

Rank	L	H	J
Range	120-200	200-350	300-400

ELECTRICAL CHARACTERISTICS (TA = 25°C unless otherwise noted.)

OFF CHARACTERISTICS

Characteristic	Symbol	Min	Max	Unit
Collector–Emitter Breakdown Voltage(3) (IC = 1.0 mA, IB = 0)	V _{(BR)CEO}	25	—	V _{dc}
Collector–Base Breakdown Voltage (IC = 100 μA, IE = 0)	V _{(BR)CBO}	40	—	V _{dc}
Emitter–Base Breakdown Voltage (IE = 100 μA, IC = 0)	V _{(BR)EBO}	5.0	—	V _{dc}
Collector cut-off current (V _{CB} = 40 V _{dc} , IE = 0)	I _{CBO}	—	0.1	μA
Collector cut-off current (V _{CE} = 20 V _{dc} , IB = 0)	I _{CEO}	—	0.1	μA
Emitter cut-off current (V _{EB} = 5 V _{dc} , IC = 0)	I _{EBO}	—	0.1	μA

1. FR-5 = 1.0 x 0.75 x 0.062 in.

2. Alumina = 0.4 x 0.3 x 0.024 in. 99.5% alumina.

3. Pulse Test: Pulse Width <300 μs, Duty Cycle <2.0%.

ON CHARACTERISTICS

Characteristic	Symbol	Min	Max	Unit
DC Current Gain	h _{FE}			—
(IC = 50 mA, V _{CE} = 1 V _{dc})		120	400	
(IC = 500 mA, V _{CE} = 1 V _{dc})		40	—	
Collector–Emitter Saturation Voltage	V _{CE(sat)}			V _{dc}
(IC = 500 mA, IB = 50 mA)(3)		—	0.6	
Base–Emitter Saturation Voltage(3)	V _{BE(sat)}			V _{dc}
(IC = 500 mA, IB = 50 mA)		—	1.2	
Base-emitter voltage (V _{CB} = 1V, IC = 10mA)	V _{BE}	—	0.7	

SMALL–SIGNAL CHARACTERISTICS

Current–Gain — Bandwidth Product (IC = 20mA, V _{CE} = 6.0V _{dc} , f = 30MHz)	f _T	150	—	MHz
Collector output capacitance (V _{CB} = 6.0V _{dc} , IE = 0, f = 1.0 MHz)	C _{ob}	—	8.0	pF

RATING AND CHARACTERISTIC CURVES

Fig.1 Power Derating Curve

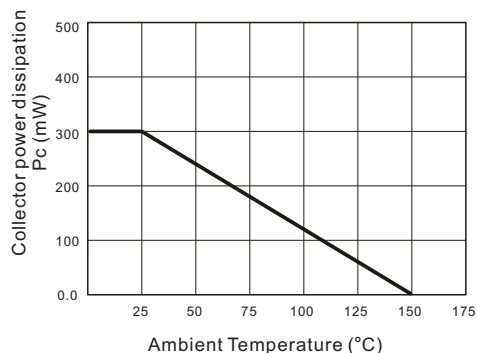


Fig.2 Static characteristics

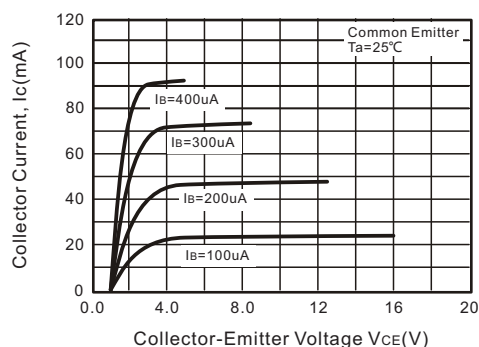


Fig.3 h_{FE} -- I_c

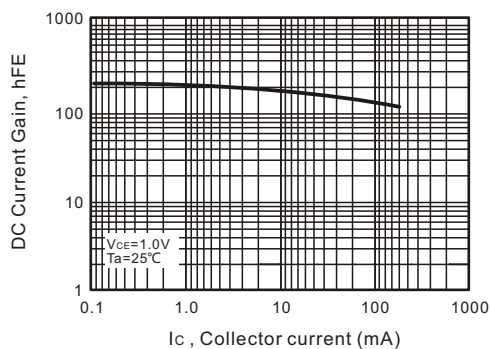


Fig.4 I_c -- V_{BE}

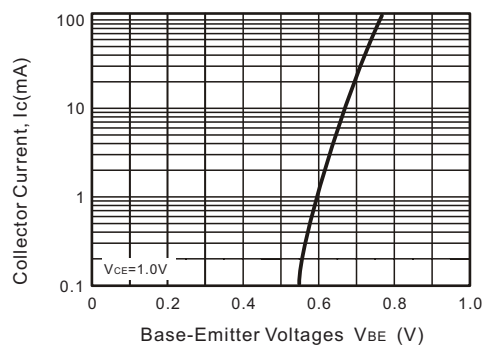


Fig.5 V_{BEsat} -- I_c

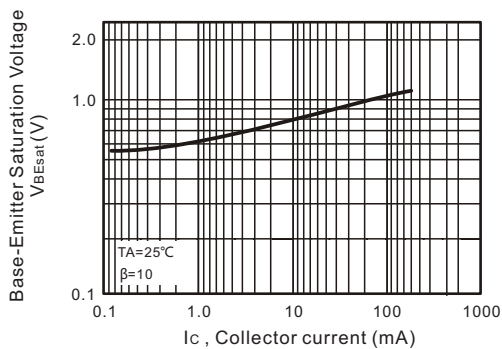


Fig.6 V_{CEsat} -- I_c

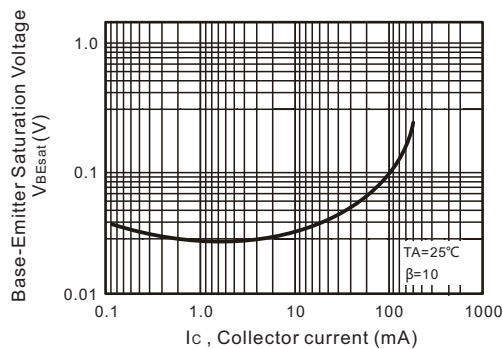


Fig.7 f_t -- I_c

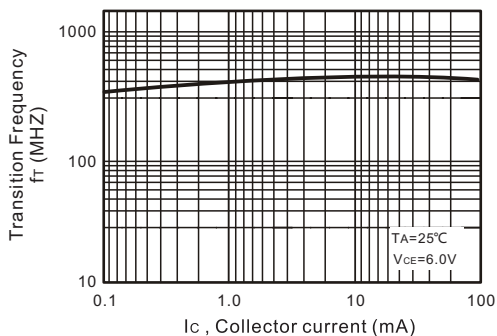
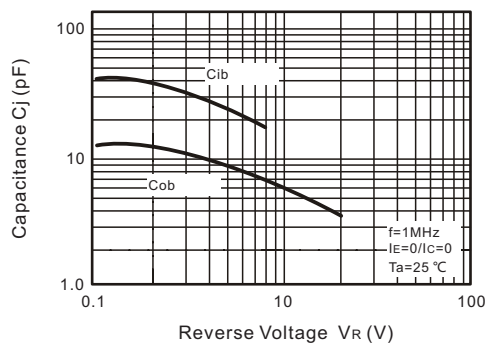
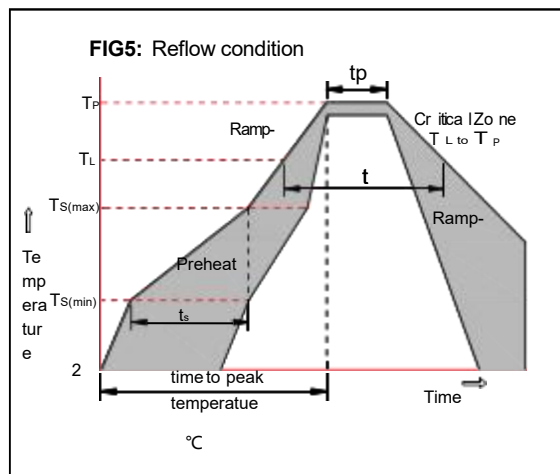


Fig.8 C_{ob}/C_{ib} -- V_{CB}/V_{EB}



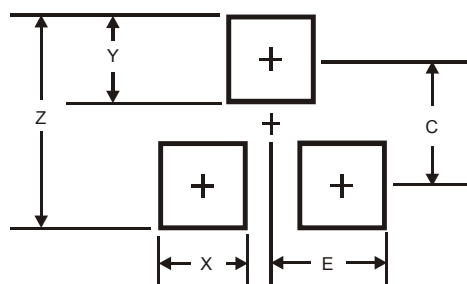
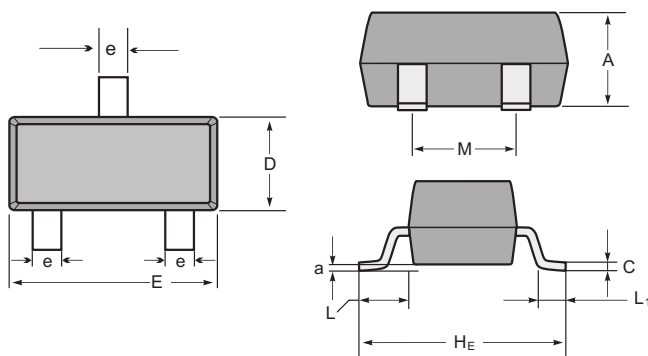
Soldering parameters

Reflow Condition		Pb-Free assembly (see as below)
Pre Heat	-Temperature Min ($T_{s(min)}$)	+150°C
	-Temperature Max($T_{s(max)}$)	+200°C
	-Time (Min to Max) (ts)	60-180 secs.
Average ramp up rate (Liquid us Temp (T_L) to peak)		3°C/sec. Max
$T_{s(max)}$ to T_L - Ramp-up Rate		3°C/sec. Max
Reflow	-Temperature(T_L)(Liquid us)	+217°C
	-Temperature(t_L)	60-150 secs.
Peak Temp (T_P)		+260(+0/-5)°C
Time within 5°C of actual Peak Temp (t_P)		30 secs. Max
Ramp-down Rate		6°C/sec. Max
Time 25°C to Peak Temp (T_P)		8 min. Max
Do not exceed		+260°C



Package Dimensions & Suggested Pad Layout

SOT23



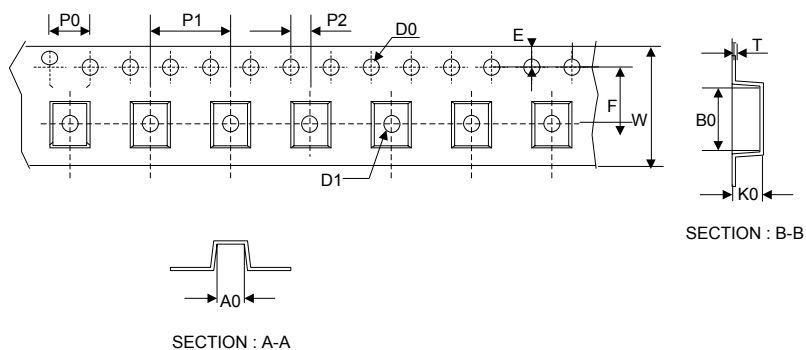
SOT-23 mechanical data

UNIT	A	C	D	E	H _E	e	M	L	L ₁	a
mm	max	1.1	0.15	1.4	3.0	2.6	0.5	1.95	0.55 (ref)	0.36 (ref)
	min	0.9	0.08	1.2	2.8	2.2	0.3	1.7		0.15
mil	max	43	6	55	118	102	20	77	22 (ref)	14 (ref)
	min	35	3	47	110	87	12	67		6

Dimensions	SOT23
Z	2.9
X	0.8
Y	0.9
C	2.0
E	1.35

Tape & reel specification

Tape



Symbol	Dimension (mm)
P0	4.00±0.10
P1	4.00±0.10
P2	2.00±0.10
D0	1.55±0.10
D1	1.05±0.10
E	1.55±0.10
F	3.60±0.10
W	8.00±0.10
A0	3.80±0.20
B0	3.25±0.20
K0	1.45±0.10
T	0.25±0.05
D2	178.0±3.0
D3	55Min.
D4	R24.0±3.0
G	R82.0±3.0
I	13.0±2.0
W1	11.0±3.0
Quantity: 3000PCS	

7" Reel

