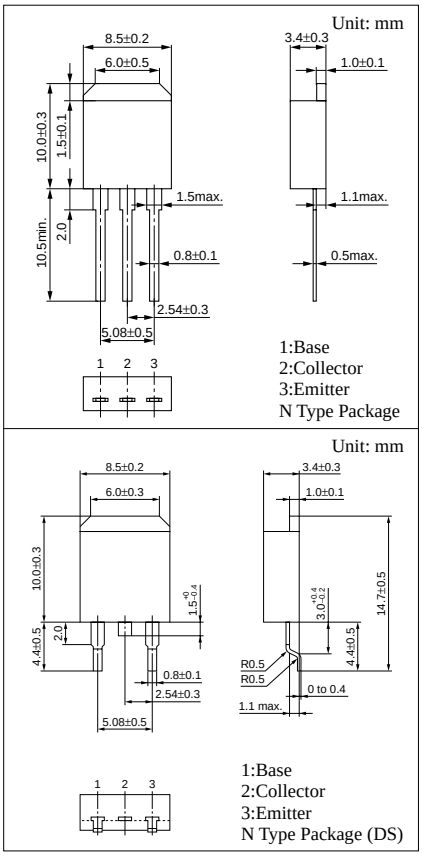
2SB939, 2SB939A

Silicon PNP epitaxial planar type Darlington

For midium-speed power switching

Complementary to 2SD1262 and 2SD1262A



Features

- High foward current transfer ratio h_{FE}
- High-speed switching
- N type package enabling direct soldering of the radiating fin to the printed circuit board, etc. of small electronic equipment.

Absolute Maximum Ratings (T_C=25˚C)

Parameter		Symbol	Ratings	Unit
Collector to base voltage	2SB939	V_{CBO}	–60	V
	2SB939A		–80	
Collector to emitter voltage	2SB939	V_{CEO}	–60	V
	2SB939A		–80	
Emitter to base voltage		V_{EBO}	–7	V
Peak collector current		I_{CP}	–12	A
Collector current		I_C	–8	A
Collector power dissipation	T_C=25°C	P_C	45	W
	Ta=25°C		1.3	
Junction temperature		T_j	150	˚C
Storage temperature		T_{stg}	–55 to +150	˚C

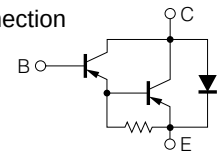
Electrical Characteristics (T_C=25˚C)

Parameter		Symbol	Conditions	min	typ	max	Unit
Collector cutoff current	2SB939	I_{CBO}	V_{CB} = –60V, I_E = 0			–100	μA
	2SB939A		V_{CB} = –80V, I_E = 0			–100	
Emitter cutoff current		I_{EBO}	V_{EB} = –7V, I_C = 0			–2	mA
Collector to emitter voltage	2SB939	V_{CEO}	I_C = –30mA, I_B = 0	–60			V
	2SB939A			–80			
Forward current transfer ratio		h_{FE1}*	V_{CE} = –3V, I_C = –4A	2000		10000	
		h_{FE2}	V_{CE} = –3V, I_C = –8A	500			
Collector to emitter saturation voltage		$V_{CE(sat)}$	I_C = –4A, I_B = –8mA			–1.5	V
Base to emitter saturation voltage		$V_{BE(sat)}$	I_C = –4A, I_B = –8mA			–2	V
Transition frequency		f_T	V_{CE} = –10V, I_C = – 0.5A, f = 1MHz		15		MHz
Turn-on time		t_{on}	I_C = –4A, I_{B1} = –8mA, I_{B2} = 8mA, V_{CC} = –50V		0.5		μs
Storage time		t_{stg}			2		μs
Fall time		t_f			1		μs

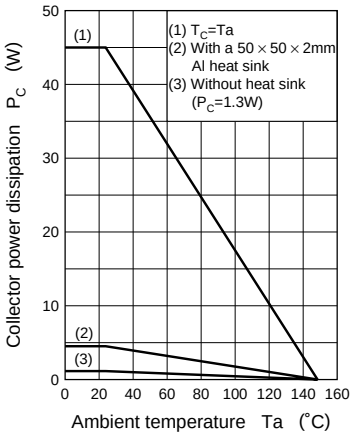
*h_{FE1} Rank classification

Rank	Q	P
h_{FE1}	2000 to 5000	4000 to 10000

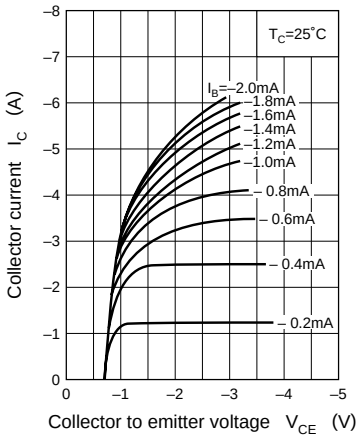
Internal Connection



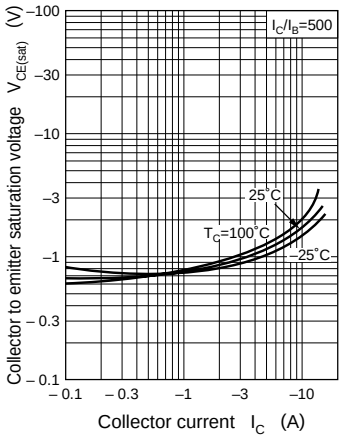
P_C — Ta



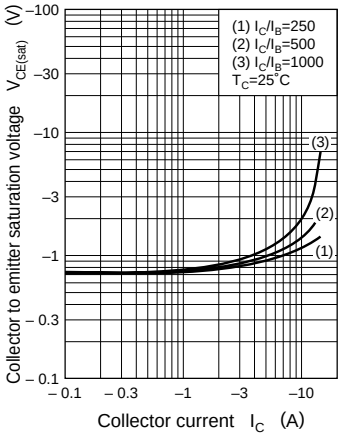
I_C — V_{CE}



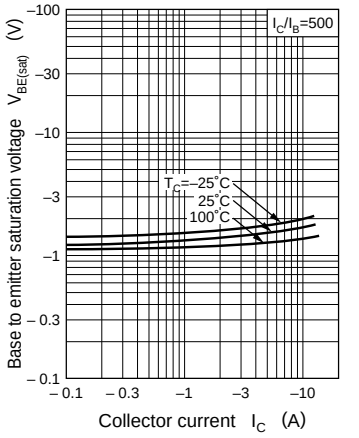
$V_{CE(sat)}$ — I_C



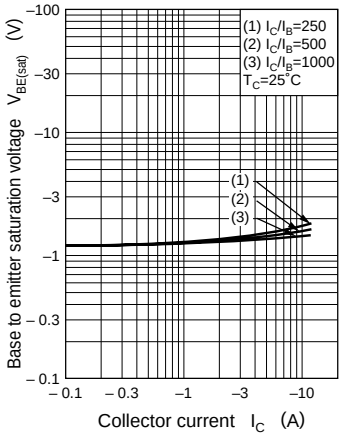
$V_{CE(sat)}$ — I_C



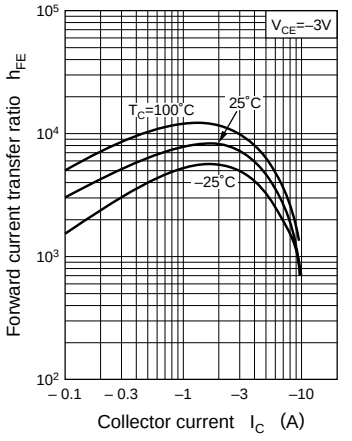
$V_{BE(sat)}$ — I_C



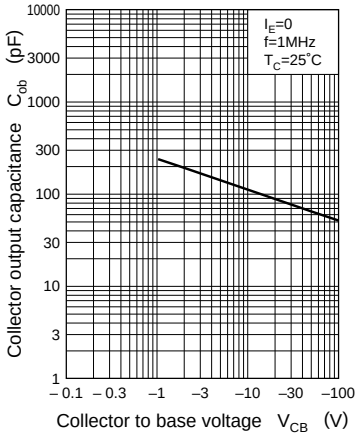
$V_{BE(sat)}$ — I_C



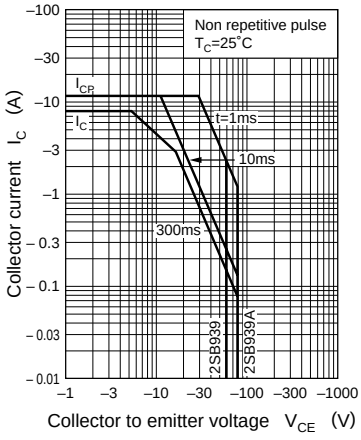
h_{FE} — I_C



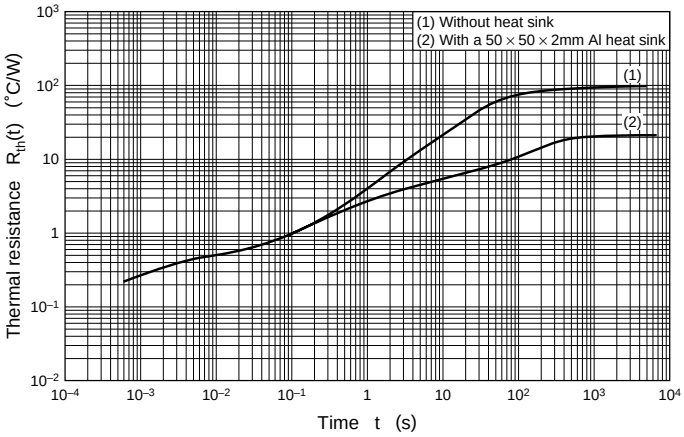
C_{ob} — V_{CB}



Area of safe operation (ASO)



$R_{th(t)}$ — t


(1) Without heat sink
(2) With a 50 × 50 × 2mm Al heat sink
(1)
(2)
Thermal resistance $R_{th}(t)$ (°C/W)
10^3
10^2
10
1
10^{-1}
10^{-2}
10^{-4}
10^{-3}
10^{-2}
10^{-1}
1
10
10^2
10^3
10^4
Time t (s)