

# 2SD2209

## Silicon NPN triple diffusion planar type Darlington

For power amplification and switching

### Features

- I type package enabling direct soldering of the radiating fin to the printed circuit board, etc. of small electronic equipment.

### Absolute Maximum Ratings (T<sub>C</sub>=25°C)

Parameter	Symbol	Ratings	Unit
Collector to base voltage	V <sub>CBO</sub>	100±15	V
Collector to emitter voltage	V <sub>CEO</sub>	100±15	V
Emitter to base voltage	V <sub>EBO</sub>	5	V
Peak collector current	I <sub>CP</sub>	8	A
Collector current	I <sub>C</sub>	4	A
Collector power dissipation	P <sub>C</sub>	T <sub>C</sub> =25°C	15
		T <sub>a</sub> =25°C	1.3
Junction temperature	T <sub>j</sub>	150	°C
Storage temperature	T <sub>stg</sub>	-55 to +150	°C

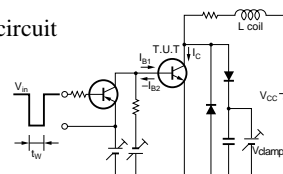
### Electrical Characteristics (T<sub>C</sub>=25°C)

Parameter	Symbol	Conditions	min	typ	max	Unit
Collector cutoff current	I <sub>CBO</sub>	V <sub>CB</sub> = 85V, I <sub>E</sub> = 0			100	μA
Emitter cutoff current	I <sub>EBO</sub>	V <sub>EB</sub> = 5V, I <sub>C</sub> = 0			2	mA
Collector to emitter voltage	V <sub>CEO</sub>	I <sub>C</sub> = 5mA, I <sub>B</sub> = 0	85		115	V
Forward current transfer ratio	h <sub>FE1</sub>	V <sub>CE</sub> = 3V, I <sub>C</sub> = 0.5A	1000			
	h <sub>FE2</sub> <sup>*1</sup>	V <sub>CE</sub> = 3V, I <sub>C</sub> = 3A	1000		10000	
Collector to emitter saturation voltage	V <sub>CE(sat)</sub>	I <sub>C</sub> = 3A, I <sub>B</sub> = 12mA			2	V
		I <sub>C</sub> = 5A, I <sub>B</sub> = 20mA			4	
Base to emitter saturation voltage	V <sub>BE(sat)</sub>	I <sub>C</sub> = 3A, I <sub>B</sub> = 12mA			2.5	V
Transition frequency	f <sub>T</sub>	V <sub>CE</sub> = 10V, I <sub>C</sub> = 0.5A, f = 1MHz		20		MHz
Turn-on time	t <sub>on</sub>	I <sub>C</sub> = 3A, I <sub>B1</sub> = 12mA, I <sub>B2</sub> = -12mA, V <sub>CC</sub> = 50V			0.3	μs
Storage time	t <sub>stg</sub>				3.0	μs
Fall time	t <sub>f</sub>				1.0	μs
Energy handling capability	E <sub>s/b</sub> <sup>*2</sup>	I <sub>C</sub> = 1A, L = 100mH, R <sub>BE</sub> = 100Ω		50		mJ

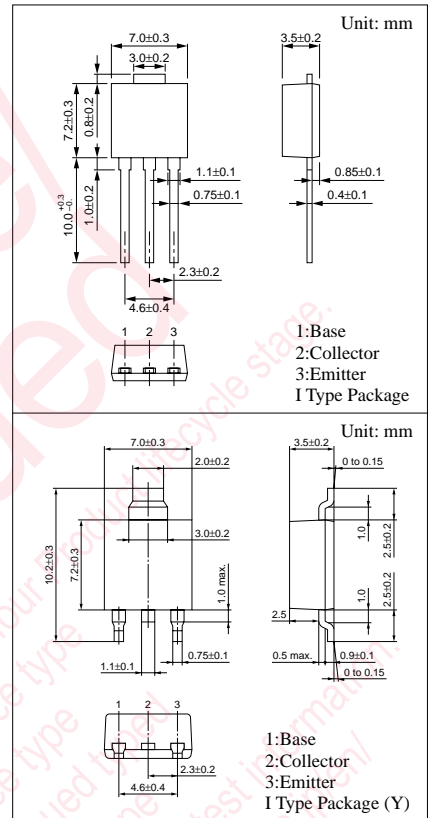
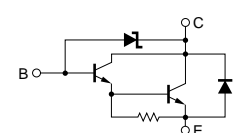
<sup>\*1</sup>h<sub>FE2</sub> Rank classification

Rank	Q	P
h <sub>FE2</sub>	1000 to 5000	2000 to 10000

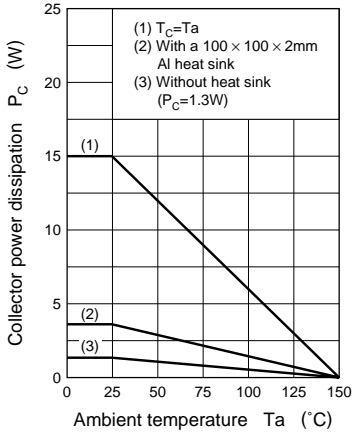
<sup>\*2</sup>E<sub>s/b</sub> Test circuit



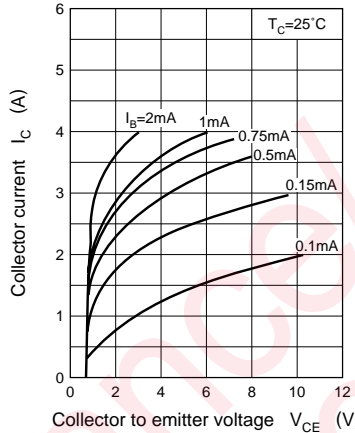
Internal Connection



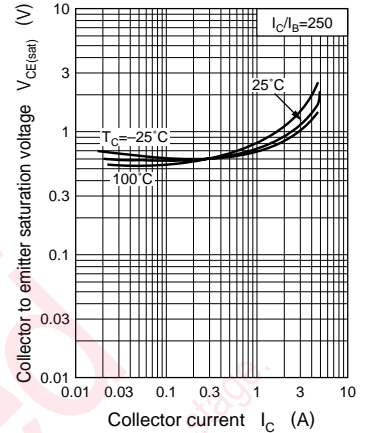
$P_C - T_a$



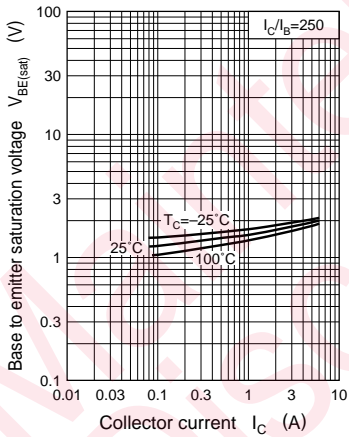
$I_C - V_{CE}$



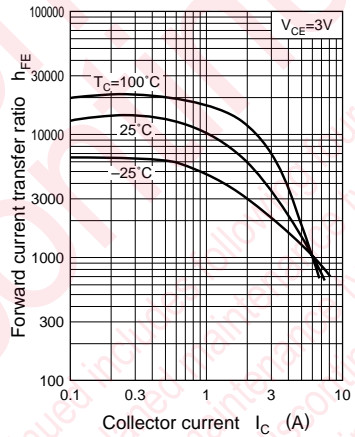
$V_{CE(sat)} - I_C$



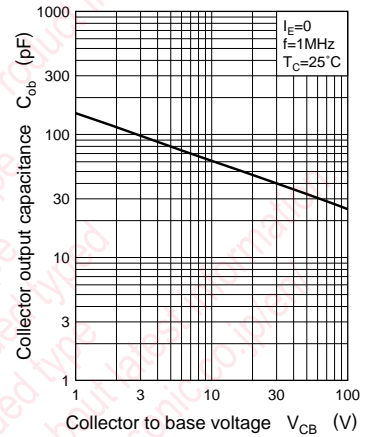
$V_{BE(sat)} - I_C$



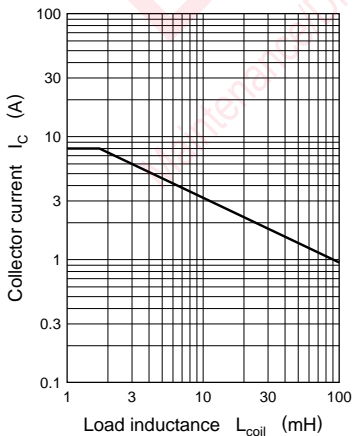
$h_{FE} - I_C$



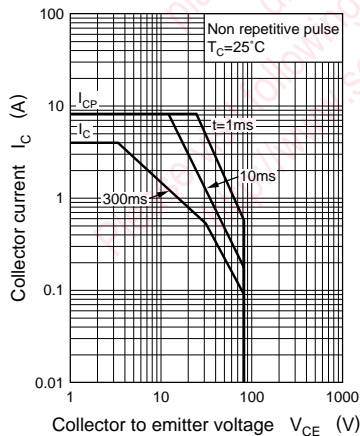
$C_{ob} - V_{CB}$

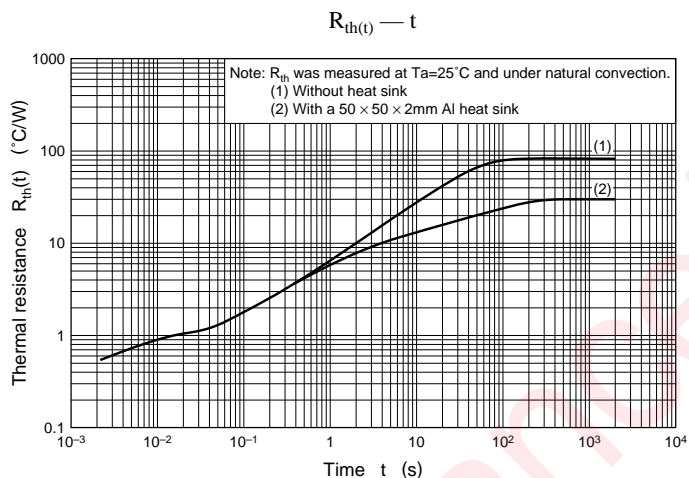


$I_C - L_{coil}$



Area of safe operation (ASO)





Maintenance/Discontinued

Maintenance/Discontinued includes following four Product lifecycle stage.  
 planned maintenance type  
 maintenance type  
 planned discontinued type  
 discontinued type  
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