

# 2SD2138, 2SD2138A

Silicon NPN triple diffusion planar type Darlington

For power amplification

Complementary to 2SB1418 and 2SB1418A

## Features

- High forward current transfer ratio  $h_{FE}$  which has satisfactory linearity
- Allowing supply with the radial taping

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

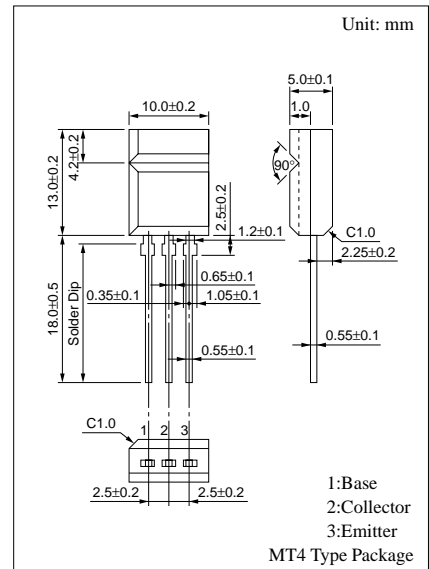
Parameter	Symbol	Rated	Unit	
Collector to base voltage	$V_{CBO}$	60	V	
base voltage		80		
Collector to emitter voltage	$V_{CEO}$	60	V	
emitter voltage		80		
Emitter to base voltage	$V_{EBO}$	5	V	
Peak collector current	$I_{CP}$	4	A	
Collector current	$I_C$	2	A	
Collector power dissipation	$P_C$	$T_C=25^\circ\text{C}$	15	W
		$T_a=25^\circ\text{C}$	2	
Junction temperature	$T_j$	150	$^\circ\text{C}$	
Storage temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$	

## Electrical Characteristics ( $T_C=25^\circ\text{C}$ )

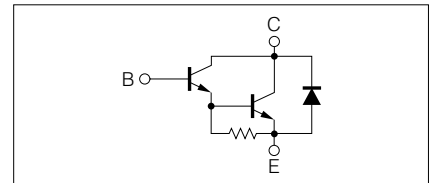
Parameter	Symbol	Conditions	min	typ	max	Unit
Collector cutoff current	$I_{CBO}$	$V_{CE} = 60\text{V}, I_E = 0$			100	$\mu\text{A}$
		$V_{CE} = 80\text{V}, I_E = 0$			100	
Collector cutoff current	$I_{CEO}$	$V_{CE} = 30\text{V}, I_B = 0$			100	$\mu\text{A}$
		$V_{CE} = 40\text{V}, I_B = 0$			100	
Emitter cutoff current	$I_{EBO}$	$V_{EB} = 5\text{V}, I_C = 0$			100	$\mu\text{A}$
Collector to emitter voltage	$V_{CEO}$	$I_C = 30\text{mA}, I_B = 0$	60			V
			80			
Forward current transfer ratio	$h_{FE1}$	$V_{CE} = 4\text{V}, I_C = 1\text{A}$	1000			
	$h_{FE2}^*$	$V_{CE} = 4\text{V}, I_C = 2\text{A}$	2000		10000	
Base to emitter voltage	$V_{BE}$	$V_{CE} = 4\text{V}, I_C = 2\text{A}$			2.8	V
Collector to emitter saturation voltage	$V_{CE(sat)}$	$I_C = 2\text{A}, I_B = 8\text{mA}$			2.5	V
Transition frequency	$f_T$	$V_{CE} = 10\text{V}, I_C = 0.5\text{A}, f = 1\text{MHz}$		20		MHz
Turn-on time	$t_{on}$	$I_C = 2\text{A}, I_{B1} = 8\text{mA}, I_{B2} = -8\text{mA}$		0.4		$\mu\text{s}$
Turn-off time	$t_{off}$	$V_{CC} = 50\text{V}$		4		$\mu\text{s}$

\* $h_{FE2}$  Rank classification

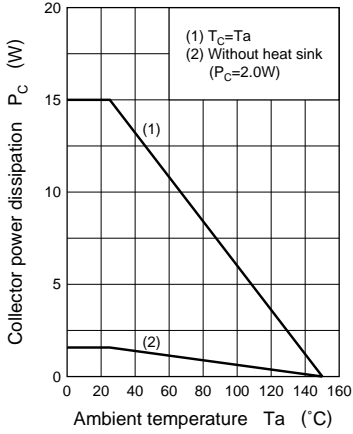
Rank	Q	P
$h_{FE2}$	2000 to 5000	4000 to 10000



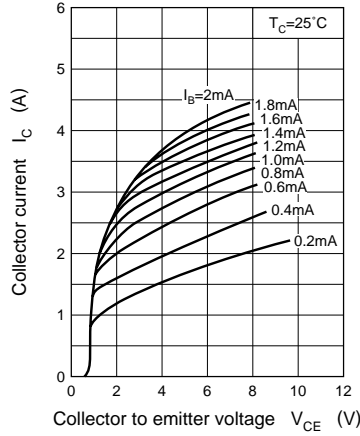
## Internal Connection



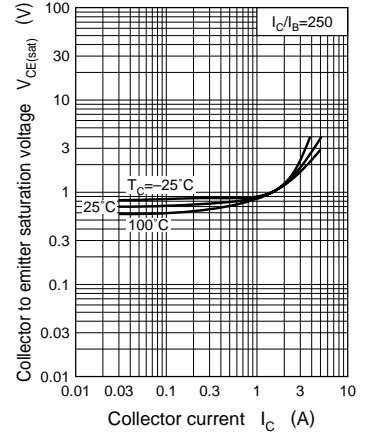
$P_C - T_a$



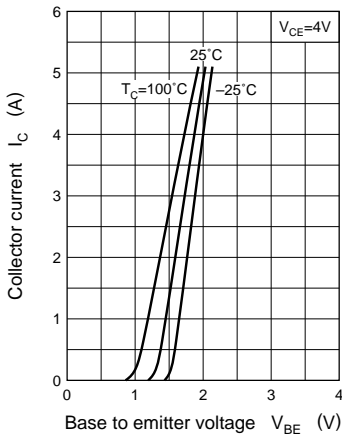
$I_C - V_{CE}$



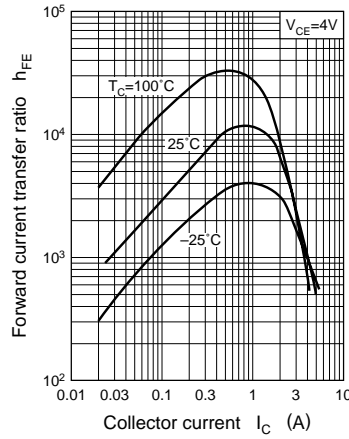
$V_{CE(sat)} - I_C$



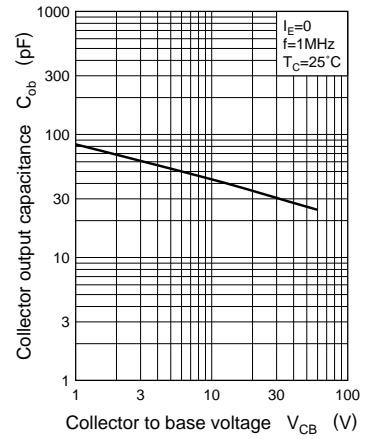
$I_C - V_{BE}$



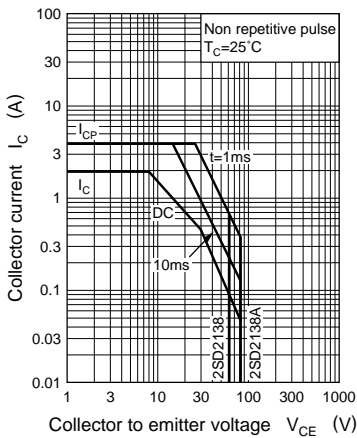
$h_{FE} - I_C$



$C_{ob} - V_{CB}$



Area of safe operation (ASO)



$R_{th(t)} - t$

