

# 2SD1538, 2SD1538A

## Silicon NPN epitaxial planar type

For low-voltage switching

Complementary to 2SB1070 and 2SB1070A

### Features

- Low collector to emitter saturation voltage  $V_{CE(sat)}$
- 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 ( $T_C=25^\circ\text{C}$ )

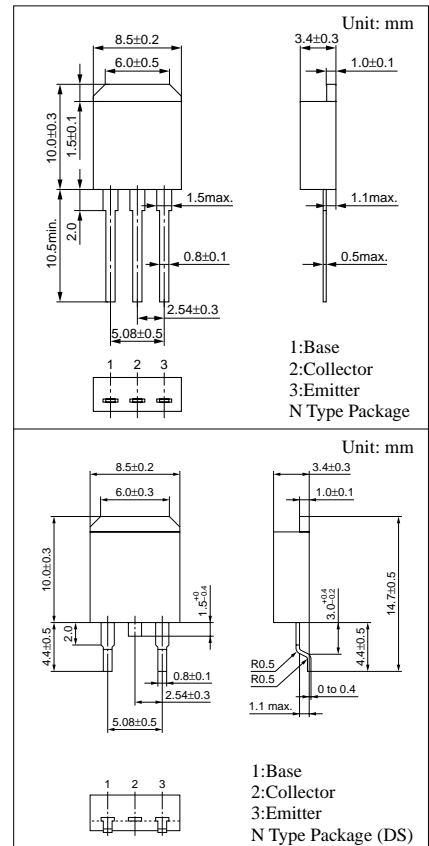
Parameter	Symbol	Rated	Unit
Collector to base voltage	2SD1538	40	V
	2SD1538A	50	
Collector to emitter voltage	2SD1538	20	V
	2SD1538A	40	
Emitter to base voltage	$V_{EBO}$	5	V
Peak collector current	$I_{CP}$	8	A
Collector current	$I_C$	4	A
Collector power dissipation	$T_C=25^\circ\text{C}$	25	W
	$T_a=25^\circ\text{C}$	1.3	
Junction temperature	$T_j$	150	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$

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

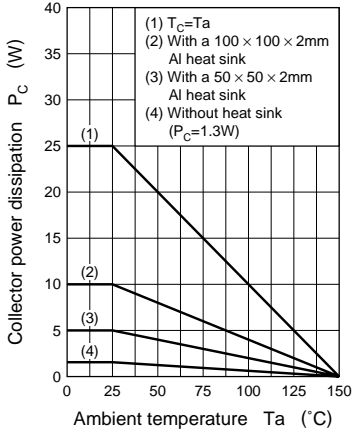
Parameter	Symbol	Conditions	min	typ	max	Unit
Collector cutoff current	2SD1538	$V_{CB} = 40\text{V}, I_E = 0$			50	$\mu\text{A}$
	2SD1538A				50	
Emitter cutoff current	$I_{EBO}$	$V_{EB} = 5\text{V}, I_C = 0$			50	$\mu\text{A}$
Collector to emitter voltage	2SD1538	$I_C = 10\text{mA}, I_B = 0$	20			V
	2SD1538A		40			
Forward current transfer ratio	$h_{FE1}$	$V_{CE} = 2\text{V}, I_C = 0.1\text{A}$	45			
	$h_{FE2}^*$	$V_{CE} = 2\text{V}, I_C = 1\text{A}$	90		260	
Collector to emitter saturation voltage	$V_{CE(sat)}$	$I_C = 2\text{A}, I_B = 0.1\text{A}$			0.5	V
Base to emitter saturation voltage	$V_{BE(sat)}$	$I_C = 2\text{A}, I_B = 0.1\text{A}$			1.5	V
Transition frequency	$f_T$	$V_{CE} = 5\text{V}, I_C = 0.5\text{A}, f = 10\text{MHz}$		120		MHz
Turn-on time	$t_{on}$	$I_C = 2\text{A}, I_{B1} = 0.2\text{A}, I_{B2} = -0.2\text{A}, V_{CC} = 20\text{V}$		0.2		$\mu\text{s}$
Storage time	$t_{stg}$			0.5		$\mu\text{s}$
Fall time	$t_f$			0.1		$\mu\text{s}$

\* $h_{FE2}$  Rank classification

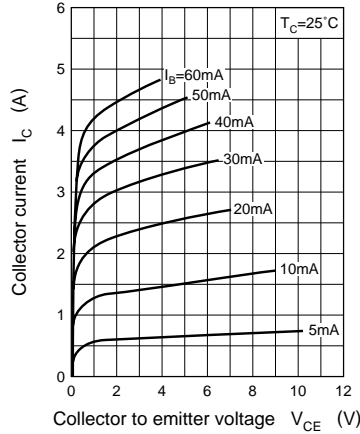
Rank	Q	P
$h_{FE2}$	90 to 180	130 to 260



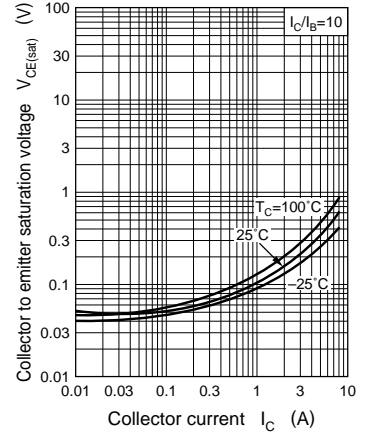
$P_C - T_a$



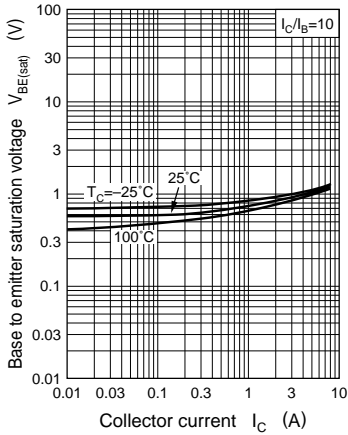
$I_C - V_{CE}$



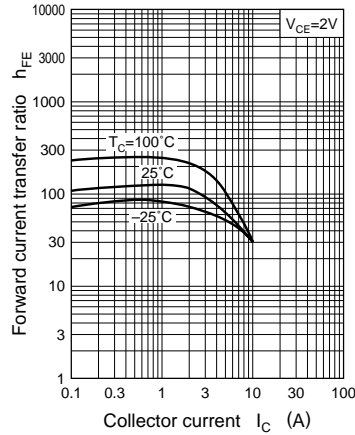
$V_{CE(sat)} - I_C$



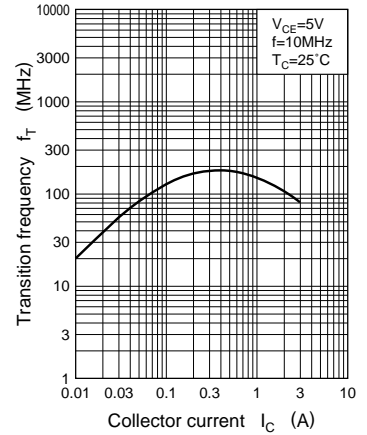
$V_{BE(sat)} - I_C$



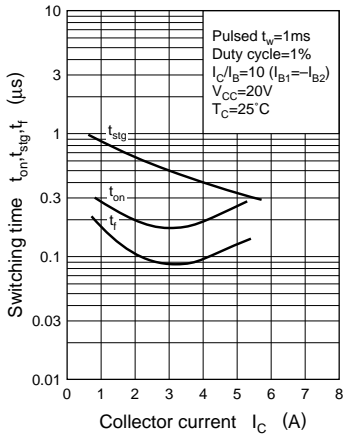
$h_{FE} - I_C$



$f_T - I_C$



$t_{on}, t_{stg}, t_f - I_C$



Area of safe operation (ASO)

