

# 2SD2399

# Transistor, NPN, Darlington

### Features

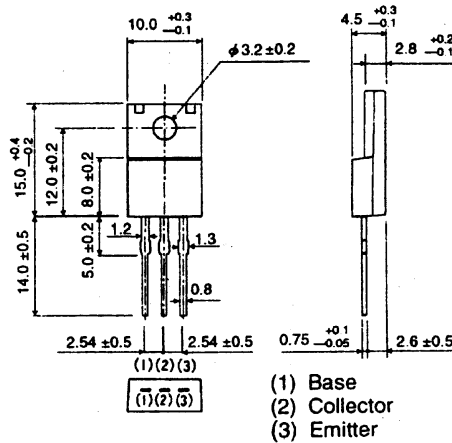
- available in TO-220FN package
- Darlington connection provides high dc current gain ( $h_{FE}$ )
- damper diode is incorporated
- built-in resistors between base and emitter
- 2 mm lower than the TO-220FP package which allows higher density mounting
- complementary pair with 2SB1568

### Applications

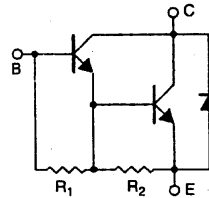
- low frequency power amplifier

### Dimensions (Units : mm)

2SD2399 (TO-220FN)



### Equivalent circuit



$R_1 \cong 3.0 \text{ k}\Omega$   
 $R_2 \cong 300 \Omega$

B: Base  
C: Collector  
E: Emitter

### Absolute maximum ratings ( $T_a = 25^\circ\text{C}$ )

Parameter	Symbol	Limits	Unit	Conditions
Collector-to-base voltage	$V_{CBO}$	80	V	
Collector-to-emitter voltage	$V_{CEO}$	80	V	
Emitter-to-base voltage	$V_{EBO}$	7	V	
Collector current	$I_C$	4	A	Continuous (dc)
		6	A	Single pulse, $P_W = 100 \text{ ms}$
Collector dissipation	$P_C$	2	W	
		30	W	$T_C = 25^\circ\text{C}$
Junction temperature	$T_j$	150	$^\circ\text{C}$	
Storage temperature	$T_{stg}$	-55 -- +150	$^\circ\text{C}$	

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2SD2399 Transistor, NPN, 2SD series

Electrical characteristics (unless otherwise noted,  $T_a = 25^\circ\text{C}$ )

Parameter	Symbol	Min	Typical	Max	Unit	Conditions
Collector-to-base breakdown voltage	$BV_{CBO}$	80			V	$I_C = 50 \mu\text{A}$
Collector-to-emitter breakdown voltage	$BV_{CEO}$	80			V	$I_C = 1 \text{ mA}$
Collector cutoff current	$I_{CBO}$			100	$\mu\text{A}$	$V_{CB} = 80 \text{ V}$
Emitter cutoff current	$I_{EBO}$			3	mA	$V_{EB} = 5 \text{ V}$
DC current gain	$h_{FE}$	1 k		10 k		$V_{CE} = 3 \text{ V}$ , $I_C = 2 \text{ A}$ , single pulse
Collector-to-emitter saturation voltage	$V_{CE(sat)}$			1.5	V	$I_C/I_B = 2 \text{ A}/4 \text{ mA}$ , single pulse
Transition frequency	$f_T$		40		MHz	$V_{CE} = 5 \text{ V}$ , $I_E = -0.2 \text{ A}$ , $f = 10 \text{ MHz}$
Output capacitance	$C_{ob}$		35		pF	$V_{CB} = 10 \text{ V}$ , $I_E = 0 \text{ A}$ , $f = 1 \text{ MHz}$

Electrical characteristic curves

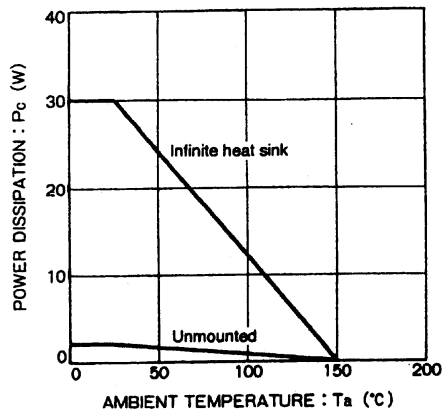


Figure 1

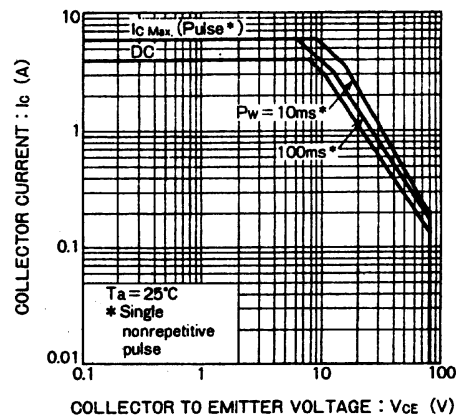


Figure 2

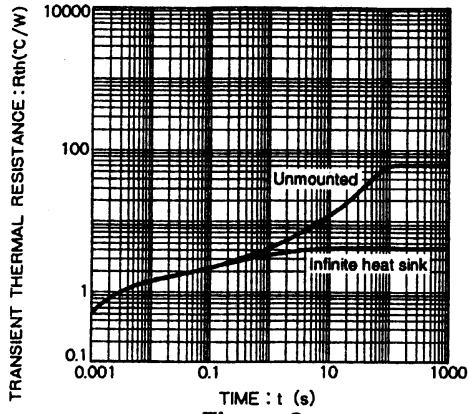


Figure 3

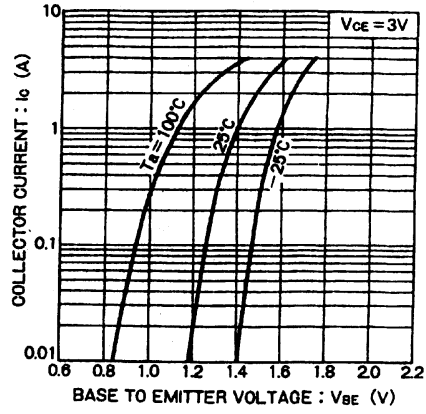


Figure 4

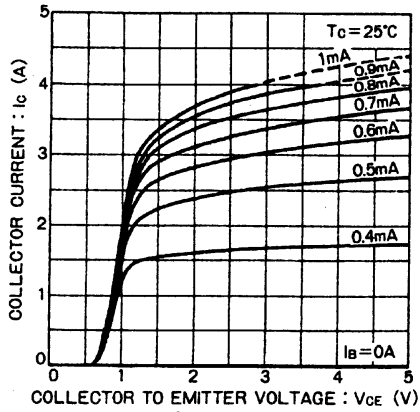


Figure 5

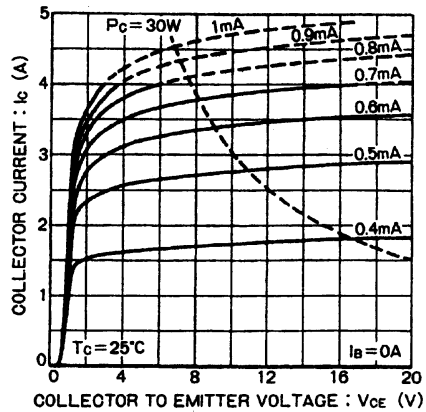


Figure 6

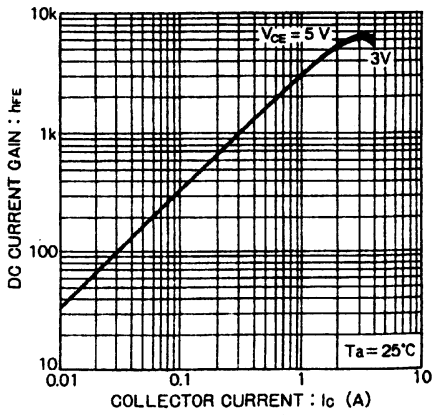


Figure 7

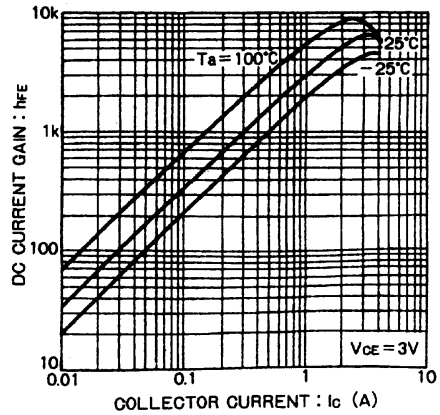
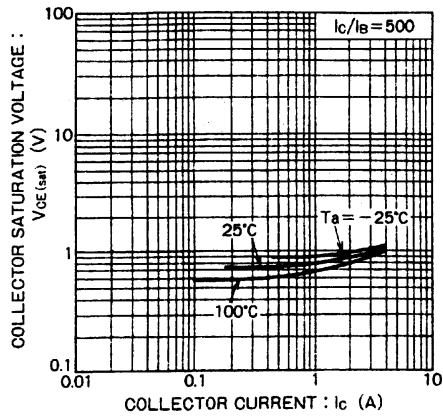
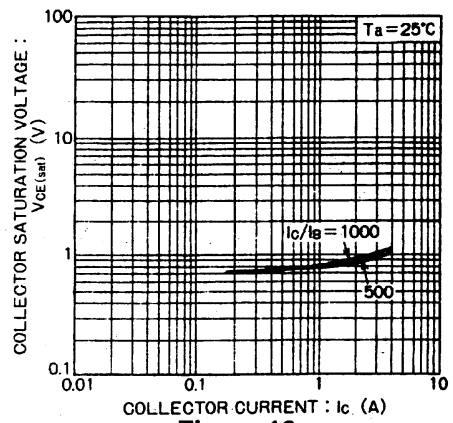


Figure 8

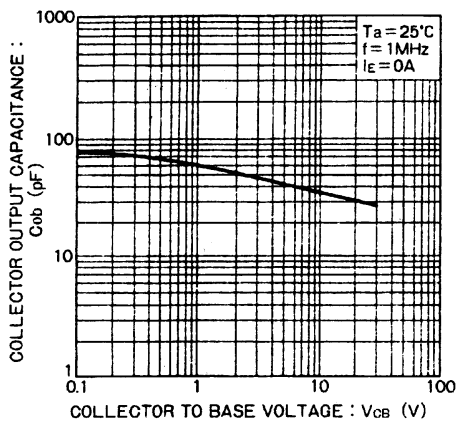
**2SD2399** Transistor, NPN, 2SD series



**Figure 9**



**Figure 10**



**Figure 11**

**Ordering information**

Package	Bulk
Code	
Basic order quantity	500
2SD2399	★
★ = Standard, ☆ = Semi-standard, * = Special order	

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