2SA1193(K)

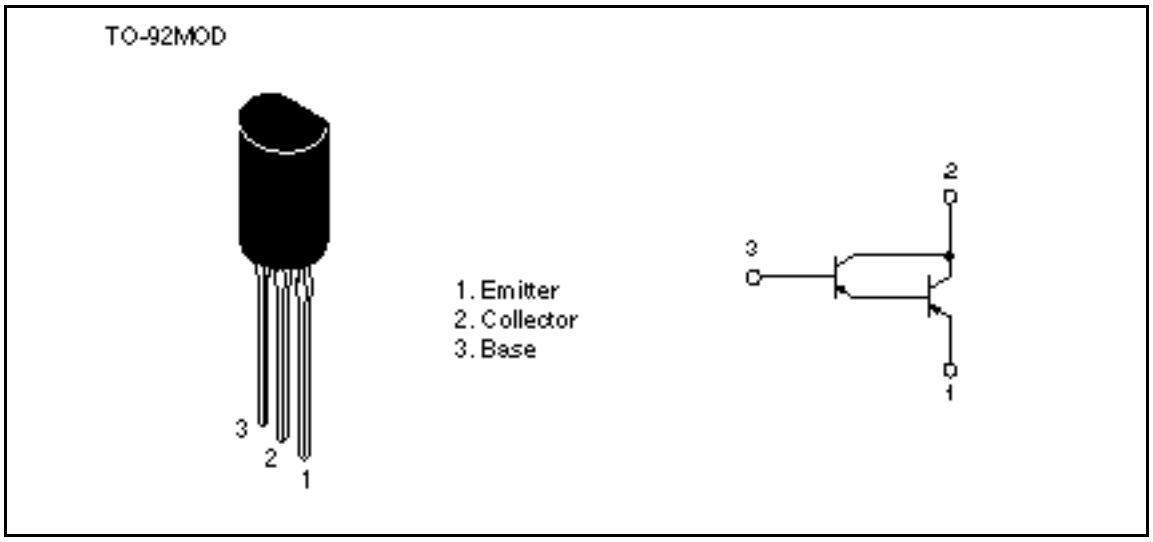
Silicon PNP Epitaxial, Darlington

HITACHI

Application

High gain amplifier

Outline



Hitachi semiconductor

Absolute Maximum Ratings (Ta = 25°C)

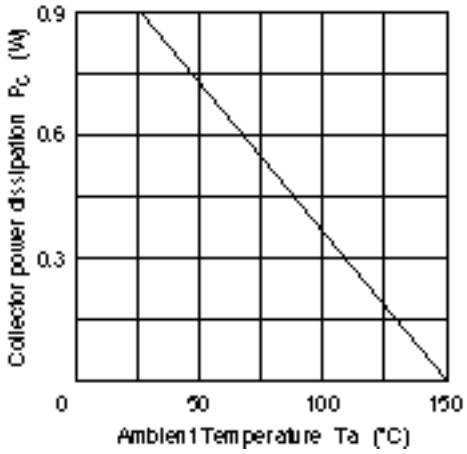
Item	Symbol	Ratings	Unit
Collector to base voltage	V_{CBO}	–60	V
Collector to emitter voltage	V_{CEO}	–60	V
Emitter to base voltage	V_{EBO}	–7	V
Collector current	I_C	–0.5	A
Collector peak current	$i_{C(peak)}$	–1.0	A
Collector power dissipation	P_C	0.9	W
Junction temperature	Tj	150	°C
Storage temperature	Tstg	–55 to +150	°C

Electrical Characteristics (Ta = 25°C)

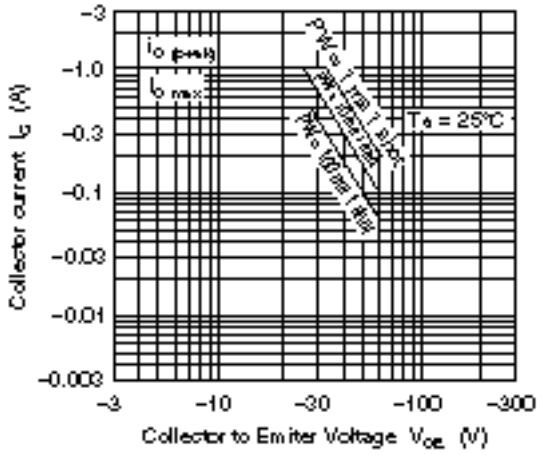
Item	Symbol	Min	Typ	Max	Unit	Test conditions
Collector to emitter breakdown voltage	$V_{(BR)CEO}$	–60	—	—	V	I_C = –1 mA, R_{BE} = ∞
Collector cutoff current	I_{CBO}	—	—	–1.0	µA	V_{CB} = –60 V, I_E = 0
Emitter cutoff current	I_{EBO}	—	—	–1.0	µA	V_{EB} = –7 V, I_C = 0
DC current transfer ratio	h_{FE}	2000	—	—		V_{CE} = –3 V, I_C = –250 mA*[1]
Collector to emitter saturation voltage	$V_{CE(sat)}$	—	—	–1.5	V	I_C = –250 mA, I_B = –0.5 mA*[1]
Base to emitter saturation voltage	$V_{BE(sat)}$	—	—	–2.0	V	
Turn on time	t_{on}	—	0.3	—	µs	I_C = –250 mA
Turn off time	t_{off}	—	0.9	—	µs	I_{B1} = $-I_{B2}$ = –0.5 mA

Note: 1. Pulse test

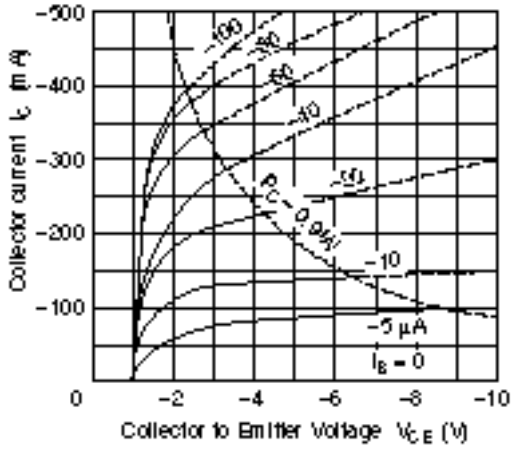
Maximum Collector Dissipation Curve



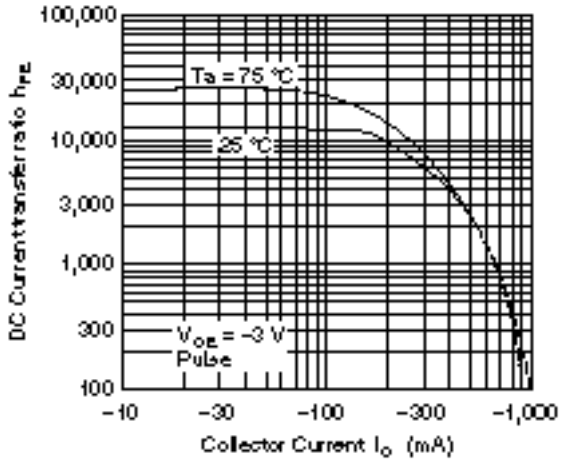
Area of Safe Operation

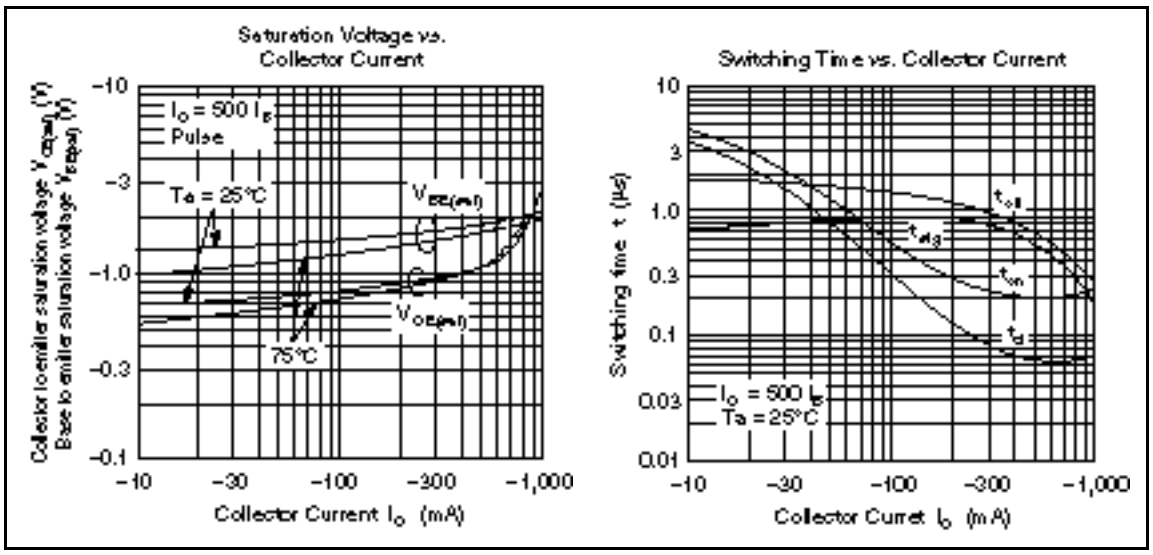


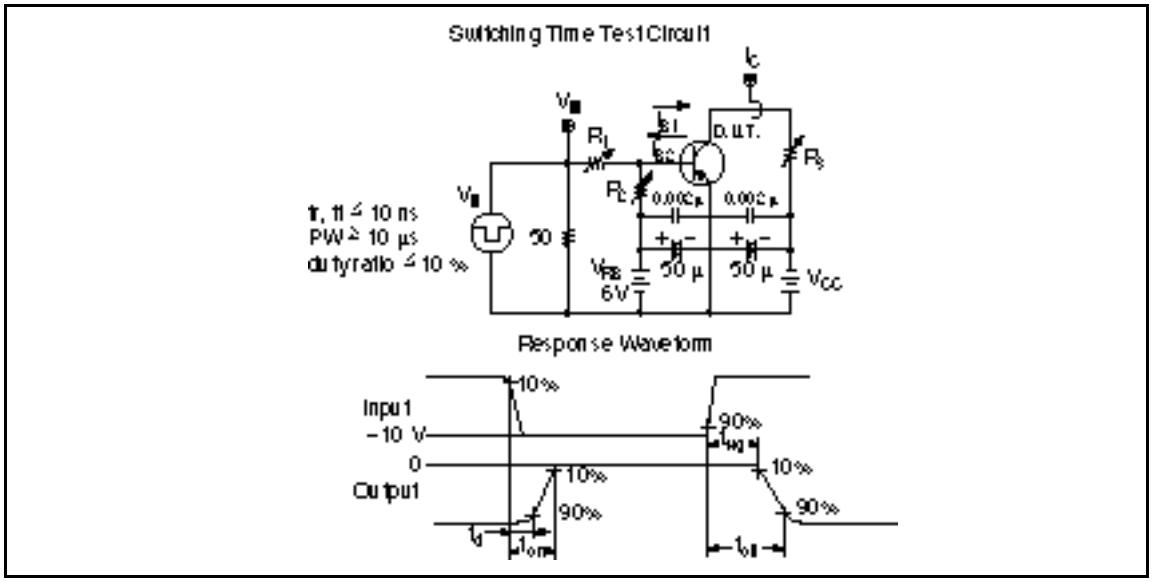
Typical Output Characteristics



DC Current Transfer Ratio vs. Collector Current




Saturation Voltage vs.
Collector Current
Collector to emitter saturation voltage $V_{CE(sat)}$ (V)
Base to emitter saturation voltage $V_{BE(sat)}$ (V)
I_C = 500 I_B
Pulse
Ta = 25°C
75°C
$V_{BE(sat)}$
$V_{CE(sat)}$
−10
−3
−1.0
−0.3
−0.1
−10
−30
−100
−300
−1,000
Collector Current I_C (mA)
Switching Time vs. Collector Current
Switching time t (µs)
10
3
1.0
0.3
0.1
0.03
0.01
t_{off}
t_{stg}
t_{on}
t_d
I_C = 500 I_B
Ta = 25°C
−10
−30
−100
−300
−1,000
Collector Curret I_C (mA)


Switching Time Test Circuit
I_C
V_{IN}
R_1
I_{B1}
D.U.T.
R_2
R_L
0.002 µF
0.002 µF
V_{IN}
50
V_{BB}
6V
50 µ
50 µ
V_{CC}
tr, tf ≦ 10 ns
PW ≧ 10 µs
duty ratio ≦ 10 %
Response Waveform
Input
−10 V
0
Output
10%
90%
10%
90%
10%
90%
t_d
t_{on}
t_{stg}
t_{off}

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