2SB649, 2SB649A

Silicon PNP Epitaxial

HITACHI

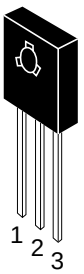
ADE-208-856 (Z)
1st. Edition
Sep. 2000

Application

Low frequency power amplifier complementary pair with 2SD669/A

Outline

TO-126 MOD



1. Emitter
2. Collector
3. Base

Hitachi semiconductor

Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings 2SB649	Ratings 2SB649A	Unit
Collector to base voltage	V_{CBO}	–180	–180	V
Collector to emitter voltage	V_{CEO}	–120	–160	V
Emitter to base voltage	V_{EBO}	–5	–5	V
Collector current	I_C	–1.5	–1.5	A
Collector peak current	$I_{C(peak)}$	–3	–3	A
Collector power dissipation	P_C	1	1	W
	P_C*[1]	20	20	W
Junction temperature	Tj	150	150	°C
Storage temperature	Tstg	–55 to +150	–55 to +150	°C

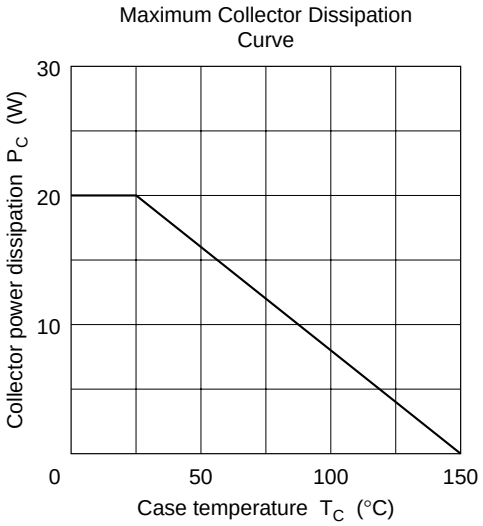
Note: 1. Value at T_C = 25°C

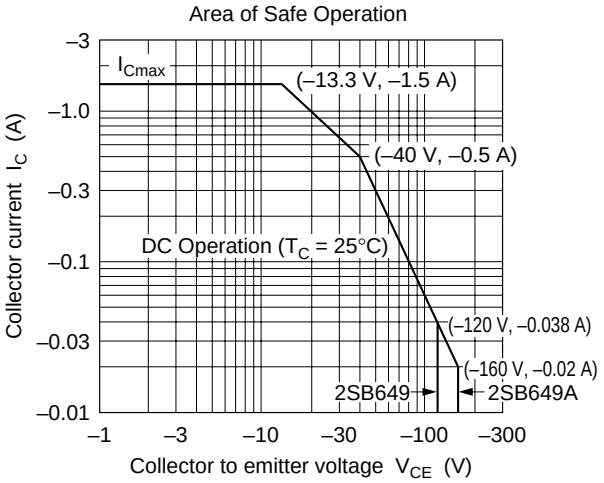
Electrical Characteristics (Ta = 25°C)

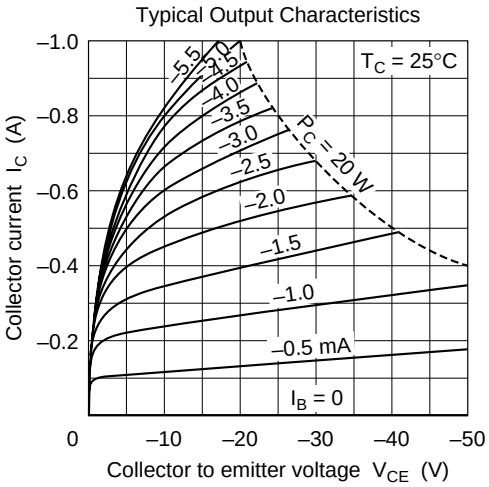
Item	Symbol	2SB649 Min	2SB649 Typ	2SB649 Max	2SB649A Min	2SB649A Typ	2SB649A Max	Unit	Test conditions
Collector to base breakdown voltage	$V_{(BR)CBO}$	–180	—	—	–180	—	—	V	I_C = –1 mA, I_E = 0
Collector to emitter breakdown voltage	$V_{(BR)CEO}$	–120	—	—	–160	—	—	V	I_C = –10 mA, R_{BE} = ∞
Emitter to base breakdown voltage	$V_{(BR)EBO}$	–5	—	—	–5	—	—	V	I_E = –1 mA, I_C = 0
Collector cutoff current	I_{CBO}	—	—	–10	—	—	–10	μA	V_{CB} = –160 V, I_E = 0
DC current transfer ratio	h_{FE1}*[1]	60	—	320	60	—	200		V_{CE} = –5 V, I_C = –150 mA
	h_{FE2}	30	—	—	30	—	—		V_{CE} = –5 V, I_C = –500 mA*[2]
Collector to emitter saturation voltage	$V_{CE(sat)}$	—	—	–1	—	—	–1	V	I_C = –500 mA, I_B = –50 mA
Base to emitter voltage	V_{BE}	—	—	–1.5	—	—	–1.5	V	V_{CE} = –5 V, I_C = –150 mA
Gain bandwidth product	f_T	—	140	—	—	140	—	MHz	V_{CE} = –5 V, I_C = –150 mA
Collector output capacitance	Cob	—	27	—	—	27	—	pF	V_{CB} = –10 V, I_E = 0, f = 1 MHz

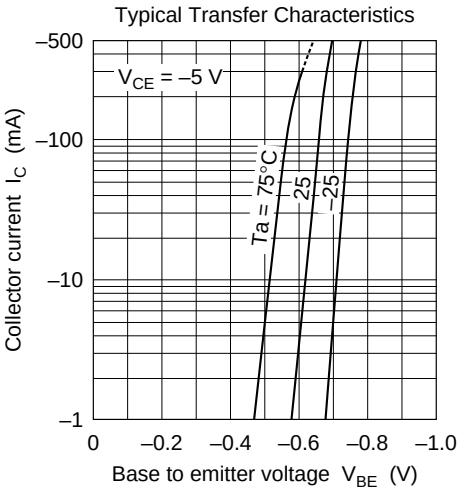
Notes: 1. The 2SB649 and 2SB649A are grouped by h_{FE1} as follows.
2. Pulse test

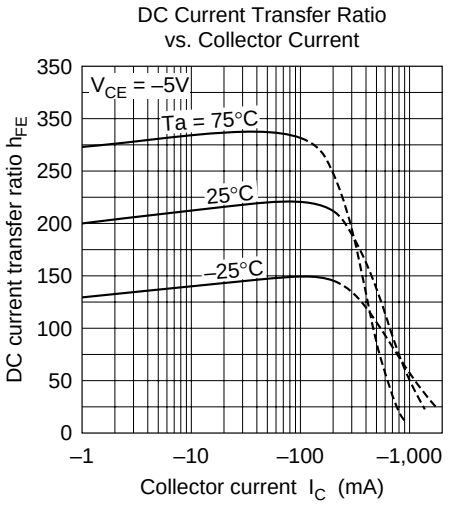
	B	C	D
2SB649	60 to 120	100 to 200	160 to 320
2SB649A	60 to 120	100 to 200	—

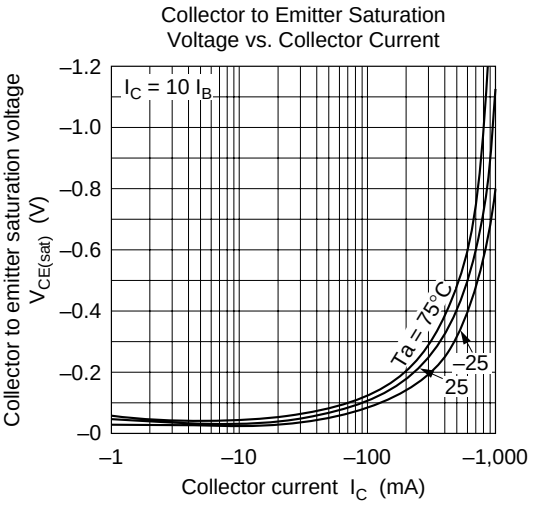

Maximum Collector Dissipation Curve
Collector power dissipation P_C (W)
30
20
10
0
50
100
150
Case temperature T_C (°C)

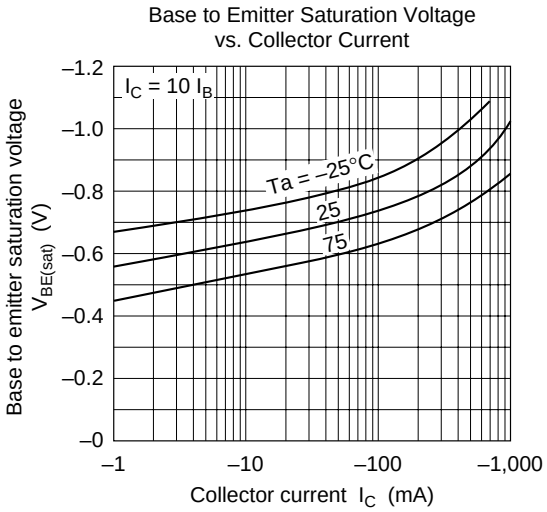

Area of Safe Operation
Collector current I_C (A)
–3
–1.0
–0.3
–0.1
–0.03
–0.01
I_{Cmax}
(–13.3 V, –1.5 A)
(–40 V, –0.5 A)
DC Operation (T_C = 25°C)
(–120 V, –0.038 A)
(–160 V, –0.02 A)
2SB649
2SB649A
–1
–3
–10
–30
–100
–300
Collector to emitter voltage V_{CE} (V)

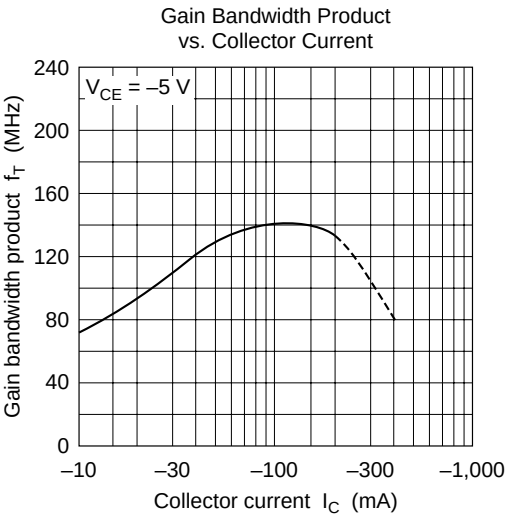

Typical Output Characteristics
Collector current I_C (A)
–1.0
–0.8
–0.6
–0.4
–0.2
T_C = 25°C
–5.5
–5.0
–4.5
–4.0
–3.5
–3.0
–2.5
–2.0
–1.5
–1.0
–0.5 mA
I_B = 0
P_C = 20 W
0
–10
–20
–30
–40
–50
Collector to emitter voltage V_{CE} (V)

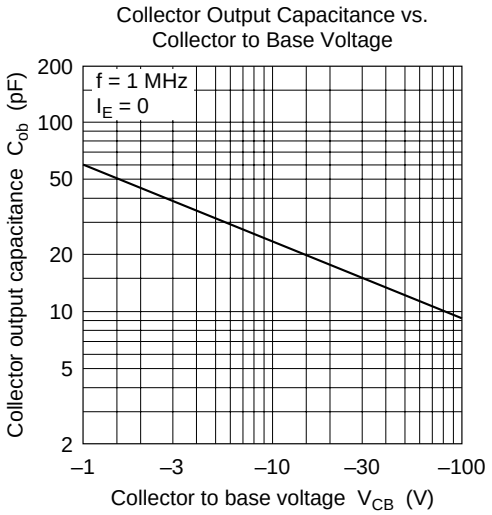

Typical Transfer Characteristics
Collector current I_C (mA)
–500
–100
–10
–1
V_{CE} = –5 V
Ta = 75°C
25
–25
0
–0.2
–0.4
–0.6
–0.8
–1.0
Base to emitter voltage V_{BE} (V)


DC Current Transfer Ratio
vs. Collector Current
DC current transfer ratio h_{FE}
V_{CE} = –5V
Ta = 75°C
25°C
–25°C
350
350
250
200
150
100
50
0
–1
–10
–100
–1,000
Collector current I_C (mA)


Collector to Emitter Saturation
Voltage vs. Collector Current
Collector to emitter saturation voltage
$V_{CE(sat)}$ (V)
I_C = 10 I_B
Ta = 75°C
–25
25
–1.2
–1.0
–0.8
–0.6
–0.4
–0.2
–0
–1
–10
–100
–1,000
Collector current I_C (mA)

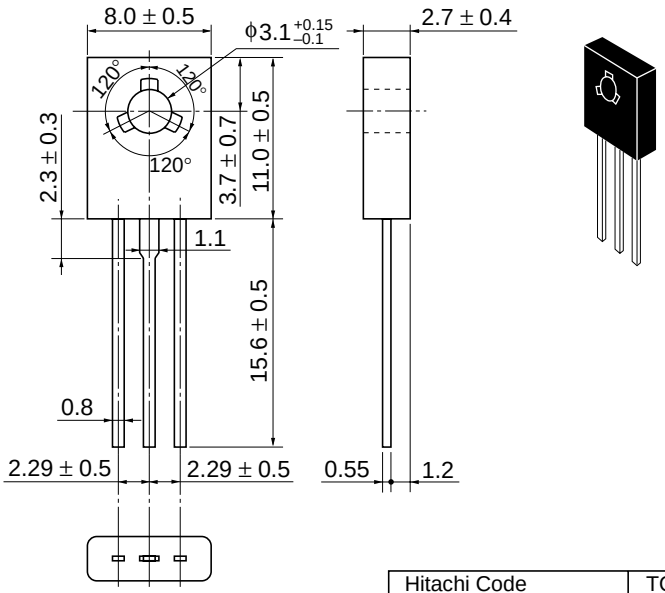

Base to Emitter Saturation Voltage
vs. Collector Current
Base to emitter saturation voltage
$V_{BE(sat)}$ (V)
I_C = 10 I_B
Ta = –25°C
25
75
–1.2
–1.0
–0.8
–0.6
–0.4
–0.2
–0
–1
–10
–100
–1,000
Collector current I_C (mA)


Gain Bandwidth Product
vs. Collector Current
Gain bandwidth product f_T (MHz)
V_{CE} = –5 V
240
200
160
120
80
40
0
–10
–30
–100
–300
–1,000
Collector current I_C (mA)


Collector Output Capacitance vs.
Collector to Base Voltage
f = 1 MHz
I_E = 0
Collector output capacitance C_{ob} (pF)
200
100
50
20
10
5
2
–1
–3
–10
–30
–100
Collector to base voltage V_{CB} (V)

Package Dimensions

Unit: mm



Hitachi Code	TO-126 Mod
JEDEC	—
EIAJ	—
Mass (reference value)	0.67 g

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