2SB1409(L)/(S)

Silicon PNP Epitaxial

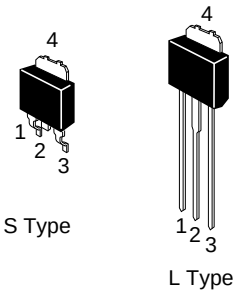
HITACHI

Application

Low frequency power amplifier complementary Pair with 2SD2123(L)/(S)

Outline

DPAK



S Type

L Type

1. Base
2. Collector
3. Emitter
4. Collector

Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings	Unit
Collector to base voltage	V_{CBO}	–180	V
Collector to emitter voltage	V_{CEO}	–160	V
Emitter to base voltage	V_{EBO}	–5	V
Collector current	I_C	–1.5	A
Collector peak current	$I_{C(peak)}$	–3	A
Collector power dissipation	P_C*[1]	18	W
Junction temperature	Tj	150	°C
Storage temperature	Tstg	–55 to +150	°C

Note: 1. Value at T_C = 25°C.

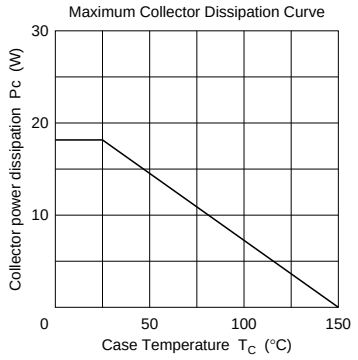
Electrical Characteristics (Ta = 25°C)

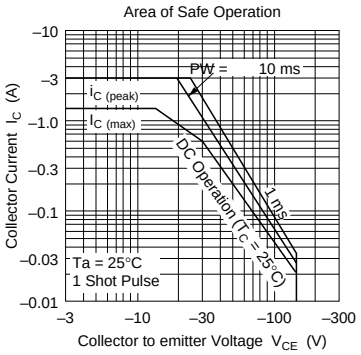
Item	Symbol	Min	Typ	Max	Unit	Test conditions
Collector to base breakdown voltage	$V_{(BR)CBO}$	–180	—	—	V	I_C = –1 mA, I_E = 0
Collector to emitter breakdown voltage	$V_{(BR)CEO}$	–160	—	—	V	I_C = –10 mA, R_{BE} = ∞
Emitter to base breakdown voltage	$V_{(BR)EBO}$	–5	—	—	V	I_E = –1 mA, I_C = 0
Collector cutoff current	I_{CBO}	—	—	–10	µA	V_{CB} = –160 V, I_E = 0
DC current transfer ratio	h_{FE1}*[1]	60	—	200		V_{CE} = –5 V, I_C = –150 mA*[2]
	h_{FE2}	30	—	—		V_{CE} = –5 V, I_C = –500 mA*[2]
Collector to emitter saturation voltage	$V_{CE(sat)}$	—	—	–1	V	I_C = –500 mA, I_B = –50 mA
Base to emitter voltage	V_{BE}	—	—	–1.5	V	V_{CE} = –5 V, I_C = –150 mA
Gain bandwidth product	f_T	—	240	—	MHz	V_{CE} = –5 V, I_C = –150 mA
Collector output capacitance	Cob	—	25	—	pF	V_{CB} = –10 A, I_E = 0, f = 1 MHz

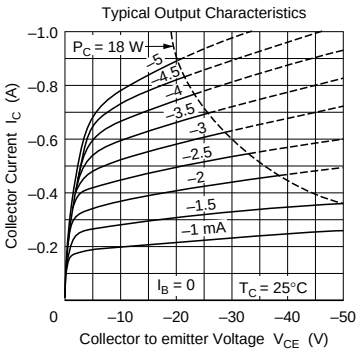
Notes: 1. The 2SB1409(L)/(S) is grouped by h_{FE1} as follows.

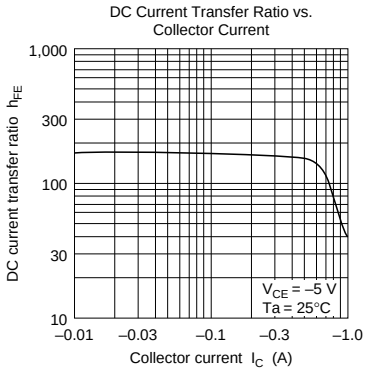
B	C
60 to 120	100 to 200

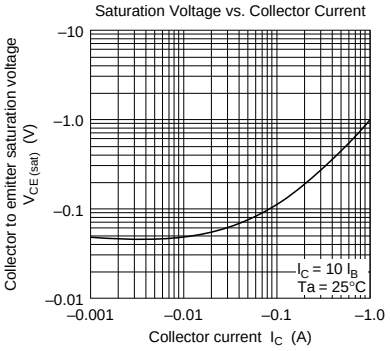
2. Pulse test.

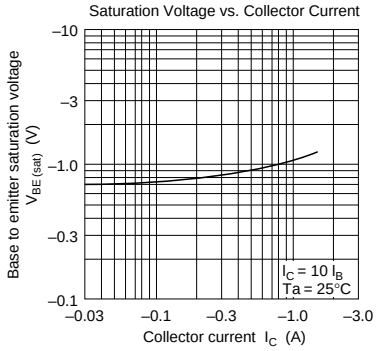

Maximum Collector Dissipation Curve
Collector power dissipation Pc (W)
30
20
10
0
50
100
150
Case Temperature T_C (°C)

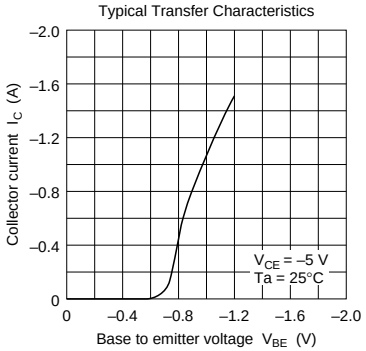

Area of Safe Operation
Collector Current I_C (A)
–10
–3
–1.0
–0.3
–0.1
–0.03
–0.01
PW = 10 ms
$I_{C\ (peak)}$
$I_{C\ (max)}$
DC Operation (T_C = 25°C)
1 ms
Ta = 25°C
1 Shot Pulse
–3
–10
–30
–100
–300
Collector to emitter Voltage V_{CE} (V)

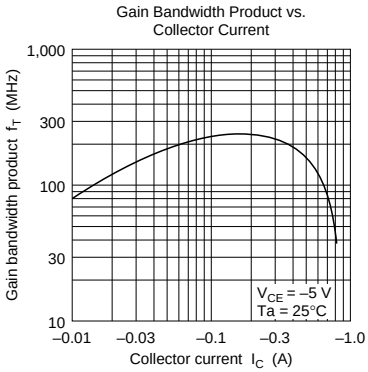

Typical Output Characteristics
Collector Current I_C (A)
–1.0
–0.8
–0.6
–0.4
–0.2
P_C = 18 W
–5
–4.5
–4
–3.5
–3
–2.5
–2
–1.5
–1 mA
I_B = 0
T_C = 25°C
0
–10
–20
–30
–40
–50
Collector to emitter Voltage V_{CE} (V)

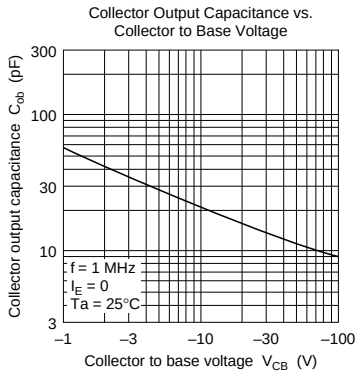

DC Current Transfer Ratio vs.
Collector Current
DC current transfer ratio h_{FE}
1,000
300
100
30
10
V_{CE} = –5 V
Ta = 25°C
–0.01
–0.03
–0.1
–0.3
–1.0
Collector current I_C (A)


Saturation Voltage vs. Collector Current
Collector to emitter saturation voltage $V_{CE(sat)}$ (V)
–10
–1.0
–0.1
–0.01
–0.001
–0.01
–0.1
–1.0
I_C = 10 I_B
Ta = 25°C
Collector current I_C (A)


Saturation Voltage vs. Collector Current
Base to emitter saturation voltage $V_{BE(sat)}$ (V)
–10
–3
–1.0
–0.3
–0.1
–0.03
–0.1
–0.3
–1.0
–3.0
I_C = 10 I_B
Ta = 25°C
Collector current I_C (A)


Typical Transfer Characteristics
Collector current I_C (A)
–2.0
–1.6
–1.2
–0.8
–0.4
0
0
–0.4
–0.8
–1.2
–1.6
–2.0
V_{CE} = –5 V
Ta = 25°C
Base to emitter voltage V_{BE} (V)


Gain Bandwidth Product vs.
Collector Current
Gain bandwidth product f_T (MHz)
1,000
300
100
30
10
–0.01
–0.03
–0.1
–0.3
–1.0
V_{CE} = –5 V
Ta = 25°C
Collector current I_C (A)


Collector Output Capacitance vs.
Collector to Base Voltage
Collector output capacitance C_{ob} (pF)
300
100
30
10
3
f = 1 MHz
I_E = 0
Ta = 25°C
–1
–3
–10
–30
–100
Collector to base voltage V_{CB} (V)

Notice

When using this document, keep the following in mind:

1. This document may, wholly or partially, be subject to change without notice.

2. All rights are reserved: No one is permitted to reproduce or duplicate, in any form, the whole or part of this document without Hitachi's permission.

3. Hitachi will not be held responsible for any damage to the user that may result from accidents or any other reasons during operation of the user's unit according to this document.

4. Circuitry and other examples described herein are meant merely to indicate the characteristics and performance of Hitachi's semiconductor products. Hitachi assumes no responsibility for any intellectual property claims or other problems that may result from applications based on the examples described herein.

5. No license is granted by implication or otherwise under any patents or other rights of any third party or Hitachi, Ltd.

6. MEDICAL APPLICATIONS: Hitachi's products are not authorized for use in MEDICAL APPLICATIONS without the written consent of the appropriate officer of Hitachi's sales company. Such use includes, but is not limited to, use in life support systems. Buyers of Hitachi's products are requested to notify the relevant Hitachi sales offices when planning to use the products in MEDICAL APPLICATIONS.

HITACHI

Hitachi, Ltd.
Semiconductor & IC Div.
Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100, Japan
Tel: Tokyo (03) 3270-2111
Fax: (03) 3270-5109

For further information write to:

Hitachi America, Ltd.
Semiconductor & IC Div.
2000 Sierra Point Parkway
Brisbane, CA. 94005-1835
U S A
Tel: 415-589-8300
Fax: 415-583-4207

Hitachi Europe GmbH
Electronic Components Group
Continental Europe
Dornacher Straße 3
D-85622 Feldkirchen
München
Tel: 089-9 91 80-0
Fax: 089-9 29 30 00

Hitachi Europe Ltd.
Electronic Components Div.
Northern Europe Headquarters
Whitebrook Park
Lower Cookham Road
Maidenhead
Berkshire SL6 8YA
United Kingdom
Tel: 0628-585000
Fax: 0628-778322

Hitachi Asia Pte. Ltd.
16 Collyer Quay #20-00
Hitachi Tower
Singapore 0104
Tel: 535-2100
Fax: 535-1533

Hitachi Asia (Hong Kong) Ltd.
Unit 706, North Tower,
World Finance Centre,
Harbour City, Canton Road
Tsim Sha Tsui, Kowloon
Hong Kong
Tel: 27359218
Fax: 27306071