

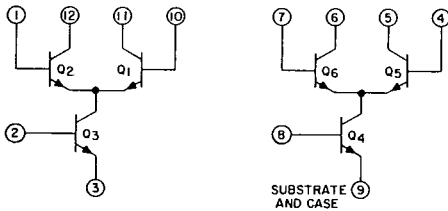
High-Reliability Dual High-Frequency Differential Amplifier

For Low-Power Applications at Frequencies up to 500 MHz in
Aerospace, Military and Critical Industrial Equipment

Features:

- Power Gain 23 dB (typ.) at 200 MHz
- Noise Figure 4.6 dB (typ.) at 200 MHz
- Two differential amplifiers on a common substrate
- Independently accessible inputs and outputs

The CA3049 Slash (/) Series type is supplied in the 12-lead TO-5 style package ("T" suffix) or in chip form ("H" suffix).



92CS-15245

Schematic Diagram

Applications

- VHF amplifiers
- VHF mixers
- Multifunction combinations – RF/Mixer/Oscillator; Converter/IF
- IF amplifiers (differential and/or cascode)
- Product detectors
- Doubly balanced modulators and demodulators
- Balanced quadrature detectors
- Cascade limiters
- Synchronous detectors
- Balanced mixers
- Synthesizers
- Balanced (push-pull) cascode amplifiers
- Sense amplifiers

MAXIMUM RATINGS, Absolute-Maximum Values at $T_A = 25^\circ\text{C}$

POWER DISSIPATION, P:

Any one transistor	300	mW
Total package	600	mW
For $T_A > 55^\circ\text{C}$ Derate at:	6.67	mW/ $^\circ\text{C}$

TEMPERATURE RANGE:

Operating	-55 to +125 $^\circ\text{C}$
Storage	-65 to +150 $^\circ\text{C}$

LEAD TEMPERATURE (During Soldering):

At distance 1/16 ± 1/32"	
(1.59 mm ± 0.79 mm)	
from case for 10 s max	265 $^\circ\text{C}$

The following ratings apply for each transistor in the devices

Collector-to-Emitter Voltage, V_{CEO}	15	V
Collector-to-Base Voltage, V_{CBO}	20	V
Collector-to-Substrate Voltage, V_{CISO}^*	20	V
Emitter-to-Base Voltage, V_{EBO}	5	V
Collector Current, I_C	50	mA

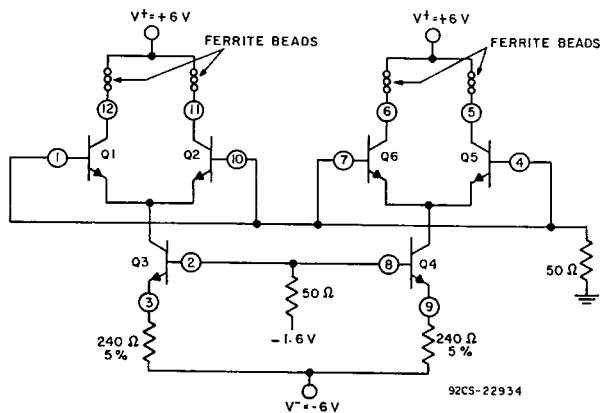
*The collector of each transistor of the CA3049T is isolated from the substrate by an integral diode. The substrate (terminal 9) must be connected to the most negative point in the external circuit to maintain isolation between transistors and to provide for normal transistor action.

CA3049/...

Pre Burn-in and Post Burn-in Electrical Tests and Delta Limits*

CHARACTERISTIC	SYMBOL	TEST CONDITIONS at $T_A = 25^\circ\text{C}$	LIMITS			UNITS
			MIN.	MAX.	MAX. Δ	
Input Bias Current Q1, Q2, Q5, Q6	I_{I1}	$I_{I3} = I_{I9} = 2\text{mA}$ $V^+ = +6\text{V}$	—	25.2	± 6	μA
Input Bias Current Q3, Q4	I_{I1}	$I_{I3} = I_{I9} = 2\text{mA}$ $V^+ = +6\text{V}$	—	50.4	± 12	μA
Emitter-to Base Breakdown Voltage Q3, Q4	V_{EBO}	$I_E = 10\mu\text{A}$ $I_C = 0$	-5.3	—	± 1.0	V
Collector Cutoff Current Q1 to Q6	I_{CBO}	$V_{CB} = 10\text{V}$ $I_E = 0$	—	95	± 50	nA

* Level /1 requires pre and post burn-in electrical tests and delta limits.
Level /3 requires pre burn-in electrical test only. The burn-in circuit is shown below.



Burn-in and operating life-test circuit.

Group A Electrical Sampling Inspection

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS FOR INDICATED TEMPERATURES (°C)						UNITS
			MINIMUM			MAXIMUM			
			-55	+25	+125	-55	+25	+125	
STATIC (Each Differential Amplifier)									
Input Offset Voltage	V_{IO}		—	—	—	7	5	7.5	mV
Input Offset Current	I_{IO}	$I_3 = I_g = 2\text{mA}$ $V^+ = +6\text{V}$	—	—	—	9	3	3	μA
Input Bias Current	I_I	$I_3 = I_g = 2\text{mA}$ $V^+ = +6\text{V}$	—	—	—	41	25.2	18	μA
Collector Cutoff Current	I_{CBO}	$V_{CB} = 10\text{V}$, $I_E = 0$	—	—	—	—	100	—	nA
Forward Base-to-Emitter Voltage	V_{BE}	$V_{CE} = 6\text{V}$, $I_C = 1\text{mA}$	—	—	—	—	874	—	mV
Collector-to-Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C = 1\text{mA}$, $I_B = 0$	—	15	—	—	—	—	V
Collector-to-Base Breakdown Voltage	$V_{(BR)CBO}$	$I_C = 10\mu\text{A}$, $I_E = 0$	—	20	—	—	—	—	V
Collector-to-Substrate Breakdown Voltage	$V_{(BR)CIO}$	$I_C = 10\mu\text{A}$, $I_B = I_E = 0$	—	20	—	—	—	—	V
Emitter-to-Base Breakdown Voltage	$V_{(BR)EBO}$	$I_E = 10\mu\text{A}$, $I_C = 0$	—	5	—	—	—	—	V
DYNAMIC									
Power Gain	P_G	$f = 200\text{MHz}$	—	19	—	—	28	—	dB
Noise Figure	NF	$f = 200\text{MHz}$	—	—	—	—	6.5	—	dB

Groups C and D Electrical Characteristics Sampling Tests ($T_A = 25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS		UNITS
			MIN.	MAX.	
Collector Current Q_1, Q_2, Q_5, Q_6	I_C	$I_g = I_3 = 2\text{mA}$	0.77	1.25	mA
Input Bias Current Q_1, Q_2, Q_5, Q_6	I_I	$I_3 = I_g = 2\text{mA}$, $V^+ = +6\text{V}$	—	25.2	μA
Input Bias Current Q_3, Q_4	I_I	$I_3 = I_g = 2\text{mA}$, $V^+ = +6\text{V}$	—	50.4	μA
Power Gain	P_G		19	26	dB