

# Group I General Purpose

DISCRETE

MICROCIRCUIT

**1300**  
**Dual Amplifier**  
**1301**  
**1303**

Specifications typical at 25°C with nominal power supply, unless otherwise indicated.

**SQ-10a**  
**General Purpose**

**1024**  
**Economy 20 mA**

**709 Pin Configuration**

			SQ-10a	1024	1300	1301	1303
			General Purpose	Economy 20 mA	709 Pin Configuration		
Output Range	E <sub>o</sub>	Voltage, min	±10 V	±10 V	±10 V		
	I <sub>o</sub>	Current, min	±5 mA	±20 mA	±2.0 mA		
Voltage Gain (dc open loop)	A <sub>o</sub>	Rated load, min	25,000	50,000	10,000		
		10 k load, min	60,000	—	—		
Frequency Response (Inverting)	f <sub>t</sub>	Small signal (unity gain, open loop), min	1 MHz	2 MHz (typ.)	1 MHz <sup>1</sup>		
	f <sub>s</sub>	Large signal: full output (undistorted) min	14 kHz	100 kHz	10 kHz <sup>1</sup>		
	f <sub>p</sub>	full output (peak-to-peak), min	20 kHz	250 kHz typ.	—		
	S <sub>r</sub>	Slew rate	1.4 V/μSec	9 V/μSec	0.6 V/μSec <sup>1</sup>		
	t <sub>s</sub>	Settling time (0.1%)	—	5 μSec	—		
Input Voltage Range	E <sub>CM</sub>	Common mode (dc linear operation), min	±10 V	±10 V	±11 V		
		(fault), abs max	±16 V	±15 V	±15 V		
	E <sub>D</sub>	Differential (between inputs), abs max	32 V	5 V	30 V		
	CMRR	Common mode rejection ratio (dc)	20,000	20,000	4000 (min)		
Input Voltage Offset	E <sub>os</sub>	Initial (without external trim) @ 25°C	—	±10 mV	±10 mV (max)		
	R <sub>os</sub>	Zero adjustment	50 kΩrhst.	10 kΩrhst.	(see data sheet)		
	E <sub>os</sub> TC	Vs. Temperature (avg. -25 to +85°C), max	±20 μV/°C	±20 μV/°C	±40 μV/°C (@25°C) <sup>2</sup>		
	ΔE <sub>os</sub> /Δt	Vs. Time (per day)	±100 μV	±50 μV	±50 μV		
	PSRR	Vs. Power Supply	±200 μV/V	±100 μV/V	±30 μV/V		
Input Bias Current	I <sub>B</sub>	Initial @ 25°C, max	±100 nA	±50 nA	+1 μA		
	I <sub>B</sub> TC	Vs. Temperature (avg. -25 to +85°C), max	±2 nA/°C	±0.6 nA/°C	±8 nA/°C (@25°C) <sup>3</sup>		
	ΔI <sub>B</sub> /ΔV <sub>CC</sub>	Vs. Power Supply	±6 nA/V	±1 nA/V	±20 nA/V		
	ΔI <sub>B</sub> /Δt	Vs. Time (per day)	±3 nA	±0.5 nA	±10 nA		
	I <sub>D</sub>	Difference (tracking)	±16 nA	±25 nA	±30 nA		
Input Impedance	Z <sub>D</sub>	Differential	300 kΩ  8pF	1 MΩ  6pF	210 kΩ  30pF		
	Z <sub>CM</sub>	Common mode (either input to common)	30 MΩ  8pF	50 MΩ  6pF	200 MΩ  3pF		
Noise (Referred to input)	e <sub>n</sub>	Flicker (0.016 to 1.6 Hz)	Voltage p-p	8 μV	7 μV	4 μV	
			Current p-p	170 pA	34 pA	250 pA	
	e <sub>n</sub>	Midband (1.6 to 160 Hz)	Voltage rms	1.2 μV	2 μV	1.5 μV	
			Current rms	100 pA	22 pA	60 pA	
	e <sub>n</sub>	Broadband (160 Hz to 16 kHz)	Voltage rms	0.9 μV	2 μV	1 μV	
			Current rms	100 pA	7 pA	80 pA	
Power Requirements	±V <sub>CC</sub>	Nominal Supply Voltage	±15 V	±15 V	±15 V		
		Voltage range	±8 to ±16 V	±12 to ±18 V	±3 to ±16 V		
	I <sub>CC</sub>	Current: quiescent, max	±10 mA	±9 mA	±6 mA		
		full load, max	-10, +15 mA	±29 mA	±8 mA		
Temperature Range (°C)	T <sub>o</sub>	Operating	-25 to +85	-25 to +85	-25 to +100		
	T <sub>s</sub>	Storage	-55 to +100	-55 to +125	-62 to +150		
Mechanical See pages 38-43		Outline drawing	A1	A1	TO-116	TO-99	TO-116
		Socket	NSK-20 (\$1.60)	NSK-20 (\$1.60)	See Note 4		
Price		Quantity (1-9)	\$11.00	\$19.00	\$6.00	3.50	3.50
		(10-24)	\$10.50	\$18.00	\$5.80	3.40	3.40

NOTES

1. Use damping scheme IV, (see 1300 data sheet)
2. ΔE<sub>os</sub> ±5 mV, max (-25 to +100°C)
3. ΔI<sub>bias</sub> ±2 μA, max (-25 to +100°C)
4. Sockets for the TO-99 and TO-116 packages are not supplied by Teledyne Philbrick, available from Barnes Corp., Lansdowne, Pa.