BURR-BROWN®

3528

NOT RECOMMENDED FOR NEW DESIGNS

Ultra Low Bias Current FET OPERATIONAL AMPLIFIER

FEATURES

- 75fA MAX INPUT BIAS CURRENT
- 250μV MAX OFFSET VOLTAGE
- 5μV/°C MAX OFFSET VOLTAGE DRIFT

APPLICATIONS

- PHOTODIODE AMPLIFIER
- PHOTOMULTIPLIER TUBE AMPLIFIER
- LOW DRIFT INTEGRATOR
- CURRENT-TO-VOLTAGE CONVERTER

DESCRIPTION

An excellent combination of specifications for applications requiring ultra low input bias currents are provided by the 3528 amplifier family. These applications include photometers, selective ion detectors, long term integrators and low-droop sample hold circuits.

The 3528 is unique in that in addition to providing bias currents as low as 75fA (3528CM) it also provides very low offset voltage drift (5μV/°C max, 3528BM) and offset voltage (250μV, 3528BM). Thus, user trimming offset voltage with an external potentiometer is usually avoided.

The output is protected from damage due to short circuits to ground or either supply and the unit is specified over the full -25°C to +85°C temperature range rather than the more limited 0°C to 70°C range.

International Airport Industrial Park - P.O. Box 11400 - Tucson, Arizona 85734 - Tel. (602) 746-1111 - Twx: 910-952-1111 - Cable: BBRCORP - Telex: 66-6491

ELECTRICAL SPECIFICATIONS

At T_A = 25°C and $\pm V_{cc}$ = ±15VDC unless otherwise noted.

PARAMETER	CONDITIONS	3528AM			3528BM			3528CM			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
OPEN LOOP GAIN, DC											
$R_L \geq 2k$	V_o = 20V p-p	88	93		92	95		90	93		dB
$R_L \geq 10k$	V_o = 20V p-p	94	114		100	*		98	*		
RATED OUTPUT											
Voltage	R_L = 2kΩ	±10	±12		*	*		*	*		V
	R_L = 10k	±12	±13		*	*		*	*		V
Current	V_o = ±10V	±5	±10		*	*		*	*		mA
Output Resistance Open Loop	f = DC		1.5	3		*	*		*	*	kΩ
Short Circuit Current	R_L = 0Ω		19			*			*		mA
DYNAMIC RESPONSE											
Bandwidth, Unity Gain	Small Signal		0.7			*			*		MHz
Full Power Bandwidth	R_L = 2kΩ	5	11		*	*		*	*		kHz
Slew Rate	R_L = 2kΩ	0.3	0.7		*	*		*	*		V/μsec
Settling time	to 1%		30			*			*		μs
	to 0.1%		150			*			*		μs
	to 0.01%		1			*			*		ms
INPUT OFFSET VOLTAGE											
Initial Offset	T_A = 25°C		±200	±500		±100	±250		±200	±500	μV
vs Temperature	-25°C ≤ T_A ≤ +85°C		±5	±15		±2	±5		±5	±10	μV/°C
vs Supply Voltage	$\pm V_{cc}$ = 15V to 20V, to 5V		±25	±100		*	*		*	*	μV/V
vs Time			20			*			*		μV mo
INPUT BIAS CURRENT											
Initial	T_A = 25°C			-300			-150			±75	fA
at Temperature	at T_A = 85°C		-40	-60		-20	-30		-10	-15	pA
vs Supply Voltage			1			*			*		fA/V
INPUT DIFFERENCE CURRENT											
Initial	T_A = 25°C		±80			±40			±20		fA
at Temperature	at T_A = 85°C		±8			±4			±2		pA
INPUT IMPEDANCE											
Differential			$10^{13} \parallel 0.8$			*			*		Ω ‖ pF
Common-mode			$10^{15} \parallel 1$			*			*		Ω ‖ pF
INPUT NOISE											
Voltage Noise Density	f_o = 1Hz		475			*			*		nV/√Hz
	f_o = 10Hz		120			*			*		nV/√Hz
	f_o = 100Hz		55			*			*		nV/√Hz
	f_o = 1kHz		40			*			*		nV/√Hz
	f_o = 10kHz		40			*			*		nV/√Hz
Voltage Noise	f_R = 0.3Hz to 10Hz		6			*			*		μV, p-p
	f_R = 10Hz to 10kHz		4			*			*		μV, rms
Current Noise Density	f_o = 1Hz		0.25			0.2			0.15		fA/√Hz
	f_o = 10Hz		0.25			0.2			0.15		fA/√Hz
	f_o = 100Hz		0.25			0.2			0.15		fA/√Hz
	f_o = 1kHz		0.25			0.2			0.15		fA/√Hz
Current Noise	f_R = 0.3Hz to 10Hz		7			5			4		fA, p-p
	f_R = 10Hz to 10kHz		26			20			15		fA, rms
INPUT VOLTAGE RANGE											
Common-mode Voltage Range	Linear Operation		±(|V_{cc}|-3)			*			*		V
Common-mode Rejection	f = DC, V_{CM} = ±10V	66	74		80	86		70	86		dB
Max. Safe Input Voltage			$\pm V_{cc}$			*			*		V
POWER SUPPLY											
Rated Voltage			±15			*			*		V
Voltage Range, derated performance		±5		±20	*		*	*		*	V
Current, quiescent			1	1.5		*	*		*	*	mA
TEMPERATURE RANGE (ambient)											
Specification		-25		+85	*		*	*		*	°C
Operating, derated performance		-55		+125	*		*	*		*	°C
Storage		-65		+150	*		*	*		*	°C