

ANALOG-OPERATIONAL AMPLIFIERS

ELECTRICAL CHARACTERISTICS TABLE (Cont'd) $V_S = +15V$ unless otherwise specified

PARAMETER DEVICE	TEST CONDITIONS	V_{OS} (mV) Offset Voltage $R_S \leq 10K\Omega$			V_{OS} DRIFT ($\mu V/^{\circ}C$) $R_S = 0\Omega$			I_{OS} (mA) Offset Current			I_{OS} DRIFT $\mu A/^{\circ}C$			I_{BIAS} (nA) Input Current		
	TEMPERATURE	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
LM324	$T_A = 25^{\circ}C$ $V^+ = 5V$ $0^{\circ}C \leq T_A \leq 70^{\circ}C$	± 2	$\pm 7^3$		N/A			± 5	± 50		N/A			I_{IN^+} or I_{IN^-} 45nA	250nA	
			$\pm 9^3$		7				± 150		10					500nA
MC1456	$T_A = 25^{\circ}C$ $0^{\circ}C \leq T_A \leq 70^{\circ}C$	5.0	10		N/A			5.0	10		N/A			15	30	
			14		N/A				14		N/A				40	
MC1556	$T_A = 25^{\circ}C$ $-55 \leq T_A \leq 125^{\circ}C$	2.0	4.0		N/A			1.0	2.0		N/A			0.8	15	
			6.0		N/A			$25 \leq T_A \leq 125^{\circ}C$ 3.0 $-55 \leq T_A \leq 25^{\circ}C$ 5.0			N/A				30	
MC1458	$T_A = 25^{\circ}C$ $0^{\circ}C \leq T_A \leq 70^{\circ}C$	2.0	6.0		N/A			30	200		N/A			200	500	
			7.5		N/A				300		N/A				800	
MC1558	$T_A = 25^{\circ}C$ $-55 \leq T_A \leq 125^{\circ}C$	1.0	5.0		N/A			30	200		N/A			200	500	
			6.0		N/A				500		N/A				1500	
$\mu A709$	$T_A = 25^{\circ}C$ $\pm 9 \leq V_S \leq \pm 15$ $-55^{\circ}C \leq T_A \leq +125^{\circ}C$	1	5		$R_S = 50\Omega$ 3.0 $R_S \leq 10K$ 6.0 N/A			50 $T_A = +125^{\circ}C$ 20 $T_A = -55^{\circ}C$ 100	200 200 500		N/A			200nA	500nA	
			6								N/A			$T_A = -55^{\circ}C$ 0.5	1.5	
$\mu A709C$	$T_A = 25^{\circ}C$ $0^{\circ}C \leq T_A \leq 70^{\circ}C$	2	7.5		N/A			100	500		N/A			300nA	1500nA	
			10		N/A				750		N/A				N/A	
$\mu A740$	$T_A = 25^{\circ}C$ $0^{\circ}C \leq T_A \leq +70^{\circ}C$	$R_S \leq 100K\Omega$ 30 30			N/A			60pA			N/A			0.1nA	2.0nA	
					N/A			60pA			N/A			1.1nA	1.0nA	
$\mu A741$	$T_A = 25^{\circ}C$ $-55^{\circ}C \leq T_A \leq +125^{\circ}C$	1.0	5.0		N/A			10 $T_A = +125^{\circ}C$ 7.0 $T_A = -55^{\circ}C$ 20	200 200 500		N/A			80nA	500nA	
		1.0	6.0		N/A						N/A			$T_A = +125^{\circ}C$ 30 $T_A = -55^{\circ}C$ 300	500 1500	
$\mu A741C$	$T_A = 25^{\circ}C$ $0^{\circ}C \leq T_A \leq +70^{\circ}C$	2.0	6.0		N/A			20	200		N/A			80	500	
			7.5		N/A				300		N/A				800	

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ELECTRICAL CHARACTERISTICS TABLE (Cont'd) $V_S = +15V$ unless otherwise specified

PARAMETER DEVICE	TEST CONDITIONS	V_{CM} (V) Common Mode Voltage Range	CMRR (dB) Common Mode Rejection Ratio $R_S \leq \pm 10K\Omega$	R_{IN} (M Ω) INPUT RESISTANCE	A_{VOL} (V/MV) LARGE SIGNAL VOLTAGE GAIN $R_L \geq 2K\Omega$ $V_{OUT} \pm 10V$ $V_S = \pm 15V$
	TEMPERATURE	MIN TYP MAX	MIN TYP MAX	MIN TYP MAX	MIN TYP MAX
LM324	$T_A = 25^\circ C$ $V^+ = 5V$ $0^\circ C \leq T_A \leq 70^\circ C$	$V^+ = 30V^5$ 0 $V \pm 1.5$ 0 $V^+ - 2$	65 85 N/A	N/A N/A	$V^+ = 15$ 25 100 15
MC1456	$T_A = 25^\circ C$ $0^\circ C \leq T_A \leq 70^\circ C$	$\pm 11 \pm 12$ N/A	$f = 100 \text{ Hz}$ 70 110 N/A	$f = 20 \text{ Hz}$ 3.0 N/A	70 100 40
MC1556	$T_A = 25^\circ C$ $-55 \leq T_A \leq 125^\circ C$	$\pm 12 \pm 13$ N/A	$f = 100 \text{ Hz}$ 80 110 N/A	$f = 20 \text{ Hz}$ 5.0 N/A	100 200 40
MC1458	$T_A = 25^\circ C$ $0^\circ C \leq T_A \leq 70^\circ C$	$\pm 12 \pm 13$ N/A	$f = 100 \text{ Hz}$ 70 90 N/A	$f = 20 \text{ Hz}$ 0.3 1.0 N/A	20 100 15
MC1558	$T_A = 25^\circ C$ $-55 \leq T_A \leq 125^\circ C$	$\pm 12 \pm 13$ N/A	$f = 100 \text{ Hz}$ 70 90 N/A	$f = 20 \text{ Hz}$ 0.3 1.0 N/A	50 200 25
$\mu A709$	$T_A = 25^\circ C$ $\pm 9 \leq V_S \leq \pm 15$ $-55^\circ C \leq T_A \leq +125^\circ C$	N/A $V_S = \pm 15$ $\pm 8.0 \pm 10$	N/A 70 90	150 400 40 100	N/A $R_L \geq 25K\Omega$ 25 45 70
$\mu A709C$	$T_A = 25^\circ C$ $0^\circ C \leq T_A \leq 70^\circ C$	$\pm 8.0 \pm 10$ N/A	65 90 N/A	50 250 35	$R_L \geq 25K\Omega$ 15 45 12
$\mu A740$	$T_A = 25^\circ C$ $0^\circ C \leq T_A \leq +70^\circ C$	N/A ± 12	N/A 80	1,000,000 N/A	1,000 500
$\mu A741$	$T_A = 25^\circ C$ $-55^\circ C \leq T_A \leq +125^\circ C$	N/A $\pm 12 \pm 13$	N/A 70 90	0.3 2.0	50 200 25
$\mu A741C$	$T_A = 25^\circ C$ $0^\circ C \leq T_A \leq +70^\circ C$	$\pm 12 \pm 13$ N/A	70 90 N/A	0.3 2.0 N/A	20 200 15

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ELECTRICAL CHARACTERISTICS TABLE (Cont'd) $V_S = +15V$ unless otherwise specified

PARAMETER DEVICE	TEST CONDITIONS	V _{OUT} OUTPUT VOLTAGE SWING (V) R _L ≥ 2KΩ			I _{CC} SUPPLY CURRENT (mA)			POWER CONSUMPTION			PSRR SUPPLY VOLTAGE REJECTION RATION (μV/V) R _S ≤ 10KΩ		
	TEMPERATURE	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
LM324	T _A = 25°C V ⁺ = 5V 0°C ≤ T _A ≤ 70°C	N/A V _{OH} V ⁺ = 30V 26 R _L ≥ 10KΩ 27 V _{OL} V ⁺ = 5V R _L ≤ 10KΩ 5 20			N/A			N/A			65	100	
MC1456	T _A = 25°C 0°C ≤ T _A ≤ 70°C	±11	±12		1.3	3.0		40	90		75	200	
			N/A			N/A					N/A		
MC1556	T _A = 25°C -55 ≤ T _A ≤ 125°C	±12	±13		1.0	1.5		30	45		50	100	
			N/A			N/A		N/A			N/A		
MC1458	T _A = 25°C 0°C ≤ T _A ≤ 70°C	R _L = 10KΩ ±12 R _L = 2KΩ ±10 ±13			2.3	5.6		70	170		30	150	
					N/A			N/A			N/A		
MC1558	T _A = 25°C -55 ≤ T _A ≤ 125°C	R _L = 10KΩ R _L = 2KΩ ±10 ±13			2.3	5.0		70	150		30	150	
					N/A			N/A			N/A		
μA709	T _A = 25°C ±9 ≤ V _S ≤ ±15 -55°C ≤ T _A ≤ +125°C	N/A ±10 ±13 R _L = 10KΩ ±12 ±14			N/A			80	165		N/A		
					N/A			N/A			25	150	
μA709C	T _A = 25°C 0°C ≤ T _A ≤ 70°C	±10 ±13 R _L = 10KΩ ±12 ±14 N/A			N/A			80	200		25	200	
					N/A			N/A			N/A		
μA740	T _A = 25°C 0°C ≤ T _A ≤ +70°C	N/A ±10 ±13 R _L ≥ 10KΩ ±12 ±14			4.2	3.0		126	240		N/A		
					N/A			N/A			70		
μA741	T _A = 25°C -55°C ≤ T _A ≤ +125°C	N/A ±10 ±13 R _L ≥ 10KΩ ±12 ±14			1.4 2.8 T _A = +125°C 1.5 2.5 T _A = -55°C 2.0 3.3			50 85 T _A = +125°C 45 75 T _A = -55°C 45 100			N/A		
											10	150	
μA741C	T _A = 25°C 0°C ≤ T _A ≤ +70°C	±10 ±13 R _L ≥ 10KΩ ±12 ±14 ±10 ±13			1.4	2.8		50	85		10	150	
					N/A			N/A			N/A		