

# HARRIS OPERATIONAL AMPLIFIERS

## Selection Guide

### for Commercial/Industrial Applications

PARAMETER †	00°C to +75°C													UNITS
	HA-911	F.E.T. PREAMP		HA-2055	HA-2055A	HA-2065	HA-2065A	PRAM™ HA-2405	S/H HA-2425	HA-2505	HA-2515	HA-2525	HA-2535	
		HA-2005	HA-2005A											
<b>INPUT CHARACTERISTICS</b>														
Offset Voltage	7.5	55	12	65	17	65	15	11	8	10	14	14	5	mV
Drift (Typ.)	15	60	40	60	40	60	40	30	5	20	30	20	5	μV/°C
Bias Current	750	1	1	1	1	1	1	500	400	500	500	500	200	nA
Offset Current	450	.5	.5	.5	.5	.5	.5	100	100	100	100	100	20	nA
Common Mode Range	±12	±10	±10	±10	±10	±10	±10	±10	±10	±10	±10	±10	±10	V
<b>INPUT NOISE (3)</b>														
	1													μVRMS
<b>TRANSFER CHARACTERISTICS</b>														
Large Signal Voltage Gain	15K	.98	.98	5K	5K	70K	70K	25K	25K	10K	5K	5K	100K	V/V
Common Mode Rejection Ratio	74	70	70	70	70	70	70	74	74	74	74	74	80	dB
Bandwidth (Typ.) (1)	7	10(3)	10(3)	20(3)	20(3)	24(3)	24(3)	18(3)	2(3)	12(3)	12(3)	25	20	MHz
<b>OUTPUT CHARACTERISTICS</b>														
Output Voltage Swing	±11	±10	±10	±10	±10	±10	±10	±10	±10	±10	±10	±10	±10	V
Output Current (1)	±15	±5	±5	±10(1)	±10(1)	±10(1)	±10(1)	20(3)	±10	±10	±10	±10	±25	mA
Full Power Bandwidth (Typ.) (1)	35	1,000(3)	1,000(3)	2,000(3)	2,000(3)	600(3)	600(3)	200(3)	70(3)	500	1,000	1,500	5,000	kHz
<b>TRANSIENT RESPONSE</b>														
Rise Time (1)	75	50(3)	50(3)	50(3)	50(3)	50(3)	50(3)	20	100(3)	50	50	50	40	ns
Overshoot (1)	40	5(3)	5(3)	25(3)	25(3)	25(3)	25(3)	25	20(3)	50	50	50	50	%
Slew Rate (1)	±2.3	100(3)	100(3)	120(3)	120(3)	35(3)	35(3)	15	5(3)	±20	±40	±80	±250	V/μs
Settling Time (Typ.) (1)	(2)	0.4(3)	0.4(3)	0.4	0.4(3)	.8(3)	.8(3)	1.5		0.33	0.25	0.20	.5	μs
<b>POWER SUPPLY CHARACTERISTICS</b>														
Supply Current (1)	2.5	1.7	1.7	8.0	8.0	6.0	6.0	6.0	5.0	6.0	6.0	6.0	6	mA
Power Supply Rejection Ratio	74	70	70	70	70	70	70	74	74	74	74	74	80	dB
<b>FUNCTIONAL CHARACTERISTICS</b>														
Offset Adjust	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No	
Compensation Components	0	0	0	0 AV>3	0 AV>5	0 AV>5	0 AV>5	0 AV>10	0	0	0	0 AV>3	1	
Output Protection	No	No	No	No	No	Yes	Yes	No	Yes	No	No	No	No	

PARAMETER †	00°C to +75°C										-25°C to +85°C		UNITS
	HA-2605	HA-2625	HA-2635	HA-2645	HA-2655	HA-2705	HA-2725	HA-2735	HA-2905	PRAM™ HA-2404	HA-2704	HA-2904	
<b>INPUT CHARACTERISTICS</b>													
Offset Voltage	7	7	300	7	7	7	7	7	.08	7	6	.05	mV
Drift (Typ.)	5	5	(2)	15	8	5	8 to 10	8 to 10	.2	20	5	.2	μV/°C
Bias Current	40	40	200	50	300	70	10 to 40	10 to 40	1	400	50	1	nA
Offset Current	40	40	(2)	50	100	40	7.5 to 20	7.5 to 20	.5	100	30	.5	nA
Common Mode Range	±11	±11	(2)	±35(4)	±13	±11	±10	±10	±10	±10	±11	±10	V
<b>INPUT NOISE (3)</b>													
													μVRMS
<b>TRANSFER CHARACTERISTICS</b>													
Large Signal Voltage Gain	70K	70K	.85	75K	15K	100K	20K	20K	10 <sup>6</sup>	25K	100K	10 <sup>7</sup>	V/V
Common Mode Rejection Ratio	74	74	(2)	74	74	80	74	74	120	80	86	130	dB
Bandwidth (Typ.) (1)	12	35	8	4	8	1	.01 to 10	.01 to 10	3	16(3)	1	3	MHz
<b>OUTPUT CHARACTERISTICS</b>													
Output Voltage Swing	±10	±10	±10	±35(4)	±13	±11	±13.5(3)	±13.5(3)	±10	±10	±11	±10	V
Output Current (1)	±10	±10	±300	±10	18(3)	±22(3)	.5 to 5.0(3)	.5 to 5.0(3)	±7	20(1)	±22(3)	±10	mA
Full Power Bandwidth (typ.)	75	600	8,000	23	30	50	1.5 to 80(3)	1.5 to 80	40	500(3)	50	40	kHz
<b>TRANSIENT RESPONSE</b>													
Rise Time (1)	60	45	30(3)	60(3)	40(3)	(2)	200 to 2,000(3)	200(3)	200(3)	20(3)	(2)	200(3)	ns
Overshoot (1)	40	(2)	25(3)	15(3)	15(3)	(2)	5 to 15(3)	5 to 15(3)	20(3)	25(3)	(2)	20(3)	%
Slew Rate (1)	±4	±20	200	5(3)	2	±10	.1 to .8(3)	.1 to .8	2.5(3)	50	10	2.5(3)	V/μs
Settling Time (Typ.) (1)	1.5	0.30	.5(3)	1.5(3)	1.5(3)	5.0	(2)	(2)	(2)	1.5(3)	5.0	(2)	μs
<b>POWER SUPPLY CHARACTERISTICS</b>													
Supply Current (1)	4.0	4.0	23	4.5	4	0.150	.02 to .2	.02 to .2	5	6.0(1)	0.150	5	mA
Power Supply Rejection Ratio	74	74	66	74	74	80	76	76	120	80	86	130	dB
<b>FUNCTIONAL CHARACTERISTICS</b>													
Offset Adjust	Yes	Yes	No	Yes	Dip Pkg. Only	Yes	Yes	Yes	No	No	Yes	No	
Compensation Components	0	0 (AV>5)	0	0	0	0	0	0	3	0 AV>10	0	3	
Output Protection	Yes	Yes	External	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	

- (1) At +25°C                      (3) Typical                      (5) .Dependent upon Iset value  
 (2) Not applicable or not specified      (4) V supply = ± 40V

\* TO-86 only                      † Guaranteed for ± 15V supplies and applicable temperature range unless otherwise specified