

High Supply Voltage 200MHz Unity-Gain Stable Operational Amplifier

The ISL55004 is a high speed, low power, low cost monolithic operational amplifier. The ISL55004 is unity-gain stable and features a 300V/ μ s slew rate and 200MHz bandwidth while requiring only 8.5mA of supply current per amplifier.

The power supply operating range of the ISL55004 is from ± 15 V down to ± 2.5 V. For single-supply operation, the ISL55004 operates from 30V down to 5V.

The ISL55004 also features an extremely wide output voltage swing of -12.75V/+13.4V with $V_S = \pm 15$ V and $R_L = 1$ k Ω .

At a gain of +1, the ISL55004 has a -3dB bandwidth of 200MHz with a phase margin of 55°. Because of its conventional voltage-feedback topology, the ISL55004 allow the use of reactive or non-linear elements in its feedback network. This versatility combined with low cost and 140mA of output-current drive makes the ISL55004 an ideal choice for price-sensitive applications requiring low power and high speed.

The ISL55004 is in a 14 Ld SO (0.150") package and specified for operation over the full -40°C to +85°C temperature range.

Ordering Information

PART NUMBER	PART MARKING	TAPE & REEL	PACKAGE	PKG. DWG. #
ISL55004IB	55004IB	-	14 Ld SO (0.150")	MDP0027
ISL55004IB-T7	55004IB	7"	14 Ld SO (0.150")	MDP0027
ISL55004IB-T13	55004IB	13"	14 Ld SO (0.150")	MDP0027
ISL55004IBZ (See Note)	55004IBZ	-	14 Ld SO (0.150") (Pb-Free)	MDP0027
ISL55004IBZ-T7 (See Note)	55004IBZ	7"	14 Ld SO (0.150") (Pb-Free)	MDP0027
ISL55004IBZ-T13 (See Note)	55004IBZ	13"	14 Ld SO (0.150") (Pb-Free)	MDP0027

NOTE: Intersil Pb-free plus anneal products employ special Pb-free material sets; molding compounds/die attach materials and 100% matte tin plate termination finish, which are RoHS compliant and compatible with both SnPb and Pb-free soldering operations. Intersil Pb-free products are MSL classified at Pb-free peak reflow temperatures that meet or exceed the Pb-free requirements of IPC/JEDEC J STD-020.

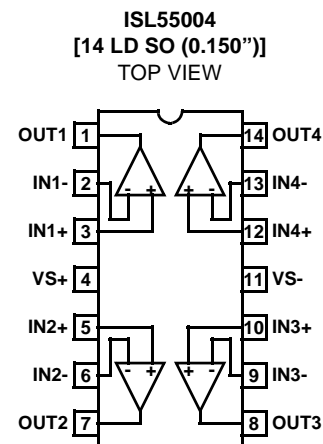
Features

- 200MHz -3dB bandwidth
- Unity-gain stable
- Low supply current: 8.5mA per amplifier
- Wide supply range: ± 2.5 V to ± 15 V dual-supply and 5V to 30V single-supply
- High slew rate: 300V/ μ s
- Fast settling: 75ns to 0.1% for a 10V step
- Wide output voltage swing: -12.75V/+13.4V with $V_S = \pm 15$ V, $R_L = 1$ k Ω
- Enhanced replacement for EL2444
- Pb-free plus anneal available (RoHS compliant)

Applications

- Video amplifiers
- Single-supply amplifiers
- Active filters/integrators
- High speed sample-and-hold
- High speed signal processing
- ADC/DAC buffers
- Pulse/RF amplifiers
- Pin diode receivers
- Log amplifiers
- Photo multiplier amplifiers
- Difference amplifiers

Pinout



Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$)

Supply Voltage (V_S)	$\pm 16.5\text{V}$ or 33V	Power Dissipation (P_D)	See Curves
Input Voltage (V_{IN})	$\pm V_S$	Operating Temperature Range (T_A)	-40°C to $+85^\circ\text{C}$
Differential Input Voltage (dV_{IN})	$\pm 10\text{V}$	Operating Junction Temperature (T_J)	$+150^\circ\text{C}$
Continuous Output Current	60mA	Storage Temperature (T_{ST})	-65°C to $+150^\circ\text{C}$

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

IMPORTANT NOTE: All parameters having Min/Max specifications are guaranteed. Typical values are for information purposes only. Unless otherwise noted, all tests are at the specified temperature and are pulsed tests, therefore: $T_J = T_C = T_A$

DC Electrical Specifications $V_S = \pm 15\text{V}$, $A_V = +1$, $R_L = 1\text{k}\Omega$, $T_A = 25^\circ\text{C}$, unless otherwise specified.

PARAMETER	DESCRIPTION	CONDITION	MIN	TYP	MAX	UNIT
V_{OS}	Input Offset Voltage	$V_S = \pm 15\text{V}$		1.2	5	mV
TCV_{OS}	Average Offset Voltage Drift (Note 1)			17		$\mu\text{V}/^\circ\text{C}$
I_B	Input Bias Current	$V_S = \pm 15\text{V}$		0.6	3.5	μA
I_{OS}	Input Offset Current	$V_S = \pm 15\text{V}$		0.2	2	μA
TCI_{OS}	Average Offset Current Drift (Note 1)			0.2		$\text{nA}/^\circ\text{C}$
A_{VOL}	Open-loop Gain	$V_S = \pm 15\text{V}$, $V_{OUT} = \pm 10\text{V}$, $R_L = 1\text{k}\Omega$	12000	21000		V/V
PSRR	Power Supply Rejection Ratio	$V_S = \pm 5\text{V}$ to $\pm 15\text{V}$	75	100		dB
CMRR	Common-mode Rejection Ratio	$V_{CM} = \pm 10\text{V}$, $V_{OUT} = 0\text{V}$	75	90		dB
CMIR	Common-mode Input Range	$V_S = \pm 15\text{V}$		13		V
V_{OUT}	Output Voltage Swing	V_{O+} , $R_L = 1\text{k}\Omega$	13.25	13.4		V
		V_{O-} , $R_L = 1\text{k}\Omega$	-12.6	-12.75		V
		V_{O+} , $R_L = 150\Omega$	9.6	10.7		V
		V_{O-} , $R_L = 150\Omega$	-8.3	-9.4		V
I_{SC}	Output Short Circuit Current		80	140		mA
I_S	Supply Current (per amplifier)	$V_S = \pm 15\text{V}$, no load		8.5	9.25	mA
R_{IN}	Input Resistance		2.0	3.2		$\text{M}\Omega$
C_{IN}	Input Capacitance	$A_V = +1$		1		pF
R_{OUT}	Output Resistance	$A_V = +1$		50		$\text{m}\Omega$
PSOR	Power Supply Operating Range	Dual supply	± 2.25		± 15	V
		Single supply	4.5		30	V

NOTE:

1. Measured from T_{MIN} to T_{MAX} .

AC Electrical Specifications $V_S = \pm 15\text{V}$, $A_V = +1$, $R_L = 1\text{k}\Omega$, $T_A = 25^\circ\text{C}$, unless otherwise specified.

PARAMETER	DESCRIPTION	CONDITION	MIN	TYP	MAX	UNIT
BW	-3dB Bandwidth ($V_{OUT} = 0.4V_{PP}$)	$V_S = \pm 15\text{V}$, $A_V = +1$		200		MHz
		$V_S = \pm 15\text{V}$, $A_V = -1$		55		MHz
		$V_S = \pm 15\text{V}$, $A_V = +2$		53		MHz
		$V_S = \pm 15\text{V}$, $A_V = +5$		17		MHz
GBWP	Gain Bandwidth Product	$V_S = \pm 15\text{V}$		70		MHz
PM	Phase Margin	$R_L = 1\text{k}\Omega$, $C_L = 5\text{pF}$		55		$^\circ$
SR	Slew Rate (Note 1)		260	300		$\text{V}/\mu\text{s}$

AC Electrical Specifications $V_S = \pm 15V$, $A_V = +1$, $R_L = 1k\Omega$, $T_A = 25^\circ C$, unless otherwise specified. (Continued)

PARAMETER	DESCRIPTION	CONDITION	MIN	TYP	MAX	UNIT
FPBW	Full-power Bandwidth (Note 2)	$V_S = \pm 15V$		9.5		MHz
t_S	Settling to +0.1% ($A_V = +1$)	$V_S = \pm 15V$, 10V step		75		ns
dG	Differential Gain (Note 3)	NTSC/PAL		0.01		%
dP	Differential Phase	NTSC/PAL		0.05		°
eN	Input Noise Voltage	10kHz		12		nV/ \sqrt{Hz}
iN	Input Noise Current	10kHz		1.5		pA/ \sqrt{Hz}

NOTES:

1. Slew rate is measured on rising edge.
2. For $V_S = \pm 15V$, $V_{OUT} = 10V_{PP}$, for $V_S = \pm 5V$, $V_{OUT} = 5V_{PP}$. Full-power bandwidth is based on slew rate measurement using $FPBW = SR / (2\pi * V_{PEAK})$.
3. Video performance measured at $V_S = \pm 15V$, $A_V = +2$ with two times normal video level across $R_L = 150\Omega$. This corresponds to standard video levels across a back-terminated 75Ω load. For other values or R_L , see curves.

Typical Performance Curves

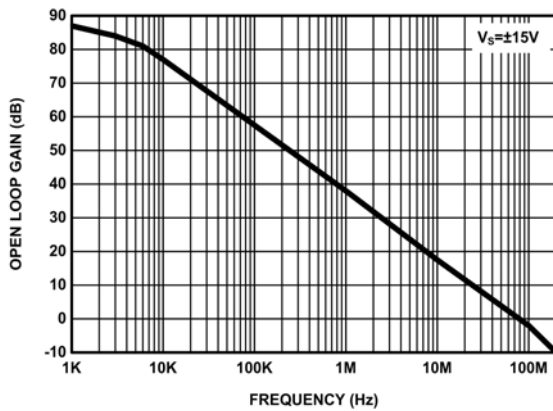


FIGURE 1. OPEN-LOOP GAIN vs FREQUENCY

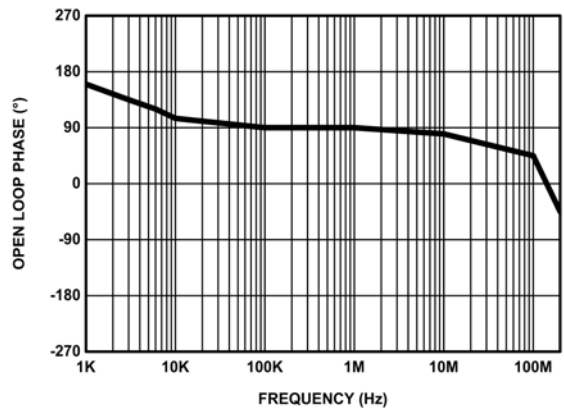


FIGURE 2. OPEN-LOOP PHASE vs FREQUENCY

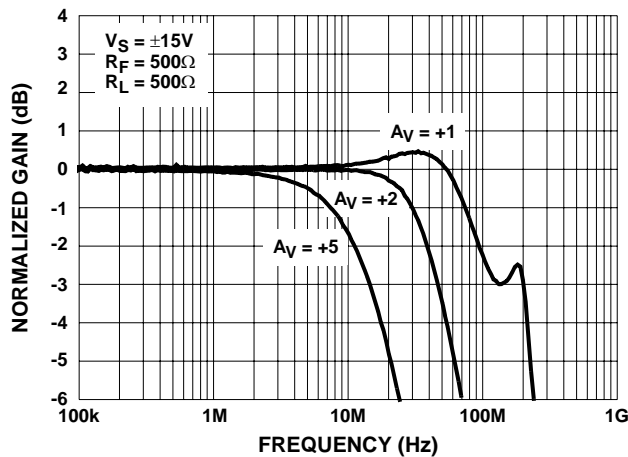


FIGURE 3. GAIN vs FREQUENCY FOR VARIOUS NON-INVERTING GAIN SETTINGS

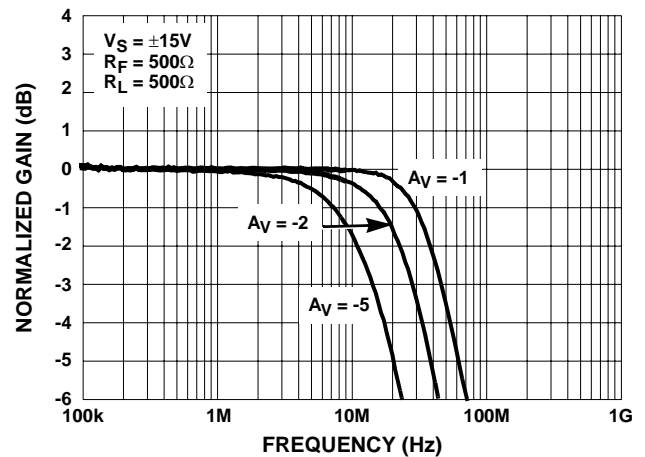
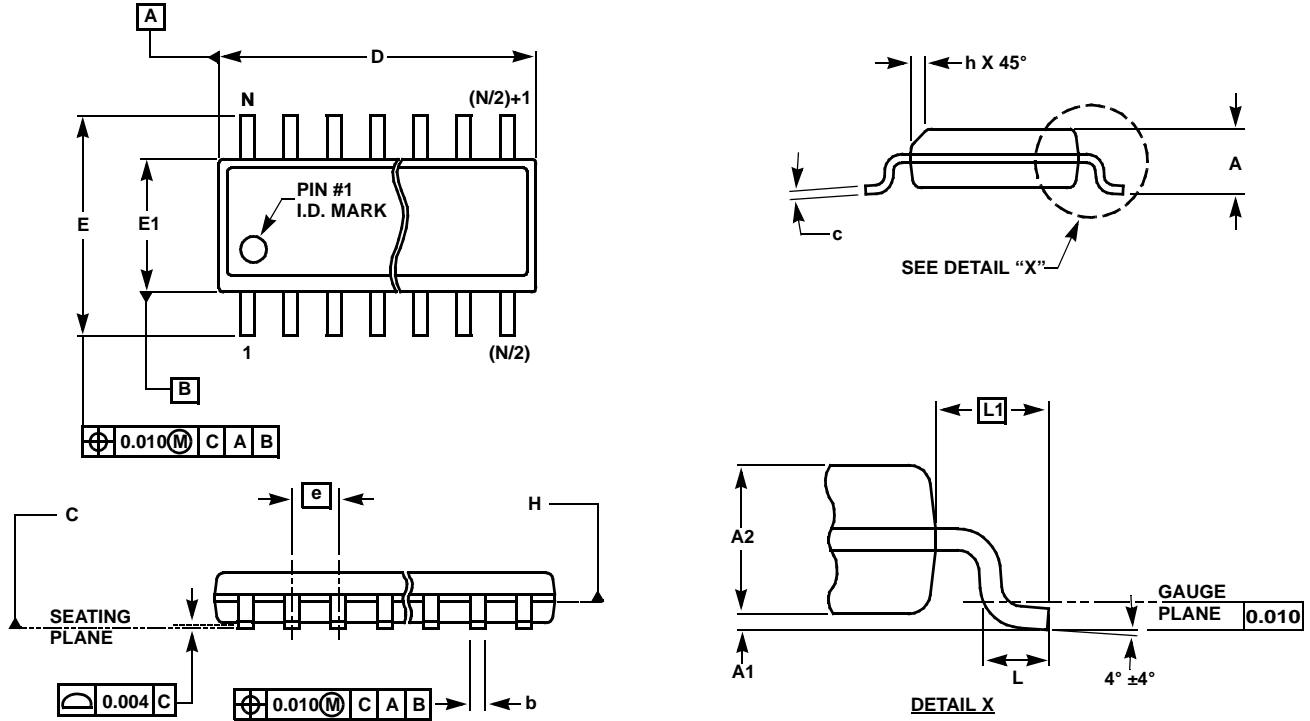


FIGURE 4. GAIN vs FREQUENCY FOR VARIOUS INVERTING GAIN SETTINGS

Small Outline Package Family (SO)



MDP0027

SMALL OUTLINE PACKAGE FAMILY (SO)

SYMBOL	SO-8	SO-14	SO16 (0.150")	SO16 (0.300") (SOL-16)	SO20 (SOL-20)	SO24 (SOL-24)	SO28 (SOL-28)	TOLERANCE	NOTES
A	0.068	0.068	0.068	0.104	0.104	0.104	0.104	MAX	-
A1	0.006	0.006	0.006	0.007	0.007	0.007	0.007	± 0.003	-
A2	0.057	0.057	0.057	0.092	0.092	0.092	0.092	± 0.002	-
b	0.017	0.017	0.017	0.017	0.017	0.017	0.017	± 0.003	-
c	0.009	0.009	0.009	0.011	0.011	0.011	0.011	± 0.001	-
D	0.193	0.341	0.390	0.406	0.504	0.606	0.704	± 0.004	1, 3
E	0.236	0.236	0.236	0.406	0.406	0.406	0.406	± 0.008	-
E1	0.154	0.154	0.154	0.295	0.295	0.295	0.295	± 0.004	2, 3
e	0.050	0.050	0.050	0.050	0.050	0.050	0.050	Basic	-
L	0.025	0.025	0.025	0.030	0.030	0.030	0.030	± 0.009	-
L1	0.041	0.041	0.041	0.056	0.056	0.056	0.056	Basic	-
h	0.013	0.013	0.013	0.020	0.020	0.020	0.020	Reference	-
N	8	14	16	16	20	24	28	Reference	-

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NOTES:

1. Plastic or metal protrusions of 0.006" maximum per side are not included.
2. Plastic interlead protrusions of 0.010" maximum per side are not included.
3. Dimensions "D" and "E1" are measured at Datum Plane "H".
4. Dimensioning and tolerancing per ASME Y14.5M-1994