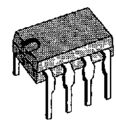
SGS-THOMSON MICROELECTRONICS

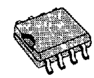
LF153
LF253 - LF353

WIDE BANDWIDTH DUAL J-FET OPERATIONAL AMPLIFIERS

- LOW POWER CONSUMPTION
- WIDE COMMON-MODE (UP TO V_{CC}^+) AND DIFFERENTIAL VOLTAGE RANGE
- LOW INPUT BIAS AND OFFSET CURRENT
- OUTPUT SHORT-CIRCUIT PROTECTION
- HIGH INPUT IMPEDANCE J–FET INPUT STAGE
- INTERNAL FREQUENCY COMPENSATION
- LATCH UP FREE OPERATION
- HIGH SLEW RATE : 16V/µs (typ)



N
DIP8
(Plastic Package)



D
SO8
(Plastic Micropackage)

H
TO99
(Metal Can)

DESCRIPTION

The LF353 are high speed J–FET input dual operational amplifiers incorporating well matched, high voltage J–FET and bipolar transistors in a monolithic integrated circuit.

The devices feature high slew rates, low input bias and offset currents, and low offset voltage temperature coefficient.

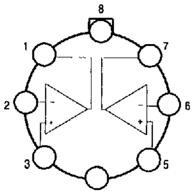
ORDER CODES

Part Number	Temperature	Package		
		H	N	D
LF353	0°C, +70°C	•	•	•
LF253	–40°C, +105°C	•	•	•
LF153	–55°C, +125°C	•	•	•

153-01.TBL

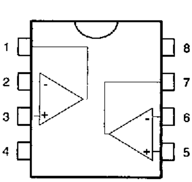
PIN CONNECTIONS (top views)

TO99



153-01 EPS

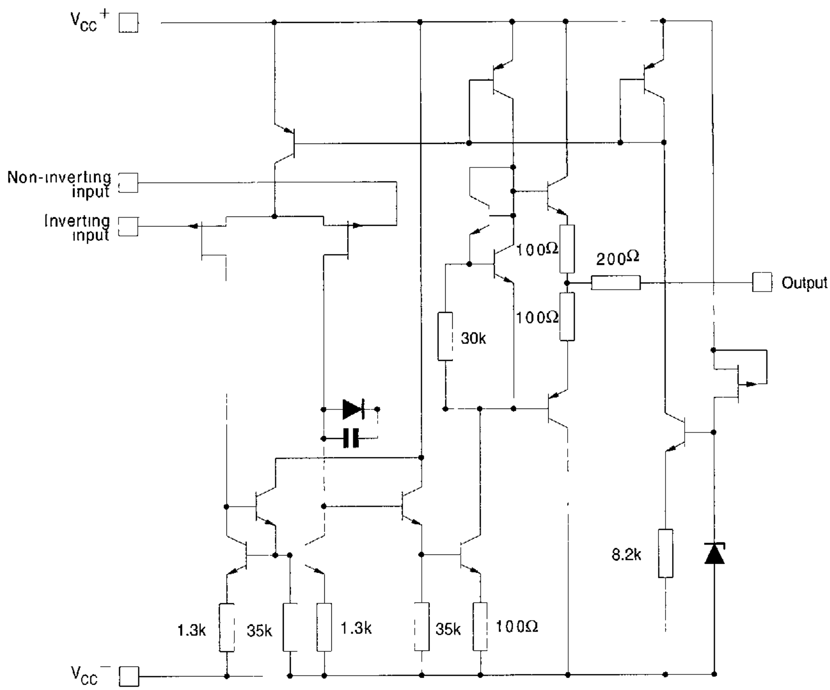
DIP8/SO8



153-02.EPS

1 - Output 1
2 - Inverting input 1
3 - Non-inverting input 1
4 - V_{CC}^-
5 - Non-inverting input 2
6 - Inverting input 2
7 - Output 2
8 - V_{CC}^+

SCHEMATIC DIAGRAM (each amplifier)



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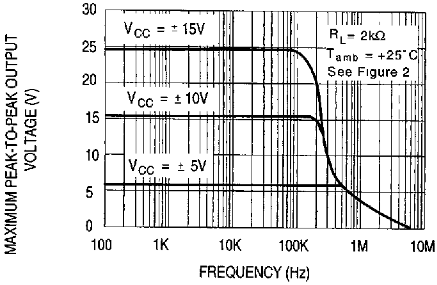
ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V_{CC}	Supply Voltage - (note 1)		±18	V
V_i	Input Voltage - (note 3)		±15	V
V_{id}	Differential Input Voltage - (note 2)		±30	V
P_{tot}	Power Dissipation		680	mW
	Output Short-circuit Duration - (note 4)		Infinite	
T_{oper}	Operating Free Air Temperature Range	LF353 LF253 LF153	0 to 70 –40 to 105 –55 to 125	°C
T_{stg}	Storage Temperature Range		–65 to 150	°C

Notes :
1 All voltage values, except differential voltage, are with respect to the zero reference level (ground) of the supply voltages where the zero reference level is the midpoint between V_{CC}^+ and V_{CC}^-.
2 Differential voltages are at the non-inverting input terminal with respect to the inverting input terminal
3 The magnitude of the input voltage must never exceed the magnitude of the supply voltage or 15 volts, whichever is less.
4. The output may be shorted to ground or to either supply. Temperature and /or supply voltages must be limited to ensure that the dissipation rating is not exceeded.

MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS FREQUENCY



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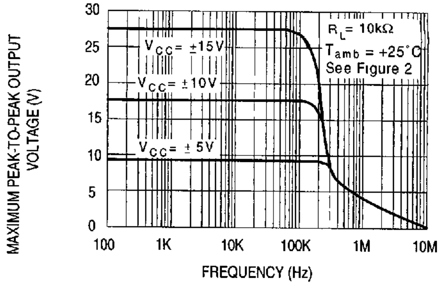
MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS FREQUENCY



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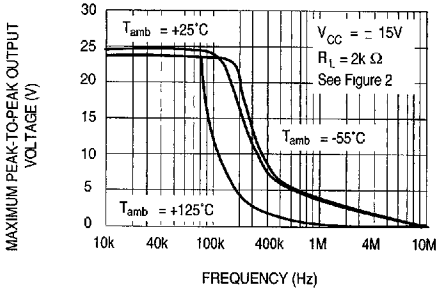
MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS FREQUENCY



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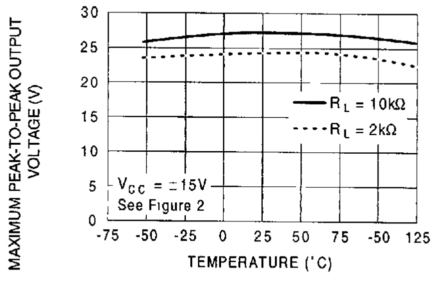
MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS FREE AIR TEMP.



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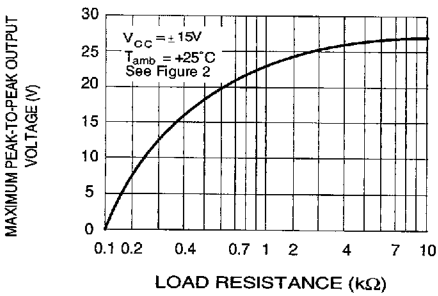
MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS LOAD RESISTANCE



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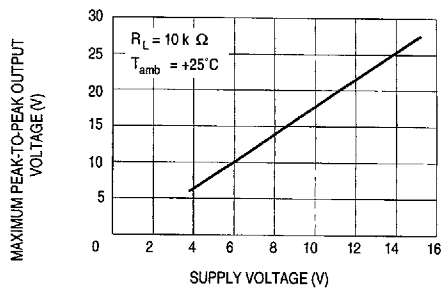
MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS SUPPLY VOLTAGE



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ELECTRICAL CHARACTERISTICS

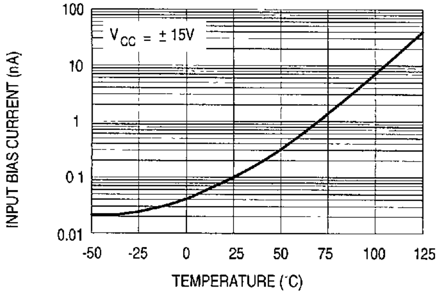
$V_{CC} = \pm 15V$, $T_{amb} = 25^{\circ}C$ (unless otherwise specified)

Symbol	Parameter	LF153 - LF253 - LF353 Min.	Typ.	Max.	Unit
V_{io}	Input Offset Voltage ($R_S = 10k\Omega$) $T_{amb} = 25^{\circ}C$ $T_{min} \le T_{amb} \le T_{max}$		3	10 13	mV
DV_{io}	Input Offset Voltage Drift		10		µV/°C
I_{io}	Input Offset Current * $T_{amb} = 25^{\circ}C$ $T_{min} \le T_{amb} \le T_{max}$		5	100 4	pA nA
I_{ib}	Input Bias Current * $T_{amb} = 25^{\circ}C$ $T_{min} \le T_{amb} \le T_{max}$.		20	200 20	pA nA
A_{vd}	Large Signal Voltage Gain ($R_L = 2k\Omega$, $V_O = \pm 10V$) $T_{amb} = 25^{\circ}C$ $T_{min.} \le T_{amb} \le T_{max}$	50 25	200		V/mV
SVR	Supply Voltage Rejection Ratio ($R_S = 10k\Omega$) $T_{amb} = 25^{\circ}C$ $T_{min} \le T_{amb} \le T_{max}$	80 80	86		dB
I_{CC}	Supply Current, per Amp, no Load $T_{amb} = 25^{\circ}C$ $T_{min} \le T_{amb} \le T_{max}$		1.4	3.2 3.2	mA
V_{icm}	Input Common Mode Voltage Range	±11	+15 -12		V
CMR	Common Mode Rejection Ratio ($R_S = 10k\Omega$) $T_{amb} = 25^{\circ}C$ $T_{min.} \le T_{amb} \le T_{max}$	70 70	86		dB
Ios	Output Short-circuit Current $T_{amb} = 25^{\circ}C$ $T_{min} \le T_{amb} \le T_{max}$.	10 10	40	60 60	mA
$\pm V_{OPP}$	Output Voltage Swing $T_{amb} = 25^{\circ}C$ $R_L = 2k\Omega$ $R_L = 10k\Omega$ $T_{min} \le T_{amb} \le T_{max}$ $R_L = 2k\Omega$ $R_L = 10k\Omega$	10 12 10 12	12 13.5		V
SR	Slew Rate ($V_i = 10V$, $R_L = 2k\Omega$, $C_L = 100pF$, $T_{amb} = 25^{\circ}C$, unity gain)	12	16		V/µs
t_r	Rise Time ($V_i = 20mV$, $R_L = 2k\Omega$, $C_L = 100pF$, $T_{amb} = 25^{\circ}C$, unity gain)		0.1		µs
K_{OV}	Overshoot ($V_i = 20mV$, $R_L = 2k\Omega$, $C_L = 100pF$, $T_{amb} = 25^{\circ}C$, unity gain)		10		%
GBP	Gain Bandwidth Product ($f = 100kHz$, $T_{amb} = 25^{\circ}C$, $V_{in} = 10mV$, $R_L = 2k\Omega$, $C_L = 100pF$)	2.5	4		MHz
R_i	Input Resistance		10^{12}		Ω
THD	Total Harmonic Distortion ($f = 1kHz$, $A_V = 20dB$, $R_L = 2k\Omega$, $C_L = 100pF$, $T_{amb} = 25^{\circ}C$, $V_O = 2V_{PP}$)		0.01		%
e_n	Equivalent Input Noise Voltage ($f = 1kHz$, $R_s = 100\Omega$)		15		$\frac{nV}{\sqrt{Hz}}$
Øm	Phase Margin		45		Degrees
V_{O1}/V_{O2}	Channel Separation ($A_v = 100$, $T_{amb} = 25^{\circ}C$)		120		dB

153-03.TBL

* The input bias currents are junction leakage currents which approximately double for every 10°C increase in the junction temperature

INPUT BIAS CURRENT VERSUS FREE AIR TEMPERATURE



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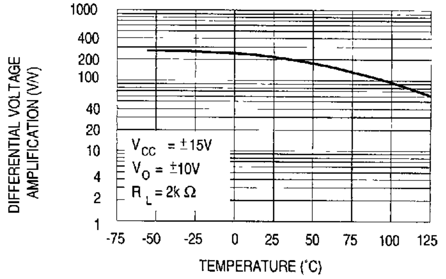
LARGE SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION VERSUS FREE AIR TEMPERATURE



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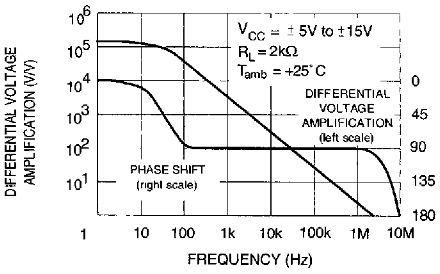
LARGE SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION AND PHASE SHIFT VERSUS FREQUENCY



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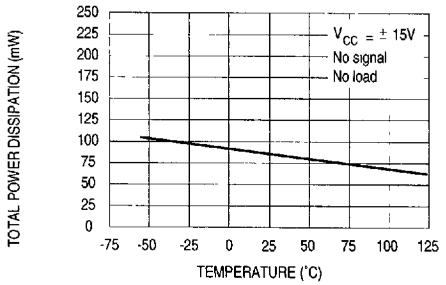
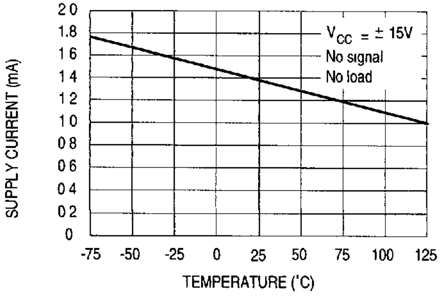
TOTAL POWER DISSIPATION VERSUS FREE AIR TEMPERATURE



153-13.EPS

SUPPLY CURRENT PER AMPLIFIER VERSUS FREE AIR TEMPERATURE



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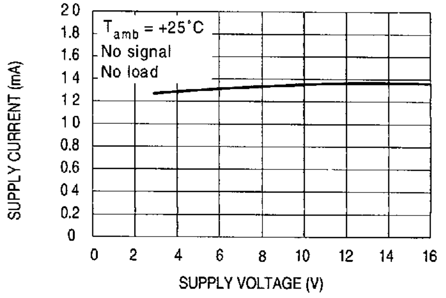
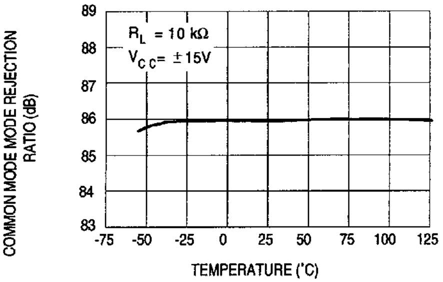
SUPPLY CURRENT PER AMPLIFIER VERSUS SUPPLY VOLTAGE



153-15.EPS

COMMON MODE REJECTION RATIO VERSUS FREE AIR TEMPERATURE



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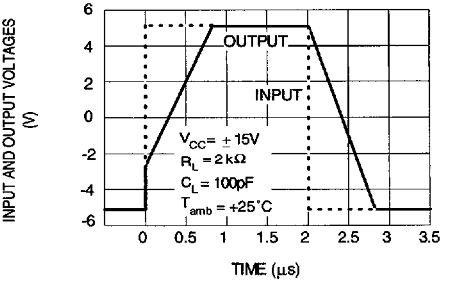
VOLTAGE FOLLOWER LARGE SIGNAL PULSE RESPONSE



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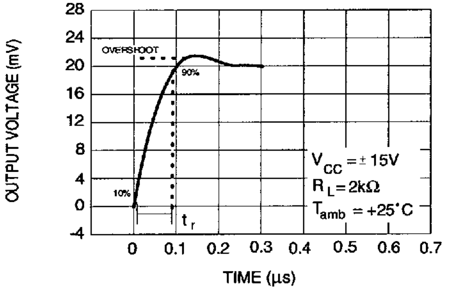
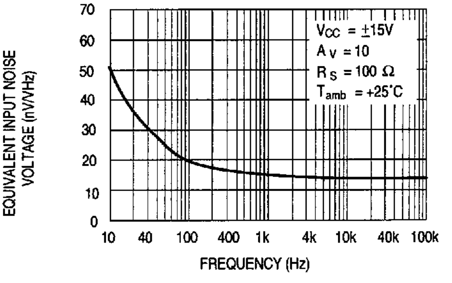
OUTPUT VOLTAGE VERSUS ELAPSED TIME



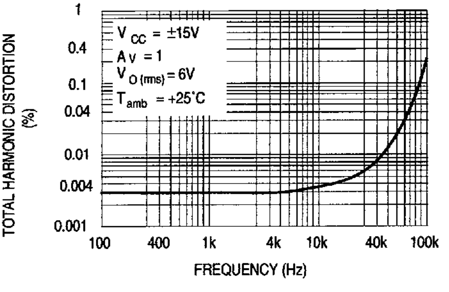
153-18.EPS

EQUIVALENT INPUT NOISE VOLTAGE VERSUS FREQUENCY



153-19.EPS

TOTAL HARMONIC DISTORTION VERSUS FREQUENCY



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PARAMETER MEASUREMENT INFORMATION

Figure 1 : Voltage Follower

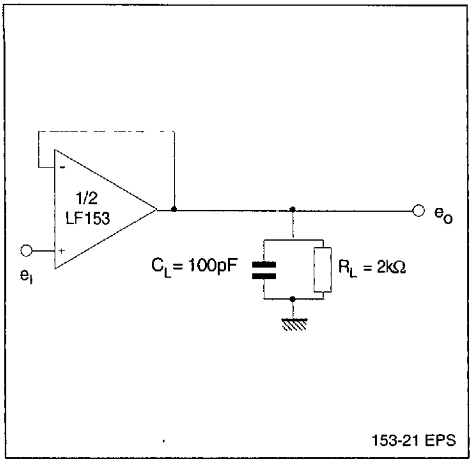
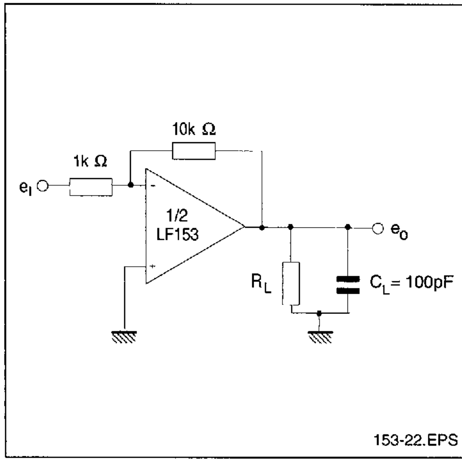


Figure 2 : Gain-of-10 Inverting Amplifier



TYPICAL APPLICATION

QUADRUPLE OSCILLATOR