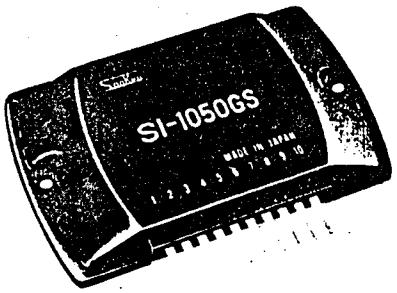
SI-1050GS

Type SI-1050GS is a self-contained high power hybrid operational amplifier designed for servo amplifiers (AC/DC), voltage/current regulators, driven inverters, sine wave oscillators and other industrial applications. The amplifier has a differential-amplifier input and quasi-complementary class AB output. The circuit employs flip-chip transistors with high reliability and passivated chip power transistors with excellent secondary breakdown strength. Built-in current limiting is provided and metal package is electrically isolated from the inside circuit.



* Multi-purpose linear amplifier for industrial applications.
* High-power output up to 50W (AC rms).
* Built-in current limiting and efficient heat radiating construction.
* ½ dB response from DC to 100,000Hz.
* Single or split (dual) power supply.
* Terminal for external feedback.
* Rugged, compact and light weight package.

SPECIFICATIONS

Power: Maximum AC power rating is 50W at 1000Hz with a load of 8 ohms and the recommended heat sink and mounting.
When used as a DC amplifier, continuous output current of 1.6A can be obtained.

Response: Flat within 1/2dB from 20Hz to 100,000Hz at voltage gain 31.5dB and output 1W.

Temperature Compensation: An internal compensating diode is used to provide minimum cross-over distortion and protection from thermal runaway.

Voltage Gain: Desired voltage gain can be obtained by changing external resistors.

Heat Sink: Values shown are minimum for a plain white aluminum sheet, 2mm (approximately 1/16 inch) thick, at a 25°C ambient, with reasonable ventilation. A silicone grease such as GE Insulgrease G-640 should be used to provide good thermal contact from base to heat sink.
Insulated base plate allows for direct mounting on a heat sink.

Power Supply: Maximum voltage values are absolute maximum. The amplifier can be operated from a single (66V) or split (±33V) power supply. A transformer with 10% regulation is recommended to assure the specified short circuit standing times.

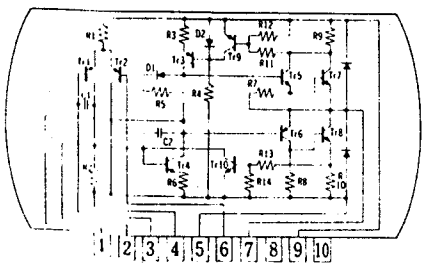
Derating: Idling current remains constant at any output power level. When used as an AC amplifier, internal power loss reaches its maximum when the output is 40% of the rated maximum output. In case of DC applications internal power loss increases as output voltage decreases and output current increases.

Oscillation: Depending on loads, oscillation may occur. If oscillation is present, the designated 75V 0.47μF capacitor as shown in example circuits should be used.

Current Limiting: Current limiting starts functioning when the load current reaches 7A±0.5A. When operated with the power supply shown in the exemplified connections and the specified heat sink, the amplifier can withstand repeated output shorts of 10 seconds with AC input and 5 seconds with DC input, provided that the time interval between shorts is sufficient to allow for internal cooling.

Application Considerations: (1) Amplifiers can be damaged by oscillation or overdriving. (2) Do not exceed recommended supply voltage. (3) For transformer-coupling the primary should always be 8 ohms. (4) Amplifier should not be operated without a quick blow fuse or circuit breaker in the power line, especially in $+V_{CC}$ line (5) Both for inverting amplifiers and non-inverting amplifiers, increase capacitance of phasecompensating capacitor between terminals 1 and 2 as voltage gain is reduced (6) Provide separate ground connections for input signal and output signal. Use RC network and coil for preventing oscillation as shown in the exemplified circuit because oscillation may occur depending on wiring or when operated with a reactive load. (7) Decrease output or lower supply voltage when the amplifier is operated at frequency over 20,000Hz. (8) With AC input the amplifier must be derated for loads less than 8 ohms. With DC input, use servo motors of less than 15W because of internal power loss of the amplifier and response speed of motors.

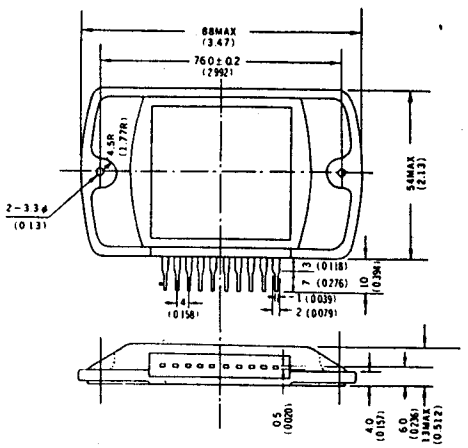
SCHEMATIC



TERMINAL ASSIGNMENTS

1 Phase compensation capacitor
2 Phase compensation capacitor
3 Non-inverting input, offset voltage adjustment
4 Power supply (−) or Ground
5 Power supply (−) or Ground
6 Inverting input
7 Output
8 Spare
9 Power supply (+)
10 Spare

OUTLINE DRAWINGS



Dimensions in mm (approx. inch)

ABSOLUTE MAXIMUM RATINGS

(Ta : 25°C)

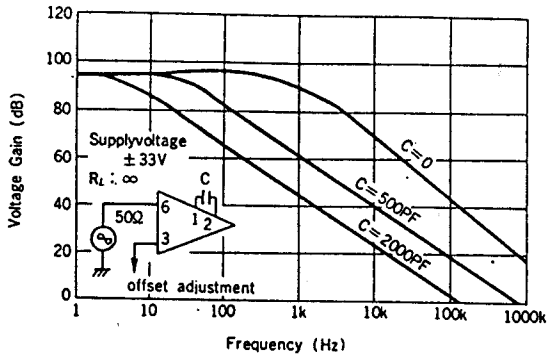
Parameter	Rating	Remarks
Supply Voltage V_{CC}, V_{EE}	±40V	
Load Current I_{ODC}	±7A	1 sec Max.
Power Dissipation Pdiss	40W(AC) 30W(DC)	
Differential Mode Input Voltage DMVin	±6V	
Common Mode Input Voltage CMVin	±32V	
Operating Temperature Top	−20°C ~ +80°C	
Storage Temperature Tstg	−30°C ~ +100°C	

ELECTRICAL CHARACTERISTICS

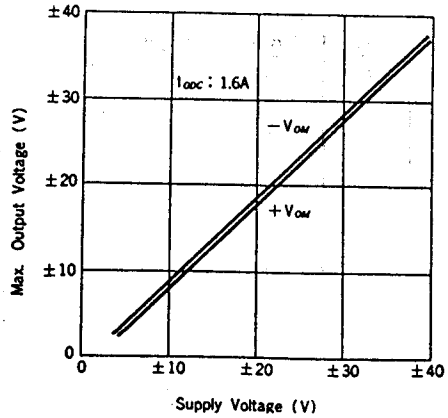
(V_{CC} : 33V, V_{EE} : −33V, Ta : 25°C)

Parameter	Rating	Remarks
Maximum Output Power Pomax	50W	AC input signal
Load Current I_{ODC}	1.64A typ.	
Supply Current I_{CC}	1.64A typ.	
Power Dissipation Pdiss	28W max.	AC input signal
	20W max.	DC input signal
Input Offset Voltage Vio	30mV typ.	
Temperature Coefficient of Input Offset Voltage ΔVio/ΔT	0.2mV/°C typ.	
Input Offset Current Iio	0.5μA typ.	
Temperature Coefficient of Input Offset Current ΔIio/ΔT	3nA/°C typ.	
Input Bias Current Ii	3μA typ.	
Input Impedance Zin	3kΩ typ.	f : 1kHz, Open loop
Common Mode Input Voltage Range CMVin	+27V −31V typ.	Voltage follower
Voltage Gain Gv	80dB typ.	f : 1kHz, Open loop
Maximum Output Voltage Vomax	±31V typ.	I_{ODC} : 1.6A
Output Impedance Zo	10Ω typ.	f : 1kHz, Open loop
Common Mode Signal Rejection Ratio CMRR	60dB typ.	
Supply Voltage Rejection Ratio SVRR	3.0mV/V typ.	V_{CC}, V_{EE} : ±38 ~ ±28V
Slewing Ratio SR	0.2V/μS typ.	Voltage follower C : 500PF
Idling Current Id	20mA typ.	
Thermal Resistance θ	1.7°C/W	Junction to case

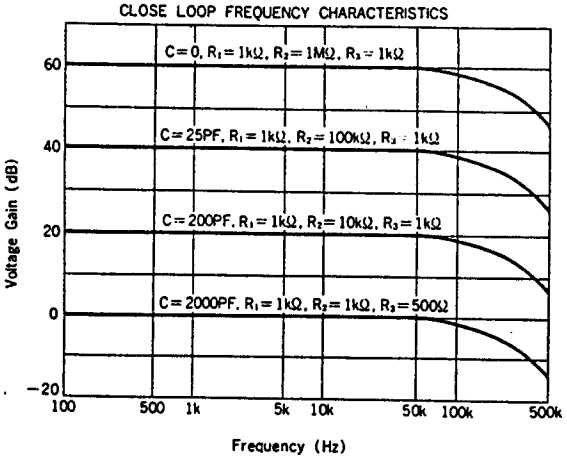
OPEN LOOP FREQUENCY CHARACTERISTICS



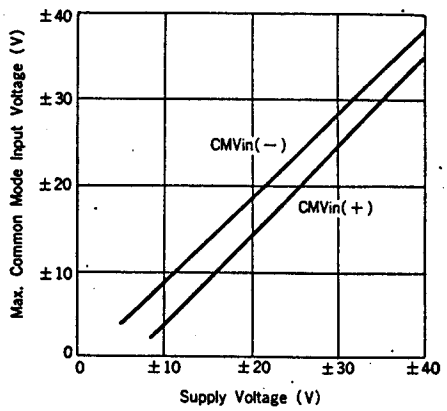
MAXIMUM OUTPUT VOLTAGE-SUPPLY VOLTAGE



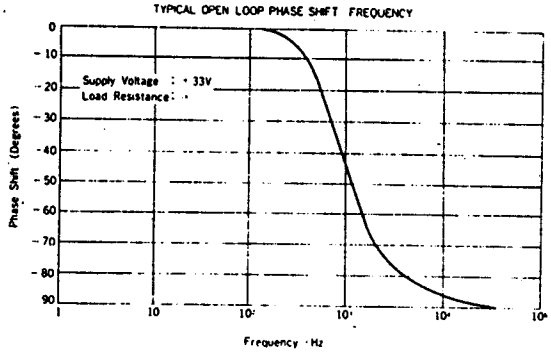
CLOSE LOOP FREQUENCY CHARACTERISTICS



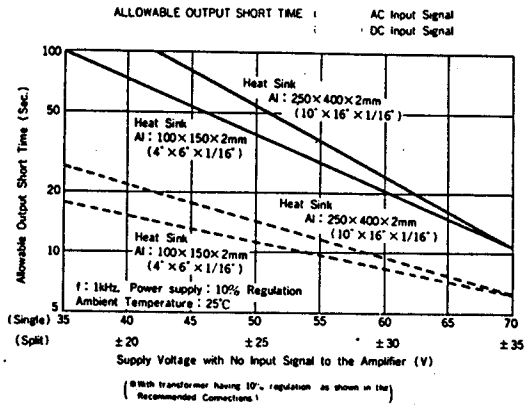
COMMON MODE INPUT VOLTAGE-SUPPLY VOLTAGE



TYPICAL OPEN LOOP PHASE SHIFT FREQUENCY



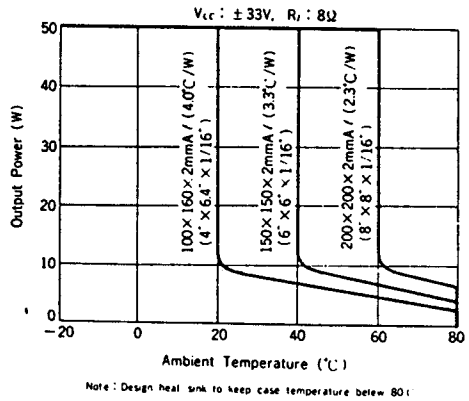
ALLOWABLE OUTPUT SHORT TIME



(※With transformer having 10% regulation as shown in the Recommended Connections)

POWER DERATING

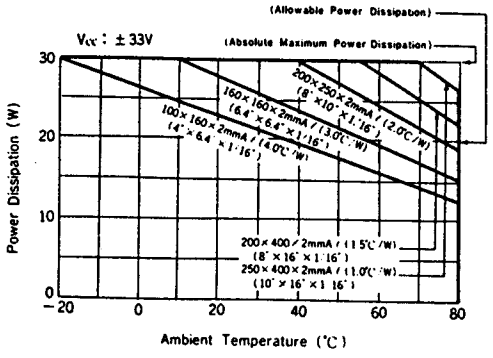
(AC Input Signal)



Note : Design heat sink to keep case temperature below 80°C

POWER DERATING

(DC Input Signal)



Note : Design heat sink to keep case temperature below 80°C