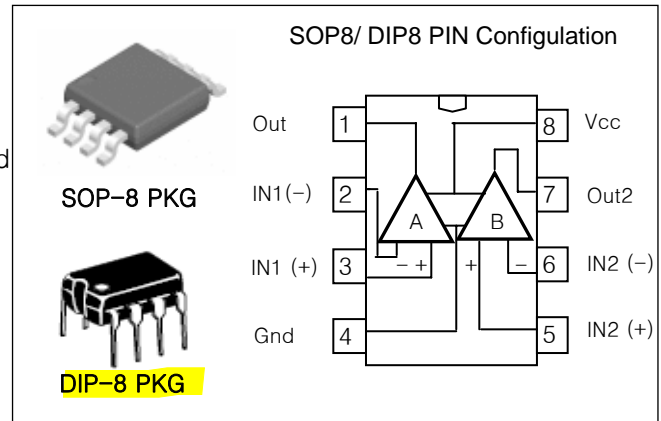


FEATURES

- Internally frequency compensated for unity gain
- Large DC voltage gain : 100dB
- Wide power supply range : 3V~32V(or $\pm 1.5\text{V}\sim 16\text{V}$)
- Input common-mode voltage range includes ground
- Large output voltage swing : 0V DC to $V_{CC}-1.5\text{V}$ DC
- Power drain suitable for battery operation
- Moisture Sensitivity Level 3
- LM358G is Halogen Free product



ORDERING INFORMATION

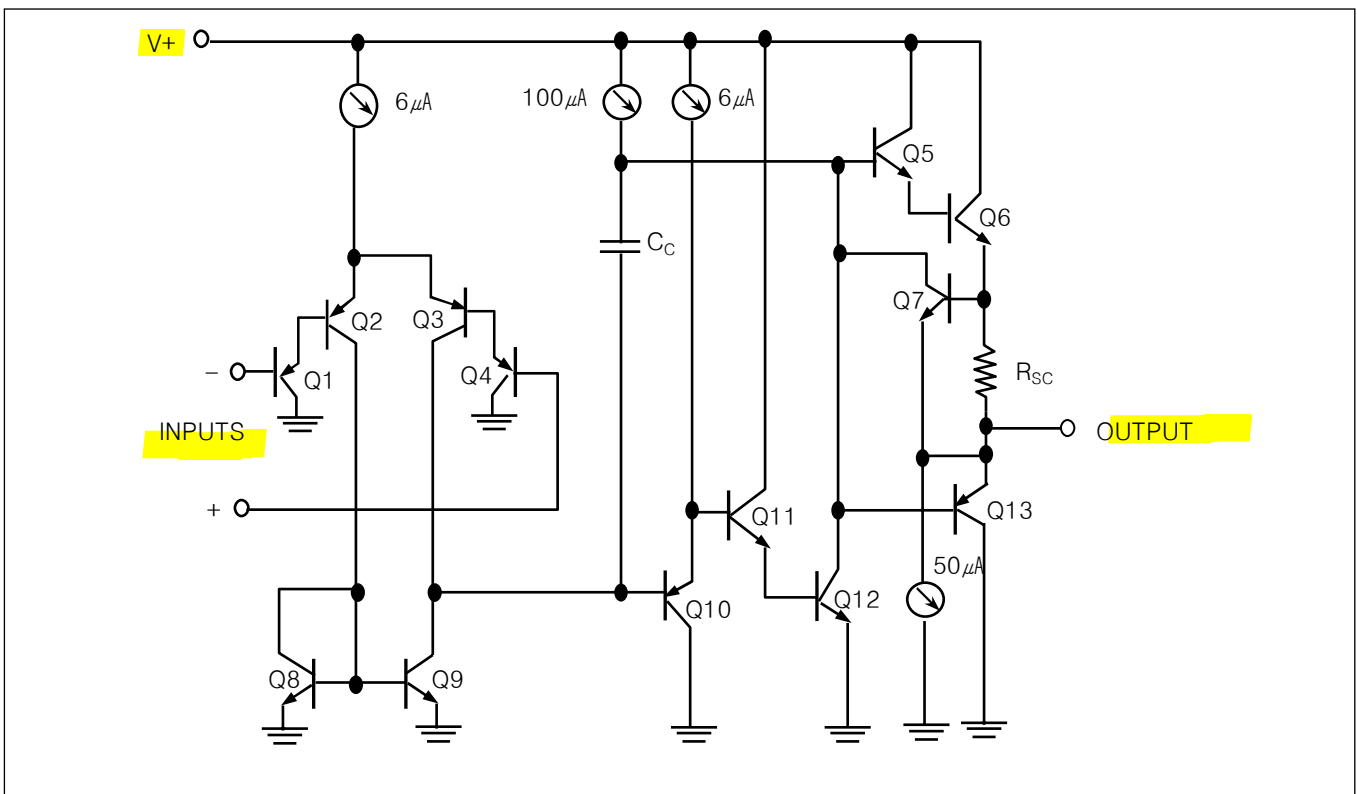
| Device | Package |
|---------|---------|
| LM358D | 8 SOP |
| LM358GD | |
| LM358N | 8 DIP |

DUAL OPERATIONAL AMPLIFIERS

LM358 consists of four independent, high gain, internally frequency compensated operational amplifiers which were designed specifically to operate from a single power supply over a wide range of voltage. Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage.

Application areas include transducer amplifier, DC gain blocks and all the conventional OP amp circuits which now can be easily implemented in single power supply systems.

EQUIVALENT CIRCUIT



ABSOLUTE MAXIMUM RATINGS

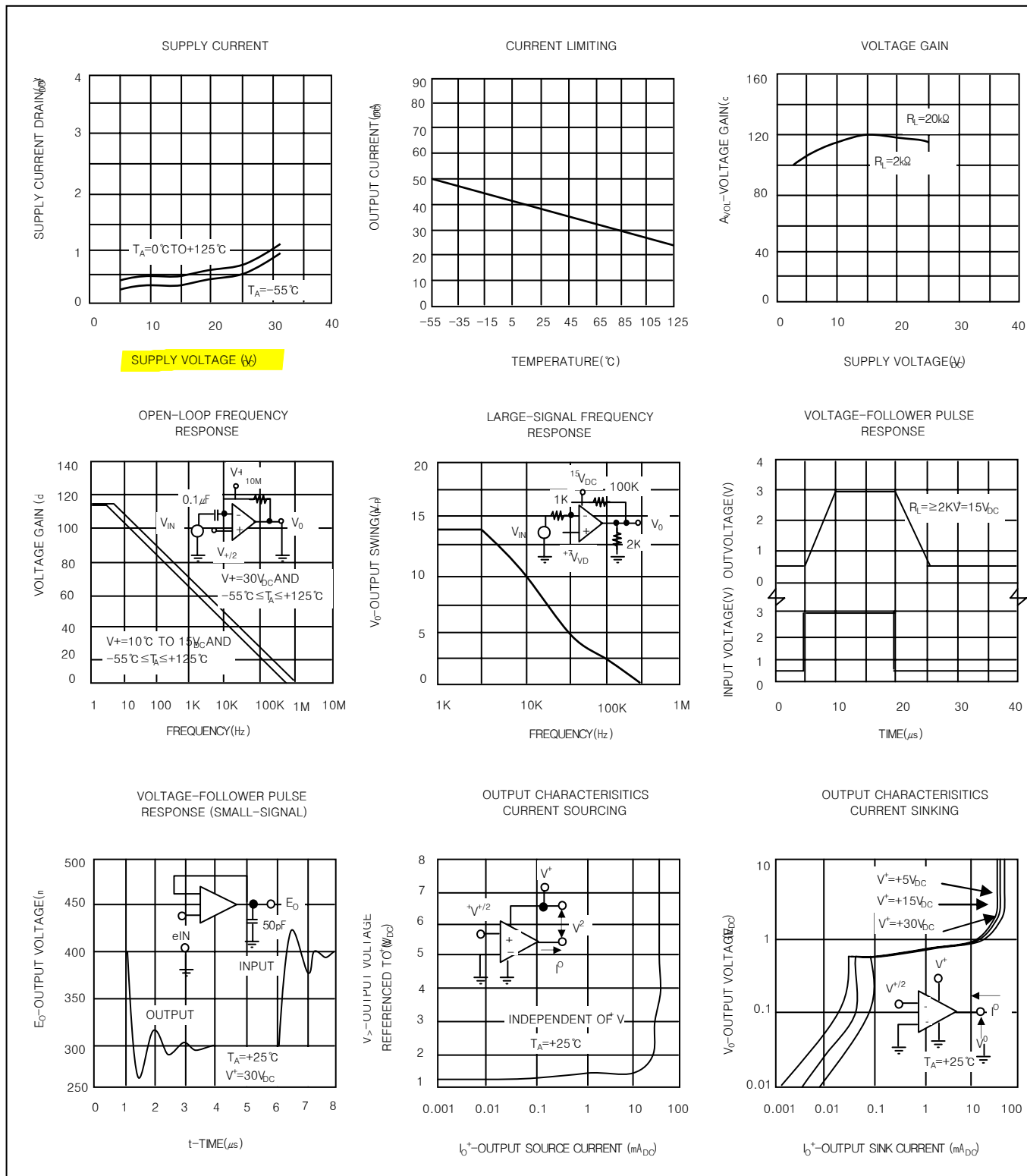
| CHARACTERISTIC | SYMBOL | VALUE | UNIT |
|---|---------------|-----------------|------------------|
| Supply Voltage | V_{CC} | ± 16 or 32 | V |
| Differential Input Voltage | $V_{I(DIFF)}$ | ± 32 | V |
| Input Voltage | V_I | -0.3 to $+32$ | V |
| Output Short Circuit to GND $V_{CC} \leq V$ $T_A = 25^\circ\text{C}$ (One Amp) | | Continuous | |
| Operating Temperature Range | T_{OPR} | $0 \sim +70$ | $^\circ\text{C}$ |
| Storage Temperature Range | T_{STG} | -65 to $+150$ | $^\circ\text{C}$ |

Electrical characteristics at specified free-air temperature, $V_{CC}=5V$ (unless otherwise noted)

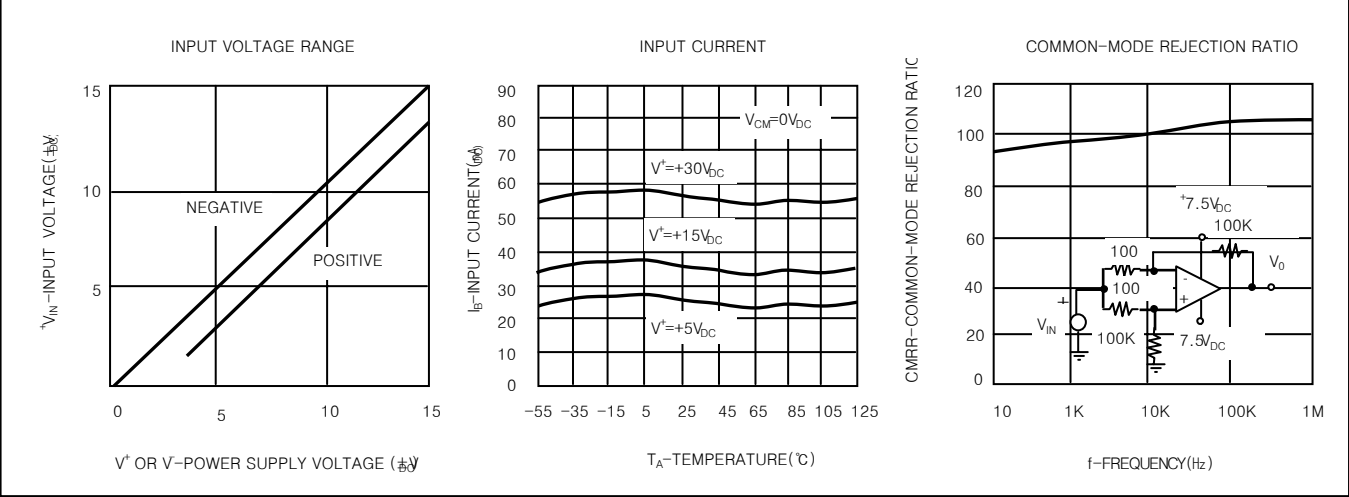
| PARAMETER | TEST CONDITIONS* | LM358 | | | UNIT |
|---|---|--------------------|---------------------|----------|------------------------|
| | | MIN | TYP | MAX | |
| V_{IO} Input Offset Voltage | $V_{CC}=5V$ to MAX, $V_{IC}=V_{ICR MIN}$, $V_O=1.4V$ | 25°C | 3 | 7 | mV |
| | | Full Range | | 9 | |
| αV_{IO} Average Temperature Coefficient of Input Offset Voltage | | Full Range | 7 | | $\mu V/^\circ\text{C}$ |
| I_{IO} Input Offset Current | $V_O=1.4V$ | 25°C | 2 | 50 | nA |
| | | Full Range | | 150 | |
| αI_{IO} Average Temperature Coefficient of Input Offset Current | | Full Range | 10 | | $pA/^\circ\text{C}$ |
| I_{IB} Input Bias Current | $V_O=1.4V$ | 25°C | -20 | -250 | nA |
| | | Full Range | | -500 | |
| V_{ICR} Common-Mode Input Voltage Range | $V_{CC}=5V$ to MAX | 25°C | 0 to $V_{CC}-1.5$ | | V |
| | | Full Range | 0 to $V_{CC}-2$ | | |
| V_{OH} High-Level Output Voltage | $R_L \geq 2k\Omega$ | 25°C | $V_{CC}-1.5$ | | V |
| | $V_{CC}=MAX$, $R_L=2k\Omega$ | Full Range | 26 | | |
| | $V_{CC}=MAX$, $R_L \geq 10k\Omega$ | Full Range | 27 | 28 | |
| V_{OL} Low-Level Output Voltage | $R_L \geq 10k\Omega$ | Full Range | 5 | 20 | mV |
| A_{VD} Large-Signal Differential Voltage Amplification | $V_{CC}=15V$, $V_O=1V$ to $11V$, $R_L \geq 2k\Omega$ | 25°C | 25 | 100 | V/mV |
| | | Full Range | 15 | | |
| THD Total Harmonic Distortion | $f=1kHz$, $A_v=20dB$, $R_L=2k\Omega$ $V_O=2V_{pp}$, $C_L=100pF$, $V_O=2V_{pp}$ | 25°C | | 0.02 | % |
| CMRR Common-Mode Rejection Ratio | $V_{CC}=5V$ to MAX, $V_{IC}=V_{ICR MIN}$ | 25°C | 65 | 80 | dB |
| K_{SVR} Supply Voltage Rejection Ratio($\Delta V_{CC}/\Delta V_{IO}$) | $V_{CC}=5V$ to MAX | 25°C | 65 | 100 | dB |
| V_{O1}/V_{O2} Crosstalk Attenuation | $f=1kHz$ to $20kHz$ | 25°C | | 120 | dB |
| I_O Output Current | $V_{CC}=15V$, $V_{ID}=1V$, $V_O=0$ | 25°C | -20 | -30 | mA |
| | | Full Range | -10 | | |
| | $V_{CC}=15V$, $V_{ID}=-1V$, $V_O=15V$ | 25°C | 10 | 20 | |
| | | Full Range | 5 | | |
| | $V_{ID}=-1V$, $V_O=200mV$ | 25°C | 12 | 30 | μA |
| I_{OS} Short-Circuit Output Current | V_{CC} at $5V$, | 25°C | | ± 40 | mA |
| | GND at $-5V$, $V_O=0$ | | | | |
| I_{CC} Supply Current (Two Amplifiers) | $V_O=2.5V$, No Load | Full Range | 0.7 | 1.2 | mA |
| | $V_{CC}=MAX$, $V_O=0.5V_{CC}$, No Load | Full Range | 1 | 2 | |

* All characteristics are measured under open-loop conditions with zero common-mode input voltage unless otherwise specified <<MAX>> V_{CC} for testing purpose is 30V. Full range is 0°C to 70°C .

TYPICAL PERFORMANCE CHARACTERISTICS



TYPICAL PERFORMANCE CHARACTERISTICS (CONTINUED)



TYPICAL APPLICATIONS

