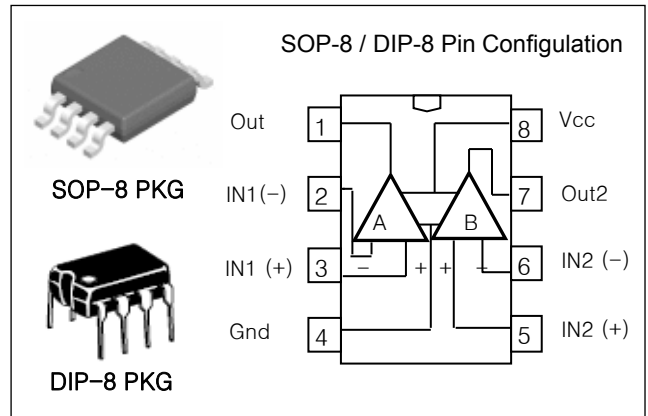


DUAL VOLTAGE COMPARATOR

LM393

FEATURES

- Single Supply Operation : 2V to 30V
- Dual Supply Operation : $\pm 1V$ to $\pm 15V$
- Allow Comparison of Voltages Near Ground Potential
- Compatible with all Forms of Logic
- Low Input Biasing Current
- Low Input Offset Current
- Low Offset Voltage
- Moisture Sensitivity Level 3
- Low supply current drain independent of supply voltage.



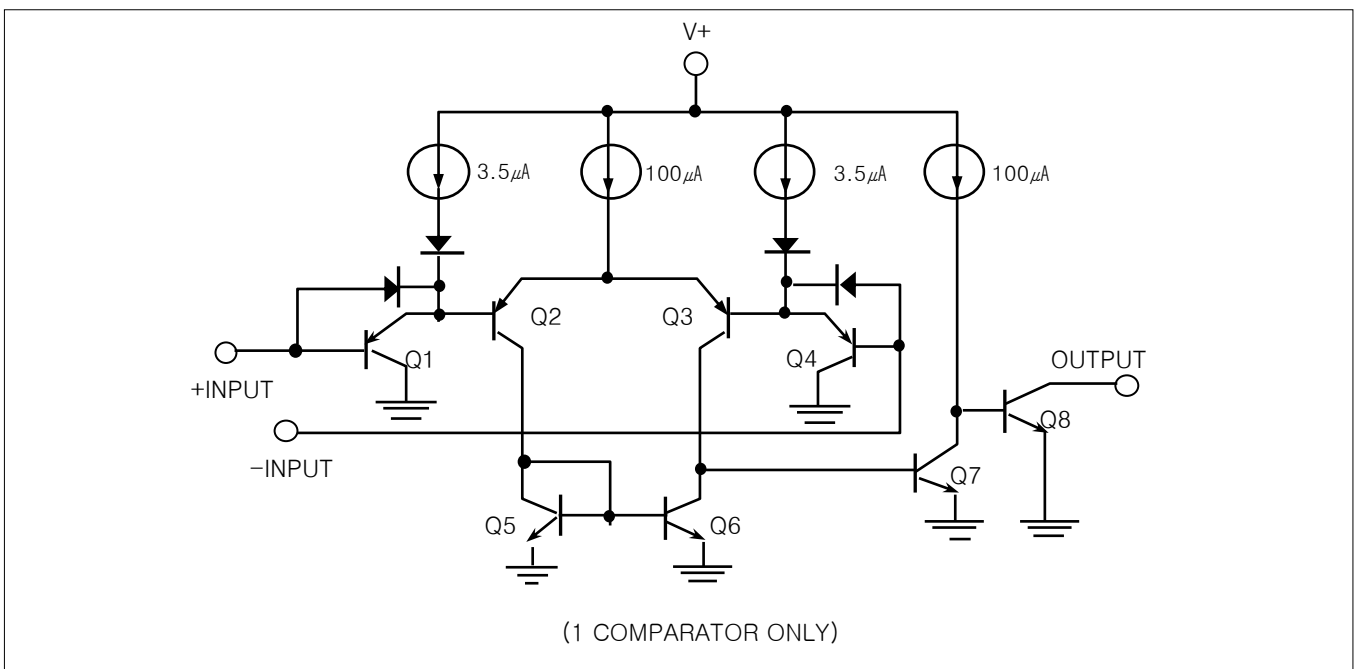
ORDERING INFORMATION

| Device | Package |
|--------|---------|
| LM393D | 8 SOP |
| LM393N | 8 DIP |

DESCRIPTION

The LM393 series consists of two independent precision voltage comparators. These were designed specifically to operate from a single power supply over a wide range of voltages. 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. The output can be connected to other open-collector outputs to achieve wired-A relationships.

EQUIVALENT CIRCUIT



ABSOLUTE MAXIMUM RATINGS

| CHARACTERISTIC | SYMBOL | VALUE | UNIT |
|-----------------------------|---------------|----------------|------|
| Power Supply Voltage | V_{CC} | ± 17 or 34 | V |
| Differential Input Voltage | $V_{I(DIFF)}$ | 34 | V |
| Input Voltage | V_I | -0.3 to +34 | V |
| Output Short Circuit to GND | | Continuous | |
| Power Dissipation | P_D | 570 | mW |
| Operating Temperature Range | T_{OPR} | 0~+70 | °C |
| Storage Temperature Range | T_{STG} | -65 to +150 | °C |

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

| PARAMETER | TEST CONDITIONS* | LM393 | | | UNIT | |
|--|--|--------------|------------|--------------|---------|----|
| | | MIN | TYP | MAX | | |
| V_{IO} Input Offset Voltage | $V_{CC}=5V$ to 30V $V_{IC}=V_{ICR}$ MIN, $V_O=1.4V$ | 25°C | 2 | 5 | mV | |
| | | Full Range | | 9 | | |
| I_{IO} Input Offset Current | $V_O=1.4V$ | 25°C | 5 | 50 | nA | |
| | | Full Range | | 150 | | |
| I_{IB} Input Bias Current | $V_O=1.4V$ | 25°C | -25 | -250 | nA | |
| | | Full Range | | -400 | | |
| V_{ICR} Common-Mode Input Voltage Range** | | 25°C | 0 | $V_{CC}-1.5$ | V | |
| | | Full Range | 0 | $V_{CC}-2.0$ | | |
| A_{VD} Large-Signal Differential Voltage Amplification | $V_{CC}=15V$, $V_O=1.4V$ to 11.4V, $R_L \geq 15k\Omega$ to V_{CC} | 25°C | 50 | 200 | V/mV | |
| I_{OH} High-Level Output Current | $V_{OH}=5V$, $V_{ID}=1V$ $V_{OH}=30V$, $V_{ID}=1V$ | 25°C | 0.1 | 50 | nA | |
| | | Full Range | | 1 | μA | |
| V_{OL} Low-Level Output Voltage | $I_{OL}=4mA$, $V_{ID}=-1V$ | 25°C | | 150 | 400 | mV |
| | | Full Range | | | 700 | |
| I_{OL} Low-Level Output Current | $V_{OL}=1.5V$, $V_{ID}=-1V$ | 25°C | 6 | | mA | |
| I_{CC} Supply Current | $R_L=\infty$ | $V_{CC}=5V$ | 25°C | 0.8 | 1 | mA |
| | | $V_{CC}=30V$ | Full Range | | 2.5 | |

* Full range (MIN to MAX), for LM393 is 0°C to 70°C. All characteristics are measured with zero common-mode input voltage unless otherwise specified.

** The voltage at either input or common-mode should not be allowed to go negative by more than 0.3V.

The upper end of the common-mode voltage range is $V_{CC} - 1.5V$, but either or both inputs can go to 30V without damage.

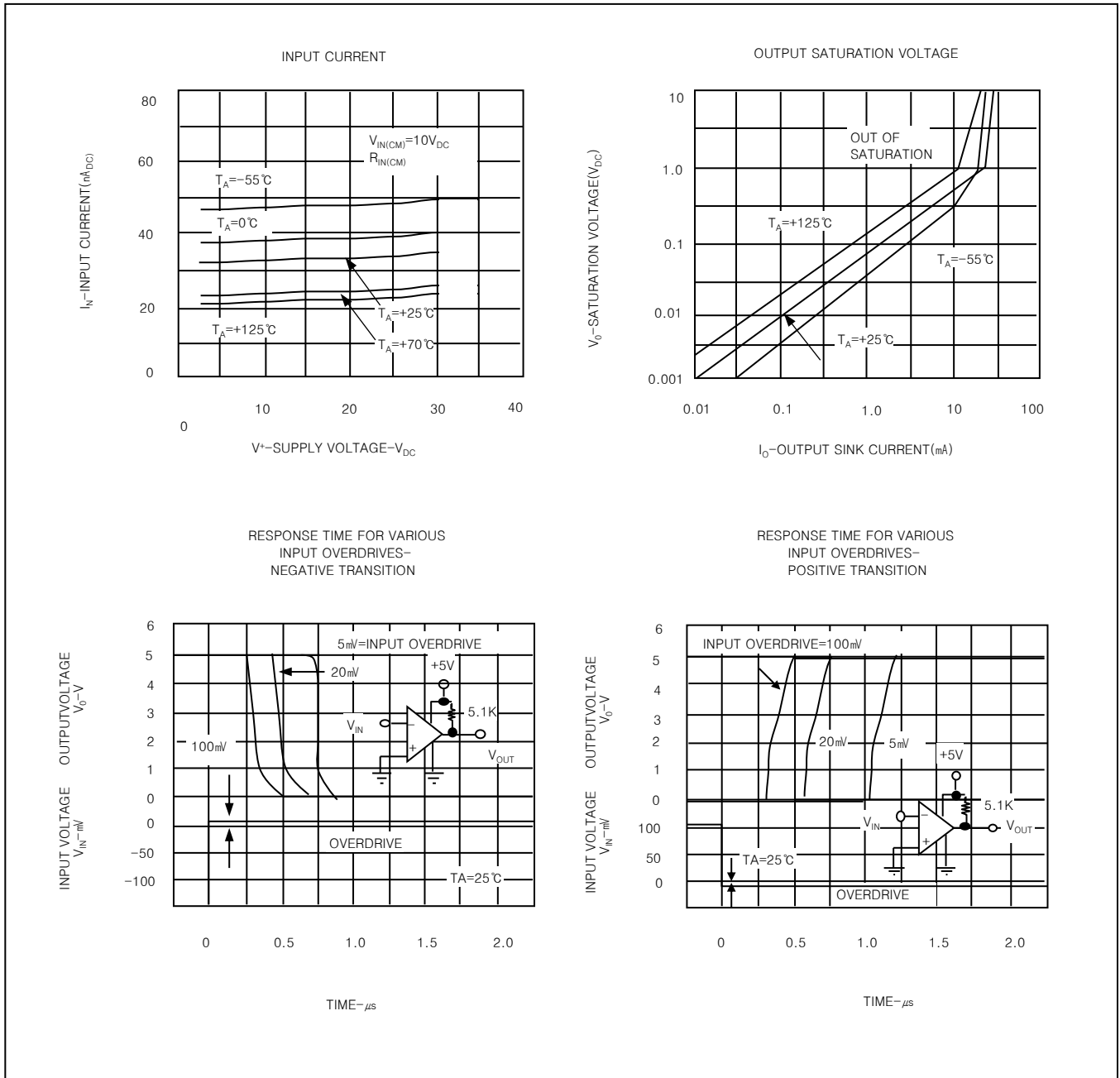
Switching characteristics, $V_{CC}=5V$, $T_A=25^\circ C$

| PARAMETER | TEST CONDITION | LM393 | | | UNIT |
|---------------|--|--|-----|-----|---------|
| | | MIN | TYP | MAX | |
| Response Time | R_L Connected to 5V Through 5.1k Ω , $C_L=15pF$ *(See Note 1) | 100-mV Input Step with 5-mV Overdrive | | 1.3 | μs |
| | | TTL-Level Input Step | | 0.3 | |

* C_L includes probe and jig capacitance.

Note 1 : The response time specified is the interval between the input step function and the instant when the output crosses 1.4V.

TYPICAL PERFORMANCE CHARACTERISTICS



TYPICAL APPLICATIONS

