Electronic Component Data Sheet

ET 150

Lesson Objectives

In this presentation you will learn:

what information electronic component manufacturers’ data sheets contain

how to read the specifications on manufacturers’ data sheets

how to convert a design from a schematic to a practical design

see designs based on commonly used integrated circuits

to read and interpret the data sheets of commonly used integrated circuits
Manufacturer’s Data Sheets

- Documentation published by electronic component manufacturers that designers use when constructing circuits.
  - Data Sheet Information
    - General Description
    - Device Features
    - Typical Applications
    - Equivalent Circuits of IC’s
    - Device Connection diagrams (pinouts)
    - Maximum Ratings and Electrical Characteristics
    - Timing Diagrams for digital circuits
    - Design formulas
    - Typical Application Circuits

Typical Data Sheet Information Example

LM555 Timer IC  Manufactured by National Semiconductor (and others)

**LM555 Timer**

**General Description**

The LM555 is a highly versatile device for generating accurate time-delays or oscillation. Additional terminals are provided for triggering or resetting/timed. In the time delayed mode of operation, the time is precisely controlled by two external resistance and capacitor. For astable operation an astable mode, the capacitor is typically controlled with two external resistors and one capacitor. The circuit may be triggered on rise or falling waveform, and the output circuit can source or sink up to 200mA or drive TTL circuits.

**Features**

- Unipolar input
- Timing from microseconds through hours
- Stable and monostable modes
- Adjustable duty cycle
- Output current can source or sink 200 mA
- Output and supply TTL compatible
- Temperature stability better than 0.005% per °C
- Normally on and normally off output
- Available in 8-pin MSOP package

**Applications**

- Pulse timing
- Full wave oscillator
- Exponential timing
- Timer delay generation
- Pulse width modulation
- Pulse position modulation
- Linear rate generator

**Summary of key features**

**Expects the device function**

**Typical applications**
Typical Data Sheet Example

Connection Diagram

Relates the IC input and output leads from schematic to pins on package. Shows package orientation.

(Where is pin 1?)

Pin 1

Notch on device package

Typical Data Sheet Example

Maximum Ratings Electrical Characteristics

Note supply voltage limits and power dissipation

Electrical Characteristics gives details of other electrical properties

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Conditions</th>
<th>Limits</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Supply Voltage</td>
<td></td>
<td>4.5</td>
<td>16 V</td>
</tr>
<tr>
<td>Supply Current</td>
<td></td>
<td>3</td>
<td>15 mA</td>
</tr>
<tr>
<td></td>
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<td>0</td>
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</tbody>
</table>

Absolute Maximum Ratings (Note 2)

- LMS55C
- LMS55U

Supply Voltage: +18V

Operating Temperature Ranges

LMS55C: 0°C to +70°C

Storage Temperature Range: -65°C to +150°C
Typical Data Sheet Example
Design Formulas and Circuit Examples

**Application Circuit Design**

**Design formulas**

Data sheets may also include external component range limits for device operation.

Graphical Design Tools (nomographs)

**Typical Waveforms**

Figure 2 shows the waveforms generated in this mode of operation.

Typical Data Sheet Example
Other Information

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LM555 Flasher Circuit

This circuit flashes an LED twice a second.

- RA, RB and C2 set Flash rate
- Charging path through RA and RB
- Discharging path through RB only

Other Common Devices
The Operation Amplifier

OP AMP’s

LM741 Connection Diagram

Other Common Devices
The Operation Amplifier

OP AMP’s
Non-Inverting Amplifier
Design LM741

Audio Amplifier
LM386

Adjustable Gain 20-200
Audio Amplifier
LM386

Typical Circuit Application for the Data Sheet

Components connected between pins 1 and 8 set gain

ET150
Coming Next: Ac Waveforms and Their Measurement
ELECTRONIC COMPONENT DATA SHEETS