



STEAM CLOWN™ PRODUCTIONS

UNDERSTANDING DATA SHEETS



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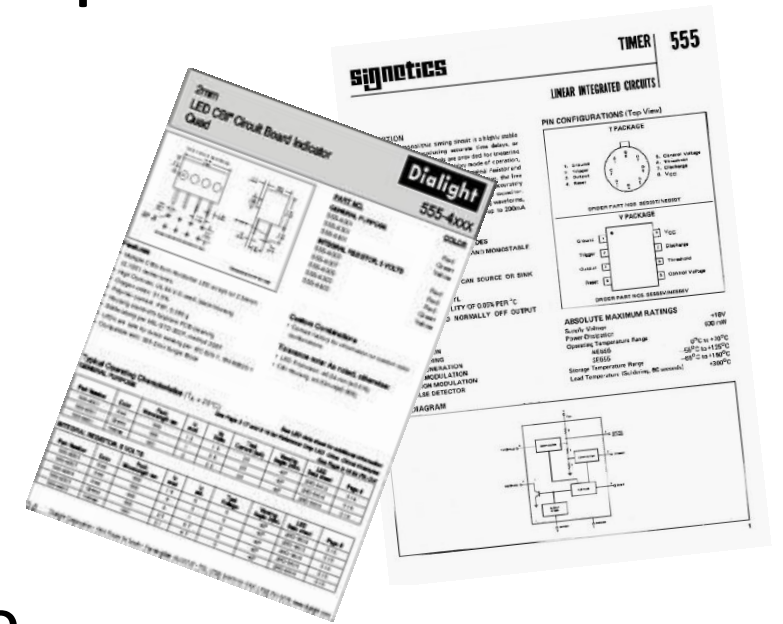
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WHAT IS A DATA SHEET?

- Technical specifications for a device or component
 - How to use it
 - How it was tested
- Provides data Min and Max tolerances
 - What are the Typical parameters
 - What are the limits to these parameters
 - At what point could you damage the device
- Describes how to test and duplicate the provided data



BUT AN ENGINEER WROTE IT...

- Engineers writing information for other Engineers
- They are supposed to be Technical...
 - That also makes them hard to read
- ...But data sheets are still the best place to find the technical specifications for a device

ANALOG DEVICES

3-Axis, $\pm 2 g \pm 4 g \pm 8 g \pm 16 g$ Digital Accelerometer ADXL345

FEATURES

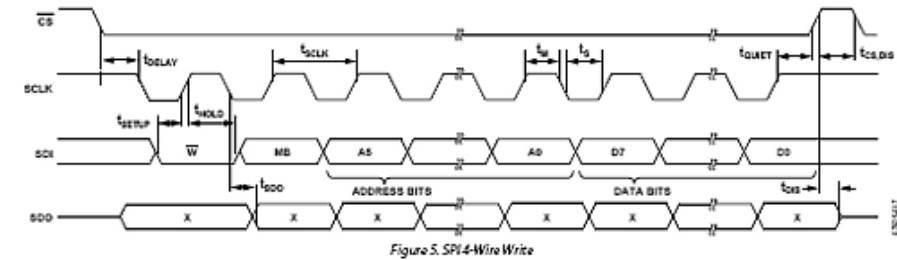
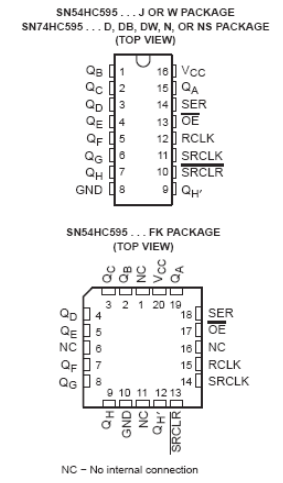
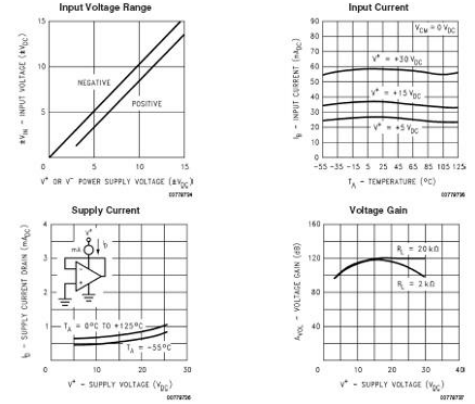
- Ultra-low power as low as 40 μA in measurement mode and 35 μA in standby mode at $V_{CC} = 1.8 V$ typical
- Power consumption scales automatically with bandwidth
- Low-noise architecture
- Fast 10-bit resolution
- Full resolution, which resolution increases with range, up to 1-bit resolution at $\pm 16g$ (maximum 4 ms) for 150 μs (user-selectable) range
- Embedded, patent-pending FIFO technology minimizes host processor load
- Temperature sensor
- Tap-detect detection
- Activity/inactivity monitoring
- Free-fall detection
- Supply voltage range 2.0V to 3.0V (V_{CC} voltage range 1.7V to 3.0V)
- SPI[®] and I²C interfaces
- Bandwidth-selectable via serial command
- Bandwidth-selectable via serial command
- Wide temperature range $-40^{\circ}C$ to $+85^{\circ}C$ (100°C check optional)
- RoHS-compliant
- Stand-by time: 1.5 ms (1 mm) 1 mm USA package

GENERAL DESCRIPTION

The ADXL345 is a small, thin, low-power, 3-axis accelerometer with high resolution (12-bit measurement at $\pm 2 g$). Digital output data is formatted as 16-bit two-complement and is accessible through either SPI[®] (3-wire) or I²C (4-wire) interface. The ADXL345 is well-suited for mobile device applications. It measures the static acceleration of gravity as well as moving applications, as well as dynamic acceleration resulting from motion or shock. Its high resolution (1 mg/LSB) enables measurement of acceleration changes for fine SP.

FUNCTIONAL BLOCK DIAGRAM

Typical Performance Characteristics



WHAT SHOULD WE FIND IN A DATA SHEET?

- Summary & overview of the device features
- Functional Block diagram – Internal Schematic
- Device Pinout
- Electrical Specifications
 - Maximum ratings
 - Typical ratings ← Recommended operating conditions
 - Graphs of typical test data
 - Truth Tables
 - Timing diagrams
- Application & typical use case examples
- Package orientation data

Philips Semiconductors Product data
Timer NE/SA/SE555/SE555C

DESCRIPTION
The 555 timer is a highly stable, precision-timed, monolithic integrated circuit. It is designed for use in a wide range of applications, including pulse generation, timing, and delay. The device is available in both bipolar and CMOS technologies.

FEATURES

- Standoff time less than 2 ns
- Min. operating frequency greater than 500 kHz
- Timing from microseconds to hours
- Operates in both stable and monostable modes
- High output current
- Adjustable duty cycle
- TTL compatible
- Temperature stability of 0.05% per °C

APPLICATIONS

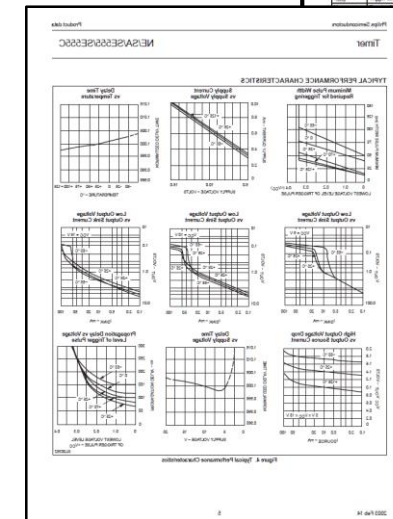
- Precision timing
- Pulse generation
- Demultiplexing
- Time delay generation
- Pulse width modulation

ORDERING INFORMATION

DESCRIPTION	TEMPERATURE RANGE	ORDER CODE
CMOS Plastic Dual In-Line Package (DIP)	-55 to +125	NE555C
CMOS Plastic Quad Flat Pack (QFP)	-55 to +125	NE555CQ
CMOS Plastic Surface Mount Package (SMD)	-55 to +125	NE555C
CMOS Plastic Small Outline Package (SOP)	-55 to +125	NE555C
CMOS Plastic Surface Mount Package (SMD)	-55 to +125	NE555C

ABSOLUTE MAXIMUM RATINGS

SYMBOL	PARAMETER	RATING	UNIT
V _{CC}	Supply voltage	+18	V
V _{EE}	Emitter-base voltage	-18	V
I _{CC}	Supply current (max)	100	mA
I _{EE}	Emitter current (max)	100	mA



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CHECK OUT THIS SPARK FUN TUTORIAL

How to Read A Data Sheet

<https://www.sparkfun.com/tutorials/223>

- Please spend 7 min reading this Sparkfun application note
- Be ready to answers some questions



In 2003, CU student Nate Seidle blew a power supply in his dorm room and, in lieu of a way to order easy replacements, decided to start his own company. Since then, SparkFun has been committed to sustainably helping our world achieve electronics literacy from our headquarters in Boulder, Colorado.

No matter your vision, SparkFun's products and resources are designed to make the world of electronics more accessible. In addition to over 2,000 open source components and widgets, SparkFun offers curriculum, training and online tutorials designed to help demystify the wonderful world of embedded electronics. We're here to help you start something.



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LET'S LOOK AT SOME DATA SHEETS

- 2N3904
- [Phillips 555 Timer](#)



ADDITIONAL RESOURCES

- YouTube Videos

- [How do I read a datasheet?](#) – By Logic Heads
- [Reading Transistor Datasheets](#) – by The Offset Volts





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APPENDIX



APPENDIX A: LICENSE & ATTRIBUTION

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APPENDIX B: ATTRIBUTION FOR SOURCES USED

- www.datasheet-pdf.com/datasheet/
- [How to Read a Data Sheet](#) – by Mike Grusin Nov 17, 2010 Sparkfun
- [Understanding electronic-device data sheets: A designer's imperative](#) – Anil Maini -July 30, 2007 - EDN Network
- [How to Read Data Sheets](#) – Prepared for the WIMS outreach program, 5/6/02, D. Grover





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REFERENCE SLIDES



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