

# WESTERN DIGITAL

C O R P O R A T I O N

## WD9216-00/WD9216-01

### Floppy Disk Data Separator — FDDS

WD9216-00

#### FEATURES

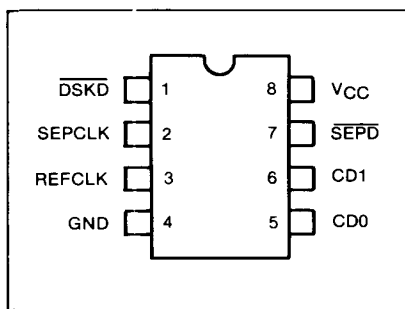
- PERFORMS COMPLETE DATA SEPARATION FUNCTION FOR FLOPPY DISK DRIVES
- SEPARATES FM OR MFM ENCODED DATA FROM ANY MAGNETIC MEDIA
- ELIMINATES SEVERAL SSI AND MSI DEVICES NORMALLY USED FOR DATA SEPARATION
- NO CRITICAL ADJUSTMENTS REQUIRED
- COMPATIBLE WITH WESTERN DIGITAL 179X, 176X AND OTHER FLOPPY DISK CONTROLLERS
- SMALL 8-PIN DUAL-IN-LINE PACKAGE
- +5 VOLT ONLY POWER SUPPLY
- TTL COMPATIBLE INPUTS AND OUTPUTS

#### GENERAL DESCRIPTION

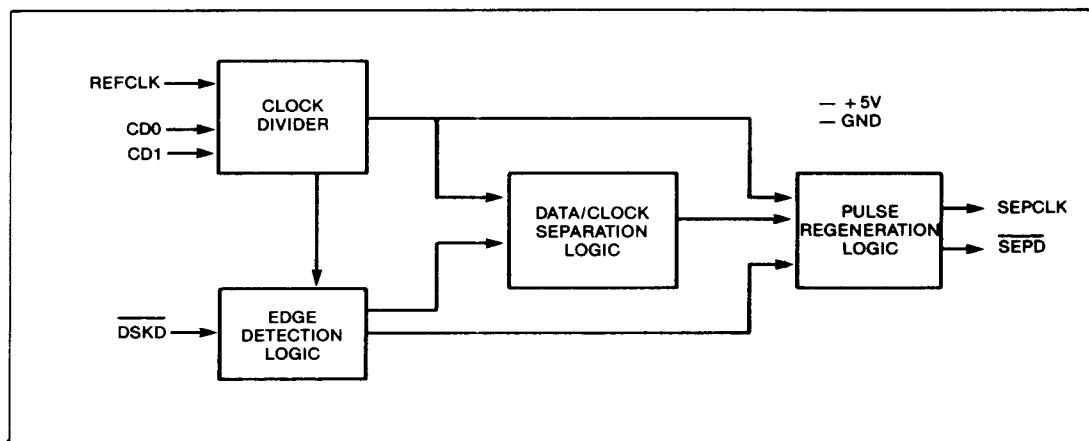
The Floppy Disk Data Separator provides a low cost solution to the problem of converting a single stream of pulses from a floppy disk drive into separate Clock and Data Inputs for a Floppy Disk Controller.

The FDDS consists primarily of a clock divider, a long-term timing corrector, a short-term timing corrector, and reclocking circuitry. Supplied in an 8-pin Dual-in-Line package to save board real estate, the FDDS operates on +5 volts only and is TTL compatible on all inputs and outputs.

The WD9216 is available in two versions; the WD9216-00, which is intended for 5 1/4" disks and the WD9216-01 for 5 1/4" and 8" disks.



PIN CONFIGURATION



FLOPPY DISK DATA SEPARATOR BLOCK DIAGRAM

**ELECTRICAL CHARACTERISTICS****MAXIMUM RATINGS\***

Operating Temperature Range ..... 0°C to +70°C  
 Storage Temperature Range ..... -55°C TO 125°C  
 Positive Voltage on any Pin,  
     with respect to ground ..... +8.0V  
 Negative Voltage on any Pin,  
     with respect to ground ..... -0.3V

\*Stresses above those listed may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or at any other condition above those indicated in the operational sections of this specification is not implied.

**NOTE:** When powering this device from laboratory or system power supplies, it is important that the Absolute Maximum Ratings not be exceeded or device failure can result. Some power supplies exhibit voltage spikes or "glitches" on their outputs when the AC power is switched on and off. In addition, voltage transients on the AC power line may appear on the DC output. If this possibility exists it is suggested that a clamp circuit be used.

**OPERATING CHARACTERISTICS** ( $T_A = 0^\circ\text{C}$  to  $70^\circ\text{C}$ ,  $V_{CC} = \pm 5\%$ , unless otherwise noted.)

PARAMETER		MIN.	TYP.	MAX.	UNITS	COMMENTS
<b>D.C. CHARACTERISTICS</b>						
<b>INPUT VOLTAGE LEVELS</b>						
Low Level $V_{IL}$				0.8	V	
High Level $V_{IH}$		2.0			V	
<b>OUTPUT VOLTAGE LEVELS</b>						
Low Level $V_{OL}$				0.4	V	$I_{OL} = 1.6 \text{ mA}$
High Level $V_{OH}$		2.4			V	$I_{OH} = -100 \text{ A}$
<b>INPUT CURRENT</b>						
Leakage $I_{IL}$				10	$\mu\text{A}$	$0 < V_{IN} < V_{DD}$
<b>INPUT CAPACITANCE</b>						
All Inputs				10	pF	
<b>POWER SUPPLY CURRENT</b>						
$I_{DD}$				50	mA	
<b>A.C. CHARACTERISTICS</b>						
<b>Symbol</b>						
$f_{CY}$	REFCLK Frequency	0.2		4.3	MHz	WD9216-00
$f_{CY}$	REFCLK Frequency	0.2		8.3	MHz	WD9216-01
$t_{CKH}$	REFCLK High Time	50		2500	ns	
$t_{CKL}$	REFCLK Low Time	50		2500	ns	
$t_{SDON}$	REFCLK to SEPD "ON" Delay		100		ns	
$t_{SDOFF}$	REFCLK to SEPD "OFF" Delay		100		ns	
$t_{SPCK}$	REFCLK to SEPCLK Delay	100			ns	
$t_{DLL}$	DSKD Active Low Time	0.1		100	$\mu\text{s}$	
$t_{DLK}$	DSKD Active High Time	0.2		100	$\mu\text{s}$	

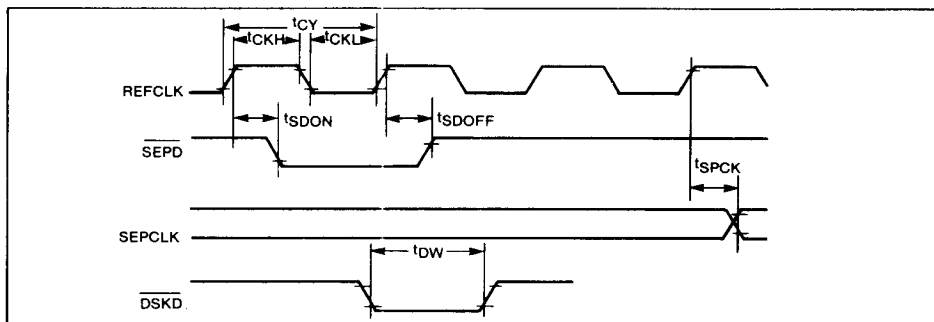
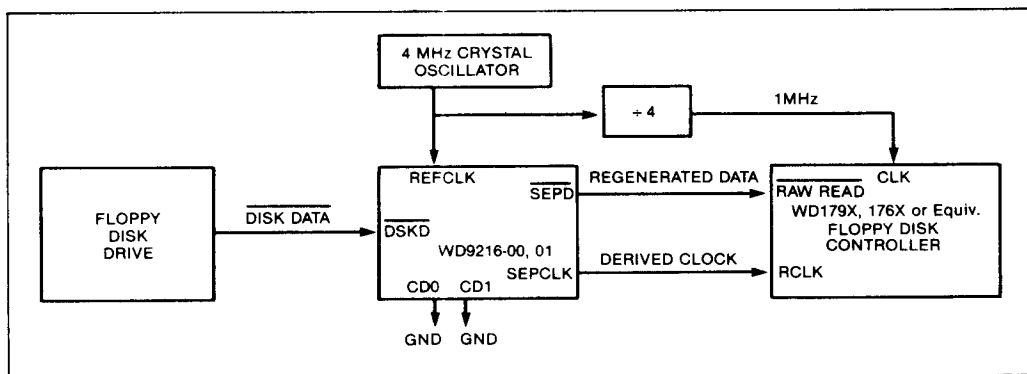


Figure 3. AC CHARACTERISTICS

## DESCRIPTION OF PIN FUNCTIONS

PIN NUMBER	PIN NAME	SYMBOL	FUNCTION															
1	Disk Data	DSKD	Data input signal direct from disk drive. Contains combined clock and data waveform.															
2	Separated Clock	SEPCLK	Clock signal output from the FDDS derived from floppy disk drive serial bit stream.															
3	Referenced Clock	REFLCK	Reference clock input.															
4	Ground	GND	Ground.															
5,6	Clock Divisor	CD0,CD1	CD0 and CD1 control the internal clock divider circuit. The internal clock is a submultiple of the REFCLK according to the following table: <table><tr><td>CD1</td><td>CD0</td><td>Divisor</td></tr><tr><td>0</td><td>0</td><td>1</td></tr><tr><td>0</td><td>1</td><td>2</td></tr><tr><td>1</td><td>0</td><td>4</td></tr><tr><td>1</td><td>1</td><td>8</td></tr></table>	CD1	CD0	Divisor	0	0	1	0	1	2	1	0	4	1	1	8
CD1	CD0	Divisor																
0	0	1																
0	1	2																
1	0	4																
1	1	8																
7	Separated Data	SEPD	SEPD is the data output of the FDDS.															
8	Power Supply	V <sub>CC</sub>	+5 volt power supply.															



**Figure 1. TYPICAL SYSTEM CONFIGURATION**  
(5 1 / 4" Drive, Double Density)

## OPERATION

A reference clock (REFCLK) of between 2 and 8 MHz is divided by the FDDS to provide an internal clock. The division ratio is selected by inputs CD0 and CD1. The reference clock and division ratio should be chosen per Table 1.

The FDDS detects the leading edges of the disk data pulses and adjusts the phase of the internal clock to provide the SEPARATED CLOCK output.

Separate short and long term timing correctors assure accurate clock separation.

The internal clock frequency is nominally 16 times the SEPCLK frequency. Depending on the internal timing correction, the internal clock may be a minimum of 12 times to a maximum of 22 times the SEPCLK frequency.

The reference clock (REFCLK) is divided to provide the internal clock according to pins CD0 and CD1.

Table 1. CLOCK DIVIDER SELECTION TABLE

DRIVE (8" or 5 1/4")	DENSITY (DD or SD)	REFCLK MHz	CD1	CD0	REMARKS
8	DD	8	0	0	Select either one
8	SD	8	0	1	
8	SD	4	0	0	
5 1/4	DD	8	0	1	Select either one
5 1/4	DD	4	0	0	
5 1/4	SD	8	1	0	Select any one
5 1/4	SD	4	0	1	
5 1/4	SD	2	0	0	

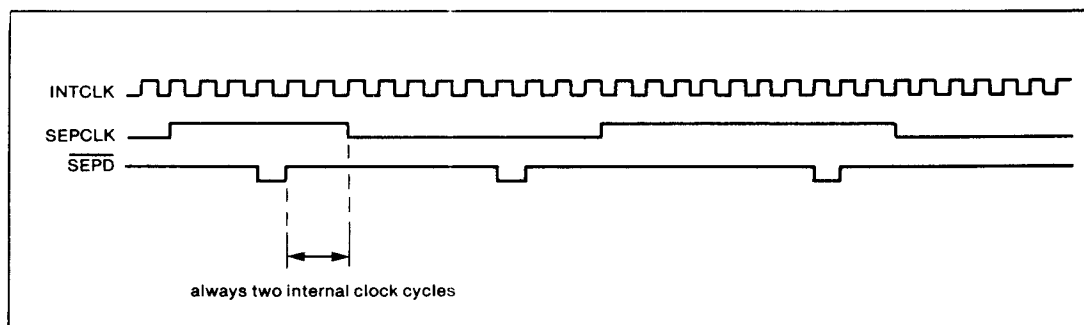


Figure 2. REFERENCE CLOCK TIMING