HFA5250

500MHz, Ultra High Speed Monolithic Pin Driver

October 1998

Features

- **High Digital Data Rate 500MHz**
- **Very Fast Slew Rate. 2500V/μs**
- **Very Fast Rise/Fall Times 600ps**
- **Wide Output Range . . . . . +7V to -2V**
- **Precise 50Ω Output Impedance**
- **High Impedance, Three-State Output Control**

Applications

- **IC Tester Pin Electronics**
- **Pattern Generators**
- **Pulse Generators**
- **Built-In Test Equipment (BITE)**
- **Level Comparator/Translator**

Description

The HFA5250 is the ideal monolithic pin driver solution for high performance test systems. The device will switch at high data rates between two input voltage levels providing variable amplitude pulses. The output impedance is trimmed to achieve a precision 50Ω source for impedance matching. Two differential ECL/TTL compatible inputs control the operation of the HFA5250, one controlling the V_{HIGH}/V_{LOW} switching and the other controlling the output's high-impedance state. The HFA5250's 500MHz data rate makes it compatible with today's high speed VLSI test systems and the +7V to -2V output swing allows testing of all common logic families.

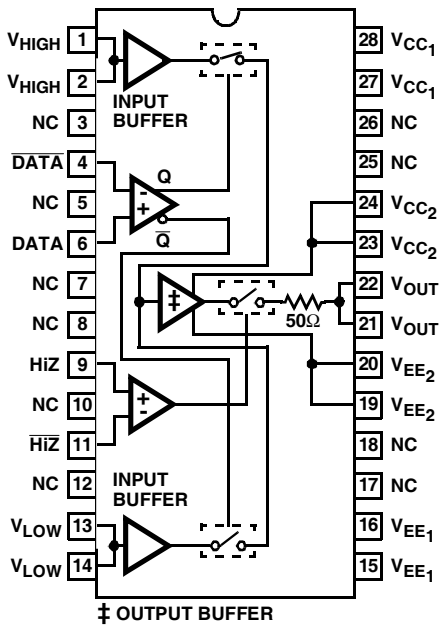
The HFA5250 is manufactured in the Intersil proprietary complementary bipolar process.

Part Number Information

PART NUMBER	TEMP. RANGE (^oC)	PACKAGE	PKG. NO.
HFA5250CB	0 to 50 Without Air Flow	28 Ld SOIC	M28.3
	0 to 70 With 400lfpm Air Flow		

Pinout

HFA5250
(SOIC)
TOP VIEW



NOTE: Switches Shown in the "1" State.

File Number **2943.6**

Absolute Maximum Ratings

Supply Voltage 17V
Differential Input Voltage 5V
Continuous Output Current. . . . . 160mA (Note 1)

Operating Conditions

Temperature Range . . . . . 0^oC to 70^oC

Thermal Information

Thermal Resistance (Typical, Note 2)	θ_{JA} ($^oC/W$)	θ_{JC} ($^oC/W$)
SOIC Package	70	55

Maximum Package Power Dissipation
SOIC Package with Still Air at 50^oC 1.43W
SOIC Package with 400lfpm Air at 70^oC. 1.45W
Maximum Junction Temperature (Plastic Package) . . . . . 150^oC
Maximum Storage Temperature Range . . . . . -65^oC to 150^oC
Maximum Lead Temperature (Soldering 10s). . . . . 300^oC
(SOIC - Lead Tips Only)

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

NOTES:

1. Internal Power Dissipation may limit Output Current below 160mA.
2. θ_{JA} is measured with the component mounted on an evaluation PC board in free air.

Electrical Specifications

V_{CC} = +10V, V_{EE} = -5.2V, Unless Otherwise Specified

PARAMETER	TEST CONDITIONS	TEMP. (^oC)	MIN	TYP	MAX	UNITS
INPUT CHARACTERISTICS (V_{HIGH}, V_{LOW})						
V_{HIGH} Input Offset Voltage	V_{HIGH} = 0	25	-200	-100	30	mV
V_{LOW} Input Offset Voltage	V_{LOW} = 0	25	-200	-100	30	mV
V_{HIGH} Input Bias Current	V_{HIGH} = 5V	25	-150	50	250	µA
V_{LOW} Input Bias Current	V_{LOW} = 0V	25	-350	-100	150	µA
V_{HIGH} Voltage Range	Note 6	25	-2.6	-	7.5	V
		25	V_{EE}+2.6	-	V_{CC}-2.5	V
V_{LOW} Voltage Range	Note 6	25	-2.7	-	7.4	V
		25	V_{EE}+2.5	-	V_{CC}-2.6	V
V_{HIGH} to V_{LOW} Differential Voltage Range		25	0.2	-	10.2	V
Input Resistance	V_{IN} = -2V to 7V	25	-	10	-	kΩ
Input Capacitance		25	-	5	-	pF
Input Noise Voltage	10Hz to 1MHz	25	-	20	-	μV_{P-P}
LOGIC INPUT CHARACTERISTICS (Data, $\overline{Data}$, HiZ, $\overline{HiZ}$)						
Input Offset Voltage		25	-	±250	-	mV
Input Voltage Range	Note 6	25	-2.0	-	7.0	V
		25	V_{EE}+3.2	-	V_{CC}-3.0	V
Input High Current	V_{IH} = 0V, V_{IL} = -2V	25	-25	50	200	µA
Input Low Current	V_{IH} = 0V, V_{IL} = -2V	25	-400	-150	25	µA
Common Mode Input Resistance	V_{CM} = -2V to 7V	25	-	1	-	MΩ
Differential Input Resistance	V_{DIFF} = 0V to 5V	25	-	100	-	kΩ
Input Capacitance		25	-	3	-	pF
TRANSFER CHARACTERISTICS						
V_{HIGH}/V_{LOW} Voltage Gain	V_{HIGH}, V_{LOW} = 0V to 5V	25	0.95	0.97	1.0	V/V
V_{HIGH}/V_{LOW} Linearity Error	V_{HIGH}, V_{LOW} = 0V to 5V, FS = 5V	25	-0.5	±0.2	0.5	%
V_{HIGH}/V_{LOW} Linearity Error	V_{HIGH}, V_{LOW} = -2V to 7V, FS = 9V	25	-1.2	±0.6	1.2	%
V_{HIGH}/V_{LOW} -3dB Bandwidth	$200mV_{P-P}$	25	-	500	-	MHz
SWITCHING CHARACTERISTICS (Z_{LOAD} = 10 Inches of RG-58, V_{HIGH} = 3V, V_{LOW} = 0V, V_{DATA} = -1.8V to -1.0V, Measured 50% to 50% pts)						
Propagation Delay	Note 3	25	-	2	-	ns
Propagation Delay Jitter, 1 Sigma		25	-	30	-	ps
Propagation Delay Match (Rising vs Falling Edge)	Note 3	25	-	150	-	ps

Electrical Specifications V_{CC} = +10V, V_{EE} = -5.2V, Unless Otherwise Specified **(Continued)**

PARAMETER	TEST CONDITIONS	TEMP. (^oC)	MIN	TYP	MAX	UNITS
Propagation Delay vs Duty Cycle	2.5% to 97.5%, 200ns Period	25	-	±100	-	ps
Active to HiZ Delay	Measured 50% to 10% Points	25	-	3.0	-	ns
HiZ to Active Delay	Measured 50% to 10% Points	25	-	3.5	-	ns
Data Rate	$1V_{P-P}$, 50% Duty Cycle, 90% Amplitude	25	-	500	-	MHz
TRANSIENT RESPONSE (Z_{LOAD} = 16 Inches of RG-58 Terminated with 5pF)						
Slew Rate	-1V to +6V	25	-	2500	-	V/µs
Rise/Fall Time	$1V_{P-P}$, 20%-80%	25	-	600	-	ps
Rise/Fall Time	$3V_{P-P}$, 10%-90%	25	-	1.2	-	ns
Rise/Fall Time	$5V_{P-P}$, 10%-90%	25	-	1.8	2.25	ns
Rise/Fall Time Match	Note 3	25	-	-	200	ps
Overshoot/Undershoot/Preshoot	$3V_{P-P}$	25	-	5	-	%
Data Settling Time 1%	Note 4	25	-	7	-	ns
V_{HIGH}/V_{LOW} Settling Time 1%	Note 4	25	-	12	-	ns
OUTPUT CHARACTERISTICS						
Output Voltage Swing, No Load	Note 6	25	-2	-	7	V
		25	V_{EE}+3.2	-	V_{CC}-3.0	V
Output Voltage Swing	R_L = 50Ω	25	-1	-	3.5	V
Output Resistance	Active (-2V to 7V)	25	49	50	51	Ω
Output Resistance	HiZ (-2V to 7V)	25	-	10	-	MΩ
HiZ Output Voltage Compliance	Note 6	25	-2	-	7	V
		25	V_{CC}-12.0	-	V_{EE}+12.2	V
Output Leakage	HiZ (-2V to 7V)	25	-1	-	1	µA
Output Capacitance	HiZ	25	-	5	-	pF
POWER SUPPLY CHARACTERISTICS						
V_{HIGH} Power Supply Rejection Ratio (Note 5)		25	28	-	-	dB
V_{LOW} Power Supply Rejection Ratio (Note 5)		25	28	-	-	dB
Data/HiZ Power Supply Rejection Ratio		25	-	22	-	dB
Total Supply Current		25	85	90	95	mA
I_{CC1}/I_{EE1} Supply Current		25	-	65	-	mA
I_{CC2}/I_{EE2} Supply Current		25	-	25	-	mA
Supply Voltage Range	V_{CC} - V_{EE}	25	10	-	15.2	V
Power Dissipation	V_{CC} = 10V, V_{EE} = -5.2V, No Load	25	-	-	1.44	W

NOTES:

3. 3V Step, 50% duty cycle, 200ns period.
4. 3V Step, measured from 50% of input to ±1% of final value, final value is at 50ns.
5. V_{HIGH} = 2.6V, V_{LOW} = 2.4V, V_{CC} = 9V to 10V, V_{EE} = -4.2V to -5.2V.
6. Operation above total supply voltage of 15.2V is not recommended. See specification under Power Supply Characteristics.

Die Characteristics

DIE DIMENSIONS:

1990µm x 1530µm x 525µm

PASSIVATION:

Nitride, 4kÅ ±0.5kÅ

METALLIZATION:

Type: Metal 1: AlCu(2%)/TiW
Thickness: Metal 1: 8kÅ ±0.4kÅ

Type: Metal 2: AlCu(2%)
Thickness: Metal 2: 16kÅ ±0.8kÅ

Metallization Mask Layout