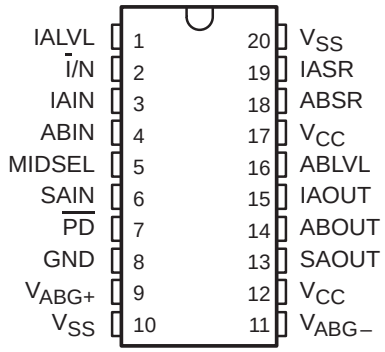
TMS3473B
PARALLEL DRIVER

- **TTL-Compatible Inputs**
- **CCD-Compatible Outputs**
- **Variable-Output Slew Rates With External Resistor Control**
- **Full-Frame Operation**
- **Frame-Transfer Operation**
- **Solid-State Reliability**
- **Adjustable Clock Levels**

DW PACKAGE
(TOP VIEW)



description

The TMS3473B is a monolithic CMOS integrated circuit designed to drive the parallel image-area gate (IAG), parallel storage-area gate (SAG), and antiblooming gate (ABG) inputs of the Texas Instruments (TI™) virtual-phase CCD image sensors. The TMS3473B interfaces the CCD image sensor to a user-defined timing generator; it receives TTL-input signals from the timing generator and outputs level-shifted and slew-rate-adjusted signals to the image sensor.

The TMS3473B allows operation of the CCD image sensor in either the interlace or noninterlace mode. When the TMS3473B $\overline{I}$/N input is connected to V_{SS}, the interlace mode is selected (see Figure 1); when $\overline{I}$/N is connected to V_{CC}, the noninterlace mode is selected (see Figure 2).

ABOUT follows ABIN and switches between V_{ABG+} and V_{ABG-}. IAOUT and SAOUT follow IAIN and SAIN, respectively, and switch between V_{CC} and V_{SS}. Additionally, ABOUT and IAOUT can each be made to output midlevel voltages. DC inputs to ABLVL and IALVL determine the midlevel voltages that can be output on ABOUT and IAOUT, respectively. A high-logic level on MIDSEL causes ABOUT to output its midlevel voltage; a low-logic level on MIDSEL causes IAOUT to output its midlevel voltage if the interlace mode is selected.

Slew-rate adjustment of IAOUT and ABOUT is accomplished by connecting IASR to V_{CC} and ABSR to V_{ABG+} through external resistors. The larger the resistor values, the longer the rise and fall times are.

A low-logic level on $\overline{PD}$ causes the TMS3473B to power down and all outputs to assume their low levels (IAOUT and SAOUT to V_{SS}, ABOUT to V_{ABG-}).

The TMS3473B is supplied in a 20-pin surface-mount package (DW) and is characterized for operation from –20°C to 45°C.

This device contains circuits to protect its inputs and outputs against damage due to high static voltages or electrostatic fields. These circuits have been qualified to protect this device against electrostatic discharges (ESD) of up to 2 kV according to MIL-STD-883C, Method 3015; however, precautions should be taken to avoid application of any voltage higher than maximum-rated voltages to these high-impedance circuits. During storage or handling, the device leads should be shorted together or the device should be placed in conductive foam. In a circuit, unused inputs should always be connected to an appropriated logic voltage level, preferably either V_{CC} or ground. Specific guidelines for handling devices of this type are contained in the publication *Guidelines for Handling Electrostatic-Discharge-Sensitive (ESDS) Devices and Assemblies* available from Texas Instruments.

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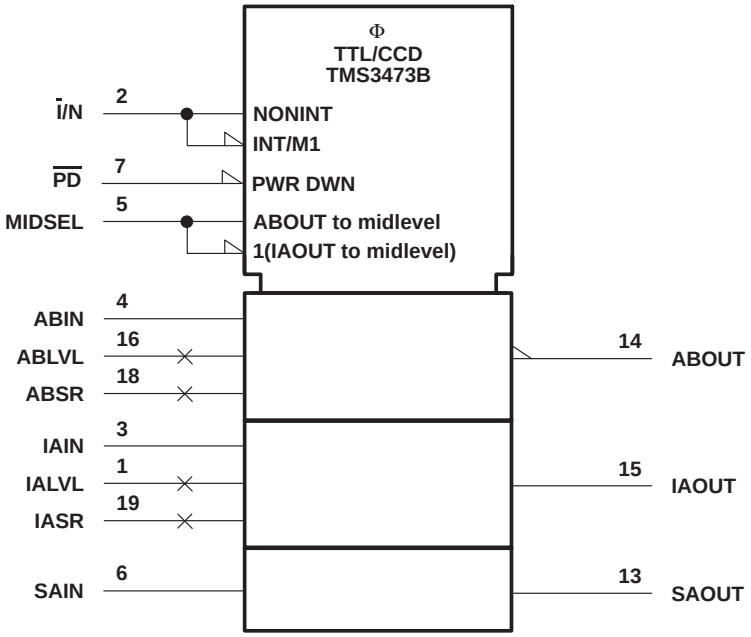
logic symbol



Terminal Functions

TERMINAL NAME	TERMINAL NO.	I/O	DESCRIPTION
ABIN	4	I	Antiblooming in
ABLVL	16	I	DC antiblooming midlevel voltage
ABOUT	14	O	Antiblooming out
ABSR	18	I	Antiblooming slew rate
GND	8		Ground
IAIN	3	I	Parallel-image-area in
IALVL	1	I	DC parallel-image-area midlevel voltage
IAOUT	15	O	Parallel-image-area out
IASR	19	I	Parallel-image-area slew rate
$\overline{I}$/N	2	I	Interlace/noninterlace select
MIDSEL	5	I	IAOUT/ABOUT midlevel voltage select
$\overline{PD}$	7	I	Power down
SAIN	6	I	Parallel storage area in
SAOUT	13	O	Parallel storage area out
V_{ABG+}	9	I	Positive ABG supply voltage
V_{ABG-}	11	I	Negative ABG supply voltage
V_{CC}†	12	I	Positive supply voltage
V_{CC}†	17	I	Positive supply voltage
V_{SS}†	10	I	Negative supply voltage
V_{SS}†	20	I	Negative supply voltage

† All terminals of the same name should be connected together externally.

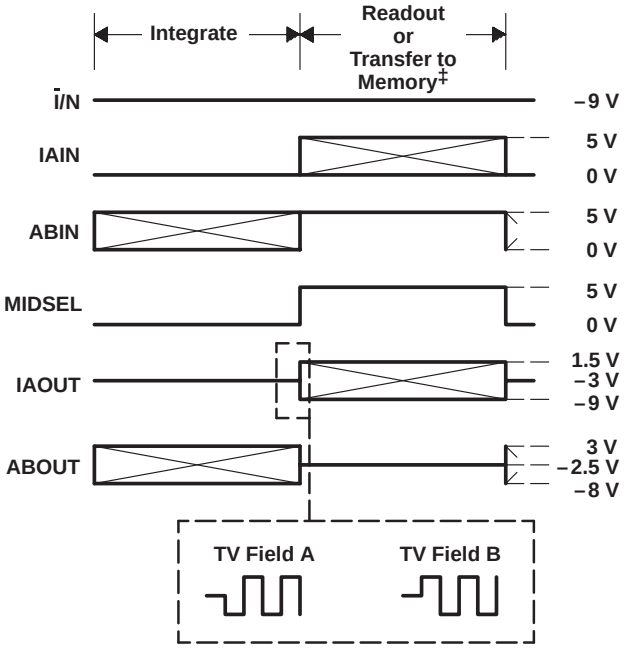


Figure 1. Parallel-Driver Timing Diagram (interlace mode)

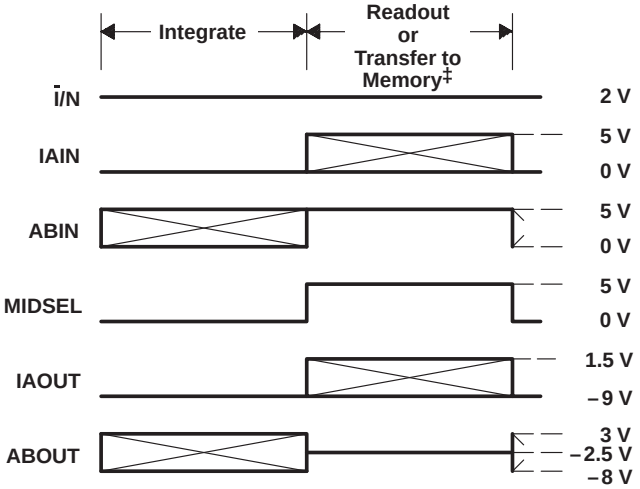


Figure 2. Parallel-Driver Timing Diagram (noninterlace mode)

‡ A readout occurs if the TMS3473B is driving a full-frame CCD image sensor; a transfer to memory occurs if the TMS3473B is driving a frame-transfer CCD image sensor.

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Positive supply voltage, V_{CC} (see Note 1) . . . . . 4.4 V
Negative supply voltage, V_{SS} (see Note 2) . . . . . –11.1 V
Positive ABG supply voltage, V_{ABG+} . . . . . 5.6 V
Negative ABG supply voltage, V_{ABG-} . . . . . –8 V
ABG supply voltage differential ($V_{ABG+} – V_{SS}$) . . . . . 15.2 V
Continuous total power dissipation at (or below), $T_A \le 25°C$:
Unmounted device (see Figure 3) . . . . . 825 mW
Mounted device (see Figure 3) . . . . . 1150 mW
Operating free-air temperature range, T_A . . . . . –20°C to 45°C
Storage temperature range, T_{STG} . . . . . –55°C to 125°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds . . . . . 260°C

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTES: 1. All voltage values are with respect to GND.
2. The algebraic convention, in which the least positive (most negative) value is designated minimum, is used in this data sheet for voltage levels only.

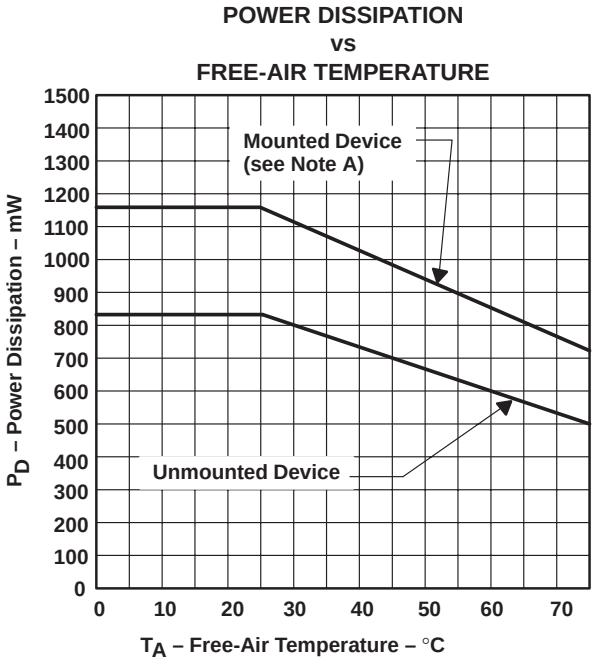


Figure 3

NOTE A: The mounted-device derating curve in Figure 3 is obtained under the following conditions:
The board is 50 mm by 50 mm by 1.6 mm thick.
The board material is glass epoxy.
The copper thickness of all the etch runs is 35 microns.
Etch run dimensions – DW package – All 20 etch runs are 0.4 mm by 22 mm.
Each chip is soldered to the board.
An aluminum cooling fin 10 mm by 10 mm by 1 mm thick is coupled to the chip with thermal paste.

recommended operating conditions (see Note 2)

		MIN	NOM	MAX	UNIT
Positive supply voltage, V_{CC}†		0	1	4.4	V
Negative supply voltage, V_{SS}†		–11.1	–10	–9.7	V
Positive ABG supply voltage, V_{ABG+}†		1	3.5	4.4	V
Negative ABG supply voltage, V_{ABG-}†		–11.1	–7	–6.2	V
Power supply voltage differential ($V_{CC} – V_{SS}$)				15.5	V
DC parallel image area midlevel voltage, IALVL‡	Z < 5 kΩ	–6	–5	–2	V
DC antiblooming midlevel voltage, ABLVL	Z < 2.5 kΩ	–3.5	–2.5	1	V
High-level input voltage, V_{IH}	ABIN, MIDSEL, $\overline{PD}$, IAIN, or SAIN	2.5	5		V
	$\overline{I}$/N	V_{CC} – 0.4			
Low-level input voltage, V_{IL}	ABIN, MIDSEL, $\overline{PD}$, IAIN, or SAIN		0	0.9	V
	$\overline{I}$/N			V_{SS} + 0.4	
Input voltage, V_I	ABLVL	–3.5		1	V
	IALVL	–6		–2	
Frequency, f_{clock}	IAIN, SAIN§			3.58	MHz
	ABIN§			2	
Input resistance, R_i	IALVL, ABLVL	2.5			kΩ
Slope-resistance bias		10		50	kΩ
Input capacitance, C_i	ABLVL	1			µF
Operating free-air temperature, T_A		–20		45	°C

† V_{CC}, V_{SS}, V_{ABG+}, and V_{ABG-} have 100-mA current limits. Adequate decoupling capacitors are required from these terminals to ground.
‡ Proper adjustment is required for interlace-mode operation.
§ Different CCD image sensors have different maximum clock rates. See the individual CCD image sensor data sheets for these rates.

electrical characteristics over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Note 2)

PARAMETER			TEST CONDITIONS†	MIN	MAX	UNIT
V_{OH}	High-level output voltage	ABOUT	I_{OH} = 180 mA (peak)	V_{ABG+} – 0.2	V_{ABG+} + 0.2	V
		IAOUT, SAOUT	I_{OH} = 730 mA (peak)	V_{CC} – 0.5	V_{CC} + 0.5	
V_{OL}	Low-level output voltage	ABOUT	I_{OL} = 180 mA (peak)	V_{ABG-} – 0.3	V_{ABG-} + 0.3	V
		IAOUT, SAOUT	I_{OL} = 730 mA (peak)	V_{SS} – 0.6	V_{SS} + 0.8	
I_{IH}†	High-level input current	ABIN, IAIN, SAIN, MIDSEL, $\overline{PD}$	V_{IH} = 5 V	0	–50	µA
		$\overline{I/N}$	$V_{IH} = V_{CC}$ = 2 V		±10	
I_{IL}†	Low-level input current	ABIN, IAIN, SAIN, MIDSEL, $\overline{PD}$	V_{IL} = 0 V		±10	µA
		$\overline{I/N}$	$V_{IL} = V_{SS}$ = –10 V		±10	
I_{AB}	Antiblooming current		Average load, See Note 3		20	mA
I_{SS}	Supply current		No load, $\overline{PD}$ = 0 V		1.5	mA
			Average load, See Note 4		25	

† These parameters are measured with V_{SS} = –10.3 V, V_{CC} = 2.1 V, V_{ABG+} = 4.3 V, V_{ABG-} = –7 V, and with IASR connected to V_{CC} and ABSR connected to V_{ABG+}, both through 22-kΩ resistors.

NOTES: 2. The algebraic convention, in which the least positive (most negative) value is designated minimum, is used in this data sheet for voltage levels only.

3. The load consists of a TC241 CCD image sensor with ABG clocked at 2 MHz using ABG mode 3 (see the TMS3471C data sheet for details on mode 3).

4. The load consists of a TC241 CCD image sensor with IAG and SAG clocked at 2.1 MHz.

switching characteristics

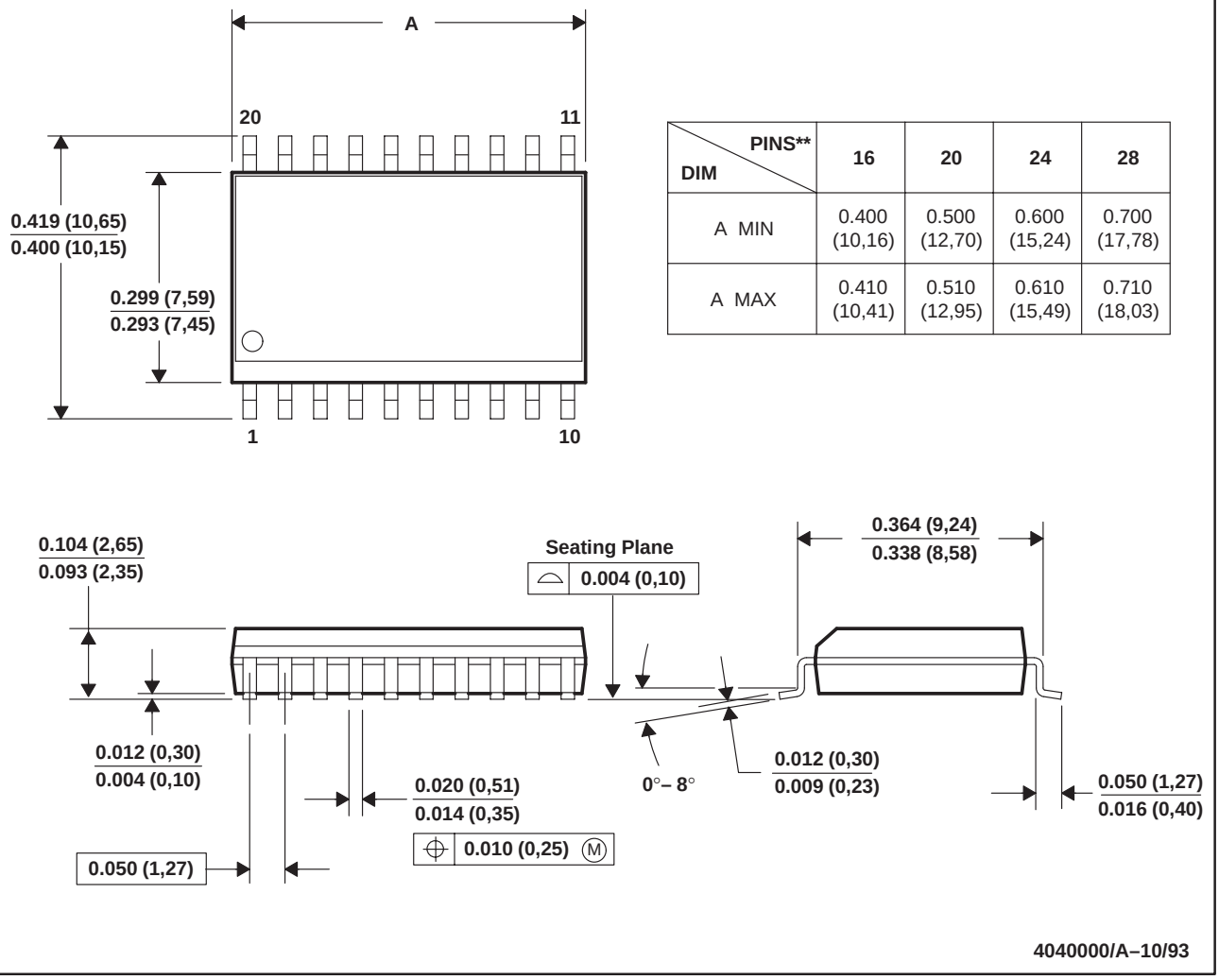
PARAMETER			TEST CONDITIONS			MIN	MAX	UNIT
t_r	Rise time	ABOUT	V_{CC} = 2.1 V, T_A = 25°C,	V_{ABG+} = 4.3 V, V_{SS} = –10.3 V,	V_{ABG-} = –7 V, See Note 5	60	140	ns
		IAOUT, SAOUT				40	180	
t_f	Fall time	ABOUT				45	100	ns
		IAOUT, SAOUT				30	110	

NOTE 5: IASR is connected to V_{CC} and ABSR is connected to V_{ABG+}, both through 22-kΩ resistors. The load consists of a TC241 CCD image sensor with ABG clocked at 2 MHz using ABG mode 3 (see the TMS3471C data sheet for details on mode 3).

MECHANICAL DATA

DW/R-PDSO-G** **PLASTIC WIDE-BODY SMALL-OUTLINE PACKAGE**

20 PIN SHOWN



DIM \ PINS**	16	20	24	28
A MIN	0.400 (10,16)	0.500 (12,70)	0.600 (15,24)	0.700 (17,78)
A MAX	0.410 (10,41)	0.510 (12,95)	0.610 (15,49)	0.710 (18,03)

NOTES: A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).

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