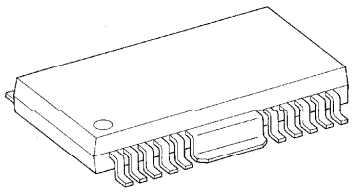
TOSHIBA BIPOLAR DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TD6336F

8-BIT SERIAL-IN PARALLEL-OUT DRIVER

The TD6336F is an automotive 8-bit SI / PO driver IC using a Bi-CMOS process characterized by high output withstand voltage.
The shift registers share a common clock and a common reset signal. Data is shifted on the leading edge of the clock. The IC also has $\overline{\text{LATCH}}$ and ENABLE inputs. Its output is an N-channel open-drain output, and Isink is up to 100mA. When the supply voltage becomes low, the output turns off.



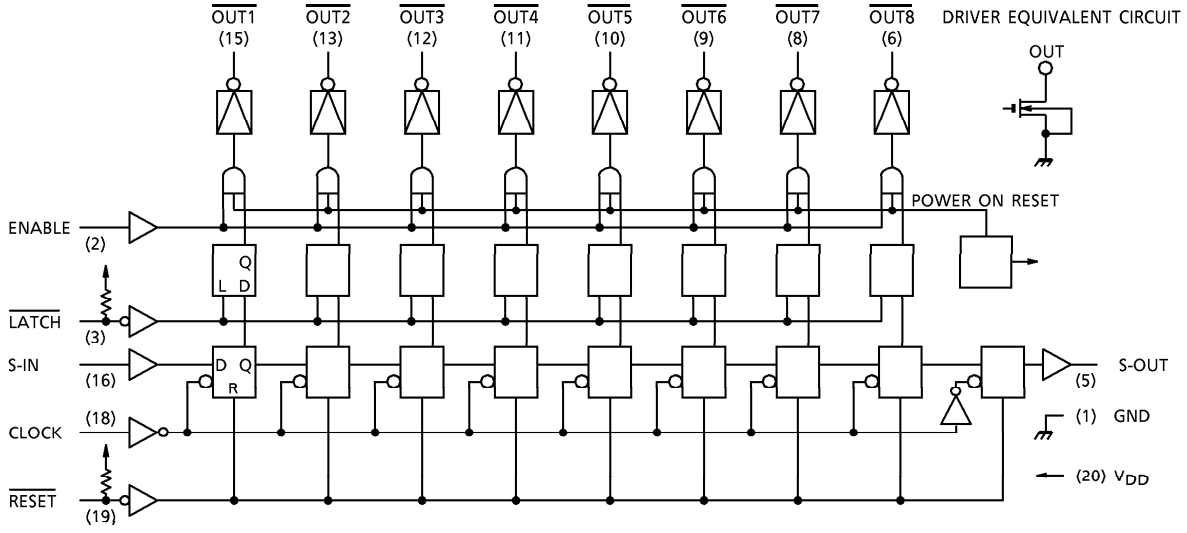
HSOP20-P-450-1.00

Weight : 0.79g (Typ.)

FEATURES

- Serial input and 8-stage parallel / serial output
- Serial output allows cascade expansion.
- ENABLE input for output control
- Large output current : 100mA (Max.)
- High output withstand voltage : 80V (Max.)
- Power detection circuit incorporated : The output is disabled when V_{DD}<3V (Typ).

BLOCK DIAGRAM AND PIN LAYOUT



961001EBA2

PIN DESCRIPTION

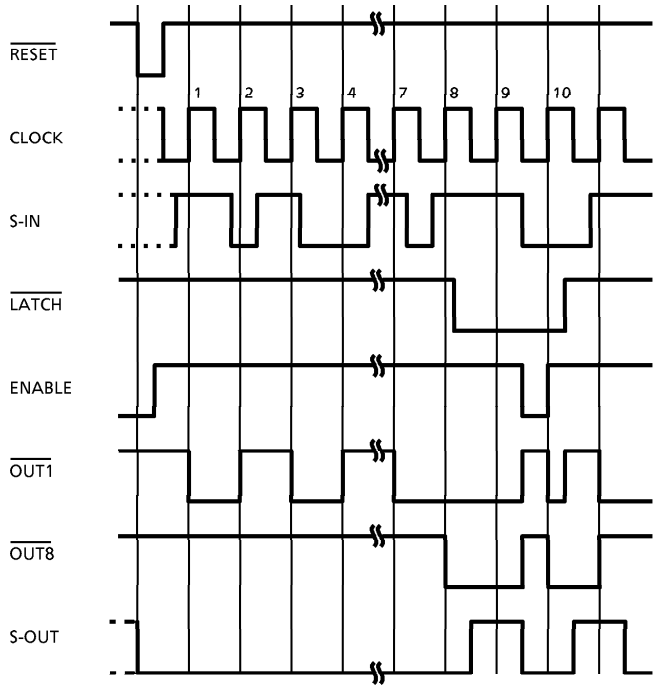
PIN No.	SYMBOL	DESCRIPTION
1	GND	Grounded. Must be connected to the FIN pin.
2	ENABLE	Data is output when this signal is high ; all output buffers turn off when the signal goes low.
3	$\overline{\text{LATCH}}$	Data is held when this signal is low ; data is rewritten when the signal goes high. When the pin is open, the signal is high.
5	S-OUT	Serial output pin allowing easy bit addition. To prevent malfunction, this pin has a function for a half-bit delay output.
6 ~15	$\overline{\text{OUT8}}$ ~$\overline{\text{OUT1}}$	Supplies shift register data or latch data. The signal is an N-channel MOS open-drain output.
16	S-IN	Serial data input pin.
18	CLOCK	Clock input pin for shift registers. The register acts at the leading edge of the clock.
19	$\overline{\text{RESET}}$	Clears data in the shift registers. The shift registers do not change when this signal is high ; they are reset when the signal goes low. When the pin is open, the signal is high.
20	V_{DD}	Power supply pin.
4, 7, 14, 17	NC	Not connected.
FIN	GND	Ground pin serving also as a heat sink. This pin must be connected to pin 1.

TRUTH TABLE

CK	E	$\overline{R}$	$\overline{\text{LATCH}}$	S-IN	OUT		S-OUT
					$\overline{Q1}$	$\overline{Qn}$	
↓	H	H	H	L	OFF	$\overline{Qn-1}$	Q7
↓	H	H	H	H	ON	$\overline{Qn-1}$	Q7
↓	H	H	L	*	NC	NC	Q7
↓	L	H	*	*	NC	NC	Q7
↑	*	*	*	*	NC	NC	Q7
*	*	L	H	*	OFF	OFF	L
*	H	⊓	L	*	NC	NC	L

CK = CLOCK
E = ENABLE
$\overline{R}$ = $\overline{\text{RESET}}$
S-IN = SERIAL IN
OUT-PARALLEL OUT
S-OUT = SERIAL OUT
* = DON'T CARE
NC = NO CHANGE
L = LOW LEVEL
H = HIGH LEVEL

TIMING CHART

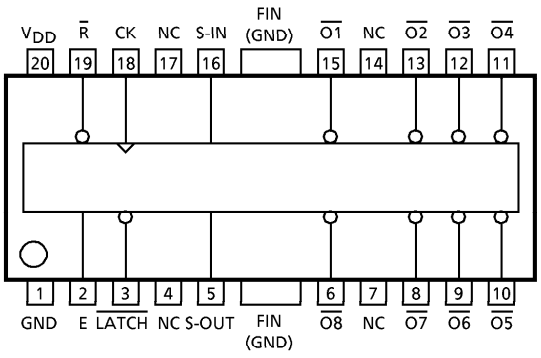


MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V_{DD}	−0.3~7	V
Input Voltage	V_{IN}	−0.3~V_{DD} + 0.3	V
Output Voltage	V_{OUT1} (Note 1)	−0.3~V_{DD} + 0.3	V
	V_{OUT2} (Note 2)	−0.3~80	
Output Current	I_{OUT}	100	mA
Power Dissipation	P_D	1.0	W
Storage Temperature	T_{stg}	−55~150	°C
Lead Temperature-time	T_{sol}	260 (10s)	°C

(Note 1) S-OUT
(Note 2) $\overline{OUT1}$~$\overline{OUT8}$

PIN CONFIGURATION



RECOMMENDED OPERATING CONDITIONS (Ta = −40~105°C)

CHARACTERISTIC			SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Voltage			V_{DD}	—	—	4	5.0	6	V
Input Voltage			V_{IN}	—	—	0	—	V_{DD}	V
Output Current	High	S-OUT	I_{OH}	—	—	0	—	−1.0	mA
Output Voltage	High	$\overline{Qn}$	V_{OH}	—	—	0	—	60	V
Output Current	Low	S-OUT	I_{OL}	—	—	0	—	1.0	mA
		$\overline{Qn}$	I_{OL}	—	—	0	—	70	mA
Clock Frequency			f clock	—	—	0	—	1.0	MHz
Clock Pulse Width			tw clock	—	—	500	—	—	ns
Data Setup Time			t_{setup}	—	—	500	—	—	ns
Data Hold Time			t_{hold}	—	—	500	—	—	ns
Maximum Clock Time	Rise Time		t_r	—	—	—	—	70	μs
	Fall Time		t_f			—	—	70	μs

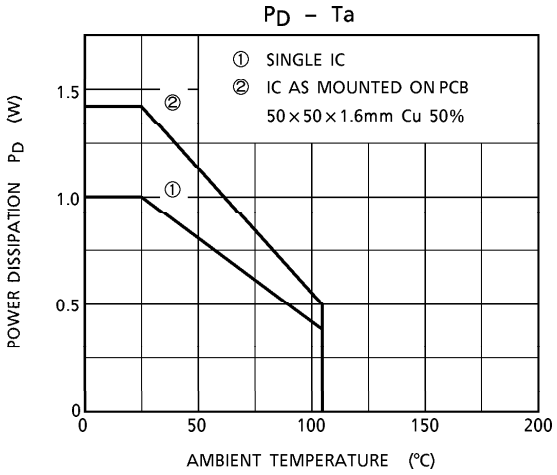
ELECTRICAL CHARACTERISTICS (Ta = −40~105°C, V_{DD} = 4~6V)

CHARACTERISTIC			SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Voltage		High	V_{IH}	—	—	0.8 × V_{DD}	—	—	V
		Low	V_{IL}	—	—	—	—	0.2 × V_{DD}	
Input Current	$\overline{R}$, $\overline{LATCH}$		I_{IN}	—	V_{IN} = 0~V_{DD}	—	—	±100	μA
	CK, S-IN, E		I_{IN}	—	V_{IN} = 0~V_{DD}	—	—	±1	
Output Voltage	High	S-OUT	V_{OH}	—	I_{OH} = −1mA	V_{DD} −0.4	—	—	V
Output Current	High	$\overline{Qn}$	I_{OH}	—	V_{OH} = 80V	—	—	100	μA
Output Voltage	Low	S-OUT	V_{OL}	—	I_{OL} = 1mA	—	—	0.4	V
		$\overline{Qn}$	V_{OL}	—	Ta = 25°C, I_{OL} = 100mA	—	—	1.2	V
Static Current Consumption			I_{DD} (1)	—	V_{DD} = 5V, f = 0Hz	—	—	1	mA
Dynamic Current Consumption			I_{DD} (2)	—	V_{DD} = 5V, f = 1MHz	—	—	5	mA

SWITCHING CHARACTERISTICS (Ta = −40~105°C, V_{DD} = 4~6V)

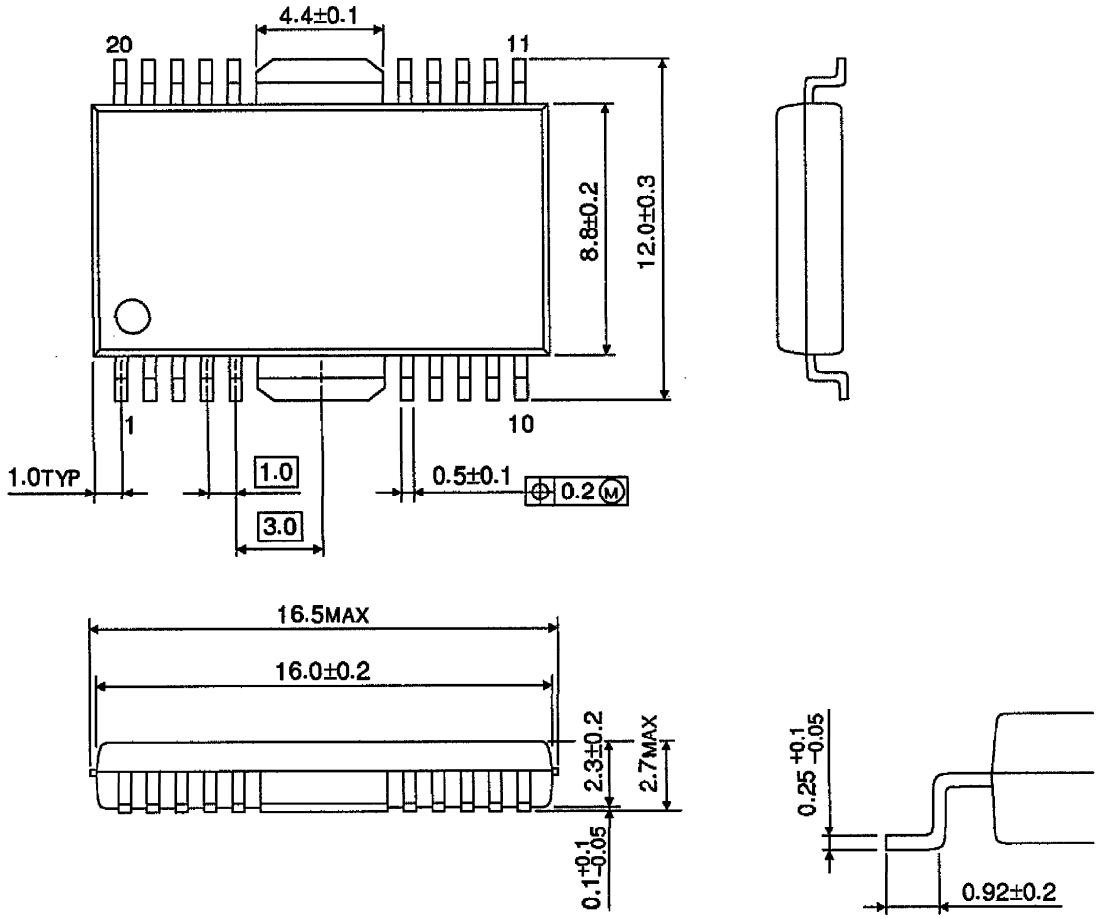
CHARACTERISTIC			SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Delay Time	High	CK-S-OUT	t_{pLH}	—	R_L S-OUT = 2kΩ R_L $\overline{Qn}$ = 150Ω C_L = 15pF V_{IH} = 3.0V, V_{IL} = 0V Duty = 50%	—	0.1	0.5	μs
		CK-$\overline{Qn}$	t_{pLH}			—	0.5	2.5	
	Low	CK-S-OUT	t_{pHL}			—	0.1	0.5	
		CK-$\overline{Qn}$	t_{pHL}			—	0.3	1.5	
Maximum Clock Frequency			f_{max}			—	10	—	MHz
Maximum Data Setup Time			t_{setup}			—	5	25	ns
Minimum Data Hold Time			t_{hold}			—	5	25	ns
Maximum Clock Time		Rise Time	t_r			—	70	—	μs
		Fall Time	t_f			—	70	—	

C_L : Includes the capacitances of the measuring instrument and probe.



OUTLINE DRAWING

HSOP20-P-450-1.00 Unit : mm



Weight : 0.79g (Typ.)