1. General Description

The IT245 is a high-speed Si-gate CMOS device. IT245 is an octal transceiver featuring non-inverting 3-state bus compatible outputs in both send and receive directions. The IT245 features an output enable input ($\overline{OE}$) for easy cascading and a send/receive input (DIR) for direction control. $\overline{OE}$ controls the outputs so that the buses are effectively isolated.

The IT245 has true (non-inverting) outputs.

2. Features

- Octal bidirectional bus interface
- Non-inverting 3-state outputs
- Multiple package options
- Complies with JEDEC standard no. 7A
- ESD protection:
  - HBM EIA/JESD22-A114-B exceeds 2000V
  - MM EIA/JESD22-A115-A exceeds 200V
- Specified from -40℃ to +85℃ and from -40℃ to +125℃

3. Quick reference data

Table 1: Quick reference data

GND=0V; T_{amb}=25℃; $t_r = t_f$ = 6ns

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
t_{PHL}, t_{PLH}	propagation delay An to Bn or Bn to An	C_L=15pF; V_{CC}=5V	-	5	-	ns
C_I	input capacitance		-	3.5	-	pF
$C_{I/O}$	input/output capacitance		-	10	-	pF
C_{PD}	power dissipation capacitance per transceiver	V_I=GND to V_{CC} *	-	12	-	pF

* C_{PD} is used to determine the dynamic power dissipation (P_D in μW)

4. Functional Diagram

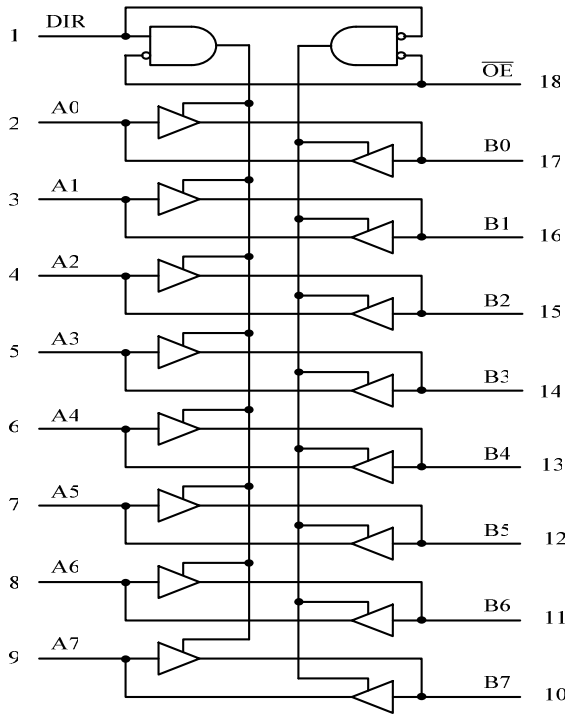


Fig. 1 Logic symbol

5. Pin information

5.1 Pinning

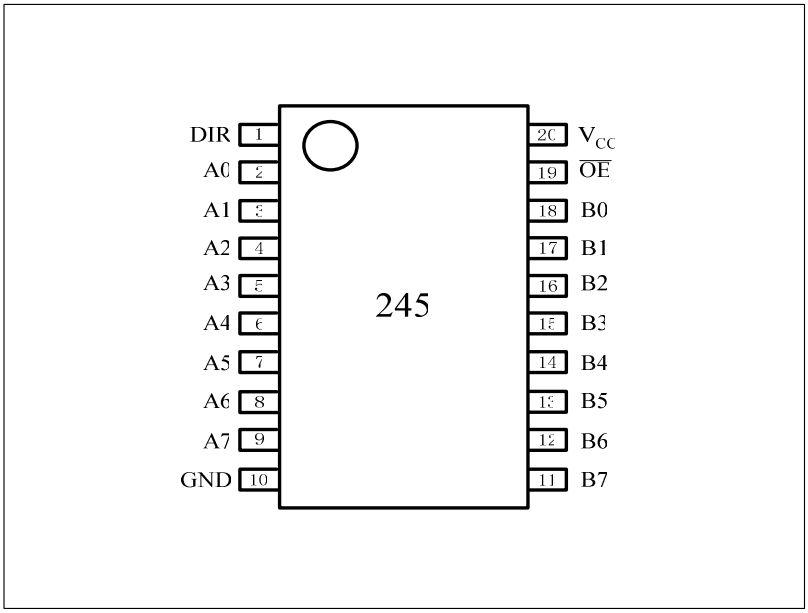


Fig. 2 Pin configuration

5.2 Pin Description

Table 2: Pin description

Symbol	Pin	Conditions
DIR	1	direction control
A0	2	data input/output
A1	3	data input/output
A2	4	data input/output
A3	5	data input/output
A4	6	data input/output
A5	7	data input/output
A6	8	data input/output
A7	9	data input/output
GND	10	ground (0V)
B7	11	data input/output
B6	12	data input/output
B5	13	data input/output
B4	14	data input/output
B3	15	data input/output
B2	16	data input/output
B1	17	data input/output
B0	18	data input/output
$\overline{OE}$	19	output enable input (active LOW)
VCC	20	supply voltage

6. Functional Description

6.1 Function table

Table 3: Function table *

Input		Input/output	
$\overline{OE}$	DIR	An	Bn
0	0	A = B	input
L	H	input	B = A
H	X	Z	Z

* H = HIGH voltage level;
L = LOW voltage level;
X = don't care;
Z = high-impedance OFF-state

7. Limiting values

Table 4: Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND (ground =0V)

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CC}	supply voltage		-0.5	+7	V
I_{IK}	input diode current	V_I < -0.5V or V_I > V_{CC}+0.5V	-	±20	mA
I_{OK}	output diode current	V_O < -0.5V or V_O > V_{CC}+0.5V	-	±20	mA
I_O	output source or sink current	V_O = -0.5V to V_{CC}+0.5V	-	±35	mA
I_{CC},I_{GND}	V_{CC} or GND current		-	±70	mA
T_{stg}	storage temperature		-65	+150	℃

8. Recommended Operating Conditions

Table 5: Recommended operating conditions

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CC}	supply voltage		4	5	6	V
V_I	input voltage		0	-	V_{CC}	V
V_O	output voltage		0	-	V_{CC}	V
t_r, t_f	input rise and fall times	V_{CC} = 4.5V	-	6.0	500	ns
T_{amb}	ambient temperature		-40	-	+125	℃

9. Static Characteristics

Table 6: static characteristics

At recommended operating conditions; voltage are referenced to GND (ground =0V)

Symbol	Parameter	Conditions	25℃			-40℃ to +85℃		-40℃ to +125℃		Unit
			Min	Typ	Max	Min	Max	Min	Max	
V_{IH}	HIGH-level input voltage	V_{CC} = 2.0 V	1.5	1.2	-	1.5	-	1.5	-	V
		V_{CC} = 4.5 V	3.15	2.4	-	3.15	-	3.15	-	V
		V_{CC} = 6.0 V	4.2	3.2	-	4.2	-	4.2	-	V
V_{IL}	LOW-level input voltage	V_{CC} = 2.0 V	-	0.8	0.5	-	0.5	-	0.5	V
		V_{CC} = 4.5 V	-	2.1	1.35	-	1.35	-	1.35	V
		V_{CC} = 6.0 V	-	2.8	1.8	-	1.8	-	1.8	V
V_{OH}	HIGH-level output voltage	V_I = V_{IH} or V_{IL}								
		I_O = -20 uA; Vcc=2.0V	1.9	2.0	-	1.9	-	1.9	-	V
		I_O = -20 uA; Vcc=4.5V	4.4	4.5	-	4.4	-	4.4	-	V
		I_O = -20 uA; Vcc=6.0V	5.9	6.0	-	5.9	-	5.9	-	V

Symbol	Parameter	Conditions	25℃			-40℃ to +85℃		-40℃ to +125℃		Unit
			Min	Typ	Max	Min	Max	Min	Max	
		I_O = -4.0 mA; Vcc=3.0V	2.72	2.84	-	2.70	-	2.70	-	V
		I_O = -6.5 mA; Vcc=4.5V	4.20	4.31	-	4.15	-	4.10	-	V
V_{OL}	LOW-level output voltage	V_I = V_{IH} or V_{IL}; V_{CC} = 4.5 V								
		I_O = 20 uA; Vcc=2.0V	-	0	0.1	-	0.1	-	0.1	V
		I_O = 20 uA; Vcc=4.5V	-	0	0.1	-	0.1	-	0.1	V
		I_O = 20 uA; Vcc=6.0V	-	0	0.1	-	0.1	-	0.1	V
		I_O = 4.0 mA; Vcc=3.0V	-	0.12	0.20	-	0.21	-	0.22	V
		I_O = 6.5 mA; Vcc=4.5V	-	0.15	0.23	-	0.23	-	0.25	V
I_{LI}	Input leakage current	V_I = Vcc or GND; Vcc = 0V to 5.5 V	-	-	±0.1	-	±1.2	-	±10	μA
Ioz	OFF-state output current	VI = VIH or VIL; VCC = 5.5 V; VO=Vcc or GND; IO= 0 A	-	-	±0.1	-	±0.1	-	±1.0	μA
Icc	quiescent supply current	V_I=Vcc or GND; I_O=0 A; Vcc = 5.5 V	-	-	1.0	-	10.0	-	50	μA
C_I	input capacitance	V_I=Vcc or GND	-	3.5	10	-	10	-	10	pF
$C_{I/O}$	input/output capacitance		-	4	-	-	-	-	-	pF

10.Dynamic characteristics

Table 7: Dynamic characteristics

GND =0V; test circuit see Figure 5.

Symbol	Parameter	Conditions	25℃			-40℃ to +85℃		-40℃ to +125℃		Unit
			Min	Typ	Max	Min	Max	Min	Max	
t_{PHL}, t_{PLH}	propagation delay	An to Bn or Bn to An, see Figure 3								
		V_{CC} = 2.0 V	-	21.0	35	-	40	-	50	ns
		V_{CC} = 4.5 V	-	7.5	15	-	20	-	25	ns
		V_{CC} = 5.0 V; C_L = 15 pF	-	5.0	10	-	-	-	-	ns
		V_{CC} = 6.0 V	-	6	12	-	15	-	20	ns
t_{PZH}, t_{PZL}	3-state output enable time	$\overline{OE}$ to An or $\overline{OE}$ to Bn, see Figure 4								
		V_{CC} = 2.0 V	-	24	48		52		60	ns
		V_{CC} = 4.5 V	-	10	20		24		28	ns
		V_{CC} = 6.0 V	-	8	16	-	20	-	24	ns
t_{PHZ}, t_{PLZ}	3-state output disable time	$\overline{OE}$ to An or $\overline{OE}$ to Bn, see Figure 4								
		V_{CC} = 2.0 V	-	13	26	-	30	-	40	ns
		V_{CC} = 4.5 V	-	10	20	-	24	-	28	ns

		V_{CC} = 6.0 V	-	9	18	-	21	-	25	ns
t_{THL}, t_{TLH}	output transition time	see Figure 4								
		V_{CC} = 2.0 V	-	16	32	-	36	-	42	ns
		V_{CC} = 4.5 V	-	5	12	-	14	-	18	ns
		V_{CC} = 6.0 V	-	4	9	-	11	-	14	ns
C_{PD}	power dissipation capacitance per transceiver	V_I=GND to Vcc-1.5V *	-	12	-	-	-	-	-	pF

* C_{PD} is used to determine the dynamic power dissipation (P_D in μW)

$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma\ (C_L \times V_{CC}^2 \times f_o)$ where:

f_i = input frequency in MHz;

f_o = output frequency in MHz;

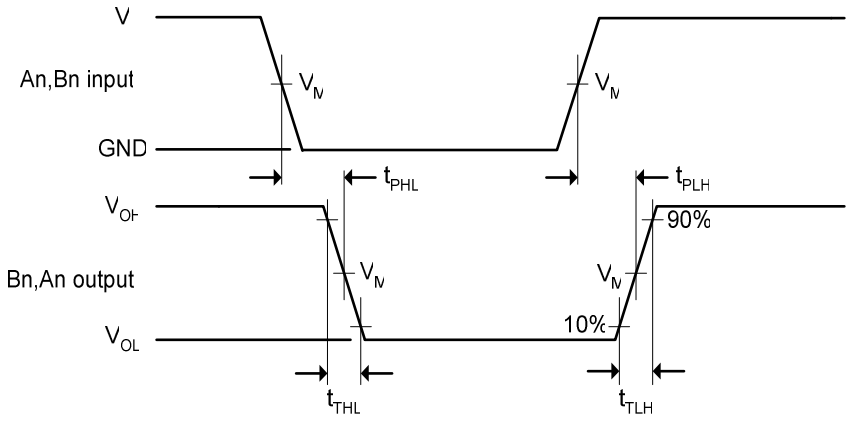
C_L = output load capacitance in pF;

V_{CC} = supply voltage in V;

N = number of inputs switching;

$\Sigma\ (C_L \times V_{CC}^2 \times f_o)$ = sum of outputs.

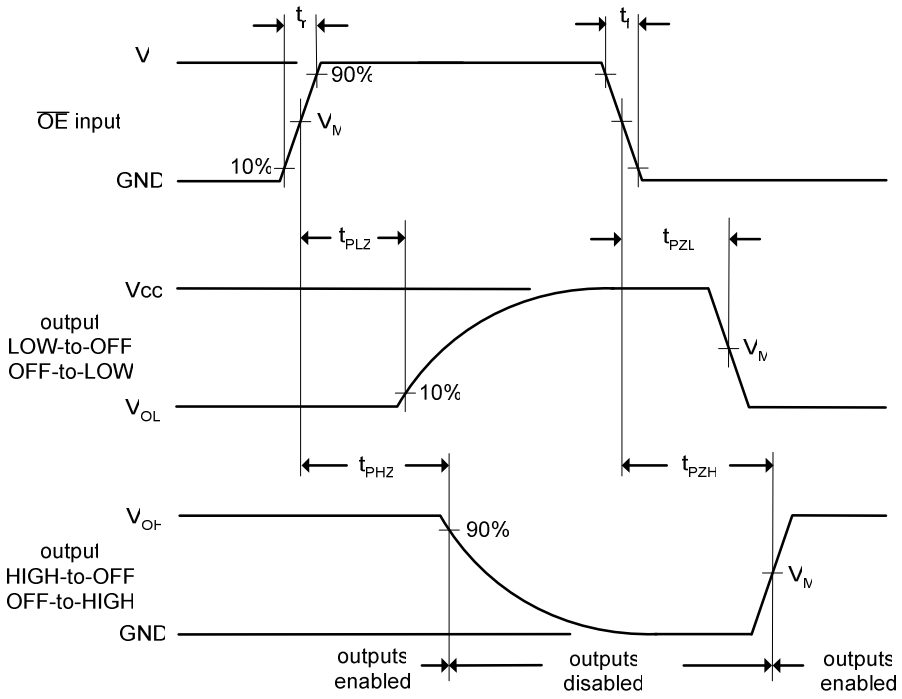
11. Waveforms



Measurement points are given in Table 8.

V_{OL} and V_{OH} are typical voltage output drop that occur with the output load.

Fig 3. Input (An, Bn) to output (Bn, An) propagation delays and output transition times



Measurement points are given in Table 8.

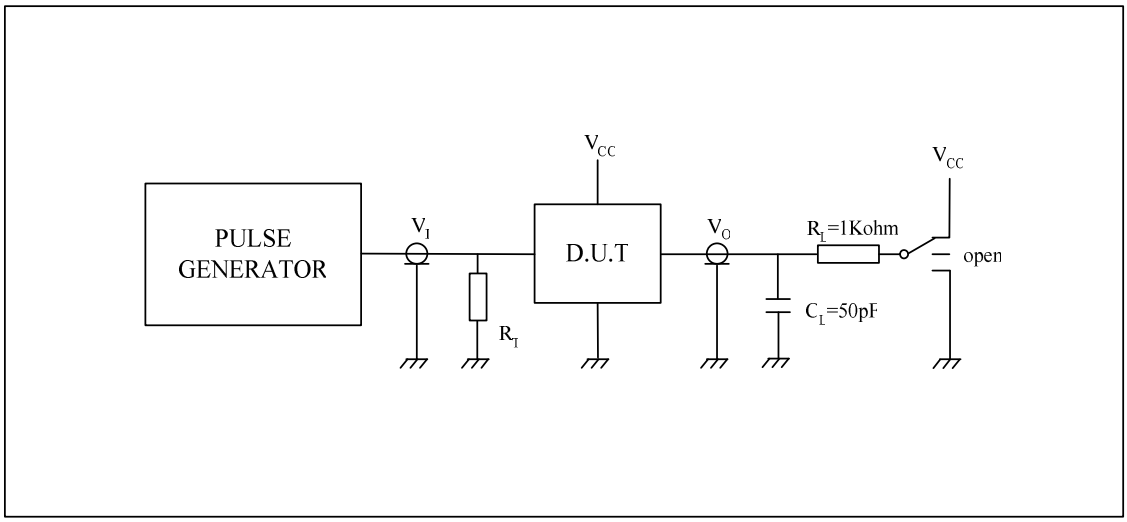
V_{OL} and V_{OH} are typical voltage output drop that occur with the output load.

Fig 4. 3-state output enable and disable times

Table 8: Measurement points

GND =0V; test circuit see Figure 5.

Input	Output
V_M	V_M
0.5*Vcc	0.5*Vcc



Definitions test circuit:

R_T = Termination resistance should be equal to output impedance Zo of the pulse generator.

C_L = Load capacitance including jig and probe capacitance.

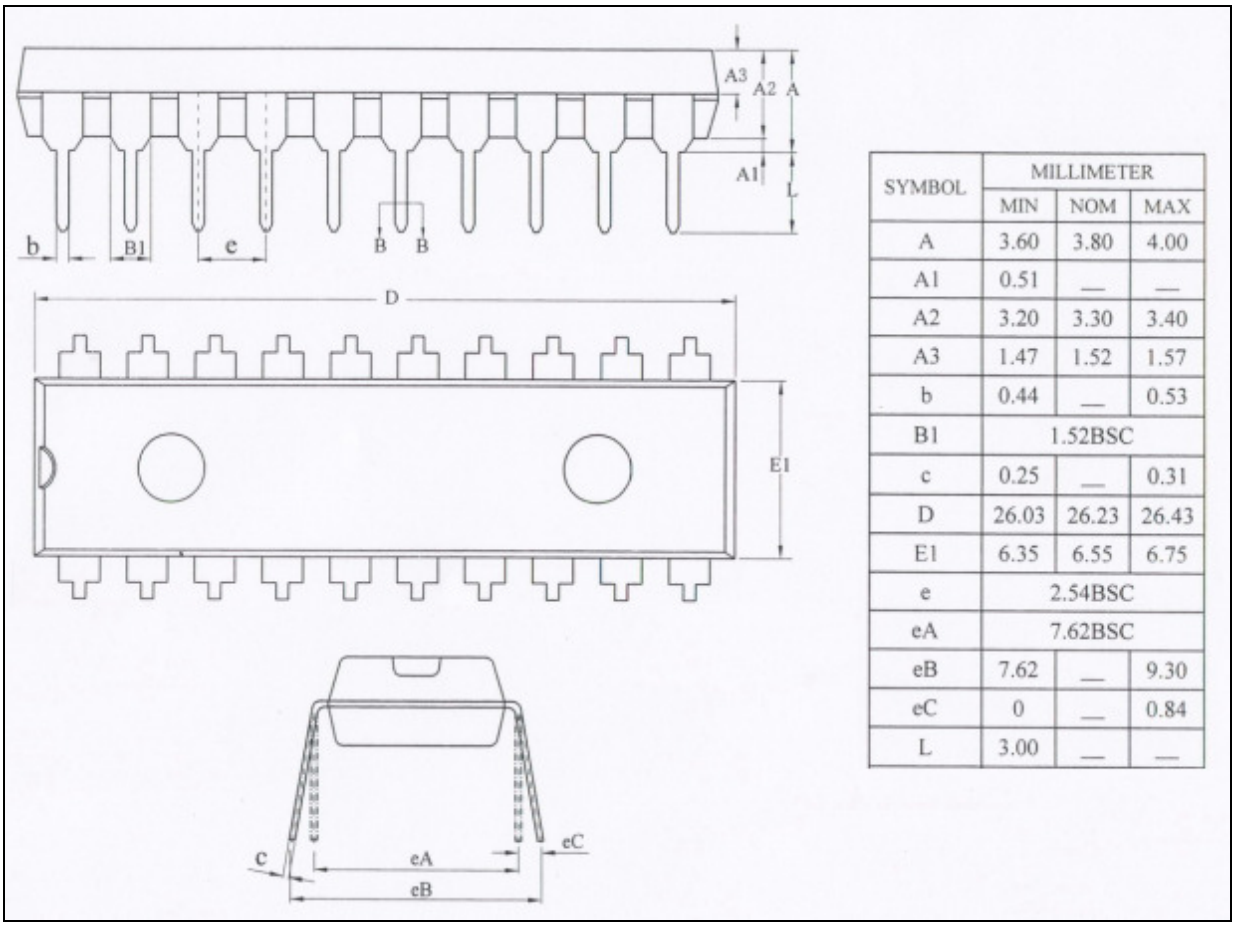
R_L = Load resistor

Fig. 5 Load circuitry for switching times

Table 9: Test data

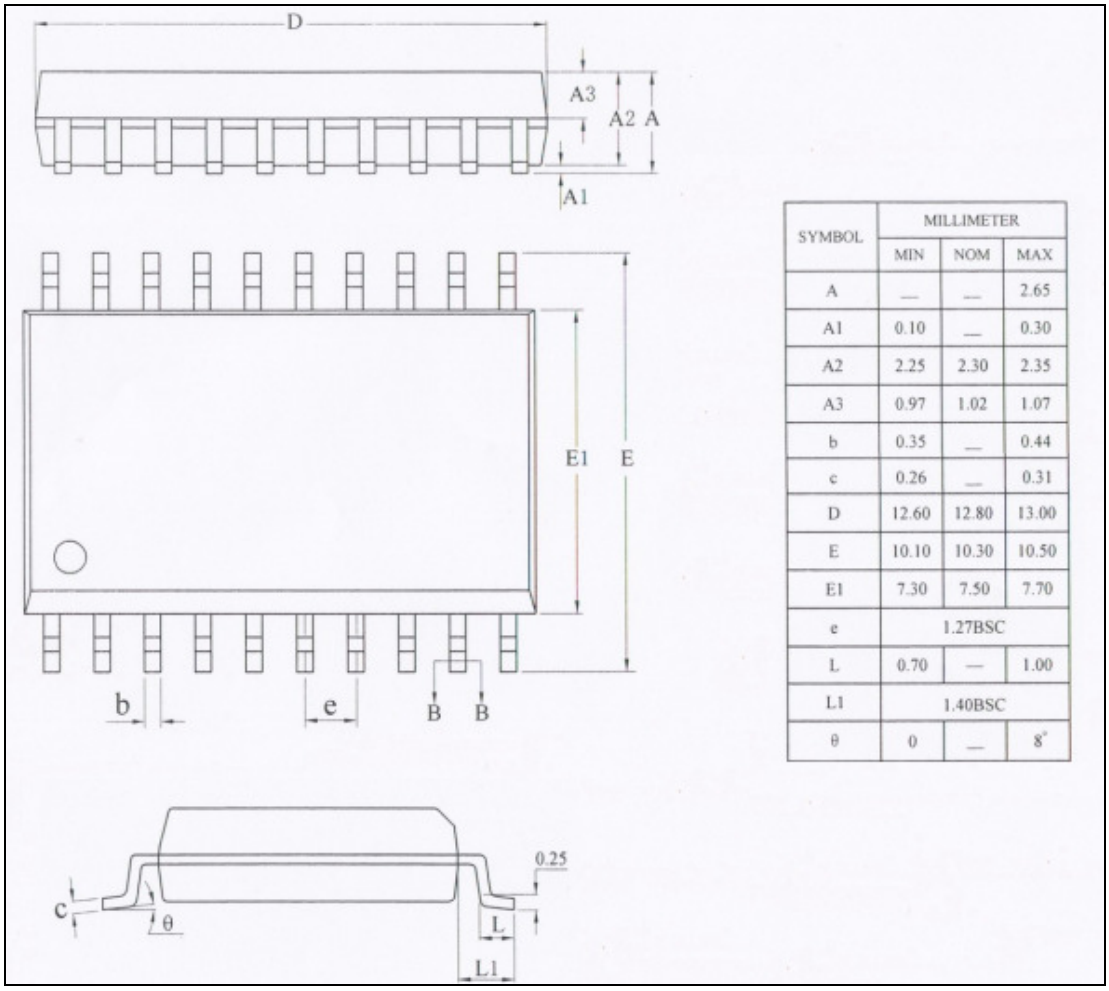
Input		Output		
V_I	t_r,t_f	t_{PHL}, t_{PLH}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ}
Vcc	6ns	open	GND	V_{CC}

IT245 (DIP-20) Outline drawing



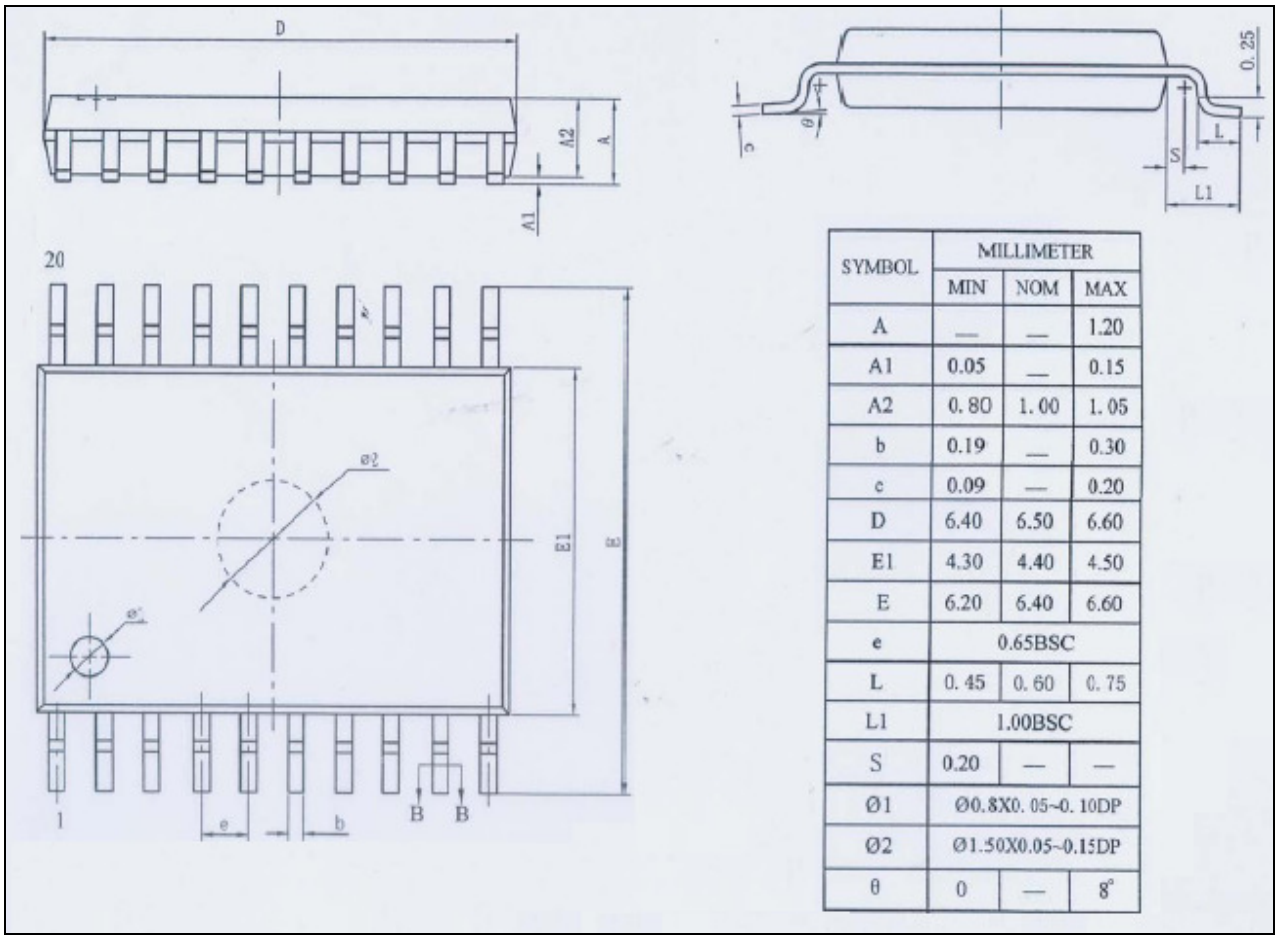
SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	3.60	3.80	4.00
A1	0.51	—	—
A2	3.20	3.30	3.40
A3	1.47	1.52	1.57
b	0.44	—	0.53
B1	1.52BSC		
c	0.25	—	0.31
D	26.03	26.23	26.43
E1	6.35	6.55	6.75
e	2.54BSC		
eA	7.62BSC		
eB	7.62	—	9.30
eC	0	—	0.84
L	3.00	—	—

IT245 (SOP-20) Outline drawing



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	2.65
A1	0.10	—	0.30
A2	2.25	2.30	2.35
A3	0.97	1.02	1.07
b	0.35	—	0.44
c	0.26	—	0.31
D	12.60	12.80	13.00
E	10.10	10.30	10.50
E1	7.30	7.50	7.70
e	1.27BSC		
L	0.70	—	1.00
L1	1.40BSC		
θ	0	—	8°

IT245 (SSOP-20) Outline drawing



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.20
A1	0.05	—	0.15
A2	0.80	1.00	1.05
b	0.19	—	0.30
c	0.09	—	0.20
D	6.40	6.50	6.60
E1	4.30	4.40	4.50
E	6.20	6.40	6.60
e	0.65BSC		
L	0.45	0.60	0.75
L1	1.00BSC		
S	0.20	—	—
Ø1	Ø0.8X0.05~0.10DP		
Ø2	Ø1.50X0.05~0.15DP		
θ	0	—	8°