



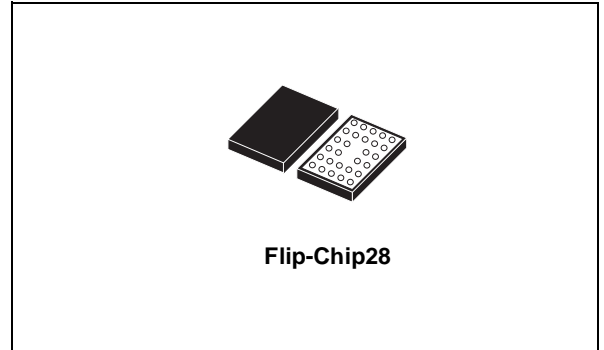
STLV3243E

±15KV ESD PROTECTED 2.3 TO 5.5V, 400KBPS, RS-232 TRANSCEIVER WITH AUTO-POWERDOWN

- ESD PROTECTION FOR RS-232 I/O PINS:
±8KV IEC 1000-4-2 CONTACT DISCHARGE
±15KV HUMAN BODY MODEL
- 1μA SUPPLY CURRENT ACHIEVED WHEN
IN AUTO-POWERDOWN
- 250Kbps MINIMUM GUARANTEED DATA
RATE
- GUARANTEED 6V/μs SLEW RATE RANGE
- GUARANTEED MOUSE DRIVEABILITY
- 0.1μF EXTERNAL CAPACITORS
- MEET EIA/TIA-562 SPECIFICATIONS
- AVAILABLE IN FLIP-CHIP28 PACKAGES

DESCRIPTION

The STLV3243E device consists of 3 drivers, 5 receivers and a dual charge-pump circuit. All transmitter outputs and receiver inputs are protected up to ±8KV USING IEC 1000-4-2 contact discharge and ±15KV using the Human Body Model. The receiver R2 is always active to implement a wake-up feature for serial port. The device is guaranteed to run at data rates of 250kbps while maintaining RS-562 output levels. The Auto-powerdown feature operates when FORCEON is low and FORCEOFF is high. During this operation mode, if the device does not sense a valid RS-562 signal, the driver outputs are



disabled. If FORCEOFF is set low, both drivers and receivers (except R2B) are shut off, and supply current is reduced to 1μA. Disconnecting the serial port or turning off the peripheral drives causes the auto-powerdown condition to occur.

Auto-powerdown can be disabled when FORCEON and FORCEOFF are high, and this should be done when driving a serial mouse. With Auto-powerdown enabled, the device is automatically activated when a valid signal is applied to any receiver input.

Typical applications are notebooks, PDAs, smart-phones, hand-held equipment, palmtop computers, peripherals, battery-powered equipment, and printers.

Table 1: Order Codes

Type	Temperature Range	Package	Comments
STLV3243EBJR	-40 to 85 °C	FLIP-CHIP28 (6x5mm)	2500 parts per reel

Table 2: Pin Description

PIN N°	SYMBOL	NAME AND FUNCTION
A1	R2 _{IN}	Second Receiver Input Voltage
A2	R3 _{IN}	Third Receiver Input Voltage
A3	R4 _{IN}	Fourth Receiver Input Voltage
A4	R5 _{IN}	Fifth Receiver Input Voltage
A5	T1 _{OUT}	First Transmitter Output Voltage
A6	T2 _{OUT}	Second Transmitter Output Voltage
B1	V-	-5.5V Generated by the Charge Pump
B2	R1 _{IN}	First Receiver Input Voltage
B3	T3 _{OUT}	Third Transmitter Output Voltage
B4	T3 _{IN}	Third Transmitter Input Voltage
B5	T1 _{IN}	First Transmitter Input Voltage
B6	T2 _{IN}	Second Transmitter Input Voltage
C1	C ₂₊	Positive Terminal of Inverting Charge Pump Capacitor
C2	C ₂₋	Negative Terminal of Inverting Charge Pump Capacitor
C5	R4 _{OUT}	Fourth Receiver Output Voltage
C6	R5 _{OUT}	Fifth Receiver Output Voltage
D1	C ₁₊	Positive Terminal of Voltage- Charge Pump Capacitor
D2	V+	5.5V Generated by the Charge Pump
D3	V _{CC}	Supply Voltage
D4	FORCEON	Drive high to override automatic circuitry keeping transmitters on (FORCEOFF must be high)
D5	R1 _{OUT}	First Receiver Output Voltage
D6	R3 _{OUT}	Third Receiver Output Voltage
E1	GND	Ground
E2	C ₁₋	Negative Terminal of Voltage- Charge Pump Capacitor
E3	FORCEOFF	Drive low to shut down transmitters and on-board power supply. This over-rides all automatic circuitry and FORCEON
E4	INVALID	Output of the valid signal detector. Indicates if a valid RS-232 level is present on receiver inputs logic "1"
E5	R2 _{OUTB}	Non-inverting Complementary Receiver Output, always active for wake-up
E6	R2 _{OUT}	Second Receiver Output Voltage

Figure 1: Pin Configuration

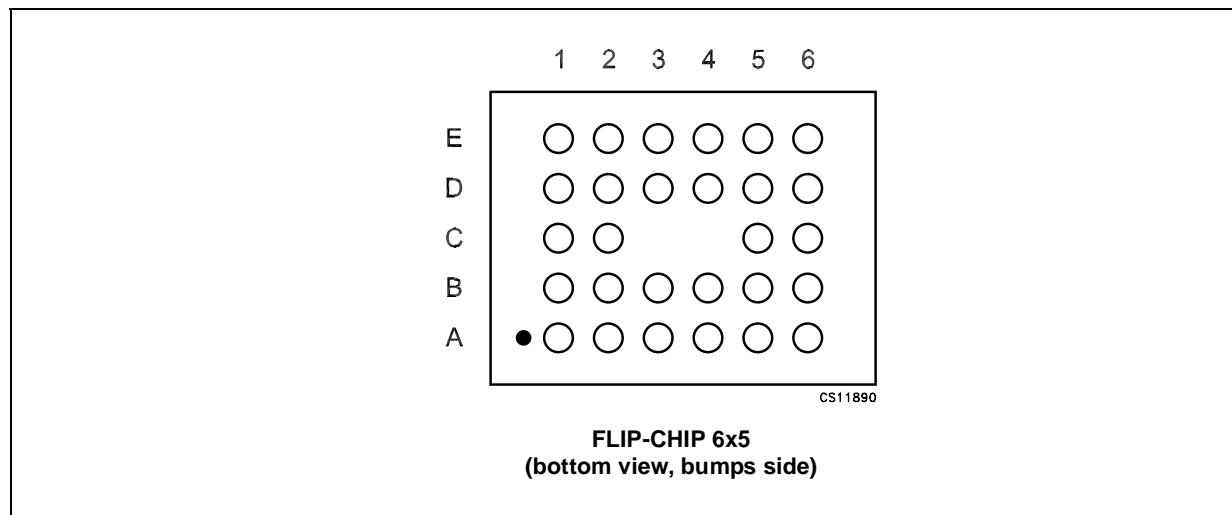


Table 3: Invalid Truth Table

RS-232 SIGNAL PRESENT AT ANY RECEIVER INPUT	INVALID OUTPUT
YES	H
NO	L

Table 4: Output Control Truth Table

FORCE ON	FORCE OFF	VALID RECEIVER LEVEL	OPERATION STATUS	T _{OUT}	R _{OUT}	R _{2OUTB}
X	0	X	Shutdown (Force OFF)	HIGH Z	HIGH Z	ACTIVE
1	1	X	Normal Operating (Force ON)	ACTIVE	ACTIVE	ACTIVE
0	1	YES	Normal Operating (Auto-powerdown)	ACTIVE	ACTIVE	ACTIVE
0	1	NO	Shutdown (Auto-powerdown)	HIGH Z	ACTIVE	ACTIVE

Table 5: Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	-0.3 to 6	V
V+	Doubled Voltage Terminal	$(V_{CC} - 0.3)$ to 7	V
V-	Inverted Voltage Terminal	0.3 to -7	V
$V+ + V- $		13	V
FORCEON, FORCEOFF, T_{IN}	Input Voltage	-0.3 to 6	V
R_{IN}	Receiver Input Voltage Range	± 25	V
T_{OUT}	Transmitter Output Voltage Range	± 13.2	V
R_{OUT} R_{OUTB} INVALID	Receiver Output Voltage Range	-0.3 to $(V_{CC} + 0.3)$	V
t_{SHORT}	Short Circuit Duration on T_{OUT} (one at a time)	Continuous	
T_{stg}	Storage Temperature Range	-65 to 150	°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

Table 6: ESD Performance: Transmitter Outputs, Receiver Inputs

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
ESD	ESD Protection Voltage	Human Body Model	± 15			KV
ESD	ESD Protection Voltage	IEC 1000-4-2 (Contact Discharge)	± 8			KV

Table 7: Electrical Characteristics

($C_1 - C_4 = 0.1\mu\text{F}$, $V_{CC} = 2.3\text{V}$ to 5.5V , $T_A = -40$ to 85°C , unless otherwise specified.

Typical values are referred to $T_A = 25^\circ\text{C}$)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{ASHDN}	Supply Current Auto-powerdown	FORCEOFF = GND FORCEON = V_{CC} All R_{IN} open or grounded		1	10	μA
I_{SUPPLY}	Supply Current	FORCEON = FORCEOFF = V_{CC}		0.3	1	mA
I_{SHDN}	Shutdown Supply Current	FORCEOFF = GND		1	10	μA

Table 8: Logic Input Electrical Characteristics

($C_1 - C_4 = 0.1\mu\text{F}$, $V_{CC} = 2.3\text{V}$ to 5.5V , $T_A = -40$ to 85°C , unless otherwise specified.

Typical values are referred to $T_A = 25^\circ\text{C}$)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{TIL}	Input Logic Threshold Low	T-IN, FORCEON, FORCEOFF, $V_{CC} = 3.0\text{V}$ $V_{CC} = 2.3\text{V}$			0.8 0.5	V V
V_{TIH}	Input Logic Threshold High	T-IN, FORCEON, FORCEOFF $V_{CC} = 3.0\text{V}$ $V_{CC} = 2.3\text{V}$	2 1.4			V V
V_{THYS}	Transmitter Input Hysteresis			0.4		V
I_{IL}	Input Leakage Current	T-IN, FORCEON, FORCEOFF		± 0.01	± 1.0	μA

Table 9: Receiver Outputs Electrical Characteristics(C₁ - C₄ = 0.1μF, V_{CC} = 2.3V to 5.5V, T_A = -40 to 85°C, unless otherwise specified.Typical values are referred to T_A = 25°C)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I _{OL}	Output Leakage Current	Receiver Disabled		± 0.05	± 10	μA
V _{OL}	Output Voltage Low	I _{OUT} = 1.6mA			0.4	V
V _{OH}	Output Voltage High	I _{OUT} = -1mA	V _{CC} -0.6	V _{CC} -0.1		V

Table 10: Auto-powerdown Electrical Characteristics(C₁ - C₄ = 0.1μF, V_{CC} = 2.3V to 5.5V, T_A = -40 to 85°C, unless otherwise specified.Typical values are referred to T_A = 25°C, FORCEON = GND, FORCEOFF = V_{CC})

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{RITE}	Receiver Input Threshold to INVALID Output Voltage HIGH (Fig. 1)	Positive Threshold			2.7	V
		Negative Threshold	2.7			V
V _{RITD}	Receiver Input Threshold to INVALID Output Voltage LOW (Fig. 1)		-0.3		0.3	V
V _{IOL}	INVALID Output Voltage LOW	I _{OUT} = 1.6mA			0.4	V
V _{IOH}	INVALID Output Voltage HIGH	I _{OUT} = -1mA	V _{CC} -0.6			V
t _{WU}	Receiver or Transmitter Edge Transmitter Enabled (Fig. 1)			100		μs
t _{invh}	Receiver Positive or Negative Threshold to INVALID HIGH (Fig. 1)			0.2		μs
t _{invL}	Receiver Positive or Negative Threshold to INVALID LOW (Fig. 1)			30		μs

Table 11: Transmitter Electrical Characteristics(C₁ - C₄ = 0.1μF, V_{CC} = 2.3V to 5.5V, T_A = -40 to 85°C, unless otherwise specified.Typical values are referred to T_A = 25°C)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{TOUT}	Output Voltage Swing	All Transmitter outputs are loaded with 3KΩ to GND V _{CC} = 3.0V V _{CC} = 2.3V	± 3.7	± 4.4 ± 3.9		V
R _{OUT}	Output Resistance	V _{CC} = V ₊ = V ₋ = 0V V _{OUT} = ± 2V	300	10M		Ω
I _{SC}	Output Short Circuit Current	V _{CC} = 3.3V		± 40	± 60	mA
I _L	Output Leakage Current	V _{CC} = 0 to 5.5V, transmitter output = ±12V, transmitter disabled			± 25	mA
V _{OT}	Transmitter Output Voltage	T1IN = T2IN = GND, T3IN = V _{CC} T3OUT loaded with 3KΩ to GND T1OUT and T2OUT loaded with 2.5mA each	± 3.7			V

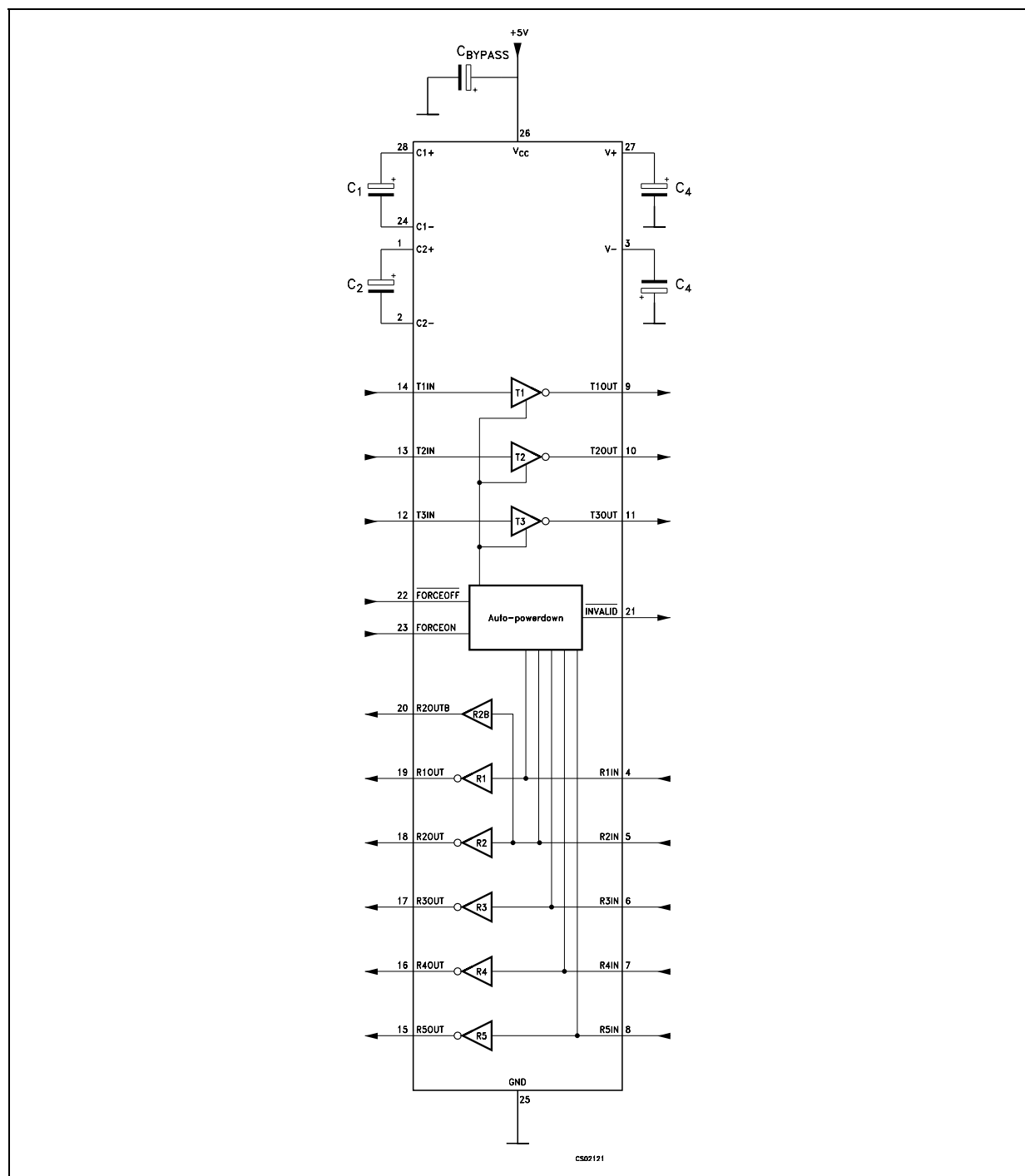
Table 12: Receiver Inputs Electrical Characteristics(C₁ - C₄ = 0.1μF, V_{CC} = 2.3V to 5.5V, T_A = -40 to 85°C, unless otherwise specified.)Typical values are referred to T_A = 25°C)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{RIN}	Receiver Input Voltage Operating Range		-25		25	V
V _{RIL}	RS-232 Input Threshold Low	T _A = 25°C V _{CC} = 3.0V T _A = 25°C V _{CC} = 2.3V	0.6 0.4	1.0 0.8		V
V _{RIH}	RS-232 Input Threshold High	T _A = 25°C V _{CC} = 3.0V T _A = 25°C V _{CC} = 2.3V		1.4 1.2	2.4 2.0	V
V _{RIHYS}	Input Hysteresis			0.5		V
R _{RIN}	Input Resistance	T _A = 25°C	3	5	7	KΩ

Table 13: Timing Characteristics(C₁ - C₄ = 0.1μF, V_{CC} = 2.3 to 3V, T_A = -40 to 85°C, unless otherwise specified.)Typical values are referred to T_A = 25°C)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
D _R	Maximum Data Rate	R _L = 3KΩ C _L = 1000pF one transmitter switching	250			Kbps
t _{PHL} t _{PLH}	Receiver Propagation Delay	R _{IN} to R _{OUT} C _L = 150pF		0.15		μs
t _{T_SKEW}	Transmitter Skew			60		ns
t _{R_SKEW}	Receiver Skew			120		ns
S _{RT}	Transition Slew Rate	T _A = 25°C R _L = 3K to 7KΩ V _{CC} = 3V measured from +3V to -3V or -3V to +3V C _L = 150pF to 1000pF	4		30	V/μs

Figure 2: Application Circuits

Table 14: Required Minimum Capacitance Value (μF)

V _{CC} (V)	C ₁	C ₂ , C ₃ , C ₄ , C _{BYPASS}
2.3 to 3.0	0.1	0.1

Figure 3: Autopowerdown Input Levels

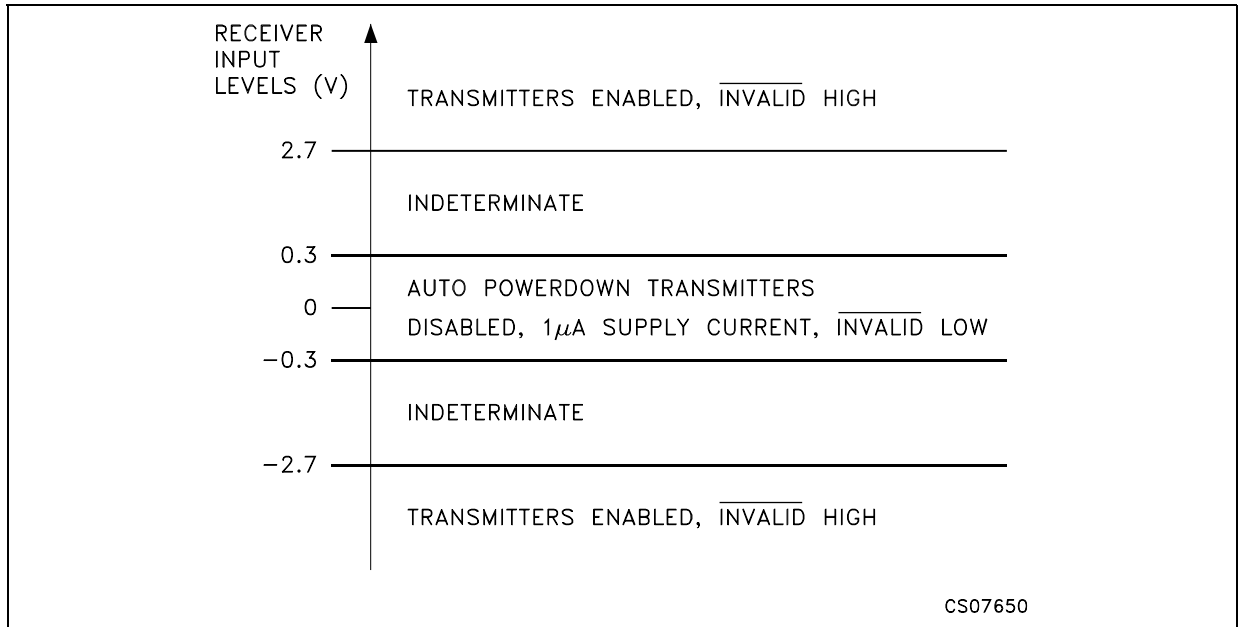


Figure 4: Autopowerdown Input Timing

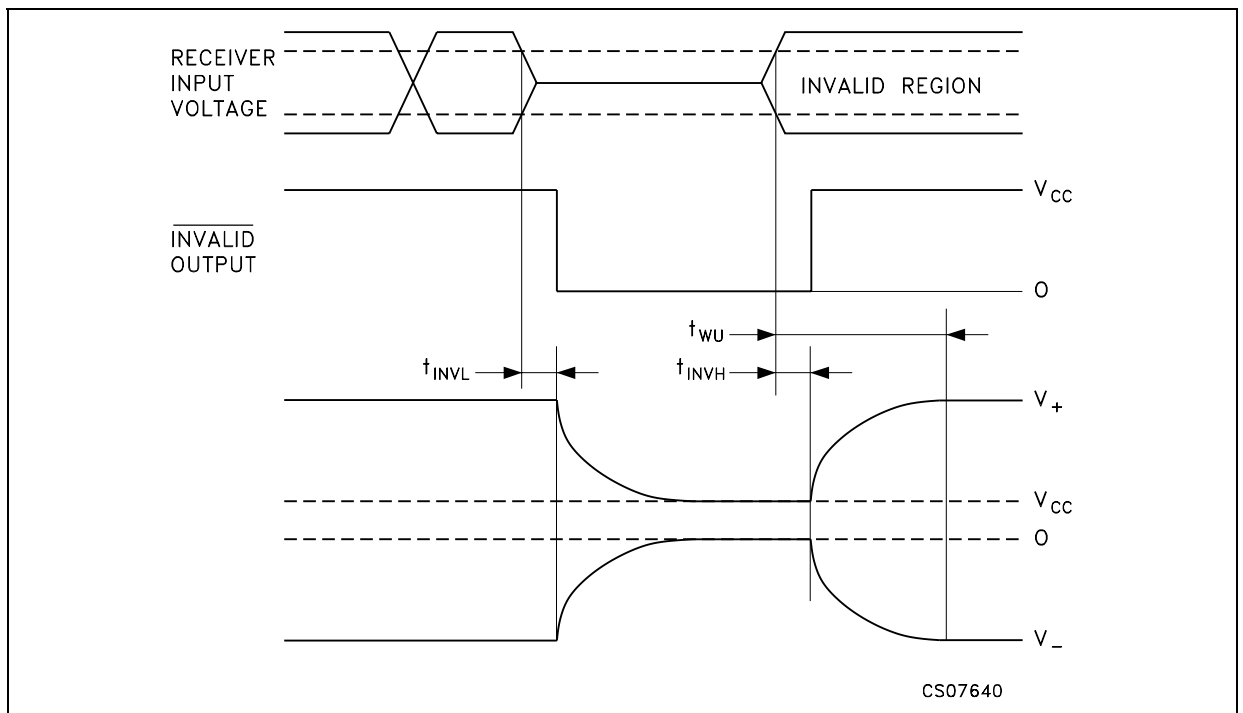
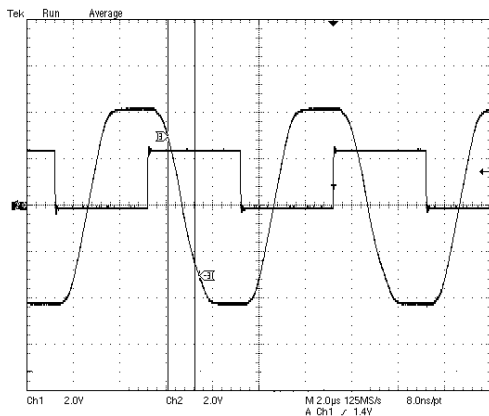


Figure 5: Data Rate

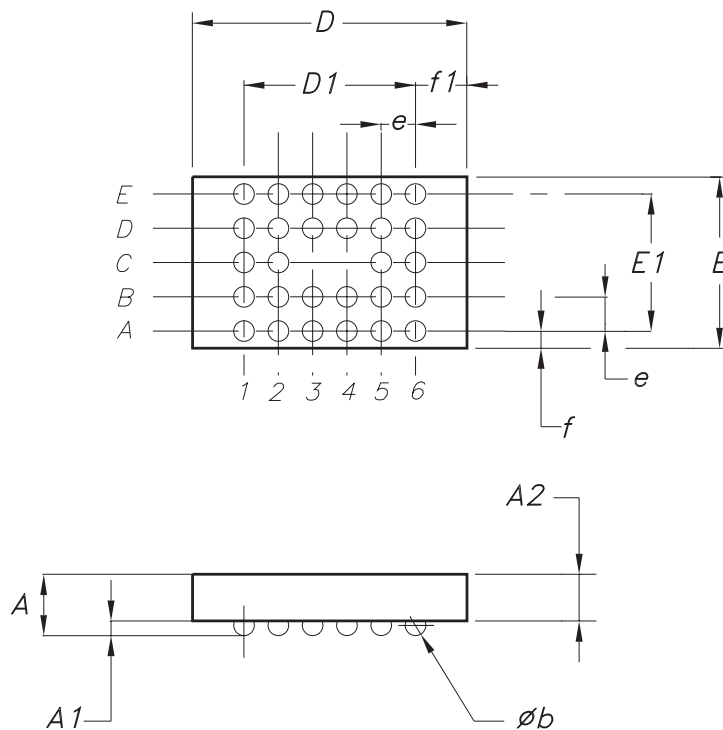


$V_{CC}=2.3V$, $I_O=100mA$, $C_I = 1\mu F$ (tantalum), $C_O=10\mu F$ (tantalum)

Flip-Chip28 MECHANICAL DATA

DIM.	mm.			mils		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	0.58		0.95	22.8		37.4
A1		0.24			9.4	
A2		0.65			25.6	
b	0.25	0.30	0.35	9.8	11.8	13.8
D	3.97		4.17	156.3		164.2
D1		2.5			98.4	
E	2.47		2.67	97.2		105.1
E1		2			78.7	
e	0.45		0.55	17.7		21.7
f	0.23		0.34	9.1		13.4
f1	0.80		0.91	31.5		31.8

BOTTOM VIEW (BUMPS SIDE)



7385199/A

Tape & Reel Flip-Chip28 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			330			12.992
C	12.8		13.2	0.504		0.519
D	20.2			0.795		
N	60			2.362		
T			18.4			0.882
Ao	2.6		2.8	0.102		0.110
Bo	4.1		4.3	0.161		0.169
Ko	1.1		1.3	0.043		0.051
Po	3.9		4.1	0.153		0.161
P	3.9		4.1	0.153		0.161

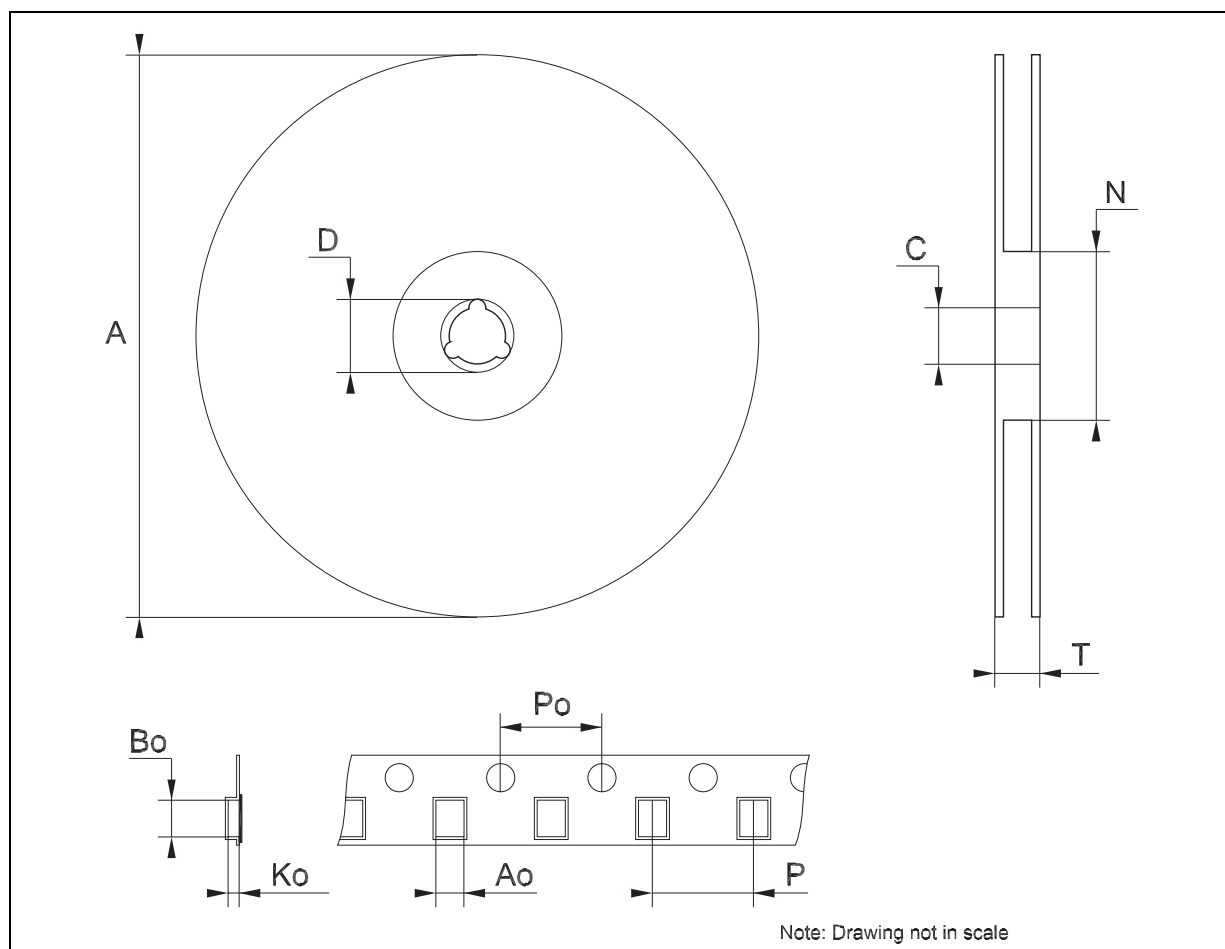


Table 15: Revision History

Date	Revision	Description of Changes
02-May-2005	2	The Packages SOP, SSOP and TSSOP have been obsoleted.

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