

± 15KV ESD PROTECTED 5V RS-232 TRANSCEIVER

- ESD PROTECTION FOR RS-232 I/O PINS:
±15 KV HUMAN BODY MODEL
- 230kbps DATE RATE
- GUARANTEED SLEW RATE 3V/μs (Min)
- OPERATES FROM A SINGLE 5V POWER SUPPLY
- PACKAGED IN SO-24, SSOP-24 AND TSSOP24

DESCRIPTION

The ST207E is a 5 driver and 3 receiver devices designed for RS-232 and V.28 communications in harsh environments. Each transmitter output and receiver input is protected against ±15KV electrostatic discharge (ESD) shocks. The drivers and receivers of the ST207E meet all EIA/TIA-232E and CCITT V.28 specifications at data rates up to 120Kbps, when loaded in accordance with the EIA/TIA-232E specification.

The ST207E operates with four 0.1μF capacitors. It came in 24-pin SO and TSSOP packages.

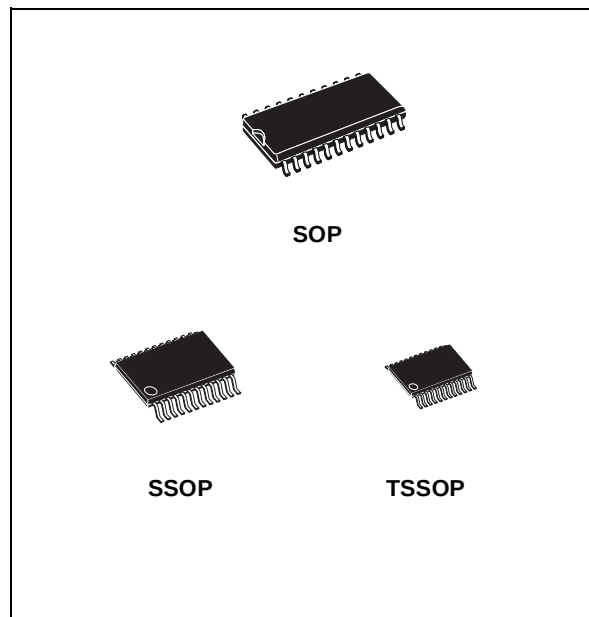


Table 1: Order Codes

Type	Temperature Range	Package	Comments
ST207ECD	0 to 70 °C	SO-24 (Tube)	33parts per tube / 25tube per box
ST207EBD	-40 to 85 °C	SO-24 (Tube)	33parts per tube / 25tube per box
ST207EAD	-40 to 125 °C	SO-24 (Tube)	33parts per tube / 25tube per box
ST207ECDR	0 to 70 °C	SO-24 (Tape & Reel)	1000 parts per reel
ST207EBDR	-40 to 85 °C	SO-24 (Tape & Reel)	1000 parts per reel
ST207EADR	-40 to 125 °C	SO-24 (Tape & Reel)	1000 parts per reel
ST207ECPR	0 to 70 °C	SSOP-24 (Tape & Reel)	1350 parts per reel
ST207EBPR	-40 to 85 °C	SSOP-24 (Tape & Reel)	1350 parts per reel
ST207EAPR	-40 to 125 °C	SSOP-24 (Tape & Reel)	1350 parts per reel
ST207ECTR	0 to 70 °C	TSSOP24 (Tape & Reel)	2500 parts per reel
ST207EBTR	-40 to 85 °C	TSSOP24 (Tape & Reel)	2500 parts per reel
ST207EATR	-40 to 125 °C	TSSOP24 (Tape & Reel)	2500 parts per reel

Figure 1: Pin Configuration

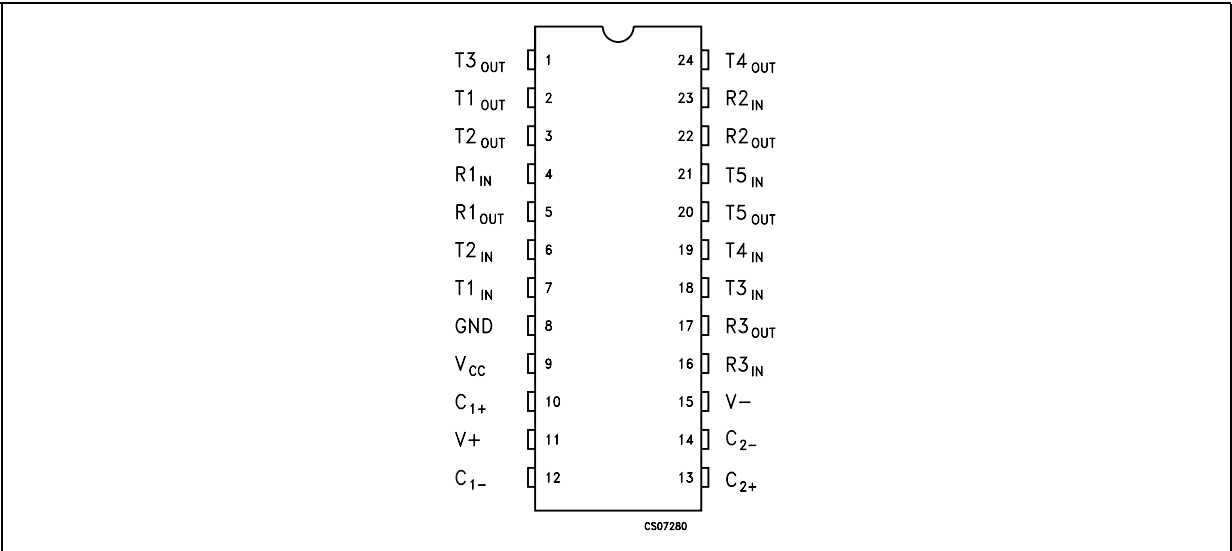


Table 2: Pin Description

PIN N°	SYMBOL	NAME AND FUNCTION
1	T3 _{OUT}	RS-232 Driver Output
2	T1 _{OUT}	RS-232 Driver Output
3	T2 _{OUT}	RS-232 Driver Output
4	R1 _{IN}	RS-232 Receiver Input
5	R1 _{OUT}	TTL/CMOS Receiver Output
6	T2 _{IN}	TTL/CMOS Driver Input Internal Pull-up to V _{CC}
7	T1 _{IN}	TTL/CMOS Driver Input Internal Pull-up to V _{CC}
8	GND	Ground
9	V _{CC}	4.75V to 5.25V Supply Voltage
10	C ₁₊	Terminal For Positive Charge-pump Capacitor
11	V ₊	2V _{CC} Generated by The Charge-pump
12	C ₁₋	Terminal For Negative Charge-pump Capacitor
13	C ₂₊	Terminal For Positive Charge-pump Capacitor
14	C ₂₋	Terminal For Negative Charge-pump Capacitor
15	V ₋	-2V _{CC} Generated by The Charge-pump
16	R3 _{IN}	RS-232 Receiver Input
17	R3 _{OUT}	TTL/CMOS Receiver Output
18	T3 _{IN}	TTL/CMOS Driver Input Internal Pull-up to V _{CC}
19	T4 _{IN}	TTL/CMOS Driver Input Internal Pull-up to V _{CC}
20	T5 _{OUT}	RS-232 Driver Output
21	T5 _{IN}	TTL/CMOS Driver Input Internal Pull-up to V _{CC}
22	R2 _{OUT}	TTL/CMOS Receiver Output
23	R2 _{IN}	RS-232 Receiver Input
24	T4 _{OUT}	RS-232 Driver Output

Table 3: Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	-0.3 to 6	V
V+	Extra Positive Voltage	($V_{CC} - 0.3$) to 14	V
V-	Extra Negative Voltage	-14 to 0.3	V
T_{IN}	Transmitter Input Voltage Range	-0.3 to ($V_{CC} + 0.3$)	V
R_{IN}	Receiver Input Voltage Range	± 30	V
T_{OUT}	Transmitter Output Voltage Range	(V- - 0.3) to (V+ + 0.3)	V
R_{OUT}	Receiver Output Voltage Range	-0.3 to ($V_{CC} + 0.3$)	V
T_{SHORT}	Short Circuit Duration on T_{OUT}	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. V+ and V- can have a maximum magnitude of +7V, but their absolute addition can not exceed 13 V.

Table 4: 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 5: Electrical Characteristics ($C_1 - C_4 = 0.1\mu F$, $V_{CC} = 5V \pm 5\%$, $T_A = \text{MIN to MAX}$, unless otherwise specified. Typical values are referred to $T_A = 25^\circ C$)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SUPPLY}	V_{CC} Power Supply Current	No Load $T_A = 25^\circ C$		2	5	mA

Table 6: Receiver Electrical Characteristics ($C_1 - C_4 = 0.1\mu F$, $V_{CC} = 5V \pm 5\%$, $T_A = \text{MIN to MAX}$, unless otherwise specified. Typical values are referred to $T_A = 25^\circ C$)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{RIN}	Receiver Input Voltage Operating Range		-30		30	V
V_{RIL}	Input Threshold Low	$T_A = 25^\circ C$ $V_{CC} = 5V$	0.8	1.2		V
V_{RIH}	Input Threshold High	$T_A = 25^\circ C$ $V_{CC} = 5V$		1.7	2.4	V
V_{RIHYS}	Input Hysteresys	$V_{CC} = 5V$, no hysteresis in shutdown	0.2	0.5	1	V
R_{RIN}	Input Resistance	$T_A = 25^\circ C$ $V_{CC} = 5V$	3	5	7	K Ω
V_{OL}	Output Voltage Low				0.4	V
V_{OH}	Output Voltage High	$I_{OUT} = -1mA$	3.5	$V_{CC}-0.4$		V

Table 7: Transmitter Electrical Characteristics ($C_1 - C_4 = 0.1\mu\text{F}$, $V_{CC} = 5\text{V} \pm 5\%$, $T_A = \text{MIN to MAX}$, unless otherwise specified. Typical values are referred to $T_A = 25^\circ\text{C}$)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{TOUT}	Output Voltage Swing	All Driver loaded with $3\text{K}\Omega$ to GND	± 5	± 8.5		V
R_{OUT}	Transmitter Output Resistance	$V_{CC} = V_+ = V_- = 0\text{V}$ $V_{\text{OUT}} = \pm 2\text{V}$	300			Ω
I_{SC}	Output Short Circuit Current			± 18	± 60	mA
I_{IL}	Input Pull-Up Current	$T_{\text{IN}} = 0\text{V}$		15	200	μA
V_{TIL}	Input Logic Threshold Low				0.8	V
V_{TIH}	Input Logic Threshold High		2			V

Table 8: Timing Characteristics ($C_1 - C_4 = 0.1\mu\text{F}$, $V_{CC} = 5\text{V} \pm 5\%$, $T_A = \text{MIN to MAX}$, unless otherwise specified. Typical values are referred to $T_A = 25^\circ\text{C}$)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
D_R	Maximum Data Rate	$R_L = 3\text{K}\Omega$ to $7\text{K}\Omega$ $C_L = 50\text{pF}$ to 1000pF one transmitter switching	150	240		Kbps
		$R_L = 3\text{K}\Omega$ to $7\text{K}\Omega$ $C_L = 50\text{pF}$ to 150pF one transmitter switching	230	300		Kbps
t_{PHLR} t_{PLHR}	Receiver Propagation Delay	All drivers loaded with $3\text{K}\Omega$ to GND		0.2	10	μs
t_{PHLT} t_{PLHT}	Transmitter Propagation Delay	$R_L = 3\text{K}\Omega$ $C_L = 2500\text{pF}$ All transmitter loaded		2	3	μs
SR	Transition-Region Slew Rate	$T_A = 25^\circ\text{C}$ $R_L = 3$ to $7\text{K}\Omega$ $V_{CC} = 5\text{V}$ $C_L = 50\text{pF}$ to 1000pF measured from $+3\text{V}$ to -3V or -3V to $+3\text{V}$	3	7	30	$\text{V}/\mu\text{s}$

Figure 2: Application Circuits

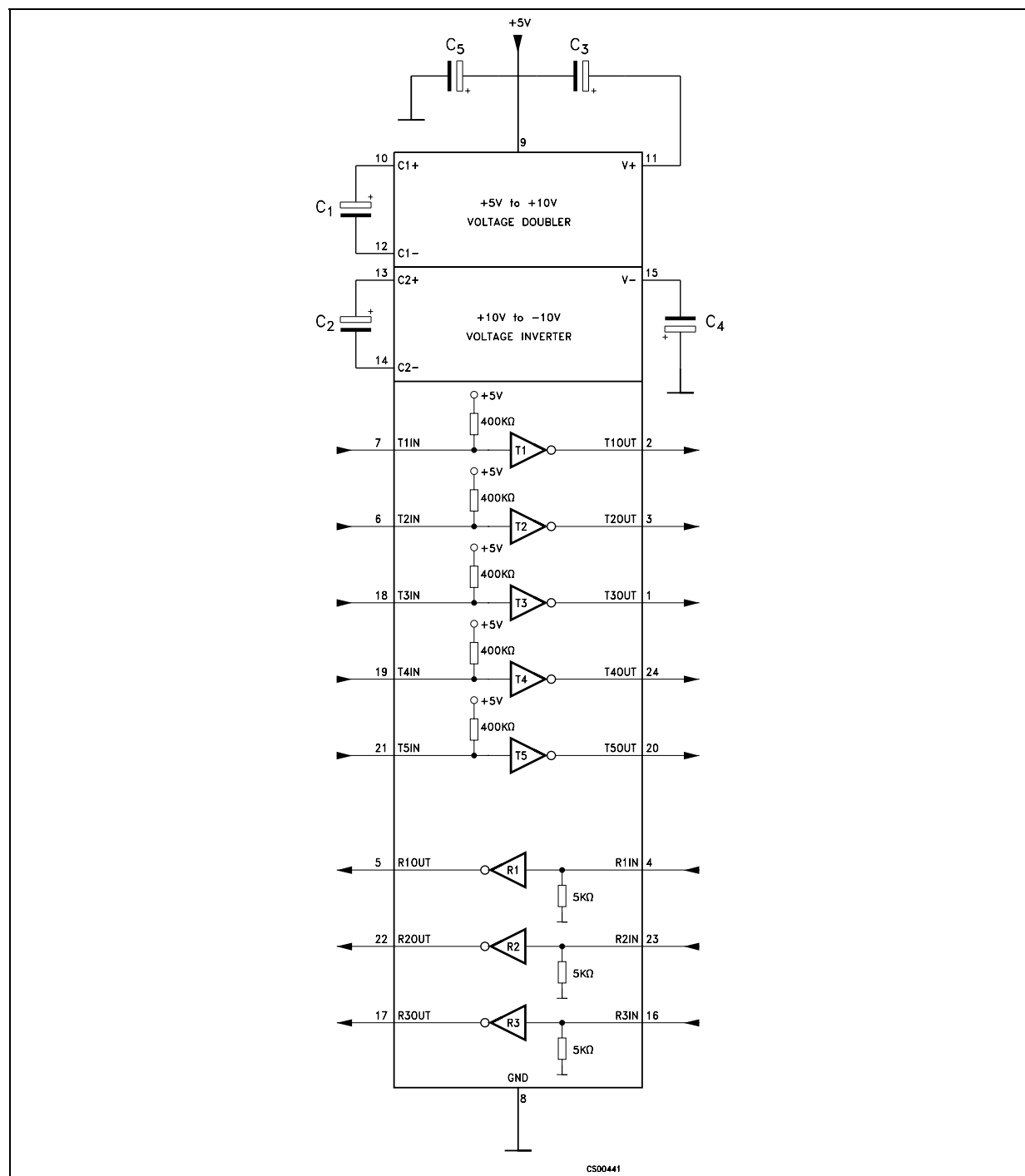
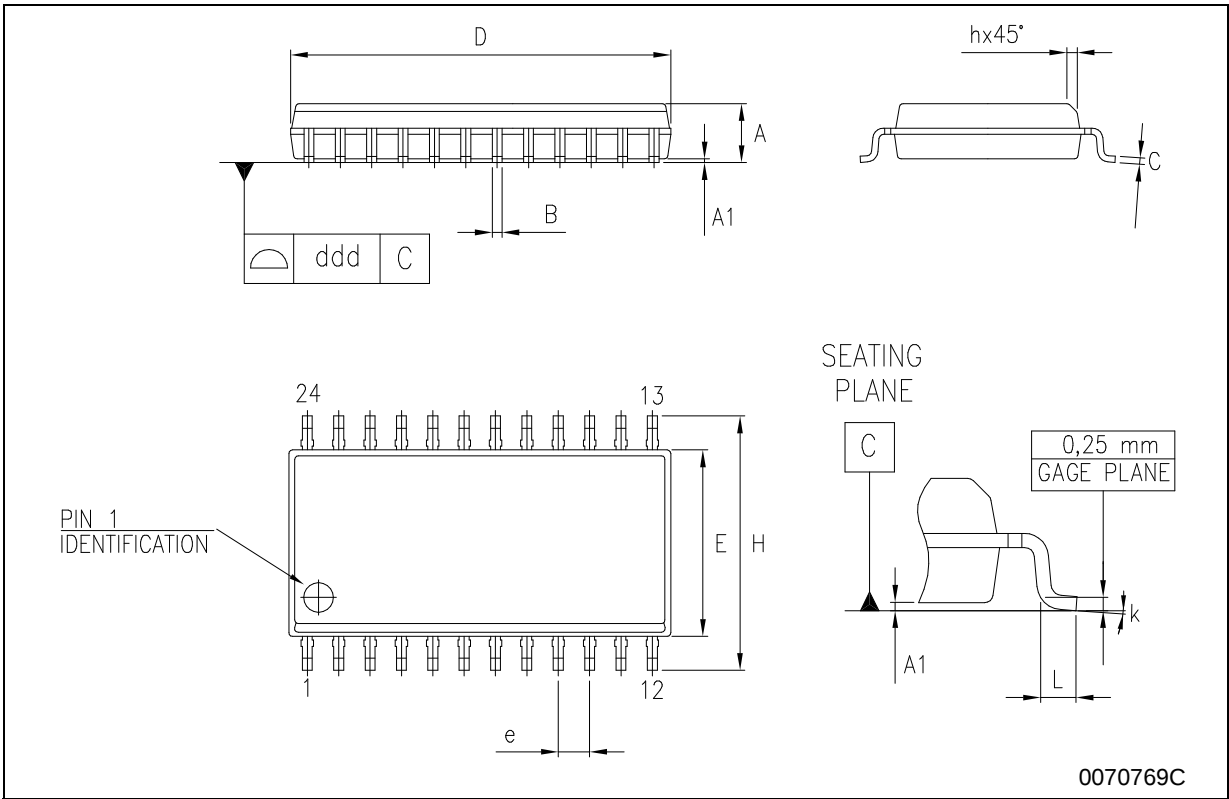


Table 9: Capacitance Value (μF)

C1	C2.	C3	C4	C5
0.1	0.1	0.1	0.1	0.1

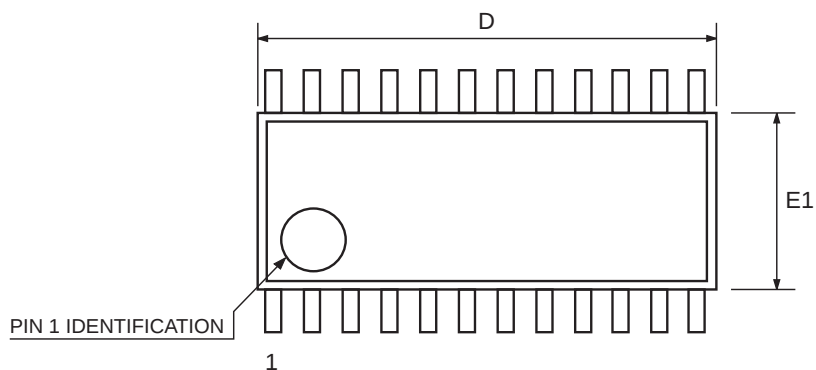
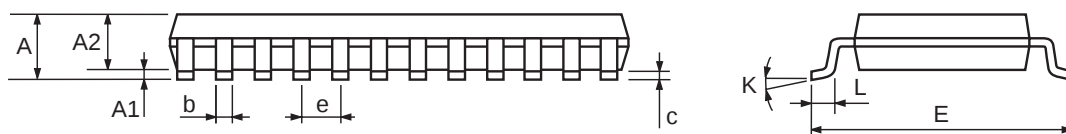
SO-24 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	2.35		2.65	0.093		0.104
A1	0.1		0.30	0.004		0.012
B	0.33		0.51	0.013		0.020
C	0.23		0.32	0.009		0.013
D	15.20		15.60	0.598		0.614
E	7.4		7.6	0.291		0.299
e		1.27			0.050	
H	10.00		10.65	0.394		0.419
h	0.25		0.75	0.010		0.030
L	0.4		1.27	0.016		0.050
k	0°		8°	0°		8°
ddd			0.100			0.004



SSOP24 MECHANICAL DATA

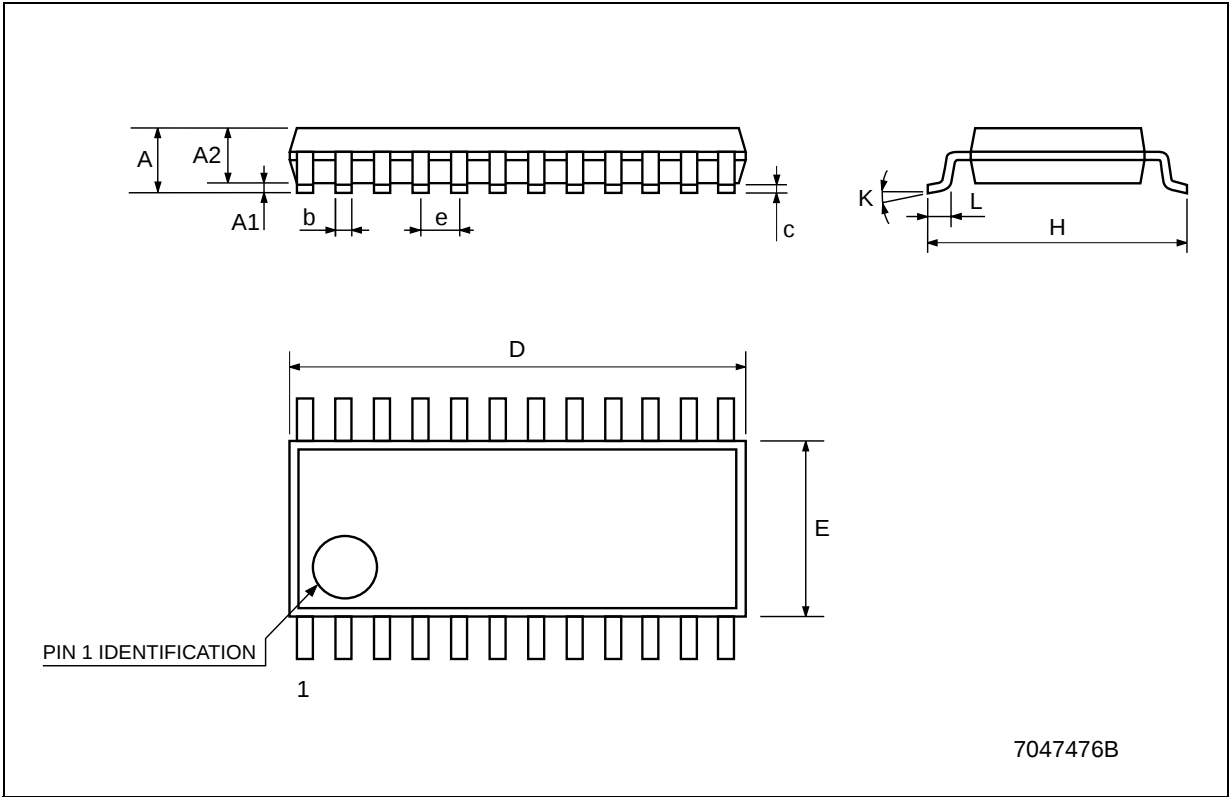
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			2			0.079
A1	0.05			0.002		
A2	1.65	1.75	1.85	0.065	0.069	0.073
b	0.22		0.38	0.009		0.015
c	0.09		0.25	0.004		0.010
D	7.9	8.2	8.5	0.311	0.323	0.335
E	7.4	7.8	8.2	0.291	0.307	0.323
E1	5.00	5.3	5.6	0.197	0.209	0.220
e		0.65 BSC			0.0256 BSC	
K	0°		8°	0°		8°
L	0.55	0.75	0.95	0.022	0.030	0.037



0053237/C

TSSOP24 MECHANICAL DATA

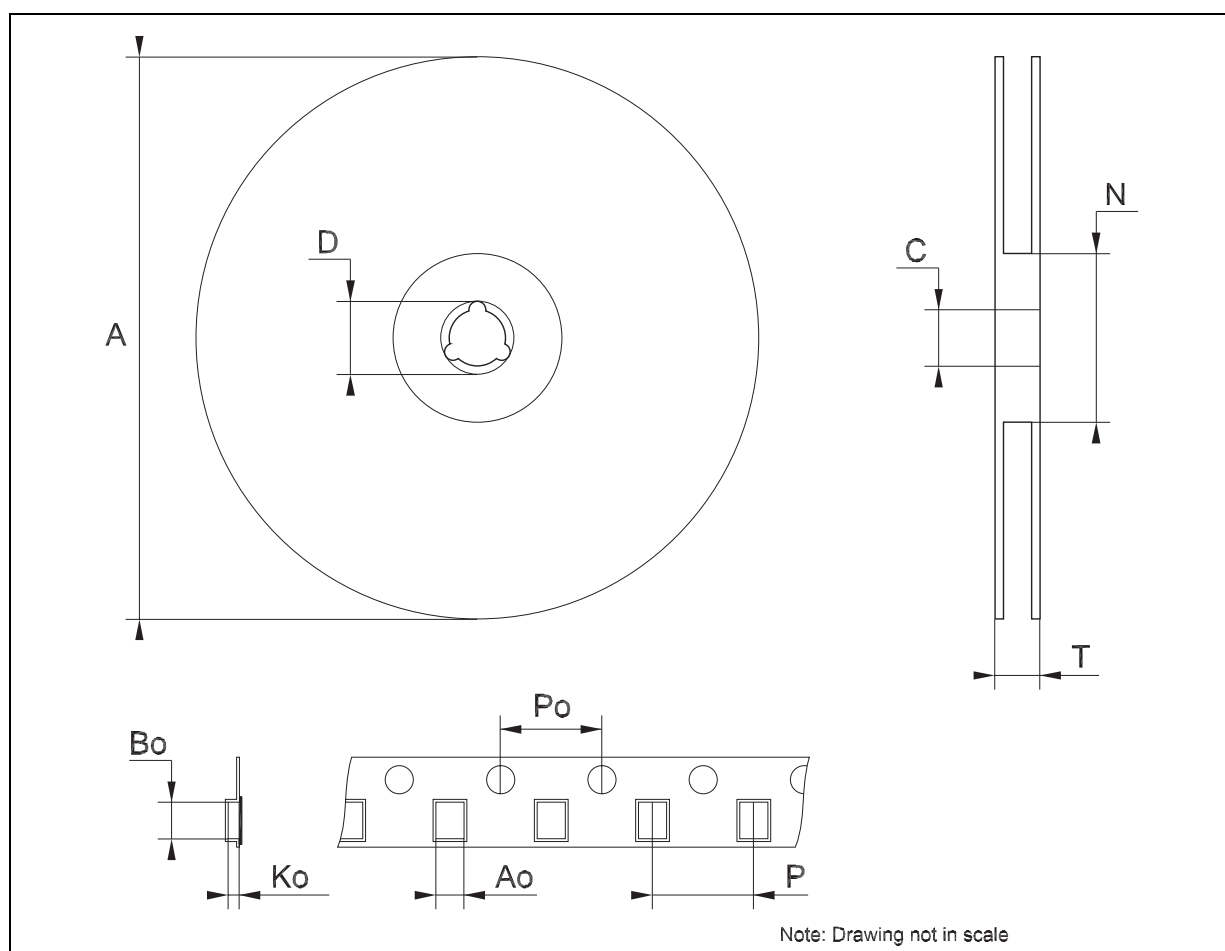
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			1.1			0.043
A1	0.05		0.15	0.002		0.006
A2		0.9			0.035	
b	0.19		0.30	0.0075		0.0118
c	0.09		0.20	0.0035		0.0079
D	7.7		7.9	0.303		0.311
E	4.3		4.5	0.169		0.177
e		0.65 BSC			0.0256 BSC	
H	6.25		6.5	0.246		0.256
K	0°		8°	0°		8°
L	0.50		0.70	0.020		0.028



7047476B

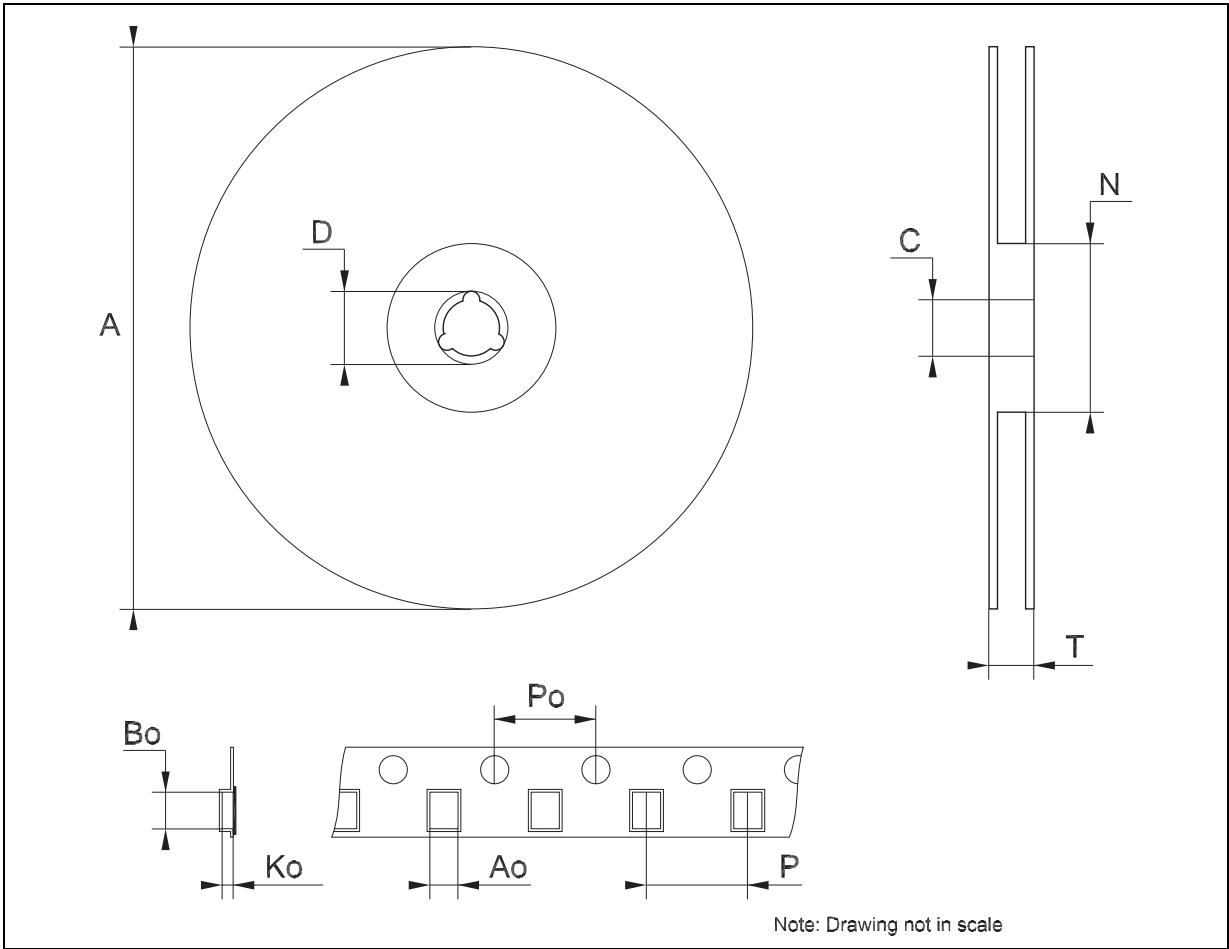
Tape & Reel SO-24 MECHANICAL DATA

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			30.4			1.197
Ao	10.8		11.0	0.425		0.433
Bo	15.7		15.9	0.618		0.626
Ko	2.9		3.1	0.114		0.122
Po	3.9		4.1	0.153		0.161
P	11.9		12.1	0.468		0.476



Tape & Reel SSOP24 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			22.4			0.882
Ao	8.4		8.6	0.331		0.339
Bo	8.7		8.9	0.343		0.351
Ko	2.9		3.1	0.114		0.122
Po	3.9		4.1	0.153		0.161
P	11.9		12.1	0.468		0.476



Tape & Reel TSSOP24 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			22.4			0.882
Ao	6.8		7	0.268		0.276
Bo	8.2		8.4	0.323		0.331
Ko	1.7		1.9	0.067		0.075
Po	3.9		4.1	0.153		0.161
P	11.9		12.1	0.468		0.476

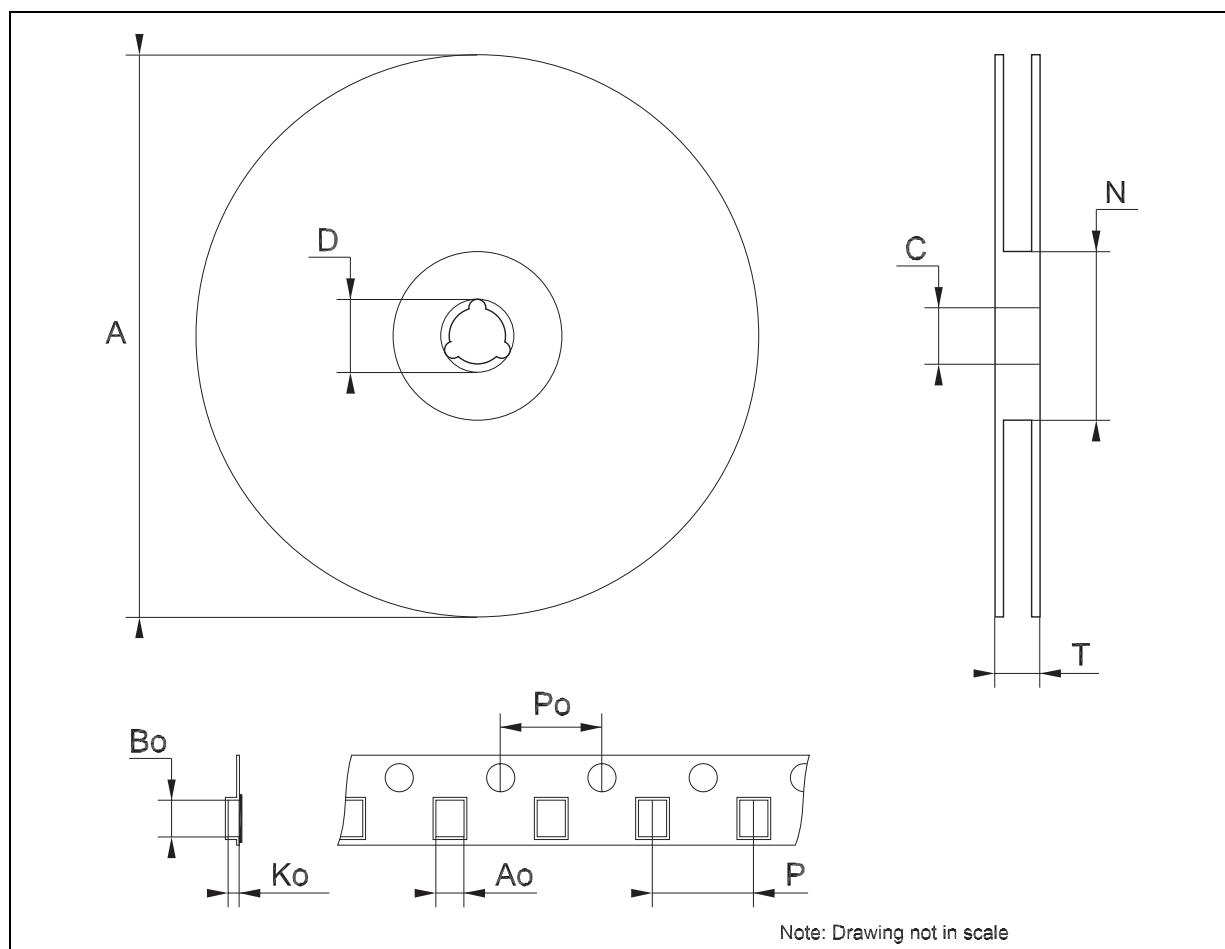


Table 10: Revision History

Date	Revision	Description of Changes
25-Jan-2005	13	Mistake on Table 1.

Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a registered trademark of STMicroelectronics

All other names are the property of their respective owners

© 2005 STMicroelectronics - All Rights Reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com