



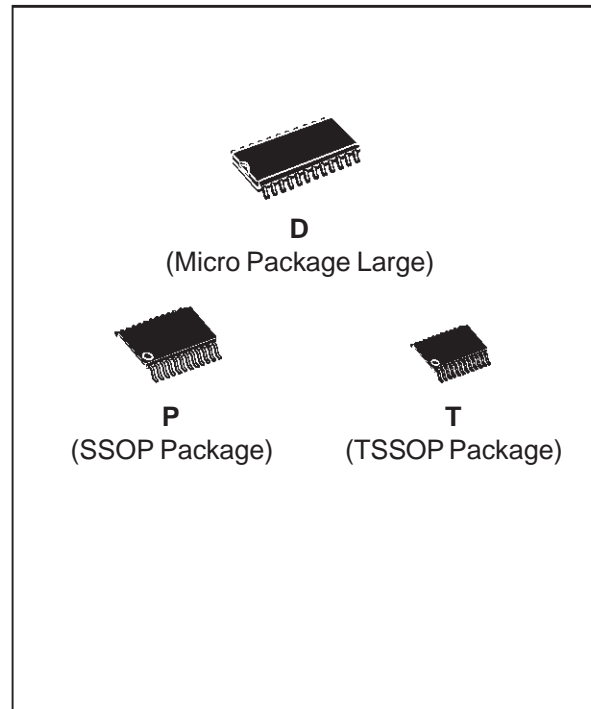
## ST207E

### ± 15KV ESD PROTECTED 5V RS-232 TRANSCEIVER

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

#### DESCRIPTION

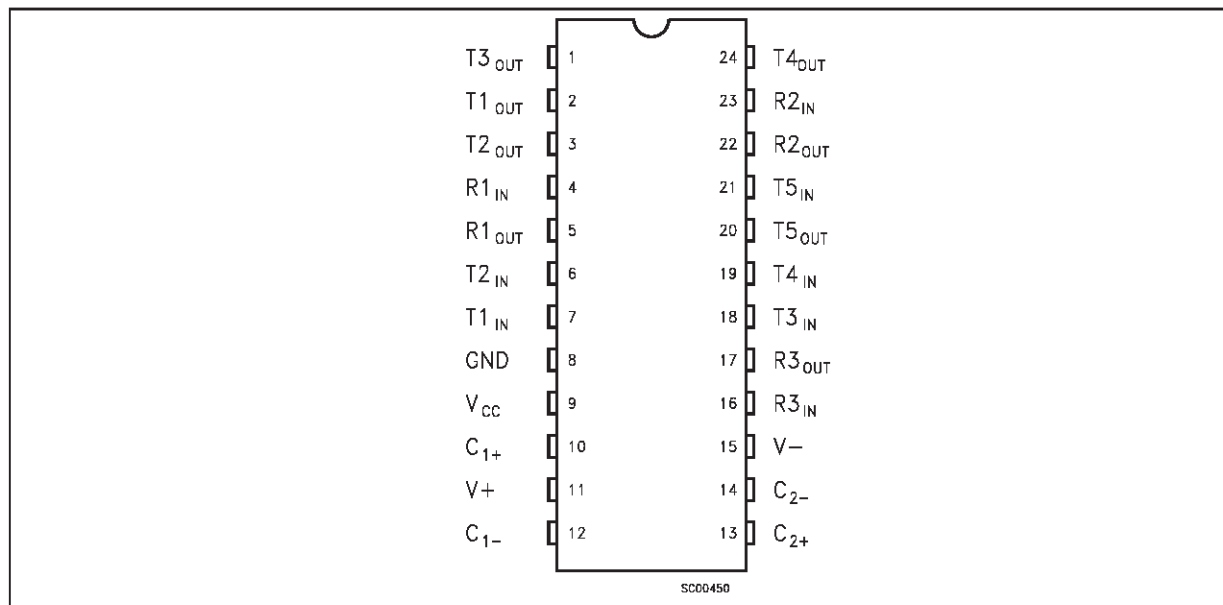
The ST207E is a 5 driver and 3 receiver devices designed for RS-232 and V.28 communications in harsh environments. Each transmitter output and receiver input is protected against ±15KV electrostatic discharge (ESD) shocks. The drivers and receivers of the ST207E meet all EIA/TIA-232E and CCITT V.28 specifications 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 comes in 24-pin SO and TSSOP packages.



#### ORDER CODES

Type	Temperature Range	Package	Comments
ST207ECD	0 to 70 °C	SO-24 (Tube)	33 parts per tube / 25 tube per box
ST207EBD	-40 to 85 °C	SO-24 (Tube)	33 parts per tube / 25 tube 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
ST207ECTR	0 to 70 °C	TSSOP24 (Tape & Reel)	2500 parts per reel
ST207EBTR	-40 to 85 °C	TSSOP24 (Tape & Reel)	2500 parts per reel
ST207ECPR	0 to 70 °C	SSOP24 (Tape & Reel)	1350 parts per reel
ST207EBPR	-40 to 85 °C	SSOP24 (Tape & Reel)	1350 parts per reel

## PIN CONFIGURATION



## PIN DESCRIPTION

PIN No	SYMBOL	NAME AND FUNCTION
1	T3 <sub>OUT</sub>	RS-232 Driver Output
2	T1 <sub>OUT</sub>	RS-232 Driver Output
3	T2 <sub>OUT</sub>	RS-232 Driver Output
4	R1 <sub>IN</sub>	RS-232 Receiver Input
5	R1 <sub>OUT</sub>	TTL/CMOS Receiver Output
6	T2 <sub>IN</sub>	TTL/CMOS Driver Input. Internal Pull-up to V <sub>CC</sub>
7	T1 <sub>IN</sub>	TTL/CMOS Driver Input. Internal Pull-up to V <sub>CC</sub>
8	GND	Ground
9	V <sub>CC</sub>	4.75V to 5.25V Supply Voltage
10	C1+	Terminal For Positive Charge-pump Capacitor
11	V+	2V <sub>CC</sub> Generated By The Charge Pump
12	C1-	Terminal For Positive Charge-pump Capacitor
13	C2+	Terminal For Negative Charge-pump Capacitor
14	C2-	Terminal For Negative Charge-pump Capacitor
15	V-	-2V <sub>CC</sub> Generated By The Charge Pump
16	R3 <sub>IN</sub>	RS-232 Receiver Input
17	R3 <sub>OUT</sub>	TTL/CMOS Receiver Output
18	T3 <sub>IN</sub>	TTL/CMOS Driver Input. Internal Pull-up to V <sub>CC</sub>
19	T4 <sub>IN</sub>	TTL/CMOS Driver Input. Internal Pull-up to V <sub>CC</sub>
20	T5 <sub>OUT</sub>	RS-232 Driver Output
21	T5 <sub>IN</sub>	TTL/CMOS Driver Input. Internal Pull-up to V <sub>CC</sub>
22	R2 <sub>OUT</sub>	TTL/CMOS Receiver Outputs
23	R2 <sub>IN</sub>	RS-232 Receiver Input
24	T4 <sub>OUT</sub>	RS-232 Driver Output

**ABSOLUTE MAXIMUM RATINGS** (Note 1)

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	Supply Voltage	-0.3 to 6	V
V <sub>+</sub>	Extra Positive Voltage	(V <sub>CC</sub> - 0.3) to 14	V
V <sub>-</sub>	Extra Negative Voltage	-14 to 0.3	V
T <sub>IN</sub>	Transmitter Input Voltage Range	-0.3 to (V <sub>CC</sub> + 0.3)	V
R <sub>IN</sub>	Receiver Input Voltage Range	±30	V
T <sub>OUT</sub>	Transmitter Output Voltage Range	(V <sub>-</sub> - 0.3) to (V <sub>+</sub> + 0.3)	V
R <sub>OUT</sub>	Receiver Output Voltage Range	-0.3 to (V <sub>CC</sub> + 0.3)	V
T <sub>SCTOUT</sub>	Short Circuit Duration on T <sub>OUT</sub>	Continuous	
T <sub>stg</sub>	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.

**ESD PERFORMANCE: TRANSMITTER OUTPUTS, RECEIVER INPUTS**

Symbol	Parameter	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
ESD	ESD Protection Voltage	Human Body Model		±15		kV

**ELECTRICAL CHARACTERISTICS** (C<sub>1</sub> -C<sub>4</sub> = 0.1μF, V<sub>CC</sub> = 5V ± 5% T<sub>A</sub> = Min to Max, unless otherwise specified. Typical Valus are referred to T<sub>A</sub> = 25 °C)

Symbol	Parameter	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
I <sub>SUPPLY</sub>	V <sub>CC</sub> Power Supply Current	No Load, T <sub>A</sub> = 25 °C		2	5	mA

**RECEIVER ELECTRICAL CHARACTERISTICS** (C<sub>1</sub> -C<sub>4</sub> = 0.1μF, V<sub>CC</sub> = 5V ± 5% T<sub>A</sub> = Min to Max, unless otherwise specified. Typical Valus are referred to T<sub>A</sub> = 25 °C)

Symbol	Parameter	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
V <sub>RIN</sub>	Receiver Input Voltage Operating Range		-30		30	V
V <sub>RIL</sub>	Input Threshold Low	T <sub>A</sub> = 25 °C, V <sub>CC</sub> = 5 V	0.8	1.2		V
V <sub>RIH</sub>	Input Threshold High	T <sub>A</sub> = 25 °C, V <sub>CC</sub> = 5 V		1.7	2.4	V
V <sub>RIHYS</sub>	Input Hysteresis	V <sub>CC</sub> = 5 V, no hysteresis in shutdown	0.2	0.5	1	V
R <sub>RIN</sub>	Input Resistance	T <sub>A</sub> = 25 °C, V <sub>CC</sub> = 5 V	3	5	7	KΩ
V <sub>OL</sub>	Output Voltage Low				0.4	V
V <sub>OH</sub>	Output Voltage High	I <sub>OUT</sub> = -1mA	3.5	V <sub>CC</sub> -0.4		V

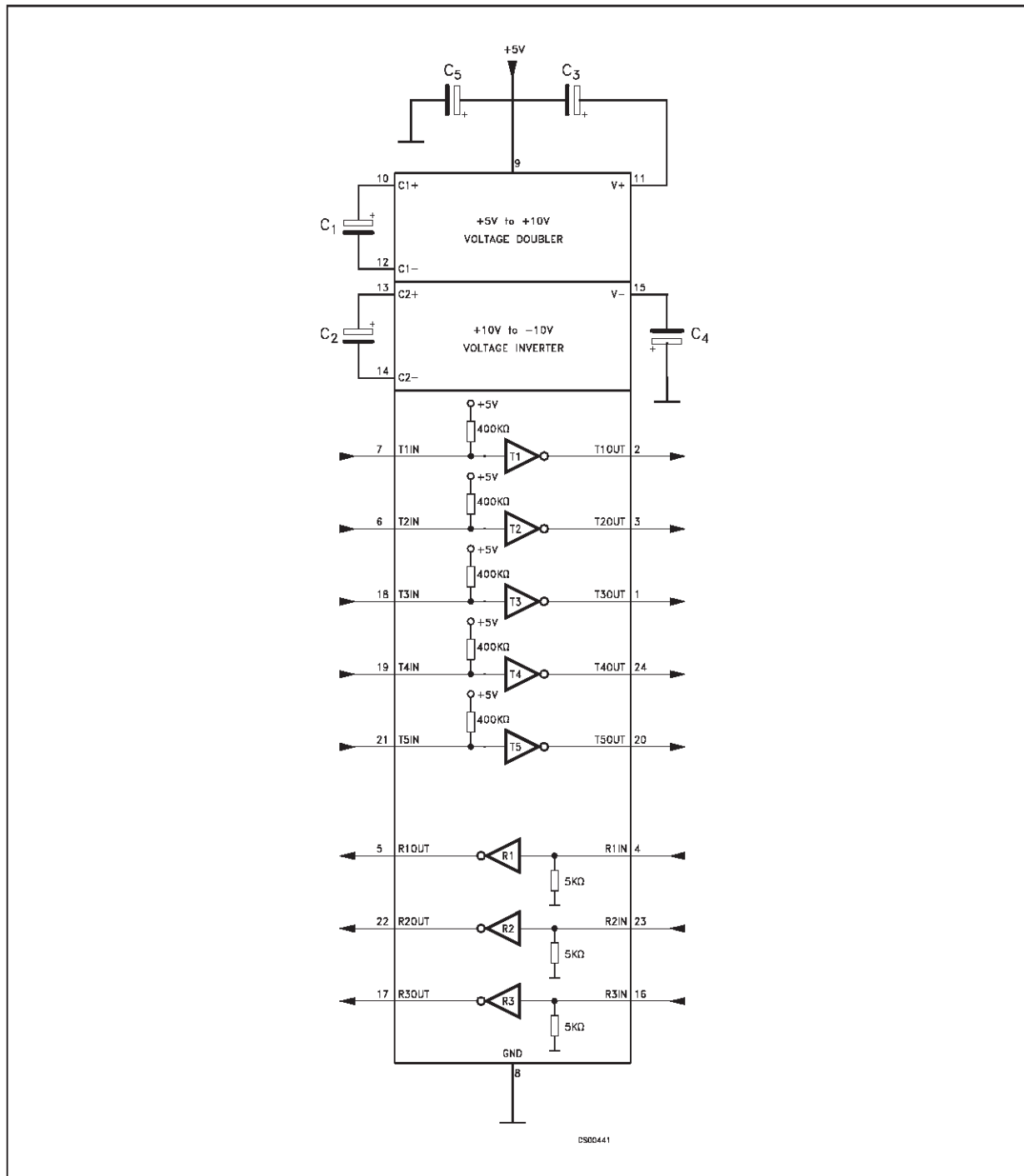
**TRANSMITTER ELECTRICAL CHARACTERISTICS** ( $C_1 - C_4 = 0.1\mu\text{F}$ ,  $V_{CC} = 5\text{V} \pm 5\%$   $T_A = \text{Min to Max}$ , unless otherwise specified. Typical Valus are referred to  $T_A = 25^\circ\text{C}$ )

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

**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 Valus are referred to  $T_A = 25^\circ\text{C}$ )

Symbol	Parameter	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
DR	Maximum Data Rate	$R_L = 3\text{K}\Omega$ to $7\text{K}\Omega$ , one transmitter switching $C_L = 50\text{pF}$ to $1000\text{pF}$ $C_L = 50\text{pF}$ to $150\text{pF}$	180 230	240 300		kbps kbps
$t_{PLHR}$ $t_{PHLR}$	Receiver Propagation Delay	All drivers loaded with $3\text{K}\Omega$ to GND		0.2	10	$\mu\text{s}$
$t_{PLHT}$ $t_{PHLT}$	Transmitter Propagation Delay	$R_L = 3\text{K}\Omega$ , $C_L = 2500\text{pF}$ all transmitters loaded		2		$\mu\text{s}$
SR	Transition-Region Slew Rate	$T_A = 25^\circ\text{C}$ $V_{CC} = 5\text{V}$ $R_L = 3\text{K}\Omega$ to $7\text{K}\Omega$ , $C_L = 50\text{pF}$ to $1000\text{pF}$ measure from $-3\text{V}$ to $3\text{V}$ or $3\text{V}$ to $-3\text{V}$	3	7	30	$\text{V}/\mu\text{s}$

APPLICATION CIRCUITS (note 1, note 2)



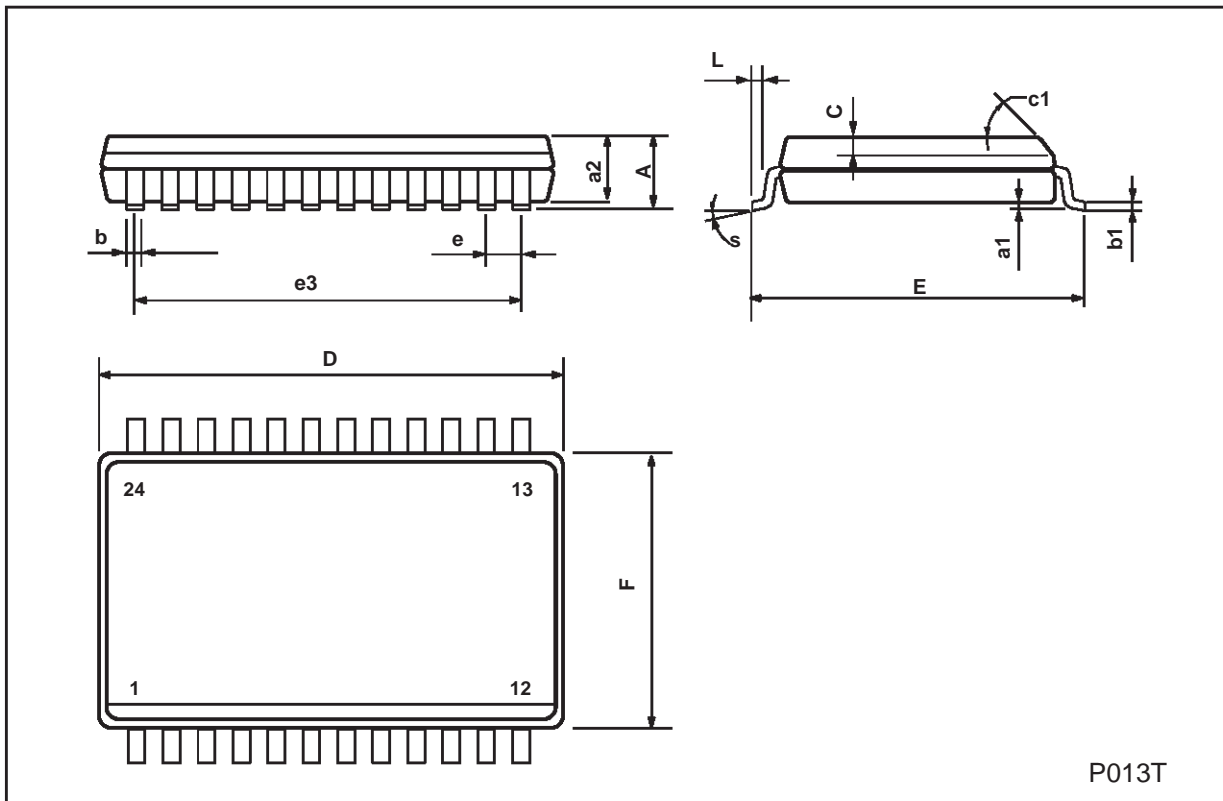
Note 1: C<sub>1-4</sub> capacitors can even be 1 μF ones.  
 Note 2: C<sub>1-4</sub> can be common or biased capacitors.

Capacitance Value (μF)

DEVICES	C1	C2	C3	C4	C5
ST207E	0.1	0.1	0.1	0.1	0.1

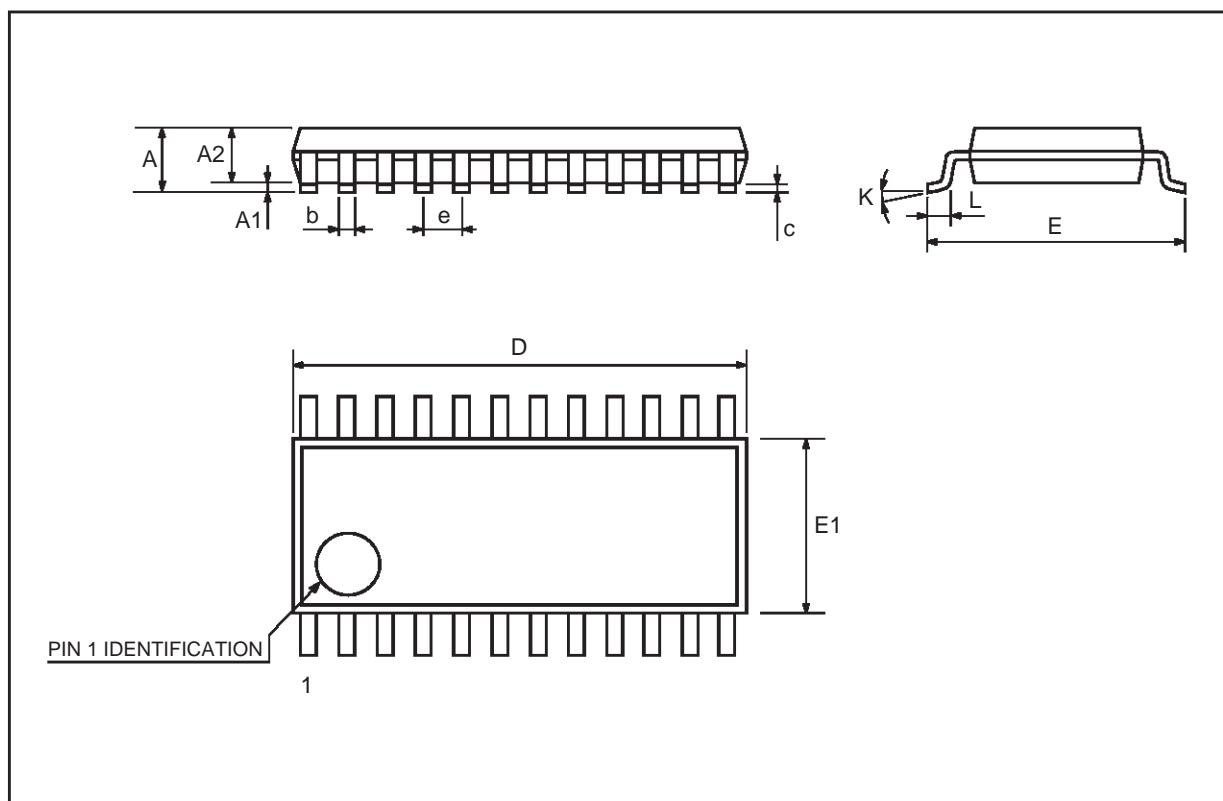
**SO-24 MECHANICAL DATA**

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			2.65			0.104
a1	0.10		0.20	0.004		0.007
a2			2.45			0.096
b	0.35		0.49	0.013		0.019
b1	0.23		0.32	0.009		0.012
C		0.50			0.020	
c1	45 (typ.)					
D	15.20		15.60	0.598		0.614
E	10.00		10.65	0.393		0.420
e		1.27			0.05	
e3		13.97			0.55	
F	7.40		7.60	0.291		0.299
L	0.50		1.27	0.19		0.050
S	8 (max.)					



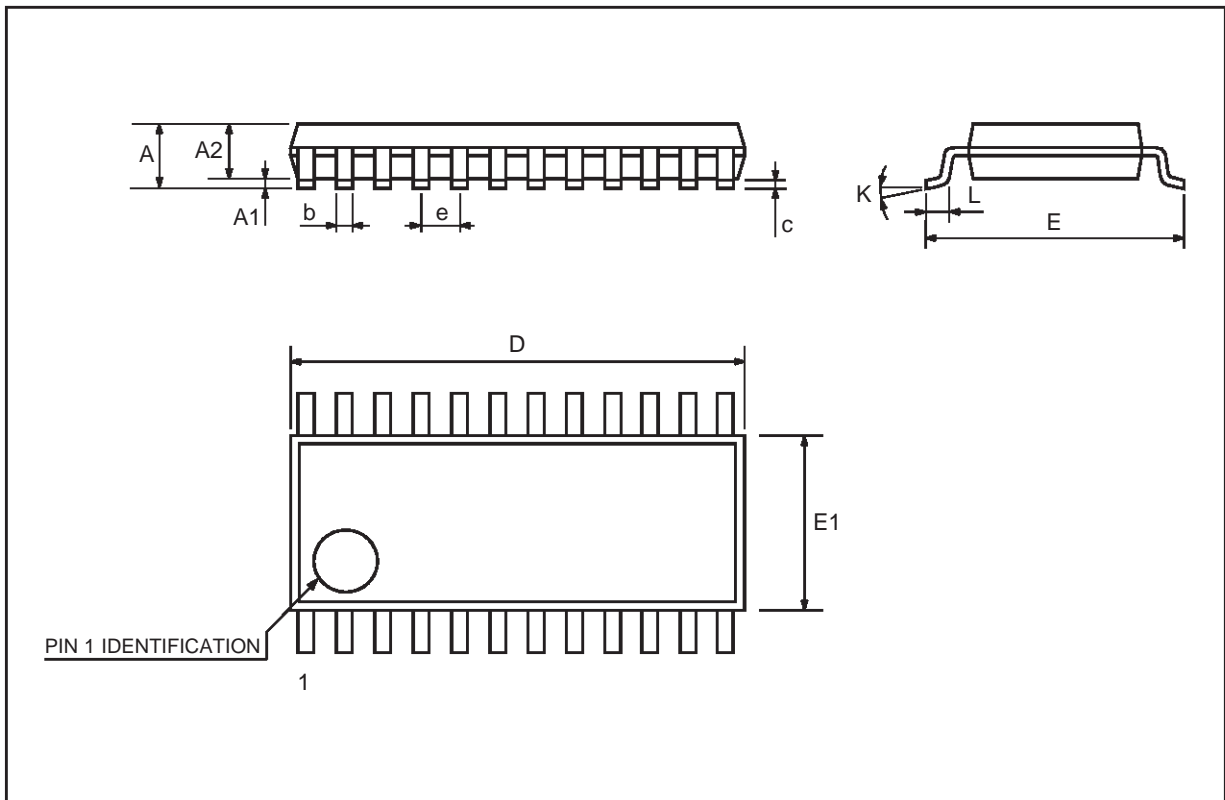
## SSOP24 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			2.00			0.079
A1			0.25			0.010
A2	1.51		2.00	0.059		0.079
b	0.25	0.30	0.35	0.010	0.012	0.014
c	0.10		0.35	0.004		0.014
D	8.35		9.35	0.329		0.368
E	7.6		8.7	0.299		0.343
E1	5.02	6.10	6.22	0.198	0.240	0.245
e		0.65 BSC			0.0256 BSC	
K	0°		10°	0°		10°
L	0.25	0.50	0.80	0.010	0.020	0.031



**TSSOP24 MECHANICAL DATA**

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.1			0.433
A1	0.05	0.10	0.15	0.002	0.004	0.006
A2	0.85	0.9	0.95	0.335	0.354	0.374
b	0.19		0.30	0.0075		0.0118
c	0.09		0.2	0.0035		0.0079
D	7.7	7.8	7.9	0.303	0.307	0.311
E	6.25	6.4	6.5	0.246	0.252	0.256
E1	4.3	4.4	4.48	0.169	0.173	0.176
e		0.65 BSC			0.0256 BSC	
K	0°	4°	8°	0°	4°	8°
L	0.50	0.60	0.70	0.020	0.024	0.028





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