



钜地半导体
Tudi Semiconductor

Product Specification

TUDI-UM232

High ESD-Protected, Fail-Safe, Single Supply RS-232 Transceivers

网址 www.sztdbdt.com Q

用芯智造 · 卓越品质

**semiconductor device
manufacturer**

- Design
- research and development
- production
- and sales



Features

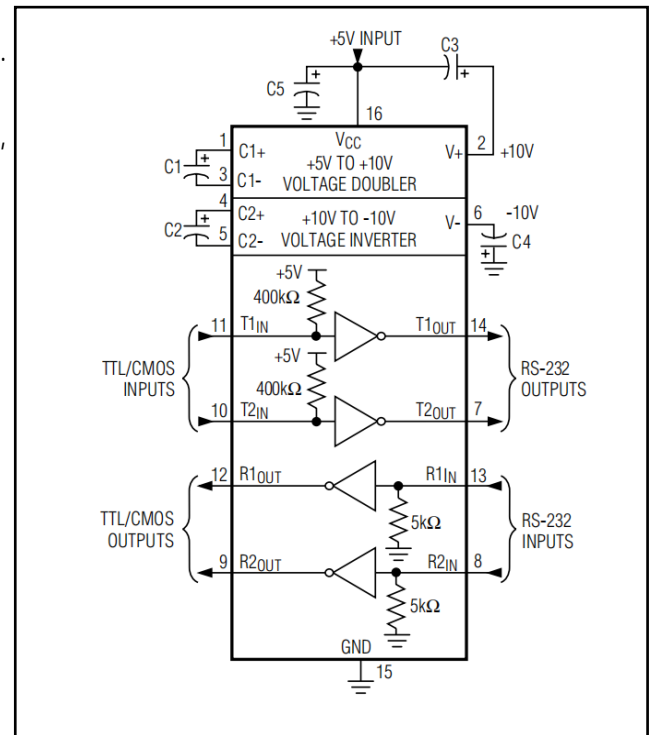
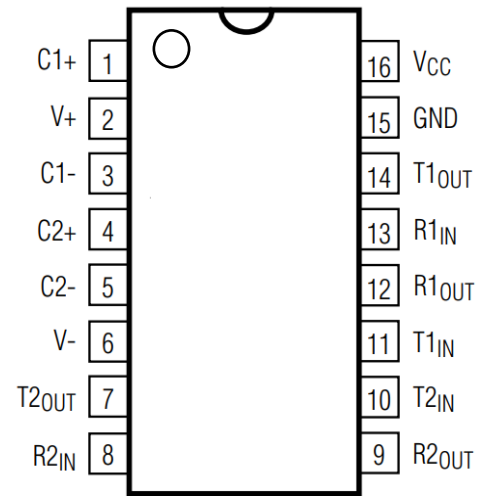
- ESD Protection for RS-232 Bus Pins up to $\pm 8\text{kV}$ Human Body Model
- Single +5V Power Supply
- Low Power, I_{cc} 15mA Maximum
- Operates up to 250kbps
- Receiver Noise Filter
- Latch-Up Performance Exceeds 200mA

Description

The UM232EExE series are low power single supply RS232 interface. The device consists of two line drivers, two line receivers, and dual charge pump circuit. The device meets the requirements of TIA/EIA-232 standard and provides the electrical interface between an asynchronous communication controller and the serial-port connector. The on chip charge pump and four small external capacitors act as onboard DC to DC converter, allow chip operated from single 5V supply, eliminating the need for $\pm 10\text{V}$ power supplies, reduce cost and board space. The device operates at data signaling rates over 250kbps. The slew rate of driver is set internally less than $30\text{V}/\mu\text{s}$ and the receivers feature internal noise filtering, eliminating the need for external slew rate and filter capacitors for reliable operation. The driver inputs and receiver outputs are TTL and CMOS compatible. UM232EExE comes in 16 pin DIP, SOP and TSSOP packages, operating over the commercial and industrial temperature ranges. The ESD tolerance has been upgraded on these devices to $\pm 8\text{kV}$ for Human Body Model and $\pm 15\text{kV}$ for IEC61000-4-2 Air Discharge Method, without latch-up. The device operates with four $0.1\mu\text{F}$ capacitors, reduce system cost and board space.

Applications

- Notebook and Palmtop Computers
- Battery-Powered Equipments
- Hand-Held Equipments
- POS Terminals



Typical Operating Circuit



Pin description

Pin No	Symbol	Pin name
01	C1+	Output of external capacitance of positive voltage multiplier unit
02	V+	Output of positive voltage of multiplier unit
03	C1-	Output of external capacitance of positive voltage multiplier unit
04	C2+	Output of external capacitance of negative voltage multiplier unit
05	C2-	Output of external capacitance of negative voltage multiplier unit
06	V-	Output of negative voltage of multiplier unit
07	T2oUT	Output of transmitter data(levels RS-232)
08	R2IN	Input of receiver data(levels RS-232)
09	R2oUT	Output of receiver data(levels TTL/KMOS)
10	T2IN	Input of transmitter data(levels TTL/KMOS)
11	T1n	Input of transmitter data(levels TTL/KMOS)
12	R1oUT	Output of receiver data(levels TTL/KMOS)
13	R1n	Input of receiver data(levels RS-232)
14	T1oUT	Output of transmitter data(levels RS-232)
15	GND	Common output
16	Vcc	Supply output of voltage source



Recommended Operating Conditions				
Symbol	Parameter	Rate		Unit
		min	max	
Vcc	Supply voltage	4.5	5.5	V
V+	Transmitter output high voltage	5.0	-	
V-	Transmitter output low voltage	-5.0	-	
VTIN	Transmitter input voltage	0	Vcc	
VRIN	Receiver input voltage	-30	30	
Isc	Transmitter short circuit output current	-	±60	mA
Ta	Ambient temperature	-40	85	C
Maximum conditions				
Symbol	Parameter	Rate		Unit
		min	max	
Vcc	Supply voltage	-0.3	6.0	V
V+	Transmitter high output voltage	Vcc-0.3	14	
V-	Transmitter low output voltage	-0.3	-14	
VTIN	Transmitter input voltage	-0.3	V+ +0.3	
VRIN	Receiver input voltage	-30	30	
Pp	Dissipated powerDIP-package	-		mW
Isc	Output current of transmitter short circuit	-	Continuously	mA
Ta	Ambient temperature	-60	150	C



Receiver electrical parameters							
Symbol	Parameter	Test conditions	Rate				Unit
			25°C		-40°C to 85°C		
			min	max	min	max	
Vh	Hysteresis voltage	Vcc=5.0V	0.2	0.9	0.2	1.0	V
Von	On(operation)voltage	Vo 0.1VloL 20 uA		2.4		2.3	
Voff	Off(dropout)voltage	Vo Vcc-01VloH -20 uA	0.8		0.9		
VoL	Output low voltage	loL=3.2 mA Vcc=4.5V	-	0.3		0.4	
VoH	Output high voltage	loH=-1.0 mA Vcc=4.5V	3.6		3.5	-	
RI	Input resistance	Vcc=5.0V	3.0	7.0	3.0	7.0	kOhm
Transmitter electrical parameters							
Symbol	Parameter	Test conditions	Rate				Unit
			25°C		-40°C to 85°C		
			min	max	min	max	
VoL	Output low voltage	Vcc=4.5V VH=2.0V	-	-5.2		-5.0	V
VoH	Output high voltage	Vcc=4.5V VL=0.8V	5.2		5.0	-	
I	Input low current	Vcc=5.5V V = 0V		-1.0		-10.0	uA
IH	Input high current	Vcc=5.5V VH=Vcc		1.0		10.0	
SR	Speed of output frontchange	Vcc=5.0V CL=50 -1000 pF	3.0	30	2.7	27	V/uS
Ro	Output resistance	Vcc=V+=V-=0V Vo=±2V	350	-	300	-	Ohm
Isc	Short circuit outputcurrent	Vcc=5.5V Vo=0V		-5050		-6060	mA kbps
ST	Speed of information transmission	Vcc=4.5V CL=1000 pF	140		120	-	



Dynamic parameters							
Symbol	Parameter	Test conditions	Rate				Unit
			25°C		-40°C to 85°C		
			min	max	min	max	
tPHLR (tPLHR)	Signal propagation delay time	V _{cc} =4.5V CL=150 pF		9.7	-	10	us
tPHLT (tPLHT)	Signal propagation delay time	V _{cc} =4.5V CL=2500 pF		5.0*		6.0*	
Capacitance							
Symbol	Parameter	Test conditions	Rate				Unit
			25°C		-40°C to 85°C		
			min	max	min	max	
CIN	Input capacitance	5.0			9.0		pF
CpD	Dynamic capacitance				90		
Static parameters							
Symbol	Parameter	Test conditions	Rate				Unit
			25°C		-40°C to 85°C		
			min	max	min	max	
I _{cc}	Consumption current static	V _{cc} =5.0V V _o =0V		10.0		14	mA



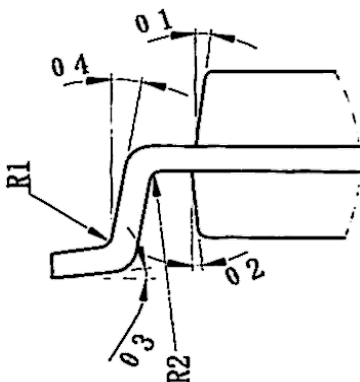
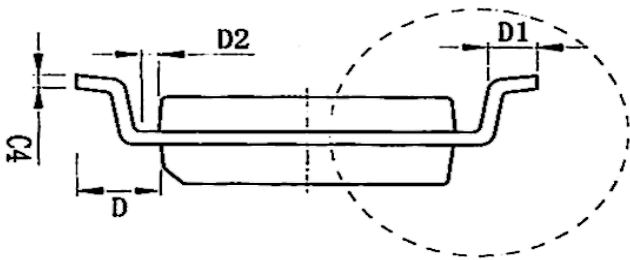
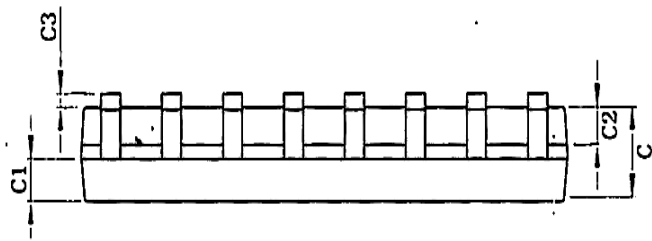
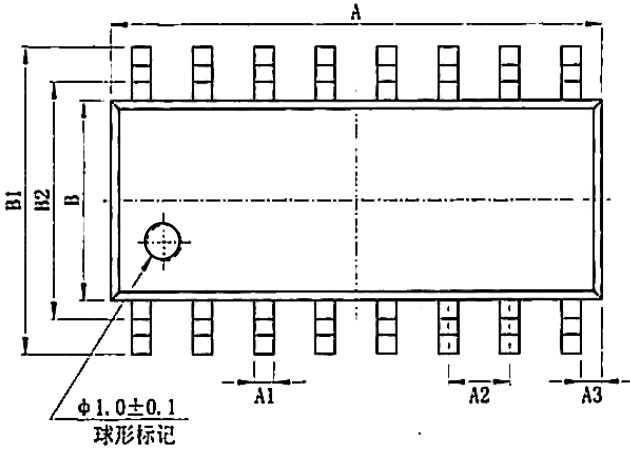
Truth table			
Inputs	RIn,TIN	H	L
Outputs	RovT,TovT	L	H
H-vol-L	Note: H: high level; L: low voltage level		

Order information

Order Number	Package	Package Quantity	Marking On The park	Temperature
UM232EESE-TUDI	SOP16	Tape,Reel,2500	UM232EESE	-40°C to 85°C
UM232EEUE-TUDI	TSSOP16	Tape,Reel,2500	UM232EEUE	
UM232EEPE-TUDI	DIP16	Tube,25,A box of 1000	UM232EEPE	



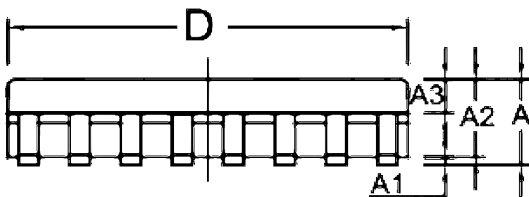
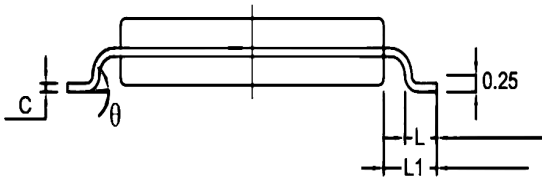
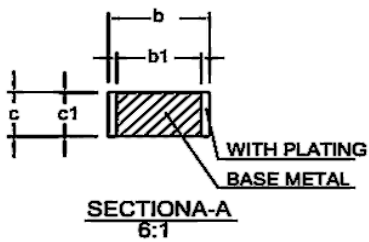
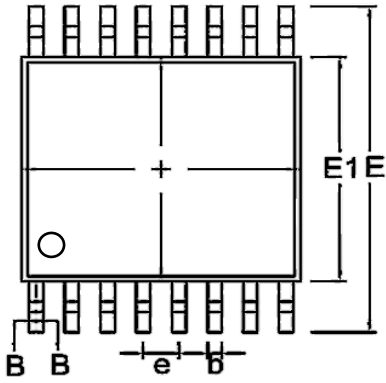
Package SOP16



SIZE	MIN./mm	MAX./mm
SYMBOL		
A	9.80	10.00
A1	0.356	0.456
A2	1.27TYP	
A3	0.302TYP	
B	3.85	3.95
B1	5.84	6.24
B2	5.00 TYP	
C	1.40	1.60
C1	0.61	0.71
C2	0.54	0.64
C3	0.05	0.25
C4	0.203	0.233
D	1.05 TYP	
D1	0.40	0.70
D2	0.15	0.25
R1	0.20TYP	
R2	0.20TYP	
01	8°~12°TYP4	
02	8°~12°TYP4	
03	0°~8°	
04	4°~12°	



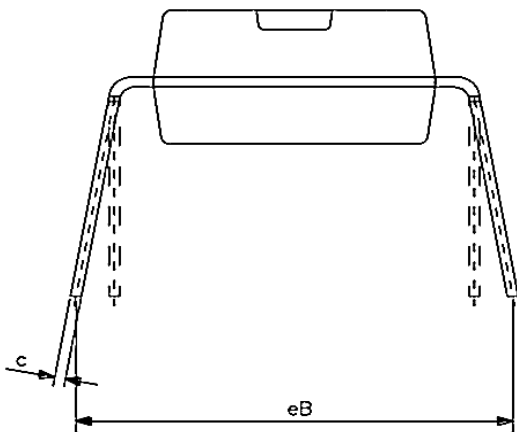
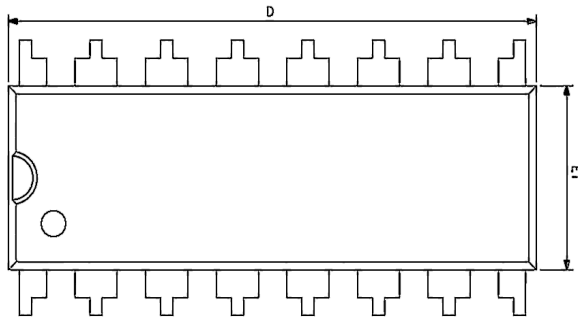
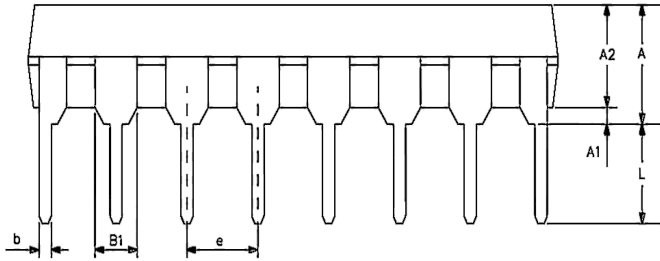
Package TSSOP16



SIZE SYMBOL	MIN./mm	TYP./mm	MAX./mm
A	--	--	1.20
A1	0.05		0.15
A2	0.90	1.00	1.05
b	0.20	--	0.30
b1	0.19	0.22	0.25
C	0.110	0.127	0.145
cl	0.12	0.13	0.14
D	4.86	4.96	5.06
E	6.20	6.40	6.60
E1	4.30	4.40	4.50
e	0.65BSC		
L	0.45	0.60	0.75
L1	1.00BSC		
	0°	--	8°



Package DIP16



SIZE SYMBOL	MIN./mm	MAX./mm
A2	3.20	3.60
A1	0.51	—
A	3.60	5.33
L	3.00	3.60
b	0.36	0.56
B1	1.52	
D	18.80	19.94
E1	6.20	6.60
e	2.54	
C	0.20	0.36
eB	7.62	9.30
R	0.20TYP	
R1	0.30TYP	
θ	0°	8°
θ_1	45°TYP	
θ_2	12°TYP	
θ_3	0°	8°
θ_4	0°	10°



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