Low Supply Current, 3V to 5.5V, 250kbps, 3-Driver/5-Receiver, Enhanced ESD Protection Smart RS-232 Transceivers
UM3243EEAS/UM3243EEUS/UM3243EESS/UM3243EEQA

General Description

The UM3243 series are 3-driver/5-receiver 3V-5.5V powered RS-232 transceivers featuring Auto Power-Off and low supply current, when no valid RS-232 level signal is sensed on any receiver inputs, the charge pump circuit and drivers will be powered off. Disconnection of the RS-232 cable or poweroff of the transmitters of the attaching peripherals will lead to Power-Off mode. When a valid level is applied to any RS-232 receiver inputs, the chip will turn on again. The Auto Power-Off mode helps to save power without changing the existing system.
The UM3243 transceivers have a regulated discontinuous mode dual charge pump power supply and low-dropout transmitters, which combine to deliver true RS-232 performance from a single +3V to +5.5V supply. Data rate of 250kbps is guaranteed.
The UM3243 needs only four 0.1μF capacitors in 3.3V operation, and can operate from input voltages ranging from +2.7V to +5.5V. They are ideal for 3.3V-only systems, mixed 3.3V and 5.0V systems, or 5.0V-only systems that require true RS-232 performance or EIA/TIA-562 levels of ±3.7V with supply voltages as low as 2.7V.
The UM3243 includes one complementary always-active receiver. This receiver can monitor an external device (such as a modem) in Power-Off. The UM3243 also includes an always-active $\overline{\text{INVALID}}$ output which indicates valid RS-232 signal levels on any receiver inputs. It is usually used in UART wakeup. The UM3243 also features enhanced ESD protection with ±15kV for human body mode and ±8kV for IEC61000-4-2 contact discharge mode.

Applications

- Industrial Controllers and Instruments
- Notebooks, Palmtop PCs and Laptops
- Networking Routers and Switches
- Peripherals
- Printers, PDAs and POS

Features

- Meets True EIA/TIA-232-F Standards from a +3.0V to +5.5V Power Supply
- Meets EIA/TIA-562 Levels of ±3.7V with Supply Voltages as Low as 2.7V
- Auto Power-Off Feature to Disable Driver Outputs when No Valid RS-232 Signal is Sensed
- 250kbps Minimum Transmission Rate
- 0.1μA (Typ) Low Power-Off Current
- Accepts 5V Logic Input with 3.3V Supply
- Latch-Up Performance Exceeds 200mA
- Enhanced ESD Specifications for RS-232 Pins:
  ±15kV Human Body Mode
  ±8kV IEC61000-4-2 Contact Discharge Mode
- Available in SSOP28, TSSOP28, SOP28 and QFN32 Packages

Ordering Information

Part Number	Temp. Range	Package Type	Shipping Qty
UM3243EEAS	-40℃ to +85℃	SSOP28	48pcs/tube
UM3243EEUS	-40℃ to +85℃	TSSOP28	3000pcs/13Inch Tape & Reel
UM3243EESS	-40℃ to +85℃	SOP28	25pcs/tube
UM3243EEQA	-40℃ to +85℃	QFN32 5.0×5.0	1000pcs/7Inch Tape & Reel

Absolute Maximum Ratings (Note 1)

Symbol	Parameter		Value	Unit
V_{CC}	Supply Voltage on V_{CC}		-0.3 to +6	V
V_+	Voltage on V_+		(V_{CC} - 0.3) to +7.5	V
V_-	Voltage on V_-		-7.5 to +0.3	V
	Voltage on TIN_, $\overline{\text{FORCEOFF}}$, FORCEON		-0.3 to +6V	V
	Voltage on ROUT_, $\overline{\text{INVALID}}$, ROUT2B		-0.3 to (V_{CC} + 0.3)	V
	Voltage on RIN_		±30	V
	Voltage on TOUT_		(V_- - 0.3) to (V_+ + 0.3)	V
	Short-Circuit Duration, TOUT_ to GND		Continuous	
P_D	Continuous Power Dissipation at T_A = 70℃	SSOP28	762	mW
		TSSOP28	696	
		SOP28	1000	
		QFN32	1500	
T_A	Operating Temperature Range		-40 to +85	℃
T_{STG}	Storage Temperature Range		-65 to +165	℃
T_L	Maximum Lead Temperature for Soldering 10 seconds		+300	℃

Note 1: Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Electrical Characteristics

(V_{CC}=+3.0V to +5.5V, C1- C4=0.1μF, T_A=T_{MIN} to T_{MAX}, unless otherwise noted. Typical values are at T_A=25℃)

Parameter	Symbol	Conditions		Min	Typ	Max	Unit
DC CHARACTERISTICS (V_{CC}=+3.3V or +5V, T_A=25℃)							
Supply Voltage		V_{CC}=3.3V		3.0	3.3	3.6	V
		V_{CC}=5.0V		4.5	5.0	5.5	
Supply Current, Auto Power-Off	I_{CC}	All RIN_ Open, $\overline{FORCEON}$=GND, $\overline{FORCEOFF}$=V_{CC}			0.1	10	μA
Supply Current, Forced Power-Off		$\overline{FORCEOFF}$=GND			0.1	10	μA
Supply Current, Normal		FORCEON=$\overline{FORCEOFF}$=V_{CC}, Other Input NC, All Outputs with No Load			0.6	1.0	mA
LOGIC INPUTS							
Input Logic Threshold Low		TIN_, FORCEON, $\overline{FORCEOFF}$				0.8	V
Input Logic Threshold High		TIN_, FORCEON, $\overline{FORCEOFF}$	V_{CC}=3.3V	2.0			V
			V_{CC}=5.0V	2.4			
Input Hysteresis	V_{hys}				0.2		V
Input Leakage Current	I_{IL}	FORCEON, $\overline{FORCEOFF}$			±0.01	±1.0	μA
		TIN_	Transmitter Disabled		±0.01	±1.0	μA
			Transmitter Enabled		±1	±5	μA
LOGIC OUTPUTS							
Output Voltage Low	V_{OL}	$\overline{INVALID}$, ROUT2B, ROUT_	I_{OL}=1.6mA			0.4	V
Output Voltage High	V_{OH}		I_{OH}=-1.0mA	V_{CC}-0.6	V_{CC}-0.1		V
Output Leakage Current	I_{OL}	ROUT_	Receivers Disabled, Connected to V_{CC} or GND		±0.05	±10	μA

Electrical Characteristics (Continued)

(V_{CC}=+3.0V to +5.5V, C1- C4=0.1μF, T_A=T_{MIN} to T_{MAX}, unless otherwise noted. Typical values are at T_A=25℃)

Parameter	Symbol	Conditions		Min	Typ	Max	Unit
RECEIVER INPUTS							
Input Voltage Range				-30		30	V
Input Threshold Low		RIN_	V_{CC} = 3.3V	0.8	1.15		V
			V_{CC} = 5.0V	0.8	1.55		
Input Threshold High			V_{CC} = 3.3V		1.35	2	V
			V_{CC} = 5.0V		1.75	2	
Input Hysteresis	V_{hys}				0.2		V
Input Resistance	R_i	T_A = +25℃		3	5	7	kΩ
TRANSMITTER OUTPUTS							
Output Voltage Swing	V_{OUT}	All Transmitter Outputs Loaded with 3kΩ to Ground		±5.0	±5.4		V
Output Short-Circuit Current	I_{OS}	Short to V_{CC} , GND or Other TXD Pin	V_{CC} = 3.3V		±20	±40	mA
			V_{CC} = 5.0V		±30	±50	mA
Output Leakage Current	I_{OL}	Transmitter Disabled, Connected to V+ or V-			±1	±10	μA

Electrical Characteristics (Continued)

(V_{CC}=+3.0V to +5.5V, C1- C4=0.1μF, T_A=T_{MIN} to T_{MAX}, unless otherwise noted. Typical values are at T_A=25℃)

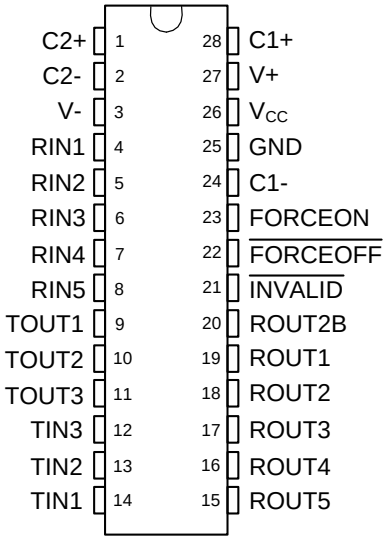
Parameter	Symbol	Conditions		Min	Typ	Max	Unit
TIMING CHARACTERISTICS							
Maximum Data Rate		R_L = 3kΩ to 7kΩ, C_L = 50pF to 1000pF, One Transmitter Switching			250		kbps
Receiver Propagation Delay	t_{PLH}, t_{PHL}	C_L = 150pF Figure 4	All Parts, Normal Operation		0.15		μs
Receiver Skew	$\|t_{PHL}-t_{PLH}\|$					0.1	μs
Receiver Output Enable Time	t_{EN}	C_L = 150pF, R_L = 3kΩ Figure 5				0.2	μs
Receiver Output Disable Time	t_{DIS}					0.2	μs
Transmitter Propagation Delay	t_{PLH}, t_{PHL}	R_L = 3kΩ, C_L = 2500pF, All Transmitters Loaded Figure 3			1.3		μs
Transmitter Skew	$\|t_{PHL}-t_{PLH}\|$					0.25	μs
Transition-Region Slew Rate	SR(tr)	T_A = +25℃, V_{CC} = 3.3V, R_L = 3kΩ to 7kΩ, C_L = 50pF to 1000pF, Measured from -3V to +3V or +3V to -3V, Figure 2		5	15	30	V/μs
ESD AND LATCH UP PERFORMANCE							
RIN_, TOUT_ ESD-Protection Voltage		Human Body Model			±15		kV
		IEC61000-4-2, Contact Discharge			±8		
Other Pins ESD-Protection Voltage		Human Body Model			±2		kV
Latch Up Performance		JEDEC Standard No.78D			±200		mA

Auto Power-Off Electrical Characteristics

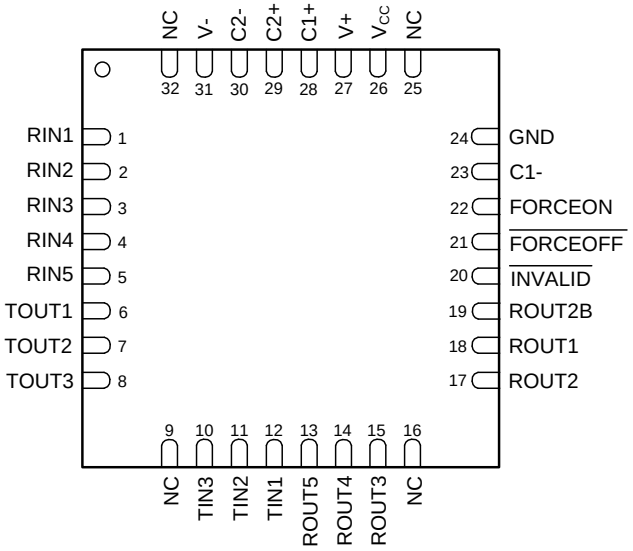
Over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (Figure 6)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Receiver Input Positive Threshold to INVALID Output High	$V_{IT+(valid)}$	$\overline{FORCEON}$=GND, $\overline{FORCEOFF}$=V_{CC}			2.7	V
Receiver Input Negative Threshold to INVALID Output High	$V_{IT-(valid)}$	$\overline{FORCEON}$=GND, $\overline{FORCEOFF}$=V_{CC}	-2.7			V
Receiver Input Threshold to INVALID Output Low	$V_{T(invalid)}$	$\overline{FORCEON}$=GND, $\overline{FORCEOFF}$=V_{CC}	-0.3		0.3	V
Receiver Positive or Negative Threshold to INVALID High	t_{valid}	$\overline{FORCEON}$=GND, $\overline{FORCEOFF}$=V_{CC}, V_{CC}=5V, Figure 6		1		μs
Receiver Positive or Negative Threshold to INVALID Low	$t_{invalid}$	$\overline{FORCEON}$=GND, $\overline{FORCEOFF}$=V_{CC}, V_{CC}=5V, Figure 6		30		μs
Receiver Edge to Charge Pump Setup	t_{en}	$\overline{FORCEON}$=GND, $\overline{FORCEOFF}$=V_{CC}, V_{CC}=5V, Figure 6		150		μs

Pin Configurations



SSOP28/TSSOP28/SOP28 (Top View)



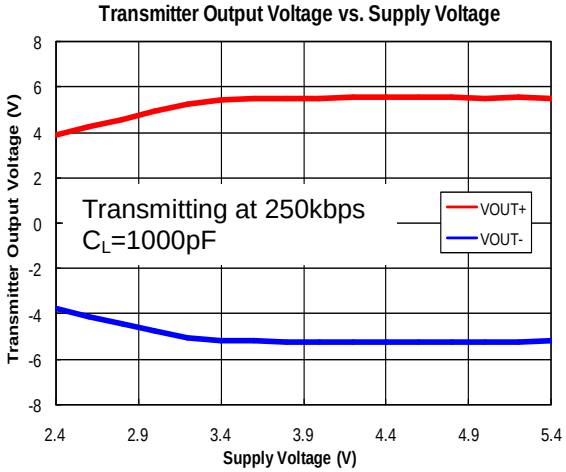
QFN32 5.0×5.0 (Top View)

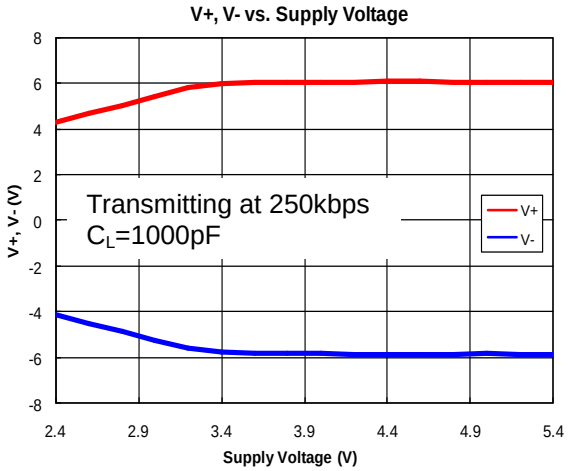
Pin Description

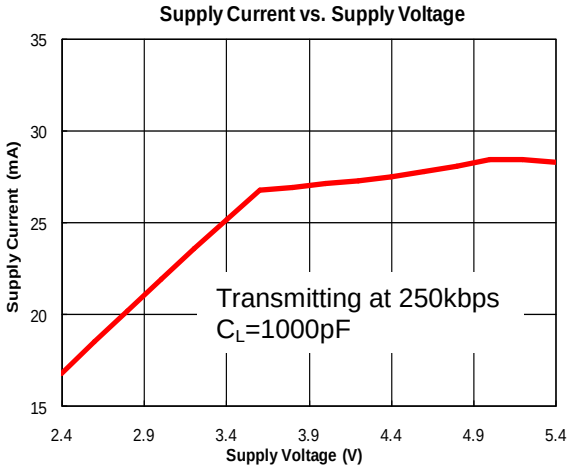
Pin No.		Pin Name	Function
UM3243EEAS/EEUS/EESS	UM3243EEQA		
1	29	C2+	Positive terminal of inverting charge-pump capacitor
2	30	C2-	Negative terminal of inverting charge-pump capacitor
3	31	V-	Negative voltage generated by the charge pump
4-8	1-5	RIN_	RS-232 Receiver Inputs
9,10,11	6,7,8	TOUT_	RS-232 Transmitter Outputs
12,13,14	10,11,12	TIN_	TTL/CMOS Transmitter Inputs
15-19	13,14,15,17,18	ROUT_	TTL/CMOS Receiver Outputs
20	19	ROUT2B	Non-Inverting Receiver Output—active in Power-Off
21	20	$\overline{\text{INVALID}}$	Output of the valid signal detector. $\overline{\text{INVALID}}$ is enabled high if a valid RS-232 level is present on any receiver inputs.
22	21	$\overline{\text{FORCEOFF}}$	Drive low to shut down transmitters and on-board power supply. This overrides all Automatic circuitry and FORCEON (See Function Tables).
23	22	FORCEON	Drive high to override automatic circuitry keeping transmitters on ($\overline{\text{FORCEOFF}}$ must be high) (See Function Tables).
24	23	C1-	Negative terminal of the voltage doubler charge-pump capacitor
25	24	GND	Ground
26	26	V_{CC}	+3.0V to +5.5V Supply Voltage
27	27	V+	Positive voltage generated by the charge pump
28	28	C1+	Positive terminal of the voltage doubler charge-pump capacitor
-	9,16,25,32	NC	No connected.

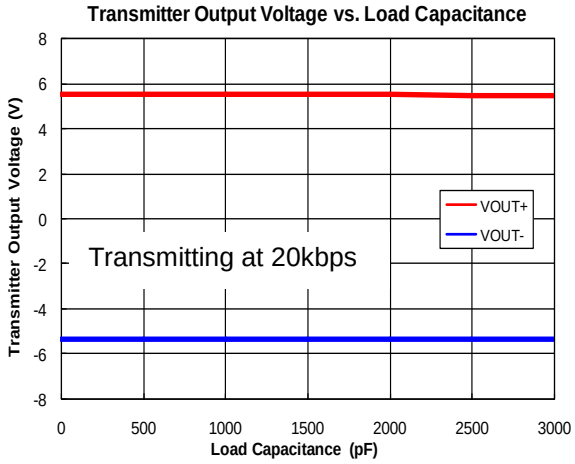
Typical Operating Characteristics

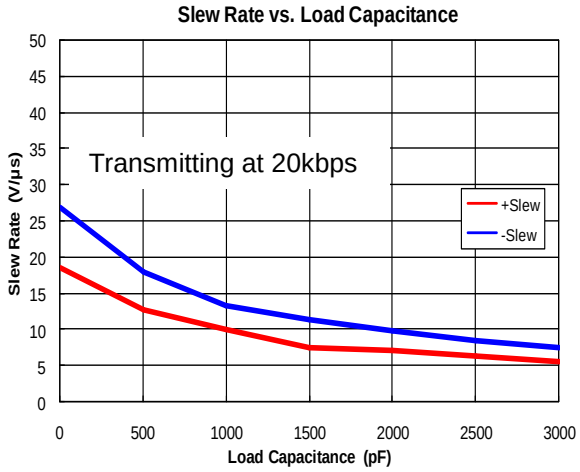
(V_{CC}=+3.3V, 0.47μF capacitors, all transmitters loaded with 3kΩ and C_L, T_A=25℃, unless otherwise noted.)

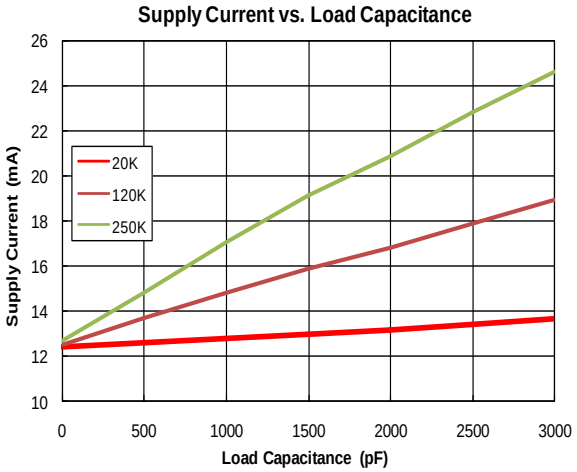






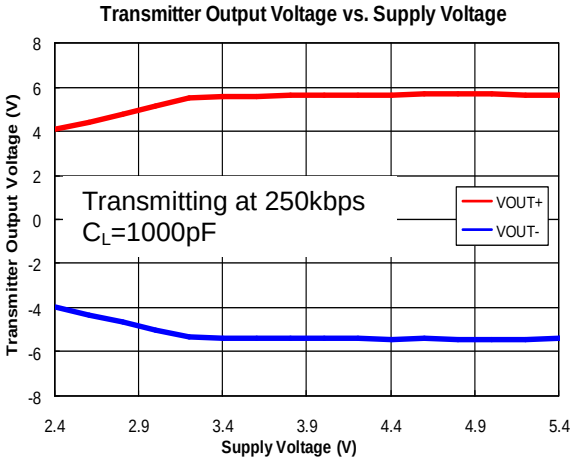


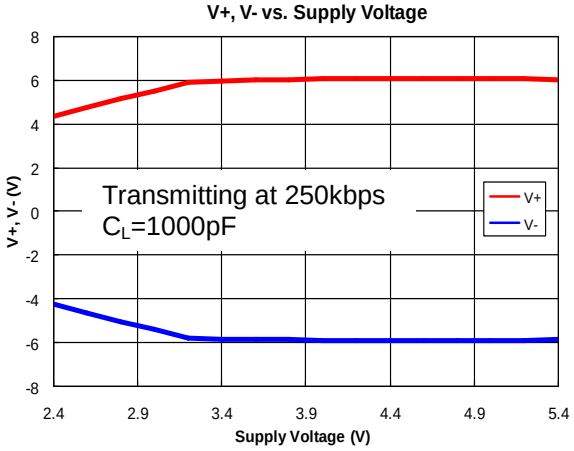




Typical Operating Characteristics (Continued)

(V_{CC}=+3.3V, 250kbps data rate, 0.47μF capacitors, all transmitters loaded with 5kΩ and C_L, T_A=25℃, unless otherwise noted.)





Function Tables

Table 1. Each Transmitter (Note 2)

INPUTS				OUTPUT	TRANSMITTER STATUS
TIN	FORCEON	$\overline{\text{FORCEOFF}}$	VALID RIN RS-232 LEVEL	TOUT	
X	X	L	X	Z	Forced Power-Off
L	H	H	X	H	Normal Operation with Forced Power-On
H	H	H	X	L	
L	L	H	Yes	H	Normal Operation with Auto Power-On
H	L	H	Yes	L	
X	L	H	No	Z	Auto Power-Off

Note 2: H=high level, L=low level, X=irrelevant, Z=high impedance

Table 2. Each Receiver (Note 3)

INPUTS			OUTPUT	RECEIVER STATUS
RIN	FORCEON	$\overline{\text{FORCEOFF}}$	ROUT	
X	X	L	Z	Forced Power-Off
L	X	H	H	Normal Operation
H	X	H	L	
Open	X	H	H	

Table 3. ROUT2B and Outputs $\overline{\text{INVALID}}$ (Note 3)

INPUTS				OUTPUTS		OUTPUT STATUS
VALID RIN RS-232 LEVEL	RIN2	FORCEON	$\overline{\text{FORCEOFF}}$	$\overline{\text{INVALID}}$	ROUT2B	
Yes	L	X	X	H	L	Always Active
Yes	H	X	X	H	H	
Yes	Open	X	X	H	L	
No	Open	X	X	L	L	

Note 3: H=high level, L=low level, X=irrelevant, Z=high impedance (off), Open=input disconnected or connected driver off

Logic Diagram

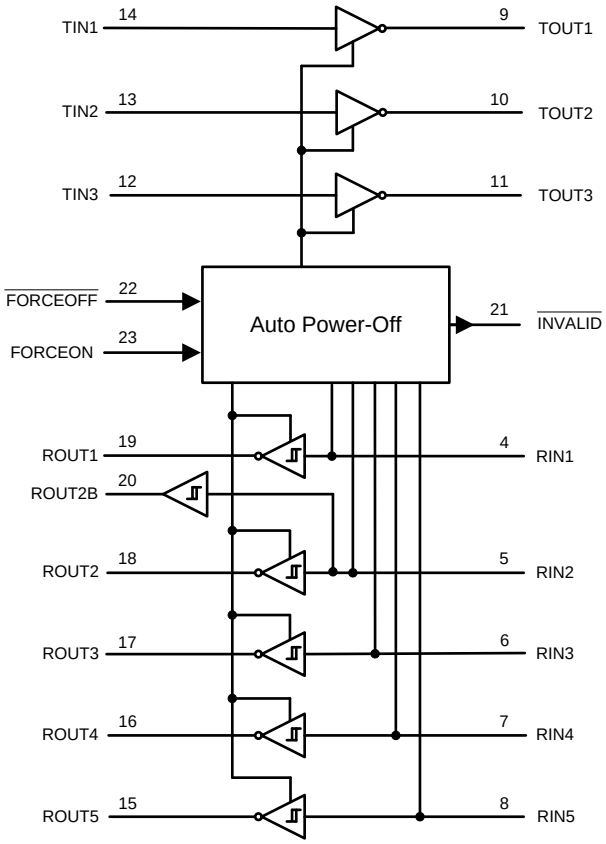
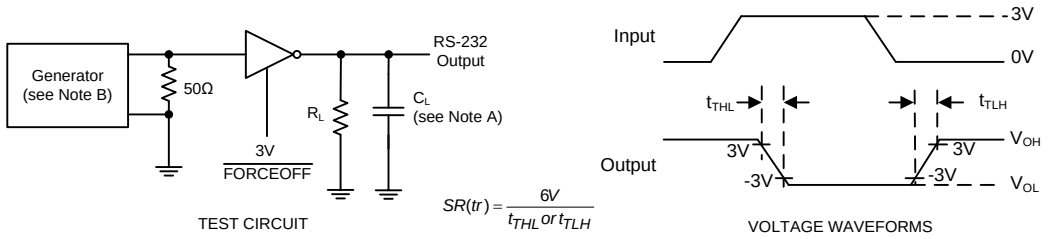


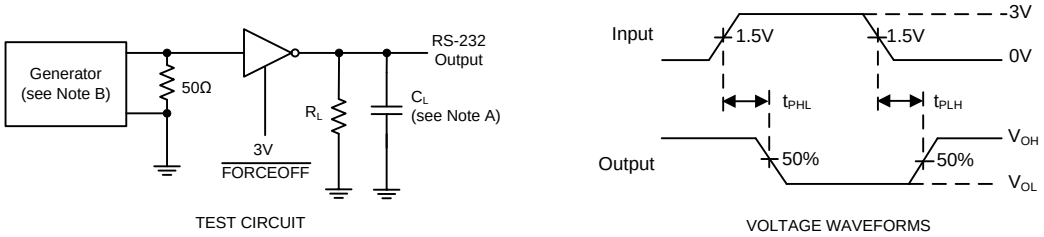
Figure 1

Parameter Measurement Information



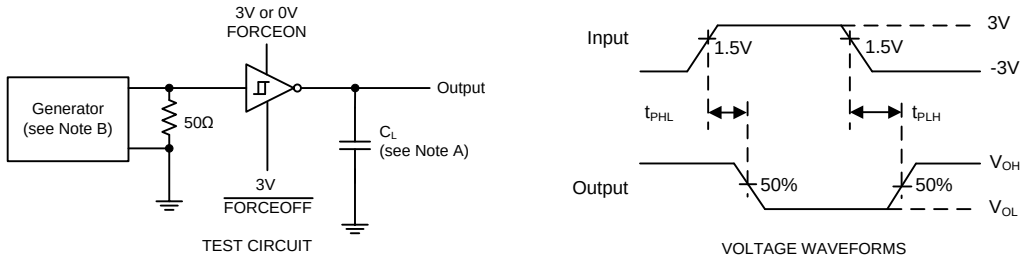
NOTES: A. C_L includes probe and jig capacitance.
B. The pulse generator has the following characteristics: Z_O=50Ω, 50% duty cycle, t_r≤10ns, t_f≤10ns.

Figure 2. Transmitter Slew Rate



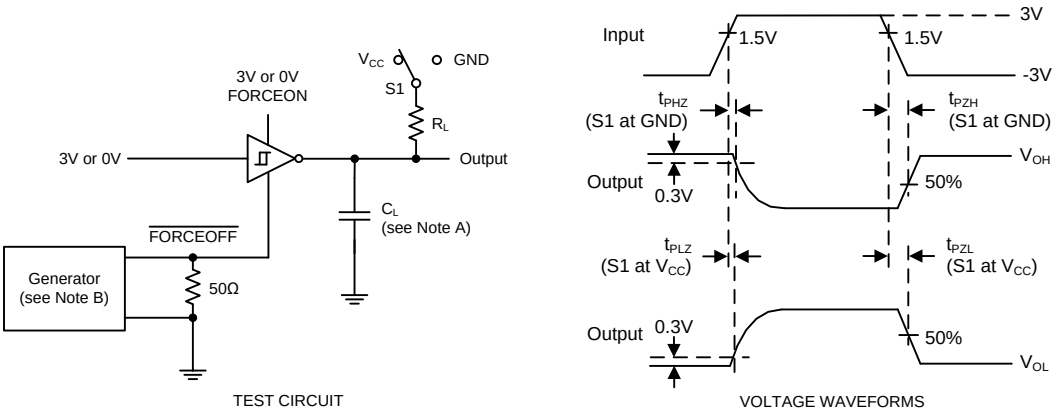
NOTES: A. C_L includes probe and jig capacitance.
B. The pulse generator has the following characteristics: PRR=250kbit/s, Z_O=50Ω, 50% duty cycle, t_r≤10ns, t_f≤10ns.

Figure 3. Transmitter Pulse Skew



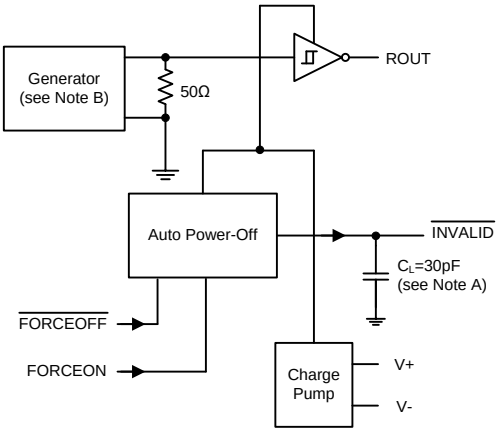
NOTES: A. C_L includes probe and jig capacitance.
B. The pulse generator has the following characteristics: Z_O=50Ω, 50% duty cycle, t_r≤10ns, t_f≤10ns.

Figure 4. Receiver Propagation Delay Times

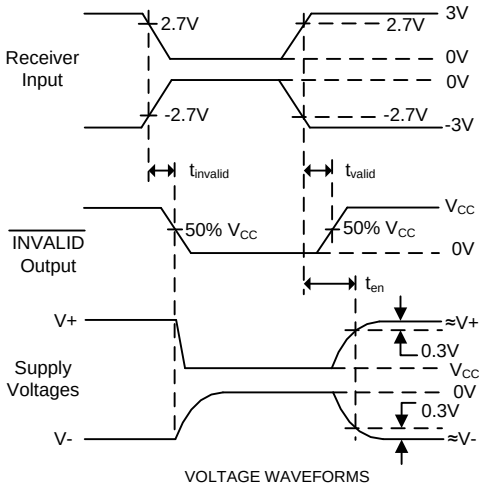


NOTES: A. C_L includes probe and jig capacitance.
B. The pulse generator has the following characteristics: Z_O=50Ω, 50% duty cycle, t_r≤10ns, t_f≤10ns.
C. t_{PLZ} and t_{PHZ} are the same as t_{dis}.
D. t_{PZL} and t_{PZH} are the same as t_{en}.

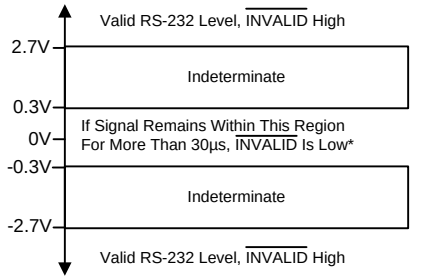
Figure 5. Receiver Enable and Disable Times



TEST CIRCUIT



VOLTAGE WAVEFORMS



* Auto Power-Off disables transmitters and reduces supply current to 1µA.

NOTES: A. C_L includes probe and jig capacitance.
B. The pulse generator has the following characteristics: PRR=5kbit/s, Z_O=50Ω, 50% duty cycle, $t_r \leqslant 10$ns, $t_f \leqslant 10$ns.

Figure 6. $\overline{\text{INVALID}}$ Propagation Delay Times and Supply Enabling Time

Typical Operating Circuits

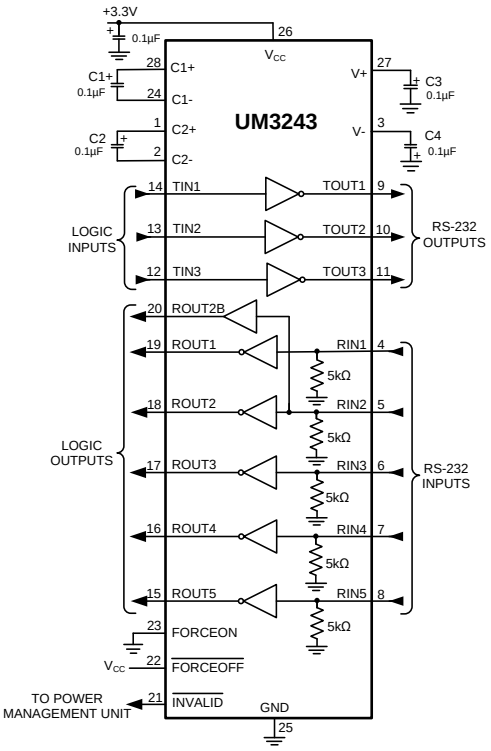


Figure 7

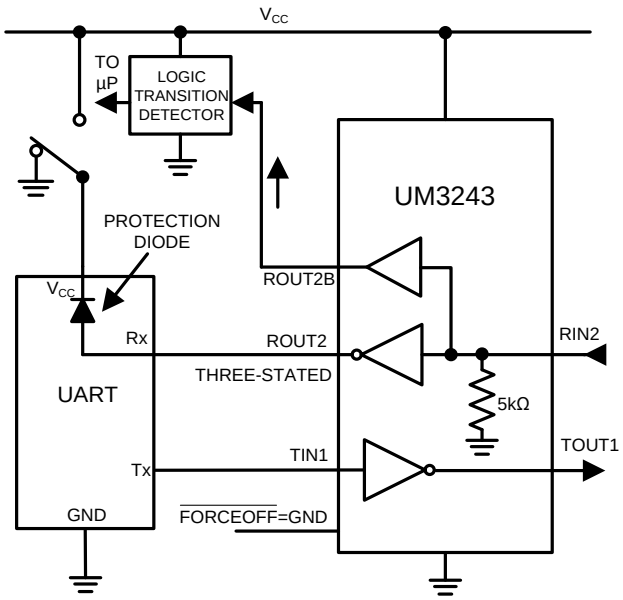
Application Information

RS-232 Receivers

The UM3243's receivers convert RS-232 signals to CMOS-logic output levels. All receivers have inverting three-state outputs and can be active or inactive. The UM3243's receivers are high-impedance when the part is in Forced Power-Off mode ($\overline{\text{FORCEOFF}}$=low).

The UM3243 features an always-active complementary output (ROUT2B). ROUT2B monitors receiver activity while the other receivers are high-impedance. This allows Ring Indicator to be monitored without forward biasing other devices connected to the receiver outputs. This is ideal for systems where V_{CC} drops to 0 in Power-Off to accommodate peripherals such as UARTs (Figure 8).

The UM3243 features an $\overline{\text{INVALID}}$ output that is enabled low when no valid RS-232 signal levels have been detected on all receiver inputs. $\overline{\text{INVALID}}$ is functional in any mode (Figure 6).



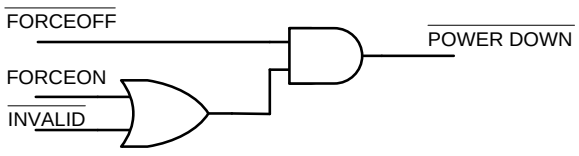
UM3243: In Power-Off, ROUT2B is used to monitor external devices and ROUT2 is three-stated, eliminating a current path through the UART's protection diode.

Figure 8. The UM3243 detects RS-232 activity when the UART and interface are powered off.

Auto Power-Off and Wakeup

The UM3243 achieves a 0.1µA supply current Auto Power-Off feature, which operates when FORCEON is low and $\overline{\text{FORCEOFF}}$ is high. When the device senses no valid signal levels on all receiver inputs for $t_{invalid}$ time (typically 30µs), the onboard charge pump and drivers are powered off, reducing supply current to 0.1µA. This occurs if the RS-232 cable is disconnected or the connected peripheral transmitters are turned off. The device turns on again when a valid level is applied to any RS-232 receiver input for t_{valid} time (typically 1µs). The charge pump will set up after t_{en} time (typically 150µs). As a result, the system saves power without changes to the existing system.

Table 3 and Figure 9 summarize the UM3243 operating modes. FORCEON and $\overline{\text{FORCEOFF}}$ override Auto Power-Off. When neither control is asserted, the IC will select between these states automatically, based on receiver input levels. Figure 6 depicts valid and invalid RS-232 receiver levels and timing diagram for Auto Power-Off operation.



$\overline{\text{INVALID}}$ is an internally generated signal that is used by the Auto Power-Off logic and appears as an output of the device.

$\overline{\text{POWER DOWN}}$ is only an internal signal. It controls the operational status of the transmitters and the power supplies.

Figure 9. UM3243 Auto Power-Off Logic

RS-232 Transmitters

The transmitters are inverting level translators that convert CMOS-logic levels to EIA/TIA-232 levels. They guarantee a 250kbps data rate with worst-case loads of 3kΩ in parallel with 1000pF, providing compatibility with PC-to-PC communication software. Transmitters can be paralleled to drive multiple receivers. In Power-Off mode (See Table 1), the transmitters are disabled and the outputs are forced into a high-impedance state.

Dual Charge Pump Voltage Converter and Capacitor Selection

The UM3243's internal power supply consists of a regulated dual charge pump that provides output voltages of +6V (doubling charge pump) and -6V (inverting charge pump), over the +3.0V to +5.5V V_{CC} range. The charge pump operates in discontinuous mode: if the output voltage is less than 6V, the charge pump is enabled; if the output voltage exceeds 6V, the charge pump is disabled. The charge pump requires a flying capacitor (C1, C2) and a reservoir capacitor (C3, C4) to generate the V+ and V- supplies.

The capacitor type used for C1–C4 is not critical for proper operation; either polarized or non-polarized capacitors may be used. The charge pump requires 0.1μF capacitors for 3.3V operation. For other supply voltages, refer to Table 4 for required capacitor values. Do not use values smaller than those listed in Table 4. Increasing the capacitor values (e.g., by a factor of 2) reduces ripple on the transmitter outputs and slightly reduces power consumption. When using the minimum required capacitor values, make sure the capacitor value does not degrade excessively with temperature. If in doubt, use capacitors with a larger nominal value. The capacitor's equivalent series resistance (ESR) usually rises at low temperatures and influences the amount of ripple on V+ and V-.

Table 4. Required Capacitor Values

V_{CC} (V)	C1, C2, C3, C4 (μF)
3.15 to 3.6	0.1
4.5 to 5.5	0.1
3.0 to 5.5	0.47
2.4 to 3.0	0.47

High Data Rates

The UM3243 maintains the RS-232 ±5.0V minimum transmitter output voltage even at high data rates. Figure 10 shows a transmitter loopback test circuit. Figure 11 shows a loopback test result at 120kbps, and Figure 12 shows the same test at 250kbps. For Figure 11, all three transmitters were driven simultaneously at 120kbps into RS-232 loads in parallel with 1000pF. For Figure 12, a single transmitter was driven at 250kbps, and all three transmitters were loaded with an RS-232 receiver in parallel with 1000pF.

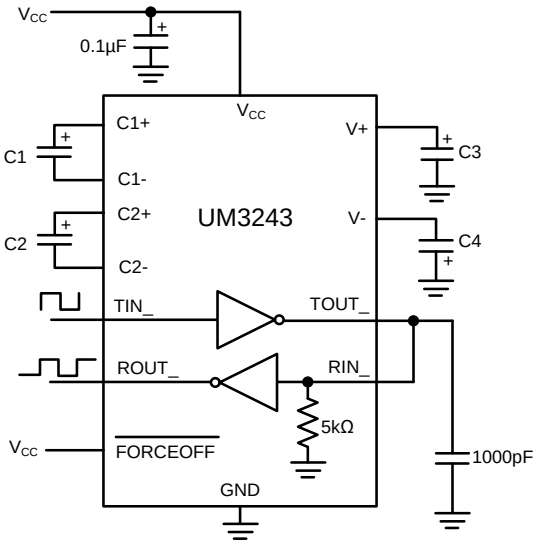


Figure 10. Loopback Test Circuit

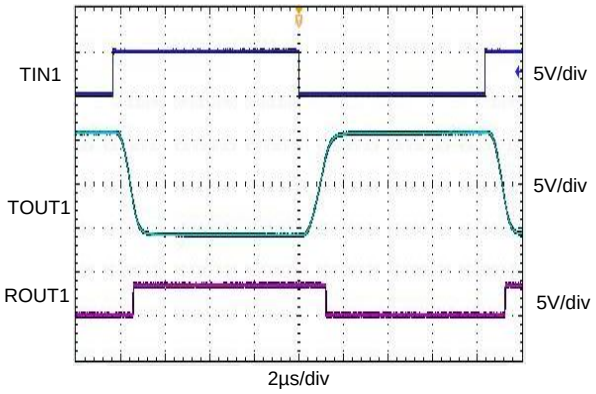


Figure 11. Loopback Test Result at 120kbps

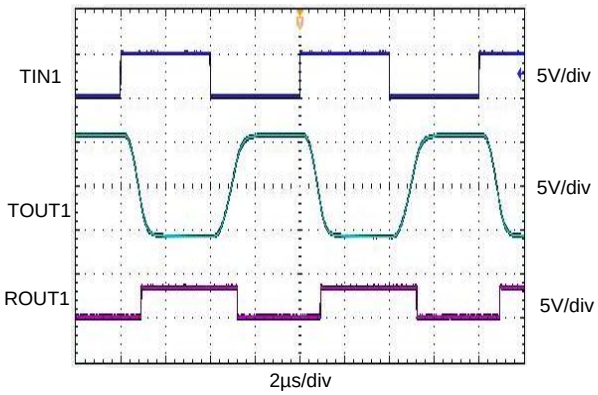
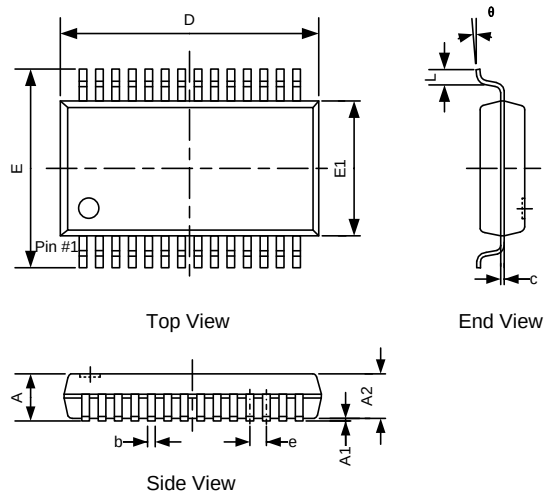


Figure 12. Loopback Test Result at 250kbps

Package Information

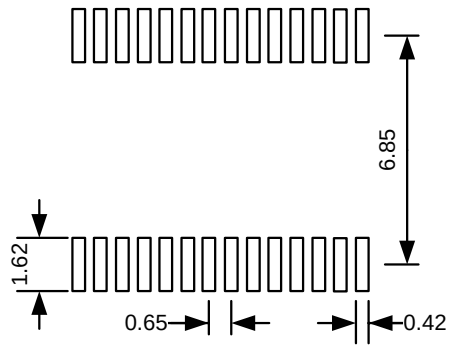
UM3243EEAS: SSOP28

Outline Drawing



Symbol	DIMENSIONS			
	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	-	2.00	-	0.079
A1	0.05	-	0.002	-
A2	1.65	1.85	0.065	0.073
b	0.22	0.38	0.009	0.015
c	0.09	0.25	0.004	0.010
D	9.90	10.50	0.390	0.413
E	7.40	8.20	0.291	0.323
E1	5.00	5.60	0.197	0.220
e	0.65BSC		0.026BSC	
L	0.55	0.95	0.022	0.037
θ	0 °	8 °	0 °	8 °

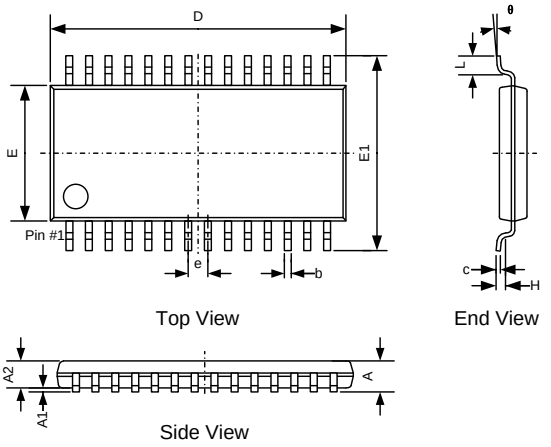
Land Pattern



NOTES:
1. Compound dimension: 10.20×5.30;
2. Unit: mm;
3. General tolerance ±0.05mm unless otherwise specified;
4. The layout is just for reference.

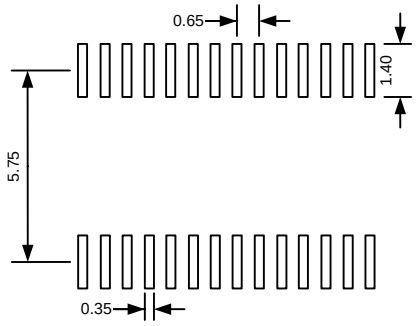
UM3243EEUS: TSSOP28

Outline Drawing



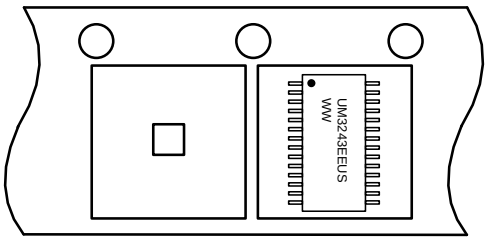
Symbol	DIMENSIONS			
	MILLIMETERS		INCHES	
	Min	Max	Min	Max
D	9.60	9.80	0.378	0.386
E	4.30	4.50	0.169	0.177
b	0.19	0.30	0.007	0.012
c	0.09	0.20	0.004	0.008
E1	6.25	6.55	0.246	0.258
A	-	1.20	-	0.047
A2	0.80	1.00	0.031	0.039
A1	0.05	0.15	0.002	0.006
e	0.65BSC		0.026BSC	
L	0.50	0.70	0.020	0.028
H	0.25TYP		0.010TYP	
θ	1°	7°	1°	7°

Land Pattern



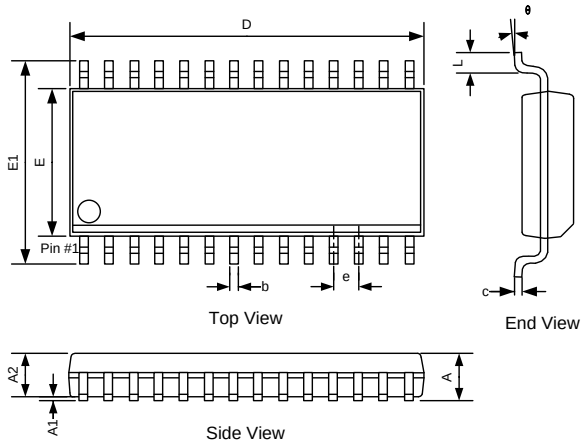
NOTES:
1. Compound dimension: 9.70×4.40;
2. Unit: mm;
3. General tolerance ±0.05mm unless otherwise specified;
4. The layout is just for reference.

Tape and Reel Orientation



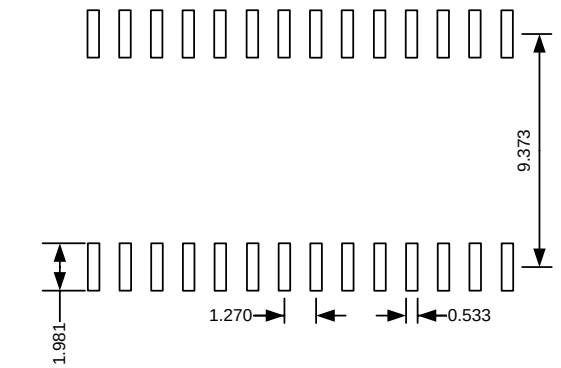
UM3243EESS: SOP28

Outline Drawing



Symbol	DIMENSIONS			
	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	2.35	2.65	0.093	0.104
A1	0.10	0.30	0.004	0.012
A2	2.29	2.50	0.090	0.098
b	0.33	0.51	0.013	0.020
c	0.204	0.33	0.008	0.013
D	17.70	18.10	0.697	0.713
E	7.40	7.70	0.291	0.303
E1	10.21	10.61	0.402	0.418
e	1.27BSC		0.050BSC	
L	0.40	1.27	0.016	0.050
θ	0 °	8 °	0 °	8 °

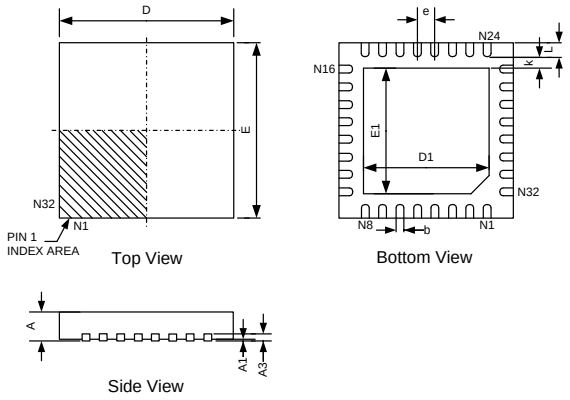
Land Pattern



NOTES:
1. Compound dimension: 17.90×7.55;
2. Unit: mm;
3. General tolerance ±0.05mm unless otherwise specified;
4. The layout is just for reference.

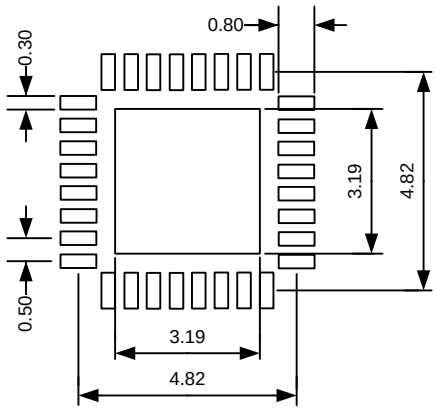
UM3243EEQA: QFN32 5.0×5.0

Outline Drawing



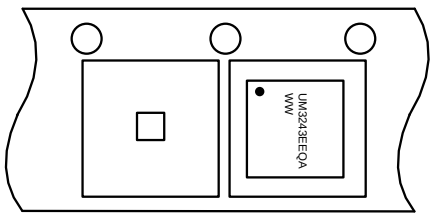
Symbol	DIMENSIONS			
	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A3	0.203REF		0.008REF	
D	4.924	5.076	0.194	0.200
E	4.924	5.076	0.194	0.200
D1	3.300	3.500	0.130	0.138
E1	3.300	3.500	0.130	0.138
k	0.200	-	0.008	-
b	0.200	0.300	0.008	0.012
e	0.500TYP		0.020TYP	
L	0.324	0.476	0.013	0.019

Land Pattern



NOTES:
1. Compound dimension: 5.00×5.00;
2. Unit: mm;
3. General tolerance ±0.05mm unless otherwise specified;
4. The layout is just for reference.

Tape and Reel Orientation



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