тоитз Г

TOUT1

TOUT2 3

ROUT2 5

RIN2 4

TIN2 6

TIN1 7 ROUT1 8

RIN1 9

GND 10

V_{CC} [] 11

C1+ 12

V_{DD} [] 13

C1- 🛛 14

2

SLLS137F - MAY 1992 - REVISED FEBRUARY 2001

28 TOUT4

26 ROUT3

25 SHUTDOWN

27 RIN3

24 1 EN

23 RIN4

21 TIN4

20 TIN3

18 RIN5

17 V_{SS}

16 C2-

15 C2+

22 ROUT4

19 ROUT5

DW PACKAGE (TOP VIEW)

-	•		<u>.</u>	- 14	-	~	
	Operates	With	Single	5-V	Power	Supp	ly

- Meets or Exceeds the Requirements of TIA/EIA-232-F and ITU Recommendation V.28
- Improved Performance Replacement for MAX241
- Operates at Data Rates up to 100 kbit/s Over a 3-m Cable
- Low-Power Shutdown Mode . . . \leq 1 μ A Typ
- LinBiCMOS[™] Process Technology
- Four Drivers and Five Receivers
- ±30-V Input Levels
- 3-State TTL/CMOS Receiver Outputs
- ±9-V Output Swing With a 5-V Supply
- Applications
 - TIA/EIA-232-F Interface
 - Battery-Powered Systems
 - Terminals
 - Modems
 - Computers
- Packaged in Plastic Small-Outline Package

description

The SN75LBC241 is a low-power LinBiCMOS[™] line-interface device containing four independent drivers and five receivers. It is designed as a plug-in replacement for the Maxim MAX241. The SN75LBC241 provides a capacitive-charge-pump voltage generator to produce RS-232 voltage levels from a 5-V supply. The charge-pump oscillator frequency is 20 kHz. Each receiver converts RS-232 inputs to 5-V TTL/CMOS levels. The receivers have a typical threshold of 1.2 V and a typical hysteresis of 0.5 V and can accept ±30-V inputs. Each driver converts TTL/CMOS input levels into RS-232 levels.

The SN75LBC241 includes a receiver, a 3-state control line, and a low-power shutdown control line. When the \overline{EN} line is high, receiver outputs are placed in the high-impedance state. When \overline{EN} is low, normal operation is enabled.

The shutdown mode reduces power dissipation to less than 5μ W, typically. In this mode, receiver outputs have high impedance, driver outputs are turned off, and the charge-pump circuit is turned off. When SHUTDOWN is high, the shutdown mode is enabled. When SHUTDOWN is low, normal operation is enabled.

This device has been designed to conform to TIA/EIA-232-F and ITU Recommendation V.28.

The SN75LBC241 has been designed using LinBiCMOS technology and cells contained in the Texas Instruments LinASIC[™] library. Use of LinBiCMOS circuitry increases latch-up immunity in this device over an all-CMOS design.

The SN75LBC241 is characterized for operation from 0°C to 70°C.



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

LinBiCMOS and LinASIC are trademarks of Texas Instruments

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.



Copyright © 2001, Texas Instruments Incorporated

SLLS137F - MAY 1992 - REVISED FEBRUARY 2001

logic symbol[†]



[†] This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

logic diagram (positive logic)





SLLS137F - MAY 1992 - REVISED FEBRUARY 2001

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)[†]

Input supply voltage range, V _{CC} (see Note 1)	
Positive output supply voltage range, V _{DD}	V _{CC} –0.3 V to 15 V
Negative output supply voltage range, $\overline{V_{SS}}$	0.3 V to –15 V
Input voltage range, VI: Driver	–0.3 V to V _{CC} + 0.3 V
Receiver	±30 V
Output voltage range, V _O : TOUT	V _{SS} –0.3 V to V _{DD} + 0.3 V
ROUT	–0.3 V to V _{CC} + 0.3 V
Short-circuit duration: TOUT	Ūnlimited
Continuous total dissipation	See Dissipation Rating Table
Package thermal impedance, θ_{JA} (see Note 2)	
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds .	
Storage temperature range, T _{stg}	

[†] 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 under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTES: 1. All voltage values are with respect to the network ground terminal.

2. The package thermal impedance is calculated in accordance with JESD 51-7.

DISSIPATION RATING TABLE

PACKAGE	T _A ≤ 25°C	OPERATING FACTOR	T _A = 70°C
	POWER RATING	ABOVE T _A = 25°C	POWER RATING
DW	1603 mW	12.8 mW/°C	1026 mW

recommended operating conditions

			MIN	NOM	MAX	UNIT
VCC	Supply voltage	Supply voltage, V _{CC}	4.5	5	5.5	V
	High lovel input voltage	TIN	2			V
VIH	High-level input voltage	EN, SHUTDOWN	2.4			v
VIL	Low-level input voltage	TIN, EN, SHUTDOWN			0.8	V
	External charge-pump capacitor	C1–C4 (see Figure 5)	1			μF
	External charge pump conspirer voltage rating	C1, C3 (see Figure 5)	6.3			V
	External charge-pump capacitor voltage failing	C2, C4 (see Figure 5)	16			v
VI	Receiver input voltage				±30	V
Τ _Α	Operating free-air temperature		0		70	°C



SLLS137F - MAY 1992 - REVISED FEBRUARY 2001

electrical characteristics over recommended ranges of supply voltage and operating free-air temperature range (unless otherwise noted)

	PARAMETER	TEST CONDITIONS	MIN	TYP†	MAX	UNIT	
Vau	High lovel output voltage	TOUT	$R_L = 3 k\Omega$ to GND, See Note 3	5	9		V
⊻ОН	High-level oulput voltage	ROUT	$I_{OH} = -1 \text{ mA}$	3.5			v
Vai		TOUT	$R_L = 3 k\Omega$ to GND, See Note 4		-9‡	-5	V
VOL	Low-level output voltage	ROUT	I _{OL} = 3.2 mA			0.4	v
VIT+	Receiver positive-going input threshold voltage	RIN	$V_{CC} = 5 V$, $T_A = 25^{\circ}C$		1.7	2.4	V
V_{IT-}	Receiver negative-going input threshold voltage	RIN	$V_{CC} = 5 V$, $T_A = 25^{\circ}C$	0.8	1.2		V
V _{hys}	Input hysteresis voltage (V _{IT+} – V _{IT} –)	RIN	$V_{CC} = 5 V$		0.5	1	V
ri	Receiver input resistance	RIN	$V_{CC} = 5 V$, $T_A = 25^{\circ}C$	3	5	7	kΩ
r _o	Output resistance	тоит	$V_{DD} = V_{SS} = V_{CC} = 0,$ $V_{O} = \pm 2 V$	300			Ω
los	Short-circuit output current§	TOUT	$V_{CC} = 5.5 V, \qquad V_{O} = 0$		±10		mA
IIS	Short-circuit input current	TIN	$V_{I} = 0$			200	μA
100	Supply ourrent		V_{CC} = 5.5 V, T _A = 25°C, All outputs open		4	8	m 4
UCC	Supply current		All outputs open, T _A = 25°C, SHUTDOWN high		1	10	mA

[†] All typical values are at $V_{CC} = 5 V$, $T_A = 25^{\circ}C$.

[‡] The algebraic convention, in which the least positive (most negative) value is designated minimum, is used in this data sheet for logic voltage levels only.

§ Not more than one output should be shorted at one time.

NOTES: 3. Total IOH drawn from TOUT1, TOUT2, TOUT3, TOUT4, and VDD terminals should not exceed 12 mA.

4. Total IOL drawn from TOUT1, TOUT2, TOUT3, TOUT4, and VSS terminals should not exceed -12 mA.

switching characteristics, $V_{CC} = 5 V$, $T_A = 25^{\circ}C$

	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
^t PLH(R)	Receiver propagation-delay time, low- to high-level output	See Figure 1		500		ns
^t PHL(R)	Receiver propagation-delay time, high- to low-level output	See Figure 1		500		ns
^t PZH	Receiver output-enable time to high level	See Figure 4		100		ns
^t PZL	Receiver output-enable time to low level	See Figure 4		100		ns
^t PHZ	Receiver output-disable time from high level	See Figure 4		50		ns
^t PLZ	Receiver output-disable time from low level	See Figure 4		50		ns
SR	Driver slew rate	R_L = 3 k Ω to 7 k Ω , C_L = 2500 pF, See Figure 3			30	V/µs
SR _(tr)	Driver transition-region slew rate	R_L = 3 kΩ to 7 kΩ, C_L = 2500 pF, See Figure 3	4	6		V/µs



SLLS137F - MAY 1992 - REVISED FEBRUARY 2001

PARAMETER MEASUREMENT INFORMATION



NOTES: A. The pulse generator has the following characteristics: $Z_O = 50 \Omega$, duty cycle $\leq 50\%$.

B. CL includes probe and jig capacitance.

C. All diodes are 1N3064 or equivalent.





NOTES: A. The pulse generator has the following characteristics: $Z_O = 50 \Omega$, duty cycle $\leq 50\%$. B. C_L includes probe and jig capacitance.

Figure 2. Driver Test Circuit and Waveforms for $t_{\mbox{PHL}}$ and $t_{\mbox{PLH}}$ Measurement (5- μs Input)



NOTES: A. The pulse generator has the following characteristics: $Z_0 = 50 \Omega$, duty cycle $\leq 50\%$. B. C_L includes probe and jig capacitance.



SLLS137F - MAY 1992 - REVISED FEBRUARY 2001



PARAMETER MEASUREMENT INFORMATION

- NOTES: A. The pulse generator has the following characteristics: $Z_O = 50 \Omega$, duty cycle $\leq 50\%$. B. CL includes probe and jig capacitance.

Figure 4. Receiver Output Enable and Disable Timing



SLLS137F - MAY 1992 - REVISED FEBRUARY 2001



Figure 5. Typical Operating Circuit



PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	e Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
SN75LBC241DW	ACTIVE	SOIC	DW	28	20	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75LBC241DWE4	ACTIVE	SOIC	DW	28	20	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75LBC241DWG4	ACTIVE	SOIC	DW	28	20	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75LBC241DWR	ACTIVE	SOIC	DW	28	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75LBC241DWRE4	ACTIVE	SOIC	DW	28	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75LBC241DWRG4	ACTIVE	SOIC	DW	28	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

⁽¹⁾ The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

⁽²⁾ Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

⁽³⁾ MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

Important Information and Disclaimer:The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

TEXAS INSTRUMENTS www.ti.com

TAPE AND REEL INFORMATION





QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal	

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN75LBC241DWR	SOIC	DW	28	1000	330.0	32.4	11.35	18.67	3.1	16.0	32.0	Q1



PACKAGE MATERIALS INFORMATION

11-Mar-2008



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN75LBC241DWR	SOIC	DW	28	1000	346.0	346.0	49.0

DW (R-PDSO-G28)

PLASTIC SMALL OUTLINE



NOTES:

A. All linear dimensions are in inches (millimeters). Dimensioning and tolerancing per ASME Y14.5M-1994.

B. This drawing is subject to change without notice.

C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).

D. Falls within JEDEC MS-013 variation AE.



IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products		Applications	
Audio	www.ti.com/audio	Communications and Telecom	www.ti.com/communications
Amplifiers	amplifier.ti.com	Computers and Peripherals	www.ti.com/computers
Data Converters	dataconverter.ti.com	Consumer Electronics	www.ti.com/consumer-apps
DLP® Products	www.dlp.com	Energy and Lighting	www.ti.com/energy
DSP	dsp.ti.com	Industrial	www.ti.com/industrial
Clocks and Timers	www.ti.com/clocks	Medical	www.ti.com/medical
Interface	interface.ti.com	Security	www.ti.com/security
Logic	logic.ti.com	Space, Avionics and Defense	www.ti.com/space-avionics-defense
Power Mgmt	power.ti.com	Transportation and Automotive	www.ti.com/automotive
Microcontrollers	microcontroller.ti.com	Video and Imaging	www.ti.com/video
RFID	www.ti-rfid.com	Wireless	www.ti.com/wireless-apps
RF/IF and ZigBee® Solutions	www.ti.com/lprf		

TI E2E Community Home Page

e2e.ti.com

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265 Copyright © 2011, Texas Instruments Incorporated