DS34C87 CMOS Quad TRI-STATE ® Differential Line Driver

General Description

The DS34C87 is a quad differential line driver designed for digital data transmission over balanced lines. The DS34C87 meets all the requirements of EIA standard RS-422 while retaining the low power characteristics of CMOS. This en ables the construction of serial and terminal interfaces while maintaining minimal power consumption.

The DS34C87 accepts TTL or CMOS input levels and trans- lates these to Rs-422 output levels. This part uses special output circuitry that enables the individual drivers to power down without loading down the bus. The DS34C87 also in- cludes special power up and down circuitry which will TRI- STATE the outputs during power up or down， preventing spurious glitches on its outputs. This device has separate enable circuitry for each pair of the four drivers. The DS34C87 is pin compatible to the DS3487.

All inputs are protected against damage due to electrostatic discharge by diodes to Vcc and ground.

DIP-16

SOP-16

TSSOP-16

Features

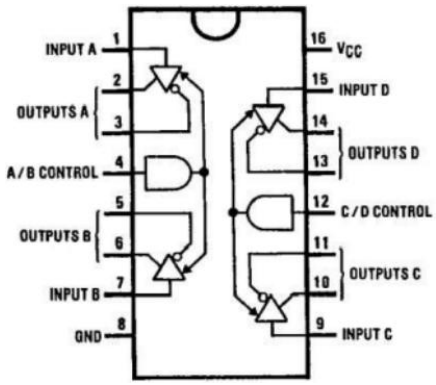
- TTL input compatible.
- Typical propagation delays: 8 ns.
- Typical output skew: 0.5 ns.
- Outputs won't load line when Vcc =0V.
- Meets the requirements of EIA standard RS-422.
- Operation from single 5V supply.
- TRI-STATE outputs for connection to system buses.
- Low quiescent current.

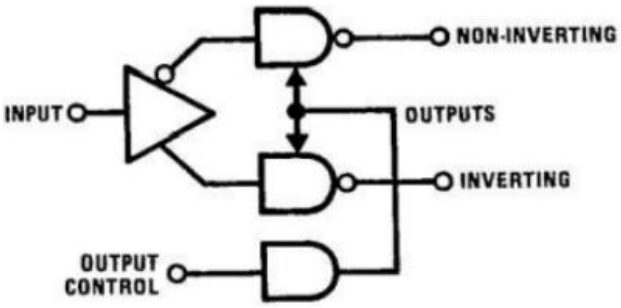
Ordering Information

DEVICE	Package Type	MARKING	Packing	Packing Qty
DS34C87N	DIP-16	DS34C87	TUBE	1000pcs/box
DS34C87M/TR	SOP-16	DS34C87	REEL	2500pcs/reel
DS34C87MT/TR	TSSOP-16	34C87	REEL	2500pcs/reel

Connection and Logic Diagrams

DIP-16/SOP-16/TSSOP-16





Truth Table

INPUT	CONTROL INPUT	NON-INVERTING OUTPUT	INVERTING OUTPUT
H	H	H	L
L	H	L	H
X	L	Z	Z

L=Low logic state H= High logic state

X=Irrelevant Z= TRI-STATE(high impedance)

Absolute Maximum RatingS (Notes1&2)

PARAMETER	LIMITS
Supply Voltage (V_{CC})	-0.5 to 7.0V
DC Voltage (V_{IN})	-1.5V to V_{CC}+1.5V
DC Output Voitage (V_{OUT})	-0.5V to 7V
Clamp Diode Current(L_{IK},L_{OK})	±20 mA
DC Output Current, Per Pin(L_{OUT})	±150 mA
DC V_{CC} OR GND Current (L_{CC})	±150 mA
Storage Temperature Range(T_{STG})	-65°C to +150°C
Power Dissipation(note3)(P_O)	500 mW
lead temperature(T_L)(soldering 10 sec)	260°C

Operating Conditions

	MIN	MAX	UNITS
Supply Voltqge(Vcc)	4.50	5.50	V
DC Input or Output Voitage(Vin Vout)	0	V_{CC}	V
Operating Temperature Range (t_A)	-40	+85	℃
Input Rise Or Fall Times (tr ,tf)		500	ns

DC ElectricalCharacteristics V_{CC} = 5V ±10% (Unless Otherwise Specified) (Note4)

SYMBOL	PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
V_{IH}	High Level Input Voitage			2.0			V
V_{IL}	Low Level Input Voitage					0.8	V
V_{OH}	High Level Output Voitage	V_{IN} = V_{IH} OR V_{IL}, L_{OUT}=-20 MA		2.5			V
V_{OL}	Low Level Output Voltage	V_{IN} = V_I OR VL I_{OUT}=48 MA				0.5	V
V_T	Differential Output Voltage	R_L=100Ω (NOTE 5)		2.0			V
$\|V_T\|-\|\bar{V}_T\|$	Difference In Differential Output	R_L=100Ω (NOTE 5)				0.4	V
V_{OS}	Common Mode Output Voltage	R_L=100Ω (NOTE 5)				3.0	V
$\|V_{OS}-\bar{V}_{OS}\|$	Difference In Common Mode Output	R_L=100Ω (NOTE 5)				0.4	V
I_{IN}	Input Current	V_{IN} =V_{CC}, GND,V_{IH}, OR V_{IL}				±10	μA
I_{CC}	Quiescent Supply Current	I_{OUT} =0μA, V_{IN} = V_{CC} OR GND V_{IN} =2.4V_{OR} 0.5V(NOTE 6)			200 0.8		μA MA
I_{OZ}	Tri-State Output Leakage Current	V_{OUT} = V_{CC} OR GND CONTROL=V_{IL}			±0.5	±0.5	μA
I_{SC}	Output Short Circuit Current	V_{IN} = V_{CC} OR GND (NOTE 7)		-30		-150	MA
I_{DFF}	Output Leakage Current Power Off	V_{CC}=0V	V_{OUT} =6V V_{OUT}=-0.25V			100 -100	μA μA

Note1: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but specific performance is not ensured.

Note 2: Uniess otherwise specified, all votages are referenced to ground.all currents into dovice pins are positive; all currents out of device pins are negative.

Note3: Power Dissipation Temperature Derating "N" Package: -12 mW/℃ From 65℃ To 85℃.
"M" Packege: -12 mW/℃ From 100℃ To 125℃.

Note4: Unless Otherwise Specifted Min/Max Limits Apply Across The -40℃ To 85℃ Temperature Range.All Typicals Are Given For Vcc=5V And Ta =25℃.

Note 5: See Ela Specilication RS-422 For Exact Test Conditions.

Note 6: Moasured por input. All other inputs at vcc or gnd.

Note 7: Only one output at a time should be shorted.

Switching Characteristics Vcc=5V±10%，tr = tf =6ns(Figures 1, 2, 3, and 4) (Note 4)

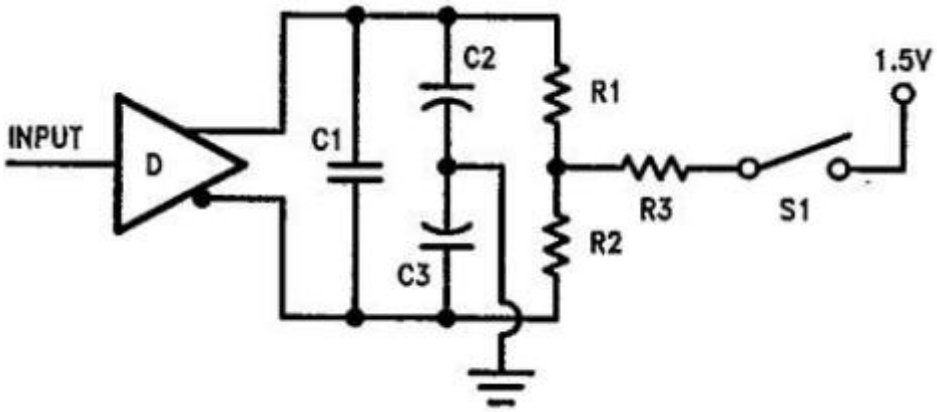
SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
T_{PLH}.T_{PHL}	Propagation delay input to output	S1 Open		8		ns
SKEW	(note 8)	S1 Open		0.5		ns
T_{TLH}, T_{THL}	Differential output rise and fall times	S1 Open		8		ns
T_{PZH}	Output enable time	S1 Closed		13		ns
T_{PZL}	Output enable time	S1 Closed		15		ns
T_{PHZ}	Output disable time (note9)	S1 Closed		9		ns
T_{PLZ}	Output disable time (note9)	S1 Closed		10		ns
C_{PD}	Power dissipation capacitance (note 10)			100		pF
C_{IN}	Input capacitance			10		pF

Note 8: Skew isdefined as the difference in propagation delays between complementary oulputs at the 50% point.

Note9: Output isable time is the delay from ENABLE or $\overline{ENABE}$ being switched to the output transistors turning off. The actual disable times are less than indicated due to the delay added by the RC time constant of the load.

Note 10:Cppdeterminesthe no load dynamic power consumption,$P_{DC}=C_{PD}V^2ccf+Icc\ V_{CC}$ and the no load dynamic current consumption, Is=Cpd Vccf + Icc.

AC Test Circuit and Switching Time Waveforms



Note:C1=C2=C3=40pF,R1=R2=50N,R3-5000Ω

FIGURE 1.AC Test Circuit

AC Test Circuit and Switching Time Waveforms (Continued)

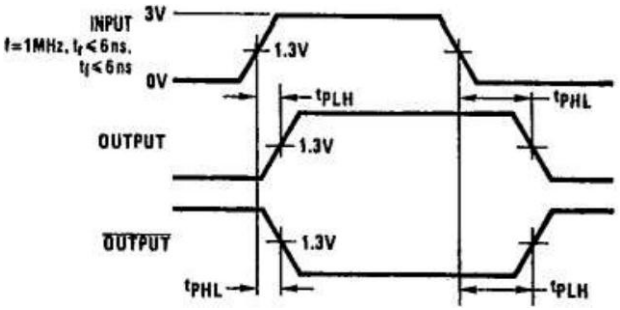


FIGURE 2. Propagation Delays

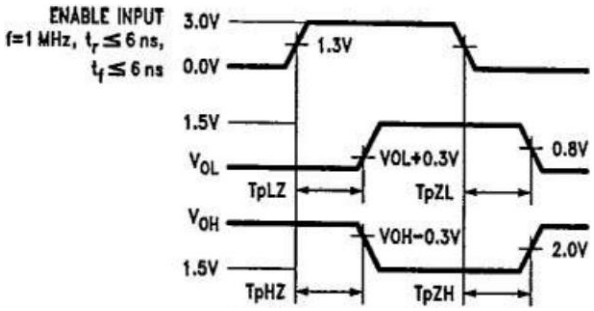


FIGURE 3. Enable and Disable Times

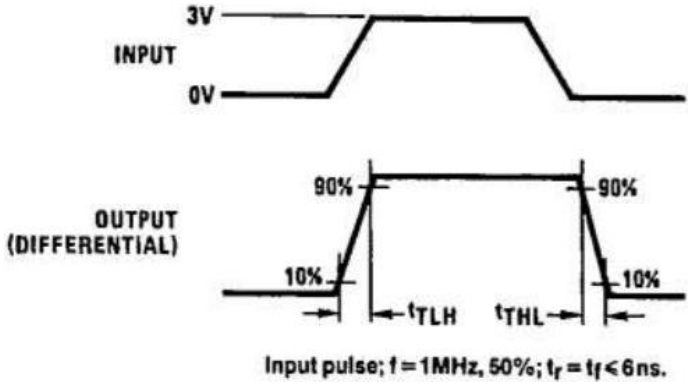
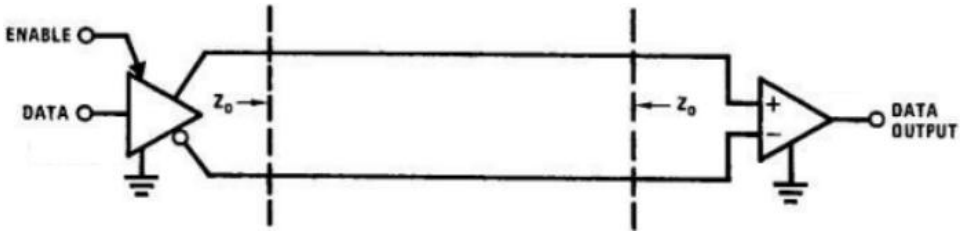


FIGURE 4. Differential Rise and Fall Times

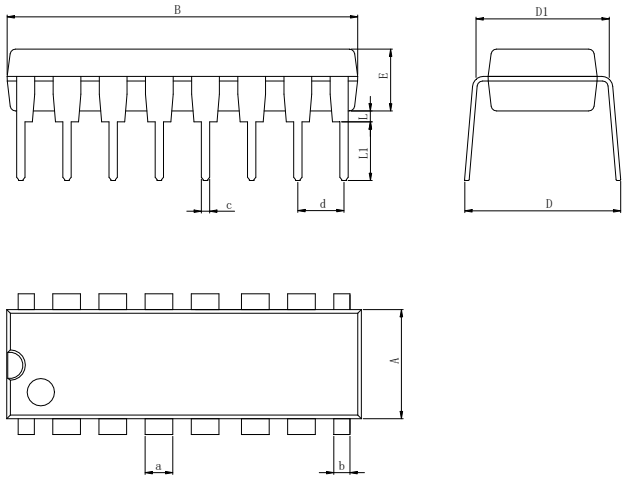
Typical Applications

Two-Wire Balanced System,RS-422



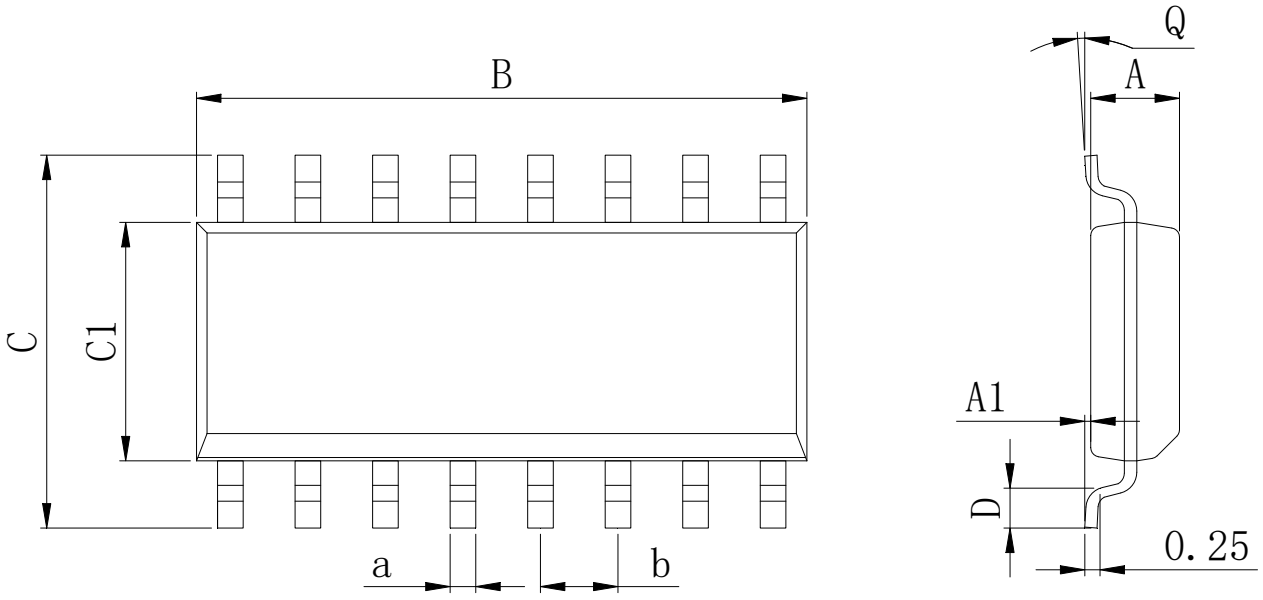
Physical Dimensions

DIP-16



Dimensions In Millimeters(DIP-16)											
Symbol:	A	B	D	D1	E	L	L1	a	b	c	d
Min:	6.10	18.94	8.10	7.42	3.10	0.50	3.00	1.50	0.85	0.40	2.54 BSC
Max:	6.68	19.56	10.9	7.82	3.55	0.70	3.60	1.55	0.90	0.50	

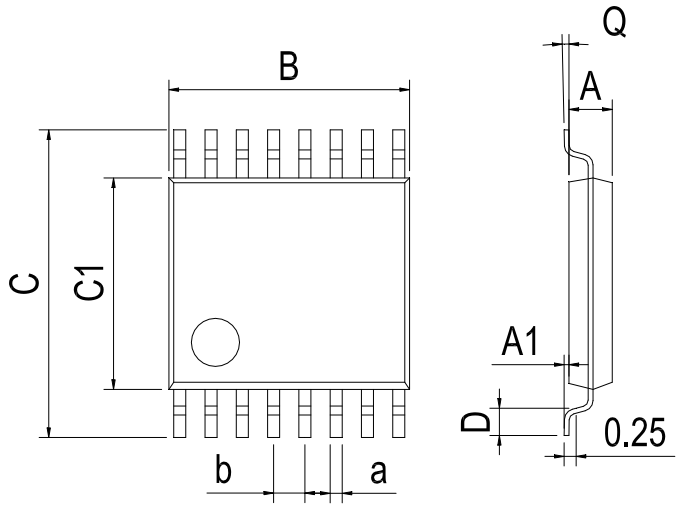
SOP-16



Dimensions In Millimeters(SOP-16)									
Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	1.35	0.05	9.80	5.80	3.80	0.40	0°	0.35	1.27 BSC
Max:	1.55	0.20	10.0	6.20	4.00	0.80	8°	0.45	

Physical Dimensions

TSSOP-16



Dimensions In Millimeters(TSSOP-16)									
Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	0.85	0.05	4.90	6.20	4.30	0.40	0°	0.20	0.65 BSC
Max:	0.95	0.20	5.10	6.60	4.50	0.80	8°	0.25	

Revision History

DATE	REVISION	PAGE
2017-1-9	New	1-9
2023-9-18	Modify the package dimension diagramTSSOP-16、Update encapsulation type、Updated DIP-16 dimension、Add annotation for Maximum Ratings.	1、2、6、8
2024-10-31	Update Lead Temperature	2

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