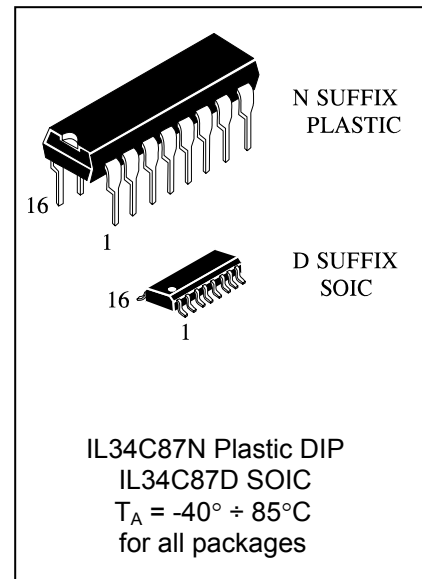# CMOS Quad TRISTATE Differential Line Driver
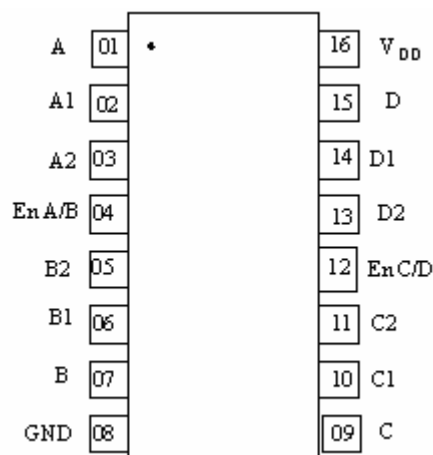
IL34C87

General Description

The IL34C87T is a quad differential line driver designed for digital data transmission over balanced lines. The IL34C87T meets all the requirements of EIA standard RS-422 while retaining the low power characteristics of CMOS. This enables the construction of serial and terminal interfaces while maintaining minimal power consumption. The IL34C87T accepts TTL or CMOS input levels and translates 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. This device has separate enable circuitry for each pair of the four drivers. All inputs are protected against damage due to electrostatic discharge by diodes to V_{DD} and ground.

N SUFFIX
PLASTIC

16

1

D SUFFIX
SOIC

16

1

IL34C87N Plastic DIP
IL34C87D SOIC
T_A = -40° ÷ 85°C
for all packages

Features

- TTL input compatible
- Typical propagation delays: 6 ns
- Typical output skew: 0.5 ns
- Outputs won't load line when V_{DD} = 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
- Available in surface mount

Pin Configuration

A	01	•	16	V_{DD}
A1	02		15	D
A2	03		14	D1
En A/B	04		13	D2
B2	05		12	En C/D
B1	06		11	C2
B	07		10	C1
GND	08		09	C

IKSemicon

Pin Definitions and Functions

Pin	Symbol	Description
01	A	Input of driver A
02	A1	Output A
03	A2	Inverted output A
04	En A/B	input of switching outputs of A and B receivers into the third state
05	B2	Inverted output B
06	B1	Output B
07	B	Input of driver B
08	GND	General pin
09	C	Input of driver C
10	C1	Output C
11	C2	Inverted output C
12	En C/D	input of switching outputs of C and D receivers into the third state
13	D2	Inverted output B
14	D1	Output B
15	D	Input of driver B
16	V_{DD}	Pin of power supply

Truth Table

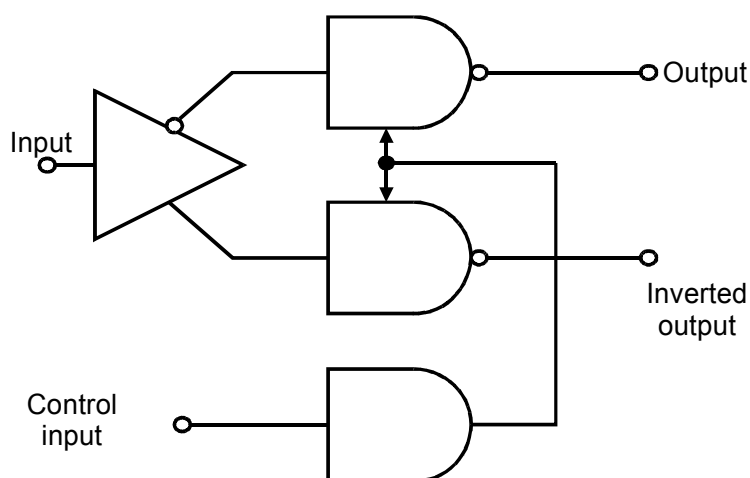| Input	Control Input	Non-Inverting Output	Inverting Output
H	H	H	L
L	H	L	H
X	L	Z	Z

L = Low logic state
H = High logic state
X = Irrelevant
Z = TRI-STATE (high performance)

Block Diagram

Input

Control input

Output

Inverted output

Limiting and extreme parameters

Table 1

| Parameter	Symbol	Operating condition		Maximum ratings		Unit
		min	max	min	max	
Supply voltage	V_{DD}	4.50	5.50	-0.5	7	V
DC input voltage	V_{IN}	0	V_{CC}	-1.5	V_{CC}+1.5	
DC output voltage	V_{OUT}	0	V_{CC}	-0.5	7	
Protection diode current	V_{DIFF}	—	—	-20	+20	
Voltage on input Enable	V_{IN}	—	—	—	7	
Output current	—	—	—	-150	+150	mA
Input Rise or Fall Times (tr, tf)	t_r, t_f	—	500	—	—	ns
Dissipated power DIP	P_D	—	—	—	1736[*]	mW
SO		—	—	—	1226[*]	
Operating Temperature Range (TA)	T_A	-40	+85	—	—	°C
Storage temperature	T_{STG}	—	—	-65	+150	
Temperature of soldering, 4s	T_L	—	—	—	260	
[*] - at increasing temperature higher than 25°C P_D decreased on 13.89mW/°C for DIP package and on 9.80mW/°C for SO package.						

Electrical Characteristics

Table 2

T= -40^0 ÷ +85^{0}C

Parameter	Symbol	Test Conditions	Values		Unit
			Min	Max	
High level input voltage	V$_{IH}$		2.0	—	V
Low level input voltage	V$_{IL}$		—	0.8	
High level output voltage	V$_{OH}$	I$_{OUT}$ = -20mA	2.5	—	V
Low level output voltage	V$_{OL}$	I$_{OUT}$ = +48mA	—	0.5	
Differential output voltage	V$_T$	R$_L$ = 100 Ohm	2.0	—	V
Difference in differential outputs	$\left\|V_T\right\| - \left\|\overline{V_T}\right\|$	R$_L$ = 100 Ohm	—	0.4	V
Output voltage	V$_{OS}$	R$_L$ = 100 Ohm	—	3.0	V
Difference in common mode output	$\left\|V_{os} - \overline{V}_{os}\right\|$	R$_L$ = 100 Ohm	—	0.4	V
Input current	I$_{IN}$	V$_{IN}$ = V$_{DD}$, 0V, V$_{IH}$ or V$_{IL}$	—	±1.0	mkA
Consumption current	I$_{CC}$	I$_{OUT}$ = 0mkA, V$_{IN}$ = V$_{DD}$ or 0V	—	500	mkA
		I$_{OUT}$ = 0mkA, V$_{IN}$ = 2.4 or 0.5V	—	2.0	mA
Output current of the third state	I$_{OZ}$	V$_{OUT}$ = V$_{DD}$ or 0V, V$_{CONTROL}$ = V$_{IL}$	—	±5.0	mkA
Short circuit output current	I$_{SC}$	V$_{IN}$ = V$_{DD}$ or 0V	-30	-150	mA
Output current of the off state	I$_{OFF}$	V$_{DD}$ = 0V, V$_{OUT}$ = 6V	—	100	mkA
		V$_{DD}$ = 0V, V$_{OUT}$ = -0.25V	—	-100	
Time of propagation delay at switching off, switching on	t$_{PLH}$, t$_{PHL}$	t$_r$, t$_f$ ≤ 6ns	—	11	ns
Asymmetric transition time when switching in, switching off	Skew	t$_r$, t$_f$ ≤ 6ns	—	3	
Transition time when switching in, switching off	t$_{RISE}$, t$_{FALL}$	t$_r$, t$_f$ ≤ 6ns	—	10	
time of the third state propagation delay on input Enable	t$_{PZH}$	t$_r$, t$_f$ ≤ 6ns	—	25	
time of the third state propagation delay on input Enable	t$_{PZL}$	t$_r$, t$_f$ ≤ 6ns	—	26	
time of the third state propagation delay on input Enable	t$_{PHZ}$	t$_r$, t$_f$ ≤ 6ns	—	8	
time of the third state propagation delay on input Enable	t$_{PLZ}$	t$_r$, t$_f$ ≤ 6ns	—	12	

Time diagram
of signals at changing dynamic parameters
t_{TLH}, t_{THL}, t_{PLH}, t_{PHL}, SKEW.
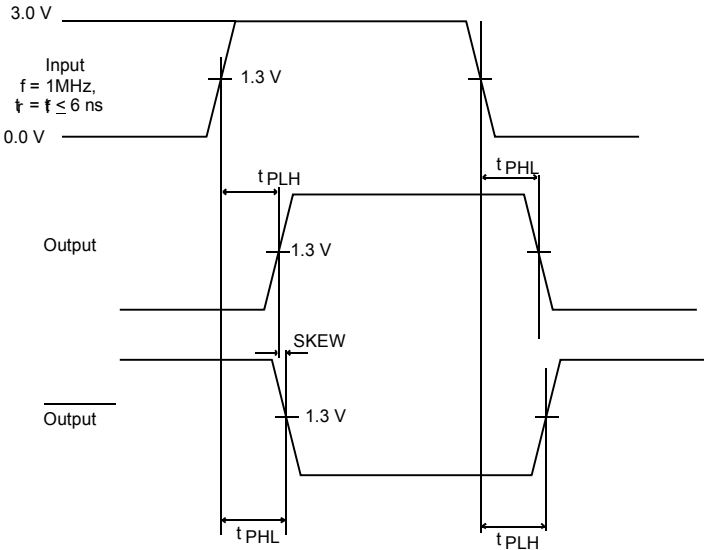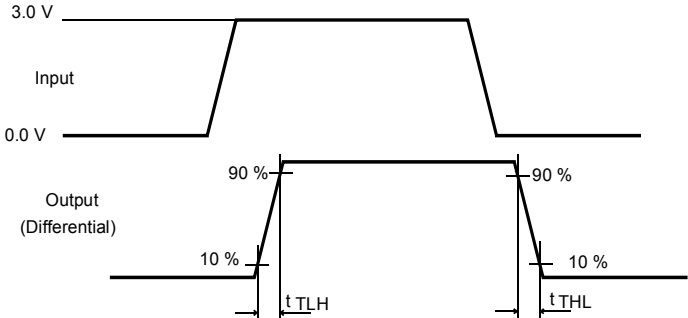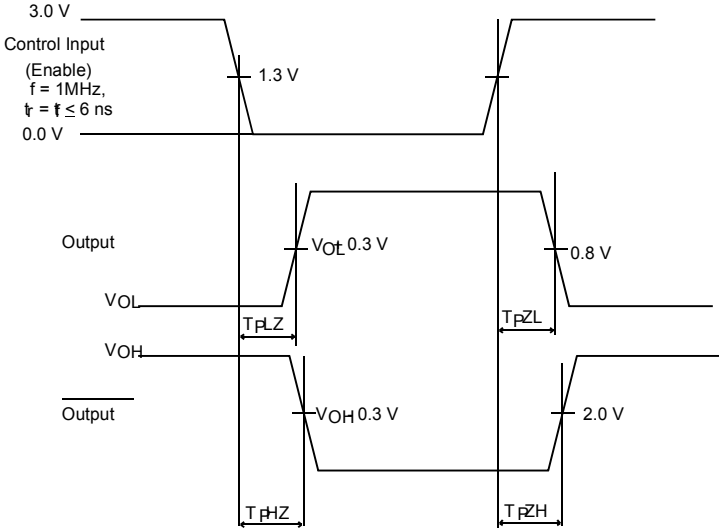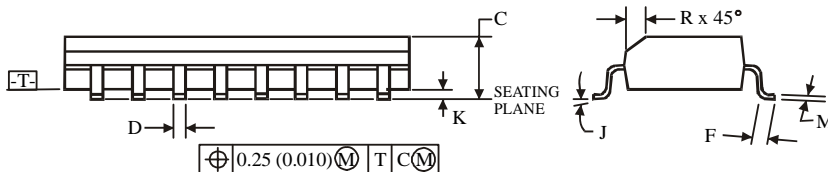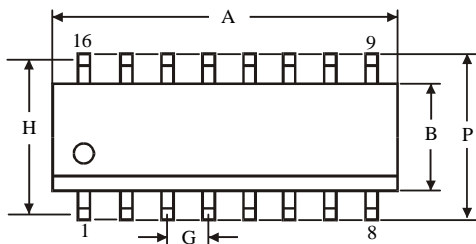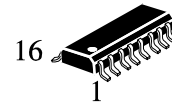
N SUFFIX PLASTIC DIP
(MS - 001BB)

	Dimension, mm	
Symbol	MIN	MAX
A	18.67	19.69
B	6.1	7.11
C		5.33
D	0.36	0.56
F	1.14	1.78
G	2.54	
H	7.62	
J	0°	10°
K	2.92	3.81
L	7.62	8.26
M	0.2	0.36
N	0.38	
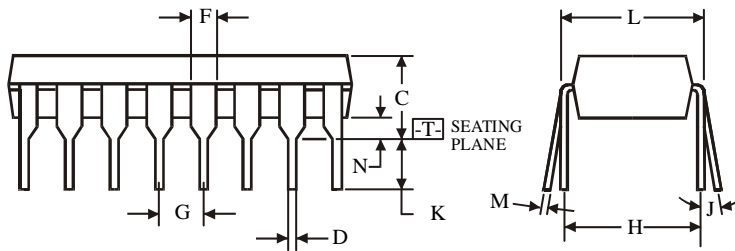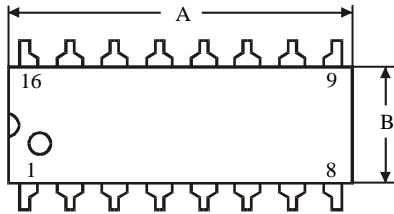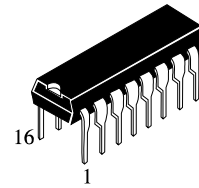
⊕ 0.25 (0.010) Ⓜ T

NOTES:

1. Dimensions "A", "B" do not include mold flash or protrusions.

   Maximum mold flash or protrusions 0.25 mm (0.010) per side.

D SUFFIX SOIC
(MS - 012AC)

	Dimension, mm	
Symbol	MIN	MAX
A	9.8	10
B	3.8	4
C	1.35	1.75
D	0.33	0.51
F	0.4	1.27
G	1.27	
H	5.72	
J	0°	8°
K	0.1	0.25
M	0.19	0.25
P	5.8	6.2
R	0.25	0.5

⊕ 0.25 (0.010) Ⓜ T C Ⓜ

NOTES:

1. Dimensions A and B do not include mold flash or protrusion.

2. Maximum mold flash or protrusion 0.15 mm (0.006) per side
   for A; for B – 0.25 mm (0.010) per side.