DS9638QML

DS9638QML RS-422 Dual High Speed Differential Line Driver

Literature Number: SNOSB15

National Semiconductor

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RS-422 Dual High Speed Differential Line Driver

General Description

The DS9638 is a Schottky, TTL compatible, dual differential line driver designed specifically to meet the EIA Standard RS-422 specifications. It is designed to provide unipolar differential drive to twisted pair or parallel wire transmission lines. The inputs are TTL compatible. The outputs are similar to totem pole TTL outputs, with active pull-up and pull-down. The device features a short circuit protected active pull-up with low output impedance and is specified to drive 50Ω transmission lines at high speed. The mini-DIP provides high package density.

Features

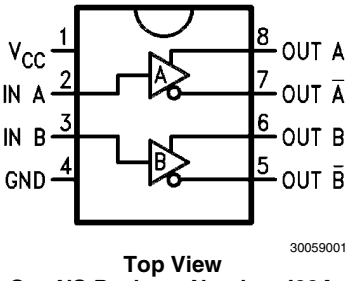
- Single 5V supply
- Schottky technology
- TTL and CMOS compatible inputs
- Output short circuit protection
- Input clamp diodes
- Complementary outputs
- Minimum output skew (<1.0 ns typical)
- 50 mA output drive capability for 50Ω transmission lines
- Meets EIA RS-422 specifications
- Propagation delay of less than 10 ns
- "Glitchless" differential output
- Delay time stable with V_{CC} and temperature variations (<2.0 ns typical) (*Figure 3*)
- Extended temperature range

Ordering Table

NS PART NUMBER	SMD PART NUMBER	NS PACKAGE NUMBER	PACKAGE DISCRIPTION
DS9638J/883	5962–8754601PA	J08A	8LD CERAMIC DIP

Connection Diagram

8-Lead DIP



Top View
See NS Package Number J08A

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Absolute Maximum Ratings (Note 1)

Storage Temperature Range	
Ceramic DIP	−65°C to +175°C
Lead Temperature	
Ceramic DIP (Soldering, 60 sec.)	300°C
Maximum Power Dissipation at 25°C (Note 2)	
Cavity Package	1300 mW
V_{CC} Lead Potential to Ground	−5V to 7V
Input Voltage	−0.5V to +7V

Recommended Operating Conditions

DS9638J/883	Min	Max	Units
Supply Voltage (V_{CC})	4.5	5.5	V
Output Current HIGH (I_{OH})		−50	mA
Output Current LOW (I_{OL})		50	mA
Operating Temperature (T_A)	−55	125	°C

Quality Conformance Inspection

MIL-STD-883, Method 5005 - Group A

Subgroup	Description	Temp (°C)
1	Static tests at	+25°C
2	Static tests at	+125°C
3	Static tests at	-55°C
4	Dynamic tests at	+25°C
5	Dynamic tests at	+125°C
6	Dynamic tests at	-55°C
7	Functional tests at	+25°C
8A	Functional tests at	+125°C
8B	Functional tests at	-55°C
9	Switching tests at	+25°C
10	Switching tests at	+125°C
11	Switching tests at	-55°C
12	Setting time at	+25°C
13	Setting time at	+125°C
14	Setting time at	-55°C

DS9638J/883 Electrical Characteristics

DC Parameters

Over recommended operating temperature and supply voltage ranges, unless otherwise specified

Symbol	Parameter	Conditions	Notes	Min	Max	Units	Sub-Groups
V_{OL}	Output Voltage Low	V_{CC} = 4.5V, F_{IOL} = 30mA for temp, F_{IOL} = 35mA for room	(Note 3)		0.5	V	1, 2, 3
VFCD	Input Clamped Voltage	V_{CC} = 4.5V, FIFCD = -18mA		-1.2		V	1, 2, 3
V_{OHQVT}	V_T, $\overline{V}_T$ Terminated Output Voltage	V_{CC} = 5.5V, R_O = 100 Ω		2		V	1, 2, 3
V_{OH}	Logical "1" Output Voltage	V_{CC} = 4.5V, F_{IOH} = -10mA		2.5		V	1
				2.0			2, 3
V_{OHQ}	Logical "1" Output Voltage	V_{CC} = 4.5V, F_{IOHQ} = -40mA		2.0		V	1
				1.0			2, 3
V_{OHQBAL}	V_T- $\overline{V}_T$ Output Balance	V_{CC} = 5.5V, R_O = 100 Ω		-0.4	0.4	V	1, 2, 3
I_{IL}	Logical "0" Input Current	V_{CC} = 5.5V, F_{VIIL}= 0.5V		-200		µA	1, 2, 3
I_{IH}	Logical "1" Input Current	V_{CC} = 5.5V, F_{VIIH} = 2.7V			25	µA	1, 2, 3
I_{IHQH}	Logical "1" Input Current	V_{CC} = 5.5V, FV_{IIHQH} = 5.5V			50	µA	1, 2, 3
I_{OS}	Output Short Circuit Current	V_{CC} = 5.5V, FV_{IOS} = 0V		-150	-50	mA	1
				-150	-40		2, 3
I_{CC}	Supply Current	V_{CC} = 5.5V, FV_{CCH} = 5.5V			65	mA	1
					75	mA	2, 3
I_{OHC}	I_O (off) Output Leakage	V_{CC} = 5.5V, FV_{OH} = 5.5V			200	µA	1
V_{OS}, $\overline{V}_{OS}$	Output Offset Voltage		(Note 5)		3	V	1, 2, 3
V_{OS}- $\overline{V}_{OS}$	Output Offset Balance		(Note 4)		.4	V	1, 2, 3
V_{IH}	Input High Voltage		(Note 6)	2		V	1, 2, 3
V_{IL}	Input Low Voltage		(Note 6)		0.5	V	1, 2, 3
V_{HB}	I_X Output Leakage	V_{CC} = 0.0V, FIOHBQI = 150 µA		5.55		V	1
I_{CEX}	Output Leakage Current	V_{CC} = 0.0V, FVCEX = 5.5V			150	µA	2, 3
I_{CEXQI}	Output Leakage Current	V_{CC} = 0.0V, FVICEXQ2 = -0.25V		-150		µA	2, 3

AC Parameters

Over recommended operating temperature and supply voltage ranges, unless otherwise specified

Symbol	Parameter	Conditions	Notes	Min	Max	Units	Sub-Groups
t_{PLH}	Propagation Delay to High Level	V_{CC} = 5V, R_O = 100 Ω, C_L = 15_{PF}			20	nS	9
t_{PHL}	Propagation Delay to Low Level	V_{CC} = 5V, R_O = 100 Ω, C_L = 15_{PF}			20	nS	9
t_F	Fall Time	V_{CC} = 5V, 90% - 10%			20	nS	9
t_R	Rise Time	V_{CC} = 5V, 10% - 90%			20	nS	9

Note 1: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. They are not meant to imply that the devices should be operated at these limits. The tables of "Electrical Characteristics provide conditions for actual device operation.

Note 2: Derate cavity package 8.7 mW/°C above 25°C.

Note 3: 35mA is more stringent than 30mA.

Note 4: Guaranteed by Vt- $\overline{V}_T$ test.

Note 5: Guaranteed by design.

Note 6: Guaranteed by V_{OH} & V_{OL} tests.

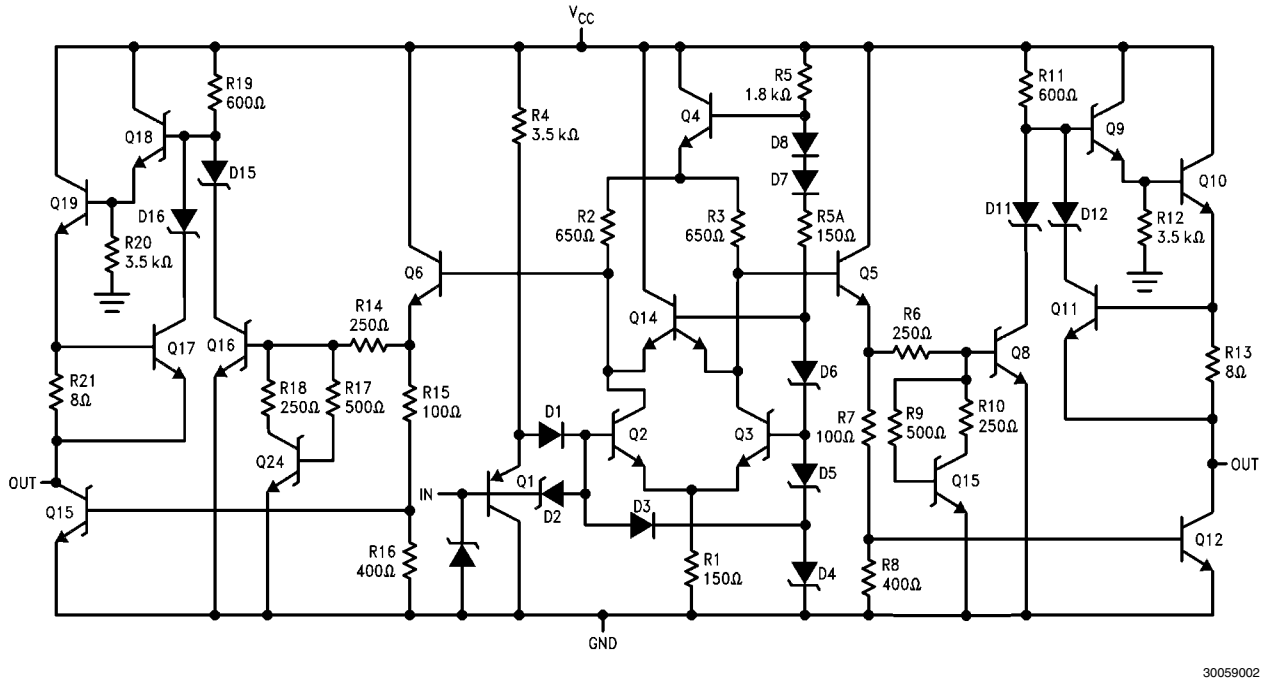


FIGURE 1. Equivalent Circuit

DC Test Circuit

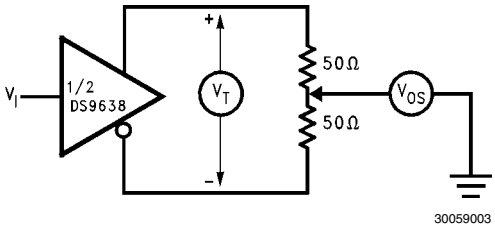
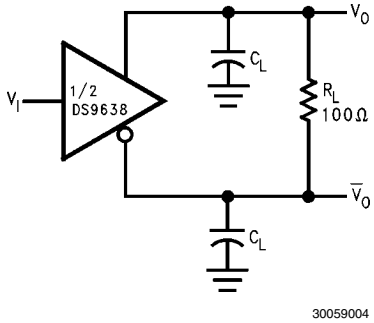
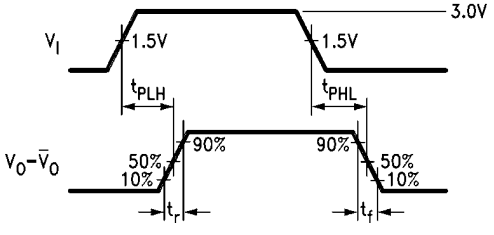


FIGURE 2. Terminated Output Voltage and Output Balance

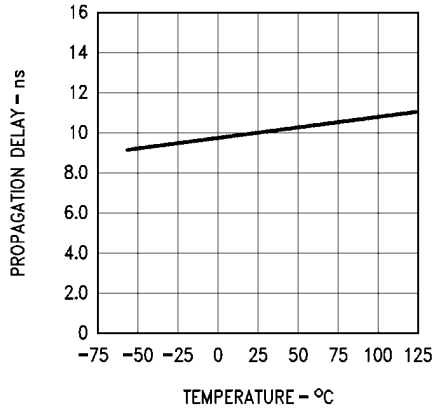


C_L includes probe and jig capacitance.
PRR = 500 kHz, t_W = 100 ns,
$t_r \leq$ 5.0 ns, Z_O = 50Ω.



Note 7: The pulse generator has the following characteristics:

FIGURE 3. AC Test Circuit and Voltage Waveform



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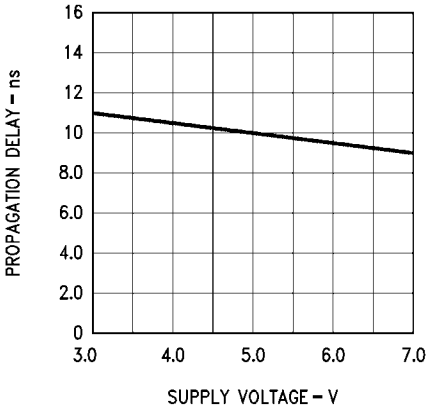

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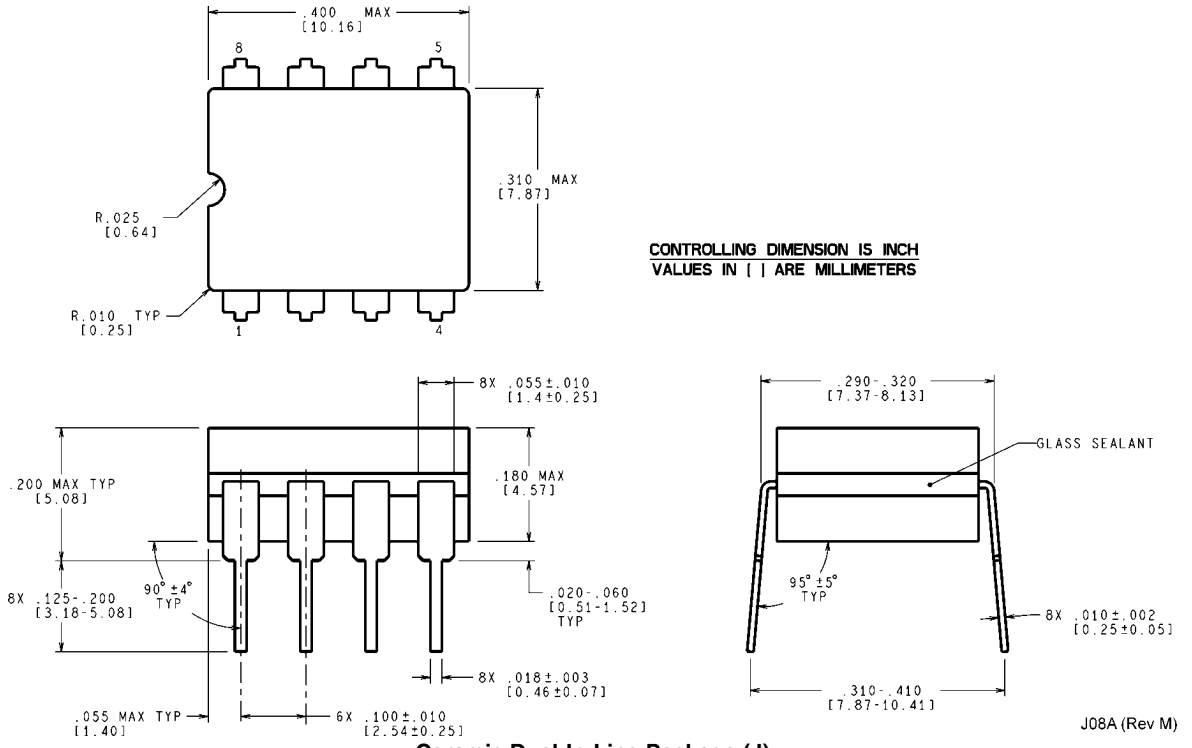
FIGURE 4. Typical Delay Characteristics

Revision History

Date Released	Revision	Section	Originator	Changes
05/27/08	A	New Release, Corporate Format, Change to DC Electrical Section	Bill Petcher	1 MDS data sheet converted into one Corp. data sheet format. Change made to V_{OH}, V_{OHQ} and I_{OS}. MNDS9638-X, Rev. 0AL data sheet will be Archived.

Physical Dimensions inches (millimeters) unless otherwise noted



Ceramic Dual-In-Line Package (J)
NS Package Number J08A

Notes

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