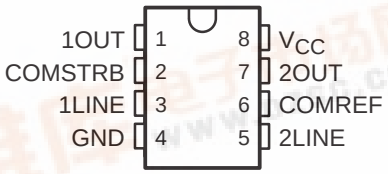
SN75140
DUAL LINE RECEIVER

SLLS080C – JANUARY 1977 – REVISED APRIL 1998

- Single 5-V Supply
- ±100-mV Sensitivity
- For Application as:
  - Single-Ended Line Receiver
  - Gated Oscillator
  - Level Comparator
- Adjustable Reference Voltage
- TTL Outputs
- TTL-Compatible Strobe
- Designed for Party-Line (Data-Bus) Applications
- Common Reference-Voltage Pin
- Common Strobe

P OR PS† PACKAGE
(TOP VIEW)



† The PS package is only available left-ended taped and reeled (order SN75140 PSR).

description

This device consists of a dual single-ended line receiver with TTL-compatible strobes and outputs. The reference voltage (switching threshold) is applied externally and can be adjusted from 1.5 V to 3.5 V, making it possible to optimize noise immunity for a given system design. Due to the low input current (less than 100 μA), the device is suited ideally for party-line (data-bus) systems.

The SN75140 has a common reference-voltage pin and a common strobe.

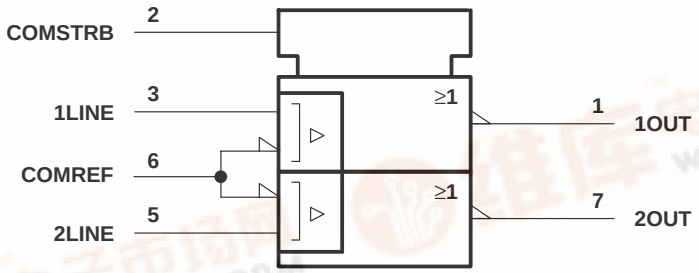
The SN75140 is characterized for operation from 0°C to 70°C.

FUNCTION TABLE
(each receiver)

LINE INPUT	STROBE	OUTPUT
≤ V_{ref} – 100 mV	L	H
≥ V_{ref} + 100 mV	X	L
X	H	L

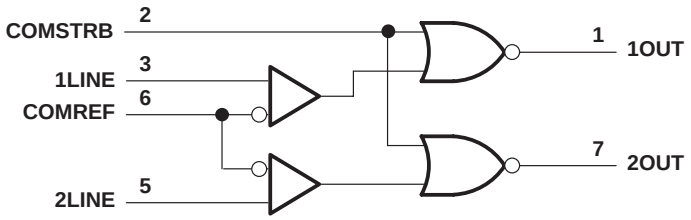
H = high level, L = low level, X = irrelevant

logic symbol‡

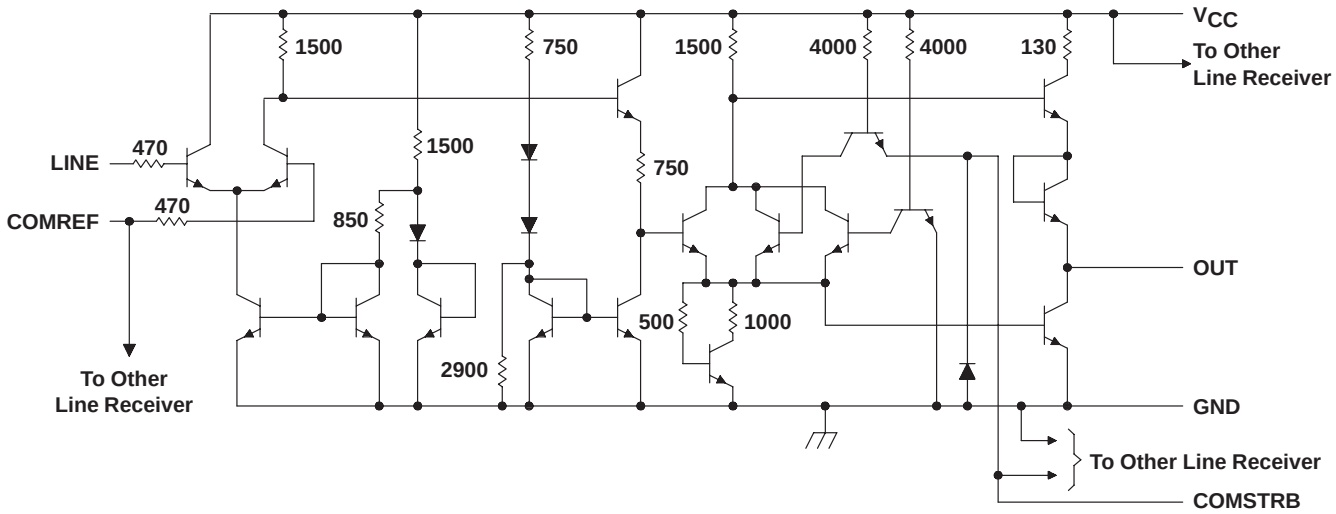


‡ This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

logic diagram (positive logic)



schematic (each receiver)



NOTE: Resistor values shown are nominal and in ohms.

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

Supply voltage, V_{CC} (see Note 1) . . . . . 7 V
Reference input voltage, V_{ref} . . . . . 5.5 V
Line input voltage range with respect to GND . . . . . –2 V to 5.5 V
Line input voltage with respect to V_{ref} . . . . . ±5 V
Strobe input voltage . . . . . 5.5 V
Continuous total power dissipation . . . . . See Dissipation Rating Table
Storage temperature range, T_{stg} . . . . . –65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds . . . . . 260°C

† 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.

NOTE 1: Unless otherwise specified, voltage values are with respect to network ground terminal.

DISSIPATION RATING TABLE

PACKAGE	$T_A \le 25°C$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25°C$	$T_A = 70°C$ POWER RATING
P	1000 mW	8.0 mW/°C	640 mW
PS	450 mW	3.6 mW/°C	288 mW

recommended operating conditions

	MIN	NOM	MAX	UNIT
Supply voltage, V_{CC}	4.5	5	5.5	V
Reference input voltage, V_{ref}	1.5		3.5	V
High-level line input voltage, $V_{IH(L)}$	V_{ref}+0.1		V_{CC}–1	V
Low-level line input voltage, $V_{IL(L)}$	0		V_{ref}–0.1	V
High-level strobe input voltage, $V_{IH(S)}$	2		5.5	V
Low-level strobe input voltage, $V_{IL(S)}$	0		0.8	V
Operating free-air temperature range, T_A	0		70	°C

electrical characteristics over recommended operating free-air temperature range, V_{CC} = 5 V ±10%, V_{ref} = 1.5 V to 3.5 V (unless otherwise noted)

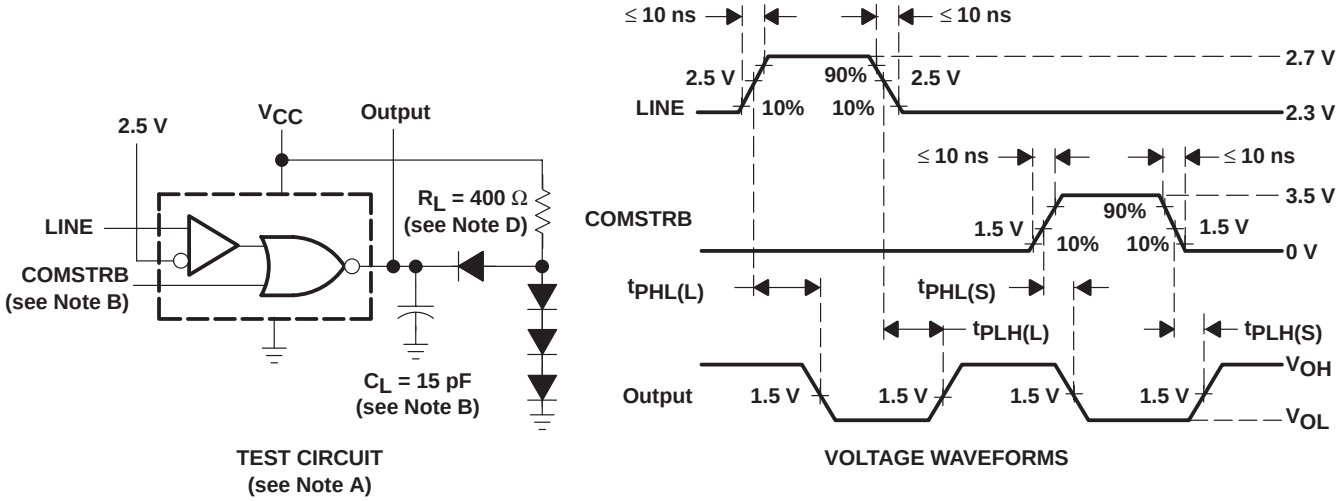
PARAMETER			TEST CONDITIONS			MIN	TYP†	MAX	UNIT
V_{IK}	Strobe input clamp voltage		$I_{I(S)}$ = –12 mA					–1.5	V
V_{OH}	High-level output voltage		$V_{IL(L)}$ = V_{ref} – 100 mV,	$V_{IL(S)}$ = 0.8 V,	I_{OH} = –400 µA	2.4			V
V_{OL}	Low-level output voltage		$V_{IH(L)}$ = V_{ref} + 100 mV,	$V_{IL(S)}$ = 0.8 V,	I_{OL} = 16 mA			0.4	V
			$V_{IL(L)}$ = V_{ref} – 100 mV,	$V_{IH(S)}$ = 2 V,	I_{OL} = 16 mA			0.4	
$I_{I(S)}$	Strobe input current at maximum input voltage	Strobe	$V_{I(S)}$ = 5.5 V					1	mA
		COMSTRB						2	
I_{IH}	High-level input current	Strobe	$V_{I(S)}$ = 2.4 V					40	µA
		COMSTRB						80	
		LINE	$V_{I(L)}$ = 3.5 V,	V_{ref} = 1.5 V			35	100	
		Reference	$V_{I(L)}$ = 0,	V_{ref} = 3.5 V			35	100	
		COMREF					70	200	
I_{IL}	Low-level input current	Strobe	$V_{I(S)}$ = 0.4 V					–1.6	mA
		COMSTRB						–3.2	
		LINE	$V_{I(L)}$ = 0,	V_{ref} = 1.5 V				–10	µA
		Reference	$V_{I(L)}$ = 1.5 V,	V_{ref} = 0				–10	
		COMREF						–20	
I_{OS}	Short-circuit output current‡		V_{CC} = 5.5 V			–18		–55	mA
I_{CCH}	Supply current, output high		$V_{I(S)}$ = 0,	$V_{I(L)}$ = V_{ref} – 100 mV			18	30	mA
I_{CCL}	Supply current, output low		$V_{I(S)}$ = 0,	$V_{I(L)}$ = V_{ref} + 100 mV			20	35	mA

† All typical values are at V_{CC} = 5 V, T_A = 25°C.
‡ Only one output should be shorted at a time.

switching characteristics, V_{CC} = 5 V, V_{ref} = 2.5 V, T_A = 25°C

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
$t_{PLH(L)}$	Propagation delay time, low- to high-level output from LINE	C_L = 15 pF, R_L = 400 kΩ, See Figure 1		22	35	ns
$t_{PHL(L)}$	Propagation delay time, high- to low-level output from LINE	C_L = 15 pF, R_L = 400 kΩ, See Figure 1		22	30	ns
$t_{PLH(S)}$	Propagation delay time, low- to high-level output from COMSTRB	C_L = 15 pF, R_L = 400 kΩ, See Figure 1		12	22	ns
$t_{PHL(S)}$	Propagation delay time, high- to low-level output from COMSTRB	C_L = 15 pF, R_L = 400 kΩ, See Figure 1		8	15	ns

PARAMETER MEASUREMENT INFORMATION



NOTES: A. Input pulses are supplied by generators having the following characteristics: PRR ≤ 1 MHz, duty cycle ≤ 50%, Z_O = 50 Ω.
B. Unused strobes are to be grounded.
C. C_L includes probe and jig capacitance.
D. All diodes are 1N3064.

Figure 1. Test Circuit and Voltage Waveforms

TYPICAL CHARACTERISTICS

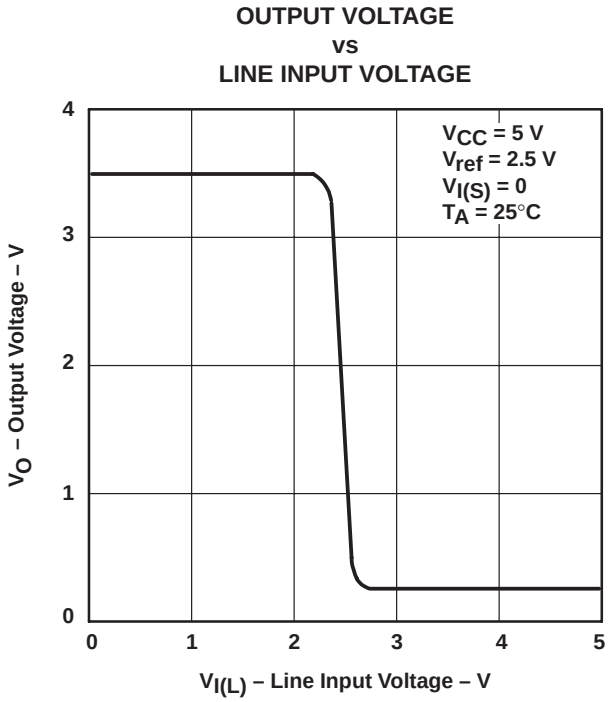


Figure 2

APPLICATION INFORMATION

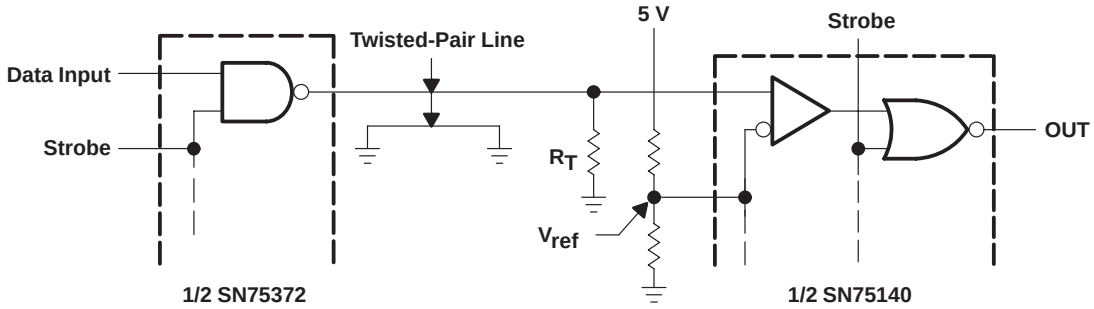
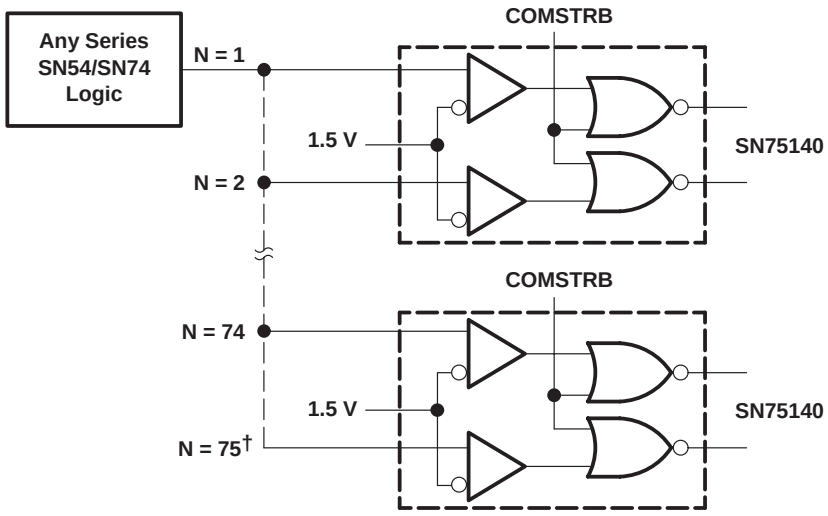


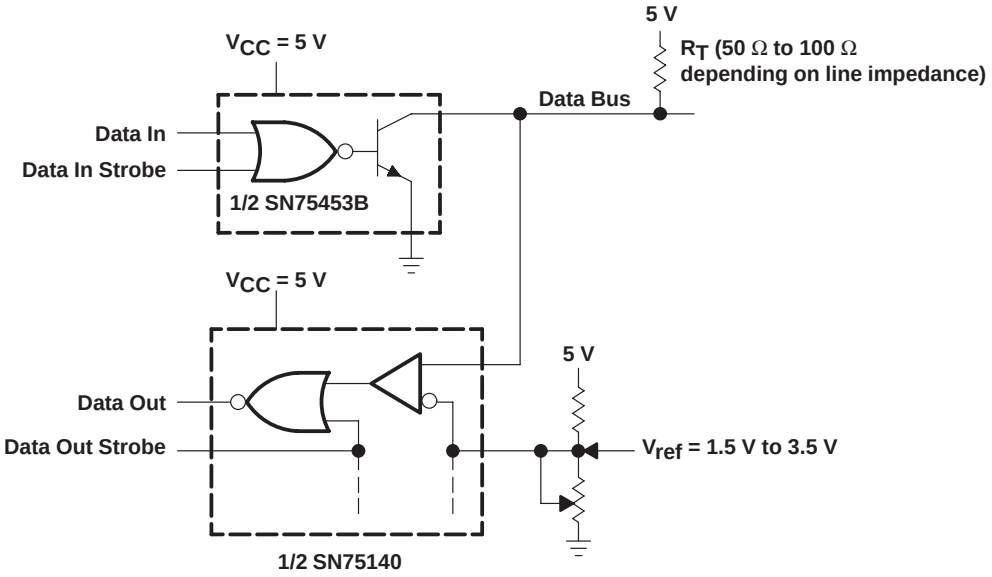
Figure 3. Line Receiver



† Although most series SN54/SN74 circuits have a >2.4-V output at 400 μA, they typically are capable of maintaining a >2.4-V output level under a load of 7.5 mA.

Figure 4. High Fanout From Standard TTL Gate

APPLICATION INFORMATION



NOTE A: Using this arrangement, as many as 100 transceivers can be connected to a single data bus. The adjustable reference-voltage feature allows the noise margin to be optimized for a given system. The complete dual bus transceiver (SN75453B driver and SN75140 receiver) can be assembled in approximately the same space required by a single 16-pin package and only one power supply is required (5 V). Data in and data out are TTL compatible.

Figure 5. Dual Bus Transceiver

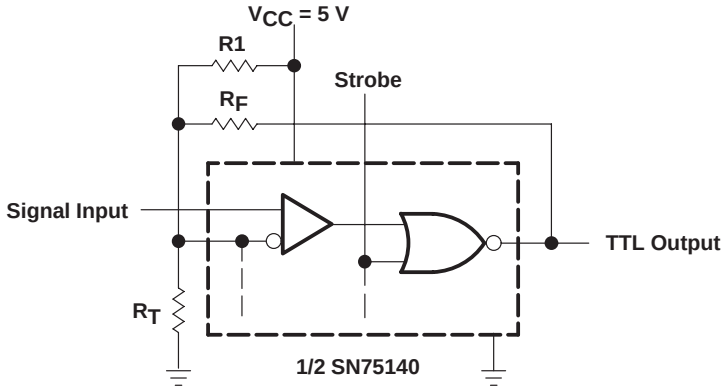
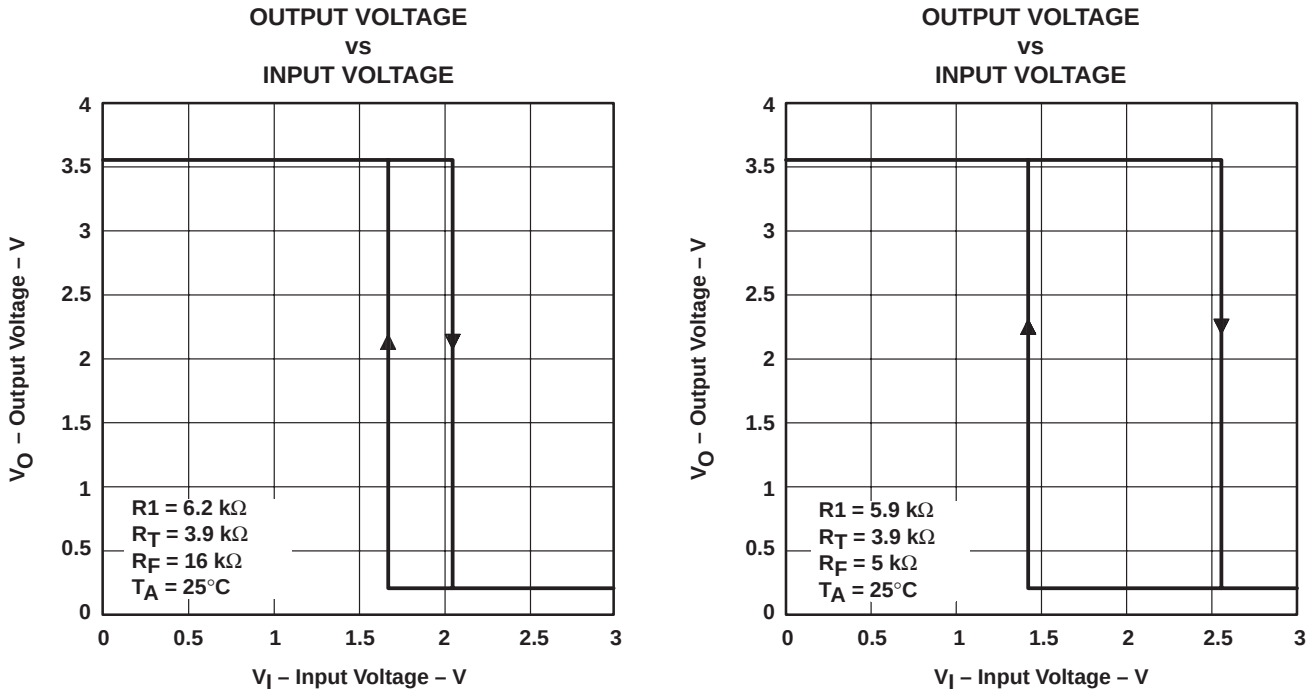


Figure 6. Schmitt Trigger

APPLICATION INFORMATION



NOTE A: Slowly changing input levels from data lines, optical detectors, and other types of transducers can be converted to standard TTL signals with this Schmitt-trigger circuit. R_1, R_F, and R_T can be adjusted for the desired hysteresis and trigger levels.

Figure 7. Examples of Transfer Characteristics

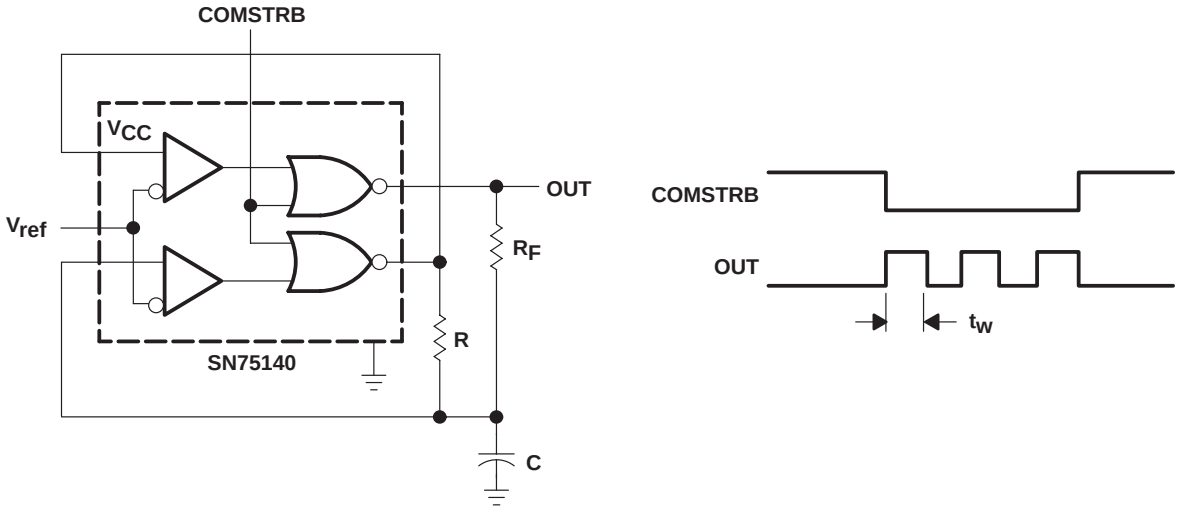


Figure 8. Gated Oscillator

APPLICATION INFORMATION

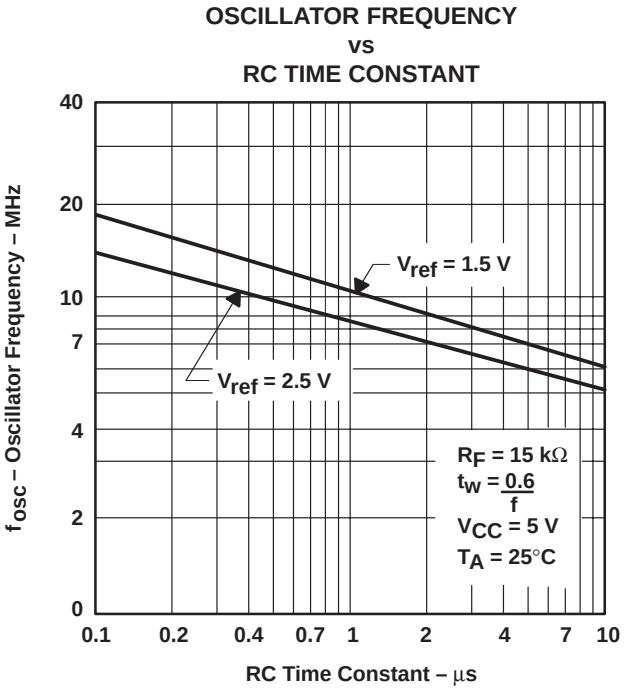


Figure 9

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