Tegsemi

TGS8596-C

ARINC 429 bus driver

Data sheet

1. Product introduction

1.1 Overview

TGS8596-C is a single-channel ARINC 429 bus driver circuit. It is powered by a single power supply of 3.3V and has a self-boosting module inside to generate positive and negative high voltages. Under the control of logic signals, a +/-10V differential voltage output is generated at the output end. It is often used where ordinary logic voltages are converted to ARINC 429 differential drive outputs under single power supply conditions.

1.2 Features

Main indicators:

Working voltage range: 3.3V;

Power supply current: ≤ 40mA (no load);

Input high level $V_{IH} \geq 0.7V_{DD}$

Input low level $V_{IL} \leq 0.3V_{DD}$;

Differential output voltage: $9V \leq V_{OH} \leq 11V$ (One);

Differential output voltage: $-11V \leq V_{OL} \leq -9V$ (Zero);

Package form: CSOP-16;

Working temperature: -55 ~ 125℃;

Quality assurance level: Level B;

General specification: GJB597B-2012 General specification for semiconductor integrated circuits.

1.3 Product usage and application scope

This circuit is an ARINC 429 bus driver circuit, suitable for converting ordinary logic voltage to ARINC 429 under single power supply conditions. Where differential drive outputs are located.

1.4 Corresponding substitution of foreign products

Corresponding to the HI-8596 circuit of foreign HOLT company, its performance and various indicators are consistent with foreign circuits and fully compatible.

2. Product appearance

2.1 Dimensions

The overall dimensions of the device are in accordance with GB/T7092-1993, and are packaged in CSOP-16 tubes. The overall dimensions are in accordance with Figure 1.

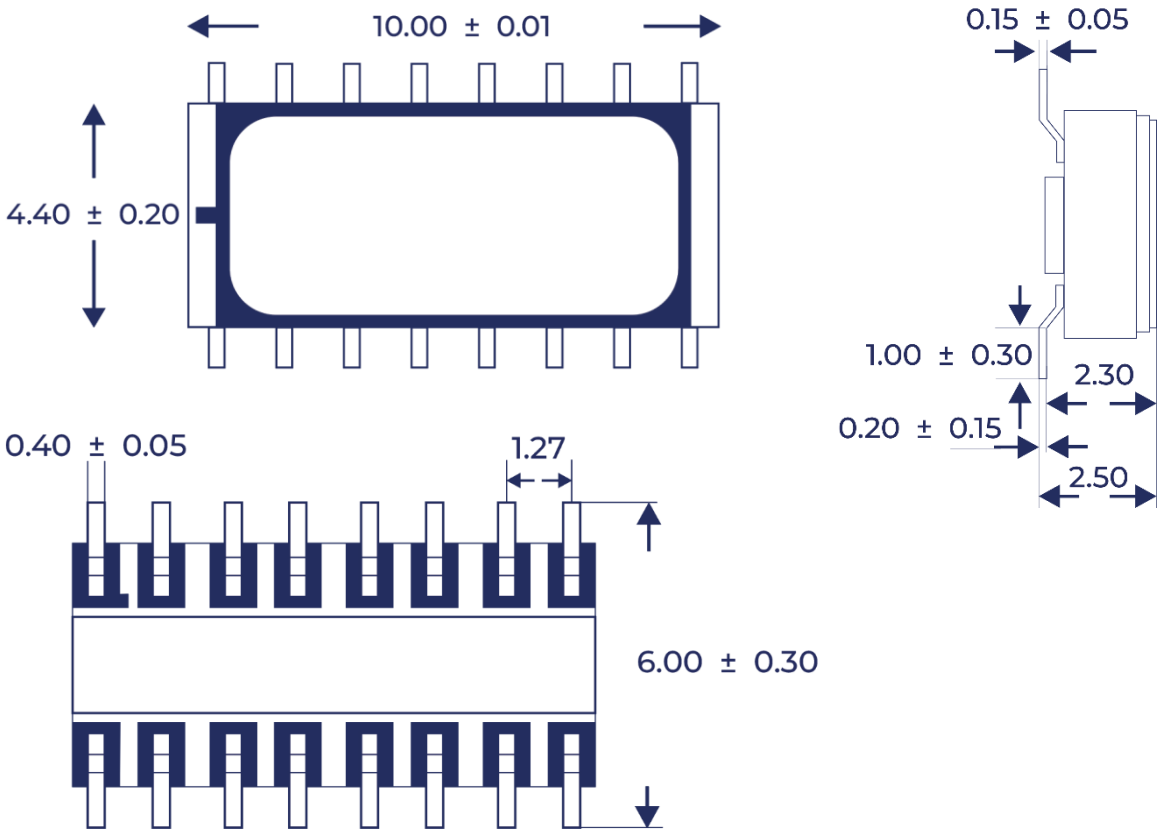

Figure 1 Dimensional drawing

2.2 Product marking

First line: Part number model

Second line: Manufacturer date code*

Note*

YY - last two digits of the calendar year

WW - last two digits being the week of the year

3. Standard implementation status

The quality level of this product is implemented according to GJB597 Level B, and the assessment standard complies with Q/FC 20997-2019 "TGS8596-C Type ARINC 429 Bus Driver Circuit Detailed Specification" requirements and meet the requirements of GJB597B-2012 "General Specification for Semiconductor Integrated Circuits" (Single chip)/GJB2438 "General Specifications for Hybrid Integrated Circuits" (Hybrid Circuits) and GJB548B-2005 "Microelectronic Device Test Methods and Procedures" requirements.

4. Brief description of basic working principles

4.1 Circuit functional block diagram

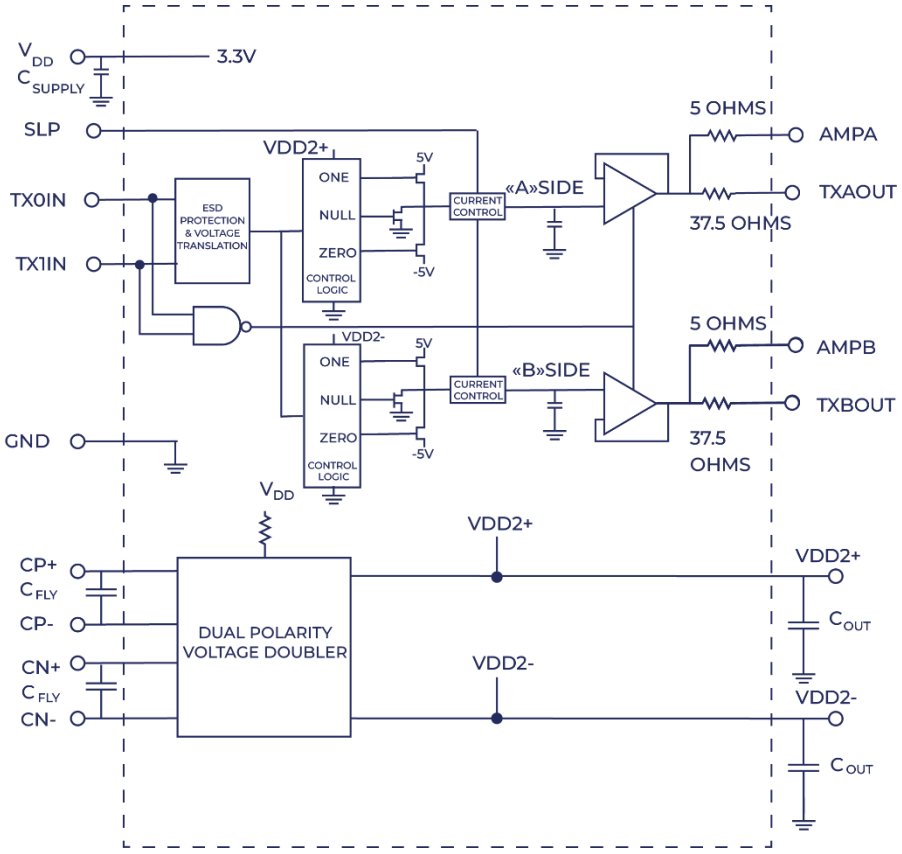

Figure 2 Circuit functional block diagram

The overall circuit includes reference voltage circuit, control circuit, charge pump circuit, level conversion circuit and buffer circuit module. The reference voltage circuit provides accurate voltage to the circuit, the control circuit module controls the output mode of the circuit, and the charge pump circuit module multiplies the power supply voltage. The level conversion module implements bidirectional high- and low-level conversion. The buffer circuit module implements output driving.

The device is powered by a single 3.3V power supply, with internal self-boosting to generate positive and negative high voltages, which are generated at the output under the control of logic signals.

+/-10V differential voltage output. Commonly used under single power supply conditions to convert ordinary logic voltages to ARINC 429 differential drive outputs place. The functional block diagram is shown in Figure 3 above.

4.2 Package form and pin description

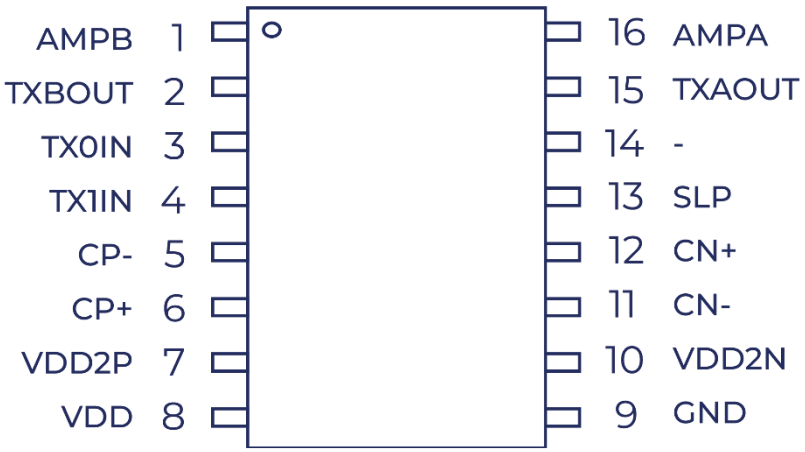

Figure 3 Chip pin diagram

Table 1 Pin function description table

Pin sequence Number	Symbol	Function	Pin number	Symbol	Function
1	AMPB	ARINC output low (resistance is 37.5Ω hour)	9	GND	Land
2	TXBOUT	ARINC output low (when the resistance is 5Ω)	10	VDD2N	Double negative supply voltage output
3	TX0IN	Data input pin 0	11	CN-	Flyback capacitor for VDD2N, CFLY negative port
4	TX1IN	Data input pin 1	12	CN+	Flyback capacitor for VDD2N, CFLY positive port
5	CP-	Flyback capacitor for VDD2P, CFLY negative port	13	SLP	Control the output through high- and low-level selection slope of edge
6	CP+	Flyback capacitor for VDD2P, CFLY positive port	14	-	-
7	VDD2P	Double positive supply voltage output	15	TXAOUT	ARNIC output high (when the resistance is 5Ω)
8	VDD	3.3V supply voltage	16	AMPA	ARNIC output high (resistance is 37.5Ω hour)

5. Extreme working conditions and recommended working conditions

5.1 Extreme working conditions

Supply voltage (V_{DD}): V~+5V

Power consumption (25ºC) (PD): 1W

Working temperature (T_A): -55ºC ～ +125ºC

Storage temperature (T_S): -65ºC ～ +150ºC

5.2 Recommended working conditions

Supply voltage (V_{CC}): V ～ 3.6V

Working environment temperature (T_A): -55℃ ～ 125℃

6. Main technical parameters

Parameter		Symbol	Conditions Unless otherwise specified V_{DD} = 3.3V, -55℃ ≤ T ≤ 125℃	Specification		Unit	Group
				Smallest	Maximum		
Input high and low levels (Port TX1IN, TX0IN, SLP)		V_{IH}	/	0.7V_{DD}	-	V	A1 A2 A3
		V_{IL}	/	-	0.3V_{DD}	V	
Input leakage current (Port TX1IN, TX0IN, SLP)		I_{IH}	V_{IN} = 0V	-	0.1	μA	
		I_{IL}	V_{IN} = 3.3V, 7.34KΩ pull-down	-	90	μA	
ARINC differential Output voltage	1	V_{DIFF1}	No load, TXAOUT - TXBOUT	9	11	V	
	0	V_{DIFF0}		-11	-9	V	
	Null	V_{DIFFN}		-0.5	0.5	V	
ARINC output Voltage (to ground)	1 or 0	V_{DOUT}	No load, test port to ground voltage amplitude	4.5	5.5	V	
	Null	V_{NOUT}	No load	-0.25	0.25	V	
Working current	No load	I_{DDNL}	SLP = V_{DD}, X1IN&TX0IN = 0V	-	50	mA	A1 A2 A3
	Maximum load	I_{DDL}	SLP = V_{DD}, 100kHz, load 400Ω	-	130		
	Output short circuit	I_{DDS}	SLP = V_{DD}, see note 1	-	220		
Bus port output Output impedance	TXAOUT, TXBOUT	Z_{OUT}	/	-	50	Ω	A4
	AMPA, AMPB			-	10		
Bus port tri-state output current		I_{OZ}	TX0IN = TX1IN = V_{DD} -5.75V < V_{OUT} < +5.75V	-1.0	1.0	μA	A1 A2 A3
Bus port tri-state output voltage		V_{OZ}	TX0IN = TX1IN = V_{DD} -1.0μA < I_{OUT} < +1.0μA	-5.75	+5.75	V	
Start time		t_{START}		-	10	ms	
Charge pump maximum output voltage		V_{DD2}+ (max)		-	6.93	V	
Transmission delay	High to low	t_{phlx}		-	1000	ns	A9 A10 A11
	Low to high	t_{plhx}		-	1000		
High speed	Fall time	t_{fx}	SLP=V_{DD}	1.0	2.0	μs	
	Rise time	t_{rx}		1.0	2.0		
Low speed	Fall time	t_{fx}	SLP=GND	5.0	15.0	μs	
	Rise time	t_{rx}		5.0	15.0		

Note 1: TXAOUT and TXBOUT are shorted or grounded. AMPA and AMPB are shorted or grounded (assuming additional resistors are connected to AMPA and AMPB to match the ARINC 429 bus 37.5Ω output resistance requirement).
Note 2: The voltages are all based on GND, GND = 0V. The current flowing into the terminal of the device is positive.

7. Application guide

7.1 Key parameter timing diagram/typical applications peripherals

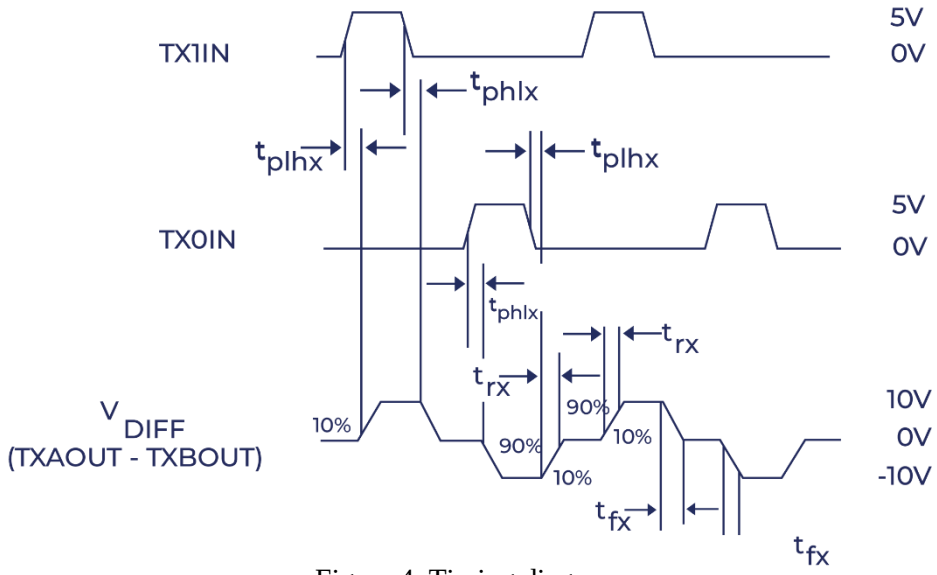

Figure 4. Timing diagram

Table 2. Working mode truth table

TX1IN	TX0IN	SLP	TXAOUT	TXBOUT	SLOPE
0	0	X	0V	0V	N/A
0	1	0	-5V	5V	10μs
0	1	1	-5V	5V	1.5μs
1	0	0	5V	-5V	10μs
1	0	1	5V	-5V	1.5μs
1	1	X	0V	0V	N/A

8. Precautions

8.1 Precautions for product transportation and storage

The chip storage environment temperature is: -65℃ to +150℃. Use designated anti-static packaging boxes for product packaging and transportation. During transportation, ensure that the chip does not collide with foreign objects. This product should be placed in an air-conditioned environment with temperature and humidity control to prevent the pins from oxidizing due to long-term storage and affecting the solderability.

8.2 Product unpacking and inspection

When unpacking the chip and using it, please pay attention to the product logo on the chip casing. Make sure the product labels are clear and there are no stains or scratches. At the same time, pay attention to checking the chip shell and pins. Make sure that the tube shell is not damaged or scarred, and the pins are neat, missing or deformed.

8.3 Precautions for circuit use and operation

The product is an electrostatically sensitive device and should be installed and operated in strict accordance with the operating requirements for electrostatically sensitive devices stipulated in relevant national standards.

During the installation of this product, it is prohibited to touch or weld this type of product without anti-static bracelets and other tools. Bare hands are not allowed to come into contact with the outer leads of the product. Installation and use must be in an anti-static work area (equipped with an anti-static workbench, tables and chairs, etc.), equipped with an ion blower, and operated within the effective range of the ion blower.

Operators must undergo anti-static training, wear anti-static work clothes (including anti-static gloves or finger cots, hats, work shoes, and anti-static wrist straps), and do not perform actions or operations that are likely to generate static electricity.

The anti-static facilities provided (such as wrist straps and finger cots) should be tested regularly to ensure that qualified anti-static facilities are used before each use.

Devices should be stored in containers made of conductive materials (e.g. special boxes for integrated circuits). Avoid using plastic, rubber or silk fabrics that cause static electricity during production, testing, use and shipping.

Ensure the relative temperature of the anti-static work area.

Use strictly in accordance with the recommended working conditions. Using this product beyond the absolute maximum ratings may cause permanent damage to the product.

If the system is used in situations with high temperature changes and vibration requirements, it is recommended to take reinforcement measures for the circuit to improve its ability to withstand mechanical vibration and thermal stress.