Ordering number : ENA0305

SANYO Semiconductors
DATA SHEET

LA2335M — Monolithic Linear IC For Audio Equipment Control Transceiver IC

Overview

The LA2335M is a transceiver for use in audio equipment control. It was developed as a bus interface driver/receiver IC for automotive audio equipment.

Features

- Supports both 3.3V and 5.0V I/O controller interface levels.
- Two-input logical OR circuit
- High bus input voltage handling capability (maximum rating : 18V)
- Built-in protection circuits

Functions

- Transmitter (current output driver : 3.8mA (typical))
- Receiver (receiver amplifier, waveshaping hysteresis comparator)
- Standby function

Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage (V_{CC})	V_{CC} max	Pin 10	7.0	V
Maximum supply voltage (V_{DD})	V_{DD} max	Pin 4	7.0	V
Logic input voltage	V_{Igc} max		V_{DD}+0.3	V
Bus input voltage	V_{bus} max	Pins 1,2 and 5	18.0	V
Allowable power dissipation	Pd max	Pins 8 and 9	100	mW
Operating temperature	Topr		-40 to +85	°C
Storage temperature	Tstg		-50 to +125	°C

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Recommended Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Operating supply voltage (V_{CC})	V_{CC} op	Pin 10	4.75	5.0	5.25	V
Operating supply voltage 1 (V_{DD})	V_{DD} op1	Pin4 : V_{DD} = 3.3V	3.0	3.3	3.6	V
Operating supply voltage 2 (V_{DD})	V_{DD} op2	Pin4 : V_{DD} = 5.0V	4.75	5.0	5.25	V

Electrical Characteristics at Ta = 25°C, V_{CC} = 5.0V, V_{DD} = 3.3V or 5.0V

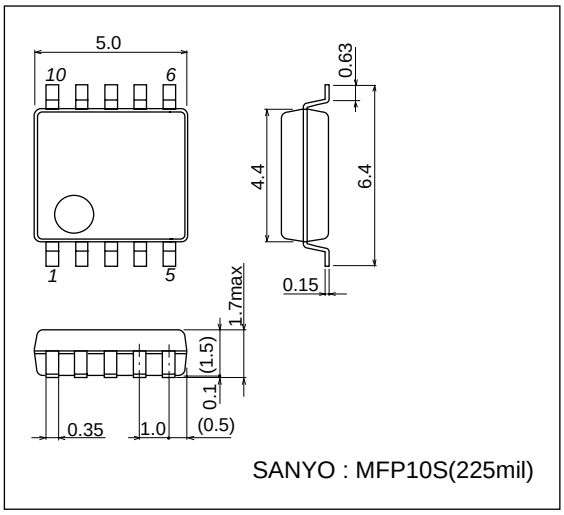
Parameter	Symbol	V_{DD}	Conditions	Ratings			Unit
				min	typ	max	
V_{CC} current drain							
With a high-level input	$I_{CC}1$	3.3V / 5.0V	TXD1 : H	4.5	6.5	9.4	mA
With a low-level input	$I_{CC}2$		TXD1 : L	0.9	1.4	1.8	mA
Standby mode	$I_{CC}STB$		STBN : L			10	µA
V_{DD} current drain							
With a high-level input	$I_{DD}H1$	3.3V	TXD1 : H	90	150	200	µA
With a low-level input	$I_{DD}L1$		TXD1 : L	200	400	600	µA
With a high-level input	$I_{DD}H2$	5.0V	TXD1 : H	100	180	230	µA
With a low-level input	$I_{DD}L2$		TXD1 : L	200	400	600	µA
Transmitter							
High-level input voltage	V_{IH}DRV1	3.3V	Driver differential output : 120 mV or higher	2.4	3.3		V
Low-level input voltage	V_{IL}DRV1		Driver differential output : 20 mV or lower	0		0.5	V
High-level input voltage	V_{IH}DRV2	5.0V	Driver differential output : 120 mV or higher	3.5	5.0		V
Low-level input voltage	V_{IL}DRV2		Driver differential output : 20 mV or lower	0		1.5	V
Bus(+) output voltage	$V_O HD^+$	3.3V / 5.0V	TXD1 : H, TXD2 : L	1.5		3.5	V
Bus(-) output voltage	$V_O HD^-$		TXD1 : H, TXD2 : L	1.5		3.5	V
Bus(+) reference operating voltage	$V_O P^+$		TXD1 : L, TXD2 : L	2.30	2.45	2.70	V
Bus(-) reference operating voltage	$V_O P^-$		TXD1 : L, TXD2 : L	2.30	2.45	2.70	V
High-level output current	I_{HD}OUT		TXD1 : H, TXD2 : L	2.7	3.8	5.0	mA
Low-level output leak current	I_{LD}OUT		TXD1 : L, TXD2 : L			1	µA
Receiver							
High-level differential input voltage	V_{IH}R	3.3V / 5.0V	[BUS^+] - [BUS^-]	65	80	120	mV
Low-level differential input voltage	V_{IL}R		[BUS^+] - [BUS^-]	20	40	60	mV
High-level output voltage	V_{OH}R1	3.3V	Load : 47kΩ // 18pF	2.4	3.3		V
Low-level output voltage	V_{OL}R1		Load : 47kΩ // 18pF	0		0.5	V
High-level output voltage	V_{OH}R2	5.0V	Load : 47kΩ // 18pF	4.0	5.0		V
Low-level output voltage	V_{OL}R2		Load : 47kΩ // 18pF	0		1.0	V
Input hysteresis voltage	V_IHYS	3.3V / 5.0V	V_{IH}R - V_{IL}R	20	40	60	mV
Total delay time (See note.)							
L→H	T_{TDR}	3.3V / 5.0V	Compared at the 90% values of the TXD and RXD amplitudes		500	800	ns
H→L	T_{TDF}		Compared at the 10% values of the TXD and RXD amplitudes		500	800	ns
Standby							
On	V_{IL}STB1	3.3V		0		0.5	V
Off	V_{IH}STB1			2.4	3.3		V
On	V_{IL}STB2	5.0V		0		1.0	V
Off	V_{IH}STB2			3.5	5.0		V

Note : The characteristics when a load of R_L = 47kΩ and a capacitance of 18pF is connected to pin 3.

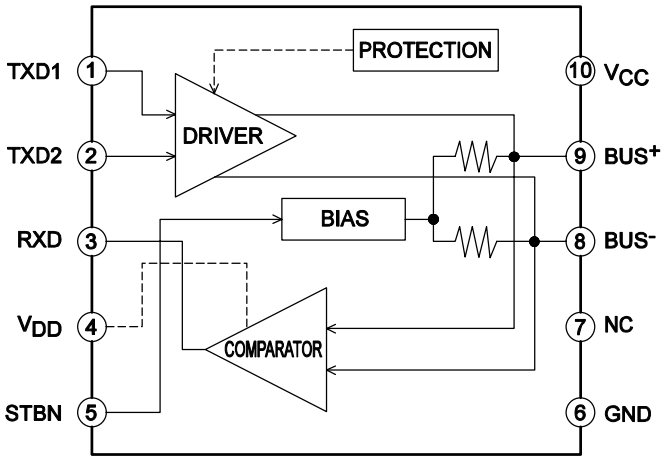
Package Dimensions

unit : mm

3086B



Block Diagram



* Bus line external termination resistor : 62Ω.

Pin Description

Pin No.	Pin Name	Pin Description
1	TXD1	Transmitted signal input from the controller
2	TXD2	Logical OR input for transmitted signal from the controller
3	RXD	Received signal output to the controller
4	V_{DD}	3.3V or 5.0V power supply
5	STBN	High : standby mode off Low : standby mode on
6	GND	Ground
7	NC	Unused pin (This pin must be left open.)
8	BUS^-	Bus (-) transmitted signal output/received signal input
9	BUS^+	Bus (+) transmitted signal output/received signal input
10	V_{CC}	5.0V power supply

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