Ordering number : ENA0304

SANYO Semiconductors
DATA SHEET

LA2352M — Monolithic Linear IC For Car-LAN Transceiver IC

Overview

The LA2352M is Low-noise transceiver IC for car-LAN. Either a 5Mbps or a 7.5Mbps automotive LAN can be formed by combining this IC with an automotive LAN protocol chip.

Features

- Combining this IC with protocol IC TMC20040C series* for automotive LAN can compose an automotive LAN.
- Supports both 3-bit digital and staircase signals as the input signal. When a 3-bit digital signal cannot be used for wiring runs due to EMI considerations, you can provide an R-2R ladder in the vicinity of the protocol chip, use the post-D/A converter signal for the wiring, and connect that signal to the low-pass filter input.
- Built-in adjustment-free low-pass filter.
- Provides low-noise data communication.

*: The TMC20040C series is IC made of SMSC Japan (Standard Microsystems Kabushiki Kaisha).

Functions

Transmitter block

- D/A converter (3 bit).
- LPF (for prevention of EMI).
- Output driver.

Receiver block

- Attenuator.
- Receiving amplifier.
- Noise eliminating LPF (for the receive signal).
- Comparator (for waveform shaping).

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Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max	With no signal	7.0	V
Allowable power dissipation	Pd max	Ta≤85°C *	500	mW
Operating temperature	Topr		-40 to +85	°C
Storage temperature	Tstg		-55 to +150	°C

* Mounted on a board : 46.2×25.7×1.6mm^3, material glass epoxy

Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Recommended supply voltage	V_{CC}			5.0		V
Operating supply voltage range	V_{CC} op		4.75		5.25	V
DAC input	V_{O}L	Low level input		0	0.5	V
	V_{O}H	High level input	2.4	3.3		V
Send control input	V_{O}L	Low level input			0.5	V
	V_{O}H	High level input	2.4			V
LPF input amplitude	V_{lpf}i		0.45		0.55	Vp-p
Output driver input amplitude	V_{drv}i		0.45		0.55	Vp-p
Receiving amplifier input signal amplitude range (differential)	V_{rx}i		0.9		1.1	Vp-p
Comparator input voltage range	V_{cpdc}i		1.2		3.5	V
Comparator input signal amplitude	V_{cp}i		0.8		1.2	Vp-p

Operating Characteristics at Ta=25°C, V_{CC}=5.0V Designated test circuit

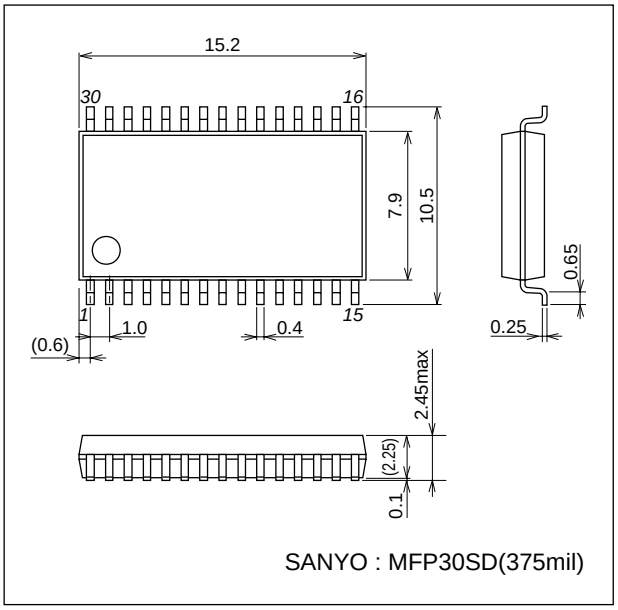
Note that this test was made with the IC socket made by Yamaichi Electrics, IC-51-0302-426.

Parameter	Symbol	Conditions	SW1	Ratings			Unit
				min	typ	max	
Current dissipation without signal	I_{CCO}	With no signal, I1+I17+I24, pin 25 = 2.4V	1	35	50	70	mA
[DAC]							
Output Level (111)-(001)	DAC	(111); TXI2 = TXI1 = TXI0 = 3.3V, (001); TXI2 = TXI1 = 0V, TXI0 = 3.3V Deviation for the output voltage difference of 0.5Vp-p	1	-1	0	1	dB
[LPF]							
Insertion loss (7.5Mbps mode)	LPF7501	V_{IN}1 = -2dBm input, FCC (pin 9) = V_{CC} Attenuation degree of 1MHz signal	1	-1	0	1	dB
13.25MHz attenuation degree (7.5Mbps mode)	LPF7513	V_{IN}1 = -2dBm input, FCC (pin 9) = V_{CC} Degree of attenuation of 13.25MHz for 1MHz	1	2	3	4	dB
[Driver Amp]							
Output level	DRV01	V_{IN}2 = -2dBm input, TXEN (pin 25) = GND, Rl = 25Ω 18PIN and 19PIN output 1 MHz output level	1	0	1.5	3	dB
Attenuation degree of 15MHz	DRV15	V_{IN}2 = -2dBm input, TXEN (pin 25) = GND, Rl = 25Ω Degree of attenuation of 15MHz for 1 MHz	1			3	dB
[Attenuator & Receiver AMP & Noise Filter]							
GAIN (pin 15)	RCV01	V_{IN}3 = 4dBm input, V_{IN}4 = 0V input (Connect RXI2 (pin 14) to GND in C connection pattern) 15pin input gain at 1 MHz input	1	-2	0	2	dB
Degree of attenuation of 15MHz	RCV15	V_{IN}3 = 4dBm input, V_{IN}4 = 0V input (Connect RXI2 (pin 14) to GND in C connection pattern) Degree of attenuation of 15 MHz for 1 MHz	1	2.0	3.0	4.2	dB
[Comparator]							
Output high voltage	V_{H}	V_{IN}6 = 4V input, V_{DD}I(pin 20) = 3.3V CPD (pin 3) output DC voltage	2	3.0	3.1	3.2	V
Output low voltage	V_{L}	V_{IN}6 = 1V input, V_{DD}I(pin 20) = 3.3V CPD (pin 3) output DC voltage	2	0.2	0.4	0.6	V

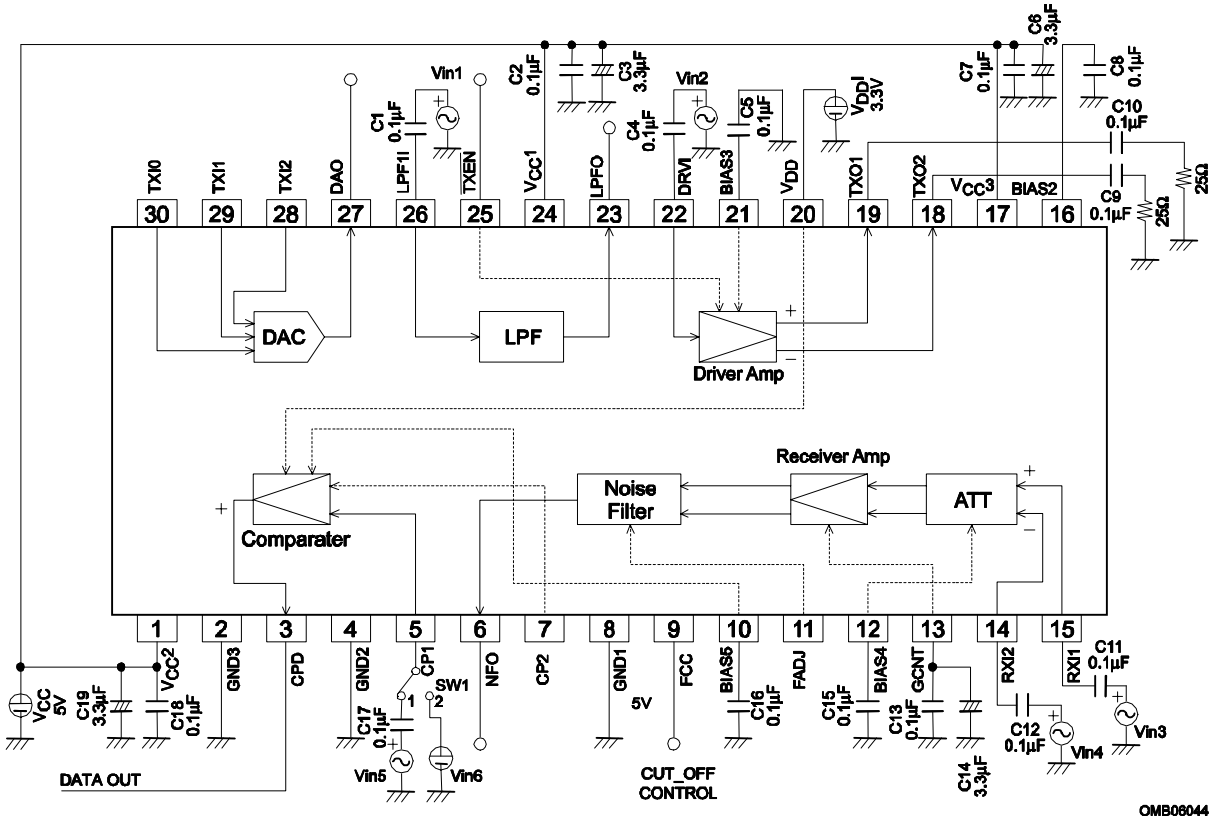
Package Dimensions

unit : mm

3073C



Block Diagram and Test Circuit Diagram



Pin Description

Pin No.	Pin Name	Pin Description	Pin Function	Remarks
1	$V_{CC}2$	Comparator power supply	Same as $V_{CC}1$ (pin 24)	
2	GND3	DAC GND	GND dedicated to DAC.	
3	CPD	Comparator non-inverted output		
4	GND2	Comparator GND	GND dedicated to comparator.	
5	CP1	Comparator input (+)		
6	NFO	Noise elimination filter output		
7	CP2	Comparator input (-)		Standard: OPEN
8	GND1	GND	System GND.	
9	FCC	Baud rate setting	5Mbps as connected to GND and 7.5Mbps as connected to $V_{CC}1$.	
10	BIAS5	Comparator bias	Connect to GND via capacitor.	
11	FADJ	Fine adjustment of the noise elimination LPF shut-off frequency	Adjust with a resistor to GND.	Standard: OPEN
12	BIAS4	Bias voltage	Connect to GND via capacitor.	
13	GCNT	Receiving amplifier amplitude adjustment	Adjust with a resistor to GND. (C connection with GND)	Standard: 0Ω
14	RXI2	Receive signal inverted input		
15	RXI1	Receive signal non-inverted input		
16	BIAS2	Bias voltage	Connect to GND via capacitor.	
17	VCC3	Power supply	Same as $V_{CC}1$ (pin 24)	
18	TXO2	Send signal non-inverted output		
19	TXO1	Send signal inverted output		
20	V_{DD}I	Comparator switch	Connect V_{DD} to supply to the protocol chip.	
21	BIAS3	Bias voltage	Connect to GND via capacitor.	
22	DRVI	Output driver input		
23	LPFO	LPF output		
24	$V_{CC}1$	Power supply	+5.0V ±5%	
25	$\overline{\text{TXEN}}$	Send/receive changeover control	L for send and H for receive. (V_OL = 0.5V, V_OH = 2.4V)	
26	LPFI	LPF input		
27	DAO	D/A converter output	0.5Vp-p ±1dB	
28	TXI2	D/A converter input (MSB)	V_OL = 0.5V, V_OH = 2.4V	
29	TXI1	D/A converter input	V_OL = 0.5V, V_OH = 2.4V	
30	TXI0	D/A converter input (LSB)	V_OL = 0.5V, V_OH = 2.4V	

Example of Application Circuit