Ordering number : EN6955A

SANYO Semiconductors
DATA SHEET

LA2351M — Monolithic Linear IC For Car-LAN Transceiver IC

Overview

The LA2351M 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

- 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 input signal	7.0	V
Allowable power dissipation	Pd max	Ta≤85°C *	500	mW
Maximum applied voltage	V_{IN} max		V_{CC}	V
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
Transmission 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		15		75	mVp-p
Comparator input voltage range	V_{cpdc}i		0		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.

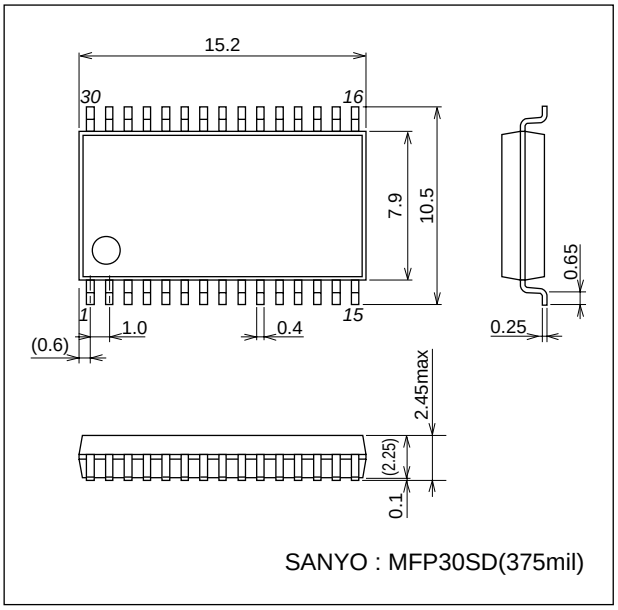
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current dissipation without signal	I_{CCO}	With no signal, I_{24}+I_1, pin 25 = 2.4V	35	55	70	mA
[D/A converter]						
Output Level	DAC	(111); V_{28} = 3.3V, V_{29} = 3.3V, V_{30} = 3.3V (001); V_{28} = 0V, V_{29} = 0V, V_{30} = 3.3V Deviation for the output voltage difference of 0.5Vp-p	-1	0	1	dB
[LPF]						
Output attenuation	Att (1)	V_{IN}1(pin 26) = 0.5Vp-p Degree of attenuation of 9MHz for 1MHz	2.5	3.0	3.5	dB
Insertion loss	Att (2)	V_{IN}1(pin 26) = 0.5Vp-p Attenuation degree of 1MHz signal	-1	0	1	dB
[Output driver]						
Output attenuation	Att (1)	V_{IN}2(pin 22) = 0.5Vp-p Degree of attenuation of 15MHz for 1MHz	0.0	2.0	3.0	dB
Differential amplifier gain	Att (2)	V_{IN}2(pin 22) = 0.5Vp-p Pin 18 output 1 MHz output level	-1.5	0.0	1.5	dB
[Receiver AMP & noise filter]						
Frequency characteristics (±15MHz)	Att	V_{IN}3(pin 15) = 56mVp-p Degree of attenuation of 15MHz for 1MHz	2.1	3.0	3.9	dB
Amplifier gain	Gain	V_{IN}3(pin 15) = 56mVp-p Pin 15 input gain at 1MHz input	24	26	28	dB
[Comparator]						
Output high amplitude	V_L	Pin 3 output DC voltage at input Pin 5 = 1V	0.25	0.40	0.60	V
Output low amplitude	V_H	Pin 3 output DC voltage at input Pin 5 = 1V	4.0	4.1	4.2	V

Notice: Apply power supply to 1pin and 24pin at the same time.

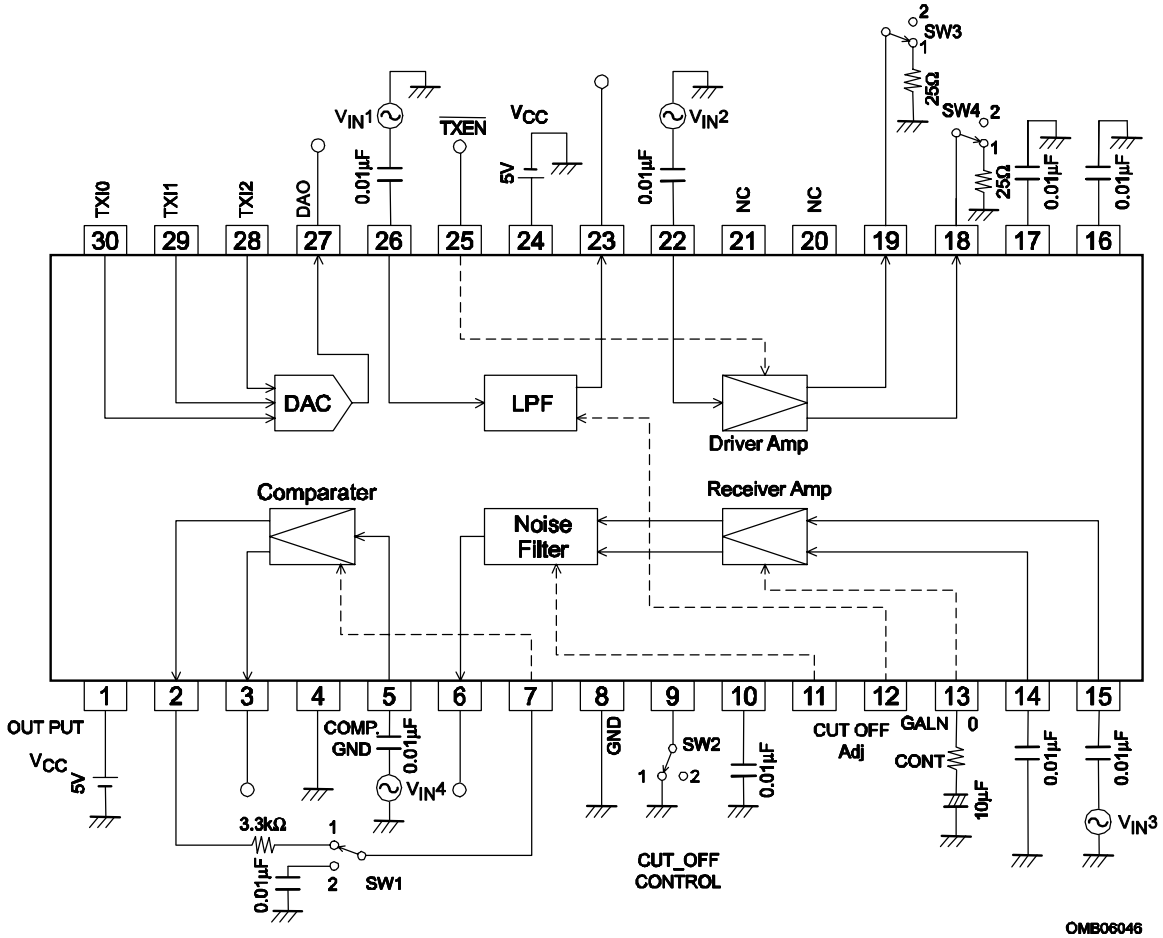
Package Dimensions

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	5V (Apply Pin 24 at the same time.)	
2	CPD2	Comparator inverted output	V_OL = 0.4V, V_OH = 4.2V ($V_{CC}2$ is the maximum voltage for this parameter.)	
3	CPD1	Comparator non-inverted output	V_OL = 0.4V, V_OH = 4.2V ($V_{CC}2$ is the maximum voltage for this parameter.)	
4	GND2	Comparator GND	GND dedicated to comparator.	
5	CP1	Comparator input (+)		
6	NFO	Noise elimination filter output		
7	CP2	Comparator input (-)		
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	BIASC	Comparator bias	Connect to GND via capacitor.	
11	FADJ1	Fine adjustment of the noise elimination LPF shut-off frequency	Adjust with a resistor to GND.	Standard: OPEN
12	FADJ2	Fine adjustment of the LPF shut-off frequency	Adjust with a resistor to GND.	Standard: OPEN
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		
17	BIAS	Bias voltage		
18	TXO2	Send signal inverted output		
19	TXO1	Send signal non-inverted output		
20	NC2	No connection		
21	NC1	No connection		
22	DRVI	Output driver input		
23	LPFO	LPF output		
24	$V_{CC}1$	Power supply	+5.0V ±5%	
25	$\overline{TXEN}$	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