

**SANYO Semiconductors****DATA SHEET****LA2360M****Monolithic Linear IC  
CAN Transceiver****Overview**

The LA2360M is a CAN (Controller Area Network) transceiver.

**Functions**

[ Transmitter block ]

- Low-pass filter (EMI prevention)
- Output driver

[ Receiver block ]

- ATT
- Comparator

**Features**

- Conforms to the ISO 11898 standard
- Transmission rate: 1 Mbps

**Specifications****Maximum Ratings** at  $T_a = 25^\circ\text{C}$ 

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC\ max}$		6.0	V
Maximum applied voltage	$V_{ap}$		$V_{CC}$	V
Maximum applied voltage (pins 6 and 7)	$V_{ap} (6, 7)$		-8 to +18	V
Allowable power dissipation	$P_d\ max$	*: Mounted on a circuit board, $T_a \leq 85^\circ\text{C}$	440	mW
Operating temperature	$T_{opg}$		-40 to +85	$^\circ\text{C}$
Storage temperature	$T_{stg}$		-55 to +150	$^\circ\text{C}$

\*: Circuit board:  $39.8 \times 50.0 \times 1.6\text{mm}^3$  glass epoxy

**Notice:** Please contact our company, when using the LA2360M in the body system or the power-train system.

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**SANYO Semiconductor Co., Ltd.**

TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

Operating Conditions at  $T_a = 25^\circ\text{C}$ 

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	$V_{CC}$		5.0	V
Operating supply voltage range	$V_{CC\text{ op}}$		4.5 to 5.5	V

Operating Characteristics at  $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 5.0\text{V}$ 

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Overall						
Current drain	$I_{CC}$	Dominant; $V_1 = 1\text{V}$ , $R_8 = 0\Omega$	30		70	mA
		Recessive; $V_1 = 4\text{V}$ , $R_8 = 47\text{k}\Omega$			14	mA
		Recessive; $V_1 = 4\text{V}$ , $R_8 = 0\text{k}\Omega$			18	mA
		Standby; $V_8 = V_{CC}$ , $I_1 = I_4 = I_5 = 0\text{mA}$	30	50	70	$\mu\text{A}$
DC transmitter block						
High-level input voltage	$V_{1IH}$	Output -recessive	$0.7V_{CC}$		$V_{CC}+0.3$	V
Low-level input voltage	$V_{1IL}$	Output -dominant	-0.3		$0.3V_{CC}$	V
High-level input current	$I_{1IH}$	$V_1 = 4\text{V}$	-200		+30	$\mu\text{A}$
Low-level input current	$I_{1IL}$	$V_1 = 1\text{V}$	-600		-100	$\mu\text{A}$
CAN_H output voltage	$V_7$	$V_1 = 1\text{V}$	2.75		4.5	V
CAN_L output voltage	$V_6$	$V_1 = 1\text{V}$	0.5		2.25	V
Recessive state bus voltage	$V_{6,7}$	$V_1 = 4\text{V}$	2.0		3.0	V
Pins 6 and 7 output voltage difference	$\Delta V_{6,7}$	$V_1 = 1\text{V}$	1.5		3.0	V
		$V_1 = 4\text{V}$ ; With no $62\Omega$ resistor	-500		+50	mV
Current when pin 7 grounded	$I_{SC7}$	$V_1 = 1\text{V}$ , $V_7 = -8\text{V}$ ; $V_{CC} = 5\text{V}$			-120	mA
Current when pin 6 shorted to $V_{CC}$	$I_{SC6}$	$V_1 = 1\text{V}$ , $V_6 = 18\text{V}$			160	mA
DC receiver block						
Differential input voltage (recessive)	$V_{\text{diff}}(r)$	Output -recessive	-1.0		0.2	V
		Output -recessive, $0\text{V} < (V_6, V_7) < 12\text{V}$	-1.0		0.1	V
Differential input voltage (dominant)	$V_{\text{diff}}(d)$	Output -dominant	0.9		5.0	V
		Output -dominant, $0\text{V} < (V_6, V_7) < 12\text{V}$	1.0		5.0	V
High-level output voltage (pin 4)	$V_{4OH}$	$I_4 = -100\mu\text{A}$	$0.8V_{CC}$		$V_{CC}$	V
Low-level output voltage (pin 4)	$V_{4OL}$	$I_4 = +100\mu\text{A}$	0		$0.2V_{CC}$	V
Input hysteresis voltage	$V_{\text{diff}}(\text{hys})$		50	80	150	mV
DC standby/slope control block						
High-speed mode input voltage	$V_8$				$0.3V_{CC}$	V
High-speed mode input current	$I_8$	$V_8 = 0\text{V}$			-500	$\mu\text{A}$
Standby mode input voltage	$V_{\text{stb}}$		$0.75V_{CC}$			V
Slope control mode current	$I_{\text{slope}}$	8pin = $47\text{k}\Omega$	-200		-10	$\mu\text{A}$
Slope control mode voltage	$V_{\text{slope}}$	8pin = $47\text{k}\Omega$	$0.4V_{CC}$		$0.6V_{CC}$	V

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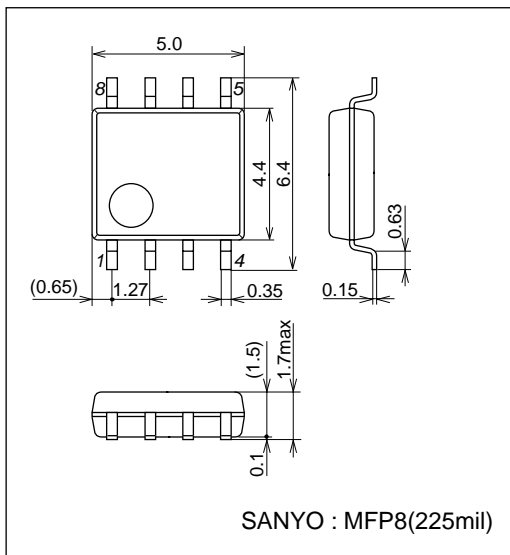
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
DC reference block						
Output reference voltage	$V_{ref}$	$V_B = 1V; -50\mu A < I_5 < 50\mu A$	$0.45V_{CC}$		$0.55V_{CC}$	V
		$V_B = 4V; -5\mu A < I_5 < 5\mu A$	$0.4V_{CC}$		$0.6V_{CC}$	V
AC transmitter block						
Pins 6 and 7 differential output pulse width	$t_{width} (diff)$	$V_B = 1V, V_1 = 1MHz$	0.45		0.55	$\mu s$
		$V_B = 1V, V_1 = 100kHz$	4.5		5.5	$\mu s$
Rise delay time	$t_{onTXD}$	$V_B = 1V, V_1 = 1MHz$		40	65	ns
		$V_B = 1V, V_1 = 100kHz$		40	65	ns
Fall delay time	$t_{offTXD}$	$V_B = 1V, V_1 = 1MHz$		40	65	ns
		$V_B = 1V, V_1 = 100kHz$		40	65	ns
AC receiver block (overall) (See note 1.)						
Rise delay time	$t_{onRXD}$	$V_B = 1V, V_1 = 1MHz$		110	160	ns
		$V_B = 1V, V_1 = 100kHz$		110	160	ns
		$R_8 = 47k\Omega, V_1 = 100kHz$		360	500	ns
		$R_8 = 24k\Omega, V_1 = 100kHz$		320	500	ns
Fall delay time	$t_{offRXD}$	$V_B = 1V, V_1 = 1MHz$		90	160	ns
		$V_B = 1V, V_1 = 100kHz$		90	160	ns
		$R_8 = 47k\Omega, V_1 = 100kHz$		600	800	ns
		$R_8 = 24k\Omega, V_1 = 100kHz$		500	800	ns
Pin 8 wakeup time from standby mode	$t_{wake}$	$V_B = 4V \rightarrow 1V, V_8 = 100kHz$			20	$\mu s$
Receiver output response time to a bus level change	$t_{dRXDL}$	$V_1 = 4.0V, V_8 = 4.0V$ [BUS] recessive $\rightarrow$ dominant			3	$\mu s$

Note 1. With an input signal to the transmitter, in automatic send/receive mode

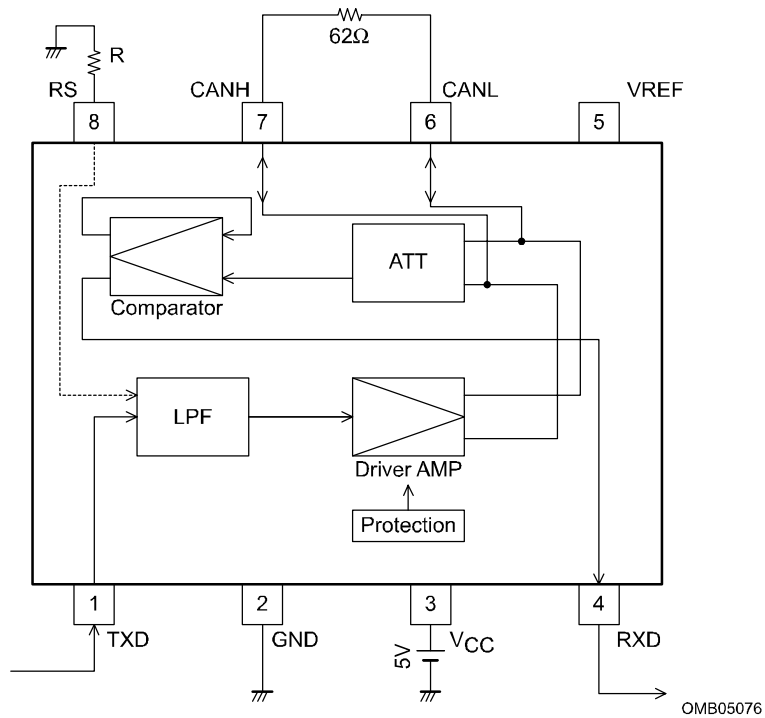
## Package Dimension

unit:mm

3032D



## Block Diagram



## Pin Functions

Pin No.	Pin	I/O	Function	Description
1	TXD	I	Transmission signal input	Input from the CAN microcontroller
2	GND	P	GND	System ground
3	VCC	P	Power supply	5V
4	RXD	O	Reception signal output	Output to the CAN microcontroller
5	VREF	O	Reference voltage output	2.5V
6	CANL	I/O	Transmission signal output (L)	Input and output of send and receive signals to the bus
7	CANH	I/O	Transmission signal output (H)	Input and output of send and receive signals to the bus
8	RS	I	Mode switching resistor	Slope control Controls standby mode

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