

High Speed 1M bit/s Photocoupler

Product Description

The EMD2A50L consists of a high efficient AlGaP Light Emitting Diode and a high speed optical detector. This design provides excellent AC and DC isolation between the input and output sides of the Optocoupler. The output of the optical detector features an open collector Schottky clamped transistor. The internal shield ensures high common mode transient immunity. A guaranteed common mode transient immunity is up to 15KV/ μ s (min.). The Optocoupler operational parameters are guaranteed over the temperature range from -40°C ~ +110°C.

Applications

- Digital signal isolation
- Communications interface
- Micro-controller interface
- Feedback elements in switching power supplies
- Digital isolation for A/D, D/A conversion
- Digital field

Features

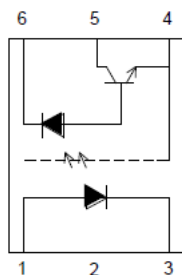
- Stretched LSOP-6
- High speed: 1M bit/s typical
- Package creepage 7mm & 8mm
- Compatible with infrared vapor phase reflow and wave soldering process
- Inverter logic type
- Very high common mode transient immunity: 15K V/ μ s at VCM = 1500 V guaranty
- Guarantee performance from temperature range: -40°C to 110°C
- TTL compatible
- Open collector output

Safety approved

- UL1577 recognized with 3750 Vrms for 1 minute for EMD2A50L-SK and 5000 Vrms for 1 minute for EMD2A50L-SL Certificate No. E529603
- IEC/EN/DIN EN 60747-5-5 Approved
V_{IORM} = 891 V_{peak} for EMD2A50L-SK
V_{IORM} = 1140 V_{peak} for EMD2A50L-SL
Certificate No. 40055846
- CQC approved: GB4943.1-2011
Certificate No. CQC22001358589

SCHEMATIC	PIN DEFINITION	PACKAGE
	1.Anode 2.NC 3.Cathode 4.GND 5.VO 6.Vcc	

Connection Diagram



Order Information

EMD2A50L-00S###%FR1

00 Internal control Code

S### SK06: LSOP-6 Package 7mm clearance

SL06: LSOP-6 Package 8mm clearance

% E: RoHS & Halogen free package with VDE

N: RoHS & Halogen free package

F -40 to 110°C temperature rating

R1 Packing in Tape & Reel

Order, Mark & Packing Information

Package	Product ID	Mark		Packing
LSOP-6	EMD2A50L-00SK06EFR1 EMD2A50L-00SL06EFR1		E : ESMT YY : Date code (Year) WW : Date code (Week) 50L : Part Number H : Internal Tracking Code V : VDE Option	Tape & Reel 3Kpcs
	EMD2A50L-00SK06NFR1 EMD2A50L-00SL06NFR1			

Absolute Maximum Ratings (Ta = 25°C unless otherwise specified)

Parameter	Symbol	Min	Max	Unit
Storage Temperature	Tstg	-55	125	°C
Operating Temperature	Topr	-40	110	°C
Supply Voltage	VCC	-0.5	30	V
Average Forward Input Current	IF	-	25	mA
Reverse Input Voltage	VR	-	5	V
Input Power Dissipation	PI	-	45	mW
Output Collector Current	IO		8	mA
Output Collector Voltage	VO	-0.5	20	V
Output Collector Power Dissipation	PI	-	100	mW
Lead Solder Temperature	Tsol	-	260	°C

IEC/EN/DIN EN 60747-5-5 Insulation Characteristics

Description	Symbol	EMD2A50L-SK	EMD2A50L-SL	Unit
Climatic Classification	--	55/100/21	55/100/21	--
Pollution Degree (DIN VDE 0110/1.89)	--	2	2	--
Maximum Working Insulation Voltage	V _{IORM}	891	1140	V _{peak}
Input to Output Test Voltage, Method b (Note 1) V _{IORM} x 1.875 = V _{PR} , 100% Production Test With t _m =1sec, Partial discharge < 5pC	V _{PR}	1671	2137	V _{peak}
Input to Output Test Voltage, Method a (Note 1) V _{IORM} x 1.6 = V _{PR} , 100% Production Test With t _m =10sec, Partial discharge < 5pC	V _{PR}	1426	1824	V _{peak}
Highest Allowable Overvoltage (Transient Overvoltage t _{ini} = 60sec)	V _{IOTM}	6000	8000	V _{peak}
Safety-limiting values – maximum values allowed in the event of a failure				
Case Temperature	Ts	175	175	°C
Input Current	I _{S, INPUT}	150	150	mA
Output Power	P _{S, OUTPUT}	600	600	mW
Insulation Resistance at TS, V _{IO} = 500 V	R _S	>10 ⁹	>10 ⁹	Ω

Note 1 : Refer to the optocoupler section of the Isolation and Control Components Designer's Catalog, under Product Safety Regulations section, (IEC/EN/DIN EN 60747-5-5) for a detailed description of Method a and Method b partial discharge test profiles.

These optocouplers are suitable for "safe electrical isolation" only within the safety limit data. Maintenance of the safety data shall be ensured by means of protective circuits. Surface mount classification is Class A accordance with CECC 00802.

Insulation and Safety-Related Specifications

Parameter	Symbol	EMD2A		Unit	Conditions
		50L-SK	50L-SL		
Minimum External Air Gap (External Clearance)	L(101)	7.0	8.0	mm	Measured from input terminals to output terminals, shortest distance through air.
Minimum External Tracking (External Creepage)	L(102)	8.0	8.0	mm	Measured from input terminals to output terminals, shortest distance path along body.
Tracking Resistance (Comparative Tracking Index)	CTI	>175	>175	V	DIN IEC 112/VDE 0303 Part 1.

Electrical Characteristics (DC)

All Typical values at $T_A = 25^\circ\text{C}$, unless otherwise specified; all minimum and maximum specifications are at recommended operating condition.

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Input Forward Voltage	VF	1.6	2.0	2.4	V	IF = 16 mA
Input Reverse Breakdown Voltage	BVR	5	-	-	V	IR = 10 μA
Current transfer ratio	CTR	20	100	-	%	IF = 16mA; VCC = 4.5V; TA = 25 °C; VO = 0.4V
		15	110	-		IF = 16mA; VCC = 4.5V; TA = 25°C; VO = 0.5V
Logic low output voltage	VOL	-	0.1	0.4	V	IF = 16mA; VCC = 4.5V; Io = 3.0mA; TA = 25°C
		-	-	0.5		IF = 16mA; VCC = 4.5V; Io = 2.4mA; TA = 25°C
Logic high output current	IOH	-	0.002	0.5	μA	IF = 0mA, VO = VCC = 5.5V, TA = 25°C
		-	0.013	1		IF = 0mA, VO = VCC = 15V TA = 25°C
		-	-	50		TA = 0 ~ 70°C
Logic low supply current	ICCL	-	230	-		IF = 16mA, Vo = open (VCC=30V)
Logic high supply current	ICCH	-	0.002	1		IF = 0mA, Vo = open ; TA = 25°C (VCC = 30V)

Note 2: Current Transfer Ratio in percent is defined as the ratio of output collector current, IO, to the forward LED input current, IF, times 100%.

Switching Specification (AC)

All Typical values at $T_A = 25^\circ\text{C}$, unless otherwise specified; all minimum and maximum specifications are at recommended operating condition.

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition	
Propagation Delay Time to Low Output Level (Note 3)	tPHL	-	250	800	ns	TA = 25°C	RL=1.9KΩ
		-	-	800		0 ~ 100°C	
Propagation Delay Time to High Output Level (Note 4)	tPLH	-	650	800		TA = 25°C	
		-	-	800		0 ~ 100°C	
Common mode transient immunity at high level output (Note 5)	CMH	15	25	-	kV/μs	IF = 0mA; VCM = 1500Vp-p; CL = 15 pF; TA=25°C , RL=1.9KΩ	
Common mode transient immunity at low level output (Note 6)	CML	15	25	-	kV/μs	IF = 16mA; VCM = 1500Vp-p; CL = 15 pF; TA = 25°C , RL = 1.9KΩ	

Note 3: t_{PLH} (propagation delay) is measured from the 3.75 mA point on the falling edge of the input pulse to the 1.5 V point on the rising edge of the output pulse.

Note 4: t_{PHL} (propagation delay) is measured from the 3.75 mA point on the rising edge of the input pulse to the 1.5 V point on the falling edge of the output pulse.

Note 5: CMH is the maximum tolerable rate of rise of the common mode voltage to assure that the output will remain in a high logic state.

Note 6: CML is the maximum tolerable rate of fall of the common mode voltage to assure that the output will remain in a low logic state.

Isolation characteristic

All Typical values at $T_A = 25^\circ\text{C}$ and $V_{CC} = 5\text{V}$, unless otherwise specified; all minimum and maximum specifications are at recommended operating condition.

Parameter	Symbol	Device	Min.	Typ.	Max.	Unit	Test Condition
Withstand Insulation Test Voltage (Note 7, 8)	V_{ISO}	EMD2A50L-SK	5000	-	-	V	$RH \leq 40\%-60\%$, $t = 1\text{min}$, $T_A = 25^\circ\text{C}$
		EMD2A50L-SL					
Input-Output Resistance (Note 7)	R_{I-O}	-	-	10^{12}	-	Ω	$V_{I-O} = 500\text{V DC}$

Note 7: Device is considered a two terminal device: pins 1, 2, 3 are shorted together and pins 4, 5, 6 are shorted together.

Note 8: According to UL1577, each photo coupler is tested by applying an insulation test voltage 6000VRMS for one second (leakage current less than 10uA). This test is performed before the 100% production test for partial discharge.

Typical Performance Curves & Test Circuits

Fig.1 DC and Pulsed Transfer Characteristics

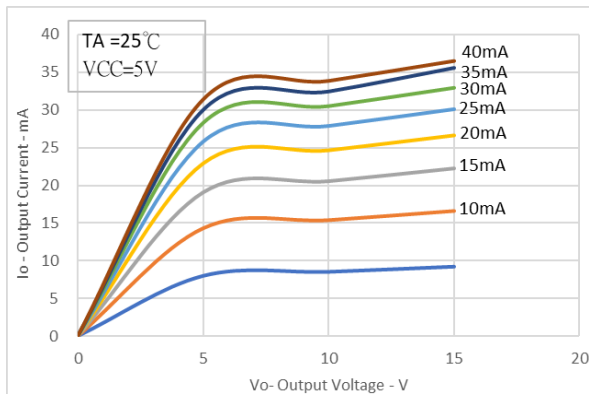


Fig.2 Input Current vs. Forward Voltage

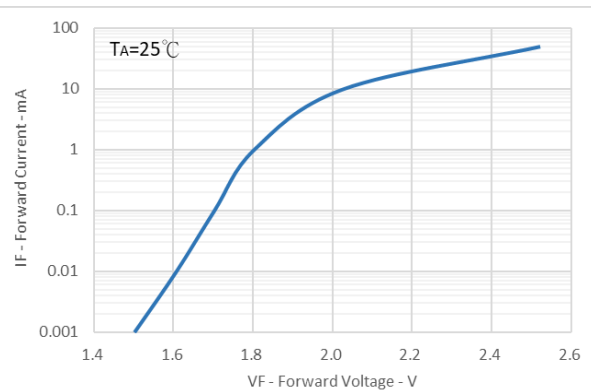


Fig.3 Propagation Delay vs. Load Resistance

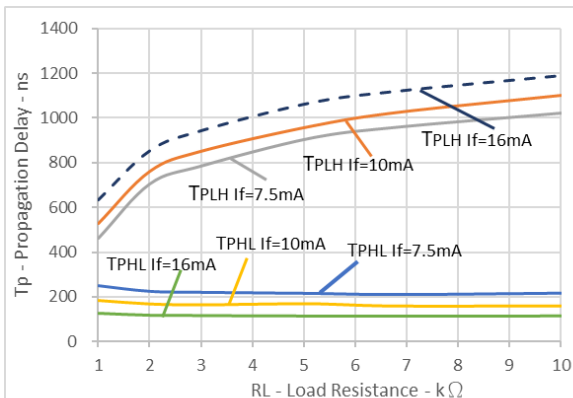


Fig.4 Current Transfer Ratio vs. Input Current

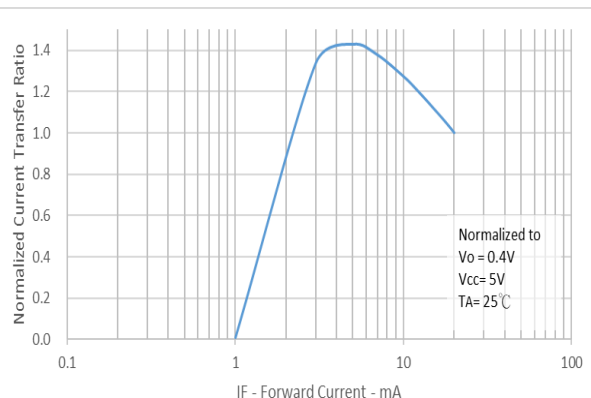


Fig.5 Current Transfer Ratio vs. Temperature

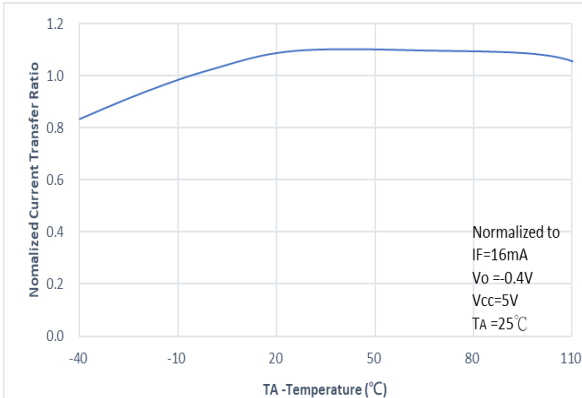


Fig.6 Propagation Delay Time vs. Temperature

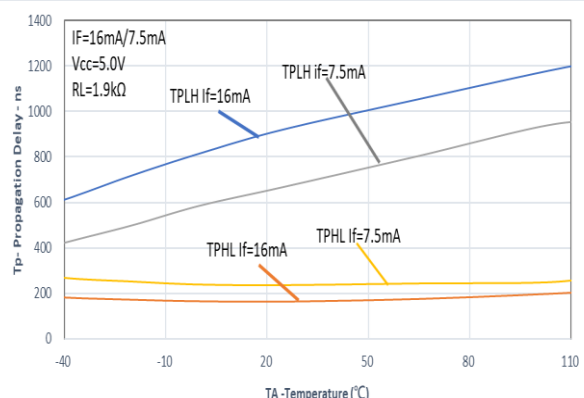


Fig.6 Propagation Delay Time vs. Temperature

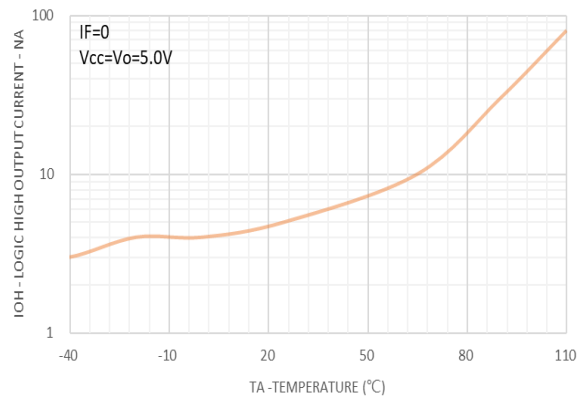
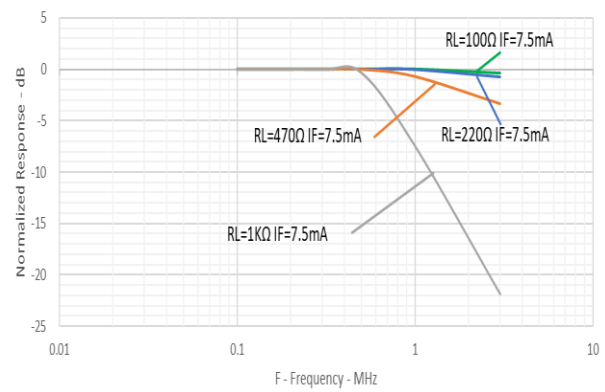
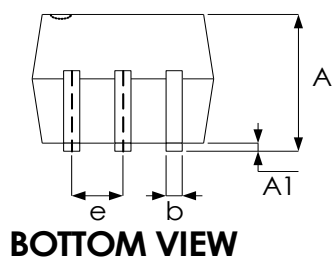
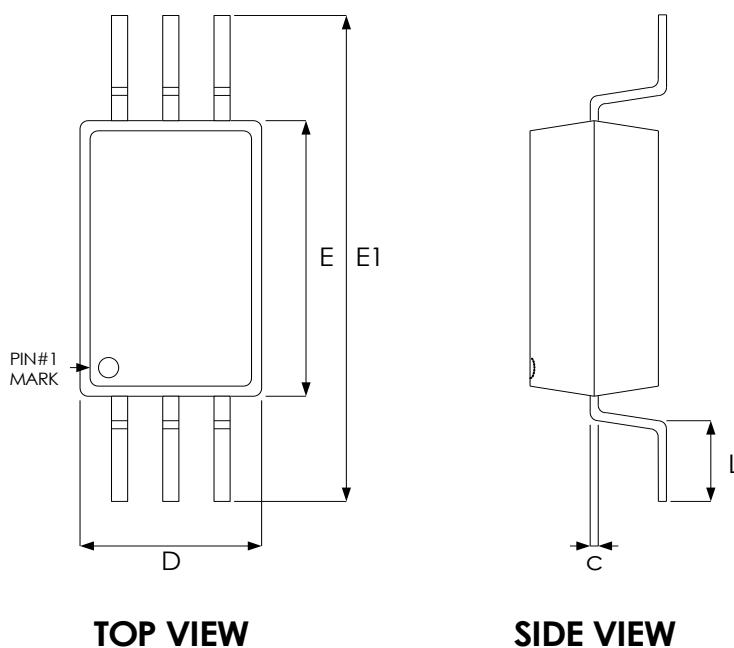
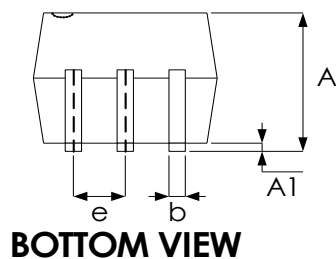
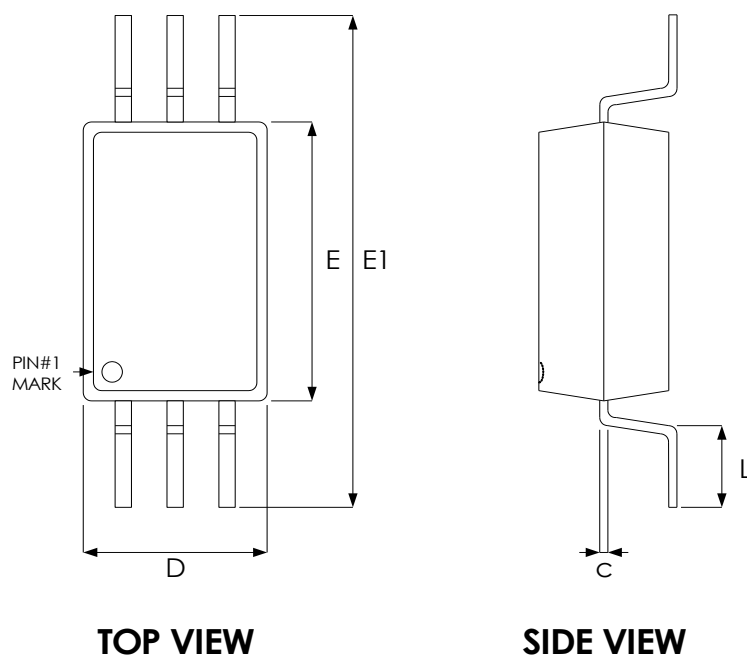


Fig.8 Frequency Response



Package Outline Drawing
L-SOP 6L (277mil, 7mm clearance)

Symbol	Dimension in mm	
	Min.	Max.
A	1.70	2.30
A1	0.10	0.30
b	0.30	0.50
c	0.20	0.30
D	4.20	4.80
E	6.50	7.10
E1	9.40	10.00
e	1.27 BSC	
L	0.70	1.20

Package Outline Drawing
L-SOP 6L (277mil, 8mm clearance)

Symbol	Dimension in mm	
	Min.	Max.
A	1.70	2.30
A1	0.10	0.30
b	0.30	0.50
c	0.20	0.30
D	4.20	4.80
E	6.51	7.11
E1	11.20	11.80
e	1.27 BSC	
L	0.50	1.00

Revision History

Revision	Date	Description
0.1	2023.06.01	Initial version

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