



JOEDA4AB-L5X Series

Rev.A.1.0

DESCRIPTION:

The products are gate driver opto-couplers in LSOP5 and LSOP5W packages. The device consists of an infrared LED optically coupled to an integrated high-gain, high-speed photodetector IC chip. It provides guaranteed performance and specifications at temperature up to 110 °C. It is physically smaller and compliant with international safety standards for reinforced insulation. It thus provides a smaller footprint solution for applications that require safety standard certification. An internal noise shield provides a guaranteed common-mode transient immunity of $\pm 35 \text{ kV}/\mu\text{s}$. It is ideal for small class IGBT and power MOSFET gate drive. The products are widely used in industrial inverters, IGBT gate drivers, MOSFET gate drivers, induction cooktop and home appliances.

MAIN FEATURES

- 4A maximum peak output current
- High isolation 5000 VRMS
- Buffer logic type
- Operating temperature range -40°C to 110°C
- REACH & RoHS compliance
- HBM: H3A; MM: M4; CDM: C3
- CQC approved
- VDE approved
- UL approved



Truth Table

LED	$V_{CC}-V_{EE}$ (Positive Going)	$V_{CC}-V_{EE}$ (Negative Going)	Output
OFF	0-30V	0-30V	Low
ON	0-12.1V	0-11.1V	Low
ON	12.1V-13.5V	11.1V-12.4V	TRANSITION
ON	13.5V-30V	12.4V-30V	HIGH

ABSOLUTE MAXIMUM RATINGS (Temperature=25°C)

Parameter		Symbol	Value	Unit
LED	Forward Current	I_F	50	mA
	Peak Forward Current	I_{FP}	1	A
	Reverse Voltage	V_R	6	V
	Power Dissipation	P_D	100	mW
Detector	Output Voltage	V_O	35	V
	Supply Voltage	V_{CC}	35	V
	Power Dissipation	P_C	400	mW
Isolation Voltage		V_{iso}	5000	Vrms
Operating Temperature		T_{opr}	-40~110	
Junction Temperature		T_j	125	
Storage Temperature		T_{stg}	-55~125	
Total Power Dissipation		P_{tot}	500	mW
Soldering Temperature		T_{sol}	260	

NOTE1 μ **NOTE2****ELECTRICAL CHARACTERISTICS** (Temperature=25°C)

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit
Input	Forward Voltage	V_F	$I_F=10\text{mA}$	-	1.35	1.6	V
	Reverse Current	I_R	$V_R=6\text{V}$	-	-	1	μA
	Terminal Capacitance	C_t	$V=0, f=1\text{MHz}$	-	60	-	pF
Output	Peak High-level Output Current	I_{OPH}	$V_O=V_{CC}-4\text{V}$, Pulse width $\leq 50\mu\text{s}$	-1	-	-	A
			$V_O=V_{CC}-10\text{V}$, Pulse width $\leq 10\mu\text{s}$	-4	-	-	A
	Peak Low-level Output Current	I_{OPL}	$V_O=V_{EE}+2.5\text{V}$, Pulse width $\leq 50\mu\text{s}$	1	-	-	A
			$V_O=V_{EE}+10\text{V}$, Pulse width $\leq 10\mu\text{s}$	4	-	-	A
	High Level Supply Current	I_{CCH}	$I_F=10\text{mA}$ $R_g=10\Omega$, $C_g=25\text{nF}$	-	-	3	mA
	Low Level Supply Current	I_{CCL}	$V_F=0\text{V}$, $R_g=10\Omega$, $C_g=25\text{nF}$	-	-	3	mA

	High Level Output Voltage	V_{OH}	$I_O=-100mA$	$V_{CC}-0.3$	$V_{CC}-0.2$	-	V
	Low Level Output Voltage	V_{OL}	$I_O=100mA$	-	-	0.2	V
	Threshold Input Current	I_{FLH}	$V_O=5V$	-	1.2	5	mA
	Threshold Input Voltage	V_{FHL}	$V_O=5V$	0.8	-	-	V
	Supply Voltage	V_{CC}	-	15	-	30	V
	UVLO Threshold	VUVLO+	$V_O=5V$, $I_F=10mA$	12.1	12.8	13.5	V
		VUVLO-	$V_O=5V$, $I_F=10mA$	11.1	11.8	12.4	V

SWITCHING SPECIFICATION

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Propagation Delay Time to High Output Level	t_{PLH}	$R_g=10\Omega$, $C_g=25nF$, $f=20kHz$, Duty Cycle=50%, $I_F=7mA$, $V_{CC}=30V$	50	-	200	ns
Propagation Delay Time to Low Output Level	t_{PHL}		50	-	200	
Pulse Width Distortion	PWD		-	-	70	
Propagation Delay Difference Between Any Two Parts	$t_{PHL}-t_{PLH}$		-100	-	100	
Output Rise Time (10 to 90%)	t_r	$R_g=10\Omega$, $C_g=25nF$, $I_F=0 \rightarrow 7mA$, $V_{CC}=30V$	-	50	-	
Output Fall Time (90 to 10%)	t_f	$R_g=10\Omega$, $C_g=25nF$, $I_F=7 \rightarrow 0mA$, $V_{CC}=30V$	-	50	-	
Common Mode Transient Immunity at High Level Output	$ CM_H $	$I_F=7mA$, $V_{CC}=30V$, $T_a=25^\circ C$, $V_{O(min)}=26V$, $V_{CM}=1500V_{pp}$	± 35	-	-	kV/ μs
Common Mode Transient Immunity at Low Level Output	$ CM_L $	$I_F=0mA$, $V_{CC}=30V$, $T_a=25^\circ C$, $V_{O(max)}=1V$, $V_{CM}=1500V_{pp}$	± 35	-	-	kV/ μs

Note1

Note2

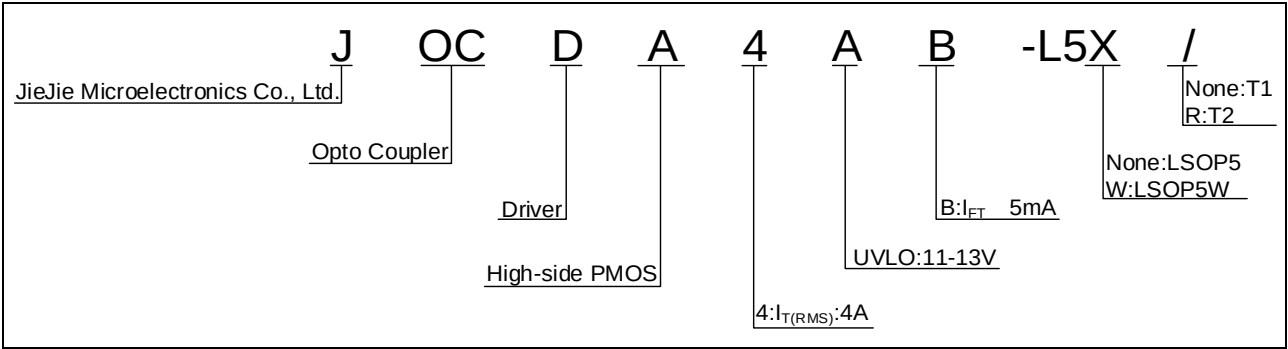
Note3

Recommended Operating Conditions

Characteristics	Symbol	Min.	Typ.	Max.	Unit
Input On-state Current	$I_{F(ON)}$	7	-	10	mA
Input Off-state Voltage	$V_{F(OFF)}$	0	-	0.8	V
Supply Voltage	V_{CC}	15	-	30	V
Operating Frequency	f	-	-	50	kHz

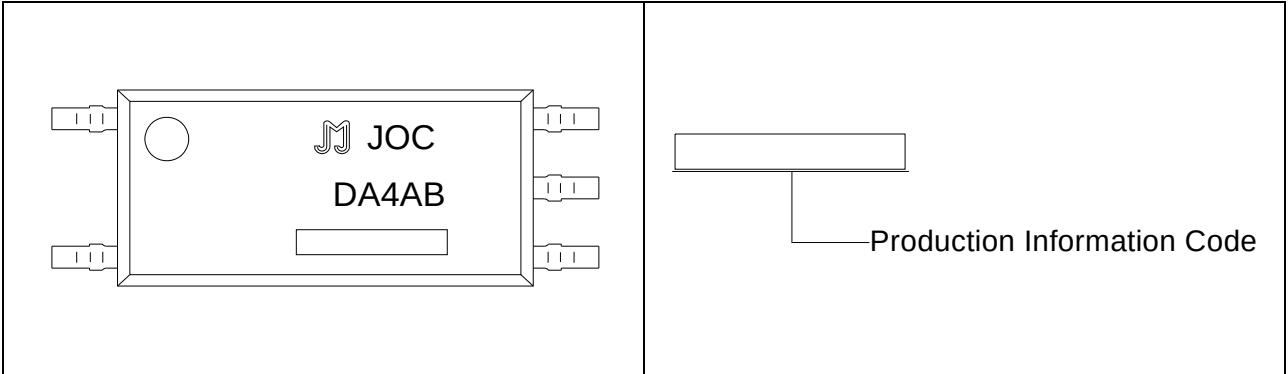
Note1**Note2****Note3****Note4**

ORDERING INFORMATION



Packing Quantity			
Option	Quantity	Quantity – Inner box	Quantity –Outer box

MARKING



Characteristics Curves

FIG.1: Forward Current vs. Forward Voltage



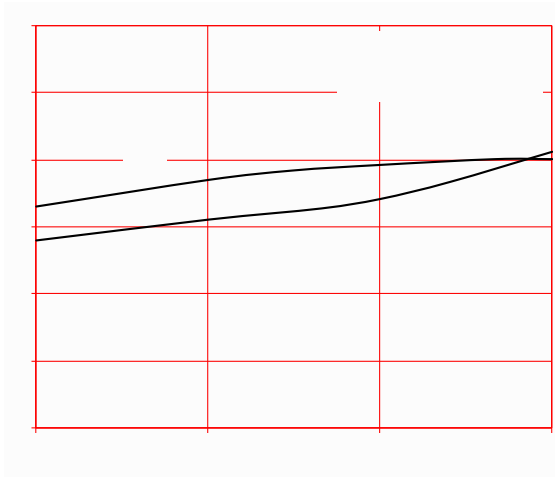
FIG.2: Max. Allowable LED Forward Current vs. Ambient Temperature

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FIG.13: Propagation Delay Time vs. Supply Voltage



Test Circuits

FIG.14: Switching Time Test Circuit and Waveform

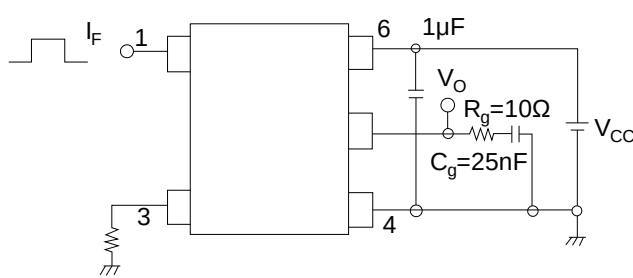
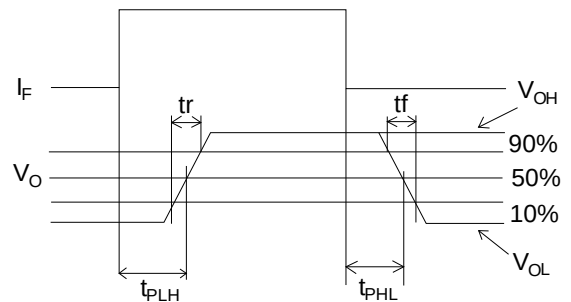
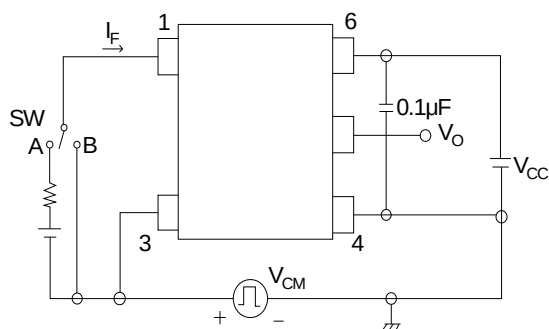
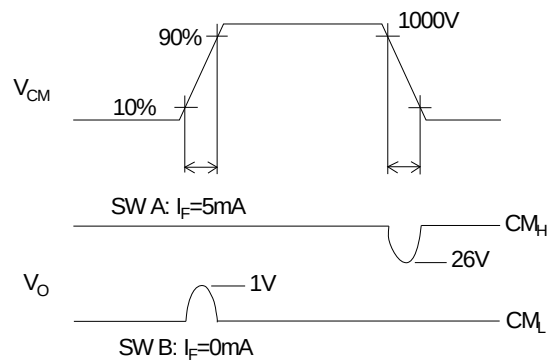
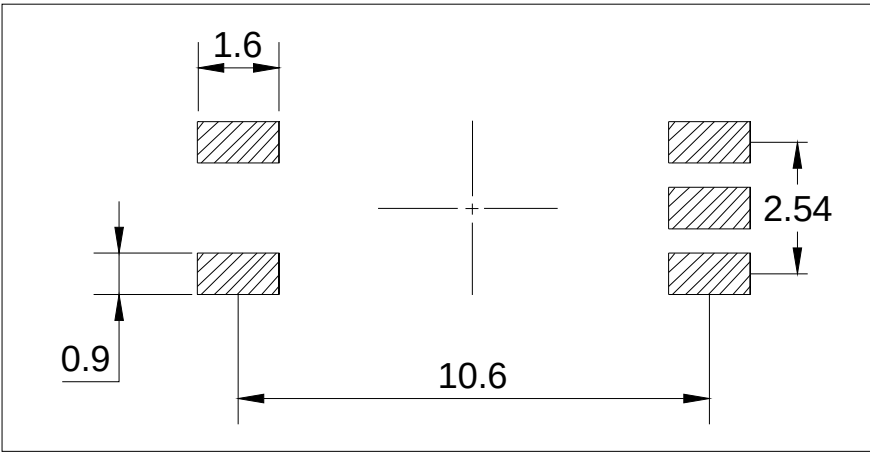


FIG.15: Common-Mode Transient Immunity Test Circuit and Waveform

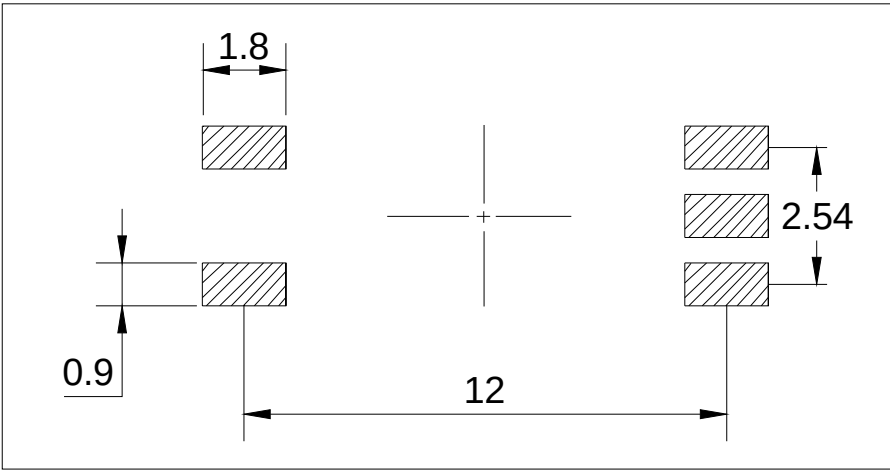


RECOMMENDED SOLDER MASK (Dimensions in mm unless otherwise stated)

LSOP5

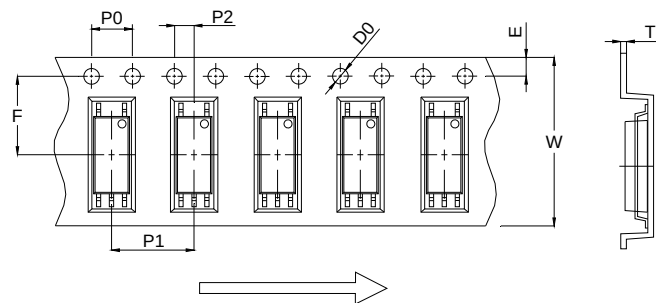


LSOP5W



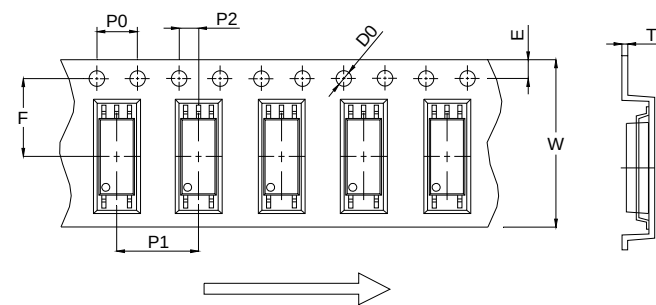
CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option None



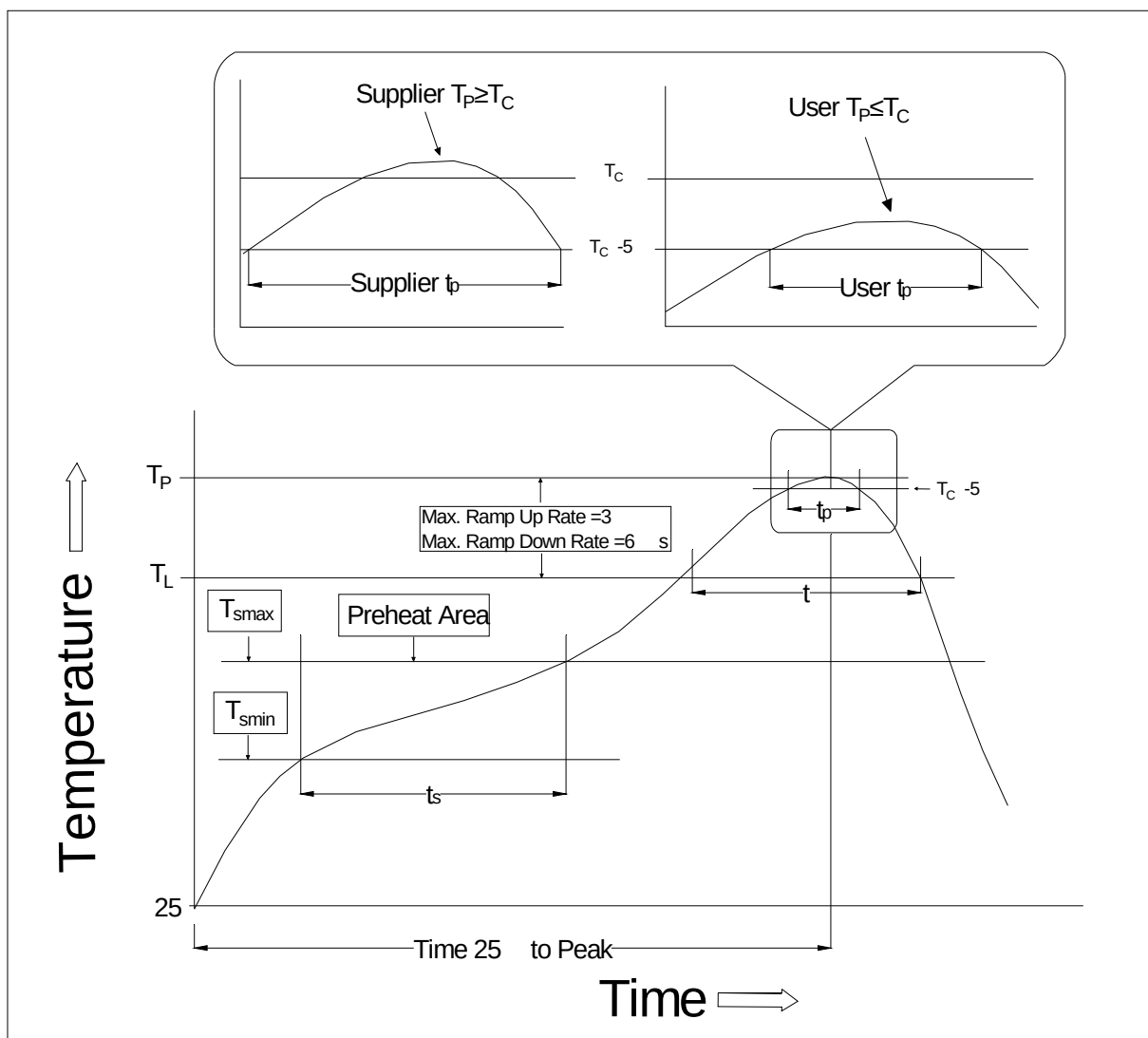
Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
D0	1.50	1.55	1.60	0.059	0.061	0.063
P0	3.90	4.00	4.10	0.154	0.157	0.161
P1	7.90	8.00	8.10	0.311	0.315	0.319
P2	1.90	2.00	2.10	0.075	0.079	0.083
E	1.65	1.75	1.85	0.065	0.069	0.073
F	7.40	7.50	7.60	0.291	0.295	0.299
T	0.35	0.40	0.45	0.014	0.016	0.018
W	15.80	16.00	16.20	0.622	0.630	0.638

Option R



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
D0	1.50	1.55	1.60	0.059	0.061	0.063
P0	3.90	4.00	4.10	0.154	0.157	0.161
P1	7.90	8.00	8.10	0.311	0.315	0.319
P2	1.90	2.00	2.10	0.075	0.079	0.083
E	1.65	1.75	1.85	0.065	0.069	0.073
F	7.40	7.50	7.60	0.291	0.295	0.299
T	0.35	0.40	0.45	0.014	0.016	0.018
W	15.80	16.00	16.20	0.622	0.630	0.638

REFLOW INFORMATION



Profile Feature	Sn-Pb Assembly Profile	Pb-Free Assembly Profile
Temperature Min. (T_{smin})	100	150
Temperature Max. (T_{smax})	150	200
Time (t_s) from (T_{smin} to T_{smax})	60-120 seconds	60-120 seconds
Ramp-up Rate (t_L to t_P)	3 °C/second max.	3 °C/second max.
Liquidus Temperature (T_L)	183	217
Time (t_L) Maintained Above (T_L)	60-150 seconds	60-150 seconds
Peak Body Package Temperature	235 +0 /-5	260 +0 /-5
Time (t_P) within 5 °C of 260	10 seconds	10 seconds
Ramp-down Rate (T_P to T_L)	3-6 °C/second	3-6 °C/second
Time 25 °C to Peak Temperature	6 minutes max.	8 minutes max.

Note:

1. Reflow soldering is recommended at the temperatures and times shown, no more than three times.
2. Avoid direct contact between the epoxy body and any tools or surfaces exceeding its maximum storage temperature.
3. Application of pressure on the epoxy body is prohibited at elevated temperatures. In specific scenarios, any applied force must not exceed 2.5N.
4. Ensure the component has cooled to ambient temperature before proceeding with any subsequent manufacturing steps.
5. The component has a shelf life of one year when stored under standard conditions.

6. Recommended Storage Temp.: 0~5℃ Moisture Rate of Fk U ge Temp.