PRODUCT SPECIFICATION

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High Noise Immunity, 2.5A Output Current, Gate Drive Optocoupler

- **Feature:**

1: High noise immunity characterized by 25kV/μs
minimum common mode rejection(CMR)at VCM=1500V
2: 2.5A maximum peak output current
3: ICC = 5mA maximun supply current
4: Wide supply voltage range from 15V to 30V
5: Fast power switching application
– 500ns max. propagation delay
– 100ns min. PWD protection scheme
6: Under Voltage Lock-Out (UVLO) with hysteresis
7: Industrial temperature range: -30°C to 115°C
8: Agency Approvals
• UL UL1577 / CUL C22.2 No.1 & NTC No.5
File No. E169586
• VDE EN 60747-5-2
File No. 40020973

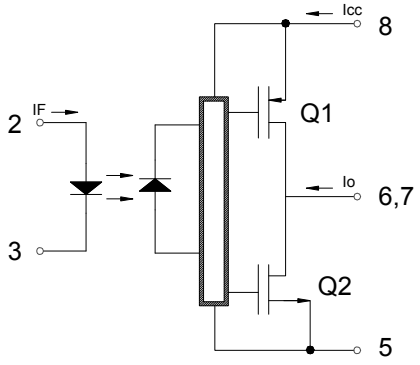
- **Application**

1. Industrial inverters
2. Switch mode power supply
3. AC/Brushless DC motor drives
4. IGBT/Power MOSFET gate drive

- **Truth Table**

LED	OUTPUT	Q1	Q2
ON	HIGH LEVEL	ON	OFF
OFF	LOW LEVEL	OFF	ON

∗The use of a 0.1μF bypass capacitor must be connected between pins 8 and 5 is recommended.



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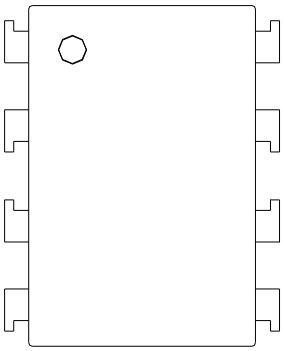
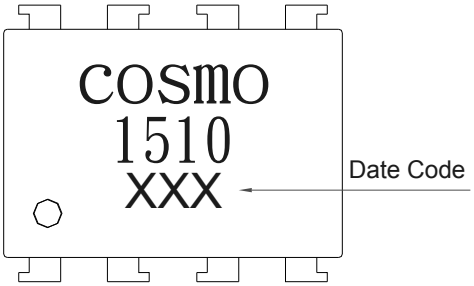
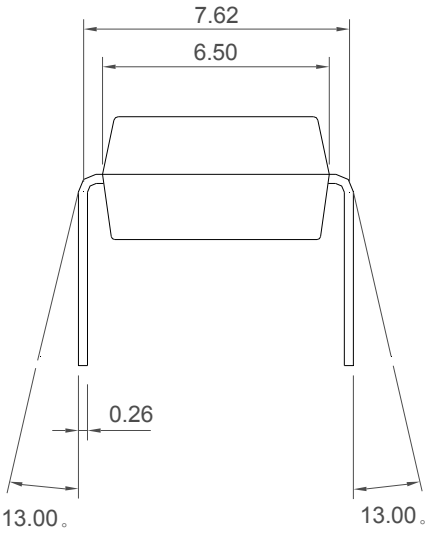
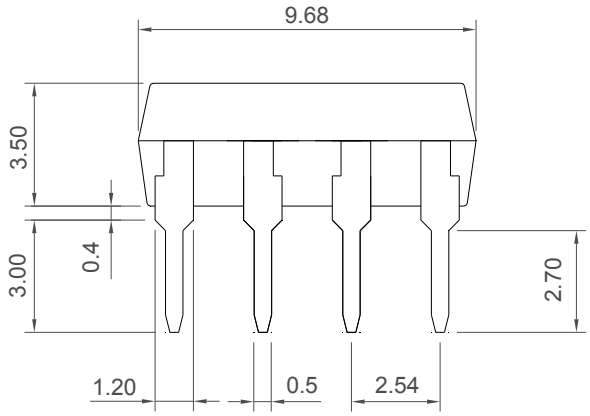
1.Output Dimensions : Unit (mm)



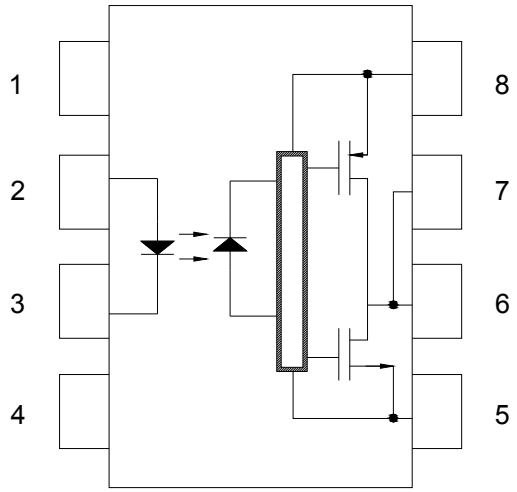






TOLERANCE : ± 0.2 mm

2.Top View:



Pin 1:	N.C.
Pin 2:	Anode
Pin 3:	Cathode
Pin 4:	N.C.
Pin 5:	GND
Pin 6:	Vo (Voltage Output)
Pin 7:	Vo (Voltage Output)
Pin 8:	Vcc

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Absolute Maximum Ratings (Ta = 25°C)

Parameter	Symbol	Rating	Unit
Storage Temperature	T_{STG}	-55 to +125	℃
Operating Temperature	T_{OPR}	-30 to +115	℃
Junction Temperature	T_J	-30 to +125	℃
Lead Wave Solder Temperature	T_{SOL}	260 for 10 SEC	℃
Average Input Current	$I_{F(AVG)}$	20	mA
Peak Transient Forward Current (10)	$I_{F(PEAK)}$	1	A
Operating Frequency (11)	f	50	KHz
Reverse Input Voltage	V_R	5	V
Peak Output Current (1)	$I_{O(PEAK)}$	2.5	A
Supply Voltage	V_{CC} -V_{EE}	0 to 35	V
$T_A \geqq 90°C$		0 to 30	
Peak Output Voltage	$V_{O(PEAK)}$	0 to V_{CC}	V
Input Signal Rise and Fall Time	$t_{R(IN)} - t_{F(IN)}$	500	ns
Input Power Dissipation (2)(4)	PD_I	45	mW
Output Power Dissipation (3)(4)	PD_O	250	mW

Recommended Operating Conditions

Parameter	Symbol	Rating	Unit
Ambient Operating Temperature	T_A	-30 to +115	℃
Power Supply	V_{CC} -V_{EE}	15 to 30	V
Input Current (ON)	$I_{F(ON)}$	7 to 16	mA
Input Voltage (OFF)	$V_{F(OFF)}$	-3.6 to 0.8	V

Isolation Characteristics

Parameter	Symbol	Rating	Min.	Typ.	Max.	Unit
Input-Output Isolation Voltage	V_{ISO}	V_A=25℃,R.H.<50%,t-1.0min, $I_{1-O} \leqq$ 10uA,50Hz (5)(6)	5000			V_{RMS}
Isolation Resistance	R_{ISO}	V_{1-O}=500V (5)			10^{11}	Ω
Isolation Capacitance	C_{ISO}	V_{1-O}=0V, Freq=1.0MHz (5)			1	pF

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Electrical Characteristics (Ta = 25℃,unless otherwise specified)

Parameter		Symbol	Test Condition	Min.	Typ.	Max.	Unit
Input Forward Voltage		V_F	IF=10mA	1.2	1.5	1.8	V
Temperature Coefficient of Forward Voltage		$\triangle(V_F/\triangle T_{A)})$			-1.8		mV/℃
Input Reverse Breakdown Voltage		BV_R	I_R=10uA	5			V
Input capacitance		C_{IN}	f=1MHz , V=0		60		pF
Output current (*A)	"H" level(1)	I_{OH}	V_O =V_{CC}-2.5V	0.5	1.5		A
			V_O =V_{CC}-4V	2.0			
	"L" level(1)	I_{OL}	V_O =V_{EE}+2.5V	0.5	2.0		A
			V_O =V_{EE}+4V	2.0			
Output voltage	"H" level	V_{OH}	I_F =10mA, I_O =-100mA	V_{CC}-4V	V_{CC}-3V		V
	"L" level	V_{OL}	I_F =0mA, I_O =100mA		V_{EE}+0.1V	V_{EE}+0.5V	
Supply current	"H" level	I_{CCH}	V_O =Open ,I_F=7 to 16mA		2.5	5.0	mA
	"L" level	I_{CCL}	V_O=Open ,V_F=-3.0 to 0.8V		2.5	5.0	
Threshold input current	"Output L→H"	I_{FLH}	I_O =0mA ,V_O>5V		2.3	5.0	mA
Threshold input voltage	"Output H→L"	V_{FHL}	I_O =0mA ,V_O<5V	0.7			V
Under Voltage Lockout Threshold		V_{UVLO+}	I_F =10mA ,V_O>5V	11.0	12.3	13.5	V
		V_{UVLO-}	I_F =10mA ,V_O<5V	9.0	10.7	12.0	
Under Voltage Lockout Threshold Hysteresis		$UVLO_{HYS}$			1.6		V

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■Switching Characteristics (Ta = 25℃,unless otherwise specified)

Parameter		Symbol	Test Condition	Min.	Typ.	Max.	Unit
Propagation delay time	"L→H"	t_{pLH}	IF=7mA to 16mA Rg=10Ω,Cg=10nF F=10KHz,Duty Cycle=50%	0.1	0.3	0.5	us
	"H→L"	t_{pHL}		0.1	0.3	0.5	us
Pulse Width Distortion t_{Phl}- t_{pLH}		PWD				0.3	us
Propagation Delay Difference Between Any Two Parts or Channels (t_{Phl}- t_{Plh}) (7)		PDD (Skew)		-0.35		0.35	us
Output rise time (10%-90%)		t_r			0.1		us
Output fall time (90%-10%)		t_f			0.1		us
UVLO Turn On Delay		$T_{UVLO\ ON}$	I_F =10mA, V_O>5V		0.8		us
UVLO Turn Off Delay		$T_{UVLO\ OFF}$	I_F =10mA, V_O<5V		0.6		us
Common mode transient immunity at high level output		$\|C_{MH}\|$	T_A=25℃,V_{CC}=30V, I_F=10Ma to 16mA V_{CM}=1500V(8)	25	35		KV / μs
Common mode transient immunity at low level output		$\|C_{ML}\|$	T_A=25℃,V_{CC}=30V, V_F=0V V_{CM}=1500V(9)	25	35		KV / μs

Notes:

1. Maximum pulse width = 10μs, maximum duty cycle = 1.1%
2. Derate linearly above 87°C, free air temperature at a rate of 0.77mW/°C
3. No derating required across temperature range.
4. Functional operation under these conditions is not implied. Permanent damage may occur if the device is subjected to conditions outside these ratings.
5. Device is considered a two terminal device: Pins 2 and 3 are shorted together and Pins 5, 6, 7 and 8 are shorted together.
6. 5,000 V_{RMS} for 1 minute duration is equivalent to 6,000 VAC_{RMS} for 1 second duration.
7. The difference between t_{PHL} and t_{PLH} between any two KP1510 parts under same test conditions.
8. Common mode transient immunity at output high is the maximum tolerable negative dVcm/dt on the trailing edge of the common mode impulse signal, Vcm, to assure that the output will remain high (i.e. V_O > 15.0V).
9. Common mode transient immunity at output low is the maximum tolerable positive dVcm/dt on the leading edge of the common pulse signal, Vcm, to assure that the output will remain low (i.e. V_O < 1.0V).
10. Pulse Width, PW δ 1μs, 300pps
11. Exponential Waveform, $I_{O(PEAK)}$ ≦ | 2.5A | (≦ 0.3μs)

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Fig.1 Forward Current vs. Forward Voltage

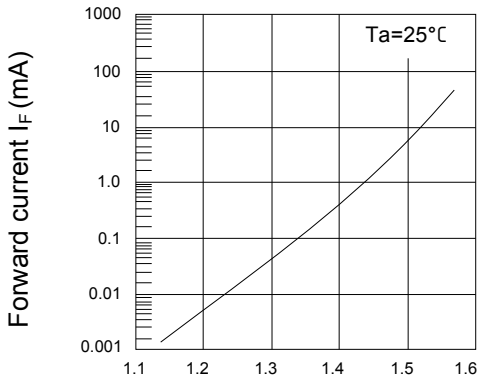

Fig.2 Ootput Voltage vs. Forward Current

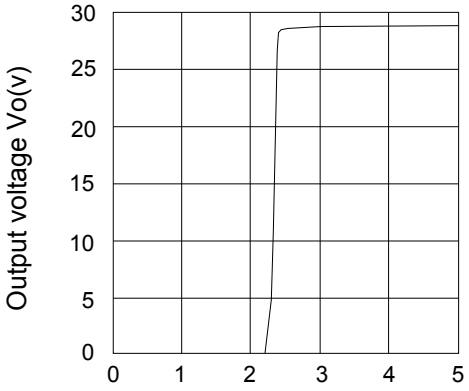

Fig.3 Output High Current vs. Ambient Temperature

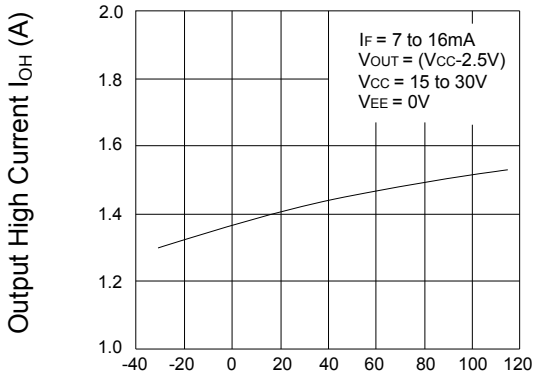

Fig.4 Output High Voltage vs. Output High Current

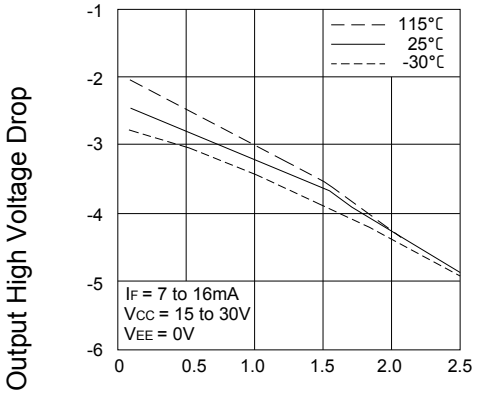

Fig.5 Output Low Current vs. Ambient Temperature

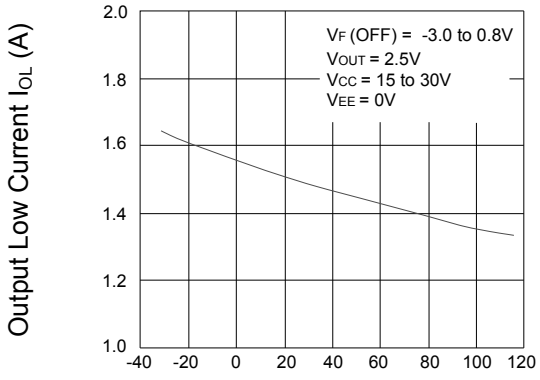

Fig.6 Output Low Voltage vs. Output Low Current

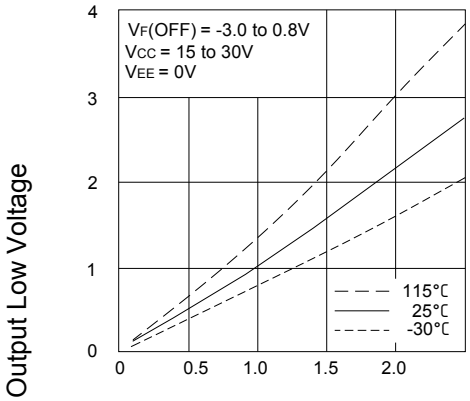

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Fig.7 Propagation Delay vs. Forward Current

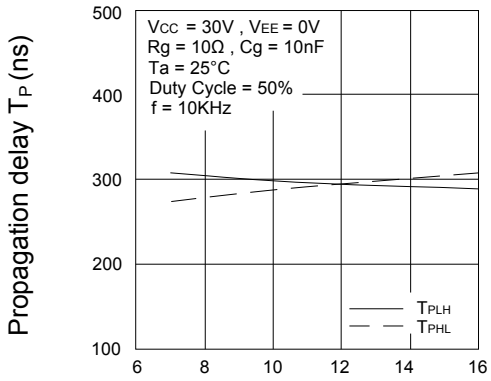


Fig.8 Propagation Delay vs. Ambient Temperature

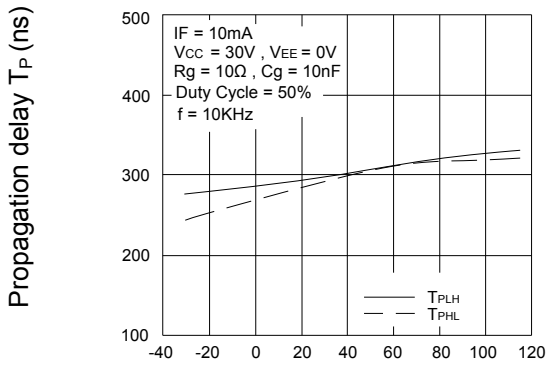


Fig.9 Propagation Delay vs. Series Load Resistance

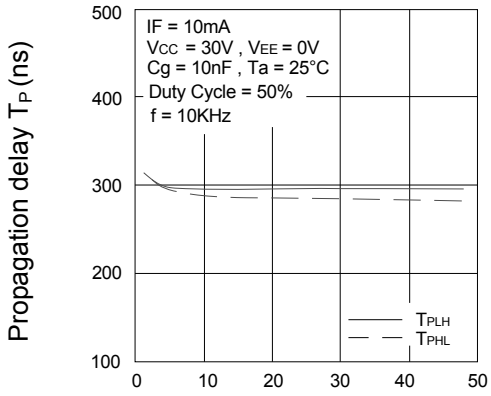
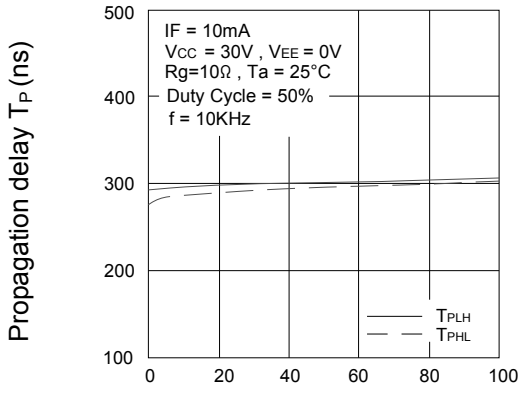


Fig.10 Propagation Delay vs. Load Capacitance



■ Test Circuit:

Fig.1 : Top View

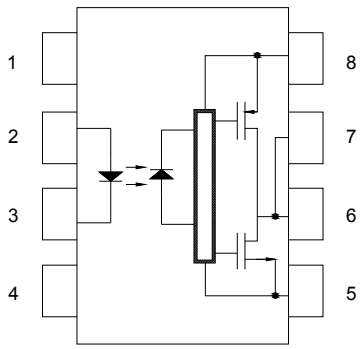


Fig.2 : I_{OPL} Measure

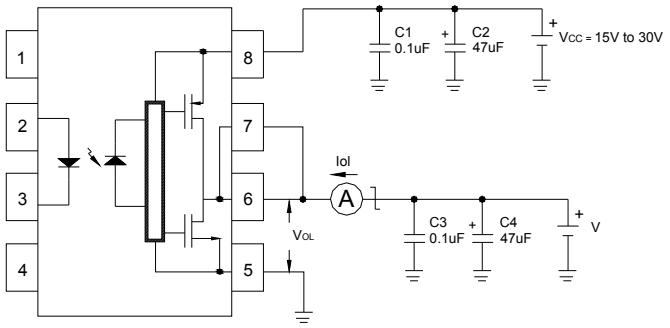


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Fig.3: I_{OPH} Measure

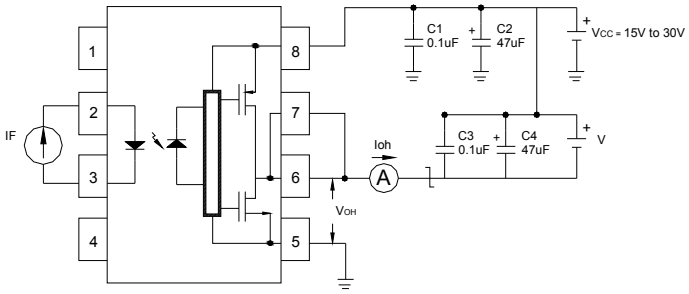


Fig.4: V_{OL} Measure

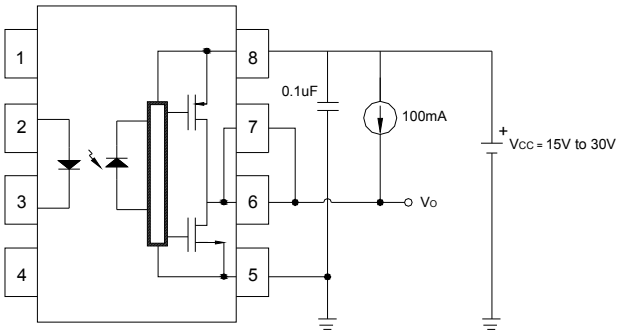


Fig.5: V_{OH} Measure

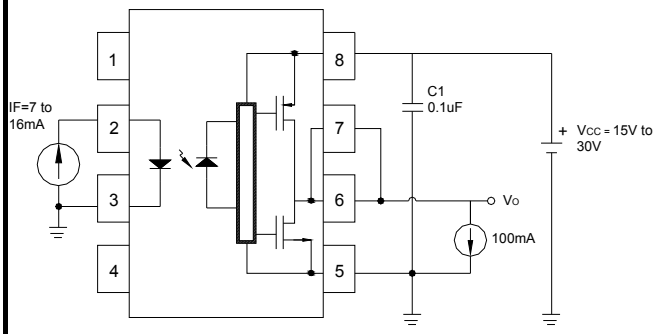
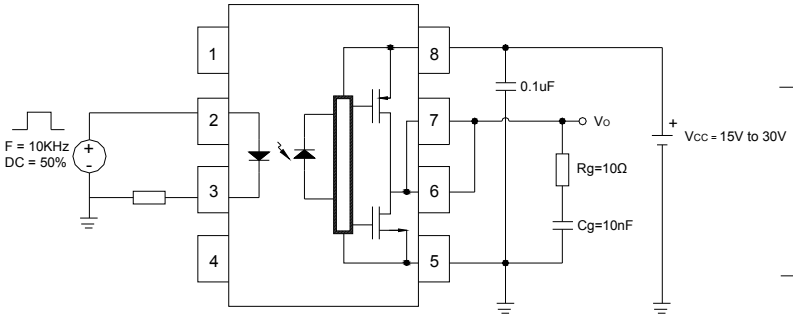


Fig.6: tp_{LH},tp_{HL},t_r,t_f Measure.



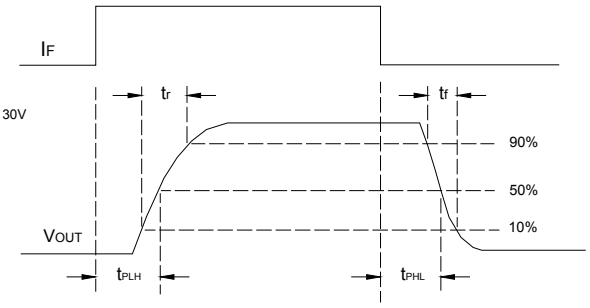
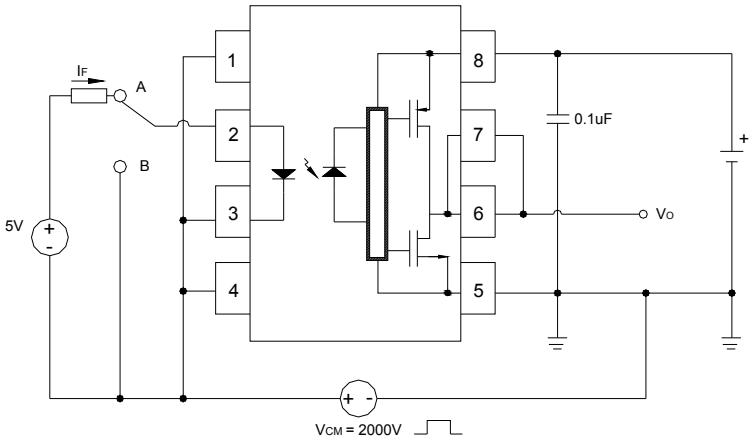
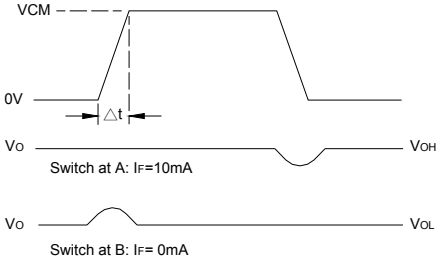


Fig.7: CMR . Measure.





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