PHOTO IC COUPLER

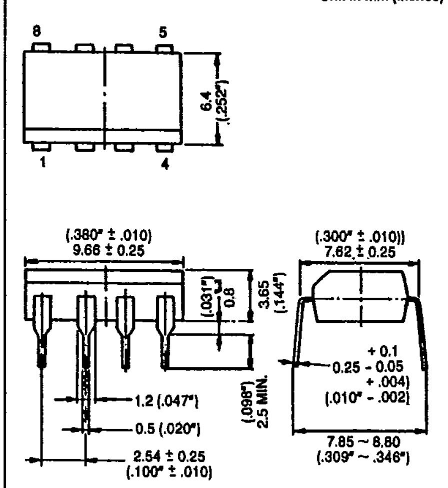
MT26300, MT26310

T-41-89

APPLICATIONS

- DIGITAL LOGIC ISOLATION
- TELECOMMUNICATION
- ANALOG DATA EQUIPMENT CONTROL
- MICROPROCESSOR SYSTEM INTERFACE
- COMPUTER PERIPHERAL INTERFACE

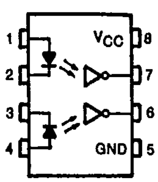
The MARKTECH MT26300 and MT26310 dual photocouplers consist of a pair of GaAlAs light emitting diodes and integrated high gain, high speed photodetectors. Both units are 8 pin dip packages. The output of the detector circuit is an open collector Schottky clamped transistor. On the 26310 a Faraday shield is integrated on the photodetector chip reducing the effects of capacitance coupling between the input emitter and the high gain stages of the detector. This provides an effective common mode transient immunity of 1000v/μs.



FEATURES

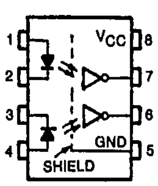
- Input Current Threshold : I_F=5mA Max.
- LSTTL/TTL Compatible : 5V Supply
- Switching Speed : 10MBd (Typ.)
- Guaranteed Performance Over Temperature : 0 ~ 70°C
- Isolation Voltage : 2500 V_{rms} Min.
- Common Mode
- Transient Immunity : 1000v/μs Min. for MT26310

MT26300
PIN CONFIGURATION (TOP VIEW)



1: ANODE .1
2: CATHODE .1
3: CATHODE .2
4: ANODE .2
5: GND
6: V_{O2} (OUTPUT 2)
7: V_{O1}(OUTPUT 1)
8: V_{CC}

MT26310
PIN CONFIGURATION (TOP VIEW)



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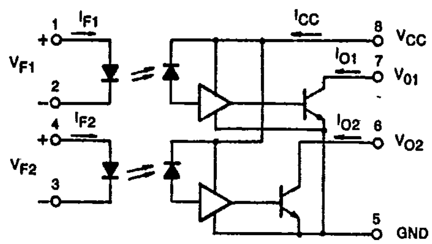
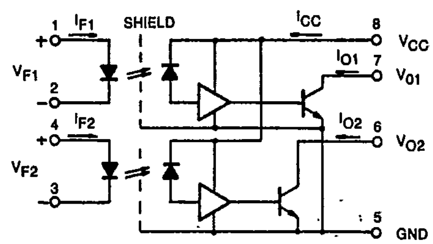
MT26300
SCHEMATIC



MT26310
SCHEMATIC



TRUTH TABLE
(Positive Logic)

Input	Output
H	L
L	H

A 0.01 to 0.1μF bypass capacitor must connect between pins 8 and 5 (See Note 1).

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RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Input Current, Low Level, Each channel	I_{FL}	0	—	250	μA
Input Current, High Level, Each channel	I_{FH}	6.3*	—	15	mA
Supply Voltage, Output	V_{CC}	4.5	5	5.5	V
Fan Out (TTL Load, Each channel)	N	—	—	8	—
Operating Temperature	T_{opr}	0	—	70	°C

* 6.3mA is a guard banded value which allows for at least 20% CTR degradation.
Initial input current threshold value is 5.0mA or less.

MAXIMUM RATINGS (No derating required up to 70°C)

CHARACTERISTIC			SYMBOL	RATING	UNIT
LED	Forward Current (Each channel)		I_F	15	mA
LED	Pulse Forward Current (Each channel)*		I_{FP}	30	mA
LED	Reverse Voltage (Each channel)		V_R	5	V
DETECTOR	Output Current (Each channel)		I_O	16	mA
DETECTOR	Output Voltage (Each channel)		V_O	7	V
DETECTOR	Supply Voltage (1 Minute Maximum)		V_{CC}	7	V
DETECTOR	Output Collector Power Dissipation (Each channel)	MT26300	P_o	60	mW
DETECTOR	Output Collector Power Dissipation (Each channel)	MT26310	P_o	40	mW
Operating Temperature Range			T_{opr}	0 ~ 70	°C
Storage Temperature Range			T_{stg}	-55 ~ 125	°C
Lead Solder Temperature (10 sec.) **			T_{sold}	260	°C
Isolation Voltage (AC, 1 min., R.H. ≤ 60%, Note 8)			BV_S	2500	V_{rms}

* t ≤ 1 msec Duration.

** 1.6mm below seating plane.

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ELECTRICAL CHARACTERISTICS
(Ta=0°C ~ 70°C, Unless otherwise noted).

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.*	MAX.	UNIT
High Level Output Current (Each channel)		I_{OH}	V_{CC}=5.5V, V_O=5.5V I_F=250μA	—	1	250	μA
Low Level Output Voltage (Each channel)		V_{OL}	V_{CC}=5.5V, I_F=5mA I_{OL} (Sinking)=13mA	—	0.4	0.6	V
High Level Supply Current (Both channels)		I_{CCH}	V_{CC}=5.5V, I_F=0	—	14	30	mA
Low Level Supply Current (Both channels)	MT26300	I_{CCL}	V_{CC}=5.5V, I_F=10mA	—	24	36	mA
	MT26310					38	
Input Forward Voltage (Each channel)		V_F	I_F=10mA, Ta=25°C	—	1.65	1.75	V
Input Reverse Breakdown Voltage (Each channel)		BV_R	I_R=10μA, Ta=25°C	5	—	—	V
Input Capacitance (Each channel)		C_{IN}	V_F=0, f=1MHz	—	45	—	pF
Input Diode Temperature Coefficient (Each channel)		$\frac{\Delta V_F}{\Delta Ta}$	I_F=10mA	—	-2.0	—	mV/°C
Input-Output Insulation Leakage Current		I_{I-O}	Relative Humidity=45% Ta=25°C, t=5 second V_{I-O}=3000V_{dc} (Note 8)	—	—	1	μA
Resistance (Input-Output)		R_{I-O}	V_{I-O}=500V (Note 8)	—	10^{12}	—	Ω
Capacitance (Input-Output)		C_{I-O}	f=1MHZ (Note 8)	—	0.6	—	pF
Input-Input Leakage Current		I_{I-I}	Relative Humidity=45% t=5s, V_{I-I}=500V (note 9)	—	0.005	—	μA
Resistance (Input-Input)		R_{I-I}	V_{I-I}=500V (Note 9)	—	10^{11}	—	Ω
Capacitance (Input-Input)		C_{I-I}	f=1MHZ (Note 9)	—	0.25	—	pF
Current Trasnfer Ratio (Each channel)	MT26300	CTR	I_F=5mA, R_L=100Ω	—	1000	—	%

*All typical values are at V_{CC}=5V, Ta=25°C.

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SWITCHING CHARACTERISTICS (T_a=25°C, V_{CC}=5V)

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Propagation Delay Time to High Output Level	t_{pLH}	1	R_L=350Ω, C_L = 15pF I_F=7.5mA (Each channel, Note 2, 3, 4 & 5	—	60	75	ns
Propagation Delay Time to Low Output Level	t_{pHL}			—	60	75	ns
Output Rise Time (10-90%)	t_r			—	30	—	ns
Output Fall Time (90-10%)	t_f			—	30	—	ns
Common Mode Transient Immunity at High Output Level MT26300	CM_H	2	V_{CM}=200V, R_L=350Ω V_O (min.) =2V, I_F=0mA (Each Channel, Note 7)	—	200	—	V/µs
Common Mode Transient Immunity at Low Output Level	C_{ML}		V_{CM}=200V, R_L =350Ω V_O (max.)=0.8V I_F=7.5mA (Each Channel, Note 6)	—	-500	—	V/µs
Common Mode Transient Immunity at High Output Level MT26310	C_{MH}	3	V_{CM}=400V, R_L=350Ω V_O (min.)=2V, I_F=0mA (Each Channel, Note 7)	1000	10000	—	V/µs
Common Mode Transient Immunity at Low Output Level	C_{ML}		V_{CM}=400V, R_L=350Ω V_O (max.)=0.8V, I_F=7.5mA (Each Channel, Note 6)	-1000	-10000	—	V/µs

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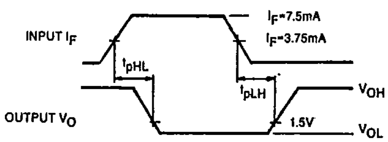
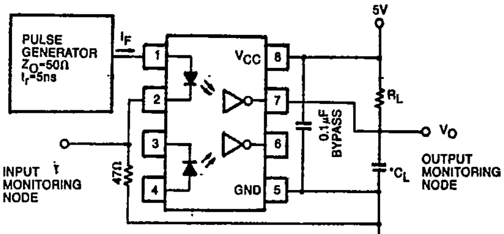
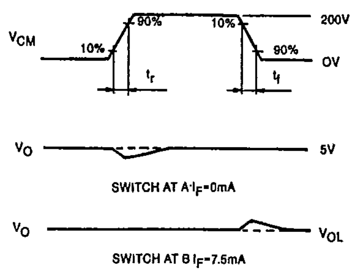
MT26300
TEST CIRCUIT 1: t_{pHL}, t_{pLH}

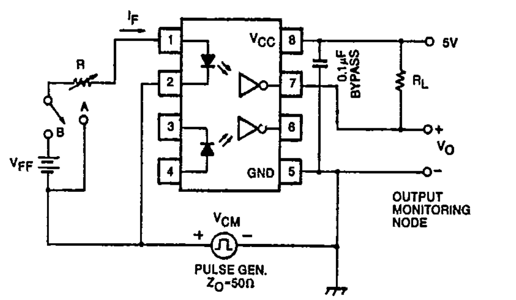




*C_L is approximately 15pF which includes probe and stray wiring capacitance.

MT26300
TEST CIRCUIT 2: TRANSIENT IMMUNITY AND TYPICAL WAVEFORMS





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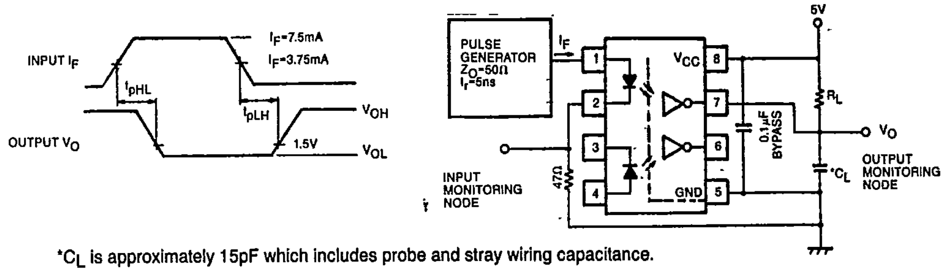
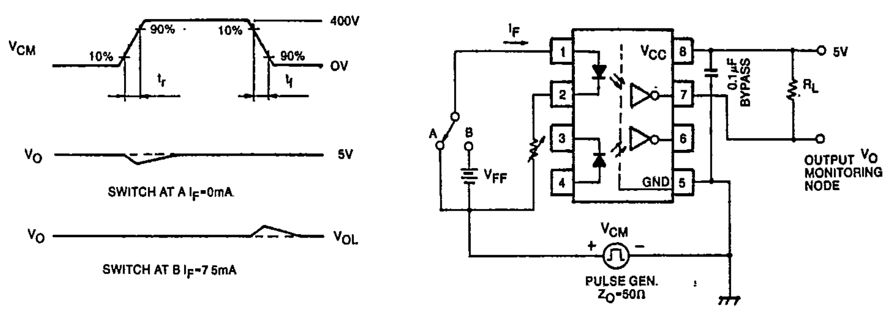
MT26310
TEST CIRCUIT 1: t_{pHL}, t_{pLH}



*C_L is approximately 15pF which includes probe and stray wiring capacitance.

MT26310
TEST CIRCUIT 3: TRANSIENT IMMUNITY AND TYPICAL WAVEFORMS



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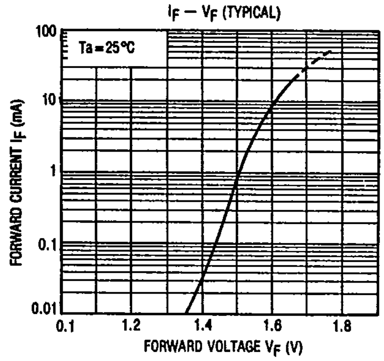

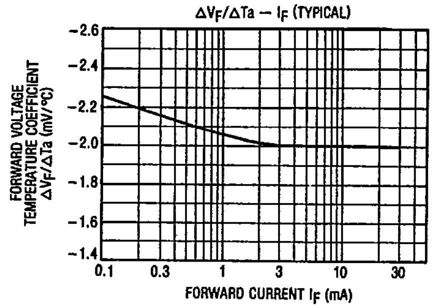

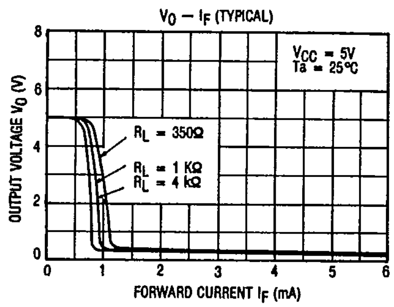

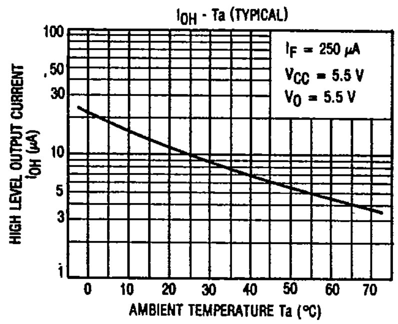

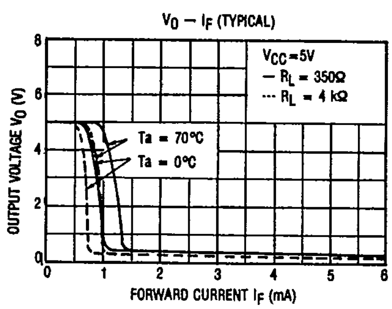

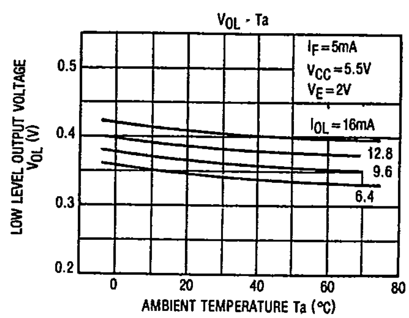

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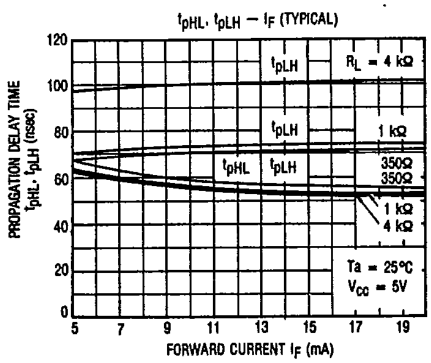

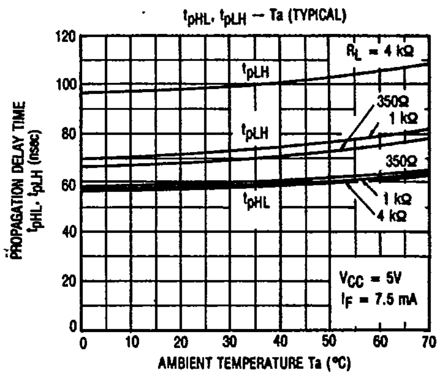

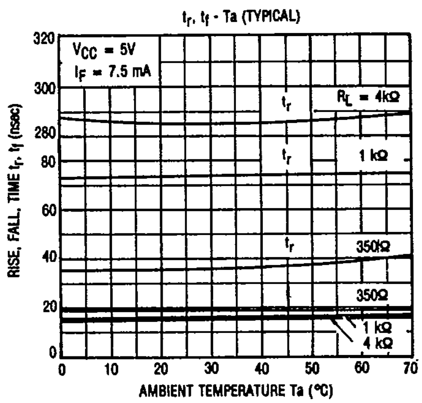

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NOTES:

1. The V_{CC} supply voltage to the MT26300 and MT26310 isolator must be bypassed by a 0.01 μF capacitor or larger. This can be either a ceramic or solid tantalum capacitor with good high frequency characteristic and should be connected as close as possible to the package V_{CC} and GND pins in each device.

2. t_{PHL} — Propagation delay is measured from the 3.75mA level on the LOW to HIGH transition of the input current pulse to the 1.5V level on the HIGH to LOW transition of the output voltage pulse.

3. t_{PLH} — Propagaion delay is measured from the 3.75mA level on the HIGH to LOW transition of the input current pulse to the 1.5V level on the LOW to HIGH transition of the output voltage pulse.

4. t_f — Fall time is measured from the 90% to the 10% levels of the HIGH to LOW transition on the output pulse.

5. t_r — Rise time is measured from the 10% to 90% levels of the LOW to HIGH transition on the output pulse.

6. CM_L — The maximum tolerable rate of fall of the common mode voltage to ensure the output will remain in the low output state (i.e., V_{OUT}<0.8V). Measured in volts per microsecond (V/μs).

7. CM_H — The maximum tolerable rate of rise of the common mode voltage to ensure the output will remain in the high state (i.e., V_{OUT}>2.0V). Measured in volts per microsecond (V/μs).

8. Device considered a two-terminal device: Pins 1, 2, 3 and 4 shorted together, and Pins 5, 6, 7 and 8 shorted together.

9. Measured between pins 1 and 2 shorted together, and pins 3 and 4 shorted together.