PHOTOCOUPLER
GaAlAs IRED & PHOTO-IC

TLP113

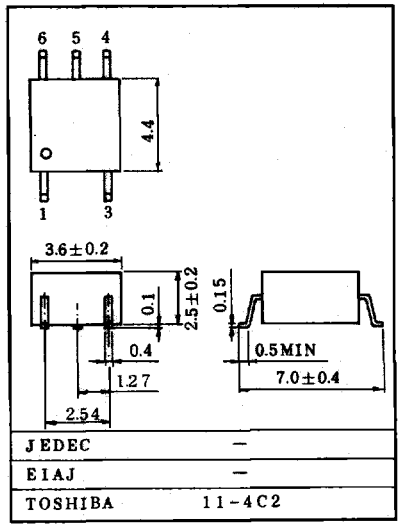
TENTATIVE DATA

ISOLATED LINE RECEIVER
SIMPLEX/MULTIPLEX DATA TRANSMISSION
COMPUTER-PERIPHERAL INTERFACE
MICROPROCESSOR SYSTEM INTERFACE
DIGITAL ISOLATION FOR A/D, D/A CONVERSION

The TOSHIBA MINI FLAT COUPLER TLP113 is a small outline coupler, suitable for surface mount assembly.
TLP113 consists of a GaAlAs light emitting diode, optically coupled to an integrated high gain, high speed photodetector whose output is an open collector, schottky clamped transistor.

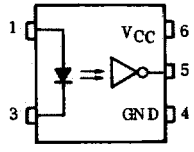
- Input Current Thresholds : I_F=10mA(Max.)
- Switching Speed : 10MBd(Typ.)
- TTL/LSTTL Compatible : V_{CC}=5V
- Guaranteed Performance Over Temp. : 0~70°C
- Isolation Voltage : 2500V_{rms}(Min.)

Unit in mm



JEDEC	—
EIAJ	—
TOSHIBA	11-4C2

PIN CONFIGURATION (TOP VIEW)

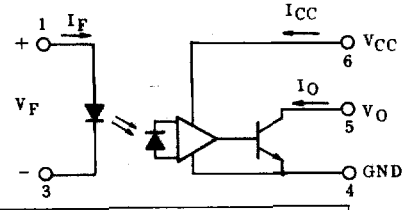


1. ANODE
3. CATHODE
4. GND
5. OUTPUT (OPEN COLLECTOR)
6. V_{CC}

TRUTH TABLE
(Positive Logic)

INPUT	OUTPUT
H	L
L	H

SCHEMATIC



Note.
A 0.1μF bypass capacitor must be connected between pins 4 and 6.

MAXIMUM RATINGS (Ta=25°C)

	CHARACTERISTIC		SYMBOL	RATING	UNIT
LED	Forward Current		I_F	20	mA
	Pulse Forward Current	(Note 1)	I_{FP}	40	mA
	Peak Transient Forward Current	(Note 2)	I_{FPT}	1	A
	Reverse Voltage		V_R	5	V
DETECTOR	Output Current		I_O	25	mA
	Output Voltage		V_O	7	V
	Supply Voltage (1 Minute Maximum)		V_{CC}	7	V
	Output Power Dissipation		P_o	40	mW
Operating Temperature Range			T_{opr}	-40~85	°C
Storage Temperature Range			T_{stg}	-55~125	°C
Lead Solder Temperature (10 sec.)			T_{sold}	260	°C
Isolation Voltage (AC, 1 min., RH≦60%, Note 4)			BV_S	2500	V_{rms}

Note 1 : 50% duty cycle, 1ms pulse width.

Note 2 : Pulse width≦1μs, 300pps.

RECOMMENDE OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Input Voltage, Low Level	V_{FL}	-3	0	1.0	V
Input Current, High Level	I_{FH}	13*	16	20	mA
Supply Voltage	V_{CC}	4.5	5	5.5	V
Fan Out (TTL Load, Each Channel)	N	-	-	8	
Operating Temperature	T_{opr}	0	-	70	°C

* 13mA is a guard banded value which allwes for at least 20% CTR degradation. Initial input current threshold value is 10mA or less.

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, Ta=0~70°C, V_{CC}=4.5~5.5V, V_{FL}≦1.0V)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Forward Voltage	V_F	I_F=10mA, Ta=25°C	-	1.65	1.80	V
Forward Voltage Temperature Coefficient	V_F/Ta	I_F=10mA	-	-2	-	mV/°C
Reverse Current	I_R	V_R=5V, Ta=25°C	-	-	10	μA
Capacitance Between Terminals	C_T	V_F=0, f=1MHz, Ta=25°C	-	45	-	pF
High Level Output Current	I_{OH}	V_F=1.0, V_O=5.5V	-	-	250	μA
		V_F=1.0, V_O=5.5V, Ta=25°C	-	0.5	10	
Low Level Output Voltage	V_{OL}	I_F=10mA I_{OL}=13mA(Sinking)	-	0.4	0.6	V
"H Level Output→L Level Output" Input Current	I_{FH}	I_{OL}=13mA(Sinking) V_{OL}=0.6V	-	-	10	mA
High Level Supply Current	I_{CCH}	V_{CC}=5.5V, I_F=0	-	7	15	mA
Low Level Supply Current	I_{CCL}	V_{CC}=5.5V, I_F=16mA	-	12	18	mA
Input-Output Insulation Leakage Current	I_S	V_S=3540V, t=5s Ta=25°C (Note 4)	-	-	100	μA
Isolation Resistance	R_S	R.H.≦60%, V_S=500V DC Ta=25°C (Note 4)	5×10^{10}	10^{12}	-	Ω
Stray Capacitance Between Input to Output	C_S	V_S=0, f=1MHz Ta=25°C (Note 4)	-	0.8	-	pF

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

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

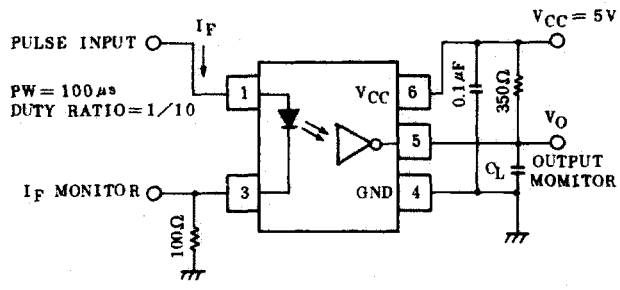
CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Propagation Delay Time (H→L)	t_{pHL}	1	I_F=0→16mA C_L=15pF, R_L=350Ω	-	60	120	ns
Propagation Delay Time (L→H)	t_{pLH}	1	I_F=16→0mA C_L=15pF, R_L=350Ω	-	60	120	ns
Output Rise-Fall Time (10-90%)	t_r, t_f	2	R_L=350Ω, C_L=15pF I_F=0⇄16mA	-	30	-	ns
Common Mode Transient Imunity at High Output Level	C_{MH}	2	I_F=0mA, V_{CM}=200Vp-p $V_{O(MIN)}$=2V, R_L=350Ω	-	200	-	V/μs
Common Mode Transient Imunity at Low Output Level	C_{ML}	2	I_F=16mA, V_{CM}=200Vp-p $V_{O(MAX)}$=0.8V, R_L=350Ω	-	-500	-	V/μs

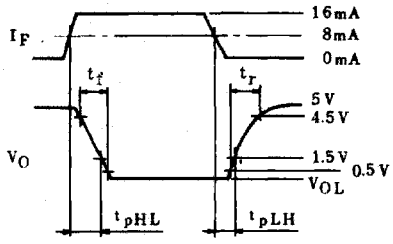
Note 4 : Device considered a two-terminal device : Pins 1 and 3 shorted together and Pin 4,5 and 6 shorted together.

Note 5 : The V_{CC} supply voltage to each TLP113 isolator must be bypassed by 0.1μF capacitor, This can be either a ceramic or solid tantalum capacitor with good high frequency characteristic and should be connected as close as possible to package V_{CC} and GND pins of each device.

Note 6 : Maximum electrostatic discharge voltage for any pins : 180V (C=200pF, R=0)

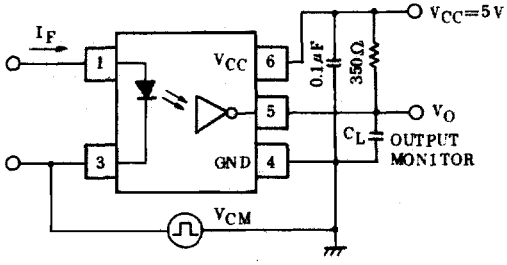
TEST CIRCUIT 1 : Switching Time Test Circuit





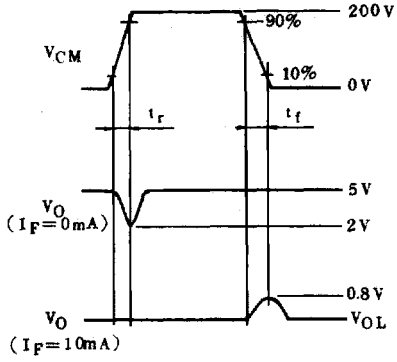
C_L is approximately 15pF which includes probe and stray wiring capacitance.

TEST CIRCUIT 2 : Common Mode Transient Immunity Test Circuit



PULSE GEN
$Z_O = 50\Omega$

$$CM_H = \frac{160\ (V)}{t_r\ (\mu s)}\ ,\quad CM_L = \frac{160\ (V)}{t_f\ (\mu s)}$$



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