

TLP113

Isolated Line Receiver

Simplex / Multiplex Data Transmission

Computer-Peripheral Interface

Microprocessor System Interface

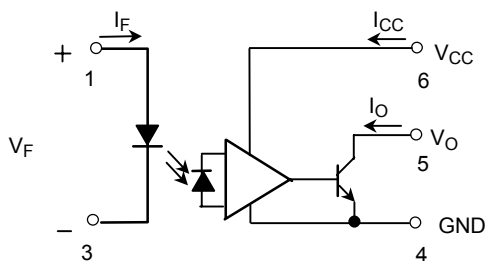
Digital Isolation For A / D, D / A Conversion

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.

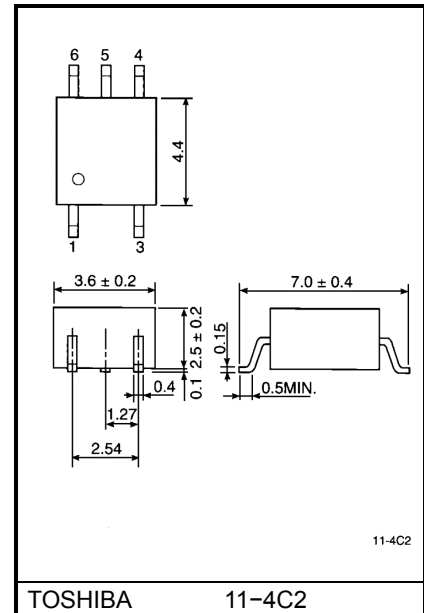
- Input current thresholds: $I_F=10\text{mA}(\text{max.})$
- Switching speed: $10\text{MBd}(\text{typ.})$
- TTL / LSTTL compatible: $V_{CC}=5\text{V}$
- Guaranteed performance over temp.: $0\sim70^\circ\text{C}$
- Isolation voltage: $2500\text{Vrms}(\text{min.})$
- UL recognized: UL1577 file no. E67349

Schematic



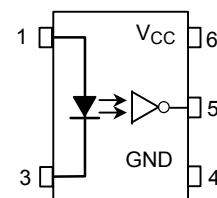
(Note) A $0.1\mu\text{F}$ bypass capacitor must be connected between pins 4 and 6.

Unit in mm



Weight: 0.09g

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

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 (10s)		T _{sol}	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.

Recommend 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 allows 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 ¹⁴	—	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 ($V_{CC}=5V$, $T_a=25^{\circ}C$)

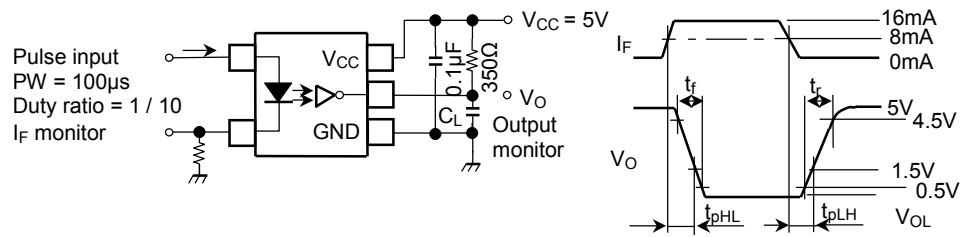
Characteristic	Symbol	Test Circuit	Test Condition	Min.	Typ.	Max.	Unit
Propagation delay time (H→L)	t_{pHL}	1	$I_F=0 \rightarrow 16mA$ $C_L=15pF$, $R_L=350\Omega$	—	60	120	ns
Propagation delay time (L→H)	t_{pLH}	1	$I_F=16 \rightarrow 0mA$ $C_L=15pF$, $R_L=350\Omega$	—	60	120	ns
Output rise-fall time (10–90%)	t_r , t_f	2	$R_L=350\Omega$, $C_L=15pF$ $I_F=0 \rightleftharpoons 16mA$	—	30	—	ns
Common mode transient immunity at high output level	CM_H	2	$I_F=0mA$, $V_{CM}=200V_{p-p}$ $V_{O(min)}=2V$, $R_L=350\Omega$	—	200	—	V / μs
Common mode transient immunity at low output level	CM_L	2	$I_F=16mA$, $V_{CM}=200V_{p-p}$ $V_{O(max)}=0.8V$, $R_L=350\Omega$	—	–500	—	V / μs

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

(Note 5) The V_{CC} supply voltage to each TLP113 isolator must be bypassed by 0.1 μF 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.

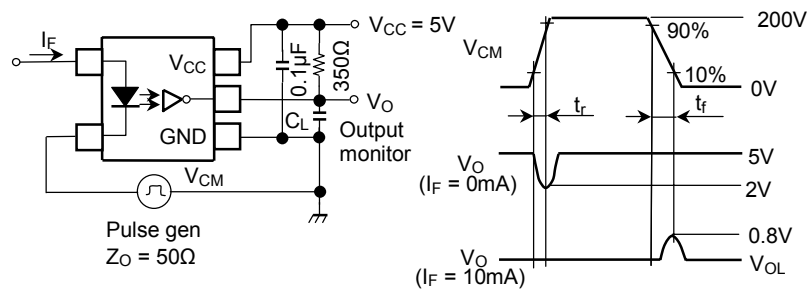
(Note 6) Maximum electrostatic discharge voltage for any pins: 180V(C=200pF, R=0)

Test Circuit 1: Switching Time Test Circuit



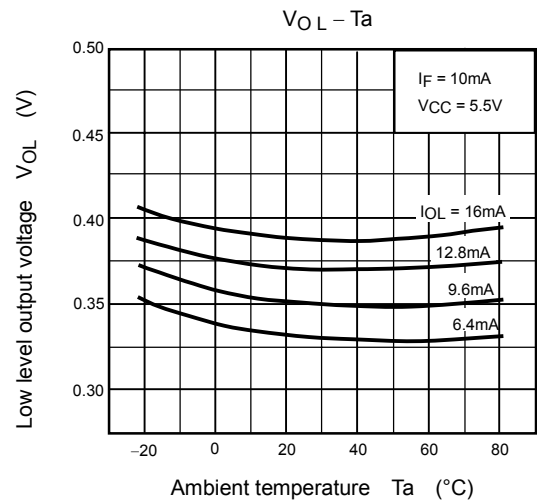
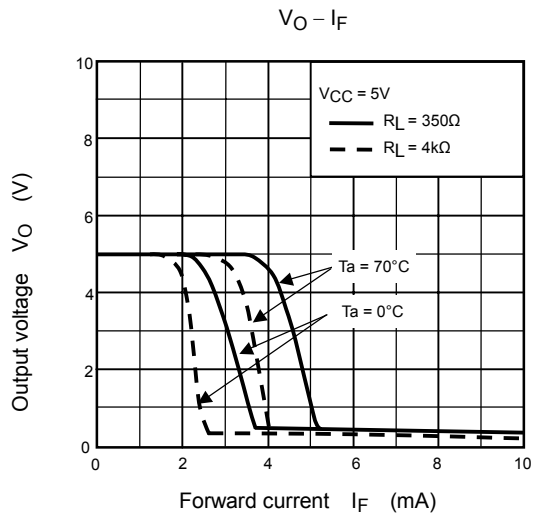
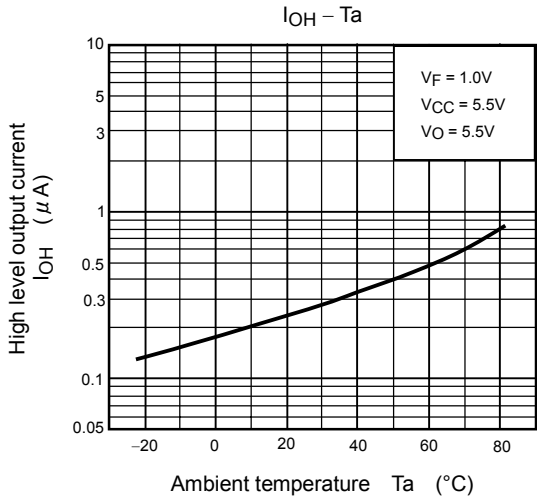
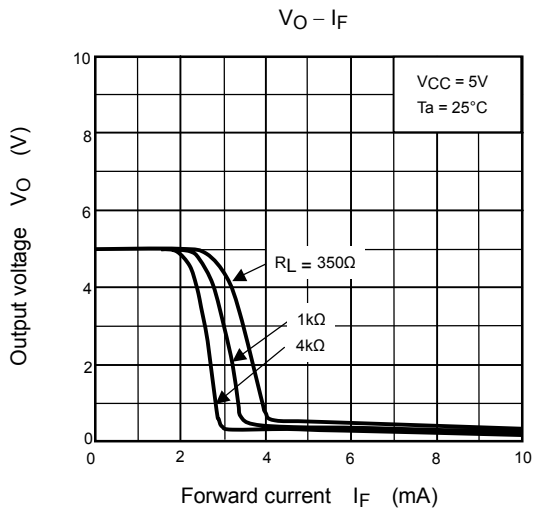
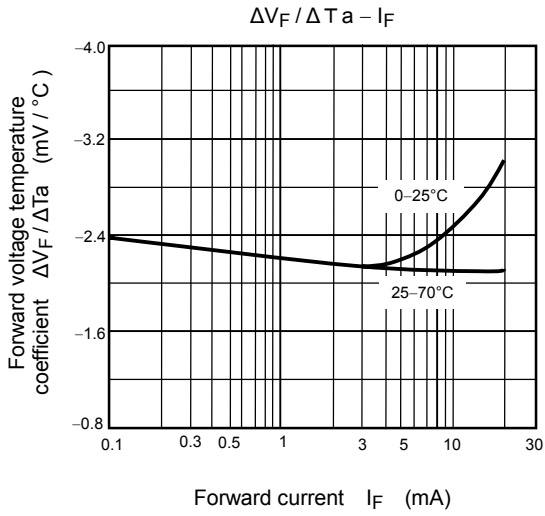
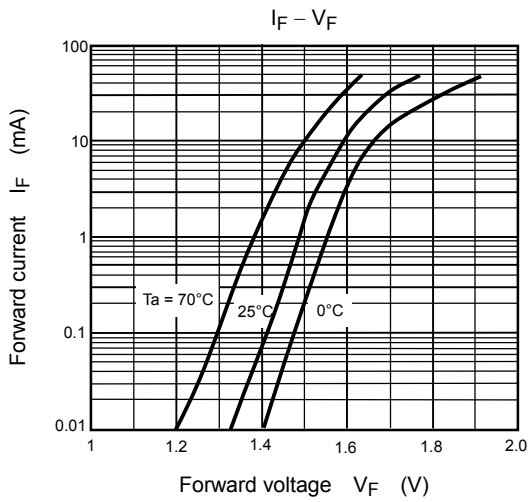
C_L is approximately 15pF which includes probe and stray wiring capacitance.

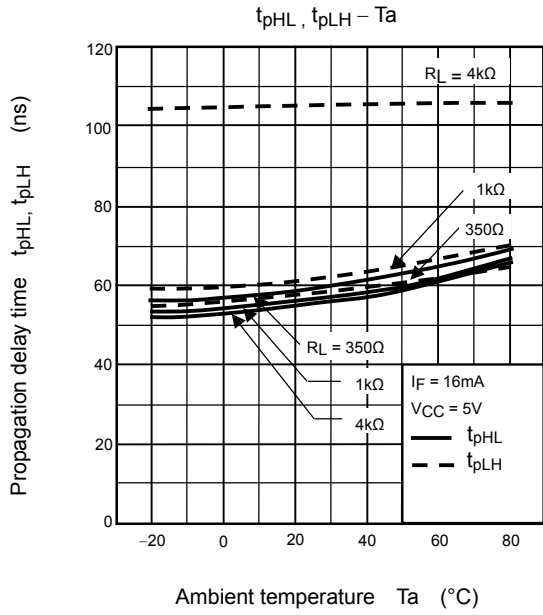
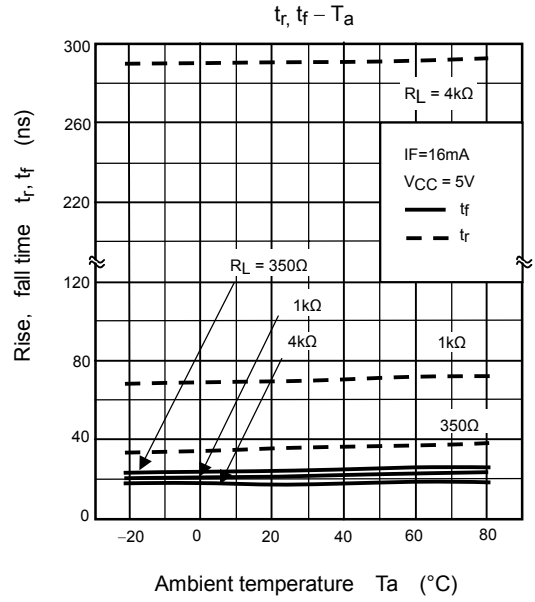
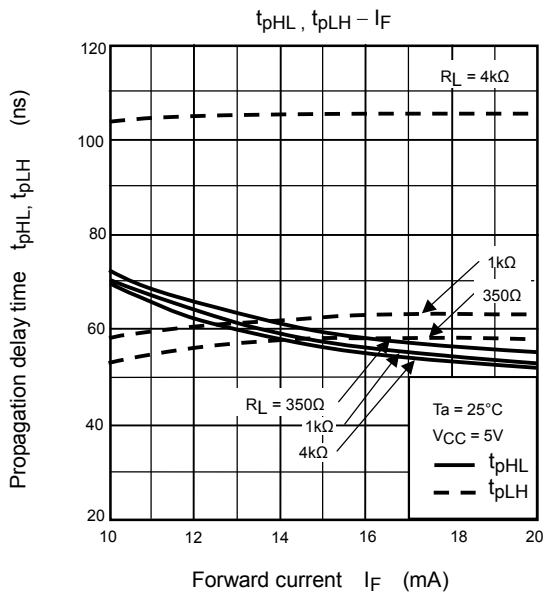
Test Circuit 2: Common Mode Transient Immunity Test Circuit



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

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





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