

TLP137

OFFICE MACHINE
PROGRAMMABLE CONTROLLERS
AC/DC-INPUT MODULE
TELECOMMUNICATION

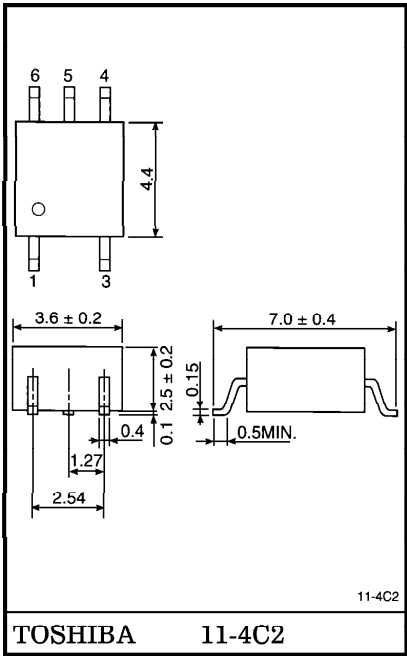
The TOSHIBA MINI FLAT COUPLER TLP137 is a small outline coupler, suitable for surface mount assembly.
TLP137 consists of a gallium arsenide infrared emitting diode, optically coupled to a photo transistor, and provides high CTR at low input current.
TLP137 base terminal is for the improvement of speed, reduction of dark current, and enable operation.

- Collector-Emitter Voltage : 80V (Min.)
- Current Transfer Ratio : 100% (Min.)
Rank BV : 200% (Min.)
- Isolation Voltage : 3750Vrms (Min.)
- UL Recognized : UL1577, File No. E67349
- Current Transfer Ratio

CLASSI- FICATION	CURRENT TRANSFER RATIO (Min.)			MARKING OF CLASSI- FICATION
	Ta = 25°C		Ta = -25~75°C	
	If = 1mA VCE = 0.5V	If = 0.5mA VCE = 1.5V	If = 1mA VCE = 0.5V	
Rank BV	200%	100%	100%	BV
Standard	100%	50%	50%	BV, Blank

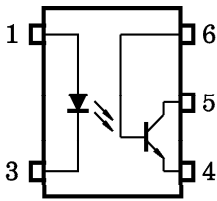
(Note) Application type name for certification test,
please use standard product type name, i.e.
TLP137 (BV) : TLP137

Unit in mm



Weight : 0.09g

PIN CONFIGURATIONS (TOP VIEW)



- 1 : ANODE
- 3 : CATHODE
- 4 : EMITTER
- 5 : COLLECTOR
- 6 : BASE

961001EBC2

● TOSHIBA is continually working to improve the quality and the reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to observe standards of safety, and to avoid situations in which a malfunction or failure of a TOSHIBA product could cause loss of human life, bodily injury or damage to property. In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent products specifications. Also, please keep in mind the precautions and conditions set forth in the TOSHIBA Semiconductor Reliability Handbook.

● Gallium arsenide (GaAs) is a substance used in the products described in this document. GaAs dust and fumes are toxic. Do not break, cut or pulverize the product, or use chemicals to dissolve them. When disposing of the products, follow the appropriate regulations. Do not dispose of the products with other industrial waste or with domestic garbage.

● The products described in this document are subject to foreign exchange and foreign trade control laws.

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● The information contained herein is subject to change without notice.

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
LED	Forward Current	I_F	50	mA
	Forward Current Derating (Ta ≥ 53°C)	$\Delta I_F / ^\circ\text{C}$	-0.7	mA / °C
	Peak Forward Current (100μs pulse, 100pps)	I_{FP}	1	A
	Reverse Voltage	V_R	5	V
	Junction Temperature	T_j	125	°C
DETECTOR	Collector-Emitter Voltage	V_{CEO}	80	V
	Collector-Base Voltage	V_{CBO}	80	V
	Emitter-Collector Voltage	V_{ECO}	7	V
	Emitter-Base Voltage	V_{EBO}	7	V
	Collector Current	I_C	50	mA
	Peak Collector Current (10ms pulse, 100pps)	I_{CP}	100	mA
	Power Dissipation	P_C	150	mW
	Power Dissipation Derating (Ta ≥ 25°C)	$\Delta P_C / ^\circ\text{C}$	-1.5	mW / °C
	Junction Temperature	T_j	125	°C
Storage Temperature Range		T_{stg}	-55~125	°C
Operating Temperature Range		T_{opr}	-55~100	°C
Lead Soldering Temperature (10s)		T_{sol}	260	°C
Total Package Power Dissipation		P_T	200	mW
Total Package Power Dissipation Derating (Ta ≥ 25°C)		$\Delta P_T / ^\circ\text{C}$	-2.0	mW / °C
Isolation Voltage (AC, 1min., RH ≤ 60%) (Note 1)		BV_S	3750	Vrms

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

INDIVIDUAL ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
LED	Forward Voltage	V_F	$I_F = 10\text{mA}$	1.0	1.15	1.3	V
	Reverse Current	I_R	$V_R = 5\text{V}$	—	—	10	μA
	Capacitance	C_T	$V = 0, f = 1\text{MHz}$	—	30	—	pF
DETECTOR	Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C = 0.5\text{mA}$	80	—	—	V
	Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$	$I_E = 0.1\text{mA}$	7	—	—	V
	Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	$I_C = 0.1\text{mA}$	80	—	—	V
	Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	$I_E = 0.1\text{mA}$	7	—	—	V
	Collector Dark Current	I_{CEO}	$V_{CE} = 48\text{V}$	—	10	100	nA
			$V_{CE} = 48\text{V}, T_a = 85^\circ\text{C}$	—	2	50	μA
	Collector Dark Current	I_{CER}	$V_{CE} = 48\text{V}, T_a = 85^\circ\text{C}$ $R_{BE} = 1\text{M}\Omega$	—	0.5	10	μA
	Collector Dark Current	I_{CBO}	$V_{CB} = 10\text{V}$	—	0.1	—	nA
	DC Forward Current Gain	h_{FE}	$V_{CE} = 5\text{V}, I_C = 0.5\text{mA}$	—	1000	—	—
	Capacitance (Collector to Emitter)	C_{CE}	$V = 0, f = 1\text{MHz}$	—	12	—	pF

COUPLED ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Current Transfer Ratio	I_C / I_F	$I_F = 1\text{mA}, V_{CE} = 0.5\text{V}$ Rank BV	100	—	1200	%
			200	—	1200	
Low Input CTR	$I_C / I_{F(\text{low})}$	$I_F = 0.5\text{mA}, V_{CE} = 1.5\text{V}$ Rank BV	50	—	—	%
			100	—	—	
Base Photo-Current	I_{PB}	$I_F = 1\text{mA}, V_{CB} = 5\text{V}$	—	5	—	μA
Collector-Emitter Saturation Voltage	$V_{CE(\text{sat})}$	$I_C = 0.5\text{mA}, I_F = 1\text{mA}$	—	—	0.4	V
		$I_C = 1\text{mA}, I_F = 1\text{mA}$ Rank BV	—	0.2	—	
			—	—	0.4	
Off-State Collector Current	$I_{C(\text{off})}$	$V_F = 0.7\text{V}, V_{CE} = 48\text{V}$	—	—	10	μA

COUPLED ELECTRICAL CHARACTERISTICS (Ta = - 25~75°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Current Transfer Ratio	I_C / I_F	$I_F = 1\text{mA}$, $V_{CE} = 0.5\text{V}$ Rank BV	50	—	—	%
			100	—	—	
Low Input CTR	$I_C / I_{F(\text{low})}$	$I_F = 0.5\text{mA}$, $V_{CE} = 1.5\text{V}$ Rank BV	—	50	—	%
			—	100	—	

ISOLATION CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Capacitance (Input to Output)	C_S	$V_S = 0$, $f = 1\text{MHz}$	—	0.8	—	pF
Isolation Resistance	R_S	$V = 500\text{V}$	5×10^{10}	10^{14}	—	Ω
Isolation Voltage	BV_S	AC, 1 minute	3750	—	—	V_{rms}
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	Vdc

SWITCHING CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Rise Time	t_r	$V_{CC} = 10\text{V}$, $I_C = 2\text{mA}$ $R_L = 100\Omega$	—	8	—	μs
Fall Time	t_f		—	8	—	
Turn-on Time	t_{on}		—	10	—	
Turn-off Time	t_{off}		—	8	—	
Turn-on Time	t_{ON}	$R_L = 4.7\text{k}\Omega$ (Fig.1) $R_{BE} = \text{OPEN}$ $V_{CC} = 5\text{V}$, $I_F = 1.6\text{mA}$	—	10	—	μs
Storage Time	t_S		—	50	—	
Turn-off Time	t_{OFF}		—	300	—	
Turn-on Time	t_{ON}	$R_L = 4.7\text{k}\Omega$ (Fig.1) $R_{BE} = 470\text{k}\Omega$ $V_{CC} = 5\text{V}$, $I_F = 1.6\text{mA}$	—	12	—	μs
Storage Time	t_S		—	30	—	
Turn-off Time	t_{OFF}		—	100	—	

Fig.1 SWITCHING TIME TEST CIRCUIT

