TOSHIBA Photocoupler GaAs Ired & Photo-Transistor

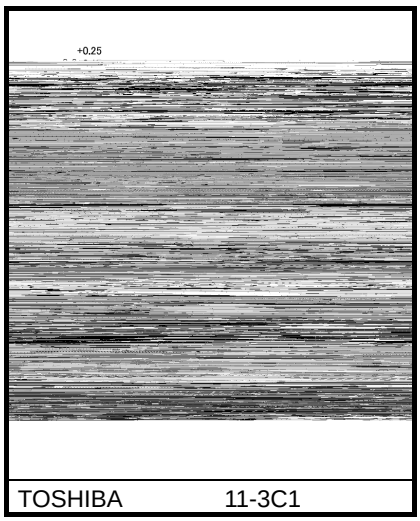
TLP290

Programmable Controllers

AC/DC-Input Module

Hybrid ICs

Unit: mm



Weight: 0.05 g (typ.)

TLP290 consist of photo transistor, optically coupled to two gallium arsenide infrared emitting diode connected inverse parallel, and can operate directly by x

- cUL approved : CSA Component Acceptance Service No.5A, File No. 67349
- SEMKO approved : EN 60065: 2002, Approved no. 1200315
  EN 60950-1: 2001, EN 60335-1: 2002, Approved no. 1200315
- BSI approved : BS EN 60065: 2002, Approved no. 9036
  : BS EN 60950-1: 2006, Approved no. 9037
- Option (V4)
  VDE approved: EN 60747-5-5 Certificate, No. 40009347
  Maximum operating insulation voltage: 707 Vpk
  Highest permissible over-voltage: 6000 Vpk
  (Note) When an EN 60747-5-5 approved type is needed, please designate the "Option(V4)"

Construction Mechanical Rating

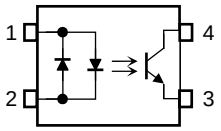
Creepage distance: 5.0 mm (min)

Clearance: 5.0 mm (min)

Insultion thickness: 0.4 mm (min)

Pin Configuration

TLP290



1: Anode
Cathode
2: Cathode
Anode
3: Emitter
4: Collector

Current Transfer Ratio (Unless otherwise specified, Ta = 25°C)

Note1: Specify both the part number and a rank in this format when ordering

(e.g.) rank GB: TLP290(GB,E

Note: For safety standard certification, however, specify the part number alone.
(e.g.) TLP290(GB,E: TLP290

Absolute Maximum Ratings (Note) (Unless otherwise specified, Ta = 25°C)

	Characteristic	Symbol	Note	Rating	Unit
LED	R.M.S. forward current	$I_{F(RMS)}$		±50	mA
	Input forward current derating (Ta ≥ 90°C)	$\Delta I_F / \Delta Ta$		-1.5	mA /°C
	Input forward current (pulsed)	I_{FP}	(Note 2)	±1	A
	Input power dissipation	P_D		100	mW
	Input power dissipation derating (Ta ≥ 90°C)	$\Delta P_D / \Delta Ta$		-3.0	mW/°C

Junction temperature

Electrical Characteristics (Unless otherwise specified, Ta = 25°C)

	Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
LED	Input forward voltage	V_F	I_F = ±10 mA	1.1	1.25	1.4	V
	Input capacitance	C_T	V = 0 V, f = 1 MHz	-	60	-	pF
Detector	Collector-emitter breakdown voltage	$V_{(BR)\ CEO}$	I_C = 0.5 mA	80	-	-	V
	Emitter-collector breakdown voltage	$V_{(BR)\ ECO}$	I_E = 0.1 mA	7	-	-	V
	Dark current	I_{CEO}	V_{CE} = 48 V,	-	0.01	0.08	μA
			V_{CE} = 48 V, Ta = 85°C	-	2	50	μA
	Collector-emitter capacitance	C_{CE}	V = 0 V, f = 1 MHz	-	10	-	pF

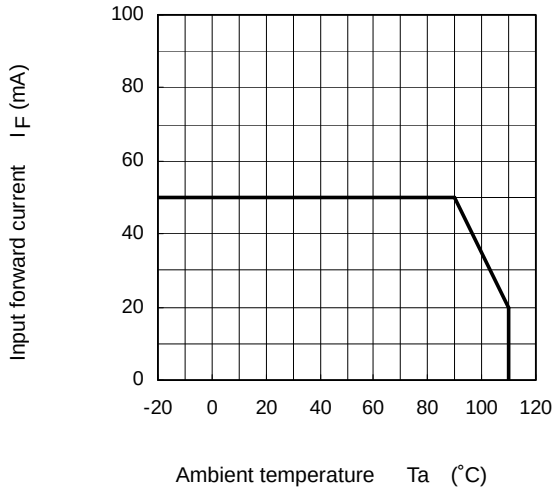
Isolation Characteristics (Unless otherwise specified, Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Total capacitance (input to output)	C_S	V_S = 0V, f = 1 MHz	-	0.8	-	pF
Isolation resistance	R_S	V_S = 500 V, R.H.≤ 60%	1×10^{12}	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	-	V_{dc}

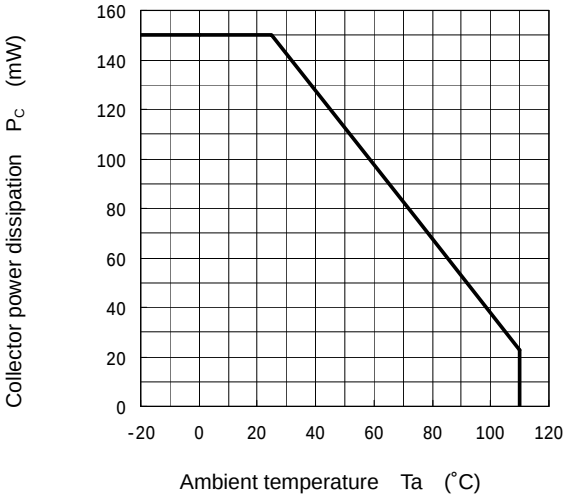
Switching Characteristics (Unless otherwise specified, Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Rise time	t_r	V_{CC} = 10 V, I_C = 2 mA R_L = 100 Ω	-	4	-	μs
Fall time	t_f		-	7	-	
Turn-on time	t_{on}		-	7	-	
Turn-off time	t_{off}		-	7	-	

I_F - Ta

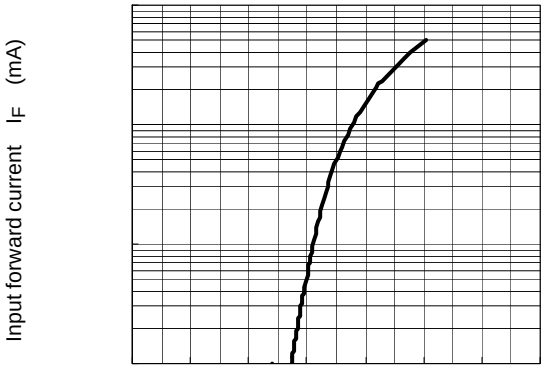


P_C - Ta

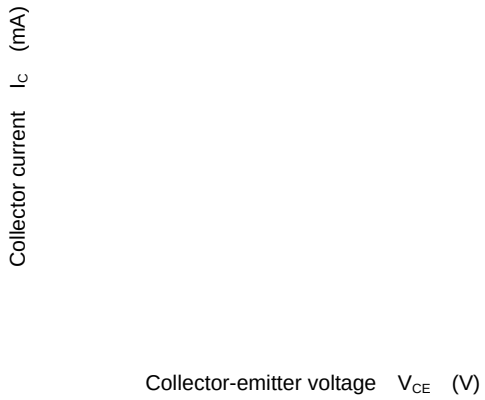


I_{FP} - D_R

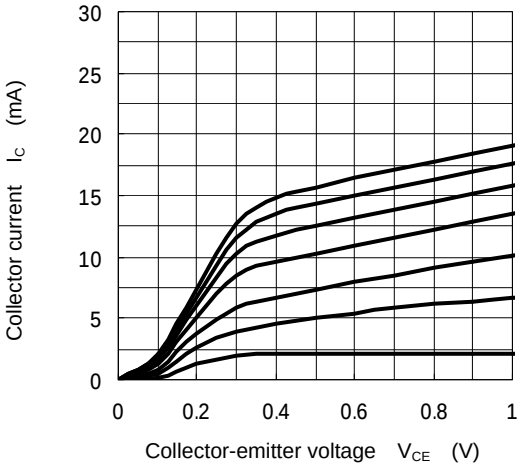
I_F - V_F



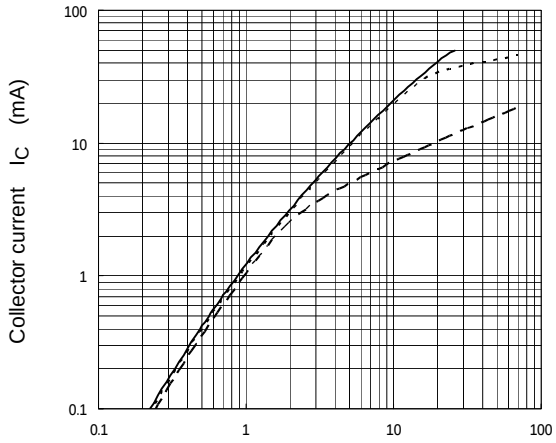
I_C-V_{CE}



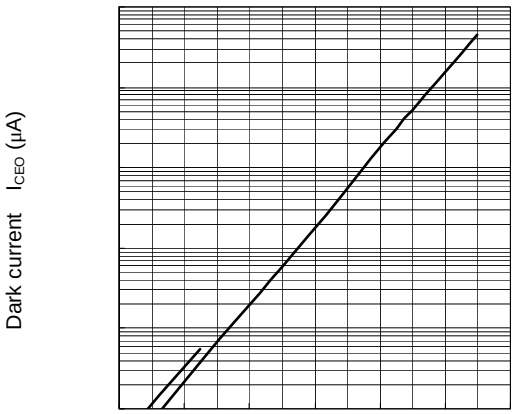
I_C-V_{CE}



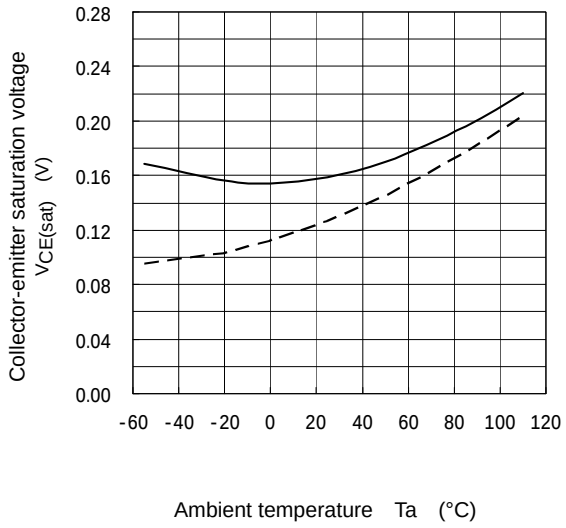
I_C-I_F



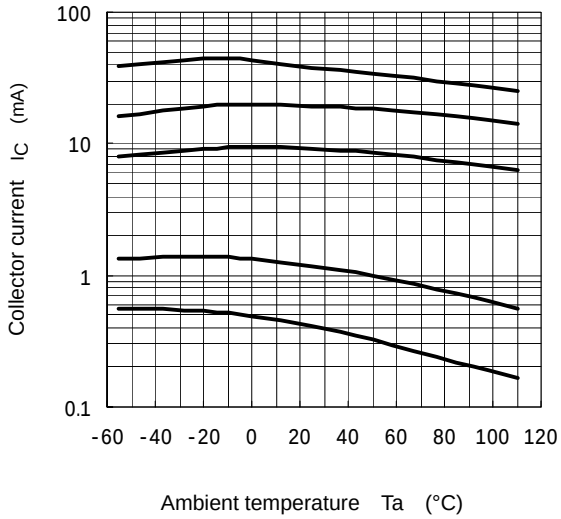
I_{CEO}-Ta



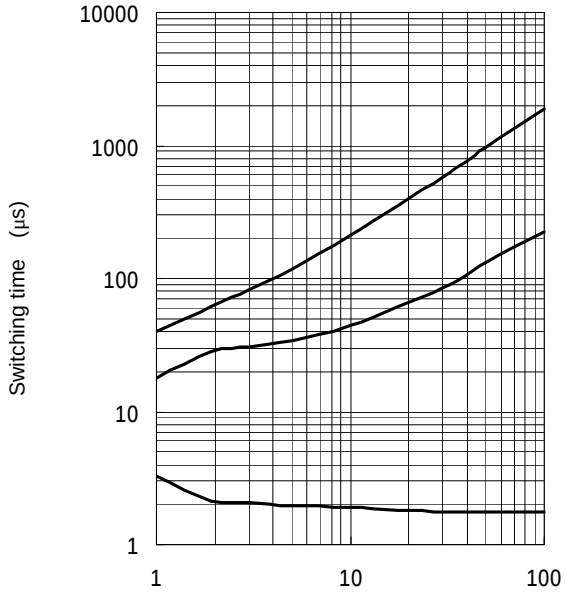
$V_{CE(sat)}$ - Ta



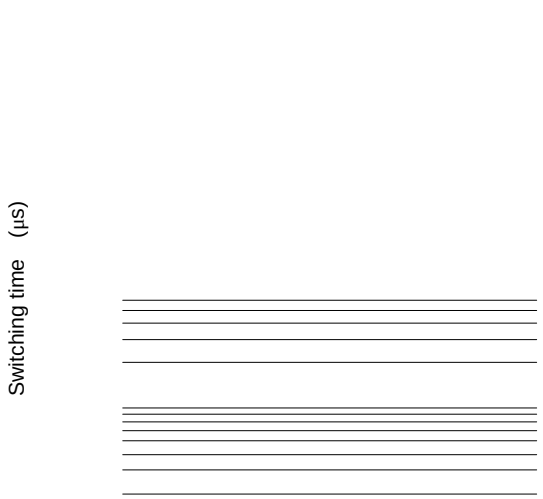
I_C - Ta



Switching time - R_L



Switching time - Ta



Soldering and Storage

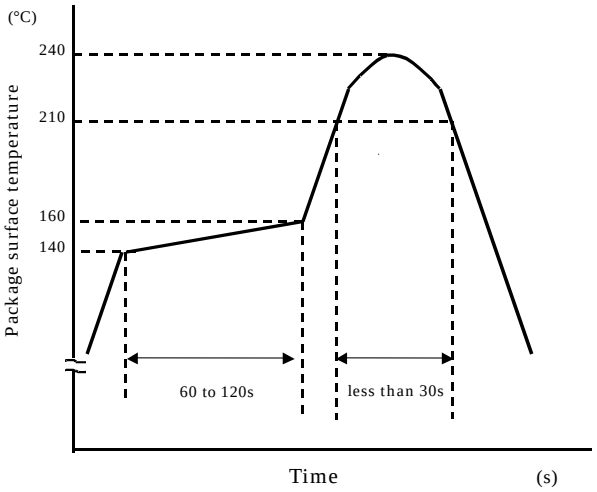
1. Soldering

1.1 Soldering

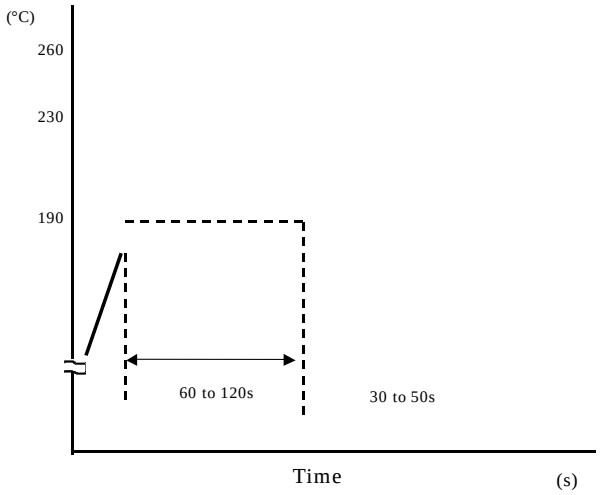
When using a soldering iron or medium infrared ray/hot air reflow, avoid a rise in device temperature as much as possible by observing the following conditions.

1) Using solder reflow

·Temperature profile example of lead (Pb) solder



·Temperature profile example of using lead (Pb)-free solder



Reflow soldering must be performed once or twice.

The mounting should be completed with the interval from the first to the last mountings being 2 weeks.

2) Using solder flow (for lead (Pb) solder, or lead (Pb)-free solder)

Please preheat it at 150°C between 60 and 120 seconds.

Complete soldering within 10 seconds below 260°C. Each pin may be heated at most once.

3) Using a soldering iron

Complete soldering within 10 seconds below 260°C, or within 3 seconds at 350°C. Each pin may be heated at most once.

2. Storage

1) Avoid storage locations where devices may be exposed to moisture or direct sunlight.
2) Follow the precautions printed on the packing label of the device for transportation and storage.
3) Keep the storage location temperature and humidity within a range of 5°C to 35°C and 45% to 75%, respectively.
4) Do not store the products in locations with poisonous gases (especially corrosive gases) or in dusty conditions.
5) Store the products in locations with minimal temperature fluctuations. Rapid temperature changes during storage can cause condensation, resulting in lead oxidation or corrosion, which will deteriorate the solderability of the leads.
6) When restoring devices after removal from their packing, use anti-static containers.
7) Do not allow loads to be applied directly to devices while they are in storage.
8) If devices have been stored for more than two years under normal storage conditions, it is recommendedthat you check the leads for ease of soldering prior to use.

Insulation Related Specifications

Minimum creepage distance	Cr	5.0mm
Minimum clearance	Cl	5.0mm
Minimum insulation thickness	ti	0.4mm
Comparative tracking index	CTI	175

1. If a printed circuit is incorporated, the creepage distance and clearance may be reduced below this value. (e.g. at a standard distance between soldering eye centers of 3.5mm).
   If this is not permissible, the user shall take suitable measures.
2. This photocoupler is suitable for 'safe electrical isolation' only within the safety limit data.
   Maintenance of the safety data shall be ensured by means of protective circuit.

VDE test sign: Marking on product for EN 60747 **V**

: Marking on packing for EN 60747 VDE

Marking Example: TLP290

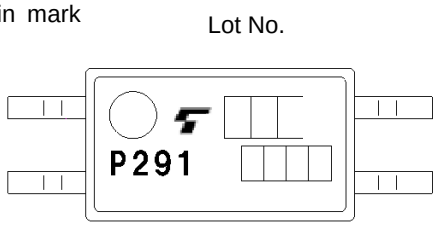


Figure 1 Partial discharge measurement procedure according to EN 60747
Destructive test for qualification and sampling tests.

Method A

(for type and sampling tests, destructive tests)

t_1, t_2	= 1 to 10 s
t_3, t_4	= 1 s
t_p(Measuring time for partial discharge)	= 10 s
t_b	= 12 s
t_{ini}	= 60 s

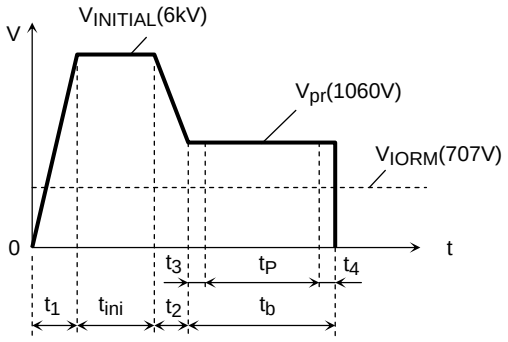


Figure 2 Partial discharge measurement procedure according to EN 60747
Non-destructive test for100% inspection.

Method B

(for sample test, non-destructive test)

t_3, t_4	= 0.1 s
t_p(Measuring time for partial discharge)	= 1 s
t_b	= 1.2 s

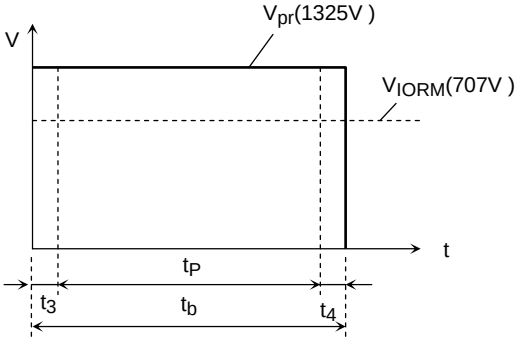
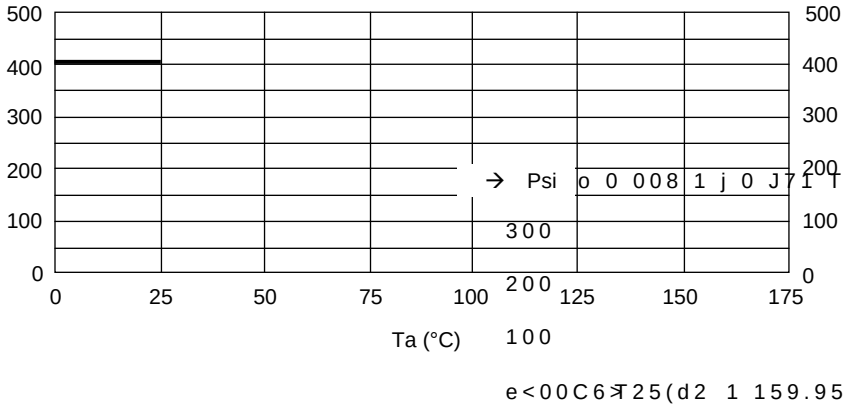


Figure 3 Dependency of maximum safety ratings on ambient temperature



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