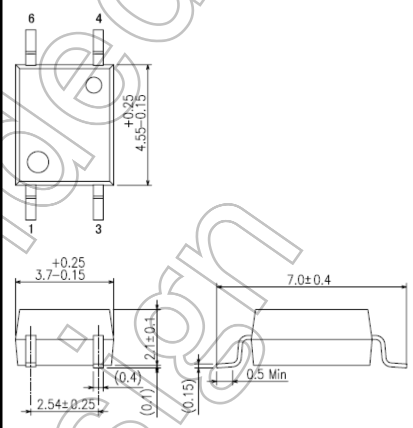
TOSHIBA Photocoupler GaAs Ired & Photo-Transistor

TLP184

Telephone Use Equipment
Programmable Controllers
AC/DC-Input Module
Telecommunication

Unit: mm



TOSHIBA	11-4M1S

Weight: 0.08 g (typ.)

The TOSHIBA mini flat coupler TLP184 is a small outline coupler, suitable for surface mount assembly.
TLP184 consist of a photo transistor, optically coupled to two gallium arsenide infrared emitting diodes connected inverse parallel, and can operate directly by AC input current.

- Collector-emitter voltage: 80 V (min)
- Current transfer ratio: 50% (min)
  Rank GB: 100% (min)
- Isolation voltage: 3750 Vrms (min)
- Operation Temperature: -55 to 110 °C
- UL approved: UL1577, File No. E67349
- cUL approved: CSA Component Acceptance Service No. 5A
  File No.E67349
- CQC approved:GB4943.1,GB8898 Japan and Thailand Factory
  仅适用于海拔 2000m 以下地区安全使用

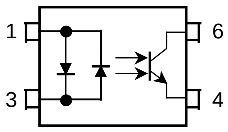
- Option (V4) type
  VDE approved: EN60747-5-5 ,EN60065,EN60950-1 (Note)
  Under application EN62368-1

  Note: When a EN60747-5-5 approved type is needed,
  Please designate "Option(V4)"

- Construction mechanical rating

Creepage distance	: 5.0 mm (min)
Clearance	: 5.0 mm (min)
Insulation thickness	: 0.4 mm (min)

Pin Configuration (top view)



1: Anode, Cathode
3: Cathode, Anode
4: Emitter
6: Collector

Start of commercial production
2011-12

Current Transfer Ratio

Type	Classification (Note 1)	Current Transfer Ratio (%) (I_C/I_F) I_F = 5 mA, V_{CE} = 5 V, Ta = 25°C Min	Max	Marking of classification
TLP184	Standard	50	400	Blank, YE, GR, B, GB
	Rank Y	50	150	YE
	Rank GR	100	300	GR
	Rank BLL	200	400	B
	Rank GB	100	400	GB, GR, BL

Note1: ex. rank GB: TLP184 (GB,E

Note: Application type name for certification test, please use standard product type name, i.e. TLP184(GB,E: TLP184

Absolute Maximum Ratings (Ta = 25°C)

	Characteristic	Symbol	Rating	Unit
LED	R.M.S. forward current	$I_{F(RMS)}$	±50	mA
	Forward current derating (Ta≥90°C)	ΔI_F/°C	-1.5	mA/°C
	Pulse forward current (Note 1)	I_{FP}	±1	A
	Diode power dissipation	P_D	100	mW
	Diode power dissipation derating (Ta≥90°C)	ΔP_D /°C	-2.9	mW/°C
	Junction temperature	T_j	125	°C
Detector	Collector-emitter voltage	V_{CEO}	80	V
	Emitter-collector voltage	V_{ECO}	7	V
	Collector current	I_C	50	mA
	Power dissipation	P_C	150	mW
	Power dissipation derating (Ta ≥ 25°C)	ΔP_C/°C	-1.5	mW/°C
	Junction temperature	T_j	125	°C
Operating temperature range		T_{opr}	-55 to 110	°C
Storage temperature range		T_{stg}	-55 to 125	°C
Lead soldering temperature (10 s)		T_{sol}	260	°C
Total package power dissipation		P_T	200	mW
Total package power dissipation derating (Ta ≥ 25°C)		ΔP_T/°C	-2.0	mW/°C
Isolation voltage (AC,1 minute, R.H. ≤ 60%) (Note 2)		BV_S	3750	Vrms

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc.).

Note 1: Pulse width ≤ 100 μs, f=100 Hz

Note 2: Device considered a two terminal device: Pins 1 and 3 shorted together and 4 and 6 shorted together.

Recommended Operating Conditions

Characteristic	Symbol	Min	Typ.	Max	Unit
Supply voltage	V_{CC}	—	5	48	V
Forward current	$I_{F(RMS)}$	—	16	20	mA
Collector current	I_C	—	1	10	mA

Note: Recommended operating conditions are given as a design guideline to obtain expected performance of the device. Additionally, each item is an independent guideline respectively. In developing designs using this product, please confirm specified characteristics shown in this document.

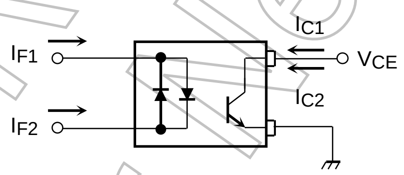
Electrical Characteristics (Ta = 25°C)

	Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
LED	Forward voltage	V_F	I_F = ±10 mA	1.1	1.25	1.4	V
	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
	Collector dark current	I_{CEO}	V_{CE} = 48 V	—	0.01	0.08	μA
			V_{CE} = 48 V, Ta = 85°C	—	2	50	μA
	Capacitance (collector to emitter)	C_{CE}	V = 0 V, f = 1 MHz	—	10	—	pF

Coupled Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition		Min	Typ.	Max	Unit
Current transfer ratio	I_C/I_F	I_F = ±5 mA, V_{CE} = 5 V		50	—	400	%
			Rank GB	100	—	400	
Saturated CTR	$I_C/I_{F(sat)}$	I_F = ±1 mA, V_{CE} = 0.4 V		—	60	—	%
			Rank GB	30	—	—	
Collector-emitter saturation voltage	$V_{CE(sat)}$	I_C = 2.4 mA, I_F = ±8 mA		—	—	0.3	V
		I_C = 0.2 mA, I_F = ±1 mA		—	0.2	—	
			Rank GB	—	—	0.3	
Off-state collector current	$I_{C(off)}$	V_F = ±0.7 V, V_{CE} = 48 V		—	1	10	μA
CTR symmetry	$I_{C(ratio)}$	I_C (I_F = -5 mA)/I_C (I_F = 5 mA) (Note 1)		0.33	1	3	—

Note 1: $I_C(\text{ratio}) = \dfrac{I_{C2}(I_F = I_{F2}, V_{CE} = 5V)}{I_{C1}(I_F = I_{F1}, V_{CE} = 5V)}$



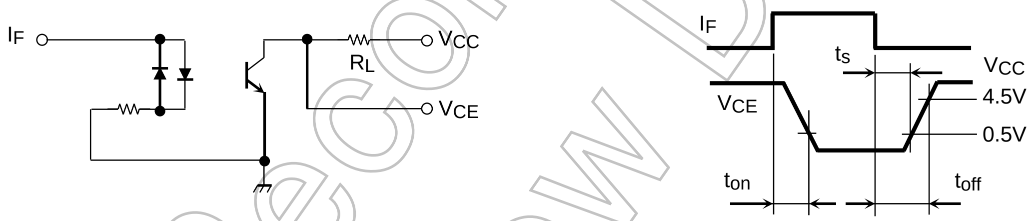
Isolation Characteristics (Ta = 25°C)

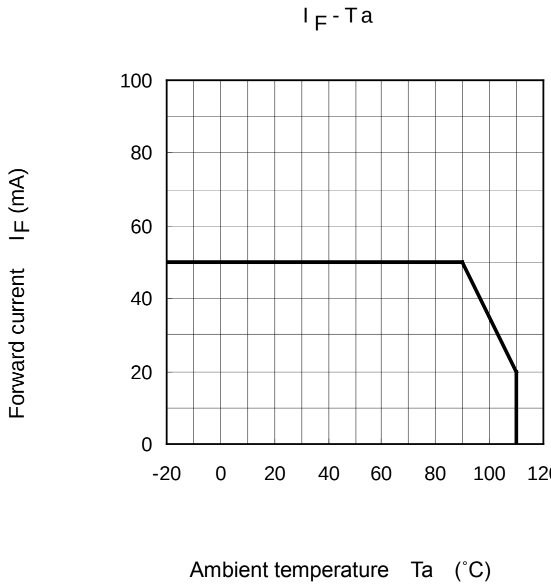
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	C_S	V_S = 0 V, f = 1 MHz	—	0.8	—	pF
Isolation resistance	R_S	V_S = 500 V, R.H. ≤ 60%	1×10^{10}	10^{14}	—	Ω
Isolation voltage	BV_S	AC, 60 s	3750	—	—	V_{rms}
		AC, 1 s, in oil	—	10000	—	
		DC, 60 s, in oil	—	10000	—	V_{dc}

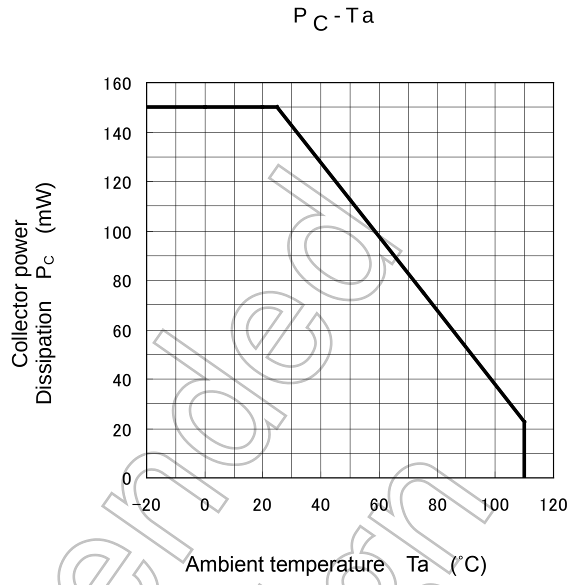
Switching Characteristics (Ta = 25°C)

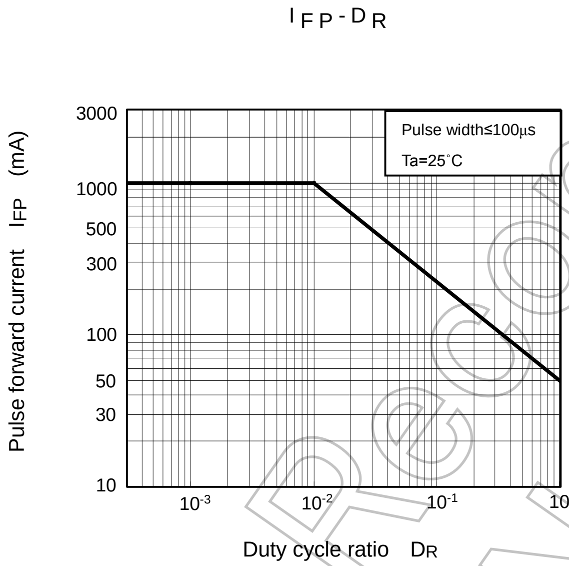
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Rise time	t_r	V_{CC} = 10 V, I_C = 2 mA R_L = 100 Ω	—	5	—	μs
Fall time	t_f		—	9	—	
Turn-on time	t_{on}		—	9	—	
Turn-off time	t_{off}		—	9	—	
Turn-on time	t_{on}	R_L = 1.9 kΩ (Fig.1) V_{CC} = 5 V, I_F = ±16 mA	—	2	—	μs
Storage time	t_s		—	30	—	
Turn-off time	t_{off}		—	70	—	

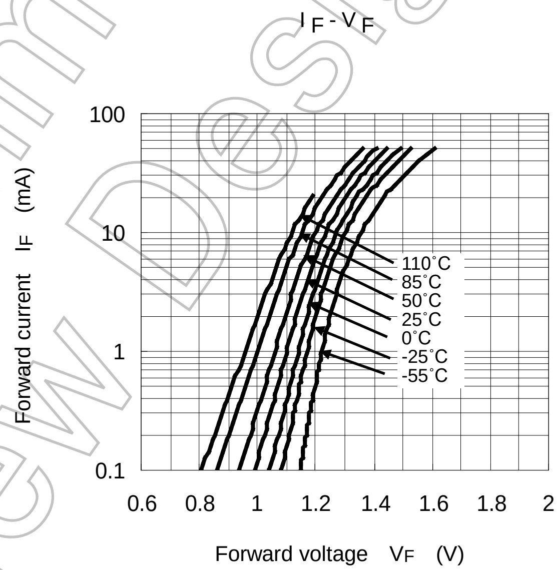
Fig. 1: Switching time test circuit

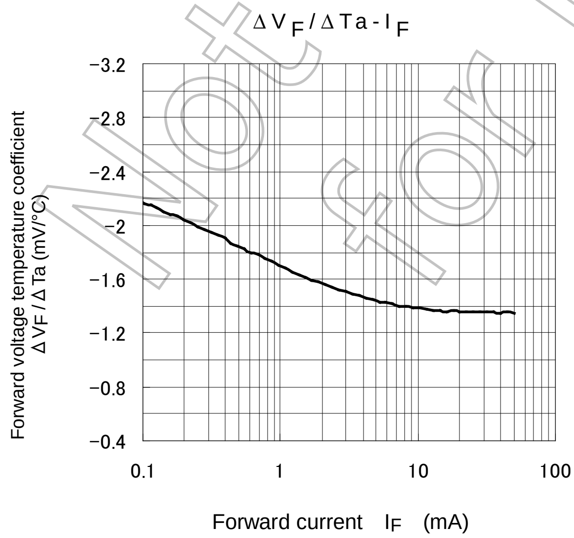


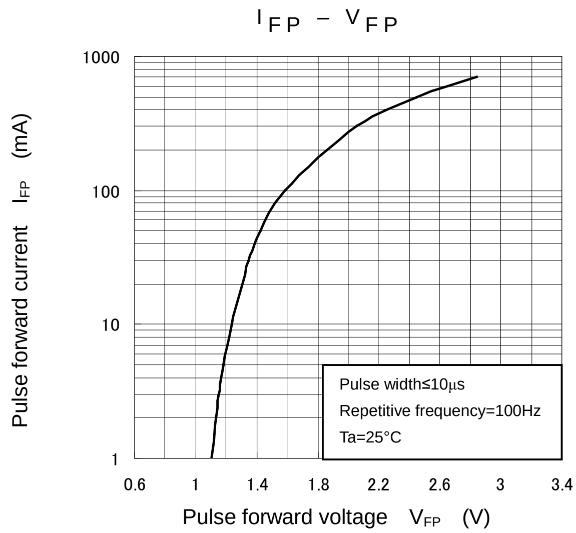






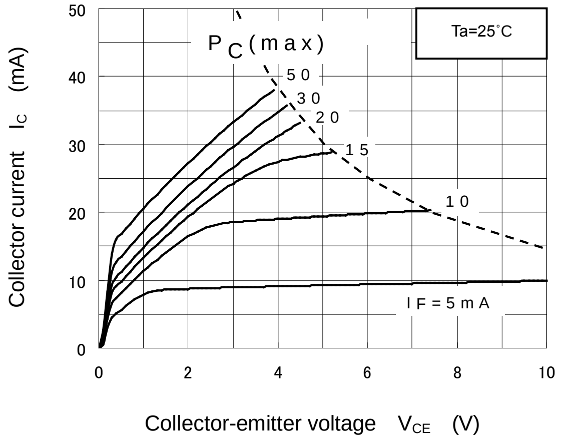




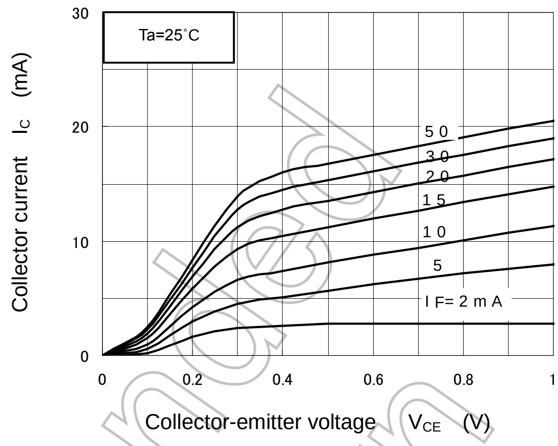


*The above graphs show typical characteristic.

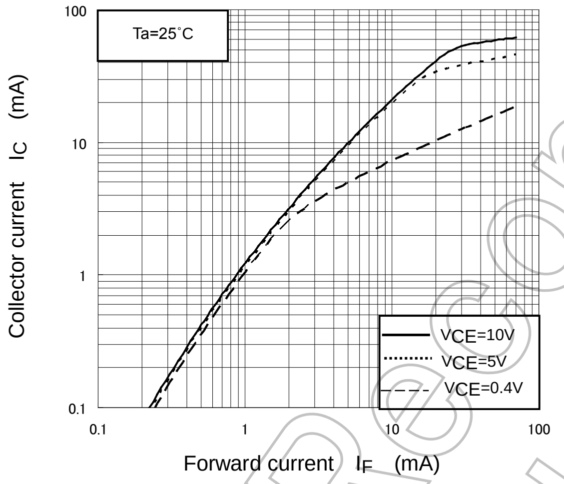
I_C - V_{CE}



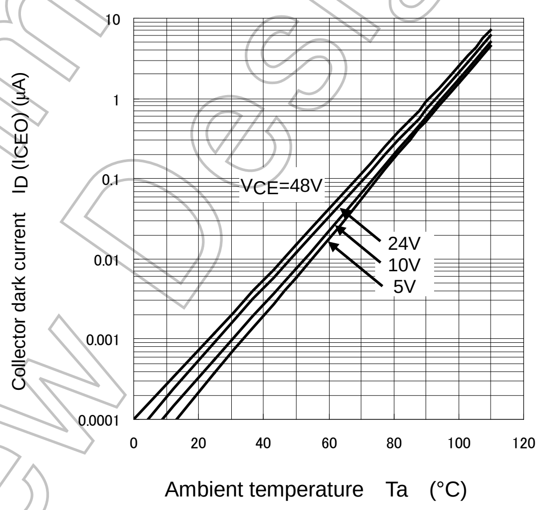
I_C - V_{CE}



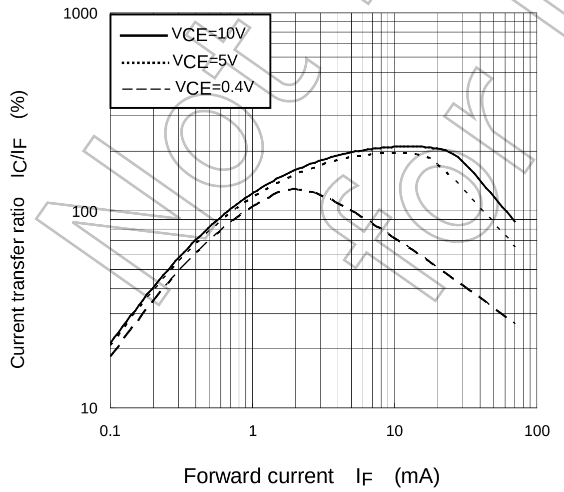
I_C - I_F



ICEO-Ta

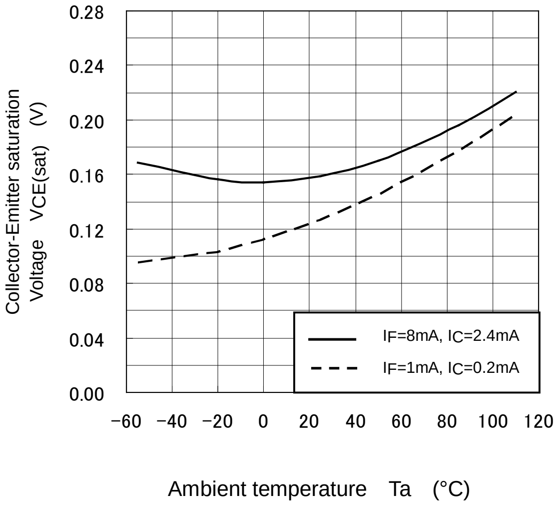


I_C/I_F - I_F

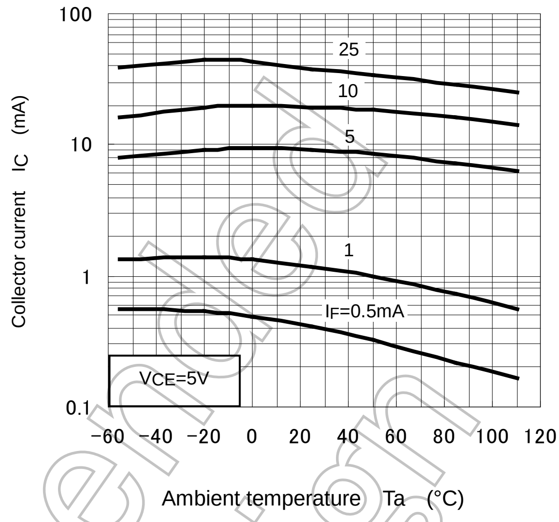


*The above graphs show typical characteristic.

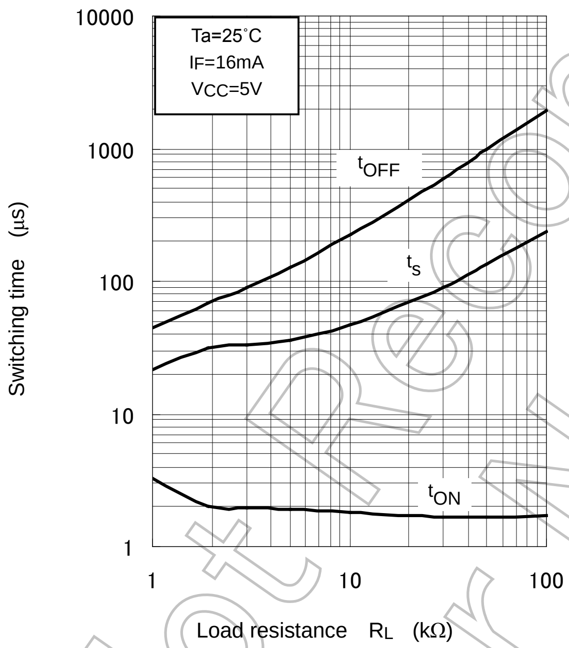
$V_{CE(sat)}$ - Ta



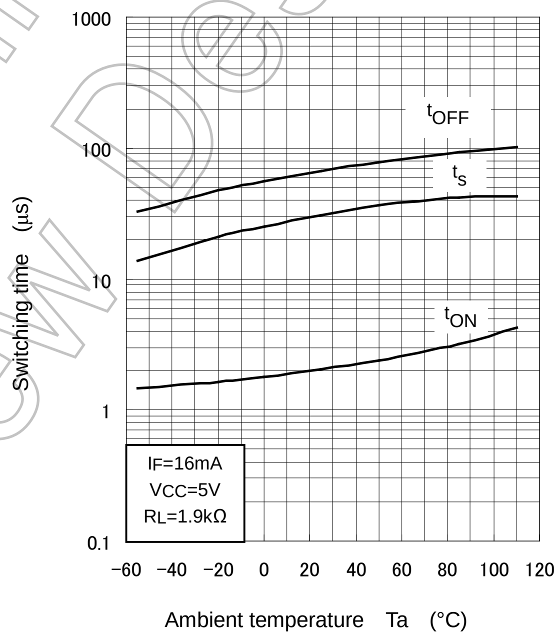
I_C - Ta



Switching time - R_L



Switching time - Ta



*The above graphs show typical characteristic.

Soldering and Storage

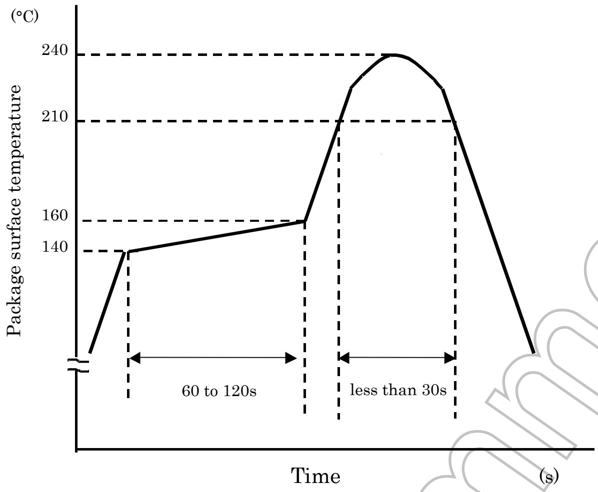
1. Soldering

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.

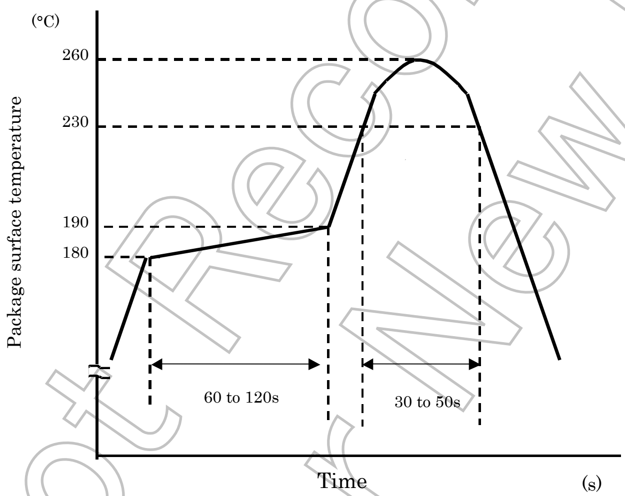
1) Using solder reflow

·Temperature profile example of lead (Pb) solder



This profile is based on the device's maximum heat resistance guaranteed value.
Set the preheat temperature/heating temperature to the optimum temperature corresponding to the solder paste type used by the customer within the described profile.

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



This profile is based on the device's maximum heat resistance guaranteed value.
Set the preheat temperature/heating temperature to the optimum temperature corresponding to the solder paste type used by the customer within the described profile.

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 recommended that you check the leads for ease of soldering prior to use.

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