

TOSHIBA Photointerrupter Infrared LED + Phototransistor

# TLP833(F)

Lead(Pb)-Free

Copiers, Printers, Fax Machines

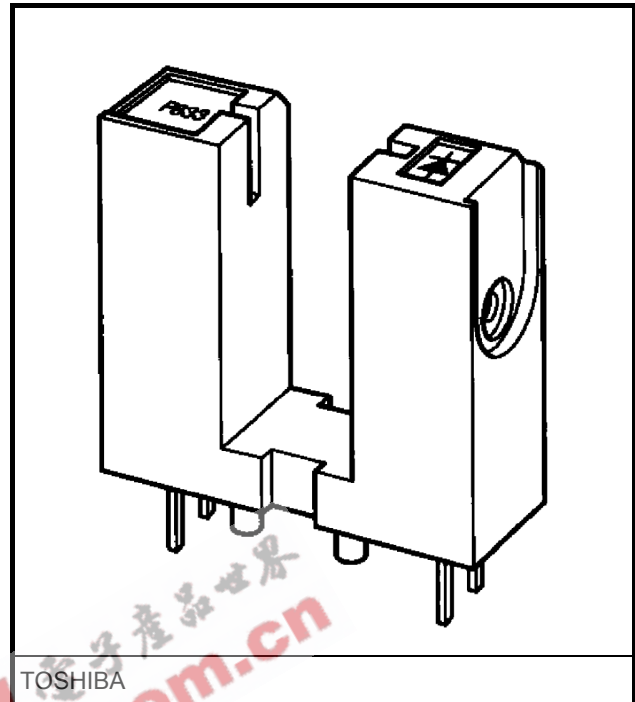
VCRS, Microwave Ovens, Air Conditioners

Automatic Vending Machines

Various Position Detection Sensors

The TLP833(F) is a photointerrupter which incorporates a high radiant power GaAs LED and a fast-response Si phototransistor. The package has a deep gap.

- Package with deep gap (gap: 12 mm)
- Designed for direct mounting on printed circuit boards (positioning pins included).
- Gap: 5mm
- Resolution: Slit width 0.5mm
- High current transfer ratio:  $I_C/I_F = 5\%$  (min)
- High temperature operation:  $T_{opr} = 95^\circ\text{C}$  (max)
- Package material: Polybutylene terephthalate (UL94-V-0)
- Detector impermeable to visible light



TOSHIBA  
Weight: 1g (typ.)

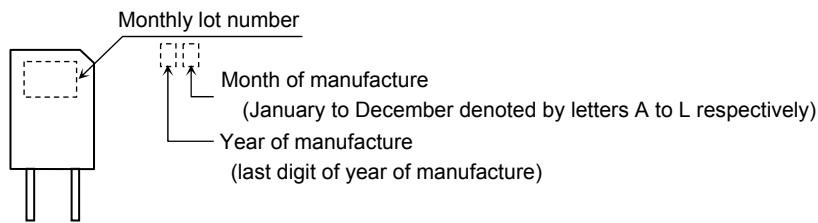
## Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

Characteristic		Symbol	Rating	Unit
LED	Forward current	$I_F$	50	mA
	Forward current derating	$\Delta I_F/^\circ\text{C}$	$25^\circ\text{C} < T_a \leq 85^\circ\text{C}$	-0.33
			$T_a > 85^\circ\text{C}$	-2
Reverse voltage		$V_R$	5	V
Detector	Collector-emitter voltage	$V_{CEO}$	35	V
	Emitter-collector voltage	$V_{ECO}$	5	V
	Collector power dissipation	$P_C$	75	mW
	Collector power dissipation derating ( $T_a > 25^\circ\text{C}$ )	$\Delta P_C/^\circ\text{C}$	-1	mW/ $^\circ\text{C}$
Collector current		$I_C$	50	mA
Operating temperature range		$T_{opr}$	-30~85	$^\circ\text{C}$
Storage temperature range		$T_{stg}$	-40~100	$^\circ\text{C}$
Soldering temperature (5 s)		$T_{sol}$	260	$^\circ\text{C}$

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 and the operating ranges.

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).

## Markings



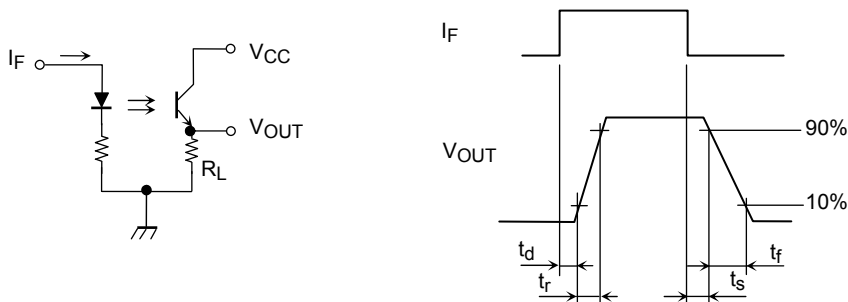
## Operating Ranges

Characteristic	Symbol	Min	Typ.	Max	Unit
Supply voltage	$V_{CC}$	—	5	24	V
Forward current	$I_F$	—	—	25	mA
Operating temperature	$T_{opr}$	-10	—	75	°C

## Optical Electrical Characteristics ( $T_a = 25^\circ\text{C}$ )

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
LED	Forward voltage	$V_F$	$I_F = 10\text{mA}$	1.00	1.15	1.30	V
	Reverse current	$I_R$	$V_R = 5\text{V}$	—	—	10	$\mu\text{A}$
	Peak emission wavelength	$\lambda_P$	$I_F = 10\text{mA}$	—	940	—	nm
Detector	Dark current	$I_D (I_{CEO})$	$V_{CE} = 24\text{V}, I_F = 0$	—	—	0.1	$\mu\text{A}$
	Peak sensitivity wavelength	$\lambda_P$	—	—	870	—	nm
Coupled	Current transfer ratio	$I_C/I_F$	$V_{CE} = 2\text{V}, I_F = 10\text{mA}$	5	—	100	%
	Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_F = 20\text{mA}, I_C = 0.5\text{mA}$	—	0.1	0.35	V
	Rise time	$t_r$	$V_{CC} = 5\text{V}, I_C = 1\text{mA}$	—	15	—	$\mu\text{s}$
	Fall time	$t_f$	$R_L = 1\text{k}\Omega$ (Note)	—	15	—	

(Note): Switching time measurement circuit and waveform



**Precautions**

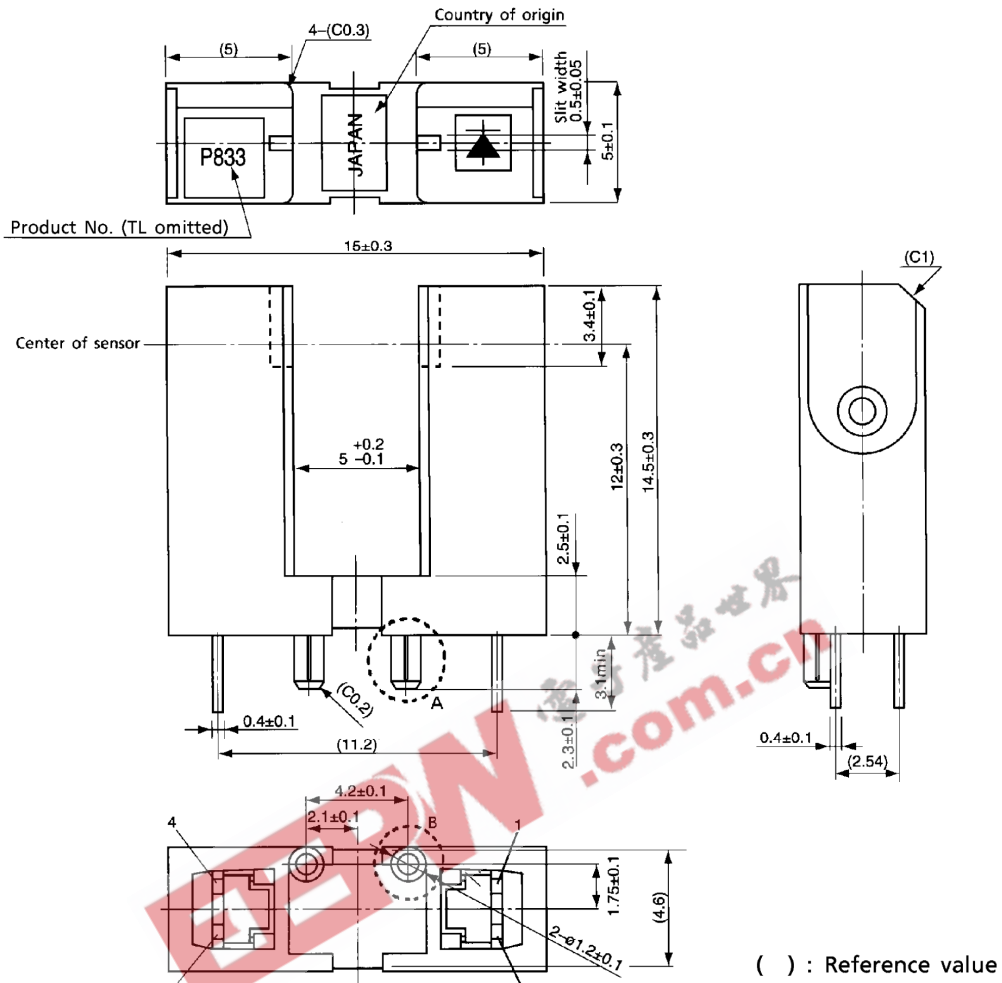
1. Clean only the soldered part of the leads. Do not immerse the entire package in the cleaning solvent.
2. The package is made of polybutylene-terephthalate. Oil or chemicals may cause the package to melt or crack. Care must be taken in relation to the environment in which the device is to be installed.
3. Mount the device on a level surface.
4. Keep the device away from external light. Although the phototransistor is of low optical sensitivity, the device may malfunction if external light with a wavelength of 700 nm or more is allowed to impinge on it.
5. Conversion efficiency falls over time due to the current which flows in the infrared LED. When designing a circuit, take into account this change in conversion efficiency over time.  
The ratio of fluctuation in conversion efficiency to fluctuation in infrared LED optical output is 1 : 1.

$$\frac{I_C/I_F(t)}{I_C/I_F(0)} = \frac{P_O(t)}{P_O(0)}$$

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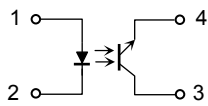
## Package Dimensions

Unit: mm



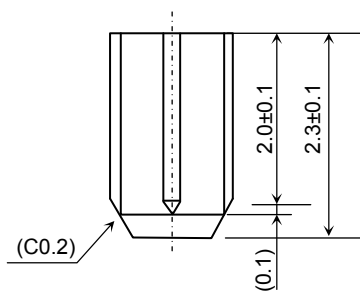
Weight: 1 g (typ.)

## Pin Connection

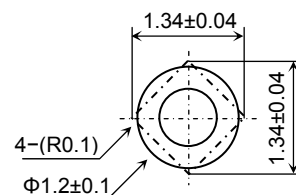


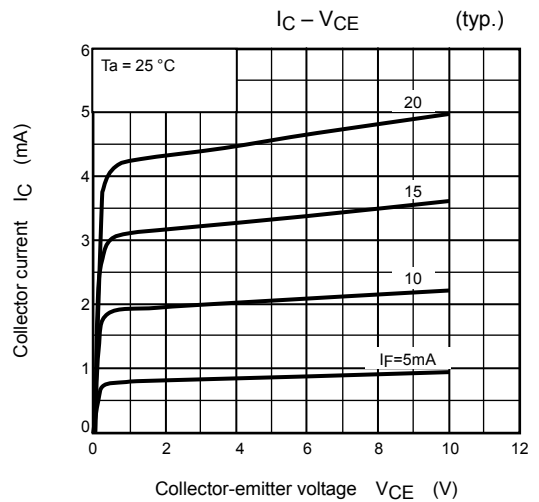
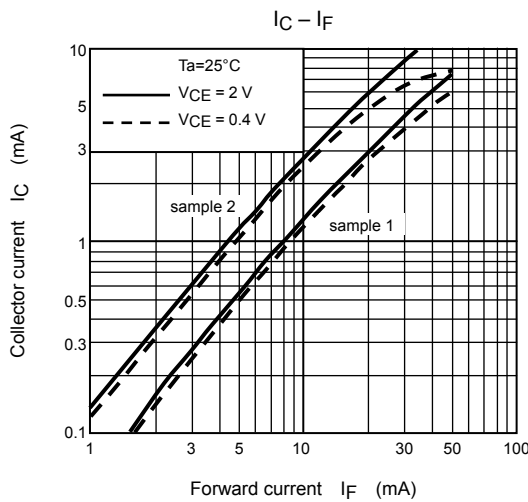
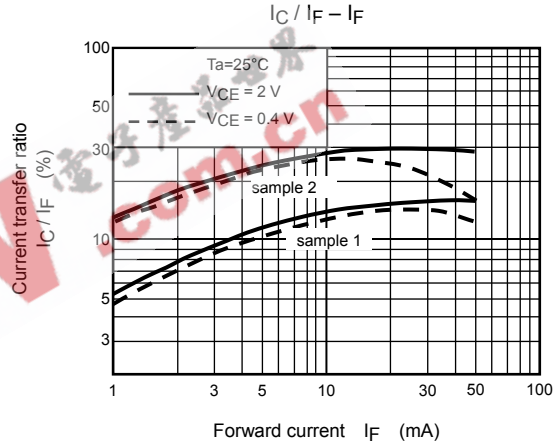
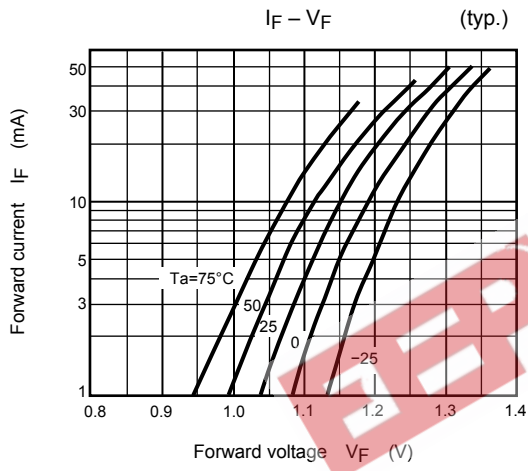
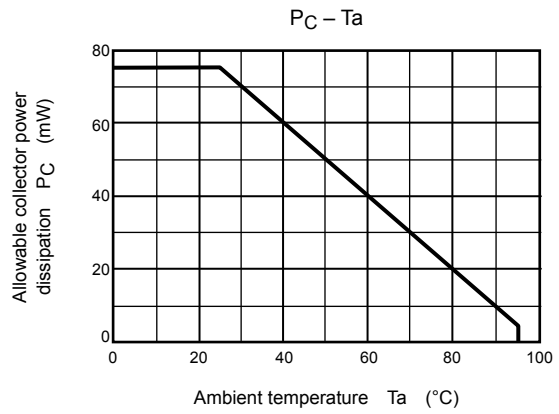
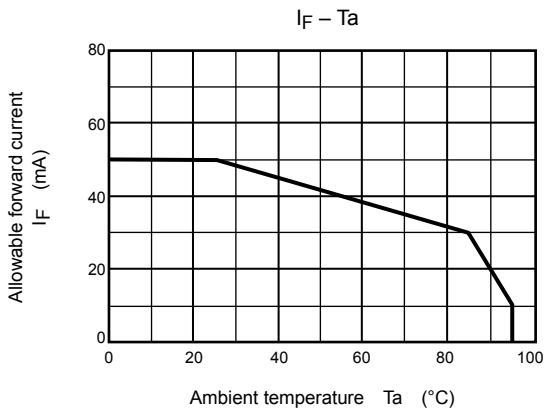
1. Anode
2. Cathode
3. Collector
4. Emitter

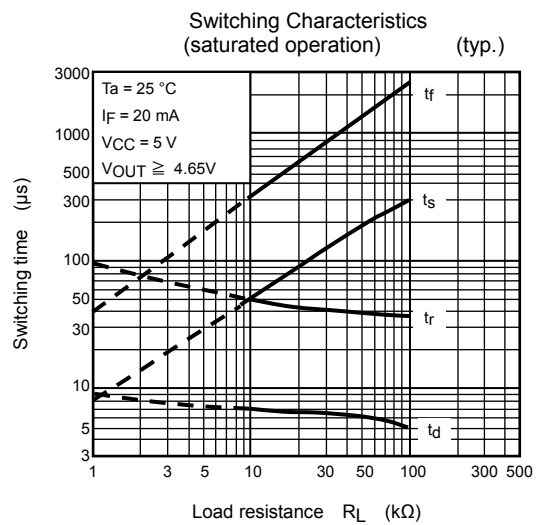
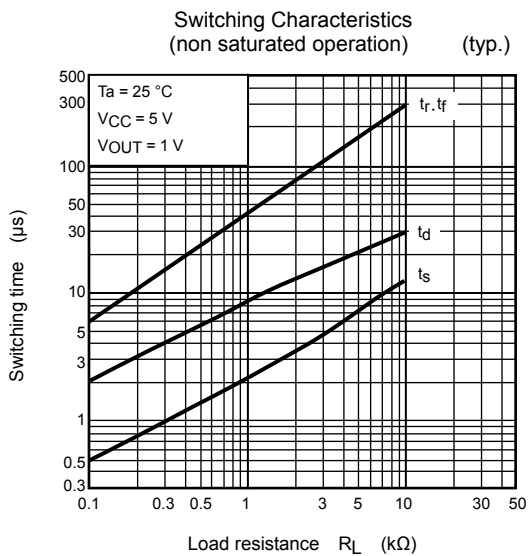
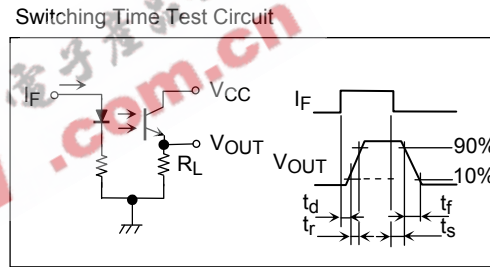
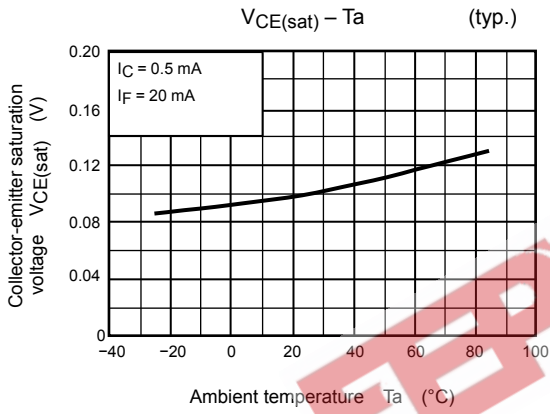
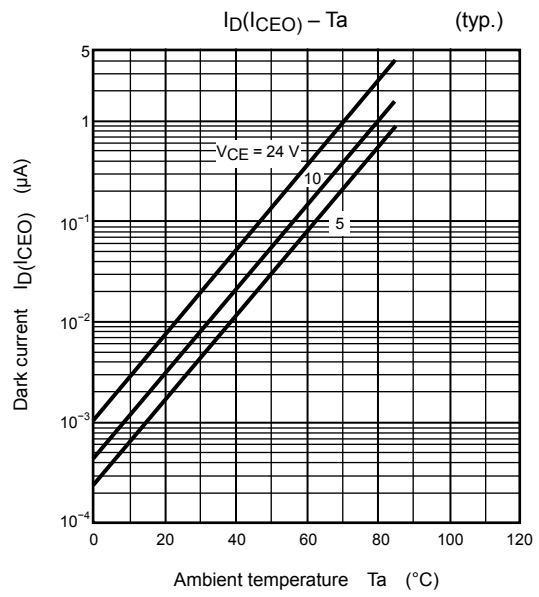
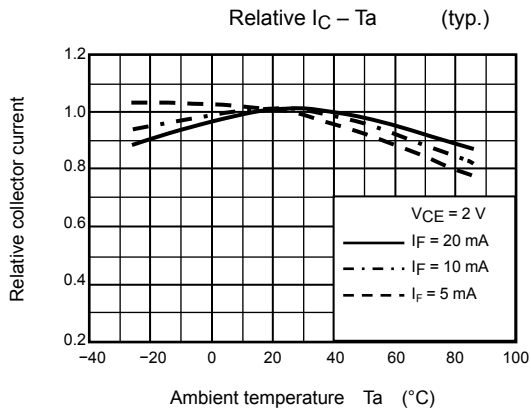
A

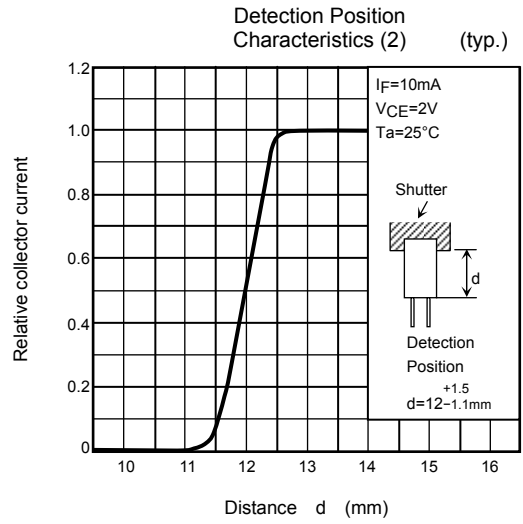
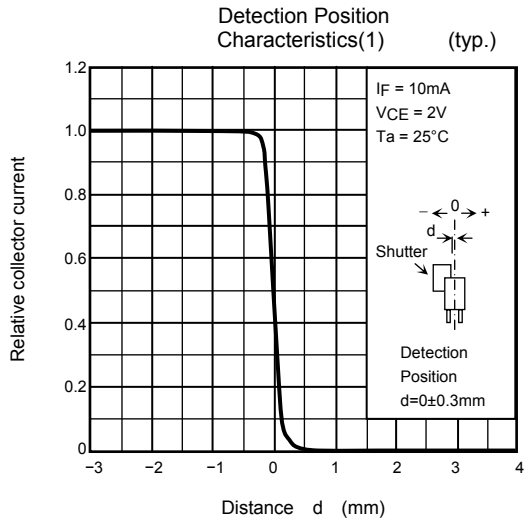


B



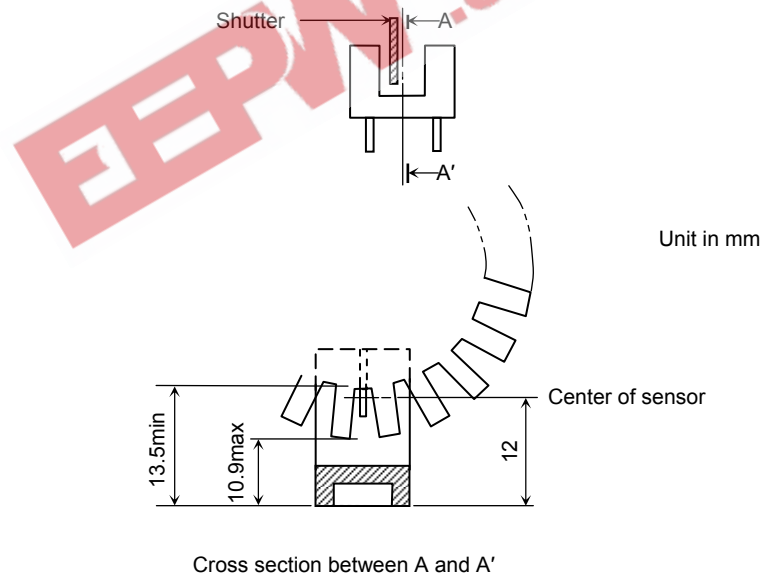






### Relative Positioning Of Shutter And Device

For normal operation position the shutter and the device as shown in the figure below. By considering the device's detection direction characteristic and switching time, determine the shutter slit width and pitch.



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

- TO SHIBA is continually working to improve



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