

TOSHIBA Photocoupler GaAs Ired & Photo-Transistor

TLP624, TLP624-2, TLP624-4

Programmable Controllers
AC/DC-Input Module
Telecommunication

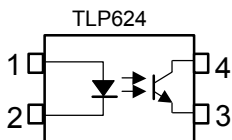
The TOSHIBA TLP624, -2 and -4 consist of a gallium arsenide infrared emitting diode optically coupled to a photo-transistor.
The TLP624-2 offers two isolated channels in an eight lead plastic DIP, while the TLP624-4 provides four isolated channels in a sixteen lead plastic DIP.

- Collector-emitter voltage: 55V min.
- Current transfer ratio

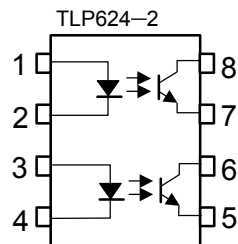
| Classi- fication | Current Transfer Ratio(min) | | | Marking of classi- fication |
|---------------------|-----------------------------|----------------------|--------------------|-----------------------------------|
| | Ta = 25°C | | Ta = -25~75°C | |
| | If=1mA VCE=0.5V | If=0.5mA VCE=1.5V | If=1mA VCE=0.5V | |
| Rank BV | 200% | 100% | 100% | BV |
| Standard | 100% | 50% | 50% | BV,blank |

- Isolation voltage: 5000V_{rms} min.
- UL recognized: UL1577, file No.E67349
- BSI approved: BS EN60065: 1994 Certificate No.7426
BS EN60950: 1992 Certificate No.7427
- Note: Application type name for certification test, please use standard product type name, i.e.
TLP624(BV): TLP624
TLP624-2(BV): TLP624-2

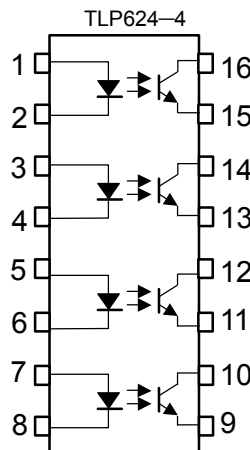
Pin Configurations(top view)



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

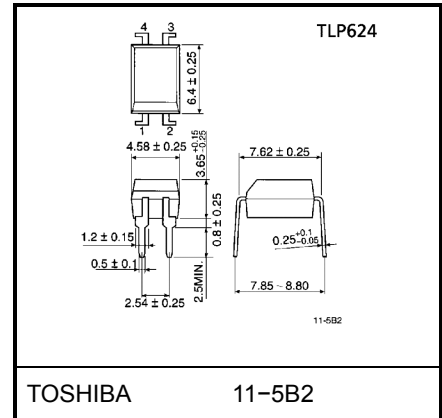


- 1,3 : Anode
- 2,4 : Cathode
- 5,7 : Emitter
- 6,8 : Collector



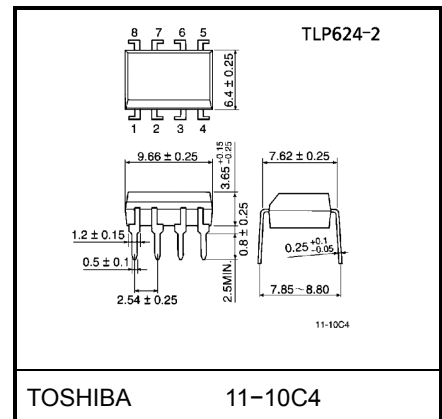
- 1,3,5,7: Anode
- 2,4,6,8: Cathode
- 9,11,13,15: Emitter
- 10,12,14,16: Collector

Unit in mm



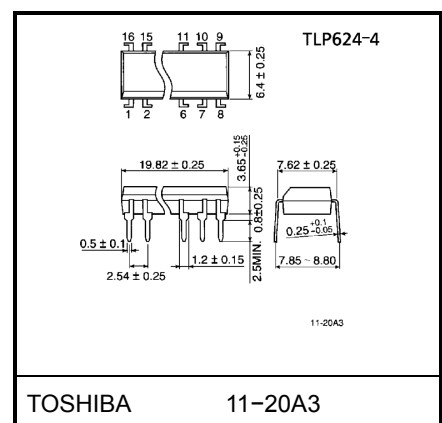
TOSHIBA 11-5B2

Weight: 0.26 g



TOSHIBA 11-10C4

Weight: 0.54 g



TOSHIBA 11-20A3

Weight: 1.1 g

Maximum Ratings (Ta = 25°C)

| Characteristic | | Symbol | Rating | | Unit |
|---|---|-------------------------------|--------------------------------|----------------------|---------|
| | | | TLP624 | TLP624-2 TLP624-4 | |
| LED | Forward current | I_F | 60 | 50 | mA |
| | Forward current derating | $\Delta I_F / ^\circ\text{C}$ | -0.7(Ta \geq 39°C) | -0.5(Ta \geq 25°C) | mA / °C |
| | Pulse forward current | I_{FP} | 1(100 μ s, pulse, 100pps) | | A |
| | Power dissipation(1 Circuit) | P_D | 100 | 70 | mW |
| | Power dissipation derating (Ta \geq 25°C, 1 Circuit) | $\Delta P_D / ^\circ\text{C}$ | -1.0 | -0.7 | mW / °C |
| | Reverse voltage | V_R | 5 | | V |
| | Junction temperature | T_j | 125 | | °C |
| Detector | Collector-emitter voltage | V_{CEO} | 55 | | V |
| | Emitter-collector voltage | V_{ECO} | 7 | | V |
| | Collector current | I_C | 50 | | mA |
| | Collector power dissipation(1 circuit) | P_C | 150 | 100 | mW |
| | Collector power dissipation derating (Ta \geq 25°C, 1 Circuit) | $\Delta P_C / ^\circ\text{C}$ | -1.5 | -1.0 | mW / °C |
| | Junction temperature | T_j | 125 | | °C |
| Storage temperature range | | T_{stg} | -55~125 | | °C |
| Operating temperature range | | P_{opr} | -55~100 | | °C |
| Lead soldering temperature | | T_{sol} | 260(10s) | | °C |
| Total package power dissipation(1 Circuit) | | P_T | 250 | 150 | mW |
| Total package power dissipation derating (Ta \geq 25°C, 1 Circuit) | | $\Delta P_T / ^\circ\text{C}$ | -2.5 | -1.5 | mW / °C |
| Isolation voltage (Note 1) | | BV_S | 5000(AC, 1min., RH \leq 60%) | | Vrms |

(Note 1) Device considered a two terminal device: LED side pins shorted together, and detector side pins shorted together.

Recommended Operating Conditions

| Characteristic | Symbol | Min. | Typ. | Max. | Unit |
|-----------------------|-----------|------|------|------|------|
| Supply voltage | V_{CC} | — | 5 | 24 | V |
| Forward current | I_F | — | 1.6 | 20 | mA |
| Collector current | I_C | — | 1 | 10 | mA |
| Operating temperature | T_{opr} | -25 | — | 75 | °C |

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 | $V_{(BR)CEO}$ | $I_C = 0.5\text{mA}$ | 55 | — | — | V |
| | Emitter-collector breakdown voltage | $V_{(BR)ECO}$ | $I_E = 0.1\text{mA}$ | 7 | — | — | V |
| | Collector dark current | I_{CEO} | $V_{CE} = 24\text{V}$ | — | 10 | 100 | nA |
| | | | $V_{CE} = 24\text{V}, T_a = 85^\circ\text{C}$ | — | 2 | 50 | μA |
| 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 (low) | $I_F = 0.5\text{mA}, V_{CE} = 1.5\text{V}$ Rank BV | 50 | — | — | % |
| | | | 100 | — | — | |
| Collector-emitter saturation voltage | V_{CE} (sat) | $I_C = 0.5\text{mA}, I_F = 1\text{mA}$ $I_C = 1\text{mA}, I_F = 1\text{mA}$ Rank BV | — | — | 0.4 | V |
| | | | — | 0.2 | — | |
| | | | — | — | 0.4 | |

Coupled Electrical Characteristics (Ta = -25°C~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 (low) | $I_F = 0.5\text{mA}, V_{CE} = 1.5\text{V}$ Rank BV | — | 50 | — | % |
| | | | — | 100 | — | |

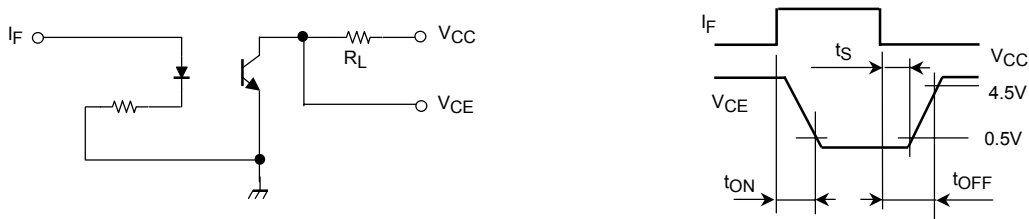
Isolation Characteristics (Ta = 25°C)

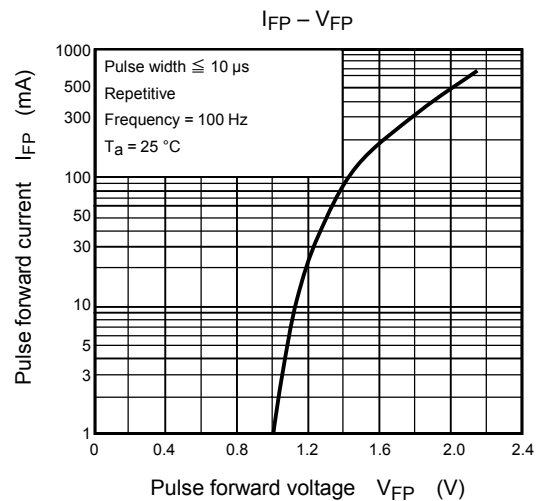
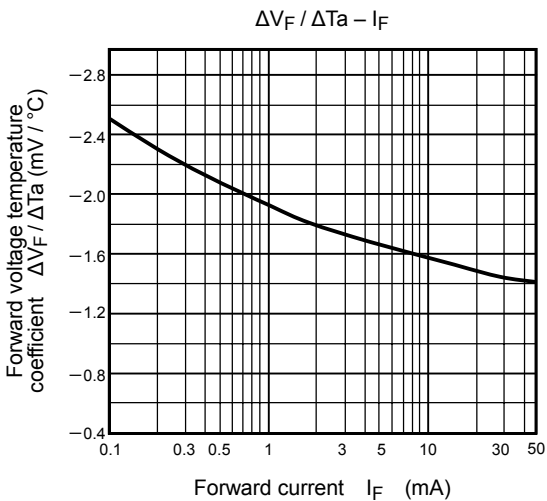
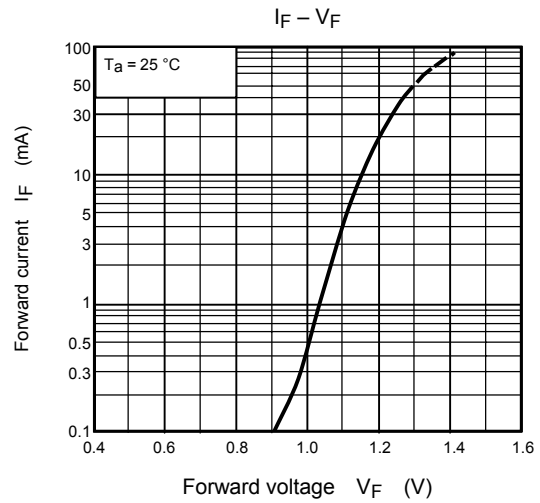
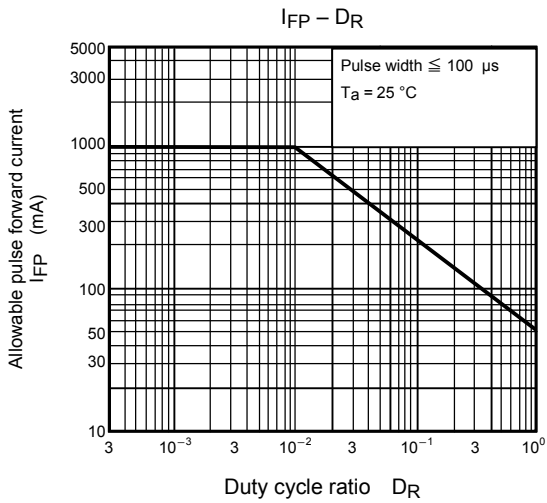
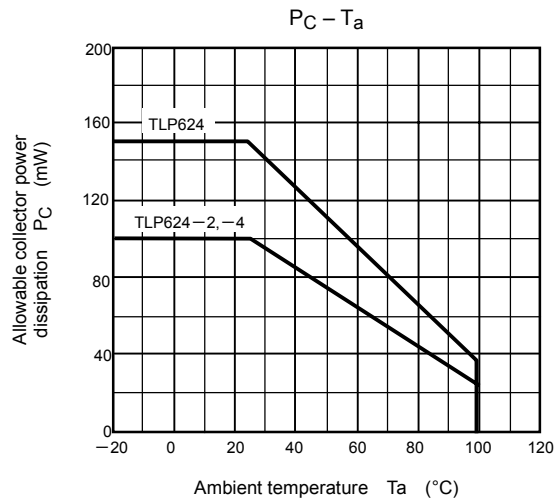
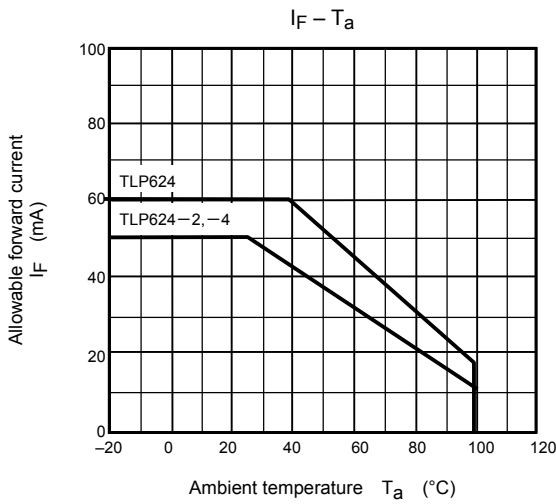
| Characteristic | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|-----------------------------|-----------------|------------------------------|--------------------|------------------|------|------------------|
| Capacitance input to output | C _S | V _S = 0, f = 1MHz | — | 0.8 | — | pF |
| Isolation resistance | R _S | V _S = 500V | 5×10 ¹⁰ | 10 ¹⁴ | — | Ω |
| Isolation voltage | BV _S | AC, 1minute | 5000 | — | — | V _{rms} |
| | | AC, 1second, in oil | — | 10000 | — | — |
| | | DC, 1 minute, in oil | — | 10000 | — | — |

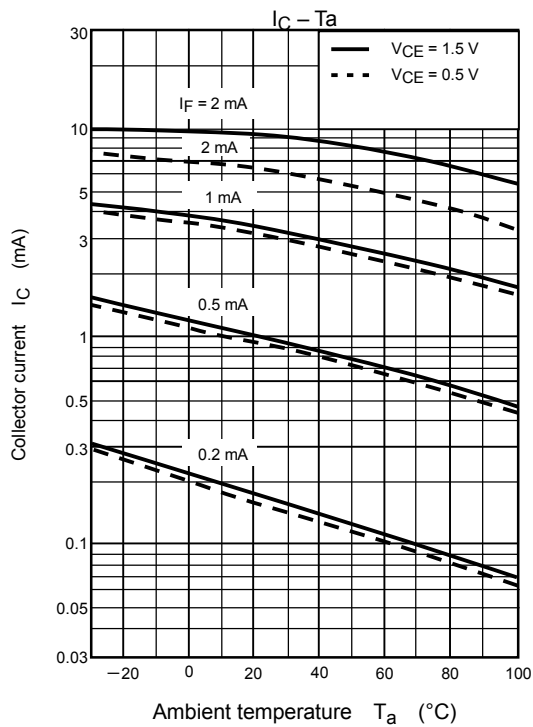
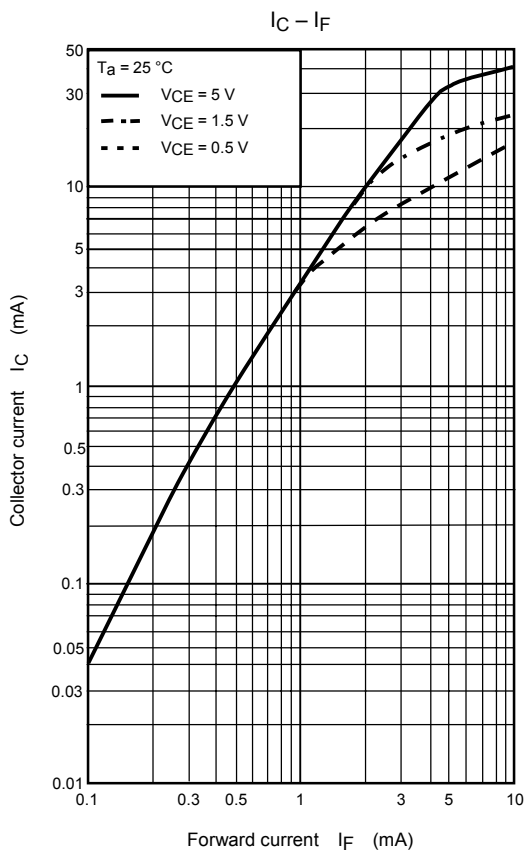
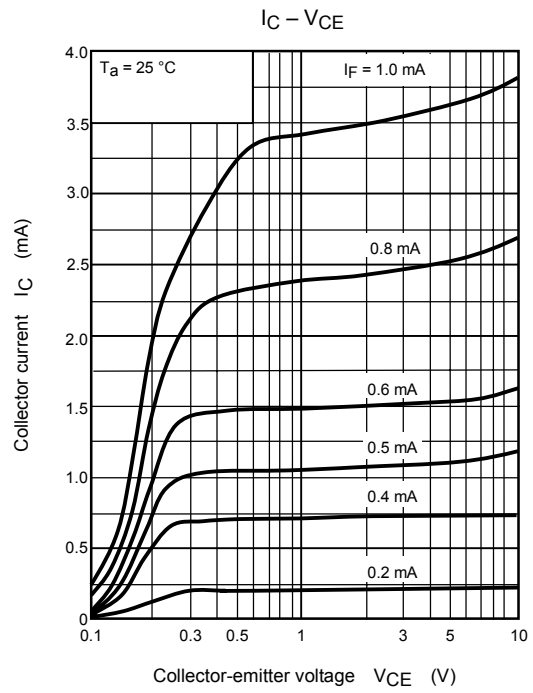
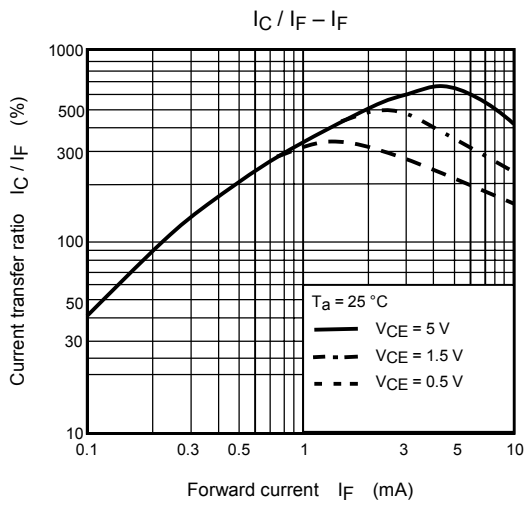
Switching Characteristics (Ta = 25°C)

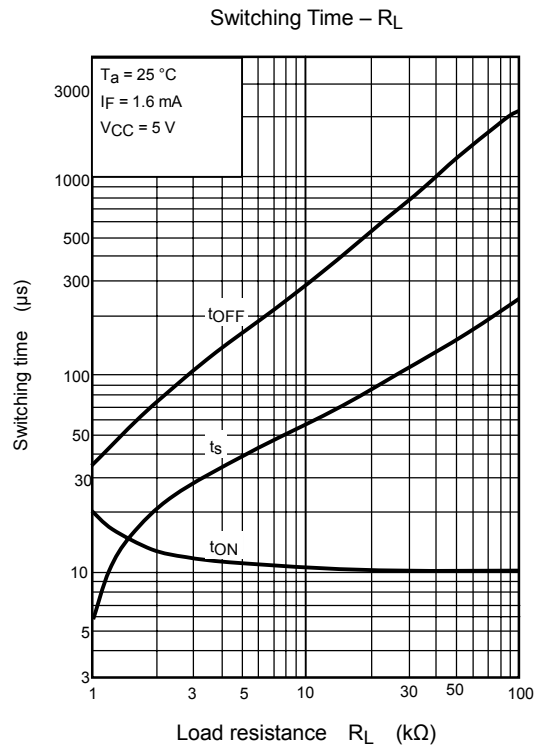
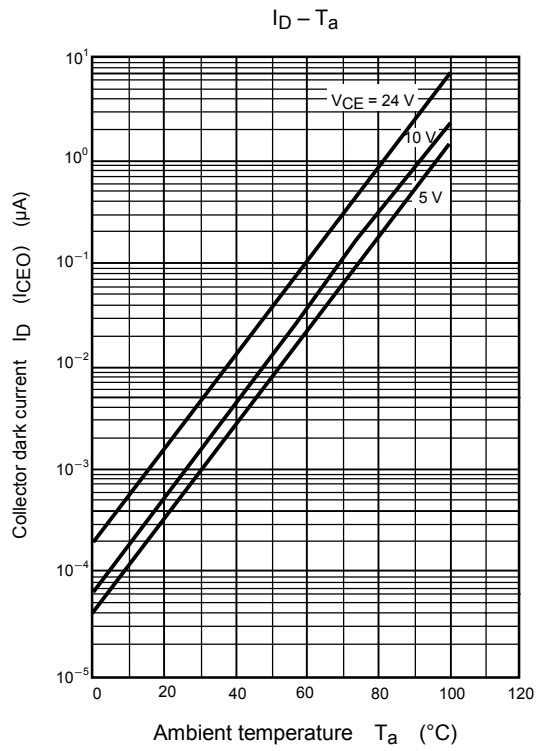
| Characteristic | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|----------------|------------------|--|------|------|------|------|
| Rise time | t _r | V _{CC} = 10V, I _C = 2mA R _L = 100Ω | — | 8 | — | μs |
| Fall time | t _f | | — | 8 | — | |
| Turn-on time | t _{on} | | — | 10 | — | |
| Turn-off time | t _{off} | | — | 8 | — | |
| Turn-on time | t _{ON} | R _L = 4.7 kΩ (Fig.1) V _{CC} = 5 V, I _F = 1.6mA | — | 10 | — | μs |
| Storage time | t _S | | — | 50 | — | |
| Turn-off time | T _{OFF} | | — | 300 | — | |

Fig. 1 Switching time test circuit









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000707EBC

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