

Tentative Data

Insulated Gate Bi-Polar Transistor

Type T0600NC17A

Absolute Maximum Ratings

| | VOLTAGE RATINGS | MAXIMUM LIMITS | UNITS |
|----------------|--|----------------|-------|
| V_{CES} | Collector – emitter voltage | 1700 | V |
| $V_{DC\ link}$ | Permanent DC voltage for 100 FIT failure rate. | 900 | V |
| V_{GES} | Peak gate – emitter voltage | ± 20 | V |

| | RATINGS | MAXIMUM LIMITS | UNITS |
|----------------|--|----------------|-------------|
| I_C | DC collector current, IGBT | 600 | A |
| I_{CRM} | Repetitive peak collector current, $t_p=1ms$, IGBT | 1200 | A |
| $I_{F(DC)}$ | Continuous DC forward current, Diode | 600 | A |
| I_{FRM} | Repetitive peak forward current, $t_p=1ms$, Diode | 1200 | A |
| I_{FSM} | Peak non-repetitive surge $t_p=10ms$, $V_{RM}=60\%V_{RRM}$, Diode (Note 4) | 2410 | A |
| I_{FSM2} | Peak non-repetitive surge $t_p=10ms$, $V_{RM}\leq 10V$, Diode (Note 4) | 2650 | A |
| P_{MAX} | Maximum power dissipation, IGBT (Note 2) | 1.85 | kW |
| $(di/dt)_{cr}$ | Critical diode di/dt (note 3) | 3500 | A/ μs |
| T_j | Operating temperature range. | -40 to +125 | $^{\circ}C$ |
| T_{stg} | Storage temperature range. | -40 to +125 | $^{\circ}C$ |

Notes: -

- 1) Unless otherwise indicated $T_j = 125^{\circ}C$.
- 2) $T_{sink} = 25^{\circ}C$, double side cooled.
- 3) Maximum commutation loop inductance 240nH.
- 4) Half-sinewave, $125^{\circ}C$ T_j initial.

Characteristics

IGBT Characteristics

| | PARAMETER | MIN | TYP | MAX | TEST CONDITIONS | UNITS |
|----------------------|--|-----|------|------|---|--|
| V _{CE(sat)} | Collector – emitter saturation voltage | - | 2.35 | 2.65 | I _C = 600A, V _{GE} = 15V, T _j = 25°C | V |
| | | - | 3.0 | 3.3 | I _C = 600A, V _{GE} = 15V | V |
| V _{T0} | Threshold voltage | - | - | 1.22 | Current range: 200A – 600A | V |
| r _T | Slope resistance | - | - | 3.48 | | mΩ |
| V _{GE(TH)} | Gate threshold voltage | - | 5 | - | V _E = V _{GE} , I _C = 20mA | V |
| I _{CES} | Collector – emitter cut-off current | - | 3.5 | 10 | V _{CE} = V _{CES} , V _{GE} = 0V | mA |
| I _{GES} | Gate leakage current | - | - | ±10 | V _{GE} = ±20V | µA |
| C _{ies} | Input capacitance | - | 47 | - | V _{CE} = 25V, V _{GE} = 0V, f = 1MHz | nF |
| t _{d(on)} | Turn-on delay time | - | 0.22 | - | I _C = 600A, V _{CE} = 900V, di/dt = 3000A/µs V _{GE} = ±15V, L _s = 240nH R _{g(ON)} = 3.3Ω, R _{g(OFF)} = 24Ω, C _{GE} = 75nF Integral diode used as freewheel diode (Note 3) | µs |
| t _{r(V)} | Rise time | - | 0.8 | - | | µs |
| Q _{g(on)} | Turn-on gate charge | - | 2.6 | - | | µC |
| E _{on} | Turn-on energy | - | 0.29 | - | | J |
| t _{d(off)} | Turn-off delay time | - | 2 | - | | µs |
| t _{f(I)} | Fall time | - | 0.54 | - | | µs |
| Q _{g(off)} | Turn-off gate charge | - | 1.5 | - | | µC |
| E _{off} | Turn-off energy | - | 0.5 | - | | J |
| I _{SC} | Short circuit current | - | 1500 | - | | V _{GE} = +15V, V _{CC} = 900V, V _{CEmax} ≤ V _{CES} , t _p ≤ 10µs |

Diode Characteristics

| | PARAMETER | MIN | TYP | MAX | TEST CONDITIONS | UNITS |
|-----------------|----------------------------------|-----|------|------|---|-------|
| V _F | Forward voltage | - | 2.12 | 2.40 | I _F = 600A, T _j = 25°C | V |
| | | - | 2.24 | 2.55 | I _F = 600A | V |
| V _{T0} | Threshold voltage | - | - | 1.42 | Current range 200A - 600A | V |
| r _T | Slope resistance | - | - | 1.88 | | mΩ |
| I _{rm} | Peak reverse recovery current | - | 300 | - | I _F = 600A, V _r = 900V, V _{GE} = -15V, di/dt = 3000A/µs | A |
| Q _{rr} | Recovered charge | - | 175 | - | | µC |
| t _{rr} | Reverse recovery time, 50% chord | - | 0.5 | - | | µs |
| E _r | Reverse recovery energy | - | 0.12 | - | | J |

Thermal Characteristics

| | PARAMETER | MIN | TYP | MAX | TEST CONDITIONS | UNITS |
|-------------------|--|-----|-----|------|-----------------------|-------|
| R _{thJK} | Thermal resistance junction to sink, IGBT | - | - | 54.1 | Double side cooled | K/kW |
| | | - | - | 93 | Collector side cooled | K/kW |
| | | - | - | 131 | Emitter side cooled | K/kW |
| R _{thJK} | Thermal resistance junction to sink, Diode | - | - | 125 | Double side cooled | K/kW |
| | | - | - | 205 | Cathode side cooled | K/kW |
| | | - | - | 319 | Anode side cooled | K/kW |
| F | Mounting force | 8 | - | 12 | Note 2 | kN |
| W _t | Weight | - | 0.5 | - | | kg |

Notes:-

- 1) Unless otherwise indicated T_j = 125°C.
- 2) Consult application note 2008AN01 for detailed mounting requirements
- 3) C_{GE} is additional gate – emitter capacitance added to output of gate drive

Curves

Figure 1 – Typical collector-emitter saturation voltage characteristics

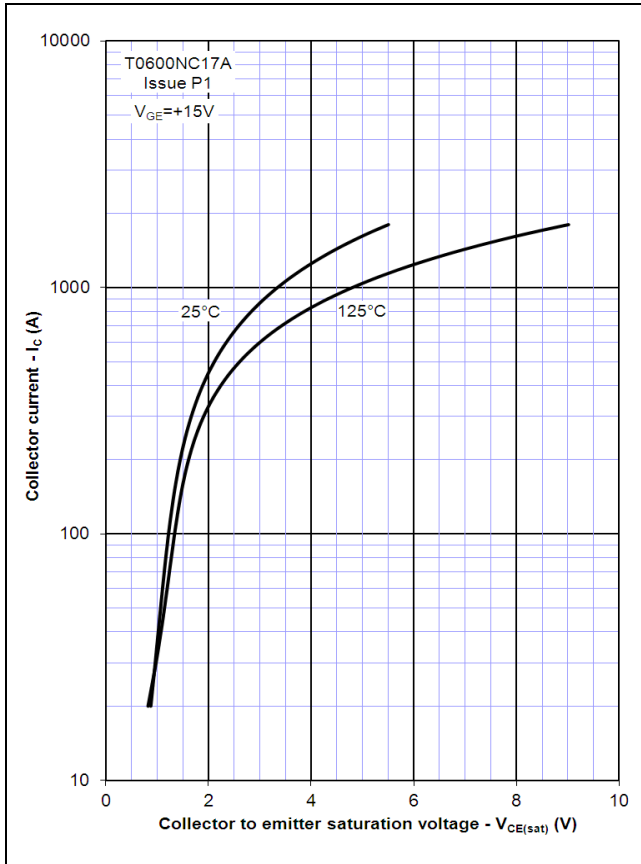


Figure 2 – Typical output characteristic

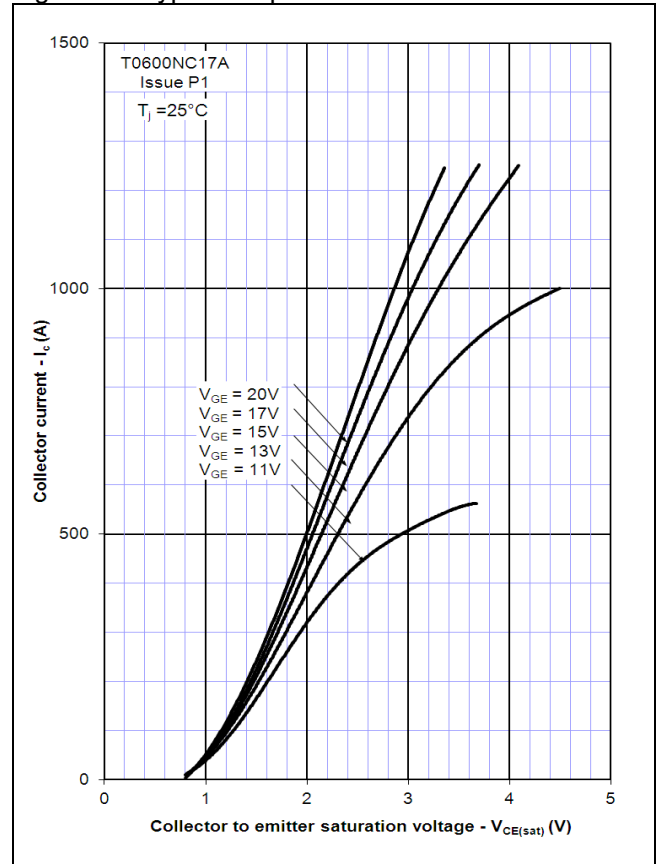


Figure 3 – Typical output characteristic

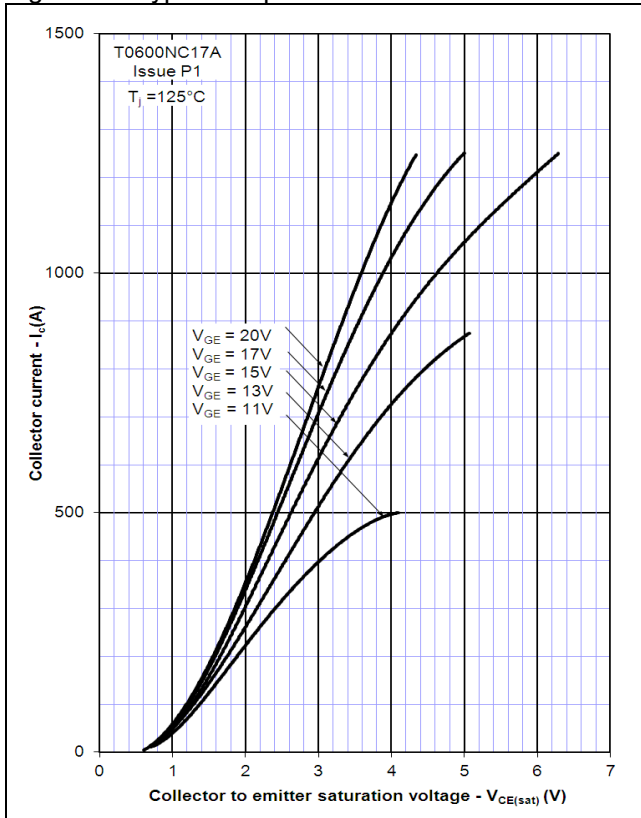


Figure 4 – Safe operating area (IGBT)

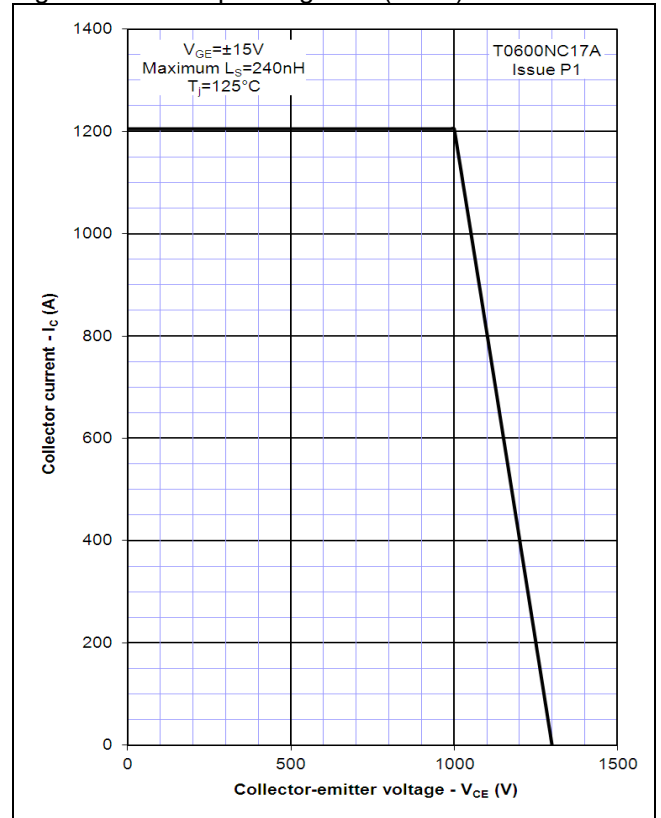


Figure 5 – Typical diode forward characteristics

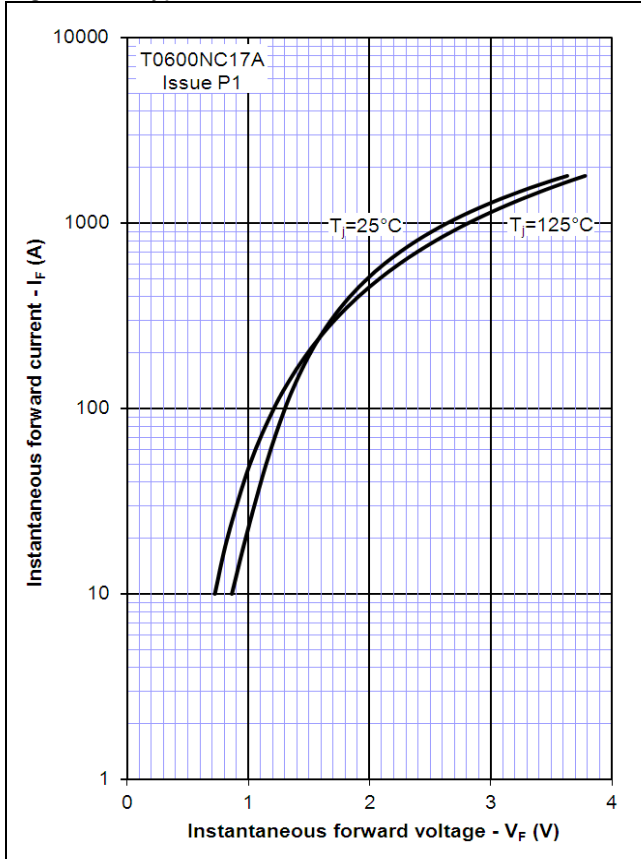


Figure 6 – Safe operating area (Diode)

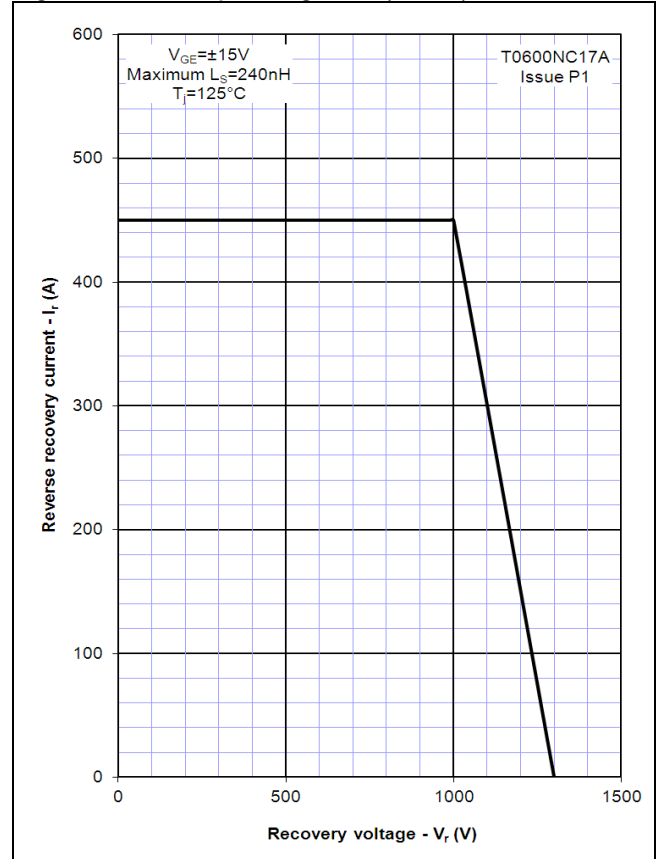


Figure 7 – Transient thermal impedance (IGBT)

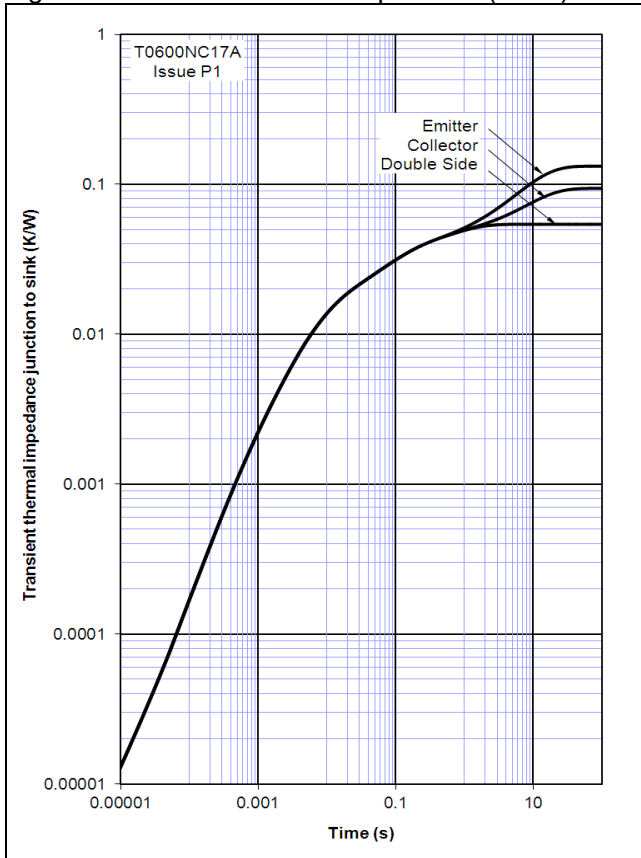
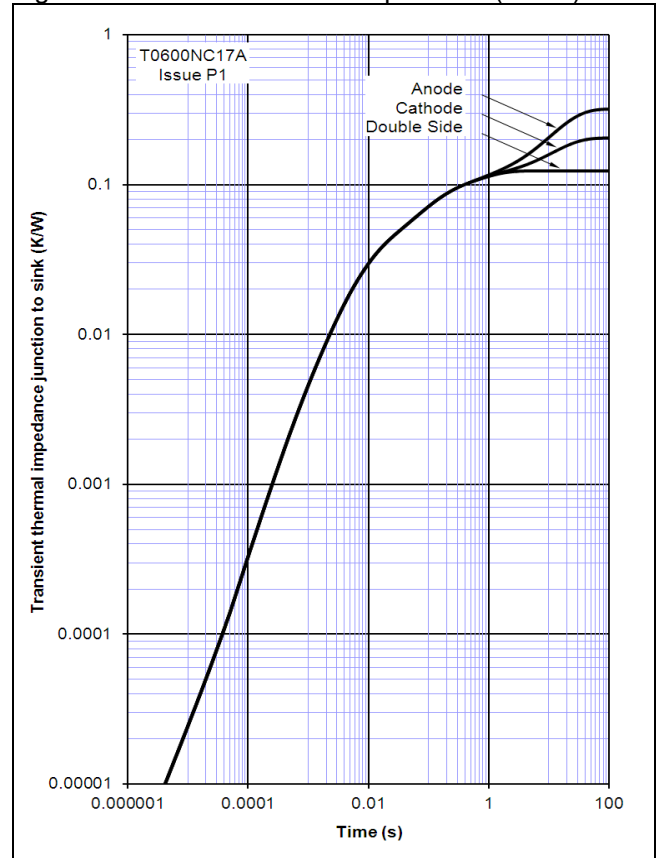
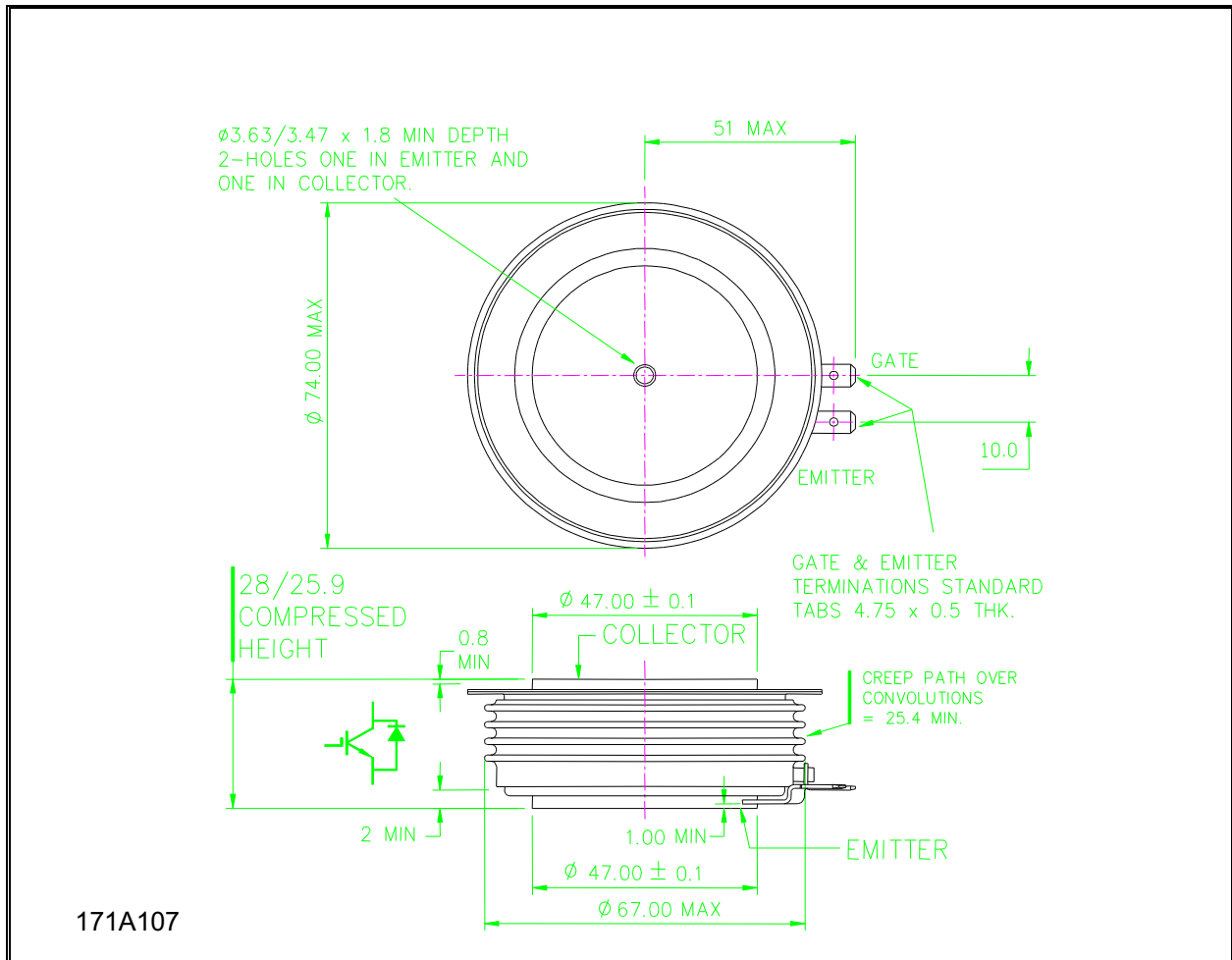


Figure 8 – Transient thermal impedance (Diode)



Outline Drawing & Ordering Information



| ORDERING INFORMATION | | | |
|---------------------------------------|--------------------|--|-------------------|
| (Please quote 10 digit code as below) | | | |
| T0600 | NC | 17 | A |
| Fixed type Code | Fixed Outline Code | Voltage Grade V _{CES} /100 17 | Fixed format code |

Typical order code: T0600NC17A (V_{CES} = 1700V)

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