

High Voltage PNP Silicon Plastic Power Transistors

MJE5730, MJE5731, MJE5731A

These devices are designed for line operated audio output amplifier, switch-mode power supply drivers and other switching applications.

Features

- Popular TO-220 Plastic Package
- PNP Complements to the TIP47 thru TIP50 Series
- These Devices are Pb-Free and are RoHS Compliant*

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|---|----------------|-------------------|--------------------------|
| Collector-Emmitter Voltage MJE5730 MJE5731 MJE5731A | V_{CEO} | 300 350 375 | Vdc |
| Collector-Base Voltage MJE5730 MJE5731 MJE5731A | V_{CB} | 300 350 375 | Vdc |
| Emitter-Base Voltage | V_{EB} | 5.0 | Vdc |
| Collector Current - Continuous | I_C | 1.0 | Adc |
| Collector Current - Peak | I_{CM} | 3.0 | Adc |
| Base Current | I_B | 1.0 | Adc |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C | P_D | 40 0.32 | W W/ $^\circ\text{C}$ |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C | P_D | 2.0 0.016 | W W/ $^\circ\text{C}$ |
| Unclamped Inducting Load Energy (See Figure 10) | E | 20 | mJ |
| Operating and Storage Junction Temperature Range | T_J, T_{stg} | -65 to +150 | $^\circ\text{C}$ |

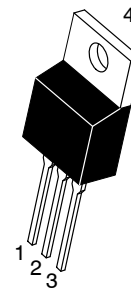
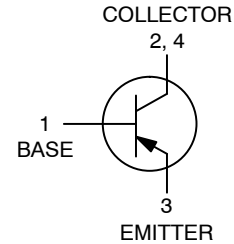
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL CHARACTERISTICS

| Characteristics | Symbol | Max | Unit |
|---|-----------------|-------|---------------------------|
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 3.125 | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 62.5 | $^\circ\text{C}/\text{W}$ |

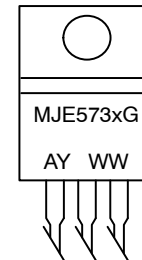
*For additional information on our Pb-Free strategy and soldering details, please download the onsemi Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

1.0 AMPERE
POWER TRANSISTORS
PCP SILICON
300-350-400 VOLTS
50 WATTS



TO-220
CASE 221A-09
STYLE 1

MARKING DIAGRAM



MJE573x = Device Code
x = 0, 1, or 1A
G = Pb-Free Package
A = Assembly Location
Y = Year
WW = Work Week

ORDERING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

| Characteristic | Symbol | Min | Max | Unit |
|--|-----------------------|-------------------|-------------------|------|
| OFF CHARACTERISTICS | | | | |
| Collector-Emitter Sustaining Voltage (Note 1) (I _C = 30 mAdc, I _B = 0) MJE5730 MJE5731 MJE5731A | V _{CEO(sus)} | 300 350 375 | - - - | Vdc |
| Collector Cutoff Current (V _{CE} = 200 Vdc, I _B = 0) MJE5730 (V _{CE} = 250 Vdc, I _B = 0) MJE5731 (V _{CE} = 300 Vdc, I _B = 0) MJE5731A | I _{CEO} | - - - | 1.0 1.0 1.0 | mAdc |
| Collector Cutoff Current (V _{CE} = 300 Vdc, V _{BE} = 0) MJE5730 (V _{CE} = 350 Vdc, V _{BE} = 0) MJE5731 (V _{CE} = 400 Vdc, V _{BE} = 0) MJE5731A | I _{CES} | - - - | 1.0 1.0 1.0 | mAdc |
| Emitter Cutoff Current (V _{BE} = 5.0 Vdc, I _C = 0) | I _{EBO} | - | 1.0 | mAdc |

ON CHARACTERISTICS (Note 1)

| | | | | |
|---|----------------------|----------|----------|-----|
| DC Current Gain (I _C = 0.3 Adc, V _{CE} = 10 Vdc) (I _C = 1.0 Adc, V _{CE} = 10 Vdc) | h _{FE} | 30 10 | 150 - | - |
| Collector-Emitter Saturation Voltage (I _C = 1.0 Adc, I _B = 0.2 Adc) | V _{CE(sat)} | - | 1.0 | Vdc |
| Base-Emitter On Voltage (I _C = 1.0 Adc, V _{CE} = 10 Vdc) | V _{BE(on)} | - | 1.5 | Vdc |

DYNAMIC CHARACTERISTICS

| | | | | |
|---|-----------------|----|---|-----|
| Current Gain – Bandwidth Product (I _C = 0.2 Adc, V _{CE} = 10 Vdc, f = 2.0 MHz) | f _T | 10 | - | MHz |
| Small-Signal Current Gain (I _C = 0.2 Adc, V _{CE} = 10 Vdc, f = 1.0 kHz) | h _{fe} | 25 | - | - |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

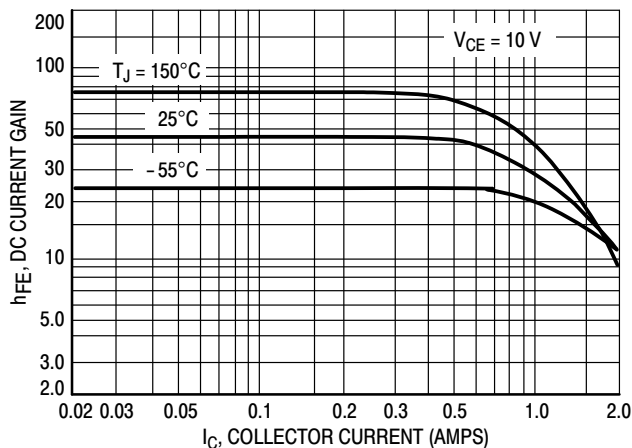


Figure 1. DC Current Gain

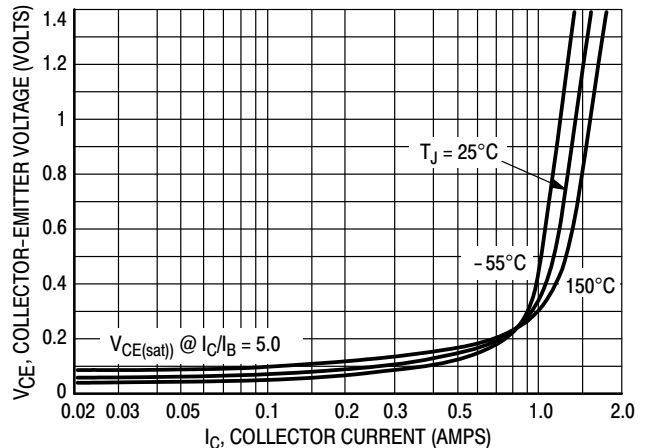


Figure 2. Collector-Emitter Saturation Voltage

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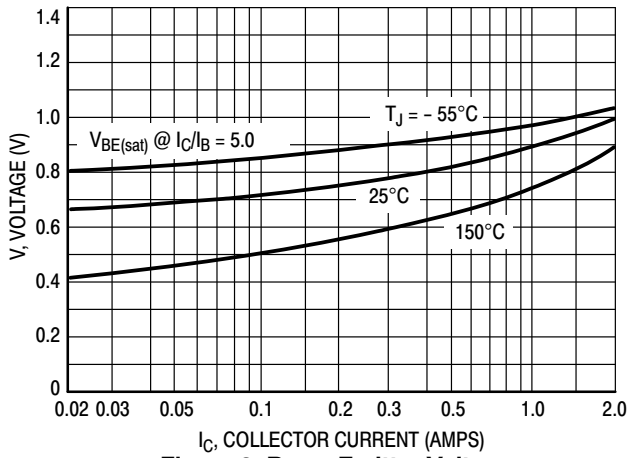


Figure 3. Base-Emitter Voltage

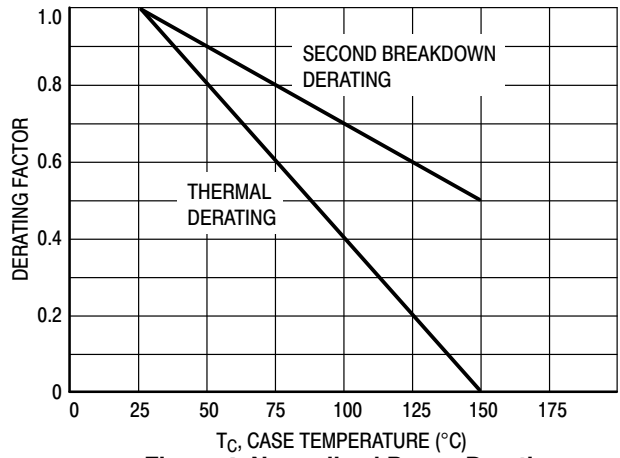


Figure 4. Normalized Power Derating

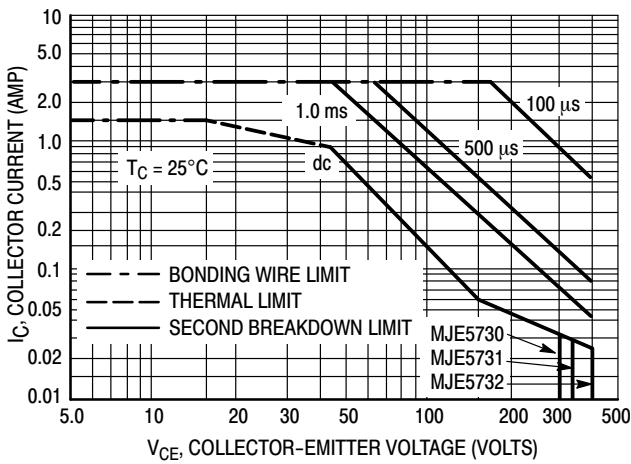


Figure 5. Forward Bias Safe Operating Area

There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate $I_C - V_{CE}$ limits of the transistor that must be observed for reliable operation; i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

The data of Figure 5 is based on $T_{J(pk)} = 150^\circ\text{C}$; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} \leq 150^\circ\text{C}$. $T_{J(pk)}$ may be calculated from the data in Figure 6. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

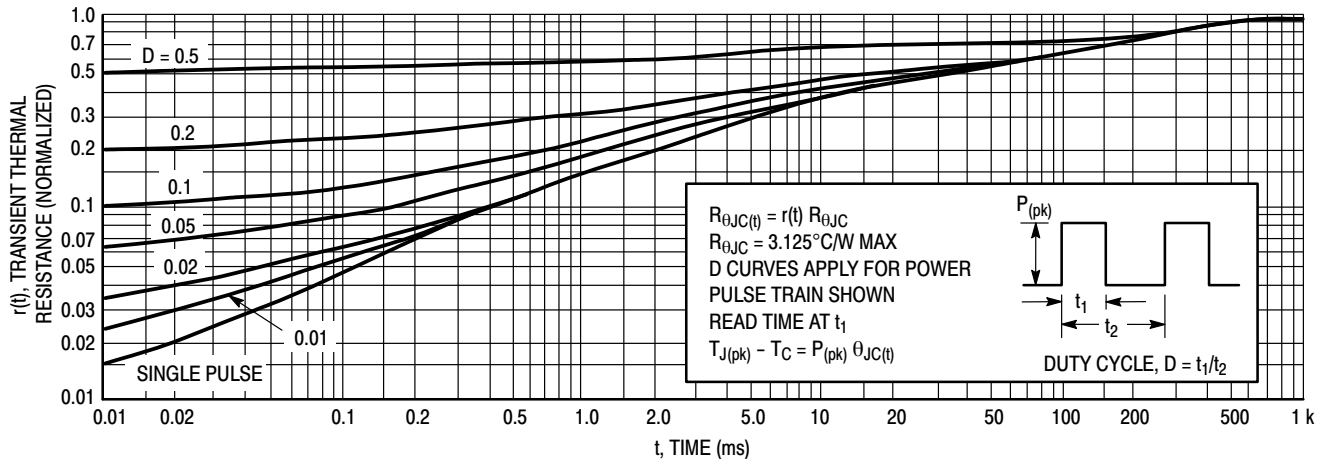


Figure 6. Thermal Response

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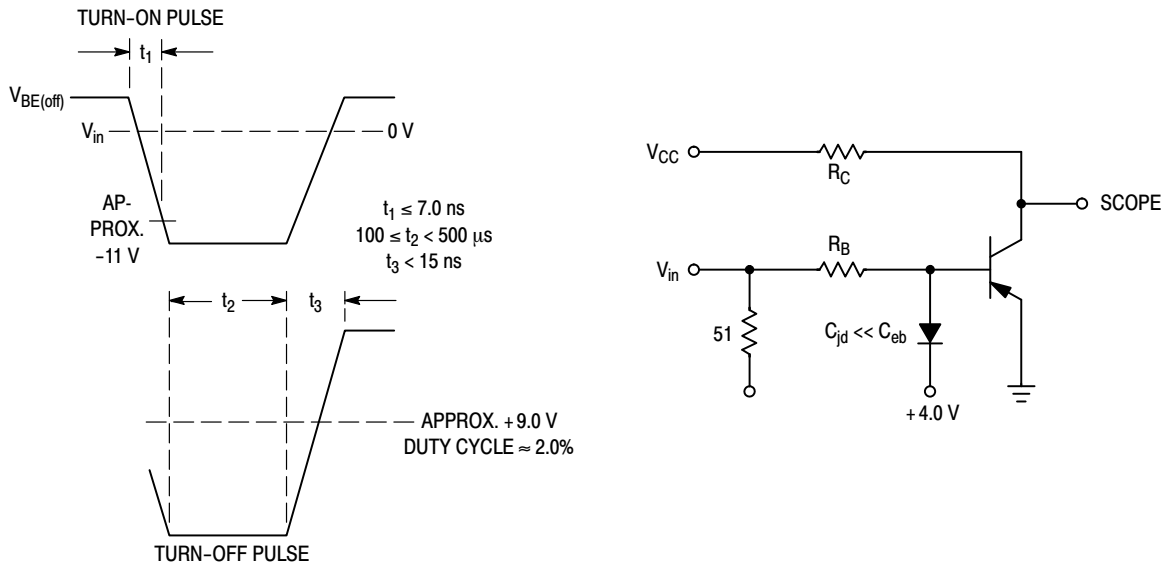


Figure 7. Switching Time Equivalent Circuit

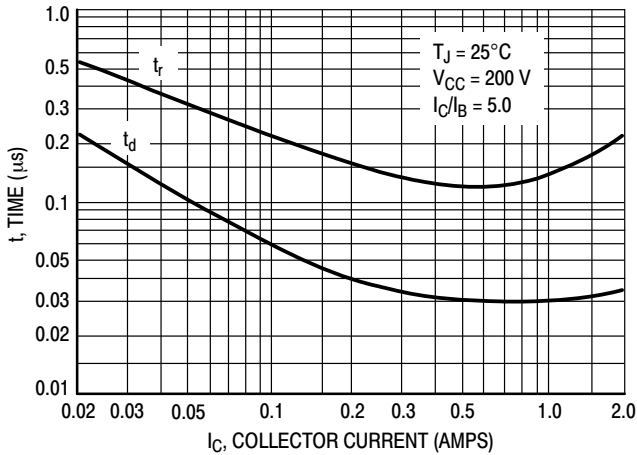


Figure 8. Turn-On Resistive Switching Times

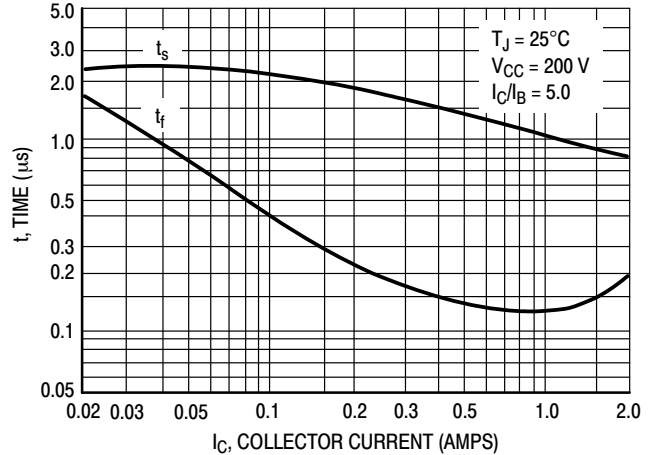


Figure 9. Resistive Turn-Off Switching Times

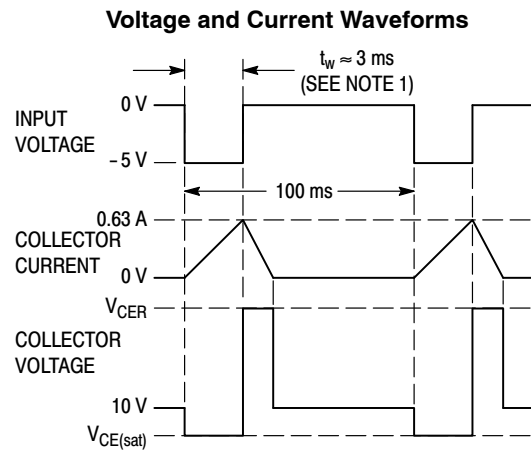
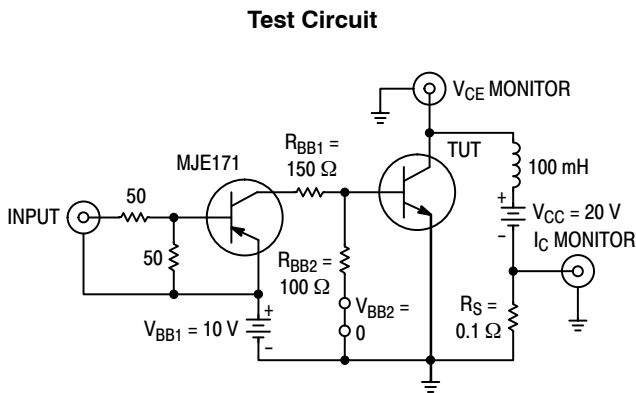


Figure 10. Inductive Load Switching

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ORDERING INFORMATION

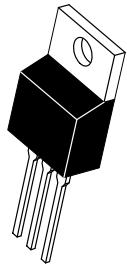
| Device | Package | Shipping |
|-----------|---------------------|-----------------|
| MJE5730G | TO-220 (Pb-Free) | 50 Units / Rail |
| MJE5731G | TO-220 (Pb-Free) | 50 Units / Rail |
| MJE5731AG | TO-220 (Pb-Free) | 50 Units / Rail |

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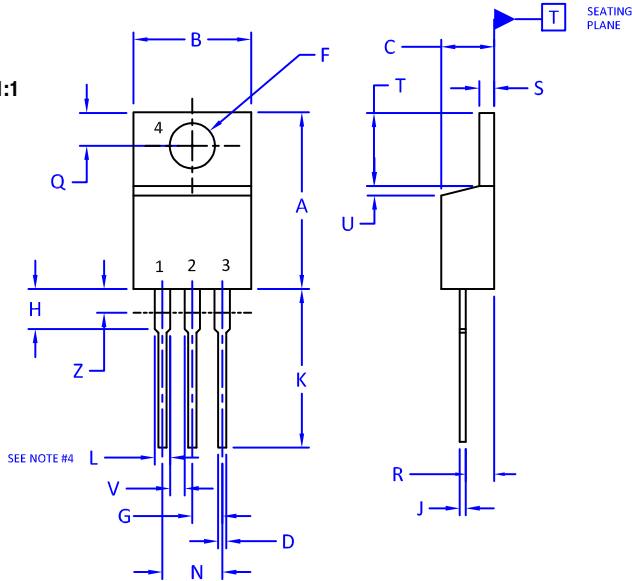
PACKAGE DIMENSIONS

TO-220
CASE 221A
ISSUE AK

DATE 13 JAN 2022



SCALE 1:1



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 2009.
2. CONTROLLING DIMENSION: INCHES
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.
4. MAX WIDTH FOR F102 DEVICE = 1.35MM

| DIM | INCHES | | MILLIMETERS | |
|-----|--------|-------|-------------|-------|
| | MIN. | MAX. | MIN. | MAX. |
| A | 0.570 | 0.620 | 14.48 | 15.75 |
| B | 0.380 | 0.415 | 9.66 | 10.53 |
| C | 0.160 | 0.190 | 4.07 | 4.83 |
| D | 0.025 | 0.038 | 0.64 | 0.96 |
| F | 0.142 | 0.161 | 3.60 | 4.09 |
| G | 0.095 | 0.105 | 2.42 | 2.66 |
| H | 0.110 | 0.161 | 2.80 | 4.10 |
| J | 0.014 | 0.024 | 0.36 | 0.61 |
| K | 0.500 | 0.562 | 12.70 | 14.27 |
| L | 0.045 | 0.060 | 1.15 | 1.52 |
| N | 0.190 | 0.210 | 4.83 | 5.33 |
| Q | 0.100 | 0.120 | 2.54 | 3.04 |
| R | 0.080 | 0.110 | 2.04 | 2.79 |
| S | 0.045 | 0.055 | 1.15 | 1.41 |
| T | 0.235 | 0.255 | 5.97 | 6.47 |
| U | 0.000 | 0.050 | 0.00 | 1.27 |
| V | 0.045 | ---- | 1.15 | --- |
| Z | ---- | 0.080 | --- | 2.04 |

STYLE 1:

- PIN 1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

STYLE 2:

- PIN 1. BASE
2. EMITTER
3. COLLECTOR
4. EMITTER

STYLE 3:

- PIN 1. CATHODE
2. ANODE
3. GATE
4. ANODE

STYLE 4:

- PIN 1. MAIN TERMINAL 1
2. MAIN TERMINAL 2
3. GATE
4. MAIN TERMINAL 2

STYLE 5:

- PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

STYLE 6:

- PIN 1. ANODE
2. CATHODE
3. ANODE
4. CATHODE

STYLE 7:

- PIN 1. CATHODE
2. ANODE
3. CATHODE
4. ANODE

STYLE 8:

- PIN 1. CATHODE
2. ANODE
3. EXTERNAL TRIP/DELAY
4. ANODE

STYLE 9:

- PIN 1. GATE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

STYLE 10:

- PIN 1. GATE
2. SOURCE
3. DRAIN
4. SOURCE

STYLE 11:

- PIN 1. DRAIN
2. SOURCE
3. GATE
4. SOURCE

STYLE 12:

- PIN 1. MAIN TERMINAL 1
2. MAIN TERMINAL 2
3. GATE
4. NOT CONNECTED

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