

# 4/6 Watts

## JTC Series



- 4:1 Input Range
- DIP-24 Metal Package
- Operating Temperature  $-40^{\circ}\text{C}$  to  $+100^{\circ}\text{C}$
- Single & Dual Outputs
- Continuous Short Circuit Protection
- 1500 VDC Isolation, 3500 VDC Option
- 3 Year Warranty

### Specification

#### Input

|                                  |                                                                                                                            |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| Input Voltage Range              | <ul style="list-style-type: none"> <li>• 24 V (9-36 VDC)</li> <li>• 48 V (18-72 VDC)</li> </ul>                            |
| Input Current                    | <ul style="list-style-type: none"> <li>• See table</li> </ul>                                                              |
| Input Filter                     | <ul style="list-style-type: none"> <li>• Pi network</li> </ul>                                                             |
| Input Reflected Ripple           | <ul style="list-style-type: none"> <li>• 35 mA pk-pk through 12 <math>\mu\text{H}</math> inductor</li> </ul>               |
| Input Surge                      | <ul style="list-style-type: none"> <li>• 24 V models 40 VDC for 100 ms</li> <li>• 48 V models 80 VDC for 100 ms</li> </ul> |
| Undervoltage Lockout             | <ul style="list-style-type: none"> <li>• None</li> </ul>                                                                   |
| Input Reverse Voltage Protection | <ul style="list-style-type: none"> <li>• None</li> </ul>                                                                   |

#### Output

|                          |                                                                                                                                                                        |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Output Voltage           | <ul style="list-style-type: none"> <li>• See table</li> </ul>                                                                                                          |
| Output Voltage Balance   | <ul style="list-style-type: none"> <li>• <math>\pm 1\%</math> max, dual output models</li> </ul>                                                                       |
| Minimum Load             | <ul style="list-style-type: none"> <li>• No minimum load required</li> </ul>                                                                                           |
| Initial Set Accuracy     | <ul style="list-style-type: none"> <li>• <math>\pm 1\%</math> max</li> </ul>                                                                                           |
| Start Up Delay           | <ul style="list-style-type: none"> <li>• <math>&lt; 800</math> ms</li> </ul>                                                                                           |
| Start Up Rise Time       | <ul style="list-style-type: none"> <li>• <math>&lt; 10</math> ms</li> </ul>                                                                                            |
| Line Regulation          | <ul style="list-style-type: none"> <li>• <math>\pm 0.5\%</math> max</li> </ul>                                                                                         |
| Load Regulation          | <ul style="list-style-type: none"> <li>• <math>\pm 0.5\%</math> max, <math>\pm 1.5\%</math> max for 3.3 V and <math>\pm 3.3</math> V models</li> </ul>                 |
| Cross Regulation         | <ul style="list-style-type: none"> <li>• <math>\pm 5\%</math> on dual output models (see note 4)</li> </ul>                                                            |
| Transient Response       | <ul style="list-style-type: none"> <li>• <math>&lt; 1.5\%</math> max deviation, recovery to within 1% in 200 <math>\mu\text{s}</math> for a 50% load change</li> </ul> |
| Ripple & Noise           | <ul style="list-style-type: none"> <li>• 60 mV pk-pk for 3.3 V to 15 V models, 100 mV pk-pk for 18 V models, 150 mV pk-pk for 24 V models, 20 MHz bandwidth</li> </ul> |
| Short Circuit Protection | <ul style="list-style-type: none"> <li>• Trip &amp; restart (Hiccup mode), auto recovery</li> </ul>                                                                    |
| Maximum Capacitive Load  | <ul style="list-style-type: none"> <li>• See tables</li> </ul>                                                                                                         |
| Temperature Coefficient  | <ul style="list-style-type: none"> <li>• <math>\pm 0.02/^{\circ}\text{C}</math> max</li> </ul>                                                                         |

#### General

|                      |                                                                                                                                                                                                                                                 |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Efficiency           | <ul style="list-style-type: none"> <li>• See tables</li> </ul>                                                                                                                                                                                  |
| Isolation Voltage    | <ul style="list-style-type: none"> <li>• 1500 VDC Input to Output, for optional high isolation version 3500 VDC input to output add suffix '-H' to model number</li> <li>• 1000 VDC Input to Case</li> <li>• 1000 VDC Output to Case</li> </ul> |
| Isolation Resistance | <ul style="list-style-type: none"> <li>• <math>10^9 \Omega</math></li> </ul>                                                                                                                                                                    |
| Switching Frequency  | <ul style="list-style-type: none"> <li>• 266 kHz typical</li> </ul>                                                                                                                                                                             |
| Power Density        | <ul style="list-style-type: none"> <li>• JTC04: 10 W/in<sup>3</sup>, JTC06: 15 W/in<sup>3</sup></li> </ul>                                                                                                                                      |
| MTBF                 | <ul style="list-style-type: none"> <li>• <math>&gt; 1.0</math> Mhrs to MIL-HDBK-217F at <math>25^{\circ}\text{C}</math>, GB</li> </ul>                                                                                                          |

#### Environmental

|                       |                                                                                                                                                                                                                                      |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating Temperature | <ul style="list-style-type: none"> <li>• <math>-40^{\circ}\text{C}</math> to <math>+100^{\circ}\text{C}</math>, derate from 100% load at <math>+85^{\circ}\text{C}</math> to no load at <math>+100^{\circ}\text{C}</math></li> </ul> |
| Case Temperature      | <ul style="list-style-type: none"> <li>• <math>+100^{\circ}\text{C}</math> max</li> </ul>                                                                                                                                            |
| Storage Temperature   | <ul style="list-style-type: none"> <li>• <math>-40^{\circ}\text{C}</math> to <math>+125^{\circ}\text{C}</math></li> </ul>                                                                                                            |
| Humidity              | <ul style="list-style-type: none"> <li>• Up to 95%, non-condensing</li> </ul>                                                                                                                                                        |
| Cooling               | <ul style="list-style-type: none"> <li>• Natural convection</li> </ul>                                                                                                                                                               |

#### EMC

|                    |                                                                                                                                             |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Emissions          | <ul style="list-style-type: none"> <li>• EN55022 class A conducted with external components - see application note</li> </ul>               |
| ESD Immunity       | <ul style="list-style-type: none"> <li>• EN61000-4-2, 8 kV air discharge Perf Criteria A, 4 kV contact discharge Perf Criteria A</li> </ul> |
| EFT/Burst          | <ul style="list-style-type: none"> <li>• EN61000-4-4, level 1, Perf Criteria A</li> </ul>                                                   |
| Conducted Immunity | <ul style="list-style-type: none"> <li>• EN61000-4-6, 3 Vrms, Perf Criteria A</li> </ul>                                                    |
| Magnetic Fields    | <ul style="list-style-type: none"> <li>• EN61000-4-8, 1 A/m, Perf Criteria A</li> </ul>                                                     |

## Models and Ratings

JTC04/06 XP

| Input Voltage | Output Voltage | Output Current | Input Current <sup>(2)</sup> |           | Maximum Capacitive Load <sup>(3)</sup> | Efficiency | Model Number <sup>(1)</sup> |
|---------------|----------------|----------------|------------------------------|-----------|----------------------------------------|------------|-----------------------------|
|               |                |                | No Load                      | Full Load |                                        |            |                             |
| 9-36 V        | 3.3 V          | 1200 mA        | 12 mA                        | 220 mA    | 1000 $\mu$ F                           | 75%        | JTC0424S3V3                 |
|               | 5.0 V          | 800 mA         | 15 mA                        | 211 mA    | 1000 $\mu$ F                           | 79%        | JTC0424S05                  |
|               | 9.0 V          | 445 mA         | 12 mA                        | 201 mA    | 220 $\mu$ F                            | 83%        | JTC0424S09                  |
|               | 12.0 V         | 333 mA         | 15 mA                        | 203 mA    | 100 $\mu$ F                            | 82%        | JTC0424S12                  |
|               | 15.0 V         | 267 mA         | 15 mA                        | 203 mA    | 220 $\mu$ F                            | 82%        | JTC0424S15                  |
|               | 18.0 V         | 223 mA         | 15 mA                        | 203 mA    | 10 $\mu$ F                             | 82%        | JTC0424S18                  |
|               | 24.0 V         | 167 mA         | 18 mA                        | 203 mA    | 220 $\mu$ F                            | 82%        | JTC0424S24                  |
|               | $\pm 3.3$ V    | $\pm 606$ mA   | 12 mA                        | 222 mA    | $\pm 470$ $\mu$ F                      | 75%        | JTC0424D03                  |
|               | $\pm 5.0$ V    | $\pm 400$ mA   | 15 mA                        | 211 mA    | $\pm 100$ $\mu$ F                      | 79%        | JTC0424D05                  |
|               | $\pm 9.0$ V    | $\pm 222$ mA   | 18 mA                        | 208 mA    | $\pm 47$ $\mu$ F                       | 80%        | JTC0424D09                  |
|               | $\pm 12.0$ V   | $\pm 167$ mA   | 15 mA                        | 203 mA    | $\pm 47$ $\mu$ F                       | 82%        | JTC0424D12                  |
|               | $\pm 15.0$ V   | $\pm 134$ mA   | 20 mA                        | 208 mA    | $\pm 10$ $\mu$ F                       | 80%        | JTC0424D15                  |
|               | $\pm 24.0$ V   | $\pm 84$ mA    | 18 mA                        | 208 mA    | $\pm 22$ $\mu$ F                       | 80%        | JTC0424D24                  |
| 18-72 V       | 3.3 V          | 1200 mA        | 10 mA                        | 110 mA    | 1000 $\mu$ F                           | 76%        | JTC0448S3V3                 |
|               | 5.0 V          | 800 mA         | 8 mA                         | 106 mA    | 470 $\mu$ F                            | 79%        | JTC0448S05                  |
|               | 9.0 V          | 445 mA         | 10 mA                        | 100 mA    | 330 $\mu$ F                            | 83%        | JTC0448S09                  |
|               | 12.0 V         | 333 mA         | 12 mA                        | 104 mA    | 1000 $\mu$ F                           | 80%        | JTC0448S12                  |
|               | 15.0 V         | 267 mA         | 10 mA                        | 99 mA     | 47 $\mu$ F                             | 84%        | JTC0448S15                  |
|               | 18.0 V         | 223 mA         | 10 mA                        | 99 mA     | 10 $\mu$ F                             | 84%        | JTC0448S18                  |
|               | 24.0 V         | 167 mA         | 15 mA                        | 102 mA    | 22 $\mu$ F                             | 82%        | JTC0448S24                  |
|               | $\pm 3.3$ V    | $\pm 606$ mA   | 10 mA                        | 107 mA    | $\pm 680$ $\mu$ F                      | 78%        | JTC0448D03                  |
|               | $\pm 5.0$ V    | $\pm 400$ mA   | 15 mA                        | 106 mA    | $\pm 330$ $\mu$ F                      | 79%        | JTC0448D05                  |
|               | $\pm 9.0$ V    | $\pm 222$ mA   | 15 mA                        | 104 mA    | $\pm 47$ $\mu$ F                       | 80%        | JTC0448D09                  |
|               | $\pm 12.0$ V   | $\pm 167$ mA   | 12 mA                        | 102 mA    | $\pm 100$ $\mu$ F                      | 82%        | JTC0448D12                  |
|               | $\pm 15.0$ V   | $\pm 134$ mA   | 15 mA                        | 104 mA    | $\pm 100$ $\mu$ F                      | 80%        | JTC0448D15                  |
|               | $\pm 24.0$ V   | $\pm 84$ mA    | 15 mA                        | 104 mA    | $\pm 10$ $\mu$ F                       | 80%        | JTC0448D24                  |

| Input Voltage | Output Voltage | Output Current | Input Current <sup>(2)</sup> |           | Maximum Capacitive Load <sup>(3)</sup> | Efficiency | Model Number <sup>(1)</sup> |
|---------------|----------------|----------------|------------------------------|-----------|----------------------------------------|------------|-----------------------------|
|               |                |                | No Load                      | Full Load |                                        |            |                             |
| 9-36 V        | 3.3 V          | 1400 mA        | 12 mA                        | 253 mA    | 1000 $\mu$ F                           | 76%        | JTC0624S3V3                 |
|               | 5.0 V          | 1200 mA        | 10 mA                        | 312 mA    | 1000 $\mu$ F                           | 80%        | JTC0624S05                  |
|               | 9.0 V          | 667 mA         | 12 mA                        | 301 mA    | 220 $\mu$ F                            | 83%        | JTC0624S09                  |
|               | 12.0 V         | 500 mA         | 15 mA                        | 301 mA    | 1000 $\mu$ F                           | 83%        | JTC0624S12                  |
|               | 15.0 V         | 400 mA         | 18 mA                        | 301 mA    | 470 $\mu$ F                            | 83%        | JTC0624S15                  |
|               | 18.0 V         | 334 mA         | 15 mA                        | 301 mA    | 47 $\mu$ F                             | 83%        | JTC0624S18                  |
|               | 24.0 V         | 250 mA         | 18 mA                        | 305 mA    | 47 $\mu$ F                             | 82%        | JTC0624S24                  |
|               | $\pm 3.3$ V    | $\pm 909$ mA   | 12 mA                        | 338 mA    | $\pm 470$ $\mu$ F                      | 74%        | JTC0624D03                  |
|               | $\pm 5.0$ V    | $\pm 600$ mA   | 10 mA                        | 312 mA    | $\pm 680$ $\mu$ F                      | 80%        | JTC0624D05                  |
|               | $\pm 9.0$ V    | $\pm 333$ mA   | 18 mA                        | 309 mA    | $\pm 100$ $\mu$ F                      | 81%        | JTC0624D09                  |
|               | $\pm 12.0$ V   | $\pm 250$ mA   | 20 mA                        | 301 mA    | $\pm 330$ $\mu$ F                      | 83%        | JTC0624D12                  |
|               | $\pm 15.0$ V   | $\pm 200$ mA   | 22 mA                        | 305 mA    | $\pm 100$ $\mu$ F                      | 82%        | JTC0624D15                  |
|               | $\pm 24.0$ V   | $\pm 125$ mA   | 18 mA                        | 312 mA    | $\pm 22$ $\mu$ F                       | 80%        | JTC0624D24                  |
| 18-72 V       | 3.3 V          | 1400 mA        | 15 mA                        | 126 mA    | 1000 $\mu$ F                           | 76%        | JTC0648S3V3                 |
|               | 5.0 V          | 1200 mA        | 8 mA                         | 156 mA    | 1000 $\mu$ F                           | 80%        | JTC0648S05                  |
|               | 9.0 V          | 667 mA         | 10 mA                        | 153 mA    | 220 $\mu$ F                            | 82%        | JTC0648S09                  |
|               | 12.0 V         | 500 mA         | 10 mA                        | 151 mA    | 1000 $\mu$ F                           | 83%        | JTC0648S12                  |
|               | 15.0 V         | 400 mA         | 10 mA                        | 149 mA    | 100 $\mu$ F                            | 84%        | JTC0648S15                  |
|               | 18.0 V         | 334 mA         | 10 mA                        | 151 mA    | 10 $\mu$ F                             | 83%        | JTC0648S18                  |
|               | 24.0 V         | 250 mA         | 12 mA                        | 151 mA    | 22 $\mu$ F                             | 83%        | JTC0648S24                  |
|               | $\pm 3.3$ V    | $\pm 909$ mA   | 10 mA                        | 162 mA    | $\pm 330$ $\mu$ F                      | 77%        | JTC0648D03                  |
|               | $\pm 5.0$ V    | $\pm 600$ mA   | 10 mA                        | 158 mA    | $\pm 470$ $\mu$ F                      | 79%        | JTC0648D05                  |
|               | $\pm 9.0$ V    | $\pm 333$ mA   | 15 mA                        | 154 mA    | $\pm 100$ $\mu$ F                      | 81%        | JTC0648D09                  |
|               | $\pm 12.0$ V   | $\pm 250$ mA   | 10 mA                        | 152 mA    | $\pm 100$ $\mu$ F                      | 82%        | JTC0648D12                  |
|               | $\pm 15.0$ V   | $\pm 200$ mA   | 15 mA                        | 149 mA    | $\pm 47$ $\mu$ F                       | 84%        | JTC0648D15                  |
|               | $\pm 24.0$ V   | $\pm 125$ mA   | 15 mA                        | 154 mA    | $\pm 22$ $\mu$ F                       | 81%        | JTC0648D24                  |

## Notes

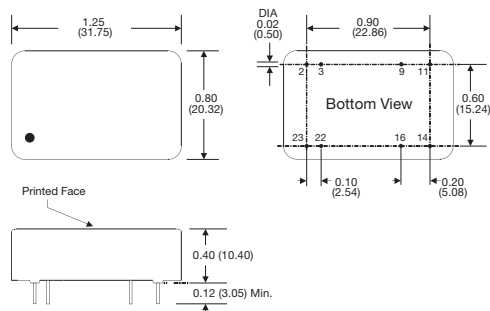
1. For optional 3500 VDC isolation add suffix '-H' to model number. For optional plastic case, add suffix '-P' to model number. For both options add suffix '-HP' to model number.

2. Input current measured at nominal input voltage.

3. Maximum capacitive load is per output.

4. Cross regulation for duals is  $\pm 5\%$  when one output is at 100% and the other is varied between 25% and 100%.

## Mechanical Details and Application Note



| Pin | Single | Dual   |
|-----|--------|--------|
| 2   | -Vin   | -Vin   |
| 3   | -Vin   | -Vin   |
| 9   | No Pin | Common |
| 11  | N.C.   | -Vout  |
| 14  | +Vout  | +Vout  |
| 16  | -Vout  | Common |
| 22  | +Vin   | +Vin   |
| 23  | +Vin   | +Vin   |

1. All dimensions are in inches (mm)
2. Weight: 0.04 lbs (17 g) approx.
3. Pin diameter: 0.02  $\pm$  0.002 (0.5  $\pm$  0.005)
4. Pin pitch tolerance:  $\pm$  0.014 ( $\pm$  0.35)
5. Case tolerance:  $\pm$  0.02 ( $\pm$  0.5)

## Input Filter

