

The Fifth Generation, Ultra Small Size, Isolated DC-DC Converter

Bellnix

6Watt BTC Series

BTC series is a thin, high efficiency, low noise isolated DC-DC converter. Contrived to adopt new circuit to achieve miniaturization. Circuit construction is high-efficiency and simple. Adjustable output voltage and remote ON/OFF control has been added as a new function.



<Features>

- Adjustable Output Voltage
- Remote ON/OFF Control
- Dual Power Supply usable as Single Power Supply
- Isolation Voltage AC500V
- Built-in Over-Current Protection Circuit
- Built-in Low Input Voltage Protection Function
- Built-in Over Input Current Protection Element
- No Electrolytic Capacitor, No Tantalum Capacitor
- MTTF 1,500,000 Hrs
- Metallic Shield Cover
- Halogen-Free PCB Used
- Between Primary and Secondary Combination Capacitance approx. 30 to 110pF
- Operating Temp. Range -40°C to 85°C (Temp. Derating required)
- RoHS Compliance

<Model, Rating>

Table 1

Model	Input V Vdc	Output V Vdc	Output I mA	Line Reg. mV(max.)	Load Reg. mV(max.)	Noise mVpp(typ.)	Efficiency %(typ.)
BTC05-03S120X	4.5 to 9	3.3	0 to 1200	20	40	40	76
BTC05-05S100X		5	0 to 1000				79
BTC05-12S50X		12(15)	0 to 500 (400)	40	100	30	82
BTC05-12W25X		±12(±15)	0 to 250 (200)	80	600		82
BTC12-03S120X	9 to 18	3.3	0 to 1200	20	40	40	78
BTC12-05S120X		5	0 to 1200				82
BTC12-12S50X		12(15)	0 to 500 (400)	40	100	30	85
BTC12-12W25X		±12(±15)	0 to 250 (200)	80	600		85
BTC24-03S120X	18 to 36	3.3	0 to 1200	20	40	40	77
BTC24-05S120X		5	0 to 1200				81
BTC24-12S50X		12(15)	0 to 500 (400)	40	100	30	87
BTC24-12W25X		±12(±15)	0 to 250 (200)	80	600		86
BTC48-03S120X	36 to 76	3.3	0 to 1200	20	40	40	77
BTC48-05S120X		5	0 to 1200				81
BTC48-12S50X		12(15)	0 to 500 (400)	40	100	30	86
BTC48-12W25X		±12(±15)	0 to 250 (200)	80	600		86

Note1 : Specify the type in the "X" model name. D:DIP type, S:SMD type

Ex.) DIP type: BTC05-03S120D, SMD type: BTC05-03S120S

Note2 : The Output voltage inside () is when it is short between Vadj and -Vout.

Note3 : The output current inside () is when adjusted to the max. output voltage.

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Table2

<Specification>

Input Voltage Range	Refer to Table 1
Rating Output Voltage	3.3V±3%, 5V±3%, 12V±3%, ±12V±5% (Vadj pin at open)
Adjustable Output Voltage Range	3.15 to 3.6V (For 3.3V), 4.75 to 6.0V (For 5V), 11.4 to 15V (For 12V), ±11.4 to ±15V (For 12V)
Line Regulation	Refer to Table1 (Rting Output, for the regulation of Input Voltage Range of Table1)
Load Regulation	Refer to table1 (Rating Input/Output Voltage, for the regulation of load 0 to 100% (±Output is when load is at balance))
Temp. Regulation	80mV max. (For 3.3V, 5V), 200mV max. (For 12V), 300mV max. (For ±12V) (Input/Output rating, For operating temp. -40°C to 50°C)
Ripple/Noise	Refer to Table 1 (Rating Input/Output, At room temp, 20MHz bandwidth)
Efficiency	76% to 87% typ. (Rating Input/Output, At room temp., Refer to table 1)
Over Current Protection Circuit	Operates at 105% or more rating load current, auto recovery type. Avoid 30 second or more long time over current Condition.
Over Voltage Protection Circuit	None
Low Input Voltage Protection	Available (Refer to p.11)
Over Input Current Protection	Built-in fuse in the input (refer to p.12)
Remote ON/OFF	Between 2pin (ON/OFF) and 3pin (-Vin) : Output goes OFF at open, Output goes ON when in short. (Refer to p.9)
Stand by Current	0.8 to 3.3mA typ. (Depend on the model)
Isolation Voltage	Input – Output, Input – Case, Output – Case AC500V 1min.
Isolation resistance	Input – Output, Input – Case, Output – Case Over 50MΩ at DC500V
Primary-Secondary capacitance	Approx. 30 to 110pF (Depend on the model)
Operating Temp. Range	Operating Temp. -40°C to 85°C (Need temp. derating from 50°C)
Storage Temp. Range	Storage Temp. -40°C to 85°C
Humidity Range	Humidity range 95%R.H. max. (Max. wet bulb temperature 38°C, non-condensing)
Cooling Condition	Air Convection (Set in a place where good convection is ensured)
Vibration	10 to 55Hz All amplitude 1.52mmp-p (2 hours in each orthogonal axes), Scanning time 15min.
Shock	Acceleration 100G (3directions, 3times each, 18times in total), Persistent time 6ms
Weight	5.8g typ.
Outline	DIP type W=21.1 L=23.2 H=8.4 typ. (mm) (For detail dimensions, refer to the outline on p.7)
	SMD type W=21.1 L=26.2 H=8.5 typ.(mm) (For detail dimensions, refer to the outline on p.8)

NOTE : Unless condition is specified, above specification is regulated as rating value.

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1- Application Range

This datasheet applies to the isolated DC/DC converter, BTC series.

2- Model/Rating

Model	Rating Input Voltage	Rating Output	Package
BTC05-03S120D	DC5V	3.3V, 1200mA	DIP
BTC05-03S120S			SMD
BTC05-05S100D		5.0V, 1000mA	DIP
BTC05-05S100S			SMD
BTC05-12S50D		12V, 500mA	DIP
BTC05-12S50S			SMD
BTC05-12W25D		±12V, each250mA	DIP
BTC05-12W25S			SMD
BTC12-03S120D	DC12V	3.3V, 1200mA	DIP
BTC12-03S120S			SMD
BTC12-05S120D		5.0V, 1200mA	DIP
BTC12-05S120S			SMD
BTC12-12S50D		12V, 500mA	DIP
BTC12-12S50S			SMD
BTC12-12W25D		±12V, each250mA	DIP
BTC12-12W25S			SMD
BTC24-03S120D	DC24V	3.3V, 1200mA	DIP
BTC24-03S120S			SMD
BTC24-05S120D		5.0V, 1200mA	DIP
BTC24-05S120S			SMD
BTC24-12S50D		12V, 500mA	DIP
BTC24-12S50S			SMD
BTC24-12W25D		±12V, each250mA	DIP
BTC24-12W25S			SMD
BTC48-03S120D	DC48V	3.3V, 1200mA	DIP
BTC48-03S120S			SMD
BTC48-05S120D		5.0V, 1200mA	DIP
BTC48-05S120S			SMD
BTC48-12S50D		12V, 500mA	DIP
BTC48-12S50S			SMD
BTC48-12W25D		±12V, each250mA	DIP
BTC48-12W25S			SMD

3- Environmental Condition

3-1 Temp. range

When Operating : -40°C to 85°C (Derating required from 50°C)

When Storage : -40°C to 85°C

3-2 Humidity Range

When Operating : 95%R.H. max. (Max. wet-bulb temp. 38°C, non-condensing)

When storage : 95%R.H. max. (Max. wet-bulb temp. 38°C, non-condensing)

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4-Specification

4-1 Input Condition, Output Characteristics

When condition is not mentioned in this data sheet, input is rating input, output is rating output, ambient temp. is 25°C±5°C.

Model *1	Input Voltage (V)	Output Voltage (V) ²	Output Current (mA)	Max. Output Voltage Constancy.			Output Ripple/Noise ⁴ (mVp-p)typ./ max.	Efficiency (%)typ. ⁵
				Input (mV)	Load (mV)	Temp. ³ (mV)		
BTC05-03S120X	4.5 to 9	3.3±3%	0 to 1200	20	40	80	40 / 120	76
BTC05-05S100X		5.0±3%	0 to 1000	20	40	80	40 / 120	79
BTC05-12S50X		12±3%	0 to 500	40	100	200	30 / 120	82
		15±3%	0 to 400	40	100	200	30 / 120	82
BTC05-12W25X		±12±5%	0 to 250 × 2	80	600	300	30 / 120	82
		±15±5%	0 to 200 × 2	80	600	300	30 / 120	82
BTC12-03S120X	9 to 18	3.3±3%	0 to 1200	20	40	80	40 / 120	78
BTC12-05S120X		5.0±3%	0 to 1200	20	40	80	40 / 120	82
BTC12-12S50X		12±3%	0 to 500	40	100	200	30 / 120	85
		15±3%	0 to 400	40	100	200	30 / 120	85
BTC12-12W25X		±12±5%	0 to 250 × 2	80	600	300	30 / 120	85
		±15±5%	0 to 200 × 2	80	600	300	30 / 120	85
BTC24-03S120X	18 to 36	3.3±3%	0 to 1200	20	40	80	40 / 120	77
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BTC24-12S50X		12±3%	0 to 500	40	100	200	30 / 120	87
		15±3%	0 to 400	40	100	200	30 / 120	87
BTC24-12W25X		±12±5%	0 to 250 × 2	80	600	300	30 / 120	86
		±15±5%	0 to 200 × 2	80	600	300	30 / 120	86
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BTC48-05S120X		5.0±3%	0 to 1200	20	40	80	40 / 120	81
BTC48-12S50X		12±3%	0 to 500	40	100	200	30 / 120	86
		15±3%	0 to 400	40	100	200	30 / 120	86
BTC48-12W25X		±12±5%	0 to 250 × 2	80	600	300	30 / 120	86
		±15±5%	0 to 200 × 2	80	600	300	30 / 120	86

*1 Specify the package in the "X". D:DIP type(Flow) S:SMD type(Reflow)

*2 Output Voltage includes line regulation, load regulation(Balance Load), temp. regulation.

*3 For temp. regulation -40 to 50°C.

*4 Bandwidth 20MHz

*5 When Rating Input Voltage, max. Output Current.

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4-2 Capacity of External Capacitor

This product has limit to the capacity of external output capacitor. Please refer to the below table.

External Output Capacitor

Model	Capacity	
	+output side	-output side
BTCXX-03SXXX	0 to 470 μ F ^{*1}	—
BTCXX-05SXXX	0 to 470 μ F ^{*1}	—
BTCXX-12SXXX	0 to 220 μ F ^{*1}	—
BTCXX-12WXXX	0 to 100 μ F ^{*2}	0 to 100 μ F ^{*3}

*1 Sum of C2 and C3 in standard connecting circuit in section 6,(1)

*2 Sum of C2 and C4 in standard connecting circuit in section 6,(2)

*3 Sum of C3 and C5 in standard connecting circuit in section 6,(2)

4-3 Temp. Derating

