

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

Bellnix® 10Watt BTD Series

BTd 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
- Metallic Shield Cover
- Halogen-Free PCB Used
- Between Primary and Secondary Combination Capacitance approx. 1,100pF
- 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.)
BTD05-03S250X	4.5 to 9	3.3	0 to 2500	20	40	40	84
BTD05-05S200X		5	0 to 2000				84
BTD05-12S80X		12(15)	0 to 800 (640)	40	100	30	84
BTD05-12W40X		±12(±15)	0 to 400 (320)	80	600	83	
BTD12-03S250X	9 to 18	3.3	0 to 2500	20	40	40	84
BTD12-05S200X		5	0 to 2000				86
BTD12-12S100X		12(15)	0 to 1000 (800)	40	100	30	88
BTD12-12W45X		±12(±15)	0 to 450 (360)	80	600	86	
BTD24-03S250X	18 to 36	3.3	0 to 2500	20	40	40	84
BTD24-05S200X		5	0 to 2000				86
BTD24-12S100X		12(15)	0 to 1000 (800)	40	100	30	87
BTD24-12W45X		±12(±15)	0 to 450 (360)	80	600	86	
BTD48-03S250X	36 to 76	3.3	0 to 2500	20	40	40	84
BTD48-05S200X		5	0 to 2000				86
BTD48-12S100X		12(15)	0 to 1000 (800)	40	100	30	88
BTD48-12W45X		±12(±15)	0 to 450 (360)	80	600	86	

Note1 : Specify the type in the "X" of the model name. D:DIP type, S:SMD type
Ex.) DIP type: BTD05-03S250D, SMD type: BTD05-03S250S

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 (Rating 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	83% to 88% 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	6.0 - 7.6mA 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. 1100pF (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), Sweeping time 15min.
Shock	Acceleration 100G (3directions, 3times each, 18times in total), Persistent time 6ms
Weight	10.0g typ.
Outline	DIP type W=22.6 L=35.9 H=8.4 typ. (mm) (For detail dimensions, refer to the outline on p.7)
	SMD type W=22.6 L=38.9 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, BTD series.

2- Model/Rating

Model	Rating Input Voltage	Rating Output	Package
BTD05-03S250D	DC5V	3.3V, 2500mA	DIP
BTD05-03S250S			SMD
BTD05-05S200D		5.0V, 2000mA	DIP
BTD05-05S200S			SMD
BTD05-12S80D		12V, 800mA	DIP
BTD05-12S80S			SMD
BTD05-12W40D		±12V, each400mA	DIP
BTD05-12W40S			SMD
BTD12-03S250D	DC12V	3.3V, 2500mA	DIP
BTD12-03S250S			SMD
BTD12-05S200D		5.0V, 2000mA	DIP
BTD12-05S200S			SMD
BTD12-12S100D		12V, 1000mA	DIP
BTD12-12S100S			SMD
BTD12-12W45D		±12V, each450mA	DIP
BTD12-12W45S			SMD
BTD24-03S250D	DC24V	3.3V, 2500mA	DIP
BTD24-03S250S			SMD
BTD24-05S200D		5.0V, 2000mA	DIP
BTD24-05S200S			SMD
BTD24-12S100D		12V, 1000mA	DIP
BTD24-12S100S			SMD
BTD24-12W45D		±12V, each450mA	DIP
BTD24-12W45S			SMD
BTD48-03S250D	DC48V	3.3V, 2500mA	DIP
BTD48-03S250S			SMD
BTD48-05S200D		5.0V, 2000mA	DIP
BTD48-05S200S			SMD
BTD48-12S100D		12V, 1000mA	DIP
BTD48-12S100S			SMD
BTD48-12W45D		±12V, each450mA	DIP
BTD48-12W45S			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 (mVp-p)typ./ max.	Efficiency (%)typ. ⁶
				Input (mV)	Load (mV)	Temp. ⁴ (mV)		
BTD05-03S250X	4.5 to 9	3.3±3%	0 to 2500	20	40	80	40 / 120	84
BTD05-05S200X		5.0±3%	0 to 2000	20	40	80	40 / 120	84
BTD05-12S80X		12±3%	0 to 800	40	100	200	30 / 120	84
		15±3%	0 to 640	40	100	200	30 / 120	84
BTD05-12W40X		±12±5%	0 to 400 × 2	80	600	300	30 / 120	83
		±15±5%	0 to 320 × 2	80	600	300	30 / 120	83
BTD12-03S250X	9 to 18	3.3±3%	0 to 2500	20	40	80	40 / 120	84
BTD12-05S200X		5.0±3%	0 to 2000	20	40	80	40 / 120	86
BTD12-12S100X		12±3%	0 to 1000	40	100	200	30 / 120	88
		15±3%	0 to 800	40	100	200	30 / 120	88
BTD12-12W45X		±12±5%	0 to 450 × 2	80	600	300	30 / 120	86
		±15±5%	0 to 360 × 2	80	600	300	30 / 120	86
BTD24-03S250X	18 to 36	3.3±3%	0 to 2500	20	40	80	40 / 120	84
BTD24-05S200X		5.0±3%	0 to 2000	20	40	80	40 / 120	86
BTD24-12S100X		12±3%	0 to 1000	40	100	200	30 / 120	87
		15±3%	0 to 800	40	100	200	30 / 120	87
BTD24-12W45X		±12±5%	0 to 450 × 2	80	600	300	30 / 120	86
		±15±5%	0 to 360 × 2	80	600	300	30 / 120	86
BTD48-03S250X	36 to 76	3.3±3%	0 to 2500	20	40	80	40 / 120	84
BTD48-05S200X		5.0±3%	0 to 2000	20	40	80	40 / 120	86
BTD48-12S100X		12±3%	0 to 1000	40	100	200	30 / 120	88
		15±3%	0 to 800	40	100	200	30 / 120	88
BTD48-12W45X		±12±5%	0 to 450 × 2	80	600	300	30 / 120	86
		±15±5%	0 to 360 × 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 input regulation, load regulation(Balance Load), temp. regulation.

*3 2 output type is when 2 output type has same current.

*4 For temp. regulation -40 to +50°C.

*5 Bandwidth 20MHz

*6 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 condenser. Please refer to the below table.

Output External Capacitor

Model	Capacity	
	+output side	-output side
BTDXX-03SXXX	0 to 470 μ F ^{*1}	—
BTDXX-05SXXX	0 to 470 μ F ^{*1}	—
BTDXX-12SXXX	0 to 220 μ F ^{*1}	—
BTDXX-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

