FEATURES

- Ultra-wide 4:1 input voltage range
- High efficiency up to 90%
- I/O isolation test voltage1500VDC
- Input under-voltage protection, output short-circuit,over-voltage,over-current protec tion
- Operating ambient temperature range-40℃ to +70℃
- CISPR32/EN55032 CLASSA EMI compliant
- without external components
- Six-sided metal shielded pac kage
- Input Reverse Polarity Protec tion available with Chassis(Z) or 35mm DIN-Rail mounting(Z)version
- Three year warranty period

20W isolated DC-DC converter with Ultra-wide input and Regulated Dual/Single Output

Selec tion Guide

Certification	Part No.①	Input Voltage(VDC)		Output		Full Load Efficiency③(%) Min./Typ.	Max.Capacitive Load④(μF)
		Nominal (Range)	Max.②	Voltage(VDC)	Current(mA) Max./Min.		
	CFDM20-24D05	24 (9-36)	40	±5	±2000/0	84/86	4800
	CFDM20-24D09			±9	±1111/0	86/88	1000
	CFDM20-24D12			±12	±834/0	86/88	800
	CFDM20-24D15			±15	±667/0	86/88	625
	CFDM20-24S03			3.3	5000/0	84/86	10000
	CFDM20-24S05			5	4000/0	86/88	10000
	CFDM20-24S09			9	2222/0	87/89	4700
	CFDM20-24S12			12	1667/0	87/89	1600
	CFDM20-24S15			15	1333/0	88/90	1000
	CFDM20-24S18			18	1111/0	88/90	1000
	CFDM20-24S24			24	834/0	88/90	500
	CFDM20-24S28			28	714/0	88/90	500
	CFDM20-48D05	48 (18-75)	80	±5	±2000/0	86/86	4800
	CFDM20-48D12			±12	±834/0	86/88	800
	CFDM20-48D15			±15	±667/0	86/88	625
	CFDM20-48S03			3.3	5000/0	84/86	10000
	CFDM20-48S05			5	4000/0	86/88	10000
	CFDM20-48S09			9	2222/0	87/89	4700
	CFDM20-48S12			12	1667/0	87/89	1600
	CFDM20-48S15			15	1333/0	88/90	1000
	CFDM20-48S18			18	1111/0	88/90	1000
	CFDM20-48S24			24	834/0	88/90	500
	CFDM20-48S28			28	714/0	88/90	500

Notes:
①Use"S"suffix for heat sink mounting,"Z "suffix for chassismounting for DIN-Rail mounting.We recommend to choose moduleswith a heat sink for enhanced heat dissipation and applicationswith extreme temperature requirements;
②Absolute maximum stress rating without damage (not recommended);

③Efficiency is measured at nominal input voltage and rated output load; efficiencies for Z1 and Z4 Model's is decreased by 2% due to the input reverse polarity protection circuit;
④The capacitive loads of positive and negative outputs are identical.

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (full load/no-load)	24VDC input	3.3V output	--	799/40	818/45	mA
		5V output	--	969/40	993/80	
		Others	--	947/6	969/10	
	48VDC input	3.3V output	--	400/20	409/25	
		5V output	--	485/20	497/60	
		Others	--	474/5	485/9	
Reflected Ripple Current	24VDC input		--	30	--	
	48VDC input		--	30	--	
Surge Voltage(1sec.max.)	24VDC input		-0.7	--	50	VDC
	48VDC input		-0.7	--	100	
Start-up Voltage	24VDC input		--	--	9	
	48VDC input		--	--	18	
Under-Voltage Shutdown	24VDC input		5.5	6.5	--	
	48VDC input		12	15.5	--	
Start-up Time	Nominal input & constant resistance load		--	10	--	ms
Input Filter			Pi			
CNT*	Module on		CNT pin open or pulled high(3.5-12VDC)			
	Module off		CNT pin pulled low to -Vin(0-1.2VDC)			
	Input current when off		--	4	7	mA
Hot Plug			Unavailable			

Note:*The CNT pin voltage is referenced to input-Vin.

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Voltage Accuracy ①	0%-100% load		--	±1	±3	%
Linear Regulation	Input voltage variation from low to high at full load	Positive Output	--	±0.2	±0.5	
		Negative Output	--	±0.5	±1	
Load Regulation ②	5%-100% load	Positive Output	--	±0.5	±1	
		Negative Output	--	±0.5	±1.5	
Cross Regulation	Dual output with Positive output at 50% load and Negative output from 10%-100% load		--	--	±5	
Transient Recovery Time	25% load step change, nominal input voltage		--	300	500	μs
Transient Response Deviation		3.3V/5V/±5V output	--	±5	±8	%
		Others	--	±3	±5	
Temperature Coefficient	Full load		--	--	±0.03	%/℃
Ripple/Noise ③	20MHz bandwidth,5%-100% load		--	50	100	Mvp-p
Trim	Input voltage range		--	±10	--	%Vo
Over-voltage Protection			110	--	160	
Over-current Protection			110	--	190	%Io
Short-- circuit Protection			Hiccup,continuous,self-recovery			

Note:
①Output voltage accuracy of ±5VDC/±9VDC output converter for 0%-5% load is ±5% max;
②Load regulation for 0%-100% load is ±5%
③Ripple/Noise at≤5% load is 5%Vo. Max.The"parallel cable"method is used for Ripple and Noise test

General Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Isolation	Input-output Electric Strength test for 1 minute with a leakage current of 1mA max.		1500	--	--	VDC
Insulation Resistance	Input-output resistance at 500VDC		1000	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100KHz/0.1V	CFDM20-24S24	--	2050	--	pF
		Others	--	1050	--	
Operating Temperature	See Fig. 1		-40	--	+70	℃
Storage Temperature			-55	--	+125	
Storage Humidity	Non-condensing		5	--	95	%RH
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds		--	--	300	℃
Vibration			10G,10-55Hz,30 Min.along X,Y and Z			
Switching Frequency*	PWM mode		--	270	--	KHz
MTBF	MIL-HDBK-217F@25℃		1000	--	--	K hours

Note:*Switching frequency is measured at full load.The module reduces the switching frequency for light load (below 50%) efficiency improvement.

General Specifications

Case Material	Aluminum alloy		
Dimensions	Horizontal package(without heat sink)		50.8×25.4×11.8mm
	Z Din-rail mounting(without heat sink)		76.0×31.5×25.8mm
Weight	without heat sink	Horizontal package/Z2 chassis mounting/Z4 Din-rail mounting	25.0g/48.0g(Typ.)
	with heat sink	Horizontal package/Z2S chassis mounting/Z4 Din-rail mounting	34.0g/56.0g(Typ.)
Cooling Method	Free air convection		

Electromagnetic Compatibility(EMC)

Emissions	CE	CISPR32/EN55032	CLASS A(without external components)/CLASS B(see Fig.3-② for recommended circuit)	
	RE	CISPR32/EN55032	CLASS A(without external components)/CLASS B(see Fig.3-② for recommended circuit)	
Immunity	ESD	IEC/EN61000-4-2	Contact ±4KV	perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	±2KV(see Fig.3-① for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line ±2KV(see Fig.3-① for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	3Vr.m.s	perf. Criteria A
	Voltage dips,short interruptions and voltage variations immunity	IEC/EN61000-4-29	0%,70%	perf. Criteria B

Typical Characteristic Curves

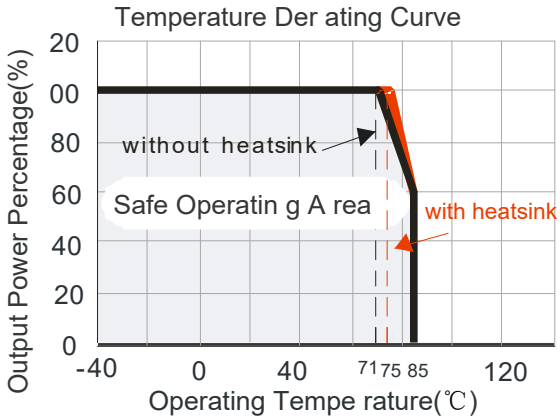
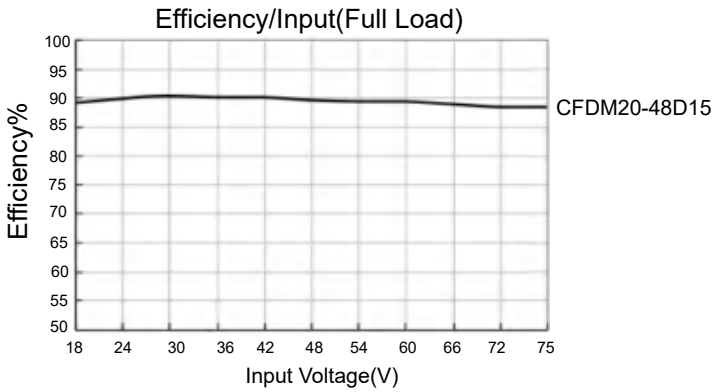
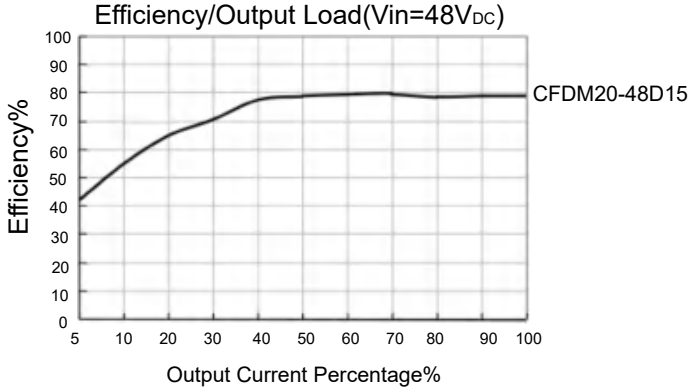
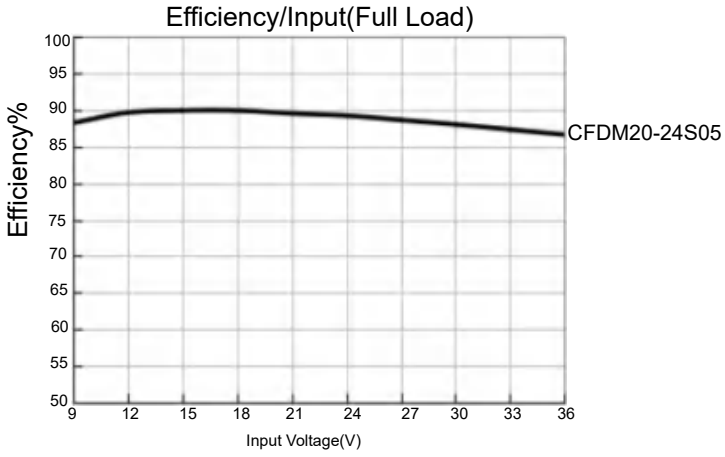
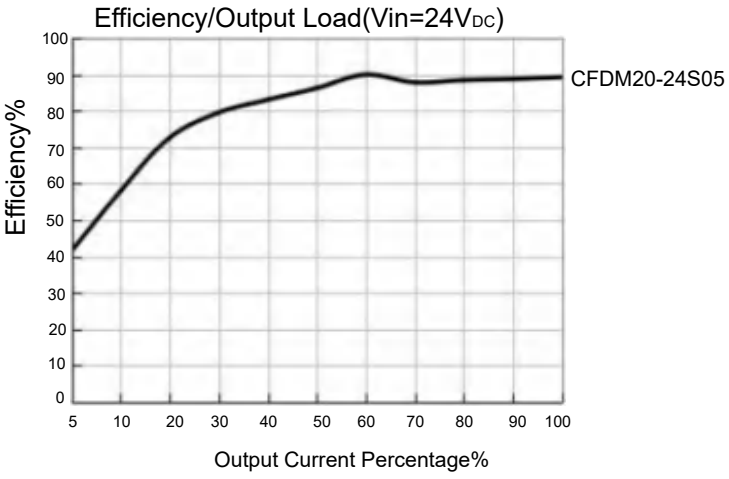


Fig . 1









Design Reference

1.Typical application

All the DC/DC converters of this series are tested before delivery using the recommended circuit shown in Fig.2.
Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values Cin and Cout and/or by selecting capacitors with a low ESR(equivalent series resistance).Also make sure that the capacitance is not exceeding the specified max. capacitive load value of the product.

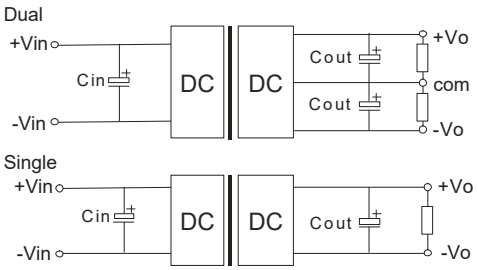
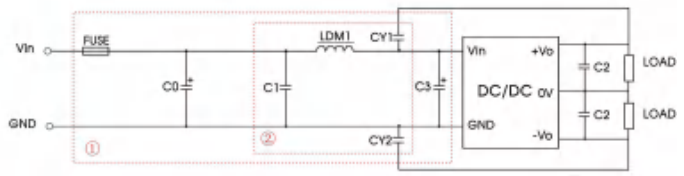


Fig. 2

Single Vout (VDC)	Cout (μF)	Cin (μF)	Dual Vout (VDC)	Cout (μF)	Cin (μF)
3.3/5	470	100	±5	220	100
9/12/15	220		±9/±12/±15	100	
24	100		--	--	

2. EMC compliance circuit

Dual



Single

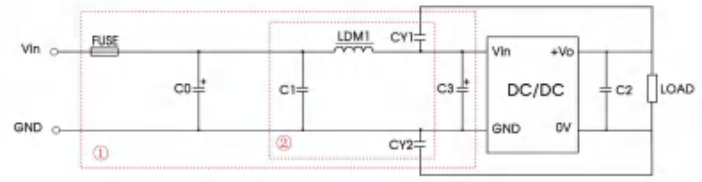


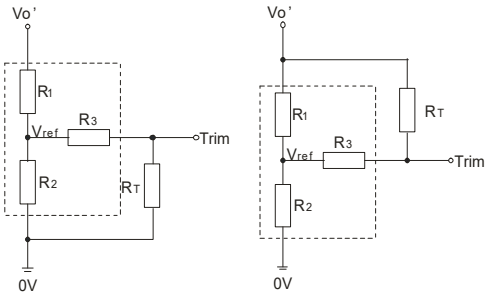
Fig. 3

Notes:Part ① in the Fig.3 is used for EMC test and part ② for EMI test

Parameter description

Model	Vin:24VDC	Vin:48VDC
FUSE	Choose according to actual input current	
C0/C3	330μF/50V	330μF/100V
C1	1μF/50V	1μF/100V
C2	Refer to the Cout in Fig.2	
LDM1	4.7μH/3.1A	
CY1/CY2	1nF/2KV	

3. Trim Function for Output Voltage Adjustment(open if unused)



TRIM resistor connection (dashed line shows internal resistor network)

Calculating Trim resistor values:

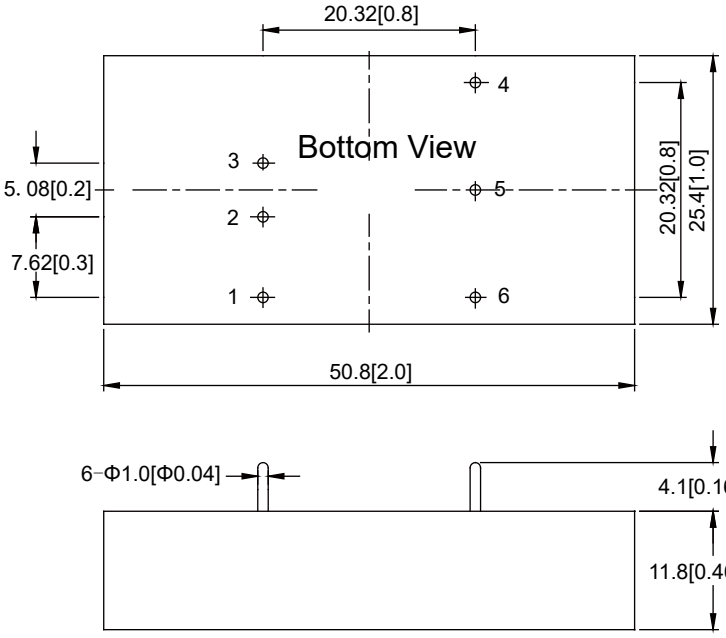
$$up: R_T = \frac{aR_2}{R_2 - a} - R_3 \qquad a = \frac{Vref}{Vo' - Vref} \cdot R_1$$

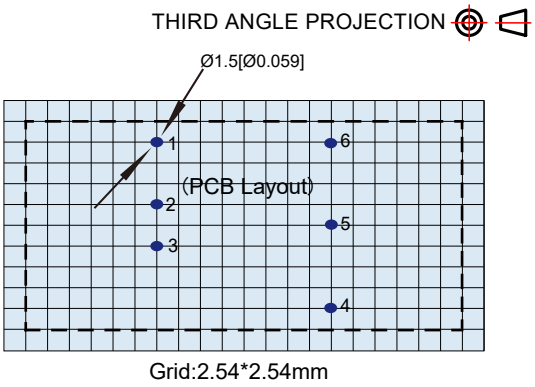
$$down: R_T = \frac{aR_1}{R_1 - a} - R_3 \qquad a = \frac{Vo' - Vref}{Vref} \cdot R_2$$

RT=Trim Resistor value;
a= self-defined parameter.

Vout(V)	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)
3.3	4.801	2.87	12.4	1.24
5	2.883	2.87	10	2.5
9	7.500	2.87	15	2.5
12	11.000	2.87	15	2.5
15	14.494	2.87	15	2.5
24	24.872	2.87	17.8	2.5

Horizontal Package(without heat sink)Dimensions and Recommended Layout

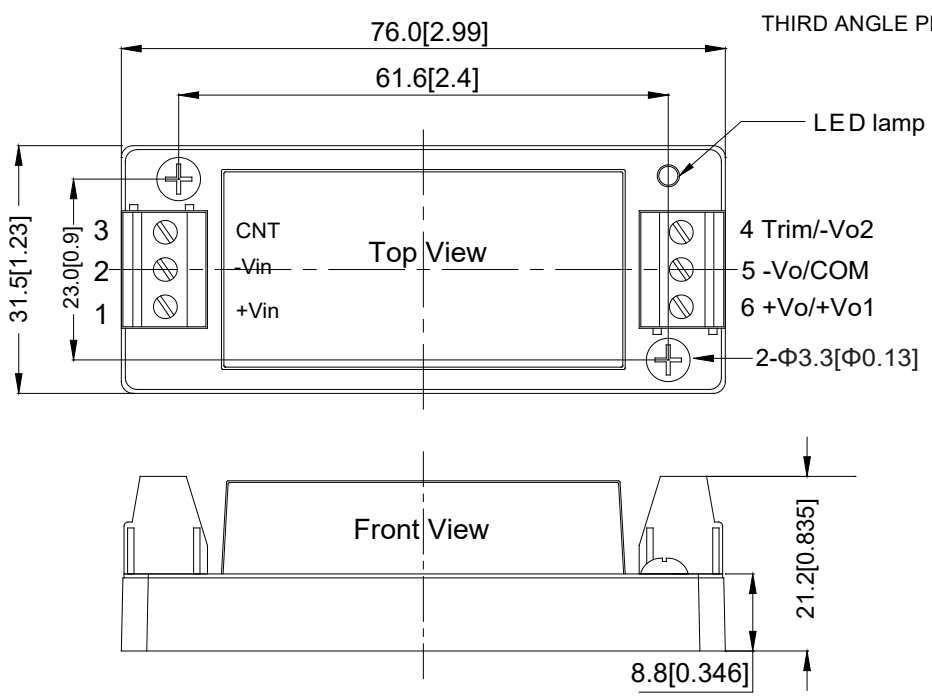




Note:
Unit:mm[inch]
Pin diameter tolerances:±0.1[±0.004]
General tolerances:±0.5[±0.02]

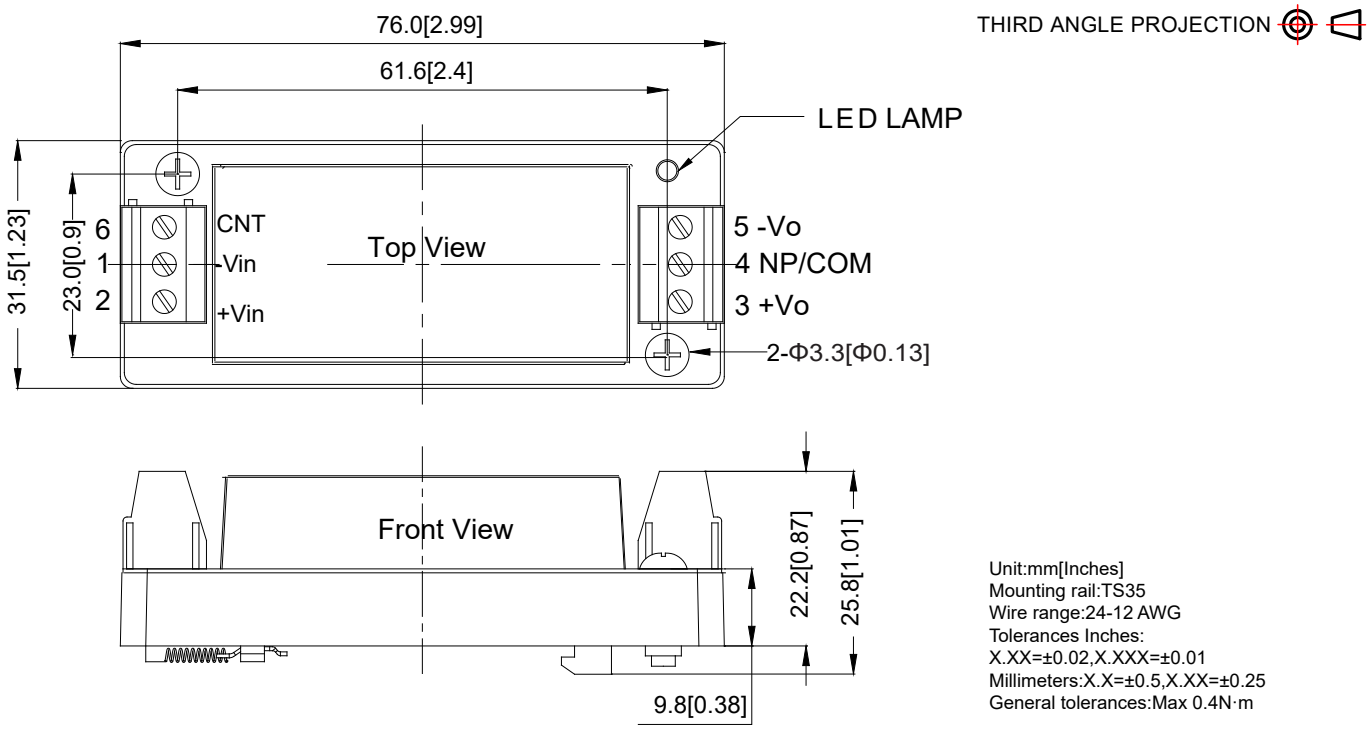
Pin	1	2	3	4	5	6
Single	CNT	-Vin	+Vin	+Vo	TRIM	-Vo
Dual	CNT	-Vin	+Vin	+Vo1	COM	-Vo2

Z1 Package Dimensions (without heat sink)



Note:
Unit:mm[inch]
Wire range:24-12 AWG
Tightening torque:Max 0.4N·m
General tolerances:±0.5[±0.02]

CFDM20-24S05Z4(without heat sink)Dimensions



Unit:mm[Inches]
Mounting rail:TS35
Wire range:24-12 AWG
Tolerances Inches:
X.XX=±0.02,X.XXX=±0.01
Millimeters:X.X=±0.5,X.XX=±0.25
General tolerances:Max 0.4N·m

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