AQ432

1.24V Shunt Ref/Amplifier
TO-92, SOT23, SC70 Package

Product Specification | Revision 1.0 | May 15, 2007

General Description

The AQ432 is a low voltage reference/ amplifier suited for the control loop of low voltage power supplies. Functionally similar to the ubiquitous TL431, the AQ432 has a lower 1.24V reference and a much wider range of operating currents. Particular care was taken in the design to minimize overshoot at startup and to allow wide AC bandwidth.

Unlike other 1.24V reference/amplifiers, the AQ432 is designed to be stable under all conditions and does not suffer from the common overshoot issued associated with other parts low voltage parts

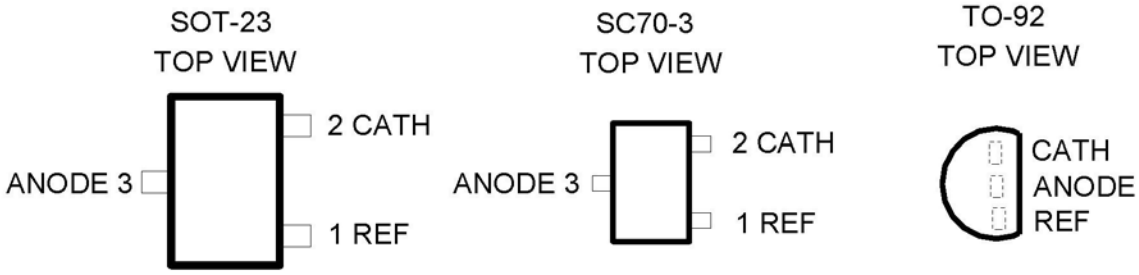
Applications

- Power supply control loop
- Low TC low voltage reference
- Power management applications
- Direct replacement for AP432, AS432, SPX432, TLV431, and LMV431

Features

- Low voltage reference: 1.24V
- 40 uA to 100 mA operation
- Low TC voltage reference
- Improved AC, DC performance compared to 1.24V part types
- Offered in ultra small SC70 package
- **RoHS compliant**

Pin Configuration



Pin Descriptions

Pin Name	Function
CATH	Output and supply terminal, must be greater than 1.2V for normal operation
REF	Input, nominally 1.24V in normal operation.
ANODE	Ground and Substrate

Ordering Information

Device	Operating Tj	%Tol	PKG Type	VOUT	Wrap	Ordering Number
AQ432	-40C° ≤ 105C°	1.0	TO-92-3	1.24V	T&R	AQ432BY-N3-12-TRL
AQ432	-40C° ≤ 105C°	0.5	SOT-23-3	1.24V	T&R	AQ432BZ-N3-12-TRL
AQ432	-40C° ≤ 105C°	1.0	SOT-23-3	1.24V	T&R	AQ432BYM3-12-TRL
AQ432	-40C° ≤ 105C°	0.5	SOT-23-3	1.24V	T&R	AQ432BZM3-12-TRL
AQ432	-40C° ≤ 105C°	1.0	SC70-3	1.24V	T&R	AQ432BY-C3-12-TRL
AQ432	-40C° ≤ 105C°	0.5	SC70-3	1.24V	T&R	AQ432BZ-C3-12-TRL

Note: The TRL parts are Lead Free and RoHS compliant.

Absolute Maximum Ratings

Stress greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These stress ratings only, and functional operation of the device at these or any conditions beyond those indicated under recommended Operating Conditions is not implied. Exposure to "Absolute Maximum Rating" for extended periods may affect device reliability. Use of standard ESD handling precautions is required.

Parameter	Value	Units
CATH Voltage	18	V
REF Current	3	mA
CATH, ANODE Currents	150	mA
Operating Junction Temperature	150	ºC
Lead Temperature (soldering 10 seconds)	260	ºC
Storage Temperature Range	-65 to +150	ºC

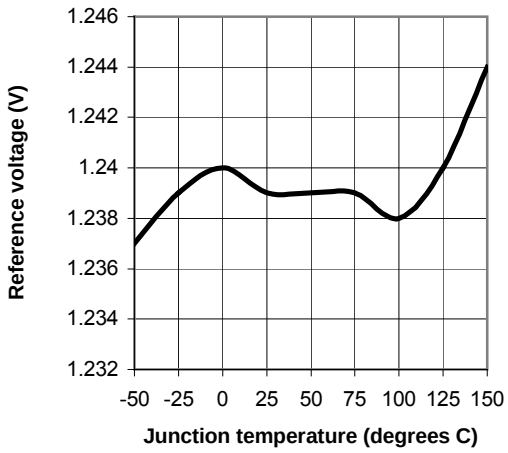
Electrical Specifications

Electrical characteristics are guaranteed over the full temperature range –40ºC <Tj<105ºC unless otherwise stated. Ambient temperature must be de-rated based upon power dissipation and package thermal characteristics.

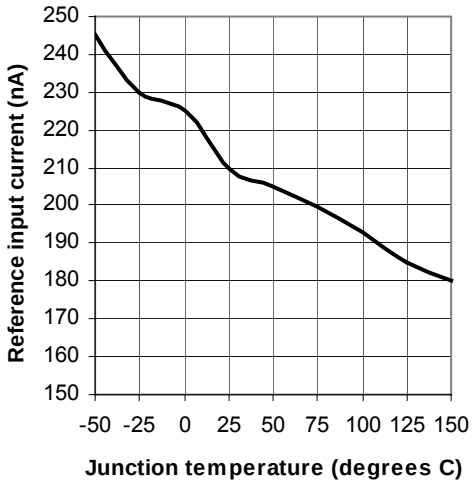
Symbol	Parameter	Conditions		Min	Typ	Max	Units
V_{REF}	Reference Voltage	25ºC; $V_{REF}=V_{CATH}$; I_{CATH} =10mA	0.5% option	1.234	1.240	1.246	V
			1.0% option	1.228	1.240	1.252	V
ΔV_{REF}	V_{REF} Temperature deviation	–40ºC <Tj<105ºC.			4	12	mV
$\frac{\Delta V_{REF}}{\Delta V_{CATH}}$	Ratio of V_{REF} Change to V_{CATH} Change (Line Reg; 1/gain)	I_{CATH}=10mA, V_{CATH} = V_{REF} to 6V			0.3	1	mV/V
I_{REF}	Reference input current	I_{CATH}=10mA			0.2	0.4	µA
ΔI_{REF}	I_{REF} Temperature Deviation				0.04	0.2	µA
$I_{CATH(min)}$	Minimum Cathode Current				18	40	µA
$I_{CATH(OFF)}$	Off-State Cathode Current	V_{REF}=0V; V_{CATH}=16V				100	nA
r_{CATH}	Dynamic Output Impedance	I_{CATH}=0.1 to 100mAf ≤ 1.0 kHz			0.3	0.4	Ω

Typical Performance Characteristics

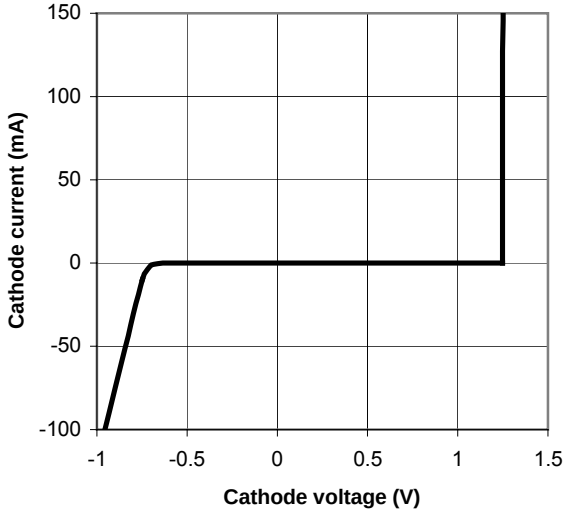
Reference voltage vs Junction temperature



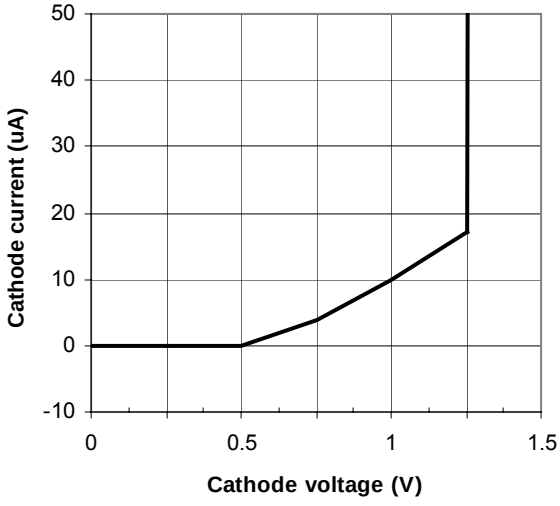
Reference input current vs junction temperature



Cathode current vs Cathode voltage

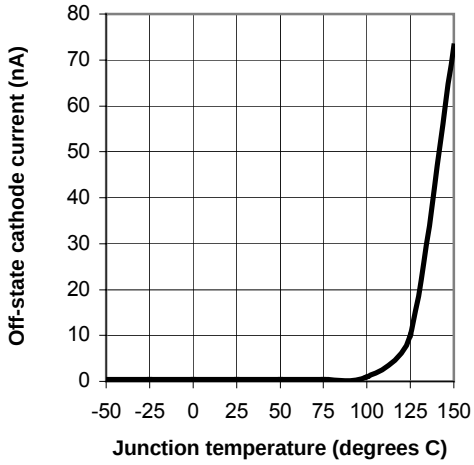


Cathode current vs Cathode voltage

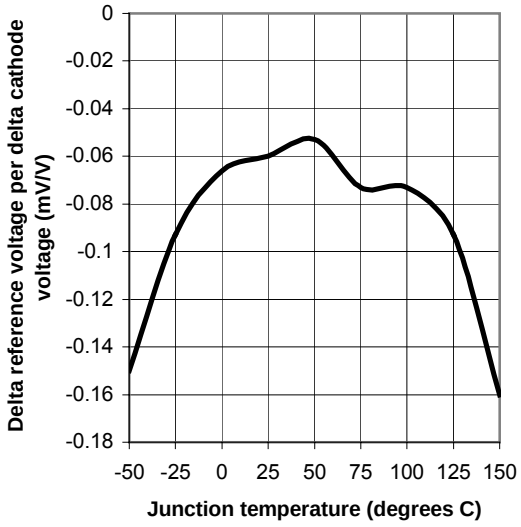


Typical Performance Characteristics (contd.)

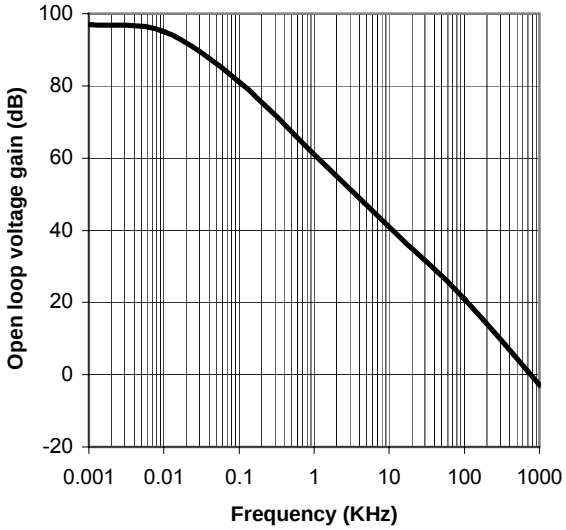
Off-state cathode current vs Junction temperature



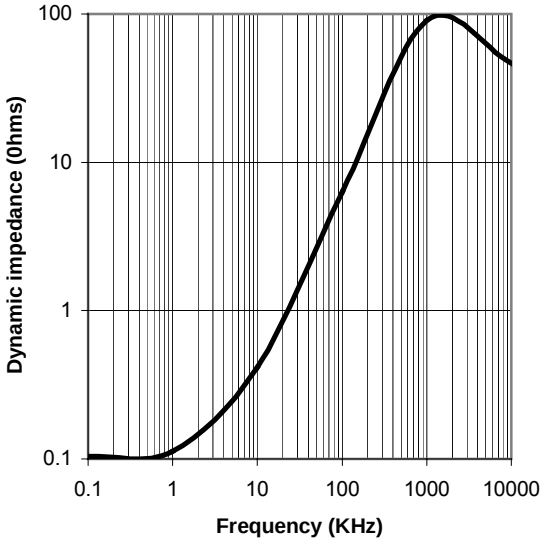
Delta Reference voltage per delta cathode voltage vs junction temperature



Open lop voltage gain vs frequency

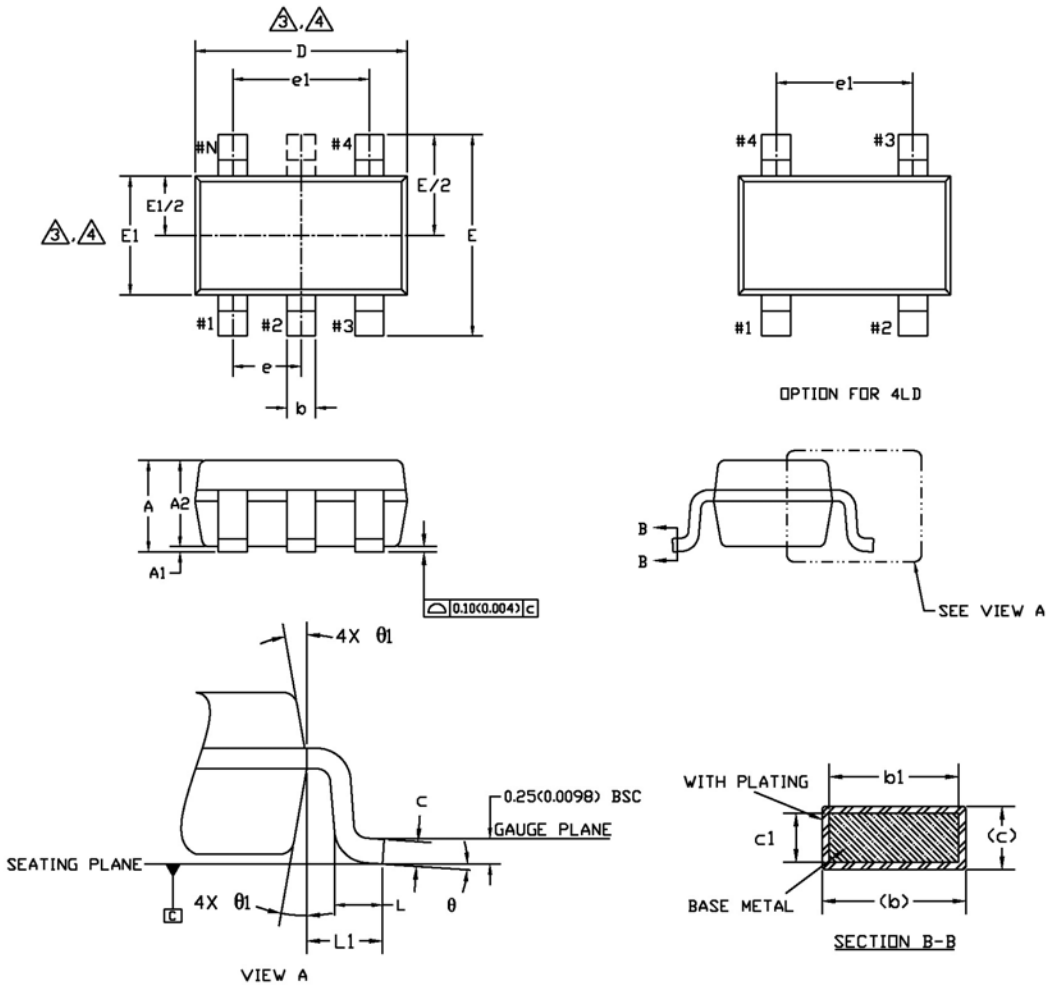


Dynamic impedance vs frequency



Package Dimensions

SOT23-3, SOT23-4, SOT23-5, SOT23-6



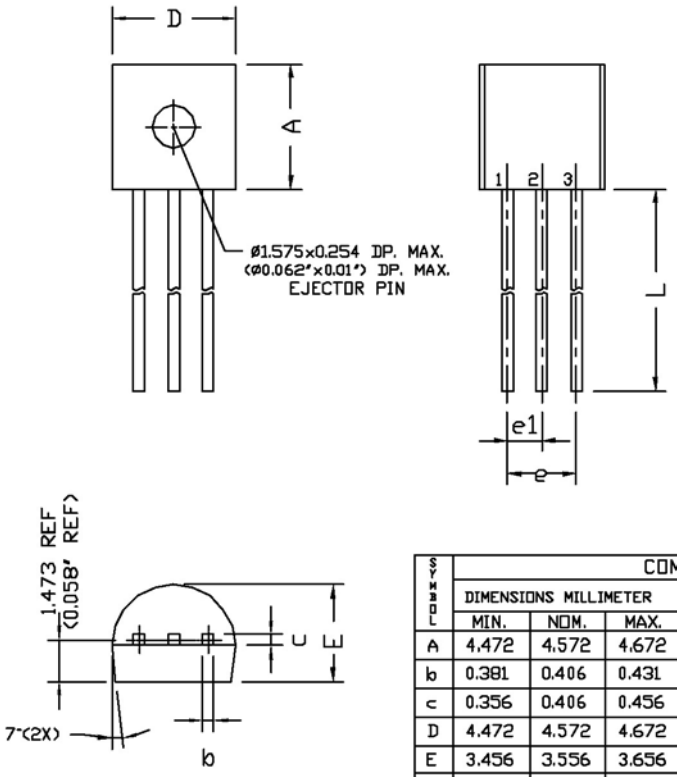
SYMBOL	COMMON					
	DIMENSIONS MILLIMETER			DIMENSIONS INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	1.20	1.30	1.40	0.047	0.051	0.055
A1	0.05	-	0.15	0.002	-	0.006
A2	0.90	1.15	1.30	0.035	0.045	0.051
b	0.35	-	0.50	0.013	-	0.020
b1	0.35	0.40	0.45	0.013	0.015	0.017
c	0.08	-	0.22	0.003	-	0.008
c1	0.08	0.13	0.20	0.003	0.005	0.007
D	2.90 BSC			0.114 BSC		
E	2.80 BSC			0.110 BSC		
E1	1.60 BSC			0.062 BSC		
e	0.95 BSC			0.037 BSC		
e1	1.90 BSC			0.074 BSC		
L	0.35	0.45	0.55	0.013	0.017	0.021
L1	0.60 REF.			0.023 REF.		
θ	0°	4°	8°	0°	4°	8°
θ1	10° TYP			10° TYP		

NOTE :

1. Dimensioning and tolerancing per ASME Y 14.5 M - 1994.
2. Dimensions are in millimeters.Converted inch dimension are not necessarily exact.
3. Dimension D does not include mold flash, protrusions or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 0.15 mm per side.
   Dimension E1 does not include interlead flash or protrusion. Interlead flash or protrusion shall not exceed 0.15 mm per side.
4. Top package may be smaller than the bottom package Dimension D and E1 are determine at the outermost extremes of the plastic body exclusive of mold flash gate burrs and interlead flash.
5. Terminal numbers are shown for reference only. Die is facing up for molding. Die is facing down for trim/form.

Package Dimensions

TO92-2, TO92-3



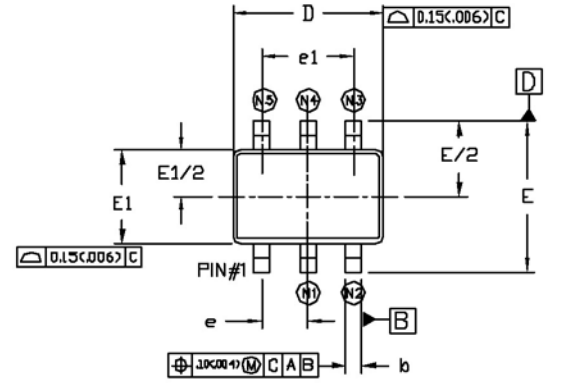
SYMBOL	COMMON					
	DIMENSIONS MILLIMETER			DIMENSIONS INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	4.472	4.572	4.672	0.176	0.180	0.184
b	0.381	0.406	0.431	0.015	0.016	0.017
c	0.356	0.406	0.456	0.014	0.016	0.018
D	4.472	4.572	4.672	0.176	0.180	0.184
E	3.456	3.556	3.656	0.136	0.140	0.144
e	2.413	2.540	2.667	0.095	0.100	0.105
e1	1.143	1.270	1.397	0.045	0.050	0.055
L	13.87	13.97	14.07	0.546	0.550	0.554

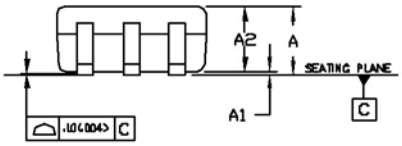
NOTES :

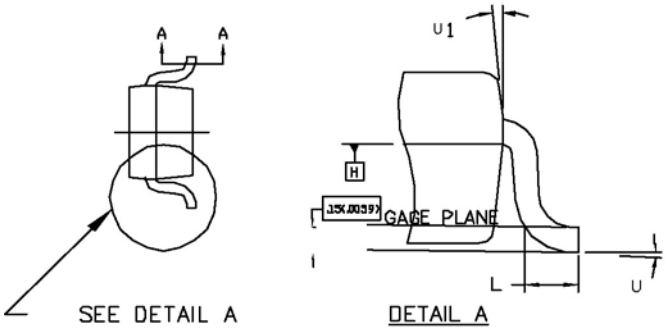
1. CONTROLLING DIMENSION : MILLIMETER. CONVERTED INCH DIMENSION ARE NOT NECESSARILY EXACT.
2. DIMENSIONING AND TOLERANCING PER ANSI Y14.5, 1973.
3. FOR 2 LEAD PACKAGE CENTER LEAD IS CLIPPED

Package Dimensions

SC70-3, SC70-4, SC70-5, SC70-6



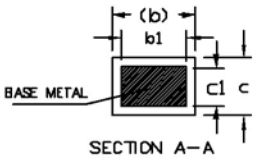




NOTE :

1. CONTROLLING DIMENSION : MILLIMETER. CONVERTED INCH DIMENSION ARE NOT NECESSARILY EXACT.
2. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M-1994.
3. DIMENSION "D" DOES NOT INCLUDE MOLD FLASH,PROTRUSION OR GATE BURR, MOLD FLASH,PROTRUSION OR GATE BURR SHALL NOT EXCEED 0.15MM(0.006") PER END. DIMENSION E1 DO NOT INCLUDE INTER-LEAD FLASH OR PROTRUSION,INTER-LEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.15MM (0.006") PER SIDE.
4. THE PACKAGE TOP BE SMALLER THAN THE PACKAGE BOTTOM. DIMENSION D AND E1 ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY EXCLUSIVE OF MOLD FLASH TIE BAR BURRS, GATE BURRS AND (INTERLEAD FLASH, BUT INCLUDING ANY MISMATCH BETWEEN THE TOP AND BOTTOM OF THE PLASTIC BODY

SYMBOL	COMMON					
	DIMENSIONS MILLIMETER			DIMENSIONS INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.80	–	1.10	0.031	–	0.043
A1	0	–	0.10	0	–	0.004
A2	0.80	0.90	1.00	0.031	0.035	0.040
b	0.15	–	0.30	0.006	–	0.012
b1	0.15	0.20	0.25	0.006	0.008	0.010
c	0.08	–	0.25	0.003	–	0.010
c1	0.08	0.13	0.20	0.003	0.005	0.008
D	1.90	2.10	2.15	0.074	0.082	0.084
E	2.00	2.10	2.20	0.078	0.082	0.086
E1	1.15	1.25	1.35	0.045	0.050	0.055
e	0.65 BSC			0.0255 BSC		
e1	1.30 BSC			0.0512 BSC		
L	0.26	0.36	0.46	0.010	0.014	0.018
U	0°	–	8°	0°	–	8°
U1	4°	–	10°	4°	–	10°



PIN CODE	LEAD COUNT			
	3	4	5	6
N1	–	–	2	2
N2	2	2	3	3
N3	–	3	4	4
N4	3	–	–	5
N5	–	4	5	6

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