

XB1085 Series

3.0A Positive Voltage Regulator

■ GENERAL DESCRIPTION

The XB1085 is a series of low dropout positive voltage regulators with a high output current capacity of 3.0A.

Stable output can be maintained by using 10 μ F (C_{IN}) and 22 μ F (C_L) of tantalum capacitors.

The fixed voltage types (XB1085P series) are available in 1.5V, 1.8V, 2.5V, 3.3V, and 5.0V. The voltage adjustable type (XB1085K series) is also available which can set the output voltage with only two external resistors.

With an overcurrent and thermal protection circuit built-in, the IC is disabled for protection when an output current reaches limit current or junction temperature increases up to limit temperature.

The XB1085 series is available in TO-252 package.

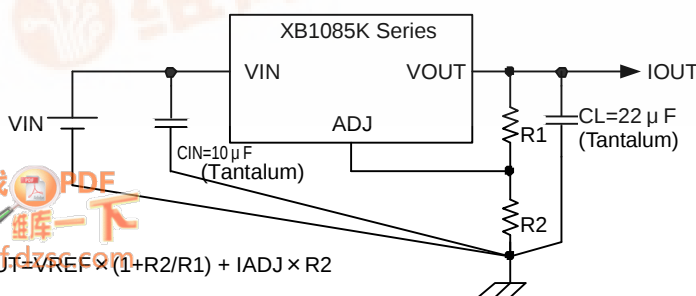
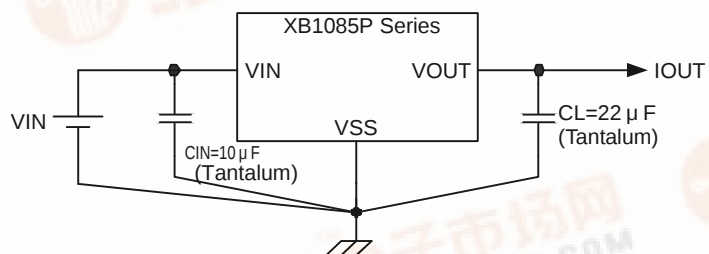
■ APPLICATIONS

- High efficiency linear regulators
- Battery chargers
- DVD drives
- Set top boxes
- Various battery drive equipment

■ FEATURES

Maximum Output Current	: More than 3.0A (within Pd)
Maximum Operating Voltage	: 12V
Output Voltage	: 1.5V, 1.8V, 2.5V, 3.3V, 5.0V, (XB1085P) Externally Set (XB1085K/ Reference Voltage 1.25V (TYP.))
Output Voltage Accuracy	: $\pm 1\%$ ($T_j = 25^\circ\text{C}$)
Dropout Voltage	: 1.3V @ $I_{OUT} = 3.0\text{A}$ (TYP.)
Line Regulation	: 0.015% (TYP.) <ADJ>
Load Regulation	: 0.1% (TYP.) <ADJ>
Reference Voltage Pin Current	: Less than 120 μ A <ADJ>
Overcurrent Protection Circuit Built-In	
Thermal Protection Circuit Built-In	
Package	: TO-252

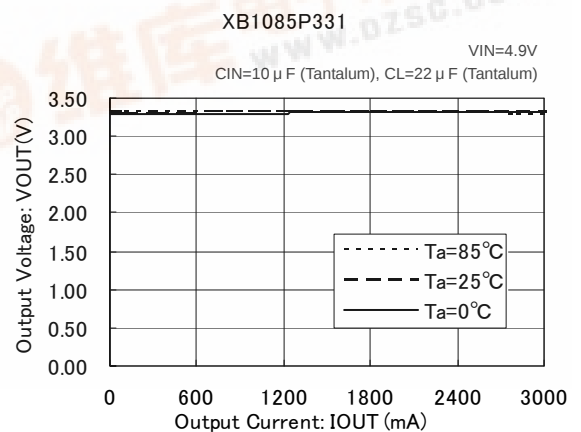
■ TYPICAL APPLICATION CIRCUITS



$$V_{OUT} = V_{REF} \times (1 + R_2/R_1) + I_{ADJ} \times R_2$$

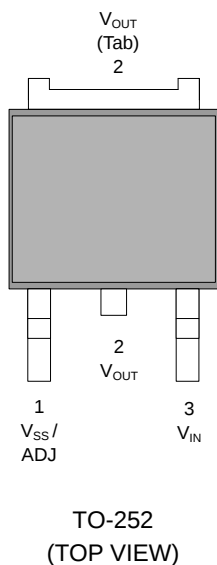
■ TYPICAL PERFORMANCE CHARACTERISTICS

- Output Voltage vs. Output Current



XB1085 Series

■ PIN CONFIGURATION



■ PIN ASSIGNMENT

PIN NUMBER	PIN NAME	FUNCTIONS
TO-252		
1	VSS / ADJ	Ground / Reference Voltage
2	VOUT	Output
3	VIN	Input

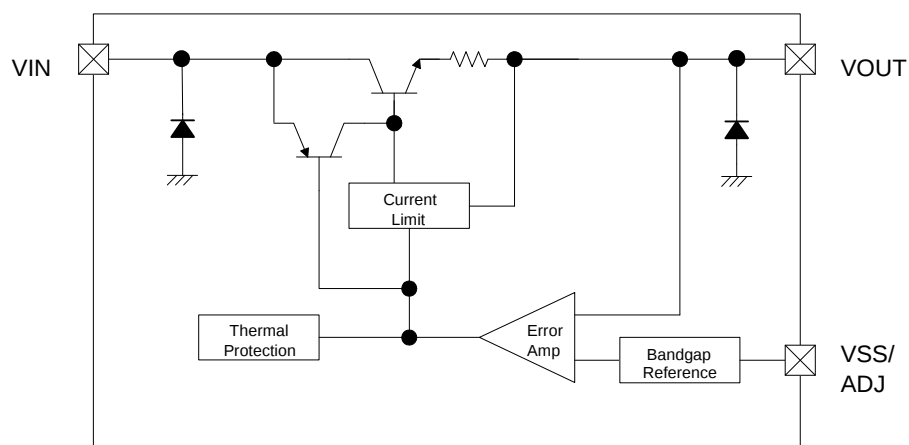
■ PRODUCT CLASSIFICATION

• Ordering Information

XB1085

DESIGNATOR	DESCRIPTION	SYMBOL	DESCRIPTION
	Type of Regulators	P	: Fixed V _{OUT}
		K	: Adjustable (Externally Set)
	Output Voltage and Output Voltage Accuracy	151	: V _{OUT} =1.5V (± 1%)
		181	: V _{OUT} =1.8V (± 1%)
		251	: V _{OUT} =2.5V (± 1%)
		331	: V _{OUT} =3.3V (± 1%)
		501	: V _{OUT} =5.0V (± 1%)
		12B	: V _{REF} =1.25V (± 1%)
	Package	J	: TO-252
	Device Orientation	R	: Embossed tape, standard feed
		L	: Embossed tape, reverse feed

■ BLOCK DIAGRAM



*Diodes inside the circuit are ESD protection diodes.

■ ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	RATINGS	UNIT
Input Voltage		V_{IN}	18	V
Power Dissipation	TO-252	P_d	1300 ^(*2)	mW
Operating Junction Temperature		T_j	125	
Storage Temperature Range		T_{stg}	- 55 ~ 125	

Note:

*1: Stresses greater than those listed above ratings may cause permanent damage to the device.

*2: The rating of the power dissipation is determined when mounted on the PCB.

XB1085 Series

■ ELECTRICAL CHARACTERISTICS

XB1085PxxxJ

Tj= 25 unless otherwise specified

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT	CIRCUIT
Output Voltage	V _{OUT} (1.5V)	V _{IN} =4.5V, I _{OUT} =0mA	1.485	1.5	1.515	V	
		O.T. ^(*)	1.47		1.53		
	V _{OUT} (1.8V)	V _{IN} =4.8V, I _{OUT} =0mA	1.782	1.8	1.818	V	
		O.T. ^(*)	1.764		1.836		
	V _{OUT} (2.5V)	V _{IN} =5.5V, I _{OUT} =0mA	2.475	2.5	2.525	V	
		O.T. ^(*)	2.450	-	2.550		
Line Regulation	V _{OUT} (3.3V)	V _{IN} =6.3V, I _{OUT} =0mA	3.267	3.3	3.333	V	
		O.T. ^(*)	3.234	-	3.366		
	V _{OUT} (5.0V)	V _{IN} =8.0V, I _{OUT} =0mA	4.95	5	5.05	V	
		O.T. ^(*)	4.9		5.1		
Line Regulation	V _{OUT1} (1.5V)	3V V _{IN} 10V I _{OUT} =10mA	-	0.5	6	mV	
		O.T. ^(*)		1	6		
	V _{OUT1} (1.8V)	3.3V V _{IN} 10V I _{OUT} =10mA	-	0.5	6	mV	
		O.T. ^(*)		1	6		
	V _{OUT1} (2.5V)	4V V _{IN} 10V I _{OUT} =10mA	-	0.5	6	mV	
		O.T. ^(*)		1	6		
Load Regulation	V _{OUT1} (3.3V)	4.8V V _{IN} 10V I _{OUT} =10mA	-	0.5	6	mV	
		O.T. ^(*)		1	6		
	V _{OUT1} (5.0V)	6.5V V _{IN} 10V I _{OUT} =10mA	-	0.5	10	mV	
		O.T. ^(*)		1	10		
Load Regulation	V _{OUT2} (1.5V)	V _{IN} -V _{OUT} =3.0V 0mA I _{OUT} 3.0A	-	3	15	mV	
		O.T. ^(*)		7	20		
	V _{OUT2} (1.8V)	V _{IN} -V _{OUT} =3.0V 0mA I _{OUT} 3.0A	-	3	15	mV	
		O.T. ^(*)		7	20		
	V _{OUT2} (2.5V)	V _{IN} -V _{OUT} =3.0V 0mA I _{OUT} 3.0A	-	3	15	mV	
		O.T. ^(*)		7	20		
Load Regulation	V _{OUT2} (3.3V)	V _{IN} -V _{OUT} =3.0V 0mA I _{OUT} 3.0A	-	3	15	mV	
		O.T. ^(*)		7	20		
	V _{OUT2} (5.0V)	V _{IN} -V _{OUT} =3.0V 0mA I _{OUT} 3.0A	-	5	20	mV	
		O.T. ^(*)		10	35		
Dropout Voltage	V _{dif}	V _{OUT} =1%, I _{OUT} =3.0A	-	1.3	1.5	V	
Limit Current	I _{LIM}	V _{IN} -V _{OUT} =3.0V	3.2	4.5	-	A	
Supply Current	I _{DD}	V _{IN} =10V	-	5	10	mA	
Temperature Stability	T _s	V _{IN} -V _{OUT} =1.5V I _{OUT} =10mA	-	0.5	-	%	-

Note:

*1: O.T. denotes the specifications which apply over the operating junction Temperature range (0 Tj 125°C).

Please be sure that the power consumption does not exceed the power dissipation rating 1300mW. If the power consumption exceeds the power dissipation rating and the operating junction temperature rises more than the rating 125°C, the IC enters thermal shutdown state.

■ ELECTRICAL CHARACTERISTICS (Continued)

XB1085K12BJ

T_j = 25 unless otherwise specified

PARAMETER	SYMBOL	CONDITIONS		MIN.	TYP.	MAX.	UNIT	CIRCUIT
Reference Voltage	VREF	VIN-VOUT=3.0V		1.238	1.25	1.262	V	
		IOUT=10mA	O.T. ^(*)	1.225	-	1.275		
Line Regulation	VOUT1	2.85V VIN 10V		-	0.015	0.2	%	
		IOUT=10mA	O.T. ^(*)		0.035	0.2		
Load Regulation	VOUT2	VIN-VOUT=3.0V		-	0.1	0.3	%	
		0mA IOUT 3.0A	O.T. ^(*)		0.2	0.4		
Dropout Voltage	Vdif	VOUT=1%, IOUT=3.0A		-	1.3	1.5	V	
Limit Current	ILIM	VIN-VOUT=3.0V		3.2	4.5	-	A	
Temperature Stability	Ts	VIN-VOUT=1.5V	O.T. ^(*)	-	0.5	-	%	-
Minimum Output Current	IOUTmin	VIN=10V	O.T. ^(*)	-	3	10	mA	
Adjust Voltage Pin Current	IADJ	VIN=4.25V, IOUT=10mA	O.T. ^(*)	-	55	120	μ A	

Note:

*1: O.T. denotes the specifications which apply over the operating junction Temperature range (0 T_j 125°C).

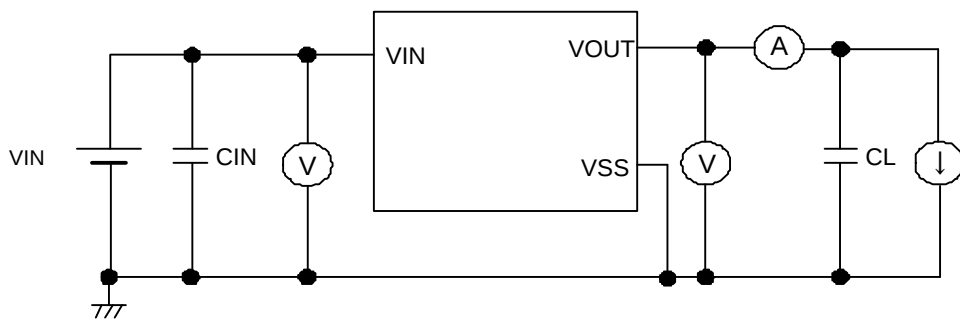
Please be sure that the power consumption does not exceed the power dissipation rating, 1300mW. If the power consumption exceeds the power dissipation rating and the operating junction temperature rises more than the rating, 125°C, the IC enters thermal shutdown state.

XB1085 Series

■ TEST CIRCUITS

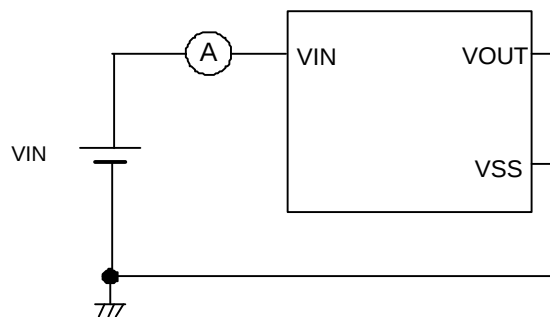
● XB1085PxxxJ

Circuit



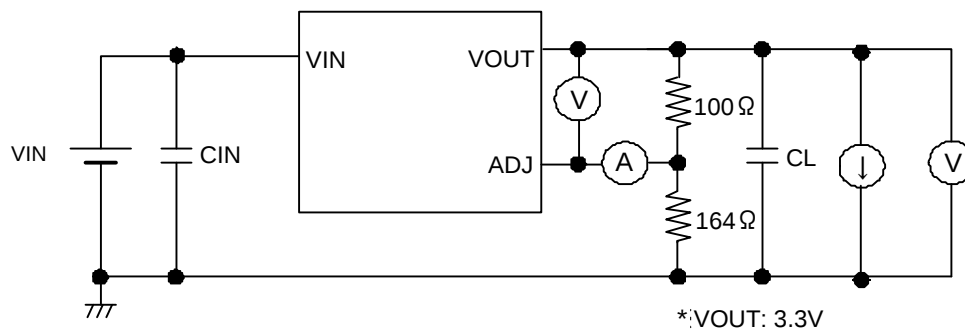
* $C_{IN}=10\ \mu\text{F}$ (Tantalum), $C_L=22\ \mu\text{F}$ (Tantalum)

Circuit



● XB1085K12BJ

Circuit

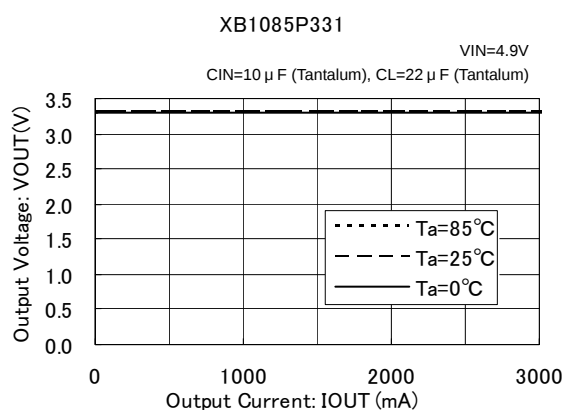


*: $V_{OUT}: 3.3\text{V}$

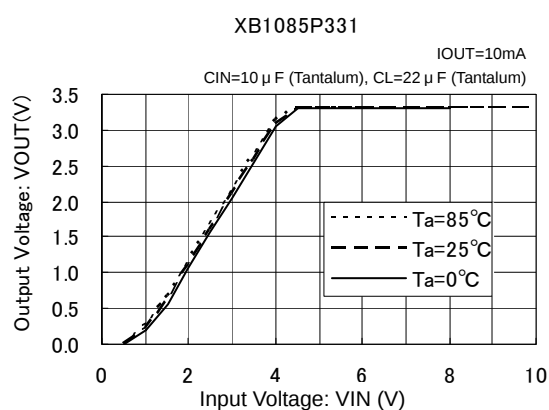
* $C_{IN}=10\ \mu\text{F}$ (Tantalum), $C_L=22\ \mu\text{F}$ (Tantalum)

■ TYPICAL PERFORMANCE CHARACTERISTICS

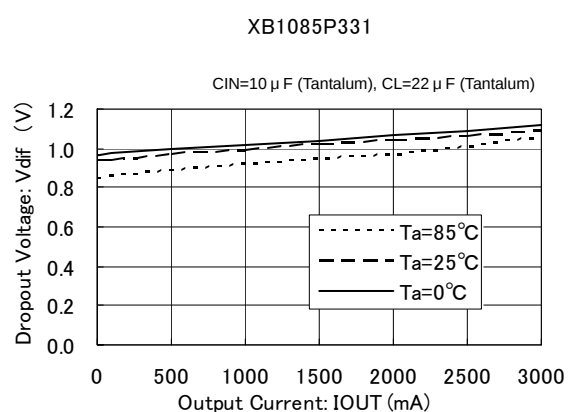
(1) Output Voltage vs. Output Current



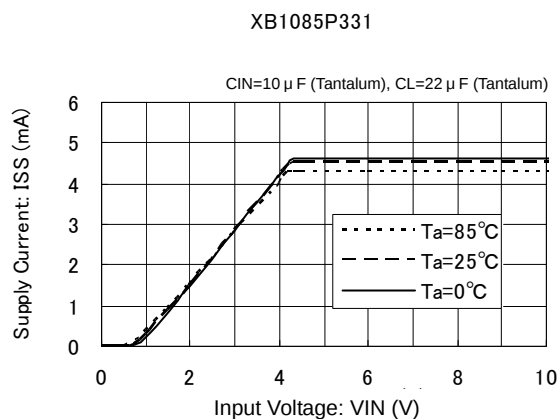
(2) Output Voltage vs. Input Voltage



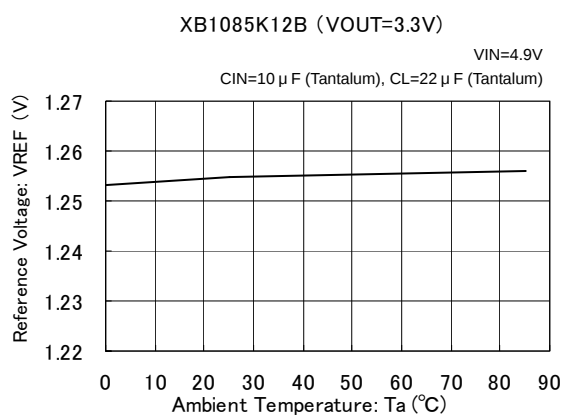
(3) Dropout Voltage vs. Output Current



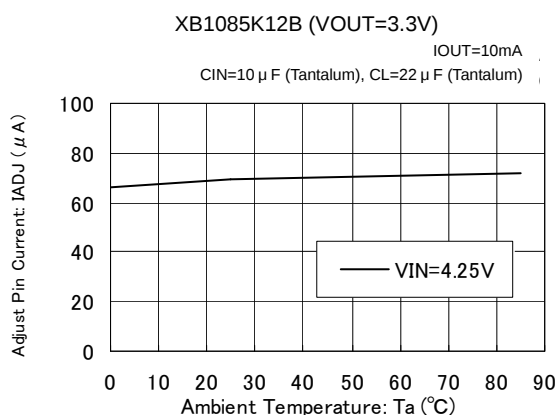
(4) Supply Current vs. Input Voltage



(5) Reference Voltage vs. Ambient Temperature



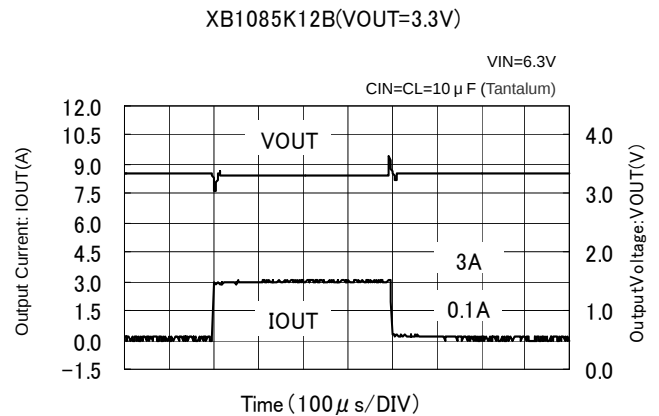
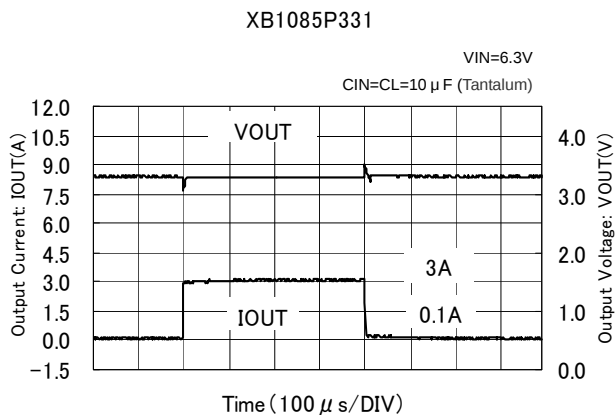
(6) Adjust Pin Current vs. Ambient Temperature



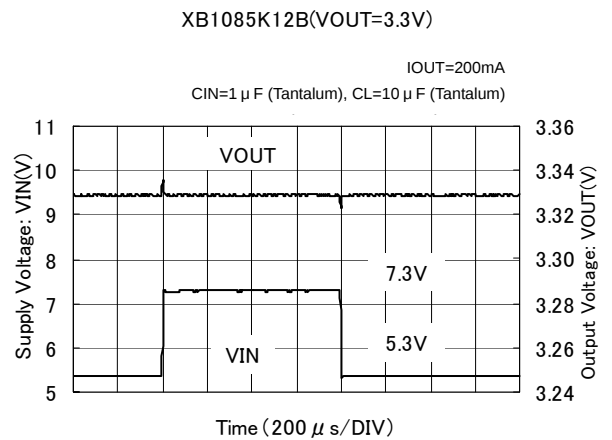
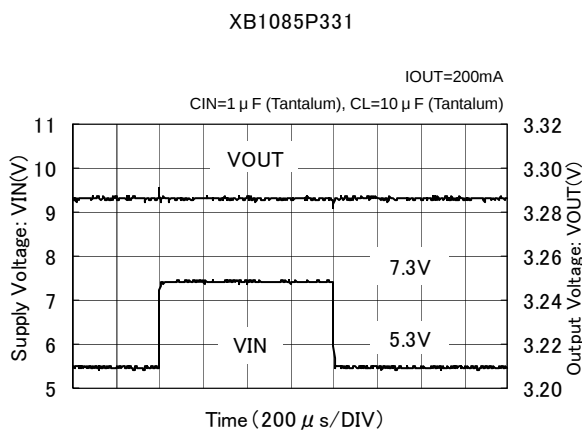
XB1085 Series

■ TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

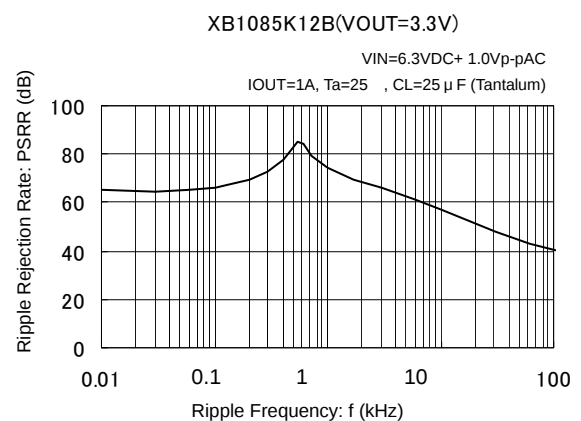
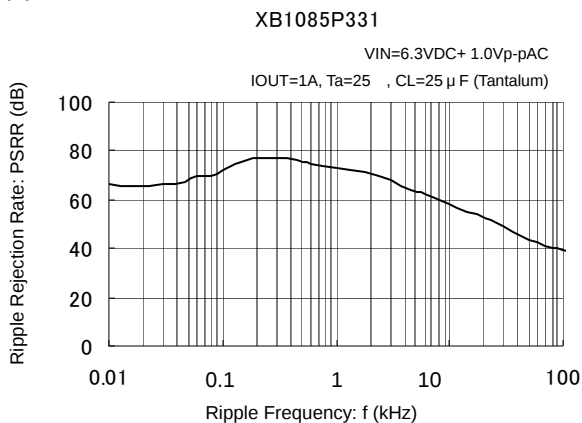
(7) Load Transient Response



(8) Input Transient Response

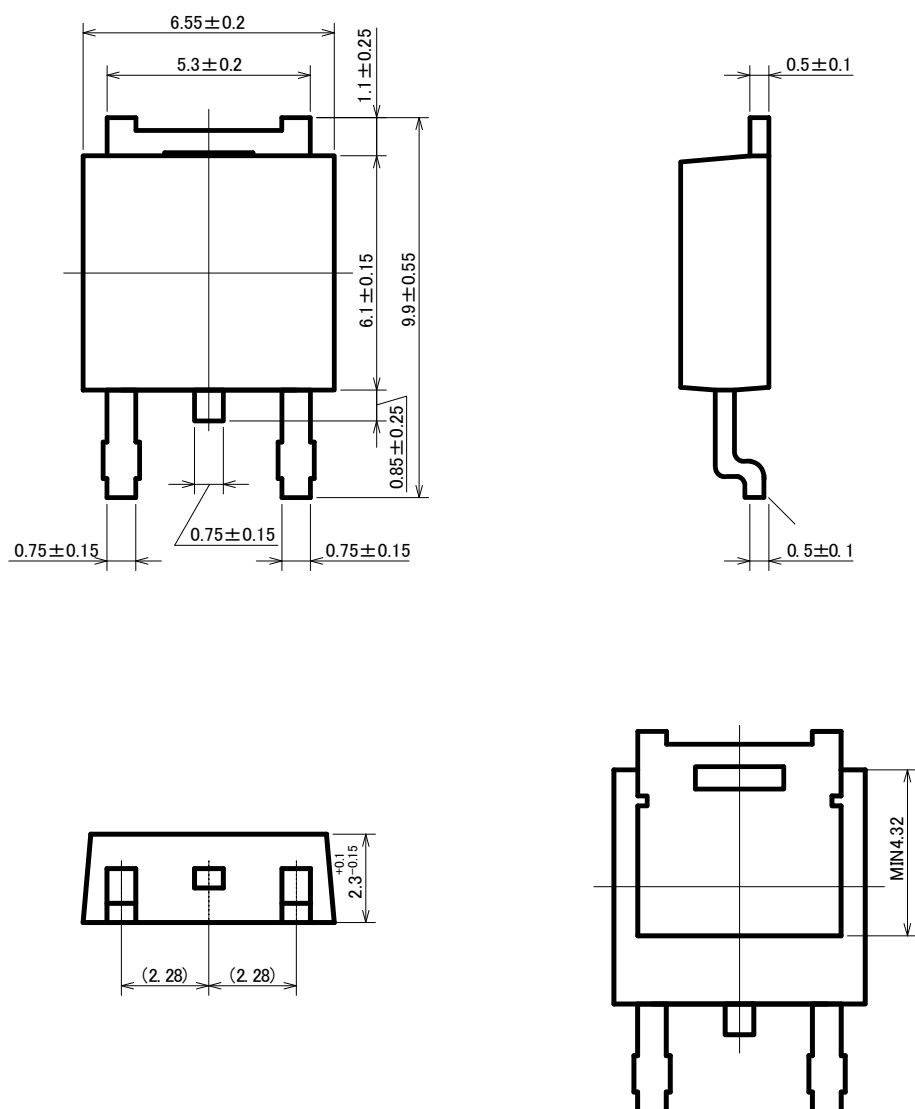


(9) Ripple Rejection Rate



■ PACKAGING INFORMATION

- TO-252

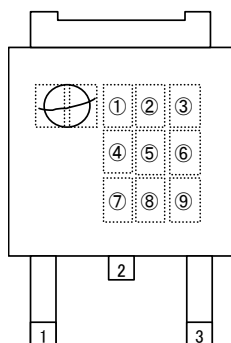


UNIT: mm

XB1085 Series

■ MARKING RULE

● TO-252



TO-252
(TOP VIEW)

Represents product series

MARK		PRODUCT SERIES
8	5	XB1085****J*

Represent the type of regulator

MARK	TYPE	PRODUCT SERIES
P	Fixed Output Type	XB1085P***J*
K	Adjustable (Externally Set)	XB1085K***J*

Represents output voltage

MARK		OUTPUT VOLTAGE	PRODUCT SERIES
1	5	1.5V	XB1085P151J*
1	8	1.8V	XB1085P181J*
2	5	2.5V	XB1085P251J*
3	3	3.3V	XB1085P331J*
5	0	5.0V	XB1085P501J*
1	2	ADJ	XB1082K12BJ*

Represents output voltage accuracy and output type

MARK	OUTPUT VOLTAGE ACCURACY (OUTPUT TYPE)	PRODUCT SERIES
1	1%	XB1085P**1J*
B	Adjustable	XB1085K12BJ*

Represents the last digit of production year

ex.)

MARK	PRODUCTION YEAR
7	2007
8	2008

Represents production lot number

0 to 9, A to Z repeated.

(G, I, J, O, Q, W excepted. '0' of the first digit does not mark.)

* No character inversion used.

ex.)

MARK		PRODUCTION LOT NUMBER
Blank	3	03
1	A	1A

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