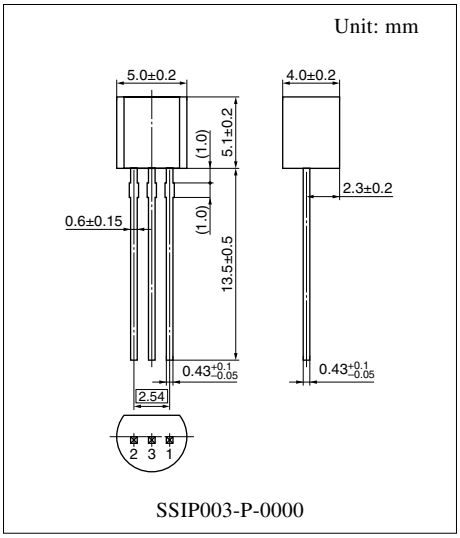
AN1432NT

Variable output, low voltage operation shunt regulator

■ Overview

The AN1432NT is a low voltage operation and positive voltage variable output type shunt regulator. Since the output voltage is adjustable from approximately 1.275 V to 14 V, it is suitable for a power supply of small-sized 3 V-system portable equipment.



■ Features

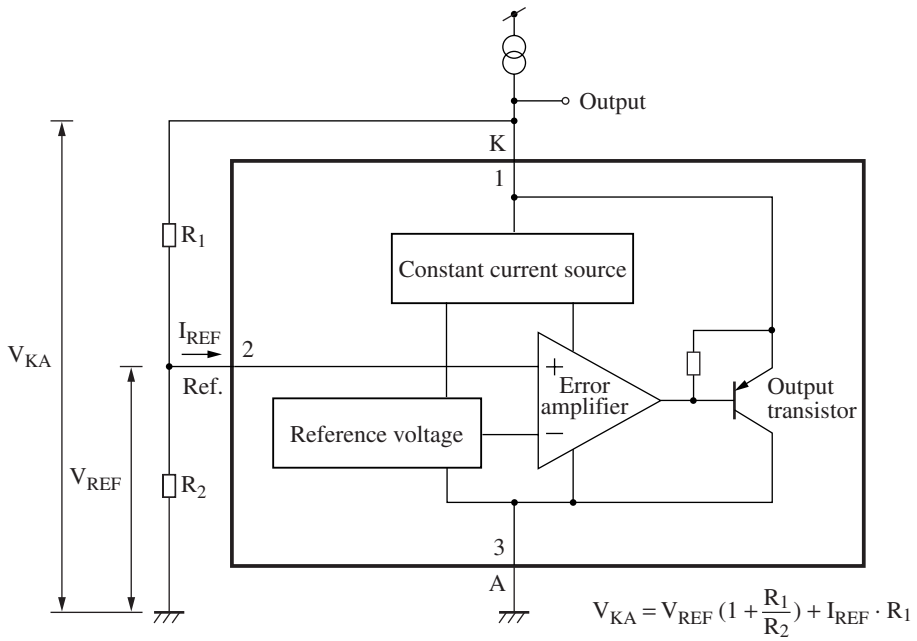
- High accuracy reference voltage: 1.275 V (allowance: ±2%)
- Low voltage operation: 1.275 V to 14 V

■ Applications

- Office automation equipment and other small-sized portable equipment

Note) The value of reference voltage and the package differ from AN1432MS.

■ Block Diagram



■ Pin Descriptions

Pin No.	Description	
1	K: Cathode	The pin for the combined use of the power source current supply of IC and the constant voltage output as the shunt regulator. An excessive current supplied to this pin is bypassed to the anode pin through the output transistor.
2	Reference	The reference voltage (1.275 V typical) pin. Although the impedance is high under the normal using conditions, be careful that the impedance drops and current flows into the IC inside if a current or voltage is forced to apply from the outside.
3	Anode	The constant voltage reference pin of the shunt regulator, and the current from the cathode and reference flows out. Usually grounded.

■ Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Supply voltage	V_K	14.4	V
Reference voltage	V_{REF}	7	V
Supply current	I_K	20	mA
Reference current	I_{REF}	50	μA
Cathode - anode reverse current	$-I_{KA}$	−10	mA
Cathode - reference reverse current	$-I_{KR}$	−10	mA
Power dissipation *2	P_D	340	mW
Operating ambient temperature *1	T_{opr}	−30 to +85	°C
Storage temperature *1	T_{stg}	−55 to +150	°C

Note) 1. Do not apply external currents or voltages to any pins not specifically mentioned.
For circuit currents, '+' denotes current flowing into the IC and '−' denotes current flowing out of the IC.
2. ∗1: Except for the power dissipation, operating ambient temperature and storage temperature, all ratings are for T_a = 25°C.
∗2: The value at T_a = 85°C.

■ Recommended Operating Range

Parameter	Symbol	Range	Unit
Supply voltage	V_{CC}	V_{REF} to 14	V

Note) The value of reference voltage differs from AN1432MS (surface mounting package).

■ Electrical Characteristics at T_a = 25°C

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reference voltage	V_{REF}	$V_{KA} = V_{REF}$, I_K = 10 mA	1.249	1.275	1.30	V
Reference voltage fluctuation 1	$\Delta V_{REF} / \Delta V_{KA}$	$\lvert V_{REF} \rvert \le V_{KA} \le 5$ V, I_K = 10 mA	—	1.9	3.5	mV/V
Reference voltage fluctuation 2	$\Delta V_{REF} / \Delta V_{KA}$	5 V ≤ V_{KA} ≤ 15 V, I_K = 10 mA	—	1.0	2.0	mV/V
Reference input current	I_{REF}	R_I = 10 kΩ, I_K = 10 mA	—	2.5	4.4	µA
Minimum cathode current	$I_{K\ min}$	$V_{KA} = V_{REF}$	—	290	350	µA
Off time cathode current	$I_{K\ OFF}$	V_{KA} = 15 V, V_{REF} = 0 V	—	—	1.0	µA
Dynamic impedance	$\lvert Z_{KA} \rvert$	$V_{KA} = V_{REF}$, f ≤ 1 kHz, I_K = 1 mA to 10 mA	—	0.1	0.5	Ω

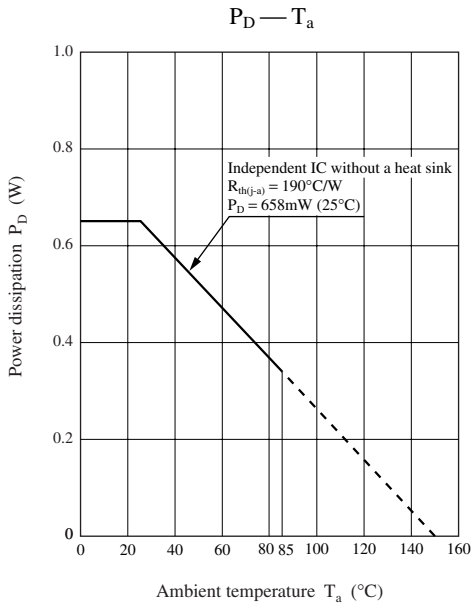
• Design reference data

Note) The characteristics listed below are theoretical values based on the IC design and are not guaranteed.

Parameter	Symbol	Conditions	Reference value	Unit
Reference voltage change with temperature	$\Delta V_{REF} / \Delta T_a$	$V_{KA} = V_{REF}$, I_{KA} = 10 mA 0°C ≤ T_a ≤ +70°C	3	mV
Reference input current change with temperature	$\Delta I_{REF} / \Delta T_a$	R_I =10 kΩ, I_K = 10 mA 0°C ≤ T_a ≤ +70°C	0.4	µA

■ Application Notes

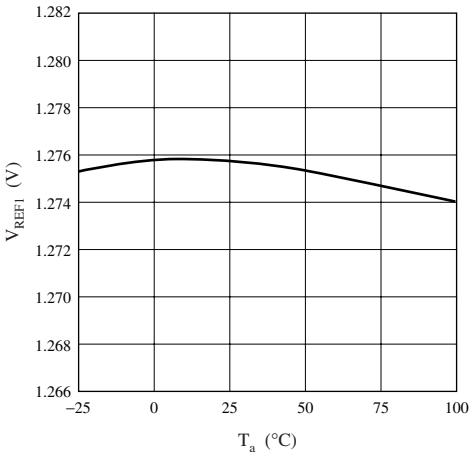
1. P_D — T_a curve of SSIP003-P-0000



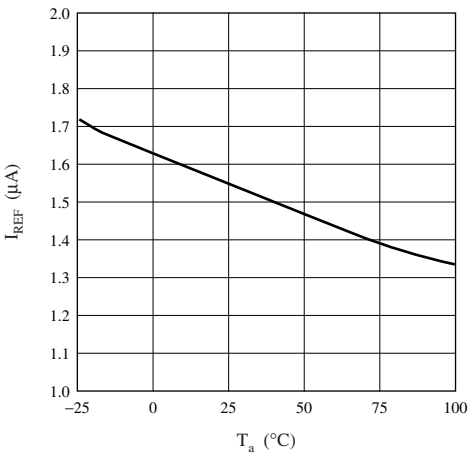
■ Application Notes (continued)

2. Main Characteristics

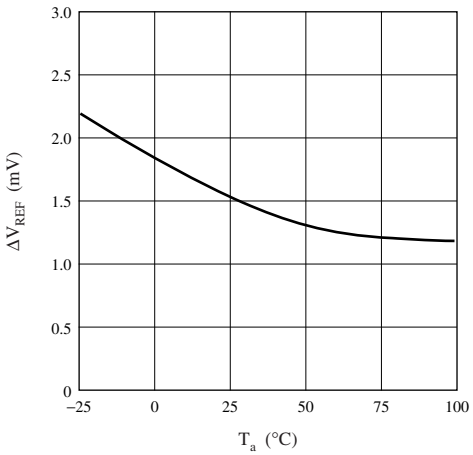
V_{REF1} temperature characteristic



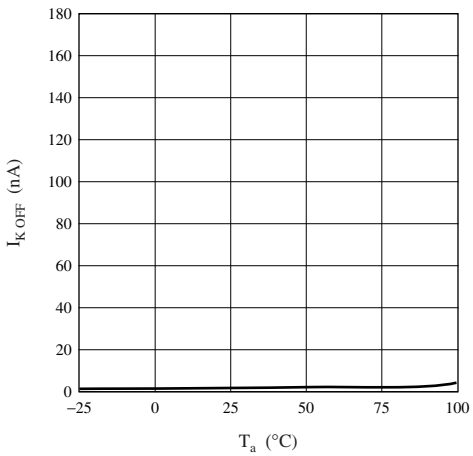
I_{REF} temperature characteristic



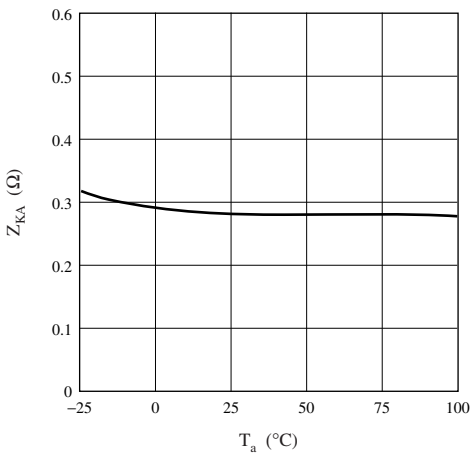
ΔV_{REF} temperature characteristic



$I_{K\ OFF}$ temperature characteristic



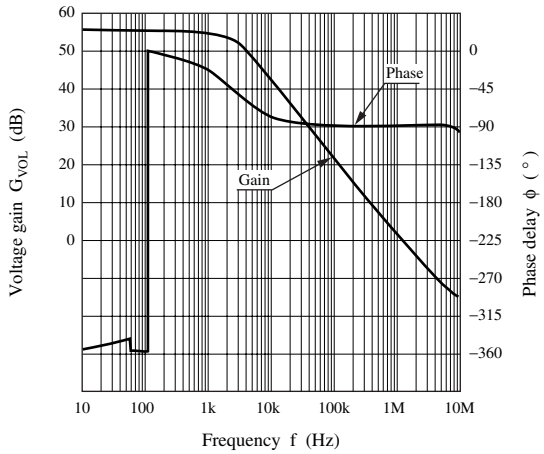
Z_{KA} temperature characteristic



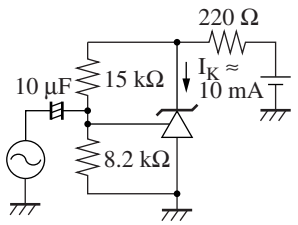
■ Application Notes (continued)

2. Main Characteristics (continued)

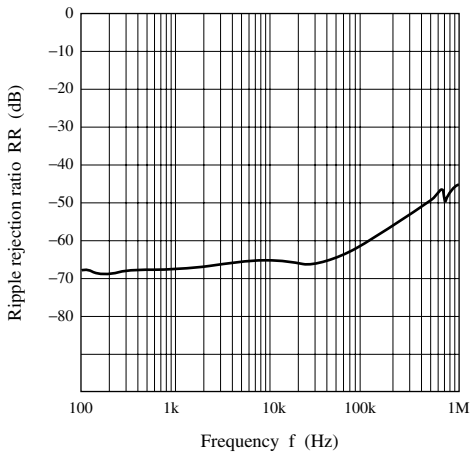
Gain — phase characteristics



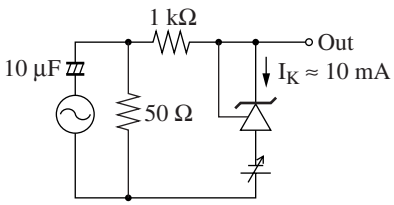
Gain — phase characteristics measurement circuit



Ripple rejection ratio



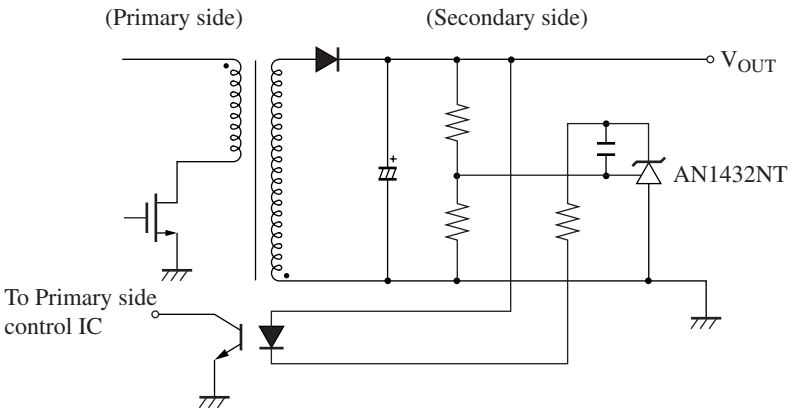
Ripple rejection ratio measurement circuit



■ Application Circuit Example

This circuit amplifies the error voltage of the secondary side output voltage in the insulation type switching power supply, then transfers it to the primary side via a photocoupler.

Replaceable with the conventional products (AN1431M, AN1431T).



Request for your special attention and precautions in using the technical information and semiconductors described in this material

(1) An export permit needs to be obtained from the competent authorities of the Japanese Government if any of the products or technologies described in this material and controlled under the "Foreign Exchange and Foreign Trade Law" is to be exported or taken out of Japan.

(2) The technical information described in this material is limited to showing representative characteristics and applied circuit examples of the products. It does not constitute the warranting of industrial property, the granting of relative rights, or the granting of any license.

(3) The products described in this material are intended to be used for standard applications or general electronic equipment (such as office equipment, communications equipment, measuring instruments and household appliances).
Consult our sales staff in advance for information on the following applications:
- Special applications (such as for airplanes, aerospace, automobiles, traffic control equipment, combustion equipment, life support systems and safety devices) in which exceptional quality and reliability are required, or if the failure or malfunction of the products may directly jeopardize life or harm the human body.
- Any applications other than the standard applications intended.

(4) The products and product specifications described in this material are subject to change without notice for reasons of modification and/or improvement. At the final stage of your design, purchasing, or use of the products, therefore, ask for the most up-to-date Product Standards in advance to make sure that the latest specifications satisfy your requirements.

(5) When designing your equipment, comply with the guaranteed values, in particular those of maximum rating, the range of operating power supply voltage and heat radiation characteristics. Otherwise, we will not be liable for any defect which may arise later in your equipment.
Even when the products are used within the guaranteed values, redundant design is recommended, so that such equipment may not violate relevant laws or regulations because of the function of our products.

(6) When using products for which dry packing is required, observe the conditions (including shelf life and after-unpacking standby time) agreed upon when specification sheets are individually exchanged.

(7) No part of this material may be reprinted or reproduced by any means without written permission from our company.

Please read the following notes before using the datasheets

A. These materials are intended as a reference to assist customers with the selection of Panasonic semiconductor products best suited to their applications.
Due to modification or other reasons, any information contained in this material, such as available product types, technical data, and so on, is subject to change without notice.
Customers are advised to contact our semiconductor sales office and obtain the latest information before starting precise technical research and/or purchasing activities.

B. Panasonic is endeavoring to continually improve the quality and reliability of these materials but there is always the possibility that further rectifications will be required in the future. Therefore, Panasonic will not assume any liability for any damages arising from any errors etc. that may appear in this material.

C. These materials are solely intended for a customer's individual use.
Therefore, without the prior written approval of Panasonic, any other use such as reproducing, selling, or distributing this material to a third party, via the Internet or in any other way, is prohibited.

2001 MAR