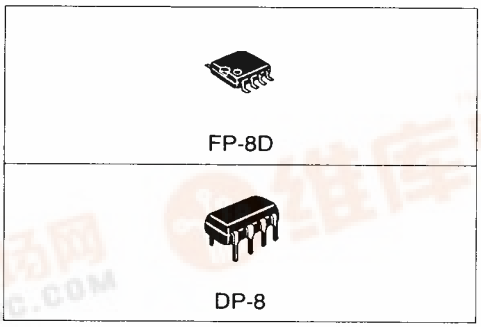
HA17431

Adjustable Precision Shunt Regulator

Description

HA17431 is a temperature-compensated, three terminal adjustable regulator. Output voltage value can be set in the range of V_{ref} (about 2.5V) to 40V with the two external resistors, R1 and R2, shown in figure 1. Dynamic output impedance is 0.2Ω when the frequency is 1KHz or less, which shows the very sharp turn-on characteristic of the HA17431. It can be used not only as a precision power supply but also as a replacement for the simple zener diode.



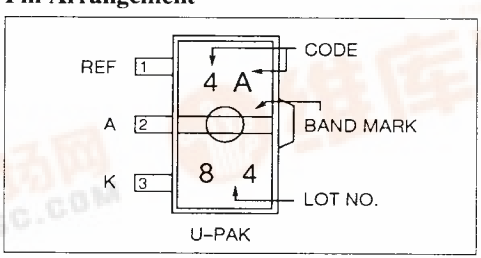
Features

- Internal temperature-compensated reference voltage (50ppm/°C typ.)
- Low quiescent current (400μA typ.)
- SINK current (1mA to 100mA)
- Wide output voltage range (V_{ref} to 40V)

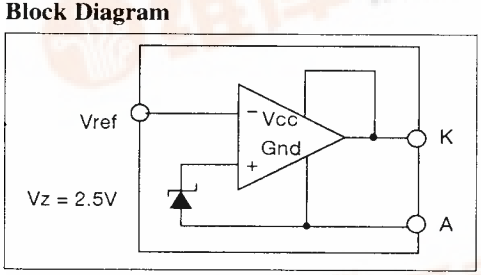
Ordering Information

Type No.	Package
HA17431UA	U-PAK
HA17431FP	FP-8D
HA17431PS	DP-8

Pin Arrangement



Block Diagram



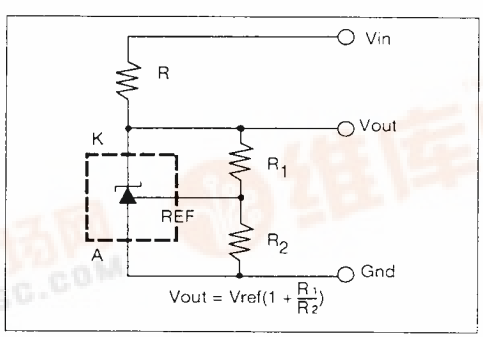


Figure 1.

HITACHI
Hitachi America, Ltd. • Hitachi Plaza • 2000 Sierra Point Pkwy. • Brisbane, CA 94005-1819 • (415) 589-8300

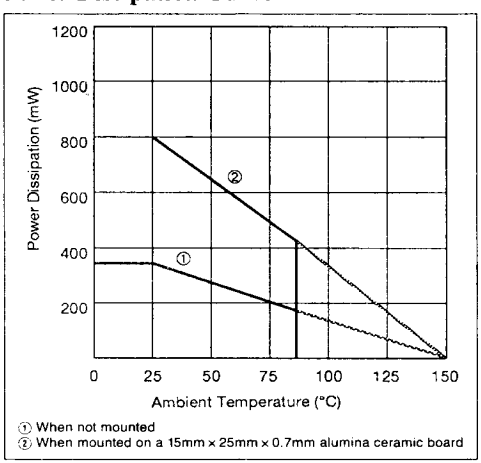
Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	HA17431	Unit
Cathode Voltage	V_{KA}	40	V
Continuous Cathode Current	I_K	−100 to + 150	mA
Reference Input Current	I_{ref}	−0.05 to + 10	mA
Power Dissipation	P_T	800*	mW
Operating Temperature	T_{opr}	−20 to + 85	°C
Storage Temperature	T_{stg}	−55 to + 150	°C

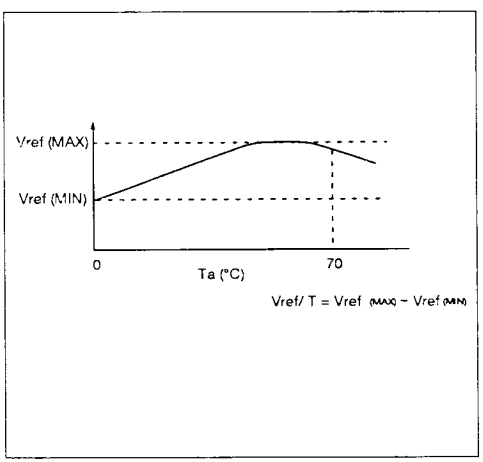
The absolute maximum ratings are limiting values, to be applied individually, beyond which the device may be permanently damaged. Functional operation under any of these conditions is not guaranteed. Exposing a circuit to its absolute maximum rating for extended periods of time may affect the device's reliability.

* The value under Ta = 25°C when mounted on a 15mm × 25mm × 0.7mm alumina ceramic board.

Power Dissipation Curve



① When not mounted
② When mounted on a 15mm × 25mm × 0.7mm alumina ceramic board



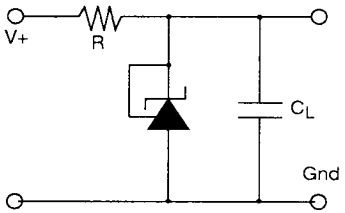
$V_{ref}/T = V_{ref\,(MAX)} - V_{ref\,(MIN)}$

Electrical Characteristics (Ta = 25°C)

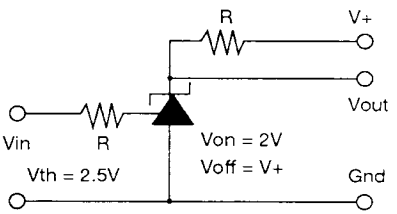
Item	Symbol	Test Condition	min.	typ.	max.	Unit
Reference Voltage	V_{ref}	V_{KA} = V_{ref}, I_K = 10mA	2.440	2.495	2.550	V
Reference Voltage Temperature	$\triangle V_{ref}/\triangle T$	V_{KA} = V_{ref}, I_K = 10mA, Ta = 0 ~ 70°C	—	5	(17)*	mV
Reference Voltage Change	$\triangle V_{ref}/\triangle V_{KA}$	I_K = 10mA, $\triangle V_{KA}$ = 10V−V_{ref}	—	1.4	3.7	mV
		$\triangle V_{KA}$ = 40V−10V	—	1	2.2	/V
Reference Input Current	I_{ref}	I_K = 10mA, R_1 = 10kΩ, R_2 = ∞	—	2	6	μA
Reference Input Current Temperature Drift	$\triangle I_{ref}/\triangle T$	I_K = 10mA, R_1 = 10kΩ, R_2 = ∞, Ta = 0 ~ 70°C	—	0.5	—	μA
Minimum Cathode Current	I_{min}	V_{KA} = V_{ref}	—	0.4	1	mA
Off Cathode Current	I_{off}	V_{KA} = 40V, V_{ref} = 0V	—	0.001	1	μA
Dynamic Impedance	Z_{KA}	V_{KA} = V_{ref}, I_K = 1−100mA, f ≤ 1KHz	—	0.2	0.5	Ω

*The maximum value of the reference voltage temperature ($\triangle V_{ref}/\triangle T$) is designed value.

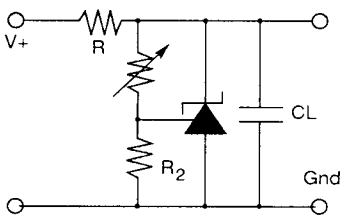
Typical Applications



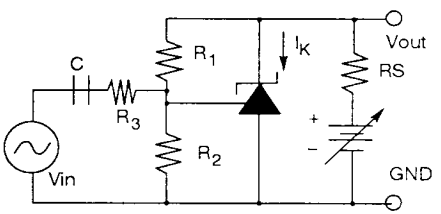
Reference Voltage Circiut



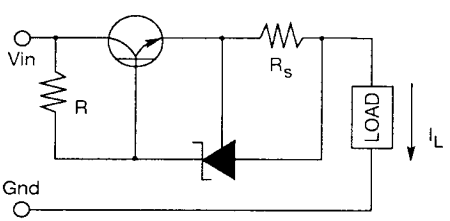
Single Supply Comparator



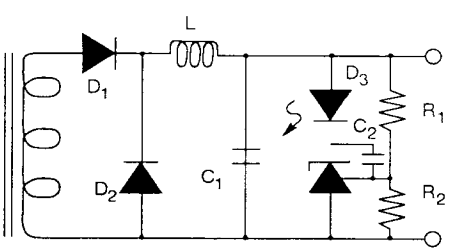
Shunt Regulator



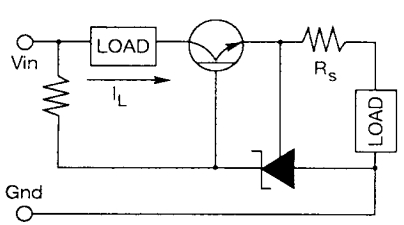
AC Amplifier Circiut



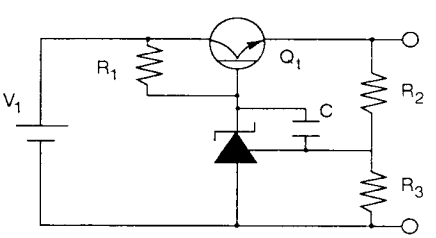
Current Limiter or Current Source



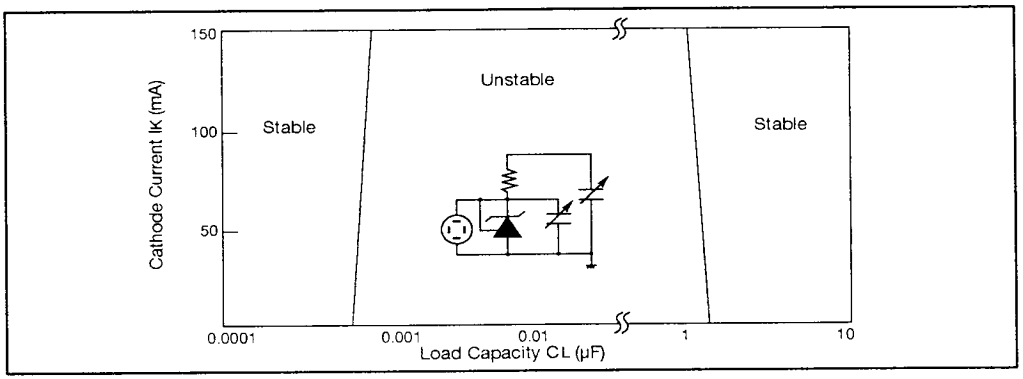
Error Amplifier Circuit

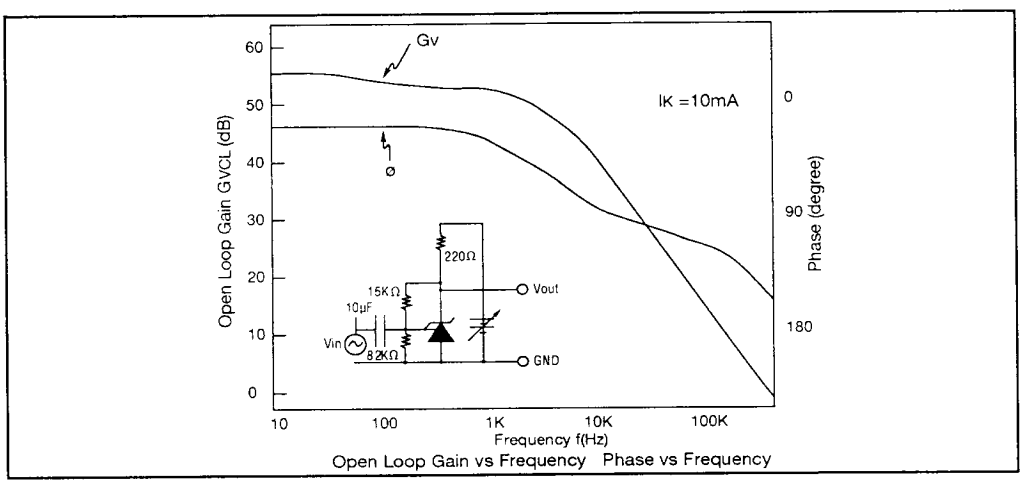


Current Liniter or Current Source

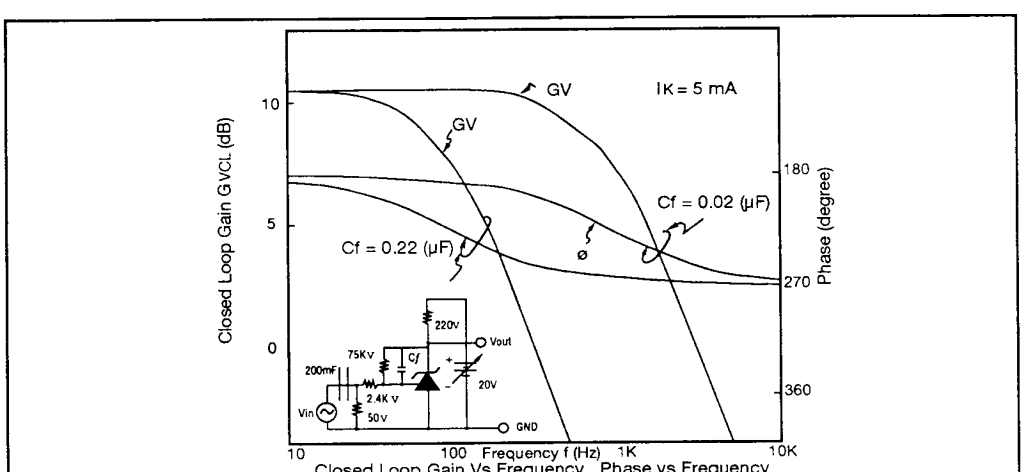


Constant Voltage Circuit

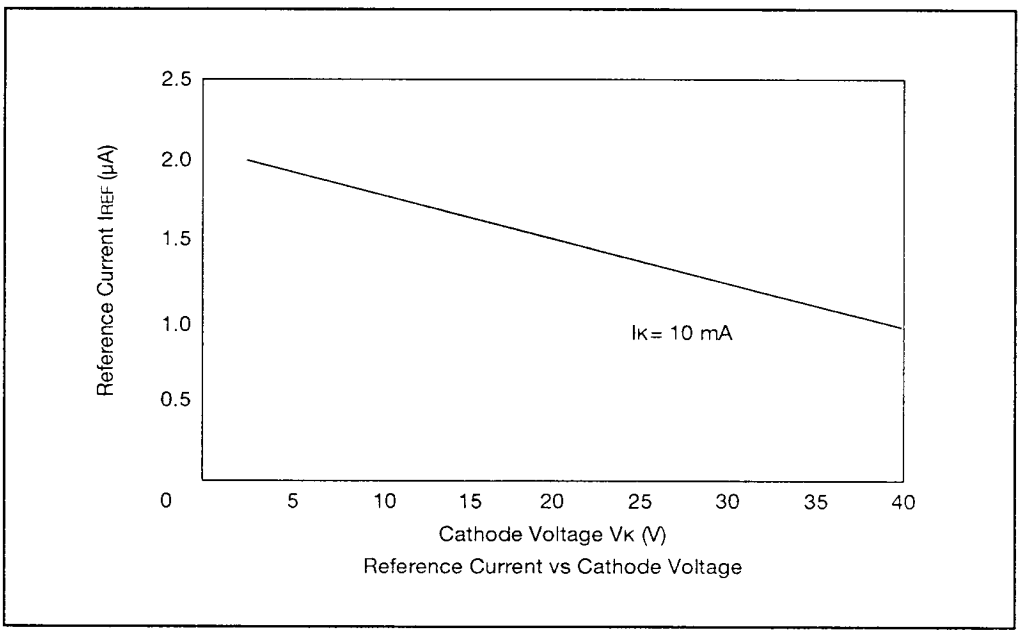




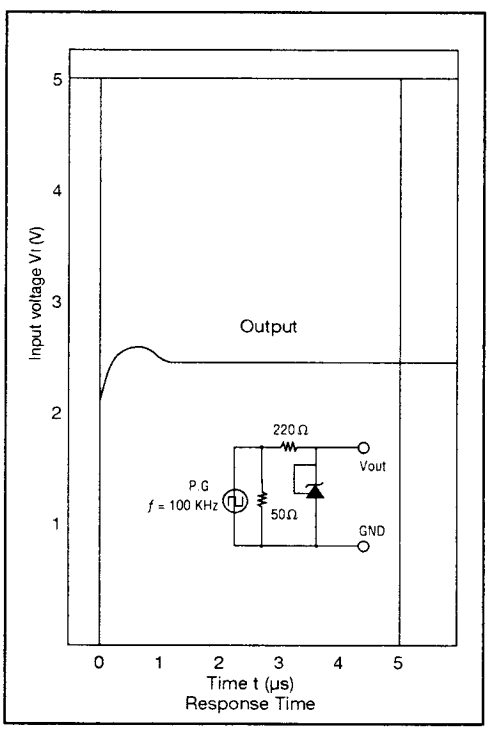
Open Loop Gain vs Frequency Phase vs Frequency



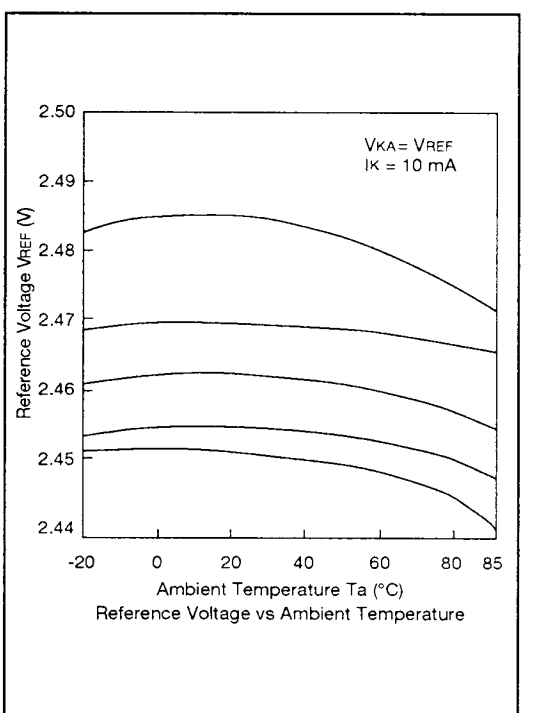
Closed Loop Gain Vs Frequency Phase vs Frequency



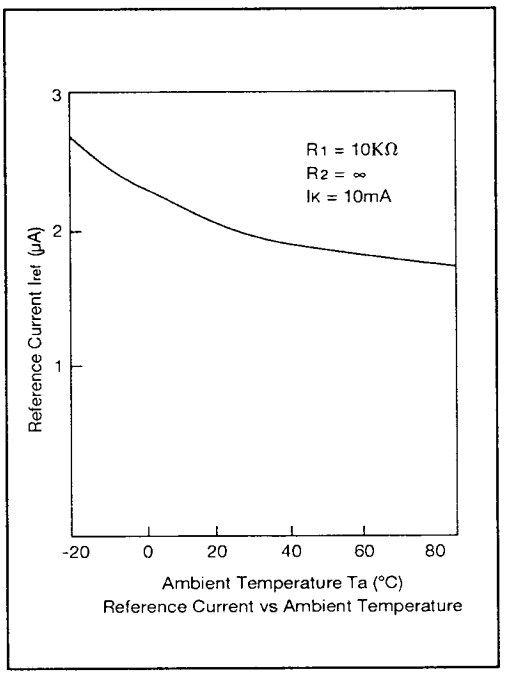
Reference Current vs Cathode Voltage



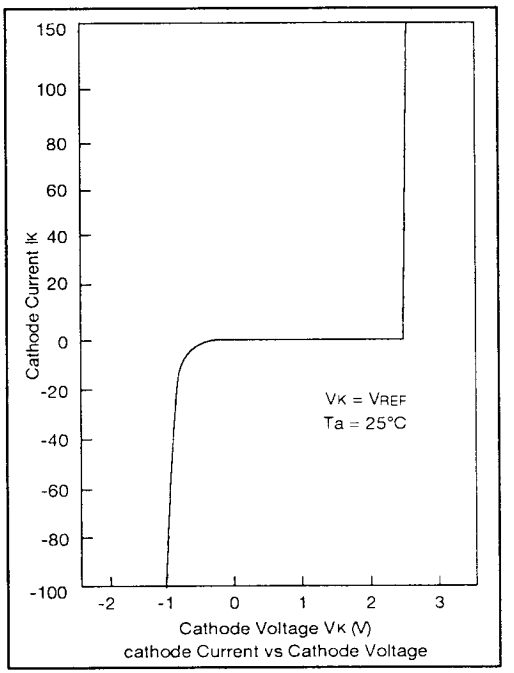
Response Time



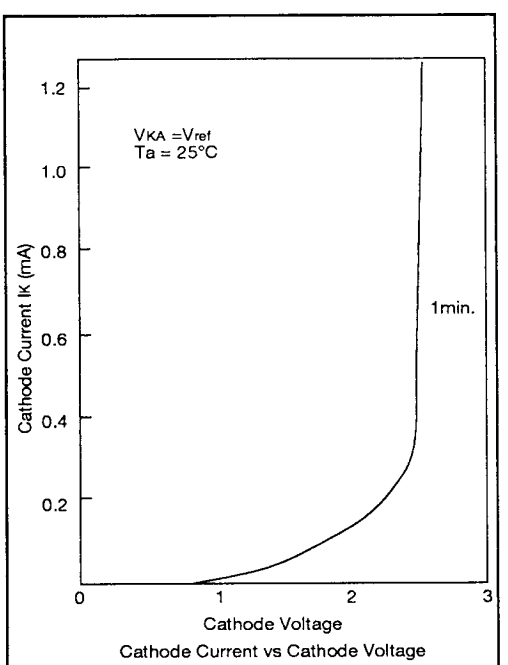
Reference Voltage vs Ambient Temperature



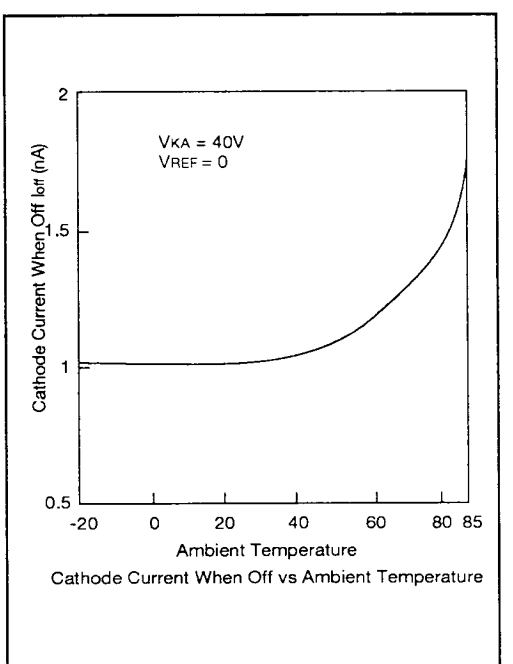
Reference Current vs Ambient Temperature



cathode Current vs Cathode Voltage



Cathode Current vs Cathode Voltage

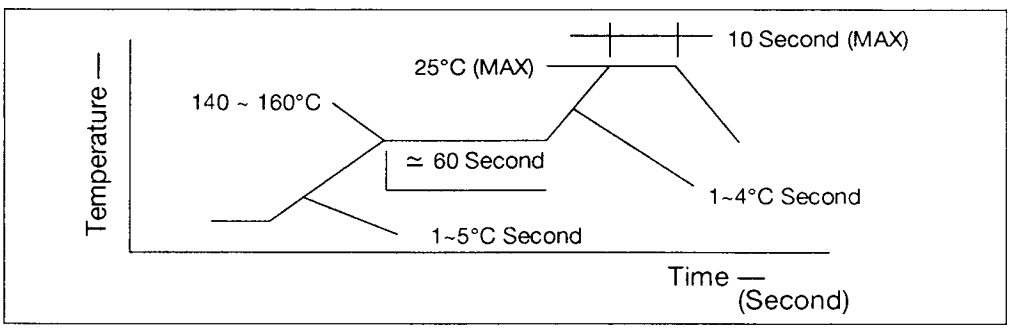


Cathode Current When Off vs Ambient Temperature

Solder Mounting Method

1). Small and light surface-mount packages require special attentions on solder mounting. On solder mounting, pre-heating before soldering is needed. The following figure shows an example of infrared rays reflow.

2). The difference of thermal expansion coefficient between mounting substrates and IC lead may cause a failure like solder peeling or solder wet, and electrical characteristics may change by thermal stress. Therefore, mounting should be done after sufficient confirmation for especially in case of ceramic substrates.



An Example of Infrared Rays Reflow Conditions