KIA431/F/A/AF

BLOCK DIAGRAM
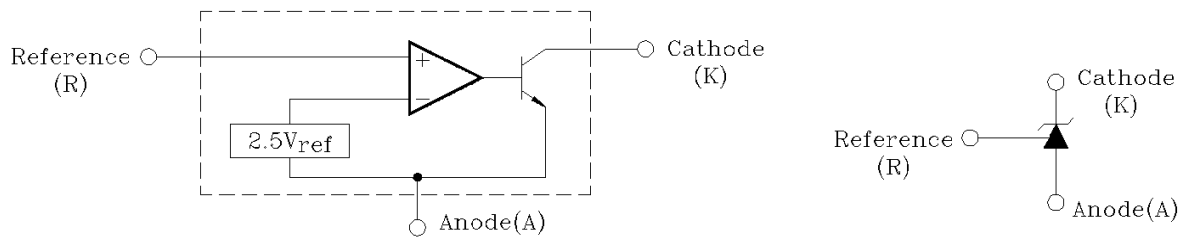
ELECTRICAL CHARACTERISTICS (Ta=25℃)

CHARACTERISTICS		SYMBOL	TEST CIRCUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Reference Input Voltage	KIA431/F	V_{ref}	Figure 1	$V_{KA}=V_{ref}$, I_K=10mA		2.440	2.495	2.550	V
	KIA431A/AF					2.470	2.495	2.520	V
Reference Input Voltage Deviation Over Temperature Range		$\triangle V_{ref}$	Figure 1 (Note 1)	$V_{KA}=V_{ref}$, I_K=10mA		–	7.0	30	mV
Ratio of Change in Reference Input Voltage to Change in Cathode to Anode Voltage		$\triangle V_{ref}/\triangle V_{KA}$	Figure 2	I_K=10mA	$\triangle V_{KA}=$ 10V～V_{ref}	–	-1.4	-2.7	mV/V
					$\triangle V_{KA}=$ 36V～10V	–	-1.0	-2.0	
Reference Input Current	Ta=25℃	I_{ref}	Figure 2	I_K=10mA, R1=10kΩ, R2=∞		–	1.8	4.0	μA
	Ta=T_{opr}					–	–	6.5	
Reference Input Current Deviation Over Temperature Range		$\triangle I_{ref}$	Figure 2	I_K=10mA, R1=10kΩ, R2=∞		–	0.8	2.5	μA
Minimum Cathode Current For Regulation		I_{min}	Figure 1	$V_{KA}=V_{ref}$		–	0.5	1.0	mA
Off-State Cathode Current		I_{off}	Figure 3	V_{KA}=36V, V_{ref}=0V		–	2.6	1000	nA
Dynamic Impedance		Z_{ka}	Figure 1 (Note 2)	$V_{KA}=V_{ref}$, I_K=1.0～100mA, f≦1.0kHz		–	0.22	–	Ω

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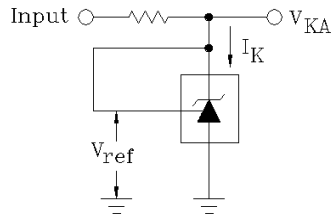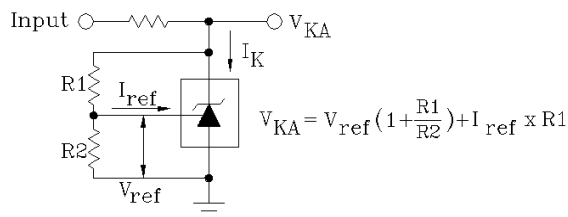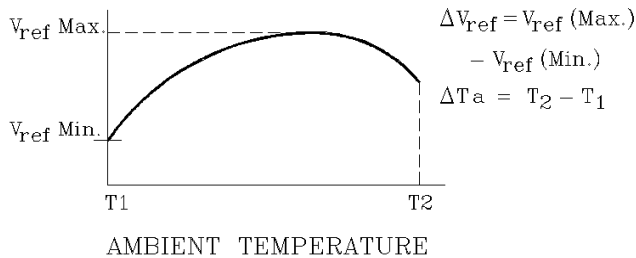FIGURE 1—TEST CIRCUIT FOR $V_{KA} = V_{ref}$

FIGURE 2—TEST CIRCUIT FOR $V_{KA} > V_{ref}$

$$V_{KA} = V_{ref}\left(1 + \frac{R1}{R2}\right) + I_{ref} \times R1$$

Note 1:
The deviation parameter ΔV_{ref} is defined as the differences between the maximum and minimum values obtained over the full operating ambient temperature range that applies.
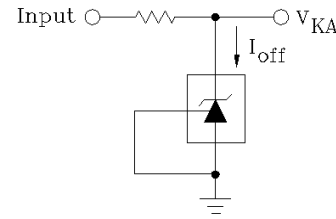

$$\Delta V_{ref} = V_{ref}(Max.) - V_{ref}(Min.)$$
$$\Delta Ta = T_2 - T_1$$

AMBIENT TEMPERATURE

The average temperature coefficient of the Reference input voltage, αV_{ref}, is defined as:

$$\alpha V_{ref}\left(\frac{ppm}{℃}\right) = \frac{\left(\dfrac{\Delta V_{ref}}{V_{ref} \text{ at } 25℃}\right) \times 10^6}{\Delta Ta}$$

$$= \frac{\Delta V_{ref} \times 10^6}{\Delta Ta(V_{ref} \text{ at } 25℃)}$$

αV_{ref} can be positive or negative depending on whether V_{ref} Min. or V_{ref} Max. occurs at the lower ambient temperature.

FIGURE 3—TEST CIRCUIT FOR I_{off}

Example : $\Delta V_{ref} = 8.0mV$ and slope is positive, V_{ref} at 25℃=2.495V, $\Delta Ta=70℃$

$$\alpha V_{ref} = \frac{0.008 \times 10^6}{70 \times (2.495)} = 45.8 \ ppm/℃$$

Note 2:
The dynamic impedance Z_{ka} is defined as:

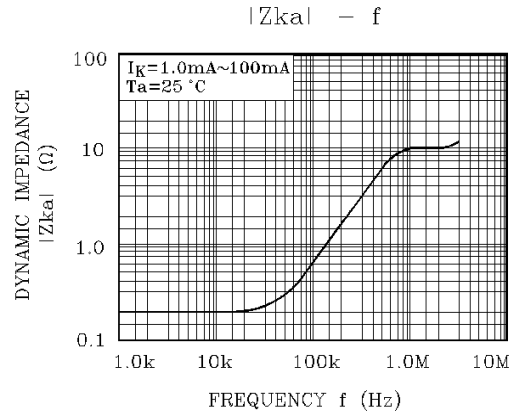$$|Z_{ka}| = \frac{\Delta VKA}{\Delta Ik}$$

When the device is programmed with two external resistors, R1 and R2, (refer to Figure 2) the total dynamic impedance of the circuit is defined as:

$$|Z_{ka'}| = |Z_{ka}| \left(1 + \frac{R1}{R2}\right)$$

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$I_K - V_{KA}$

$I_K - V_{KA}$

$\Delta V_{ref} - Ta$

$|Zka| - f$

$G_{VO} - f$

PULSE RESPONSE

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P_D − Ta
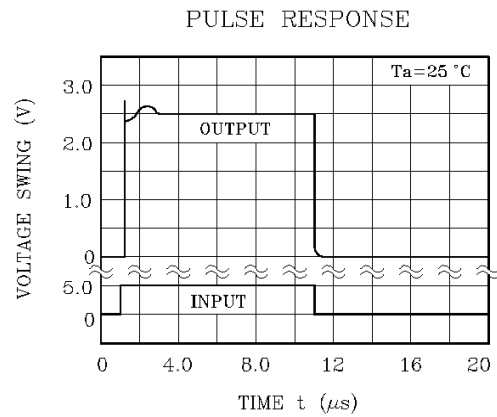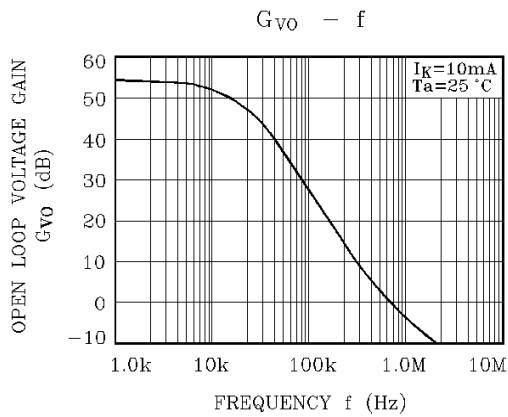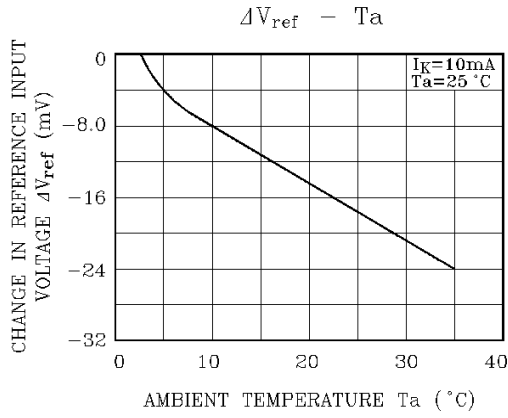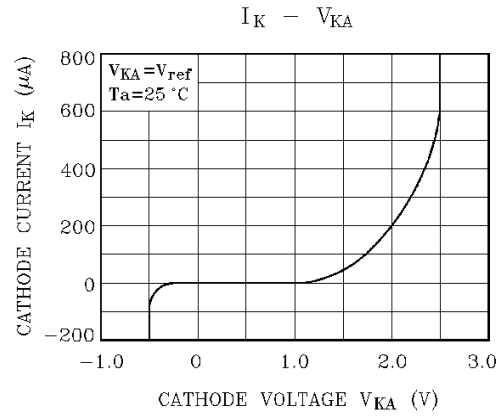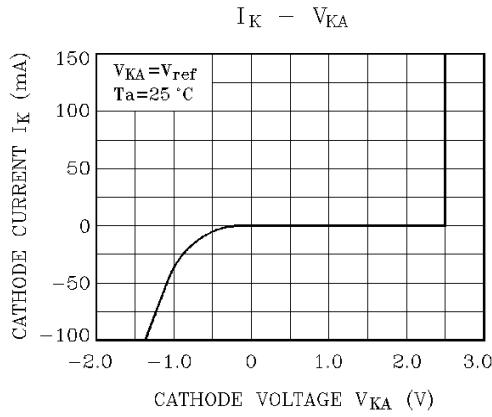
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PRECAUTION FOR USE

SOLDERING

Flat Package (SOT-89 Package)

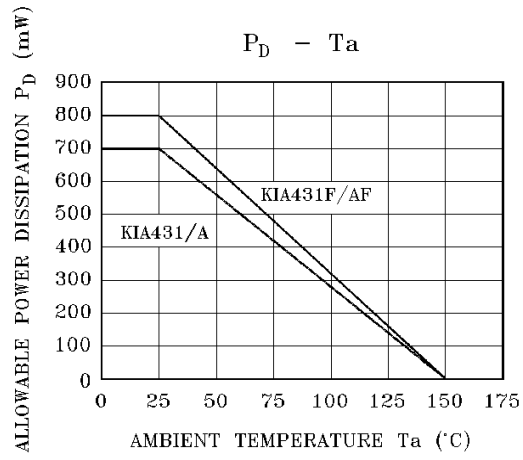Elements mounting styles of electronic devices are gaining in further diversification over recent years, and needs for components are all the more expanding in varieties. Especially, surface mounting is steadily penetrating into industrial segments as a world-wide popular technical trend.
Although exposure to high temperature is inevitable during soldering we recommend limiting the soldering temperature to low levels as shown in figure for the sake of retaining inherent excellent reliability.
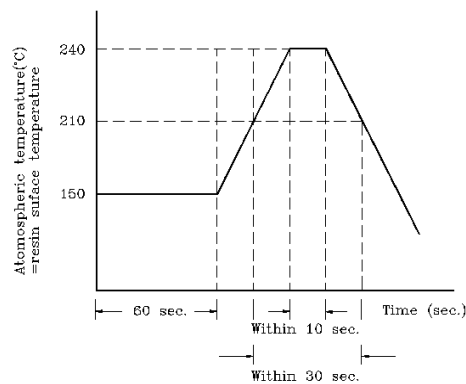
(a) When employing solder reflow method
  ① Atmospheric temperature around resin surfaces must be less than 240℃, not exceeding the time length of 10 sec.
  ② Recommend temperature profile
  ③ Precautions on heating method
      When resin in kept exposed to high temperature for a long time, device reliability may be marred. Therefore, it is essential to complete soldering in the shortest time possible to prevent temperature of resin from rising.

(b) When employing halogen lamps or infrared-ray heaters
      When halogen lamps or infrared-ray heaters are used, avoid direct irradiation onto resin surfaces; such devices cause extensive localized temperature rise.

  ※ Please keep a reflow solder operating when SOT-89 package's soldering.