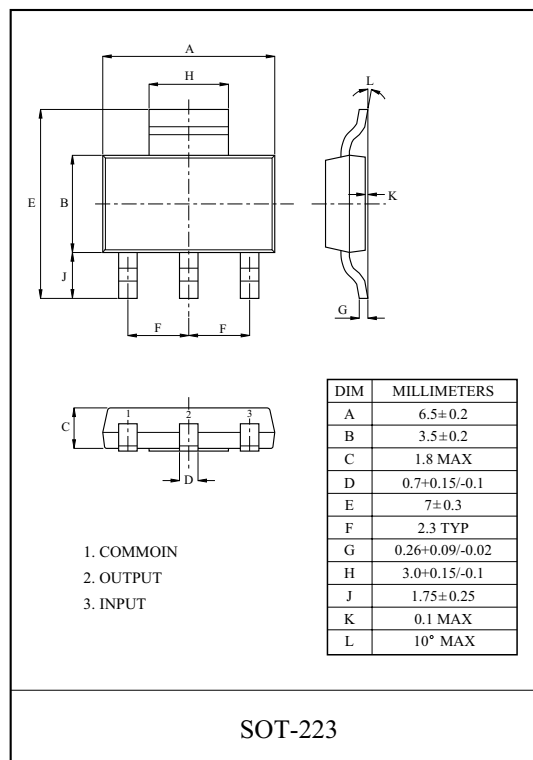


#### LOW DROP FIXED AND ADJUSTABLE POSITIVE VOLTAGE REGULATOR

The KIA78Q  $\times \times \times$  S/F is a Low Drop Voltage Regulator able to provide up to 1A of output current, available even in adjustable version ( $V_{ref}=1.25V$ )

#### FEATURES

- Low Dropout Voltage : 1.1V/Typ. ( $I_{out}=1.0A$ )
- Very Low Quiescent Current : 4.2mA/Typ.
- Output Current up to 1A
- Fixed Output Voltage of 1.5V, 1.8V, 2.5V, 2.85V, 3.3V, 5.0V
- Adjustable Version Availability :  $V_{ref}=1.25V$
- Internal Current and Thermal Limit
- Only 10  $\mu F$  for stability
- Available in  $\pm 2\%$ (at 25  $^{\circ}C$ ) and 4% in full Temperature range
- High Ripple Rejection : 80dB/Typ
- Temperature Range : 0  $^{\circ}C \sim 125^{\circ}C$



#### LINE UP

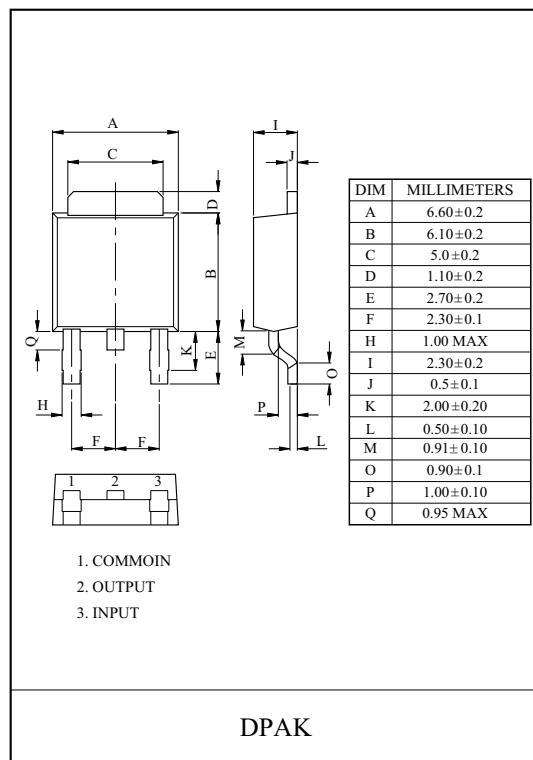
| ITEM         | OUTPUT VOLTAGE (V)    | PACKAGE                 |
|--------------|-----------------------|-------------------------|
| KIA78Q000S/F | Adjustable (1.25~10V) | S : SOT-223<br>F : DPAK |
| KIA78Q015S/F | 1.5                   |                         |
| KIA78Q018S/F | 1.8                   |                         |
| KIA78Q025S/F | 2.5                   |                         |
| KIA78Q028S/F | 2.85                  |                         |
| KIA78Q033S/F | 3.3                   |                         |
| KIA78Q050S/F | 5.0                   |                         |

#### MAXIMUM RATINGS ( $T_a=25^{\circ}C$ )

| CHARACTERISTIC                             |          | SYMBOL    | RATING         | UNIT        |
|--------------------------------------------|----------|-----------|----------------|-------------|
| Input Voltage                              |          | $V_{IN}$  | 10             | V           |
| Output Current                             | S/F      | $I_{OUT}$ | 1.0            | A           |
| Power Dissipation 1<br>(No heatsink)       | S (Note) | $P_{D1}$  | 1.0            | W           |
|                                            | F        |           | 1.3            |             |
| Power Dissipation 2<br>(Infinite Heatsink) | S        | $P_{D2}$  | 8.3            | W           |
|                                            | F        |           | 13             |             |
| Operating Temperature                      |          | $T_{opr}$ | 0 $\sim$ 125   | $^{\circ}C$ |
| Storage Temperature                        |          | $T_{stg}$ | -55 $\sim$ 150 | $^{\circ}C$ |

Note) Package Mounted on FR-4 PCB 36  $\times$  18  $\times$  1.5 mm.

: mounting pad for the GND Lead min. 6mm<sup>2</sup>



# KIA78Q000S/F~KIA78Q050S/F

Fig.1 Application Circuit-1 (Fixed-Type)

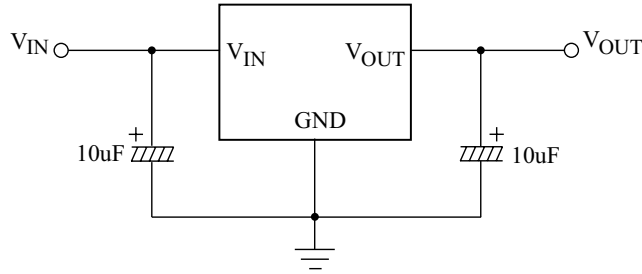
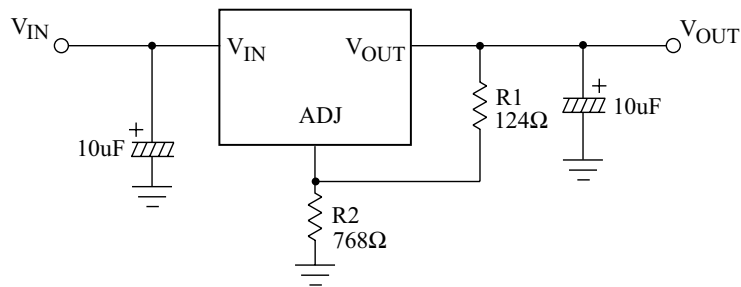


Fig.2 Application Circuit-2 (Adjustable-Type)



$$V_{OUT}=V_{REF} (1+R2/R1) + I_{ADJ} \cdot R2$$

## ELECTRICAL CHARACTERISTICS

KIA78Q000S/F (Unless otherwise specified,  $T_j=0\sim125\text{ }^{\circ}\text{C}$ )

| CHARACTERISTIC             | SYMBOL      | TEST CONDITIONS                                                                                    | MIN.  | TYP. | MAX.  | UNIT                |
|----------------------------|-------------|----------------------------------------------------------------------------------------------------|-------|------|-------|---------------------|
| Output Voltage             | $V_{OUT1}$  | $V_{IN}=V_{OUT}+1.5\text{V}$ , $I_{OUT}=10\text{mA}$ , $T_j=25\text{ }^{\circ}\text{C}$            | 1.225 | 1.25 | 1.275 | V                   |
|                            | $V_{OUT2}$  | $10\text{mA}\leq I_{OUT}\leq 1\text{A}$ , $V_{OUT}+1.5\text{V}\leq V_{IN}\leq 10\text{V}$          | 1.20  | 1.25 | 1.30  |                     |
| Line Regulation            | Reg Line    | $V_{OUT}+1.5\text{V}\leq V_{IN}\leq 10\text{V}$ , $I_{OUT}=10\text{mA}$                            | -     | 1    | 10    | mV                  |
| Load Regulation            | Reg Load    | $10\text{mA}\leq I_{OUT}\leq 1\text{A}$ , $V_{IN}=V_{OUT}+2.0\text{V}$                             | -     | 15   | 30    | mV                  |
| Quiescent Current          | $I_{B1}$    | $V_{IN}=V_{OUT}+1.25\text{V}$ , $I_{OUT}=0\text{A}$                                                | -     | 4.2  | 10    | mA                  |
|                            | $I_{B2}$    | $V_{IN}=10\text{V}$ , $I_{OUT}=0\text{A}$                                                          | -     | 4.2  | 10    |                     |
| Adjustable Pin Current     | $I_{ADJ}$   | $V_{IN}=V_{OUT}+1.5\text{V}$                                                                       | -     | 35   | -     | $\mu\text{A}$       |
| Minimum Load Current       | $I_{MIN}$   | $V_{IN}=V_{OUT}+1.5\text{V}$                                                                       | 10    | -    | -     | mA                  |
| Output Noise Voltage       | $V_{NO}$    | $V_{IN}=V_{OUT}+1.25\text{V}$ , $I_{OUT}=40\text{mA}$ ,<br>$10\text{Hz}\leq f\leq 10\text{kHz}$    | -     | 100  | -     | $\mu\text{V}_{rms}$ |
| Sort Circuit Current Limit | $I_{SC}$    | $V_{IN}=V_{OUT}+2.0\text{V}$                                                                       | 1.1   | -    | -     | A                   |
| Ripple Rejection           | $R \cdot R$ | $I_{OUT}=40\text{mA}$ , $f=120\text{Hz}$ , $V_{ripple}=1\text{Vp-p}$<br>$V_{IN}=V_{OUT}+3\text{V}$ | 60    | 80   | -     | dB                  |
| Dropout Voltage            | $V_D$       | $I_{OUT}=1\text{A}$ , $V_{IN}=0.95V_{OUT}$                                                         | -     | 1.1  | 1.2   | V                   |
| Temperature Stability      | $TCV_O$     | $V_{IN}=V_{OUT}+1.5\text{V}$ , $I_{OUT}=10\text{mA}$                                               | -     | 0.5  | -     | %                   |

# KIA78Q000S/F~KIA78Q050S/F

## ELECTRICAL CHARACTERISTICS

KIA78Q015S/F (Unless otherwise specified, Tj=0~125 °C)

| CHARACTERISTIC             | SYMBOL            | TEST CONDITIONS                                                                                      | MIN. | TYP. | MAX. | UNIT  |
|----------------------------|-------------------|------------------------------------------------------------------------------------------------------|------|------|------|-------|
| Output Voltage             | V <sub>OUT1</sub> | V <sub>IN</sub> =V <sub>OUT</sub> +1.5V, I <sub>OUT</sub> =10mA, Tj=25 °C                            | 1.47 | 1.5  | 1.53 | V     |
|                            | V <sub>OUT2</sub> | 10mA ≤ I <sub>OUT</sub> ≤ 1A, V <sub>OUT</sub> +1.5V ≤ V <sub>IN</sub> ≤ 10V                         | 1.44 | 1.5  | 1.56 |       |
| Line Regulation            | Reg Line          | V <sub>OUT</sub> +1.5V ≤ V <sub>IN</sub> ≤ 10V, I <sub>OUT</sub> =10mA                               | -    | 1    | 10   | mV    |
| Load Regulation            | Reg Load          | 10mA ≤ I <sub>OUT</sub> ≤ 1A, V <sub>IN</sub> =V <sub>OUT</sub> +2.0V                                | -    | 15   | 30   | mV    |
| Quiescent Current          | I <sub>B1</sub>   | V <sub>IN</sub> =V <sub>OUT</sub> +1.25V, I <sub>OUT</sub> =0A                                       | -    | 4.2  | 10   | mA    |
|                            | I <sub>B2</sub>   | V <sub>IN</sub> =10V, I <sub>OUT</sub> =0A                                                           | -    | 4.2  | 10   |       |
| Output Noise Voltage       | V <sub>NO</sub>   | V <sub>IN</sub> =V <sub>OUT</sub> +1.25V, I <sub>OUT</sub> =40mA,<br>10Hz ≤ f ≤ 10kHz                | -    | 100  | -    | μVrms |
| Sort Circuit Current Limit | I <sub>SC</sub>   | V <sub>IN</sub> =V <sub>OUT</sub> +2.0V                                                              | 1.1  | -    | -    | A     |
| Ripple Rejection           | R · R             | I <sub>OUT</sub> =40mA, f=120Hz, V <sub>ripple</sub> =1Vp-p<br>V <sub>IN</sub> =V <sub>OUT</sub> +3V | 60   | 80   | -    | dB    |
| Dropout Voltage            | V <sub>D</sub>    | I <sub>OUT</sub> =1A, V <sub>IN</sub> =0.95V <sub>OUT</sub>                                          | -    | 1.1  | 1.2  | V     |
| Temperature Stability      | TCV <sub>O</sub>  | V <sub>IN</sub> =V <sub>OUT</sub> +1.5V, I <sub>OUT</sub> =10mA                                      | -    | 0.5  | -    | %     |

## ELECTRICAL CHARACTERISTICS

KIA78Q018S/F (Unless otherwise specified, Tj=0~125 °C)

| CHARACTERISTIC             | SYMBOL            | TEST CONDITIONS                                                                                      | MIN.  | TYP. | MAX.  | UNIT  |
|----------------------------|-------------------|------------------------------------------------------------------------------------------------------|-------|------|-------|-------|
| Output Voltage             | V <sub>OUT1</sub> | V <sub>IN</sub> =V <sub>OUT</sub> +1.5V, I <sub>OUT</sub> =10mA, Tj=25 °C                            | 1.764 | 1.8  | 1.836 | V     |
|                            | V <sub>OUT2</sub> | 10mA ≤ I <sub>OUT</sub> ≤ 1A, V <sub>OUT</sub> +1.5V ≤ V <sub>IN</sub> ≤ 10V                         | 1.728 | 1.8  | 1.872 |       |
| Line Regulation            | Reg Line          | V <sub>OUT</sub> +1.5V ≤ V <sub>IN</sub> ≤ 10V, I <sub>OUT</sub> =10mA                               | -     | 1    | 10    | mV    |
| Load Regulation            | Reg Load          | 10mA ≤ I <sub>OUT</sub> ≤ 1A, V <sub>IN</sub> =V <sub>OUT</sub> +2.0V                                | -     | 15   | 30    | mV    |
| Quiescent Current          | I <sub>B1</sub>   | V <sub>IN</sub> =V <sub>OUT</sub> +1.25V, I <sub>OUT</sub> =0A                                       | -     | 4.2  | 10    | mA    |
|                            | I <sub>B2</sub>   | V <sub>IN</sub> =10V, I <sub>OUT</sub> =0A                                                           | -     | 4.2  | 10    |       |
| Output Noise Voltage       | V <sub>NO</sub>   | V <sub>IN</sub> =V <sub>OUT</sub> +1.25V, I <sub>OUT</sub> =40mA,<br>10Hz ≤ f ≤ 10kHz                | -     | 100  | -     | μVrms |
| Sort Circuit Current Limit | I <sub>SC</sub>   | V <sub>IN</sub> =V <sub>OUT</sub> +2.0V                                                              | 1.1   | -    | -     | A     |
| Ripple Rejection           | R · R             | I <sub>OUT</sub> =40mA, f=120Hz, V <sub>ripple</sub> =1Vp-p<br>V <sub>IN</sub> =V <sub>OUT</sub> +3V | 60    | 80   | -     | dB    |
| Dropout Voltage            | V <sub>D</sub>    | I <sub>OUT</sub> =1A, V <sub>IN</sub> =0.95V <sub>OUT</sub>                                          | -     | 1.1  | 1.2   | V     |
| Temperature Stability      | TCV <sub>O</sub>  | V <sub>IN</sub> =V <sub>OUT</sub> +1.5V, I <sub>OUT</sub> =10mA                                      | -     | 0.5  | -     | %     |

# KIA78Q000S/F~KIA78Q050S/F

## ELECTRICAL CHARACTERISTICS

KIA78Q025S/F (Unless otherwise specified, Tj=0~125 °C)

| CHARACTERISTIC             | SYMBOL            | TEST CONDITIONS                                                                                      | MIN. | TYP. | MAX. | UNIT  |
|----------------------------|-------------------|------------------------------------------------------------------------------------------------------|------|------|------|-------|
| Output Voltage             | V <sub>OUT1</sub> | V <sub>IN</sub> =V <sub>OUT</sub> +1.5V, I <sub>OUT</sub> =10mA, Tj=25 °C                            | 2.45 | 2.5  | 2.55 | V     |
|                            | V <sub>OUT2</sub> | 10mA ≤ I <sub>OUT</sub> ≤ 1A, V <sub>OUT</sub> +1.5V ≤ V <sub>IN</sub> ≤ 10V                         | 2.4  | 2.5  | 2.6  |       |
| Line Regulation            | Reg Line          | V <sub>OUT</sub> +1.5V ≤ V <sub>IN</sub> ≤ 10V, I <sub>OUT</sub> =10mA                               | -    | 1    | 10   | mV    |
| Load Regulation            | Reg Load          | 10mA ≤ I <sub>OUT</sub> ≤ 1A, V <sub>IN</sub> =V <sub>OUT</sub> +2.0V                                | -    | 15   | 30   | mV    |
| Quiescent Current          | I <sub>B1</sub>   | V <sub>IN</sub> =V <sub>OUT</sub> +1.25V, I <sub>OUT</sub> =0A                                       | -    | 4.2  | 10   | mA    |
|                            | I <sub>B2</sub>   | V <sub>IN</sub> =10V, I <sub>OUT</sub> =0A                                                           | -    | 4.2  | 10   |       |
| Output Noise Voltage       | V <sub>NO</sub>   | V <sub>IN</sub> =V <sub>OUT</sub> +1.25V, I <sub>OUT</sub> =40mA,<br>10Hz ≤ f ≤ 10kHz                | -    | 100  | -    | μVrms |
| Sort Circuit Current Limit | I <sub>SC</sub>   | V <sub>IN</sub> =V <sub>OUT</sub> +2.0V                                                              | 1.1  | -    | -    | A     |
| Ripple Rejection           | R · R             | I <sub>OUT</sub> =40mA, f=120Hz, V <sub>ripple</sub> =1Vp-p<br>V <sub>IN</sub> =V <sub>OUT</sub> +3V | 60   | 80   | -    | dB    |
| Dropout Voltage            | V <sub>D</sub>    | I <sub>OUT</sub> =1A, V <sub>IN</sub> =0.95V <sub>OUT</sub>                                          | -    | 1.1  | 1.2  | V     |
| Temperature Stability      | TCV <sub>O</sub>  | V <sub>IN</sub> =V <sub>OUT</sub> +1.5V, I <sub>OUT</sub> =10mA                                      | -    | 0.5  | -    | %     |

## ELECTRICAL CHARACTERISTICS

KIA78Q028S/F (Unless otherwise specified, Tj=0~125 °C)

| CHARACTERISTIC             | SYMBOL            | TEST CONDITIONS                                                                                      | MIN.  | TYP. | MAX.  | UNIT  |
|----------------------------|-------------------|------------------------------------------------------------------------------------------------------|-------|------|-------|-------|
| Output Voltage             | V <sub>OUT1</sub> | V <sub>IN</sub> =V <sub>OUT</sub> +1.5V, I <sub>OUT</sub> =10mA, Tj=25 °C                            | 2.793 | 2.85 | 2.907 | V     |
|                            | V <sub>OUT2</sub> | 10mA ≤ I <sub>OUT</sub> ≤ 1A, V <sub>OUT</sub> +1.5V ≤ V <sub>IN</sub> ≤ 10V                         | 2.736 | 2.85 | 2.964 |       |
| Line Regulation            | Reg Line          | V <sub>OUT</sub> +1.5V ≤ V <sub>IN</sub> ≤ 10V, I <sub>OUT</sub> =10mA                               | -     | 1    | 10    | mV    |
| Load Regulation            | Reg Load          | 10mA ≤ I <sub>OUT</sub> ≤ 1A, V <sub>IN</sub> =V <sub>OUT</sub> +2.0V                                | -     | 15   | 30    | mV    |
| Quiescent Current          | I <sub>B1</sub>   | V <sub>IN</sub> =V <sub>OUT</sub> +1.25V, I <sub>OUT</sub> =0A                                       | -     | 4.2  | 10    | mA    |
|                            | I <sub>B2</sub>   | V <sub>IN</sub> =10V, I <sub>OUT</sub> =0A                                                           | -     | 4.2  | 10    |       |
| Output Noise Voltage       | V <sub>NO</sub>   | V <sub>IN</sub> =V <sub>OUT</sub> +1.25V, I <sub>OUT</sub> =40mA,<br>10Hz ≤ f ≤ 10kHz                | -     | 100  | -     | μVrms |
| Sort Circuit Current Limit | I <sub>SC</sub>   | V <sub>IN</sub> =V <sub>OUT</sub> +2.0V                                                              | 1.1   | -    | -     | A     |
| Ripple Rejection           | R · R             | I <sub>OUT</sub> =40mA, f=120Hz, V <sub>ripple</sub> =1Vp-p<br>V <sub>IN</sub> =V <sub>OUT</sub> +3V | 60    | 80   | -     | dB    |
| Dropout Voltage            | V <sub>D</sub>    | I <sub>OUT</sub> =1A, V <sub>IN</sub> =0.95V <sub>OUT</sub>                                          | -     | 1.1  | 1.2   | V     |
| Temperature Stability      | TCV <sub>O</sub>  | V <sub>IN</sub> =V <sub>OUT</sub> +1.5V, I <sub>OUT</sub> =10mA                                      | -     | 0.5  | -     | %     |

# KIA78Q000S/F~KIA78Q050S/F

## ELECTRICAL CHARACTERISTICS

KIA78Q033S/F (Unless otherwise specified, Tj=0~125 °C)

| CHARACTERISTIC             | SYMBOL            | TEST CONDITIONS                                                                                      | MIN.  | TYP. | MAX.  | UNIT  |
|----------------------------|-------------------|------------------------------------------------------------------------------------------------------|-------|------|-------|-------|
| Output Voltage             | V <sub>OUT1</sub> | V <sub>IN</sub> =V <sub>OUT</sub> +1.5V, I <sub>OUT</sub> =10mA, Tj=25 °C                            | 3.234 | 3.3  | 3.366 | V     |
|                            | V <sub>OUT2</sub> | 10mA ≤ I <sub>OUT</sub> ≤ 1A, V <sub>OUT</sub> +1.5V ≤ V <sub>IN</sub> ≤ 10V                         | 3.168 | 3.3  | 3.432 |       |
| Line Regulation            | Reg Line          | V <sub>OUT</sub> +1.5V ≤ V <sub>IN</sub> ≤ 10V, I <sub>OUT</sub> =10mA                               | -     | 1    | 10    | mV    |
| Load Regulation            | Reg Load          | 10mA ≤ I <sub>OUT</sub> ≤ 1A, V <sub>IN</sub> =V <sub>OUT</sub> +2.0V                                | -     | 15   | 30    | mV    |
| Quiescent Current          | I <sub>B1</sub>   | V <sub>IN</sub> =V <sub>OUT</sub> +1.25V, I <sub>OUT</sub> =0A                                       | -     | 4.2  | 10    | mA    |
|                            | I <sub>B2</sub>   | V <sub>IN</sub> =10V, I <sub>OUT</sub> =0A                                                           | -     | 4.2  | 10    |       |
| Output Noise Voltage       | V <sub>NO</sub>   | V <sub>IN</sub> =V <sub>OUT</sub> +1.25V, I <sub>OUT</sub> =40mA,<br>10Hz ≤ f ≤ 10kHz                | -     | 100  | -     | μVrms |
| Sort Circuit Current Limit | I <sub>SC</sub>   | V <sub>IN</sub> =V <sub>OUT</sub> +2.0V                                                              | 1.1   | -    | -     | A     |
| Ripple Rejection           | R · R             | I <sub>OUT</sub> =40mA, f=120Hz, V <sub>ripple</sub> =1Vp-p<br>V <sub>IN</sub> =V <sub>OUT</sub> +3V | 60    | 80   | -     | dB    |
| Dropout Voltage            | V <sub>D</sub>    | I <sub>OUT</sub> =1A, V <sub>IN</sub> =0.95V <sub>OUT</sub>                                          | -     | 1.1  | 1.2   | V     |
| Temperature Stability      | TCV <sub>O</sub>  | V <sub>IN</sub> =V <sub>OUT</sub> +1.5V, I <sub>OUT</sub> =10mA                                      | -     | 0.5  | -     | %     |

## ELECTRICAL CHARACTERISTICS

KIA78Q050S/F (Unless otherwise specified, Tj=0~125 °C)

| CHARACTERISTIC             | SYMBOL            | TEST CONDITIONS                                                                                      | MIN. | TYP. | MAX. | UNIT  |
|----------------------------|-------------------|------------------------------------------------------------------------------------------------------|------|------|------|-------|
| Output Voltage             | V <sub>OUT1</sub> | V <sub>IN</sub> =V <sub>OUT</sub> +1.5V, I <sub>OUT</sub> =10mA, Tj=25 °C                            | 4.9  | 5    | 5.1  | V     |
|                            | V <sub>OUT2</sub> | 10mA ≤ I <sub>OUT</sub> ≤ 1A, V <sub>OUT</sub> +1.5V ≤ V <sub>IN</sub> ≤ 10V                         | 4.8  | 5    | 5.2  |       |
| Line Regulation            | Reg Line          | V <sub>OUT</sub> +1.5V ≤ V <sub>IN</sub> ≤ 10V, I <sub>OUT</sub> =10mA                               | -    | 1    | 10   | mV    |
| Load Regulation            | Reg Load          | 10mA ≤ I <sub>OUT</sub> ≤ 1A, V <sub>IN</sub> =V <sub>OUT</sub> +2.0V                                | -    | 15   | 30   | mV    |
| Quiescent Current          | I <sub>B1</sub>   | V <sub>IN</sub> =V <sub>OUT</sub> +1.25V, I <sub>OUT</sub> =0A                                       | -    | 4.2  | 10   | mA    |
|                            | I <sub>B2</sub>   | V <sub>IN</sub> =10V, I <sub>OUT</sub> =0A                                                           | -    | 4.2  | 10   |       |
| Output Noise Voltage       | V <sub>NO</sub>   | V <sub>IN</sub> =V <sub>OUT</sub> +1.25V, I <sub>OUT</sub> =40mA,<br>10Hz ≤ f ≤ 10kHz                | -    | 100  | -    | μVrms |
| Sort Circuit Current Limit | I <sub>SC</sub>   | V <sub>IN</sub> =V <sub>OUT</sub> +2.0V                                                              | 1.1  | -    | -    | A     |
| Ripple Rejection           | R · R             | I <sub>OUT</sub> =40mA, f=120Hz, V <sub>ripple</sub> =1Vp-p<br>V <sub>IN</sub> =V <sub>OUT</sub> +3V | 60   | 80   | -    | dB    |
| Dropout Voltage            | V <sub>D</sub>    | I <sub>OUT</sub> =1A, V <sub>IN</sub> =0.95V <sub>OUT</sub>                                          | -    | 1.1  | 1.2  | V     |
| Temperature Stability      | TCV <sub>O</sub>  | V <sub>IN</sub> =V <sub>OUT</sub> +1.5V, I <sub>OUT</sub> =10mA                                      | -    | 0.5  | -    | %     |

# KIA78Q000S/F~KIA78Q050S/F

Fig. 3  $V_D - I_{OUT}$

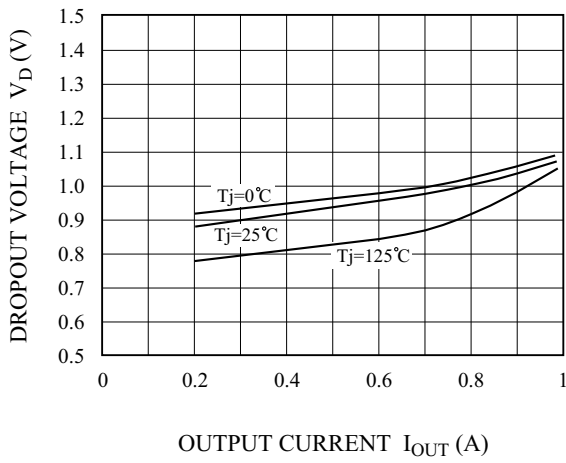


Fig. 4  $V_{REF} - T_j$

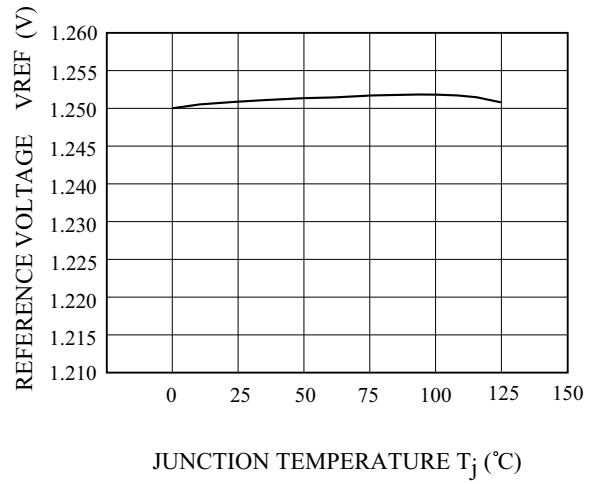


Fig. 5  $I_{OUT(MIN)} - T_j$

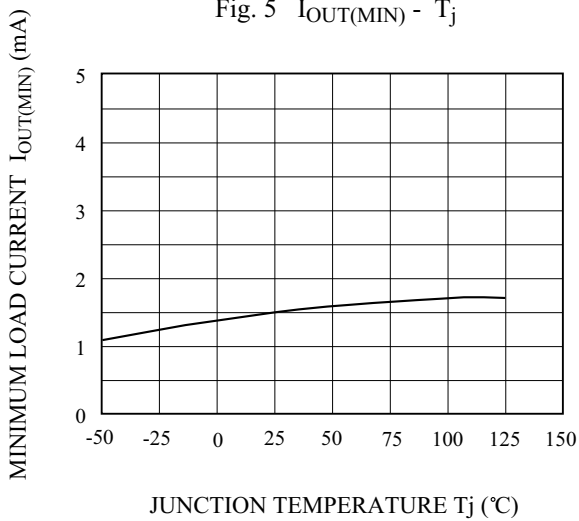


Fig. 6  $I_{ADJ} - T_j$

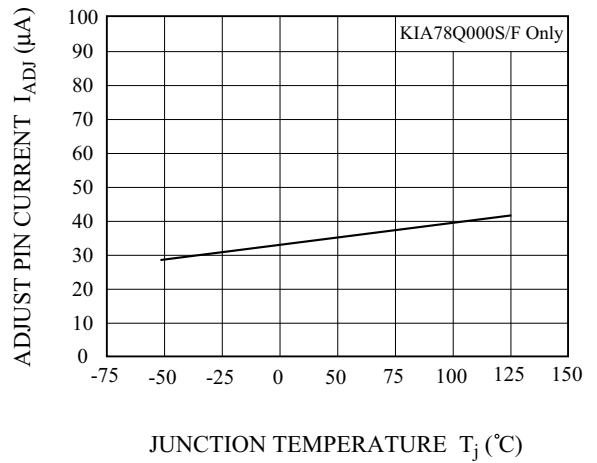


Fig. 7  $I_{SC} - T_j$

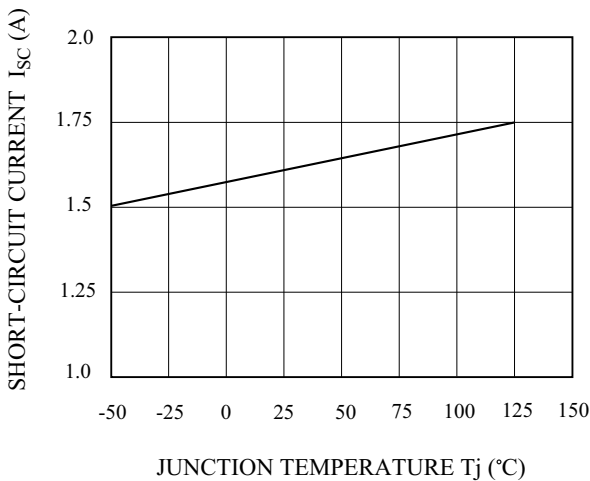
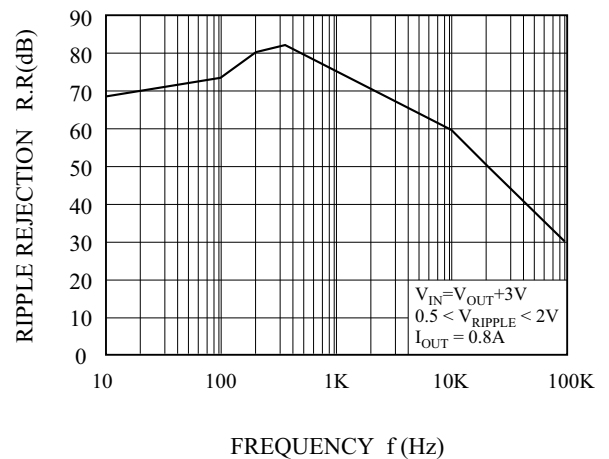


Fig.8 R.R-f



# KIA78Q000S/F~KIA78Q050S/F

Fig.9 P<sub>D</sub> - T<sub>a</sub> (S-Type : SOT-223)

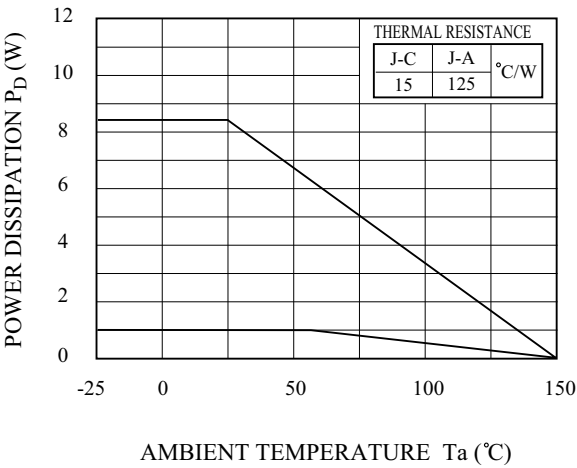


Fig.10 P<sub>D</sub> - T<sub>a</sub> (F-Type : DPAK)

