

## 2A LOW DROPOUT VOLTAGE REGULATOR [Low Quiescent Current Type]

### FEATURES

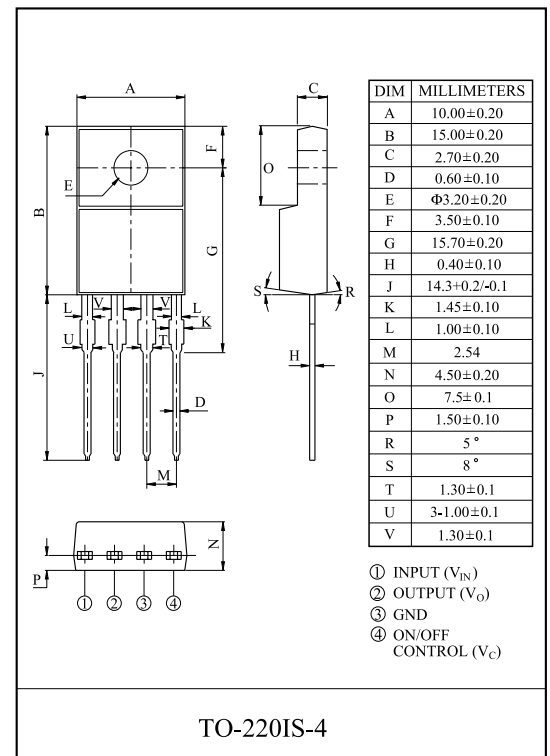
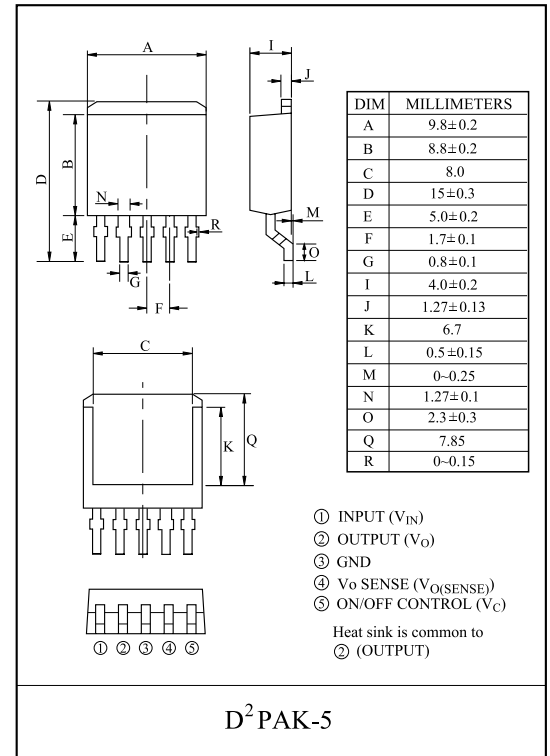
- 2.0A Output Low Dropout Voltage Regulator.
- Very Low Dropout Voltage : 0.5V/Max ( $I_{OUT}=2.0A$ )
- Built-in ON/OFF Control terminal. : Active High
- Built in Over Current, Over Heat Protection ASO Protection Functions.
- Low Quiescent Current (Output OFF Mode) :  $0.5\mu A$ (Typ.)
- Low Voltage Operation :  $V_{OPR(MIN)}=2.35V$ .

### LINE UP

| ITEM            | OUTPUT VOLTAGE (Typ.) | PACKAGE                                      |
|-----------------|-----------------------|----------------------------------------------|
| KIA278R015FP/PI | 1.5                   | FP : D <sup>2</sup> PAK-5<br>PI : TO-220IS-4 |
| KIA278R018FP/PI | 1.8                   |                                              |
| KIA278R020FP/PI | 2.0                   |                                              |
| KIA278R025FP/PI | 2.5                   |                                              |
| KIA278R030FP/PI | 3.0                   |                                              |
| KIA278R033FP/PI | 3.3                   |                                              |
| KIA278R050FP/PI | 5.0                   |                                              |

### MAXIMUM RATINGS (Ta=25℃)

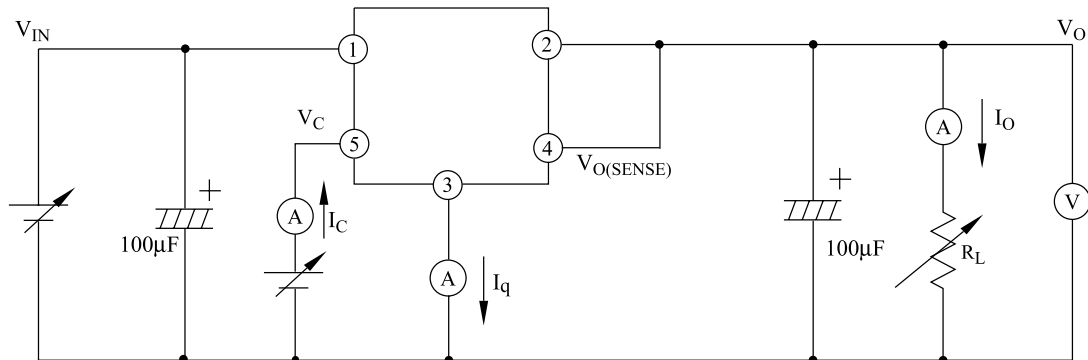
| CHARACTERISTIC                             |    | SYMBOL    | RATING    | UNIT |
|--------------------------------------------|----|-----------|-----------|------|
| Input Voltage                              |    | $V_{IN}$  | 15        | V    |
| ON/OFF Control Voltage                     |    | $V_C$     | 15        | V    |
| Output Current                             |    | $I_{OUT}$ | 2.0       | A    |
| Power Dissipation-1<br>(No Heatsink)       | FP | $P_{D1}$  | 2.0       | W    |
|                                            | PI |           | 1.5       |      |
| Power Dissipation-2<br>(Infinite Heatsink) | FP | $P_{D2}$  | 35        | W    |
|                                            | PI |           | 15        |      |
| Junction Temperature                       |    | $T_j$     | 150       | ℃    |
| Operating Junction Temperature             |    | $T_{opr}$ | -20 ~ 80  | ℃    |
| Storage Temperature                        |    | $T_{stg}$ | -30 ~ 150 | ℃    |



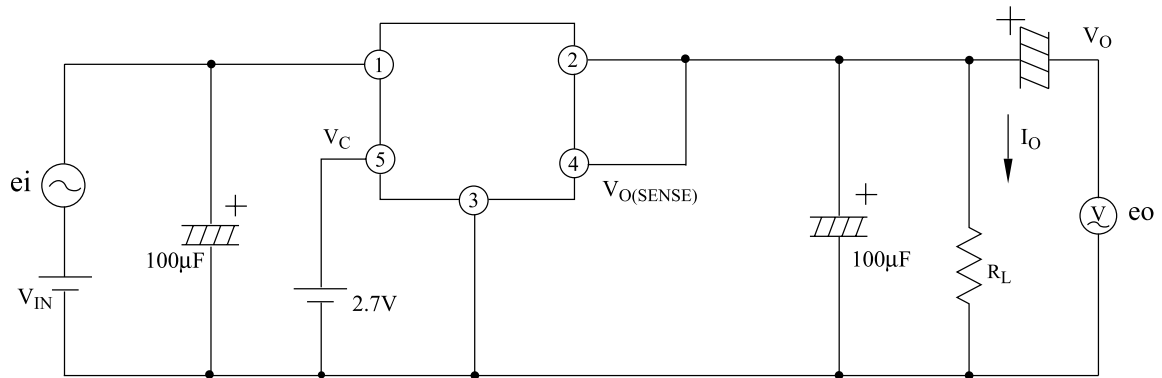
# KIA278R015FP/PI~KIA278R050FP/PI

## KIA278R015FP~KIA278R050FP (D<sup>2</sup>PAK-5)

**Fig. 1 Test Circuit**

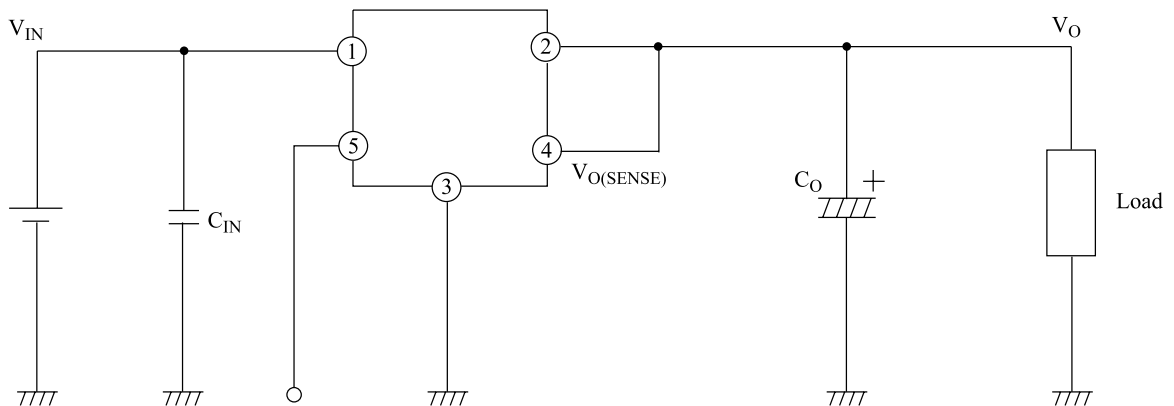


**Fig. 2 Ripple Rejection Test Circuit**



\* Test Condition :  $f=120\text{Hz}$ ,  $e_i = 0.5\text{Vrms}$ ,  $R.R=20.\log(e_i/e_o)$

**Fig. 3 Application Circuit for Standard**



On/off signal [ High : Output ON  
Low : Output OFF  
Open : Output OFF ]

# KIA278R015FP/PI~KIA278R050FP/PI

## KIA278R015PI~KIA278R050PI (TO-220IS-4)

Fig. 1 Test Circuit

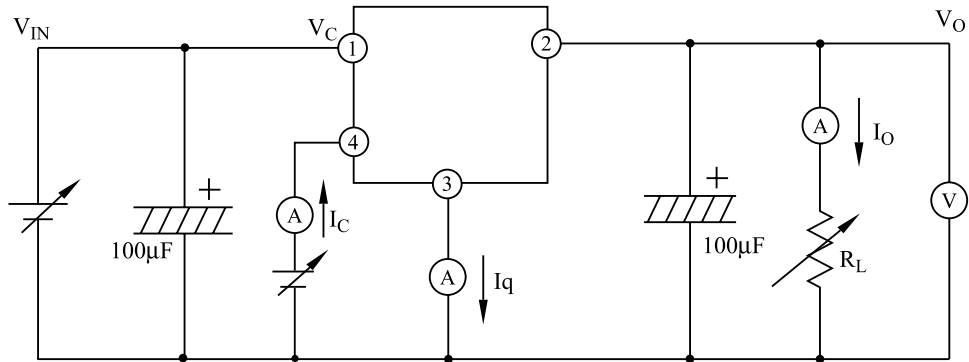
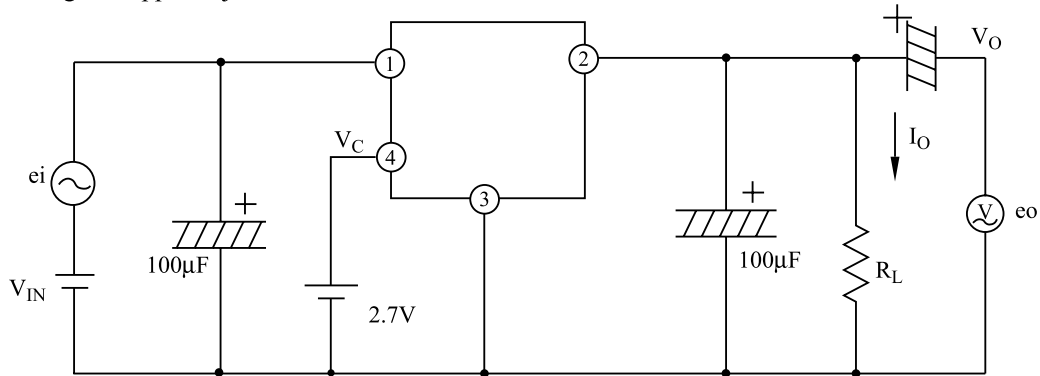
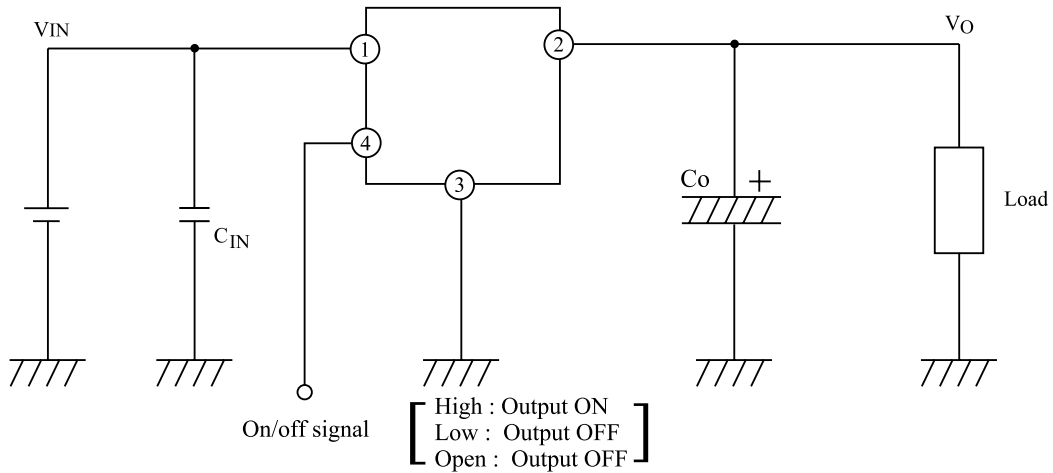


Fig. 2 Ripple Rejection Test Circuit



\* Test Condition :  $f=120\text{Hz}$ ,  $e_i = 0.5\text{Vrms}$ ,  $R_L=20.\log(e_i/e_o)$

Fig. 3 Application Circuit for Standard



# KIA278R015FP/PI~KIA278R050FP/PI

## ELECTRICAL CHARACTERISTICS (KIA278R015)

(Unless otherwise specified,  $V_{IN}=V_O+1V$ ,  $I_O=1A$ ,  $T_a=25^\circ C$ )

| CHARACTERISTIC                            | SYMBOL       | CONDITIONS                                              | MIN. | TYP.       | MAX.       | UNIT          |
|-------------------------------------------|--------------|---------------------------------------------------------|------|------------|------------|---------------|
| Input Voltage                             | $V_{IN}$     | -                                                       | 2.35 | -          | 7          | V             |
| Output Voltage                            | $V_O$        | -                                                       | 1.45 | 1.50       | 1.55       | V             |
| Load Regulation                           | Reg Load     | $I_O=5mA \sim 2.0A$                                     | -    | 0.2        | 2.0        | %             |
| Line Regulation                           | Reg Line     | $V_{IN}=2.5V \sim 5.5V$ , $I_O=5mA$                     | -    | 0.05       | 1.0        | %             |
| Temperature Coefficient of Output Voltage | $T_C V_O$    | $T_j=0 \sim 125^\circ C$ , $I_O=5mA$                    | -    | $\pm 0.02$ | $\pm 0.05$ | %/ $^\circ C$ |
| Ripple Rejection                          | $R \cdot R$  | $I_{OUT}=0.5A$ , $f=120Hz$ ,<br>$V_{ripple}=0.5V_{rms}$ | 45   | 60         | -          | dB            |
| Output ON state for control Voltage       | $V_{C(ON)}$  | -                                                       | 2.0  | -          | -          | V             |
| Output ON state for control Current       | $I_{C(ON)}$  | $V_C=2.7V$                                              | -    | -          | 200        | $\mu A$       |
| Output OFF state for control Voltage      | $V_{C(OFF)}$ | -                                                       | -    | -          | 0.8        | V             |
| Output OFF state for control Current      | $I_{C(OFF)}$ | $V_C=0.4V$                                              | -    | -          | 2.0        | $\mu A$       |
| Quiescent Current                         | $I_Q$        | $I_O=0A$                                                | -    | 1          | 2          | mA            |
| Quiescent Current (OFF Mode)              | $I_{Q(OFF)}$ | $V_C=0.4V$ , $I_O=0A$                                   | -    | 0.5        | 5          | $\mu A$       |

## ELECTRICAL CHARACTERISTICS (KIA278R018)

(Unless otherwise specified,  $V_{IN}=V_O+1V$ ,  $I_O=1A$ ,  $T_a=25^\circ C$ )

| CHARACTERISTIC                            | SYMBOL       | CONDITIONS                                              | MIN. | TYP.       | MAX.       | UNIT          |
|-------------------------------------------|--------------|---------------------------------------------------------|------|------------|------------|---------------|
| Input Voltage                             | $V_{IN}$     | -                                                       | 2.35 | -          | 7          | V             |
| Output Voltage                            | $V_O$        | -                                                       | 1.75 | 1.8        | 1.85       | V             |
| Load Regulation                           | Reg Load     | $I_O=5mA \sim 2.0A$                                     | -    | 0.2        | 2.0        | %             |
| Line Regulation                           | Reg Line     | $V_{IN}=2.5V \sim 5.5V$ , $I_O=5mA$                     | -    | 0.05       | 1.0        | %             |
| Temperature Coefficient of Output Voltage | $T_C V_O$    | $T_j=0 \sim 125^\circ C$ , $I_O=5mA$                    | -    | $\pm 0.02$ | $\pm 0.05$ | %/ $^\circ C$ |
| Ripple Rejection                          | $R \cdot R$  | $I_{OUT}=0.5A$ , $f=120Hz$ ,<br>$V_{ripple}=0.5V_{rms}$ | 45   | 60         | -          | dB            |
| Output ON state for control Voltage       | $V_{C(ON)}$  | -                                                       | 2.0  | -          | -          | V             |
| Output ON state for control Current       | $I_{C(ON)}$  | $V_C=2.7V$                                              | -    | -          | 200        | $\mu A$       |
| Output OFF state for control Voltage      | $V_{C(OFF)}$ | -                                                       | -    | -          | 0.8        | V             |
| Output OFF state for control Current      | $I_{C(OFF)}$ | $V_C=0.4V$                                              | -    | -          | 2.0        | $\mu A$       |
| Quiescent Current                         | $I_Q$        | $I_O=0A$                                                | -    | 1          | 2          | mA            |
| Quiescent Current (OFF Mode)              | $I_{Q(OFF)}$ | $V_C=0.4V$ , $I_O=0A$                                   | -    | 0.5        | 5          | $\mu A$       |

# KIA278R015FP/PI~KIA278R050FP/PI

## ELECTRICAL CHARACTERISTICS (KIA278R020)

(Unless otherwise specified,  $V_{IN}=V_O+1V$ ,  $I_O=1A$ ,  $T_a=25^\circ C$ )

| CHARACTERISTIC                            | SYMBOL       | CONDITIONS                                              | MIN. | TYP.       | MAX.       | UNIT          |
|-------------------------------------------|--------------|---------------------------------------------------------|------|------------|------------|---------------|
| Output Voltage                            | $V_O$        | -                                                       | 1.95 | 2.0        | 2.05       | V             |
| Load Regulation                           | Reg Load     | $I_O=5mA \sim 2.0A$                                     | -    | 0.2        | 2.0        | %             |
| Line Regulation                           | Reg Line     | $V_{IN}=3V \sim 6V$ , $I_O=5mA$                         | -    | 0.05       | 1.0        | %             |
| Temperature Coefficient of Output Voltage | $T_C V_O$    | $T_j=0 \sim 125^\circ C$ , $I_O=5mA$                    | -    | $\pm 0.02$ | $\pm 0.05$ | %/ $^\circ C$ |
| Ripple Rejection                          | $R \cdot R$  | $I_{OUT}=0.5A$ , $f=120Hz$ ,<br>$V_{ripple}=0.5V_{rms}$ | 45   | 60         | -          | dB            |
| Dropout Voltage                           | $V_D$        | $I_O=2A$                                                | -    | -          | 0.5        | V             |
| Output ON state for control Voltage       | $V_{C(ON)}$  | -                                                       | 2.0  | -          | -          | V             |
| Output ON state for control Current       | $I_{C(ON)}$  | $V_C=2.7V$                                              | -    | -          | 200        | $\mu A$       |
| Output OFF state for control Voltage      | $V_{C(OFF)}$ | -                                                       | -    | -          | 0.8        | V             |
| Output OFF state for control Current      | $I_{C(OFF)}$ | $V_C=0.4V$                                              | -    | -          | 2.0        | $\mu A$       |
| Quiescent Current                         | $I_Q$        | $I_O=0A$                                                | -    | 1          | 2          | mA            |
| Quiescent Current (OFF Mode)              | $I_{Q(OFF)}$ | $V_C=0.4V$ , $I_O=0A$                                   | -    | 0.5        | 5          | $\mu A$       |

## ELECTRICAL CHARACTERISTICS (KIA278R025)

(Unless otherwise specified,  $V_{IN}=V_O+1V$ ,  $I_O=1A$ ,  $T_a=25^\circ C$ )

| CHARACTERISTIC                            | SYMBOL       | CONDITIONS                                              | MIN.  | TYP.       | MAX.       | UNIT          |
|-------------------------------------------|--------------|---------------------------------------------------------|-------|------------|------------|---------------|
| Output Voltage                            | $V_O$        | -                                                       | 2.438 | 2.50       | 2.562      | V             |
| Load Regulation                           | Reg Load     | $I_O=5mA \sim 2.0A$                                     | -     | 0.2        | 2.0        | %             |
| Line Regulation                           | Reg Line     | $V_{IN}=3V \sim 6.5V$ , $I_O=5mA$                       | -     | 0.05       | 1.0        | %             |
| Temperature Coefficient of Output Voltage | $T_C V_O$    | $T_j=0 \sim 125^\circ C$ , $I_O=5mA$                    | -     | $\pm 0.02$ | $\pm 0.05$ | %/ $^\circ C$ |
| Ripple Rejection                          | $R \cdot R$  | $I_{OUT}=0.5A$ , $f=120Hz$ ,<br>$V_{ripple}=0.5V_{rms}$ | 45    | 60         | -          | dB            |
| Dropout Voltage                           | $V_D$        | $I_O=2A$                                                | -     | -          | 0.5        | V             |
| Output ON state for control Voltage       | $V_{C(ON)}$  | -                                                       | 2.0   | -          | -          | V             |
| Output ON state for control Current       | $I_{C(ON)}$  | $V_C=2.7V$                                              | -     | -          | 200        | $\mu A$       |
| Output OFF state for control Voltage      | $V_{C(OFF)}$ | -                                                       | -     | -          | 0.8        | V             |
| Output OFF state for control Current      | $I_{C(OFF)}$ | $V_C=0.4V$                                              | -     | -          | 2.0        | $\mu A$       |
| Quiescent Current                         | $I_Q$        | $I_O=0A$                                                | -     | 1          | 2          | mA            |
| Quiescent Current (OFF Mode)              | $I_{Q(OFF)}$ | $V_C=0.4V$ , $I_O=0A$                                   | -     | 0.5        | 5          | $\mu A$       |

# KIA278R015FP/PI~KIA278R050FP/PI

## ELECTRICAL CHARACTERISTICS (KIA278R030)

(Unless otherwise specified,  $V_{IN}=V_O+1V$ ,  $I_O=1A$ ,  $T_a=25^\circ C$ )

| CHARACTERISTIC                            | SYMBOL       | CONDITIONS                                              | MIN.  | TYP.       | MAX.       | UNIT          |
|-------------------------------------------|--------------|---------------------------------------------------------|-------|------------|------------|---------------|
| Output Voltage                            | $V_O$        | -                                                       | 2.925 | 3.0        | 3.075      | V             |
| Load Regulation                           | Reg Load     | $I_O=5mA \sim 2.0A$                                     | -     | 0.2        | 2.0        | %             |
| Line Regulation                           | Reg Line     | $V_{IN}=3.5V \sim 7V$ , $I_O=5mA$                       | -     | 0.05       | 1.0        | %             |
| Temperature Coefficient of Output Voltage | $T_C V_O$    | $T_j=0 \sim 125^\circ C$ , $I_O=5mA$                    | -     | $\pm 0.02$ | $\pm 0.05$ | %/ $^\circ C$ |
| Ripple Rejection                          | $R \cdot R$  | $I_{OUT}=0.5A$ , $f=120Hz$ ,<br>$V_{ripple}=0.5V_{rms}$ | 45    | 60         | -          | dB            |
| Dropout Voltage                           | $V_D$        | $I_O=2A$                                                | -     | -          | 0.5        | V             |
| Output ON state for control Voltage       | $V_{C(ON)}$  | -                                                       | 2.0   | -          | -          | V             |
| Output ON state for control Current       | $I_{C(ON)}$  | $V_C=2.7V$                                              | -     | -          | 200        | $\mu A$       |
| Output OFF state for control Voltage      | $V_{C(OFF)}$ | -                                                       | -     | -          | 0.8        | V             |
| Output OFF state for control Current      | $I_{C(OFF)}$ | $V_C=0.4V$                                              | -     | -          | 2.0        | $\mu A$       |
| Quiescent Current                         | $I_Q$        | $I_O=0A$                                                | -     | 1          | 2          | mA            |
| Quiescent Current (OFF Mode)              | $I_{Q(OFF)}$ | $V_C=0.4V$ , $I_O=0A$                                   | -     | 0.5        | 5          | $\mu A$       |

## ELECTRICAL CHARACTERISTICS (KIA278R033)

(Unless otherwise specified,  $V_{IN}=V_O+1V$ ,  $I_O=1A$ ,  $T_a=25^\circ C$ )

| CHARACTERISTIC                            | SYMBOL       | CONDITIONS                                              | MIN.  | TYP.       | MAX.       | UNIT          |
|-------------------------------------------|--------------|---------------------------------------------------------|-------|------------|------------|---------------|
| Output Voltage                            | $V_O$        | -                                                       | 3.218 | 3.30       | 3.382      | V             |
| Load Regulation                           | Reg Load     | $I_O=5mA \sim 2.0A$                                     | -     | 0.2        | 2.0        | %             |
| Line Regulation                           | Reg Line     | $V_{IN}=3.8V \sim 7V$ , $I_O=5mA$                       | -     | 0.05       | 1.0        | %             |
| Temperature Coefficient of Output Voltage | $T_C V_O$    | $T_j=0 \sim 125^\circ C$ , $I_O=5mA$                    | -     | $\pm 0.02$ | $\pm 0.05$ | %/ $^\circ C$ |
| Ripple Rejection                          | $R \cdot R$  | $I_{OUT}=0.5A$ , $f=120Hz$ ,<br>$V_{ripple}=0.5V_{rms}$ | 45    | 60         | -          | dB            |
| Dropout Voltage                           | $V_D$        | $I_O=2A$                                                | -     | -          | 0.5        | V             |
| Output ON state for control Voltage       | $V_{C(ON)}$  | -                                                       | 2.0   | -          | -          | V             |
| Output ON state for control Current       | $I_{C(ON)}$  | $V_C=2.7V$                                              | -     | -          | 200        | $\mu A$       |
| Output OFF state for control Voltage      | $V_{C(OFF)}$ | -                                                       | -     | -          | 0.8        | V             |
| Output OFF state for control Current      | $I_{C(OFF)}$ | $V_C=0.4V$                                              | -     | -          | 2.0        | $\mu A$       |
| Quiescent Current                         | $I_Q$        | $I_O=0A$                                                | -     | 1          | 2          | mA            |
| Quiescent Current (OFF Mode)              | $I_{Q(OFF)}$ | $V_C=0.4V$ , $I_O=0A$                                   | -     | 0.5        | 5          | $\mu A$       |

# KIA278R015FP/PI~KIA278R050FP/PI

## ELECTRICAL CHARACTERISTICS (KIA278R050)

(Unless otherwise specified,  $V_{IN}=V_O+1V$ ,  $I_O=1A$ ,  $T_a=25^\circ C$ )

| CHARACTERISTIC                            | SYMBOL       | CONDITIONS                                              | MIN. | TYP.       | MAX.       | UNIT          |
|-------------------------------------------|--------------|---------------------------------------------------------|------|------------|------------|---------------|
| Output Voltage                            | $V_O$        | -                                                       | 4.88 | 5.0        | 5.12       | V             |
| Load Regulation                           | Reg Load     | $I_O=5mA \sim 2.0A$                                     | -    | 0.2        | 2.0        | %             |
| Line Regulation                           | Reg Line     | $V_{IN}=5.5V \sim 7V$ , $I_O=5mA$                       | -    | 0.05       | 1.0        | %             |
| Temperature Coefficient of Output Voltage | $T_C V_O$    | $T_j=0 \sim 125^\circ C$ , $I_O=5mA$                    | -    | $\pm 0.02$ | $\pm 0.05$ | %/ $^\circ C$ |
| Ripple Rejection                          | $R \cdot R$  | $I_{OUT}=0.5A$ , $f=120Hz$ ,<br>$V_{ripple}=0.5V_{rms}$ | 45   | 60         | -          | dB            |
| Dropout Voltage                           | $V_D$        | $I_O=2A$                                                | -    | -          | 0.5        | V             |
| Output ON state for control Voltage       | $V_{C(ON)}$  | -                                                       | 2.0  | -          | -          | V             |
| Output ON state for control Current       | $I_{C(ON)}$  | $V_C=2.7V$                                              | -    | -          | 200        | $\mu A$       |
| Output OFF state for control Voltage      | $V_{C(OFF)}$ | -                                                       | -    | -          | 0.8        | V             |
| Output OFF state for control Current      | $I_{C(OFF)}$ | $V_C=0.4V$                                              | -    | -          | 2.0        | $\mu A$       |
| Quiescent Current                         | $I_Q$        | $I_O=0A$                                                | -    | 1          | 2          | mA            |
| Quiescent Current (OFF Mode)              | $I_{Q(OFF)}$ | $V_C=0.4V$ , $I_O=0A$                                   | -    | 0.5        | 5          | $\mu A$       |

# KIA278R015FP/PI~KIA278R050FP/PI

Fig. 4  $I_O - V_O$  (KIA278R015)

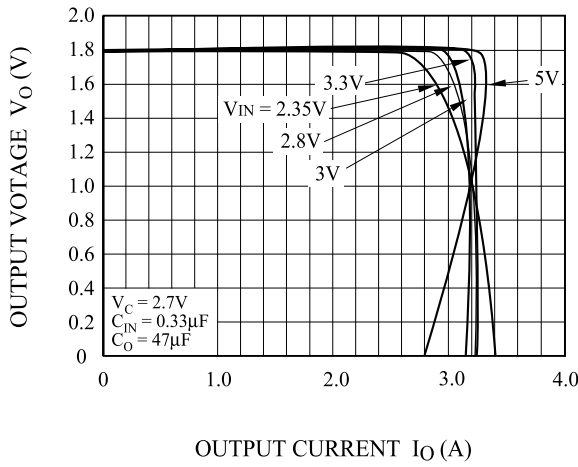


Fig. 5  $I_O - V_O$  (KIA278R018)

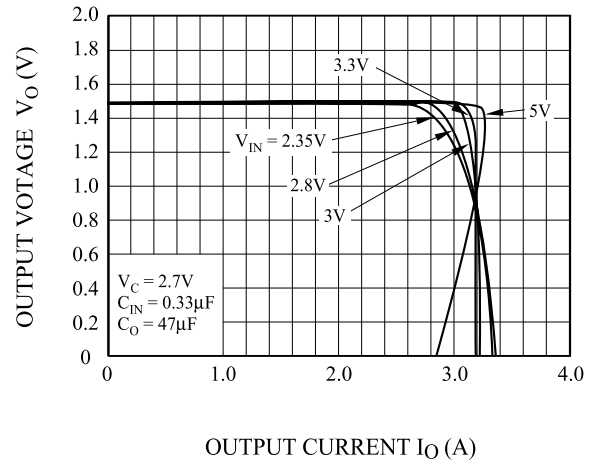


Fig. 6  $I_O - V_O$  (KIA278R025)

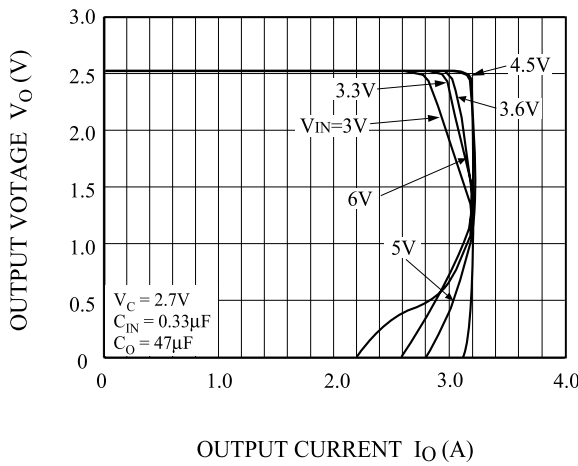


Fig. 7  $T_j - \Delta V_O$  (KIA278R015)

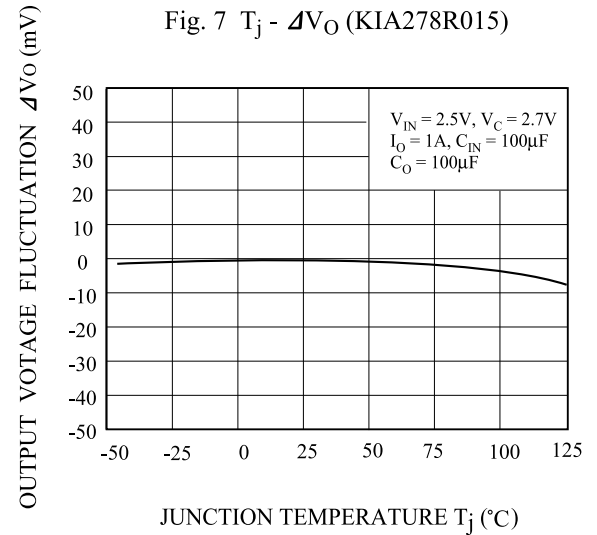


Fig. 8  $T_j - \Delta V_O$  (KIA278R018)

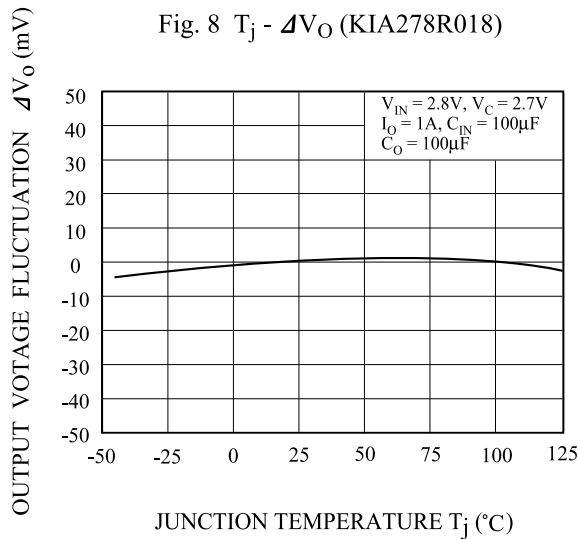
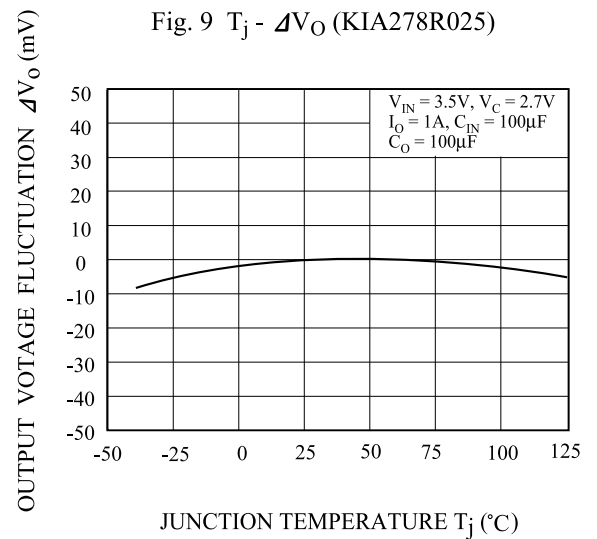


Fig. 9  $T_j - \Delta V_O$  (KIA278R025)





# KIA278R015FP/PI~KIA278R050FP/PI

Fig. 10  $V_{IN} - V_{OUT}$  (KIA278R015)

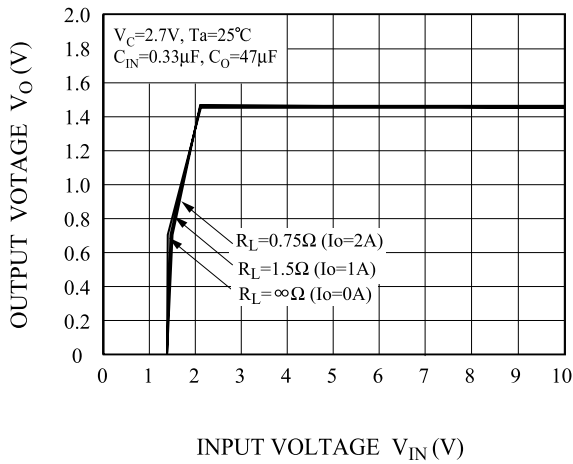


Fig. 11  $V_{IN} - V_{OUT}$  (KIA278R018)

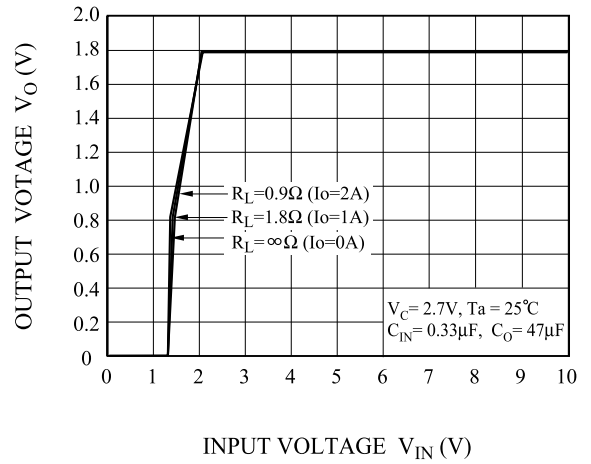


Fig. 12  $V_{IN} - V_{OUT}$  (KIA278R025)

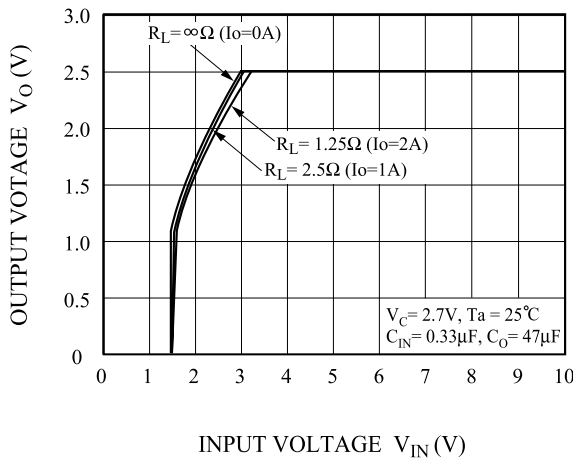


Fig. 13  $V_{IN} - I_{BIAS}$  (KIA278R015)

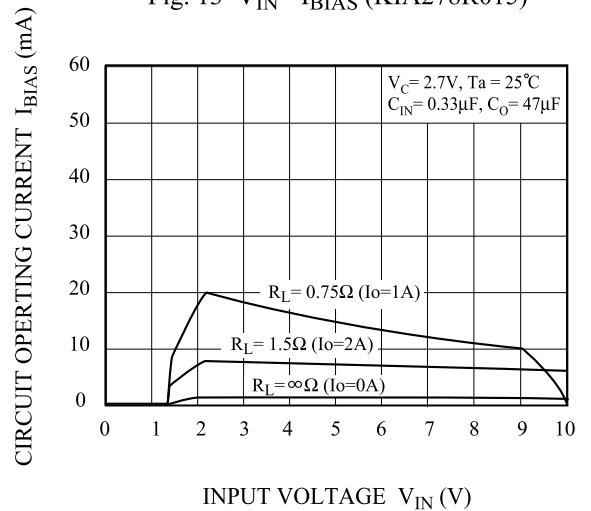


Fig. 14  $V_{IN} - I_{BIAS}$  (KIA278R018)

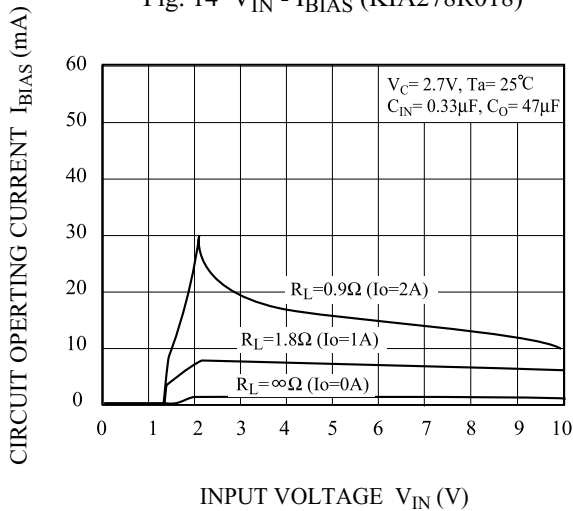
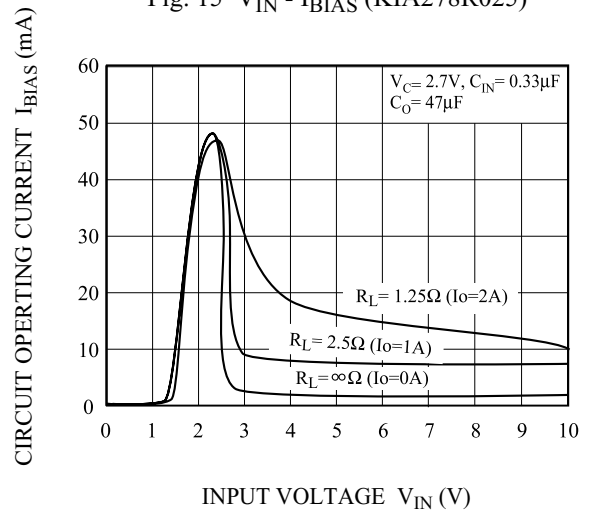


Fig. 15  $V_{IN} - I_{BIAS}$  (KIA278R025)



# KIA278R015FP/PI~KIA278R050FP/PI

Fig. 16  $T_j - I_q$

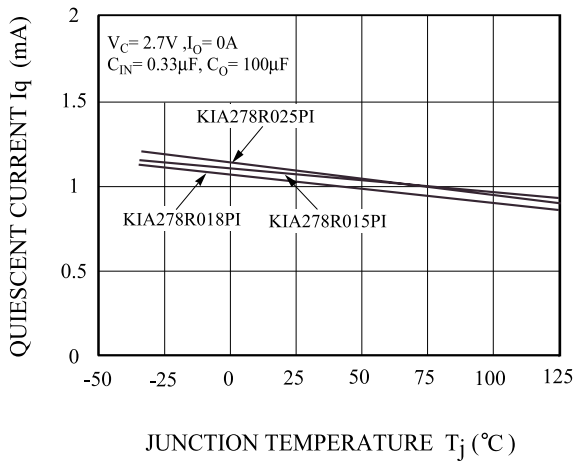


Fig. 17  $T_j - V_C$  (ON/OFF)

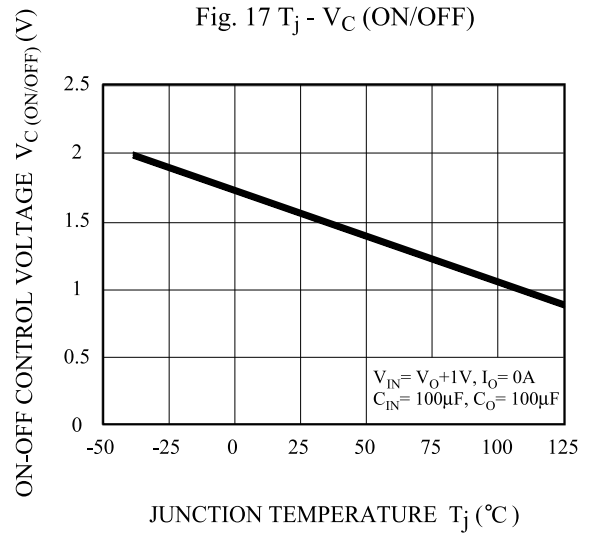


Fig.18  $f_{rip} - RR$

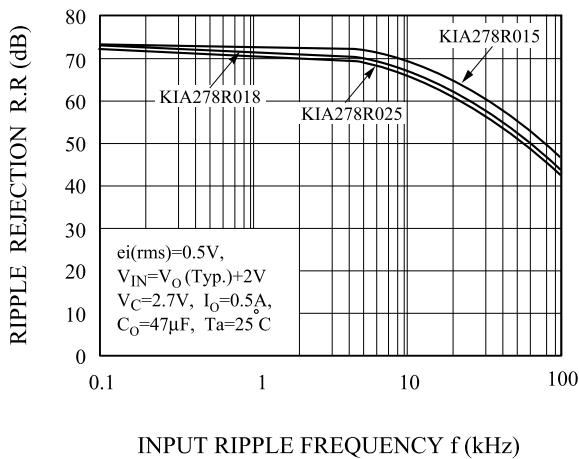


Fig. 19  $I_{OUT} - RR$

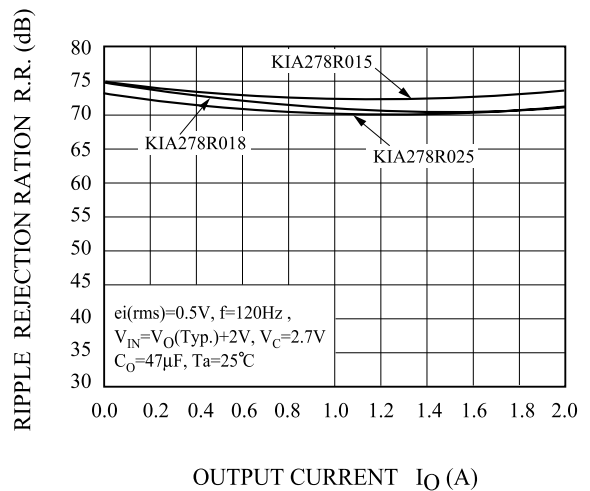


Fig. 21  $P_D - T_a$  (D<sup>2</sup>PAK-5)

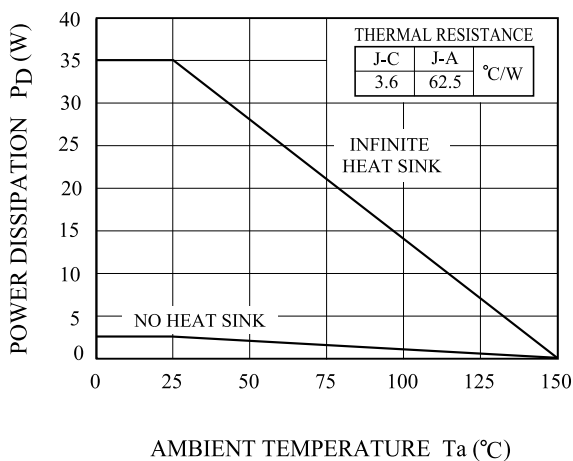


Fig. 20  $P_D - T_a$  (TO-220IS-4)

