

## 1A THREE TERMINAL NEGATIVE VOLTAGE REGULATORS -5V, -6V, -7V, -8V, -9V, -10V, -12V, -15V, -18V, -20V, -24V.

### FEATURES

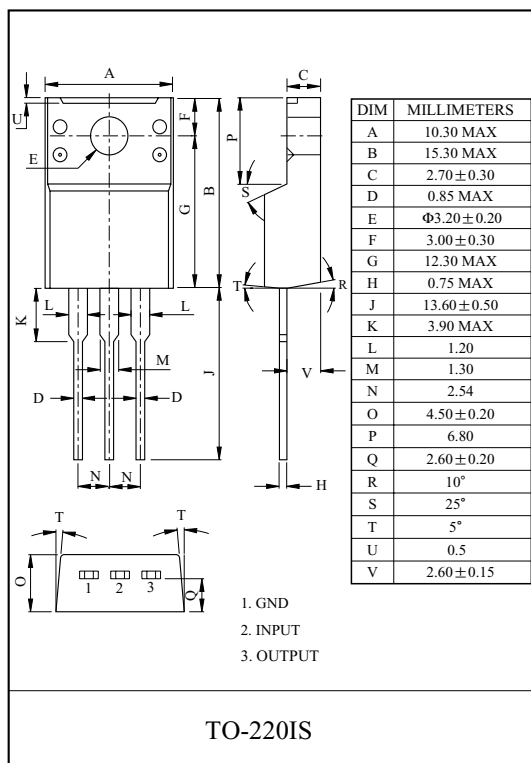
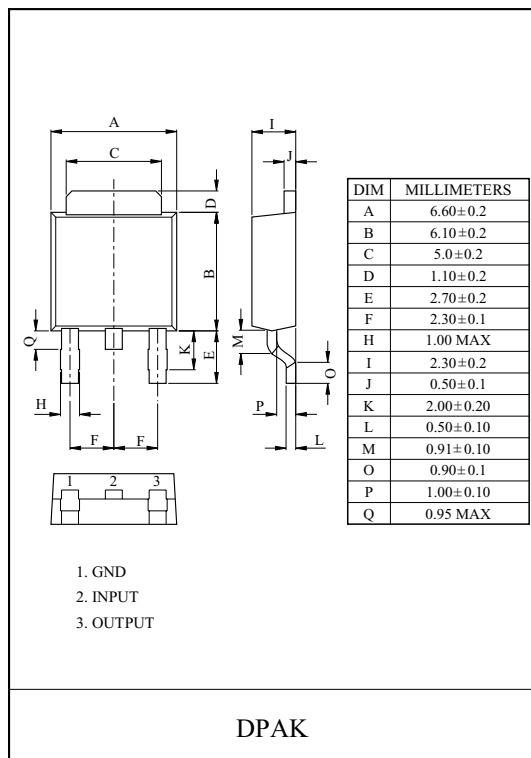
- Suitable for C-MOS, TTL, and the other digital IC power supply.
- Internal thermal overload protecting.
- Internal short circuit current limiting.
- Output current in excess of 1.0A.

### LINE-UP

| ITEM        | OUTPUT VOLTAGE (Typ.) | UNIT                      |
|-------------|-----------------------|---------------------------|
| KIA7905F/PI | -5                    | F : DPAK<br>PI : TO-220IS |
| KIA7906F/PI | -6                    |                           |
| KIA7907F/PI | -7                    |                           |
| KIA7908F/PI | -8                    |                           |
| KIA7909F/PI | -9                    |                           |
| KIA7910F/PI | -10                   |                           |
| KIA7912F/PI | -12                   |                           |
| KIA7915F/PI | -15                   |                           |
| KIA7918F/PI | -18                   |                           |
| KIA7920F/PI | -20                   |                           |
| KIA7924F/PI | -24                   |                           |

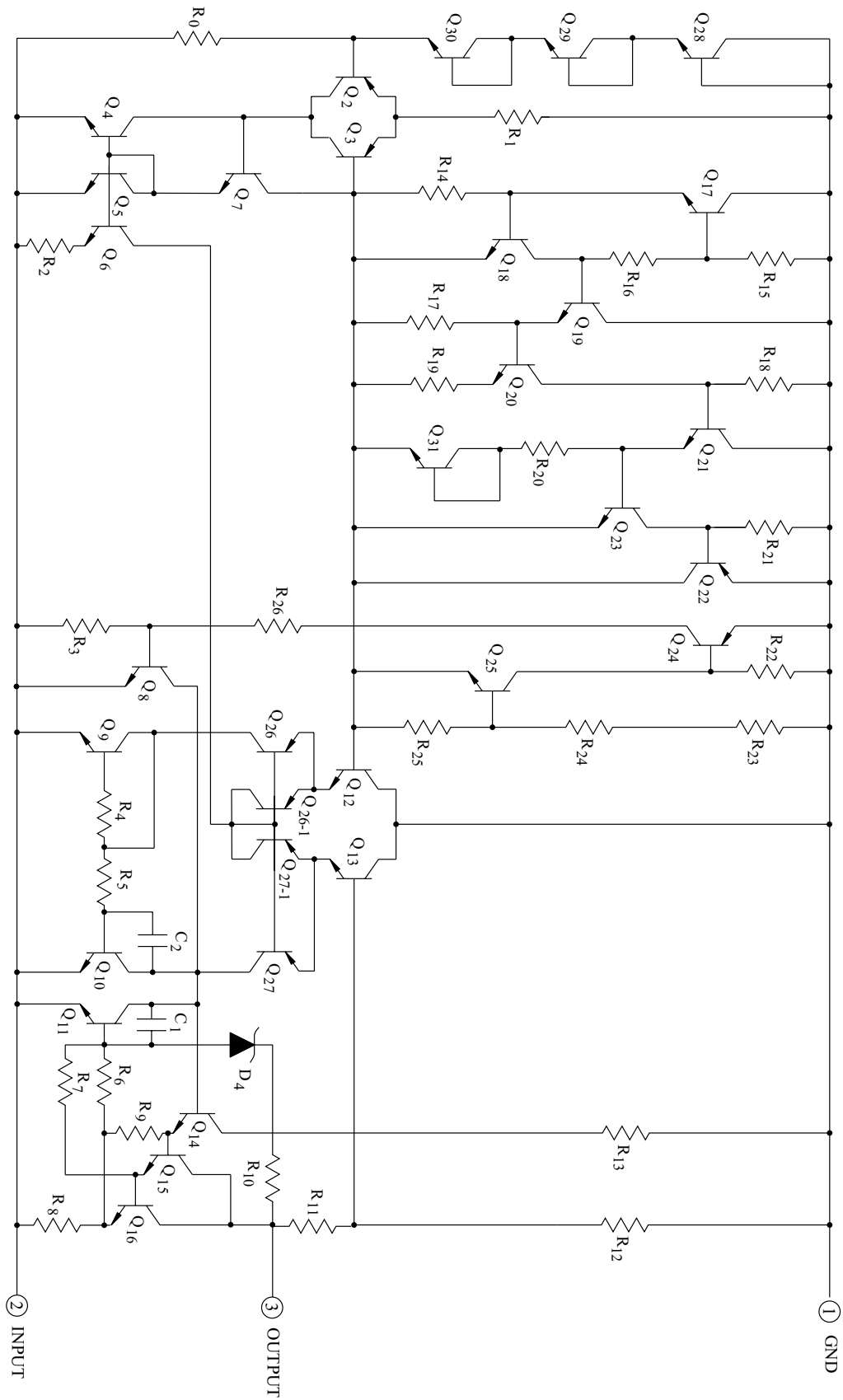
### MAXIMUM RATINGS (Ta=25 °C)

| CHARACTERISTIC                             |                   | SYMBOL           | RATING    | UNIT |
|--------------------------------------------|-------------------|------------------|-----------|------|
| Input Voltage                              | KIA7905 ~ KIA7915 | V <sub>IN</sub>  | -35       | V    |
|                                            | KIA7918 ~ KIA7924 |                  | -40       |      |
| Power Dissipation-1<br>(No Heatsink)       | F                 | P <sub>D1</sub>  | 1.3       | W    |
|                                            | PI                |                  | 2.0       |      |
| Power Dissipation-2<br>(Infinite Heatsink) | F                 | P <sub>D2</sub>  | 12.0      | W    |
|                                            | PI                |                  | 20.8      |      |
| Operating Junction Temperature             |                   | T <sub>j</sub>   | -30 ~ 150 | °C   |
| Operating Temperature                      |                   | T <sub>opr</sub> | -30 ~ 75  | °C   |
| Storage Temperature                        |                   | T <sub>stg</sub> | -55 ~ 150 | °C   |



# KIA7905F/PI~KIA7924F/PI

## EQUIVALENT CIRCUIT



# KIA7905F/PI~KIA7924F/PI

## ELECTRICAL CHARACTERISTICS

### KIA7905F/PI

(Unless otherwise specified,  $V_{IN}=-10V$ ,  $I_{OUT}=500mA$ ,  $0\text{ }^{\circ}C \leq T_j \leq 125\text{ }^{\circ}C$ ,  $C_{IN}=2.2\mu F$ ,  $C_{OUT}=1\mu F$ )

| CHARACTERISTIC                                    | SYMBOL          | TEST CIRCUIT | TEST CONDITION                                              | MIN.                            | TYP. | MAX.  | UNIT            |     |
|---------------------------------------------------|-----------------|--------------|-------------------------------------------------------------|---------------------------------|------|-------|-----------------|-----|
| Output Voltage                                    | $V_{OUT}$       | Fig.1        | $T_j=25\text{ }^{\circ}C$                                   | -5.2                            | -5.0 | -4.8  | V               |     |
| Input Regulation                                  | Reg line        | Fig.1        | $T_j=25\text{ }^{\circ}C$                                   | $-12V \leq V_{IN} \leq -8V$     | -    | 5     | 50              | mV  |
|                                                   |                 |              |                                                             | $-25V \leq V_{IN} \leq -7V$     | -    | 10    | 100             |     |
| Load Regulation                                   | Reg load        | Fig.1        | $T_j=25\text{ }^{\circ}C$                                   | $5mA \leq I_{OUT} \leq 1.5A$    | -    | 10    | 100             | mV  |
|                                                   |                 |              |                                                             | $250mA \leq I_{OUT} \leq 750mA$ | -    | 3     | 50              |     |
| Output Voltage                                    | $V_{OUT}$       | Fig.1        | $-20V \leq V_{IN} \leq -7V$<br>$5mA \leq I_{OUT} \leq 1.0A$ | -5.25                           | -5.0 | -4.75 | V               |     |
| Quiescent Current                                 | $I_B$           | Fig.1        | $T_j=25\text{ }^{\circ}C$                                   | -                               | 3    | 6     | mA              |     |
| Quiescent Current Change                          | $\Delta I_{BI}$ | Fig.1        | $-25V \leq V_{IN} \leq -8V$                                 | -                               | 0.1  | 1.3   | mA              |     |
|                                                   | $\Delta I_{BO}$ |              |                                                             | $5mA \leq I_{OUT} \leq 1.0A$    | -    | 0.05  |                 | 0.5 |
| Output Noise Voltage                              | $V_{NO}$        | Fig.2        | $T_a=25\text{ }^{\circ}C$ , $10Hz \leq f \leq 100kHz$       | -                               | 100  | -     | $\mu V_{rms}$   |     |
| Ripple Rejection Ratio                            | RR              | Fig.3        | $f=120Hz$ , $I_{OUT}=20mA$ ,                                | 54                              | 60   | -     | dB              |     |
| Short Circuit Current Limit                       | $I_{SC}$        | Fig.1        | $T_j=25\text{ }^{\circ}C$                                   | -                               | 1.9  | -     | A               |     |
| Average Temperature Coefficient of Output Voltage | $T_{CVO}$       | Fig.1        | $I_{OUT}=5.0mA$                                             | -                               | -0.4 | -     | mV/ $^{\circ}C$ |     |
| Dropout Voltage                                   | $V_D$           | Fig.1        | $T_j=25\text{ }^{\circ}C$ , $I_{OUT}=1A$                    | -                               | 2.0  | -     | V               |     |

# KIA7905F/PI~KIA7924F/PI

## ELECTRICAL CHARACTERISTICS

### KIA7906F/PI

(Unless otherwise specified,  $V_{IN}=-11V$ ,  $I_{OUT}=500mA$ ,  $0^{\circ}C \leq T_j \leq 125^{\circ}C$ ,  $C_{IN}=2.2\mu F$ ,  $C_{OUT}=1\mu F$ )

| CHARACTERISTIC                                    |  | SYMBOL    | TEST CIRCUIT | TEST CONDITION                                              | MIN.                            | TYP. | MAX.  | UNIT            |                              |
|---------------------------------------------------|--|-----------|--------------|-------------------------------------------------------------|---------------------------------|------|-------|-----------------|------------------------------|
| Output Voltage                                    |  | $V_{OUT}$ | Fig.1        | $T_j=25^{\circ}C$                                           | -6.25                           | -6.0 | -5.75 | V               |                              |
| Input Regulation                                  |  | Reg line  | Fig.1        | $T_j=25^{\circ}C$                                           | $-13V \leq V_{IN} \leq -9V$     | -    | 5     | 60              | mV                           |
|                                                   |  |           |              |                                                             | $-25V \leq V_{IN} \leq -8V$     | -    | 10    | 120             |                              |
| Load Regulation                                   |  | Reg load  | Fig.1        | $T_j=25^{\circ}C$                                           | $5mA \leq I_{OUT} \leq 1.5A$    | -    | 10    | 120             | mV                           |
|                                                   |  |           |              |                                                             | $250mA \leq I_{OUT} \leq 750mA$ | -    | 3     | 60              |                              |
| Output Voltage                                    |  | $V_{OUT}$ | Fig.1        | $-21V \leq V_{IN} \leq -9V$<br>$5mA \leq I_{OUT} \leq 1.0A$ | -6.3                            | -6.0 | -5.7  | V               |                              |
| Quiescent Current                                 |  | $I_B$     | Fig.1        | $T_j=25^{\circ}C$                                           | -                               | 3    | 6     | mA              |                              |
| Quiescent Current Change                          |  | Line      | Fig.1        | $-25V \leq V_{IN} \leq -9V$                                 | -                               | -    | 1.3   | mA              |                              |
|                                                   |  | Load      |              |                                                             |                                 |      |       |                 | $5mA \leq I_{OUT} \leq 1.0A$ |
| Output Noise Voltage                              |  | $V_{NO}$  | Fig.2        | $T_a=25^{\circ}C$ , $10Hz \leq f \leq 100kHz$               | -                               | 130  | -     | $\mu V_{rms}$   |                              |
| Ripple Rejection Ratio                            |  | RR        | Fig.3        | $f=120Hz$ , $I_{OUT}=20mA$ ,                                | 54                              | 60   | -     | dB              |                              |
| Short Circuit Current Limit                       |  | $I_{SC}$  | Fig.1        | $T_j=25^{\circ}C$                                           | -                               | 1.9  | -     | A               |                              |
| Average Temperature Coefficient of Output Voltage |  | $T_{CVO}$ | Fig.1        | $I_{OUT}=5mA$                                               | -                               | -0.5 | -     | mV/ $^{\circ}C$ |                              |
| Dropout Voltage                                   |  | $V_D$     | Fig.1        | $T_j=25^{\circ}C$ , $I_{OUT}=1A$                            | -                               | 2.0  | -     | V               |                              |

# KIA7905F/PI~KIA7924F/PI

## ELECTRICAL CHARACTERISTICS

### KIA7907F/PI

(Unless otherwise specified,  $V_{IN}=-12V$ ,  $I_{OUT}=500mA$ ,  $0^{\circ}C \leq T_j \leq 125^{\circ}C$ ,  $C_{IN}=2.2\mu F$ ,  $C_{OUT}=1\mu F$ )

| CHARACTERISTIC                                    |  | SYMBOL    | TEST CIRCUIT | TEST CONDITION                                              | MIN.                            | TYP. | MAX.  | UNIT            |    |
|---------------------------------------------------|--|-----------|--------------|-------------------------------------------------------------|---------------------------------|------|-------|-----------------|----|
| Output Voltage                                    |  | $V_{OUT}$ | Fig.1        | $T_j=25^{\circ}C$                                           | -7.28                           | -7.0 | -6.72 | V               |    |
| Input Regulation                                  |  | Reg line  | Fig.1        | $T_j=25^{\circ}C$                                           | $-15V \leq V_{IN} \leq -10V$    | -    | 10    | 70              | mV |
|                                                   |  |           |              |                                                             | $-25V \leq V_{IN} \leq -9V$     | -    | 45    | 140             |    |
| Load Regulation                                   |  | Reg load  | Fig.1        | $T_j=25^{\circ}C$                                           | $5mA \leq I_{OUT} \leq 1.5A$    | -    | 20    | 140             | mV |
|                                                   |  |           |              |                                                             | $250mA \leq I_{OUT} \leq 750mA$ | -    | 7     | 70              |    |
| Output Voltage                                    |  | $V_{OUT}$ | Fig.1        | $-22V \leq V_{IN} \leq -9V$<br>$5mA \leq I_{OUT} \leq 1.0A$ | -7.35                           | -    | -6.65 | V               |    |
| Quiescent Current                                 |  | $I_B$     | Fig.1        | $T_j=25^{\circ}C$                                           | -                               | 4.3  | 8.0   | mA              |    |
| Quiescent Current Change                          |  | Line      | Fig.1        | $-25V \leq V_{IN} \leq -9V$<br>$5mA \leq I_{OUT} \leq 1.0A$ | -                               | -    | 1.0   | mA              |    |
|                                                   |  | Load      |              |                                                             | -                               | -    | 0.5   |                 |    |
| Output Noise Voltage                              |  | $V_{NO}$  | Fig.2        | $T_a=25^{\circ}C$ , $10Hz \leq f \leq 100kHz$               | -                               | 49   | -     | $\mu V_{rms}$   |    |
| Ripple Rejection Ratio                            |  | RR        | Fig.3        | $f=120Hz$ , $I_{OUT}=20mA$ ,                                | 60                              | 67   | -     | dB              |    |
| Short Circuit Current Limit                       |  | $I_{SC}$  | Fig.1        | $T_j=25^{\circ}C$                                           | -                               | 1.9  | -     | A               |    |
| Average Temperature Coefficient of Output Voltage |  | $T_{CVO}$ | Fig.1        | $I_{OUT}=5mA$                                               | -                               | 0.9  | -     | mV/ $^{\circ}C$ |    |
| Dropout Voltage                                   |  | $V_D$     | Fig.1        | $T_j=25^{\circ}C$ , $I_{OUT}=1A$                            | -                               | 2.0  | -     | V               |    |

# KIA7905F/PI~KIA7924F/PI

## ELECTRICAL CHARACTERISTICS

### KIA7908F/PI

(Unless otherwise specified,  $V_{IN}=-14V$ ,  $I_{OUT}=500mA$ ,  $0^{\circ}C \leq T_j \leq 125^{\circ}C$ ,  $C_{IN}=2.2\mu F$ ,  $C_{OUT}=1\mu F$ )

| CHARACTERISTIC                                    |  | SYMBOL    | TEST CIRCUIT | TEST CONDITION                                                 | MIN.                            | TYP. | MAX. | UNIT            |                              |
|---------------------------------------------------|--|-----------|--------------|----------------------------------------------------------------|---------------------------------|------|------|-----------------|------------------------------|
| Output Voltage                                    |  | $V_{OUT}$ | Fig.1        | $T_j=25^{\circ}C$                                              | -8.3                            | -8.0 | -7.7 | V               |                              |
| Input Regulation                                  |  | Reg line  | Fig.1        | $T_j=25^{\circ}C$                                              | $-17V \leq V_{IN} \leq -11V$    | -    | 5    | 80              | mV                           |
|                                                   |  |           |              |                                                                | $-25V \leq V_{IN} \leq -10.5V$  | -    | 10   | 100             |                              |
| Load Regulation                                   |  | Reg load  | Fig.1        | $T_j=25^{\circ}C$                                              | $5mA \leq I_{OUT} \leq 1.5A$    | -    | 12   | 160             | mV                           |
|                                                   |  |           |              |                                                                | $250mA \leq I_{OUT} \leq 750mA$ | -    | 4    | 80              |                              |
| Output Voltage                                    |  | $V_{OUT}$ | Fig.1        | $-23V \leq V_{IN} \leq -11.5V$<br>$5mA \leq I_{OUT} \leq 1.0A$ | -8.4                            | -8.0 | -7.6 | V               |                              |
| Quiescent Current                                 |  | $I_B$     | Fig.1        | $T_j=25^{\circ}C$                                              | -                               | 3    | 6    | mA              |                              |
| Quiescent Current Change                          |  | Line      | Fig.1        | $-25V \leq V_{IN} \leq -11.5V$                                 | -                               | 0.1  | 1.0  | mA              |                              |
|                                                   |  | Load      |              |                                                                |                                 |      |      |                 | $5mA \leq I_{OUT} \leq 1.0A$ |
| Output Noise Voltage                              |  | $V_{NO}$  | Fig.2        | $T_a=25^{\circ}C$ , $10Hz \leq f \leq 100kHz$                  | -                               | 175  | -    | $\mu V_{rms}$   |                              |
| Ripple Rejection Ratio                            |  | RR        | Fig.3        | $f=120Hz$ , $I_{OUT}=20mA$ ,                                   | 54                              | 60   | -    | dB              |                              |
| Short Circuit Current Limit                       |  | $I_{SC}$  | Fig.1        | $T_j=25^{\circ}C$                                              | -                               | 1.9  | -    | A               |                              |
| Average Temperature Coefficient of Output Voltage |  | $T_{CVO}$ | Fig.1        | $I_{OUT}=5mA$                                                  | -                               | -0.6 | -    | mV/ $^{\circ}C$ |                              |
| Dropout Voltage                                   |  | $V_D$     | Fig.1        | $T_j=25^{\circ}C$ , $I_{OUT}=1A$                               | -                               | 2.0  | -    | V               |                              |

# KIA7905F/PI~KIA7924F/PI

## ELECTRICAL CHARACTERISTICS

### KIA7909F/PI

(Unless otherwise specified,  $V_{IN}=-15V$ ,  $I_{OUT}=500mA$ ,  $0\text{ }^{\circ}C \leq T_j \leq 125\text{ }^{\circ}C$ ,  $C_{IN}=2.2\mu F$ ,  $C_{OUT}=1\mu F$ )

| CHARACTERISTIC                                    |  | SYMBOL    | TEST CIRCUIT | TEST CONDITION                                                 | MIN.                            | TYP. | MAX. | UNIT            |                              |
|---------------------------------------------------|--|-----------|--------------|----------------------------------------------------------------|---------------------------------|------|------|-----------------|------------------------------|
| Output Voltage                                    |  | $V_{OUT}$ | Fig.1        | $T_j=25\text{ }^{\circ}C$                                      | -9.3                            | -9.0 | -8.7 | V               |                              |
| Input Regulation                                  |  | Reg line  | Fig.1        | $T_j=25\text{ }^{\circ}C$                                      | $-19V \leq V_{IN} \leq -13V$    | -    | 5    | 90              | mV                           |
|                                                   |  |           |              |                                                                | $-26V \leq V_{IN} \leq -11.5V$  | -    | 10   | 100             |                              |
| Load Regulation                                   |  | Reg load  | Fig.1        | $T_j=25\text{ }^{\circ}C$                                      | $5mA \leq I_{OUT} \leq 1.5A$    | -    | 10   | 150             | mV                           |
|                                                   |  |           |              |                                                                | $250mA \leq I_{OUT} \leq 750mA$ | -    | 5    | 120             |                              |
| Output Voltage                                    |  | $V_{OUT}$ | Fig.1        | $-24V \leq V_{IN} \leq -11.5V$<br>$5mA \leq I_{OUT} \leq 1.0A$ | -9.4                            | -9.0 | -8.6 | V               |                              |
| Quiescent Current                                 |  | $I_B$     | Fig.1        | $T_j=25\text{ }^{\circ}C$                                      | -                               | 3    | 6    | mA              |                              |
| Quiescent Current Change                          |  | Line      | Fig.1        | $-26.5V \leq V_{IN} \leq -13V$                                 | -                               | 0.1  | 1.0  | mA              |                              |
|                                                   |  | Load      |              |                                                                |                                 |      |      |                 | $5mA \leq I_{OUT} \leq 1.0A$ |
| Output Noise Voltage                              |  | $V_{NO}$  | Fig.2        | $T_a=25\text{ }^{\circ}C$ , $10Hz \leq f \leq 100kHz$          | -                               | 180  | -    | $\mu V_{rms}$   |                              |
| Ripple Rejection Ratio                            |  | RR        | Fig.3        | $f=120Hz$ , $I_{OUT}=20mA$ ,                                   | 54                              | 60   | -    | dB              |                              |
| Short Circuit Current Limit                       |  | $I_{SC}$  | Fig.1        | $T_j=25\text{ }^{\circ}C$                                      | -                               | 1.9  | -    | A               |                              |
| Average Temperature Coefficient of Output Voltage |  | $T_{CVO}$ | Fig.1        | $I_{OUT}=5mA$                                                  | -                               | -0.7 | -    | mV/ $^{\circ}C$ |                              |
| Dropout Voltage                                   |  | $V_D$     | Fig.1        | $T_j=25\text{ }^{\circ}C$ , $I_{OUT}=1A$                       | -                               | 2.0  | -    | V               |                              |

# KIA7905F/PI~KIA7924F/PI

## ELECTRICAL CHARACTERISTICS

### KIA7910F/PI

(Unless otherwise specified,  $V_{IN}=-16V$ ,  $I_{OUT}=500mA$ ,  $0^{\circ}C \leq T_j \leq 125^{\circ}C$ ,  $C_{IN}=2.2\mu F$ ,  $C_{OUT}=1\mu F$ )

| CHARACTERISTIC                                    |  | SYMBOL    | TEST CIRCUIT | TEST CONDITION                                                 | MIN.                            | TYP. | MAX. | UNIT            |                              |
|---------------------------------------------------|--|-----------|--------------|----------------------------------------------------------------|---------------------------------|------|------|-----------------|------------------------------|
| Output Voltage                                    |  | $V_{OUT}$ | Fig.1        | $T_j=25^{\circ}C$                                              | -10.4                           | -10  | -9.6 | V               |                              |
| Input Regulation                                  |  | Reg line  | Fig.1        | $T_j=25^{\circ}C$                                              | $-20V \leq V_{IN} \leq -14V$    | -    | 5    | 100             | mV                           |
|                                                   |  |           |              |                                                                | $-27V \leq V_{IN} \leq -12.5V$  | -    | 10   | 110             |                              |
| Load Regulation                                   |  | Reg load  | Fig.1        | $T_j=25^{\circ}C$                                              | $5mA \leq I_{OUT} \leq 1.5A$    | -    | 10   | 180             | mV                           |
|                                                   |  |           |              |                                                                | $250mA \leq I_{OUT} \leq 750mA$ | -    | 6    | 120             |                              |
| Output Voltage                                    |  | $V_{OUT}$ | Fig.1        | $-25V \leq V_{IN} \leq -12.5V$<br>$5mA \leq I_{OUT} \leq 1.0A$ | -10.5                           | -10  | -9.5 | V               |                              |
| Quiescent Current                                 |  | $I_B$     | Fig.1        | $T_j=25^{\circ}C$                                              | -                               | 3    | 6    | mA              |                              |
| Quiescent Current Change                          |  | Line      | Fig.1        | $-27.5V \leq V_{IN} \leq -14V$                                 | -                               | 0.1  | 1.0  | mA              |                              |
|                                                   |  | Load      |              |                                                                |                                 |      |      |                 | $5mA \leq I_{OUT} \leq 1.0A$ |
| Output Noise Voltage                              |  | $V_{NO}$  | Fig.2        | $T_a=25^{\circ}C$ , $10Hz \leq f \leq 100kHz$                  | -                               | 190  | -    | $\mu V_{rms}$   |                              |
| Ripple Rejection Ratio                            |  | RR        | Fig.3        | $f=120Hz$ , $I_{OUT}=20mA$                                     | 54                              | 60   | -    | dB              |                              |
| Short Circuit Current Limit                       |  | $I_{SC}$  | Fig.1        | $T_j=25^{\circ}C$                                              | -                               | 1.9  | -    | A               |                              |
| Average Temperature Coefficient of Output Voltage |  | $T_{CVO}$ | Fig.1        | $I_{OUT}=5mA$                                                  | -                               | -0.7 | -    | mV/ $^{\circ}C$ |                              |
| Dropout Voltage                                   |  | $V_D$     | Fig.1        | $T_j=25^{\circ}C$ , $I_{OUT}=1A$                               | -                               | 2.0  | -    | V               |                              |



# KIA7905F/PI~KIA7924F/PI

## ELECTRICAL CHARACTERISTICS

### KIA7912F/PI

(Unless otherwise specified,  $V_{IN}=-18V$ ,  $I_{OUT}=500mA$ ,  $0\text{ }^{\circ}C \leq T_j \leq 125\text{ }^{\circ}C$ ,  $C_{IN}=2.2\mu F$ ,  $C_{OUT}=1\mu F$ )

| CHARACTERISTIC                                    |  | SYMBOL    | TEST CIRCUIT | TEST CONDITION                                                 | MIN.                            | TYP. | MAX.  | UNIT            |                 |
|---------------------------------------------------|--|-----------|--------------|----------------------------------------------------------------|---------------------------------|------|-------|-----------------|-----------------|
| Output Voltage                                    |  | $V_{OUT}$ | Fig.1        | $T_j=25\text{ }^{\circ}C$                                      | -12.5                           | -12  | -11.5 | V               |                 |
| Input Regulation                                  |  | Reg line  | Fig.1        | $T_j=25\text{ }^{\circ}C$                                      | $-22V \leq V_{IN} \leq -16V$    | -    | 6     | 120             | mV              |
|                                                   |  |           |              |                                                                | $-30V \leq V_{IN} \leq -14.5V$  | -    | 12    | 240             |                 |
| Load Regulation                                   |  | Reg load  | Fig.1        | $T_j=25\text{ }^{\circ}C$                                      | $5mA \leq I_{OUT} \leq 1.5A$    | -    | 12    | 240             | mV              |
|                                                   |  |           |              |                                                                | $250mA \leq I_{OUT} \leq 750mA$ | -    | 4     | 120             |                 |
| Output Voltage                                    |  | $V_{OUT}$ | Fig.1        | $-27V \leq V_{IN} \leq -15.5V$<br>$5mA \leq I_{OUT} \leq 1.0A$ | -12.6                           | -12  | -11.4 | V               |                 |
| Quiescent Current                                 |  | $I_B$     | Fig.1        | $T_j=25\text{ }^{\circ}C$                                      | -                               | 3    | 6     | mA              |                 |
| Quiescent Current Change                          |  | Line      | Fig.1        | $-30V \leq V_{IN} \leq -15V$<br>$5mA \leq I_{OUT} \leq 1.0A$   | -                               | 0.1  | 1.0   | mA              |                 |
|                                                   |  | Load      |              |                                                                |                                 |      |       |                 | $\Delta I_{BO}$ |
| Output Noise Voltage                              |  | $V_{NO}$  | Fig.2        | $T_a=25\text{ }^{\circ}C$ , $10Hz \leq f \leq 100kHz$          | -                               | 200  | -     | $\mu V_{rms}$   |                 |
| Ripple Rejection Ratio                            |  | RR        | Fig.3        | $f=120Hz$ , $I_{OUT}=20mA$ ,                                   | 54                              | 60   | -     | dB              |                 |
| Short Circuit Current Limit                       |  | $I_{SC}$  | Fig.1        | $T_j=25\text{ }^{\circ}C$                                      | -                               | 1.9  | -     | A               |                 |
| Average Temperature Coefficient of Output Voltage |  | $T_{CVO}$ | Fig.1        | $I_{OUT}=5mA$                                                  | -                               | -0.8 | -     | mV/ $^{\circ}C$ |                 |
| Dropout Voltage                                   |  | $V_D$     | Fig.1        | $T_j=25\text{ }^{\circ}C$ , $I_{OUT}=1A$                       | -                               | 2.0  | -     | V               |                 |

# KIA7905F/PI~KIA7924F/PI

## ELECTRICAL CHARACTERISTICS

### KIA7915F/PI

(Unless otherwise specified,  $V_{IN}=-23V$ ,  $I_{OUT}=500mA$ ,  $0^{\circ}C \leq T_j \leq 125^{\circ}C$ ,  $C_{IN}=2.2\mu F$ ,  $C_{OUT}=1\mu F$ )

| CHARACTERISTIC                                    |  | SYMBOL    | TEST CIRCUIT | TEST CONDITION                                                 | MIN.                            | TYP. | MAX.   | UNIT            |                 |
|---------------------------------------------------|--|-----------|--------------|----------------------------------------------------------------|---------------------------------|------|--------|-----------------|-----------------|
| Output Voltage                                    |  | $V_{OUT}$ | Fig.1        | $T_j=25^{\circ}C$                                              | -15.6                           | -15  | -14.4  | V               |                 |
| Input Regulation                                  |  | Reg line  | Fig.1        | $T_j=25^{\circ}C$                                              | $-26V \leq V_{IN} \leq -20V$    | -    | 6      | 150             | mV              |
|                                                   |  |           |              |                                                                | $-30V \leq V_{IN} \leq -17.5V$  | -    | 12     | 300             |                 |
| Load Regulation                                   |  | Reg load  | Fig.1        | $T_j=25^{\circ}C$                                              | $5mA \leq I_{OUT} \leq 1.5A$    | -    | 12     | 300             | mV              |
|                                                   |  |           |              |                                                                | $250mA \leq I_{OUT} \leq 750mA$ | -    | 4      | 150             |                 |
| Output Voltage                                    |  | $V_{OUT}$ | Fig.1        | $-30V \leq V_{IN} \leq -18V$<br>$5mA \leq I_{OUT} \leq 1.0A$   | -15.75                          | -15  | -14.25 | V               |                 |
| Quiescent Current                                 |  | $I_B$     | Fig.1        | $T_j=25^{\circ}C$                                              | -                               | 3    | 6      | mA              |                 |
| Quiescent Current Change                          |  | Line      | Fig.1        | $-30V \leq V_{IN} \leq -17.5V$<br>$5mA \leq I_{OUT} \leq 1.0A$ | -                               | 0.1  | 1.0    | mA              |                 |
|                                                   |  | Load      |              |                                                                |                                 |      |        |                 | $\Delta I_{BO}$ |
| Output Noise Voltage                              |  | $V_{NO}$  | Fig.2        | $T_a=25^{\circ}C$ , $10Hz \leq f \leq 100kHz$                  | -                               | 250  | -      | $\mu V_{rms}$   |                 |
| Ripple Rejection Ratio                            |  | RR        | Fig.3        | $f=120Hz$ , $I_{OUT}=20mA$ ,                                   | 54                              | 60   | -      | dB              |                 |
| Short Circuit Current Limit                       |  | $I_{SC}$  | Fig.1        | $T_j=25^{\circ}C$                                              | -                               | 1.9  | -      | A               |                 |
| Average Temperature Coefficient of Output Voltage |  | $T_{CVO}$ | Fig.1        | $I_{OUT}=5mA$                                                  | -                               | -0.9 | -      | mV/ $^{\circ}C$ |                 |
| Dropout Voltage                                   |  | $V_D$     | Fig.1        | $T_j=25^{\circ}C$ , $I_{OUT}=1A$                               | -                               | 2.0  | -      | V               |                 |

# KIA7905F/PI~KIA7924F/PI

## ELECTRICAL CHARACTERISTICS

### KIA7918F/PI

(Unless otherwise specified,  $V_{IN}=-27V$ ,  $I_{OUT}=500mA$ ,  $0\text{ }^{\circ}C \leq T_j \leq 125\text{ }^{\circ}C$ ,  $C_{IN}=2.2\mu F$ ,  $C_{OUT}=1\mu F$ )

| CHARACTERISTIC                                    |  | SYMBOL    | TEST CIRCUIT | TEST CONDITION                                                 | MIN.                            | TYP. | MAX.   | UNIT            |                              |
|---------------------------------------------------|--|-----------|--------------|----------------------------------------------------------------|---------------------------------|------|--------|-----------------|------------------------------|
| Output Voltage                                    |  | $V_{OUT}$ | Fig.1        | $T_j=25\text{ }^{\circ}C$                                      | -18.7                           | -18  | -17.3  | V               |                              |
| Input Regulation                                  |  | Reg line  | Fig.1        | $T_j=25\text{ }^{\circ}C$                                      | $-30V \leq V_{IN} \leq -24V$    | -    | 8      | 180             | mV                           |
|                                                   |  |           |              |                                                                | $-33V \leq V_{IN} \leq -21V$    | -    | 15     | 360             |                              |
| Load Regulation                                   |  | Reg load  | Fig.1        | $T_j=25\text{ }^{\circ}C$                                      | $5mA \leq I_{OUT} \leq 1.5A$    | -    | 15     | 360             | mV                           |
|                                                   |  |           |              |                                                                | $250mA \leq I_{OUT} \leq 750mA$ | -    | 5      | 180             |                              |
| Output Voltage                                    |  | $V_{OUT}$ | Fig.1        | $-33V \leq V_{IN} \leq -22.5V$<br>$5mA \leq I_{OUT} \leq 1.0A$ | -18.85                          | -18  | -17.15 | V               |                              |
| Quiescent Current                                 |  | $I_B$     | Fig.1        | $T_j=25\text{ }^{\circ}C$                                      | -                               | 3    | 6      | mA              |                              |
| Quiescent Current Change                          |  | Line      | Fig.1        | $-33V \leq V_{IN} \leq -22V$                                   | -                               | -    | 1.0    | mA              |                              |
|                                                   |  | Load      |              |                                                                |                                 |      |        |                 | $5mA \leq I_{OUT} \leq 1.0A$ |
| Output Noise Voltage                              |  | $V_{NO}$  | Fig.2        | $T_a=25\text{ }^{\circ}C$ , $10Hz \leq f \leq 100kHz$          | -                               | 300  | -      | $\mu V_{rms}$   |                              |
| Ripple Rejection Ratio                            |  | RR        | Fig.3        | $f=120Hz$ , $I_{OUT}=20mA$ ,                                   | 54                              | 60   | -      | dB              |                              |
| Short Circuit Current Limit                       |  | $I_{SC}$  | Fig.1        | $T_j=25\text{ }^{\circ}C$                                      | -                               | 1.9  | -      | A               |                              |
| Average Temperature Coefficient of Output Voltage |  | $T_{CVO}$ | Fig.1        | $I_{OUT}=5mA$                                                  | -                               | -1.0 | -      | mV/ $^{\circ}C$ |                              |
| Dropout Voltage                                   |  | $V_D$     | Fig.1        | $T_j=25\text{ }^{\circ}C$ , $I_{OUT}=1A$                       | -                               | 2.0  | -      | V               |                              |

# KIA7905F/PI~KIA7924F/PI

## ELECTRICAL CHARACTERISTICS

### KIA7920F/PI

(Unless otherwise specified,  $V_{IN}=-30V$ ,  $I_{OUT}=500mA$ ,  $0^{\circ}C \leq T_j \leq 125^{\circ}C$ ,  $C_{IN}=2.2\mu F$ ,  $C_{OUT}=1\mu F$ )

| CHARACTERISTIC                                    |  | SYMBOL    | TEST CIRCUIT | TEST CONDITION                                                 | MIN.                            | TYP. | MAX.  | UNIT            |                 |
|---------------------------------------------------|--|-----------|--------------|----------------------------------------------------------------|---------------------------------|------|-------|-----------------|-----------------|
| Output Voltage                                    |  | $V_{OUT}$ | Fig.1        | $T_j=25^{\circ}C$                                              | -20.8                           | -20  | -19.2 | V               |                 |
| Input Regulation                                  |  | Reg line  | Fig.1        | $T_j=25^{\circ}C$                                              | $-32V \leq V_{IN} \leq -26V$    | -    | 10    | 180             | mV              |
|                                                   |  |           |              |                                                                | $-35V \leq V_{IN} \leq -24V$    | -    | 18    | 360             |                 |
| Load Regulation                                   |  | Reg load  | Fig.1        | $T_j=25^{\circ}C$                                              | $5mA \leq I_{OUT} \leq 1.5A$    | -    | 18    | 360             | mV              |
|                                                   |  |           |              |                                                                | $250mA \leq I_{OUT} \leq 750mA$ | -    | 10    | 180             |                 |
| Output Voltage                                    |  | $V_{OUT}$ | Fig.1        | $-35V \leq V_{IN} \leq -24V$<br>$5mA \leq I_{OUT} \leq 1.0A$   | -21.0                           | -20  | -19.0 | V               |                 |
| Quiescent Current                                 |  | $I_B$     | Fig.1        | $T_j=25^{\circ}C$                                              | -                               | 3    | 6     | mA              |                 |
| Quiescent Current Change                          |  | Line      | Fig.1        | $-36.5V \leq V_{IN} \leq -25V$<br>$5mA \leq I_{OUT} \leq 1.0A$ | -                               | -    | 1.0   | mA              |                 |
|                                                   |  | Load      |              |                                                                |                                 |      |       |                 | $\Delta I_{BO}$ |
| Output Noise Voltage                              |  | $V_{NO}$  | Fig.2        | $T_a=25^{\circ}C$ , $10Hz \leq f \leq 100kHz$                  | -                               | 350  | -     | $\mu V_{rms}$   |                 |
| Ripple Rejection Ratio                            |  | RR        | Fig.3        | $f=120Hz$ , $I_{OUT}=20mA$                                     | 54                              | 60   | -     | dB              |                 |
| Short Circuit Current Limit                       |  | $I_{SC}$  | Fig.1        | $T_j=25^{\circ}C$                                              | -                               | 1.9  | -     | A               |                 |
| Average Temperature Coefficient of Output Voltage |  | $T_{CVO}$ | Fig.1        | $I_{OUT}=5mA$                                                  | -                               | -1.0 | -     | mV/ $^{\circ}C$ |                 |
| Dropout Voltage                                   |  | $V_D$     | Fig.1        | $T_j=25^{\circ}C$ , $I_{OUT}=1A$                               | -                               | 2.0  | -     | V               |                 |

# KIA7905F/PI~KIA7924F/PI

## ELECTRICAL CHARACTERISTICS

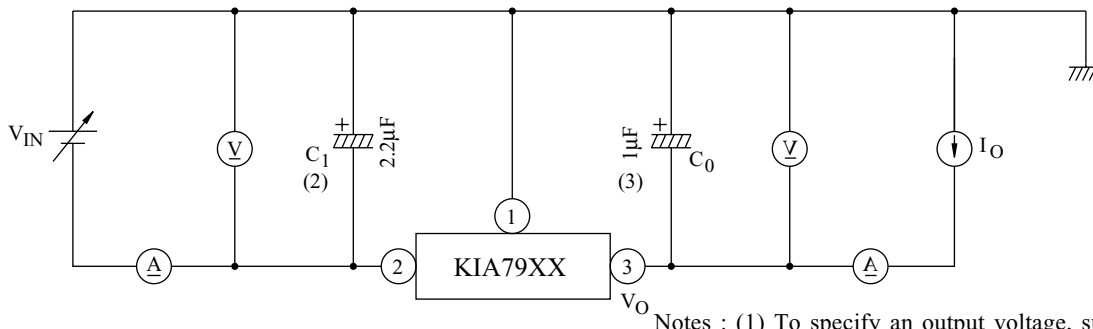
### KIA7924F/PI

(Unless otherwise specified,  $V_{IN}=-33V$ ,  $I_{OUT}=500mA$ ,  $0\text{ }^{\circ}C \leq T_j \leq 125\text{ }^{\circ}C$ ,  $C_{IN}=0.33\mu F$ ,  $C_{OUT}=0.1\mu F$ )

| CHARACTERISTIC                                    |  | SYMBOL    | TEST CIRCUIT | TEST CONDITION                                               | MIN.                            | TYP. | MAX.  | UNIT            |                 |
|---------------------------------------------------|--|-----------|--------------|--------------------------------------------------------------|---------------------------------|------|-------|-----------------|-----------------|
| Output Voltage                                    |  | $V_{OUT}$ | Fig.1        | $T_j=25\text{ }^{\circ}C$                                    | -25                             | -24  | -23   | V               |                 |
| Input Regulation                                  |  | Reg line  | Fig.1        | $T_j=25\text{ }^{\circ}C$                                    | $-36V \leq V_{IN} \leq -30V$    | -    | 8     | 240             | mV              |
|                                                   |  |           |              |                                                              | $-38V \leq V_{IN} \leq -27V$    | -    | 15    | 480             |                 |
| Load Regulation                                   |  | Reg load  | Fig.1        | $T_j=25\text{ }^{\circ}C$                                    | $5mA \leq I_{OUT} \leq 1.5A$    | -    | 15    | 480             | mV              |
|                                                   |  |           |              |                                                              | $250mA \leq I_{OUT} \leq 750mA$ | -    | 5     | 240             |                 |
| Output Voltage                                    |  | $V_{OUT}$ | Fig.1        | $-38V \leq V_{IN} \leq -27V$<br>$5mA \leq I_{OUT} \leq 1.0A$ | -25.2                           | -24  | -22.5 | V               |                 |
| Quiescent Current                                 |  | $I_B$     | Fig.1        | $T_j=25\text{ }^{\circ}C$                                    | -                               | 3    | 6     | mA              |                 |
| Quiescent Current Change                          |  | Line      | Fig.1        | $-38V \leq V_{IN} \leq -27V$<br>$5mA \leq I_{OUT} \leq 1.0A$ | -                               | -    | 1.0   | mA              |                 |
|                                                   |  | Load      |              |                                                              |                                 |      |       |                 | $\Delta I_{BO}$ |
| Output Noise Voltage                              |  | $V_{NO}$  | Fig.2        | $T_a=25\text{ }^{\circ}C$ , $10Hz \leq f \leq 100kHz$        | -                               | 400  | -     | $\mu V_{rms}$   |                 |
| Ripple Rejection Ratio                            |  | RR        | Fig.3        | $f=120Hz$ , $I_{OUT}=20mA$ ,                                 | 54                              | 60   | -     | dB              |                 |
| Short Circuit Current Limit                       |  | $I_{SC}$  | Fig.1        | $T_j=25\text{ }^{\circ}C$                                    | -                               | 1.9  | -     | A               |                 |
| Average Temperature Coefficient of Output Voltage |  | $T_{CVO}$ | Fig.1        | $I_{OUT}=5mA$                                                | -                               | -1.0 | -     | mV/ $^{\circ}C$ |                 |
| Dropout Voltage                                   |  | $V_D$     | Fig.1        | $T_a=25\text{ }^{\circ}C$ , $I_{OUT}=1A$                     | -                               | 2.0  | -     | V               |                 |

# KIA7905F/PI~KIA7924F/PI

**Fig.1 Standard Test Circuit**



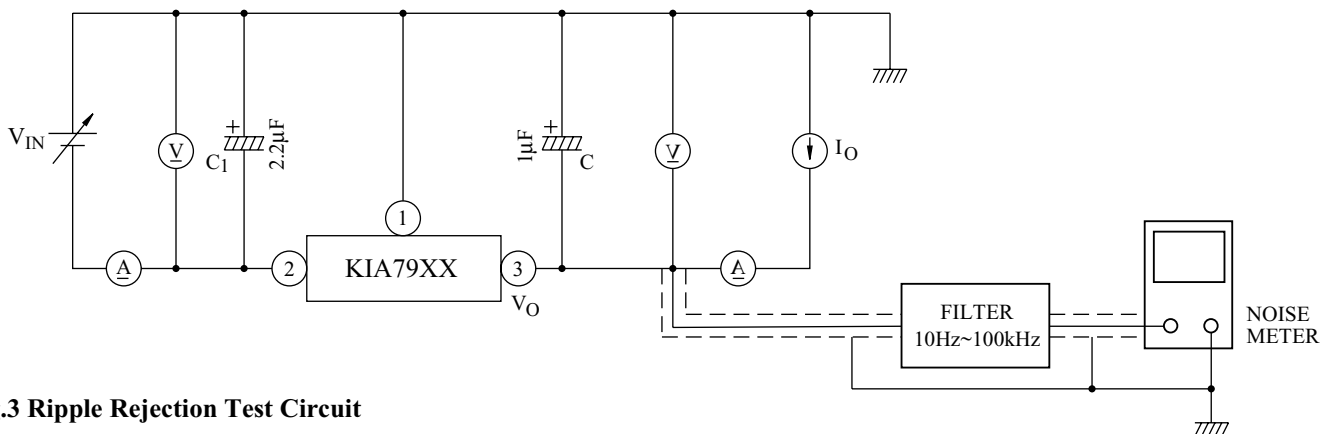
"XX"

Notes : (1) To specify an output voltage, substitute voltage value for

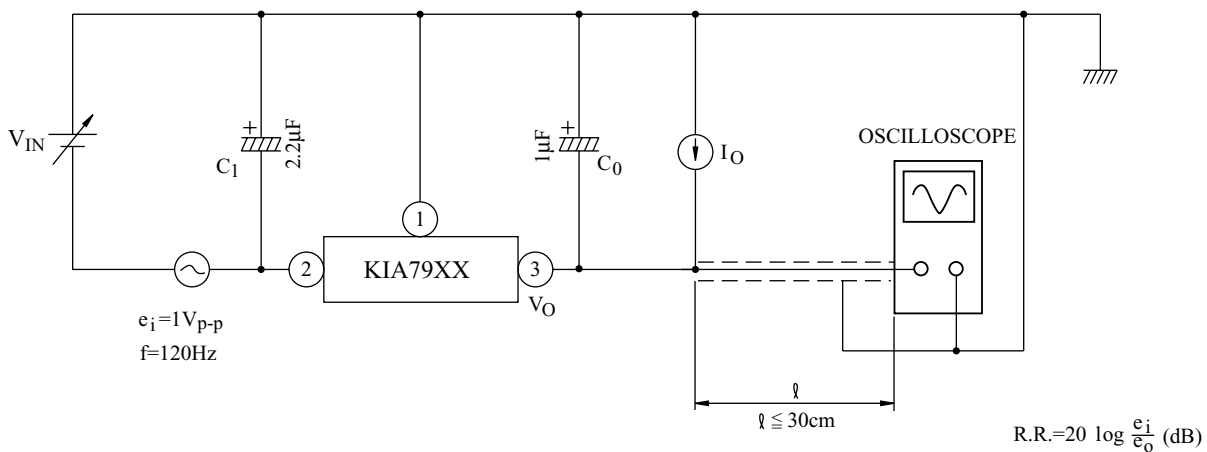
(2) Required for stability. For value given, capacitor must be solid tantalum. If aluminium electrolytics are used, at least ten times value shown should be selected.  $C_1$  is required if regulator is located an appreciable distance from power supply filter.

(3) To improve transient response. If large capacitors are used, a high current diode from input to output

**Fig.2  $V_{NO}$  Test Circuit**



**Fig.3 Ripple Rejection Test Circuit**



# KIA7905F/PI~KIA7924F/PI

Fig. 4

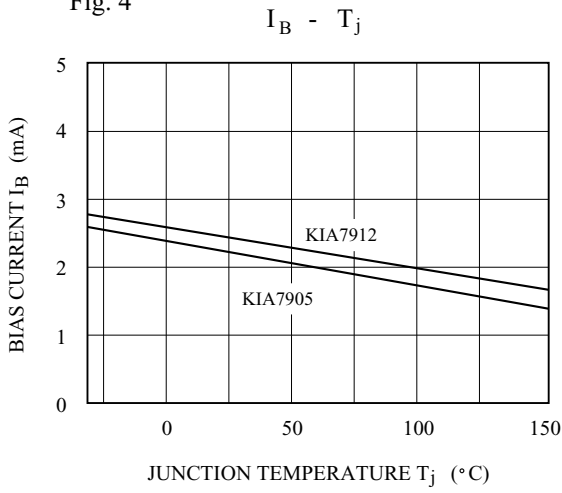


Fig. 5

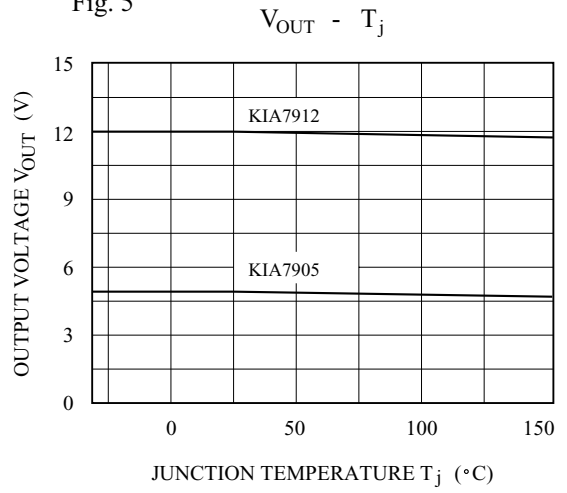


Fig. 6

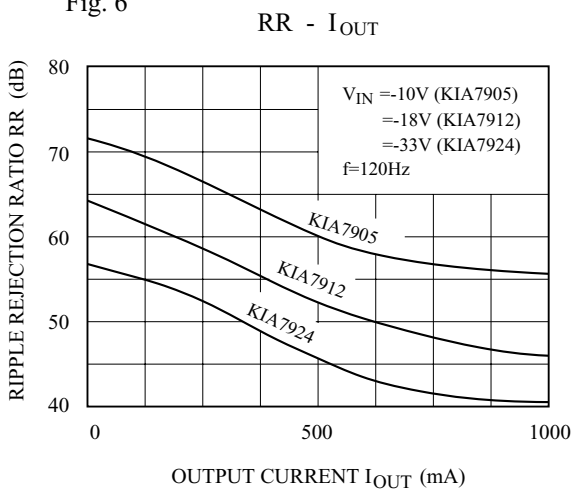


Fig. 7

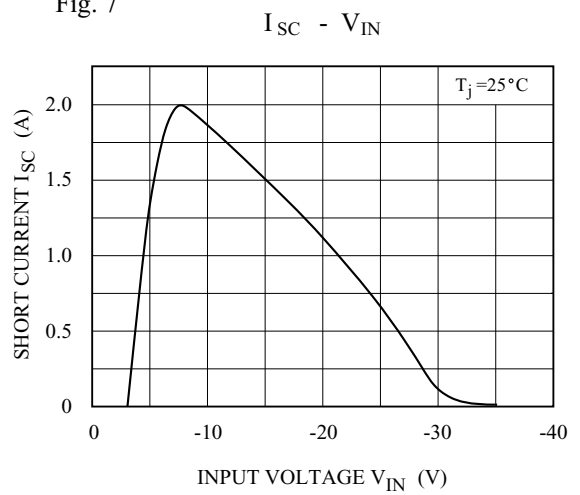


Fig. 8

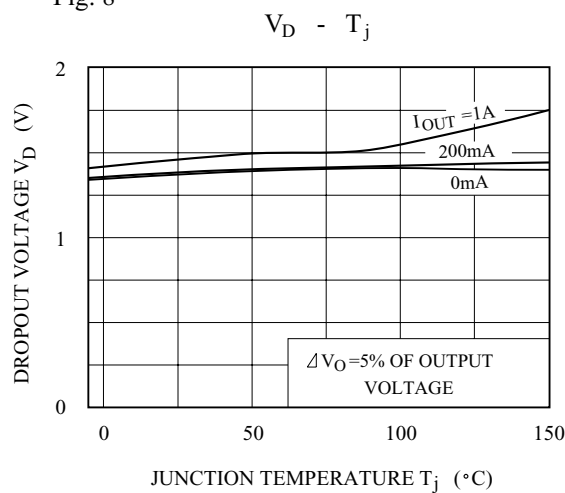
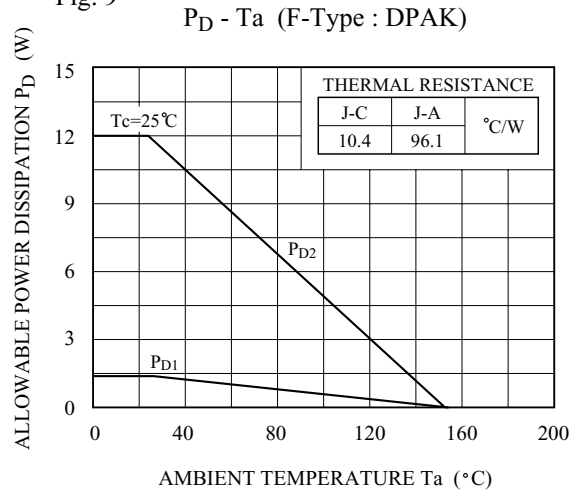


Fig. 9



# KIA7905F/PI~KIA7924F/PI

