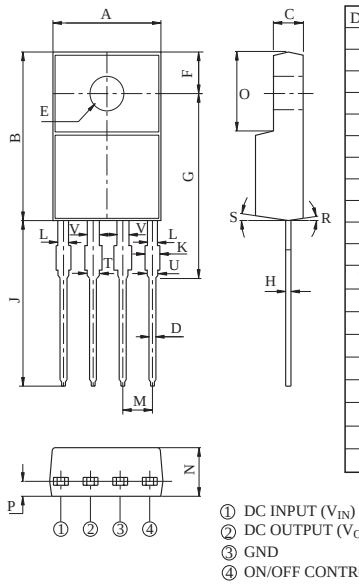
## 4 TERMINAL LOW DROPOUT VOLTAGE REGULATOR

The FR78RXX series are Low Dropout Voltage Regulator suitable for various electronic equipments. It provides constant voltage power source with TO-220-4 terminal lead full molded PKG.

The Regulator has multi function such as over current protection, overheat protection and ON/OFF control.




| DIM | MILLIMETERS |
|---|---|
| A | 10 00±0 20 |
| B | 15 00±0 20 |
| C | 2 70±0 20 |
| D | 0 60±0 10 |
| E | Φ3 20±0 20 |
| F | 3 50±0 10 |
| G | 15 70±0 20 |
| H | 0 40±0 10 |
| J | 14 3+0 2/-0 1 |
| K | 1 45±0 10 |
| L | 1 00±0 10 |
| M | 2 54 |
| N | 4 50±0 20 |
| O | 7 5± 0 1 |
| P | 1 50±0 10 |
| R | 5 ° |
| S | 8 ° |
| T | 1 30±0 1 |
| U | 3-1 00±0 1 |
| V | 1 30±0 1 |

TO-220IS-4

### FEATURES

· 1.0A Output Low Dropout Voltage Regulator.
· Built in ON/OFF Control Terminal.
· Built in Over Current Protection, Over Heat Protection Function.

### MAXIMUM RATINGS (Ta=25℃)

| CHARACTERISTIC | SYMBOL | RATING | UNIT | REMARK |
|---|---|---|---|---|
| Input Voltage | $V_{IN}$ | 35 | V | - |
| ON/OFF Control Voltage | $V_C$ | 35 | V | - |
| Output Current | $I_O$ | 1 | A | - |
| Power Dissipation 1 | $P_{D1}$ | 1.5 | W | No Heatsink |
| Power Dissipation 2 | $P_{D2}$ | 15 | W | Infinite Heatsink |
| Operating Junction Temperature | $T_{J(opr)}$ | -40～150 | ℃ | - |
| Storage Temperature | $T_{stg}$ | -45～150 | ℃ | - |
| Soldering Temperature (10sec) | $T_{sol}$ | 260 | ℃ | - |

## ELECTRICAL CHARACTERISTICS

**(Unless otherwise specified, $I_O$=0.5A, Ta=25℃, Note1.)**

| CHARACTERISTIC | | SYMBOL | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|---|
| Output Voltage | FR78R33PI | $V_O$ | - | 3.22 | 3.3 | 3.38 | V |
| | FR78R05PI | | - | 4.88 | 5.0 | 5.12 | |
| | FR78R08PI | | - | 7.80 | 8.0 | 8.2 | |
| | FR78R09PI | | - | 8.78 | 9.0 | 9.22 | |
| | FR78R12PI | | - | 11.70 | 12.0 | 12.30 | |
| | FR78R15PI | | - | 14.70 | 15.0 | 15.30 | |
| Load Regulation | | Reg Load | 5mA ≤$I_{OUT}$≤1A , Vin=7V | - | 0.1 | 2.0 | % |
| Line Regulation | | Reg Line | (Note 2) | - | 0.5 | 2.5 | % |
| Temperature Coefficient of Output Voltage | | $T_CV_O$ | Tj=0～125 ℃ | - | ±0.02 | ±0.05 | %/℃ |
| Ripple Rejection | | R · R | - | 45 | 55 | - | dB |
| Drop Out Voltage | | $V_D$ | $I_O$=1A, $V_{IN}$=0.95 $V_{OUT}$ | - | - | 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 | - | - | 20 | μA |
| 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 | - | - | -0.4 | mA |
| Quiescent Current | | $I_Q$ | $I_O$=0 | - | - | 10 | mA |

Note1) $V_{IN}$ of KIA78R33=3.3V
" KIA78R05=5.0V
" KIA78R08=10V
" KIA78R09=15V
" KIA78R12=12V
" KIA78R15=15V

Note2) $V_{IN}$ of KIA78R33=4 ~ 10V
" KIA78R05=6 ~ 12V
" KIA78R08=9 ~ 25V
" KIA78R09=10 ~ 25V
" KIA78R12=13 ~ 29V
" KIA78R15=16 ~ 32V

## BLOCK DIAGRAM

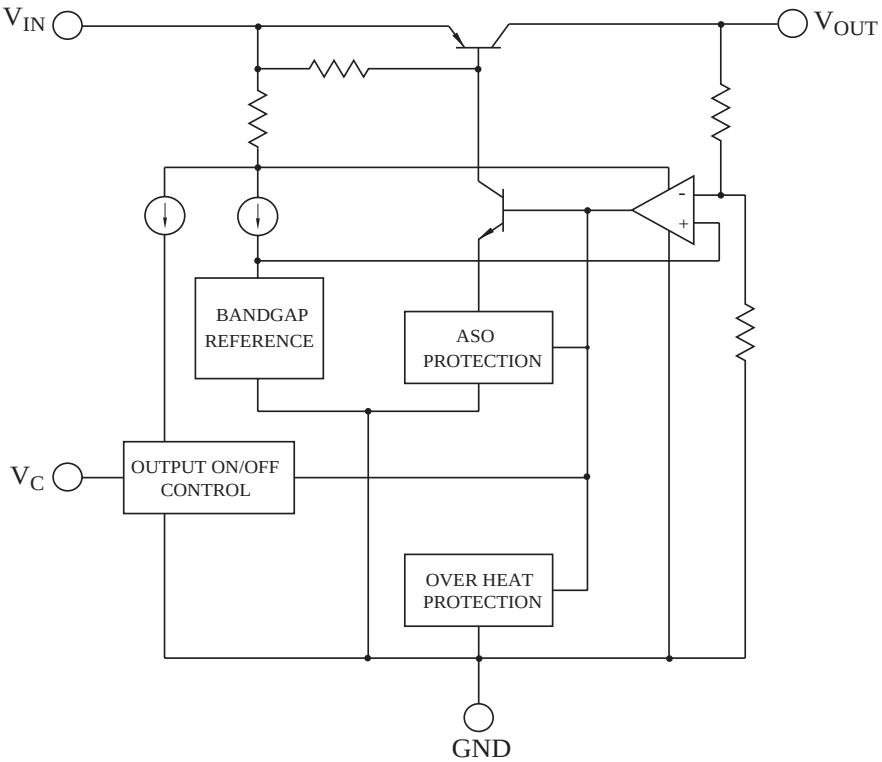


**Fig. 1 Standard Test Circuit**

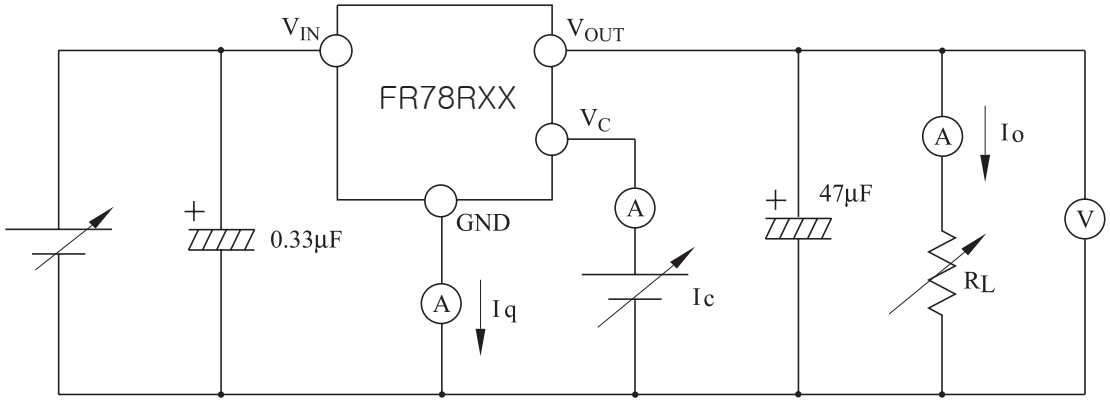



**Fig. 2 Ripple Rejection Test Circuit**

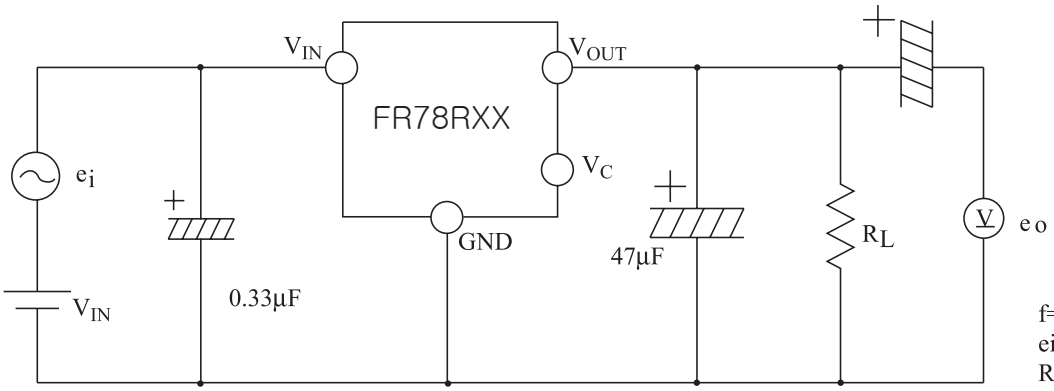



**Fig. 3 Application Circuit for Standard**

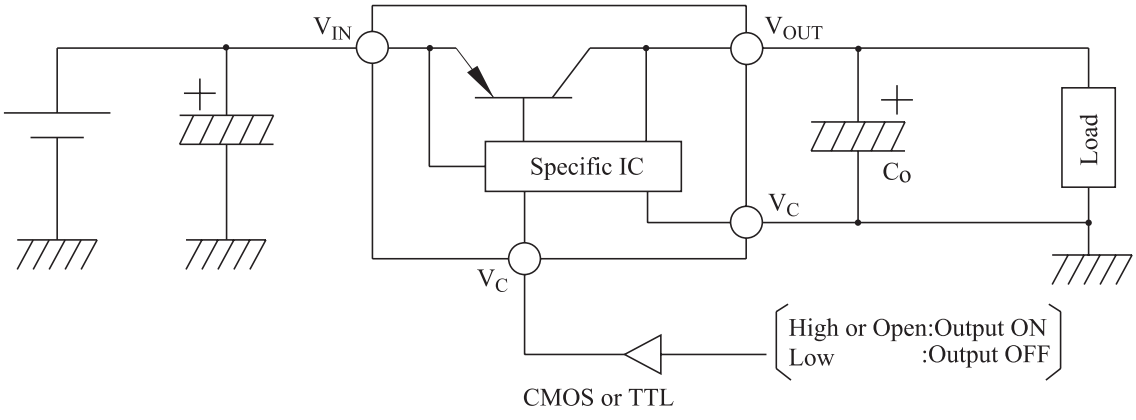


Fig.4 $P_D$ - Ta (PI-Type : TO-220IS-4)

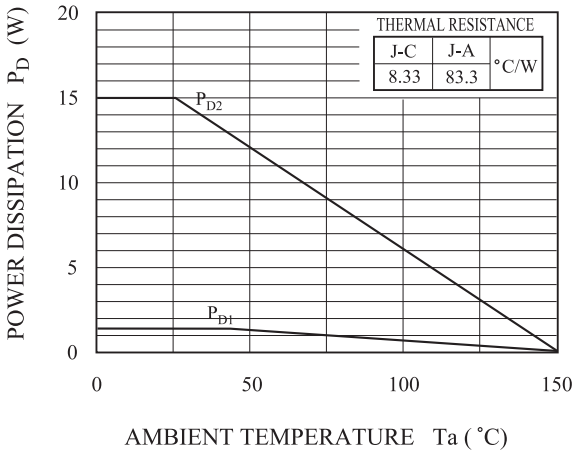



Fig. 5 $V_{OUT}$ - $I_{OUT}$

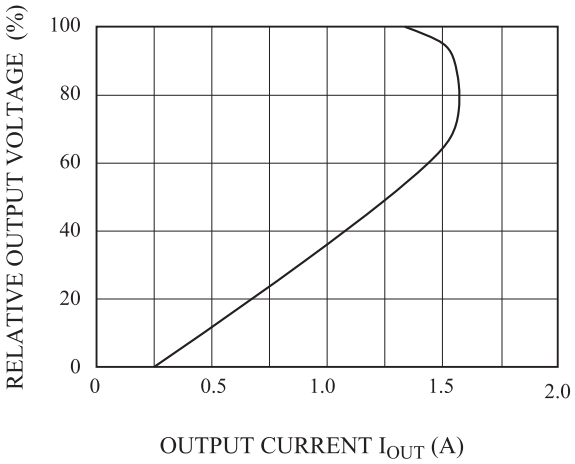



Fig. 6 $\Delta V_O$ - $T_j$

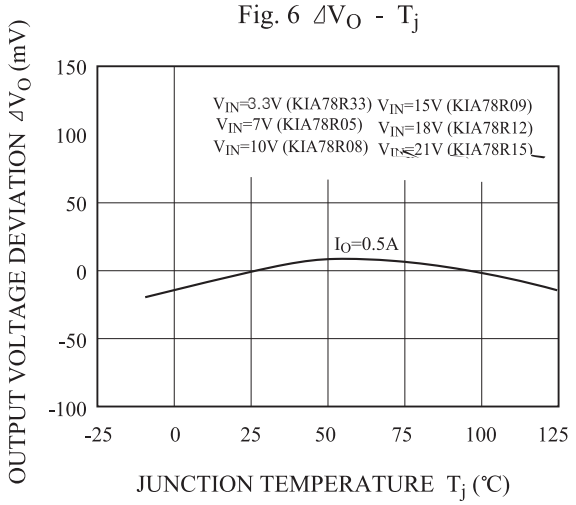



Fig. 7 $V_D$ - $T_j$

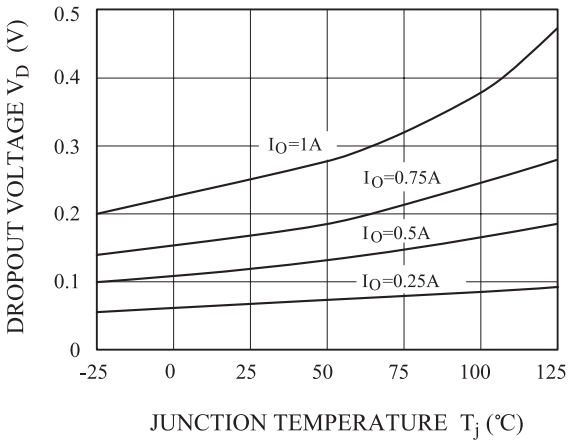



Fig. 8 $I_q$ - $T_j$

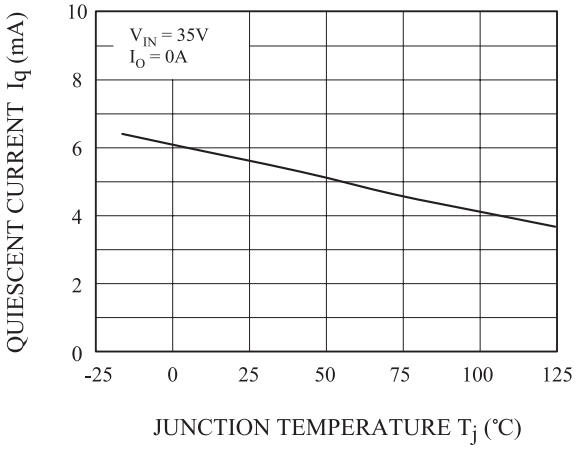



Fig. 9 R.R - f

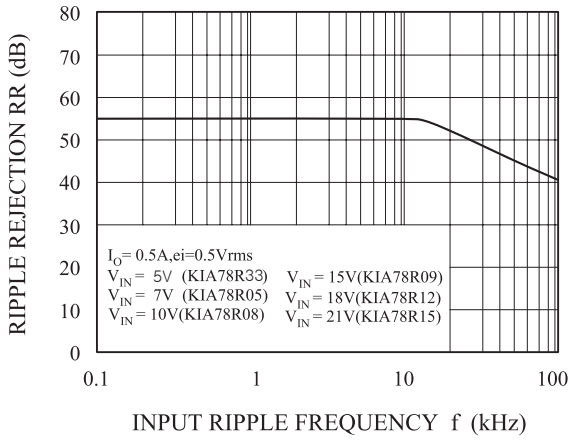


Fig. 10 R.R - $I_{OUT}$

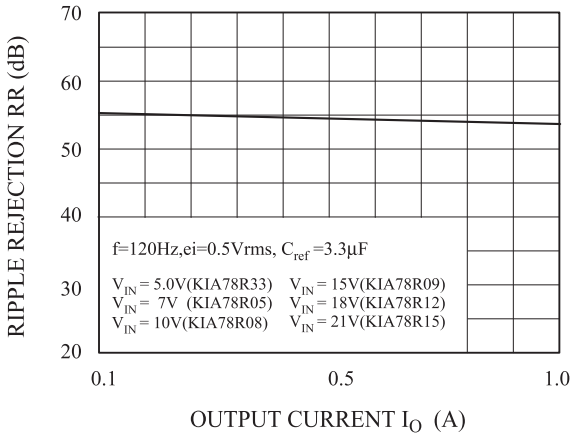



Fig. 11 $V_{OUT}$ - $V_{IN}$ (KIA78R05)

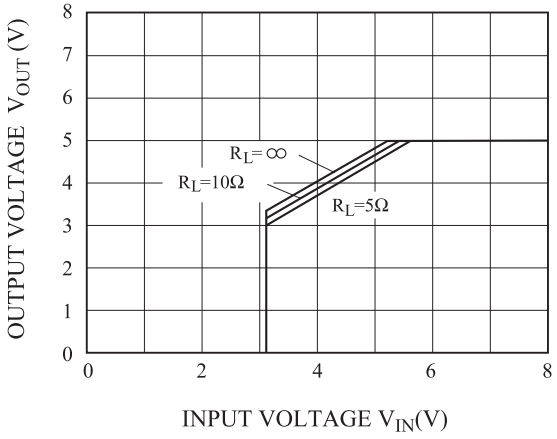



Fig. 13 $V_{OUT}$ - $V_{IN}$ (KIA78R08)

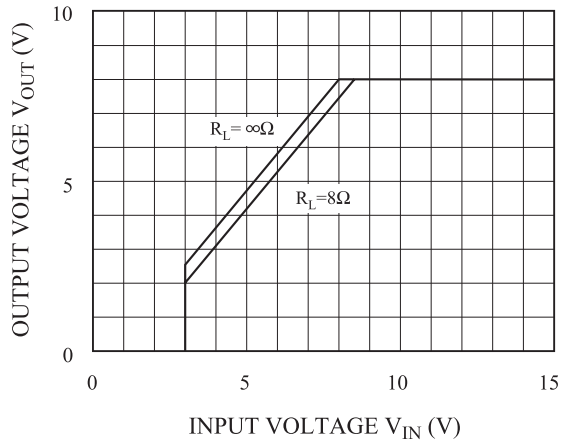



Fig. 14 $V_{OUT}$ - $V_{IN}$ (KIA78R09)

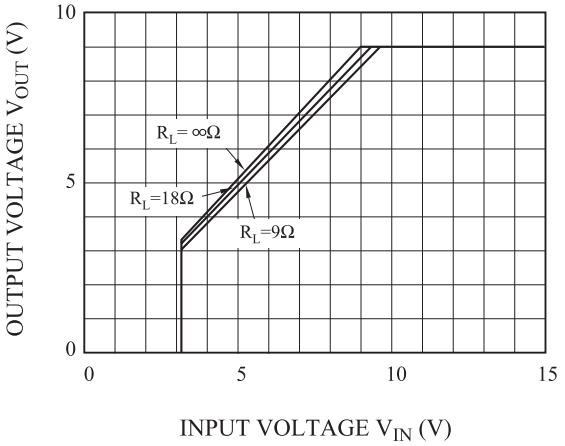



Fig. 16 $V_{OUT}$ - $V_{IN}$ (KIA78R12)

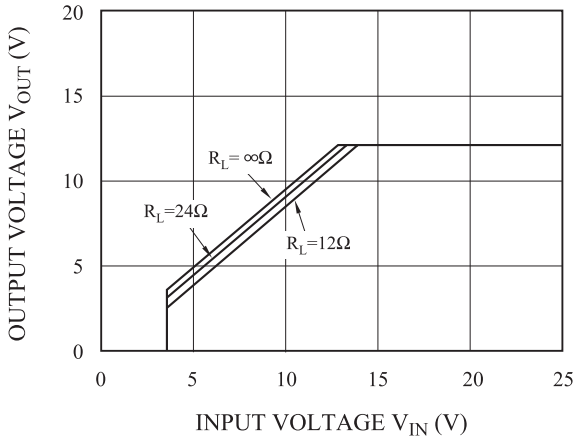



Fig. 17 $V_{OUT}$ - $V_{IN}$ (KIA78R15)

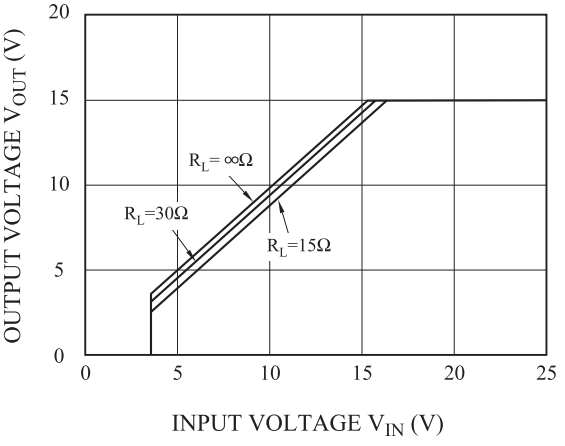


Fig. 18 $I_{BIAS}$ - $V_{IN}$ (FR7805)

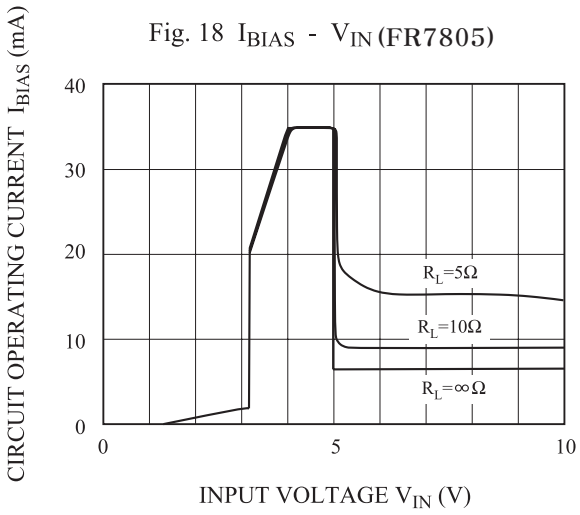



Fig. 20 $I_{BIAS}$ - $V_{IN}$ (KIA78R08)

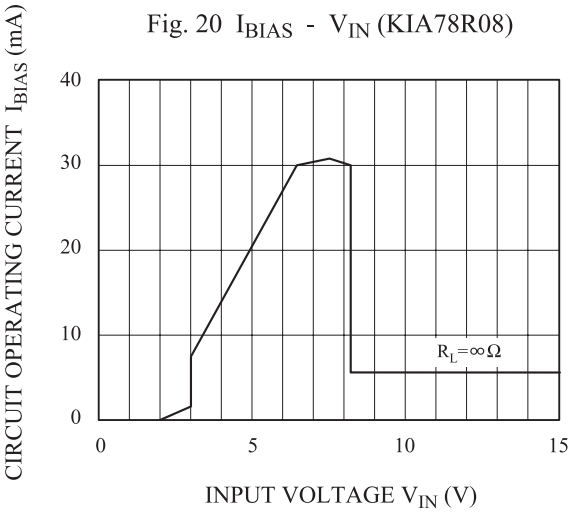



Fig. 21 $I_{BIAS}$ - $V_{IN}$ (KIA78R09)

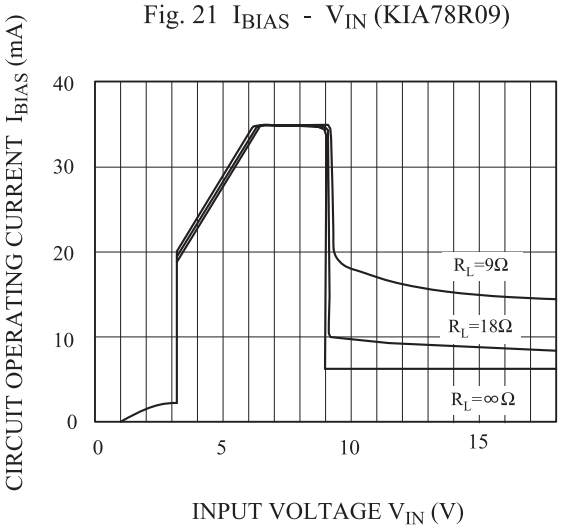



Fig. 23 $I_{BIAS}$ - $V_{IN}$ (KIA78R12)

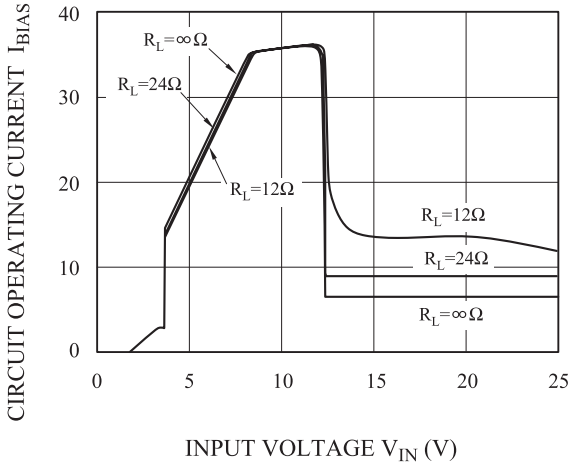



Fig. 24 $I_{BIAS}$ - $V_{IN}$ (KIA78R15)