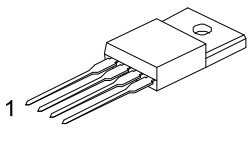
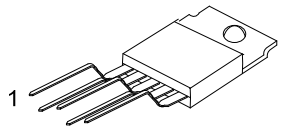
# RXXLD30

***Linear Integrated Circuit***

## 3A OUTPUT TYPE LOW POWER-LOSS VOLTAGE REGULATOR




TO-220F-4




TO-220B

### ■ FEATURES

*Low power-loss(Dropout voltage: 0.5V(max) at Io=3.0A)
*3.0A output type
*Output voltage precision:±3.0%
*Built-in ON/OFF control function and over-current protection circuit.
*Thermal shutdown protection.

### ■ ORDERING INFORMATION

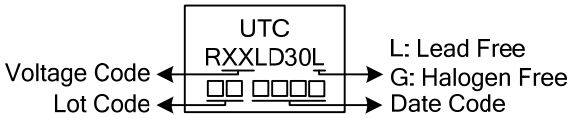
| Ordering Number | | Package | Pin Assignment | | | | | Packing |
|---|---|---|---|---|---|---|---|---|
| Lead Free | Halogen Free | | 1 | 2 | 3 | 4 | 5 | |
| RXXLD30L-TB5-T | RXXLD30G-TB5-T | TO-220B | N | I | O | G | F | Tube |
| RXXLD30L-TF4-T | RXXLD30G-TF4-T | TO-220F-4 | I | O | G | F | - | Tube |

Note: Pin Assignment: N: NC I: INPUT O: OUTPUT G: GND F: ON/OFF

RXXLD30L-TB5-T
(1) Packing Type
(2) Package Type
(3) Green Package
(4) Voltage Code

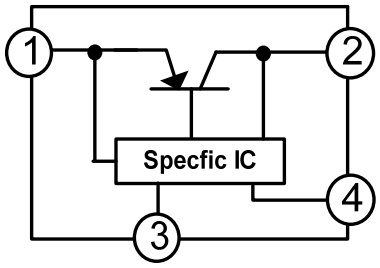
(1) T: Tube
(2) TB5: TO-220B, TF4: TO-220F-4
(3) L: Lead Free, G: Halogen Free and Lead Free
(4) XX: refer to Marking Information

## ■ MARKING INFORMATION

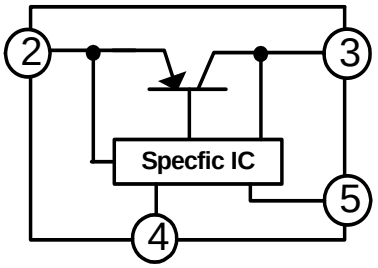
| PACKAGE | VOLTAGE CODE | MARKING |
|---|---|---|
| TO-220F-4<br>TO-220B | 33 :3.3V<br>05 :5.0V<br>09 :9.0V<br>12 :12V |  |

## ■ BLOCK DIAGRAM

TO-220F-4




TO-220B



## ■ ABSOLUTE MAXIMUM RATINGS ($T_A$=25°C, unless otherwise specified.)

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---|---|---|---|---|
| Input Voltage | | $V_{IN}$ | 20 | V |
| ON/OFF Control Terminal Voltage | | Vc | 20 | V |
| Output Current | | $I_{OUT}$ | 3.0 | A |
| Power Dissipation | No Heat Sink | $P_D$ | 1.4 | W |
| | With Heat Sink | | 15 | W |
| Junction Temperature | | $T_J$ | 125 | °C |
| Operating Temperature | | $T_{OPR}$ | -40 ~ +85 | °C |
| Storage Temperature | | $T_{STG}$ | -40 ~ +150 | °C |

Note: The device is guaranteed to meet performance specification within 0℃~70℃ operating temperature range and assured by design from –20℃~85℃, characteristic and correlation with static process control.

## ■ ELECTRICAL CHARACTERISTICS (Refer to the test circuits, unless otherwise specified, Ta=25°C)

**For R33LD30(3.3V)**

| PARAMETER | | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| Output Voltage | | $V_{OUT}$ | $V_{IN}$=5V, $I_{OUT}$=2A | 3.201 | 3.3 | 3.399 | V |
| Line Regulation | | $\Delta V_{OUT}$ | $V_{IN}$=4 ~ 10V, $I_{OUT}$=5mA | | 0.1 | 2.5 | % |
| Load Regulation | | $\Delta V_{OUT}$ | $V_{IN}$=5V, $I_{OUT}$=5mA ~ 3.0A | | 0.1 | 2.0 | % |
| Temperature Coefficient of Output Voltage | | TcVo | $T_J$=0 ~ 125°C,$I_{OUT}$=5mA | | ±0.02 | | %/°C |
| Ripple Rejection | | RR | Refer to Fig.2 | 45 | 55 | | dB |
| Dropout Voltage | | $V_D$ | (Note1), $I_{OUT}$=3A | | | 0.5 | V |
| Voltage for Control(Note2) | ON | $V_{C(ON)}$ | $V_{IN}$=5V | 2.0 | | | V |
| | OFF | $V_{C(OFF)}$ | $V_{IN}$=5V | | | 0.8 | V |
| Current for Control | ON | $I_{C(ON)}$ | $V_C$=2.7V,$V_{IN}$=5V | | | 20 | μA |
| | OFF | $I_{C(OFF)}$ | $V_C$=0.4V, $V_{IN}$=5V | | | -0.4 | mA |
| Quiescent Current | | $I_D$ | $I_{OUT}$=0A, $V_{IN}$=5V | | | 10 | mA |

**For R05LD30(5V)**

| PARAMETER | | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| Output Voltage | | $V_{OUT}$ | $V_{IN}$ =7V, $I_{OUT}$=2A | 4.85 | 5.0 | 5.15 | V |
| Line Regulation | | $\Delta V_{OUT}$ | $V_{IN}$ =6 ~ 12V, $I_{OUT}$=5mA | | 0.5 | 2.5 | % |
| Load Regulation | | $\Delta V_{OUT}$ | $V_{IN}$ =7V, $I_{OUT}$=5mA ~ 3.0A | | 0.1 | 2.0 | % |
| Temperature Coefficient of Output Voltage | | TcVo | $T_J$=0 ~ 125°C, $I_{OUT}$=5mA | | ±0.02 | | %/°C |
| Ripple Rejection | | RR | Refer to Fig.2 | 45 | 55 | | dB |
| Dropout Voltage | | $V_D$ | (Note1), $I_{OUT}$=3A | | | 0.5 | V |
| Voltage for Control(Note2) | ON | $V_{C(ON)}$ | $V_{IN}$ =7V | 2.0 | | | V |
| | OFF | $V_{C(OFF)}$ | $V_{IN}$ =7V | | | 0.8 | V |
| Current for Control | ON | $I_{C(ON)}$ | $V_C$=2.7V, $V_{IN}$ =7V | | | 20 | μA |
| | OFF | $I_{C(OFF)}$ | $V_C$=0.4V, $V_{IN}$ =7V | | | -0.4 | mA |
| Quiescent Current | | $I_D$ | $I_{OUT}$ =0A, $V_{IN}$ =7V | | | 10 | mA |

## ■ ELECTRICAL CHARACTERISTICS(Cont.)

**For R09LD30(9V)**

| PARAMETER | | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| Output Voltage | | $V_{OUT}$ | $V_{IN}$ =11V, $I_{OUT}$=2A | 8.73 | 9.0 | 9.27 | V |
| Line Regulation | | $\Delta V_{OUT}$ | $V_{IN}$ =10 ~ 16V, $I_{OUT}$=5mA | | 0.5 | 2.5 | % |
| Load Regulation | | $\Delta V_{OUT}$ | $V_{IN}$ =11V, $I_{OUT}$=5mA ~ 3.0A | | 0.1 | 2.0 | % |
| Temperature Coefficient of Output Voltage | | TcVo | $T_J$=0 ~ 125°C, $I_{OUT}$=5mA | | ±0.02 | | %/°C |
| Ripple Rejection | | RR | Refer to Fig.2 | 45 | 55 | | dB |
| Dropout Voltage | | $V_D$ | (Note1), $I_{OUT}$=3A | | | 0.5 | V |
| Voltage for Control(Note2) | ON | $V_{C(ON)}$ | $V_{IN}$ =11V | 2.0 | | | V |
| | OFF | $V_{C(OFF)}$ | $V_{IN}$ =11V | | | 0.8 | V |
| Current for Control | ON | $I_{C(ON)}$ | $V_C$=2.7V, $V_{IN}$ =11V | | | 20 | μA |
| | OFF | $I_{C(OFF)}$ | $V_C$=0.4V, $V_{IN}$ =11V | | | -0.4 | mA |
| Quiescent Current | | $I_D$ | $I_{OUT}$ =0A, $V_{IN}$ =11V | | | 10 | mA |

**For R12LD30(12V)**

| PARAMETER | | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| Output Voltage | | $V_{OUT}$ | $V_{IN}$ =14V, $I_{OUT}$=2A | 11.64 | 12.0 | 12.36 | V |
| Line Regulation | | $\Delta V_{OUT}$ | $V_{IN}$ =13 ~ 19V, $I_{OUT}$=5mA | | 0.5 | 2.5 | % |
| Load Regulation | | $\Delta V_{OUT}$ | $V_{IN}$ =14V, $I_{OUT}$=5mA ~ 3.0A | | 0.1 | 2.0 | % |
| Temperature Coefficient of Output Voltage | | TcVo | $T_J$=0 ~ 125°C, $I_{OUT}$=5mA | | ±0.02 | | %/°C |
| Ripple Rejection | | RR | Refer to Fig.2 | 45 | 55 | | dB |
| Dropout Voltage | | $V_D$ | (Note1), $I_{OUT}$=3A | | | 0.5 | V |
| Voltage for Control(Note2) | ON | $V_{C(ON)}$ | $V_{IN}$ =14V | 2.0 | | | V |
| | OFF | $V_{C(OFF)}$ | $V_{IN}$ =14V | | | 0.8 | V |
| Current for Control | ON | $I_{C(ON)}$ | $V_C$=2.7V, $V_{IN}$ =14V | | | 20 | μA |
| | OFF | $I_{C(OFF)}$ | $V_C$=0.4V, $V_{IN}$ =14V | | | -0.4 | mA |
| Quiescent Current | | $I_D$ | $I_{OUT}$ =0A, $V_{IN}$ =14V | | | 10 | mA |

Note: 1.Input voltage shall be the value when output voltage is 95% in comparison with the initial value.
2.In case of opening control terminal(pin 5 of TO-220B, pin 4 of TO-220F-4), output voltage turns on.

## ■ TEST CIRCUIT

Note : ◯: TO-220F-4, ( ): TO-220B

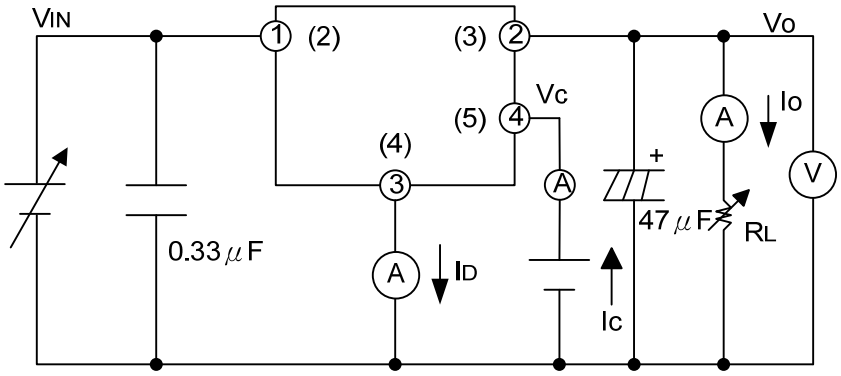
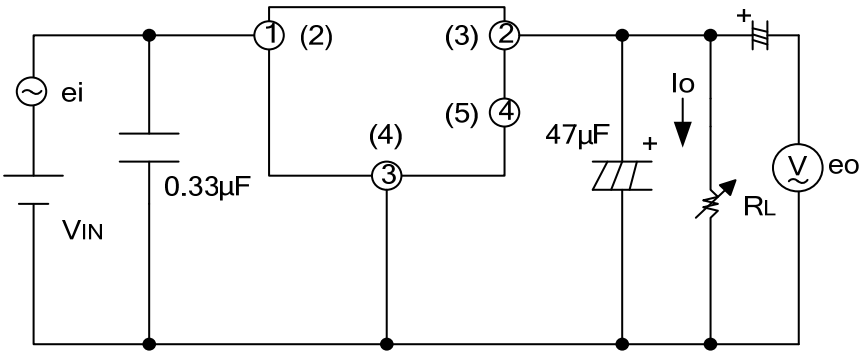



Fig.1

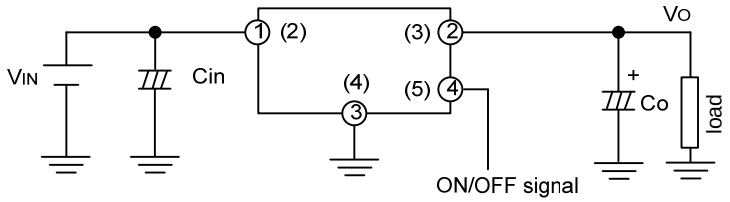



VIN=5V(R33LD30)
7V(R05LD30)
11V(R09LD30)
14V(R12LD30)

f=120Hz
ei=0.5Vrms
Io=0.5A
RR=20log (ei/eo)

Fig.2 For Ripple Rejection

## ■ TYPICAL APPLICATION



## ■ TYPICAL CHARACTERISTICS

Fig.3 Power Dissipation vs. Ambient Temperature

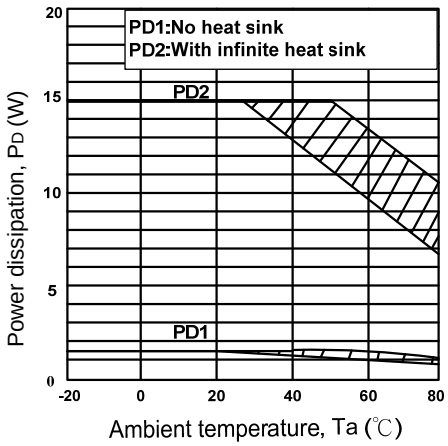
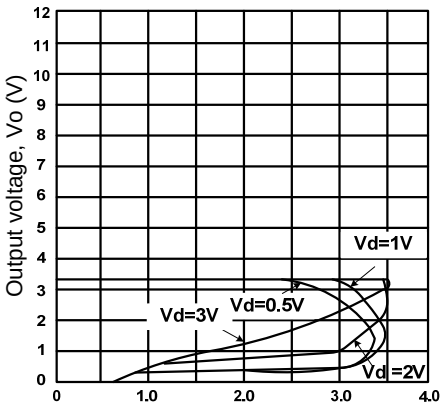



Fig.4 Overcurrent Protection Characteristics(Typical Value) (R33LD30)




**Note: Oblique line portion:Overheat protection may operate in this area.**

Fig.5 Overcurrent Protection Characteristics (Typical Value)(R05LD30)

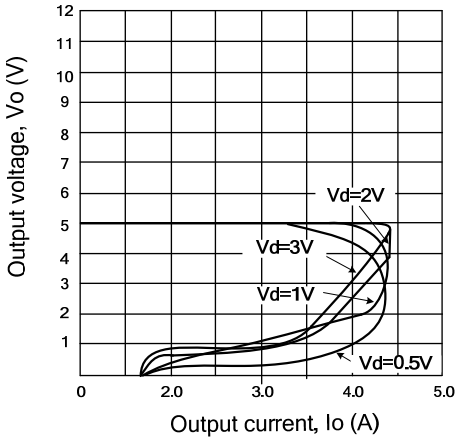



Fig.6 Overcurrent Protection Characteristics (Typical Value)(R09LD30)

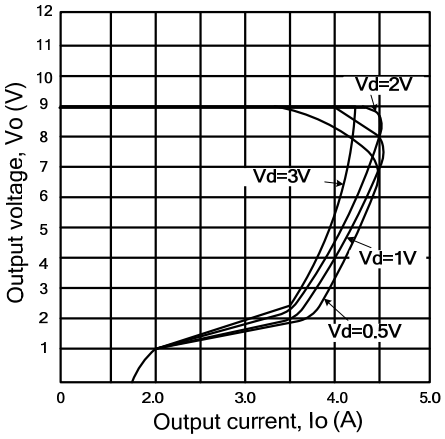



Fig.7 Overcurrent Protection Characteristics (Typical Value)(R12LD30)

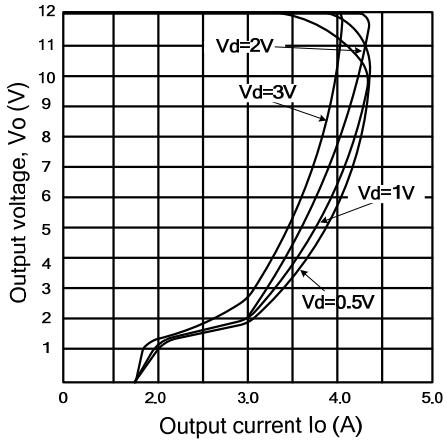
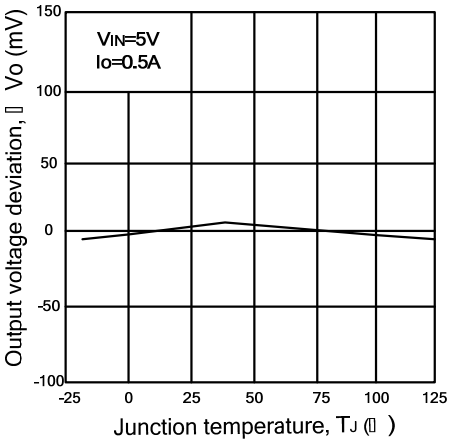



Fig.8 Output Voltage Deviation vs .Junction Temperature (R03LD30)



## ■ TYPICAL CHARACTERISTICS(cont.)

Fig.9 Output Voltage Deviation vs .Junction Temperature (R05LD30)

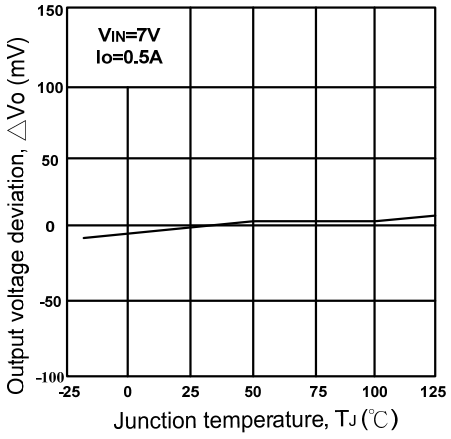



Fig.10 Output Voltage Deviation vs .Junction Temperature (R09LD30)

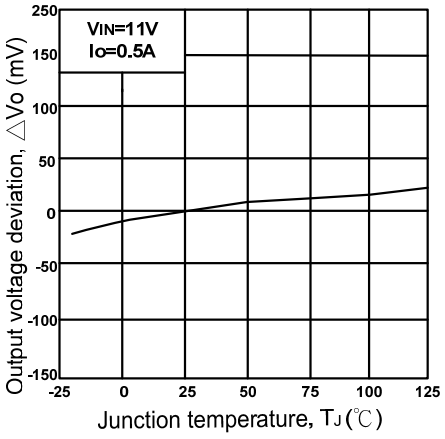



Fig.11 Output Voltage Deviation vs .Junction Temperature (R12LD30)

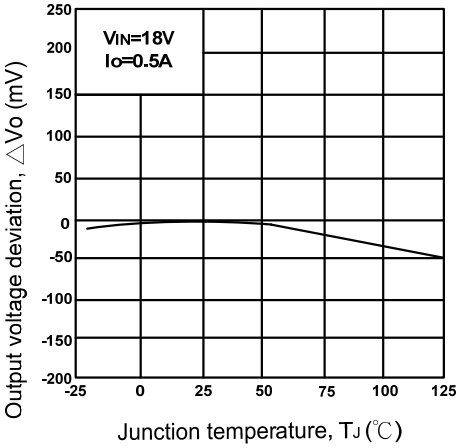



Fig.12 Output Voltage vs .Input Voltage (R33LD30)

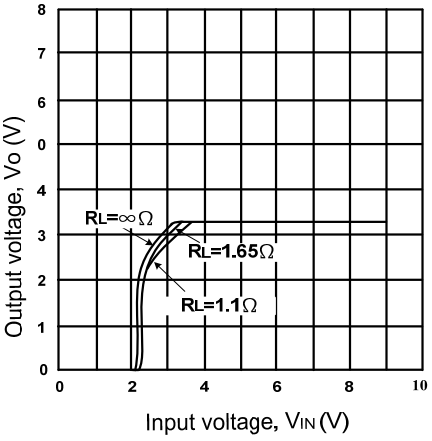



Fig.13 Output Voltage vs .Input Voltage (R05LD30)

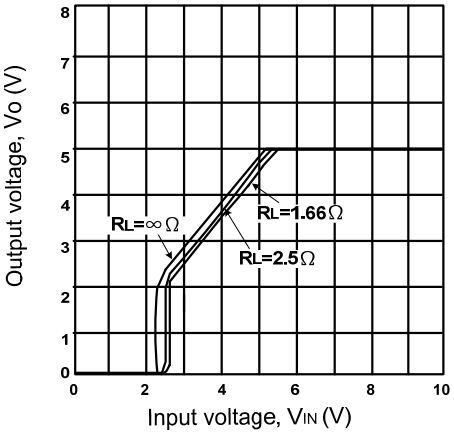
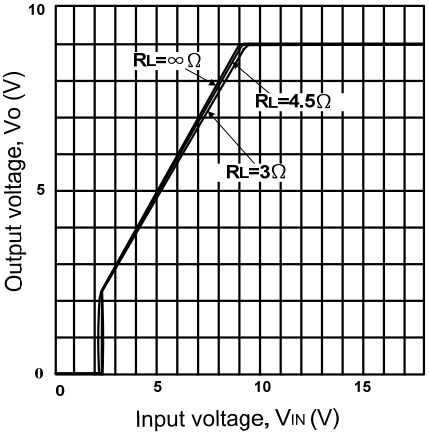



Fig.14 Output Voltage vs .Input Voltage (R09LD30)



## ■ TYPICAL CHARACTERISTICS(cont.)

Fig.15 Output Voltage vs .Input Voltage (R12LD30)

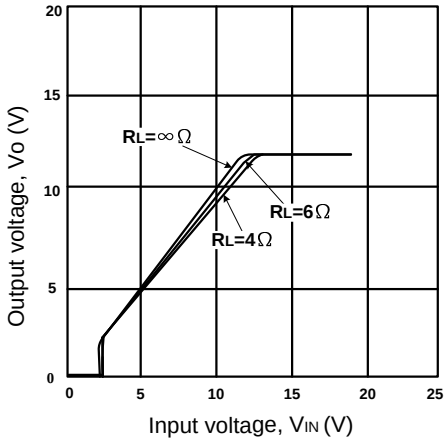



Fig.16 Circuit Operating Current vs .Input Voltage (R33LD30)

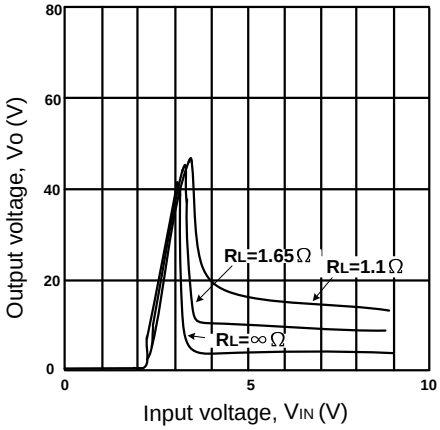



Fig.17 Circuit Operating Current vs .Input Voltage (R05LD30)

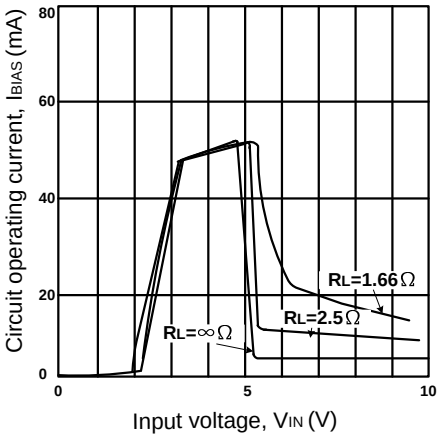



Fig.18 Circuit Operating Current vs .Input Voltage (R09LD30)

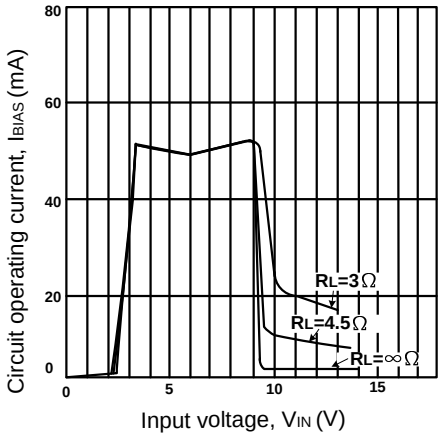



Fig.19 Circuit Operating Current vs .Input Voltage (R12LD30)

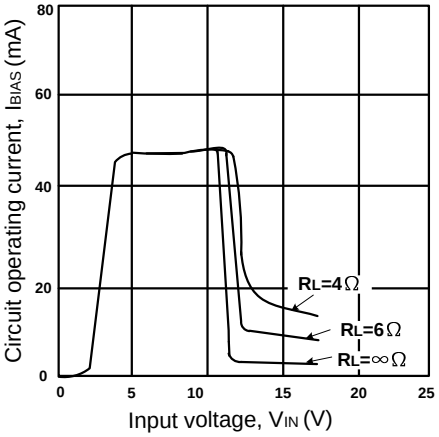
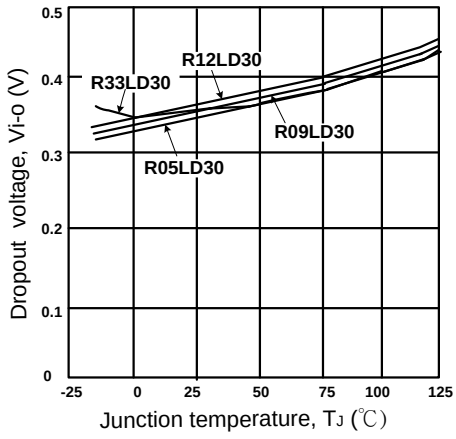



Fig.20 Dropout Voltage vs .Junction Temperature



## ■ TYPICAL CHARACTERISTICS(cont.)

Fig.21 Quiescent Current vs .Junction Temperature

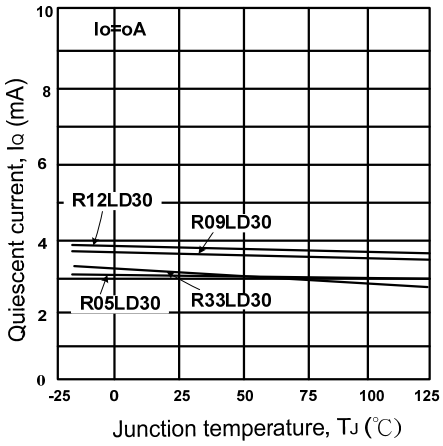



Fig.22 Ripple Rejection vs .Input Ripple Frequency