



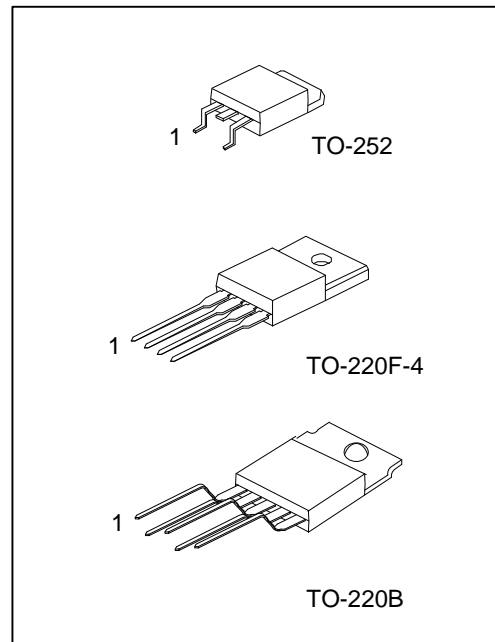
RXXLD20

LINEAR INTEGRATED CIRCUIT

2A OUTPUT TYPE LOW POWER-LOSS VOLTAGE REGULATOR

FEATURES

- * Low power-loss(Dropout voltage: 0.5V(max) at I_{OUT}=2.0A)
- * 2.0A 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 | |
| RXXLD20L-TB5-T | RXXLD20G-TB5-T | TO-220B | N | I | O | G | F | Tube |
| RXXLD20L-TF4-T | RXXLD20G-TF4-T | TO-220F-4 | I | O | G | F | - | Tube |
| RXXLD20L-TN3-T | RXXLD20G-TN3-T | TO-252 | I | G | O | - | - | Tube |
| RXXLD20L-TN3-R | RXXLD20G-TN3-R | TO-252 | I | G | O | - | - | Tape Reel |

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

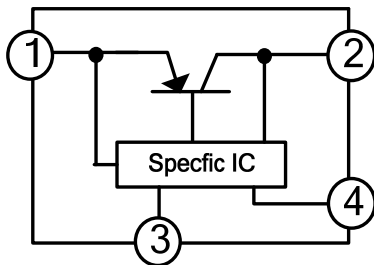
| | |
|---|---|
| <p>RXXLD20L-TN3-T</p> <p>(1) Packing Type (2) Package Type (3) Lead Free (4) Voltage Code</p> | <p>(1) T: Tube, R: Tape Reel (2) TB5: TO-220B, TF4: TO-220F-4, TN3: TO-252 (3) G: Halogen Free, L: Lead Free (4) XX: refer to Marking Information</p> |
|---|---|

MARKING INFORMATION

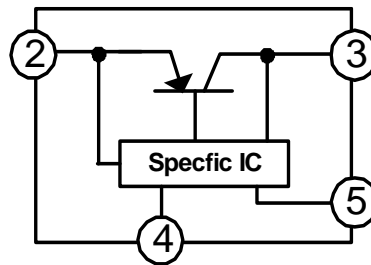
| PACKAGE | VOLTAGE CODE | MARKING |
|--------------------------------|--|---|
| TO-220F-4 TO-220B TO-252 | 33 :3.3V 35 :3.5V 05 :5.0V 06 :6.0V 09 :9.0V 12 :12 V | <p>The marking diagram shows a rectangular package with the following markings: 'UTC' at the top, 'RXXLD20L' in the center, and 'L' at the bottom. To the left of the package, 'Voltage Code' and 'Lot Code' are indicated with arrows pointing to the left side of the package. To the right, 'Space:Pb/Sn', 'L:Pb-free', and 'DATE CODE' are indicated with arrows pointing to the right side of the package.</p> |

BLOCK DIAGRAM

TO-220F-4



TO-220B



■ ABSOLUTE MAXIMUM RATINGS (T_A=25°C)

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---|----------------|-------------------|------------|------|
| Input Voltage(Note1) | | V _{IN} | 20 | V |
| ON/OFF Control Terminal Voltage (Note1) | | V _C | 20 | V |
| Output Current | | I _{OUT} | 2.0 | A |
| Power Dissipation | No Heat Sink | TO-220F-4/TO-220B | 1.4 | W |
| | | TO-252 | 0.7 | |
| | With Heat Sink | TO-220F-4/TO-220B | 15 | W |
| | | TO-252 | 5 | |
| Junction Temperature (Note2) | | T _J | 150 | °C |
| Operating Temperature | | T _{OPR} | -40 ~ +85 | °C |
| Storage Temperature | | T _{STG} | -40 ~ +150 | °C |

Note 1: All are open except GND and applicable terminals.

2: Overheat protection may operate at 125 ≤ T_J ≤ 150°C

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

For R33LD20(3.3V)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|-------------------------------|---|-------|-------|-------|------|
| Output Voltage | V _{OUT} | V _{IN} =5V, I _{OUT} =1A | 3.201 | 3.3 | 3.399 | V |
| Line Regulation | ΔV _{OUT} | V _{IN} =4 ~ 10V, I _{OUT} =5mA | | 0.1 | 2.5 | % |
| Load Regulation | ΔV _{OUT} | V _{IN} =5V, I _{OUT} =5mA ~ 2.0A | | 0.1 | 2.0 | % |
| Temperature Coefficient of Output Voltage | T _C V _O | 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 | (Note 1), I _{OUT} =2A | | | 0.5 | V |
| Voltage for Control(Note 2) | 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 _Q | I _{OUT} =0A, V _{IN} =5V | | | 10 | mA |

For R35LD20(3.5V)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|-------------------------------|---|-------|-------|-------|------|
| Output Voltage | V _{OUT} | V _{IN} =5.5V, I _{OUT} =1A | 3.395 | 3.5 | 3.605 | V |
| Line Regulation | ΔV _{OUT} | V _{IN} =4.5 ~ 10.5V, I _{OUT} =5mA | | 0.1 | 2.5 | % |
| Load Regulation | ΔV _{OUT} | V _{IN} =5.5V, I _{OUT} =5mA ~ 2.0A | | 0.1 | 2.0 | % |
| Temperature Coefficient of Output Voltage | T _C V _O | 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 | (Note 1), I _{OUT} =2A | | | 0.5 | V |
| Voltage for Control (Note 2) | 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} =5.5V | | | 20 | μA |
| | OFF | I _{C(OFF)} V _C =0.4V, V _{IN} =5.5V | | | -0.4 | mA |
| Quiescent Current | I _Q | I _{OUT} =0A, V _{IN} =5.5V | | | 10 | mA |

■ ELECTRICAL CHARACTERISTICS(Cont.)

For R05LD20(5V)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|------------------|---------------------------------------|-----------------------|------------|------|---------------|
| Output Voltage | V_{OUT} | $V_{IN}=7V, I_{OUT}=1A$ | 4.85 | 5.0 | 5.15 | V |
| Line Regulation | ΔV_{OUT} | $V_{IN}=6 \sim 12V, I_{OUT}=5mA$ | | 0.5 | 2.5 | % |
| Load Regulation | ΔV_{OUT} | $V_{IN}=7V, I_{OUT}=5mA \sim 2.0A$ | | 0.1 | 2.0 | % |
| Temperature Coefficient of Output Voltage | $T_C V_O$ | $T_J=0 \sim 125^\circ C, I_{OUT}=5mA$ | | ± 0.02 | | $\%/^\circ C$ |
| Ripple Rejection | RR | Refer to Fig.2 | 45 | 55 | | dB |
| Dropout Voltage | V_D | (Note 1), $I_{OUT}=2A$ | | | 0.5 | V |
| Voltage for Control (Note 2) | 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_Q | $I_{OUT}=0A, V_{IN}=7V$ | | | 10 | mA |

For R06LD20(6V)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|------------------|---------------------------------------|-----------------------|------------|------|---------------|
| Output Voltage | V_{OUT} | $V_{IN}=8V, I_{OUT}=1A$ | 5.82 | 6.0 | 6.18 | V |
| Line Regulation | ΔV_{OUT} | $V_{IN}=7 \sim 13V, I_{OUT}=5mA$ | | 0.5 | 2.5 | % |
| Load Regulation | ΔV_{OUT} | $V_{IN}=8V, I_{OUT}=5mA \sim 2.0A$ | | 0.1 | 2.0 | % |
| Temperature Coefficient of Output Voltage | $T_C V_O$ | $T_J=0 \sim 125^\circ C, I_{OUT}=5mA$ | | ± 0.02 | | $\%/^\circ C$ |
| Ripple Rejection | RR | Refer to Fig.2 | 45 | 55 | | dB |
| Dropout Voltage | V_D | (Note 1), $I_{OUT}=2A$ | | | 0.5 | V |
| Voltage for Control (Note 2) | ON | $V_{C(ON)}$ | $V_{IN}=8V$ | 2.0 | | V |
| | OFF | $V_{C(OFF)}$ | $V_{IN}=8V$ | | 0.8 | V |
| Current for Control | ON | $I_{C(ON)}$ | $V_C=2.7V, V_{IN}=8V$ | | 20 | μA |
| | OFF | $I_{C(OFF)}$ | $V_C=0.4V, V_{IN}=8V$ | | -0.4 | mA |
| Quiescent Current | I_Q | $I_{OUT}=0A, V_{IN}=8V$ | | | 10 | mA |

For R09LD20(9V)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|------------------|---------------------------------------|------------------------|------------|------|---------------|
| Output Voltage | V_{OUT} | $V_{IN}=11V, I_{OUT}=1A$ | 8.73 | 9.0 | 9.27 | V |
| Line Regulation | ΔV_{OUT} | $V_{IN}=10 \sim 16V, I_{OUT}=5mA$ | | 0.5 | 2.5 | % |
| Load Regulation | ΔV_{OUT} | $V_{IN}=11V, I_{OUT}=5mA \sim 2.0A$ | | 0.1 | 2.0 | % |
| Temperature Coefficient of Output Voltage | $T_C V_O$ | $T_J=0 \sim 125^\circ C, I_{OUT}=5mA$ | | ± 0.02 | | $\%/^\circ C$ |
| Ripple Rejection | RR | Refer to Fig.2 | 45 | 55 | | dB |
| Dropout Voltage | V_D | (Note 1), $I_{OUT}=2A$ | | | 0.5 | V |
| Voltage for Control (Note 2) | 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_Q | $I_{OUT}=0A, V_{IN}=11V$ | | | 10 | mA |

■ ELECTRICAL CHARACTERISTICS(Cont.)

For R12LD20(12V)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|------------------|---------------------------------------|------------------------|------------|-------|---------------|
| Output Voltage | V_{OUT} | $V_{IN}=14V, I_{OUT}=1A$ | 11.64 | 12.0 | 12.36 | V |
| Line Regulation | ΔV_{OUT} | $V_{IN}=13 \sim 19V, I_{OUT}=5mA$ | | 0.5 | 2.5 | % |
| Load Regulation | ΔV_{OUT} | $V_{IN}=14V, I_{OUT}=5mA \sim 2.0A$ | | 0.1 | 2.0 | % |
| Temperature Coefficient of Output Voltage | $T_C V_O$ | $T_J=0 \sim 125^\circ C, I_{OUT}=5mA$ | | ± 0.02 | | %/ $^\circ C$ |
| Ripple Rejection | RR | Refer to Fig.2 | 45 | 55 | | dB |
| Dropout Voltage | V_D | (Note 1), $I_{OUT}=2A$ | | | 0.5 | V |
| Voltage for Control (Note 2) | 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_Q | $I_{OUT}=0A, V_{IN}=14V$ | | | 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 CIRCUITS

Note : ○: TO-220F-4, (): TO-220B

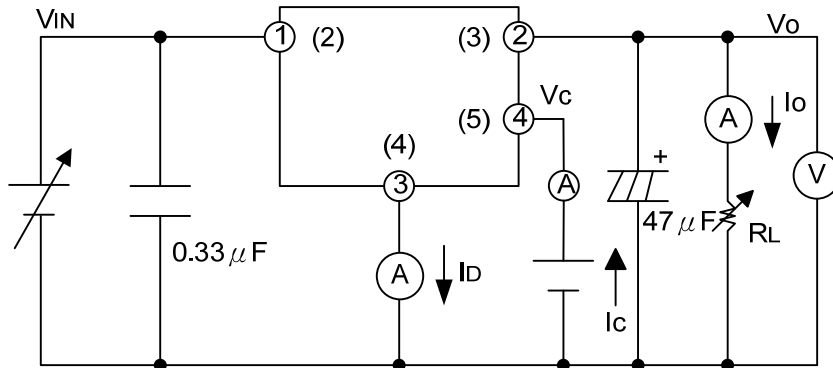
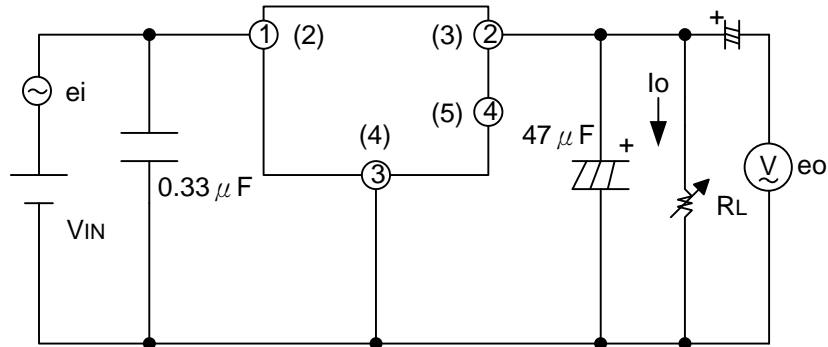


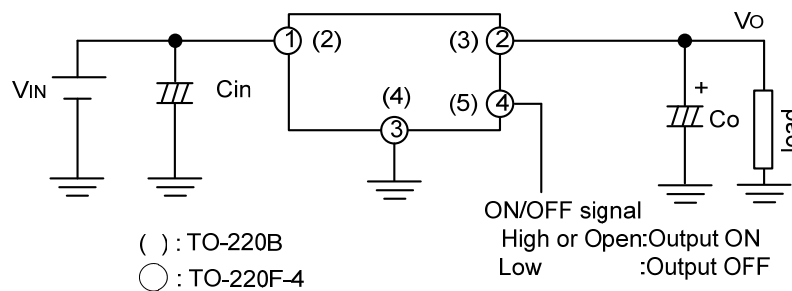
Fig.1



$V_{IN}=5V(R33LD20)$ $f=120Hz$
 $5.5V(R35LD20)$ $e_i=0.5V_{rms}$
 $7V(R05LD20)$ $I_o=0.5A$
 $8V(R06LD20)$ $RR=20 \log (e_i/e_o)$
 $11V(R09LD20)$
 $14V(R12LD20)$

Fig.2 For Ripple Rejection

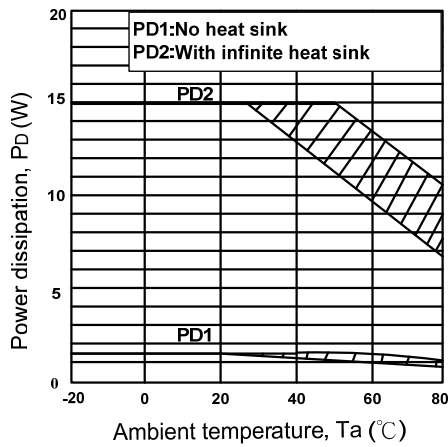
TYPICAL APPLICATION



(): TO-220B
 ○: TO-220F-4

TYPICAL CHARACTERISTICS

Fig.3 Power Dissipation vs. Ambient Temperature



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

Fig.4 Overcurrent Protection Characteristics(Typical Value) (R33LD20)

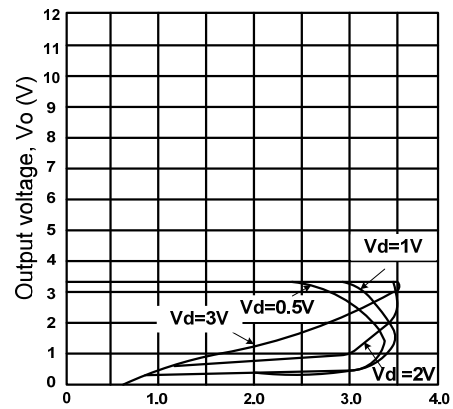


Fig.5 Overcurrent Protection Characteristics (Typical Value)(R05LD20)

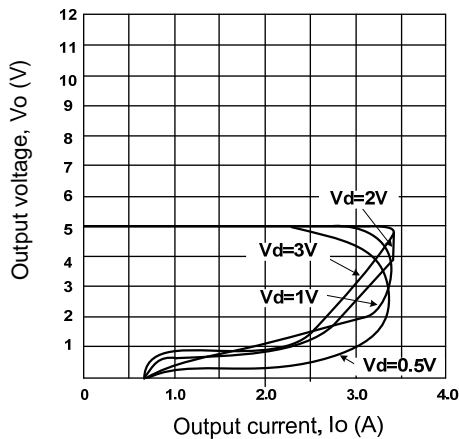


Fig.6 Overcurrent Protection Characteristics (Typical Value)(R09LD20)

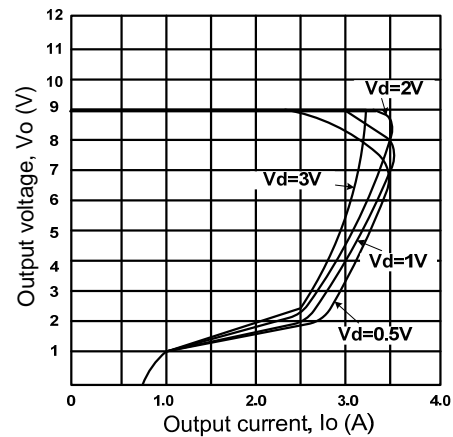


Fig.7 Overcurrent Protection Characteristics (Typical Value)(R12LD20)

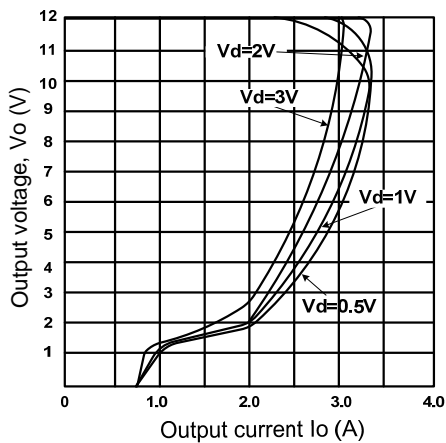
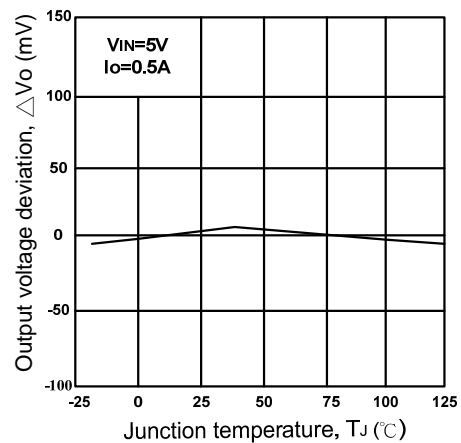


Fig.8 Output Voltage Deviation vs .Junction Temperature (R03LD20)



■ TYPICAL CHARACTERISTICS(Cont.)

Fig.9 Output Voltage Deviation vs .Junction Temperature (R05LD20)

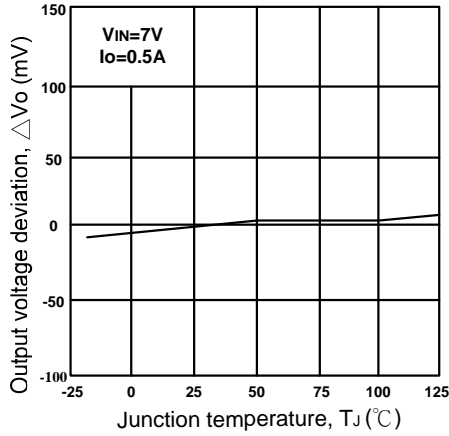


Fig.10 Output Voltage Deviation vs .Junction Temperature (R09LD20)

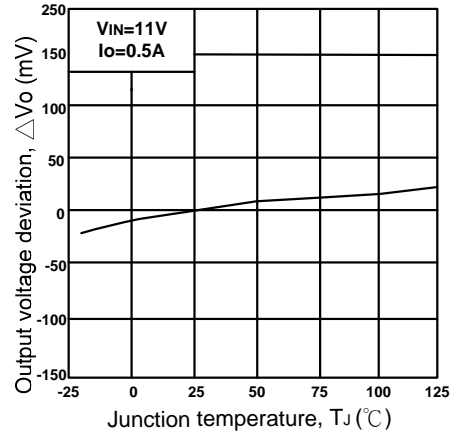


Fig.11 Output Voltage Deviation vs .Junction Temperature (R12LD20)

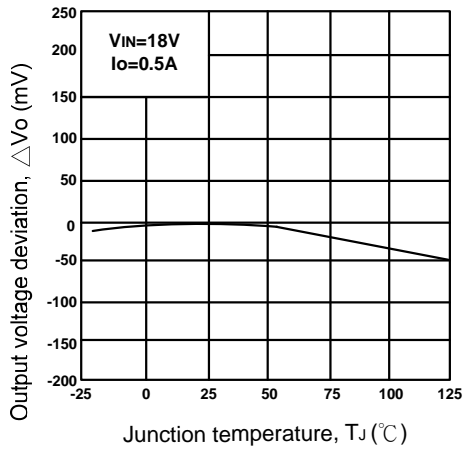


Fig.12 Output Voltage vs .Input Voltage (R33LD20)

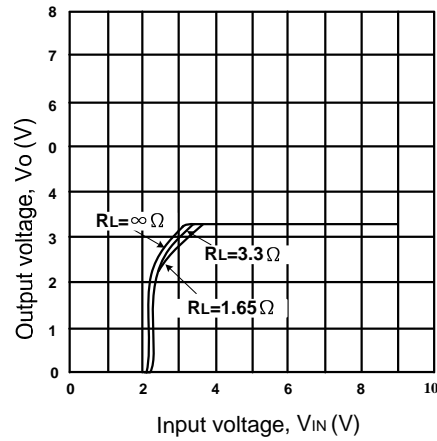


Fig.13 Output Voltage vs .Input Voltage (R05LD20)

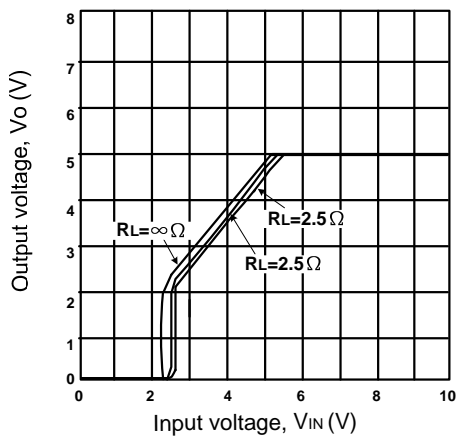
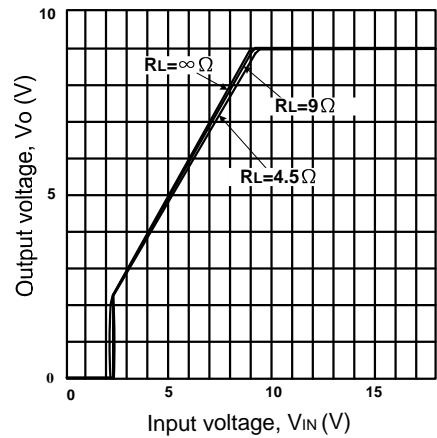


Fig.14 Output Voltage vs .Input Voltage (R09LD20)



■ TYPICAL CHARACTERISTICS(Cont.)

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

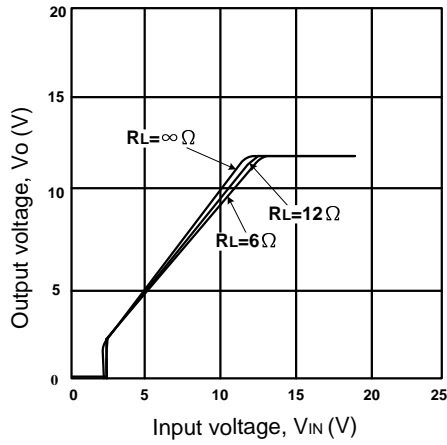


Fig.16 Circuit Operating Current vs .Input Voltage (R33LD30)

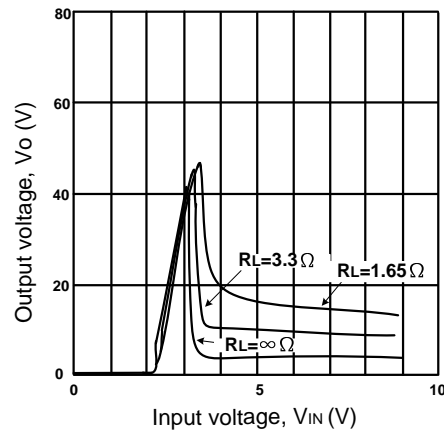


Fig.17 Circuit Operating Current vs .Input Voltage (R05LD30)

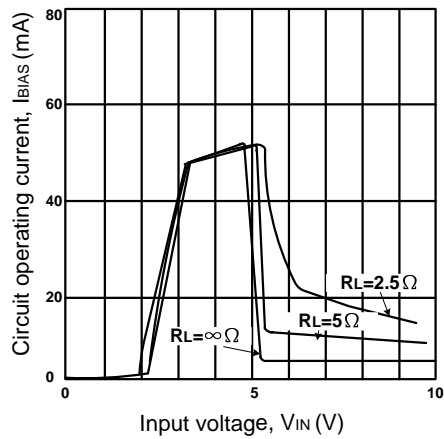


Fig.18 Circuit Operating Current vs .Input Voltage (R09LD30)

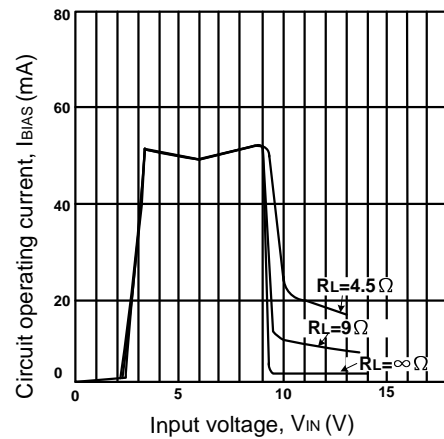


Fig.19 Circuit Operating Current vs .Input Voltage (R12LD30)

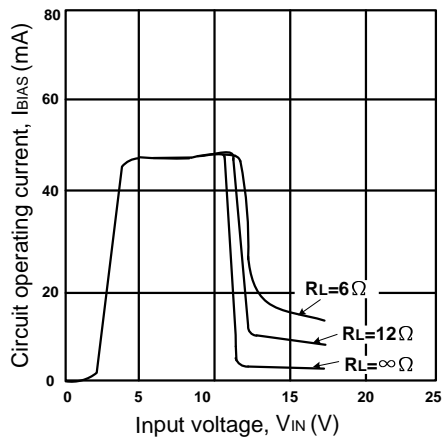
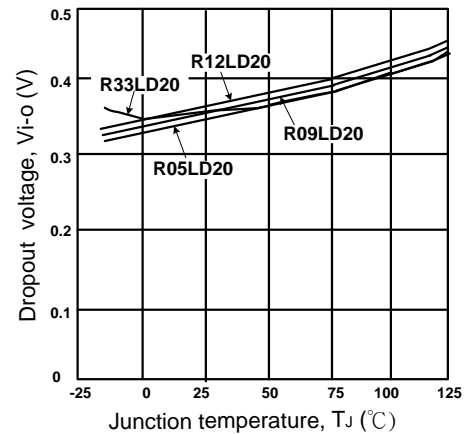


Fig.20 Dropout Voltage vs .Junction Temperature



■ TYPICAL CHARACTERISTICS(Cont.)

Fig.21 Quiescent Current vs Junction Temperature

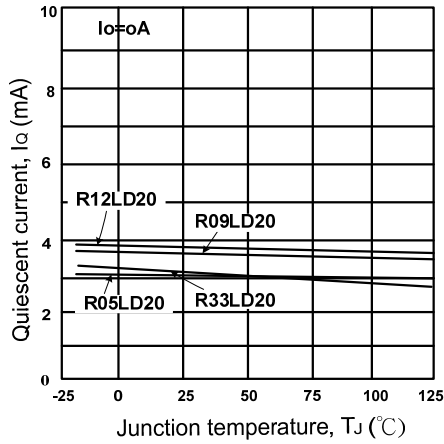
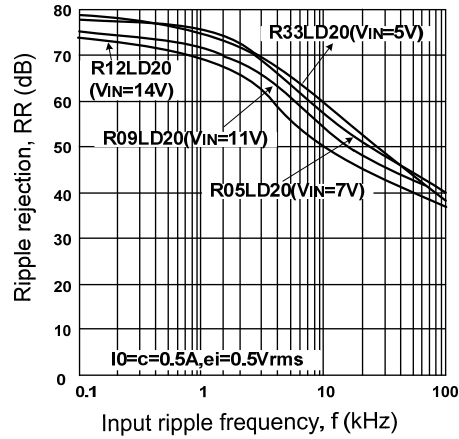


Fig.22 Ripple Rejection vs Input Ripple Frequency



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