# KA78RXXC-Series

## 1A Output Low Dropout Voltage Regulators

### Features

- 1A/3.3V, 5V, 8V, 9V, 12V, 15V output low dropout voltage regulator
- TO-220 full-mold package (4pin)
- Overcurrent protection, thermal shutdown
- Overvoltage protection, short circuit protection
- With output disable function

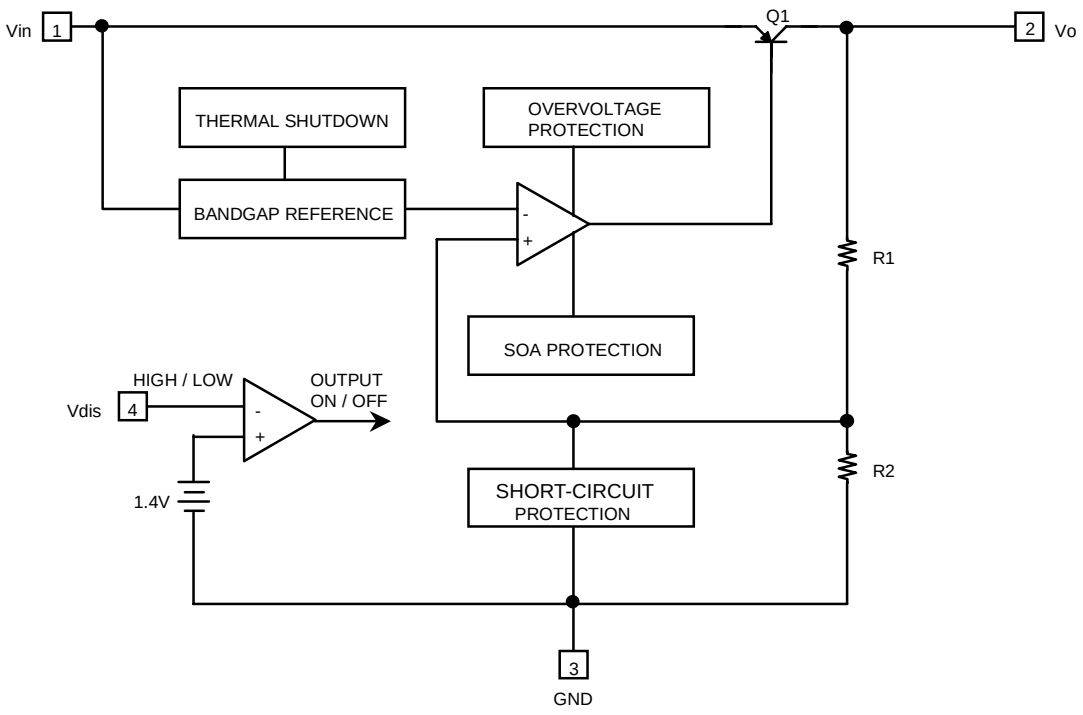
### Description

The KA78RXXC is a low-dropout voltage regulator suitable for various electronic equipments.
It provides constant voltage power source with TO-220-4 lead full mold package. Dropout voltage of KA78RXXC is below 0.5V in full rated current(1A).
This regulator has various functions such as peak current protection, thermal shut down, overvoltage protection and output disable function.

**TO-220F-4L**


1. Vin 2. Vo 3. GND 4. Vdis

### Internal Block Diagram



# Absolute Maximum Ratings

## KA78RXXC

| Parameter | Symbol | Value | Unit | Remark |
|---|---|---|---|---|
| Input voltage | Vin | 35 | V | - |
| Disable voltage | Vdis | 35 | V | - |
| Output current | Io | 1.0 | A | - |
| Power dissipation 1 | Pd1 | 1.5 | W | No heatsink |
| Power dissipation 2 | Pd2 | 15 | W | With heatsink |
| Junction temperature | Tj | +150 | °C | - |
| Operating temperature | Topr | -20 ~ +80 | °C | - |
| Thermal resistance, junction-to case (Note2) | Rθjc | 4.31 | °C/W | - |
| Thermal resistance, junction-to-air (Note2) | Rθja | 48.83 | °C/W | - |

## Electrical Characteristics

(Vin = Note3, Io = 0.5A, Ta = 25°C, unless otherwise specified)

| Parameter | | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Output voltage | KA78R33C | Vo | - | 3.22 | 3.3 | 3.38 | V |
| | KA78R05C | | - | 4.88 | 5 | 5.12 | |
| | KA78R08C | | - | 7.8 | 8 | 8.2 | |
| | KA78R09C | | - | 8.78 | 9 | 9.22 | |
| | KA78R12C | | - | 11.7 | 12 | 12.3 | |
| | KA78R15C | | - | 14.6 | 15 | 15.4 | |
| Load regulation | | Rload | 5mA < Io < 1A | - | 0.1 | 2.0 | % |
| Line regulation | | Rline | Note4 | - | 0.5 | 2.5 | % |
| Ripple rejection ratio | | RR | Note1 | 45 | 55 | - | dB |
| Dropout voltage | | Vdrop | Io = 1A | - | - | 0.5 | V |
| Disable voltage high | | VdisH | Output active | 2.0 | - | - | V |
| Disable voltage low | | VdisL | Output disabled | - | - | 0.8 | V |
| Disable bias current high | | IdisH | Vdis = 2.7V | - | - | 20 | μA |
| Disable bias current low | | IdisL | Vdis = 0.4V | - | - | -0.4 | mA |
| Quiescent current | | Iq | Io = 0A | - | - | 10 | mA |

**Note:**

1.These parameters, although guaranteed, are not 100% tested in production.

2. Junction -to -case thermal resistance test environments.

-. Pneumatic heat sink fixture.

-. Clamping pressure 60psi through 12mm diameter cylinder.

-. Thermal grease applied between PKG and heat sink fixture.

3. KA78R33C :Vin = 5V
   KA78R05C : Vin = 7V
   KA78R08C : Vin = 10V
   KA78R09C : Vin = 11V
   KA78R12C : Vin = 15V
   KA78R15C : Vin = 20V

4. KA78R33C :Vin = 4V to 10V
   KA78R05C : Vin = 6V to 12V
   KA78R08C : Vin = 9V to 25V
   KA78R09C : Vin = 10V to 25V
   KA78R12C : Vin = 13V to 29V
   KA78R15C : Vin = 16V to 30V

# Typical Performance Characteristics

## KA78R33

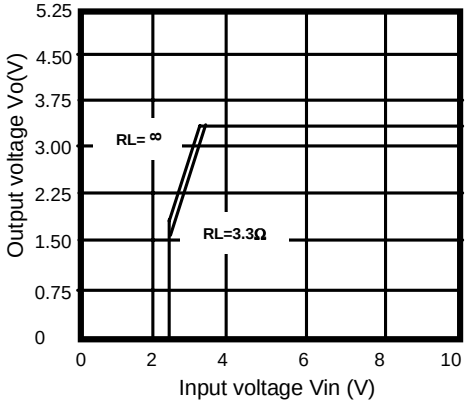



**Figure 1. Output Voltage vs. Input Voltage**

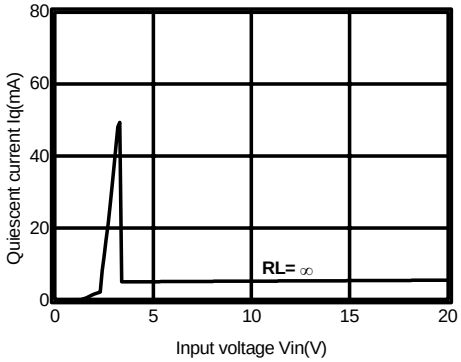



**Figure 2. Quiescent Current vs. Input Voltage**

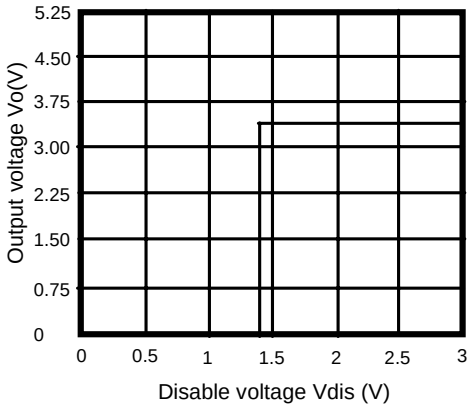



**Figure 3. Output Voltage vs. Disable Voltage**

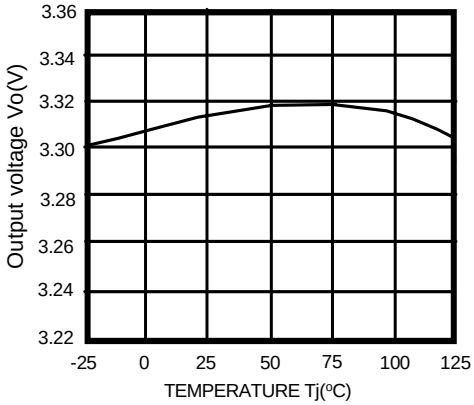



**Figure 4. Output Voltage vs. Temperature(Tj)**

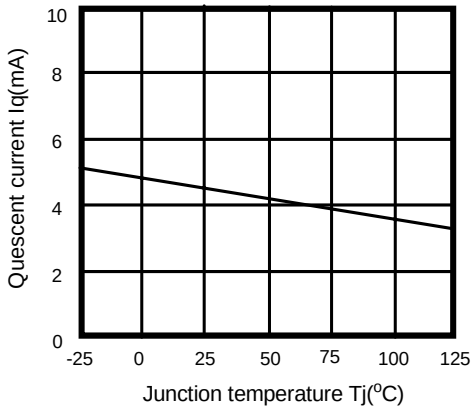



**Figure 5. Quiescent Current vs. Temperature(Tj)**

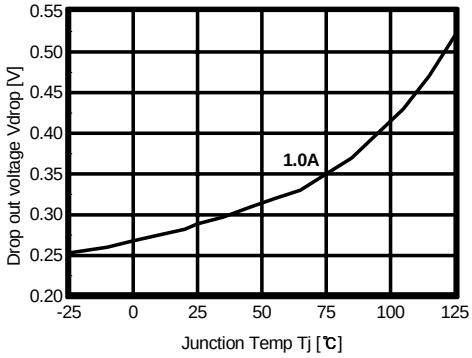



**Figure 6. Dropout Voltage vs.Junction Temperature**

## Typical Performance Characteristics (Continued)

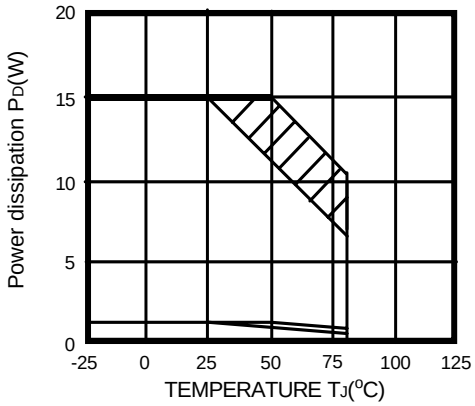



**Figure 7. Power Dissipation vs. Temperature(Tj)**

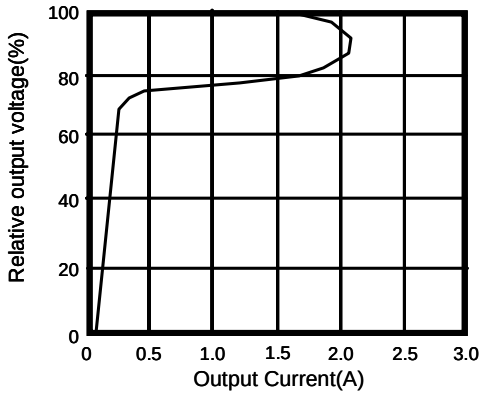



**Figure 8. Overcurrent Protection Characteristics (Typical Value)**

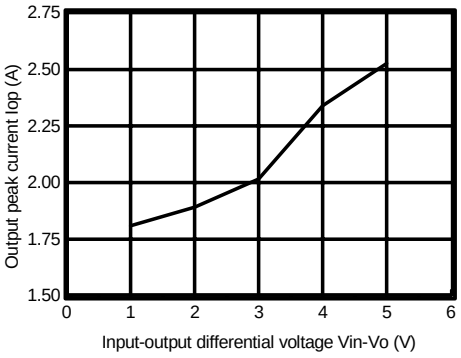



**Figure 9. Output Peak Currenrt vs. Input-Output Differential Voltage**

# Typical Performance Characteristics

## KA78R05C

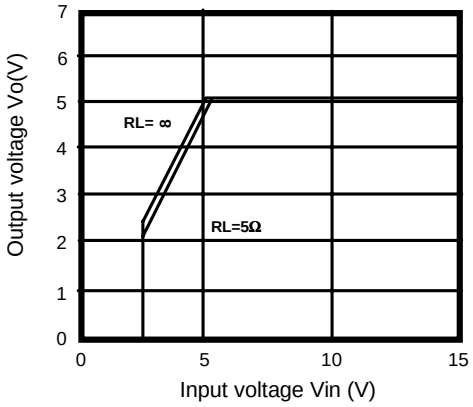



**Figure 1. Output Voltage vs. Input Voltage**

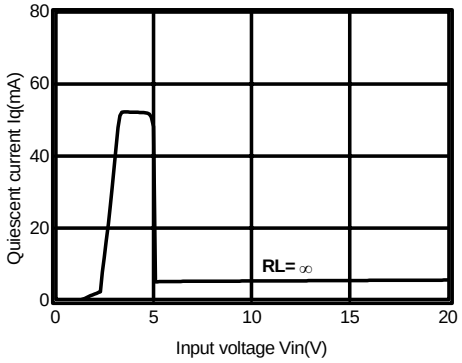



**Figure 2. Quiescent Current vs. Input Voltage**

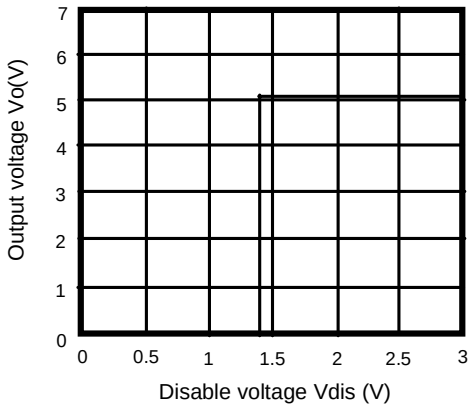



**Figure 3. Output Voltage vs. Disable Voltage**

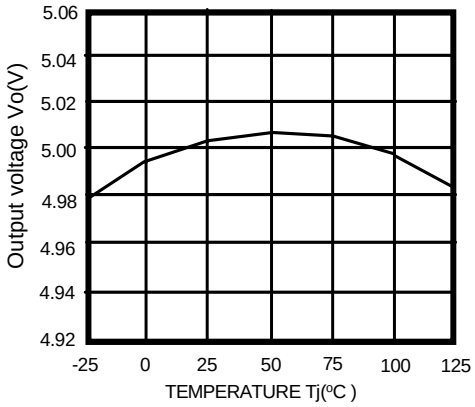



**Figure 4. Output Voltage vs. Temperature(Tj)**

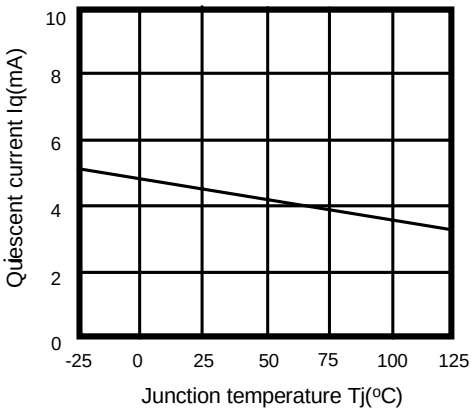



**Figure 5. Quiescent Current vs. Temperature(Tj)**

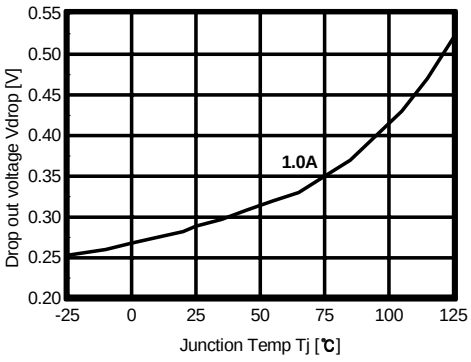



**Figure 6. Dropout Voltage vs. Junction Temperature**

## Typical Performance Characteristics (Continued)

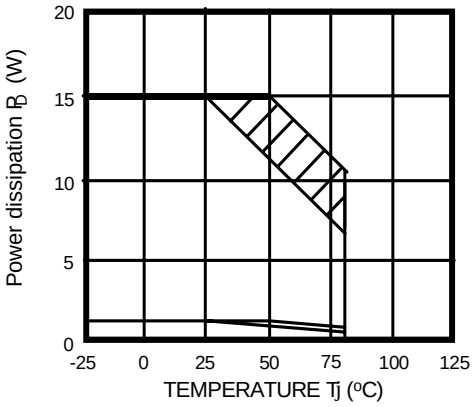



**Figure 7. Power Dissipation vs. Temperature(Tj)**

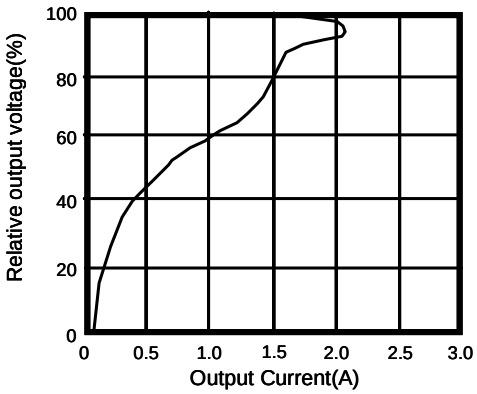



**Figure 8. Overcurrent Protection Characteristics (Typical Value)**

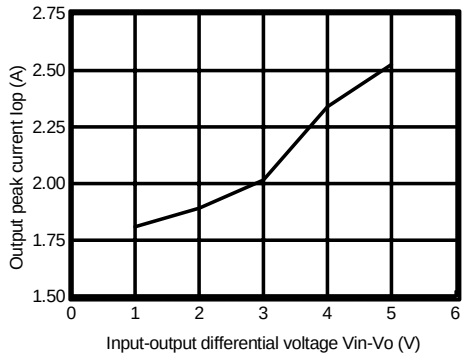



**Figure 9. Output Peak Currenrt vs. Input-Output Differential Voltage**

# Typical Performance Characteristics (Continued)

## KA78R08C

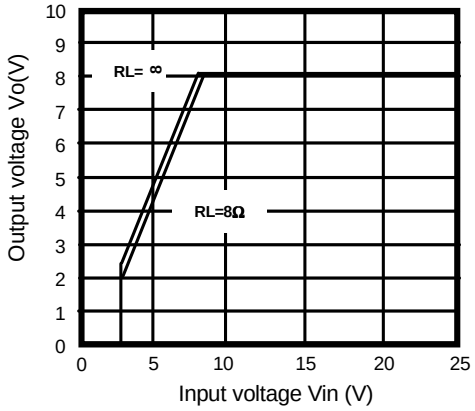



**Figure 1. Output Voltage vs. Input Voltage**

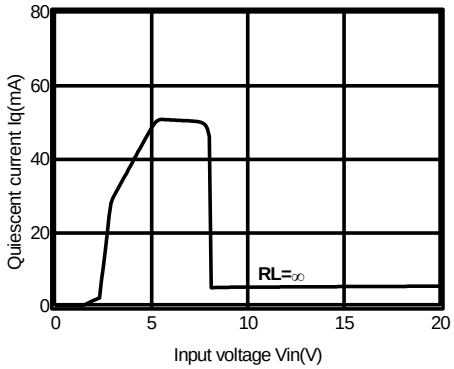



**Figure 2. Quiescent Current vs. Input Voltage**

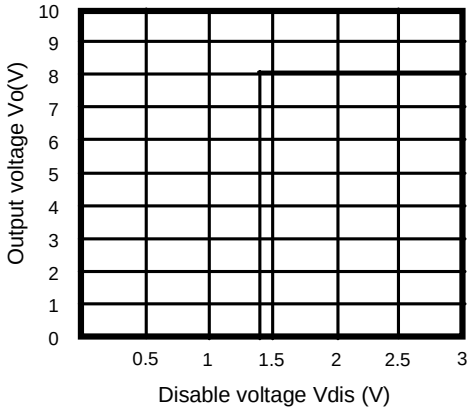



**Figure 3. Output Voltage vs. Disable Voltage**

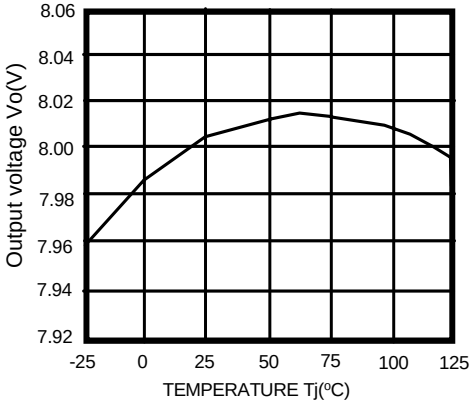



**Figure 4. Output Voltage vs. Temperature(Tj)**

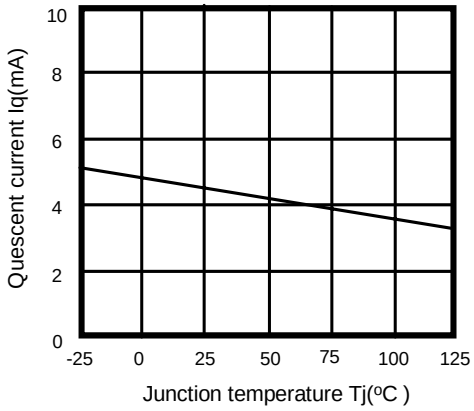



**Figure 5. Quiescent Current vs. Temperature(Tj)**

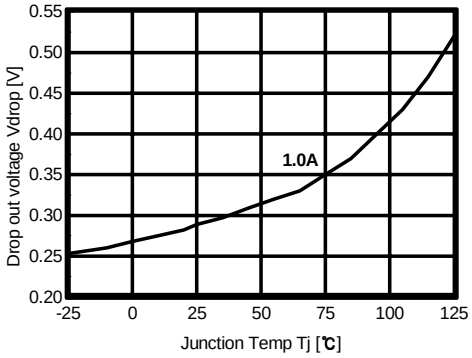



**Figure 6. Dropout Voltage vs.Junction Temperature**

## Typical Performance Characteristics (Continued)

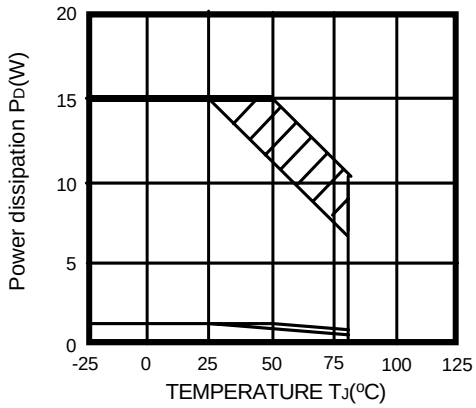



**Figure 7. Power Dissipation vs. Temperature(Tj)**

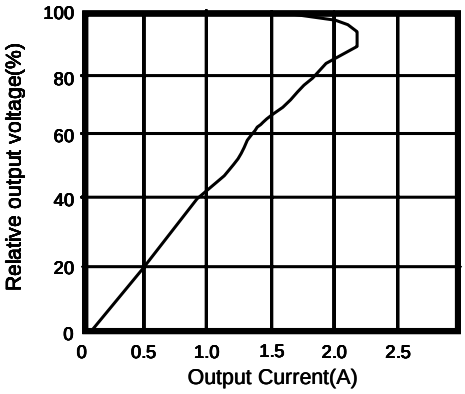



**Figure 8. Overcurrent Protection Characteristics (Typical Value)**

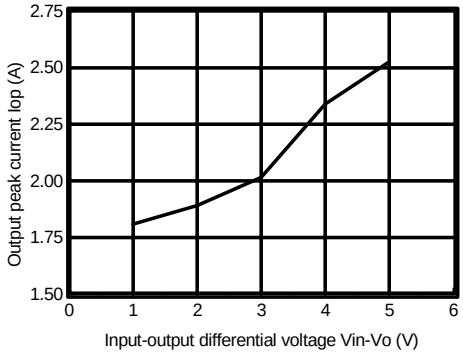



**Figure 9. Output Peak Currenrt vs. Input-Output Differential Voltage**

# Typical Performance Characteristics (Continued)

## KA78R09C

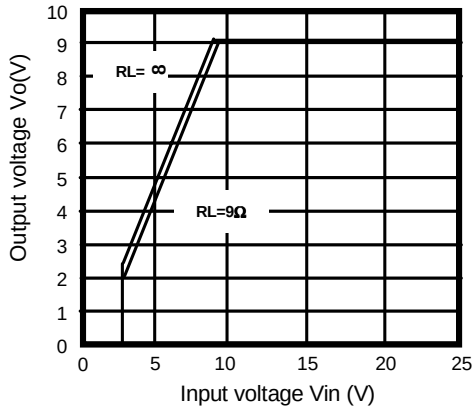



**Figure 1. Output Voltage vs. Input Voltage**

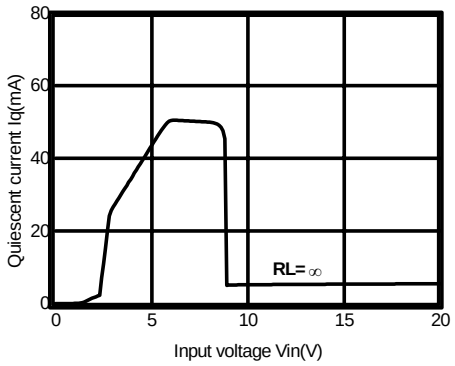



**Figure 2. Quiescent Current vs. Input Voltage**

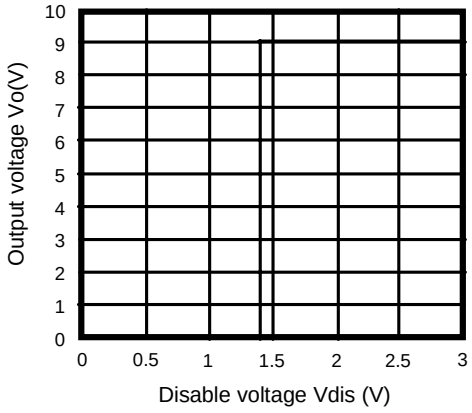



**Figure 3. Output Voltage vs. Disable Voltage**

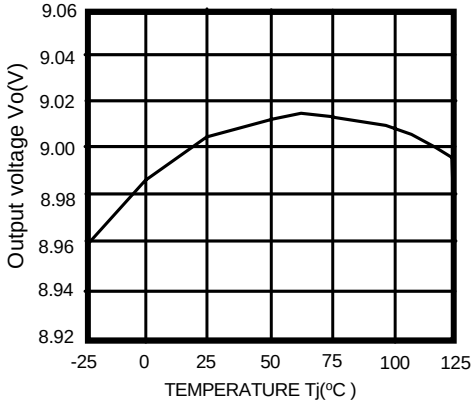



**Figure 4. Output Voltage vs. Temperature(Tj)**

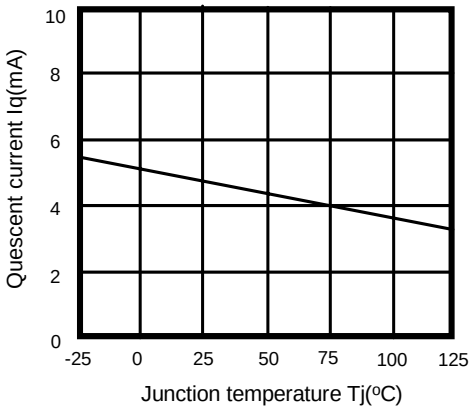



**Figure 5. Quiescent Current vs. Temperature(Tj)**

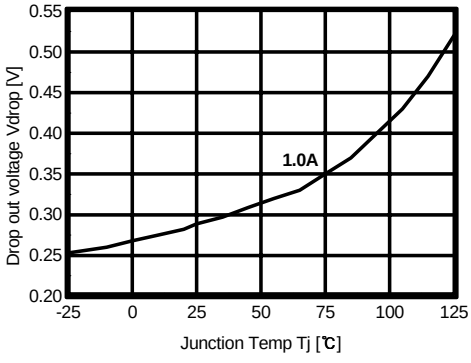



**Figure 6. Dropout Voltage vs.Junction Temperature**

## Typical Performance Characteristics (Continued)

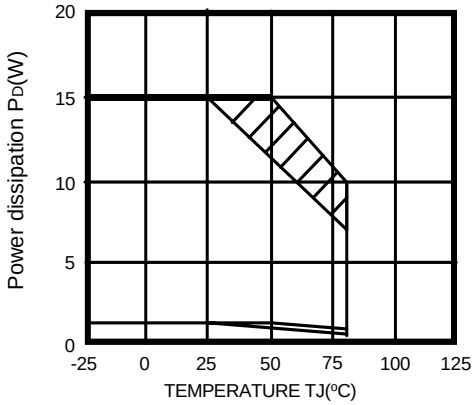



**Figure 7. Power Dissipation vs. Temperature(Tj)**

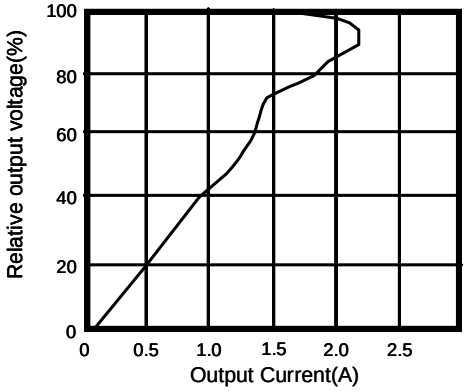



**Figure 8. Overcurrent Protection Characteristics (Typical Value)**

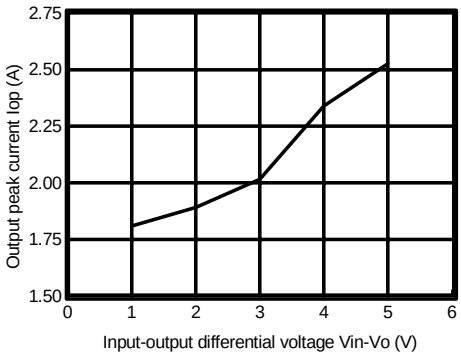



**Figure 9. Output Peak Currenrt vs. Input-Output Differential Voltage**

# Typical Performance Characteristics (Continued)

## KA78R12C

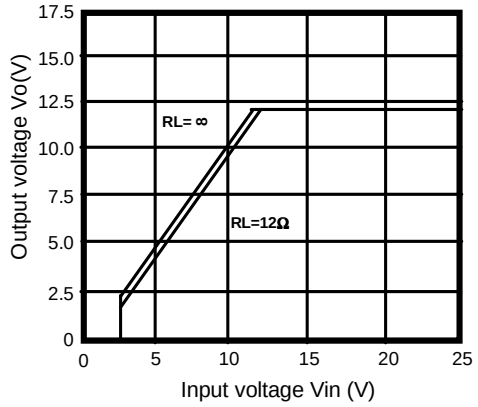



**Figure 1. Output Voltage vs. Input Voltage**

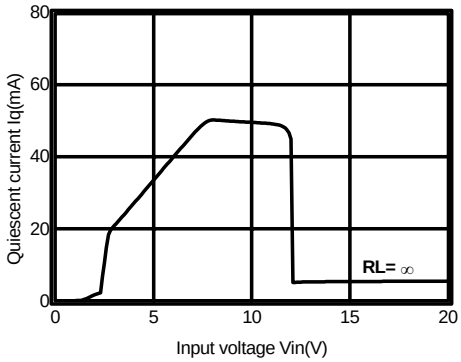



**Figure 2. Quiescent Current vs. Input Voltage**

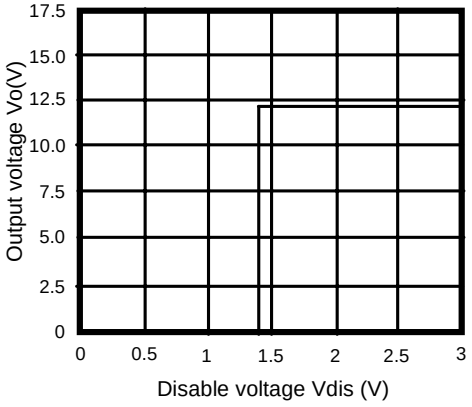



**Figure 3. Output Voltage vs. Disable Voltage**

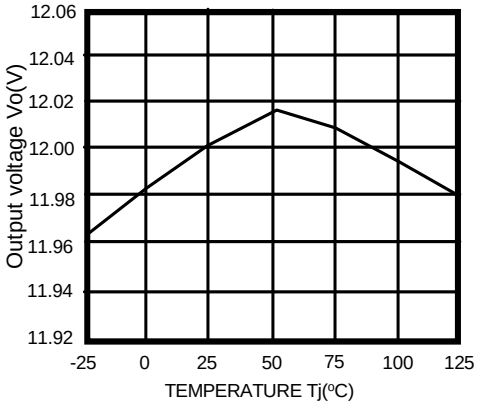



**Figure 4. Output Voltage vs. Temperature(Tj)**

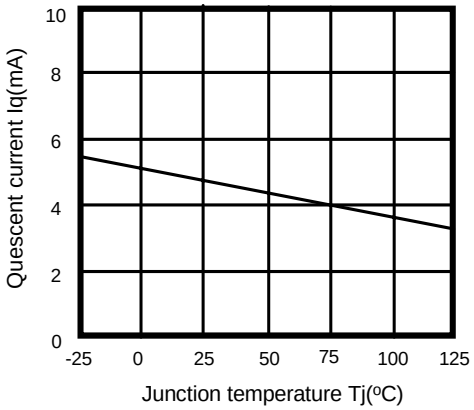



**Figure 5. Quiescent Current vs. Temperature(Tj)**

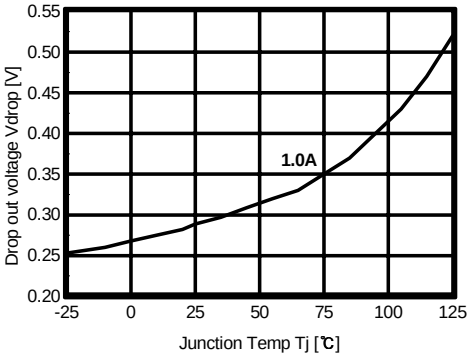



**Figure 6. Dropout Voltage vs.Junction Temperature**

## Typical Performance Characteristics (Continued)

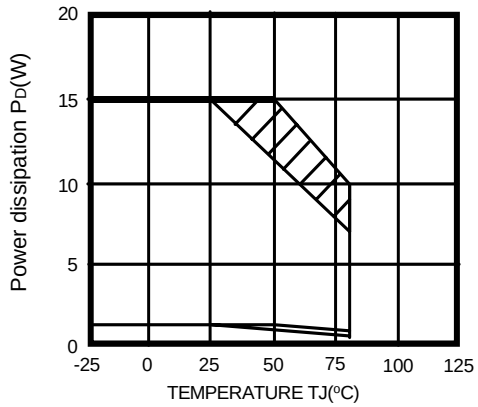



**Figure 7. Power Dissipation vs. Temperature(Tj)**

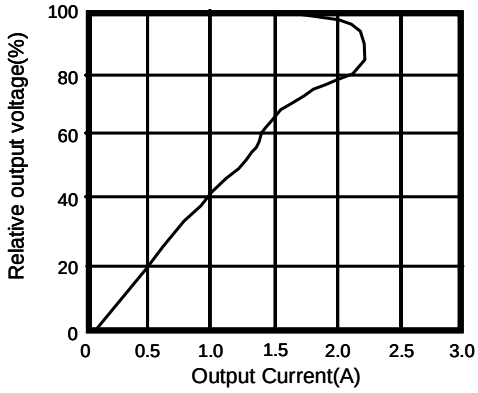



**Figure 8. Overcurrent Protection Characteristics (Typical Value)**

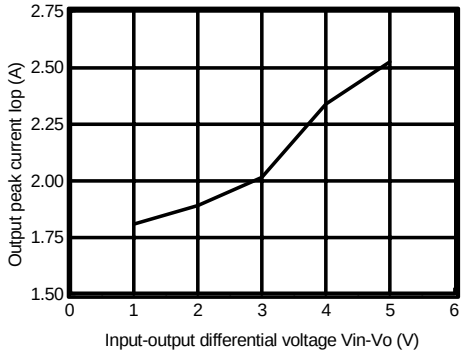



**Figure 9. Output Peak Currenrt vs. Input-Output Differential Voltage**

# Typical Performance Characteristics (Continued)

## KA78R15C

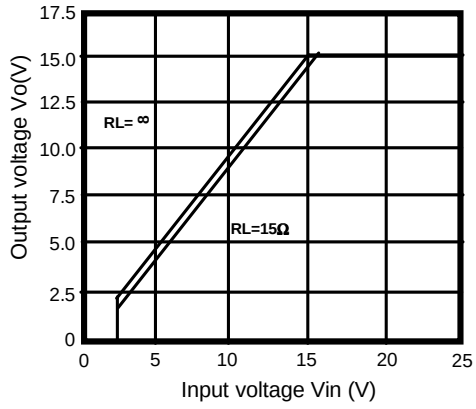



**Figure 1. Output Voltage vs. Input Voltage**

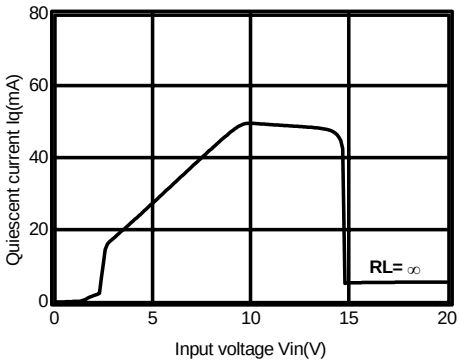



**Figure 2. Quiescent Current vs. Input Voltage**

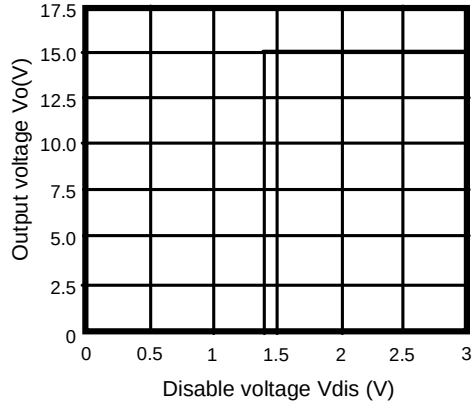



**Figure 3. Output Voltage vs. Disable Voltage**

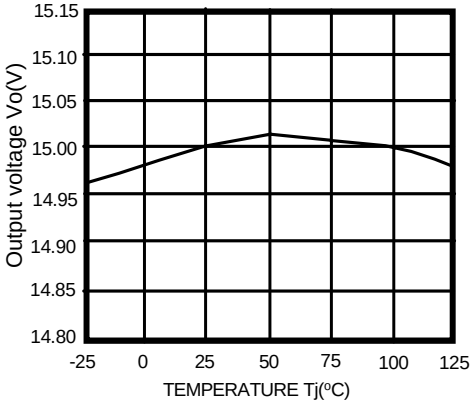



**Figure 4. Output Voltage vs. Temperature(Tj)**

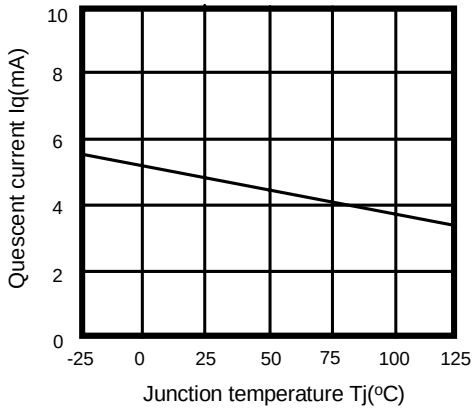



**Figure 5. Quiescent Current vs. Temperature(Tj)**

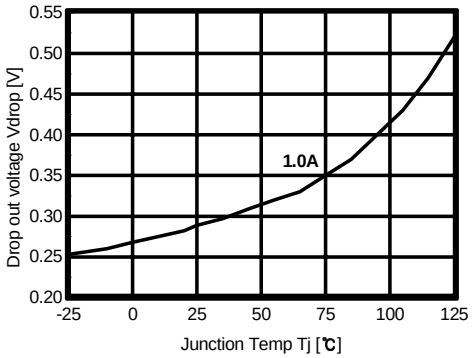



**Figure 6. Dropout Voltage vs.Junction Temperature**

## Typical Performance Characteristics (Continued)

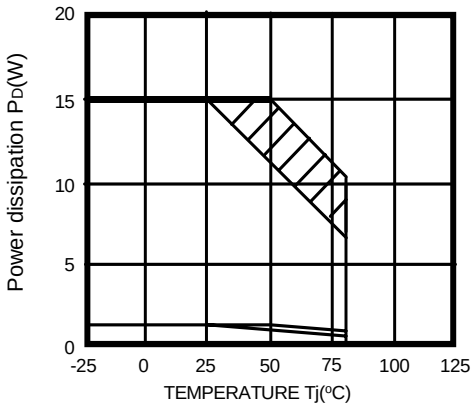



**Figure 7. Power Dissipation vs. Temperature(Tj)**

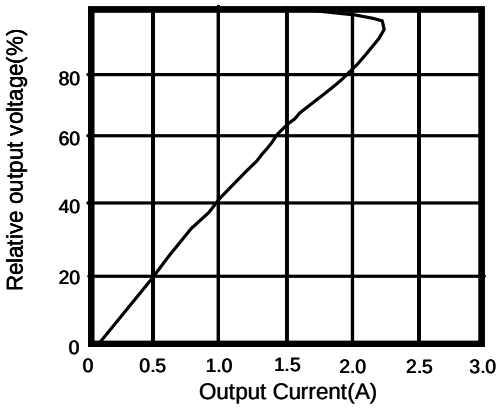



**Figure 8. Overcurrent Protection Characteristics (Typical Value)**

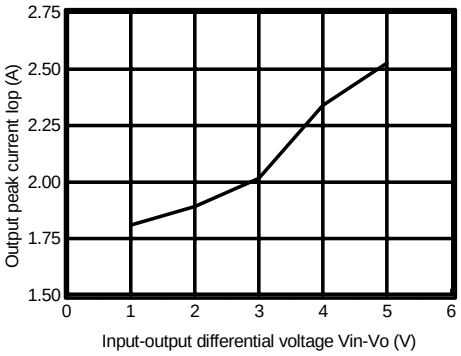



**Figure 9. Output Peak Currenrt vs. Input-Output Differential Voltage**

## Typical Application

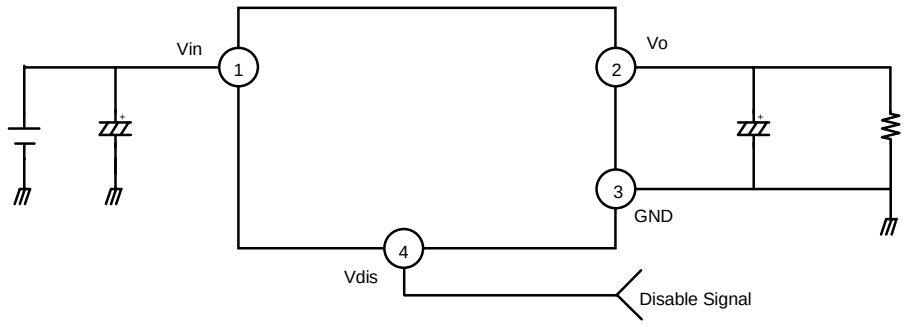



**Figure 1. Application Circuit**

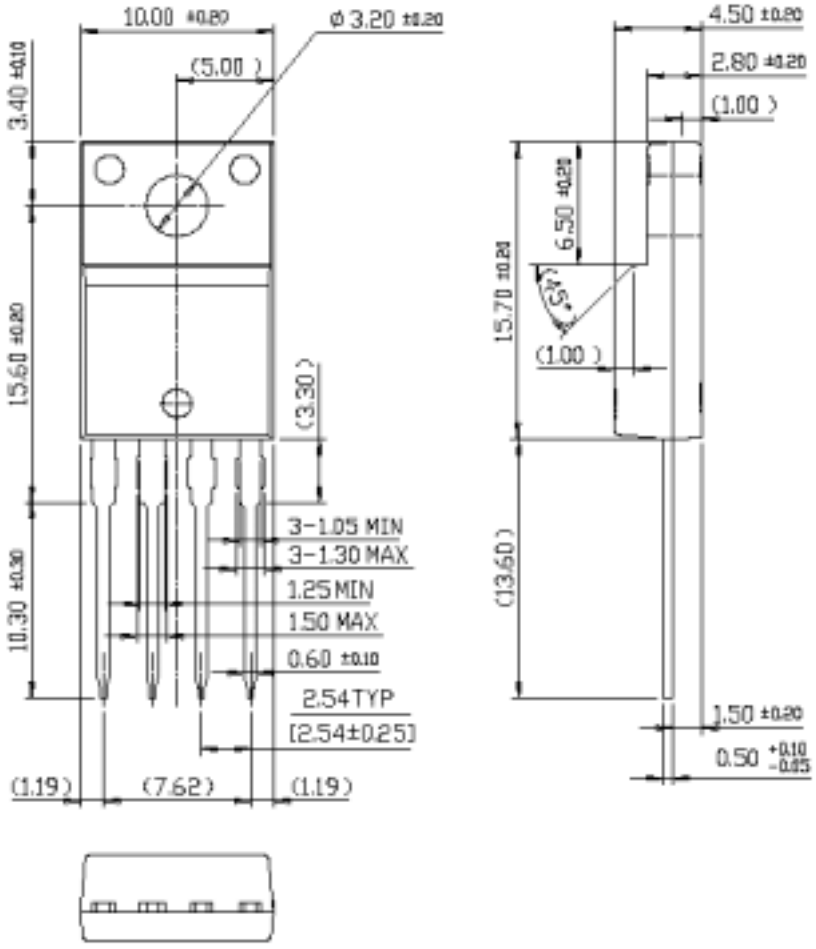
- Ci is required if regulator is located at an appreciable distance from power supply filter.
- Co improves stability and transient response.(Co > 47μF)

## Mechanical Dimensions

**Package**

**Dimensions in millimeters**

# TO-220F-4L

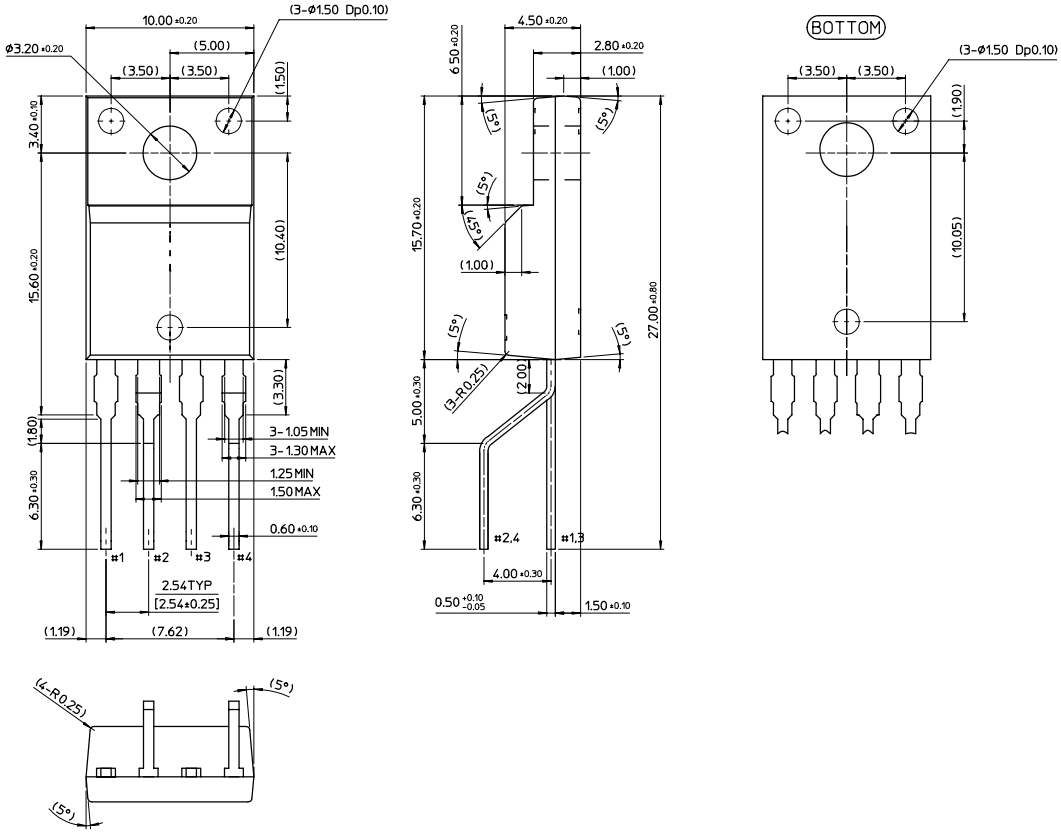


## Mechanical Dimensions (Continued)

### Package

**Dimensions in millimeters**

# TO-220F-4L(Forming)

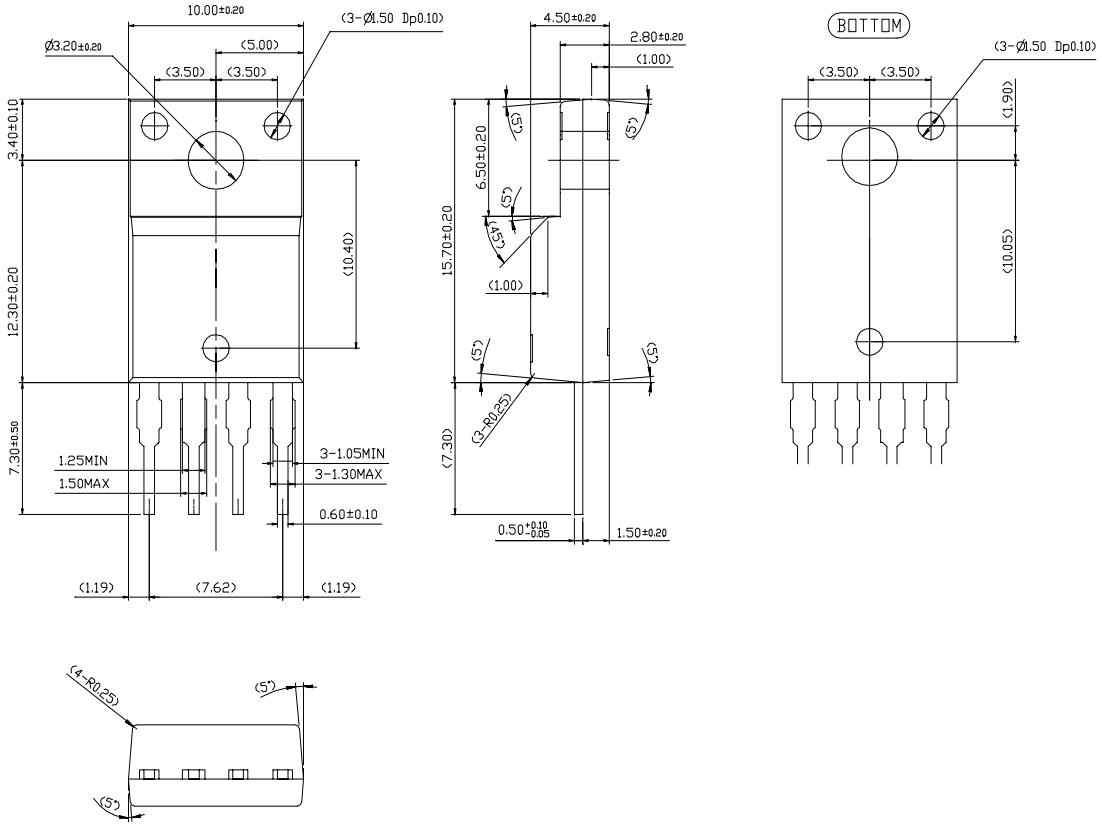


## Mechanical Dimensions (Continued)

### Package

**Dimensions in millimeters**

# TO-220F-4L(Short Lead)



## Ordering Information

| Product Number | Package | Operating Temperature |
|---|---|---|
| KA78R33CTU | TO-220F-4L | -20°C to +80°C |
| KA78R05CTU | | |
| KA78R08CTU | | |
| KA78R09CTU | | |
| KA78R12CTU | | |
| KA78R15CTU | | |
| KA78R33CYDTU | TO-220F-4L(Forming) | |
| KA78R05CYDTU | | |
| KA78R09CYDTU | | |
| KA78R33CTSTU | TO-220F-4L(Short Lead) | |
| KA78R05CTSTU | | |
| KA78R08CTSTU | | |
| KA78R09CTSTU | | |
| KA78R12CTSTU | | |