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KA78RXXC-Series

1A Output Low Dropout Voltage Regulators

Features

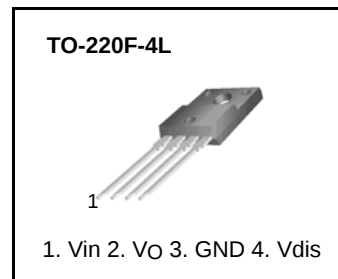
- 1A/3.3V, 5V, 8V, 9V, 12V, 15V output low dropout voltage regulator
- TO-220 full-mold package (4pin)
- Overcurrent protection, thermal shutdown
- Overvoltage protection, short circuit protection
- With output disable function

Description

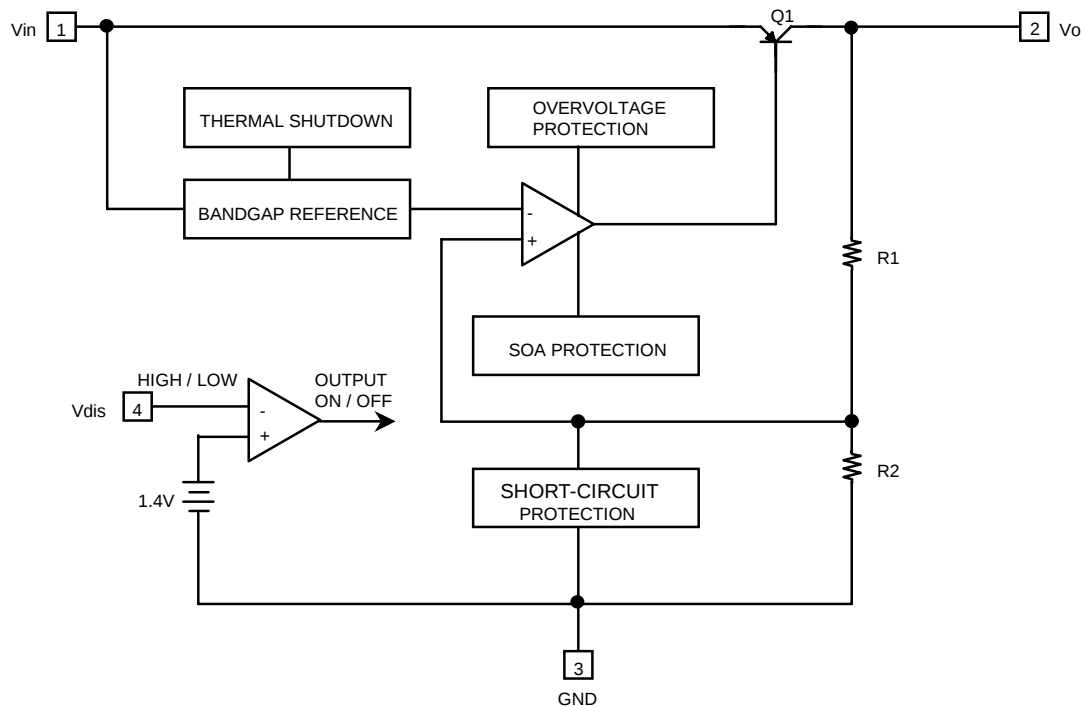
The KA78RXXC is a low-dropout voltage regulator suitable for various electronic equipments.

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.



Internal Block Diagram



Absolute Maximum Ratings

KA78RXXC

Parameter	Symbol	Value	Unit	Remark
Input voltage	V _{in}	35	V	-
Disable voltage	V _{dis}	35	V	-
Output current	I _o	1.0	A	-
Power dissipation 1	P _{d1}	1.5	W	No heatsink
Power dissipation 2	P _{d2}	15	W	With heatsink
Junction temperature	T _j	+150	°C	-
Operating temperature	T _{opr}	-20 ~ +80	°C	-
Thermal resistance, junction-to case (Note2)	R _{θjc}	4.31	°C/W	-
Thermal resistance, junction-to-air (Note2)	R _{θja}	48.83	°C/W	-

Electrical Characteristics

(V_{in} = Note3, I_o = 0.5A, T_a = 25°C, unless otherwise specified)

Parameter		Symbol	Conditions	Min.	Typ.	Max.	Unit
Output voltage	KA78R33C	V_o	-	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		R_{load}	$5mA < I_o < 1A$	-	0.1	2.0	%
Line regulation		R_{line}	Note4	-	0.5	2.5	%
Ripple rejection ratio		RR	Note1	45	55	-	dB
Dropout voltage		V_{drop}	$I_o = 1A$	-	-	0.5	V
Disable voltage high		V_{disH}	Output active	2.0	-	-	V
Disable voltage low		V_{disL}	Output disabled	-	-	0.8	V
Disable bias current high		I_{disH}	$V_{dis} = 2.7V$	-	-	20	μA
Disable bias current low		I_{disL}	$V_{dis} = 0.4V$	-	-	-0.4	mA
Quiescent current		I_q	$I_o = 0A$	-	-	10	mA

Note:

- These parameters, although guaranteed, are not 100% tested in production.
- 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.
- KA78R33C : $V_{in} = 5V$
 KA78R05C : $V_{in} = 7V$
 KA78R08C : $V_{in} = 10V$
 KA78R09C : $V_{in} = 11V$
 KA78R12C : $V_{in} = 15V$
 KA78R15C : $V_{in} = 20V$
- KA78R33C : $V_{in} = 4V$ to $10V$
 KA78R05C : $V_{in} = 6V$ to $12V$
 KA78R08C : $V_{in} = 9V$ to $25V$
 KA78R09C : $V_{in} = 10V$ to $25V$
 KA78R12C : $V_{in} = 13V$ to $29V$
 KA78R15C : $V_{in} = 16V$ to $30V$

Typical Performance Characteristics

KA78R33

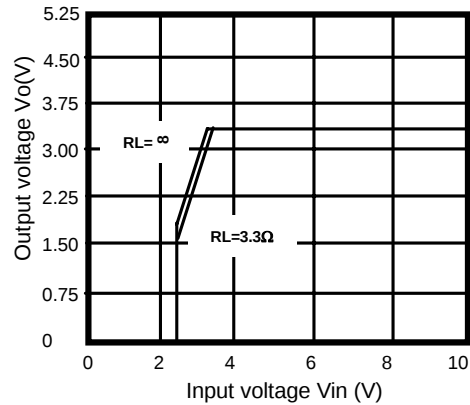


Figure 1. Output Voltage vs. Input Voltage

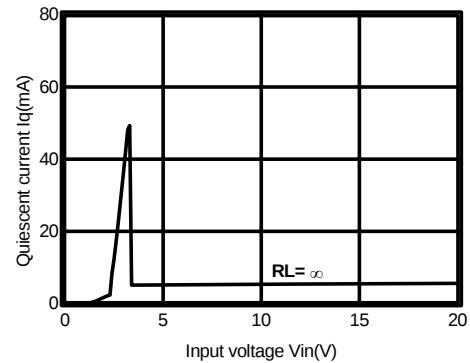


Figure 2. Quiescent Current vs. Input Voltage

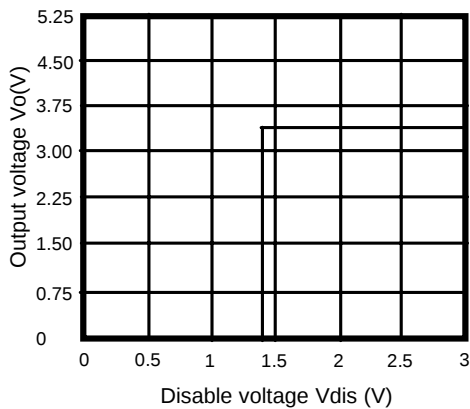


Figure 3. Output Voltage vs. Disable Voltage

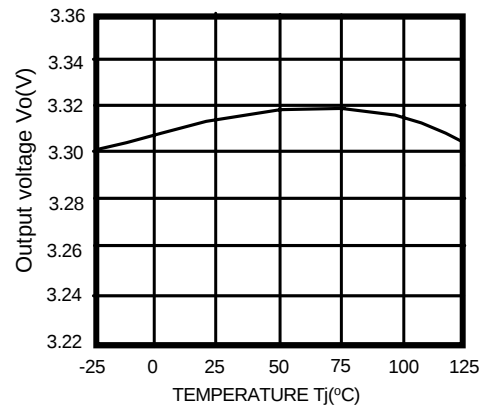


Figure 4. Output Voltage vs. Temperature(T_j)

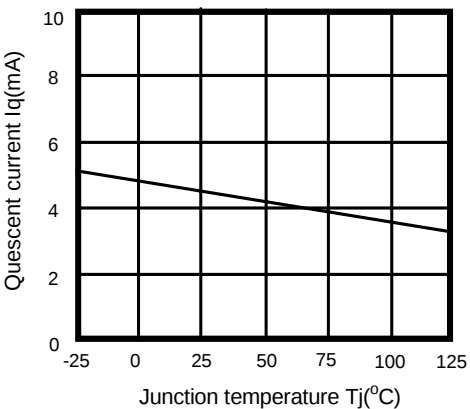


Figure 5. Quiescent Current vs. Temperature(T_j)

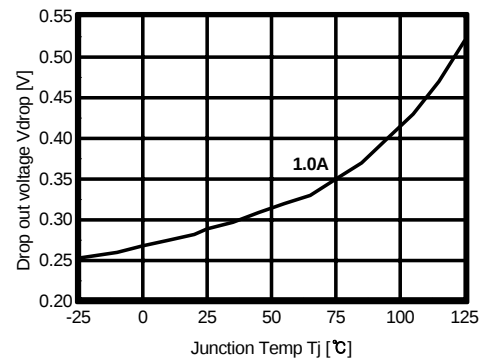
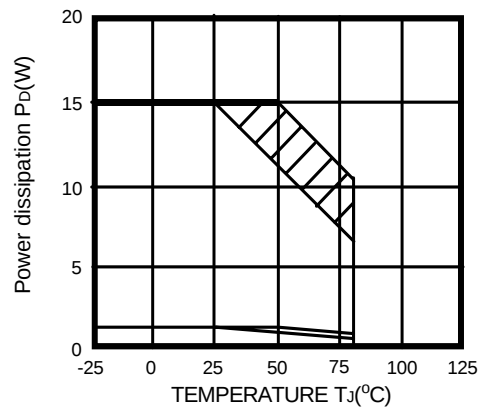
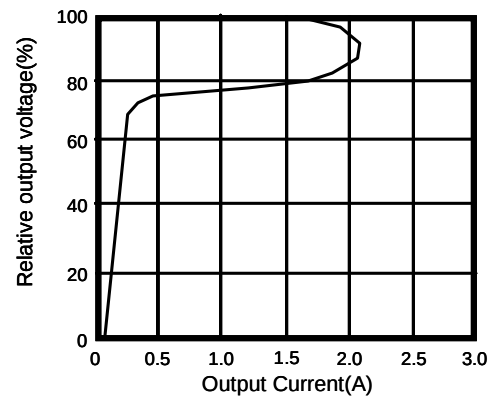
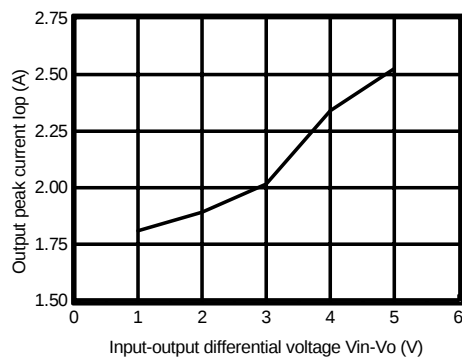


Figure 6. Dropout Voltage vs. Junction Temperature

Typical Performance Characteristics (Continued)**Figure 7. Power Dissipation vs. Temperature(T_j)****Figure 8. Overcurrent Protection Characteristics (Typical Value)****Figure 9. Output Peak Current vs. Input-Output Differential Voltage**

Typical Performance Characteristics

KA78R05C

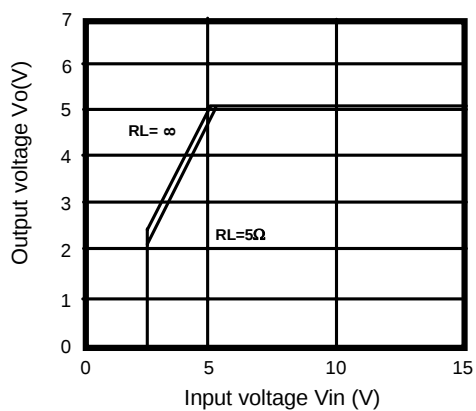


Figure 1. Output Voltage vs. Input Voltage

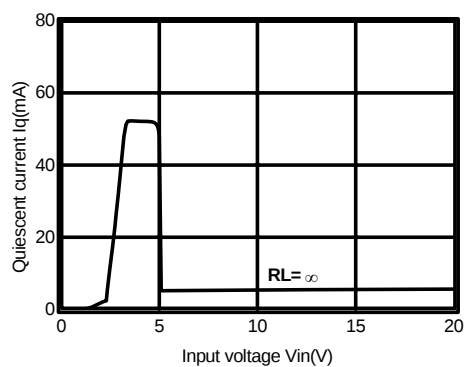


Figure 2. Quiescent Current vs. Input Voltage

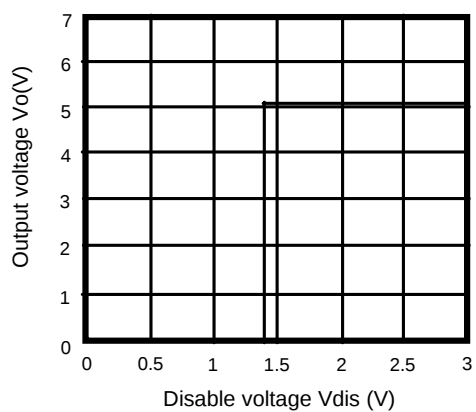


Figure 3. Output Voltage vs. Disable Voltage

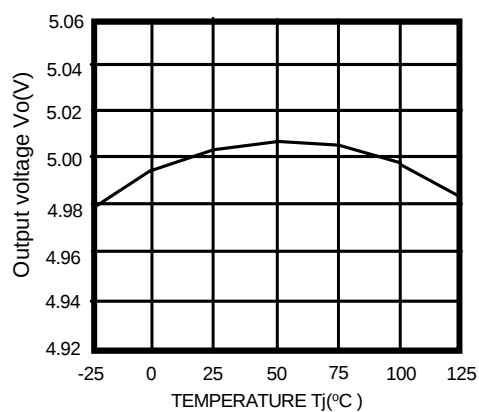


Figure 4. Output Voltage vs. Temperature(T_j)

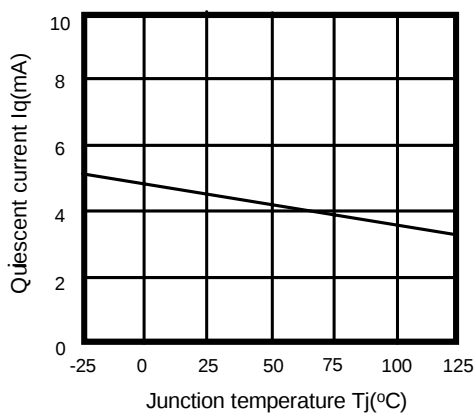


Figure 5. Quiescent Current vs. Temperature(T_j)

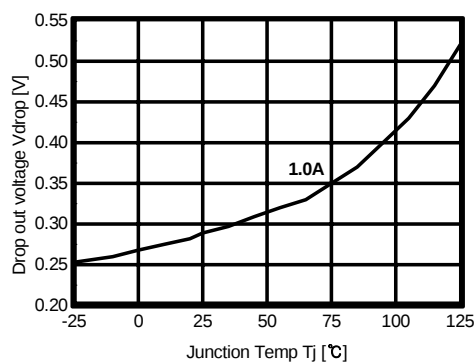
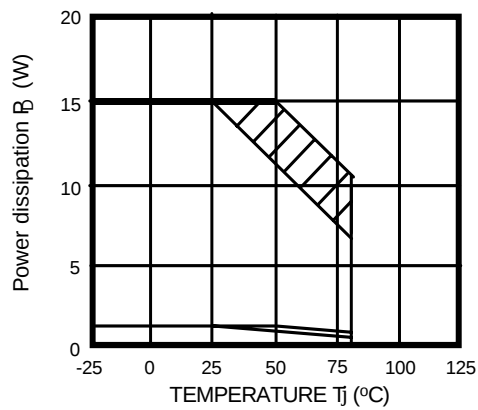
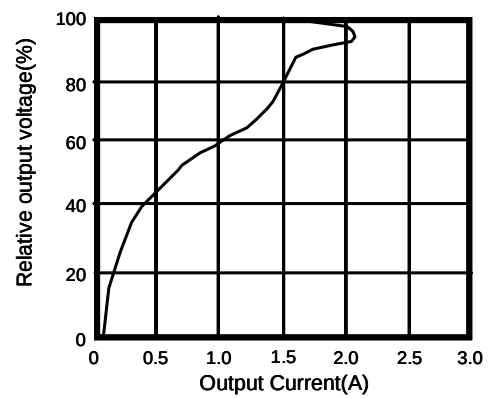
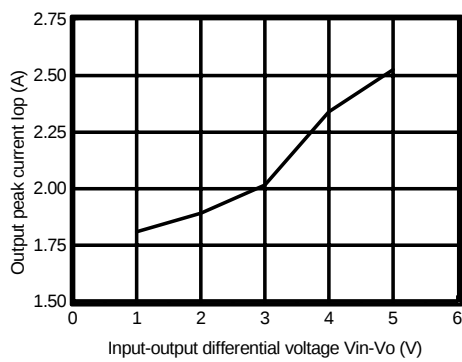


Figure 6. Dropout Voltage vs. Junction Temperature

Typical Performance Characteristics (Continued)**Figure 7. Power Dissipation vs. Temperature(T_j)****Figure 8. Overcurrent Protection Characteristics (Typical Value)****Figure 9. Output Peak Current vs. Input-Output Differential Voltage**

Typical Performance Characteristics (Continued)

KA78R08C

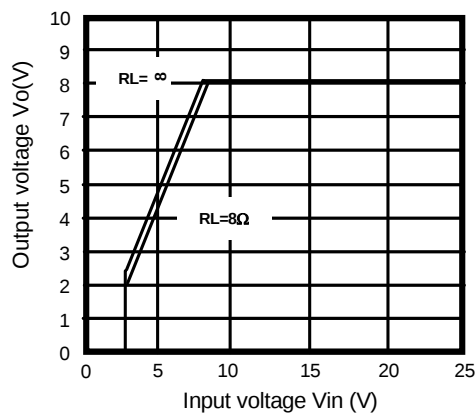


Figure 1. Output Voltage vs. Input Voltage

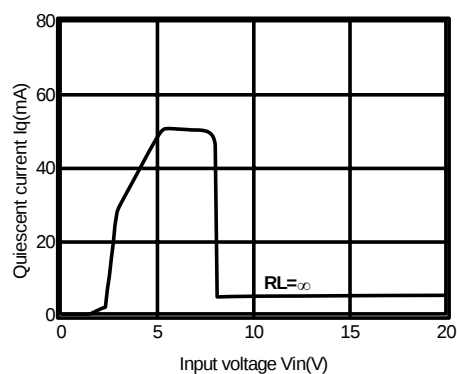


Figure 2. Quiescent Current vs. Input Voltage

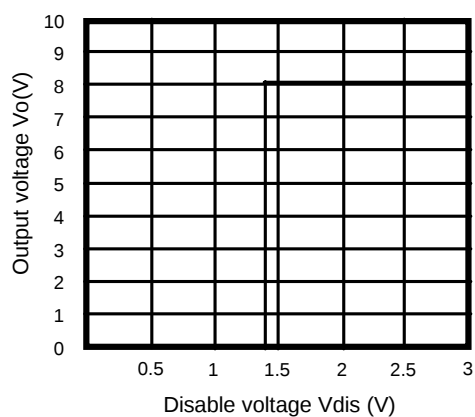


Figure 3. Output Voltage vs. Disable Voltage

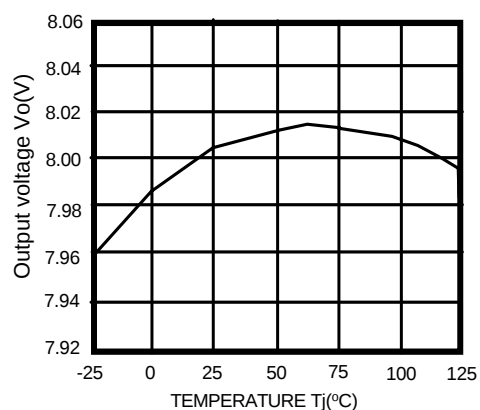


Figure 4. Output Voltage vs. Temperature(Tj)

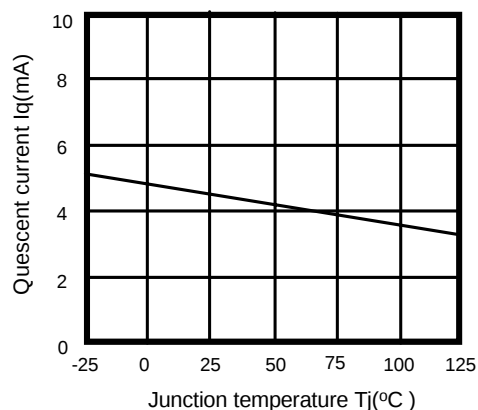


Figure 5. Quiescent Current vs. Temperature(Tj)

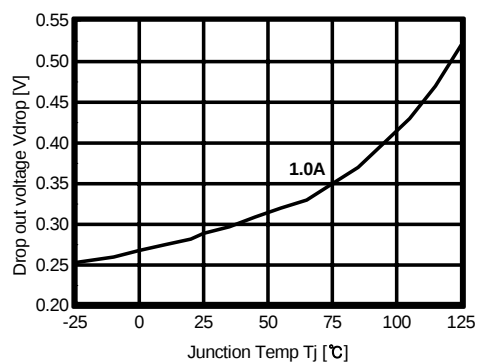


Figure 6. Dropout Voltage vs. Junction Temperature

Typical Performance Characteristics (Continued)

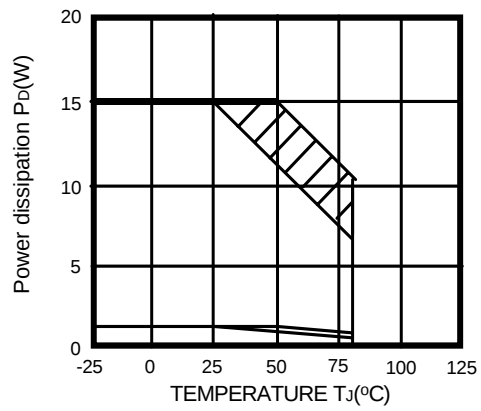


Figure 7. Power Dissipation vs. Temperature(T_j)

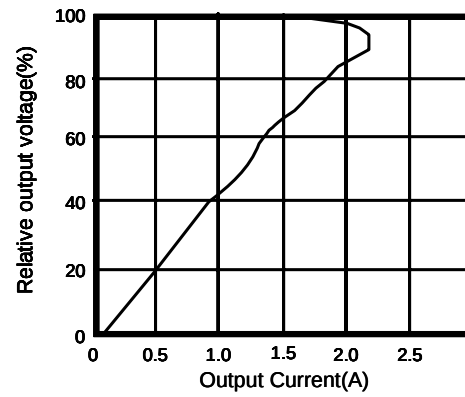


Figure 8. Overcurrent Protection Characteristics (Typical Value)

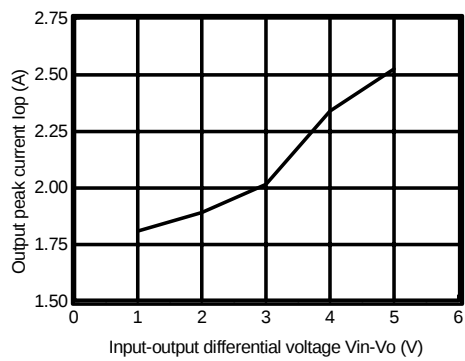


Figure 9. Output Peak Current vs. Input-Output Differential Voltage

Typical Performance Characteristics (Continued)

KA78R09C

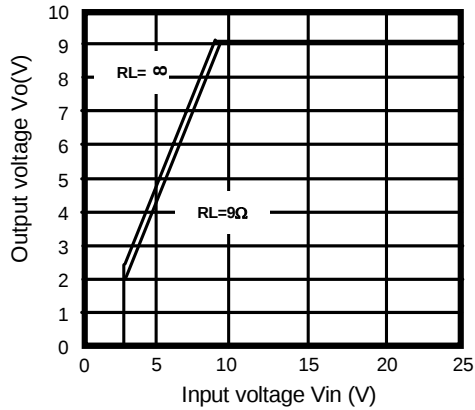


Figure 1. Output Voltage vs. Input Voltage

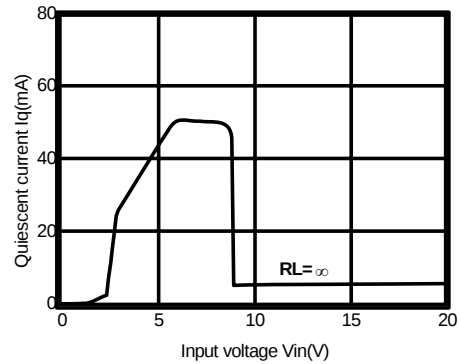


Figure 2. Quiescent Current vs. Input Voltage

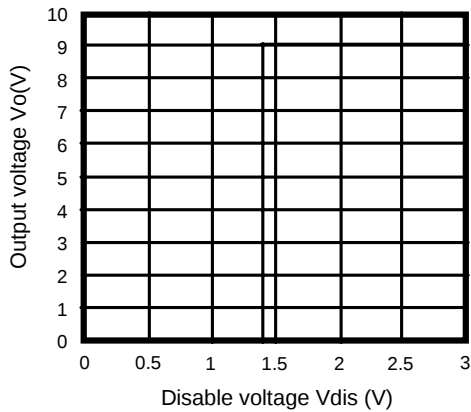


Figure 3. Output Voltage vs. Disable Voltage

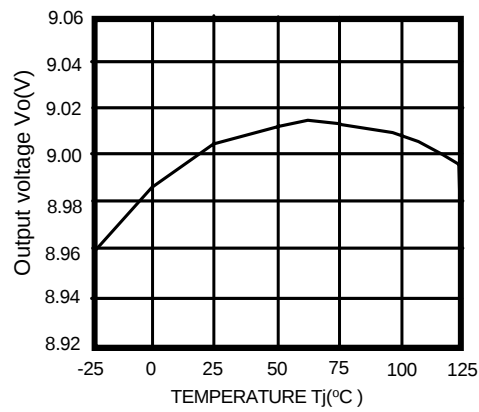


Figure 4. Output Voltage vs. Temperature(T_j)

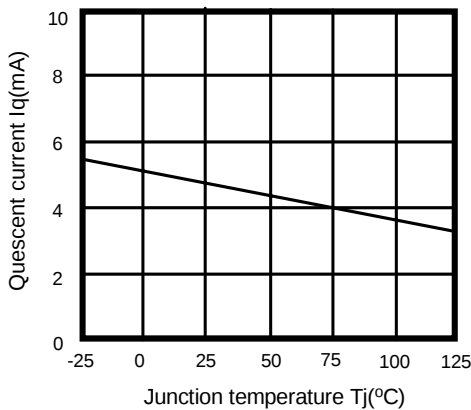


Figure 5. Quiescent Current vs. Temperature(T_j)

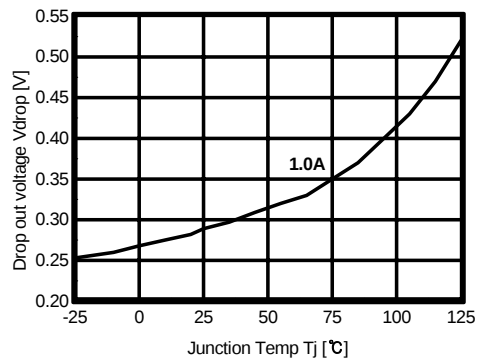


Figure 6. Dropout Voltage vs. Junction Temperature

Typical Performance Characteristics (Continued)

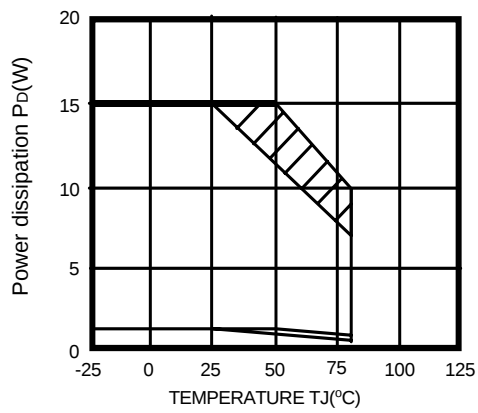


Figure 7. Power Dissipation vs. Temperature(T_j)

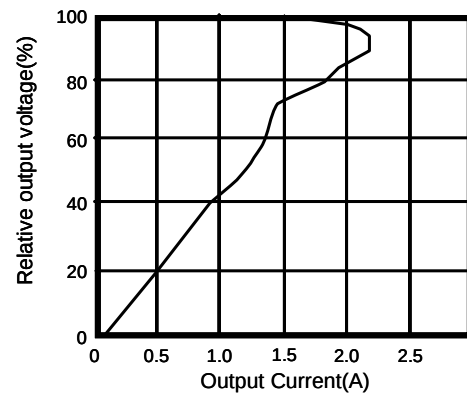


Figure 8. Overcurrent Protection Characteristics (Typical Value)

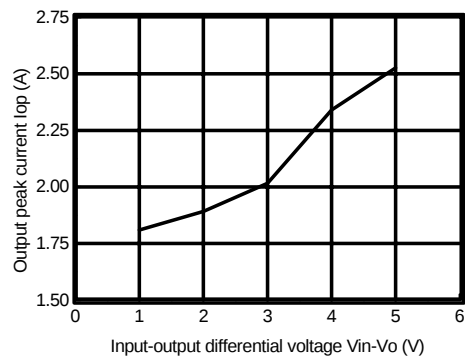


Figure 9. Output Peak Current vs. Input-Output Differential Voltage

Typical Performance Characteristics (Continued)

KA78R12C

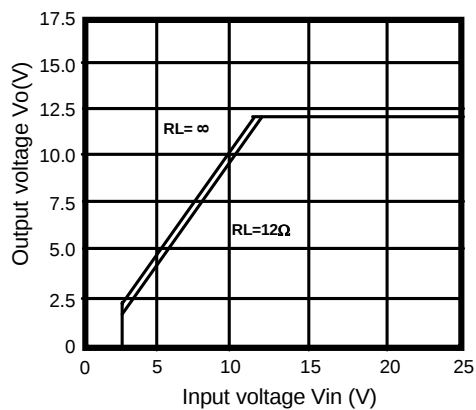


Figure 1. Output Voltage vs. Input Voltage

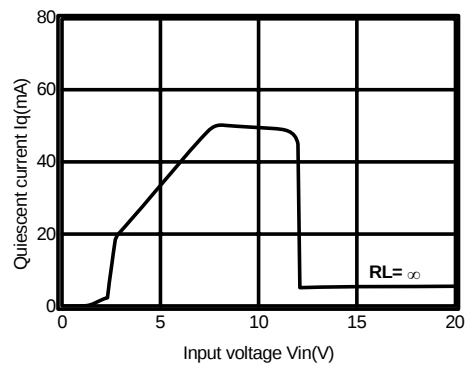


Figure 2. Quiescent Current vs. Input Voltage

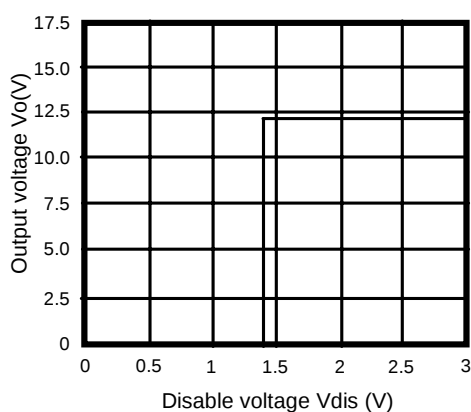


Figure 3. Output Voltage vs. Disable Voltage

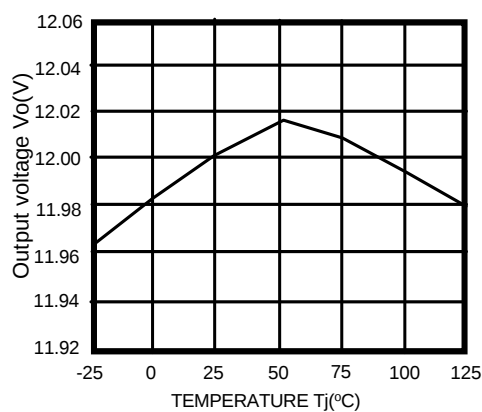


Figure 4. Output Voltage vs. Temperature(Tj)

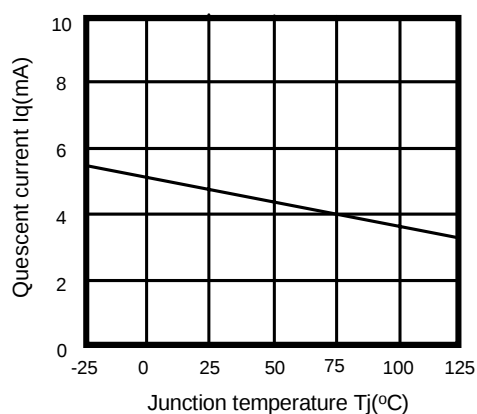


Figure 5. Quiescent Current vs. Temperature(Tj)

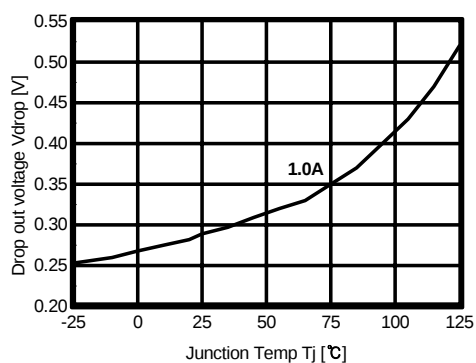


Figure 6. Dropout Voltage vs. Junction Temperature

Typical Performance Characteristics (Continued)

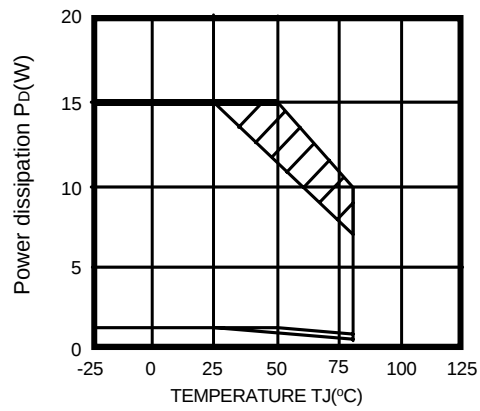


Figure 7. Power Dissipation vs. Temperature(T_j)

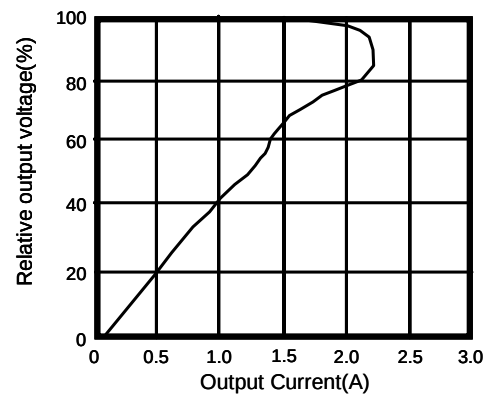


Figure 8. Overcurrent Protection Characteristics (Typical Value)

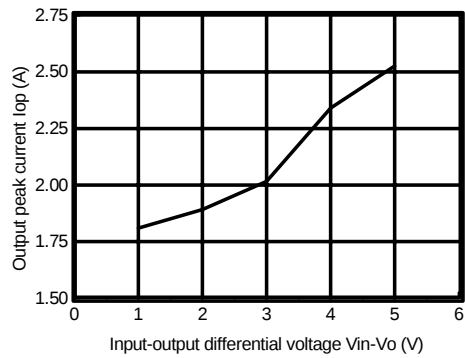


Figure 9. Output Peak Current vs. Input-Output Differential Voltage

Typical Performance Characteristics (Continued)

KA78R15C

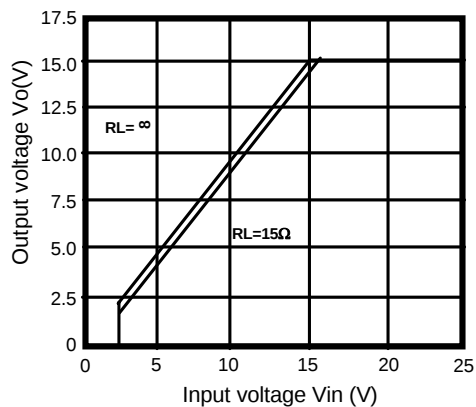


Figure 1. Output Voltage vs. Input Voltage

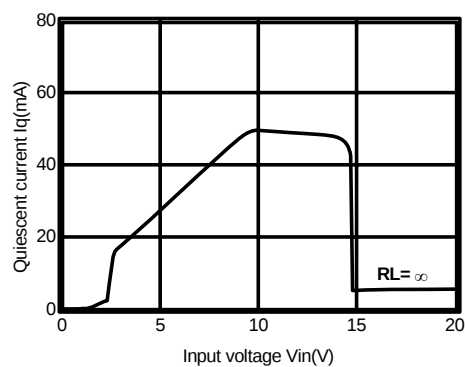


Figure 2. Quiescent Current vs. Input Voltage

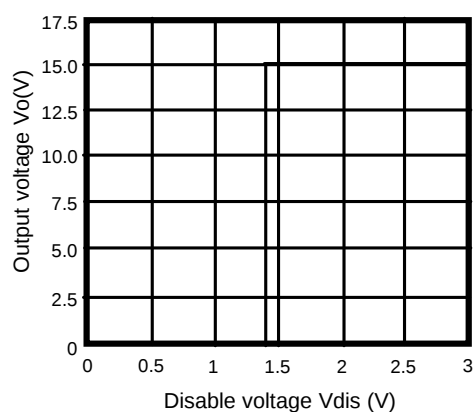


Figure 3. Output Voltage vs. Disable Voltage

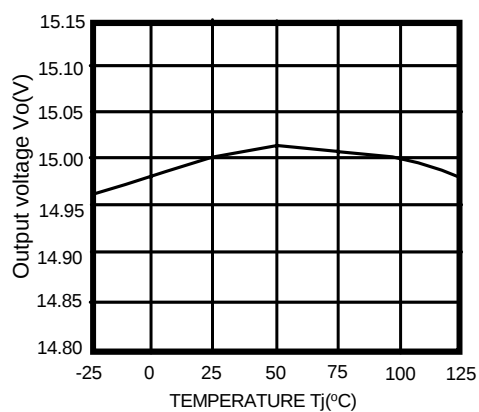


Figure 4. Output Voltage vs. Temperature(T_j)

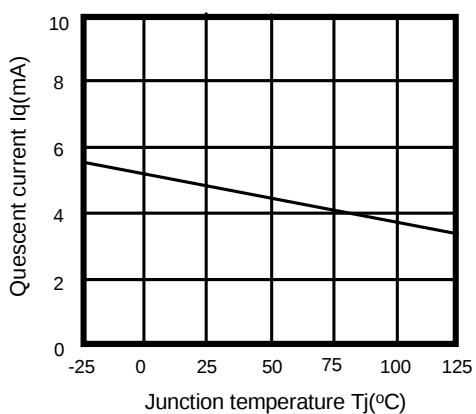


Figure 5. Quiescent Current vs. Temperature(T_j)

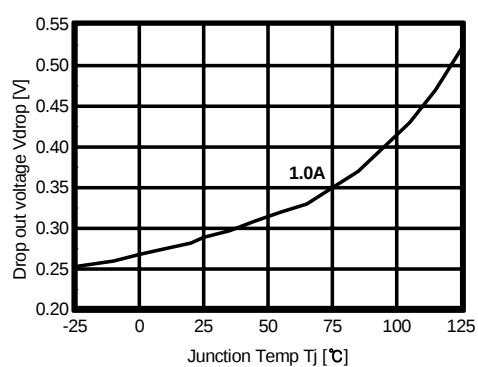


Figure 6. Dropout Voltage vs. Junction Temperature

Typical Performance Characteristics (Continued)

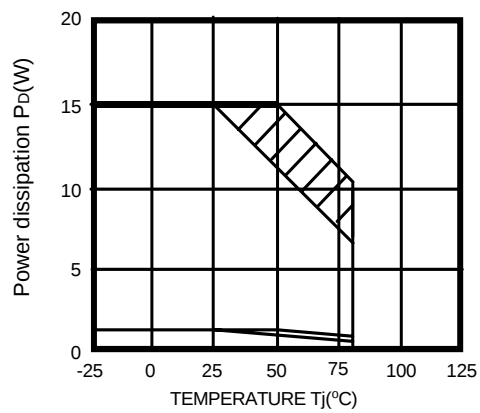


Figure 7. Power Dissipation vs. Temperature(T_j)

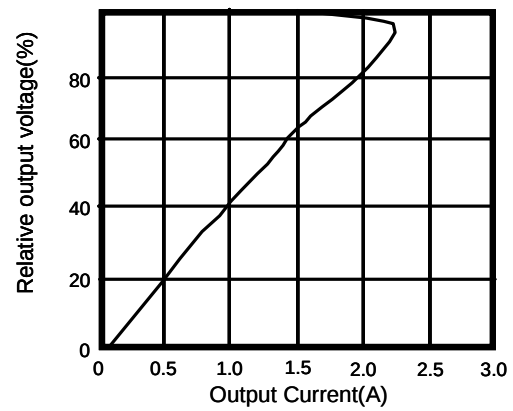


Figure 8. Overcurrent Protection Characteristics (Typical Value)

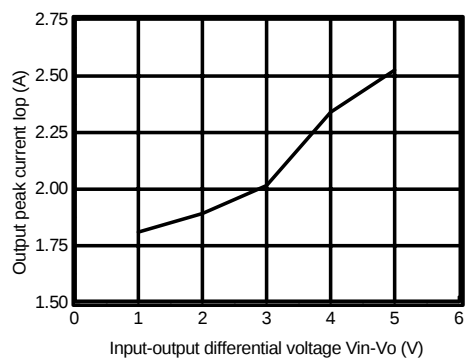


Figure 9. Output Peak Current vs. Input-Output Differential Voltage

Typical Application

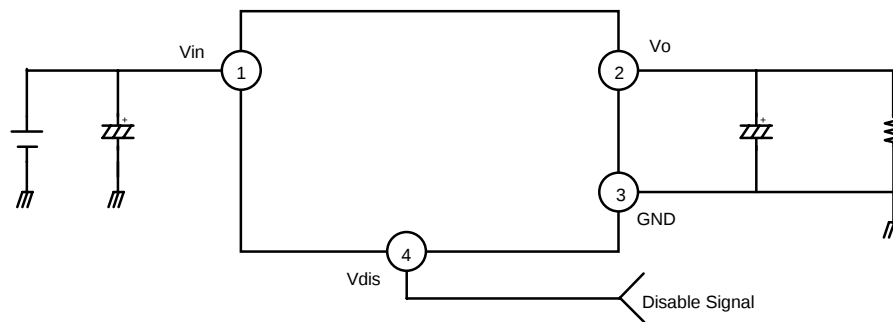


Figure 1. Application Circuit

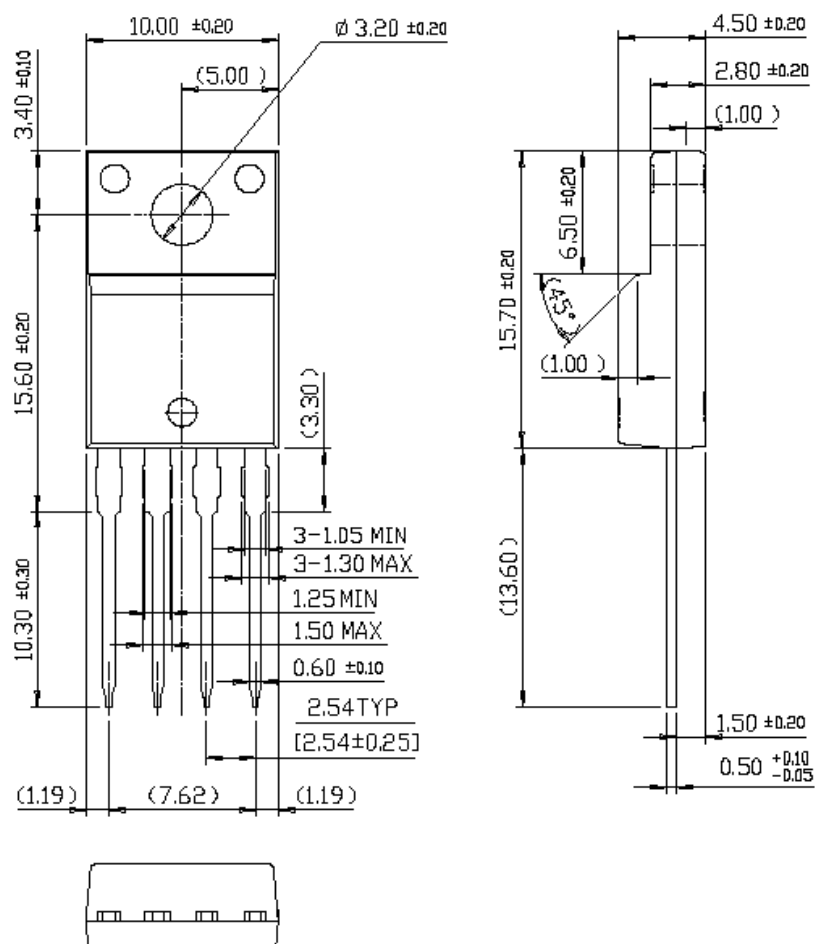
- C_i is required if regulator is located at an appreciable distance from power supply filter.
- C_o improves stability and transient response. ($C_o > 47\mu\text{F}$)

Mechanical Dimensions

Package

Dimensions in millimeters

TO-220F-4L



Ordering Information

Product Number	Package	Operating Temperature
KA78R33CTU	TO-220F-4L	-20°C to +80°C
KA78R05CTU		
KA78R08CTU		
KA78R09CTU		
KA78R12CTU		
KA78R15CTU		

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