

4, 5 TERMINAL LOW DROP VOLTAGE REGULATOR

[Low Quiescent Current-Type]

The KIA78R $\times \times \times$ ZF/ZPI Series are Low Dropout Voltage Regulator suitable for various electronic equipments. The Regulator has multi function such as over current protection, overheat protection.

FEATURES

- 1.0A Output Low Drop Voltage Regulator.
- Built in ON/OFF Control Terminal. (Active High)
- Built in Over Current Protection, Over Heat Protection Function.
- ASO Protection Function.
- Low Quiescent Current (Output OFF mode) : 0.1 μ A(Typ.)
- Adjustable Outut Voltage Type : $V_{OUT} = 1.5 \sim 14V$
- Low Voltage Operation : $V_{opr(min.)} = 2.35V$

LINE UP

ITEM	OUTPUT VOLTAGE (V)	PACKAGE
KIA78R000ZF/ZPI	Adjustable ($V_{rf} = 1.25V$)	ZF : DPAK-5 ZPI : TO-220IS-4
KIA78R015ZF/ZPI	1.5	
KIA78R018ZF/ZPI	1.8	
KIA78R020ZF/ZPI	2.0	
KIA78R025ZF/ZPI	2.5	
KIA78R030ZF/ZPI	3.0	
KIA78R033ZF/ZPI	3.3	
KIA78R050ZF/ZPI	5.0	

MAXIMUM RATINGS ($T_a = 25^\circ C$)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Input Voltage		V_{IN}	15	V
ON/OFF Control Voltage		V_C	15	V
Output Adjustment Terminal Voltage		V_{ADJ}	10	V
Output Current		I_{OUT}	1	A
Power Dissipation -1 (No heatsink)	ZF	P_{D1}	1.3	W
	ZPI		1.5	
Power Dissipation -2 (Infinite heatsink)	ZF	P_{D2}	13	W
	ZPI		15	
Junction Temperature		T_j	150	$^\circ C$
Operating Junction Temperature		T_{opr}	-40 ~ 125	$^\circ C$
Storage Temperature		T_{stg}	-55 ~ 150	$^\circ C$

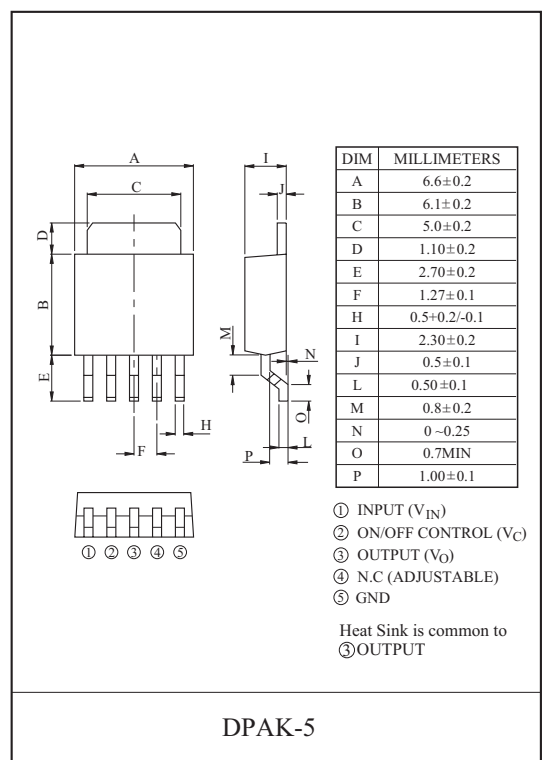
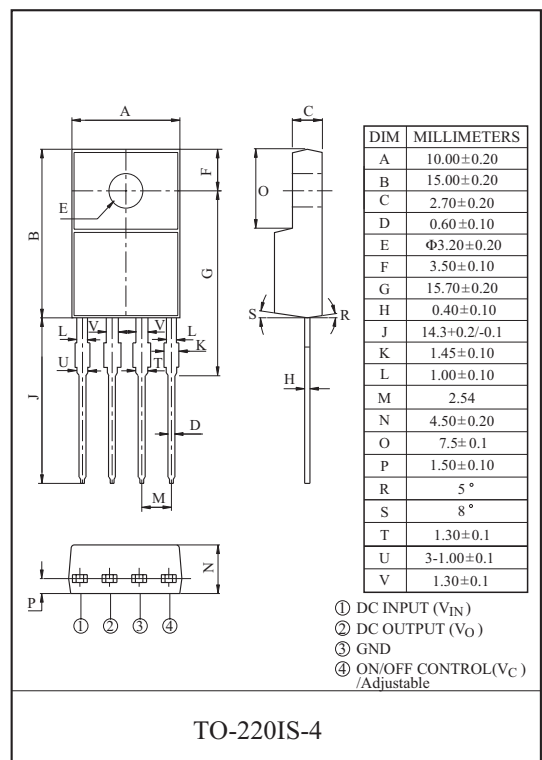
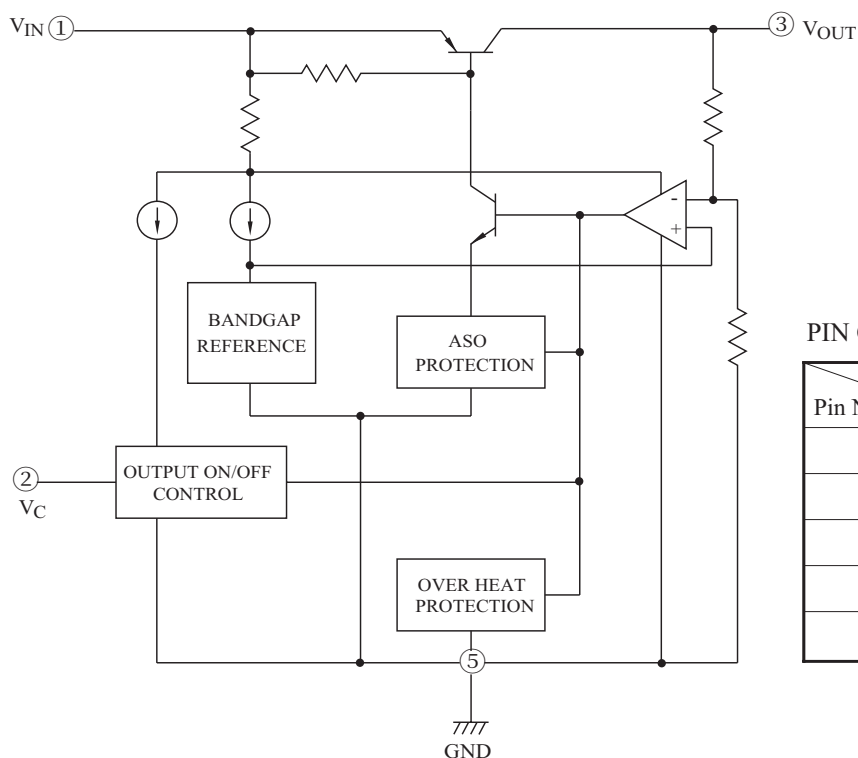


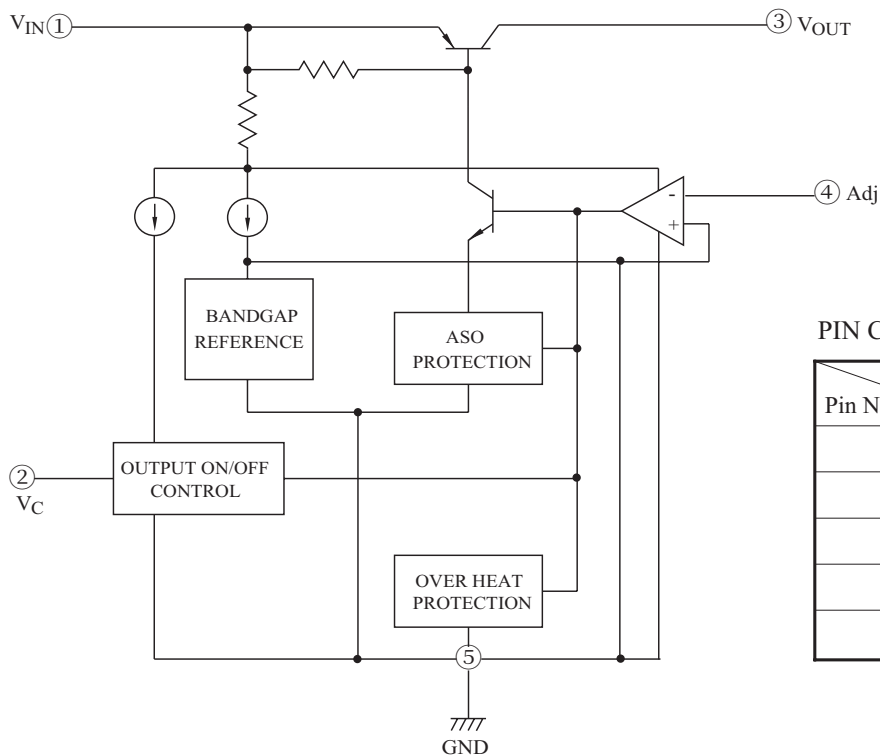
Fig.1 BLOCK DIAGRAM -1(Fixed - Type)



PIN CONNECTION

Pin No. \ Item	KIA78R***ZPI (TO-220IS-4)	KIA78R***ZF (DPAK-5)
1	V_{IN}	V_{IN}
2	V_{OUT}	V_C
3	GND	V_{OUT}
4	V_C	NC
5	-	GND

Fig.2 BLOCK DIAGRAM -2(Adjustable - Type)



PIN CONNECTION

Pin No. \ Item	KIA78R000ZPI (TO-220IS-4)	KIA78R000ZF (DPAK-5)
1	V_{IN}	V_{IN}
2	V_{OUT}	V_C
3	GND	V_{OUT}
4	Adj	Adj
5	-	GND

ELECTRICAL CHARACTERISTICS (KIA78R000ZF/ZPI)

(Unless otherwise specified, $V_{IN}=3.5V$, $V_O=2.5V$, $I_O=0.5A$, $R_1,R_2=1k\Omega$, $T_j=25^\circ C$)

CHARACTERISTIC	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Input Voltage	V_{IN}	-	2.35	-	15	V
Output Voltage	V_{OUT}	-	1.5	-	14	V
Reference Voltage	V_{REF}	$V_{IN}=2.5V$, $I_{OUT}=0.5A$	1.22	1.25	1.28	V
Load Regulation	Reg Load	$I_O=5mA$ 1A	-	0.2	2.0	%
Line Regulation	Reg Line	$V_{IN}=3.5V\sim 8.5V$, $I_O=5mA$	-	0.2	1.0	%
Temperature Coefficient of Output Voltage	$T_C V_O$	$T_j=0\sim 125^\circ C$, $I_O=5mA$	-	± 1.0	± 2.0	%
Ripple Rejection	$R \cdot R$	$I_{OUT}=0.3A$, $f=120Hz$, $V_{ripple}=0.5V_{rms}$, $V_{IN}=4V$	45	60	-	dB
Output ON state for control Voltage	$V_{C(ON)}$	-	2.0	-	-	V
Output ON state for control Current	$I_{C(ON)}$	$V_C=2.7V$	-	-	200	μA
Output OFF state for control Voltage	$V_{C(OFF)}$	$I_O=0$	-	-	0.8	V
Output OFF state for control Current	$I_{C(OFF)}$	$V_C=0.4V$	-	-	2.0	μA
Quiescent Current	I_Q	$I_O=0$	-	1	2	mA
Quiescent Current (OFF Mode)	$I_{Q(OFF)}$	$V_C=0.4V$	-	0.1	5	μA

ELECTRICAL CHARACTERISTICS (KIA78R015ZF/ZPI)

(Unless otherwise specified, $V_{IN}=V_O+1V$, $I_O=0.5A$, $T_a=25^\circ C$)

CHARACTERISTIC	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Input Voltage	V_{IN}	-	2.35	-	15	V
Output Voltage	V_O	-	1.45	1.50	1.55	V
Load Regulation	Reg Load	$I_O=5mA$ 1A	-	0.2	2.0	%
Line Regulation	Reg Line	$V_{IN}=2.5V\sim 6.5V$, $I_O=5mA$	-	0.2	1.0	%
Temperature Coefficient of Output Voltage	$T_C V_O$	$T_j=0\sim 125^\circ C$, $I_O=5mA$	-	± 0.02	± 0.05	%/ $^\circ C$
Ripple Rejection	$R \cdot R$	$I_{OUT}=0.3A$, $f=120Hz$, $V_{ripple}=0.5V_{rms}$	45	60	-	dB
Output ON state for control Voltage	$V_{C(ON)}$	-	2.0	-	-	V
Output ON state for control Current	$I_{C(ON)}$	$V_C=2.7V$	-	-	200	μA
Output OFF state for control Voltage	$V_{C(OFF)}$	-	-	-	0.8	V
Output OFF state for control Current	$I_{C(OFF)}$	$V_C=0.4V$	-	-	2.0	μA
Quiescent Current	I_Q	$I_O=0A$	-	1	2	mA
Quiescent Current (OFF Mode)	$I_{Q(OFF)}$	$V_C=0.4V$, $I_O=0A$	-	0.1	5	μA

ELECTRICAL CHARACTERISTICS (KIA78R018ZF/ZPI)

(Unless otherwise specified, $V_{IN}=V_O+1V$, $I_O=0.5A$, $T_a=25^{\circ}C$)

CHARACTERISTIC	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Input Voltage	V_{IN}	-	2.45	-	15	V
Output Voltage	V_O	-	1.75	1.8	1.85	V
Load Regulation	Reg Load	$I_O=5mA$ 1A	-	0.2	2.0	%
Line Regulation	Reg Line	$V_{IN}=2.5V\sim 7V$, $I_O=5mA$	-	0.2	1.0	%
Temperature Coefficient of Output Voltage	$T_C V_O$	$T_j=0\sim 125^{\circ}C$, $I_O=5mA$	-	± 0.02	± 0.05	%/ $^{\circ}C$
Ripple Rejection	$R \cdot R$	$I_{OUT}=0.3A$, $f=120Hz$, $V_{ripple}=0.5V_{rms}$	45	60	-	dB
Output ON state for control Voltage	$V_{C(ON)}$	-	2.0	-	-	V
Output ON state for control Current	$I_{C(ON)}$	$V_C=2.7V$	-	-	200	μA
Output OFF state for control Voltage	$V_{C(OFF)}$	-	-	-	0.8	V
Output OFF state for control Current	$I_{C(OFF)}$	$V_C=0.4V$	-	-	2.0	μA
Quiescent Current	I_Q	$I_O=0A$	-	1	2	mA
Quiescent Current (OFF Mode)	$I_{Q(OFF)}$	$V_C=0.4V$, $I_O=0A$	-	0.1	5	μA

ELECTRICAL CHARACTERISTICS (KIA78R020ZF/ZPI)

(Unless otherwise specified, $V_{IN}=V_O+1V$, $I_O=0.5A$, $T_a=25^{\circ}C$)

CHARACTERISTIC	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_O	-	1.944	2.0	2.056	V
Load Regulation	Reg Load	$I_O=5mA$ 1A	-	0.2	2.0	%
Line Regulation	Reg Line	$V_{IN}=3V\sim 8V$, $I_O=5mA$	-	0.2	1.0	%
Temperature Coefficient of Output Voltage	$T_C V_O$	$T_j=0\sim 125^{\circ}C$, $I_O=5mA$	-	± 0.02	± 0.05	%/ $^{\circ}C$
Ripple Rejection	$R \cdot R$	$I_{OUT}=0.3A$, $f=120Hz$, $V_{ripple}=0.5V_{rms}$	45	60	-	dB
Dropout Voltage	V_D	$I_O=1A$, $V_{IN}=0.95V_{OUT}$	-	-	0.5	V
Output ON state for control Voltage	$V_{C(ON)}$	-	2.0	-	-	V
Output ON state for control Current	$I_{C(ON)}$	$V_C=2.7V$	-	-	200	μA
Output OFF state for control Voltage	$V_{C(OFF)}$	-	-	-	0.8	V
Output OFF state for control Current	$I_{C(OFF)}$	$V_C=0.4V$	-	-	2.0	μA
Quiescent Current	I_Q	$I_O=0A$	-	1	2	mA
Quiescent Current (OFF Mode)	$I_{Q(OFF)}$	$V_C=0.4V$, $I_O=0A$	-	0.1	5	μA

ELECTRICAL CHARACTERISTICS (KIA78R025ZF/ZPI)

(Unless otherwise specified, $V_{IN}=V_O+1V$, $I_O=0.5A$, $T_a=25^{\circ}C$)

CHARACTERISTIC	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_O	-	2.438	2.50	2.562	V
Load Regulation	Reg Load	$I_O=5mA$ 2.0A	-	0.2	2.0	%
Line Regulation	Reg Line	$V_{IN}=3.5V\sim 8.5V$, $I_O=5mA$	-	0.2	1.0	%
Temperature Coefficient of Output Voltage	$T_C V_O$	$T_j=0$ 125 $^{\circ}C$, $I_O=5mA$	-	± 0.02	± 0.05	%/ $^{\circ}C$
Ripple Rejection	$R \cdot R$	$I_{OUT}=0.3A$, $f=120Hz$, $V_{ripple}=0.5V_{rms}$	45	60	-	dB
Dropout Voltage	V_D	$I_O=1A$, $V_{IN}=0.95V_{OUT}$	-	-	0.5	V
Output ON state for control Voltage	$V_{C(ON)}$	-	2.0	-	-	V
Output ON state for control Current	$I_{C(ON)}$	$V_C=2.7V$	-	-	200	μA
Output OFF state for control Voltage	$V_{C(OFF)}$	-	-	-	0.8	V
Output OFF state for control Current	$I_{C(OFF)}$	$V_C=0.4V$	-	-	2.0	μA
Quiescent Current	I_Q	$I_O=0A$	-	1	2	mA
Quiescent Current (OFF Mode)	$I_{Q(OFF)}$	$V_C=0.4V$, $I_O=0A$	-	0.1	5	μA

ELECTRICAL CHARACTERISTICS (KIA78R030ZF/ZPI)

(Unless otherwise specified, $V_{IN}=V_O+1V$, $I_O=0.5A$, $T_a=25^{\circ}C$)

CHARACTERISTIC	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_O	-	2.928	3.0	3.072	V
Load Regulation	Reg Load	$I_O=5mA$ 1A	-	0.2	2.0	%
Line Regulation	Reg Line	$V_{IN}=4V\sim 9V$, $I_O=5mA$	-	0.2	1.0	%
Temperature Coefficient of Output Voltage	$T_C V_O$	$T_j=0$ 125 $^{\circ}C$, $I_O=5mA$	-	± 0.02	± 0.05	%/ $^{\circ}C$
Ripple Rejection	$R \cdot R$	$I_{OUT}=0.3A$, $f=120Hz$, $V_{ripple}=0.5V_{rms}$	45	60	-	dB
Dropout Voltage	V_D	$I_O=1A$, $V_{IN}=0.95V_{OUT}$	-	-	0.5	V
Output ON state for control Voltage	$V_{C(ON)}$	-	2.0	-	-	V
Output ON state for control Current	$I_{C(ON)}$	$V_C=2.7V$	-	-	200	μA
Output OFF state for control Voltage	$V_{C(OFF)}$	-	-	-	0.8	V
Output OFF state for control Current	$I_{C(OFF)}$	$V_C=0.4V$	-	-	2.0	μA
Quiescent Current	I_Q	$I_O=0A$	-	1	2	mA
Quiescent Current (OFF Mode)	$I_{Q(OFF)}$	$V_C=0.4V$, $I_O=0A$	-	0.1	5	μA

ELECTRICAL CHARACTERISTICS (KIA78R033ZF/ZPI)(Unless otherwise specified, $V_{IN}=V_O+1V$, $I_O=0.5A$, $T_a=25^{\circ}C$)

CHARACTERISTIC	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_O	-	3.221	3.30	3.379	V
Load Regulation	Reg Load	$I_O=5mA \sim 1A$	-	0.2	2.0	%
Line Regulation	Reg Line	$V_{IN}=4V \sim 9V$, $I_O=5mA$	-	0.2	1.0	%
Temperature Coefficient of Output Voltage	$T_C V_O$	$T_j=0 \sim 125^{\circ}C$, $I_O=5mA$	-	± 0.02	± 0.05	$\%/^{\circ}C$
Ripple Rejection	$R \cdot R$	$I_{OUT}=0.3A$, $f=120Hz$, $V_{ripple}=0.5V_{rms}$	45	60	-	dB
Dropout Voltage	V_D	$I_O=1A$, $V_{IN}=0.95V_{OUT}$	-	-	0.5	V
Output ON state for control Voltage	$V_{C(ON)}$	-	2.0	-	-	V
Output ON state for control Current	$I_{C(ON)}$	$V_C=2.7V$	-	-	200	μA
Output OFF state for control Voltage	$V_{C(OFF)}$	-	-	-	0.8	V
Output OFF state for control Current	$I_{C(OFF)}$	$V_C=0.4V$	-	-	2.0	μA
Quiescent Current	I_Q	$I_O=0A$	-	1	2	mA
Quiescent Current (OFF Mode)	$I_{Q(OFF)}$	$V_C=0.4V$, $I_O=0A$	-	0.1	5	μA

ELECTRICAL CHARACTERISTICS (KIA78R050ZF/ZPI)(Unless otherwise specified, $V_{IN}=V_O+1V$, $I_O=0.5A$, $T_a=25^{\circ}C$)

CHARACTERISTIC	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_O	-	4.88	5.0	5.12	V
Load Regulation	Reg Load	$I_O=5mA \sim 1A$	-	0.2	2.0	%
Line Regulation	Reg Line	$V_{IN}=6V \sim 10V$, $I_O=5mA$	-	0.2	1.0	%
Temperature Coefficient of Output Voltage	$T_C V_O$	$T_j=0 \sim 125^{\circ}C$, $I_O=5mA$	-	± 0.02	± 0.05	$\%/^{\circ}C$
Ripple Rejection	$R \cdot R$	$I_{OUT}=0.3A$, $f=120Hz$, $V_{ripple}=0.5V_{rms}$	45	60	-	dB
Dropout Voltage	V_D	$I_O=1A$, $V_{IN}=0.95V_{OUT}$	-	-	0.5	V
Output ON state for control Voltage	$V_{C(ON)}$	-	2.0	-	-	V
Output ON state for control Current	$I_{C(ON)}$	$V_C=2.7V$	-	-	200	μA
Output OFF state for control Voltage	$V_{C(OFF)}$	-	-	-	0.8	V
Output OFF state for control Current	$I_{C(OFF)}$	$V_C=0.4V$	-	-	2.0	μA
Quiescent Current	I_Q	$I_O=0A$	-	1	2	mA
Quiescent Current (OFF Mode)	$I_{Q(OFF)}$	$V_C=0.4V$, $I_O=0A$	-	0.1	5	μA

Fig. 3 Test Circuit (Fixed-Type)

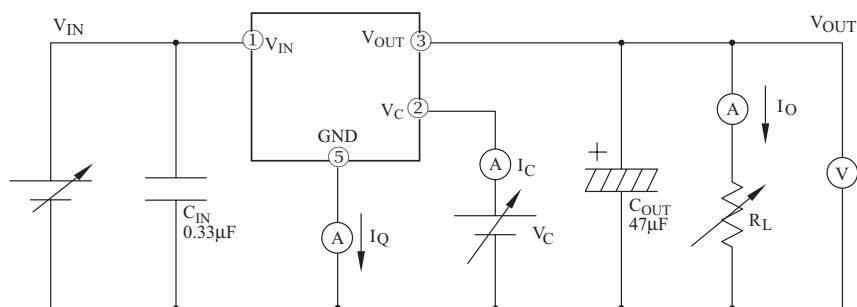
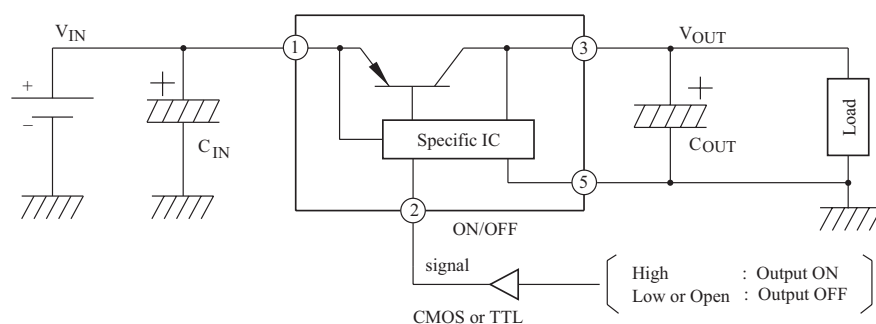


Fig. 4 Application Circuit for Standard (Fixed-Type)



C_{IN} : More than $0.33\mu F$ required if regulator is located an appreciable distance from power supply filter.

You must use to prevent from the parasitic oscillation.

C_{OUT} : More than $47\mu F$. You must use the Low-impedance-type(low ESR) capacitor.

Fig. 5 Test Circuit (Adjustable - Type)

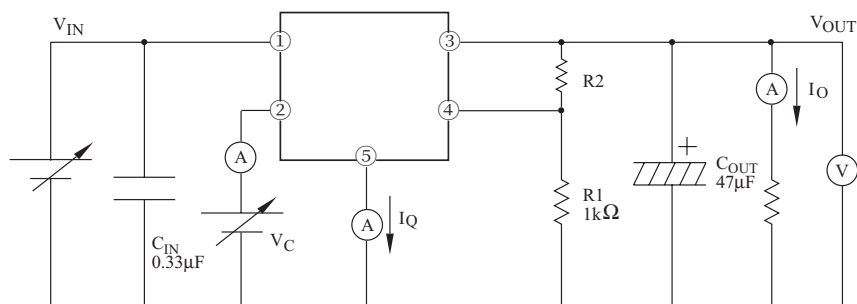
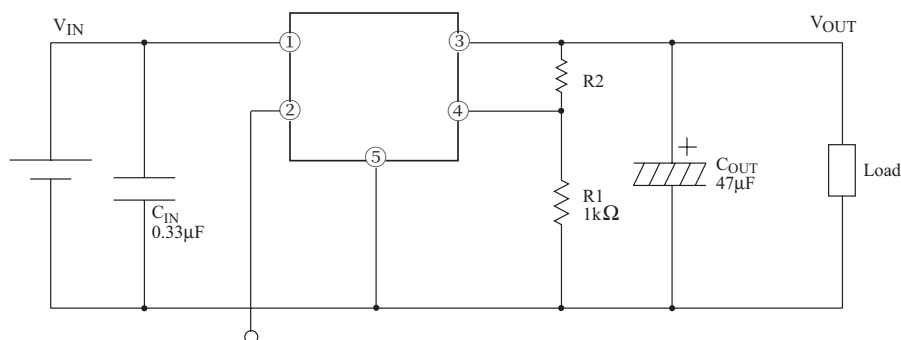


Fig. 6 Application Circuit (Adjustable - Type)



C_{IN} : More than $0.33\mu F$ required if regulator is located an appreciable distance from power supply filter.

You must use to prevent from the parasitic oscillation.

C_{OUT} : More than $47\mu F$. You must use the Low-impedance-type(low ESR) capacitor.

Fig. 7 $I_O - V_O$

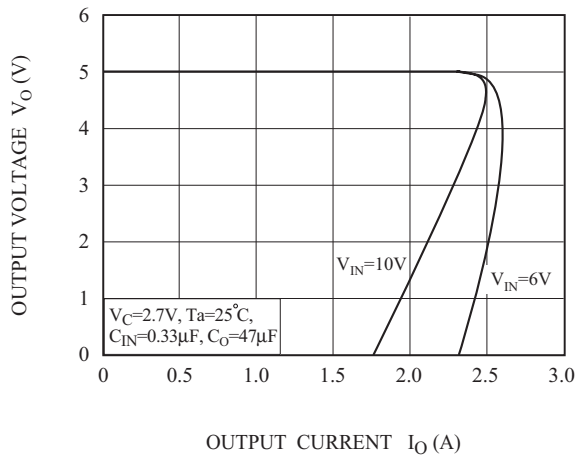


Fig. 8 $T_a - \Delta V_{ref}$

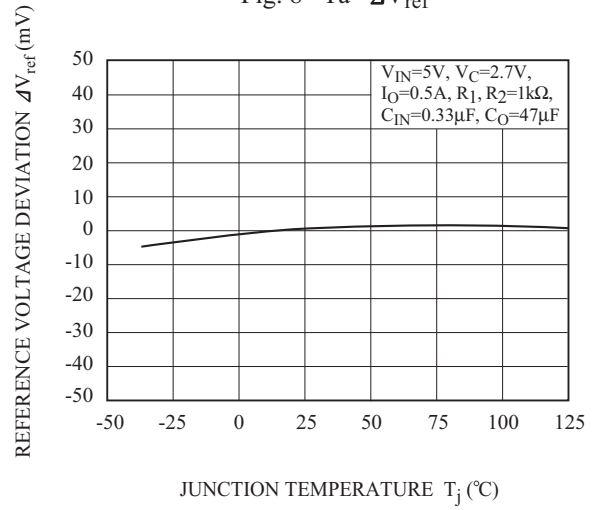


Fig. 9 $V_{IN} - V_O$

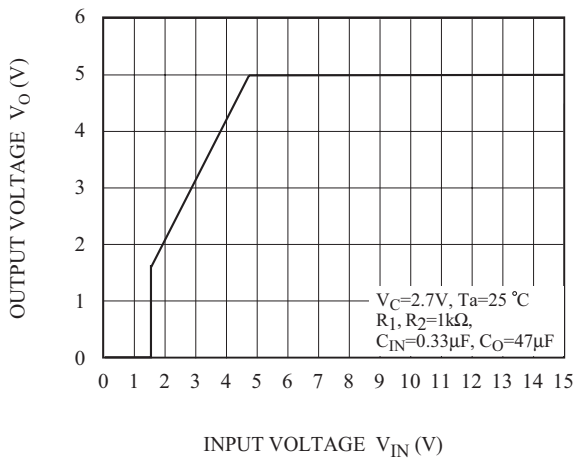


Fig. 10 $V_{IN} - I_{BIAS}$

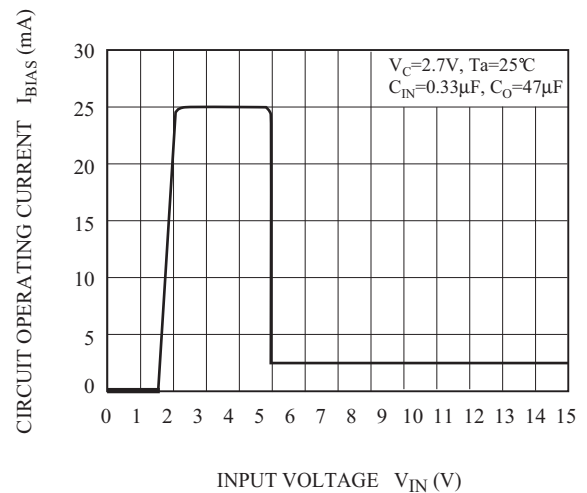


Fig. 11 $T_J - V_D$

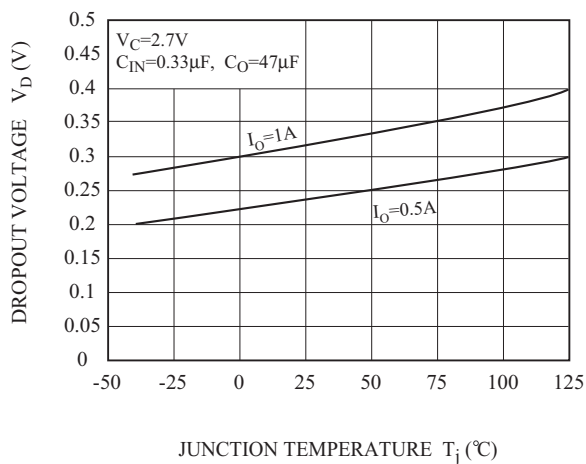


Fig. 12 $T_J - I_Q$

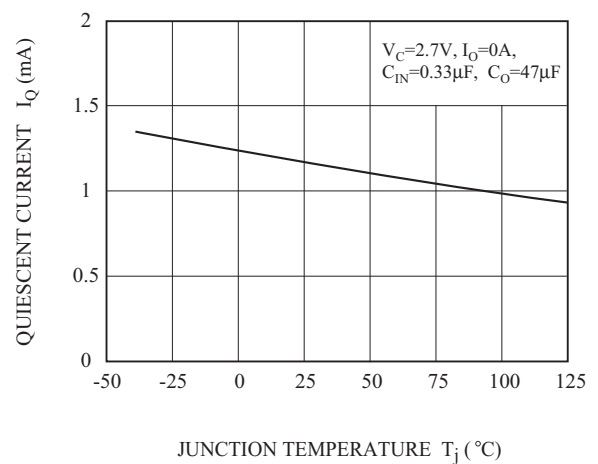


Fig. 13 f_{IN} - R.R

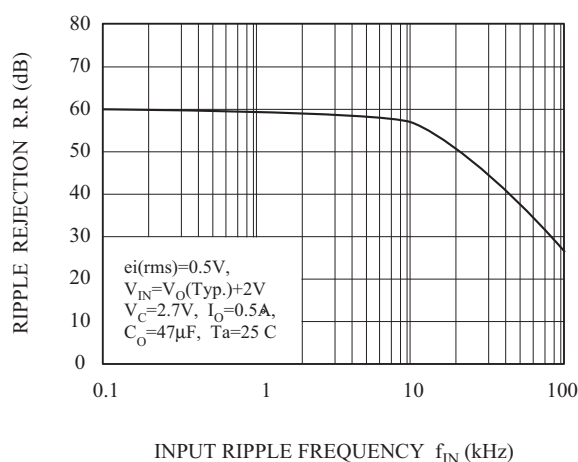


Fig. 14 I_{OUT} - R.R

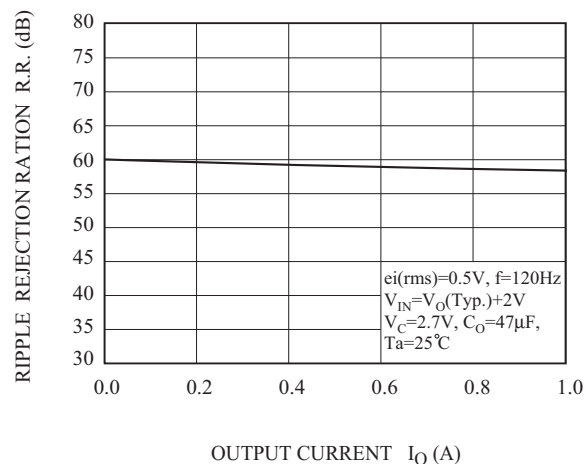


Fig. 15 P_D - T_a (F-Type : DPAK-5)

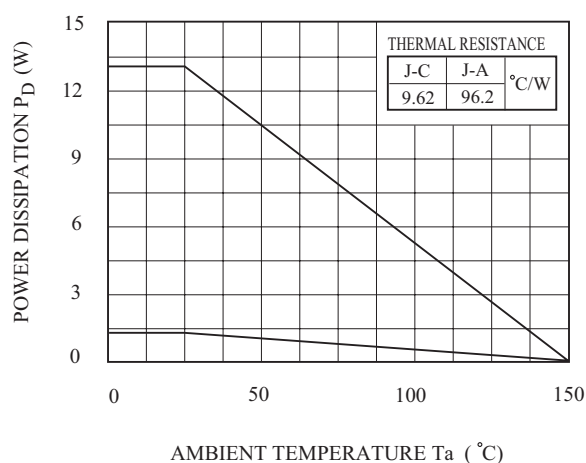


Fig. 16 P_D - T_a (PI-Type : TO-220IS-4)

