

3 TERMINAL LOW DROP VOLTAGE REGULATOR

The KIA78DXXXS/F Series are Low Dropout Voltage Regulator suitable for various electronic equipments.

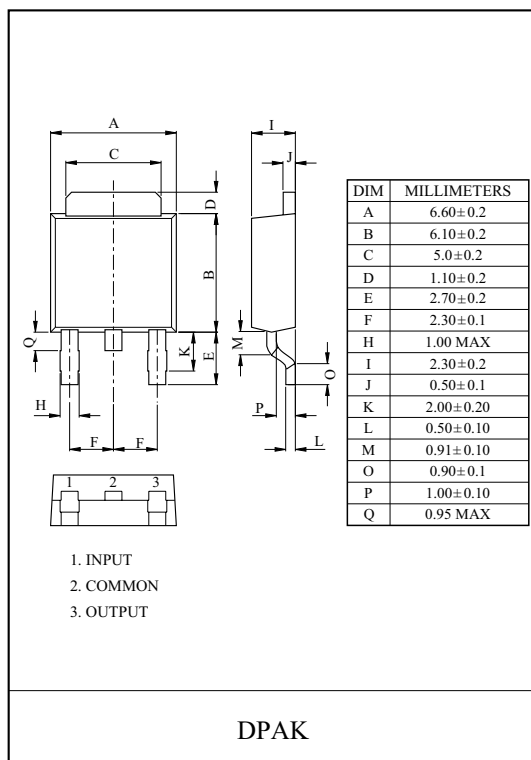
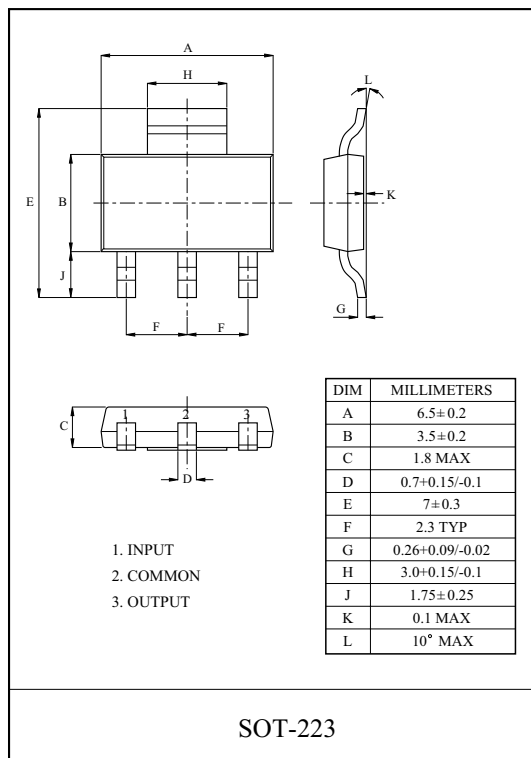
The Regulator has multi function such as over current protection, overheat protection.

FEATURES

- 1.0A Output Low Drop Voltage Regulator.
- Built in Over Current Protection, Over Heat Protection Function.
- Low Quiescent Current :0.8mA (Typ.)

LINE UP

| ITEM | OUTPUT VOLTAGE (Typ.) | UNIT |
|--------------|-----------------------|-------------------------|
| KIA78D125S/F | 1.25 | S : SOT-223 F : DPAK |
| KIA78D015S/F | 1.5 | |
| KIA78D018S/F | 1.8 | |
| KIA78D020S/F | 2.0 | |
| KIA78D025S/F | 2.5 | |
| KIA78D030S/F | 3.0 | |
| KIA78D033S/F | 3.3 | |
| KIA78D050S/F | 5.0 | |



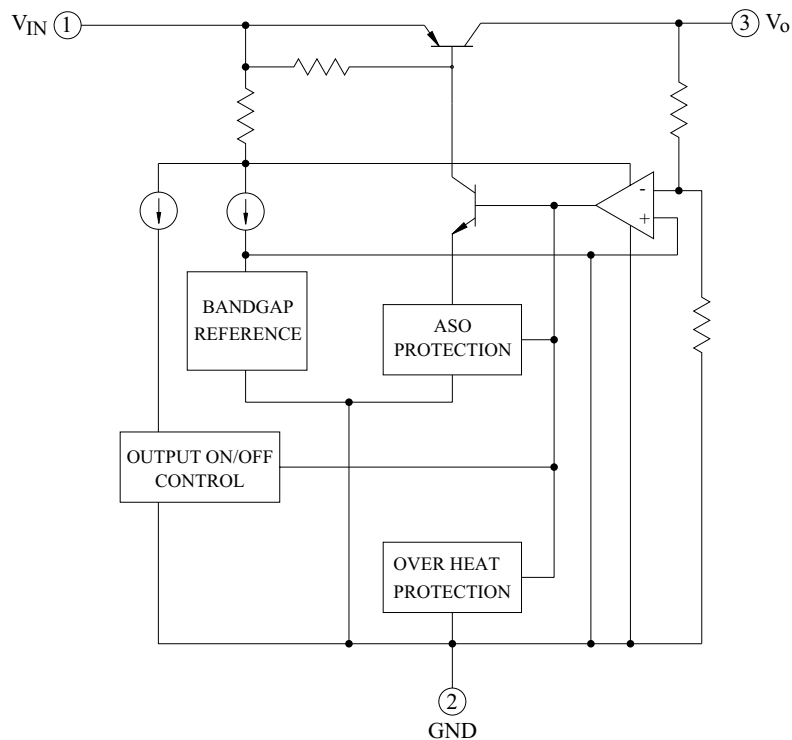
KIA78D125S/F~KIA78D050S/F

MAXIMUM RATINGS (Ta=25 °C)

| CHARACTERISTIC | | SYMBOL | RATING | UNIT |
|---|----------|-----------|---------|------|
| Input Voltage | | V_{IN} | 16 | V |
| Output Current | | I_{OUT} | 1 | A |
| Power Dissipation-1 (No Heatsink) | S (Note) | P_{D1} | 1.0 | W |
| | F | | 1.3 | |
| Power Dissipation-2 (Without Heatsink) | S | P_{D2} | 8.3 | W |
| | F | | 13 | |
| Junction Temperature | | T_j | 150 | °C |
| Operating Temperature | | T_{opr} | -20~80 | °C |
| Storage Temperature | | T_{stg} | -30~150 | °C |
| Soldering Temperature | | T_{sol} | 260 | °C |

Note) Package Mounted on FR-4 PCB 36 × 18 × 1.5mm : mounting pad for the GND Lead min. 6cm²

BLOCK DIAGRAM



KIA78D125S/F~KIA78D050S/F

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ELECTRICAL CHARACTERISTICS

KIA78D125S/F (Unless otherwise specified, $V_{IN}=2.8V$, $T_j=25^\circ C$)

| CHARACTERISTIC | SYMBOL | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|----------------------------|--------------|---|-------|------|-------|---------------|
| Output Voltage | V_{OUT} | $V_{IN}=2.8V$, $I_{OUT}=0.5A$ | 1.225 | 1.25 | 1.275 | V |
| | | $2.8V \leq V_{IN} \leq 12V$, $5mA \leq I_{OUT} \leq 1A$, $0^\circ C \leq T_j \leq 125^\circ C$ | 1.21 | 1.25 | 1.29 | |
| Line Regulation | Reg Line | $2.8V \leq V_{IN} \leq 12V$, $I_{OUT}=0.5A$ | - | 5 | 20 | mV |
| Load Regulation | Reg Load | $V_{IN}=2.8V$, $5mA \leq I_{OUT} \leq 1A$, | - | 5 | 20 | mV |
| Quiescent Current | I_B | $2.8V \leq V_{IN} \leq 12V$, $I_{OUT}=0A$ | - | 0.8 | 1.8 | mA |
| | | $2.8V \leq V_{IN} \leq 12V$, $I_{OUT}=1A$ | - | 10 | 20 | |
| Starting Quiescent Current | I_{Bstart} | $V_{IN}=2.1V$, $I_{OUT}=0A$ | - | 0.7 | 5 | mA |
| | | $V_{IN}=2.5V$, $I_{OUT}=1A$ | - | 10 | 30 | |
| Output Noise Voltage | V_{NO} | $V_{IN}=2.8V$, $I_{OUT}=50mA$, $10Hz \leq f \leq 100kHz$ | - | 110 | - | μV_{rms} |
| Ripple Rejection | $R \cdot R$ | $2.8V \leq V_{IN} \leq 12V$, $I_{OUT}=50mA$, $f=120Hz$ | 53 | 65 | - | dB |
| Dropout Voltage | V_D | $I_{OUT}=0.5A$ | - | 0.3 | 0.5 | V |
| | | $I_{OUT}=1A$ | - | 0.5 | - | |

ELECTRICAL CHARACTERISTICS

KIA78D015S/F (Unless otherwise specified, $V_{IN}=3.8V$, $T_j=25^\circ C$)

| CHARACTERISTIC | SYMBOL | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|----------------------------|--------------|---|-------|------|-------|---------------|
| Output Voltage | V_{OUT} | $V_{IN}=3.8V$, $I_{OUT}=0.5A$ | 1.45 | 1.5 | 1.55 | V |
| | | $2.8V \leq V_{IN} \leq 12V$, $5mA \leq I_{OUT} \leq 1A$, $0^\circ C \leq T_j \leq 125^\circ C$ | 1.434 | 1.5 | 1.566 | |
| Line Regulation | Reg Line | $2.8V \leq V_{IN} \leq 12V$, $I_{OUT}=0.5A$ | - | 5 | 20 | mV |
| Load Regulation | Reg Load | $V_{IN}=3.8V$, $5mA \leq I_{OUT} \leq 1A$, | - | 5 | 20 | mV |
| Quiescent Current | I_B | $2.8V \leq V_{IN} \leq 12V$, $I_{OUT}=0A$ | - | 0.8 | 1.8 | mA |
| | | $2.8V \leq V_{IN} \leq 12V$, $I_{OUT}=1A$ | - | 10 | 20 | |
| Starting Quiescent Current | I_{Bstart} | $V_{IN}=2.1V$, $I_{OUT}=0A$ | - | 0.7 | 5 | mA |
| | | $V_{IN}=2.5V$, $I_{OUT}=1A$ | - | 10 | 30 | |
| Output Noise Voltage | V_{NO} | $V_{IN}=3.8V$, $I_{OUT}=50mA$, $10Hz \leq f \leq 100kHz$ | - | 75 | - | μV_{rms} |
| Ripple Rejection | $R \cdot R$ | $2.8V \leq V_{IN} \leq 12V$, $I_{OUT}=50mA$, $f=120Hz$ | 53 | 65 | - | dB |
| Dropout Voltage | V_D | $I_{OUT}=0.5A$ | - | 0.5 | 0.7 | V |
| | | $I_{OUT}=1A$ | - | 0.6 | - | |

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ELECTRICAL CHARACTERISTICS

KIA78D018S/F (Unless otherwise specified, $V_{IN}=3.8V$, $T_j=25^\circ C$)

| CHARACTERISTIC | SYMBOL | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|----------------------------|--------------|---|-------|------|-------|---------------|
| Output Voltage | V_{OUT} | $V_{IN}=3.8V$, $I_{OUT}=0.5A$ | 1.75 | 1.8 | 1.85 | V |
| | | $2.8V \leq V_{IN} \leq 12V$, $5mA \leq I_{OUT} \leq 1A$, $0^\circ C \leq T_j \leq 125^\circ C$ | 1.732 | 1.8 | 1.868 | |
| Line Regulation | Reg Line | $2.8V \leq V_{IN} \leq 12V$, $I_{OUT}=0.5A$ | - | 5 | 20 | mV |
| Load Regulation | Reg Load | $V_{IN}=3.8V$, $5mA \leq I_{OUT} \leq 1A$, | - | 5 | 20 | mV |
| Quiescent Current | I_B | $2.8V \leq V_{IN} \leq 12V$, $I_{OUT}=0A$ | - | 0.8 | 1.8 | mA |
| | | $2.8V \leq V_{IN} \leq 12V$, $I_{OUT}=1A$ | - | 10 | 20 | |
| Starting Quiescent Current | I_{Bstart} | $V_{IN}=2.1V$, $I_{OUT}=0A$ | - | 0.7 | 5 | mA |
| | | $V_{IN}=2.5V$, $I_{OUT}=1A$ | - | 10 | 30 | |
| Output Noise Voltage | V_{NO} | $V_{IN}=3.8V$, $I_{OUT}=50mA$, $10Hz \leq f \leq 100kHz$ | - | 75 | - | μV_{rms} |
| Ripple Rejection | $R \cdot R$ | $2.8V \leq V_{IN} \leq 12V$, $I_{OUT}=50mA$, $f=120Hz$ | 53 | 65 | - | dB |
| Dropout Voltage | V_D | $I_{OUT}=0.5A$ | - | 0.3 | 0.5 | V |
| | | $I_{OUT}=1A$ | - | 0.5 | - | |

ELECTRICAL CHARACTERISTICS

KIA78D020S/F (Unless otherwise specified, $V_{IN}=4V$, $T_j=25^\circ C$)

| CHARACTERISTIC | SYMBOL | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|----------------------------|--------------|---|------|------|------|---------------|
| Output Voltage | V_{OUT} | $V_{IN}=4V$, $I_{OUT}=0.5A$ | 1.95 | 2.0 | 2.05 | V |
| | | $3V \leq V_{IN} \leq 12V$, $5mA \leq I_{OUT} \leq 1A$, $0^\circ C \leq T_j \leq 125^\circ C$ | 1.93 | 2.0 | 2.07 | |
| Line Regulation | Reg Line | $3.0V \leq V_{IN} \leq 12V$, $I_{OUT}=0.5A$ | - | 5 | 20 | mV |
| Load Regulation | Reg Load | $V_{IN}=4V$, $5mA \leq I_{OUT} \leq 1A$, | - | 5 | 20 | mV |
| Quiescent Current | I_B | $3.0V \leq V_{IN} \leq 12V$, $I_{OUT}=0A$ | - | 0.8 | 1.8 | mA |
| | | $3.0V \leq V_{IN} \leq 12V$, $I_{OUT}=1A$ | - | 10 | 20 | |
| Starting Quiescent Current | I_{Bstart} | $V_{IN}=2.1V$, $I_{OUT}=0A$ | - | 0.7 | 5 | mA |
| | | $V_{IN}=2.5V$, $I_{OUT}=1A$ | - | 10 | 30 | |
| Output Noise Voltage | V_{NO} | $V_{IN}=4V$, $I_{OUT}=50mA$, $10Hz \leq f \leq 100kHz$ | - | 80 | - | μV_{rms} |
| Ripple Rejection | $R \cdot R$ | $3.0V \leq V_{IN} \leq 12V$, $I_{OUT}=50mA$, $f=120Hz$ | 52 | 65 | - | dB |
| Dropout Voltage | V_D | $I_{OUT}=0.5A$ | - | 0.3 | 0.5 | V |
| | | $I_{OUT}=1A$ | - | 0.5 | - | |

KIA78D125S/F~KIA78D050S/F

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ELECTRICAL CHARACTERISTICS

KIA78D025S/F (Unless otherwise specified, $V_{IN}=4.5V$, $T_j=25^\circ C$)

| CHARACTERISTIC | SYMBOL | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|----------------------------|--------------|---|-------|------|-------|---------------|
| Output Voltage | V_{OUT} | $V_{IN}=4.5V$, $I_{OUT}=0.5A$ | 2.438 | 2.5 | 2.562 | V |
| | | $3.5V \leq V_{IN} \leq 12V$, $5mA \leq I_{OUT} \leq 1A$, $0^\circ C \leq T_j \leq 125^\circ C$ | 2.412 | 2.5 | 2.588 | |
| Line Regulation | Reg Line | $3.5V \leq V_{IN} \leq 12V$, $I_{OUT}=0.5A$ | - | 5 | 20 | mV |
| Load Regulation | Reg Load | $V_{IN}=4.5V$, $5mA \leq I_{OUT} \leq 1A$, | - | 5 | 20 | mV |
| Quiescent Current | I_B | $3.5V \leq V_{IN} \leq 12V$, $I_{OUT}=0A$ | - | 0.8 | 1.8 | mA |
| | | $3.5V \leq V_{IN} \leq 12V$, $I_{OUT}=1A$ | - | 10 | 20 | |
| Starting Quiescent Current | I_{Bstart} | $V_{IN}=2.1V$, $I_{OUT}=0A$ | - | 0.9 | 5 | mA |
| | | $V_{IN}=2.7V$, $I_{OUT}=1A$ | - | 12 | 30 | |
| Output Noise Voltage | V_{NO} | $V_{IN}=4.5V$, $I_{OUT}=50mA$, $10Hz \leq f \leq 100kHz$ | - | 95 | - | μV_{rms} |
| Ripple Rejection | $R \cdot R$ | $3.5V \leq V_{IN} \leq 12V$, $I_{OUT}=50mA$, $f=120Hz$ | 53 | 64 | - | dB |
| Dropout Voltage | V_D | $I_{OUT}=0.5A$ | - | 0.3 | 0.5 | V |
| | | $I_{OUT}=1A$ | - | 0.5 | - | |

ELECTRICAL CHARACTERISTICS

KIA78D030S/F (Unless otherwise specified, $V_{IN}=5V$, $T_j=25^\circ C$)

| CHARACTERISTIC | SYMBOL | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|----------------------------|--------------|---|-------|------|-------|---------------|
| Output Voltage | V_{OUT} | $V_{IN}=5.0V$, $I_{OUT}=0.5A$ | 2.925 | 3.0 | 3.075 | V |
| | | $4.0V \leq V_{IN} \leq 12V$, $5mA \leq I_{OUT} \leq 1A$, $0^\circ C \leq T_j \leq 125^\circ C$ | 2.895 | 3.0 | 3.105 | |
| Line Regulation | Reg Line | $4.0V \leq V_{IN} \leq 12V$, $I_{OUT}=0.5A$ | - | 5 | 20 | mV |
| Load Regulation | Reg Load | $V_{IN}=5.0V$, $5mA \leq I_{OUT} \leq 1A$, | - | 5 | 20 | mV |
| Quiescent Current | I_B | $4.0V \leq V_{IN} \leq 12V$, $I_{OUT}=0A$ | - | 0.8 | 1.8 | mA |
| | | $4.0V \leq V_{IN} \leq 12V$, $I_{OUT}=1A$ | - | 10 | 20 | |
| Starting Quiescent Current | I_{Bstart} | $V_{IN}=2.1V$, $I_{OUT}=0A$ | - | 1.1 | 5 | mA |
| | | $V_{IN}=2.8V$, $I_{OUT}=1A$ | - | 13 | 30 | |
| Output Noise Voltage | V_{NO} | $V_{IN}=5.0V$, $I_{OUT}=50mA$, $10Hz \leq f \leq 100kHz$ | - | 110 | - | μV_{rms} |
| Ripple Rejection | $R \cdot R$ | $4.0V \leq V_{IN} \leq 12V$, $I_{OUT}=50mA$, $f=120Hz$ | 50 | 63 | - | dB |
| Dropout Voltage | V_D | $I_{OUT}=0.5A$ | - | 0.3 | 0.5 | V |
| | | $I_{OUT}=1A$ | - | 0.5 | - | |

KIA78D125S/F~KIA78D050S/F

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ELECTRICAL CHARACTERISTICS

KIA78D033S/F (Unless otherwise specified, $V_{IN}=5.3V$, $T_j=25^\circ C$)

| CHARACTERISTIC | SYMBOL | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|----------------------------|--------------|---|-------|------|-------|---------------|
| Output Voltage | V_{OUT} | $V_{IN}=5.3V$, $I_{OUT}=0.5A$ | 3.218 | 3.3 | 3.382 | V |
| | | $4.3V \leq V_{IN} \leq 12V$, $5mA \leq I_{OUT} \leq 1A$, $0^\circ C \leq T_j \leq 125^\circ C$ | 3.184 | 3.3 | 3.416 | |
| Line Regulation | Reg Line | $4.3V \leq V_{IN} \leq 12V$, $I_{OUT}=0.5A$ | - | 5 | 20 | mV |
| Load Regulation | Reg Load | $V_{IN}=5.3V$, $5mA \leq I_{OUT} \leq 1A$, | - | 5 | 20 | mV |
| Quiescent Current | I_B | $4.3V \leq V_{IN} \leq 12V$, $I_{OUT}=0A$ | - | 0.8 | 1.8 | mA |
| | | $4.3V \leq V_{IN} \leq 12V$, $I_{OUT}=1A$ | - | 10 | 20 | |
| Starting Quiescent Current | I_{Bstart} | $V_{IN}=2.1V$, $I_{OUT}=0A$ | - | 1.1 | 5 | mA |
| | | $V_{IN}=2.9V$, $I_{OUT}=1A$ | - | 13 | 30 | |
| Output Noise Voltage | V_{NO} | $V_{IN}=5.3V$, $I_{OUT}=50mA$, $10Hz \leq f \leq 100kHz$ | - | 115 | - | μV_{rms} |
| Ripple Rejection | $R \cdot R$ | $4.3V \leq V_{IN} \leq 12V$, $I_{OUT}=50mA$, $f=120Hz$ | 48 | 61 | - | dB |
| Dropout Voltage | V_D | $I_{OUT}=0.5A$ | - | 0.3 | 0.5 | V |
| | | $I_{OUT}=1A$ | - | 0.5 | - | |

ELECTRICAL CHARACTERISTICS

KIA78D050S/F (Unless otherwise specified, $V_{IN}=7V$, $T_j=25^\circ C$)

| CHARACTERISTIC | SYMBOL | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|----------------------------|--------------|---|------|------|------|---------------|
| Output Voltage | V_{OUT} | $V_{IN}=7V$, $I_{OUT}=0.5A$ | 4.88 | 5.0 | 5.12 | V |
| | | $6.0V \leq V_{IN} \leq 12V$, $5mA \leq I_{OUT} \leq 1A$, $0^\circ C \leq T_j \leq 125^\circ C$ | 4.83 | 5.0 | 5.17 | |
| Line Regulation | Reg Line | $6.0V \leq V_{IN} \leq 12V$, $I_{OUT}=0.5A$ | - | 5 | 20 | mV |
| Load Regulation | Reg Load | $V_{IN}=7.0V$, $5mA \leq I_{OUT} \leq 1A$, | - | 5 | 20 | mV |
| Quiescent Current | I_B | $6.0V \leq V_{IN} \leq 12V$, $I_{OUT}=0A$ | - | 0.8 | 1.8 | mA |
| | | $6.0V \leq V_{IN} \leq 12V$, $I_{OUT}=1A$ | - | 10 | 20 | |
| Starting Quiescent Current | I_{Bstart} | $V_{IN}=2.1V$, $I_{OUT}=0A$ | - | 1.3 | 5 | mA |
| | | $V_{IN}=3.0V$, $I_{OUT}=1A$ | - | 14 | 30 | |
| Output Noise Voltage | V_{NO} | $V_{IN}=7.0V$, $I_{OUT}=50mA$, $10Hz \leq f \leq 100kHz$ | - | 150 | - | μV_{rms} |
| Ripple Rejection | $R \cdot R$ | $6.0V \leq V_{IN} \leq 12V$, $I_{OUT}=50mA$, $f=120Hz$ | 48 | 60 | - | dB |
| Dropout Voltage | V_D | $I_{OUT}=0.5A$ | - | 0.3 | 0.5 | V |
| | | $I_{OUT}=1A$ | - | 0.5 | - | |

KIA78D125S/F~KIA78D050S/F

Fig. 1 Standard Test Circuit

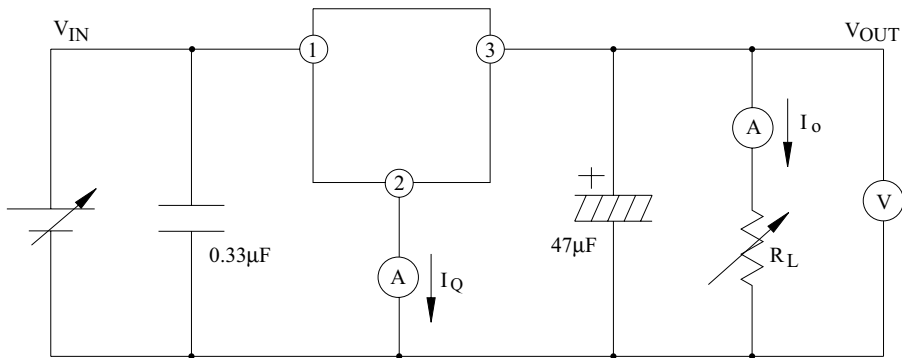


Fig. 2 Ripple Rejection Test Circuit

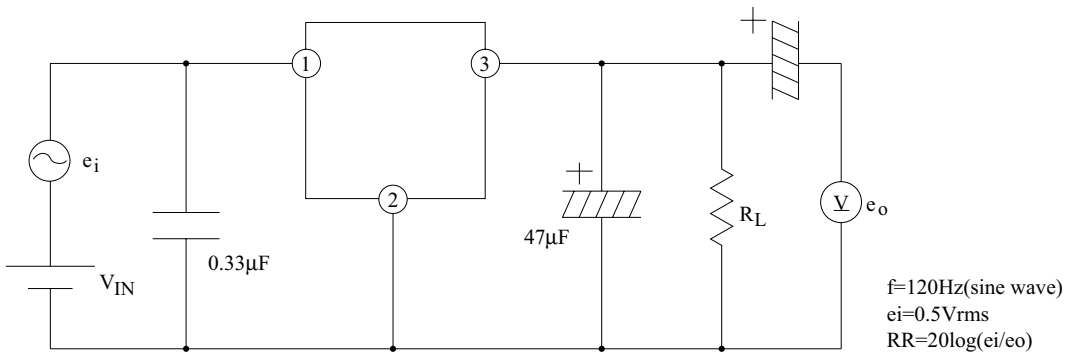
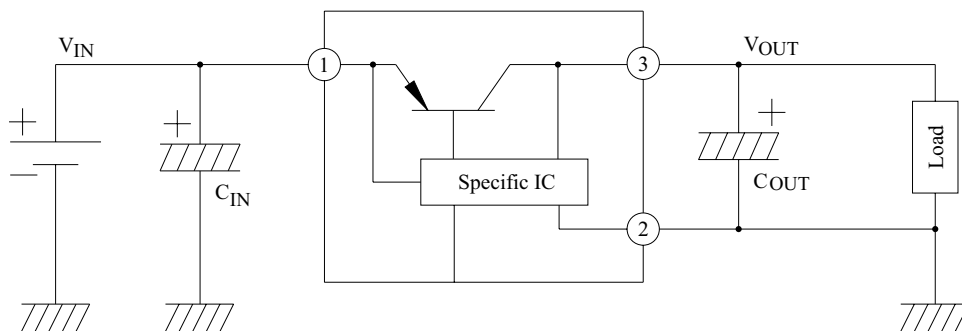


Fig. 3 Application Circuit for Standard



KIA78D125S/F~KIA78D050S/F

Fig. 4 $V_{OUT} - T_j$

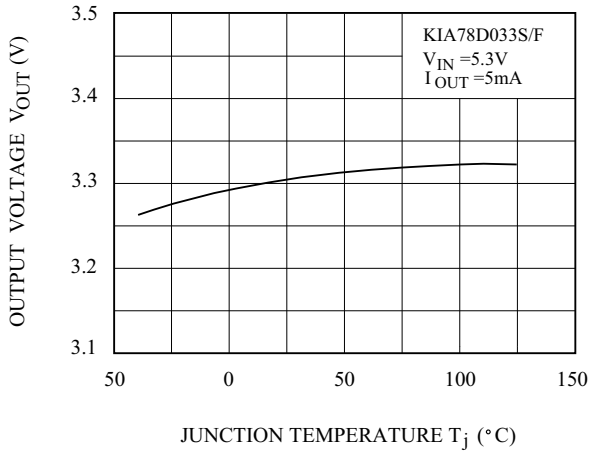


Fig. 5 $V_{OUT} - V_{IN}$

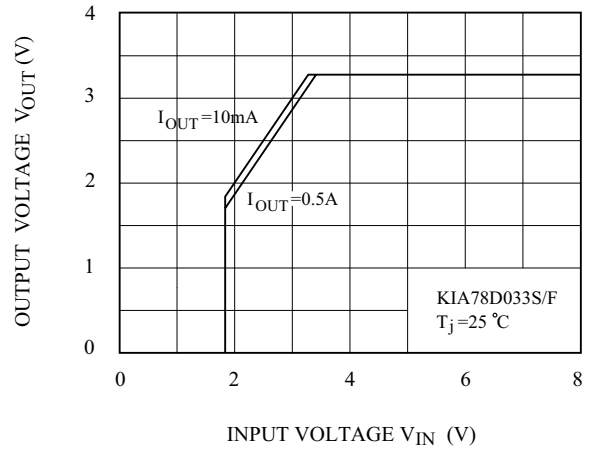


Fig. 6 $I_B - V_{IN}$

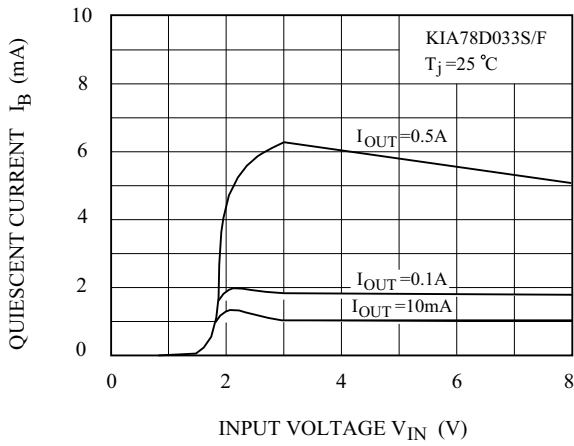


Fig. 7 $I_B - T_j$

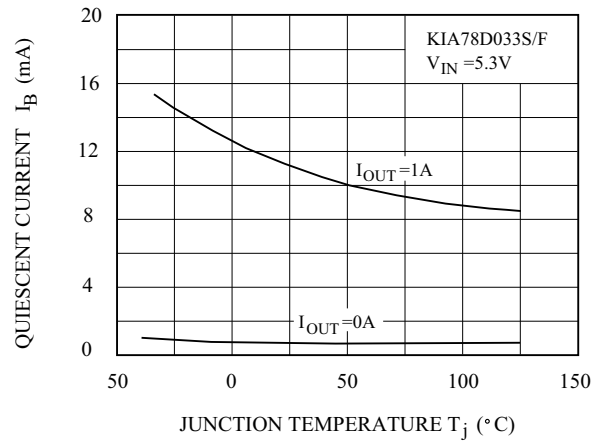


Fig. 8 $I_B - I_{OUT}$

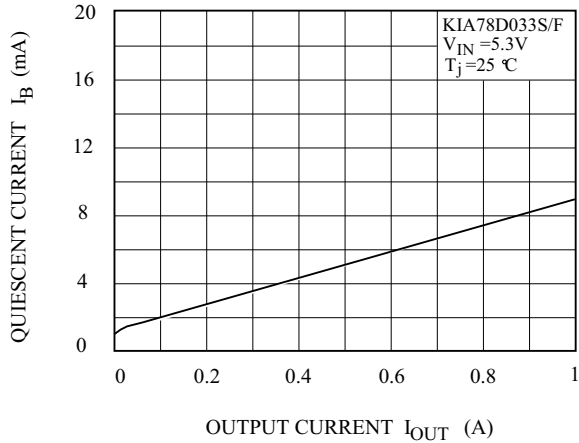
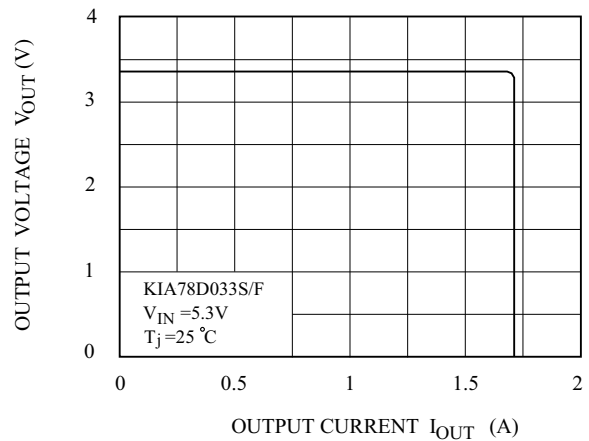


Fig. 9 $V_{OUT} - I_{OUT}$



KIA78D125S/F~KIA78D050S/F

Fig.10 $V_D - T_j$

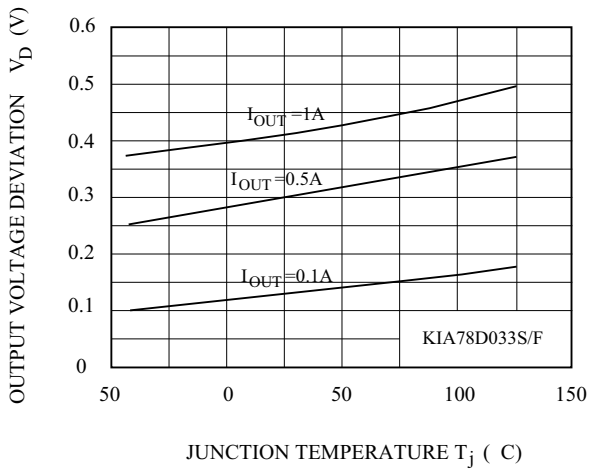


Fig.11 RR-f

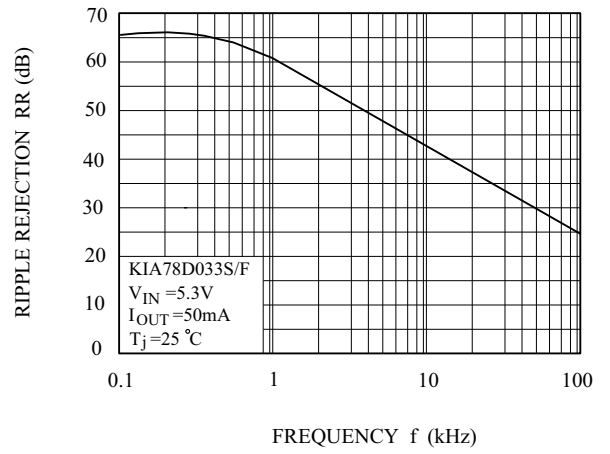


Fig.12 $P_D - T_a$ (S-Type : SOT-223)

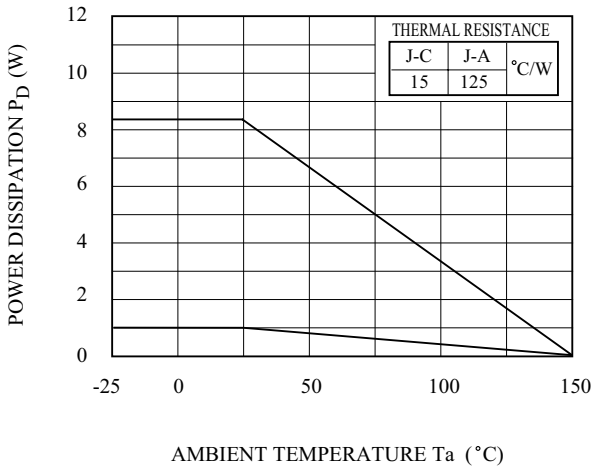


Fig.13 $P_D - T_a$ (F-Type : DPAK)

