

# KA79MXX

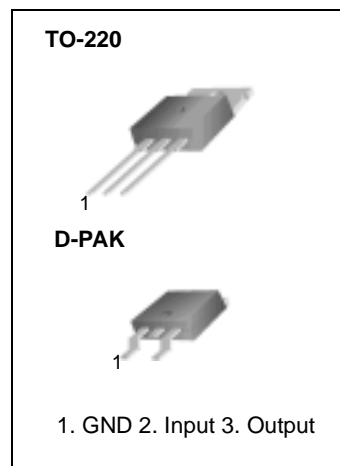
## 3-Terminal 0.5A Negative Voltage Regulator

### Features

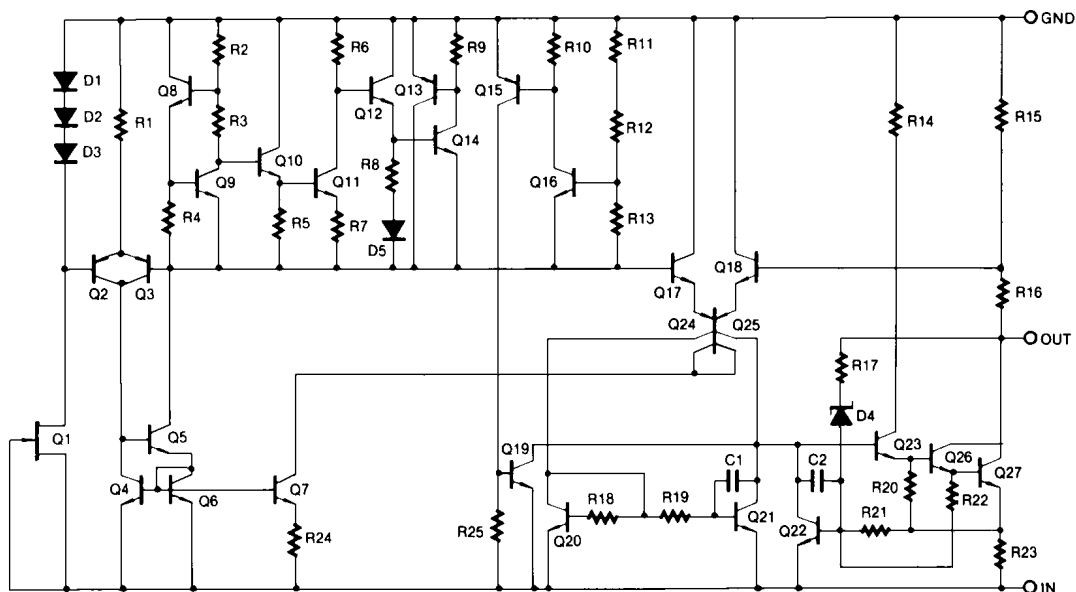
- No external components required
- Output current in excess of 0.5A
- Internal thermal overload
- Internal short circuit current limiting
- Output transistor safe area compensation
- Output voltages of -5V, -6V, -8V, -12V, -15V, -18V, -24V

### Description

The KA79MXX series of 3-Terminal medium current negative voltage regulators are monolithic integrated circuits designed as fixed voltage regulators. These regulators employ internal current limiting, thermal shutdown and safe area compensation making them essentially indestructible.



### Schematic Diagram



## Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Input Voltage(for $V_O = -5V$ to $-18V$ ) (for $V_O = -24V$ )	$V_I$ $V_I$	-35 -40	V V
Thermal Resistance Junction-Cases	$R_{\theta JC}$	5	$^{\circ}C/W$
Thermal Resistance Junction-Air	$R_{\theta JA}$	65	$^{\circ}C/W$
Operating Temperature Range	$T_{OPR}$	0 ~ +125	$^{\circ}C$
Storage Temperature Range	$T_{STG}$	-65 ~ +125	$^{\circ}C$

## Electrical Characteristics (KA79M05/KA79M05R)

(Refer to test circuit,  $0^{\circ}C \leq T_J \leq +125^{\circ}C$ ,  $I_O = 350mA$ ,  $V_I = -10V$ , unless otherwise specified,  $C_I = 0.33\mu F$ ,  $C_O = 0.1\mu F$ )

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	$V_O$	$T_J = +25^{\circ}C$	-4.8	-5	-5.2	V
		$I_O = 5mA$ to $350mA$ $V_I = -7V$ to $-25V$	-4.75	-5	-5.25	
Line Regulation (Note1)	$\Delta V_O$	$T_J = +25^{\circ}C$				mV
		$V_I = -7V$ to $-25V$ $V_I = -8V$ to $-25V$	- -	7.0 2.0	50 30	
Load Regulation (Note1)	$\Delta V_O$	$I_O = 5mA$ to $500mA$ $T_J = +25^{\circ}C$	-	30	100	mV
Quiescent Current	$I_Q$	$T_J = +25^{\circ}C$	-	3.0	6.0	mA
Quiescent Current Change	$\Delta I_Q$	$I_O = 5mA$ to $350mA$	-	-	0.4	mA
		$I_O = 200mA$ $V_I = -8V$ to $-25V$	-	-	0.4	
Output Voltage Drift	$\Delta V_O / \Delta T$	$I_O = 5mA$	-	-0.2	-	mV/ $^{\circ}C$
Output Noise Voltage	$V_N$	$f = 10Hz, 100KHz$ $T_A = +25^{\circ}C$	-	40	-	$\mu V$
Ripple Rejection	RR	$f = 120Hz$ $V_J = -8V$ to $-18V$	54	60	-	dB
Dropout Voltage	$V_D$	$T_J = +25^{\circ}C$ , $I_O = 500mA$	-	1.1	-	V
Short Circuit Current	$I_{SC}$	$T_J = +25^{\circ}C$ , $V_I = -35V$	-	140	-	mA
Peak Current	$I_{PK}$	$T_J = +25^{\circ}C$	-	650	-	mA

### Note:

1. Load and line regulation are specified at constant junction temperature. Change in  $V_O$  due to heating effects must be taken into account separately. Pulse testing with low duty is used.

## Electrical Characteristics (KA79M06)

(Refer to test circuit,  $0^{\circ}\text{C} \leq T_J \leq +125^{\circ}\text{C}$ ,  $I_O = 350\text{mA}$ ,  $V_I = -11\text{V}$ , unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Output Voltage	VO	TJ= +25 °C		- 5.75	- 6.0	- 6.25	V
		IO = 5mA to 350mA VI = -8.0V to -25V		- 5.7	- 6.0	- 6.3	
Line Regulation (Note1)	ΔVO	TJ =+25°C	VI = -8Vto -25V	-	7.0	60	mV
			VI = -9V to -19V	-	2.0	40	
Load Regulation (Note1)	ΔVO	TJ= +25 °C	IO = 5.0mA to 500mA	-	30	120	mV
Quiescent Current	IQ	TJ= +25 °C		-	3	6	mA
Quiescent Current Change	ΔIQ	IO = 5mA to 350mA		-	-	0.4	mA
		VI = -8V to -25V		-	-	0.4	
Output Voltage Drift	ΔVO/ΔT	IO = 5mA		-	0.4	-	mV/ °C
Output Noise Voltage	VN	f = 10Hz to 100KHz,TA = +25 °C		-	50	-	μV
Ripple Rejection	RR	f = 120Hz,VI = -9V to -19V		54	60	-	dB
Dropout Voltage	VD	IO = 500mA, TJ = +25 °C		-	1.1	-	V
Short Circuit Current	ISC	VI = -35V, TJ = +25 °C		-	140	-	mA
Peak Current	IPK	TJ= +25 °C		-	650	-	mA

### Note:

1. Load and line regulation are specified at constant junction temperature. Change in  $V_O$  due to heating effects must be taken into account separately. Pulse testing with low duty is used.

## Electrical Characteristics (KA79M08/KA79M08R)

(Refer to test circuit,  $0^{\circ}\text{C} \leq T_J \leq +125^{\circ}\text{C}$ ,  $I_O = 350\text{mA}$ ,  $V_I = -14\text{V}$ , unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Output Voltage	VO	TJ= +25 °C		- 7.7	- 8.0	- 8.3	V
		IO = 5mA to 350mA VI = -10.5V to -25V		- 7.6	- 8.0	- 8.4	
Line Regulation (Note1)	ΔVO	TJ =+25°C	VI = -10.5V to -25V	-	7.0	80	mV
			VI = -11V to -21V	-	2.0	50	
Load Regulation (Note1)	ΔVO	TJ= +25 °C	IO = 5.0mA to 500mA	-	30	160	mV
Quiescent Current	IQ	TJ= +25 °C		-	3	6	mA
Quiescent Current Change	ΔIQ	IO = 5mA to 350mA		-	-	0.4	mA
		VI = -8V to -25V		-	-	0.4	
Output Voltage Drift	ΔVO/ΔT	IO = 5mA		-	-0.6	-	mV/ °C
Output Noise Voltage	VN	f = 10Hz to 100KHz,TA = +25 °C		-	60	-	μV
Ripple Rejection	RR	f = 120Hz,VI = -9V to -19V		54	59	-	dB
Dropout Voltage	VD	IO = 500mA, TJ = +25 °C		-	1.1	-	V
Short Circuit Current	ISC	VI = -35V, TJ = +25 °C		-	140	-	mA
Peak Current	IPK	TJ = +25 °C		-	650	-	mA

### Note:

1. Load and line regulation are specified at constant junction temperature. Change in  $V_O$  due to heating effects must be taken into account separately. Pulse testing with low duty is used.

## Electrical Characteristics (KA79M12)

(Refer to test circuit,  $0\text{ }^{\circ}\text{C} \leq T_J \leq +125\text{ }^{\circ}\text{C}$ ,  $I_O = 350\text{mA}$ ,  $V_I = -19\text{V}$ , unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Output Voltage	VO	TJ= +25 °C		-11.5	-12	-12.5	V
		IO = 5mA to 350mA VI = -14.5V to -30V		-11.4	-12	-12.6	
Line Regulation (Note1)	ΔVO	TJ =+25°C	VI = -14.5V to -30V	-	8.0	80	mV
			VI = -15V to -25V	-	3.0	50	
Load Regulation (Note1)	ΔVO	TJ= +25 °C	IO = 5.0mA to 500mA	-	30	240	mV
Quiescent Current	IQ	TJ= +25 °C		-	3	6	mA
Quiescent Current Change	ΔIQ	IO = 5mA to 350mA		-	-	0.4	mA
		VI = -14.5V to -30V		-	-	0.4	
Output Voltage Drift	ΔVO/ΔT	IO = 5mA		-	-0.8	-	mV/ °C
Output Noise Voltage	VN	f = 10Hz to 100KHz,TA =+25 °C		-	75	-	μV
Ripple Rejection	RR	f = 120Hz,VI = -15V to -25V		54	60	-	dB
Dropout Voltage	VD	IO = 500mA, TJ = +25 °C		-	1.1	-	V
Short Circuit Current	ISC	VI = -35V, TJ = +25 °C		-	140	-	mA
Peak Current	IPK	TJ= +25 °C		-	650	-	mA

### Note:

1. Load and line regulation are specified at constant junction temperature. Change in  $V_O$  due to heating effects must be taken into account separately. Pulse testing with low duty is used.

## Electrical Characteristics (KA79M15)

(Refer to test circuit,  $0\text{ }^{\circ}\text{C} \leq T_J \leq +125\text{ }^{\circ}\text{C}$ ,  $I_O = 350\text{mA}$ ,  $V_I = -23\text{V}$ , unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Output Voltage	$V_O$	$T_J = +25\text{ }^{\circ}\text{C}$		- 14.4	- 15	- 15.6	V
		$I_O = 5\text{mA to } 350\text{mA}$ $V_I = -17.5\text{V to } -30\text{V}$		-14.25	- 15	-15.75	
Line Regulation (Note1)	$\Delta V_O$	$T_J = +25\text{ }^{\circ}\text{C}$	$V_I = -17.5\text{V to } -30\text{V}$	-	9.0	80	mV
			$V_I = -18\text{V to } -28\text{V}$	-	5.0	50	
Load Regulation (Note1)	$\Delta V_O$	$T_J = +25\text{ }^{\circ}\text{C}$	$I_O = 5.0\text{mA to } 500\text{mA}$	-	30	240	mV
Quiescent Current	$I_Q$	$T_J = +25\text{ }^{\circ}\text{C}$		-	3	6	mA
Quiescent Current Change	$\Delta I_Q$	$I_O = 5\text{mA to } 350\text{mA}$		-	-	0.4	mA
		$V_I = -17.5\text{V to } -28\text{V}$		-	-	0.4	
Output Voltage Drift	$\Delta V_O / \Delta T$	$I_O = 5\text{mA}$		-	-1.0	-	mV/ $^{\circ}\text{C}$
Output Noise Voltage	$V_N$	$f = 10\text{Hz to } 100\text{kHz}, T_A = +25\text{ }^{\circ}\text{C}$		-	90	-	$\mu\text{V}$
Ripple Rejection	RR	$f = 120\text{Hz}, V_I = -18.5\text{V to } -28.5\text{V}$		54	59	-	dB
Dropout Voltage	$V_D$	$I_O = 500\text{mA}, T_J = +25\text{ }^{\circ}\text{C}$		-	1.1	-	V
Short Circuit Current	$I_{SC}$	$V_I = -35\text{V}, T_J = +25\text{ }^{\circ}\text{C}$		-	140	-	mA
Peak Current	$I_{PK}$	$T_J = +25\text{ }^{\circ}\text{C}$		-	650	-	mA

### Note:

1. Load and line regulation are specified at constant junction temperature. Change in  $V_O$  due to heating effects must be taken into account separately. Pulse testing with low duty is used.

## Electrical Characteristics (KA79M18)

(Refer to test circuit,  $0\text{ }^{\circ}\text{C} \leq T_J \leq +125\text{ }^{\circ}\text{C}$ ,  $I_O = 350\text{mA}$ ,  $V_I = -27\text{V}$ , unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Output Voltage	VO	TJ= +25 °C		- 17.3	- 18	- 18.7	V
		IO = 5mA to 350mA VI = -21V to -33V		- 17.1	- 18	- 18.9	
Line Regulation (Note1)	ΔVO	TJ =+25°C	VI = -21V to -33V	-	9.0	80	mV
			VI = -24V to -30V	-	5.0	80	
Load Regulation (Note1)	ΔVO	TJ= +25 °C	IO = 5.0mA to 500mA	-	30	360	mV
Quiescent Current	IQ	TJ= +25 °C		-	3	6	mA
Quiescent Current Change	ΔIQ	IO = 5mA to 350mA		-	-	0.4	mA
		VI = -21V to -33V		-	-	0.4	
Output Voltage Drift	ΔVO/ΔT	IO = 5mA		-	-1.0	-	mV/ °C
Output Noise Voltage	VN	f = 10Hz to 100KHz, TA = +25 °C		-	110	-	μV
Ripple Rejection	RR	f = 120Hz, VI = -22V to -32V		54	59	-	dB
Dropout Voltage	VD	IO = 500mA, TJ = +25 °C		-	1.1	-	V
Short Circuit Current	ISC	VI = -35V, TJ = +25 °C		-	140	-	mA
Peak Current	IPK	TJ= +25 °C		-	650	-	mA

### Note;

1. Load and line regulation are specified at constant junction temperature. Change in  $V_O$  due to heating effects must be taken into account separately. Pulse testing with low duty is used.

## Electrical Characteristics (KA79M24)

(Refer to test circuit,  $0^{\circ}\text{C} \leq T_J \leq +125^{\circ}\text{C}$ ,  $I_O = 350\text{mA}$ ,  $V_I = -33\text{V}$ , unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Output Voltage	VO	TJ= +25 °C		- 23	- 24	- 25	V
		IO = 5mA to 350mA VI = -27V to -38V		- 22.8	- 24	- 25.2	
Line Regulation (Note1)	ΔVO	TJ =+25°C	VI = -27V to -38V	-	9.0	80	mV
			VI = -30V to -36V	-	5.0	70	
Load Regulation (Note1)	ΔVO	TJ= +25 °C	IO = 5.0mA to 500mA	-	30	300	mV
Quiescent Current	IQ	TJ= +25 °C		-	3	6	mA
Quiescent Current Change	ΔIQ	IO = 5mA to 350mA		-	-	0.4	mA
		VI = -27V to -38V		-	-	0.4	
Output Voltage Drift	ΔVO/ΔT	IO = 5mA		-	-1.0	-	mV/ °C
Output Noise Voltage	VN	f = 10Hz to 100KHz,TA = +25 °C		-	180	-	μV
Ripple Rejection	RR	f = 120Hz,VI = -28V to -38V		54	58	-	dB
Dropout Voltage	VD	IO = 500mA, TJ = +25 °C		-	1.1	-	V
Short Circuit Current	ISC	VI = -35V, TJ = +25 °C		-	140	-	mA
Peak Current	IPK	TJ= +25 °C		-	650	-	mA

### Note:

1. Load and line regulation are specified at constant junction temperature. Change in  $V_O$  due to heating effects must be taken into account separately. Pulse testing with low duty is used.



## Typical Applications

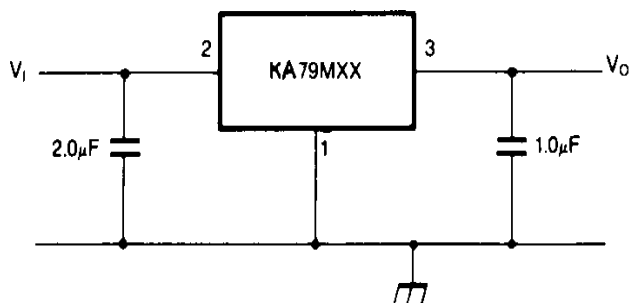


Figure 1. Fixed Output Regulator

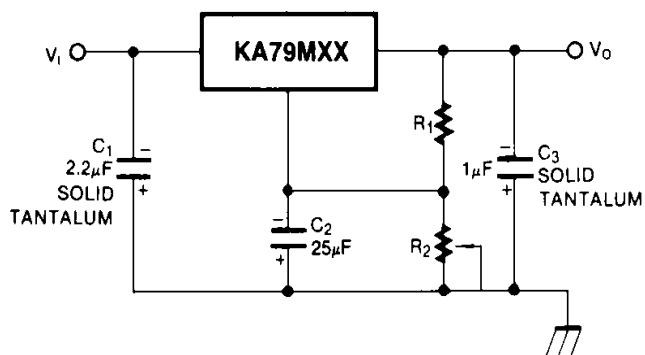


Figure 2. Variable Output

### Notes:

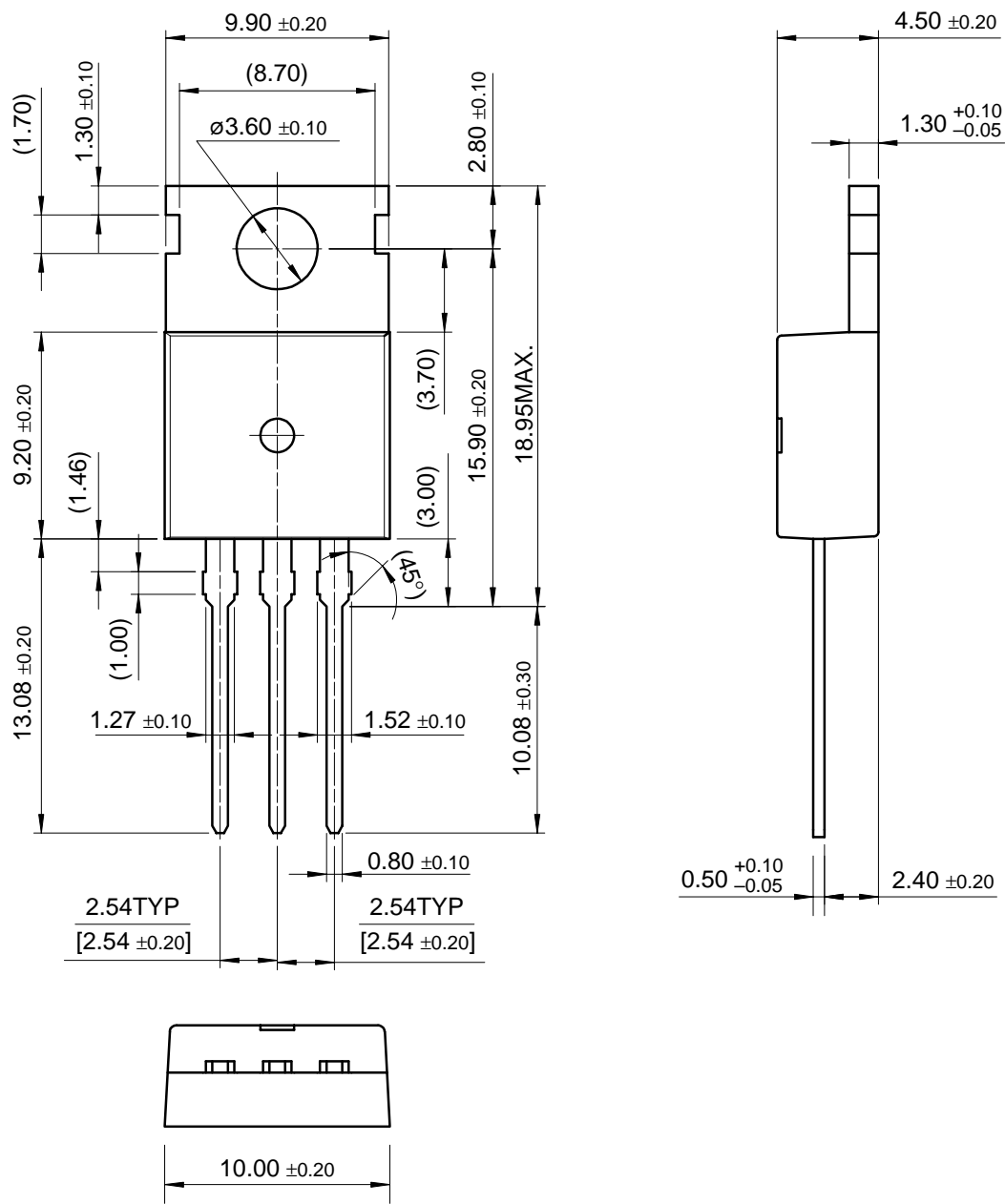
1. Required for stability. For value given, capacitor must be solid tantalum.  $25\mu\text{F}$  aluminum electrolytic may be substituted.
2.  $C_2$  improves transient response and ripple rejection. Do not increase beyond  $50\mu\text{F}$ .

Mechanical Dimensions

Package

Dimensions in millimeters

TO-220

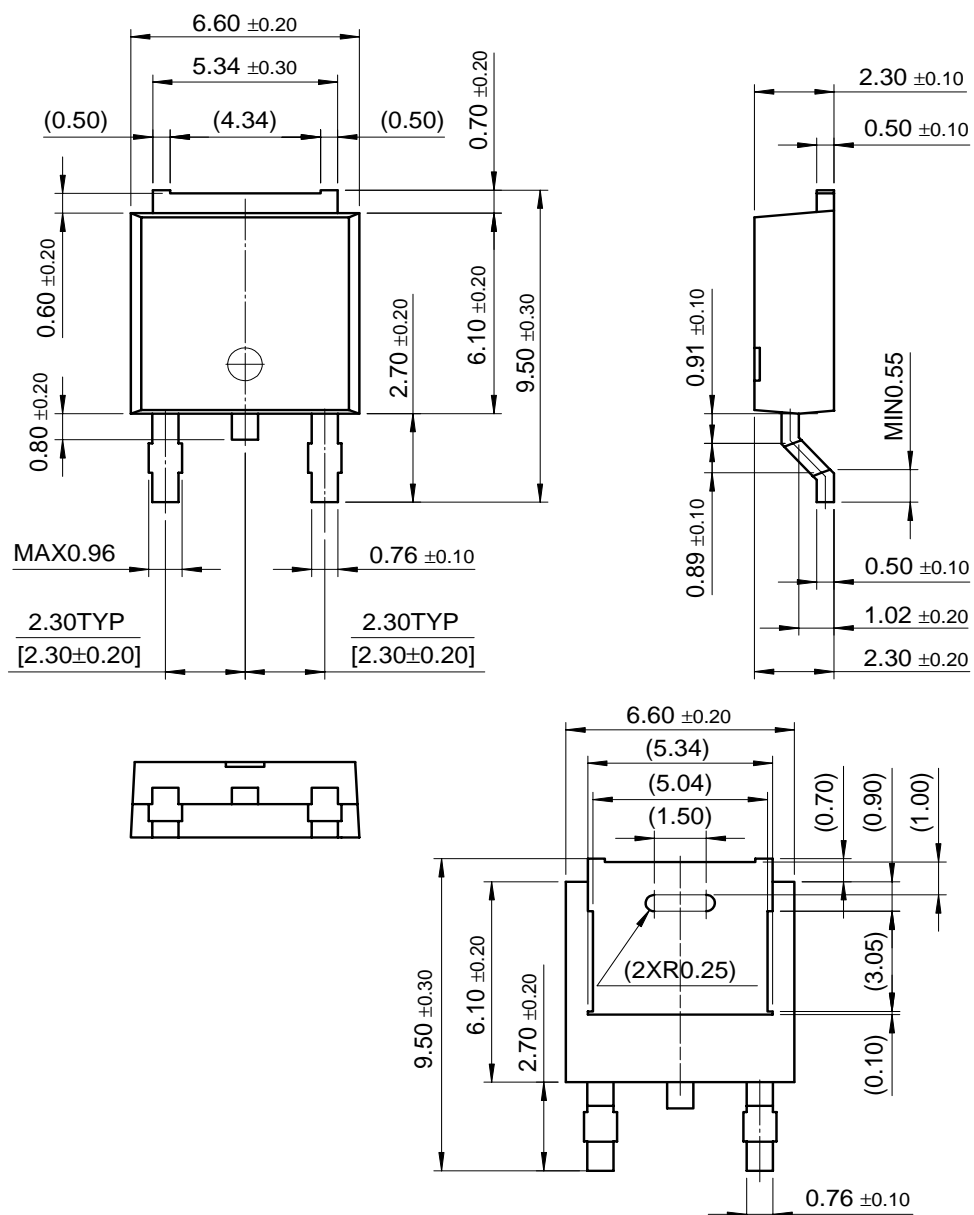


# Mechanical Dimensions (Continued)

## Package

Dimensions in millimeters

### D-PAK



## Ordering Information

Product Number	Package	Operating Temperature
KA79M05	TO-220	0 ~ + 125°C
KA79M06		
KA79M08		
KA79M12		
KA79M15		
KA79M18		
KA79M24		
KA79M05R	D-PAK	
KA79M08R		
KA79M12R		



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