MC79MXX

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,-18Vand -24V

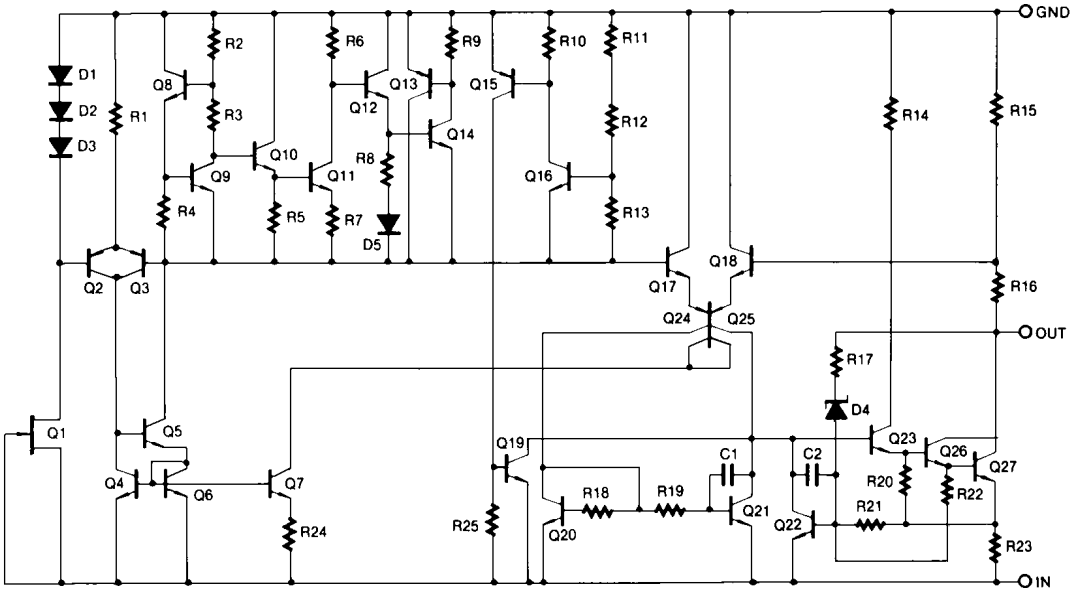
Description

The MC79MXX 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.

TO-220

1. GND 2. Input 3. Output

Schematic Diagram



Rev. 1.0.0

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	°C /W
Thermal Resistance Junction-Air	$R_{\theta JA}$	65	°C /W
Operating Temperature Range	T_{OPR}	0 ~ +125	°C
Storage Temperature Range	T_{STG}	-65 ~ +125	°C

Electrical Characteristics (MC79M05)

(Refer to test circuit, 0 °C ≤T_J ≤ +125 °C, I_O =350mA, V_I = -10V,unless otherwise specified, C_I =0.33μF,C_O=0.1μF)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Output Voltage	V_O	T_J= +25 °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)	ΔV_O	T_J =+25°C	V_I = -7V to -25V	-	7.0	50	mV
			V_I = -8V to -25V	-	2.0	30	
Load Regulation (Note1)	ΔV_O	I_O = 5mA to 500mA T_J = +25 °C		-	30	100	mV
Quiescent Current	I_Q	T_J= +25 °C		-	3.0	6.0	mA
Quiescent Current Change	ΔI_Q	I_O = 5mA to 350mA		-	-	0.4	mA
		I_O = 200mA V_I = -8V to -25V		-	-	0.4	
Output Voltage Drift	$\Delta Vo/\Delta T$	I_O = 5mA		-	-0.2	-	mV/ °C
Output Noise Voltage	V_N	f = 10Hz, 100KHz T_A = +25 °C		-	40	-	μV
Ripple Rejection	RR	f = 120Hz V_J= -8 to -18V		54	60	-	dB
Dropout Voltage	V_D	T_J =+25 °C, I_O = 500mA		-	1.1	-	V
Short Circuit Current	I_{SC}	T_J= +25 °C, V_I = -35V		-	140	-	mA
Peak Current	I_{PK}	T_J= +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 (MC79M06)

(Refer to test circuit, 0 °C ≤T_J ≤ +125 °C, I_O =350mA, V_I = -11V,unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Output Voltage	V_O	T_J= +25 °C		- 5.75	- 6.0	- 6.25	V
		I_O = 5mA to 350mA V_I = -8.0V to -25V		- 5.7	- 6.0	- 6.3	
Line Regulation (Note1)	ΔV_O	T_J =+25°C	V_I = -8V to -25V	-	7.0	60	mV
			V_I = -9V to -19V	-	2.0	40	
Load Regulation (Note1)	ΔV_O	T_J= +25 °C	I_O = 5.0mA to 500mA	-	30	120	mV
Quiescent Current	I_Q	T_J= +25 °C		-	3	6	mA
Quiescent Current Change	ΔI_Q	I_O = 5mA to 350mA		-	-	0.4	mA
		V_I = -8V to -25V		-	-	0.4	
Output Voltage Drift	$\Delta V_O/\Delta T$	I_O = 5mA		-	0.4	-	mV/ °C
Output Noise Voltage	V_N	f = 10Hz to 100KHz,T_A = +25 °C		-	50	-	μV
Ripple Rejection	RR	f = 120Hz,V_I = -9V to -19V		54	60	-	dB
Dropout Voltage	V_D	I_O = 500mA, T_J = +25 °C		-	1.1	-	V
Short Circuit Current	I_{SC}	V_I = -35V, T_J = +25 °C		-	140	-	mA
Peak Current	I_{PK}	T_J= +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 (MC79M08)

(Refer to test circuit, 0 °C ≤T_J ≤ +125 °C, I_O =350mA, V_I = -14V,unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Output Voltage	V_O	T_J= +25 °C		- 7.7	- 8.0	- 8.3	V
		I_O = 5mA to 350mA V_I = -10.5V to -25V		- 7.6	- 8.0	- 8.4	
Line Regulation (Note1)	ΔV_O	T_J =+25°C	V_I = -10.5V to -25V	-	7.0	80	mV
			V_I = -11V to -21V	-	2.0	50	
Load Regulation (Note1)	ΔV_O	T_J= +25 °C	I_O = 5.0mA to 500mA	-	30	160	mV
Quiescent Current	I_Q	T_J= +25 °C		-	3	6	mA
Quiescent Current Change	ΔI_Q	I_O = 5mA to 350mA		-	-	0.4	mA
		V_I = -8V to -25V		-	-	0.4	
Output Voltage Drift	$\Delta V_O/\Delta T$	I_O = 5mA		-	-0.6	-	mV/ °C
Output Noise Voltage	V_N	f = 10Hz to 100KHz,T_A = +25 °C		-	60	-	μV
Ripple Rejection	RR	f = 120Hz,V_I = -9V to -19V		54	59	-	dB
Dropout Voltage	V_D	I_O = 500mA, T_J = +25 °C		-	1.1	-	V
Short Circuit Current	I_{SC}	V_I = -35V, T_J = +25 °C		-	140	-	mA
Peak Current	I_{PK}	T_J = +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 (MC79M12)

(Refer to test circuit, 0 °C ≤T_J ≤ +125 °C, I_O =350mA, V_I = -19V,unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Output Voltage	V_O	T_J= +25 °C		-11.5	-12	-12.5	V
		I_O = 5mA to 350mA V_I = -14.5V to -30V		-11.4	-12	-12.6	
Line Regulation (Note1)	ΔV_O	T_J =+25°C	V_I = -14.5V to -30V	-	8.0	80	mV
			V_I = -15V to -25V	-	3.0	50	
Load Regulation (Note1)	ΔV_O	T_J= +25 °C	I_O = 5.0mA to 500mA	-	30	240	mV
Quiescent Current	I_Q	T_J= +25 °C		-	3	6	mA
Quiescent Current Change	ΔI_Q	I_O = 5mA to 350mA		-	-	0.4	mA
		V_I = -14.5V to -30V		-	-	0.4	
Output Voltage Drift	$\Delta V_O/\Delta T$	I_O = 5mA		-	-0.8	-	mV/ °C
Output Noise Voltage	V_N	f = 10Hz to 100KHz,T_A =+25 °C		-	75	-	μV
Ripple Rejection	RR	f = 120Hz,V_I = -15V to -25V		54	60	-	dB
Dropout Voltage	V_D	I_O = 500mA, T_J = +25 °C		-	1.1	-	V
Short Circuit Current	I_{SC}	V_I = -35V, T_J = +25 °C		-	140	-	mA
Peak Current	I_{PK}	T_J= +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 (MC79M15)

(Refer to test circuit, 0 °C ≤T_J ≤ +125 °C, I_O =350mA, V_I = -23V,unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Output Voltage	V_O	T_J= +25 °C		- 14.4	- 15	- 15.6	V
		I_O = 5mA to 350mA V_I = -17.5V to -30V		-14.25	- 15	-15.75	
Line Regulation (Note1)	ΔV_O	T_J =+25°C	V_I = -17.5V to -30V	-	9.0	80	mV
			V_I = -18V to -28V	-	5.0	50	
Load Regulation (Note1)	ΔV_O	T_J= +25 °C	I_O = 5.0mA to 500mA	-	30	240	mV
Quiescent Current	I_Q	T_J= +25 °C		-	3	6	mA
Quiescent Current Change	ΔI_Q	I_O = 5mA to 350mA		-	-	0.4	mA
		V_I = -17.5V to -28V		-	-	0.4	
Output Voltage Drift	$\Delta V_O/\Delta T$	I_O = 5mA		-	-1.0	-	mV/ °C
Output Noise Voltage	V_N	f = 10Hz to 100KHz,T_A = +25 °C		-	90	-	μV
Ripple Rejection	RR	f = 120Hz,V_I = -18.5V to -28.5V		54	59	-	dB
Dropout Voltage	V_D	I_O = 500mA, T_J = +25 °C		-	1.1	-	V
Short Circuit Current	I_{SC}	V_I = -35V, T_J = +25 °C		-	140	-	mA
Peak Current	I_{PK}	T_J= +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 (MC79M18)

(Refer to test circuit, 0 °C ≤T_J ≤ +125 °C, I_O =350mA, V_I = -27V,unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Output Voltage	V_O	T_J= +25 °C		- 17.3	- 18	- 18.7	V
		I_O = 5mA to 350mA V_I = -21V to -33V		- 17.1	- 18	- 18.9	
Line Regulation (Note1)	ΔV_O	T_J =+25°C	V_I = -21V to -33V	-	9.0	80	mV
			V_I = -24V to -30V	-	5.0	80	
Load Regulation (Note1)	ΔV_O	T_J= +25 °C	I_O = 5.0mA to 500mA	-	30	360	mV
Quiescent Current	I_Q	T_J= +25 °C		-	3	6	mA
Quiescent Current Change	ΔI_Q	I_O = 5mA to 350mA		-	-	0.4	mA
		V_I = -21V to -33V		-	-	0.4	
Output Voltage Drift	$\Delta V_O/\Delta T$	I_O = 5mA		-	-1.0	-	mV/ °C
Output Noise Voltage	V_N	f = 10Hz to 100KHz,T_A = +25 °C		-	110	-	μV
Ripple Rejection	RR	f = 120Hz,V_I = -22V to -32V		54	59	-	dB
Dropout Voltage	V_D	I_O = 500mA, T_J = +25 °C		-	1.1	-	V
Short Circuit Current	I_{SC}	V_I = -35V, T_J = +25 °C		-	140	-	mA
Peak Current	I_{PK}	T_J= +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 (MC79M24)

(Refer to test circuit, 0 °C ≤T_J ≤ +125 °C, I_O =350mA, V_I = -33V,unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Output Voltage	V_O	T_J= +25 °C		- 23	- 24	- 25	V
		I_O = 5mA to 350mA V_I = -27V to -38V		- 22.8	- 24	- 25.2	
Line Regulation (Note1)	ΔV_O	T_J =+25°C	V_I = -27V to -38V	-	9.0	80	mV
			V_I = -30V to -36V	-	5.0	70	
Load Regulation (Note1)	ΔV_O	T_J= +25 °C	I_O = 5.0mA to 500mA	-	30	300	mV
Quiescent Current	I_Q	T_J= +25 °C		-	3	6	mA
Quiescent Current Change	ΔI_Q	I_O = 5mA to 350mA		-	-	0.4	mA
		V_I = -27V to -38V		-	-	0.4	
Output Voltage Drift	$\Delta V_O/\Delta T$	I_O = 5mA		-	-1.0	-	mV/ °C
Output Noise Voltage	V_N	f = 10Hz to 100KHz,T_A = +25 °C		-	180	-	μV
Ripple Rejection	RR	f = 120Hz,V_I = -28V to -38V		54	58	-	dB
Dropout Voltage	V_D	I_O = 500mA, T_J = +25 °C		-	1.1	-	V
Short Circuit Current	I_{SC}	V_I = -35V, T_J = +25 °C		-	140	-	mA
Peak Current	I_{PK}	T_J= +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

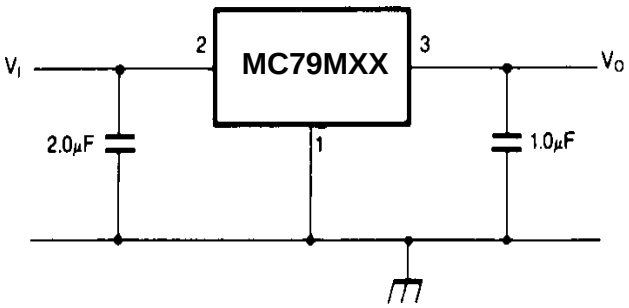


Figure 1. Fixed Output Regulator

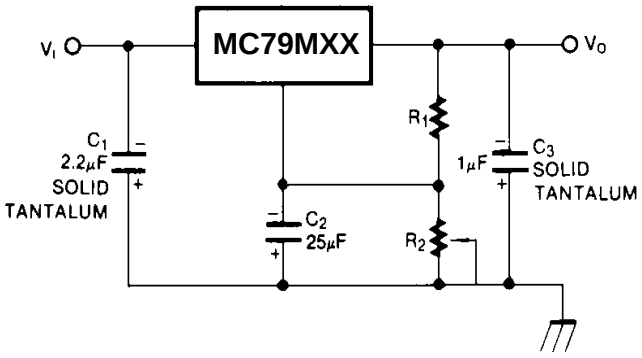


Figure 2. Variable Output

Notes:

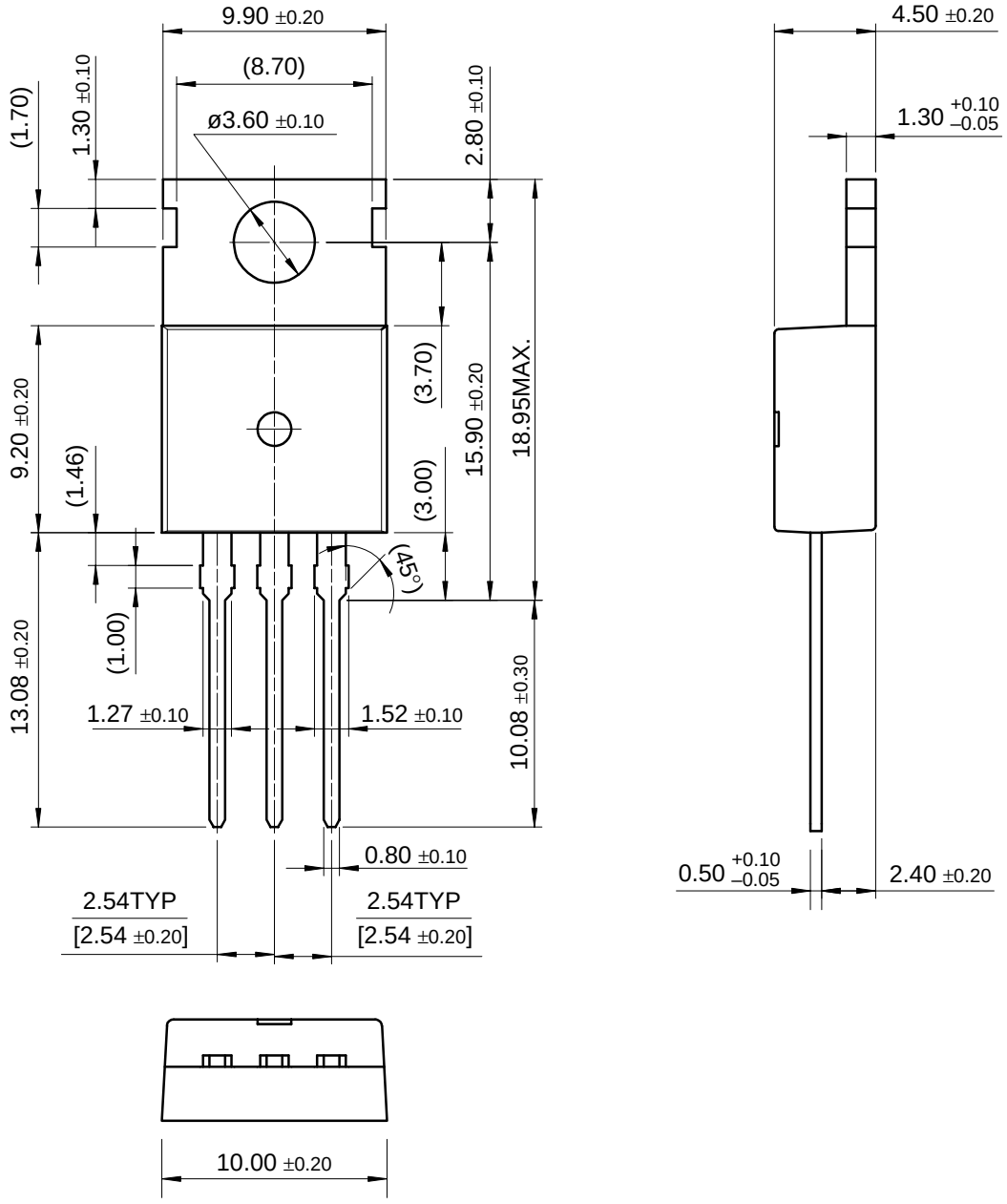
1. Required for stability. For value given, capacitor must be solid tantalum. 25μF aluminum electrolytic may be substituted.
2. C_2 improves transient response and ripple rejection. Do not increase beyond 50μF.

Mechanical Dimensions

Package

Dimensions in millimeters

TO-220

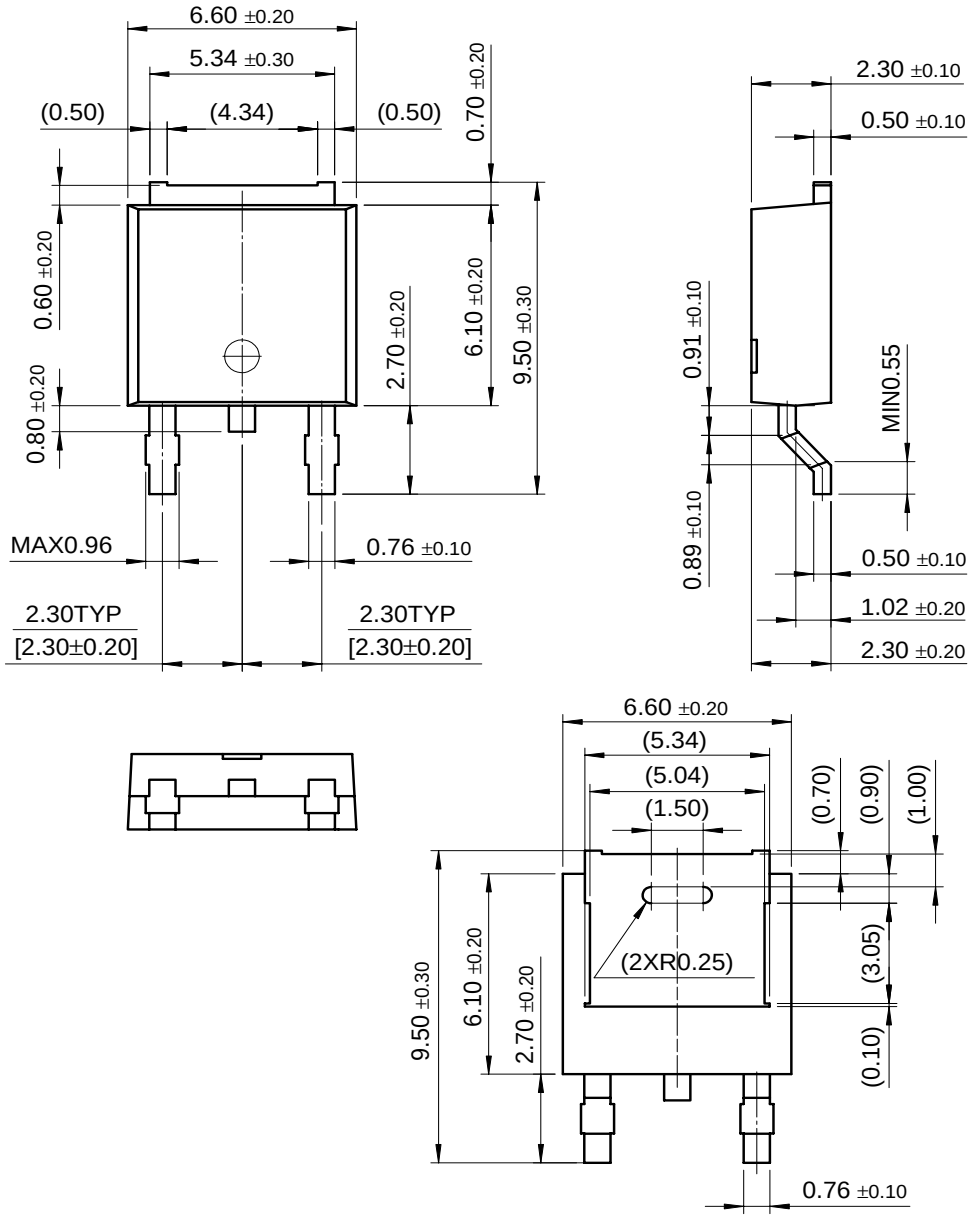


Mechanical Dimensions (Continued)

Package

Dimensions in millimeters

D-PAK



Ordering Information

Product Number	Package	Operating Temperature
MC79M05CT	TO-220	0 ~ + 125°C
MC79M06CT		
MC79M08CT		
MC79M12CT		
MC79M15CT		
MC79M18CT		
MC79M24CT		

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