查询"LM78M05CT"供应商

MC78MXX/LM78MXX

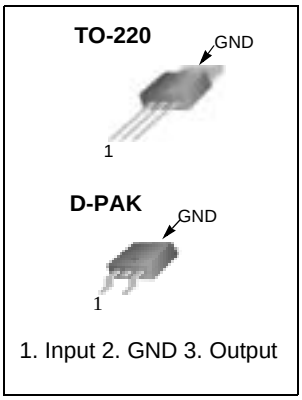
3-Terminal 0.5A Positive Voltage Regulator

Features

- Output Current up to 0.5A
- Output Voltages of 5, 6, 8, 12, 15, 18, 24V
- Thermal Overload Protection
- Short Circuit Protection
- Output Transistor Safe Operating Area (SOA)Protection

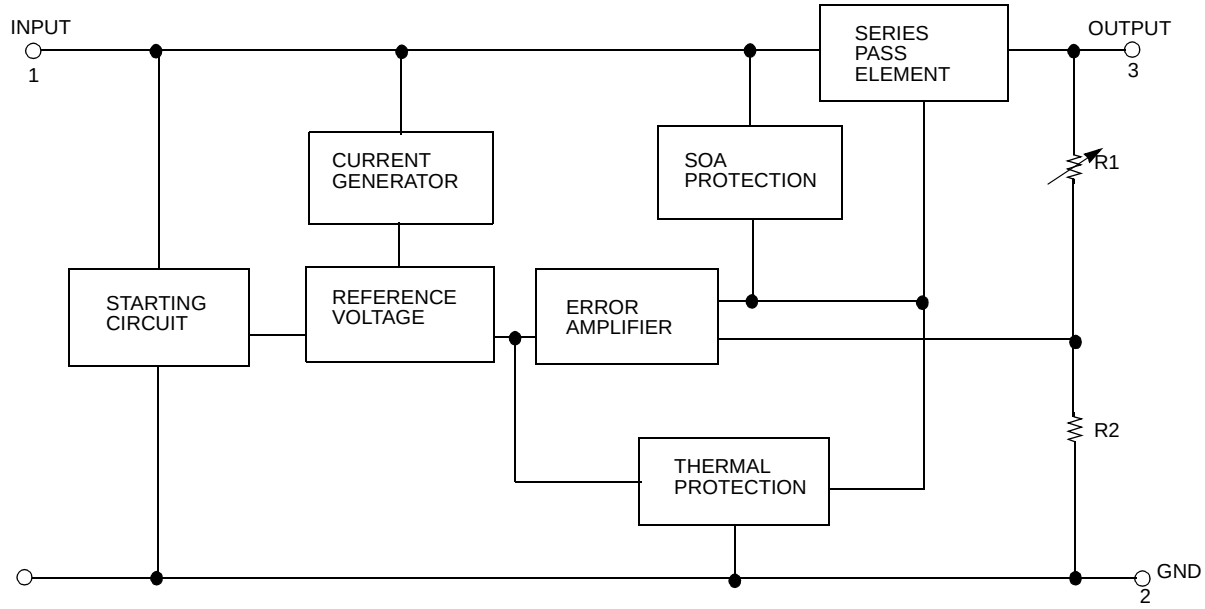
Description

The MC78MXX/LM78MXX series of three-terminal positive regulators are available in the TO-220/D-PAK package with several fixed output voltages making it useful in a wide range of applications.



1. Input 2. GND 3. Output

Internal Block Digram



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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-Case (Note1) TO-220 (Tc = +25°C)	$R_{\theta JC}$	2.5	°C/W
Thermal Resistance Junction-Air (Note1, 2) TO-220 (Ta = +25°C) D-PAK (Ta = +25°C)	$R_{\theta JA}$	 66 92	°C/W
Operating Junction Temperature Range	T_{OPR}	0 ~ +150	°C
Storage Temperature Range	T_{STG}	-65 ~ +150	°C

Note:

1. Thermal resistance test board
   Size: 76.2mm * 114.3mm * 1.6mm(1S0P)
   JEDEC standard: JESD51-3, JESD51-7
2. Assume no ambient airflow

Electrical Characteristics (MC78M05/LM78M05)

(Refer to the test circuits, 0 ≤ 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 20V		4.75	5	5.25	
Line Regulation (Note3)	ΔV_O	I_O = 200mA T_J =+25°C	V_I = 7V to 25V	-	-	100	mV
			V_I = 8V to 25V	-	-	50	
Load Regulation (Note3)	ΔV_O	I_O = 5mA to 0.5A, T_J =+25°C		-	-	100	mV
		I_O = 5mA to 200mA, T_J =+25 °C		-	-	50	
Quiescent Current	I_Q	T_J =+25°C		-	4.0	6.0	mA
Quiescent Current Change	ΔI_Q	I_O = 5mA to 350mA		-	-	0.5	mA
		I_O = 200mA V_I = 8V to 25V		-	-	0.8	
Output Voltage Drift	$\Delta V/\Delta T$	I_O = 5mA T_J = 0 to +125°C		-	-0.5	-	mV/°C
Output Noise Voltage	V_N	f = 10Hz to 100kHz		-	40	-	μV/Vo
Ripple Rejection	RR	f = 120Hz, I_O = 300mA V_I = 8V to 18V, T_J =+25 °C		-	80	-	dB
Dropout Voltage	V_D	T_J =+25°C, I_O = 500mA		-	2	-	V
Short Circuit Current	I_{SC}	T_J =+25°C, V_I = 35V		-	300	-	mA
Peak Current	I_{PK}	T_J =+25°C		-	700	-	mA

Note:

3. 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.

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Electrical Characteristics (MC78M06) (Continued)

(Refer to the test circuits, $0 \leq T_J \leq +125°C$, I_O=350mA, V_I =11V, 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		5.75	6	6.25	V
		I_O = 5mA to 350mA V_I = 8V to 21V		5.7	6	6.3	
Line Regulation (Note1)	ΔV_O	I_O = 200mA T_J = +25°C	V_I = 8V to 25V	-	-	100	mV
			V_I = 9V to 25V	-	-	50	
Load Regulation (Note1)	ΔV_O	I_O = 5mA to 0.5A, T_J = +25°C		-	-	120	mV
		I_O = 5mA to 200mA, T_J = +25°C		-	-	60	
Quiescent Current	I_Q	T_J = +25°C		-	4.0	6.0	mA
Quiescent Current Change	ΔI_Q	I_O = 5mA to 350mA		-	-	0.5	mA
		I_O = 200mA V_I = 9V to 25V		-	-	0.8	
Output Voltage Drift	$\Delta V/\Delta T$	I_O = 5mA T_J = 0 to +125°C		-	-0.5	-	mV/°C
Output Noise Voltage	V_N	f = 10Hz to 100kHz		-	45	-	µV/Vo
Ripple Rejection	RR	f = 120Hz, I_O = 300mA V_I = 9V to 19V, T_J =+25 °C		-	80	-	dB
Dropout Voltage	V_D	T_J =+25°C, I_O = 500mA		-	2	-	V
Short Circuit Current	I_{SC}	T_J = +25°C, V_I= 35V		-	300	-	mA
Peak Current	I_{PK}	T_J =+25°C		-	700	-	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.

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Electrical Characteristics (MC78M08) (Continued)

(Refer to the test circuits, $0 \leq T_J \leq +125°C$, I_O=350mA, V_I=14V, 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		7.7	8	8.3	V
		I_O = 5mA to 350mA V_I = 10.5V to 23V		7.6	8	8.4	
Line Regulation (Note1)	ΔV_O	I_O = 200mA T_J =+25°C	V_I = 10.5V to 25V	-	-	100	mV
			V_I = 11V to 25V	-	-	50	
Load Regulation (Note1)	ΔV_O	I_O = 5mA to 0.5A, T_J =+25°C		-	-	160	mV
		I_O = 5mA to 200mA, T_J =+25°C		-	-	80	
Quiescent Current	I_Q	T_J = +25°C		-	4.0	6.0	mA
Quiescent Current Change	ΔI_Q	I_O = 5mA to 350mA		-	-	0.5	mA
		I_O = 200mA V_I = 10.5V to 25V		-	-	0.8	
Output Voltage Drift	RR	I_O = 5mA T_J = 0 to +125°C		-	–0.5	-	mV/°C
Output Noise Voltage	V_N	f = 10Hz to 100kHz		-	52	-	μV/Vo
Ripple Rejection	RR	f = 120Hz, I_O = 300mA V_I = 11.5V to 21.5V, T_J =+25 °C		-	80	-	dB
Dropout Voltage	V_D	T_J = +25°C, I_O = 500mA		-	2	-	V
Short Circuit Current	I_{SC}	T_J = +25°C, V_I = 35V		-	300	-	mA
Peak Current	I_{PK}	T_J = +25°C		-	700	-	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.

查询"LM78M05CT"供应商

Electrical Characteristics (MC78M12) (Continued)

(Refer to the test circuits, $0 \leq T_J \leq +125°C$, I_O=350mA, V_I=19V, 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		11.5	12	12.5	V
		I_O = 5mA to 350mA V_I = 14.5V to 27V		11.4	12	12.6	
Line Regulation (Note1)	ΔV_O	I_O = 200mA T_J = +25°C	V_I = 14.5V to 30V	-	-	100	mV
			V_I = 16V to 30V	-	-	50	
Load Regulation (Note1)	ΔV_O	I_O = 5mA to 0.5A, T_J = +25°C		-	-	240	mV
		I_O = 5mA to 200mA, T_J = +25°C		-	-	120	
Quiescent Current	I_Q	T_J =+25°C		-	4.1	6.0	mA
Quiescent Current Change	ΔI_Q	I_O = 5mA to 350mA		-	-	0.5	mA
		I_O = 200mA V_I = 14.5V to 30V		-	-	0.8	
Output Voltage Drift	$\Delta V/\Delta T$	I_O = 5mA T_J = 0 to +125°C		-	-0.5	-	mV/°C
Output Noise Voltage	V_N	f = 10Hz to 100kHz		-	75	-	µV/Vo
Ripple Rejection	RR	f = 120Hz, I_O = 300mA V_I = 15V to 25V, T_J =+25 °C		-	80	-	dB
Dropout Voltage	V_D	T_J =+25°C, I_O = 500mA		-	2	-	V
Short Circuit Current	I_{SC}	T_J = +25°C, V_I = 35V		-	300	-	mA
Peak Current	I_{PK}	T_J = +25°C		-	700	-	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.

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Electrical Characteristics (MC78M15) (Continued)

(Refer to the test circuits, $0 \leq T_J \leq +125°C$, I_O=350mA, V_I=23V, 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		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	I_O = 200mA T_J =+25°C	V_I = 17.5V to 30V	-	-	100	mV
			V_I = 20V to 30V	-	-	50	
Load Regulation (Note1)	ΔV_O	I_O = 5mA to 0.5A, T_J =+25°C		-	-	300	mV
		I_O = 5mA to 200mA, T_J =+25°C		-	-	150	
Quiescent Current	I_Q	T_J = +25°C		-	4.1	6.0	mA
Quiescent Current Change	ΔI_Q	I_O = 5mA to 350mA		-	-	0.5	mA
		I_O = 200mA V_I = 17.5V to 30V		-	-	0.8	
Output Voltage Drift	$\Delta V/\Delta T$	I_O = 5mA T_J = 0 to +125°C		-	-1	-	mV/°C
Output Noise Voltage	V_N	f = 10Hz to 100kHz		-	100	-	µV/Vo
Ripple Rejection	RR	f = 120Hz, I_O = 300mA V_I = 18.5V to 28.5V, T_J =+25 °C		-	70	-	dB
Dropout Voltage	V_D	T_J =+25°C, I_O = 500mA		-	2	-	V
Short Circuit Current	I_{SC}	T_J = +25°C, V_I = 35V		-	300	-	mA
Peak Current	I_{PK}	T_J = +25°C		-	700	-	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.

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Electrical Characteristics (MC78M18) (Continued)

(Refer to the test circuits, $0 \leq T_J \leq +125°C$, I_O=350mA, V_I=26V, 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		17.3	18	18.7	V
		I_O = 5mA to 350mA V_I = 20.5V to 33V		17.1	18	18.9	
Line Regulation (Note1)	ΔV_O	I_O = 200mA T_J = +25°C	V_I = 21V to 33V	-	-	100	mV
			V_I = 24V to 33V	-	-	50	
Load Regulation (Note1)	ΔV_O	I_O = 5mA to 0.5A, T_J = +25°C		-	-	360	mV
		I_O = 5mA to 200mA, T_J = +25°C		-	-	180	
Quiescent Current	I_Q	T_J = +25°C		-	4.2	6.0	mA
Quiescent Current Change	ΔI_Q	I_O = 5mA to 350mA		-	-	0.5	mA
		I_O = 200mA V_I = 21V to 33V		-	-	0.8	
Output Voltage Drift	$\Delta V/\Delta T$	I_O = 5mAT_J = 0 to 125°C		-	-1.1	-	mV/°C
Output Noise Voltage	V_N	f = 10Hz to 100kHz		-	100	-	μV/Vo
Ripple Rejection	RR	f = 120Hz, I_O= 300mA , V_I = 22V to 32V T_J =+25 °C		-	70	-	dB
Dropout Voltage	V_D	T_J = +25°C, I_O = 500mA		-	2	-	V
Short Circuit Current	I_{SC}	T_J = +25°C, V_I = 35V		-	300	-	mA
Peak Current	I_{PK}	T_J = +25°C		-	700	-	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.

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Electrical Characteristics (MC78M24) (Continued)

(Refer to the test circuits, $0 \leq T_J \leq +125°C$, I_O=350mA, V_I=33V, 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		23	24	25	V
		I_O = 5mA to 350mA V_I = 27V to 38V		22.8	24	25.2	
Line Regulation (Note1)	ΔV_O	I_O = 200mA T_J =+25°C	V_I = 27V to 38V	-	-	100	mV
			V_I = 28V to 38V	-	-	50	
Load Regulation (Note1)	ΔV_O	I_O = 5mA to 0.5A, T_J =+25°C		-	-	480	mV
		I_O = 5mA to 200mA, T_J =+25°C		-	-	240	
Quiescent Current	I_Q	T_J = +25°C		-	4.2	6.0	mA
Quiescent Current Change	ΔI_Q	I_O = 5mA to 350mA		-	-	0.5	mA
		I_O = 200mA V_I = 27V to 38V		-	-	0.8	
Output Voltage Drift	$\Delta V/\Delta T$	I_O = 5mA T_J = 0 to +125°C		-	-1.2	-	mV/°C
Output Noise Voltage	V_N	f = 10Hz to 100kHz		-	170	-	µV/Vo
Ripple Rejection	RR	f = 120Hz, I_O = 300mA V_I = 28V to 38V, T_J =+25 °C		-	70	-	dB
Dropout Voltage	V_D	T_J = +25°C, I_O = 500mA		-	2	-	V
Short Circuit Current	I_{SC}	T_J = +25°C, V_I = 35V		-	300	-	mA
Peak Current	I_{PK}	T_J = +25°C		-	700	-	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.

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Typical Applications

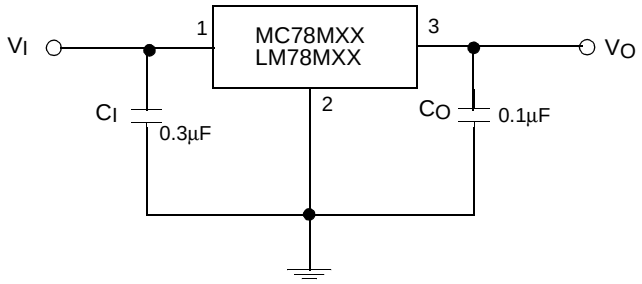

Figure 1. Fixed Output Regulator

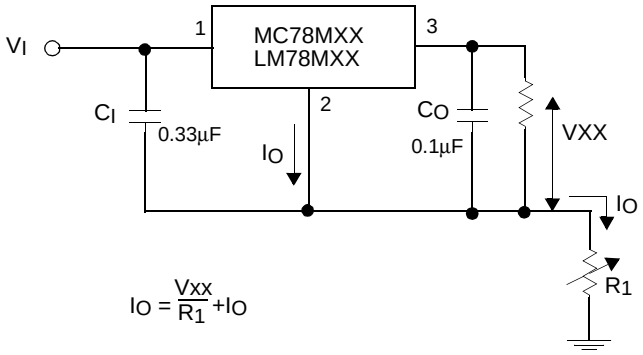

Figure 2. Constant Current Regulator

Notes:

1. To specify an output voltage, substitute voltage value for "XX"
2. Although no output capacitor is needed for stability, it does improve transient response.
3. C_I is required if regulator is located an appreciable distance from power Supply filter

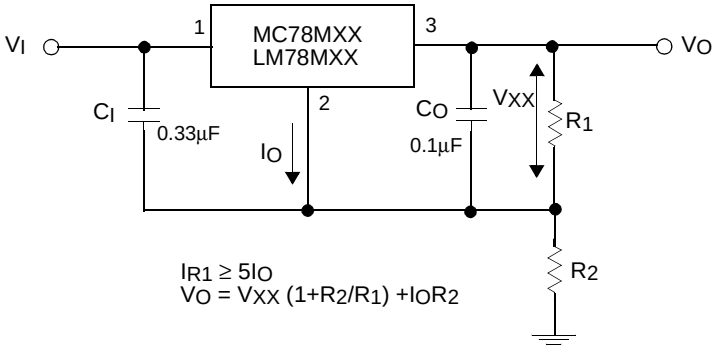

Figure 3. Circuit for Increasing Output Voltage

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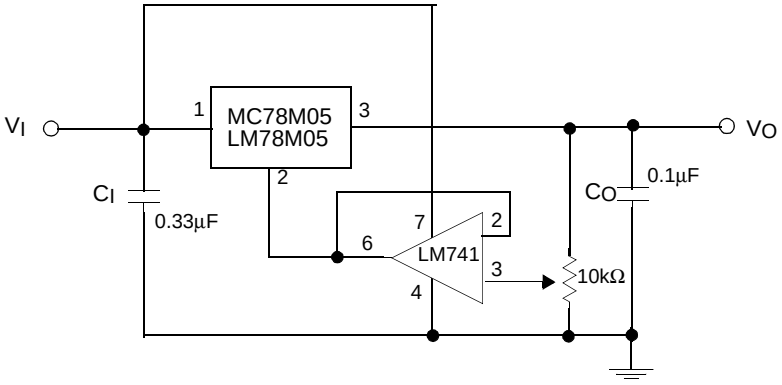

Figure 4. Adjustable Output Regulator (7 to 30V)

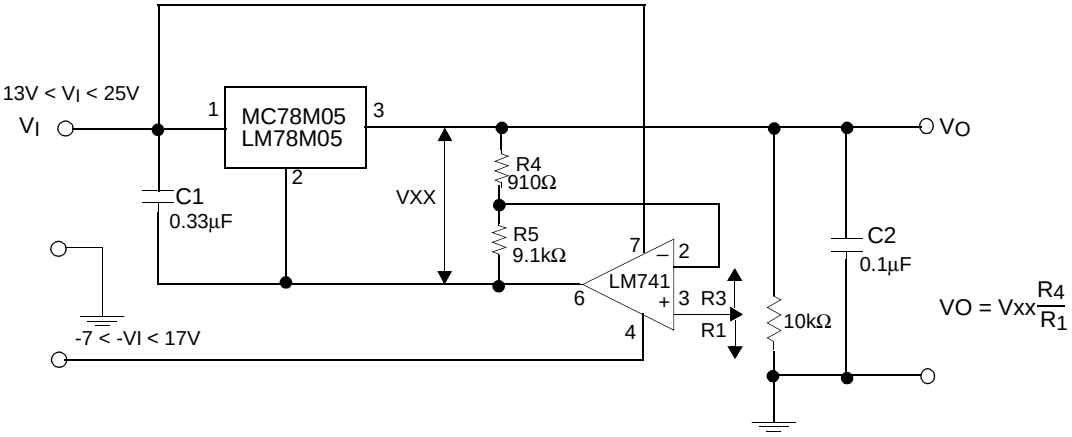

Figure 5. 0.5 to 10V Regulator

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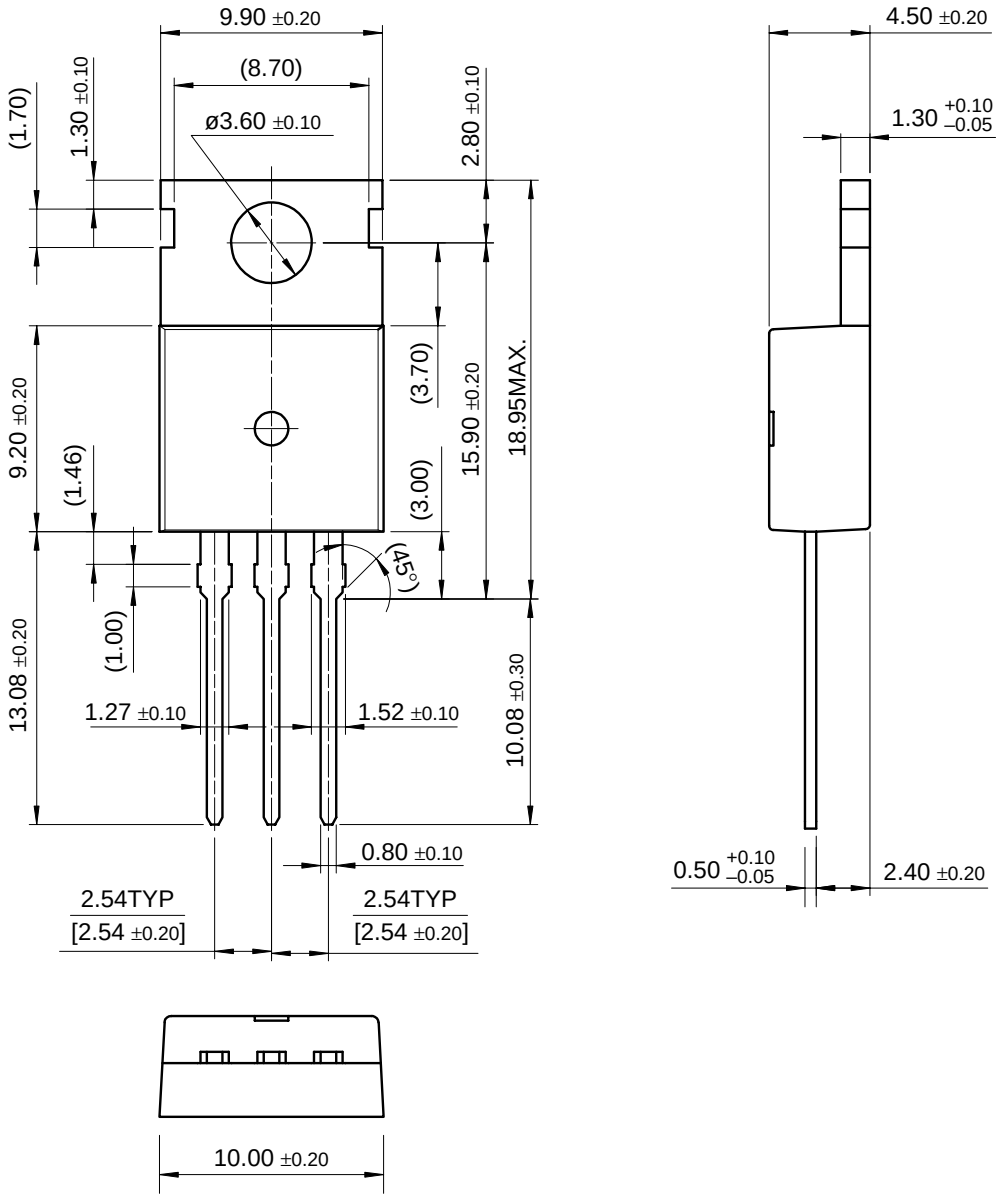
Mechanical Dimensions

Package

Dimensions in millimeters

TO-220



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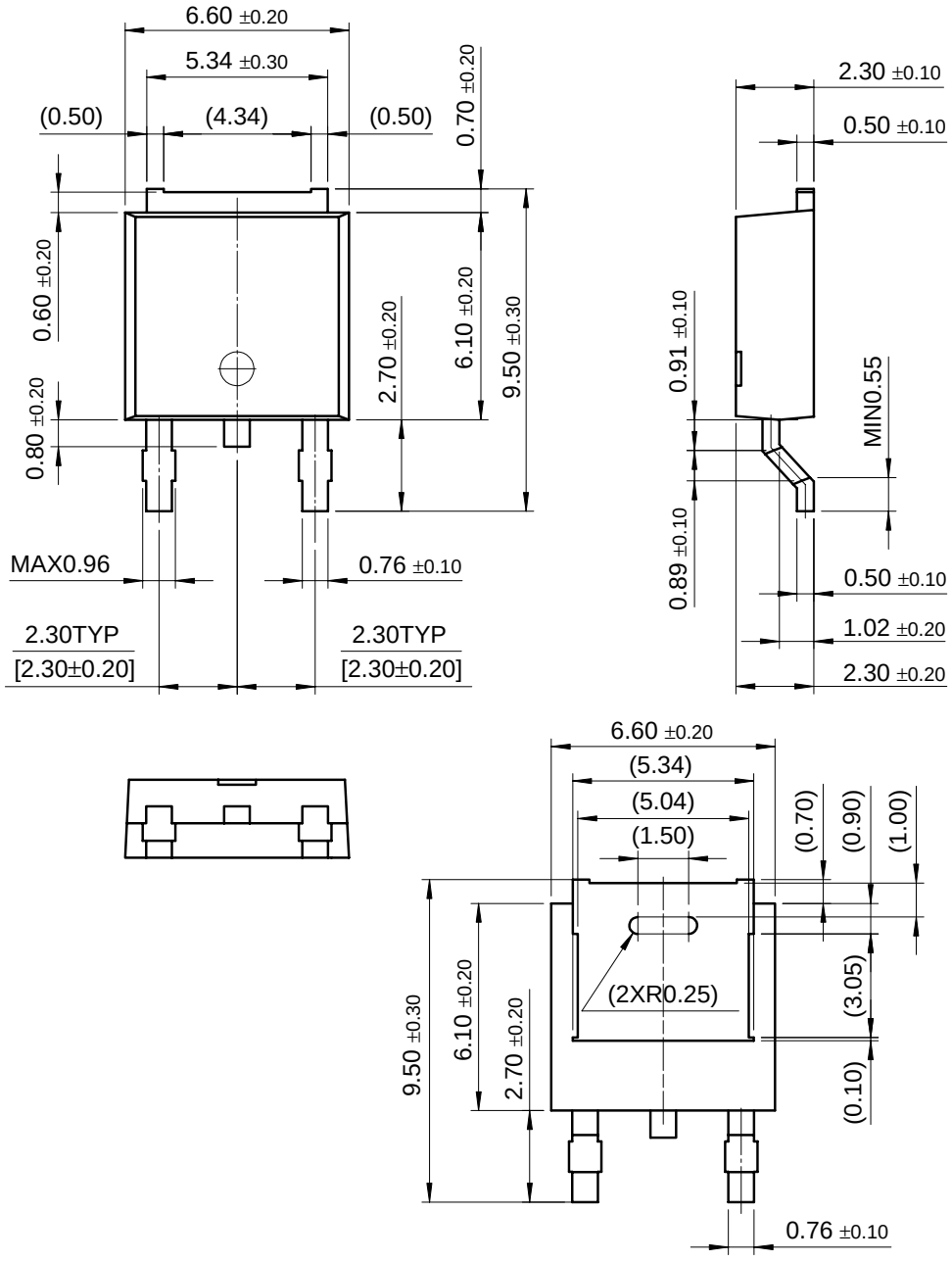
Mechanical Dimensions (Continued)

Package

Dimensions in millimeters

D-PAK



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Ordering Information

Product Number	Package	Operating Temperature
LM78M05CT	TO-220	0 ~ +125°C

Product Number	Package	Operating Temperature
MC78M05CT	TO-220	0 ~ +125°C
MC78M06CT		
MC78M08CT		
MC78M12CT		
MC78M15CT		
MC78M18CT		
MC78M24CT		
MC78M05CDT	D-PAK	
MC78M06CDT		
MC78M08CDT		
MC78M12CDT		

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