

78MXX

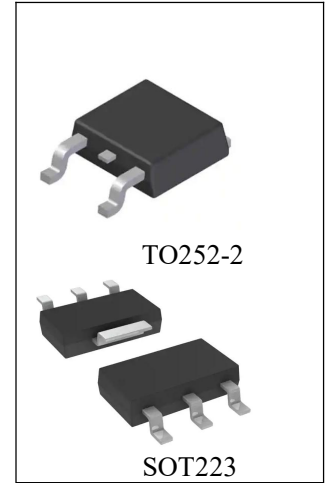
Three-terminal positive Voltage Regulator

General Description

The 78MXX family is monolithic fixed voltage regulator integrated circuit. They are suitable for applications that required supply current up to 0.5 A.

Features

- Output Current Up To 0.5 A
- Fixed Output Voltage Of 3.3V, 5V, 6V, 8V, 9V, 12V, 15V, 18V and 24V Available
- Thermal Overload Shutdown Protection
- Short Circuit Current Limiting
- Output Transistor SOA Protection



Package Information

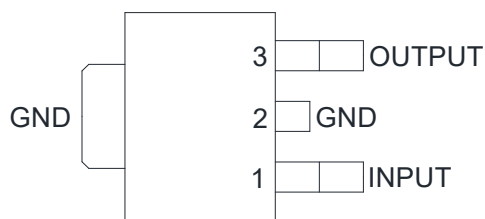
Part NO.	Package Description	Package Marking	Package Option
78MXX	TO252-2	CHMC 78MXX SXXXX	70/Tube 2500/Reel
78MXXS	SOT223	78MXXS SXXXX	2500/Reel

SXXXX:Lot NO.

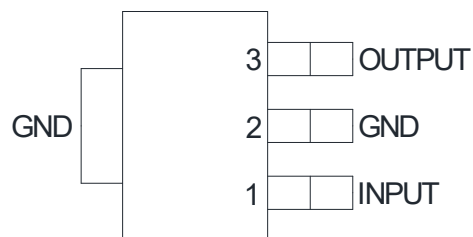
78MXX/78MXXS:Part NO. (XX:Output Voltage)

XX(Output Voltage):33(3.3V)/ 05(5.0V)/06(6.0V)/08(8.0V)/09(9.0V)/12(12V)/15(15V)/18(18V)/24(24V)

Pin Connection

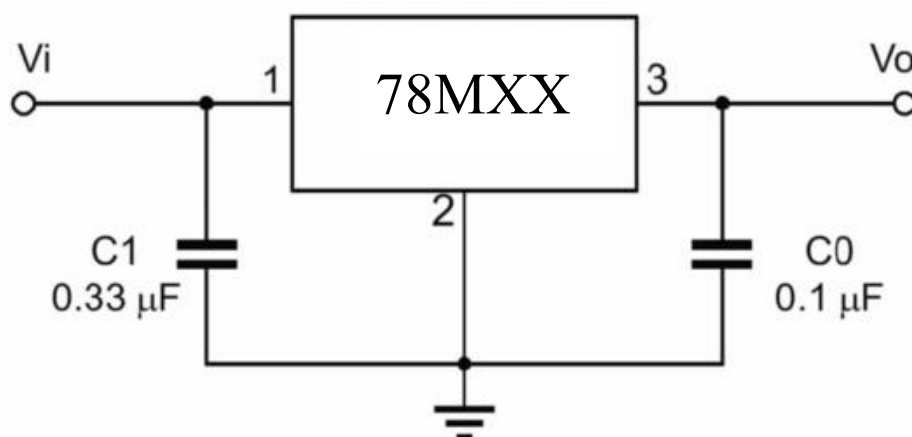


78MXX(TO252-2)



78MXXS(SOT223)

Typical Application Circuits



Absolute Maximum Ratings ($T_J=25^{\circ}\text{C}$, unless otherwise specified)

Characteristic	Value	Value	Unit
Input Voltage	V_i	35	V
Thermal Resistance Junction-Case	$R_{\theta JC}$	10	$^{\circ}\text{C/W}$
Thermal Resistance Junction-Air	$R_{\theta JA}$	93	$^{\circ}\text{C/W}$
Operating Temperature Range	T_{OPR}	-40~+125	$^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	-55~+150	$^{\circ}\text{C}$

Electrical Characteristics

For 78M33(S)(unless otherwise noted, $V_i=9\text{V}$, $I_o=350\text{mA}$, $C_i=0.33\mu\text{F}$, $C_o=0.1\mu\text{F}$)

Characteristics	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_o	$T_J=+25^{\circ}\text{C}$, $I_o=5\text{mA}\sim 0.5\text{A}$	3.16	3.3	3.43	V
		$5.3\text{V}\leq V_i\leq 20\text{V}$, $I_o=5\text{mA}\sim 0.5\text{A}$	3.13	3.3	3.46	
Line Regulation*	ΔV_o	$5.3\text{V}\leq V_i\leq 25\text{V}$, $T_J=25^{\circ}\text{C}$, $I_o=200\text{mA}$		4.0	100	mV
		$6.3\text{V}\leq V_i\leq 20\text{V}$, $T_J=25^{\circ}\text{C}$, $I_o=200\text{mA}$		2	80	
Load Regulation*	ΔV_o	$T_J=25^{\circ}\text{C}$, $I_o=5\text{mA}\sim 0.5\text{A}$		25	100	mV
		$T_J=25^{\circ}\text{C}$, $I_o=5\text{mA}\sim 200\text{mA}$		10	50	
Quiescent Current	I_Q	$T_J=+25^{\circ}\text{C}$, $I_o=0.5\text{A}$		4	6	mA
Quiescent Current Change	ΔI_Q	$6.3\text{V}\leq V_i\leq 25\text{V}$, $I_o=200\text{mA}$			0.8	mA
		$5\text{mA}\leq I_o\leq 0.35\text{A}$			0.5	
Output Noise Voltage	V_N	$10\text{Hz}\leq f\leq 100\text{kHz}$, $T_J=25^{\circ}\text{C}$		40	200	μV
Ripple Rejection	RR	$6.3\text{V}\leq V_i\leq 18\text{V}$, $f=120\text{Hz}$, $I_o=300\text{mA}$, $T_J=25^{\circ}\text{C}$	56	70		dB
Dropout Voltage	V_d	$T_J=+25^{\circ}\text{C}$		1.7		V
Short Circuit Current Limit	I_{SC}	$V_i=V_o+2\text{V}$, $T_J=+25^{\circ}\text{C}$		0.9		A

For 78M05(S) (unless otherwise noted, $V_i=10V, I_o=350mA, C_i=0.33\mu F, C_o=0.1\mu F$)

Characteristics	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_o	$T_j=+25^{\circ}C, I_o=5mA \sim 0.5A$	4.8	5.0	5.2	V
		$7V \leq V_i \leq 20V, I_o=5mA \sim 0.5A$	4.75	5.0	5.25	
Line Regulation*	ΔV_o	$7V \leq V_i \leq 25V, T_j=25^{\circ}C, I_o=200mA$		4.0	100	mV
		$8V \leq V_i \leq 20V, T_j=25^{\circ}C, I_o=200mA$		2	80	
Load Regulation*	ΔV_o	$T_j=25^{\circ}C, I_o=5mA \sim 0.5A$		25	100	mV
		$T_j=25^{\circ}C, I_o=5mA \sim 200mA$		10	50	
Quiescent Current	I_Q	$T_j=+25^{\circ}C, I_o=0.5A$		4	6	mA
Quiescent Current Change	ΔI_Q	$8V \leq V_i \leq 25V, I_o=200mA$			0.8	mA
		$5mA \leq I_o \leq 0.35A$			0.5	
Output Noise Voltage	V_N	$10Hz \leq f \leq 100kHz, T_j=25^{\circ}C$		40	200	μV
Ripple Rejection	RR	$8V \leq V_i \leq 18V, f=120Hz, I_o=300mA, T_j=25^{\circ}C$	56	70		dB
Dropout Voltage	V_d	$T_j=+25^{\circ}C$		1.7		V
Short Circuit Current Limit	I_{SC}	$V_i=V_o+2V, T_j=+25^{\circ}C$		0.9		A

For 78M06(S) (unless otherwise noted, $V_i=11V, I_o=350mA, C_i=0.33\mu F, C_o=0.1\mu F$)

Characteristics	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_o	$T_j=+25^{\circ}C$	5.75	6.0	6.25	V
		$8V \leq V_i \leq 21V, I_o=5mA \sim 0.35A$	5.7	6.0	6.3	
Line Regulation*	ΔV_o	$8V \leq V_i \leq 25V, T_j=25^{\circ}C, I_o=200mA$		4	100	mV
		$8V \leq V_i \leq 21V, I_o=0.2A, T_j=25^{\circ}C$		2	80	
Load Regulation*	ΔV_o	$T_j=25^{\circ}C, I_o=5mA \sim 0.5A$		25	120	mV
		$T_j=25^{\circ}C, I_o=5mA \sim 200mA$		10	60	
Quiescent Current	I_Q	$T_j=+25^{\circ}C$		4	6	mA
Quiescent Current Change	ΔI_Q	$9V \leq V_i \leq 25V, I_o=200mA$			0.8	mA
		$5mA \leq I_o \leq 0.35A$			0.5	
Output Noise Voltage	V_N	$10Hz \leq f \leq 100kHz, T_j=25^{\circ}C$		40	200	μV
Ripple Rejection	RR	$9V \leq V_i \leq 19V, f=120Hz, I_o=300mA, T_j=25^{\circ}C$	56	70		dB
Dropout Voltage	V_d	$T_j=+25^{\circ}C$		1.7		V
Short Circuit Current Limit	I_{SC}	$V_i=V_o+2V, T_j=+25^{\circ}C$		0.9		A

For 78M08(S) (unless otherwise noted, $V_i=14V, I_o=350mA, C_i=0.33\mu F, C_o=0.1\mu F$)

Characteristics	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_o	$T_j=+25^{\circ}C$	7.68	8.0	8.32	V
		$10V \leq V_i \leq 23V, I_o=5mA \sim 0.35A$	7.6	8.0	8.4	
Line Regulation*	ΔV_o	$10V \leq V_i \leq 25V, T_j=25^{\circ}C, I_o=200mA$		6	100	mV
		$11V \leq V_i \leq 25V, I_o=0.5A, T_j=25^{\circ}C, I_o=200mA$		2	80	
Load Regulation*	ΔV_o	$T_j=25^{\circ}C, I_o=5mA \sim 0.5A$		26	160	mV
		$T_j=25^{\circ}C, I_o=5mA \sim 200mA$		10	80	
Quiescent Current	I_Q	$T_j=+25^{\circ}C$		4.0	6.0	mA
Quiescent Current Change	ΔI_Q	$10V \leq V_i \leq 25V, I_o=200mA$			0.8	mA
		$5mA \leq I_o \leq 0.5A$			0.5	
Output Noise Voltage	V_N	$10Hz \leq f \leq 100kHz$		60	250	μV
Ripple Rejection	RR	$11.5V \leq V_i \leq 21.5V, f=120Hz, I_o=300mA, T_j=25^{\circ}C$	56	70		dB
Dropout Voltage	V_d	$T_j=+25^{\circ}C$		1.7		V
Short Circuit Current Limit	I_{SC}	$V_i=V_o+2V, T_j=+25^{\circ}C$		0.9		A

For 78M09(S) (unless otherwise noted, $V_i=15V, I_o=350mA, C_i=0.33\mu F, C_o=0.1\mu F$)

Characteristics	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_o	$T_j=+25^{\circ}C$	8.64	9	9.36	V
		$11V \leq V_i \leq 26V, I_o=5mA \sim 0.35A$	8.55	9	9.45	
Line Regulation*	ΔV_o	$11V \leq V_i \leq 26V, I_o=0.2A, T_j=25^{\circ}C$		5	100	mV
		$13V \leq V_i \leq 26V, I_o=0.2A, T_j=25^{\circ}C$		3	80	
Load Regulation*	ΔV_o	$T_j=25^{\circ}C, I_o=5mA \sim 0.5A$		25	180	mV
		$T_j=25^{\circ}C, I_o=5mA \sim 200mA$		10	90	
Quiescent Current	I_Q	$T_j=+25^{\circ}C$		4.0	6.0	mA
Quiescent Current Change	ΔI_Q	$12V \leq V_i \leq 26V, I_o=0.2A$			0.8	mA
		$5mA \leq I_o \leq 0.35A$			0.5	
Output Noise Voltage	V_N	$10Hz \leq f \leq 100kHz, T_j=25^{\circ}C$		60	250	μV
Ripple Rejection	RR	$12V \leq V_i \leq 22V, f=120Hz, I_o=300mA, T_j=25^{\circ}C$	56	68		dB
Dropout Voltage	V_d	$T_j=+25^{\circ}C$		1.7		V
Short Circuit Current Limit	I_{SC}	$V_i=V_o+2V, T_j=+25^{\circ}C$		0.9		A

For 78M12(S) (unless otherwise noted, $V_i=19V, I_o=350mA, C_i=0.33\mu F, C_o=0.1\mu F$)

Characteristics	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_o	$T_j=+25^{\circ}C$	11.5	12	12.5	V
		$14V \leq V_i \leq 27V, I_o=5mA \sim 0.35A$	11.4	12	12.6	
Line Regulation*	ΔV_o	$14V \leq V_i \leq 30V, I_o=0.2A, T_j=25^{\circ}C$		7	100	mV
		$16V \leq V_i \leq 30V, I_o=0.2A, T_j=25^{\circ}C$		3	80	
Load Regulation*	ΔV_o	$T_j=25^{\circ}C, I_o=5mA \sim 0.5A$		27	240	mV
		$T_j=25^{\circ}C, I_o=5mA \sim 200mA$		10	120	
Quiescent Current	I_Q	$T_j=+25^{\circ}C$		4.0	6.0	mA
Quiescent Current Change	ΔI_Q	$15V \leq V_i \leq 30V, I_o=0.2A$			0.8	mA
		$5mA \leq I_o \leq 0.5A$			0.5	
Output Noise Voltage	V_N	$10Hz \leq f \leq 100kHz, T_j=25^{\circ}C$		70	300	μV
Ripple Rejection	RR	$15V \leq V_i \leq 25V, f=120Hz, I_o=300mA, T_j=25^{\circ}C$	50	60		dB
Dropout Voltage	V_d	$T_j=+25^{\circ}C$		1.7		V
Short Circuit Current Limit	I_{SC}	$V_i=V_o+2V, T_j=+25^{\circ}C$		0.9		A

For 78M15(S) (unless otherwise noted, $V_i=23V, I_o=350mA, C_i=0.33\mu F, C_o=0.1\mu F$)

Characteristics	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_o	$T_j=+25^{\circ}C$	14.4	15	15.6	V
		$17V \leq V_i \leq 30V, I_o=5mA \sim 0.35A$	14.25	15	15.75	
Line Regulation*	ΔV_o	$17V \leq V_i \leq 30V, I_o=0.2A, T_j=25^{\circ}C$		8	100	mV
		$19V \leq V_i \leq 30V, I_o=0.2A, T_j=25^{\circ}C$		4	80	
Load Regulation*	ΔV_o	$T_j=25^{\circ}C, I_o=5mA \sim 0.5A$		27	300	mV
		$T_j=25^{\circ}C, I_o=5mA \sim 200mA$		10	150	
Quiescent Current	I_Q	$T_j=+25^{\circ}C$		4.0	6.0	mA
Quiescent Current Change	ΔI_Q	$18V \leq V_i \leq 30V, I_o=200mA$			0.8	mA
		$5mA \leq I_o \leq 0.35A$			0.5	
Output Noise Voltage	V_N	$10Hz \leq f \leq 100kHz, T_j=25^{\circ}C$		70	300	μV
Ripple Rejection	RR	$18.5V \leq V_i \leq 28.5V, f=120Hz, I_o=300mA, T_j=25^{\circ}C$	48	57		dB
Dropout Voltage	V_d	$T_j=+25^{\circ}C$		1.7		V
Short Circuit Current Limit	I_{SC}	$V_i=V_o+2V, T_j=+25^{\circ}C$		0.9		A

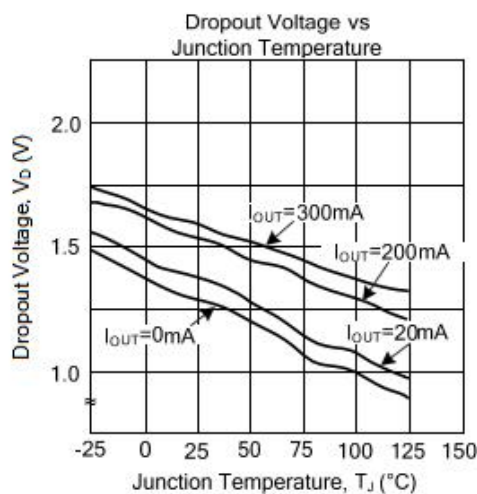
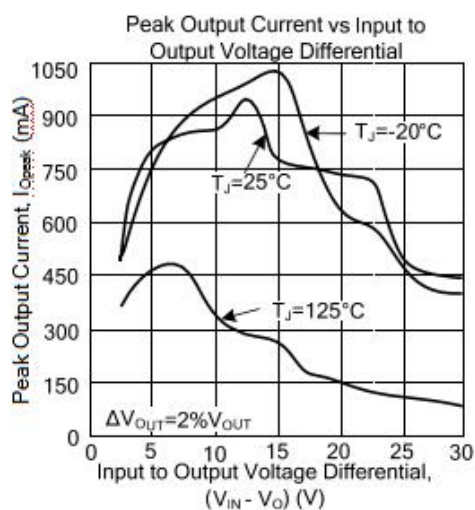
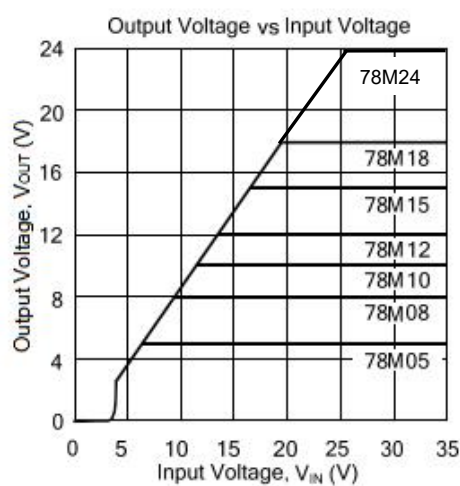
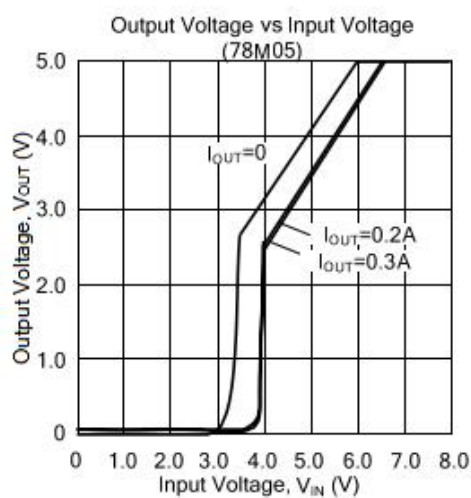
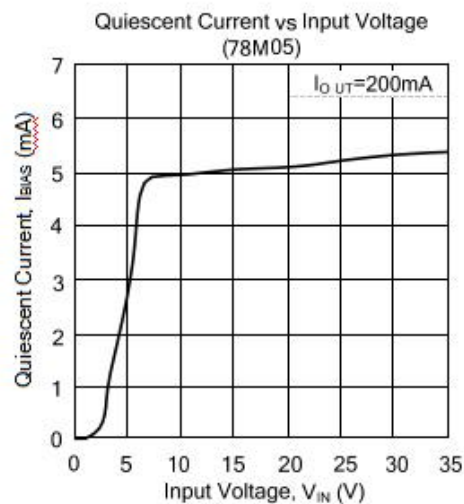
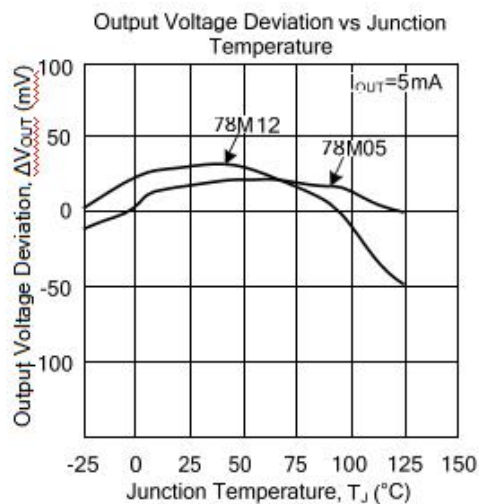
For 78M18(S) (unless otherwise noted, $V_i=25V, I_o=350mA, C_i=0.33\mu F, C_o=0.1\mu F$)

Characteristics	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_o	$T_j=+25^{\circ}C$	17.28	18	18.72	V
		$20V \leq V_i \leq 30V, I_o=5mA \sim 0.35A$	17.1	18	18.90	
Line Regulation*	ΔV_o	$20V \leq V_i \leq 30V, I_o=0.2A, T_j=25^{\circ}C$		8	100	mV
		$22V \leq V_i \leq 30V, I_o=0.2A, T_j=25^{\circ}C$		4	80	
Load Regulation*	ΔV_o	$T_j=25^{\circ}C, I_o=5mA \sim 0.5A$		27	300	mV
		$T_j=25^{\circ}C, I_o=5mA \sim 200mA$		10	150	
Quiescent Current	I_Q	$T_j=+25^{\circ}C$		4.0	6.0	mA
Quiescent Current Change	ΔI_Q	$21V \leq V_i \leq 30V, I_o=200mA$			0.8	mA
		$5mA \leq I_o \leq 0.35A$			0.5	
Output Noise Voltage	V_N	$10Hz \leq f \leq 100kHz, T_j=25^{\circ}C$		70	300	μV
Ripple Rejection	RR	$20V \leq V_i \leq 30V, f=120Hz, I_o=300mA, T_j=25^{\circ}C$	48	55		dB
Dropout Voltage	V_d	$T_j=+25^{\circ}C$		1.7		V
Short Circuit Current Limit	I_{SC}	$V_i=V_o+2V, T_j=+25^{\circ}C$		0.9		A

For 78M24(S) (unless otherwise noted, $V_i=33V, I_o=350mA, C_i=0.33\mu F, C_o=0.1\mu F$)

Characteristics	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_o	$T_j=+25^{\circ}C$	23	24	25	V
		$27V \leq V_i \leq 38V, I_o=5mA \sim 0.35A$	22.8	24	25.2	
Line Regulation*	ΔV_o	$27V \leq V_i \leq 38V, I_o=0.2A, T_j=25^{\circ}C$		12	100	mV
		$28V \leq V_i \leq 38V, I_o=0.2A, T_j=25^{\circ}C$		7	50	
Load Regulation*	ΔV_o	$T_j=25^{\circ}C, I_o=5mA \sim 0.5A$		30	480	mV
		$T_j=25^{\circ}C, I_o=5mA \sim 200mA$		10	240	
Quiescent Current	I_Q	$T_j=+25^{\circ}C$		5.0	8.0	mA
Quiescent Current Change	ΔI_Q	$27.5V \leq V_i \leq 38.5V, I_o=200mA$			0.8	mA
		$5mA \leq I_o \leq 0.35A$			0.5	
Output Noise Voltage	V_N	$10Hz \leq f \leq 100kHz, T_j=25^{\circ}C$		115	650	μV
Ripple Rejection	RR	$28V \leq V_i \leq 38V, f=120Hz, I_o=300mA, T_j=25^{\circ}C$	46	53		dB
Dropout Voltage	V_d	$T_j=+25^{\circ}C$		1.7		V
Short Circuit Current Limit	I_{SC}	$V_i=V_o+2V, T_j=+25^{\circ}C$		0.9		A

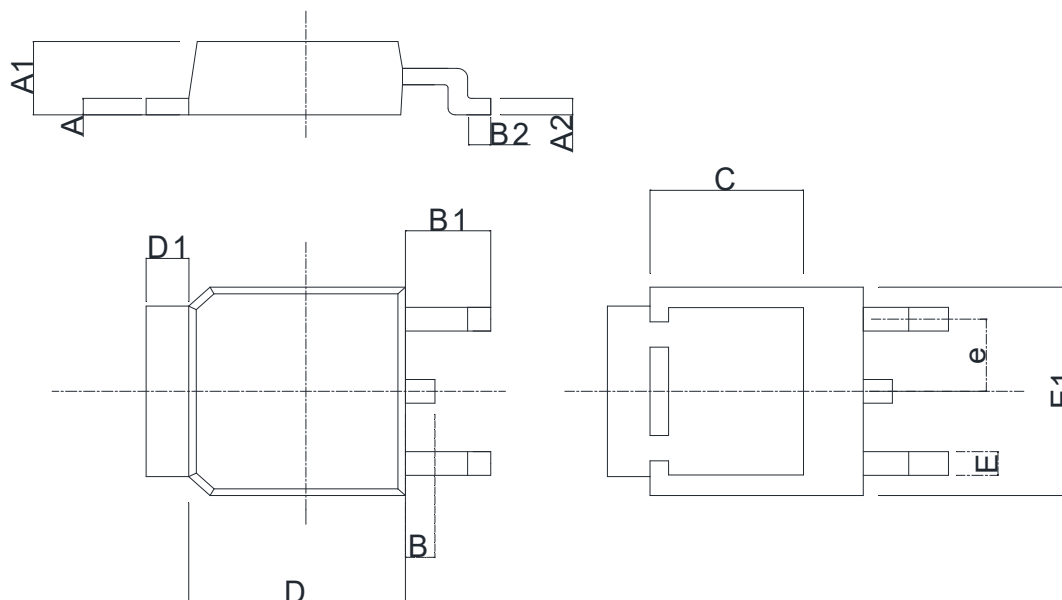
Typical Characteristics



Outline Dimensions

TO252-2

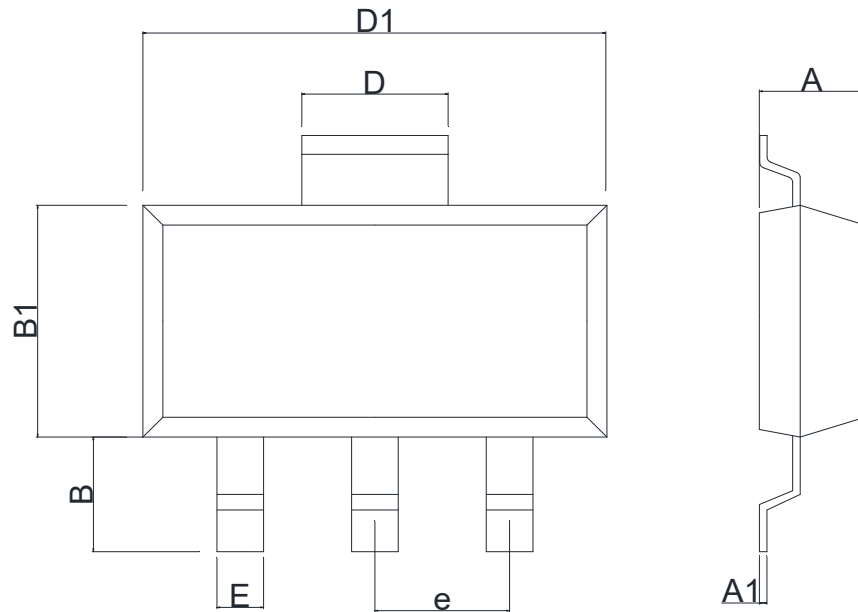
Unit: mm



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.470	0.570	0.018	0.023
A1	2.220	2.380	0.087	0.094
A2	0.470	0.570	0.018	0.023
B	0.820	0.840	0.032	0.033
B1	2.380	2.480	0.093	0.098
B2	0.500	0.520	0.019	0.021
C	4.250	4.450	0.167	0.176
D	6.000	6.200	0.236	0.245
D1	1.150	1.250	0.045	0.050
E	0.650	0.850	0.025	0.034
E1	6.450	6.750	0.253	0.266
e	2.285 (BSC)		0.090 (BSC)	

SOT223

Unit: mm



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.550	1.650	0.061	0.064
A1	0.280	0.320	0.011	0.012
B	1.750	1.950	0.068	0.076
B1	3.350	3.550	0.131	0.140
E	0.660	0.760	0.025	0.030
D1	6.450	6.550	0.253	0.257
D	2.900	3.000	0.114	0.118
e	2.300 (BSC)		0.090 (BSC)	

Statements

- Silicore Technology reserves the right to make changes without further notice to any products or specifications herein. Before customers place an order, customers need to confirm whether datasheet obtained is the latest version, and to verify the integrity of the relevant information.
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