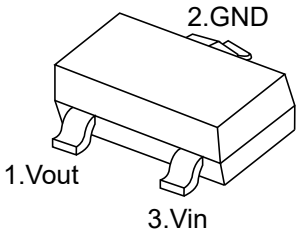
1.Description

The 78Lxx series of fixed voltage monolithic integrated circuit voltage regulators are suitable for applications that required supply up to 150mA.

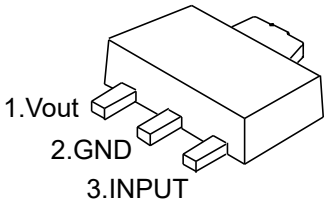
2.Features

- Maximum output current of 150mA
- Output voltage of 3.3V,5V,6V,8V,9V,10V 12V,15V,18V and 24V
- Thermal overload protection
- Short circuit current limiting
- Output voltage accuracy：1%

3.Pinning information

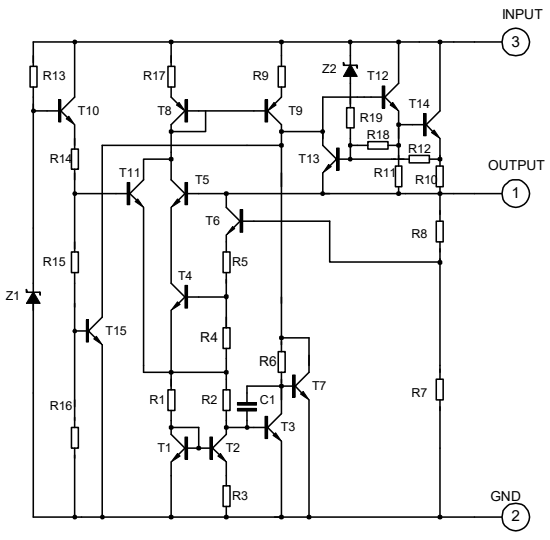


SOT-23



SOT-89

4.Block Diagram



5.Absolute Maximum Ratings

Characteristics	Symbol	Value	Units
Input voltage (for V_O=3.3~18V)	V_I	35	V
(for V_O=24V)		40	V
High power dissipation	P_D	800	mW
Junction Temperature Range	T_{OPR}	-20 to 120	°C
Storage Temperature Range	T_{STG}	-55 to 150	°C

6.1 Electrical Characteristics (78L33)

(V_I=5.3V, I_O=40mA, 0<T_J<125°C, C1=0.33μF, C_O=0.1μF, unless otherwise specified) (Note 1)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Output Voltage	V_O	T_J=25°C	3.267	3.3	3.333	V
Load Regulation	ΔV_O	T_J=25°C, I_O=1mA~130mA		10	60	mV
		T_J=25°C, I_O=1mA~70mA		7	30	mV
Line regulation	ΔV_O	5.3V≤V_I≤20V, T_J=25°C		7	150	mV
		6.3V≤V_I≤20V, T_J=25°C		4	100	mV
Quiescent Current	I_q	T_J=25°C		2	5.5	mA
Quiescent Current Change	ΔI_q	6.3V≤V_I≤20V			1.5	mA
	ΔI_q	1mA≤I_O≤40mA			0.1	mA
Output Noise Voltage	V_N	10Hz≤f≤100kHz, T_J=25°C		40		μV
Temperature coefficient of V_O	$\Delta V_O/\Delta T$	I_O=5mA		0.45		mV/°C
Ripple Rejection	RR	6.3V ≤V_I≤16.3V, f=120Hz, T_J=25°C	40	49		dB
Dropout Voltage	V_d	T_J=25°C		1.7		V

6.2 Electrical Characteristics (78L05)

(V_I=10V, I_O=40mA, 0<T_J<125°C, C1=0.33μF, C_O=0.1μF, unless otherwise specified) (Note 1)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Output Voltage	V_O	T_J=25°C	4.95	5	5.05	V
Load Regulation	ΔV_O	T_J=25°C, I_O=1mA~130mA		11	60	mV
		T_J=25°C, I_O=1mA~40mA		5	30	mV
Line regulation	ΔV_O	7V≤V_I≤20V, T_J=25°C		8	150	mV
		8V≤V_I≤20V, T_J=25°C		6	100	mV
Quiescent Current	I_q			2	5.5	mA
Quiescent Current Change	ΔI_q	8V≤V_I≤20V			1.5	mA
	ΔI_q	1mA≤V_I≤40mA			0.1	mA
Output Noise Voltage	V_N	10Hz≤f≤100kHz		40		μV
Temperature coefficient of V_O	ΔV_O/ ΔT	I_O=5mA		0.65		mV/°C
Ripple Rejection	RR	8V ≤V_I≤20V, f=120Hz, T_J=25°C	40	49		dB
Dropout Voltage	V_d	T_J=25°C		1.7		V

6.3 Electrical Characteristics (78L06)

(V_I=12V, I_O=40mA, 0<T_J<125°C, C1=0.33μF, C_O=0.1μF, unless otherwise specified) (Note 1)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Output Voltage	V_O	T_J=25°C	5.94	6	6.06	V
Load Regulation	ΔV_O	T_J=25°C, I_O=1mA~130mA		12.8	80	mV
		T_J=25°C, I_O=1mA~70mA		5.8	40	mV
Line regulation	ΔV_O	8.5V≤V_I≤20V, T_J=25°C		64	175	mV
		9V≤V_I≤20V, T_J=25°C		54	125	mV
Quiescent Current	I_q			2	5.5	mA
Quiescent Current Change	ΔI_q	9V≤V_I≤20V			1.5	mA
	ΔI_q	1mA≤V_I≤40mA			0.1	mA
Output Noise Voltage	V_N	10Hz≤f≤100kHz		49		μV
Temperature coefficient of V_O	$\Delta V_O/\Delta T$	I_O=5mA		0.75		mV/°C
Ripple Rejection	RR	10V≤V_I≤20V, f=120Hz, T_J=25°C	38	46		dB
Dropout Voltage	V_d	T_J=25°C		1.7		V

6.4 Electrical Characteristics (78L08)

(V_I=14V, I_O=40mA, 0<T_J<125°C, C1=0.33μF, C_O=0.1μF, unless otherwise specified) (Note 1)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Output Voltage	V_O	T_J=25°C	7.92	8	8.08	V
Load Regulation	ΔV_O	T_J=25°C, I_O=1mA~130mA		15	80	mV
		T_J=25°C, I_O=1mA~70mA		8	40	mV
Line regulation	ΔV_O	10.5V≤V_I≤23V, T_J=25°C		10	175	mV
		11V≤V_I≤23V, T_J=25°C		8	125	mV
Quiescent Current	I_q			2	5.5	mA
Quiescent Current Change	ΔI_q	11V≤V_I≤23V			1.5	mA
	ΔI_q	1mA≤V_I≤40mA			0.1	mA
Output Noise Voltage	V_N	10Hz≤f≤100kHz		49		μV
Temperature coefficient of V_O	$\Delta V_O/\Delta T$	I_O=5mA		0.75		mV/°C
Ripple Rejection	RR	11V≤V_I≤23V, f=120Hz, T_J=25°C	36	45		dB
Dropout Voltage	V_d	T_J=25°C		1.7		V

6.5 Electrical Characteristics (78L09)

(V_I=15V, I_O=40mA, 0<T_J<125°C, C1=0.33μF, C_O=0.1μF, unless otherwise specified) (Note 1)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Output Voltage	V_O	T_J=25°C	8.91	9	9.09	V
Load Regulation	ΔV_O	T_J=25°C, I_O=1mA~130mA		20	90	mV
		T_J=25°C, I_O=1mA~40mA		10	45	mV
Line regulation	ΔV_O	11.5V≤V_I≤24V, T_J=25°C		90	200	mV
		13V≤V_I≤24V, T_J=25°C		100	150	mV
Quiescent Current	I_q			2	5.5	mA
Quiescent Current Change	ΔI_q	13V≤V_I≤24V			1.5	mA
	ΔI_q	1mA≤V_I≤40mA			0.1	mA
Output Noise Voltage	V_N	10Hz≤f≤100kHz		49		μV
Temperature coefficient of V_O	$\Delta V_O/\Delta T$	I_O=5mA		0.75		mV/°C
Ripple Rejection	RR	12V≤V_I≤23V, f=120Hz, T_J=25°C	36	44		dB
Dropout Voltage	V_d	T_J=25°C		1.7		V

6.6 Electrical Characteristics (78L10)

(V_I=15V, I_O=40mA, 0<T_J<125°C, C1=0.33μF, C_O=0.1μF, unless otherwise specified) (Note 1)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Output Voltage	V_O	T_J=25°C	9.90	10	10.1	V
Load Regulation	ΔV_O	T_J=25°C, I_O=1mA~130mA		25	150	mV
		T_J=25°C, I_O=1mA~40mA		12	75	mV
Line regulation	ΔV_O	12.5V≤V_I≤27V, T_J=25°C		25	300	mV
		14V≤V_I≤27V, T_J=25°C		20	250	mV
Quiescent Current	I_q			2	5.5	mA
Quiescent Current Change	ΔI_q	14V≤V_I≤27V			1.5	mA
	ΔI_q	1mA≤V_I≤40mA			0.1	mA
Output Noise Voltage	V_N	10Hz ≤f≤100kHz		80		μV
Temperature coefficient of V_O	$\Delta V_O/\Delta T$	I_O=5mA		1		mV/°C
Ripple Rejection	RR	13V≤V_I≤25V, f=120Hz, T_J=25°C	36	42		dB
Dropout Voltage	V_d	T_J=25°C		1.7		V

6.7 Electrical Characteristics (78L12)

(V_I=19V, I_O=40mA, 0<T_J<125°C, C1=0.33μF, C_O=0.1μF, unless otherwise specified) (Note 1)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Output Voltage	V_O	T_J=25°C	11.88	12	12.12	V
Load Regulation	ΔV_O	T_J=25°C, I_O=1mA~130mA		25	150	mV
		T_J=25°C, I_O=1mA~40mA		12	75	mV
Line regulation	ΔV_O	14.5V≤V_I≤27V, T_J=25°C		25	300	mV
		16V≤V_I≤27V, T_J=25°C		20	250	mV
Quiescent Current	I_q			2	5.5	mA
Quiescent Current Change	ΔI_q	16V≤V_I≤27V			1.5	mA
	ΔI_q	1mA≤V_I≤40mA			0.1	mA
Output Noise Voltage	V_N	10Hz ≤f≤100kHz		80		μV
Temperature coefficient of V_O	$\Delta V_O/\Delta T$	I_O=5mA		1		mV/°C
Ripple Rejection	RR	15V≤V_I≤25V, f=120Hz, T_J=25°C	36	42		dB
Dropout Voltage	V_d	T_J=25°C		1.7		V

6.8 Electrical Characteristics (78L15)

(V_I=23V, I_O=40mA, 0<T_J<125°C, C1=0.33μF, C_O=0.1μF, unless otherwise specified) (Note 1)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Output Voltage	V_O	T_J=25°C	14.85	15	15.15	V
Load Regulation	ΔV_O	T_J=25°C, I_O=1mA~130mA		20	150	mV
		T_J=25°C, I_O=1mA~70mA		25	150	mV
Line regulation	ΔV_O	17.5V≤V_I≤30V, T_J=25°C		25	150	mV
		20V≤V_I≤30V, T_J=25°C		15	75	mV
Quiescent Current	I_q			2.2	6	mA
Quiescent Current Change	ΔI_q	20V≤V_I≤30V			1.5	mA
	ΔI_q	1mA≤V_I≤40mA			0.1	mA
Output Noise Voltage	V_N	10Hz ≤f≤100kHz		90		μV
Temperature coefficient of V_O	$\Delta V_O/\Delta T$	I_O=5mA		1.3		mV/°C
Ripple Rejection	RR	18.5V≤V_I≤28.5V, f=120Hz,T_J=25°C	33	39		dB
Dropout Voltage	V_d	T_J=25°C		1.7		V

6.9 Electrical Characteristics (78L18)

(V_I=27V, I_O=40mA, 0<T_J<125°C, C1=0.33μF, C_O=0.1μF, unless otherwise specified) (Note 1)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Output Voltage	V_O	T_J=25°C	17.82	18	18.18	V
Load Regulation	ΔV_O	T_J=25°C, I_O=1mA~130mA		30	170	mV
		T_J=25°C, I_O=1mA~40mA		15	85	mV
Line regulation	ΔV_O	21V≤V_I≤33V, T_J=25°C		145	300	mV
		22V≤V_I≤33V, T_J=25°C		135	250	mV
Quiescent Current	I_q			2.2	6	mA
Quiescent Current Change	ΔI_q	21V≤V_I≤33V			1.5	mA
	ΔI_q	1mA≤V_I≤40mA			0.1	mA
Output Noise Voltage	V_N	10Hz ≤f≤100kHz		150		μV
Temperature coefficient of V_O	$\Delta V_O/\Delta T$	I_O=5mA		1.8		mV/°C
Ripple Rejection	RR	23V≤V_I≤33V, f=120Hz, T_J=25°C	32	38		dB
Dropout Voltage	V_d	T_J=25°C		1.7		V

6.10 Electrical Characteristics (78L24)

(V_I=33V, I_O=40mA, 0<T_J<125°C, C1=0.33μF, C_O=0.1μF, unless otherwise specified) (Note 1)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Output Voltage	V_O	T_J=25°C	23.76	24	24.24	V
Load Regulation	ΔV_O	T_J=25°C, I_O=1mA~130mA		40	200	mV
		T_J=25°C, I_O=1mA~40mA		20	100	mV
Line regulation	ΔV_O	27V≤V_I≤38V, T_J=25°C		160	300	mV
		28V≤V_I≤38V, T_J=25°C		150	250	mV
Quiescent Current	I_q			2.2	6	mA
Quiescent Current Change	ΔI_q	21V≤V_I≤38V			1.5	mA
	ΔI_q	1mA≤V_I≤40mA			0.1	mA
Output Noise Voltage	V_N	10Hz ≤f≤100kHz		200		μV
Temperature coefficient of V_O	ΔV_O/ ΔT	I_O=5mA		2		mV/°C
Ripple Rejection	RR	27V≤V_I≤38V, f=120Hz, T_J=25°C	30	37		dB
Dropout Voltage	V_d	T_J=25°C		1.7		V

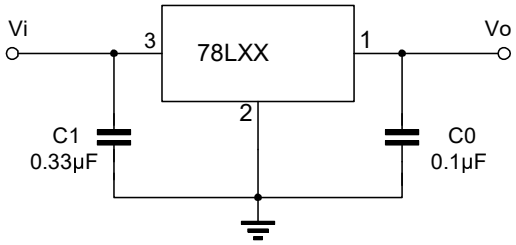
Notes

1: The Maximum steady state usable output current and input voltage are very dependent on the heating sinking and/or lead temperature length of the package.The date above respresent pulse test conditions with junction temperatures as indicated at the initiation of test.

Note 2:Power dissipation<0.75W.

Note 3:Output voltage of 78Lxx.

7.Typical Application



Note 1: To specify an output voltage,substitue voltage value for "XX".

Note 2: Bypass capacitors are recommended for optimum stability and transient response and should be located as close as possible to the regulators

8.Typical Characteristic

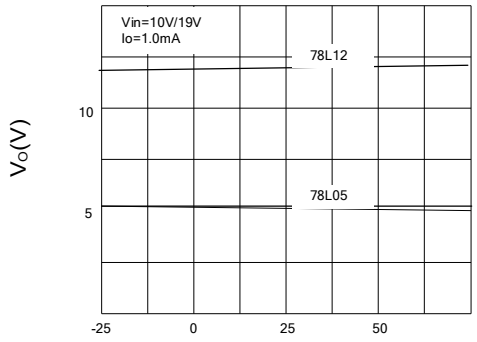


Figure 1: 78L05/12 Output Voltage vs Ambient Temperature

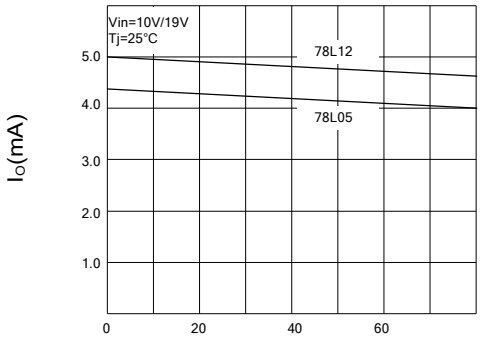


Figure 2: 78L05/12 Quiescent Curent vs Output Current

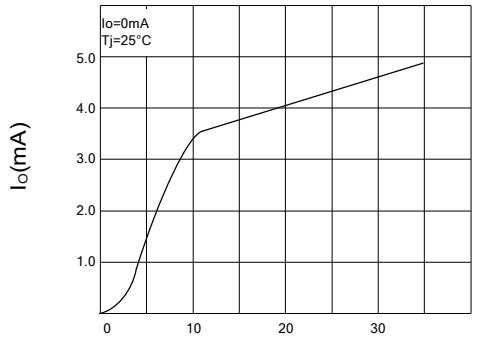


Figure 3: 78L05 Quiescent Current vs Input

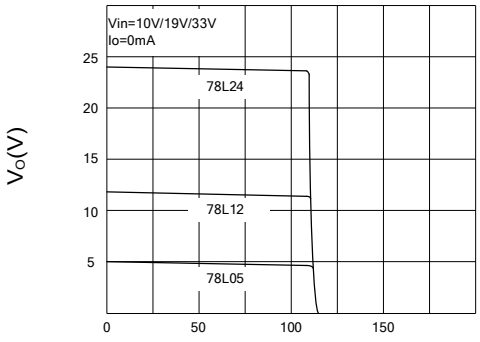


Figure 4: 78 L05/12/24 Thermal Shutdown

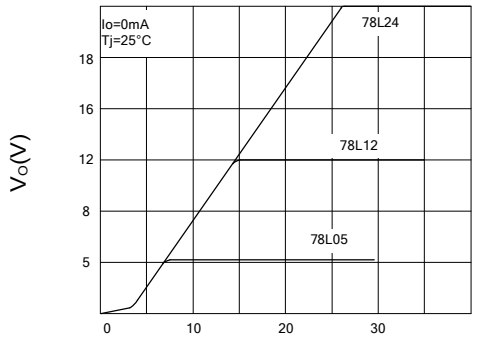


Figure 5: 78 L05/12/24 Output Characteristics

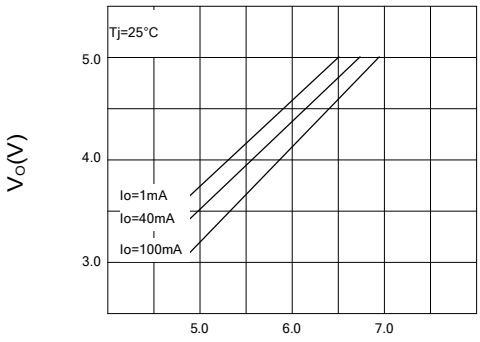
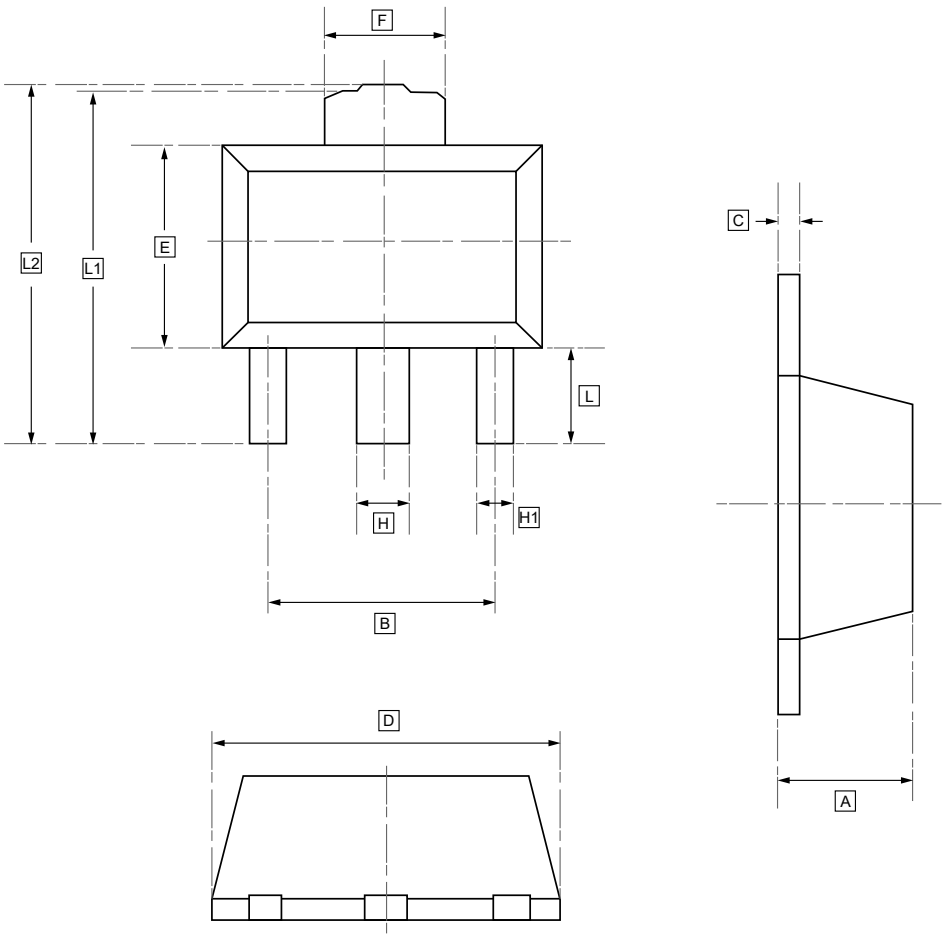


Figure 6: 78 L05 Dropout Characteristics

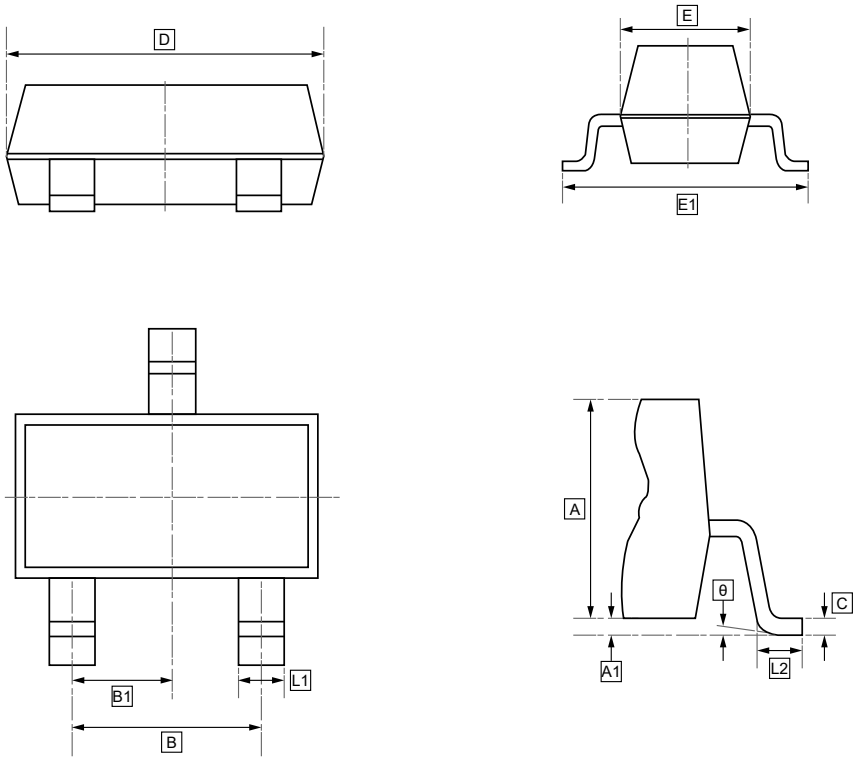
9.1 SOT-89 Package Outline Dimensions



DIMENSIONS (mm are the original dimensions)

Symbol	A	B	C	D	E	F	H	H1	L	L1	L2
Min	1.450	2.950	0.330	4.450	2.450	1.650	0.450	0.370	0.900	4.100	4.100
Max	1.550	3.050	0.430	4.550	2.550	1.750	0.580	0.480	1.000	4.300	4.350

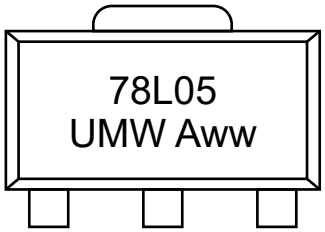
9.2 SOT-23 Package Outline Dimensions



DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	L1	L2	C	D	E	E1	B	B1	θ
Min	0.900	0.020	0.300	0.300	0.100	2.800	1.200	2.300	1.800	0.950	0°
Max	1.100	0.100	0.500	0.500	0.120	3.000	1.400	2.500	2.000	TYP	8°

10.Ordering Information



ww: Batch Code

Order Code	Marking	Package	Base QTY	Delivery Mode
UMW78L33-150	78L33	SOT-89	1000	Tape and reel
UMW 78L05-150	78L05	SOT-89	1000	Tape and reel
UMW 78L06-150	78L06	SOT-89	1000	Tape and reel
UMW 78L08-150	78L08	SOT-89	1000	Tape and reel
UMW 78L09-150	78L09	SOT-89	1000	Tape and reel
UMW 78L010-150	78L10	SOT-89	1000	Tape and reel
UMW78L12-150	78L12	SOT-89	1000	Tape and reel
UMW78L15-150	78L15	SOT-89	1000	Tape and reel
UMW78L18-150	78L18	SOT-89	1000	Tape and reel
UMW78L24-150	78L24	SOT-89	1000	Tape and reel
UMW 78L05S-150	L05	SOT-23	3000	Tape and reel

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