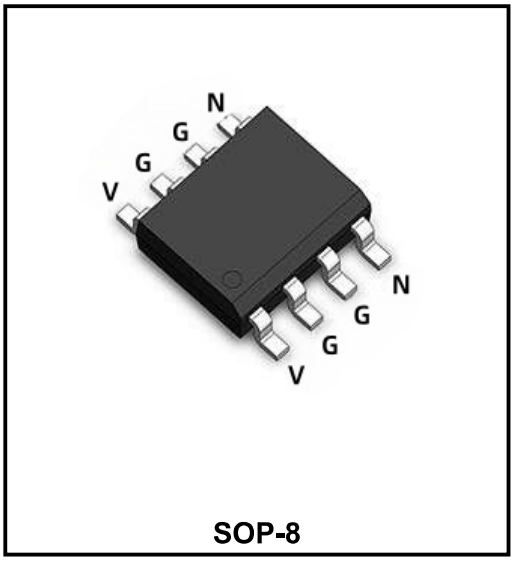
3-TERMINAL 0.1A POSITIVE VOLTAGE REGULATORS



SOP-8

DESCRIPTION

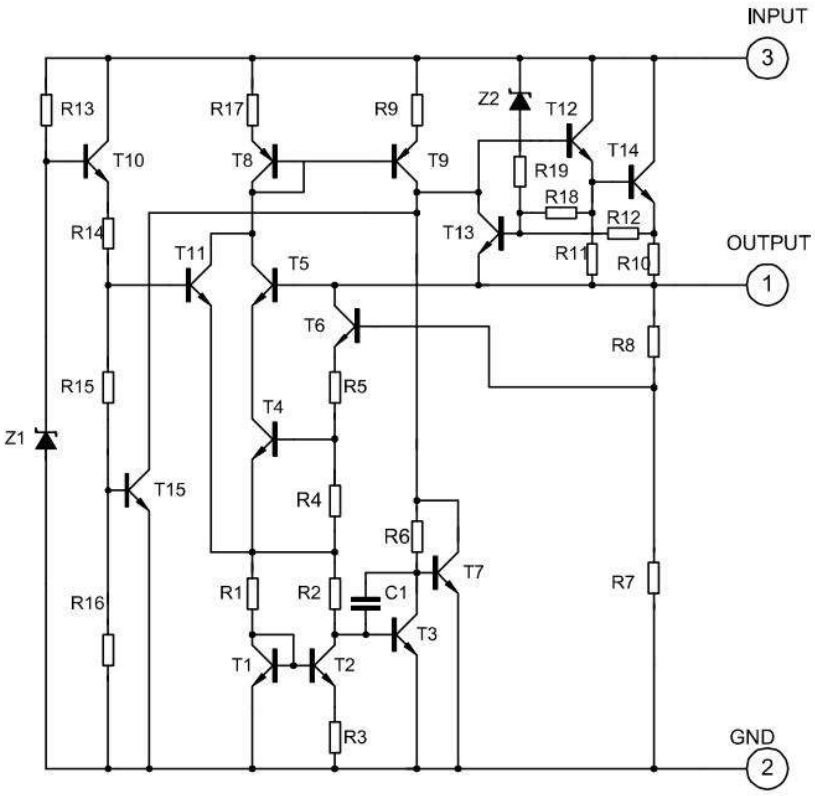
The 78LXXX series of fixed voltage monolithic integrated circuit voltage regulators are suitable for applications that required supply up to 100mA.

FEATURE

- Maximum output current of 100mA
- Output voltage of 5V,6V,8V,9V,10V,12V,15Vand 24V
- Thermal overload protection
- Short circuit current limiting

Marking Code	
78L05S	YFW 78L05
78L06S	YFW 78L06
78L08S	YFW 78L08
78L09S	YFW 78L09
78L10S	YFW 78L10
78L12S	YFW 78L12
78L15S	YFW 78L15
78L18S	YFW 78L18
78L24S	YFW 78L24

BLOCK DIAGRAM



Absolute Maximum Ratings (T_C=25℃unless otherwise noted)

Symbol	Parameter	Value	Units
VI	Input voltage for VO=5.8V	30	V
	Input voltage for VO=12.15V	35	V
Pd	High power dissipation	400	mW
TOPR	Operating junction temperature range	-20~+120	℃
TSTG	Storage temperature range	-55~+150	℃

78L05S Electrical Characteristics

(VI=10V, IO=40mA,0＜Tj＜125℃, C1=0.33uF, CO=0.1uF, unless otherwise specified)(Note1)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
VO	Output voltage	Tj=25℃	4.8	5.0	5.2	V
		7.5V≤VI≤20V, IO=1mA~40mA	4.75		5.25	V
		7.5V≤VI≤VMAX, IO=1mA~70mA	4.75		5.25	V(note2)
VO	Output voltage(note3)	Tj=25℃	4.9	5.0	5.1	V
		7.5V≤VI≤20V, IO=1mA~40mA	4.85		5.15	V
		7.5V≤VI≤VMAX, IO=1mA~70mA	4.85		5.15	V(note2)
△VO	Load regulation	Tj=25℃, IO=1mA~100mA		11	60	mV
		Tj=25℃, IO=1mA~40mA		5.0	30	mV
△VO	Line regulation	7V≤VI≤20V, Tj=25℃		8	150	mV
		8V≤VI≤20V, Tj=25℃		6	100	mV
Iq	Quiescent current			2.0	5.5	mA
△Iq	Quiescent current change	8V≤VI≤20V			1.5	mA
		1mA≤VI≤40mA			0.1	mA
VN	Output noise voltage	10Hz≤f≤100kHz		40		uV
△VO/△T	Temperature coefficient of VO	IO=5mA		0.65		mV/℃
RR	Ripple rejection	8V≤VI≤20V, f=120Hz, Tj=25℃	40	49		dB
Vd	Dropout voltage	Tj=25℃		1.7		V

78L06S Electrical Characteristics

(V_I=12V, I_O=40mA,0＜Tj＜125℃, C1=0.33uF, C_O=0.1uF, unless otherwise specified)(Note1)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
V_O	Output voltage	Tj=25℃	5.75	6.0	6.25	V
		8.5V≤V_I≤20V, I_O=1mA~40mA	5.7		6.3	V
		8.5V≤V_I≤V_{MAX}, I_O=1mA~70mA	5.7		6.3	V(note2)
V_O	Output voltage(note3)	Tj=25℃	5.88	6.0	6.12	V
		8.5V≤V_I≤20V, I_O=1mA~40mA	5.82		6.18	V
		8.5V≤V_I≤V_{MAX}, I_O=1mA~70mA	5.82		6.18	V(note2)
△V_O	Load regulation	Tj=25℃, I_O=1mA~100mA		12.8	80	mV
		Tj=25℃, I_O=1mA~70mA		5.8	40	mV
△V_O	Line regulation	8.5V≤V_I≤20V, Tj=25℃		64	175	mV
		9V≤V_I≤20V, Tj=25℃		54	125	mV
Iq	Quiescent current			2.0	5.5	mA
△Iq	Quiescent current change	9V≤V_I≤20V			1.5	mA
		1mA≤V_I≤40mA			0.1	mA
V_N	Output noise voltage	10Hz≤f≤100kHz		49		uV
△V_O/△T	Temperature coefficient of V_O	I_O=5mA		0.75		mV/℃
RR	Ripple rejection	10V≤V_I≤20V, f=120Hz, Tj=25℃	38	46		dB
Vd	Dropout voltage	Tj=25℃		1.7		V

78L08S Electrical Characteristics

(V_I=14V, I_O=40mA,0＜Tj＜125℃, C1=0.33uF, C_O=0.1uF, unless otherwise specified)(Note1)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
V_O	Output voltage	Tj=25℃	7.7	8.0	8.3	V
		10.5V≤V_I≤23V, I_O=1mA~40mA	7.6		8.4	V
		10.5V≤V_I≤V_{MAX}, I_O=1mA~70mA	7.6		8.4	V(note2)
V_O	Output voltage(note3)	Tj=25℃	7.84	8.0	8.16	V
		10.5V≤V_I≤23V, I_O=1mA~40mA	7.76		8.24	V
		10.5V≤V_I≤V_{MAX}, I_O=1mA~70mA	7.76		8.24	V(note2)
△V_O	Load regulation	Tj=25℃, I_O=1mA~100mA		15	80	mV
		Tj=25℃, I_O=1mA~70mA		8.0	40	mV
△V_O	Line regulation	10.5V≤V_I≤23V, Tj=25℃		10	175	mV
		11V≤V_I≤23V, Tj=25℃		8	125	mV
Iq	Quiescent current			2.0	5.5	mA
△Iq	Quiescent current change	11V≤V_I≤23V			1.5	mA
		1mA≤V_I≤40mA			0.1	mA
V_N	Output noise voltage	10Hz≤f≤100kHz		49		uV
△V_O/△T	Temperature coefficient of V_O	I_O=5mA		0.75		mV/℃
RR	Ripple rejection	11V≤V_I≤23V, f=120Hz, Tj=25℃	36	45		dB
Vd	Dropout voltage	Tj=25℃		1.7		V

78L09S Electrical Characteristics

(VI=15V, IO=40mA,0＜Tj＜125℃, C1=0.33uF, CO=0.1uF, unless otherwise specified)(Note1)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
VO	Output voltage	Tj=25℃	8.64	9.0	9.36	V
		11.5V≤VI≤24V, IO=1mA~40mA	8.55		9.45	V
		11.5V≤VI≤VMAX, IO=1mA~70mA	8.55		9.45	V(note2)
VO	Output voltage(note3)	Tj=25℃	8.82	9.0	9.18	V
		11.5V≤VI≤24V, IO=1mA~40mA	8.73		9.27	V
		11.5V≤VI≤VMAX, IO=1mA~70mA	8.73		9.27	V(note2)
△VO	Load regulation	Tj=25℃, IO=1mA~100mA		20	90	mV
		Tj=25℃, IO=1mA~40mA		10	45	mV
△VO	Line regulation	11.5V≤VI≤24V, Tj=25℃		90	200	mV
		13V≤VI≤24V, Tj=25℃		100	150	mV
Iq	Quiescent current			2.0	5.5	mA
△Iq	Quiescent current change	13V≤VI≤24V			1.5	mA
		1mA≤VI≤40mA			0.1	mA
VN	Output noise voltage	10Hz≤f≤100kHz		49		uV
△VO/△T	Temperature coefficient of VO	IO=5mA		0.75		mV/℃
RR	Ripple rejection	12V≤VI≤23V, f=120Hz, Tj=25℃	36	44		dB
Vd	Dropout voltage	Tj=25℃		1.7		V

78L10S Electrical Characteristics

(VI=15V, IO=40mA,0＜Tj＜125℃, C1=0.33uF, CO=0.1uF, unless otherwise specified)(Note1)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
VO	Output voltage	Tj=25℃	9.61	10	10.4	V
		12.5V≤VI≤24V, IO=1mA~40mA	9.55		10.45	V
		12.5V≤VI≤VMAX, IO=1mA~70mA	9.55		10.45	V(note2)
VO	Output voltage(note3)	Tj=25℃	9.8	10	10.2	V
		12.5V≤VI≤24V, IO=1mA~40mA	9.7		10.3	V
		12.5V≤VI≤VMAX, IO=1mA~70mA	9.7		10.3	V(note2)
△VO	Load regulation	Tj=25℃, IO=1mA~100mA		20	90	mV
		Tj=25℃, IO=1mA~40mA		10	45	mV
△VO	Line regulation	12.5V≤VI≤24V, Tj=25℃		90	200	mV
		13V≤VI≤24V, Tj=25℃		100	150	mV
Iq	Quiescent current			2.0	5.5	mA
△Iq	Quiescent current change	13V≤VI≤24V			1.5	mA
		1mA≤VI≤40mA			0.1	mA
VN	Output noise voltage	10Hz≤f≤100kHz		49		uV
△VO/△T	Temperature coefficient of V O	IO=5mA		0.75		mV/℃
RR	Ripple rejection	12V≤VI≤23V, f=120Hz, Tj=25℃	36	44		dB
Vd	Dropout voltage	Tj=25℃		1.7		V

78L12S Electrical Characteristics

(VI=19V, IO=40mA,0＜Tj＜125℃, C1=0.33uF, CO=0.1uF, unless otherwise specified)(Note1)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
VO	Output voltage	Tj=25℃	11.5	12	12.6	V
		14.5V≤VI≤27V, IO=1mA~40mA	11.4		12.6	V
		14.5V≤VI≤VMAX, IO=1mA~70mA	11.4		12.6	V(note2)
VO	Output voltage(note3)	Tj=25℃	11.76	12	12.24	V
		14.5V≤VI≤27V, IO=1mA~40mA	11.64		12.36	V
		14.5V≤VI≤VMAX, IO=1mA~70mA	11.64		12.36	V(note2)
△VO	Load regulation	Tj=25℃, IO=1mA~100mA		25	150	mV
		Tj=25℃, IO=1mA~40mA		12	75	mV
△VO	Line regulation	14.5V≤VI≤27V, Tj=25℃		25	300	mV
		16V≤VI≤27V, Tj=25℃		20	250	mV
Iq	Quiescent current			2.0	5.5	mA
△Iq	Quiescent current change	16V≤VI≤27V			1.5	mA
		1mA≤VI≤40mA			0.1	mA
VN	Output noise voltage	10Hz≤f≤100kHz		80		uV
△VO/△T	Temperature coefficient of VO	IO=5mA		1.0		mV/℃
RR	Ripple rejection	15V≤VI≤25V, f=120Hz, Tj=25℃	36	42		dB
Vd	Dropout voltage	Tj=25℃		1.7		V

78L15S Electrical Characteristics

(VI=23V, IO=40mA,0＜Tj＜125℃, C1=0.33uF, CO=0.1uF, unless otherwise specified)(Note1)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
VO	Output voltage	Tj=25℃	14.4	15	15.6	V
		17.5V≤VI≤30V, IO=1mA~40mA	14.25		15.75	V
		17.5V≤VI≤VMAX, IO=1mA~70mA	14.25		15.75	V(note2)
VO	Output voltage(note3)	Tj=25℃	14.7	15	15.3	V
		17.5V≤VI≤30V, IO=1mA~40mA	14.55		15.45	V
		17.5V≤VI≤VMAX, IO=1mA~70mA	14.55		15.45	V(note2)
△VO	Load regulation	Tj=25℃, IO=1mA~100mA		20	150	mV
		Tj=25℃, IO=1mA~70mA		25	150	mV
△VO	Line regulation	17.5V≤VI≤30V, Tj=25℃		25	150	mV
		20V≤VI≤30V, Tj=25℃		15	75	mV
Iq	Quiescent current			2.2	6.0	mA
△Iq	Quiescent current change	20V≤VI≤30V			1.5	mA
		1mA≤VI≤40mA			0.1	mA
VN	Output noise voltage	10Hz≤f≤100kHz		90		uV
△VO/△T	Temperature coefficient of VO	IO=5mA		1.3		mV/℃
RR	Ripple rejection	18.5V≤VI≤28.5V, f=120Hz, Tj=25℃	33	39		dB
Vd	Dropout voltage	Tj=25℃		1.7		V

78L18S Electrical Characteristics

(VI=27V, IO=40mA,0＜Tj＜125℃, C1=0.33uF, CO=0.1uF, unless otherwise specified)(Note1)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
VO	Output voltage	Tj=25℃	17.3	18	18.7	V
		21V≤VI≤33V, IO=1mA~40mA	17.1		18.9	V
		21V≤VI≤VMAX, IO=1mA~70mA	17.1		18.9	V(note2)
VO	Output voltage(note3)	Tj=25℃	17.64	18	18.36	V
		21V≤VI≤33V, IO=1mA~40mA	17.46		18.54	V
		21V≤VI≤VMAX, IO=1mA~70mA	17.46		18.54	V(note2)
△VO	Load regulation	Tj=25℃, IO=1mA~100mA		30	170	mV
		Tj=25℃, IO=1mA~40mA		15	85	mV
△VO	Line regulation	21V≤VI≤33V, Tj=25℃		145	300	mV
		22V≤VI≤33V, Tj=25℃		135	250	mV
Iq	Quiescent current			2.2	6.0	mA
△Iq	Quiescent current change	21V≤VI≤33V			1.5	mA
		1mA≤VI≤40mA			0.1	mA
VN	Output noise voltage	10Hz≤f≤100kHz		150		uV
△VO/△T	Temperature coefficient of VO	IO=5mA		1.8		mV/℃
RR	Ripple rejection	23V≤VI≤33V, f=120Hz, Tj=25℃	32	38		dB
Vd	Dropout voltage	Tj=25℃		1.7		V

78L24S Electrical Characteristics

(VI=33V, IO=40mA,0＜Tj＜125℃, C1=0.33uF, CO=0.1uF, unless otherwise specified)(Note1)

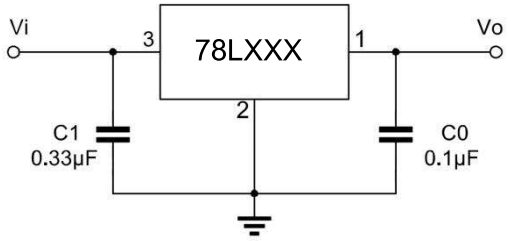
Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
VO	Output voltage	Tj=25℃	23	24	25	V
		27V≤VI≤38V, IO=1mA~40mA	22.8		25.2	V
		27V≤VI≤VMAX, IO=1mA~70mA	22.8		25.2	V(note2)
VO	Output voltage(note3)	Tj=25℃	23.5	24	24.5	V
		27V≤VI≤38V, IO=1mA~40mA	23.25		24.75	V
		27V≤VI≤VMAX, IO=1mA~70mA	23.25		24.75	V(note2)
△VO	Load regulation	Tj=25℃, IO=1mA~100mA		40	200	mV
		Tj=25℃, IO=1mA~40mA		20	100	mV
△VO	Line regulation	27V≤VI≤38V, Tj=25℃		160	300	mV
		28V≤VI≤38V, Tj=25℃		150	250	mV
Iq	Quiescent current			2.2	6.0	mA
△Iq	Quiescent current change	27V≤VI≤38V			1.5	mA
		1mA≤VI≤40mA			0.1	mA
VN	Output noise voltage	10Hz≤f≤100kHz		200		uV
△VO/△T	Temperature coefficient of VO	IO=5mA		2.0		mV/℃
RR	Ripple rejection	27V≤VI≤38V, f=120Hz, Tj=25℃	30	37		dB
Vd	Dropout voltage	Tj=25℃		1.7		V

Note1: 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.

Note2: Power dissipation＜0.75W.

Note3: Output voltage of 78LXX .

TYPICAL APPLICATION



Note1: To specify an output voltage, substitue voltage value for “XX”.
Note2: Bypass capacitors are recommended for optimum stability and transient response and should be located as close as possible to the regulators.

Fig .1 78L05S/12S 0utput Voltage vs Ambient Temperature

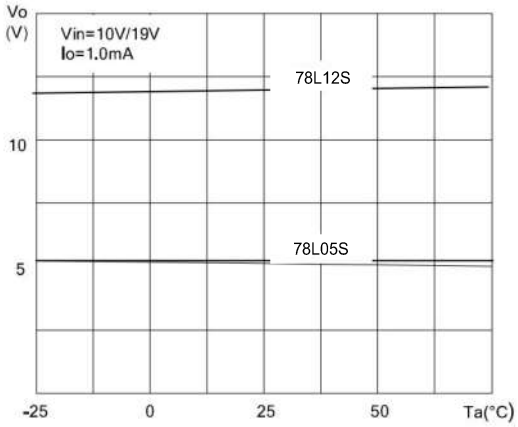


Fig 2 78L05S/12S Quiescent Current vs Qutput Current

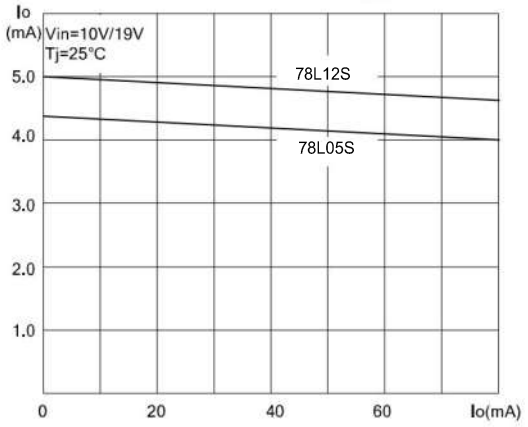


Fig.3 78L05S Quiescent Current vs Input

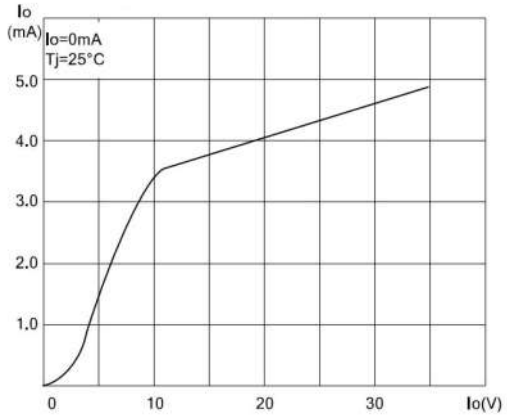


Fig.4 78L05S/12S/24S Thermal Shutdown

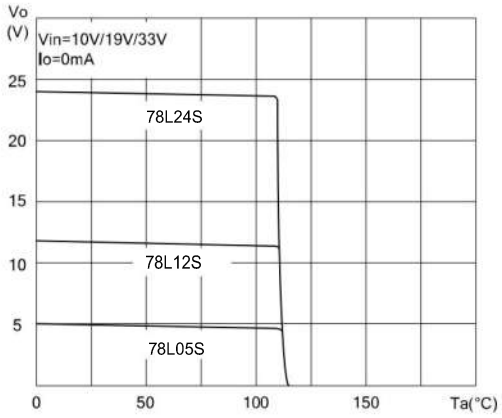


Fig.5 78L05S/12S/24S 0utput Characteristics

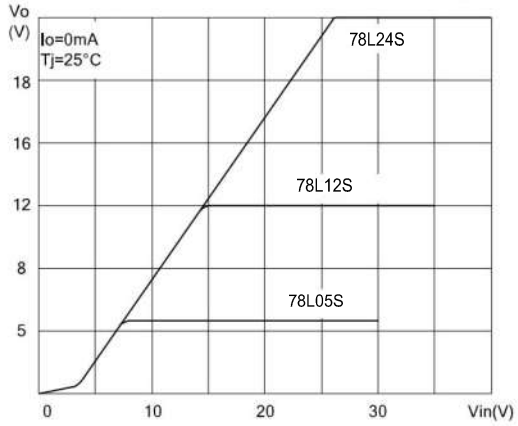
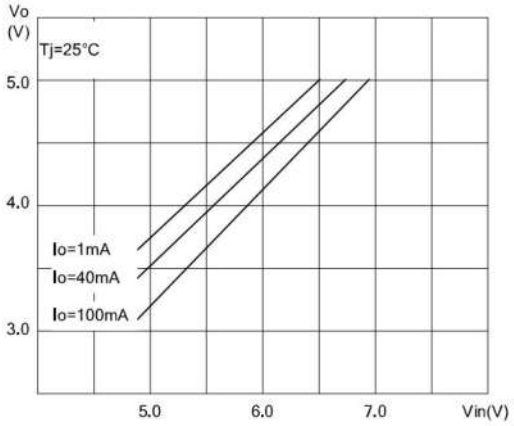
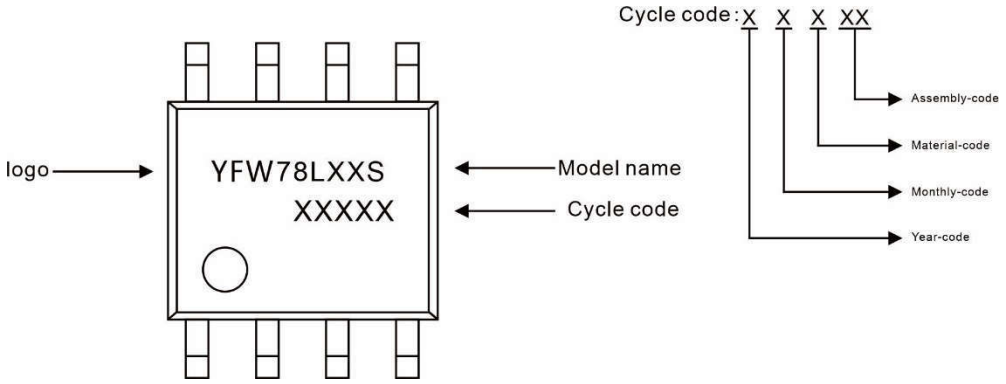


Fig.6 78 L05S Dropout Characteristics



Marking Diagram

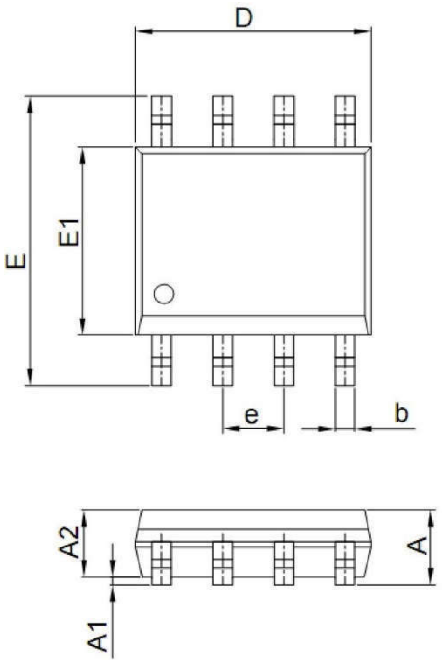


Ordering information

Package	Packing Description	Packing Quantity
SOP-8	Tape/Reel,13"reel	3000PCS/Reel 30000PCS/Carton

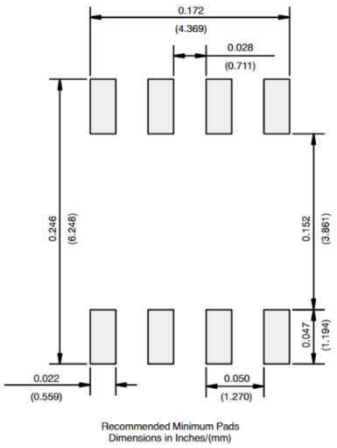
Package Dimensions

SOP-8



Dim	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	1.35	1.75	0.053	0.069
A1	0.10	0.25	0.004	0.010
A2	1.35	1.50	0.053	0.059
b	0.35	0.55	0.014	0.022
c	0.15	0.25	0.006	0.010
D	4.80	5.00	0.189	0.197
D1	3.10	3.50	0.122	0.138
E	5.80	6.20	0.228	0.244
E1	3.80	4.00	0.150	0.157
E2	2.20	2.60	0.087	0.102
e	1.27 (BSC)		0.050 (BSC)	
L	0.40	1.27	0.016	0.050
θ	0°	8°	0°	8°

The recommended mounting pad size



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