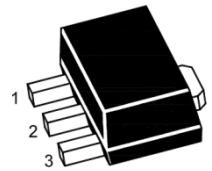
78L05K THRU 78L15K

3-Terminal Positive Voltage Regulator

FEATURES

- Maximum Output Current I_O: 0.1 A
- Output Voltage V_O: 5V/6V/8V/9V/10V/12V/15V
- Continuous Total Dissipation
- P_D: 0.5W (T_a = 25 ℃)
- Thermal overload protection
- Short circuit current limiting



1：OUT 2：GND 3：IN

SOT-89 PLASTIC PACKAGE

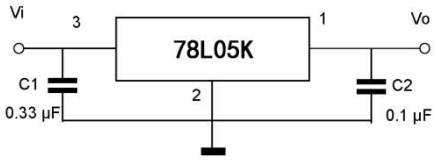
Absolute Maximum Ratings (T_a = 25 $_o$C)

Parameter		Symbol	Rating	Unit
Input Voltage	78L05K~78L08K	V_I	30	V
	78L09K~78L15K		35	V
Power Dissipation		P_{tot}	500 1)	mW
Operating Temperature		T_{opr}	- 20 to + 120	℃
Storage Temperature Range		T_{stg}	- 55 to +150	℃

1) 15 mm X 25 mm X 0.7 mm alumina ceramic board, $T_a \leq 25$℃

Electrical Characteristics (T_a = 25℃) (Unless otherwise specified，0℃≤ TJ ≤ 125℃, VI = 10 V, IO = 40 mA, CI = 0.33 μF, C2 = 0.1 μF)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Output Voltage	V_O	Tj = 25℃	4.8	5	5.2	V
		7 V ≤ VI ≤ 20 V, 1 mA ≤ IO ≤ 40 mA	4.75	--	5.25	V
		VI = 10 V, 1 mA ≤ IO ≤ 70 mA	4.75	--	5.25	V
Line Regulation	Regline	7 V ≤ VI ≤ 20 V, Tj = 25℃	--	--	150	mV
		8 V ≤ VI ≤ 20 V, Tj = 25℃	--	--	100	
Load Regulation	Regload	1 mA ≤ IO ≤ 100 mA, Tj = 25℃	--	--	60	mV
		1 mA ≤ IO ≤ 40 mA, Tj = 25℃	--	--	30	
Quiescent Current	I_Q	Tj = 25℃	--	--	5.5	mA
Quiescent Current Change	ΔI_Q	8 V ≤ VI ≤ 20 V	--	--	1.5	mA
		1 mA ≤ Io ≤ 40 mA	--	--	0.1	
Output Noise Voltage	V_N	10 Hz ≤ f ≤ 100 KHz, Tj = 25℃	--	40	--	μ V
Ripple Rejection	RR	f = 120 Hz, 8 V ≤ VI ≤ 18 V, Tj = 25℃	41	--	--	dB
Dropout Voltage	V_{Drop}	Tj = 25℃	--	1.7	--	V



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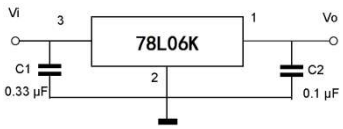
Electrical Characteristics (T_a = 25℃) (Unless otherwise specified，0℃≤ TJ ≤ 125℃, VI = 11 V, IO = 40 mA, CI = 0.33 μF, C2 = 0.1 μF)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Output Voltage	V_O	Tj = 25℃	5.76	6	6.24	V
		8.5V ≤ VI ≤ 21V, 1 mA ≤ IO ≤ 40 mA	5.7	--	6.3	V
		VI = 11 V, 1 mA ≤ IO ≤ 70 mA	5.7	--	6.3	V
Line Regulation	Regline	8.5V ≤ VI ≤ 21V, Tj = 25℃	--	--	155	mV
		9 V ≤ VI ≤ 21 V, Tj = 25℃	--	--	105	
Load Regulation	Regload	1 mA ≤ IO ≤ 100 mA, Tj = 25℃	--	--	65	mV
		1 mA ≤ IO ≤ 40 mA, Tj = 25℃	--	--	35	
Quiescent Current	I_Q	Tj = 25℃	--	--	5.5	mA
Quiescent Current Change	ΔI_Q	9 V ≤ VI ≤ 21 V，IO = 40 mA	--	--	1.5	mA
		VI = 11 V,1 mA ≤ IO ≤ 40 mA	--	--	0.1	
Output Noise Voltage	V_N	10 Hz ≤ f ≤ 100 KHz, Tj = 25℃	--	49	--	μ V
Ripple Rejection	RR	f = 120 Hz, 9 V ≤ VI ≤ 19 V, Tj = 25℃	40	--	--	dB
Dropout Voltage	V_{Drop}	Tj = 25℃	--	1.7	--	V



Electrical Characteristics (T_a = 25℃) (Unless otherwise specified，0℃≤ TJ ≤ 125℃, VI = 14 V, IO = 40 mA, CI = 0.33 μF, C2 = 0.1 μF)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Output Voltage	V_O	Tj = 25℃	7.7	8	8.3	V
		10.5V ≤ VI ≤ 23V, 1 mA ≤ IO ≤ 40 mA	7.6	--	8.4	V
		VI = 14 V, 1 mA ≤ IO ≤ 70 mA	7.6	--	8.4	V
Line Regulation	Regline	10.5V ≤ VI ≤ 23V, Tj = 25℃	--	--	175	mV
		11 V ≤ VI ≤ 23 V, Tj = 25℃	--	--	125	
Load Regulation	Regload	1 mA ≤ IO ≤ 100 mA, Tj = 25℃	--	--	80	mV
		1 mA ≤ IO ≤ 40 mA, Tj = 25℃	--	--	40	
Quiescent Current	I_Q	Tj = 25℃	--	--	5.5	mA
Quiescent Current Change	ΔI_Q	12 V ≤ VI ≤ 23 V，IO = 40 mA	--	--	1.5	mA
		VI = 14 V,1 mA ≤ IO ≤ 40 mA	--	--	0.1	
Output Noise Voltage	V_N	10 Hz ≤ f ≤ 100 KHz, Tj = 25℃	--	60	--	μ V
Ripple Rejection	RR	f = 120 Hz, 12 V ≤ VI ≤ 22 V, Tj = 25℃	39	--	--	dB
Dropout Voltage	V_{Drop}	Tj = 25℃	--	1.7	--	V

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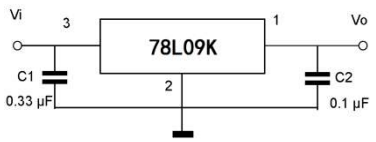
Electrical Characteristics (T_a = 25℃) (Unless otherwise specified，0℃≤ TJ ≤ 125℃, VI = 15 V, IO = 40 mA, CI = 0.33 μF, C2 = 0.1 μF)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Output Voltage	V_O	Tj = 25℃	8.64	9	9.36	V
		11.4V ≤ VI ≤ 24V, 1 mA ≤ IO ≤ 40 mA	8.55	--	9.45	V
		VI = 15 V, 1 mA ≤ IO ≤ 70 mA	8.55	--	9.45	V
Line Regulation	Regline	11.4V ≤ VI ≤ 24V, Tj = 25℃	--	--	200	mV
		12 V ≤ VI ≤ 24 V, Tj = 25℃	--	--	160	
Load Regulation	Regload	1 mA ≤ IO ≤ 100 mA, Tj = 25℃	--	--	90	mV
		1 mA ≤ IO ≤ 40 mA, Tj = 25℃	--	--	45	
Quiescent Current	I_Q	Tj = 25℃	--	--	6	mA
Quiescent Current Change	ΔI_Q	12 V ≤ VI ≤ 24 V， IO = 40 mA	--	--	1.5	mA
		VI = 15 V,1 mA ≤ IO ≤ 40 mA	--	--	0.1	
Output Noise Voltage	V_N	10 Hz ≤ f ≤ 100 KHz, Tj = 25℃	--	70	--	μ V
Ripple Rejection	RR	f = 120 Hz, 12 V ≤ VI ≤ 24 V, Tj = 25℃	38	--	--	dB
Dropout Voltage	V_{Drop}	Tj = 25℃	--	1.7	--	V



Electrical Characteristics (T_a = 25℃) at specified virtual junction temperature, V_I= 17V, I_O= 40mA (unless otherwise noted)

Parameter	Test Conditions*		78L10			Units
			Min	Typ	Max	
Output voltage**		25°C	9.6	10	10.4	V
	I_O= 1mA to 40 mA, V_I= 13V to 25V	0°C to 125°C	9.5	10	10.5	
	I_O= 1mA to 70mA,		9.5	10	10.5	
Input regulation	V_I= 13V to 25V	25°C		51	175	mV
	V_I= 14V to 25V			42	125	
Ripple rejection	V_I= 15V to 25V, f= 120Hz	0°C to 125°C	37	44		dB
Output regulation	I_O= 1mA to 100mA	25°C		20	90	mV
	I_O= 1mA to 40mA			11	40	
Output noise voltage	f= 10Hz to 100 KHz	25°C		62		μV
Dropout voltage		25°C		1.7		V
Bias current		25°C		4.2	6	mA
		125°C			5.5	
Bias current change	V_I= 14V to 25V	0°C to 125°C			1.5	
	I_O= 1mA to 40mA				0.1	

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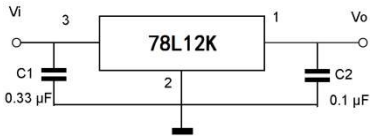
Electrical Characteristics (T_a = 25℃) (Unless otherwise specified，0℃≤ TJ ≤ 125℃, VI = 19 V, IO = 40 mA, CI = 0.33 μF, C2 = 0.1 μF)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Output Voltage	V_O	Tj = 25℃	11.5	12	12.5	V
		14.5V ≤ VI ≤ 27V, 1 mA ≤ IO ≤ 40 mA	11.4	--	12.6	V
		VI = 19 V, 1 mA ≤ IO ≤ 70 mA	11.4	--	12.6	V
Line Regulation	Regline	14.5V ≤ VI ≤ 27V, Tj = 25℃	--	--	250	mV
		16 V ≤ VI ≤ 27 V, Tj = 25℃	--	--	200	
Load Regulation	Regload	1 mA ≤ IO ≤ 100 mA, Tj = 25℃	--	--	100	mV
		1 mA ≤ IO ≤ 40 mA, Tj = 25℃	--	--	50	
Quiescent Current	I_Q	Tj = 25℃	--	--	6	mA
Quiescent Current Change	ΔI_Q	16 V ≤ VI ≤ 27 V	--	--	1.5	mA
		1 mA ≤ IO ≤ 40 mA	--	--	0.1	
Output Noise Voltage	V_N	10 Hz ≤ f ≤ 100 KHz, Tj = 25℃	--	80	--	μ V
Ripple Rejection	RR	f = 120 Hz, 15 V ≤ VI ≤ 25 V, Tj = 25℃	37	--	--	dB
Dropout Voltage	V_{Drop}	Tj = 25℃	--	1.7	--	V



Electrical Characteristics (Unless otherwise specified, V_{IN} = 23 V, I_{OUT} = 40 mA, C_{IN} = 0.33 μF, C_{OUT} = 0.1 μF, T_j = 25 °C)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Output Voltage	V_{OUT}	14.4	15	15.6	V
Output Voltage 17.5 V ≤ V_{IN} ≤ 30 V, 1 mA ≤ I_{OUT} ≤ 40 mA	V_{OUT}	14.25	-	15.75	V
Output Voltage V_{IN} = 23 V, 1 mA ≤ I_{OUT} ≤ 70 mA	V_{OUT}	14.25	-	15.75	V
Input Regulation 17.5 V ≤ V_{IN} ≤ 30 V 19 V ≤ V_{IN} ≤ 30 V	Reg. line	- -	- -	300 250	mV
Load Regulation 1 mA ≤ I_{OUT} ≤ 100 mA 1 mA ≤ I_{OUT} ≤ 40 mA	Reg. load	- -	- -	150 75	mV
Quiescent Current	I_Q	-	-	6.5	mA
Quiescent Current Change 19 V ≤ V_{IN} ≤ 30 V With line 1 mA ≤ I_{OUT} ≤ 40 mA With load	ΔI_Q	- -	- -	1.5 0.1	mA
Output Noise Voltage at T_a = 25 °C, 10 Hz ≤ f ≤ 100 KHz	V_{NO}	-	90	-	μV
Ripple Rejection at f = 120 Hz, 18.5 V ≤ V_{IN} ≤ 28.5 V, T_j = 25 °C	RR	34	-	-	dB
Dropout Voltage at T_j = 25 °C	$\lvert V_{IN}-V_{OUT}\rvert$	-	1.7	-	V

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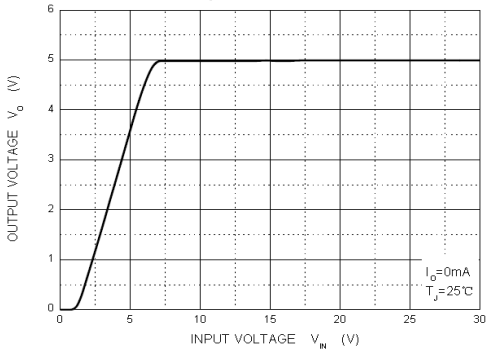
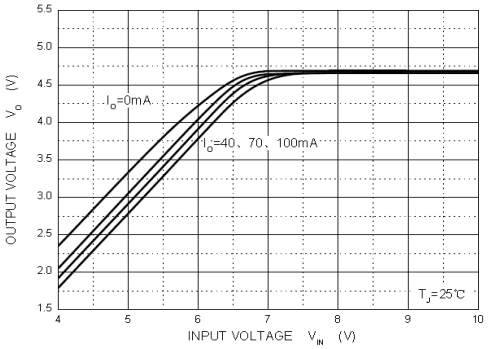
78L05K Typical Characteristics

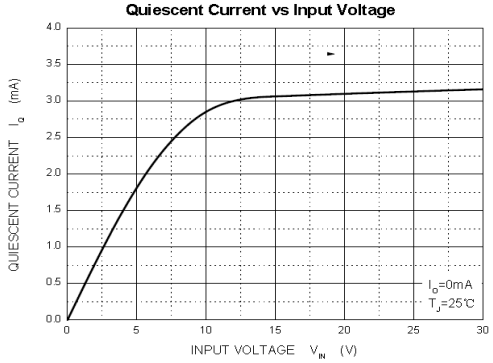
Output Characteristics



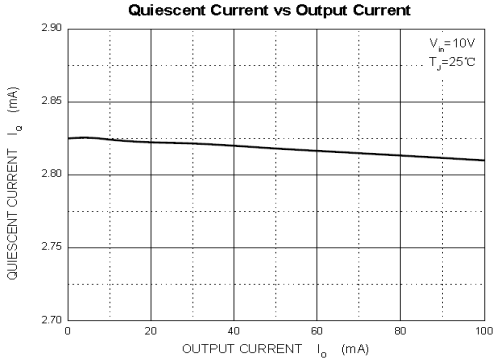
Dropout Characteristics



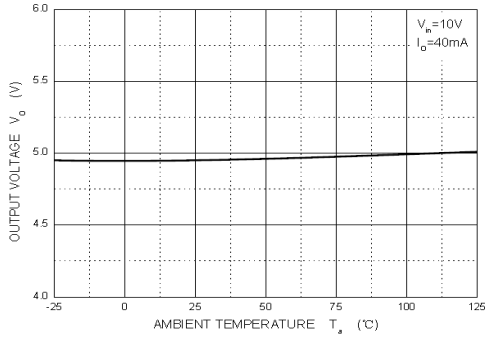
Quiescent Current vs Input Voltage



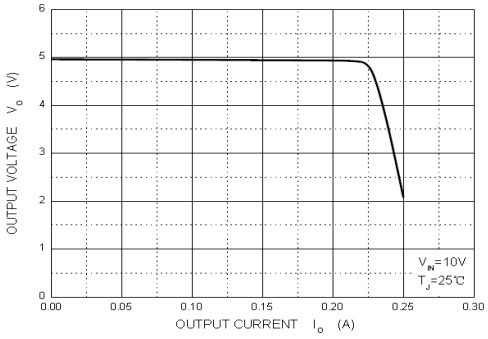
Quiescent Current vs Output Current



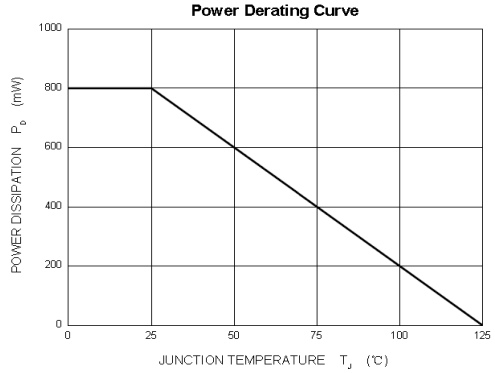
Output Voltage vs Ambient Temperature



Current Cut-off Grid Voltage



Power Derating Curve



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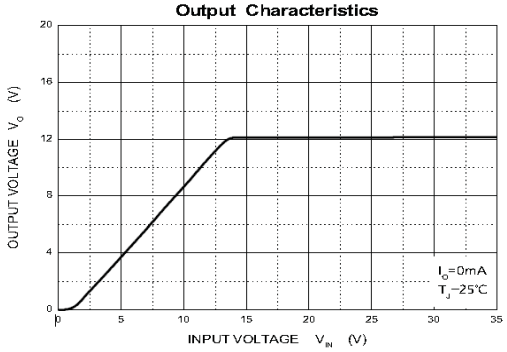
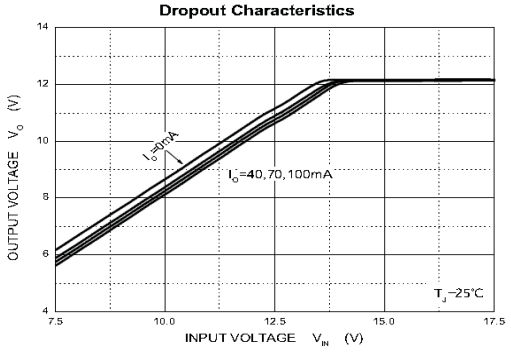
78L12K Typical Characteristics

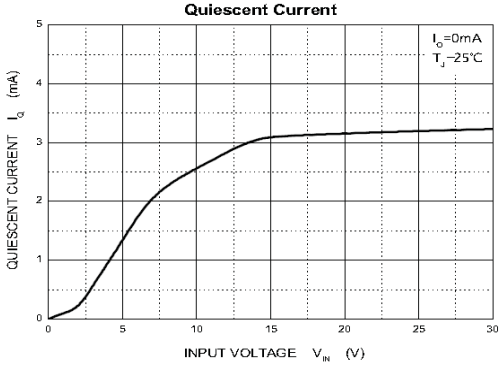
Output Characteristics



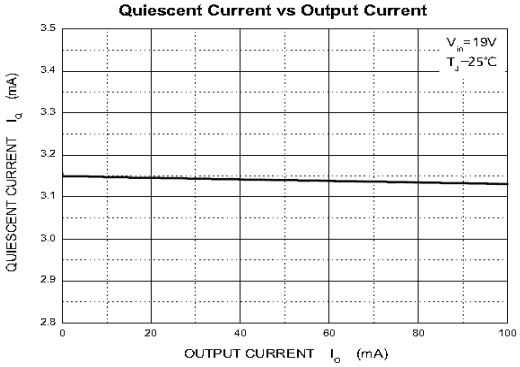
Dropout Characteristics



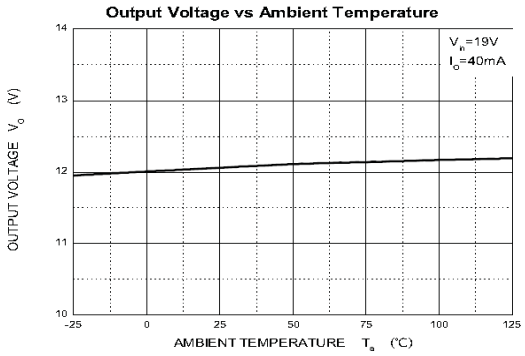
Quiescent Current



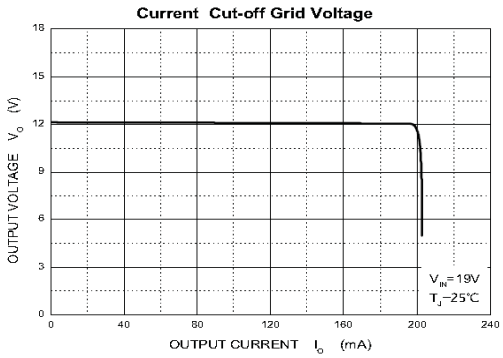
Quiescent Current vs Output Current



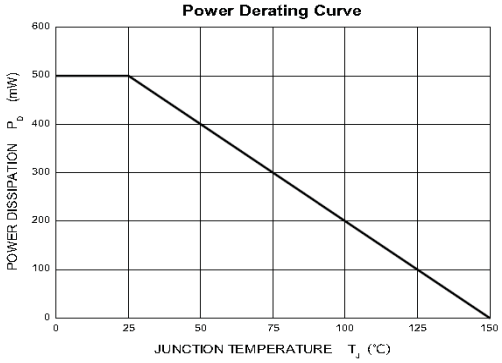
Output Voltage vs Ambient Temperature



Current Cut-off Grid Voltage



Power Derating Curve



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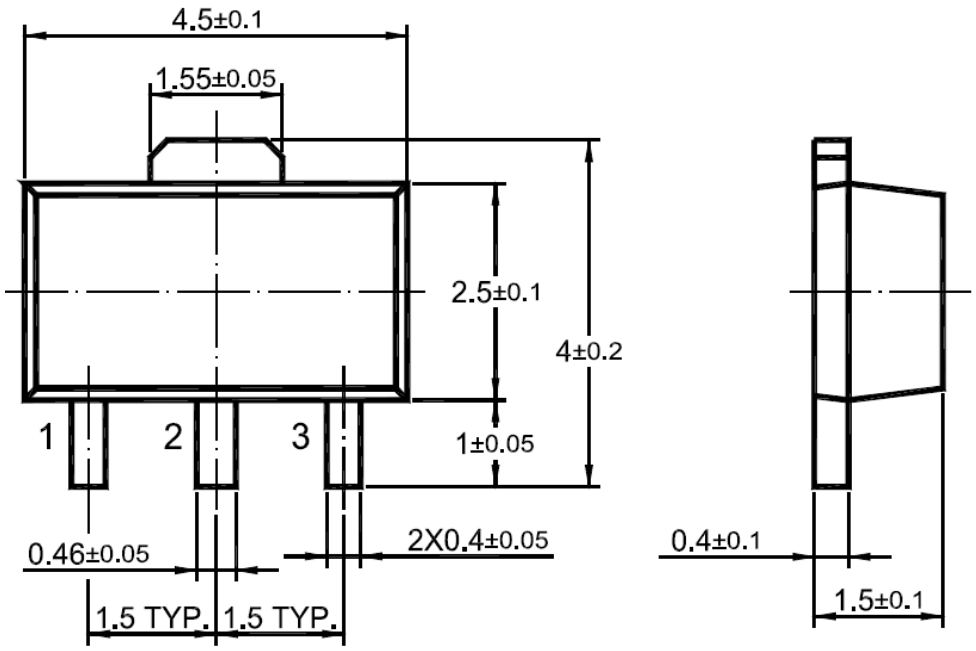
SOT-89 PACKAGE OUTLINE **Unit：mm**



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