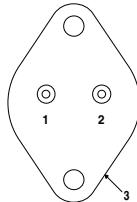


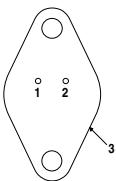
**SEMELAB**

**IP140A SERIES**  
**IP140 SERIES**  
**IP7800A SERIES**  
**IP7800 SERIES**  
**LM140 SERIES**



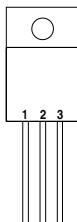
Pin 1 –  $V_{IN}$   
 Pin 2 –  $V_{OUT}$   
 Case – Ground

**K Package – TO-3**



Pin 1 –  $V_{IN}$   
 Pin 2 –  $V_{OUT}$   
 Case – Ground

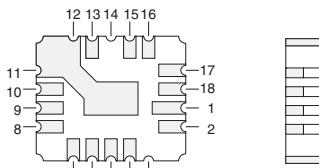
**R Package – TO-66**



Pin 1 –  $V_{IN}$   
 Pin 2 – Ground  
 Pin 3 –  $V_{OUT}$   
 Case – Ground\*

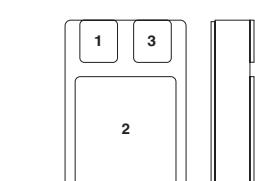
**G Package – TO-257**  
**IG Package – TO-257\***

\* isolated Case on IG package



**LCC4**  
**CERAMIC SURFACE MOUNT**

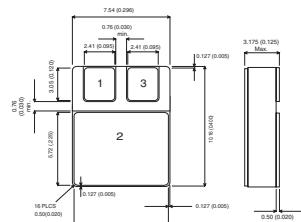
Pins 4,5 –  $V_{IN}$ .  
 Pins 6,7,8,9,10,11,12,13 –  $V_{OUT}$   
 Pins 15,16,17,18,1,2 – Ground



Pin 1 –  $V_{IN}$   
 Pin 2 – Ground  
 Pin 3 –  $V_{OUT}$

**SMD 1 PACKAGE**

Ceramic Surface Mount



Pin 1 –  $V_{IN}$   
 Pin 2 – Ground  
 Pin 3 –  $V_{OUT}$

**SMD 05 PACKAGE**

Ceramic Surface Mount

## 1 AMP POSITIVE VOLTAGE REGULATOR

### FEATURES

- OUTPUT CURRENT UP TO 1.0A
- OUTPUT VOLTAGES OF 5, 12, 15V
- 0.01% / V LINE REGULATION
- 0.3% / A LOAD REGULATION
- THERMAL OVERLOAD PROTECTION
- SHORT CIRCUIT PROTECTION
- OUTPUT TRANSISTOR SOA PROTECTION
- 1% VOLTAGE TOLERANCE (-A VERSIONS)

### DESCRIPTION

The IP140A / LM140 / IP7800A / IP7800 series of 3 terminal regulators is available with several fixed output voltage making them useful in a wide range of applications.

The A suffix devices are fully specified at 1A, provide 0.01% / V line regulation, 0.3% / A load regulation and ±1% output voltage tolerance at room temperature.

Protection features include Safe Operating Area current limiting and thermal shutdown.

### ABSOLUTE MAXIMUM RATINGS ( $T_{case} = 25^{\circ}\text{C}$ unless otherwise stated)

$V_I$	DC Input Voltage (for $V_O = 5, 12, 15\text{V}$ )	35V
$P_D$	Power Dissipation	Internally limited <sup>1</sup>
$T_j$	Operating Junction Temperature Range	-55 to 150°C
$T_{stg}$	Storage Temperature	-65 to 150°C

Note 1. Although power dissipation is internally limited, these specifications are applicable for maximum power dissipation  $P_{MAX}$  of 20W.  $I_{MAX} = 1.0\text{A}$ .

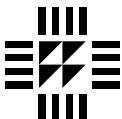
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**Semelab plc.** Telephone +44(0)1455 556565. Fax +44(0)1455 552612.

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Document Number 2833

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**SEME  
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**IP140A SERIES**  
**IP140 SERIES**  
**IP7800A SERIES**  
**IP7800 SERIES**  
**LM140 SERIES**

Parameter	Test Conditions	IP7805A LM,IP140A-05			IP7805 LM,IP140-05			Units
		Min.	Typ.	Max.	Min.	Typ.	Max.	
V <sub>O</sub> Output Voltage	I <sub>O</sub> = 1A V <sub>IN</sub> = 10V	4.95	5	5.05	4.8	5	5.2	V
	I <sub>O</sub> = 5mA to I <sub>MAX</sub> V <sub>IN</sub> = 7.5V to 20V T <sub>J</sub> = -55 to 150°C	4.85		5.15	4.75		5.25	
V <sub>O</sub> Low Supply	I <sub>O</sub> = 5mA to I <sub>MAX</sub> V <sub>IN</sub> = 7V to 20V	P <sub>D</sub> ≤ P <sub>MAX</sub>	4.75		5.15	4.75	5.25	V
ΔV <sub>O</sub> Line Regulation	I <sub>O</sub> = 0.5 I <sub>MAX</sub>	V <sub>IN</sub> = 7V to 25V	3	10			50	mV
		V <sub>IN</sub> = 7.5V to 25V T <sub>J</sub> = -55 to 150°C	3	10			50	
	I <sub>O</sub> ≤ I <sub>MAX</sub>	V <sub>IN</sub> = 7.3V to 20V	3	10			50	
	V <sub>IN</sub> = 8V to 12V	1	4				20	
		T <sub>J</sub> = -55 to 150°C	2	12			25	
ΔV <sub>O</sub> Load Regulation	V <sub>IN</sub> = 10V	I <sub>O</sub> = 5mA to 1.5A	10	25			50	mV
		I <sub>O</sub> = 250mA to 750mA	4	15			25	
	V <sub>IN</sub> = 10V	I <sub>O</sub> = 5mA to I <sub>MAX</sub> T <sub>J</sub> = -55 to 150°C	7	25			50	
I <sub>Q</sub> Quiescent Current	I <sub>O</sub> ≤ I <sub>MAX</sub>		4	6			6	mA
	V <sub>IN</sub> = 10V	T <sub>J</sub> = -55 to 150°C	4	6.5			7	
ΔI <sub>Q</sub> Quiescent Current Change	I <sub>O</sub> = 5mA to I <sub>MAX</sub>	V <sub>IN</sub> = 10V	0.2	0.5			0.5	mA
	I <sub>O</sub> ≤ I <sub>MAX</sub>	V <sub>IN</sub> = 7.5V to 20V T <sub>J</sub> = -55 to 150°C	0.1	0.8			0.8	
	I <sub>O</sub> ≤ 0.5 I <sub>MAX</sub>	V <sub>IN</sub> = 8V to 25V	0.1	0.8			0.8	
	I <sub>O</sub> ≤ 0.5 I <sub>MAX</sub>	V <sub>IN</sub> = 7V to 25V T <sub>J</sub> = -55 to 150°C	0.2	1			1.0	
V <sub>N</sub> Output Noise Voltage	f = 10Hz to 100kHz V <sub>IN</sub> = 10V		40	200			40	μV
ΔV <sub>IN</sub> ΔV <sub>O</sub>	f = 120Hz V <sub>IN</sub> = 8V to 18V	I <sub>O</sub> ≤ I <sub>MAX</sub>	68	80	68			dB
		I <sub>O</sub> ≤ 0.5 I <sub>MAX</sub> T <sub>J</sub> = -55 to 150°C	68	80	68			
Dropout Voltage	I <sub>O</sub> = I <sub>MAX</sub>		2	2.5			2	V
R <sub>O</sub> Output Resistance	f = 1 kHz		5				5	mΩ
I <sub>sc</sub> Short Circuit Current	V <sub>IN</sub> = 35V		0.6	1.2			0.6	1.2
I <sub>pk</sub> Peak Output Current	V <sub>IN</sub> = 10V		2.4	3.3			2.4	3.3
Average Temperature Coefficient of V <sub>O</sub>	I <sub>O</sub> = 5mA		0.2	2			0.6	mV/ °C
Input Voltage required to maintain line regulation	I <sub>O</sub> ≤ I <sub>MAX</sub>		7.3				7.3	V

- All characteristics are measured with a capacitor across the input of 0.22μF and a capacitor across the output of 0.1μF. All characteristics except noise voltage and ripple rejection ratio are measured using pulse techniques ( $t_p \leq 10\text{ms}$ ,  $\delta \leq 5\%$ ). Output voltage changes due to changes in internal temperature must be taken into account separately.
- Although power dissipation is internally limited, these specifications are applicable for maximum power dissipation P<sub>MAX</sub> of 20W , I<sub>MAX</sub> = 1.0A.
- T<sub>J</sub> = 25°C unless otherwise stated.



**SEME  
LAB**

**IP140A SERIES**  
**IP140 SERIES**  
**IP7800A SERIES**  
**IP7800 SERIES**  
**LM140 SERIES**

Parameter	Test Conditions	IP7812A LM,IP140A-12			IP7812 LM,IP140-12			Units
		Min.	Typ.	Max.	Min.	Typ.	Max.	
V <sub>O</sub> Output Voltage	I <sub>O</sub> = 1A V <sub>IN</sub> = 19V	11.88	12	12.12	11.5	12	12.5	V
	I <sub>O</sub> = 5mA to I <sub>MAX</sub> P <sub>D</sub> ≤ P <sub>MAX</sub> V <sub>IN</sub> = 14.8V to 27V T <sub>J</sub> = -55 to 150°C	11.64		12.36	11.4		12.6	
V <sub>O</sub> Low Supply	I <sub>O</sub> = 5mA to I <sub>MAX</sub> P <sub>D</sub> ≤ P <sub>MAX</sub> V <sub>IN</sub> = 14.5V to 27V	11.40		12.36	11.4		12.6	V
ΔV <sub>O</sub> Line Regulation	I <sub>O</sub> = 0.5 I <sub>MAX</sub>	V <sub>IN</sub> = 14.5V to 30V	4	18			120	mV
		V <sub>IN</sub> = 14.8V to 30V	4	18			120	
		T <sub>J</sub> = -55 to 150°C						
	I <sub>O</sub> ≤ I <sub>MAX</sub>	V <sub>IN</sub> = 14.5V to 27V	4	18			120	
	V <sub>IN</sub> = 16V to 22V		2	9			50	
		T <sub>J</sub> = -55 to 150°C	4	30			60	
ΔV <sub>O</sub> Load Regulation	V <sub>IN</sub> = 19V	I <sub>O</sub> = 5mA to 1.5A	12	32			120	mV
		I <sub>O</sub> = 250mA to 750mA	4	19			60	
	V <sub>IN</sub> = 19V	I <sub>O</sub> = 5mA to I <sub>MAX</sub> T <sub>J</sub> = -55 to 150°C	8	60			120	
I <sub>Q</sub> Quiescent Current	I <sub>O</sub> ≤ I <sub>MAX</sub>		4	6			6	mA
	V <sub>IN</sub> = 19V	T <sub>J</sub> = -55 to 150°C	4	6.5			7	
ΔI <sub>Q</sub> Quiescent Current Change	I <sub>O</sub> = 5mA to I <sub>MAX</sub>	V <sub>IN</sub> = 19V	0.2	0.5			0.5	mA
	I <sub>O</sub> ≤ I <sub>MAX</sub>	V <sub>IN</sub> = 14.8V to 27V T <sub>J</sub> = -55 to 150°C	0.1	0.8			0.8	
	I <sub>O</sub> ≤ 0.5 I <sub>MAX</sub>	V <sub>IN</sub> = 15V to 30V	0.1	0.8			0.8	
	I <sub>O</sub> ≤ 0.5 I <sub>MAX</sub>	V <sub>IN</sub> = 14.5V to 30V T <sub>J</sub> = -55 to 150°C	0.2	1			1	
V <sub>N</sub> Output Noise Voltage	f = 10Hz to 100kHz V <sub>IN</sub> = 19V		75	480			75	μV
ΔV <sub>IN</sub> ΔV <sub>O</sub> Ripple Rejection	f = 120Hz V <sub>IN</sub> = 15V to 25V	I <sub>O</sub> ≤ I <sub>MAX</sub>	61	72		61		dB
		I <sub>O</sub> ≤ 0.5 I <sub>MAX</sub> T <sub>J</sub> = -55 to 150°C	61	72		61		
Dropout Voltage	I <sub>O</sub> = I <sub>MAX</sub>		2	2.5		2		V
R <sub>O</sub> Output Resistance	f = 1 kHz		8			8		mΩ
I <sub>sc</sub> Short Circuit Current	V <sub>IN</sub> = 35V		0.6	1.2		0.6	1.2	
I <sub>pk</sub> Peak Output Current	V <sub>IN</sub> = 19V		2.4	3.3		2.4	3.3	A
Average Temperature Coefficient of V <sub>O</sub>	I <sub>O</sub> = 5mA		0.5	4.8		1.5		mV/ °C
Input Voltage required to maintain line regulation	I <sub>O</sub> ≤ I <sub>MAX</sub>		14.5		14.6			V

- All characteristics are measured with a capacitor across the input of 0.22μF and a capacitor across the output of 0.1μF. All characteristics except noise voltage and ripple rejection ratio are measured using pulse techniques ( $t_p \leq 10\text{ms}$ ,  $\delta \leq 5\%$ ). Output voltage changes due to changes in internal temperature must be taken into account separately.
- Although power dissipation is internally limited, these specifications are applicable for maximum power dissipation P<sub>MAX</sub> of 20W , I<sub>MAX</sub> = 1.0A.
- T<sub>J</sub> = 25°C unless otherwise stated.

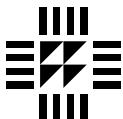


**SEME  
LAB**

**IP140A SERIES**  
**IP140 SERIES**  
**IP7800A SERIES**  
**IP7800 SERIES**  
**LM140 SERIES**

Parameter	Test Conditions	IP7815A LM,IP140A-15			IP7815 LM,IP140-15			Units
		Min.	Typ.	Max.	Min.	Typ.	Max.	
V <sub>O</sub> Output Voltage	I <sub>O</sub> = 1A V <sub>IN</sub> = 23V	14.85	15	15.15	14.4	15	15.60	V
	I <sub>O</sub> = 5mA to I <sub>MAX</sub> P <sub>D</sub> ≤ P <sub>MAX</sub> V <sub>IN</sub> = 17.9V to 30V T <sub>J</sub> = -55 to 150°C	14.55		15.45	14.25		15.75	
V <sub>O</sub> Low Supply	I <sub>O</sub> = 5mA to I <sub>MAX</sub> P <sub>D</sub> ≤ P <sub>MAX</sub> V <sub>IN</sub> = 17.5V to 30V	14.25		15.45	14.25		15.75	V
ΔV <sub>O</sub> Line Regulation	I <sub>O</sub> = 0.5 I <sub>MAX</sub>	V <sub>IN</sub> = 17.5V to 30V	4	22			150	mV
		V <sub>IN</sub> = 17.9V to 30V	4	22			150	
		T <sub>J</sub> = -55 to 150°C						
	I <sub>O</sub> ≤ I <sub>MAX</sub>	V <sub>IN</sub> = 17.5V to 30V	4	22			150	
	V <sub>IN</sub> = 20V to 26V		2	10			60	
		T <sub>J</sub> = -55 to 150°C	5	30			75	
ΔV <sub>O</sub> Load Regulation	V <sub>IN</sub> = 23V	I <sub>O</sub> = 5mA to 1.5A	12	35			150	mV
		I <sub>O</sub> = 250mA to 750mA	4	21			75	
	V <sub>IN</sub> = 23V	I <sub>O</sub> = 5mA to I <sub>MAX</sub> T <sub>J</sub> = -55 to 150°C	9	75			150	
I <sub>Q</sub> Quiescent Current	I <sub>O</sub> ≤ I <sub>MAX</sub>		4	6			6	mA
	V <sub>IN</sub> = 23V	T <sub>J</sub> = -55 to 150°C	4	6.5			7	
ΔI <sub>Q</sub> Quiescent Current Change	I <sub>O</sub> = 5mA to I <sub>MAX</sub>	V <sub>IN</sub> = 23V	0.2	0.5			0.5	mA
	I <sub>O</sub> ≤ I <sub>MAX</sub>	V <sub>IN</sub> = 17.9V to 30V T <sub>J</sub> = -55 to 150°C	0.1	0.8			0.8	
	I <sub>O</sub> ≤ 0.5 I <sub>MAX</sub>	V <sub>IN</sub> = 18.5V to 30V	0.1	0.8			0.8	
	I <sub>O</sub> ≤ 0.5 I <sub>MAX</sub>	V <sub>IN</sub> = 17.5V to 30V T <sub>J</sub> = -55 to 150°C	0.2	1			1	
V <sub>N</sub> Output Noise Voltage	f = 10Hz to 100kHz V <sub>IN</sub> = 23V		90	600			90	μV
ΔV <sub>IN</sub> ΔV <sub>O</sub> Ripple Rejection	f = 120Hz	I <sub>O</sub> ≤ I <sub>MAX</sub>	60	70	60			dB
	V <sub>IN</sub> = 18.5V to 28.5V	I <sub>O</sub> ≤ 0.5 I <sub>MAX</sub> T <sub>J</sub> = -55 to 150°C	60	70	60			
Dropout Voltage	I <sub>O</sub> = I <sub>MAX</sub>		2	2.5	2			V
R <sub>O</sub> Output Resistance	f = 1 kHz		9		9			mΩ
I <sub>sc</sub> Short Circuit Current	V <sub>IN</sub> = 35V		0.6	1.2	0.6	1.2		
I <sub>pk</sub> Peak Output Current	V <sub>IN</sub> = 23V		2.4	3.3	2.4	3.3		A
Average Temperature Coefficient of V <sub>O</sub>	I <sub>O</sub> = 5mA		0.6	6	1.8			mV/ °C
Input Voltage required to maintain line regulation	I <sub>O</sub> ≤ I <sub>MAX</sub>		17.5		17.7			V

- All characteristics are measured with a capacitor across the input of 0.22μF and a capacitor across the output of 0.1μF. All characteristics except noise voltage and ripple rejection ratio are measured using pulse techniques ( $t_p \leq 10\text{ms}$ ,  $\delta \leq 5\%$ ). Output voltage changes due to changes in internal temperature must be taken into account separately.
- Although power dissipation is internally limited, these specifications are applicable for maximum power dissipation P<sub>MAX</sub> of 20W , I<sub>MAX</sub> = 1.0A.
- T<sub>J</sub> = 25°C unless otherwise stated.



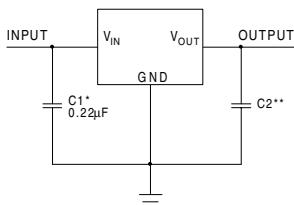
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LAB**

**IP140A SERIES**  
**IP140 SERIES**  
**IP7800A SERIES**  
**IP7800 SERIES**  
**LM140 SERIES**

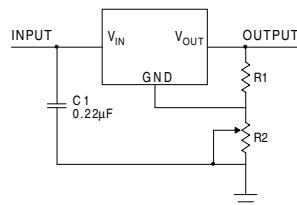
## THERMAL DATA

		<b>MAX</b>
$R_{thj-case}$	Thermal Resistance Junction-case	
	K-Pack	3°C/W
	R-Pack	7°C/W
	G/IG-Pack	5°C/W
	LCC4	13°C/W
	SMD	1.3°C/W

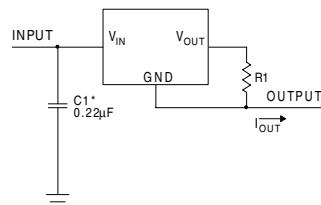
## APPLICATIONS INFORMATION



**Fixed Output Regulator**



**Adjustable Output Regulator**



**Current Regulator**

\* Required if the regulator is located far from the power supply.

\*\* Although no output capacitor is needed for stability, it does help transient response.(If needed, use 0.1µF ceramic disc)

$$V_{OUT} = 5V + \left( \frac{5V}{R1 + V} \right) R2$$

$$\left( \frac{5V}{R1} \right) > 3I_Q, \text{ Load Regulation} \approx$$

$$\left[ \frac{R1+R2}{R1} \right] (L_R \text{ of Regulator})$$

$$I_{OUT} = \left( \frac{V2 - V3}{R1} \right) + I_Q$$

$\Delta I_Q = 1.3\text{mA}$  over line and load changes

## Order Information

Part Number	K-Pack (TO-3)	R-Pack (TO-66)	G/IG-Pack (TO-257)	SMD 1 SMD 05	LCC4	Temp. Range	Note:
IP7800A	✓	✓	✓	✓	✓	-55 to +150°C	To order, add the package identifier to the part number. eg. IP7805AK
IP7800	✓	✓	✓	✓	✓	"	IP140SMD-12
IP140A	✓	✓	✓	✓	✓	"	
IP140	✓	✓	✓	✓	✓	"	
LM140	✓	✓	✓	✓	✓	"	

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E-mail: [sales@semelab.co.uk](mailto:sales@semelab.co.uk) Website: <http://www.semelab.co.uk>

Document Number 2833

Issue 2

# Mouser Electronics

Authorized Distributor

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[IP7815AIG-DESC](#)

[TT Electronics:](#)

[LM140K-15-883B](#)



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

#### Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помошь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помошь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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