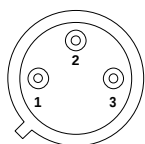
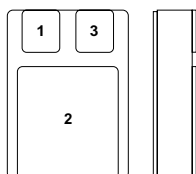


## 0.5 AMP NEGATIVE VOLTAGE REGULATOR



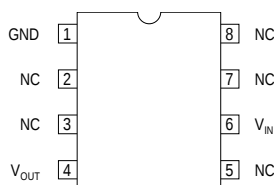
Pin 1 – Ground  
Pin 2 –  $V_{OUT}$   
Case –  $V_{IN}$

**H Package – TO-39**



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

**SMD Package - SMD1  
CERAMIC SURFACE MOUNT**



**8 Pin J Package**

### FEATURES

- **OUTPUT CURRENT UP TO 0.5A**
- **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)**

### Order Information

| Part Number  | H-Pack (TO-39) | J-Pack Cerdip | SMD-Pack SMD1 | Temp. Range   |
|--------------|----------------|---------------|---------------|---------------|
| IP79MxxAzz   | ✓              | ✓             | ✓             | -55 to +150°C |
| IP79Mxxzz    | ✓              | ✓             | ✓             | "             |
| IP120MAzz-xx | ✓              |               | ✓             | "             |
| IP120Mzz-xx  | ✓              |               | ✓             | "             |

#### Note:

xx = Voltage Code (05, 12, 15)  
zz = Package Code (H, J)  
eg. IP79M05J IP120MAH-12

### DESCRIPTION

The IP120MA and IP79M00A series of voltage regulators are fixed output regulators intended for local, on-card voltage regulation. These devices are available in -5, -12, and -15 volt options and are capable of delivering in excess of 500mA over temperature.

The A suffix devices are fully specified at 0.5A, provide 0.01% / V line regulation, 0.3% / A load regulation, and  $\pm 1\%$  output voltage tolerance at room temperature. Protection features include safe operating area, current limiting and thermal shutdown.

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

|                 |                                                      |                                                 |
|-----------------|------------------------------------------------------|-------------------------------------------------|
| $V_I$           | DC Input Voltage (for $V_O = -5, -12, -15\text{V}$ ) | -35V                                            |
| $P_D$           | Power Dissipation                                    | Internally limited                              |
| $R_{\theta JC}$ | Thermal Resistance Junction to Case                  | – H Package 20°C / W<br>– SMD Package TBA°C / W |
| $R_{\theta JA}$ | Thermal Resistance Junction to Ambient               | – H Package 120°C / W<br>– J Package 119°C / W  |
| $T_J$           | 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 2W for the H-Package, 1.05W for the J-Package and 15W for the SG-Package.

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

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

Prelim. 9/00

## ELECTRICAL CHARACTERISTICS

| Parameter                                            |                             | Test Conditions                                                                                                                        |                                                                | IP79M05A<br>IP120MA-05 |      |       | IP79M05<br>IP120M-05 |      |       | Units |
|------------------------------------------------------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|------------------------|------|-------|----------------------|------|-------|-------|
|                                                      |                             |                                                                                                                                        |                                                                | Min.                   | Typ. | Max.  | Min.                 | Typ. | Max.  |       |
| V <sub>O</sub>                                       | Output Voltage              | I <sub>O</sub> = 100mA      V <sub>IN</sub> = -10V                                                                                     |                                                                | -4.95                  | -5   | -5.05 | -4.8                 | -5   | -5.2  | V     |
|                                                      |                             | I <sub>O</sub> = 5mA to 350mA<br>P <sub>D</sub> ≤ P <sub>MAX</sub><br>V <sub>IN</sub> = -7V to -25V      T <sub>J</sub> = -55 to 150°C |                                                                | -4.85                  |      | -5.15 | -4.75                |      | -5.25 |       |
|                                                      |                             |                                                                                                                                        |                                                                |                        |      |       |                      |      |       |       |
| ΔV <sub>O</sub>                                      | Line Regulation             | I <sub>O</sub> = 350mA                                                                                                                 | V <sub>IN</sub> = -7V to -25V                                  | 3                      | 10   |       |                      | 50   | mV    |       |
|                                                      |                             |                                                                                                                                        | V <sub>IN</sub> = -8V to -18V<br>T <sub>J</sub> = -55 to 150°C | 3                      | 10   |       |                      | 30   |       |       |
| ΔV <sub>O</sub>                                      | Load Regulation             | I <sub>O</sub> = 5mA to 500mA<br>V <sub>IN</sub> = -10V      T <sub>J</sub> = -55 to 150°C                                             |                                                                | 5                      | 50   |       |                      | 100  | mV    |       |
| I <sub>Q</sub>                                       | Quiescent Current           | V <sub>IN</sub> = -10V                                                                                                                 | I <sub>O</sub> = 350mA<br>T <sub>J</sub> = -55 to 150°C        | 1                      | 2    |       | 1                    | 2    | mA    |       |
| ΔI <sub>Q</sub>                                      | Quiescent Current<br>Change | I <sub>O</sub> = 5mA to 500mA<br>V <sub>IN</sub> = -10V      T <sub>J</sub> = -55 to 150°C                                             |                                                                | 0.1                    | 0.4  |       |                      | 0.4  | mA    |       |
|                                                      |                             | I <sub>O</sub> = 200mA      V <sub>IN</sub> = -8V to -25V<br>T <sub>J</sub> = -55 to 150°C                                             |                                                                | 0.1                    | 0.4  |       |                      | 0.4  |       |       |
|                                                      |                             |                                                                                                                                        |                                                                |                        |      |       |                      |      |       |       |
| V <sub>N</sub>                                       | Output Noise<br>Voltage     | f = 10Hz to 100kHz                                                                                                                     |                                                                | 40                     | 400  |       |                      | 400  | μV    |       |
| $\frac{\Delta V_{IN}}{\Delta V_O}$                   | Ripple Rejection            | f = 120Hz                                                                                                                              | I <sub>O</sub> = 300mA                                         | 65                     | 80   |       | 54                   |      | dB    |       |
|                                                      |                             | V <sub>IN</sub> = -8V to -18V                                                                                                          | I <sub>O</sub> = 100mA<br>T <sub>J</sub> = -55 to 150°C        | 65                     | 80   |       | 54                   |      |       |       |
| Dropout Voltage                                      |                             | I <sub>O</sub> = 350mA                                                                                                                 |                                                                | 1.1                    | 2.3  |       |                      | 2.3  | V     |       |
| I <sub>sc</sub>                                      | Short Circuit<br>Current    | V <sub>IN</sub> = -35V                                                                                                                 |                                                                | 300                    | 600  |       | 300                  | 600  | mA    |       |
| I <sub>pk</sub>                                      | Peak Output<br>Current      | V <sub>IN</sub> = -10V                                                                                                                 |                                                                | 0.5                    | 1.0  | 1.4   | 0.5                  | 1.0  | 1.6   | A     |
| Average Temperature<br>Coefficient of V <sub>O</sub> |                             | I <sub>O</sub> = 5mA                                                                                                                   |                                                                |                        | 0.5  | 2.0   |                      | 0.5  | mV/°C |       |

- 1) 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<sub>p</sub> ≤ 10ms, δ ≤ 5%). Output voltage changes due to changes in internal temperature must be taken into account separately.
- 2) Test Conditions unless otherwise stated: T<sub>J</sub> = 25°C  
P<sub>MAX</sub> = 2W for H Package (TO-39)  
P<sub>MAX</sub> = 1.05W for J Package (CERDIP)  
P<sub>MAX</sub> = 15W for SMD1 Package (SMD1)

## ELECTRICAL CHARACTERISTICS

| Parameter                                           | Test Conditions                                                                                     |                                  | IP79M12A<br>IP120MA-12 |      |        | IP79M12<br>IP120M-12 |      |       | Units |
|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------|----------------------------------|------------------------|------|--------|----------------------|------|-------|-------|
|                                                     |                                                                                                     |                                  | Min.                   | Typ. | Max.   | Min.                 | Typ. | Max.  |       |
| V <sub>O</sub> Output Voltage                       | I <sub>O</sub> = 100mA V <sub>IN</sub> = -19V                                                       |                                  | -11.88                 | -12  | -12.12 | -11.5                | -12  | -12.5 | V     |
|                                                     | I <sub>O</sub> = 5mA to 350mA                                                                       |                                  |                        |      |        |                      |      |       |       |
|                                                     | P <sub>D</sub> ≤ P <sub>MAX</sub> V <sub>IN</sub> = -14.5V to -30V<br>T <sub>J</sub> = -55 to 150°C |                                  | -11.64                 |      | -12.36 | -11.4                |      | -12.6 |       |
| ΔV <sub>O</sub> Line Regulation                     | I <sub>O</sub> = 350mA                                                                              | V <sub>IN</sub> = -14.5V to -30V |                        | 4    | 18     |                      |      | 80    | mV    |
|                                                     |                                                                                                     | V <sub>IN</sub> = -15V to -25V   |                        | 4    | 18     |                      |      | 50    |       |
|                                                     |                                                                                                     | T <sub>J</sub> = -55 to 150°C    |                        |      |        |                      |      |       |       |
| ΔV <sub>O</sub> Load Regulation                     | I <sub>O</sub> = 5mA to 500mA<br>V <sub>IN</sub> = -19V T <sub>J</sub> = -55 to 150°C               |                                  |                        | 10   | 60     |                      |      | 240   | mV    |
| I <sub>Q</sub> Quiescent Current                    | V <sub>IN</sub> = -19V I <sub>O</sub> = 350mA<br>T <sub>J</sub> = -55 to 150°C                      |                                  |                        | 1.5  | 3      |                      | 1.5  | 3     | mA    |
| ΔI <sub>Q</sub> Quiescent Current Change            | I <sub>O</sub> = 5mA to 500mA<br>V <sub>IN</sub> = -19V T <sub>J</sub> = -55 to 150°C               |                                  |                        | 0.1  | 0.4    |                      |      | 0.4   | mA    |
|                                                     | I <sub>O</sub> = 200mA V <sub>IN</sub> = -14.5V to -30V<br>T <sub>J</sub> = -55 to 150°C            |                                  |                        | 0.1  | 0.4    |                      |      | 0.4   |       |
|                                                     |                                                                                                     |                                  |                        |      |        |                      |      |       |       |
| V <sub>N</sub> Output Noise Voltage                 | f = 10Hz to 100kHz                                                                                  |                                  |                        | 96   | 960    |                      |      | 960   | μV    |
| $\frac{\Delta V_{IN}}{\Delta V_O}$ Ripple Rejection | f = 120Hz<br>V <sub>IN</sub> = -15V to -25V                                                         | I <sub>O</sub> = 300mA           | 58                     | 72   |        | 54                   |      |       | dB    |
|                                                     |                                                                                                     | I <sub>O</sub> = 100mA           | 58                     | 72   |        | 54                   |      |       |       |
|                                                     |                                                                                                     | T <sub>J</sub> = -55 to 150°C    |                        |      |        |                      |      |       |       |
| Dropout Voltage                                     | I <sub>O</sub> = 350mA                                                                              |                                  |                        | 1.1  | 2.3    |                      |      | 2.3   | V     |
| I <sub>sc</sub> Short Circuit Current               | V <sub>IN</sub> = -35V                                                                              |                                  |                        | 300  | 600    |                      | 300  | 600   | mA    |
| I <sub>pk</sub> Peak Output Current                 | V <sub>IN</sub> = -19V                                                                              |                                  | 0.5                    | 1.0  | 1.4    | 0.5                  | 1.0  | 1.6   | A     |
| Average Temperature Coefficient of V <sub>O</sub>   | I <sub>O</sub> = 5mA                                                                                |                                  |                        | 1.2  | 4.8    |                      | 1.2  |       | mV/°C |

- 1) 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<sub>p</sub> ≤ 10ms, δ ≤ 5%). Output voltage changes due to changes in internal temperature must be taken into account separately.
- 2) Test Conditions unless otherwise stated: T<sub>J</sub> = 25°C  
P<sub>MAX</sub> = 2W for H Package (TO-39)  
P<sub>MAX</sub> = 1.05W for J Package (CERDIP)  
P<sub>MAX</sub> = 15W for SMD Package (SMD1)

## ELECTRICAL CHARACTERISTICS

| Parameter                                            |                             | Test Conditions                                                                               |                                  | IP79M15A<br>IP120MA-15 |      |        | IP79M15<br>IP120M-15 |      |        | Units     |
|------------------------------------------------------|-----------------------------|-----------------------------------------------------------------------------------------------|----------------------------------|------------------------|------|--------|----------------------|------|--------|-----------|
|                                                      |                             |                                                                                               |                                  | Min.                   | Typ. | Max.   | Min.                 | Typ. | Max.   |           |
| V <sub>O</sub>                                       | Output Voltage              | I <sub>O</sub> = 100mA      V <sub>IN</sub> = -23V                                            |                                  | -14.85                 | -15  | -15.15 | -14.4                | -15  | -15.6  | V         |
|                                                      |                             | I <sub>O</sub> = 5mA to 350mA                                                                 |                                  |                        |      |        |                      |      |        |           |
|                                                      |                             | P <sub>D</sub> ≤ P <sub>MAX</sub> V <sub>IN</sub> = -17.5V to -30V                            |                                  | -14.55                 |      | -15.45 | -14.25               |      | -15.75 |           |
|                                                      |                             | T <sub>J</sub> = -55 to 150°C                                                                 |                                  |                        |      |        |                      |      |        |           |
| ΔV <sub>O</sub>                                      | Line Regulation             | I <sub>O</sub> = 350mA                                                                        | V <sub>IN</sub> = -17.5V to -30V |                        | 4    | 22     |                      |      | 80     | mV        |
|                                                      |                             |                                                                                               | V <sub>IN</sub> = -18V to -28V   |                        | 4    | 22     |                      |      | 50     |           |
|                                                      |                             |                                                                                               | T <sub>J</sub> = -55 to 150°C    |                        |      |        |                      |      |        |           |
| ΔV <sub>O</sub>                                      | Load Regulation             | I <sub>O</sub> = 5mA to 500mA<br>V <sub>IN</sub> = -23V      T <sub>J</sub> = -55 to 150°C    |                                  |                        | 12   | 75     |                      |      | 240    | mV        |
| I <sub>Q</sub>                                       | Quiescent Current           | V <sub>IN</sub> = -23V      I <sub>O</sub> = 350mA<br>T <sub>J</sub> = -55 to 150°C           |                                  |                        | 1.5  | 3      |                      | 1.5  | 3      | mA        |
| ΔI <sub>Q</sub>                                      | Quiescent Current<br>Change | I <sub>O</sub> = 5mA to 500mA<br>V <sub>IN</sub> = -23V      T <sub>J</sub> = -55 to 150°C    |                                  |                        | 0.1  | 0.4    |                      |      | 0.4    | mA        |
|                                                      |                             | I <sub>O</sub> = 200mA      V <sub>IN</sub> = -17.5V to -30V<br>T <sub>J</sub> = -55 to 150°C |                                  |                        | 0.1  | 0.4    |                      |      | 0.4    |           |
|                                                      |                             |                                                                                               |                                  |                        |      |        |                      |      |        |           |
| V <sub>N</sub>                                       | Output Noise<br>Voltage     | f = 10Hz to 100kHz                                                                            |                                  |                        | 120  | 1200   |                      |      | 1200   | μV        |
| $\frac{\Delta V_{IN}}{\Delta V_O}$                   | Ripple Rejection            | f = 120Hz                                                                                     | I <sub>O</sub> = 300mA           | 57                     | 70   |        | 54                   |      |        | dB        |
|                                                      |                             | V <sub>IN</sub> = -18.5V to<br>-28.5V                                                         | I <sub>O</sub> = 100mA           | 57                     | 70   |        | 54                   |      |        |           |
|                                                      |                             | T <sub>J</sub> = -55 to 150°C                                                                 |                                  |                        |      |        |                      |      |        |           |
| Dropout Voltage                                      |                             | I <sub>O</sub> = 350mA                                                                        |                                  |                        | 1.1  | 2.3    |                      |      | 2.3    | V         |
| I <sub>sc</sub>                                      | Short Circuit<br>Current    | V <sub>IN</sub> = -35V                                                                        |                                  |                        | 300  | 600    |                      | 300  | 600    | mA        |
| I <sub>pk</sub>                                      | Peak Output<br>Current      | V <sub>IN</sub> = -23V                                                                        |                                  | 0.5                    | 1.0  | 1.4    | 0.5                  | 1.0  | 1.6    | A         |
| Average Temperature<br>Coefficient of V <sub>O</sub> |                             | I <sub>O</sub> = 5mA                                                                          |                                  |                        | 1.5  | 6.0    |                      | 1.5  |        | mV<br>/°C |

- 1) 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<sub>p</sub> ≤ 10ms, δ ≤ 5%). Output voltage changes due to changes in internal temperature must be taken into account separately.
- 2) Test Conditions unless otherwise stated: T<sub>J</sub> = 25°C  
P<sub>MAX</sub> = 2W for H Package (TO-39)  
P<sub>MAX</sub> = 1.05W for J Package (CERDIP)  
P<sub>MAX</sub> = 15W for SMD Package (SMD1)