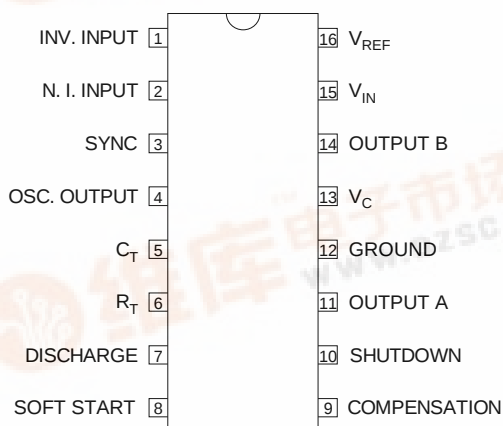


IP1P125  
IP3P125

## TOP VIEW



J Package – 16 Pin Ceramic DIP

N Package – 16 Pin Plastic DIP

D Package – 16 Pin Plastic (300) SOIC

REGULATING PULSE  
WIDTH MODULATORS

## FEATURES

- Pin Compatible with 1525A Series
- Low Output Crossover Current
- Fixed 100ns Deadtime
- 100Hz to 500kHz Operating Frequencyrange
- 5.1 volt  $\pm$  1% Reference
- Oscillator Sync. Terminal
- Soft Start
- Undervoltage Lockout
- Latching PWM

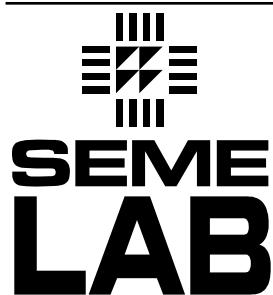
## Order Information

| Part Number | J-Pack<br>16 Pin | N-Pack<br>16 Pin | D-16<br>16 Pin | Temp.<br>Range | Note:<br>To order, add the package identifier to the part number.<br>eg. IP1P125J |
|-------------|------------------|------------------|----------------|----------------|-----------------------------------------------------------------------------------|
| IP1P125J    | ✓                |                  |                | -55 to +125°C  |                                                                                   |
| IP3P125D    |                  |                  | ✓              | 0 to +70°C     |                                                                                   |
| IP3P125J    | ✓                |                  |                | 0 to +70°C     |                                                                                   |
| IP3P125N    |                  | ✓                |                | 0 to +70°C     |                                                                                   |

ABSOLUTE MAXIMUM RATINGS (T<sub>case</sub> = 25°C unless otherwise stated)

|                  |                                |                                |                          |
|------------------|--------------------------------|--------------------------------|--------------------------|
| +V <sub>IN</sub> | Input Voltage                  |                                | +40V                     |
|                  | Collector Voltage              |                                | +40V                     |
|                  | Logic Inputs                   |                                | -0.3 to +5.5V            |
|                  | Analogue Inputs                |                                | -0.3 to +V <sub>IN</sub> |
|                  | Output Current, Source or Sink |                                | 500mA                    |
|                  | Reference Output Load Current  |                                | Internally Limited       |
|                  | Oscillator Charging Current    |                                | 5mA                      |
| P <sub>D</sub>   | Power Dissipation              | T <sub>A</sub> = 25°C          | 1000mW                   |
|                  |                                | Derate @ T <sub>A</sub> > 50°C | 10mW/°C                  |
| P <sub>D</sub>   | Power Dissipation              | T <sub>C</sub> = 25°C          | 2000W                    |
|                  |                                | Derate @ T <sub>C</sub> > 25°C | 16mW/°C                  |
|                  | Operating Junction Temperature |                                | -55 to +150°C            |
|                  | Storage Temperature Range      |                                | -65 to +150°C            |
|                  | Lead Temperature               | (soldering, 10 seconds)        | +300°C                   |





IP1P125  
IP3P125

DESCRIPTION

The IP1P125 series of pulse width modulator intergrated circuits offers high speed performance optimized for MOSFET drive. Pin compatible with SG1525A, the IP1P125 features low crossover current through the output transistors as well as 95% total usable output pulse width up to 500KHz. High speed latched shutdown is included as well as a precision 5.1 volt rference, error amp, oscillator, latched PWM coparator, totem-pole output drivers, soft-start and undervolt-age lockout.

RECOMMENDED OPERATING CONDITIONS

|                 |                                         |                   |                 |
|-----------------|-----------------------------------------|-------------------|-----------------|
| V <sub>IN</sub> | Input Voltage                           |                   | +8 to +         |
|                 | Collector Voltage                       |                   | +4.5 to +35V    |
|                 | Sink/Source Load Current (Steady State) |                   | 0 to 100mA      |
|                 | Sink/Source Load Current (Peak)         |                   | 0 to 400mA      |
|                 | Reference Load Current                  |                   | 0 to 20mA       |
|                 | Oscillator Frequency Range              |                   | 100Hz to 500kHz |
| R <sub>T</sub>  | Oscillator Timing Resistor              |                   | 1.5kΩ to 200kΩ  |
| C <sub>T</sub>  | Oscillator Timing Capacitor             |                   | 470pF to 0.1μF  |
|                 | Deadtime Resistor Range                 |                   | 0 to 500Ω       |
|                 | Operating Ambient Temperature Range     | IP1525A / IP1527A | –55 to +125°C   |
|                 |                                         | IP2525A / IP3527A | –25 to + 85°C   |
|                 |                                         | IP3525A / IP3527A | 0 to +70°C      |

**ELECTRICAL CHARACTERISTICS** ( $T_J$  = Over Operating Temperature Range unless otherwise stated)

| Parameter                            | Test Conditions                                                 | IP1P125 |      |      | IP3P125 |      |      | Units                          |
|--------------------------------------|-----------------------------------------------------------------|---------|------|------|---------|------|------|--------------------------------|
|                                      |                                                                 | Min.    | Typ. | Max. | Min.    | Typ. | Max. |                                |
| REFERENCE SECTION                    |                                                                 |         |      |      |         |      |      |                                |
| Output Voltage                       | T <sub>J</sub> = 25°C                                           | 5.05    | 5.10 | 5.15 | 5.0     | 5.1  | 5.2  | V                              |
| Line Regulation                      | V <sub>IN</sub> = 8 to 35V                                      |         | 1    | 10   |         | 1    | 15   | mV                             |
| Load Regulation                      | I <sub>L</sub> = 0 to 20mA                                      |         | 5    | 15   |         | 5    | 25   |                                |
| Temperature Stability <b>note5</b>   | Over Operating Range                                            |         | 15   | 50   |         | 15   | 20   | mV                             |
| Total Output                         | V <sub>IN</sub> = 8 to 35V, I <sub>L</sub> = 0 to 20mA          | 5.0     |      | 5.2  | 4.95    |      | 5.25 | V                              |
| Short Circuit Current                | V <sub>REF</sub> = 0                                            | 25      | 70   | 120  | 25      | 70   | 120  | mA                             |
| Output Noise Voltage <b>note5</b>    | 10 Hz ≤ f ≤ 10kHz                                               |         | 40   | 200  |         | 40   | 200  | μVrms                          |
| Long Term Stability <b>note5</b>     |                                                                 |         | 1    | 10   |         | 1    | 50   | $\frac{\text{mV}}{\text{kHr}}$ |
| OSCILLATOR SECTION <sup>2</sup>      |                                                                 |         |      |      |         |      |      |                                |
| Initial Accuracy                     |                                                                 | 37.6    | 40   | 42.4 | 37.6    | 40   | 42.4 | kHz                            |
| Voltage Stability                    | V <sub>IN</sub> = 8 to 35V                                      |         | 0.1  | 0.5  |         | 0.1  | 2    | %                              |
| Temperature Stability <b>note5</b>   | Over Operating Range                                            |         | 1    | 4    |         | 1    | 6    |                                |
| Minimum Frequency                    | R <sub>T</sub> = 200kΩ C <sub>T</sub> = 0.1μF                   |         | 80   | 120  |         | 80   | 120  | Hz                             |
| Maximum Frequency                    | R <sub>T</sub> = 2kΩ C <sub>T</sub> = 470pF R <sub>D</sub> = 0Ω |         | 900  |      |         | 900  |      | kHz                            |
| Current Mirror                       | I <sub>RT</sub> = 2mA                                           | 1.7     | 2.0  | 2.2  | 1.7     | 2.0  | 2.2  | mA                             |
| Clock Amplitude                      | Output, PIN 4, C <sub>T</sub> = 0.1μF                           | 3.0     | 4.0  |      | 3.0     | 4.0  |      | V                              |
| Clock Width                          | Output, PIN 4, C <sub>T</sub> = 0.1μF                           | 0.3     | 0.5  | 1.0  | 0.3     | 0.5  | 1.0  | μs                             |
| Sync Threshold                       |                                                                 | 1.2     | 2.0  | 2.8  | 1.2     | 2.0  | 2.8  | V                              |
| Sync Input Current                   | Sync Voltage = 3.5V                                             |         | 1.0  | 2.5  |         | 1.0  | 2.5  | mA                             |
| ERROR AMPLIFIER SECTION <sup>3</sup> |                                                                 |         |      |      |         |      |      |                                |
| Input Offset Voltage                 | V <sub>cm</sub> = 1.5 to 5.2V                                   |         | 0.1  | 5    |         | 2    | 10   | mV                             |
| Input Bias Current                   | V <sub>cm</sub> = 1.5 to 2.5V                                   |         | 1    | 10   |         | 1    | 10   | μA                             |
| Input Offset Current                 | V <sub>cm</sub> = 1.5 to 5.2V                                   |         | 0.1  | 1    |         | 0.1  | 1    |                                |
| DC Open Loop Gain                    | Δ V <sub>0</sub> = 1 to 3V ,R <sub>L</sub> ≥ 10 MΩ              | 60      | 80   |      | 60      | 80   |      | dB                             |
| Gain Bandwidth Product               | <b>note5</b>                                                    | 1       | 3.5  |      | 1       | 3.5  |      | MHz                            |

**ELECTRICAL CHARACTERISTICS** ( $T_J$  = Over Operating Temperature Range unless otherwise stated)

| Parameter                                    | Test Conditions                               | IP1P125 |      |      | IP3P125 |      |      | Units |
|----------------------------------------------|-----------------------------------------------|---------|------|------|---------|------|------|-------|
|                                              |                                               | Min.    | Typ. | Max. | Min.    | Typ. | Max. |       |
| ERROR AMPLIFIER SECTION (cont.) <sup>3</sup> |                                               |         |      |      |         |      |      |       |
| Output Low Level                             |                                               |         | 0.2  | 0.5  |         | 0.2  | 0.5  | V     |
| Output High Level                            |                                               | 3.8     | 5.6  | 7.0  | 3.8     | 5.6  | 7.0  |       |
| Common Mode Rejection                        | V <sub>CM</sub> = 1.5 to 5.2V                 | 60      | 90   |      | 60      | 90   |      | dB    |
| Supply Voltage Rejection                     | V <sub>IN</sub> = 8 to 35V                    | 50      | 60   |      | 50      | 60   |      |       |
| PWM COMPARATOR                               |                                               |         |      |      |         |      |      |       |
| Minimum Duty Cycle                           | V <sub>PIN1</sub> – V <sub>PIN2</sub> ≥ 150mV |         | 0    |      |         | 0    |      | %     |
| Maximum Duty Cycle                           | V <sub>PIN2</sub> – V <sub>PIN1</sub> ≥ 150mV | 45      | 49   |      | 45      | 49   |      |       |
| Input Threshold                              | Zero Duty Cycle                               | 0.6     | 0.9  |      | 0.6     | 0.9  |      | V     |
| Input Threshold                              | Max. Duty Cycle                               |         | 3.3  | 3.6  |         | 3.3  | 3.6  |       |
| Input Bias Current                           |                                               |         | 50   |      |         | 50   |      | μA    |
| SHUTDOWN SECTION                             |                                               |         |      |      |         |      |      |       |
| Soft Start Current                           | V <sub>SHUTDOWN</sub> = 0V                    | 25      | 50   | 80   | 25      | 50   | 80   | μA    |
| Soft Start Low Level                         | V <sub>SHUTDOWN</sub> = 2V                    |         | 0.4  | 0.6  |         | 0.4  | 0.6  | V     |
| Shutdown Threshold                           | To Outputs                                    | 0.6     | 1.3  | 2.0  | 0.6     | 1.3  | 2.0  |       |
| Shutdown Input Current                       | V <sub>SHUTDOWN</sub> = 2.5V                  |         | 0.1  | 1.0  |         | 0.1  | 1.0  | mA    |
| Shutdown Delay <b>note5</b>                  | PIN 10 to Output T <sub>J</sub> = 25°C        |         | 50   | 300  |         | 50   | 300  | ns    |
| OUTPUT DRIVERS (each output) <sup>4</sup>    |                                               |         |      |      |         |      |      |       |
| Output Low Level                             | I <sub>SINK</sub> = 20mA                      |         | 0.2  | 0.4  |         | 0.2  | 0.4  | V     |
|                                              | I <sub>SINK</sub> = 100mA                     |         | 1.0  | 2.5  |         | 1.0  | 2.5  |       |
| Output High Level                            | I <sub>SOURCE</sub> = 20mA                    | 18      | 19   |      | 18      | 19   |      | V     |
|                                              | I <sub>SOURCE</sub> = 100mA                   | 17      | 18   |      | 17      | 18   |      |       |
| Collector Leakage Current                    | V <sub>C</sub> = 35V                          |         | 200  |      |         | 200  |      | V     |
| Rise Time                                    | C <sub>L</sub> = 1nF T <sub>J</sub> = 25°C    |         | 100  | 300  |         | 100  | 300  | ns    |
| Fall Time                                    | C <sub>L</sub> = 1nF T <sub>J</sub> = 25°C    |         | 50   | 300  |         | 50   | 300  |       |
| Dead Time                                    | C <sub>L</sub> = 1nF T <sub>J</sub> = 25°C    |         | 100  |      |         | 100  |      |       |

**NOTES**

**note5**

These parameters, although guaranteed over the recommended conditions are not 100% tested in production.