power-one®
Changing the Shape of Power

RoHS Compliant

## Applications

- Distributed power architectures
- Telecommunications equipment
- LAN/WAN applications
- Data processing
- Industrial applications

## Features

- RoHS lead free and lead-solder-exempt products are available
- Single board design
- Excellent co-planarity
- Basic insulation
- Synchronization function
- Output voltage sense function
- Low profile SMT device
- Input-to-output isolation: 1500 VDC
- Low conducted and radiated EMI
- Output overcurrent protection
- Remote shutdown (primary referenced)
- Output voltage trim adjust, positive or negative
- Operational to 100 °C
- Meets EN55022 level A
- UL, CSA, and EN/IEC60950 approvals

## Description

The SFS Series of converters are low profile, single output, DC-DC converters intended for SMT placement and reflow soldering. The product provides onboard conversion of standard telecom, datacom and industrial input voltages to isolated low output voltages. Proprietary patented manufacturing process ensures optimal quality through full process automation. The converters are cost effective high performance alternatives to competing products on the market, both through hole and surface mount.

**Model Selection**

| Model | Input Voltage, Vdc | Input Current, Max Adc | Output Voltage, Vdc | Output Current, Adc | Output Ripple/Noise, mV p-p | Typical Efficiency, % |
|---|---|---|---|---|---|---|
| **SFS13ZA-M6** | 36-72 | 0.8 | 1.5 | 13 | 60 | 80 |
| **SFS13ZB-M6** | 36-72 | 0.9 | 1.8 | 13 | 60 | 80 |
| **SFS13ZD-M6** | 36-72 | 1.2 | 2.5 | 13 | 80 | 81 |
| **SFS13ZE-M6** | 36-72 | 1.5 | 3.3 | 13 | 80 | 86 |
| **SFS08ZG-M6** | 36-72 | 1.4 | 5.0 | 8 | 80 | 86 |

Model numbers highlighted or shaded are not recommended for new designs.

### Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings may cause performance degradation, adversely affect long term reliability and cause permanent damage to the converter. Specifications apply over specified input voltage, output load and temperature range, unless otherwise noted.

| Parameter | Conditions/Description | Min | Max | Units |
|---|---|---|---|---|
| Input voltage ($V_{IN}$)<br>Transient Input Voltage | Continuous<br>Transient, 100 ms | 36 | 72<br>100 | VDC<br>VDC |
| Operating Case Temp. ($T_C$) | All operating conditions | -40 | 100 | °C |
| Storage Temperature | | -55 | 125 | °C |
| ON/OFF Control Voltage ($V_{RC}$) | Referenced to -$V_{IN}$ | -5 | 12 | VDC |

### Environmental and Mechanical Specifications

Specifications apply over specified input voltage, output load and temperature range, unless otherwise noted.

| Parameter | Conditions/Description | Min | Nom | Max | Units |
|---|---|---|---|---|---|
| Shock | IEC68-2-27 | | | 100 | g |
| Sinusoidal Vibration | IEC68-2-6 | | | 10 | g |
| Weight | | | | 0.9/25 | oz/gr |
| Water Washing | Standard process | | Yes | | |
| MTBF | Per Bellcore TR-NWT-000332<br>(100% load @25 °C, GB) | | 1,127 | | kHr |

### Isolation Specifications

| Parameter | Conditions/Description | Min | Nom | Max | Units |
|---|---|---|---|---|---|
| Insulation Safety Rating | | | Basic | | |
| Isolation Voltage | | | | 1,500 | VDC |
| Isolation Resistance | | 10 | | | MΩ |
| Isolation Capacitance | | | 1,100 | | pF |

### Input Specifications

| Parameter | Conditions/Description | Min | Nom | Max | Units |
|---|---|---|---|---|---|
| Input Voltage (Vin) | Continuous | 36 | 48 | 72 | VDC |
| Input Current when Shutdown | Vin.Nom, Remote Control activated | | 2 | 5 | mADC |
| Input Current No Load | Vin.Nom, Io = 0 | | 20 | 50 | mADC |
| Turn-On Input Voltage | Ramping Up, Io.Max<br>(3.3V / 5V output versions only) | 24<br>(34) | 26<br>(35) | 28<br>(36) | VDC |
| Turn-Off Input Voltage | Ramping Down, Io.Max<br>(3.3V / 5V output versions only) | 25.5<br>(31.5) | 27.5<br>(32.5) | 29.5<br>(33.5) | VDC |
| Turn-On Time | To Output Regulation Band<br>After Remote Control<br>Rise Time | | 90<br>50<br>5 | 250<br><br>10 | ms<br>ms<br>ms |
| Input Reflected Ripple Current | Vin.Max, Io.Max | | | 30 | mAp-p |
| Input Capacitance | | | | 1.5 | µF |

### Output Specifications

All specifications apply over input voltage, output load and temperature range, unless otherwise noted.

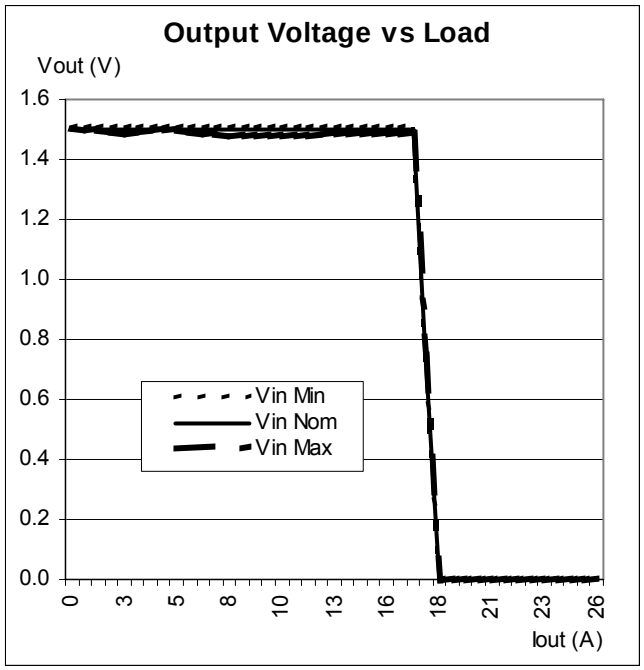
## SFS13ZA : 1.5V/13A

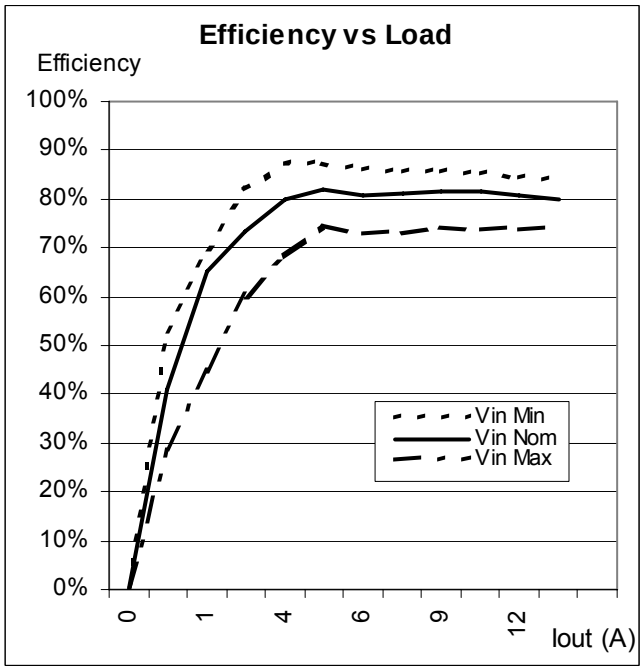
| Parameter | | Conditions/Description | Min | Nom | Max | Units |
|---|---|---|---|---|---|---|
| Output Voltage Setpoint Accuracy | $V_O$ | $V_{IN}$nom, $I_O$ = 6.5 A, 25 °C | 1.48 | 1.50 | 1.52 | VDC |
| Output Current [1] | $I_O$ | $V_{IN}$min to $V_{IN}$max | 1 | 10 | 13 | ADC |
| Line Regulation | | $V_{IN}$min to $V_{IN}$max, 50% $I_O$max | | | 25 | mV |
| Load Regulation | | Vin.Nom, Io.Min to $I_O$max | | 10 | 25 | mV |
| Dynamic Regulation<br>Peak Deviation<br>Settling Time | | 50-100% Io.Max load step change.<br>to 1% error band | | | <br>250<br>500 | <br>± mV<br>µs |
| Output Voltage Ripple [2] | $V_R$ | $V_{IN}$min to $V_{IN}$max, $I_O$min to $I_O$max, 10 MHz Bandwidth | | 60 | 100 | mV p-p |
| Admissible Load Capacitance | $C_O$max | $I_O$max, $V_{IN}$nom | | | 3,300 | µF |
| Output Current Limit Threshold | $I_{CL}$ | $V_O$ ≤0.90 $V_O$nom | 110 | | 200 | %$I_O$max |
| Switching Frequency | | $V_{IN}$nom, $I_O$max | | 650 | | kHz |
| Temperature Coefficient | $T_{CO}$ | | | | 0.06 | %$V_O$/°C |
| Trim Range | | $I_O$min to $I_O$max, $V_{IN}$min to $V_{IN}$max | 1.35 | | 1.65 | Vdc |

1 Below $I_O$min the output maintains regulation but output ripple may increase

2 Measured with a 1µF ceramic capacitor across output pins, as shown on page 9

### SFS13ZA Typical Characteristic Curves



## Output Specifications

All specifications apply over input voltage, output load and temperature range, unless otherwise noted.

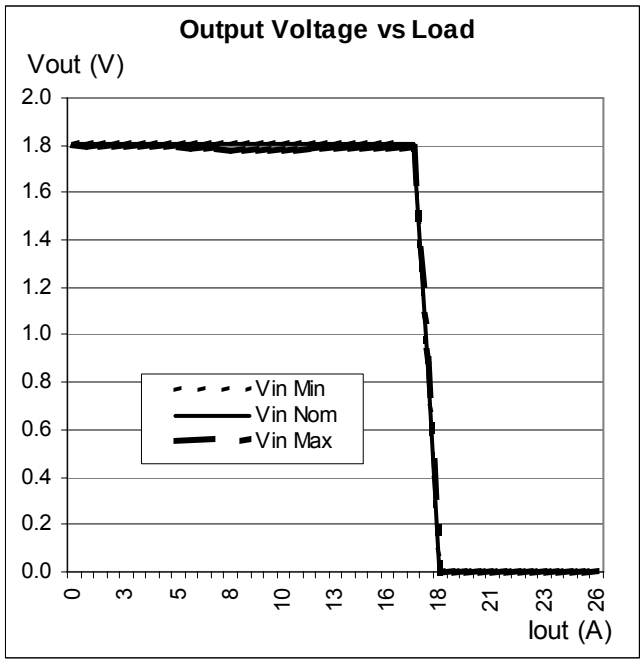
### SFS13ZB : 1.8V/13A

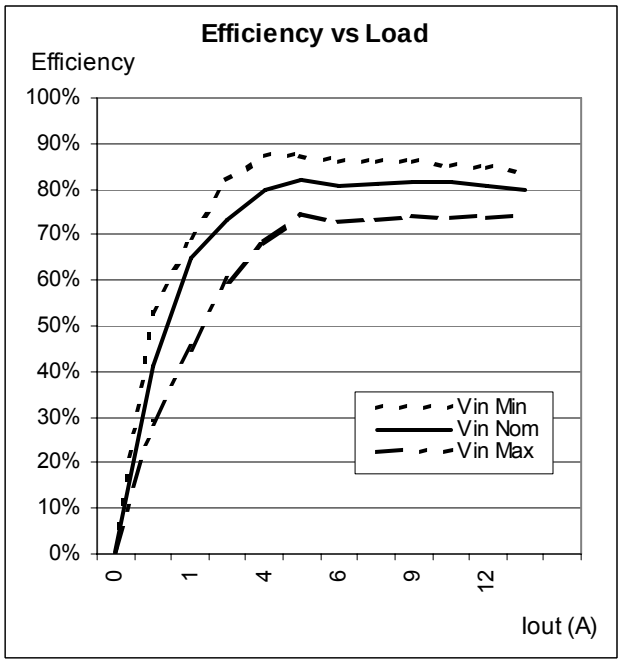
| Parameter | | Conditions/Description | Min | Nom | Max | Units |
|---|---|---|---|---|---|---|
| Output Voltage Setpoint Accuracy | $V_O$ | $V_{IN}$nom, $I_O$ = 6.5 A, 25 °C | 1.78 | 1.80 | 1.82 | VDC |
| Output Current [1] | $I_O$ | $V_{IN}$min to $V_{IN}$max | 1 | 10 | 13 | ADC |
| Line Regulation | | $V_{IN}$min to $V_{IN}$max, 50% $I_O$max | | | 25 | mV |
| Load Regulation | | Vin.Nom, Io.Min to $I_O$max | | 10 | 25 | mV |
| Dynamic Regulation<br>Peak Deviation<br>Settling Time | | 50-100% Io.Max load step change.<br>to 1% error band | | | <br>250<br>500 | <br>± mV<br>µs |
| Output Voltage Ripple[2] | $V_R$ | $V_{IN}$min to $V_{IN}$max, $I_O$min to $I_O$max, 10 MHz Bandwidth | | 60 | 100 | mV p-p |
| Admissible Load Capacitance | $C_O$max | $I_O$max, $V_{IN}$nom | | | 3,300 | µF |
| Output Current Limit Threshold | $I_{CL}$ | $V_O$ ≤0.90 $V_O$nom | 110 | | 200 | %$I_O$max |
| Switching Frequency | | $V_{IN}$nom, $I_O$max | | 650 | | kHz |
| Temperature Coefficient | $T_{CO}$ | | | | 0.06 | %$V_O$/°C |
| Trim Range | | $I_O$min to $I_O$max, $V_{IN}$min to $V_{IN}$max | 1.62 | | 1.98 | VDC |

1 Below $I_O$min the output maintains regulation but output ripple may increase

2 Measured with a 1µF ceramic capacitor across output pins, as shown on page 9

### SFS13ZB Typical Characteristic Curves



## Output Specifications

All specifications apply over input voltage, output load and temperature range, unless otherwise noted.

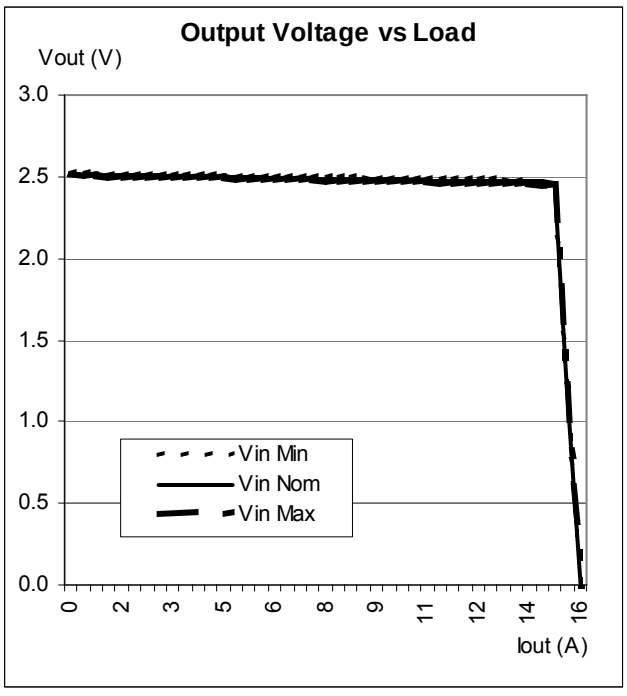
### SFS13ZD : 2.5V/13A

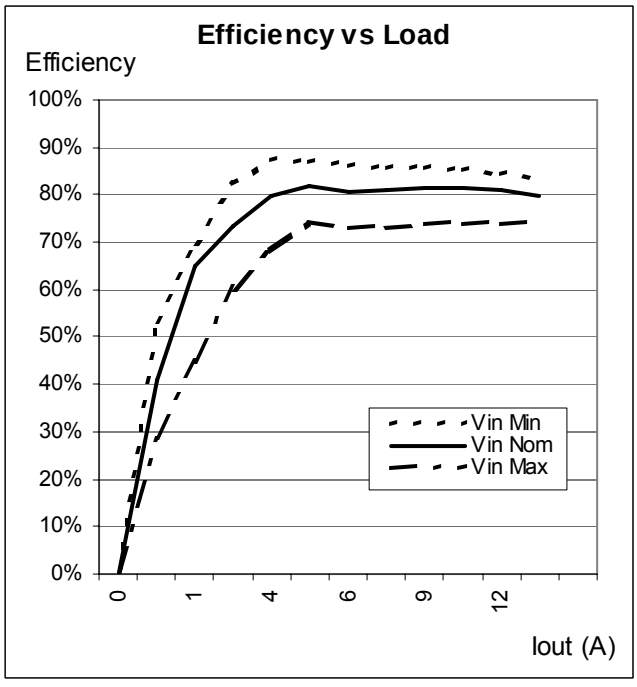
| Parameter | | Conditions/Description | Min | Nom | Max | Units |
|---|---|---|---|---|---|---|
| Output Voltage Setpoint Accuracy | $V_O$ | $V_{IN}$nom, $I_O$ = 6.5 A, 25 °C | 2.47 | 2.5 | 2.53 | VDC |
| Output Current [1] | $I_O$ | $V_{IN}$min to $V_{IN}$max | 1 | 10 | 13 | ADC |
| Line Regulation | | $V_{IN}$min to $V_{IN}$max, 50% $I_O$max | | | 35 | mV |
| Load Regulation | | Vin.Nom, Io.Min to $I_O$max | | 15 | 35 | mV |
| Dynamic Regulation<br>Peak Deviation<br>Settling Time | | 50-100% Io.Max load step change.<br>to 1% error band | | | <br>250<br>500 | <br>± mV<br>µs |
| Output Voltage Ripple[2] | $V_R$ | $V_{IN}$min to $V_{IN}$max, $I_O$min to $I_O$max, 10 MHz Bandwidth | | 80 | 130 | mV p-p |
| Admissible Load Capacitance | $C_O$max | $I_O$max, $V_{IN}$nom | | | 3,300 | µF |
| Output Current Limit Threshold | $I_{CL}$ | $V_O$ ≤0.90 $V_O$nom | 110 | | 200 | %$I_O$max |
| Switching Frequency | | $V_{IN}$nom, $I_O$max | | 650 | | kHz |
| Temperature Coefficient | $T_{CO}$ | | | | 0.06 | %$V_O$/°C |
| Trim Range | | $I_O$min to $I_O$max, $V_{IN}$min to $V_{IN}$max | 2.25 | | 2.75 | VDC |

1 Below $I_O$min the output maintains regulation but output ripple may increase

2 Measured with a 1µF ceramic capacitor across output pins, as shown on page 9

### SFS13ZD Typical Characteristic Curves



**Output Specifications**

All specifications apply over input voltage, output load and temperature range, unless otherwise noted.

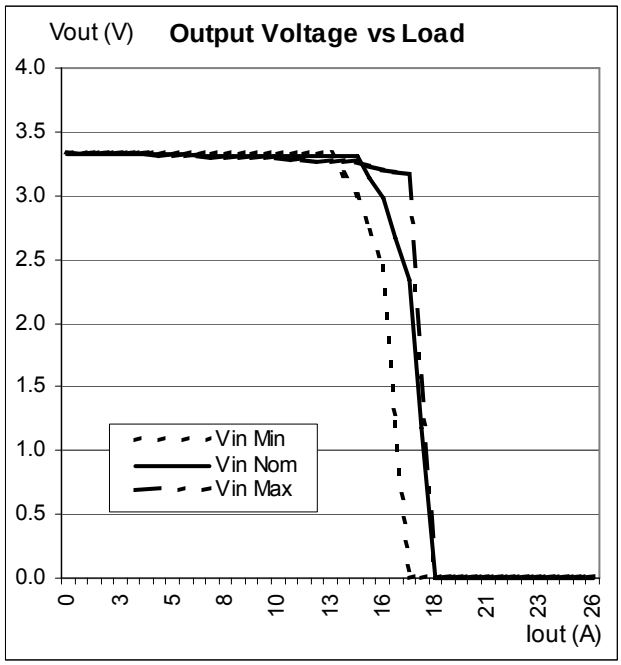
## SFS13ZE : 3.3V/13A

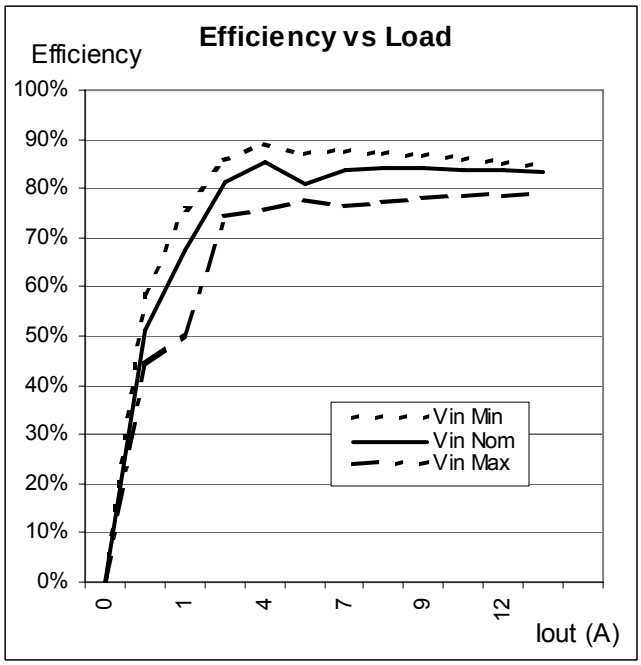
| Parameter | | Conditions/Description | Min | Nom | Max | Units |
|---|---|---|---|---|---|---|
| Output Voltage Setpoint Accuracy | $V_O$ | $V_{IN}$nom, $I_O$ = 6.5 A, 25 °C | 3.26 | 3.3 | 3.34 | VDC |
| Output Current [1] | $I_O$ | $V_{IN}$min to $V_{IN}$max | 1 | 10 | 13 | ADC |
| Line Regulation | | $V_{IN}$min to $V_{IN}$max, 50% $I_O$max | | | 45 | mV |
| Load Regulation | | Vin.Nom, Io.Min to $I_O$max | | 20 | 45 | mV |
| Dynamic Regulation<br>Peak Deviation<br>Settling Time | | 50-100% Io.Max load step change.<br>to 1% error band | | | <br>350<br>500 | <br>± mV<br>µs |
| Output Voltage Ripple[2] | $V_R$ | $V_{IN}$min to $V_{IN}$max, $I_O$min to $I_O$max, 10 MHz Bandwidth | | 80 | 130 | mV p-p |
| Admissible Load Capacitance | $C_O$max | $I_O$max, $V_{IN}$nom | | | 3,300 | µF |
| Output Current Limit Threshold | $I_{CL}$ | $V_O$ ≤0.90 $V_O$nom | 110 | | 200 | %$I_O$max |
| Switching Frequency | | $V_{IN}$nom, $I_O$max | | 650 | | kHz |
| Temperature Coefficient | $T_{CO}$ | | | | 0.06 | %$V_O$/°C |
| Trim Range | | $I_O$min to $I_O$max, $V_{IN}$min to $V_{IN}$max | 3.0 | | 3.6 | VDC |

1 Below $I_O$min the output maintains regulation but output ripple may increase

2 Measured with a 1µF ceramic capacitor across output pins, as shown on page 9

## SFS13ZE Typical Characteristic Curves



## Output Specifications

All specifications apply over input voltage, output load and temperature range, unless otherwise noted.

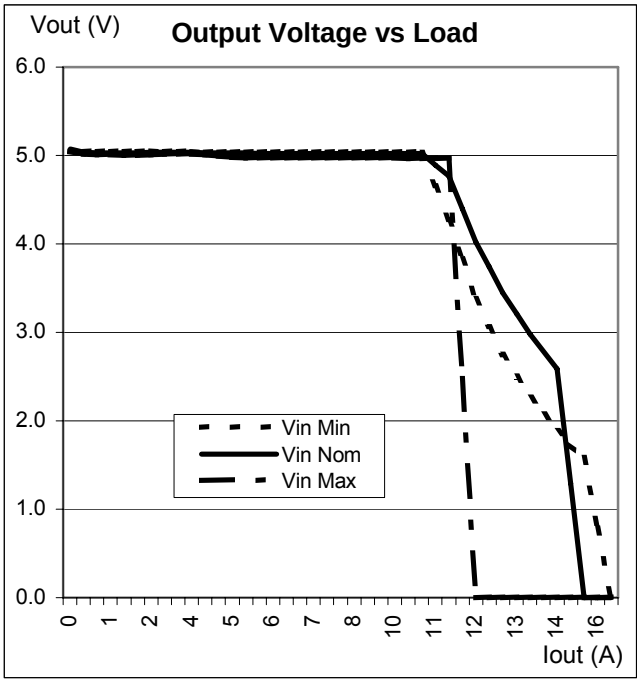
### SFS08ZG : 5.0V/8A

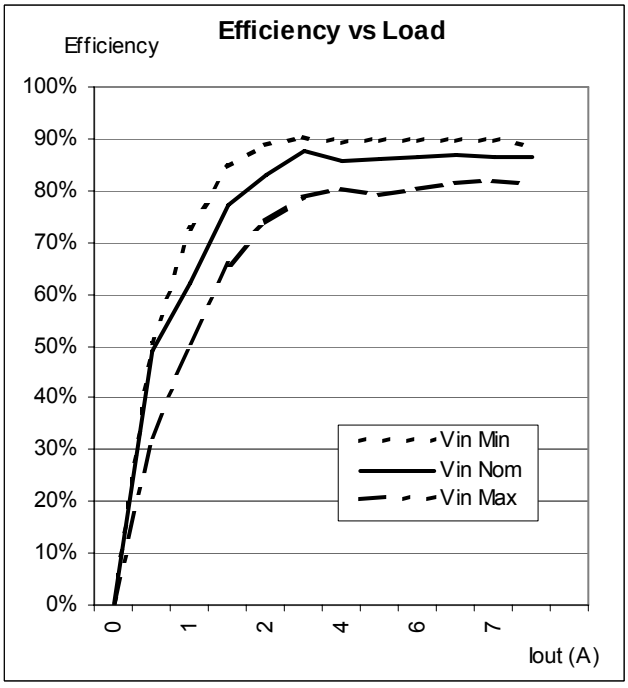
| Parameter | | Conditions/Description | Min | Nom | Max | Units |
|---|---|---|---|---|---|---|
| Output Voltage Setpoint Accuracy | $V_O$ | $V_{IN}$nom, $I_O$ = 6.5 A, 25 °C | 4.94 | 5.0 | 5.06 | VDC |
| Output Current [1] | $I_O$ | $V_{IN}$min to $V_{IN}$max | 0.8 | 6 | 8 | ADC |
| Line Regulation | | $V_{IN}$min to $V_{IN}$max, 50% $I_O$max | | | 65 | mV |
| Load Regulation | | Vin.Nom, Io.Min to $I_O$max | | 30 | 65 | mV |
| Dynamic Regulation<br>Peak Deviation<br>Settling Time | | 50-100% Io.Max load step change.<br>to 1% error band | | | <br>350<br>500 | <br>± mV<br>µs |
| Output Voltage Ripple [2] | $V_R$ | $V_{IN}$min to $V_{IN}$max, $I_O$min to $I_O$max, 10 MHz Bandwidth | | 80 | 130 | mV p-p |
| Admissible Load Capacitance | $C_O$max | $I_O$max, $V_{IN}$nom | | | 3,300 | µF |
| Output Current Limit Threshold | $I_{CL}$ | $V_O$ ≤0.90 $V_O$nom | 110 | | 200 | %$I_O$ max |
| Switching Frequency | | $V_{IN}$nom, $I_O$max | | 650 | | kHz |
| Temperature Coefficient | $T_{CO}$ | | | | 0.06 | %$V_O$/°C |
| Trim Range | | $I_O$min to $I_O$max, $V_{IN}$min to $V_{IN}$max | 4.5 | | 5.5 | Vdc |

1 Below $I_O$min the output maintains regulation but output ripple may increase

2 Measured with a 1µF ceramic capacitor across output pins, as shown on page 9

### SFS08ZG Typical Characteristic Curves



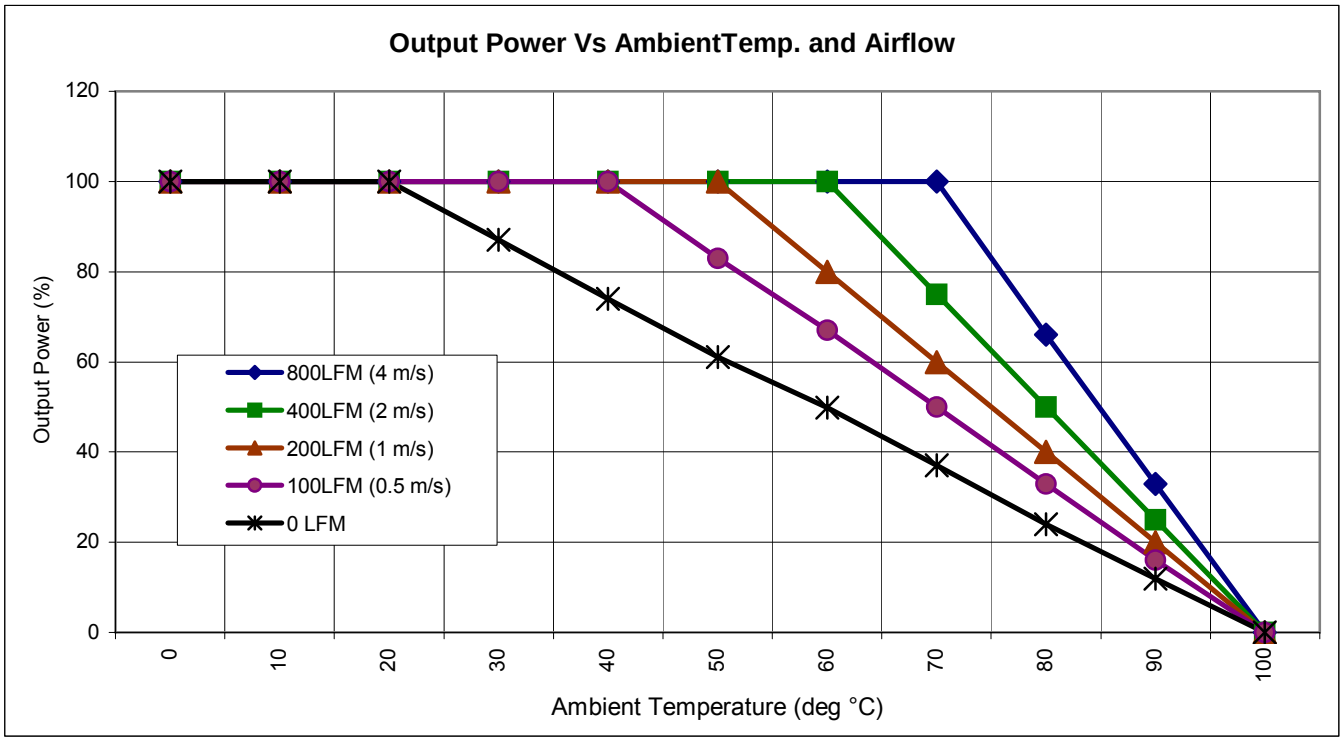
### Feature Specifications

All specifications apply over input voltage, output load and temperature range, unless otherwise noted.

| Parameter | Conditions/Description | Min | Nom | Max | Units |
|---|---|---|---|---|---|
| Shutdown Control: | | | | | |
| Converter OFF | Shutdown pin is pulled low | -1.0 | | 1.0 | VDC |
| Converter ON | Voltage source or open circuit | 3.5 | | 6 | VDC |
| Sink Current | Vin=Vin.Nom | | 0.3 | | mADC |
| Synchronization: | | | | | |
| Frequency Range | TTL compatible square wave on sync pin. Referenced to –Vin | 700 | | 800 | kHz |
| Voltage Sense Range | Available compensation | | 10 | | % |

### Temperature Derating Curves

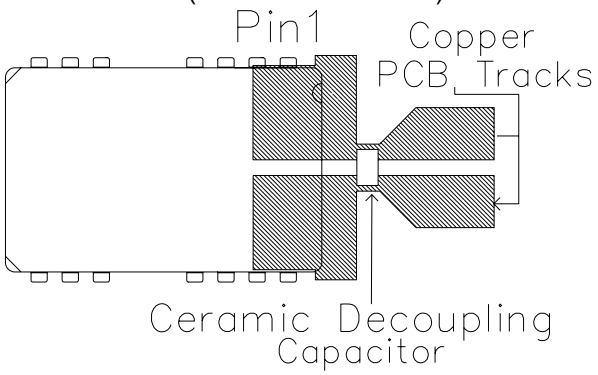
The derating curves below give an indication of the output power achievable with and without forced-air cooling. However in the final application, in order to ensure the reliability of the unit, care must be taken to ensure the maximum case temperature is not exceeded under any conditions.




Note: For continuous operation above 60V input the available output power is further derated linearly up to 50% at 75V input. This additional derating is due to a predictable drop in efficiency at high input voltages.

### Typical Application

This series of converters does not require any external components for proper operation. However, if the distribution of the input voltage to the converter contains significant inductance, a capacitor across the input terminals may be required to stabilize the input voltage. A minimum of 1 µF, quality electrolytic / ceramic capacitor is recommended for this purpose.
For output decoupling it is recommended to connect a 1 µF ceramic capacitor directly across the output pins of the converter (illustrated as follows).




### Shutdown Feature

The remote control pin functions as a normal soft shutdown. It is referenced to the –Vin pin. With positive logic, when the remote control pin is pulled low, the output is turned off and the unit goes into a very low input power mode.

An open collector switch is recommended to control the voltage between the remote control pin and the -Vin pin of the converter. The remote control pin is pulled up internally, so no external voltage source is required. The user should avoid connecting a resistor between the remote control pin and the +Vin pin.

The user must take care to ensure that the pin reference for the control is connected close to the -Vin pin. The control signal must not be referenced ahead of EMI filtering, or remotely from the unit. If the remote control pin is not used, it can be left floating.

### Thermal Considerations

The converter is designed for natural or forced convection cooling. The output power of the converter is limited by the maximum case temperature ($T_C$). To ensure reliable long term operation of the converters, and to comply with safety agency requirements, Power-One limits maximum allowable case temperature ($T_C$) to 100°C (see Mechanical Drawings).

### Output Current Limiting

When the output is overloaded above the maximum output current rating, the voltage will start to reduce to maintain the output power to a safe level. In a condition of high overload or short-circuit where the output voltage is pulled below approximately 30% of $V_O$nom, the unit will enter a 'Hiccup' mode of operation. Under this condition the unit will attempt to restart, approximately every 20 ms until the overload has cleared.

### Voltage Sense Description

The voltage sense feature compensates for voltage drops that may occur at the point of load due to PCB tracks or other losses. Pin 3 and pin 16 are used to sense the output voltage at point of load.

If the sense feature is not used, it is recommended to connect pin 3 to pins 1 & 2 and pin 16 to pins 17 & 18.

**Note:**
When the output voltage is sensed remotely at the load, the output power from the converter must not exceed maximum rating. This is determined by multiplying the output voltage (measured at output pins) by the output current.

### Output Voltage Trim

The trim feature allows the user to adjust the output voltage from the nominal.
Output voltage can be adjusted using an external resistor. To increase Vo a resistor should be connected between pin 15 and pins 17 & 18. To decrease Vo a resistor should be connected between pin 15 and pins 1 & 2.

To **increase** Vo :

Rext = (A – (D x Vout )) / ( Vout – Vout.Nom), Ω

To **reduce** Vo:

Rext = ((B x Vout) - C) / ( Vout.Nom - Vout), Ω

Where Vout is the desired output voltage

| Model | A | B | C | D |
|---|---|---|---|---|
| **SFS13ZA** | 1945 | 1470 | 1944 | 470 |
| **SFS13ZB** | 2590 | 1730 | 2560 | 750 |
| **SFS13ZD** | 5010 | 2516 | 5010 | 1500 |
| **SFS13ZE** | 7010 | 3161 | 7010 | 1500 |
| **SFS08ZG** | 11260 | 4532 | 11240 | 1500 |

**Note:**
When the output voltage is trimmed up, the output power from the converter must not exceed its maximum rating. This is determined by measuring the voltage on the output pins, and multiplying it by the output current.

### Parallel Operation

Paralleling of two converters is not possible.

### Synchronization Feature

It is possible to synchronize the switching frequency of one or more converters to an external symmetrical clock signal. Consult factory if this option is required, for full application details.

## Safety Considerations

These converters feature 1500 Volt DC isolation from input to output. The input to output resistance is greater than 10 MOhm. These converters are provided with Basic Insulation between input and output circuits according to all IEC60950 based standards. Nevertheless, if the system using the converter needs to receive safety agency approval, certain rules must be followed in the design of the system. In particular, all of the creepage and clearance requirements of the end-use safety requirements must be observed. These documents include UL60950 - CSA60950-00 and EN60950, although specific applications may have other or additional requirements.

In order for the output of the converter to be considered as SELV (Safety Extra Low Voltage) or TNV-1, according to all IEC60950 based standards, one of the following requirements must be met in the system design:

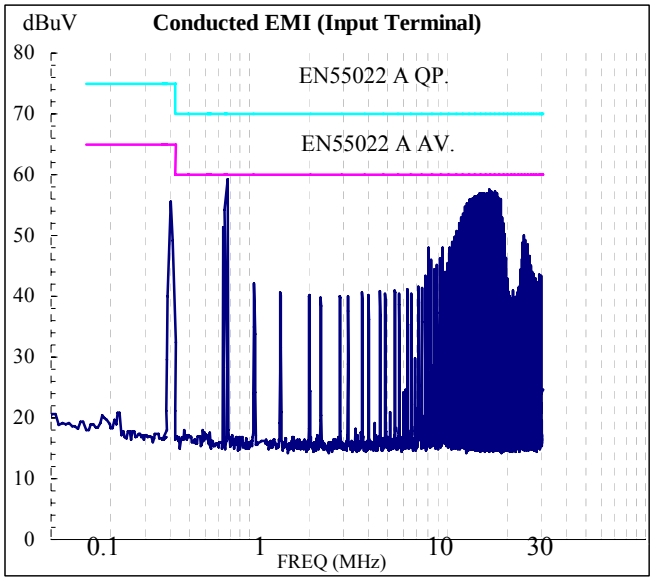
- The converter has no internal fuse. The external fuse must be provided to protect the system from catastrophic failure. The fuse with a rating not greater than 2.0A is recommended. The user can select a lower rating fuse based upon the inrush transient and the maximum input current of the converter, which occurs at the minimum input voltage. Both input traces and the chassis ground trace (if applicable) must be capable of conducting a current of 1.5 times the value of the fuse without opening. The fuse must not be placed in the grounded input line, if any.

- If the voltage source feeding the module is SELV, the output of the converter is considered SELV and may be grounded or ungrounded.

- The components on the converter carry transients that exceed the input voltage. Even if the input voltage is SELV (<60V) the components on the primary side of the converter may have to be considered as hazardous. A safety interlock may be needed to prevent the user from accessing the converter while operational.

## EMC Specifications

Conducted Noise:
The converters meet the requirements of EN55022, CISPR22 and FCC CFR title 47 part 15 Sub-part J - Conducted (conducted noise on the input terminals) without any external components. The results for this solution are displayed below.




To meet level B for the above standards it is necessary to fit a 5.0μF ceramic capacitor across the input terminals.

Electromagnetic Susceptibility:

| Standard | Applied Stress | Class Level | Performance Outcome * |
|---|---|---|---|
| Electrostatic Discharge EN61000-4-2 | 2KV to pins | 1 | B |
| Electromagnetic Field EN61000-4-3 | 3V/m | 2 | A |
| Electrical Fast Transient EN61000-4-4 | 2000Vp to input | 3 | B |
| Conducted Disturbances EN61000-4-6 | 3Vrms to input | 2 | B |

* **A** denotes normal operation, no deviation from specification. **B** denotes temporary deviation from specification is possible.

## Surface Mount Assembly

Soldering:
The following instructions must be observed when soldering the unit. Failure to observe these instructions may result in failure or significant degradation of the modules performance. Power-One will not honor any warranty claims arising from failure to observe these instructions.

This product is approved for forced convection reflow soldering only.

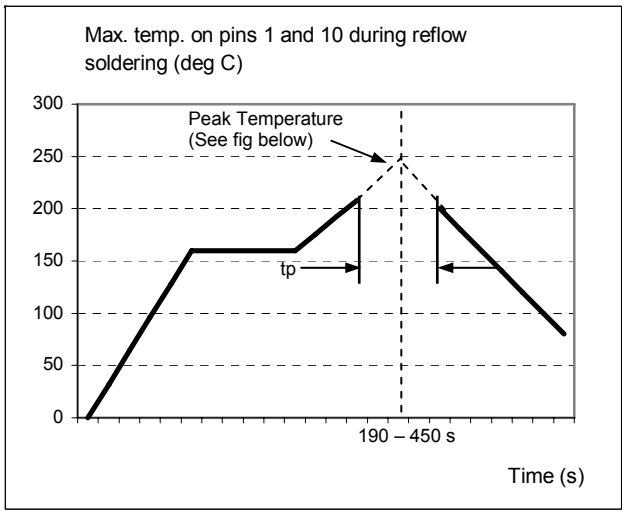
The curves below define the maximum peak reflow temperature permissible measured on Pins 1 and 10 of the converter.

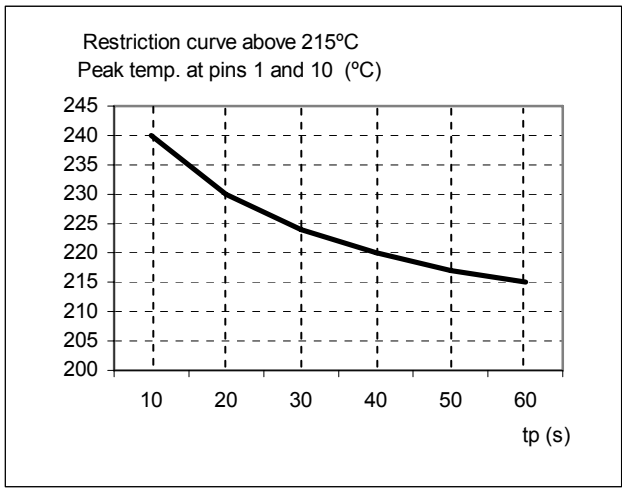
The lead-frame is constructed from a high temperature glass filled, UL94V0 flame retardant, diallyl ortho-phthalate moulding compound commonly used for packaging of electronics components. It passes NASA outgassing tests and is certified to MIL-M-14. It's coefficient of thermal expansion is equivalent to FR4.

The gull wing leads are formed to ensure optimal solder joint strength and structure. Furthermore they facilitate visual inspection (manual or automatic). The leads are formed from a 97% Cu alloy plated with Cu and Sn 90. This material is commonly used in the manufacture of integrated circuits. It has good corrosion resistance and exhibits the nobility inherent to all high copper alloys. Unlike brasses, this material is essentially immune to stress corrosion cracking. It also exhibits excellent solderability. It is readily wetted by solders and performs well in standard solderability tests. (Dip of Class II or better).

The product is manufactured with a patented process, which is fully automated, and 'in-line'. This ensures that there is no contamination or mechanical stress on the lead-frame so that the co planarity and solderability are maintained.

The product is shipped in JEDEC style trays to ensure preservation of the co-planarity and enable fully automated assembly in the final application (co-planarity within 0.1mm).



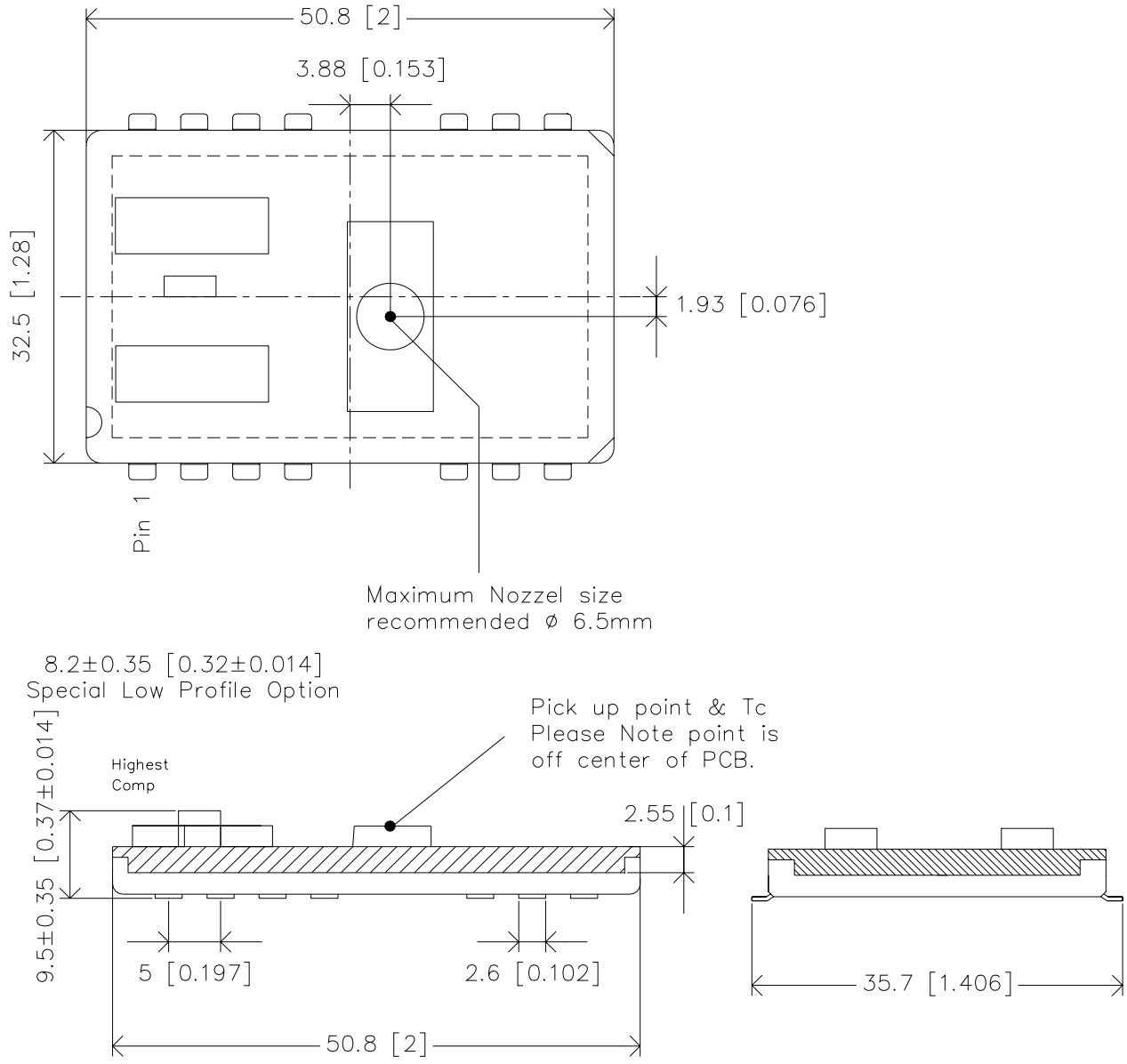

Pick & Place Assembly:

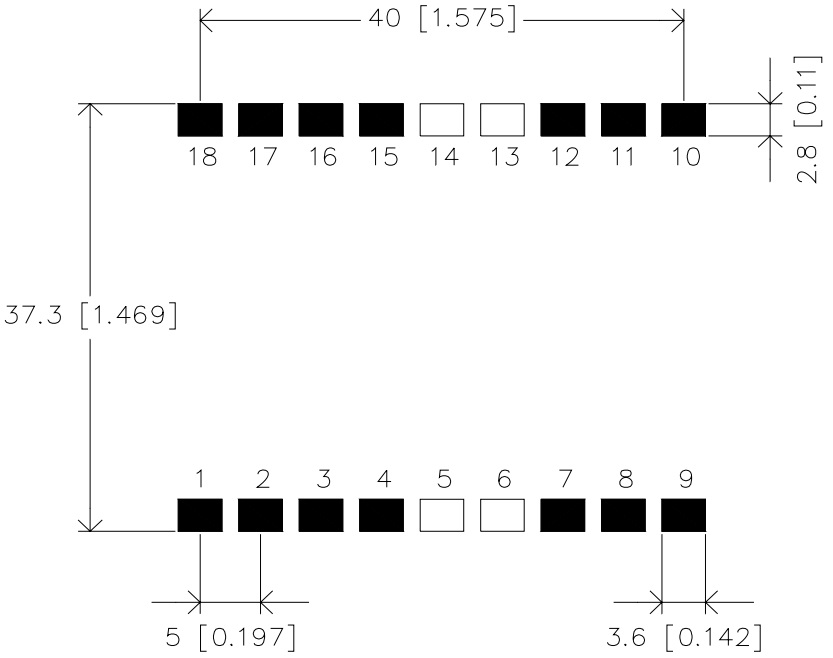
The product is designed to have a large flat area in the center of the top surface to serve as a pick up point for automated vacuum pick and place equipment. The 'open board' construction of the unit ensures that weight is kept to a minimum. However due to the relatively large size of the component, a large nozzle (> 8mm, depending on vacuum pressure) is recommended for picking and placing.
The unit may also be automatically handled using 'odd-form' placement equipment, with mechanical grippers. For this type of equipment the end edges of the device, which have no leads and also feature the greatest dimensional accuracy, should be used as pick-up points.

## Mechanical Drawings

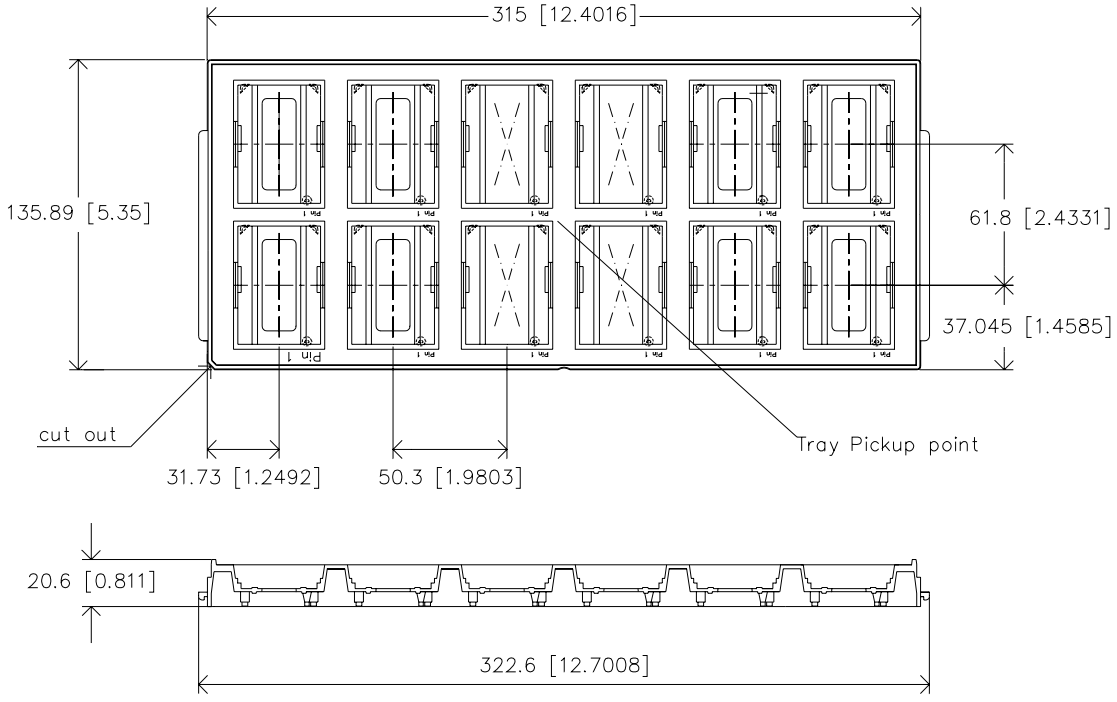
Note:- mm[inches]
Tolerances: -
**0.5-10 ±0.1**
**10-100 ±0.2**

**Note**: Pickup point not central






**Recommended Land Pattern**




**Packaging Tray (JEDEC STYLE)**

### Pinout

| Pin | Designation | Function | Reference |
|---|---|---|---|
| 1 | $+V_O$ | Positive output voltage | Secondary |
| 2 | $+V_O$ | Positive output voltage | Secondary |
| 3 | $+V_{SENSE}$ | Positive output voltage sense | Secondary |
| 4 | NC | Not connected | Secondary |
| 5 | No Pin | No pin | |
| 6 | No Pin | No pin | |
| 7 | NC | Not connected | Primary |
| 8 | Sync | Synchronization input | Primary |
| 9 | $+V_{IN}$ | Positive input voltage | Primary |
| 10 | $-V_{IN}$ | Negative input voltage | Primary |
| 11 | Shutdown | Shutdown control | Primary |
| 12 | NC | Not connected | Primary |
| 13 | No Pin | No pin | |
| 14 | No Pin | No pin | |
| 15 | Trim | Output voltage adjust | Secondary |
| 16 | $-V_{SENSE}$ | Output voltage sense return | Secondary |
| 17 | $-V_O$ | Output voltage return | Secondary |
| 18 | $-V_O$ | Output voltage return | Secondary |

## Ordering Information

| Options | Suffixes to add to part number |
|---|---|
| Extra Low Profile (<8.5mm) | Consult factory for availability. |
| RoHS lead-solder exempt compliant [1] | No RoHS suffix character required. |
| RoHS compliant for all six substances | Add "G" as the last character of the part number. |

[1] The solder exemption refers to all the restricted materials except lead in solder.