

# DC - DC Converters



### Features:

- 50 W to 60 W DC / DC Converter
- 2 : 1 input range, Pi input filter
- Isolation input and output
- High performance up to 86%
- Short circuit protection

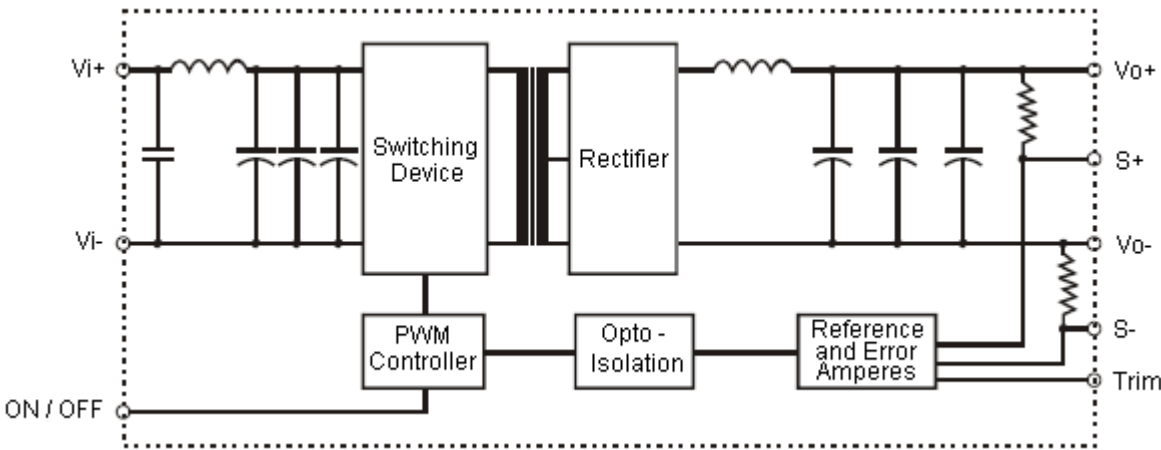
### Model List

| Model No.            | Input Voltage | Output Wattage | Output Voltage | Output Current | EFF. (Minimum) |
|----------------------|---------------|----------------|----------------|----------------|----------------|
| Single Output Models |               |                |                |                |                |
| HDD60-12S05T         | 9 to 18 V dc  | 60 W           | +5 V dc        | 12,000 mA      | 79%            |
| HDD60-12S12T         |               |                | +12 V dc       | 5,000 mA       | 82%            |
| HDD60-12S24T         |               |                | +24 V dc       | 2,500 mA       | 84%            |
| HDD60-24S12T         | 18 to 36 V dc |                | +12 V dc       | 5,000 mA       |                |
| HDD60-48S12T         | 36 to 72 V dc |                | +24 V dc       | 2,500 mA       | 85%            |
| HDD60-48S24T         |               |                |                |                | 86%            |

Suffix “T” : Chassis mounting type : (Terminal Block), no heat sink  
Use chassis as heat sink or fan force cooling

### Circuit Schematic

Block diagram for HDD60 series with single output



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## Specifications

All specifications typical at nominal line, full load, 25°C unless otherwise noticed

| General              |                                     |                    |         |         |        |
|----------------------|-------------------------------------|--------------------|---------|---------|--------|
| Characteristics      | Conditions                          | Minimum            | Typical | Maximum | Unit   |
| Switching Frequency  | Vi nom, Io nom                      | -                  | 80      | -       | KHz    |
| Isolation Voltage    | Input / Output                      | 1,500              | -       | -       | V dc   |
| Isolation Resistance | Input / Output, at 500 V dc         | 1G                 | -       | -       | Ω      |
| Ambient Temperature  | Operating at Vi nom, Io nom         | -25                | -       | +71     | °C     |
| Case Temperature     | Operating at Vi nom, Io nom         | -                  | -       | +95     |        |
| Derating             | Vi nom                              | See derating curve |         |         | % / °C |
| Storage Temperature  | Non operational                     | -25                | -       | 100     | °C     |
| M.T.B.F.             | According to MIL-HDBK-217F, GF40    | -                  | 122,500 | -       | Hours  |
| Dimension            | L88.9 × W139.7 × H35.6 for "P" type |                    |         |         | mm     |
|                      | L88.9 × W139.7 × H32.9 for "T" type |                    |         |         |        |
| Cooling              | Free air convection                 |                    |         |         |        |
| Case Material        | Metal                               |                    |         |         |        |

## Input Specifications

| Characteristics          | Conditions                       |             | Minimum | Typical | Maximum | Unit |
|--------------------------|----------------------------------|-------------|---------|---------|---------|------|
| Input Voltage Range      | Ta minimum to Ta maximum, Io nom |             | 9       | 12      | 18      | V dc |
|                          |                                  |             | 18      | 24      | 36      |      |
|                          |                                  |             | 36      | 48      | 72      |      |
| No Load Input Current    | Vi nom, Io = 0                   | 12 V Models | -       | -       | 20      | mA   |
|                          |                                  | 24 V Models | -       | -       | 15      |      |
|                          |                                  | 48 V Models | -       | -       | 10      |      |
| Input Voltage w/o Damage | Io nom                           | 12 V Models | -       | -       | 20      | V dc |
|                          |                                  | 24 V Models | -       | -       | 40      |      |
|                          |                                  | 48 V Models | -       | -       | 75      |      |
| Input Filter             | Pi type                          |             |         |         |         |      |

## Output Specifications

| Characteristics         | Conditions                       | Minimum                   | Typical | Maximum    | Unit   |
|-------------------------|----------------------------------|---------------------------|---------|------------|--------|
| Output Voltage accuracy | Vi nom, Io nom                   | -                         | -       | ±1         | %      |
| Minimum load            | Vi nom                           | 0                         | -       | -          |        |
| Line Regulation         | Io nom, Vi minimum to Vi maximum | -                         | -       | ±1         |        |
| Load Regulation         | Vi nom, Io minimum to Io nom     | -                         | -       | ±2         |        |
| Transient Recovery Time | 25% load, step changed           | -                         | 500     | -          | μs     |
| Temperature Coefficient | Vi nom, Io nom                   | -                         | -       | ±0.02      | % / °C |
| Ripple and Noise        | Vi nom, Io nom, BW = 20 MHz      | -                         | -       | Vout × ±1% | mV     |
| Voltage Trim Range      | Vi nom                           | -                         | 10      | -          | %      |
| Efficiency              | Vi nom, Io nom, Po / Pi          | Up to 86%, see model list |         |            |        |

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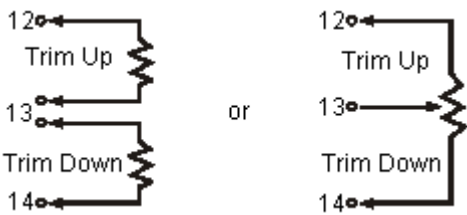
| Control and Protection |                                                          |
|------------------------|----------------------------------------------------------|
| Remote ON / OFF        | ON : opened or +5.5 V dc applied, reference to input GND |
|                        | OFF : -1.8 V dc applied, reference to input GND          |
| Input Reversed         | Shunt diode built in, external fuse recommended          |
| Output Short Circuit   | Continuous                                               |

## Mechanism and Pin Configuration

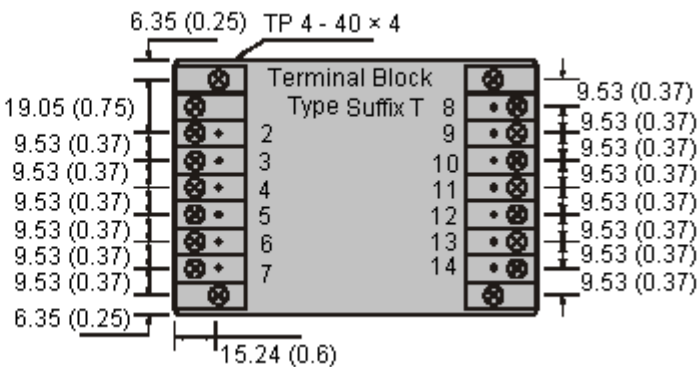
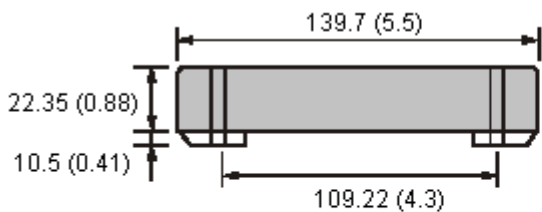
### Remote ON / OFF Control

Terminal 6 control  
Logic compatibility : .....open collector TTL  
Control voltage ON +5.5 V minimum or open circuit  
OFF .....+1.8 V maximum  
Converter shutdown idle current .....10 mA  
Control common ..... input terminal 2

### External Output Trimming



### Case : HH- T



Bottom View

Dimensions : Millimetres (Inches)

## Physical Characteristics

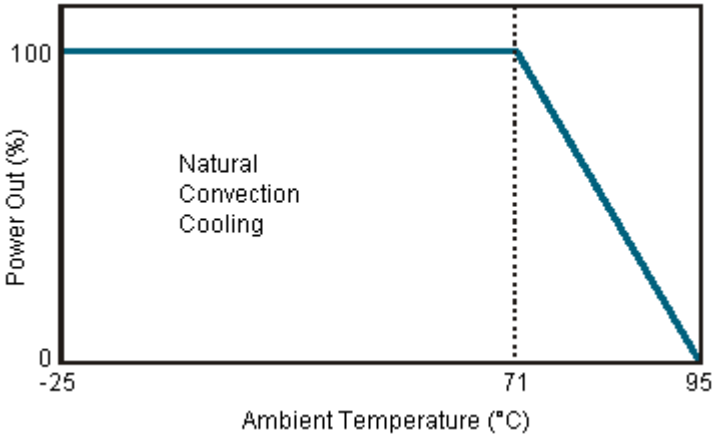
|               |                                                             |
|---------------|-------------------------------------------------------------|
| Case Size     | 88.9 × 139.7 × 32.9 mm 3.5 × 5.5 × 1.29 inches for "T" type |
| Case Material | Metal                                                       |
| Weight        | 570 g for "T" type                                          |



## Pin Assignment

| General |          |
|---------|----------|
| Pin No. | Single   |
| 1       | No Pin   |
| 2 and 3 | Vi -     |
| 4 and 5 | Vi +     |
| 6       | -        |
| 7       | N. C.    |
| 8       | Vo -     |
| 9       | Vo -     |
| 10      | Vo +     |
| 11      | Vo +     |
| 12      | Sensor - |
| 13      | Trim     |
| 14      | Sensor + |

## Derating



## Part Number Table

| Description                             | Part Number  |
|-----------------------------------------|--------------|
| Converter, DC / DC, Chassis, 60 W, 5 V  | HDD60-12S05T |
| Converter, DC / DC, Chassis, 60 W, 12 V | HDD60-12S12T |
| Converter, DC / DC, Chassis, 60 W, 24 V | HDD60-12S24T |
| Converter, DC / DC, Chassis, 60 W, 12 V | HDD60-24S12T |
| Converter, DC / DC, Chassis, 60 W, 12 V | HDD60-48S12T |
| Converter, DC / DC, Chassis, 60 W, 24 V | HDD60-48S24T |

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