Single Output LSM-10A D5 Models

Non-Isolated, 5VIN, 0.8-3.3VOUT 10 Amp DC/DC’s in SMT Packages

Features

- Step-down buck regulators with industry-standard SMT footprint
- 5V input (4.5-5.5V range)
- 0.8/1/1.2/1.5/1.8/2/2.5/3.3VOUT @ 10A
- Non-isolated, fixed-frequency, synchronous-rectifier topology
- Tape and reel SMT package
- ±1% setpoint accuracy
- Efficiencies to 95% @ 10 Amps
- Noise as low as 30mVp-p
- Stable no-load operation
- Remote on/off control
- Sense pin and output voltage trim
- Thermal shutdown
- No derating to +71°C, natural convection
- UL/IEC/EN60950 certified
- EMC compliant

DATEL’s LSM D5 Series for SMT (surface-mount) are non-isolated DC/DC converters that accept a 5V input (4.5V to 5.5V input range) and deliver 0.8V, 1V, 1.2V, 1.5V, 1.8V, 2V, 2.5V, or 3.3V outputs at 10 Amps. LSM D5 SMT’s are designed to take on-board 5V power and convert it, with the highest efficiency in the smallest space, to any lower voltage required by today’s current-hungry DSP’s, ASIC’s and CPLD’s.

The LSM D5’s miniature size makes them ideal for true point-of-use/load power processing. They occupy a mere 0.7 square inches (4.5 cm²) and are only 0.34 inches (8.64 mm) high. The SMT package is designed for pick and place including lead free reflow soldering, and they typically require no additional external components.

The LSM’s best-in-class power density is achieved with a fully synchronous, fixed-frequency (300kHz), buck topology that also delivers: high efficiency (95% for 3.3VOUT models), low noise (30mVp-p typ.), tight line/load regulation (±0.1%/±0.25% max.), quick step response (100µsec), stable no-load operation, and no output reverse conduction.

The fully functional LSM’s feature output overcurrent detection, continuous short-circuit and over-temperature protection, an output-voltage trim function, a remote on/off control pin (pull low to disable), and a sense pin. High efficiency enables the LSM D5’s to deliver rated output currents of 10 Amps at ambient temperatures to +71°C with no air flow (natural convection).

If your low-voltage, high-current requirements have made the use of inefficient linear regulators impractical, take a look at one of DATEL’s easy-to-use, low-cost LSM SMT’s (or equivalent LSN SIP’s). All devices are UL/IEC/EN60950 certified and EMC compliant. UL, CB, HALT and EMC reports are available upon request.

Figure 1. Simplified Schematic
## LSM-10A D5 Series

Non-Isolated, 8-33W SMT DC/DC Converters

### Performance Specifications and Ordering Guide

<table>
<thead>
<tr>
<th>Model</th>
<th>Output (Volts)</th>
<th>Input Current (Amps)</th>
<th>Ripple/Noise (R/N)</th>
<th>Regulation (Max.)</th>
<th>Voltage Range</th>
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<tbody>
<tr>
<td>LSM-0.8/10-D5</td>
<td>0.8</td>
<td>10</td>
<td>±0.1%</td>
<td>±0.25%</td>
<td>5</td>
<td>4.5-5.5</td>
<td>50/2</td>
</tr>
<tr>
<td>LSM-1.0/10-D5</td>
<td>1</td>
<td>10</td>
<td>±0.1%</td>
<td>±0.25%</td>
<td>5</td>
<td>4.5-5.5</td>
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<tr>
<td>LSM-1.2/10-D5</td>
<td>1.2</td>
<td>10</td>
<td>±0.1%</td>
<td>±0.25%</td>
<td>5</td>
<td>4.5-5.5</td>
<td>50/2.85</td>
</tr>
<tr>
<td>LSM-1.5/10-D5</td>
<td>1.5</td>
<td>10</td>
<td>±0.1%</td>
<td>±0.25%</td>
<td>5</td>
<td>4.5-5.5</td>
<td>50/3.48</td>
</tr>
<tr>
<td>LSM-1.8/10-D5</td>
<td>1.8</td>
<td>10</td>
<td>±0.1%</td>
<td>±0.25%</td>
<td>5</td>
<td>4.5-5.5</td>
<td>50/4.09</td>
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<tr>
<td>LSM-2/10-D5</td>
<td>2</td>
<td>10</td>
<td>±0.1%</td>
<td>±0.25%</td>
<td>5</td>
<td>4.5-5.5</td>
<td>50/4.51</td>
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<tr>
<td>LSM-2.5/10-D5</td>
<td>2.5</td>
<td>10</td>
<td>±0.1%</td>
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<td>5</td>
<td>4.5-5.5</td>
<td>50/5.5</td>
</tr>
<tr>
<td>LSM-3.3/10-D5</td>
<td>3.3</td>
<td>10</td>
<td>±0.1%</td>
<td>±0.25%</td>
<td>5</td>
<td>4.5-5.5</td>
<td>50/7.25</td>
</tr>
</tbody>
</table>

1. Typical at TA = +25°C under nominal line voltage and full-load conditions, unless otherwise noted. All models are tested and specified with external 22µF tantalum input and output capacitors. These capacitors are necessary to accommodate our test equipment and may not be required to achieve specified performance in your applications. See I/O Filtering and Noise Reduction.
2. Ripple/Noise (R/N) is tested/specified over a 20MHz bandwidth and may be reduced with external filtering. See I/O Filtering and Noise Reduction for details.
3. These devices have no minimum-load requirements and will regulate under no-load conditions. Regulation specifications describe the output-voltage deviation as the line voltage or load is varied from its nominal/midpoint value to either extreme.
4. Nominal line voltage, no-load/full-load conditions.
5. Contact DATEL for availability.

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## Mechanical Specifications

### PART NUMBER STRUCTURE

- **Output Configuration:**
  - L = Unipolar
  - Low Voltage
  - Non-Isolated SMT
- **Nominal Output Voltage:**
  - 0.8, 1, 1.2, 1.5, 1.8, 2, 2.5 or 3.3 Volts
- **Maximum Rated Output Current in Amps**

### RECOMMENDED PAD LAYOUT

- **Recommended Pad Size:** 0.15 x 0.10 (3.81 x 2.54)

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Refer to the last page for Tape and Reel information.
Performance/Functional Specifications

Typical @ TA = +25°C under nominal line voltage and full-load conditions unless noted.

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<th>Output</th>
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<td>Vout Accuracy (50% load)</td>
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<tr>
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<td>Overcurrent Detection and Short-Circuit Protection:</td>
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<td>Current-Limiting Detection Point</td>
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<td>SC Protection Technique</td>
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<td>Short-Circuit Current</td>
</tr>
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</table>

Dynamic Characteristics

| Transient Response (50% load step) | 100µsec to ±2% of final value |
| Start-Up Time: |
| Vin to Vout | 7msec |
| On/Off to Vout | 6msec |
| Switching Frequency | 300kHz (+40/-50kHz) |

Environmental

| Calculated MTBF | 2.3-1.8 million hours (1Vout to 5Vout) |
| Operating Temperature: (Ambient) |
| Without Derating (Natural convection) | -40 to +63/71°C (model dependent) |
| With Derating | See Derating Curves |
| Thermal Shutdown | +115°C (110 to 125°C) |

Physical

| Dimensions | 1.3" x 0.53" x 0.34" (33.02 x 13.46 x 8.64 mm) |
| Pin Dimensions/Material | 0.112" x 0.062" (2.84 x 1.57mm) rectangular copper with gold plate over nickel underplate |
| Weight | 0.28 ounces (7.9g) |
| Flammability Rating | UL94V-0 |

I/O Filtering and Noise Reduction

All models in the LSM D5 Series are tested and specified with external 22µF tantalum input and output capacitors. These capacitors are necessary to accommodate our test equipment and may not be required to achieve desired performance in your application. The LSM D5’s are designed with high-quality, high-performance internal I/O caps, and will operate within spec in most applications with no additional external components.

In particular, the LSM D5’s input capacitors are specified for low ESR and are fully rated to handle the units’ input ripple currents. Similarly, the internal output capacitors are specified for low ESR and full-range frequency response. As shown in the Performance Curves, removal of the external 22µF tantalum output caps has minimal effect on output noise.

In critical applications, input/output ripple/noise may be further reduced using filtering techniques, the simplest being the installation of external I/O caps. External input capacitors serve primarily as energy-storage devices. They minimize high-frequency variations in input voltage (usually caused by IR drops in conductors leading to the DC/DC) as the switching converter draws pulses of current. Input capacitors should be selected for bulk capacitance (at appropriate frequencies), low ESR, and high rms-ripple-current ratings. The switching nature of modern DC/DC’s requires that the dc input voltage source have low ac impedance at the frequencies of interest. Highly inductive source impedances can greatly affect system stability. Your specific system configuration may necessitate additional considerations.
Output ripple/noise (also referred to as periodic and random deviations or PARD) may be reduced below specified limits with the installation of additional external output capacitors. Output capacitors function as true filter elements and should be selected for bulk capacitance, low ESR, and appropriate frequency response. Any scope measurements of PARD should be made directly at the DC/DC output pins with scope probe ground less than 0.5” in length.

Input Overvoltage and Reverse-Polarity Protection
LSM D5 SMT Series DC/DC's do not incorporate either input overvoltage or input reverse-polarity protection. Input voltages in excess of the specified absolute maximum ratings and input polarity reversals of longer than "instantaneous" duration can cause permanent damage to these devices.

Start-Up Time
The V<sub>IN</sub> to V<sub>OUT</sub> Start-Up Time is the interval between the time at which a ramping input voltage crosses the lower limit of the specified input voltage range (4.5 Volts) and the fully loaded output voltage enters and remains within its specified accuracy band. Actual measured times will vary with input source impedance, external input capacitance, and the slew rate and final value of the input voltage as it appears to the converter.

The On/Off to V<sub>OUT</sub> Start-Up Time assumes the converter is turned off via the On/Off Control with the nominal input voltage already applied to the converter. The specification defines the interval between the time at which the converter is turned on and the fully loaded output voltage enters and remains within its specified accuracy band. See Typical Performance Curves.

Remote Sense
LSM D5 SMT Series DC/DC converters offer an output sense function on pin 6. The sense function enables point-of-use regulation for overcoming moderate IR drops in conductors and/or cabling. Since these are non-isolated devices whose inputs and outputs usually share the same ground plane, sense is provided only for the +Output.

The remote sense line is part of the feedback control loop regulating the DC/DC converter’s output. The sense line carries very little current and consequently requires a minimal cross-sectional-area conductor. As such, it is not a low-impedance point and must be treated with care in layout and cabling. Sense lines should be run adjacent to signals (preferably ground), and in cable and/or discrete-wiring applications, twisted-pair or similar techniques should be used. To prevent high frequency voltage differences between V<sub>OUT</sub> and Sense, we recommend installation of a 1000pF capacitor close to the converter.

The sense function is capable of compensating for voltage drops between the +Output and +Sense pins that do not exceed 10% of V<sub>OUT</sub>.

\[
[V_{OUT}(+) - \text{Common}] - [\text{Sense}(+) - \text{Common}] \leq 10\% V_{OUT}
\]

Power derating (output current limiting) is based upon maximum output current and voltage at the converter's output pins. Use of trim and sense functions can cause the output voltage to increase, thereby increasing output power beyond the LSM's specified rating. Therefore:

\[
(V_{OUT}\text{ at pins}) \times (I_{OUT}) \leq \text{rated output power}
\]

The internal 10.5Ω resistor between +Sense and +Output (see Figure 1) serves to protect the sense function by limiting the output current flowing through the sense line if the main output is disconnected. It also prevents output voltage runaway if the sense connection is disconnected.

Note: If the sense function is not used for remote regulation, +Sense (pin 6) must be tied to +Output (pin 4) at the DC/DC converter pins.
On/Off Control

The On/Off Control pin may be used for remote on/off operation. LSM D5 Series DC/DC converters are designed so that they are enabled when the control pin is left open (open collector) and disabled when the control pin is pulled low (to less than +0.8V relative to Common). As shown in Figure 4, all models have an internal 5kΩ pull-up resistor to VIN (+Input).

Dynamic control of the on/off function is best accomplished with a mechanical relay or open-collector/open-drain drive circuit (optically isolated if appropriate). The drive circuit should be able to sink appropriate current when activated and withstand appropriate voltage when deactivated.

Output Overcurrent Detection

Overloading the power converter’s output for an extended time will invariably cause internal component temperatures to exceed their maximum ratings and eventually lead to component failure. High-current-carrying components such as inductors, FET’s and diodes are at the highest risk. LSM D5 SMT Series DC/DC converters incorporate an output overcurrent detection and shutdown function that serves to protect both the power converter and its load.

If the output current exceeds it maximum rating by typically 70% (17 Amps) or if the output voltage drops to less than 98% of it original value, the LSM D5’s internal overcurrent-detection circuitry immediately turns off the converter, which then goes into a “hiccup” mode. While hiccupping, the converter will continuously attempt to restart itself, go into overcurrent, and then shut down. Under these conditions, the average output current will be approximately 600mA, and the average input current will be approximately 60mA. Once the output short is removed, the converter will automatically restart itself.

Output Voltage Trimming

Allowable trim ranges for each model in the LSM D5 SMT Series are ±10%. Trimming is accomplished with either a trimpot or a single fixed resistor. The trimpot should be connected between +Output and Common with its wiper connected to the Trim pin as shown in Figure 6 below.

A trimpot can be used to determine the value of a single fixed resistor which can then be connected, as shown in Figure 7, between the Trim pin and +Output to trim down the output voltage, or between the Trim pin and Common to trim up the output voltage. Fixed resistors should have absolute TCR’s less than 100ppm/°C to ensure stability.

The equations below can be starting points for selecting specific trim-resistor values. Recall, untrimmed devices are guaranteed to be ±1% accurate. Adjustment beyond the specified ±10% adjustment range is not recommended. When using trim in combination with Remote Sense, the maximum rated power must not be exceeded (see Remote Sense).
Output Reverse Conduction

Many DC/DC's using synchronous rectification suffer from Output Reverse Conduction. If those devices have a voltage applied across their output before a voltage is applied to their input (this typically occurs when another power supply starts before them in a power-sequenced application), they will either fail to start or self-destruct. In both cases, the cause is the "freewheeling" or "catch" FET biasing itself on and effectively becoming a short circuit.

LSM D5 SMT DC/DC converters do not suffer from Output Reverse Conduction. They employ proprietary gate drive circuitry that makes them immune to applied output voltages.

Thermal Considerations and Thermal Protection

The typical output-current thermal-derating curves shown below enable designers to determine how much current they can reliably derive from each model of the LSM D5 SMT's under known ambient-temperature and air-flow conditions. Similarly, the curves indicate how much air flow is required to reliably deliver a specific output current at known temperatures.

The highest temperatures in LSM D5 SMT's occur at their output inductor, whose heat is generated primarily by I²R losses. The derating curves were developed using thermocouples to monitor the inductor temperature and varying the load to keep that temperature below +110°C under the assorted conditions of air flow and air temperature. Once the temperature exceeds +115°C (approx.), the thermal protection will disable the converter. Automatic restart occurs after the temperature has dropped below +110°C.

As you may deduce from the derating curves and observe in the efficiency curves on the following pages, LSM D5 SMT's are more efficient at lower current levels. Also I²R losses in the output inductor are significantly less at lower current levels. Consequently, LSM-D5 SMT's deliver very impressive temperature performance if operating at less than full load.

Lastly, when LSM D5 SMT's are installed in system boards, they are obviously subject to numerous factors and tolerances not taken into account here. If you are attempting to extract the most current out of these units under demanding temperature conditions, we advise you to monitor the output-inductor temperature to ensure it remains below +110°C at all times.

Trim Equations

<table>
<thead>
<tr>
<th>Model</th>
<th>Trim Equations</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSM-1/10-D5</td>
<td>[ R_{\text{DOWN}} (\text{k}\Omega) = \frac{1.62(V_O - 0.8)}{1 - V_O} - 1 ]</td>
</tr>
<tr>
<td></td>
<td>[ R_{\text{UP}} (\text{k}\Omega) = \frac{1.296}{V_O} - 1 ]</td>
</tr>
<tr>
<td>LSM-1.2/10-D5</td>
<td>[ R_{\text{DOWN}} (\text{k}\Omega) = \frac{2.49(V_O - 0.8)}{1.2 - V_O} - 2.37 ]</td>
</tr>
<tr>
<td></td>
<td>[ R_{\text{UP}} (\text{k}\Omega) = \frac{1.992}{V_O} - 2.37 ]</td>
</tr>
<tr>
<td>LSM-1.5/10-D5</td>
<td>[ R_{\text{DOWN}} (\text{k}\Omega) = \frac{2.37(V_O - 0.8)}{V_O - V_{\text{NOM}}} - 4.99 ]</td>
</tr>
<tr>
<td>LSM-1.8/10-D5</td>
<td>[ R_{\text{UP}} (\text{k}\Omega) = \frac{1.896}{V_O - V_{\text{NOM}}} - 4.99 ]</td>
</tr>
<tr>
<td>LSM-2/10-D5</td>
<td>[ R_{\text{DOWN}} (\text{k}\Omega) = \frac{7.5(V_O - 0.8)}{V_O - V_{\text{NOM}}} - 4.99 ]</td>
</tr>
<tr>
<td>LSM-2.5/10-D5</td>
<td>[ R_{\text{UP}} (\text{k}\Omega) = \frac{6}{V_O - V_{\text{NOM}}} - 4.99 ]</td>
</tr>
<tr>
<td>LSM-3.3/10-D5</td>
<td>[ R_{\text{DOWN}} (\text{k}\Omega) = \frac{7.5(V_O - 0.8)}{V_O - V_{\text{NOM}}} - 4.99 ]</td>
</tr>
<tr>
<td></td>
<td>[ R_{\text{UP}} (\text{k}\Omega) = \frac{6}{V_O - V_{\text{NOM}}} - 4.99 ]</td>
</tr>
</tbody>
</table>

Note: Resistor values are in kΩ. Accuracy of adjustment is subject to tolerances of resistors and factory-adjusted, initial output accuracy.

\( V_O = \text{desired output voltage} \), \( V_{\text{NOM}} = \text{nominal output voltage} \).

Note: LSM-0.8/10-D5 is not trimmable.
Typical Performance Curves for LSM-10A D5 SMT Series

**LSM-1/10-D5 Efficiency vs. Line Voltage and Load Current**

- $V_N = 4.5V$
- $V_N = 5V$
- $V_N = 5.5V$

**LSM-1/10-D5 Output Current vs. Ambient Temperature**
(SMT mount, air flow direction from pin 2 to pin 1)

- Natural Convection
- 100 lfm
- 200 lfm

**LSM-1.2/10-D5 Efficiency vs. Line Voltage and Load Current**

- $V_N = 4.5V$
- $V_N = 5V$
- $V_N = 5.5V$

**LSM-1.2/10-D5 Output Current vs. Ambient Temperature**
(SMT mount, air flow direction from pin 2 to pin 1)

**LSM-1.5/10-D5 Efficiency vs. Line Voltage and Load Current**

- $V_N = 4.5V$
- $V_N = 5V$
- $V_N = 5.5V$

**LSM-1.5/10-D5 Output Current vs. Ambient Temperature**
(SMT mount, air flow direction from pin 2 to pin 1)
Typical Performance Curves for LSM-10A D5 SMT Series

LSM-1.8/10-D5 & LSM-2/10-D5
Output Current vs. Ambient Temperature
(SMT mount, air flow direction from pin 2 to pin 1)

LSM-2.5/10-D5 & LSM-3.3/10-D5
Output Current vs. Ambient Temperature
(SMT mount, air flow direction from pin 2 to pin 1)

LSM-1.8/10-D5
Efficiency vs. Line Voltage and Load Current

LSM-2.5/10-D5
Efficiency vs. Line Voltage and Load Current

LSM-2/10-D5
Efficiency vs. Line Voltage and Load Current

LSM-3.3/10-D5
Efficiency vs. Line Voltage and Load Current
Typical Performance Curves for LSM-10A D5 SMT Series at $V_{IN} = 5V$

- **Start-Up from ON/OFF**
  - (IOUT = 1V/10A, CIN/COUT = 22µF)
  - VIN: 2V/div, VOUT: 1V/div, 2msec/div

- **Output Hiccup**
  - (LSM-3.3/10-D5 Shorted VOUT)
  - VIN: 2V/div, VOUT: 1V/div, 2msec/div

- **Start-Up from VIN**
  - (IOUT = 3.3V/10A, CIN/COUT = 22µF)
  - VIN: 2V/div, VOUT: 1V/div, 2msec/div

- **Input Reflected Ripple Current**
  - (Input Filter = 220µF/12µH/33µF, IOUT = 3.3V/10A)
  - VIN: 2V/div, VOUT: 1V/div, 2msec/div

- **Output Hiccup**
  - (LSM-3.3/10-D5 Shorted VOUT)
  - VIN: 2V/div, VOUT: 1V/div, 2msec/div

- **Start-Up from ON/OFF**
  - (IOUT = 3.3V/10A, CIN/COUT = 22µF)
  - VIN: 2V/div, VOUT: 1V/div, 2msec/div

- **Input Reflected Ripple Current**
  - (Input Filter = 220µF/12µH/33µF, IOUT = 3.3V/10A)
  - VIN: 2V/div, VOUT: 1V/div, 2msec/div

- **Start-Up from VIN**
  - (IOUT = 1V/10A, CIN/COUT = 22µF)
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- **Output Hiccup**
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  - VIN: 2V/div, VOUT: 1V/div, 2msec/div

- **Start-Up from VIN**
  - (IOUT = 3.3V/10A, CIN/COUT = 22µF)
  - VIN: 2V/div, VOUT: 1V/div, 2msec/div

- **Input Reflected Ripple Current**
  - (Input Filter = 220µF/12µH/33µF, IOUT = 3.3V/10A)
  - VIN: 2V/div, VOUT: 1V/div, 2msec/div

- **Start-Up from VIN**
  - (IOUT = 1V/10A, CIN/COUT = 22µF)
  - VIN: 2V/div, VOUT: 1V/div, 2msec/div
Typical Performance Curves for LSM-10A D5 SMT Series at \( V_{IN} = 5V \)

**Output Ripple and Noise**
(VOUT = 3.3V/10A, CIN/COUT = 22\( \mu \)F, BW = 20MHz)

**Dynamic Load Response**
(VOUT = 3.3V, 0 to 10A Step, CIN/COUT = 22\( \mu \)F)

**Dynamic Load Response**
(VOUT = 1V, 5 to 10A Step, CIN = 22\( \mu \)F, COUT = 1000\( \mu \)F Oscon)

**Output Ripple and Noise**
(VOUT = 1V/10A, CIN/COUT = 22\( \mu \)F, BW = 20MHz)

**Dynamic Load Response**
(VOUT = 1V, 5 to 10A Step, CIN/COUT = 22\( \mu \)F)

**Dynamic Load Response**
(VOUT = 1V, 5 to 10A Step, CIN = 22\( \mu \)F, COUT = 1000\( \mu \)F Oscon)
Tape & Reel Surface Mount Package

DATEL’s LSM series DC/DC converters are the only higher-current (10A) SMT DC/DC’s that can be automatically “pick-and-placed” using standard vacuum-pickup equipment (nozzle size and style, vacuum pressure and placement speed may need to be optimized for automated pick and place) and subsequently reflowed using high-temperature, lead-free solder.

Virtually all SMT DC/DC’s today are unprotected “open-frame” devices assembled by their vendors with high-temperature solder (usually Sn96.5/Ag3.5 with a melting point +221°C) so that you may attach them to your board using low-temperature solder (usually Sn63/Pb37 with a melting point of +183°C). Conceptually straightforward, this “stepped” solder approach has its limitations, and it is clearly out of step with an industry trending toward the broad use of lead-free solders. Are you to experiment and develop reflow profiles from other vendors that ensure the components on those DC/DC never exceed 215-216°C? If those components get too hot, “double-reflow” could compromise the reliability of their solder joints. Virtually all these devices demand you “cool down” the Sn63 profile you are likely using today.

DATEL is not exempted from the Laws of Physics, and we do not have magic solders no one else has. Nevertheless, we have a simple and practical, straightforward approach that works. We assemble our LSM SMT DC/DC’s using a high-temperature (+216°C), lead-free alloy (Sn96.2%, Ag2.5%, Cu0.8%, Sb0.5%). The LSM design ensures co-planarity to within 0.004 inches (100µm) of the unit’s tin-plated (150 micro-inches) copper leads. See Mechanical Data for additional information.

The disposable heat shield (patent pending), which has a cutaway exposing the package leads, provides thermal insulation to internal components during reflow and its smooth surface ideally doubles as the vacuum pick-up location also. The insulation properties of the heat shield are so effective that temperature differentials as high as 50°C develop inside-to-outside the shield. Oven temperature profiles with peaks of 250-260°C and dwell times exceeding 2 minutes above 221°C (the melting point of Sn96.5/Ag3.5) are easily achieved.

Figure 6. Reflow Solder Profile
DATEL’s new-generation LSM SMT DC/DC converters are shipped in quantities of 150 modules per tape and reel.

Figure 7. Tape Dimensions

Figure 8. Reel Dimensions