DE-Series MOSFET, DEIC420 And SOP-28 IC

Device Installation & Mounting Instructions

The DE-Series MOSFETs or ICs may be mounted in three different configurations, depending upon the application and power dissipation required. This document refers to MOSFET mounting, however these mounting instructions also apply to the DEIC420 gate driver IC. The package dimensions of the DEIC420 are identical to those of the DE-275 Series MOSFETs.

Additionally, mounting topologies for the IXDD415 and IXLD02 ICs are discussed.

Low Average Power - Label Side Up

For low average power applications (low power is defined as that power level which will not exceed the free air dissipation rating of the device when mounted as shown in Figure 1), the MOSFET is mounted on the component side of the printed circuit board (PCB), with the substrate (metalized surface) of the device flat against the PCB (see Figure 1). The leads should be bent (with respect to the device) and trimmed (using scissors or shears) so the ends of the leads stop in the midpoint of the mounting lands. Note that in low power mounting with maximum free air rated power, the substrate could be at temperatures > 100°C.

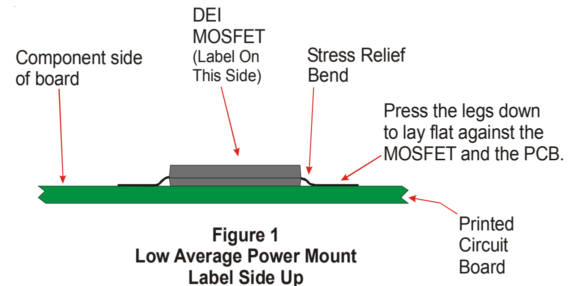

Figure 1
Low Average Power Mount
Label Side Up

The die is mounted to the substrate of the device. Since the heat cannot freely dissipate from the substrate in this configuration, it has the lowest power dissipation capability of the three mounting configurations.

Low Average Power - Label Side Down

For low average power applications, the device may be mounted on the component side of the PCB, with the top (lettering side) of the device flat against the PCB, with the metalized substrate exposed (see Figure 2). The leads should be bent up (with respect to the device) according to the guidelines on page 2 of this document, and trimmed (using scissors or shears) so the ends of the leads stop in the midpoint of the mounting lands.

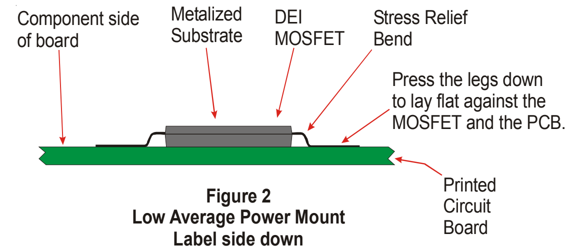

Figure 2
Low Average Power Mount
Label side down

This mounting configuration provides a limited amount of convection cooling of the device through the substrate. A small heatsink may also be placed against the substrate for additional cooling. Note that in low power mounting with maximum free air rated power, the substrate could be at temperatures > 100°C.

High Average Power - With Heat Sink

For high average power applications (high power is defined as that power level which exceeds the free air rating of the device when mounted as shown in Figure 1), the DE-Series device is mounted with the lettering on the MOSFET (i.e., the top) against the solder side (back side) of the PCB (see Figure 3). The leads should be bent up according to the guidelines on page 2 of this document, and soldered to the lands on the back side of the PCB in the manner described for the low average power mounting above. In this configuration, the MOSFET may be installed on the PCB prior to mounting on the heat sink, and the device can then easily be attached to a heat sink, using the PCB as the clamping device. Before installing the device on the heat sink, ensure that the substrate of the device and the heat sink are clean and free of contaminants. **Foreign material on the substrate may cause damage to the device when it is clamped to the heat sink and severely reduce power dissipation capability.**

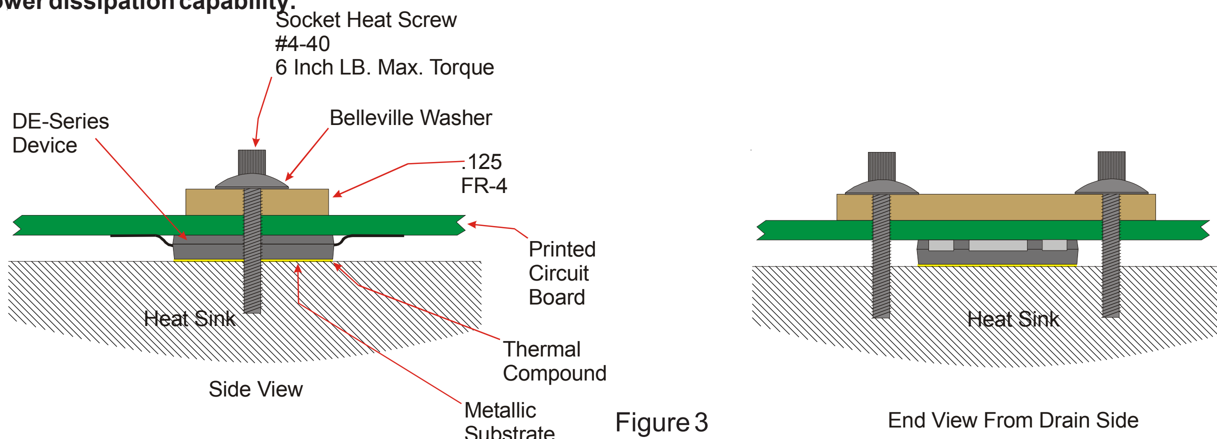

Figure 3

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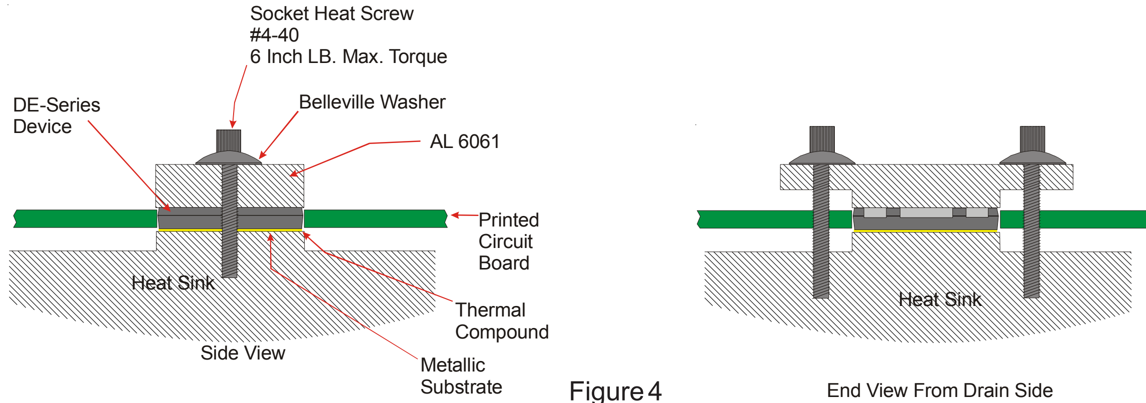


Figure 4

Figure 4 illustrates an alternate mounting scheme. In this approach, the DE-series device is mounted through the PCB. This allows the device to be replaced without removing the PCB from the heatsink, however it incurs additional cost for machining of the heatsink and clamping device.

When soldering the MOSFET to the lands, the lead temperature should not exceed 300°C for more than 10 seconds. In both mounting configurations, care should be taken that the device is mounted straight and the leads are not shorted.

IXDD415 gate Drive IC and IXLD02 Laser Diode Driver IC Mounting

The heat sinking of the IXDD415 and the IXLD02 is dependent on the power level that will be dissipated in the device, not the power delivered to the load. At power levels approaching 1W the heat sinking metalization on the bottom of the high power SI package, see Figure 5, should be attached to the top of the ground plane of the PCB with thermally conductive epoxy.

At power levels approaching 3W the heat sinking metalization on the bottom of the device should be soldered to the PCB ground plane. The heat sinking metalization is attached to the circuit ground of the IC internally. For the 1W and 3W power levels there should be at least 4in^2 of ground plane for proper cooling.

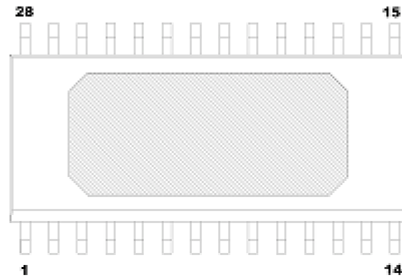


Figure 5
Bottom View High Power SI (SOP-28) Package

At power levels approaching 50W the heat sinking metalization on the bottom of the high power SI package must be in contact with a much more significant heat sink.

Figure 6 and 7 illustrate a heat sink and clamp assembly that will allow the device to operate at power levels exceeding 50W. In this configuration the bond wires, not the silicon die, limit the maximum power dissipation of the device.

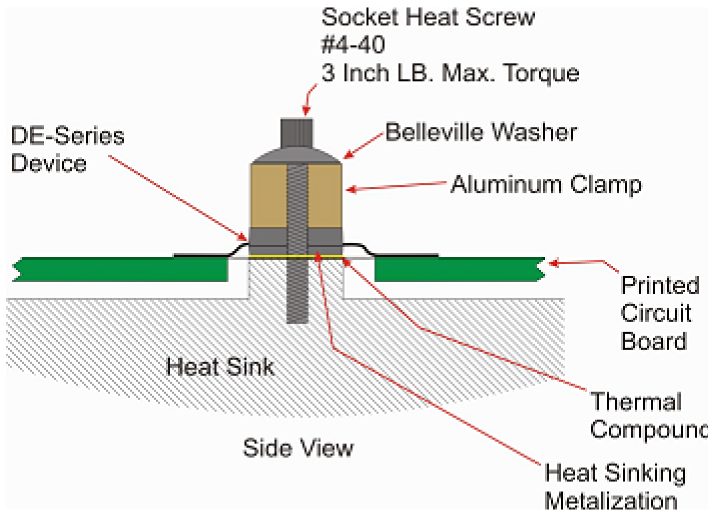


Figure 6
End View of the IXDD415 And IXLD02 High Power Mounting Assembly

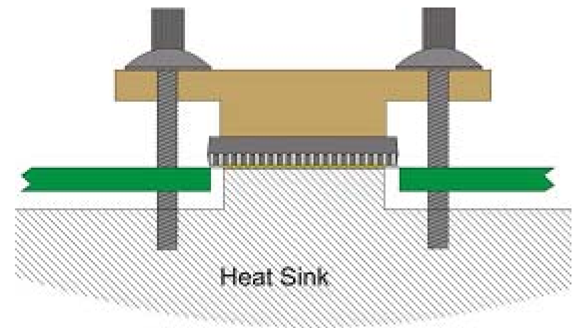


Figure 7
Side View of the IXDD415 And IXLD02 High Power Mounting Assembly

The device is mounted in the normal fashion on the PCB, however a slot is made in the board to allow the cold finger on the heat sink to contact the bottom of the IC. A compression clamp is then placed on top of the IC. The two screws are then torqued to 6 inch-pounds. This mounting technique allows the device to dissipate well in excess of 50W.

Figure 8 illustrates the copper heat sink, IXYS-RF Part Number 1961-0233-B. The mechanical design matches the IIXDD415 evaluation PCB (EVDD415). The design also allows the copper heat sink to be attached to a system level heat sink via the holes labeled “B”. This heat sink may also be used with the IXLD02, however the EVLD02 evaluation board is not layed out to accept high power heatsinking.

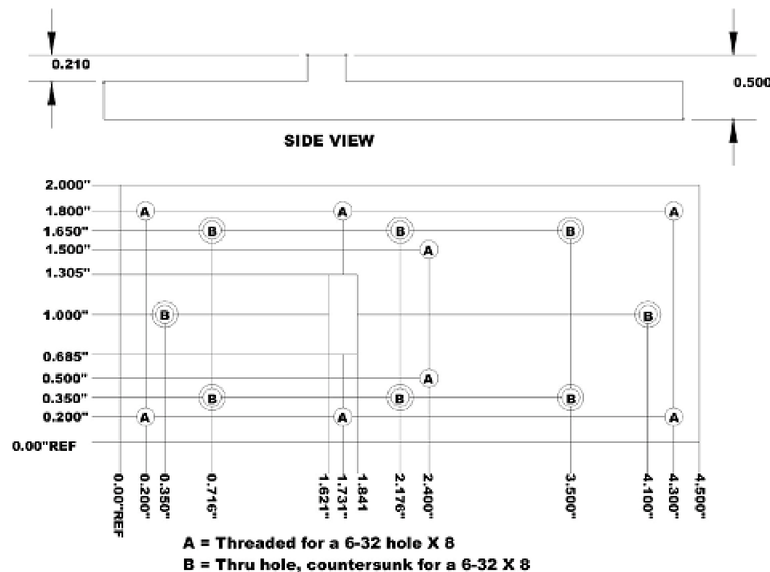


Figure 8
IXDD415 and IXLD02 Copper Heat Sink
IXYS-RF Part Number 1961-0233-B

The aluminum compression clamp is illustrated in Figure 9. This component places the IC in compression against the heat sink to provide the best possible heat sinking and the maximum power dissipation. The IXYS RF PN is 1943-0423-A.

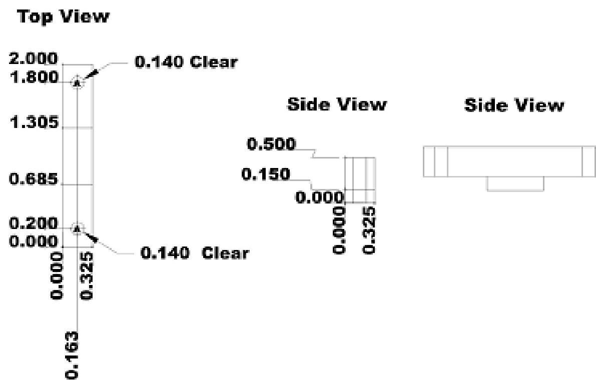
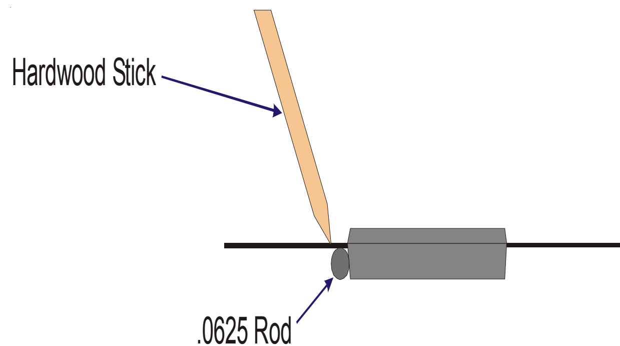


Figure 9
Aluminum Compression Clamp
IXYS-RF Part Number 1943-0423-A

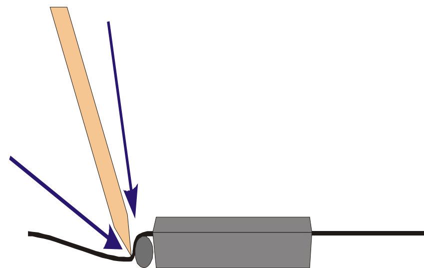
The mechanical drawings for these two items and / or the fabricated parts are available through IXYS RF.

DE-Series MOSFET and DEIC420 Gate Driver IC Lead Bending Guide

1. Gently hold the MOSFET face down on a hard flat surface.
2. Place a .0625 inch steel rod under the lead as shown below.



3. With an orange stick, or similar non-metallic tool, push the lead in and toward the MOSFET as shown.
4. The lead should wrap neatly around the rod.



5. Repeat for the lead set on the other side.

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