

The Package Offering

Xilinx Code	Body (mm)	THK (mm)	Mass (gm)	Heatsink Location	JEDEC No.	Xilinx No.
HQ304	40x40	3.80	26.2	TOP	MO-143-JA	OPQ0014
HQ240	32x32	3.40	15.0	DOWN	MO-143-GA	OPQ0019
HQ208	28x28	3.37	10.0	DOWN	MO-143-FA	OPQ0020

Overview

Xilinx offers thermally enhanced quad flat pack packages on certain devices. This app note discusses the performance and usage of these packages (designated HQ). In summary:

- The HQ-series and the regular packages conform to the same JEDEC drawings.
- The HQ and PQ use the same PCB land patterns.
- The HQ packages have more mass
- Thermal performance is better for the HQ

Where and When Offered

- The HQ packages are offered as the thermally enhanced equivalents of the PQ packages. They are used for high gate or high I/O count devices in packages where heat dissipation without the enhancement may be a handicap for device performance. Such devices include XC4013E, XC4020E, XC4025E and XC5215.
- They are also being used in place of MQUAD (MQ) packages of the same lead count for new devices.
- The HQ series at the 240 pin count level or below are offered with the heatsink at the bottom of the package. This was done deliberately to insure pin to pin compatibility with the existing PQ and MQ packages.
- At the 304 pin count level, the HQ is offered with the heatsink up – on top. The heatsink up arrangement offers a better potential for further thermal enhancement and management by the user.

Mass Comparison

Because of the copper heatsink, the HQ series packages are about twice as heavy as the equivalent PQ. Here is a quick comparison. MQ packages are added for information.

	PQ (gm)	MQ (gm)	HQ (gm)
208 Pin	5.3	6.1	10.0
240 Pin	7.1	8.0	15.0
304 Pin	N/A	N/A	26.2

Thermal Data for the HQ

The data for individual devices may be obtained from Xilinx.

Table a - Still Air Data Comparison			
	HQ	MQ	PQ
	JA (°C/watt)	JA (°C/watt)	JA (°C/watt)
208 Pin	14-10	17-19	25-32
240 Pin	11-14	15-17	18-28
304 Pin	10-12	N/A	N/A

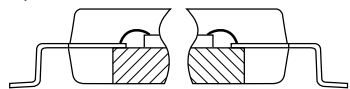
Note: JC is typically between 1 and 2 °C/watt for HQ and MQ Packages. For PQ's, it is between 2 and 7 °C/watt.

Table b - Data Comparison at Airflow - 250 LFM			
	HQ	MQ	PQ
	JA (°C/watt)	JA (°C/watt)	JA (°C/watt)
208 Pin	9-10	14-15	19-25
240 Pin	8-9	11-13	14-20
304 Pin	6.5-8	N/A	N/A

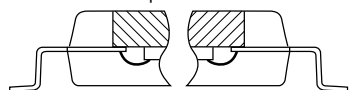
Other Information

- Leadframe: Copper EFTEC-64 or C7025
- Heat Slug: Copper - Nickel plated → Heatsink metal is Grounded
- Lead Finish 85/15 Sn/Pb 300 microinches minimum
- D/A material - Same as PQ; Epoxy 84-1LMISR4
- Mold Cpd. Same as PQ - EME7304LC
- Packed in the same JEDEC trays

A Die Up/Heatsink Down



B Die Down/Heatsink Up



A – Heatsink down orientation
B – Heatsink up orientation

X5962

Figure 1