

LPDM Series
LPDH Series
LPDP Series

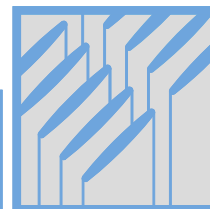
Low Pressure Drop Heat Sink
with Attachment Holes

ALPHA

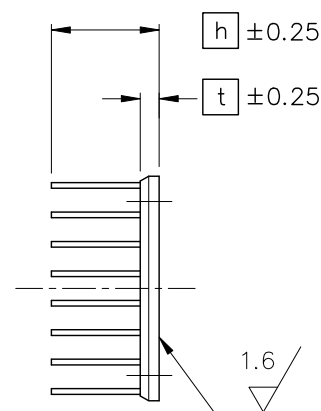
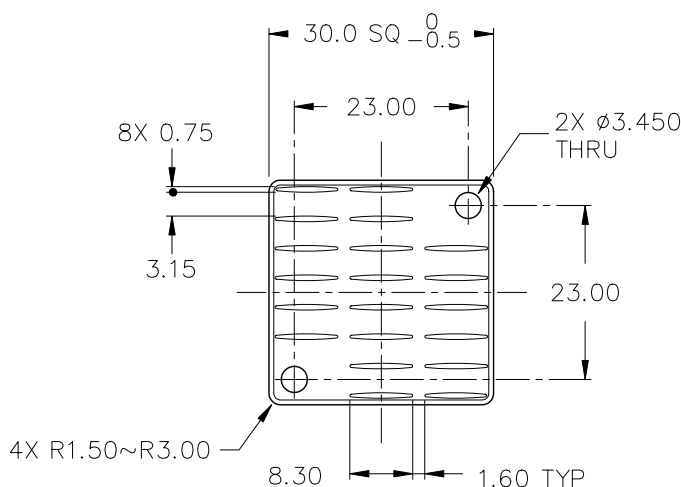
ALPHA

Low Pressure Drop Heat Sink
with attachment holes

LPDM30



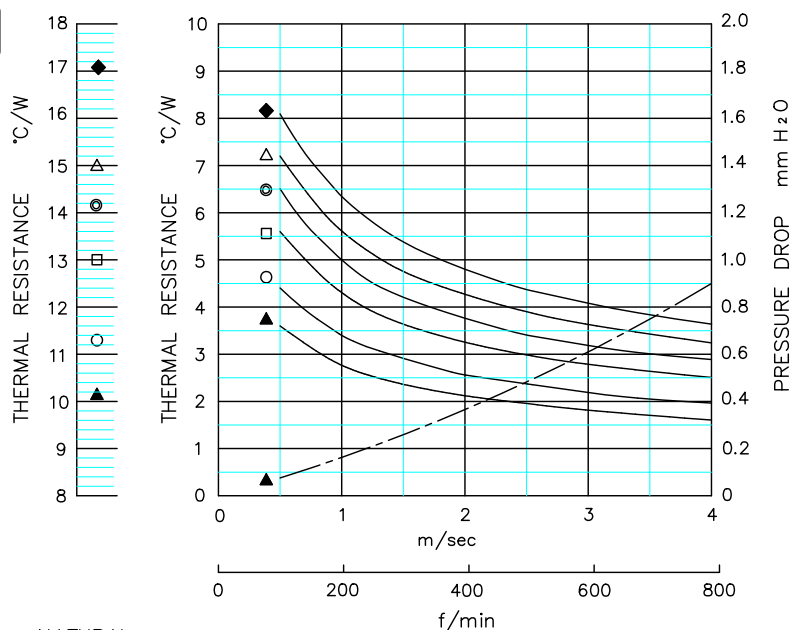
DIM



MODEL	HEIGHT [h]	THICKNESS [t]	WEIGHT (grams)
LPDM30-8BP	8	2.00	6.2
LPDM30-10BP	10	2.50	7.7
LPDM30-12BP	12		8.3
LPDM30-15BP	15		9.1
LPDM30-20BP	20		10.5
LPDM30-25BP	25		11.8
LPDM30-[h] BP	$8 \leq [h] < 10$	2.00	-
	$10 \leq [h] \leq 25$	2.50	-

MATERIAL : A 6063
FINISH : BLACK ANODIZE
DIMENSIONS : mm

DATA

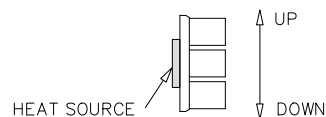


NATURAL
CONVECTION

AIR VELOCITY: DUCTED CONDITION

- ◆ LPDM30-8BP
- △ LPDM30-10BP
- LPDM30-12BP
- LPDM30-15BP
- LPDM30-20BP
- ▲ LPDM30-25BP

- DUCTED CONDITION
DUMMY HEATER SIZE: 12.7 SQ
THERMAL RESISTANCE ———
PRESSURE DROP - - - - -
- NATURAL CONVECTION
DUMMY HEATER SIZE: 12.7 SQ
DISSIPATED POWER: 3.9(W)



NOTE ORIENTATION OF HEAT SINK USED
FOR NATURAL CONVECTION TESTING

- BASED ON ALPHA'S STANDARD TEST
PROCEDURE.
REFER TO TECHNICAL INFORMATION.

Alpha Company Ltd.

256-1 UEDA, NUMAZU-CITY SHIZUOKA-PREF., JAPAN
PHONE +81(55)966 0789
FAX +81(55)966 9192
E mail : alpha@micforg.co.jp
URL : <http://www.micforg.co.jp>

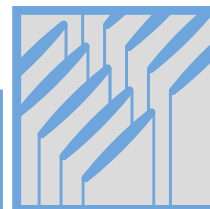
Alpha Novatech, Inc. - a subsidiary of Alpha Company.

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PHONE +1(408)567-8082
FAX +1(408)567-8053
E mail : sales@alphanovatech.com
URL : <http://www.alphanovatech.com>

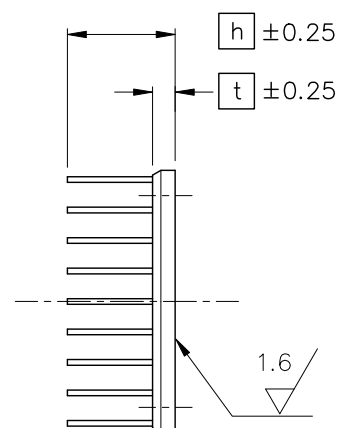
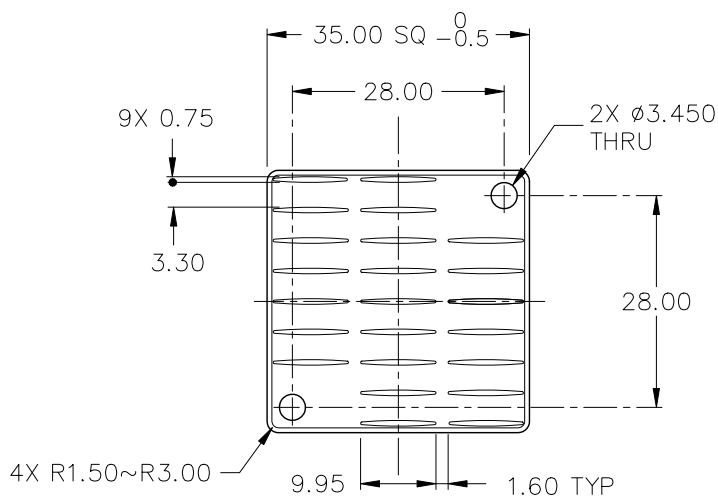
ALPHA

Low Pressure Drop Heat Sink
with attachment holes

LPDM35



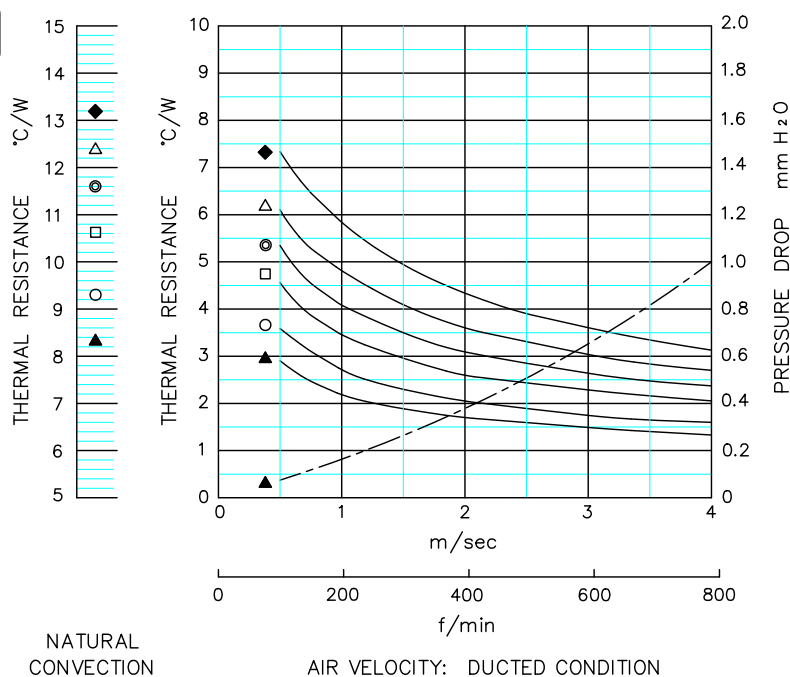
DIM



MODEL	HEIGHT [h]	THICKNESS [t]	WEIGHT (grams)
LPDM35-8BP	8	2.00	8.5
LPDM35-10BP	10	3.00	12.1
LPDM35-12BP	12		12.8
LPDM35-15BP	15		14.0
LPDM35-20BP	20		15.8
LPDM35-25BP	25		17.7
LPDM35-[h] BP	$8 \leq [h] < 10$	2.00	—
	$10 \leq [h] \leq 25$	3.00	—

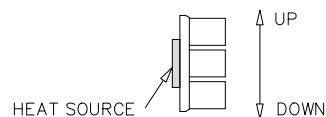
MATERIAL : A 6063
FINISH : BLACK ANODIZE
DIMENSIONS : mm

DATA



- ◆ LPDM35-8BP
- △ LPDM35-10BP
- ◎ LPDM35-12BP
- LPDM35-15BP
- LPDM35-20BP
- ▲ LPDM35-25BP

- DUCTED CONDITION
DUMMY HEATER SIZE: 12.7 SQ
THERMAL RESISTANCE ———
PRESSURE DROP - - - -
- NATURAL CONVECTION
DUMMY HEATER SIZE: 12.7 SQ
DISSIPATED POWER: 4.7(W)



NOTE ORIENTATION OF HEAT SINK USED FOR NATURAL CONVECTION TESTING

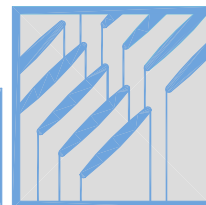
- BASED ON ALPHA'S STANDARD TEST PROCEDURE.
REFER TO TECHNICAL INFORMATION.

Alpha Company Ltd.

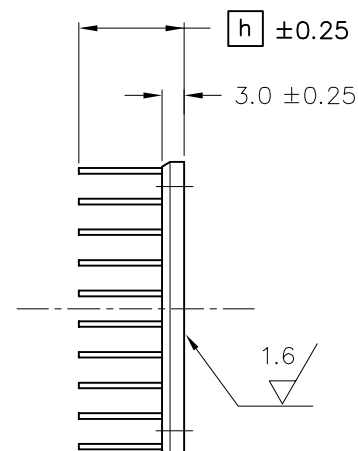
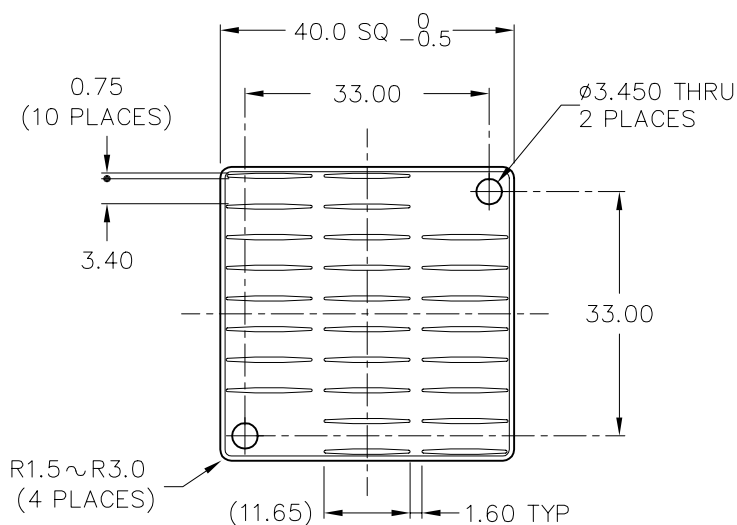
256-1 UEDA, NUMAZU-CITY SHIZUOKA-PREF., JAPAN
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ALPHA**Low Pressure Drop Heat Sink
with attachment holes****LPDM40**

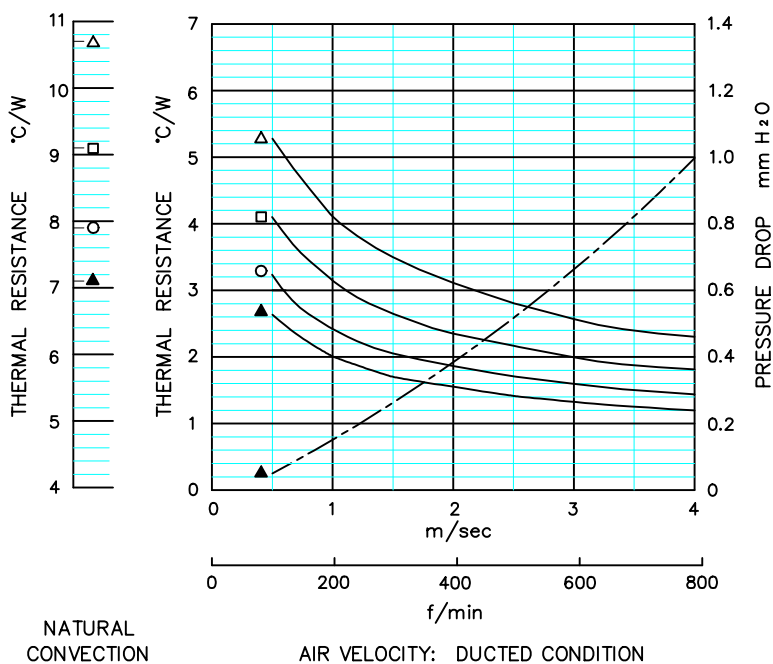
DIM



MODEL	HEIGHT [h]	WEIGHT (grams)
LPDM40-10BP	10	15.7
LPDM40-15BP	15	18.1
LPDM40-20BP	20	20.6
LPDM40-25BP	25	23.0

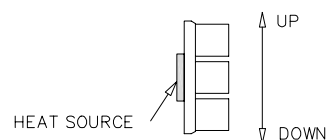
MATERIAL : A 6063
 FINISH : BLACK ANODIZE
 DIMENSIONS : mm

DATA



- △ LPDM40-10BP
- LPDM40-15BP
- LPDM40-20BP
- ▲ LPDM40-25BP

- DUCTED CONDITION
 DUMMY HEATER SIZE: 12.7 SQ
 THERMAL RESISTANCE _____
 PRESURE DROP _____
- NATURAL CONVECTION
 DUMMY HEATER SIZE: 12.7 SQ
 DISSIPATED POWER: 6.0(W)



NOTE ORIENTATION OF HEAT SINK USED
 FOR NATURAL CONVECTION TESTING

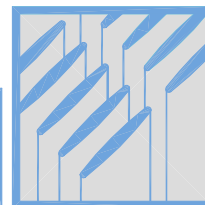
- BASED ON ALPHA'S STANDARD TEST
 PROCEDURE.
 REFER TO TECHNICAL INFORMATION.

Alpha Company Ltd.

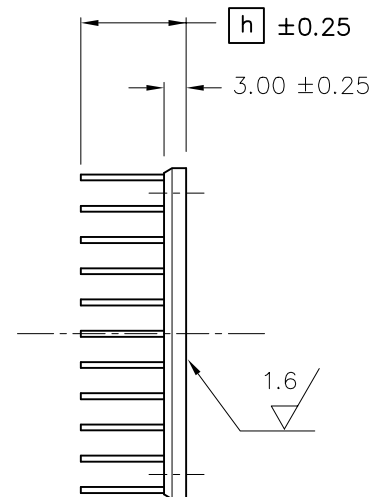
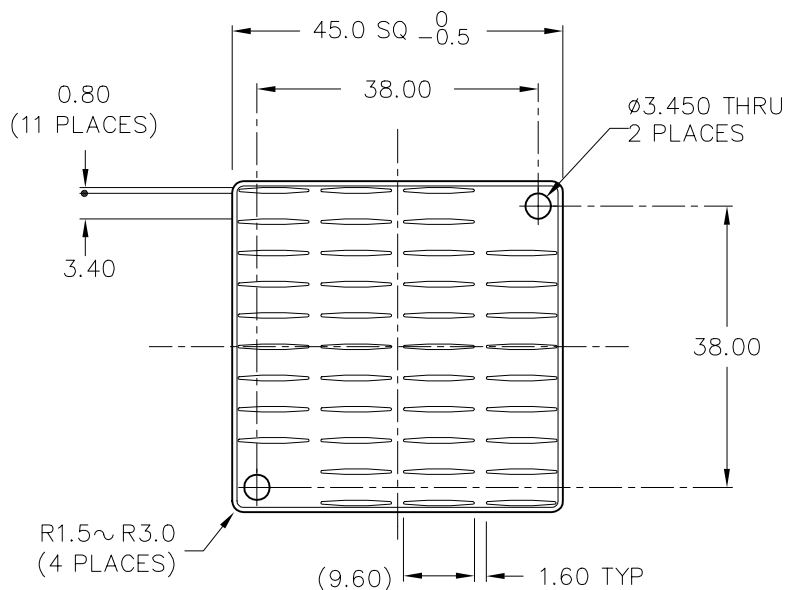
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ALPHALow Pressure Drop Heat Sink
with attachment holes**LPDM 45**

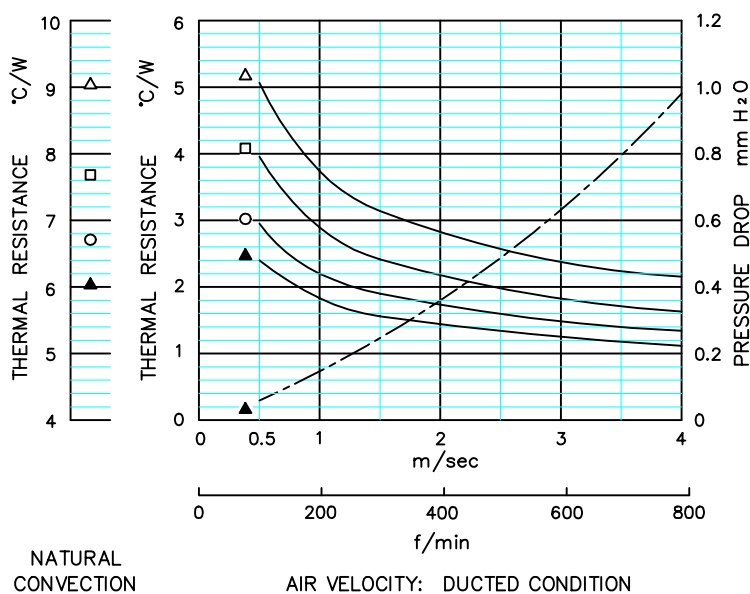
DIM



MODEL	HEIGHT h	WEIGHT (grams)
LPDM45-10BP	10	20.6
LPDM45-15BP	15	23.8
LPDM45-20BP	20	26.9
LPDM45-25BP	25	30.1

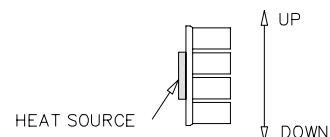
MATERIAL : A 6063
FINISH : BLACK ANODIZE
DIMENSIONS : mm

DATA



- △ LPDM45-10BP
- LPDM45-15BP
- LPDM45-20BP
- ▲ LPDM45-25BP

- DUCTED CONDITION
DUMMY HEATER SIZE: 12.7 SQ
THERMAL RESISTANCE ———
PRESSURE DROP - - - - -
- NATURAL CONVECTION
DUMMY HEATER SIZE: 12.7 SQ
DISSIPATED POWER: 7.5(W)



NOTE ORIENTATION OF HEAT SINK USED
FOR NATURAL CONVECTION TESTING

- BASED ON ALPHA'S STANDARD TEST
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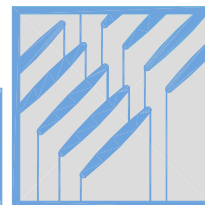
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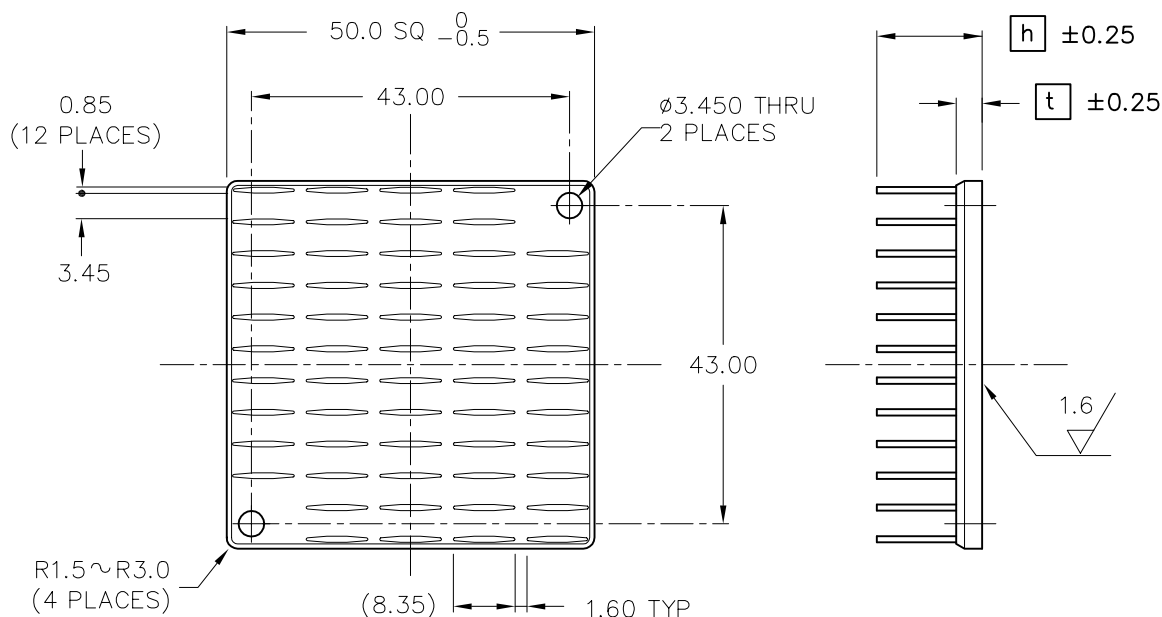
ALPHA

Low Pressure Drop Heat Sink with attachment holes

LPDM 50



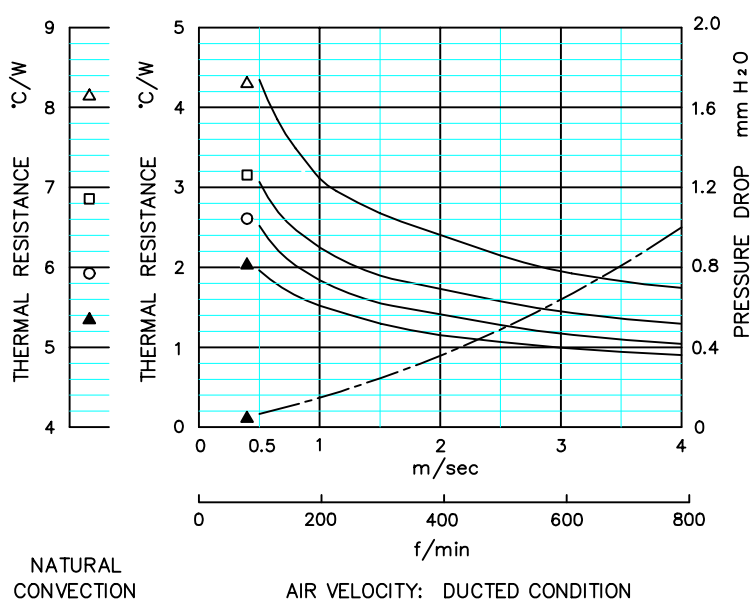
DIM



MODEL	HEIGHT h	THICKNESS t	WEIGHT (grams)
LPDM50-10BP	10	3.0	29.9
LPDM50-15BP	15	3.5	35.4
LPDM50-20BP	20		37.9
LPDM50-25BP	25		40.5

MATERIAL : A 6063
FINISH : BLACK ANODIZE
DIMENSIONS : mm

DATA

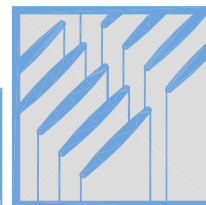


Alpha Company Ltd.

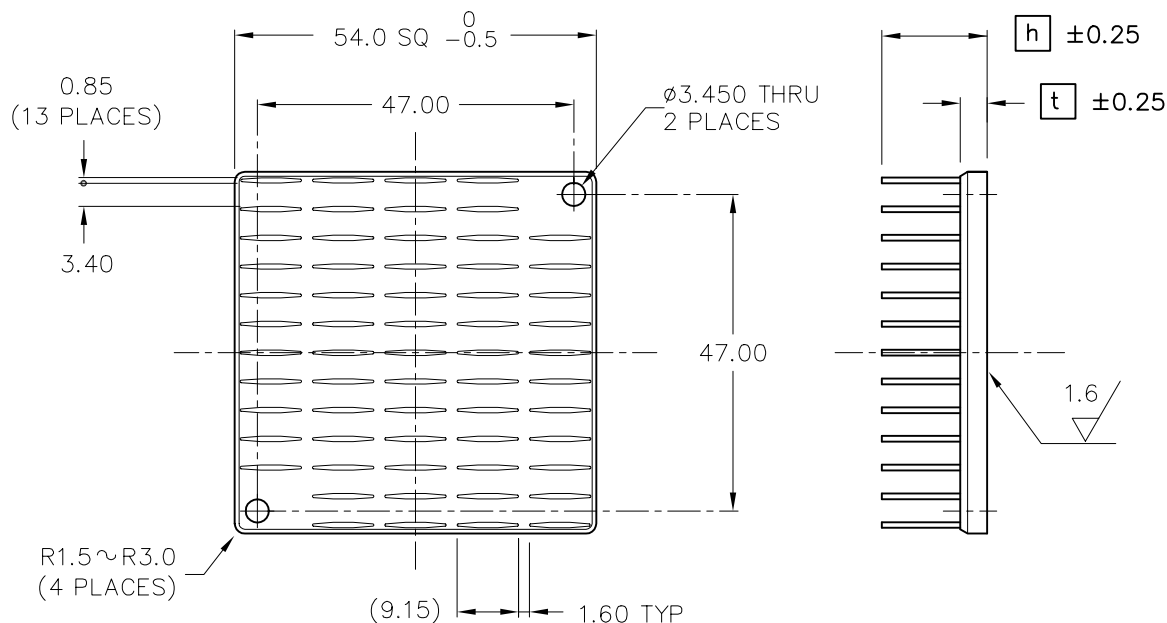
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ALPHALow Pressure Drop Heat Sink
with attachment holes**LPDM 54**

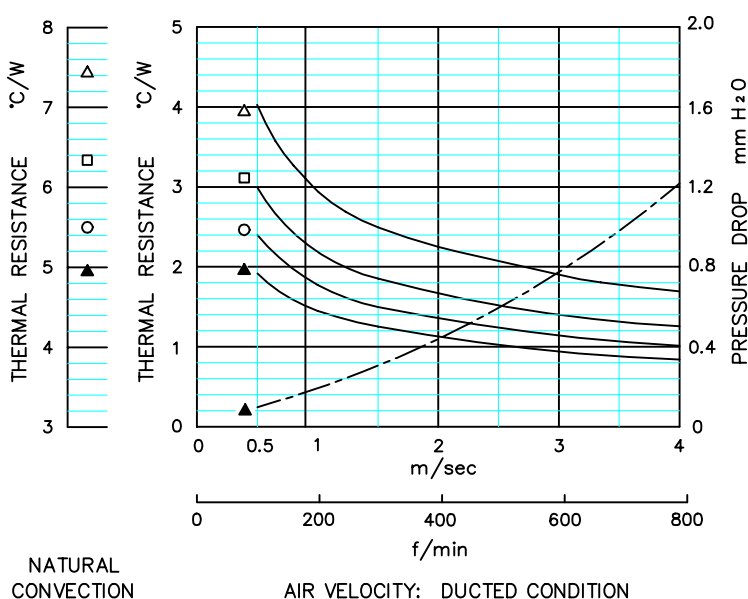
DIM



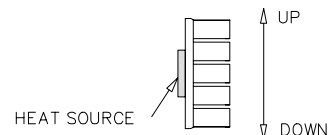
MODEL	HEIGHT h	THICKNESS t	WEIGHT (grams)
LPDM54-10BP	10	3.0	30.4
LPDM54-15BP	15	4.0	41.5
LPDM54-20BP	20		46.1
LPDM54-25BP	25		50.7

MATERIAL : A 6063
 FINISH : BLACK ANODIZE
 DIMENSIONS : mm

DATA



- Δ LPDM54-10BP
- $\square$ LPDM54-15BP
- $\circ$ LPDM54-20BP
- $\blacktriangle$ LPDM54-25BP
- DUCTED CONDITION
DUMMY HEATER SIZE: 12.7 SQ
THERMAL RESISTANCE ———
PRESURE DROP - - -
- NATURAL CONVECTION
DUMMY HEATER SIZE: 12.7 SQ
DISSIPATED POWER: 8.3(W)



NOTE ORIENTATION OF HEAT SINK USED FOR NATURAL CONVECTION TESTING

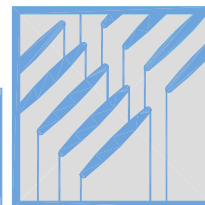
- BASED ON ALPHA'S STANDARD TEST PROCEDURE. REFER TO TECHNICAL INFORMATION.

Alpha Company Ltd.

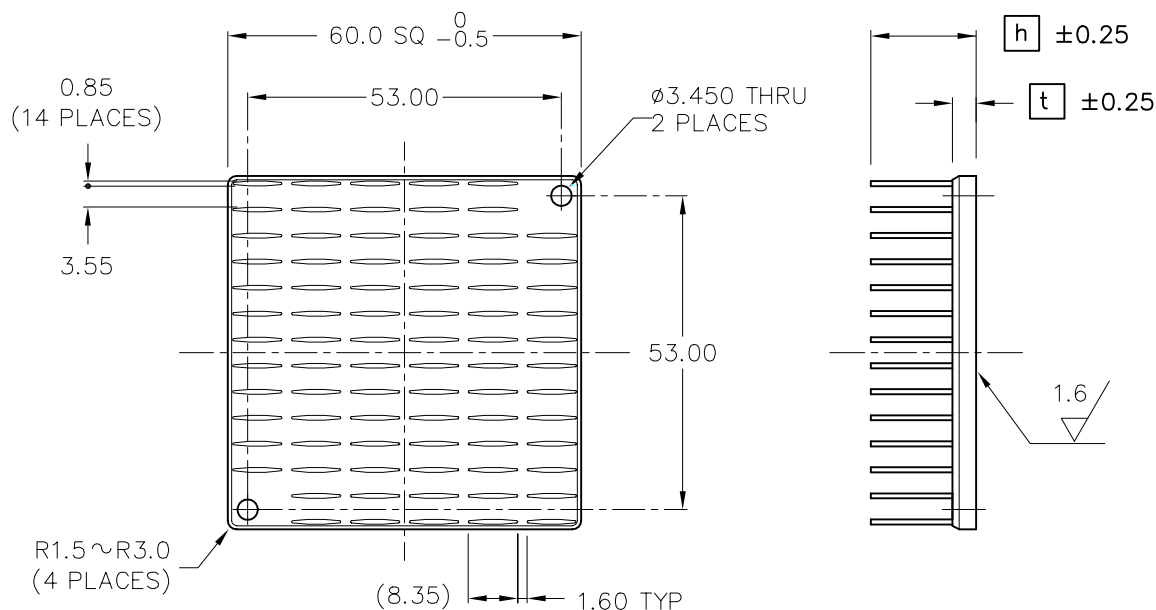
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ALPHALow Pressure Drop Heat Sink
with attachment holes**LPDM 60**

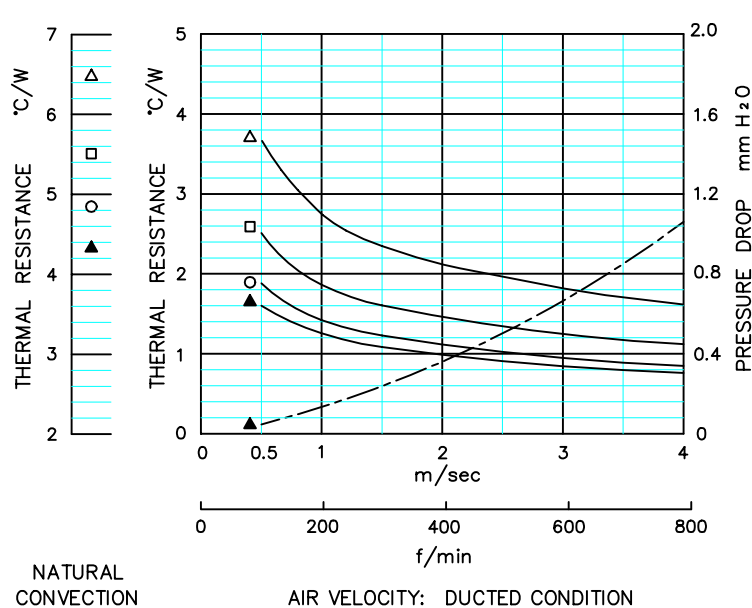
DIM



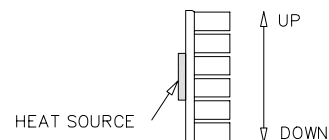
MODEL	HEIGHT h	THICKNESS t	WEIGHT (grams)
LPDM60-10BP	10	3.0	36.8
LPDM60-15BP	15	4.0	50.6
LPDM60-20BP	20		56.1
LPDM60-25BP	25		61.6

MATERIAL : A 6063
 FINISH : BLACK ANODIZE
 DIMENSIONS : mm

DATA



- Δ LPDM60-10BP
- $\square$ LPDM60-15BP
- $\circ$ LPDM60-20BP
- $\blacktriangle$ LPDM60-25BP
- $\bullet$ DUCTED CONDITION
DUMMY HEATER SIZE: 12.7 SQ
THERMAL RESISTANCE ———
PRESSURE DROP - - - -
- $\bullet$ NATURAL CONVECTION
DUMMY HEATER SIZE: 12.7 SQ
DISSIPATED POWER: 9.9(W)



NOTE ORIENTATION OF HEAT SINK USED FOR NATURAL CONVECTION TESTING

- $\blacksquare$ BASED ON ALPHA'S STANDARD TEST PROCEDURE. REFER TO TECHNICAL INFORMATION.

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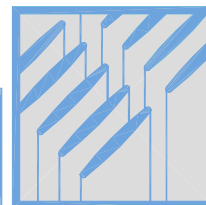
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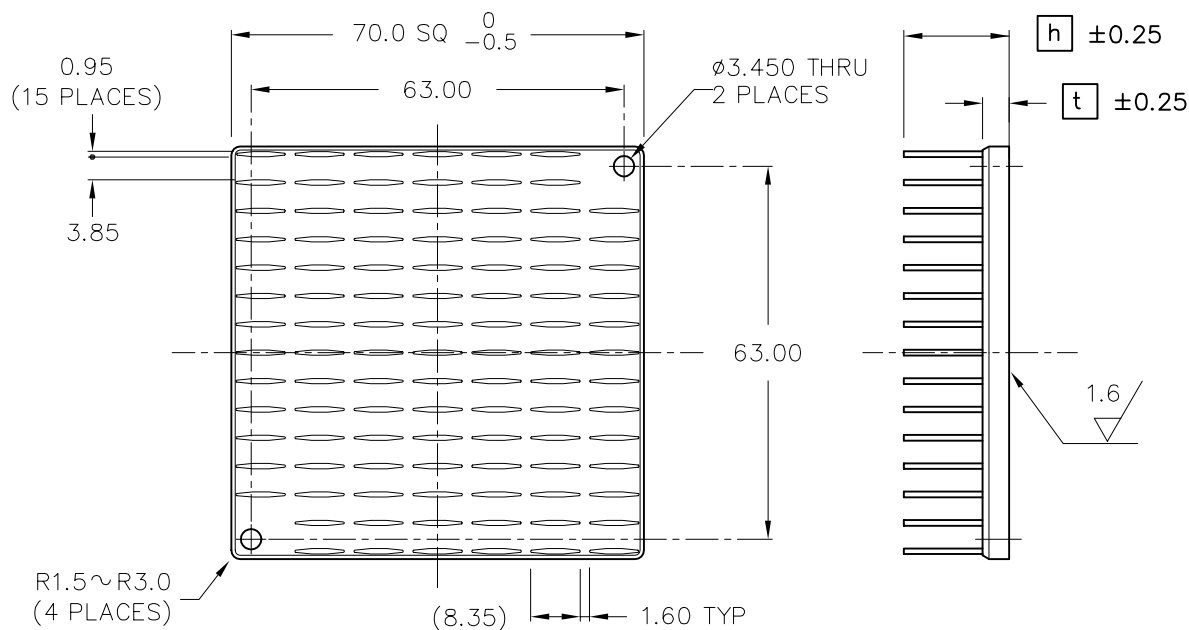
ALPHA

Low Pressure Drop Heat Sink with attachment holes

LPDM 70



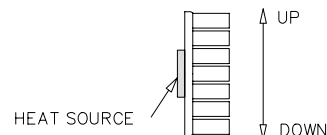
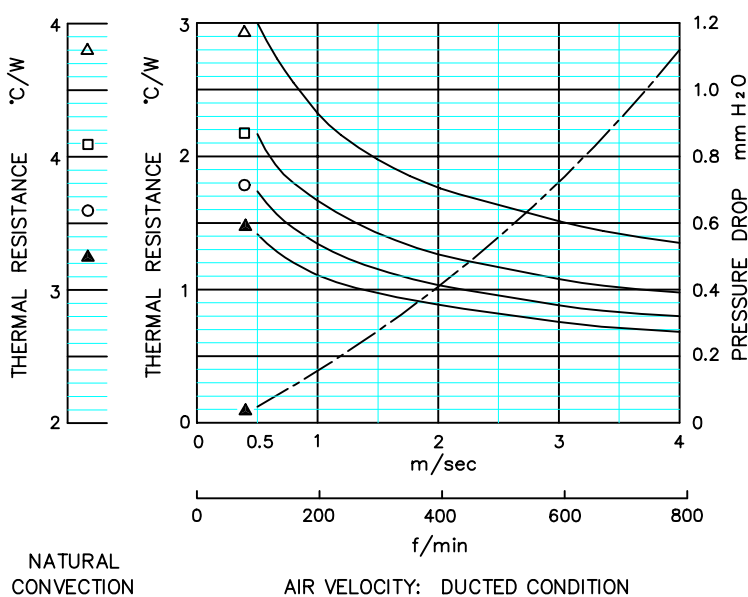
DIM



MODEL	HEIGHT h	THICKNESS t	WEIGHT (grams)
LPDM70-10BP	10	3.0	59.4
LPDM70-15BP	15	4.0	70.9
LPDM70-20BP	20		78.8
LPDM70-25BP	25		86.8

MATERIAL : A 6063
FINISH : BLACK ANODIZE
DIMENSIONS : mm

DATA



NOTE ORIENTATION OF HEAT SINK USED FOR NATURAL CONVECTION TESTING

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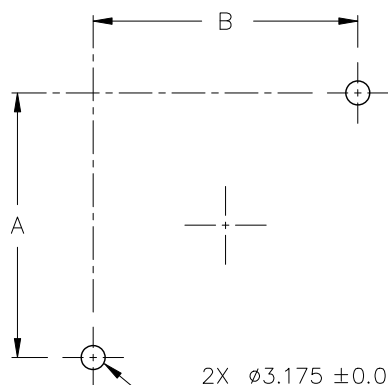
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REF



PCB HOLE LAYOUT



2X $\phi 3.175 \pm 0.05$ [$\phi .125 \pm .002$]

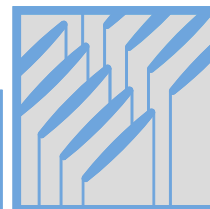
USE OF PLATED HOLES TO REDUCE EXCESSIVE WEAR
AND INSERTION FORCE IS RECOMMENDED.

LPDM30, UBM30, ZM30	23.0	23.0
LPDM35, UBM35, ZM35	28.0	28.0
LPDM40, UBM40, ZM40	33.0	33.0
LPDM45, UBM45, ZM45	38.0	38.0
LPDM50, UBM50, ZM50	43.0	43.0
LPDM54, UBM54, ZM54	47.0	47.0
LPDM60, UBM60, ZM60	53.0	53.0
LPDM70, UBM70	63.0	63.0
MODEL	A	B

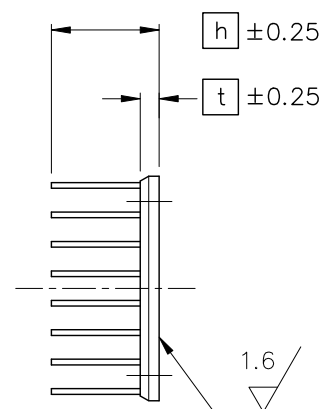
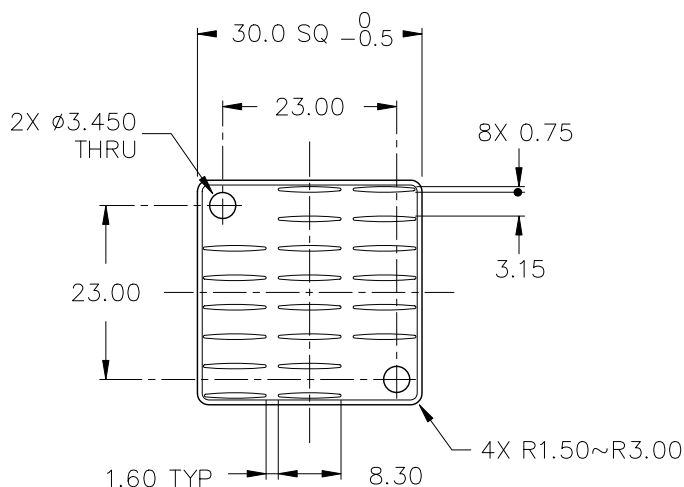
ALPHA

Low Pressure Drop Heat Sink
with attachment holes

LPDH 30



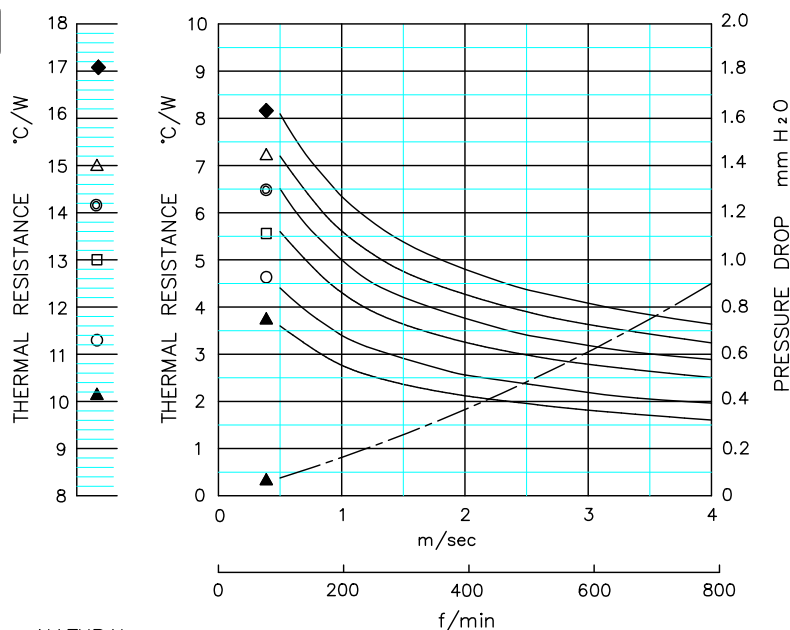
DIM



MODEL	HEIGHT [h]	THICKNESS [t]	WEIGHT (grams)
LPDH30-8BP	8	2.00	6.2
LPDH30-10BP	10	2.50	7.7
LPDH30-12BP	12		8.3
LPDH30-15BP	15		9.1
LPDH30-20BP	20		10.5
LPDH30-25BP	25		11.8
LPDH30-[h] BP	$8 \leq [h] < 10$	2.00	—
	$10 \leq [h] \leq 25$	2.50	—

MATERIAL : A 6063
FINISH : BLACK ANODIZE
DIMENSIONS : mm

DATA

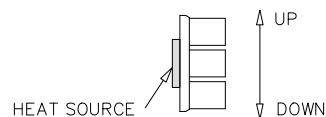


NATURAL
CONVECTION

AIR VELOCITY: DUCTED CONDITION

- ◆ LPDH30-8BP
- △ LPDH30-10BP
- ◎ LPDH30-12BP
- LPDH30-15BP
- LPDH30-20BP
- ▲ LPDH30-25BP

- DUCTED CONDITION
DUMMY HEATER SIZE: 12.7 SQ
THERMAL RESISTANCE ———
PRESSURE DROP - - - - -
- NATURAL CONVECTION
DUMMY HEATER SIZE: 12.7 SQ
DISSIPATED POWER: 3.9(W)



NOTE ORIENTATION OF HEAT SINK USED
FOR NATURAL CONVECTION TESTING

- BASED ON ALPHA'S STANDARD TEST
PROCEDURE.
REFER TO TECHNICAL INFORMATION.

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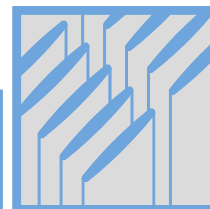
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PHONE +1(408)567-8082
FAX +1(408)567-8053
E mail : sales@alphanovatech.com
URL : <http://www.alphanovatech.com>

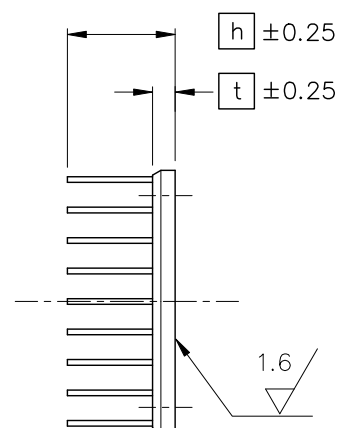
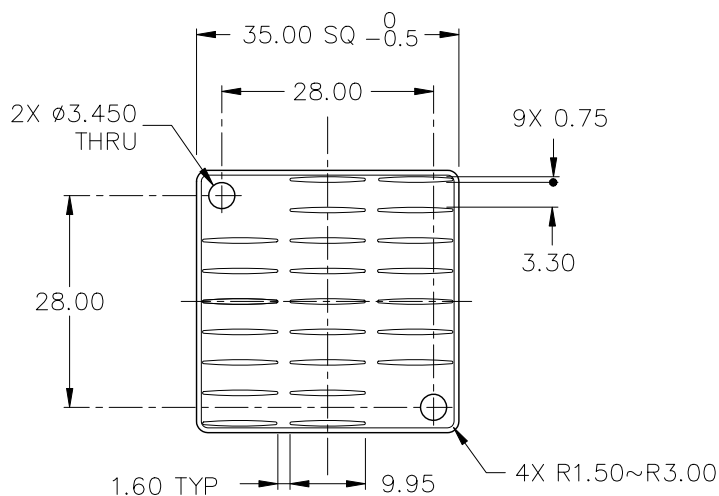
ALPHA

Low Pressure Drop Heat Sink
with attachment holes

LPDH 35



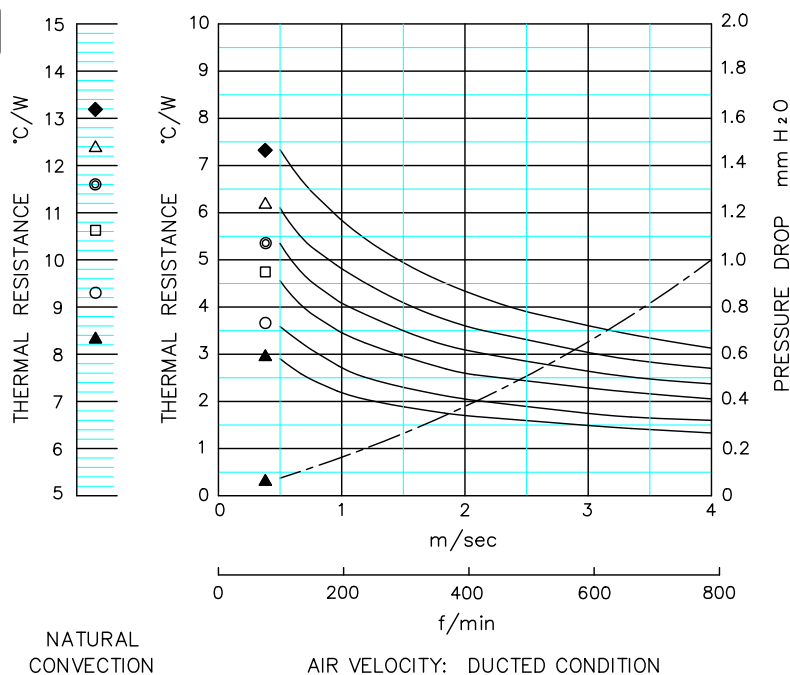
DIM



MODEL	HEIGHT [h]	THICKNESS [t]	WEIGHT (grams)
LPDH35-8BP	8	2.00	8.5
LPDH35-10BP	10	3.00	12.1
LPDH35-12BP	12		12.8
LPDH35-15BP	15		14.0
LPDH35-20BP	20		15.8
LPDH35-25BP	25		17.7
LPDH35-[h] BP	$8 \leq [h] < 10$	2.00	—
	$10 \leq [h] \leq 25$	3.00	—

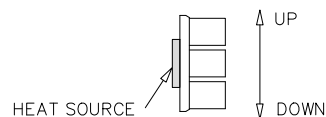
MATERIAL : A 6063
FINISH : BLACK ANODIZE
DIMENSIONS : mm

DATA



- ◆ LPDH35-8BP
- △ LPDH35-10BP
- ◎ LPDH35-12BP
- LPDH35-15BP
- LPDH35-20BP
- ▲ LPDH35-25BP

- DUCTED CONDITION
DUMMY HEATER SIZE: 12.7 SQ
THERMAL RESISTANCE ———
PRESSURE DROP - - - - -
- NATURAL CONVECTION
DUMMY HEATER SIZE: 12.7 SQ
DISSIPATED POWER: 4.7(W)



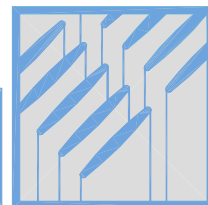
NOTE ORIENTATION OF HEAT SINK USED FOR NATURAL CONVECTION TESTING
BASED ON ALPHA'S STANDARD TEST PROCEDURE.
REFER TO TECHNICAL INFORMATION.

Alpha Company Ltd.

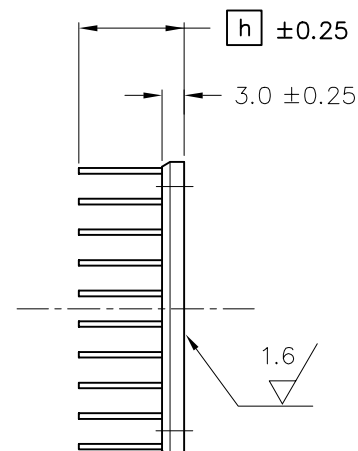
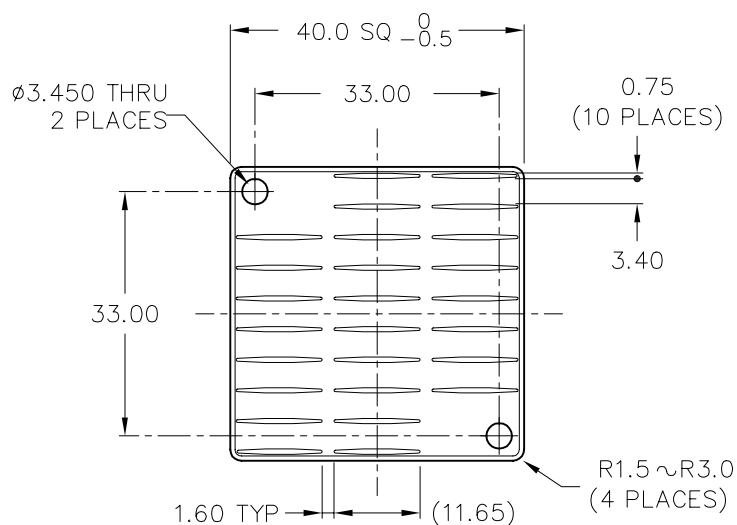
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ALPHA**Low Pressure Drop Heat Sink
with attachment holes****LPDH 40**

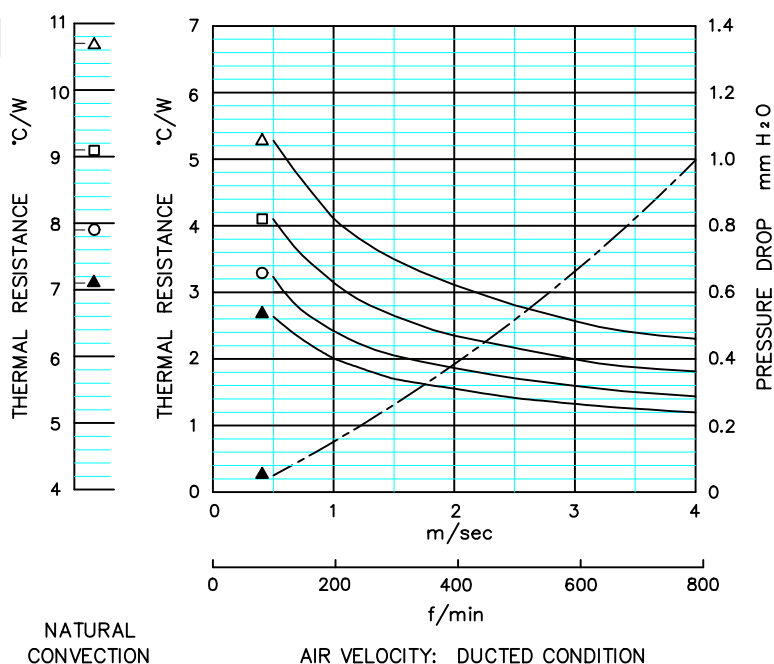
DIM



MODEL	HEIGHT [h]	WEIGHT (grams)
LPDH40-10BP	10	15.7
LPDH40-15BP	15	18.1
LPDH40-20BP	20	20.6
LPDH40-25BP	25	23.0

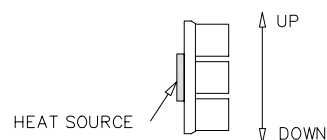
MATERIAL : A 6063
 FINISH : BLACK ANODIZE
 DIMENSIONS : mm

DATA



- △ LPDH40-10BP
- LPDH40-15BP
- LPDH40-20BP
- ▲ LPDH40-25BP

- DUCTED CONDITION
 DUMMY HEATER SIZE: 12.7 SQ
 THERMAL RESISTANCE _____
 PRESURE DROP _____
- NATURAL CONVECTION
 DUMMY HEATER SIZE: 12.7 SQ
 DISSIPATED POWER: 6.0(W)



NOTE ORIENTATION OF HEAT SINK USED
 FOR NATURAL CONVECTION TESTING

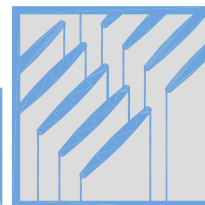
- BASED ON ALPHA'S STANDARD TEST PROCEDURE.
 REFER TO TECHNICAL INFORMATION.

Alpha Company Ltd.

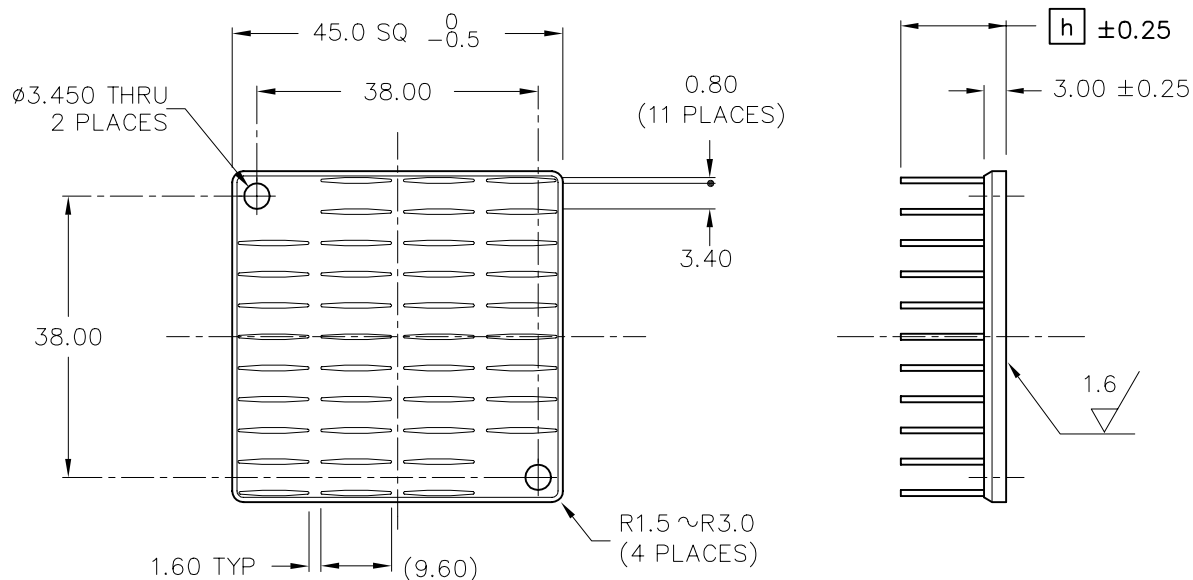
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ALPHA**Low Pressure Drop Heat Sink
with attachment holes****LPDH 45**

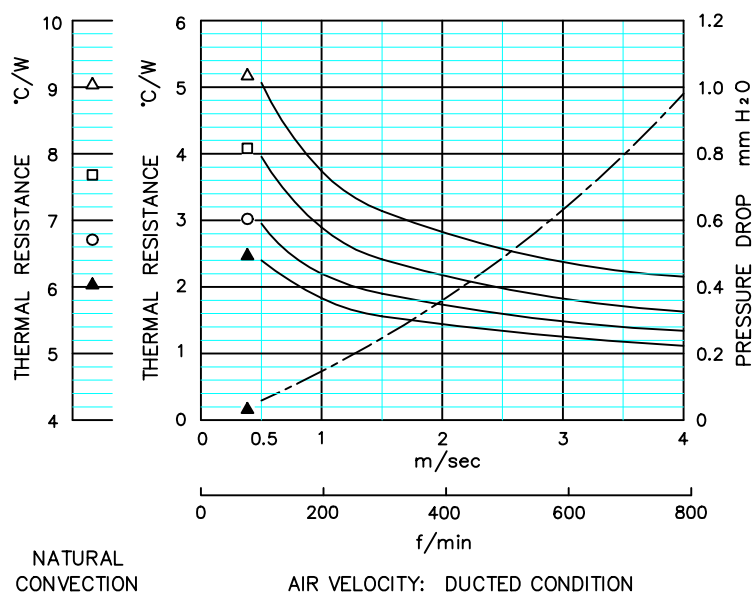
DIM



MODEL	HEIGHT h	WEIGHT (grams)
LPDH45-10BP	10	20.6
LPDH45-15BP	15	23.8
LPDH45-20BP	20	26.9
LPDH45-25BP	25	30.1

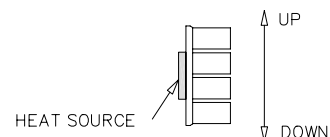
MATERIAL : A 6063
 FINISH : BLACK ANODIZE
 DIMENSIONS : mm

DATA



- $\triangle$ LPDH45-10BP
- $\square$ LPDH45-15BP
- $\circ$ LPDH45-20BP
- $\blacktriangle$ LPDH45-25BP

- $\bullet$ DUCTED CONDITION
 DUMMY HEATER SIZE: 12.7 SQ
 THERMAL RESISTANCE ———
 PRESURE DROP - - - -
- $\bullet$ NATURAL CONVECTION
 DUMMY HEATER SIZE: 12.7 SQ
 DISSIPATED POWER: 7.5(W)



NOTE ORIENTATION OF HEAT SINK USED FOR NATURAL CONVECTION TESTING

- $\blacksquare$ BASED ON ALPHA'S STANDARD TEST PROCEDURE.
 REFER TO TECHNICAL INFORMATION.

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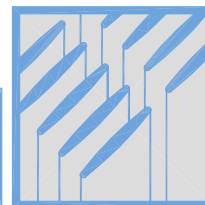
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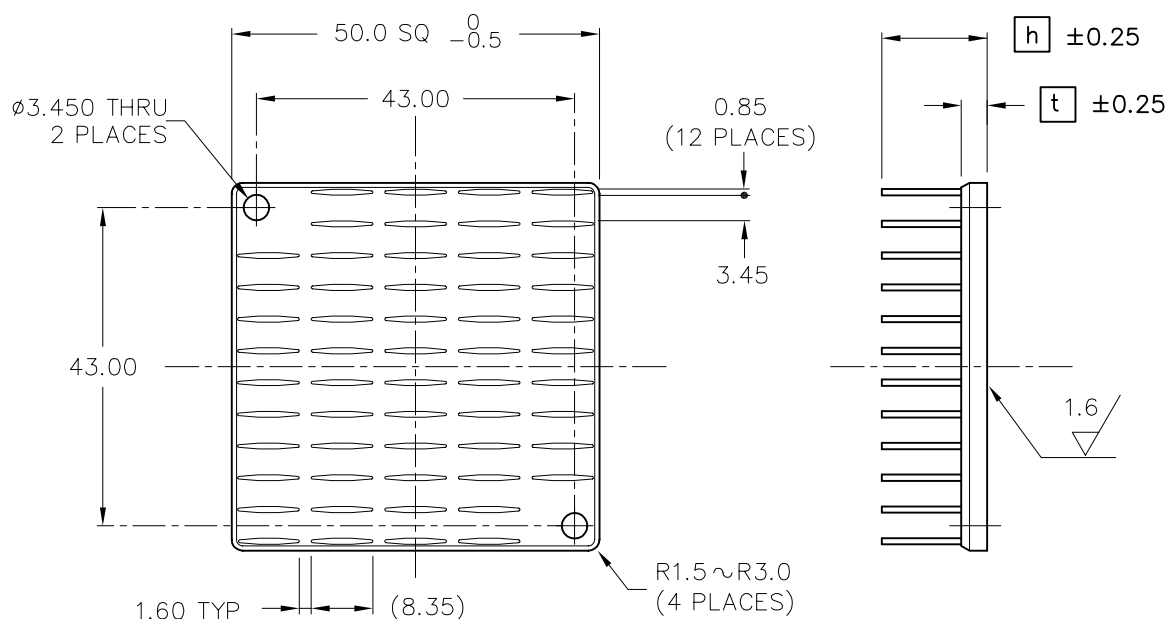
ALPHA

Low Pressure Drop Heat Sink with attachment holes

LPDH 50



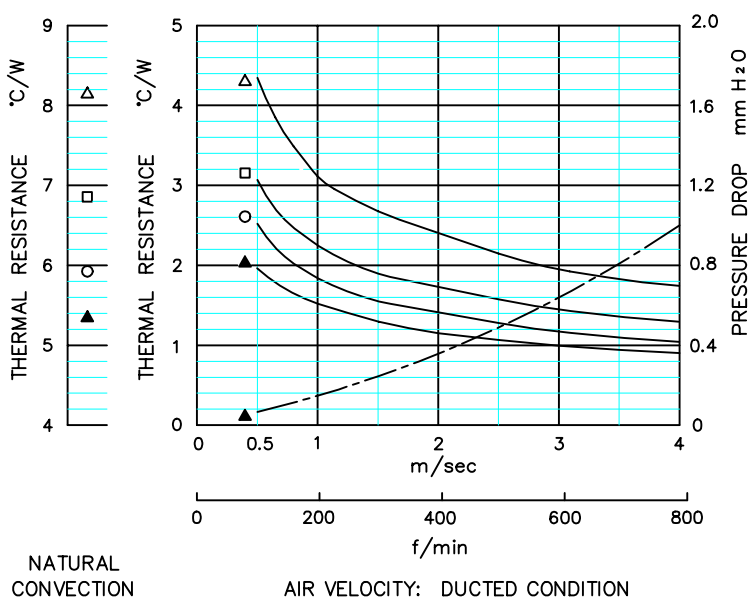
DIM



MODEL	HEIGHT h	THICKNESS t	WEIGHT (grams)
LPDH50-10BP	10	3.0	29.9
LPDH50-15BP	15	3.5	35.4
LPDH50-20BP	20		37.9
LPDH50-25BP	25		40.5

MATERIAL : A 6063
FINISH : BLACK ANODIZE
DIMENSIONS : mm

DATA



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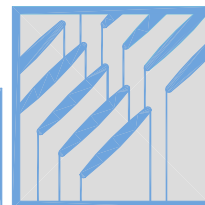
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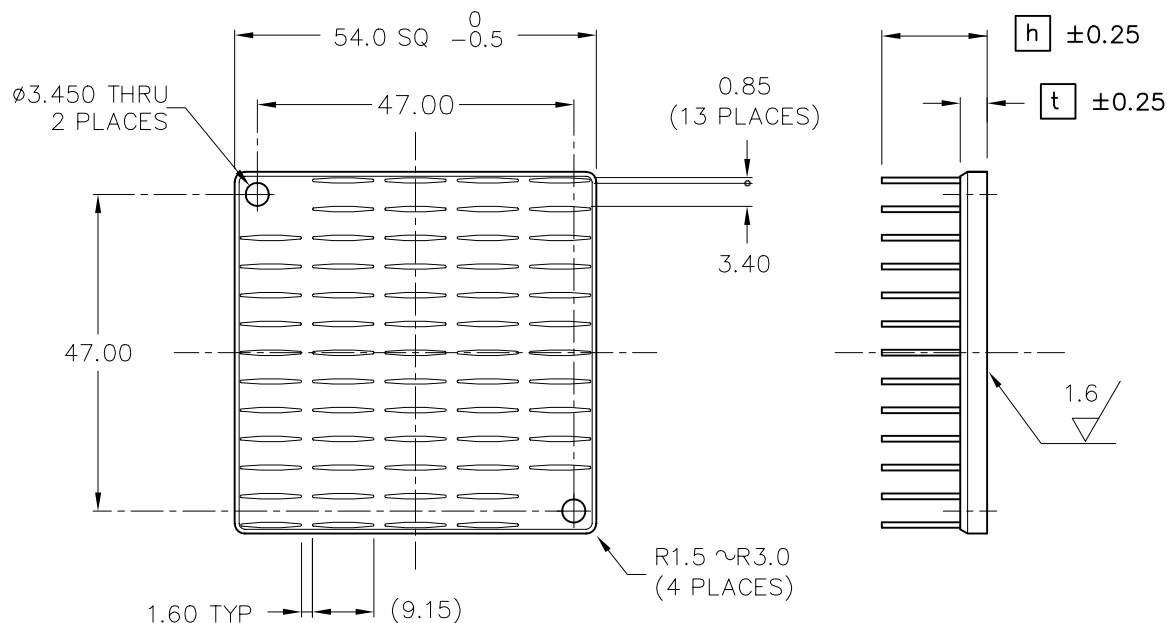
ALPHA

Low Pressure Drop Heat Sink with attachment holes

LPDH 54



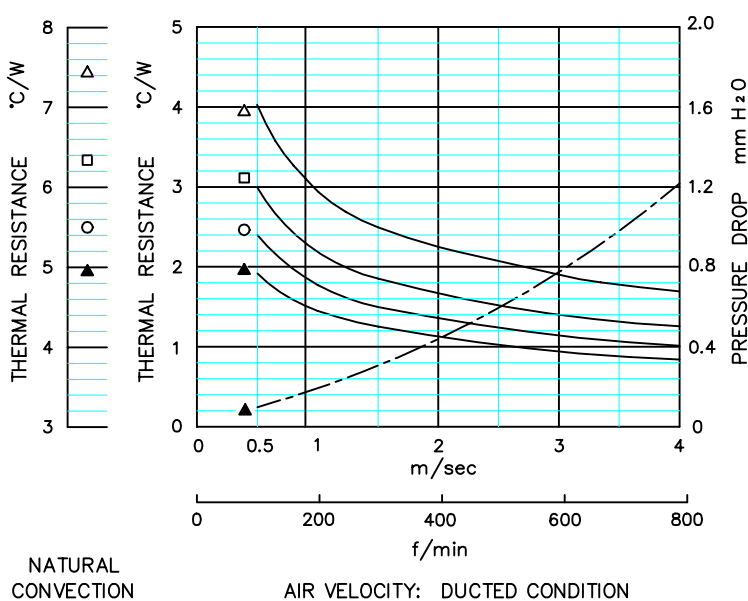
DIM



MODEL	HEIGHT h	THICKNESS t	WEIGHT (grams)
LPDH54-10BP	10	3.0	30.4
LPDH54-15BP	15	4.0	41.5
LPDH54-20BP	20		46.1
LPDH54-25BP	25		50.7

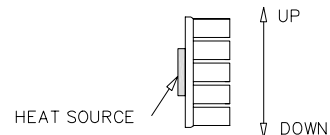
MATERIAL : A 6063
FINISH : BLACK ANODIZE
DIMENSIONS : mm

DATA



- △ LPDH54-10BP
- LPDH54-15BP
- LPDH54-20BP
- ▲ LPDH54-25BP

- DUCTED CONDITION
DUMMY HEATER SIZE: 12.7 SQ
THERMAL RESISTANCE _____
PRESSURE DROP _____
- NATURAL CONVECTION
DUMMY HEATER SIZE: 12.7 SQ
DISSIPATED POWER: 8.3(W)



NOTE ORIENTATION OF HEAT SINK USED FOR NATURAL CONVECTION TESTING

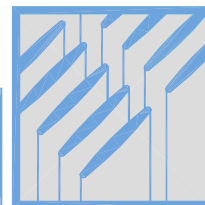
- BASED ON ALPHA'S STANDARD TEST PROCEDURE.
REFER TO TECHNICAL INFORMATION.

Alpha Company Ltd.

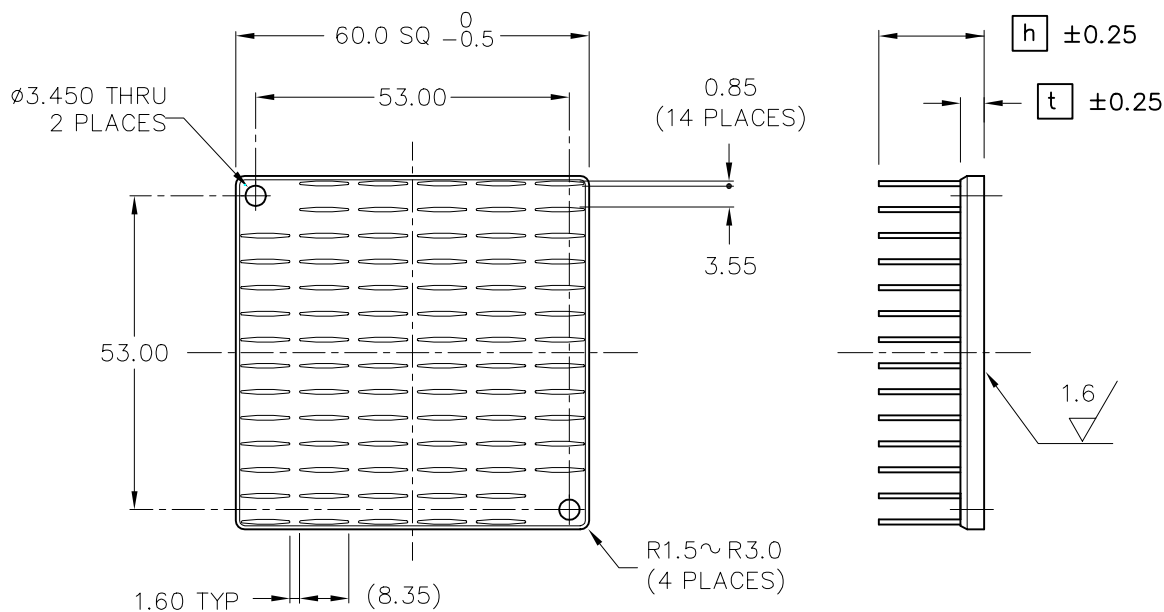
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ALPHALow Pressure Drop Heat Sink
with attachment holes**LPDH 60**

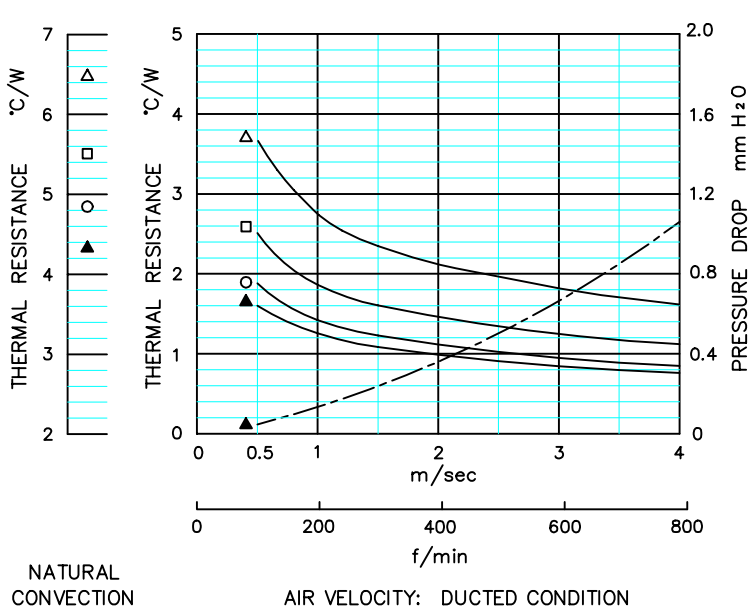
DIM



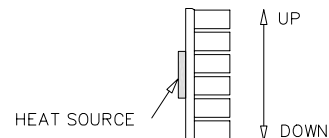
MODEL	HEIGHT h	THICKNESS t	WEIGHT (grams)
LPDH60-10BP	10	3.0	36.8
LPDH60-15BP	15	4.0	50.6
LPDH60-20BP	20		56.1
LPDH60-25BP	25		61.6

MATERIAL : A 6063
 FINISH : BLACK ANODIZE
 DIMENSIONS : mm

DATA



- Δ LPDH60-10BP
 $\square$ LPDH60-15BP
 $\circ$ LPDH60-20BP
 $\blacktriangle$ LPDH60-25BP
- $\bullet$ DUCTED CONDITION
 DUMMY HEATER SIZE: 12.7 SQ
 THERMAL RESISTANCE ———
 PRESSURE DROP - - -
 - $\bullet$ NATURAL CONVECTION
 DUMMY HEATER SIZE: 12.7 SQ
 DISSIPATED POWER: 9.9(W)



NOTE ORIENTATION OF HEAT SINK USED FOR NATURAL CONVECTION TESTING

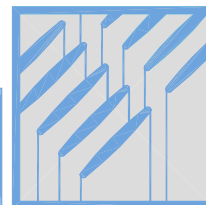
- $\blacksquare$ BASED ON ALPHA'S STANDARD TEST PROCEDURE. REFER TO TECHNICAL INFORMATION.

Alpha Company Ltd.

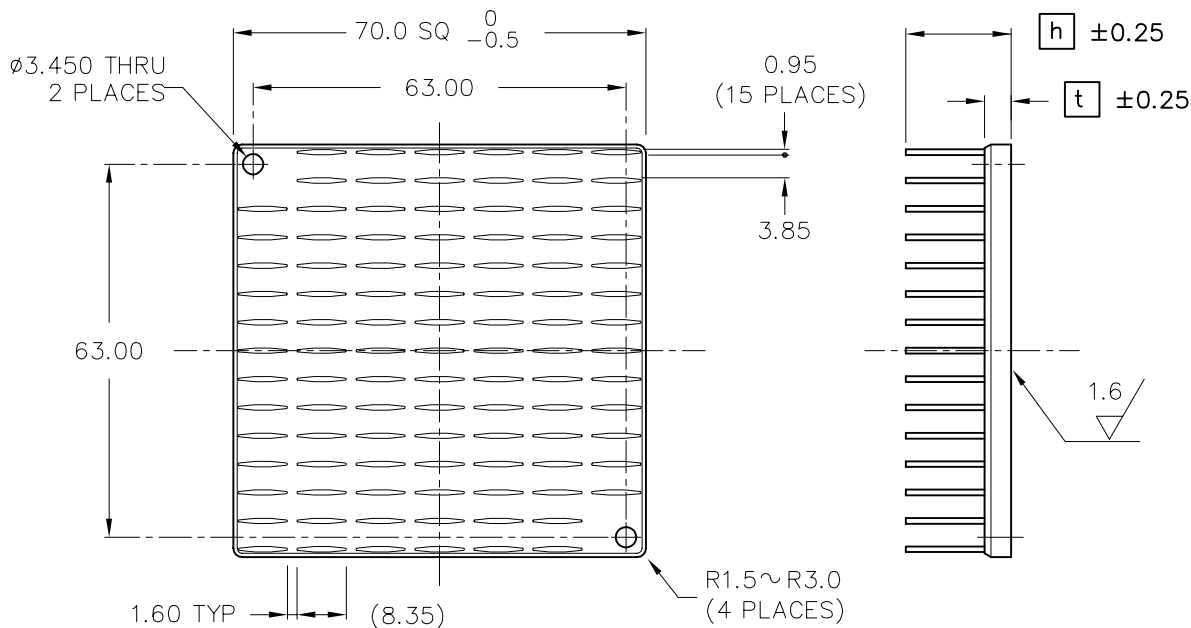
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ALPHALow Pressure Drop Heat Sink
with attachment holes**LPDH 70**

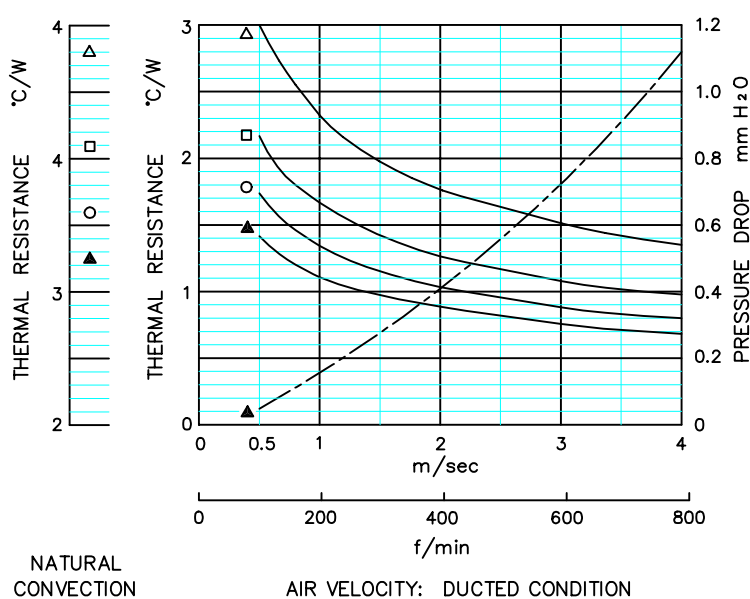
DIM



MODEL	HEIGHT h	THICKNESS t	WEIGHT (grams)
LPDH70-10BP	10	3.0	59.4
LPDH70-15BP	15	4.0	70.9
LPDH70-20BP	20		78.8
LPDH70-25BP	25		86.8

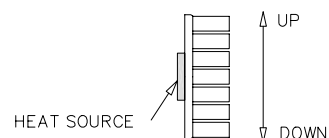
MATERIAL : A 6063
 FINISH : BLACK ANODIZE
 DIMENSIONS : mm

DATA



- Δ LPDH70-10BP
- $\square$ LPDH70-15BP
- $\circ$ LPDH70-20BP
- $\blacktriangle$ LPDH70-25BP

- $\bullet$ DUCTED CONDITION
 DUMMY HEATER SIZE: 12.7 SQ
 THERMAL RESISTANCE (solid line)
 PRESURE DROP (dashed line)
- $\bullet$ NATURAL CONVECTION
 DUMMY HEATER SIZE: 25.4 SQ
 DISSIPATED POWER: 13.3(W)



NOTE ORIENTATION OF HEAT SINK USED FOR NATURAL CONVECTION TESTING

- $\blacksquare$ BASED ON ALPHA'S STANDARD TEST PROCEDURE.
 REFER TO TECHNICAL INFORMATION.

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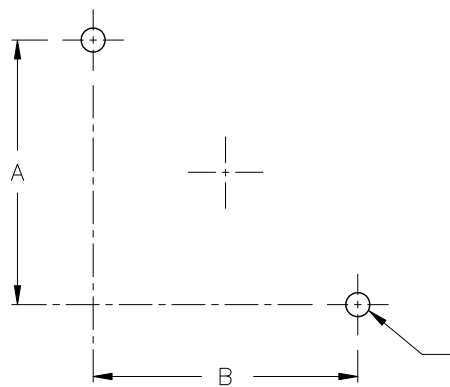
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REF



PCB HOLE LAYOUT



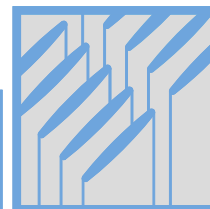
2X $\phi 3.175 \pm 0.05$ [$\phi .125 \pm .002$]
USE OF PLATED HOLES TO REDUCE EXCESSIVE WEAR
AND INSERTION FORCE IS RECOMMENDED.

LPDH30, UBH30, ZH30	23.0	23.0
LPDH35, UBH35, ZH35	28.0	28.0
LPDH40, UBH40, ZH40	33.0	33.0
LPDH45, UBH45, ZH45	38.0	38.0
LPDH50, UBH50, ZH50	43.0	43.0
LPDH54, UBH54, ZH54	47.0	47.0
LPDH60, UBH60, ZH60	53.0	53.0
LPDH70, UBH70	63.0	63.0
MODEL	A	B

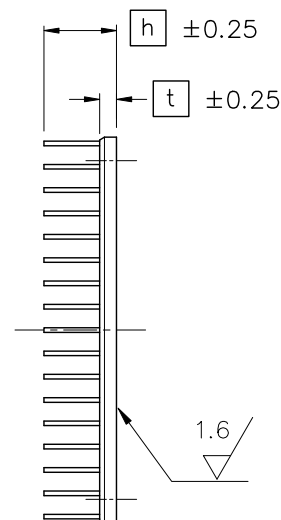
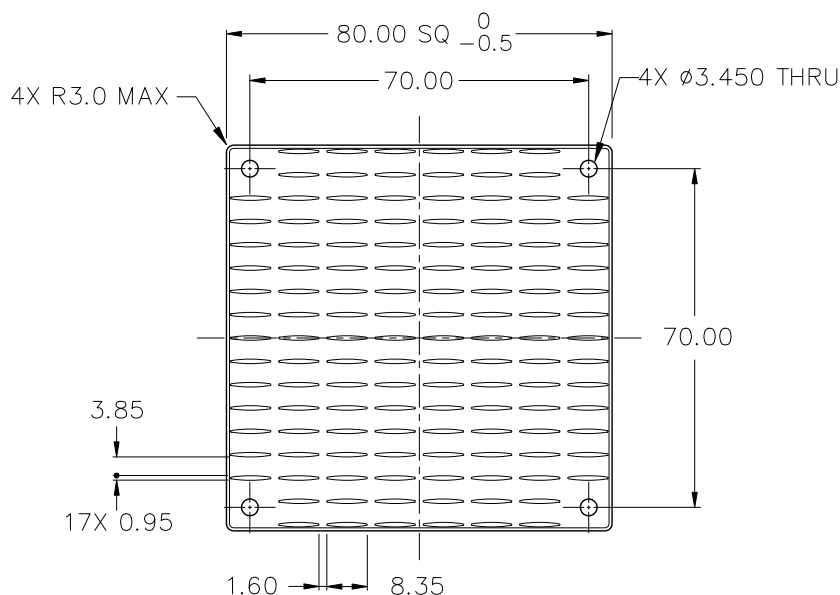
ALPHA

Low Pressure Drop Heat Sink
with attachment holes

LPDP 80



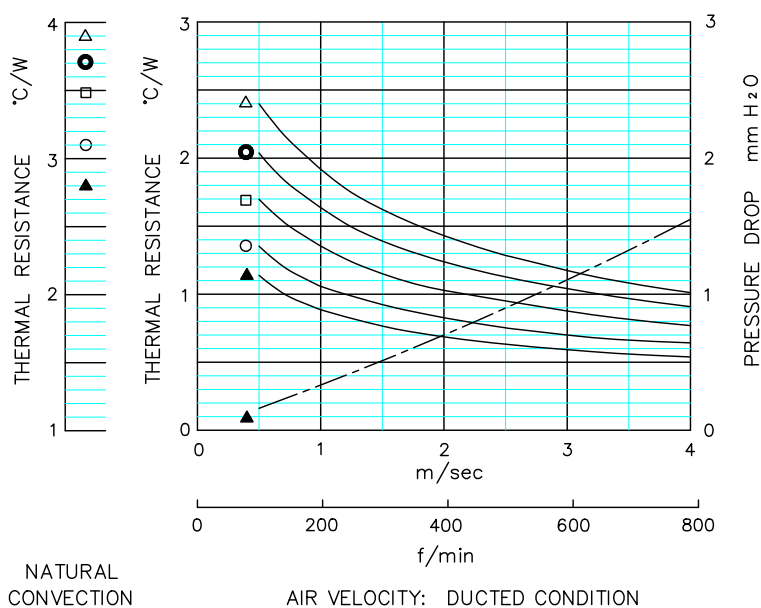
DIM



MODEL	HEIGHT [h]	THICKNESS [t]	WEIGHT (grams)
LPDP80-10B	10	3.50	75
LPDP80-12B	12		79
LPDP80-15B	15		86
LPDP80-20B	20	5.00	119
LPDP80-25B	25		131

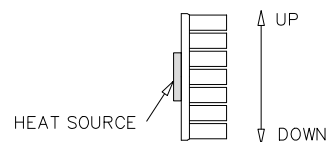
MATERIAL : A 6063
FINISH : BLACK ANODIZE
DIMENSIONS : mm

DATA



- △ LPDP80-10B
- LPDP80-12B
- LPDP80-15B
- ◇ LPDP80-20B
- ▲ LPDP80-25B

- DUCTED CONDITION
DUMMY HEATER SIZE: 25.4 SQ
THERMAL RESISTANCE ———
PRESSURE DROP - - - - -
- NATURAL CONVECTION
DUMMY HEATER SIZE: 25.4 SQ
DISSIPATED POWER: 14.5(W)



NOTE ORIENTATION OF HEAT SINK USED FOR NATURAL CONVECTION TESTING

- BASED ON ALPHA'S STANDARD TEST PROCEDURE.
REFER TO TECHNICAL INFORMATION.

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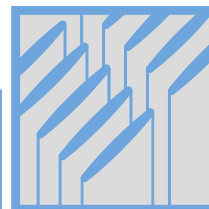
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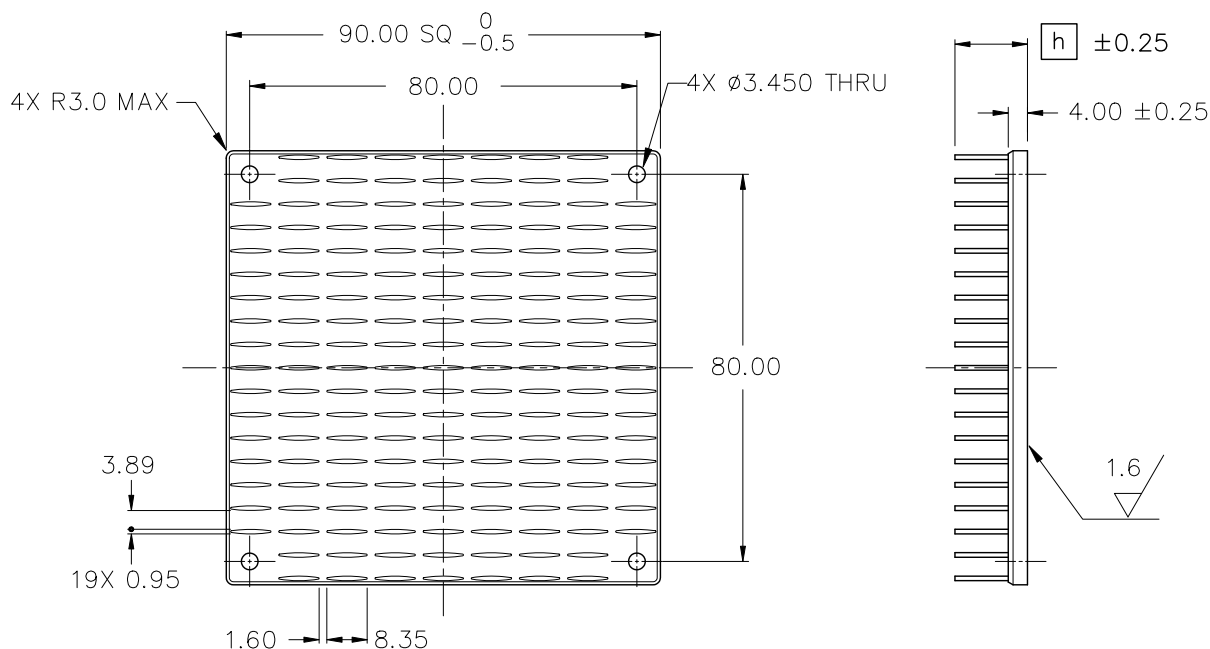
ALPHA

Low Pressure Drop Heat Sink
with attachment holes

LPDP 90



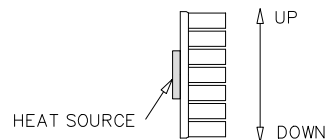
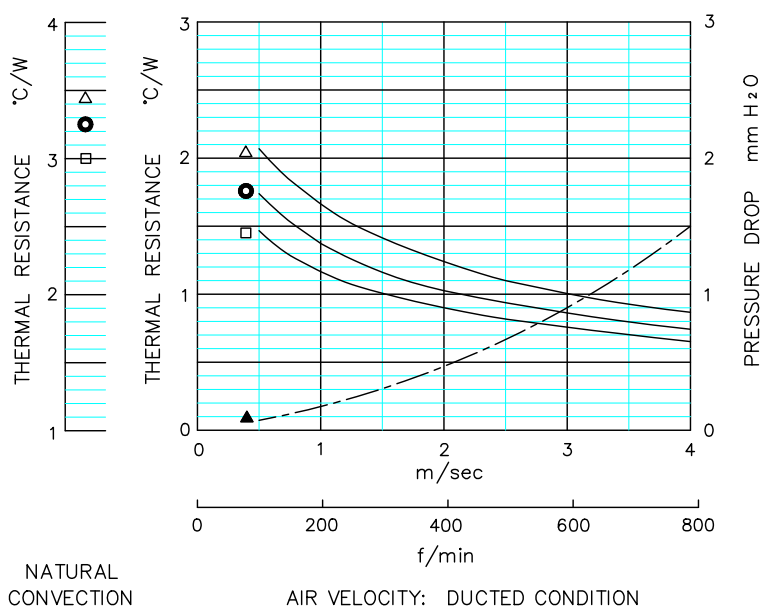
DIM



MODEL	HEIGHT h	WEIGHT (grams)
LPDP90-10B	10	104
LPDP90-12B	12	109
LPDP90-15B	15	118

MATERIAL : A 6063
 FINISH : BLACK ANODIZE
 DIMENSIONS : mm

DATA



NOTE ORIENTATION OF HEAT SINK USED FOR NATURAL CONVECTION TESTING

BASED ON ALPHA'S STANDARD TEST PROCEDURE.
 REFER TO TECHNICAL INFORMATION.

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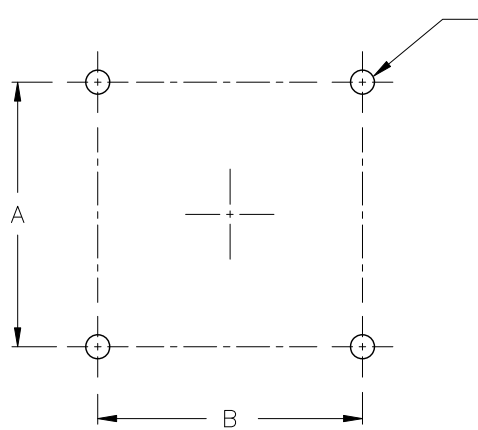
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REF



PCB HOLE LAYOUT



4X $\varnothing 3.175 \pm 0.05$ [$\varnothing.125 \pm .002$]
USE OF PLATED HOLES TO REDUCE EXCESSIVE WEAR
AND INSERTION FORCE IS RECOMMENDED.

LPDP80, UBP80	70.0	70.0
LPDP90, UBP90	80.0	80.0
MODEL	A	B