

METAL DOME ARRAY

Design Guidelines



NICOMATIC

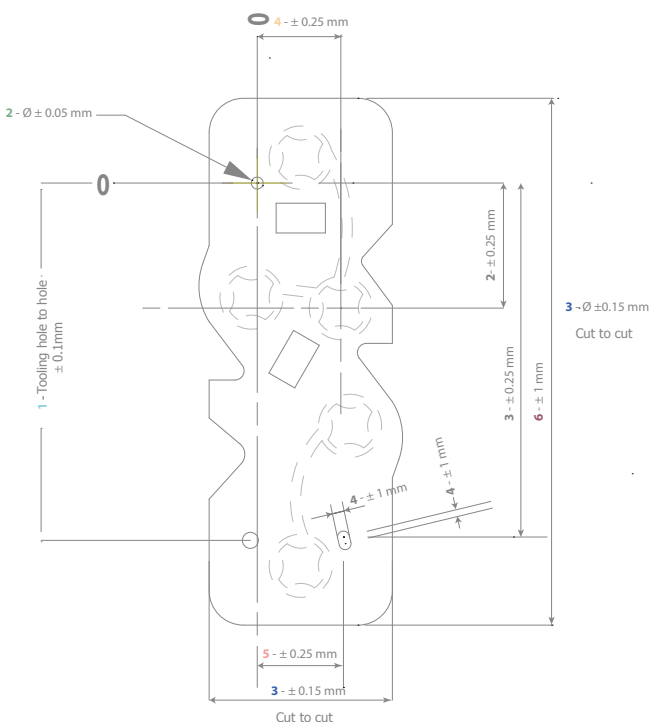
This sheet will provide a guideline for designers who require domes and dome array products in electronic devices. The information below is proprietary and specific to NICOMATIC and its manufacturing processes. Designers should consult the NICOMATIC engineering department early in the design process to insure a compatible dome array that will yield the desired product functionality.

NICOMATIC PROCESS

The following guidelines are designed to be easily achievable by NICOMATIC's current manufacturing process for standard size dome arrays at the lowest possible product cost and 100 % controlled.

STANDARD MANUFACTURING TOLERANCES

Feature description	Tolerance Soft tooling (P.A.S. & Kiss Cut) - for prototypes & pre-series		Tolerance Hard tooling (P.A.S. & Kiss Cut) – for series process control
	Prototype	Pre-series	
1 - Tooling hole to hole	± 0.25mm (0.0098")	± 0.15mm (0.0059")	± 0.1mm (0.0038")
2 - Tooling hole feature	± 0.25mm (0.0098")	± 0.15mm (0.0059")	± 0.05mm (0.0020")
3 - Cut to cut	± 0.25mm (0.0098")	± 0.15mm (0.0059")	± 0.15mm (0.0059")
4 -Dome to tooling hole	± 0.25mm* (0.0098")		± 0.25mm*(0.0098")
5 - Tooling hole to position slot	± 0.25mm (0.0098")		± 0.25mm (0.0098")
6 - Part Edge Periphery & Slot dimensions	± 1.00mm (0.039")		± 1.00mm (0.039")



*+/- 0.20mm for N6 domes +/-0.15mm for N4 & N5 domes

Notes:

- Dome arrays that require tighter manufacturing tolerances are sometimes possible but need to be communicated with the NICOMATIC engineering team early in the design cycle.

STANDARD PART SIZE

- Standard sheet dimensions are 150 mm (5.90") long to 120 mm (4.72") wide. The sheet dimensions can be larger (eg. 10 mm) but will not fit the standard packaging. For greater length, dedicated MDA* and control equipment will occur.

- The edges of all adjacent domes should be at least 1.00 mm (0.039") from one another. With dedicated tubes, NICOMATIC can reach a minimum distance of 0.5 mm (0.020 ") between metal dome edges.

- For P.A.S** type arrays, the spacer hole should be 1.00 mm larger than the dome's dimension.

- If an insulated barrier or double side adhesive is used, the hole in the barrier around the domes should be 1.00 mm larger in diameter than the dome size. Please consult us if a smaller hole size is needed.

- Up to 256 domes can be placed onto a sheet whatever the type (force, plating & shape). Additional metal domes can be placed but this operation will require 2 times process control.

- Any shape of array as well as different types are allowed on the same metal dome sheet.

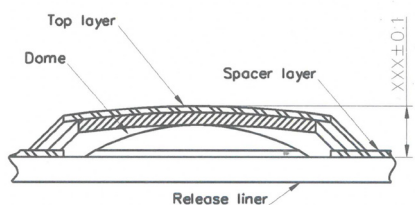
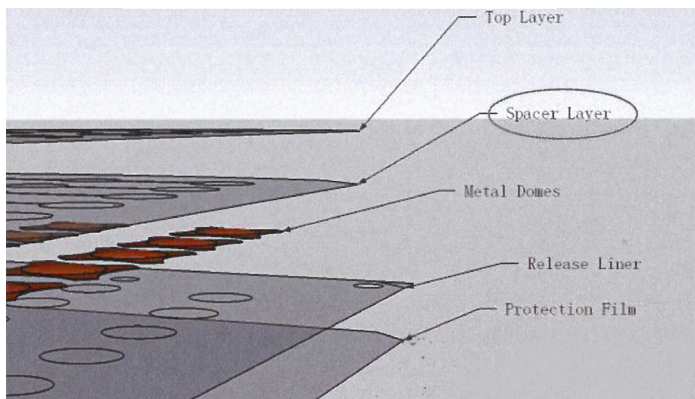
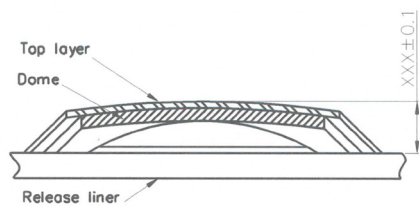
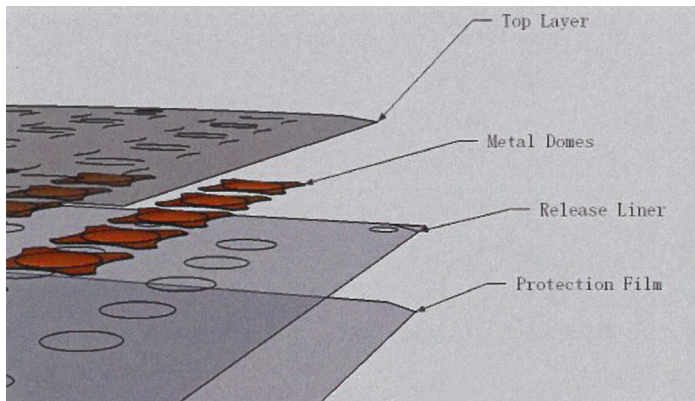
* Multi-Dome Assembly - **Pre-assembled spacer

STANDARD MATERIALS

- NICOMATIC metal domes are formed from 301 stainless steel and nickel plated as standard. Bare, silver or gold plating is also available upon request. Multiple dome shapes and sizes are available in many different trip forces and tactile ratios.
- Standard dome seal material (top layer or spacer) is 0.05 mm thick PET with 0.02 mm acrylic adhesive. This is available in either clear or white colour. Release liner thickness is 0.08 mm thick.

Other thicknesses are also available, please consult us for details but be careful not to damage or strongly reduce the tactile feeling.

NICOMATIC has approved top layer thickness between 0.06 mm and 0.10 mm. For P.A.S. spacer it must be between 0.06 and 0.08 mm for 4, 5, 6 mm domes. The release liner should not be greater than 0.15 mm otherwise the control machine may not work properly.



OTHER DESIGN CONSIDERATIONS

- Four holes of 4mm diameter at (0,0), (0, 110), (140,0), (110, 140) are required for the NICOMATIC dome placement process.
- NICOMATIC recommends an origin hole and a direction on each individual array to define precisely the position of each dome. It is necessary for inspection.

- In standard, no marking is put on the array. Specific marking can be printed at overcost on customer request.
- If polyester removal is required, arrays can touch each other. In other more standard cases, a 1.50 mm space should be left between the arrays on the sheet.
- Dome position and dome force reports can be provided upon request.
- Hermetically sealed domes require an air vent to function properly. This can occur by either standard top side venting (kiss cuts), by a through hole in the PCB board or by air tracks, which should be 1.00 mm wide and link at least 2 domes.
- All internal holes (Positioning, LED) should be a minimum of 1.20 mm in diameter.
- In order to create a sealed switch, all dome edges should be a minimum of 1.00 mm from the edge of the part or any other cut.
- ESD/EMI shielding can be added by printing the top surface of the part with silver ink. The printing needs to be offset from the edges of all cuts and dome vents by 1.00 mm.
- Recommendation: Activators should have a round shape (diameter 1.50 mm to 2.00 mm) or flat shape with 1.50 mm diameter depending on the metal dome type.
- Our hard tooling is generally used for high volume > 50k arrays. Production capability of this tooling is standard 2 500 sheets per shift. It requires high quality & in-house designed and assembled toolings for placement and control.
- The soft tooling is mainly used for prototypes or pre-series it allows more flexibility.
- NICOMATIC 4-legged square domes are required for single sided PCBs and flex circuits that have a top-side track for the center dome switch contact. Contact NICOMATIC engineering if your design requires this type of PCB design.
- Automated assembly of metal dome arrays to ESD/EMI shieldings, keypads, PCBs, flex circuits or EL lamps is possible. Call your Key Account Manager for specific requirements.

PACKAGING & SHIPMENT

- All sheets parts are delivered in sealed boxes for standard sheet dimensions 120 mm x 150 mm. Each box is labeled with NICOMATIC and customer part numbers. Other packagings are available (reel, individual arrays...).
- Weight for a metal dome: $\pm 0.02\text{gr}$
- Weight for a metal dome array (typical 20 domes array): $\pm 0.45\text{gr}$
- Typical storage stability: 2 years stored at 21°C and 50% RH
- Service temperature range: -40°C to +105°C

FILE TRANSFER TO NICOMATIC

For dome arrays approval by our engineering department, the following information is needed:

- Customer drawing mentioning all dimensions in *.DXF* or *.DWG* format clearly showing top view and tolerances.
- Type of dome array selected: either top side venting (with kiss-cuts) or with Pre-assembled spacer (P.A.S. extra layer).
- Type and part number of metal dome inside the array: diameters 4 and 5mm circle, diameters 6, 8.4, 10 and 12.2mm square (4-legged), DD type (Please always specify which Trip force, Rebound force, Click ratio and Plating.)
- Type of polyester used: white, transparent or other material specified by the customer.

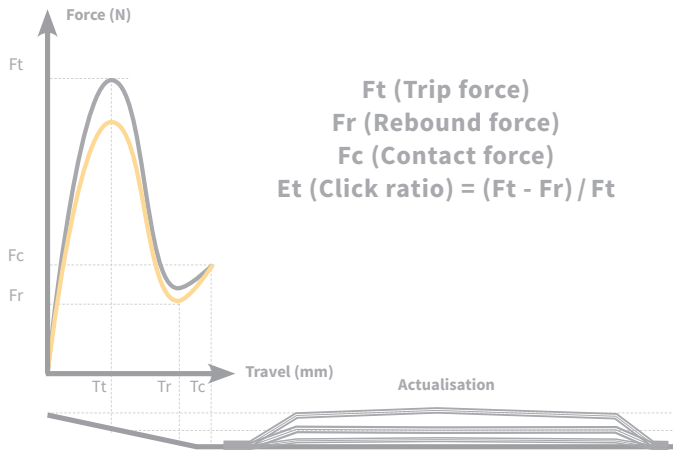
Please use our online Dome array check-list formular to specify your need (Available as attachment).

PROTOTYPE DELIVERY

According to the customer requirement, Nicomatic can provide the prototype sample sheet (after reviewing / confirming specification) within 3 weeks* :

The prototype is done using our latest equipments & has all the aspects of the series but with higher tolerance. Release liner is included.

*6 weeks for series production



SUMMARY

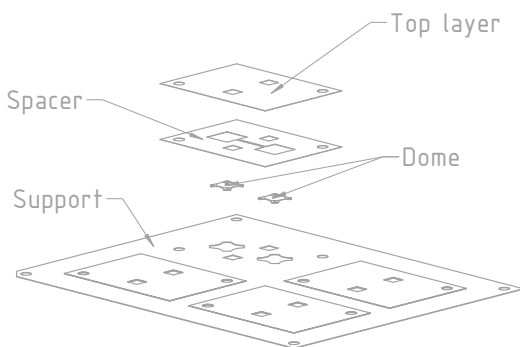
Nicomatic dome arrays are made according to your own technical specification. They are used in any type of Man/Machine interface (M.M.I.). Every kind of push-button for front panels and switch keypads can integrate a 4-legged or round Nicomatic dome. Our in-house manufacturing of domes and internal assembly process are based on high quality components & materials.

The placement method of a dome array is simple & quick:

1. Peel off the backing
2. Align the array
3. Apply it to your PCB

All domes are placed in 1 single operation and allow to subsequently reduce your production time.

Typical applications are now in consumer electronics, medical devices, domotics, payment terminals, cash machines & ATMs, calculators, automotive, security systems etc.



OUR ADVANTAGES:

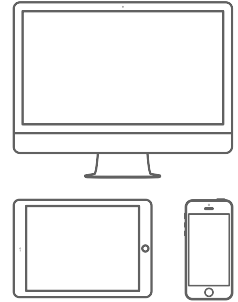
- High Quality components & materials
- Nicomatic Group In-house manufacturing & quality process
- Easy & Accurate placement on PCB for prototyping, small volume processes & high series
- Effective & durable positioning of the component
- Venting – Adhesion – Sealing features available
- Design flexibility with domes of your choice, dimension and shape
- Custom made with standard process & competitive price
- Low tooling charges

OUR RELATED INFORMATION ONLINE

- Metal domes datasheet/specification
- Metal domes arrays datasheet
- Single dome arrays datasheet
- Metal dome 2D drawings

CONTACT INFORMATION

nicomatic@nicomatic.com





PROJECT REFERENCE

please name your identity & project

*Thank you for your quote request.
In order to proceed,
please fill the data below and send back to
your sales assistant*

**Your ideal MMI solution
with easy & quick placement !**



QUANTITY TO QUOTE

TECHNOLOGY

Type:

- Kiss cut
- PAS (Pre assembled Spacer)
- Other :

LINER DESCRIPTION

- 0.05 mm clear PET + 0.02 mm adhesive

ARRAYS PER SHEET

YOUR COMMENT

DOME DESCRIPTION

part number:

FILM DESCRIPTION

Spacer:

- 0.05 mm clear PET + 0.025 mm adhesive
- 0.05 mm white PET + 0.025 mm adhesive
- Other :

ARRAY DIMENSION (MM)

Sheet standard dimension: 150 x 120

- Other :

DOMES PER ARRAY

ATTACHED FILE

- . DFX or .DWG required or any other Solidworks extension file

We stay at your disposal for any further information you may need.

FEATURE DESCRIPTION

TOLERANCES FOR SOFT TOOLING

Tooling hole feature

± 0.1 MM (0.0039")

Dome to Tooling Hole

± 0.25 MM (0.0098")

Tooling hole to Tooling Hole/Slot

± 0.25 MM (0.0098")

Part edge/periphery & slot dimensions

± 1.0 MM (0.039")