EM MICROELECTRONIC

A COMPANY OF THE SWATCH GROUP

FACT SHEET | PLASTIC LCDS

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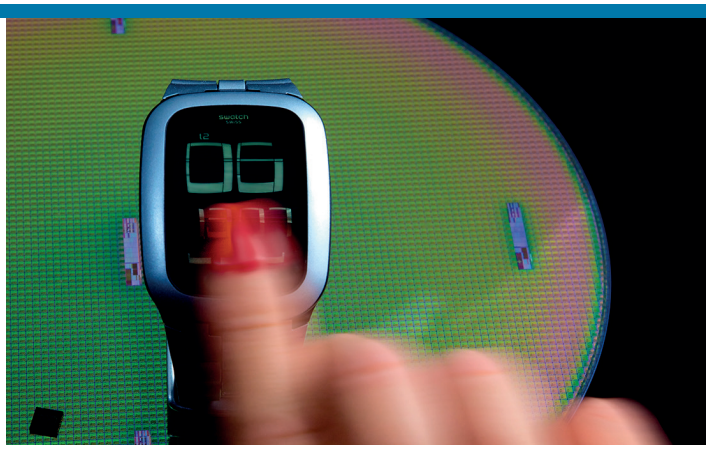
www.emmicroelectronic.com



EM offers Customer-Specific, Flexible LCD modules (monochrome) for a diverse range of applications using plastic LCD technology

EM Flexible LCD Features

- Technology: TN
- Display Mode
  - positive or negative
  - reflective, transflective, or transmissive
- Curvature
  - 30mm min. radius
- Operating Temp. -10°C / +60°C
- Storage Temp. -20°C / +70°C
- Available in various color solutions
- Available with backlight
- Driven by the same LCD Drivers or uCs used for glass LCDs (EM offers a large selection of low power LCD Driver & uC solutions)

Compatible Assembly Technologies

- Heat seal connection to PCB
- Zebra connection to PCB
- Integrated Backlight or Lightguide
- Integrated Touch Screen
- Integrated LCD Driver or Microcontroller (from EM)
- Subassembly into custom-injection molded plastic (under development)

Flexible LCD Benefits

- Ultra-Thin
- No parallax effect
- Light Weight
- Unbreakable
- Bendable
- Custom Shapes
- Integrated Backlight, Touch Screen

Touch Screens

Capacitive touch screen technologies can be integrated in the LCD or LCD module

The EM Advantage

- Experienced Flexible LCD Supplier
- Volume Production
- Advanced LCD Technologies
- EM Offers ICs & Module Assembly
- Quality & Flexibility
- Competitive Prices
- Credibility (Swatch Group Company)
- TS16494/Avionic-Qualified Manufacturer

Custom Shaped LCDs

EM Plastic LCDs are not bound to a traditional rectangular shape. They can be produced in **any shape**, tailored to the specific space or design requirements of the customer's product. Rectangular LCDs can consume too much space or surface area; custom-shaped LCDs **allow the display to fit the equipment** instead of having to design the equipment around the display.

Thin Plastic Substrates

The use of thin substrates results in a **slimmer profile** and **better viewability** for your products. EM can produce LCDs **as thin as 0.45mm** (including polarizer).

Customer Specific

All EM's Plastic LCD products are customer specific designs. EM is used to accommodating to the particular requests and to engineering solutions which optimally fit the customer's requirements.

Lightguide/Backlighting

LED Backlighting or Lightguides can be integrated in the LCD Module

Standard display or module : not available

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LCD OUTLINE

- Active Area: custom, defined by the customer:
  - Dimension:
    - max 150 x 150mm
    - min: 5 x 5mm
  - Layout:
    - segmented and / or icon: minimum segments gap is 60um
    - character type with 8 rows max (max duty ratio 1/8)
- Distance from Active Area to Viewing Area: generally 1mm, but it can be reduced or increased depending on assembly tolerance in the application (bezel opening to Active Area).
- Distance from Viewing Area to the outline of the LCD smaller substrate:
  - If the LCD is flat in the application: 1.7mm min. on LC injection hole side, 1.6mm min. on the other sides
  - If the LCD is curved in the application: 2mm min. all around Viewing Area
- LCD connection shelf: it is the part of the bigger LCD substrate that exceeds the outline of the smaller one and on which all the LCD connection pads.
  - If the LCD is connected to the PCB via zebra connector (anisotropic conductive elastomer) the LCD connector width is 1.5mm min.. The minimum pads pitch is 0.5mm
  - If the LCD is connected to the PCB via HSC (Heat Seal Connector or FPC (Kapton) cables the LCD connector width is 2.0mm min. The minimum pads pitch is 0.35mm.
- LCD thickness: depending on the selected display color combination the thickness of the LCD can vary from 0.45mm min to 0.80mm.
- Special shape: the LCD can be manufactured in any desired shape. LCD Outline tolerance is ±0.1mm
- The tolerance from LCD outline to ITO tracks or segments is ±0.15mm

POLARIZERS AND COLOR FILM

- Polarizer dimensions: the distance from polarizer outline to LCD outline is 0.4±0.4mm.
- If the LCD is connected to the PCB via a zebra connector, the front polarizer should have same outline dimension as the front glass. This is to support zebra compression.
- Several colors are available for segments and background with an incidence on display thickness (see above)

MODULE OPTIONS

- HSC or FPC cables: custom designed and supplied already bonded to the LCD, basing on customer specification
- Light-guides or back-light: down to 0.3mm, curved or flat
- PCB with MCU, LCD driver or other circuits or components (SMT and COB capability)
- Custom plastic parts such as front glasses, frame, holders...

ASSEMBLY INTO THE APPLICATION

- Our advice is to laminate the display with OCA (Optical Clear Adhesive) to the front lens . We can supply the stack LCD + front lens (custom designed with deco printings or in-mould decoration (IMD or FIM)) or deliver the LCD with a self adhesive front surface, ready to be laminated the front lens (DAP). Our in house OCA process can guarantee an alignment tolerance of ±0.15mm from lens edge to LCD edge.
- Current minimum bending radius is 30mm for LCD thickness 0.45mm and approx. 70mm for the thickest versions. Smaller bending radius requirement can discussed case by case.

TOUCH FUNCTION

- Capacitive touch sensors can be integrated either on the top surface of the front lens or directly inside the LCD. In this case, the LCD portion dedicated to the touch sensors cannot contain any segments or icons
- Ultra low power capacitive touch controller EM6420 can be embedded in the module PCB/FPC (see Module Options).