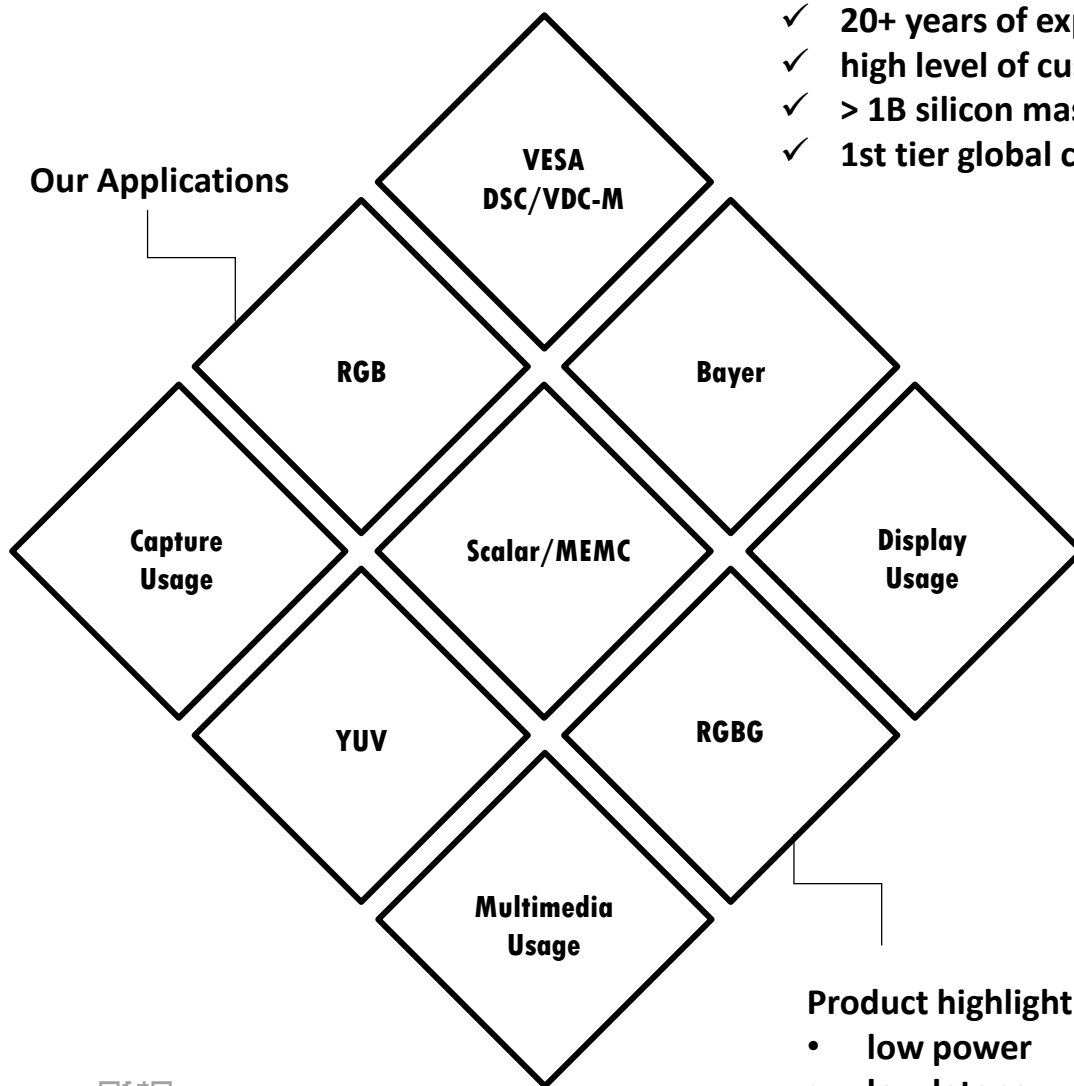# TITC

## Image Compression IP specialist

✓ **20+ years of experience**
✓ **high level of customization**
✓ **> 1B silicon mass produced**
✓ **1st tier global customers**

**Our Applications**

- VESA DSC/VDC-M
- RGB
- Bayer
- Capture Usage
- Scalar/MEMC
- Display Usage
- YUV
- RGBG
- Multimedia Usage

**Product highlight features:**
- **low power**
- **low latency**
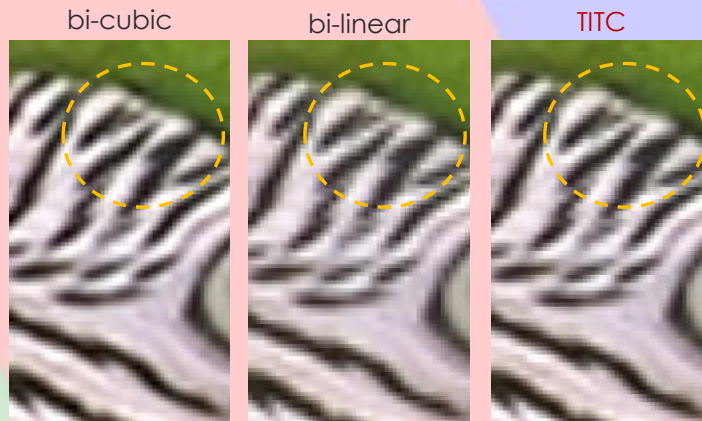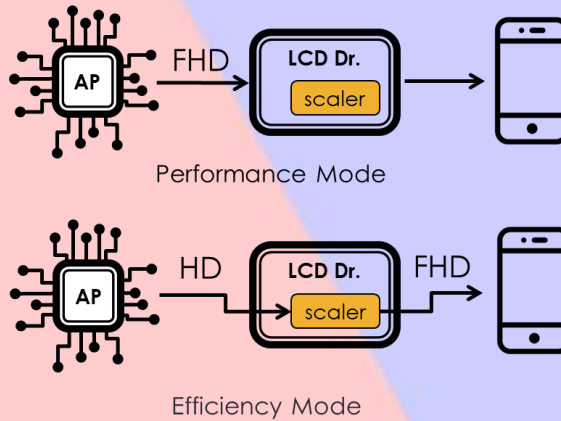- **small area**

Tel: +886-3-5839011
☺ www.titc-usa.com

# TITC NS-Series IP
# Niche Scalar for DDI

Scalar is basic, but essential image signal processing. There are several well known techniques, like nearest neighbor, bilinear, bicubic. For hardware implementation, the algorithm and line buffer cost must be in consideration.

TITC develops a novel method, that the picture quality is close to bicubic with hardware cost effective. Besides, it can also equip with edge enhancement to get higher contrast. One of applications is power saving mode in mobile phone. The AP just transmits low resolution sequences and the sequences will be scaled up to resize the panel resolution in DDI. Therefore, the transition power can be reduced.
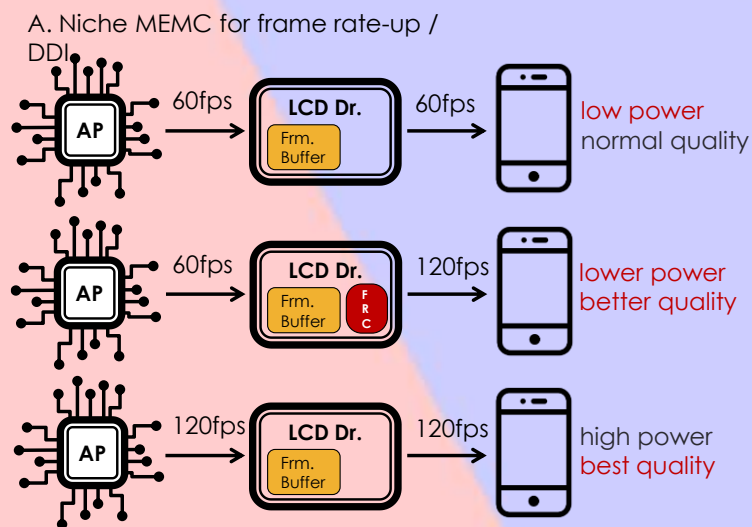
Niche Scalar for resolution up / DDI

AP → FHD → LCD Dr. [scaler] →

Performance Mode

AP → HD → LCD Dr. [scaler] → FHD →

Efficiency Mode

| bi-cubic | bi-linear | TITC |
|---|---|---|

# TITC NM-Series IP
# Niche MEMC for DDI

The technique "Motion estimation and motion compensation(MEMC)" has been developed for a long time and used widely. In order to get perfect quality, general TV-level MEMC will adopt complex algorithms with high hardware cost.

TITC is proposing a light version MEMC solution for some specific applications. One of applications is frame rate converter in DDI. The AP just transmits low frame rate sequences and the sequences will be pumped up doubly in DDI. Therefore, the transition power can be reduced. Also, the ME kernel is also used in 3D noise reduction to predict the motion vector.

A. Niche MEMC for frame rate-up / DDI



AP → 60fps → **LCD Dr.** Frm. Buffer → 60fps → low power normal quality

AP → 60fps → **LCD Dr.** Frm. Buffer FRC → 120fps → lower power better quality

AP → 120fps → **LCD Dr.** Frm. Buffer → 120fps → high power best quality

B. Niche MEMC for 3DNR / ISP



Stacking frame under low-light view



without NR          with NR