

# LoCosto™

## TCS2305 and TCS2315 solutions: TI's next-generation single-chip GSM/GPRS



The TCS2305 (GSM) is a member of TI's second generation LoCosto family of single-chip solutions that have set a new standard for features and a compelling user experience in the ultra low-cost handset segment. By combining advanced 65-nm process technology, a TMS320C54x™ DSP with a powerful ARM7 core, and integrating TI's market-leading DRP™ technology, the TCS2305-based handsets with high performance, robust functionality and innovative form factors are possible in the most price-sensitive handsets.

The TCS2305 LoCosto solution is targeted at emerging and fast-growing countries such as India, China, Brazil and Russia. Moreover, to enable lowest cost color phones, this highly flexible and scalable solution also addresses value-conscious segments in mature markets.

### Sustainable low-cost structure

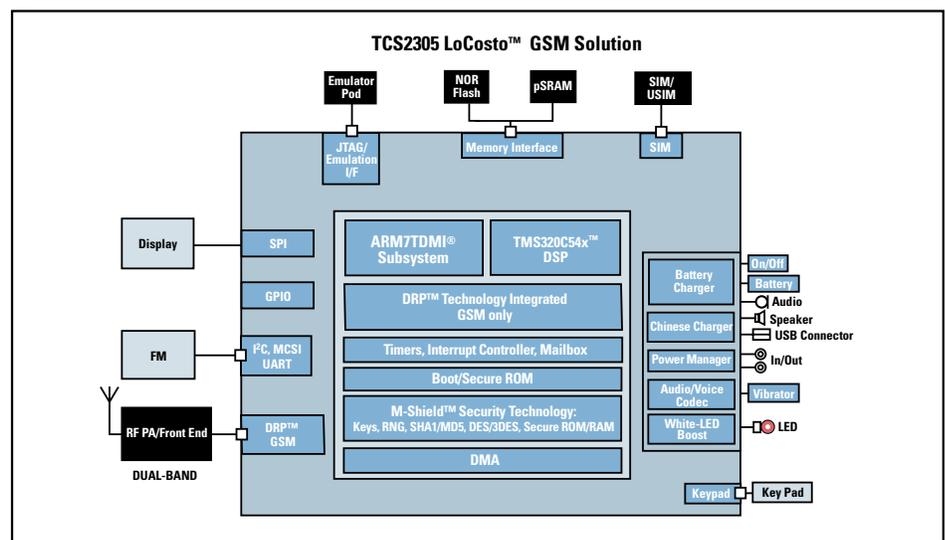
Several system-level factors contribute to the sustainable low-cost structure of second-generation LoCosto solutions, such as the integration of power management, RF section and digital baseband into a single chip, advanced packaging, a significant reduction of component count, and an optimized PCB area.

Those factors allow customers to achieve an approximate 25 percent reduction in a handset's electronic eBOM, as well as a reduction in their space requirements, to design innovative and fashionable form factors.

Other system-level cost-reduction features include the TCS2305's ability to support a full 128 x 160, 65,000-color display with no additional external SRAM memory. Circuitry for power management for phone peripherals like headsets and battery charging is also integrated on-chip, reducing costs further by lowering chip count.

### TCS2305 GSM key features:

- Leverages 65-nm process with advanced DSP and ARM7 technologies
- Integrated RF using TI's DRP™ technology into a single-chip solution
- GSM voice:
  - Dual band: 850/1900 or 900/1800 or 850/1800 or 900/1900
  - Codecs: HR, FR, EFR, AMR
  - Acoustic algorithms for high-quality, full-duplex voice: AEC, ANR, IIR, FIR, AGC, DRC, WMC
- SAIC and TTY support
- Delivers a compelling next-generation user experience in ULC handsets
  - Lowest cost color handset with no additional external SRAM memory (128 x 160, 65,000-color display)
  - Fast CPU processing for smooth user interface processing
  - MIDI ringtone and playback – 32 polyphonics
  - CD-quality (44.1 kHz) MP3 ringtones and polyphonic ringtones
- High-end full-duplex voice quality
- FM connectivity with integrated stereo support
- Record FM for on-the-fly ringtones
- Optimized system design reduces component count and PCB board size relative to the previous generation
  - More than 25 percent reduction in eBOM
  - Approximately 40 percent lower overall component count
  - Smaller modem by as much as 35 percent reduces PCB board size
- Easy charger access and compliant to USB China charger interface
- Lower power consumption for longer talk (30 percent) and standby (60 percent) times
- Hardware security (flash content protection, ME personalization, IMEI protection)/OMTP1.0-compliant
- Innovative handset form factors and larger batteries enabled by smaller PCB requirements
- Enhanced hardware security to protect users, operators and device manufacturers



▲ TCS2305 LoCosto GSM solution

By combining its advanced 65-nanometer (nm) process technology, leading DSP and DRP™ technologies, power management technology, and an ARM core, the next-generation LoCosto single-chip solution (TCS2315) from Texas Instruments sets a new standard for features and a compelling user experience in the entry handset segment. The performance, high-quality functionality and innovative form factors enabled by the TCS2315 solutions are unmatched in the entry phone segment.

The TCS2315 solution has the powerful processing capabilities required for an affordable feature set far richer than previously possible. Enhanced capabilities now possible in affordable feature phones include a high-resolution QVGA 256,000-color display, high-end full-duplex voice quality, near CD-quality MP3 and polyphonic ringers, longer talk time and standby time, stereo FM radio connectivity, as much as 2-megapixel camera support, MP3/AAC playback and mass storage (SD/MMC, micro memory stick, micro-SD) support, USB connectivity and charging, hands-free speakerphone operation, vibration ringer, headset support, and Bluetooth, as well as WLAN and GPS connectivity and other functionality.

The superb full-duplex voice quality of the TCS2315 solution is comparable to more expensive handsets. In fact, the voice loudness on both ends of a call can be improved by some 7 dB – practically twice as loud. Moreover, voice chopping and double talk are reduced dramatically, making handsets based on TCS2315 solution very effective in hands-free applications and noisy environments – a characteristic of densely populated emerging markets.

Feature-rich but low-cost handsets are also afforded the protection of TI's scalable and hardware-based M-Shield™ mobile security technology, which in the TCS2315 solution can safeguard the handset owner's sensitive personal information and defeat attempts to unlock the handset's SIM lock code.

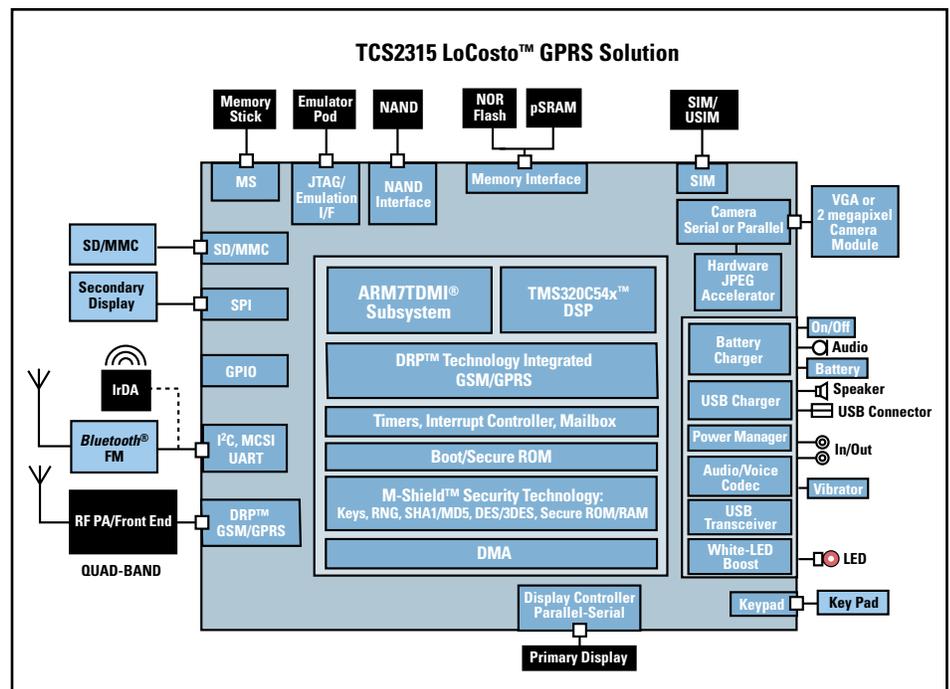
### Sustainable low-cost structure

The TCS2315 LoCosto solution extends the established performance of TI's successful first generation of TCS2310 GPRS LoCosto single-chip wireless handset solution. The software portability from one LoCosto solution generation to the next gives manufacturers and operators the ability to rapidly and cost-

### TCS2315 GPRS key features:

The TCS2315 embeds all of the benefits of the TCS2305 solution plus the following features:

- GPRS Class 12
- Built-in 2-megapixel camera support, with JPEG encode/decode and advanced imaging functions such as rotation, zoom and overlay
- Support for video MPEG-4/H.263 recording and playback in QCIF content
- Large display support (QVGA)
- CD-quality MP3/AAC stereo playback capability
- Integrated USB 2.0 full speed for data transfer between PCs and phones
- Mass storage capability (SD/MMC, micro memory stick, micro-SD) to store MP3 music and ringers, pictures, data and contacts
- Bluetooth connectivity (with multiple profiles including stereo headset (A2DP))



▲ TCS2315 LoCosto GPRS solution

effectively differentiate products and service offerings for both emerging and mature markets, crossing over every language, region and subscriber type.

Innovative user form factors such as ultra-slim, clamshell and candy bar handsets are possible because of the reduced component count and PCB board space requirements brought about by the smaller 65-nm process

node, increased integration and advanced packaging technologies. In addition, a smaller PCB area requirement allows the handset to support larger batteries for a longer battery life, enabling extended standby and talk times.

### For more information

Visit [www.ti.com/tcs2305](http://www.ti.com/tcs2305) or [www.ti.com/tcs2315](http://www.ti.com/tcs2315).

## TCS2305 and TCS2315 Benefits

Market characteristics	User/OEM expectations	TCS2305 and TCS2315 LoCosto™ solution resources	TCS2305 and TCS2315 LoCosto end-user benefits	TCS2305 and TCS2315 LoCosto solution operator benefits
<b>Low incomes</b>	Affordability; ultra-low-cost	65-nm process node; single chip with integrated DRP technology; up to 25% lower eBOM		Increased subscriber base especially in emerging markets; lower handset subsidies
<b>Status aspirations</b>	Appealing form factor	40% fewer components and 35% smaller modem/PCB area; single-package solution	Attractive small and slim form factors, larger batteries	Increase subscriber base with attractive features
	Color display			Increase subscriber base with attractive features
<b>Noisy environments</b>	Voice clarity and loudness	Full duplex voice call; speakerphone support with twice the loudness, important for hands-free operation in noisy environments	Voice clarity and loudness well suited to hands-free operation in noisy conditions	Build subscriber loyalty with improved user experience
<b>Limited power access</b>	Long battery life	60% longer stand-by time; 30% longer talk time; USB charging for universal and easy battery access	Longer interval between battery charges, especially important in rural environments without reliable power sources	Build subscriber loyalty with improved user experience
<b>Handset fraud concerns</b>	Robust handset security	Robust hardware-based security for SIM lock, IMEI, phone software and personal data protection	Strong personal data protection	Increased ROI with handset theft/fraud prevention; reduced subscriber churn; high-value content protection
<b>Retail market</b>	Fast time to market for handset manufacturers	Full software re-use from previous LoCosto device generation, easy development, faster time to market	Familiar software environment facilitates ease-of-experience and includes easy upgrades	Familiar software environment facilitates easy upgrades and simplifies continuing support

## TCS2305 Ultra low-cost market benefits

Market characteristics	User/OEM expectations	TCS2305 LoCosto™ solution resources	TCS2305 LoCosto end-user benefits	TCS2305 LoCosto solution operator benefits
<b>Low incomes</b>	Affordability; ultra-low-cost		Affordable handsets especially in emerging markets; removes barrier to purchase	
<b>Status aspirations</b>	Color display	Color displays (Up to 128 x 160, 65,000) colors with enhanced MMI and animation capability; no additional external SRAM, enabling lower eBOM	Color ULC handset for enhanced user experience and social status	
<b>Personalization</b>	Ringtones and customization	Integrated MIDI32, CD-quality (44.1 kHz) MP3, ability to record (ringers on-the-fly)	Improved user experience and personalization FM	Increase average revenue per user (ARPU)

## TCS2315 Advanced multimedia feature phone benefits

Market characteristics	User/OEM expectations	TCS2315 LoCosto™ solution resources	TCS2315 LoCosto end-user benefits	TCS2315 LoCosto solution operator benefits
<b>Status aspirations</b>	Camera and imaging	Integrated and up to 2-megapixel camera support; video QCIF content	Ability to take spontaneous high-quality pictures	Increase average revenue per user via data (MMS) traffic
<b>Enhanced user experience</b>	Superior MMI	Fast ARM7 @ 125 MHz and higher on-chip SRAM allows personalization (additional graphics etc.) and smoother MMI processing	Compelling experience and personalization	Build subscriber loyalty with improved experience
<b>Desire for infotainment</b>	Music and news	FM connectivity with integrated stereo, CD-quality MP3 stereo playback; USB connectivity and mass storage (SD/MMC)	Music and news anytime, anywhere, attractive for emerging markets	Build subscriber loyalty with improved user experience and increased ARPU

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