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Telit GSM/GPRS-UMTS Technology

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Making machines talk.[®]

Who is Telit ?

Main Facts.



Publicly Listed at London Stock Exchange:	LSE:TCM.L "AIM"		
Core business:	Machine to Machine communications		
Launched:	2003		
Global Corporate Headquarters:	worldwide		
Regional Headquarters:	Trieste Tel Aviv Raleigh São Paulo Seoul	Italy Israel USA Brazil Korea	EMEA NORTH America LATIN America APAC
Employees:	367		
2009 Revenue:	€63.8 million	market expectations* for 2010 - €78.7 million *Astaire Securities	

Telit develops, manufactures and markets

GSM/GPRS | UMTS/WEDGE/HSDPA | CDMA | WiFi | ZigBee
Short Range RF | Wireless Mbus | GPS

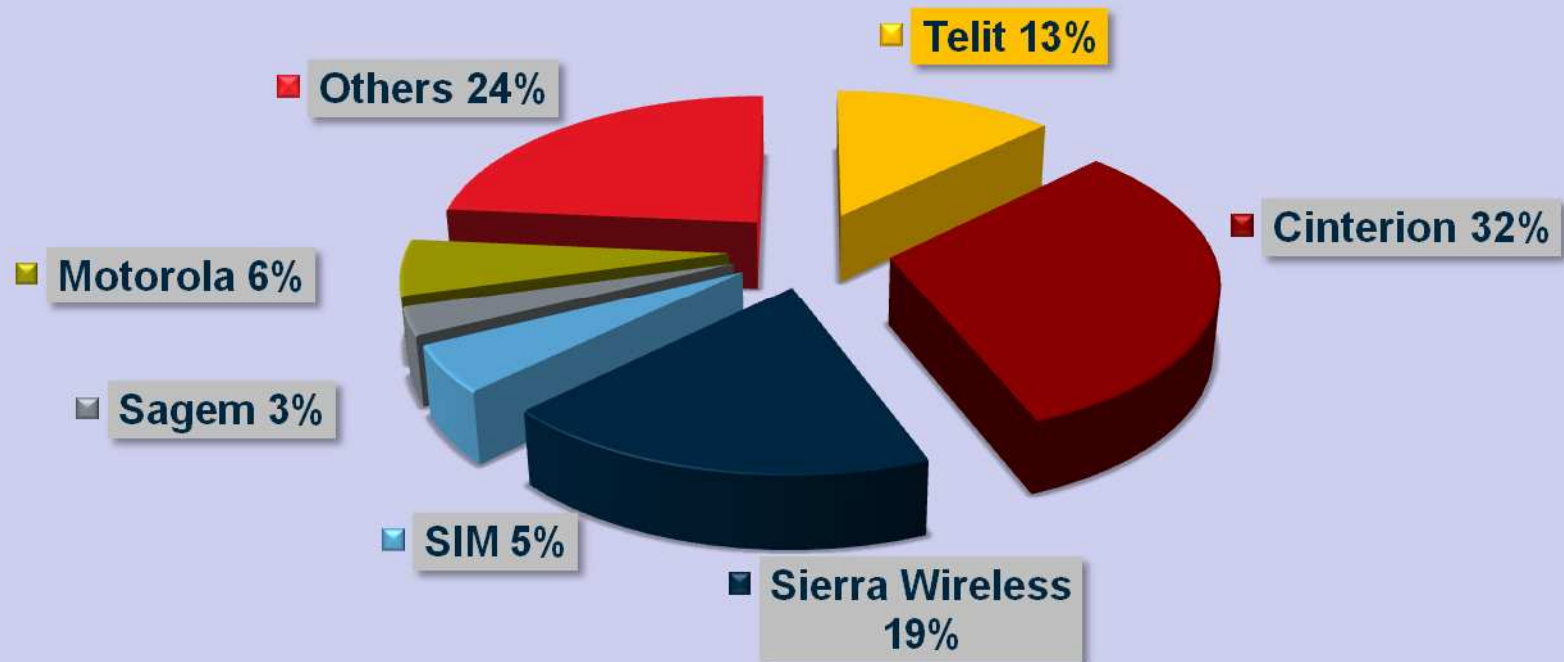
m2m modules & solutions for machine-to-machine communications.

Estimated Market Shares by Revenue worldwide



Source: ABI report - The Global Wireless M2M Market

Total Available Market (TAM) 2009: € 500m

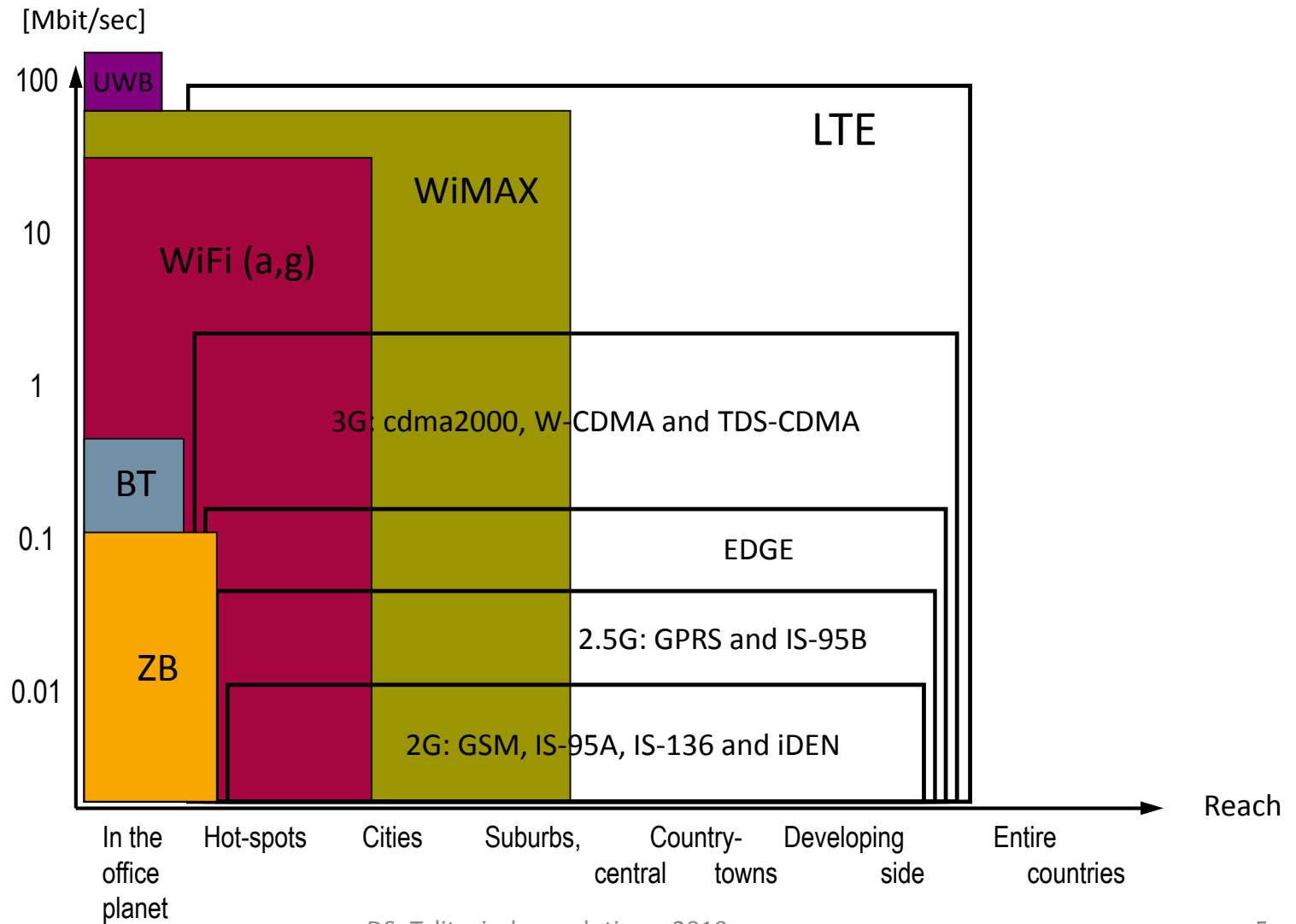


The global Market shrank approx. 23% in 2009, Telit grew by 10.7% in 2009!

Telit increased its Market Share approx. 40% from 9% to 13% in 2009!

CellularTechnologies

Wireless technology map



General Packet Radio Service / Enhanced Data rates for Global Evolution

GSM™ is a circuit-switched network; ideal for the delivery of voice but with limitations for sending data. The standard for GSM was designed to evolve. In 2000 the introduction of General Packet Radio Service (GPRS) added packet-switched functionality and 'kick started' the delivery of the Internet on mobile handsets.

GPRS adds packet-switched functionality to GSM networks

Based on specifications in Release 97, GPRS typically reached speeds of 40Kbps in the downlink and 14Kbps in the uplink by aggregating GSM time slots into one bearer. Enhancements in Releases R'98 and R'99 meant that GPRS could theoretically reach downlink speeds of up to 171Kbps.

The next advance in GSM radio access technology was EDGE (Enhanced Data rates for Global Evolution) or Enhanced GPRS.

With a new modulation technique yielding a three-fold increase in bit rate (8PSK replacing GMSK) and new channel coding for spectral efficiency, EDGE was successfully introduced without disrupting the frequency re-use plans of existing GSM deployments.

From 3GPP.org

Universal Mobile Telecommunications System

UMTS - sometimes referred to as 3GSM to highlight the evolution of 3G from its GSM foundations - is an umbrella term for the third generation radio technologies developed within 3GPP.

The radio access specifications provide for Frequency Division Duplex (FDD) and Time Division Duplex (TDD) variants, and several chip rates are provided for in the TDD option, allowing UTRA technology to operate in a wide range of bands and co-exist with other radio access technologies.

UMTS includes the original W-CDMA scheme using paired or unpaired 5 MHz wide channels in globally agreed bandwidth around 2 GHz, though subsequently, further bandwidth has been allocated by the ITU on a regional basis.

From 3GPP.org

High-Speed Packet Access

Parity between DSL-type broadband speeds and mobile broadband moved a step closer with HSDPA delivering up to 14Mbps in the downlink and HSUPA returning 5.8Mbps in the uplink.

Specifications for HSPA are included in Release 5 (Downlink) and Release 6 (Uplink) of 3GPP specifications.

HSPA improvements in UMTS spectrum efficiency are achieved through:

- New modulation (16QAM) techniques
- Reduced radio frame lengths
- New functionalities within radio networks (including re-transmissions between NodeB and the Radio Network Controller)

Consequently, throughput is increased and latency is reduced (down to 100ms and 50ms for HSDPA and HSUPA respectively).

By the end of 2007, there were 166 commercial HSDPA networks in 75 countries with a further 38 networks committed to deployment.

The first commercial launch of HSUPA was in early 2007 and 24 networks had launched by the end of the year. According to the Global mobile Suppliers Association (GSA); over 45 networks have launched, are testing or plan to deploy HSUPA

From 3GPP.org

Wideband Code Division Multiple Access

W-CDMA – the radio technology of UMTS - is a part of the ITU IMT-2000 family of 3G Standards.

Both Frequency Division Duplex (FDD) and Time Division Duplex (TDD) variants are supported.

W-CDMA is a spread-spectrum modulation technique; one which uses channels whose bandwidth is much greater than that of the data to be transferred. Instead of each connection being granted a dedicated frequency band just wide enough to accommodate its envisaged maximum data rate, W-CDMA channels share a much larger band.

The modulation technique encodes each channel in such a way that a decoder, knowing the code, can pick out the wanted signal from other signals using the same band, which simply appear as so much noise.

UMTS uses a core network derived from that of GSM, ensuring backward compatibility of services and allowing seamless handover between GSM access technology and W CDMA. At the end of 2007, W-CDMA represented over 70% of commercial 3G networks, with over 190 networks in 83 countries, and more than 160 million W-CDMA subscriptions.

75 million W-CDMA subscriptions were added between September 2006 and 2007 and throughout 2007 W-CDMA experienced average growth of 6.6 million subscriptions per month. W-CDMA handset sales now outstrip 2G sales in Europe as consumers seek high-end phones.

From 3GPP.org

CDMA2000, auch **IS-2000**, bezeichnet einen [Mobilfunkstandard](#) der dritten Generation ([3G](#)) welcher primär in Amerika und Teilen von Asien und Afrika für den Betrieb von [Mobilfunknetzen](#) Anwendung findet. CDMA2000 verwendet zur [Datenübertragung](#), wie auch der in Europa verwendete 3G-Mobilfunkstandard [Universal Mobile Telecommunications System](#) (UMTS) ein [Codemultiplexverfahren](#) (engl. *Code Division Multiple Access*, CDMA) wovon sich die Bezeichnung des Standards ableitet. CDMA2000 ist im Rahmen des [IMT-2000](#) (engl. *International Mobile Telecommunications-2000*) der [ITU-R](#) spezifiziert und die Bezeichnung CDMA2000 ist eine registrierte Markenbezeichnung der [Telecommunications Industry Association](#) (TIA-USA) in den USA.

Umgangssprachlich wird der Mobilfunkstandard CDMA2000 fälschlicherweise mit dem Verfahren des Codemultiplex (CDMA) gleich gesetzt. Der UMTS-Standard basiert ebenfalls auf einem Codemultiplexverfahren, ist allerdings zu dem Standard CDMA2000 nicht kompatibel.

From 3GPP.org

Peak data rate

Instantaneous downlink peak data rate of 100 Mb/s within a 20 MHz downlink spectrum allocation (5 bps/Hz)
Instantaneous uplink peak data rate of 50 Mb/s (2.5 bps/Hz) within a 20MHz uplink spectrum allocation)

Control-plane capacity

At least 200 users per cell should be supported in the active state for spectrum allocations up to 5 MHz

User-plane latency

Less than 5 ms in unload condition (single user with single data stream) for small IP packet

User throughput

Downlink: average user throughput per MHz, 3 to 4 times Release 6 HSDPA
Uplink: average user throughput per

Spectrum efficiency

Downlink: In a loaded network, target for spectrum efficiency (bits/sec/Hz/site), 3 to 4 times Release 6 HSDPA

Uplink: In a loaded network, target for spectrum efficiency (bits/sec/Hz/site), 2 to 3 times Release 6 Enhanced Uplink

Coverage

Throughput, spectrum efficiency and mobility targets above should be met for 5 km cells, and with a slight degradation for 30 km cells. Cells range up to 100 km should not be precluded.

From 3GPP.org

Migration to 3G

2G to 3G transition in Europe – Telit's View

- CSD Cellular Dial up services will be switched off soon
- SMS will be supported on the new networks
 - There is some discussion about changing this to SMS-over packet so don't design with a non GPRS module !
- GPRS may be turned off in some countries
- DACH networks will probably not carry out their threat to turn off GPRS soon
- Networks make no promises.
- O2 has renewed its 2G license for another 10 years
- GPRS data connections are increasing so the networks are reluctant to switch off and are expected now to continue
- Climate may change so keep in contact with the Networks
- Very low tariffs on 2G now for volume Data users For the moment GPRS looks safe in DACH

3G in the USA

There is a strict Certification Scheme that is in force in the USA
– it comprises of two main parts:-

1. PTCRB - PCS Type Certification Review Board
 - a. A rigorous test of the application and its cellular signalling performance taking 3-6 months. Budget ~ USD40K. This can be conducted outside of the USA.
 2. AT&T / Cingular Testing
 - a. Extensive test of the Terminal's performance on the AT&T network using all of the many different infrastructures (switches). There is no charge for this.
 3. Telit modules are approved for use on the USA networks*
 4. Telit's USA office provides in depth assistance to Telit customers to arrange USA certification
- * UC864G certification due Q2-2009

Migration to 3G using Telit's products is easy!

Using GC864 – Just plug in the UC864 for UMTS or CC864 for CDMA!

Using GE864 – If the GC864 connector is tracked in at the design stage, it permits the UC864 to be plugged in with no changes!

In this way, a low cost 2G product can be built to accommodate a 3G upgrade when required at little or no extra cost.

An application note explains what to do!

TELIT Global Formfactor Concept



Telit has a Unique Offering that is not available anywhere else:

Developed and maintained by and under total control of the company's R&D team

Complete technology spectrum for global deployment:

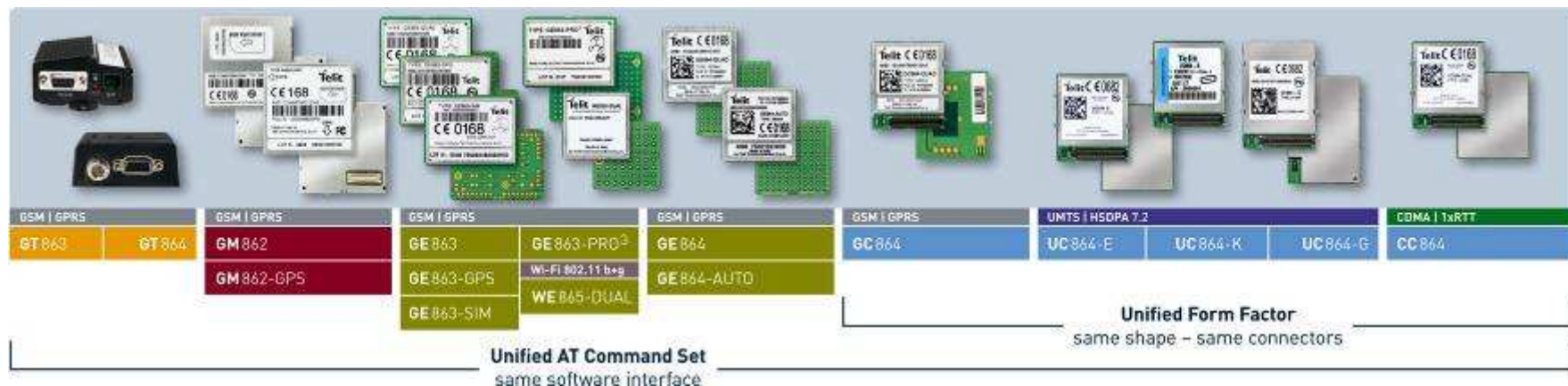
Design your product now to be '3G-Ready'

Form factor & family concept for:

low vol.
low/mid/high

low/mid vol.

mid/high vol.



Cellular Products

UC864-E/K/G.



Designed for:

- Industrial & consumer applications
- Low to medium to high volume

Main characteristics:

- UMS/HSDPA 850/1900/2100 MHz, 7.2 Mbps (**G**)
- UMS/HSDPA 2100 MHz, 7.2 Mbps (**E, K**)
- Quad Band GSM, GPRS/EDGE, class 12 (**E/G**)
- Small dimensions: 30 x 36,2 x 4.8 mm – (**E/K**)
- Small dimensions: 30 x 45 x 4.8 mm – (**G**)

Approvals:

- CE, GCF (**E,G**)
- FCC, PTCRB, IC (**G**)
- MIC, SKT, KTF Interoperability tests, UMS specifications adjusted to SKT/KTF (**K**)
- Extended temperature range
 - 20°C to +55°C (Operational)
 - 30°C to +80°C (Extended operating mode)
 - 40°C to +85°C (Storage temperature)

- Telit unified AT-command set
- Telit unified form-factor
- PREMIUM FOTA MANAGEMENT



Cellular Products

UC864-E-AUTO.



- Ultra Compact
- Telit Unified AT Command Set
- Telit Unified Form Factor
- Designed for Automotive Applications
- Multi Band
- Single Band UMS | HSDPA 7.2
- Quad Band Edge
- Quad Band GPRS
- RoHS Compliant
- 80 Pin Connector
- Landing Pads for B2B Antenna Connector
- Automotive Temperature Range
- Extended RF Sensitivity
- Embedded TCP/IP Stack

TELIT INFINITA SERVICES

Premium FOTA Management

Designed for:

- Automotive & Industrial applications
- Medium to high volume

Main characteristics:

- UMS/HSDPA 2100 MHz, 7.2 Mbps
- Quad Band GSM, GPRS/EDGE, class 12
- Small dimensions: 30 x 36.2 x 4.8 mm

Approvals:

- CE, GCF
- Reference ambient temperature range
 - 10°C to +55°C (Normal operating range)
 - 20°C to +70°C (Extended operating range)
 - 30°C to +85°C (Extreme operating range)
 - 40°C to +85°C (Storage)

- **Telit unified AT-command set with Automotive extensions**

- Temperature reporting and control
- Remote SIM Access Profile support (rSAP)

- **Telit unified form-factor with Automotive adaptations**

- Thru-hole vertical mounting tabs
- Board-to-board RF mating support with landing pad

- **Automotive compliance**

- Environmentally tested and PPAP
- TS-16949 compliant manufacturing

- **PREMIUM FOTA MANAGEMENT**



What is WEDGE?

- WEDGE is a Connection Type that uses part of the 3G network but does not include the high speed protocols like HSDPA that are possible on the network
- It is a more simple implementation of the 3G standard that allows a lower cost module to be produced

Cellular Products

UC864-WD & UC864-WDU.



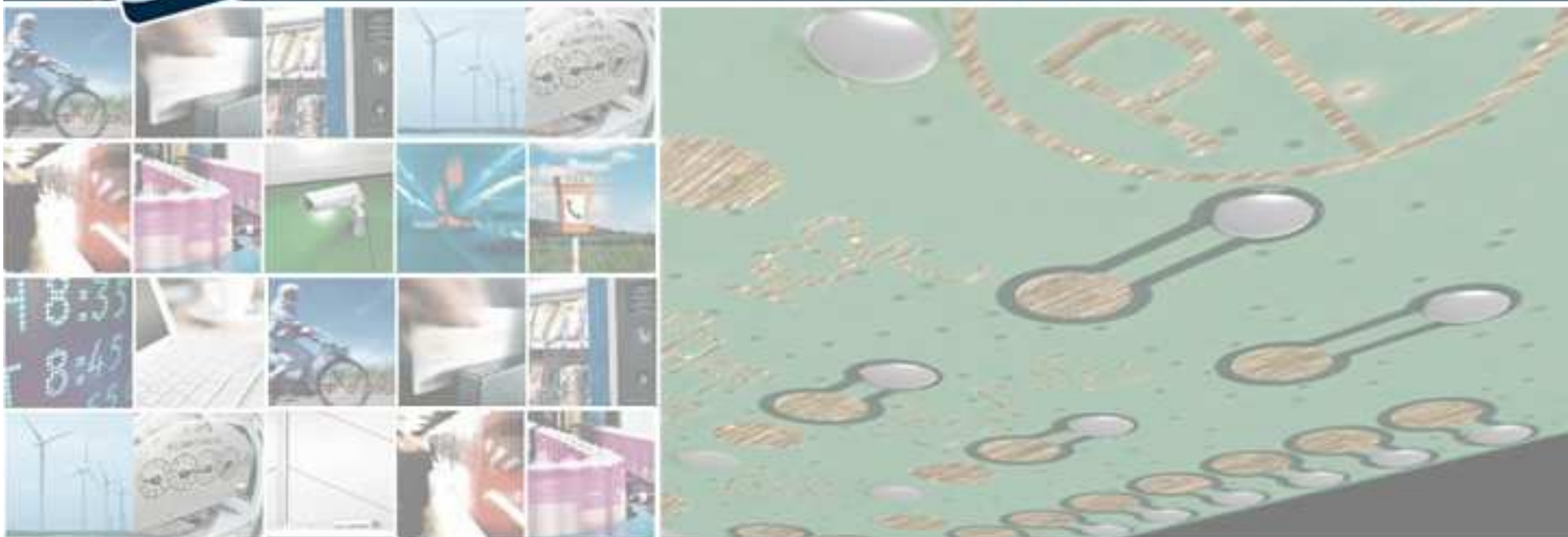
Designed for:

- Applications requiring basic UMTS data rate (384kbps)
- The new UMTS 900MHz band

Main characteristics:

- Small dimensions: 30 x 45 x 4.8 mm
- Weight: 12.8 grams
- 80-pin Molex connector, USB
- PCM, UART, GPIOs, D/A and A/D converters
- **WD CE, GCF**
- **WDU FCC, IC, PTCRB**
- Supply voltage range: 3.4 – 4.2 V DC (3.8 V DC recommended)
- **WD** Dual band GSM 900/1800
- **WD** Dual band UMTS 900/2100 (UL/DL 384kbps)
- **WDU** Dual band GSM 850/1900
- **WDU** Dual band UMTS 850/1900 (UL/DL 384kbps)
- Extended temperature range
 - 30°C to +80°C (operational) (**WD, WDU**)
 - 40°C to +90°C (Storage temperature) (**WD, WDU**)
- **Telit unified AT-command set**
- **Telit unified form-factor**
- **PREMIUM FOTA MANAGEMENT**





Author: Telit wireless solutions, October
2008