EM MICROELECTRONIC

A COMPANY OF THE **SWATCH GROUP**

em | echo
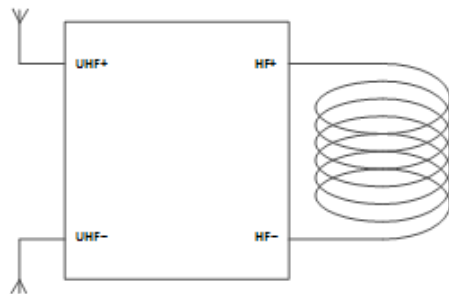**RAINFC Dual Frequency**

DUAL Frequency
RAINFC Transponder IC

General Description

em|echo corresponds to the latest generation of EM Microelectronic Radio-Frequency IDentification (RFID) devices, combining Near-Field Communication (NFC) and RAIN RFID worlds in a single die. The integrated circuit (IC) brings innovative features to both interface and combines RAIN RFID technology used for long range application purposes and NFC used to exchange data in a proximity range. Target applications and market segments include retail, supply-chain management, product authenticity and customer engagement as well as NFC smart posters.

A tag or label based on the em|echo provides multiple benefits and usages via the RAIN RFID communication interface like stock inventory, product returns and data privacy. The same single-chip tag or label also enables new marketing services like product information or loyalty programs using an NFC enabled smartphone. An NFC smart counter incrementing its value each time the NFC message has been read by the end-user can be read-out through the RAIN RFID reader infrastructure for in-store analytics purposes and store layout optimization.

em|echo is a dual frequency device supporting ISO/IEC 14443 Type A, NFC Forum™ Type 2 specifications on one side and RAIN RFID protocols ISO/IEC 18000-63 and EPC™ Generation-2 Version 2 (Gen2 V2), including extended privacy features, on the other. Each IC is manufactured with a 96-bit unalterable unique identifier (UID) to ensure full traceability, the same UID number being used by both RF protocols. em|echo offers common non-volatile memory accessible from either RF air interface and supports BlockWrite command, enabling fast encoding, as well as the Untraceable command to hide portions of memory of the tag or label to guarantee end-user privacy.

Typical Operating Application

RAIN RFID is a trademark of the RAIN RFID Alliance.
EPC is a trademark of EPCglobal Inc.

Features

l Dual-frequency 1-step inlay manufacturing
l Shared memory and shared unique ID
l Minimum 100k write cycles endurance
l Minimum 10 years data retention
l Extended temperature range (-40°C to +85°C)
l Sawn wafers, 6-mils thickness, gold bumps

l **NFC Interface**
· ISO/IEC 14443A-3 compliant tag
· NFC Forum™ Type 2 compatible
· Enables NDEF data structure configurations
· Communication baud rates at 106kbps
· Anti-tearing support for NFC capability container (CC) and Static/Dynamic lock bytes
· ACCESS counter increased at first reading
· Optional limit of unsuccessful LOGINs
· Optional security timeout for unsuccessful LOGINs
· Optional control of EPC privacy features
· UHF power detection
· 50pF NFC on-chip resonant capacitor

l **EPC Interface**
· ISO/IEC 18000-63 compliant
· EPC™ Gen2 V2 certified
  · Alteration EAS certified
  · TAG alteration (Core) certified
· 32-bit Access and Kill passwords
· Read sensitivity up to -18dBm with a dipole antenna
· Write sensitivity up to -13dBm with a dipole antenna
· Fast writing using the BlockWrite command
· BlockPermalock of USER memory
· NFC field detection
· NFC ACCESS counter

l **Memory**
· 32-bit Shared unique ID included in:
  · 7 bytes UID (NFC)
  · 96-bit TID (EPC)
· 2080-bit or 1984-bit User memory
  · 1920 bit contiguous user data from NFC
  · 160 or 64 bit USER contiguous data from EPC
· 128-bit or 224-bit UII/EPC encodings
· 1 step encoding possible from NFC or EPC interface.

Applications

l Product Identification
l Customer engagement, coupons, loyalty programs
l Inventory and supply chain management
l Asset control
l Single tap quick re-ordering