DRFM – Digital Radio Frequency Memory

Electronic Self-Defence against Hostile Radar Signals

HENSOLDT
Detect and Protect

DRFM

Digital Radio Frequency Memory

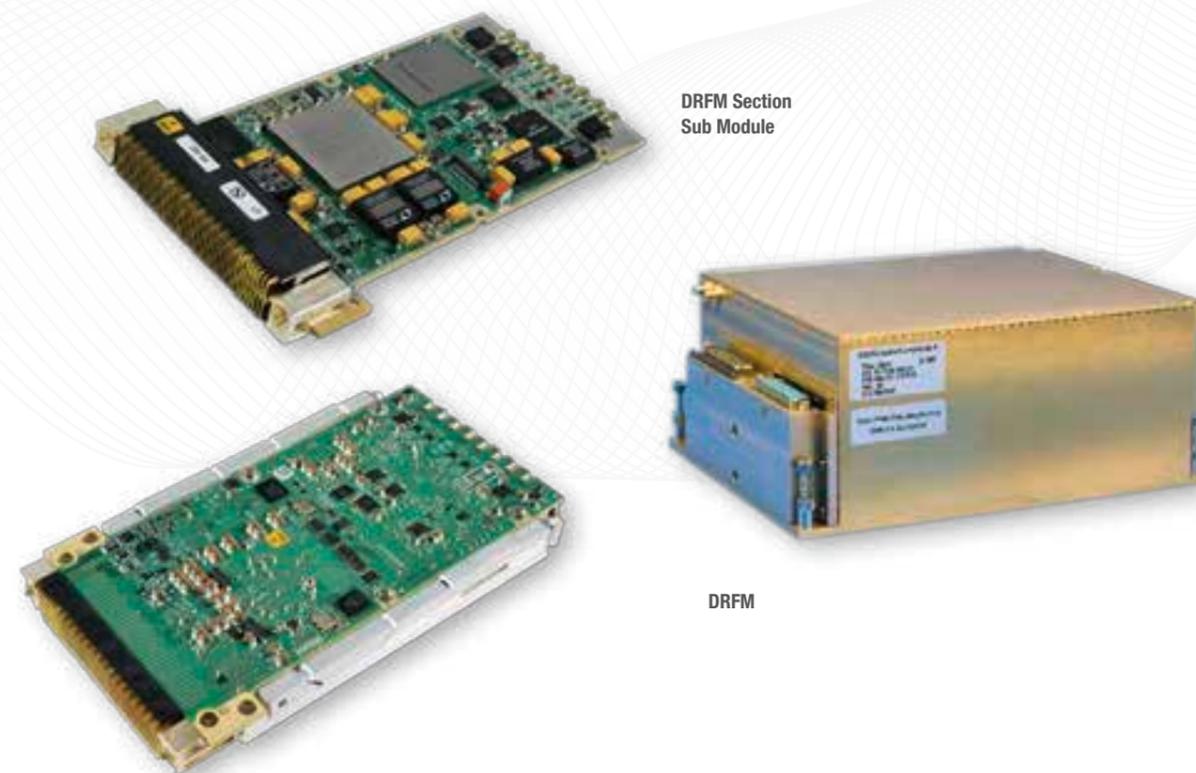DRFM Section
Sub Module

DRFM

Manipulating the Threat

Military airborne, shipborne, and ground based radar systems are designed around their ability to function in a jammed environment. Modern radars, e.g. pulsed Doppler radars, have a fixed phase relationship between the transmitted and received RF signals because they are operating on a basis of coherent processing.

DRFM Jamming Technology
Digital Radio Frequency Memories (DRFM) have become the core of any electronic jamming system. The DRFM is a device with storage methods in which the radar signal itself is stored, modulated with jamming signals and then retransmitted to the threat.

The DRFM capability is essential for jamming pulsed Doppler radars. Most jamming techniques require precise signal measurement and RF signal storage. The DRFM stores complete radar pulses together with their modulations, e.g. intrapulse modulation; it also stores RF pulses of different pulse repetition intervals (PRIs) without loosing coherence and can instantaneously follow frequency agile radars.

DRFM are operating by converting the received analogue RF signal into a digital signal for further processing. The digital output signal is then converted back again into the analogue RF signal within its original frequency range. A common clock generator (Clock) and local oscillator generator (LO) ensure that the retransmitted signal and the received RF input signal remain coherent.
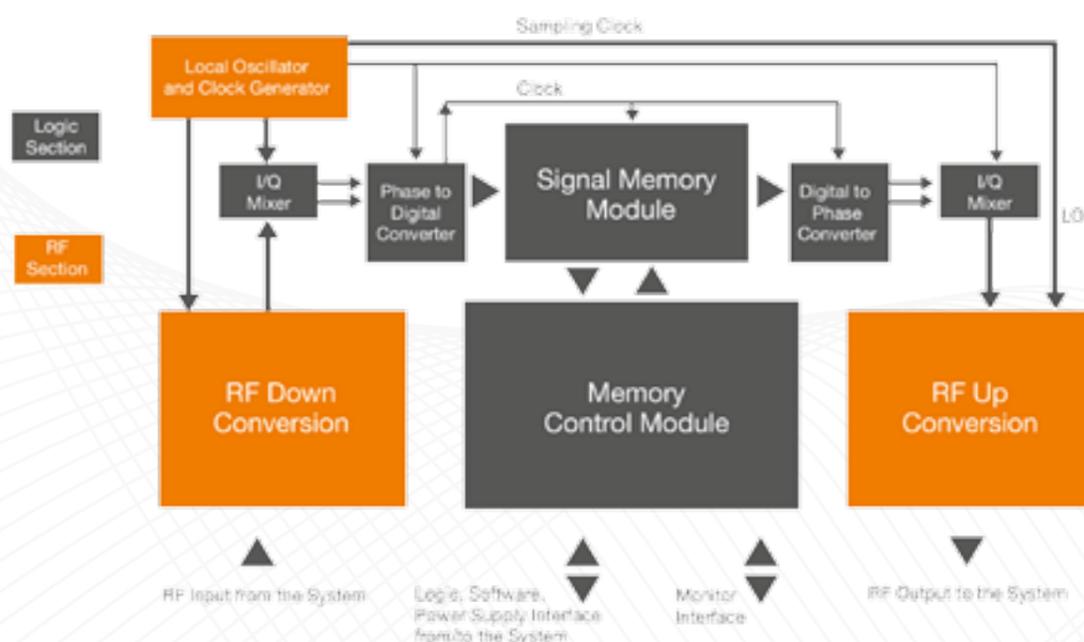
The HENSOLDT DRFM
HENSOLDT started the development of the first DRFM in 1990 as a key element for EW systems such as the Tornado Self-Protection Jammer (TSPJ) for the German Air Force. In 1998 the second generation of DRFM was developed for various airborne and naval applications. Currently, already the third generation is in production.

The HENSOLDT DRFM combines unprecedented instantaneous bandwidth with very high frequency accuracy and multi-threat capability. It has considerable growth potential due to its software programmability.

An ECM techniques generator is embedded in the Memory Control Module and can be programmed via the Logic/Software interface.

Additionally, the HENSOLDT DRFM provides extremely fast digital signal detection. Due to the programmability it can be used as:

- DRFM function with coherent/ non-coherent ECM techniques
- Receiver with tracker and signal analysis
- Transponder with techniques generator

Standard ECM Functions
- Coherent range and velocity Pull-Off/In
- Velocity gate Pull-Off/In
- Fixed false Doppler and range targets
- Random false Doppler and range targets
- Phase modulation
- Multi-frequency false targets
- Narrow and wideband coherent noise
- Narrow and wideband non-coherent noise
- Swept spot noise
- Multi-frequency noise
- CW jamming
- Frequency offset jamming, coherent and non-coherent
- Inverse amplitude techniques (with amplitude quantisation)
- Target scintillation
- Due to the programmability, other „custom-made" ECM functions can be installed. A combination of ECM techniques is possible.

Characteristics and Performances
- Extremely wide band, single board DRFM
- Freely configurable integrated techniques generator
- Multi-threat capability
- Coherent and non-coherent ECM techniques
- Extremely fast digital signal detection
- Instantaneous bandwidth: up to 2,3 GHz
- Quantisation: up to 10 Bit amplitude
- Frequency accuracy: extremely accurate
- Volume: 3 litres
- Power consumption: 50 Watt

Basic Structure of the third DRFM generation