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RF power solutions for medical applications

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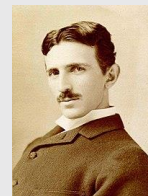
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RF power in medical application

- RF Power has been used in medical applications for many years*
- The main application of RF Power is Magnetic Resonance Imaging, but it can be used also for Cosmetic Therapy, Ablation, and Diathermy



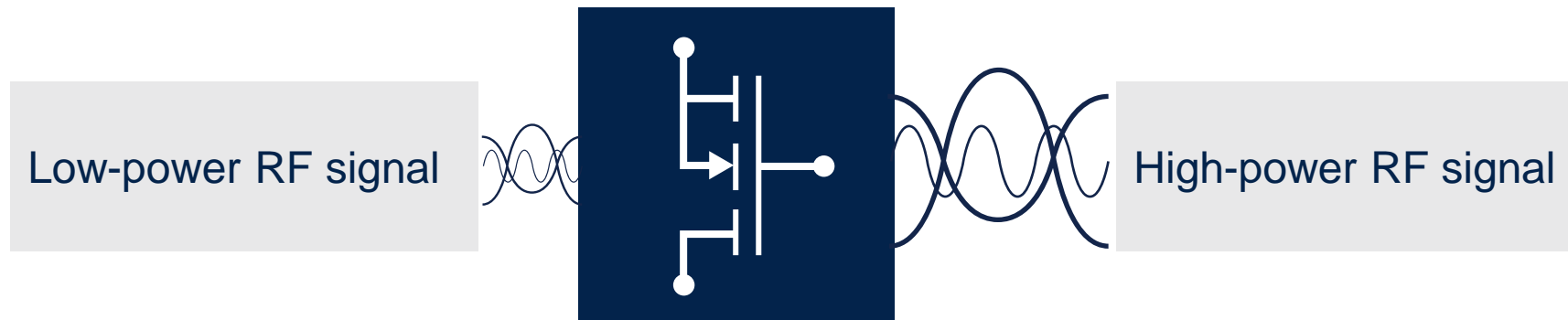
- ST offers a broad portfolio of RF DMOS (double-diffused metal oxide semiconductor) and LDMOS (lateral double-diffused metal oxide semiconductor) transistors operating from a supply voltage ranging from 50 up to 100 V with high reliability (1 million power cycles).



*Back in the nineteen century, Nikola Tesla was the first to study the effect of high frequency current in human body. The first physiological reaction studied was the warmness of the impacted tissues and its links with the RF frequency

What is RF power?

A RF power amplifier converts a low-power radio-frequency signal into a higher power signal.



Design goals:

Gain, power output, bandwidth, power efficiency, linearity, input and output impedance matching, and heat dissipation.

LDMOS (laterally-diffused metal-oxide semiconductor) is a planar double-diffused MOSFET used in RF power amplifiers



ST RF power technology family

Available technologies

LDMOS

- 7 V to 50 V
- 1 W to 2 kW
- Up to 4.2 GHz



DMOS

- 50 V to 100 V
- Up to 250 MHz



In development 2021

LDMOS

Enlarging LDMOS portfolio

Applications

Plasma generator
Laser driver
Magnetic Resonance Imaging
Particle accelerators

Wideband communication
Wireless infrastructure
Automotive applications
Portable & Mobile radios
Avionics & Radar

Plasma generator
Laser driver
Magnetic Resonance Imaging
Induction & dielectric heating

Induction & dielectric heating

Features

- Lower current consumption
- Low thermal resistance
- Optimized packaging

Benefits

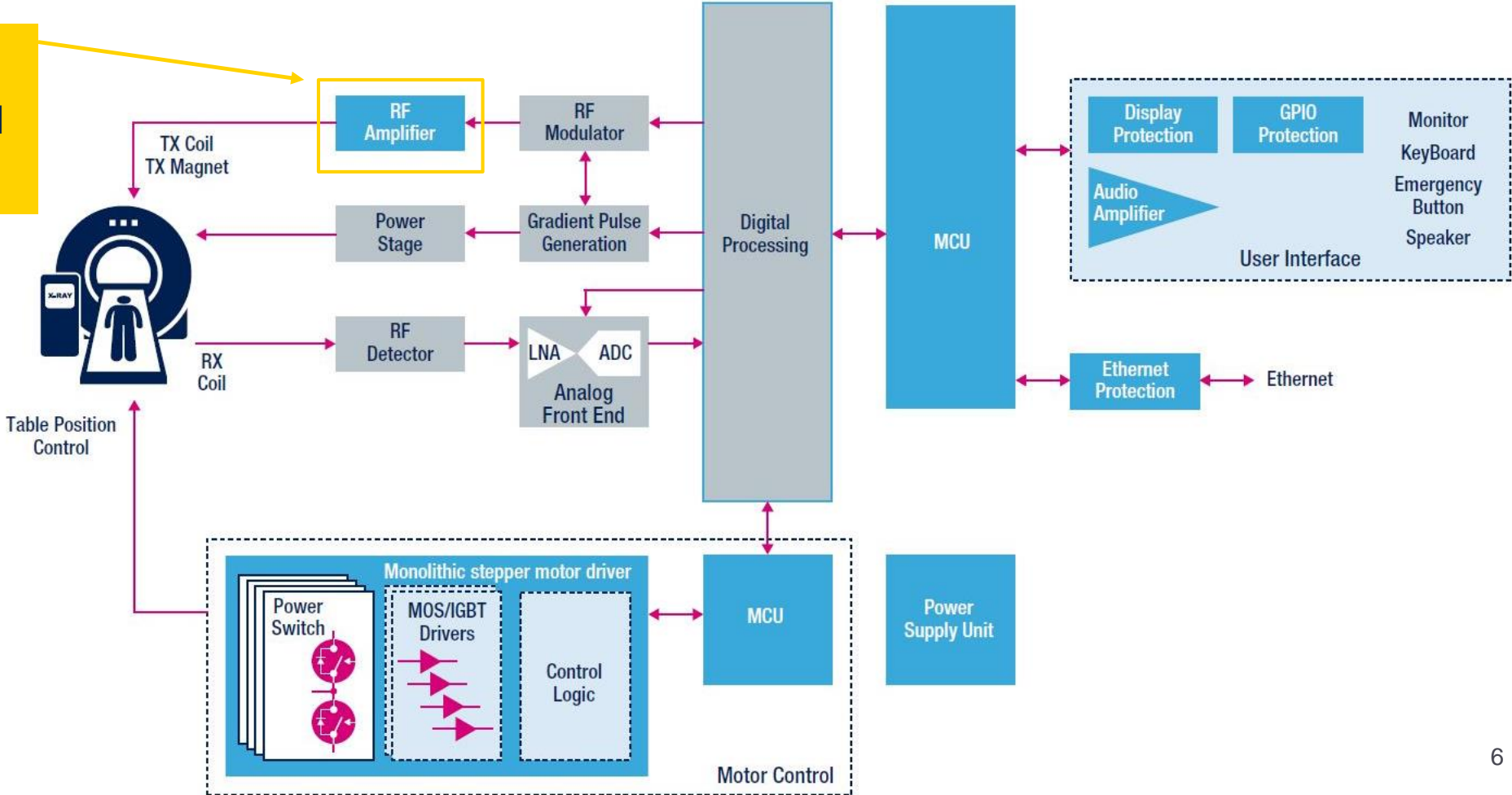
- High efficiency
- Higher reliability
- Cost effective solution

LDMOS in MRI

MRI scanners rely on detecting a RF signal emitted by excited hydrogen atoms in the body (water molecules), using energy from an RF magnetic field applied at the appropriate resonance frequency.

The LDMOS in the RF amplifier provides the high-power RF signal to the system

| Magnetic field | Frequency |
|----------------|------------------|
| 1.5 Tesla | Typ. 61-64 MHz |
| 3 Tesla | Typ. 123-128 MHz |
| 7 Tesla | Up to 433 MHz |

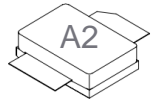




LDMOS product package portfolio

RFXL family

2 leads flangeless



A2

Applications

Wideband radio
Military communications
Industrial
Scientific and medical
RF energy
Broadcast
Avionics and radar
Telecom and sat com



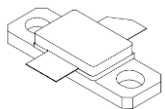
B2



C2

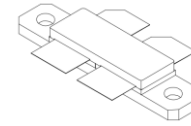


E2



GXB

4 leads bolt down



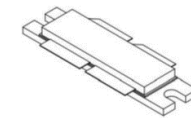
LBB

Applications

Industrial
Scientific and medical
Broadcast
Wideband radio
Military comm
Avionics and radar



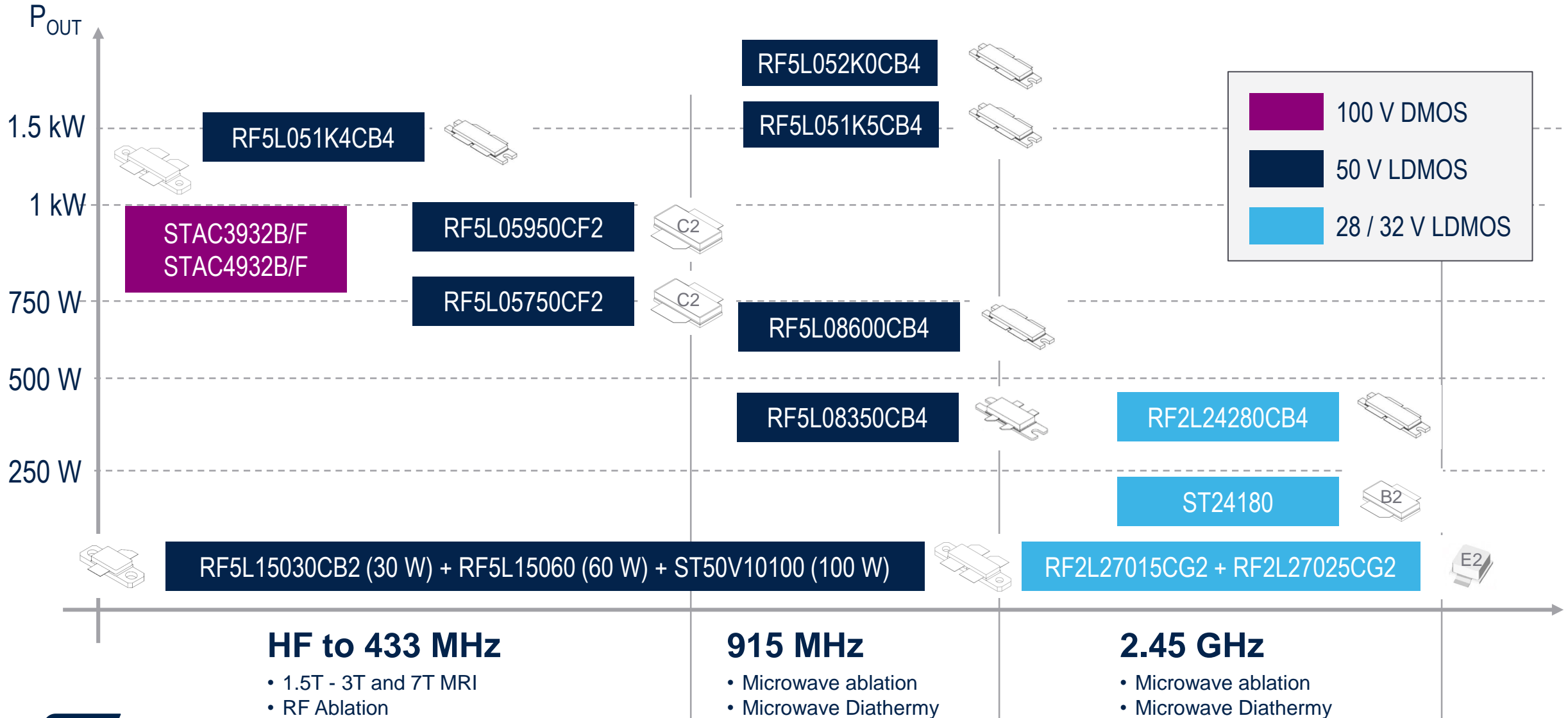
B4E



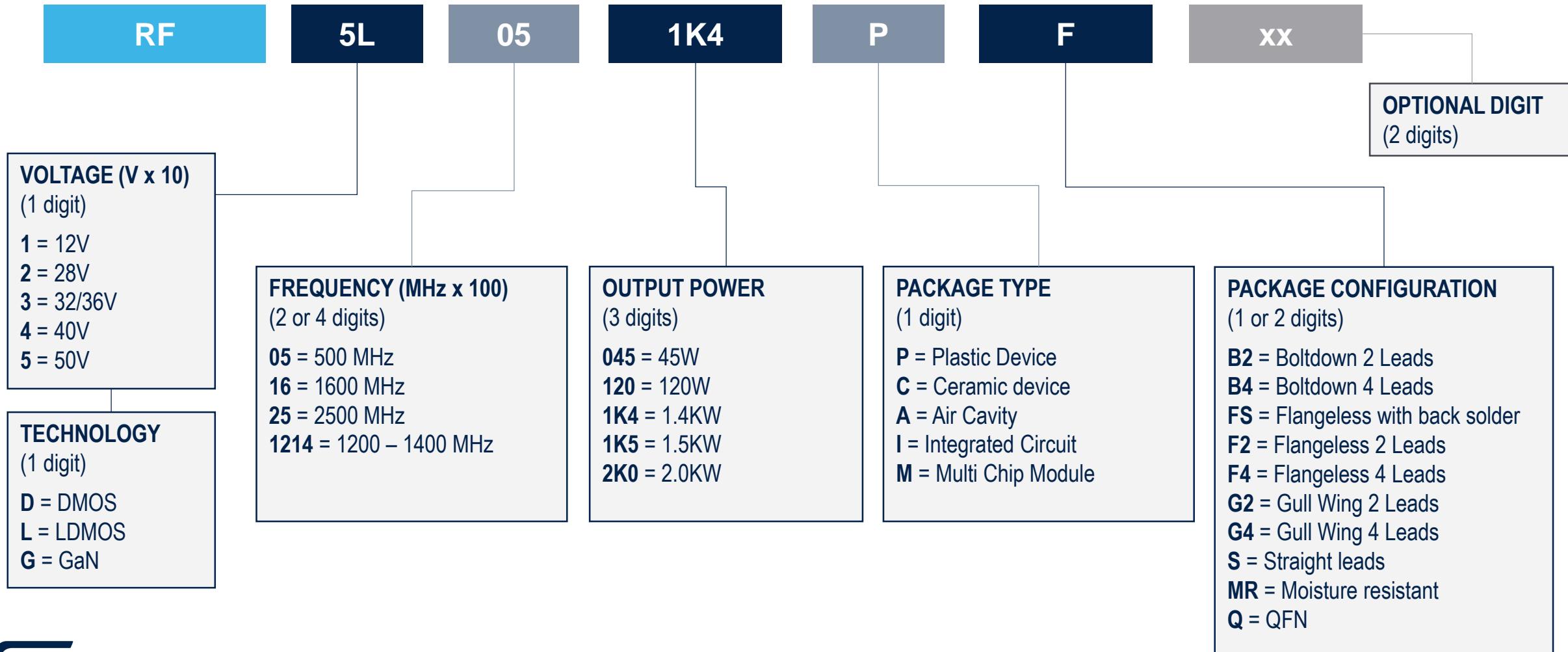
D4E*

* Engineering sample available

Products portfolio for medical



RF new products nomenclature



Thank you

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