

## FERRITE BASED RF SWITCHES

Honeywell, a major international supplier of high technology microwave and electronic equipment to the space industry, designs and manufactures ultra reliable RF switching solutions. Ferrite-based switches can be used to implement numerous elements of RF front-end subsystems on Earth observation and telecommunications satellites, including duplexers, switch matrices, receiver protection, beam hopping, beam forming, and redundancy switching.

### Key Features

- Very high number of switching actions
- High peak and average RF power handling capability
- Ultra high reliability
- Extensive frequency range (C-band to Ka-band)
- Very low insertion loss
- Very fast switching rate and switching time
- Multiple switches in a single monoblock housing to reduce overall mass
- Compatible with all standard satellite TC/TM and DC power interfaces
- ITAR free

### Technical Description

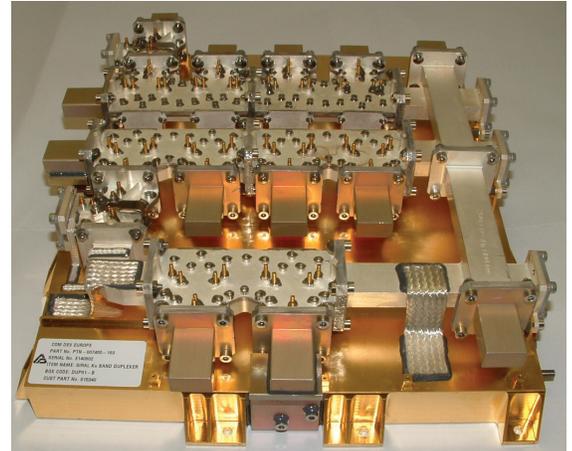
The basic RF switch consists of a 3-port waveguide module, with a ferrite resonator located at the centre mounted on dielectric spacers. The RF wave enters through port 1 and is switched to port 2, with port 3 isolated. Switching is achieved by driving a current pulse through a single coil or multi-coil wire wrapped around the ferrite resonator, which induces a saturating magnetic flux inside it. Switching the RF wave to port 3, with port 2 isolated is achieved by reversing the current direction. The value and timing of the current is carefully controlled by sophisticated drive electronics. These basic switch elements can be built up as required to implement standard or customer-defined RF switch, matrix, and isolator solutions.

### Typical Applications

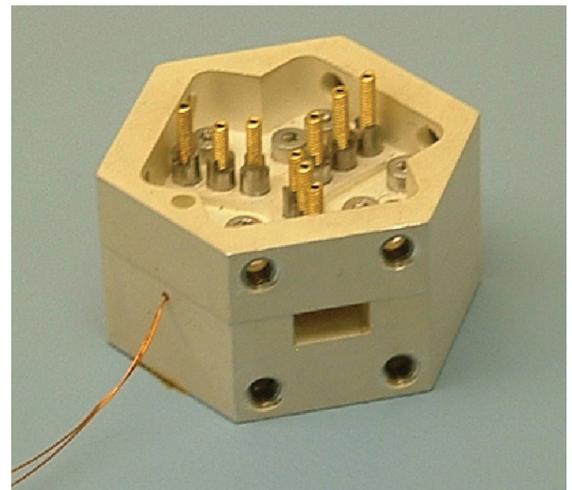
- Radar / SAR
- Altimeters and Scatterometers
- Radiometers
- Beam and frequency hopping
- Redundancy switches

### Missions To Date

- Advanced EHF
- MetOp
- SARAL
- CryoSat 2
- GMES Sentinel 3

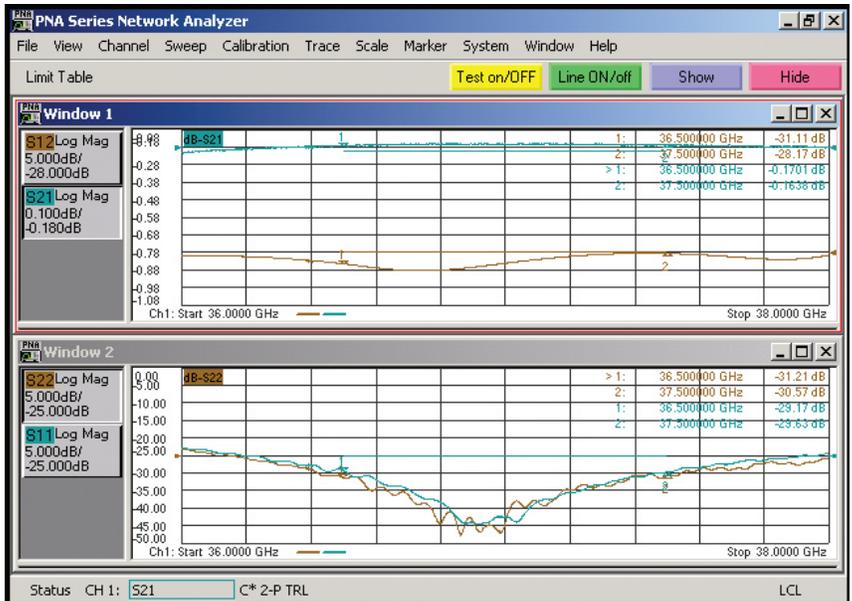


Ku-band duplexer using 10 switches

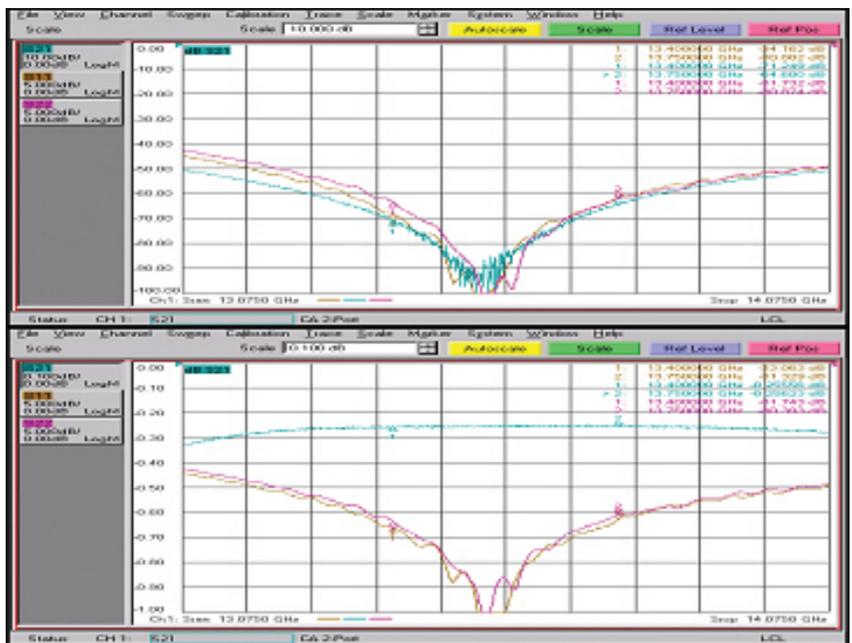


Ka-band switch

GENERAL SPECIFICATIONS	
RF frequencies available	5 GHz – 45 GHz
Waveguide dimensions available	WR159 to WR28
Peak power	3 kW
Average (CW) power	> 150 W
Insertion loss (bandwidth, peak power, and temperature range dependent)	0.05 dB – 0.2 dB
Isolation (bandwidth and temperature range dependent)	> 30 dB
Return loss	> 23 dB
Switching speed	< 1μsec
RF bandwidth	10%
Temperature range	-20°C to +65°C
Number of switching actions	> 1014
Switching rate	20 kHz



Ka-band single ferrite switch response



High power (50W) Ku-band double ferrite switch response