

Acronyms and Abbreviations

ACME	Antenna Calibration and Measurement Equipment
A/D	analog to digital
ADL	Arthur D. Little Corporation
AES	Auger electron spectroscopy
AGC	automatic gain control
AIAA	American Institute of Aeronautics and Astronautics
AIL	Airborne Instruments Laboratories
Al	aluminum
AlAs	aluminum arsenide
Al₂O₃	aluminum oxide
AlGaAs	aluminum gallium arsenide
AM	air mass
AMW	Antenna Microwave System
ANA	automatic network analyzer
As	arsenic
AsH₃	arsine
atm	atmosphere
Au	gold

A.U.	astronomical unit
AUT	antenna under test
AWVR	advanced water vapor radiometer
az-el	azimuth-elevation
Az-EI	elevation-over-azimuth-drive
B	boron
B	radiometer factor, kelvins/watt (K/W)
Be	beryllium
BP	bandpass
BPF	bandpass filter
bps	bits per second
BTL	Bell Telephone Laboratories
BW	bandwidth
BWG	beam waveguide (DSN 34-m antenna)
cal/g	calories per gram
cc	cubic centimeter
CCIR	Comité Consultatif International des Radio Communications (French: International Radio Consultative Committee)
CCR	closed-cycle refrigerator; closed cycle refrigeration
CCW	counterclockwise
CD	cumulative distribution of the atmospheric microwave loss, $0 < CD < 1$
(CH₃)₃Ga	trimethylgallium (also abbreviated TMGa)
CH₄	methane
CMB	cosmic microwave background
CMF	cosmic microwave foreground
CO₂	carbon dioxide

Cr	chromium
Cr₂O₃	chromium oxide
CVD	chemical vapor deposition
CW	clockwise
CW	continuous wave
dB	decibel
dB_i	decibels referenced to isotropic radiator
dB_m	decibels referenced to milliwatts
dB_W	decibels referenced to watts
dc	direct current
deg	degree
DFT	discrete Fourier transform
DGT	Deep Space Network Galileo Telemetry Receiver
DSCC	Deep Space Communication Complex
DSIF	Deep Space Instrumental Facility
DSIF	Deep Space Instrumentation Facility (combined with part of the Space Flight Operation Facility in 1963 to create the Deep Space Network)
DSMS	Deep Space Mission Systems
DSN	Deep Space Network
DSS	Deep Space Station
DSS-11	Pioneer Site at Goldstone, California
DSS-12	Echo Site at Goldstone, California
DSS-13	research station at Goldstone
DSS-14	70-m antenna at Goldstone
DSS-41	Woomera, Australia
DSS-42	near Canberra, Australia
DSS-43	70-m antenna in Australia

DSS-51	near Johannesburg, South Africa
DSS-54	antenna in Madrid
DSS-55	antenna in Madrid
DSS-63	70-m antenna antenna in Madrid
DSS-65	antenna in Madrid
DUT	device under test
DX (centers)	deep donor states (also referred to as deep-level trapping sites) related to the band structure of AlGaAs
EBL	electron beam lithography
EDM	electric discharge machining
EIRP	equivalent (or effective) isotropic radiated power
ESA	European Space Agency
eV	electron volt
f	frequency
feed assembly	feed horn + ambient waveguide components
feedcone	front-end assembly + supporting equipment + feedcone shell enclosure
FET	field effect transistor
FFT	fast-Fourier transform
FL	linearity factor
front-end assembly	feed assembly + LNA assembly
FTS	Frequency and Timing System
G	gain
G	gauss
Ga	gallium
GaAs	gallium arsenide

GAVRT	Goldstone-Apple Valley Radio Telescope program with 34-m antenna (DSS 12)
GCF	Ground Communications Facility
Ge	germanium
GE	General Electric Company
GHz	gigahertz
GIT	Georgia Institute of Technology (Atlanta, Georgia)
GM	Gifford-McMahon (cycle)
g/mm³	grams per cubic millimeter
GPIB	general purpose interface bus
GSSR	Goldstone Solar System Radar
g/s	grams per second
G/T	gain-to-temperature ratio; antenna gain (proportional to antenna area) and the noise temperature performance; a system figure of merit
GUI	graphic user interface
G10	fiberglass and epoxy composite

H₂	hydrogen
H₂O	water
He	helium
HEF	High Efficiency (DSN 34-m antenna)
HEMT	high electron mobility transistor
HFET	heterostructure transistor (SDHT), and heterojunction FET (synonym for HEMT)
HP	horsepower
HPBW	half-power beamwidth (degrees)
HSB	High-Speed Beam Waveguide (antenna)
Hz	hertz

ICE	Inter-Cometary Explorer
IEEE	Institute of Electrical and Electronics Engineers
IF	interface
IF	intermediate-frequency
IMPATT	impact avalanche and transit time
In	indium
InAlAs	indium aluminum arsenide
InGaAs	indium gallium arsenide
InP	indium phosphide
ISO	International Organization for Standardization
ISS	impedance standard substrate
ITU	International Telecommunications Union
J	joule
J/K	joules/kelvin
JMOC	Jupiter Microwave Observation Campaign (Cassini)
JPL	Jet Propulsion Laboratory
J-s	joule-second
JT	Joule-Thomson
JWST	James Webb Space Telescope
K	kelvin
Ka-band	31.8–32.3 GHz (DSN frequency allocation within Ka-band)
KaBLE	Ka-Band Link Experiment
kbps	thousand bits per second
KHz	kilohertz
km	kilometer
Ku-band	15 GHz
kW	Kilowatt

I	liter
LAN	local-area network
L-band	960 MHz
LCER	Lewis Center for Educational Research
LCP	left-hand circularly polarized
LH₂	liquid hydrogen
LHe	liquid helium
LN₂	liquid nitrogen
LNA	low-noise amplifier
LNA assembly	low-noise amplifier + post amplifier + gain set attenuator
LO	local oscillator
lps	liters per second
LRM	line-reflect-match (calibration method)
LRO	Lunar Reconnaissance Orbiter
LWC	liquid water content
m	meter
maser	microwave amplification by stimulated emission of radiation
MBE	molecular beam epitaxy
Mb/s	megabit per second
mdeg	millidegree
MDSCC	Madrid Deep Space Communication Complex
MEC	Microwave Electronics Corporation
MESFET	metal semiconductor field effect transistor
MHEMT	metamorphic high electron mobility transistor
mho	(a unit of conductance equal to the reciprocal of an ohm)
MHz	megahertz
mm	millimeter

μm	micrometer
MMIC	microwave monolithic integrated circuit
MMICAD	(computer-aided engineering/computer-aided testing [CAE/CAT] software from Optotek, Ltd.)
MMS	(Agilent) modular measurement system
Mo	molybdenum
MOCVD	metal-organic chemical vapor deposition
MODFET	modulation-doped FET (synonym for HEMT)
MOVPE	metal-organic vapor phase epitaxy
MRE	mean radial error
MRO	Mars Reconnaissance Orbiter
ms	millisecond
μs	microsecond
m/s	meters per second
m³/s	cubic meters per second
MSFN	Manned-Space-Flight-Network
mS/mm	millisiemens/millimeter
MTBF	mean time between failures
N₂	nitrogen
NAR	noise-adding radiometer
NASA	National Aeronautics and Space Administration
ND	noise diode
Ni	
NL	nonlinearity
NMC	(Deep Space Network) Network Monitor and Control
NRAO	National Radio Astronomy Observatory
NRAO, AUI	National Radio Astronomy Observatory of the Associated Universities Inc.

OCR	Open-cycle refrigeration
OFHC	oxygen-free high conductivity
OTF	on-the-fly (mapping)
Ω	ohm
P	phosphorus
Pa	pascal
par-amp	parametric amplifier
PCG	phase calibration generator
Pd	palladium
Perspex	polymethyl methacrylate
PH₃	phosphine
PHEMT	pseudomorphic high electron mobility transistor
PLL	phase-locked loop
PM	power meter
PMAA	polymethyl methacrylate
PPC	persistent photoconductivity
PSD	power spectral density
psia	pounds per square inch absolute
Pt	platinum
RAC	radio astronomy controller
RA–DEC	right ascension–declination
RCP	right-hand circularly polarized
R&D	research and development
RF	radio frequency
RFI	radio-frequency interference
RHEED	reflection high energy electron diffraction

RIE	reactive ion etching
R-J	Rayleigh-Jeans
RMS, rms	root mean square
rpm	revolutions per minute
RSS	root sum square
RTA	rapid thermal annealing
RWM	reflected-wave maser
S	siemens
SAR	signal adding radiometer
Sb	antimony
S-band	2.20–2.40 GHz (DSN frequency allocation within S-band)
SCFM	standard cubic feet per minute
SD	standard deviation = sigma = σ
SDHT	selectively-doped heterostructure transistor (synonym for HEMT)
SEM	scanning electron microscope
SFOF	Space Flight Operations Facility (combined with part of the Deep Space Instrumentation Facility in 1963 to create the Deep Space Network)
Si	silicon
SiC	silicon carbide
SiH₄	Silane
Si₃N₄	silicon nitride
SIM	Space Interferometry Mission
SiO₂	silicon dioxide
SMART-2	Small Missions for Advanced Research in Technology–2
SNR	signal-to-noise ratio
SNT	system noise temperature
SOLT	short-open-load-thru (calibration method)

SPC	(Deep Space Network) Signal Processing Center
SPD	S-band polarization diversity (feedcone)
std	standard
STDN	S-band Tracking and Data Network
SWS	slow-wave structure
T	tesla
teflon	polytetrafluoroethylene
TEGFET	two-dimensional electron gas FET (synonym for HEMT)
Ti	titanium
TMGa	trimethylgallium, $(\text{CH}_3)_3\text{Ga}$
TPR	total power radiometer
TV	television
TWM	traveling wave maser
UCSD	University of California, San Diego
ULNA	ultra-low-noise (X-band TWM [amplifier])
URSI	International Union of Radio Science
UWV	microwave
VC	voltage-controlled crystal oscillator
VLA	National Radio Astronomy Observatory) Very Large Array (Socorro, New Mexico)
VLBI	very long baseline interferometry
VSWR	voltage standing wave ratio
W	watt
W/cm	watts per centimeter
WG	waveguide

W/g	watts per gram
W/s	watts per second
WR	rectangular waveguide
WVR	water vapor radiometer
X-band	8.40–8.45 GHz (DSN frequency allocation within X-band)
XEI	cross elevation
XMT	transmit
XRO	X-band receive operational (DSN feedcone assembly)
XTR	X-band transmit and receive feed assembly
YIG	yttrium iron garnet
2-D	two dimensional
3-D	three dimensional