Model 4000TP4G8, M1 through M24
4000 Watt Pulse Amplifier
4-8 GHz

The Model 4000TP4G8 is a self-contained, forced air cooled, broadband traveling wave tube (TWT) microwave amplifier designed for pulse applications at low to moderate duty factors where instantaneous bandwidth and high gain are required. A reliable TWT provides a conservative 3800 watts minimum peak RF pulse power at the amplifier output connector. Stated power specifications are at the fundamental frequency.

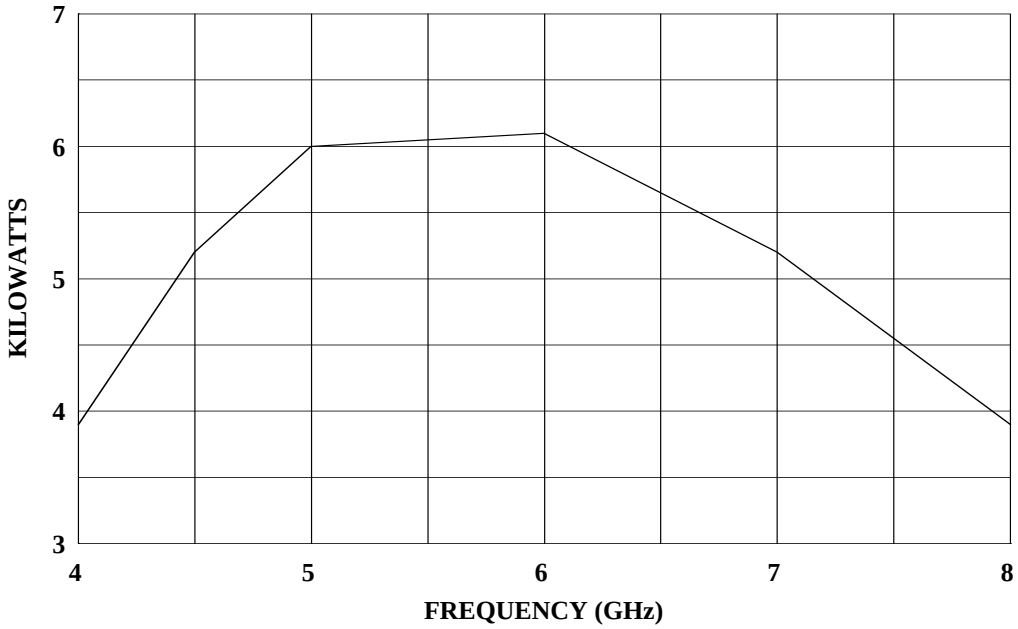
The amplifier's front panel digital display shows forward and reflected average power output or forward and reflected peak power, plus extensive system status information accessed through a series of menus via soft keys. Status indicators include power on, warm-up, standby, operate, faults, excess average or peak reflected power warning and remote. Standard features include a built-in IEEE-488 (GPIB) interface, 0dBm input, TTL Gating, VSWR protection, gain control, RF output sample port, auto sleep, plus monitoring of TWT helix current, cathode voltage, collector voltage, heater current, heater voltage, baseplate temperature and cabinet temperature. Modular design of the power supply and RF components allow for easy access and repair. Use of switching mode power supplies results in significant weight reduction.

Housed in a stylish contemporary cabinet, the amplifier provides readily available pulsed RF power for a variety of applications in Test and Measurement, (including EMC RF pulse susceptibility testing), Industrial and University Research and Development, and Service applications. AR also offers a broad range of amplifiers for CW (Continuous Wave) applications.

See Model Configurations for alternative prime power, packaging, and special features.

The export classification for this amplifier is ITAR. The export of this equipment is governed by the U.S. International Traffic in Arms Regulations (ITAR). This equipment and related technical data must not be transferred to a foreign person/entity without proper authorization of the U.S. Government. Violations may result in administrative, civil or criminal penalties.

4000TP4G8 Typical Peak Pulse Power Output



SPECIFICATIONS, MODEL 4000TP4G8

POWER (Fundamental), Peak Pulse, @ Output	
Nominal	5000 watts
Minimum	3.8 kW from 4–4.5 GHz 4.0 kW from 4.5–7.5 GHz 3.8 kW from 7.5–8.0 GHz
FLATNESS	±10 dB maximum
FREQUENCY RESPONSE	4-8 GHz
INPUT FOR RATED OUTPUT	1.0 milliwatt maximum
GAIN (at maximum setting)	66 dB minimum
GAIN ADJUSTMENT (continuous range)	35 dB minimum
INPUT IMPEDANCE	50 ohms, VSWR 2.5:1 maximum
OUTPUT IMPEDANCE	50 ohms, VSWR 2.5:1 typical
MISMATCH TOLERANCE	Output pulse width foldback protection at peak reflected power exceeding 1000 watts. Will operate without damage with any magnitude and phase of source and load impedance. May oscillate with unshielded open due to coupling to input. Should not be tested with connector off. See S3M special option, if applicable.
PULSE CAPABILITY	
Pulse Width	0.07 – 100 microseconds.
Pulse Rate (PRF)	100 kHz maximum
Duty Cycle	4% maximum.
RF Rise and Fall	35 ns max (10% to 90%).
Delay	300 ns maximum from pulse input to RF 90%
Pulse Width Distortion	±50 ns maximum (50% points of output pulse width compared to 50% points of input pulse width)
Pulse Off Isolation	80 dB minimum, 90 dB typical
Pulse Input	TTL level, 50 ohm nominal termination
NOISE POWER DENSITY	
(pulse on)	Minus 65 dBm/Hz (maximum); Minus 75 dBm/Hz (typical)
(pulse off)	Minus 140 dBm/Hz (typical)
HARMONIC DISTORTION	Minus 0 dBc maximum
PRIMARY POWER	See Model Configurations
CONNECTORS	
RF input	Type N female on rear panel
RF output	Type WRD350 waveguide flange on rear panel
RF output forward sample port	Type N female on rear panel
Pulse input	Type BNC female on rear panel
GPIB	IEEE-488 female on rear panel
Interlock	DB-15 female on rear panel
COOLING	Forced air (self contained fans), air entry and exit in rear.
SIZE AND WEIGHT	See Model Configurations
EXPORT CLASSIFICATION	ITAR

MODEL CONFIGURATIONS AND FEATURES – MODEL 4000TP4G8

E Must select one enclosure type from the following [E1 or E2 or E2S]:

E1 with removable outer enclosure, size 19.8 x 17.5 x 33 in., 51 x 44.5 x 84 cm, weight 155 lbs, 71 kg.

E2 without outer enclosure, for rack mounting, size 19 x 10.5 x 31 in, 48.3 x 27 x 79cm. weight of E1 less 30 lbs, 14 kg.

E2S without outer enclosure, for rack mounting with slides and front pull handles installed, size 19 x 10.5 x 31 in, 48.3 x 27 x 79cm. , weight of E2 plus 5 lbs, 2kg.

P Must select one primary power from the following [P1 or P2]

P1 208 VAC ± 10% three phase 50/60 Hz 2.5 KVA maximum

P2 190-260 VAC single phase 50/60 Hz 2.5 KVA maximum

S May select a special feature (extra cost) from the following [S1R and/or S2K and/or S3M]:

S1R Reflected power sample port, type N female connector on rear panel. Forward and reflected sample port calibration data supplied on disk in Excel format at 51 points, evenly spaced over specified frequency response.

S2K Supplied with one TF type externally mountable harmonic filter and a switch kit that allows user to select an appropriate filter band, high (which bypasses filter) or low (which applies filter), via this TWTA. Insertion loss when used with filters is maximum 1.5 dB. Minimum harmonic separation is minus 20 dBc with switch kit applied. See **TF Type Filter Specifications** table below. Amplifier dimensions and weight do not include kits and filter. Add 35 lbs, 16 kg.

S3M **Special Mismatch Tolerance Operation:** Amplifier will permit up to 2kW reflected power at maximum 8μs pulse width and .8% duty, without VSWR trip or fold-back. Exceeding 2kW reflected power will cause the unit to truncate pulse within 2μs. For pulses beyond 8μs, exceeding 1kW will cause the unit to truncate the pulse. If exceeding .8% duty with reflected power exceeding 1kW, the amplifier will truncate the pulse within 2μs. The amplifier will continue to truncate pulses until reflected power dissipates from outside source. Operation with truncated pulses for >250mS will result in latched "Truncated Pulse Fold Back" displayed on screen and over the remote interface, including an audible alarm. Operation with truncated pulses for 5 to 10 seconds will cause "Over Reverse" fault and a shutdown of high voltage and the amplifier.

Model	Features		
4000TP4G8	E	P	S
4000TP4G8	E1	P1	-
M1	E2	P1	-
M2	E2S	P1	-
M3	E1	P2	-
M4	E2	P2	-
M5	E2S	P2	-
M6	E1	P1	S1R
M7	E2	P1	S1R
M8	E2S	P1	S1R
M9	E1	P2	S1R
M10	E2	P2	S1R
M11	E2S	P2	S1R
M12	E1	P1	S2K
M13	E2	P1	S2K
M14	E2S	P1	S2K
M15	E1	P2	S2K
M16	E2	P2	S2K
M17	E2S	P2	S2K
M18	E1	P1	S1R & S2K
M19	E2	P1	S1R & S2K
M20	E2S	P1	S1R & S2K
M21	E1	P2	S1R & S2K
M22	E2	P2	S1R & S2K
M23	E2S	P2	S1R & S2K
M24	E1	P1	S3M

S2K – TF TYPE FILTER SPECIFICATIONS

Microwave Filter Model	For Use with AR TWTA Model	Pass Band (GHz)	Insertion Loss (dB max)	Reject Band (GHz)	Rejection (dB min)	Power (fundamental & harmonic, watts, max)	Input Connector	Output connector	Size L x W x D (cm, in max)	Weight (kg, lbs typical)	Input VSWR in Pass band (typical)	Input VSWR in Reject band (typical)
TF type filter 1	4000TP4G8 with WRD350 waveguide	4.0-6.4	0.5	8.0 – 15	25	300 & 300 average 7000 & 6000 peak	WRD350 waveguide	WRD350 waveguide	76 x 10 x 31 30 x 4 x 12	11, 25	1.3:1	2.5:1