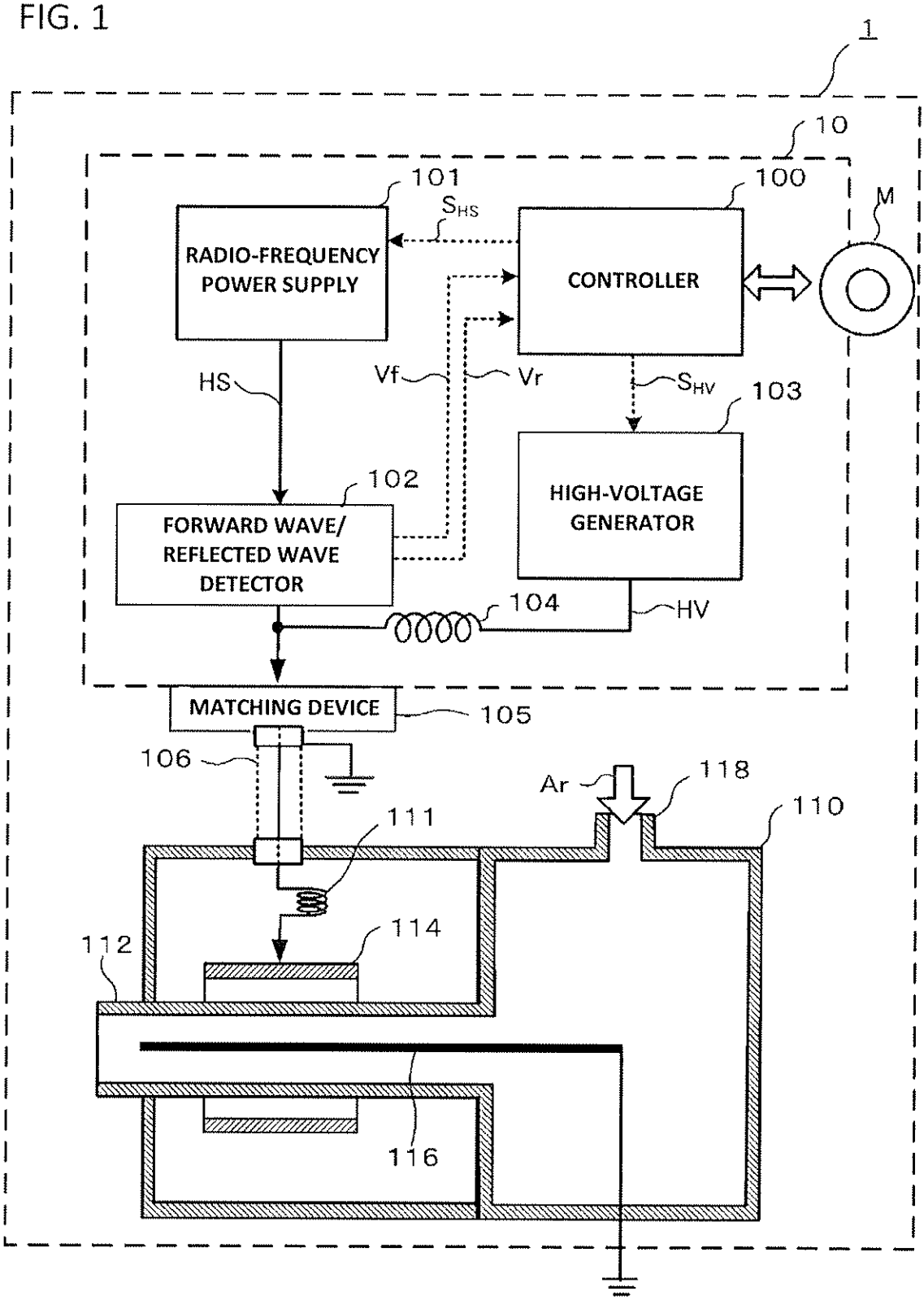
FIG. 1


1
10
101
100
M
S_{HS}
RADIO-FREQUENCY POWER SUPPLY
CONTROLLER
HS
Vf
Vr
S_{HV}
103
102
HIGH-VOLTAGE GENERATOR
FORWARD WAVE/ REFLECTED WAVE DETECTOR
104
HV
MATCHING DEVICE
105
106
Ar
118
110
111
112
114
116

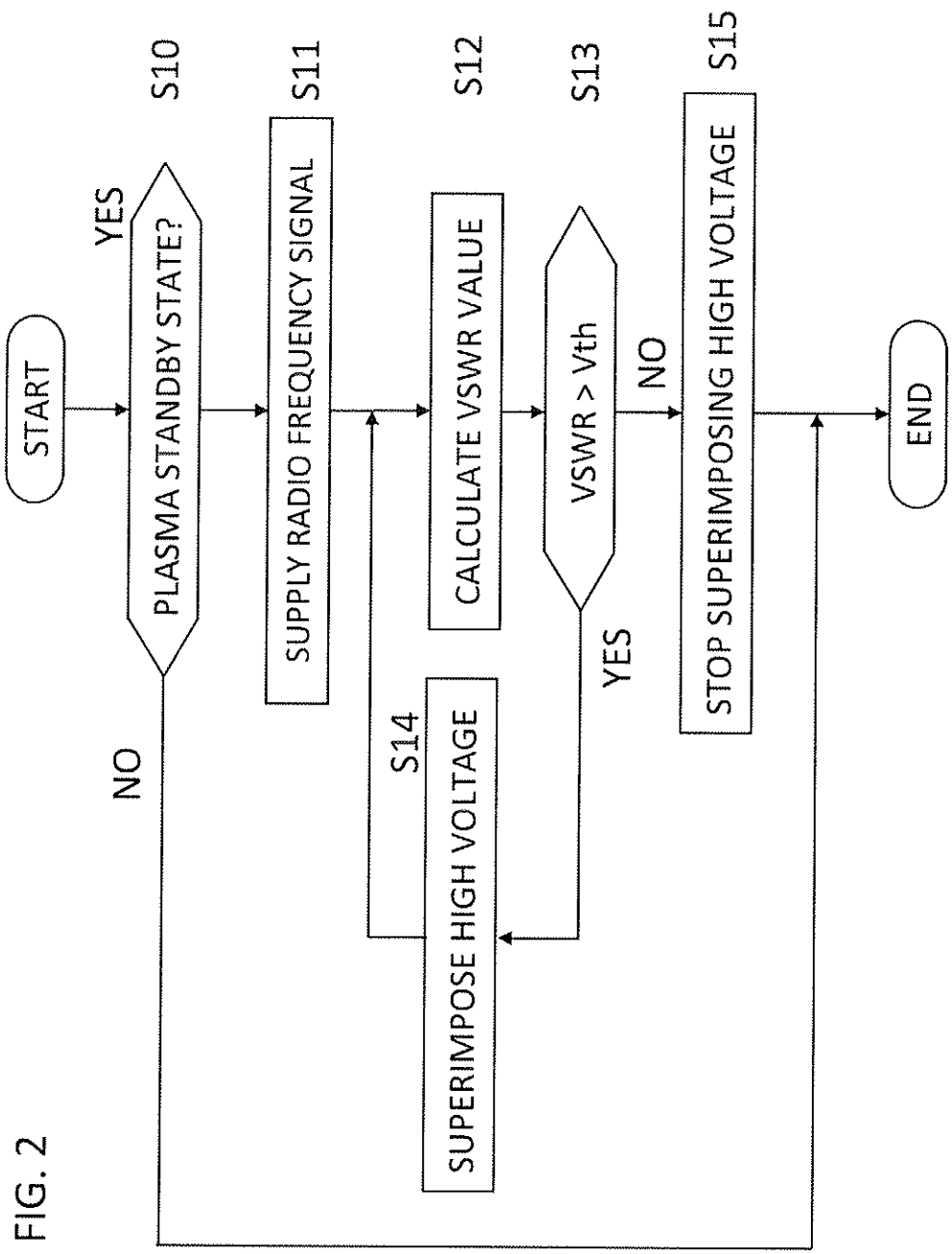
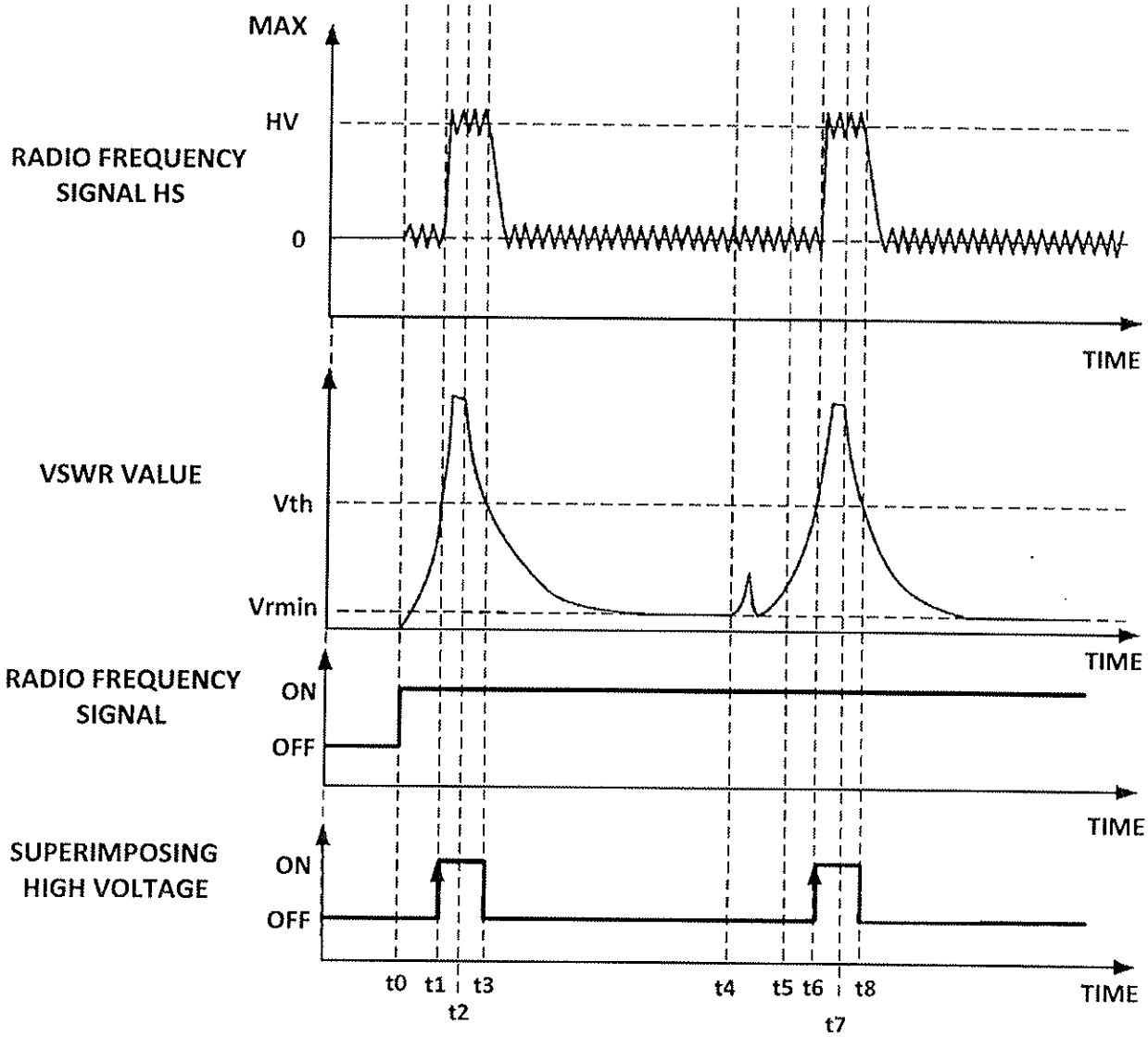

START
PLASMA STANDBY STATE?
YES
NO
S10
SUPPLY RADIO FREQUENCY SIGNAL
S11
CALCULATE VSWR VALUE
S12
VSWR > Vth
S13
YES
NO
SUPERIMPOSE HIGH VOLTAGE
S14
STOP SUPERIMPOSING HIGH VOLTAGE
S15
END

FIG. 2

FIG. 3


MAX
HV
RADIO FREQUENCY SIGNAL HS
0
TIME
VSWR VALUE
Vth
Vrmin
TIME
RADIO FREQUENCY SIGNAL
ON
OFF
TIME
SUPERIMPOSING HIGH VOLTAGE
ON
OFF
t0
t1
t2
t3
t4
t5
t6
t7
t8
TIME

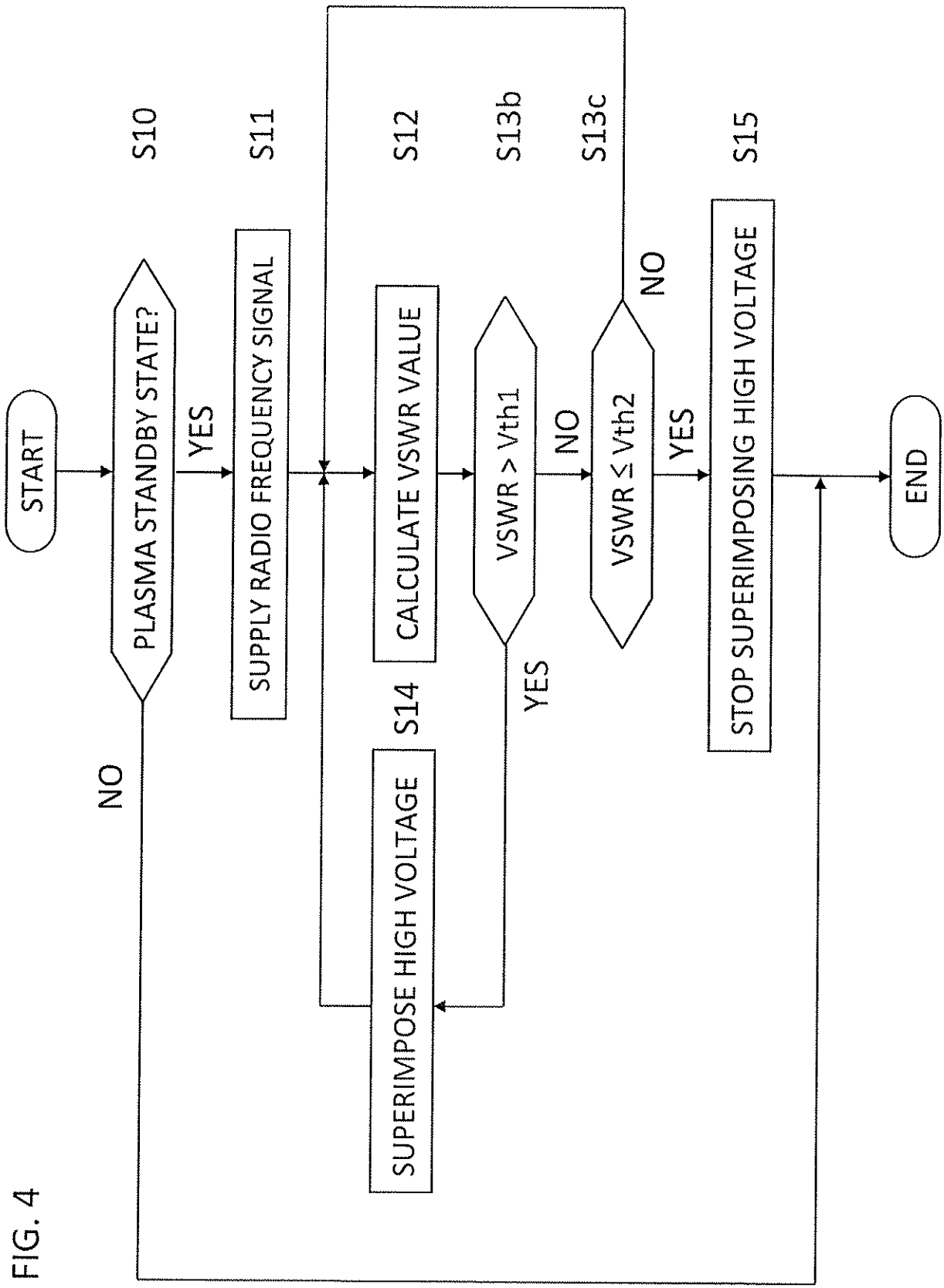
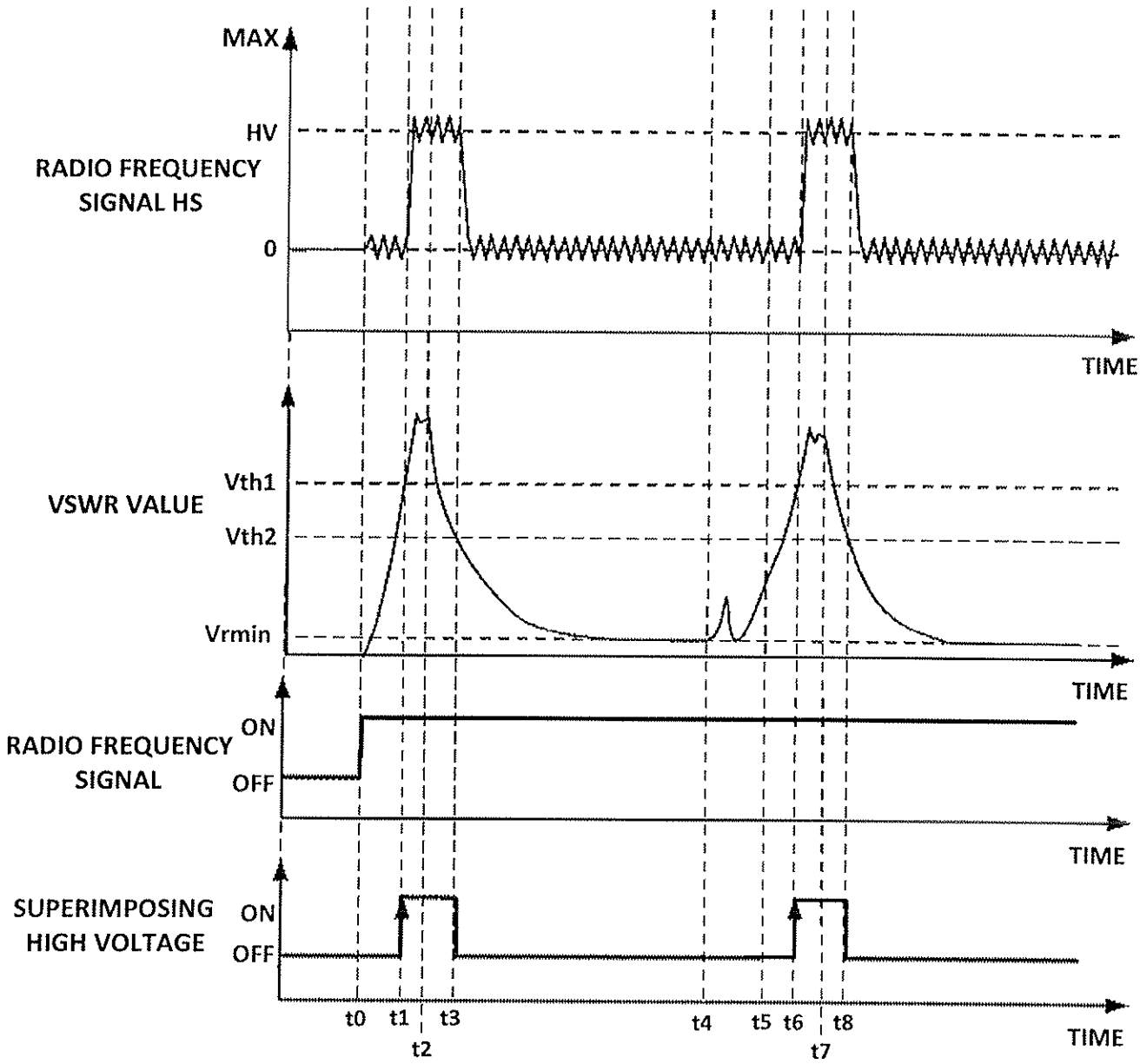

START
S10
PLASMA STANDBY STATE?
YES
NO
S11
SUPPLY RADIO FREQUENCY SIGNAL
S12
CALCULATE VSWR VALUE
S13b
VSWR > Vth1
NO
YES
S13c
VSWR ≤ Vth2
NO
YES
S14
SUPERIMPOSE HIGH VOLTAGE
S15
STOP SUPERIMPOSING HIGH VOLTAGE
END

FIG. 4

FIG. 5


MAX
HV
RADIO FREQUENCY SIGNAL HS
0
TIME
VSWR VALUE
Vth1
Vth2
Vrmin
TIME
RADIO FREQUENCY SIGNAL
ON
OFF
TIME
SUPERIMPOSING HIGH VOLTAGE
ON
OFF
t0
t1
t2
t3
t4
t5
t6
t7
t8
TIME

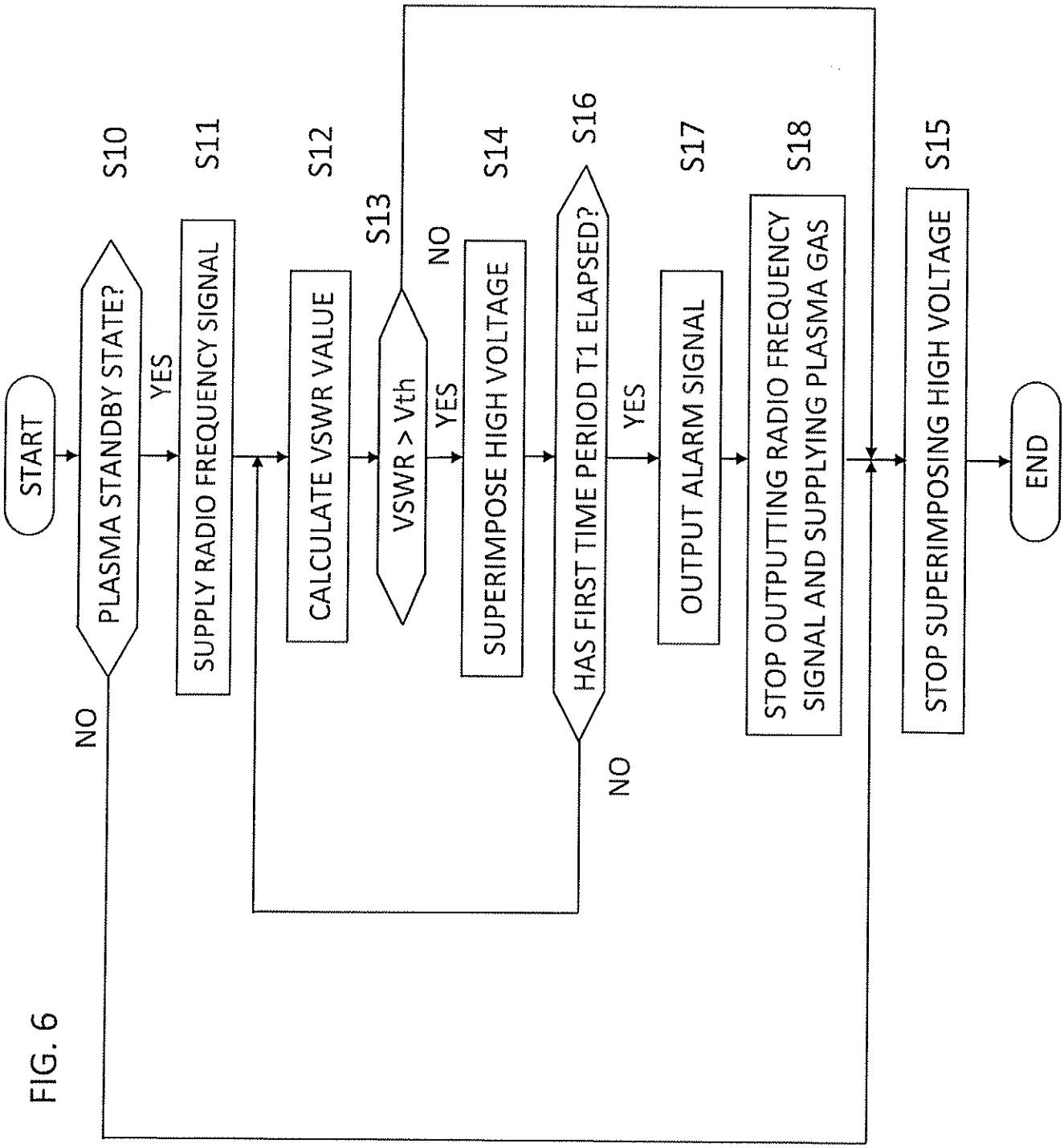

START
PLASMA STANDBY STATE?
S10
YES
NO
SUPPLY RADIO FREQUENCY SIGNAL
S11
CALCULATE VSWR VALUE
S12
VSWR > Vth
S13
YES
NO
SUPERIMPOSE HIGH VOLTAGE
S14
HAS FIRST TIME PERIOD T1 ELAPSED?
S16
YES
NO
OUTPUT ALARM SIGNAL
S17
STOP OUTPUTTING RADIO FREQUENCY SIGNAL AND SUPPLYING PLASMA GAS
S18
STOP SUPERIMPOSING HIGH VOLTAGE
S15
END

FIG. 6

FIG. 7

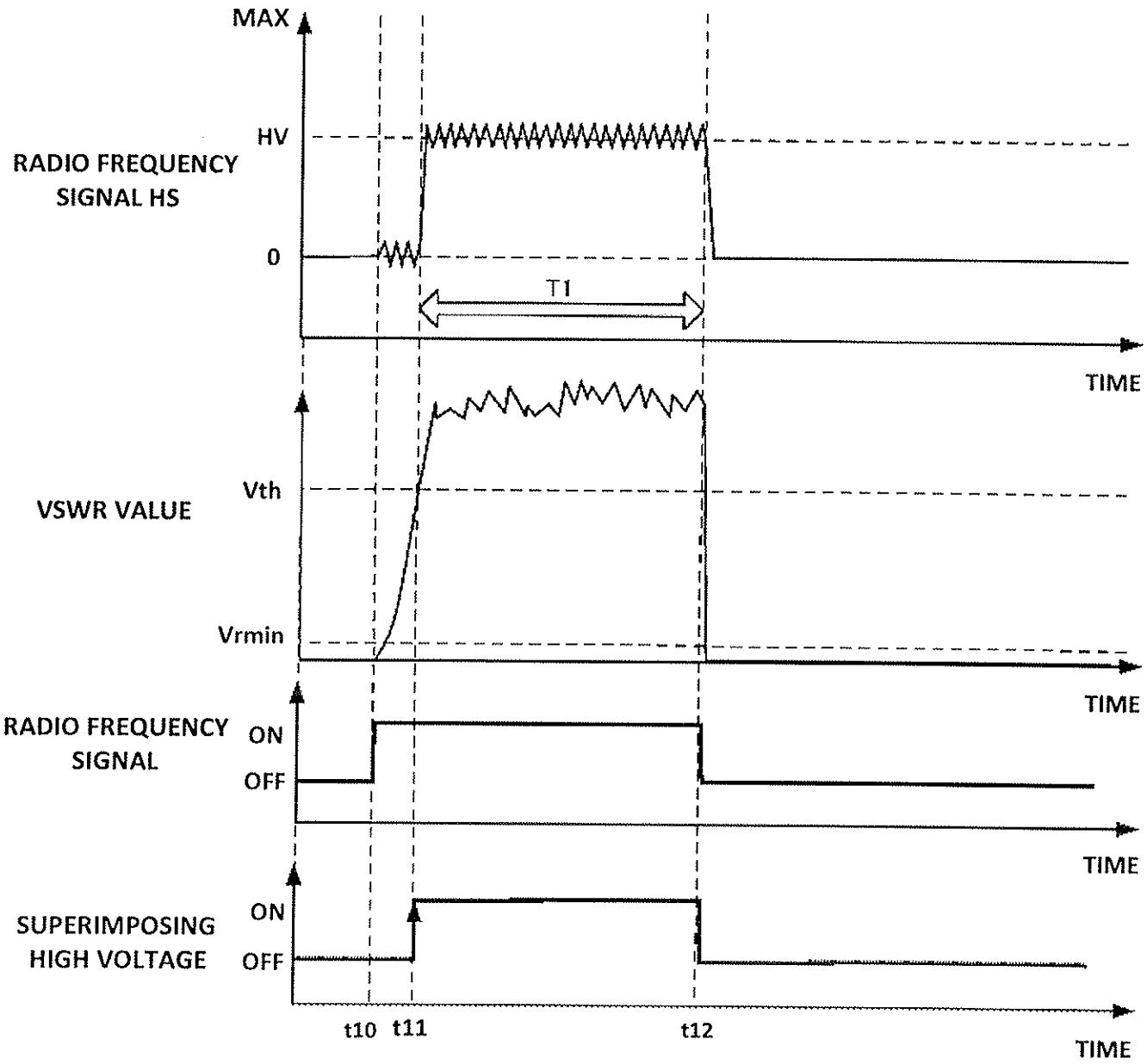

MAX
HV
RADIO FREQUENCY SIGNAL HS
0
T1
TIME
VSWR VALUE
Vth
Vrmin
TIME
RADIO FREQUENCY SIGNAL
ON
OFF
TIME
SUPERIMPOSING HIGH VOLTAGE
ON
OFF
t10
t11
t12
TIME

FIG. 8

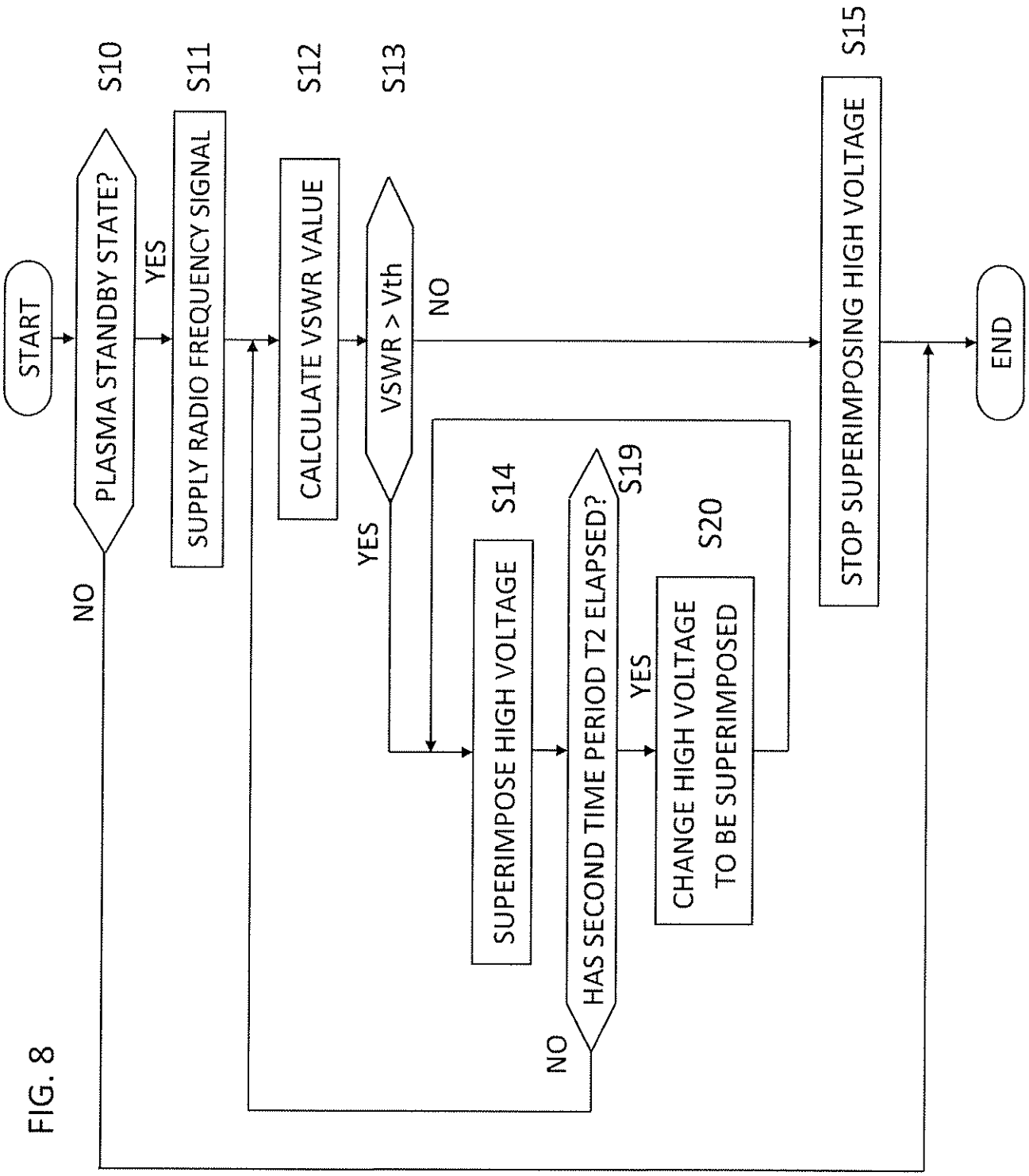
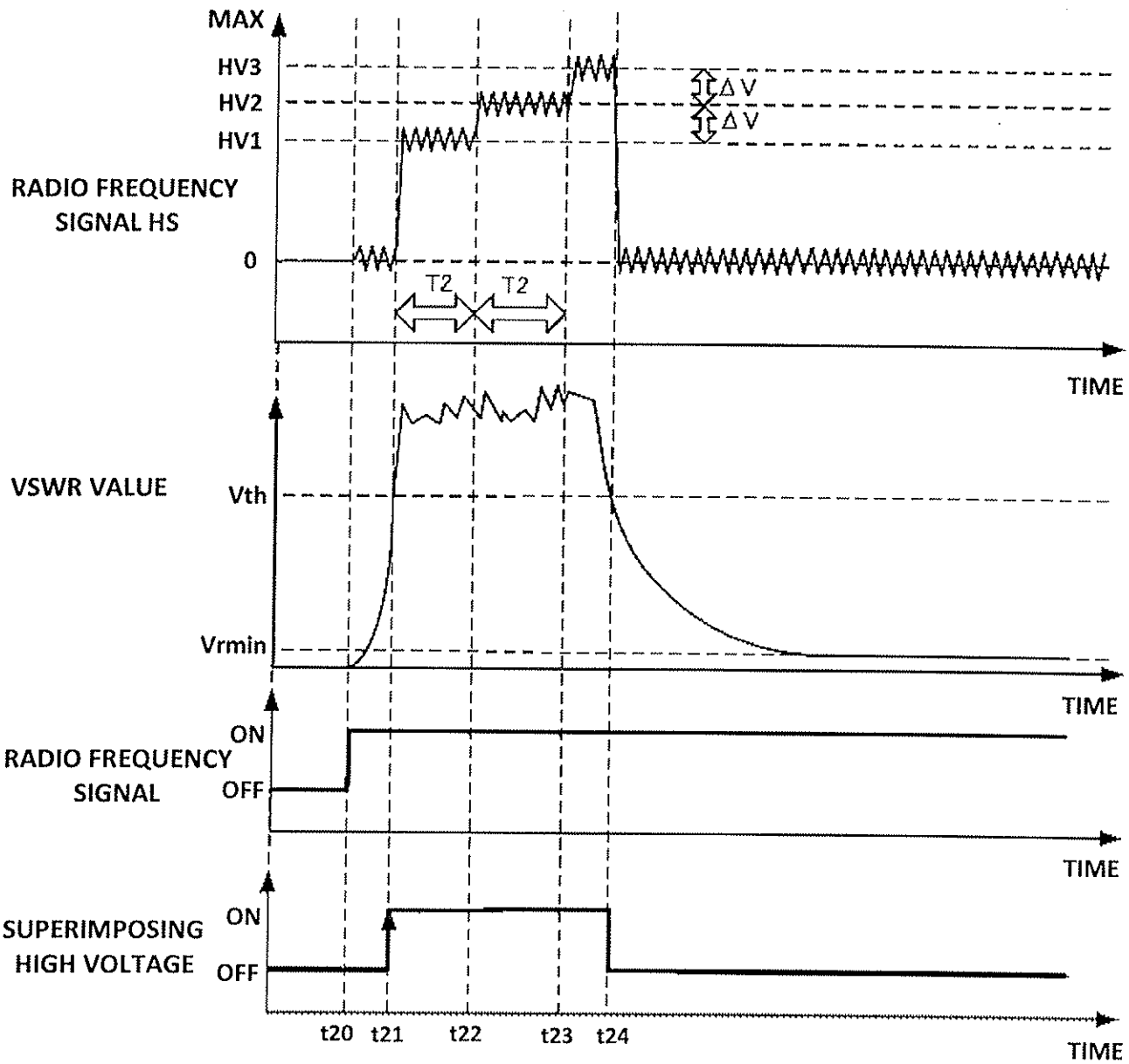

START
PLASMA STANDBY STATE?
S10
YES
NO
SUPPLY RADIO FREQUENCY SIGNAL
S11
CALCULATE VSWR VALUE
S12
VSWR > Vth
S13
YES
NO
SUPERIMPOSE HIGH VOLTAGE
S14
HAS SECOND TIME PERIOD T2 ELAPSED?
S19
YES
NO
CHANGE HIGH VOLTAGE TO BE SUPERIMPOSED
S20
STOP SUPERIMPOSING HIGH VOLTAGE
S15
END

FIG. 9


MAX
HV3
HV2
HV1
RADIO FREQUENCY SIGNAL HS
0
ΔV
ΔV
T2
T2
TIME
VSWR VALUE
Vth
Vrmin
TIME
RADIO FREQUENCY SIGNAL
ON
OFF
TIME
SUPERIMPOSING HIGH VOLTAGE
ON
OFF
t20
t21
t22
t23
t24
TIME

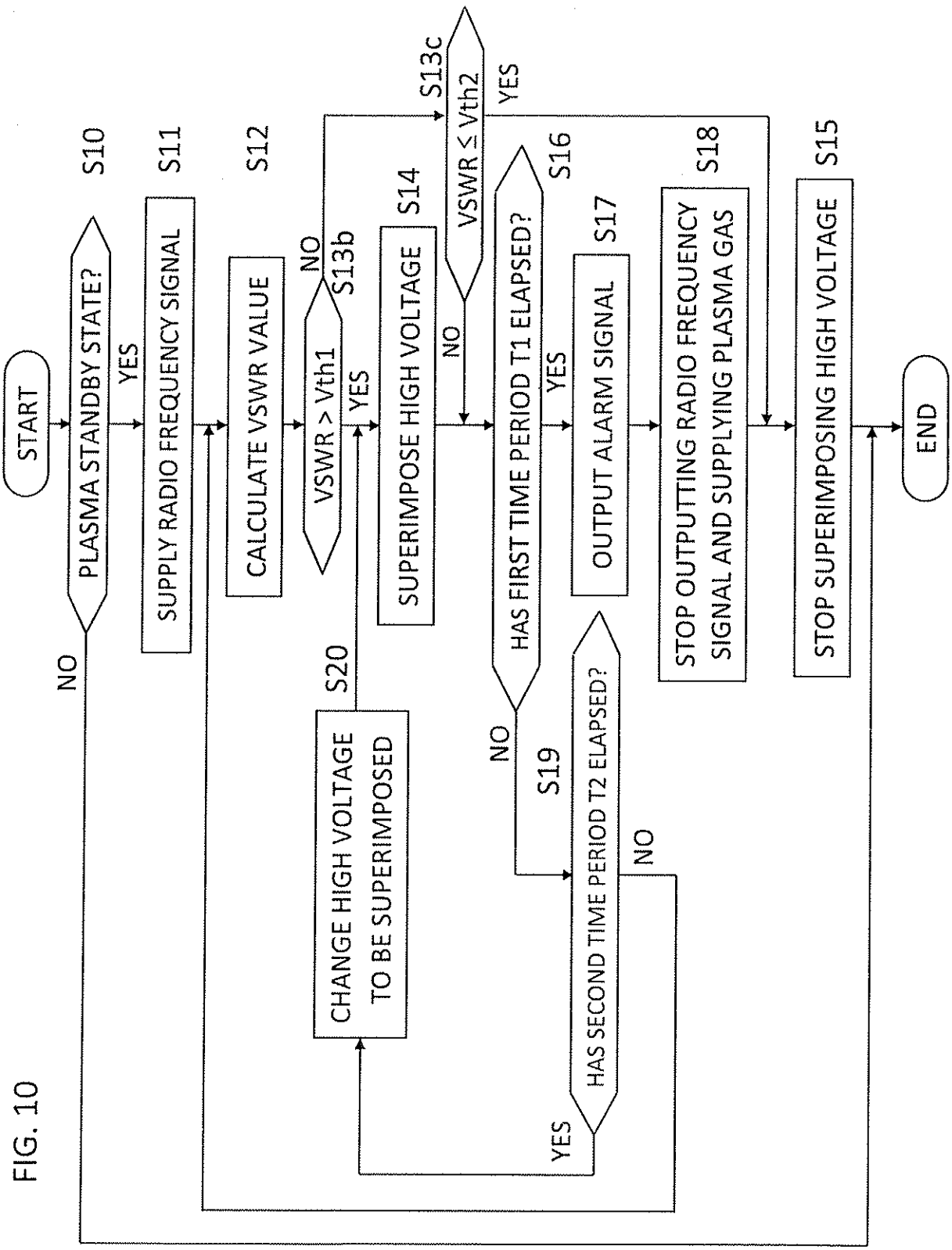
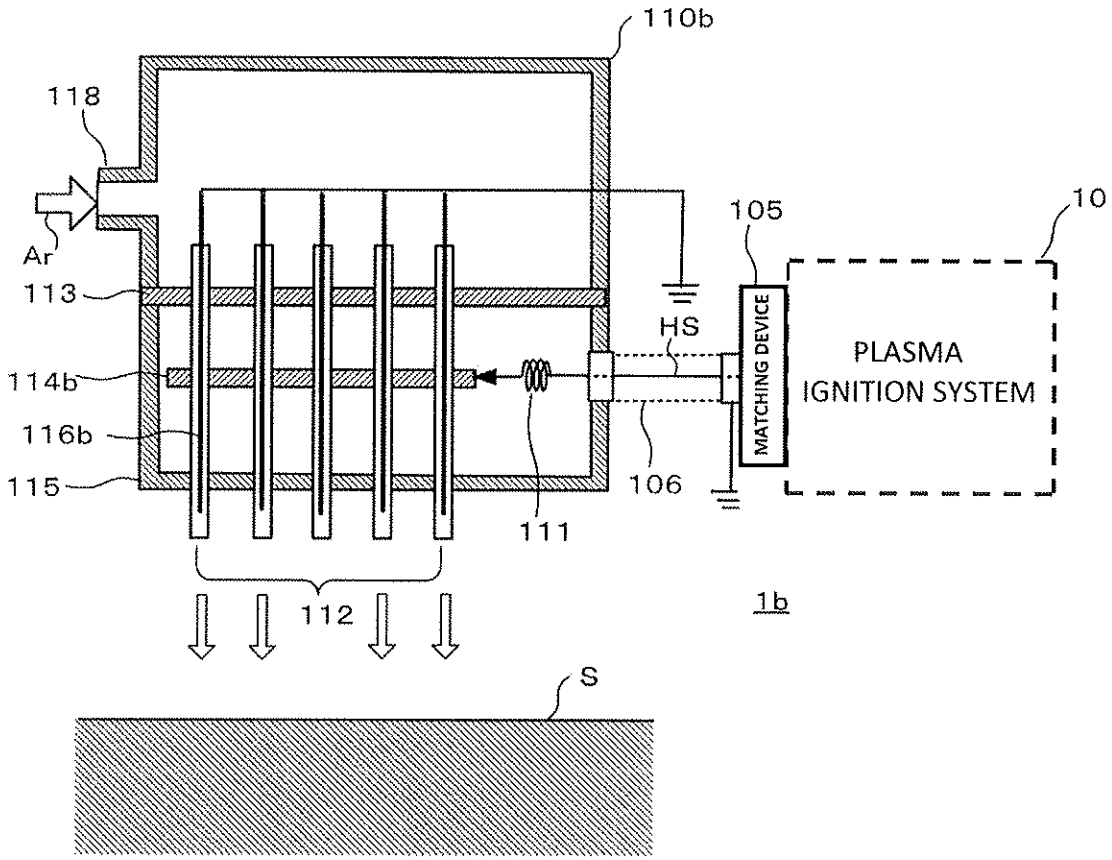

START
PLASMA STANDBY STATE?
S10
NO
YES
SUPPLY RADIO FREQUENCY SIGNAL
S11
CALCULATE VSWR VALUE
S12
VSWR > Vth1
S13b
NO
YES
VSWR ≤ Vth2
S13c
YES
NO
SUPERIMPOSE HIGH VOLTAGE
S14
HAS FIRST TIME PERIOD T1 ELAPSED?
S16
NO
YES
OUTPUT ALARM SIGNAL
S17
STOP OUTPUTTING RADIO FREQUENCY SIGNAL AND SUPPLYING PLASMA GAS
S18
STOP SUPERIMPOSING HIGH VOLTAGE
S15
END
CHANGE HIGH VOLTAGE TO BE SUPERIMPOSED
S20
HAS SECOND TIME PERIOD T2 ELAPSED?
S19
YES
NO

FIG. 10

FIG. 11


110b
118
Ar
113
114b
116b
115
105
10
HS
MATCHING DEVICE
PLASMA
IGNITION SYSTEM
106
111
112
1b
S