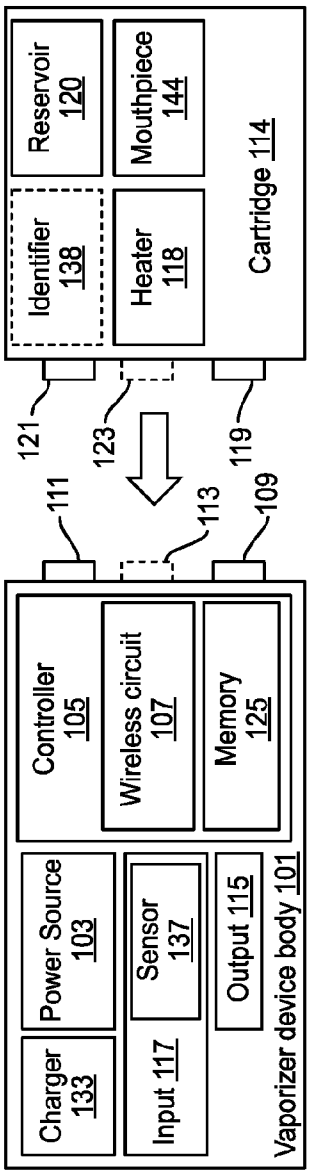


FIG. 1A

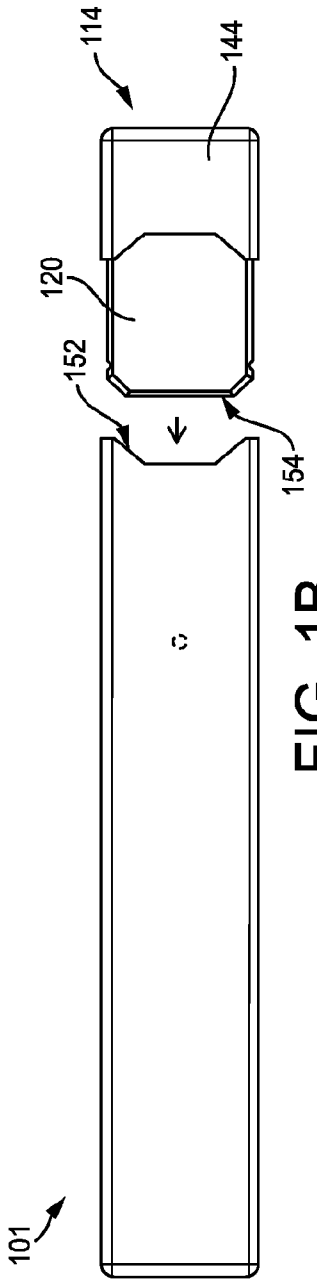


FIG. 1B

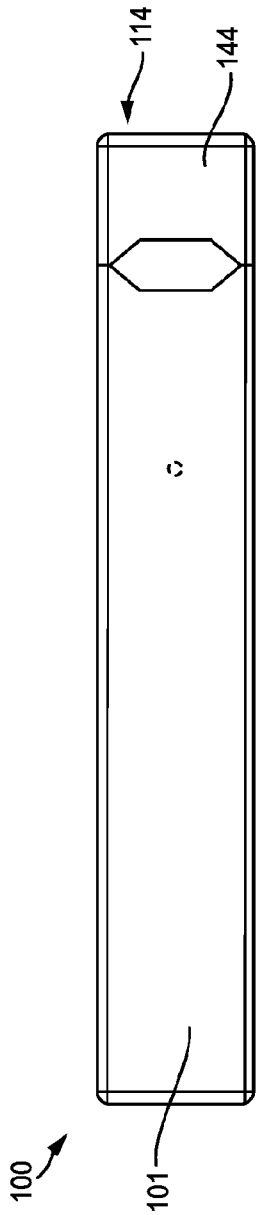


FIG. 1C

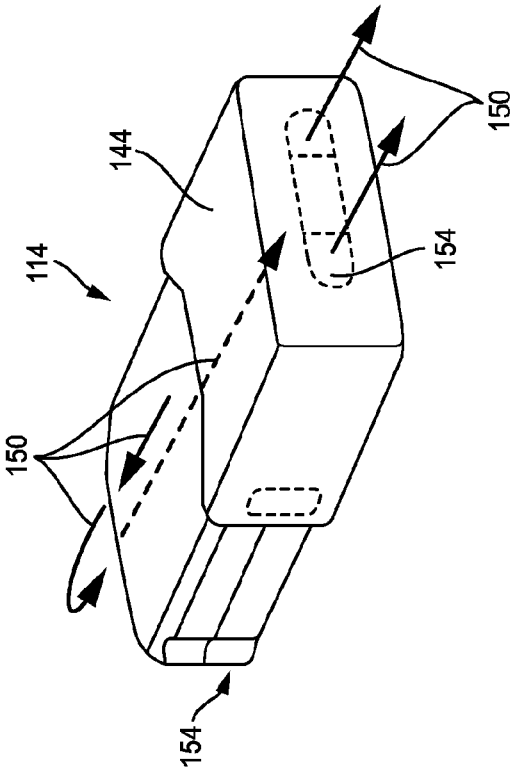


FIG. 1E

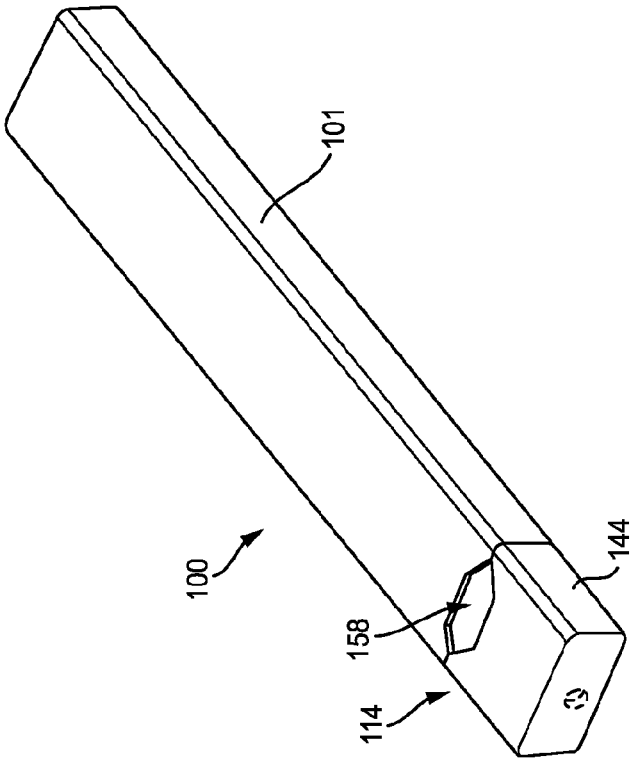


FIG. 1D

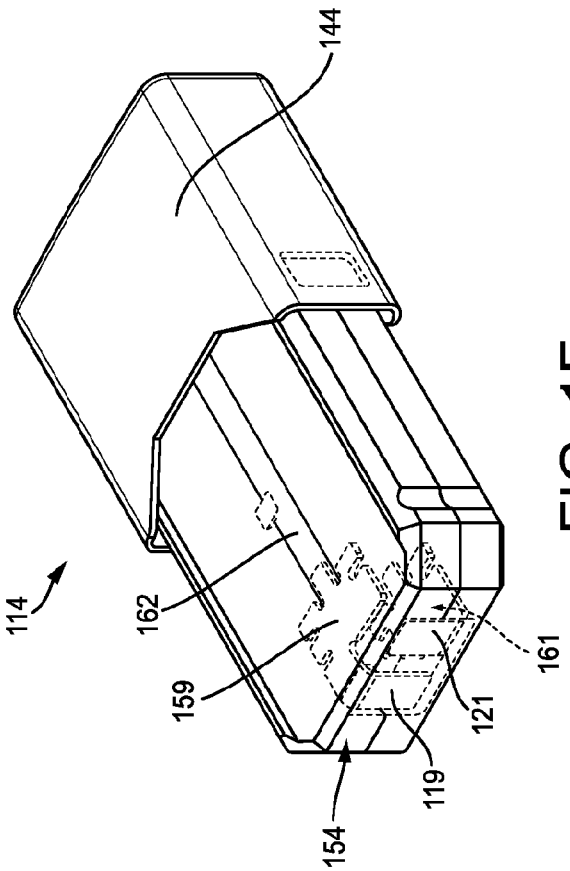

114
162
159
154
119
121
161
144

FIG. 1F

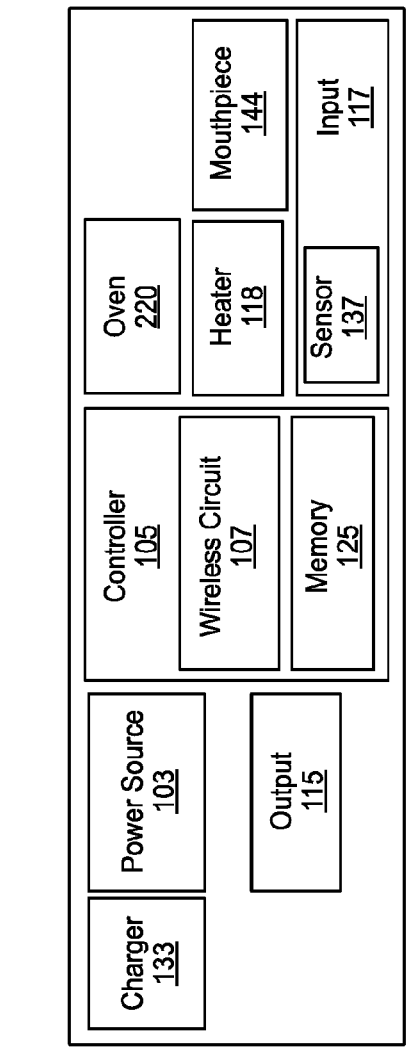

100
Charger 133
Power Source 103
Output 115
Controller 105
Wireless Circuit 107
Memory 125
Oven 220
Heater 118
Sensor 137
Mouthpiece 144
Input 117

FIG. 2A

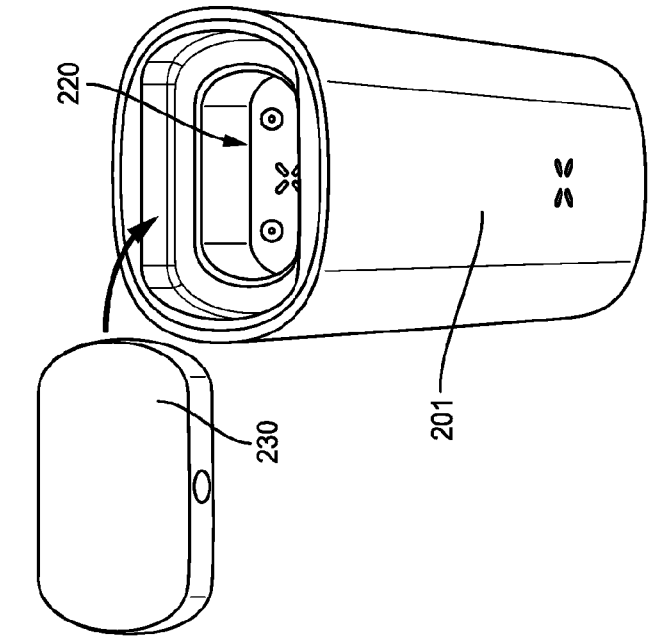


FIG. 2C

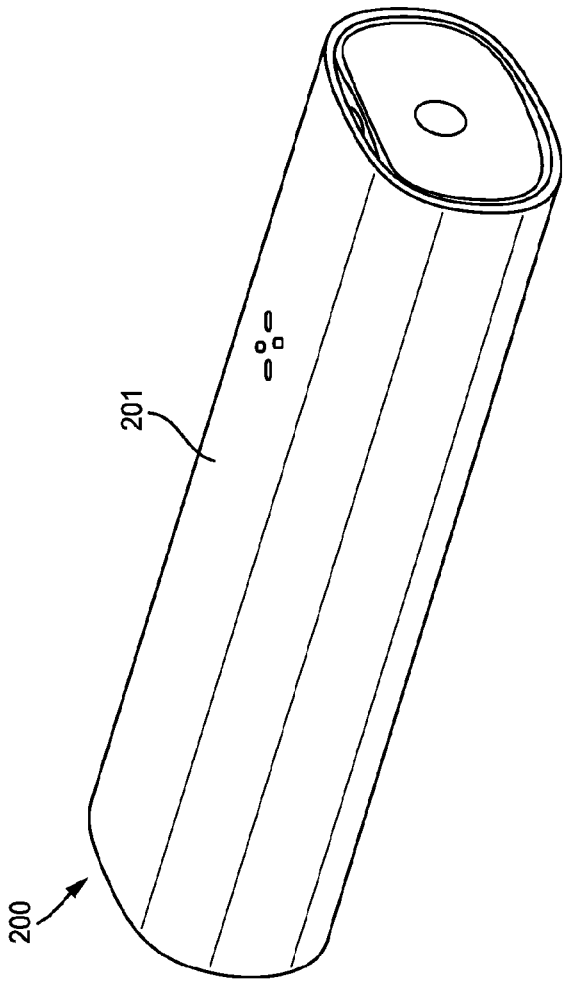


FIG. 2B

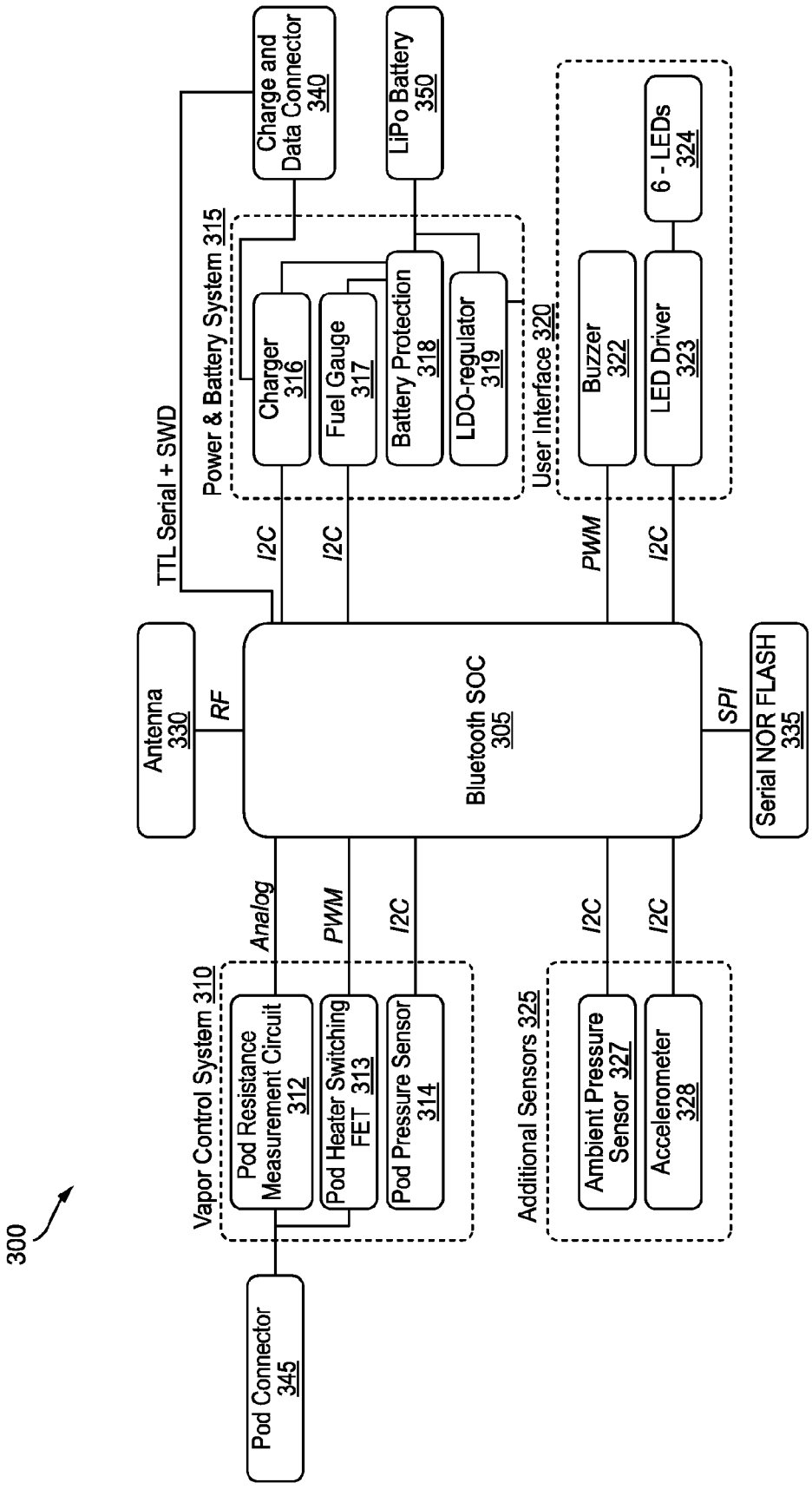

300
Pod Connector 345
Vapor Control System 310
Pod Resistance Measurement Circuit 312
Pod Heater Switching FET 313
Pod Pressure Sensor 314
Analog
PWM
I2C
Additional Sensors 325
Ambient Pressure Sensor 327
Accelerometer 328
I2C
I2C
Antenna 330
RF
Bluetooth SOC 305
SPI
Serial NOR FLASH 335
TTL Serial + SWD
Power & Battery System 315
Charger 316
Fuel Gauge 317
Battery Protection 318
LDO-regulator 319
I2C
I2C
Charge and Data Connector 340
LiPo Battery 350
User Interface 320
Buzzer 322
LED Driver 323
6 - LEDs 324
PWM
I2C

FIG. 3

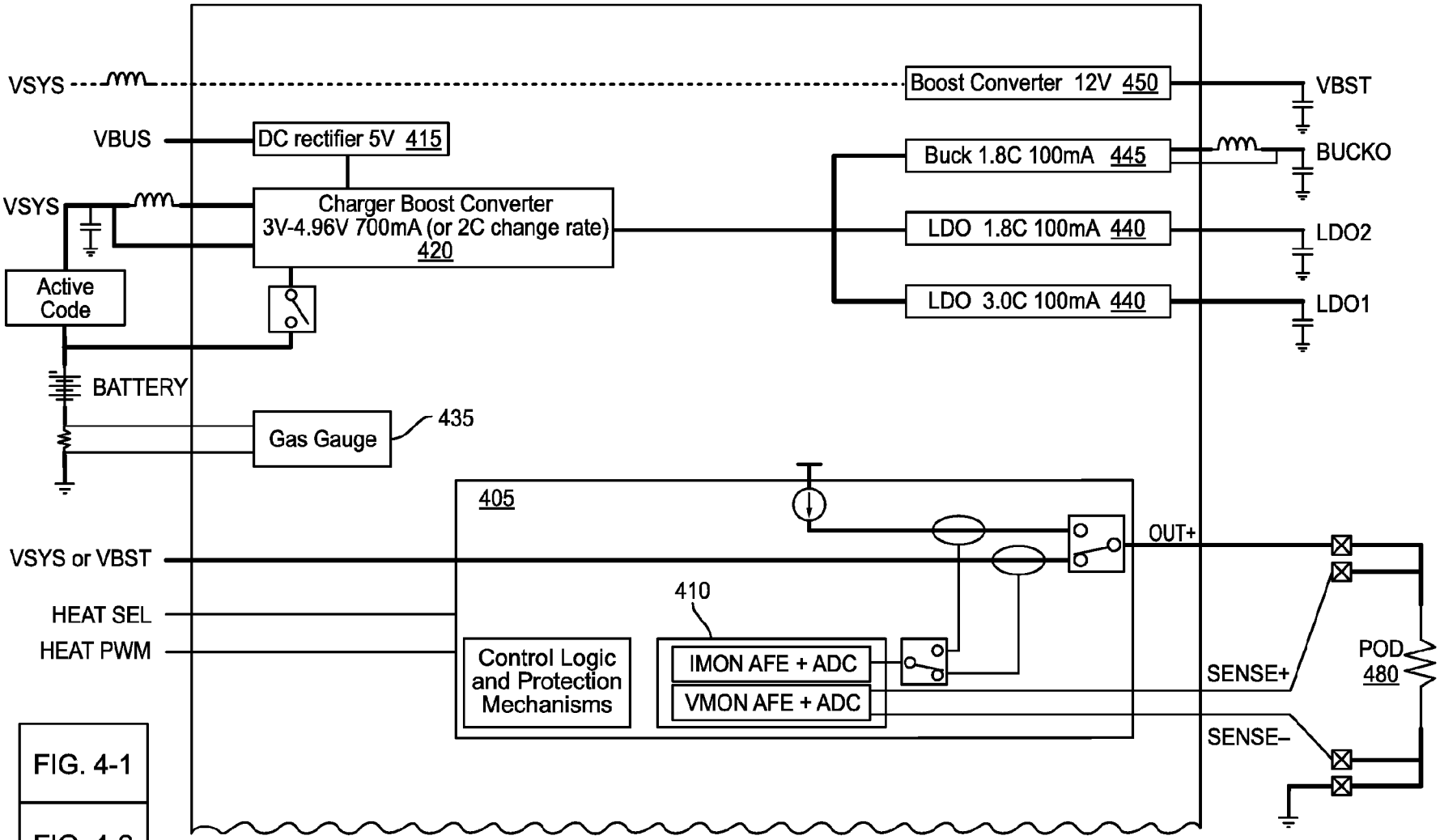


FIG. 4-1

FIG. 4-2

FIG. 4-1

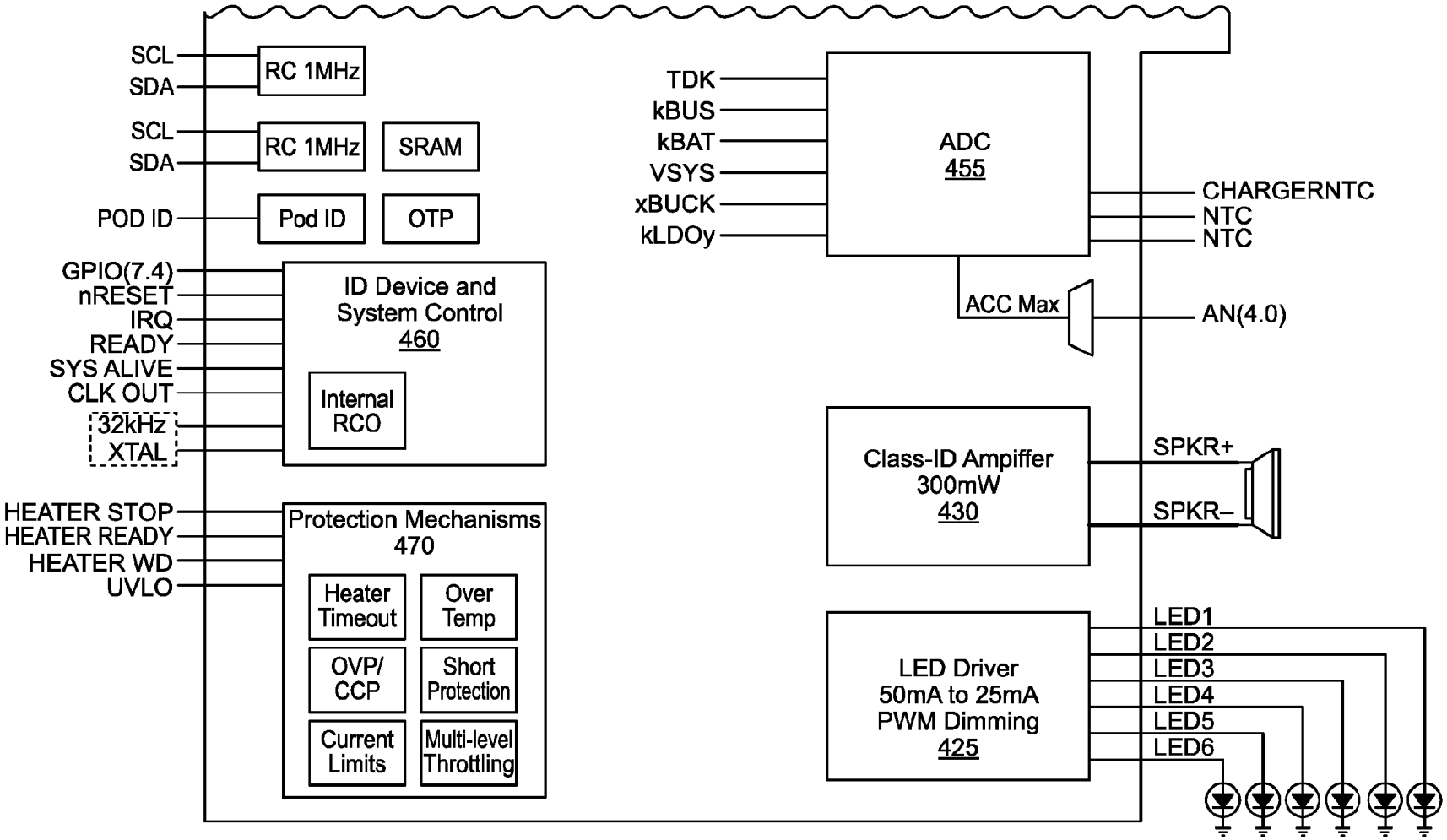

SCL
SDA
RC 1MHz
SCL
SDA
RC 1MHz
SRAM
POD ID
Pod ID
OTP
GPIO(7.4)
nRESET
IRQ
READY
SYS ALIVE
CLK OUT
32kHz
XTAL
ID Device and
System Control
460
Internal
RCO
HEATER STOP
HEATER READY
HEATER WD
UVLO
Protection Mechanisms
470
Heater
Timeout
Over
Temp
OVP/
CCP
Short
Protection
Current
Limits
Multi-level
Throttling
TDK
kBUS
kBAT
VSYS
xBUCK
kLDOy
ADC
455
CHARGERNTC
NTC
NTC
ACC Max
AN(4.0)
Class-ID Ampiffer
300mW
430
SPKR+
SPKR–
LED Driver
50mA to 25mA
PWM Dimming
425
LED1
LED2
LED3
LED4
LED5
LED6

FIG. 4-2

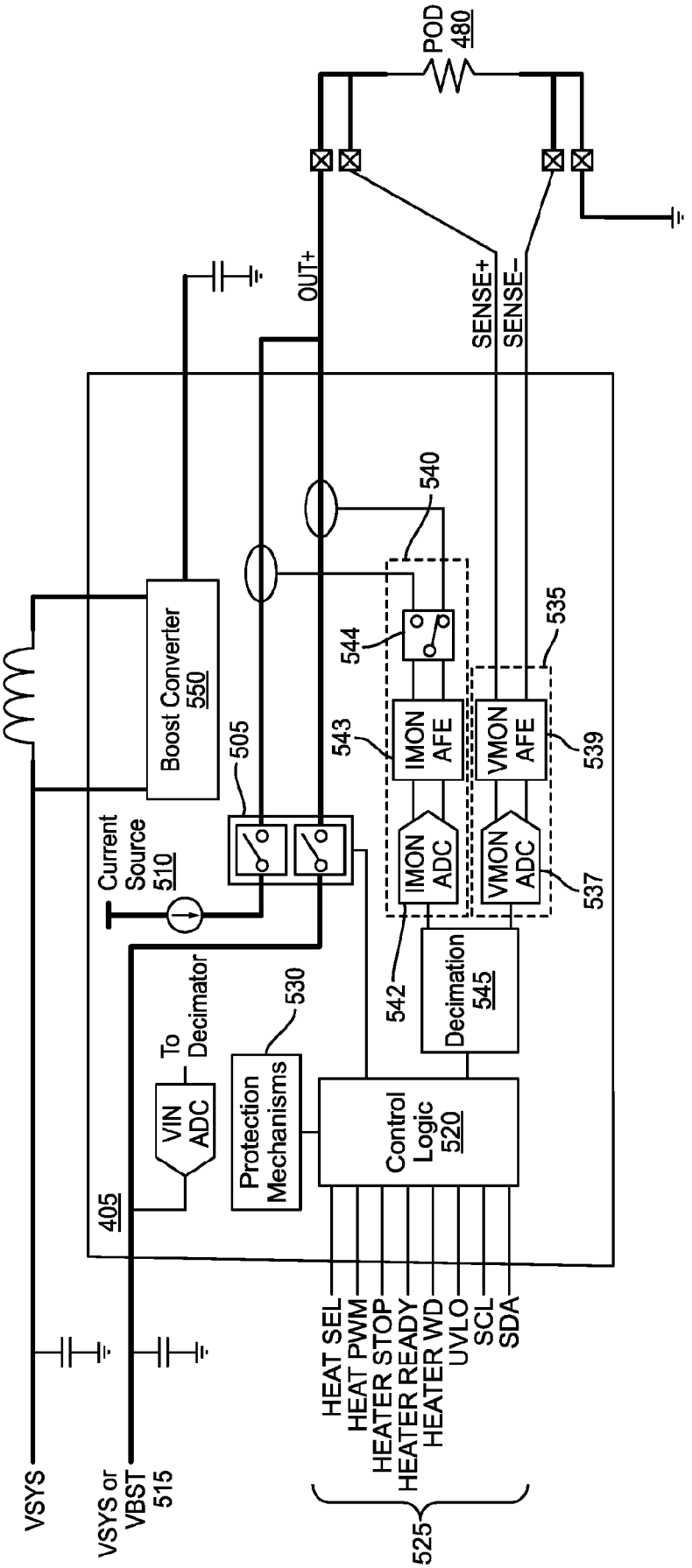

POD
480
OUT+
SENSE+
SENSE-
540
544
535
Boost Converter
550
505
543
IMON
AFE
VMON
AFE
539
Current
Source
510
IMON
ADC
VMON
ADC
537
542
Decimation
545
To
Decimator
530
VIN
ADC
Protection
Mechanisms
Control
Logic
520
405
HEAT SEL
HEAT PWM
HEATER STOP
HEATER READY
HEATER WD
UVLO
SCL
SDA
525
VSYS
VSYS or
VBST
515

FIG. 5

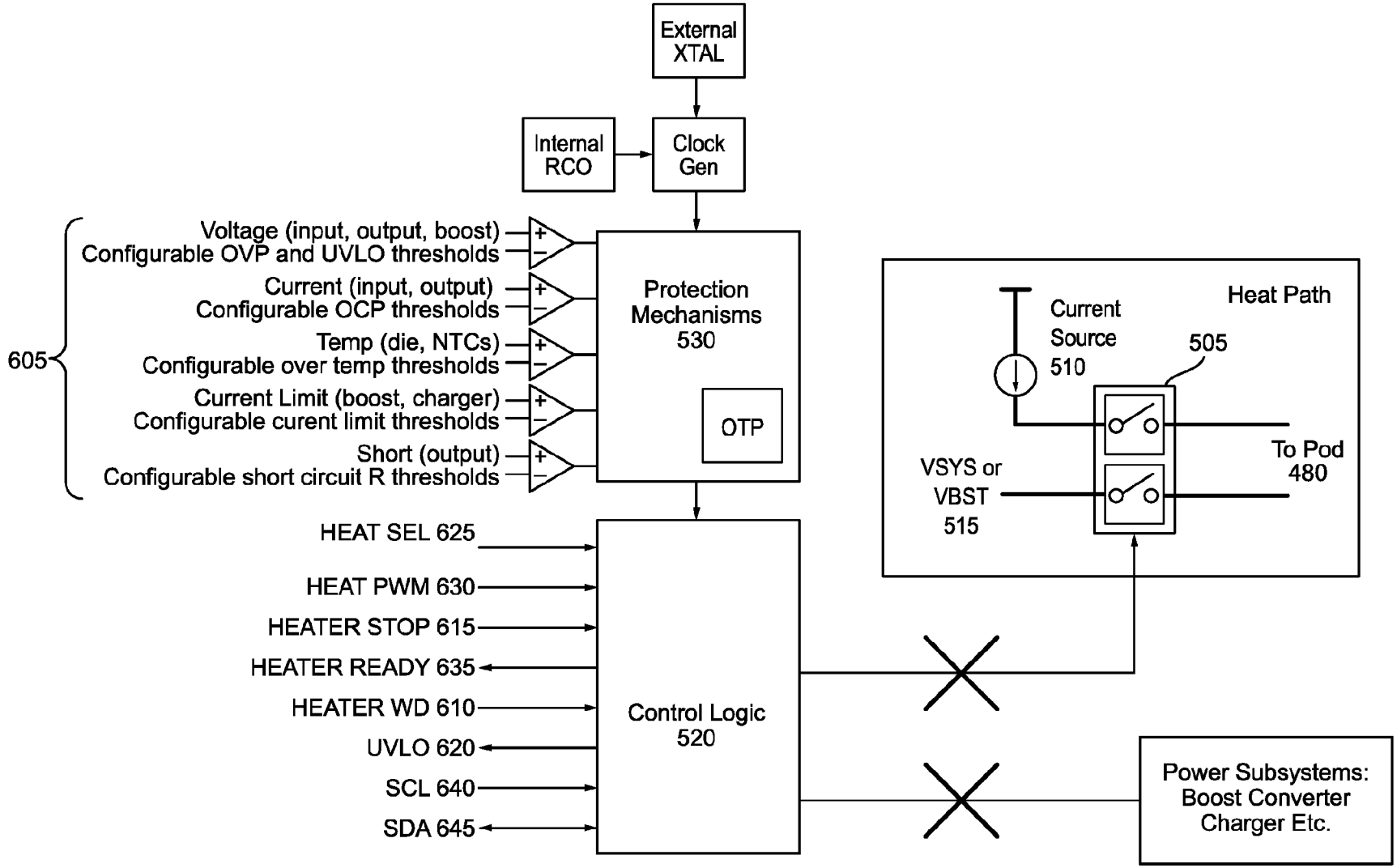

External XTAL
Internal RCO
Clock Gen
Voltage (input, output, boost)
Configurable OVP and UVLO thresholds
Current (input, output)
Configurable OCP thresholds
Temp (die, NTCs)
Configurable over temp thresholds
Current Limit (boost, charger)
Configurable curent limit thresholds
Short (output)
Configurable short circuit R thresholds
605
Protection Mechanisms 530
OTP
Heat Path
Current Source 510
505
To Pod 480
VSYS or VBST 515
HEAT SEL 625
HEAT PWM 630
HEATER STOP 615
HEATER READY 635
HEATER WD 610
UVLO 620
SCL 640
SDA 645
Control Logic 520
Power Subsystems: Boost Converter Charger Etc.

FIG. 6

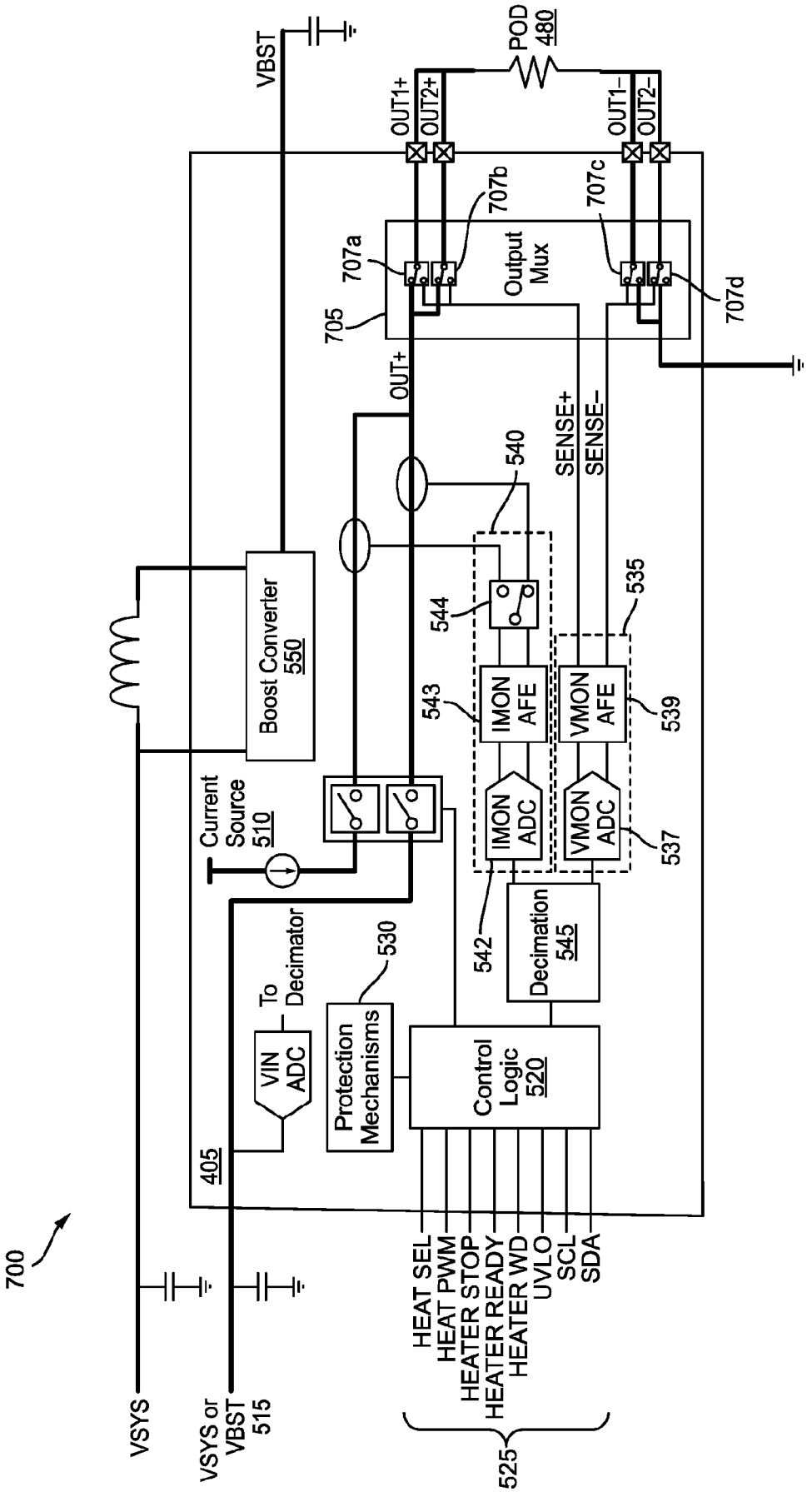

700
VSYS
VSYS or VBST 515
405
VBST
POD 480
OUT1+
OUT2+
OUT1-
OUT2-
707a
707b
707c
707d
705
Output Mux
OUT+
SENSE+
SENSE-
540
544
535
543
539
537
542
530
Boost Converter 550
Current Source 510
IMON AFE
VMON AFE
IMON ADC
VMON ADC
Decimation 545
To Decimator
VIN ADC
Protection Mechanisms
Control Logic 520
HEAT SEL
HEAT PWM
HEATER STOP
HEATER READY
HEATER WD
UVLO
SCL
SDA
525

FIG. 7

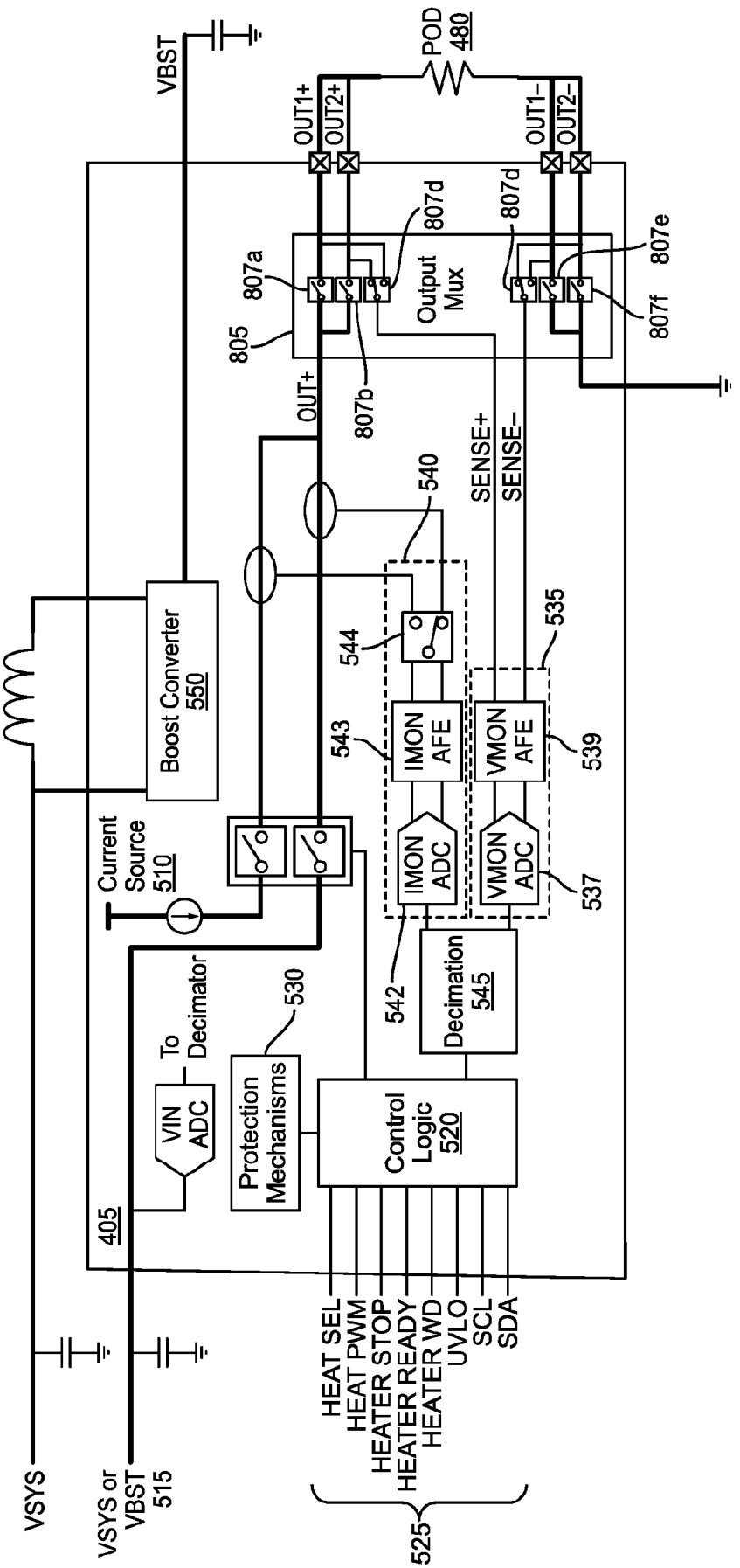

VBST
POD
480
OUT1+
OUT2+
OUT1-
OUT2-
807d
807d
807e
807a
Output
Mux
807f
805
807b
OUT+
SENSE+
SENSE-
540
544
535
Boost Converter
550
543
IMON
AFE
VMON
AFE
539
Current
Source
510
IMON
ADC
VMON
ADC
537
542
Decimation
545
To
Decimator
530
VIN
ADC
Protection
Mechanisms
Control
Logic
520
405
HEAT SEL
HEAT PWM
HEATER STOP
HEATER READY
HEATER WD
UVLO
SCL
SDA
525
VSYS
VSYS or
VBST
515

FIG. 8

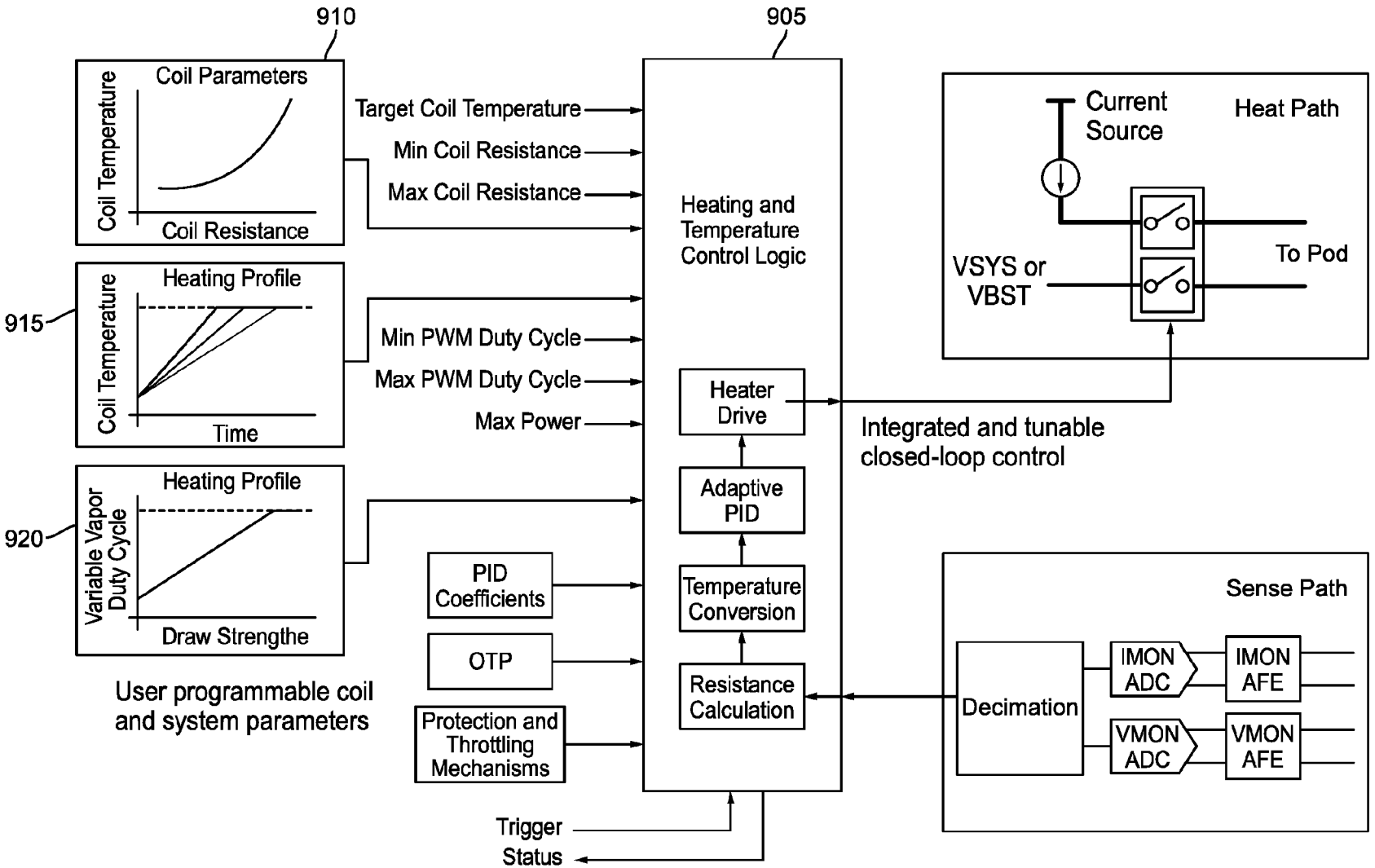

910
905
Coil Parameters
Coil Temperature
Coil Resistance
Target Coil Temperature
Min Coil Resistance
Max Coil Resistance
Heating and Temperature Control Logic
Current Source
Heat Path
To Pod
VSYS or VBST
915
Heating Profile
Coil Temperature
Time
Min PWM Duty Cycle
Max PWM Duty Cycle
Max Power
Heater Drive
Integrated and tunable closed-loop control
920
Heating Profile
Variable Vapor Duty Cycle
Draw Strengthe
Adaptive PID
PID Coefficients
Temperature Conversion
OTP
Resistance Calculation
Sense Path
Protection and Throttling Mechanisms
Decimation
IMON ADC
IMON AFE
VMON ADC
VMON AFE
Trigger
Status
User programmable coil and system parameters

FIG. 9

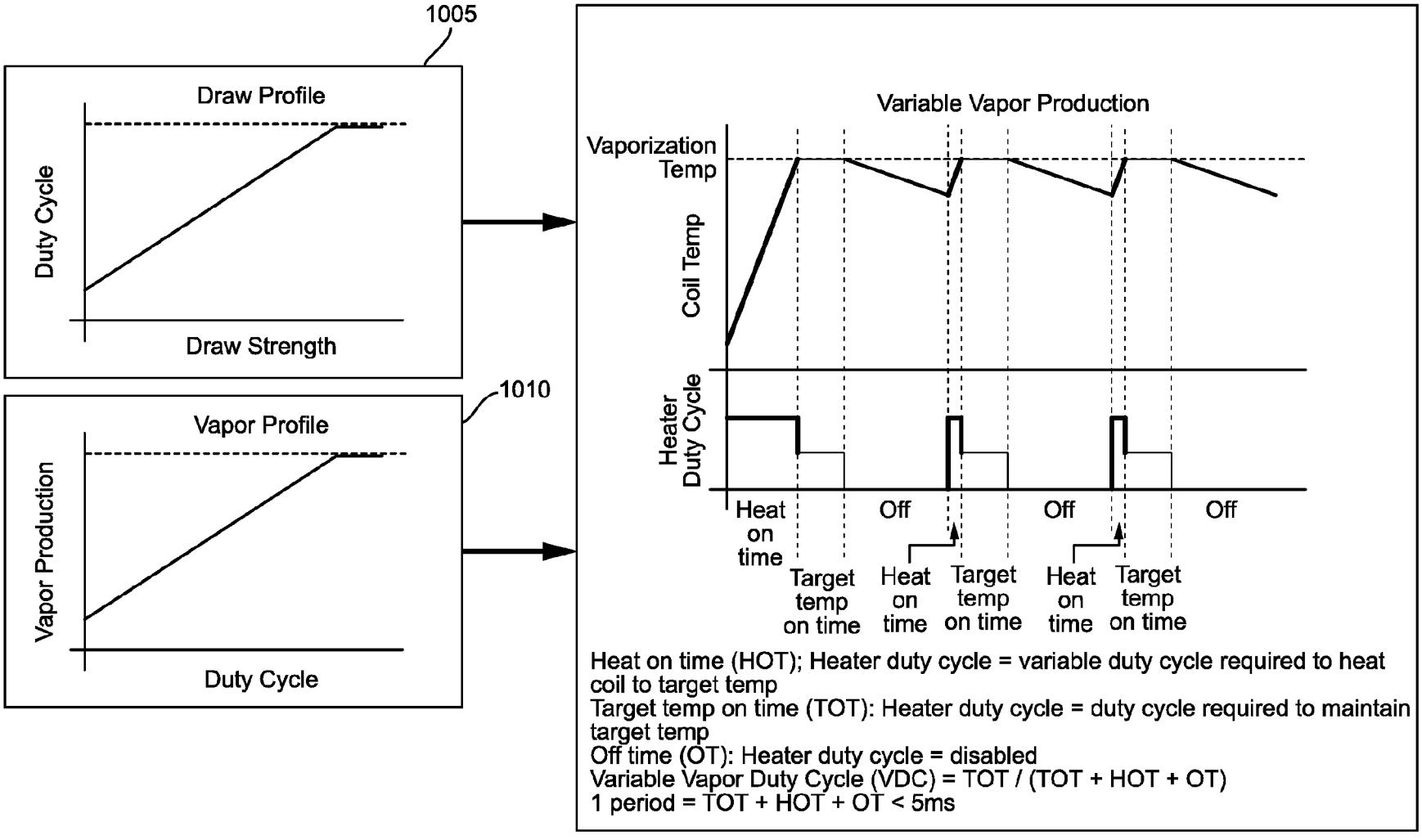

1005
Draw Profile
Duty Cycle
Draw Strength
1010
Vapor Profile
Vapor Production
Duty Cycle
Variable Vapor Production
Vaporization Temp
Coil Temp
Heater Duty Cycle
Heat on time
Off
Off
Off
Target temp on time
Heat on time
Target temp on time
Heat on time
Target temp on time
Heat on time (HOT); Heater duty cycle = variable duty cycle required to heat coil to target temp
Target temp on time (TOT): Heater duty cycle = duty cycle required to maintain target temp
Off time (OT): Heater duty cycle = disabled
Variable Vapor Duty Cycle (VDC) = TOT / (TOT + HOT + OT)
1 period = TOT + HOT + OT < 5ms

FIG. 10

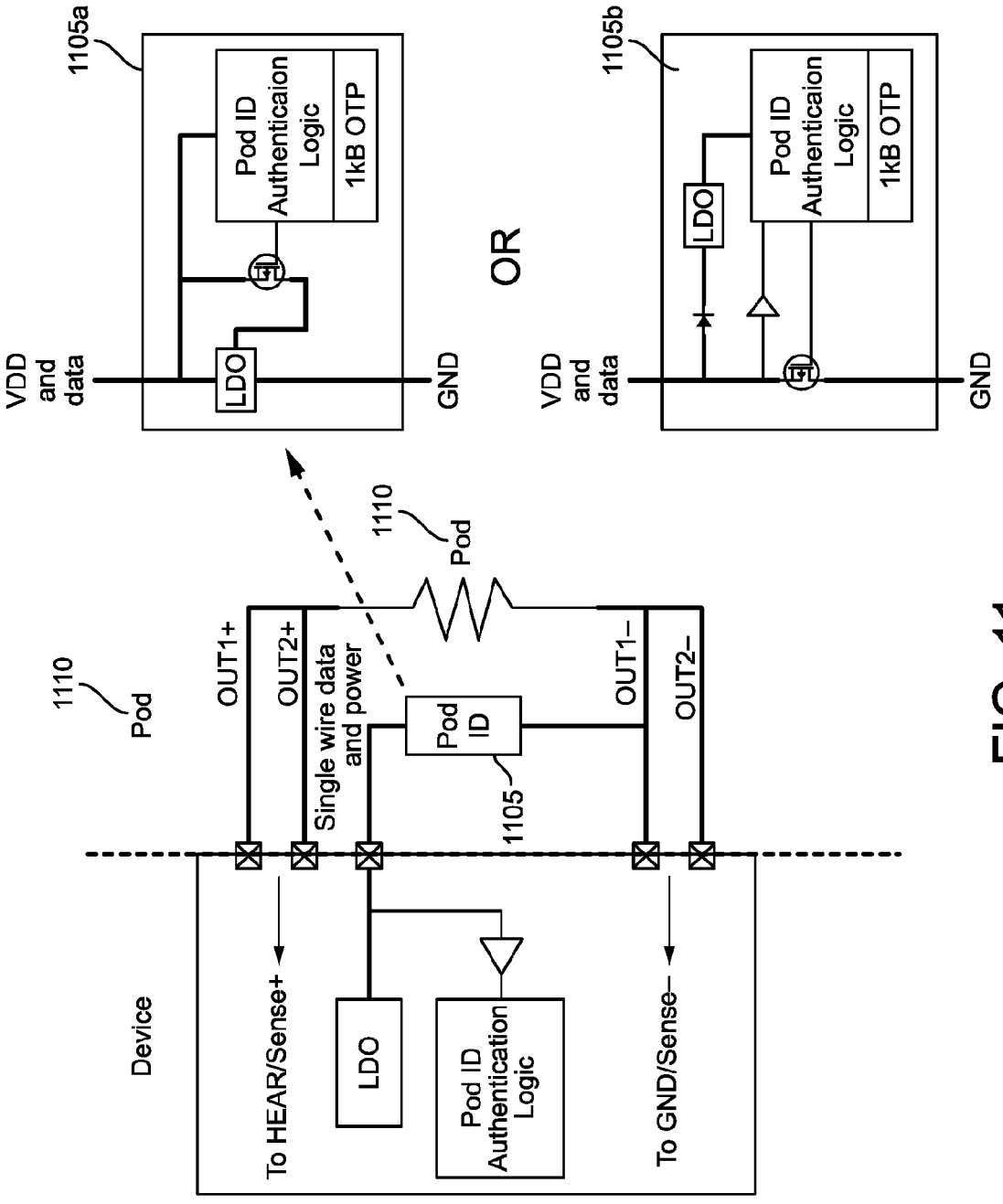

1105a
Pod ID Authenticaion Logic
1kB OTP
LDO
VDD and data
GND
OR
1105b
Pod ID Authenticaion Logic
1kB OTP
LDO
VDD and data
GND
1110
Pod
OUT1+
OUT2+
Single wire data and power
Pod ID
1105
OUT1–
OUT2–
1110
Pod
Device
To HEAR/Sense+
LDO
Pod ID Authentication Logic
To GND/Sense–

FIG. 11

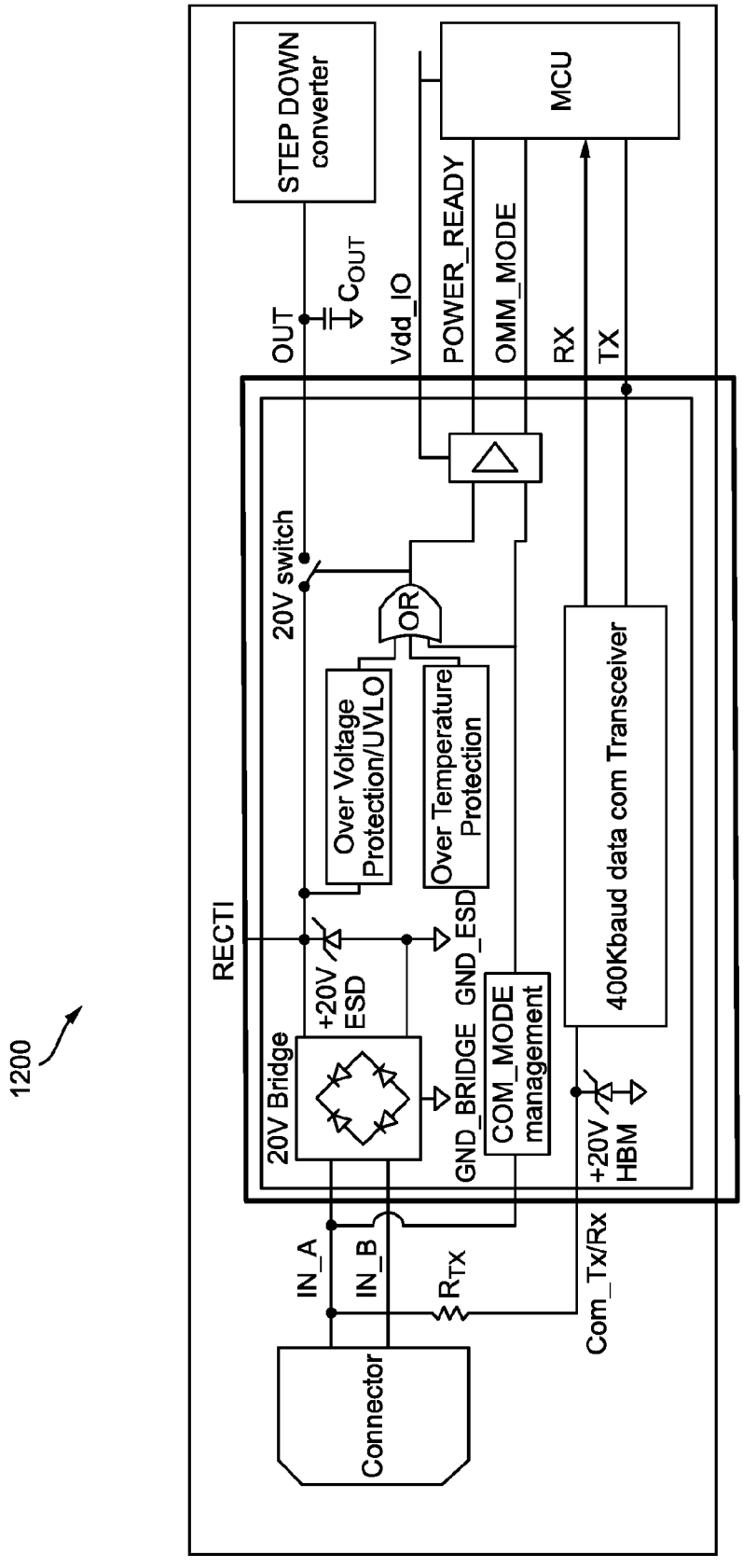

1200
STEP DOWN converter
MCU
OUT
C_{OUT}
Vdd_IO
POWER_READY
OMM_MODE
RX
TX
20V switch
OR
Over Voltage Protection/UVLO
Over Temperature Protection
400Kbaud data com Transceiver
RECTI
+20V ESD
GND_ESD
20V Bridge
COM_MODE management
GND_BRIDGE
+20V HBM
IN_A
IN_B
R_{TX}
Com_Tx/Rx
Connector

FIG. 12