

Product Name : Mobile Phone
Model Name : 25128PC17L
Trademark : POCO
FCC ID : 2AFZZ8PC17L

**–Technical Description of Power Reduction through
Proximity Sensor**

Table of Contents

1. INTRODUCTION	3
2. THE ANTENNA LOCATION	5
3. PROXIMITY SENSOR INTRODUCTION	6
4. TRIGGER DISTANCE OF SAR SENSOR	14
5. TARGET POWER REDUCTION APPLIED FOR EACH WIRELESS MODE AND ORIENTATION.....	15
6. TRIGGER DISTANCE TESTING	19
7. SENSOR COVERAGE AREA TESTING	21

1. Introduction

This device is a mobile phone with WWAN/WLAN function, it has embedded a proximity sensor to reduce power for the compliance with FCC SAR test. When the body gets close to the sensor pad area, the sensor will be triggered and reduce the TX power.

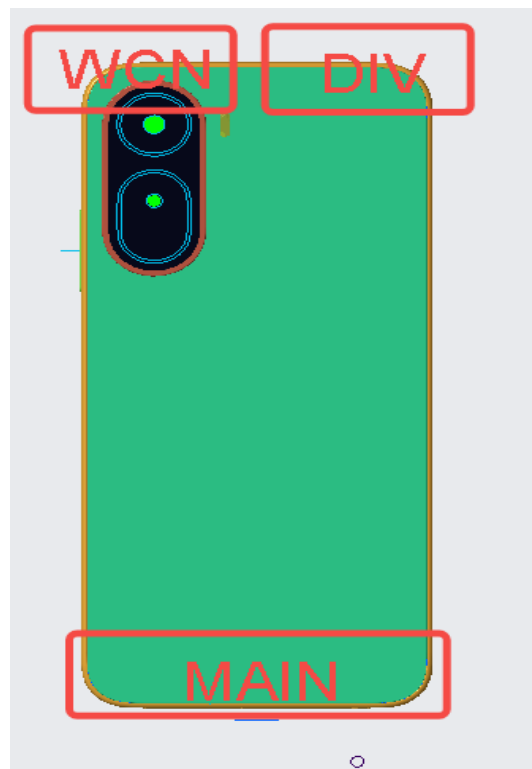
1.1 Product Spec for wireless technology

Product Name:	Mobile Phone	
Model Name:	25128PC17L	
Trademark.:	POCO	
FCC ID:	2AFZZ8PC17L	
Power Supply	3.86 Vdc, EUT is equipped with an adapter to power it via AC/DC.	
Hardware Version	135100502	
Software Version	Xiaomi HyperOS 3.0	
Manufacturer	Xiaomi Communications Co., Ltd.	
Manufacturer Address	#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085	
Test Matrix/ IMEI	IMEI 1: 863426080028684 IMEI 2: 863426080028692	IMEI 1: 863426080028262 IMEI 2: 863426080028270
Wireless specification	GSM	
Support Band(s)	GSM 850, GSM 1900	
Uplink Frequency	GSM 850: 824.2-848.8 MHz GSM1900: 1850.2-1909.8 MHz	
Downlink Frequency	GSM 850: 869.2-893.8 MHz GSM1900: 1930.2-1989.8 MHz	
Wireless specification	WCDMA	
Support Band(s)	Band 2, Band 4, Band 5	
Uplink Frequency	Band 2: 1850-1910 MHz Band 4: 1710-1755 MHz Band 5: 824-849 MHz	
Downlink Frequency	Band 2: 1930-1990 MHz Band 4: 2110-2155 MHz Band 5: 869-894 MHz	
Type of Modulation	Downlink modulation: QPSK & 16QAM & 64QAM Uplink modulation: QPSK & 16QAM	
Wireless specification	LTE	
Support Band(s)	Band2/4/5/7/13/26/38/41/66	
Uplink Frequency	Band 2: 1850-1910 MHz Band 4: 1710-1755 MHz Band 5: 824-849 MHz Band 7: 2500-2570 MHz Band 13: 777-787 MHz Band 26: 814-824MHz, 824-849 MHz Band 38: 2570-2620 MHz Band 41: 2496-2690 MHz Band 66: 1710-1780 MHz	
Downlink Frequency	Band 2: 1930-1990 MHz Band 4: 2110-2155 MHz	

	Band 5: 869-894 MHz Band 7: 2620-2690 MHz Band 13: 746-756 MHz Band 26: 859-869 MHz, 869-894 MHz Band 38: 2570-2620 MHz Band 41: 2496-2690 MHz Band 66: 2110-2200 MHz					
Type of Modulation	Downlink modulation: QPSK & 16QAM & 64QAM Uplink modulation: QPSK & 16QAM & 64QAM					
Wireless specification	802.11b / g / n					
Operating frequency	2412~2462MHz					
Type of Modulation	DSSS / OFDM					
Smart System	☒	SISO				
Wireless specification	802.11a / n / ac					
Frequency Range	U-NII-1: 5150 MHz to 5250 MHz					
	U-NII-2A: 5250 MHz to 5350 MHz					
	U-NII-2C: 5470 MHz to 5725 MHz					
	U-NII-3: 5725 MHz to 5850 MHz					
Channel Bandwidth	802.11a 20 MHz 802.11n 20 MHz, 40 MHz 802.11ac 20 MHz, 40 MHz, 80 MHz					
Modulation technology	OFDM					
Smart System	☒	SISO				
Wireless specification	Bluetooth (BR/EDR)					
Operating frequency range(s)	2402~2480MHz					
Type of Modulation	GFSK & DPSK					
PHYs	☒	GFSK	☒	Pi/4 DQPSK	☒	8DPSK
Data Rate	☒	1Mbit/s	☒	2Mbit/s	☒	3Mbit/s
Number of channels	79					
Wireless specification	Bluetooth (LE)					
Operating frequency range(s)	2402~2480MHz					
Type of Modulation	GFSK & DPSK					
PHYs	☒	LE 1M	☒	LE 2M		
Data Rate	☒	1Mbit/s	☒	2Mbit/s		
Number of channels	40					
Remark: As above information is provided and confirmed by the applicant. DEKRA is not liable to the accuracy, suitability, reliability or/and integrity of the information.						

2. The Antenna Location

The Detailed Antenna Locations are shown in the following figure.



As shown in the above figure and the table below, there are 3 antennas embedded in the phone. It has embedded a capacitive proximity sensor for the power reduction of antenna to comply with SAR requirement. The antenna (MAIN(ANT 0), DIV(ANT 0)) is used as the sensor pad.

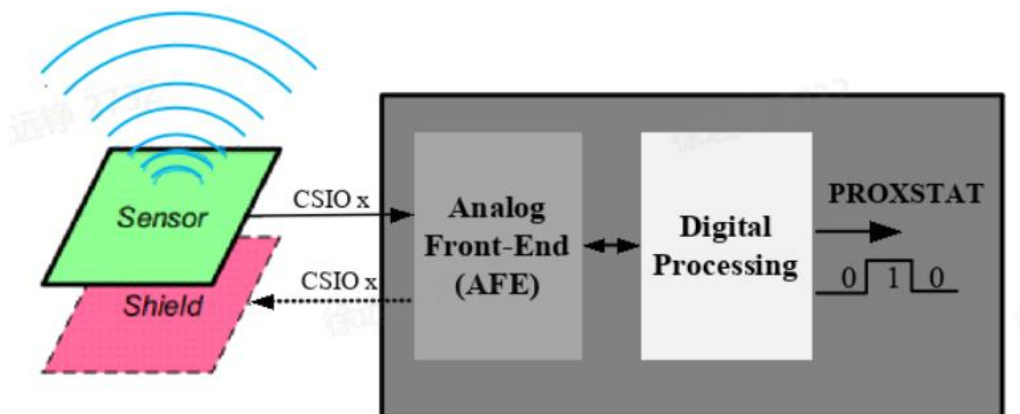
3 Proximity Sensor Introduction

The device uses one sensor chip to reduce the maximum output power in selected wireless mode and operating configurations to ensure SAR compliance. The sensor implementation can identify and facilitate triggering different max power levels for different scenarios including different exposure test positions when the device is closed to a user's body. The main purpose for the implementation is to distinguish the scenarios of Body and trigger power reduction for body worn state and provide enhanced user experience.

1. When antenna close to the body, the Antenna will be enter to fix Power Level.

The purpose of the proximity sensing interface is to detect when a conductive object (usually a body part i.e. finger, palm, face, etc.) is in the proximity of the system. Note that proximity sensing can be done through the air or through a solid (typically plastic) overlay (also called "touch" sensing). The chip's proximity sensing interface is based on capacitive sensing technology. An overview is given below.

- a. The sensor can be a simple copper area on a PCB or FPC for example. Its capacitance (to ground) will vary when a conductive object is moving in its proximity.
- b. The optional shield can also be a simple copper area on a PCB or FPC below/under/around the sensor. It is used to protect the sensor against potential surrounding noise sources and improve its global performance. It also brings directivity to the sensing, for example sensing objects approaching from top only.
- c. The analog front-end (AFE) performs the raw sensor's capacitance measurement and converts it into a digital value. It also controls the shield.
- d. The digital processing block computes the raw capacitance measurement from the AFE and extracts a binary information PROXSTAT corresponding to the proximity status, i.e. object is "Far" or "Close". It also triggers AFE operations (compensation, etc.).

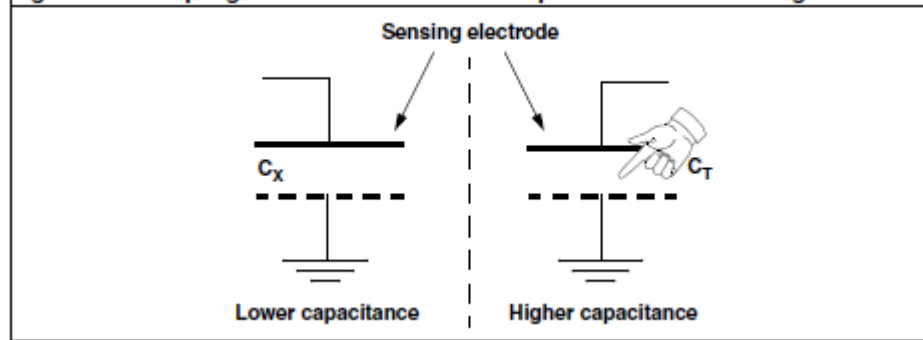


Proximity Sensing Interface Overview

Capacitive sensing overview

A capacitance exists between any reference point and ground as long as they are electrically isolated. If this reference point is a sensing electrode, it can help to think of it as a capacitor. The positive electrode of the capacitor is the sensing electrode, and the negative electrode is formed by the surrounding area (virtual ground reference in Figure 4).

Figure 4. Coupling with hand increases the capacitance of the sensing electrode



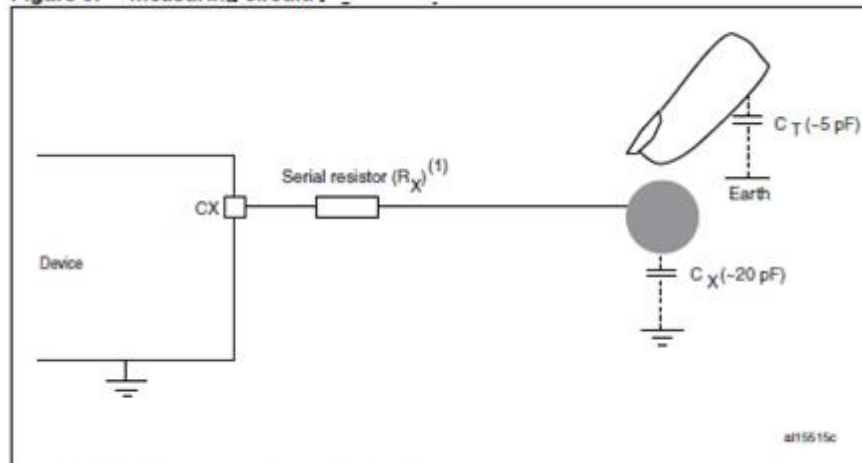
When a conductive object is brought into proximity of the sensing electrode, coupling appears between them, and the capacitance of the sensing electrode relative to ground increases. For example, a human hand raises the capacitance of the sensing electrode as it approaches it. Touching the dielectric panel that protects the electrode increases its capacitance significantly.

Charge-transfer acquisition principle

To measure changes in the electrode capacitance, devices employ bursts of charge-transfer cycles.

The measuring circuitry is connected to the CX pin. It is composed of a serial resistor R_X plus the sensing electrode itself of equivalent capacitance C_X (see Figure 5). The sensing electrode can be made of any electrically conductive material, such as copper on PCBs, or transparent conductive material like Indium Tin Oxide (ITO) deposited on glass or Plexiglas. The dielectric panel usually provides a high degree of isolation to prevent electrostatic discharge (ESD) from reaching the STM8T touch sensing controller. Connecting the serial resistor (R_X) to the CX pin improves ESD immunity even more.

Figure 5. measuring circuitry



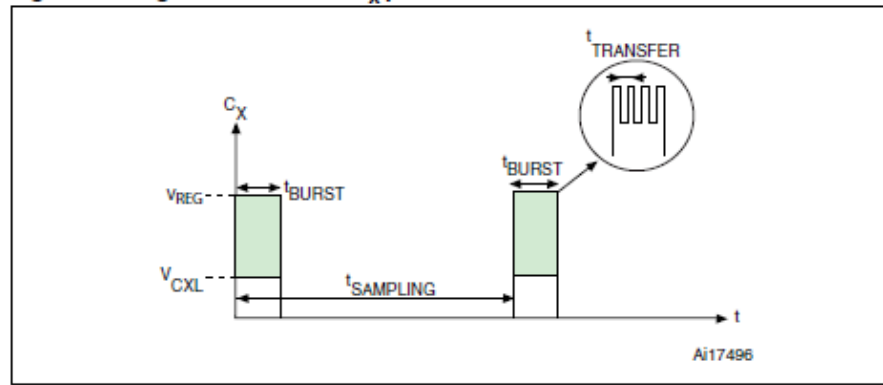
1. R_X must be placed as close as possible to the device.

The principle of charge transfer is to charge the electrode capacitance (C_X) using a stable power supply. When C_X is fully charged, part of the accumulated charge is transferred from C_X to an internal sampling capacitance, referred to as C_S . The transfer cycle is repeated until the voltage across the sampling capacitor C_S reaches the end of acquisition reference voltage (V_{TRIP}). The change in the electrode capacitance, caused by the presence or absence of the human body, is detected by measuring the number of transfer cycles composing a burst (see Figure 6).

Throughout this document the following naming conventions apply:

- The charge transfer period ($t_{TRANSFER}$) refers to the charging of C_X and the subsequent transfer of the charge to C_S .
- The burst cycle duration (t_{BURST}) is the time required to charge C_S to V_{TRIP} . The burst count is the number of charge transfer periods ($t_{TRANSFER}$) during one t_{BURST} cycle.
- The sampling period ($t_{SAMPLING}$) is the acquisition rate.

Figure 6. Signal monitored on C_X pin



Internal sampling capacitor

To reduce the application cost and increase the device flexibility, the features several internal sampling capacitors to fit a wide range of applications. The sampling interval is 9 msec.

Electrode parasitic capacitance compensation (EPCC)

The implementation of an electrode pad in a system always induces parasitic capacitances through tracks and surrounding components. The electrode parasitic capacitance is the residual capacitance between electrode and ground when no finger is present.

The EPCC is an internal hardware circuitry that compensates part of the electrode parasitic capacitance to improve the capacitive sensing channel sensitivity.

Detection and release thresholds

During the detection operation, after calibration is over, the device switches between three operating states: no detection, proximity detection, and touch detection. The switch between these states is driven by the difference between the signal and the reference.

The system goes from no detection to proximity detection state when the (reference - signal) is higher than the proximity threshold (PTh). In this state, the ECS is halted and the reference is frozen.

The system goes from no detection or proximity detection state to touch detection state when the (reference - signal) is higher than the touch threshold (TTh). When this happens, the reference value is changed to reflect the touch state after the delay tDYCAL_T. This process is called dynamic calibration (DYCAL).

The system goes from the touch detection to no detection state when the (signal - reference) goes above the release threshold (RTh). At this point, another DYCAL occurs for the reference to represent the untouched state again.

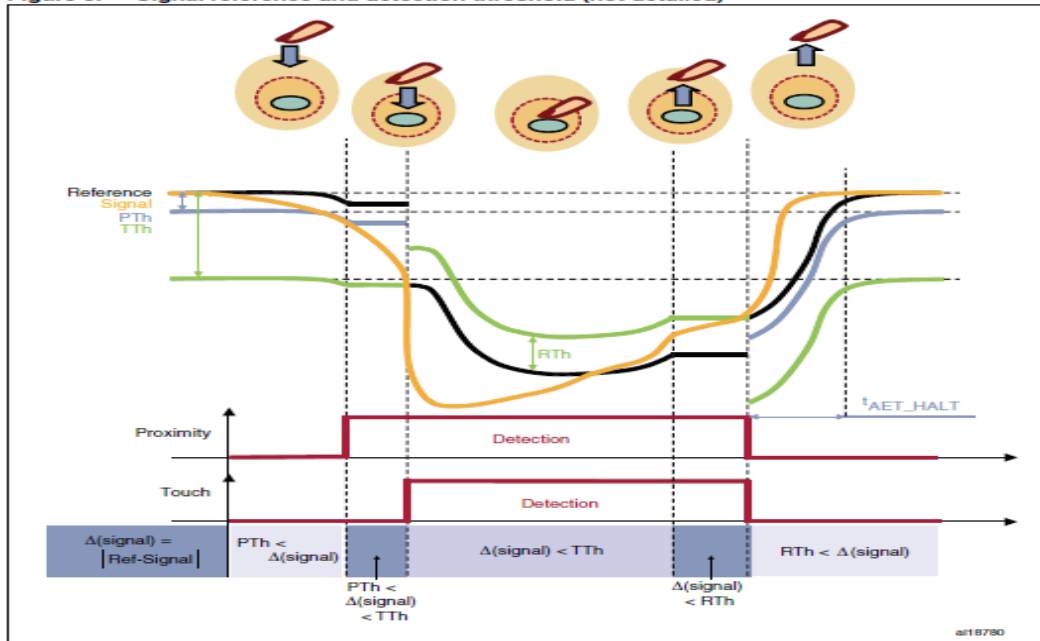
For higher flexibility, several proximity and touch detection thresholds are available and independently selectable through option byte: one PTh and one TTh.

- The touch thresholds allow the touch sensitivity to be adapted to the panel thickness and the electrode sensitivity.
- The proximity thresholds allow the device to adapt to various surroundings and to tune the detection distance.

The release threshold is a ratio of the touch threshold noted (TTh). TTh is selected by the "touch detection threshold" option bits. The ratio is selected by the "release threshold ratio" option bits.

A time filtering, similar to the debouncing of the mechanical switches, is applied to avoid noise induced detections. Figure 8 simplifies the proximity and touch detection event according to the signal variation " Δ (signal)". The Δ (signal) is the absolute value of the reference minus the signal

Figure 8. Signal reference and detection threshold (not detailed)

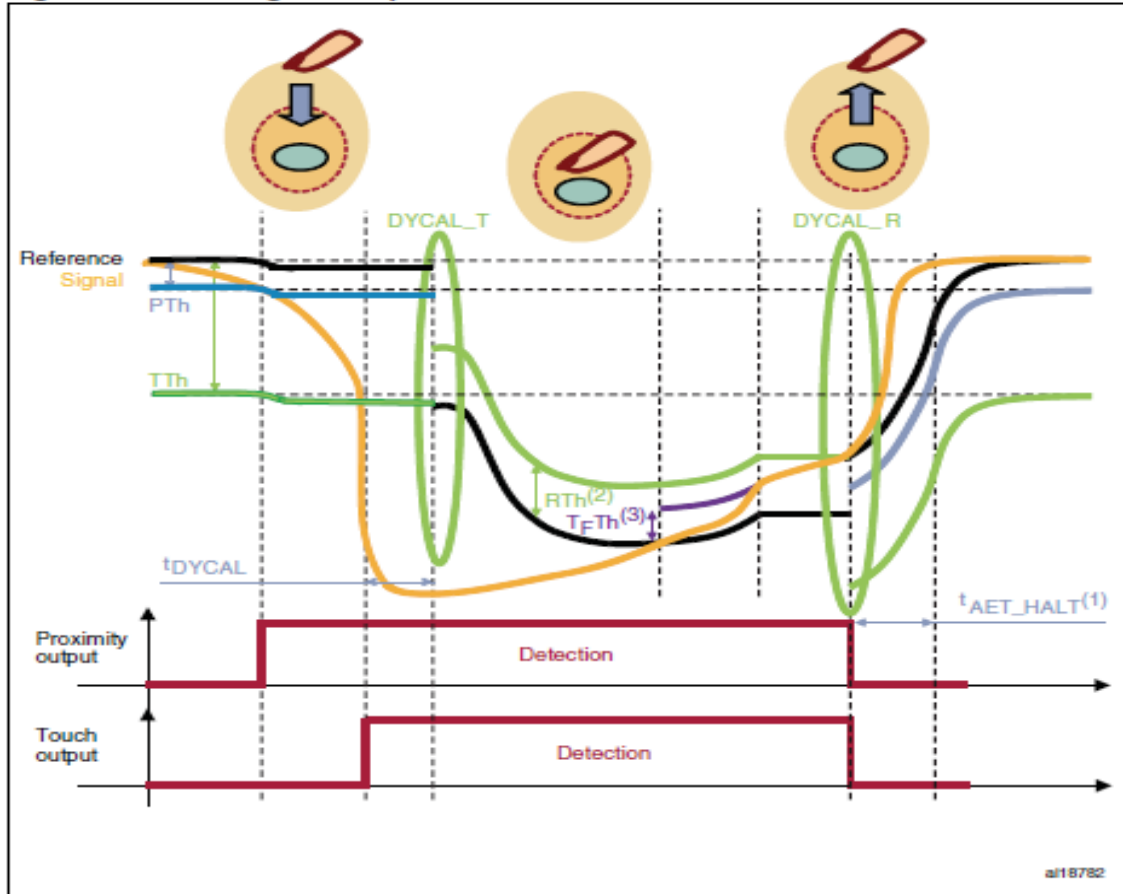


Dynamic calibration (DYCAL)

The device DYCAL process is based on a dynamic threshold and reference management which allows tracking of slow environmental changes even when the sensor is in touch state. A low threshold is used to detect the proximity of an object, with a higher threshold for touch detection. DYCAL is performed when a touch condition is detected for longer than a certain period (t_{DYCAL_T}). When a release condition occurs, the DYCAL operation is performed instantaneously. Figure 9 represents the DYCAL operation for the touch event (DYCAL_T) and for the release event (DYCAL_R).

After the DYCAL_R event, the AET process is frozen for a t_{AET_HALT} delay.

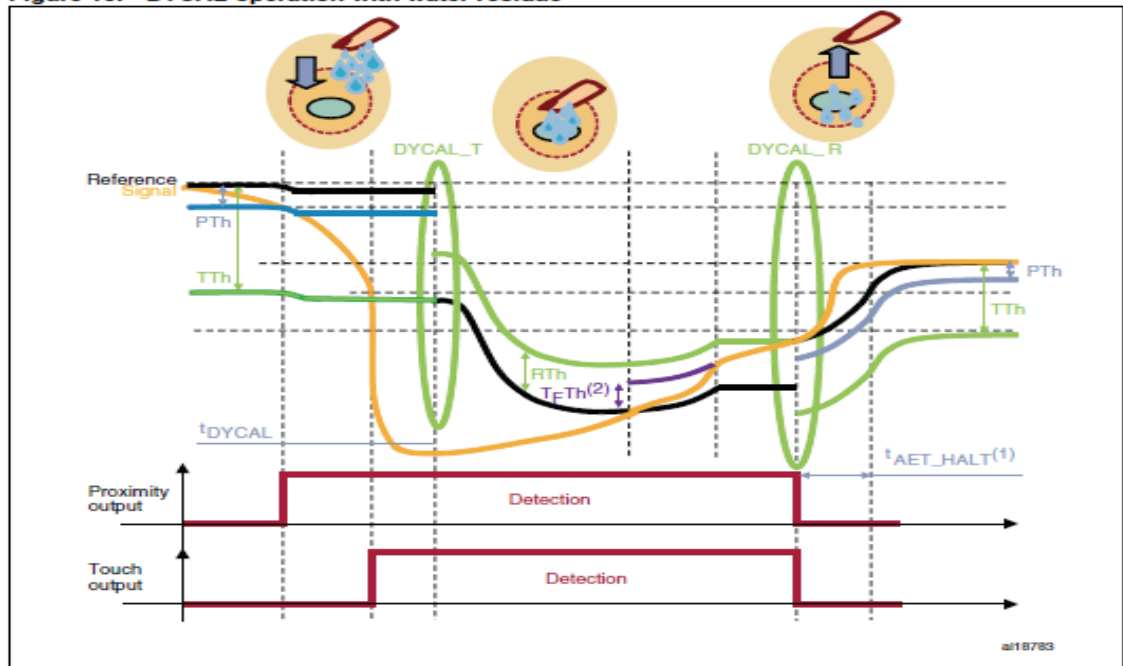
Figure 9. DYCAL general operation



1. t_{AET_HALT} = AET HALT period after end of detection.
2. The release threshold (RTh) is a ratio of the touch threshold (TTh). TTh is selected by the "touch detection threshold" option bits (TTh). The ratio is selected by the "release threshold ratio" option bits.
3. T_{FTh} = Touch freeze threshold. Please refer to [Table 17: General capacitive sensing characteristics](#) and [Figure 12: IIR filter formula](#) for the T_{FTh} description.
4. In touch condition, the ECS allows the reference to adapt a slow signal variation change.

Figure 10 is an example of how the system behaves with a water residue when it is managed by DYCAL.

Figure 10. DYCAL operation with water residue

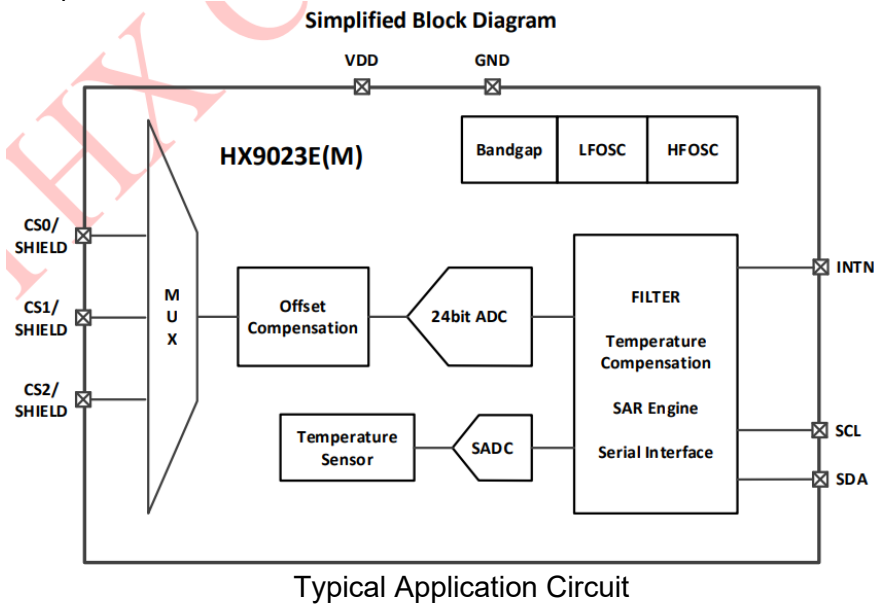


1. t_{AET_HALT} = AET HALT period after end of detection.
2. T_{FTh} = Touch freeze threshold. Please refer to [Table 17: General capacitive sensing characteristics](#) and [Figure 12: IIR filter formula](#) for the T_{FTh} description.

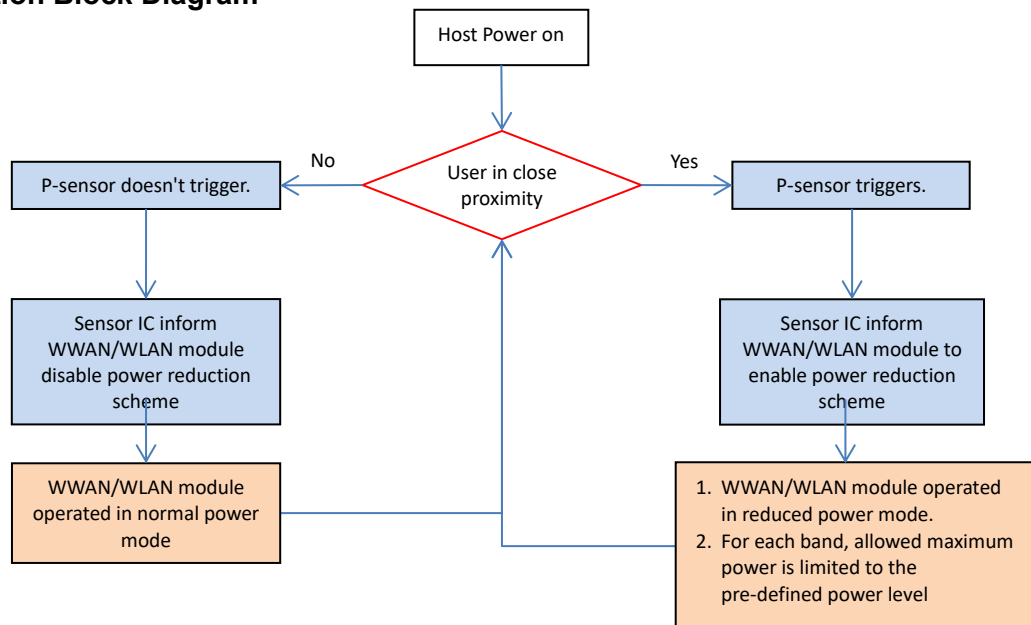
Proximity sensor configuration

The device uses one sensor chip and one proximity sensors (metallic electrode) to reduce the maximum output power in selected wireless mode and operating configurations to ensure SAR compliance. The proximity sensor shares the same metallic electrode with the 2G/3G/4G main antennas. The sensor implementation can identify and facilitate triggering different max power levels for different scenarios including different exposure test positions(front side/Back side/Bottom side/Top side) when the device is closed to a user's body. The main purpose for the implementation is to distinguish the scenarios of Body, minimize triggering associated with power reduction for different scenarios and provide enhanced user experience.

The device chooses HX9134 as the SAR sensor. The HX9134 can use any of its four sensor inputs(only two inputs have been used here). The resulting detection is used in portable electronic devices to reduce and control RF emission power in the presence of a human body, enabling significant performance advantages for devices with electro-magnetic radiation sources to meet stringent emission regulations' criteria and SAR standards. When communication link is built between DUT and base station, If body gets close to the sensor of the DUT, the sensor will be triggered, and reduce power table will be call.



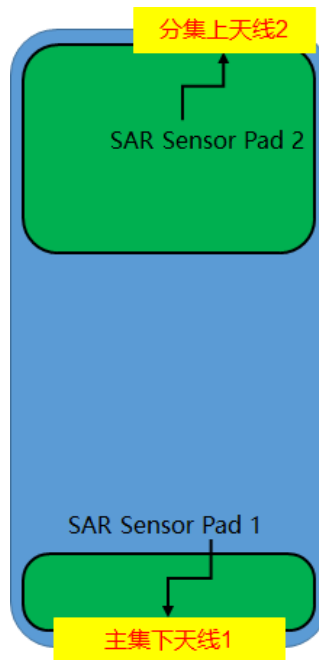
Power Reduction Block Diagram



Remark:

1. The sensor IC samples every **9 msec**, a debouncing filter mechanism will detect few consecutive triggering status, and will update the sensor IC output status every **60 msec**.
2. The reduced power is enabled through a look-up table on the WWAN module. Once the P-sensor is triggered the Sensor IC will send an active signal to inform WWAN module to enable power reduction scheme.

The location of the proximity sensor



Following procedures to verify this cap sensor detection capability

- a. The Front surface is moved toward the flat phantom in 3 mm steps until the sensor triggers.
- b. The Front surface is then moved back (further away) from the phantom by at least 5 mm until sensor off.
- c. The Front surface is again moved toward the phantom, but in 1 mm steps, until it is at least 5mm past the triggering point or touching the phantom.
- d. If the device is not touching the phantom, it is moved in 3 mm steps until it touches the phantom to confirm that the sensor remains triggered.
- e. The process is then reversed by moving the DUT away from the phantom according to steps a) to d), to determine triggering release.
- f. Steps a) to e) need be repeated at front side, back side, top side, bottom side.

4 Trigger Distance of SAR Sensor

Sensor in main board

Bottom Sensor pad: MAIN Antenna (ANT 0)			
Position	SAR Sensor Trigger	Trigger Distance	
		Near	Far
Frant side	YES	≤16mm	>16mm
Back side	YES	≤12mm	>12mm
Left side	NO	Not Detect	Not Detect
Right side	NO	Not Detect	Not Detect
Top side	NO	Not Detect	Not Detect
Bottom side	YES	≤16mm	>16mm

Top Sensor pad: DIV Antenna (ANT 1)			
Position	SAR Sensor Trigger	Trigger Distance	
		Near	Far
Frant side	YES	≤16mm	>16mm
Back side	YES	≤12mm	>12mm
Left side	NO	Not Detect	Not Detect
Right side	NO	Not Detect	Not Detect
Top side	NO	≤16mm	>16mm
Bottom side	YES	Not Detect	Not Detect

Maximum transmit power reduce process follow below strategy when mobile connect network.

Position	Audio Reciver	Bottom Sensor	Top Sensor	TX Power reduce
Body	Off	Near	Near	Yes_DSI 3
	Off	Near	Far	Yes_DSI 4
	Off	Far	Far	No DSI 2
Head	On	/	/	No_DSI 1

Audio receiver detection configuration

The device supports the Audio receiver detection mechanism. The audio receiver is used to determine head.

When operating in a call at the head, the relevant power levels are set for 2G&3G&4G accordingly, in order to comply with SAR requirement.

5 Target Power reduction applied for each wireless mode and orientation

Power Summary Table

Band	Antenna	Full Power (Receiver off) DSI 2	Head SAR (Receiver on) DSI 1	Hotspot SAR (Sensor on) DSI 3	Body worn SAR (Sensor on) DSI 3	Limbs SAR (Sensor on) DSI 3
GSM850 (GPRS 3TX)	ANT0	29.50	29.50	29.50	29.50	N/A
DCS1900 (GPRS 3TX)	ANT0	27.00	27.00	26.00	26.00	N/A
WCDMA II	ANT0	25.00	25.00	20.00	20.00	20.00
WCDMA IV	ANT0	25.00	25.00	21.50	21.50	21.50
WCDMA V	ANT0	25.00	25.00	25.00	25.00	N/A
LTE Band 2	ANT0	24.50	24.50	21.50	21.50	21.50
LTE Band 4	ANT0	25.00	25.00	21.50	21.50	21.50
LTE Band 5	ANT0	25.50	25.50	25.00	25.00	N/A
LTE Band 7	ANT0	24.50	24.50	21.50	21.50	21.50
LTE Band 13	ANT0	25.50	25.50	25.50	25.50	N/A
LTE Band 26	ANT0	25.50	25.50	25.50	25.50	N/A
LTE Band 38	ANT0	25.50	25.50	22.00	22.00	22.00
LTE Band 41	ANT0	25.50	25.50	22.00	22.00	22.00
LTE Band 66	ANT0	24.50	24.50	22.00	22.00	22.00

Band	Antenna	Full Power (Receiver off) DSI 2	Head SAR (Receiver on) DSI 1	Hotspot SAR (Sensor on) DSI 4	Body worn SAR (Sensor on) DSI 4	Limbs SAR (Sensor on) DSI 4
GSM850 (GPRS 3TX)	ANT1	29.50	26.50	29.50	29.50	N/A
DCS1900 (GPRS 3TX)	ANT1	27.00	20.00	21.00	21.00	21.00
WCDMA II	ANT1	25.00	14.50	25.00	15.50	15.50
WCDMA IV	ANT1	25.00	14.00	20.00	15.50	15.50
WCDMA V	ANT1	25.00	22.50	21.50	24.50	N/A
LTE Band 2	ANT1	25.50	15.00	15.50	15.50	15.50
LTE Band 4	ANT1	25.50	14.00	15.50	15.50	15.50
LTE Band 5	ANT1	25.50	22.00	25.00	25.00	N/A
LTE Band 7	ANT1	25.50	17.00	16.50	16.50	16.50
LTE Band 13	ANT1	25.50	24.50	25.50	25.50	N/A
LTE Band 26	ANT1	25.50	22.00	25.50	25.50	N/A
LTE Band 38	ANT1	25.50	19.50	19.00	19.00	19.00
LTE Band 41	ANT1	25.50	19.50	19.00	19.00	19.00
LTE Band 66	ANT1	25.50	13.00	16.50	16.50	16.50

Band	Antenna	Full Power (Receiver off) DSI 2	Head SAR (Receiver on) DSI 1	Hotspot SAR (Receiver off) DSI 3/4	Body worn SAR (Receiver off) DSI 3/4	Limbs SAR (Receiver off) DSI 3/4
Bluetooth	ANT10	11.50	11.50	11.50	11.50	N/A
WIFI 2.4G	ANT10	20.00	15.00	20.00	20.00	N/A
WIFI 5.2G	ANT10	15.00	20.00	18.00	18.00	N/A
WIFI 5.3G	ANT10	15.00	20.00	18.00	18.00	18.00
WIFI 5.6G	ANT10	14.00	20.00	18.00	18.00	18.00
WIFI 5.8G	ANT10	12.00	20.00	18.00	18.00	N/A

Power table that needs to be reduced

Band	Antenna	Full Power (Sensor not trigger)	Down Power (Sensor trigger)	
		DSI 2	DSI 3	
GSM850 (GPRS 3TX)	ANT0	29.50	29.50	0.0
DCS1900 (GPRS 3TX)	ANT0	27.00	26.00	1.0
WCDMA II	ANT0	25.00	20.00	5.0
WCDMA IV	ANT0	25.00	21.50	3.5
WCDMA V	ANT0	25.00	25.00	0.0
LTE Band 2	ANT0	24.50	21.50	3.0
LTE Band 4	ANT0	25.00	21.50	3.5
LTE Band 5	ANT0	25.50	25.00	0.5
LTE Band 7	ANT0	24.50	21.50	3.0
LTE Band 13	ANT0	25.50	25.50	0.0
LTE Band 26	ANT0	25.50	25.50	0.0
LTE Band 38	ANT0	25.50	22.00	3.5
LTE Band 41	ANT0	25.50	22.00	3.5
LTE Band 66	ANT0	24.50	22.00	2.5

Band	Antenna	Full Power	Down Power	
		(Sensor not trigger) DSI 2	(Sensor trigger) DSI 4	
GSM850 (GPRS 3TX)	ANT1	29.50	29.50	0.0
DCS1900 (GPRS 3TX)	ANT1	27.00	21.00	6.0
WCDMA II	ANT1	25.00	25.00	0.0
WCDMA IV	ANT1	25.00	20.00	5.0
WCDMA V	ANT1	25.00	21.50	3.5
LTE Band 2	ANT1	25.50	15.50	10.0
LTE Band 4	ANT1	25.50	15.50	10.0
LTE Band 5	ANT1	25.50	25.00	0.5
LTE Band 7	ANT1	25.50	26.50	9.0
LTE Band 13	ANT1	25.50	25.50	0.0
LTE Band 26	ANT1	25.50	25.50	0.0
LTE Band 38	ANT1	25.50	19.00	6.5
LTE Band 41	ANT1	25.50	19.00	6.5
LTE Band 66	ANT1	25.50	16.50	9.0

Note:

1. Reduced maximum limit applied by activation of proximity sensor.
2. Power reduction triggered via proximity sensor is implemented for SAR compliance when users approach the device. The power reduction level is a single fixed level for each frequency band.
3. Power reduction is enabled solely upon a proximity sensor trigger event, at the user-EUT distance equal or smaller than the trigger distance. The power reduction is of the highest priority of this device and will not be overridden by the request of the base station (ex: poor RSSI, etc.), and will be overridden by any other event (ex: low battery, AC-plugged, etc.) or any user intervention. There is no software setting or any 3rd party software that can disable the mechanism.

6 Trigger distance testing

Measurement Procedure

<Sensor Trigger distance testing –Back side & Front side>:

1. Set the transmitter to operate at its normal maximum output power.
2. Place the entire Back of the phone below a flat phantom filled with tissue-equivalent medium required for the test frequency range, For this device, tissue-simulating liquid SAR measurement was filled for trigger distance and sensor coverage area testing and positioned at least 20 mm away the flat phantom.
3. Gradually move the device in 3 mm steps toward the flat phantom in the perpendicular direction, until the sensor triggers.
4. Move the device 5 mm back from the flat phantom and then again move the device toward the phantom in 1 mm steps until it touches the phantom. Make sure the power stays reduced after the device past the triggering point.
5. Record the distance between EUT and the flat phantom, when the proximity sensor starts to be triggered.
6. Place EUT Bottom Face contacted with the flat phantom. Gradually Move the device in 3 mm steps away from the flat phantom in the perpendicular direction, until the sensor stop triggering.
7. Move the device 5 mm toward the flat phantom and then again move the device away from the phantom in 1 mm steps until it is at least 20 mm away from the phantom and return to the normal maximum power level.
8. Record the distance between EUT and the flat phantom, when proximity sensor starts to be NOT triggered.

<Sensor Trigger distance testing – Left Side/Right Side/Bottom Side/Top Side>:

1. Set the transmitter to operate at its normal maximum output power.
2. Place the entire Edge1 of the phone below a flat phantom filled with tissue-equivalent medium required for the test frequency range, and positioned at least 20 mm away the flat phantom.
3. Gradually move the device in 3 mm steps toward the flat phantom in perpendicular direction, until the sensor triggers.
4. Move the device 5 mm back from the flat phantom and then again move the device toward the phantom in 1 mm steps until it touches the phantom. Make sure the power stays reduced after the device past the triggering point.
5. Record the distance between EUT and the flat phantom, when proximity sensor starts to be triggered.
6. Place EUT Edge1 contacted with the flat phantom Gradually Move the device in 3 mm steps away from the flat phantom in perpendicular direction, until the sensor stop triggering.
7. Move the device 5 mm toward the flat phantom and then again move the device away from the phantom in 1 mm steps until it is at least 20 mm away from the phantom and return to the normal maximum power level.
8. Record the distance between EUT and the flat phantom, when proximity sensor starts to be NOT triggered.

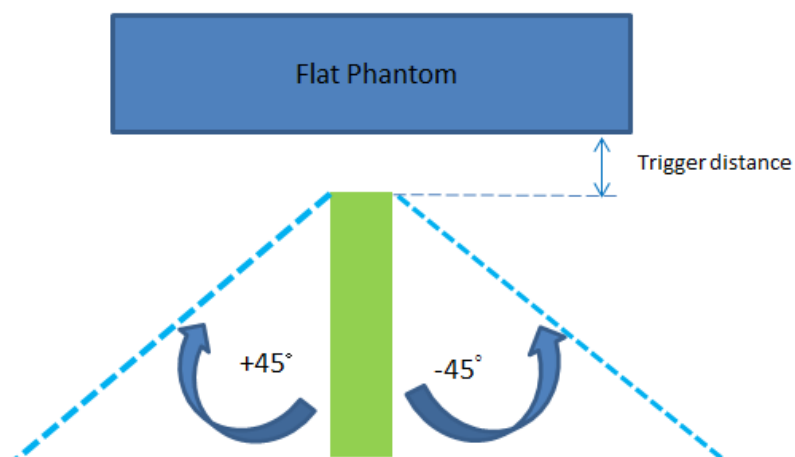
<Procedures for determining phone tilt angle influences to proximity sensor triggering>

The procedures below quoted from KDB 616217 D04 6.4, are followed.

1. The influence of table tilt angles to proximity sensor triggering is determined by positioning each phone edge that contains a transmitting antenna, perpendicular to the flat phantom, at the smallest sensor triggering test distance determined in sections 6.2 and 6.3 by rotating the phone around the edge in $\leq 10^\circ$ increments until the phone is $\pm 45^\circ$ or more from the vertical position at 0° .
2. If sensor triggering is released and normal maximum output power is restored within the $\pm 45^\circ$ range, the procedures in step 1) should be repeated by reducing the phone to phantom separation distance by 1 mm until the proximity sensor no longer releases triggering, and maximum output power remains in the reduced mode.
3. The smallest separation distance determined in steps 1) and 2), minus 1 mm, is the sensor triggering distance for phone tilt coverage. The smallest separation distance determined in sections 6.2, 6.3 and 6.4 minus 1 mm should be used in the SAR measurements.

Sensor Trigger distance testing

1. The influence of table tilt angles to proximity sensor triggering is determined by positioning each phone edge that contains a transmitting antenna, perpendicular to the flat phantom, set the 15 mm separation for Left side, Right side, Top side, Bottom side for phone tilt coverage.
2. Rotating the phone around the edge next to the phantom in $\leq 10^\circ$ increments until the phone is $\pm 45^\circ$ from the vertical position at 0° , and the maximum output power remains in the reduced mode.



Proximity Sensor Trigger Distance (mm)	
Minimum	15

Note:

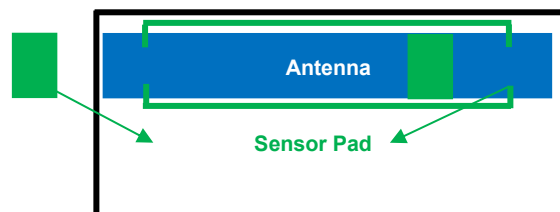
1. KDB 616217 D04v01r02 footnote 26 at page 13: Depending on the antenna and sensor offset, if a test separation distance smaller than that determined by the triggering distance procedures can extend the coverage area to include the peak SAR location, a smaller test separation distance may be considered to avoid additional SAR tests

7 Sensor Coverage Area Testing

<Procedures for determining proximity sensor triggering coverage – Not required for this device>

In KDB 616217 section 6.3, if a sensor is spatially offset from the antenna(s), it is necessary to verify sensor triggering for conditions where the antenna is next to the user but the sensor is laterally further away to ensure sensor coverage is sufficient for reducing the power to maintain compliance. For p-sensor coverage testing, the device is moved and “along the direction of maximum antenna and sensor offset”.

The below figure of this device, the sensor pad is integrated into the Antenna and covers it; there is no trigger condition where the antenna is next to the user; therefore proximity sensor coverage testing is not required.



Special Remark:

If the sensor failure and malfunctioning, the default power is reduced power for WWAN.