



ERS, J522, Compass nonUI test 099-{{docNum}}-0.06

Motion Sensing HW

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1. Introduction

High compass offset shift is observed in J52x when display is turned on. Root cause is the large return current loop in the new display technology 2DBL. FATP online QT1 station only tests compass-display coex with uncalibrated display. This nonUI compass test station is intended to test compass-display coex with calibrated display.

2. Test Fixture Requirement

The test can be done at bench, no special fixture is required. To make sure the coex test is reliable and repeatable, the testing area should be measured using a Gauss meter and the environmental magnetic field noise and magnitude should be within spec (see Table 1). The operator should make sure the distance between DUTs is >15 cm to avoid interference between neighboring DUTs. Also there is no steel/magnetic materials/current trace within 20cm of any DUT. Examples of the test bench can be: plastic, wood, aluminum, granite.

Table 1. Test Fixture Requirement

Description	Units	Min.	Typ.	Max.
Temperature	°C	15	25	30
Enviornmental Noise: Magnetic	μT-rms	-	-	0.1
Environmental Field: Magnetic	μT	-	-	60

3. Test Procedure

1. Transfer the test pattern to the DUT

- 1.1. Transfer white, red, maps patterns to the DUT. Open a new terminal and run: scp -P <offset + 22> <image path on host> root@localhost:/var/root/.
- 1.2. Passcode when asked: alpine
- 1.3. Example: scp -P 46022 /Users/qcwang/Desktop/J5xx/P0/display_coex/J5x_white.jpg root@localhost:/var/root/

2. Baseline Test (default 120 Hz display refresh rate)

- 2.1. Connect DUT to Mac Mini, root in non-UI
- 2.2. Turn of LCD, disable display timeout:

```
powerswitch lcd on  
set defaults ignoreDisplayTimeout=1
```

- 2.3. Set brightness to 0, disable Chimp charging:

```
setbrt --nits 0
```

```
setbatt drain
```

2.4. Collect 100 samples of compass data @ 100Hz ODR:

```
compassTester -interval 0.01 -printTemperature -samples 100
```

2.5. Calculate the mean and standard deviation of X, Y, Z output respectively, report as keys: *Baseline_X_avg*, *Baseline_X_std*, *Baseline_Y_avg*, *Baseline_Y_std*, *Baseline_Z_avg*, *Baseline_Z_std*

3. Compass coex test with different pattern & brightness:

3.1. Load the test image (e.g., White pattern), and wait 2s to make sure the pattern is stable:

```
killall -9 colortest; colortest -l /var/root/J5x_white.jpg  
  
sleep 2
```

3.2. Set brightness to 300:

```
setbrt --nits 300
```

3.3. Collect 100 samples of compass data @ 100Hz ODR:

```
compassTester -interval 0.01 -printTemperature -samples 100
```

3.4. Calculate the mean and standard deviation of X, Y, Z output respectively, report as keys: *White_300nits_X_avg*, *White_300nits_X_std*, *White_300nits_Y_avg*, *White_300nits_Y_std*, *White_300nits_Z_avg*, *White_300nits_Z_std*

3.5. Calculate compass offset shift and report the keys following the equations:

$$White_300nits_delta_X = White_300nits_X_avg - Baseline_X_avg$$
$$White_300nits_delta_Y = White_300nits_Y_avg - Baseline_Y_avg$$
$$White_300nits_delta_Z = White_300nits_Z_avg - Baseline_Z_avg$$
$$White_300nits_delta_M = \sqrt{White_300nits_delta_X^2 + White_300nits_delta_Y^2 + White_300nits_delta_Z^2}$$

3.6. Repeat step 3.1-3.5 for brightness 600 nits and max nits. Ideally we want to test 1000 nits full screen pattern, if not applicable, please use the max allowed nits.

3.7. Repeat the test for Red and Maps pattern.

4. Wrap up test:

4.1. Turn charging back on, kill colortest:

```
setbatt on  
  
setbrt --nits 200  
  
killall -9 colortest
```

Revision History

Revision	Date	ECO	Author	Comments
1	06.02.2020	n/a	QC Wang	New request for compass nonUI test in J522