

LIGO HANFORD OBSERVATORY

PO BOX 159

RICHLAND WA 99352

TEL: 509.372.8106

FAX: 509.372.8137

# MEMORANDUM

DATE: March 15, 2017

|  |  |
| --- | --- |
| TO: | ISC |
| FROM: | Daniel Sigg |
| SUBJECT: | Phase Frequency Discriminator Modifications |
| Refer to: | LIGO-E1700100-v1 |

The table-top frequency stabilization servo (TTFSS) is using the phase frequency discriminator (PFD) for laser locking. The standard circuit board variant has a bandwidth of no more than 500 kHz. For laser locking an overall bandwidth around 1 MHz is desirable and we require the PFD to introduce no more than 20° of phase at 1 MHz. The schematics can be found under [D1002471](https://dcc.ligo.org/LIGO-D1002471).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameters | | | Standard | High Frequency | Unit |
| Pole frequency (Q) | | | 0.46  3.0 (1.5)  3.0 (1.5)  5.3 | 5.7  7.1 (1.4)  7.1 (1.4)  17 | MHz |
| Phase at | 0.1  0.5  1.0  2.0 | MHz | −15  −59  −90  −135 | −2  −10  −19  −38 | ° |
| 3-dB bandwidth | | | 0.48 | 7.7 | MHz |
| Capacitor C15 | | | 150 | 47 | pF |
| Capacitor C16 | | | 1000 | 47 | pF |
| Capacitors C26 & C43 | | | 15 | 4.7 | pF |

