

Discussion: This information and test results are in response to questions relating receiver temperature (Trx) of the low band receivers to observed values of Tsys.

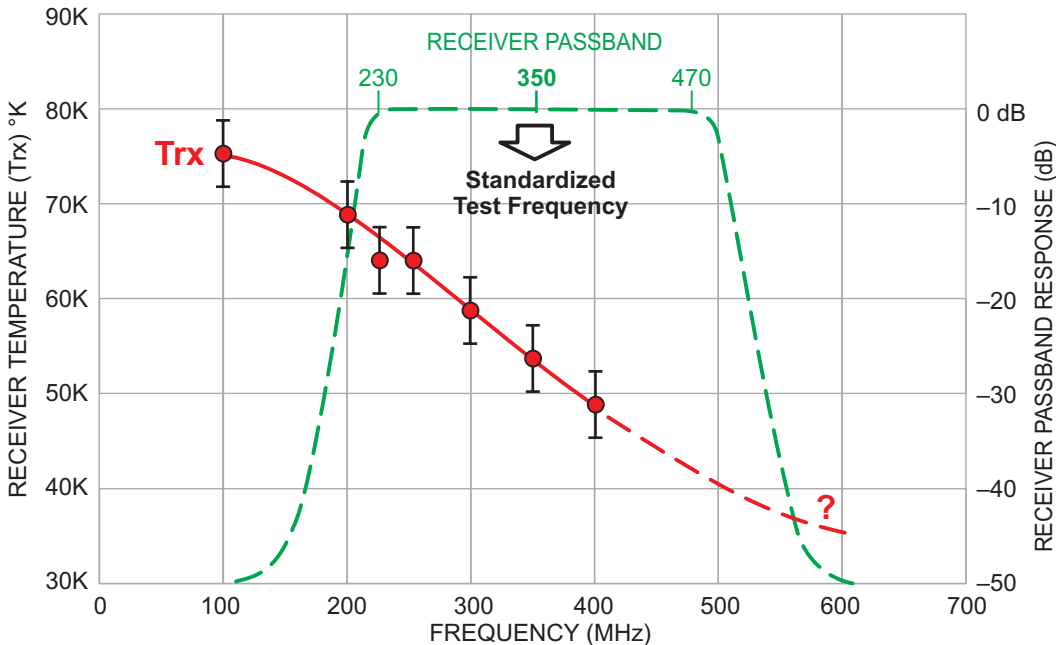
Trx is measured on each Low Band Receiver upon construction or maintenance actions using the Hot/Cold Load method — where the input “load” is terminated and the receiver output power is measured with the load HOT (290°K room temperature) and COLD (LN2 -77°K). The difference is a function of the receiver noise figure (NF) or receiver temperature (Trx). For P-band, Trx (and Tcal) is measured mid-band at 350 MHz.

Previous to this test, Trx has not been measured at different frequencies within P-band. Filters were used for measuring Trx at 100, 200, 225, 250, 300, 350 and 400 MHz. Filters between 400-600 MHz were not available. Measurement data and derived values are shown below in tabular and graphic form.

Summary: Trx measured at 350 MHz on all 30 LBR receivers is quite consistent in the 50-60K region. This test shows Trx is quite linear through the P-band passband with no observed aberrations. The following results are a sample of one (actually two, LCP & RCP on the same receiver); another receiver will be tested in the near future to verify values and consistency between samples.

Note: Hot/cold output powers are measured with about 0.1dB accuracy, which relates to an uncertainty in derived Trx of between 5-7°K. Differences in room temperature (hot) power at the different frequencies is a function of the filter bandwidth. The Cane model for Tsky is on page 2.

TEST FREQUENCY:			100 MHz	200 MHz	225 MHz	250 MHz	300 MHz	350 MHz	400 MHz	Units	
Filter/bandwidth			100/20	200/20	225/60	250/60	300/18	350/25	400/18	MHz	
	CAL	TEMP									
Rcvr pwr out HOT	OFF	290K	PH	-65.3	-57.4	-41.6	-39.6	-44.0	-42.9	-59.3	dBm
Rcvr pwr out COLD	OFF	77K	PC	-69.1	-61.3	-45.6	-43.6	-48.1	-47.1	-63.6	dBm
Rcvr pwr out COLD	ON	77K	PCC	-68.5	-60.9	-45.0	-43.0	-47.5	-46.4	-63.2	dBm
RCVR TEMP			Trx	75K	69K	64K	64K	59K	54K	49K	°K
SWITCHED CAL TEMP			Tcal	23K	14K	21K	21K	20K	23K	12K	°K
Y-Factor (PC-PH)			Y	3.8	3.9	4.0	4.0	4.1	4.2	4.3	—
Noise Figure			NF	1.1	1.0	0.9	0.9	0.8	0.8	0.7	dB
Tsky (Cane model)			Tsky	800	150	100	80	50	35	15	°K
Tsys (Trx+Tsky)			Tsys	875	219	164	144	109	89	64	°K



Approximate Minimum Background Temperature (K) Based on Cane Model

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