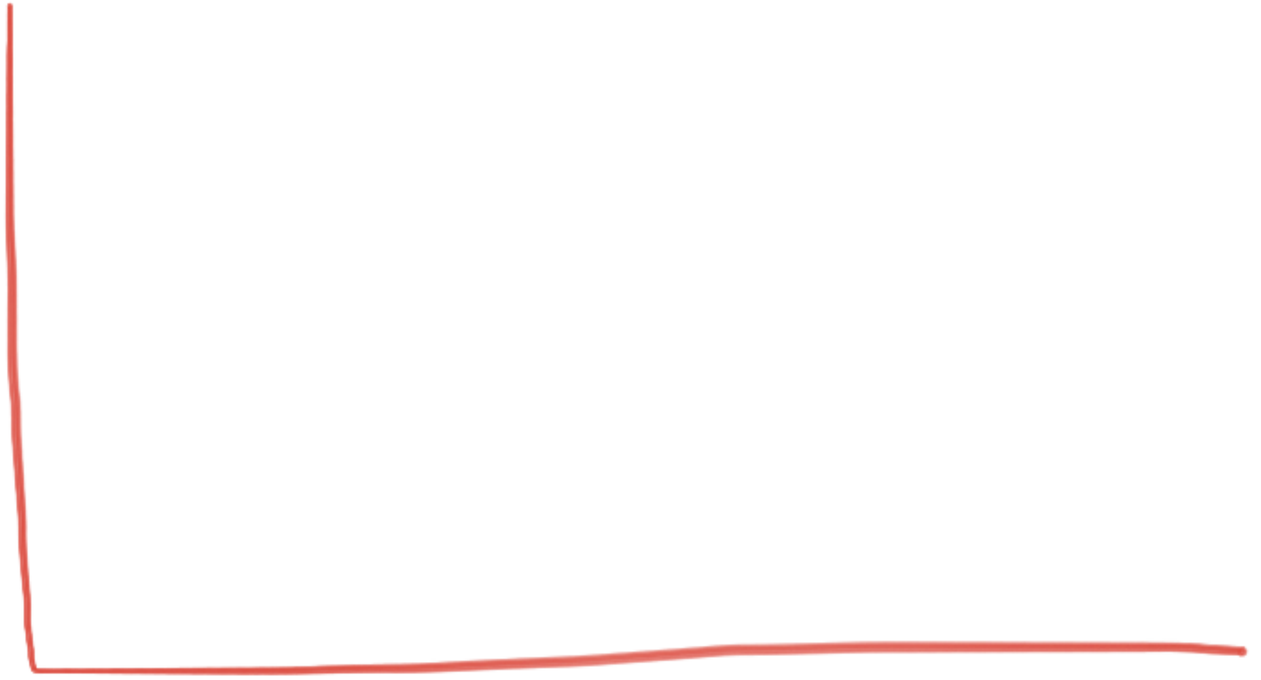
12/Mar/2021.

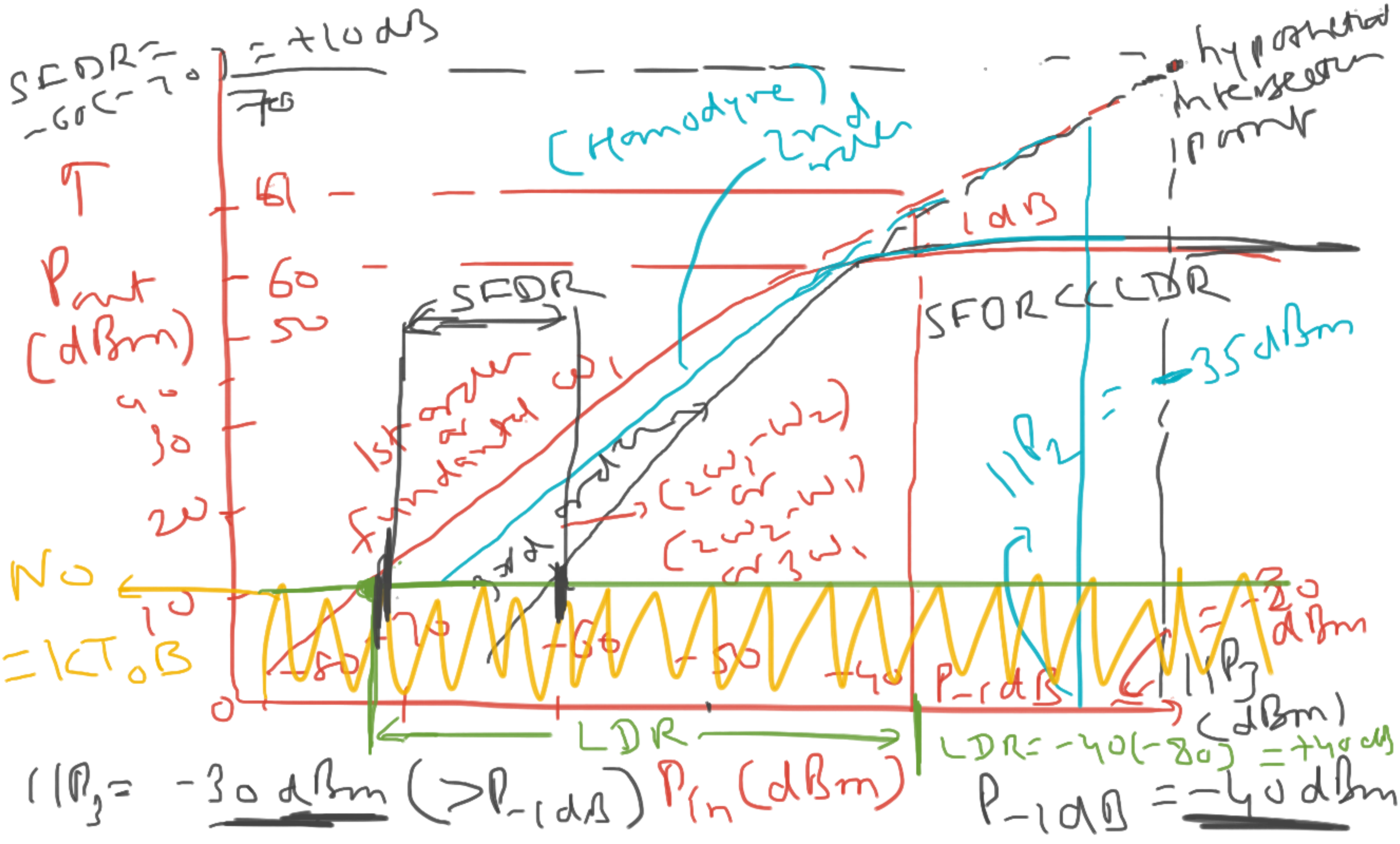
Graphical representation of IIP3 (IP3 or P3)

IP3 → 3rd order Intercept Pt

IIP3 →

↳ Input power




SFDR = 70 dB
T
P_{out} (dBm)
Homodyne 2nd order
hypothetical intercept point
1 dB
SFDR
SFDR < LDR
1st order fundamental OP
$(2\omega_1 - \omega_2)$
$(2\omega_2 - \omega_1)$
$(2\omega_2 - 3\omega_1)$
IIP2 = 35 dBm
NO
$= kTB$
LDR
P_{in} (dBm)
P-1dB
IIP3 (dBm)
IIP3 = -30 dBm (> P-1dB)
LDR = -40(-80) = +40 dB
P-1dB = -40 dBm

IIP3 is defined as the input power corresponding to the hypothetical intersection point of first order (or fundamental freq gain curve) & 3rd order harmonic gain curve

IIP3 also defined as input power at which first order & 3rd order o/p powers are equal

IIP2 → more serious in homodyne systems

Dynamic range (dB) = $\frac{\text{max sig}}{\text{min sig}}$

↳ i/p pwr range

MDS = −30 dBm = 1 μW

Max signal = 0 dBm = 1 mW

DR = 0 − (−30) = +30 dB

MDS = −60 dBm = 1 nW

Max signal = 0 dBm

DR = 0 − (−60) = +90 dB

Dynamic range (DR) → dB

LDR (linear)

BDR (blocking)
↳ dB

↳ Input power range from noise floor (No) upto 1 dB compression point (P_{-1dB})
- expressed in dB

SFDR
↳ dB
(Spurious Free DR)

SFDR → Input power range (in dB) from noise floor (No) upto which input power will create 3rd order IMD products

SFDR << LDR

Larger SFDR

↳ larger value of IIP_3 → Significant SFDR will increase

⇓

less likely that mobile RX be effected by 3rd order IMD products

⇓

related to SAR (Specific Absorption Rate)

↳ 1.6 W/kg/cm

Dial *#07# → SAR

Recall

$$MDS\ (dBm) = -174\ dBm/Hz + 10\log_{10}B\ (dB) + NF\ (dB) + SNR\ (dB)$$

$$N_0 = kT_0B$$

$T_0 \rightarrow 17^\circ C \sim 290\ K$

$$LDR\ (or\ BDR)\ (dB) = P_{-1dB}\ (dBm) - Noise\ Floor\ (N_0)\ (dBm)$$

$$SFDR\ (dB) = ?? - N_0\ (dBm)$$

$$P_{-1dB}\ (dBm) = IIP_3\ (dBm) - 9.64\ dB$$