

Application Note

Reference factor between RF (referenced to sync top level) and VF

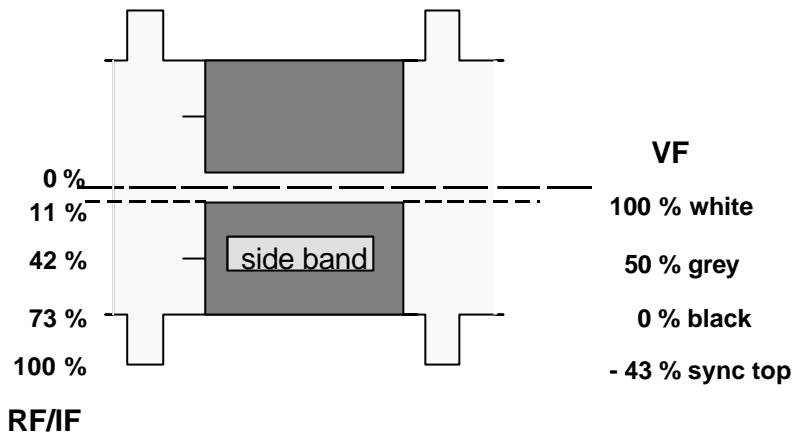
Products:

TV Demodulators and Video Analyzers

UAF + EFA 33
VSA + B10

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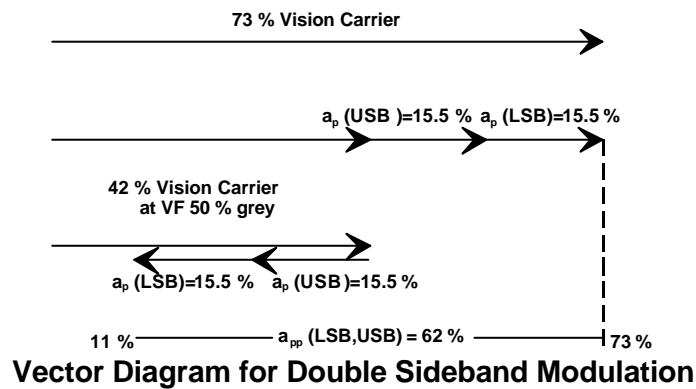
Let us analyze a modulated signal:



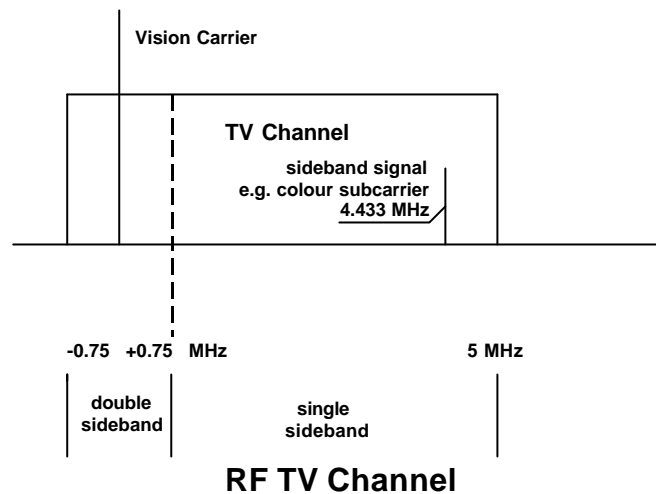
Level Percentages for RF/IF Signal with Reference to VF Signal

Now do the calculation:

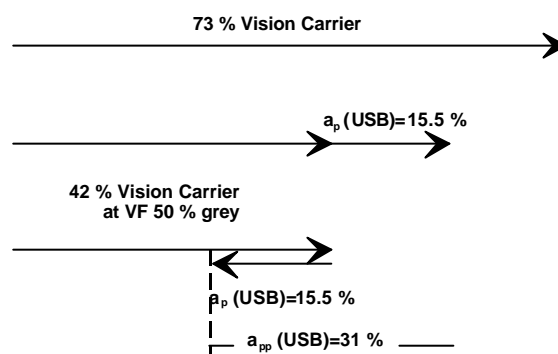
The sideband amplitude referenced to U_{pp} (USB, LSB) is $a_{pp}(\text{USB}, \text{LSB}) = 73\% - 11\% = 62\%$
 in case of double sideband modulation,
 as we have in VSB frequency range.



If we now shift the sideband frequency to more than + 0.75 MHz, we reach the range of the single sideband modulation in the TV channel:



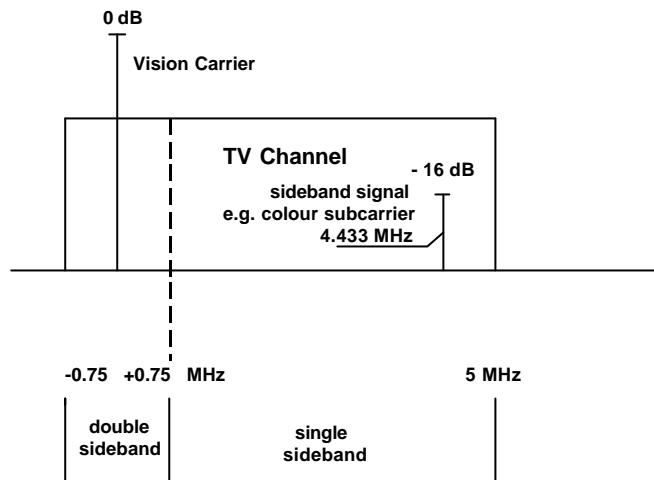
Then the vector diagram changes to the following:



Vector Diagram for Single Sideband Modulation

This shows, that the equivalent level of a RF sideband for a 100% VF signal (that is 700 mV e.g. White Bar) is $a_p(\text{USB}) = 15.5\%$ of the vision carrier. As the vector with the level $U_{p, \text{USB}}$ rotates around the peak of the RF carrier 42 % of the vision carrier which represents the 50 % grey level in VF, the resulting related level as percentage is $a_{pp}(\text{USB}) = 31\%$.

The ratio 15.5 % between $U_{p, \text{USB}}$ and the vision carrier defines the level distance between the sideband signal - for instance the colour subcarrier 4.433 MHz - and the vision carrier. If you calculate this distance in dB, you arrive at the famous level value of $\Delta L = 20 \lg(0.155) \text{ dB} = 16.19 \text{ dB}$.



Levels inside the RF TV Channel

This level distance of -16.19 dB corresponds to a VF sideband signal with $U_{pp} = 700$ mV. At least we have to consider the conversion factor from U_{pp} to U_{rms} for the sideband sinewave signal

$$c = 20 \lg (1/(2 \cdot \sqrt{2})) = -9.09 \text{ dB}$$

and we arrive at the reference factor V dB between RF (referenced to sync top level) and VF

$$V_{RF} - 16.19 \text{ dB} + 9.03 \text{ dB} = V_{VF}$$

$$V_{RF} = V_{VF} + 7.16 \text{ dB}$$

Additional Information

Our Application Notes are regularly revised and updated. Check for any changes at

<http://www.rohde-schwarz.com>.

Please send any comments or suggestions about this Application Note to

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