The DSP function :

int LogFunctionASM(int x, int *coeff)) ;

makes this calculation on a Q23 X input between 1 and 2^23-1:
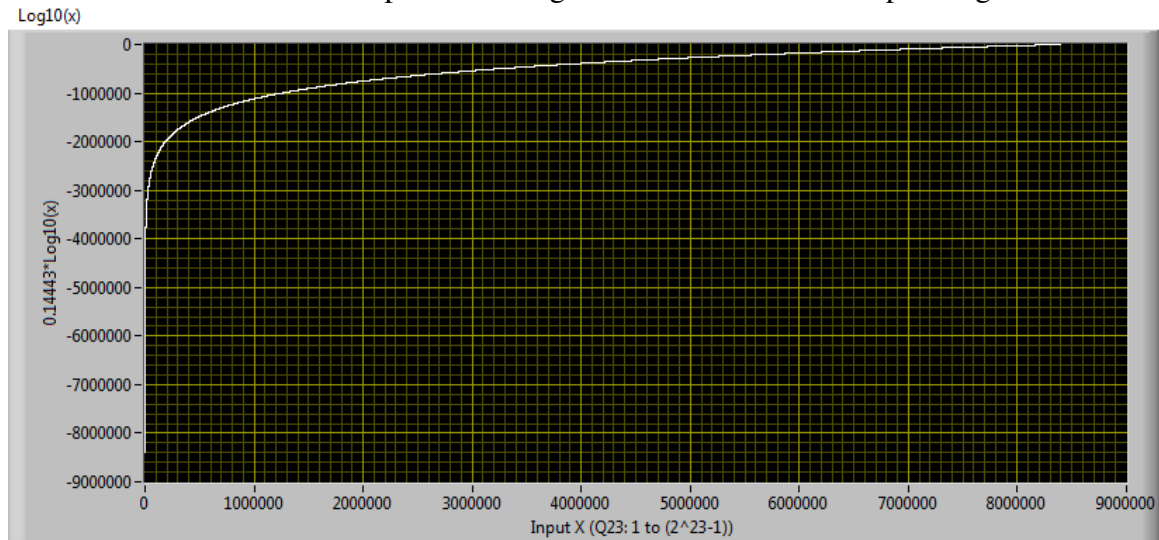
0.14443*Log10(X)

The 0.14443 is used to fit the Log function output in the Q23 range.
The output range is -8388603 to 0.

The function has been written in assembler and the C context is required. The function requires 130 CPU cycles to execute (including the call and the return). To use this function:

1) Include the file **LogAsmSR3Pro.asm** to the project
2) Add this declaration in the C file that uses the log function: ***extern int LogFunctionASM(int x, int *Coeff_Log);***
3) Declare a vector for the log coefficients: ***int CoeffLog[8]={7279871,-7139840,8326142,-7755777,3657879,-5704,1211581,2525222};***
4) Call the function where required: ***LogFunctionASM(x,&CoeffLog[0]);***

The next curve shows the output of the Log function for the entire input range:
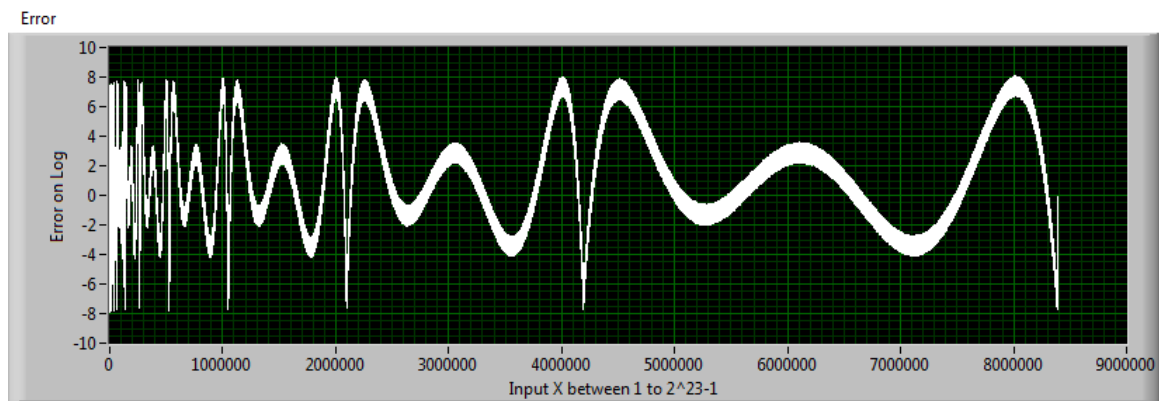

Log (<=0): -8388608
Log (1): -8388603
Log (2^23-1): 0
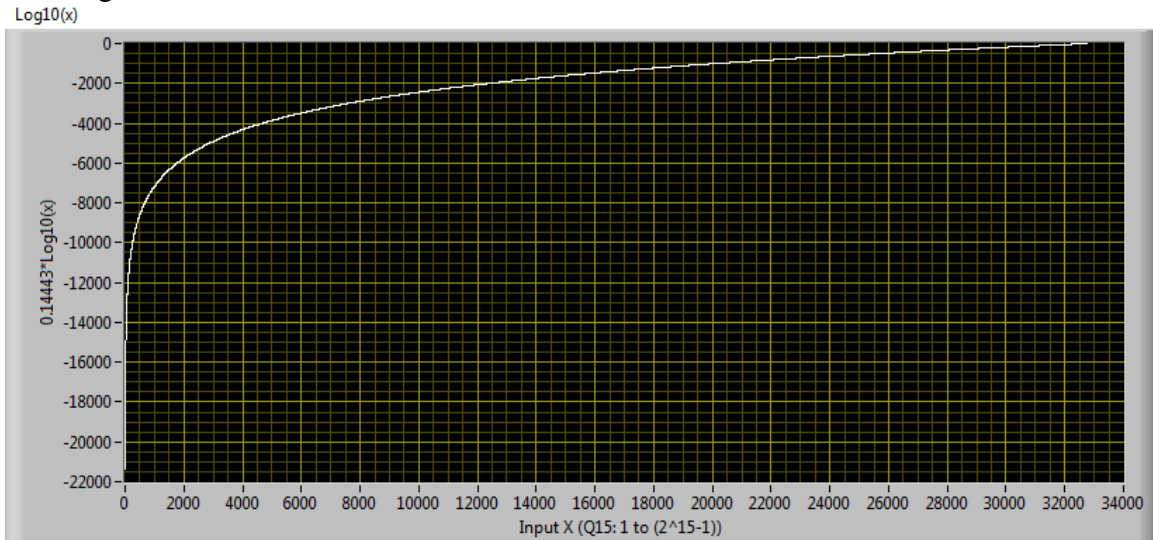
The error for X : 1 to 2^23-1 :

The maximal error is 8 and for a dynamic of 8388603, it means 120.5 dB of precision.

The same function can be used with a Q15 input, like this :

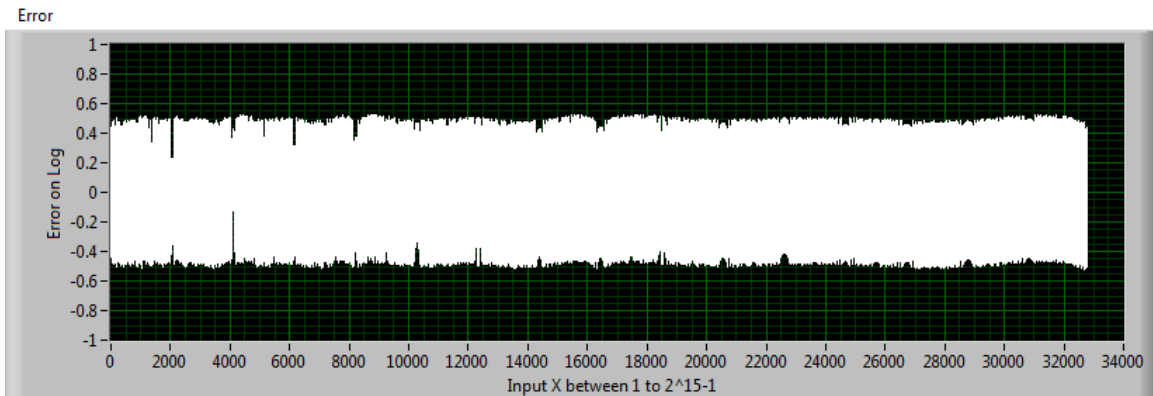*(short)(128+LogFunctionASM((i<<8),&CoeffLog[0]))>>8;*

The Log curve becomes :

Log (<=0): -32768
Log (1): -21370
Log (2^15-1): 0

The error for X : 1 to 2^15-1 :

The maximal error is 0.5 and for a dynamic of 21370, it means 93 dB of precision.