The detection algorithm is based on the rank

$R = \sum_i w_i \ \mathrm{nneg}(m_i - a_i)$

Where the sum goes over the 12 filter bank channels (RMS values) , i=1…12. R is calculated using weights w_i , running average amplitudes a_i (calculated onboard using a parameter M, see below), and the maximum amplitudes m_i (calculated onboard using a parameter N, see below). The parameters M, N, and weights w_i are preset. The function nneg(x) is defined as

nneg(x) = x for $x > 0$, and nneg(x) = 0 for $x \leq 0$.

The running average amplitudes a_i are calculated for each channel i separately as

$a_i = 1/M \ \sum_j f_{ij}$

where j is an index to a continuously measured series of past (~12 µs) samples for the given channel i. j runs from l-M+1 to l. After starting the detection algorithm, l starts by a value of M/8 samples, then it increments by M/8 samples. The running averages a_i are always calculated from M samples.

The maximum amplitudes m_i are always found in the series of N samples (usually N«M, the default value is M=2^{20} corresponding to a time interval of ~12.583s, and N=16 corresponding to ~192 µs),

$m_i = \max_j(f_{ij})$

where j runs from k-N+1 to k. After starting the algorithm, k starts by a value of N samples, and then it increments by N/2 samples. The successive intervals over which the maxima m_i are found are therefore always overlaid by 50%, with the step between these intervals being N/2 samples.

This is also the step of updates of R which defines the time resolution of the detection algorithm. If $N \leq M$/8 then the first value of R is calculated ~12 µs * M/8 after starting the algorithm else the first value of R is calculated ~12 µs * N after starting the algorithm. The value of R then continues to be updated with a regular time step of ~12 µs * N/2, always using the most recent set of a_i values. This update is done 21 cycles of the 10M clock (~2.1 µs) after the last filter bank sample, over which the rank R is calculated. To generate the event detection alert**,** we use a criterion of having R larger than a predefined threshold P. The alert is then generated immediately when R is updated to a value exceeding P.