

Specifications

Frequency range	55 kHz to 120 MHz
with option FAM-B2 1.36 GHz ..	55 kHz to 1360 MHz
with option FAM-B2 1 GHz	55 kHz to 1000 MHz
Frequency setting	automatic ¹⁾ or manual
Display	8-digit readout
Resolution, $f < 1000$ MHz	1 Hz or 10 Hz
$f \geq 1000$ MHz	1 Hz or 100 Hz
Frequency error and drift	± 1 digit + error of reference frequency
Reference oscillator	standard option SMS-B1
Crystal aging	$< \pm 1 \times 10^{-6}$ /month $< \pm 5 \times 10^{-8}$ /month
Temperature coefficient	$< \pm 1 \times 10^{-6}/^{\circ}\text{C}$ $< \pm 1 \times 10^{-7}$ over total op. range

RF input $Z_{in} = 50 \Omega$, BNC female connector

Input level range

55 kHz to 550 MHz 10 mV to 3 V (–27 to +22.5 dBm)

550 to 1050 MHz 20 mV to 3 V (–21 to +22.5 dBm)

1050 to 1360 MHz 30 mV to 3 V (–17 to +22.5 dBm)

RF level attenuator programmable via IEC bus or keyboard.

¹⁾ Frequency measurement and automatic tuning for $AM \leq 80\%$;
for $f_{in} \geq 550$ MHz up to 60%.

SPECIFICATIONS

Amplitude modulation measurement

Modulation frequency range	10 Hz to 200 kHz	
	10 Hz to 20 kHz for $f_{in} < 3.6$ MHz	
Max. measurable mod. depth	100%	
Display	4 digits + analog indication	
Units	absolute: %; relative: % or dB	
Resolution	0.25% (of rdg), max.: 0.005% (AM)	
Error	mod. $\leq 80\%$ mod. $> 80\%$	
	with peak-resp. detector (plus peak residual AM)	
f_{mod} 30 Hz to 60 kHz	$\pm 2\%$	$\pm 5\%$
60 to 100 kHz	$\pm 4\%$	$\pm 10\%$
Residual AM (%) at f	≤ 550 MHz	> 550 MHz
With CCITT weighting and rms-resp. detector	$\leq 0.01\%$	$\leq 0.02\%$
Weighting bandwidth 30 Hz to 20 kHz	$\leq 0.05\%$	$\pm 0.05\%$
CCIR weighting	$\leq 0.05\%$	$\pm 0.1\%$
Incidental AM with FM ²⁾ (f_{mod} 1 kHz, 50 kHz deviation, meas. bandwidth 30 Hz to 3 kHz) 0.1%		
AF distortion (at AF output; f_{mod} 30 Hz to 20 kHz)	≤ 120 MHz	> 120 MHz
40% mod.	$\leq 0.2\%$	$\pm 0.4\%$
40 to 80% mod.	$\leq 0.4\%$	$\pm 0.6\%$
AM measurement ranges (11) programmable		

Frequency modulation measurement (with input freq. ≥ 4.25 MHz)

Modulation frequency range	10 Hz to 200 kHz			
Max. measurable frequency deviation	500 kHz (100 kHz with input frequ. ≤ 4.75 MHz)			
Display	4 digits + analog indication			
Units	absolute: Hz, kHz; relative: %, dB			
Resolution	0.25%, max.: 0.1 Hz			
Error	deviation ≤ 100 kHz dev. > 100 kHz			
with peak-resp. detector (plus peak residual FM)				
f_{mod} 30 Hz to 60 kHz	$\leq \pm 1.5\%$	$\leq \pm 3\%$		
60 to 100 kHz	$\leq \pm 3\%$	$\leq \pm 6\%$		
with rms-resp. detector (plus residual FM)				
f_{mod} 30 Hz to 60 kHz	$\leq \pm 3\%$	$\leq \pm 3\%$		
60 to 100 kHz	$\leq \pm 6\%$	$\leq \pm 6\%$		
Residual FM at f	≤ 120 MHz	120 to 550 MHz	550 to 1050 MHz	1050 to 1360 MHz
With CCITT weighting and rms-resp. detector	≤ 1 Hz	≤ 3 Hz	≤ 6 Hz	≤ 12 Hz
Weighting bandwidth 30 Hz to 20 kHz, with rms-resp. detector	≤ 5 Hz	≤ 14 Hz	≤ 25 Hz	≤ 50 Hz
With CCIR weighting and deemphasis and squelch	≤ 6 Hz	—	—	—
Stereo S/N ratio, weighted to CCIR, referred to 40 kHz deviation ($f_{in} \leq 120$ MHz, $V_{in} \geq 20$ mV)	typ. 72 dB			
Incidental FM with AM + peak residual FM (f_{mod} 1 kHz, m = 50%; test bandwidth 30 Hz to 3 kHz)	≤ 20 Hz			
AF distortion (at AF output; f_{mod} 30 Hz to 20 kHz)	75 kHz deviation $\leq 0.1\%$			
500 kHz deviation	$\leq 0.5\%$ (input freq. > 10 MHz)			
Stereo separation				
at f_{mod} 30 Hz to 15 kHz	≥ 46 dB (typ. 50 dB) at stereo output			
$f_{mod} = 1$ kHz	≥ 50 dB			
Deemphasis	50/75/750 μ s, switch-selected			
FM measurement ranges (13) programmable				

Phase modulation measurement (with input frequency ≥ 4.25 MHz)

Modulation frequency range		300 Hz to 20 kHz			
Maximum measurable phase deviation		500 rad (up to 1 kHz mod. freq.)			
Display		4 digits + analog indication			
Units		absolute: rad; relative: %, dB			
Resolution		0.25 %, max.: 0.001 rad			
Error with peak-resp. detector		$\pm 3.5\%$ + peak residual ϕ M			
with rms-resp. detector		$\pm 5\%$ + residual ϕ M			
Residual ϕ M at f		≤ 120 MHz	120 to 550 MHz	550 to 1050 MHz	1050 to 1360 MHz
Weighted with CCITT filter: rad		≤ 0.002	≤ 0.003	≤ 0.006	≤ 0.012
bandwidth 30 Hz to 20 kHz: rad		≤ 0.005	≤ 0.01	≤ 0.02	≤ 0.04
AF distortion (at AF output), deviation 4 rad		$\leq 0.1\%$			
ϕ M measurement ranges (13) programmable					

AF detector

Peak-responding detector	positive or negative peak of AF or their arithmetic mean
Rms-responding detector	true rms response, indication as rms or for sine wave converted to peak; crest factor 10

Weighting filters

High pass (1-dB cutoff frequency)	10 Hz (2 Hz at 3 dB by changing connection), 30 Hz and 300 Hz (12 dB/octave)
Low pass (3-dB cutoff frequency)	3/20/200 kHz (24 dB/octave min.)

¹⁾ With input level 6 dB above minimum; > 250 mV for $f_{in} < 3.6$ MHz.

²⁾ In frequency range specified for FM measurement.

CCITT filter (option FAM-B6)	weighting network acc. to CCITT Rec. P53
CCIR filter (option FAM-B7)	weighting network acc. to CCIR Rec. 468-2 (Rev. 78) combined with quasi-peak detector

AF frequency display

Frequency range	10 Hz to 200 kHz
Display	4-digit readout
Resolution	0.1 Hz up to 1 kHz
Error at $f > 100$ Hz	$\pm 0.1\%$ at S/N > 40 dB
at $f < 100$ Hz	± 0.1 Hz at S/N > 60 dB

Distortion measurement

Test frequencies (total of 30)	with option FAM-B8
	30/40 to 100 Hz
	200/300 to 1000 Hz
	2/3 to 10 kHz
	12.5/15/17.5/20 kHz

Autom. adjustment

(S/N > 30 dB)	tuning range $\pm 3\%$, automatic switchoff when frequency is outside of measurable range
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Display	4 digits, THD in % or SINAD in dB
Display range	0.1 to 50% (THD), 6 to 60 dB (SINAD)
Error (d $\leq 10\%$)	$\leq \pm 10\%$ of rdg or $\leq \pm 1$ dB ± 1 digit
Test frequencies programmable	

AF voltmeter

Frequency range	10 Hz to 200 kHz
Measurement range	0.1 mV to 3 V (max. 5 V _p)
Display	4-digit readout
Units	absolute: mV; relative: %, dB
Resolution	0.1 mV
Error with LP 3/20 kHz	$\pm 1.5\% \pm 0.1$ mV
without LP	$\pm 1.5\% \pm 0.4$ mV (30 Hz to 60 kHz)
	$\pm 3\% \pm 0.4$ mV (60 to 100 kHz)

Weighting all AF measuring facilities in the FAM (detectors, weighting networks, frequency counter, distortion meter) can also be used in voltage measurements (LP 200 kHz not included)

Input $Z_{in} \geq 400$ k Ω || 300 pF floating; BNC female connector

Voltage measurement ranges (11) programmable

Outputs

AM signal output (V_{rms})	max. 1 V into 2 k Ω at 100% mod.
FM stereo signal output (V_{rms})	1.5 V at 40 kHz dev. corresp. to +6 dBm across 600 Ω (for crosstalk see FM)

AF output (V_{rms}) 350 mV to 1 V depending on modulation or AF voltage

IEC-bus interface

in accordance with IEC 625-1; 24-pin Amphenol connector

Listener and talker functions AH1, T4, L2, RL1, DC1

Measurement periods

RF and modulation measurement triggered (frequency, RF and AF measurement ranges programmed, P+ or P-).....	at a frequency resolution	
(For input frequ. > 120 MHz: T + 100 ms)	10 Hz	1 Hz
	FM, ϕ M ≤ 250 ms	≤ 2050 ms
	AM ≤ 420 ms	≤ 2300 ms

Automatic RF, modulation and AF measurement

when changing frequency or after applying the RF level	typ. 3.5 s
after settling	typ. 1.5 s
DIST/SINAD-measurement	typ. 6 s
after settling	typ. 2 s

General data

Operating temperature range	+5 to +45 °C
Storage temperature range	-40 to +70 °C
RFI suppression	VDE radio protection mark: DBP 527 GI
Mechanical loading capacity	shock- and vibration-tested to DIN 40046, Part 7 and 8 (corresp. to IEC Publ. 68-2-27 and 68-2-6)
Power supply	115/125/220/235 V $\pm 10\%$, 47 to 440 Hz (80 VA); safety class I
Dimensions, weight	345 mm x 198 mm x 370 mm, 13.5 kg

Ordering information

Order designation	► Modulation Analyzer FAM
FAM 55 kHz to 120 MHz	334.2015.54
Accessories supplied	power cable, adapter (for PC boards)
FAMA and options	see flyer 843.600

Options

Reference Oscillator	SMS-B1	302.8918.02
1.36-GHz Frequency-range		
Extension	FAM-B2	334.4918.02
1-GHz Frequency-range		
Extension	FAM-B2	334.4918.04
IEC-625-1 Interface ³⁾	FAM-B4	334.5914.02
CCITT Filter	FAM-B6	334.5614.02
CCIR Filter	FAM-B7	334.5514.02
DIST/SINAD Meter	FAM-B8	334.5714.02
19" Adapter	FAM-Z9	349.7318.02



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