



MIG-System

Capacitor Testers



- I Active Flammability Tests
- II Insulation Test 1.2/50 μ s
- III Automatic 1.2/50 μ s Tests
- IV Accessories



General Information about Capacitors

The Different Electrical Tests

V rated

The maximum allowed d.c. voltage between two terminals of the capacitors.

Type of capacitors in LV networks

a.c. capacitors are designed essentially for application with power-frequency alternating voltage.

rfi-suppression capacitors are used to reduce electromagnetic interferences caused by electrical or electronic apparatus or other sources. Two classes of rfi capacitor can be differed:

Class X capacitors are suitable for use in situations where failure of the capacitors would not lead danger of electric shock. Overvoltage which can destroy the capacitor may arise from lightning strike on outside lines, from switching in neighbouring equipment, or switching in the equipment in which the capacitor is used.

Class Y capacitors are suitable for use in situations, where failure of the capacitor could lead to danger situation.

Further tests on capacitors

IEC 60384-1

Fixed capacitors for use in electronic equipment

Part 1:

General specification

Chapter 4:

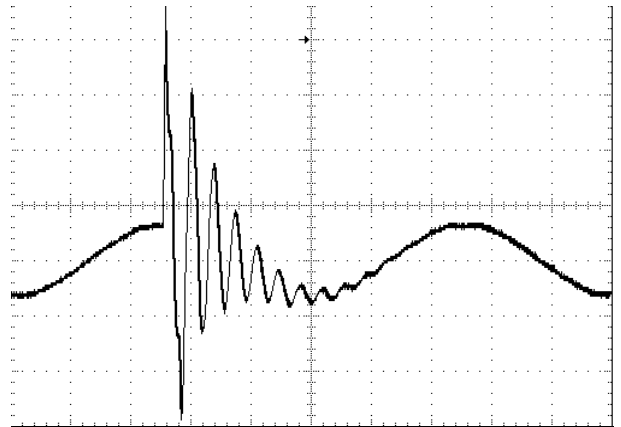
Tests and measurements procedures

4.26 SURGE

4.27 Charge and discharge tests and in-rush tests

Active flammability tests

Active flammability tests must be carried out on X and Y capacitors (except Y1). Each sample of capacitors shall be subjected to 20 discharges from a 3 μF tank capacitor. The charging voltage must be selected in order that the voltage across the capacitor reaches 1 to 5 kV (depending on the class). The surge voltage is superimposed to the a.c. power supply. The cheesecloth around the capacitor shall not burn with a flame.

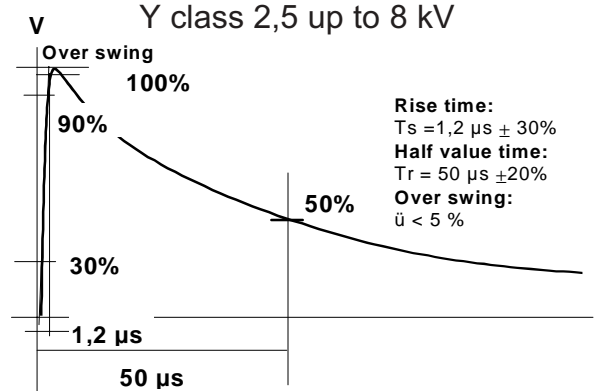


Impulse voltage test 1.2/50

For X and Y capacitors the tester, waveform and test levels are specified in IEC 384-14.

X class 0,8 up to 4 kV

Y class 2,5 up to 8 kV



For low voltage capacitors up to 1000 V generally the test voltage is in accordance with IEC 60-1. For capacitance values greater than 0,1 μF a front time longer than 1,2 μs is allowed.

MIG1803CAP: Active Flammability Tester on X- and Y-Capacitors, Capacitance Range up to 10 μF

Active flammability tests

The active flammability test must be carried out on X and Y capacitors (except Y1).

Class:	Voltage:
Y2	5 kV
X1	4 kV
X2, Y3, Y4	2.5 kV
X3	1.2 kV



MIG1803CAP

Basic data

Dimensions: 450 x 850 x 1200 mm
 Weight: approx. 140 kg
 Power supply: 230 V, max 16 A

Technical data

Impulse Tester:

Voltage range:	750 V up to 18'000 V
Settings:	1 V steps
Max. V up to 4 μF	6000 V
Min. V 4 to 10 μF	4000 V
Polarity	pos. / neg.
Tank Capacitor	3 μF

Capacitance range:

$C_x > 1 \mu\text{F}$	5 Ohm
$0.22 \mu\text{F} < C_x < 1 \mu\text{F}$	10 Ohm
$0.068 \mu\text{F} < C_x < 0.22 \mu\text{F}$	40 Ohm
$C_x < 0.068 \mu\text{F}$	100 Ohm

Resistors:

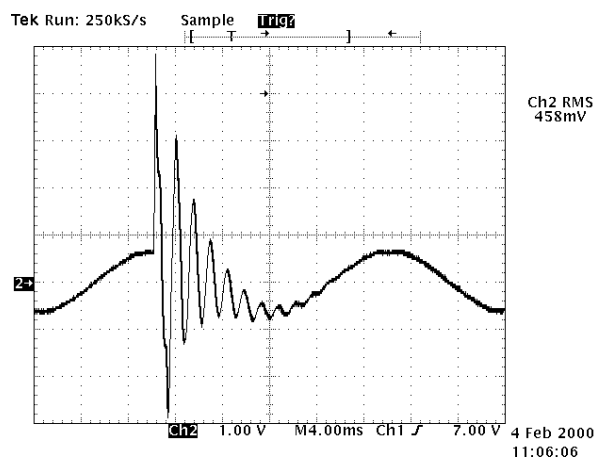
AC Part

Power at insulation transformer output
 16 A for ≤ 6 minutes at 800 V rms

Power at insulation transformer output
 16 A continuous at 380 V rms

Voltage control:	manually with Variac
Voltage display:	digital voltmeter
Settings:	1 V steps
Voltage range:	100 V to 800 V rms
Voltage setting:	accuracy 3%
Power source:	no voltage stabilisation

Example: 275 V rms $V_i = 2.5$ kV



MIG0603CAP and MIG1212CAP: X- and Y-Capacitor Testers, Capacitance Range 0 up to 10 μ F

The MIG0603CAP and MIG1212CAP are designed in accordance with IEC 60384-14, EN 132400 published 1994.



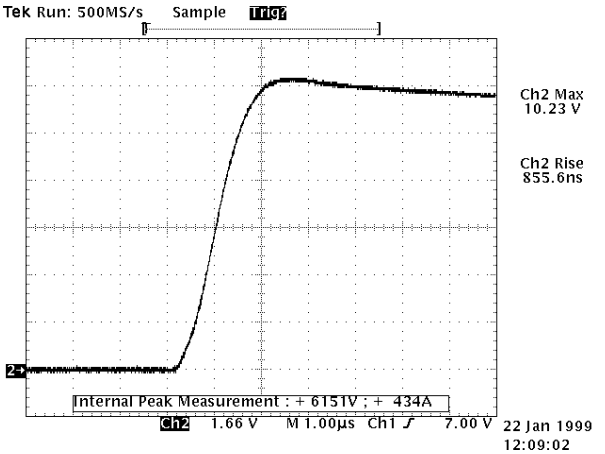
MIG0603CAP
 Test on X and Y up to 5 kV. The serial resistors R_s , C_T and C_p will be automatically switched when different capacitance ranges are selected.

MIG1212CAP
 Test on X and Y up to 10 kV. The serial resistors R_s , C_T and C_p must be manually switched for testing different capacitance ranges.

Example of a measurement
 EUT: 82 nF capacitor
 Range: $56 < C_x < C = 82$ nF

Range of testers
 MIG0603CAP: X and Y up to 5 kV
 MIG1212CAP: X and Y up to 10 kV

Control
 Impulse counter: 1 up to 29'999
 Trigger: auto or manual
 Ramps: voltage, polarity
 Protocol: peak values, polarity, shots
 Limits I_{peak} , V_{peak} , for "passed - failed"



Measurement
 Voltage measurement: V_{peak} on display,
 Voltage waveform BNC output (u):
 0,5 kV up to 6,5 kV 10 V = 6'000 V (\pm 3%)
 Current measurement: I_{peak} on display,
 Current waveform BNC output (i):
 250 A up to 3000 A,
 10 V = 3000 A (\pm 3%)

Capacitance range: adjustable on display, see table below

Capacitance C_x [nF]	C_T [μ F]	R_s [Ω]	C_p [pF]
$C_x < 3,9$	0,25	62	7800
$3,9 < C_x < 12$	0,25	45	7800
$12 < C_x < 18$	0,25	27	7800
$18 < C_x < 27$	0,25	27	
$27 < C_x < 39$	20	25	3300
$39 < C_x < 56$	20	13	3300
$56 < C_x < 82$	20	9	3300
$82 < C_x < 120$	20	7	3300
$120 < C_x < 180$	20	5	3300
$C_x > 180$	20	3	3300

Automatic Test Place

DUT-MUX, TEMA Software with DSO Control

XY-Capacitor Surge Test : 2kV

09:16 01.11.2001 EMC-PARTNER AG, 4242 Laufen, Switzerland --- The widest range of impulse generators

Notes

Operator : R.Casanova

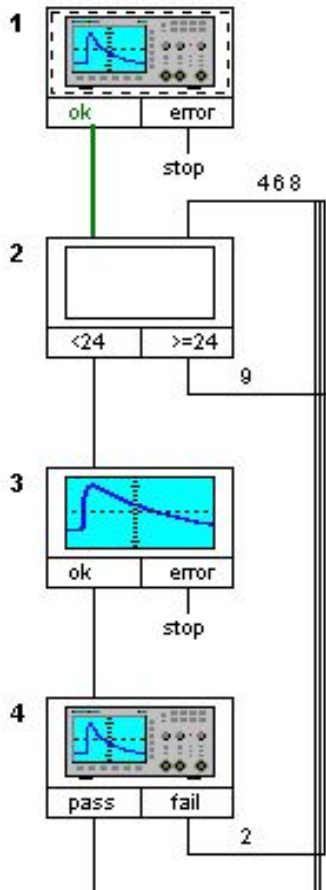
LOT Nbr. : 0122567

Remarks :

Mfg. Date : 03.03.2001

09:16 01.11.2001 Test output on Port 1..2

09:16



09:16

Sequence Aborted

Setup DSO for XY-capacitor Test, 2kV

Load Setup: XY-2kV

Maximum 24 pulses per sample

Total number of pulses : 2 of 24

Result : Application block not run

first of three in a sequence

Load Setup: xy-2kV-Port1

2kV positive on port 1

Result : Test not run

check for flashover

pulse width: (40us..100us)

Amplitude: (1.8kV..2.2kV)



Test set-up with MIG1212CAP and DUT-MUX

Accessories, TEMA

Test cabinet TC-MIG24

The test cabinet fits on MIG0603CAP or MIG1212CAP.



Basic data

Dimensions: 450 x 500 x 270 mm (l x w x h)

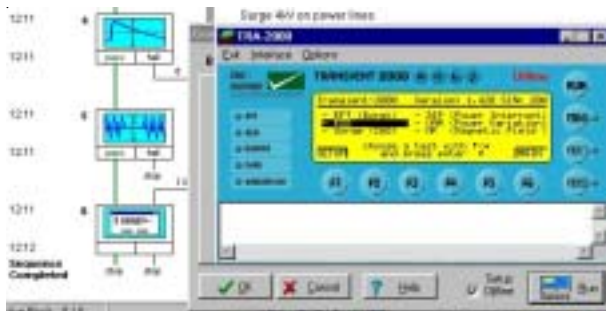
Weight: approx. 8 kg

Volume device under test (DUT):

200 x 200 x 200 mm

TEMA software

The TEMA Software enables the remote control of MIG0603CAP or MIG1212CAP.



Why remote control?

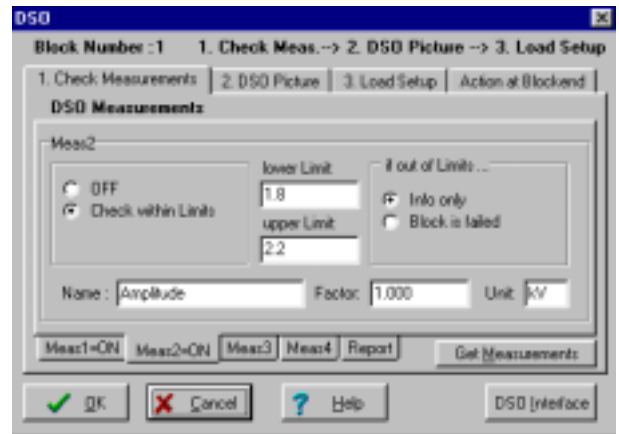
- A lot of different devices must be tested.
- The measuring results Upeak and Ipeak of the voltage test should be used for statistical investigation e.g. insulation test.
- Protocol layout must be customised formatted and must be available at test end.
- An automatic EUT failed detection is required.

Automatic test and detection

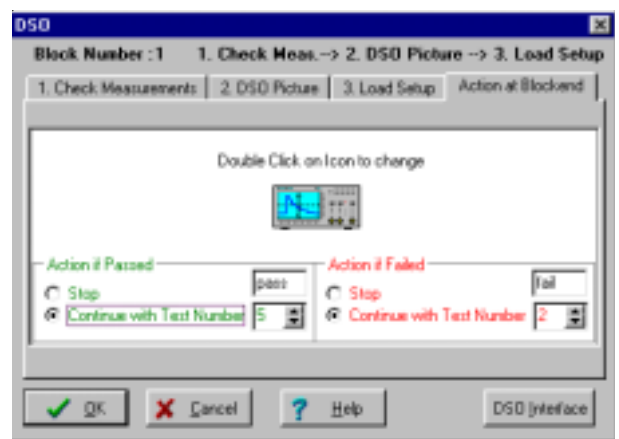
6 The TEMA software with DSO option ena-

bles the remote control of CAP testers to carry out test sequence in accordance with IEC 384-14. With the DSO the waveform can be compared and used for passed/failed detection.

Window: DSO Meas1 setting



Window: action at block end



Other accessories

Further accessories are available on demand.

Further information

You will find further information on our website www.emc-partner.com. For application notes regarding X and Y capacitor tests follow the links documents - application notes - component tests.

EMC PARTNER's Product Range

Immunity Tests



The TRA2000 performs all of the following transient tests on electronic equipment that are required for the CE-mark up to full levels: **ESD, EFT, surge, dips, a.c. magnetic field, surge magnetic field and common mode tests**. A large range of accessories for different applications is available: MF antennas, three phase couplers, verification sets, coupling kits, etc. The TRA2000 complies with IEC 61000-4-2, -4, -5, -8, -9, -11, -12p, -16, -29p.



The Modular Impulse Generator (MIG) performs **damped oscillatory tests**: 100 kHz, 1 MHz, voltage and magnetic field tests. The MIG complies with IEC 61000-4-8, -9, -10, -12 as well as with IEC 60255-4, -5, -22.



The HAR1000 with the Immunity software performs the following tests: **harmonics, voltage variation and ripple on d.c.** The HARMONICS-1000 complies with IEC 61000-4-13, -14, -17, -29p.

Lightning Tests

EMC PARTNER offers a wide range of testers in accordance with FCC 68 part D, ITU K.44, ETS 300 046, Bellcore and RTCA DO-160D, etc. for telecom, aircraft and military electronic equipment testing.



Component Tests



EMC PARTNER offers a wide range of modular impulse generators (MIG) for transient component testing on: varistors, arresters, surge protective devices (SPD), capacitors, circuit breakers, watt-hour meters, protection relays, insulation material, suppressor diodes, connectors, chokes, fuses, resistors, emc-gaskets, cables, etc.

EMC PARTNER has the largest range of impulse generators in the range up to 100 kV and 100 kA. Below is an example for an insulation tester up to 24 kV.



Emission Measurements



One unit performs all measurements on the power supplies of electronic equipment and products for the CE-Mark. The HAR1000 includes an amplifier for a clean power source, a line impedance network, the measurement systems Harmonics and Flicker. Accessories: three phase extension, "Immunity" and "ANASIM" software. Complies with IEC 61000-3-2 and -3.

We look forward to working with you

For more detailed information please contact our representative in your area or EMC PARTNER in Switzerland. For information on further products please visit also our website.

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We have representatives in:

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Asia: China, Hong Kong, Israel, Japan, Malaysia, South Korea, Taiwan, ...

Australia: Australia, New Zealand

Europe: Austria, Belgium, France, Germany, Great Britain, Hungary, Ireland, Italy, Netherlands, Scandinavia, Spain, ...

You will find contact information for all representatives at EMC PARTNER's website www.emc-partner.com.

Your local representative:

EMC PARTNER offers the largest range of impulse test equipment up to 100 kA and 100 kV in the areas of:

Immunity Tests

Lightning Tests

Component Tests

Emission Measurements