

Technical Specification



E-MIG2000-6
revised: 07. May 2009

1 MIG Tester Type MIG2000-6

1	MIG Tester Type MIG2000-6	1
2	General	2
2.1	Brief description of the MIG2000-6 system	2
2.1.1	Serial Injection	2
2.1.2	Parallel injection	2
2.1.3	Impulse Synchronization	2
2.2	Standards and applications	3
2.3	Overview of the EMCP MIG2000-6 Test System	3
3	Generator circuit, wave shapes definitions	4
3.1	Wave shape definition MIL-STD-461F CS106	4
3.2	Wave shape definition MIL-STD-461F CS115	4
3.3	Wave shape definition MIL-STD-461F CS116	4
3.4	Wave shape definition MIL-STD-1275	5
3.5	Wave shape definition Euro Fighter CS-EFA-4 "Fast & Slow"	5
3.6	Wave shape definition Airbus AMD24-C	6
3.7	Wave shape definition DO160 section 17	6
3.8	Wave shape definition DO160 section 19	6
3.9	Mechanical dimensions, climatic conditions	7
4	Technical data	8
4.1	Voltage Spike waveform MIL-STD-461F CS106	8
4.2	Rectangular waveform MIL-STD-461F CS115	8
4.3	Damped oscillatory MIL-STD-461F, CS116	8
4.4	Ringwave MIL-STD-1275	9
4.5	Airbus AMD24-C	9
4.6	Euro Fighter Slow & Fast	10
4.7	DO160 section 17	10
4.8	DO160 section 19	10
5	Accessories and Options	11
5.1	System Accessories	11
5.2	Accessories to all MIG and TRA Testers	13

Introduction

The MIG2000-6 is available with a range of plug-in modules capable of generating damped oscillatory and double exponential pulses in accordance with MIL-STD-461E: CS115, CS116 and other standards. MIG2000-6 system comprises the impulse generator together with necessary injection probes (couplers). Because this is a complete system, waveforms are guaranteed at the injection point. The MIG "Modular-Impulse-Generator" is a flexible kit system, ready to quote tailored generators for special test applications. The MIG is a further innovative solution from EMC PARTNER AG to meet customer requests.

MIG generators are modern test equipment with the following features:

- Solid state impulse switch and solid state polarity change (no mechanical switch, no spark gaps or tubes) - advantages: low jitter, no high frequency switching noise,
- Microprocessor menu controlled, printer port and RS232 remote control
- Safety in accordance with VDE 0104 (safety circuit, connector for warning lamp)
- Integrated peak measurement for voltage and current. Peak display and monitor output for v,i
- Windows software for PC control available. Software versions see EMCP web site

2 General

2.1 Brief description of the MIG2000-6 system

MIG2000-6 is a versatile, flexible system which uses modules to provide a wide variety of impulse types for many applications.

The principle application is MIL-STD-461F, CS106, CS115 and CS116 testing. Apart from the MIG2000-6 mainframe, this requires:

- Plug-in module CS115
- Plug-in module CS116 10K10M
- Plug-in module CS116 30M100M
- Plug-in module CS106
- Injection coupler CN-MIG-BT for the frequency range 10 kHz up to 10 MHz
- Injection coupler CN-MIG-BT2 for the frequency range 10 MHz up to 100 MHz
- Calibration set-up VERI-MIL2 in accordance with MIL-STD-461E

In addition to MIL-STD-461F, modules are available for applications as below:

- NATO-SLOW-10u, 2/10us
- NATO-FAST-150n, 0.15/10us
- Fx-DO-160-S17, 2/10us
- Fx-DO-160-S19, 250kHz burst
- Fx-MIL1275, Ringwave
- Fx-AMD24C, 2/10us + 2/50us + 2/100us + 2/200us + 2/400us

Customised frequency plug-in modules (e.g. platform resonances) can be ordered separately

2.1.1 Serial Injection

Serial injection is used to superimpose impulses onto an equipment cabling. These tests are applicable to all waveform types. Together with the MIG generator, coupling transformers such as the CN-MIG-BT and CN-MIG-BT2 make a complete system to couple pulses into the Equipment Under Test (EUT).

Because coupling transformers are used for serial injection tests, external verification equipment is required to ensure that waveforms and amplitudes are correct at the point of injection.

2.1.2 Parallel injection

Parallel injection is an alternative method to serial injection which requires direct connection of the impulse generator to equipment housing or cables. Because the generator could be connected to AC or DC power lines, the generator impulse circuits must be protected against current flowing from the EUT.

2.1.3 Impulse Synchronization

For all impulses applied on power lines, synchronization at 90° the power frequency must be achieved. MIG2000-6 uses an external SYNC adapter to provide synchronization up to 400Hz.

2.2 Standards and applications

MIL-STD-461F, Department of Defense Interface Standard.

Requirements for the control of electromagnetic interference characteristics of subsystems and equipment

MIL-STD-1275D – Department of Defense Interface Standard.

Characteristics of 28 Volt DC Electrical Systems in Military Vehicles.

Airbus A400M AMD24-C

DO160 Environmental conditions and Test Procedures for Airborne Equipment
Section17 – Voltage Spike

DO160 Environmental conditions and Test Procedures for Airborne Equipment
Section19 – Induced Signal Susceptibility

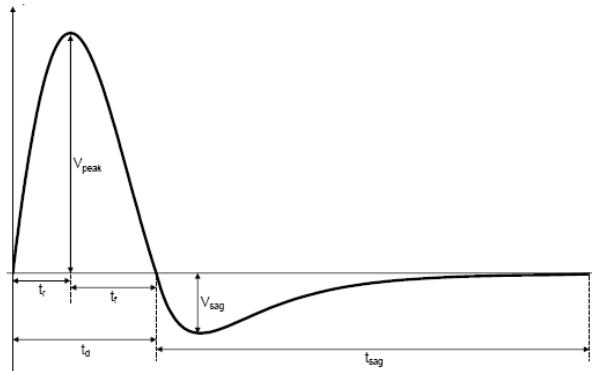
Euro Fighter SPE-J-000-E-1000. CS-EFA-4, Imported Transients conducted Susceptibility, Imported Spikes and Transients, Time Domain, Power Lines.

2.3 Overview of the EMCP MIG2000-6 Test System

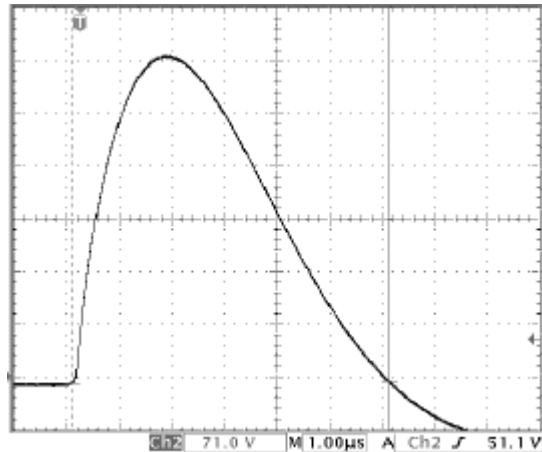
MIG2000-6 Module	CS106	CS115REC	CS116-10K10M	CS11630M100M	NATO-SLOW 10u	NATO-FAST-150n	Fx-DO-160-S17	Fx-DO-160-S19	Fx-MIL1275	Fx-AMD24C	CN-MIG-BT	CN-MIG-BT2	CN-MIG-BT4	SYNCH-ADAPTER	VERI-MIL2	VERI-50	VERI5	DC S17 CL
Standard																		
MIL-STD-461 CS106	X										X						X	X
MIL-STD-461 CS115		X									X				X	X		
MIL-STD-461 CS116 10kHz			X								X				X	X		
MIL-STD-461 CS116 100kHz			X								X				X	X		
MIL-STD-461 CS116 1MHz			X								X				X	X		
MIL-STD-461 CS116 10MHz			X								X				X	X		
MIL-STD-461 CS116 30MHz				X								X			X	X		
MIL-STD-461 CS116 100MHz				X								X			X	X		
MIL-STD-1275									X									
Euro Fighter CS-EFA-4					X	X					X			X		X	X	X
Airbus AMD24-C										X			X	X			X	X
DO160 section 17							X				X			X		X		X
DO160 section 19								X										

3 Generator circuit, wave shapes definitions

3.1 Wave shape definition MIL-STD-461F CS106

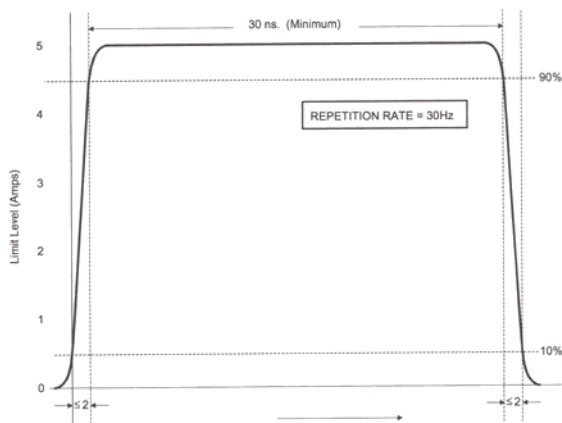


Standard waveform

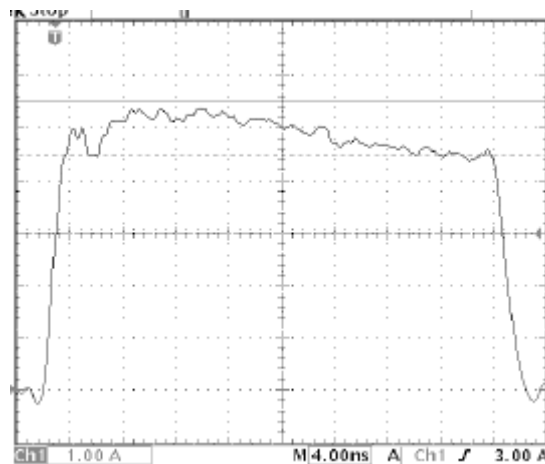


Waveform in the 50ohm load

3.2 Wave shape definition MIL-STD-461F CS115

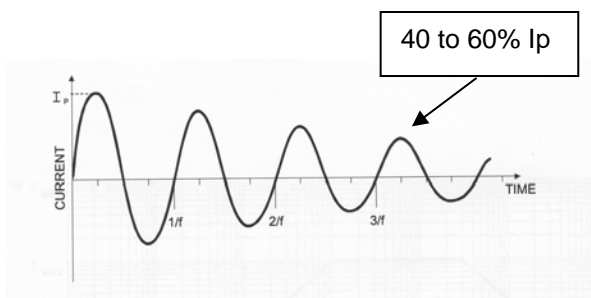


Standard waveform

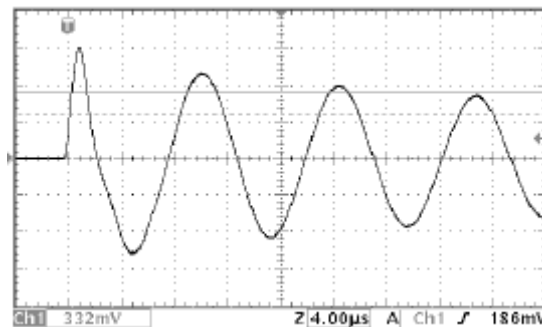


Waveform in the calibration fixture

3.3 Wave shape definition MIL-STD-461F CS116

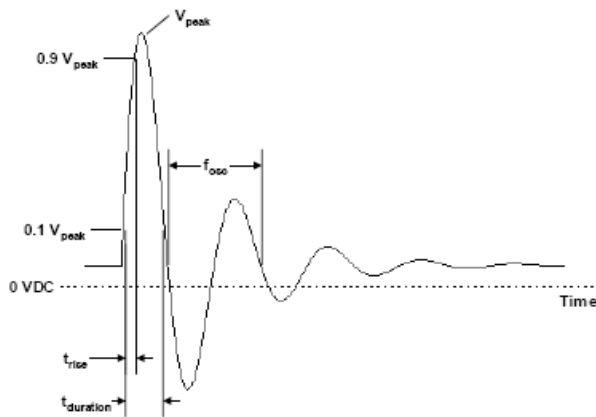


Standard waveform

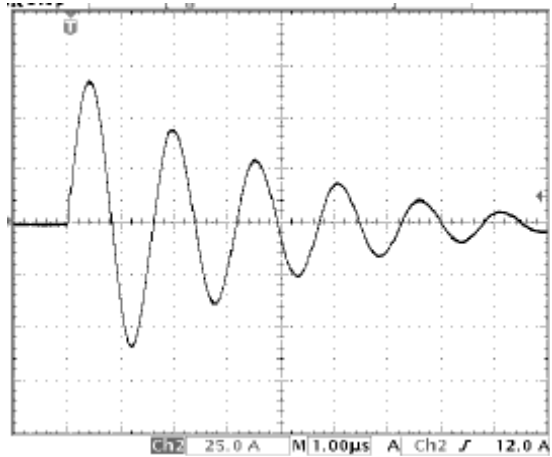


Waveform in the calibration fixture

3.4 Wave shape definition MIL-STD-1275

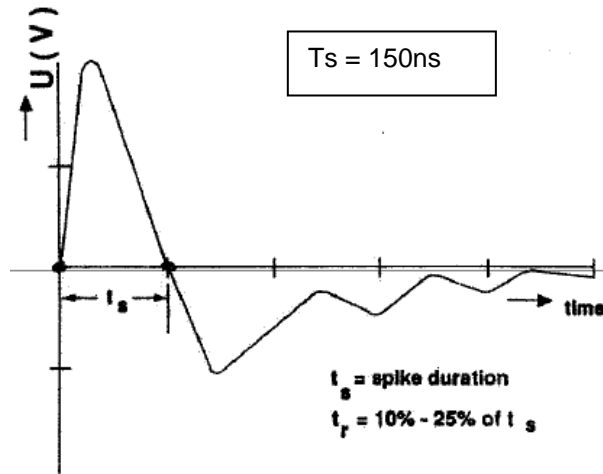


Standard waveform

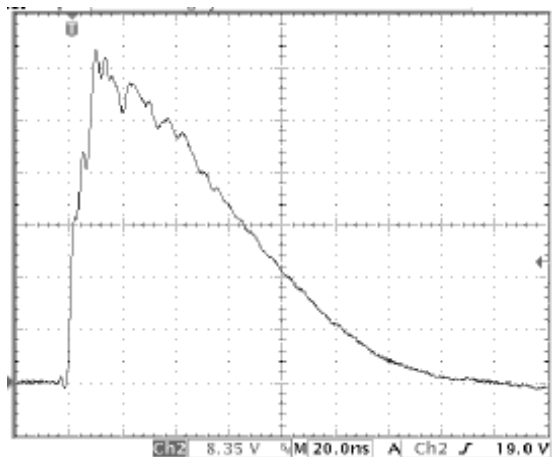


Waveform at the EUT

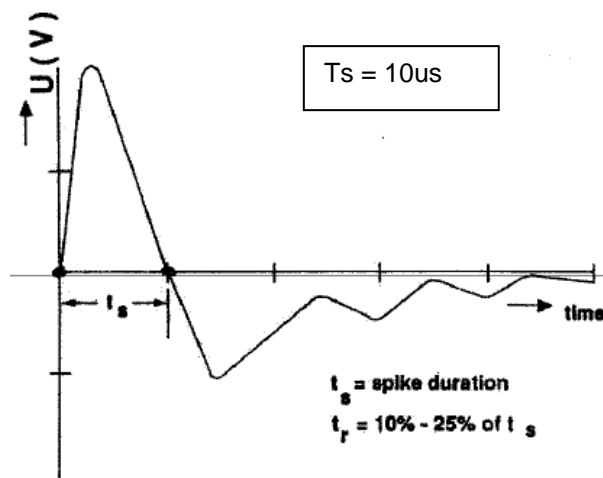
3.5 Wave shape definition Euro Fighter CS-EFA-4 "Fast & Slow"



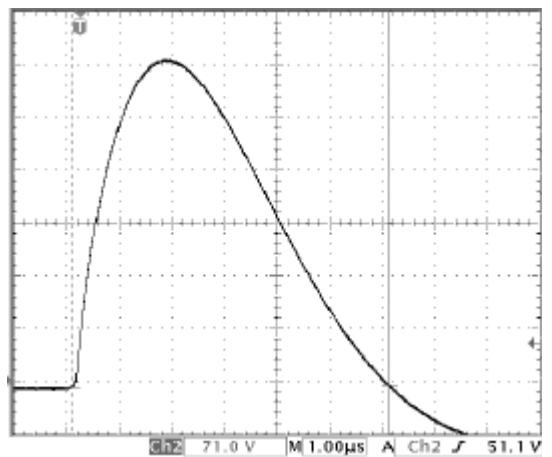
CS - EFA - 4, Spike Waveform (Typical)
Standard waveform "Fast"



Waveform at the EUT

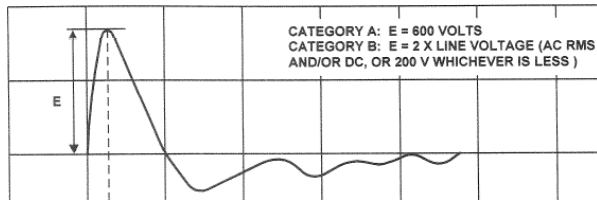


CS - EFA - 4, Spike Waveform (Typical)
Standard waveform "Slow"

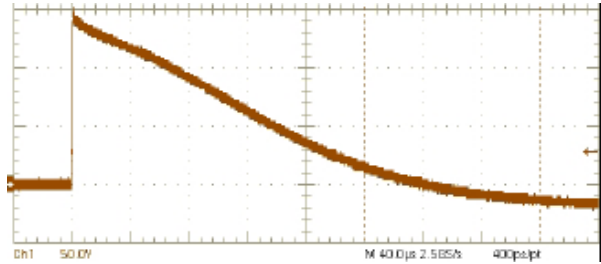


Waveform at the EUT

3.6 Wave shape definition Airbus AMD24-C

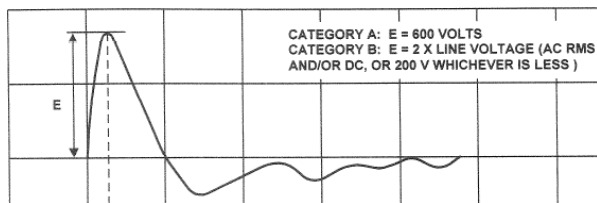


Tr = 10us, 50us, 100us, 200us & 400us
Standard waveform



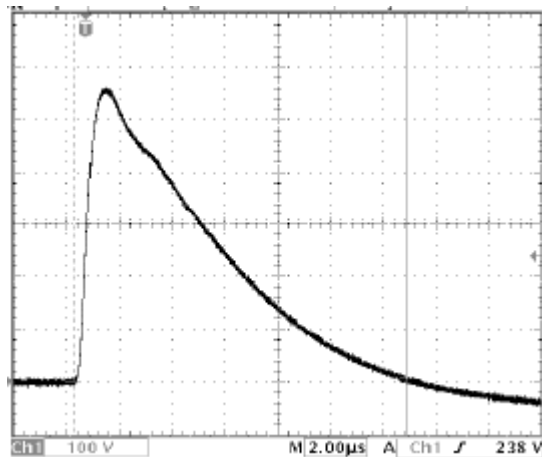
Example of Waveform at the EUT (200us)

3.7 Wave shape definition DO160 section 17



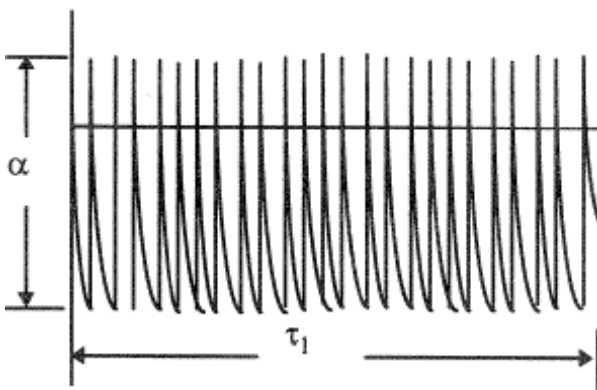
Tr = 10us

Standard waveform



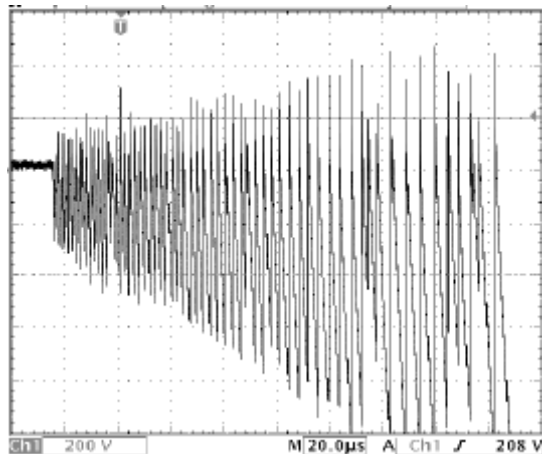
Waveform at the EUT

3.8 Wave shape definition DO160 section 19



T1 = 50 to 1000us

Standard waveform



Waveform at the EUT

3.9 Mechanical dimensions, climatic conditions

MIG type	Dimensions [mm]	Weight [kg]	Versions
	width x depth x height		
MIG2000-6	450 x 500 x 190	17	19" Rack 4 UH
Plug-in modules	200 x 280 x 80	approx. 2.5	

Power :			
Power voltage	L-N single phase 230 V/ 115V ±10% plus protective earth	auto switching	
Power consumption	Maximum <400 VA Standby < 10 VA	(230 V, 50 Hz)	(115 V, 60 Hz)

Environment conditions		
Temperature range	°C	0 to 35 °C
Humidity	rh %	25 to 80%
Pressure	kPa	86 to 106



MIG2000-6 with pug-in module



Plug-in modules

4 Technical data

4.1 Voltage Spike waveform MIL-STD-461F CS106

Waveform in the calibration set up:	5 ohm load	
Rise time	1.5us	± 0.5us
Fall time	3.5us	± 0.5us
Duration	5us	± 22%
Underswing	< 120V	
Voltage Settings	100V to 500V	
Repetition rate	max. 10 Hz	
Polarity	pos. / neg.	
Source Impedance	>2 Ohm	
Test time	1 up to 29999 s	

4.2 Rectangular waveform MIL-STD-461F CS115

Waveform in the calibration set up:	VERI-MIL2	
Rise time	< 2ns	± 10%
Fall time	< 2 ns	
Duration	> 30 ns	
current range into 100 Ohm	1.00 A up to 10.0 A	With coupler
Settings	Ipeak 1.00 A up to 15.0A	See display
Repetition rate	max. 30 Hz (0.033s)	+10% -0%
Polarity	pos. / neg.	
Source Impedance	50 Ohm	
Test time	1 up to 29999 s	

4.3 Damped oscillatory MIL-STD-461F, CS116

Waveform in the calibration set up:	VERI-MIL2		
Oscillation frequency	10, 100 kHz, 1, 10, 30 100 MHz		
Q - Damping	15	± 5	
Current range into 100 Ohm - Plug-in CS116-10k..10M with injection probe CN-MIG-BT			
Plug-in CS116-10k..10M „one output“	0.02 A up to 0.20 A	10 kHz	Z ≈ 10 Ohm
	0.20 A up to 2.00 A	100 kHz	Z ≈ 10 Ohm
	1.00 A up to 15.0 A	1 MHz	Z ≈ 50 Ohm
	2.00 A up to 12.0 A	10 MHz	Z ≈ 50 Ohm
Current range into 100 Ohm - Plug-in CS116-30M..100M with injection probe CN-MIG-BT2			
Plug-in CS116-30M+100M „two outputs“	2.00 A up to 12.0 A	30 MHz	Z ≈ 50 Ohm
	1.0 A up to 6.00 A	100 MHz	Z ≈ 50 Ohm
Repetition rate	0.5 up to 999 s		
Polarity	positive and negative programmable		
Test time	1 up to 29999 seconds		
CS116-10k..10M	parameter programmable: frequency, Ip, polarity, test time, repetition, etc.		

4.4 Ringwave MIL-STD-1275

Voltage range output generator	100 V up to 1000 V	open circuit
Rise time 10/90%	< 50 ns	open circuit
Oscillation frequency	between 100 to 500 kHz	open circuit
Energy at 550 V	15 mJ	
Energy at 250 V	3 mJ	
Pulse repetition	2 to 0.001Hz	
Power supply d.c.		
Voltage maximum	28V	
Maximum current	30A	
Power supply a.c.		
Voltage	115V	
Maximum current	25A	
Voltage	230V	
Maximum current	10A	
Frequency	50/60/400Hz	

4.5 Airbus AMD24-C

Serial Injection		
Voltage range BT4 output	50 – 1200V	Calibration loop 1 or 2 turns
Inductance secondary	Approx. 190 μ H	2 turns
Maximum EUT power supply current at	Maximum voltage drop at the CN-MIG-BT4	< 15V
	400Hz	30A
	600Hz	20A
	800Hz	15A
Voltage drop at maximum current	< 15V	
Waveform 2/10 us		
Source impedance with BT4	50 Ohms	+/- 10 %
Decoupling for serial injection	up to 250V at 50/60 Hz up to 115V at 800 Hz	
Repetition	up to max 2 Hz	
	10 s(to charge the C-battery)	Interval between tests
Waveform 2/50 us		
Source impedance with BT4	5 Ohms	+/- 10 %
Decoupling for serial injection	up to 250V at 50/60 Hz up to 115V at 800 Hz	
Repetition	up to max 2 Hz	
	10 s(to charge the C-battery)	Interval between tests
Waveform 2/100 us		
Source impedance with BT4	5 Ohms	+/- 10 %
Decoupling for serial injection	up to 250V at 50/60 Hz up to 115V at 800 Hz	
Repetition	up to max 1 Hz	
	10 s(to charge the C-battery)	Interval between tests
Output polarity	Positive./negative	

Waveform 2/200 us		
Source impedance with BT4	5 Ohms	+/- 10 %
Decoupling for serial injection	up to 250V at 50/60 Hz up to 115V at 800 Hz	
Repetition	up to max 1 Hz	
	10 s(to charge the C-battery)	Interval between tests
Waveform 2/400 us		
Using additional NW-AMD24C-400us		
Source impedance with BT4	5 Ohms	+/- 20 %
Decoupling for serial injection	up to 250V at 50/60 Hz up to 115V at 800 Hz	
Repetition	up to max 1 Hz	10 s(to charge the C-battery)

4.6 Euro Fighter Slow & Fast

NATO-SLOW-10u		
Risetime	< 2us	
Duration	10us ±20%	
Voltage range	100 V up to 850 V	
Repetition	up to max 10 Hz	
Source impedance	5 Ohm	+/- 20 %

NATO-FAST-150n		
Risetime	< 30ns	
Duration	150ns ±20%	
Voltage range	200 V up to 1600 V	
Repetition	up to max 10 Hz	
Source impedance	50 Ohm	+/- 20 %

4.7 DO160 section 17

Parallel Injection		
Voltage range output	100 V up to 1200V	Calibration Test tip cable length 1 m
Decoupling for parallel injection	up to 250V at 50/60 Hz up to 115V at 400 Hz	
Serial Injection		
Voltage range BT output	100 V up to 1200 V	Calibration loop (3 turns)
Source impedance BT	50 Ohm	+/- 10 %
Voltage range BT1 output	100 V up to 700 V	Calibration loop (1 turns)
Source impedance BT1	25 Ohm	+/- 10%
Decoupling for serial injection	up to 250V at 50/60 Hz up to 115V at 400 Hz	
Repetition	up to max 2 Hz	
Synchronisation with box	50/60/400Hz	
Angle setting	1 °	
Accuracy of Synchronisation	+/-5°	

4.8 DO160 section 19

Spike repetition	approx. 250 kHz	
Burst duration	approx 150 µs	
Voltage	600V	
Polarity reversal	By turning coil	
Polarity	Negative and positive	
Pulse Repetition	max 10 Hz	

5 Accessories and Options

5.1 System Accessories

CN-MIG-BT for Cable Induction Tests



Injection probe (coupler)
frequency range 10 kHz up
to
10 MHz.
Maximum cable diameter
30 mm (approx. 1.2")

CN-MIG-BT2 for Cable Induction Tests



Injection probe (coupler)
frequency range 10 MHz up
to
100 MHz.
Maximum cable diameter
26 mm (1")

VERI-MIL2



Calibration fixture for
waveform calibration 10
kHz up to 100 MHz.

CN-MIG-BT4 for AMD-24C Tests



VERI50



50 ohm termination and attenuator for system verification according to MIL-STD-461E.

VERI5



5 ohm termination and attenuator for system verification.

SYNCH ADAPTER



The Sync Adapter generates the signal for the Spike synchronisation. It must be connected to the „Auxiliary“ plug on the rear panel of the MIG2000-6 generator.

DC-S17CL



10uF decoupling set for voltage spike on power supplies.

5.2 Accessories to all MIG and TRA Testers

TEMA software

MS-W3-L3 - Microsoft Internet Explorer bereitgestellt von EMC-Partner AG

Datei Bearbeiten Ansicht Favoriten Extras ?

Zurück Suchen Favoriten

Adresse C:\Programme\EMC-Partner\Test-Manager\Database\MIG\DO160\CB-M5\MS-W3-L3.htm





Cable Bundle, Multiple Stroke : Waveform 3 , 1MHz and 10MHz : Level 3

EMC-PARTNER AG, 4242 Laufen, Switzerland

TEMA Sequence File : [MS-W3-L3_SEQ](#)

Operator : R.Casanova Unit :
Serial Nbr.:

Equipment : MIG-OS-MB and CN-MIG-BT1

<p>1</p>  <p>pass fail</p> <p>stop</p>	<p>Cable Bundle, Multiple Stroke : W3 : 1MHz , 600V , positive</p> <p>Load Setup: ms-w3-l3-pos</p> <p>10 Events every 10sec: 1First and 13Sub. on 50% , randomly up to 1.5sec</p> <p>Result : Test not run</p>
<p>2</p>  <p>pass fail</p> <p>stop</p>	<p>Cable Bundle, Multiple Stroke : W3 : 1MHz , 600V , negative</p> <p>Load Setup: ms-w3-l3-neg</p> <p>10 Events every 10sec: 1First and 13Sub. on 50% , randomly up to 1.5sec</p> <p>Result : Test not run</p>
<p>3</p>  <p>pass fail</p> <p>stop</p>	<p>Cable Bundle, Multiple Stroke : W3 : 10MHz , 600V , positive</p> <p>Load Setup: ms-w310M-l3-pos</p> <p>10 Events every 10sec: 1First and 13Sub. on 50% , randomly up to 1.5sec</p> <p>Result : Test not run</p>
<p>4</p>  <p>pass fail</p> <p>stop</p>	<p>Cable Bundle, Multiple Stroke : W3 : 10MHz , 600V , negative</p> <p>Load Setup: ms-w310M-l3-neg</p> <p>10 Events every 10sec: 1First and 13Sub. on 50% , randomly up to 1.5sec</p> <p>Result : Test not run</p>

TEest MAnager Platform Software
For MIG, TRA and ESD testers

- Test Library
- Remote control
- Customised protocolling without oscillograms

DSO control option

Cable Bundle, Single Stroke : Waveform 3, 1MHz and 10MHz : Level 3

11:14 02.08.2007 EMC-PARTNER AG, 4242 Laufen, Switzerland
 Operator : R.Casanova Unit :
 Remarks Serial Nbr.:

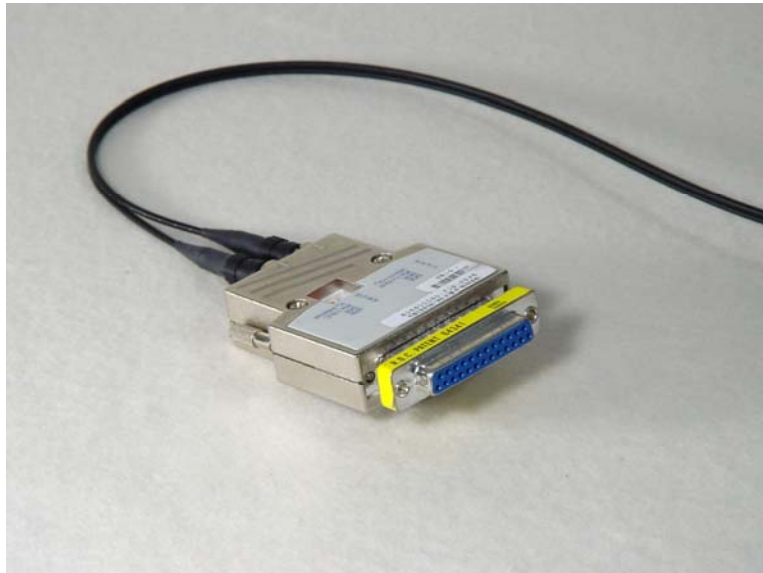
17:29 06.05.03 Equipment : MIG-OS-MB and CN-MIG-BT1

Time	Step	Description	Result
17:29	1	set-up DSO for 1MHz , 600V Load Setup: ss-w3-I3-pos	pass
17:29	2	Cable Bundle : W3 : 1MHz , 600V , positive Load Setup: ss-w3-I3-pos 10 pulses , repetition 6sec Result : Test completed Report 2 in File : ss-w3-I3-pos.txt	pass
17:30	3	Download picture Screendump: ss-w3-I3-pos	pass
17:31	4	Cable Bundle : W3 : 1MHz , 600V , negative Load Setup: ss-w3-I3-neg 10 pulses , repetition 6sec Result : Test completed Report 4 in File : ss-w3-I3-neg.txt	pass
17:32	5	Download picture Screendump: ss-w3-I3-neg	pass

DSO control to TEMA Software
 For MIG, TRA and ESD testers

- Remote control DSO
- Customised protocolling with oscillograms

OPTICAL LINK



Serial, optical connection between PC and Generators. length 10 m