

**GTJ2000 SERIES SERVICE MANUAL**

**Features**

- GTJ2020 20W JIG
- GTJ2030 80W JIG
- GTJ2040 250W JIG
- GTJ2050 500W JIG
- GTJ2060 AC/DC 50W JIG
- GTJ2070 200W charger JIG

**GTJ2000 Series Information**

Gaia-converter has developed a series of test jig printed circuit boards intended to ease Gaia-converter 's product testing. The pcb are for demonstration purpose only and are not intended to be used for final application. Parameters like isolation distance, copper thickness thermal management choices are not optimized for final application, but for test only. The

present document shows board schematic diagrams, layout, bill of materials, and describes an easy process to populate the sample test jig. Expected performance with such jigs are also given at the end of each chapter as examples. QR codes pointing to the present document and product data sheets have been printed into pcb for faster information access.

**GTJ2000**

**Standards**

- Mil-STD-704
- Mil-STD-1275
- Mil-STD-461
- DO160
- ABD100

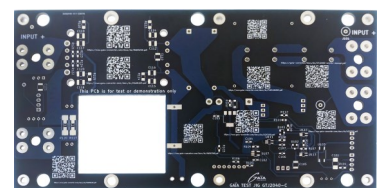
1. GTJ2020 : 20W JIG for **FGDS6A100 MGDD08/MGDD21**-----02
2. GTJ2030 : 80W JIG for **FGDS12A LHUG150N MGDD40/MGDD80** --- 07
3. GTJ2040 : 200W JIG for **MGDS160, MGDS205 or MGDS250**-----13
4. GTJ2050 : 500W JIG for **FGDS35A50, LGDS600, MGDS500** -----20
5. GTJ2060 : AC/DC 50W JIG for **HGMB50 & MPGS14**----- 26
6. GTJ2070 : 200W battery charger with **MGDS201**-----34



GTJ2020-A



GTJ2030-A



GTJ2040-C



GTJ2050-B



GTJ2060-B



GTJ2070-A

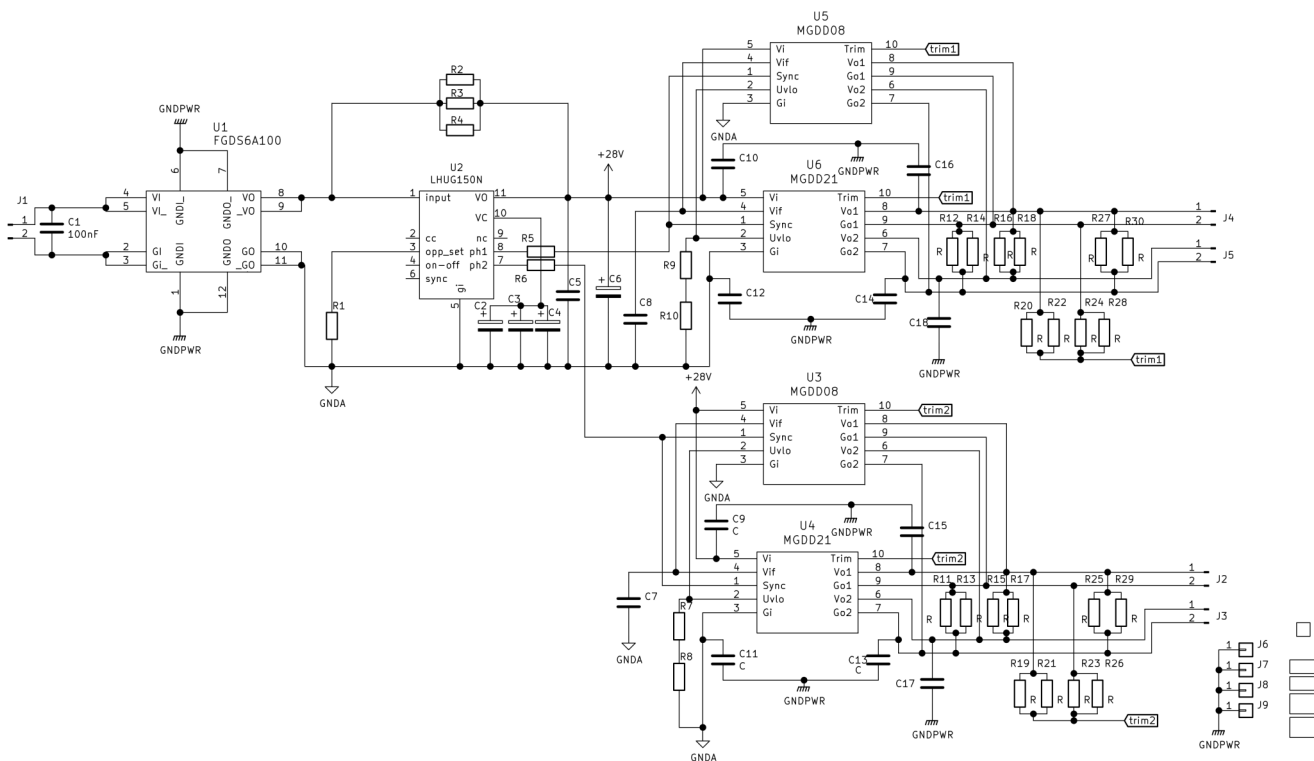
## 1-GTJ-2020 : JIG For FGDS6A100 MGDD08 MGDD21

### 1.1-Board Description

GTJ2020 is a test jig that can be used to evaluate converters from the MGDD08 or MGDD21 series, along with the LHUG150N input bus conditioner, and the FGDS6A100 EMI filter. Testing can be performed with regards to the Mil-STD1275, Mil-STD 704 and Mil-STD461 military standards.



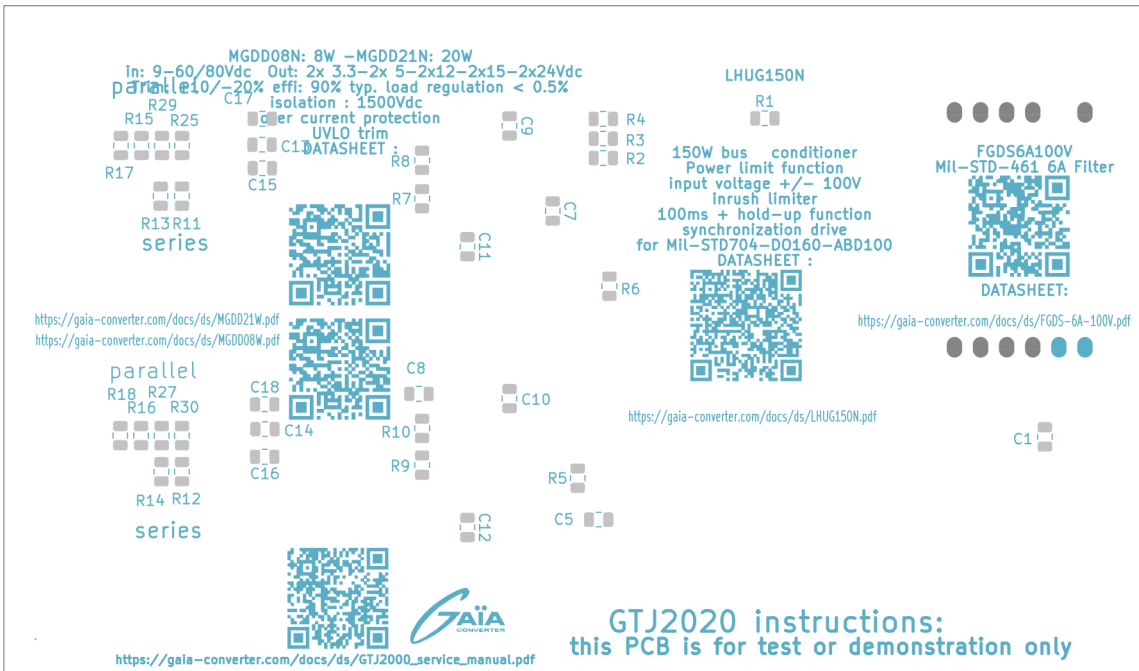
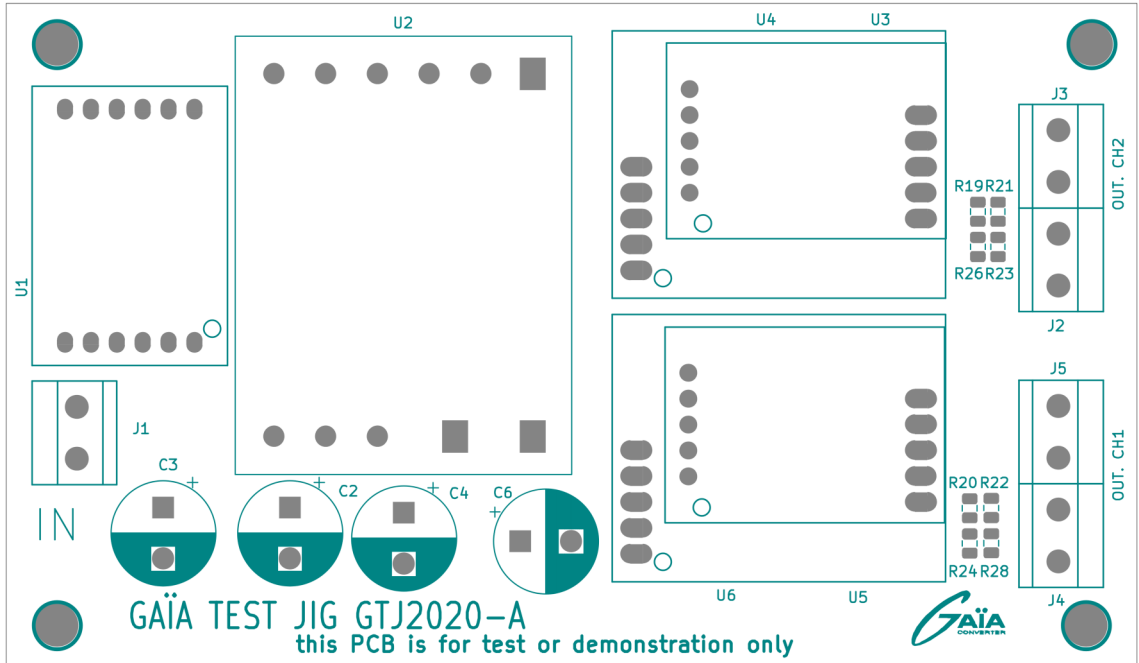
### 1.2-SCHEMATIC DIAGRAM



GTJ2020-A Schematic diagram  
U3/U4 and U5/U6 are double implantation components

## 1-GTJ-2020 : JIG For FGDS6A100 MGDD08 MGDD21

### 1.3-BOARD DRAWINGS



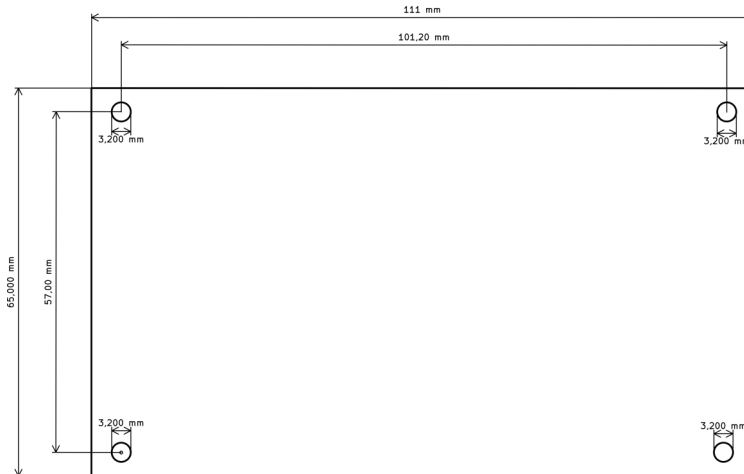
GTJ2020-A

## 1-GTJ-2020 : JIG For FGDS6A100 MGDD08 MGDD21

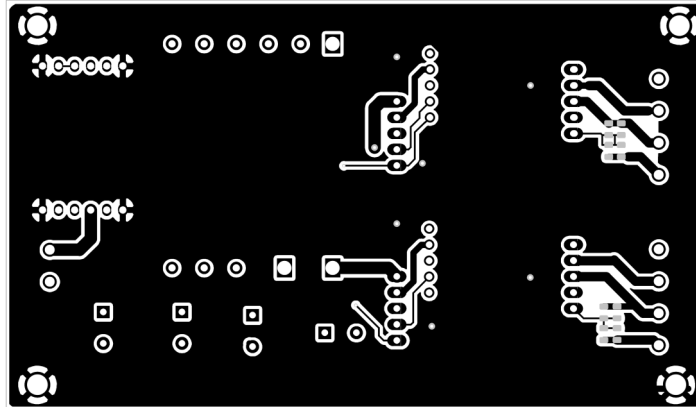
### 1.3-BOARD DRAWINGS

General tolerances +/- 0.2

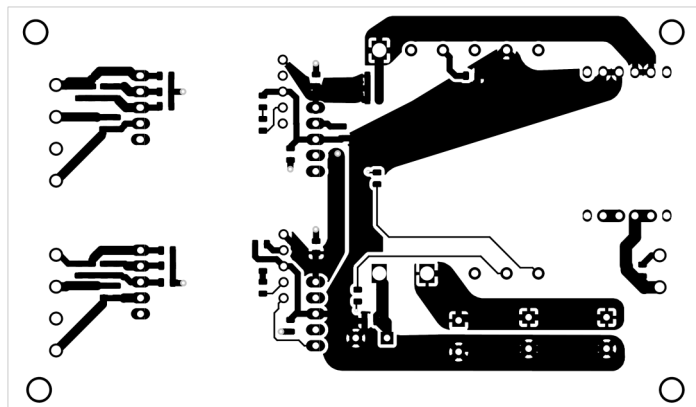
PCB thickness : 1.6 mm



Copper top layer



Copper bottom layer



GTJ2020-A

## 1-GTJ-2020 : JIG For FGDS6A100 MGDD08 MGDD21

### 1.4-BILL OF MATERIALS

designator	description	Qty.	possible part-number	Supplier	comment
C6	47µF 100V	1	EKMG101ELL470MJC5S	CHEMI-CON	
C1,C7,C8,C5	100nF 100V MLCC	4	C0805C104J1RACTU	KEMET	
C2,C3,C4	100µF / 100V	3	ECA2AHG101	Panasonic	
C9,C10,C11,C12,C13C14,C15,C16,C17,C18	10nF MLCC	10	08051C103JAT2A	AVX	Warning not for 1500V isolation
R2,R3,R4,R5,R6,R14,R18,R30,R27,R16,R12,R11,R13,R15,R17, R25,R29	0 OHMS	17	CRCW08050000Z0EAHP	Vishay	Configuration straps, to be populated according to desired configuration
R1,R19,R20,R21,R22,R7,R8,R9,R10,R23,R24,R26,R28	Any value	13	MCU08050D1001BP500	Vishay	Configuration resistors
J4,J1,J2,J3,J5	Terminal blocks	5	1760490000	WEIDMULLER	
U1	EMI FILTER 6A	1	FGDS6A100	GAIA-CONVERTER	
U2	INPUT BUS CONDITIONER	1	LHUG150N	GAIA-CONVERTER	Can be bypassed
U3/U4/U5/U6	8/21W DC/DC converter	2	MGDD08N/MGDD21N	GAIA-CONVERTER	

Bom is given as suggestion, any other components part numbers may suit.

### 1.5-COMPATIBLE MODULES

Compatible Modules	comment	Compatibles Modules	comment
MGDD08NB		MGDD21NB	
MGDD08NC		MGDD21NC	
MGDD08NE		MGDD21NE	
MGDD08NF		MGDD21NF	
MGDD08NI		MGDD21NI	
MGDD08EB		MGDD21EB	With shunt instead of LHUG150
MGDD08EC	With shunt instead of LHUG150	MGDD21EC	With shunt instead of LHUG150
MGDD08EE	With shunt instead of LHUG150	MGDD21EE	With shunt instead of LHUG150
MGDD08EF	With shunt instead of LHUG150	MGDD21EF	With shunt instead of LHUG150
MGDD08EI	With shunt instead of LHUG150	MGDD21EI	With shunt instead of LHUG150
FGDS6A100		MGDD21NCE	With shunt instead of LHUG150
LHUG150N			

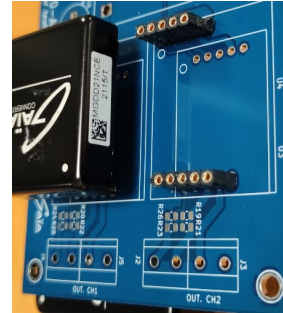
## 1-GTJ-2020 : JIG For FGDS6A100 MGDD08 MGDD21

### 1.6-ASSEMBLY & OPERATION

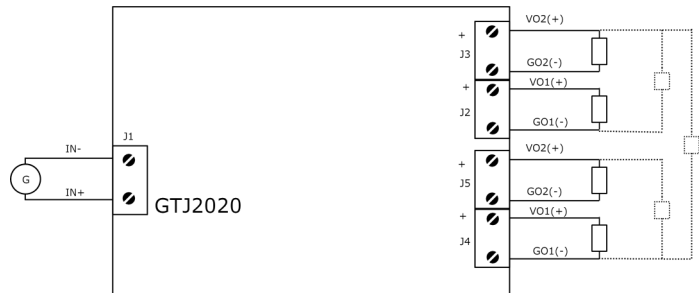
**Board Assembly :** Start populating smallest components (SMD resistors and SMD capacitors) on the bottom side of GTJ2020, and then on top side. Populate configuration resistors according to the desired output configuration (see table opposite). If R1 is not populated and LHUG150N used, the maximum power will be limited to ~30W at converters input. Populate then the 3 junction blocks, and aluminum capacitors. Gaia modules have to be populated at the last stage of assembly.

Installing sockets (E-TEC : BL1-036-G-700-1) in place of Gaia modules allow to use board as re-usable test jig. **Warning :** Performances given below are measured with modules assembled directly on board without sockets.

**Board Operation :** To operate the board, the wiring scheme opposite needs to be followed. The input Generator (or Lab. PSU) can be connected to J1, J2 to J3 will be wired according to desired output. **Warning :** do not populate R2, R3 ,R4, if LHUG150 is in place.

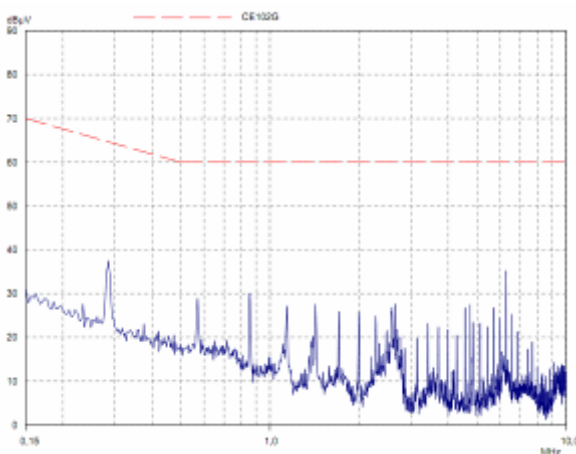


Socket E-TEC: BL1-036-G-700-1

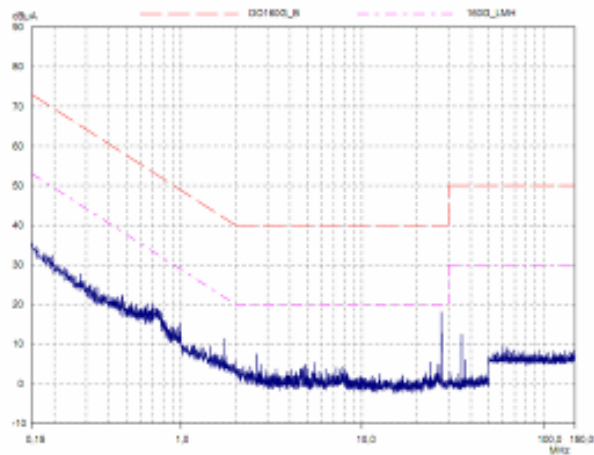


### 1.7-EXPECTED PERFORMANCES

#### 1.7.1-MIL-STD 461 DO 160



2 x MGDD08NF Mil-STD-461

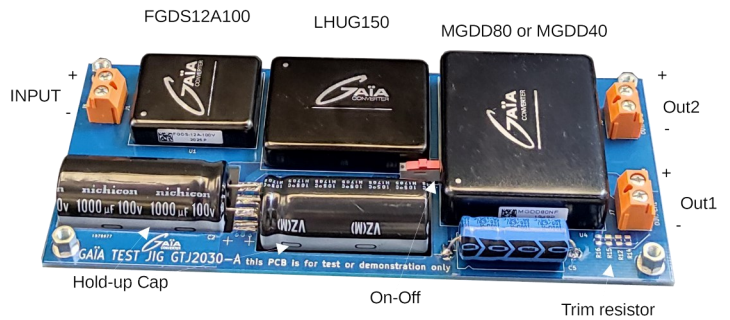


2 x MGDD08NF DO-160

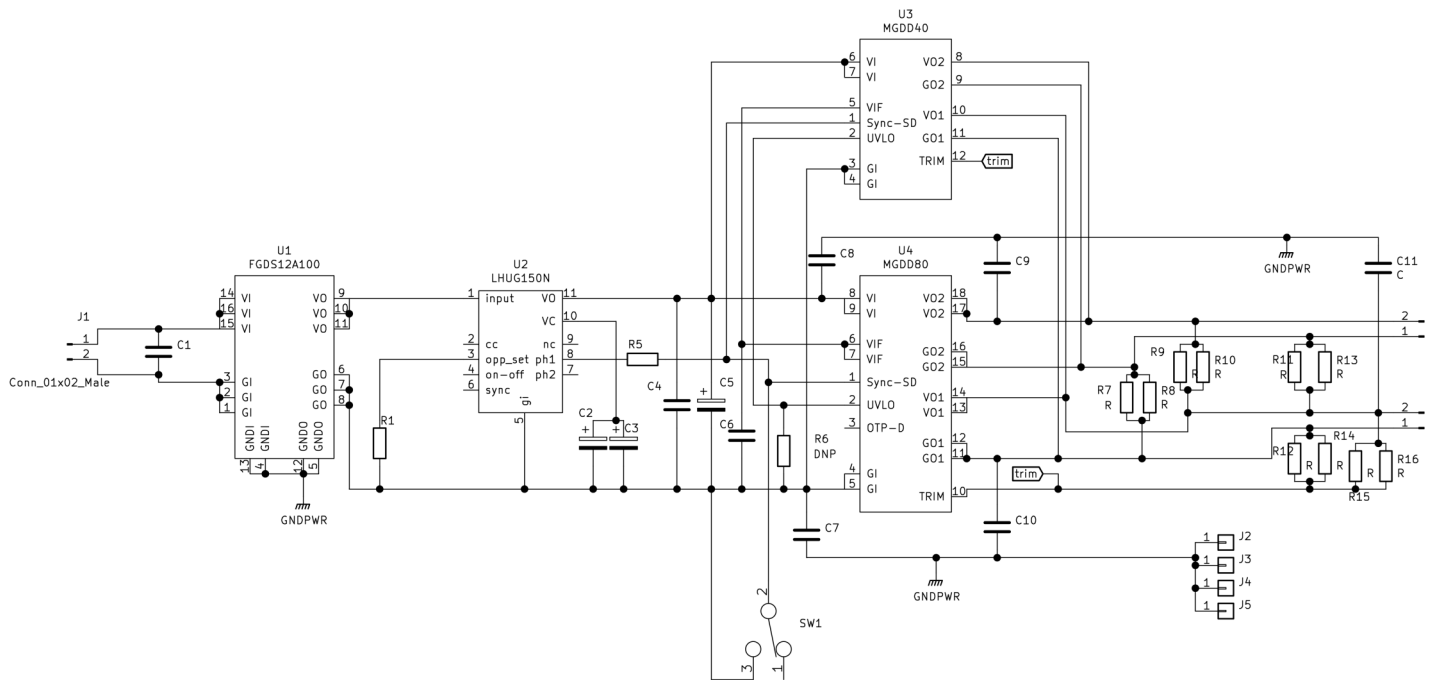
## 2-GTJ-2030 : JIG For FGDS12A LHUG150N MGDD40/MGDD80

### 2.1-Board Description

GTJ2030 is a test jig that can be used to evaluate converters from the MGDD40 or MGDD80 series, along with the LHUG150N input bus conditioner, and the FGDS12A100 EMI filter. Testing can be performed with regards to the Mil-STD1275, Mil-STD 704 and Mil-STD461 military standards. This Board is for evaluation only.



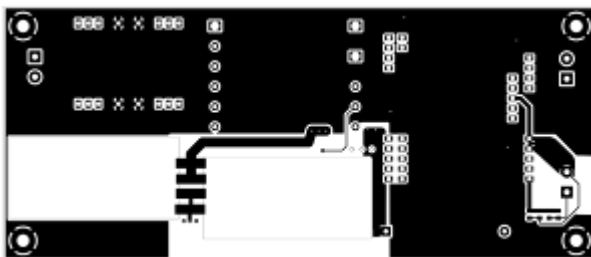
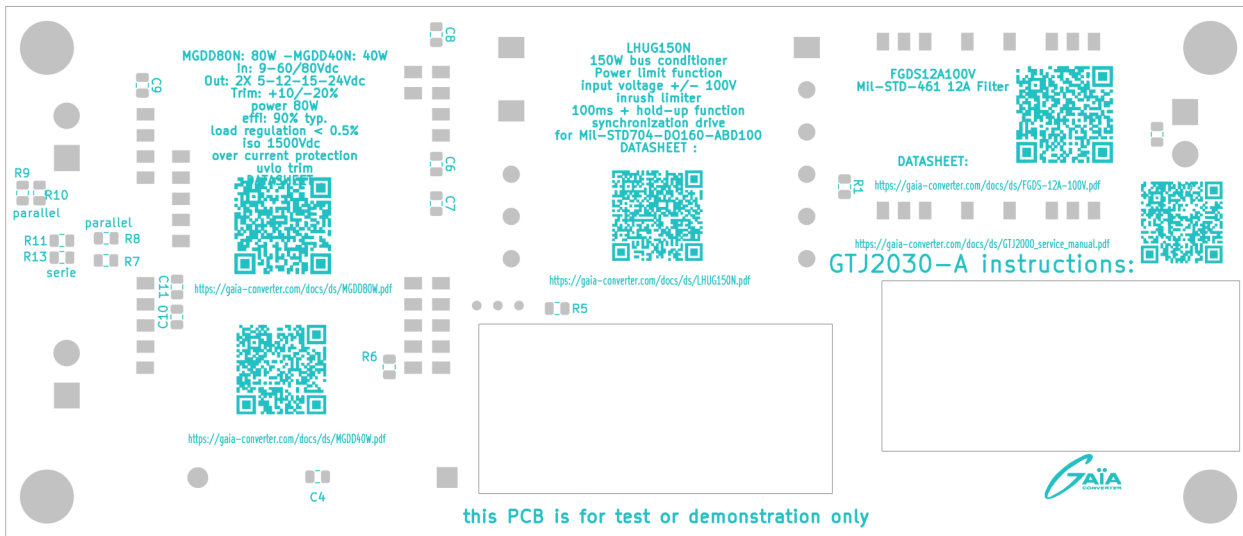
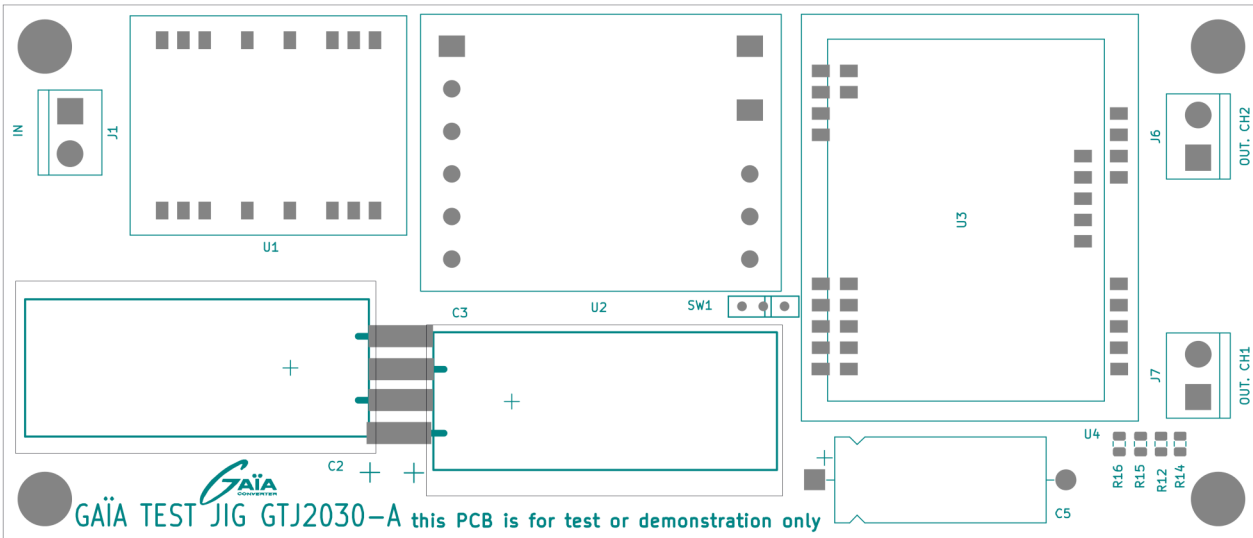
### 2.2-SCHEMATIC DIAGRAM



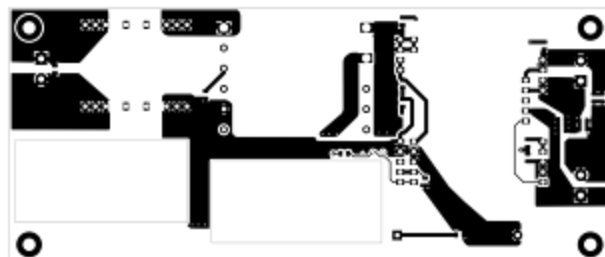
GTJ2030-A Schematic diagram  
U3/U4 are double implantation components

## 2-GTJ-2030 : JIG For FGDS12A LHUG150N MGDD40/MGDD80

### 2.3-BOARD DRAWINGS



Copper top layer



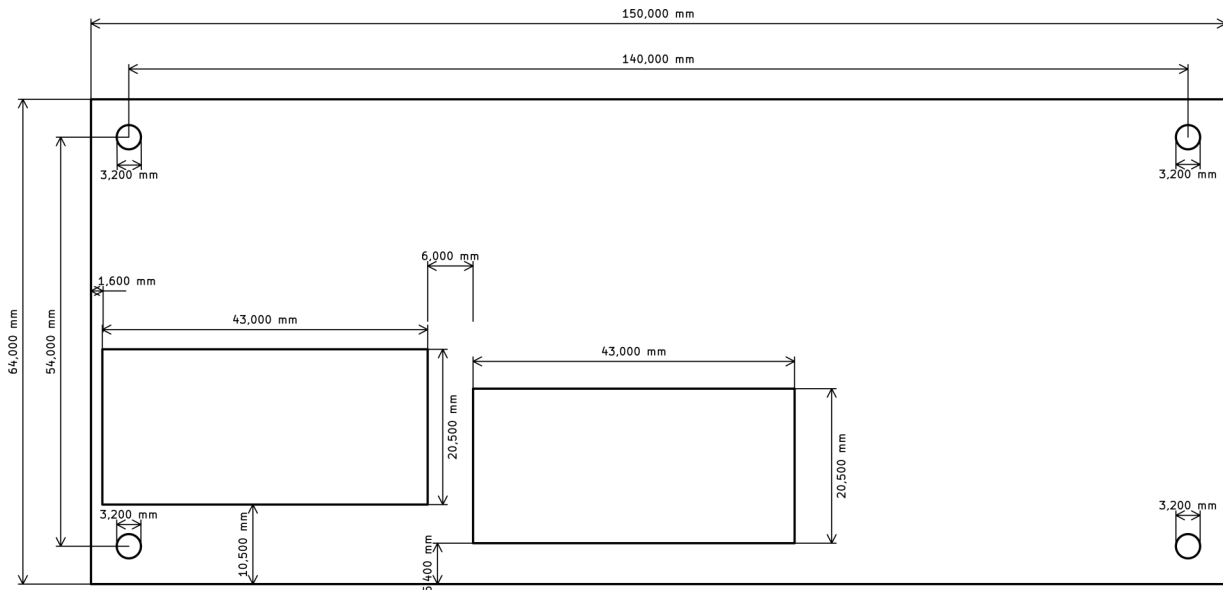
Copper bottom layer

GTJ2030-A



**2-GTJ-2030** : JIG For FGDS12A LHUG150N MGDD40/MGDD80

## 2.3-BOARD DRAWINGS



General tolerances +/- 0.2

PCB thickness : 1.6 mm

## 2-GTJ-2030 : JIG For FGDS12A LHUG150N MGDD40/MGDD80

### 2.4-BILL OF MATERIALS

designator	description	Quantity	possible part-number	Supplier	comment
C2,C3	1000µF 100V	2 (1)	UVZ2A102MHD	Nichicon	
C1,C4	100nF 100V MLCC	2	C0805C104J1RACTU	KEMET	
C5	100µF / 100V	1	107TTA100M	CORNELL DUBLIER	
C6	1µF 100V MLCC	1	08051C105KAT2A	AVX	
C7,C8,C9,C10	10nF MLCC	4	08051C103JAT2A	AVX	Warning not for 1500V isolation
R5, R7,R8, R9, R10,R11 ,R13	0 OHMS	7	CRCW08050000Z0EAHP	Vishay	Configuration straps
R1, R6 R12,R14,R15	Anny value	5	MCU08050D1001BP500	Vishay	Configuration resistors
J1,J7,J8	Terminal blocks	3	1760490000	WEIDMULLER	
SW1	Switch SIL 1 mm THT WS 10x2.5	1	45030101442	WURTH ELEKTRONIK	
U1	EMI FILTER 12A	1	FGDS12A100	GAÏA-CONVERTER	
U2	INPUT BUS CONDITIONER	1	LHUG150N	GAÏA-CONVERTER	Can be bypassed
U3/U4	40/80W DC/DC converter	1	MGDD40 MGDD80	GAÏA-CONVERTER	

Bom is given as suggestion, any other components part numbers may suit.

### 2.5-COMPATIBLE MODULES

Compatible Modules	comment	Compatibles Modules	comment
MGDD40NB		MGDD80NB	
MGDD40NC		MGDD80NC	
MGDD40NE		MGDD80NE	
MGDD40NF		MGDD40NF	
MGDD40NI		MGDD40NI	
MGDD40NCE		MGDD40NCE	
MGDD40EC	With shunt instead of LHUG150	MGDD40EC	With shunt instead of LHUG150
MGDD40EE	With shunt instead of LHUG150	MGDD40EE	With shunt instead of LHUG150
MGDD40EF	With shunt instead of LHUG150	MGDD40EF	With shunt instead of LHUG150
MGDD40EI	With shunt instead of LHUG150	MGDD40EI	With shunt instead of LHUG150
FGDS12A100		LHUG150N	

## 2-GTJ-2030 : JIG For FGDS12A LHUG150N MGDD40/MGDD80

### 2.6-ASSEMBLY & OPERATION

**Board Assembly :** Start by populating smallest components (SMD resistors and SMD capacitors) on the bottom side of GTJ2030, and then on top side. Populate configuration resistors according to the desired output configuration (see table opposite). If R1 is not populated and LHUG150N used, the maximum power will be limited to ~30W at converters input. Populate then the 3 junction blocks, aluminum capacitors, and switch SW1. Gaia modules have to be populated at the last stage of assembly. **Warning :** The Hold-up Cap polarity may be confusing due to 2 crosses drawn on silk screen near the cap – connection. Installing sockets (E-TEC : BL1-036-G-700-1) in place of Gaia modules allow to use board as reusable test jig. Performances given behind are measured with modules Assembled without directly on board without sockets.

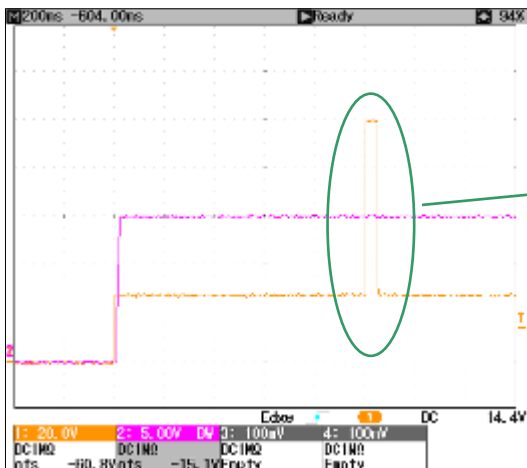
CONFIGURATION	COMPONENTS VALUE
Output channels in parallel	R7,R8,R9,R10 =0Ω R11, R13 =DNP
2 output channels independant	R7,R8,R9,R10 = DNP* R11, R13 =DNP
Output channels in series or +/- V	R7,R8,R9,R10 = DNP* R11, R13 =0Ω
Forbidden	R7,R8,R9,R10 = 0Ω R11, R13 =0Ω
Up to 120W power	R1 = 0Ω
Up to 120W power	R1 = DNP*

**Board Operation :** To operate the board, the wiring scheme opposite needs to be followed. The input Generator (or Lab. PSU) has to be connected to J1; LOAD#1, and LOAD#2 have to be connected respectively to J7 and J6. In case of connection in series the LOAD#3 scheme can be used. In case of connection in parallel, only LOAD#1 can be used.

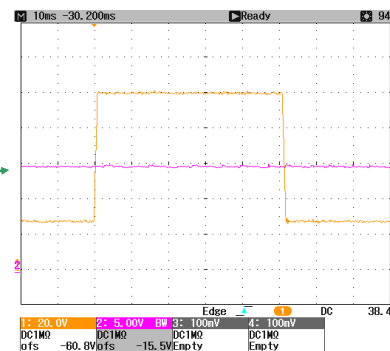


### 2.7-EXPECTED PERFORMANCES

#### 2.7.1-MIL-STD 1275 100V 50ms SURGE



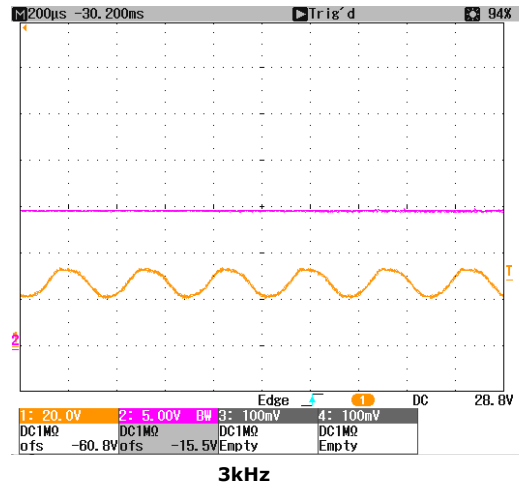
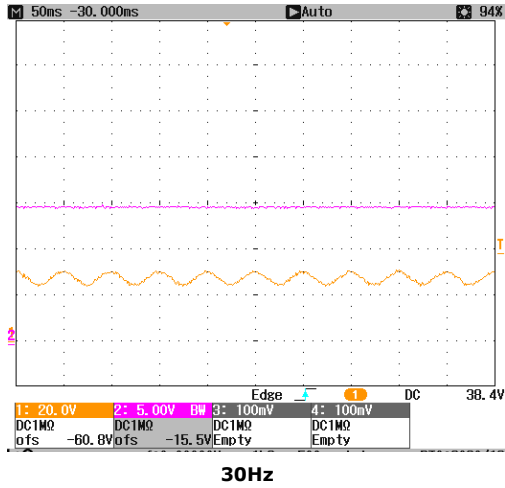
Ch1= 28V in Ch2 = 15V out



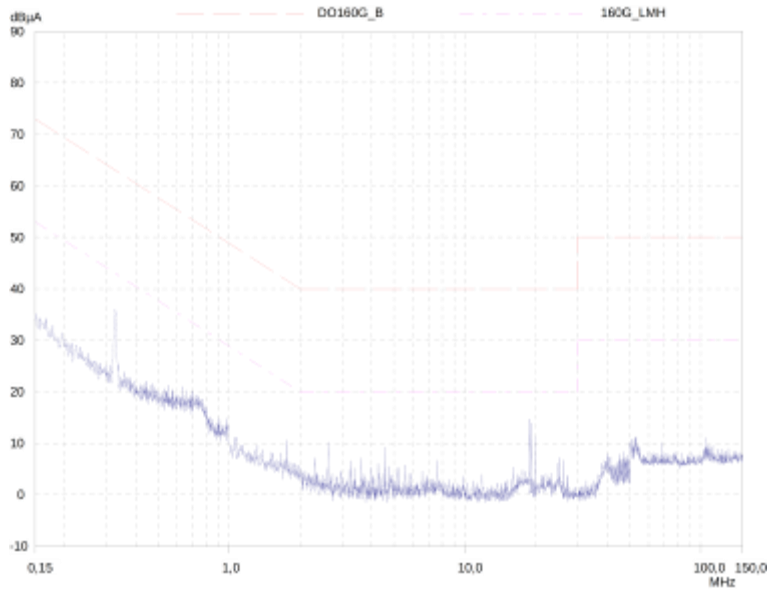
## 2-GTJ-2030 : JIG For FGDS12A LHUG150N MGDD40/MGDD80

### 2.7-EXPECTED PERFORMANCES (Continued)

#### 2.7.2-MIL-STD 461 Audio Frequency Injection



#### 2.7.3-DO160 EMI Performances



## 3-GTJ-2040 : JIG For MGDM205 & MGDM250

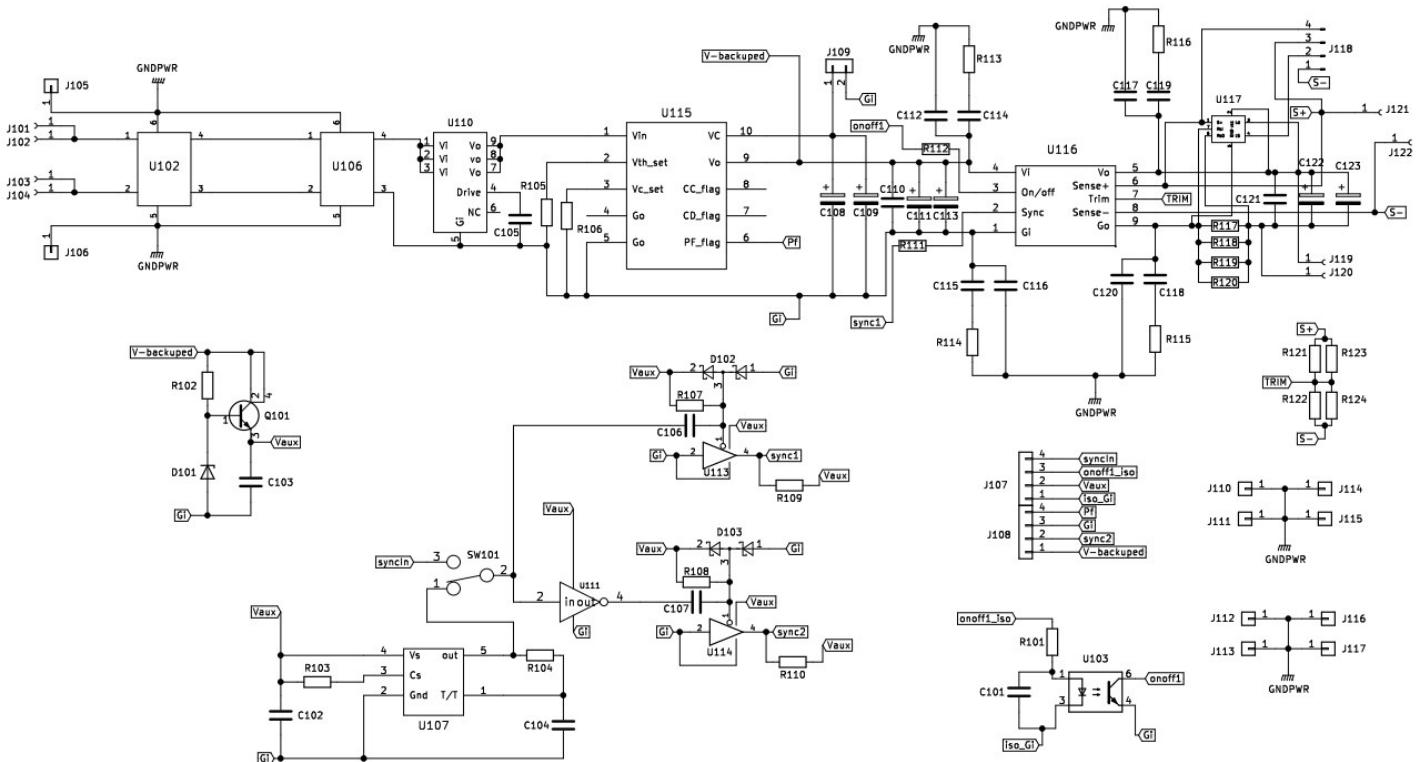
### 3.1-Board Description

GTJ2040 is a test jig that can be used to evaluate a large range of converters from the quarter brick families of Gaia-converter, along with filters, surge limiter and hold up modules. Testing can be performed with regards to the Mil-STD461, Mil-STD704, Mil-STD 1275, DO 160 avionic and military standards. The GTJ2040 enable evaluation of global power architectures.

**Warning!** the copper track thickness of this board is only 35µ, not compatible with high temperature testing.

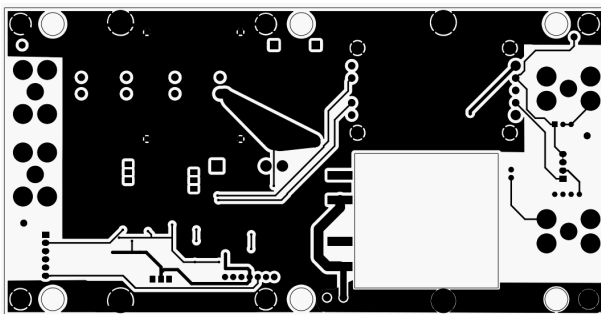
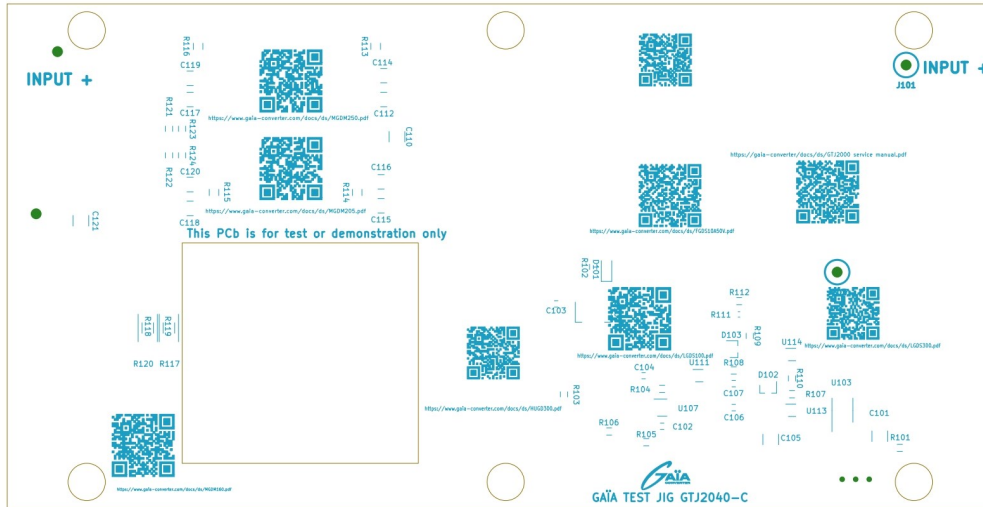
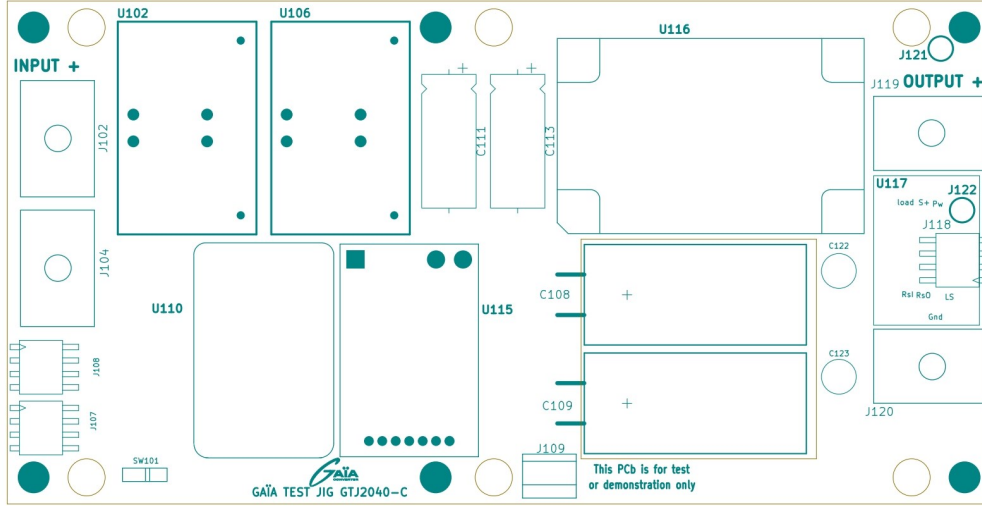


### 3.2-SCHEMATIC DIAGRAM

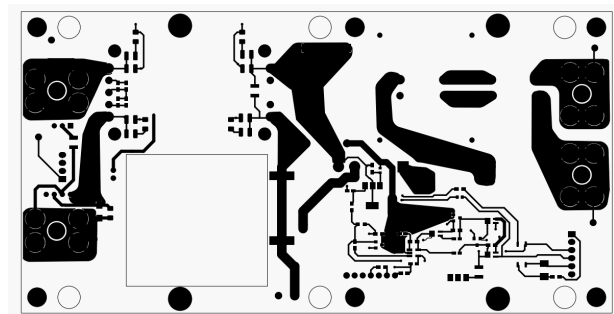


## 3-GTJ-2040 : JIG For MGDM205 & MGDM250

### 3.3-BOARD DRAWINGS



Copper top layout



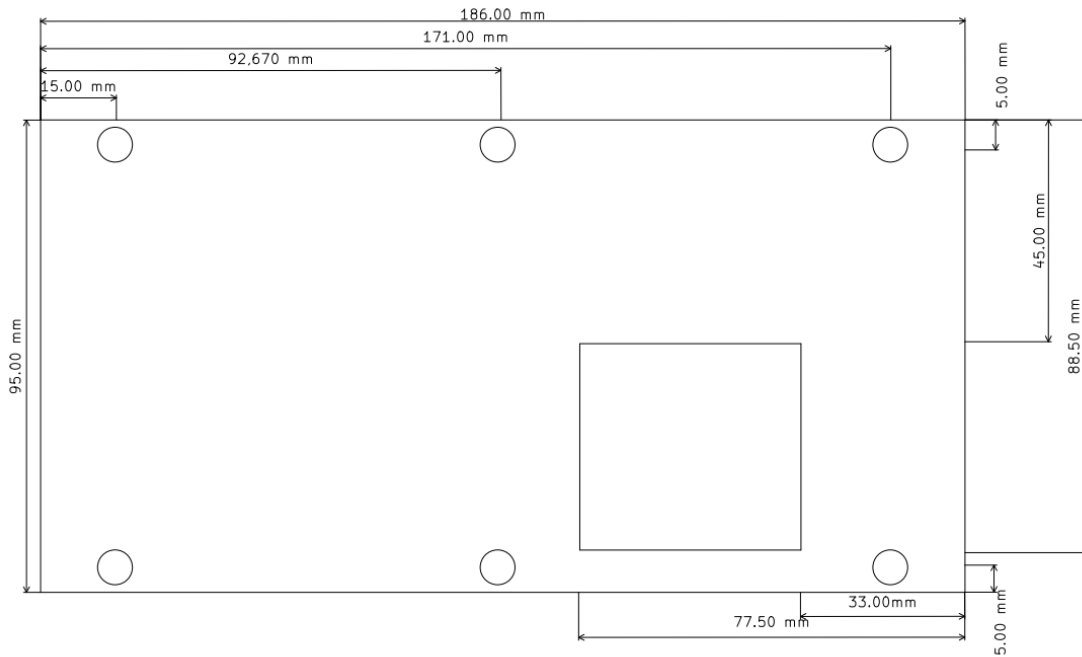
Copper bottom layout

GTJ2040-C

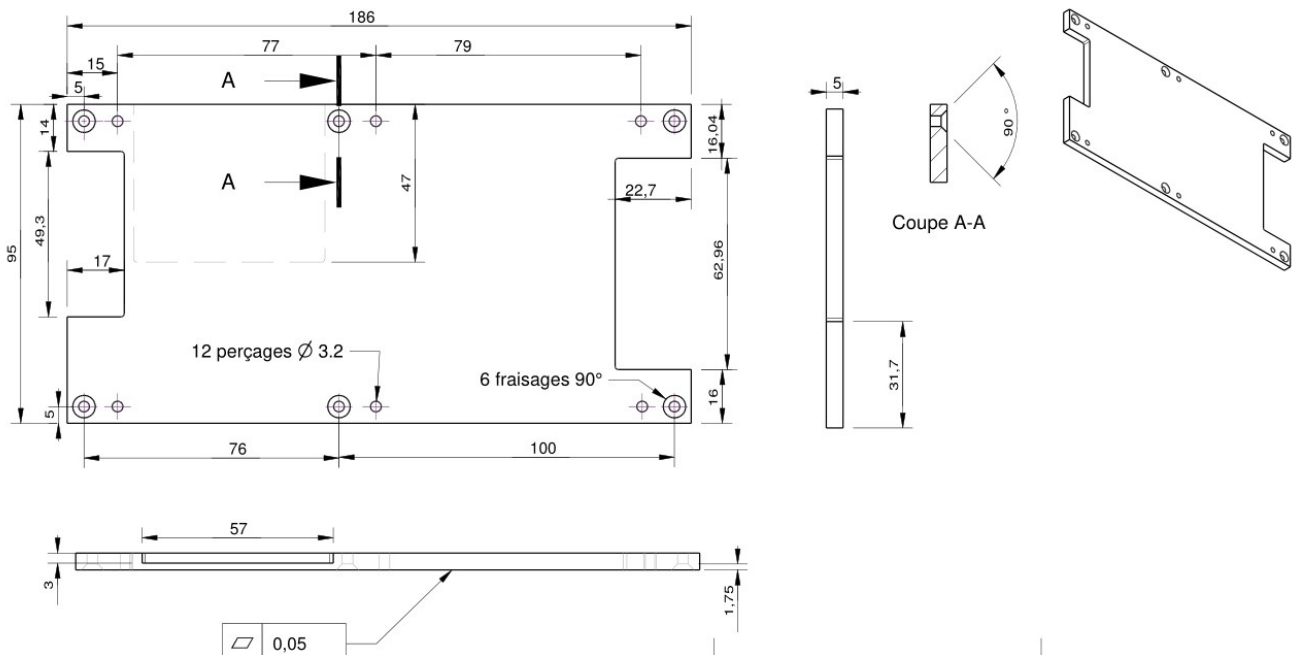
## 3-GTJ-2040 : JIG For MGDM205 & MGDM250

### 3.3-BOARD DRAWINGS

#### BOARD MECHANICAL DRAWING



#### BASE-PLATE MECHANICAL DRAWING



GTJ2040-C

## 3-GTJ-2040 : JIG For MGDM205 & MGDM250

### 3.4-BILL OF MATERIALS

designator	description	Qty	possible part-number	Supplier	comment
C101	1nF	1	VJ1206Y102KXE	Vishay	
C102,C103	100nF-50v	1	06035C104K4T2A	AVX	
C104	3,3nF – 50v	1	06035C332MAT	AVX	
C105	Any value	1			DS LGDS3000K
C106,C107	220pF	2	VJ0603A221JXAT	Vishay	
C108,C109	3300µF/63v	2	UVY1J332MRD	Nichicon	Hold-up capacitor
C110	Any value	1	1210 size	Vishay	
C112,C116,C117 ,C120	22nF 100V MLCC	4		KEMET	Not mendatory
C114,C115,C118,C119	100nF 100V MLCC	4	VJ1210Y104MXB	Vishay	
C111,C113	100µF / 100V	2	107TTA100M	CORNELL DUBLIER	
C122,C123	Any value	2		Nichicon	47µF /63v
R101	470 ohms	1	CRCV0603	Vishay	
R103	1Mohms	1	CRCV0603	Vishay	
R104,R107,R108	1k ohms	3	CRCV0603	Vishay	
R105,R106	Any value	2	CRCV0603	Vishay	DS HUGD300
R113,R114,R115,R116	10 ohms	4	CRCV1206	Vishay	
R102,R109,R110	4,7kohms	3	CRCV0603	Vishay	
R111	0 OHMS	1	CRCW08050000Z0EAHP	Vishay	Configuration straps
R121,R122,R123,R124	Any value	4		Vishay	Configuration resistors TRIM
R117,R118,R119,R120	Any value	4	1206 or 2512 format	Vishay	Configuration resistors current
J102,J104,J119,J120	Terminal blocks	4	OT-047-M5	Block masters	
J101,J103,J121,J122	Test point	4	TEST-1(BK)	Multicomp	
J107,J108,J118	Connector	3	KK-254_AE-6410-04/H	MOLEX	
J109	Connector	1	897-0843	RS PRO	
J110,J111,J114,J115	Entretoises 14mm	4	3754494	Farnell	For BasePlate
SW101	Switch SIL 1 mm	1	45030101442	WURTH ELEKTRONIK	
U102, U106	EMI FILTER 20A	1	FGDS20A50	GAÏA-CONVERTER	
U103	Optocoupleur	1	TLP185	Toshiba	
U107	Timer/Oscillator	1	MIC1557-B	Microchip	
U110	TRANSIENT LIMITOR	1	LGDS3000K	GAÏA-CONVERTER	
U111	Inverting Schmitt trigger	1	74HC1G14	Philips	
U113,U114	Bus buffer/line driver	2	74HC1G125	Philips	
U115	Hold-up	1	HUGD300	GAÏA-CONVERTER	
U116	Quarter brick converter	1	MGDS155HE	GAÏA-CONVERTER	
U117	Load sharing	1	GTJ2051A	GAÏA-CONVERTER	
Q101	Transistor NPN	1	FZT653	Diodes Inc	
D101	Diode zener	1	MMSZ5v6 0,1W	OnSemiconductor	
D102,D103	Diode	2	BAT54S	Vishay	



## 3-GTJ-2040 : JIG For MGDM205 & MGDM250

### 3.5-COMPATIBLE MODULES

Compatible Modules	comment	Compatibles Modules	comment
FGDS10A50	Lower case height	MGDS155OI	
FGDS20A50		MGDS155OJ	
FGDS35A50		MGDS160HC	
LGDS100PK	For P< 100W	MGDS160HE	
LGDS300PK		MGDS160HF	
HUGD300	Includes reverse polarity	MGDS160HI	
MGDS155HC		MGDS160HJ	
MGDS155HE		MGDS205HC	
MGDS155HF		MGDS205HE	
MGDS155HI		MGDS250HC	
MGDS155HJ		MGDS250HE	
MGDS155OC		MGDS250HI	
MGDS155OE		MGDS250HJ	
MGDS155OF			

### 3.6-ASSEMBLY & OPERATION

**Board Assembly :** Start by populating smallest components (SMD resistors and SMD capacitors) on the bottom side of JIG, and then on top side. Populate in a second stage all touchhole components. Note the GTJ2051 is only mandatory only for paralleling 2 boards.

Based on involved power level, it is highly recommended to operate the GTJ2040 with a heatsink on DC/DC converter or the required base plate, and only a room temperature.

**Warning, the board copper thickness (1 Oz) is not compliant with high temperature testing.**

**Board Operation :**

The board can be connected according to the opposite schematics diagram, for performances testing. Be sure the DC/DC converter is properly cooled with an heatsink or a base plate even for short lasting testing.

**Pinout:**

Input side			
J102	Input+	J108(4)	Pf
J104	Input-	J107(1)	Iso-Gi
J108(1)	Vbackup	J107(2)	Vaux
J108(2)	Sinc2	J107(3)	On_off iso
J108(3)	gi	J107(4)	Sync_in
Output side			
J119	Output +	J118(1)	Sense-
J120	Output -	J118(2)	Share
J121	Test +	J118(3)	Sense+ (2)
J122	Test -	J118(4)	Sense+

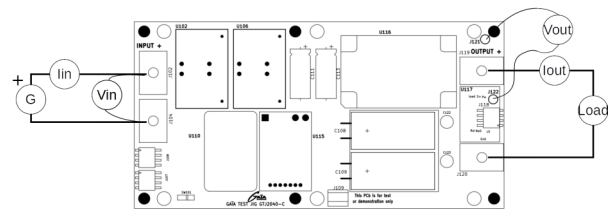
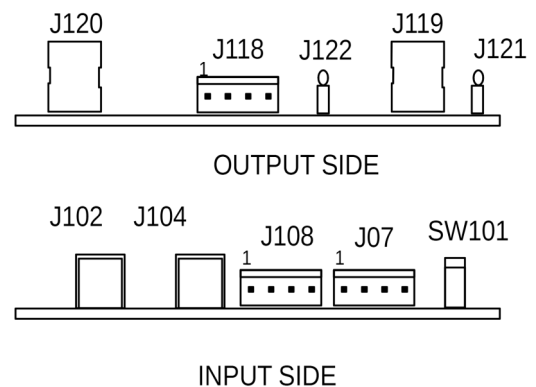
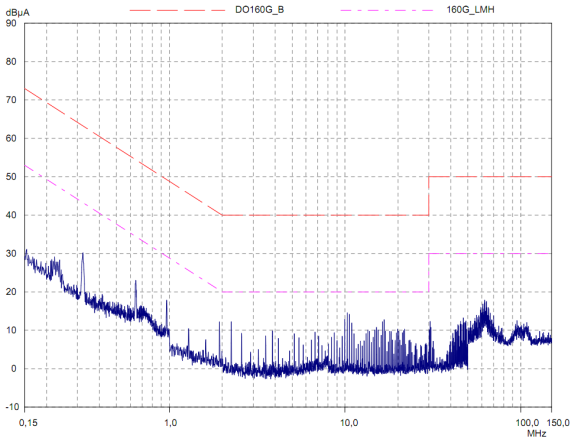


Figure 1

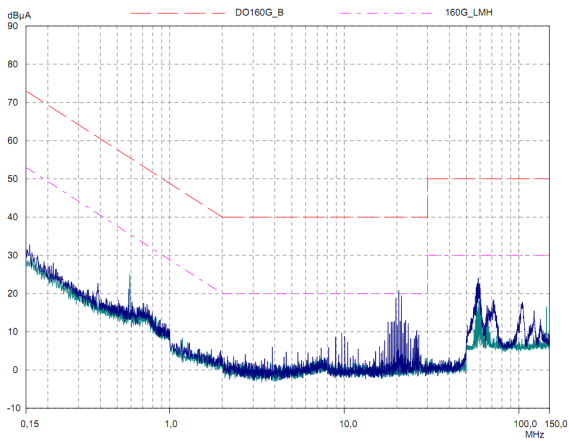
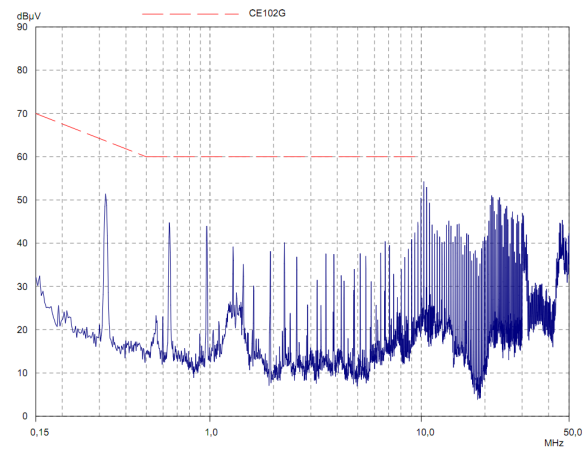


## 3-GTJ-2040 : JIG For MGDM155 to MGDM250

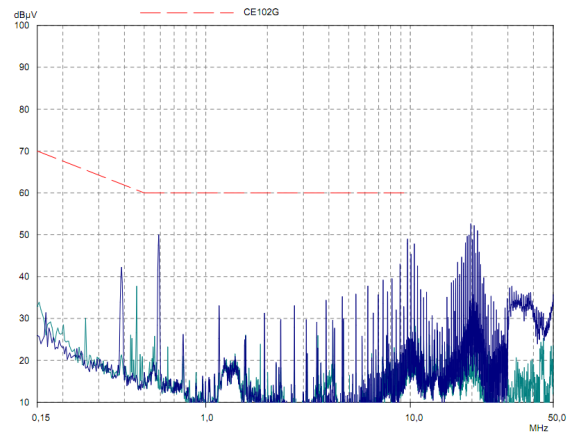
### 3.7-EXPECTED PERFORMANCES EXAMPLES



MGDS160HC EMI performance



MGDS1550J EMI performance



## 3-GTJ-2040 : JIG For MGDM155 to MGDM250

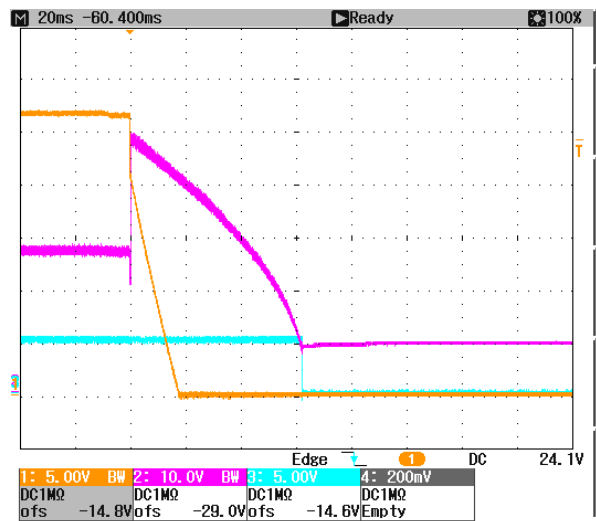
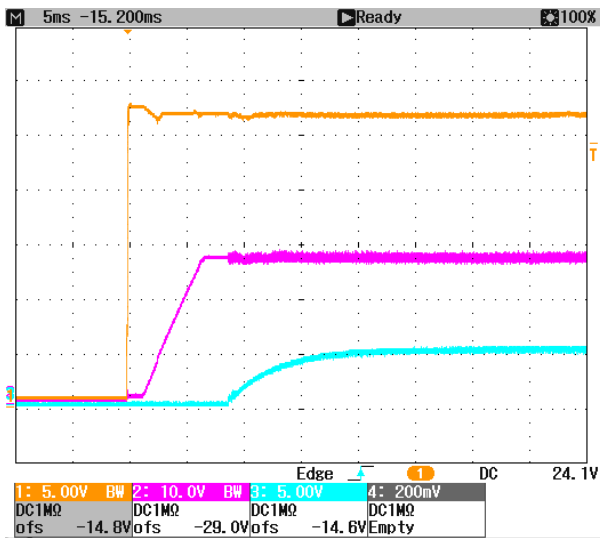
### 3.7-EXPECTED PERFORMANCES EXAMPLES

#### Power Efficiency (25°C):

Converter vi= 28v	50w	100w	150w	200w	250w
MGDS205HC	86.7%	88.7%	88%	86,2%	---
MGDS250HI	81,6%	86,3%	87%	86,6%	86%
MGDS160HJ	79,6%	82,6%	83,9%	---	---
MGDS155HE	85,9%	89,4%	88,6%	---	---

#### Hold-up Operation

MGDS205HC



Ch1 = input 28Vdc  
 Ch2 = DC/DC converter Input  
 Ch3 = DC/DC converter Output

## 4-GTJ-2050 : JIG For MGDM500 and LGDS600

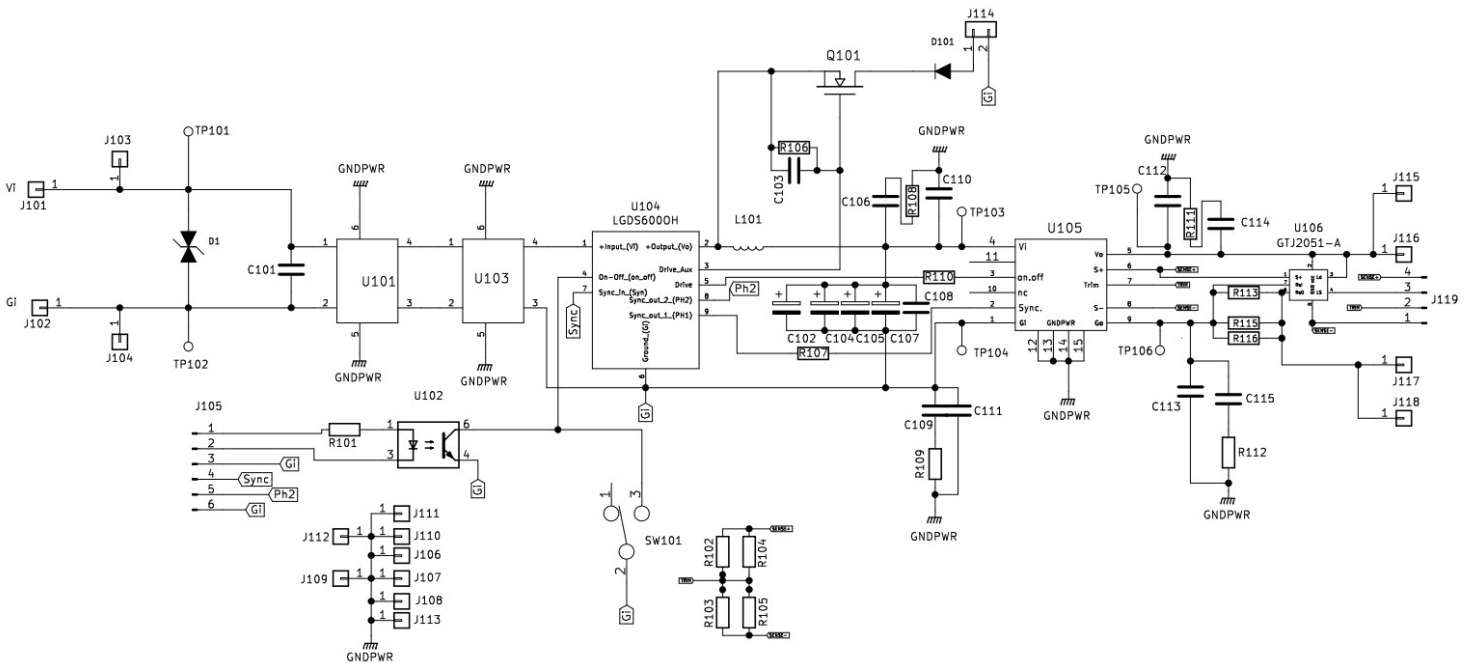
### 4.1-Board Description

GTJ2050 is a test jig that can be used to evaluate converters from the MGDM500 series, along with the FGDS35A100 EMI filter and LGDS600 Input Bus conditioner. Testing can be performed with regards to the Mil-STD461 and DO 160 military standards.

**Warning!** the copper track thickness of this board is only 35μ, not compatible with high temperature testing



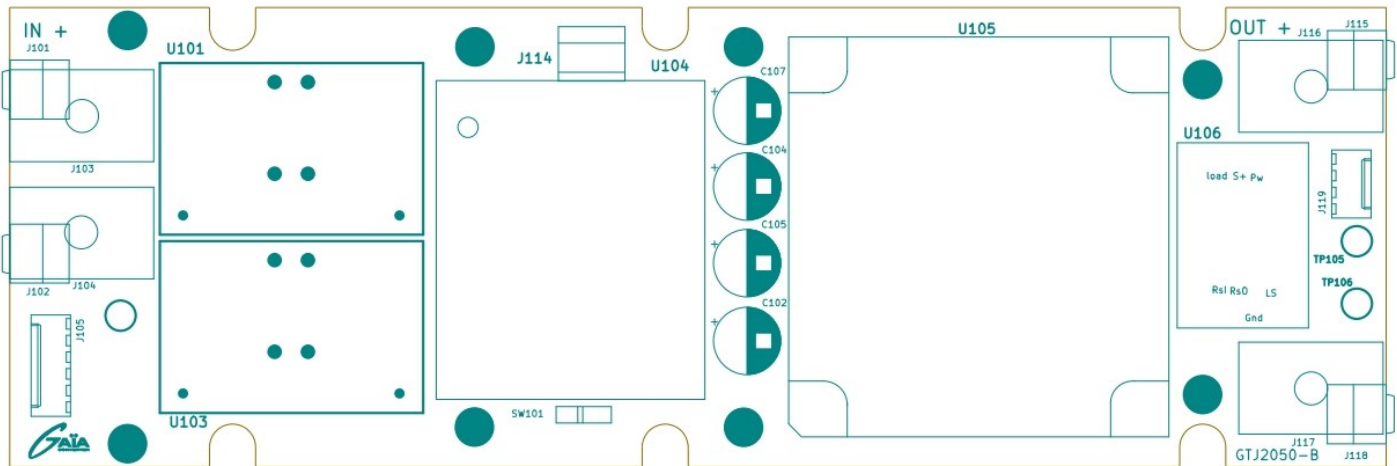
### 4.2-SCHEMATIC DIAGRAM



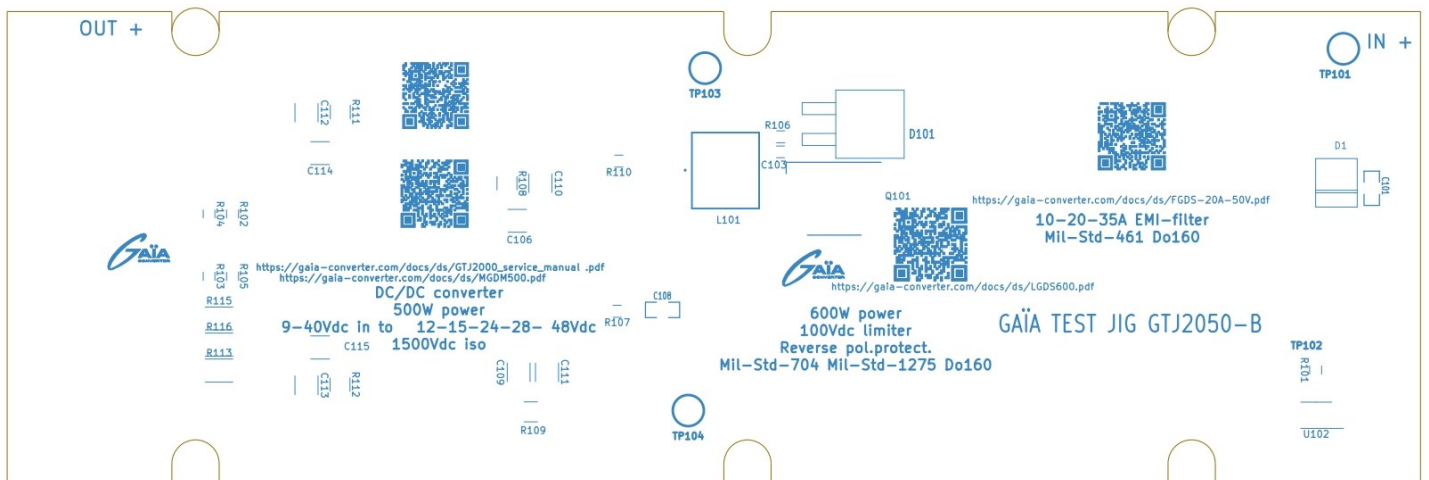
GTJ2050-B

## 4-GTJ-2050 : JIG For MGDM500

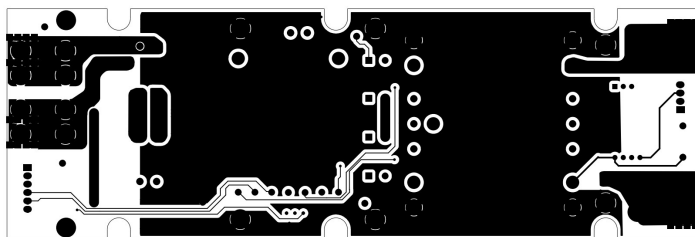
### 4.3-BOARD DRAWINGS



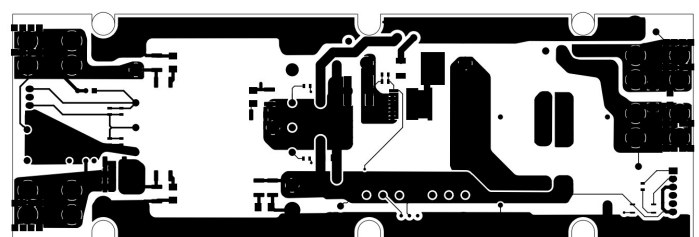
Front



Back



Front



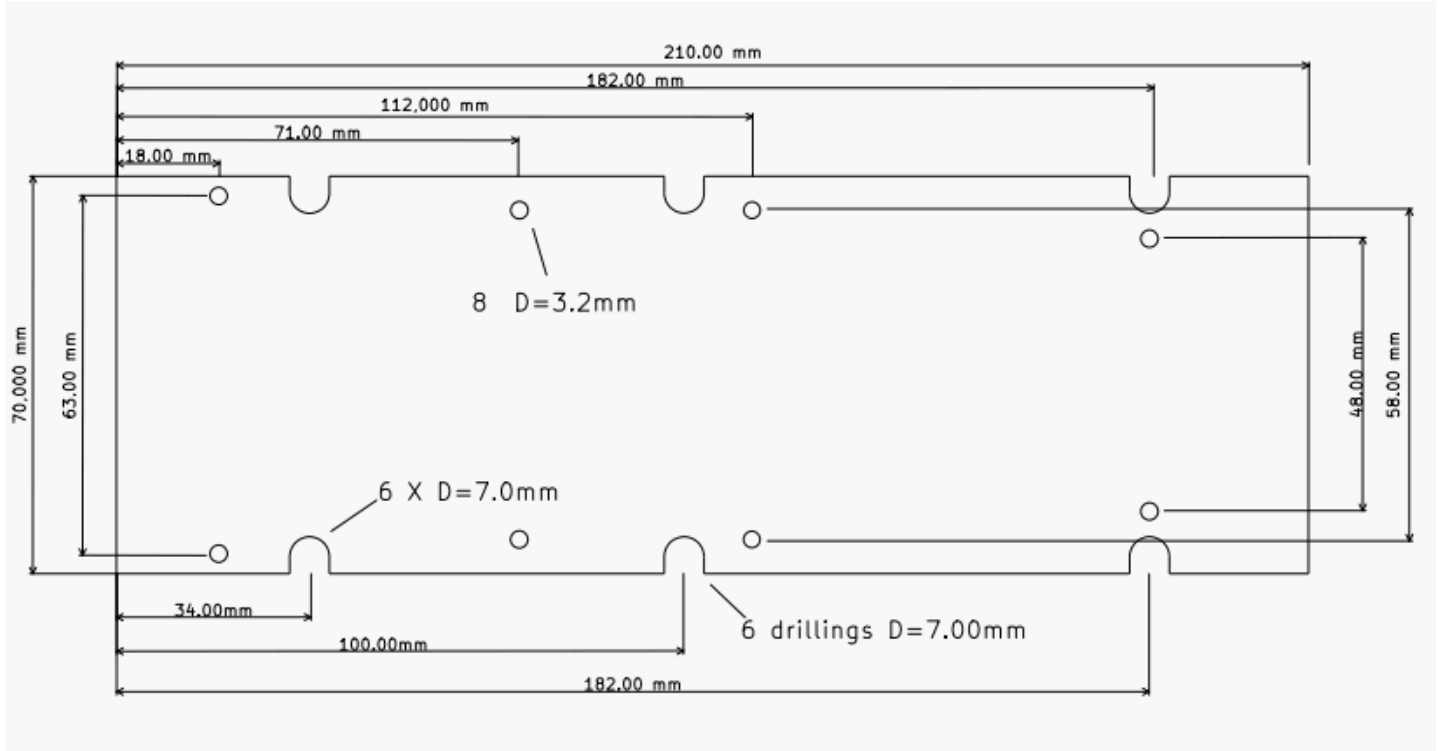
Back

GTJ2050-B

## 4-GTJ-2050 : JIG For MGDM500

### 4.3-BOARD DRAWING

Board Mechanical drawing



Base-Plate Mechanical drawing

## 4-GTJ-2050 : JIG For MGDM500

### 4.4-BILL OF MATERIALS

designator	Description Value	Qty	possible part-number	Supplier	comment
Q101	IPT007N06N	1	IPT007N06N	INFINEON	
C102,C104,C105,C107	220µF / 50V	2	ECA1HHG221	panasonic	
C101	100nF /100V	1			
C103	DNP	1			
D101	Diode	1	VB30100C-E3/4W	VISHAY	
D1	TVS	1	SMAJ10CA	Littlefuse	
C110,C111,C112,C113	470nF MLCC	4	C1210X474K251T	HOLYSTONE	
R110,R107	0 R	2	CRCW08050000Z0EA	VISHAY	
R115,R116,R113	1 mR	1	TLR3AWDTE1L00F	KOA	Replaced by short if no U106 used <sup>22</sup>
R109,R111,R112,R108	10R	4	CRCW1206- series	VISHAY	SMD 1206 (not mandatory)
C106,C114,C109,C115	1 tp 4.7 µF	4			SMD 1210 (not mandatory)
R102, R104,R105,R103	Anny value	4	CRCW0805- series	VISHAY	Configuration resistors TRIM
R101	1k	1	CRCW08051K00FKEA	VISHAY	
R106	DNP	1			
L101	450nH	1	XAL1010-451MED	CoilCraft	
J103,J104,J116,J117	Terminal blocks	4	OT-048-M5	BLOCK MASTER ELECTRONICS	To be used for strait-connection
J101,J102,J118,J118	PCB Terminal	4	7461103	Wurth Elecktronic	To be used for 90°C connection
J106, J107,J108,J109-J110, J112,J111,J113	holes 3,2 mm	8	SpacersL=14mm	RS PRO	L= 14mm
J114	Connector 2 pts	1	PM 5.08/02/90 3.5SN	WEIDMULLER	408-7871 RS
J112	Connector2 pts	1	Mini KK series 2 contacts	MOLEX	
J105	MOLEX 6 CTS	1	22-05-7068	Molex	
J119	MOLEX 4 CTS	1	22-05-7048		
TP103,TP104,TP105,TP106	Test point	4	RS 101-2391	Rs-pro	
SW101	Switch	1	45030101442	WURTH ELEKTRONIK	
U101,U103	EMI FILTER 35A	2	FGDS35A50	GAÍA-CONVERTER	
U104	LGDS6000OH	1	LGDS6000OH	GAÍA-CONVERTER	
U102	Opto-coupler	1	TLP 185	Toshiba	
U106	Current Share IC	1	GTJ-2051A	GAÍA-CONVERTER	
U105	DC/DC Converter	1	MGDS500Hx	GAÍA-CONVERTER	
J106, J107,J108,J109-J110, J112,J111,J113	holes 3,2 mm	8	SpacersL=14mm	RS PRO	L= 14mm
J114	Connector 2 pts	1	PM 5.08/02/90 3.5SN	WEIDMULLER	408-7871 RS

GTJ2050

## 4-GTJ-2050 : JIG For MGDM500

### 4.5-COMPATIBLES PRODUCTS

Compatible Modules	comment
MGDS500HE	12V 500W
MGDS500HF	15V 500W
MGDS500HI	24V 500W
MGDS500HJ	28V 500W
MGDS500HP	48V 480W
FGDS20A50	Min. steady state input voltage at full power = 27.5 Vdc
FGDS35A50	Min. steady state input voltage at full power = 16 Vdc
LGDS600OH	Input Bus Conditioner

### 4.6- ASSEMBLY OPERATION CONNECTIONS.

**Board Assembly :** Start populating smallest components (SMD resistors and SMD capacitors) on the bottom side of GTJ2050, and then on top side. Install trim resistors if output voltage needs to be changed, for nominal output voltage, R102 to R105 should not be populates.

Install then through hole components, taking care that the MGDS500 converter is correctly applied to PCB board. If you plan to screw the converter to PCB , it is mandatory to solder the converter pins only when the 4 screws are tightened..

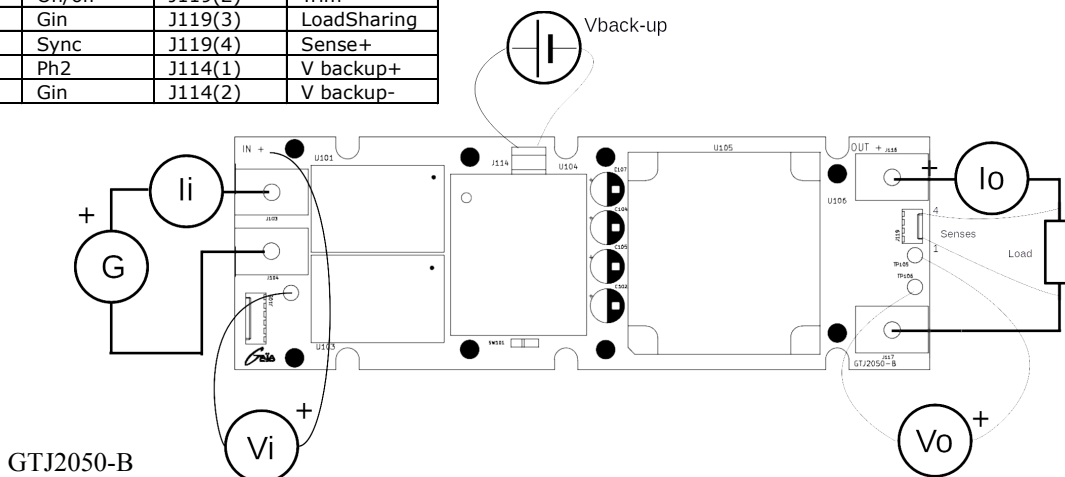
**Board Operation :** For board operation, the wiring scheme opposite needs to be applied. The input Generator (or Lab. PSU) is to connect to J101 & J102. Load is connected across J116 & J117. To compensate power wire losses, senses can be connected to the load through J105(1&4), using AWG 24 wires. U106 does not need to be connected for single channel operation. For performance testing, be sure to properly cool down components, with adequate heatsink or baseplate.

**Warning! the copper track thickness of this board is only 35µm, not compatible with high temperature testing**

The board efficiency can be evaluated using the wiring describe here below.

#### Connectors & Pinout :

Input side		Output side	
J101(J103)	VI (Input+)	J115/J116	Vo (output+)
J102(J104)	Gin(Input-)	J118/J117	Go (output-)
J105(1)	On/off+	J119(1)	Sense-
J105(2)	On/off-	J119(2)	Trim
J105(3)	Gin	J119(3)	LoadSharing
J105(4)	Sync	J119(4)	Sense+
J105(5)	Ph2	J114(1)	V backup+
J105(6)	Gin	J114(2)	V backup-

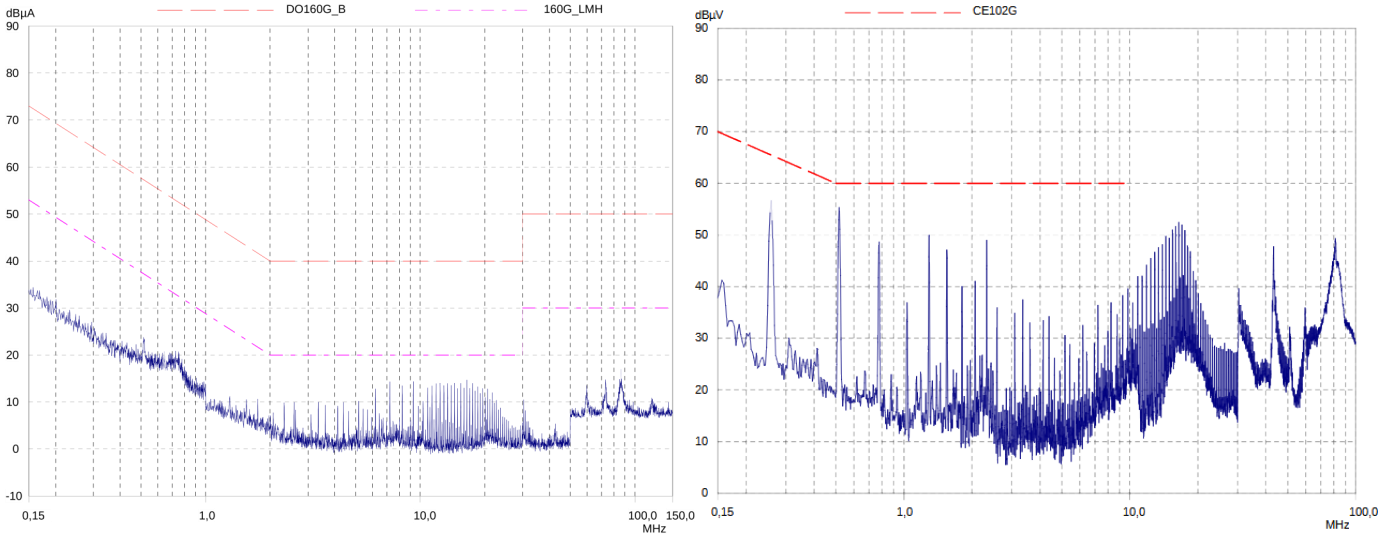




## 4-GTJ-2050 : JIG For MGDM500

### 4.7-EXPECTED PERFORMANCES

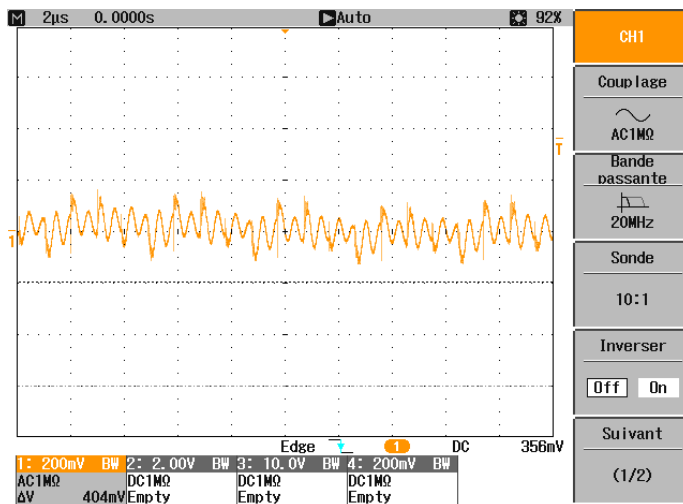
#### 4.7.1-MIL-STD 461 DO 160



#### 4.7.2-POWER EFFICIENCY

Input Voltage/current	Output Voltage/current	Output POWER (W)	efficiency
26.05/21	12.09/41.3	500	91 %
26.1/18.4	12.1/36.02	436	92%
26.9/10.2	12.12/21.2	257	93%

#### 4.7.3-OUTPUT RIPPLE

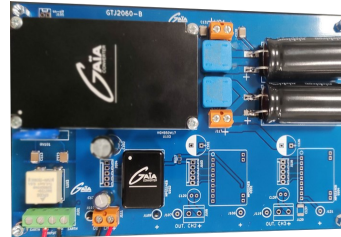


Output ripple of MGDS500HE at : 12Vdc 500W,

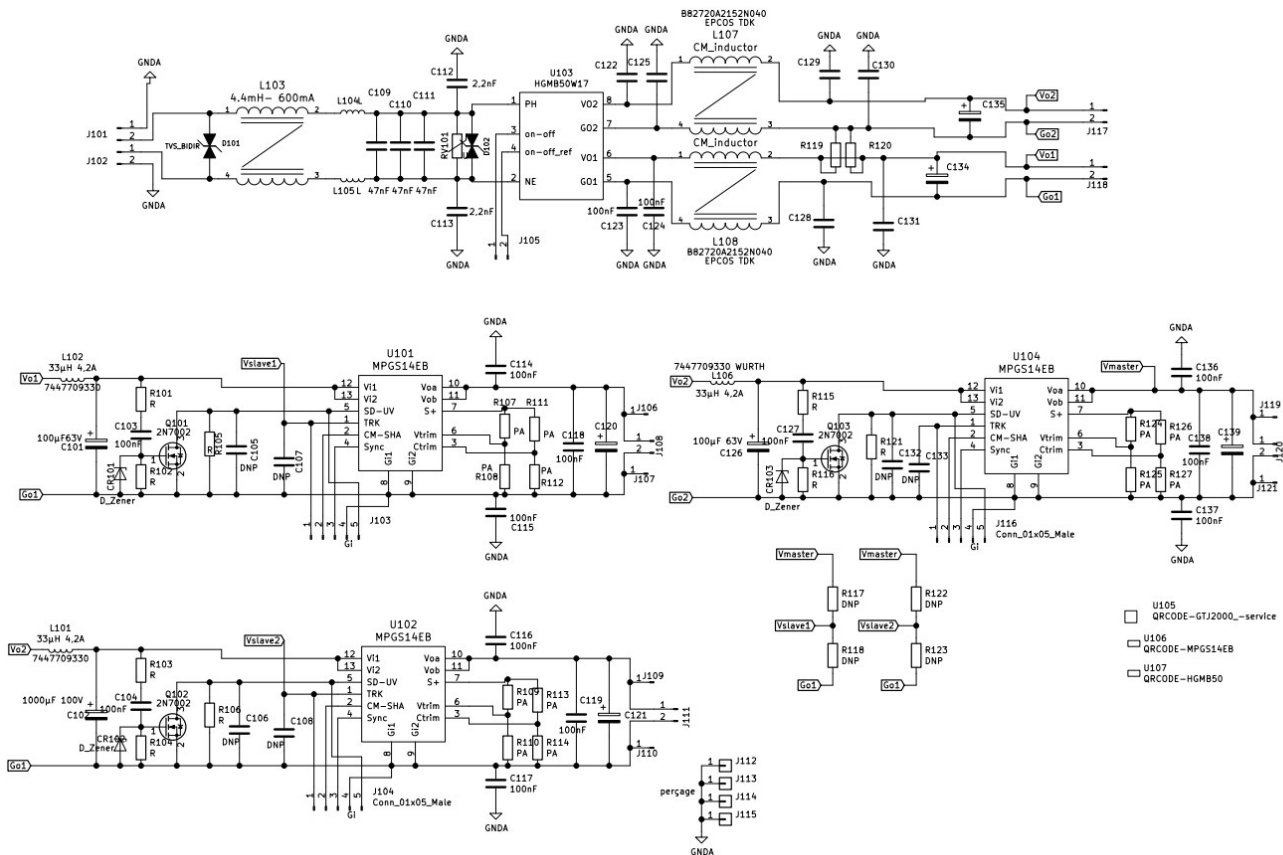
## 5-GTJ-2060 : JIG For HGMB50 & MPGS14EB

### 5.1-Board Description

GTJ2060 is a test jig that can be used to evaluate ac/dc converters from the HGMM35 or HGMM50 series, along with the MPGS14Eb Point of load. Testing can be performed against Military standards Mil-STD 704, DO 160, ABD 100 and Mil-Std 461. The board has also been designed in order to test separately up to 3 MPGS14EB with multiple sequencing modes. This board is for evaluation purpose only

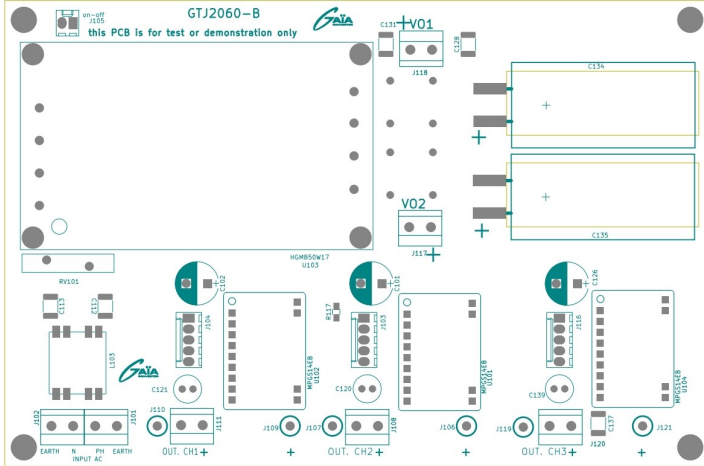


### 5.2-SCHEMATIC DIAGRAM

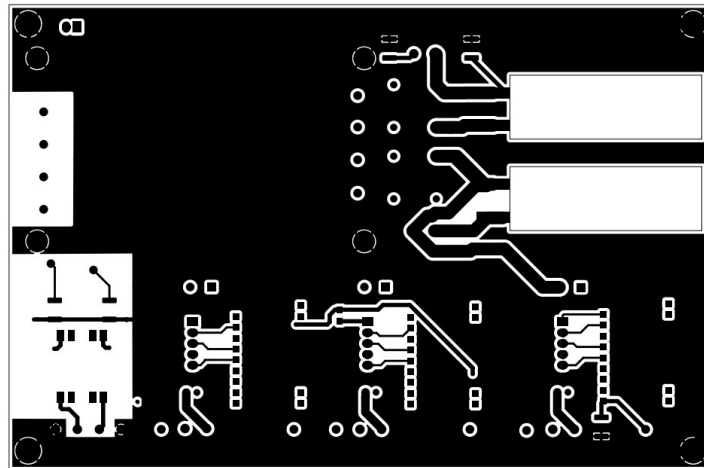
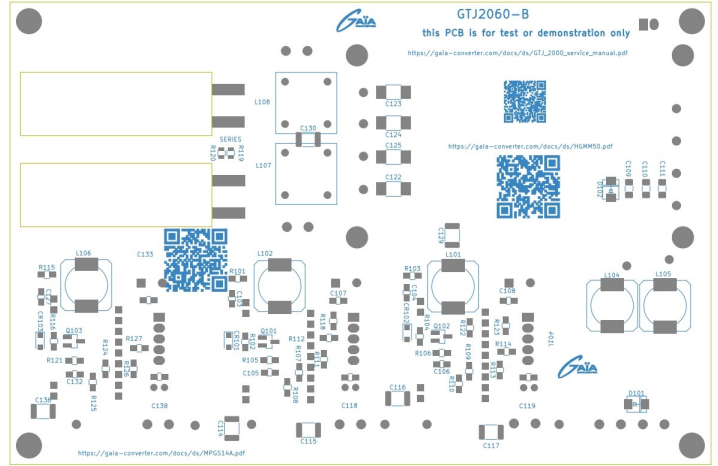


## 5-GTJ-2060 : JIG For HGMB50 & MPGS14EB

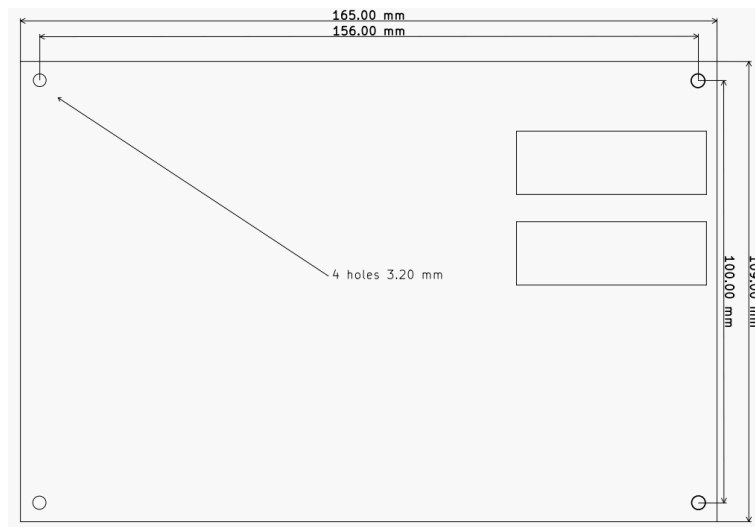
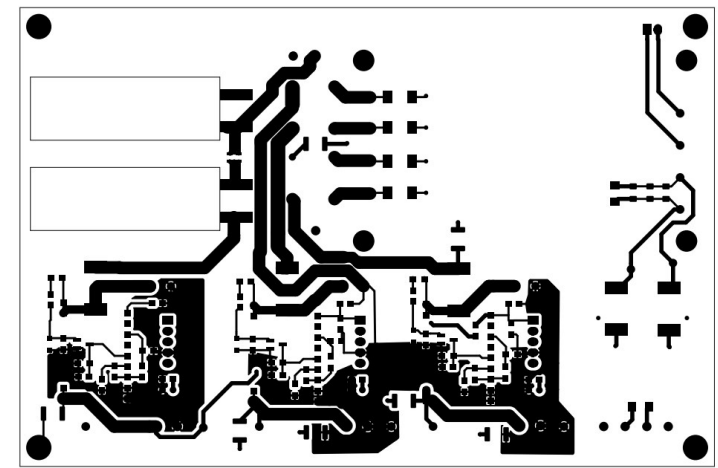
### 5.3-BOARD DRAWINGS



Top view



Top view



General tolerances +/- 0.2

PCB thickness : 1.6 mm

## 5-GTJ-2060 : JIG For HGMB50 & MPGS14EB

### 5.4-BILL OF MATERIAL

DDesignator	Description	Qty	Possible part-number	Supplier	Comment
C101,C102,C126	100µF/100V	3	ECA2AHG101	Panasonic	
C105,C106,C107,C108,C132,C133	DNP	6	08055C103KAT2A	AVX	for MPGS14EB sequencing
C109,C110,C111	47nF /200V	3	VJ1206Y473KXCAT	Vishay	
C112,C113	2,2nF /500V	2	VJ1206Y222KXEAC	Vishay	
C118,C103,C104,C119,C127,C138	100nF 50V	6	08055C104KAT2A	AVX	
C121,C120,C139	100µF 35V	3	ECA1VHG101B		
C135,C134	2200µF 50V	2	SK050M2200B7F-1636	Yageo	value fit for H-up
C136,C115,C128,C129,C130,C131,C114,C116,C117,C137,C122,C123,C124,C125	100nF / 500V	10	1812Y5000104MX	Syfer	value can be adjusted
CR101,CR102,CR103	12V 0.5W zener	3	MMSZ12T1	One semi	not mandatory
D101,D102	TVS_BIDIR	2	TVS_BIDIR		
J103,J104,J116	Connector 5 points	3	22-27-2051	Molex	
J105	Connector 2 points	1	22-27-2021	Molex	
J101,J102,J108,J111,J117,J118,J120	Connector 2 points	7	PM 5.08/0290 3.35NCR BX	WEIDMULLER	407-7871 RS
J110,J106,J107,J109,J119,J121	test point	6	Radispares	RS 101-2391	
L102,L101,L106	33µH 4,2A	3	7447709330	WURTH ELECTRONIK	
L103	4.4mH- 600mA	1	B82720S2601N040	EPCOS	
L104,L105	1mH	2	74477030	WURTH ELECTRONIK	
L107,L108	1.6mH 1.5A	2	B82720A2152N040	EPCOS	
Q101,Q102,Q103	2N7002	3	2N7002NXBKR	NEXPERIA	
R102,R104,R116	68k 0805	3	R		not mandatory
R105,R106,R121	1k5 0805	3			not mandatory
R107,R108,R109,R110,R111,R112,R113,R114,R124,R125,R126,R127	DNP	12	TBD		configuration resistor
R115,R103,R101	3k3 0805				not mandatory
R117,R118,R122,R123	DNP	4			for MPGS14EB sequencing
R119,R120	0R	2	5015	Keystone Electronics	configuration strap
RV101	Varistor 230Vac 130J	1	B72220S0231K101	EPCOS	
U101,U102,U104	MPGS14EB	3	MPGS14EB	GAIA-CONVERTER	Single converter possible testing
U103	HGMB50W17	1	HGMB35W17 / HGMB50W17	GAIA-CONVERTER	

## 5-GTJ-2060 : JIG For HGMB50 & MPGS14EB

### 5.5-COMPATIBLE PRODUCTS

Compatible Modules	comment
HGMS35W17	Can be tested stand-alone or along with MPGS14EB
HGMS55W17	Can be tested stand-alone or along with MPGS14EB
MPGS14EB	Can be tested stand-alone (up to 3 converters) or to down convert the AC/DC converter output

### 5.6-ASSEMBLY & OPERATION

**Board Assembly :** Start by populating smallest components (SMD resistors and SMD capacitors) on the bottom side of JIG, and then on top side. Populate configuration resistors according to the desired output configuration (see table).

**Board Operation :**

**.AC/DC stand-alone:** The PFC converter can be operated stand-alone with 2 independent 17 Vdc outputs (R119 and R120 not populated). In this case only the LOAD1 and LOAD2 are connected according to connecting diagram#1. If AC/DC outputs are connected in series (R119 and R120 populated) to provide 34 Vdc, only LOAD3 is connected according to diagram#1.

For this mode of operation the MPGS14EB (U101-U102-U104) and associated components can remain unpopulated.

**.AC/DC along with down converter:**

To provide an output voltage between 12Vdc and 24Vdc it is recommended to populate U2 and its associated components, U2 being the only MPGS14EB supplied with 34Vdc. To provide an output voltage between 1.2 and 12V dc it is recommended to populate U101 or U104 with their associated components. For these operation modes, follow the diagram#2.

For this mode of operation, the set of components R103, R104, C104, Q102, CR102, R106 associated to U102, or the homologue components associated to U101 and U104 need to be populated. This delay circuit is designed to delay MPGS14EB start-up in order not to disturb Tank capacitor (C135 and C135) charge during AC/DC warm up. This circuit is intended to delay start-up during voltage rising stage and allow turn-off tuning (through R106) during voltage falling stage.

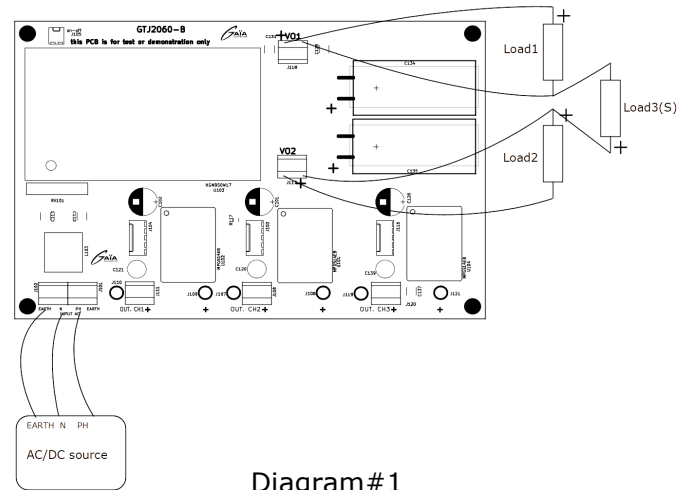


Diagram #1

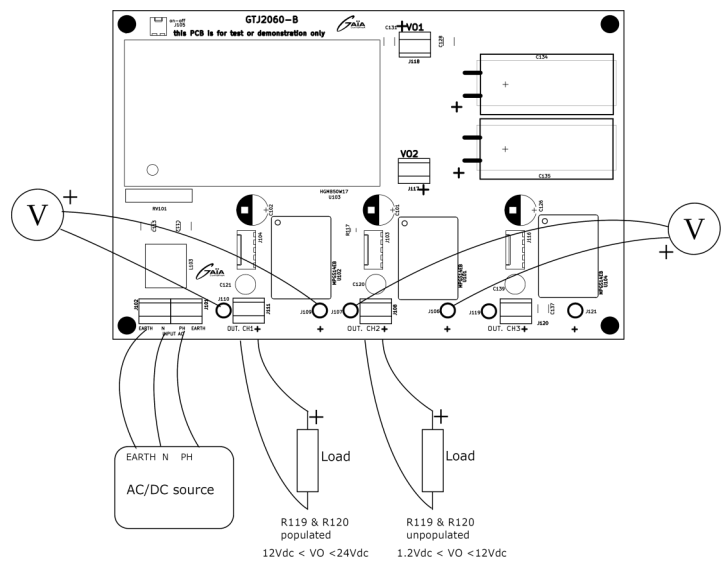


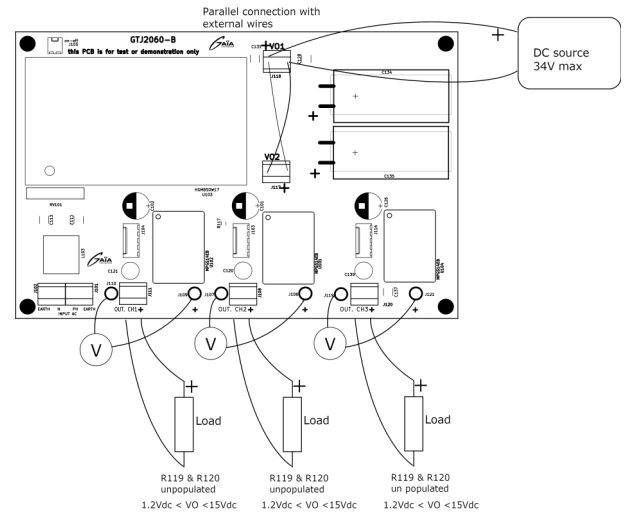
Diagram #2

## 5-GTJ-2060 : JIG For HGMB50 & MPGS14EB

### 5.6-ASSEMBLY & OPERATION (continued)

**DC/DC operation :** dc/dc operation involving up to 3 MPGS14EB can be possible when Dc input is performed through J117 and J118. In this configuration the components related to PFC function, including U103 and associated input and output filters circuit are not necessarily populated.

To supply each MPGS14EB with the same input voltage, J117 and J118 need to get connected together in parallel to serve as common input connector for MPGS14EB input voltage, this connection should be performed via external cables. The connection diagram is represented in diagram#3.



### 5.7-CONNECTORS PINOUT

Designator	Pin#	Section	Function	Model	Designator	Pin#	Section	Function	Model
J101	1	PFC	INPUT Chassis (Earth)	PCB terminal 26 to 14 AWG	J111	1	CH1	Vch1 Load	PCB terminal 26 to 14 AWG
J101	2	PFC	INPUT AC : PH	PCB terminal 26 to 14 AWG	J111	2	CH1	Gch1 Load	PCB terminal 26 to 14 AWG
J102	1	PFC	INPUT AC : N	PCB terminal 26 to 14 AWG	J116	1	CH2	Tracking function	MOLEX KK 5
J102	2	PFC	INPUT Chassis (Earth)	PCB terminal 26 to 14 AWG	J116	2	CH2	Current monitoring /share function	MOLEX KK 5
J103	1	CH2	Tracking function	MOLEX KK 5	J116	3	CH2	Sync input	MOLEX KK 5
J103	2	CH2	Current monitoring /share function	MOLEX KK 5	J116	4	CH2	Gch1	MOLEX KK 5
J103	3	CH2	Sync input	MOLEX KK 5	J116	5	CH2	Sd UVLO	MOLEX KK 5
J103	4	CH2	Go1	MOLEX KK 5	J116	1	CH2	Tracking function	MOLEX KK 5
J103	5	CH2	Sd UVLO	MOLEX KK 5	J116	2	CH2	Current monitoring /share function	MOLEX KK 5
J104	1	CH1	Tracking function	MOLEX KK 5	J116	3	CH2	Sync input	MOLEX KK 5
J104	2	CH1	Current monitoring /share function	MOLEX KK 5	J116	4	CH2	Go1	MOLEX KK 5
J104	3	CH1	Sync input	MOLEX KK 5	J116	5	CH2	Sd UVLO	MOLEX KK 5
J104	4	CH1	Go1	MOLEX KK 5	J117	1	PFC	VO2	PCB terminal 26 to 14 AWG
J104	5	CH1	Sd UVLO	MOLEX KK 5	J117	2	PFC	GO2	PCB terminal 26 to 14 AWG
J105	1	PFC	PFC On-off	MOLEX KK 2	J118	1	PFC	VO1	PCB terminal 26 to 14 AWG
J105	2	PFC	PFC On-off _ref	MOLEX KK 2	J118	2	PFC	GO1	PCB terminal 26 to 14 AWG
J106	1	CH2	Vch2 Measure	Terminal assembly testpoint	J119	1	CH3	Vch3 Measure	Terminal assembly testpoint
J107	1	CH2	Gch2 Measure	Terminal assembly testpoint	J120	1	CH3	Vch3 Load	PCB terminal 26 to 14 AWG
J108	1	CH2	Vch2 Load	PCB terminal 26 to 14 AWG	J120	2	CH3	Gch3 Load	PCB terminal 26 to 14 AWG
J108	2	CH2	Gch2 Load	PCB terminal 26 to 14 AWG	J121	1	CH3	Gch3 Measure	Terminal assembly testpoint
J109	1	CH1	Vch1 Measure	Terminal assembly testpoint					
J110	1	CH1	Gch1 Measure	Terminal assembly testpoint					

## 5-GTJ-2060 : JIG For HGMB50 & MPGS14EB

### 5.8-CONFIGURATION TABLE

SECTION	CONFIGURATION	COMPONENTS VALUE AND CONNEXIONS
AC/DC TESTING	34V dc output (U102 input voltage =34Vdc) (U101 input voltage =17Vdc) (U104 input voltage =17Vdc)	R119, R120=0Ω
AC/DC TESTING	2X 17 Vdc output (U102 input voltage =NC) (U101 input voltage =17Vdc) (U104 input voltage =17Vdc)	R119, R120=DNP
AC/DC TESTING	MPGS14EB supplier by U103 with large tank capacitors (C135-C134)	R103, R104,C104, CR102, Q102, Populated R101, R102,C103, CR101, Q101, Populated R110, R115,C127, CR103, Q103, Populated
DC/DC TESTING	MPGS14EB supplier by external PSU on J117 & J118	R103, R104,C104, CR102, Q102, = DNP R101, R102,C103, CR101, Q101, = DNP R110, R115,C127, CR103, Q103, = DNP
DC/DC TESTING	(U102 input voltage =34Vdc) (U101 input voltage =17Vdc) (U104 input voltage =17Vdc)	R119, R120=0Ω Input + on J117(1) Input - on J118(2)
DC/DC TESTING	(U102 input voltage =17Vdc) (U101 input voltage =17Vdc) (U104 input voltage =17Vdc)	R119, R120=DNP Input + on J117(1) & J118(1) Input - on J118(2) & J117(2)
DC/DC TESTING	U102 U101 U104 independent operation	R117,R118,R122,R123 = DNP
DC/DC TESTING	U104 U101 coincident (AN5005056)	R117,R118 =calculated values
DC/DC TESTING	U104 U102 coincident (AN5005056)	R122,R123 =calculated values
DC/DC TESTING	U102 U101 U104 output trimmed up	R110,R108,R125 =calculated values R109,R107,R124 =DNP
DC/DC TESTING	U102 U101 U104 output trimmed down	R110,R108,R125 = DNP R109,R107,R124 = calculated values
DC/DC TESTING	U102 U101 U104 nominal UVLO	R106,R105,R121 = DNP
DC/DC TESTING	U102 U101 U104 trimmed UVLO	R106,R105,R121 = calculated values P
DC/DC TESTING	U102 U101 U104 Current limit trim	R114,R112,R127 populated R113,R111,R126 = DNP
DC/DC TESTING	U102 U101 U104 nominal Current limit	R114,R112,R127 = DNP R113,R111,R126 = DNP
DC/DC TESTING	U102 U101 U104 nominal start-up delay	C106,C105,C132 = DNP
DC/DC TESTING	U102 U101 U104 delayed start-up delay	C106,C105,C132 = populated
DC/DC TESTING	U102 U101 U104 nominal start-up slope	C108,C107,C133 = DNP
DC/DC TESTING	U102 U101 U104 modified start-up slope	C108,C107,C133 = populated

DNP = do not populate,

## 5-GTJ-2060 : JIG For HGMB50 & MPGS14EB

### 5.9-PERFORMANCES

#### 5.9.1 Power factor and THD :

Frequency : (Hz)	360	400	500	600	700	800
Input Voltage	<b>Power Factor@ 50W output power</b>					
100 VAC	1.00	1.00	1.00	1.00	1.00	1.00
115 Vac	1.00	1.00	1.00	1.00	1.00	1.00
122 Vac	1.00	1.00	1.00	1.00	0.99	0.99

Frequency : (Hz)	360	400	500	600	700	800
Input Voltage	<b>Power Factor@25W output power</b>					
100 VAC	0.99	0.99	0.99	0.98	0.97	0.97
115 Vac	0.98	0.98	0.98	0.96	0.94	0.94
122 Vac	0.98	0.97	0.97	0.95	0.94	0.92

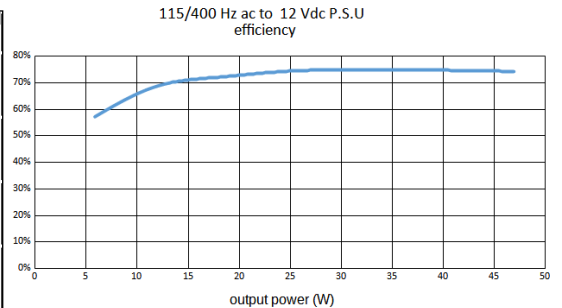
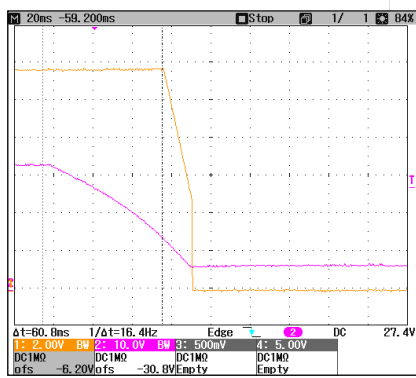
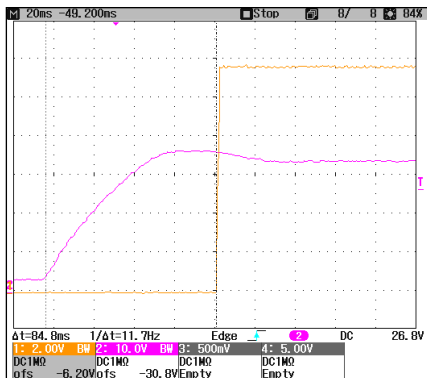
Frequency : (Hz)	360	400	800
Output Power	<b>THD@ 115 Vac (%)</b>		
50W	2.3	3	2.8
25W	4.2	5.8	5.1

Single output performances measured with U102 Populated and tuned to 12V out, C134 & C135 = 3300µF R119 & R120 = 0R

#### MPGS14EB starting delay :

#### 12V 45W 50ms Hold up :

#### Power efficiency :



Ch1 + 12v dc output Ch2= 34V dc PFC output (6600µF)

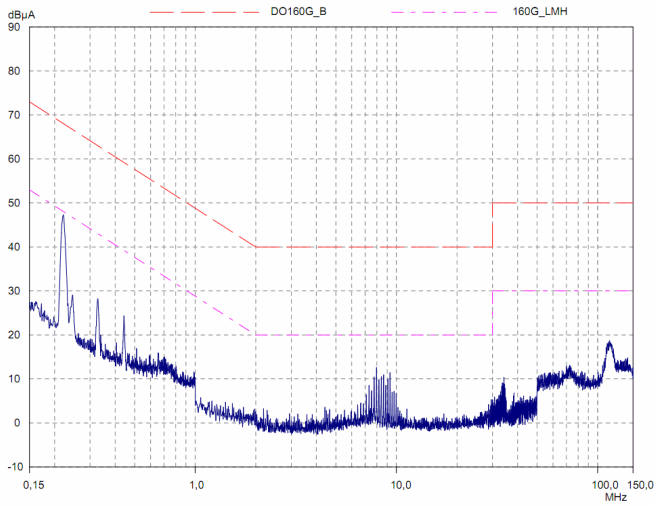


## 5-GTJ-2060 : JIG For HGMB50 & MPGS14EB

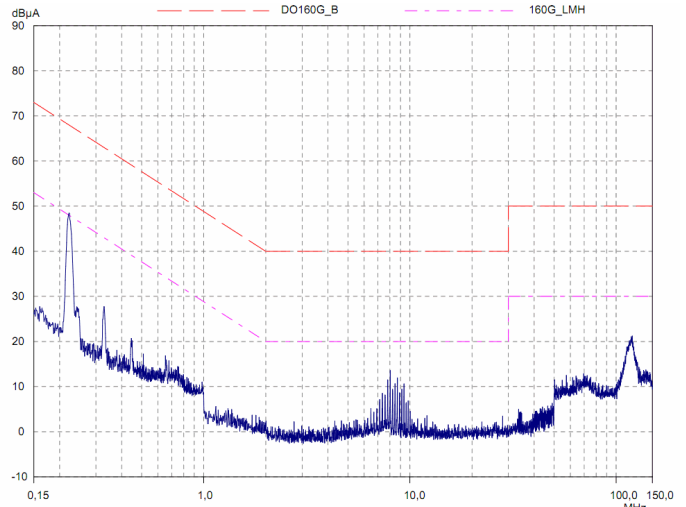
### 5.9-PERFORMANCES

#### 5.9.2 EMC compliance :

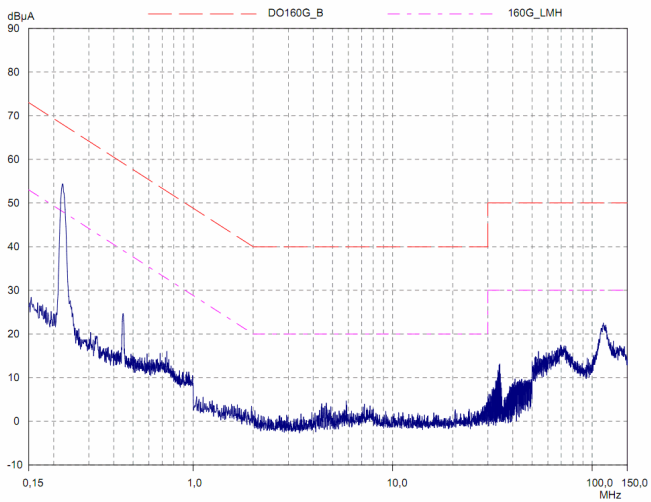
DO160 EMI for HGMB50W17 connected to 1 MPGS14EB(CH1) at 45W



Measure on PHASE AC line



Measure on NEUTRAL AC line



Measure on EARTH AC line



# GTJ2000 SERIES SERVICE MANUAL PRELIMINARY



## 6-GTJ-2070 : JIG For MGDM201

### 6.1-Board Description

Coming Soon

### 6.2-SCHEMATIC DIAGRAM



# GTJ2000 SERIES SERVICE MANUAL PRELIMINARY



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