Green Power Solutions Srl
Web: www.gpsemi.it e-mail: info@gpsemi.it
Phone: +39-011-988 2251
Fax: +39-011-988 1358
http://gpsemi.it/pdf/GEM07_035,_049.pdf

GEM_035,_049
QUAD SCR MODULES

Green Power Easy Module

- ► Electrically insulated metal frame
- ► Extremely high power density
- ► 3000 V_{RMS} insulation voltage
- ► Line voltage range up to 230 V_{RMS}
- ► High reliability
- ► Modularity
- ► Fully customizable
- ► Broad range of accessories
- ► Cost effective solution
- ► Suitable for heavy duty applications

This new family of high power modules brings to the high power applications the same compactness, ease of use and scalability of the lower power semiconductor modules. In addition to these typical features (i.e. standard dimensions, electrical insulation, various circuit types, etc.) the new Green Power Easy Module (GEM) family includes many features aimed to simplify their adoption allowing the end users to focus on their core business. These features include:

• embedded air cooling system
• optimised snubber circuits
• pulse transformer modules
• ducted heat flow.

.

Maximum ratings of single thyristor

Part number / Parameters	GEM_043	GEM_049	GEM_035			Conditions	Units
$I_{T(AV)}$	431	497	356			180° cond, half sine Ta = 40 °C Air velocity = 5 m/s	A
$I_{T(RMS)}$	677	780	559				A
I_{TSM}	12.8	30	22			50 Hz, Tj = Tjmax, V_R = 0 V	kA
I_{TSM}	13.5	31.7	23.2			60 Hz, Tj = Tjmax, V_R = 0 V	kA
I^2t	819	4500	2420			50 Hz, Tj = Tjmax, V_R = 0 V	kA^2s
I^2t	745	4095	2202			60 Hz, Tj = Tjmax, V_R = 0 V	kA^2s
V_{DRM}/V_{RRM}	400	800	1000			Tj = Tjmax	V
Tjmax	150	150	125				°C

Part Number	V code	V_{DRM} V_{RRM} max repetitive reverse and off-state blocking voltage [V]	I_{DRM} I_{RRM} @ Tjmax [mA]	$V_{L(RMS)}$ maximum suggested RMS line voltage [V]
GEM_043	04	400	50	115
GEM_049	08	800	100	190
GEM_035	10	1000	75	230

On-State Characteristics

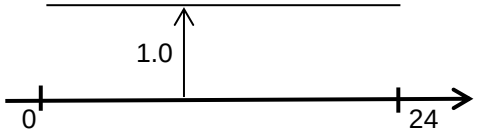
	Parameters	GEM_043	GEM_049	GEM_035			Conditions	Units
$V_{T(TO)}$	Threshold voltage	0.87	0.80	0.85			Tj = Tjmax	V
r_T	On-state slope resistance	0.238	0.170	0.270			Tj = Tjmax	mΩ
I_H	Holding current, max	600	300	300			Tj = 25°C	mA
I_L	Latching current, typ	1000	1000	1000			Tj = 25°C	mA
P_{MAX}	Max power losses	1941	2012	1555			T_A = 40°C	W

Triggering Characteristics

	Parameters	GEM_043	GEM_049	GEM_035			Conditions	Units
V_{GT}	Gate trigger voltage	2.5	2.5	2.5			T_j = 25°C, V_D = 5V	V
I_{GT}	Gate trigger current	190	250	250			T_j = 25°C, V_D = 5V	mA
P_{GM}	Peak gate power dissipation	10	15	15			Pulse width 1 ms	W
$P_{G(AV)}$	Average gate power dissipation	2	4	4				W
I_{FGM}	Peak gate current	3	8	8				A
V_{FGM}	Peak gate voltage (forward)	20	20	20				V
V_{RGM}	Peak gate voltage (reverse)	5	5	5				V

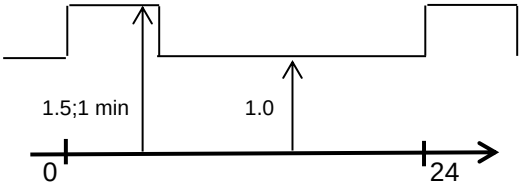
Switching Characteristics

	Parameters	GEM_043	GEM_049	GEM_035			Conditions	Units
di/dt	Critical rate of rise of on-state current	200	400	400			Tj = Tjmax	A/µs
dV/dt	Critical rate of rise of off-state voltage	500	1000	1000			Tj = Tjmax	V/µs
t_q	Turn-off time, typ	200	200	200			Tj=Tjmax, IT=1000A di/dt=-20A/µs VR=50V dV/dt=20V/µs	µs



Maximum IEC class 1 currents for typical circuit type

Circuit Type	GEM_043	GEM_049	GEM_035			Conditions	Units
AC switch	963	1111	796			T_A = 40 °C delay angle = 0°	A
Center tap	862	995	713			T_A = 40 °C delay angle = 0°	A
Two pulse bridge	862	995	713			T_A = 40 °C delay angle = 0°	A
Six pulse bridge	1244	1440	1030			T_A = 40 °C delay angle = 0°	A
Double star with I.P. transf.	2495	2887	2066			T_A = 40 °C delay angle = 0°	A

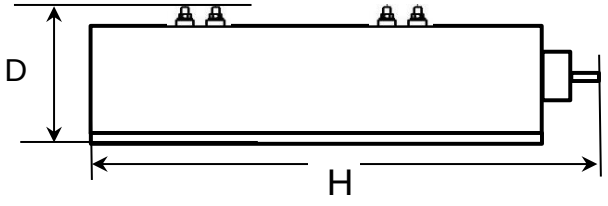


Maximum IEC class 2 currents for typical circuit type

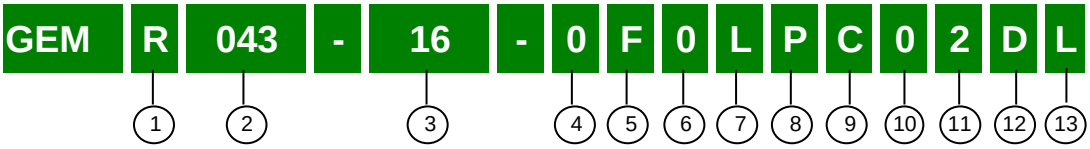
Circuit Type	GEM_043	GEM_049	GEM_035			Conditions	Units
AC switch	822	966	693			T_A = 40 °C delay angle = 0°	A
Center tap	736	865	621			T_A = 40 °C delay angle = 0°	A
Two pulse bridge	736	865	621			T_A = 40 °C delay angle = 0°	A
Six pulse bridge	1060	1251	895			T_A = 40 °C delay angle = 0°	A
Double star with I.P. transf.	2124	2505	1793			T_A = 40 °C delay angle = 0°	A

Thermal and mechanical characteristics

Parameters		GEM_043	GEM_049	GEM_035			Conditions	Units
T_{jmax}	Max operating junction temperature	150	150	125				°C
T_{stg}	Storage temperature	-40 +70	-40 +70	-40 +70				°C
R_{thJA}	Thermal resistance (junction to ambient)	0.227	0.219	0.219			Air velocity = 5 m/s	°C/W
F	Mounting torque - GEM to panel (+/- 10%)	7	7	7			M6 mounting screw	N·m
	Mounting torque - busbar to GEM (+/- 10%)	14	14	14			M8 mounting screw	N·m
m	Mass, typ						with FAPC options	kg
MTTR	Mean Time To Repair	8	8	8				minutes
	Overall dimensions							
D	Depth	200						mm
H	Height	570						mm
W	Width	103						mm



PART-NUMBERING SYSTEM



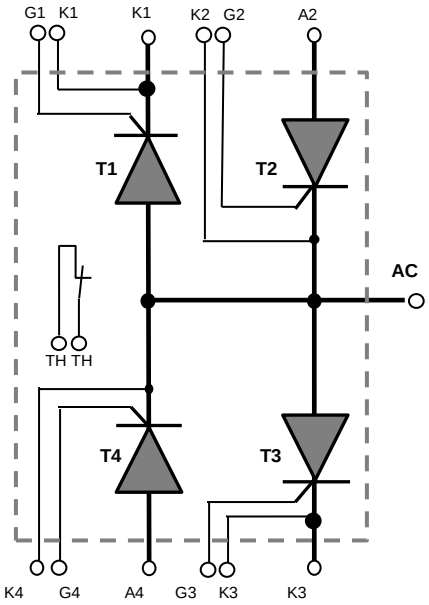
1. Circuit configuration
2. GEM average current / 10
3. GEM blocking voltage / 100
4. 0 = No fan
5. 0 = No fuse - F = With fuse protetction
6. 0 = No standard busbar available for this module; please contact factory in case of specific need
7. 0 = No anti-parallel busbar - L = Anti-parallel busbar
8. 0 = No pulse transformer - P = With pulse transformer *
9. 0 = No fan loss detection module - C = With fan loss detection module
10. 0 = No SCR fault detection module - S = SCR fault detection module (for AC-switch circuits)
11. 0 = No snubber - 1 = One snubber - 2 = Two snubbers
12. 0 = No fan-on-demand thermo-switch - D = Fan-on-demand thermo-switch (trip point 50 °C)
13. 0 = No current transformer - L (R) = Sirio current transformer on the Left side (or on the Right side)

* Pulse transformer GT001 (dual) or GT002 (single) depending on the circuit configuration.
For pulse transformer characteristics see their specific datasheets.

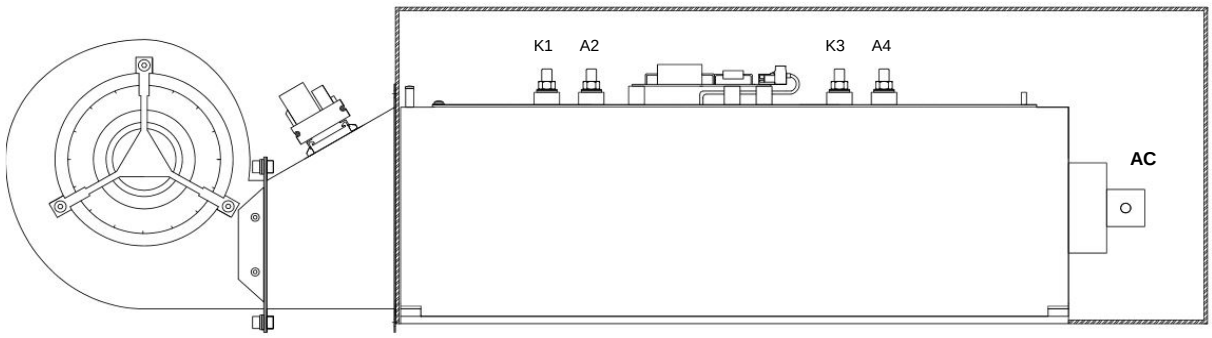
GEM modules are not covered by the Low Voltage Directive (LVD) 2014/35/EU because, according to LVD Guidelines, they are components "the safety of which can only, to a very large extent, be assessed taking into account how they are incorporated and for which a risk assessment cannot be undertaken".

In the interest of product improvement Green Power Solutions reserves the right to change any specification given in this data sheet without notice.

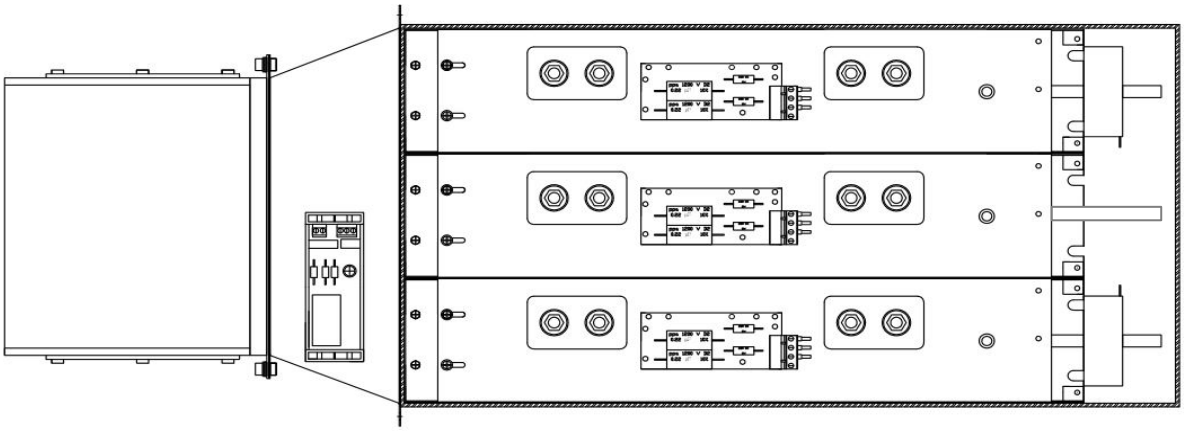
GEMR …



Example of application - **3P Regen bridge realized with three GEMR modules**

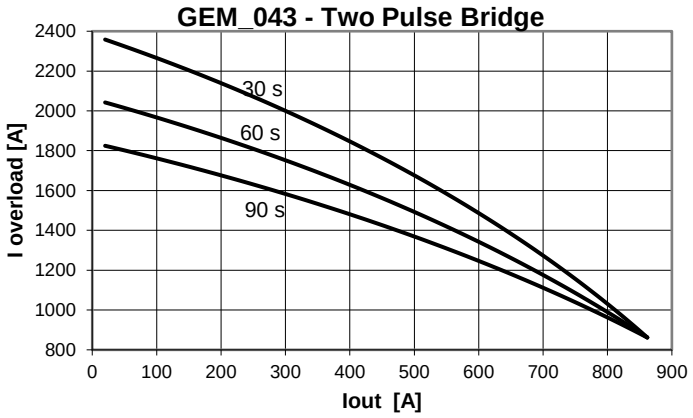


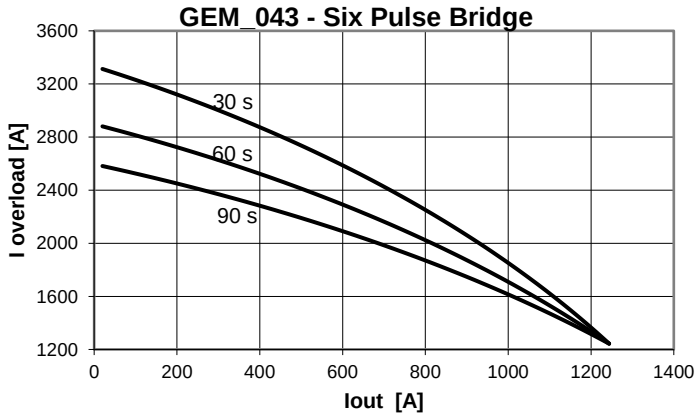
Side view

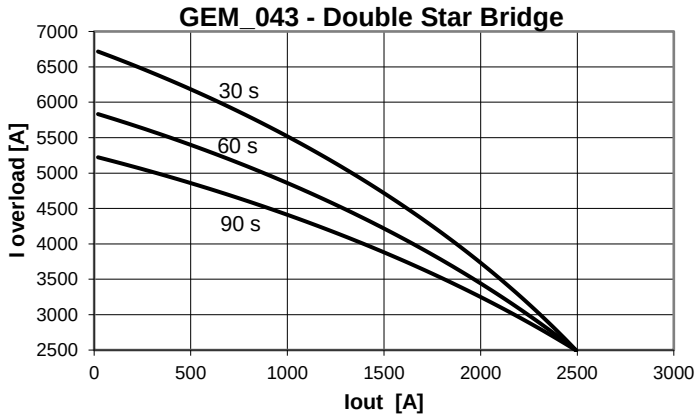


Top view

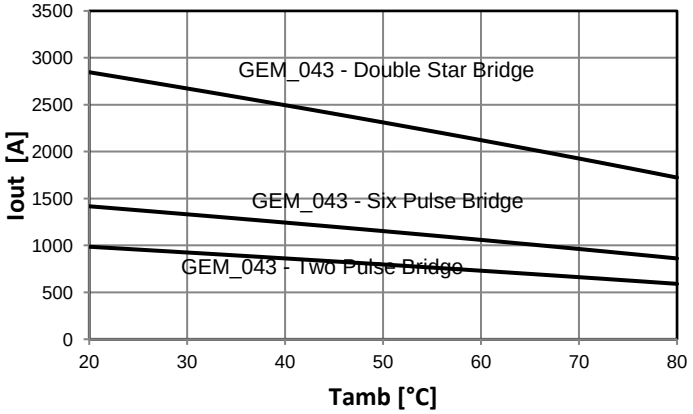
Overload capability at different overload time - Tamb = 40 °C



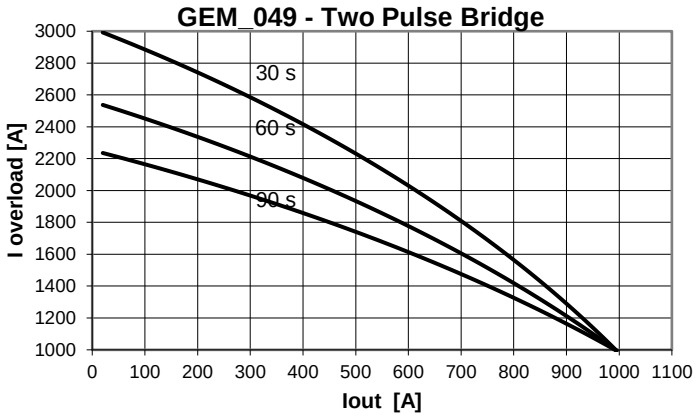


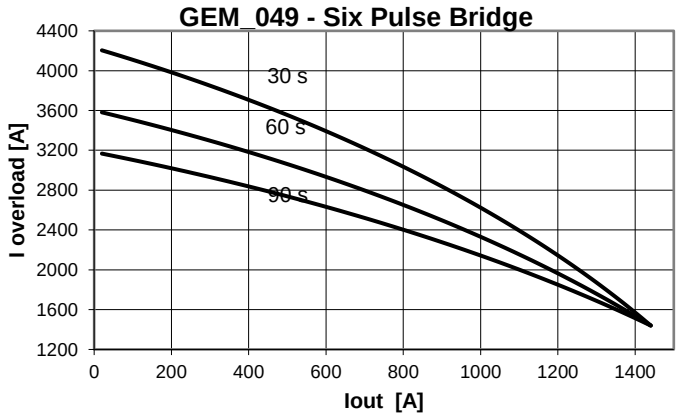


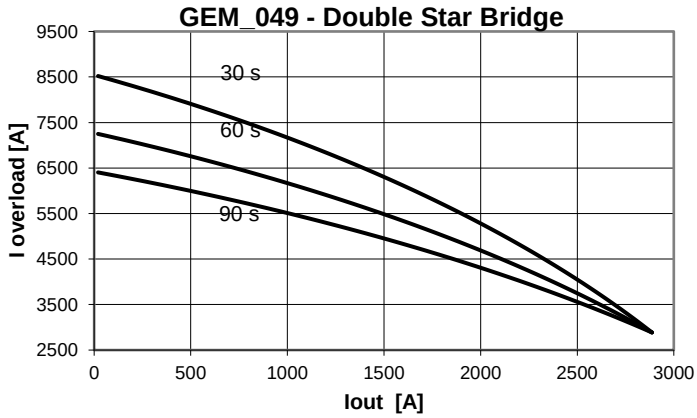
Max output vs Tamb



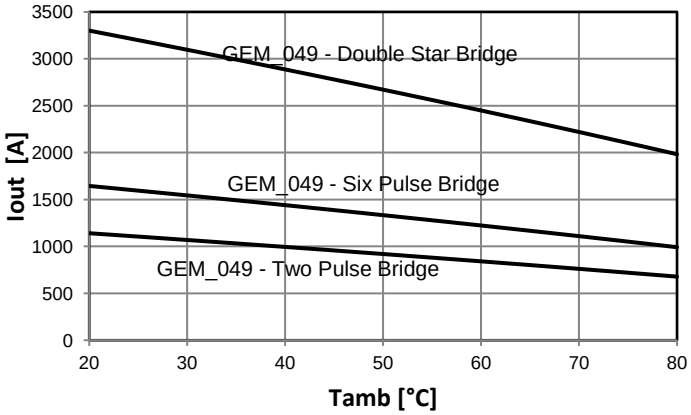
Overload capability at different overload time - Tamb = 40 °C



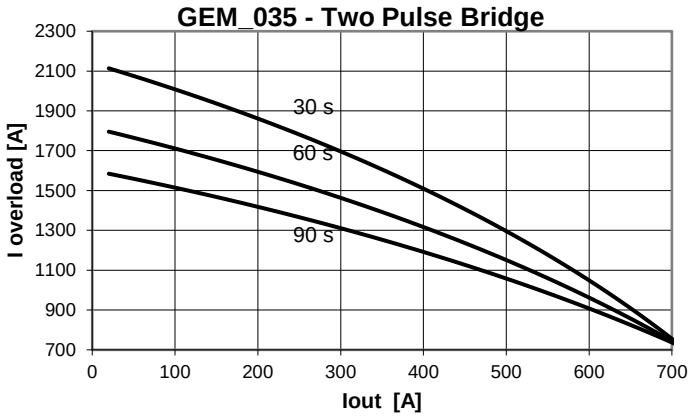


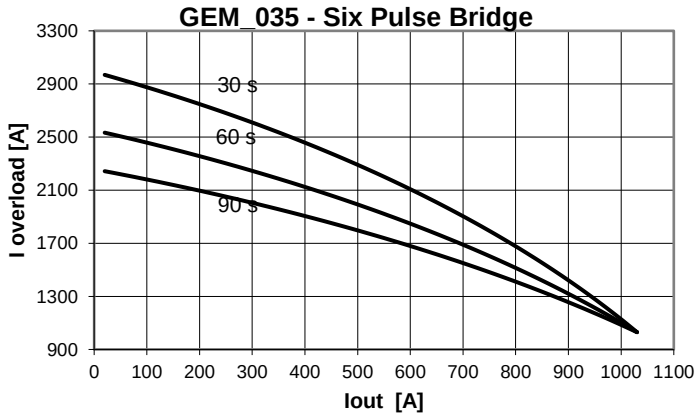


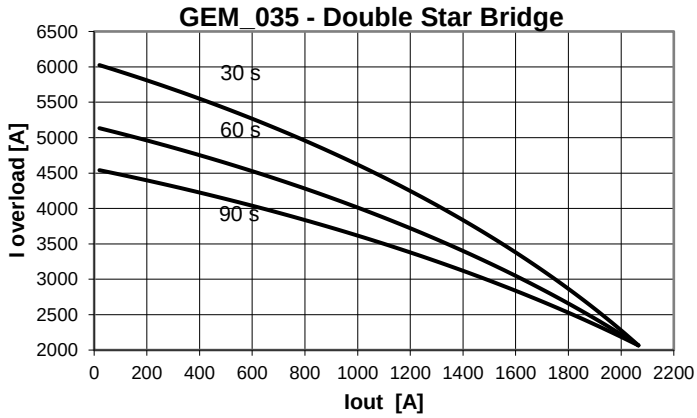
Max output vs Tamb



Overload capability at different overload time - Tamb = 40 °C







Max output vs Tamb