GEM_136, _137, _148 FAMILY

Green Power Easy Module®

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

Description

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 (heatsink and fan)
• optimised snubber circuits
• pulse transformer modules
• ducted heat flow.

The GEM family can be used for most of the converter cicuits like single and three phase bridges, AC-switches, motor brakes, double wye rectifiers, current source inverters, etc.. Their application range covers all low voltage applications (up to 230 VRMS) such as electroplating and resistance welding.

Maximum Ratings

Part number / Parameters	GEM_136	GEM_137	GEM_148			Conditions	Units
$I_{T(AV)}$	1365	1370	1480			180° cond, half sine Ta = 40 °C	A
$I_{T(RMS)}$	2143	2151	2324			180° cond, half sine Ta = 40 °C	A
I_{TSM}	70	70	70			50 Hz, Tj = Tjmax V_R = 0 V	kA
I_{TSM}	73.9	73.9	73.9			60 Hz, Tj = Tjmax V_R = 0 V	kA
I^2t	24500	24500	24500			50 Hz, Tj = Tjmax V_R = 0 V	kA²s
I^2t	22295	22295	22295			60 Hz, Tj = Tjmax V_R = 0 V	kA²s
V_{DRM}/V_{RRM}	1000	800	400			Tj = Tjmax	V
Tjmax	140	140	150				°C

Green Power Solutions

Part Number	V code	VDRM VRRM max repetitive reverse and off-state blocking voltage [V]	IDRM IRRM @ Tjmax [mA]	VL(RMS) maximum suggested RMS line voltage [V]
GEM_148	04	400	200	115
GEM_137	08	800	200	190
GEM_136	10	1000	200	230

On-State Characteristics

	Parameters	GEM_136	GEM_137	GEM_148			Conditions	Units
$V_{T(TO)}$	Threshold voltage	0.83	0.85	0.85			Tj = Tjmax	V
r_T	On-state slope resistance	0.062	0.060	0.060			Tj = Tjmax	mΩ
I_H	Holding current, max	300	300	300			Tj = 25°C	mA
I_L	Latching current, typ	1500	1000	1000			Tj = 25°C	mA
P_{MAX}	Max power losses	2837	2878	3165			TA = 40°C	W

Triggering Characteristics

	Parameters	GEM_136	GEM_137	GEM_148			Conditions	Units
V_{GT}	Gate trigger voltage	3	3.5	3.5			Tj = 25°C, VD = 5V	V
I_{GT}	Gate trigger current	300	250	250			Tj = 25°C, VD = 5V	mA
P_{GM}	Peak gate power dissipation	150	150	150			Pulse width 1 ms	W
$P_{G(AV)}$	Average gate power dissipation	5	5	5				W
I_{FGM}	Peak gate current	10	10	10				A
V_{FGM}	Peak gate voltage (forward)	30	30	30				V
V_{RGM}	Peak gate voltage (reverse)	5	5	5				V

Switching Characteristics

	Parameters	GEM_136	GEM_137	GEM_148			Conditions	Units
di/dt	Critical rate of rise of on-state current	250	250	250			Tj = Tjmax	A/µs
dV/dt	Critical rate of rise of off-state voltage	500	500	500			Tj = Tjmax	V/µs
t_q	Turn-off time, typ	300	300	300			Tj=Tjmax, IT=1000A di/dt=-20A/µs VR=50V dV/dt=20V/µs	µs
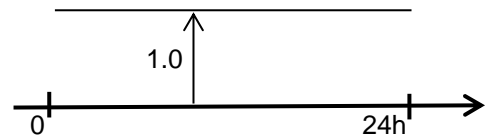
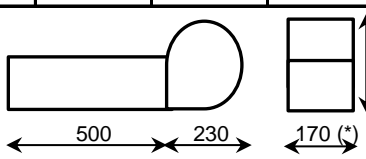## Maximum IEC class 1 currents for typical circuit type

Circuit Type	GEM_136	GEM_137	GEM_148			Conditions	Units
AC switch	3049	3061	3306			T_A = 40 °C delay angle = 0°	A
Center tap	2730	2740	2960			T_A = 40 °C delay angle = 0°	A
Two pulse bridge	2730	2740	2960			T_A = 40 °C delay angle = 0°	A
Six pulse bridge	3950	3960	4280			T_A = 40 °C delay angle = 0°	A
Double star with I.P. transf.	7915	7935	8575			T_A = 40 °C delay angle = 0°	A
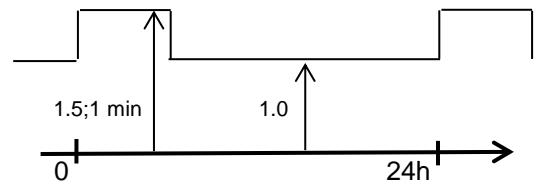
Maximum IEC class 2 currents for typical circuit type

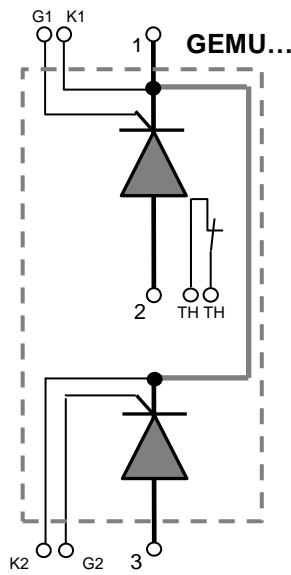| Circuit Type	GEM_136	GEM_137	GEM_148			Conditions	Units
AC switch						T_A = 40 °C delay angle = 0°	A
Center tap						T_A = 40 °C delay angle = 0°	A
Two pulse bridge						T_A = 40 °C delay angle = 0°	A
Six pulse bridge						T_A = 40 °C delay angle = 0°	A
Double star with I.P. transf.						T_A = 40 °C delay angle = 0°	A

Thermal and mechanical characteristics

	Parameters	GEM_136	GEM_137	GEM_148			Conditions	Units
T_{jmax}	Max operating junction temperature	140	140	150				°C
T_{stg}	Storage temperature	-40 +70	-40 +70	-40 +70				°C
R_{thJA}	Thermal resistance (junction to ambient)	0.071	0.070	0.070			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	30	30	30			module complete with cooling fan	kg
	Overall dimensions							mm

500   230   170 (*)   290   (*) without fuses

PART-NUMBERING SYSTEM

GEM	T	136	-	10	-	V	F	0	L	P	C	0	2	D
	①	②		③		④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫
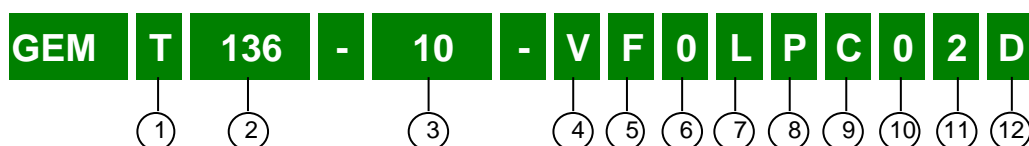
① Circuit configuration

② GEM average current / 10

③ GEM blocking voltage / 100

④ 0 = No fan - V = With 230 VRMS fan - W = With 115 VRMS fan

⑤ 0 = No fuse - F = with fuse for non-regenerative bridges - R = with fuse for regenerative bridges

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)

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

Green Power Solutions

GEMT…

K1 G1 1

2 TH TH

K2 G2 3

GEMH…

K1 G1 1

2 TH TH

3

GEML…

1

2 TH TH

K2 G2 3

GEMU…

G1 K1 1

2 TH TH

K2 G2 3

GEMK…

G1 K1 1

2 TH TH

3

GEMV…

K1 G1 1

2 TH TH

K2 G2 3

GEMN…

K1 G1 1

2 TH TH

3
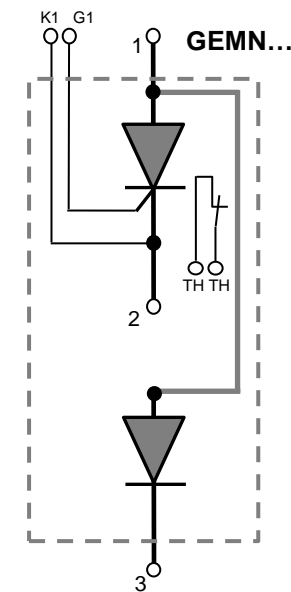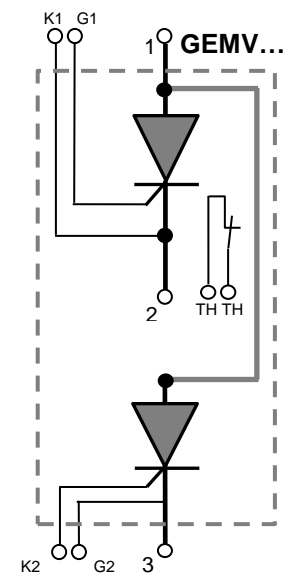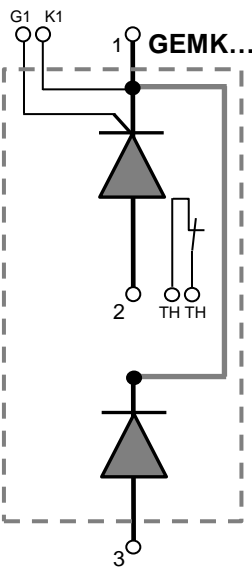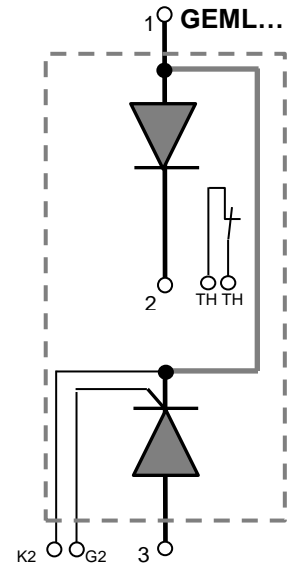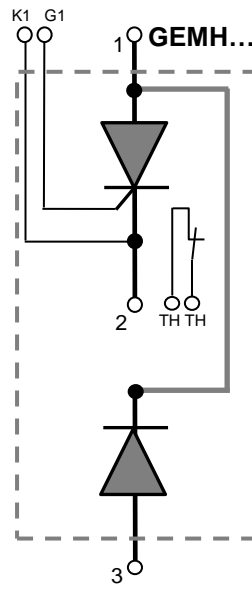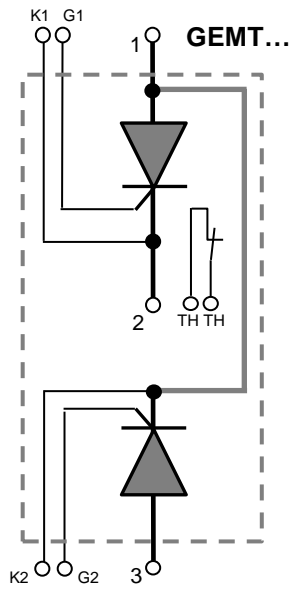
In the interest of product improvement Green Power Solutions reserves the right to change any specification given in this data sheet without notice.