

Thyristor and Diode Pressure Contact Modules



powerful ideas at work

Introduction

Dynex Semiconductor is one of the world's leading designers and manufacturers of industrial high power semiconductors. The Company's unique capabilities permit the manufacture of both standard bipolar semiconductors and new generation insulated-gate bipolar transistors. The Company's power products are used to improve the efficiency, reliability and quality of the electric power in:

- Power transmission and distribution
- Alternative power generation
- Marine and rail propulsion
- Aerospace
- Medical equipment
- Heavy industries such as metal smelting and mining
- Telecommunications
- Electric vehicles

Dynex offers a comprehensive range of isolated base-plate water and air cooled dual thyristor (SCR), dual diode, and thyristor/diode modules with industry standard footprints. The diode and thyristor chips within the modules are available in several combinations to make different circuit configurations easily realisable.

Isolation is achieved without the use of beryllium oxide, thus avoiding any potential health hazards in the event of a major current fault causing structural damage to the module.

All the Dynex bipolar modules are of a pressure contact construction for maximum life under duties with a high degree of temperature cycling. In addition all the modules are recognised under the Recognised Components Program of Underwriters Laboratories Inc. USA, UL file No. E15069 or have applications pending.



The Dynex line of pressure contact isolated modules includes air and liquid cooled base plate variants and are available in dual thyristor (SCR) and/or diode combinations



1800V MP03 dual thyristor module with air cooled baseplate.

Nomenclature

Example: MP03HBT360-12

- MP03** - Outline type code.
- HBT** - Circuit configuration.
(Please see Circuit Configurations on page 5).
- 360** - Average current rating per arm or welding rating RMS current.
- 12** - Voltage grade / 100



1800V MP04 water cooled thyristor module with W3 baseplate

Thyristor (SCR) Modules

Air Cooled Thyristor (SCR) Modules

Part Number ** = $V_{DRM}/100$	V_{DRM}/V_{RRM} (V)	$I_{T(AV)}$ Per Arm at T_{case} Specified						I_{TSM} @ T_{vj} (kA)	I^2t @ T_{vj} (A ² s x 10 ³)	dV/dt (V/μs)	Non-rep. di/dt (A/μs)	Package Outline Type Code	Package Dims. Base plate / Height (mm)
		@ 75°C (A)	@ 80°C (A)	@ 85°C (A)	@ 90°C (A)	@ 95°C (A)	@ 100°C (A)						
MP02XXX190-**	800-1200	190	173	158	141	125	107	5.5	151	1000	500	MP02	94 x 34 / 30
MP03XXX190-**	800-1200	190	173	158	141	125	107	5.5	151	1000	500	MP03	92 x 50 / 52
MP03XXX330-**	800-1200	334	310	286	262	236	209	10.6	560	1000	500	MP03	92 x 50 / 52
MP03XXX360-**	800-1200	352	343	318	292	265	236	10.6	560	1000	500	MP03	92 x 50 / 52
MP02XXX175-**	1000-1600	175	152	138	123	108	92	6.8	231	1000	500	MP02	94 x 34 / 30
MP03XXX175-**	1000-1600	175	152	138	123	108	92	6.8	231	1000	500	MP03	92 x 50 / 52
MP03XXX300-**	1000-1600	312	289	265	240	214	186	10.6	560	1000	500	MP03	92 x 50 / 52
MP03XXX275-**	1200-1800	277	256	234	211	186	161	8.1	330	1000	500	MP03	92 x 50 / 52
MP04XXX590-**	1200-1800	595	549	504	456	406	353	14	975	1000	500	MP04	124 x 60 / 52
MP02XXX130-**	1600-1800	134	124	113	101	89	76	4	80	1000	500	MP02	94 x 34 / 30
MP03XXX130-**	1600-1800	134	124	113	101	89	76	4	80	1000	500	MP03	92 x 50 / 52
MP03XXX360H-**	1600-1800	355	333	310	285	259	232	8.1	330	1000	500	MP03	92 x 50 / 52
MP04XXX490-**	1800-2800	490	457	421	383	343	300	11.25	633	1000	500	MP04	124 x 60 / 52

Notes:

1. $V_{DSM}/V_{RSM} = V_{DRM}/V_{RRM} + 100V$ respectively.
2. Isolation voltage for all types is 3kV A.C. RMS.
3. XXX is shown in the part number as a substitution for the circuit configuration reference code, please see page 5 for standard Dynex circuit configurations.
4. Gate and auxiliary cathode leads are not supplied as standard but can be purchased separately.
5. Voltage isolation is provided by alumina based substrates, manufactured by direct copper bonding processes. This is a **non-toxic** material and **all** modules are beryllia free.
6. The products listed are recognised under the Recognised Component Program of Underwriters Laboratories Inc. USA, UL file No. E151069 or have applications pending.
7. Package outline information is give on pages 6 and 7.

Water Cooled Thyristor (SCR) Modules

Part Number ** = $V_{DRM}/100$	V_{DRM}/V_{RRM} (V)	$I_{T(AV)}$ @ $T_{water} = 40^\circ C$ @ 4.5 litres per min. (Per Arm) (A)	I_{TSM} @ T_{vj} (kA)	I^2t (A ² s x 10 ³)	dV/dt (V/μs)	Non-rep. di/dt (A/μs)	Package Outline Type Code ¹	Package Dims. Base plate / Height (mm)
MP02TT200-**W12	1600	200	6.8	231	1000	500	MP02-W12	94 x 34 / 49
MP03TT300-**W3A	1800	310	8.1	330	1000	500	MP03-W3A	92 x 50 / 67.4
MP04TT600-**W3A	1800	580	14	975	1000	500	MP04-W3A	124 x 60 / 67.4
MP04TT500-**W3A	2800	480	11.25	633	1000	500	MP04-W3A	124 x 60 / 67.4

Notes:

1. Other heatsinks are available, please contact Customer Services.
2. Package outline information is give on pages 6 and 7.

Thyristor (SCR) Modules

Welding Rated AC Switch Water Cooled Modules

Part Number ** = $V_{RRM}/100$	Welding Rating ¹ I_{RMS} (A)	Cont. I_{RMS} line 25°C water inlet@ 4.5 ltrs per min. (A)	I_{TSM} (kA)	I^2t (A ² s x 10 ³)	V_{RRM} (V)	di/dt (A/μs)	dV/dt (V/μs)	Package ²	Package Dims. Base plate (mm)
MP02TT800-**W12	805	510	6.8	231	1300-1600	500	1000	MP02-W12	94 x 34
MP03TT1250-**W3A	1258	798	8.1	330	1200-1800	500	1000	MP03-W3A	92 x 50
MP04TT1400-**W3A	1508	1185	11.25	633	2200-2800	500	1000	MP04-W3A	124 x 60
MP04TT1550-**W3A	1670	1438	14	975	1200-1800	500	1000	MP04-W3A	124 x 60

Notes:

1. Water inlet temperature 40°C, 50% duty cycle, 20 cycles.
2. Alternative water connections are available, please contact Customer Services.
3. Package outline information is given on pages 6 and 7.

Diode Modules

Air Cooled Diode Modules

Part Number ** = $V_{RRM}/100$	V_{RRM} (V)	$I_{T(AV)}$ Per Arm at T_{case} Specified						I_{FSM} @ T_{vj} (kA)	I^2t @ T_{vj} (A ² s x 10 ³)	Package Outline Type Code	Package Dims. Base plate / Height (mm)
		@ 75°C (A)	@ 80°C (A)	@ 85°C (A)	@ 90°C (A)	@ 95°C (A)	@ 100°C (A)				
MP02XX175-**	800-2000	170	161	152	143	133	123	5.6	158	MP02	94 x 34 / 30
MP02XX260-**	1000-1600	267	253	239	225	211	196	8.1	328	MP02	94 x 34 / 30
MP03XX260-**	1000-1600	267	253	239	225	211	196	8.1	328	MP03	92 x 50 / 52
MP02XX280-**	1400-2000	280	266	252	237	222	206	6	180	MP02	94 x 34 / 30
MP03XX280-**	1400-2000	280	266	252	237	222	206	6	180	MP03	92 x 50 / 52
MP03XX440-**	1600-2100	440	423	399	374	348	322	11.25	630	MP03	92 x 50 / 52
MP02XX130-**	1800-2500	130	123	116	109	102	94	2.2	242	MP02	94 x 34 / 30
MP04XX910-**	1200-3000	915	873	830	786	740	692	20	2000	MP04	124 x 60 / 52
MP04XX780-**	4000-4500	782	747	712	675	636	596	15	1125	MP04	124 x 60 / 52

Notes:

1. $V_{RSM} = V_{RRM} + 100V$ respectively.
2. Isolation voltage for all types is 3kV A.C. RMS.
3. XX is shown in the part number as a substitution for the circuit configuration reference code, please see page 5 for standard Dynex circuit configurations. e.g. MP02HB175-18.
4. Voltage isolation is provided by alumina based substrates, manufactured by direct copper bonding processes. This is a **non-toxic** material and **all** modules are beryllia free.
5. The products listed are recognised under the Recognised Component Program of Underwriters Laboratories Inc. USA, UL file No. E151069 or have applications pending.
6. Package outline information is given on pages 6 and 7.

Diode Modules

Water Cooled Diode Modules

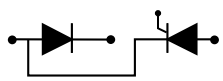
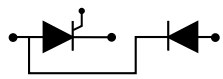
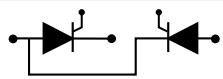
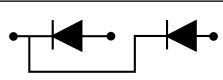
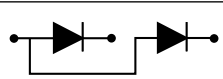
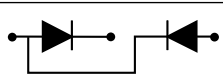
ParT Number ** = $V_{RRM}/100$	V_{RRM} (V)	$I_{F(AV)}$ @ $T_{water} = 40^{\circ}C$ @ 4.5 ltrs per min. (Per Arm) (A)	I_{FSM} @ T_{vj} (kA)	I^2t (A ² s x 10 ³)	Package ¹	Package Dims. Base plate / Height (mm)
MP04DD810-**-W3A	3000	812	20	2000	MP04-W3A	124 x 60 / 67.4

Notes:

1. Other heatsinks are available, please contact Customer Services.
2. $V_{RSM} = V_{RRM} + 100V$ respectively.
3. Isolation voltage for all types is 3kV A.C. RMS.
4. Voltage isolation is provided by alumina based substrates, manufactured by direct copper bonding processes. This is a **non-toxic** material and **all** modules are beryllia free.
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Circuit Configurations

Cross Reference With Major Manufacturers

Circuit	Dynex	eupec	IR	IXYS	Powerex	Semikron
	HBN	DT	IRKL	MDC	-	SKKL
	HBP	TD	IRKH	MCD	1	SKKH
	HBT / TT	TT	IRKT	MCC	3	SKKT
	G	-	IRKC	-	-	SKMD
	GN	-	IRKJ	MDA	-	SKND
	HB / DD	DD	IRKD	MDD	2	SKKD

Module Package Outlines

Cross Reference With Major Manufacturers

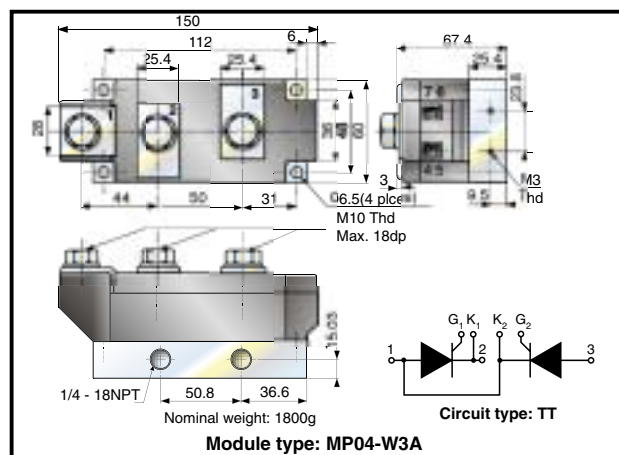
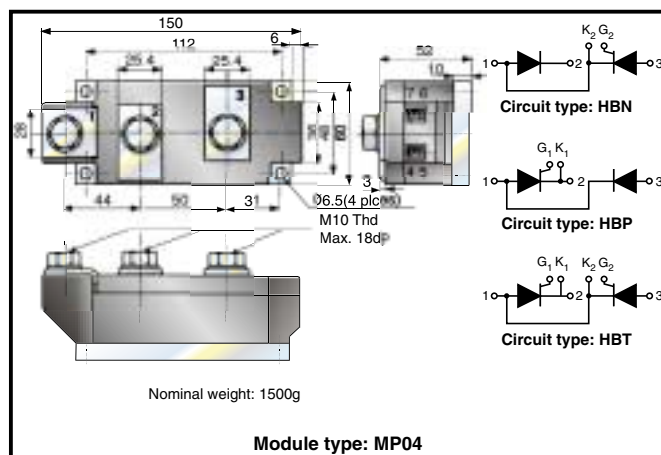
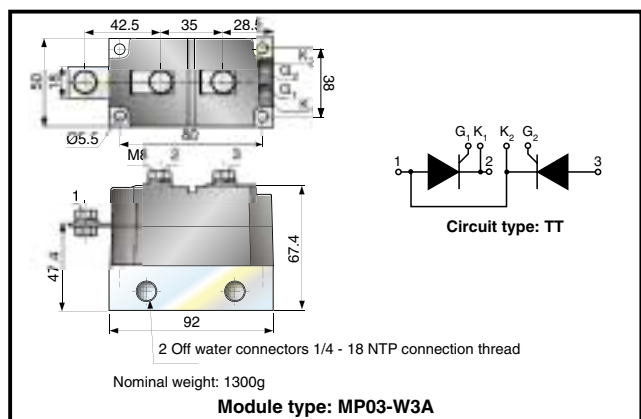
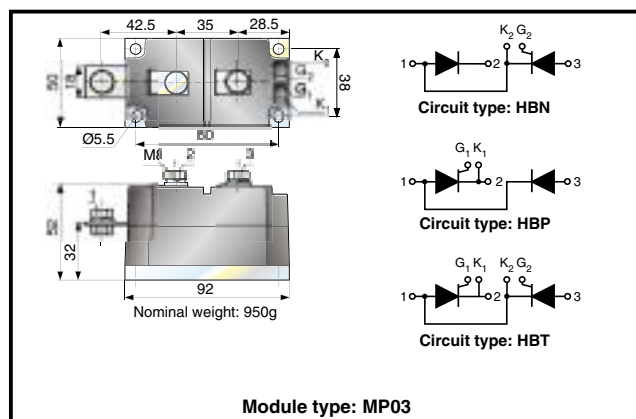
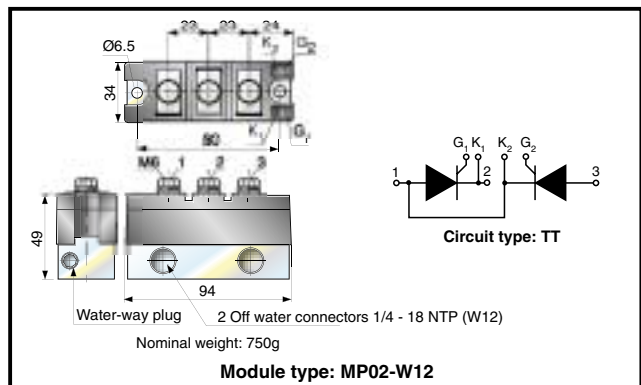
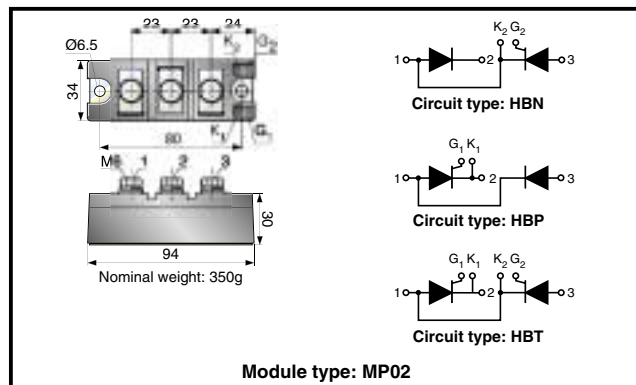
Dynex	eupec	IR	IXYS	Powerex	Semikron
MP02	TP34	INT-A-PAK	Style #2	CD6	Semipak 2
MP03	TP50	MAGN-A-PAK	Style #3	ED4	Semipak 3
MP04	TP60	Super MAGN-A-PAK	Style #4	LD4	-

Package outline information is given on pages 6 and 7.

Module Package Outlines

Thyristor (SCR) Package Outlines and Circuit Configurations

All dimensions shown in mm unless stated otherwise.



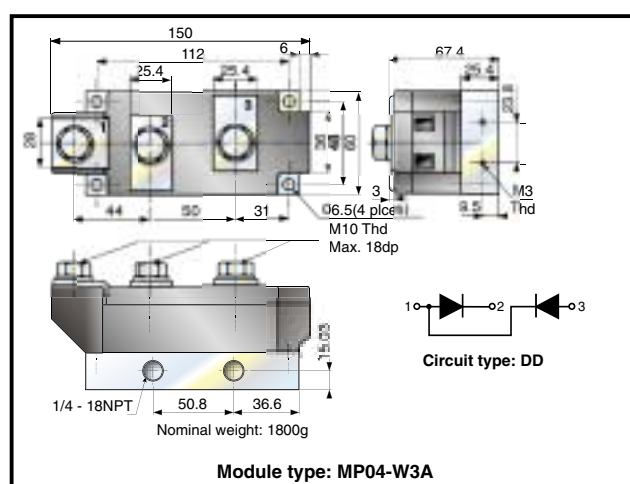
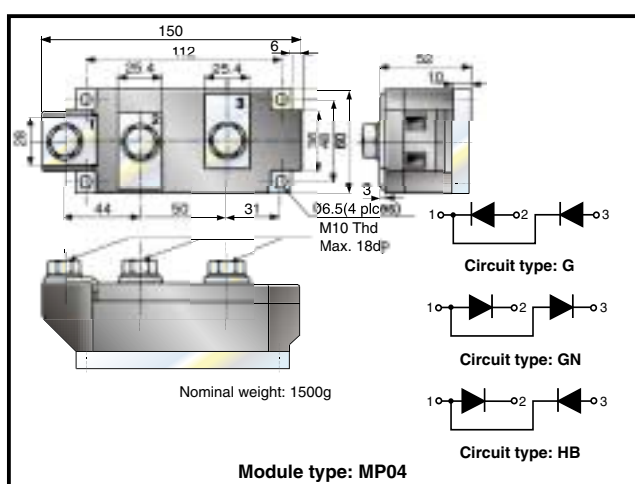
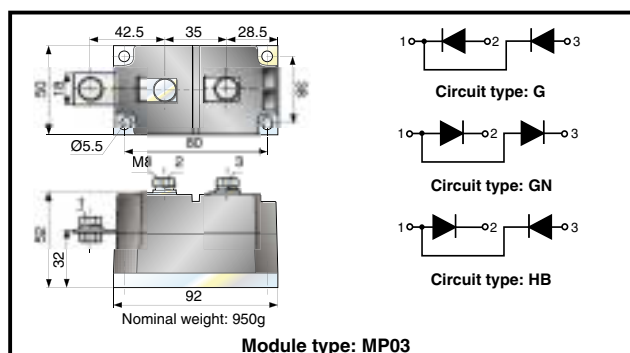
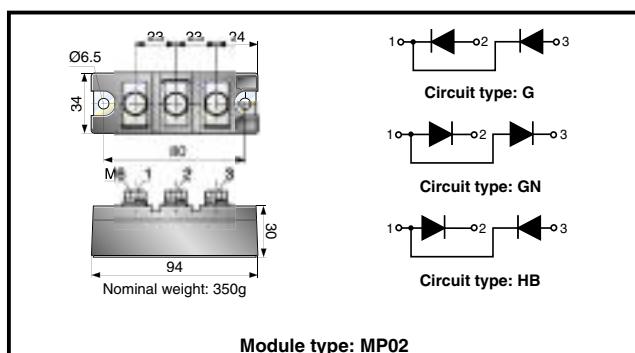
Interface Compounds

	Rhodorsil 47V5	Dow Corning DC200	Aavid Sil Free 1020	American Oil PQ	BICC BX13	Aremco 664	Unial
Max. Temp.	120°C	315°C	200°C	200°C	260°C	285°C	120°C
Min. Temp.	-65°C	-50°C	-40°C	-	-	-	-30°C
Thermal conductivity	0.12W/m.K	0.155W/m.K	0.793W/m.K	16.7x10 ⁴ CAL(Sec.cm.°C)	-	3.31x10 ⁴ CAL(Sec.cm.°C)	-
Dielectric strength V/mm	15000	-	225	15000	-	0	0

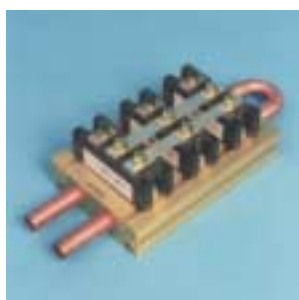
Module Package Outlines

Diode Package Outlines and Circuit Configurations

All dimensions shown in mm unless stated otherwise.



Module Mounting Recommendations



Adequate heatsinking is required to maintain the base temperature at 75°C if full rated current is to be achieved. Power dissipation may be calculated by use of $V_{T(TO)}$ and r_T information in accordance with standard formulae. Dynex can provide assistance with calculations or choice of heatsink if required.

The heatsink surface must be smooth and flat; a surface finish of N6 (32µin) and a flatness within 0.05mm (0.002") are recommended.

Immediately prior to mounting, the heatsink surface should be lightly scrubbed with fine emery, Scotch Brite™ or a mild chemical etchant and then cleaned with a solvent to remove oxide build up and foreign material. Care should be taken to ensure no foreign particles remain.

An even coating of thermal compound (eg. Unial) should be applied to both the heatsink and module mounting surfaces. This should ideally be 0.05mm (0.002") per surface to ensure optimum thermal performance.

After application of thermal compound, place the module squarely over the mounting holes, (or 'T' slots) in the heatsink. Using a torque wrench, slowly tighten the recommended fixing bolts at each end, rotating each in turn no more than 1/4 of a revolution at a time. Continue until the required torque of 6Nm (55lb.ins) is reached at both ends.

It is not acceptable to fully tighten one fixing bolt before starting to tighten the others. Such action may DAMAGE the module.

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