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Powerline IGBT Modules



1200V IGBT Modules

Part Number	I _C at T _C		I _{C(PK)}	V _{CE(SAT)} at T _C =25°C	Total E _{SW} at T _C =125°C (mJ)	R _{th(j-c)} (per arm) (°C/kW)	Outline Type Code	Baseplate Dims (mm)	Baseplate Material
	(A)	(°C)							
IGBT Modules - Chopper									
DIM800DCS12-A	800	85	1600	2.2	280	18	D	140 x 130	Cu
DIM800DCM12-A	800	80	1600	2.2	280	18	D	140 x 130	AlSiC
IGBT Modules - Dual Switch									
DIM400DDM12-A	400	85	800	2.2	120	36	D	140 x 130	AlSiC
DIM400DDS12-A	400	85	800	2.2	120	36	D	140 x 130	Cu
DIM600DDS12-A	600	85	1200	2.2	200	24	D	140 x 130	Cu
DIM800DDM12-A	800	85	1600	2.2	280	18	D	140 x 130	AlSiC
DIM800DDS12-A	800	85	1600	2.2	280	18	D	140 x 130	Cu
IGBT Modules - Single Switch									
DIM800FSM12-A	800	85	1600	2.2	280	18	F	140 x 130	AlSiC
DIM800FSS12-A	800	85	1600	2.2	280	18	F	140 x 130	Cu
DIM1200FSM12-A	1200	85	2400	2.2	400	12	F	140 x 130	AlSiC
DIM1200FSS12-A	1200	85	2400	2.2	400	14	F	140 x 130	Cu
DIM1600FSM12-A	1600	85	3200	2.2	500	9	F	140 x 130	AlSiC
DIM1600FSS12-A	1600	85	3200	2.2	500	9	F	140 x 130	Cu
DIM1600FSS12-L	1600	80	3200	3.1	635	9	F	140 x 130	Cu
DIM1800ESM12-A	1800	85	3600	2.2	570	8	E	190 x 140	AlSiC
DIM1800ESS12-A	1800	85	3600	2.2	570	8	E	190 x 140	Cu
DIM2400ESM12-A	2400	85	4800	2.2	800	6	E	190 x 140	AlSiC
DIM2400ESS12-A	2400	85	4800	2.2	800	6	E	190 x 140	Cu

Notes:

1. IGBT module outlines and circuit configurations are shown on pages 13-14.



Powerline IGBT Modules

1700V IGBT Modules

Part Number	V_{DRM}	I_C at T_C		$I_{C(PK)}$	V_F	Total E_{SW} at $T_C=125^\circ C$ (mJ)	$R_{th(j-c)}$ (per arm) ($^\circ C/kW$)	Outline Type Code	Baseplate Dims (mm)	Baseplate Material
IGBT Modules - Bi-directional Switch										
DIM400PBM17-A	± 1700	400	75	800	4.9	350	36	P	140 x 73	AlSiC

Part Number	I_C at T_C		$I_{C(PK)}$	$V_{CE(SAT)}$ at $T_C=25^\circ C$	Total E_{SW} at $T_C=125^\circ C$ (mJ)	$R_{th(j-c)}$ (per arm) ($^\circ C/kW$)	Outline Type Code	Baseplate Dims (mm)	Baseplate Material
IGBT Modules - Chopper									
DIM400DCM17-A	400	75	800	2.7	350	36	D	140 x 130	AlSiC
DIM600DCM17-A	600	75	1200	2.7	620	24	D	140 x 130	AlSiC
DIM800DCM17-A	800	75	1600	2.7	785	18	D	140 x 130	AlSiC
DIM1600ECM17-A	1600	75	3200	2.7	1250	9	E	190 x 140	AlSiC
IGBT Modules - Dual Switch									
DIM400DDM17-A	400	75	800	2.7	350	36	D	140 x 130	AlSiC
DIM600DDM17-A	600	75	1200	2.7	620	27	D	140 x 130	AlSiC
DIM800DDM17-A	800	75	1600	2.7	700	18	D	140 x 130	AlSiC
IGBT Modules - Half Bridge									
DIM400PHM17-A	400	75	800	2.7	350	36	P	140 x 73	AlSiC
IGBT Modules - Single Switch									
DIM800FSM17-A	800	75	1600	2.7	700	18	F	140 x 130	AlSiC
DIM1200FSM17-A	1200	75	2400	2.7	1000	12	F	140 x 130	AlSiC
DIM1600FSM17-A	1600	75	3200	2.7	1250	9	F	140 x 130	AlSiC
DIM2400ESM17-A	2400	75	4800	2.7	1950	6	E	190 x 140	AlSiC

Note:

- $V_{CE(SAT)}$ is measured across both arms of the bi-directional switch.
- IGBT module outlines and circuit configurations are shown on pages 13-14.

Powerline IGBT Modules



3300V IGBT Modules

Part Number	I _c at T _c		I _{c(PK)}	V _{CE(SAT)} at T _c =25°C	Total E _{sw} at T _c =125°C (mJ)	R _{th(j-c)} (IGBT arm) (°C/kW)	Outline Type Code	Baseplate Dims (mm)	Baseplate Material
	(A)	(°C)							
IGBT Modules - Chopper									
DIM200PKM33-F	200	90	400	2.8	655	48	P	140 x 73	AlSiC
DIM200PLM33-F	200	90	400	2.8	655	48	P	140 x 73	AlSiC
DIM400GCM33-F	400	90	800	2.8	1470	24	G	140 x 130	AlSiC
DIM400XCM33-F	400	90	800	2.8	1470	24	X	140 x 130	AlSiC
DIM800ECM33-F	800	90	1600	2.8	2950	12	E	190 x 140	AlSiC
IGBT Modules - Dual Switch									
DIM400GDM33-F	400	90	800	2.8	1470	24	G	140 x 130	AlSiC
IGBT Modules - Half Bridge									
DIM100PHM33-F	100	90	200	2.8	335	96	P	140 x 73	AlSiC
DIM200PHM33-F	200	90	400	2.8	655	48	P	140 x 73	AlSiC
IGBT Modules - Single Switch									
DIM400NSM33-F	400	90	800	2.8	1470	24	N	140 x 130	AlSiC
DIM800NSM33-F	800	90	1600	2.8	2950	12	N	140 x 130	AlSiC
DIM800XSM33-F	800	90	1600	2.8	2950	12	X	140 x 130	AlSiC
DIM1200ESM33-F	1200	90	2400	2.8	4400	8	E	190 x 140	AlSiC

4500V IGBT Modules

Part Number	I _c at T _c		I _{c(PK)}	V _{CE(SAT)} at T _c =25°C	Total E _{sw} at T _c =125°C (mJ)	R _{th(j-c)} (IGBT arm) (°C/kW)	Outline Type Code	Baseplate Dims (mm)	Baseplate Material
	(A)	(°C)							
IGBT Modules - Chopper									
DIM300XCM45-T	300	90	600	2.9	2200	24	X	140 x 130	AlSiC
IGBT Modules - Single Switch									
DIM600NSM45-T	600	90	1200	2.9	4400	12	N	140 x 130	AlSiC
DIM600XSM45-T	600	90	1200	2.9	4400	12	X	140 x 130	AlSiC
DIM900ESM45-T	900	90	1800	2.9	6600	8	E	190 x 140	AlSiC
DIM900ASM45-T	900	90	1800	2.9	6600	8	A	190 x 140	AlSiC

6500V IGBT Modules

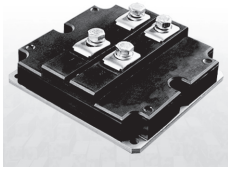
Part Number	I _c at T _c		I _{c(PK)}	V _{CE(SAT)} at T _c =25°C	Total E _{sw} at T _c =125°C (mJ)	R _{th(j-c)} (IGBT arm) (°C/kW)	Outline Type Code	Baseplate Dims (mm)	Baseplate Material
	(A)	(°C)							
IGBT Modules - Single Switch									
DIM400XSM65-T	400	90	800	4	5250	15	X	140 x 130	AlSiC
DIM600ASM65-T	600	90	1200	4	7875	10	A	190 x 140	AlSiC

Note:

1. IGBT module outlines and circuit configurations are shown on pages 13-14.

IGBT and FRD Die

Naked die are available. Please refer to factory for details.



Powerline FRD Modules

(for use with IGBT Modules)

1200V Diodes

Part Number	I_F at T_C		I_F as Single Diode (with external connection)	I_{FM}	V_F at $T_{vj}=25^\circ\text{C}$	I^2t	Q_{rr} at T_{vj}	E_{rec} at T_{vj}	$R_{th(j-c)}$ (per arm)	Outline Type Code	Baseplate Dimensions (mm)	Baseplate Material
	(A)	($^\circ\text{C}$)	(A)	(A)	(V)	(kA^2)	(μC)	(mJ)	($^\circ\text{C}/\text{kW}$)			
Fast Recovery Diode Modules - Dual Diode												
DFM600FXM12-A	600	75	1200	1200	1.9	100	150	70	40	F	140 x 130	AlSiC
DFM600FXS12-A	600	75	1200	1200	1.9	100	150	70	40	F	140 x 130	Cu
DFM900FXM12-A	900	75	1800	1800	1.9	150	225	105	27	F	140 x 130	AlSiC
DFM900FXS12-A	900	75	1800	1800	1.9	150	225	105	27	F	140 x 130	Cu
DFM1200FXM12-A	1200	75	2400	2400	1.9	200	300	140	20	F	140 x 130	AlSiC
DFM1200FXS12-A	1200	75	2400	2400	1.9	200	300	140	20	F	140 x 130	Cu
Fast Recovery Diode Modules - Triple Diode												
DFM1200EXM12-A	1200	75	3600	2400	1.9	200	300	140	20	E	190 x 140	AlSiC
DFM1200EXS12-A	1200	75	3600	2400	1.9	200	300	140	20	E	190 x 140	Cu

1800V Diodes

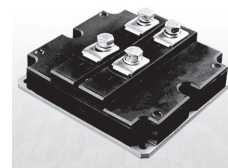
Part Number	I_F at T_C		I_F as Single Diode (with external connection)	I_{FM}	V_F at $T_{vj}=25^\circ\text{C}$	I^2t	Q_{rr} at T_{vj}	E_{rec} at T_{vj}	$R_{th(j-c)}$ (per arm)	Outline Type Code	Baseplate Dimensions (mm)	Baseplate Material
	(A)	($^\circ\text{C}$)	(A)	(A)	(V)	(kA^2)	(μC)	(mJ)	($^\circ\text{C}/\text{kW}$)			
Fast Recovery Diode Modules - Dual Diode												
DFM600FXM18-A	600	75	1200	1200	2	120	160	120	40	F	140 x 130	AlSiC
DFM900FXM18-A	900	75	1800	1800	2	270	410	270	27	F	140 x 130	AlSiC
DFM1200FXM18-A	1200	75	2400	2400	2	480	540	360	20	F	140 x 130	AlSiC
Fast Recovery Diode Modules - Triple Diode												
DFM1200EXM18-A	1200	75	3600	2400	2	480	540	360	20	E	190 x 140	AlSiC

Notes:

1. FRD module outlines and circuit configurations are shown on page 15.

Powerline FRD Modules

(for use with IGBT Modules)



3300V Diodes

Part Number	I_F at T_C		I_F as Single Diode (with external connection)	I_{FM}	V_F at $T_{vj}=25^\circ\text{C}$	I^2t	Q_{rr} at T_{vj}	E_{rec} at T_{vj}	$R_{th(j-c)}$ (per arm)	Outline Type Code	Baseplate Dimensions (mm)	Baseplate Material
	(A)	($^\circ\text{C}$)	(A)	(A)	(V)	(kA^2)	(μC)	(mJ)	($^\circ\text{C}/\text{kW}$)			
Fast Recovery Diode Modules - Dual Diode												
DFM400NXM33-A	400	75	800	800	2.5	80	450	550	48	N	140 x 130	AlSiC
DFM400NXM33-F	400	70	800	800	2.9	80	300	300	48	N	140 x 130	AlSiC
DFM800NXM33-A	800	75	1600	1600	2.5	320	670	850	24	N	140 x 130	AlSiC
DFM800NXM33-F	800	70	1600	1600	2.9	320	600	600	24	N	140 x 130	AlSiC
DFM1200NXM33-A	1200	75	2400	2400	2.5	720	1000	1250	16	N	140 x 130	AlSiC
DFM1200NXM33-F	1200	70	2400	2400	2.9	720	900	900	16	N	140 x 130	AlSiC
Fast Recovery Diode Modules - Series Diode Pair												
DFM100PXM33-A	100	70	NA	200	2.5	10	95	110	216	P	140 x 73	AlSiC
DFM100PXM33-F	100	70	NA	200	2.9	5	65	65	192	P	140 x 73	AlSiC
DFM200PXM33-A	200	70	NA	400	2.5	20	190	220	96	P	140 x 73	AlSiC
DFM200PXM33-F	200	70	NA	400	2.9	20	125	130	96	P	140 x 73	AlSiC
DFM400PXM33-A	400	70	NA	800	2.5	80	450	550	48	P	140 x 73	AlSiC
DFM400PXM33-F	400	70	NA	800	2.9	80	300	300	48	P	140 x 73	AlSiC

4500V and 6500V Diodes

Part Number	I_F at T_C		I_F as Single Diode (with external connection)	I_{FM}	V_F at $T_{vj}=25^\circ\text{C}$	I^2t	Q_{rr} at T_{vj}	E_{rec} at T_{vj}	$R_{th(j-c)}$ (per arm)	Outline Type Code	Baseplate Dimensions (mm)	Baseplate Material
	(A)	($^\circ\text{C}$)	(A)	(A)	(V)	(kA^2)	(μC)	(mJ)	($^\circ\text{C}/\text{kW}$)			
Fast Recovery Diode Modules - Dual Diode (4500V)												
DFM450NXM45-F	450	80	900	900	3	108	650	800	32	N	140 x 130	AlSiC
DFM600NXM45-F	600	80	1200	1200	3	192	850	1050	24	N	140 x 130	AlSiC
DFM600XXM45-F	600	80	1200	1200	3	192	850	1050	24	X	140 x 130	AlSiC
DFM900NXM45-F	900	80	1800	1800	3	432	1300	1600	16	N	140 x 130	AlSiC
Fast Recovery Diode Modules - Dual Diode (6500V)												
DFM200XXM65-F	200	75	400	400	3.6	24	500	100	60	X	140 x 130	AlSiC
DFM400XXM65-F	400	75	800	800	3.6	97	1000	2000	30	X	140 x 130	AlSiC
DFM600XXM65-F	600	75	1200	600	3.6	218	1500	3000	20	X	140 x 130	AlSiC

Notes:

- FRD module outlines and circuit configurations are shown on page 15.

Custom Module Design Capability

Transportation, power generation and industry are all benefiting from Dynex high reliability IGBT module technology. Many applications use standard products but some require custom solutions. Dynex has a strong and very experienced module design team and will be happy to offer custom IGBT or diode modules to those customers with non-standard requirements. This may be a simple variant of the standard module, perhaps with other combinations of die, or a full custom design. Please ask customer services for more details.



Phase Control Thyristors

Disc Devices

Part Number	I_T (AV) at $T_c = 60^\circ\text{C}$ (A)	V_{DRM} / V_{RRM} (V)	I_{TSM} at T_{vjm} & 10ms (kA)	I_{TM} for V_{TM} (A)	V_{TM} at I_{TM} & $T_{case} = T_{vjm}$ (V)	V_{TO} at T_{vjm} (V)	r_T at T_{vjm} (m Ω)	T_{vjm} ($^\circ\text{C}$)	$R_{th(j-c)}$ dsc ($^\circ\text{C}/\text{W}$)	$R_{th(c-s)}$ dsc ($^\circ\text{C}/\text{W}$)	F \pm 10% (kN)	Outline
Up to 1400V												
DCR470T14	470	600-1400	6.3	600	1.23	0.85	0.6400	125	0.08000	0.0200	5	T
DCR780E14	780	600-1400	9.1	1500	1.75	0.95	0.5300	125	0.04100	0.0100	5	E
DCR950D14	950	600-1400	12.8	1500	1.45	0.87	0.3820	125	0.03500	0.0100	10	D
DCR1010G14	1010	600-1400	15.0	1500	1.35	0.85	0.3300	125	0.03500	0.0080	15	G
DCR1910F14	1910	600-1400	26.0	1500	1.10	0.86	0.1600	125	0.02000	0.0050	22	F
DCR2150X14	2150	600-1400	29.0	3000	1.23	0.84	0.1300	125	0.01800	0.0050	30	X
DCR2980C14	2980	600-1400	47.0	3000	1.16	0.87	0.0980	125	0.01250	0.0040	45	C
DCR3710V14	3710	600-1400	60.0	3000	1.12	0.83	0.0920	125	0.01000	0.0030	56	V
Up to 1800V												
DCR370T18	370	1200-1800	5.0	600	1.62	0.93	1.1500	125	0.08000	0.0200	5	T
DCR720E18	720	1200-1800	8.3	1500	1.97	1.09	0.5870	125	0.04100	0.0100	5	E
DCR860D18	860	1200-1800	11.5	1500	1.65	0.90	0.5000	125	0.03500	0.0100	10	D
DCR960G18	960	1200-1800	14.0	1500	1.45	0.91	0.3600	125	0.03500	0.0080	15	G
DCR1710F18	1710	1200-1800	25.0	1500	1.18	0.88	0.2000	125	0.02000	0.0050	22	F
DCR1800F18	1800	1200-1800	32.0	2000	1.20	0.84	0.1800	125	0.02000	0.0050	22	F
DCR1970X18	1970	1200-1800	28.0	3000	1.36	0.88	0.1600	125	0.01800	0.0050	30	X
DCR2830C18	2830	1200-1800	45.0	3000	1.27	0.91	0.1200	125	0.01250	0.0040	45	C
DCR3400V18	3400	1200-1800	60.0	3000	1.23	0.90	0.1100	125	0.01000	0.0030	56	V
Up to 2400V												
DCR4440W22	4440	1800-2200	64.5	3000	1.15	0.86	0.0950	125	0.00700	0.0020	70	W
DCR5900A22	5900	1800-2200	80.0	3000	1.05	0.87	0.0610	125	0.00570	0.0015	90	A
DCR6430M22	6430	1800-2200	80.0	3000	1.05	0.87	0.0610	125	0.00500	0.0015	90	M
DCR590E24	590	2000-2400	7.8	1500	2.49	0.94	1.0360	125	0.04100	0.0100	5	E
DCR750D24	750	2000-2400	10.0	1500	2.00	0.92	0.7200	125	0.03500	0.0100	10	D
DCR1700X24	1700	2000-2400	23.0	3000	1.65	0.96	0.2300	125	0.01800	0.0050	30	X
DCR2360C24	2360	2000-2400	35.0	3000	1.50	0.96	0.1790	125	0.01250	0.0040	45	C
DCR3060V24	3060	2000-2400	45.0	3000	1.31	0.90	0.1370	125	0.01000	0.0030	56	V
Up to 3000V												
DCR850G26	850	2000-2600	11.0	1500	1.70	0.95	0.5000	125	0.03500	0.0080	15	G
DCR1560F26	1560	2000-2600	24.0	1500	1.30	0.89	0.2700	125	0.02000	0.0050	22	F
DCR2060C28	2060	2400-2800	30.0	3000	1.77	1.02	0.2500	125	0.01250	0.0040	45	C
DCR2760V28	2760	2400-2800	43.0	3000	1.49	0.98	0.1700	125	0.01000	0.0030	56	V
DCR7610H28	7610	2200-2800	105.0	6000	1.19	0.88	0.0520	125	0.00400	0.0008	120	H
DCR780G30	780	2400-3000	10.5	1500	1.90	1.00	0.6000	125	0.03500	0.0080	15	G
DCR1460F30	1460	2400-3000	23.0	1500	1.40	0.95	0.3000	125	0.02000	0.0050	22	F
Up to 3400V												
DCR470E34	470	2400-3400	6.3	1500	3.63	1.04	1.7250	125	0.04100	0.0100	5	E
DCR610D34	610	2400-3400	8.0	1500	2.78	0.98	1.2000	125	0.03500	0.0100	10	D
DCR650G34	650	2800-3400	8.4	1500	2.49	1.03	0.9700	125	0.03500	0.0080	15	G
DCR1120F34	1120	2800-3400	17.0	1500	1.92	1.08	0.5600	125	0.02000	0.0050	22	F
DCR1430X34	1430	2400-3400	19.2	3000	2.11	1.06	0.3500	125	0.01800	0.0050	30	X
DCR1970C34	1970	2800-3400	30.0	3000	1.94	1.05	0.2980	125	0.01250	0.0040	45	C
DCR2440V34	2440	2800-3400	33.0	3000	1.71	1.00	0.2350	125	0.01000	0.0030	56	V
DCR3640W34	3640	2400-3400	54.0	3000	1.41	0.95	0.1530	125	0.00700	0.0020	70	W
DCR4720A34	4720	2400-3400	69.0	3000	1.21	0.86	0.1150	125	0.00570	0.0015	90	A
DCR5110M34	5110	2400-3400	69.0	3000	1.21	0.86	0.1150	125	0.00500	0.0015	90	M

Phase Control Thyristors



Disc Devices

Part Number	I_T (AV) at $T_c = 60^\circ\text{C}$ (A)	V_{DRM} / V_{RRM} (V)	I_{TSM} at T_{vj} & 10ms (kA)	I_{TM} for V_{TM} (A)	V_{TM} at I_{TM} & $T_{case} = T_{vj}$ (V)	V_{TO} at T_{vj} (V)	r_T at T_{vj} (m Ω)	T_{vj} ($^\circ\text{C}$)	$R_{th(j-c)}$ dsc ($^\circ\text{C}/\text{W}$)	$R_{th(c-s)}$ dsc ($^\circ\text{C}/\text{W}$)	F \pm 10% (kN)	Outline
Up to 4200V												
DCR780G42	780	3600-4200	10.5	1600	2.10	1.05	0.8443	125	0.02680	0.0072	12	G
DCR1150N42	1150	3600-4200	16.8	2900	1.95	1.00	0.4440	125	0.02210	0.0040	22	N
DCR1260F42	1255	3600-4200	16.8	2900	1.95	1.00	0.4440	125	0.01840	0.0040	22	F
DCR2040L42	2040	3600-4200	29.0	3000	1.57	1.08	0.2650	125	0.01170	0.0025	37	L
DCR2150C42	2150	3600-4200	29.0	3000	1.57	1.08	0.2650	125	0.01010	0.0025	37	C
DCR2930Y42	2930	3600-4200	40.6	4000	1.67	0.98	0.1980	125	0.00835	0.0020	54	Y
DCR3030V42	3030	3600-4200	40.6	4000	1.67	0.98	0.1980	125	0.00746	0.0020	54	V
DCR3790B42	3790	3600-4200	53.5	4000	1.49	1.00	0.1263	125	0.00700	0.0014	70	B
DCR4100W42	3880	3600-4200	53.5	4000	1.49	1.00	0.1263	125	0.00631	0.0014	70	W
DCR4500A42	4500	3600-4200	60.8	4000	1.39	0.92	0.1220	125	0.00603	0.0010	83	A
DCR4880M42	4880	3600-4200	60.8	4000	1.39	1.92	1.1220	125	0.00518	0.0010	83	M
DCR5840H42	5840	3000-4200	83.5	6000	1.58	0.98	0.1000	125	0.00400	0.0008	120	H
Up to 5200V												
DCR690G52	690	4500-5200	9.5	1600	2.40	1.08	1.1250	125	0.02680	0.0072	12	G
DCR1020N52	1018	4500-5200	14.8	2900	2.30	1.08	0.6100	125	0.02210	0.0040	22	N
DCR1110F52	1107	4500-5200	14.8	2900	2.30	1.08	0.6100	125	0.01840	0.0040	22	F
DCR1850L52	1845	4500-5200	26.3	3000	1.80	1.10	0.3460	125	0.01170	0.0025	37	L
DCR1950C52	1950	4500-5200	26.3	3000	1.80	1.10	0.3460	125	0.01010	0.0025	37	C
DCR2630Y52	2630	4500-5200	36.7	4000	1.83	1.10	0.2414	125	0.00835	0.0020	54	Y
DCR2720V52	2720	4500-5200	36.7	4000	1.83	1.10	0.2414	125	0.00746	0.0020	54	V
DCR3480B52	3480	4500-5200	49.0	4000	1.64	0.98	0.1886	125	0.00700	0.0014	70	B
DCR3640W52	3550	4500-5200	49.0	4000	1.64	0.98	0.1886	125	0.00631	0.0014	70	W
DCR3990A52	3990	4500-5200	53.4	4000	1.53	0.99	0.1578	125	0.00603	0.0010	83	A
DCR4330M52	4325	4500-5200	53.4	4000	1.53	0.99	0.1578	125	0.00518	0.0010	83	M
DCR4540H52	4540	4600-5200	80.0	3000	1.46	1.08	0.1270	110	0.00400	0.0008	120	H
Up to 6500V												
DCR490J65	490	5000-6500	6.6	1600	3.00	1.11	1.6470	125	0.03790	0.0072	12	J
DCR590G65	595	5000-6500	6.6	1600	3.00	1.11	1.6470	125	0.02680	0.0072	12	G
DCR820N65	820	5000-6500	12.0	2900	3.10	1.18	0.9472	125	0.02210	0.0040	22	N
DCR890F65	894	5000-6500	12.0	2900	3.10	1.18	0.9472	125	0.01840	0.0040	22	F
DCR1570L65	1568	5000-6500	22.0	3000	2.50	1.20	0.5000	125	0.01170	0.0025	37	L
DCR1650C65	1650	5000-6500	22.0	3000	2.50	1.20	0.5000	125	0.01010	0.0025	37	C
DCR2220Y65	2220	5000-6500	30.0	4000	2.20	1.24	0.3518	125	0.00835	0.0020	54	Y
DCR2290V65	2290	5000-6500	30.0	4000	2.20	1.24	0.3518	125	0.00746	0.0020	54	V
DCR2880B65	2845	5000-6500	38.5	4000	1.91	1.13	0.2640	125	0.00700	0.0014	70	B
DCR2950W65	2945	5000-6500	38.5	4000	1.91	1.13	0.2640	125	0.00631	0.0014	70	W
DCR3220A65	3220	5000-6500	44.2	4000	1.90	1.08	0.2643	125	0.00603	0.0010	83	A
DCR3900H65	3900	5000-6500	71.0	3000	1.69	1.13	0.1850	110	0.00400	0.0008	120	H
Up to 8500V												
DCR390J85	387	7000-8500	5.3	1600	4.00	1.31	2.7630	125	0.03790	0.0072	12	J
DCR470G85	467	7000-8500	5.3	1600	4.00	1.31	2.7630	125	0.02680	0.0072	12	G
DCR680N85	677	7000-8500	9.8	2900	4.30	1.30	1.5420	125	0.02210	0.0040	22	N
DCR750F85	733	7000-8500	9.8	2900	4.30	1.30	1.5420	125	0.01840	0.0040	22	F
DCR1300L85	1300	7000-8500	17.6	3000	2.80	1.35	0.7670	125	0.01170	0.0025	37	L
DCR1840Y85	1840	7000-8500	25.0	4000	2.75	1.30	0.5500	125	0.00835	0.0020	54	Y
DCR1910V85	1910	7000-8500	25.0	4000	2.75	1.30	0.5500	125	0.00746	0.0020	54	V
DCR2400B85	2370	7000-8500	32.5	4000	2.40	1.23	0.3980	125	0.00631	0.0014	70	B
DCR2450W85	2445	7000-8500	32.5	4000	2.40	1.23	0.3980	125	0.00700	0.0014	70	W
DCR2560A85	2560	7000-8500	32.5	4000	2.50	1.18	0.4600	125	0.00603	0.0010	83	A
DCR2180H85	2180	7000-8500	40.0	1500	1.90	1.30	0.4000	90	0.00400	0.0008	120	H



Pulsed Power Thyristors

Disc Devices

Part Number	VDRM (V)	VRRM (V)	$I_{T(AV)}$ at $T_c=80^\circ\text{C}$ (A)	I_{TSM} at $T_c=125^\circ\text{C}$ (kA)	di/dt to I_{PK} (kA/ μ s)	I_{PK} (kA)	dV/dt (V/ μ s)	$R_{th(j-c)}$ dsc ($^\circ\text{C}/\text{W}$)	Outline Type Code
Pulsed Power Thyristors (SCR) - Disc / Puk Devices									
PT40QPx45	4500	16	760	13	5	20	200	0.033	P
PT60QHx45	4500	16	1000	22.5	10	40	175	0.013	H
PT85QWx45	4500	16	1670	37	22	90	200	0.01	W
ACR300SG33	3300	20	493	6.5	2	0.125	3000	0.042	G

Note:

1. Please contact Customer Services for the availability of clamps for these devices.

The PT family of Pulse Power Thyristors (PPTs) is based on Dynex's GTO technology and is designed for long term stability under D.C. voltages. The structures are resistant to cosmic ray induced failures at normal working voltages.

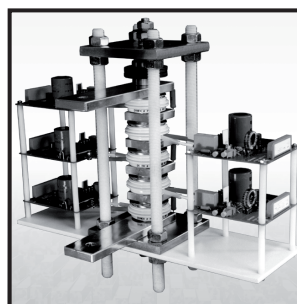
Dynex's Pulse Power Thyristors may be used to connect a source of stored energy, such as a capacitor, to a load, or to bypass and protect the load in the case of a crowbar circuit. In these pulsed power applications where the rate of rise of current is very fast, the pulse power switch is acting as a closing switch and ordinary phase control thyristors (SCRs) are likely to fail due to the high di/dt experienced.

Pulse Power Thyristors may also be required to act in the opening switch mode. Such applications may include those where voltage is reapplied to the pulse power switch shortly after closing and the switch needs to have recovered blocking capability or the transferred energy needs to be controlled. In these applications, the switch needs to have turn-off capability to reduce the natural turn-off time (t_q) of the device. The device is operated in GTO mode with the appropriate commutating gate drive.

Dynex has been supplying thyristors used as crowbars to protect other high power circuitry in railway propulsion units and the like for many years. In addition, Dynex has been a supplier of devices used in equipment for the sterilization of foods by intense light or x-rays since the late 1980s. These applications operate at moderate di/dts and can be satisfied with conventional thyristor solutions.

In the field of ignitron replacements and weld switches, Dynex has been a world leader in the application of solid state devices. Dynex has been involved in the design and manufacture of assemblies for the pulse power communities on the West Coast of America and at CERN, Switzerland. An example of a pulse power

For more information on how Dynex can help with your pulse power needs, please e-mail us at power_solutions@dynexsemi.com



Thyatron replacement pulsed power assembly

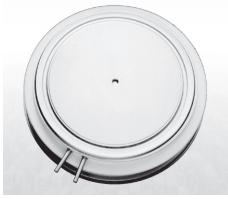
assembly is shown above. It uses five Dynex PT40QPx45 4.5kV SCR devices and was designed in-house by our power electronics design team. It features optical triggering and feedback plus breakover diode protection of individual thyristors.

Rectifier Diodes



Disc Devices

Product Number	$I_{F(AV)}$ at $T_C = 100^\circ\text{C}$ (A)	V_{RRM} (V)	I_{FSM} at T_{vjM} & 10ms (kA)	I_{FM} for V_{FM} (A)	V_{FM} at I_{FM} & $T_{case} = 25^\circ\text{C}$ (V)	V_{FO} at T_{vjM} (V)	r_F at T_{vjM} (m Ω)	T_{vjM} ($^\circ\text{C}$)	$R_{th(j-c)}$ dsc ($^\circ\text{C}/\text{W}$)	$R_{th(c-s)}$ dsc ($^\circ\text{C}/\text{W}$)	F $\pm 10\%$ (kN)	Outline
Up to 1400V												
DRD520T14	520	600-1400	5.9	800	1.45	0.8	0.657	190	0.08	0.02	5	T
DRD1360D14	1360	600-1400	15.2	1500	1.3	0.78	0.257	190	0.035	0.01	10	D
DRD1510G14	1510	600-1400	16.8	1500	1.2	0.78	0.188	190	0.035	0.008	15	G
DRD2770F14	2770	600-1400	31	1500	1.05	0.78	0.092	190	0.02	0.005	22	F
DRD3220X14	3220	600-1400	35.8	3000	1.15	0.77	0.073	190	0.018	0.005	30	X
DRD4650C14	4650	600-1400	45	3000	1.05	0.76	0.051	190	0.0125	0.004	45	C
DRD6080V14	6080	600-1400	60	3000	1.05	0.76	0.035	190	0.01	0.003	56	V
Up to 2200V												
DRD410T22	410	1600-2200	4.9	800	1.85	0.82	1.11	175	0.08	0.02	5	T
DRD990D22	990	1600-2200	12.5	1500	1.6	0.82	0.433	175	0.035	0.01	10	D
DRD1100G22	1100	1600-2200	13.9	1500	1.45	0.82	0.318	175	0.035	0.008	15	G
DRD2030F22	2030	1600-2200	25.7	1500	1.2	0.82	0.156	175	0.02	0.005	22	F
DRD2360X22	2360	1600-2200	29.8	3000	1.35	0.81	0.125	175	0.018	0.005	30	X
DRD3430C22	3430	1600-2200	42.2	3000	1.2	0.79	0.086	175	0.0125	0.004	45	C
DRD4460V22	4460	1600-2200	56.4	3000	1.15	0.81	0.059	175	0.01	0.003	56	V
DRD6380W22	6380	1600-2200	78	6000	1.09	0.82	0.045	175	0.007	0.002	70	W
DRD6800A22	6800	1600-2200	94	6000	1.03	0.82	0.035	160	0.0057	0.0015	90	A
DRD8880H22	8880	1600-2200	125	6000	0.98	0.77	0.035	160	0.004	0.0008	120	H
Up to 3400V												
DRD850D34	850	2400-3400	10.8	1500	1.95	0.88	0.613	175	0.035	0.01	10	D
DRD960G34	960	2400-3400	12	1500	1.7	0.88	0.45	175	0.035	0.008	15	G
DRD1830F34	1830	2400-3400	23	1500	1.35	0.88	0.2	175	0.02	0.005	22	F
DRD2050X34	2050	2400-3400	25.8	3000	1.55	0.86	0.18	175	0.018	0.005	30	X
DRD2980C34	2980	2400-3400	36.5	3000	1.35	0.82	0.128	175	0.0125	0.004	45	C
DRD3920V34	3920	2400-3400	49.5	3000	1.25	0.85	0.084	175	0.01	0.003	56	V
DRD5240W34	5240	2400-3400	64.2	6000	1.292	0.8	0.082	175	0.007	0.002	70	W
DRD6140A34	6140	2400-3400	84.4	6000	1.1	0.8	0.05	160	0.0057	0.0015	90	A
DRD7810H34	7810	2400-3400	118	6000	1.1	0.8	0.05	160	0.004	0.0008	120	H
Up to 4000V												
DRD870G40	870	3500-4000	15	1800	1.6	0.75	0.44	150	0.032	0.008	12.5	G
DRD1230F40	1225	3500-4000	25	3400	1.6	0.82	0.29	150	0.022	0.004	20	F
DRD2960Y40	2956	3500-4000	62.5	3000	1.15	0.75	0.118	150	0.0095	0.002	43	Y
DRD3390V40	3388	3500-4000	62.5	3000	1.15	0.75	0.118	150	0.0075	0.002	43	V
DRD4350A40	4350	3500-4000	83	3000	1.06	0.78	0.0763	150	0.0065	0.001	83	A
Up to 4500V												
DRA170E44	170	4000-4400	1.5	300	2.1	1.12	3.75	150	0.115	0.02	3.2	E
DRD2000L45	2000	4000-4500	31	3000	1.45	0.84	0.19	150	0.013	0.003	44	L
DRD2590Y45	2590	4000-4500	52.5	3000	1.275	0.77	0.157	150	0.0095	0.002	43	Y
DRD6290H45	6290	3600-4500	99.4	6000	1.19	0.8	0.065	150	0.004	0.0008	120	H
Up to 5500V												
DRD710G50	710	4500-5000	11.5	1800	1.8	0.88	0.687	150	0.032	0.008	12.5	G
DRD1100F48	1105	4500-4800	20.5	3400	1.8	0.84	0.383	150	0.022	0.004	20	F
DRD2690Y50	2691	4500-5000	55	3000	1.21	0.82	0.143	150	0.0095	0.002	43	Y
DRD3770A52	3768	4500-5200	70	3000	1.17	0.82	0.111	150	0.0065	0.001	83	A
DRD5940H55	5940	4600-5500	93.6	6000	1.26	0.8	0.076	150	0.004	0.0008	120	H
Up to 6500V												
DRD630G60	628	5600-6000	10.5	1800	2.1	0.9	0.93	150	0.032	0.008	12.5	G
DRD1010F60	1015	5600-6000	16.5	3400	2.1	1.00	0.42	150	0.022	0.004	20	F
DRD5150H65	5150	5800-6500	82.5	6000	1.65	1.15	0.083	150	0.004	0.0008	120	H
Up to 8500V												
DRD4950H72	4950	6600-7200	79	6000	1.71	1.15	0.094	150	0.004	0.0008	120	H
DRD4690H85	4690	7400-8500	74.5	6000	1.81	1.15	0.11	150	0.004	0.0008	120	H
DRD560G90	557	8000-9000	10	1200	2.08	1.00	1.575	160	0.032	0.008	12.5	G



Gate Turn-off Thyristors

Disc Devices - Asymmetric GTO

Part Number	V_{DRM} (V)	V_{RRM} (V)	$I_{T(AV)}$ at $T_{HS}=80^{\circ}C$ (A)	I_{TCM} (A)	di_T/dt (A/ μ s)	dV_D/dt (V/ μ s)	$R_{th(j-hs)}$ dsc ($^{\circ}C/W$)	Outline Type Code	Snubber Diode	Antiparallel and Freewheel Diode
Up to 1300V										
DGT304SE	1300	16	250	700	500	500	0.075	E	-	DF451
Up to 1800V										
DGT305SE	1800	16	240	700	500	500	0.075	E	-	DF451
Up to 2500V										
DG306AE	2500	16	225	600	300	1000	0.075	E	-	DFS454
DG406BP	2500	16	500	1200	300	1000	0.041	P	DSF8025SE	DSF8025SE
DG646BH	2500	16	867	2500	300	1000	0.018	H	DSF8025SE	DF051
Up to 4500V										
DG408BP	4500	16	320	1000	300	1000	0.041	P	DSF8045SK	DSF8045SK
DG648BH	4500	16	745	2000	300	1000	0.018	H	DSF8045SK	DSF20545SF
DG758BX	4500	16	870	3000	300	1000	0.0146	X	DSF8045SK	DSF21545SV
DG808BC	4500	16	780	3000	400	1000	0.014	C	DSF8045SK	DSF21545SV
DG858BW	4500	16	1180	4000	300	1000	0.011	W	DSF8045SK	DSF21545SV
DG858DW	4500	16	1100	3000	300	750	0.011	W	DSF8045SK	DSF21545SV

Disc Devices - Reverse Blocking GTO

Part Number	V_{DRM} (V)	V_{RRM} (V)	$I_{T(AV)}$ at $T_{HS}=80^{\circ}C$ (A)	I_{TCM} (A)	di_T/dt (A/ μ s)	dV_D/dt (V/ μ s)	$R_{th(j-hs)}$ dsc ($^{\circ}C/W$)	Outline Type Code	Snubber Diode	Antiparallel and Freewheel Diode
Up to 1300V										
DGT304RE	1300	1300	250	700	500	500	0.075	E	-	DF451
Up to 1800V										
DGT305RE	1800	1800	240	700	500	500	0.075	E	-	DF451

Fast Recovery Diodes



Disc Devices

Part Number	V_{RRM} (V)	$I_{F(AV)}$ at $T_C=65^\circ\text{C}$ (A)	I_{FSM} at $V_R=0$ (kA)	I^2t at $T_{vj} V_R=0$ (kA ² s)	V_F (V)	Q_r (μC)	t_{rr} (μs)	$R_{th(j-c)}$ dsc ($^\circ\text{C}/\text{W}$)	Outline Type Code
Up to 1600V									
DF451	1600	295	3.5	61.25	2.65	25	1.22	0.07	T
Up to 2500V									
DSF8025SE	2500	650	7.5	281	2.3	540	5	0.047	E or G
DF051	2500	1490	14	980	1.85	800	5	0.018	F
Up to 4500V									
DSF8045SK	4500	430	3.5	61.25	4	440	3.07	0.047	K or G
DSF20545SF	4500	1250	16	1280	2.1	1250	7	0.022	F
DSF21545SV	4500	3200	20	2000	2	1800	7	0.008	V
Up to 6000V									
DSF11060SG	6000	400	4.2	88	3.8	700	6	0.032	G

Notes:

1. Pins and tags may be present on some diode packages.

Space and Radiation Hard Products

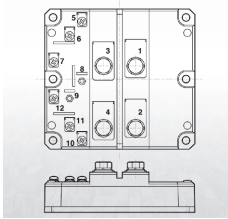
The Dynex facility is unique in the United Kingdom in that it has the capability of complete SOS component manufacturing on one site. This facility is a world leader in the space components market with some 20 years experience in the supply of products into space programmes.

SOS is a mature technology with a long history of successful uses in space programmes. Comprehensive radiation data is available on most Dynex Space products and most are submitted to total dose radiation testing. The quality system meets all the requirements of ESA9000. There is an increasing demand for space systems that can survive radiation effects and ensure continued operation.

Of all the current silicon based semiconductor technologies, only SOS offers the necessary resistance to the hazards of single event upset, transient and total dose radiation.

Total Dose [Rad (Si)]	10^{62}
Single Event Upset [Errors/bitday]	10^{-11}
Neutrons [Neutron/cm ²]	10^{15}
Transient Upset [Rad(Si)/s]	10^{12}
Latch Up	Immune

www.dynexsemi.com/products/sos

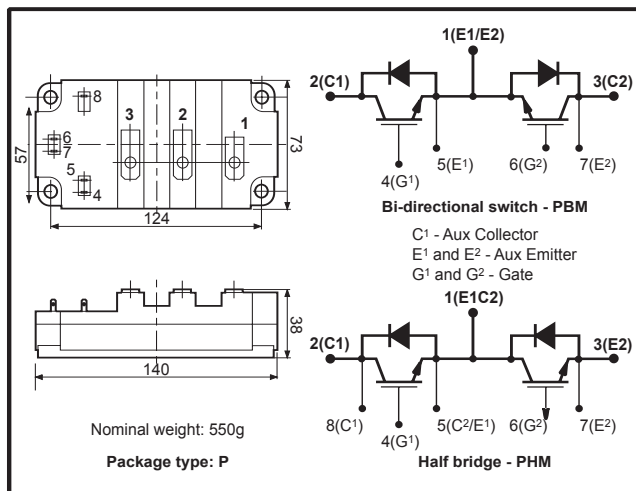
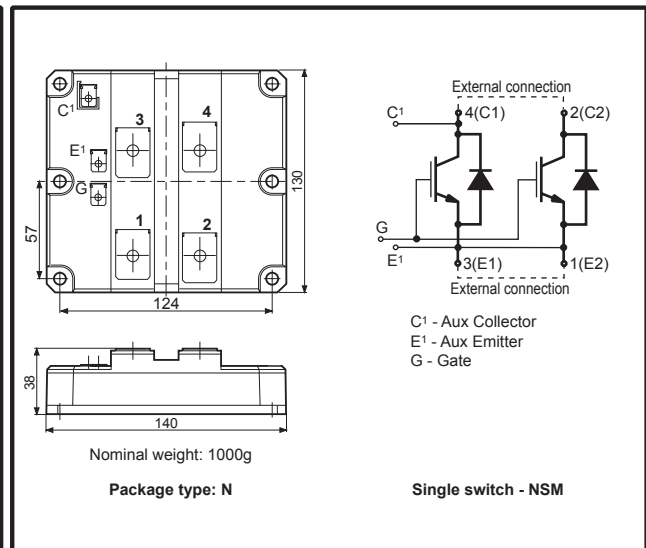
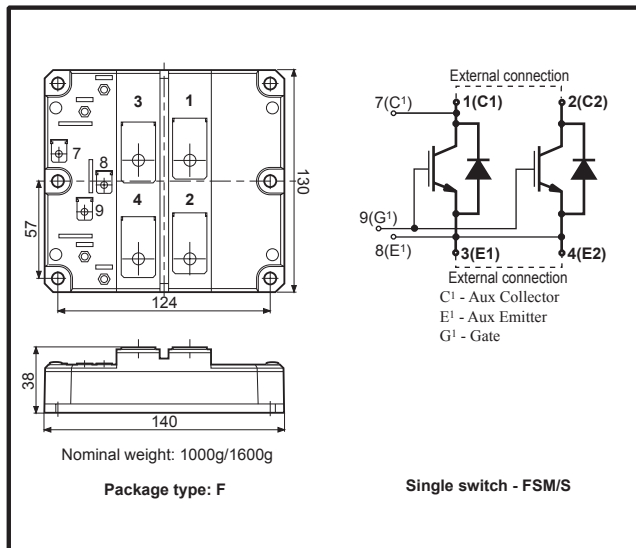
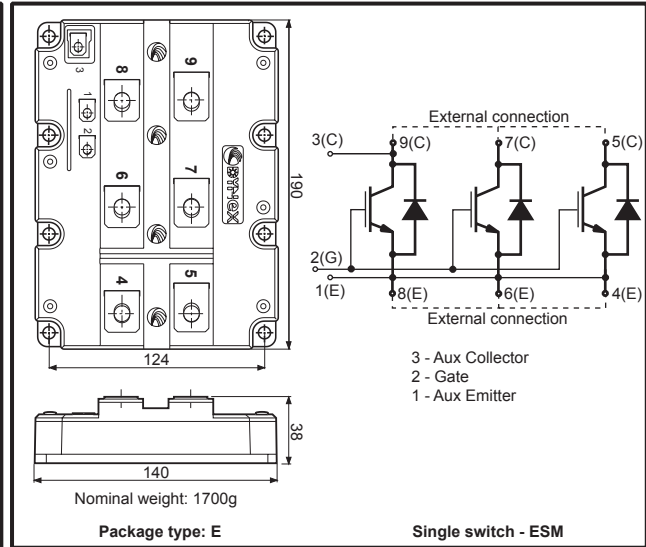
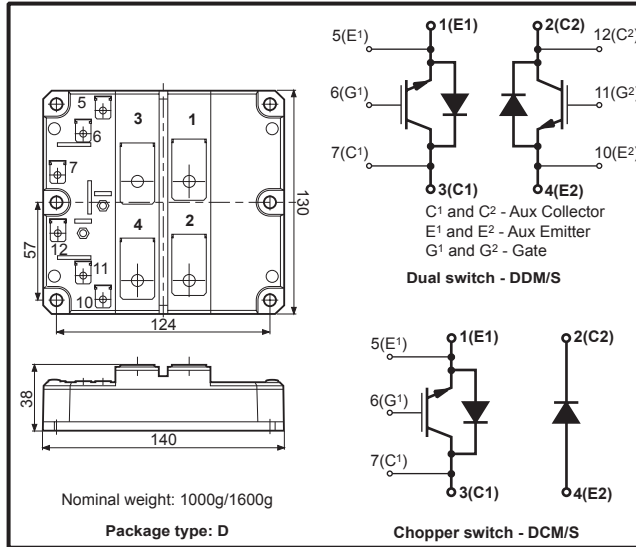


Package Outlines

IGBT Modules

Module Outlines and Circuit Configurations

All dimensions shown in mm unless stated otherwise.

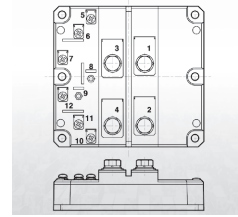


Note:

1. Mounting recommendations are given in the application note AN4505 'Heatsink Issues For IGBT Modules' available from our website.

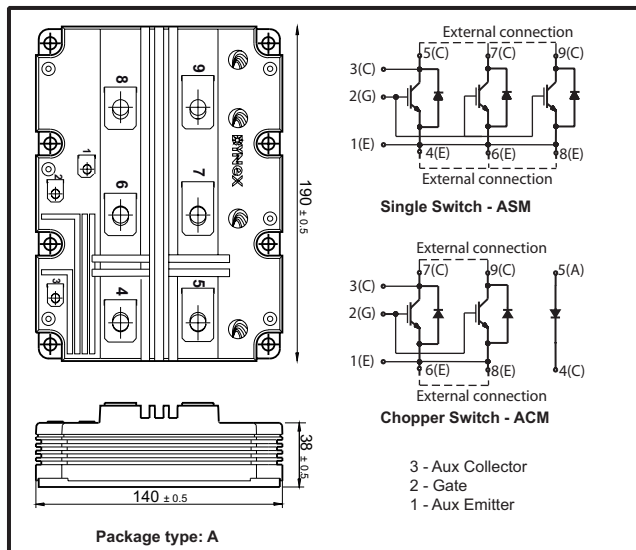
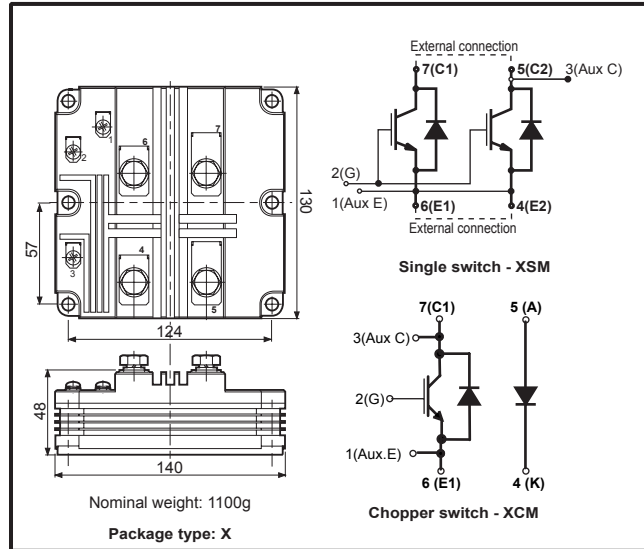
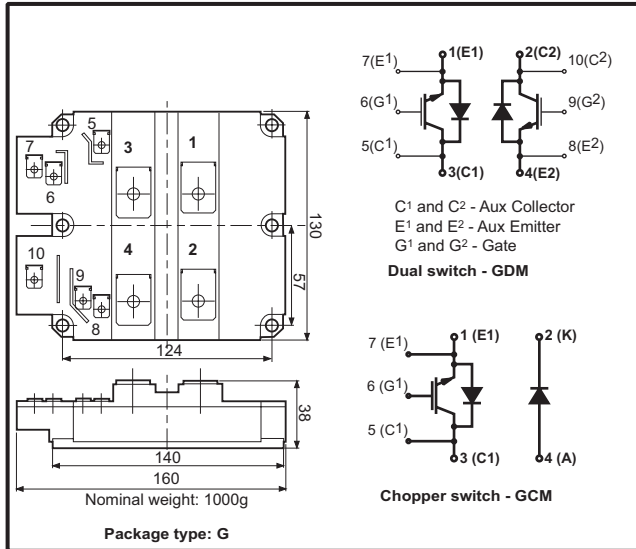
Package Outlines

IGBT Modules



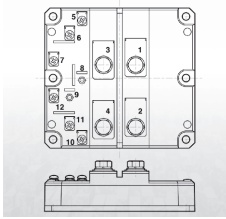
Module Outlines and Circuit Configurations

All dimensions shown in mm unless stated otherwise.



Note:

1. Mounting recommendations are given in the application note AN4505 'Heatsink Issues For IGBT Modules' available from our website.

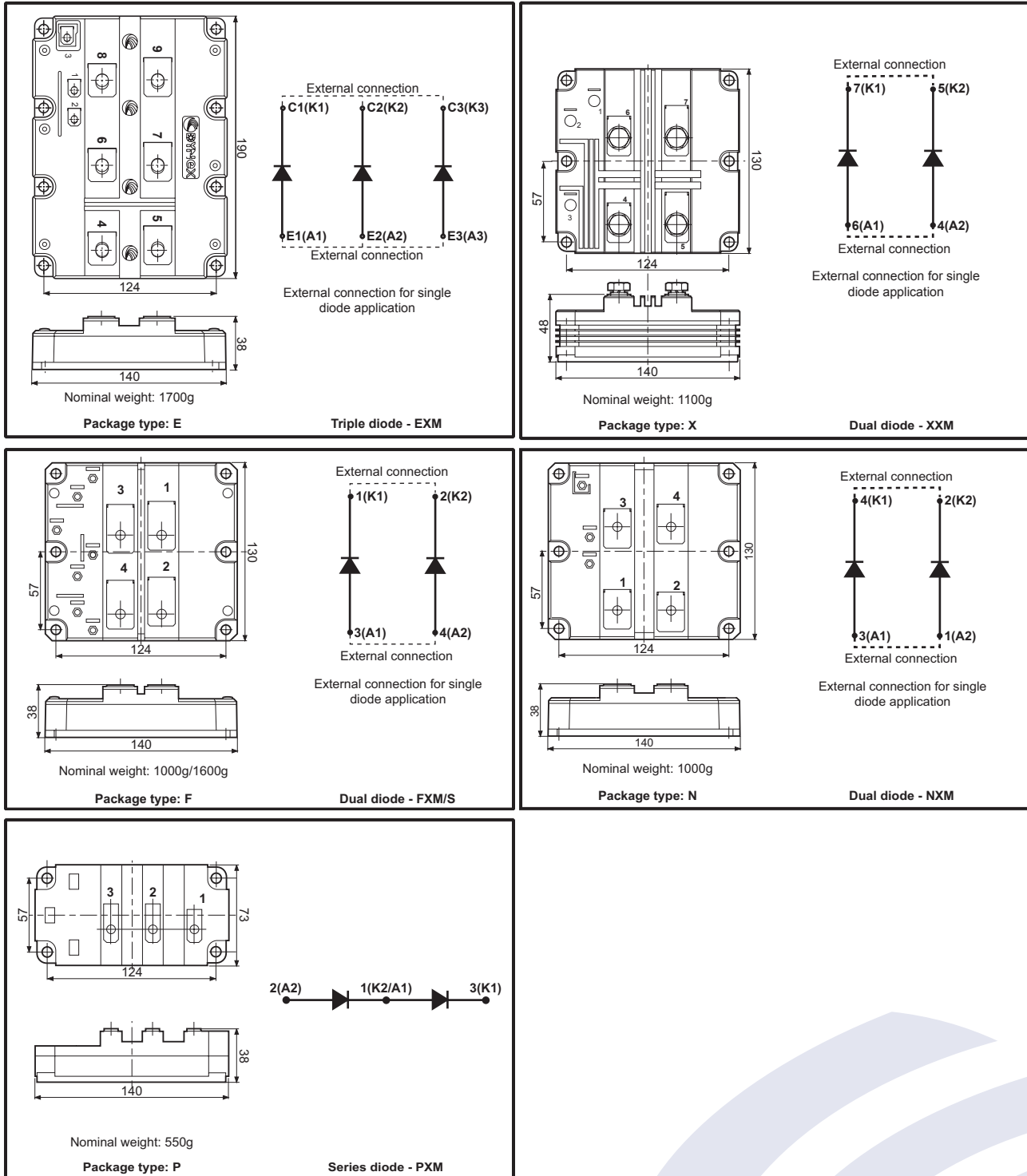


Package Outlines

FRD Modules

Module Outlines and Circuit Configurations

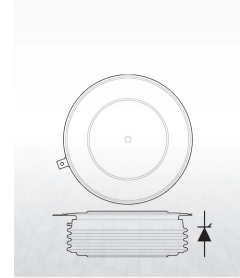
All dimensions shown in mm unless stated otherwise.



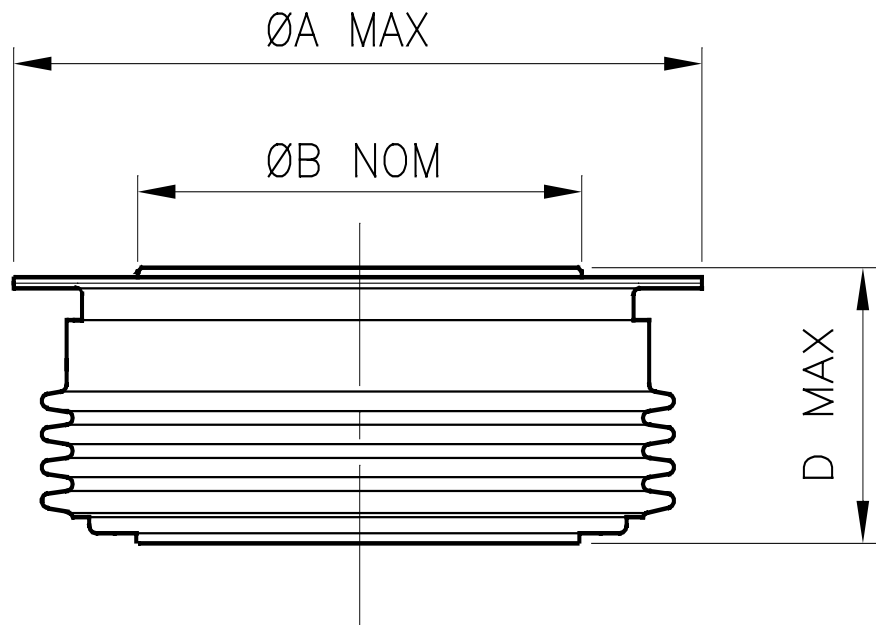
Notes:

1. Mounting recommendations are given in the application note AN4505 'Heatsink Issues For IGBT Modules' available from our website.

Thyristor & Diode Outlines



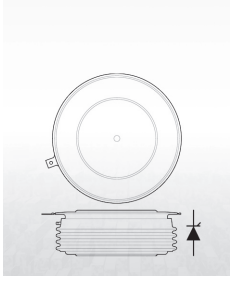
For detailed dimensions, see Datasheet



Outline	Flange (A) [mm] Nominal *	Pole (B) [mm] Nominal *	Depth (D) [mm] Maximum *
A	148 & 150	100	37
B	120	85	36
C	99 & 102	63	28
D	47	29	15
E	42	25	15
F	73 & 75	47	28
G	57 & 58	35	28
H	172	110	36
J	57 & 58	34	36
K	42	25	27
L	99 & 100 & 102	63	36
M	148 & 150	100	27
N	73 & 75	47	36
T	42	19	15
V	110 & 112	73	29
W	120	84	29
X	85	53	27
Y	112 & 120	73 & 78	36

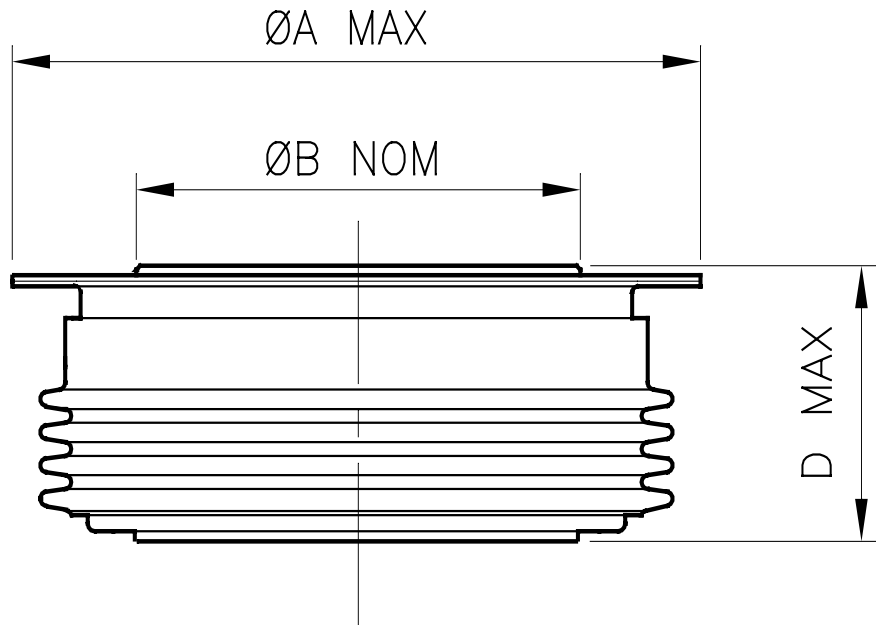
Notes:

"&" denotes we manufacture products in a generic outline, some of which have one flange/contact diameter and others that have a different flange/contact diameter. There is no choice of flange/contact diameter for a specific device.



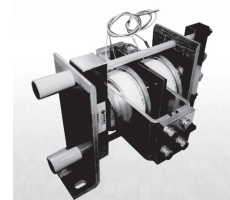
GTO & Pulsed Power Thyristor Outlines

For detailed dimensions, see Datasheet



Outline	Flange/Max OD (A) [mm]	Pole (B) [mm]	Depth (D) [mm]
C	108	77	27
E	42	25	15
G	59	35	27
H	100	63	27
P	56	38	27
W	120	85	27
X	85	53	27

Power Assemblies



In addition to the discrete product line, Dynex offers a design, build and refurbishment service for power assemblies through our Power Electronic Assemblies group. This group provides support for customers requiring more than the basic semiconductor and utilises the skills of our power electronics, mechanical and electronic engineers.

The team has direct access to the company's application, test and product design personnel to produce the optimum solution for your requirements.

Typical applications for Dynex power assemblies include:

- High power rectification
- Pulse power
- Inverters
- Soft starts
- Battery chargers
- Magnet supplies
- Resistance welding switches
- Variable speed drives
- GTO gate drive units
- Static compensation



Pulsed power low inductance co-axial assembly for single shot duty

Dynex also has a range of air and liquid cooled heatsink and clamping systems.

Assemblies

Dynex power electronics and mechanical engineers are experts in designing high quality and high reliability power assemblies for applications where optimised performance is required in the harshest of environments.

Many factors need to be taken into consideration to maximise semiconductor performance in an assembly. Typically these are; type of heatsink, transient conditions, overloads, ambient temperature, surface finish (e.g. black anodised) and the method of cooling on which the application relies (air, liquid or phase change).

With a wealth of experience behind them and using CAD software and the vast range of bipolar and IGBT power semiconductor devices and components available, the design team are able to

provide customers with a solution which best suits their needs.

Typical Dynex assembly designs include:

Rectifiers

Standard diode and thyristor rectifier combinations.

- 3-phase and dual 3-phase diode rectifier assemblies.
- 3-phase (6 pulse) and dual 3-phase (12 pulse) controlled assemblies.

Inverters/Converters

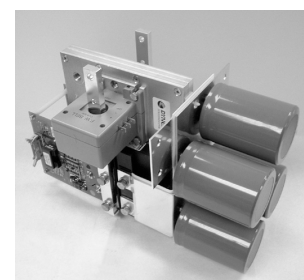
- 3-phase thyristor inverter power units.
- IGBT chopper H-bridge inverter modules.
- IGBT full 3-phase inverters for motor control.
- Frequency converters.

Pulsed Power

- Single pulse systems (e.g. 150kA, 20kV, 1 pulse per 5 seconds).
- Multiple pulse systems, (e.g. 15Hz).
- Waveform shaping.

Stack Assemblies

- Stick stacks for high voltage, high current applications.
- MV soft starts.
- Crowbars.
- Thyristor/GTO assemblies with anti-parallel diode combinations.



Water cooled IGBT H bridge inverter assembly

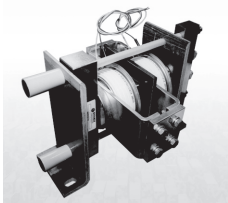
Special System Support

Our experienced engineers and assemblers have worked closely with customers throughout the world to design and/or manufacture assemblies to their requirements. Typically this work has included marine and rail propulsion and power utility applications such as STATCOM link assemblies, SVC and HVDC systems.

Dynex also undertake refurbishment of assemblies. This process involves the stripping down of an existing assembly into its component parts and cleaning, replacing, rebuilding and testing the assembly. This refurbishment service has proved especially beneficial to railway traction operating companies who do not have the facilities or the skilled engineering staff to undertake this type of work.

Use the online technical enquiry form or call Dynex to discuss your power assembly requirements.

Online technical enquiry form: http://www.dynexsemi.com/products/power_assembly/technical_enquiry/



Power Assemblies

A.C. Switches

Dynex offer a comprehensive range of standard water and air cooled A.C. switch assemblies, including isolated heatsink types and modules with an integral water cooled base plate.

High voltage A.C. switches are available up to 15kV for HV soft starts and SVC systems.

Water cooled A.C. switches (discrete device type): 300A to 3200A rms welding rating. (Water 40°C, 4.5 ltrs./min., 5% duty cycle, 20 cycles.)

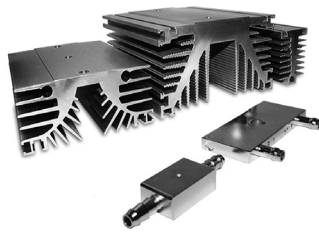
Natural air cooled A.C. switches: 400A to 3270A rms. ($T_{amb.}$ 45°C, 5% duty cycle, 10 cycles.)

Ignitron replacement solid state assemblies are also available and can easily be fitted as a direct substitute for a pair of ignitrons.

Device Clamps

A line of pre-loaded clamps is offered, from cube clamps for single side cooling up to 30mm discs and bar clamps up to 83kN for our 100mm disc devices. Bar clamps are suitable for single and double side cooling, with high insulation versions available for high voltage assemblies.

Clamps can also be supplied separately as a kit of parts.

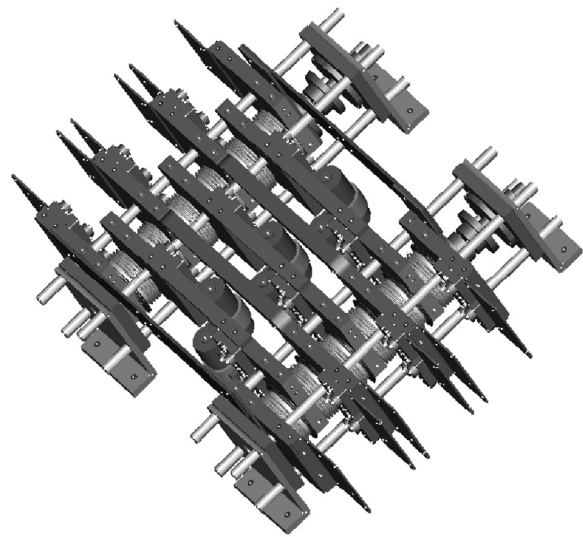


Air cooled and water cooled (cooler) heatsinks

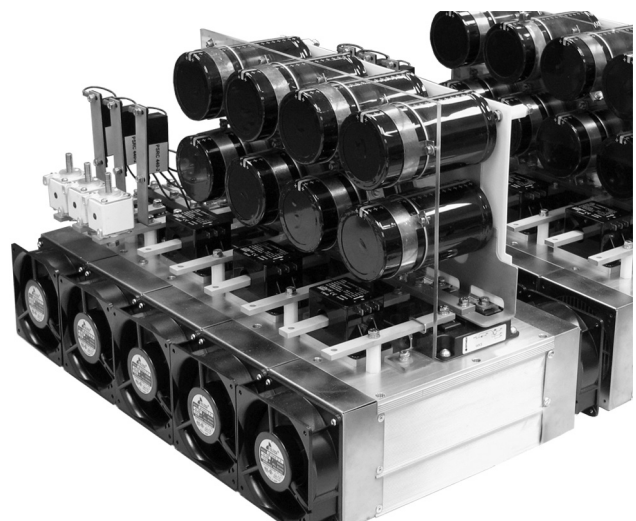
Heatsinks

Dynex has its own proprietary range of extruded aluminium heatsinks designed to optimise the performance of our semiconductors. Additionally, Dynex has access to a vast range of aluminium extrusions from independent manufacturers giving our design team the best options available.

Water cooled heatsinks (coolers) are available and are compatible with devices up to 100mm silicon diameter. These are designed for use in high current, high power assemblies such as single, three or six phase bridges or A.C. controllers. Complete bridges of up to six devices may be constructed and two coolers per device may be used for double side cooling.



High voltage AC switch for SVC applications



Power block for 150kW Switched Reluctance (SR) motor

Online technical enquiry form: http://www.dynexsemi.com/products/power_assembly/technical_enquiry/

Datasheets available on www.dynexsemi.com

Symbols and Definitions



C_S	Snubber capacitance.	P_G	Gate power dissipation.
di/dt	Critical rate of rise of on-state/forward current.	$P_{G(AV)}$	Mean gate power dissipation.
di_{FG}/dt	Rate of rise of positive gate current.	P_{GM}	Peak gate power dissipation.
di_{GQ}/dt	Rate of rise of reverse gate current (GTO).	Q_r	Recovered charge.
di_T/dt	Critical rate of rise of on-state current (GTO).	Q_{rr}	Reverse recovery charge.
dsc	Double side cooled.	r_T	On-state/forward slope resistance.
dV/dt	Critical rate of rise of off-state voltage.	$R_{th(c-hs)}$	Thermal resistance – case to heatsink.
dV_D/dt	Rate of rise of off-state voltage (GTO).	$R_{th(j-c)}$	Thermal resistance – junction to case.
E_{OFF}	Turn-off energy loss.	$R_{th(j-hs)}$	Thermal resistance – junction to heatsink.
E_{rec}	Reverse recovery energy.	$R_{th(j-w)}$	Thermal resistance – junction to water.
$E_{sw(TOT)}$	Total switching energy.	T_c	Case temperature.
F_m/F	Clamping force/mounting torque.	t_{gc}	Gate controlled turn-off time.
I^2t	I^2t value.	t_q	Turn-off time.
I_C	Collector current.	t_{rr}	Reverse recovery time.
$I_{C(PK)}$	Peak collector current.	T_{HS}	Heatsink temperature.
I_{DRM}	On-state leakage current (thyristor).	T_{vj}	Virtual junction temperature.
I_F	Forward current (diode).	T_{vjm}	Maximum virtual junction temperature.
$I_{F(AV)}$	Mean forward current (diode).	T_{water}	Water temperature.
I_{FM}	Peak forward current (diode).	$V_{CE(sat)}$	Collector-emitter saturation voltage (IGBT).
$I_{F(RMS)}$	RMS forward current (diode).	V_{CES}	Collector-emitter voltage (IGBT).
I_{FSM}	Single cycle surge current (diode), (10ms half sinewave).	V_{DRM}	Repetitive peak off-state voltage.
$I_{G(ON)}$	Gate turn-on current (GTO).	V_{DSM}	Non-repetitive peak off-state voltage.
I_{GT}	Gate trigger current.	V_F	Forward voltage (diode).
I_{RMS}	RMS line current.	V_{FM}	Peak forward voltage (diode).
I_{PK}	Peak current.	V_{isol}	Isolation voltage.
I_{RRM}	Peak reverse recovery current.	V_{GT}	Gate trigger voltage.
$I_{T(RMS)}$	RMS on-state current (thyristor).	V_R	Reverse voltage.
I_T/I_{TM}	On-state current.	V_{RRM}	Repetitive peak reverse voltage.
$I_{T(AV)}$	Mean on-state current (thyristor).	V_{RSM}	Non-repetitive peak reverse voltage.
I_{TCM}	Maximum repetitive controllable current (GTO).	V_T	On-state voltage.
I_{TSM}	Single cycle surge current (thyristor), (10ms half sinewave).	V_{TM}	Peak on-state voltage.
		V_{TO}	Threshold voltage (diode).
		$V_{T(TO)}$	Threshold voltage (thyristor).

Notes

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