Littelfuse
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Product **Brief**

Gate Turn-Off Thyristors

IXYS UK offers a broad range of high specification devices with voltage ratings to 6.kV (3.6kV DC link) and controllable current ratings of up to 4kA are available to meet the toughest demands in applications such as traction propulsion and auxiliaries, AC industrial drives, FACT's and active VAr con-trollers. Offering both symmetrical devices for applications with a reverse blocking requirement e.g. current sourced inverters and asymmetric block-ing devices for applications where no reverse blocking requirement exists e.g. voltage sourced inverters.

A new addition to the range is the 4500V, 4000A, G4000EF450 Asymmetric GTO thyristor, available in a hermetically sealed capsule with an 85mm electrode diameter. New G3000HF600 in development.

Gate Turn-off Thyristors are still the component of choice when it comes to very high power converters and we remain totally committed to this tech-nology for the foreseeable future.

Features & Benifits

- Advanced technologies and lifetime control
- Controllable current ratings up to 4000A
- Fully hermetic pressure contact construction
- Available in 8 package sizes to industry stand-ards

IXYS UK can also offer a range of complimentary products to its GTO thyristor range including

- Anti-parallel Diodes
- Snubber Diodes
- Snubber Capacitors
- Clamps

Applications

- Transportation propulsion
- Transportation auxiliaries
- Industrial drives
- Medium voltage AC drives
- Energy and renewables
- High power converters

Asymmetric GTO's

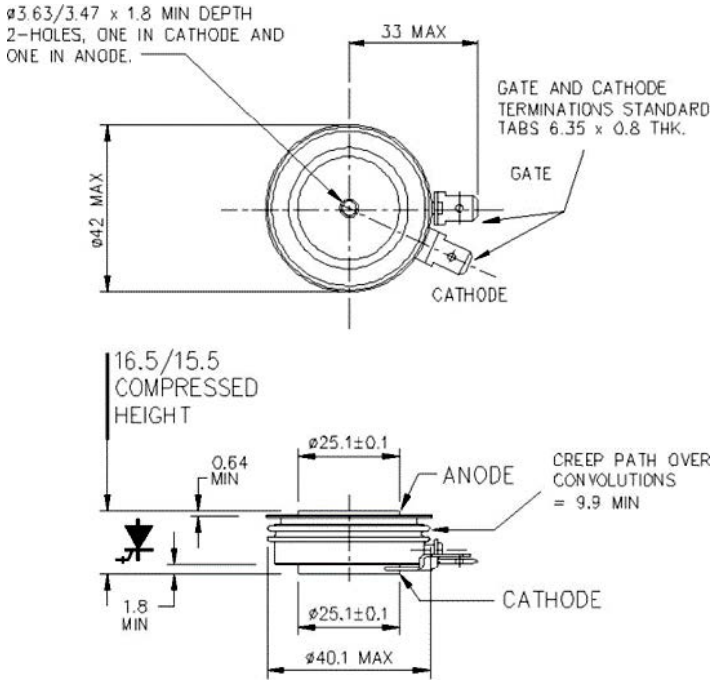
Part No.	V_{DRM}	V_{RRM}	I_{TGQM} @ C_S		ITAV	I_{TSM}	I^2t	Typ. Switching		V_T	T_{JM}	R_{thJK}	Fig. No.
	V_{GK}=-2V				TK=55°C	10ms 1/2 sine		Times		I_T=I_{TGQM}		180°	
	V	V	A	µF	A	V_R = ≤ 10V		tgt	tgq	V	oC	Sine	
						kA	kA^2s	µs	µs			K/W	
G1000NC45B	4500	18	1000	2	545	8	320 x 10^3	4.5	14	4	125	0.027	W36
G1000QC25B	2500	18	1000	1	615	8	320 x 10^3	2.8	13	2.5	125	0.038	W35
G1000QC45B	4500	18	1000	1	443	6.5	211 x 10^3	3.0	13	4	125	0.038	W35
G2000HF250	2500	18	2000	4	1030	16	1.28×10^6	3.0	25	2.8	125	0.022	W85
G2000HF450	4500	18	2000	4	890	13.7	938×10^3	4.0	25	3.5	125	0.022	W85
G2500HF250	2500	18	2500	6	1085	16	1.28×10^6	3.0	25	3.1	125	0.02	W85
G3000TF250	2500	18	3000	5	1690	30	4.5×10^6	3.5	26	2.5	125	0.012	W86
G3000TF450	4500	18	3000	6	1381	24	2.88×10^6	4.0	22	4	125	0.012	W86
G4000EF250	2500	18	4000	6.0	2005	32.00	5.12×10^6	4.5	28	3.0	125	0.0110	W104
G4000EF450	4500	18	4000	6	1480	26	3.38×10^6	4.0	30	4.4	125	0.011	W104

Symmetric GTO's

Part No.	V_{DRM}	V_{RRM}	I_{TGQM} @ C_S		I_{TAV}	I_{TSM}	I^2t	Typ. Switching		V_T	T_{JM}	R_{thJK}	Fig. No.
	V_{GK}=-2V				T_K=55°C	10ms 1/2 sine		Times		I_T=I_{TGQM}		180°	
	V	V	A	µF	A	V_R = ≤ 10V		t_{gt}	t_{gq}	V	oC	Sine	
						kA	kA^2s	µs	µs			K/W	
H0500KC200	2000	2000	500	1	280	3	45 x 103	2	5	3.2	125	0.065	W34
H0500KC20Y	2000	100	500	1	280	3	45 x 103	2	5	3.2	125	0.065	W34
H0500KC25D	2500	2000	500	1	280	3	45 x 103	2	5	3.2	125	0.065	W34
H0500KC25Y	2500	100	500	1	280	3	45 x 103	2	5	3.2	125	0.065	W34
H0700KC140	1400	1400	700	1.5	360	4	80 x 103	3	5	2.75	125	0.063	W34
H0700KC14Y	1400	100	700	1.5	360	4	80 x 103	3	5	2.75	125	0.063	W34
H0700KC17D	1700	1400	700	1.5	360	4	80 x 103	3	5	2.75	125	0.063	W34
H0700KC17Y	1700	100	700	1.5	360	4	80 x 103	3	5	2.75	125	0.063	W34
H1200NC200	2000	2000	1200	3	670	10.5	550 x 103	3	12	3.3	125	0.027	W36
H1200NC20Y	2000	100	1200	3	670	10.5	550 x 103	3	12	3.3	125	0.027	W36
H1200NC25D	2500	2000	1200	3	670	10.5	550 x 103	3	12	3.3	125	0.027	W36
H1200NC25Y	2500	100	1200	3	670	10.5	550 x 103	3	12	3.3	125	0.027	W36

Fast Switching GTO's

Part No.	V_{DRM} V_{GK}=-2V	V_{RRM}	I_{TGQM} @ C_S		I_{TAV} T_K=55°C	I_{TSM} 10ms 1/2 sine	I^2t	Typ. Switching Times		V_T I_T=I_{TGQM}	T_{JM}	R_{thJK} 180° Sine	Fig. No.
	V	V	A	µF	A	V_R = ≤ 10V		t_{gt}	t_{gq}	V	oC	K/W	
						kA	kA^2s	µs	µs				
S0300SR12Y	1200	100	480	1	215	3.5	61.2×10^3	3.5	9	2.4	125	0.13	W87
S0500YC20Y	2000	100	500	1	275	4	80×10^3	3.5	10	2.5	125	0.087	W93
S0500YC25Y	2500	100	500	1	275	4	80×10^3	3.5	10	2.5	125	0.087	W93
S0500KC200	2000	2000	500	1	330	4	80×10^3	3.5	10	2.5	125	0.065	W34
S0500KC20Y	2000	100	500	1	330	4	80×10^3	3.5	10	2.5	125	0.065	W34
S0500KC25D	2500	2000	500	1	330	4	80×10^3	3.5	10	2.5	125	0.065	W34
S0500KC25Y	2500	100	500	1	330	4	80×10^3	3.5	10	2.5	125	0.065	W34
S0700KC140	1400	1400	700	1.5	430	5	125×10^3	3	10	2.2	125	0.063	W34
S0700KC14Y	1400	100	700	1.5	430	5	125×10^3	3	10	2.2	125	0.063	W34
S0700KC17D	1700	1400	700	1.5	430	5	125×10^3	3	10	2.2	125	0.063	W34
S0700KC17Y	1700	100	700	1.5	430	5	125×10^3	3	10	2.2	125	0.063	W34
S1200NC200	2000	2000	1200	3	790	13	840×10^3	4.5	19	2.7	125	0.027	W36
S1200NC20Y	2000	100	1200	3	790	13	840×10^3	4.5	19	2.7	125	0.027	W36
S1200NC25D	2500	2000	1200	3	790	13	840×10^3	4.5	19	2.7	125	0.027	W36
S1200NC25Y	2500	100	1200	3	790	13	840×10^3	4.5	19	2.7	125	0.027	W36



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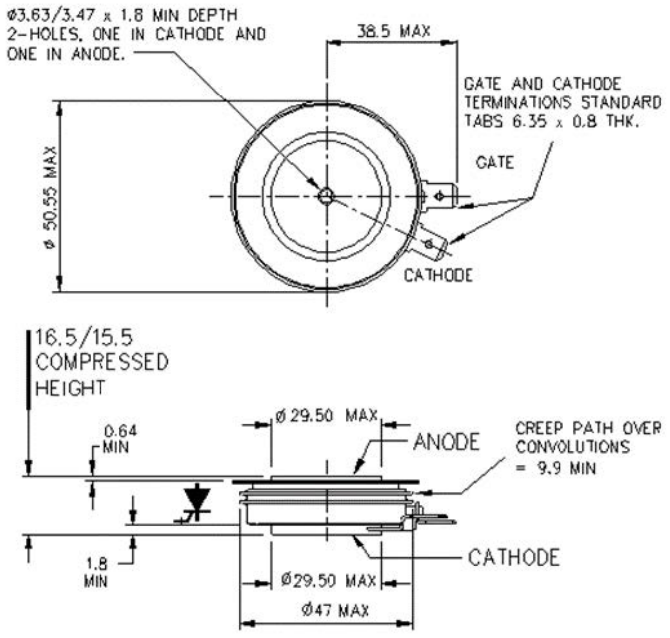

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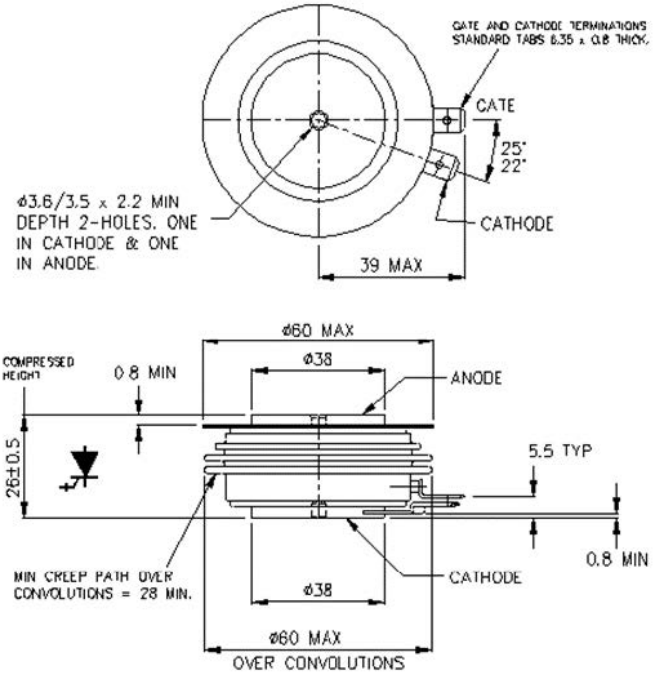

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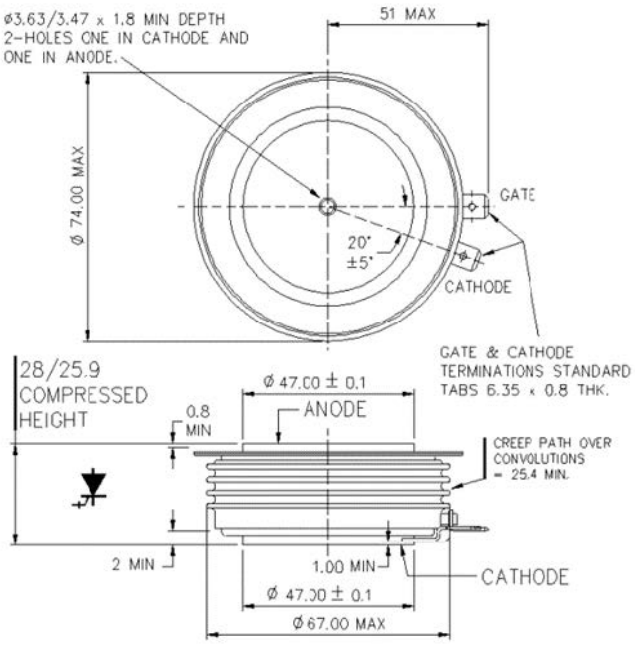

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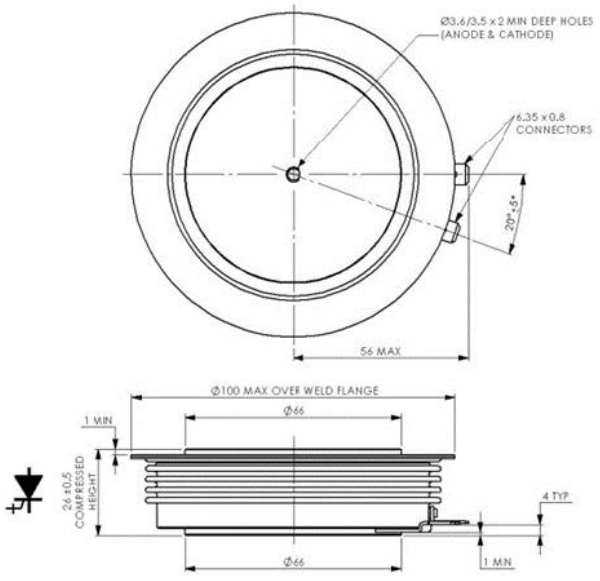

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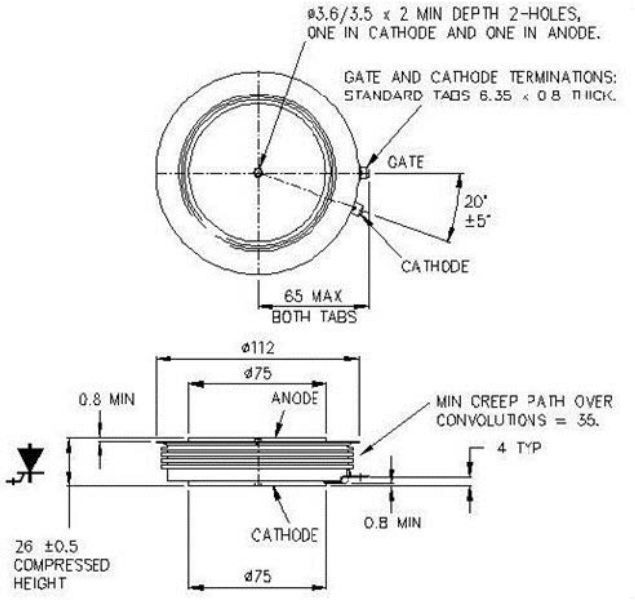

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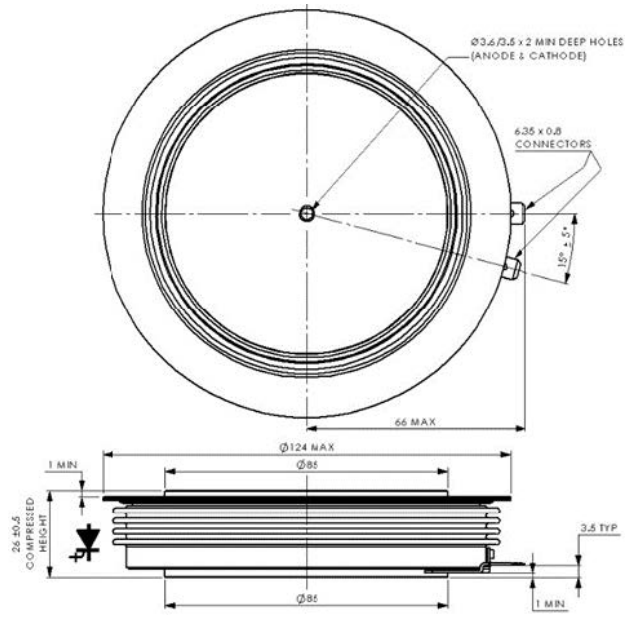

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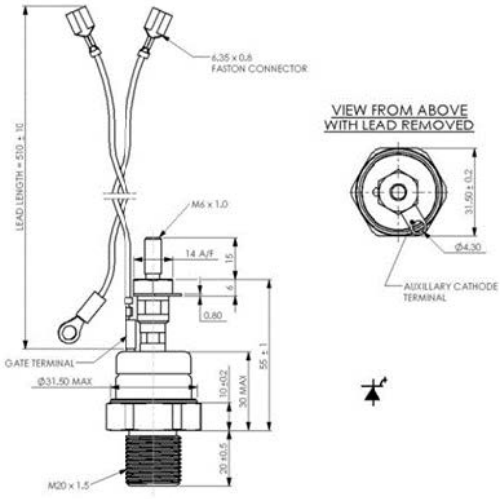


W87 - 101A376

Cross reference of diodes# and capacitors suitable for most GTO applications.

GTO Thyristor	Anti-parallel Diode	Snubber Diode	Snubber Capacitor
G1000NC45B	M0588LC450	M0371YH450	E53.R11-202T2W
G1000QC25B	M0955LC250	M0347WC250	E53.H59-102T1W
G1000QC45B	M0955LC250	M0371YH450	E53.H59-102T1W
G2000HF250	M1494NC250	M0955LC250	E53.R11-402T2W
G2000HF450	M1163NC450	M0659LC450	E53.R11-402T2W
G2500HF250	M1494NC250	M0955LC250	E53.Q59-602T2W
G3000TF250	M1565VF450	M0955LC250	E53.Q59-502T2W
G3000TF450	M1565VF450	M1104NC500	E53.Q59-602T2W
G4000EF450	M1565VF450	M1104NC500	E53.Q59-602T2W
H0500KC200	M0347WC200	M0130RM200	E53.H59-102T1W
H0500KC20Y	M0347WC200	M0130RM200	E53.H59-102T1W
H0500KC25D	M0347WC250	M0130RM250	E53.H59-102T1W
H0500KC25Y	M0347WC250	M0130RM250	E53.H59-102T1W
H0700KC140	M0367WC220	M0139RM180	E53.H59-152T1W
H0700KC14Y	M0367WC220	M0139RM180	E53.H59-152T1W
H0700KC17D	M0367WC220	M0139RM180	E53.H59-152T1W
H0700KC17Y	M0367WC220	M0139RM180	E53.H59-152T1W
H1200NC200	M0955LC200	M0367WC220	E53.R11-302T2W
H1200NC20Y	M0955LC200	M0367WC220	E53.R11-302T2W
H1200NC25D	M0955LC250	M0367WC280	E53.R11-302T2W
H1200NC25Y	M0955LC250	M0367WC280	E53.R11-302T2W
S0300SR12Y	M0367WC220	M0367WC220	E53.H59-102T1W
S0500YC20Y	M0347WC200	M0347WC200	E53.H59-102T1W
S0500YC25Y	M0347WC200	M0347WC200	E53.H59-102T1W
S0500KC200	M0347WC200	M0130RM200	E53.H59-102T1W
S0500KC20Y	M0347WC200	M0130RM200	E53.H59-102T1W
S0500KC25D	M0347WC250	M0130RM250	E53.H59-102T1W
S0500KC25Y	M0347WC250	M0130RM250	E53.H59-102T1W
S0700KC140	M0367WC220	M0139RM180	E53.H59-152T1W
S0700KC14Y	M0367WC220	M0139RM180	E53.H59-152T1W
S0700KC17D	M0367WC220	M0139RM180	E53.H59-152T1W
S0700KC17Y	M0367WC220	M0139RM180	E53.H59-152T1W
S1200NC200	M0955LC200	M0367WC220	E53.R11-302T2W
S1200NC20Y	M0955LC200	M0367WC220	E53.R11-302T2W
S1200NC25D	M0955LC250	M0367WC250	E53.R11-302T2W
S1200NC25Y	M0955LC250	M0367WC250	E53.R11-302T2W

- Diode selection is influenced by the application. Consult factory for specific require-ments.

Anti-parallel and Snubber Diodes

Fast Recovery Diodes are an essential complement to any switching device and are more often than not the limiting factor in the design and performance of modern power converters. To address the needs of our customers, we have developed an unparalleled range of Fast Recovery Diodes. These diodes are available with blocking voltages up to 4.5kV and average current ratings to 2.4kA. The devices utilise compression bonding and fully hermetic packaging to deliver robust devices that you can rely on in de-manding applications.

IXYS UK's range of fast recovery diodes include characteristics tailored to meet the requirements of snubber applications.

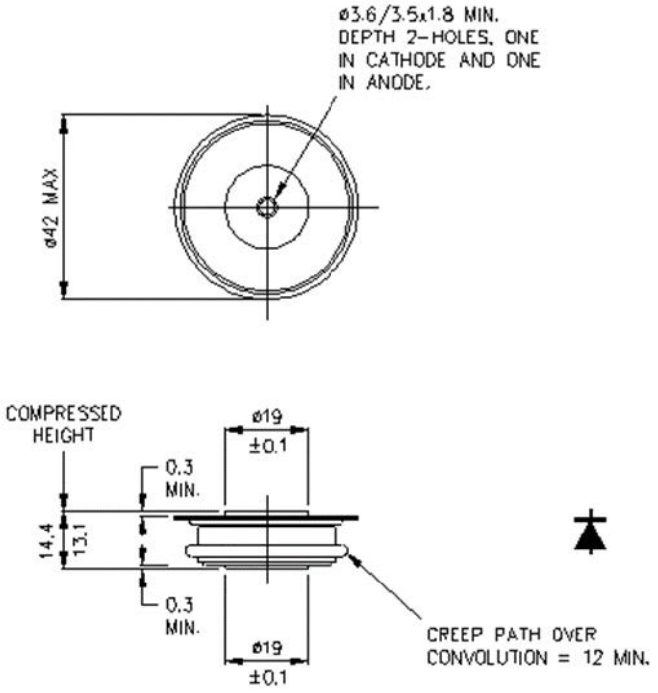
IXYS UK can also provide capacitors to suit our range of GTO thyristors.

Snubber circuits are essential for reducing or eliminating voltage transients in inductive circuits where the sudden interruption of current flow can lead to a sharp rise in voltage across the device creating the interruption. The sharp rise in voltage is a transient, and can damage and lead to failure of the control-ling device. The snubber attempts to prevent this undesired voltage by conducting transient current around the device. Snubber circuits usually consist of a network resistor, capacitor and diode, specially selected to cope with the demands of the circuit.

Features & Benifits

- Stud and capsule housing options available to suit your application
- Capsule package sizes from 25mm to 73mm poleface
- VRRM from 200V to 4500V available
- Current rating up to 2413A IFAV
- Minimum recovery times down to 1µs (50% chord)

Part No.	VRRM	IFAV	IFSM	I²t	Typ. Reverse Recovery Parameters				VT0	r_T	TJM	RthJK	Fig. No.
		T_K=55°C	10ms 1/2 sine		TJM				@T_{JM}			d.c.	
			V_R - ≤ 60% V_{RRM}		trr	Qrr	@I_{FM}	@-di_F/dt				180o sine	
	V	A	A	A^2s	µs	µC	A	A/µs	V	mΩ	°C	K/W	
M0130RM200	2000	130	2240	25.0 x 10^3	2.6	430	1000	150	1.29	1.54	125	0.3	W21
M0130RM250	2500	130	2240	25.0 x 10^3	2.6	430	1000	150	1.29	1.54	125	0.3	W21
M0139RM120	1200	139	2450	30.0 x 10^3	1	125	1000	100	1.24	1.28	125	0.3	W21
M0139RM180	1800	139	2450	30.0 x 10^3	1	125	1000	100	1.24	1.28	125	0.3	W21
M0347WC200	2000	347	4250	90.3 x 10^3	2.8	210	550	40	1.21	1.2	125	0.09	W1
M0347WC250	2500	347	4250	90.3 x 10^3	2.8	210	550	40	1.21	1.2	125	0.09	W1
M0367WC220	2200	367	4500	101 x 10^3	3.3	300	550	40	1.28	0.92	125	0.09	W1
M0371YH350	3500	371	4900	120 x 10^3	3.2	1260	1000	200	1.05	1.65	150	0.1	W3
M0371YH450	4500	371	4900	120 x 10^3	3.2	1260	1000	200	1.05	1.65	150	0.1	W3
M0588LC450	4500	588	3955	78.2 x 10^3	3.5	450	1000	60	2.32	1.77	150	0.033	W4
M0659LC450	4500	659	7620	290 x 10^3	4.2	800	1000	60	1.71	0.925	125	0.033	W4
M0863LC300	3000	863	10000	500 x 10^3	4.8	950	1000	60	1.308	0.538	125	0.033	W4
M0863LC360	3600	863	10000	500 x 10^3	4.8	950	1000	60	1.308	0.538	125	0.033	W4
M0955LC200	2000	955	11700	684 x 10^3	3.4	500	1000	60	1.44	0.33	125	0.033	W4
M0955LC250	2500	955	11700	684 x 10^3	3.4	500	1000	60	1.44	0.33	125	0.033	W4
M1104NC450	4500	1104	13000	845 x 10^3	6	2100	1000	60	1.37	0.553	125	0.022	W5
M1163NC450	4500	1163	10800	583 x 10^3	6.4	1200	1000	60	1.5	0.77	150	0.022	W5
M1494NC250	2500	1494	19600	1.92 x 10^6	3.9	815	1000	60	1.15	0.265	125	0.022	W5
M1565VF450	4500	1565	19700	1.94 x 10^6	5	2800	1000	200	1.09	0.36	125	0.018	W43
M2413VF250	2500	2413	32000	5.12 x 10^6	5	2500	1000	200	1.09	0.121	125	0.016	W43



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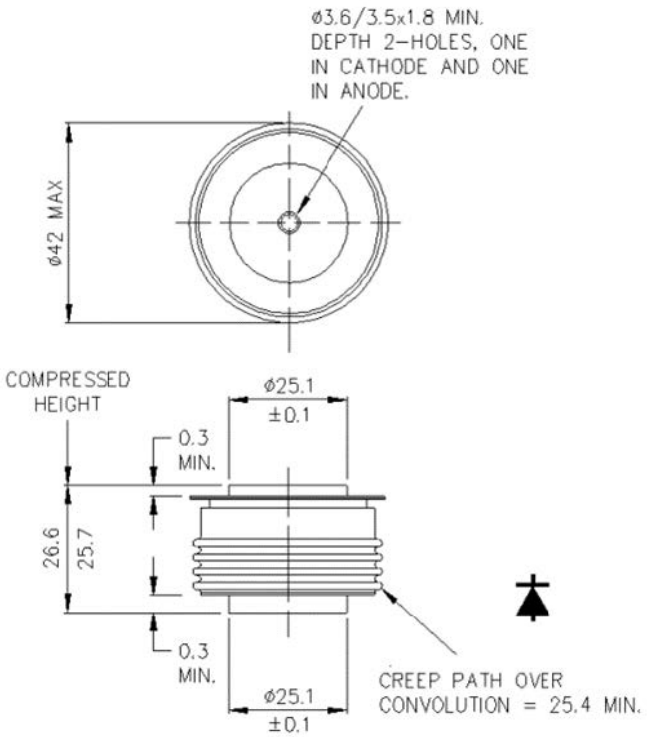

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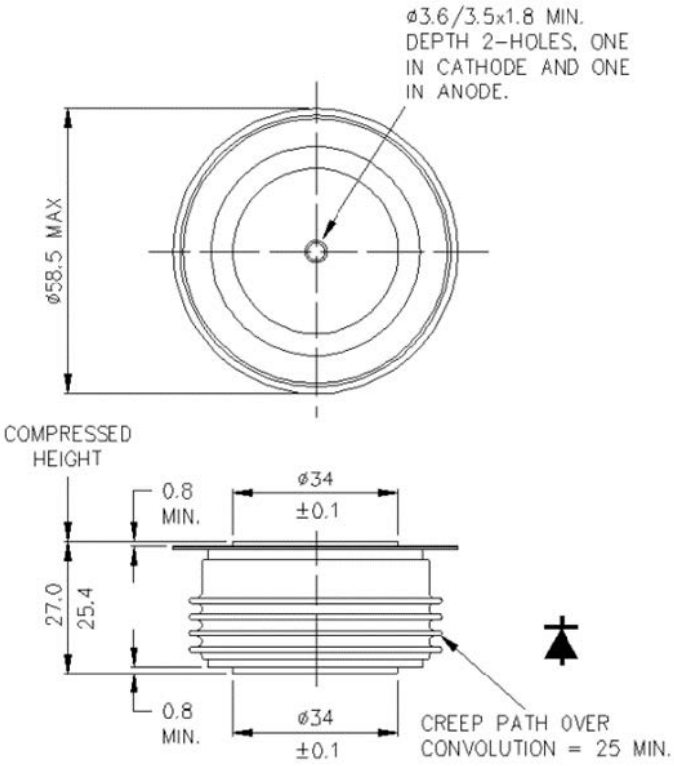

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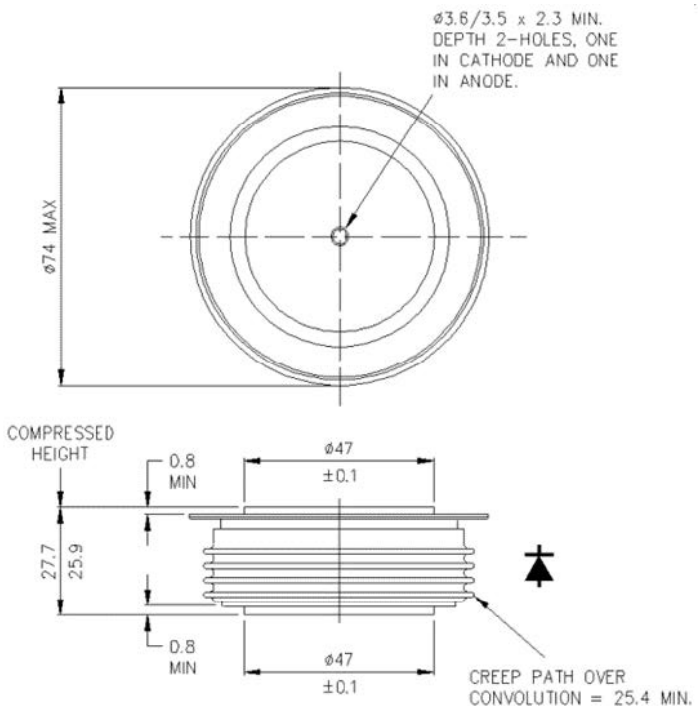

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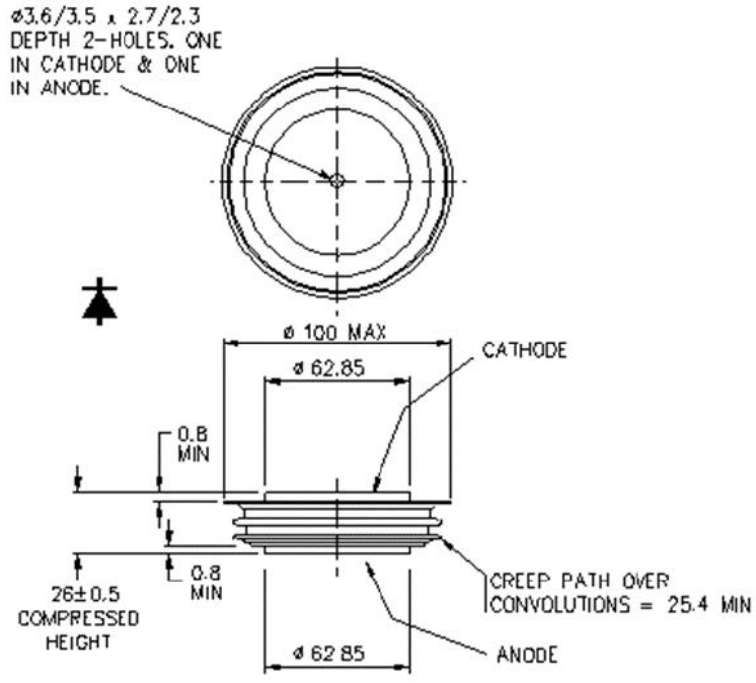

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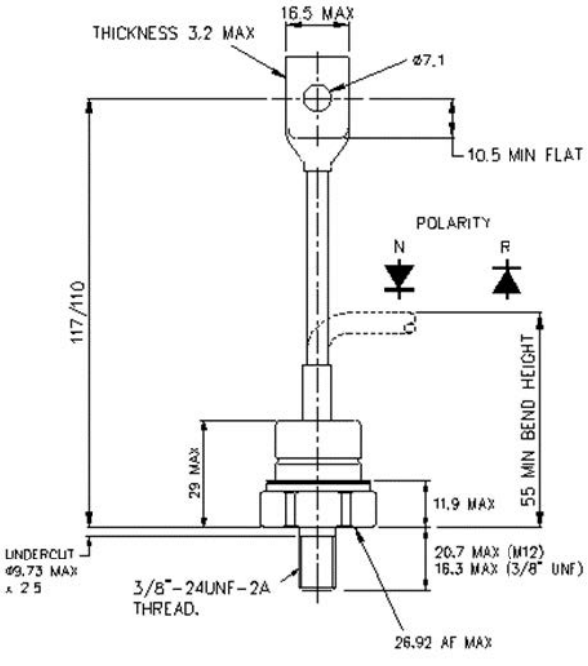


W21 - 100A294

Snubber Capacitors

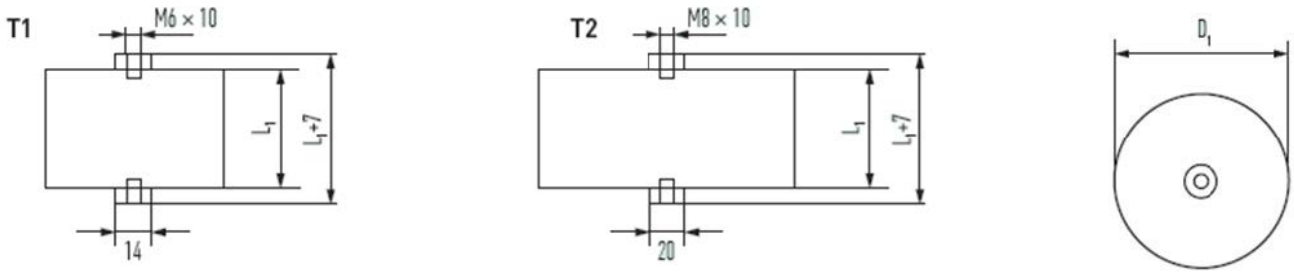
IXYS UK supply a broad range of capacitors suitable for GTO snubber circuits. These capacitors have a low series resistance and high pulse strength; they also have very good self-healing characteristics with-out loss of capacitance.

These capacitors consist of a flame retardant plastic can filled with solid resin to ensure reliable opera-tion even under the most extreme environmental conditions.

Features & Benifits

- Dry construction – can be mounted in any position
- Self-healing
- Low self-inductance
- Low series resistance
- High RMS current capability
- High surge current capability

Part Number	Rated Capacitance	Series Resistance	Thermal Resistance	Maximum Current (RMS)	Maximum Current (Peak)	Peak Surge Current	Rated Energy Content	Self Inductance	Rated Voltage DC	Rated Voltage AC	rms at sinusoidal voltage	Non repetitive Surge (V)	Rated Can Diameter	Rated Can Length
	C_N µF	R_s mW	R_{th} K/W	Imax A	Î kA	I_s kA	W_N Ws	L_c nH	U_N (V) DC	U_N (V) AC	Urms (V)	U_s	D_1mm	L_1 mm
E53.H56-102T1W	1	1.6	8.1	40	0.35	1.8	5	15	3200	1050	750	4800	55	56
E53.H56-152T1W	1.5	2.4	8.1	32	0.27	1.35	6	15	2800	700	500	4200	55	56
E53.R11-202T2W	2	1.2	2.1	100	3	10	16	15	-	4000	2800	6000	115	110
E53.H56-252T1W	2.5	1.8	8.1	40	0.37	1.1	6	15	2250	700	500	3375	55	56
E53.M56-252T2W	2.5	0.65	5.9	75	0.9	4.5	13	15	3200	1050	750	4800	75	56
E53.R11- 302T21W	3	1.2	2.1	125	2.1	6.3	38	15	5000	2100	1500	7500	115	110
E53.P56-402T2W	4	0.5	4.7	80	1.5	7.5	20	15	3200	1050	750	4800	95	56
E53.R11- 402T21W	4	1	2.1	125	2.5	7.5	50	15	5000	2100	1500	7500	115	110
E53.Q56-502T2W	5	0.32	4.2	100	1.8	9	26	15	3200	1050	750	4800	105	56
E53.M56-602T2W	6	0.75	5.9	70	0.88	2.6	15	15	2250	700	500	3375	75	56
E53.Q56-602T2W	6	0.28	4.2	100	2.2	11	31	15	3200	1050	750	4800	105	56



Bar Clamps for GTO Thyristors

Part Number	RodSize & Length	Insulator Size & Length	Fixing Centres	Maximum Electrode Diameter	Clamp Force Range	Fig. No.
	mm	mm	mm	mm	kN	
XSK1500DA076038	M8 × 90	M8 × 60	89	32	20-Oct	WC51
XSK1500DA076076	M8 × 130	M8 × 95				
XSK1500DA076101	M8 × 160	M8 × 120				
XSK2000DA076038	M8 × 95	M8 × 60	89	38	13-20	WC52
XSK2000DA076076	M8 × 130	M8 × 95				
XSK2000DA076101	M8 × 160	M8 × 120				
XSK3000DA076038	M8 × 100	M8 × 65	89	50	25-31	WC53
XSK3000DA076076	M8 × 130	M8 × 100				
XSK3000DA076101	M8 × 160	M8 × 125				
XSK3400DA076038	M8 × 100	M8 × 65	78	50	27-34	WC54
XSK3400DA076076	M8 × 140	M8 × 105				
XSK3400DA076101	M8 × 160	M8 × 130				
XSK3800DA116076	M10 × 150	M12 × 100	132	66	32-38	WC55
XSK3800DA116101	M10 × 180	M12 × 125				
XSK4400DA116076	M10 × 150	M12 × 105	132	68	36-44	WC56
XSK4400DA116101	M10 × 180	M12 × 130				
XSK6000DA116076	M10 × 150	M12 × 105	132	75	50-60	WC57
XSK6000DA116101	M10 × 180	M12 × 130				

WC51

WC51

WC51

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WC51

Pulse Power Assemblies

As a pioneer in the development of solid state pulsed power components and systems, we are able to deliver anything from discrete components to fully integrate energy transfer switches.

With systems successfully delivering voltage ratings of over 50kV and pulsed currents to 140kA, we have a wealth of experience to put at your disposal.

Our modular design solutions based on pulse thyristor technology and integrating control and protection func-tions provide you with a flexible 'black box' approach to energy transfer problems.

We are involved with pulsed power on a global basis, working with prestigious research organisations such as CERN, Switzerland as well as medium volume man-ufacture for emerging commercial applications such as laser supplies, PUV and PEF sterilisation, magneti-sation and metal forming.

We have a philosophy of working closely with our customers to ensure that we deliver the right solu-tion in the right time and right price – First time and every time.

At IXYS UK, we have over 70 years of experience in power circuit design and manufacture, our dedicated team of design engineers can deliver custom solutions for a whole range of design problems ranging from simple crowbar applications to complicated multi-megawatt power con-verters. Utilising the latest 3D modelling techniques, we can reduce the cycle time from concept to manufacture and ensure successful system level integration into our customers' equipment.

IXYS UK Westcode Ltd are at the forefront of solid state pulsed power technology, offering custom solutions to complex pulsed power problems.

IXYS UK's range of pulse thyristors have voltage ratings of 2.5kV, pulsed currents to 50kA peak and di/dt capa-bilities to over 11kA/µs are available. Please consult factory for other requirements

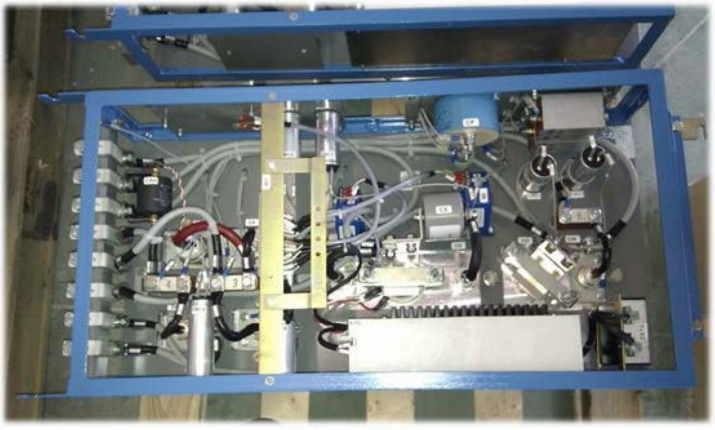
Part No.	V_{DRM}	V_{RRM}	V_{DC}	I_{PULSE}	di/dt_{cr}	V_{T0}	r_T	T_{JM}	R_{thJC}
	V_{GK} = 2V		V_{GK} = 2V			@T_{JM}			180°
		V		kA	kA/µs		mΩ	°C	Sine
	V		V			V			K/W
Y200CKC250	2500	2000	1500	20	5	1.216	2.196	125	0.065
Y500CNC250	2500	2000	1500	50	11	1.755	1.122	125	0.027

GTO Thyristor Product Matrix

The following table highlight the current and future range of GTO thyristors available from IXYS UK Westcode Ltd, arranged by voltage rating, technology and package size

Voltage	**25mm**	**30mm**	**32mm**	**32mm**	**43mm**	**50mm**	**50mm**	**53mm**	**68mm**	**87mm**	**93mm**
1200V	S0300										
1700V		Option	S0700	H0700							
2500V		S0500	S0500	H0500	G1000	S1200	H1200	Option	G2000 & G2500	G3000	G4000
4500V					G1000			G1000	G2000	G3000	G4000
6000V										G3000*	
Package	**25mm**	**24mm**	**29mm**	**29mm**	**38mm**	**47mm**	**47mm**	**47mm**	**66mm**	**75mm**	**85mm**
Stud	SR										
15mm		YC	KC	KC							
26mm					QC	NC	NC	NC	HF	TF	EF
Technology	Symmetrical	Symmetrical	Symmetrical	Fast Symmetrical	Anode shorted	Symmetrical	Fast Symmetrical	Anode shorted	Anode shorted Floating silicon		

* For 6.0kV parts, please refer to factory.



GTO Chopper Circuit