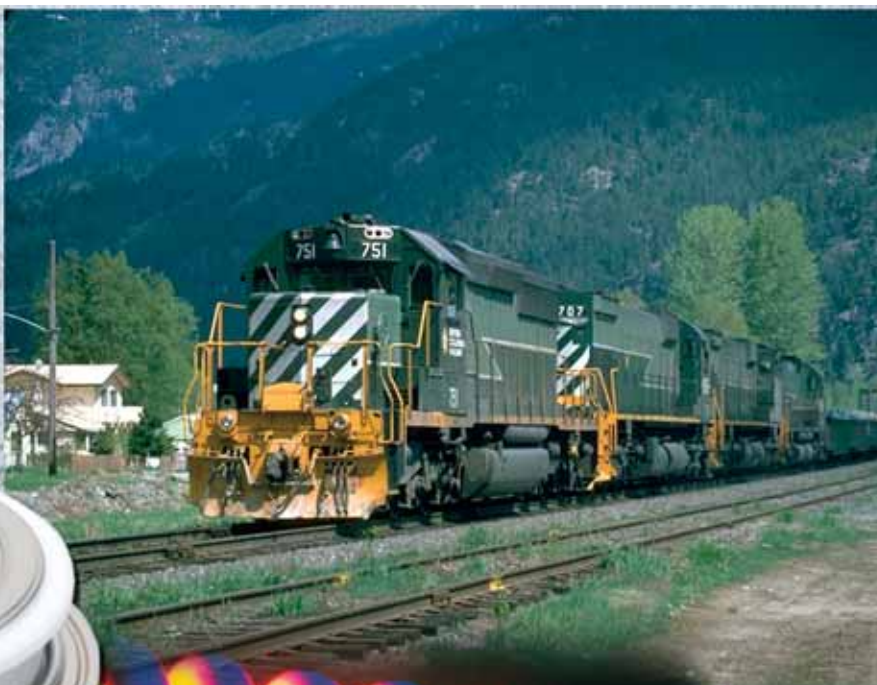




Richardson Electronics

Engineered Solutions



**SCRs, Diodes,
Thyristor/Diode Modules,
Current Transducers,
RF Pallets, Heatsinks**



Finding what is needed to complete a unique manufacturing plan or complex design of a project can often be a daunting task for our customers. They may need only one particular component, or a complete system, to help them develop an effective solution. Richardson Electronics provides the solution.

We use the term “Engineered Solutions” to describe our core engineering and manufacturing expertise in identifying and supporting cost-effective

solutions for our customers: component selection, product manufacturing, systems integration, prototype design and manufacture, testing and logistics.

We possess the expertise, experience and relationships required to provide our customers with exactly what they need. Richardson is committed to delivering high quality engineered solutions that meet our customer's power conversion requirements on a cost-effective basis.





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Thyristor/Diode Modules



**800V - 1800V
250A - 310A**



**800V - 1800V
130A - 160A**



**800V - 1800V
25A - 105A**

Thyristor/Diode Modules

DIODE/DIODE

Type	V _{RRM}	I _{FAV} @ T _C		I _{FRMS}	I _{FSM}	V _F @ I _F (T _{VJ} =25°C)		T _{VJM}	R _{thJC}	R _{thCH}	Outline
	V	A	°C	A	A	V	A	°C	K/W	K/W	
W4D25	800 - 1800	36	100	60	650	1.38	80	150	1	0.2	Fig.1
W4D45	800 - 1800	59	100	100	1150	1.6	200	150	0.59	0.2	Fig.1
W4D55	800 - 1800	71	100	150	1400	1.48	200	150	0.51	2	Fig.1
W4D90	800 - 1800	99	100	180	1700	1.6	300	150	0.35	0.2	Fig.1
W4D106	800 - 1800	120	105	180	2800	1.43	300	150	0.26	0.2	Fig.1
W4D132	800 - 1800	165	100	300	4700	1.3	300	150	0.21	0.1	Fig.2
W4D162	800 - 1800	190	100	300	6600	1.15	300	150	0.21	0.1	Fig.2
W4D250	800 - 1800	270	100	450	9500	1.4	600	150	0.14	0.04	Fig.3
W4D310	800 - 1800	310	100	480	11500	1.32	600	150	0.129	0.04	Fig.3

SCR/DIODE

Type	V _{RRM}	I _{TAV} @ T _C		I _{TRMS}	I _{TSM}	V _T @ I _T (T _{VJ} =25°C)		T _{VJM}	R _{thJC}	R _{thCH}	Outline
	V	A	°C	A	A	V	A	°C	K/W	K/W	
W4DA25	800 - 1600	27	85	50	520	1.64	80	125	0.88	0.2	Fig.1
W4DA45	800 - 1600	49	85	80	1150	1.75	200	125	0.53	0.2	Fig.1
W4DA55	800 - 1800	60	85	100	1500	1.57	200	125	0.45	0.2	Fig.1
W4DA90	800 - 1800	85	85	180	1700	1.74	300	125	0.3	0.2	Fig.1
W4DA105	800 - 1800	116	85	180	2250	1.5	300	125	0.22	0.2	Fig.1
W4DA132	800 - 1800	130	85	300	5500	1.36	300	125	0.23	0.1	Fig.2
W4DA162	800 - 1800	181	85	300	6000	1.25	300	125	0.155	0.07	Fig.2
W4DA250	800 - 1800	250	85	450	9000	1.36	600	140	0.129	0.04	Fig.3
W4DA310	800 - 1800	320	85	500	9200	1.36	600	140	0.112	0.04	Fig.3

SCR/SCR

Type	V _{RRM}	I _{TAV} @ T _C		I _{TRMS}	I _{TSM}	V _T @ I _T (T _{VJ} =25°C)		T _{VJM}	R _{thJC}	R _{thCH}	Outline
	V	A	°C	A	A	V	A	°C	K/W	K/W	
W4DC25	800 - 1600	27	85	50	520	1.64	80	125	0.88	0.2	Fig.1
W4DC45	800 - 1800	49	85	80	1150	1.75	200	125	0.53	0.2	Fig.1
W4DC55	800 - 1800	60	85	100	1500	1.57	200	125	0.45	0.2	Fig.1
W4DC90	800 - 1800	85	85	180	1700	1.74	300	125	0.3	0.2	Fig.1
W4DC105	800 - 1800	116	85	180	2250	1.5	300	125	0.22	0.2	Fig.1
W4DC132	800 - 1800	130	85	300	4750	1.36	300	125	0.23	0.1	Fig.2
W4DC162	800 - 1800	181	85	300	6000	1.25	300	125	0.155	0.07	Fig.2
W4DC250	800 - 1800	250	85	450	9000	1.36	600	140	0.129	0.04	Fig.3
W4DC310	800 - 1800	320	85	520	9200	1.36	600	140	0.12	0.04	Fig.3

Part Number Nomenclature

Classification	Type	Current (A)	Voltage (V)	Complete Part Number
W4	D Diode	25-310	N 800V	W4DA25PB
	DA SCR/Diode		P 1000V	
	DC SCR/SCR		PB 1200V	
			PD 1400V	
			PM 1600V	
			PN 1800V	

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Thyristor/Diode Modules

Outline Drawings

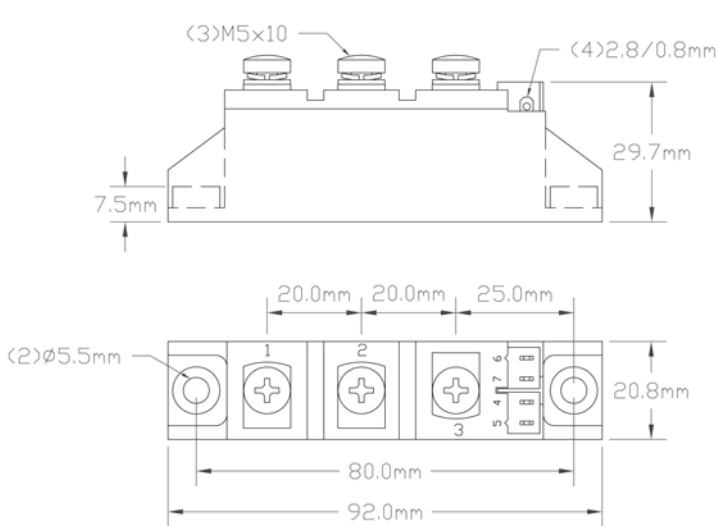


Figure 1
Weight: 90 grams

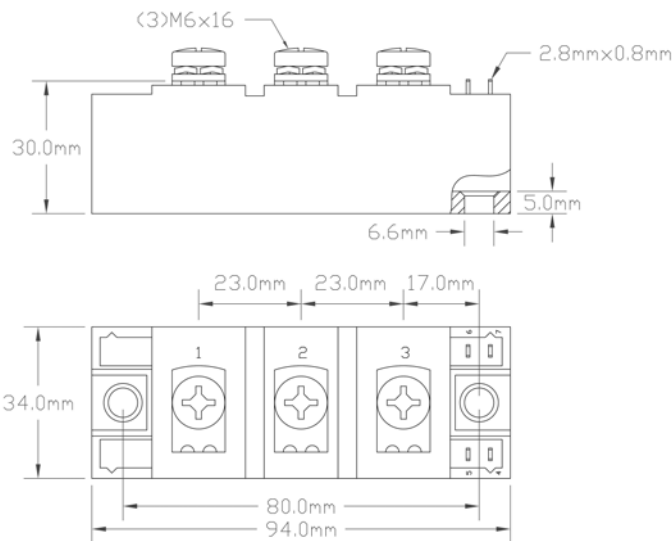


Figure 2
Weight: 125 grams

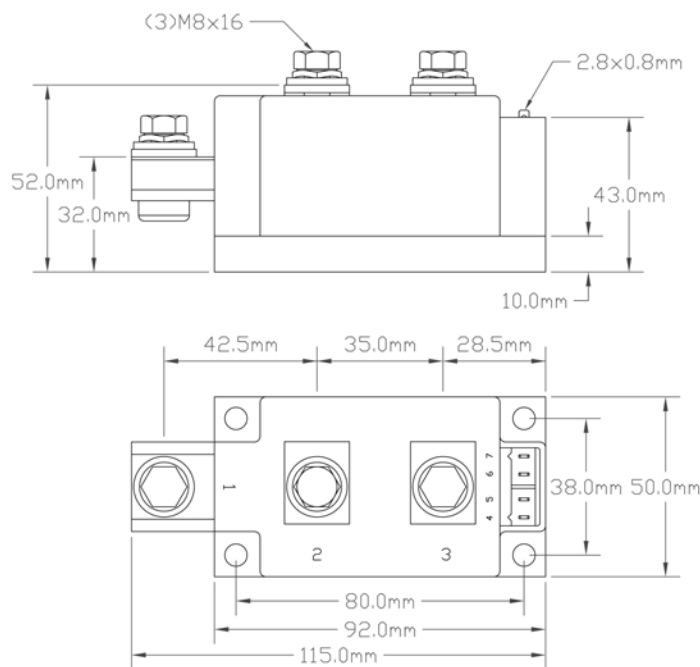


Figure 3
Weight: 750 grams

Inverter SCR



T-73

**1400V - 2000V
3375A**



T-47

**600V - 2000V
730A - 1450A**



TO-200AC

**200V - 2000V
315A - 990A**



TO-200AB-2

**200V - 1400V
380A - 633A**



TO-200AB

**200V - 1200V
140A - 389A**



TO-93

**200V - 800V
190A**



TO-94

**200V - 1200V
70A**



TO-83

**200V - 1200V
70A**



TO-65

**200V - 1200V
22A - 40A**

Inverter SCRs

Part Number	V _{DRM/RRM} V	I _{TRMS} A	I _{TAV} @ T _C A °C	T _q µs	V _{TM} @ I _{TM} , 25°C V A	I _{TSM} A	T _{J(MAX)} °C	R _{th(j-c)} °C/W	Case
C156	200-600	110	70 65	10	3.0 500	1800	125	0.30	TO-83
C157	200-600	110	70 65	20	3.0 500	1800	125	0.30	TO-83
C159	600-1200	110	70 65	40	3.5 500	1600	125	0.30	TO-83
C164-2	200-600	110	70 65	10	2.6 500	1800	125	0.30	TO-83
C165-2	200-800	110	70 65	20	2.6 500	1800	125	0.30	TO-83
C154	200-600	110	70 65	10	3.0 500	1800	125	0.30	TO-94
C155	200-600	110	70 65	20	3.0 500	1800	125	0.30	TO-94
C158	600-1200	110	70 65	40	3.5 500	1600	125	0.30	TO-94
C164	200-600	110	70 65	10	2.6 500	1800	125	0.30	TO-94
C165	200-800	110	70 65	20	2.6 500	1800	125	0.30	TO-94
C184	200-800	300	190 65	10	2.9 1500	3500	125	0.15	TO-93
C185	200-800	300	190 65	20	2.9 1500	3500	125	0.15	TO-93
C358	200-1200	225	140 65	40	3.5 500	1600	125	0.14	TO-200AB
C354	200-600	275	175 65	10	3.0 500	1800	125	0.13	TO-200AB
C355	200-600	275	175 65	20	3.0 500	1800	125	0.13	TO-200AB
C364	200-800	275	175 65	10	2.6 500	1800	125	0.14	TO-200AB
C365	200-800	275	175 65	20	2.6 500	1800	125	0.14	TO-200AB
C384	200-800	400	250 65	10	2.9 1500	3500	150	0.10	TO-200AB
C385	200-800	400	250 65	20	2.9 1500	3500	125	0.10	TO-200AB
C434	200-600	600	380 65	15	2.1 1000	8000	125	0.04	TO-200AB-2
C435	200-600	600	380 65	20	2.1 1000	8000	125	0.04	TO-200AB-2
C436	600-1400	650	410 65	30	2.6 1000	5500	125	0.06	TO-200AB-2
C437	600-1400	650	410 65	60	2.2 1000	7500	125	0.04	TO-200AB-2
C438	600-1400	650	410 65	40	2.2 1000	7500	125	0.04	TO-200AB-2
C376	600-1400	500	315 65	20	2.2 1000	6000	125	0.06	TO-200AC
C387	600-1200	500	315 65	40	4.2 3000	5500	125	0.06	TO-200AC
C388	600-1200	500	315 65	30	4.2 3000	5500	125	0.06	TO-200AC
C392	200-600	500	315 65	15	4.2 3000	5500	125	0.06	TO-200AC
C393	200-600	500	315 65	20	4.2 3000	5500	125	0.06	TO-200AC
C398	200-1400	650	410 65	40	3.0 3000	7500	150	0.06	TO-200AC
C377	600-1400	700	445 65	40	1.8 1000	7500	125	0.06	TO-200AC
C378	600-1400	700	445 65	30	1.8 1000	7500	125	0.06	TO-200AC
C394	200-600	700	445 65	15	2.5 3000	8000	125	0.06	TO-200AC
C395	200-600	700	445 65	20	2.5 3000	8000	125	0.06	TO-200AC
C447	600-1400	1000	635 65	40	2.9 2000	9000	125	0.04	TO-200AC
C448	600-1400	1000	635 65	25	2.9 2000	9000	125	0.04	TO-200AC
C612	1200-2000	1150	730 65	60	2.0 1000	8000	125	0.05	TO-200AC
C648	600-1200	1150	730 65	40	1.7 1000	10000	125	0.04	TO-200AC
C458	600-1400	1600	1000 65	25	2.6 3000	16000	125	0.03	T-47
C712	1400-2000	1570	1000 65	60	1.9 1000	14300	125	0.02	T-47
C457	600-1400	2000	1250 65	40	2.0 3000	18700	125	0.02	T-47
C770	1400-1800	3250	2100 70	100	1.6 2000	38000	125	0.01	T-73

Voltage Matrix

B 200V	PD 1400V	LE 2500V	CM 3600V
D 400V	PM 1600V	LM 2600V	CN 3800V
M 600V	PN 1800V	LN 2800V	DP 4000V
N 800V	L 2000V	LP 3000V	DB 4200V
P 1000V	LB 2200V	CB 3200V	DD 4400V
PB 1200V	LD 2400V	CD 3400V	DE 4500V

Part Number Nomenclature

Classification	Voltage (V)	Complete Part Number
C448	P 1000V	C448P
C448	PB 1200V	C448PB

Distributed Gate SCRs

Part Number	V _{DRM/RRM} V	I _{TAV} @ T _c A	°C	Tq μs	V _{TM} @ I _{TM} , 125°C V	A	I _{TSM} A	T _{J(MAX)} °C	R _{th(j-c)} °C/W	Case
NLD201	800-1200	389	55	10	2.03	1000	6200	125	0.135	TO-200AB
NLD304	800-1200	577	55	25	2.15	1000	7500	125	0.040	TO-200AB-2
NLD313	800-1200	633	55	20	1.85	1000	7800	125	0.040	TO-200AB-2
NLD401	1000-1400	830	55	10	2.40	1400	10600	125	0.025	TO-200AC
NLD404	1000-1400	830	55	25	2.40	1400	10600	125	0.025	TO-200AC
NLD418	1600-2000	878	55	60	2.12	1400	9300	125	0.025	TO-200AC
NLD422	800-1200	929	55	15	2.04	1400	11200	125	0.025	TO-200AC
NLD433	800-1200	964	55	20	1.96	1400	11700	125	0.025	TO-200AC
NLD441	400-800	990	55	10	1.84	1400	13700	125	0.025	TO-200AC
NLD451	600-1000	809	55	12	2.52	1400	10000	125	0.025	TO-200AC
NLD508	1400-2000	1127	55	60	2.30	2000	16800	125	0.020	T-47
NLD514	1000-1400	1178	55	25	2.20	2000	21200	125	0.020	T-47
NLD522	800-1200	1211	55	15	2.18	2000	22000	125	0.020	T-47
NLD533	800-1200	1280	55	20	2.02	2000	22500	125	0.020	T-47
NLD548	1400-2000	1280	55	60	1.90	2000	19300	125	0.020	T-47
NLD554	800-1200	1448	55	25	1.70	2000	24300	125	0.020	T-47
NLD561	1000-1200	1331	55	10	2.02	2000	22700	125	0.020	T-47
NLD571	1400-1800	1446	55	40	1.80	2000	19300	125	0.020	T-47
NLD707	1800-2000	2619	55	50	2.00	4000	42200	125	0.010	T-73
NLD716	1600-1800	2700	55	40	1.90	4000	44500	125	0.010	T-73
NLD723	1000-1200	3375	55	20	1.54	4000	54800	125	0.010	T-73

Voltage Matrix

B	200V	PD	1400V	LE	2500V	CM	3600V
D	400V	PM	1600V	LM	2600V	CN	3800V
M	600V	PN	1800V	LN	2800V	DP	4000V
N	800V	L	2000V	LP	3000V	DB	4200V
P	1000V	LB	2200V	CB	3200V	DD	4400V
PB	1200V	LD	2400V	CD	3400V	DE	4500V

Part Number Nomenclature

Classification	Voltage (V)	Complete Part Number
NLD422	N 800V	NLD422N
NLD422	PB 1200V	NLD422PB

Phase Control



T-73

**1600V - 4400V
2590A - 4240A**



T-47

**200V - 2600V
1570A - 2400A**



TO-200AC

**200V - 2600V
700A - 1400A**



TO-200AB-2

**200V - 1800V
670A - 700A**



TO-200AB

**200V - 1600V
115A - 700A**



TO-118

**400V - 1600V
300A**



TO-93

**200V - 1400V
150A - 190A**



TO-94

**200V - 1200V
52 - 70A**



TO-83

**200V - 1200V
70A**



TO-65

**200V - 1400V
40A**



TO-48

**200V - 1400V
22A**

Phase Control SCRs

Part Number	$V_{DRM/RRM}$	I_{TRMS}	$I_{TAV} @ T_C$		$V_{TM} @ I_{TM}, 25^{\circ}C$		I_{TSM}	$T_{J(MAX)}$	$R_{th(j-c)}$	Case
	V	A	A	$^{\circ}C$	V	A	A	$^{\circ}C$	$^{\circ}C/W$	
C137	200-1400	35	22.3	66	2.30	70	360	125	1.00	TO-48
C147	200-1400	63	40	102	3.00	500	1000	125	0.35	TO-65
C45	200-1200	80	52	75	3.10	500	800	125	0.40	TO-83
C52	600-1200	110	70	62	2.50	500	1000	125	0.40	TO-83
C52X500	200-600	110	70	95	1.80	500	1500	125	0.30	TO-83
C152	200-1200	100	70	80	2.60	15	1200	125	0.32	TO-83
C46	200-1200	80	52	75	3.10	50	800	125	0.40	TO-94
C50	600-1200	110	70	62	2.50	500	1000	125	0.40	TO-94
C50X500	200-600	110	70	95	1.80	500	1500	125	0.30	TO-94
C150	200-1200	100	70	80	2.60	15	1200	125	0.32	TO-94
C180	200-1400	235	150	90	2.85	1500	3500	125	0.14	TO-93
C180X500	200-600	300	190	92	1.75	900	5500	125	0.14	TO-93
C290	400-1600	470	300	75	1.40	500	5500	125	0.11	TO-118
C291	400-1600	470	300	75	1.40	500	5500	125	0.11	F-1
C350	200-1200	180	115	89	2.60	500	1600	125	0.14	TO-200AB
C380	200-1600	400	250	74	2.85	1500	3500	125	0.10	TO-200AB
C380X555	200-1200	450	300	85	2.85	1500	3200	150	0.10	TO-200AB
C380X500	200-600	500	310	83	2.00	1500	5500	125	0.10	TO-200AB
C430	200-1600	1000	700	65	2.40	3000	8000	125	0.04	TO-200AB-2
C431	600-1800	1000	670	65	2.65	3000	8000	125	0.04	TO-200AB-2
C430X555	200-1200	1000	700	75	2.40	2200	8000	150	0.05	TO-200AB-2
C430X500	200-600	1200	700	76	1.90	2000	10000	125	0.04	TO-200AB-2
C390	200-1200	700	450	73	2.40	3000	8000	125	0.06	TO-200AC
C502	1600-2200	700	450	65	1.60	625	8000	125	0.06	TO-200AC
C391	600-1800	770	490	64	2.65	3000	8000	125	0.06	TO-200AC
C501	200-1800	850	550	65	1.53	1000	8000	125	0.06	TO-200AC
C390X555	600-1200	925	590	80	2.60	3000	8000	150	0.06	TO-200AC
C602	1800-2600	950	600	73	1.90	1000	10000	125	0.04	TO-200AC
C390X500	200-600	975	620	65	1.90	3000	10000	125	0.06	TO-200AC
C441	600-1800	1175	750	65	2.00	3000	11000	125	0.04	TO-200AC
C601	200-1600	1100	750	72	2.10	3000	11000	125	0.04	TO-200AC
C440	200-1600	1400	900	67	1.65	3000	13000	125	0.04	TO-200AC
C702	2400-3200	1570	1050	74	2.10	3000	15000	125	0.02	T-47
C701	1200-2000	2000	1300	70	1.70	3000	20000	125	0.02	T-47
C451	1400-2600	2350	1300	65	1.95	3000	20000	125	0.03	T-47
C450	200-1600	2400	1500	66	1.50	3000	28500	125	0.03	T-47
C783	3000-3600	2826	1800	70	1.71	2000*	29000	125	0.01	T-73
C784	3600-4400	2590	1930	55	1.85	2000	26000	125	0.01	T-73
C782	2000-2500	4240	2300	70	1.35	2000*	35000	125	0.01	T-73
C781	1600-2000	3925	2500	72	1.20	2000*	45000	125	0.01	T-73

* (@125°C)

Voltage Matrix

B 200V	PD 1400V	LE 2500V	CM 3600V
D 400V	PM 1600V	LM 2600V	CN 3800V
M 600V	PN 1800V	LN 2800V	DP 4000V
N 800V	L 2000V	LP 3000V	DB 4200V
P 1000V	LB 2200V	CB 3200V	DD 4400V
PB 1200V	LD 2400V	CD 3400V	DE 4500V

Part Number Nomenclature

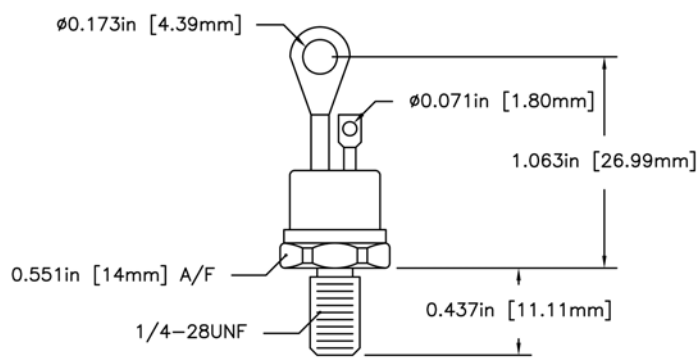
Classification	Voltage (V)	Complete Part Number
C701	PD 1400V	C701PD
C701	L 2000V	C701L

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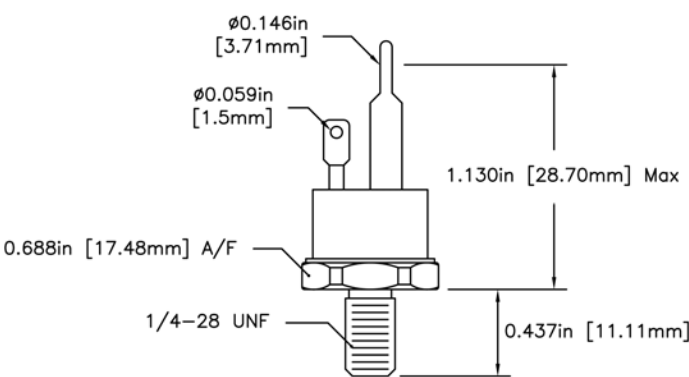


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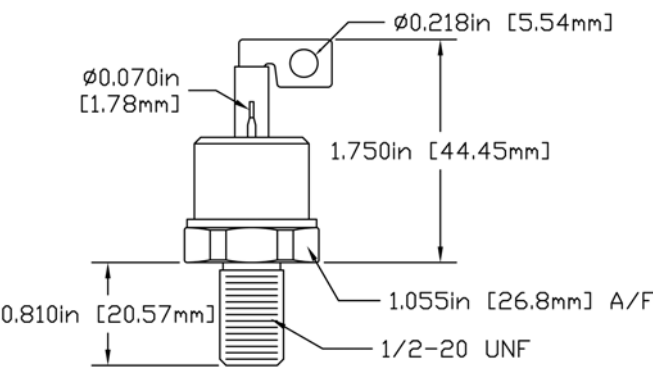
SCR Outline Drawings



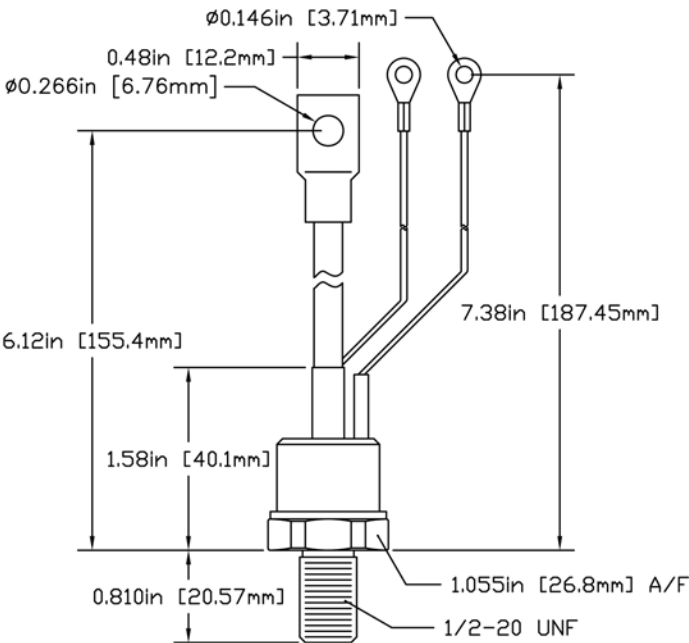
TO-48
Weight: 10 grams



TO-65
Weight: 33 grams

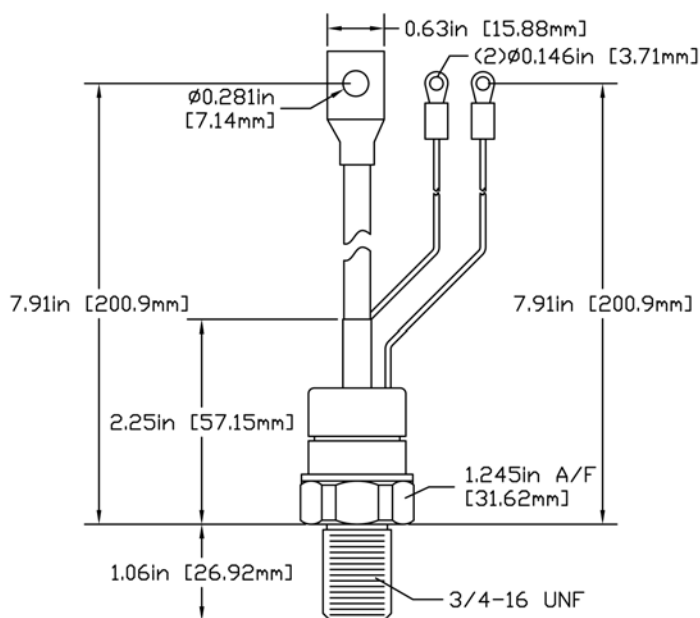


TO-83
Weight: 100 grams

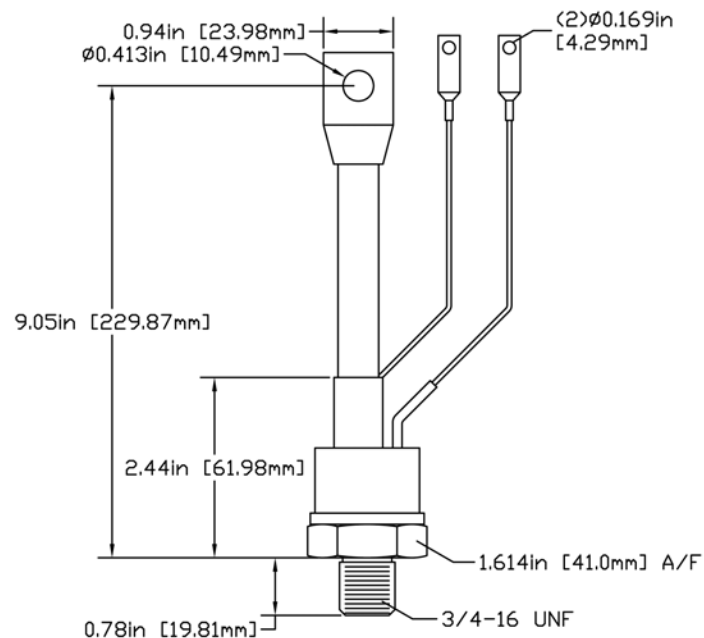


TO-94
Weight: 130 grams

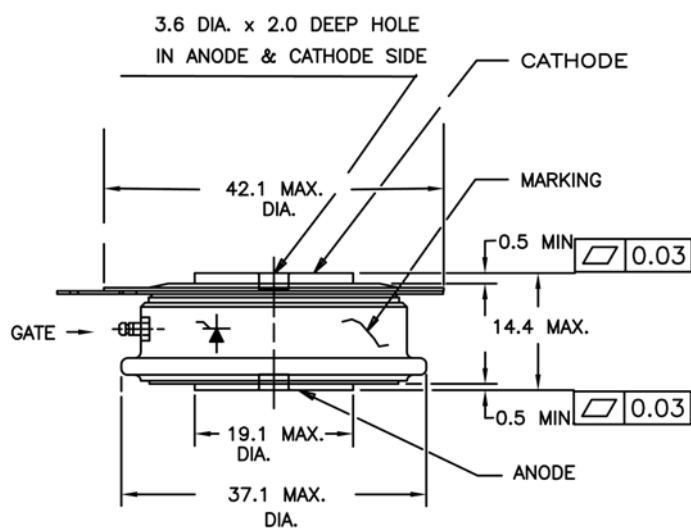
SCR Outline Drawings



TO-93
Weight: 250 grams

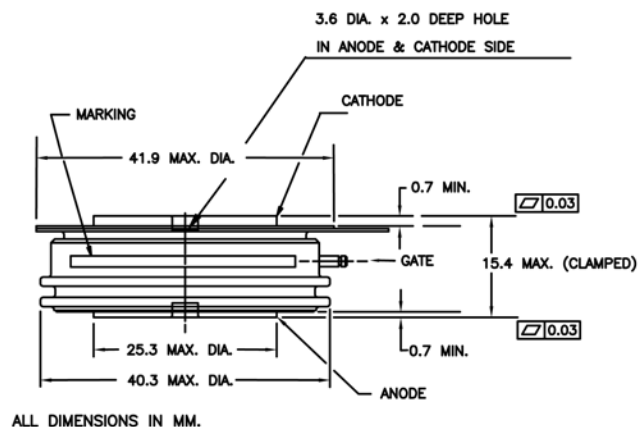


TO-118
Weight: 280 grams



ALL DIMENSIONS IN MM.

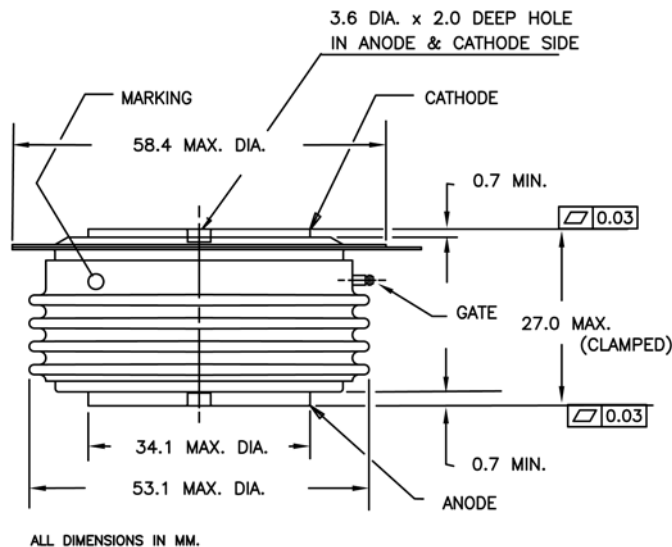
TO-200AB
Weight: 70 grams



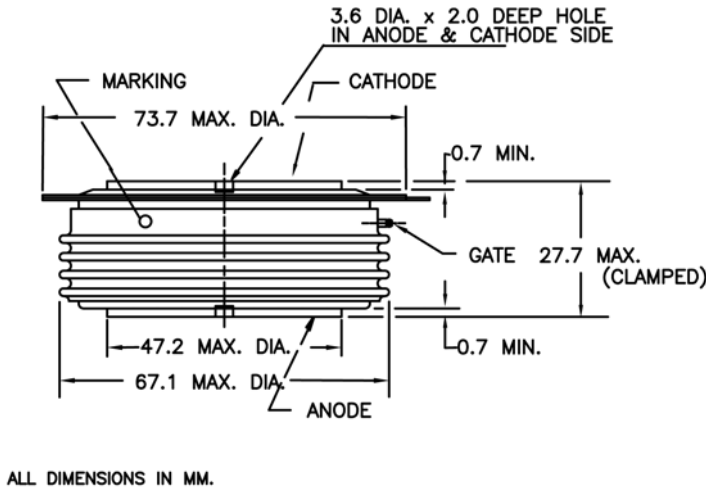
ALL DIMENSIONS IN MM.

TO-200AB-2
Weight: 90 grams

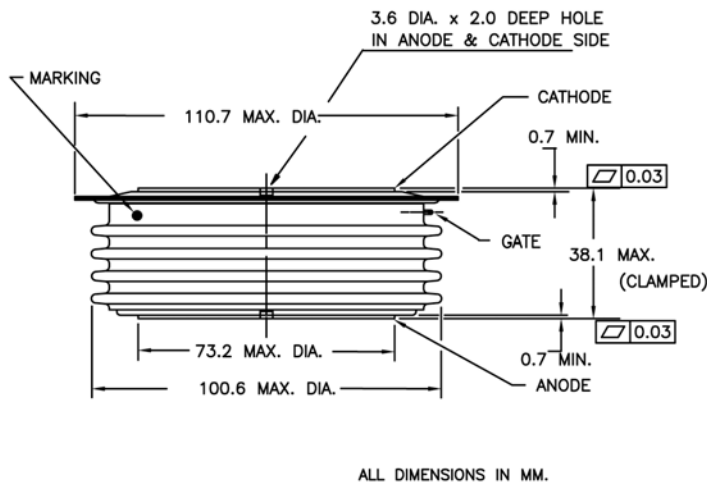
SCR Outline Drawings



TO-200AC
Weight: 340 grams



T-47
Weight: 510 grams



T-73
Weight: 950 grams

Diodes



D-73

**2000V - 3000V
3770A**



DO-200AC

**200V - 2400V
1800A - 2500A**



DO-200AB

**200V - 2200V
1000A - 2000A**



DO-200AA

**200V - 1400V
400A**



DO-9

**200V - 1600V
250A - 300A**



DO-30

**200V - 1000V
150A**



DO-8

**200V - 1400V
150A**



DO-5

**200V - 1200V
40A - 70A**



DO-4

**200V - 1200V
12A - 25A**

Standard Recovery Diodes

Part Number	V _{RMM}	I _{FRMS}	I _{FAV} @ T _c		V _{FM} @ I _{FM} , 25°C		T _{J(MAX)}	R _{th(j-c)}	Case
	V	A	A	°C	V	A	°C	°C/W	
1N1202	200	18	12	150	1.2	40	175	2.5	DO-4
1N1202R	200	18	12	150	1.2	40	175	2.5	DO-4
1N1206A	600	18	12	150	1.2	40	175	2.5	DO-4
1N1206RA	600	18	12	150	1.2	40	175	2.5	DO-4
A25	200-1200	40	25	100	1.2	50	175	1.5	DO-4
A25R	200-1200	40	25	100	1.2	50	175	1.5	DO-4
1N1186A	200	63	40	115	1.1	100	200	1.1	DO-5
1N1186RA	200	63	40	115	1.1	100	200	1.1	DO-5
1N1190A	600	63	40	115	1.1	100	200	1.1	DO-5
1N1190RA	600	63	40	115	1.1	100	200	1.1	DO-5
A72	200-1200	118	70	110	1.35	220	150	0.45	DO-5
A72R	200-1200	118	70	110	1.35	220	150	0.45	DO-5
A180	200-1400	236	150	135	1.3	500	200	0.35	DO-8
A180R	200-1400	236	150	135	1.3	500	200	0.35	DO-8
1N3086	200	236	150	150	1.2	470	200	0.25	DO-30
1N3086R	200	236	150	150	1.2	470	200	0.25	DO-30
1N3092	1000	236	150	150	1.2	470	200	0.25	DO-30
1N3092R	1000	236	150	150	1.2	470	200	0.25	DO-30
1N3736	200	390	250	130	1.3	785	200	0.18	DO-9
1N3736R	200	390	250	130	1.3	785	200	0.18	DO-9
1N3744	1400	390	250	130	1.3	785	200	0.18	DO-9
1N3744R	1400	390	250	130	1.3	785	200	0.18	DO-9
1N4047	200	435	275	120	1.35	860	190	0.17	DO-9
1N4047R	200	435	275	120	1.35	860	190	0.17	DO-9
1N4050	400	435	275	120	1.35	860	190	0.17	DO-9
1N4050R	400	435	275	120	1.35	860	190	0.17	DO-9
1N4052	800	435	275	120	1.35	860	190	0.17	DO-9
1N4052R	800	435	275	120	1.35	860	190	0.17	DO-9
1N4054	1000	435	275	120	1.35	860	190	0.17	DO-9
1N4054R	1000	435	275	120	1.35	860	190	0.17	DO-9
1N4056	1000	435	275	120	1.35	860	190	0.17	DO-9
1N4056R	1000	435	275	120	1.35	860	190	0.17	DO-9
NL1931	200-1600	470	300	120	1.4	950	200	0.18	DO-9
NL1931R	200-1600	470	300	120	1.4	950	200	0.18	DO-9
A390	200-1400	628	400	145	1.4	1260	180	0.09	DO-200AA
A430	200-1400	1570	1000	124	1.2	1000	200	0.06	DO-200AB
A641	1400-2200	2355	1500	65	1.1	1000	175	0.04	DO-200AB
A621	200-1200	3140	2000	65	1.3	1800	175	0.04	DO-200AB
A730	1600-2400	2825	1800	100	1.3	3000	160	0.02	DO-200AC
A740	200-1800	3765	2400	100	1.3	4000	175	0.02	DO-200AC
A451	1400-2200	3925	2500	88	1.4	5000	175	0.03	DO-200AC

Voltage Matrix

B 200V	PD 1400V	LE 2500V	CM 3600V
D 400V	PM 1600V	LM 2600V	CN 3800V
M 600V	PN 1800V	LN 2800V	DP 4000V
N 800V	L 2000V	LP 3000V	DB 4200V
P 1000V	LB 2200V	CB 3200V	DD 4400V
PB 1200V	LD 2400V	CD 3400V	DE 4500V

Part Number Nomenclature

Classification	Voltage (V)	Complete Part Number
A390	N 800V	A390N
A390	PB 1200V	A390PB

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Fast Recovery Diodes

Part Number	V_{RMM} V	I_{FAV} @ T_C A °C	V_{FM} @ I_{FM} , 25°C V A	t_{rr} µSec	$T_{J(MAX)}$ °C	$R_{th(j-c)}$ °C/W	Case
1N3891	200-400	12 100	1.60 20	200nSec	150	2.00	DO-4
1N3891R	200-400	12 100	1.60 20	200nSec	150	2.00	DO-4
1N3893	200-400	12 100	1.60 20	200nSec	150	2.00	DO-4
1N3893R	200-400	12 100	1.60 20	200nSec	150	2.00	DO-4
1N3911	200-400	30 100	1.40 30	200nSec	150	1.00	DO-5
1N3911R	200-400	30 100	1.40 30	200nSec	150	1.00	DO-5
1N3913	200-400	30 100	1.40 30	200nSec	150	1.00	DO-5
1N3913R	200-400	30 100	1.40 30	200nSec	150	1.00	DO-5
A139	600-1000	25 75	1.95 100	500nSec	125	1.00	DO-5
A139R	600-1000	25 75	1.95 100	500nSec	125	1.00	DO-5
A77	200-1000	70 75	2.00 200	1.00	125	0.40	DO-5
A77R	200-1000	70 75	2.00 200	1.00	125	0.40	DO-5
A177	200-1400	100 85	1.75 500	2.30	125	0.40	DO-8
A177R	200-1400	100 85	1.75 500	2.30	125	0.40	DO-8
A197	200-1400	250 103	1.70 1000	2.80	125	0.25	DO-9
A197R	200-1400	250 103	1.70 1000	2.80	125	0.25	DO-9
A397	200-1400	400 110	1.80 1000	2.80	125	0.09	DO-200AA
A398	200-1400	400 90	1.70 1000	1.50	175	0.09	DO-200AA
A437	600-1400	750 65	1.60 1000	3.50	125	0.05	DO-200AB

Fast Soft Recovery Diodes

Part Number	V_{RMM} V	$I_{F(AVG)}$ @ T_{HS} A °C	V_{FM} @ I_{FM} V A	t_{rr} µSec	$T_{J(MAX)}$ °C	$R_{th(j-c)}$ °C/W	$R_{th(j-hs)}$ °C/W	Case
NLR102xx	1200-1800	139 55	1.60 280	1.0	150	0.30	—	DO-8
NLR102xxR	1200-1800	139 55	1.60 280	1.0	150	0.30	—	DO-8
NLR113xx	1200-1400	336 55	1.35 470	1.5	150	0.13	—	DO-9
NLR113xxR	1200-1400	336 55	1.35 470	1.5	150	0.13	—	DO-9
NLR124xx	1200-2000	334 55	1.35 470	2.0	150	0.13	—	DO-9
NLR124xxR	1200-2000	334 55	1.35 470	2.0	150	0.13	—	DO-9
NLR204xx	800-1400	437 55	1.46 635	2.3	150	—	0.090	DO-200AA
NLR215xx	1200-2000	433 55	1.47 635	2.8	150	—	0.090	DO-200AA
NLR303xx	400-1600	759 55	1.70 1500	1.5	125	—	0.050	DO-200AA-2
NLR404xx	1200-1600	859 55	1.55 1200	2.3	125	—	0.044	DO-200AB
NLR413xx	1400-2100	872 55	1.50 1200	1.7	125	—	0.044	DO-200AB
NLR425xx	2600-3600	863 55	2.10 1400	2.8	125	—	0.033	DO-200AB
NLR434xx	1200-2000	1023 55	1.72 1450	1.9	125	—	0.033	DO-200AB
NLR446xx	4000-4500	736 55	2.56 1400	3.8	125	—	0.033	DO-200AB
NLR506xx	1600-2500	1194 55	2.34 4500	3.7	125	—	0.022	DO-200AC
NLR514xx	4000-4500	1104 55	2.20 1500	5.0	125	—	0.022	DO-200AC
NLR706xx	2000-3000	3770 55	1.74 4700	4.1	125	—	0.011	D-73

Voltage Matrix

B 200V	PD 1400V	LE 2500V	CM 3600V
D 400V	PM 1600V	LM 2600V	CN 3800V
M 600V	PN 1800V	LN 2800V	DP 4000V
N 800V	L 2000V	LP 3000V	DB 4200V
P 1000V	LB 2200V	CB 3200V	DD 4400V
PB 1200V	LD 2400V	CD 3400V	DE 4500V

Part Number Nomenclature

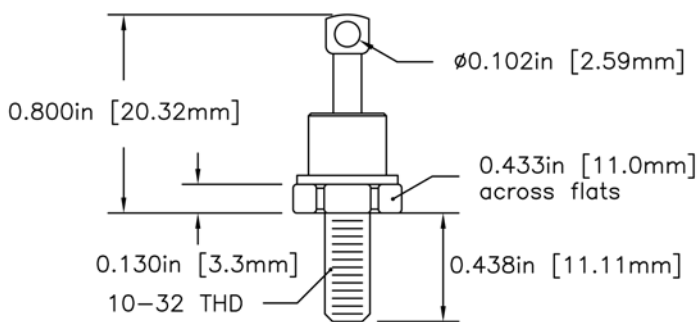
Classification	Voltage (V)	Complete Part Number
NLR434	PB 1200V	NLR434PB

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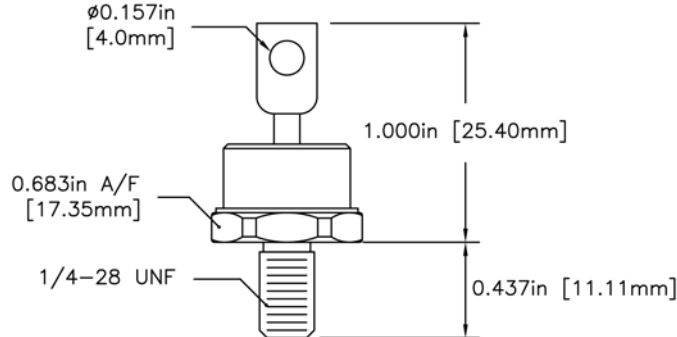


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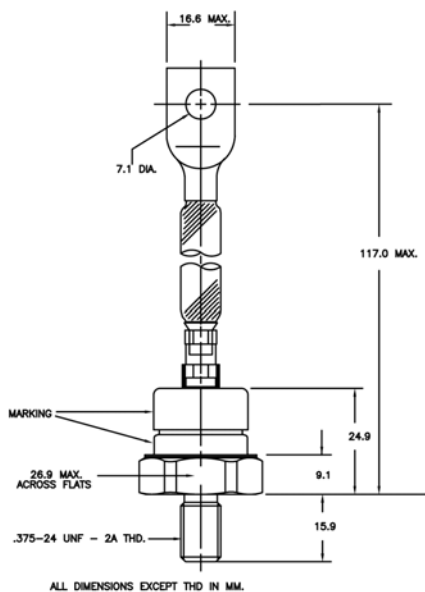
Diode Outline Drawings



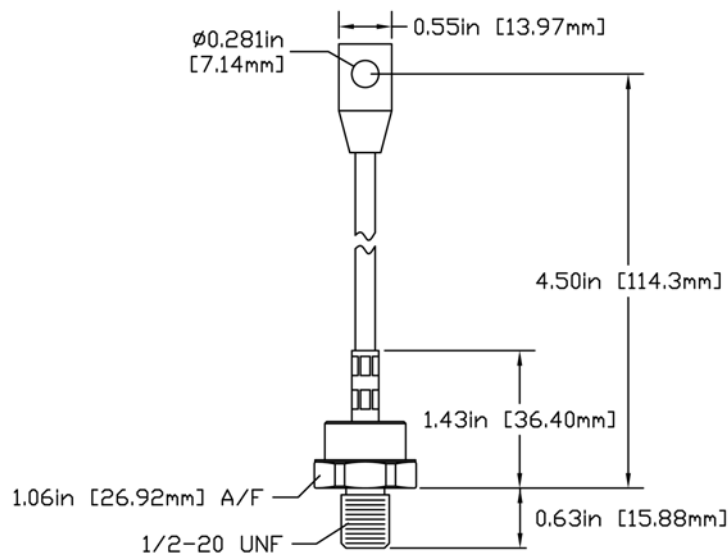
DO-4
Weight: 6 grams



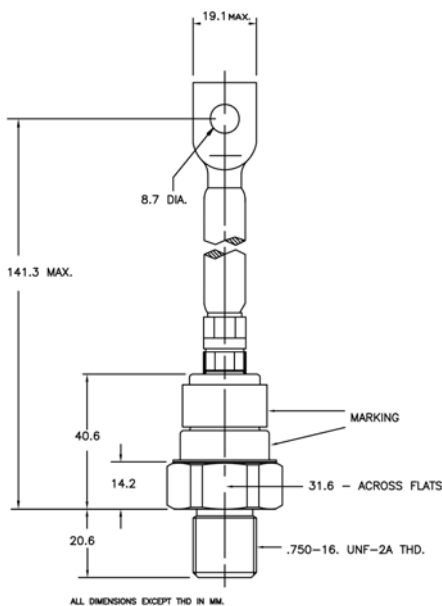
DO-5
Weight: 17 grams



DO-8
Weight: 85 grams

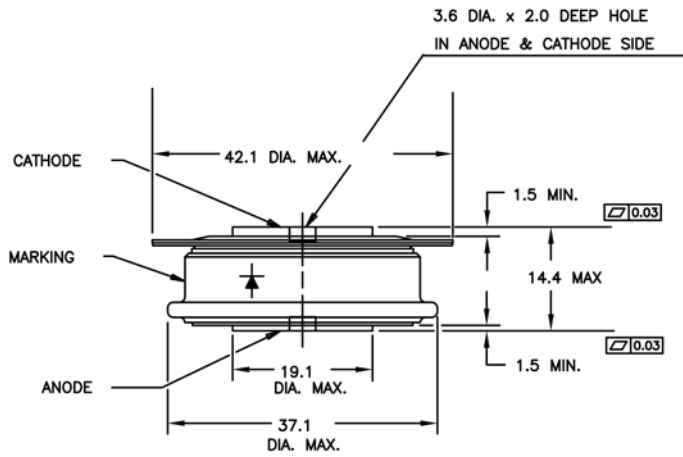


DO-30
Weight: 120 grams



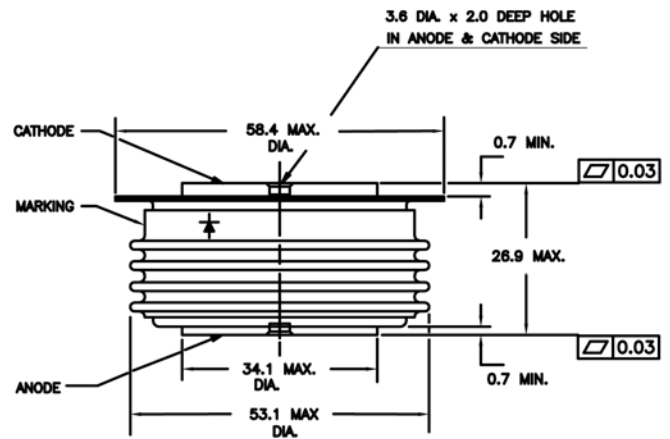
DO-9, Weight: 250 grams

Diode Outline Drawings



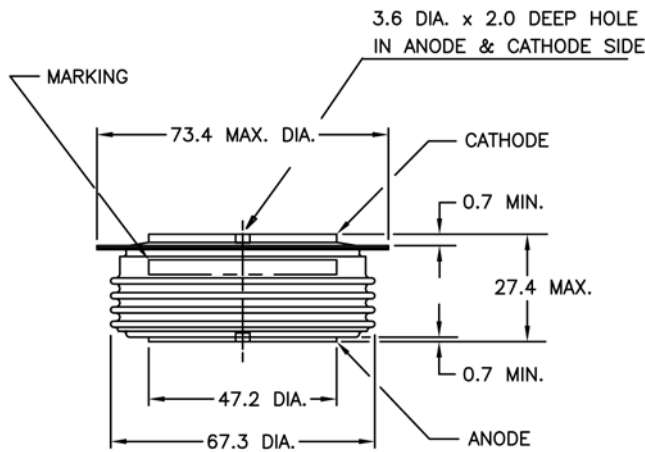
ALL DIMENSIONS IN MM.

DO-200AA
Weight: 70 grams



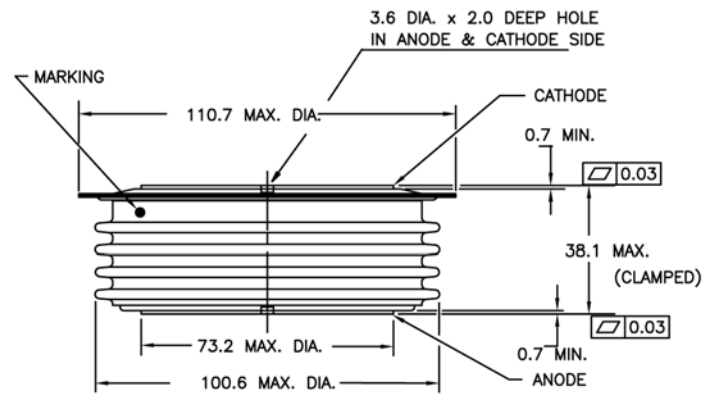
ALL DIMENSIONS IN MM.

DO-200AB
Weight: 340 grams



ALL DIMENSIONS IN MM.

DO-200AC
Weight: 510 grams



ALL DIMENSIONS IN MM.

D-73
Weight: 1700 grams

SCR/Diodes Rectifier Bridges



M0-11

**120-240V
25A**



M0-12

**120-240V
25A**



M0-13

**120-240V
50A**



M0-14

**120-240V
50A**

Diodes Rectifier Bridges



RB-1

**200 - 1500V
25A - 35A**



RB-2

**200 - 1500V
60A - 100A**



RB-3

**200 - 1500V
80A - 100A**

SCR/Diode Rectifier Bridges

Part Number	I_{AVE} @ 85°C	Input Voltage V	I_{TSM} A	I^2t A ² sec	V_{TM} @ I_{PEAK} V	@ $T_J=25°C$ A	V_{GT} V	I_{GT} A	$R_{\theta CS}$ °C/W	$T_J (MAX)$ °C	Package
WV2BE25C	25	120	300	370	1.6	50	2.5	50	0.1	125	MO-11
WV2BC25C	25	120	300	370	1.6	50	2.5	50	0.1	125	MO-11
W2BE25C	25	120	300	370	1.6	50	2.5	50	0.1	125	MO-11
W2BC25C	25	120	300	370	1.6	50	2.5	50	0.1	125	MO-11
VW2BE25E	25	240	300	370	1.6	50	2.5	50	0.1	125	MO-11
W2BC25E	25	240	300	370	1.6	50	2.5	50	0.1	125	MO-11
W2BE25E	25	240	300	370	1.6	50	2.5	50	0.1	125	MO-11
W2BC25E	25	240	300	370	1.6	50	2.5	50	0.1	125	MO-11
P201KW	50	120	600	1500	1.6	100	3	150	0.1	125	MO-13
P201K	50	120	600	1500	1.6	100	3	150	0.1	125	MO-13
P201W	50	120	600	1500	1.6	100	3	150	0.1	125	MO-13
P201	50	120	600	1500	1.6	100	3	150	0.1	125	MO-13
P202KW	50	240	600	1500	1.6	100	3	150	0.1	125	MO-13
P202K	50	240	600	1500	1.6	100	3	150	0.1	125	MO-13
P202W	50	240	600	1500	1.6	100	3	150	0.1	125	MO-13
P202	50	240	600	1500	1.6	100	3	150	0.1	125	MO-13
WV2BJ25C	25	120	300	370	1.6	50	2.5	50	0.1	125	MO-11
WV2BK25C	25	120	300	370	1.6	50	2.5	50	0.1	125	MO-11
W2BJ25C	25	120	300	370	1.6	50	2.5	50	0.1	125	MO-11
W2BK25C	25	120	300	370	1.6	50	2.5	50	0.1	125	MO-11
VW2BJ25E	25	240	300	370	1.6	50	2.5	50	0.1	125	MO-11
WV2BK25E	25	240	300	370	1.6	50	2.5	50	0.1	125	MO-11
W2BJ25E	25	240	300	370	1.6	50	2.5	50	0.1	125	MO-11
W2BK25E	25	240	300	370	1.6	50	2.5	50	0.1	125	MO-11
P211KW	50	120	600	1500	1.6	100	3	150	0.1	125	MO-13
P211K	50	120	600	1500	1.6	100	3	150	0.1	125	MO-13
P211W	50	120	600	1500	1.6	100	3	150	0.1	125	MO-13
P211	50	120	600	1500	1.6	100	3	150	0.1	125	MO-13
P212KW	50	240	600	1500	1.6	100	3	150	0.1	125	MO-13
P212K	50	240	600	1500	1.6	100	3	150	0.1	125	MO-13
P212W	50	240	600	1500	1.6	100	3	150	0.1	125	MO-13
P212	50	240	600	1500	1.6	100	3	150	0.1	125	MO-13
WV2BH25C	25	120	300	370	1.6	50	2.5	50	0.1	125	MO-12
WV2BH25E	25	240	300	370	1.6	50	2.5	50	0.1	125	MO-12
P231K	50	120	600	1500	1.6	100	3	15	0.1	125	MO-14
P232K	50	240	600	1500	1.6	100	3	15	0.1	125	MO-14

Diode Rectifier Bridges

Part	VRRM	$I_{FS(AV)}$ @ T_C		I_{FSM}	I^2t	V_{FM} @ $T_J=25^{\circ}C$		$R_{\theta JC}$	T_J	Input Ø	Package
Number		A	°C	A	A²sec	V	A	°C/W	°C		Outline
NL25	200-1500	25	85	375	585	1.1	12.5	0.75	150	1	RB-1
NL35	200-1500	35	85	400	585	1.1	17.5	0.75	150	1	RB-1
800HB	200-1500	80	85	800	2670	1.6	125	0.2	150	1	RB-2
1000HB	200-1500	100	80	1000	4170	1.4	157	0.18	150	1	RB-2
600HT	200-1500	60	70	500	1040	1.25	95	0.2	150	3	RB-3
1000HT	200-1500	100	100	800	2670	1.25	157	0.18	150	3	RB-3

	Classification	Voltage (V)		Complete Part Number
Part	NL25	20	200V	NL25-200
Number	NL35	1000	1000V	NL35-1000
Nomenclature	1000HB	20	200V	1000HB20
	1000HB	100	1000V	1000HB100

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AC Welding Switches



HS6B

**500-1800V
250A-1375A**



HS86

**500-1800V
250A-1375A**



HS82

**500-1800V
1200A-2400A**



HS90

**500-1800V
250A-1375A**



HS94

**500-1800V
250A-1600A**

Part Number	V _{DRM/RRM} V	I _{RMS} (A) (@100% duty)	I _{TSM} A	I _{TRMS} (A) @ 5 cycles/sec	@ 20 cycles/sec	Max H ₂ O temp °C @1.2 gal/min	Heat Exchanger Assembly Outline
C350	500-1300	250	1800	610	460	40	HS6B, HS86, HS90-1, HS94
C380	500-1600	600	3500	1250	980	40	HS6B, HS86, HS90-1, HS94
C430	500-1300	1375	8000	2500	2200	40	HS6B, HS86, HS90-1, HS94
C431	500-1800	1300	8000	2400	2075	40	HS6B, HS86, HS90-1, HS94
C501	800-1700	1200	8000	2250	1925	40	HS82, HS94
C601	800-1700	1600	11000	3000	2550	40	HS82, HS94
C602	1700-2600	1300	10000	2400	2075	40	HS82, HS94
C701	500-1700	2000	18000	4450	3750	40	HS82
C702	800-2600	2000	15000	4450	3750	40	HS82
C450	500-1400	2400	25000	5400	4500	40	HS82
C451	500-2600	2100	20000	4600	3900	40	HS82

Voltage Matrix

B	200V	PD	1400V	LE	2500V	CM	3600V
D	400V	PM	1600V	LM	2600V	CN	3800V
M	600V	PN	1800V	LN	2800V	DP	4000V
N	800V	L	2000V	LP	3000V	DB	4200V
P	1000V	LB	2200V	CB	3200V	DD	4400V
PB	1200V	LD	2400V	CD	3400V	DE	4500V

Part Number Nomenclature

Classification		Voltage (V)	Heat Sink Assembly	Complete Part Number
C350	N	800V	HS6B	C350NHS6B
	PB	1200V	HS94	C350PBHS94

Closed Loop Current Sensors



NCT25B-A

25A
Board Mount



NCT50B-A

50A
Board Mount



NCT100B-A

100A
Board Mount



NCT100B-T

100A
Board Mount



NCT200P-A

200A
Panel Mount



NCT300P-A

300A
Panel Mount

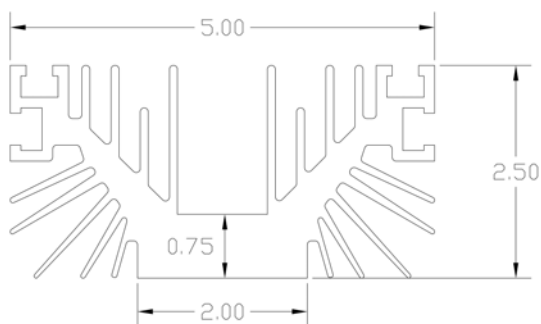


NCT500P-A

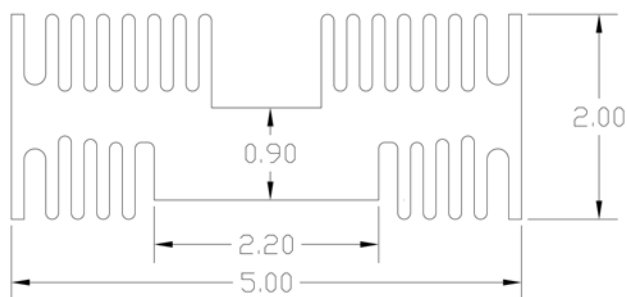
500A
Panel Mount

Part Number	Type	Nominal Current (A)	Construction
NCT25B-A	Closed Loop	25	Board Mount
NCT50B-A	Closed Loop	50	Board Mount
NCT100B-A	Closed Loop	100	Board Mount
NCT100B-T	Closed Loop	100	Board Mount
NCT200P-A	Closed Loop	200	Board Mount
NCT300P-A	Closed Loop	300	Board Mount
NCT500P-A	Closed Loop	500	Board Mount

Typical Extrusion SCR or Diode

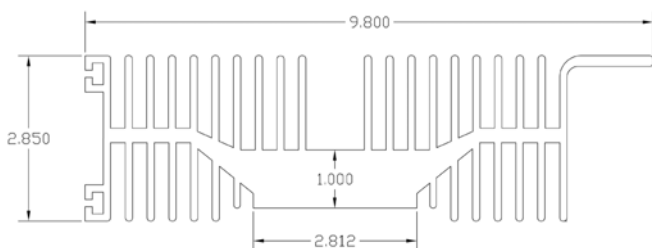


Extrusion - A

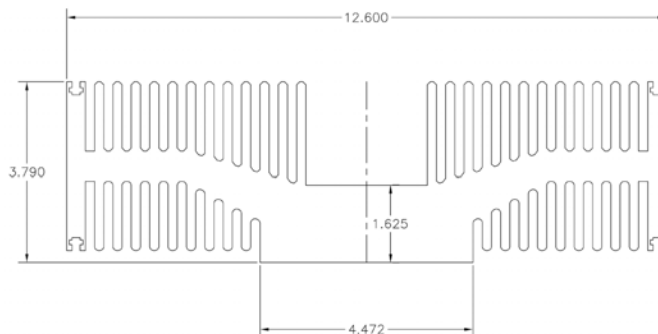


Extrusion - B

Technical Data: PER WT θ_{SA}	Extrusion - A 55.30 IN ² /IN 5.58 LB/FT 1.39 °C/W/3 IN	Extrusion - B 49.60 IN ² /IN 6.53 LB/FT 1.30 °C/W/3 IN
Recommended Devices: SCR Diode	TO-200AB, TO-200AB-2, TO-200AC DO-200AA, DO-200AB	TO-200AB, TO-200AB-2, TO-200AC, P-4 DO-200AA, DO-200AB, DO-200AC
Recommended Clamps: TO-200AB/TO-200AB-2/ DO-200AA TO-200AC/DO-200AB P-4	130-1 & 130-D 139-1 & 139-3G or 139-2 & 139-5H	130-1 & 130-E 139-1 & 139-3H or 139-2 & 139-5J 144-2 & 144-C



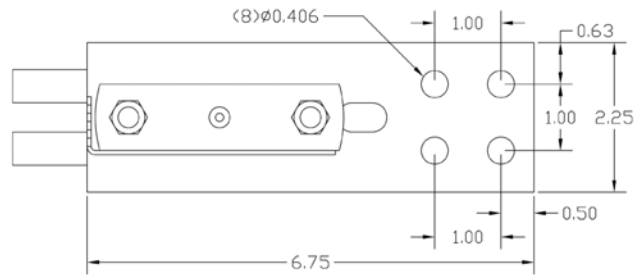
Extrusion - C



Extrusion - D

Technical Data: PER WT θ_{SA}	Extrusion - C 106.79 IN ² /IN 11.00 LB/FT 0.74 °C/W/3 IN	Extrusion - D 157.00 IN ² /IN 20.28 LB/FT 0.65 °C/W/3 IN
Recommended Devices: SCR Diode	TO-200AC, P-4, 63 mm DO-200AB, DO-200AC, 63 mm	P-4, 63 mm, 73 mm DO-200AC, 63 mm, 73 mm
Recommended Clamps: TO-200AC/DO-200AB/P-4/DO-200AC 63 mm/73 mm	144-2 & 144-C 144-2 & 144-D	144-2 & 144-D 144-2 & 144-E

Water-Cooled Blocks SCR or Diode



Technical Data:

Weight: 3.51 - 4.08 lbs

θ_{SW} : 0.028°C/W

Recommended Devices:

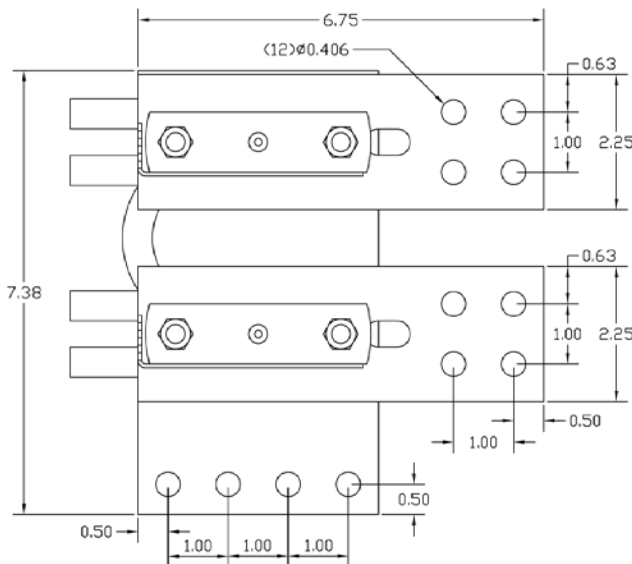
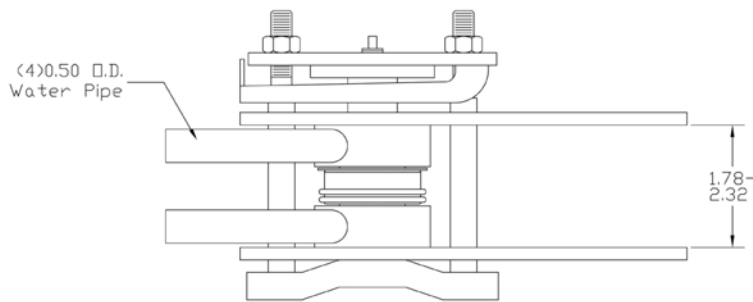
TO-200AB, TO-200AB-2, TO-200AC

DO-200AA, DO-200AB

Recommended Clamps:

For the **TO-200AB, TO-200AB-2, DO-200AA** use **130-1 & 130-E**

For the **TO-200AC, DO-200AB** use the **139-1 & 139-3G** or **139-2** or **139-5H**



Technical Data:

Weight: 6.98 - 10.34 lbs

θ_{SW} : 0.016°C/W

Recommended Devices:

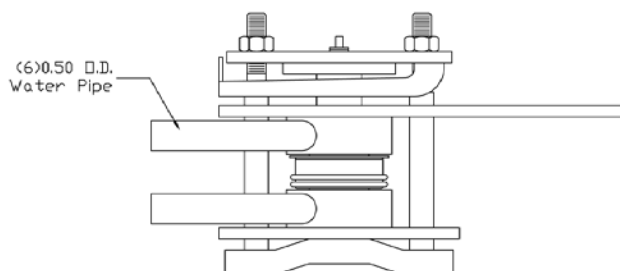
TO-200AB, TO-200AB-2, TO-200AC

DO-200AA, DO-200AB

Recommended Clamps:

For the **TO-200AB, TO-200AB-2, DO-200AA** use **130-1 & 130-E**

For the **TO-200AC, DO-200AB** use the **139-1 & 139-3G** or **139-2** or **139-5H**

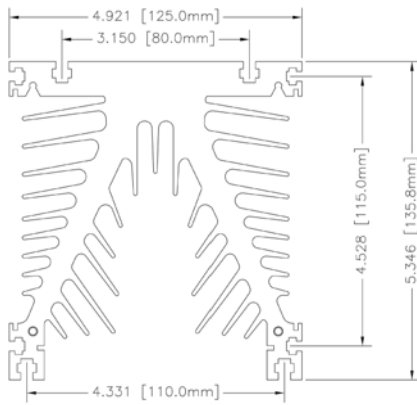


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Heat Sinks for Modules



Technical Data:

392-120: L: 4.725in, Wt: 4.45 lbs, θ_{SA} : 0.50°C/W
 392-180: L: 7.087in, Wt: 6.64 lbs, θ_{SA} : 0.43°C/W
 392-300: L: 11.811in, Wt: 10.42 lbs, θ_{SA} : 0.33°C/W

Recommended Devices:

SCR/Diode Modules, IGBT Modules

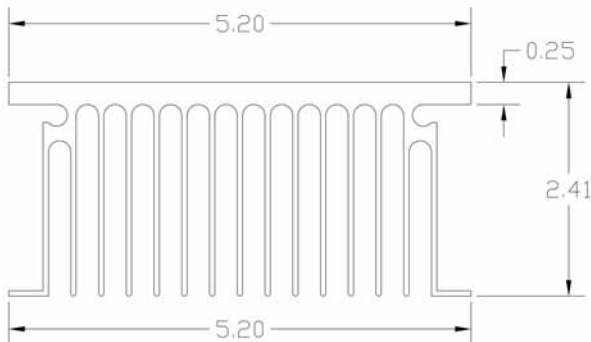
Options:

Cooling Kit:

Part #: 919180 (3-side plates, end bracket, Fan bracket)

Fan: 100 CFM, 12 VDC or 120 VAC

Finish: Gold Iridite or Black Anodize



Technical Data:

511-6/512-6: L: 6.00in, Wt: 2.27-2.57 lbs, θ_{SA} : 0.65°C/W
 511-9/512-9: L: 9.00in, Wt: 3.40-3.85 lbs, θ_{SA} : 0.56°C/W
 511-12/512-12: L: 12.00in, Wt: 4.53-5.13 lbs, θ_{SA} : 0.45°C/W

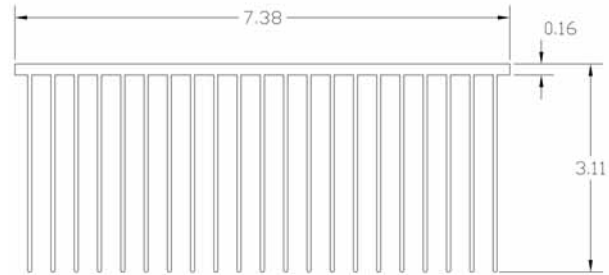
Recommended Devices:

SCR/Diode Modules, IGBT Modules

Options:

Machining: Surface Milling, Drilling, Tapping

Finish: Gold Iridite



Technical Data:

510-3: L: 3.00in, Wt: 1.64 lbs, θ_{SA} : 0.56°C/W
 510-6: L: 6.00in, Wt: 3.28 lbs, θ_{SA} : 0.38°C/W
 510-9: L: 9.00in, Wt: 4.92 lbs, θ_{SA} : 0.29°C/W
 510-12: L: 12.00in, Wt: 6.56 lbs, θ_{SA} : 0.24°C/W

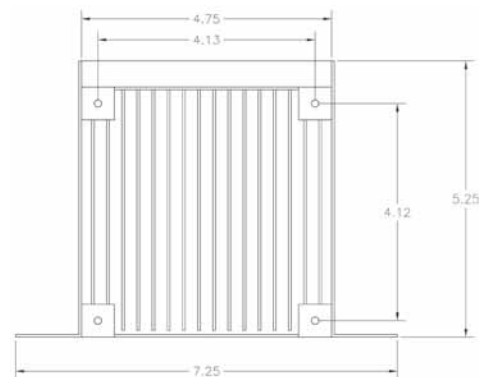
Recommended Devices:

SCR/Diode Modules, IGBT Modules

Options:

Machining: Surface Milling, Drilling, Tapping

Finish: Gold Iridite



Technical Data:

BE8119-12: L: 12.00in, Wt: 6.42 lbs, θ_{SA} : 0.33°C/W
 W: 4.750in, BT: 0.500in, FP: 0.288in
 BE8121-12: L: 12.00in, Wt: 17.31 lbs, JSA: 0.209°C/W
 W: 10.780in, BT: 0.560in, FP: 0.238in

Recommended Devices:

SCR/Diode Modules, IGBT Modules

Options:

Machining: Surface Milling, Drilling, Tapping

Finish: Gold Iridite

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Definitions

$di/dt, -di/dt$	Rate of change of current	R_{thJS}	Thermal resistance junction to heatsink
dv/dt	Rate of rise of voltage	R_{thJW}	Thermal resistance junction to water
$F_{(mounting)}$	Required for to mount hole-less discretes	R_{thKA}	Thermal resistance heatsink to ambient
I_{AVM}	Maximum average forward current	T_{amb}, T_A	Ambient (cooling medium) temperature
I_{DAV}	Average DC output current	T_C, T_{CASE}	Case temperature
I_F, I_T	Forward current	T_J, T_{VJ}	Virtual junction temperature
I_{FM}	Maximum forward current	T_{JM}, T_{VJM}	Maximum virtual junction temperature
I_{FAV}	Average forward current	T_K, T_H, T_S	Heatsink temperature
$I_{F(AV)}, I_{T(AV)M}$	Maximum average forward current	$T_{S(MAX)}$	Maximum allowable heatsink temperature
$I_{F(RMS)}, I_{T(RMS)}$	RMS forward current	T_{stg}	Storage temperature
I_{FSM}, I_{TSM}	Maximum surge forward current	T_q	Turn-off time
I_G, I_{GT}	Trigger gate current	t_r	Current rise time
I_{GD}	Non-trigger current	t_{rr}	Reverse recovery time
I_H	Holding current	V_{DRM}	Maximum repetitive forward blocking voltage
I_{ISOL}	RMS current for isolation test	V_{DSM}	Maximum non-repetitive forward blocking voltage
I_L	Latching current	V_F	Forward voltage
I_R	Reverse current	V_{GT}	Gate trigger voltage
I_{RM}	Maximum reverse recovery current	V_{ISOL}	Isolation voltage
I_{RMS}	RMS Current	V_R	Reverse voltage
I_{RRM}	Maximum repetitive reverse current	V_{RRM}	Maximum repetitive reverse voltage
I^2t	I^2t value for fusing	V_{RSM}	Maximum non-repetitive reverse voltage
M_d	Mounting torque	V_T	Forward voltage
P_D	Power dissipation	V_{TO}	Threshold voltage (for power loss calculation)
P_{GAV}	Average gate power dissipation	Z_{thJC}	Transient thermal impedance junction to case
$P_{G(AV)M}$	Maximum average gate power dissipation	Z_{thJK}, Z_{thJH}	Transient thermal impedance junction to heatsink
P_{GM}	Maximum gate power dissipation		
P_T, P_{tot}	Total power dissipation		
Q_R	Reverse recovery charge		
R_G	Gate resistance		
r_T	Slope resistance (for power loss calculation only)		
R_{thCK}, R_{thCH}	Thermal resistance case to heatsink		
R_{thJA}	Thermal resistance junction to ambient		
R_{thJC}	Thermal resistance junction to case		
R_{thJK}, R_{thJH}	Thermal resistance junction to heatsink		

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Manufacturing Capabilities

Machining

In-house Metalworking

- CNC Vertical Machining Centers (Milling)
- CNC Lathes (Turning)
- Metal Forming
 - Punch Presses
 - Hydraulic Presses
 - Lead Forming
- Qualified Tool and Die Makers
- Non-Ferrous NC Cutoff Machine
 - Aluminum Heatsinks
 - Waveguide Extrusions



Assembly

- Electro-Mechanical
- Mechanical
- Chassis Assembly, Wiring
- Cable
- Kitting



Special Testing

- RF & Microwave Matching

Thermal Management

- Heatsinking
- Water Cooling

Chemical Processing & Finishing Capabilities

Plating

- Bright Nickel, Ductile Nickel, Copper, Silver, Gold
- Chromate Conversion of Aluminum
 - Iridite, (Equivalent to Chem Film and Alodine)
 - Gold or Clear
- Electropolishing of Stainless Steel
- Plating on Aluminum
- Custom Cleaning
 - Cold solvent cleaning, drying, packaging



Corporate Headquarters

Richardson Electronics
40W267 Keslinger Road
P.O. Box 393
LaFox, IL 60147-0393
Telephone: **(888) 735-7358**
(630) 208-2200
Fax: (630) 208-2550
Internet: industrial.rell.com
E-Mail: edg@rell.com

Eastern Sales Region Hdqtrs.
Ronkonkoma, NY
Telephone: **(888) 735-7358**
(631) 468-3900
Fax: (631) 468-3950

Central Sales Region Hdqtrs.
LaFox, IL
Telephone: **(888) 735-7358**
(630) 208-2200
Fax: (630) 208-2550

Western Sales Region Hdqtrs.
Woodland Hills, CA
Telephone: **(888) 735-7358**
(818) 594-5600
Fax: (818) 594-5650

Latin America

Brazil
São Paulo
Telephone: +55 (11) 5186 9655
Fax: +55 (11) 5186 9678

Colombia
Sante Fe de Bogota, DC
Telephone: (57-1) 636-1028
Fax: (57-1) 636-1005

Mexico
Mexico City
Telephone: +52 55 5292-8029
Fax: +52 55 5292-8030

Guadalajara
Telephone: +52 33 31230041
+52 33 31230042
Fax: +52 33 31220565

Europe

Denmark
Hedenhusene
Telephone: (+45) 4655-5630
Fax: (+45) 4655-5631

Finland
Oulunsalo
Telephone: +358-8-825-1100
Fax: +358-8-825-1110

France
Colombes Cedex
Telephone: +33 (1) 55.66.00.30
Fax: +33 (1) 55.66.00.31

Nozay
Telephone: +33 (1) 69.80.71.33
Fax: +33 (1) 69.80.76.28

Germany
Puchheim
Telephone: +49 (89) 890 214-0
Fax: +49 (89) 890 214-90

Hamburg
Telephone: +49 (40) 555 88 410
Fax: +49 (40) 555 88 444

Italy
Sesto Fiorentino (FI)
Telephone: +39 (055) 420831
Fax: +39 (055) 4210726

Agrate Brianza (MI)
Telephone: +39 (039) 653145
Fax: +39 (039) 653835

Roma
Telephone: +39 (06) 41.73.37.51
Fax: +39 (06) 41.73.37.49

Netherlands
Amsterdam
Telephone: +31 (0) 23 5560490
Fax: +31 (0) 23 5560491

Norway
Torod
Telephone: +47 333-86271
Fax: +31 333-83106

Sweden
Stockholm
Telephone: +46 8 564 705 90
Fax: +46 8 760 4663

Spain
Madrid
Telephone: +34 (91) 528 3700
Fax: +34 (91) 467 5468

Barcelona
Telephone: +34 (93) 415 8303
Fax: +34 (93) 415 5379

United Kingdom
Lincoln
Telephone: +44 (1522) 542631
Fax: +44 (1522) 545453

Slough
Telephone: +44 (1753) 733010
Fax: +44 (1753) 733012

Middle East
Israel
Ra'Anana
Telephone: 972-9-7483232
Fax: 972-9-7416510

Asia/Pacific Rim/Australia
Australia
Castle Hill
ABN 19 069 808 108
Phone: +61 1300 882 819
Fax: +61 (02) 9894 7481

Bayswater
ABN 19 069 808 108
Phone: +61 1300 882 819
Fax: +61 (3) 9738 1807

China
Beijing
Telephone: +86-10-65885548
Fax: +86-10-65885541

Chengdu
Telephone: +86-28-8620-3488
Fax: +86-28-8620-3499
Nanjing
Telephone: 86-25-8320-0266
Fax: 86-25-8320-0299

Shanghai
Telephone: +86 (21) 62351788
Fax: +86 (21) 6440-1293

Shenzhen
Telephone: +86-755-82943736
Fax: +86-755-82940656

Japan
Tokyo
Telephone: +81 (3) 5844-0521
Fax: +81 (3) 5844-0527

Osaka
Telephone: +81 (6) 6314-5557
Fax: +81 (6) 6314-5558

Korea
Seoul
Telephone: +82 (2) 539-4731
Fax: +82 (2) 539-4730

Malaysia
Selangor
Telephone: +60 (3) 5511-5421
Fax: +60 (3) 5511-5423

Philippines
Pasig City
Telephone: +63 (2) 636-8891
Fax: +63 (2) 635-5721

Singapore
Telephone: +65 6487-5995
Fax: +65 6487-5665

Taiwan
Taipei
Telephone: +886 (2) 26983288
+886 (2) 86915238
Fax: +886 (2) 26983285

Thailand
Bangkok
Telephone: +66 (2) 749-4402
Fax: +66 (2) 749-4403

Vietnam
Ho Chi Minh City
Telephone: +84 8997 4245
+84 8997 4246
Fax: +84 8997 4071

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