IXYS

IGBT & Rectifier Modules

MAY 2007

Selector Guide incl.:

Product Overview Tables

Application Overview

Technology Overview

MiniPack 2 NEW

Press-Pack IGBTs

IXYS Corporation is a global supplier of Power and Control Semiconductors with a wide range of Power MOSFETs, IGBTs, Bipolar products, GaAs RF devices, Mixed-Signal ICs, Modules and subsystem solutions that provide higher efficiency, reduced energy cost and improved performance in a wide range of power management and system applications. For over 20 years, IXYS has been at the forefront of Power Semiconductor and IC technologies having over 120 patents and innovations in the development of the IGBTs, High Current Power MOSFETs, Fast Recovery Diodes, BiMOSFETs, Reverse Blocking IGBTs, Gate Driver ICs, SOI technology, Opto-coupled ICs for telecommunication and VOIP, flat and flexible Display Driver ICs, Solar cells and GaAs RF PHEMT.

Since the beginning of the Internet boom, IXYS has been recognized as the leader in the Telecom and IT infrastructure Power Supply market with its family of »ruggedized« Power MOSFETs known as HiPerFETs™. IXYS also achieved a leadership position in the burgeoning Factory Automation market with its innovation in Direct Bond Copper (DCB) module technology and a family of industrial rated Power Semiconductors and Integrated Power Modules.

IXYS serves a variety of consumers and industries, including energy management and conservation, wind power, medical, automotive, transportation, military and aerospace, through an extensive product portfolio produced by its seven divisions. Headquartered in Santa Clara, California, IXYS is a public company trading on the **NASDAQ**. IXYS continually focuses on serving the global market through its divisions: IXYS Corp and IXYS Semiconductor GmbH for power products, Westcode for high power bipolar products, Clare and Micronix for Mixed Signal ICs and ASICs, MwT for GaAs RF products, and IXYS COLORADO for RF POWER systems and RF Silicon products.

To date, IXYS has substantially grown its business around its key strategic objective to become a more diversified supplier of medium to high power devices, mixed signal ICs, optoelectronic and RF semiconductors, keeping the emphasis on »power« as the company's strategic theme.

IXYS *IGBTs*

IXYS *Rectifier Bridges*

Sales Representatives and Distributors: See „Sales Offices“ at

www.ixys.com

Outline Drawings

IXYS
WESTCODE

For further products see main cata

Please note:

IXYS offers the broadest line of
including our PT line of IGBT's t
1986, which we improved on.

Please refer to factory for your s
our Fast PT IGBT based product

IGBT & Rectifier Modules Catalog,

Note
As far as patents or other rights of thi
liability is only assumed for compone
cations, processes and circuits imple
or assemblies. The information desc
nent and shall not be considered as
Stress above one or more of the lin
permanent damage to the device. T
only and operation of the device at th
ditions above those given in the chara
specification is not implied. Exposure
tended periods may affect device rel
and rights to change design or speci
Changes have been made to earlier
The data herein supersedes all previ
tions.

Life support applications
IXYS products used in life support
systems where malfunction of these
be expected to result in personal inju
horized for such purposes.

IXYS Semiconductor GmbH

ISO/TS 16949:2002
(includes ISO 9001:2000)

ISO 14001:2004

CLARE

ISO 9001:2000

micronix

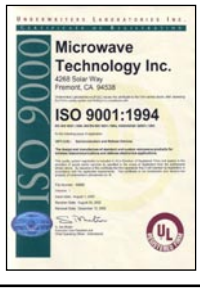
ISO 9001:2000

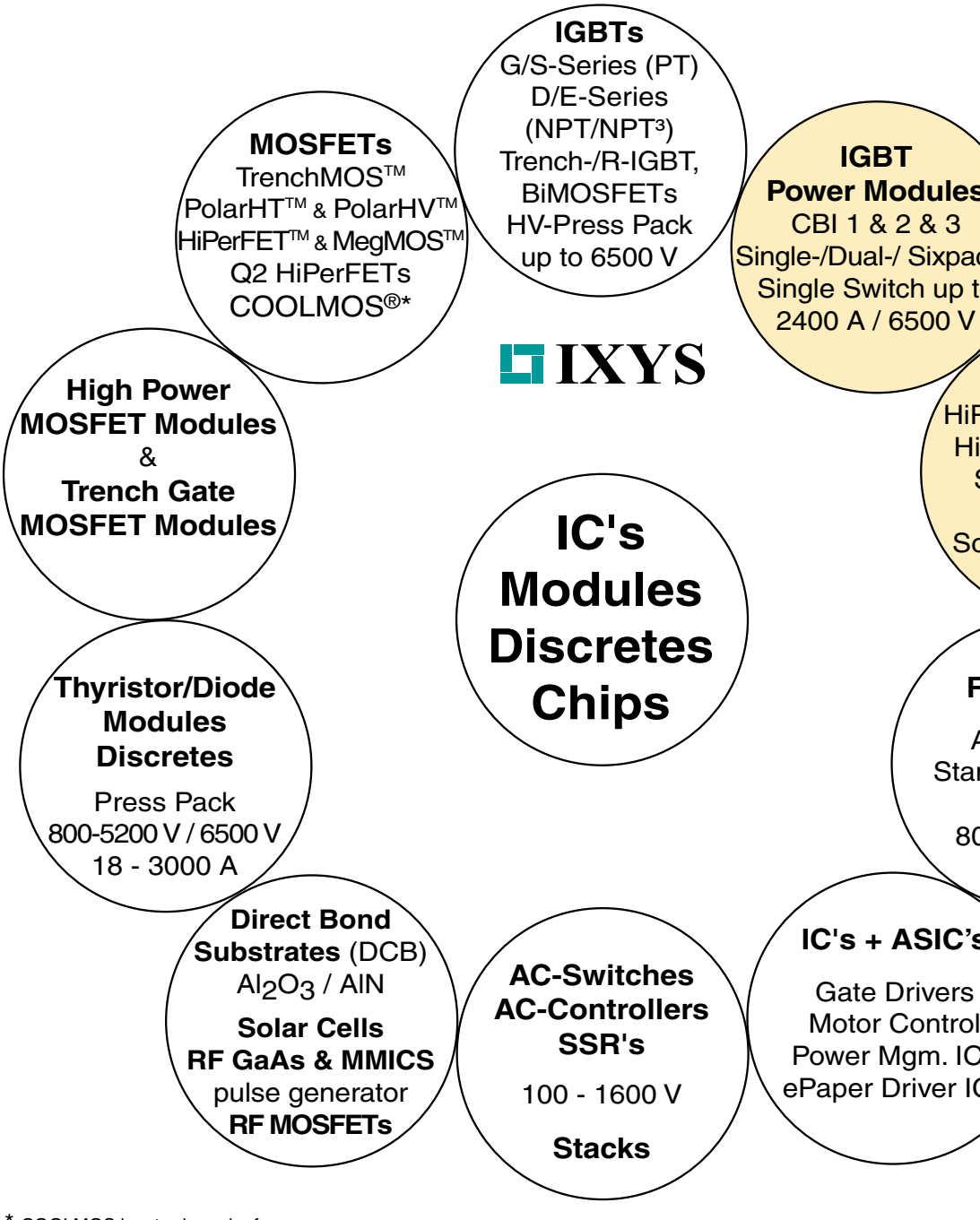
WESTCODE

BS EN 9001:2000

MwT MicroWave Technology

ISO 9001:2000





* COOLMOS is a trademark of Infineon Technologies AG.

I_C	Collector current
I_{CES}	Leakage current
I_{GES}	Gate - emitter leakage current
I_{C25}	Continuous DC collector current at T_C = 25°C
I_{C90}	Continuous DC collector current at T_C = 90°C
I_{CM}	Maximum pulsed collector current in on state
I_{DAV}	Average DC output current (rectifier output)
$I_{D(AV)M}$	Maximum average DC output current
I_F	Forward current (diode)
I_{FAV}	Average forward current
I_{FSM}	Maximum surge forward current
I_{RM}	Maximum reverse recovery current
I^2t	I^2t value for fusing
NTC	Thermistor
Q_r	Reverse recovery charge
r_T , R_0	Slope resistance (for power loss calculation)
R_{thJC}	Thermal resistance junction to case
R_{thJK}; R_{thJH}	Thermal resistance junction to heatsink
T_C	Case temperature
T_{Jmax}, T_{VJM}	Maximum virtual junction temperature
t_{rr}	Reverse recovery time
$V_{CE(sat)}$	Collector emitter saturation voltage
V_{CES}	Collector emitter voltage
V_{RRM}	Maximum repetitive reverse voltage
V_{T0} , V_0	Threshold voltage (for power loss calculation)
$V_{GE(th)}$	Threshold voltage

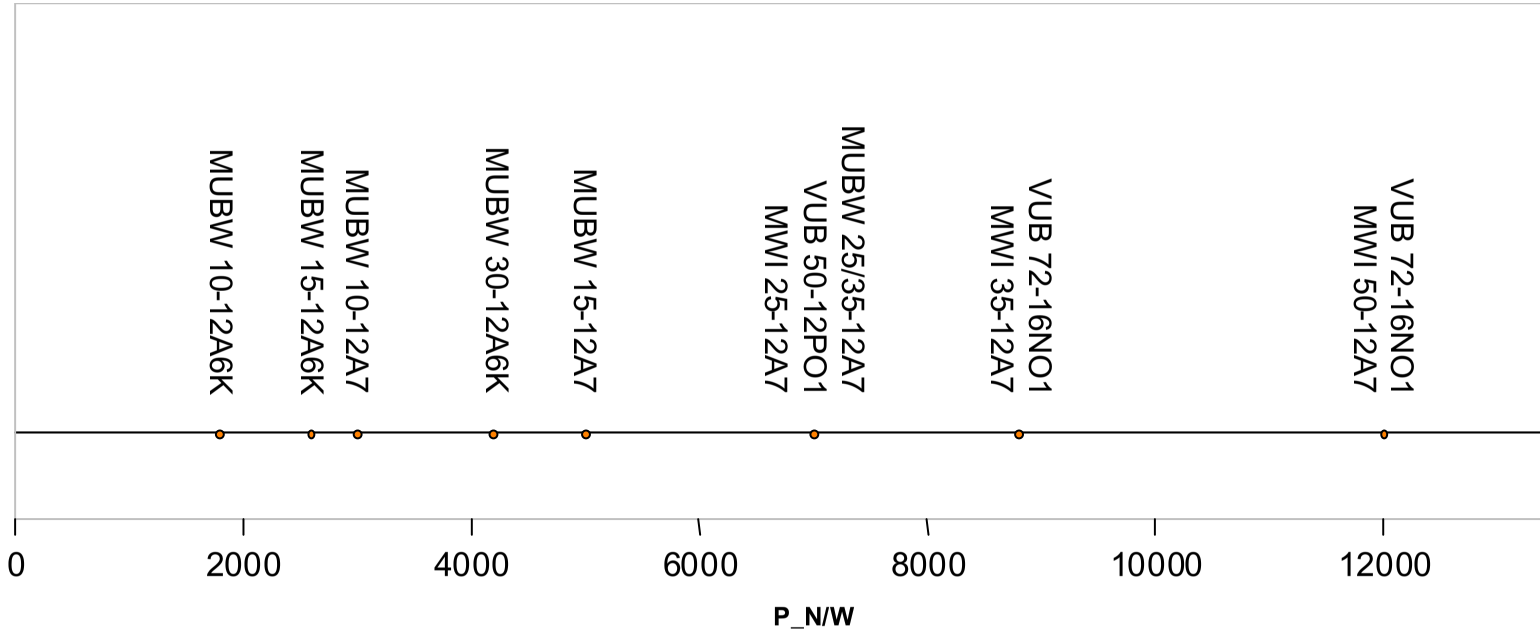
V								Module
	C							Thyristor
	D							Diode
	I							IGBT with SCSOA capa
	M							MOSFET
	W							Three phase bridge
	U							Uncontrolled 3 phase in
		C						Thyristor
		D						Diode
		I						IGBT with SCSOA capa
		K						Common cathode
		M						MOSFET
		O						No meaning. Reserved f
		BW						Brake chopper and IGBT
			100					Current rating 100 = 100
				-12				Voltage class, 12 = 1200
					A			NPT IGBT
					E			NPT[3] IGBT
					F			Fast NPT IGBT
					G			PT IGBT
					T			Trench IGBT
						6K		E1 Package
						7		E2 Package
						8		E3 Package
						9		E+ Package
						10		High Power Module
						11		High Power Module with clearance and creepage
							T	NTC temperature senso

New nomenclature

M	I	AA	10	WB	600	T	MH	Example
M								Module
	I							IGBT
		AA						NPT
		TA						Trench standard v
		TB						Trench fast versio
			10					Current
				W				Six-Pack
				WB				Six-Pack with 3~ I
				WD				Six-Pack with 1~ I
				WE				Six-Pack with 1~ I
				WF				Six-Pack with 3~ I
					600			Voltage
						T		NTC inside
							MH	MiniPack 2 housir

CBI-Modules 1200 V

Estimation of typ. nom. power of the drive connection to 230/400 V 3~



41					MWI 60 - 06
30	MWI 30 - 06 A7(T)				
50	MWI 50 - 06 A7(T)				
60	MWI 75 - 06 A7(T)				
88	MWI 100 - 06 A8 (T)				
115	MWI 150 - 06 A8 (T)				
155	MWI 200 - 06 A8 (T)				
			1200 V		
13	MWI 15 - 12 A6K				
21		➢ MWI 30 - 12 E6K			
31				MWI 45 - 12 T6K	
36		➢ MWI 50 - 12 E6K			
41				MWI 60 - 12 T6K	
56				MWI 80 - 12 T6K	
20	MWI 15 - 12 A7				
35	MWI 25 - 12 A7(T)	MWI 25 - 12 E7			
44	MWI 35 - 12 A7(T)				
50				MWI 50-12T7T*	
60	MWI 50 - 12 A7(T)				
62		MWI 50 - 12 E7			
75				MWI 75-12T7T*	
75				MWI 75-12T8T*	
85	MWI 75 - 12 A8 (T)				
90		MWI 75 - 12 E8			
100				MWI 100-12T8T*	
110	MWI 100 - 12 A8 (T)				
115		MWI 100 - 12 E8			
150				MWI 150-12T8T*	
250		➢ MWI 225 - 12 E9			
375		➢ MWI 300 - 12 E9			
440		➢ MWI 450 - 12 E9			
			1700 V		
235		➢ MWI 225 - 17 E9			
350		➢ MWI 300 - 17 E9			
440			➢ MWI 451 - 17 E9		

* different pin-out compared to NPT and NPT^3 modules

13	➢ MIAA10WB600TMH			
16	➢ MIAA15WB600TMH			
20	➢ MIAA20WB600TMH			
27	➢ MIAA30WB600TMH			
8	MUBW 10 - 06 A6K			
14	MUBW 15 - 06 A6K			
17	MUBW 20 - 06 A6K			
21	MUBW 25 - 06 A6K			
29	MUBW 35 - 06 A6K			
15	MUBW 10 - 06 A7			
18	MUBW 15 - 06 A7			
25	MUBW 20 - 06 A7			
35	MUBW 30 - 06 A7			
50	MUBW 50 - 06 A7			
50	MUBW 50 - 06 A8			
65	MUBW 75 - 06 A8			
85	MUBW 100 - 06 A8			
		1200 V		
11			➢ MITA10WB1200TMH	➢ MITB10WE
17			➢ MITA15WB1200TMH	➢ MITB15WE
13	MUBW 15 - 12 A6K			
21	MUBW 30 - 12 A6K	➢ MUBW 30 - 12 E6K		
32			➢ MUBW 45 - 12 T6K	
15	MUBW 10 - 12 A7		➢ MUBW 15-12T7	
25	MUBW 15 - 12 A7		➢ MUBW 25-12T7	
35	MUBW 25 - 12 A7			
35	MUBW 35 - 12 A7	MUBW 35 - 12 E7		
40				➢ MUBW 40-
35	MUBW 35 - 12 A8			
50			➢ MUBW 50 - 12 T8	
60	MUBW 50 - 12 A8	MUBW 50 - 12 E8		
75			➢ MUBW 75 - 12 T8	
		1700 V		
53			MUBW 50 - 17 T8	
80			MUBW 80 - 17 T8	

Full Bridge Modules (Four Pack)

I_{C80} [A]	NPT	Fast NPT	NPT[3]	Trench S
		600 V		
67				MWI 80 -
45	MKI 50 - 06 A7(T)			
67	MKI 65 - 06 A7 (T)			
85	MKI 75 - 06 A7			
		1200 V		
45		MKI 50 - 12 F7		
62			MKI 50 - 12 E7	
85		MKI 100 - 12 F8		
90			MKI 75 - 12 E8	
115			MKI 100 - 12 E8	

networks possible
- frequency range to well above 100 kHz
- low switching losses
- compact equipment design
- high efficiency

The IGBT is suitable for numerous applications in power electronics, especially in Pulse Width

cuits. Optimized IGBTs are available for both low conduction loss and low switching loss. See table 1 and 2.

Discrete standard „G“ series IGBTs are characterized by a high control gain, which limits their short-circuit withstand time. Newer „S“, „D“ and „E“ series products utilize newly

for use in IGBT cir
requiring high dio
The IGBT modul
ded (DCB) subst
aluminium oxide
copper is directl
techniques develo

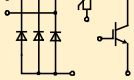
Chip Type	Low V_{CEsat}	Low Switching Losses	R_{thJC}	Short Circuit Rated
Low loss NPT	-	-	++	yes
Fast NPT	- -	++	++	yes
NPT³	o	+	++	yes
Standard Trench	++	o	+	yes
Fast Trench	++	+	+	yes
PT IGBT	-	+++	++	no/yes
PT IGBT LV*	+++	++++	++	no

IGBT Modules

PT IGBT	punch through IGBT, very low switching losses, someone short circuit rated
PT IGBT LV*	punch through IGBT 250 - 300 V, very fast, low V_{SAT} up to 200 kHz switching, *for new*
NPT IGBT	non-punch through insulated gate bipolar transistor; square RBSOA, short circuit rate
NPT³ IGBT	improved NPT IGBT • reduced Vcesat • reduced switching losses • optimized for switching frequencies from 10 kHz up to 25 kHz
Trench IGBT	improved NPT IGBT • very low Vcesat • reduced switching losses • optimized for switching frequencies up to 10 kHz
SPT+	soft punch through IGBT, improved NPT³ IGBT

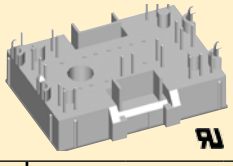
Outline drawings on pages O-1...O-3

See data sheet for pin arrangement



Type	Rectifier 3~			Inverter 3~					Bra
	V_{RRM}	I_{DAVM} T_H = 80°C	R_{thJC} typ.	V_{CES}	I_C T_C = 25°C	I_C T_C = 80°C	$V_{CE(sat)}$ typ.	R_{thJC} typ.	V_{CES}
	V	A	K/W	V	A	A	V	K/W	V
600 V NPT IGBT									
MIAA10WB600TMH	1600	62	2.1	600	18	13	2.1	1.8	600
MIAA10WF600TMH		62	2.1		18	13	2.1	1.8	no brake
MIAA15WB600TMH		62	2.1		23	16	2.1	1.6	600
MIAA20WB600TMH		62	2.1		29	20	2.1	1.3	
600 V Trench IGBT									
MITA30WB600TMH	1600	90	1.4	600	40	27	1.5	1.4	600
1200 V Trench IGBT									
MITA10WB1200TMH	1600	62	2.1	1200	17	12	1.8	1.9	1200
MITA15WB1200TMH		62	2.1		30	21	1.8	1.1	
MITB10WB1200TMH		62	2.1		17	12	1.9	1.85	
MITB15WB1200TMH		62	2.1		29	20	1.7	1.2	

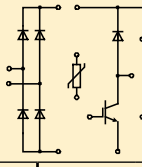
CBI



X110 MiniPack2
Package style

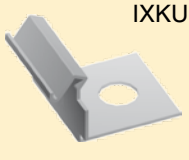
Outline drawings on pages O-1...O-3

See data sheet for pin arrangement



Type	Rectifier			Inverter					Bra
	V_{RRM}	I_{DAVM} T_H = 80°C	R_{thJC} typ.	V_{CES}	I_C T_C = 25°C	I_C T_C = 80°C	$V_{CE(sat)}$ typ.	R_{thJC} typ.	V_{CES}
	V	A	K/W	V	A	A	V	K/W	V
600 V NPT IGBT									
MIAA10WE600TMH	1600	23	2.1	600	18	13	2.1	1.8	600
MIAA10WD600TMH		23	2.1		18	13	2.1	1.8	no brake
MIAA15WE600TMH		23	2.1		23	16	2.1	1.6	600
MIAA15WD600TMH		23	2.1		23	16	2.1	1.6	no brake
MIAA20WE600TMH		23	2.1		29	20	2.1	1.3	600
MIAA20WD600TMH		23	2.1		29	20	2.1	1.3	no brake

Mechanical mounting part



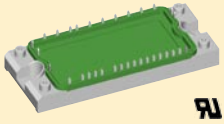
IXKU 5-505

See data sheet for pin arrangement

Type	Rectifier 3~			Inverter 3~					
	V_{RRM} V	I_{DAVM} T_H = 80°C A	R_{thJC} typ. K/W	V_{CES} V	I_C T_C = 25°C A	I_C T_C = 80°C A	$V_{CE(sat)}$ typ. V	R_{thJC} typ. K/W	V
600 V NPT IGBT									
MUBW 10-06A6K	1600	61	2.1	600	12	8	2.5	2.8	
MUBW 15-06A6K		65	1.9		19	14	2.4	1.7	
MUBW 20-06A6K		65	1.9		25	17	2	1.5	6
MUBW 25-06A6K		65	1.9		31	21	2.1	1.25	
MUBW 35-06A6K		89	1.4		42	29	2.3	0.95	
1200 V NPT IGBT									
MUBW 15-12A6K	1600	89	1.4	1200	19	13	3	1.35	1
MUBW 30-12A6K		89	1.4		30	21	3	0.95	
1200 V NPT³ IGBT									
MUBW 30-12E6K	1600	89	1.4	1200	30	21	3.1	0.95	1
1200 V Trench IGBT									
MUBW 45-12T6K	1600	104	1.1	1200	43	31	2.5	0.8	1

CBI 2

IGBT Modules

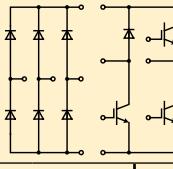


X112 E2-pack

Package style

Outline drawings on pages O-1...O-3

See data sheet for pin arrangement



Type	Rectifier 3~			Inverter 3~					
	V_{RRM} V	I_{DAVM} T_H = 80°C A	R_{thJC} typ. K/W	V_{CES} V	I_C T_C = 25°C A	I_C T_C = 80°C A	$V_{CE(sat)}$ typ. V	R_{thJC} typ. K/W	V
600 V NPT IGBT									
MUBW 10-06A7	1600	18	1.5	600	20	15	1.9	1.5	
MUBW 15-06A7		18	1.5		25	18	1.9	1.3	
MUBW 20-06A7		24	1.3		35	25	1.9	1	6
MUBW 30-06A7		24	1.3		50	35	1.9	0.7	
MUBW 50-06A7		29	1.1		75	50	1.9	0.5	
1200 V NPT IGBT									
MUBW 10-12A7	1600	18	1.5	1200	20	15	2.3	1.2	
MUBW 15-12A7		24	1.3		35	25	2	0.7	1
MUBW 25-12A7		24	1.3		50	35	2.2	0.55	
MUBW 35-12A7		29	1.1		50	35	2.5	0.55	
1200 V NPT³ IGBT									
MUBW 35-12E7	1600	29	1.1	1200	52	36	2.2	0.55	1
1200 V Trench IGBT									
MUBW15-12T7	1600	24	1.3	1200	25	15	1.7	1.2	
MUBW25-12T7		24	1.3		40	25	1.7	0.8	1
MUBW40-12T7		80	1.3		62	44	2.0	0.8	

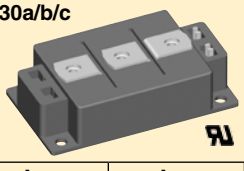
Type	Rectifier 3~			Inverter 3~					Bral
	V_{RRM} V	I_{DAVM} T_H = 80°C A	R_{thJC} typ. K/W	V_{CES} V	I_C T_C = 25°C A	I_C T_C = 80°C A	$V_{CE(sat)}$ typ. V	R_{thJC} typ. K/W	V_{CES} V
600 V NPT IGBT									
MUBW 50-06A8	1600	40	1.1	600	75	50	1.9	0.5	600
MUBW 75-06A8		46	0.94		100	65	2	0.39	
MUBW 100-06A8		60	0.73		125	85	1.9	0.3	
1200 V NPT IGBT									
MUBW 35-12A8	1600	27	1.3	1200	50	35	2.5	0.55	1200
MUBW 50-12A8		46	0.94		85	60	2.2	0.35	
1200 V NPT³ IGBT									
MUBW 50-12E8	1600	50	0.94	1200	90	62	1.9	0.35	1200
1200 V Trench IGBT									
MUBW 50-12T8	1600	50	0.94	1200	75	50	1.7	0.45	1200
MUBW 75-12T8		50	0.94		105	75	1.7	0.35	
1700 V Trench IGBT									
MUBW 50-17T8	2200	120	1.1	1700	74	53	2.0	0.43	1700
MUBW 75-17T8		140	0.95		113	80	2.0	0.48	

Phase-Leg Modules

NPT

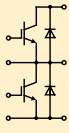
IGBT Modules

X130a/b/c



Outline drawings on pages O-1...O-3

See data sheet for pin arrangement



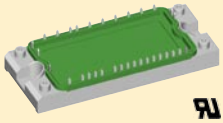
MII

Type ➢ New	V_{CES} V	I_{C25} A T_C = 25°C IGBT	I_{C80} A T_C = 80°C IGBT	$V_{CE(sat)}$ typ V T_J = 25°C IGBT	E_{off} mJ T_J = 125°C IGBT	R_{thJC} K/W IGBT	I_{F25} A T_C = 25°C diode	T_C d
1200 V Half Bridge with 3rd generation NPT³								
➢ **MII 300-12E4**	1200	280	200	2.0	20	0.11	300	
➢ **MII 400-12E4**		420	300	2.2	30	0.08	450	
1200 V Boost chopper with 3rd generation NPT³								
➢ **MID 400-12E4**	1200	420	300	2.2	30	0.08	450	
1200 V Buck chopper with 3rd generation NPT³								
➢ **MDI 400-12E4**	1200	420	300	2.2	30	0.08	450	

Type	V_{CES} V	I_{C25} A T_C = 25°C IGBT	I_{C80} A T_C = 80°C IGBT	$V_{CE(sat)\ typ}$ V T_J = 25°C IGBT	E_{off} mJ T_J = 125°C IGBT	R_{thJC} K/W IGBT	I_F A T_C = 25 dio
600 V PT IGBT							
MWI 60-06G6K	600	60	41	2.3	0.5	0.7	4
1200 V NPT IGBT							
MWI 15-12A6K	1200	19	13	3	1.1	1.37	2
1200 V NPT³ IGBT							
MWI 30-12E6K	1200	29	21	2.5	1.8	0.95	2
MWI 50-12E6K		51	36	2.4	2.6	0.6	4
1200 V Trench IGBT							
MWI 45-12T6K	1200	43	31	1.9	3.4	0.8	4
MWI 60-12T6K		58	41	1.9	4.8	0.62	4
MWI 80-12T6K		80	56	2	6.5	0.46	8

Sixpack

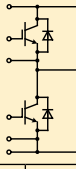
IGBT Modules



X112 E2-pack
Package style

Outline drawings on pages O-1...O-3

See data sheet for pin arrangement

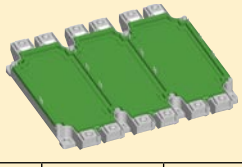


Type	V_{CES} V	I_{C25} A T_C = 25°C IGBT	I_{C80} A T_C = 80°C IGBT	$V_{CE(sat)\ typ}$ V T_J = 25°C IGBT	E_{off} mJ T_J = 125°C IGBT	R_{thJC} K/W IGBT	I_F A T_C = 25 dio
600 V NPT IGBT							
MWI 30-06A7	600	45	30	1.9	1	0.88	3
MWI 30-06A7T		45	30	1.9	1	0.88	3
MWI 50-06A7		75	50	1.9	1.7	0.55	7
MWI 50-06A7T		75	50	1.9	1.7	0.55	7
MWI 75-06A7		90	60	2.1	2.5	0.44	1
MWI 75-06A7T		90	60	2.1	2.5	0.44	1
1200 V NPT IGBT							
MWI 15-12A7	1200	30	20	1	1.8	0.88	2
MWI 25-12A7		50	35	2.2	2.8	0.55	5
MWI 25-12A7T		50	35	2.2	2.8	0.55	5
MWI 35-12A7		62	44	2.2	4.2	0.44	5
MWI 35-12A7T		62	44	2.2	4.2	0.44	5
MWI 50-12A7		85	60	2.2	5.6	0.35	1
MWI 50-12A7T		85	60	2.2	5.6	0.35	1
1200 V NPT³ IGBT							
MWI 25-12E7	1200	52	36	1.9	2.5	0.55	5
MWI 50-12E7		90	62	2.1	4	0.35	1
1200 V Trench IGBT							
MWI 50-12T7T	1200	75	50	1.7	6.5	0.49	1
MWI 75-12T7T		105	75	1.7	9.5	0.35	1

Type	V_{CES} V	I_{C25} A T_C = 25°C IGBT	I_{C80} A T_C = 80°C IGBT	$V_{CE(sat)\ typ}$ V T_J = 25°C IGBT	E_{off} mJ T_J = 125°C IGBT	R_{thJC} K/W IGBT	I_{F25} A T_C = 25°C diode	T 8 di
600 V NPT IGBT								
MWI 100-06A8	600	130	88	2	2.9	0.3	140	
MWI 100-06A8T		130	88	2	2.9	0.3	140	
MWI 150-06A8		170	115	2	4.6	0.24	210	
MWI 150-06A8T		170	115	2	4.6	0.24	210	
MWI 200-06A8		215	155	2	6.3	0.18	260	
MWI 200-06A8T		215	155	2	6.3	0.18	260	
1200 V NPT IGBT								
MWI 75-12A8	1200	125	85	2.2	10.5	0.25	150	
MWI 75-12A8T		125	85	2.2	10.5	0.25	150	
MWI 100-12A8		160	110	2.2	14.6	0.19	200	
MWI 100-12A8T		160	110	2.2	14.6	0.19	200	
1200 V NPT[3] IGBT								
MWI 75-12E8	1200	130	90	2	7.5	0.25	150	
MWI 100-12E8		165	115	2	10.0	0.19	200	
1200 V Trench IGBT								
MWI 75-12T8T	1200	100	75	1.7	9.5	0.35	150	
MWI 100-12T8T		140	100	1.7	12.0	0.26	200	
MWI 150-12T8T		200	150	1.7	17.0	0.18	tbd	

Sixpack

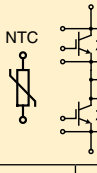
IGBT Modules



X114 E9-pack
Package style

Outline drawings on pages O-1...O-3

See data sheet for pin arrangement

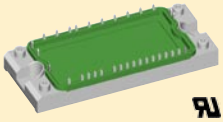


Type	V_{CES} V	I_{C25} A T_C = 25°C IGBT	I_{C80} A T_C = 80°C IGBT	$V_{CE(sat)\ typ}$ V T_J = 25°C IGBT	E_{off} mJ T_J = 125°C IGBT	R_{thJC} K/W IGBT	I_{F25} A T_C = 25°C diode
1200 V NPT[3] IGBT							
MWI 225-12E9	1200	355	250	2.1	20	0.09	
MWI 300-12E9		530	375	2	30	0.06	
MWI 450-12E9		640	440	2.2	45	0.057	
1700 V NPT[3] IGBT							
MWI 225-17E9	1700	335	235	2.5	54	0.085	
MWI 300-17E9		500	350	2.3	80	0.057	
1700 V SPT[+] IGBT							
MWI 451-17E9	1700	580	475	2.25	90	0.057	

Type ➢ New	V_{CES} V	I_{C25} A T_C = 25°C IGBT	I_{C80} A T_C = 80°C IGBT	$V_{CE(sat)\ typ}$ V T_J = 25°C IGBT	E_{off} mJ T_J = 125°C IGBT	R_{thJC} K/W IGBT	I_{F25} A T_C = 25°C diode
600 V Trench IGBT							
➢ **MKI 80-06T6K**	600	89	67	1.8	2.8	0.6	105

Full Bridge

IGBT Modules



X112 E2-pack
Package style

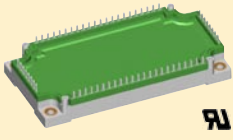
Outline drawings on pages O-1...O-3

See data sheet for pin arrangement

Type	V_{CES} V	I_{C25} A T_C = 25°C IGBT	I_{C80} A T_C = 80°C IGBT	$V_{CE(sat)\ typ}$ V T_J = 25°C IGBT	E_{off} mJ T_J = 125°C IGBT	R_{thJC} K/W IGBT	I_{F25} A T_C = 25°C diode
600 V NPT IGBT							
MKI 50-06A7	600	72	50	1.9	1.7	0.55	72
MKI 50-06A7T		72	50	1.9	1.7	0.55	72
➢ **MKI 65-06A7T**		100	67	2.0	2.3	0.39	140
MKI 75-06A7		90	60	2.5	6.3	0.44	140
MKI 75-06A7T		90	60	2.5	6.3	0.44	140
1200 V Fast NPT IGBT							
MKI 50-12F7	1200	65	45	3.2	2.5	0.35	110
1200 V NPT³ IGBT							
MKI 50-12E7	1200	90	62	1.9	4.0	0.35	110

Full Bridge

IGBT Modules

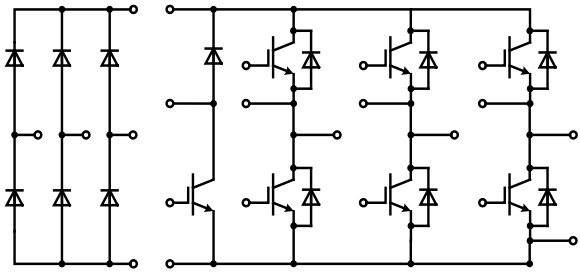


X113 E3-pack
Package style

Outline drawings on pages O-1...O-3

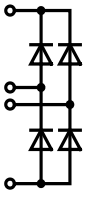
See data sheet for pin arrangement

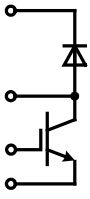
Type	V_{CES} V	I_{C25} A T_C = 25°C IGBT	I_{C80} A T_C = 80°C IGBT	$V_{CE(sat)\ typ}$ V T_J = 25°C IGBT	E_{off} mJ T_J = 125°C IGBT	R_{thJC} K/W IGBT	I_{F25} A T_C = 25°C diode
1200 V Fast NPT IGBT							
MKI 100-12F8	1200	65	45	3.2	2.5	0.35	110
1200 V NPT³ IGBT							
MKI 75-12E8	1200	130	90	2.0	7.5	0.25	150
MKI 100-12E8		150	115	2.0	10	0.19	200



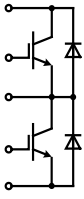
Rectifier Bridge **Brake (Boost)** **Converter (3x pl**

FBO 16-12N
FBO 40-12N



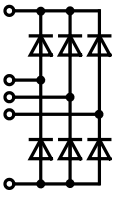


FID 35-06C
FID 36-06D
FID 60-06D



FII 30-06D
FII 40-06D
FII 30-12E
FII 50-12E

FUO 22-12N
FUO 22-16N
FUO 50-16N

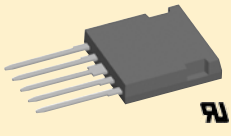


* PT IGBT LV alv
(*inquire factory*

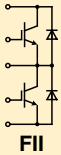
Building blocks for your ideal converter

ISOPLUS i4-PAC™

Package



X024a
Package style
Outline drawings on pages O-1...O-4



FII

Type	Configu-ration	Technology	V_{RRM} / V_{CES} V	I_{C25} @ 25°C A	$I_{D(AV)M}$ / I_{C80} @ 90°C A
FBO 16-12N	*1~*	Rectifier Bridge	1200		22
FBO 40-12N					40
FUO 22-12N	*3~*	Rectifier Bridge	1200		27
FUO 22-16N			1600		27
FUO 50-16N			1600		50
FID 35-06C	*boost*	NPT IGBT & HiPerDynFRED	600	38	24
FID 36-06D		NPT IGBT & HiPerFRED		38	24
FID 60-06D		NPT IGBT & HiPerFRED		65	40
FII 30-06D	*phaseleg*	NPT IGBT	600	30	18
FII 40-06D		NPT IGBT	600	40	25
FII 30-12E		NPT³ IGBT	1200	32	20
FII 50-12E		NPT³ IGBT	1200	50	32

appropriate accessories for designing compact power converter operating from AC mains up to 690 V.

- captured nuts;
- series-connected diode/diode, thyristor/diode and thyristor/thyristor modules;
- easy assembly.

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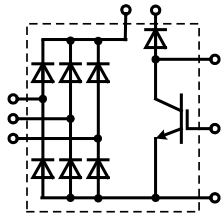
Inc., USA for al

3~ Rectifier Bridges

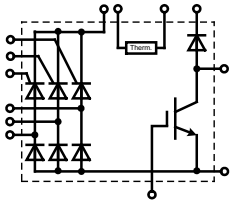
with IGBT and Diode for Brake Unit



Type	Rectifier			IGBT		fast Diode			Fig. No.	Pack
	V_{RRM}	I_{dAV} @ T_C		V_{CES}	I_{C80}	V_{RRM}	$I_{F(AV)}$	t_{rr}		Outli on p
	V	A	°C	V	A	V	A	ns		
VUB 50-12PO1	1200	56	100	1200	14	1200	10	110	X102	**X102**
VUB 50-16PO1	1600									Weigh
VUB 72-12NO1	1200	110	80	1200	35	1200	15	130	X103	See da
VUB 72-16NO1	1600									
VUB 116-16NO1	1600	116	100	1200	67	1200	27	40	X112	
VUB 120-12NO2	1200	188	80	1200	100	1200	32	40	X104	
VUB 120-16NO2	1600									
VUB 135-16NO1	2200	135	100	1700	50	1800	50	40	X112	**X103**
VUB 145-16NO1	1600	145	100	1200	100	1200	27	40		Weigh
VUB 160-12NO2	1200	188	80	1200	125	1200	34	40	X104	
VUB 160-16NO2	1600									

3~ Half Controlled Rectifier Bridges

with IGBT and Diode for Brake Unit



VVZB 120-12io1	1200	120	80	1200	100	1200	27	40	X104	**X104**
VVZB 120-16io1	1600									Weigh
VVZB 135-16NO1	1600	135	85		67				X112	
VVZB 170-16NO1		170			100					**X112**

Weigh

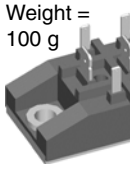
VVZ 12-12io1	1200	400	15	110	1.1	30	125	2.5	3.1	X106a
VVZ 12-14io1	1400	440								
VVZ 12-16io1	1600	500								
VVZ 24-12io1	1200	400	21	300	1	16	125	2.1	2.7	
VVZ 24-14io1	1400	440								
VVZ 24-16io1	1600	500								
VVZ 39-08ho7	800	250	39 T_C = 85°C	200	0.85	27	125	1.3	1.8	X101
VVZ 39-12ho7	1200	400								
VVZ 40-12io1	1200	400	34	320	0.85	15	125	1.0	1.6	X106a
VVZ 40-14io1	1400	440								
VVZ 40-16io1	1600	500								
VVZ 70-08io7	800	250	70 T_C = 85°C	550	0.85	11	125	0.9	1.1	X118c
VVZ 70-12io7	1200	400								
VVZ 70-14io7	1400	440								
VVZ 70-16io7	1600	500								
VVZ 110-12io7	1200	400	110 T_C = 85°C	1150	0.85	6	125	0.65	0.8	X123b
VVZ 110-14io7	1400	440								
VVZ 175-12io7	1200	400	167 T_C = 85°C	1500	0.85	3.5	125	0.46	0.55	
VVZ 175-14io7	1400	440								
VVZ 175-16io7	1600	500								

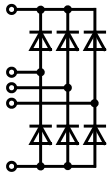
X101 ECO-P
Weight = 19 g

See data sheet

X106a
Weight = 28 g

X118c
Weight = 100 g





X123b
Weight = 300 g

3~ Rectifier Bridges, B6U

Type	V_{RRM} V	V_{vRMS} V	I_{dAV} A	T_C °C	I_{FSM} 45°C 10 ms A	V_{T0} V	r_T mΩ	T_{VJM} °C	R_{thJC} per Chip K/W	R_{thJH} per Chip K/W	Fig. No.
VUO 16-08NO1	800	250	15 T_H = 90°C		100	0.8	50	130	-	4.5	X103
VUO 16-12NO1	1200	400									
VUO 16-14NO1	1400	440									
VUO 16-16NO1	1600	500									
VUO 16-18NO1	1800	575									
FUO 22-12N	1200	400	27	90	100	0.83	28	150	4	5	X024a
FUO 22-16N	1600	500									
VUO 22-08NO1	800	250	22 T_H = 90°C		100	0.8	40	130	-	3.1	X103
VUO 22-12NO1	1200	400									
VUO 22-14NO1	1400	440									
VUO 22-16NO1	1600	500									
VUO 22-18NO1	1800	575									
VUO 34-08NO1	800	250	36		300	0.8	15	130	-	2.5	X103
VUO 34-14NO1	1400	440									
VUO 34-16NO1	1600	500									
VUO 34-18NO1	1800	575									
FUO 50-16N	1600	500	50	90	200 $_{25°C}$	tbd	tbd	150	2.1	3.2	X024a

Package st

Outline drav
on pages O

X103 V1-Pac
Weight = 35 g

X024a V1-Pa
ISOPLUS i4
Weight = 9 g

VUO 52-08NO1	800	250	54 T_H = 90°C		350	0.8	12.5	130	-	1.5	X103
VUO 52-12NO1	1200	400									
VUO 52-14NO1	1400	440									
VUO 52-16NO1	1600	500									
VUO 52-18NO1	1600	500									
VUO 52-20NO1	1800	575									
VUO 68-08NO7	800	250	68	100	300	0.8	13	150	1.1	1.6	X101
VUO 68-12NO7	1200	400									
VUO 68-14NO7	1400	440									
VUO 68-16NO7	1600	500									
VUO 80-08NO1	800	250	82 T_H = 90°C		600	0.8	7.5	150	-	1.42	X103
VUO 80-12NO1	1200	400									
VUO 80-14NO1	1400	440									
VUO 80-16NO1	1600	500									
VUO 80-18NO1	1800	575									
VUO 86-08NO7	600	125	86	90	530	0.8	7.5	150	1.2	1.5	X101
VUO 86-12NO7	1200	400									
VUO 86-14NO7	1400	440									
VUO 86-16NO7	1600	500									
VUO 98-08NO7	800	250	95	85	750	0.8	6	150	1.2	1.5	X102
VUO 98-12NO7	1200	400									
VUO 98-14NO7	1400	440									
VUO 98-16NO7	1600	500									
VUO 100-08NO7	800	250	100	100	1000	0.8	5	150	1.12	1.5	X118d
VUO 100-12NO7	1200	400									
VUO 100-14NO7	1400	440									
VUO 100-16NO7	1600	500									
VUO 120-12NO1	1200	1200	121	75	650	0.8	6.1	150	1	1.3	X104
VUO 120-16NO1	1600	1600									
VUO 121-16NO1	1600	575	118	100	650	0.8	5	150	0.8	0.9	X112
VUO 122-08NO7	800	250	117	100	900	0.8	4	150	0.85	1.15	X102
VUO 122-12NO7	1200	400									
VUO 122-14NO7	1400	440									
VUO 122-16NO7	1600	500									
VUO 122-18NO7	1800	575									
VUO 155-12NO1	1200	1200	157	75	850	0.75	4.6	150	0.8	1.1	X104
VUO 155-16NO1	1600	1600									
VUO 160-08NO7	800	250	175	90	1800	0.8	3	150	0.65	0.83	X123a
VUO 160-12NO7	1200	400									
VUO 160-14NO7	1400	440									
VUO 160-16NO7	1600	500									
VUO 160-18NO7	1800	575									
VUO 190-08NO7	800	250	248	110	2800	0.8	2.2	150	0.45	0.6	X123c
VUO 190-12NO7	1200	400									
VUO 190-14NO7	1400	440									
VUO 190-16NO7	1600	500									
VUO 190-18NO7	1800	575									

X101
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See d

X102
Weig

See d

X103
Weig

X104
Weig

X118
Weig

X112
Weig

X123
Weig

4.5kV	2.5kV	1.7kV	
		TX1161A17E	**2500A**
T2400GA45E			**2400A**
		TX115TA16A	**1900A**
T1800GA45A			**1800A**
T1500EA45E	T1500TA25E		**1500A**
	T1200TA25A		**1200A**
T0900EA45A			**900A**
T0800TA45A		TX167NA17E	**800A**
T0600TA45A		TX168NA17A	**600A**
	T0500NA25E		**500A**
	T0360NA25A		**360A**
T0240NA45E			**240A**
T0160NA45A			**160A**

The construction of these devices is totally free from wire and solder bonds which all but eliminates the problems of mechanical fatigue associated with conventional modules. Internal stray inductance in both the gate connections and emitter connections is vastly reduced when compared to conventional modules leading to improved ruggedness and short circuit behaviour, which is further enhanced by direct cooling of the emitter side of the chip. Double sided cooling allows full use of the nominal rated collector current without derating of voltage or frequency.

Devices are available with or without integral anti-parallel diode – a range of complementary HP Sonic-FRDs™ optimised for use with these IGBTs are outlined below.

The press pack construction offers several advantages over conventional IGBT modules:

- exceptional power cycling performance – typically an order of magnitude better than modules – making them highly suited to applications such as transportation and induction heating where there are repeated cyclic power demands.
- high rupture ratings making them a good choice in critical applications such as transportation applications, mining, and the petro-chemical industry.
- stable short circuit failure mode which, as well as safety benefits, makes them an ideal choice for medium and high voltage applications where series connection is required. Press-pack construction is the obvious choice where series connection is needed and the short circuit failure mode allows for the design in of n+1 redundancy. Typical examples include medium voltage drives, HVDC, and active VAr controllers.

125 mm 85 mm

- largely backwardly compatible with s
  Gate Turn-Off thyristors (including
  tions such as transportation and AC
  parts a simple and economical path
  equipment that previously used Gate
  as locomotives or medium voltage d
- suitable for all cooling options
  immersion.

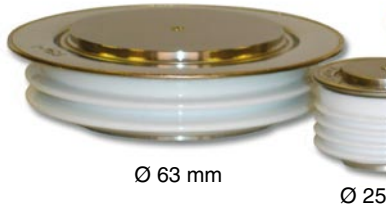
Complementary gate drives (shown
clamps and passive components are
the UK Factory.

HP Sonic-FRDs

Anti-parallel Diodes for IGBTs and IGCTs - 1.7kV to 4.5kV

New world-leading class of ultra fast and ultra soft recovery diode available from 1.7kV to 4
from 300 to 2500A.

These high power super fast, soft recovery diodes incorporate a unique manufacturing process and novel lifetime control to offer a class leading trade-off between conduction and switching loses. Their exceptionally wide safe operating area (SOA) makes them the number one choice for freewheeling diodes for snubberless IGBT and IGCT applications. In fact, most applications which require a fast, low loss diode can benefit from this new technology - for example, traction, medium voltage drives, induction heating and pulsed power applications.



Ø 63 mm Ø 25

T0160NA45A	4500	160	310	4.6	0.50	0.42	3.8	400	0.96	340	125	0.05
T0240NA45E	4500	240	400	4.7	0.73	0.88	N/A	N/A	N/A	N/A	125	0.04
T0360NA25A	2500	360	720	3.6	0.75	0.34	2.1	250	0.93	285	125	0.05
T0500NA25E	2500	500	1000	3.6	0.80	0.50	N/A	N/A	N/A	N/A	125	0.03
T0600TA45A	4500	600	1000	4.7	1.75	1.50	3.6	1400	0.92	650	125	0.01
T0800TA45E	4500	800	1500	4.6	2.20	1.92	N/A	N/A	N/A	N/A	125	0.01
T0900EA45A	4500	900	1500	4.6	2.80	2.60	3.6	1800	0.85	800	125	0.01
T1200TA25A	2500	1200	2400	3.6	2.50	1.40	2.5	670	1.50	830	125	0.01
T1200EA45E	4500	1200	2100	4.6	3.20	3.80	N/A	N/A	N/A	N/A	125	0.01
T1500TA25E	2500	1500	3000	3.6	3.30	1.70	N/A	N/A	N/A	N/A	125	0.01
➢ T1800GA45A	4500	1800	3000	4.7	5.60	6.40	3.6	2150	2.20	3500	125	0.00
➢ T2400GA45E	4500	2400	4200	4.7	7.20	7.80	N/A	N/A	N/A	N/A	125	0.00
• TX168NA17A	1700	600	900	4.0	• Products Under Development							0.05
• TX167NA17E	1700	840	1260	4.0								0.03
• TX115TA17A	1700	1900	2850	4.0								0.01
• TX116TA17E	1700	2500	3750	4.0								0.01

Press-Pack IGBT Outlines on page O - 5

HP Sonic-FRDs™

Type Part No. ➢ New	Old Part No.	V_{RRM} V	I_{FAV} T_K = 55°C A	I_{FSM} 10 ms ½ sine $V_R \leq 60\% V_{RRM}$ A	I^2t A^2s	Typ. Reverse Recovery Parameters T_{jmax} (50% Chord) I_{rm} A	t_{rr} µs	Q_r µC	@I_{FM} A	@-di_F/dt A/µs	V_{T0} @T_{jmax} V	r_T @T_{jmax} mΩ
E0300YH400	N/A	4000	277	2630	$34.58x10^3$	605	0.75	245	300	2000	2.170	3.800
E0300YH450	N/A	4500	277	2630	$34.58x10^3$	605	0.75	245	300	2000	2.170	3.800
E0400YH200	N/A	2000	348	3542	$62.7x10^3$	572	0.74	175	400	1500	1.770	2.290
E0400YH250	N/A	2500	348	3542	$62.7x10^3$	572	0.74	175	400	1500	1.770	2.290
E0900NC400	N/A	4000	969	15270	$1.17x10^6$	1340	2.20	1440	900	2000	2.140	1.150
E0900NC450	N/A	4500	969	15270	$1.17x10^6$	1340	2.20	1440	900	2000	2.140	1.150
E1500NC200	N/A	2000	1557	15180	$1.15x10^6$	1450	2.30	1550	1500	2000	1.670	0.360
E1500NC250	N/A	2500	1557	15180	$1.15x10^6$	1450	2.30	1550	1500	2000	1.670	0.360
E1500VF400	N/A	4000	1995	23600	$2.78x10^6$	1730	3.00	2700	1500	2000	2.350	0.270
E1500VF450	N/A	4500	1995	23600	$2.78x10^6$	1730	3.00	2700	1500	2000	2.350	0.270
E2000NC140	N/A	1400	1568	16500	$1.13x10^6$	1880	1.00	950	2000	4000	1.770	0.350
E2000NC170	N/A	1700	1568	16500	$1.13x10^6$	1880	1.00	950	2000	4000	1.770	0.350
E2500VF200	N/A	2000	2516	28600	$4.10x10^6$	1750	1.40	1350	2500	3000	1.630	0.210
E2500VF250	N/A	2500	2516	28600	$4.10x10^6$	1750	1.40	1350	2500	3000	1.630	0.210
➢ E2400TC400	N/A	4000	2227	25600	$3.29x10^6$	2400	1.12	1330	2400	4000	2.039	0.598
➢ E2400TC450	N/A	4500	2227	25600	$3.29x10^6$	2400	1.12	1330	2400	4000	2.039	0.598

HP Sonic-FRD Outlines on page O - 6

fibre optic command and feedback signals.

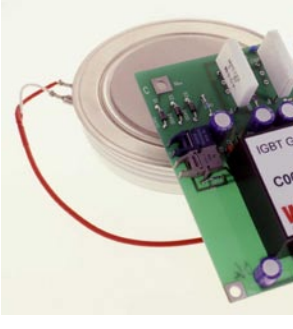
This GDU is capable of driving virtually all IGBTs including our range of press-pack devices a up to 20kHz with no duty cycle limitations.

Options include standard variants set up for use with each of Westcode's range of IGBTs (s module for integration into end user PCBs. Additionally our application engineers can develop based around the standard core module.

Features

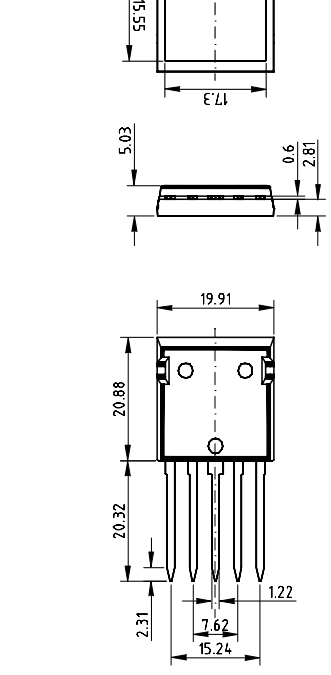
- 30A peak drive current (500ns rise time)
- 10kV AC rms isolation test
- Partial discharge free up to 4kV AC rms
- 100kV/µs dv/dt immunity
- Temperature range –40°C up to +70°C (–55°C up to +80°C available)
- ±15V gate drive voltage
- Standard HP Versatile Link™ Fibre optic links
- Status feedback signal
- User configurable SCSOA protection

IGBT Part Number	$R_{g(on)}$ (W)	$R_{g(off)}$ (W)	C (r
T0160NA45A	15	8.2	1
T0240NA45E	10	5.6	1
T0360NA25A	33	18	1
T0500NA25E	22	15	1
T0600TA45A	5.6	3.3	1
T0800TA45E	4.7	3.3	1
T0900EA45A	4.7	2.7	1
T1200EA45E	3.3	2.2	1
T1200TA25A	4.7	6.8	1
T1500TA25E	3.3	6.8	1
T1800GA45A	3.3	2.2	1
T2400GA45E	2.2	1.5	1

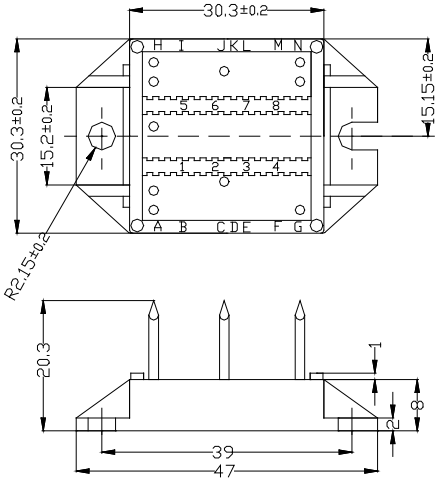


The launch of this complementary product demonstrates our continued comm our customers with complete solutions for power electronics and further streng semblies' capability.

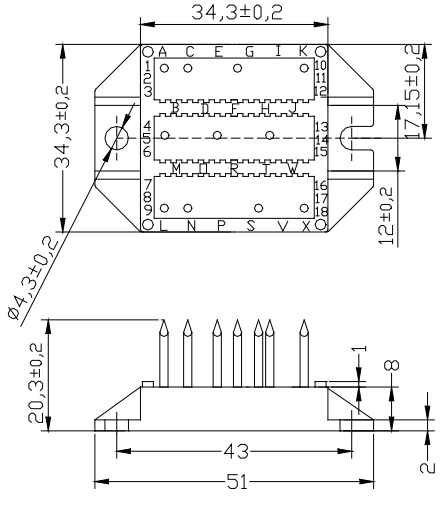
This GDU also provides our customers with a rapid route to prototype with voltage press-pack IGBTs without having to solve the additional problems as isolation voltage gate drives.



X101 ECO-PAC1

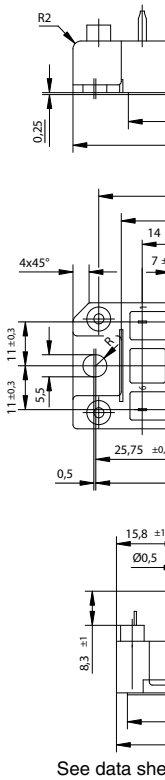


See data sheet for pin arrangement



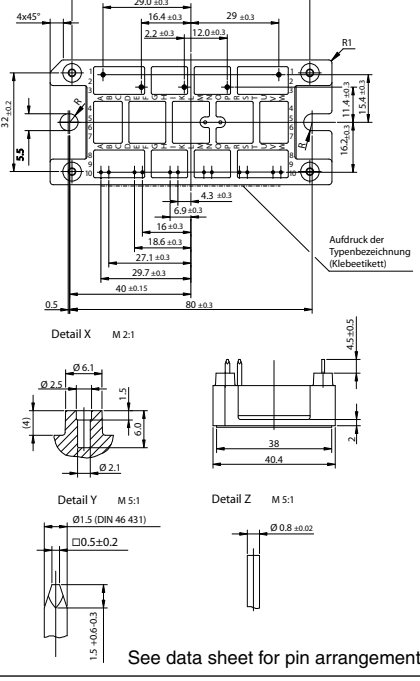
See data sheet for pin arrangement

X102 ECO-PAC2

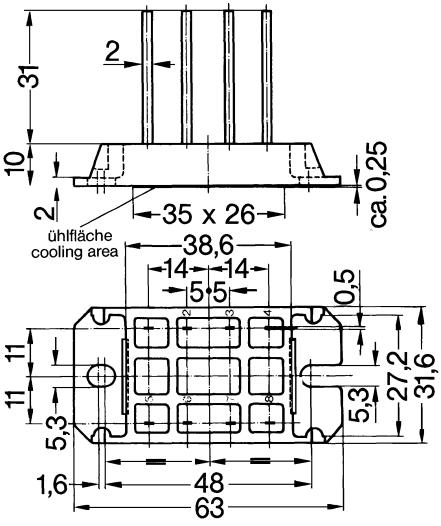


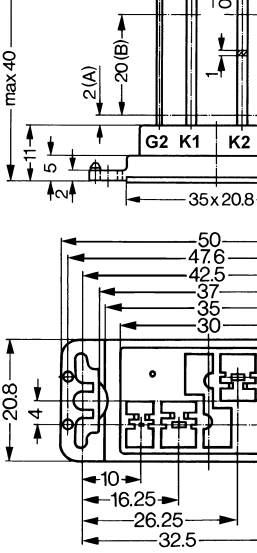
See data she

X103 V1-A-Pac

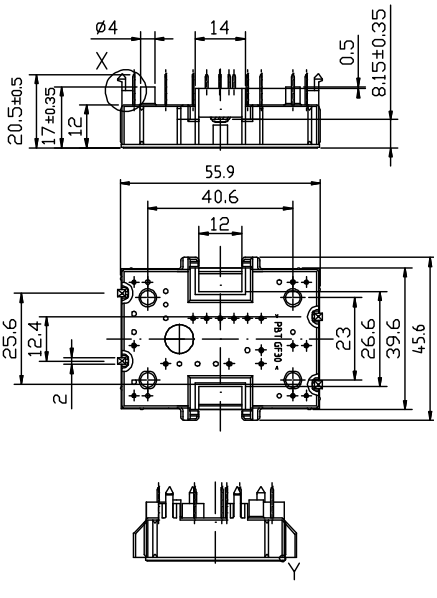


See data sheet for pin arrangement



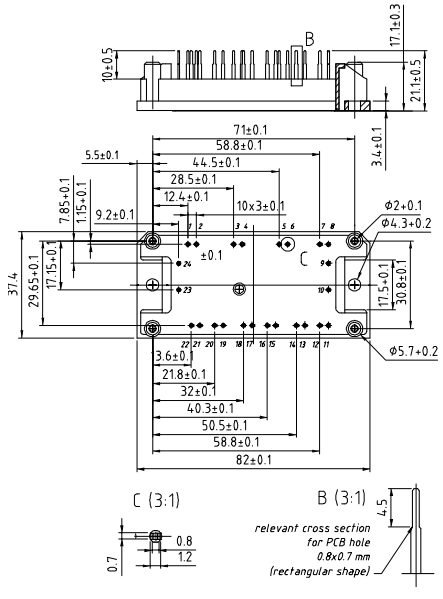


X110 Mini-Pack 2



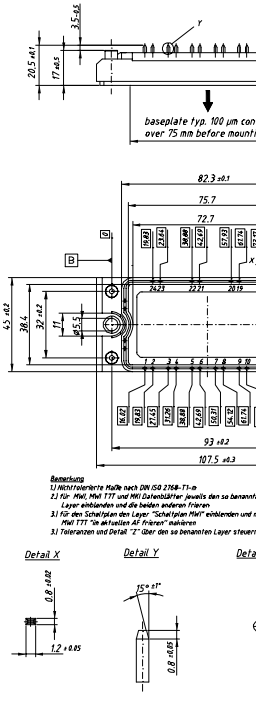
See data sheet for pin arrangement

X111 E1-Pack

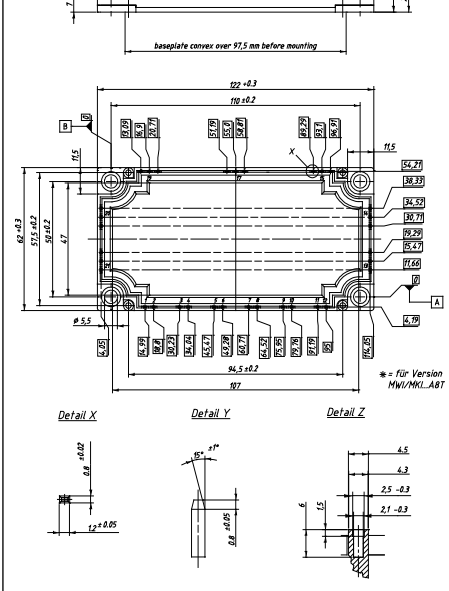


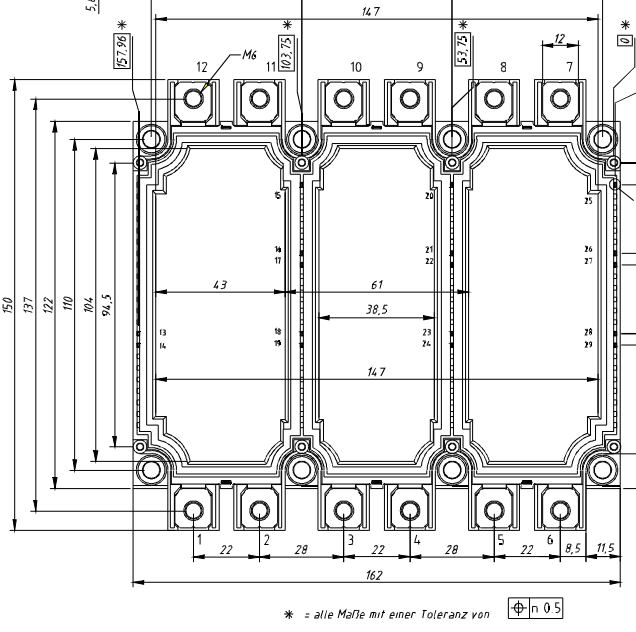
See data sheet for pin arrangement

X112 E2-Pack



See data sheet for pin

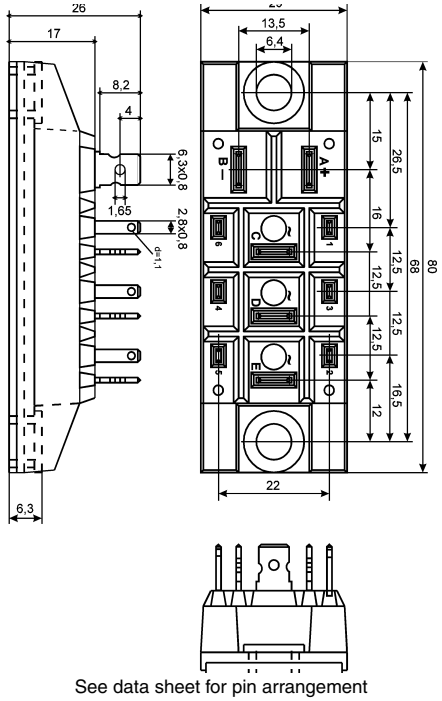




See data sheet for pin arrangement

X118 FO-T-A

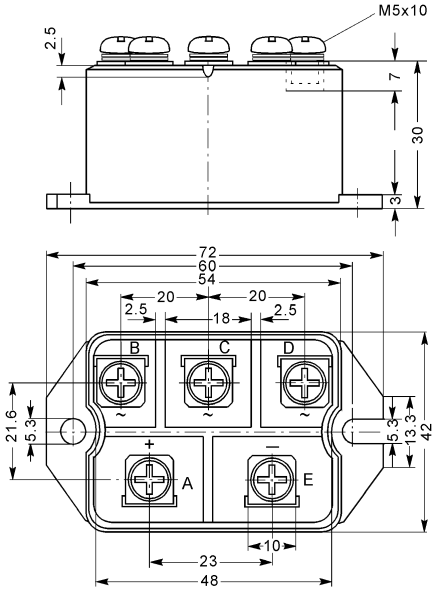
a: VTO & VTOF
c: w/o terminal 4, 5, & 6 (VVZ & VVZF)
d: w/o terminal 1, 2, 3, 4, 5, & 6 (VUO)
e: w/o terminal D, 4 & 5 (VKF & VKO)
f: w/o terminal D, 2, 3, 4 & 5 (VGO)
g: w/o terminal D, 3, 4, 5, & 6 (VHF & VHO)
h: w/o terminal D, 1, 2, 3, 4, 5, & 6 (VBO)



See data sheet for pin arrangement

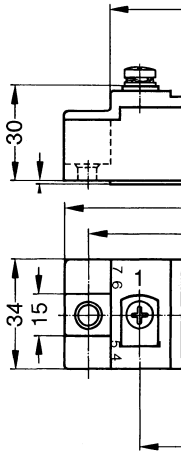
X122 PWS-D

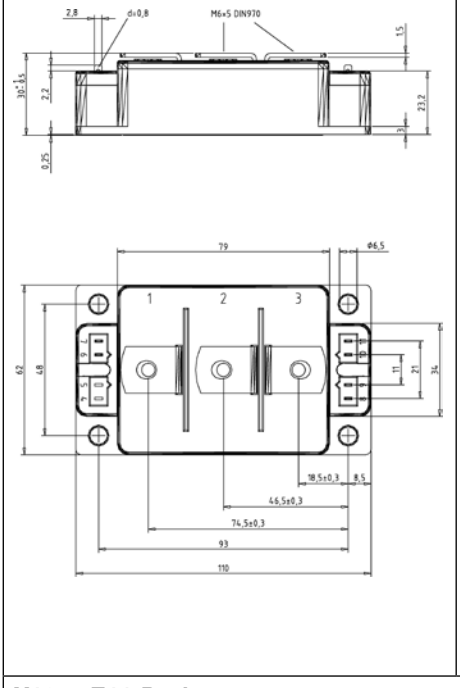
a: VUO
b: w/o terminal d (VBO)

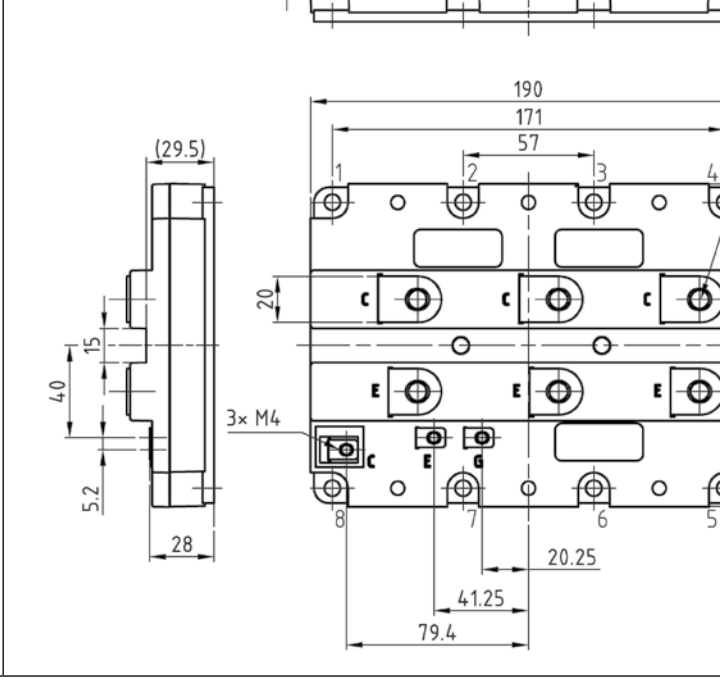


X127 Y4-M5

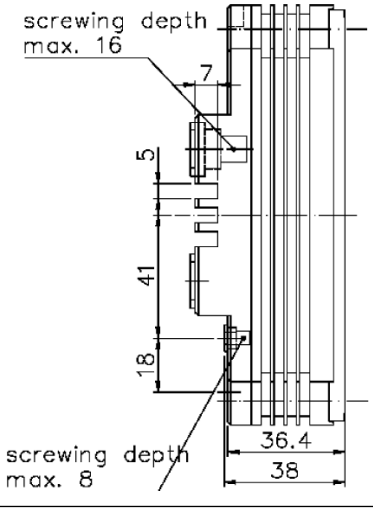
a: MII
b: w/o pin 6 & 7 (M
c: w/o pin 4 & 5 (M

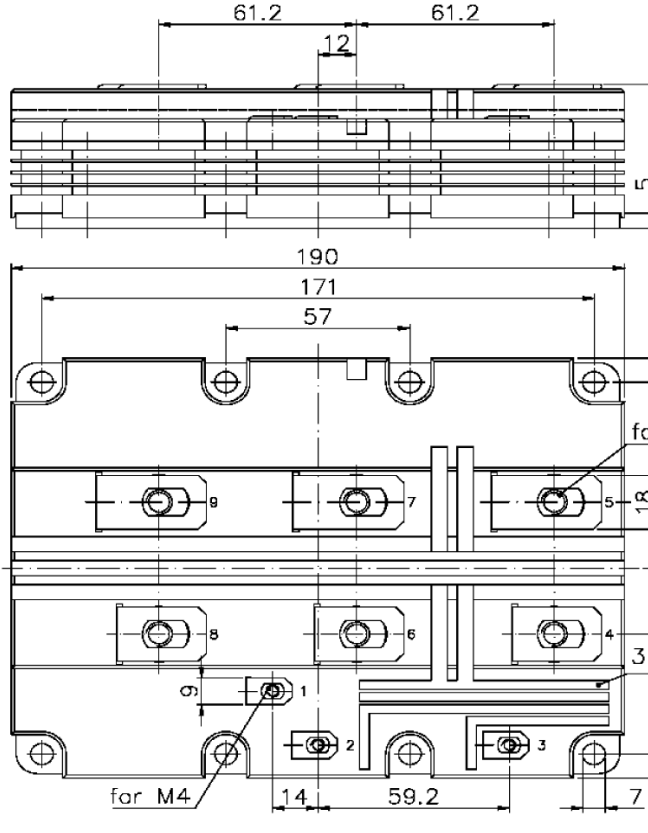


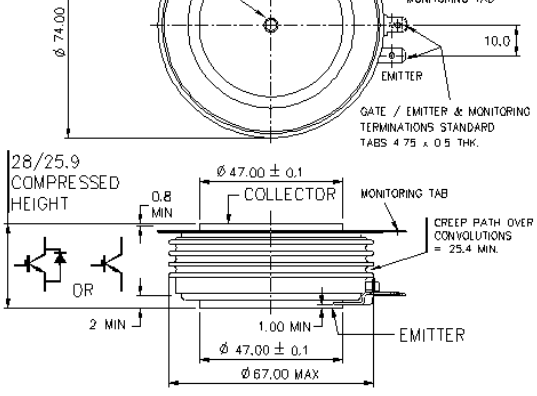


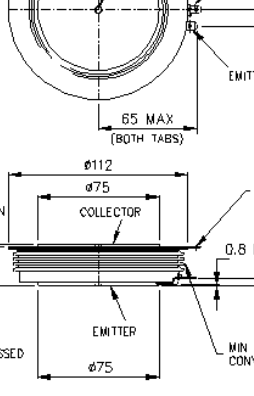


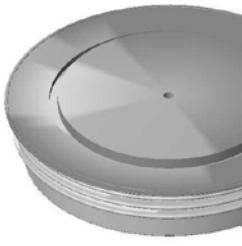
X135 E11-Pack



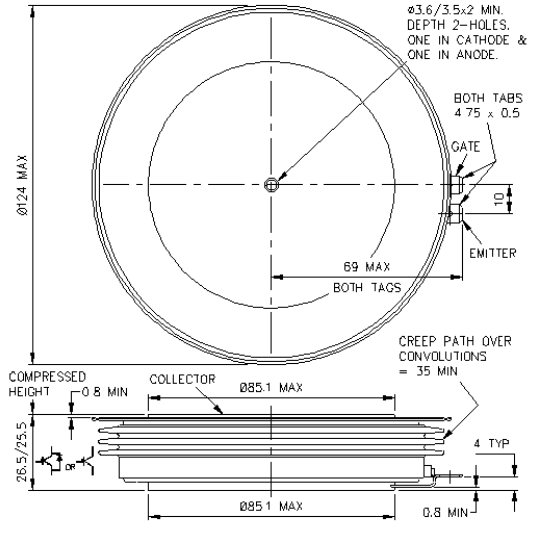


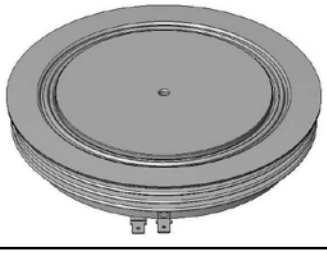




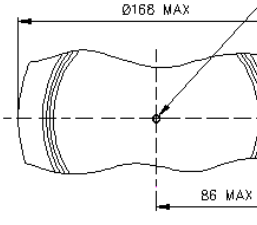


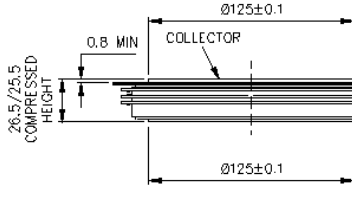
W44 - 101A340 - 85mm - Weight 1200g

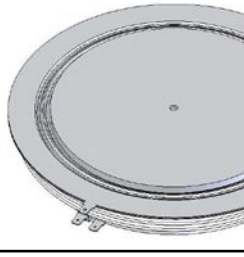


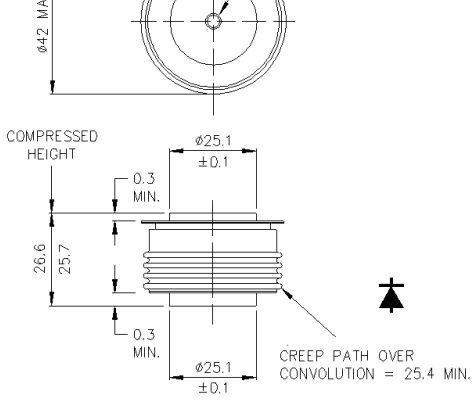


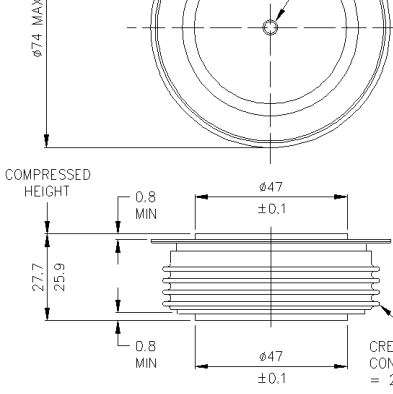
W45 - 101A359 - 125mm - Weight 20



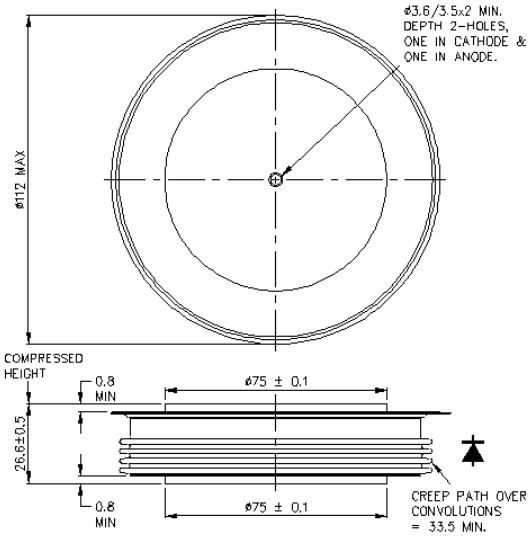




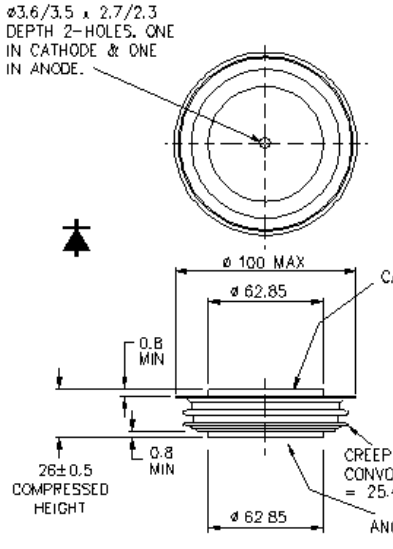




W28 - 100A330 - 73mm - Weight 1240g



W43 - 100A320 - 63mm - Weight 1000g



IXYS Corporation is a global supplier of Power and Control Semiconductors with a wide range of Power MOSFETs, IGBTs, Bipolar products, GaAs RF devices, Mixed-Signal ICs, Modules and subsystem solutions that provide higher efficiency, reduced energy cost and improved performance in a wide range of power management and system applications. For over 20 years, IXYS has been at the forefront of Power Semiconductor and IC technologies having over 120 patents and innovations in the development of the IGBTs, High Current Power MOSFETs, Fast Recovery Diodes, BiMOSFETs, Reverse Blocking IGBTs, Gate Driver ICs, SOI technology, Opto-coupled ICs for telecommunication and VOIP, flat and flexible Display Driver ICs, Solar cells and GaAs RF PHEMT.

Since the beginning of the Internet boom, IXYS has been recognized as the leader in the Telecom and IT infrastructure Power Supply market with its family of »ruggedized« Power MOSFETs known as HiPerFETs™. IXYS also achieved a leadership position in the burgeoning Factory Automation market with its innovation in Direct Bond Copper (DCB) module technology and a family of industrial rated Power Semiconductors and Integrated Power Modules.

IXYS serves a variety of consumers and industries, including energy management and conservation, wind power, medical, automotive, transportation, military and aerospace, through an extensive product portfolio produced by its seven divisions. Headquartered in Santa Clara, California, IXYS is a public company trading on the **NASDAQ**. IXYS continually focuses on serving the global market through its divisions: IXYS Corp and IXYS Semiconductor GmbH for power products, Westcode for high power bipolar products, Clare and Micronix for Mixed Signal ICs and ASICs, MwT for GaAs RF products, and IXYS COLORADO for RF POWER systems and RF Silicon products.

To date, IXYS has substantially grown its business around its key strategic objective to become a more diversified supplier of medium to high power devices, mixed signal ICs, optoelectronic and RF semiconductors, keeping the emphasis on »power« as the company's strategic theme.

IXYS

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sales@ixys.com.tw

IXYS Korea: Phone: 82-2-3667-0670 · Fax: 82-2-3667-0670
IXYS China: Phone: 86-755-8294 7332 · Fax: 86-755-8294 7262

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e-mail: thunt@mwtinc.com

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