

IGBT & Rectifier Modules

M A Y 2 0 0 7



Selector Guide incl.:

Product Overview Tables

Application Overview

Technology Overview

MiniPack 2

NEW

Press-Pack IGBTs

- POWER DEVICES
 - Power MOSFET Discreets
 - RF Power MOSFETs
 - IGBT Discreets
 - >>> IGBT Modules
 - Ultra Fast Rectifiers
 - Silicon Schottky Rectifiers
 - GaAs Schottky Rectifiers
 - SCRs and Thyristors
 - >>> Rectifier Bridges
- ICS AND GATE DRIVERS
 - MOSFET and IGBT Gate Drivers
 - RF Power MOSFETs
 - PWM Controllers
- FUNCTIONAL SOLUTIONS
 - PFC Modules
 - Converter/Brake/Inverter Modules
 - Boost & Buck Power Modules



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.

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**Sales Representatives
and Distributors:
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www.ixys.com**

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For further products see main catalog 2006/2007

Please note:

IXYS offers the broadest line of IGBT technology, including our PT line of IGBT's that we introduced in 1986, which we improved on.

Please refer to factory for your special requirement of our Fast PT IGBT based products.

IGBT & Rectifier Modules Catalog, Edition 2007

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Note

As far as patents or other rights of third parties are concerned, liability is only assumed for components per se, not for applications, processes and circuits implemented with components or assemblies. The information describes the type of component and shall not be considered as assured characteristics. Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability. Terms of delivery and rights to change design or specifications are reserved. Changes have been made to earlier published specifications. The data herein supersedes all previously published informations.

Life support applications

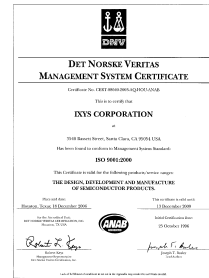
IXYS products used in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury must be expressly authorized for such purposes.

QA and Environmental Management Systems

Certificates



ISO 9001:2000



ISO/TS 16949:2002
(includes ISO 9001:2000)
ISO 14001:2004



ISO 9001:2000



ISO 9001:2000



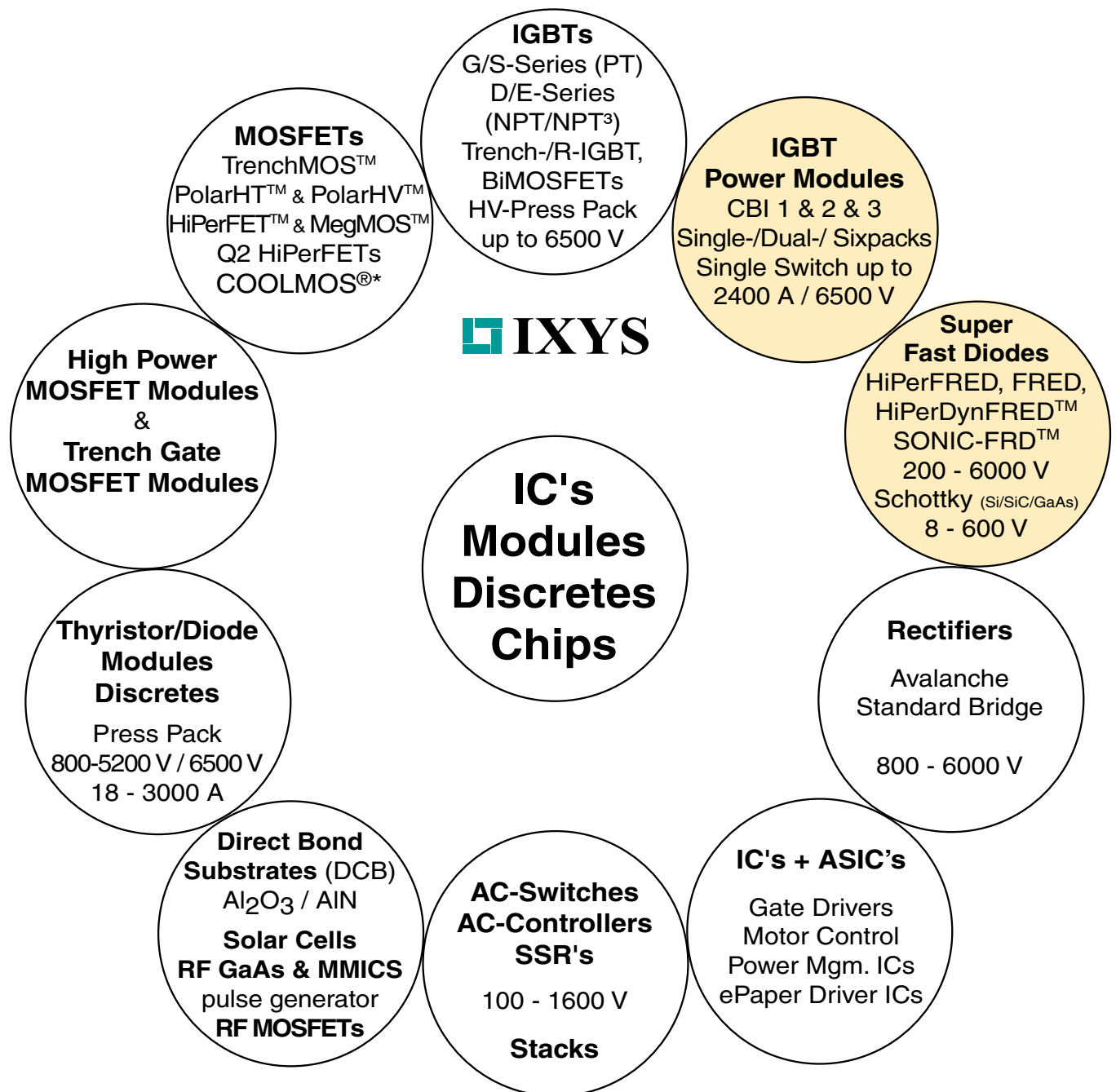
BS EN 9001:2000



ISO 9001:2000



IXYS Product Portfolio



* COOLMOS is a trademark of Infineon Technologies AG.

Symbols and Terms

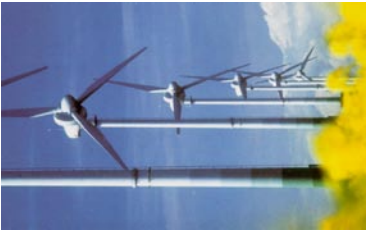
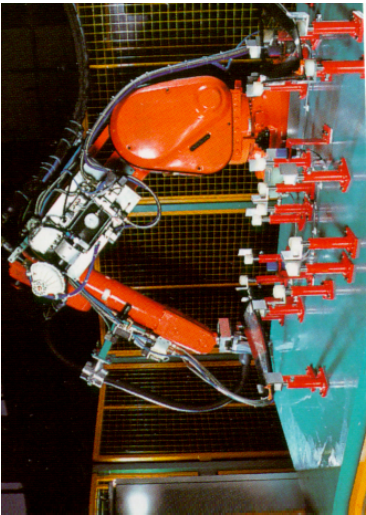
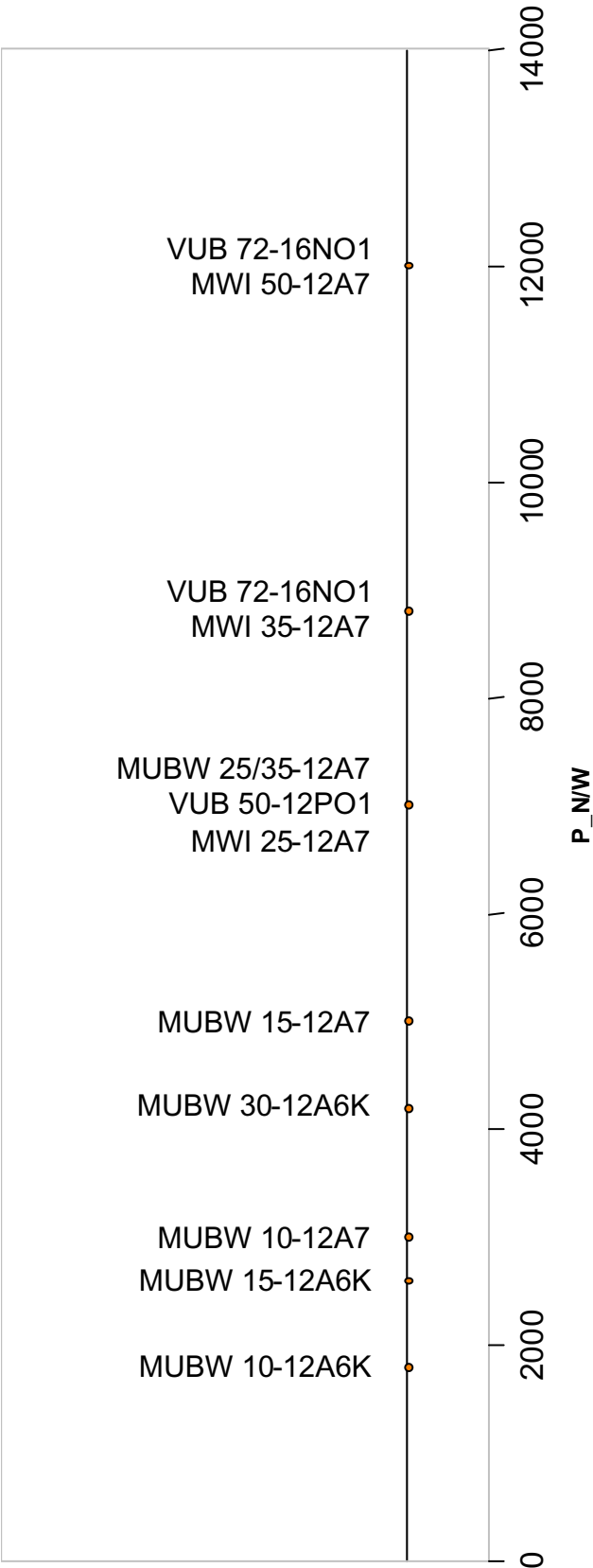
Nomenclature

(-)di/dt	Rate of change of current
E_{off}	Turn-off energy per pulse
E_{on}	Turn-on energy per pulse
I_C	Collector current
I_{CES}	Leakage current
I_{GES}	Gate - emitter leakage current
I_{C25}	Continuous DC collector current at $T_C = 25^\circ\text{C}$
I_{C90}	Continuous DC collector current at $T_C = 90^\circ\text{C}$
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

IGBT Modules								
M	W	I	100	-12	T	8	T	(Example)
F								ISOPLUS-I4
M								Module
V								Module
	C							Thyristor
	D							Diode
	I							IGBT with SCSOA capability
	M							MOSFET
	W							Three phase bridge
	U							Uncontrolled 3 phase input rectifier
	C							Thyristor
	D							Diode
	I							IGBT with SCSOA capability
	K							Common cathode
	M							MOSFET
	O							No meaning. Reserved for future function
	BW							Brake chopper and IGBT sixpack
			100					Current rating 100 = 100 A
				-12				Voltage class, 12 = 1200 V
					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 enlarged clearance and creepage distance
							T	NTC temperature sensor
New nomenclature								
M	I	AA	10	WB	600	T	MH	Example
M								Module
	I							IGBT
		AA						NPT
		TA						Trench standard version
		TB						Trench fast version
			10					Current
				W				Six-Pack
				WB				Six-Pack with 3~ bridge and brake
				WD				Six-Pack with 1~ bridge
				WE				Six-Pack with 1~ bridge and brake
				WF				Six-Pack with 3~ bridge
					600			Voltage
						T		NTC inside
							MH	MiniPack 2 housing

CBI-Modules 1200 V

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



Product Overview

Sixpack Modules

I _{C80} [A]	NPT	NPT ³	SPT ⁺	Trench IGBT	PT IGBT	Package			
➤ New	600 V								
41					MWI 60 - 06 G6K	E1			
30	MWI 30 - 06 A7(T)					E2			
50	MWI 50 - 06 A7(T)								
60	MWI 75 - 06 A7(T)								
88	MWI 100 - 06 A8 (T)					E3			
115	MWI 150 - 06 A8 (T)								
155	MWI 200 - 06 A8 (T)								
1200 V									
13	MWI 15 - 12 A6K	➤ MWI 30 - 12 E6K		MWI 45 - 12 T6K		E1			
21									
31		➤ MWI 50 - 12 E6K		MWI 60 - 12 T6K					
36									
41									
56				MWI 80 - 12 T6K					
20	MWI 15 - 12 A7	MWI 25 - 12 E7		MWI 50-12T7T*		E2			
35	MWI 25 - 12 A7(T)								
44	MWI 35 - 12 A7(T)								
50	MWI 50 - 12 A7(T)	MWI 50 - 12 E7		MWI 75-12T7T*					
60									
62									
75				MWI 75-12T8T*		E3			
75	MWI 75 - 12 A8 (T)	MWI 75 - 12 E8	MWI 100-12T8T*						
85									
90									
100	MWI 100 - 12 A8 (T)	MWI 100 - 12 E8		MWI 150-12T8T*					
110									
115									
150									
250		➤ MWI 225 - 12 E9				E9			
375		➤ MWI 300 - 12 E9							
440		➤ MWI 450 - 12 E9							
1700 V									
235		➤ MWI 225 - 17 E9				E9			
350		➤ MWI 300 - 17 E9							
440			➤ MWI 451 - 17 E9						

* different pin-out compared to NPT and NPT³ modules

Product Overview

CBI Modules

I _{C80} [A]	NPT	NPT ³	Trench Standard	Trench Fast	Package
➤ New	600 V				
13 16 20 27	➤ MIAA10WB600TMH ➤ MIAA15WB600TMH ➤ MIAA20WB600TMH ➤ MIAA30WB600TMH				MiniPack2
8 14 17 21 29	MUBW 10 - 06 A6K MUBW 15 - 06 A6K MUBW 20 - 06 A6K MUBW 25 - 06 A6K MUBW 35 - 06 A6K				E1
15 18 25 35 50	MUBW 10 - 06 A7 MUBW 15 - 06 A7 MUBW 20 - 06 A7 MUBW 30 - 06 A7 MUBW 50 - 06 A7				E2
50 65 85	MUBW 50 - 06 A8 MUBW 75 - 06 A8 MUBW 100 - 06 A8				E3
1200 V					
11 17			➤ MITA10WB1200TMH ➤ MITA15WB1200TMH	➤ MITB10WB1200TMH ➤ MITB15WB1200TMH	MiniPack2
13 21 32	MUBW 15 - 12 A6K MUBW 30 - 12 A6K	➤ MUBW 30 - 12 E6K	➤ MUBW 45 - 12 T6K		E1
15 25 35 35 40	MUBW 10 - 12 A7 MUBW 15 - 12 A7 MUBW 25 - 12 A7 MUBW 35 - 12 A7	MUBW 35 - 12 E7	➤ MUBW 15-12T7 ➤ MUBW 25-12T7	➤ MUBW 40-12T7	E2
35 50 60 75	MUBW 35 - 12 A8 MUBW 50 - 12 A8	MUBW 50 - 12 E8	➤ MUBW 50 - 12 T8 ➤ MUBW 75 - 12 T8		E3
1700 V					
53 80			MUBW 50 - 17 T8 MUBW 80 - 17 T8		E 3

Full Bridge Modules (Four Pack)

I _{C80} [A]	NPT	Fast NPT	NPT ³	Trench Standard	Package
600 V					
67				MWI 80 - 06 T6K	E1
45 67 85	MKI 50 - 06 A7(T) MKI 65 - 06 A7 (T) MKI 75 - 06 A7				E2
1200 V					
45 62		MKI 50 - 12 F7	MKI 50 - 12 E7		E2
85 90 115		MKI 100 - 12 F8	MKI 75 - 12 E8 MKI 100 - 12 E8		E3

Insulated Gate Bipolar Transistor (IGBT) Modules

The IGBT is a combination of bipolar and MOS technologies. The best features of bipolar transistors are merged with the voltage-controlled properties of MOSFETs.

Advantages to the user:

- rugged, short-circuit-proof device (S-series, D-series and E-series)
- operation without protective snubber 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

Modulated servo and three-phase drives requiring high dynamic range control and low noise. It also can be used in Uninterruptible Power Supplies (UPS), Switch Mode Power Supplies (SMPS), and other power circuits requiring high switch repetition rates. IGBTs improve dynamic performance and efficiency and reduce the level of audible noise. IGBTs are equally suitable in resonant converter circuits. 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

developed IGBT chips capable of withstanding up to 10 ms in short-circuit, even with a 15 V gate drive.

A switch is only as good as its companion free-wheeling diode. For this reason, all IGBTs with integrated diodes incorporate ultra-fast-recovery epitaxial diodes (FREDs) with very low reverse recovery charge (Q_{rr}). These same diodes are also available as separate elements for use in IGBT circuits or any other application requiring high diode switching speeds.

The IGBT modules use **Direct Copper Bonded (DCB)** substrates, which consist of an aluminium oxide (Al_2O_3) insulator to which copper is directly bonded using the latest techniques developed by IXYS.

Chip Type	Low V_{CEsat}	Low Switching Losses	R_{thJC}	Short Circuit Rated	Optimized Operation Frequency
Low loss NPT	-	-	++	yes	up to 20 kHz
Fast NPT	- -	++	++	yes	up to 30 kHz
NPT ³	o	+	++	yes	10 to 20 kHz
Standard Trench	++	o	+	yes	up to 8 kHz
Fast Trench	++	+	+	yes	up to 12 kHz
PT IGBT	-	+++	++	no/yes	up to 50 kHz
PT IGBT LV*	+++	++++	++	no	up to 200 kHz

IGBT Modules

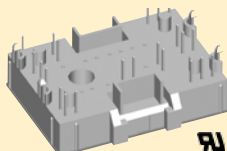
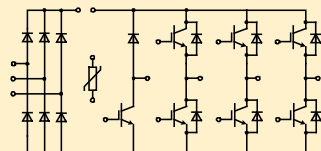
PT IGBT	punch through IGBT, very low switching losses, someone short circuit rated
PT IGBT LV*	punch through IGBT 250 - 300 V, very fast, low V_{SAT} up to 200 kHz switching, <i>for new products consult factory</i>
NPT IGBT	non-punch through insulated gate bipolar transistor; square RBSOA, short circuit rated
NPT ³ IGBT	improved NPT IGBT • reduced V_{cesat} • reduced switching losses • optimized for switching frequencies from 10 kHz up to 25 kHz
Trench IGBT	improved NPT IGBT • very low V_{cesat} • reduced switching losses • optimized for switching frequencies up to 10 kHz
SPT+	soft punch through IGBT, improved NPT ³ IGBT

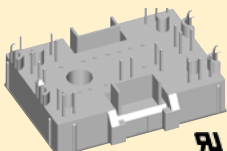
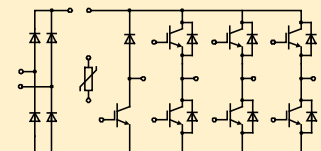
CBI Modules

CBI = Converter Brake Inverter

Rectifier, IGBT brake chopper, three phase IGBT inverter, temperature sensor

* PT IGBT (LV 250 V, 300 V, 600 V) are available too, *consult factory*

CBI  X110 MiniPack2 Package style Outline drawings on pages O-1...O-3 See data sheet for pin arrangement 											
Type	Rectifier 3~			Inverter 3~					Brake chopper		
	V_{RRM}	I_{DAVM} $T_H = 80^{\circ}C$	R_{thJC} typ.	V_{CES}	I_C $T_C = 25^{\circ}C$	I_C $T_C = 80^{\circ}C$	$V_{CE(sat)}$ typ.	R_{thJC} typ.	V_{CES}	I_C $T_C = 80^{\circ}C$	R_{thJC} typ.
	V	A	K/W	V	A	A	V	K/W	V	A	K/W
600 V NPT IGBT											
MIAA10WB600TMH	1600	62	2.1	600	18	13	2.1	1.8	600	13	1.8
MIAA10WF600TMH		62	2.1		18	13	2.1	1.8	no brake chopper included		
MIAA15WB600TMH		62	2.1		23	16	2.1	1.6	600	16	1.6
MIAA20WB600TMH		62	2.1		29	20	2.1	1.3	600	20	1.3
600 V Trench IGBT											
MITA30WB600TMH	1600	90	1.4	600	40	27	1.5	1.4	600	27	1.4
1200 V Trench IGBT											
MITA10WB1200TMH	1600	62	2.1	1200	17	12	1.8	1.9	1200	12	1.9
MITA15WB1200TMH		62	2.1		30	21	1.8	1.1		21	1.1
MITB10WB1200TMH		62	2.1		17	12	1.9	1.85		12	1.85
MITB15WB1200TMH		62	2.1		29	20	1.7	1.2		17	1.6

CBI  X110 MiniPack2 Package style Outline drawings on pages O-1...O-3 See data sheet for pin arrangement 											
Type	Rectifier			Inverter					Brake chopper		
	V_{RRM}	I_{DAVM} $T_H = 80^{\circ}C$	R_{thJC} typ.	V_{CES}	I_C $T_C = 25^{\circ}C$	I_C $T_C = 80^{\circ}C$	$V_{CE(sat)}$ typ.	R_{thJC} typ.	V_{CES}	I_C $T_C = 80^{\circ}C$	R_{thJC} typ.
	V	A	K/W	V	A	A	V	K/W	V	A	K/W
600 V NPT IGBT											
MIAA10WE600TMH	1600	23	2.1	600	18	13	2.1	1.8	600	13	1.8
MIAA10WD600TMH		23	2.1		18	13	2.1	1.8	no brake chopper included		
MIAA15WE600TMH		23	2.1		23	16	2.1	1.6	600	16	1.6
MIAA15WD600TMH		23	2.1		23	16	2.1	1.6	no brake chopper included		
MIAA20WE600TMH		23	2.1		29	20	2.1	1.3	600	20	1.3
MIAA20WD600TMH		23	2.1		29	20	2.1	1.3	no brake chopper included		

**Mechanical
mounting part**

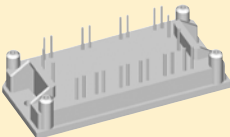
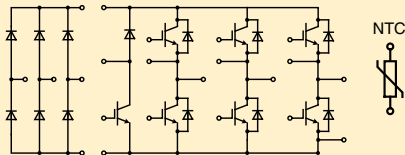


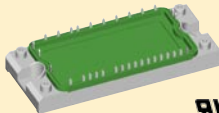
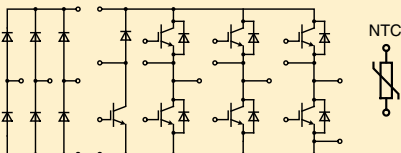
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CBI Modules

CBI = Converter Brake Inverter

Rectifier, IGBT brake chopper, three phase IGBT inverter, temperature sensor

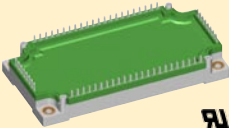
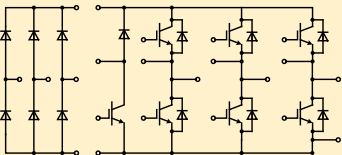
CBI 1 IGBT Modules					X111 E1-pack Package style Outline drawings on pages O-1...O-3 See data sheet for pin arrangement							
Type	Rectifier 3~			Inverter 3~					Brake chopper			
	V_{RRM}	I_{DAVM} $T_H = 80^{\circ}C$	R_{thJC} typ.	V_{CES}	I_C $T_C = 25^{\circ}C$	I_C $T_C = 80^{\circ}C$	$V_{CE(sat)}$ typ.	R_{thJC} typ.	V_{CES}	I_C $T_C = 80^{\circ}C$	R_{thJC} typ.	
	V	A	K/W	V	A	A	V	K/W	V	A	K/W	
600 V NPT IGBT												
MUBW 10-06A6K	1600	61	2.1	600	12	8	2.5	2.8	600	8	2.8	
MUBW 15-06A6K		65	1.9		19	14	2.4	1.7		8	2.8	
MUBW 20-06A6K		65	1.9		25	17	2	1.5		8	2.8	
MUBW 25-06A6K		65	1.9		31	21	2.1	1.25		14	1.7	
MUBW 35-06A6K		89	1.4		42	29	2.3	0.95		17	1.5	
1200 V NPT IGBT												
MUBW 15-12A6K	1600	89	1.4	1200	19	13	3	1.35	1200	13	1.35	
MUBW 30-12A6K		89	1.4		30	21	3	0.95		13	1.35	
1200 V NPT ³ IGBT												
MUBW 30-12E6K	1600	89	1.4	1200	30	21	3.1	0.95	1200	13	1.35	
1200 V Trench IGBT												
MUBW 45-12T6K	1600	104	1.1	1200	43	31	2.5	0.8	1200	13	1.35	

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~					Brake chopper		
	V_{RRM}	I_{DAVM} $T_H = 80^{\circ}C$	R_{thJC} typ.	V_{CES}	I_C $T_C = 25^{\circ}C$	I_C $T_C = 80^{\circ}C$	$V_{CE(sat)}$ typ.	R_{thJC} typ.	V_{CES}	I_C $T_C = 80^{\circ}C$	R_{thJC} typ.
	V	A	K/W	V	A	A	V	K/W	V	A	K/W
600 V NPT IGBT											
MUBW 10-06A7	1600	18	1.5	600	20	15	1.9	1.5	600	15	1.5
MUBW 15-06A7		18	1.5		25	18	1.9	1.3		15	1.5
MUBW 20-06A7		24	1.3		35	25	1.9	1		18	1.4
MUBW 30-06A7		24	1.3		50	35	1.9	0.7		18	1.3
MUBW 50-06A7		29	1.1		75	50	1.9	0.5		25	1
1200 V NPT IGBT											
MUBW 10-12A7	1600	18	1.5	1200	20	15	2.3	1.2	1200	15	1.2
MUBW 15-12A7		24	1.3		35	25	2	0.7		15	1.2
MUBW 25-12A7		24	1.3		50	35	2.2	0.55		15	1.2
MUBW 35-12A7		29	1.1		50	35	2.5	0.55		25	0.7
1200 V NPT ³ IGBT											
MUBW 35-12E7	1600	29	1.1	1200	52	36	2.2	0.55	1200	25	0.7
1200 V Trench IGBT											
MUBW15-12T7	1600	24	1.3	1200	25	15	1.7	1.2	1200	15	1.2
MUBW25-12T7		24	1.3		40	25	1.7	0.8		15	1.2
MUBW40-12T7		80	1.3		62	44	2.0	0.8		25	0.7

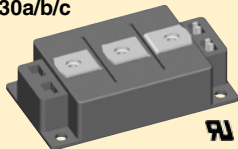
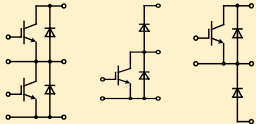
CBI Modules

CBI = Converter Brake Inverter

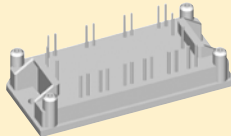
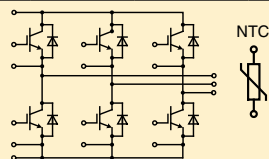
Rectifier, IGBT brake chopper, three phase IGBT inverter, temperature sensor

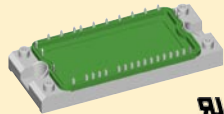
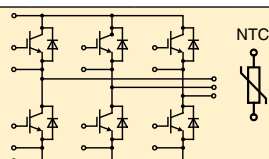
CBI 3 IGBT Modules								X113 E3-pack Package style Outline drawings on pages O-1...O-3 See data sheet for pin arrangement							
Type	Rectifier 3~			Inverter 3~					Brake chopper						
	V_{RRM}	I_{DAVM} $T_H = 80^{\circ}C$	R_{thJC} typ.	V_{CES}	I_C $T_C = 25^{\circ}C$	I_C $T_C = 80^{\circ}C$	$V_{CE(sat)}$ typ.	R_{thJC} typ.	V_{CES}	I_C $T_C = 80^{\circ}C$	R_{thJC} typ.				
	V	A	K/W	V	A	A	V	K/W	V	A	K/W				
600 V NPT IGBT															
MUBW 50-06A8	1600	40	1.1	600	75	50	1.9	0.5	600	25	1				
MUBW 75-06A8		46	0.94		100	65	2	0.39		35	0.75				
MUBW 100-06A8		60	0.73		125	85	1.9	0.3		50	0.55				
1200 V NPT IGBT															
MUBW 35-12A8	1600	27	1.3	1200	50	35	2.5	0.55	1200	25	0.7				
MUBW 50-12A8		46	0.94		85	60	2.2	0.35		35	0.55				
1200 V NPT ³ IGBT															
MUBW 50-12E8	1600	50	0.94	1200	90	62	1.9	0.35	1200	35	0.55				
1200 V Trench IGBT															
MUBW 50-12T8	1600	50	0.94	1200	75	50	1.7	0.45	1200	35	0.55				
MUBW 75-12T8		50	0.94		105	75	1.7	0.35		35	0.55				
1700 V Trench IGBT															
MUBW 50-17T8	2200	120	1.1	1700	74	53	2.0	0.43	1700	34	0.62				
MUBW 75-17T8		140	0.95		113	80	2.0	0.48		34	0.62				

Phase-Leg Modules

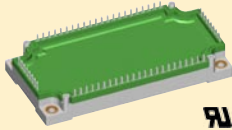
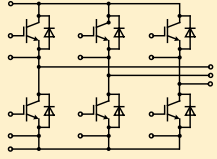
NPT IGBT Modules  X130a/b/c Outline drawings on pages O-1...O-3 See data sheet for pin arrangement  MII MID MDI									
Type	V_{CES} V	I_{C25} A $T_C = 25^{\circ}C$ IGBT	I_{C80} A $T_C = 80^{\circ}C$ IGBT	$V_{CE(sat)}$ typ V $T_J = 25^{\circ}C$ IGBT	E_{off} mJ $T_J = 125^{\circ}C$ IGBT	R_{thJC} K/W IGBT	I_{F25} A $T_C = 25^{\circ}C$ diode	I_{F80} A $T_C = 80^{\circ}C$ diode	Fig.
➤ New									
1200 V Half Bridge with 3 rd generation NPT ³									
➤ MII 300-12E4	1200	280	200	2.0	20	0.11	300	190	X130a
➤ MII 400-12E4		420	300	2.2	30	0.08	450	290	
1200 V Boost chopper with 3 rd generation NPT ³									
➤ MID 400-12E4	1200	420	300	2.2	30	0.08	450	290	X130b
1200 V Buck chopper with 3 rd generation NPT ³									
➤ MDI 400-12E4	1200	420	300	2.2	30	0.08	450	290	X130c

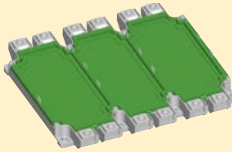
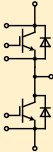
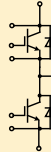
Sixpack configuration

Sixpack IGBT Modules				X111 E1-pack Package style Outline drawings on pages O-1...O-3 See data sheet for pin arrangement					
Type	V_{CES} V	I_{C25} A $T_C = 25^{\circ}\text{C}$ IGBT	I_{C80} A $T_C = 80^{\circ}\text{C}$ IGBT	$V_{CE(sat)}$ typ V $T_J = 25^{\circ}\text{C}$ IGBT	E_{off} mJ $T_J = 125^{\circ}\text{C}$ IGBT	R_{thJC} K/W IGBT	I_{F25} A $T_C = 25^{\circ}\text{C}$ diode	I_{F80} A $T_C = 80^{\circ}\text{C}$ diode	NTC
600 V PT IGBT									
MWI 60-06G6K	600	60	41	2.3	0.5	0.7	48	33	•
1200 V NPT IGBT									
MWI 15-12A6K	1200	19	13	3	1.1	1.37	24	16	•
1200 V NPT ³ IGBT									
MWI 30-12E6K	1200	29	21	2.5	1.8	0.95	24	16	•
MWI 50-12E6K		51	36	2.4	2.6	0.6	49	32	•
1200 V Trench IGBT									
MWI 45-12T6K	1200	43	31	1.9	3.4	0.8	49	32	•
MWI 60-12T6K		58	41	1.9	4.8	0.62	49	32	•
MWI 80-12T6K		80	56	2	6.5	0.46	80	51	•

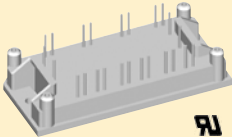
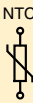
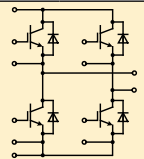
Sixpack IGBT Modules				X112 E2-pack Package style Outline drawings on pages O-1...O-3 See data sheet for pin arrangement					
Type	V_{CES} V	I_{C25} A $T_C = 25^{\circ}\text{C}$ IGBT	I_{C80} A $T_C = 80^{\circ}\text{C}$ IGBT	$V_{CE(sat)}$ typ V $T_J = 25^{\circ}\text{C}$ IGBT	E_{off} mJ $T_J = 125^{\circ}\text{C}$ IGBT	R_{thJC} K/W IGBT	I_{F25} A $T_C = 25^{\circ}\text{C}$ diode	I_{F80} A $T_C = 80^{\circ}\text{C}$ diode	NTC
600 V NPT IGBT									
MWI 30-06A7	600	45	30	1.9	1	0.88	36	24	•
MWI 30-06A7T		45	30	1.9	1	0.88	36	24	
MWI 50-06A7		75	50	1.9	1.7	0.55	72	45	•
MWI 50-06A7T		75	50	1.9	1.7	0.55	72	45	
MWI 75-06A7		90	60	2.1	2.5	0.44	140	85	•
MWI 75-06A7T		90	60	2.1	2.5	0.44	140	85	
1200 V NPT IGBT									
MWI 15-12A7	1200	30	20	1	1.8	0.88	25	17	•
MWI 25-12A7		50	35	2.2	2.8	0.55	50	33	
MWI 25-12A7T		50	35	2.2	2.8	0.55	50	33	•
MWI 35-12A7		62	44	2.2	4.2	0.44	50	33	
MWI 35-12A7T		62	44	2.2	4.2	0.44	50	33	•
MWI 50-12A7		85	60	2.2	5.6	0.35	110	70	
MWI 50-12A7T		85	60	2.2	5.6	0.35	110	70	•
1200 V NPT ³ IGBT									
MWI 25-12E7	1200	52	36	1.9	2.5	0.55	50	33	
MWI 50-12E7		90	62	2.1	4	0.35	110	70	
1200 V Trench IGBT									
MWI 50-12T7T	1200	75	50	1.7	6.5	0.49	110	70	•
MWI 75-12T7T		105	75	1.7	9.5	0.35	150	100	•

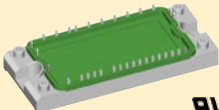
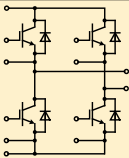
Sixpack configuration

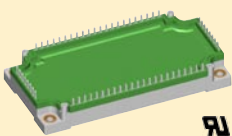
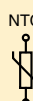
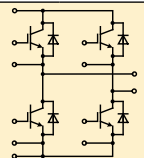
Sixpack				X113 E3-pack Package style		Outline drawings on pages O-1...O-3					
IGBT Modules						See data sheet for pin arrangement					
Type	V_{CES} V	I_{C25} A $T_c = 25^{\circ}\text{C}$ IGBT	I_{C80} A $T_c = 80^{\circ}\text{C}$ IGBT	$V_{CE(sat)}$ typ V $T_J = 25^{\circ}\text{C}$ IGBT	E_{off} mJ $T_J = 125^{\circ}\text{C}$ IGBT	R_{thJC} K/W IGBT	I_{F25} A $T_c = 25^{\circ}\text{C}$ diode	I_{F80} A $T_c = 80^{\circ}\text{C}$ diode	NTC		
600 V NPT IGBT											
MWI 100-06A8	600	130	88	2	2.9	0.3	140	88			
MWI 100-06A8T		130	88	2	2.9	0.3	140	88	•		
MWI 150-06A8		170	115	2	4.6	0.24	210	130			
MWI 150-06A8T		170	115	2	4.6	0.24	210	130	•		
MWI 200-06A8		215	155	2	6.3	0.18	260	165			
MWI 200-06A8T		215	155	2	6.3	0.18	260	165	•		
1200 V NPT IGBT											
MWI 75-12A8	1200	125	85	2.2	10.5	0.25	150	100			
MWI 75-12A8T		125	85	2.2	10.5	0.25	150	100	•		
MWI 100-12A8		160	110	2.2	14.6	0.19	200	130			
MWI 100-12A8T		160	110	2.2	14.6	0.19	200	130	•		
1200 V NPT ³ IGBT											
MWI 75-12E8	1200	130	90	2	7.5	0.25	150	100			
MWI 100-12E8		165	115	2	10.0	0.19	200	130			
1200 V Trench IGBT											
MWI 75-12T8T	1200	100	75	1.7	9.5	0.35	150	100	•		
MWI 100-12T8T		140	100	1.7	12.0	0.26	200	130	•		
MWI 150-12T8T		200	150	1.7	17.0	0.18	tbd	tbd	•		

Sixpack IGBT Modules  X114 E9-pack Package style Outline drawings on pages O-1...O-3 See data sheet for pin arrangement NTC    									
Type	V_{CES} V	I_{C25} A $T_C = 25^{\circ}\text{C}$ IGBT	I_{C80} A $T_C = 80^{\circ}\text{C}$ IGBT	$V_{CE(sat)}$ typ V $T_J = 25^{\circ}\text{C}$ IGBT	E_{off} mJ $T_J = 125^{\circ}\text{C}$ IGBT	R_{thJC} K/W IGBT	I_{F25} A $T_C = 25^{\circ}\text{C}$ diode	I_{F80} A $T_C = 80^{\circ}\text{C}$ diode	NTC
1200 V NPT ³ IGBT									
MWI 225-12E9	1200	355	250	2.1	20	0.09		205	•
MWI 300-12E9		530	375	2	30	0.06		300	•
MWI 450-12E9		640	440	2.2	45	0.057		450	•
1700 V NPT ³ IGBT									
MWI 225-17E9	1700	335	235	2.5	54	0.085		200	•
MWI 300-17E9		500	350	2.3	80	0.057		290	•
1700 V SPT ⁺ IGBT									
MWI 451-17E9	1700	580	475	2.25	90	0.057		450	•

Full Bridge configuration

Full Bridge IGBT Modules  X111 E1-pack Package style Outline drawings on pages O-1...O-3 See data sheet for pin arrangement  									
Type	V_{CES} V	I_{C25} A $T_C = 25^\circ\text{C}$ IGBT	I_{C80} A $T_C = 80^\circ\text{C}$ IGBT	$V_{CE(sat)}$ typ V $T_J = 25^\circ\text{C}$ IGBT	E_{off} mJ $T_J = 125^\circ\text{C}$ IGBT	R_{thJC} K/W IGBT	I_{F25} A $T_C = 25^\circ\text{C}$ diode	I_{F80} A $T_C = 80^\circ\text{C}$ diode	NTC
600 V Trench IGBT									
➤ MKI 80-06T6K	600	89	67	1.8	2.8	0.6	105	67	•

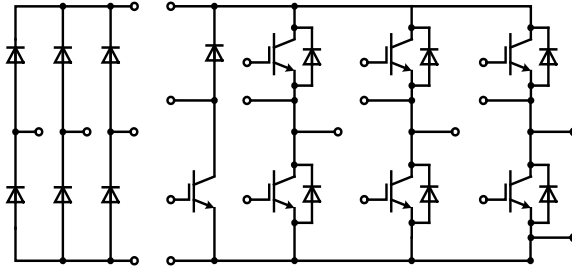
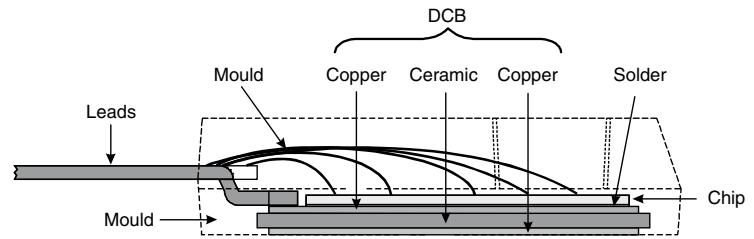
Full Bridge IGBT Modules				X112 E2-pack Package style Outline drawings on pages O-1...O-3 See data sheet for pin arrangement					
Type	V_{CES} V	I_{C25} A $T_C = 25^{\circ}C$ IGBT	I_{C80} A $T_C = 80^{\circ}C$ IGBT	$V_{CE(sat)}$ typ V $T_J = 25^{\circ}C$ IGBT	E_{off} mJ $T_J = 125^{\circ}C$ IGBT	R_{thJC} K/W IGBT	I_{F25} A $T_C = 25^{\circ}C$ diode	I_{F80} A $T_C = 80^{\circ}C$ diode	NTC
600 V NPT IGBT									
MKI 50-06A7	600	72	50	1.9	1.7	0.55	72	45	• • •
MKI 50-06A7T		72	50	1.9	1.7	0.55	72	45	
➤ MKI 65-06A7T		100	67	2.0	2.3	0.39	140	85	
MKI 75-06A7		90	60	2.5	6.3	0.44	140	85	
MKI 75-06A7T		90	60	2.5	6.3	0.44	140	85	
1200 V Fast NPT IGBT									
MKI 50-12F7	1200	65	45	3.2	2.5	0.35	110	70	
1200 V NPT ³ IGBT									
MKI 50-12E7	1200	90	62	1.9	4.0	0.35	110	70	

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 $T_C = 25^\circ\text{C}$ IGBT	I_{C80} A $T_C = 80^\circ\text{C}$ IGBT	$V_{CE(sat)}$ typ V $T_J = 25^\circ\text{C}$ IGBT	E_{off} mJ $T_J = 125^\circ\text{C}$ IGBT	R_{thJC} K/W IGBT	I_{F25} A $T_C = 25^\circ\text{C}$ diode	I_{F80} A $T_C = 80^\circ\text{C}$ diode	NTC
1200 V Fast NPT IGBT									
MKI 100-12F8	1200	65	45	3.2	2.5	0.35	110	70	
1200 V NPT³ IGBT									
MKI 75-12E8	1200	130	90	2.0	7.5	0.25	150	100	
MKI 100-12E8		150	115	2.0	10	0.19	200	130	

IXYS ISOPLUS Technology

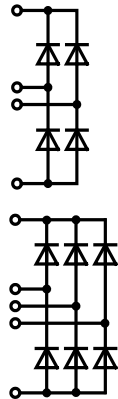
DCB base plate

- 2500 V electrical isolation
- low thermal resistance
- increased power & temperature cycling
- saves space
- replaces multiple discretes
- reduces parasitic inductance and capacitance
- reduces EMI
- heat spreading

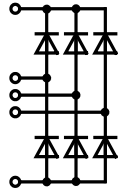


Rectifier Bridge

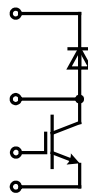
FBO 16-12N
FBO 40-12N



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

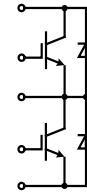


Brake (Boost)



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

Converter (3x phaseleg)



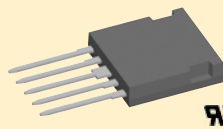
FII 30-06D
FII 40-06D
FII 30-12E
FII 50-12E

* PT IGBT LV alvailable too
(*inquire factory*)

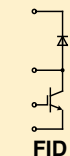
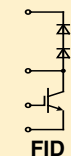
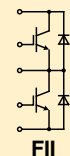
Building blocks for your ideal converter

ISOPLUS i4-PAC™

Package



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



FII FID FID
HiPerDyn HiPerFRED

Type	Configu- ration	Technology	V_{RRM} / V_{CES} V	I_{C25} @ 25°C A	$I_{D(AV)M} / I_{C80}$ @ 90°C A	$V_{CE(sat)}$ typ. $T_C = 25°C$ V
FBO 16-12N FBO 40-12N	1~	Rectifier Bridge	1200		22 40	
FUO 22-12N FUO 22-16N FUO 50-16N	3~	Rectifier Bridge	1200 1600 1600		27 27 50	
FID 35-06C FID 36-06D FID 60-06D	boost	NPT IGBT & HiPerDynFRED NPT IGBT & HiPerFRED NPT IGBT & HiPerFRED	600	38 38 65	24 24 40	1.9 1.9 1.6
FII 30-06D FII 40-06D FII 30-12E FII 50-12E	phaseleg	NPT IGBT NPT IGBT NPT ³ IGBT NPT ³ IGBT	600 600 1200 1200	30 40 32 50	18 25 20 32	1.9 1.8 2.4 2.0

Thyristor / Diode Modules

One of the essential advantages of power semiconductor modules compared to discrete designs is the electrical isolation between the baseplate of the module and the parts subject to voltage (3.6 kV_{RMS} tested). This makes possible the mount-down of any number of the same or different modules on a common heatsink. It is feasible to use standard housings with appropriate accessories for designing compact power converter operating from AC mains up to 690 V.

Plastic Housing with DCB Substrate

IXYS has succeeded in simplifying the conventional multilayer module construction by the DCB (Direct Copper Bonding) technique.

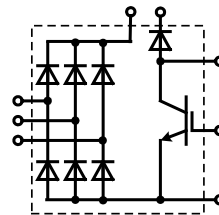
Other features are:

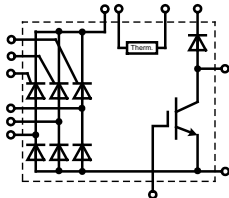
- top-side electrical terminals with captured nuts;
- series-connected diode/diode, thyristor/diode and thyristor/thyristor modules;
- easy assembly.

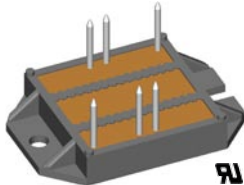
All thyristor modules with DCB ceramic base contacts are available in volume with two standardized twin plugs (2.8 mm x 0.8 mm) for gate and auxiliary cathode control terminals (version 1). Modules in TO-240 housing of the version 8 are delivered with gate plugs only (without auxiliary cathode terminal; mounting screws available on request). The module housing is designed for adequate clearance and creepage distance resulting in recognition by Underwriters Laboratories, Inc., USA for all types.

3~ Rectifier Bridges

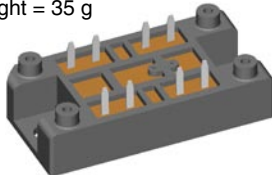
with IGBT and Diode for Brake Unit



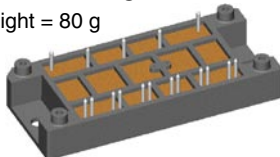
Type	Rectifier			IGBT		fast Diode			Fig. No.	Package style
	V_{RRM}	$I_{dAV} @ T_C$		V_{CES}	I_{C80}	V_{RRM}	$I_{F(AV)}$	t_{rr}		Outline drawings on pages O-1...O-3
	V	A	°C	V	A	V	A	ns		
VUB 50-12PO1	1200	56	100	1200	14	1200	10	110	X102	X102 ECO-PAC 2 Weight = 24 g See data sheet for pin arrangement
VUB 50-16PO1	1600									
VUB 72-12NO1	1200	110	80	1200	35	1200	15	130	X103	
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	
VUB 145-16NO1	1600	145	100	1200	100	1200	27	40		
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 V2-Package Weight = 80 g
VVZB 120-16io1	1600				67					
VVZB 135-16NO1	1600	135	85		67				X112	
VVZB 170-16NO1		170			100					



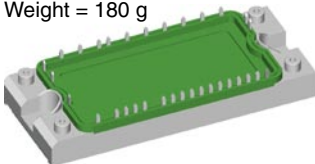
X103 V1-Package
Weight = 35 g

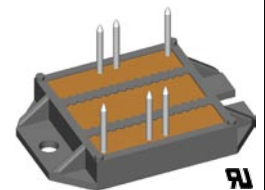


X104 V2-Package
Weight = 80 g

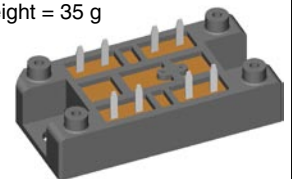


X112 V2-Package
Weight = 180 g

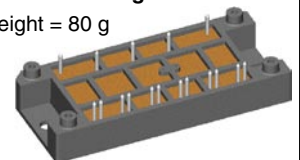




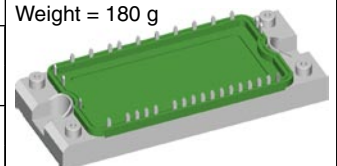
X103 V1-Package
Weight = 35 g



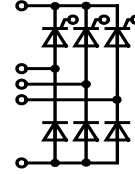
X104 V2-Package
Weight = 80 g



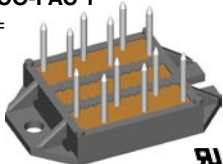
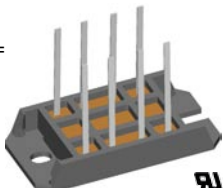
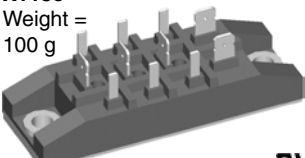
X112 V2-Package
Weight = 180 g

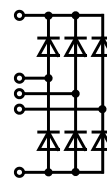


3~ Rectifier Bridges

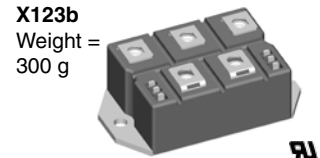


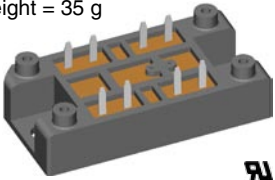
3~ Half Controlled Rectifier Bridges, B6HK

Type	V _{RRM}	V _{VRMS}	I _{dAV} T _H = 100°C	I _{FSM} 45°C 10 ms	V _{T0}	r _T	T _{VJM}	R _{thJC} per Chip	R _{thJH} per Chip	Fig. No.	Package style
	V	V	A	A	V	mΩ	°C	K/W	K/W		Outline drawings on pages O-5...O-17
VVZ 12-12io1 VVZ 12-14io1 VVZ 12-16io1	1200 1400 1600	400 440 500	15	110	1.1	30	125	2.5	3.1	X106a	X101 ECO-PAC 1 Weight = 19 g 
VVZ 24-12io1 VVZ 24-14io1 VVZ 24-16io1	1200 1400 1600	400 440 500	21	300	1	16	125	2.1	2.7		
VVZ 39-08ho7 VVZ 39-12ho7	800 1200	250 400	39 T _C = 85°C	200	0.85	27	125	1.3	1.8		
VVZ 40-12io1 VVZ 40-14io1 VVZ 40-16io1	1200 1400 1600	400 440 500	34	320	0.85	15	125	1.0	1.6	X106a	X106a Weight = 28 g 
VVZ 70-08io7 VVZ 70-12io7 VVZ 70-14io7 VVZ 70-16io7	800 1200 1400 1600	250 400 440 500	70 T _C = 85°C	550	0.85	11	125	0.9	1.1	X118c	X118c Weight = 100 g 
VVZ 110-12io7 VVZ 110-14io7	1200 1400	400 440	110 T _C = 85°C	1150	0.85	6	125	0.65	0.8	X123b	
VVZ 175-12io7 VVZ 175-14io7 VVZ 175-16io7	1200 1400 1600	400 440 500	167 T _C = 85°C	1500	0.85	3.5	125	0.46	0.55		



3~ Rectifier Bridges, B6U

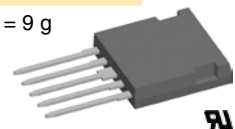


Type	V _{RRM}	V _{VRMS}	I _{dAV}	T _C	I _{FSM} 45°C 10 ms	V _{T0}	r _T	T _{VJM}	R _{thJC} per Chip	R _{thJH} per Chip	Fig. No.	Package style
	V	V	A	°C	A	V	mΩ	°C	K/W	K/W		Outline drawings on pages O-5...O-17
VUO 16-08NO1 VUO 16-12NO1 VUO 16-14NO1 VUO 16-16NO1 VUO 16-18NO1	800 1200 1400 1600 1800	250 400 440 500 575	15	T _H = 90°C	100	0.8	50	130	-	4.5	X103	X103 V1-Package Weight = 35 g 
FUO 22-12N FUO 22-16N	1200 1600	400 500	27		100	0.83	28	150	4	5		
VUO 22-08NO1 VUO 22-12NO1 VUO 22-14NO1 VUO 22-16NO1 VUO 22-18NO1	800 1200 1400 1600 1800	250 400 440 500 575	22		100	0.8	40	130	-	3.1		
VUO 34-08NO1 VUO 34-14NO1 VUO 34-16NO1 VUO 34-18NO1	800 1400 1600 1800	250 440 500 575	36		300	0.8	15	130	-	2.5		
FUO 50-16N	1600	500	50		200 25°C	tbd	tbd	150	2.1	3.2	X024a	

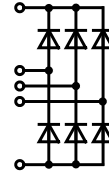
X024a V1-Package

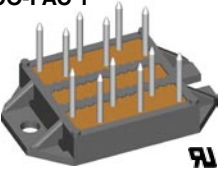
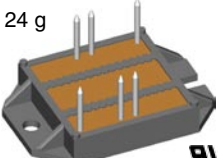
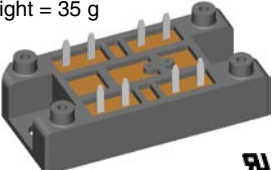
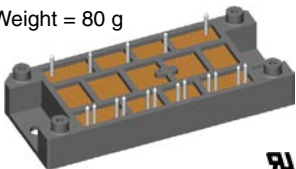
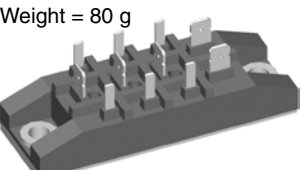
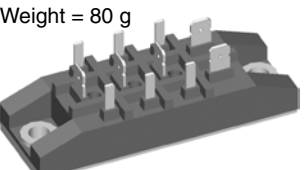
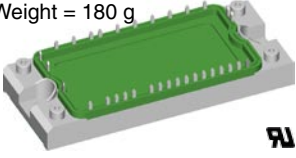
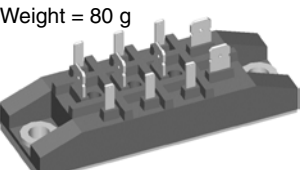
ISOPLUS i4-PAC™

Weight = 9 g



3~ Rectifier Bridges, B6U



Type	V _{RRM}	V _{VRMS}	I _{dAV}	T _C	I _{FSM} 45°C 10 ms	V _{T0}	r _T	T _{VJM}	R _{thJC} per Chip	R _{thJH} per Chip	Fig. No.	Package style
	V	V	A	°C	A	V	mΩ	°C	K/W	K/W		Outline drawings on pages O-1...O-4
VUO 52-08NO1 VUO 52-12NO1 VUO 52-14NO1 VUO 52-16NO1 VUO 52-18NO1 VUO 52-20NO1	800 1200 1400 1600 1600 1800	250 400 440 500 500 575	54 T _H = 90°C		350	0.8	12.5	130	-	1.5	X103	X101 ECO-PAC 1 Weight = 19 g 
VUO 68-08NO7 VUO 68-12NO7 VUO 68-14NO7 VUO 68-16NO7	800 1200 1400 1600	250 400 440 500	68	100	300	0.8	13	150	1.1	1.6	X101	See data sheet for pin arrangement X102 ECO-PAC 2 Weight = 24 g 
VUO 80-08NO1 VUO 80-12NO1 VUO 80-14NO1 VUO 80-16NO1 VUO 80-18NO1	800 1200 1400 1600 1800	250 400 440 500 575	82 T _H = 90°C		600	0.8	7.5	150	-	1.42	X103	See data sheet for pin arrangement
VUO 86-08NO7 VUO 86-12NO7 VUO 86-14NO7 VUO 86-16NO7	600 1200 1400 1600	125 400 440 500	86	90	530	0.8	7.5	150	1.2	1.5	X101	X103 V1-Package Weight = 35 g 
VUO 98-08NO7 VUO 98-12NO7 VUO 98-14NO7 VUO 98-16NO7	800 1200 1400 1600	250 400 440 500	95	85	750	0.8	6	150	1.2	1.5	X102	X104 V2-Package Weight = 80 g 
VUO 100-08NO7 VUO 100-12NO7 VUO 100-14NO7 VUO 100-16NO7	800 1200 1400 1600	250 400 440 500	100	100	1000	0.8	5	150	1.12	1.5	X118d	
VUO 120-12NO1 VUO 120-16NO1	1200 1600	1200 1600	121	75	650	0.8	6.1	150	1	1.3	X104	X118d Weight = 80 g 
VUO 121-16NO1	1600	575	118	100	650	0.8	5	150	0.8	0.9	X112	X112 Weight = 180 g 
VUO 122-08NO7 VUO 122-12NO7 VUO 122-14NO7 VUO 122-16NO7 VUO 122-18NO7	800 1200 1400 1600 1800	250 400 440 500 575	117	100	900	0.8	4	150	0.85	1.15	X102	
VUO 155-12NO1 VUO 155-16NO1	1200 1600	1200 1600	157	75	850	0.75	4.6	150	0.8	1.1	X104	X123a/c Weight = 80 g 
VUO 160-08NO7 VUO 160-12NO7 VUO 160-14NO7 VUO 160-16NO7 VUO 160-18NO7	800 1200 1400 1600 1800	250 400 440 500 575	175	90	1800	0.8	3	150	0.65	0.83	X123a	
VUO 190-08NO7 VUO 190-12NO7 VUO 190-14NO7 VUO 190-16NO7 VUO 190-18NO7	800 1200 1400 1600 1800	250 400 440 500 575	248	110	2800	0.8	2.2	150	0.45	0.6	X123c	

Product Overview

Press-Pack IGBTs (T Types) 1.7kV, 2.5kV, and 4.5kV 160A to 2500A

		TX116TA17E	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
4.5kV	2.5kV	1.7kV	



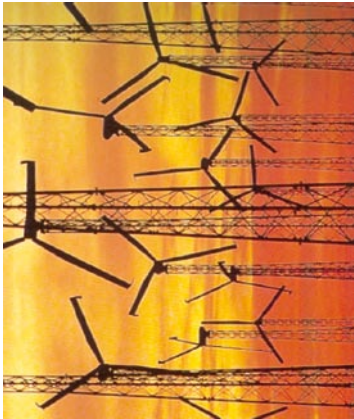
HSR-350X - Korean Rail



E10 Shunting Locomotive - Polish Rail



Induction Heating



Wind Power

Press-Pack IGBTs - 1.7kV, 2.5kV and 4.5kV

As a pioneer of Press-Pack IGBT technology, we are able to offer a range of class leading devices with voltage ratings of 2.5kV (1.25kV DC link), 4.5kV (2.8kV DC link) and 1.7kV.

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.



- largely backwardly compatible with standard 2.5kV and 4.5kV Gate Turn-Off thyristors (including GCTs) in many applications such as transportation and AC drives. This makes these parts a simple and economical path to upgrade or refurbish equipment that previously used Gate Turn-Off thyristors, such as locomotives or medium voltage drives.
- suitable for all cooling options including direct liquid immersion.

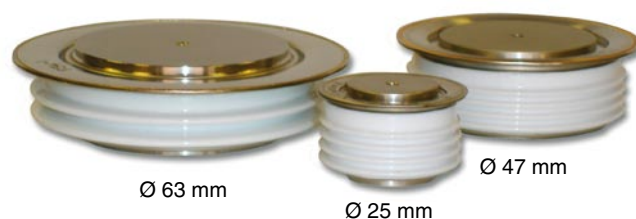
Complementary gate drives (shown on Page 15), mounting clamps and passive components are available by contacting the UK Factory.

HP Sonic-FRDs

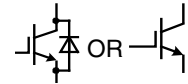
Anti-parallel Diodes for IGBTs and IGCTs - 1.7kV to 4.5kV

New world-leading class of ultra fast and ultra soft recovery diode available from 1.7kV to 4.5kV in current ratings 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 losses. 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.



Press-Pack IGBTs



Type Part No.	V_{CES} V	I_C A	I_{CM} A	$V_{CE(sat)}$ $I_F = I_C$ V	IGBT Switching Typical		V_F $I_F = I_C$ V	Diode Recovery Typical			T_{jmax} °C	R_{thJK}		Fig. No.
					E_{ON} J	E_{OFF} J		I_{rm} A	t_{rr} µs	Q_r µC		IGBT K/W	Diode K/W	
➤ New	V	A	A	V	J	J	V	A	µs	µC	°C	K/W	K/W	
T0160NA45A	4500	160	310	4.6	0.50	0.42	3.8	400	0.96	340	125	0.058	0.095	W40
T0240NA45E	4500	240	400	4.7	0.73	0.88	N/A	N/A	N/A	N/A	125	0.042	N/A	W40
T0360NA25A	2500	360	720	3.6	0.75	0.34	2.1	250	0.93	285	125	0.054	0.087	W40
T0500NA25E	2500	500	1000	3.6	0.80	0.50	N/A	N/A	N/A	N/A	125	0.039	N/A	W40
T0600TA45A	4500	600	1000	4.7	1.75	1.50	3.6	1400	0.92	650	125	0.016	0.039	W41
T0800TA45E	4500	800	1500	4.6	2.20	1.92	N/A	N/A	N/A	N/A	125	0.012	N/A	W41
T0900EA45A	4500	900	1500	4.6	2.80	2.60	3.6	1800	0.85	800	125	0.014	0.026	W44
T1200TA25A	2500	1200	2400	3.6	2.50	1.40	2.5	670	1.50	830	125	0.017	0.029	W41
T1200EA45E	4500	1200	2100	4.6	3.20	3.80	N/A	N/A	N/A	N/A	125	0.010	N/A	W44
T1500TA25E	2500	1500	3000	3.6	3.30	1.70	N/A	N/A	N/A	N/A	125	0.013	N/A	W41
➤ T1800GA45A	4500	1800	3000	4.7	5.60	6.40	3.6	2150	2.20	3500	125	0.008	0.014	W45
➤ T2400GA45E	4500	2400	4200	4.7	7.20	7.80	N/A	N/A	N/A	N/A	125	0.005	N/A	W45
• TX168NA17A	1700	600	900	4.0	• Products Under Development							0.054	0.073	W40
• TX167NA17E	1700	840	1260	4.0								0.039	N/A	W40
• TX115TA17A	1700	1900	2850	4.0								0.017	0.029	W41
• TX116TA17E	1700	2500	3750	4.0								0.013	N/A	W41

Press-Pack IGBT Outlines on page O - 5

HP Sonic-FRDs™



Type Part No.	Old Part No.	V _{RRM}	I _{FAV} T _K = 55°C	I _{FSM} 10 ms ½ sine V _R ≤ 60% V _{RRM}	I ² t A ² s	Typ. Reverse Recovery Parameters					V _{TO}	r _T	T _{Jmax}	R _{thJK} 180° Sine	Fig. No.
➤ New		V	A	A	A ² s	I _{rm} A	t _{rr} µs	Q _r µC	@ I _{FM} A	@-di _F /dt A/µs	@ T _{Jmax} V	mΩ	°C	K/W	
E0300YH400	N/A	4000	277	2630	34.58x10 ³	605	0.75	245	300	2000	2.170	3.800	150	0.073	W3
E0300YH450	N/A	4500	277	2630	34.58x10 ³	605	0.75	245	300	2000	2.170	3.800	150	0.073	W3
E0400YH200	N/A	2000	348	3542	62.7x10 ³	572	0.74	175	400	1500	1.770	2.290	150	0.073	W3
E0400YH250	N/A	2500	348	3542	62.7x10 ³	572	0.74	175	400	1500	1.770	2.290	150	0.073	W3
E0900NC400	N/A	4000	969	15270	1.17x10 ⁶	1340	2.20	1440	900	2000	2.140	1.150	150	0.020	W5
E0900NC450	N/A	4500	969	15270	1.17x10 ⁶	1340	2.20	1440	900	2000	2.140	1.150	150	0.020	W5
E1500NC200	N/A	2000	1557	15180	1.15x10 ⁶	1450	2.30	1550	1500	2000	1.670	0.360	150	0.020	W5
E1500NC250	N/A	2500	1557	15180	1.15x10 ⁶	1450	2.30	1550	1500	2000	1.670	0.360	150	0.020	W5
E1500VF400	N/A	4000	1995	23600	2.78x10 ⁶	1730	3.00	2700	1500	2000	2.350	0.270	150	0.013	W43
E1500VF450	N/A	4500	1995	23600	2.78x10 ⁶	1730	3.00	2700	1500	2000	2.350	0.270	150	0.013	W43
E2000NC140	N/A	1400	1568	16500	1.13x10 ⁶	1880	1.00	950	2000	4000	1.770	0.350	150	0.020	W5
E2000NC170	N/A	1700	1568	16500	1.13x10 ⁶	1880	1.00	950	2000	4000	1.770	0.350	150	0.020	W5
E2500VF200	N/A	2000	2516	28600	4.10x10 ⁶	1750	1.40	1350	2500	3000	1.630	0.210	150	0.013	W43
E2500VF250	N/A	2500	2516	28600	4.10x10 ⁶	1750	1.40	1350	2500	3000	1.630	0.210	150	0.013	W43
➤ E2400TC400	N/A	4000	2227	25600	3.29x10 ⁶	2400	1.12	1330	2400	4000	2.039	0.598	150	0.008	W28
➤ E2400TC450	N/A	4500	2227	25600	3.29x10 ⁶	2400	1.12	1330	2400	4000	2.039	0.598	150	0.008	W28

HP Sonic-FRD Outlines on page O - 6

High Voltage IGBT Gate Drive Units – C0030BG400

The C0030BG400 is a single channel 30A peak rated gate drive unit (GDU), suitable for low and high side applications with DC link voltages of up to 3.5kV (5kV available on request) and with dv/dt immunity of over 100kV/μs.

This GDU performs all of the necessary supervisory functions including under voltage lockout and SCSOA protection with user configurable response and feedback. The unit requires a simple 15V DC power supply and features fibre optic command and feedback signals.

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

Options include standard variants set up for use with each of Westcode's range of IGBTs (see table) and the core module for integration into end user PCBs. Additionally our application engineers can develop semi-custom solutions 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 _g (nF)	GDU Part Number
T0160NA45A	15	8.2	100	C0030BG400SAK
T0240NA45E	10	5.6	100	C0030BG400SAL
T0360NA25A	33	18	100	C0030BG400SAA
T0500NA25E	22	15	100	C0030BG400SAB
T0600TA45A	5.6	3.3	100	C0030BG400SAM
T0800TA45E	4.7	3.3	100	C0030BG400SAN
T0900EA45A	4.7	2.7	100	C0030BG400SAP
T1200EA45E	3.3	2.2	100	C0030BG400SAR
T1200TA25A	4.7	6.8	100	C0030BG400SAC
T1500TA25E	3.3	6.8	100	C0030BG400SAD
T1800GA45A	3.3	2.2	100	C0030BG400SAS
T2400GA45E	2.2	1.5	100	C0030BG400SAT



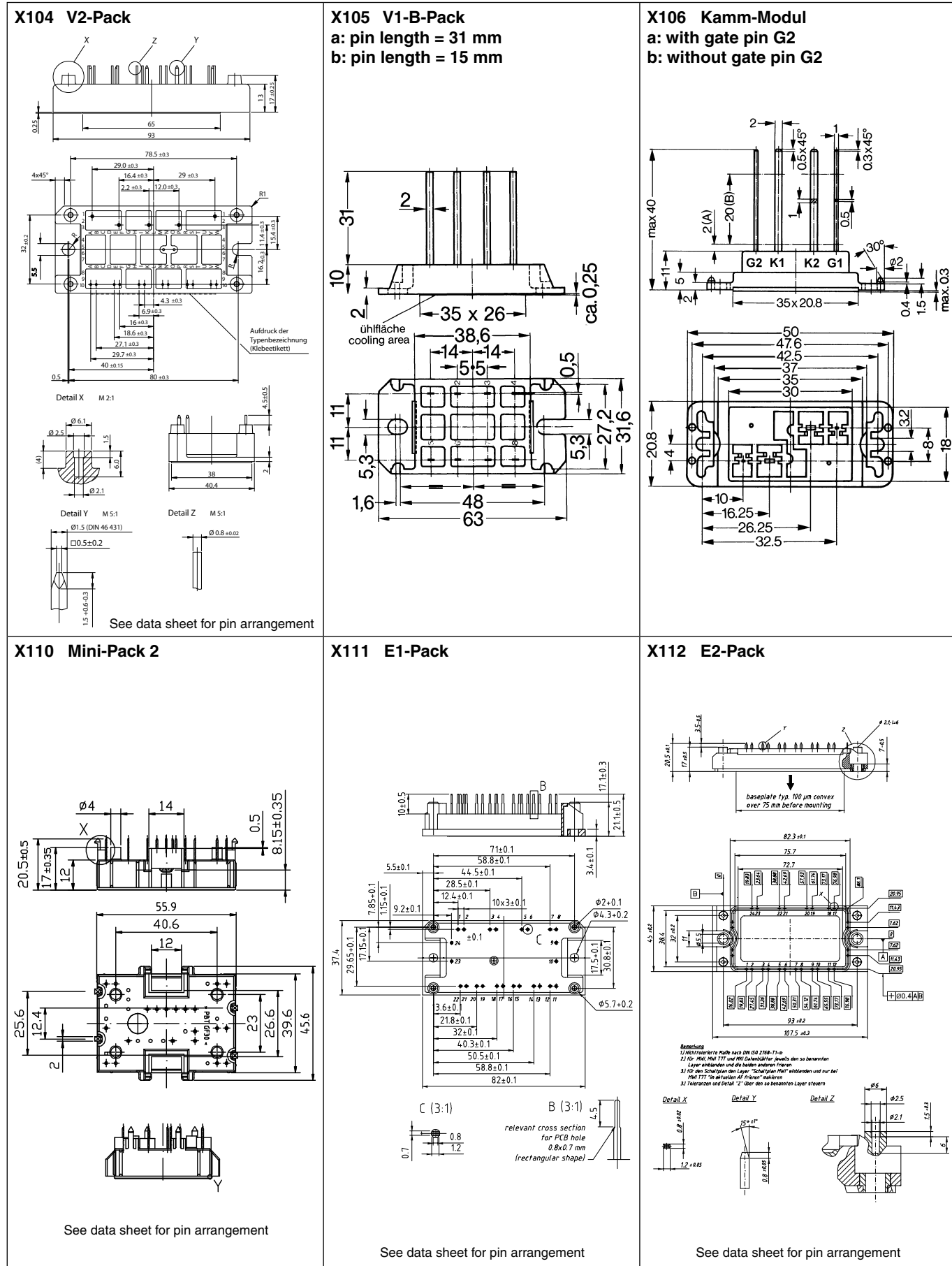
The launch of this complementary product demonstrates our continued commitment to provide our customers with complete solutions for power electronics and further strengthens our assemblies' capability.

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

Dimensions in mm and inches (1 mm = 0.0394")

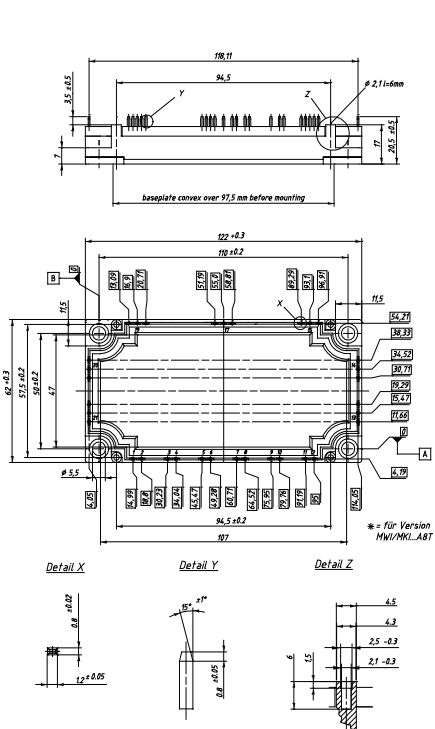
X024a ISOPLUS i4-Pac™ Top view dimensions: 65.9, 55.51, 17.3, 19.91, 20.88, 20.32, 2.31, 7.62, 15.24, 1.22. Side view dimensions: 5.03, 0.6, 2.81. Bottom view dimensions: 19.91, 20.88, 20.32, 2.31, 7.62, 15.24, 1.22.	X024b ISOPLUS i4-Pac™ Top view dimensions: 65.9, 55.51, 17.3, 19.91, 20.88, 20.32, 2.31, 15.24, 1.22. Side view dimensions: 5.03, 0.6, 2.81. Bottom view dimensions: 19.91, 20.88, 20.32, 2.31, 15.24, 1.22.	X024c ISOPLUS i4-Pac™ Top view dimensions: 65.9, 55.51, 17.3, 19.91, 20.88, 20.32, 2.31, 3.81, 15.24, 1.22. Side view dimensions: 5.03, 0.6, 2.81. Bottom view dimensions: 19.91, 20.88, 20.32, 2.31, 3.81, 15.24, 1.22.
X101 ECO-PAC1 Top view dimensions: 30.3±0.2, 15.2±0.2, 15.15±0.2, 39, 47, 20.3, 1, 2, 8. Side view dimensions: 15.15±0.2, 1, 2, 8. Bottom view dimensions: 39, 47, 20.3, 1, 2, 8. See data sheet for pin arrangement	X102 ECO-PAC2 Top view dimensions: 34.3±0.2, 17.15±0.2, 12±0.2, 20.3±0.2, 43, 51, 1, 2, 8. Side view dimensions: 17.15±0.2, 12±0.2, 1, 2, 8. Bottom view dimensions: 20.3±0.2, 43, 51, 1, 2, 8. See data sheet for pin arrangement	X103 V1-A-Pack Top view dimensions: 4.6±1, 5±1, 13, 17±0.25, 35, 63, 0.25, 50±0.2, 38.6, 14±0.3, 7±0.3, 7±0.3, 11±0.3, 11±0.3, 5.5, 25.75±0.15, 51.5±0.3, 0.5, 15.8±1, 0.5±0.2, 0.5, 2, 3.3±0.5, 26, 31.6, 6.3±1. Side view dimensions: 13, 17±0.25, 1, 2, 8. Bottom view dimensions: 15.8±1, 0.5±0.2, 0.5, 2, 3.3±0.5, 26, 31.6, 6.3±1. See data sheet for pin arrangement

Dimensions in mm and inches (1 mm = 0.0394")



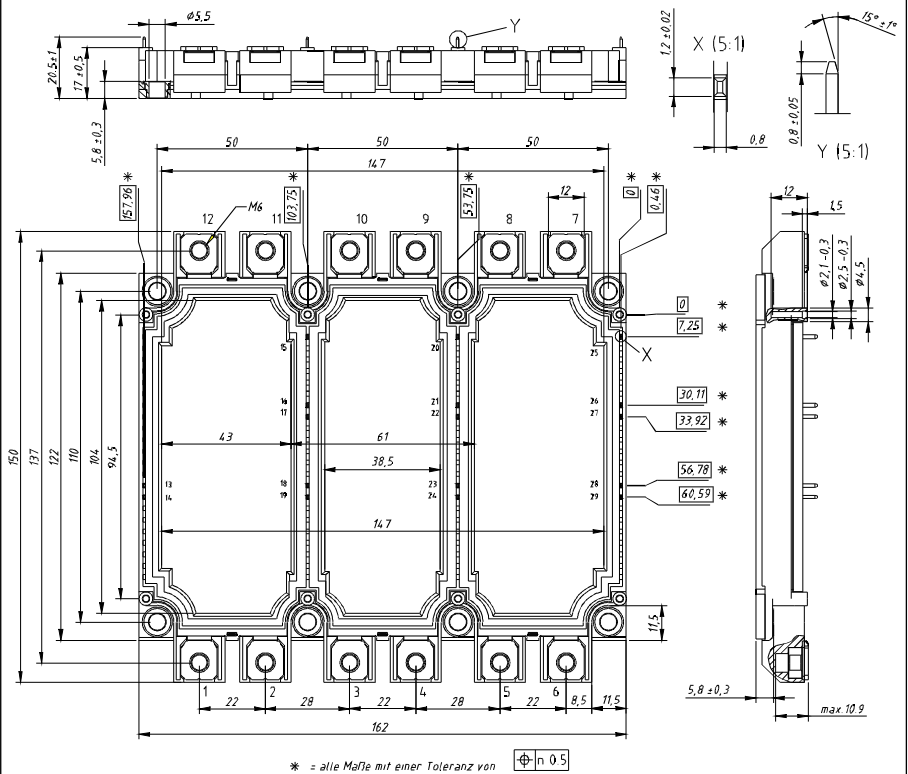
Dimensions in mm and inches (1 mm = 0.0394")

X113 E3-Pack



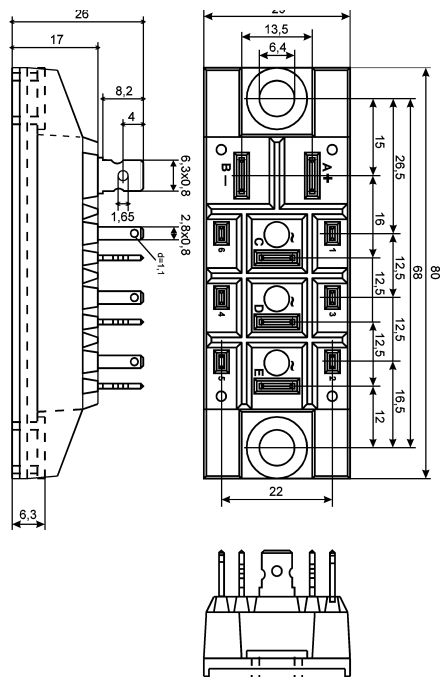
See data sheet for pin arrangement

X114 E9-Pack



X118 FO-T-A

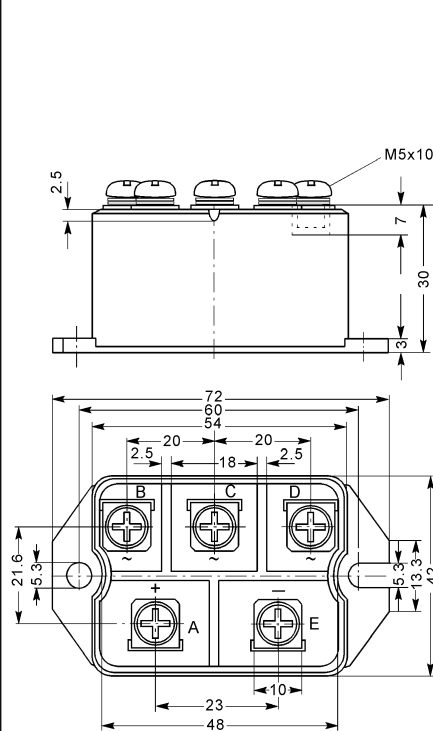
- a: VTO & VTOF
- c: w/o terminal 4, 5, & 6 (VVZ & VVZF)
- d: w/o terminal 1, 2, 3, 4, 5, & 6 (VVO)
- e: w/o terminal D, 4 & 5 (VKF & VKO)
- f: w/o terminal D, 2, 3, 4 & 5 (VGO)
- g: w/o terminal D, 3, 4, 5, & 6 (VHF & VHO)
- h: w/o terminal D, 1, 2, 3, 4, 5, & 6 (VBO)



See data sheet for pin arrangement

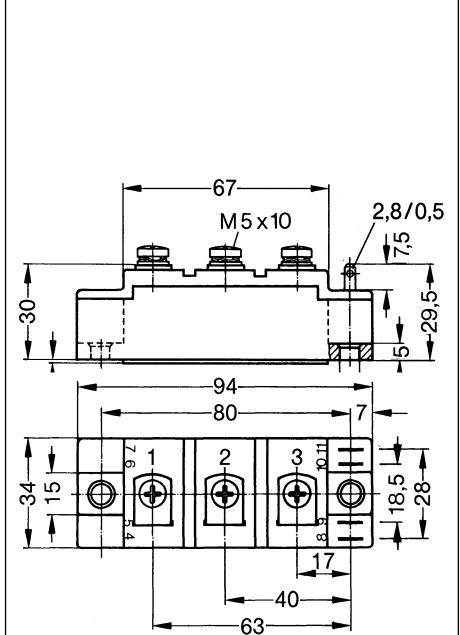
X122 PWS-D

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



X127 Y4-M5

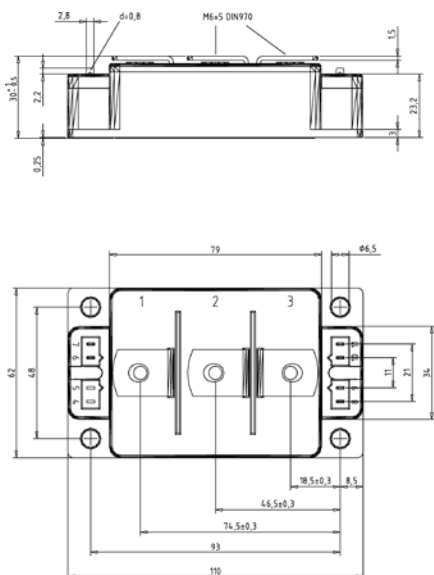
- a: MII
- b: w/o pin 6 & 7 (MID)
- c: w/o pin 4 & 5 (MDI)



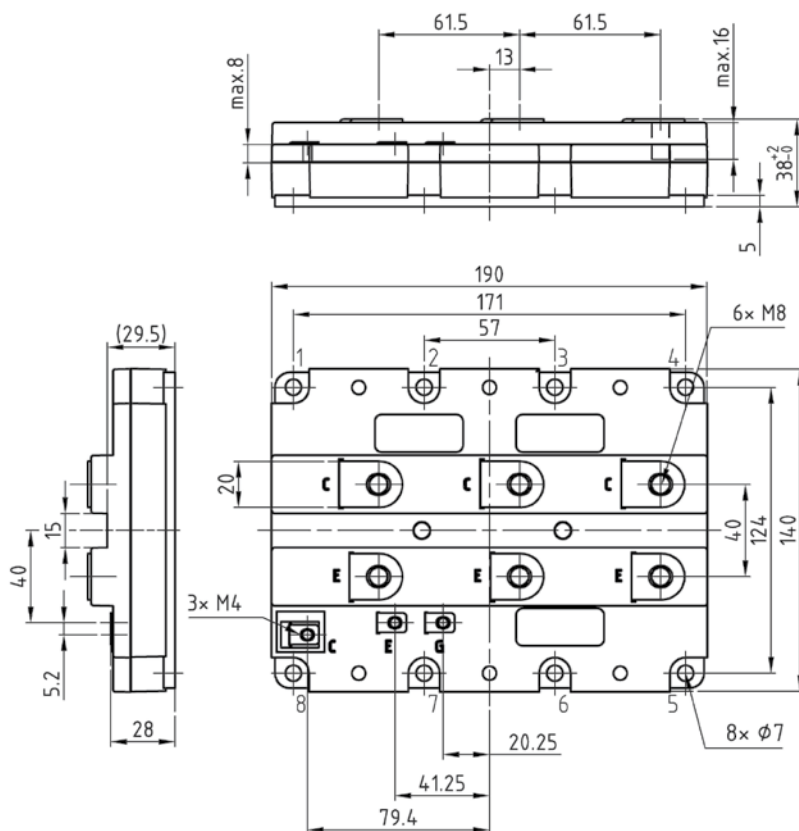
Dimensions in mm and inches (1 mm = 0.0394")

X130 Y3-Li

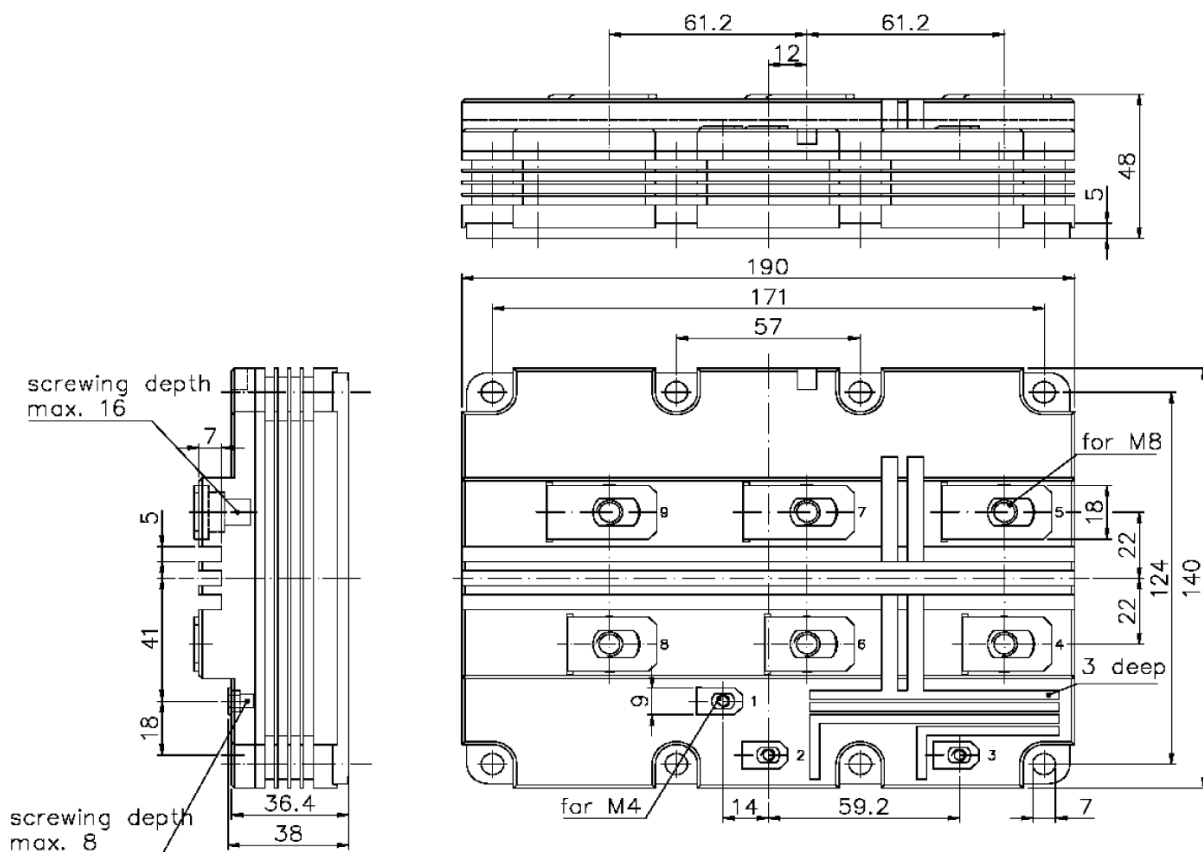
- a: low inductance (VMM, MII)
- b: w/o pin 8 & 9, low inductance (MID)
- c: w/o pin 10 & 11, low inductance (MDI)
- d: w/o terminal 1, low inductance (VMO)



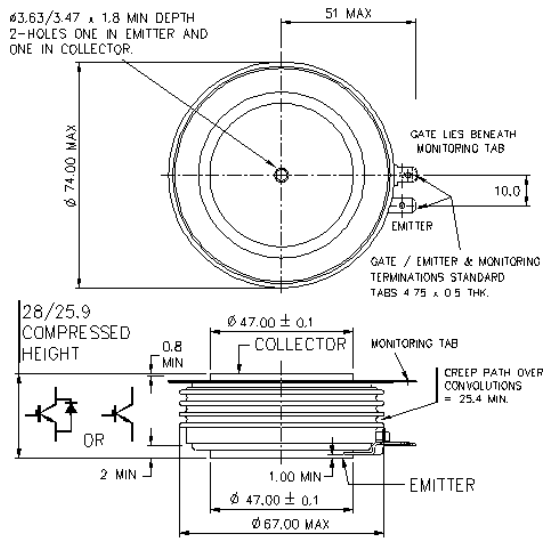
X134 E10-Pack



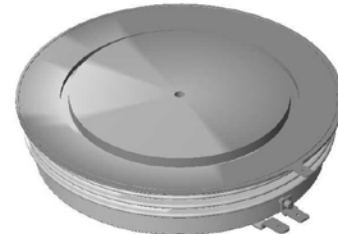
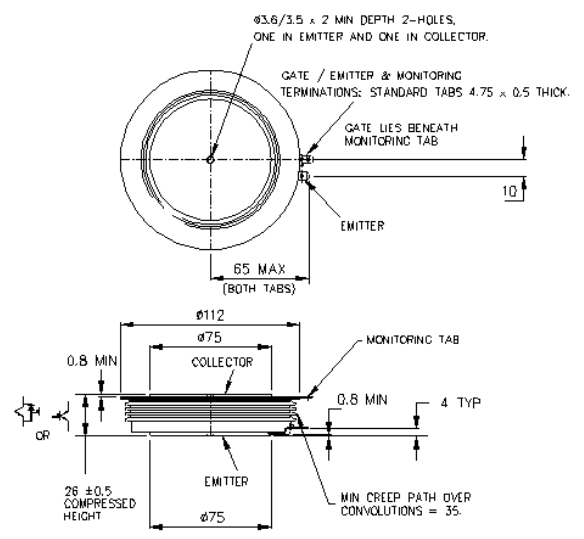
X135 E11-Pack



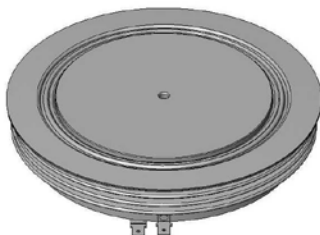
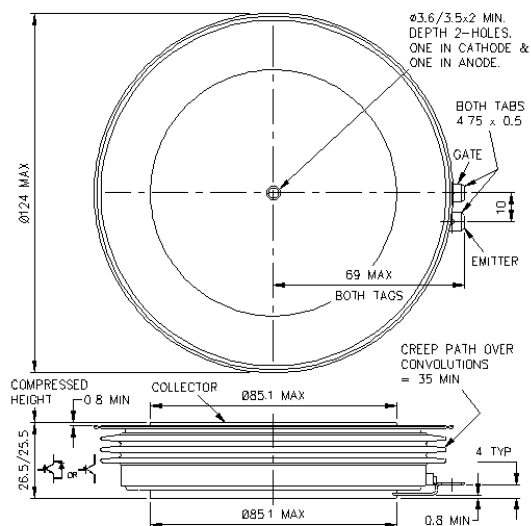
W40 - 171A107 - 47mm - Weight 430g



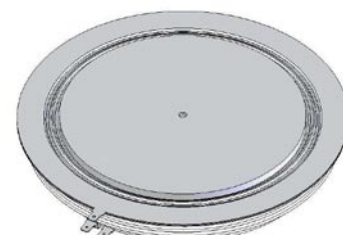
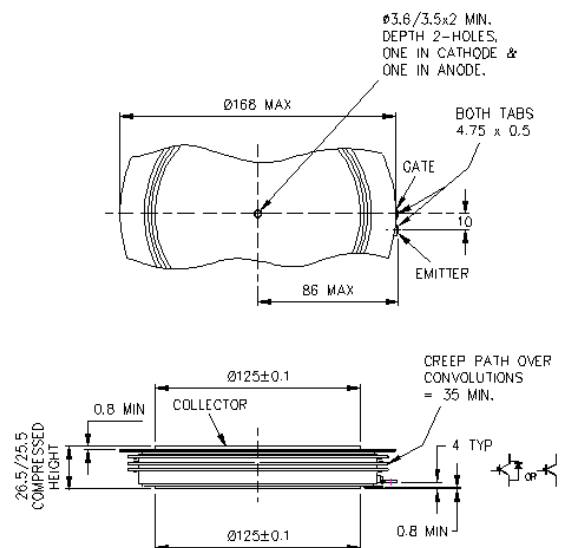
W41 - 171A108 - 75mm - Weight 1100g



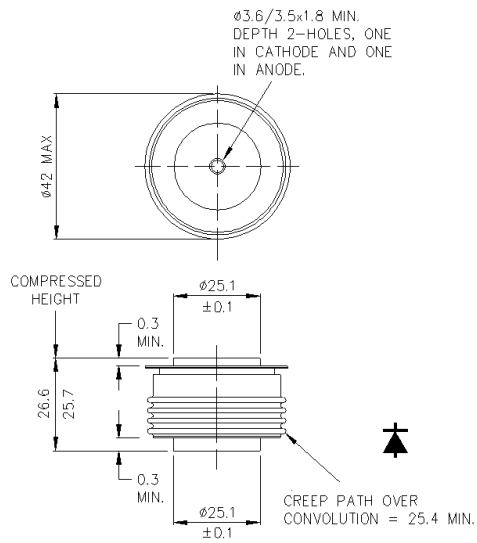
W44 - 101A340 - 85mm - Weight 1200g



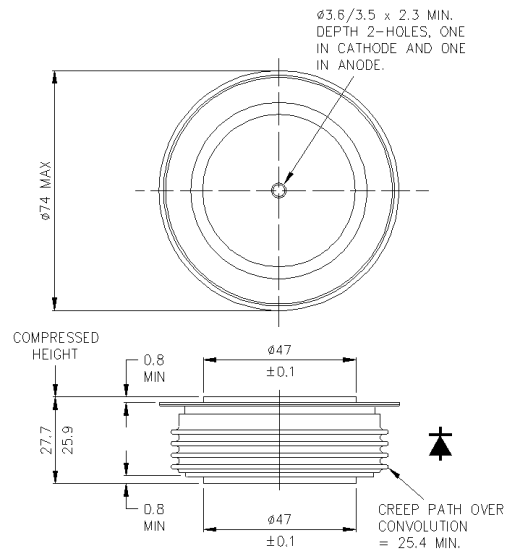
W45 - 101A359 - 125mm - Weight 2000g



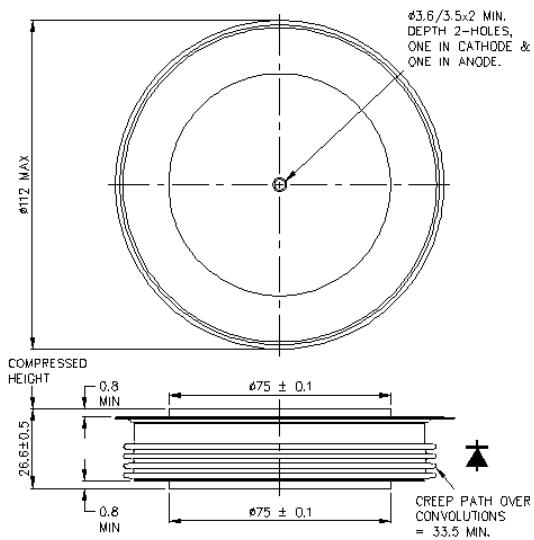
W3 - 100A317 - 25mm - Weight 140g



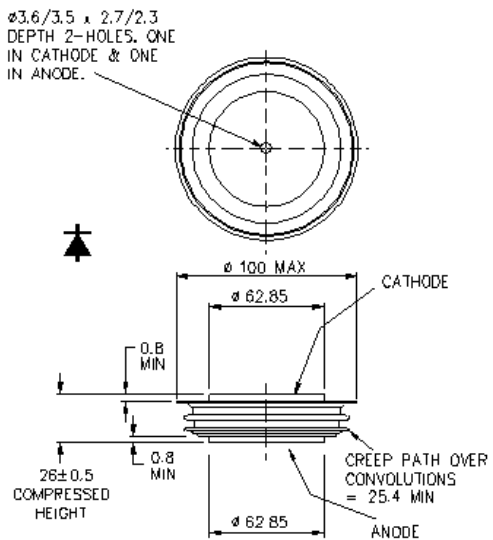
W5 - 100A249 - 47mm - Weight 510g

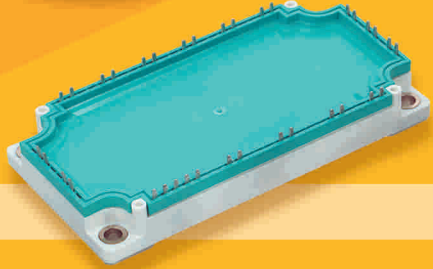
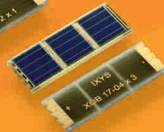
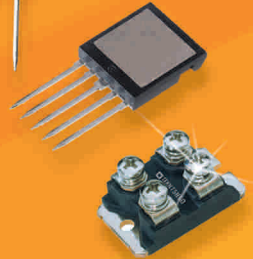
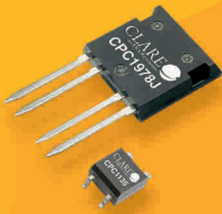


W28 - 100A330 - 73mm - Weight 1240g



W43 - 100A320 - 63mm - Weight 1000g







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