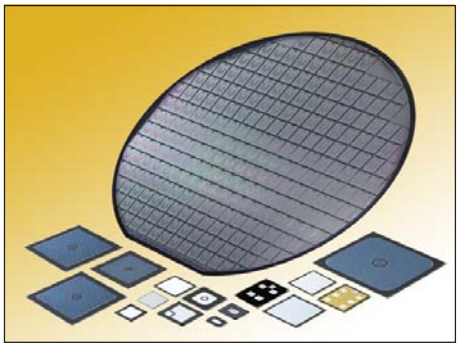
IXYS

Power Semiconductor Chips

IXYS offers a wide range of dice for a multitude of applications.

IGBT Chips	V_{CES}	I_C	$V_{CE(sat)}$
G series, Low $V_{CE(sat)}$ type	300 - 1200 V	10 - 60 A	1.6 - 3.5 V
G series, High Speed type	300 - 1200 V	10 - 100 A	2.5 - 4.0 V
S series, Low $V_{CE(sat)}$ type	600 - 1200 V	20 - 45 A	2.5 - 3.5 V
S series, High Speed type	600 - 1400 V	20 - 40 A	2.7 - 4.0 V
MOSFET Chips	V_{DSS}	$R_{DS(on)}$	t_{rr}
HiPerFET™ Power MOSFET	70 - 1200 V	0.005 - 4.5 Ω	150 - 250 ns
Standard Power MOSFET	55 - 1100 V	0.013 - 4.5 Ω	-
Fast Recovery Diodes, Rectifier Diodes and Thyristor Chips in Planar Design			
Bipolar Chips	V_{RRM} / V_{DRM}	$I_{F(AV)M}$ / $I_{T(AV)M}$	t_{rr}
Ultrafast FRED Chips	200 - 1200 V	8 - 162 A	35 - 50 ns
Low Leakage ultrafast FRED Chips	200 - 1200 V	15 - 143 A	-
Fast Recovery Diode Chips	1200 - 1600 V	17 - 48 A	1.5 ns
Rectifier Diodes	1200 - 1800 V	15 - 400 A	-
Phase Control Thyristors	800 - 2200 V	19 - 250 A	-
Schottky Diodes	8 - 180 V	10 - 200 A	-
GaAs Diodes		Contact Factory	
Silicon Chip Resistors	1 - 10 Ω		
Sonic Fast Recovery Diode Chips	600 - 1800 V	15 - 90 A	tbd



The most important features of planar technology are:

- no PN junction termination in the underside or to the edges; thus non-critical handling and simplified mounting
- fabricated using isolation diffusion with guard rings, channel stoppers and thick glass passivation to assure high electrical reliability and stability
- important electrical parameters 100% tested on the chips
- thyristor chips with center or corner gate construction
- chips with solderable or bondable metallization
- new standard 125 mm (5 inch) diameter wafers

IXYS can ship chips as follows:

Chips in wafer form, unsawed, electrically tested, rejects are inked

Chips in sawed wafer on foil, electrically tested, rejects are inked

Chips in tray (Waffle Pack), electrically tested

IXOLAR™ High Efficiency Solar Cells
Technical Information

Description

IXOLAR™ Solar Cells are IXYS' monocrystalline, high efficiency solar cell technology products incorporating an enhanced light trapping surface. There are 6 different cell sizes available: 36 mm², 72 mm², 120 mm², 240 mm², 360 mm² and 480 mm².

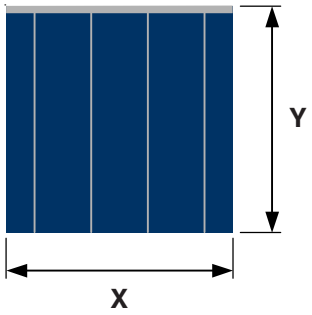
The IXOLAR™ Solar Cells are ideal for charging various battery powered and handheld consumer products such as mobile phones, cameras, PDAs, MP3-Players and toys. They are also suitable for industrial applications such as wireless sensors, portable instrumentation and for charging emergency backup batteries.

With an efficiency of typically 17%, these solar cells give the ability to extend run time even in „low light" conditions and increase battery life and run time in a small footprint, which can be easily accommodated in the design of Portable Products.

IXOLAR products have a very good response over a wide wavelength range and therefore can be used in both indoor and outdoor applications.

Product and Ordering Information

Part Number	X [mm]	Y [mm]	Open Circuit Voltage [mV]	Short Circuit Current[mA]
XOD17-04B	6	6	630	12
XOD17-07B	12	6	630	24
XOD17-12B	6	20	630	42
XOD17-24B	12	20	630	84
XOD17-36B	18	20	630	126
XOD17-48B	24	20	630	168



Front-side contact (–)
Back-side contact (+)

Electrical Characteristics

Symbol	Cell Parameter	Typical Ratings *)	Units
V_{oc}	open circuit voltage	630	mV
J_{sc}	short circuit current density	35	mA/cm²
V_{mpp}	voltage at max. power point	505	mV
J_{mpp}	current density at max. power point	32.5	mA/cm²
P_{mpp}	maximum peak power	16.6	mW/cm²
FF	fill factor	> 75	%
ç	efficiency	17	%
$\Delta V_{oc}/\Delta T$	open circuit voltage temp. coefficient	-2.1	mV/K
$\Delta J_{sc}/\Delta T$	short circuit current temp. coefficient	0.12	mA/(cm²K)
t	cell thickness	250	µm

*) All values measured at Standard Condition:
1 sun (= 100 mW/cm²), Air Mass 1.5, 25°C

Features

- Monocrystalline silicon technology
- High efficiency
- Enhanced light trapping surface texturization

Applications

- Battery chargers for portables such as cell phones, PDAs, GPS-Systems, …
- „Green" electricity generation
- Power backup for UPS, Sensors, Wearables

Advantages

- Long life and stable output
- Solderable back-side metallization
- Bondable front-side metallization
- Available in die and wafer form

IXOLAR™ High Efficiency Solar Bits

Description

IXOLAR™ Solar Bits are IXYS' product line of coated monocrystalline, high efficiency solar cell products using IXYS' XOD17 bondable solar cell dies. Solar Bits have reflow solderable surface mount packages, they are available in tape and reel packages and can be automatically pick and place mounted. There are 2 different Solar Bits available with different voltage and current output.

The IXOLAR™ Solar Bits are ideal for charging various battery powered and handheld consumer products such as mobile phones, cameras, PDAs, MP3-Players and toys. They are also suitable for industrial applications such as wireless sensors, portable instrumentation and for charging emergency backup batteries.

With a cell efficiency of typically 17%, Solar Bits give the ability to extend run time even in „low light" conditions and increase battery life and run time in a small footprint, which can be easily accommodated in the design of Portable Products. The design allows to flexibly connect Solar Bits in series and/or parallel to perfectly meet the application's power requirements.

IXOLAR products have a very good response over a wide wavelength range and therefore can be used in both indoor and outdoor applications.

Product and Ordering Information

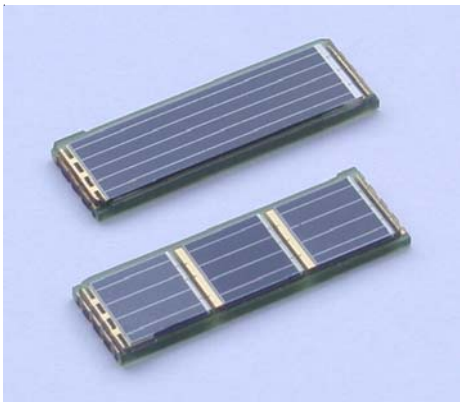
Part Number	Open Circuit Voltage [V]	Short Circuit Current [mA]	Typ. Voltage @ P_{mpp} [V]	Typ. Current @ P_{mpp} [mA]
➤ **XOB17-12 x 1**	0.63	42.0	0.51	39.0
➤ **XOB17-04 x 3**	1.89	12.6	1.53	11.7

(all parameters given are typical values)

Dimensions (L x W x H): 22 x 7 x 1.4 [mm]

Solar Bit Weight: 0.5 grams

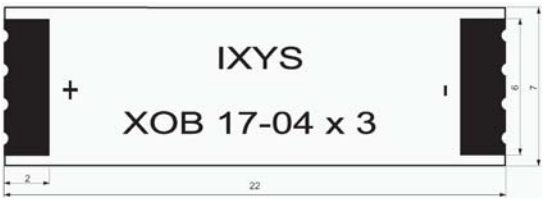
Solar Bits are compliant to the RoHS Norm.



Solar Cell Electrical Characteristics

Symbol	Cell Parameter	TypicalRatings *)	Units
V_{oc}	open circuit voltage	630	mV
J_{sc}	short circuit current density	35	mA/cm²
V_{mpp}	voltage at max. power point	505	mV
J_{mpp}	current density at max. power point	32.5	mA/cm²
P_{mpp}	maximum peak power	16.6	mW/cm²
FF	fill factor	> 75	%
η	efficiency	17	%
$\Delta V_{oc}/\Delta T$	open circuit voltage temp. coefficient	-2.1	mV/K
$\Delta J_{sc}/\Delta T$	short circuit current temp. coefficient	0.12	mA/(cm²K)

*) All values measured at Standard Condition: 1 sun (= 1000 W/m²), Air Mass 1.5, 25°C



Features

- Monocrystalline silicon technology
- High efficiency outdoor and indoor
- Long life and stable output
- Sealed Package
- Surface Mount Package
- Reflow Solderable
- Very high mechanical robustness

Applications

- Battery chargers for portables such as cell phones, PDAs, GPS-Systems, …
- „Green" electricity generation
- Power backup for UPS, Sensors, Wearables

Advantages

- Automatic Pick & Place Mounting
- One Product for Multiple Applications
- Flexible Integration into the Application

Direct Copper Bonded Ceramic Substrates

DCB and DAB Ceramic Substrates (Al_2O_3 or AlN)

IXYS manufactures **D**irect **C**opper **B**onded substrates on aluminum oxide (Al_2O_3) or aluminum nitride (AlN) base. DCB ceramic substrates form the basis for new product ideas and electronic developments with a high degree of integration.

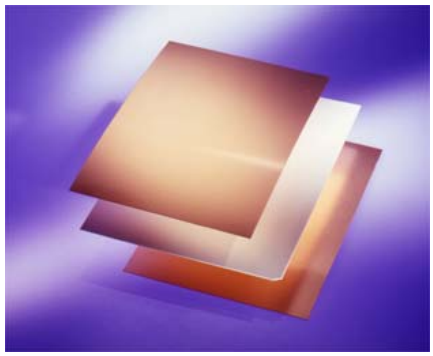
Standard bonded DCB panel dimensions are:

Unclad aluminum oxide ceramic			
Al_2O_3 content		> 96	%
dimensions		138 x 190.5, 115 x 165*	mm
usable area	max.	130 x 180, 107 x 156*	mm
thickness		1.00, 0.63, 0.38, 0.25	mm
arc through voltage		10	kV
thermal conductivity		> 24	W/m · K
Conduction layers - both sides			
copper thickness		0.3 (< 0.3 on request)	mm
conductor width	min.	0.3 + / - 0.2	mm
conductor spacing	min.	0.4 + / - 0.2	mm
spacing conductor/edge of ceramic	min.	0.35 + / - 0.2	mm
surface finishes available		bare copper; nickel plated; nickel + gold plated	
peel-off resistance (DIN 532282)	min.	9	N/mm
DCB ceramic substrate			
application temperature range		-55...+850	°C
resistant to hydrogen	max. up to	400	°C
thermal expansion coefficient	typical	7.4 x 10^{-6}	K^{-1}
dimensions according to customer specific drawing			

DCB parts are available as:
- bonded plate
- bonded and patterned plate
- prelasered, unbroken plate
- individuale substrates

ALN - DCB on request

* = (for 0.25 mm thk.)



Patterned DCB substrates can be manufactured to customers' drawings.

DCB ceramic substrates fulfill several functions:

- carriers for the semiconductor chips and connection clips
- circuits similar to that on a PC board
- electrical isolator for separating the "current paths" from the "heat paths"
- transfer medium for the heat dissipation from the active parts into the heat sink.