

# **Sonic Fast Recovery Diode**

 $V_{RRM}$ 4500 V

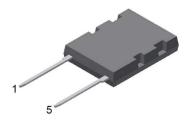
43 A | <sub>F80</sub>

1450 ns  $t_{rr}$ 

High Performance Fast Recovery Diode Low Loss and Soft Recovery Single Diode

Part number

# **DHG40I4500KO**



Backside: Isolated see important note page 3



## Features / Advantages:

- Planar passivated chips
- Very low leakage current
- · Very short recovery time
- Improved thermal behaviour
- Very low Irm-values
- Very soft recovery behaviour
- Avalanche voltage rated for reliable operation
- Soft reverse recovery for low EMI/RFI
- Low Irm reduces:
  - Power dissipation within the diode
  - Turn-on loss in the commutating switch

## **Applications:**

- Antiparallel diode for high frequency switching devices
- Snubber diode
- Free wheeling diode
- Rectifiers in switch mode power supplies (SMPS)
- Uninterruptible power supplies (UPS)

Package: ISOPLUS264

- Isolation Voltage: 4200 V~
- Industry convenient outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Soldering pins for PCB mounting
- Backside: DCB ceramic
- Reduced weight
- Advanced power cycling

#### Terms and Conditions of Usage

The data contained in this product data sheet is exclusively intended for technically trained staff. The user will have to evaluate the suitability of the product for the intended application and the completeness of the product data with respect to his application. The specifications of our components may not be considered as an assurance of component characteristics. The information in the valid application- and assembly notes must be considered. Should you require product information in excess of the data given in this product data sheet or which concerns the specific application of your product, please contact your local sales office.

Due to technical requirements our product may contain dangerous substances. For information on the types in question please contact your local sales office.

Should you intend to use the product in aviation, in health or life endangering or life support applications, please notify. For any such application we urgently recommend

to perform joint risk and quality assessments;
the conclusion of quality agreements;

- to establish joint measures of an ongoing product survey, and that we may make delivery dependent on the realization of any such measures.

IXYS reserves the right to change limits, conditions and dimensions.

Data according to IEC 60747 and per semiconductor unless otherwise specified

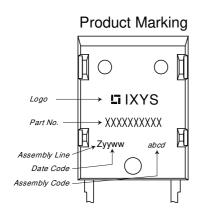
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Fast Diode				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
V <sub>RSM</sub>	max. non-repetitive reverse blocki	ng voltage	$T_{VJ} = 25^{\circ}C$			4500	V
V <sub>RRM</sub>	max. repetitive reverse blocking vo	oltage	$T_{VJ} = 25^{\circ}C$			4500	V
IR	reverse current, drain current	V <sub>R</sub> = 4500 V	$T_{VJ} = 25^{\circ}C$			100	μΑ
		$V_R = 4500 \text{ V}$	$T_{VJ} = 125^{\circ}C$			2	mΑ
V <sub>F</sub>	forward voltage drop	I <sub>F</sub> = 50 A	$T_{VJ} = 25^{\circ}C$			3.00	V
		$I_F = 100 \text{ A}$					٧
		I <sub>F</sub> = 50 A	T <sub>VJ</sub> = 125°C			3.50	V
		$I_F = 100 A$					٧
I <sub>FAV</sub>	average forward current	$T_{C} = 80^{\circ}C$	T <sub>VJ</sub> = 150°C			43	Α
		rectangular d = 1.0					
V <sub>F0</sub>	threshold voltage	T <sub>vJ</sub> = 150	T <sub>VJ</sub> = 150°C			2.20	٧
r <sub>F</sub>	slope resistance } for power lo	calculation only				24	mΩ
R <sub>thJC</sub>	thermal resistance junction to case	9				0.5	K/W
R <sub>thCH</sub>	thermal resistance case to heatsin	k			0.15		K/W
P <sub>tot</sub>	total power dissipation		$T_{C} = 25^{\circ}C$			250	W
I <sub>FSM</sub>	max. forward surge current	$t = 10 \text{ ms}$ ; (50 Hz), sine; $V_R = 0 \text{ V}$	$T_{VJ} = 45^{\circ}C$			600	Α
CJ	junction capacitance	$V_R = 1800  V$ $f = 1  MHz$	$T_{VJ} = 25^{\circ}C$		13		pF
I <sub>RM</sub>	max. reverse recovery current		$T_{VJ} = 25 ^{\circ}\text{C}$		80		Α
		$I_F = 50 \text{ A}; V_R = 2800 \text{ V}$	$T_{VJ} = 125$ °C		82		Α
t <sub>rr</sub>	reverse recovery time	$I_F = 50 \text{ A}; V_R = 2800 \text{ V}$ $-\text{di}_F / \text{dt} = 800 \text{ A} / \mu \text{s}$	$T_{VJ} = 25 ^{\circ}\text{C}$		1450		ns
	)	1	$T_{VJ} = 125$ °C		2200		ns



Package ISOPLUS264				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
I <sub>RMS</sub>	RMS current	per terminal				70	Α
T <sub>VJ</sub>	virtual junction temperature			-40		150	°C
T <sub>op</sub>	operation temperature			-40		125	°C
T <sub>stg</sub>	storage temperature			-40		150	°C
Weight					10		g
<b>F</b> <sub>c</sub>	mounting force with clip			20		120	N
d <sub>Spp/App</sub>	creepage distance on surface   striking distance through air		terminal to terminal	13.8			mm
$d_{\text{Spb/Apb}}$			terminal to backside	5.0			mm
V <sub>ISOL</sub>	isolation voltage	t = 1 second		4200			٧
		t = 1 minute	50/60 Hz, RMS; IISOL ≤ 1 mA	3000			٧



# Part description

D = Diode

H = Sonic Fast Recovery Diode

G = extreme fast

40 = Current Rating [A]

I = Single Diode

4500 = Reverse Voltage [V]

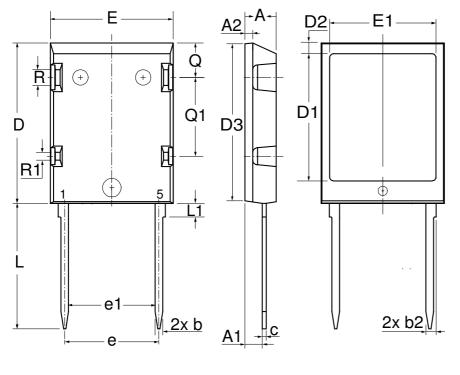
KO = ISOPLUS264 (2HV)

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity Code No.	
Standard	DHG40I4500KO	DHG40I4500KO			

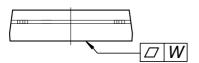
<b>Equivalent Circuits for Simulation</b>			* on die level	$T_{VJ} = 150 ^{\circ}\text{C}$
$I \rightarrow V_0$	R <sub>o</sub> -	Fast Diode		
V <sub>0 max</sub>	threshold voltage	2.2		V
$R_{0\;max}$	slope resistance *	24		$m\Omega$



### **Outlines ISOPLUS264**



Dim.	Millimeter		Inches		
חווט.	min	max	min	max	
Α	4.83	5.21	0.190	0.205	
A1	2.59	3.00	0.102	0.118	
A2	1.17	1.40	0.046	0.055	
b	1.14	1.40	0.045	0.055	
b2	1.60	1.83	0.063	0.072	
С	0.51	0.74	0.020	0.029	
D	25.91	26.42	1.020	1.040	
D1	20.34	20.85	0.801	0.821	
D2	1.65	2.03	0.065	0.080	
D3	25.29	25.78	1.000	1.020	
Е	19.56	20.29	0.770	0.799	
E1	16.97	17.53	0.668	0.690	
е	15.24	BSC	0.600	BSC	
e1	14.10	BSC	0.555	BSC	
L	19.81	20.83	0.780	0.820	
L1	2.03	2.59	0.080	0.102	
Q	5.33	5.97	0.210	0.235	
Q1	12.45	13.03	0.490	0.513	
R	3.81	4.57	0.150	0.180	
R1	2.54	3.30	0.100	0.130	
W	-	0.10	-	0.004	



Die konvexe Form des Substrates ist typ. < 0.05 mm über der Kunststoffoberfläche der Bauteilunterseite

The convex bow of substrate is typ.  $< 0.05 \, \mathrm{mm} \, \mathrm{over} \, \mathrm{plastic}$  surface level of device bottom side

# Important note:

External clearances between pins and between pins and tab may be insufficient to prevent flash over under all conditions. It is the customer's responsibility to apply additional insulation appropriate to the application.

ISOPLUS264 is designed to isolate a max continuous operation voltage (DC) of 1700 V. The peak test voltage of 4200 V assures safety for transient voltages only. The package is not tested for partial discharge.

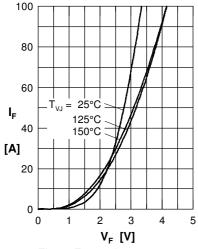
If the product is used outside the package design voltage range the customer must use additional electrical insulation. Extra insulation layers should be used both between the tab and any heatsink and between any conducting clip and the top surface of the package particularly when metal parts (such as a heatsink or a clip) are in contact. Please note that the intention of this package is to provide customers with an encapsulated die for high voltage application but the responsibility rests entirely with the customer to ensure for safe operation. Bodily injury cannot be excluded if this warning is disregarded. Device implementation is the end user's responsibility.

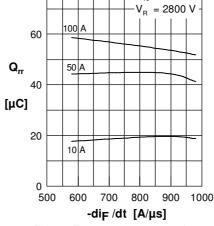
For a low FIT rate over lifetime failures due to SEB (Single Event Burnout) and an adequate voltage derating should be considered.





## **Fast Diode**





 $T_{VJ} = 125^{\circ}C$ 

80

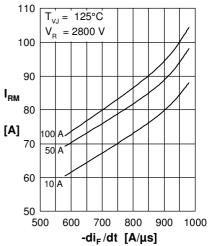
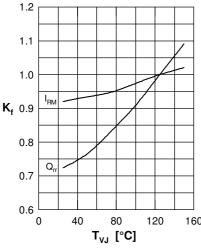
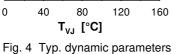


Fig. 1 Forward current I<sub>F</sub> versus V<sub>F</sub>

Fig. 2 Typ. reverse recov. charge Q<sub>rr</sub> versus -di<sub>F</sub>/dt

Fig. 3 Typ. reverse recov. current I<sub>RM</sub> versus -di<sub>F</sub>/dt





 $Q_{rr}$ ,  $I_{RM}$  versus  $T_{VJ}$ 

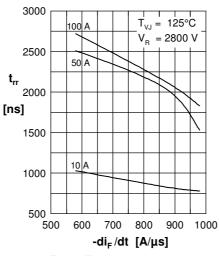


Fig. 5 Typ. reverse recov. time t<sub>rr</sub> versus -di<sub>F</sub>/dt

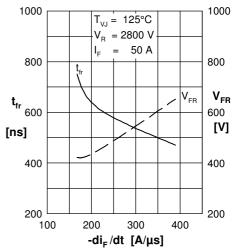


Fig. 6 Typ. forward recov. voltage V<sub>FR</sub> & time t<sub>fr</sub> versus di<sub>F</sub>/dt

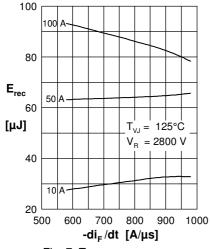


Fig. 7 Typ. recovery energy  $E_{\rm rec}$  versus  $-di_{\rm F}/dt$ 

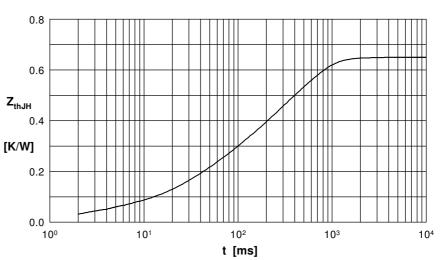


Fig. 8 Typical transient thermal impedance junction to heatsink