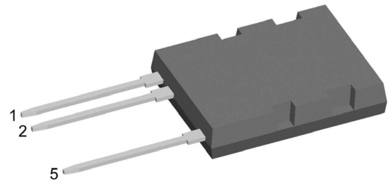
preliminary

X2PT IGBT

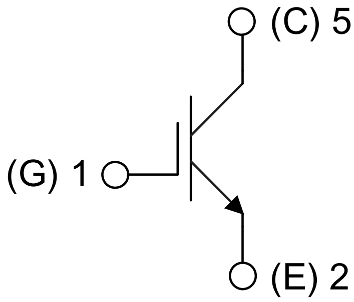
V_{CES}	=	4500 V
I_{C25}	=	74 A
$V_{CE(sat)}$	=	2.8 V

Very High Voltage
Single IGBT

Part number
IXG 50I4500KN



Backside: isolated
see important note page 3



Features / Advantages:
- Easy paralleling due to the positive temperature coefficient of the on-state voltage
- Short circuit rated for 10 µsec.
- Very low gate charge
- Low EMI

Applications:
- AC motor drives
- Solar inverter
- Medical equipment
- Uninterruptible power supply
- Air-conditioning systems
- Welding equipment
- Switched-mode and resonant-mode power supplies
- Inductive heating, cookers
- Pumps, Fans
- Pulse application
- Capacitor discharge

Package: ISOPLUS264
- Isolation voltage 4200 V~
  see important note on page 3
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Soldering pins for PCB mounting
- Backside: DCB ceramic
- Reduced weight
- Advanced power cycling

preliminary

IGBT				Ratings		
Symbol	**Definitions**	**Conditions**	**min.**	**typ.**	**max.**	
V_{CES}	*collector emitter voltage*	T_{VJ} = 25°C			4500	V
V_{GES} V_{GEM}	*max. DC gate voltage* *max. transient gate emitter voltage*	T_{VJ} = 25°C			±20 ±30	V V
I_{C25} I_{C80} I_{C100}	*collector current*	T_C = 25°C T_C = 80°C T_C = 100°C			74 52 42	A A A
P_{tot}	*total power dissipation*	T_C = 25°C			368	W
$V_{CE(sat)}$	*collector emitter saturation voltage*	I_C = 55 A; V_{GE} = 15 V; T_{VJ} = 25°C T_{VJ} = 125°C		2.8 3.65	3.2	V V
$V_{GE(th)}$	*gate emitter threshold voltage*	I_C = 10 mA; V_{GE} = V_{CE}; T_{VJ} = 25°C	5.5	6.3	7	V
I_{CES}	*collector emitter leakage current*	V_{CE} = V_{CES}; V_{GE} = 0 V; T_{VJ} = 25°C T_{VJ} = 125°C		 0.5	0.1	mA mA
I_{GES}	*gate emitter leakage current*	V_{GE} = ±20 V			500	nA
Q_{Gon}	*total gate charge*	V_{CE} = 2800 V; V_{GE} = 15 V; I_C = 55 A		500		nC
$t_{d(on)}$ t_r $t_{d(off)}$ t_f E_{on} E_{off}	*turn-on delay time* *current rise time* *turn-off delay time* *current fall time* *turn-on energy per pulse* *turn-off energy per pulse*	inductive load V_{CE} = 2800 V; I_C = 55 A; T_{VJ} = 25°C V_{GE} = ±15 V; R_G = 47 Ω, C_{GE} = 6.8 nF		440 90 900 1310 123* 69		ns ns ns ns mJ mJ
$t_{d(on)}$ t_r $t_{d(off)}$ t_f E_{on} E_{off}	*turn-on delay time* *current rise time* *turn-off delay time* *current fall time* *turn-on energy per pulse* *turn-off energy per pulse*	inductive load V_{CE} = 2800 V; I_C = 55 A; T_{VJ} = 125°C V_{GE} = ±15 V; R_G = 47 Ω; C_{GE} = 6.8 nF		300 130 940 1350 150* 73		ns ns ns ns mJ mJ
RBSOA I_{CM}	*reverse bias safe operating area*	V_{GE} = ±15 V; T_{VJ} ≤ 150°C V_{CEmax} = 4500 V			 110	 A
SCSOA t_{SC} I_{SC}	*short circuit safe operation area* *short circuit duration* *short circuit current*	V_{CEmax} = 4500 V V_{CE} = 3400 V; V_{GE} = ±15 V; T_{VJ} ≤ 150°C R_G = 47 Ω; none repetitive		 200	 10	 µs A
R_{thJC}	*thermal resistance junction to case*				0.34	K/W
R_{thJH}	*thermal resistance junction to heatsink*			0.45		K/W

Note *: Measured with DHG50I4500KN as freewheeling diode

preliminary

Package	ISOPLUS264		Ratings			
Symbol	**Definitions**	**Conditions**	**min.**	**typ.**	**max.**	**Unit**
I_{RMS}	*RMS current*	per terminal			70	A
C_P	*coupling capacity*	between shorted pins and back side metallization				pF
$R_{pin\text{-}chip}$	*resistance terminal to chip*	$V_{CE} = V_{CE(sat)} + 2 \cdot I_C \cdot R_{pin-chip}$				mΩ
T_{VJM}	*max. virtual junction temperature*		-40		150	°C
T_{OP}	*operation temperature*		-40		125	°C
T_{stg}	*storage temperature*		-40		150	°C
Weight				10		g
F_C	*mounting force with clip*		40		130	N
$d_{Spp/App}$	*creepage distance on surface / strikiing distance through air*	*terminal to terminal (pin 2 to pin 3)*	10.2			mm
$d_{Spb/Apb}$		*terminal to backside*	6.4			mm
V_{ISOL}	*isolation voltage*	t = 1 second; 50/60 Hz, RMS, $I_{ISOL} \leq 1$ mA	4200			V

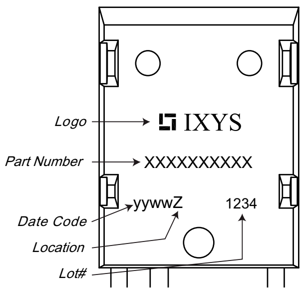
Important note:

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.

Product Marking

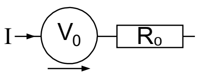


Part number

I = IGBT
X = XPT IGBT
G = Gern 2 / std
50 = Current Rating [A]
I = Single IGBT
4500 = Reverse Voltage [V]
KN = ISOPLUS264 (3HV)

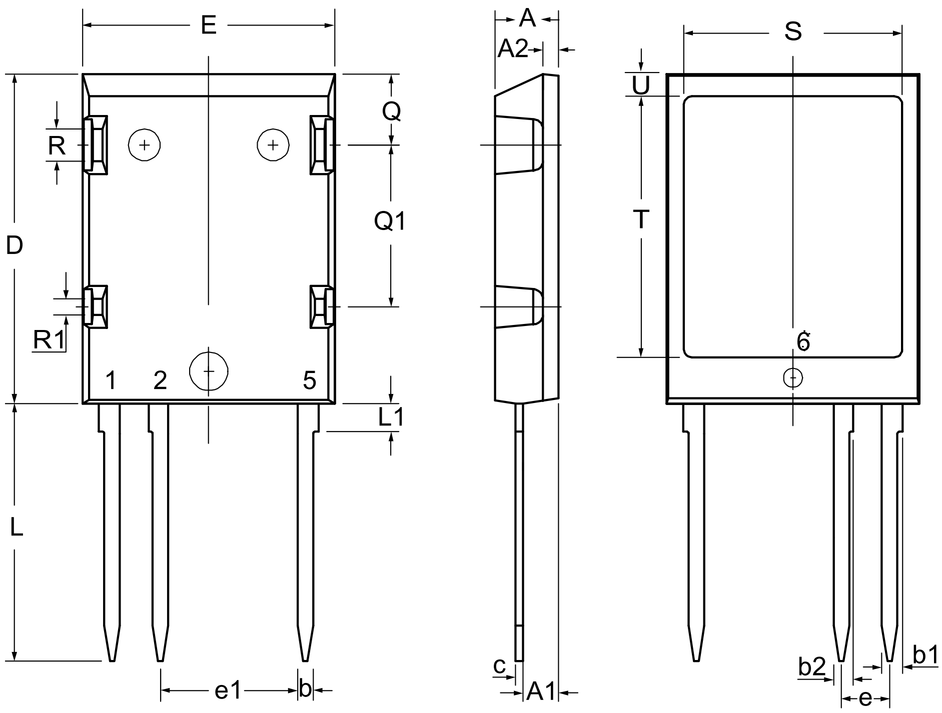
Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	IXG50I4500KN	IXG50I4500KN	Tube	25	IXG50I4500KN

Equivalent Circuits for Simulation **on die level* $T_{VJ} = 150$ °C

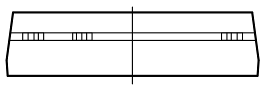


		IGBT	Diode	
$V_{0\,max}$	*threshold voltage*	1.7		V
$R_{0\,max}$	*slope resistance **	45		mΩ

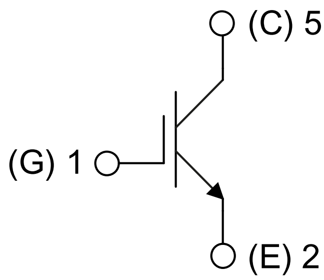
Outlines ISOPLUS264



Dim.	Millimeter		Inches	
	min	max	min	max
A	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
b1	1.60	1.83	0.063	0.072
b2	1.47	1.73	0.058	0.068
c	0.51	0.74	0.020	0.029
D	25.91	26.42	1.020	1.040
E	19.56	20.29	0.770	0.799
e	3.81	BSC	0.150	BSC
e1	11.43	BSC	0.450	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
S	16.97	17.53	0.668	0.690
T	20.34	20.85	0.801	0.821
U	1.65	2.03	0.065	0.080



Pin 1 = Gate
Pin 2 = Emitter
Pin 5 = Collector
Tab 6 = isolated



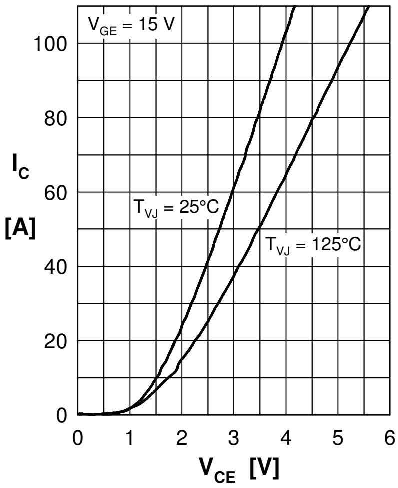


Fig. 1 Typ. output characteristics

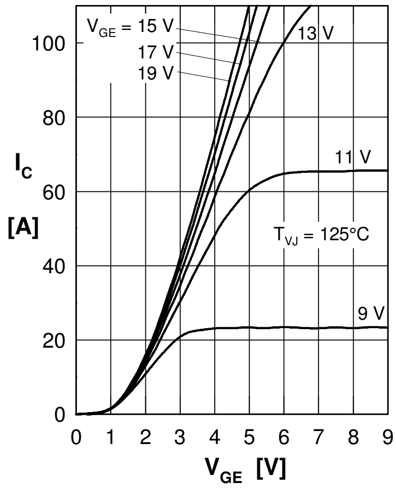


Fig. 2 Typ. tranfer characteristics

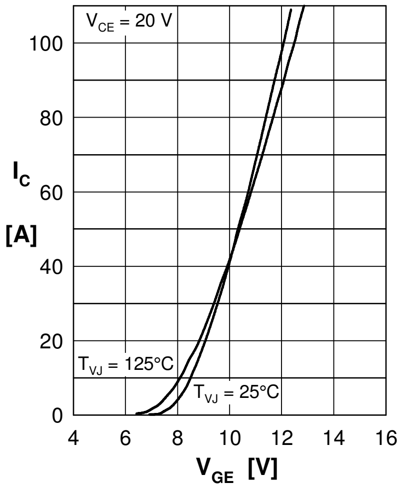


Fig. 3 Typ. transfer characteristics

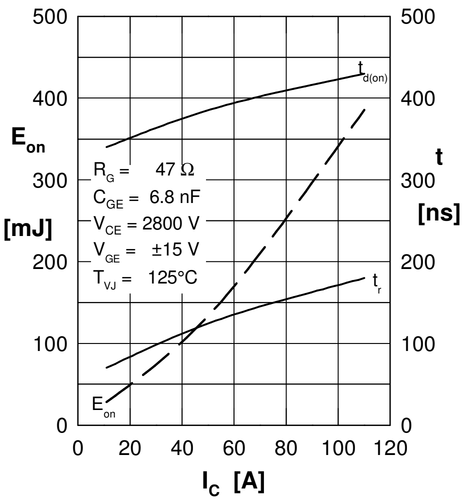


Fig. 4 Typ. turn-on energy and switching times vs. collector current, inductive switching

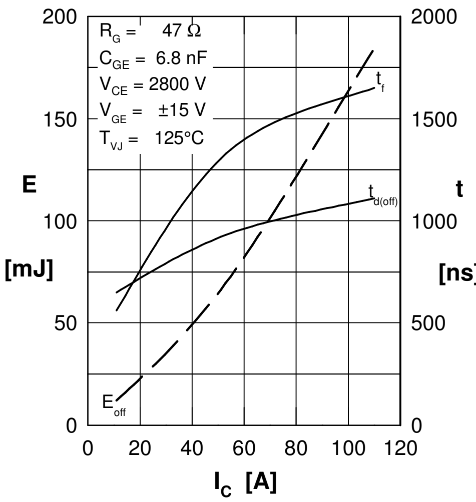


Fig. 5 Typ. turn-off energy and switching times vs. collector current, inductive switching

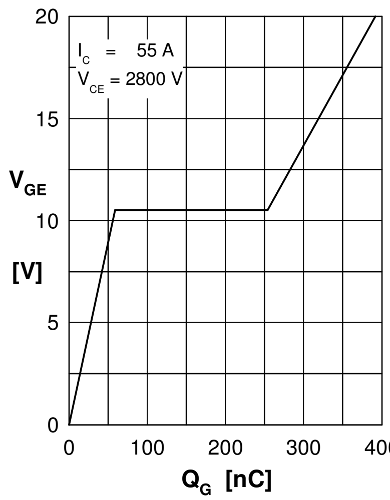


Fig. 6 Typ. turn-on gate charge

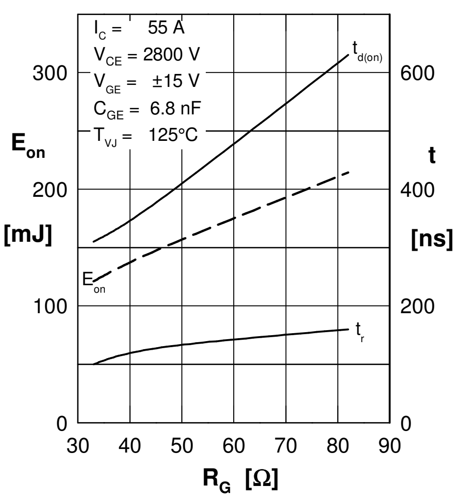


Fig. 7 Typ. turn-on energy and switching times vs. gate resistor, inductive switching

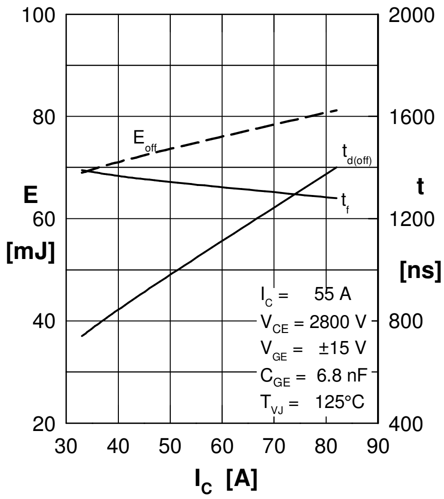


Fig. 8 Typ. turn-off energy and switching times vs. gate resistor, inductive switching

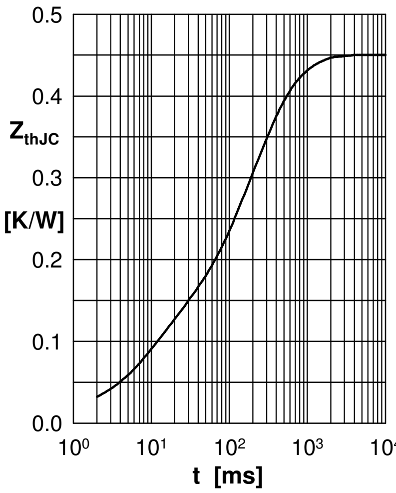


Fig. 8 Transient thermal impedance junction to case