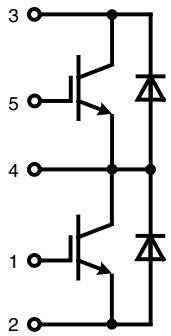
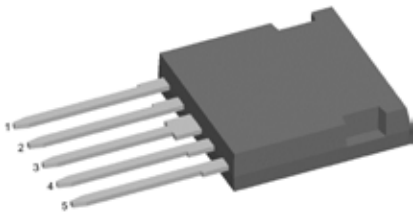
IGBT phaseleg

in ISOPLUS i4-PAC™

I_{C25} = 30 A
V_{CES} = 600 V
$V_{CE(sat)\ typ.}$ = 1.9 V





E72873

IGBT			
Symbol	**Conditions**	**Maximum Ratings**	
V_{CES}	T_{VJ} = 25°C to 150°C	600	V
V_{GES}		± 20	V
I_{C25}	T_C = 25°C	30	A
I_{C90}	T_C = 90°C	18	A
I_{CM}	V_{GE} = ±15 V; R_G = 47 Ω; T_{VJ} = 125°C	40	A
V_{CEK}	**RBSOA** Clamped inductive load; L = 100 µH	V_{CES}	
t_{SC} (SCSOA)	V_{CE} = V_{CES}; V_{GE} = ±15 V; R_G = 47 Ω; T_{VJ} = 125°C; non-repetitive	10	µs
P_{tot}	T_C = 25°C	100	W

Symbol	**Conditions**		**Characteristic Values** (T_{VJ} = 25°C, unless otherwise specified)			
			min.	**typ.**	**max.**	
$V_{CE(sat)}$	I_C = 20 A; V_{GE} = 15 V	T_{VJ} = 25°C		1.9	2.4	V
		T_{VJ} = 125°C		2.2		V
$V_{GE(th)}$	I_C = 0.5 mA; V_{GE} = V_{CE}		4.5		6.5	V
I_{CES}	V_{CE} = V_{CES}; V_{GE} = 0 V	T_{VJ} = 25°C			0.6	mA
		T_{VJ} = 125°C		0.6		mA
I_{GES}	V_{CE} = 0 V; V_{GE} = ± 20 V				200	nA
$t_{d(on)}$	Inductive load	T_{VJ} = 125°C		50		ns
t_r	V_{CE} = 300 V; I_C = 20 A			55		ns
$t_{d(off)}$	V_{GE} = ±15 V; R_G = 47 Ω			200		ns
t_f				30		ns
E_{on}				0.75		mJ
E_{off}				0.6		mJ
C_{ies}	V_{CE} = 25 V; V_{GE} = 0 V; f = 1 MHz			1.1		nF
Q_{Gon}	V_{CE} = 300 V; V_{GE} = 15 V; I_C = 20 A			65		nC
R_{thJC}					1.25	K/W
R_{thJH}	with heatsink compound			2.5		K/W

Features

- NPT IGBT technology
  - low saturation voltage
  - positive temperature coefficient for easy paralleling
  - fast switching
- HiPerFRED™ diode
  - optimized fast and soft reverse recovery
  - low operating forward voltage
  - low leakage current
- ISOPLUS i4-PAC™ package
  - isolated back surface
  - low coupling capacity between pins and heatsink
  - enlarged creepage towards heatsink
  - application friendly pinout
  - low inductive current path
  - high reliability
  - industry standard outline
  - UL registered E 72873

Applications

- single phaseleg
  - buck-boost chopper
- H bridge
  - power supplies
  - induction heating
  - four quadrant DC drives
  - controlled rectifier
- three phase bridge
  - AC drives
  - controlled rectifier

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

20110119a

Diode

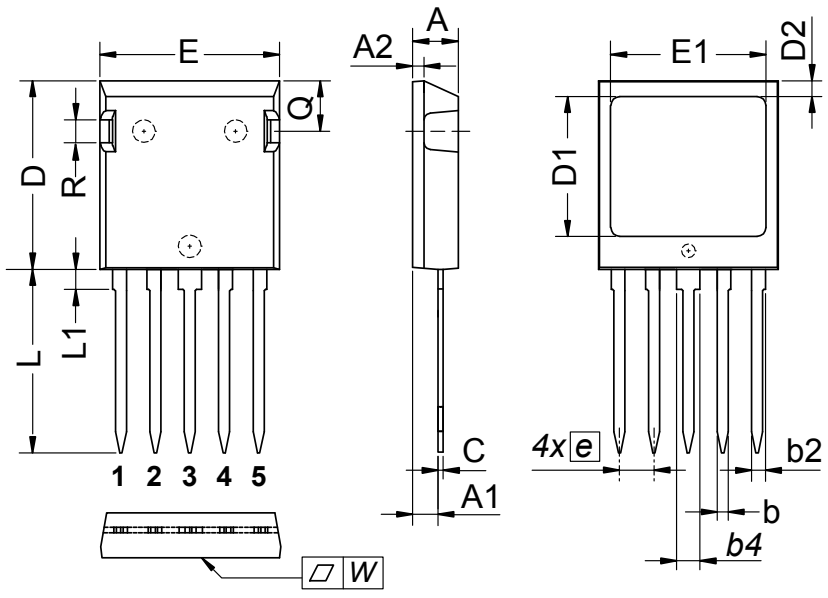
Symbol	Conditions	Maximum Ratings	
V_{RRM}	T_{VJ} = 25°C to 150°C	600	V
I_{F25}	T_C = 25°C	30	A
I_{F90}	T_C = 90°C	15	A

Symbol	Conditions		Characteristic Values min.	typ.	max.	
V_F	I_F = 20 A	T_{VJ} = 25°C		2.3	2.7	V
		T_{VJ} = 125°C		1.6		V
I_{RM}	I_F = 15 A; di_F/dt = -400 A/µs;			7		A
t_{rr}	V_R = 300 V; V_{GE} = 0 V;	T_{VJ} = 125°C		50		ns
R_{thJC}	(per diode)				2.3	K/W
R_{thJH}	with heatsink compound			4.6		K/W

Component

Symbol	Conditions	Maximum Ratings	
T_{VJ}	operating	-55...+150	°C
T_{stg}		-55...+125	°C
V_{ISOL}	$I_{ISOL} \leq$ 1 mA; 50/60 Hz; t = 1 s	2500	V~
F_C	Mounting force with clip	20...120	Nm

Symbol	Conditions	Characteristic Values min.	typ.	max.	
C_P	coupling capacity between shorted pins and mounting tab in the case		40		pF
d_S, d_A	pin - pin	1.7			mm
d_S, d_A	pin - backside metal	5.5			mm
Weight			6		g



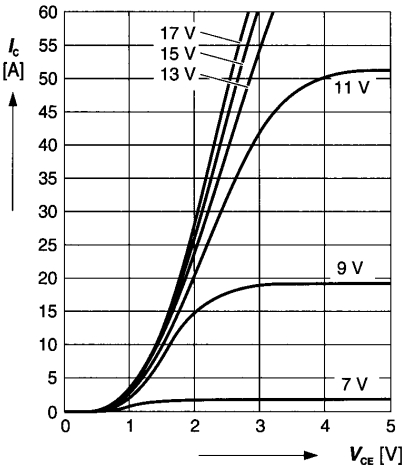
DIM.	MILLIMETER MIN	MAX	INCHES MIN	MAX
A	4.83	5.21	0.190	0.205
A1	2.59	3.00	0.102	0.118
A2	1.17	2.16	0.046	0.085
b	1.14	1.40	0.045	0.055
b2	1.47	1.73	0.058	0.068
b4	2.54	2.79	0.100	0.110
C	0.51	0.74	0.020	0.029
D	20.80	21.34	0.819	0.840
D1	14.99	15.75	0.590	0.620
D2	1.65	2.03	0.065	0.080
E	19.56	20.29	0.770	0.799
E1	16.76	17.53	0.660	0.690
e	3.81 BSC		0.15 BSC	
L	19.81	21.34	0.780	0.840
L1	2.11	2.59	0.083	0.102
Q	5.33	6.20	0.210	0.244
R	2.54	4.57	0.100	0.180
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 mm over plastic surface level ofdevice bottom side

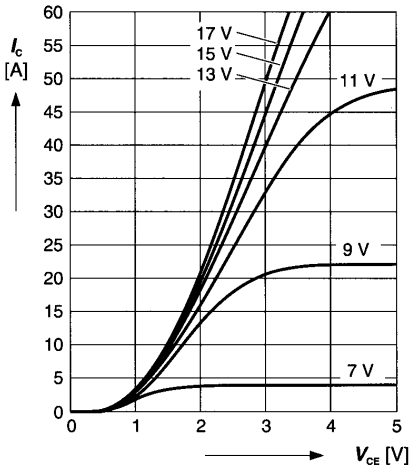
IXYS reserves the right to change limits, test conditions and dimensions.

20110119a

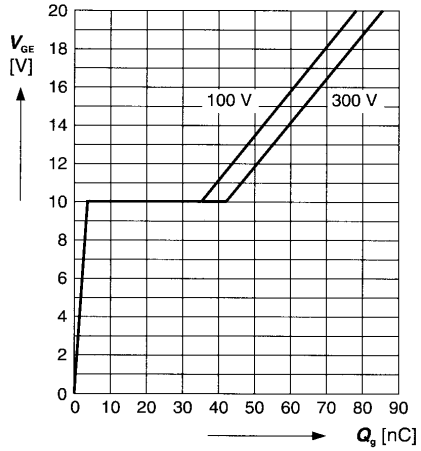
Typ. output characteristics
$I_C = f(V_{CE})$
parameter: t_p = 250 µs; T_j = 25 °C



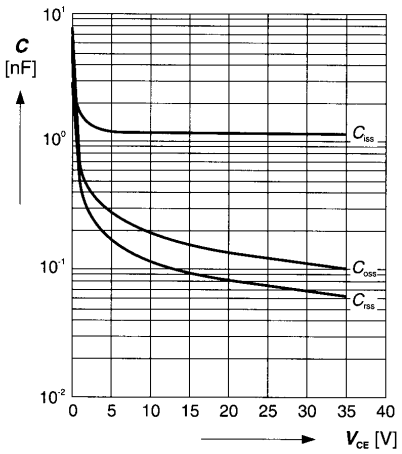
Typ. output characteristics
$I_C = f(V_{CE})$
parameter: t_p = 250 µs; T_j = 125 °C



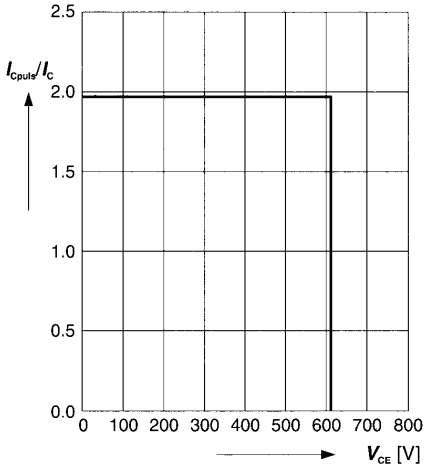
Typ. gate charge
$V_{GE} = f(Q_g)$
parameter: $I_{C\,puls}$ = 20 A



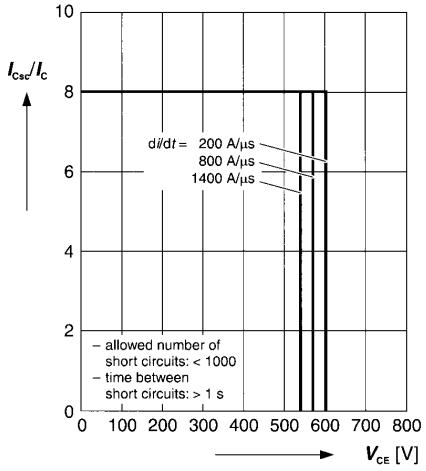
Typ. capacitances
$C = f(V_{CE})$
parameter: V_{GE} = 0 V ; f = 1 MHz



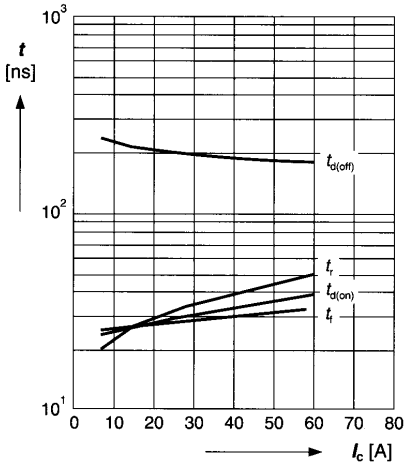
Reverse biased safe operating area
$I_{C\,puls} = f(V_{CE})$, T_j = 150 °C
parameter: V_{GE} = 15 V



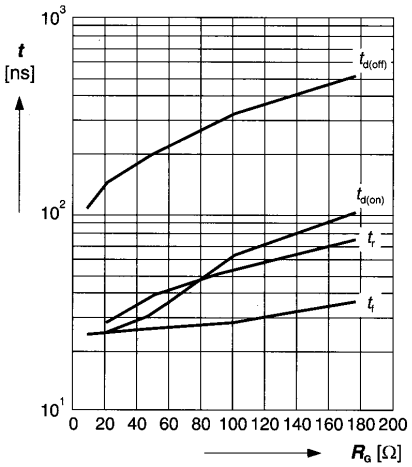
Short circuit safe operating area
$I_{Csc} = f(V_{CE})$, T_j = 150 °C
parameter: V_{GE} = ± 15 V ; t_{sc} ≤ 10 µs; L < 50 nH



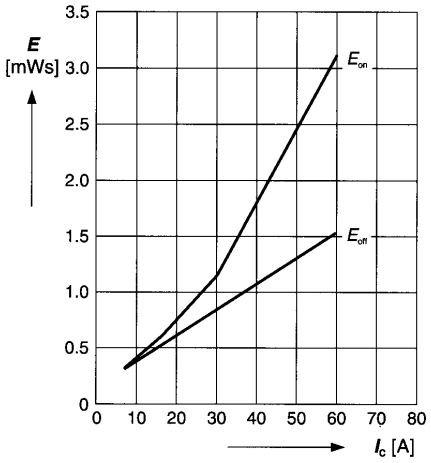
Typ. switching time
$t = f(I_C)$, inductive load, $T_j = 125$ °C
parameter: $V_{CE} = 300$ V; $V_{GE} = \pm 15$ V; $R_G = 33\ \Omega$



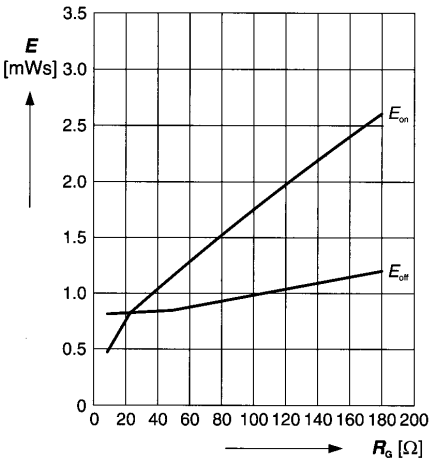
Typ. switching time
$t = f(R_G)$, inductive load, $T_j = 125$ °C
parameter: $V_{CE} = 300$ V; $V_{GE} = \pm 15$ V; $I_C = 30$ A

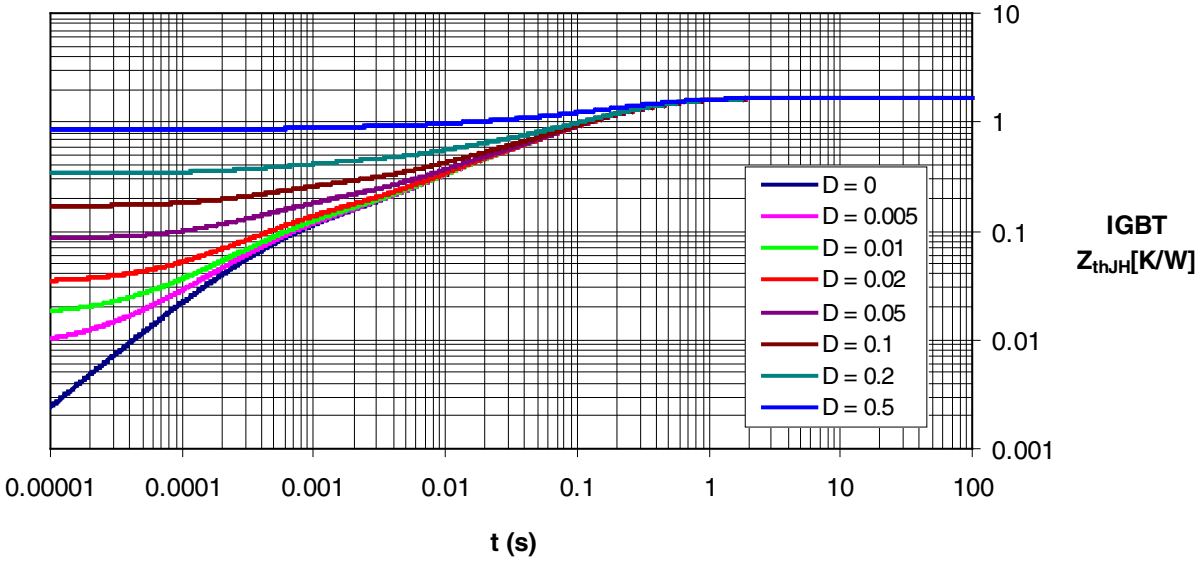


Typ. switching losses
$E = f(I_C)$, inductive load, $T_j = 125$ °C
parameter: $V_{CE} = 300$ V; $V_{GE} = \pm 15$ V; $R_G = 33\ \Omega$

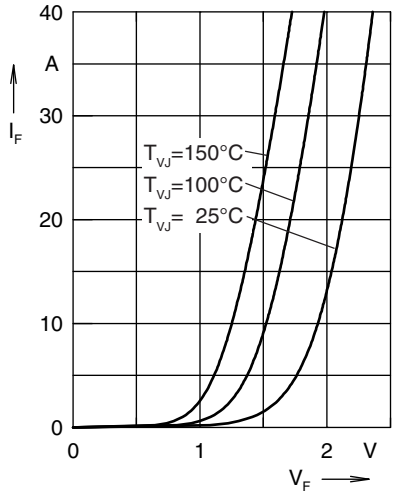


Typ. switching losses
$E = f(R_G)$, inductive load, $T_j = 125$ °C
parameter: $V_{CE} = 300$ V; $V_{GE} = \pm 15$ V; $I_C = 30$ A

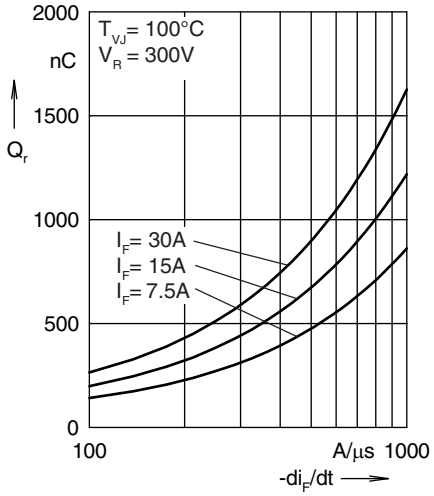




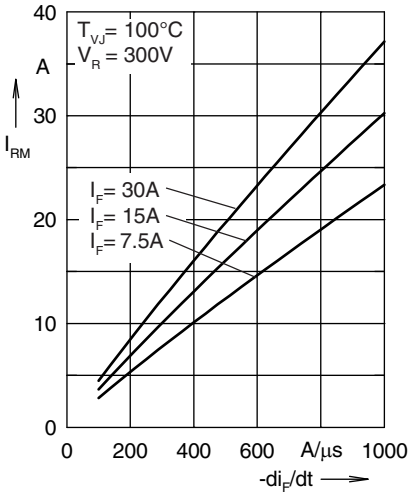
Diode



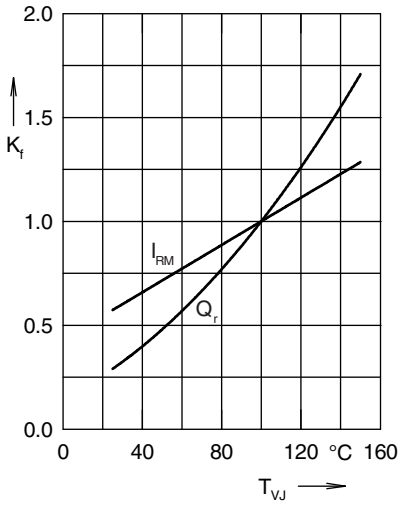
Forward current I_F versus V_F



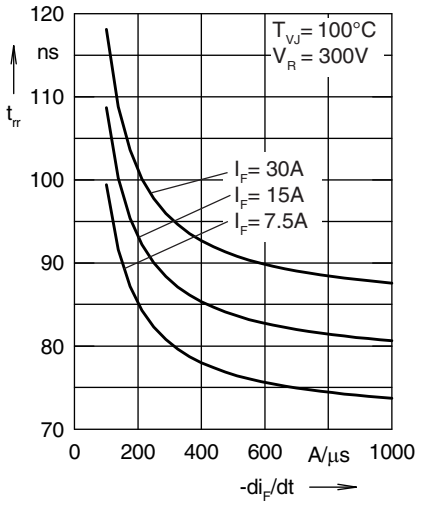
Reverse recovery charge Q_r versus $-di_F/dt$



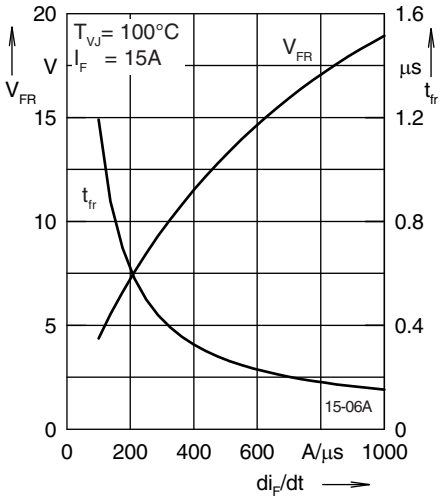
Peak reverse current I_{RM} versus $-di_F/dt$



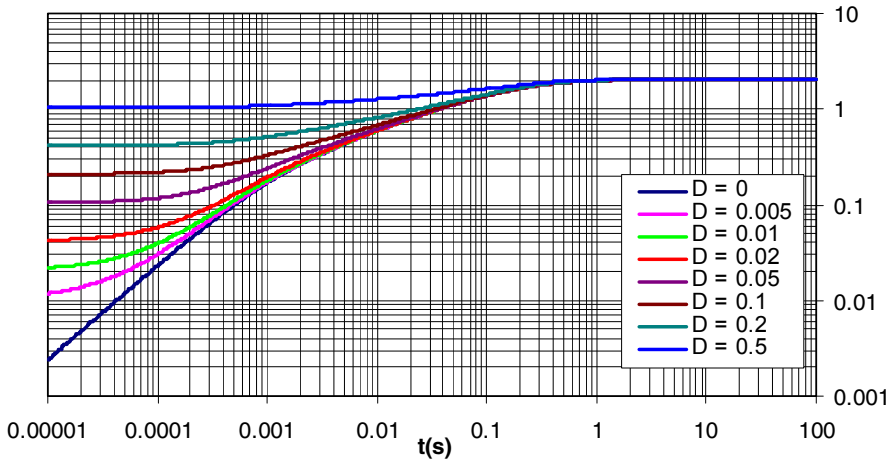
Dynamic parameters Q_r, I_{RM} versus T_{VJ}



Recovery time t_{rr} versus $-di_F/dt$



Peak forward voltage V_{FR} and t_{fr} versus di_F/dt



Transient thermal resistance junction to heatsink