IXYS

ISOSMART® IGBT Module

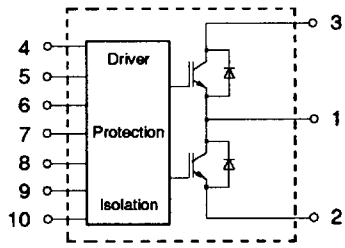
VIE100-12S4

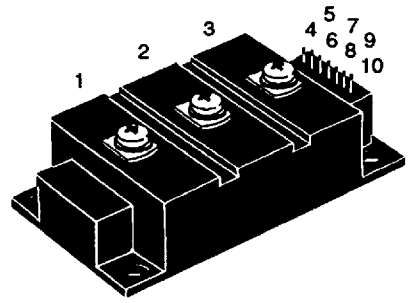
I_C = 100 A
V_{CES} = 1200 V

Intelligent Power Module (IPM) with integrated galvanic isolation interface

High Short Circuit
SOA Capability

Preliminary data





Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	1200	V
V_{CGR}	T_J = 25°C to 150°C; V_{IN} = Low	1200	V
I_{C25}	T_C = 25°C	100	A
I_{C80}	T_C = 80°C	90	A
I_{C100}	T_C = 100°C	70	A
I_{CM}	T_C = 25°C, t_P = 1 ms	200	A
t_{SC} *) (SCSOA)	V_{CE} = 0.6 • V_{CES}, T_J = 125°C V_{DD} = 14 - 16 V	4	µs
RBSOA	V_{DD} = 14 - 16 V, T_J = 125°C, Clamped inductive load, L = 100 µH	I_{CM} = 200 @ 0.8 V_{CES}	A
P_{tot}	T_C = 25°C, per IGBT	625	W
T_J		-40 ... +150	°C
T_{Jmax}		110	°C
T_{stg}		-40 ... +125	°C
V_{ISOL}	50/60 Hz, RMS t = 1 min	3000	V~
	I_{ISOL} ≤ 1 mA t = 1 s	3600	V~
M_d	Mounting torque (M6)	2.25 - 2.75 20 - 24	Nm lb.in.
	Terminal connection torque (M5)	2.50 - 3.70 22 - 33	Nm lb.in.
d_S	Creepage distance on surface	10	mm
d_A	Strike distance through air	9.6	mm
a	Max. allowable acceleration	50	m/s^2
Weight	typical including screws	0.25 8.85	kg oz.

*) Turn-off-time of short circuit
Data according to a single IGBT/FRED unless otherwise stated.
IXYS reserves the right to change limits, test conditions and dimensions.

Features

- Package with DCB ceramic base plate
- Input logic, isolation, drive circuitry and protection in one package
- ESD protected digital interface
- Galvanic isolation, 3000 V_{RMS} between logic and power
- Optimized gate drive
- Short circuit and under-voltage protection
- Ultra fast free wheeling diodes
- Low conduction and commutation losses
- Pulse frequency up to 20 kHz

Applications

- AC motor speed control
- DC servo and robot drives
- Uninterruptible power systems (UPS)
- Switched-mode and resonant-mode power supplies
- Induction heating
- DC choppers

Advantages

- Space and weight savings
- Simple mounting
- Reduced protection circuits
- High $V_{GE(th)}$ for good noise immunity

Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
$V_{(BR)CES}$	I_C = 14 mA, V_{IN} = Low	1200			V
I_{CES}	V_{CE} = V_{CES}, V_{IN} = Low; T_J = 25°C			14	mA
	V_{CE} = 0.8 • V_{CES}; T_J = 125°C			44	mA
$V_{CE(sat)}$	I_C = 100 A, V_{IN} = High		3.4	3.7	V
$t_{d(on)}$	**Inductive load, T_J = 125°C**		600		ns
t_{rv}	I_C = 100 A, V_{DD} = 15 V		200		ns
$t_{d(off)}$	V_{CE} = 600 V		1100		ns
t_{fi}	Remarks: Switching times may increase		700		ns
E_{on}	for V_{CE} > 600 V and T_J > 125°C		24.5		mJ
E_{off}			22		mJ
R_{thJC}	for calculation of P_{tot}			0.20	K/W
R_{thJS}	with heat transfer paste			0.28	K/W

Reverse Diode (FRED)

		Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
V_F	I_F = 100 A, V_{IN} = Low		1.7	1.85	V
I_F	T_C = 25°C			100	A
I_F	T_C = 80°C			100	A
I_{RM}	I_F = 100 A, V_{IN} = Low, V_{DD} = 15 V		90		A
t_{rr}	T_J = 125°C, V_R = 600 V		150	200	ns
R_{thJC}				0.37	K/W
R_{thJS}	with heat transfer paste			0.60	K/W

Control Unit

	Definition / Test Conditions		Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
V_{DD}	Supply voltage		14	15	16	V
V_{IN}	Input control voltage		-0.5		16.5	V
V_{ISOL}	Isolation voltage	t = 1 min	3000			V~
	50 Hz, RMS	t = 1 s	3600			V~
I_{DD}	Supply current			152	200	mA
	V_{DD} = 15 V; V_{CE} = 0 V, f_{IN} = 20 kHz					
I_{DD0}	Supply current			80	100	mA
	V_{DD} = 15 V; V_{CE} = 0 V, f_{IN} = 0					
V_{INH}	Input voltage for IGBT turn-on		9	10	11	V
	V_{DD} = 15 V; V_{IN} = L → H					
V_{INL}	Input voltage for IGBT turn-off		5	6	7	V
	V_{DD} = 15 V; V_{IN} = H → L					
V_{RES}	Threshold for Reset = active		7	8	9	V
	V_{DD} = 15 V; V_{RES} = L → H					

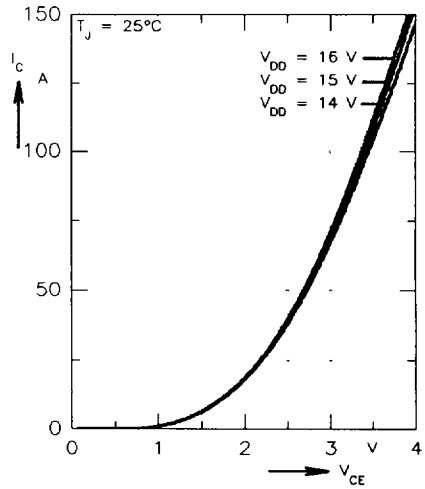


Fig. 1 Typ. IGBT output characteristics

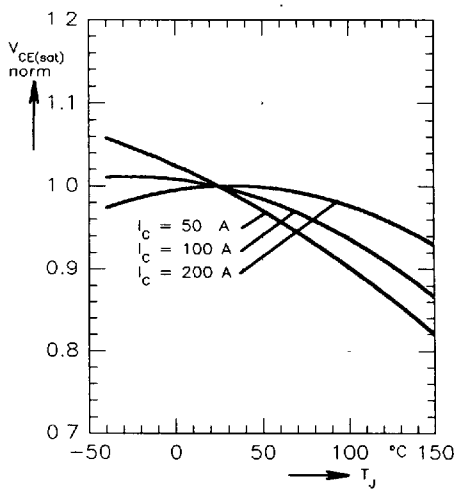


Fig. 2 Typ. temperature dependence of normalized $V_{CE(sat)}$

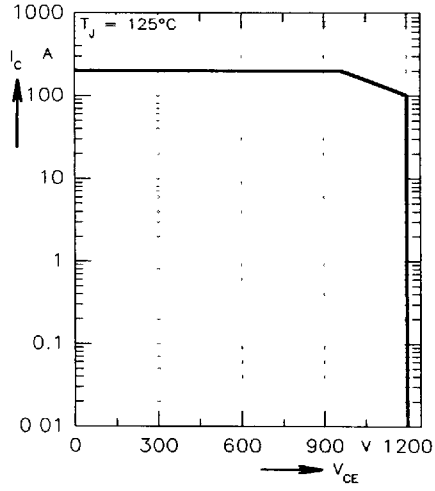


Fig. 3 Reverse Biased Safe Operating Area (RBSOA)

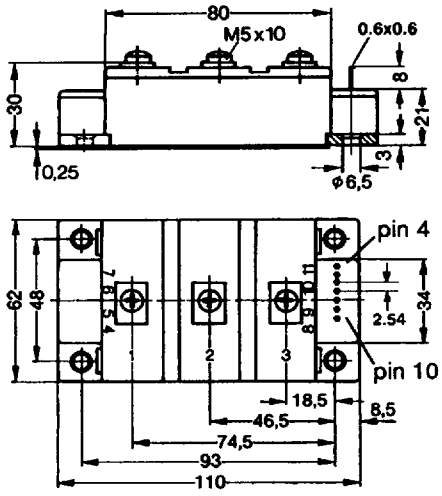
Control Unit

	Definition / Test Conditions		Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
$I_{IN(H)}$	Signal input current	V_{IN} = High		1	1.5	mA
$I_{IN(L)}$	Signal input current	V_{IN} = Low		5	10	µA
V_{FLT}	Max. voltage of Fault terminal				50	V
I_{FLT}	Max. sink current of Fault terminal				50	mA
$t_{d(on)}$	Turn-on delay time V_{IN} = 10 % → I_C = 10 %, V_{DD} = 15 V			0.6		µs
$t_{d(off)}$	Turn-off delay time V_{IN} = 90 % → I_C = 90 %, V_{DD} = 15 V			1.1		µs

Fault Characteristics

	Definition / Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
$V_{DD\ FLT}$	Min. V_{DD} without fault	10	11	12	V
$V_{CE(sat)\ FLT}$	Max. $V_{CE(sat)}$ to indicate fault	5	6	7	V
t_{FLT}	Overcurrent or short-circuit trip delay time V_{DD} = 15 V; V_{CE} > 10 V	1.5	2.5	4	µs
$(dI/dt)_{max}$	Max.di/dt of collector current during turn-off	2	2.5	3	A/ns

Dimensions in mm (1 mm = 0.0394")



Arrangement of control pins

4 = Reset, active **High**
5 = In1 (High side) active **High**
6 = GND
7 = In2 (Low side) active High
8 = V_{DD}
9 = Fault (open collector)
10 = Enable = Low disables the In1 and In2 inputs

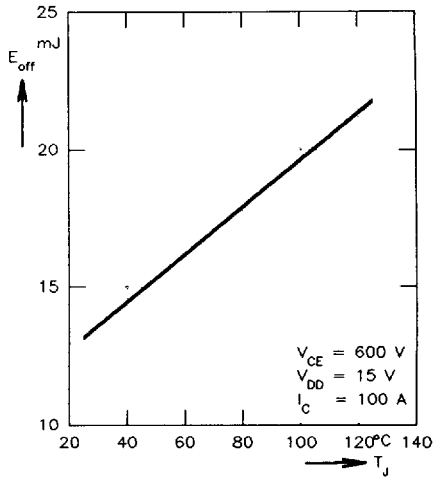


Fig. 4 Typ. turn-off energy per pulse versus junction temperature

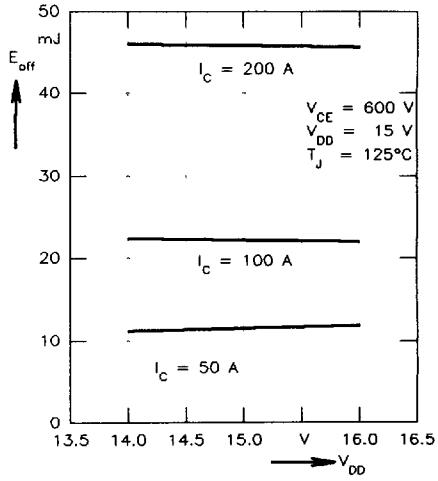


Fig. 5 Typ. turn-off energy per pulse versus V_{DD}

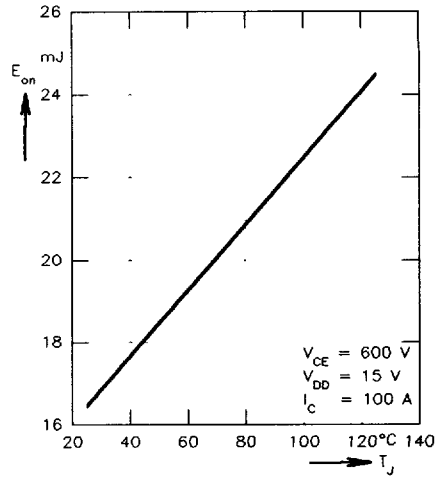


Fig. 6 Typ. turn-on energy per pulse versus junction temperature

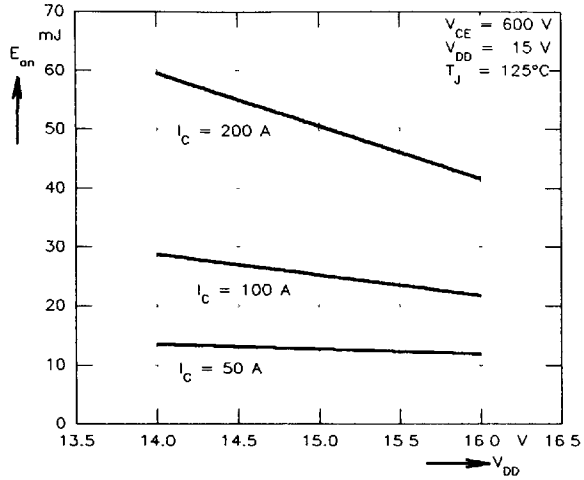


Fig. 7 Typ. turn-on energy per pulse versus V_{DD}

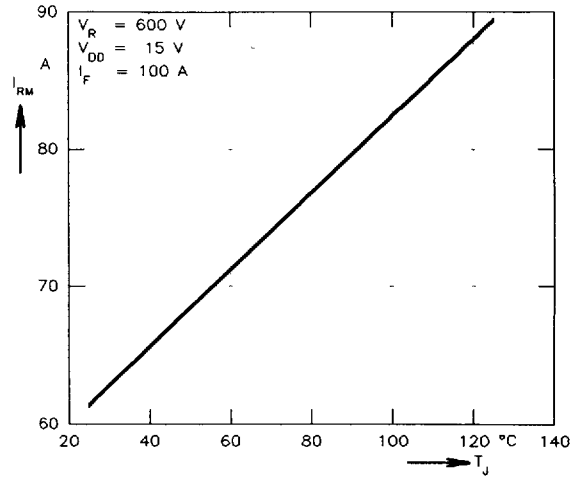


Fig. 8 Typ. peak recovery current versus junction temperature

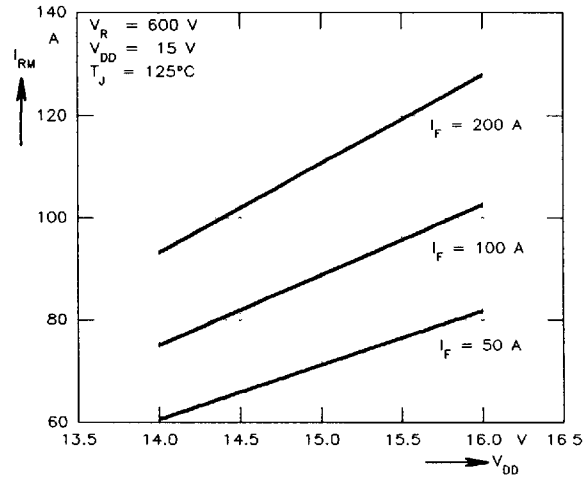


Fig. 9 Typ. peak recovery current versus V_{DD}

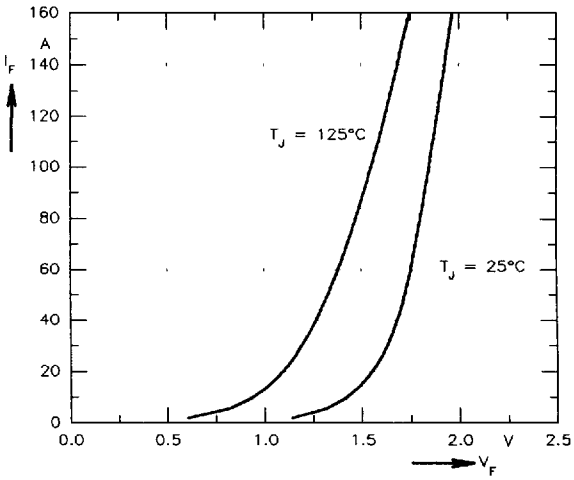


Fig. 10 Max. forward characteristic of reverse diode

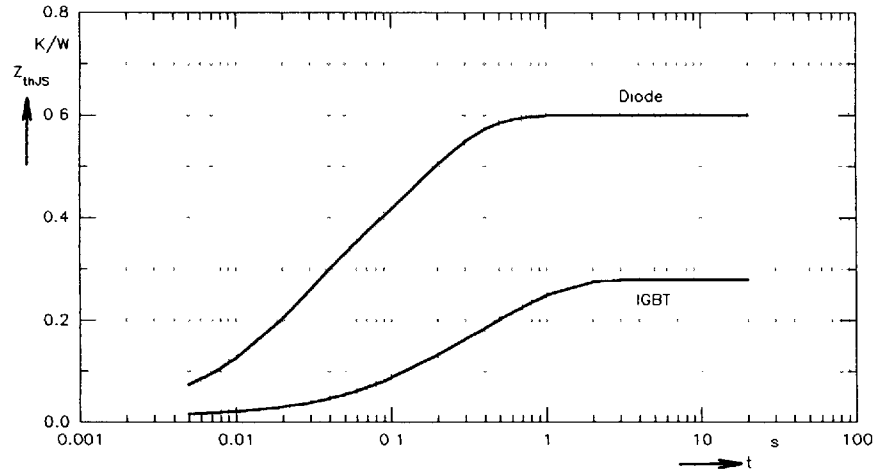


Fig. 11 Transient thermal resistance junction to heatsink of IGBT and Diode