

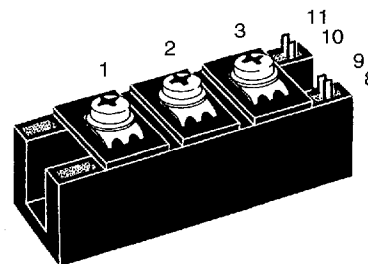
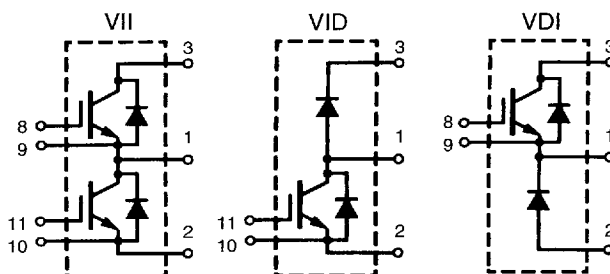
IGBT Modules

Half-Bridge and Chopper Configurations

VII 50-12S3
VID50-12S3
VDI50-12S3

$I_{C(DC)} = 50 \text{ A}$
 $V_{CES} = 1200 \text{ V}$
 $V_{CE(sat)} = 3.4 \text{ V}$

High Short Circuit
SOA Capability



VID50 has no pin 8 + 9
 VDI50 has no pin 10 + 11

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^\circ\text{C to } 150^\circ\text{C}$	1200	V
V_{CGR}	$T_J = 25^\circ\text{C to } 150^\circ\text{C}; R_{GE} = 1 \text{ M}\Omega$	1200	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^\circ\text{C}$	50	A
I_{C100}	$T_C = 100^\circ\text{C}$	45	A
I_{CM}	$T_C = 25^\circ\text{C}, t_p = 1 \text{ ms}$	100	A
t_{SC} (SCSOA)	$V_{GE} = 15 \text{ V}, V_{CE} = 0.6 \cdot V_{CES}, T_J = 125^\circ\text{C}$ $R_G = 11 \Omega$, non repetitive	10	μs
RBSOA	$V_{GE} = 15 \text{ V}, T_J = 125^\circ\text{C}, R_G = 11 \Omega$ Clamped inductive load, $L = 100 \mu\text{H}$	$I_{CM} = 100$ @ $0.8 V_{CES}$	A
P_{tot}	$T_C = 25^\circ\text{C}$	400	W
T_J		-40 ... +150	$^\circ\text{C}$
T_{Smax}		110	$^\circ\text{C}$
T_{stg}		-40 ... +125	$^\circ\text{C}$
V_{ISOL}	50/60 Hz, RMS $t = 1 \text{ min}$ $I_{ISOL} \leq 1 \text{ mA}$ $t = 1 \text{ s}$ Insulating material: Al_2O_3	3000 3600	V~ V~
M_d	Mounting torque (M5)	2.25 - 2.75 20 - 25	Nm lb.in.
	Terminal connection torque (M5)	2.50 - 3.70 22 - 33	Nm lb.in.
d_s	Creepage distance on surface	12.7	mm
d_A	Strike distance through air	9.6	mm
a	Max. allowable acceleration	50	m/s^2
Weight	Typical, including screws	0.13 4.60	kg oz.

Features

- International standard package
- Package with DCB ceramic base plate
- Isolation voltage 3600 V~
- MOS-input (voltage controlled)
- Low saturation voltage
- High short circuit capability
- No latch-up
- Ultra fast free wheeling diode
- Low conduction and commutation losses
- Pulse frequency up to 20 kHz
- UL-registered E 72873

Applications

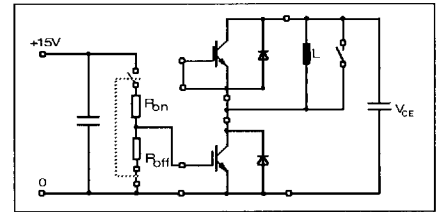
- AC motor speed control
- DC servo and robot drives
- Uninterruptible power systems (UPS)
- Switch-mode and resonant-mode power supplies
- Induction heating
- DC choppers

Advantages

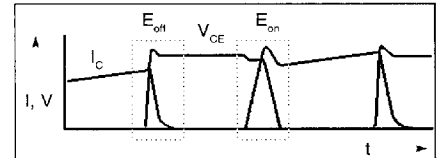
- Space and weight savings
- Simple mounting with two screws
- Reduced protection circuits
- High $V_{GE(th)}$ for good noise immunity

Data according to a single IGBT/FRED unless otherwise stated.
 IXYS reserves the right to change limits, test conditions and dimensions.

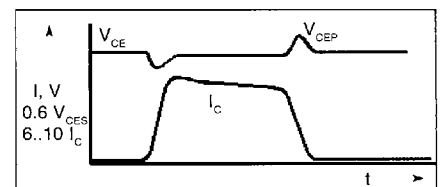
Symbol	Test Conditions	Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified)		
		min.	typ.	max.
$V_{(BR)CES}$	$I_C = 5 \text{ mA}$, $V_{GE} = 0 \text{ V}$	1200		V
$V_{GE(th)}$	$I_C = 20 \text{ mA}$, $V_{CE} = V_{GE}$	5		8 V
I_{CES}	$V_{CE} = V_{CES}$, $T_J = 25^\circ\text{C}$ $V_{CE} = 0.8 \cdot V_{CES}$, $T_J = 125^\circ\text{C}$			5 mA 18 mA
I_{GES}	$V_{CE} = 0 \text{ V}$, $V_{GE} = \pm 20 \text{ V}$			$\pm 500 \text{ nA}$
$V_{CE(sat)}$	$I_C = 50 \text{ A}$, $V_{GE} = 15 \text{ V}$		3.4	3.7 V
C_{ies}	$V_{CE} = 25 \text{ V}$, $V_{GE} = 0 \text{ V}$, $f = 1 \text{ MHz}$		9	nF
C_{oes}			1	nF
C_{res}			0.18	nF
$t_{d(on)}$	Inductive load, $T_J = 125^\circ\text{C}$ $I_C = 50 \text{ A}$, $V_{GE} = 15 \text{ V}$ $V_{CE} = 600 \text{ V}$, $R_{on} = 3.9 \Omega$, $R_{off} = 11 \Omega$ Remarks: Switching times may increase for $V_{CE} > 600 \text{ V}$, $T_J > 125^\circ\text{C}$ or increased R_G		300	ns
t_{rv}			200	ns
$t_{d(off)}$			300	ns
t_{fi}			600	ns
E_{on}			8	10 mJ
E_{off}			8	10 mJ
R_{thJC}	for calculation of P_{tot}			0.31 K/W
R_{thJS}	with heat transfer paste			0.41 K/W



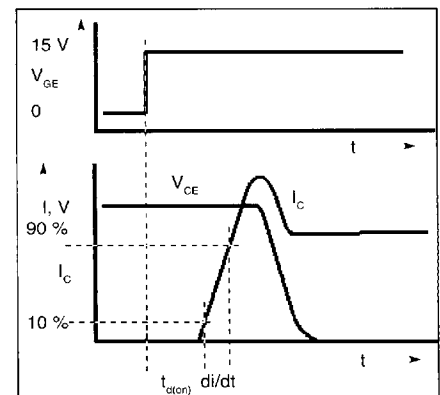
Test circuit for E_{on} , E_{off} , SCSOA and RBSOA
 $R_{on} = 3.9 \Omega$, $L = 100 \mu\text{H}$
 $R_{off} = 11 \Omega$ for RBSOA, E_{off}



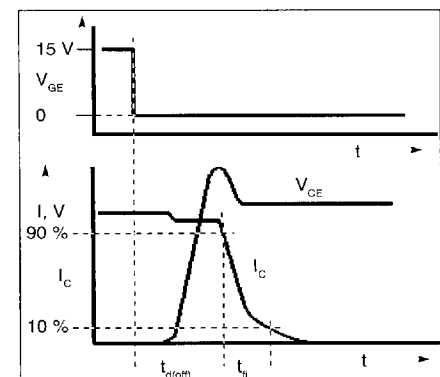
Typical V/I waveforms for inductive load



SCSOA conditions $V_{CE} = 0.6 V_{CES}$,
 $V_{CEP} < V_{CES}$, $T_J = 125^\circ\text{C}$



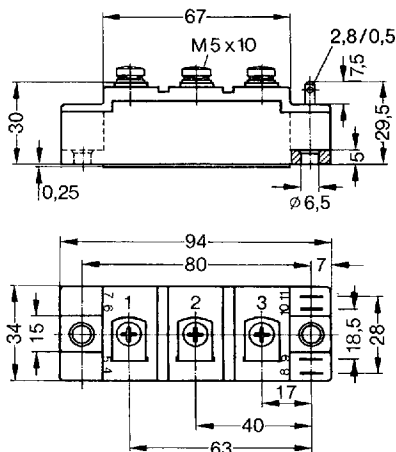
Turn-on waveforms E_{on}



Turn-off waveforms E_{off} RBSOA

Symbol	Test Conditions	Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified)		
		min.	typ.	max.
V_F	$I_F = 50 \text{ A}$, $V_{GE} = 0 \text{ V}$		1.9	2.2 V
I_F	$T_C = 25^\circ\text{C}$ $T_C = 100^\circ\text{C}$			50 A 45 A
I_{RM}	$I_F = 50 \text{ A}$, $V_{GE} = 0 \text{ V}$, $-di_F/dt = 400 \text{ A}/\mu\text{s}$			60 A
t_{rr}	$T_J = 125^\circ\text{C}$, $V_R = 600 \text{ V}$		200	ns
R_{thJC}	with heat transfer paste			0.6 K/W
R_{thJS}				1 K/W

Dimensions in mm (1 mm = 0.0394")



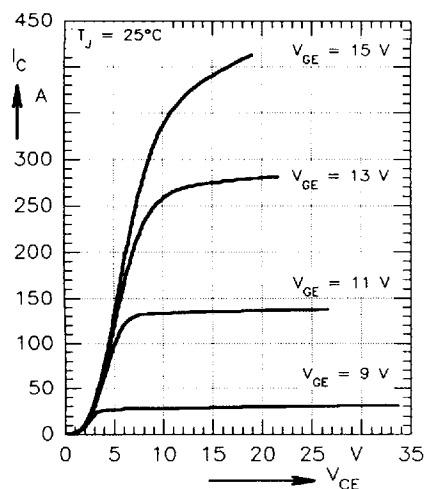


Fig. 1 Typ. output characteristics

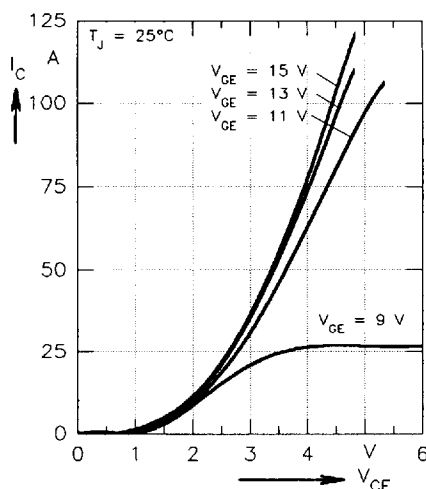


Fig. 2 Typ. output characteristics

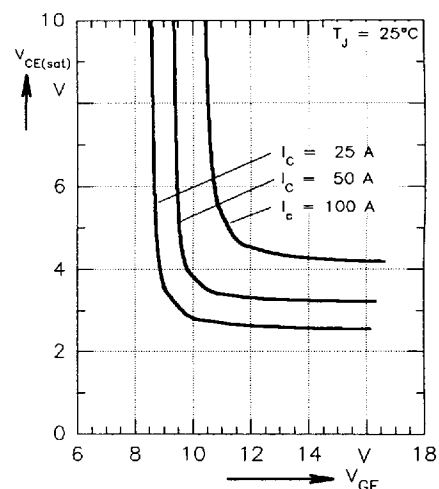


Fig. 3 Typ. on-state characteristics

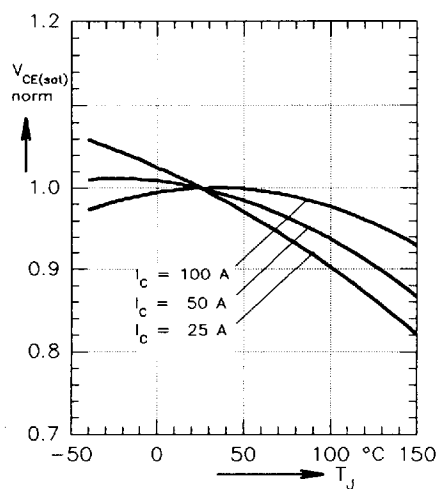
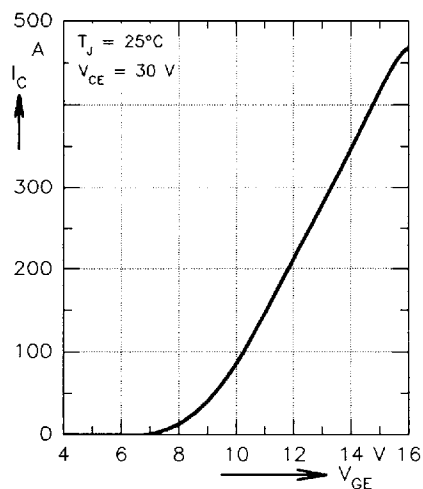
Fig. 4 Typ. temperature dependence of normalized $V_{CE(sat)}$ 

Fig. 5 Typ. transfer characteristics

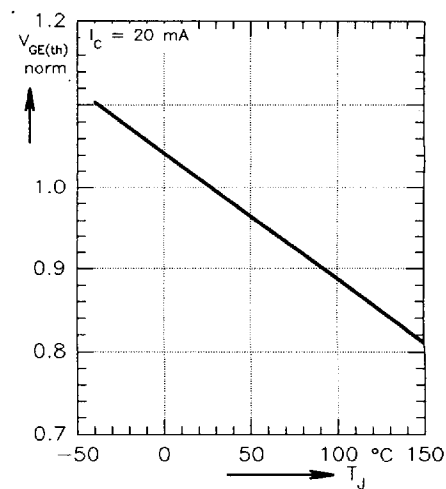
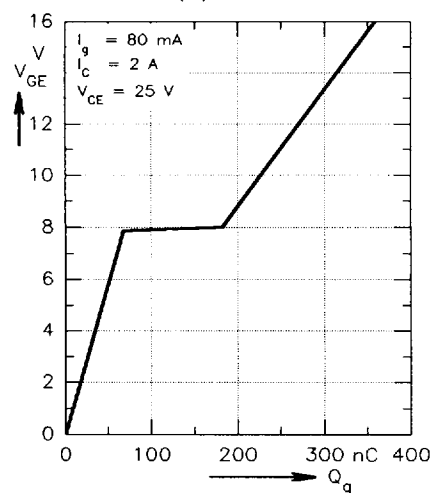
Fig. 6 Temperature dependence of normalized $V_{GE(th)}$ 

Fig. 7 Typ. turn-on gate charge characteristics

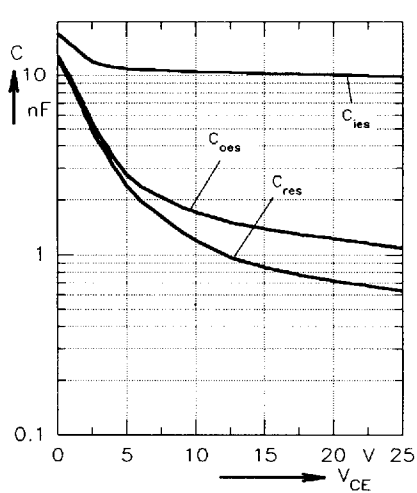


Fig. 8 Typ. capacitances

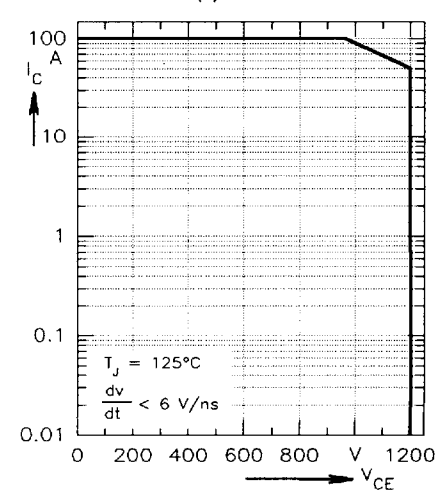


Fig. 9 Reverse biased SOA

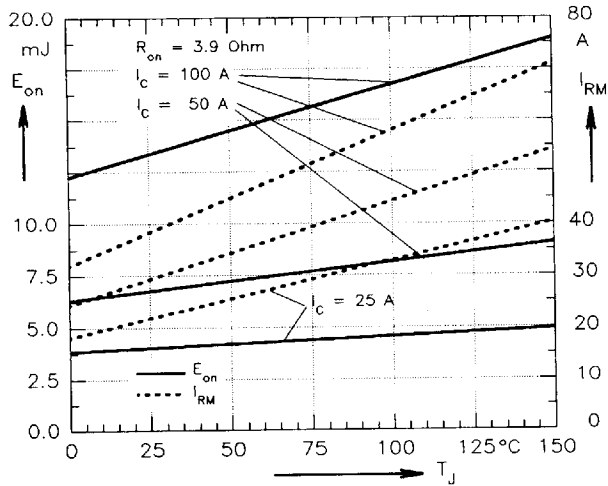


Fig. 10 Typ. turn-on energy per pulse

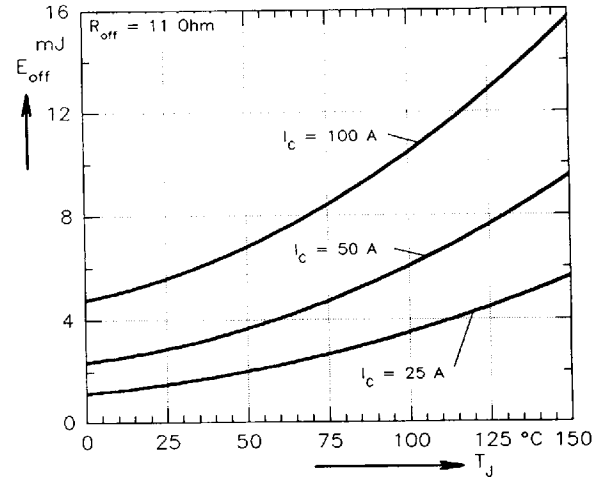


Fig. 11 Typ. turn-off energy per pulse

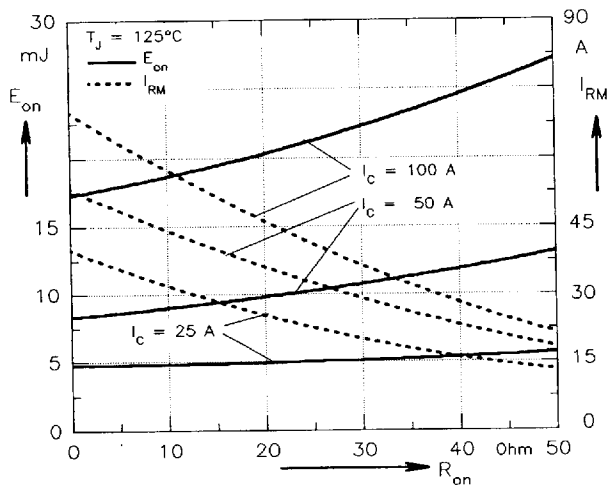


Fig. 12 Typ. turn-on energy per pulse

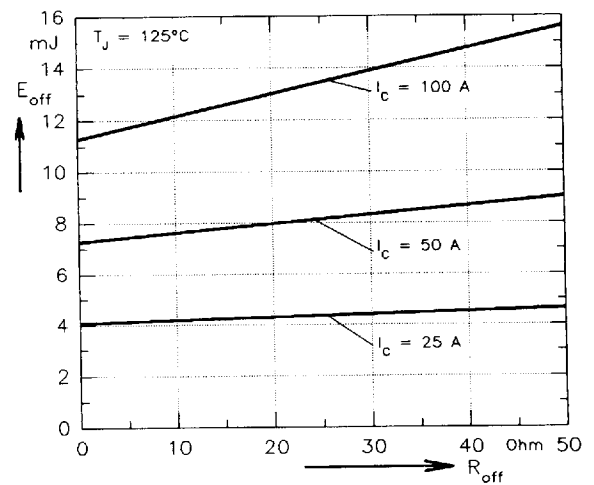


Fig. 13 Typ. turn-off energy per pulse

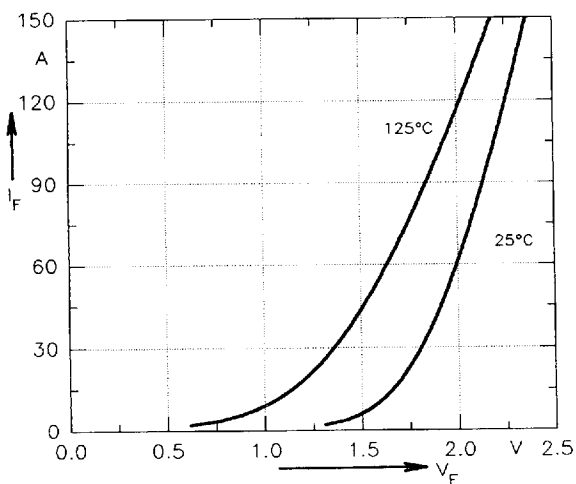


Fig. 14 Typ. forward characteristic of reverse diode

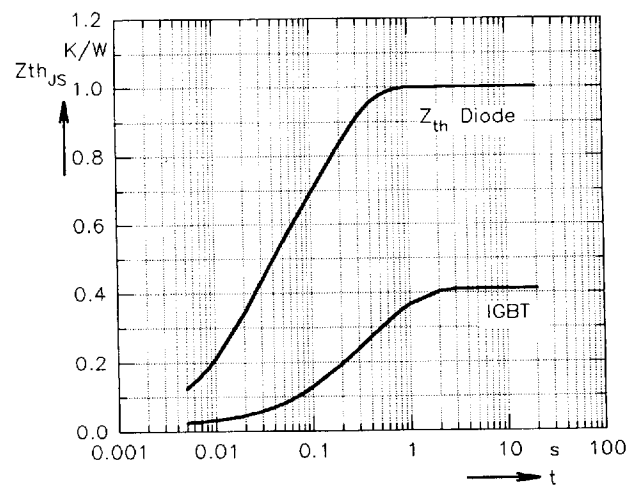


Fig. 15 Transient thermal resistance junction to heatsink of IGBT and Diode (per leg)