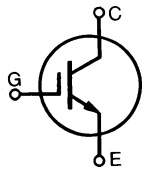
IXYS

Low $V_{CE(sat)}$ IGBT

IXSH 45N100
IXSM 45N100

V_{CES} = 1000 V
I_{C25} = 75 A
$V_{CE(sat)}$ = 2.7 V

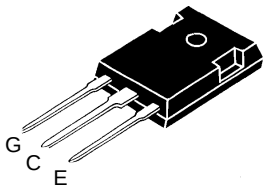
Short Circuit SOA Capability



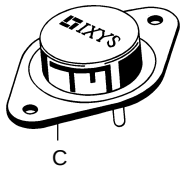
Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	1000	V
V_{CGR}	T_J = 25°C to 150°C; R_{GE} = 1 MΩ	1000	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C	75	A
I_{C90}	T_C = 90°C	45	A
I_{CM}	T_C = 25°C, 1 ms	180	A
SSOA (RBSOA)	V_{GE} = 15 V, T_J = 125°C, R_G = 2.7 Ω Clamped inductive load, L = 30 μH	I_{CM} = 90 @ 0.8 V_{CES}	A
t_{SC} **(SCSOA)**	V_{GE} = 15 V, V_{CE} = 0.6 • V_{CES}, T_J = 125°C R_G = 22 Ω, non repetitive	10	μs
P_C	T_C = 25°C	300	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
M_d	Mounting torque	1.13/10	Nm/lb.in.
Weight		TO-204 = 18 g, TO-247 = 6 g	
Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s		300	°C

Symbol	Test Conditions		Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
BV_{CES}	I_C = 3 mA, V_{GE} = 0 V		1000			V
$V_{GE(th)}$	I_C = 4 mA, V_{CE} = V_{GE}		5		8	V
I_{CES}	V_{CE} = 0.8 • V_{CES}	T_J = 25°C			250	μA
	V_{GE} = 0 V	T_J = 125°C			1	mA
I_{GES}	V_{CE} = 0 V, V_{GE} = ±20 V				±100	nA
$V_{CE(sat)}$	I_C = I_{C90}, V_{GE} = 15 V				2.7	V

TO-247 AD (IXSH)



TO-204 AE (IXSM)



G = Gate, C = Collector,
E = Emitter, TAB = Collector

Features
- International standard packages
- Guaranteed Short Circuit SOA capability
- Low $V_{CE(sat)}$
  - for low on-state conduction losses
- High current handling capability
- MOS Gate turn-on
  - drive simplicity

Applications
- AC motor speed control
- Uninterruptible power supplies (UPS)
- Welding

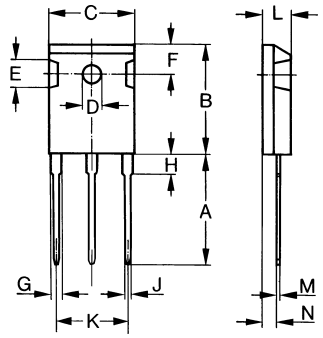
Advantages
- Easy to mount with 1 screw (TO-247) (isolated mounting screw hole)
- High power density

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

93013E (12/96)

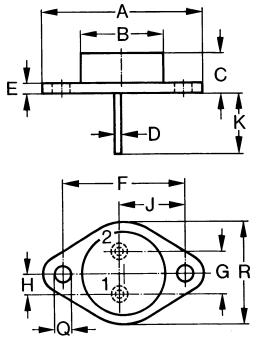
Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
g_{fs}	$I_C = I_{C90}$; V_{CE} = 10 V, Pulse test, t ≤ 300 µs, duty cycle d ≤ 2 %	20	25		S
$I_{C(on)}$	V_{GE} = 15 V, V_{CE} = 10 V		195		A
C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz		4150		pF
C_{oes}			300		pF
C_{res}			60		pF
Q_g	$I_C = I_{C90}$, V_{GE} = 15 V, V_{CE} = 0.5 V_{CES}		165	260	nC
Q_{ge}			40	60	nC
Q_{gc}			80	200	nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		80		ns
t_{ri}	$I_C = I_{C90}$, V_{GE} = 15 V, L = 100 µH		150		ns
$t_{d(off)}$	V_{CE} = 0.8 V_{CES}, R_G = 2.7 Ω		400		ns
t_{fi}	Remarks: Switching times may increase for V_{CE} (Clamp) > 0.8 • V_{CES}, higher T_J or increased R_G		1000	1500	ns
E_{off}			15		mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C**		100		ns
t_{ri}	$I_C = I_{C90}$, V_{GE} = 15 V, L = 100 µH		300		ns
E_{on}	V_{CE} = 0.8 V_{CES}, R_G = 2.7 Ω		5.4		mJ
$t_{d(off)}$	Remarks: Switching times may increase for V_{CE} (Clamp) > 0.8 • V_{CES}, higher T_J or increased R_G		550	900	ns
t_{fi}			2200	2900	ns
E_{off}			25		mJ
R_{thJC}				0.42	K/W
R_{thCK}			0.25		K/W

TO-247 AD (IXSH) Outline



Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	19.81	20.32	0.780	0.800
B	20.80	21.46	0.819	0.845
C	15.75	16.26	0.610	0.640
D	3.55	3.65	0.140	0.144
E	4.32	5.49	0.170	0.216
F	5.4	6.2	0.212	0.244
G	1.65	2.13	0.065	0.084
H	-	4.5	-	0.177
J	1.0	1.4	0.040	0.055
K	10.8	11.0	0.426	0.433
L	4.7	5.3	0.185	0.209
M	0.4	0.8	0.016	0.031
N	1.5	2.49	0.087	0.102

TO-204 AE (IXSM) Outline



Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	38.61	39.12	1.520	1.540
B	-	22.22	-	0.875
C	6.40	11.40	0.252	0.449
D	1.45	1.60	0.057	0.063
E	1.52	3.43	0.060	0.135
F	30.15	BSC	1.187	BSC
G	10.67	11.17	0.420	0.440
H	5.21	5.71	0.205	0.225
J	16.64	17.14	0.655	0.675
K	11.18	12.19	0.440	0.480
Q	3.84	4.19	0.151	0.165
R	25.16	26.66	0.991	1.050

IXYS MOSFETS and IGBTs are covered by one or more of the following U.S. patents:
4,835,592 4,881,106 5,017,508 5,049,961 5,187,117 5,486,715
4,850,072 4,931,844 5,034,796 5,063,307 5,237,481 5,381,025

Fig.1 Saturation Characteristics

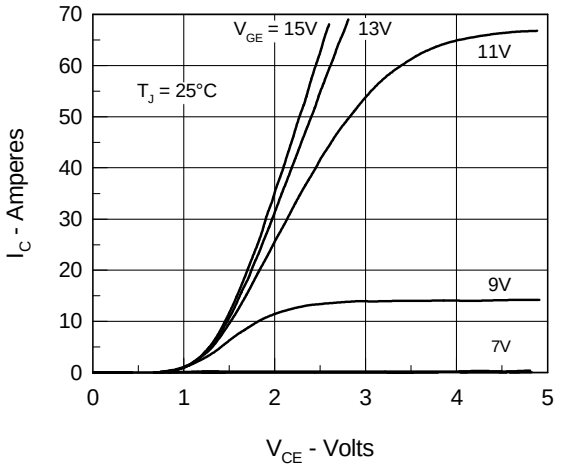


Fig.2 Output Characterstics

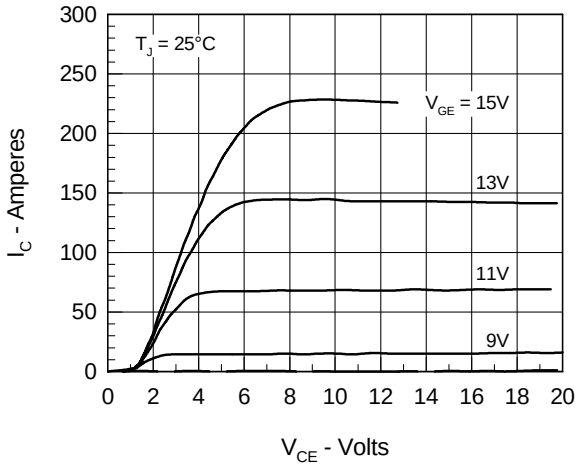


Fig.3 Collector-Emitter Voltage vs. Gate-Emitter Voltage

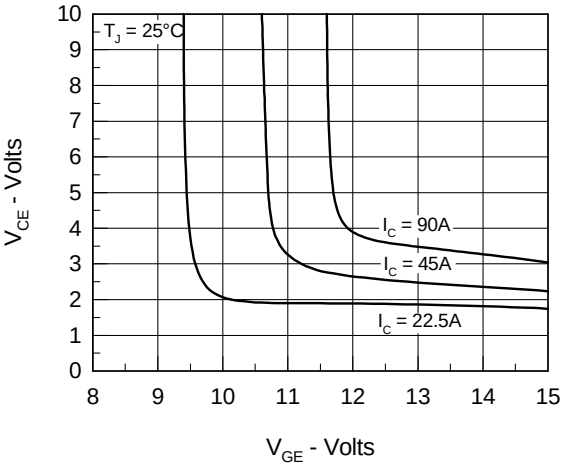


Fig.4 Temperature Dependence of Output Saturation Voltage

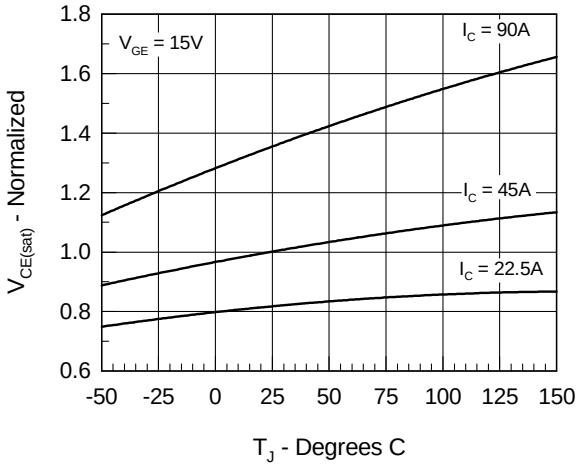


Fig.5 Input Admittance

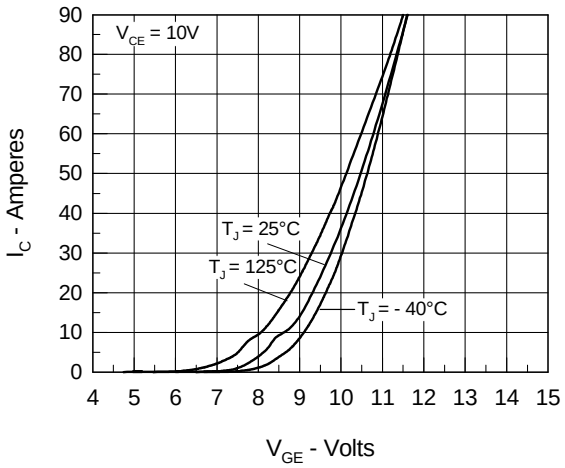


Fig.6 Temperature Dependence of Breakdown and Threshold Voltage

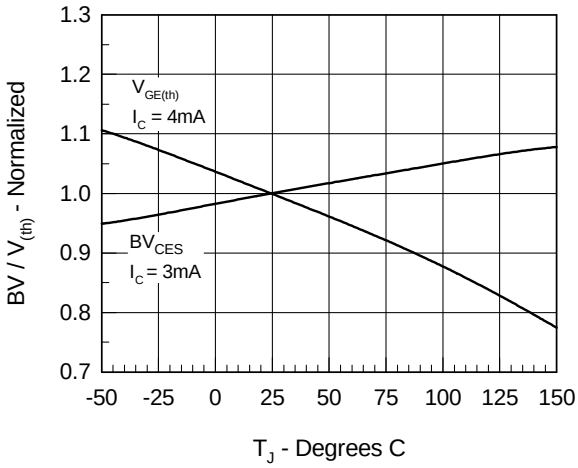


Fig.7 Turn-Off Energy per Pulse and Fall Time on Collector Current

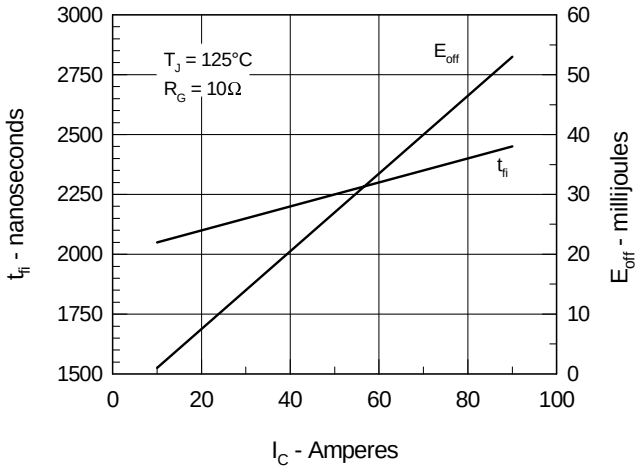


Fig.8 Dependence of Turn-Off Energy Per Pulse and Fall Time on R_G

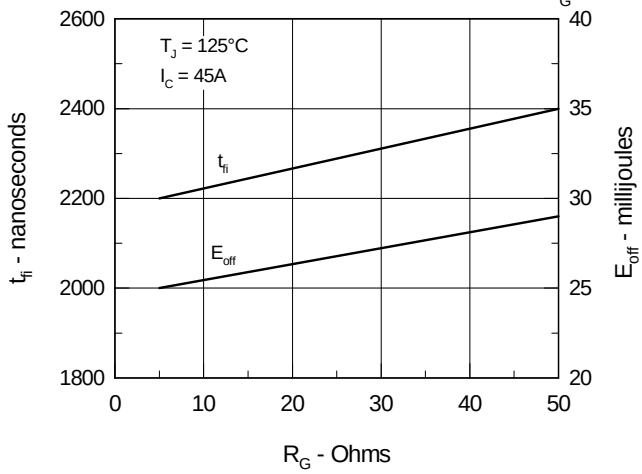


Fig.9 Gate Charge Characteristic Curve

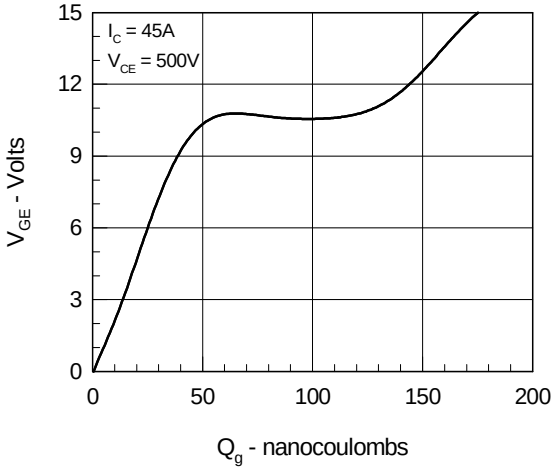


Fig.10 Turn-Off Safe Operating Area

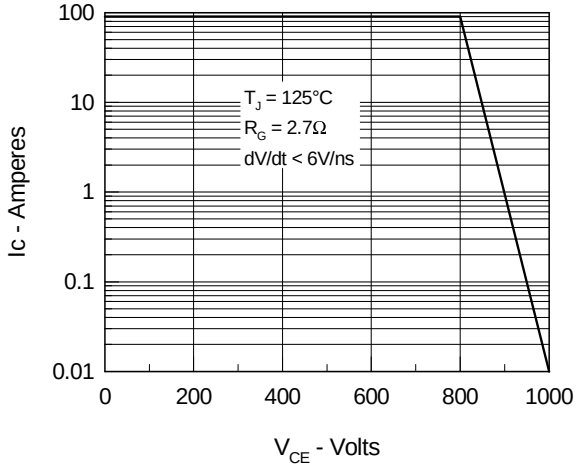


Fig.11 Transient Thermal Impedance