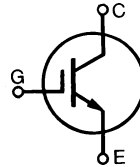


Low $V_{CE(sat)}$ IGBT
High Speed IGBT

IXSH/IXSM 40 N60
IXSH/IXSM 40 N60A

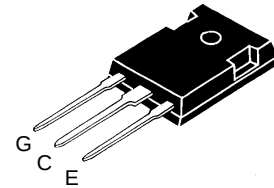
V_{CES}	I_{C25}	$V_{CE(sat)}$
600 V	75 A	2.5 V
600 V	75 A	3.0 V

Short Circuit SOA Capability

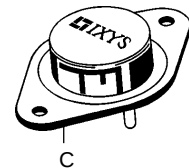


Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^\circ\text{C}$ to 150°C	600	V
V_{CGR}	$T_J = 25^\circ\text{C}$ to 150°C ; $R_{GE} = 1\text{ M}\Omega$	600	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^\circ\text{C}$	75	A
I_{C90}	$T_C = 90^\circ\text{C}$	40	A
I_{CM}	$T_C = 25^\circ\text{C}$, 1 ms	150	A
SSOA (RBSOA)	$V_{GE} = 15\text{ V}$, $T_J = 125^\circ\text{C}$, $R_G = 2.7\ \Omega$ Clamped inductive load, $L = 30\ \mu\text{H}$	$I_{CM} = 80$ @ $0.8\ V_{CES}$	A
t_{SC} (SCSOA)	$V_{GE} = 15\text{ V}$, $V_{CE} = 360\text{ V}$, $T_J = 125^\circ\text{C}$ $R_G = 22\ \Omega$, non repetitive	10	μs
P_C	$T_C = 25^\circ\text{C}$	300	W
T_J		-55 ... +150	$^\circ\text{C}$
T_{JM}		150	$^\circ\text{C}$
T_{stg}		-55 ... +150	$^\circ\text{C}$
M_d	Mounting torque	1.13/10	Nm/lb.in.
Weight		TO-204 = 18 g, TO-247 = 6g	
Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s		300	$^\circ\text{C}$

TO-247 AD (IXSH)



TO-204 AE (IXSM)



G = Gate,
E = Emitter,

C = Collector,
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
- Fast Fall Time for switching speeds up to 20 kHz

Applications

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

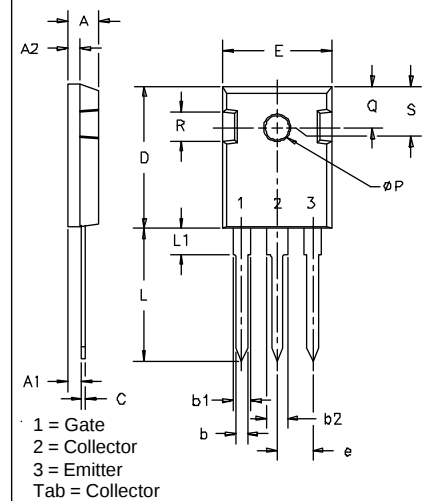
Advantages

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

Symbol	Test Conditions	Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified)		
		min.	typ.	max.
BV_{CES}	$I_C = 250\ \mu\text{A}$, $V_{GE} = 0\text{ V}$	600		V
$V_{GE(th)}$	$I_C = 4\text{ mA}$, $V_{CE} = V_{GE}$	4		7 V
I_{CES}	$V_{CE} = 0.8 \cdot V_{CES}$ $V_{GE} = 0\text{ V}$			50 μA 1 mA
I_{GES}	$V_{CE} = 0\text{ V}$, $V_{GE} = \pm 20\text{ V}$			$\pm 100\text{ nA}$
$V_{CE(sat)}$	$I_C = I_{C90}$, $V_{GE} = 15\text{ V}$			2.5 V 3.0 V

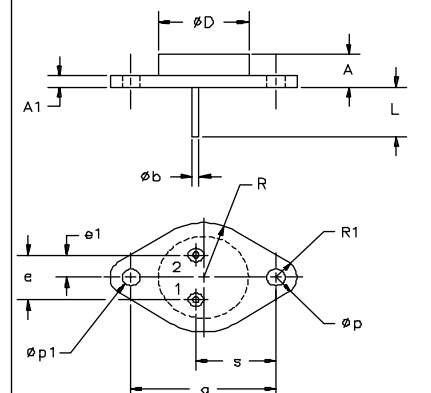
Symbol	Test Conditions	Characteristic Values (T _J = 25°C, unless otherwise specified)			
		min.	typ.	max.	
g_{fs}	I _C = I _{C90} ; V _{CE} = 10 V, Pulse test, t ≤ 300 μs, duty cycle ≤ 2 %	16	23	S	
I_{C(on)}	V _{GE} = 15 V, V _{CE} = 10 V		200	A	
C_{ies}	} V _{CE} = 25 V, V _{GE} = 0 V, f = 1 MHz		4500	pF	
C_{oes}			350	pF	
C_{res}			90	pF	
Q_g	} I _C = I _{C90} , V _{GE} = 15 V, V _{CE} = 0.5 V _{CES}		190	260	nC
Q_{ge}			45	60	nC
Q_{gc}			88	120	nC
t_{d(on)}	} Inductive load, T_J = 25°C I _C = I _{C90} , V _{GE} = 15 V, L = 100 μH V _{CE} = 0.8 V _{CES} , R _G = 2.7 Ω Switching times may increase for V _{CE} (Clamp) > 0.8 • V _{CES} , higher T _J or increased R _G		55	ns	
t_{ri}			170	ns	
t_{d(off)}			400	ns	
t_{fi}		40N60	400	ns	
		40N60A	200	ns	
E_{off}		40N60	5.0	mJ	
	40N60A	2.5	mJ		
t_{d(on)}	} Inductive load, T_J = 125°C I _C = I _{C90} , V _{GE} = 15 V, L = 100 μH V _{CE} = 0.8 V _{CES} , R _G = 2.7 Ω Remarks: Switching times may increase for V _{CE} (Clamp) > 0.8 • V _{CES} , higher T _J or increased R _G		55	ns	
t_{ri}			170	ns	
E_{on}		40N60	1.7	mJ	
t_{d(off)}		40N60A	340	1000	ns
				525	ns
t_{fi}		40N60	600	1500	ns
		40N60A	340	700	ns
E_{off}		40N60	12	mJ	
	40N60A	6	mJ		
R_{thJC}				0.42 K/W	
R_{thCK}			0.25	K/W	

TO-247 AD Outline



SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.185	.209	4.7	5.3
A ₁	.087	.102	2.2	2.54
A ₂	.059	.098	2.2	2.6
b	.040	.055	1.0	1.4
b ₁	.065	.084	1.65	2.13
b ₂	.113	.123	2.87	3.12
C	.016	.031	.4	.8
D	.819	.845	20.80	21.46
E	.610	.640	15.75	16.26
e	.215 BSC		5.45 BSC	
L	.780	.800	19.81	20.32
L ₁		.177		4.50
øP	.140	.144	3.55	3.65
Q	.212	.244	5.4	6.2
R	.170	.216	4.32	5.49
S	.242 BSC		6.15 BSC	

TO-204AE Outline



1 = Gate
2 = Emitter
Case = Collector

SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.250	.450	6.4	11.4
A1	.060	.135	1.53	3.42
ø b	.057	.063	1.45	1.60
ø D		.875		22.22
e	.420	.440	10.67	11.17
e1	.205	.225	5.21	5.71
L	.440	.480	11.18	12.19
ø p	.151	.165	3.84	4.19
ø p1	.151	.165	3.84	4.19
q	1.187 BSC		30.15 BSC	
R	.495	.525	12.58	13.33
R1	.131	.188	3.33	4.77
s	.655	.675	16.64	17.14

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

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3540 Bassett Street, Santa Clara CA 95054
P

IXYS MOSFETs and IGBTs are covered by one of the following U.S.patents:

4,835,592	4,881,108	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

IXYS Semiconductor GmbH
Edisonstr. 15, D-68623 Lampertheim
Phone: +49-6206-503-0. Fax: +49-6206-503627

Fig. 1 Saturation Characteristics

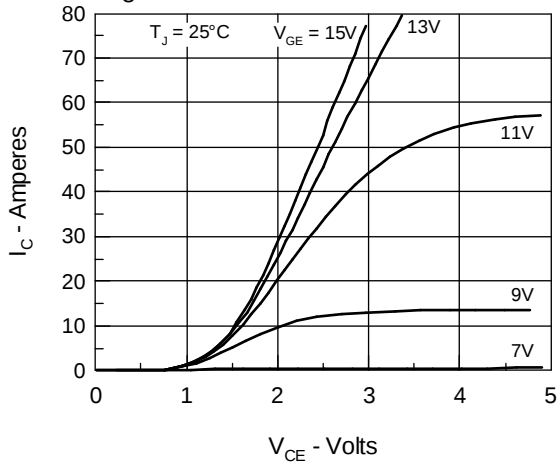


Fig. 2 Output Characteristics

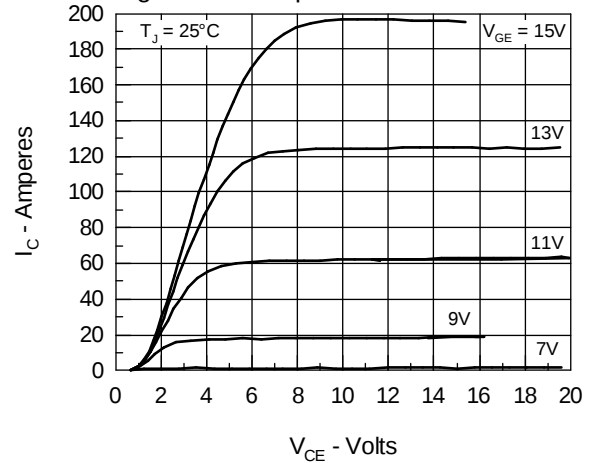


Fig. 3 Collector-Emmitter Voltage vs. Gate-Emitter Voltage

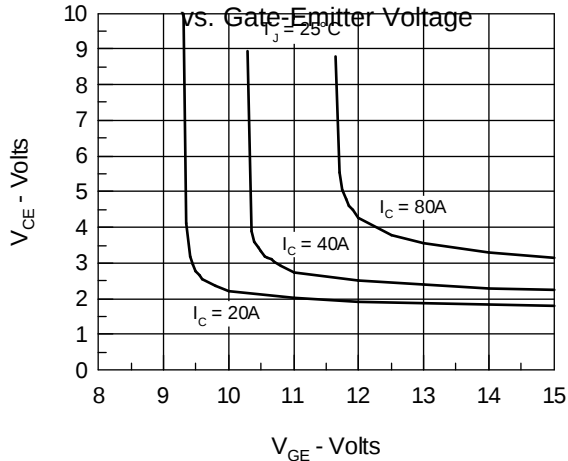


Fig. 4 Temperature Dependence of Output Saturation Voltage

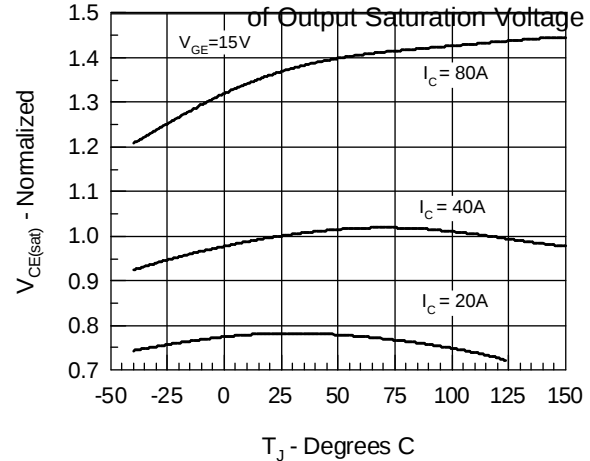


Fig. 5 Input Admittance

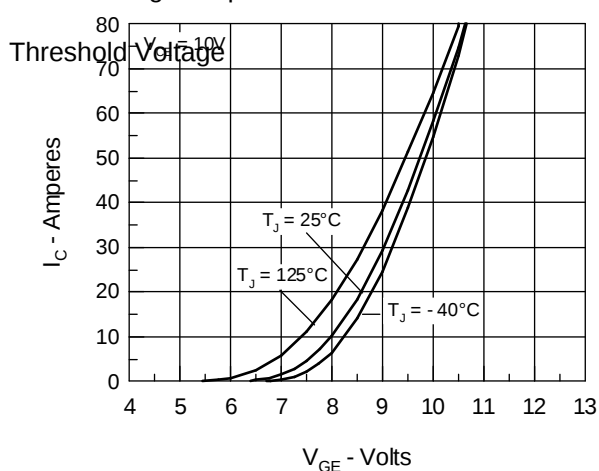


Fig. 6 Temperature Dependence of Breakdown and

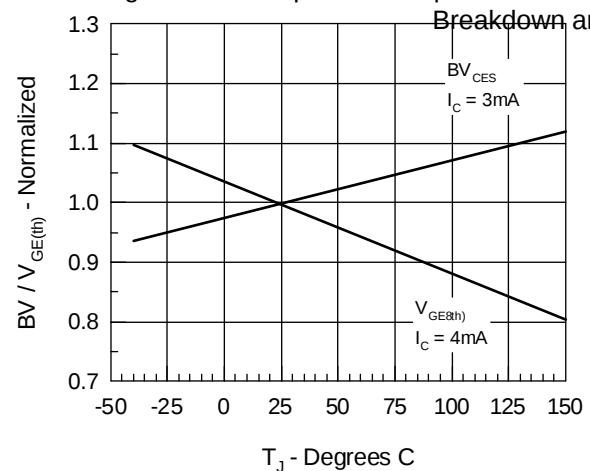


Fig.7 Turn-Off Energy per Pulse and Fall Time on Collector Current

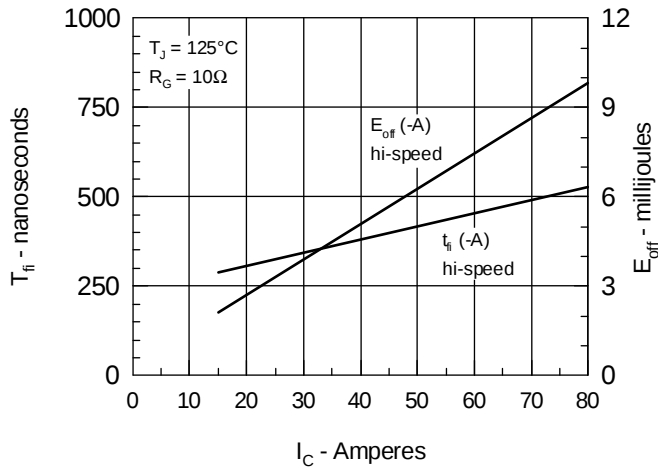


Fig.8 Dependence of Turn-Off Energy Per Pulse and Fall Time on R_G

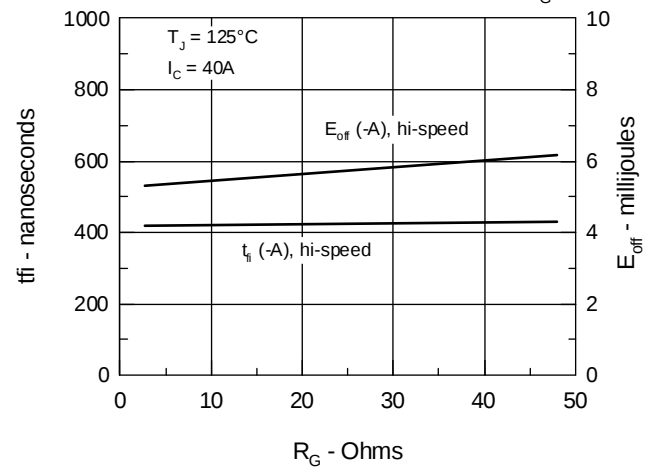


Fig.9 Gate Charge Characteristic Curve

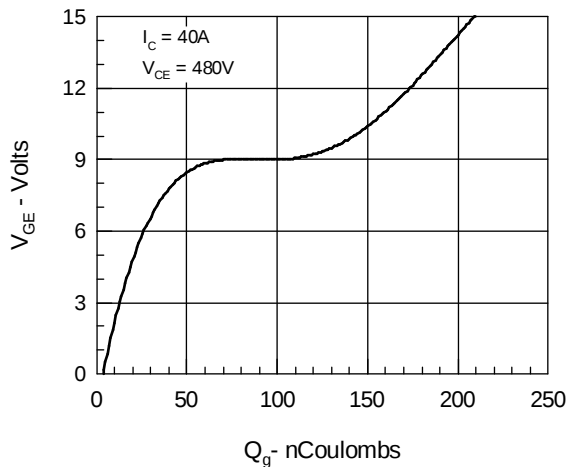


Fig.10 Turn-Off Safe Operating Area

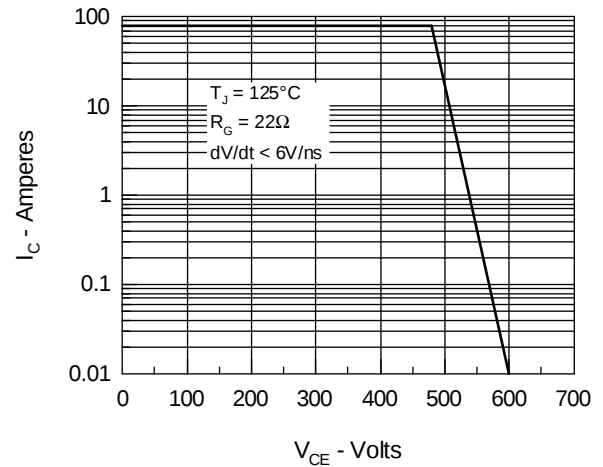
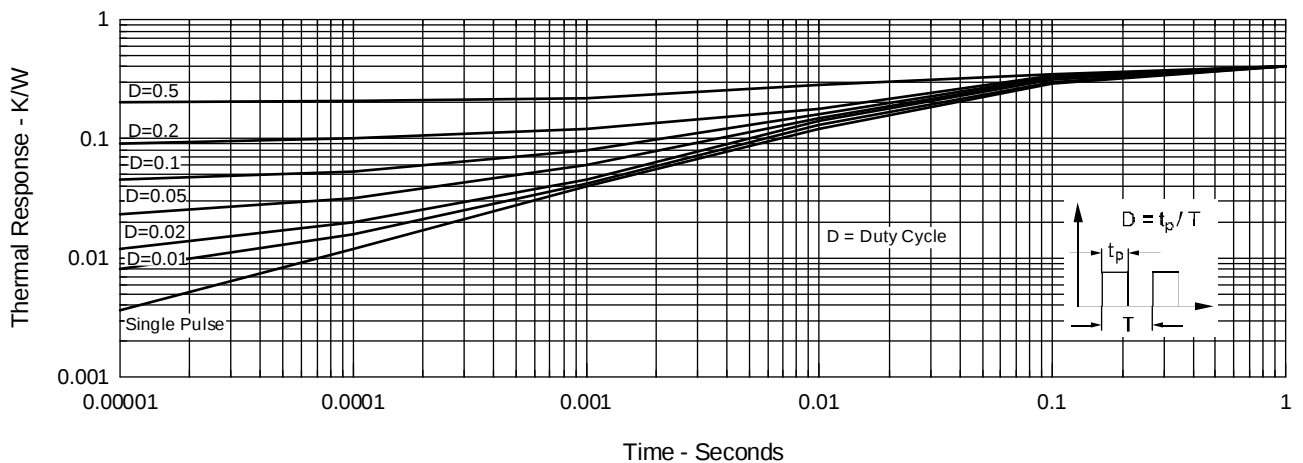


Fig.11 Transient Thermal Impedance



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IXYS Corporation
3540 Bassett Street, Santa Clara CA 95054
Phone: 408-982-0700, Fax: 408-496-0670

IXYS Semiconductor GmbH
Edisonstr. 15, D-68623 Lampertheim
Phone: +49-6206-503-0, Fax: +49-6206-503627