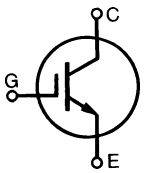
IXYS

		V_{CES}	I_{C25}	$V_{CE(sat)}$
Low $V_{CE(sat)}$ IGBT	**IXSH/IXSM 40 N60**	**600 V**	**75 A**	**2.5 V**
High Speed IGBT	**IXSH/IXSM 40 N60A**	**600 V**	**75 A**	**3.0 V**

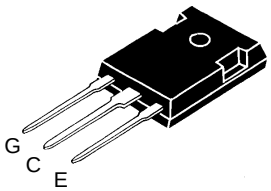
Short Circuit SOA Capability



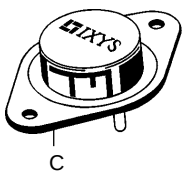
Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	600	V
V_{CGR}	T_J = 25°C to 150°C; R_{GE} = 1 MΩ	600	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C	75	A
I_{C90}	T_C = 90°C	40	A
I_{CM}	T_C = 25°C, 1 ms	150	A
SSOA (RBSOA)	V_{GE}= 15 V, T_J = 125°C, R_G = 2.7 Ω Clamped inductive load, L = 30 µH	I_{CM} = 80 @ 0.8 V_{CES}	A
t_{SC} **(SCSOA)**	V_{GE}= 15 V, V_{CE} = 360 V, 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 = 6g	
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 = 250 µA, V_{GE} = 0 V		600			V
$V_{GE(th)}$	I_C = 4 mA, V_{CE} = V_{GE}		4		7	V
I_{CES}	V_{CE} = 0.8 • V_{CES} V_{GE} = 0 V	T_J = 25°C T_J = 125°C			50 1	µA mA
I_{GES}	V_{CE} = 0 V, V_{GE} = ±20 V				±100	nA
$V_{CE(sat)}$	I_C = I_{C90}, V_{GE} = 15 V	40N60 40N60A			2.5 3.0	V 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
- 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

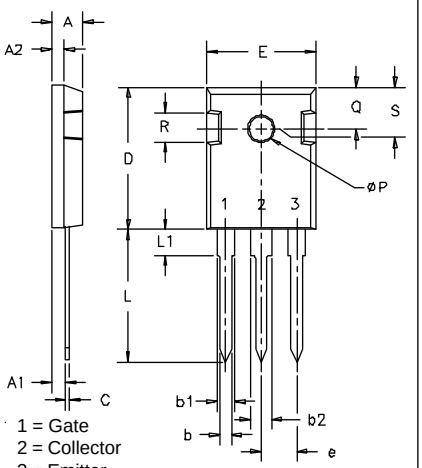
91546F (4/96)

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

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**			55		ns
t_{ri}	$I_C = I_{C90}$, V_{GE} = 15 V, L = 100 µH			170		ns
$t_{d(off)}$	V_{CE} = 0.8 V_{CES}, R_G = 2.7 Ω			400		ns
t_{fi}	Switching times may increase for V_{CE} (Clamp) > 0.8 • V_{CES}, higher T_J or increased R_G	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**			55		ns
t_{ri}				170		ns
E_{on}	$I_C = I_{C90}$, V_{GE} = 15 V, L = 100 µH, V_{CE} = 0.8 V_{CES}, R_G = 2.7 Ω			1.7		mJ
$t_{d(off)}$	Remarks: Switching times may increase for V_{CE} (Clamp) > 0.8 • V_{CES}, higher T_J or increased R_G	40N60			1000	ns
		40N60A		340	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

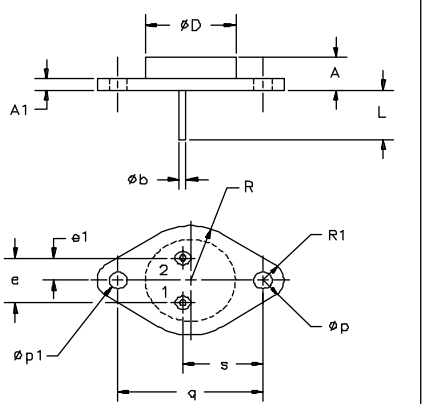
TO-247 AD Outline



1 = Gate
2 = Collector
3 = Emitter
Tab = Collector

SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS 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
L1		.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 MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	.250	.450	6.4	11.4
A1	.060	.135	1.53	3.42
øb	.057	.063	1.45	1.60
øD		.875		22.22
e	.420	.440	10.67	11.17
e1	.205	.225	5.21	5.71
L	.440	.480	11.18	12.19
øp	.151	.165	3.84	4.19
øp1	.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 Corporation
3540 Bassett Street, Santa Clara CA 95054
P

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

Fig. 1 Saturation Characteristics

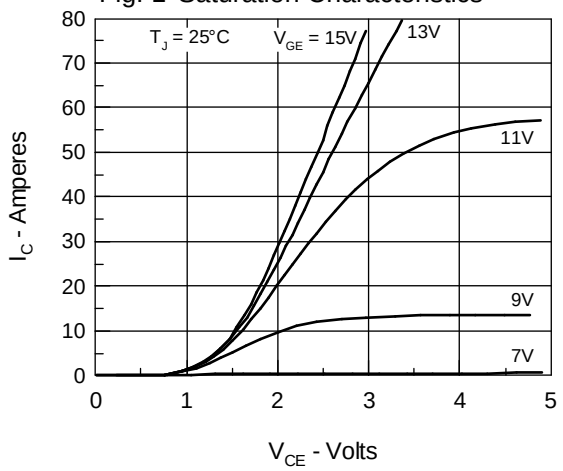


Fig. 2 Output Characterstics

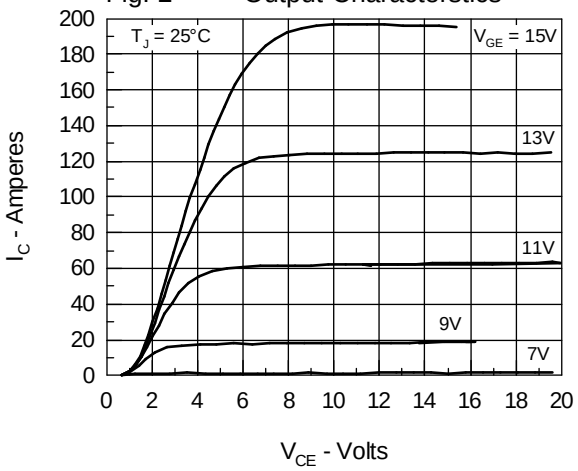


Fig. 3 Collector-Emitter Voltage vs. Gate-Emitter Voltage

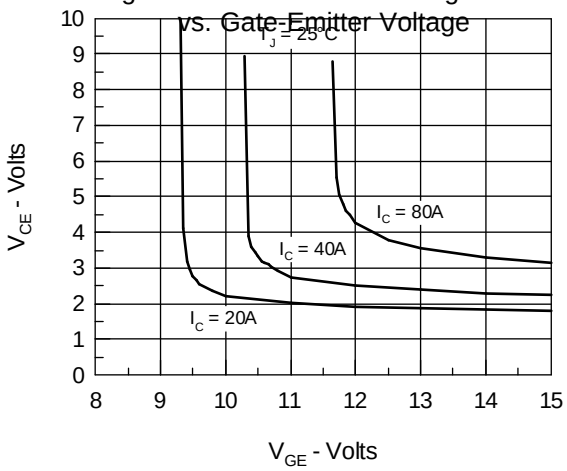


Fig. 4 Temperature Dependence of Output Saturation Voltage

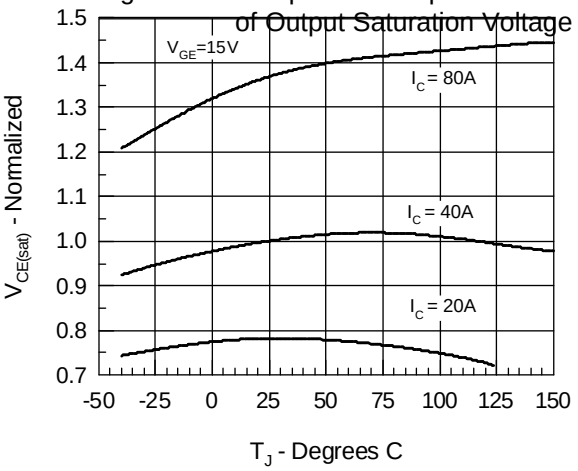


Fig. 5 Input Admittance

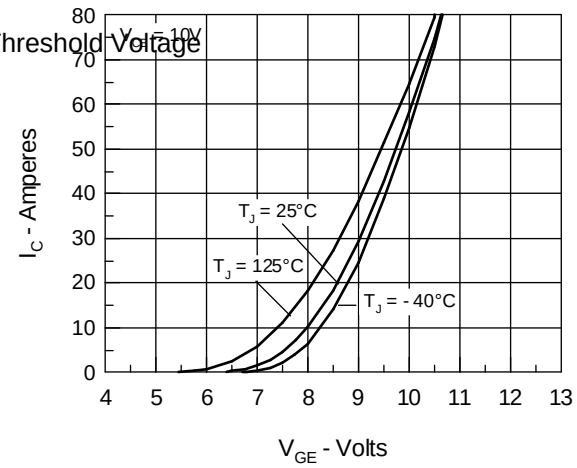
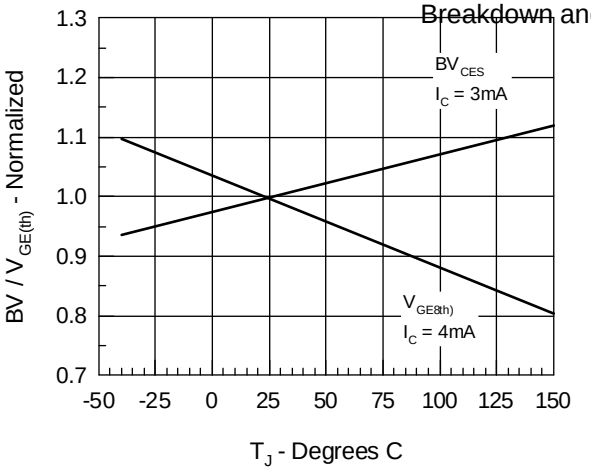


Fig. 6 Temperature Dependence of Breakdown and Threshold Voltage



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

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

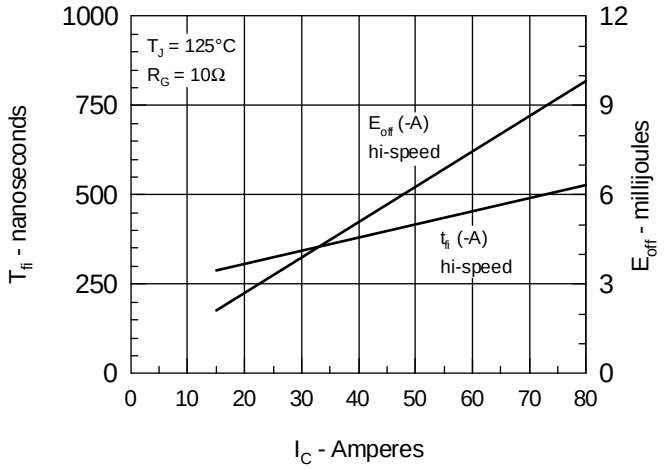


Fig.8 Dependence of Turn-Off Energy Per Pulse and Fall Time on R_G

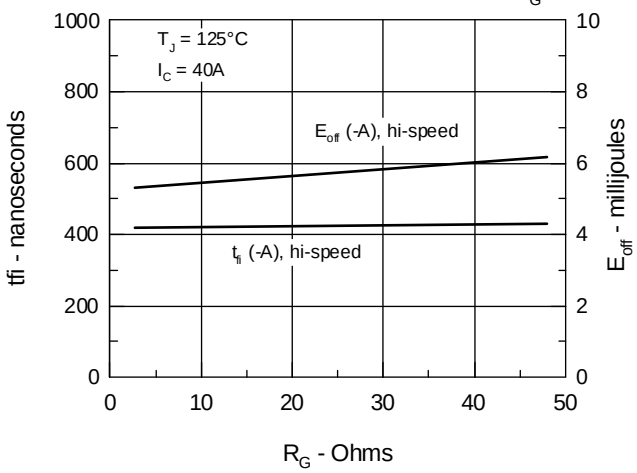


Fig.9 Gate Charge Characteristic Curve

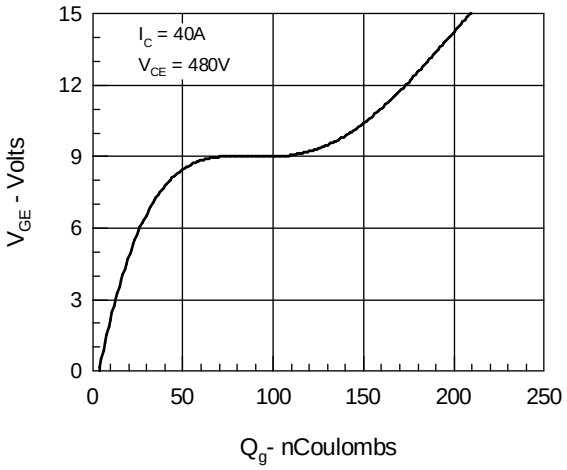


Fig.10 Turn-Off Safe Operating Area

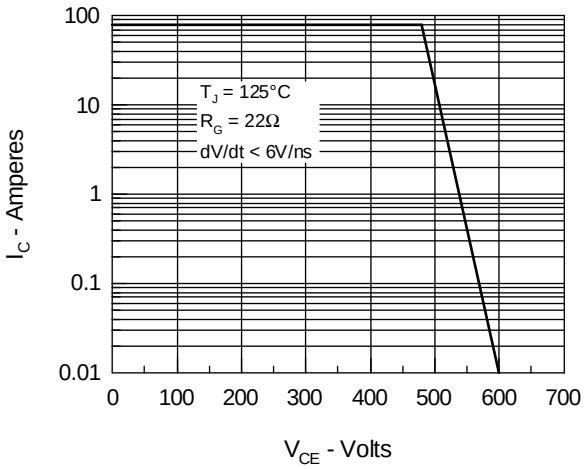
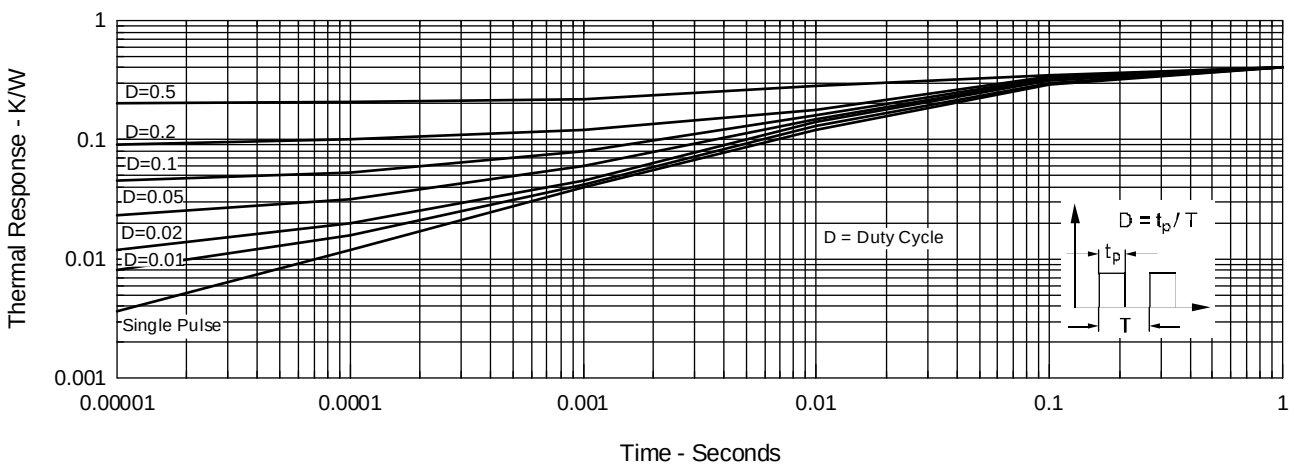


Fig.11 Transient Thermal Impedance



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

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

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