IXYS

High Speed IGBT

Short Circuit SOA Capability

	V_{CES}	I_{CES}	t_{fi}
IXSH/IXST 30N60B	**600 V**	**2.0 V**	**140 ns**
IXSH/IXST 30N60C	**600 V**	**2.5 V**	**70 ns**

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	55	A
I_{C90}	T_C = 90°C	30	A
I_{CM}	T_C = 25°C, 1 ms	110	A
SSOA (RBSOA)	V_{GE} = 15 V, T_J = 125°C, R_G = 2.7 Ω Clamped inductive load, V_{CC} = 0.8 V_{CES}	I_{CM} = 60 @ 0.8 V_{CES}	A
t_{SC} (SCSOA)	V_{GE} = 15 V, V_{CE} = 360 V, T_J = 125°C R_G = 33 Ω, non repetitive	10	μs
P_C	T_C = 25°C	200	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
M_d	Mounting torque (TO-247)	1.13/10 Nm/lb.in.	
Weight	TO-247	6	g
	TO-268	4	g
Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s		300	°C

TO-247 AD (IXSH)

G D S (TAB)

TO-268 (D3) (IXST)

G S (TAB)

G = Gate
S = Source   TAB = Drain

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 = 2.5 mA, V_{CE} = V_{GE}		4		7 V
I_{CES}	V_{CE} = 0.8 V_{CES}	T_J = 25°C			100 μA
	V_{GE} = 0 V	T_J = 125°C			1 mA
I_{GES}	V_{CE} = 0 V, V_{GE} = ±20 V				±100 nA
$V_{CE(sat)}$	V_{GE} = 15 V; I_C = I_{C90} 30N60B				2.0 V
	30N60C				2.5 V

Features

- International standard packages
- Short Circuit SOA capability
- High frequency IGBT
- New generation HDMOS™ process

Applications

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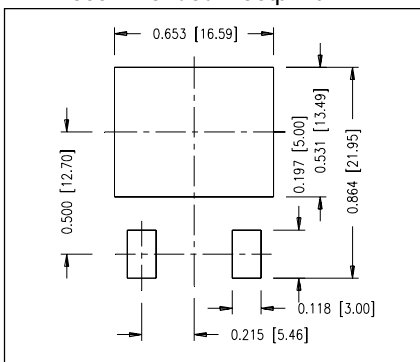- Switch-mode and resonant-mode power supplies

Advantages

- Easy to mount with 1 screw (isolated mounting screw hole)
- Surface mountable, high power case style
- Reduce assembly time and cost
- High power density

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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 %		10		S
C$_{ies}$				3100	pF
C$_{oes}$	V$_{CE}$ = 25 V, V$_{GE}$ = 0 V, f = 1 MHz			240	pF
C$_{res}$				30	pF
Q$_g$				100	nC
Q$_{ge}$	I$_C$ = I$_{C90}$, V$_{GE}$ = 15 V, V$_{CE}$ = 0.5 V$_{CES}$			30	nC
Q$_{gc}$				38	nC
t$_{d(on)}$				30	ns
t$_{ri}$	**Inductive load, T$_J$ = 25°C**			30	ns
t$_{d(off)}$	I$_C$ = I$_{C90}$, V$_{GE}$ = 15 V	30N60B	150	270	ns
	V$_{CE}$ = 0.8 V$_{CES}$, R$_G$ = 4.7 Ω	30N60C	90	150	ns
t$_{fi}$	Note 1	30N60B	140	270	ns
		30N60C	70	120	ns
E$_{off}$		30N60B	1.5	2.5	mJ
		30N60C	0.7	1.2	mJ
t$_{d(on)}$				35	ns
t$_{ri}$	**Inductive load, T$_J$ = 125°C**			35	ns
E$_{on}$	I$_C$ = I$_{C90}$, V$_{GE}$ = 15 V			0.5	mJ
	V$_{CE}$ = 0.8 V$_{CES}$, R$_G$ = 4.7 Ω				
t$_{d(off)}$	Note 1	30N60B		270	ns
		30N60C		150	ns
t$_{fi}$		30N60B		250	ns
		30N60C		140	
E$_{off}$		30N60B		2.5	mJ
		30N60C		1.2	mJ
R$_{thJC}$					0.62 K/W
R$_{thCK}$	(TO-247)			0.25	K/W

Notes: 1. Switching times may increase for V$_{CE}$ (Clamp) > 0.8 V$_{CES}$, higher T$_J$ or increased R$_G$.
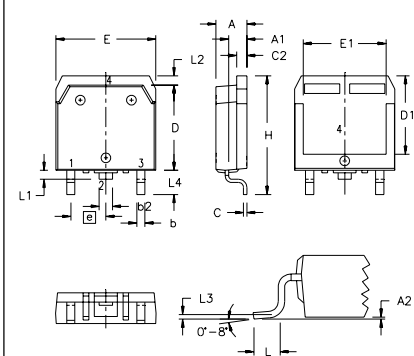
Min Recommended Footprint

TO-247 AD Outline

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

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
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-268 Outline

SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.193	.201	4.90	5.10
A1	.106	.114	2.70	2.90
A2	.001	.010	0.02	0.25
b	.045	.057	1.15	1.45
b2	.075	.083	1.90	2.10
C	.016	.026	0.40	0.65
C2	.057	.063	1.45	1.60
D	.543	.551	13.80	14.00
D1	.488	.500	12.40	12.70
E	.624	.632	15.85	16.05
E1	.524	.535	13.30	13.60
e	.215 BSC		5.45 BSC	
H	.736	.752	18.70	19.10
L	.094	.106	2.40	2.70
L1	.047	.055	1.20	1.40
L2	.039	.045	1.00	1.15
L3	.010 BSC		0.25 BSC	
L4	.150	.161	3.80	4.10

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

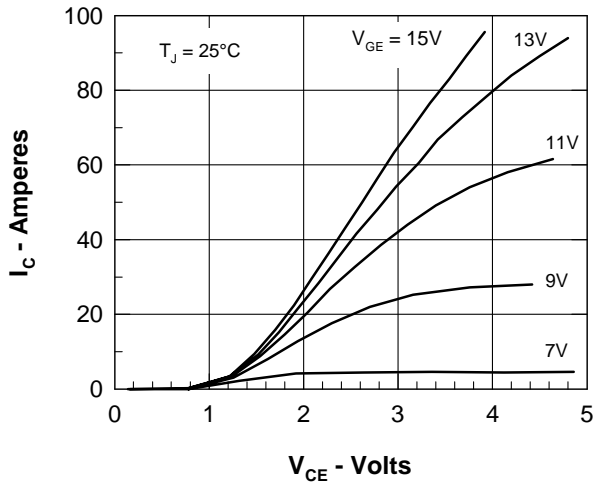## Fig.1 Saturation Characteristics
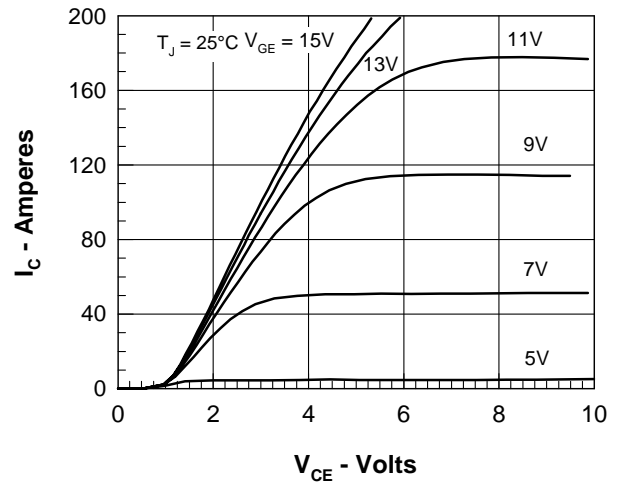

Fig.2 Output Characterstics

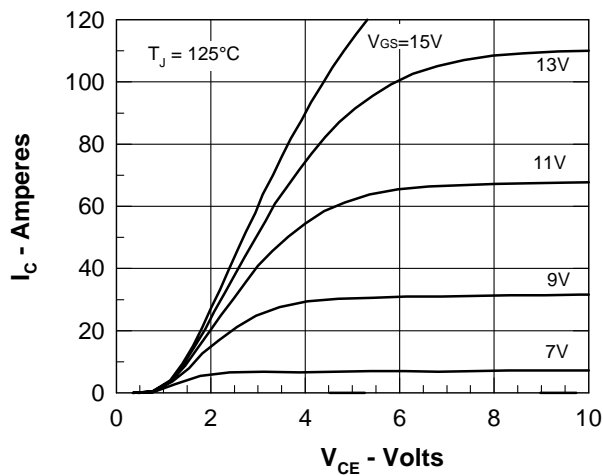## Fig.3 Collector-Emitter Voltage vs. Gate-Emitter Voltage

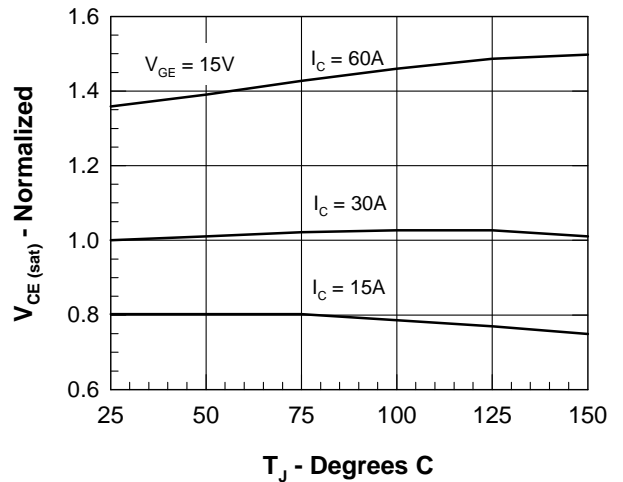## Fig.4 Temperature Dependence of Output Saturation Voltage
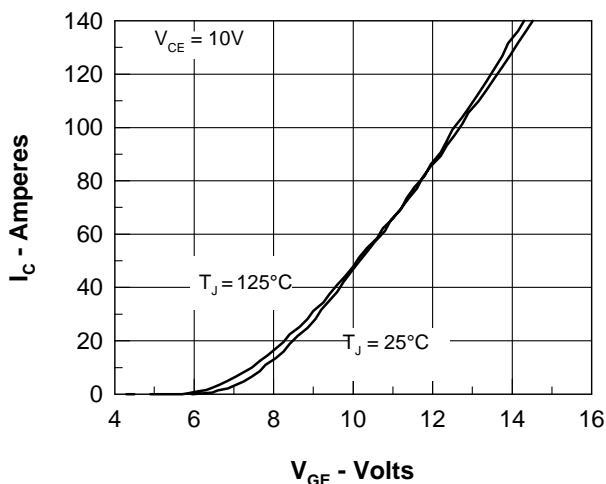

Fig.5 Input Admittance

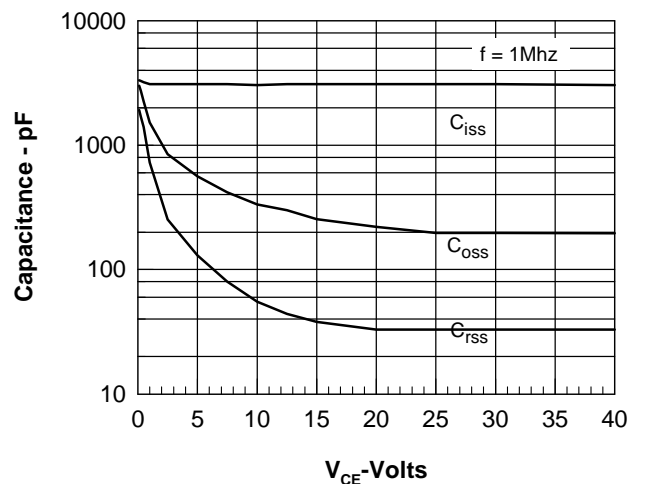## Fig.6 Temperature Dependence of Breakdown and Threshold Voltage

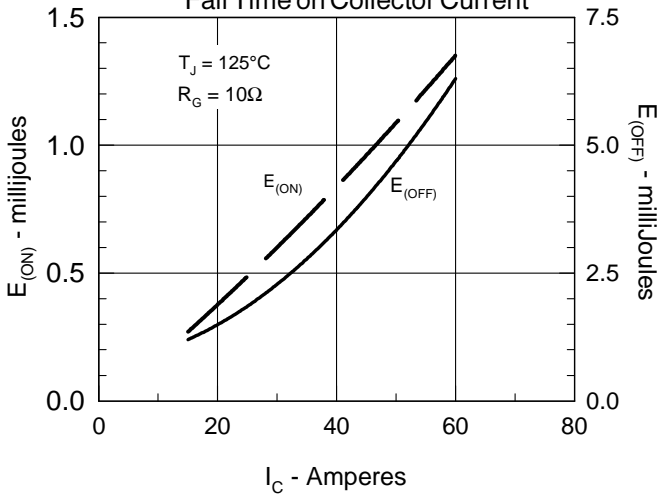Fig.7 Turn-Off Energy per Pulse and Fall Time on Collector Current

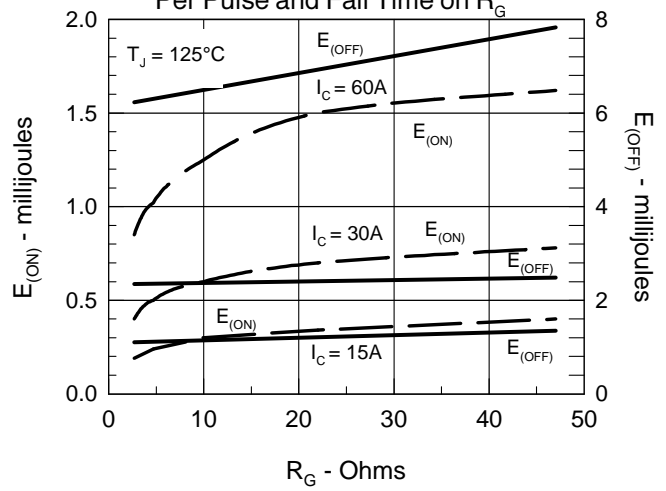Fig.8 Dependence of Turn-Off Energy Per Pulse and Fall Time on R_G

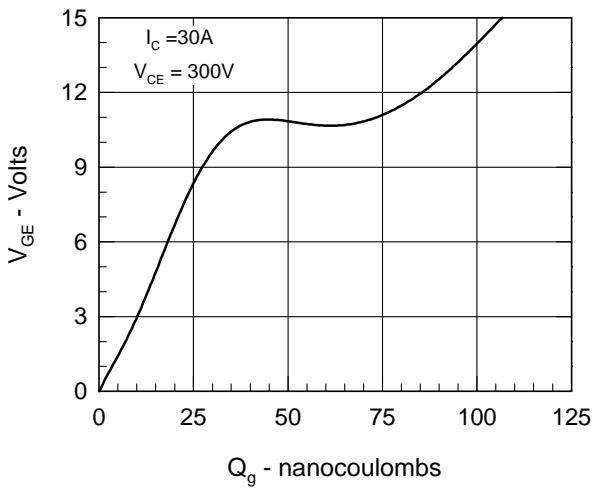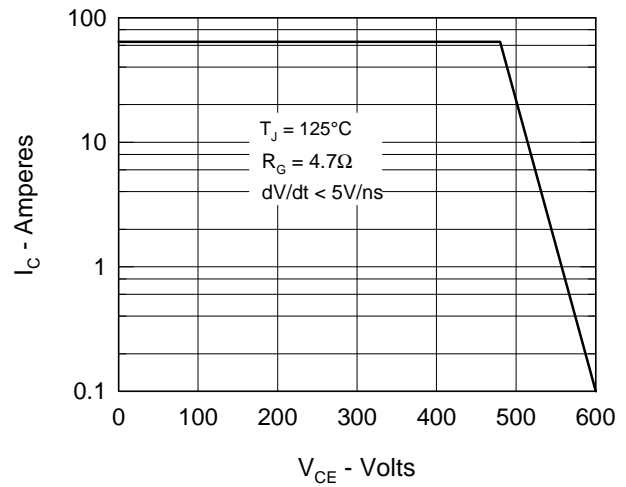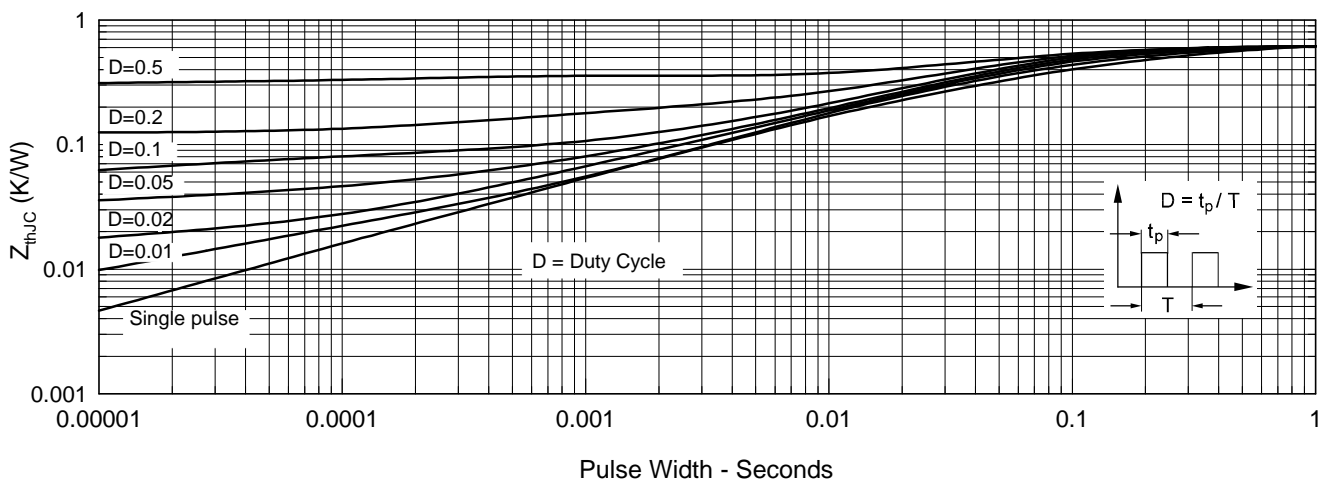Fig.9 Gate Charge Characteristic Curve

Fig.10 Turn-Off Safe Operating Area

Fig.11 Transient Thermal Impedance

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