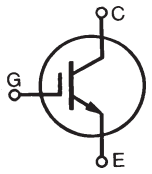
IXYS

High Voltage High speed IGBT

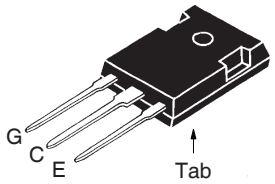
IXSH35N140A

V_{CES} = 1400V
I_{C90} = 35A
$V_{CE(sat)}$ ≤ 4.0V
$t_{fi(typ)}$ = 200ns

Short Circuit SOA Capability



TO-247



G = Gate C = Collector
E = Emitter Tab = Collector

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	1400	V
V_{CGR}	T_J = 25°C to 150°C, R_{GE} = 1MΩ	1400	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C	70	A
I_{C90}	T_C = 90°C	35	A
I_{CM}	T_C = 25°C, 1ms	140	A
SSOA (RBSOA)	V_{GE} = 15V, T_J = 125°C, R_G = 3Ω Clamped Inductive Load	I_{CM} = 70 @V_{CE} ≤ 960	A V
t_{SC} **(SCSOA)**	V_{GE} = 15V, V_{CE} = 840V, T_J = 125°C R_G = 22Ω, 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.
T_L	Maximum Lead Temperature for Soldering	300	°C
T_{SOLD}	1.6mm (0.062 in.) from Case for 10s	260	°C
Weight		6	g

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
$V_{GE(th)}$	I_C = 4mA, V_{CE} = V_{GE}	4.5		7.5	V
I_{CES}	V_{CE} = V_{CES}, V_{GE} = 0V			50	µA
	T_J = 125°C			2	mA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±100	nA
$V_{CE(sat)}$	I_C = 35A, V_{GE} = 15V, Note 1		3.4	4.0	V

Features

- International Standard Package JEDEC TO-247AD
- High Frequency IGBT with Guaranteed Short Circuit SOA Capability
- Fast Fall Time for Switching Speeds up to 20kHz
- 2nd Generation HDMOS™ Process
- Low $V_{CE(SAT)}$
  - for Minimum on-state Conduction Losses
- MOS Gate turn-on

Advantages

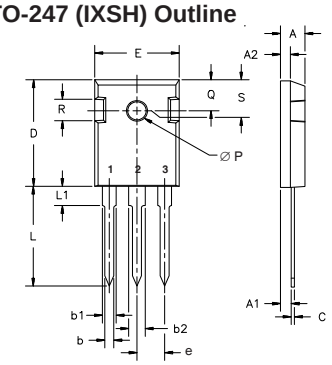
- High Power Density
- Easy to Mount
- Space Savings

Applications

- DC-DC Converters
- Switch-Mode and Resonant-Mode Power Supplies
- DC Choppers
- AC and DC Motor Drives
- Uninterrupted Power Supplies
- Welding

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	I_C = 35A, V_{CE} = 10V, Note 1	16	23		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		3710		pF
C_{oes}			230		pF
C_{res}			73		pF
Q_g	I_C = 35A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		120		nC
Q_{ge}			32		nC
Q_{gc}			50		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		40		ns
t_{ri}	I_C = 35A, V_{GE} = 15V		60		ns
$t_{d(off)}$	V_{CE} = 960V, R_G = 3Ω		150	300	ns
t_{fi}	Note 2		200	450	ns
E_{off}			4.0		mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C**		40		ns
t_{ri}	I_C = 35A, V_{GE} = 15V		65		ns
E_{on}	V_{CE} = 960V, R_G = 3Ω		4.0		mJ
$t_{d(off)}$	Note 2		240		ns
t_{fi}			400		ns
E_{off}			9.5		mJ
R_{thJC}				0.42	°C/W
R_{thCK}			0.21		°C/W

TO-247 (IXSH) Outline



Terminals: 1 - Gate 2 - Collector
3 - Emiiter

Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	4.7	5.3	.185	.209
A_1	2.2	2.54	.087	.102
A_2	2.2	2.6	.059	.098
b	1.0	1.4	.040	.055
b_1	1.65	2.13	.065	.084
b_2	2.87	3.12	.113	.123
C	.4	.8	.016	.031
D	20.80	21.46	.819	.845
E	15.75	16.26	.610	.640
e	5.20	5.72	0.205	0.225
L	19.81	20.32	.780	.800
L1		4.50		.177
ØP	3.55	3.65	.140	.144
Q	5.89	6.40	0.232	0.252
R	4.32	5.49	.170	.216
S	6.15 BSC		242 BSC	

Notes:

1. Pulse test, t ≤ 300µs, duty cycle, d ≤ 2%.
2. Switching times & energy losses may increase for higher V_{CE}(Clamp), T_J or R_G.

Fig. 1. Output Characteristics @ 25ºC

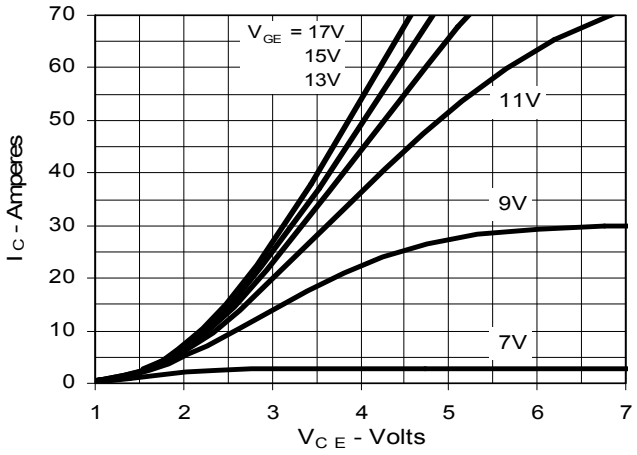


Fig. 2. Extended Output Characteristics @ 25ºC

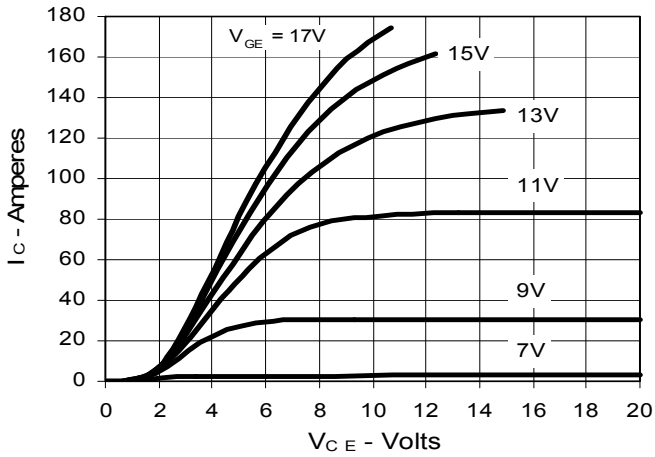


Fig. 3. Output Characteristics @ 125ºC

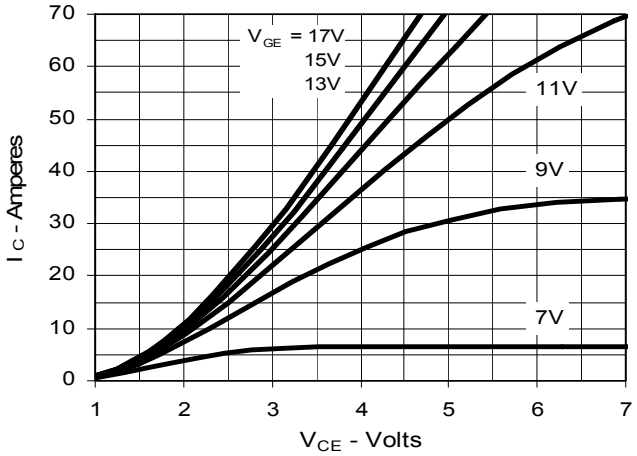


Fig. 4. Temperature Dependence of $V_{CE(sat)}$

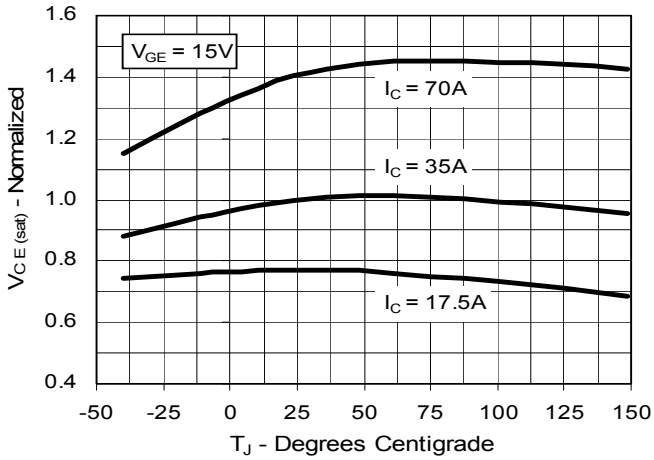


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emiiter voltage

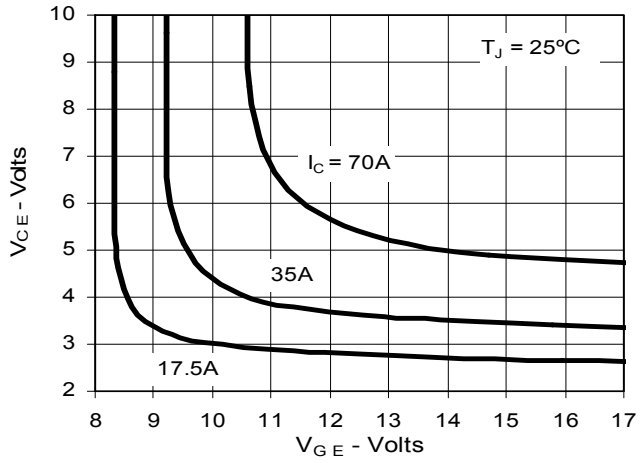


Fig. 6. Input Admittance

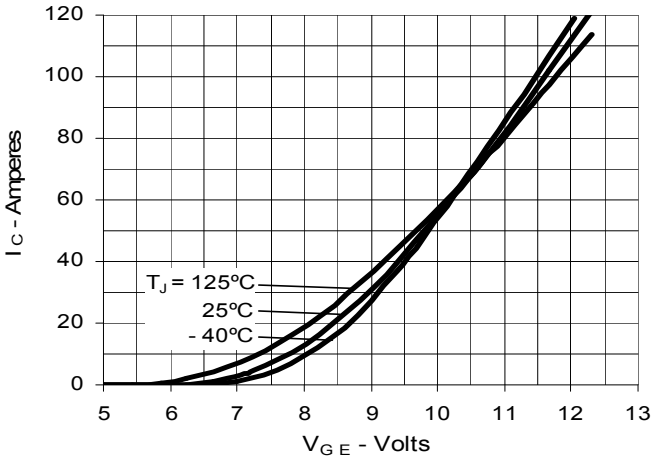


Fig. 7. Transconductance

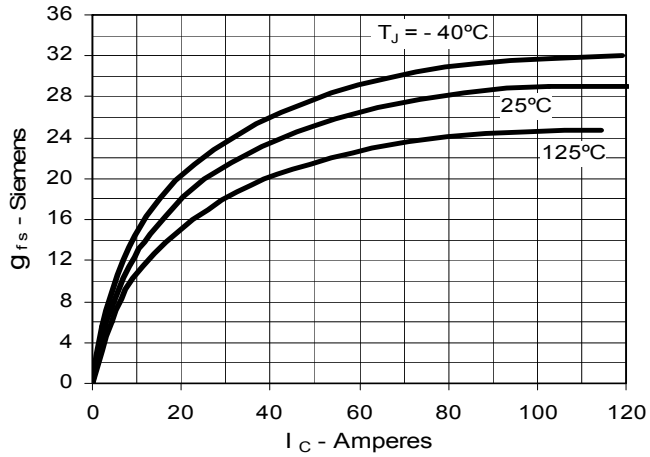


Fig. 8. Dependence of E_{off} on R_G

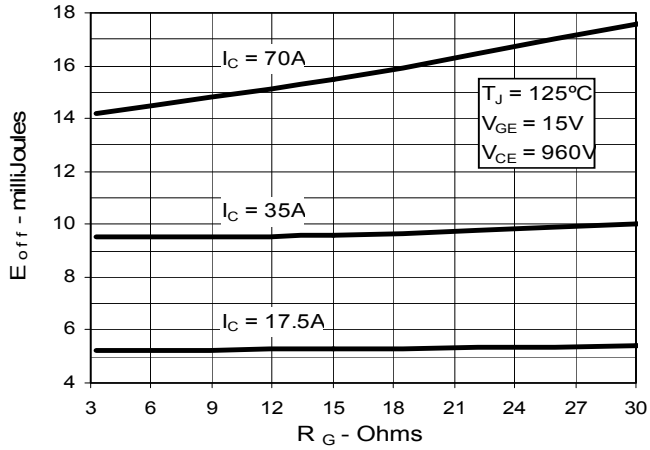


Fig. 9. Dependence of E_{off} on I_c

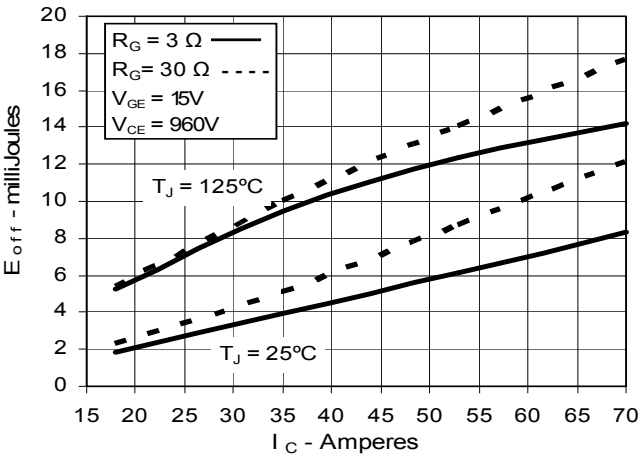


Fig. 10. Dependence of E_{off} on Temperature

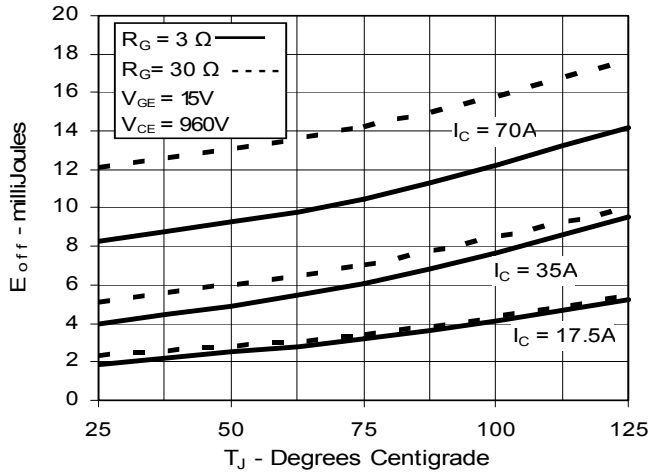


Fig. 11. Gate Charge

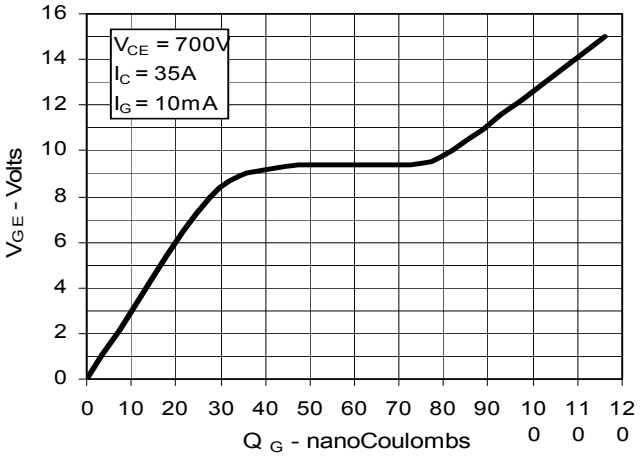


Fig. 12. Capacitance

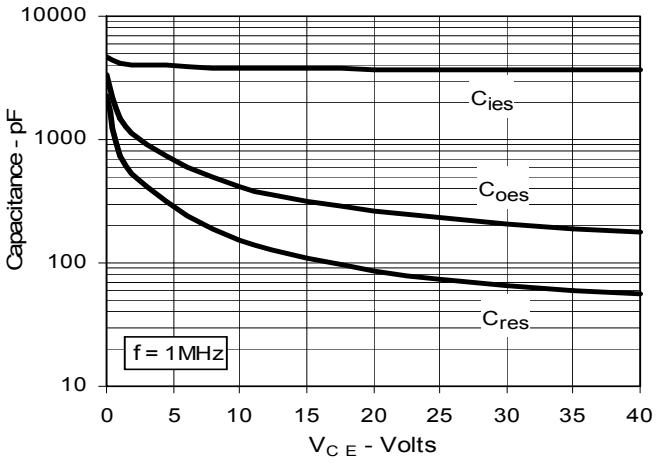


Fig. 13. Maximum Transient Thermal Impedance