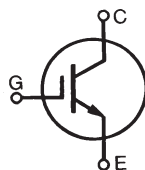


High Voltage
High speed IGBT

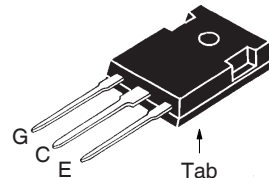
IXSH35N140A

Short Circuit SOA Capability



$$\begin{aligned} V_{CES} &= 1400V \\ I_{C90} &= 35A \\ V_{CE(sat)} &\leq 4.0V \\ t_{fi(typ)} &= 200ns \end{aligned}$$

TO-247



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

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

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

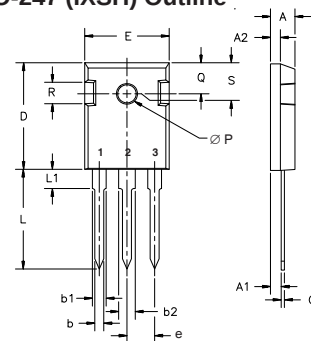
Applications

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

Symbol	Test Conditions ($T_J = 25^\circ\text{C}$, 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}	$V_{CE} = V_{CES}$, $V_{GE} = 0V$ $T_J = 125^\circ\text{C}$			50 μA 2 mA
I_{GES}	$V_{CE} = 0V$, $V_{GE} = \pm 20V$			± 100 nA
$V_{CE(sat)}$	$I_C = 35A$, $V_{GE} = 15V$, Note 1		3.4	4.0 V

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

TO-247 (IXSH) Outline



Terminals: 1 - Gate
2 - Collector
3 - Emitter

Dim.	Millimeter		Inches	
	Min.	Max.	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
L ₁		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, $t \leq 300\mu\text{s}$, duty cycle, $d \leq 2\%$.
2. Switching times & energy losses may increase for higher V_{CE} (Clamp), T_J or R_G .

Fig. 1. Output Characteristics
@ 25°C

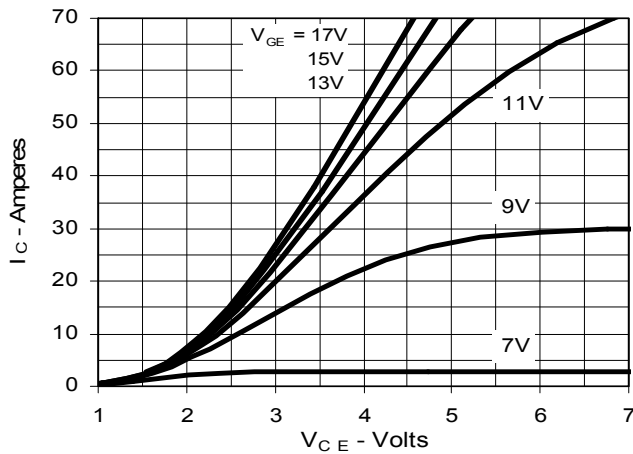


Fig. 2. Extended Output Characteristics
@ 25°C

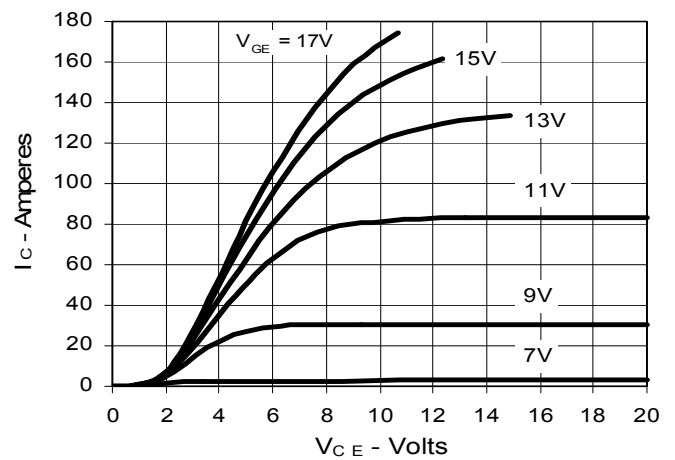


Fig. 3. Output Characteristics
@ 125°C

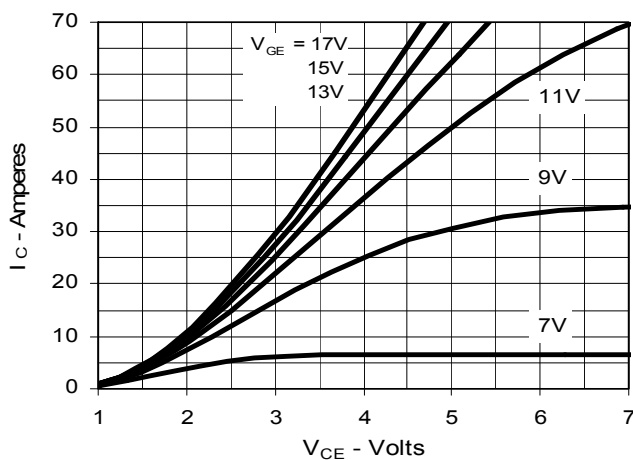


Fig. 4. Temperature Dependence of $V_{CE(sat)}$

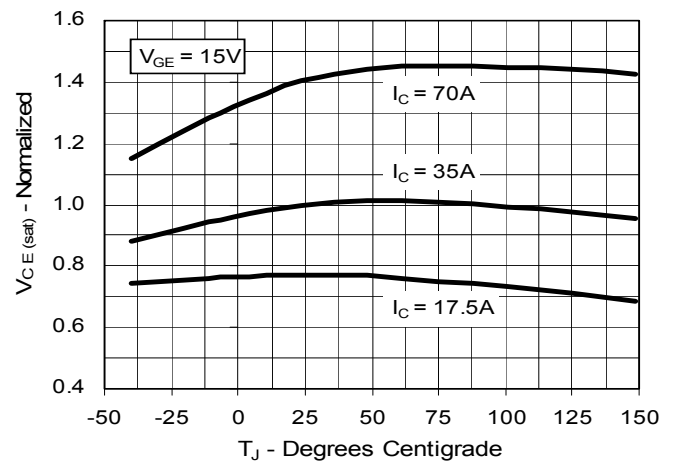


Fig. 5. Collector-to-Emitter Voltage
vs. Gate-to-Emitter voltage

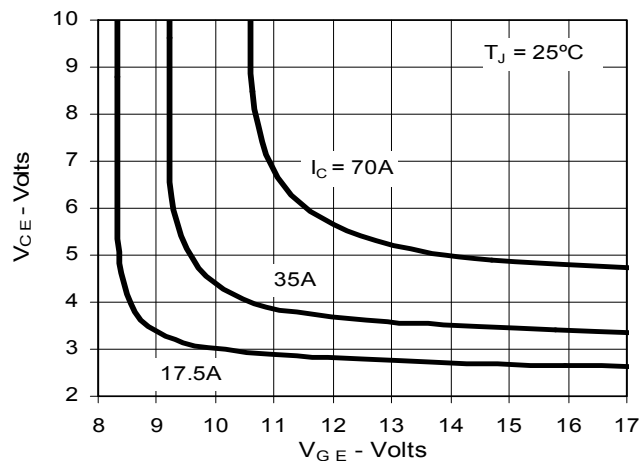


Fig. 6. Input Admittance

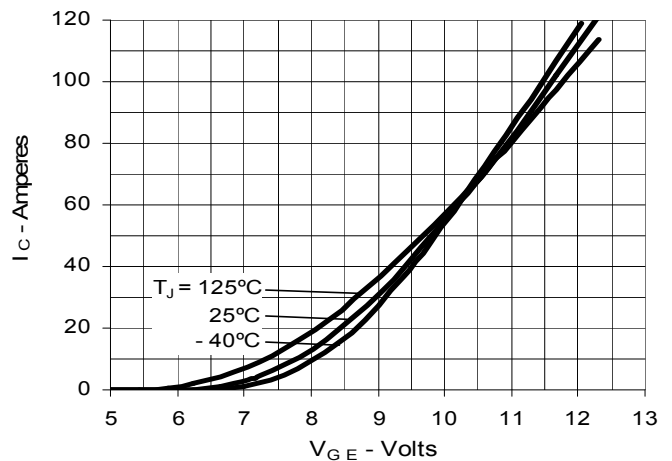


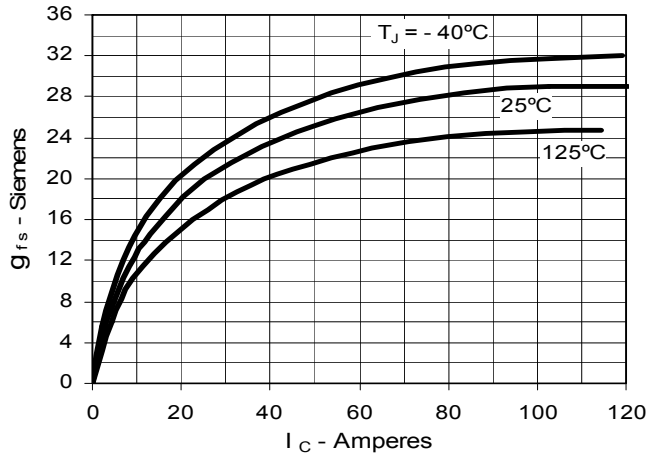
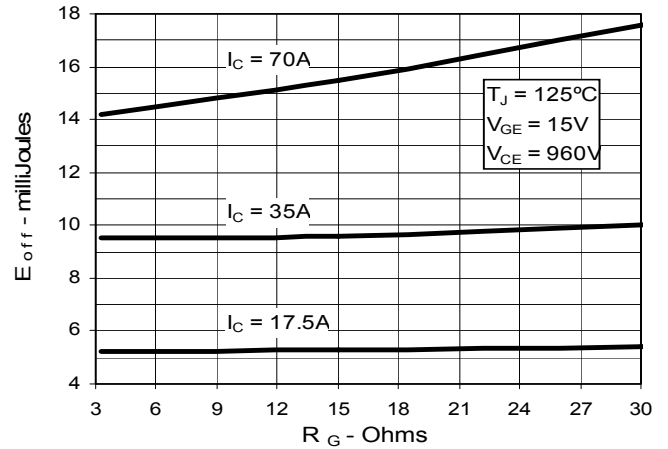
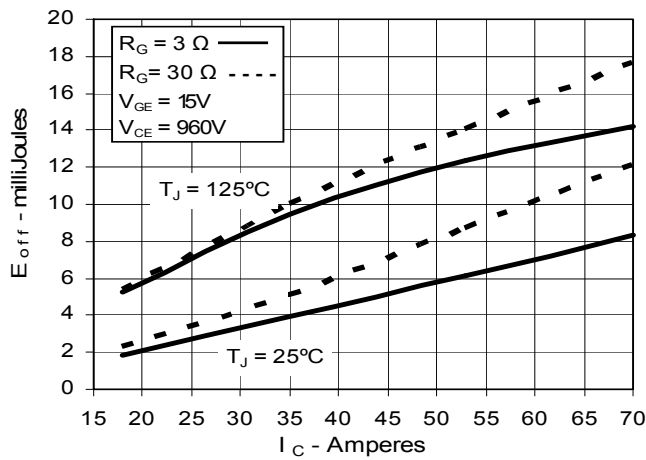
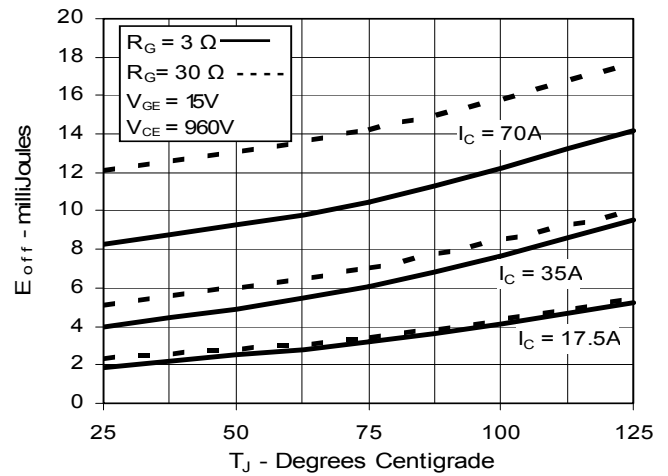
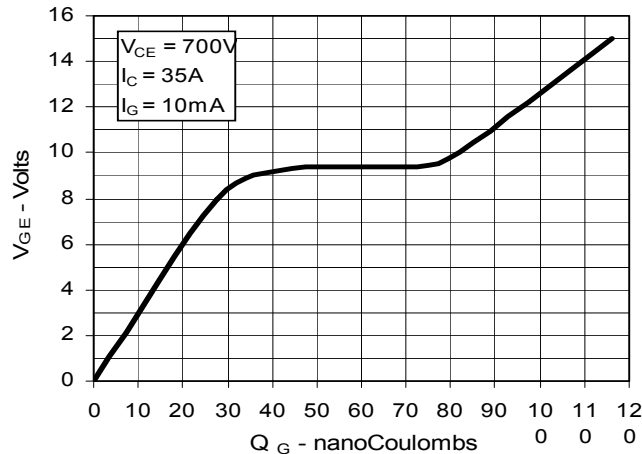
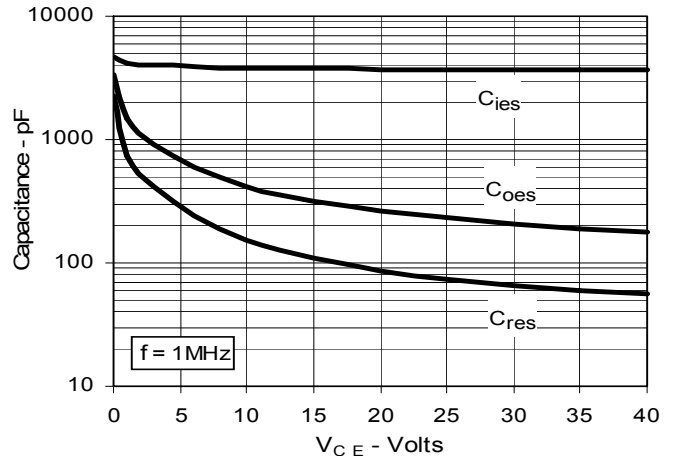
Fig. 7. Transconductance

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

