IXYS

Advance Technical Information

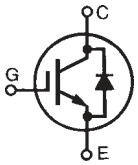
IGBT with Diode

IXGR 50N60A2U1

V_{CES} = 600 V
I_{C25} = 75 A
$V_{CE(sat)}$ = 1.7 V

Low Saturation Voltage IGBT with
Low Forward Drop Diode
Electrically Isolated Mounting Tab

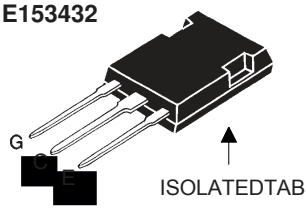
Preliminary Data Sheet



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 (limited by leads)	75	A
I_{C110}	T_C = 110°C	50	A
I_{F110}	T_C = 110°C (50N60A2U1 Diode)	25	A
I_{CM}	T_C = 25°C, 1 ms	200	A
SSOA (RBSOA)	V_{GE} = 15 V, T_{VJ} = 125°C, R_G = 10 Ω Clamped inductive load @ $V_{CE} \le$ 600 V	I_{CM} = 80	A
P_C	T_C = 25°C	200	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s		300	°C
F_C	Mounting Force	22..130/5..29	N/lb
V_{ISOL}	50/60 Hz, RMS, t = 1 minute I_{SOL} = 1mA, t = 1 s	2500 3000	V~ V~
Weight		4	g
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.	
$V_{GE(th)}$	I_C = 250 μA, V_{CE} = V_{GE}		3.0		5.0	V
I_{CES}	V_{CE} = V_{CES} V_{GE} = 0 V	T_J = 25°C T_J = 125°C			650 5	μA mA
I_{GES}	V_{CE} = 0 V, V_{GE} = ±20 V				±100	nA
$V_{CE(sat)}$	I_C = 50 A, V_{GE} = 15 V Note 1	 T_J = 125°C		 1.3	1.7	V V

ISOPLUS247(IXGR)
E153432



G = Gate C = Collector
E = Emitter

Features

- Low on-state voltage IGBT and anti-parallel diode in one package
- High current handling capability
- MOS Gate turn-on for drive simplicity

Applications

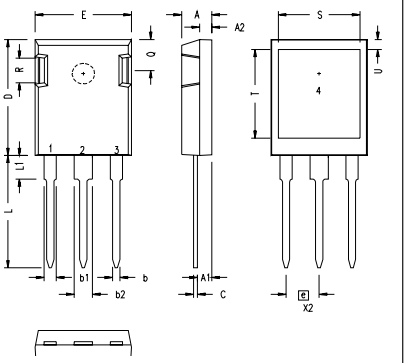
- Lighting controls
- Heating controls
- AC/DC relays

Advantages

- Space savings (two devices in one package)
- Easy to mount with 1 screw or spring clip

Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) Min.	Typ.	Max.	
g_{fs}	I_C = 50 A; V_{CE} = 10 V, Note 1	40	55		S
C_{ies}			3500		pF
C_{oes}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz		400		pF
C_{res}			50		pF
Q_g			140		nC
Q_{ge}	I_C = 50 A, V_{GE} = 15 V, V_{CE} = 0.5 V_{CES}		23		nC
Q_{gc}			44		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		20		ns
t_{ri}	I_C = 50 A, V_{GE} = 15 V		25		ns
$t_{d(off)}$	V_{CE} = 480 V, R_G = R_{off} = 5.0 Ω		410		ns
t_{fi}			260		ns
E_{off}			3.5		mJ
$t_{d(on)}$			20		ns
t_{ri}			25		ns
E_{on}	**Inductive load, T_J = 125°C**		1.0		mJ
$t_{d(off)}$	I_C = 50 A, V_{GE} = 15 V		720		ns
t_{fi}	V_{CE} = 480 V, R_G = R_{off} = 5.0 Ω		510		ns
E_{off}			7.7		mJ
R_{thJC}				0.62	K/W
R_{thCK}			0.15		K/W

ISOPLUS247 Outline



SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	.190	.205	4.83	5.21
A1	.090	.100	2.29	2.54
A2	.075	.085	1.91	2.16
b	.045	.055	1.14	1.40
b1	.075	.084	1.91	2.13
b2	.115	.123	2.92	3.12
C	.024	.031	0.61	0.80
D	.819	.840	20.80	21.34
E	.620	.635	15.75	16.13
e	.215 BSC		5.45 BSC	
L	.780	.800	19.81	20.32
L1	.150	.170	3.81	4.32
Q	.220	.244	5.59	6.20
R	.170	.190	4.32	4.83
S	.520	.540	13.21	13.72
T	.620	.640	15.75	16.26
U	.065	.080	1.65	2.03

1 – GATE
2 – DRAIN (COLLECTOR)
3 – SOURCE (EMITTER)
4 – NO CONNECTION

NOTE: This drawing will meet all dimensions requirement of JEDEC outline TO-247AD except screw hole.

Reverse Diode (FRED)

Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
V_F	I_F = 50 A, V_{GE} = 0 V, Note 1			1.6	V
R_{thJC}				0.95	K/W

Note 1: Pulse test, t ≤ 300 μs, duty cycle ≤ 2 %

Fig. 1. Output Characteristics @ 25 ºC

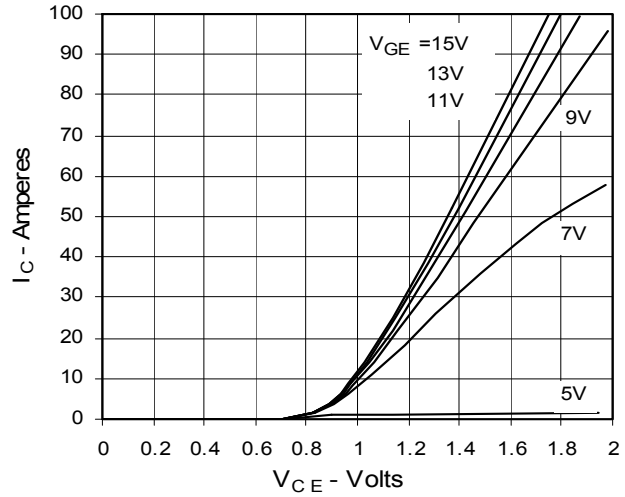


Fig. 2. Extended Output Characteristics @ 25 ºC

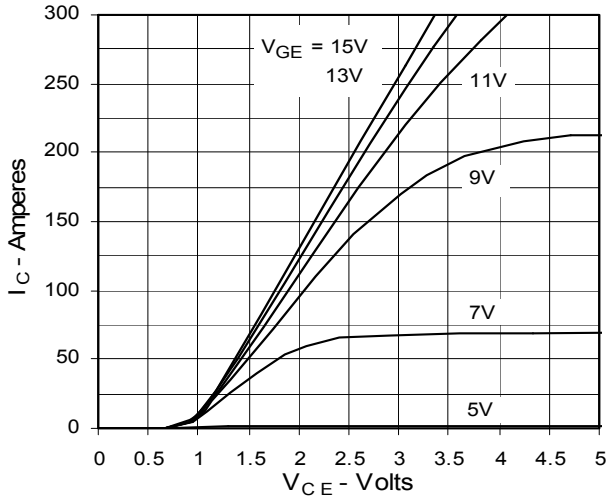


Fig. 3. Output Characteristics @ 125 ºC

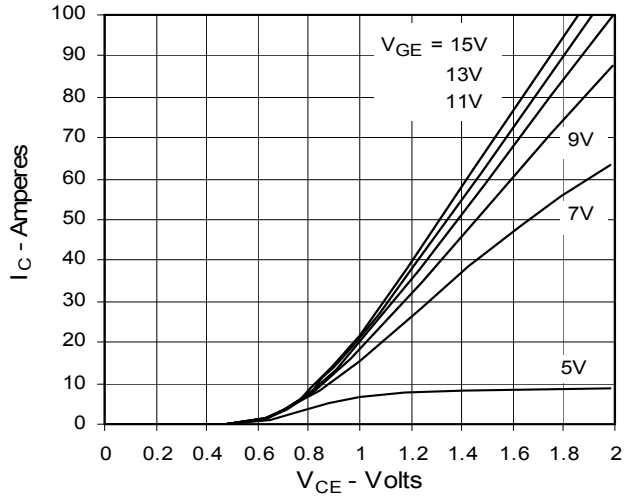


Fig. 4. Dependence of $V_{CE(sat)}$ on Temperature

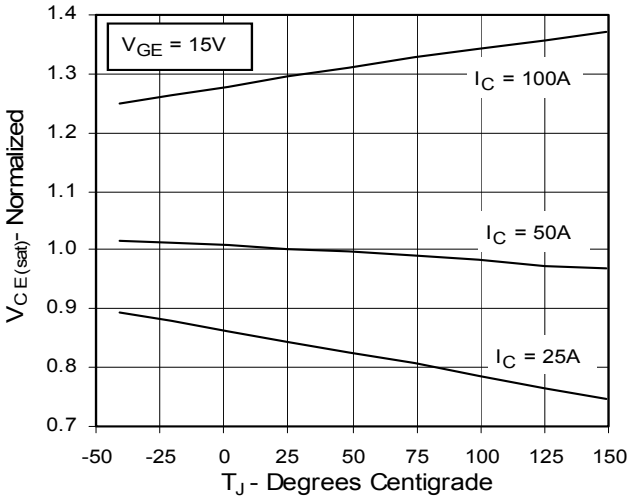


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter voltage

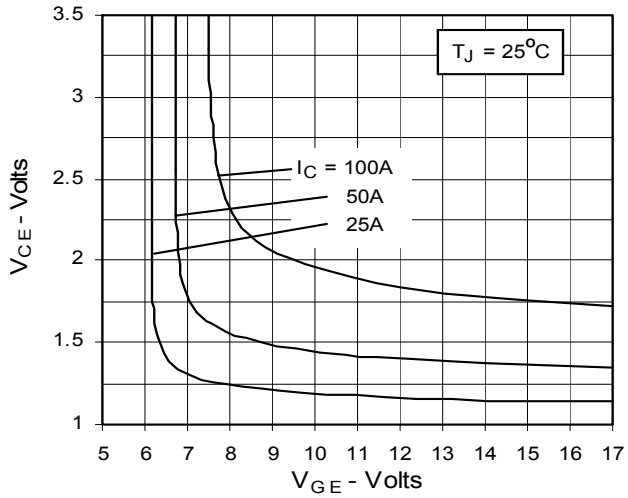


Fig. 6. Input Admittance

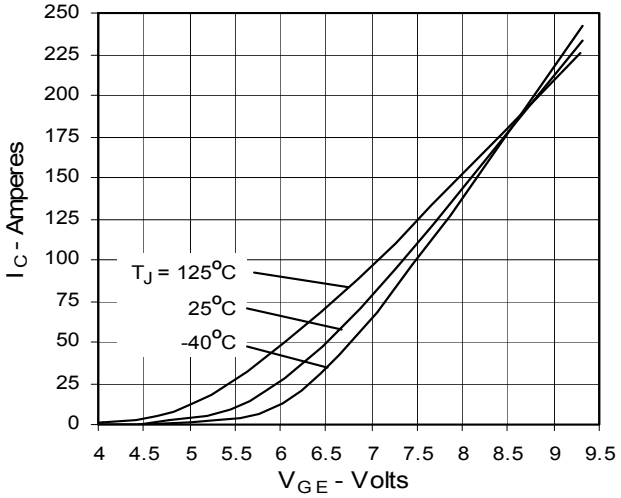


Fig. 7. Transconductance

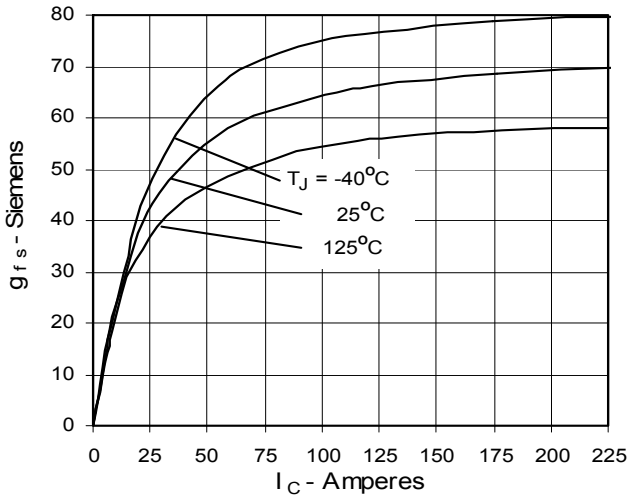


Fig. 8. Dependence of Turn-off Energy Loss on R_G

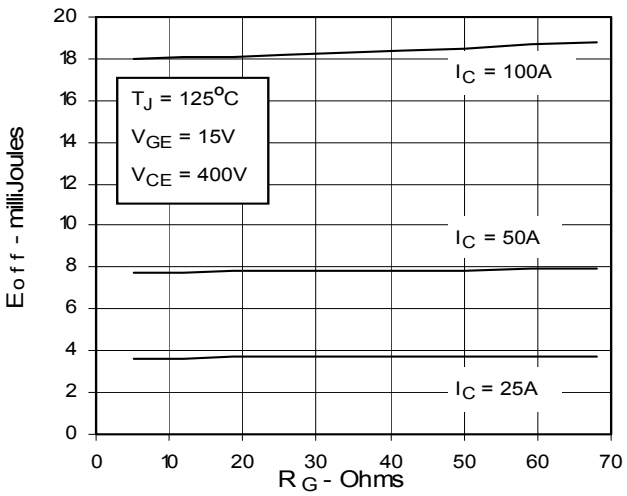


Fig. 9. Dependence of Turn-Off Energy Loss on I_C

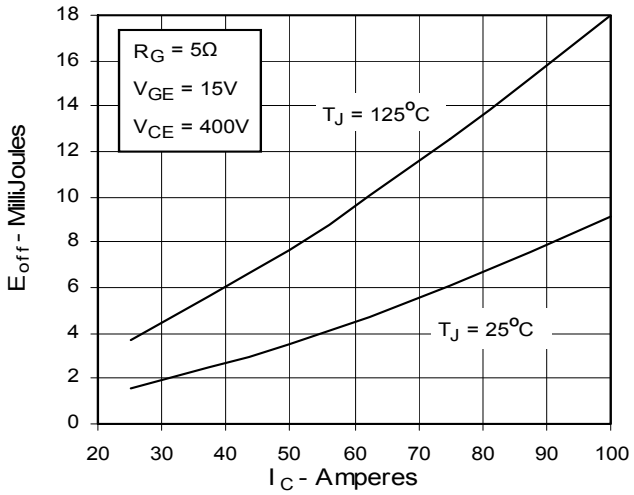


Fig. 10. Dependence of Turn-off Energy Loss on Temperature

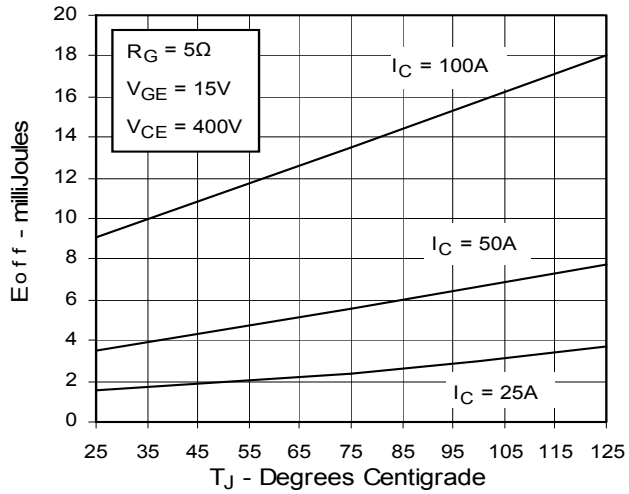


Fig. 11. Dependence of Turn-off Switching Time on R_G

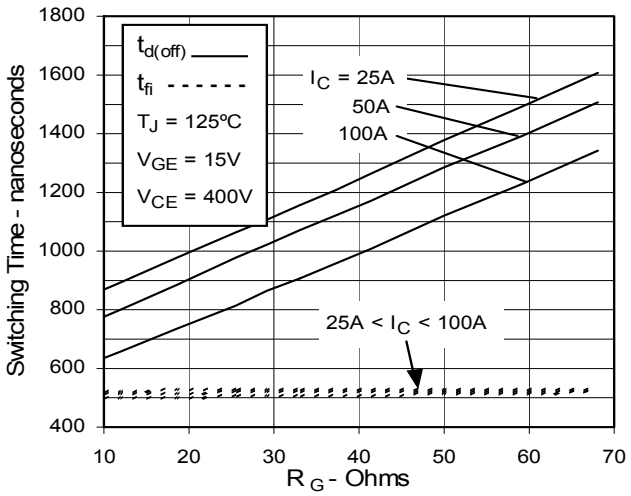


Fig. 12. Dependence of Turn-off Switching Time on I_C

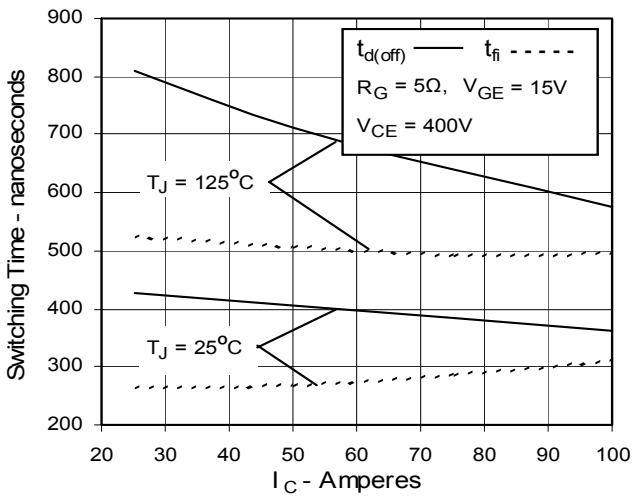


Fig. 13. Dependence of Turn-off Switching Time on Temperature

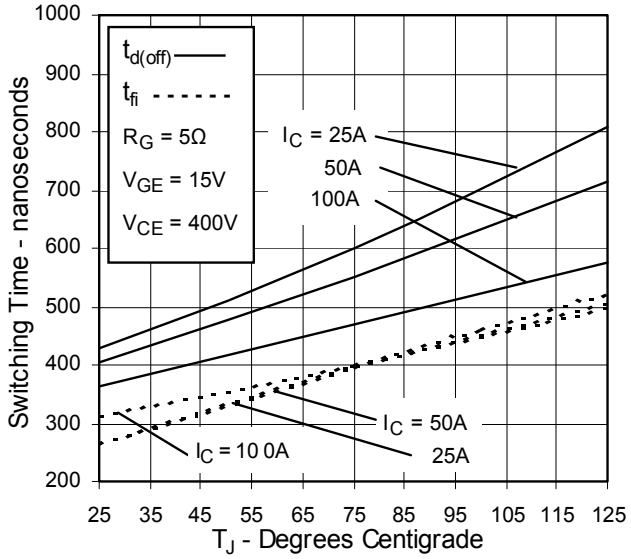


Fig. 14. Gate Charge

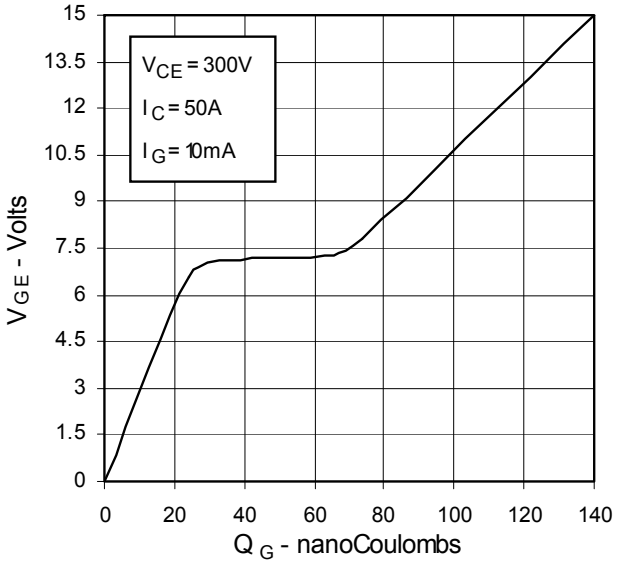


Fig. 15. Capacitance

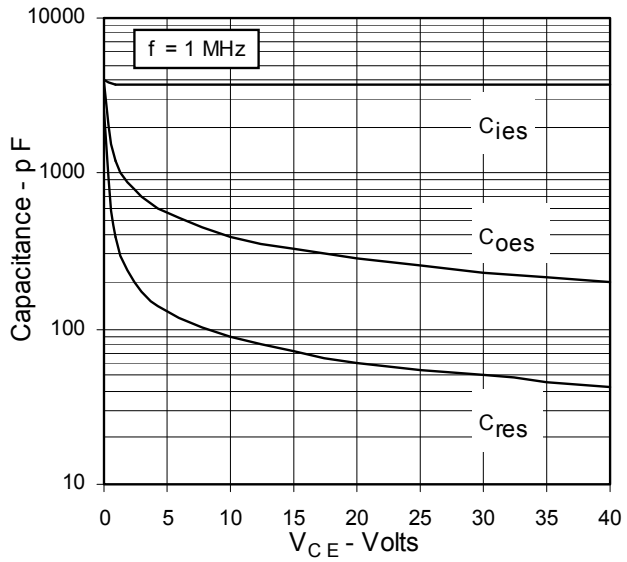


Fig. 16. Reverse-Bias Safe Operating Area

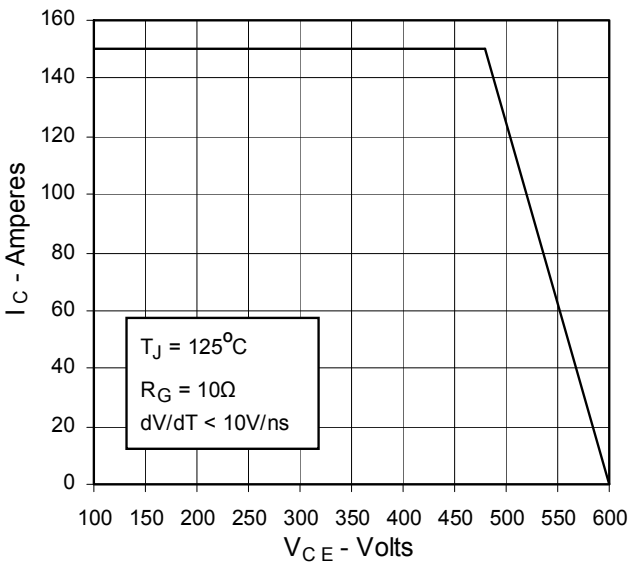


Fig. 17. Maximum Transient Thermal Resistance