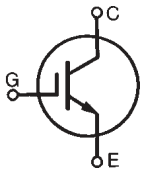
IXYS

Very High Voltage IGBT

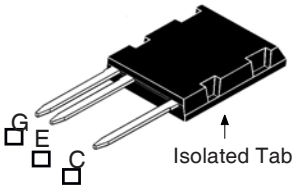
IXEL40N400

V_{CES} = 4000V
I_{C110} = 40A
$V_{CE(sat)}$ ≤ 3.2V
$t_{fi(typ)}$ = 425ns

(Electrically Isolated Tab)



ISOPLUS i5-Pak™



G = Gate C = Collector
E = Emitter

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	4000	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C	90	A
I_{C110}	T_C = 110°C	40	A
I_{CM}	Pulse Width Limited by T_{JM}, 1ms, V_{GE} = 25V	400	A
P_C	T_C = 25°C	380	W
T_J		- 40 ... +150	°C
T_{JM}		150	°C
T_{stg}		- 40 ... +150	°C
T_L	Maximum Lead Temperature for Soldering	300	°C
T_{SOLD}	1.6 mm (0.062 in.) from Case for 10s	260	°C
V_{ISOL}	I_{ISOL} < 1mA, 50/60 Hz, t = 1 minute	4000	V~
F_C	Mounting Force	30..170 / 7..36	Nm/lb-in.
Weight		8	g

Features

- Silicon Chip on Direct-Copper Bond (DCB) Substrate
- Isolated Mounting Surface
- 4000V~ Electrical Isolation
- UL Recognized Package
- High Peak Current Capability
- Low Saturation Voltage
- Molding Epoxies Meet UL 94 V-0 Flammability Classification

Advantages

- High Power Density
- Easy to Mount

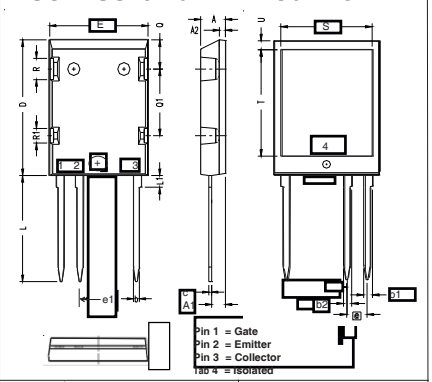
Applications

- Capacitor Discharge
- Pulser Circuits

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
$V_{GE(th)}$	I_C = 10mA, V_{CE} = V_{GE}	5.5		7.0	V
I_{CES}	V_{CE} = V_{CES}, V_{GE} = 0V			100	μA
	Note 2, T_J = 125°C		1.5		mA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±500	nA
$V_{CE(sat)}$	I_C = I_{C110}, V_{GE} = 15V, Note 1		2.4	3.2	V
	T_J = 125°C		3.0		V

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	$I_C = I_{C110}$, V_{CE} = 10V, Note 1	14	24		S
I_{SC}	$I_C = I_{C110}$, V_{CC} = 3400V, V_{CM} < 4000V V_{GE} = 15V, $t_{SC} \le 10\mu s$		200		A
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		6040		pF
C_{oes}			278		pF
C_{res}			120		pF
R_{Gint}			5.2		Ω
$Q_{g(on)}$	$I_C = I_{C110}$, V_{GE} = 15V, V_{CE} = 1000 V		275		nC
Q_{ge}			63		nC
Q_{gc}			134		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C** $I_C = I_{C110}$, V_{GE} = 15V V_{CE} = 2800V, R_G = 33Ω Note 3		160		ns
t_{ri}			100		ns
E_{on}			55		mJ
$t_{d(off)}$			630		ns
t_{fi}			425		ns
E_{off}			165		mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C** $I_C = I_{C110}$, V_{GE} = 15V V_{CE} = 2800V, R_G = 33Ω Note 3		155		ns
t_{ri}			105		ns
E_{on}			85		mJ
$t_{d(off)}$			715		ns
t_{fi}			455		ns
E_{off}			205		mJ
R_{thJC}				0.26	°C/W
R_{thCK}	(Pressure Mount)		0.15		°C/W

ISOPLUS i5-Pak™ HV Outline



SYM	INCHES MIN	INCHES MAX	MILLIMETER MIN	MILLIMETER MAX
A	0.190	0.205	4.83	5.21
A1	0.102	0.118	2.59	3.00
A2	0.046	0.055	1.17	1.40
b	0.045	0.055	1.14	1.40
b1	0.063	0.072	1.60	1.83
b2	0.058	0.068	1.47	1.73
c	0.020	0.029	0.51	0.74
D	1.020	1.040	25.91	26.42
E	0.770	0.799	19.56	20.29
e	0.150 BSC		3.81 BSC	
e1	0.450 BSC		11.43 BSC	
L	0.780	0.820	19.81	20.83
L1	0.080	0.102	2.03	2.59
Q	0.210	0.235	5.33	5.97
Q1	0.490	0.513	12.45	13.03
R	0.150	0.180	3.81	4.57
R1	0.100	0.130	2.54	3.30
S	0.668	0.690	16.97	17.53
T	0.801	0.821	20.34	20.85
U	0.065	0.080	1.65	2.03

Notes:

1. Pulse test, t ≤ 300μs, duty cycle, d ≤ 2%.
2. Part must be heatsunk for high-temp I_{CES} measurement.
3. Switching times & energy losses may increase for higher V_{CE}(Clamp), T_J or R_G.

Fig. 1. Output Characteristics @ T_J = 25ºC

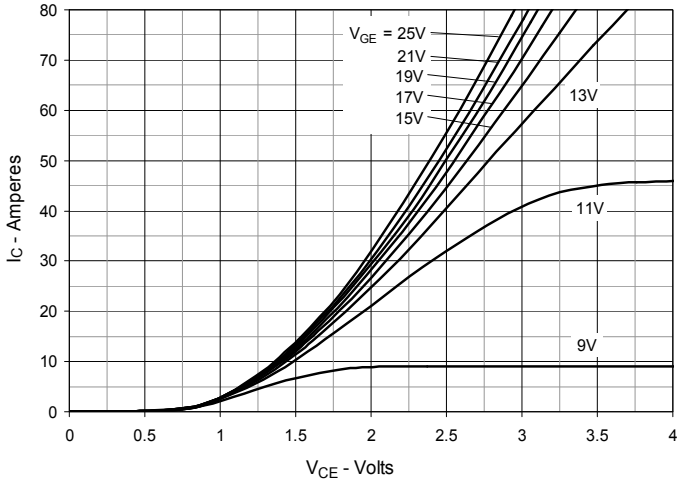


Fig. 2. Extended Output Characteristics @ T_J = 25ºC

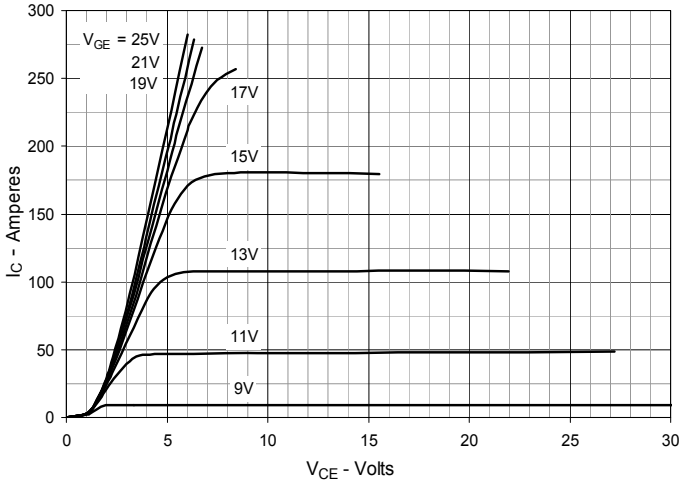


Fig. 3. Output Characteristics @ T_J = 125ºC

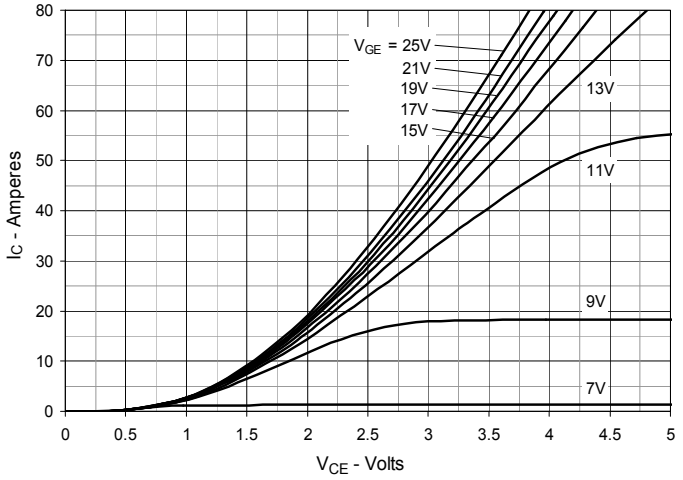


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

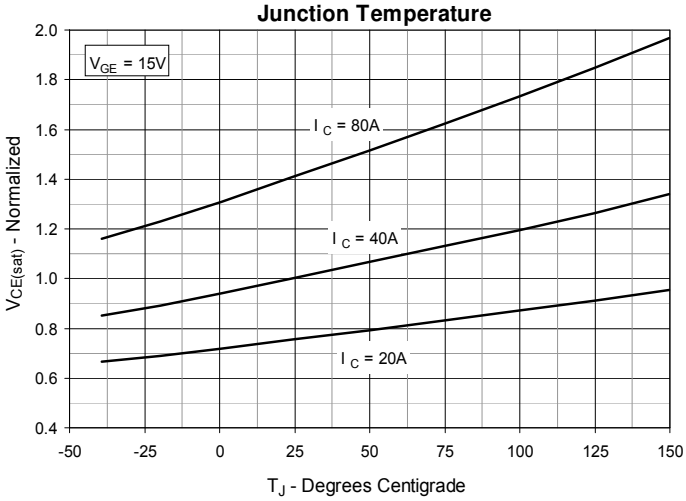


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

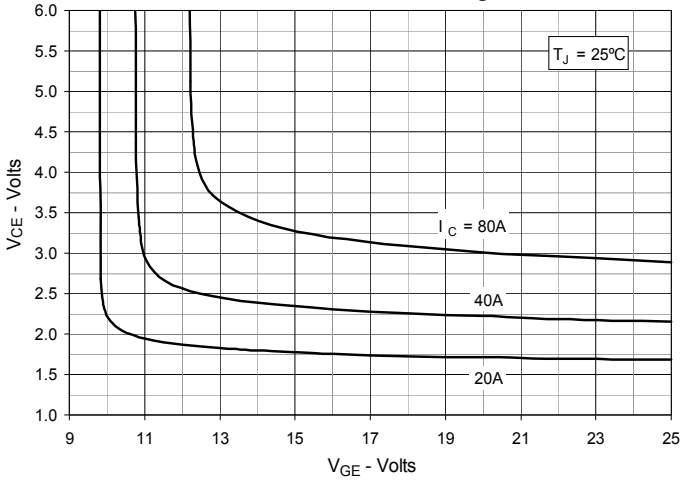


Fig. 6. Input Admittance

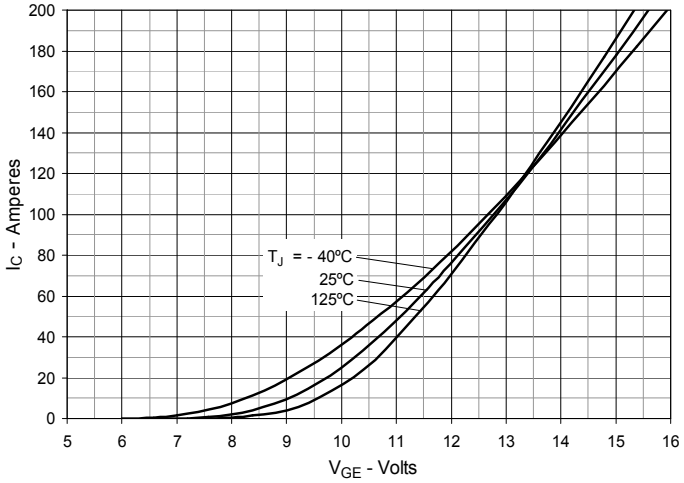


Fig. 7. Transconductance

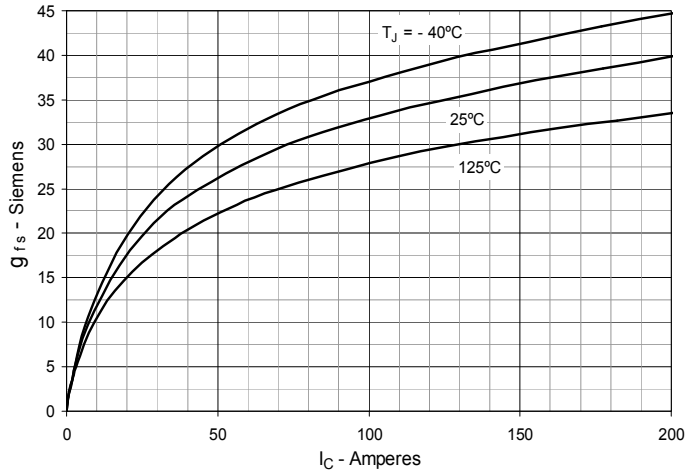


Fig. 8. Gate Charge

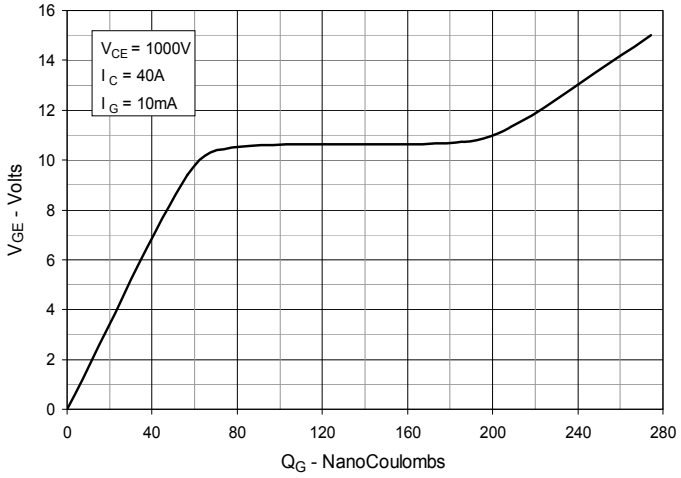


Fig. 9. Capacitance

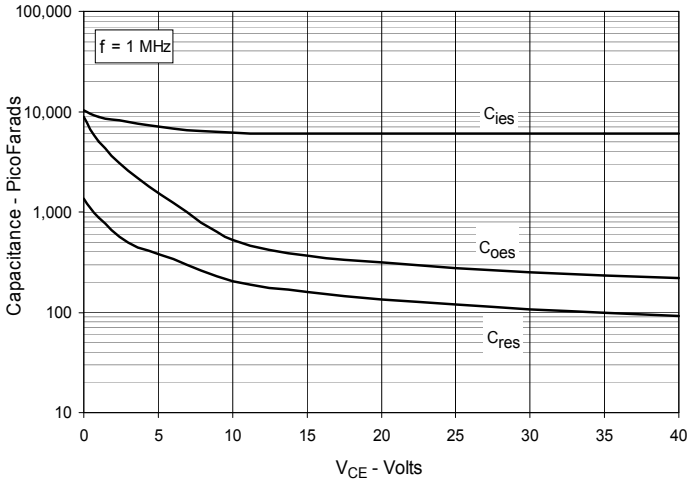


Fig. 10. Reverse-Bias Safe Operating Area

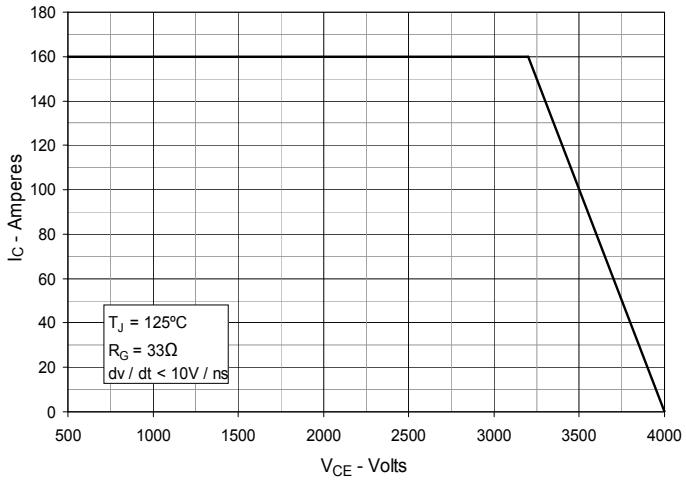


Fig. 11. Maximum Transient Thermal Impedance

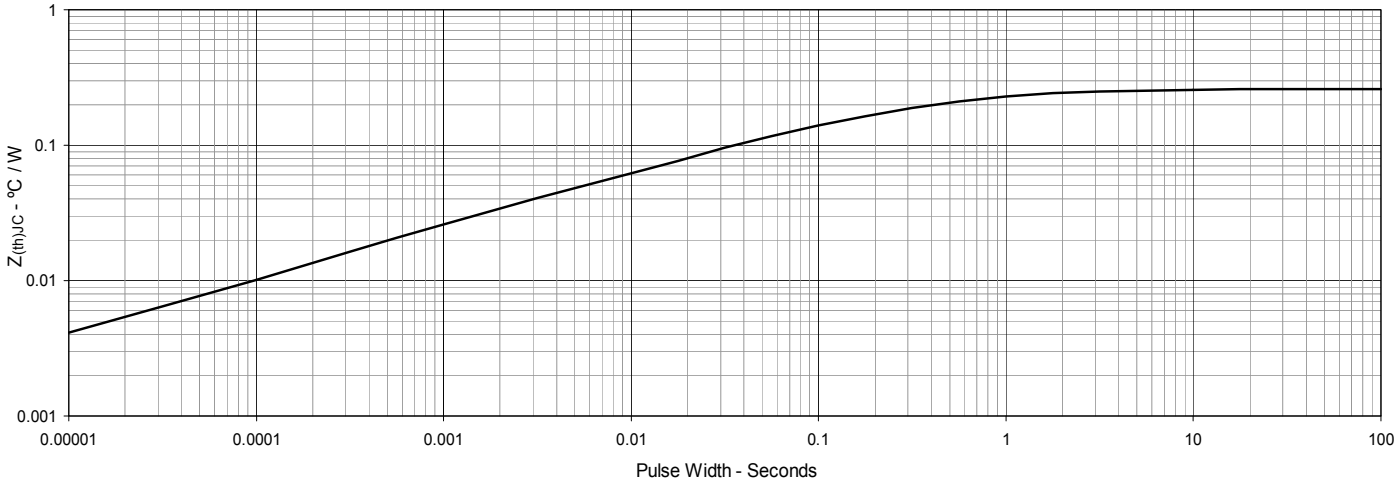


Fig. 12. Typ. Swicthing Characteristics vs. Collector Current

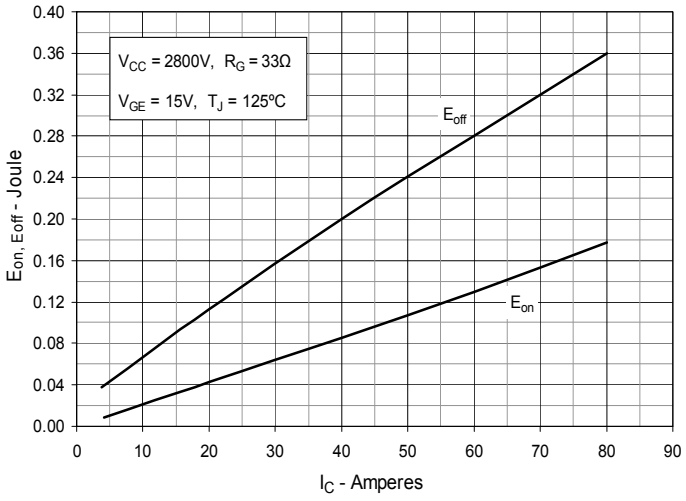


Fig. 13. Typ. Swicthing Characteristics vs. Gate Resistor