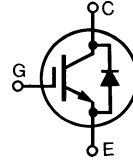


# IGBT

Combi Pack

**IXGA/IXGP12N100U1**  
**IXGA/IXGP12N100AU1**

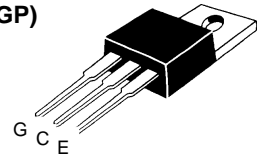
$V_{CES}$	$I_{C25}$	$V_{CE(sat)}$
1000 V	24 A	3.5 V
1000 V	24 A	4.0 V



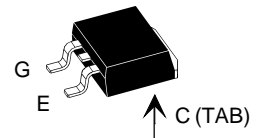
Preliminary Data Sheet

Symbol	Test Conditions	Maximum Ratings	
$V_{CES}$	$T_J = 25^\circ\text{C to } 150^\circ\text{C}$	1000	V
$V_{CGR}$	$T_J = 25^\circ\text{C to } 150^\circ\text{C}; R_{GE} = 1 \text{ M}\Omega$	1000	V
$V_{GES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C25}$	$T_C = 25^\circ\text{C}$	24	A
$I_{C90}$	$T_C = 90^\circ\text{C}$	12	A
$I_{CM}$	$T_C = 25^\circ\text{C}, 1 \text{ ms}$	48	A
<b>SSOA</b> <b>(RBSOA)</b>	$V_{GE} = 15 \text{ V}, T_{VJ} = 125^\circ\text{C}, R_G = 150 \Omega$ Clamped inductive load, $L = 300 \mu\text{H}$	$I_{CM} = 24$ @ $0.8 V_{CES}$	A
$P_C$	$T_C = 25^\circ\text{C}$	100	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 with screw M3 Mounting torque with screw M3.5	0.45/4 0.55/5	Nm/lb.in.
<b>Weight</b>		4	g
Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s		300	$^\circ\text{C}$

**TO-220AB(IXGP)**



**TO-263 AA (IXGA)**



## Features

- International standard packages JEDEC TO-220AB and TO-263AA
- IGBT with antiparallel FRED in one package
- Second generation HDMOS™ process
- Low  $V_{CE(sat)}$ 
  - for minimum on-state conduction losses
- MOS Gate turn-on
  - drive simplicity
- Fast Recovery Expitaxial Diode (FRED)
  - soft recovery with low  $I_{RM}$

## Applications

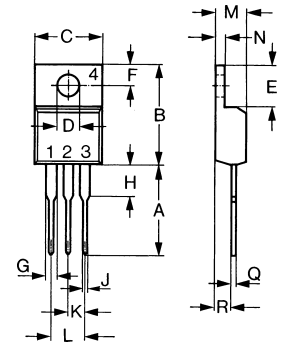
- AC motor speed control
- DC servo and robot drives
- DC choppers
- Uninterruptible power supplies (UPS)
- Switch-mode and resonant-mode power supplies

## Advantages

- Easy to mount with one screw
- Space savings (two devices in one package)
- Reduces assembly time and cost
- High power density

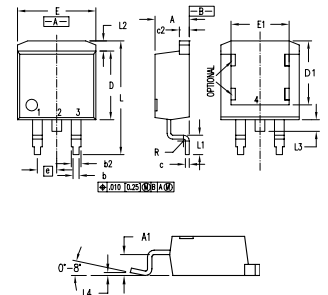
Symbol	Test Conditions	Characteristic Values		
		Min.	Typ.	Max.
$BV_{CES}$	$I_C = 3 \text{ mA}, V_{GE} = 0 \text{ V}$	1000		V
$V_{GE(th)}$	$I_C = 250 \mu\text{A}, V_{GE} = V_{GE}$	2.5		V
$I_{CES}$	$V_{CE} = 0.8, V_{CES}$ $V_{GE} = 0 \text{ V}$	$T_J = 25^\circ\text{C}$		300 $\mu\text{A}$
		$T_J = 125^\circ\text{C}$		3 mA
$I_{GES}$	$V_{CE} = 0 \text{ V}, V_{GE} = \pm 20 \text{ V}$			$\pm 100 \text{ nA}$
$V_{CE(sat)}$	$I_C = I_{CE90}, V_{GE} = 15$	12N100		3.5 V
		12N100A		4.0 V

Symbol	Test Conditions	Characteristic Values		
		Min.	Typ.	Max.
$(T_J = 25^\circ\text{C}, \text{ unless otherwise specified})$				
$g_{fs}$	$I_C = I_{C90}; V_{CE} = 10\text{ V},$ Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $\leq 2\%$	6	10	S
$Q_g$	$I_C = I_{C90}; V_{GE} = 15\text{ V}, V_{CE} = 0.5 V_{CES}$		65	90
$Q_{ge}$			8	20
$Q_{gc}$			24	45
$t_{d(on)}$	<b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b> $I_C = I_{C90}, V_{GE} = 15\text{ V}, L = 300\ \mu\text{H}$ $V_{CE} = 800\text{ V}, R_G = R_{off} = 120\ \Omega$ Remarks: Switching times may increase for $V_{CE} (\text{Clamp}) > 0.8 V_{CES}$ , higher $T_J$ or increased $R_G$		100	ns
$t_{ri}$			200	ns
$t_{d(off)}$			850	1000
$t_{fi}$		12N100A	500	700
		12N100	800	1000
$E_{off}$		12N100A	4	6
$t_{d(on)}$	<b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b> $I_C = I_{C90}, V_{GE} = 15\text{ V}, L = 300\ \mu\text{H}$ $V_{CE} = 800\text{ V}, R_G = R_{off} = 120\ \Omega$ Remarks: Switching times may increase for $V_{CE} (\text{Clamp}) > 0.8 V_{CES}$ , higher $T_J$ or increased $R_G$		100	ns
$t_{ri}$			200	ns
$E_{on}$			1.1	mJ
$t_{d(off)}$		12N100A	900	ns
$t_{fi}$		12N100	950	ns
$E_{off}$		12N100A	8	mJ
		12N100	10	mJ
$R_{thJC}$				1.25
$R_{thCK}$		0.25		K/W

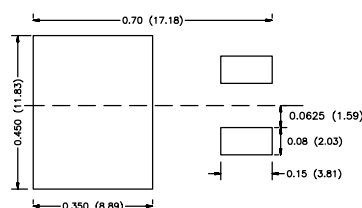
**TO-220 AB (IXGP) Outline**


Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	12.70	13.97	0.500	0.550
B	14.73	16.00	0.580	0.630
C	9.91	10.66	0.390	0.420
D	3.54	4.08	0.139	0.161
E	5.85	6.85	0.230	0.270
F	2.54	3.18	0.100	0.125
G	1.15	1.65	0.045	0.065
H	2.79	5.84	0.110	0.230
J	0.64	1.01	0.025	0.040
K	2.54	BSC	0.100	BSC
M	4.32	4.82	0.170	0.190
N	1.14	1.39	0.045	0.055
Q	0.35	0.56	0.014	0.022
R	2.29	2.79	0.090	0.110

Reverse Diode (FRED)		Characteristic Values		
$(T_J = 25^\circ\text{C}, \text{ unless otherwise specified})$				
Symbol	Test Conditions	Min.	Typ.	Max.
$V_F$	$I_F = 8\text{ A}, V_{GE} = 0\text{ V},$ Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $d \leq 2\%$			2.75
$I_{RM}$	$I_F = I_{C90}, V_{GE} = 0\text{ V}, -di_F/dt = 100\text{ A}/\mu\text{s}$		6.5	A
$t_{rr}$	$V_R = 100\text{ V}, T_J = 125^\circ\text{C}$		140	ns
	$I_F = 1\text{ A}, -di/dt = 50\text{ A}/\mu\text{s}, V_R = 30\text{ V}, T_J = 25^\circ\text{C}$		50	60
$R_{thJC}$				2.5

**TO-263 AA (IXGA) Outline**


Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.06	4.83	.160	.190
A1	2.03	2.79	.080	.110
b	0.51	0.99	.020	.039
b2	1.14	1.40	.045	.055
c	0.46	0.74	.018	.029
c2	1.14	1.40	.045	.055
D	8.64	9.65	.340	.380
D1	7.11	8.13	.280	.320
E	9.65	10.29	.380	.405
E1	6.86	8.13	.270	.320
e	2.54	BSC	.100	BSC
L	14.61	15.88	.575	.625
L1	2.29	2.79	.090	.110
L2	1.02	1.40	.040	.055
L3	1.27	1.78	.050	.070
L4	0	0.38	0	.015
R	0.46	0.74	.018	.029

**Min. Recommended Footprint**


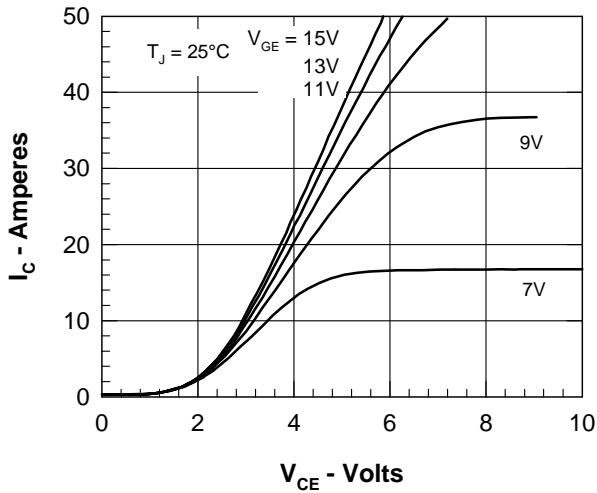


Figure 1. Saturation Voltage Characteristics

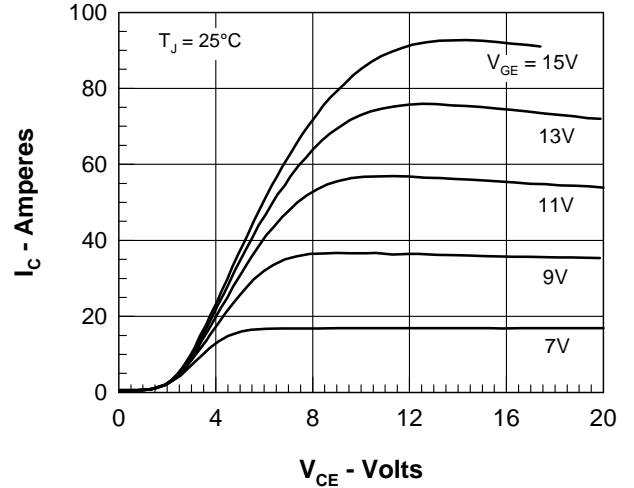


Figure 2. Extended Output Characteristics

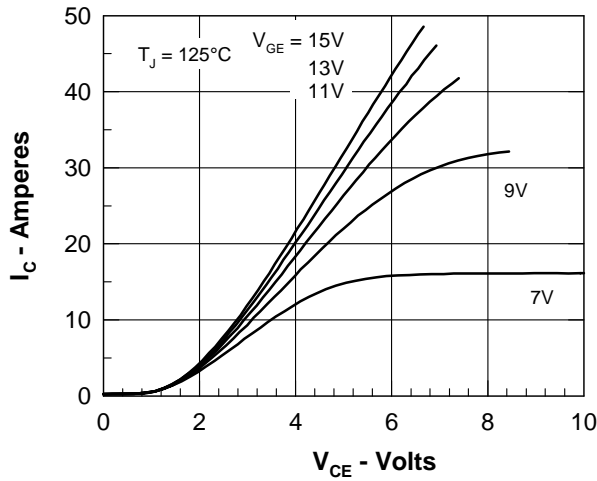


Figure 3. Saturation Voltage Characteristics

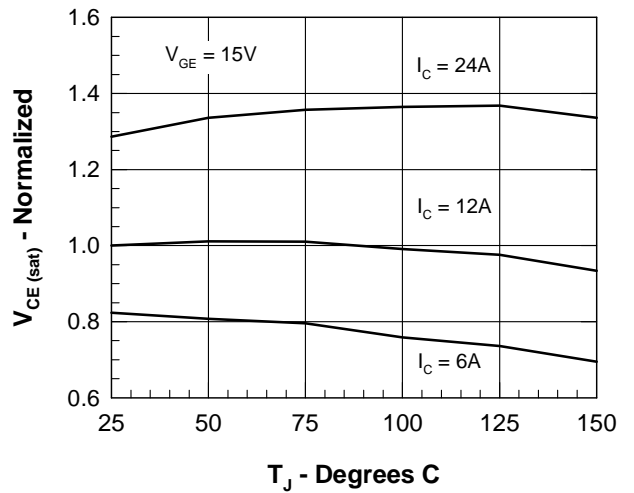


Figure 4. Temperature Dependence of  $V_{CE(sat)}$

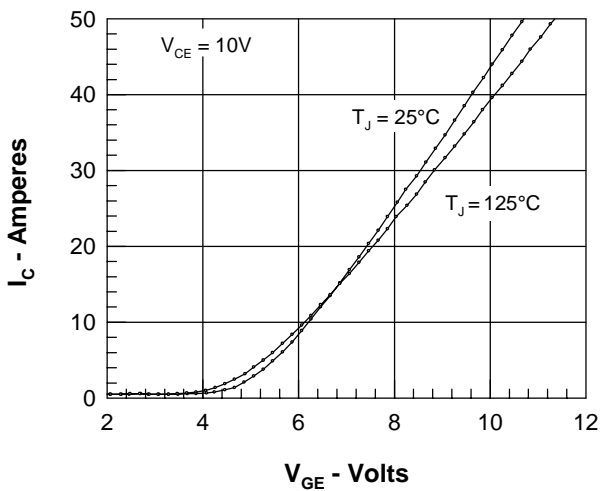


Figure 5. Admittance Curves

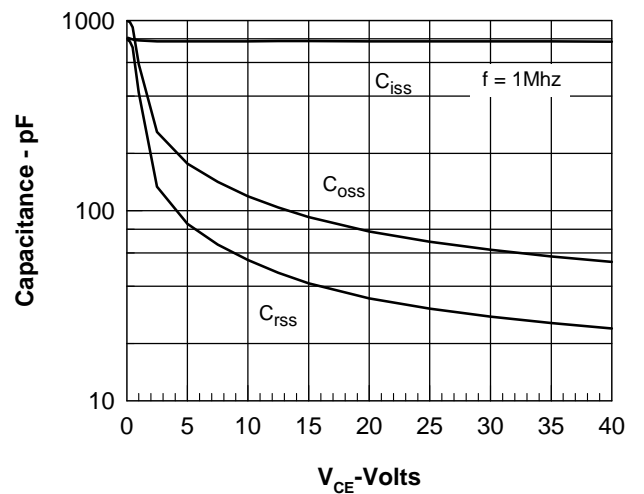


Figure 6. Capacitance Curves

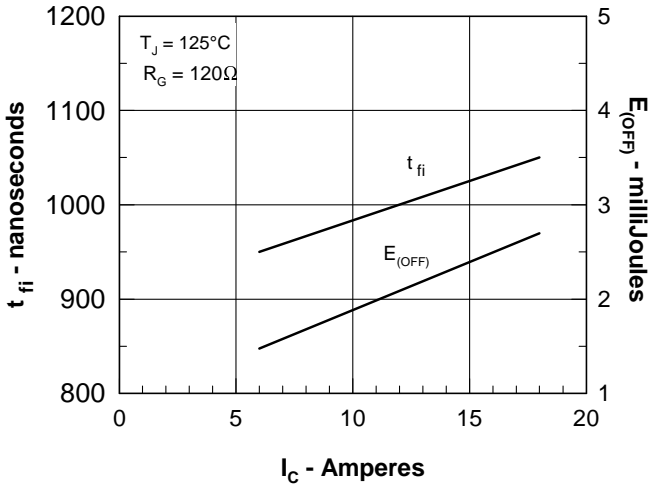


Figure 7. Dependence of  $t_{fi}$  and  $E_{OFF}$  on  $I_C$ .

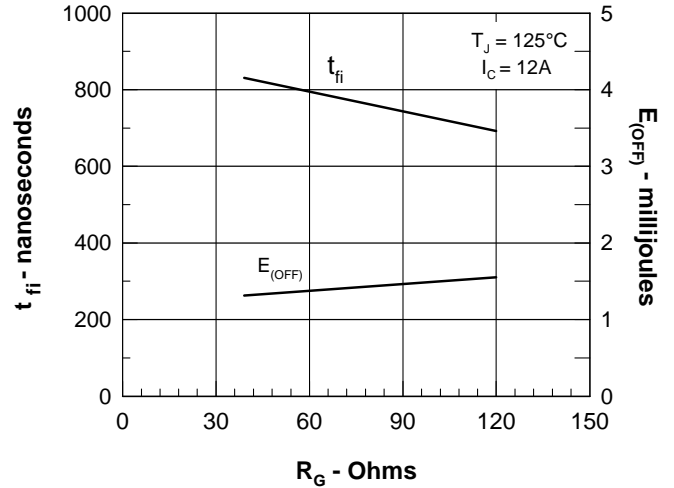


Figure 8. Dependence of  $t_{fi}$  and  $E_{OFF}$  on  $R_G$ .

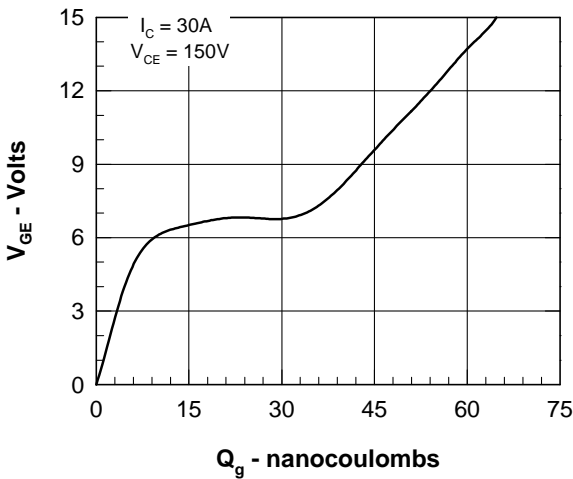


Figure 9. Gate Charge

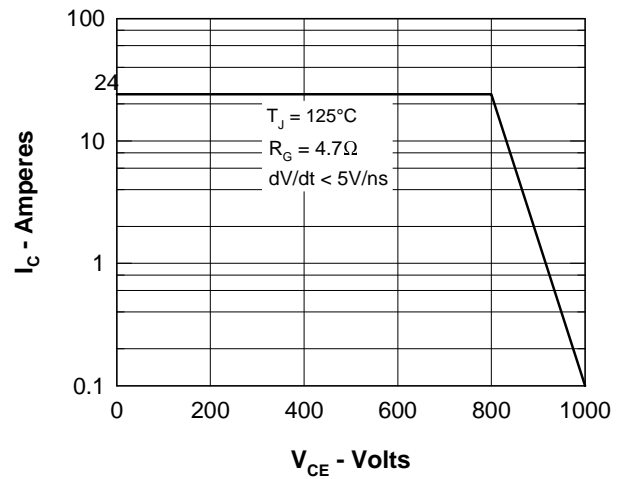


Figure 10. Turn-off Safe Operating Area

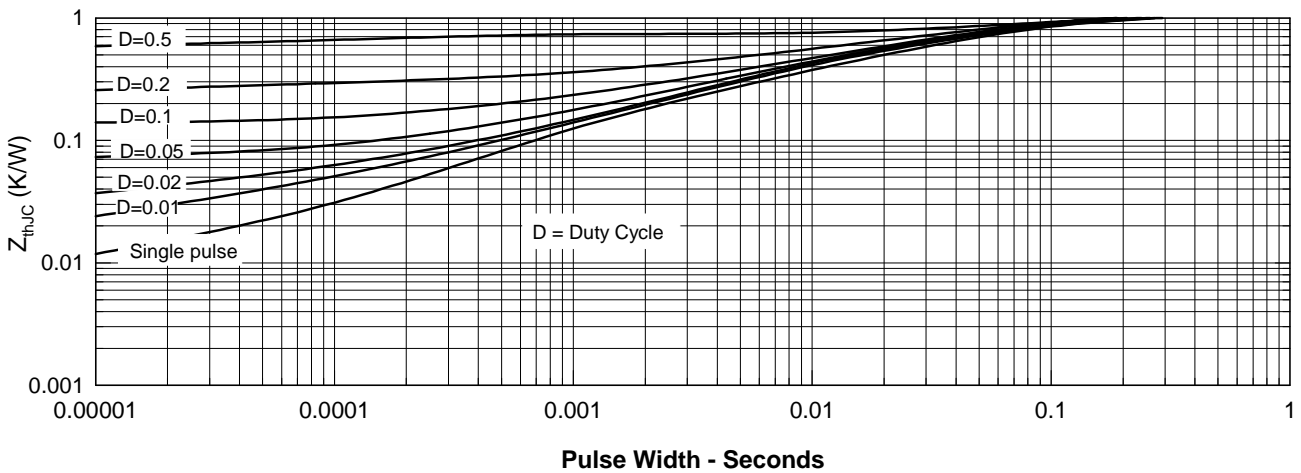


Figure 11. Transient Thermal Resistance



---

Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at [www.littelfuse.com/disclaimer-electronics](http://www.littelfuse.com/disclaimer-electronics).