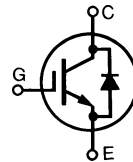


IGBT

Combi Pack

IXGA/IXGP12N100U1
IXGA/IXGP12N100AU1

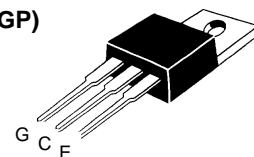


Preliminary Data Sheet

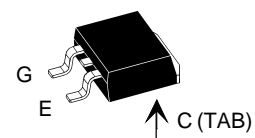
V_{CES}	I_{C25}	$V_{CE(sat)}$
1000 V	24 A	3.5 V
1000 V	24 A	4.0 V

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^{\circ}\text{C}$ to 150°C	1000	V
V_{CGR}	$T_J = 25^{\circ}\text{C}$ to 150°C ; $R_{GE} = 1\text{ M}\Omega$	1000	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 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 ms	48	A
SSOA (RBSOA)	$V_{GE} = 15\text{ V}$, $T_{VJ} = 125^{\circ}\text{C}$, $R_G = 150\ \Omega$ 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		$-55 \dots +150$	$^{\circ}\text{C}$
T_{JM}		150	$^{\circ}\text{C}$
T_{stg}		$-55 \dots +150$	$^{\circ}\text{C}$
M_d	Mounting torque with screw M3 Mounting torque with screw M3.5	0.45/4 0.55/5	Nm/lb.in.
Weight		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

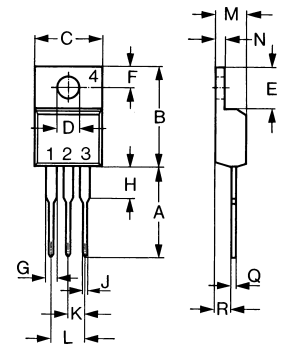
Advantages

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

Symbol	Test Conditions ($T_J = 25^{\circ}\text{C}$, unless otherwise specified)	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}	$T_J = 25^{\circ}\text{C}$		300 μA
	$V_{GE} = 0\text{ V}$	$T_J = 125^{\circ}\text{C}$		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.
g_{fs}	$I_C = I_{C90}; V_{CE} = 10\text{ V}$, Pulse test, $t \leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$	6	10	S
Q_g	$I_C = I_{C90}; V_{GE} = 15\text{ V}$, $V_{CE} = 0.5\text{ V}_{CES}$		65	90 nC
Q_{ge}			8	20 nC
Q_{gc}			24	45 nC
$t_{d(on)}$	Inductive load, $T_J = 25^\circ\text{C}$ $I_C = I_{C90}$, $V_{GE} = 15\text{ V}$, $L = 300\text{ }\mu\text{H}$ $V_{CE} = 800\text{ V}$, $R_G = R_{off} = 120\text{ }\Omega$ Remarks: Switching times may increase for $V_{CE}(\text{Clamp}) > 0.8\text{ V}_{CES}$, higher T_J or increased R_G		100	ns
t_{ri}			200	ns
$t_{d(off)}$			850	1000 ns
t_{fi}		12N100A	500	700 ns
		12N100	800	1000 ns
E_{off}		12N100A	4	6 mJ
$t_{d(on)}$	Inductive load, $T_J = 125^\circ\text{C}$ $I_C = I_{C90}$, $V_{GE} = 15\text{ V}$, $L = 300\text{ }\mu\text{H}$ $V_{CE} = 800\text{ V}$, $R_G = R_{off} = 120\text{ }\Omega$ Remarks: Switching times may increase for $V_{CE}(\text{Clamp}) > 0.8\text{ V}_{CES}$, 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
		12N100A	1250	ns
E_{off}		12N100A	8	mJ
		12N100	10	mJ
R_{thJC}				1.25 K/W
R_{thCK}			0.25	K/W

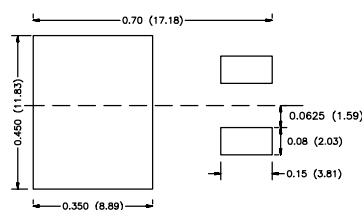
TO-220 AB (IXGP) Outline



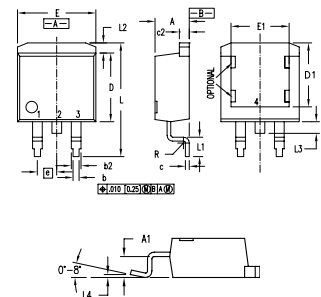
Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	12.70	13.97	0.500	0.550
B	14.73	16.00	0.580	0.630
C	9.91	10.66	0.390	0.420
D	3.54	4.08	0.139	0.161
E	5.85	6.85	0.230	0.270
F	2.54	3.18	0.100	0.125
G	1.15	1.65	0.045	0.065
H	2.79	5.84	0.110	0.230
J	0.64	1.01	0.025	0.040
K	2.54	BSC	0.100	BSC
M	4.32	4.82	0.170	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°C, unless otherwise specified)		Min.	Typ.	Max.
Symbol	Test Conditions			
V_F	$I_F = 8\text{ A}$, $V_{GE} = 0\text{ V}$, Pulse test, $t \leq 300\text{ }\mu\text{s}$, duty cycle $d \leq 2\%$			2.75 V
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
	$I_F = 1\text{ A}$, $-di_F/dt = 50\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$, $T_J = 25^\circ\text{C}$		50	60 ns
R_{thJC}				2.5 K/W

Min. Recommended Footprint



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

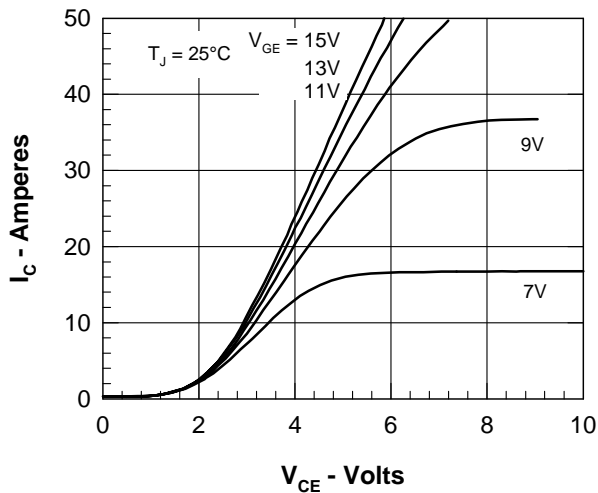


Figure 1. Saturation Voltage Characteristics

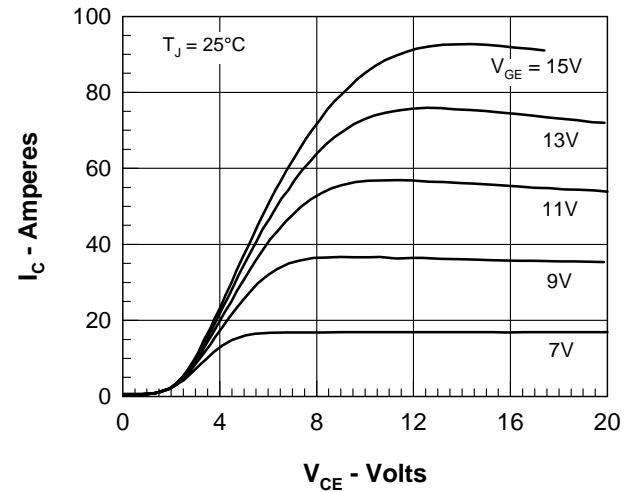


Figure 2. Extended Output Characteristics

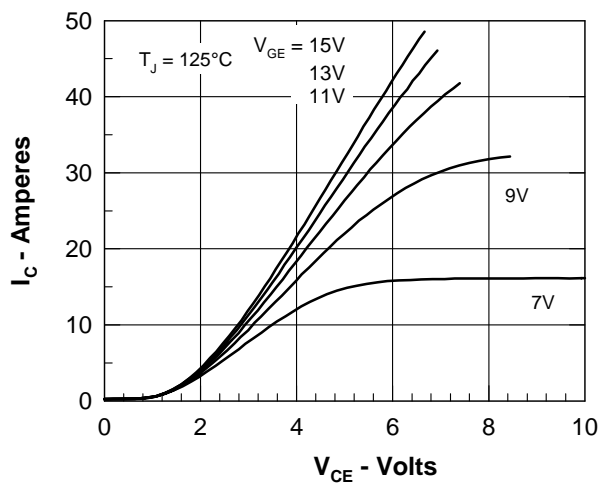


Figure 3. Saturation Voltage Characteristics

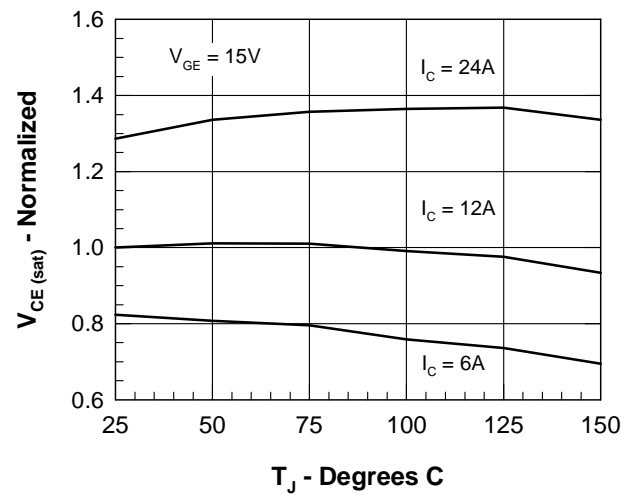


Figure 4. Temperature Dependence of $V_{CE(sat)}$

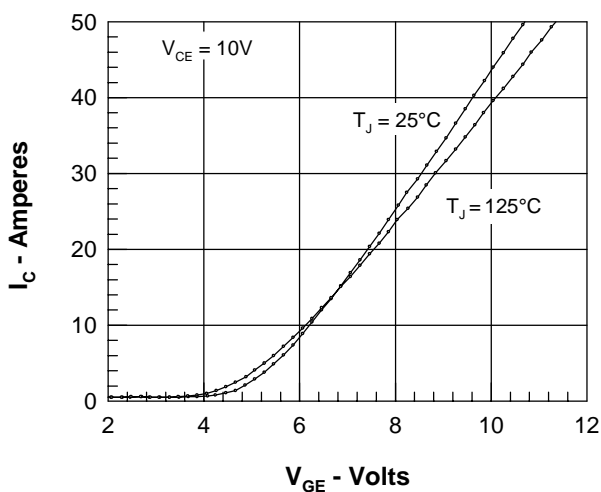


Figure 5. Admittance Curves

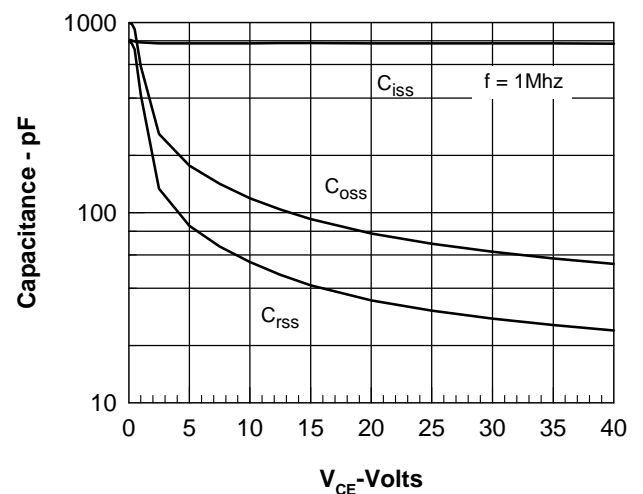


Figure 6. Capacitance Curves

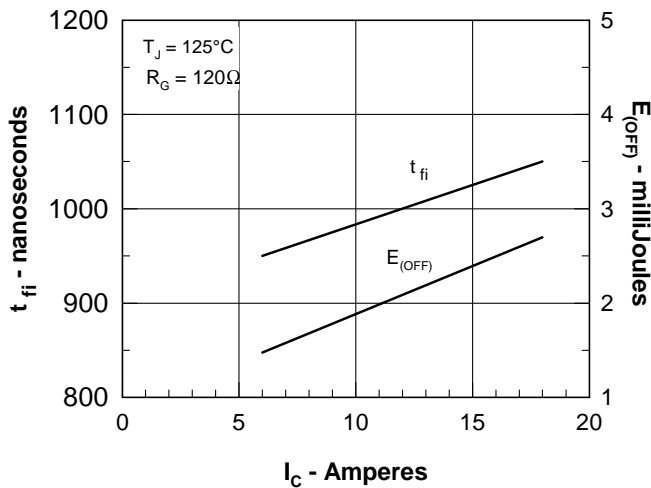
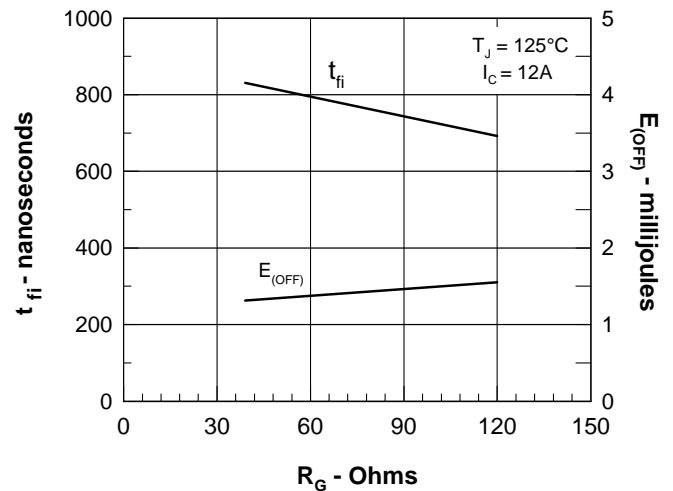
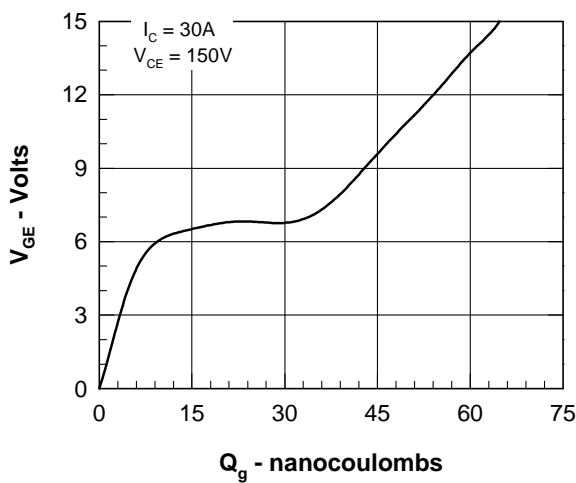

Figure 7. Dependence of t_{fi} and E_{OFF} on I_C .

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


Figure 9. Gate Charge

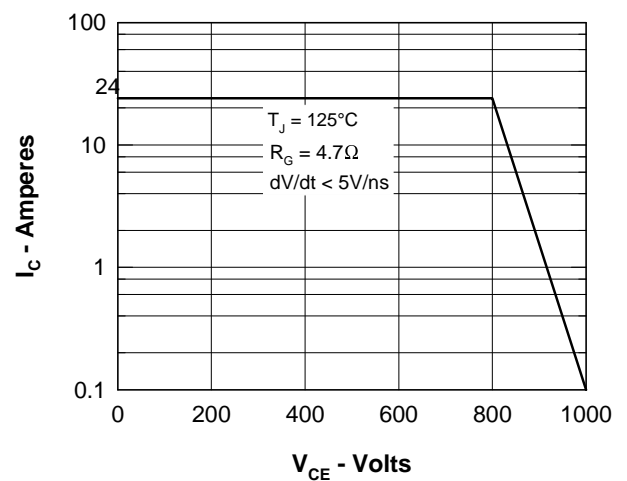


Figure 10. Turn-off Safe Operating Area

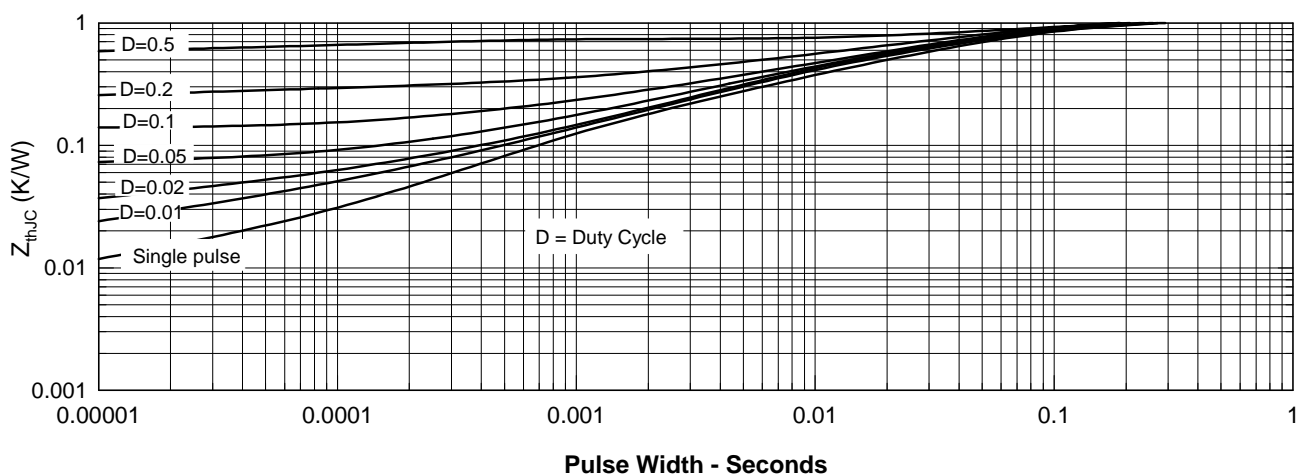


Figure 11. Transient Thermal Resistance