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[IXGR60N60U1](#)

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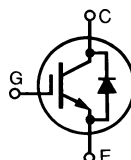
sales@integrated-circuit.com



Low $V_{CE(sat)}$ IGBT with Diode ISOPLUS247™ (Electrically Isolated Back Surface)

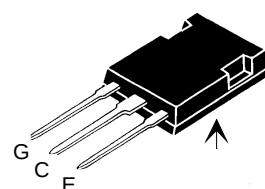
$$\begin{aligned} V_{CES} &= 600 \text{ V} \\ I_{C25} &= 75 \text{ A} \\ V_{CE(sat)} &= 1.7 \text{ V} \end{aligned}$$

Preliminary data



Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^\circ\text{C}$ to 150°C	600	V
V_{CGR}	$T_J = 25^\circ\text{C}$ to 150°C ; $R_{GE} = 1 \text{ M}\Omega$	600	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^\circ\text{C}$	75	A
I_{C100}	$T_C = 90^\circ\text{C}$	60	A
I_{CM}	$T_C = 25^\circ\text{C}$, 1 ms	200	A
SSOA (RBSOA)	$V_{GE} = 15 \text{ V}$, $T_{VJ} = 125^\circ\text{C}$, $R_G = 10 \Omega$ Clamped inductive load; $V_{CL} = 0.8 V_{CES}$	$I_{CM} = 100$	A
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	$^\circ\text{C}$
T_L	1.6 mm (0.062 in.) from case for 10 s	300	$^\circ\text{C}$
V_{ISOL}	50/60Hz, RMS, t = 1minute, leads-to tab	2500	V
Weight		5	g

ISOPLUS247™



Isolated back surface*

G = Gate, C = Collector,
E = Emitter, TAB = Collector

* Patent pending

Features

- Silicon chip on Direct-Copper-Bond substrate
 - High power dissipation
 - Isolated mounting surface
 - 2500V electrical isolation
- Low collector to tab capacitance (<25pF)
- Rugged polysilicon gate cell structure
- Fast intrinsic Rectifier
- Low $V_{CE(sat)}$ IGBT and standard diode for minimum on-state conduction losses
- MOS Gate turn-on for drive simplicity

Applications

- Solid state relays
- Capacitor discharge circuits
- High power ignition circuits

Advantages

- Space savings (two devices in one package)
- Reduces assembly time and cost
- High power density

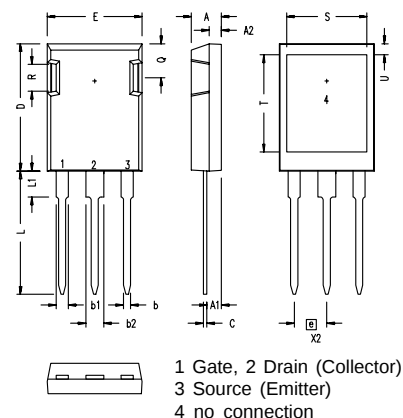
Symbol	Test Conditions	Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified)		
		min.	typ.	max.
BV_{CES}	$I_C = 1 \text{ mA}$, $V_{GE} = 0 \text{ V}$	600		V
$V_{GE(th)}$	$I_C = 250 \mu\text{A}$, $V_{CE} = V_{GE}$	2.5		5.5 V
I_{CES}	$V_{CE} = V_{CES}$ $V_{GE} = 0 \text{ V}$			250 μA 2 mA
I_{GES}	$V_{CE} = 0 \text{ V}$, $V_{GE} = \pm 20 \text{ V}$			$\pm 100 \text{ nA}$
$V_{CE(sat)}$	$I_C = I_{C100}$, $V_{GE} = 15 \text{ V}$			1.7 V

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Symbol	Test Conditions	Characteristic Values (T _J = 25°C, unless otherwise specified)		
		min.	typ.	max.
g_{fs}	I _C = I _{C100} ; V _{CE} = 10 V, Pulse test, t ≤ 300 μs, duty cycle ≤ 2 %	30	40	S
C_{ies} C_{oes} C_{res}	V _{CE} = 25 V, V _{GE} = 0 V, f = 1 MHz		4000	pF
			340	pF
			100	pF
Q_g Q_{ge} Q_{gc}	I _C = I _{C100} , V _{GE} = 15 V, V _{CE} = 0.5 V _{CES}		200	nC
			35	nC
			80	nC
t_{d(on)} t_{ri} t_{d(off)} t_{fi} E_{off}	Inductive load, T_J = 25°C I _C = I _{C100} , V _{GE} = 15 V, L = 100 μH, V _{CE} = 0.8 V _{CES} , R _G = R _{off} = 2.7 Ω Remarks: Switching times may increase for V _{CE} (Clamp) > 0.8 • V _{CES} , higher T _J or increased R _G		50	ns
			200	ns
			600	800 ns
			500	700 ns
			16	mJ
t_{d(on)} t_{ri} t_{d(off)} t_{fi} E_{off}	Inductive load, T_J = 125°C I _C = I _{C100} , V _{GE} = 15 V, L = 100 μH V _{CE} = 0.8 V _{CES} , R _G = R _{off} = 2.7 Ω Remarks: Switching times may increase for V _{CE} (Clamp) > 0.8 • V _{CES} , higher T _J or increased R _G		50	ns
			240	ns
			1000	ns
			1000	ns
			26	mJ
R_{thJC} R_{thCK}				0.5 K/W K/W

ISOPLUS 247 (IXGR) OUTLINE



Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.83	5.21	.190	.205
A ₁	2.29	2.54	.090	.100
A ₂	1.91	2.16	.075	.085
b	1.14	1.40	.045	.055
b ₁	1.91	2.13	.075	.084
b ₂	2.92	3.12	.115	.123
C	0.61	0.80	.024	.031
D	20.80	21.34	.819	.840
E	15.75	16.13	.620	.635
e	5.45	BSC	.215	BSC
L	19.81	20.32	.780	.800
L1	3.81	4.32	.150	.170
Q	5.59	6.20	.220	.244
R	4.32	4.83	.170	.190
S	13.21	13.72	.520	.540
T	15.75	16.26	.620	.640
U	1.65	3.03	.065	.080

Reverse Diode		Characteristic Values (T _J = 25°C, unless otherwise specified)		
Symbol	Test Conditions	min.	typ.	max.
V_F	I _F = I _{C100} , V _{GE} = 0 V, Pulse test, t ≤ 300 μs, duty cycle d ≤ 2 %			2.2 V
R_{thJC}				1.0 K/W

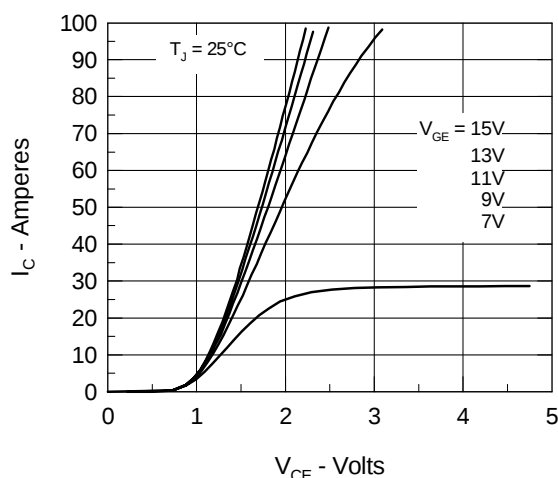


Figure 1. Saturation Voltage Characteristics

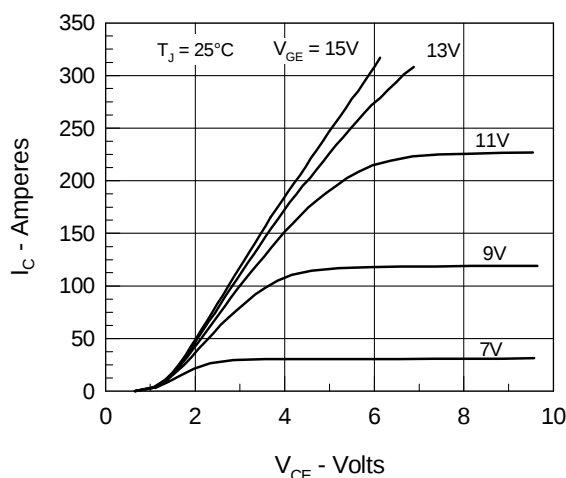


Figure 2. Extended Output Characteristics

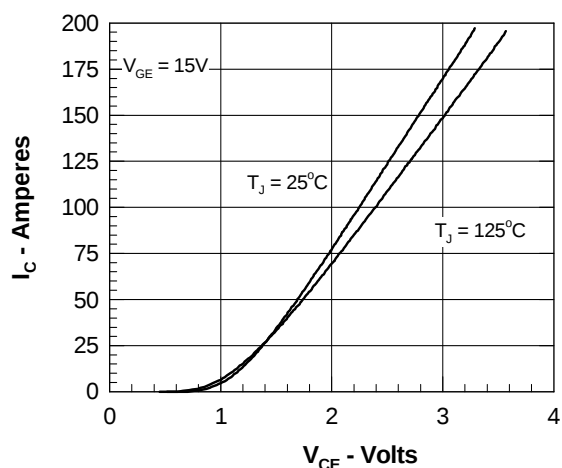


Figure 3. Saturation Voltage Characteristics

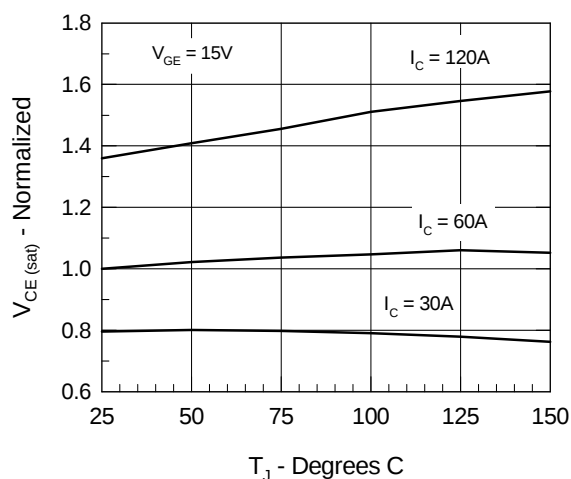


Figure 4. Temperature Dependence of $V_{CE(sat)}$

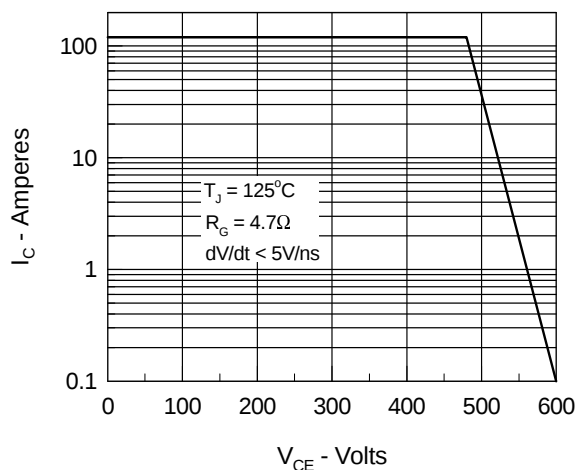


Figure 5. Admittance Curves

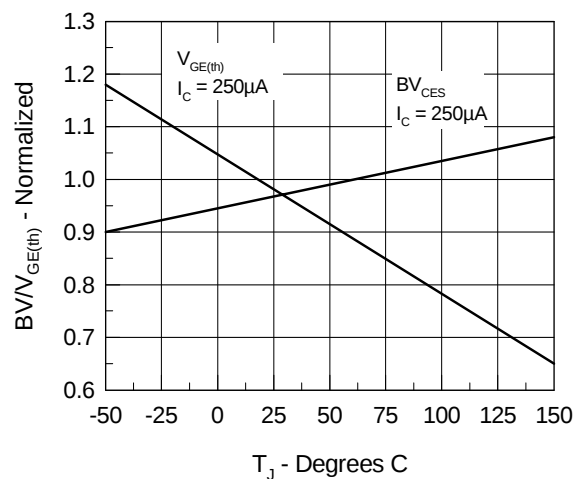


Figure 6. Capacitance Curves

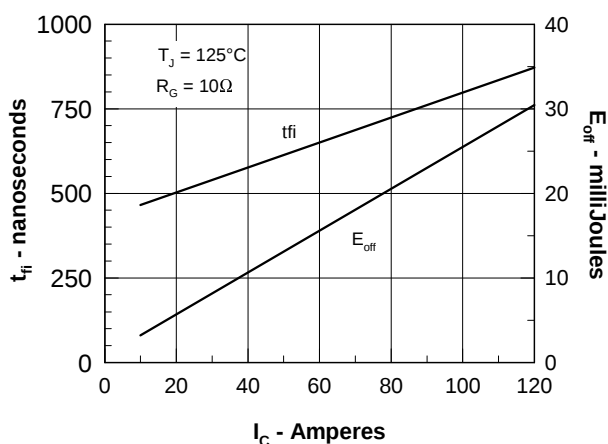


Figure 7. Dependence of E_{ON} and E_{OFF} on I_C .

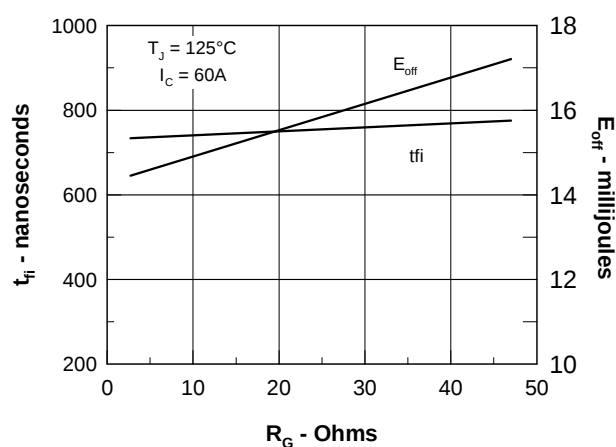


Figure 8. Dependence of E_{ON} and E_{OFF} on R_G .

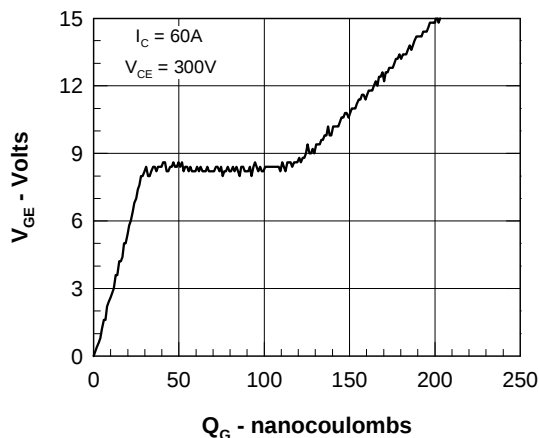


Figure 9. Gate Charge

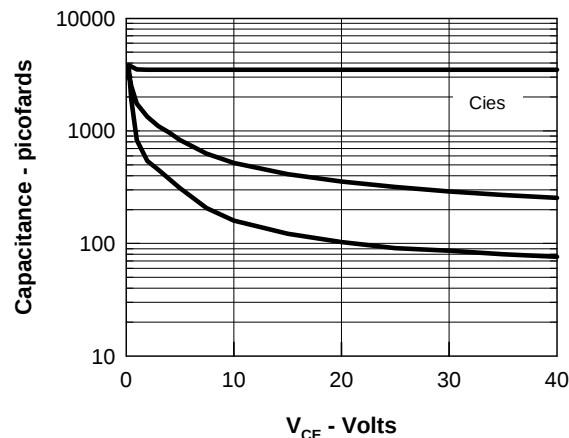


Figure 10. Turn-off Safe Operating Area

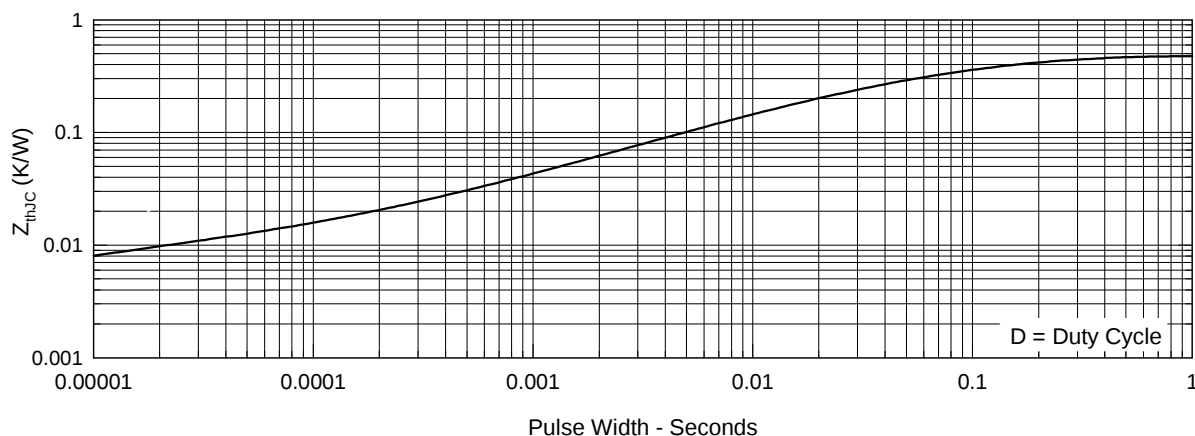


Figure 11. IGBT Transient Thermal Resistance

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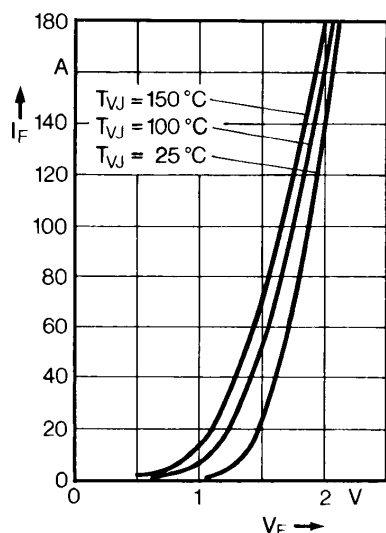


Fig. 12 Forward current versus voltage drop.

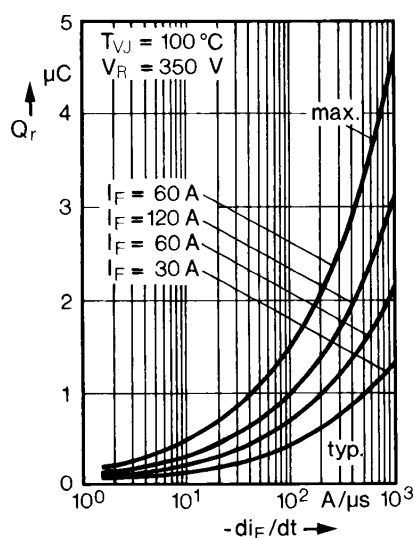


Fig. 13 Recovery charge versus $-di_F/dt$.

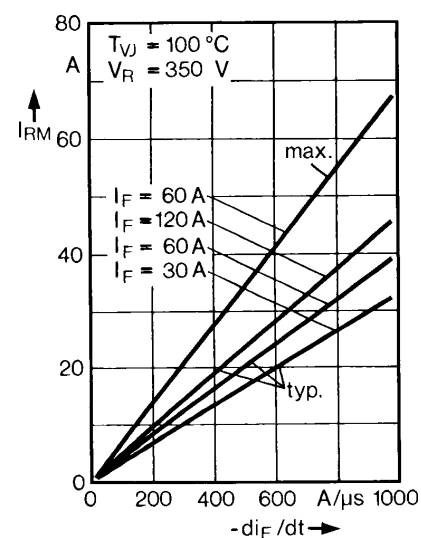


Fig. 14 Peak reverse current versus $-di_F/dt$.

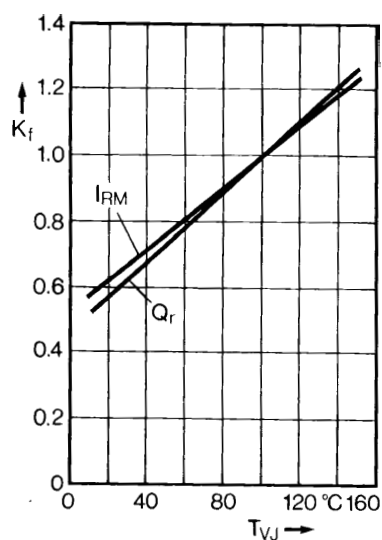


Fig. 15. Dynamic parameters versus junction temperature.

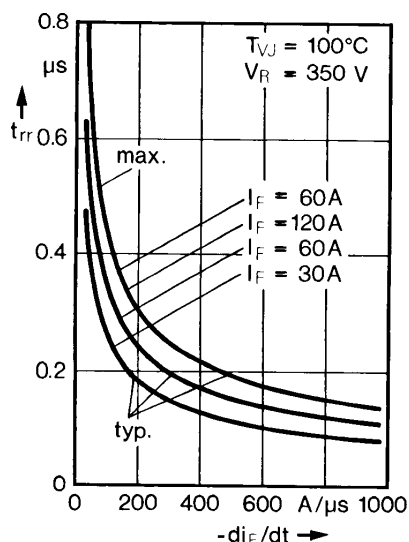


Fig. 16 Recovery time versus $-di_F/dt$.

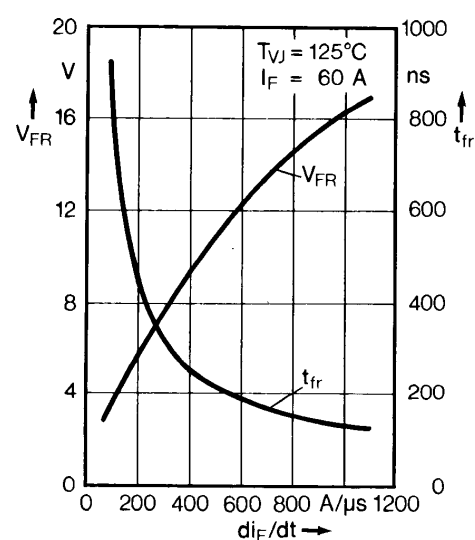


Fig. 17 Peak forward voltage vs. di_F/dt .

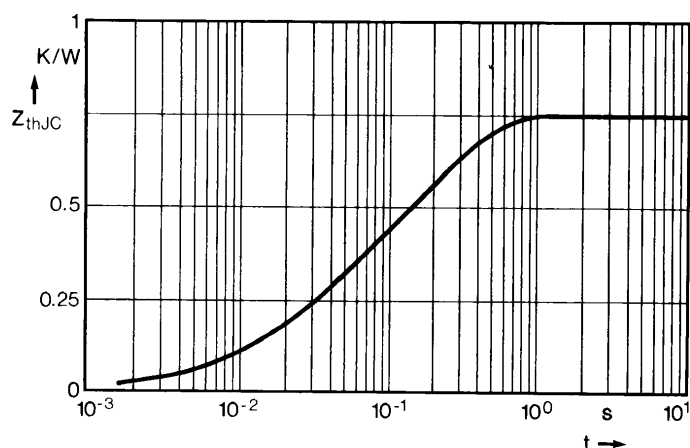


Fig. 18 Transient thermal impedance junction to case.