

General Description:

Using advanced IGBT technology, the 600V IGBT. Offers superior conduction and switching performances.

Lead Free Package and Finish

V_{CES}	$V_{CE(sat)}$	I_C
600V	2.0V	15A

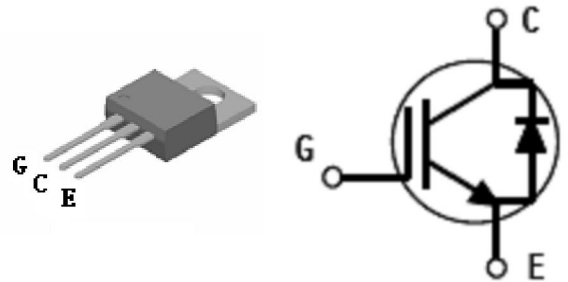
Features:

● Low saturation voltage: $V_{CE(sat),typ}=2.0V @I_C=15A$, and $T_C = 25^{\circ}C$;

● RoHS Compliant;

Applications:

- Inverter welder
- Solar inverters
- UPS
- High switching frequency inverter



Ordering Information

Part Number	Package	Brand
IGP15N60F	TO-220	IPS

Absolute Maximum Ratings (Ta= 25°C, unless otherwise specified)

Symbol	Parameter	Rating	Units
V_{CES}	Collector-Emitter Voltage	600	V
V_{GES}	Gate- Emitter Voltage	± 20	V
I_C	Collector Current	30	A
	Collector Current @ $T_C=100^{\circ}C$	15	
I_{CM}^{a1}	Pulsed Collector Current @ $T_C=25^{\circ}C$	45	A
I_F	Diode Continuous Forward Current@ $T_C=100^{\circ}C$	10	A
I_{FM}	Diode Maximum Forward Current	30	A
P_D	Power Dissipation @ $T_C=25^{\circ}C$	100	W
	Power Dissipation @ $T_C=100^{\circ}C$	40	
	Power Dissipation @ $T_A=25^{\circ}C$	2.0	
T_J	Operating Junction	150	$^{\circ}C$
T_{stg}	Storage Temperature Range	-55~150	$^{\circ}C$
T_L	Maximum Temperature for Soldering	270	$^{\circ}C$

a1: Repetitive rating; pulse width limited by maximum junction temperature



IGP15N60F

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Thermal Resistance, Junction to case for IGBT	--	1.25	$^{\circ}C/W$
$R_{\theta JC}$	Thermal Resistance, Junction to case for Diode	--	2.50	$^{\circ}C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	--	62.5	$^{\circ}C/W$

Electrical Characteristics of the IGBT ($T_a = 25^{\circ}C$, unless otherwise specified)

Symbol	Parameter	Test Conditions	Rating			Units
			Min	Typ.	Max.	
OFF Characteristics						
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	$V_{GE}=0V, I_{CE}=250\mu A$	600	--	--	V
I_{CES}	Collector-Emitter Leakage Current	$V_{GE}=0V, V_{CE}=600V$	--	--	1.0	mA
$I_{GES(F)}$	Gate to Emitter Forward Leakage	$V_{GE}=+20V$	--	--	+250	nA
$I_{GES(R)}$	Gate to Source Reverse Leakage	$V_{GE}=-20V$	--	--	-250	nA
ON Characteristics						
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=15A, V_{GE}=15V$	--	2.0	2.6	V
$V_{GE(th)}$	Gate Threshold Voltage	$I_C=1mA, V_{CE}=V_{GE}$	5.0	6.0	7.0	V
Pulse width $t_p \leq 380\mu s, \delta \leq 2\%$						
Dynamic Characteristics						
C_{ies}	Input Capacitance	$V_{CE}=30V, V_{GE}=0V$ $f=1MHz$	--	675	--	pF
C_{oes}	Output Capacitance		--	80	--	
C_{res}	Reverse Transfer Capacitance		--	18.5	--	
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	$V_{CE}=400V, I_C=15A,$ $R_g=10\Omega, V_{GE}=15V,$ Inductive Load, $T_a=25^{\circ}C,$	--	25.8	--	ns
t_r	Rise Time		--	19.0	--	
$t_{d(off)}$	Turn-Off Delay Time		--	57.6	--	
t_f	Fall Time		--	32	--	
E_{on}	Turn-On Switching Loss		--	0.761	--	mJ
E_{off}	Turn-Off Switching Loss		--	0.081	--	
E_{ts}	Total Switching Loss		--	0.842	--	
Q_g	Total Gate Charge	$V_{CE}=400V, I_C=15A$ $V_{GE}=15V,$	--	33	--	nC
Q_{ge}	Gate to Emitter Charge		--	7.8	--	
Q_{gc}	Gate to Collector Charge		--	16	--	
Electrical Characteristics of the Diode						
V_F	Diode Forward Voltage	$I_F=10A$	--	1.3	2.1	V
T_{rr}	Reverse Recovery Time	$I_F=10A$ $di/dt=100A/\mu s$	--	88	--	ns
I_{rr}	Diode Peak Reverse Recovery Current		--	3.0	--	A
Q_{rr}	Reverse Recovery Charge		--	132	--	nC

Characteristics Curve:

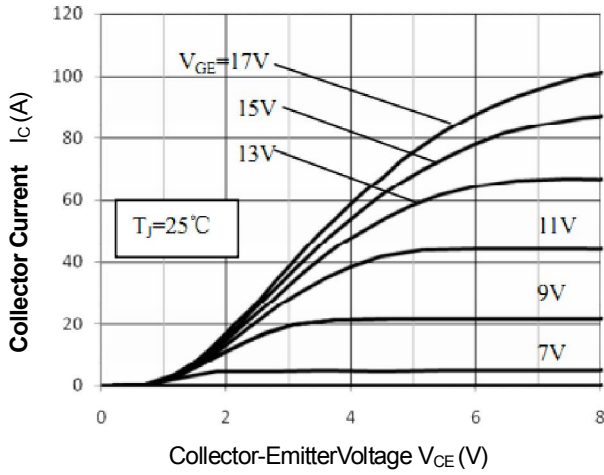


Figure 1. Typical Output Characteristics

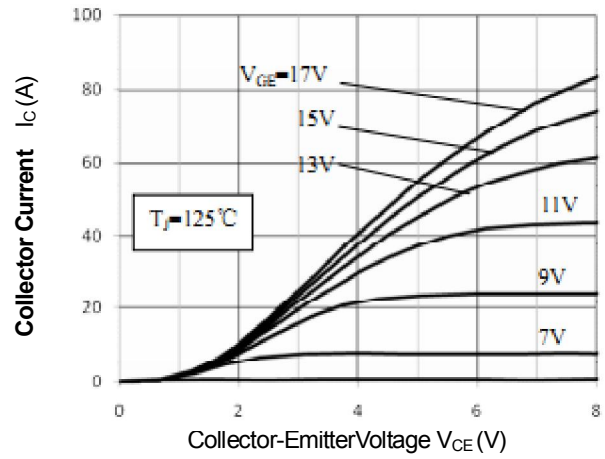


Figure 2. Typical Output Characteristics

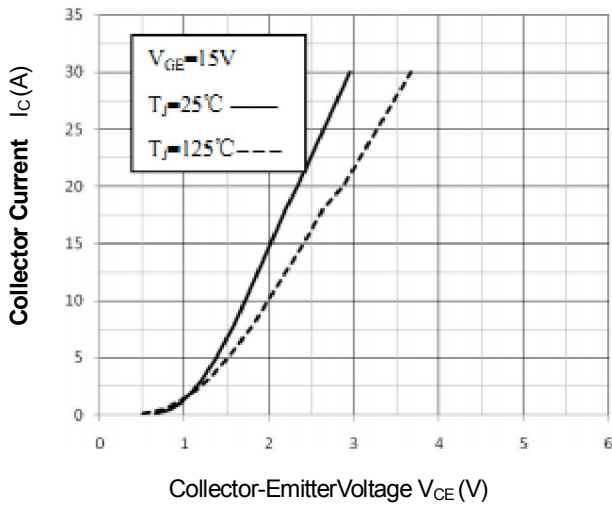


Figure 3. Saturation Voltage Characteristics

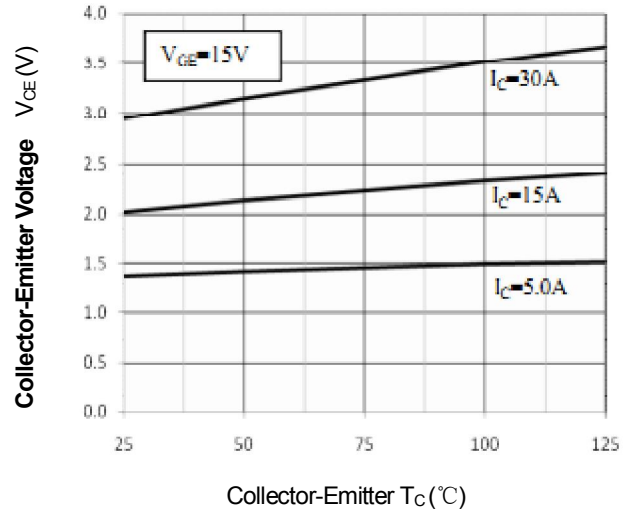


Figure 4. Saturation Voltage - T_c Characteristics

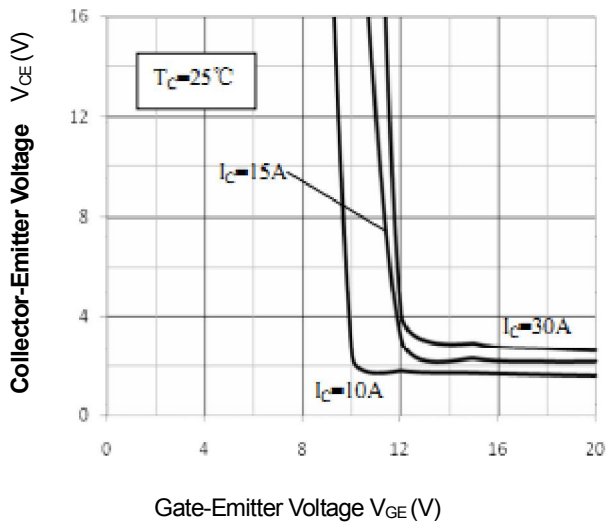


Figure 5. $V_{CE(sat)}$ - V_{GE} Characteristics

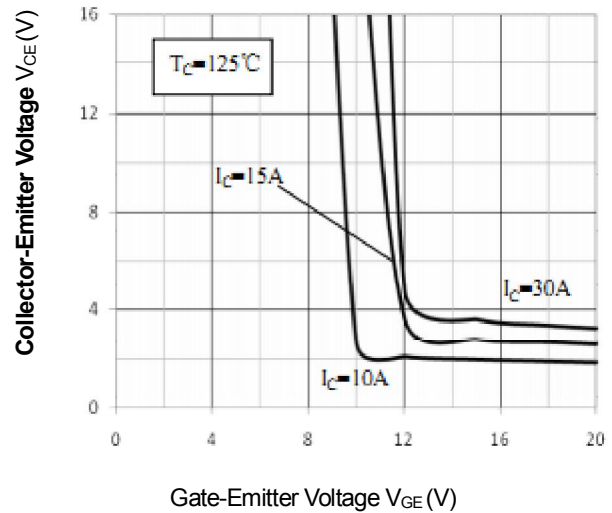


Figure 6. $V_{CE(sat)}$ - V_{GE} Characteristics

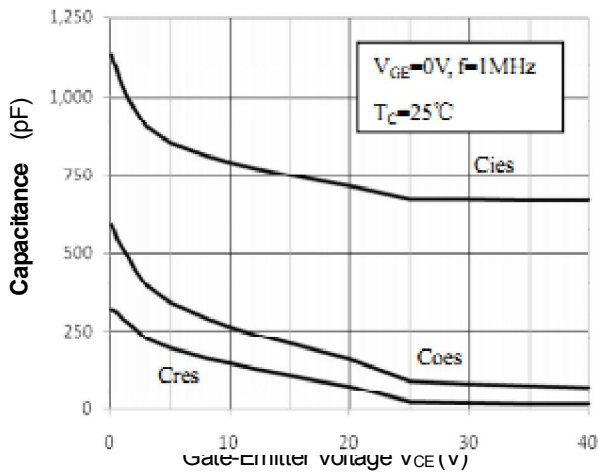


Figure 7. Capacitance Characteristics

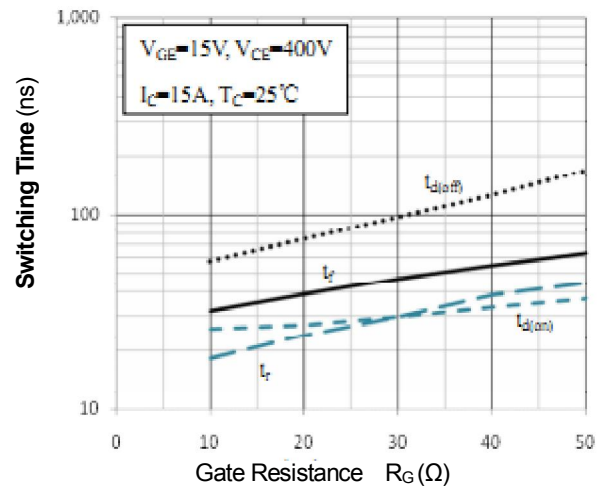


Figure 8. Switching Time— R_G Characteristics

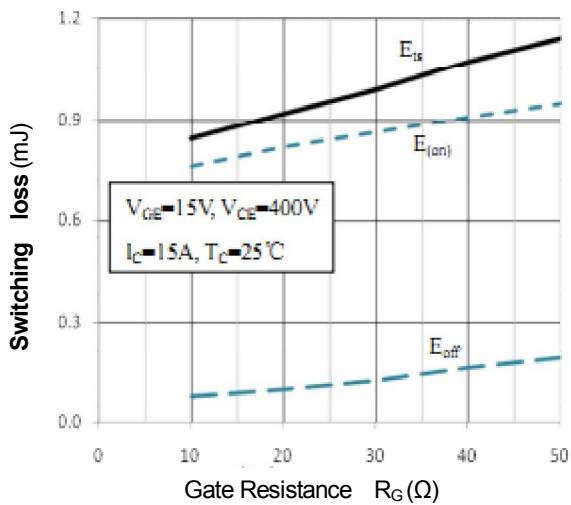


Figure 9. Switching loss— R_G Characteristics

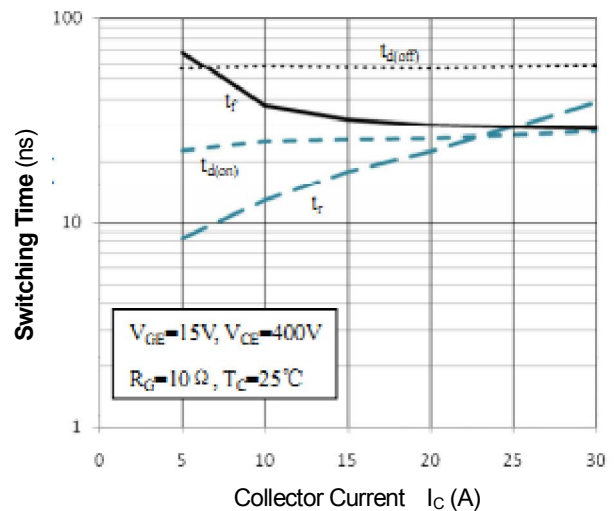


Figure 10. Switching Time— I_C Characteristics

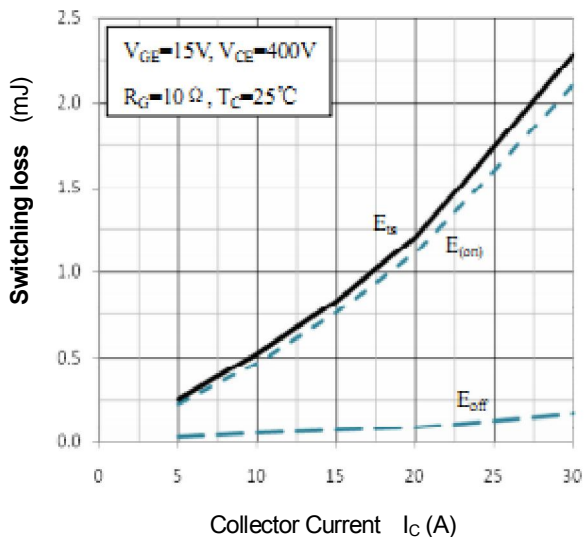


Figure 11. Switching loss— I_C Characteristics

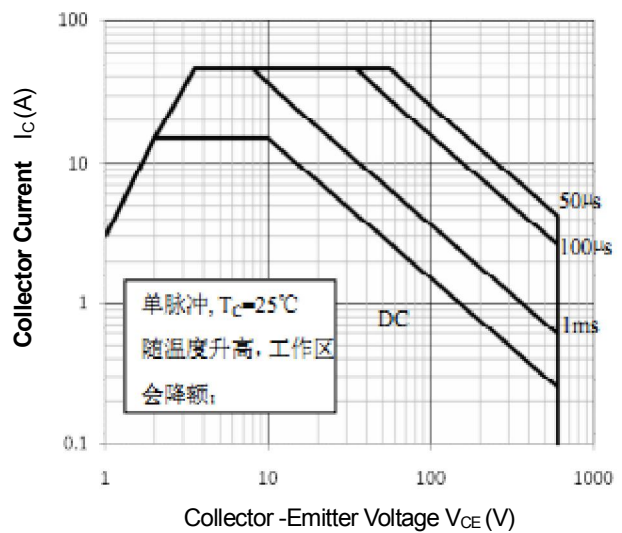


Figure 12. Safe Operating Area

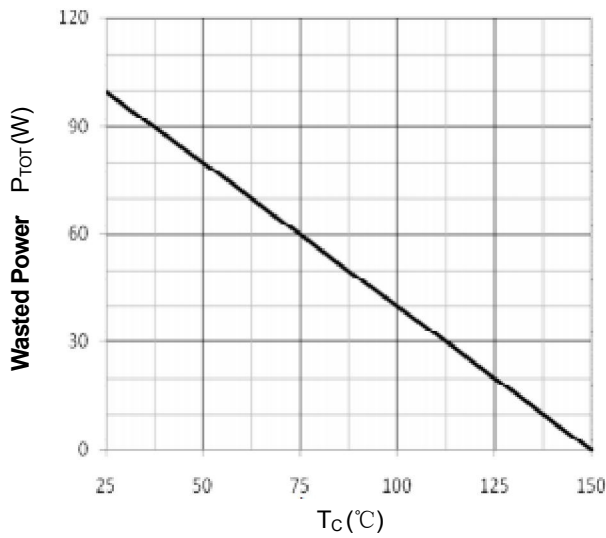


Figure 13. Power Dissipation— T_c Characteristics

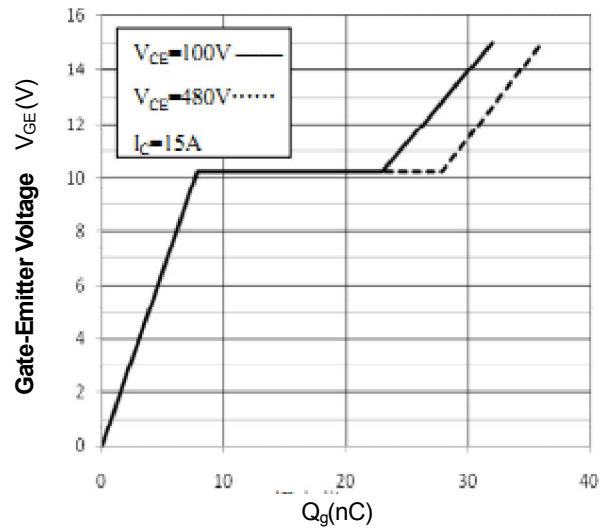


Figure 14. Gage Charge Characteristics

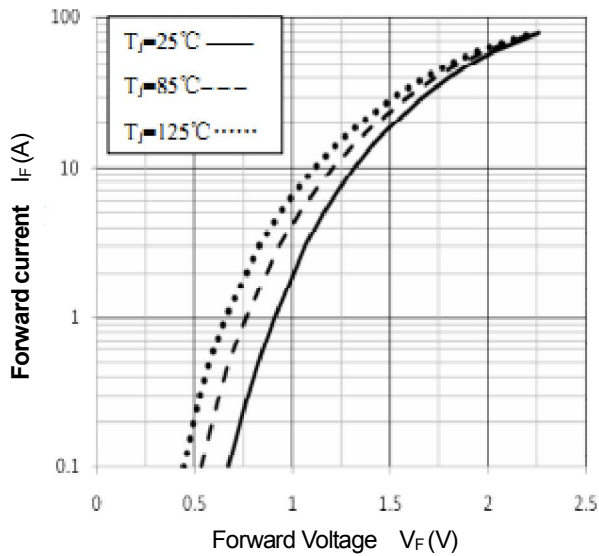


Figure 15. Diode Forward Characteristics

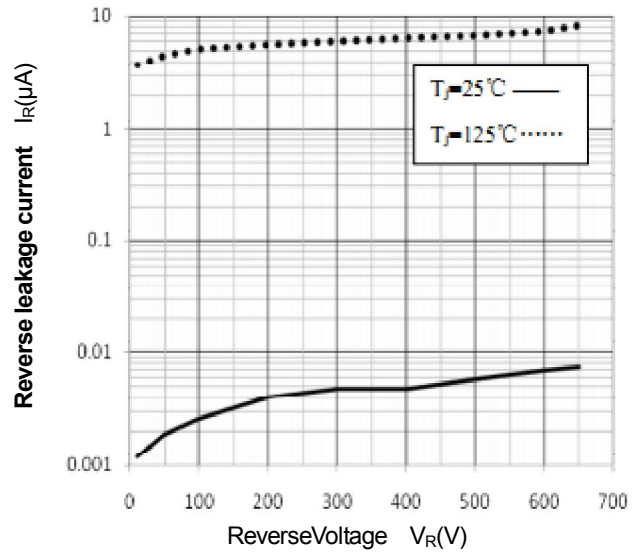


Figure 16. Diode Reverse Characteristics

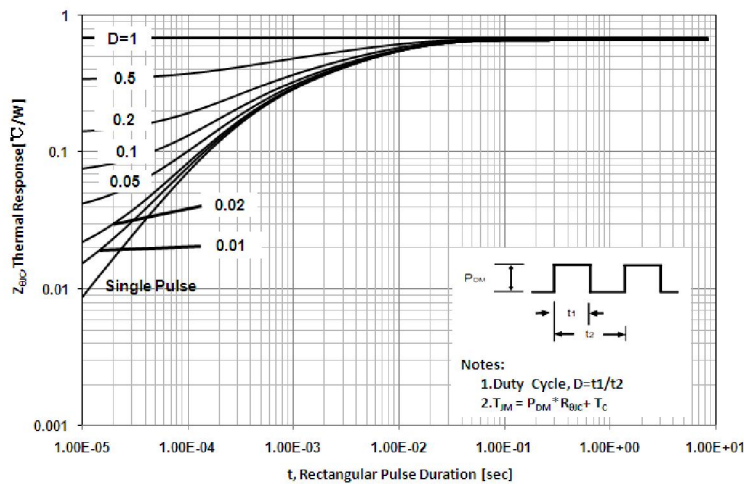


Figure 17. IGBT Transient Thermal Impedance



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