

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	2.2V	40A

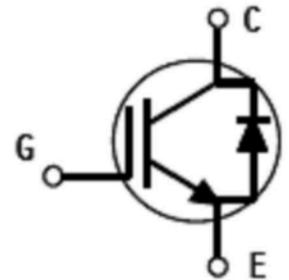
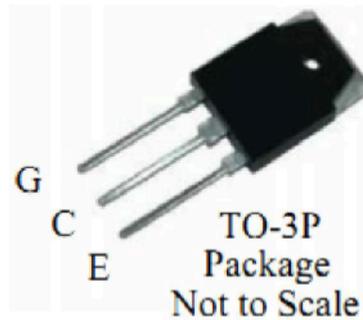
Features:

● Low saturation voltage: $V_{CE(sat),typ}=2.2V @ I_C=40A, V_{GE}=15V$;

● RoHS Compliant;

Applications:

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



Ordering Information

Part Number	Package	Brand
IGW40N60F	TO-3P	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	80	A
	Collector Current @ $T_C=100^\circ C$	40	
I_{CM}^{a1}	Pulsed Collector Current @ $T_C=25^\circ C$	120	A
I_F	Diode Continuous Forward Current@ $T_C=100^\circ C$	20	A
I_{FM}	Diode Maximum Forward Current	100	A
P_D	Power Dissipation @ $T_C=25^\circ C$	280	W
	Power Dissipation @ $T_C=100^\circ C$	110	
	Power Dissipation @ $T_A=25^\circ C$	3.125	
T_J	Operating Junction	150	°C
T_{stg}	Storage Temperature Range	-55~150	°C
T_L	Maximum Temperature for Soldering	300	°C

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



IGW40N60F

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Thermal Resistance, Junction to case for IGBT	--	0.446	$^{\circ}C/W$
$R_{\theta JC}$	Thermal Resistance, Junction to case for Diode	--	1.25	$^{\circ}C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	--	40	$^{\circ}C/W$

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	$I_C=40A, V_{GE}=15V$	--	2.2	2.7	V
$V_{GE(th)}$	Gate Threshold Voltage	$I_C=1mA, V_{CE}=V_{GE}$	3.5	5.0	6.5	V
Pulse width $t_p \leq 380\mu s, \delta \leq 2\%$						
Dynamic Characteristics						
C_{ies}	Input Capacitance	$V_{CE}=30V, V_{GE}=0V$ $f=1MHz$	--	1830	--	pF
C_{oes}	Output Capacitance		--	169	--	
C_{res}	Reverse Transfer Capacitance		--	47	--	
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	$V_{CE}=400V, I_C=40A,$ $R_g=10\Omega, V_{GE}=15V,$ Inductive Load, $T_a=25^{\circ}C,$	--	37	--	ns
t_r	Rise Time		--	46	--	
$t_{d(off)}$	Turn-Off Delay Time		--	130	--	
t_f	Fall Time		--	30	--	
E_{on}	Turn-On Switching Loss		--	2.1	--	mJ
E_{off}	Turn-Off Switching Loss		--	0.53	--	
E_{ts}	Total Switching Loss	--	2.63	--		
Q_g	Total Gate Charge	$V_{CE}=400V, I_C=40A,$ $V_{GE}=15V,$	--	94	--	nC
Q_{ge}	Gate to Emitter Charge		--	18	--	
Q_{gc}	Gate to Collector Charge		--	46	--	
Electrical Characteristics of the Diode						
V_F	Diode Forward Voltage	$I_F=20A$	--	1.8	2.6	V
T_{rr}	Reverse Recovery Time	$I_F=20A$ $di/dt=200A/\mu s$	--	80	--	ns
I_{rr}	Diode Peak Reverse Recovery Current		--	6	--	A
Q_{rr}	Reverse Recovery Charge		--	240	--	nC

Characteristics Curve:

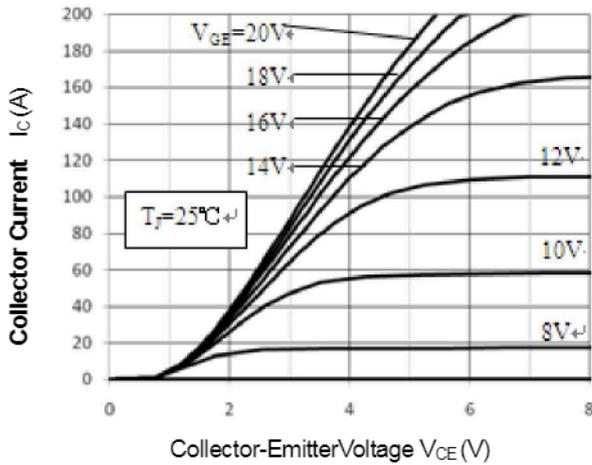


Figure 1. Typical Output Characteristics

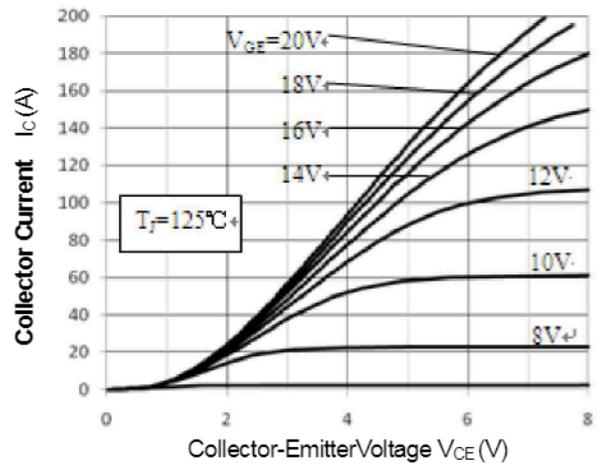


Figure 2. Typical Output Characteristics

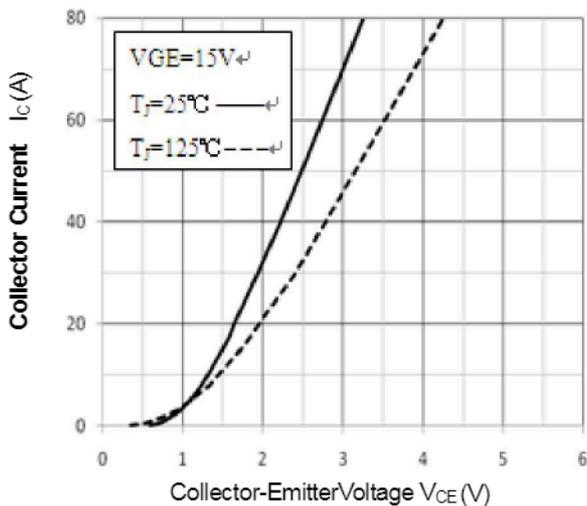


Figure 3. Saturation Voltage Characteristics

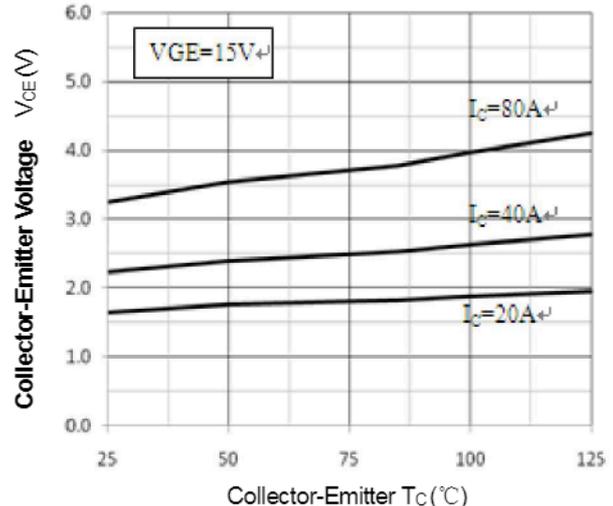


Figure 4. Saturation Voltage - T_c Characteristics

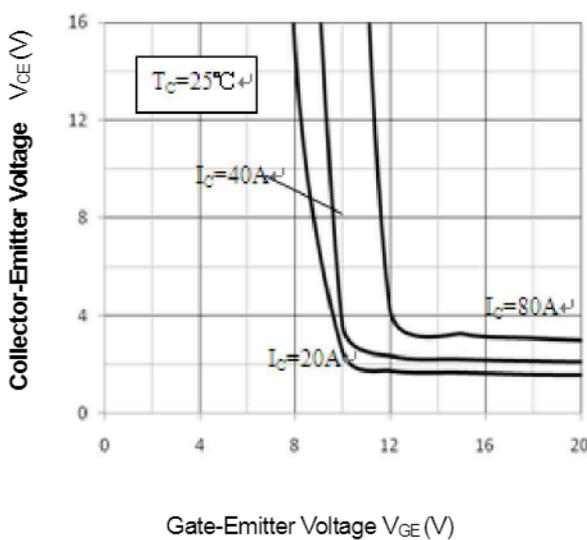


Figure 5. $V_{CE(sat)}$ - V_{GE} Characteristics

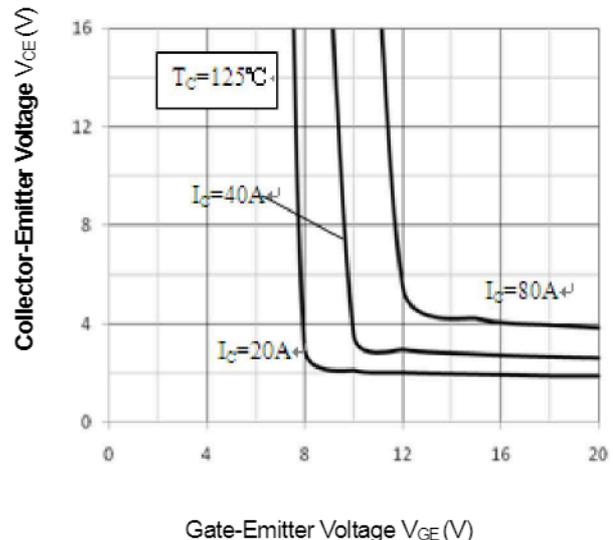


Figure 6. $V_{CE(sat)}$ - V_{GE} Characteristics

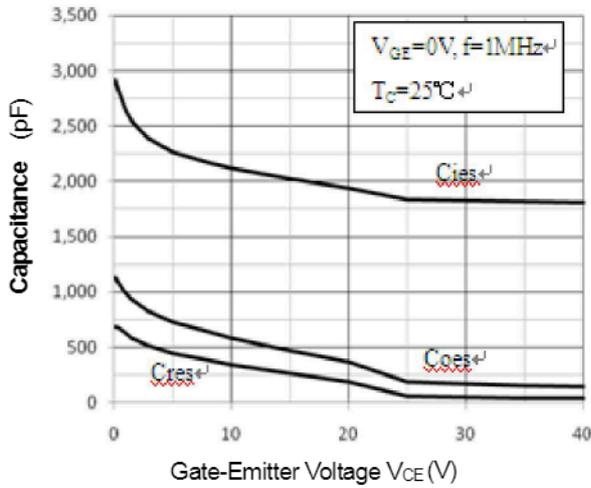


Figure 7. Capacitance Characteristics

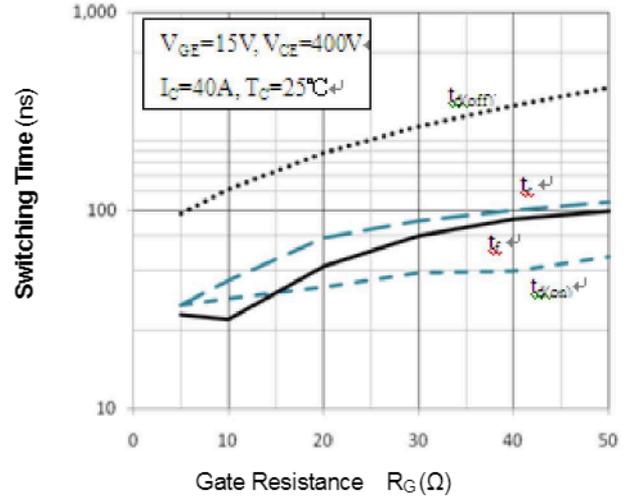


Figure 8. Switching Time— R_G Characteristics

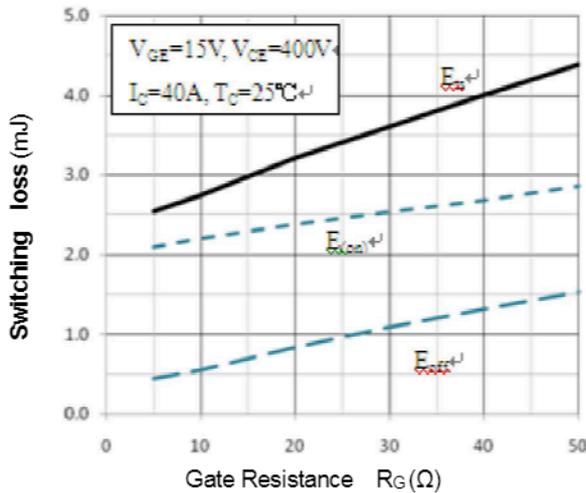


Figure 9. Switching loss— R_G Characteristics

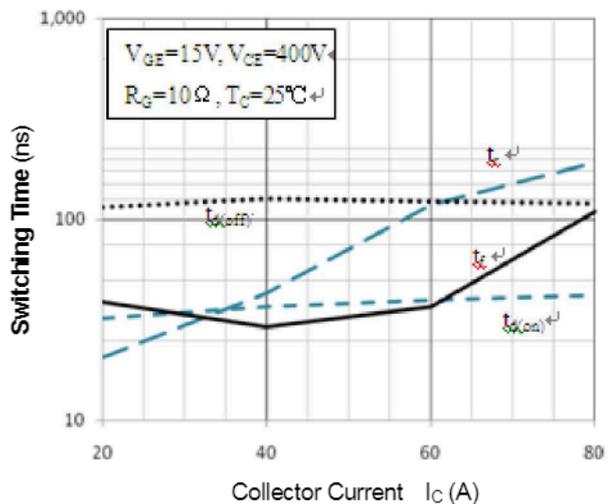


Figure 10. Switching Time— I_C Characteristics

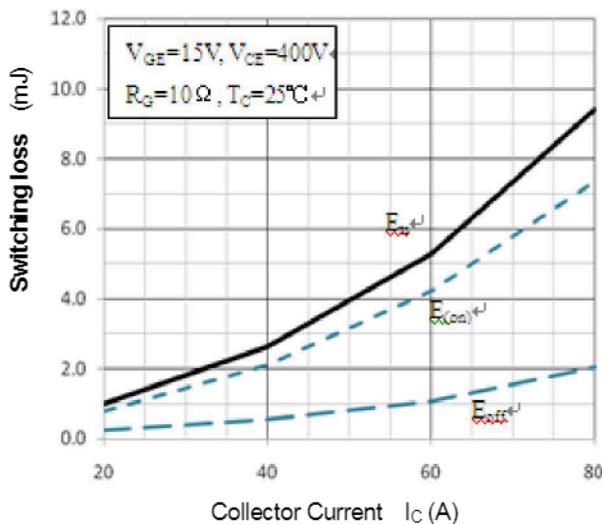


Figure 11. Switching loss— I_C Characteristics

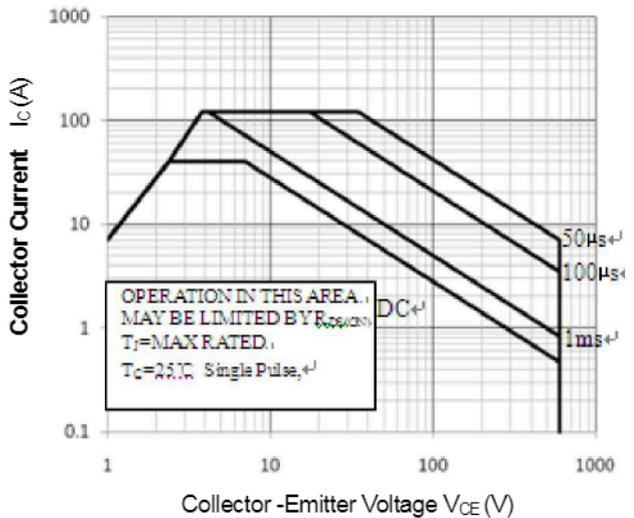


Figure 12. Safe Operating Area

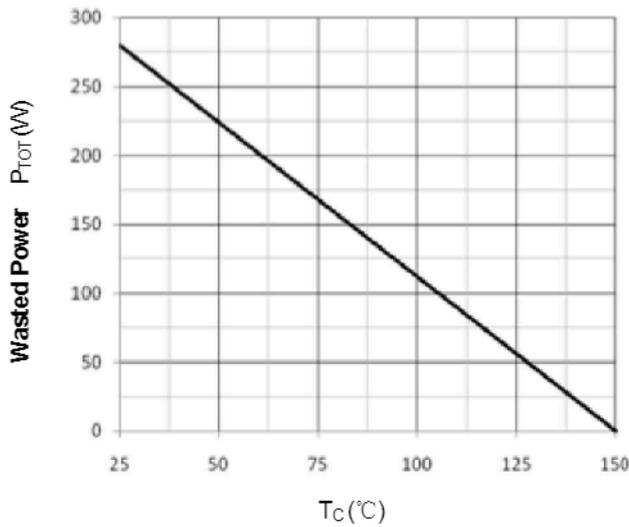


Figure 13. Power Dissipation— T_c Characteristics

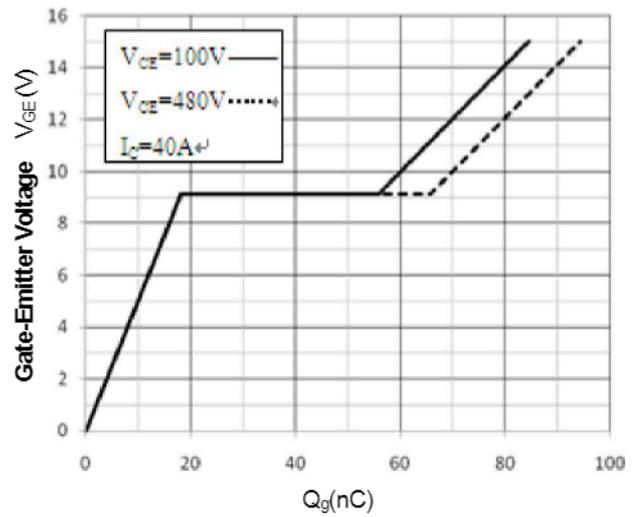


Figure 14. Gage Charge Characteristics

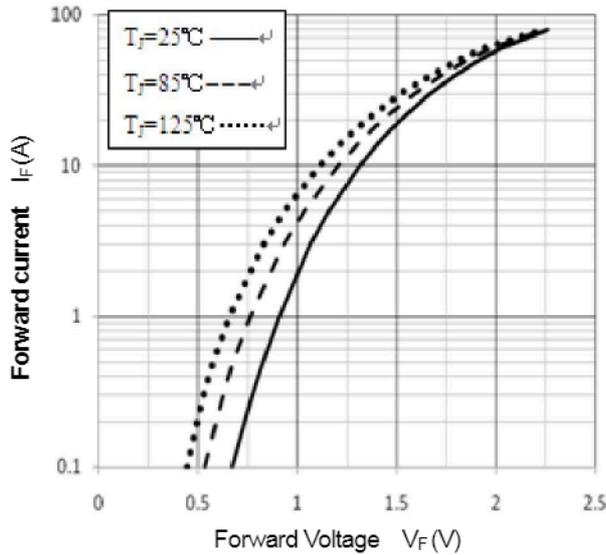


Figure 15. Diode Forward Characteristics

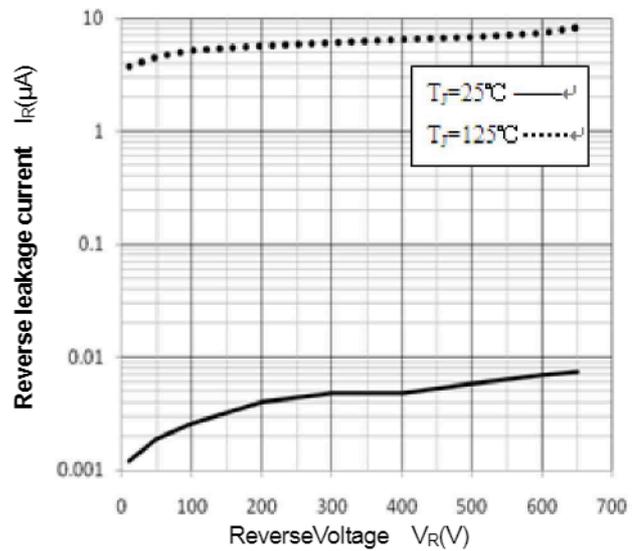


Figure 16. Diode Reverse Characteristics

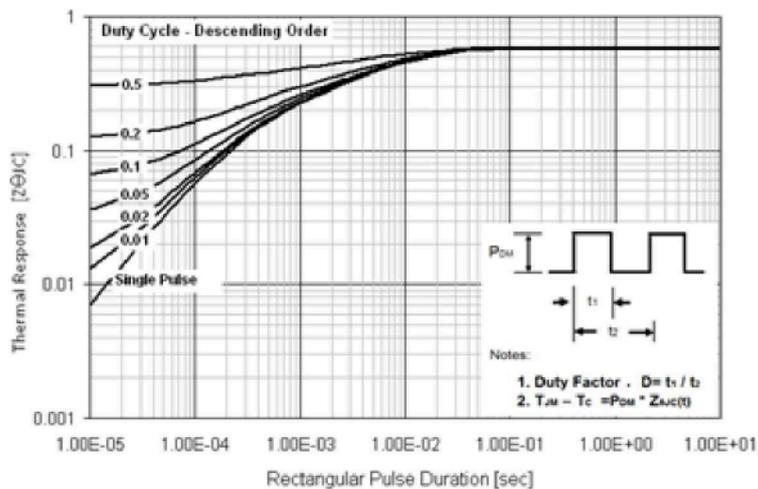


Figure 17. IGBT Transient Thermal Impedance



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