IGF40T120F

Lead Free Package and Finish

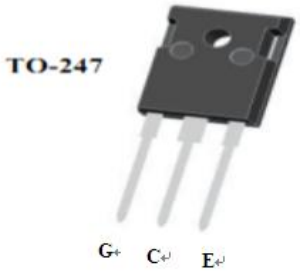
V_{CES}	$V_{CE(sat)}$	I_C
1200V	1.9V	40A

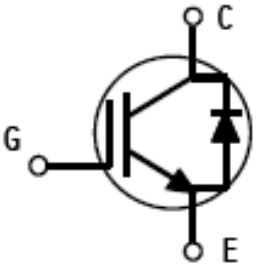
General Description:

Using advanced IGBT technology, the IGBT offers superior conduction and switching performances,high avalanche ruggedness.

Features:

- Low saturation voltage and Quick switching
- saturation voltage is positive temperature relation and is easy to be used in parallel
- High reliability
- Built-in quick recovery diode.





Applications:

- UPS
- Inverter welding machine

Ordering Information

Part Number	Package	Brand
IGF40T120F	TO-247	***IPS***

Absolute Maximum Ratings（T_J= 25℃，unless otherwise specified）

Symbol	Parameter	Rating	Units
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate- Emitter Voltage	±20	V
I_C	Collector Current @T_C=25℃	80	A
	Collector Current @T_C=100℃	40	
I_{CM}[a1]	Pulsed Collector Current @T_C=25℃	160	A
I_F	Diode Continuous Forward Current@T_C=25℃	40	A
	Diode Continuous Forward Current@T_C=100℃	20	A
I_{FM}	Diode Maximum Forward Current	60	A
P_D	Power Dissipation @T_C=25℃	278	W
T_J	Operating Junction	150	℃
T_{stg}	Storage Temperature Range	-55～150	℃
T_L	Maximum Temperature for Soldering	270	℃

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

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Thermal Resistance, Junction to case for IGBT	--	0.45	℃/W
$R_{\theta JC}$	Thermal Resistance, Junction to case for Diode	--	0.8	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	--	40	℃/W

Electrical Characteristics of the IGBT (T_J= 25℃, unless otherwise specified)

Symbol	Parameter	Test Conditions	Rating			Units
			Min	Typ.	Max.	
OFF Characteristics						
V_{CES}	Collector-Emitter Breakdown Voltage	V_{GE}=0V,I_{CE}=250uA	1200	--	--	V
I_{CES}	Collector-Emitter Leakage Current	V_{GE}=0V,V_{CE}=1200V	--	--	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	--	1.9	2.4	V
$V_{GE(th)}$	Gate Threshold Voltage	I_C=250uA ,V_{CE}=V_{GE}	4.5	5.8	7	V
Pulse width tp≤300μs,δ≤2%						
Dynamic Characteristics						
C_{ies}	Input Capacitance	V_{CE}=25V,V_{GE}=0V f=1MHz	--	3823	--	pF
C_{oes}	Output Capacitance		--	170	--	
C_{res}	Reverse Transfer Capacitance		--	94	--	
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{CE}=600V,I_C=40A, R_g=10Ω,V_{GE}=15V, Inductive Load, Ta=25℃,	--	62	--	ns
t_r	Rise Time		--	54	--	
$t_{d(off)}$	Turn-Off Delay Time		--	265	--	
t_f	Fall Time		--	30	--	
E_{on}	Turn-On Switching Loss		--	3.3	--	mJ
E_{off}	Turn-Off Switching Loss		--	1.4	--	
E_{ts}	Total Switching Loss		--	4.7	--	
$t_{d(on)}$	Turn-on Delay Time	V_{CE}=600V,I_C=40A, R_g=10Ω,V_{GE}=15V, Inductive Load, Ta=150℃,	--	55	--	ns
t_r	Rise Time		--	55	--	
$t_{d(off)}$	Turn-Off Delay Time		--	306	--	
t_f	Fall Time		--	38	--	
E_{on}	Turn-On Switching Loss		--	3.49	--	mJ
E_{off}	Turn-Off Switching Loss		--	1.85	--	
E_{ts}	Total Switching Loss		--	5.34	--	
Q_g	Total Gate Charge	V_{CE}=600V,I_C=40A V_{GE}=15V,	--	239	--	nC
Q_{ge}	Gate-to-emitter Charge		--	30	--	
Q_{gc}	Gate-to-Collector (“Miller”) Charge		--	147	--	

©2018 InPower Semiconductor Co., Ltd.

Diode Characteristics						
V_F	Diode Forward Voltage	I_F=20A	--	2.6	--	V
T_{rr}	Reverse Recovery Time	I_F=20A di/dt=100A/uS	--	80	--	ns
I_{rrm}	Reverse Recovery Current		--	5.4	--	A
Q_{rr}	Reverse Recovery Charge		--	150	--	nC

Characteristics Curve：

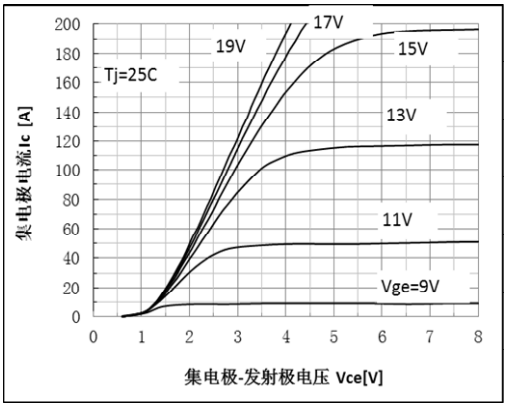


图 1 输出特性曲线

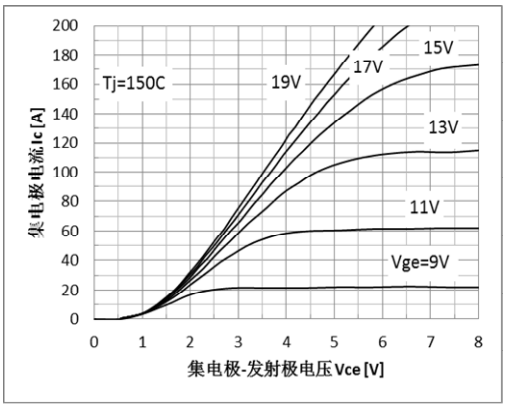


图 2 输出特性曲线

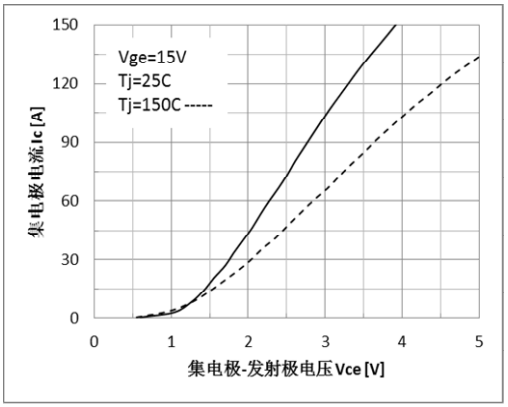


图 3 饱和压降特性

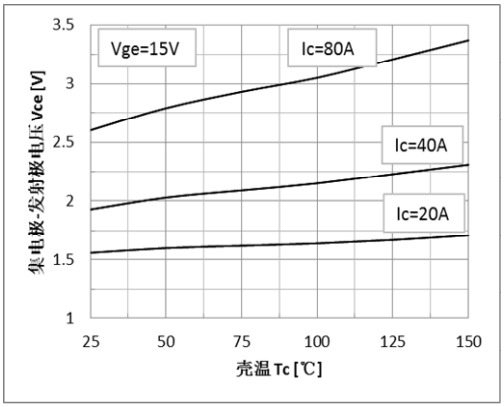


图 4 饱和压降温度特性

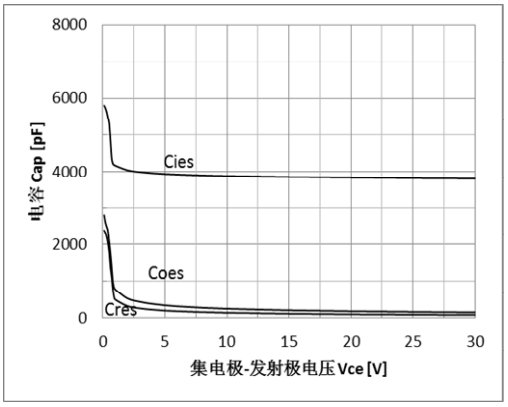


图 5 电容特性

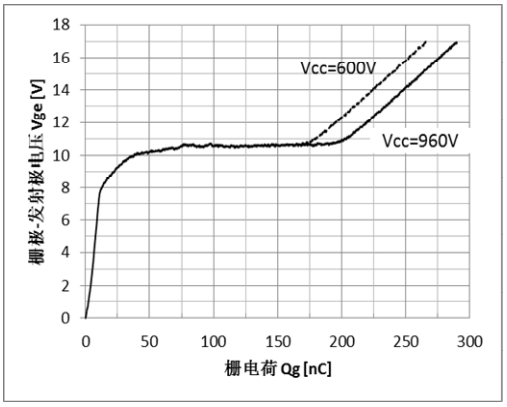


图 6 栅电荷特性

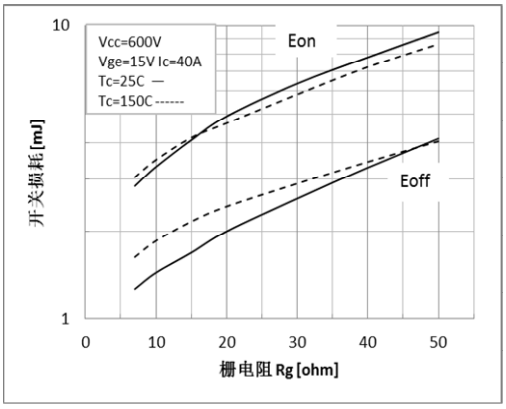


图 7 开关损耗-栅电阻特性曲线

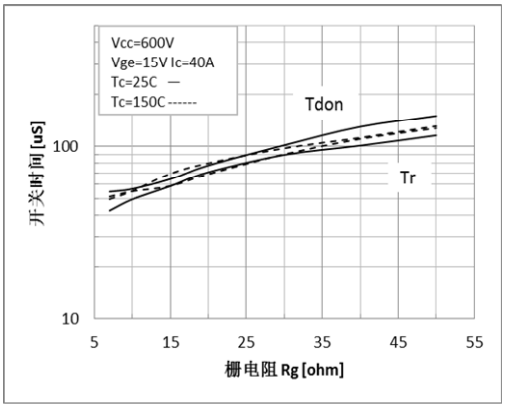


图 8 开通-栅电阻特性曲线

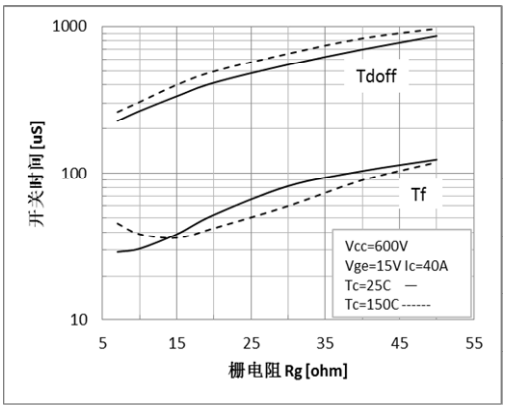


图 9 关断-栅电阻特性曲线

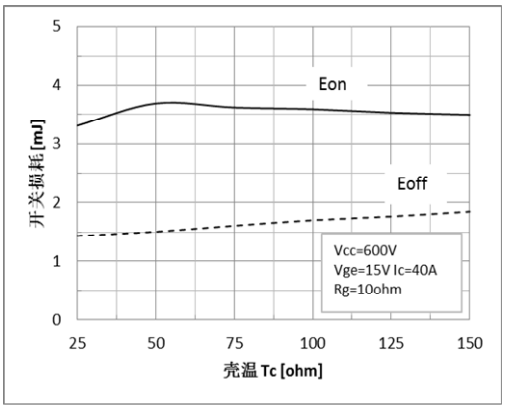


图 10 开关损耗温度特性

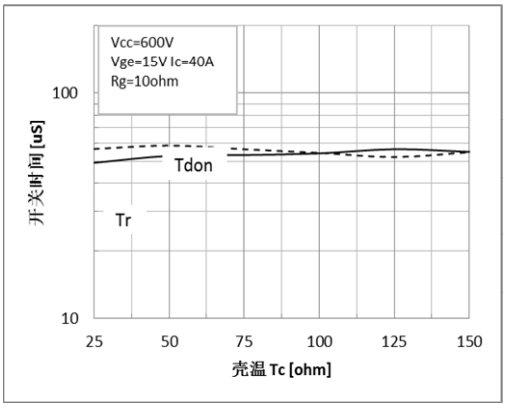


图 11 开通温度特性

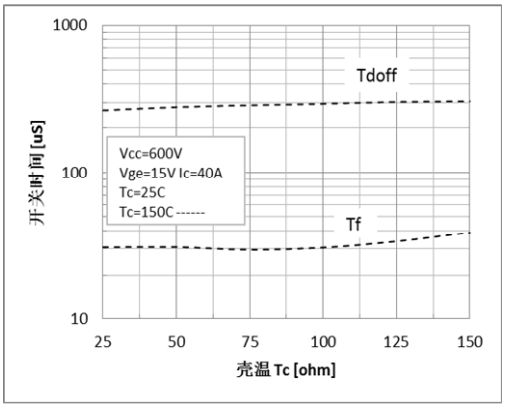


图 12 关断温度特性

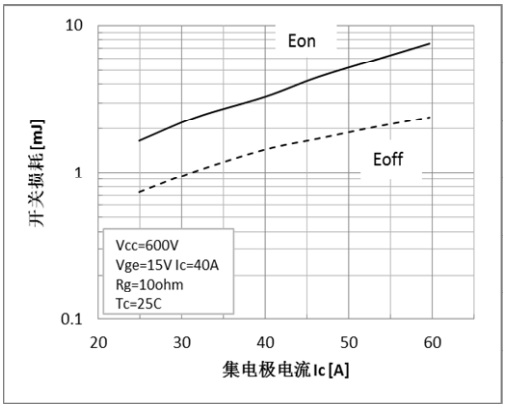


图 13 开关损耗与电流特性

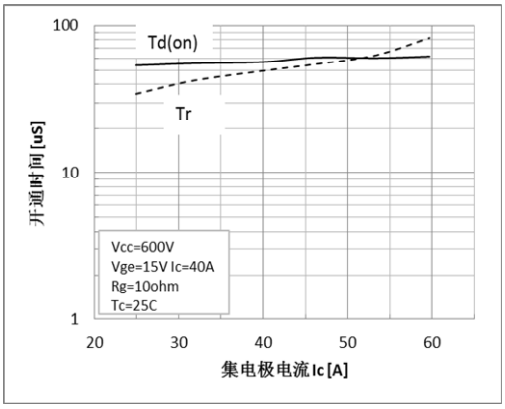


图 14 开通与电流特性

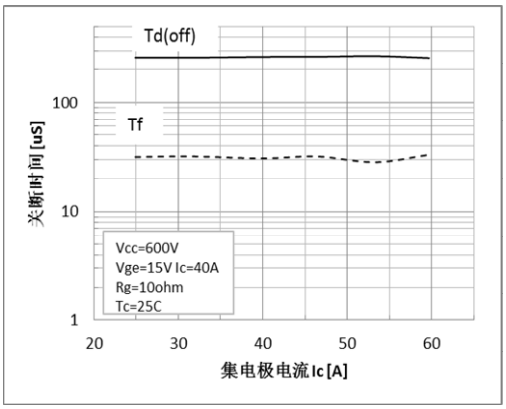


图 15 关断与电流特性

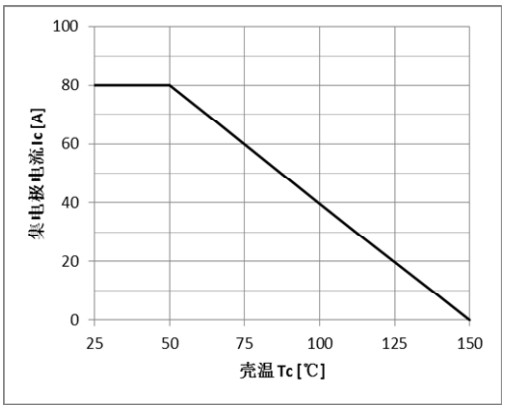


图 16 集电极电流温度特性

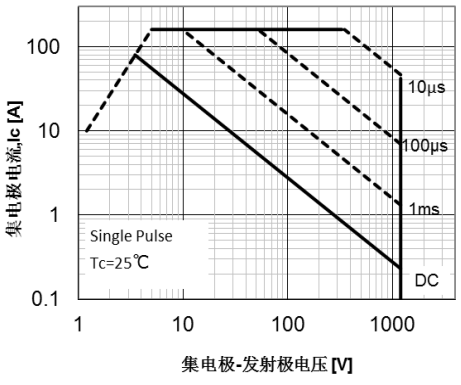


图 17 正向安全工作区

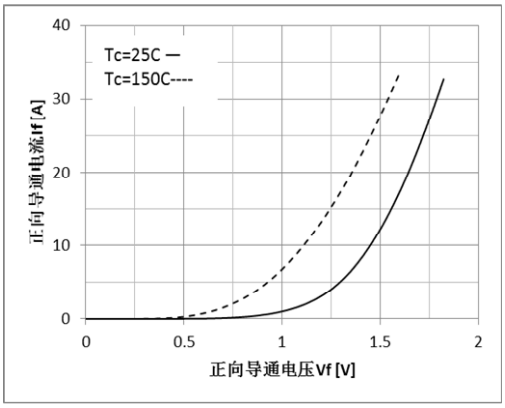


图 18 二极管正向特性

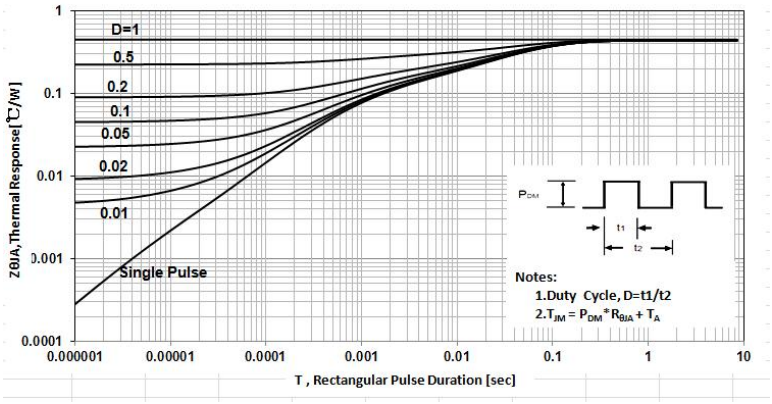

D=1
0.5
0.2
0.1
0.05
0.02
0.01
Single Pulse
ZθJA, Thermal Response[℃/W]
T , Rectangular Pulse Duration [sec]
Notes:
1.Duty Cycle, D=t1/t2
2.TJM = PDM*RθJA + TA
t1
t2

图 19 瞬态热阻特性

Disclaimers:

InPower Semiconductor Co., Ltd (IPS) reserves the right to make changes without notice in order to improve reliability, function or design and to discontinue any product or service without notice. Customers should obtain the latest relevant information before orders and should verify that such information is current and complete. All products are sold subject to IPS's terms and conditions supplied at the time of order acknowledgement.

InPower Semiconductor Co., Ltd warrants performance of its hardware products to the specifications at the time of sale, Testing reliability and quality control are used to the extent IPS deems necessary to support this warrantee. Except where agreed upon by contractual agreement, testing of all parameters of each product is not necessarily performed.

InPower Semiconductor Co., Ltd does not assume any liability arising from the use of any product or circuit designs described herein. Customers are responsible for their products and applications using IPS's components. To minimize risk, customers must provide adequate design and operating safeguards.

InPower Semiconductor Co., Ltd does not warrant or convey any license either expressed or implied under its patent rights, nor the rights of others. Reproduction of information in IPS's data sheets or data books is permissible only if reproduction is without modification or alteration. Reproduction of this information with any alteration is an unfair and deceptive business practice. InPower Semiconductor Co., Ltd is not responsible or liable for such altered documentation.

Resale of IPS's products with statements different from or beyond the parameters stated by InPower Semiconductor Co., Ltd for that product or service voids all express or implied warrantees for the associated IPS's product or service and is unfair and deceptive business practice. InPower Semiconductor Co., Ltd is not responsible or liable for any such statements.

Life Support Policy:

InPower Semiconductor Co., Ltd's products are not authorized for use as critical components in life support devices or systems without the expressed written approval of InPower Semiconductor Co., Ltd.

As used herein:

1. Life support devices or systems are devices or systems which:
   a. are intended for surgical implant into the human body,
   b. support or sustain life,
   c. whose failure to perform when properly used in accordance with instructions for used provided in the labeling, can be reasonably expected to result in significant injury to the user.

2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.