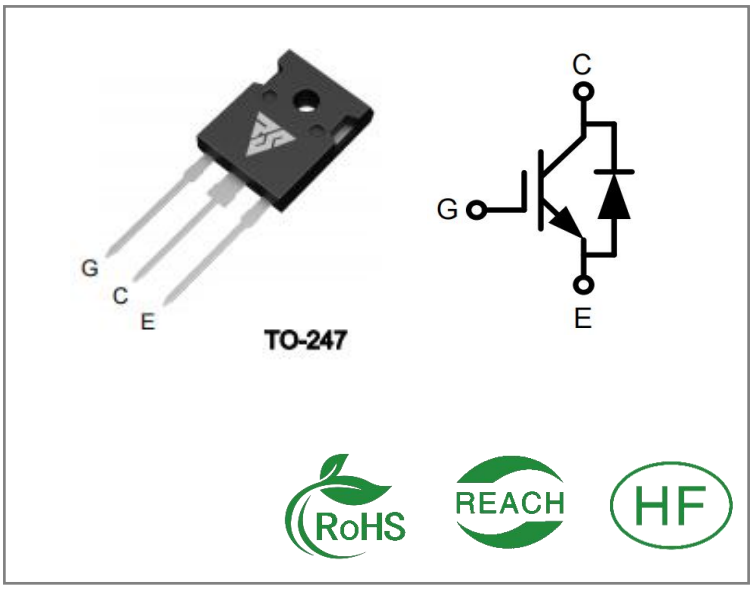
IF	V_{ce}(sat)	VCES
40A	1.91V	1200V



Applications:
- EV Charging
- Uninterruptible Power Supply (UPS)
- Inverters

Features:
- 1200V trench gate/field termination process
- Very low Vce(sat)
- Low switching loss
- Positive temperature coefficient in Vce(sat)

Ordering Information

Part Number	Package	Marking	Packing	Qty.
RSG40N120HW	T0-247-3	RSG40N120HW	Tube	30 PCS

Absolute Maximun Ratings Tc= 2 5℃ unless otherwise specified

Symbol	Parameter	RSG40N120HW	Units
VCES	Collector-Emitter Voltage	1200	V
VGES	Gate- Emitter Voltage	±20	V
IC	Continuous DC collector current TC = 100 °C	40	A
ICrm	Repetitive peak collector current tp=1 ms	80	A
Ptot	Total Power Dissipation @ TC = 25°C	270	W
Tstg	Storage Temperature	- 40to150	°C
TL	Maximum Temperature for Soldering	260	°C

Thermal Characteristic

Symbol	Parameter	RSG40N120HW	Units
R_{thJC}	Thermal Resistance, Junction to case for IGBT	0.38	K/ W

Electrical Characteristics (T_C=25℃ unless otherwise noted)

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
Static Characteristics						
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	1200	-	--	V	V_{GE}=0V,I_{CE}=1mA
ICES	Collector-Emitter Leakage Current	-	-	1	mA	V_{GE} =0V, V_{CE}=1200V
IGES	Gate to Emitter Leakage current	-	-	200	nA	V_{GE}=+20V, V_{CE}=0V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	-	1.91	2.3	V	I_C=40A V_{GE}=15 V, T_j=25° C
	Gate Threshold Voltage	-	2.36	--	V	I_C=40A V_{GE}=15 V, T_j=175° C
$V_{GE(th)}$	Collector-Emitter Breakdown Voltage	4.5	5.1	5.7	V	I_C=1.5mA,V_{CE}=V_{GE}
Gfs	Transconductance		27		S	I_C=15A,V_{CE}=20V
Dynamic Characteristics						
Cies	Input Capacitance	-	2510	--	PF	V_{CE}=25V, V_{GE}=0V, f=100KHz
Coes	Output Capacitance	-	210	--		
Cres	Reverse Transfer Capacitance	-	106	--		
Qg	Total Gate Charge		212		uC	V_{GE}=15V 、 I_C=40A V_{CE}=960V
Switching Characteristics						
$t_{d(ON)}$	Turn-on Delay Time	-	17	--	ns	V_{CE}=600V, I_C=40A, V_{GE}=+/-15V, R_g=12Ω, Inductive Load
t_r	Rise Time	-	70			
$t_{d(OFF)}$	Turn-Off Delay Time	-	150	--		
t_f	Fall Time	-	85	--		
E_{on}	Turn-On Switching Loss	-	3.45	--	mJ	
E_{off}	Turn-Off Switching Loss	-	5.72			

Diode Maximum Ratings （TJ= 25℃ unless otherwise specified）

Symbol	Parameter	Value	Unit	Test Conditions
VRRM	Repetitive Peak Reverse Voltage	1200	V	TC = 25℃
IF	Forward Current	40	A	TC = 100℃
IFRM	Repetitive Peak Forward Surge Current	80	A	tp=1 ms

Characteristics Values (TC=25°C unless otherwise noted)

Symbol	Parameter	Min.	Typ.	Max.	Test Conditions	Unit
VF	Forward Voltage		2.0 1.74	2.5	IF =40A,V_{GE}=0V TJ = 25℃ IF =40A,V_{GE}=0V TJ = 175℃	V
IRM	Peak reverse recovery current		13 27		VR = 600V, IF =40A,V_{GE}=-15V diF/dt=400A/us TJ = 25℃ VR = 600V, IF =40A,V_{GE}=-15V diF/dt=400A/us TJ = 175℃	A
Qrr	Reverse Recovery Charge		2.55 7.62		VR = 600V, IF =40A,V_{GE}=-15V diF/dt=400A/us TJ = 25℃ VR = 600V, IF =40A,V_{GE}=-15V diF/dt=400A/us TJ = 175℃	uC
trr	Reverse Recovery time		450 700		VR = 600V, IF =40A,V_{GE}=-15V diF/dt=400A/us TJ = 25℃ VR = 600V, IF =40A,V_{GE}=-15V diF/dt=400A/us TJ = 175℃	ns
Erec	Reverse recovered energy		1.04 3.08		VR = 600V, IF =40A,V_{GE}=-15V diF/dt=400A/us TJ = 25℃ VR = 600V, IF =40A,V_{GE}=-15V diF/dt=400A/us TJ = 175℃	mJ
R_{thJC}	Diode Thermal Resistance, Junction		0.45			K/ W
Tvj op	Temperature under switching conditions	-40		175		°C

Typical Feature Curve

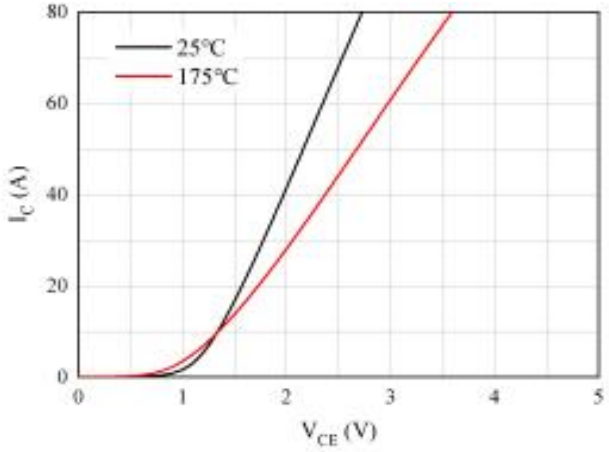


图 1. 典型输出特性 (V_{GE}=15V)
Figure 1. Typical output characteristics (V_{GE}=15V)

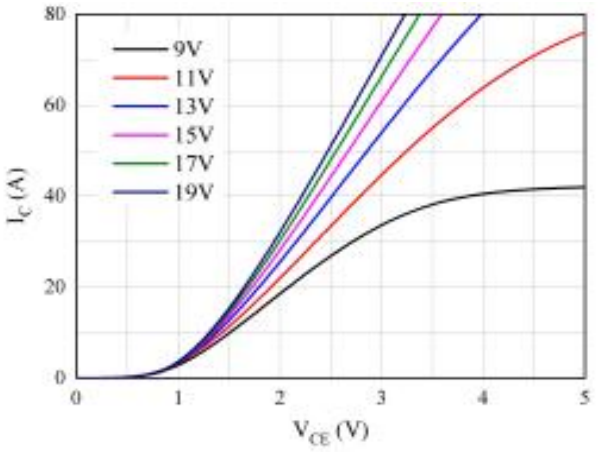


图 2. 典型输出特性 (T_{vj}=175℃)
Figure 2. Typical output characteristics (T_{vj}=175℃)

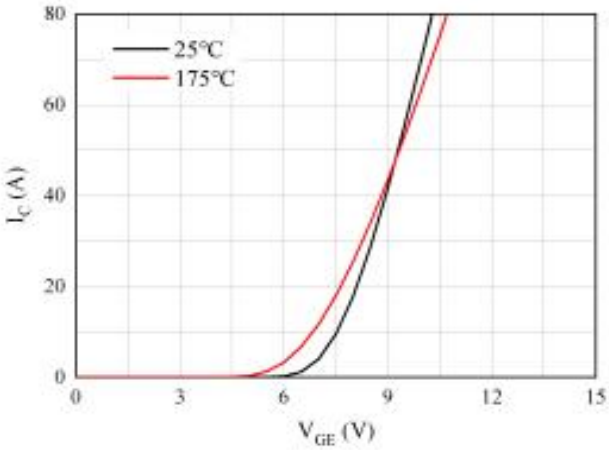


图 3. 典型传输特性(V_{CE}=20V)
Figure 3. Typical transfer characteristic(V_{CE}=20V)

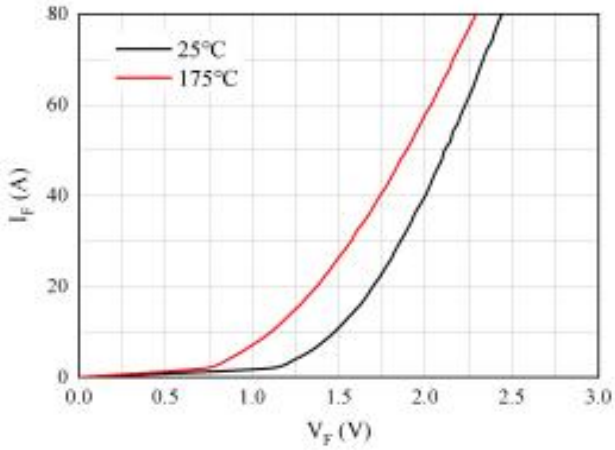


图 4. 正向偏压特性 二极管
Figure 4. Forward characteristic of Diode

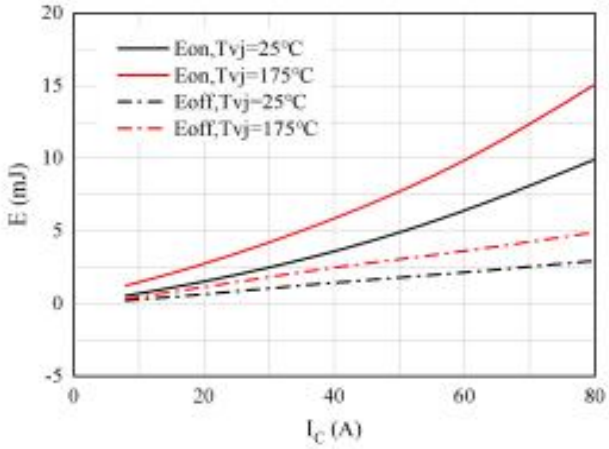


图 5. 开关损耗
Figure 5. Switching losses of IGBT
VGE=±15V, RGon=12Ω, Rgoff=12Ω, VCE=600V

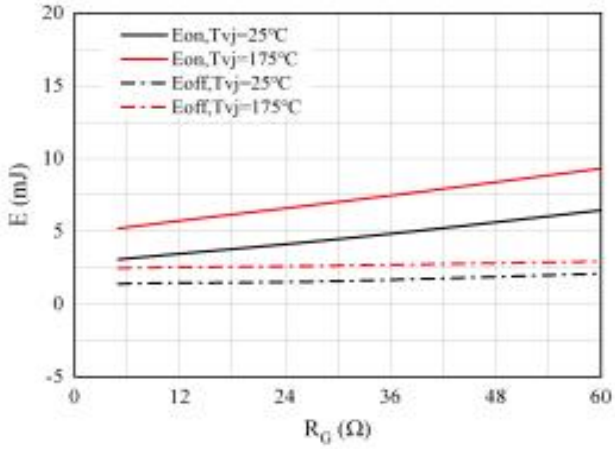


图 6. 开关损耗
Figure 6. Switching losses of IGBT
VGE=±15V, IC=40A, VCE=600V

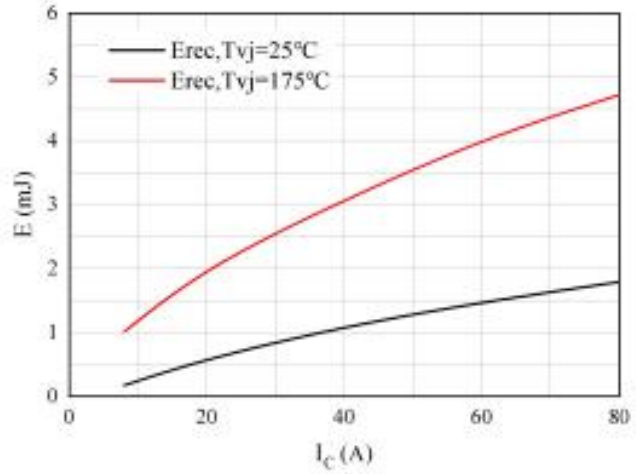


图 7. 开关损耗 二极管
Figure 7. Switching losses of Diode
Rgon=12Ω, VCE=600V

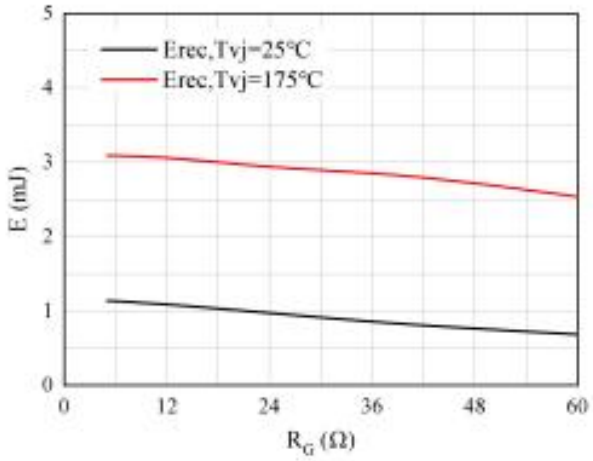


图 8. 开关损耗 二极管
Figure 8. Switching losses of Diode
IF=40A, VCE=600V

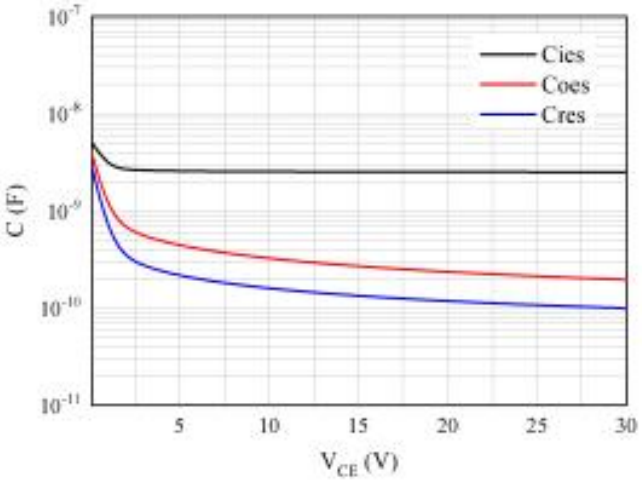
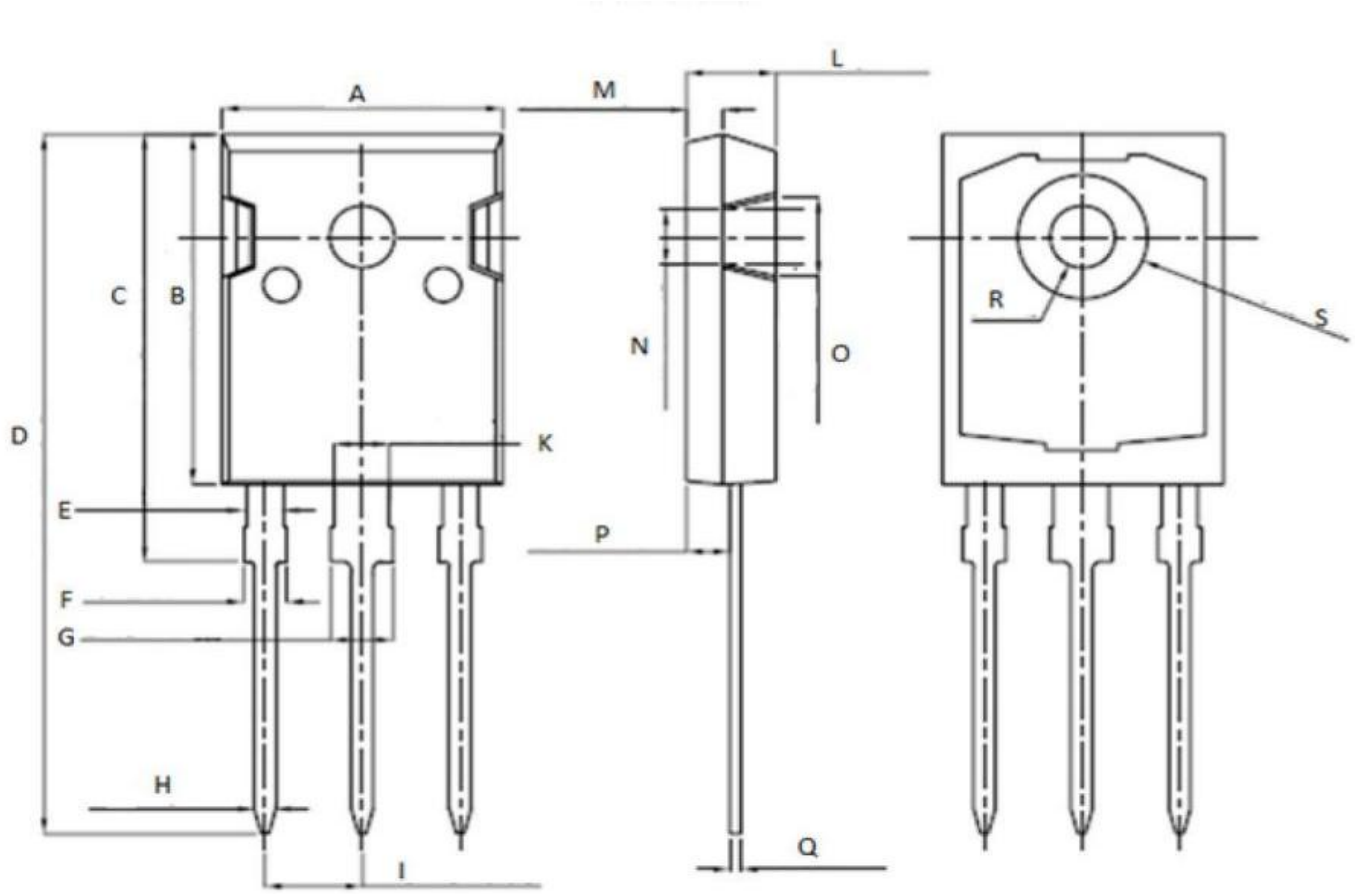


图 9. 电容特性
Figure 9. Capacitance characteristic

Package outline drawing(TO-247-3 Unit: mm)



Unit: mm		
Symbol	Min.	Max.
A	15.95	16.25
B	20.85	21.25
C	20.95	21.35
D	40.5	40.9
E	1.9	2.1
F	2.1	2.25
G	3.1	3.25
H	1.1	1.3
I	5.40	5.50

Unit: mm		
Symbol	Min.	Max.
K	2.90	3.10
L	4.90	5.30
M	1.90	2.10
N	4.50	4.70
O	5.40	5.60
P	2.29	2.49
Q	0.51	0.71
R	ϕ3.5	ϕ3.7
S	ϕ7.1	ϕ7.3

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