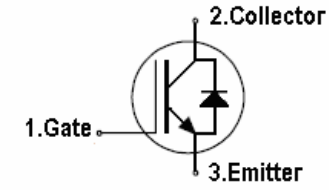
TSG20N120A

IGBT

DRAWING

G C E



Features

- 1200V,20A
- $V_{CE(sat)(typ.)}$=2.7V@V_{GE}=15V，I_C=20A
- High speed switching
- Higher system efficiency
- Soft current turn-off waveforms

General Description

TS IGBTs offer lower losses and higher energy efficiency for application such as IH (induction heating),UPS, General inverter and other soft switching applications.

Absolute Maximum Ratings

Symbol	Parameter	Spec	Units
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	±30	V
I_C	Continuous Collector Current (TC=25 ℃)	40	A
	Continuous Collector Current (TC=100℃)	20	A
I_{CM}	Pulsed Collector Current (Note 1)	60	A
I_F	Diode Continuous Forward Current (TC=100 ℃)	20	A
I_{FM}	Diode Maximum Forward Current (Note 1)	60	A
P_D	Maximum Power Dissipation (TC=25 ℃)	170	W
	Maximum Power Dissipation (TC=100℃)	65	W
T_J	Operating Junction Temperature Range	-55 to +150	℃
T_{STG}	Storage Temperature Range	-55 to +150	℃

Notes：

1. Repetitive Rating: Pulse width limited by maximum junction temperature

Thermal Characteristics

Symbol	Parameter	Spec	Units
Rth j-c	Thermal Resistance, Junction to case for IGBT	0.74	℃/ W
Rth j-c	Thermal Resistance, Junction to case for Diode	0.85	℃/ W
Rth j-a	Thermal Resistance, Junction to Ambient	40	℃/ W

Electrical Characteristics (TC=25℃ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
BV_{CES}	Collector-Emitter Breakdown Voltage	V_{GE}= 0V, I_C= 250uA	1200			V
I_{CES}	Collector-Emitter Leakage Current	V_{CE}= 1200V, V_{GE}= 0V			250	uA
I_{GES}	Gate Leakage Current, Forward	V_{GE}=30V, V_{CE}= 0V			100	nA
	Gate Leakage Current, Reverse	V_{GE}= -30V, V_{CE}= 0V			-100	nA
$V_{GE(th)}$	Gate Threshold Voltage	V_{GE}= V_{CE}, I_C= 250uA	4.0		6.0	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE}=15V, I_C= 20A		2.7		V
Qg	Total Gate Charge	V_{CC}=600V V_{GE}=15V I_C=20A		63		nC
Qge	Gate-Emitter Charge			24		nC
Qgc	Gate-Collector Charge			19		nC
t d(on)	Turn-on Delay Time	V_{CC}=600V V_{GE}=15V I_C=20A R_G=28Ω Inductive Load TC=25 ℃		36		ns
t r	Turn-on Rise Time			78		ns
t d(off)	Turn-off Delay Time			285		ns
t f	Turn-off Fall Time			331		ns
Eon	Turn-on Switching Loss			1.9		mJ
Eoff	Turn-off Switching Loss			1.2		mJ
Ets	Total Switching Loss			3.1		mJ
Cies	Input Capacitance	V_{CE}=30V V_{GE}=0V f = 100kHz		550		pF
Coes	Output Capacitance			180		pF
Cres	Reverse Transfer Capacitance			110		pF

Electrical Characteristics of Diode (TC=25℃ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
V_F	Diode Forward Voltage	I_F=20A		2.0	2.8	V
t r r	Diode Reverse Recovery Time	V_{CE} = 600V I_F=20A dIF/dt = 500A/us		172		ns
I r r	Diode peak Reverse Recovery Current			24		A
Qr r	Diode Reverse Recovery Charge			2415		nC

Typical Characteristics

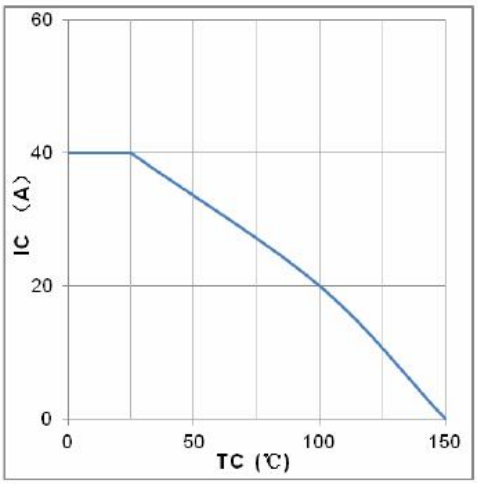


Figure1:maximum DC collector current VS. case temprature

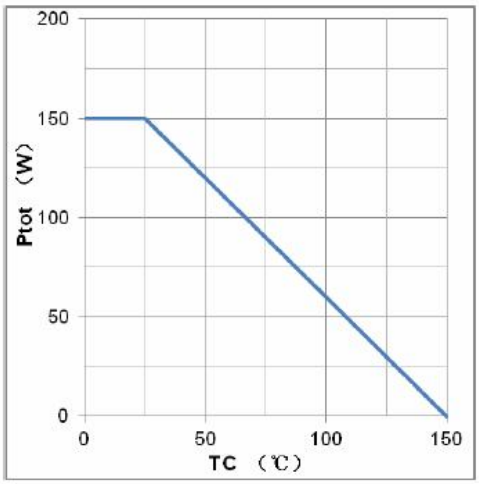


Figure2:power dissipation VS. case temprature

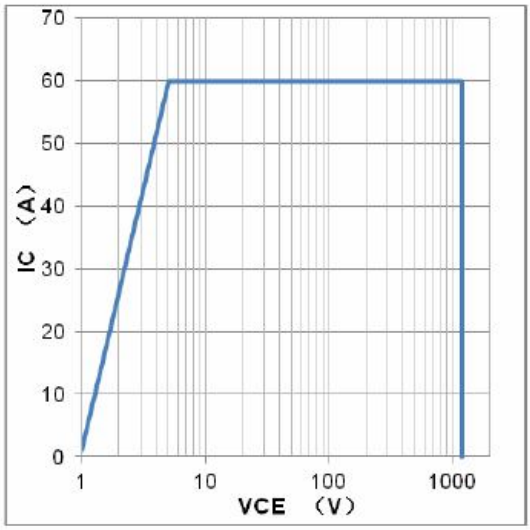


Figure3:reverse bias SOA,TJ=150℃,VGE=15V

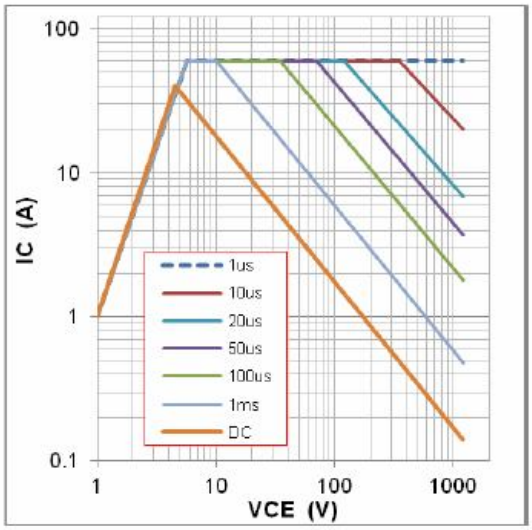


Figure4:forward SOA,TC=25℃,TJ≤150℃

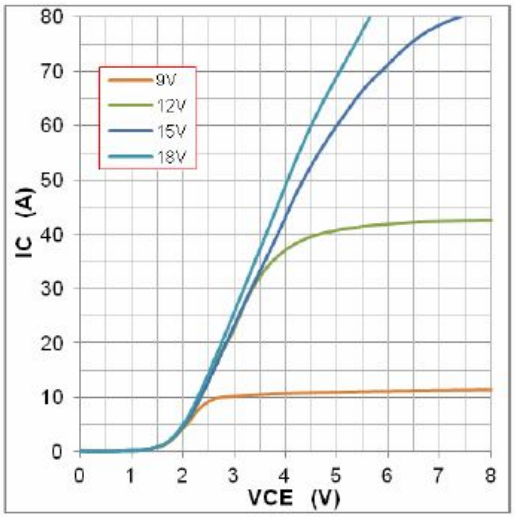


Figure5:typical IGBT output characteristics, TJ=25℃;tp=300us

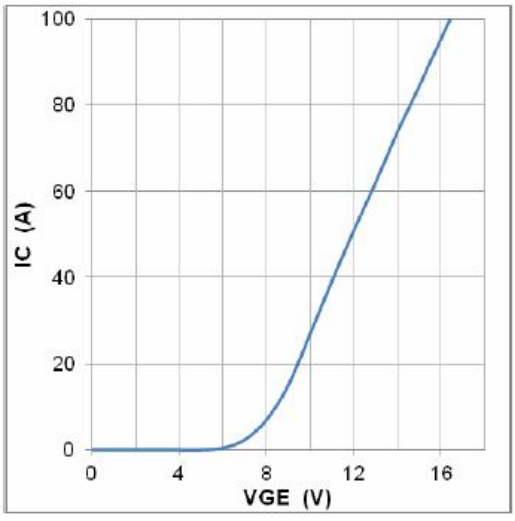


Figure6:typical trans characteristics,VCE=20V,tp=20us

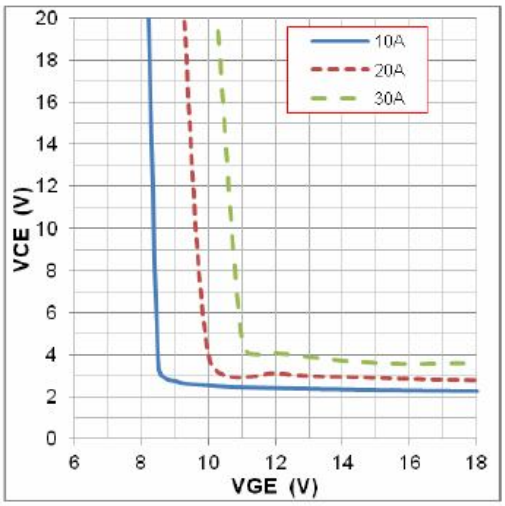


Figure7: typical VCE VS. VGE,TJ=25℃

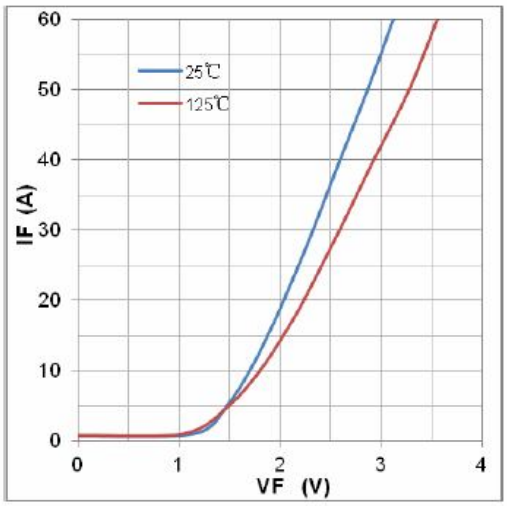


Figure8:typical diode forward characteristic,tp=300us

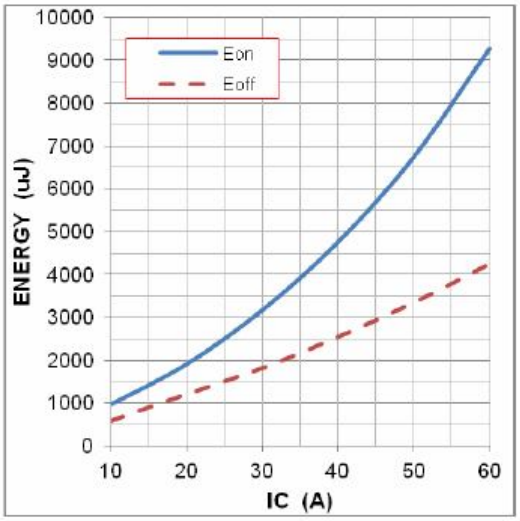


Figure9: typical energy loss VS. IC, TC=25℃,

L=500uH, VCE=600V,VGE=15V,Rg=28Ω

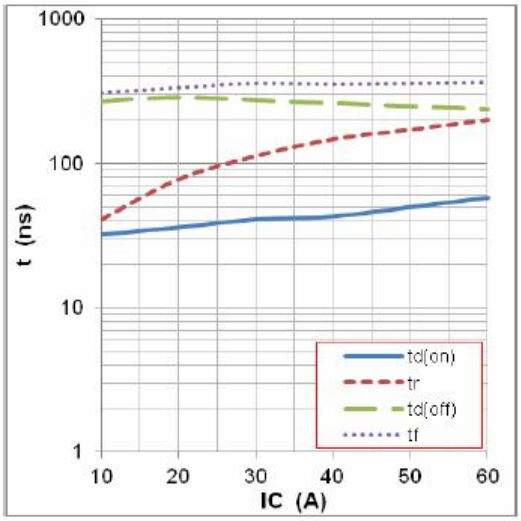


Figure10: typical switching time VS. IC, TC=25℃,

L=500uH, VCE=600V,VGE=15V,Rg=28Ω

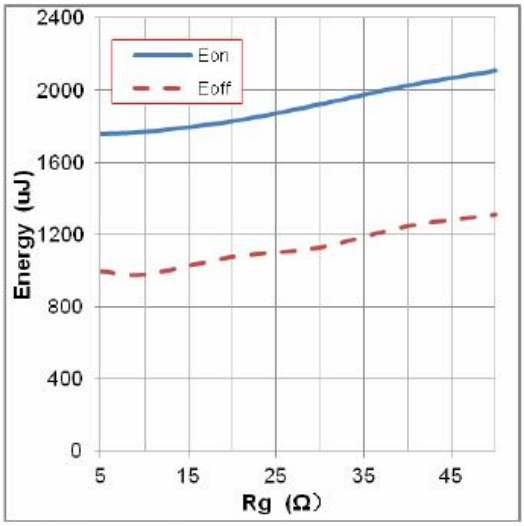


Figure11: typical energy loss VS. Rg,TC=25℃,

L=500uH, VCE=600V, VGE=15V,IC=20A

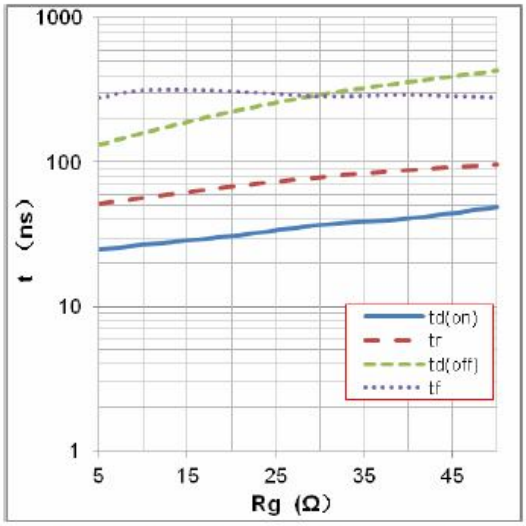


Figure12: typical switching time VS. Rg,TC=25℃,

L=500uH,VCE=600V,VGE=15V,IC=20A

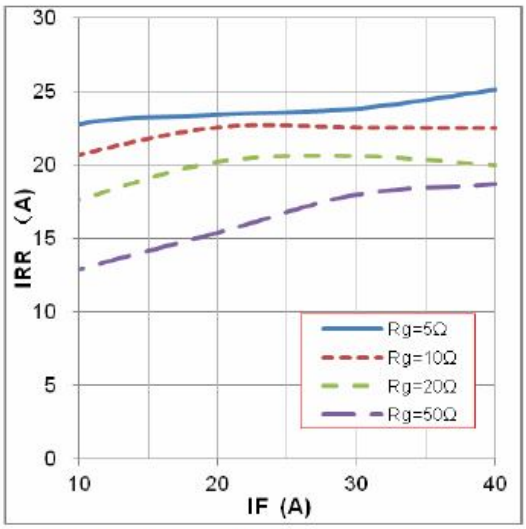


Figure13: typical diode IRR VS. IF, TC=25℃

VCC=600V, VGE=15V

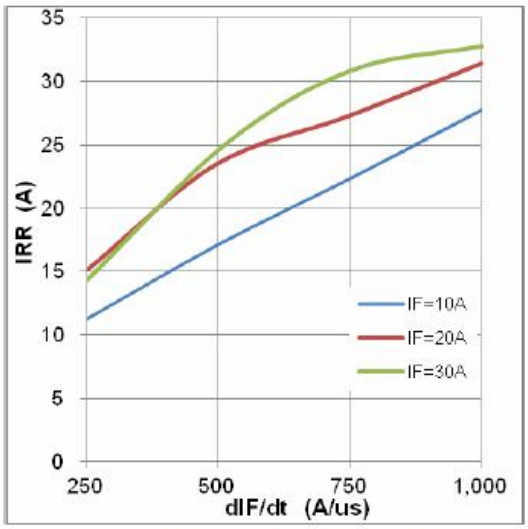


Figure14:typical diode IRR VS. dIF/dt

VCC=600V,VGE=15V

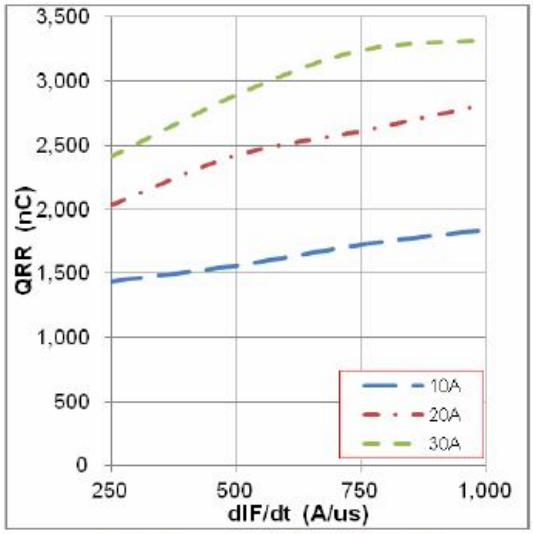


Figure15:typical diode QRR VS. dIF/dt

VCC=600V,VGE=15V

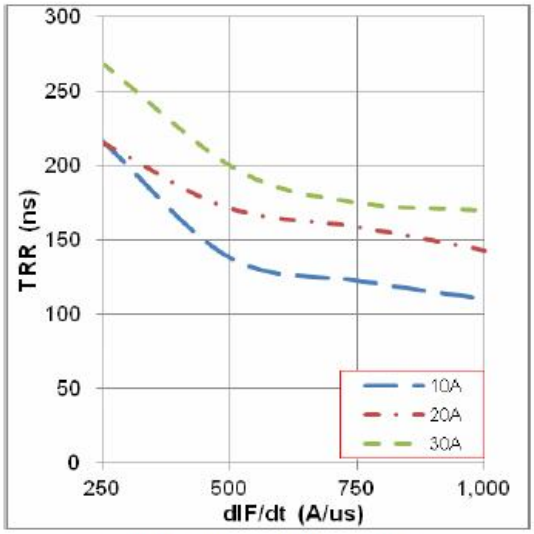


Figure16:typical diode TRR VS. dIF/dt,

VCC=600V,VGE=15V

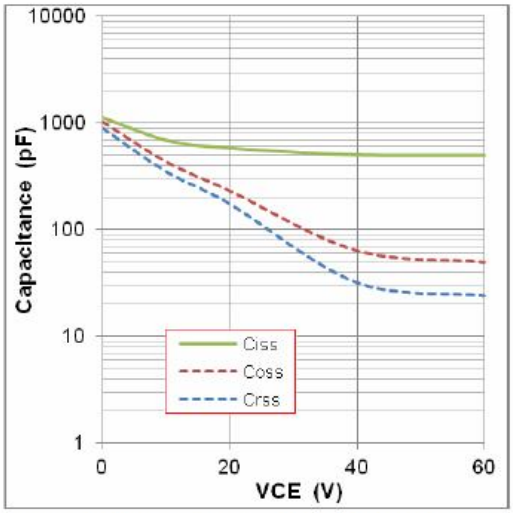


Figure17:typical capacitance VS. VCE,VGE=0V,f=100kHz

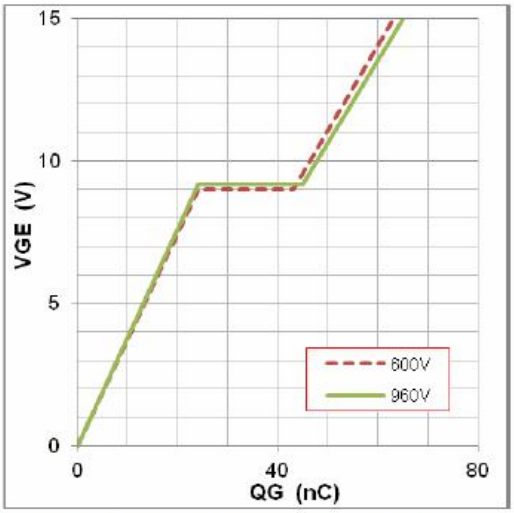


Figure18:typical gate charge VS. VGE,IC=20A

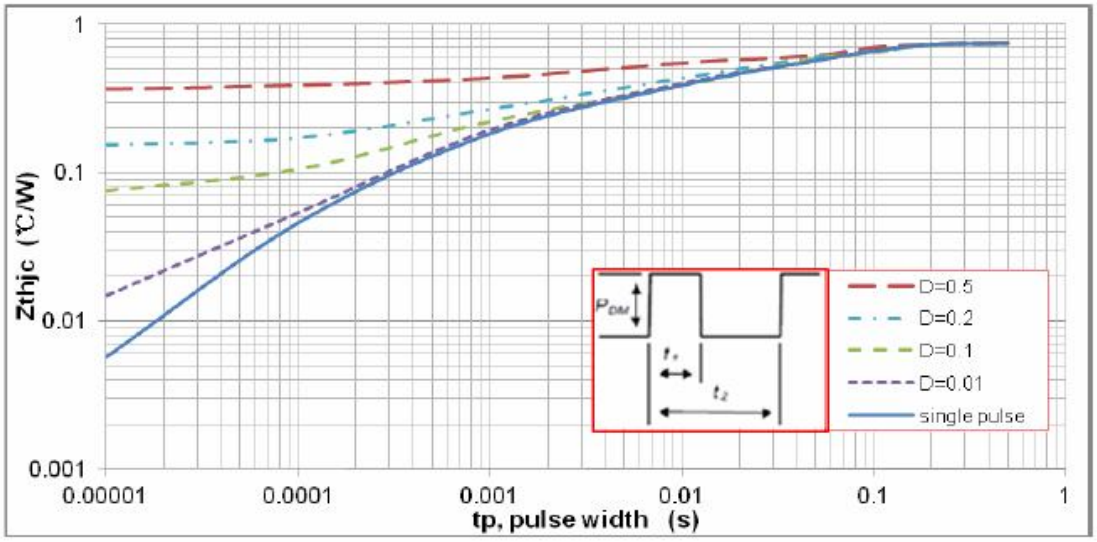


Figure19:normalized transient thermal impedance, junction-to-case

Note1.Duty factor D=t1/t2; Note2:peak TJ=PDM×Zthjc+TC

Mechanical Dimensions