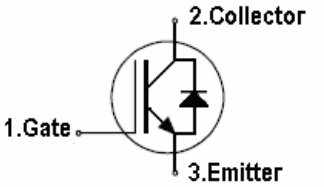
TSG40N120B

IGBT

DRAWING

G C E



Features

- 1200V,40A
- $V_{CE(sat)(typ.)}$=2.3V@V_{GE}=15V, Ic=40A
- High speed switching
- Higher system efficiency
- Soft current turn-off waveforms
- Square RBSOA using NPT technology

General Description

TS NPT 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 ℃)	80	A
	Continuous Collector Current (TC=100℃)	40	A
I_{CM}	Pulsed Collector Current (Note 1)	110	A
I_F	Diode Continuous Forward Current (TC=100 ℃)	40	A
I_{FM}	Diode Maximum Forward Current (Note 1)	75	A
tsc	Short Circuit Withstand Time	10	us
P_D	Maximum Power Dissipation (TC=25 ℃)	300	W
	Maximum Power Dissipation (TC=100℃)	120	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	0.42	℃/ W
Rth j-c	Thermal Resistance, Junction to case for Diode	0.83	℃/ 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		6	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE}=15V, I_C= 40A		2.3		V
Qg	Total Gate Charge	V_{CC}=960V		195		nC
Qge	Gate-Emitter Charge	V_{GE}=15V		90		nC
Qgc	Gate-Collector Charge	I_C=40A		105		nC
t d(on)	Turn-on Delay Time			68		ns
t r	Turn-on Rise Time	V_{CC}=600V		105		ns
t d(off)	Turn-off Delay Time	V_{GE}=15V,I_C=40A		680		ns
t f	Turn-off Fall Time	R_G=28Ω		97		ns
Eon	Turn-on Switching Loss	Inductive Load		5		mJ
Eoff	Turn-off Switching Loss	TC=25 ℃		3.6		mJ
Ets	Total Switching Loss			8.6		mJ
Cies	Input Capacitance	V_{CE}=25V		930		pF
Coes	Output Capacitance	V_{GE}=0V		215		pF
Cres	Reverse Transfer Capacitance	f = 100kHz		110		pF
R_{Gint}	Integrated gate resistor			3.8		Ω

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
V_F	Diode Forward Voltage	I_F=40A		2.5	3.5	V
t r r	Diode Reverse Recovery Time	V_{CE} = 600V		160		ns
I r r	Diode peak Reverse Recovery Current	I_F=40A		12		A
Qr r	Diode Reverse Recovery Charge	dIF/dt = 200A/us		1040		nC

Typical Characteristics

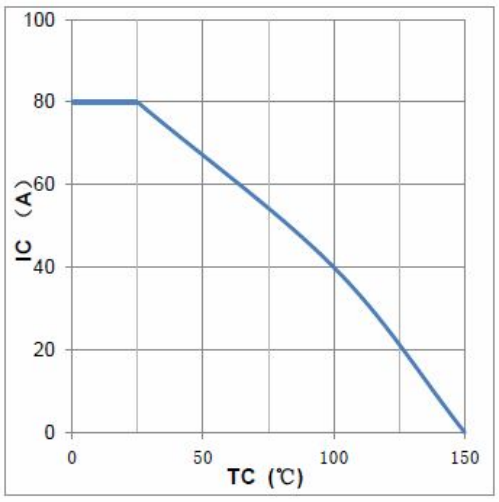


Figure1:maximum DC collector current VS. case temprature

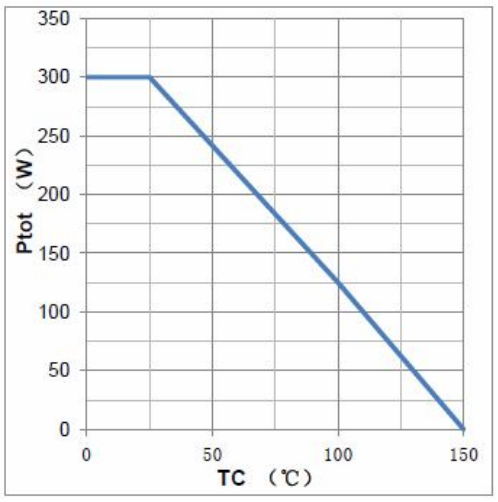


Figure2:power dissipation VS. case temprature

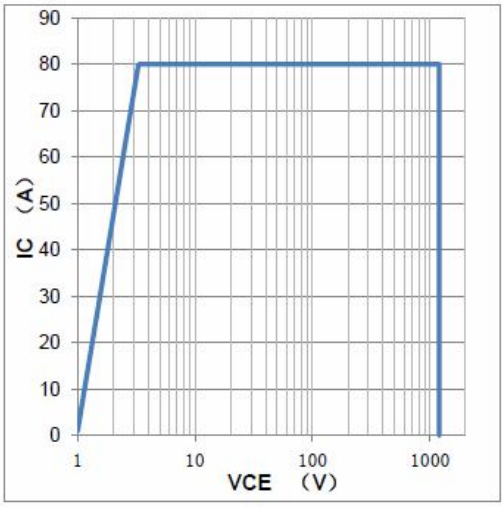


Figure3:reverse bias SOA,TJ=150℃,VGE=15V

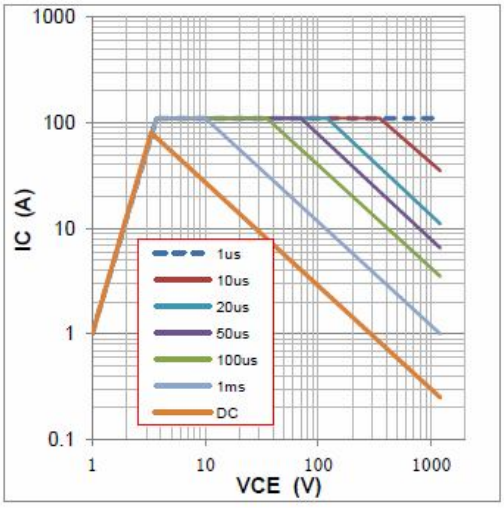


Figure4:forward SOA,TC=25℃,TJ≤150℃

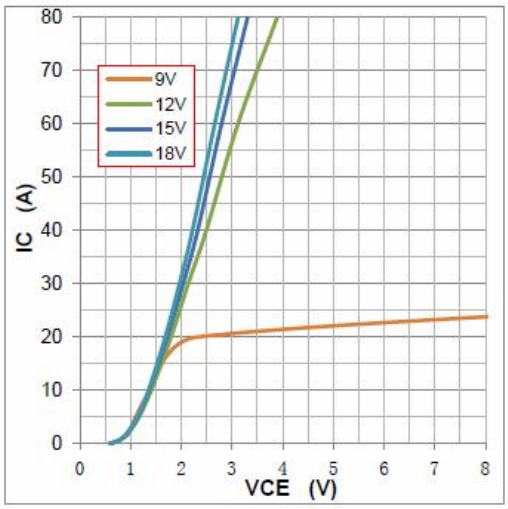


Figure5:typical IGBT output characteristics, TJ=25℃;tp=300us

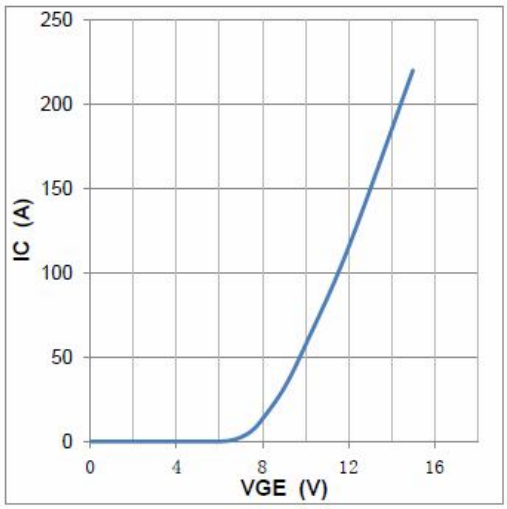


Figure6:typical trans characteristics,VCE=20V,tp=20us

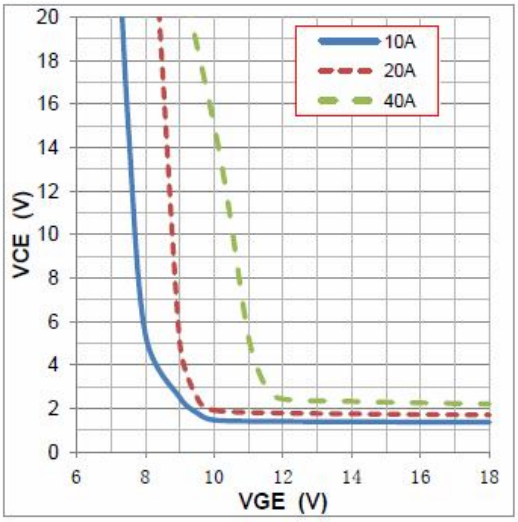


Figure7: typical VCE VS. VGE,TJ=25℃

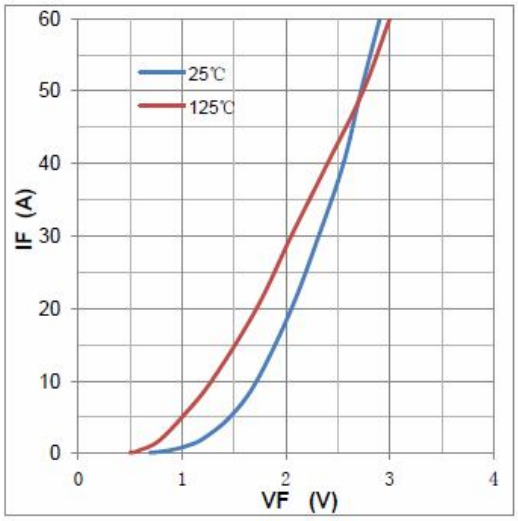


Figure8:typical diode forward characteristic,tp=300us

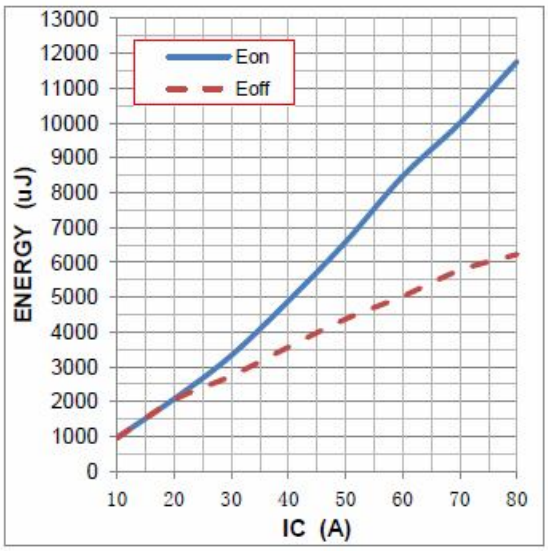


Figure9: typical energy loss VS. IC, TC=25℃,

L=500uH, VCE=600V,VGE=15V,Rg=28Ω

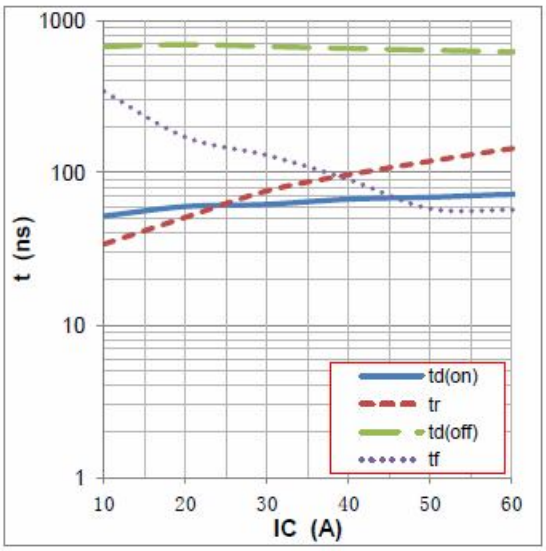


Figure10: typical switching time VS. IC, TC=25℃,

L=500uH, VCE=600V,VGE=15V,Rg=28Ω

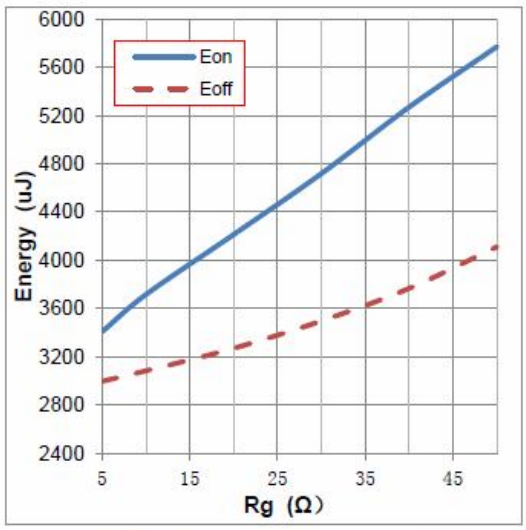


Figure11: typical energy loss VS. Rg,TC=25℃,

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

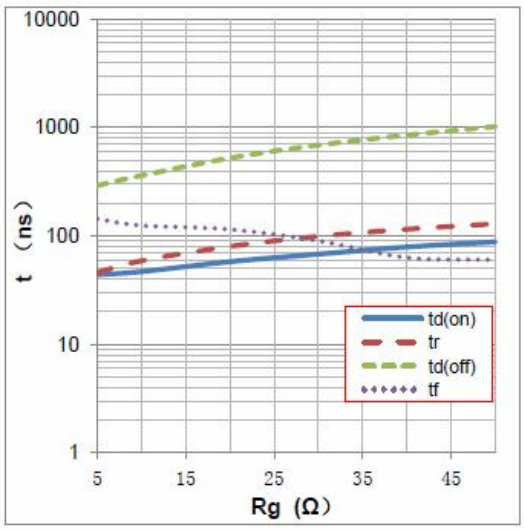


Figure12: typical switching time VS. Rg,TC=25℃,

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

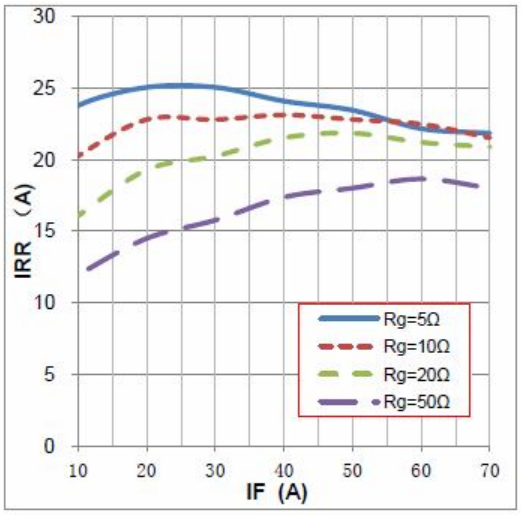


Figure13: typical diode IRR VS. IF, TC=25℃

VCC=600V, VGE=15V

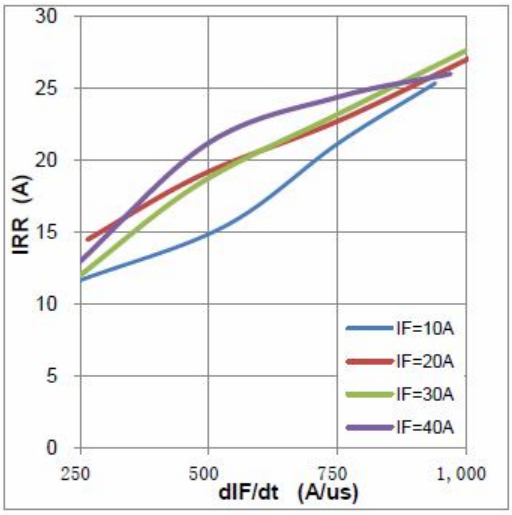


Figure14:typical diode IRR VS. dIF/dt

VCC=600V,VGE=15V

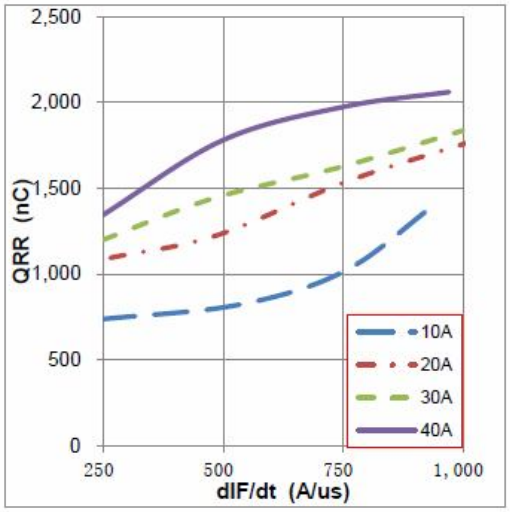


Figure15:typical diode QRR VS. dIF/dt

VCC=600V,VGE=15V

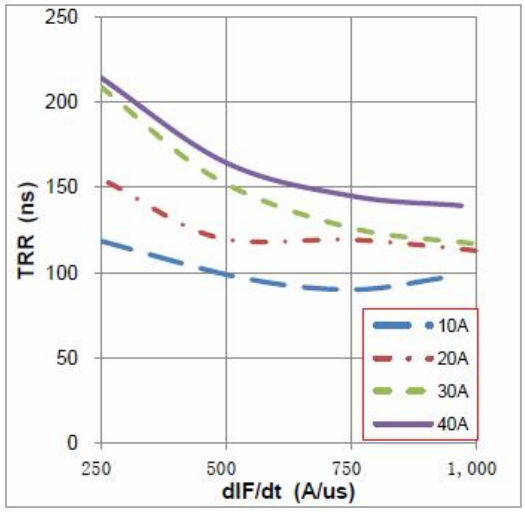


Figure16:typical diode TRR VS. dIF/dt,

VCC=600V,VGE=15V

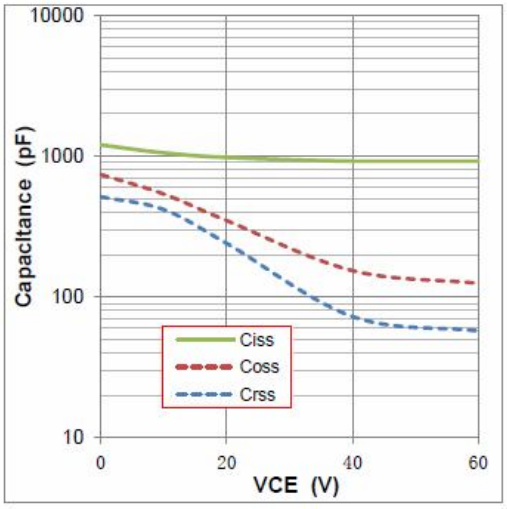


Figure17:typical capacitance VS. VCE,VGE=0V,f=100kHz

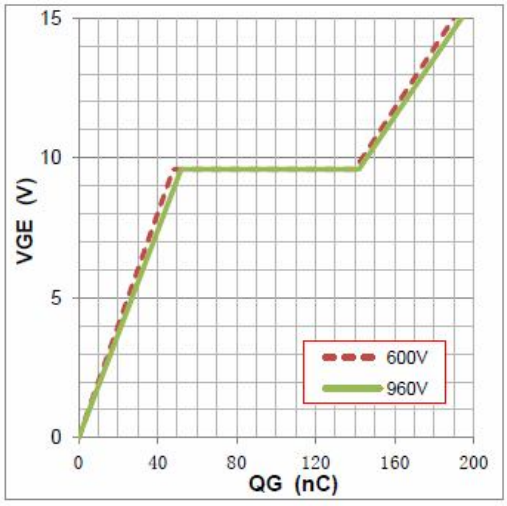


Figure18:typical gate charge VS. VGE,IC=20A

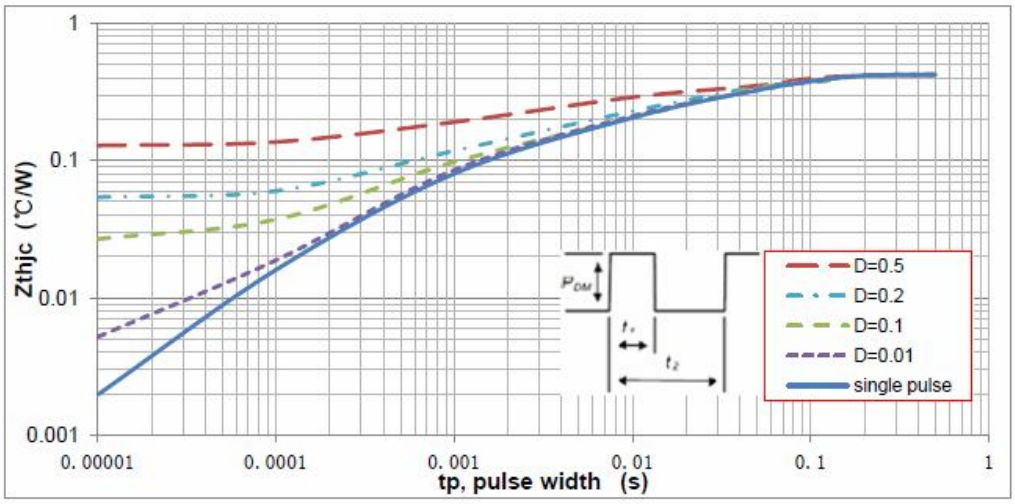


Figure19:normalized transient thermal impedance, junction-to-case

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

Mechanical Dimensions