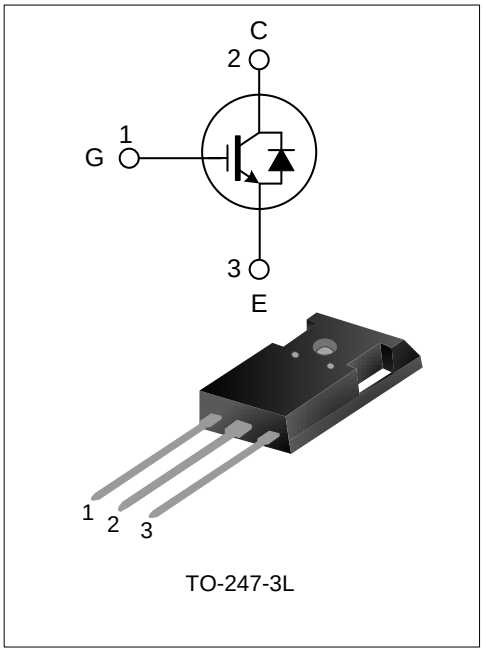
40A, 1200V FIELD STOP IGBT

DESCRIPTION

SGT40T120SDB4P7 adopts Silan Field Stop IV IGBT technology, features low conduction loss and switching loss, positive temperature coefficient for easy parallel operation. This device is applicable to frequency converters, UPS, and SMPS fields.



FEATURES

- 40A, 1200V, $V_{CE(sat)(typ.)}$=1.8V@I_C=40A
- Ultra low conduction loss
- Fast switching
- High breakdown voltage
- TJmax=175°C

NOMENCLATURE

SGT 40 T 120 S D B 4 P7

IGBT series

Current, 70: 70A

N : N Channel
NE : N-channel planar gate with ESD
T : Field Stop 3/4
U : Field Stop 4+
V : Field Stop 5
W: Field Stop 6
X : Field Stop 7

Voltage, 65: 650V
120: 1200V

Package
P7 : TO-247-3L

1,2,3⋯ : Version No.

Blank: Standard diode
M : Standard Diode, full range
R : Rapid Diode
B : Rapid Diode, full range
S : Soft Diode, full range

D : Packaged with fast recovery diode
R : RC IGBT

L: Ultra low switching,
recommended frequency ~2kHz;
Q: Low switching,
recommended frequency 2~20kHz;
S: Standard frequency,
recommended frequency 5~40kHz;
F: Fast switching,
recommended frequency10~60kHz;
UF: Ultra fast switching,
recommended frequency 40kHz~.

ORDERING INFORMATION

Part No.	Package	Marking	Hazardous Substance Control	Packing Type
SGT40T120SDB4P7	TO-247-3L	40T120SDB4	Pb free	Tube

ABSOLUTE MAXIMUM RATINGS (UNLESS OTHERWISE NOTED, T_C=25°C)

Characteristics		Symbol	Ratings	Unit
Collector to Emitter Voltage		V_{CE}	1200	V
Gate to Emitter Voltage		V_{GE}	±20	V
Collector Current	T_C=25°C	I_C	80	A
	T_C=100°C		40	A
Pulsed Collector Current		I_{CM}	160	A
Diode Current	T_C=25°C	I_F	80	A
	T_C=100°C		40	A
Diode Pulse Current		I_{FM}	160	A
Short Circuit Withstand Time		Tsc	10	μs
Power Dissipation (TC=25°C)		P_D	428	W
- Derate above 25°C			2.85	W/°C
Operating Junction Temperature		T_J	-55～+175	°C
Storage Temperature Range		T_{stg}	-55～+150	°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Ratings	Unit
Thermal Resistance, Junction-to-Case (IGBT)	$R_{\theta JC}$	0.32	°C/W
Thermal Resistance, Junction-to-Case (FRD)	$R_{\theta JC}$	0.52	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	40	°C/W

ELECTRICAL CHARACTERISTICS OF IGBT (UNLESS OTHERWISE NOTED, T_C=25°C)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Collector to Emitter Breakdown Voltage	BV_{CE}	V_{GE}=0V, I_C=1mA	1200	--	--	V
C-E Leakage Current	I_{CES}	V_{CE}=1200V, V_{GE}=0V	--	--	500	μA
G-E Leakage Current	I_{GES}	V_{GE}=20V, V_{CE}=0V	--	--	±400	nA
G-E Threshold Voltage	$V_{GE(th)}$	I_C=4.0mA,V_{CE}=V_{GE}	4	5.5	7	V
Collector to Emitter Saturation Voltage	$V_{CE(sat)}$	I_C=40A, V_{GE}=15V, T_J=25C	--	1.8	2.4	V
		I_C=40A, V_{GE}=15V, T_J=150°C	--	2.1	--	V
Input Capacitance	C_{ies}	V_{CE}=30V, V_{GE}=0V, f=1MHz	--	4100	--	pF
Output Capacitance	C_{oes}		--	190	--	
Reverse Transfer Capacitance	C_{res}		--	80	--	
Turn-On Delay Time	$T_{d(on)}$	V_{CE}=600V, I_C=40A, R_g=10Ω V_{GE}=15V, Inductive load T_J=25°C	--	45	--	ns
Rise Time	T_r		--	120	--	
Turn-Off Delay Time	$T_{d(off)}$		--	270	--	
Fall Time	T_f		--	200	--	
Turn-On Switching Loss	E_{on}		--	4.5	--	mJ
Turn-Off Switching Loss	E_{off}		--	1.8	--	
Total Switching Loss	E_{st}		--	6.3	--	
Total Gate Charge	Q_g	V_{CE}=600V, I_C=40A, V_{GE}=15V	--	270	--	nC
Gate to Emitter Charge	Q_{ge}		--	45	--	
Gate to Collector Charge	Q_{gc}		--	150	--	

ELECTRICAL CHARACTERISTICS OF FRD (UNLESS OTHERWISE NOTED, T_C=25°C)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Diode Forward Voltage	V_{fm}	I_F=40A, T_J=25°C	--	1.9	2.6	V
		I_F=40A, T_J=150°C	--	1.7	--	
Diode Reverse Recovery Time	T_{rr}	VDD=200V, I_{ES}=40A, dI_{ES}/dt=100A/μs, T_J=25°C	--	119	--	ns
Diode Reverse Recovery Charge	Q_{rr}		--	0.23	--	μC
Diode Peak Reverse Recovery Current	Irm		--	3.86	--	A
Diode Reverse Recovery Current Tb slope	Di_{rr}/Dt		--	103	--	A/μs

TYPICAL CHARACTERISTICS

Figure 1. Typical Output Characteristics (Tc=25°C)

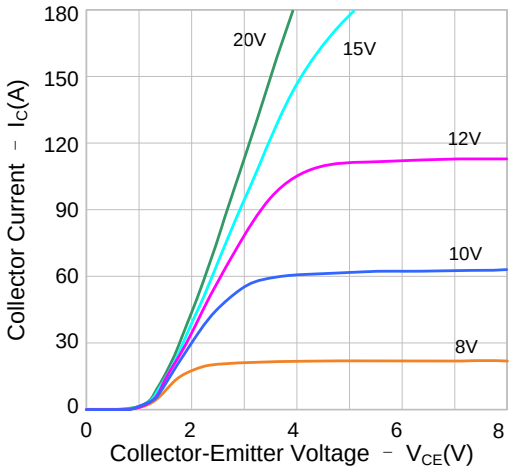


Figure 2. Typical Output Characteristics(Tc=175°C)

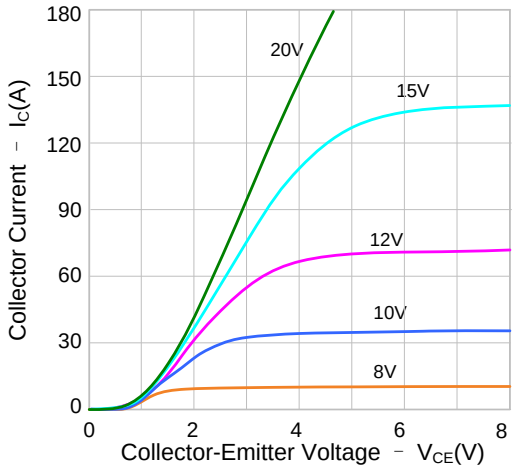


Figure 3. Typical Saturation Voltage Characteristic

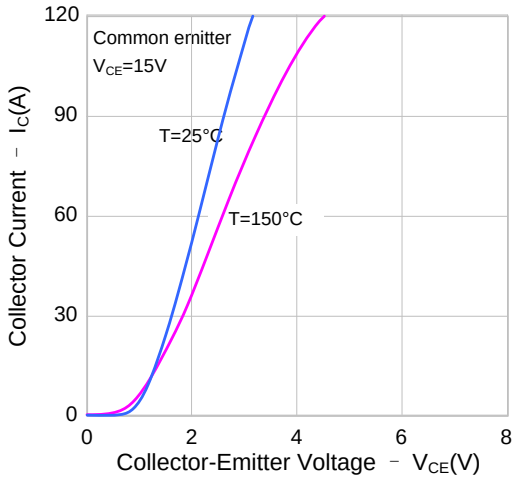


Figure 4. Transfer Characteristic

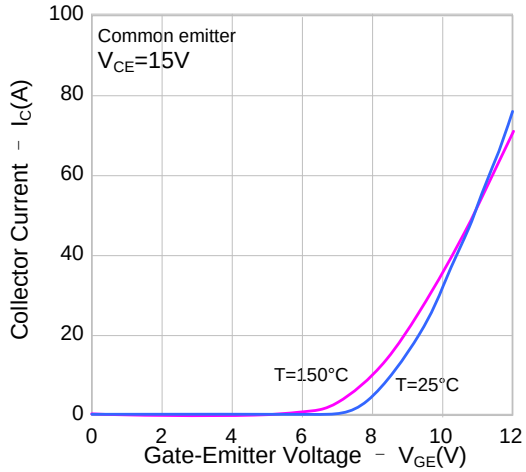


Figure 5. Saturation Voltage Drop vs. Temperature

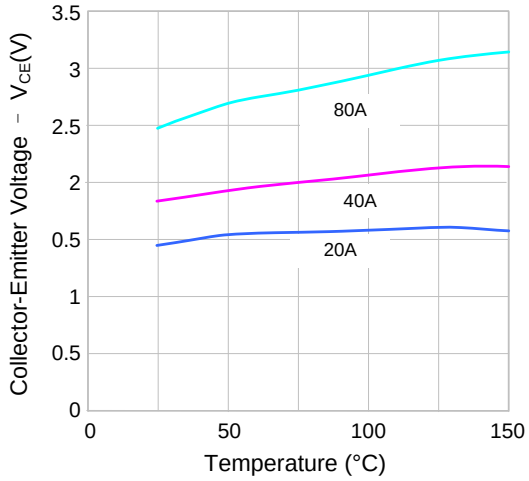
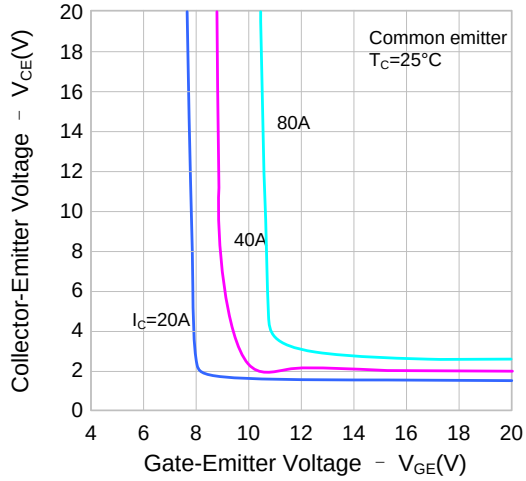


Figure 6. Saturation Voltage vs. V_{GE}



TYPICAL CHARACTERISTICS (CONTINUED)

Figure 7. Saturation Voltage vs. V_{GE}

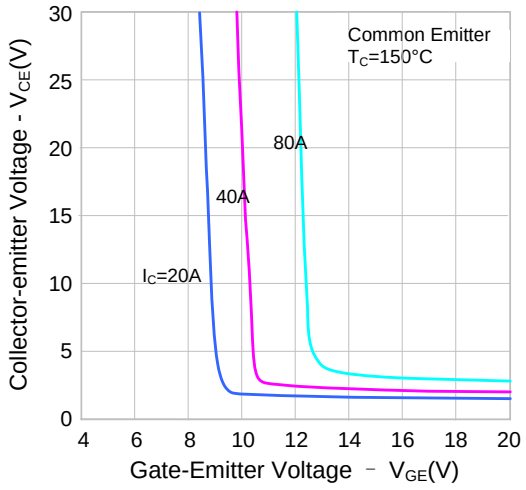


Figure 8. Capacitance Characteristic

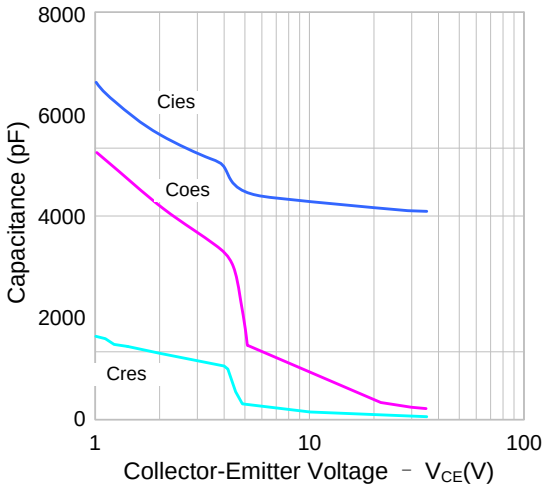


Figure 9. Gate Charge Characteristic

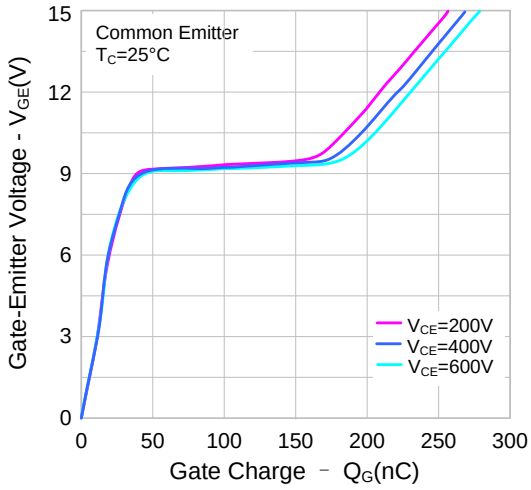


Figure 10. Turn-on Characteristic vs. Gate Resistance

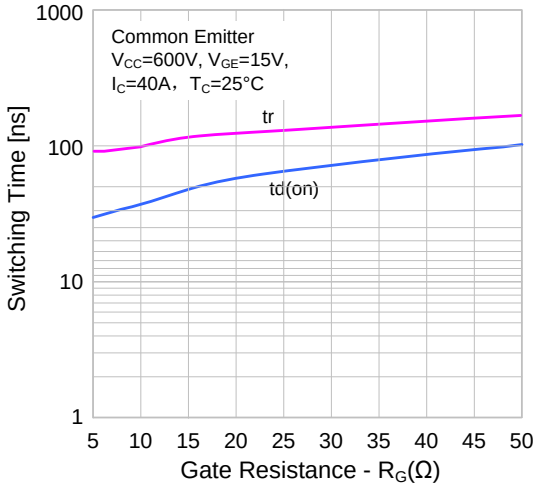


Figure 11. Turn-off Characteristic vs. Gate Resistance

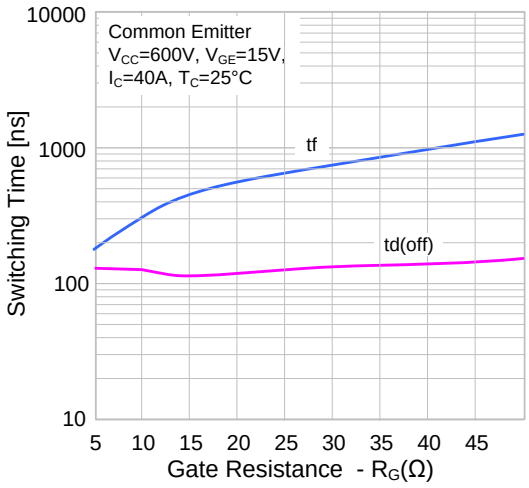
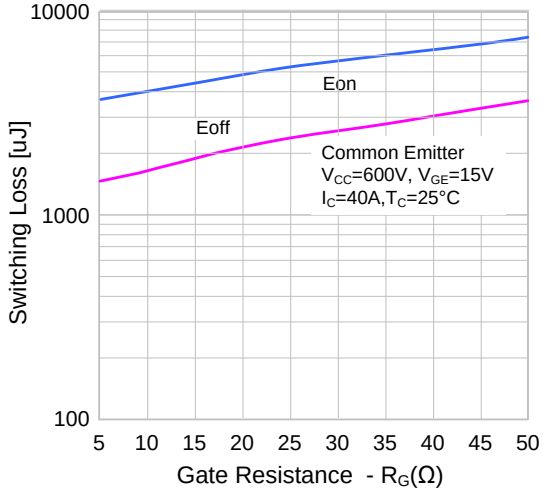


Figure 12. Switching Loss vs. Gate Resistance



TYPICAL CHARACTERISTICS (CONTINUED)

Figure 13. Turn-on Characteristic vs. Collector Current

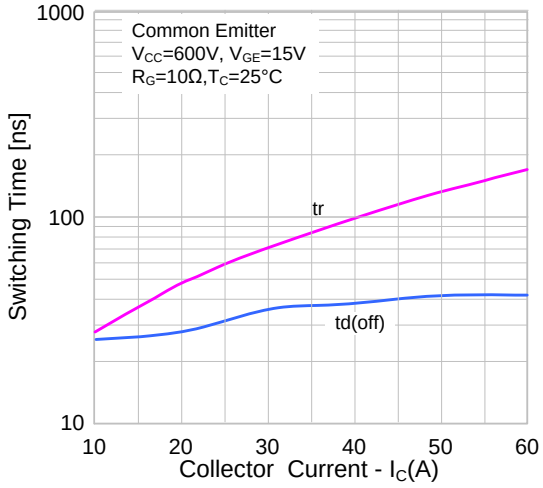


Figure 14. Turn-off Characteristic vs. Collector Current

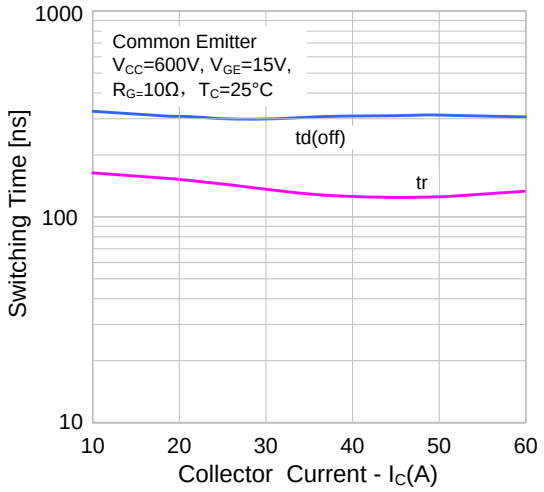


Figure 15. Switching Loss vs. Collector Current

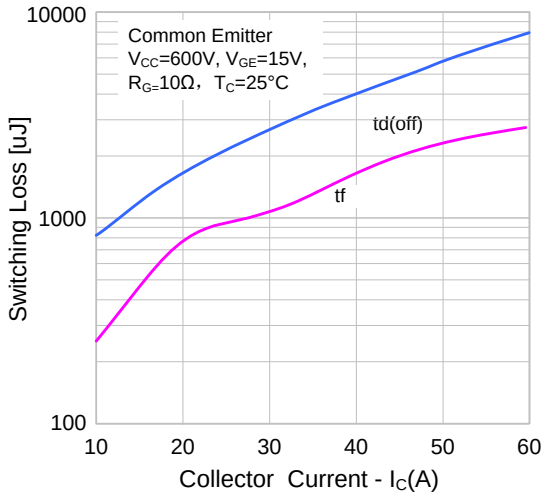


Figure 16. Forward Characteristic

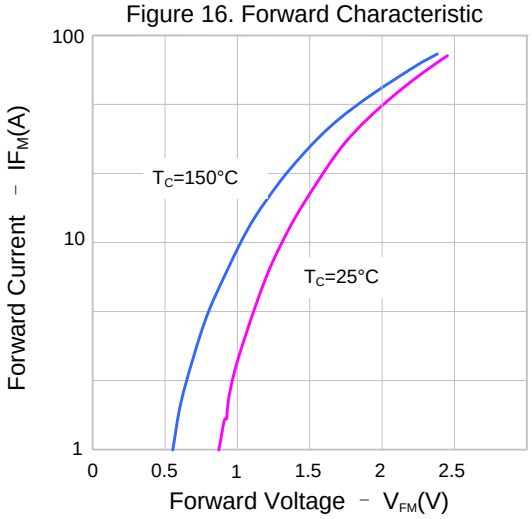


Figure 17. Reverse Recovery Time vs. Forward Current

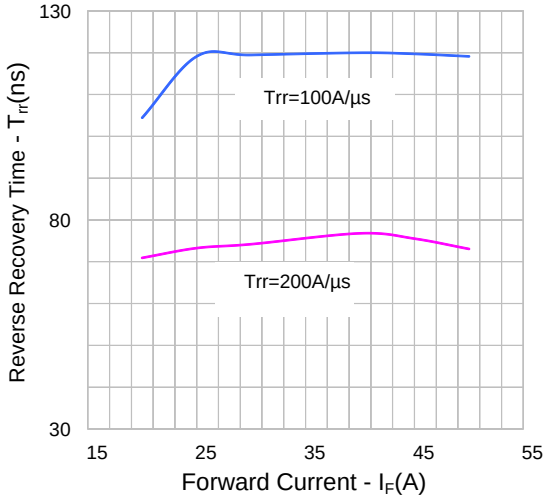
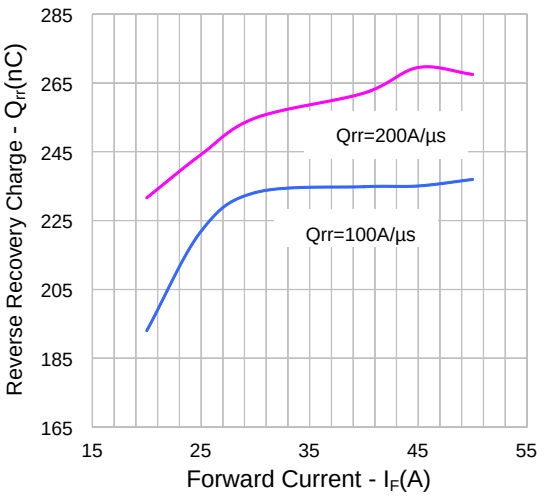


Figure 18. Reverse Recovery Charge vs. Forward Current



TYPICAL CHARACTERISTICS (CONTINUED)

Figure 19. Peak Reverse Recovery Current vs. Forward Current

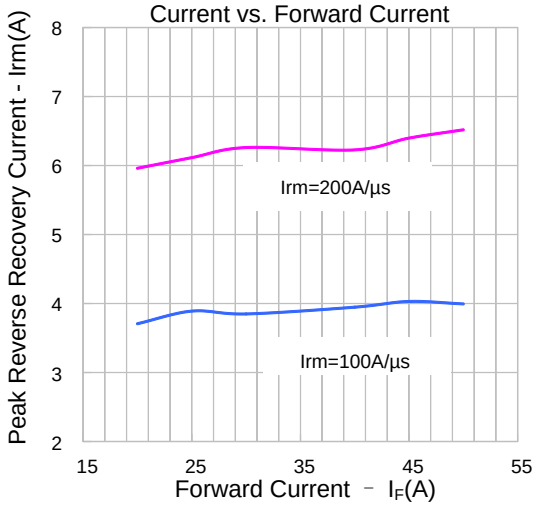


Figure 20. Tb Slope vs. Forward Current

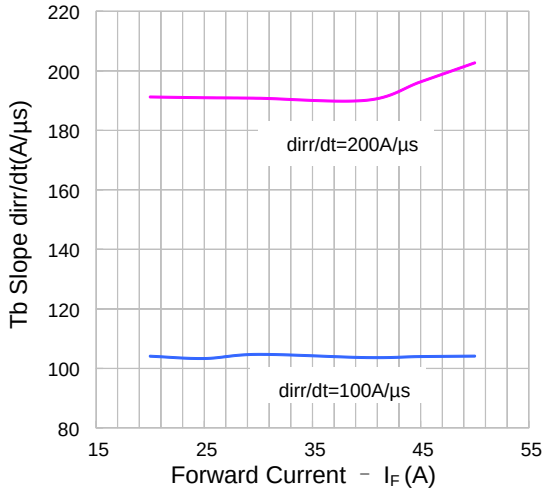
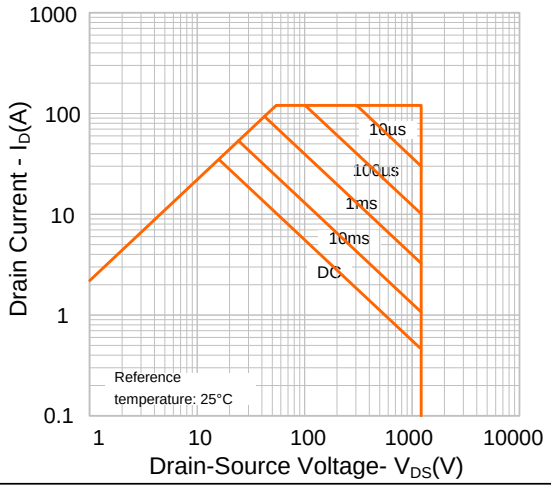
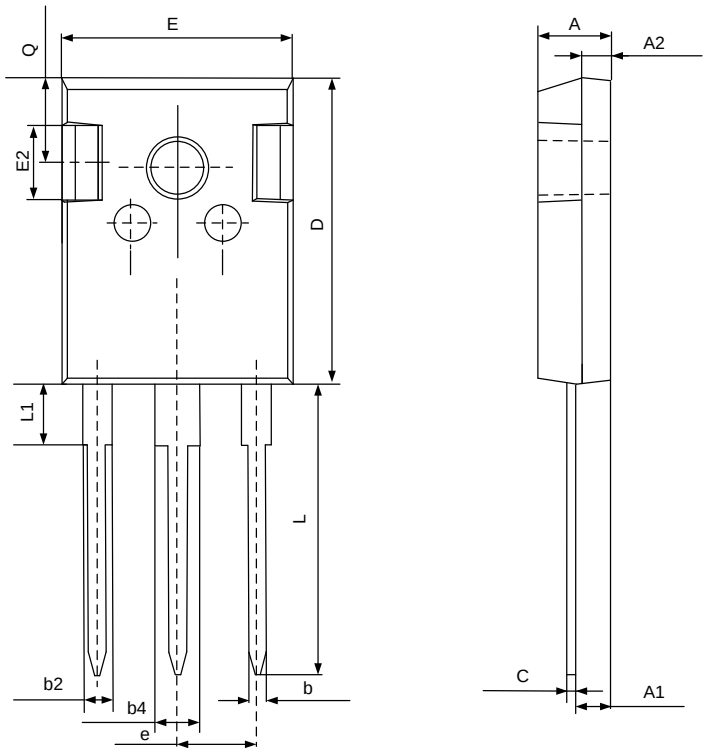


Figure 21. Max. Safe Operating Area



PACKAGE OUTLINE

TO-247-3L **UNIT: mm**



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.59
A2	1.85	2.00	2.15
b	1.11	–	1.36
b2	1.91	–	2.25
b4	2.91	–	3.25
c	0.51	–	0.75
D	20.80	21.00	21.30
E	15.50	15.80	16.10
E2	4.40	5.00	5.20
e	5.44 BSC		
L	19.72	19.92	20.22
L1	–	–	4.30
Q	5.60	5.80	6.00

Important notice :

1. **The instructions are subject to change without notice!**
2. **Customers should obtain the latest relevant information before placing orders and should verify that such information is complete and current. Please read the instructions carefully before using our products, including the circuit operation precautions.**
3. **Our products are consumer electronic products or the other civil electronic products.**
4. **When using our products, please do not exceed the maximum rating of the products, otherwise the reliability of the whole machine will be affected. There is a certain possibility of failure or malfunction of any semiconductor product under specific conditions. The buyer is responsible for complying with safety standards and taking safety measures when using our products for system design, sample and whole machine manufacturing, so as to avoid potential failure risk that may cause personal injury or property loss.**
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Rev.: 1.0

Revision History:

1. First release