

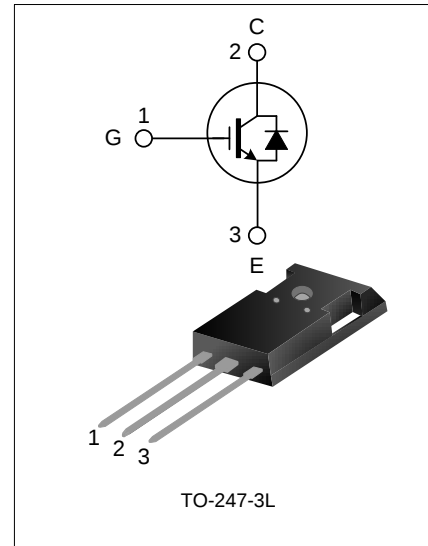
51A, 650V FIELD STOP IGBT

DESCRIPTION

The SGT51V65FD1P7 field stop IGBT adopts Silan Field Stop V technology, features low conduction loss and switching loss. This device is applicable to photovoltaic, UPS, SMPS, and PFC fields.

FEATURES

- ◆ 51A, 650V, $V_{CE(sat)(typ.)}=1.65V@I_C=51A$
- ◆ Low conduction loss
- ◆ Fast switching
- ◆ High input impedance



NOMENCLATURE

SGT 51 V 65 F D X 1 P7			
IGBT series			Package
Current, 70: 70A			P7 : TO-247-3L
N : N Channel			1,2,3... : Version No.
NE : N-channel planar gate with ESD			Blank: Standard diode
T : Field Stop 3/4			M : Standard Diode, full range
U : Field Stop 4+			R : Rapid Diode
V : Field Stop 5			B : Rapid Diode, full range
W : Field Stop 6			S : Soft Diode, full range
X : Field Stop 7			D : Packaged with fast recovery diode
Voltage, 65: 650V			R : RC IGBT
120: 1200V			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 frequency 10~60KHz
			UF : Ultra fast switching, recommended frequency 40KHz~

ORDERING INFORMATION

Part No.	Package	Marking	Hazardous Substance Control	Packing Type
SGT51V65FD1P7	TO-247-3L	51V65FD1	Pb free	Tube

ABSOLUTE MAXIMUM RATINGS (UNLESS OTHERWISE NOTED, $T_C=25^{\circ}\text{C}$)

Characteristics		Symbol	Ratings	Unit
Collector to Emitter Voltage		V_{CE}	650	V
Gate to Emitter Voltage		V_{GE}	± 20	V
Collector Current	$T_C=25^{\circ}\text{C}$	I_C	100	A
	$T_C=100^{\circ}\text{C}$		51	
Pulsed Collector Current		I_{CM}	150	A
Diode Current	$T_C=25^{\circ}\text{C}$	I_F	51	A
	$T_C=100^{\circ}\text{C}$		25	
Power Dissipation ($T_C=25^{\circ}\text{C}$)		P_D	231	W
Operating Junction Temperature		T_J	$-55 \sim +150$	$^{\circ}\text{C}$
Storage Temperature Range		T_{stg}	$-55 \sim +150$	$^{\circ}\text{C}$

THERMAL CHARACTERISTICS

Characteristics	Symbol	Ratings	Unit
Thermal Resistance, Junction to Case (IGBT)	$R_{\theta JC}$	0.54	$^{\circ}\text{C/W}$
Thermal Resistance, Junction to Case (FRD)	$R_{\theta JC}$	1.48	$^{\circ}\text{C/W}$
Thermal Resistance, Junction to Ambient (IGBT)	$R_{\theta JA}$	40	$^{\circ}\text{C/W}$

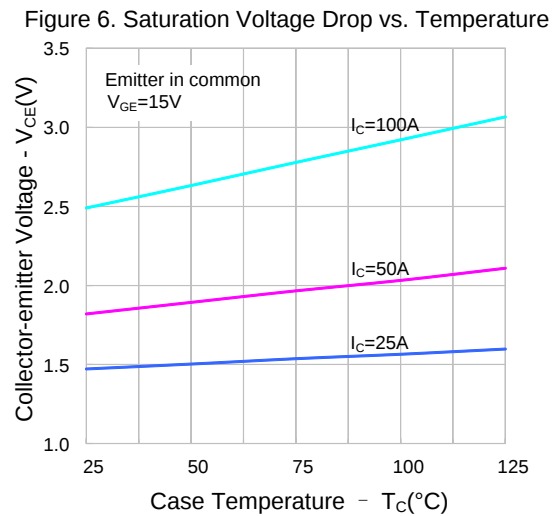
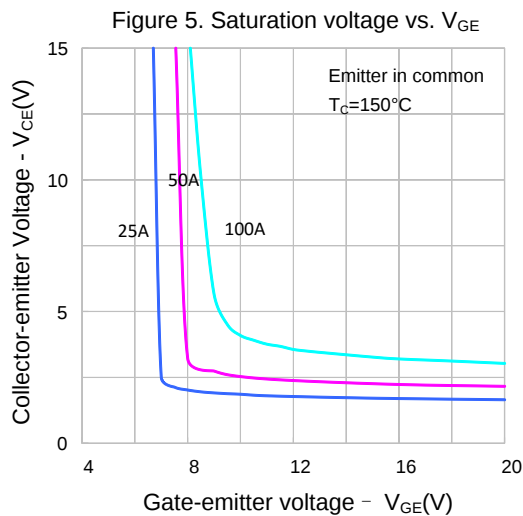
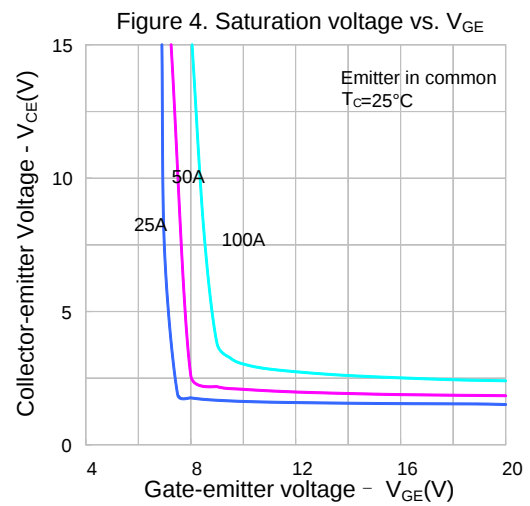
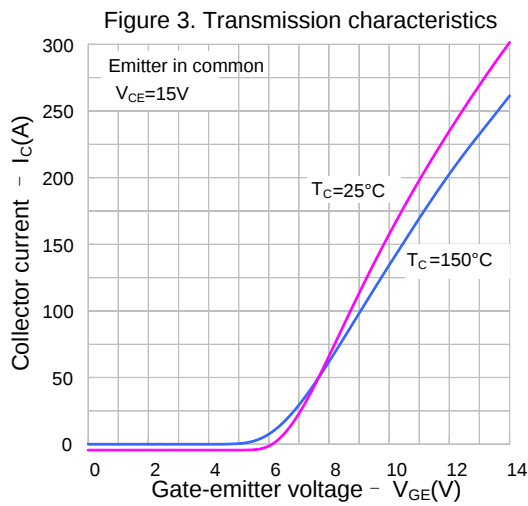
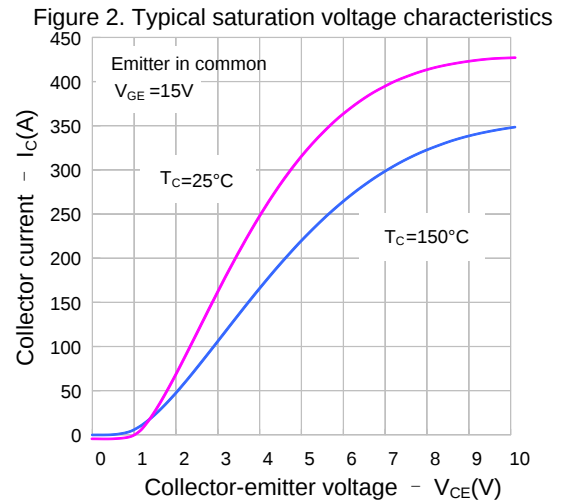
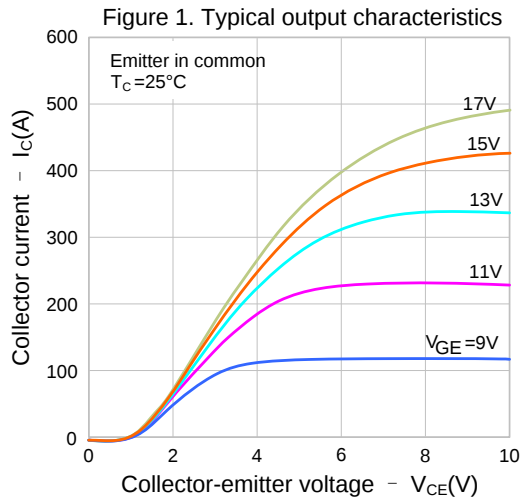
ELECTRICAL CHARACTERISTICS OF IGBT (UNLESS OTHERWISE NOTED, $T_c = 25^\circ\text{C}$)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Collector to Emitter Breakdown Voltage	BV_{CE}	$V_{GE}=0V, I_C=250\mu A$	650	--	--	V
C-E Leakage Current	I_{CES}	$V_{CE}=600V, V_{GE}=0V$	--	--	200	μA
G-E Leakage Current	I_{GES}	$V_{GE}=20V, V_{CE}=0V$	--	--	± 400	nA
G-E Threshold Voltage	$V_{GE(th)}$	$I_C=250\mu A, V_{CE}=V_{GE}$	3.2	4.5	5.8	V
Collector to Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=51A, V_{GE}=15V, T_C=25^\circ\text{C}$	--	2.1	--	V
		$I_C=51A, V_{GE}=15V, T_C=125^\circ\text{C}$	--	2.35	--	V
Input Capacitance	C_{ies}	$V_{CE}=30V$	--	3139	--	pF
Output Capacitance	C_{oes}	$V_{GE}=0V$	--	62	--	
Reverse Transfer Capacitance	C_{res}	$f=1\text{MHz}$	--	13	--	
Turn-On Delay Time	$T_{d(on)}$	$V_{CE}=400V$ $I_C=25A$ $R_g=10\Omega$ $V_{GE}=15V$ inductive load	--	23	--	ns
Rise Time	T_r		--	53	--	
Turn-Off Delay Time	$T_{d(off)}$		--	118	--	
Fall Time	T_f		--	72	--	
Turn-On Switching Loss	E_{on}		--	1.0	--	mJ
Turn-Off Switching Loss	E_{off}		--	0.2	--	
Total Switching Loss	E_{st}		--	1.2	--	
Turn-On Delay Time	$T_{d(on)}$	$V_{CE}=400V$ $I_C=51A$ $R_g=10\Omega$ $V_{GE}=15V$ inductive load	--	30	--	ns
Rise Time	T_r		--	109	--	
Turn-Off Delay Time	$T_{d(off)}$		--	120	--	
Fall Time	T_f		--	129	--	
Turn-On Switching Loss	E_{on}		--	2.8	--	mJ
Turn-Off Switching Loss	E_{off}		--	1.2	--	
Total Switching Loss	E_{st}		--	4.0	--	
Total Gate Charge	Q_g	$V_{CE}=400V, I_C=51A, V_{GE}=15V$	--	112	--	nC
Gate to Emitter Charge	Q_{ge}		--	30	--	
Gate to Collector Charge	Q_{gc}		--	30	--	

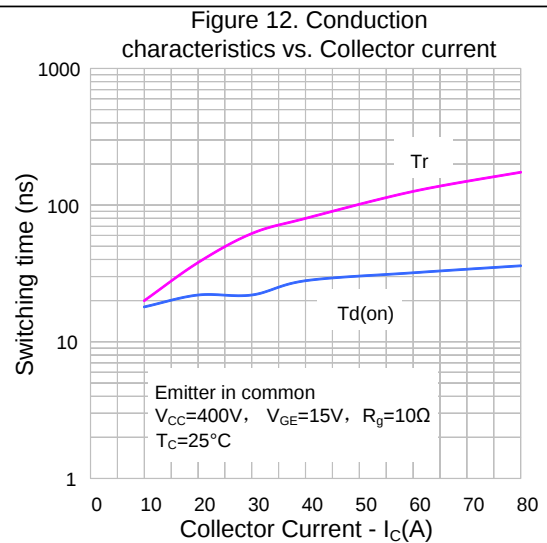
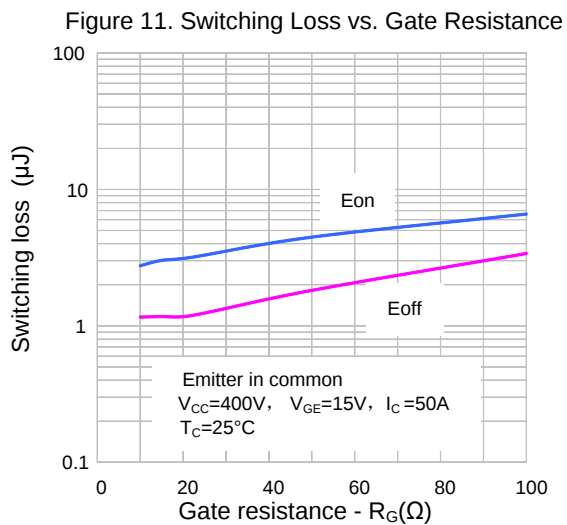
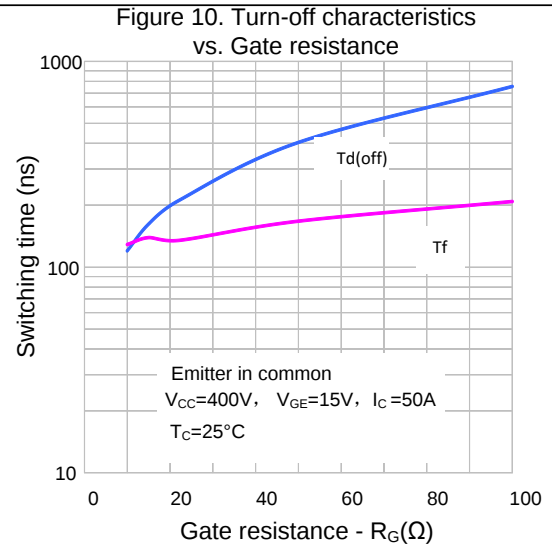
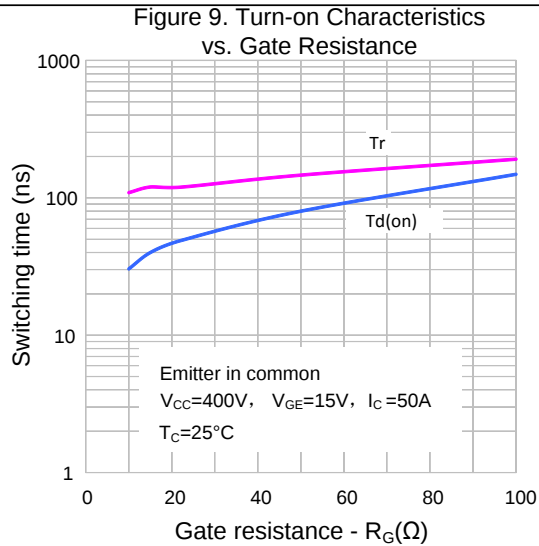
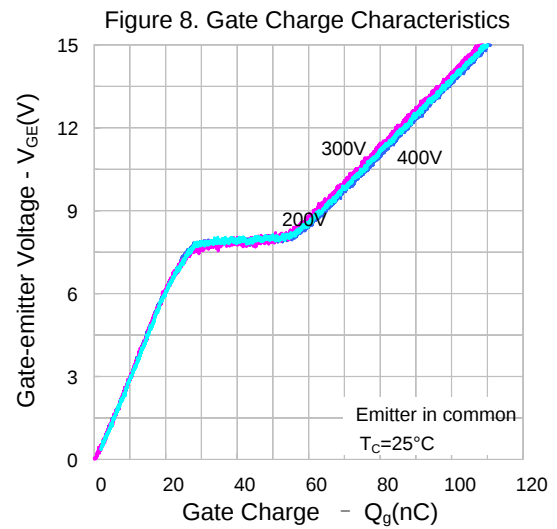
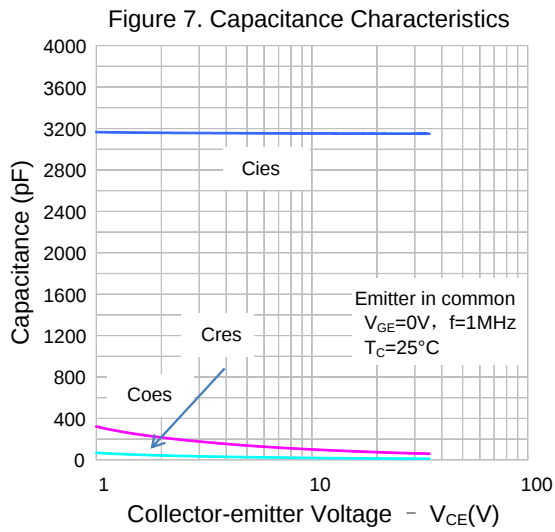
ELECTRICAL CHARACTERISTICS OF FRD (UNLESS OTHERWISE NOTED, $T_c=25^\circ\text{C}$)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Diode Forward Voltage	V_{fm}	$I_F=25A, T_C=25^\circ\text{C}$	--	1.95	--	V
		$I_F=25A, T_C=125^\circ\text{C}$	--	1.7	--	
Diode Reverse Recovery Time	T_{rr}	$I_{EC}=25A, di_{EC}/dt=200A/\mu s,$	--	33	--	ns
Diode Reverse Recovery Charge	Q_{rr}	$T_C=25^\circ\text{C}$	--	65	--	nC

TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS (CONTINUED)



TYPICAL CHARACTERISTICS (CONTINUED)

Figure 13. Turn-off characteristics vs. Collector current

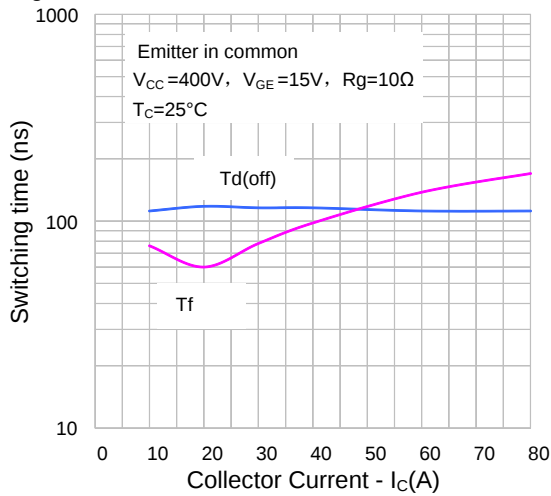


Figure 14. Switching Loss vs. Collector Current

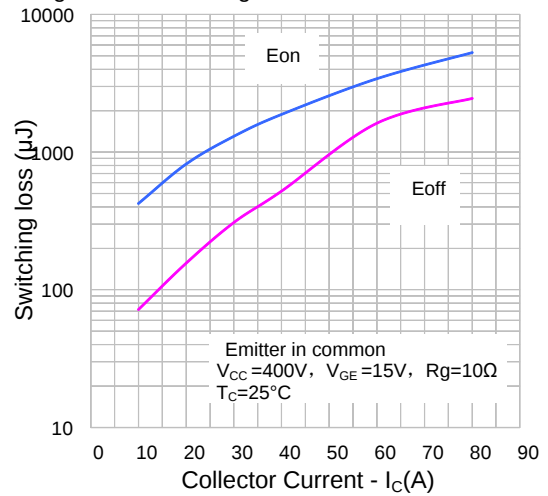


Figure 15. Forward characteristics

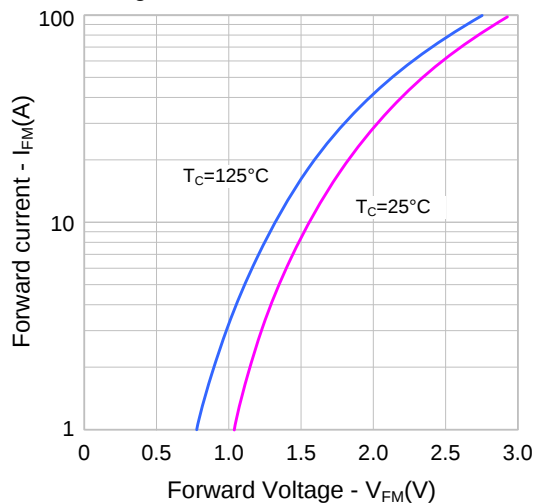


Figure 16. Reverse recovery time vs. Forward current

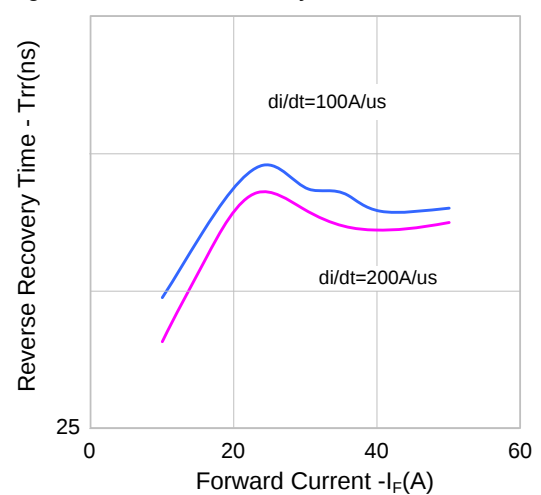


Figure 17. Reverse Recovery Charge vs. Forward Current

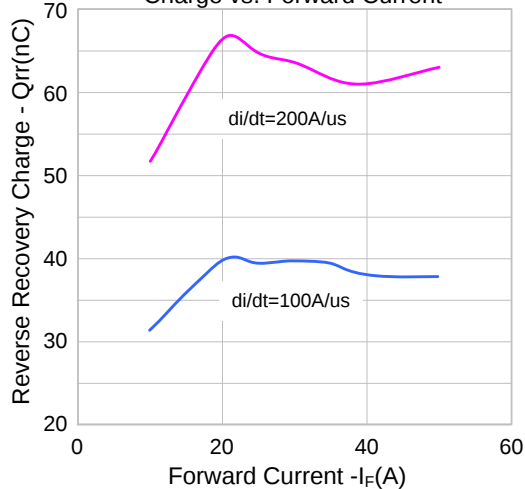
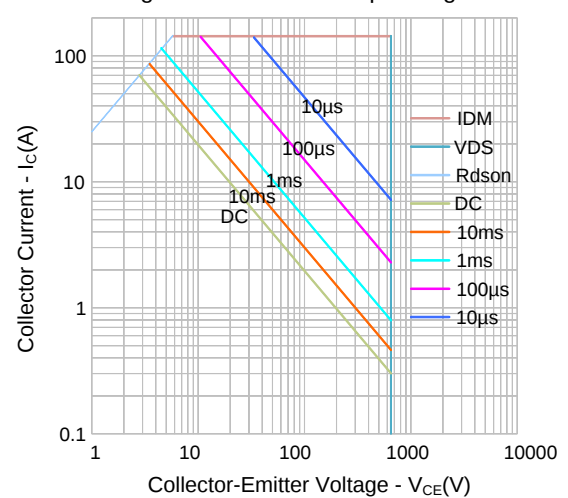


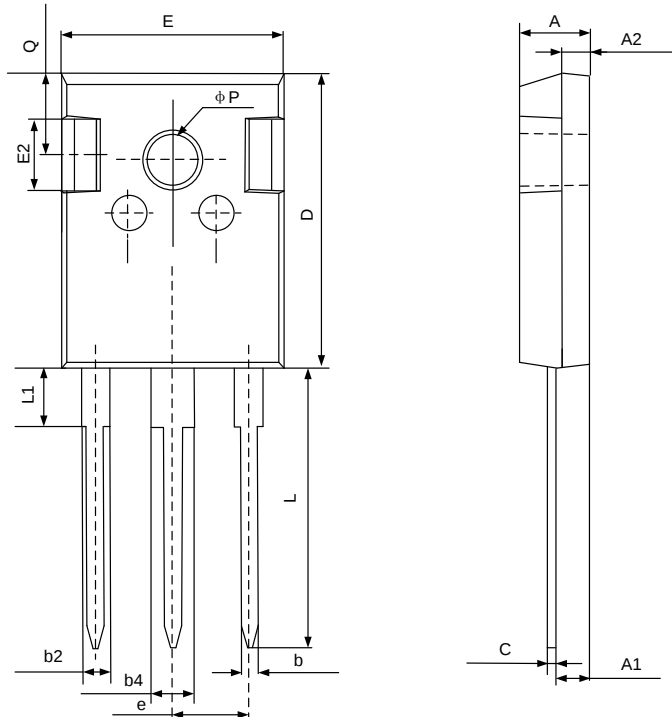
Figure 18. Max. Safe Operating Area



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
P	3.40	—	3.80

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.
5. It is strongly recommended to identify the trademark when buying our products. Please contact us if there is any question.
6. Product promotion is endless, our company will wholeheartedly provide customers with better products!
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Rev.: 1.0

Revision History:

1. First release
