

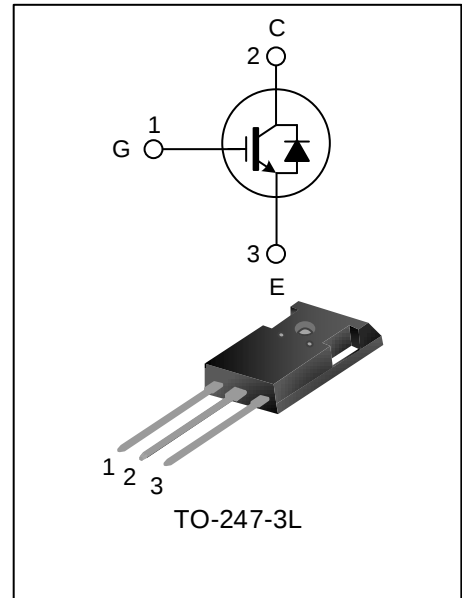
40A, 1200V FIELD STOP IGBT

DESCRIPTION

The SGT40U120FD1P7 field stop IGBT adopts Silan Trench Gate Field Stop IV+ technology, features low conduction loss and switching loss, positive temperature coefficient for easy parallel operation. This device is applicable to industrial welding, UPS, SMPS, and photovoltaic fields.

FEATURES

- ◆ 40A, 1200V, $V_{CE(sat)}(typ.)=2.2V@I_C=40A$
- ◆ Low conduction loss
- ◆ Fast switching
- ◆ High breakdown voltage



NOMENCLATURE

SGT 40 U120 F D 1 P7		
IGBT series		Package P7 : TO-247-3L
Current, 70: 70A		1,2,3... : Version No.
N : N Channel		Blank: Standard diode
NE : N-channel planar gate with ESD		M : Standard Diode, full range
T : Field Stop III和IV		R : Rapid Diode
U : Field Stop IV+		B : Rapid Diode, full range
V : Field Stop V		S : Soft Diode, full range
W: Field Stop VI		
X : Field Stop VII		
Voltage, 65: 650V		D : Packaged with fast recovery diode
120: 1200V		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 frequency 10~60KHz
		UF : Ultra fast switching, recommended frequency 40KHz~

ORDERING INFORMATION

Part No.	Package	Marking	Hazardous Substance Control	Packing Type
SGT40U120FD1P7	TO-247-3L	40U120FD1	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
Transient Gate to Emitter Voltage (t _p ≤10μs, D<0.010)		V _{GE}	±30	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	40	A
	T _C =100°C		20	A
Pulsed Diode Current		I _{FM}	80	A
Power Dissipation (T _C =25°C)		P _D	312	W
-Derate above 25°C			2.5	W/°C
Operating Junction Temperature		T _J	-55~+150	°C
Storage Temperature Range		T _{stg}	-55~+150	°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Thermal Resistance, Junction to Case (IGBT)	R _{θJC}	--	--	--	0.4	°C/W
Thermal Resistance, Junction to Case (FRD)	R _{θJC}	--	--	--	1.2	°C/W
Thermal Resistance, Junction to Ambient (IGBT)	R _{θJA}	--	--	--	40	°C
Soldering Temperature (in line)	T _{sold}	15 ⁺² ₋₀ sec, 1time	--	--	260	°C

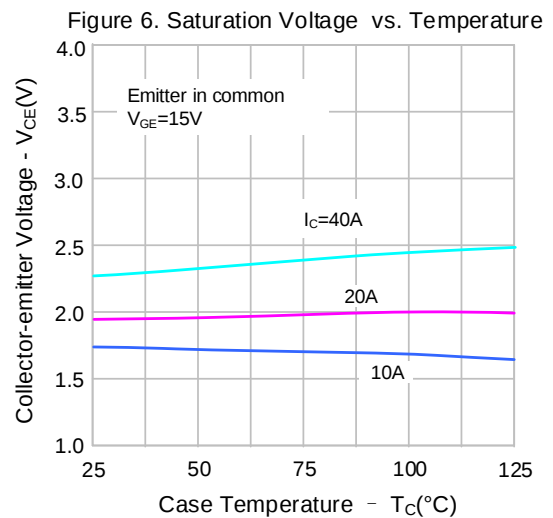
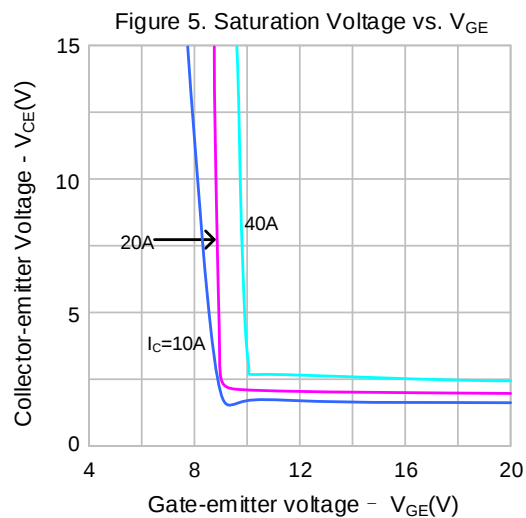
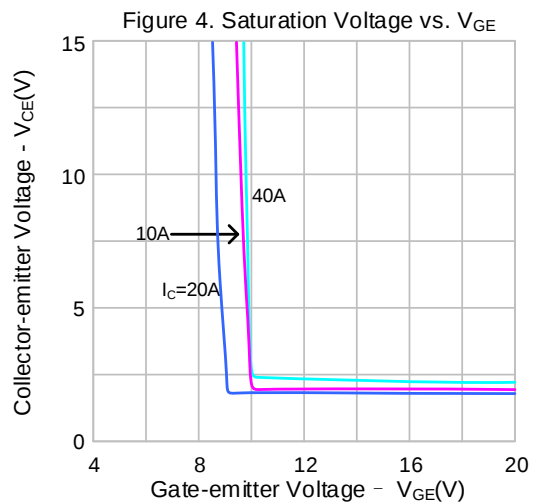
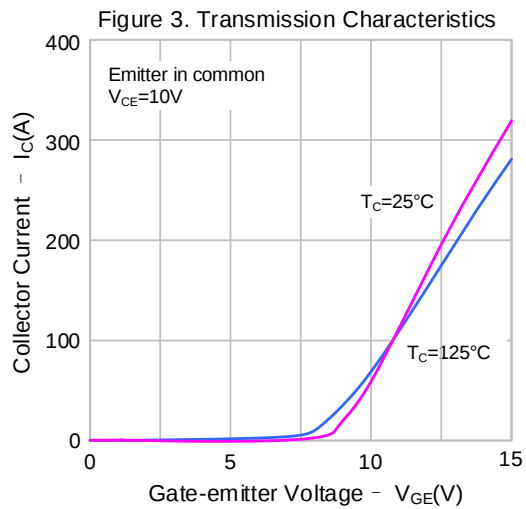
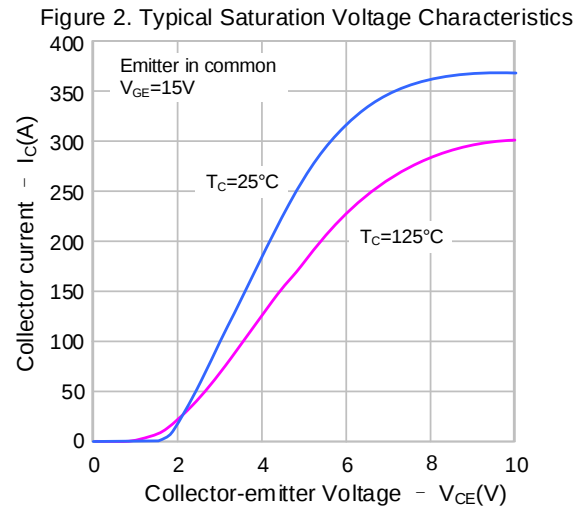
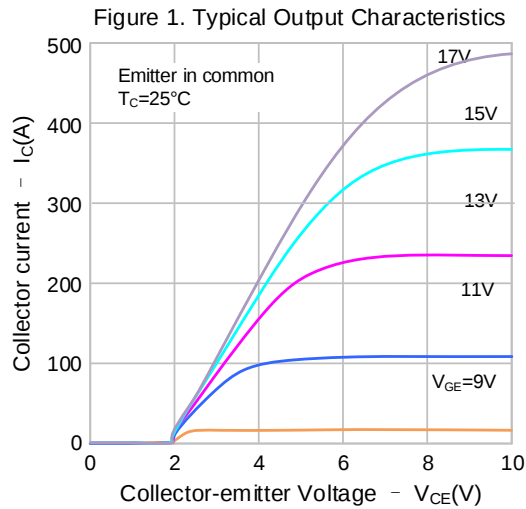
ELECTRICAL CHARACTERISTICS OF IGBT (UNLESS OTHERWISE NOTED, $T_c=25^\circ\text{C}$)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Collector to Emitter Breakdown Voltage	BV_{CE}	$V_{GE}=0V, I_C=1mA$	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	$V_{GE(th)}$	$I_C=250\mu A, V_{CE}=V_{GE}$	4.8	6.4	8	V
Collector to Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=40A, V_{GE}=15V, T_J=25^\circ\text{C}$	--	2.2	2.7	V
		$I_C=40A, V_{GE}=15V, T_J=125^\circ\text{C}$	--	2.5	--	V
Input Capacitance	C_{ies}	$V_{CE}=30V, V_{GE}=0V, f=1MHz$	--	4404	--	pF
Output Capacitance	C_{oes}		--	140	--	
Reverse Transfer Capacitance	C_{res}		--	30	--	
Turn-On Delay Time	$T_{d(on)}$	$V_{CE}=600V, I_C=40A, R_g=10\Omega$ $V_{GE}=15V$, inductive load $T_J=25^\circ\text{C}$	--	44	--	ns
Rise Time	T_r		--	118	--	
Turn-Off Delay Time	$T_{d(off)}$		--	102	--	
Fall Time	T_f		--	84	--	
Turn-On Switching Loss	E_{on}		--	3.9	--	mJ
Turn-Off Switching Loss	E_{off}		--	0.6	--	
Total Switching Loss	E_{st}		--	4.5	--	
Total Gate Charge	Q_g	$V_{CE}=600V, I_C=40A, V_{GE}=15V$	--	134	--	nC
Gate to Emitter Charge	Q_{ge}		--	44	--	
Gate to Collector Charge	Q_{gc}		--	46	--	

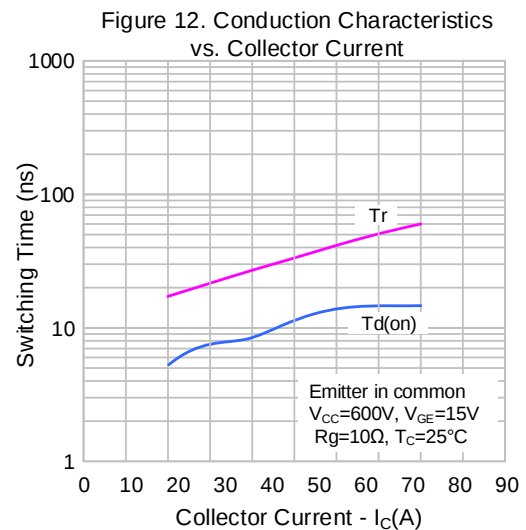
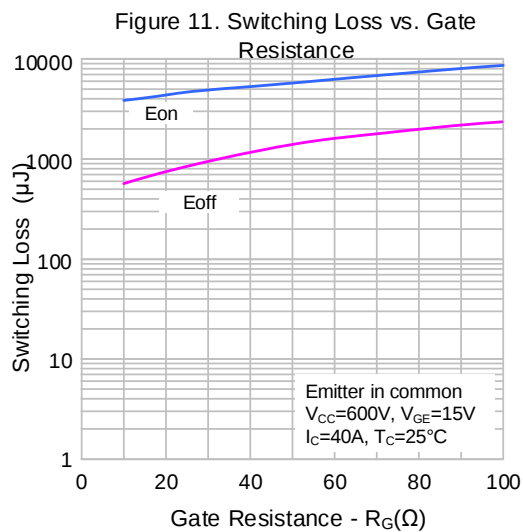
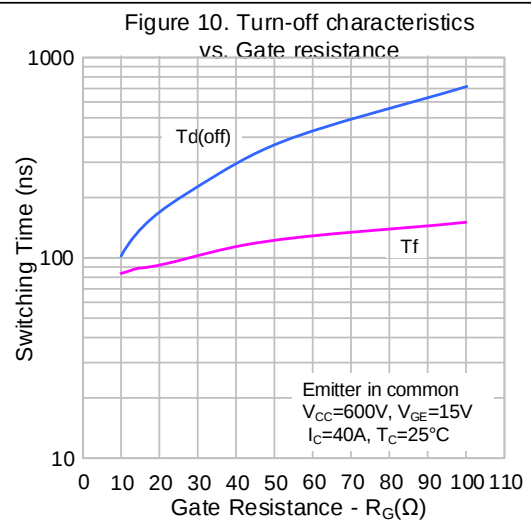
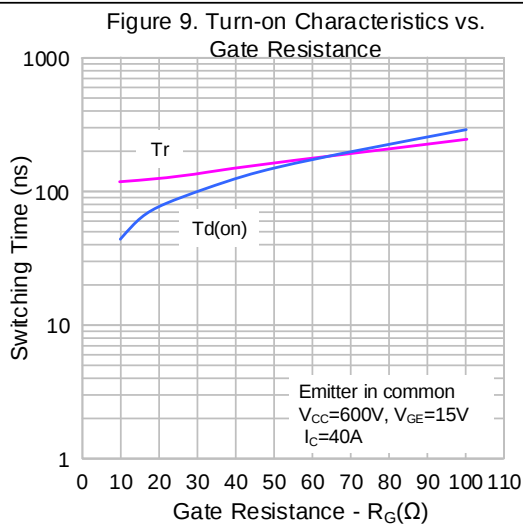
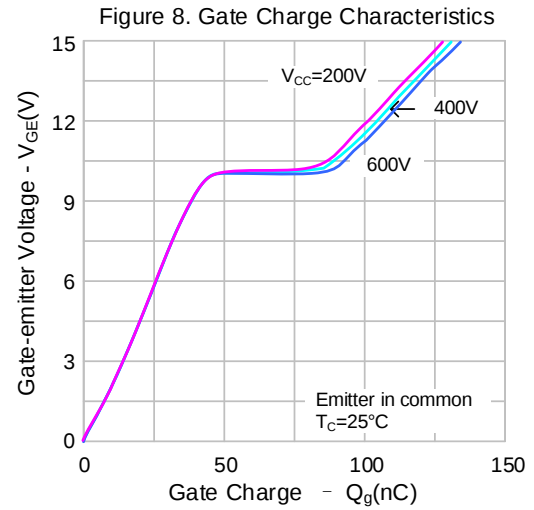
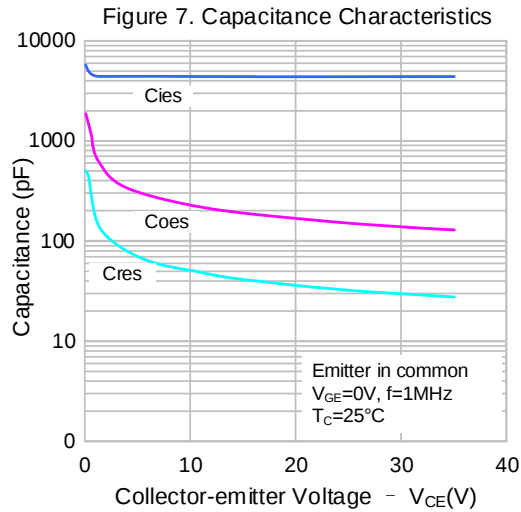
ELECTRICAL CHARACTERISTICS OF FRD (UNLESS OTHERWISE NOTED, $T_c=25^\circ\text{C}$)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Diode Forward Voltage	V_{fm}	$I_F=10A, T_J=25^\circ\text{C}$	--	2.3	2.6	V
		$I_F=10A, T_J=125^\circ\text{C}$	--	1.8	--	
Diode Reverse Recovery Time	T_{rr}	$V_{DD}=200V, I_{ES}=10A$, $dI_{ES}/dt=100A/\mu s, T_J=25^\circ\text{C}$	--	95	--	ns
Diode Reverse Recovery Charge	Q_{rr}		--	300	--	nC
Diode Peak Reverse Recovery Current	I_{rm}		--	6.4	--	A
Diode Reverse Recovery Current Tb Slope	Di_{rr}/Dt		--	104	--	A/ μs

TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS (CONTINUED)



TYPICAL CHARACTERISTICS (CONTINUED)

Figure 13. Turn-off Characteristics vs. Collector Current

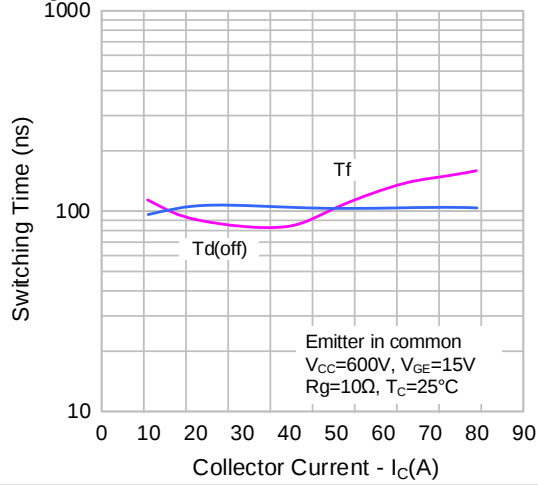


Figure 14. Switching Loss vs. Collector Current

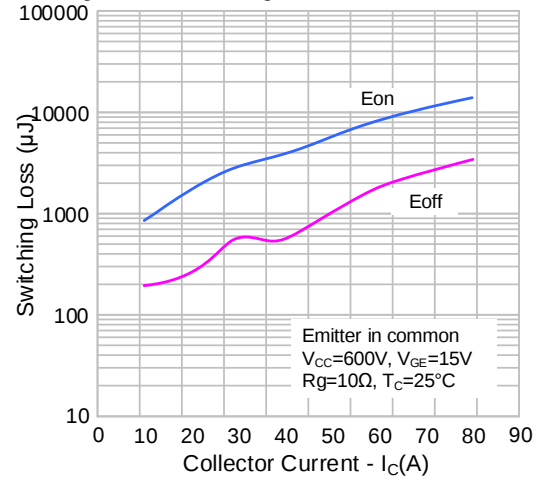


Figure 15. Forward Characteristics

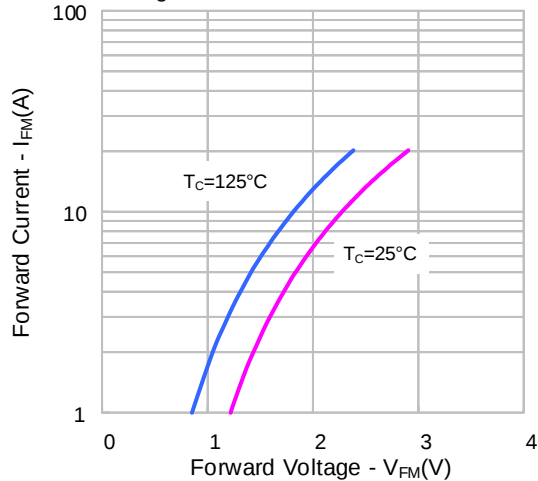


Figure 16. Reverse Recovery Time vs. Forward Current

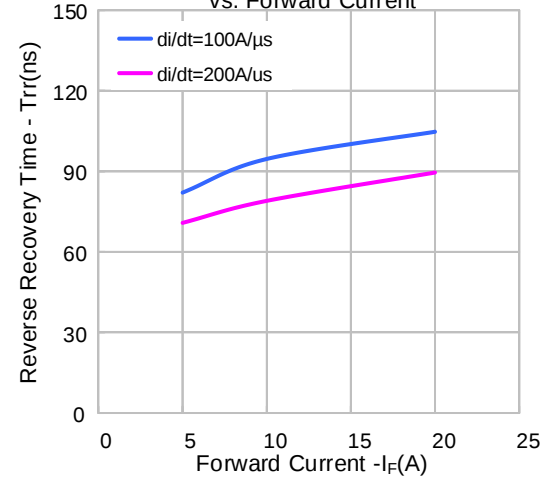


Figure 17. Reverse Recovery Charge vs. Forward Current

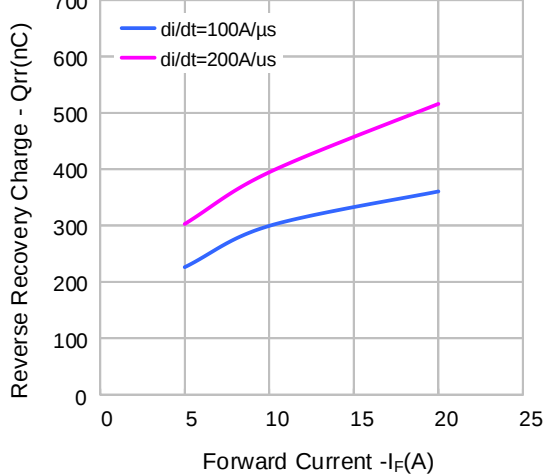
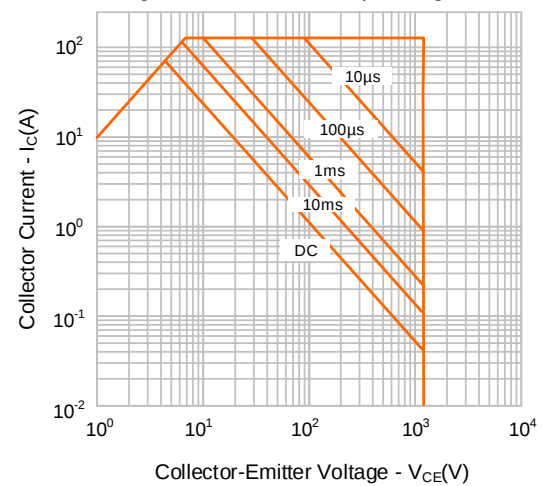
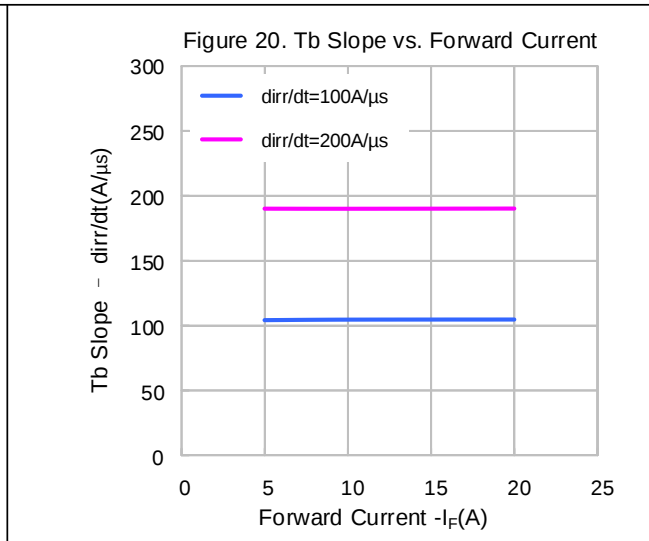
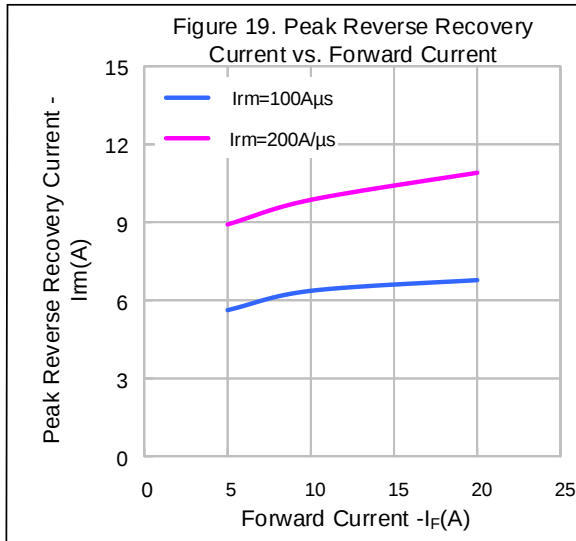


Figure 18. Max. Safe Operating Area



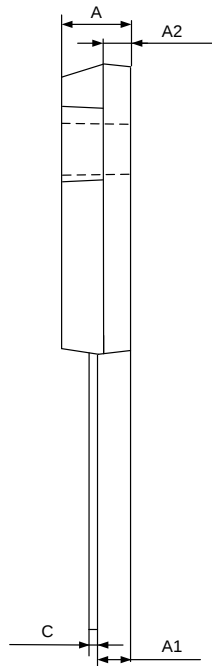
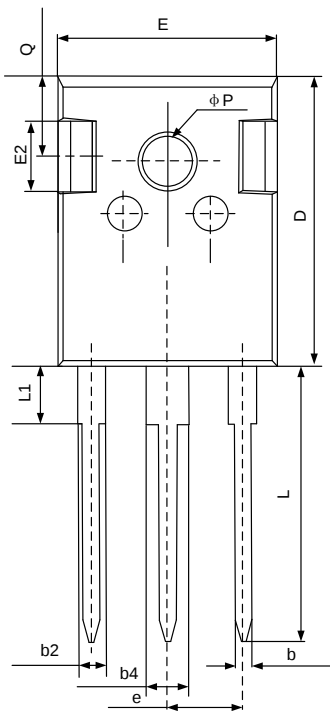
TYPICAL CHARACTERISTICS (CONTINUED)



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!
7. Website: <http://www.silan.com.cn>

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Rev.: 1.0

Revision History:

1. First release