

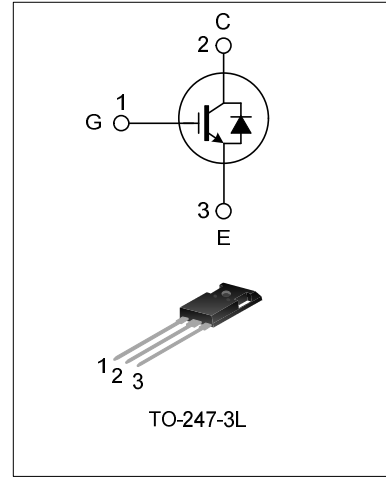
## 40A, 1200V IGBT

### DESCRIPTION

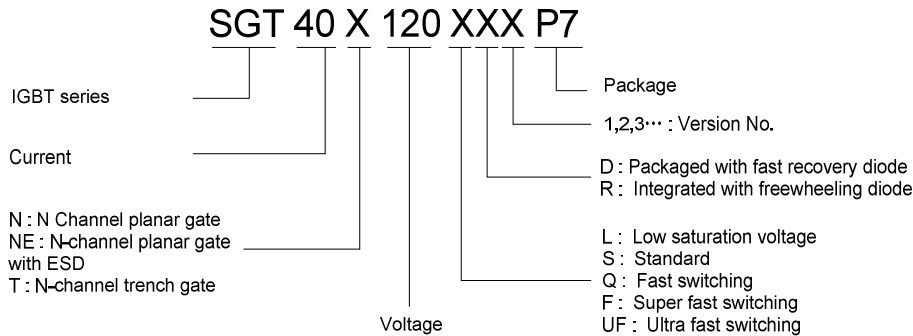
The SGT40T120FD1P7 IGBT is fabricated using Silan 4rd generation of trench field stop technology, features low conduction loss and switching loss, positive temperature coefficient for easy parallel operation. This device is applicable to induction heating, UPS, SMPS, and PFC fields.

### FEATURES

- ◆ 40A, 1200V,  $V_{CE(sat)(typ.)}=2.1V@I_C=40A$
- ◆ Low conduction loss
- ◆ Ultra fast switching
- ◆ High breakdown voltage



### NOMENCLATURE



### ORDERING INFORMATION

Part No.	Package	Marking	Hazardous substance control	Packing
SGT40T120FD1P7	TO-247-3L	40T120FD1	Pb free	Tube

### ABSOLUTE MAXIMUM RATINGS (T<sub>c</sub> = 25°C unless otherwise noted)

Parameter	Symbol	Ratings	Units
Collector to Emitter Voltage	$V_{CE}$	1200	V
Gate to Emitter Voltage	$V_{GE}$	±20	V
Collector Current	$I_C$	T <sub>c</sub> =25°C	80
		T <sub>c</sub> =100°C	40
Pulsed Collector Current	$I_{CM}$	120	A
Power Dissipation (T <sub>c</sub> =25°C) -Derate above 25°C	$P_D$	570	W
		3.80	W/°C
Operating Junction Temperature	$T_J$	-55~+175	°C
Storage Temperature Range	$T_{stg}$	-55~+175	°C

## THERMAL CHARACTERISTICS

Parameter	Symbol	Ratings	Units
Thermal Resistance, Junction to Case (IGBT)	$R_{\theta JC}$	0.26	$^{\circ}\text{C/W}$
Thermal Resistance, Junction to Case (FRD)	$R_{\theta JC}$	1.3	$^{\circ}\text{C/W}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	40	$^{\circ}\text{C/W}$

## ELECTRICAL CHARACTERISTICS OF IGBT ( $T_C = 25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Test conditions	Min.	Typ.	Max.	Units
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	$\mu\text{A}$
G-E Leakage Current	$I_{GES}$	$V_{GE}=20V, V_{CE}=0V$	--	--	$\pm 400$	nA
G-E Threshold Voltage	$V_{GE(th)}$	$I_C=4.0mA, V_{CE}=V_{GE}$	3.5	6.0	7.5	V
Collector to Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=40A, V_{GE}=15V$	--	2.1	2.5	V
		$I_C=40A, V_{GE}=15V, T_C=125^{\circ}\text{C}$	--	2.4	--	V
Input Capacitance	$C_{ies}$	$V_{CE}=30V$	--	5400	--	pF
Output Capacitance	$C_{oes}$	$V_{GE}=0V$	--	126	--	
Reverse Transfer Capacitance	$C_{res}$	$f=1\text{MHz}$	--	93	--	
Turn-On Delay Time	$T_{d(on)}$	$V_{CE}=600V$ $I_C=40A$ $R_g=10\Omega$	--	42	--	ns
Rise Time	$T_r$		--	54	--	
Turn-Off Delay Time	$T_{d(off)}$		--	290	--	
Fall Time	$T_f$		--	160	--	
Turn-On Switching Loss	$E_{on}$	$V_{GE}=15V$	--	2.8	--	mJ
Turn-Off Switching Loss	$E_{off}$	Inductive Load	--	1.9	--	
Total Switching Loss	$E_{st}$		--	4.7	--	
Total Gate Charge	$Q_g$	$V_{CE} = 600V, I_C=40A,$ $V_{GE} = 15V$	--	222	--	nC
Gate to Emitter Charge	$Q_{ge}$		--	2.9	--	
Gate to Collector Charge	$Q_{gc}$		--	130	--	

## ELECTRICAL CHARACTERISTICS OF FRD ( $T_C = 25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Test conditions	Min.	Typ.	Max.	Units
Diode Forward Voltage	$V_{fm}$	$I_F = 25A, T_C=25^{\circ}\text{C}$	--	2.3	3.1	V
		$I_F = 25A, T_C=125^{\circ}\text{C}$	--	2.1	--	
Diode Reverse Recovery Time	$T_{rr}$	$I_{ES} = 25A, dI_{ES}/dt = 200A/\mu\text{s}$	--	130	--	ns
Diode Reverse Recovery Charge	$Q_{rr}$	$I_{ES} = 25A, dI_{ES}/dt = 200A/\mu\text{s}$	--	0.92	--	$\mu\text{C}$

**TYPICAL CHARACTERISTICS CURVE**

Figure 1. Typical output characteristics

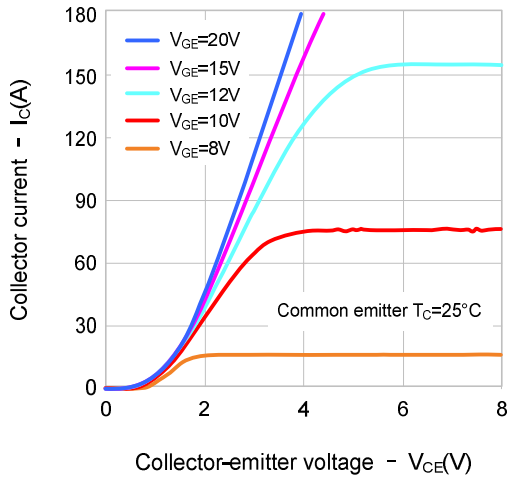


Figure 2. Typical output characteristics

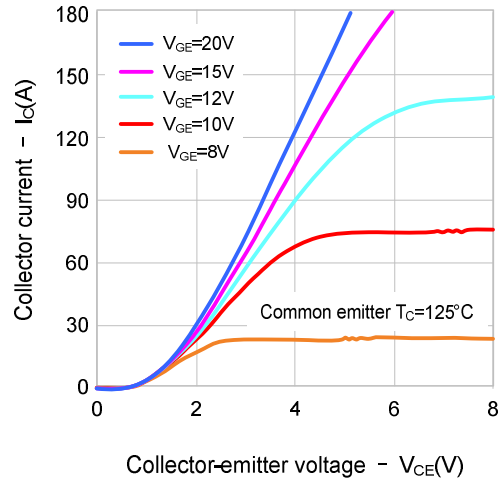


Figure 3. Typical saturation voltage characteristics

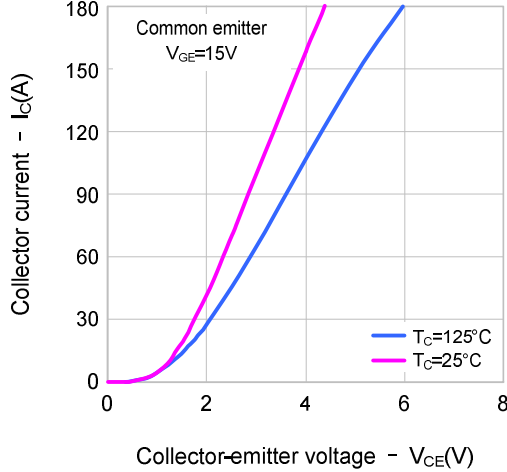


Figure 4. Transmission characteristics

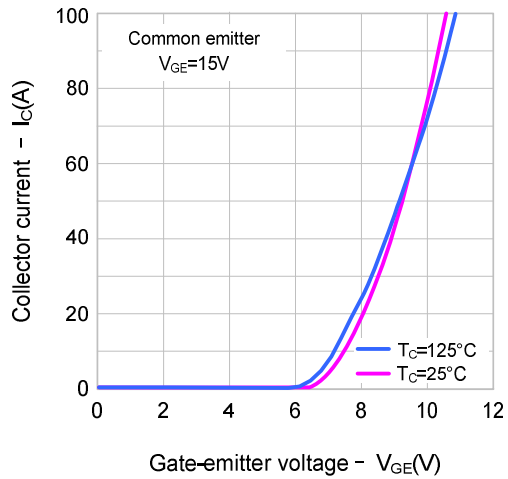


Figure 5. Saturation voltage vs. Gate-emitter voltage

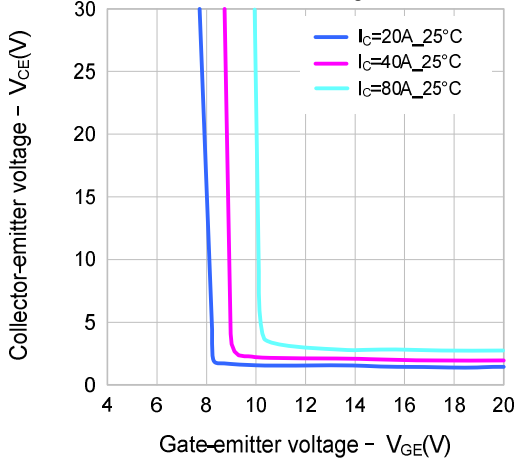
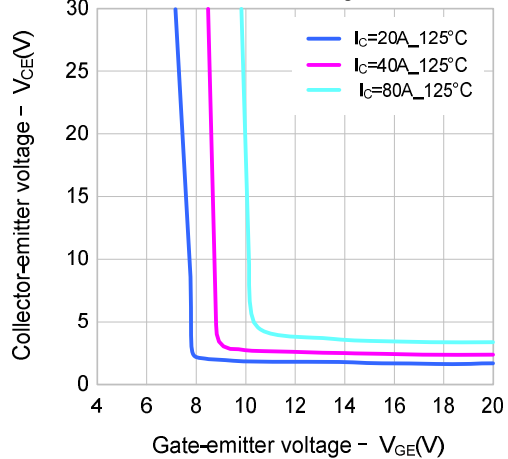


Figure 6. Saturation voltage vs. Gate-emitter voltage



**TYPICAL CHARACTERISTICS CURVE(Continued)**

Figure 7. Capacitance characteristics

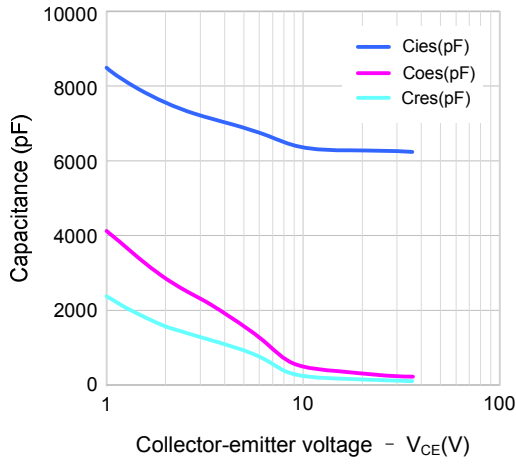


Figure 8. Gate charge characteristics

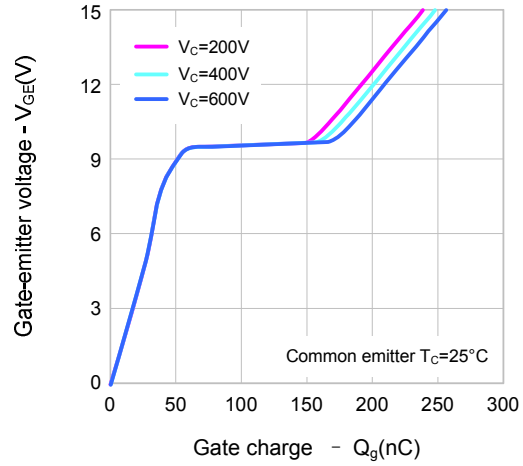


Figure 9. Turn-on characteristics vs. Gate resistance

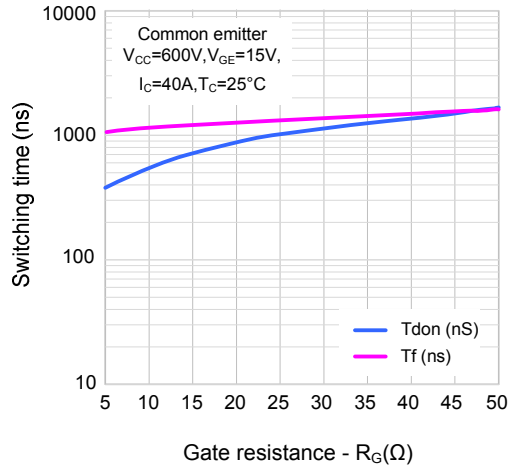


Figure 10. Turn-off characteristics vs. Gate resistance

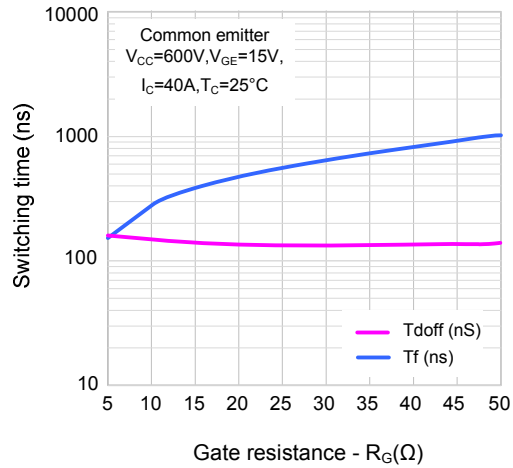


Figure 11. Switching loss vs. Gate resistance

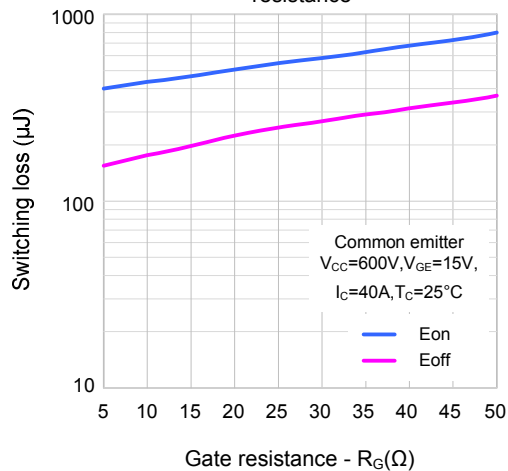
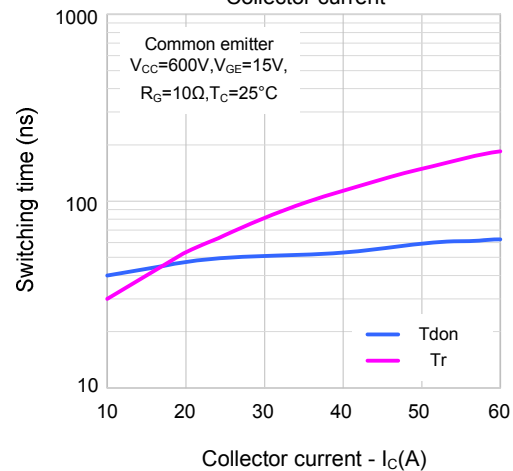
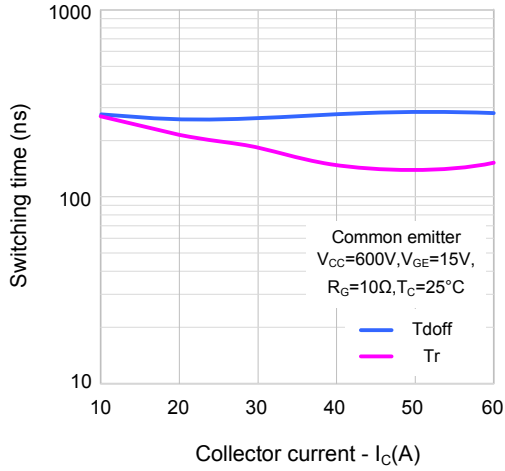


Figure 12. Turn-on characteristics vs. Collector current



**TYPICAL CHARACTERISTICS CURVE(Continued)**

Figure 13. Turn-off characteristics vs. Collector current



14. Switching loss vs. Collector current

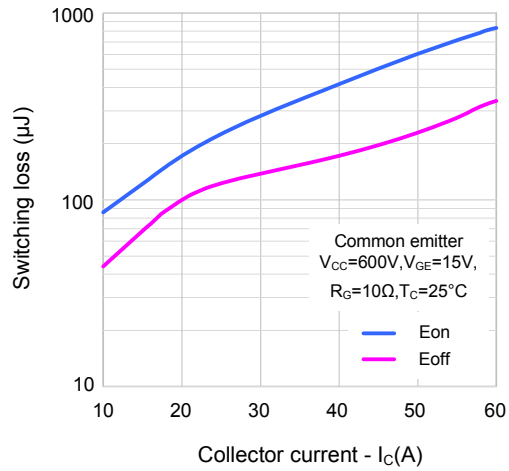


Figure 15. Forward characteristics

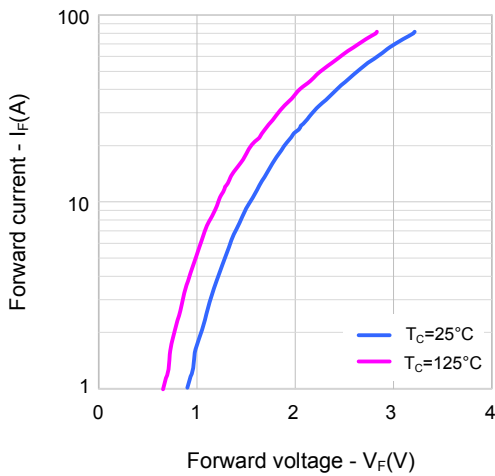


Figure 16. Reverse recovery time vs. Forward current

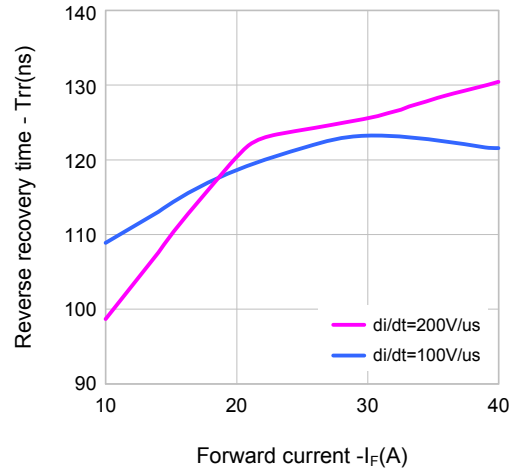


Figure 17. Reverse recovery charge vs. Forward current

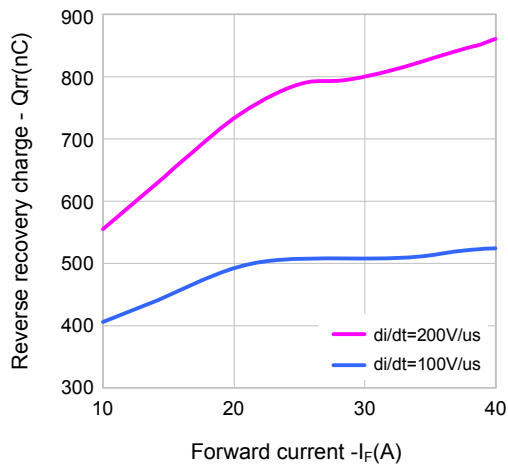
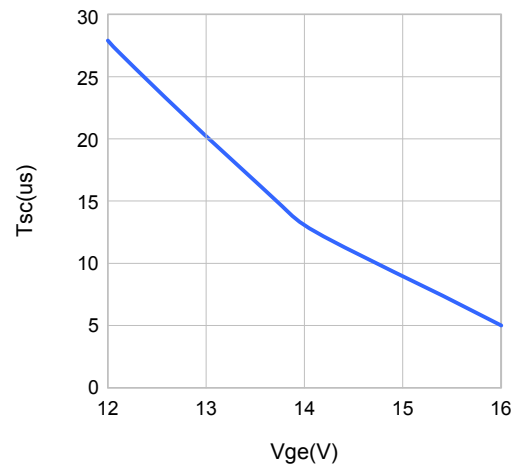
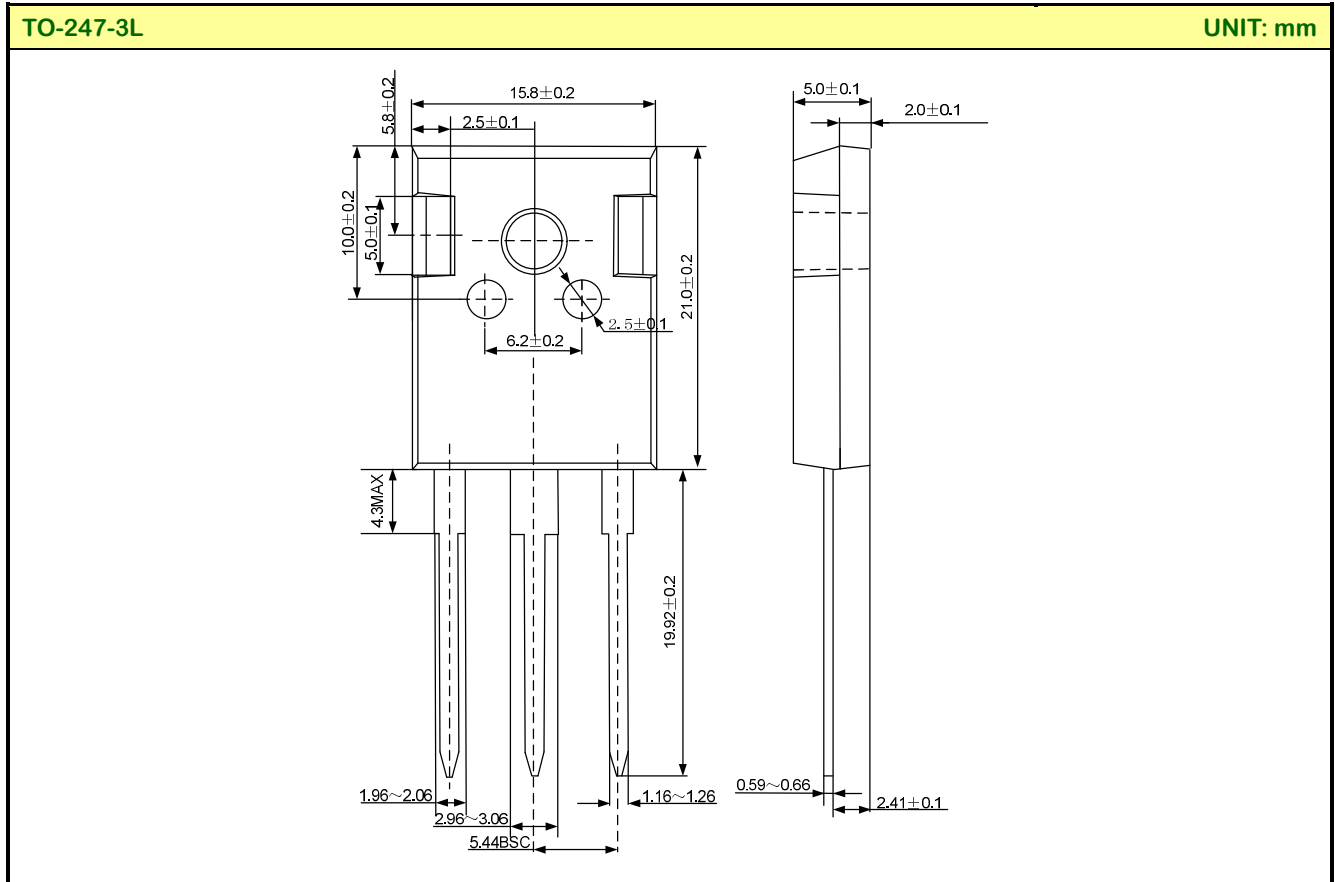


Figure 18. Tsc(Vce=600V)



**PACKAGE OUTLINE**



**Disclaimer :**

- Silan reserves the right to make changes to the information herein for the improvement of the design and performance without prior notice! Customers should obtain the latest relevant information before placing orders and should verify that such information is complete and current.
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- Silan will supply the best possible product for customers!

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Rev.: 1.2

Revision History:

1. Add Figure 18
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Rev.: 1.1

Revision History:

1. Modify ABSOLUTE MAXIMUM RATINGS
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Rev.: 1.0

Revision History:

1. First release
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