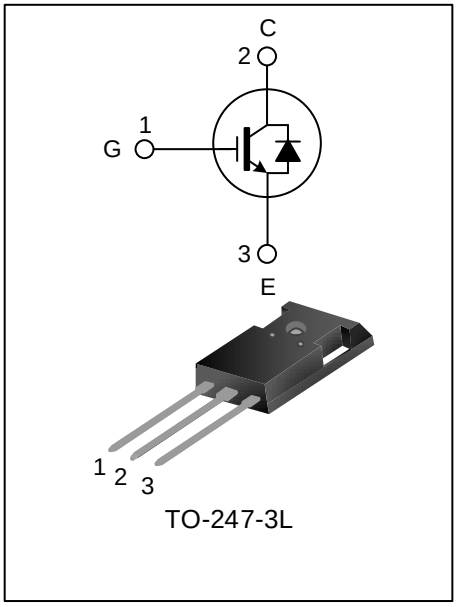
40A, 1200V FIELD STOP IGBT

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

Current, 70: 70A

N : N Channel
NE : N-channel planar gate with ESD
T : Field Stop III和IV
U : Field Stop IV+
V : Field Stop V
W: Field Stop VI
X : Field Stop VII

Voltage, 65: 650V
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 frequency10~60KHz
UF : Ultra fast switching, recommended frequency 40KHz~

D : Packaged with fast recovery diode
R : RC IGBT

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

1,2,3… : Version No.

Package
P7 : TO-247-3L

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)	$R_{\theta JC}$	--	--	--	0.4	°C/W
Thermal Resistance, Junction to Case (FRD)	$R_{\theta JC}$	--	--	--	1.2	°C/W
Thermal Resistance, Junction to Ambient (IGBT)	$R_{\theta JA}$	--	--	--	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°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=250μA, 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=25C	--	2.2	2.7	V
		I_C=40A, V_{GE}=15V, T_J=125°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=10Ω V_{GE}=15V, inductive load T_J=25°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°C)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Diode Forward Voltage	V_{fm}	I_F=10A, T_J=25°C	--	2.3	2.6	V
		I_F=10A, T_J=125°C	--	1.8	--	
Diode Reverse Recovery Time	T_{rr}	V_{DD}=200V, I_{ES}=10A, dI_{ES}/dt=100A/μs, T_J=25°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

Figure 1. Typical Output Characteristics

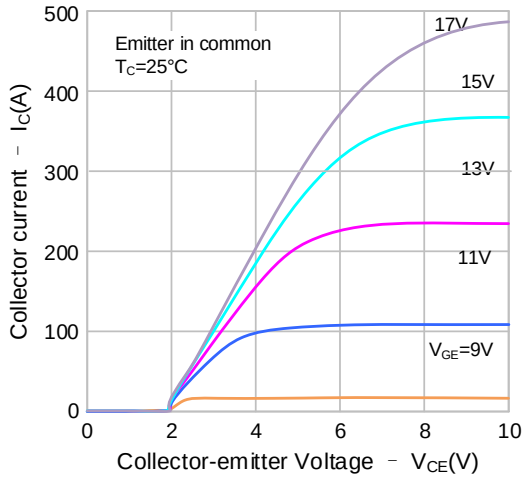


Figure 2. Typical Saturation Voltage Characteristics

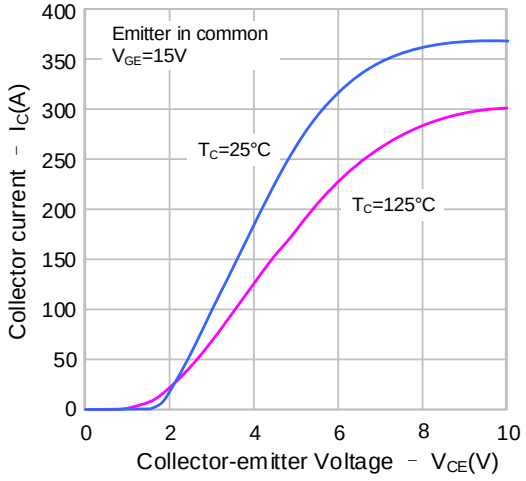


Figure 3. Transmission Characteristics

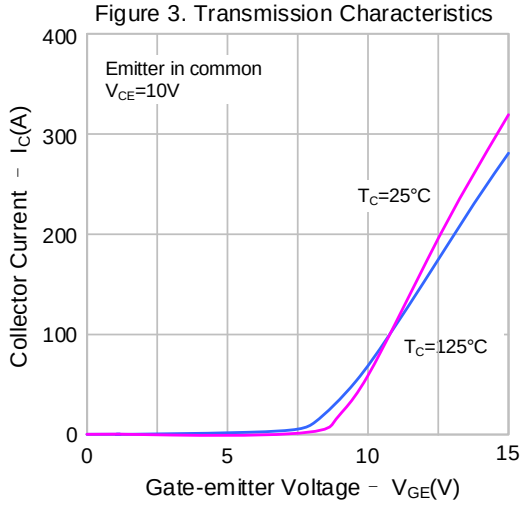


Figure 4. Saturation Voltage vs. V_{GE}

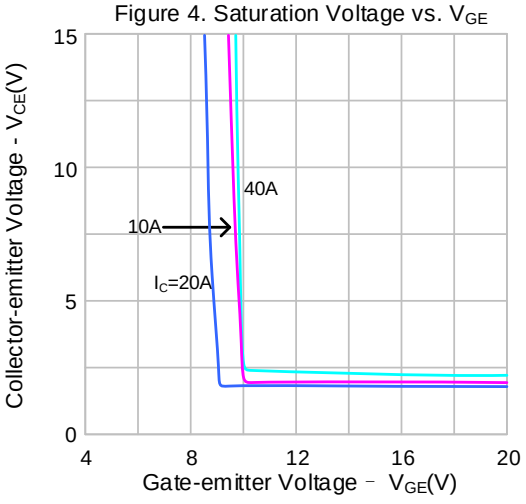


Figure 5. Saturation Voltage vs. V_{GE}

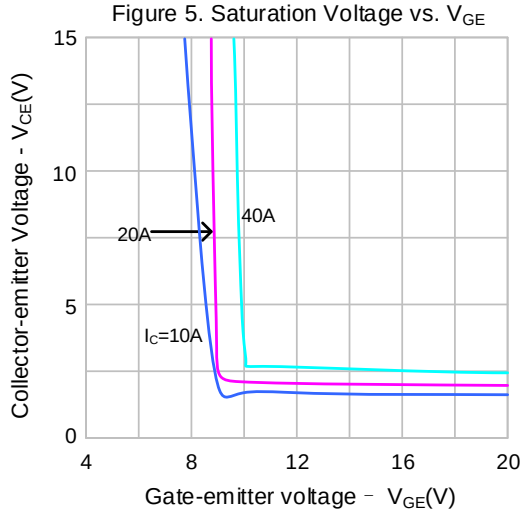
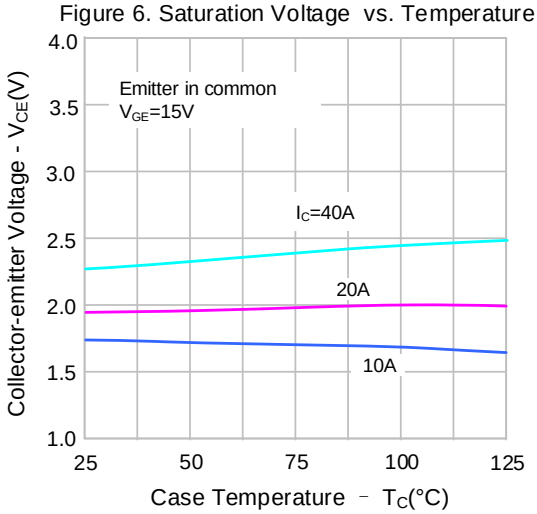


Figure 6. Saturation Voltage vs. Temperature



TYPICAL CHARACTERISTICS (CONTINUED)

Figure 7. Capacitance Characteristics

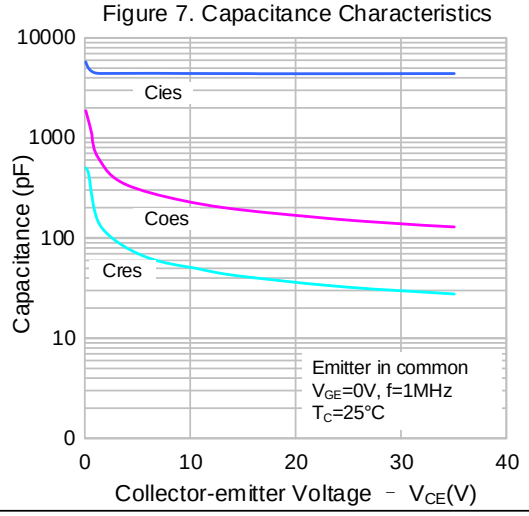


Figure 8. Gate Charge Characteristics

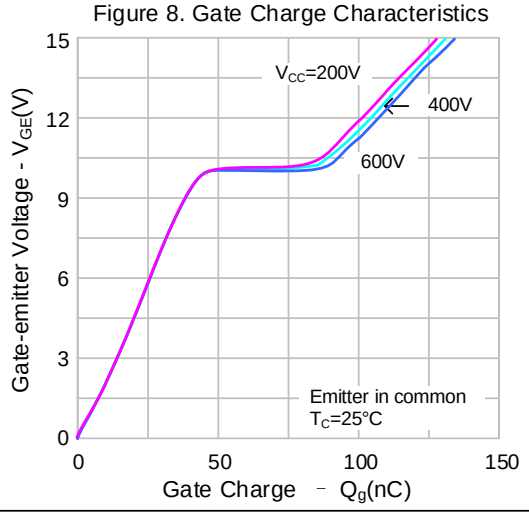


Figure 9. Turn-on Characteristics vs. Gate Resistance

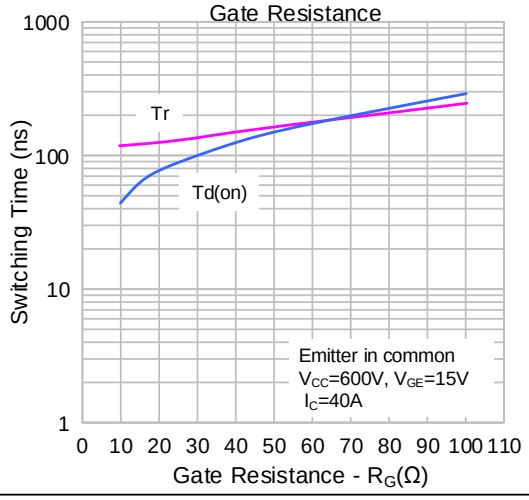


Figure 10. Turn-off characteristics vs. Gate resistance

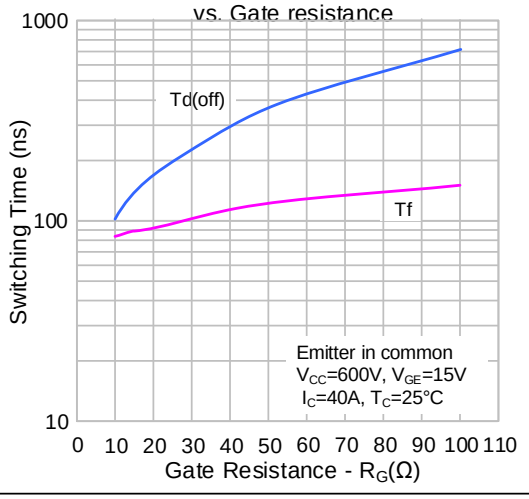


Figure 11. Switching Loss vs. Gate Resistance

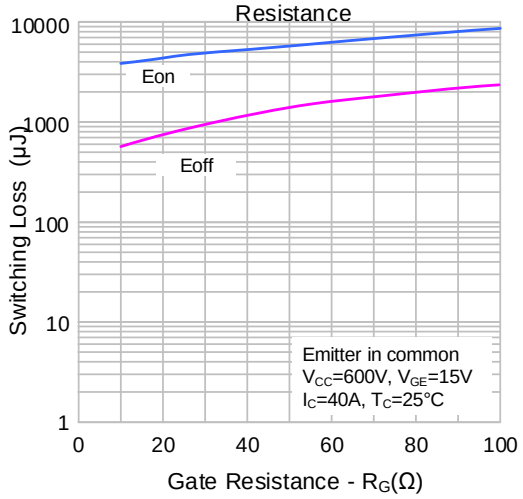
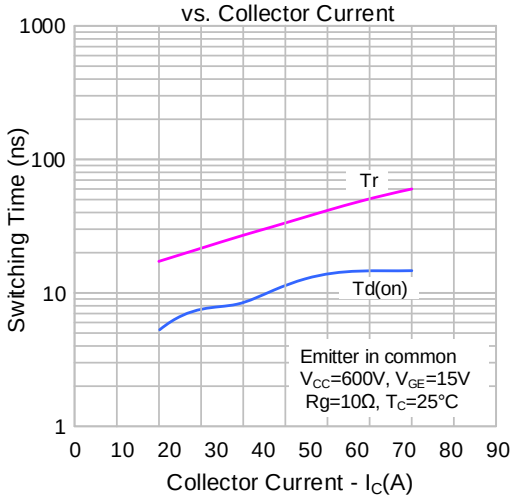


Figure 12. Conduction Characteristics vs. Collector Current



TYPICAL CHARACTERISTICS (CONTINUED)

Figure 13. Turn-off Characteristics vs. Collector Current

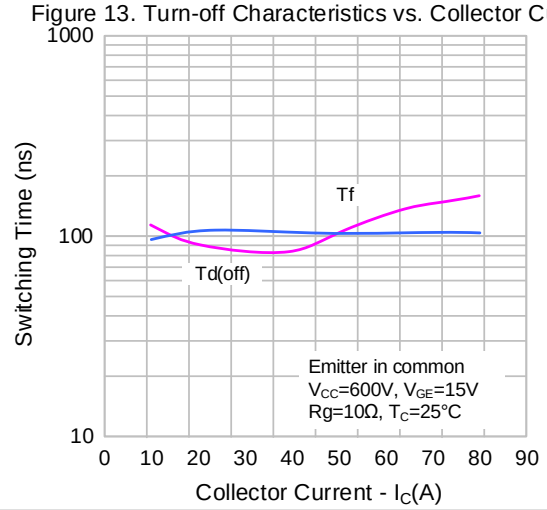


Figure 14. Switching Loss vs. Collector Current

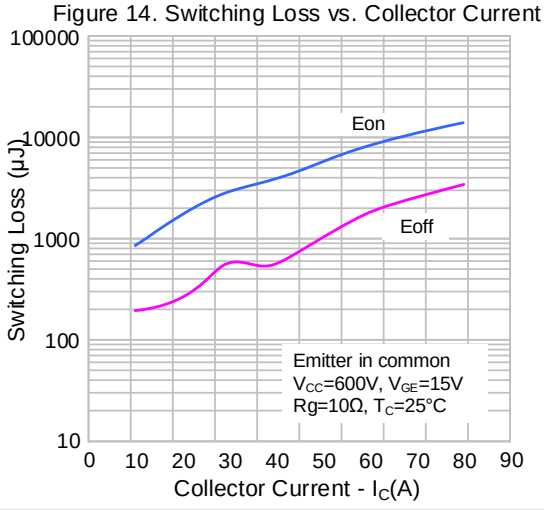


Figure 15. Forward Characteristics

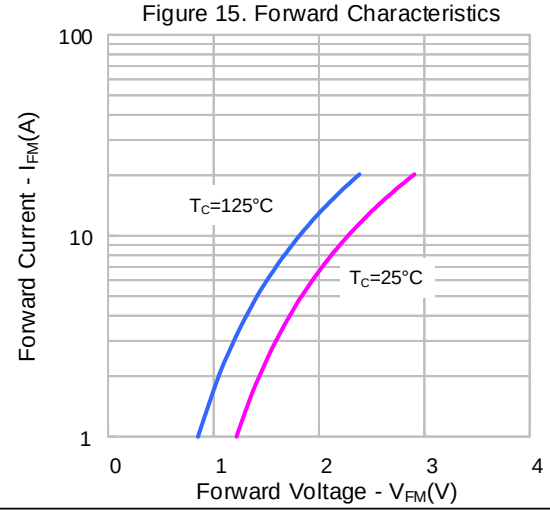


Figure 16. Reverse Recovery Time vs. Forward Current

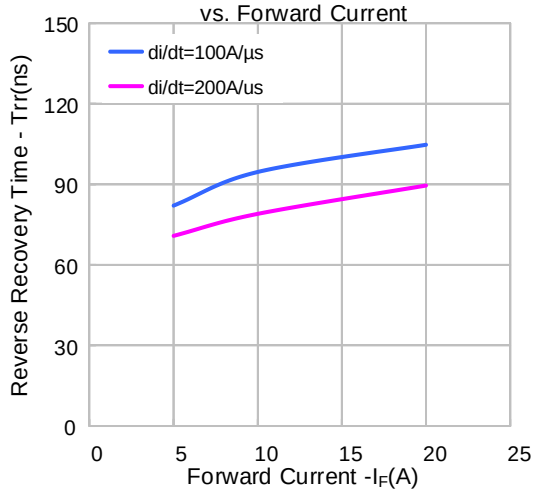


Figure 17. Reverse Recovery Charge vs. Forward Current

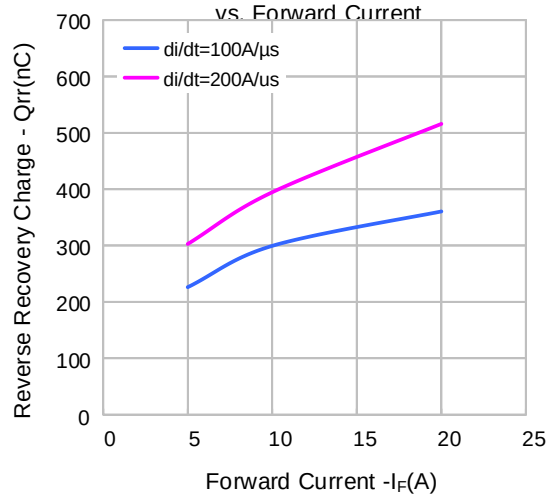
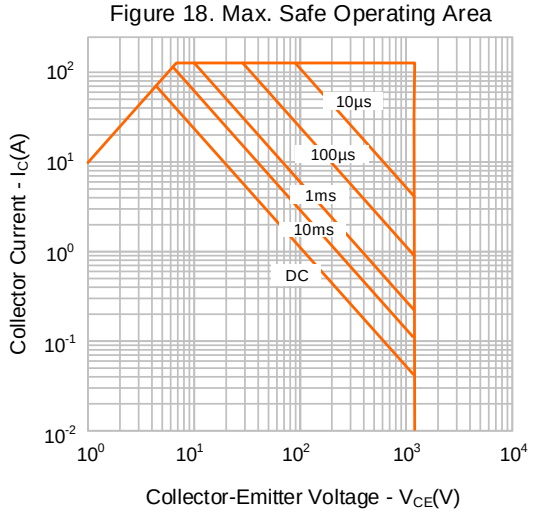


Figure 18. Max. Safe Operating Area



TYPICAL CHARACTERISTICS (CONTINUED)

Figure 19. Peak Reverse Recovery Current vs. Forward Current

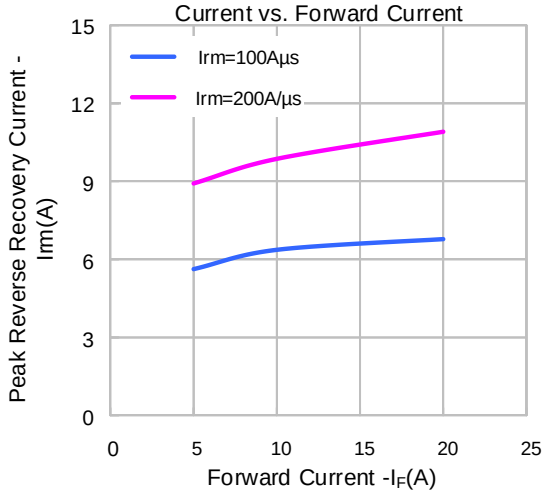
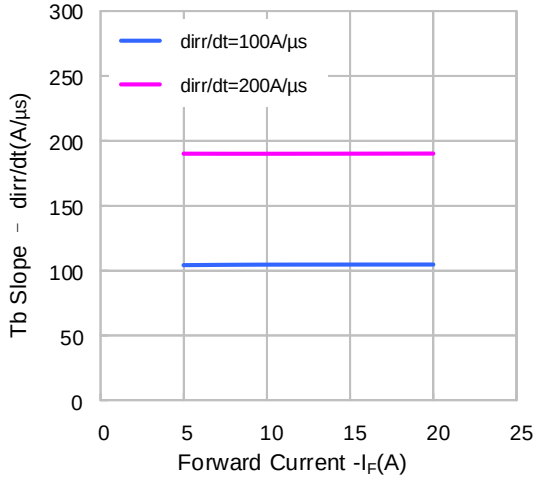
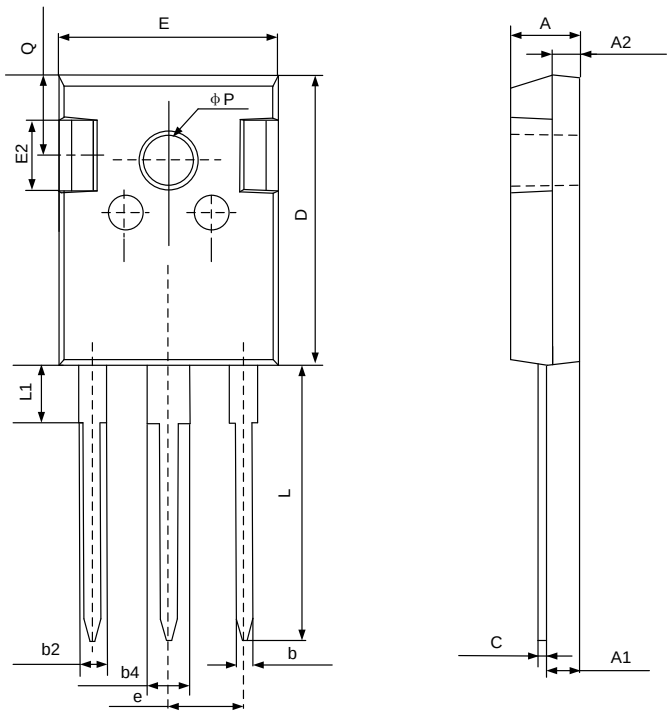


Figure 20. Tb Slope vs. Forward Current



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 :

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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.**
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Rev.: 1.0

Revision History:

1. First release