

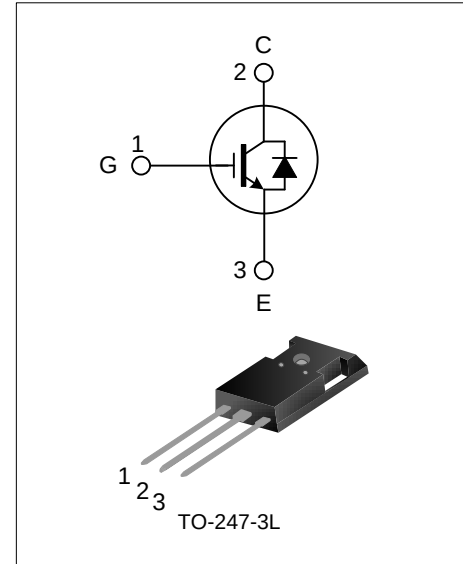
20A, 600V FIELD STOP IGBT

DESCRIPTION

The SGT20T60SDM1P7 field stop IGBT adopts Silan the 4th-generation trench Field Stop technology, features low conduction loss and switching loss, positive temperature coefficient, easy parallel operation, etc. It is applicable to inverters, UPS, SMPS, and PFC.

FEATURES

- 20A, 600V, $V_{CE(sat)}(typ.)=1.7V@I_C=20A$
- Low conduction loss
- Fast switching speed
- High breakdown voltage



NOMENCLATURE

SGT 20 T 60 S D M 1 P7	
IGBT series	Package
Current, 70: 70A	P7: TO-247-3L
	F: TO-220F-3L
	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 3/4	R: Rapid Diode
U: Field Stop 4+	B: Rapid Diode, full range
V: Field Stop 5	S: Soft Diode, full range
W: Field Stop 6	
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 2~20K
	S: Standard frequency, recommended frequency 5~40K
	F: Fast switching, recommended frequency 10~60K
	UF: Ultra fast switching, recommended frequency 40K~

ORDERING INFORMATION

Part No.	Package	Marking	Hazardous Substance Control	Packing Type
SGT20T60SDM1P7	TO-247-3L	20T60SDM1	Pb free	Tube

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

Characteristics		Symbol	Ratings	Units
Collector to Emitter Voltage		V_{CE}	600	V
Gate to Emitter Voltage		V_{GE}	± 20	V
Collector Current	$T_C = 25^\circ\text{C}$	I_C	40	A
	$T_C = 100^\circ\text{C}$		20	
Pulsed Collector Current		I_{CM}	60	A
Diode current	$T_C = 25^\circ\text{C}$	I_F	40	A
	$T_C = 100^\circ\text{C}$		20	
Short-circuit time ($V_{GE} = 15\text{V}$, $V_{CC} = 300\text{V}$)		T_{SC}	10	μs
Maximum Power Dissipation ($T_C = 25^\circ\text{C}$)		P_D	192	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	Units
Thermal Resistance, Junction to Case (IGBT)	$R_{\theta JC}$	0.65	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case (FRD)	$R_{\theta JC}$	1.19	$^\circ\text{C/W}$

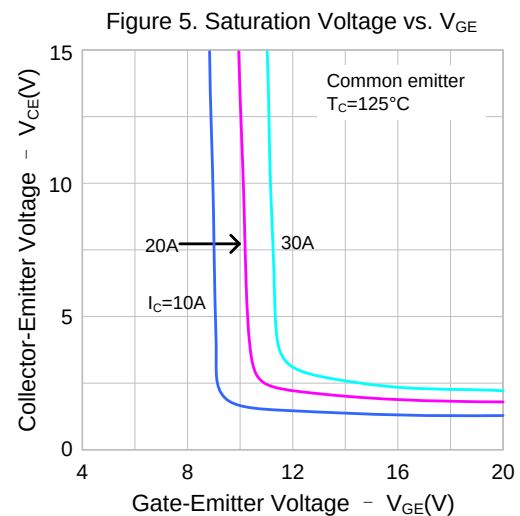
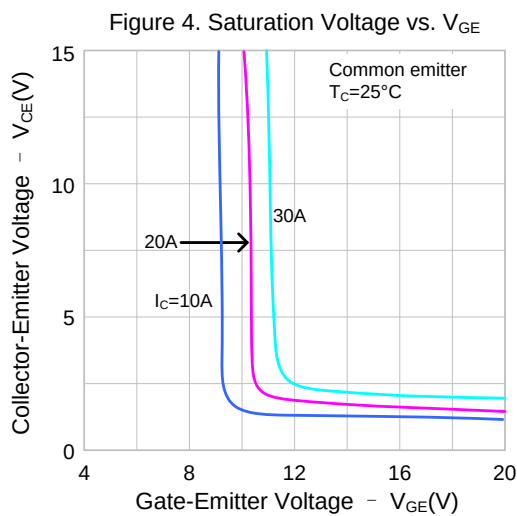
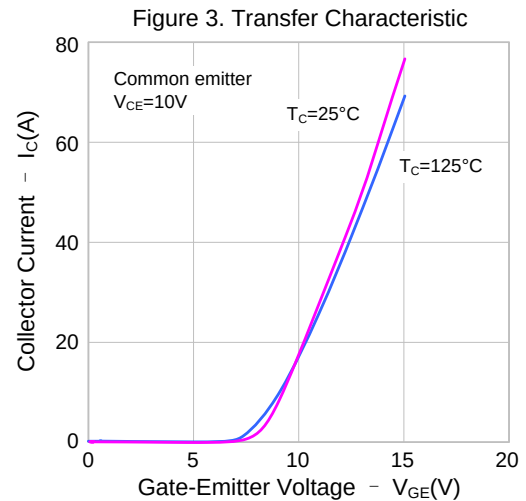
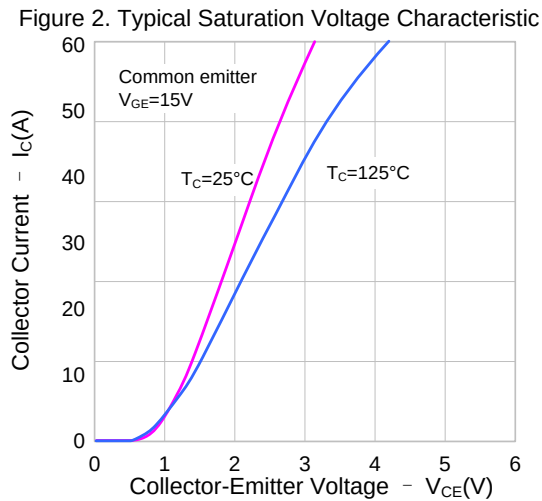
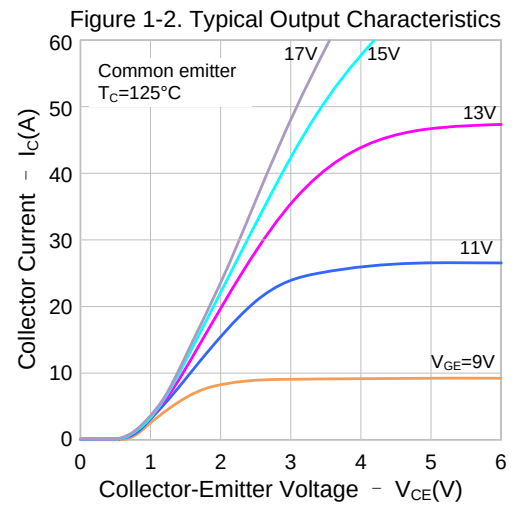
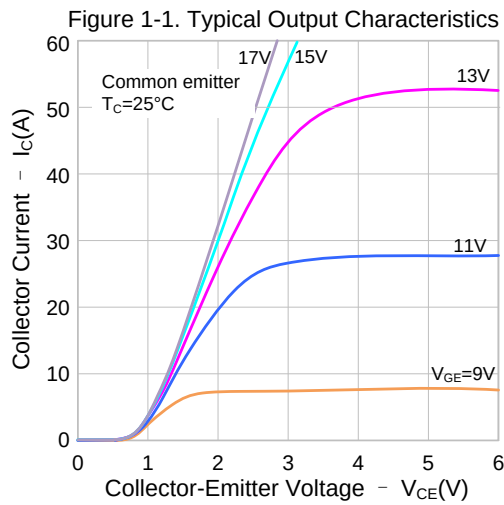
ELECTRICAL CHARACTERISTICS OF IGBT ($T_C=25^{\circ}\text{C}$, UNLESS OTHERWISE NOTED)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Units
Collector to Emitter Breakdown Voltage	BV_{CE}	$V_{GE}=0V, I_C=250\mu A$	600	--	--	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	$V_{GE(th)}$	$I_C=250\mu A, V_{CE}=V_{GE}$	4.0	5.0	6.5	V
Collector to Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=20A, V_{GE}=15V$	--	1.7	2.4	V
		$I_C=20A, V_{GE}=15V, T_C=125^{\circ}\text{C}$	--	1.9	--	V
Input Capacitance	C_{ies}	$V_{CE}=30V, V_{GE}=0V, f=1\text{MHz}$	--	1100	--	pF
Output Capacitance	C_{oes}		--	55	--	
Reverse Transfer Capacitance	C_{res}		--	22	--	
Turn-On Delay Time	$T_{d(on)}$	$V_{CE}=400V$ $I_C=20A$ $R_g=10\Omega$ $V_{GE}=15V$ Inductive load	--	19	--	ns
Rise Time	T_r		--	55	--	
Turn-Off Delay Time	$T_{d(off)}$		--	48	--	
Fall Time	T_f		--	115	--	
Turn-On Switching Loss	E_{on}	Inductive load	--	1	--	mJ
Turn-Off Switching Loss	E_{off}		--	0.3	--	
Total Switching Loss	E_{st}		--	1.3	--	
Total Gate Charge	Q_g	$V_{CE}=400V, I_C=20A, V_{GE}=15V$	--	52	--	nC
Gate to Emitter Charge	Q_{ge}		--	15	--	
Gate to Collector Charge	Q_{gc}		--	22	--	

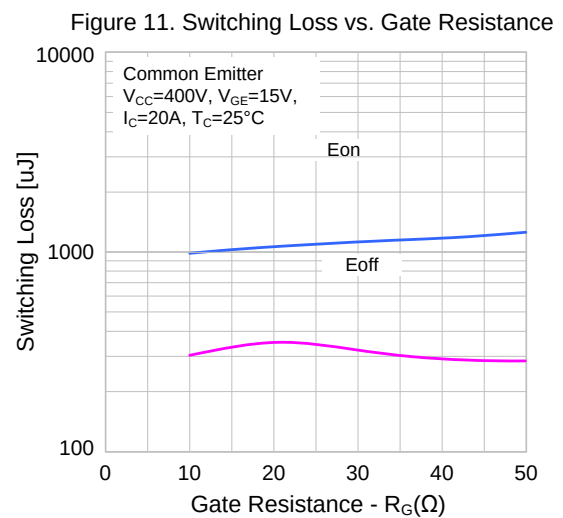
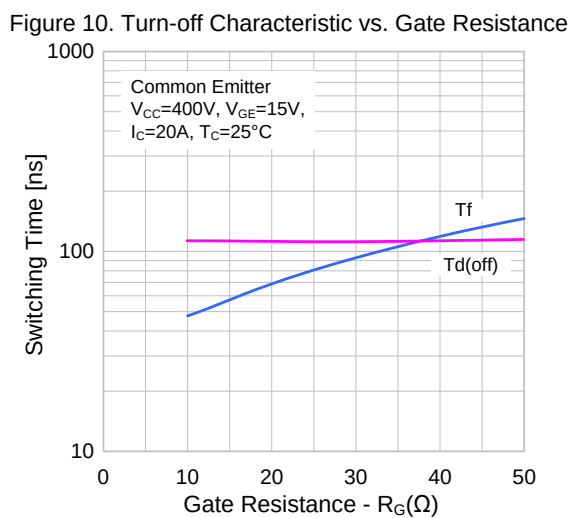
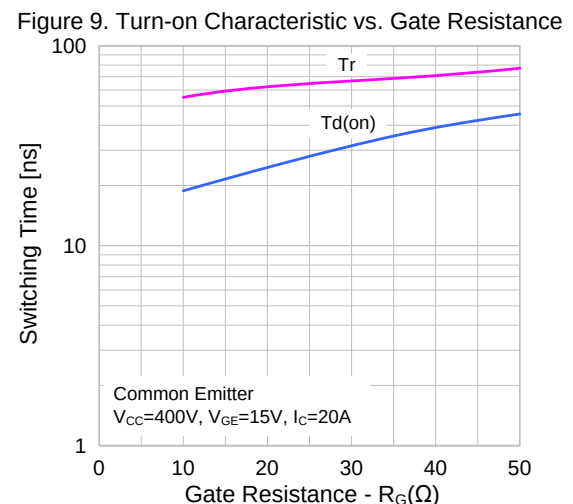
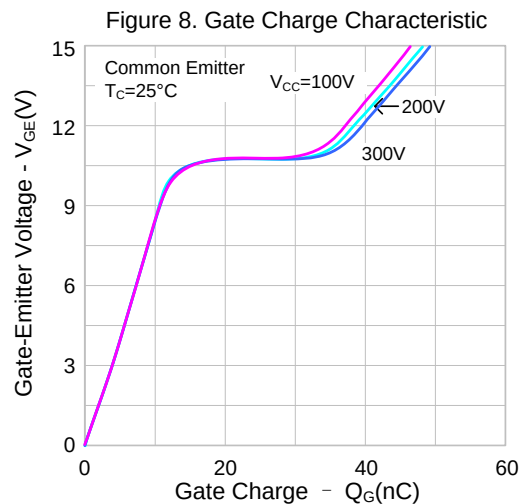
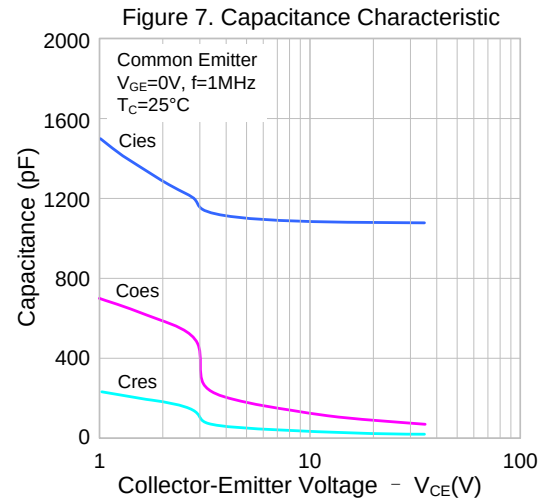
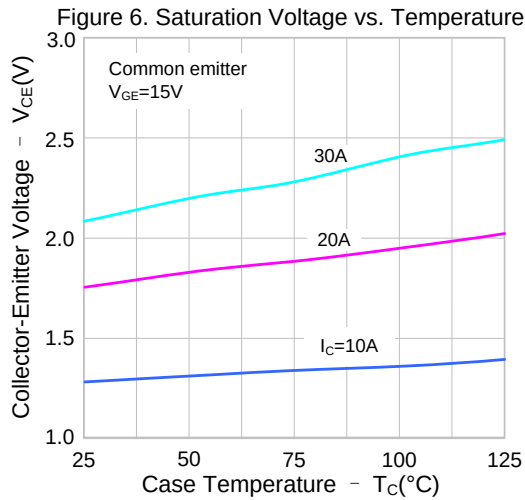
ELECTRICAL CHARACTERISTICS OF FRD ($T_C=25^{\circ}\text{C}$, UNLESS OTHERWISE NOTED)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Units
Diode Forward Voltage	V_{fm}	$I_F=20A, T_C=25^{\circ}\text{C}$	--	1.8	--	V
		$I_F=20A, T_C=125^{\circ}\text{C}$	--	1.5	--	
Diode Reverse Recovery Time	T_{rr}	$I_{ES}=20A, dI_{ES}/dt=200A/\mu s$	--	33.69	--	ns
Diode Reverse Recovery Charge	Q_{rr}	$I_{ES}=20A, dI_{ES}/dt=200A/\mu s$	--	73.31	--	nC

TYPICAL CHARACTERISTICS CURVE



TYPICAL CHARACTERISTICS CURVE (CONTINUED)



TYPICAL CHARACTERISTICS CURVE (CONTINUED)

Figure 12. Turn-on Characteristic vs. Collector Current

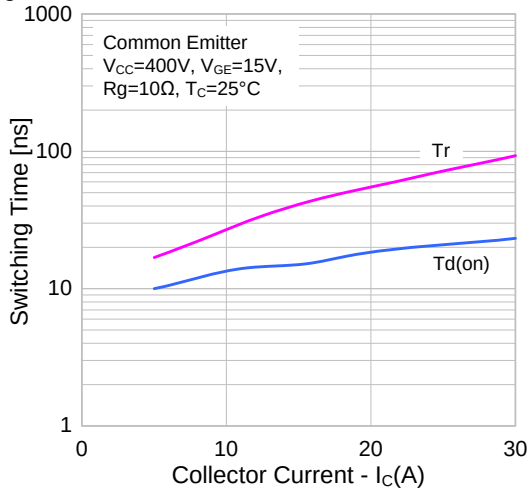


Figure 13. Turn-off Characteristic vs. Collector Current

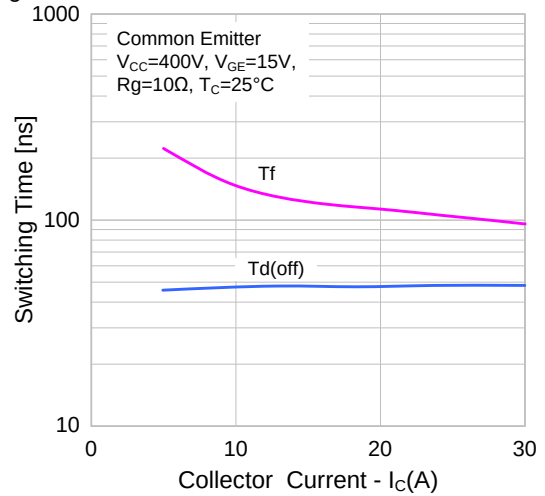


Figure 14. Turn-off Loss vs. Collector Current

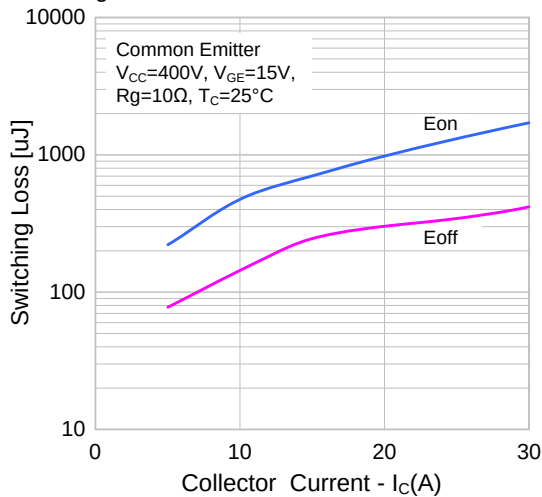


Figure 15. Forward Characteristic

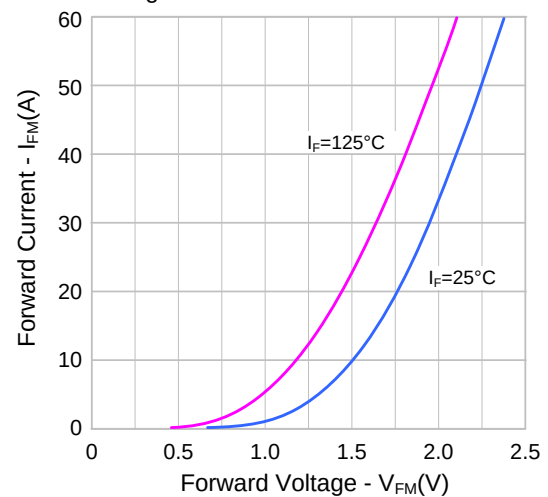


Figure 16. Reverse Recovery Time vs. Forward Current

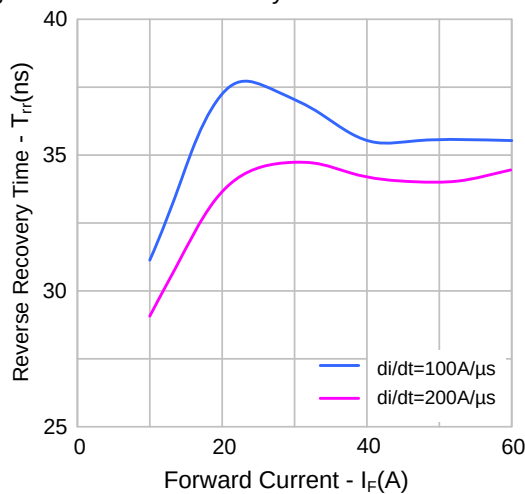
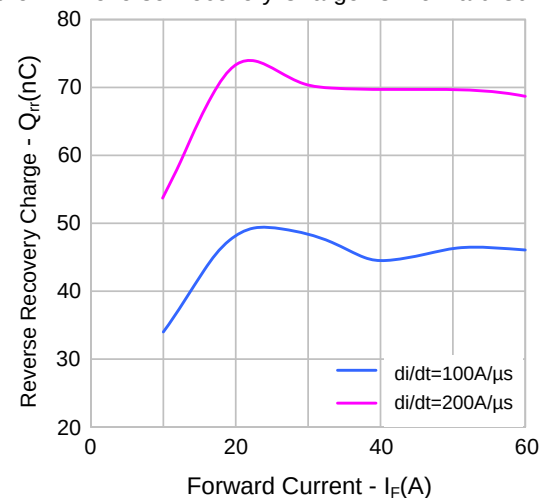
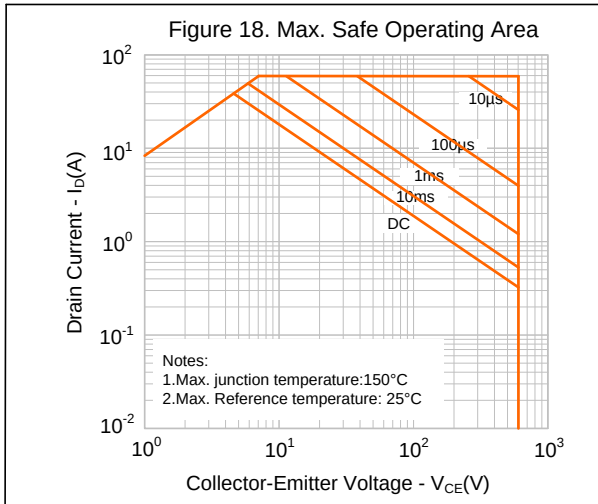


Figure 17. Reverse Recovery Charge vs. Forward Current



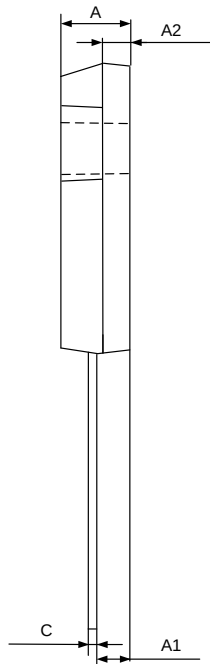
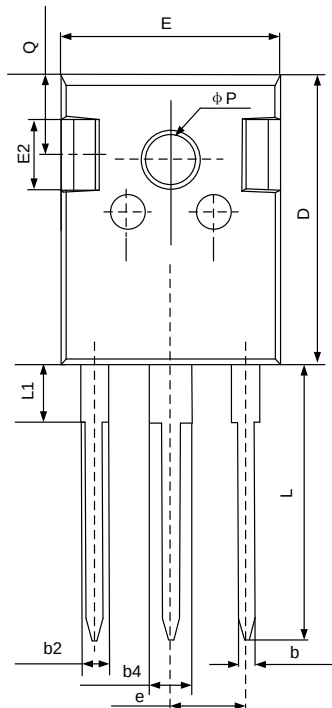
TYPICAL CHARACTERISTICS CURVE (CONTINUED)



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!
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Rev.: 1.4

Revision History:

1. Update P_D and SOA

Rev.: 1.3

Revision History:

1. Modify the upper limit of Operating Junction Temperature

Rev.: 1.2

Revision History:

1. Add IF current
2. Update the curve template and description

Rev.: 1.1

Revision History:

1. Update NOMENCLATURE

Rev.: 1.0

Revision History:

1. First release
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