

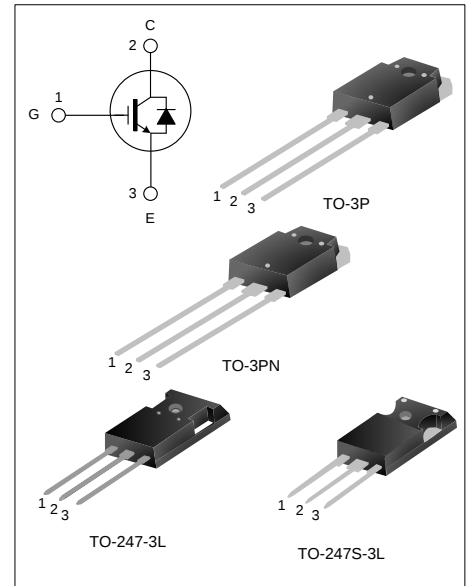
50A, 650V FIELD STOP IGBT

DESCRIPTION

SGT50T65FD1PN/P7/PS/PT using Field Stop IV IGBT technology, offers the optimum performance for induction Heating, UPS, SMPS and PFC application.

FEATURES

- ◆ 50A, 650V, $V_{CE(sat)}(typ.)=2.2V@I_C=50A$
- ◆ Low conduction loss
- ◆ Fast switching
- ◆ High input impedance



NOMENCLATURE

SGT 50 T 65 F D X 1 PN	
IGBT series	Package PN: TO-3P
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 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	D: Packaged with fast recovery diode
X: Field Stop 7	R: RC IGBT
Voltage, 65: 650V	L: Ultra low switching, recommended frequency ~2KHz
120: 1200V	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
SGT50T65FD1PN	TO-3P	50T65FD1	Pb free	Tube
SGT50T65FD1P7	TO-247-3L	50T65FD1	Pb free	Tube
SGT50T65FD1PS	TO-247S-3L	50T65D1	Pb free	Tube
SGT50T65FD1PT	TO-3PN	50T65FD1	Pb free	Tube



ABSOLUTE MAXIMUM RATINGS (T_C=25°C UNLESS OTHERWISE NOTED)

Parameter		Symbol	Ratings	Units
Collector to Emitter Voltage		V _{CE}	650	V
Gate to Emitter Voltage		V _{GE}	±20	V
Transient G-E voltage		V _{GEM}	±30	V
Collector Current	T _C =25°C	I _C	100	A
	T _C =100°C		50	
Pulsed Collector Current		I _{CM}	150	A
Diode Current		I _F	25	A
Power Dissipation (T _C =25°C)		P _D	235	W
Operating Junction Temperature Range		T _J	-55~+150	°C
Storage Temperature Range		T _{stg}	-55~+150	°C

THERMAL CHARACTERISTICS

Parameter	Symbol	Ratings	Units
Thermal Resistance, Junction to Case (IGBT)	R _{θJC}	0.53	°C/W
Thermal Resistance, Junction to Case (FRD)	R _{θJC}	1.48	°C/W

ELECTRICAL CHARACTERISTICS OF IGBT (T_C=25°C UNLESS OTHERWISE NOTED)

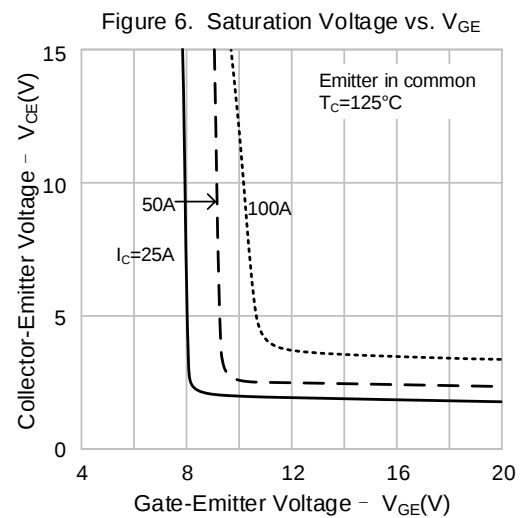
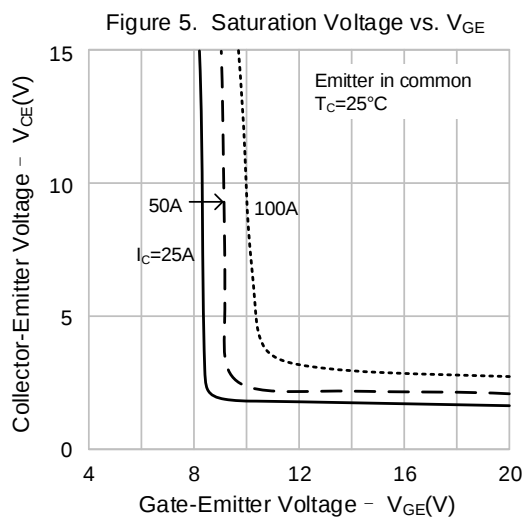
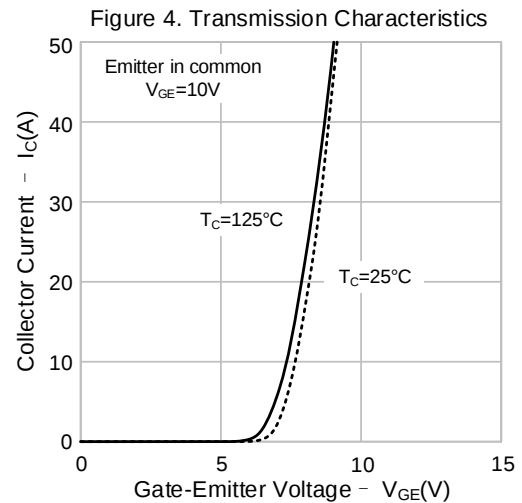
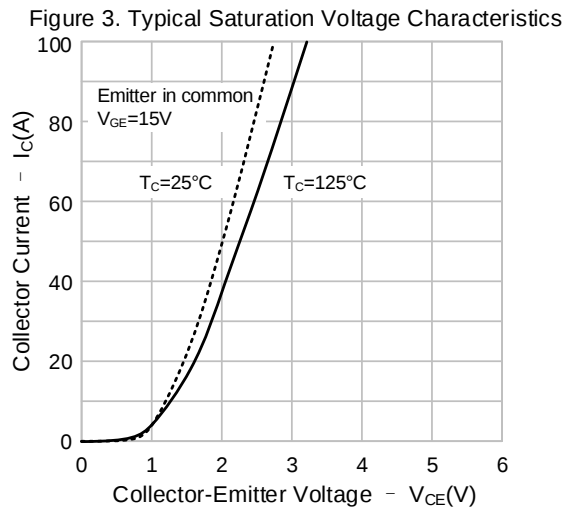
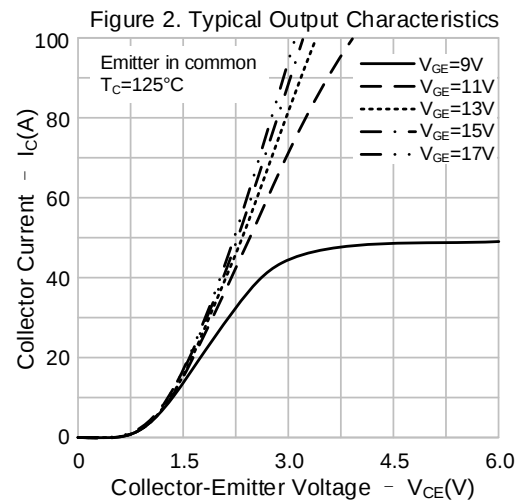
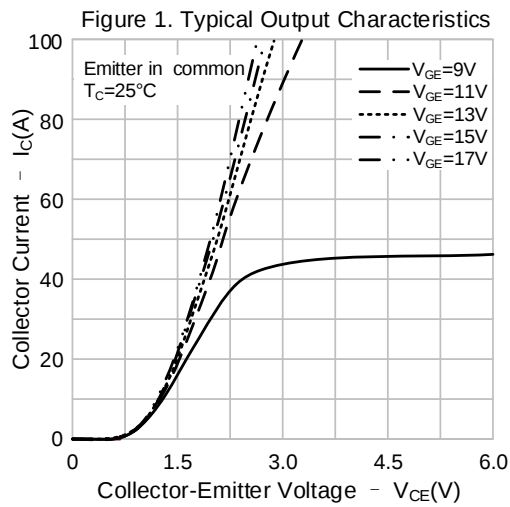
Parameter	Symbol	Test conditions	Min.	Typ.	Max.	Units
Collector to Emitter Breakdown Voltage	BV _{CE}	V _{GE} =0V, I _C =250μA	650	--	--	V
C-E Leakage Current	I _{CES}	V _{CE} =650V, V _{GE} =0V	--	--	200	μA
G-E Leakage Current	I _{GES}	V _{GE} =20V, V _{CE} =0V	--	--	±400	nA
G-E Threshold Voltage	V _{GE(th)}	I _C =250μA, V _{CE} =V _{GE}	4.0	5.0	6.5	V
Collector to Emitter Saturation Voltage	V _{CE(sat)}	I _C =50A, V _{GE} =15V, T _C =25°C	--	2.2	2.6	V
		I _C =50A, V _{GE} =15V, T _C =125°C	--	2.4	--	V
Input Capacitance	C _{ies}	V _{CE} =30V, V _{GE} =0V, f=1MHz	--	4532	--	pF
Output Capacitance	C _{oes}		--	90	--	
Reverse Transfer Capacitance	C _{res}		--	41	--	
Turn-On Delay Time	T _{d(on)}	V _{CE} =400V I _C =50A R _g =10Ω V _{GE} =15V Inductive Load	--	45	--	ns
Rise Time	T _r		--	145	--	
Turn-Off Delay Time	T _{d(off)}		--	125	--	
Fall Time	T _f		--	130	--	
Turn-On Switching Loss	E _{on}		--	2.8	--	mJ
Turn-Off Switching Loss	E _{off}		--	1.0	--	
Total Switching Loss	E _{st}		--	3.8	--	
Total Gate Charge	Q _g	V _{CE} =400V, I _C =50A, V _{GE} =15V	--	145	--	nC
Gate to Emitter Charge	Q _{ge}		--	48	--	
Gate to Collector Charge	Q _{gc}		--	46	--	

ELECTRICAL CHARACTERISTICS OF FRD (T_C=25°C UNLESS OTHERWISE NOTED)

Parameter	Symbol	Test conditions	Min.	Typ.	Max.	Units
Diode Forward Voltage	V _{FM}	I _F =25A, T _C =25°C	--	1.95	--	V
		I _F =25A, T _C =125°C	--	1.7	--	
Diode Reverse Recovery Time	T _{rr}	I _{EC} =25A, dI _{EC} /dt=200A/μs	--	33	--	ns
Diode Reverse Recovery Charge	Q _{rr}	I _{EC} =25A, dI _{EC} /dt=200A/μs	--	65	--	nC

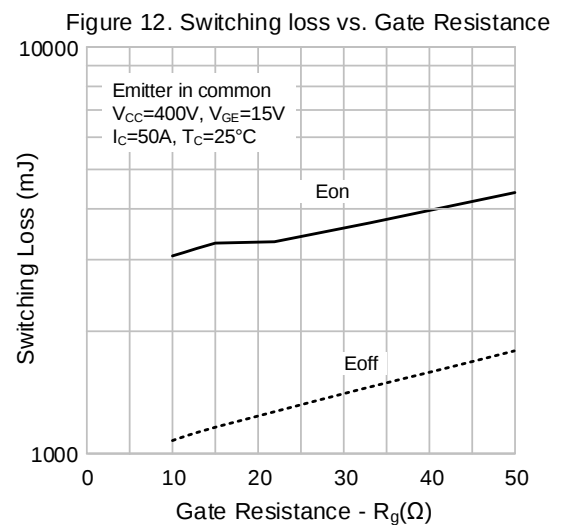
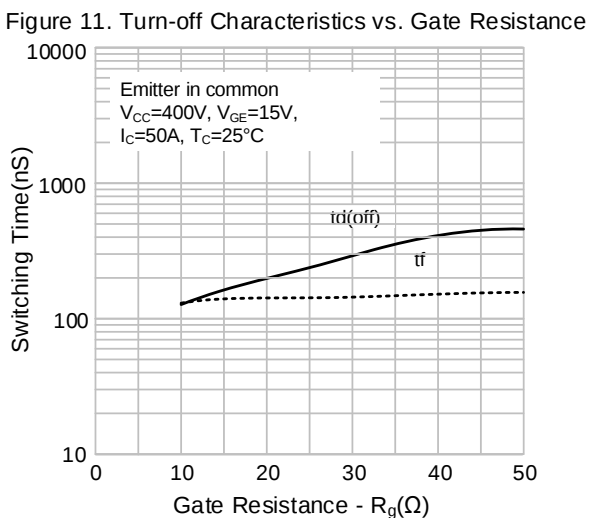
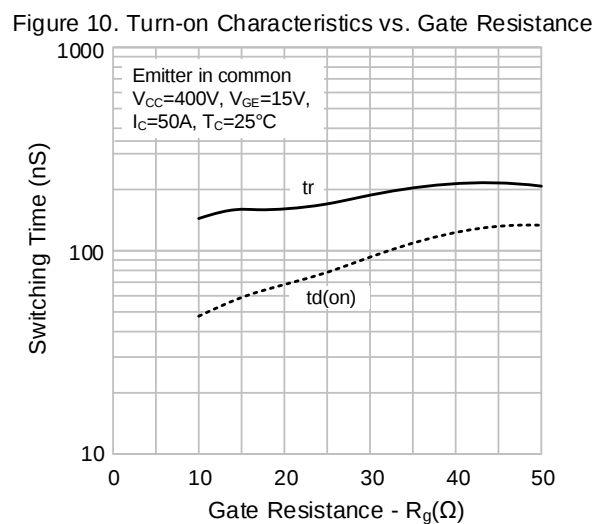
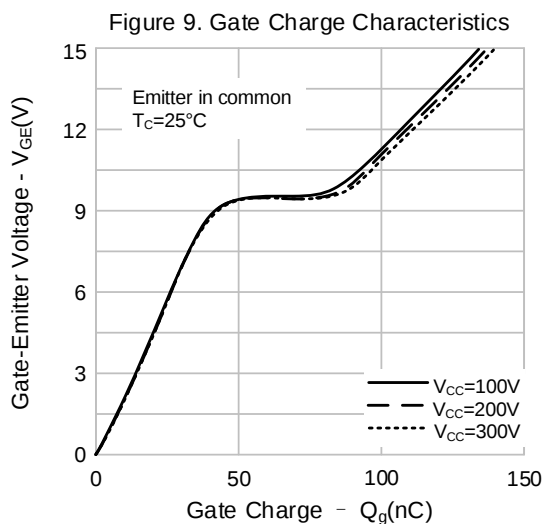
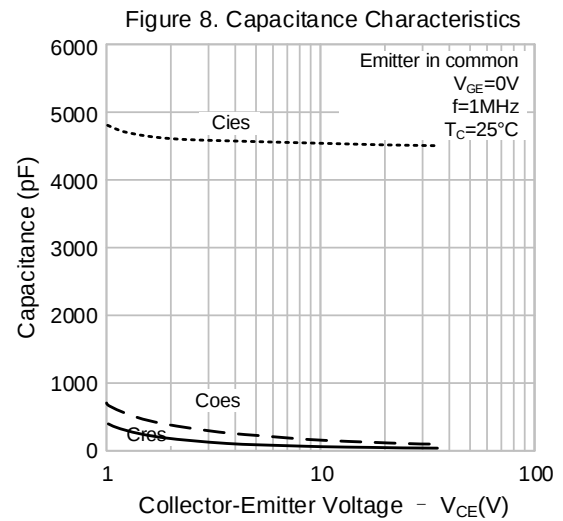
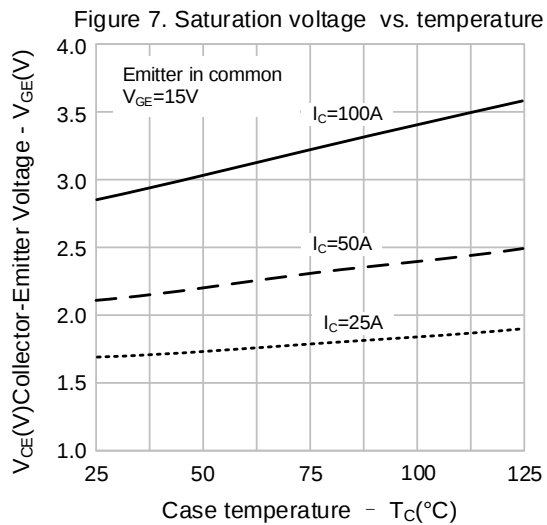


TYPICAL CHARACTERISTIC CURVES





TYPICAL CHARACTERISTIC CURVES (CONTINUED)





TYPICAL CHARACTERISTIC CURVES (CONTINUED)

Figure 13. Turn-on Characteristics vs. Collector Current

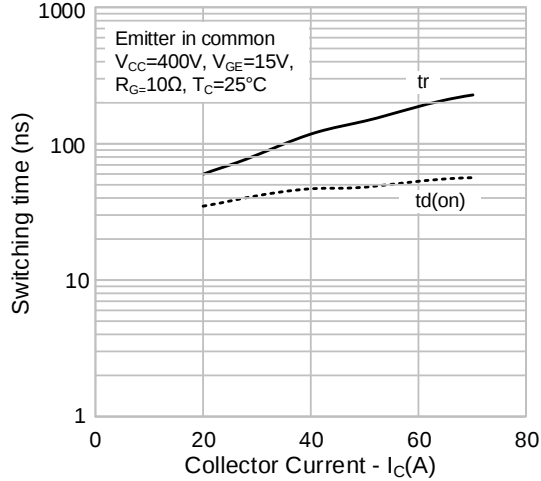


Figure 14. Turn-off Characteristics vs. Collector Current

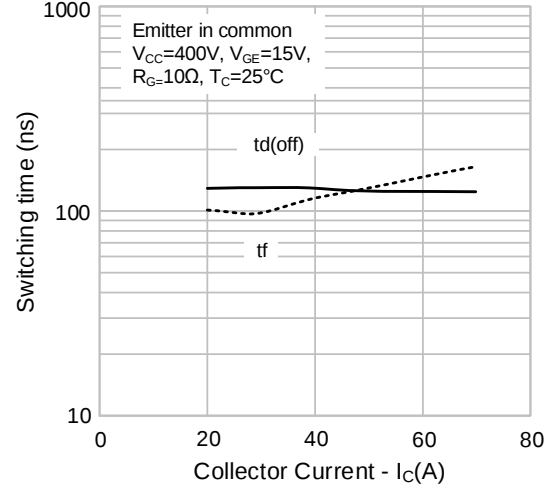


Figure 15. Switching loss vs. collector current

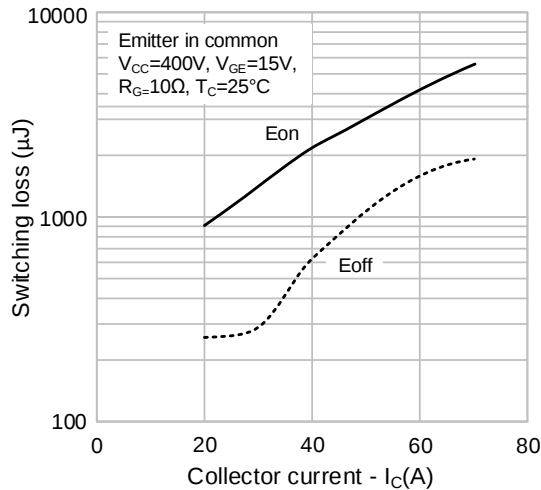


Figure 16. Forward Characteristics

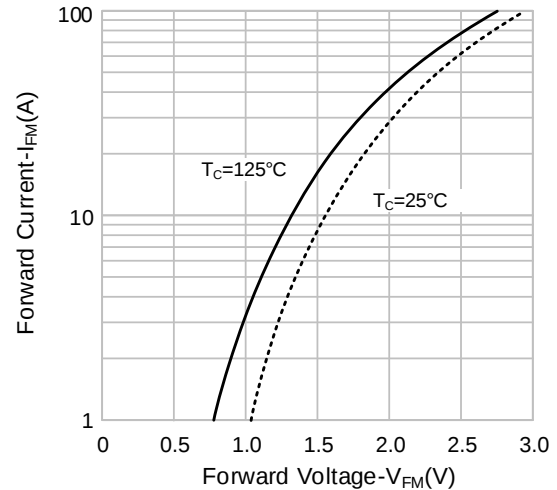


Figure 17. Reverse Recovery Time vs. Forward Current

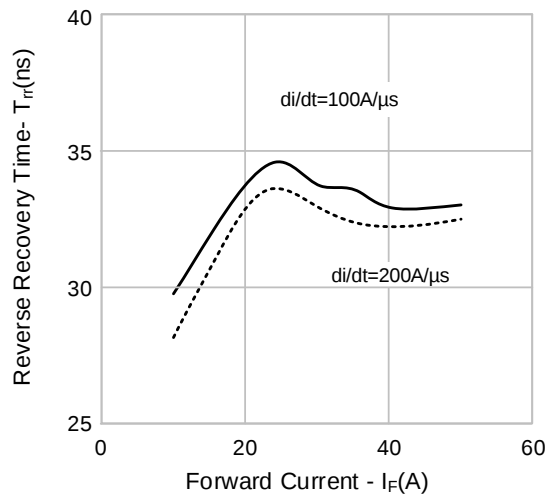
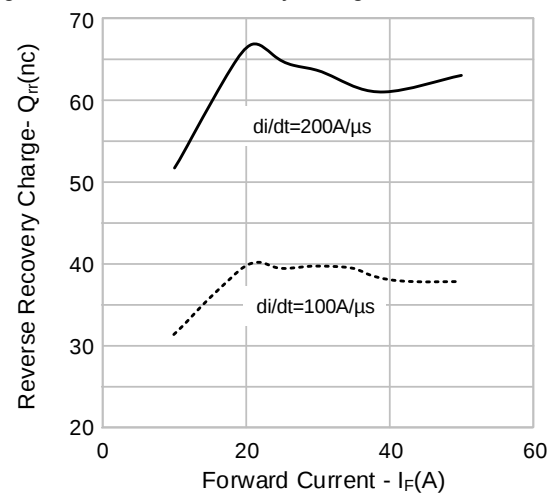
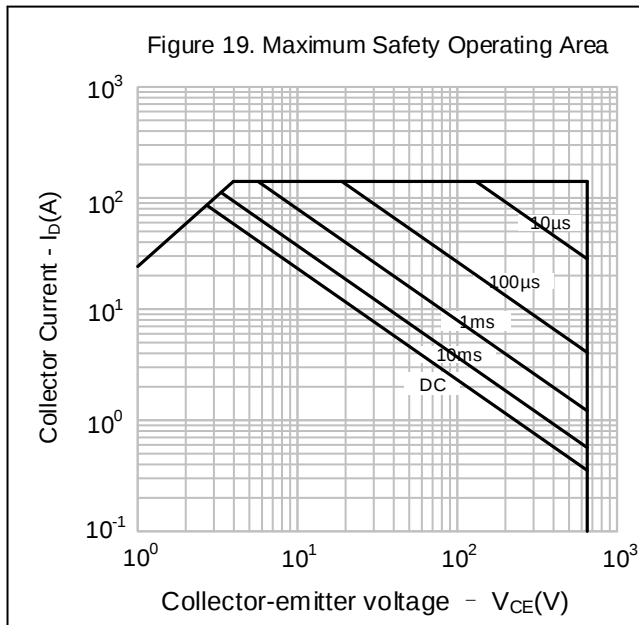


Figure 18. Reverse Recovery Charge vs. Forward Current





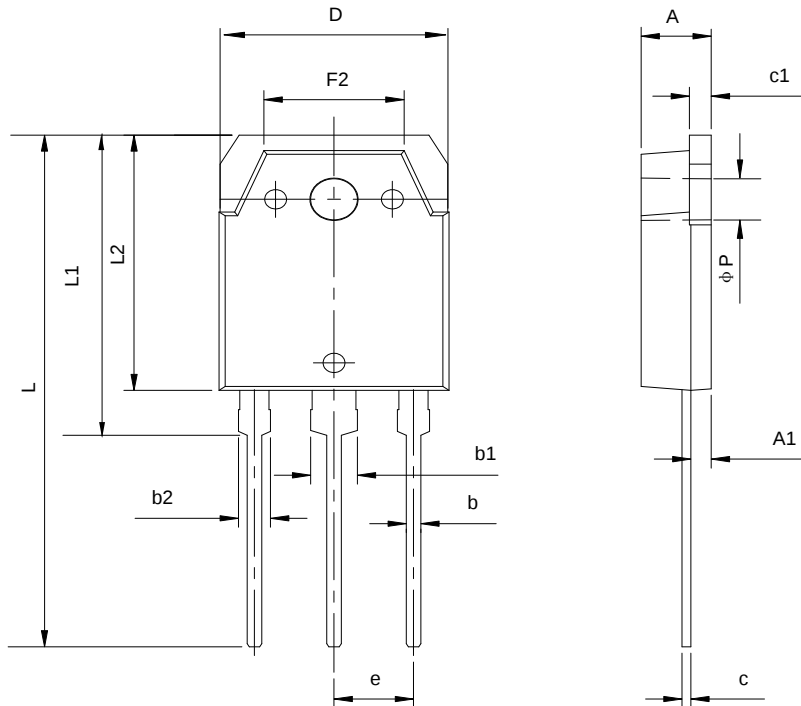
TYPICAL CHARACTERISTIC CURVES (CONTINUED)



PACKAGE OUTLINE

TO-3P

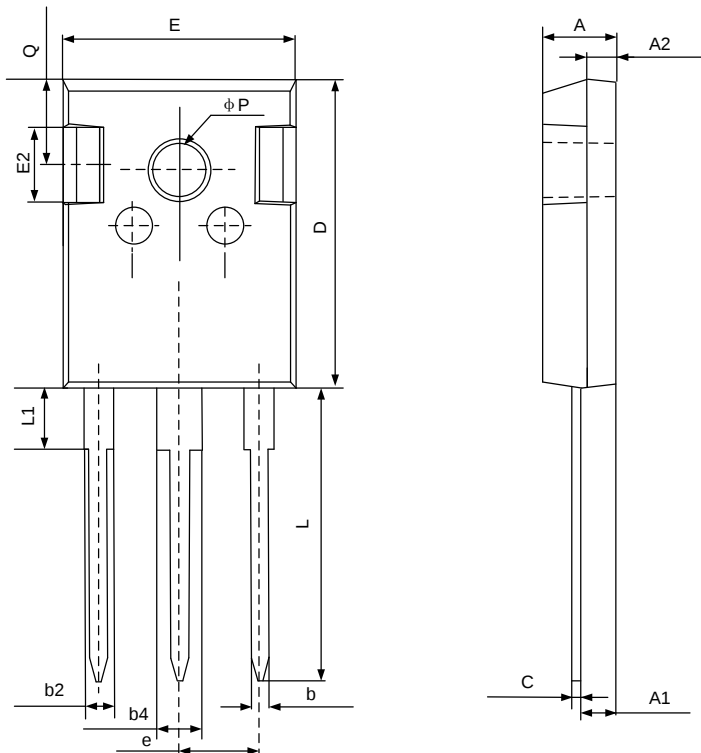
UNIT: mm



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.4	—	5.2
c1	1.2	—	1.8
A1	1.2	—	2.0
b	0.7	1.0	1.3
b1	2.7	3.0	3.3
b2	1.7	2.0	2.3
D	15.0	15.5	16.0
c	0.4	0.6	0.8
F2	8.5	—	10.0
e	5.45 TYP		
L1	22.6	—	23.6
L	39.0	—	41.5
L2	19.5	—	21.0
P	3.0	—	3.4

TO-247-3L

UNIT: mm



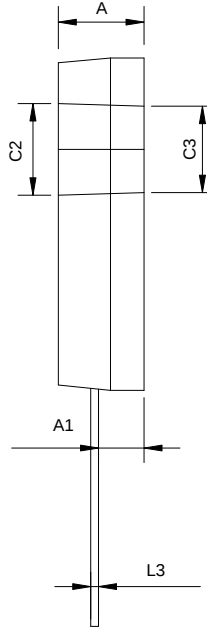
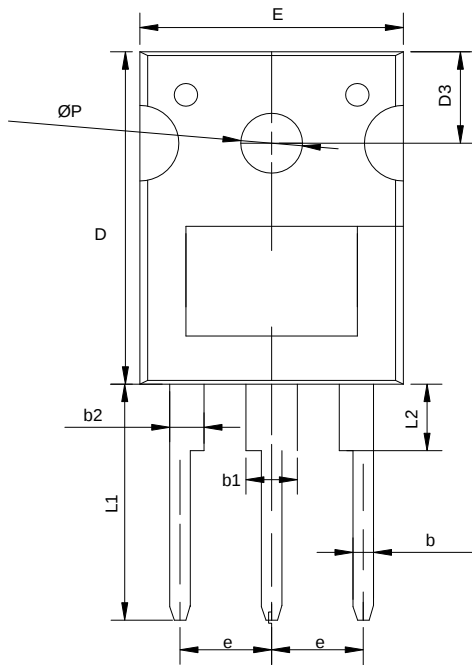
SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.59
A2	1.85	2.00	2.15
b	1.11	—	1.36
b2	1.91	—	2.25
b4	2.91	—	3.25
c	0.51	—	0.75
D	20.80	21.00	21.30
E	15.50	15.80	16.10
E2	4.40	5.00	5.20
e	5.44 BSC		
L	19.72	19.92	20.22
L1	—	—	4.30
Q	5.60	5.80	6.00
P	3.40	—	3.80



PACKAGE OUTLINE(CONTINUED)

TO-247S-3L

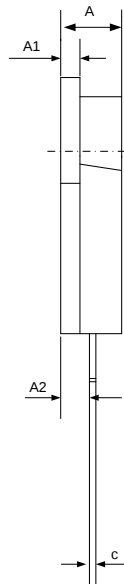
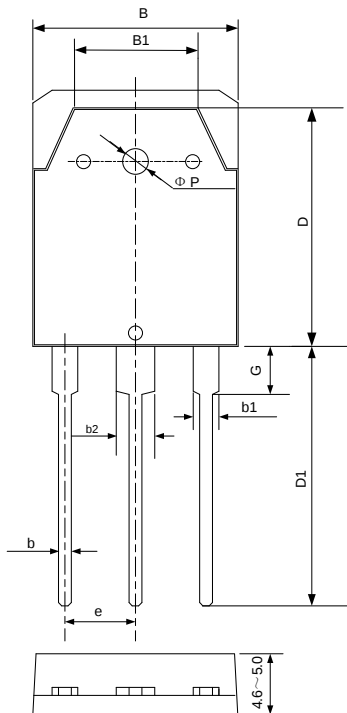
UNIT: mm



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.30	2.50	2.70
b	1.10	1.20	1.30
b1	2.90	3.10	3.30
b2	1.90	2.10	2.30
c2	5.50	6.00	6.50
c3	4.95	5.10	5.25
D	19.00	20.00	21.00
D3	5.30	5.50	5.70
e	5.34	5.44	5.54
E	15.40	15.60	15.80
L1	14.40	14.60	14.80
L2	3.85	4.00	4.15
L3	0.35	0.50	0.65
ØP	3.40	3.60	3.80

TO-3PN

UNIT: mm



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.60	4.80	5.00
A1	1.30	1.50	1.70
A2	2.20	2.40	2.60
b	0.80	1.00	1.20
b1	1.80	2.00	2.20
b2	2.90	3.10	3.30
B	15.20	15.60	16.00
B1	9.10	9.30	9.50
c	0.50	0.60	0.70
D	18.30	18.50	18.70
D1	19.00	19.50	20.00
e	5.25	5.45	5.65
G	2.80	3.00	3.20
ØP	3.00	3.20	3.40



MOS DEVICES OPERATE NOTES:

Electrostatic charges may exist in many things. Please take following preventive measures to prevent effectively the MOS electric circuit as a result of the damage which is caused by discharge:

- The operator must put on wrist strap which should be earthed to against electrostatic.
- Equipment cases should be earthed.
- All tools used during assembly, including soldering tools and solder baths, must be earthed.
- MOS devices should be packed in antistatic/conductive containers for transportation.

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Part No.: SGT50T65FD1PN/P7/PS/PT

Document Type: Datasheet

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Rev.: 2.0

Revision History:

1. Update typical characteristic curves
2. Update important notice

Rev.: 1.9

Revision History:

1. Modify electrical characteristics

Rev.: 1.8

Revision History:

1. Add TO-3PN
2. Update important notice

Rev.: 1.7

Revision History:

1. Update characteristics
2. Update the package outline

Rev.: 1.6

Revision History:

1. Add package outline of TO-247S-3L
2. Modify NOMENCLATURE

Rev.: 1.5

Revision History:

1. Update Electrical characteristics

Rev.: 1.4

Revision History:

1. Add Max. value of Vcesat

Rev.: 1.3

Revision History:

1. Modify TO-247-3L

Rev.: 1.2

Revision History:

1. Add TO-247-3L
2. Modify Diode Current to 25A

Rev.: 1.1

Revision History:

1. Add TransientUpdate the package outline

Rev.: 1.0

Revision History:

1. First release
