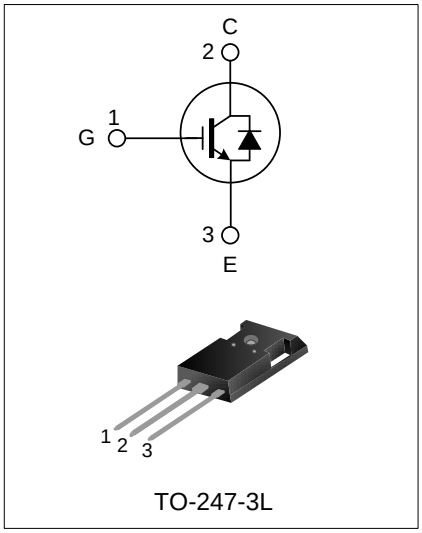
50A, 650V FIELD STOP IGBT

DESCRIPTION

The SGT50T65SDM1P7 adopts Field Stop III IGBT technology, features low conduction loss and switching loss, positive temperature coefficient, easy parallel operation, etc. It is applicable to inverters, UPS, SMPS, and PFC.



TO-247-3L

FEATURES

- 50A, 650V, $V_{CE(sat)(typ.)}$=1.65V@I_C=50A
- Low conduction loss
- Fast switching speed
- High breakdown voltage

NOMENCLATURE

SGT 50 T 65 S D M 1 P7

IGBT series

Current, 70: 70A

N : N Channel
NE : N-channel planar gate with ESD
T : Field Stop 3/4
U : Field Stop 4+
V : Field Stop 5
W: Field Stop 6
X : Field Stop 7

Voltage, 65: 650V
120: 1200V

Package
P7 : TO-247-3L
F: TO-220F-3L

1,2,3··· : Version No.

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

D : Packaged with fast recovery diode
R : RC IGBT

L : Ultra low switching, recommended frequency ~2KHz
Q : Low switching, recommended frequency2~20K
S : STandard frequency, recommended frequency5~40K
F : Fast switching, recommended frequency10~60K
UF : Ultra fast switching, recommended frequency 40K~

ORDERING INFORMATION

Part No.	Package	Marking	Hazardous Substance Control	Packing Type
SGT50T65SDM1P7	TO-247-3L	50T65SDM1	Pb free	Tube

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

Characteristics		Symbol	Ratings	Unit
Collector to Emitter Voltage		V_{CE}	650	V
Gate to Emitter Voltage		V_{GE}	±20	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	T_C=25°C	I_F	100	A
	T_C=100°C		50	
Diode forward peak surge current		I_{FSM}	150	A
Short-circuit time (V_{GE}=15V, V_{CC}=300V)		Tsc	10	μs
Maximum Power Dissipation (T_C=25°C)		P_D	416	W
Operating Junction Temperature		T_J	-55～+175	°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)	$R_{\theta JC}$	--	--	--	0.3	°C/W
Thermal Resistance, Junction to Case (FRD)	$R_{\theta JC}$	--	--	--	0.65	°C/W
Thermal Resistance, Junction to Ambient (IGBT)	$R_{\theta JA}$	--	--	--	40	°C/W
Soldering Temperature (in line)	T_{sold}	15^{+2}_{-0} sec, 1time	--	--	260	°C

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

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
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	7	V
Collector to Emitter Saturation Voltage	$V_{CE(sat)}$	I_C=50A, V_{GE}=15V, T_C=25°C	--	1.65	2.2	V
		I_C=50A, V_{GE}=15V, T_C=125°C	--	1.90	--	V
Input Capacitance	C_{ies}	V_{CE}=30V	--	2723	--	pF
Output Capacitance	C_{oes}	V_{GE}=0V	--	230	--	
Reverse Transfer Capacitance	C_{res}	f=1MHz	--	55	--	
Turn-On Delay Time	$T_{d(on)}$	V_{CE}=400V I_C=50A R_g=10Ω V_{GE}=15V Inductive load	--	37	--	ns
Rise Time	T_r		--	133	--	
Turn-Off Delay Time	$T_{d(off)}$		--	125	--	
Fall Time	T_f		--	121	--	
Turn-On Switching Loss	E_{on}		--	3.0	--	mJ
Turn-Off Switching Loss	E_{off}		--	1.1	--	
Total Switching Loss	E_{st}		--	4.1	--	
Total Gate Charge	Q_g	V_{CE}=400V, I_C=50A, V_{GE}=15V	--	123	--	nC
Gate to Emitter Charge	Q_{ge}		--	31	--	
Gate to Collector Charge	Q_{gc}		--	48	--	

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

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Units
Diode Forward Voltage	V_{fm}	I_F=50A, T_C=25°C	--	1.7	2.5	V
		I_F=50A, T_C=125°C	--	1.3	--	
Diode Reverse Recovery Time	T_{rr}	I_{EC}=50A, dI_{EC}/dt=200A/μs	--	37.5	--	ns
Diode Reverse Recovery Charge	Q_{rr}	I_{EC}=50A, dI_{EC}/dt=200A/μs	--	78	--	nC

TYPICAL CHARACTERISTICS CURVE

Figure 1. Typical Output Characteristics

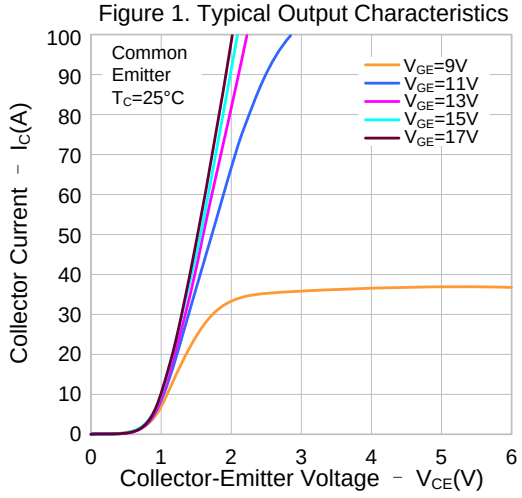


Figure 2. Typical Output Characteristics

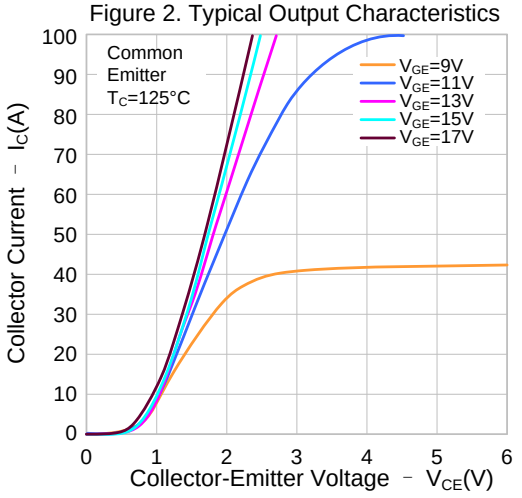


Figure 3. Typical Saturation Voltage Characteristic

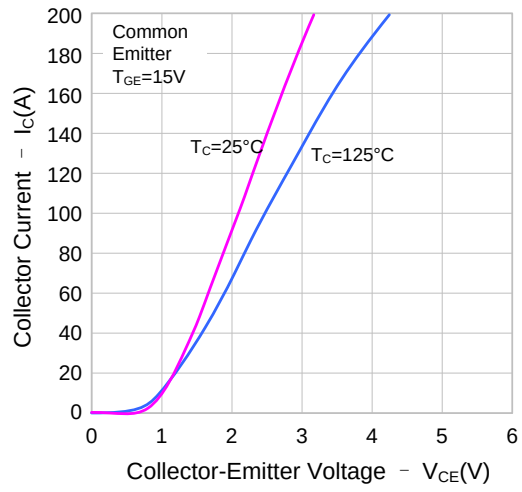


Figure 4. Transfer Characteristic

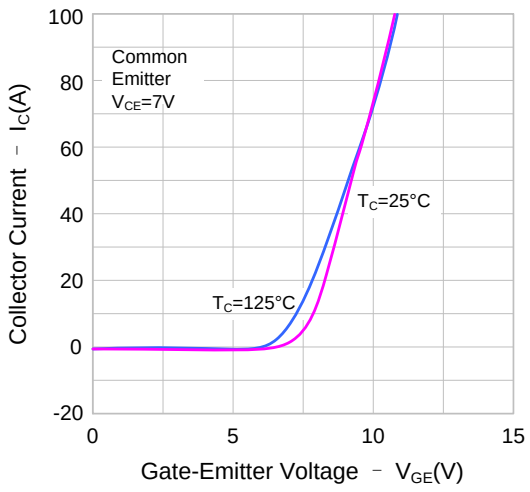


Figure 5. Saturation Voltage vs. V_{GE}

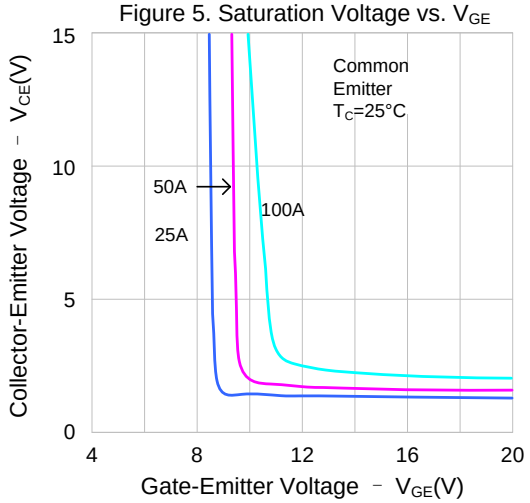
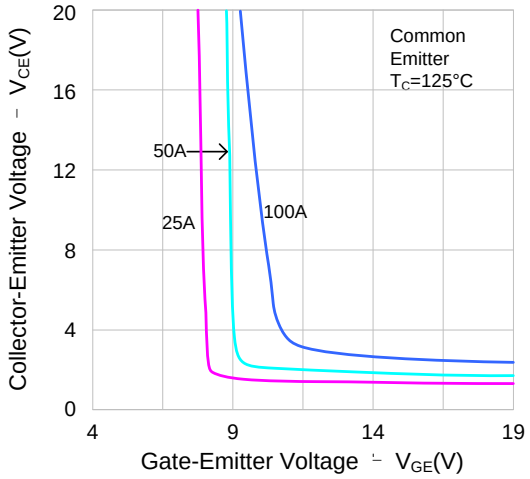


Figure 6. Saturation Voltage vs. V_{GE}



TYPICAL CHARACTERISTICS CURVE (CONTINUED)

Figure 7. Saturation Voltage vs. Temperature

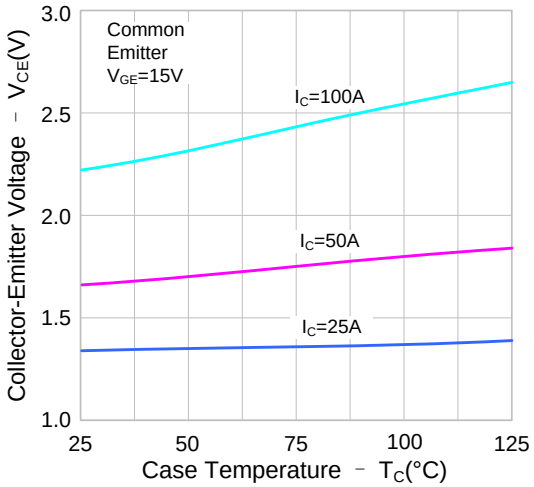


Figure 8. Capacitance Characteristic

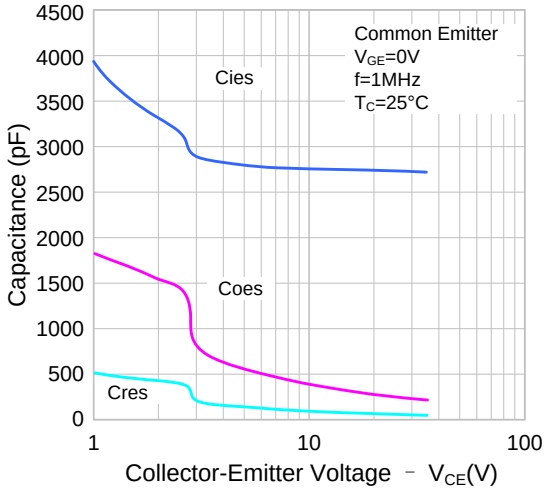


Figure 9. Gate Charge Characteristic

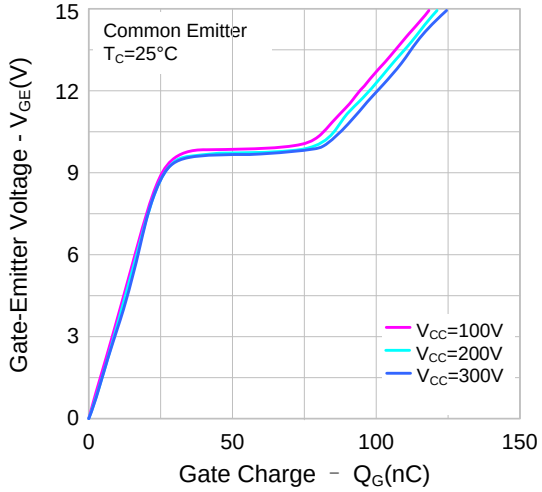


Figure 10. Turn-on Characteristic vs. Gate Resistance

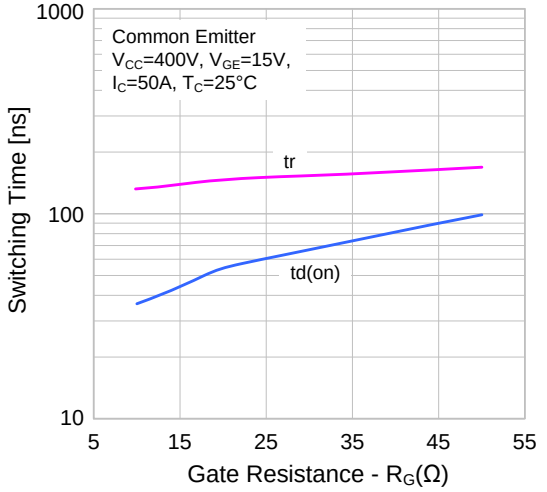


Figure 11. Turn-off Characteristic vs. Gate Resistance

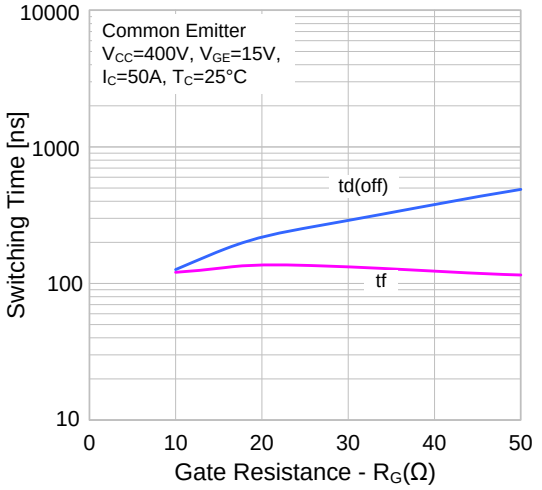
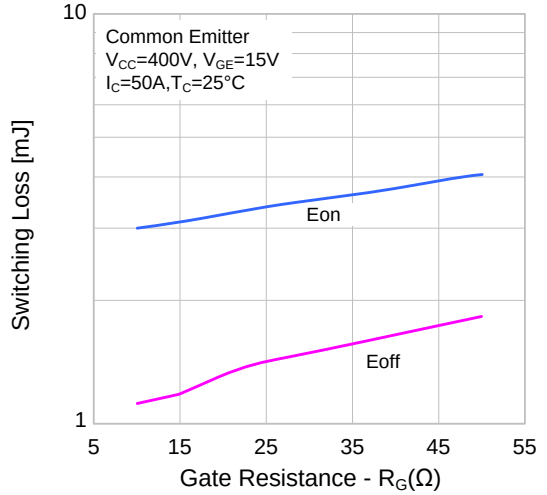


Figure 12. Switching Loss vs. Gate Resistance



TYPICAL CHARACTERISTICS CURVE (CONTINUED)

Figure 13. Turn-on Characteristic vs. Collector Current

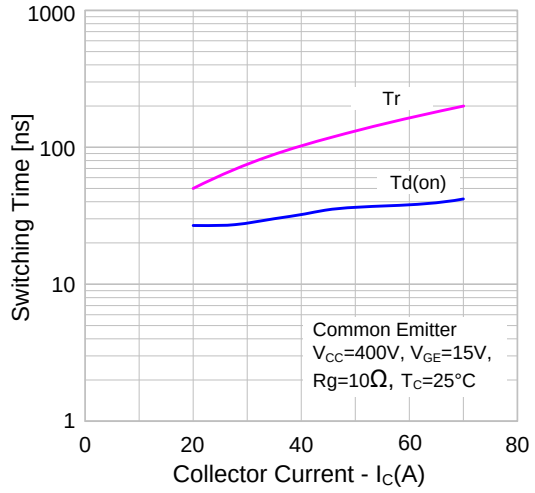


Figure 14. Turn-off Characteristic vs. Collector Current

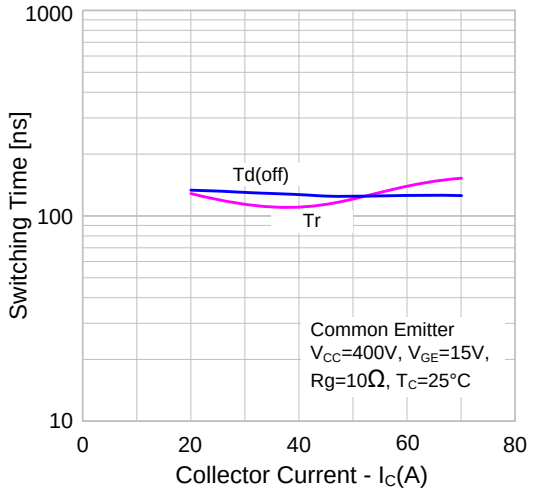


Figure 15. Switching Loss vs. Collector Current

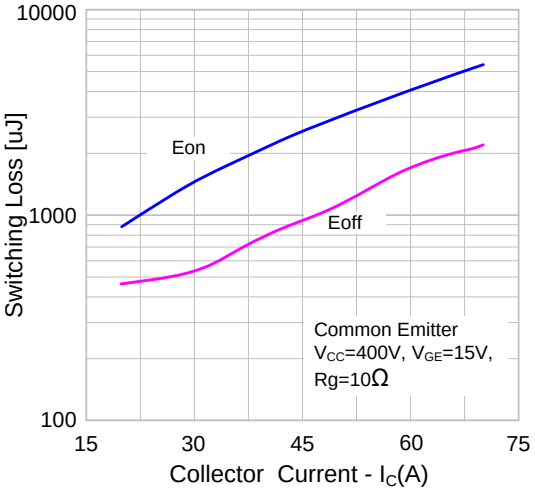


Figure 16. Forward Characteristic

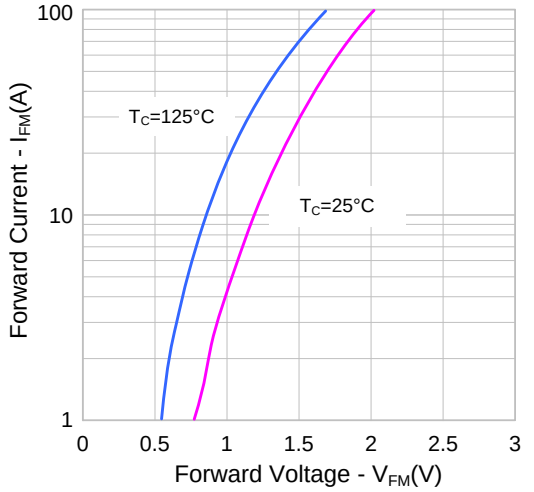


Figure 17. Reverse Recovery Time vs. Forward Current

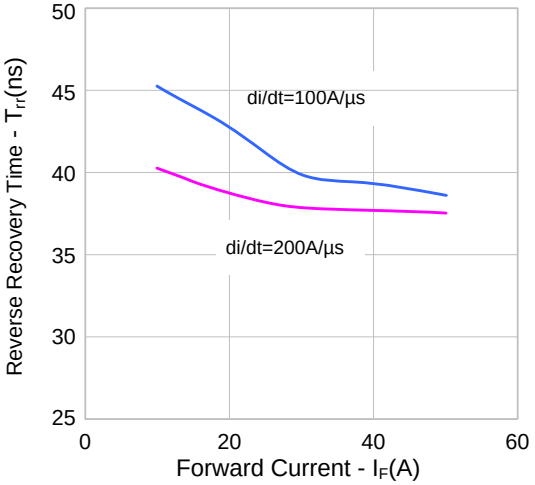
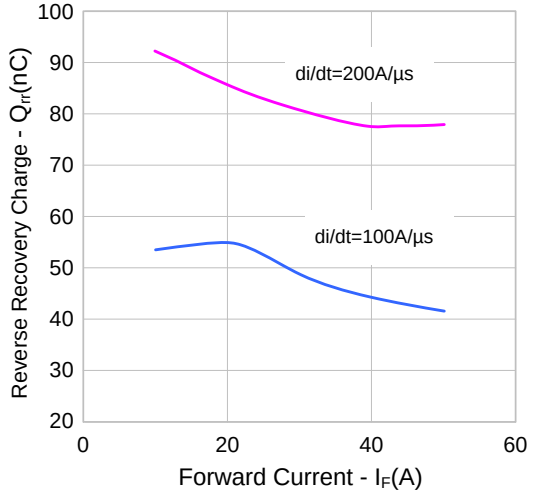


Figure 18. Reverse Recovery Charge vs. Forward Current



TYPICAL CHARACTERISTICS CURVE (CONTINUED)

Figure 19. Max. Safe Operating Area

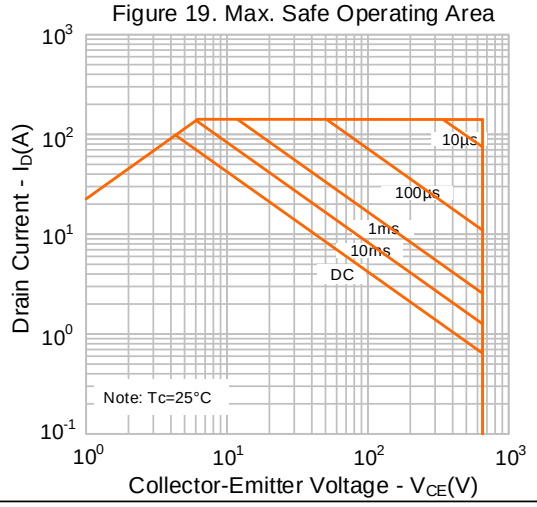


Figure 20. Transient Thermal Impedance vs. On-pulse Duration (IGBT)

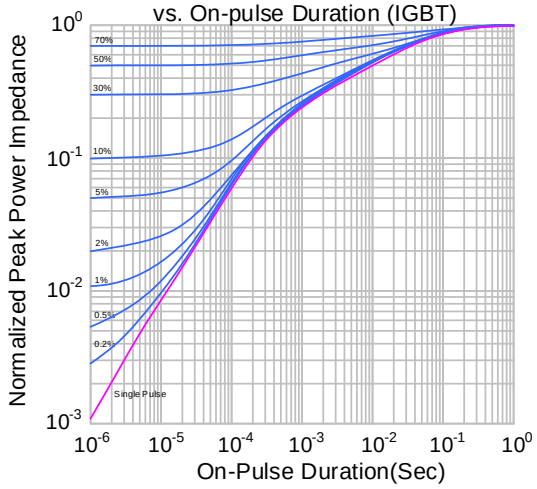
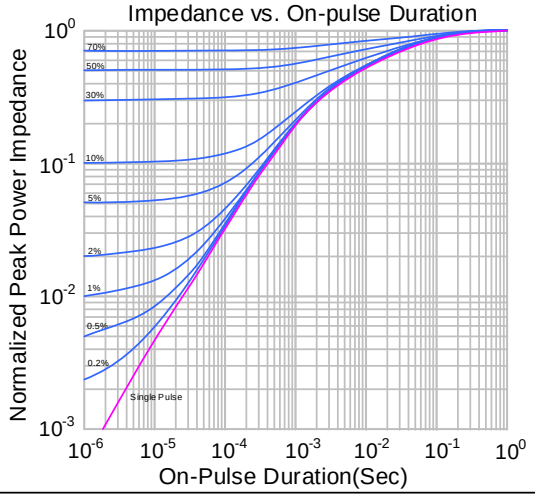
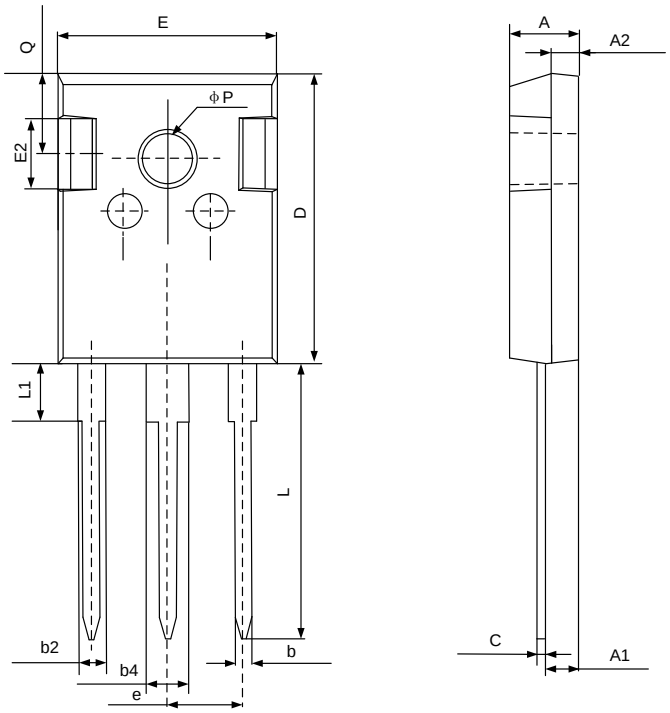


Figure 21. Diode Transient Thermal Impedance vs. On-pulse Duration



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**

Part No.:	SGT50T65SDM1P7	Document Type:	Datasheet
Copyright:	HANGZHOU SILAN MICROELECTRONICS CO.,LTD	Website:	http: //www.silan.com.cn

Rev.: 1.5

Revision History:

1. Modify operating junction temperature

Rev.: 1.4

Revision History:

1. Update SOA

Rev.: 1.3

Revision History:

1. Update figure 20 and add figure 21

Rev.: 1.2

Revision History:

1. Update Total Switching Loss
2. Update package outline

Rev.: 1.1

Revision History:

1. Add short circuit protection time
2. Update the template of the datasheet

Rev.: 1.0

Revision History:

1. First release