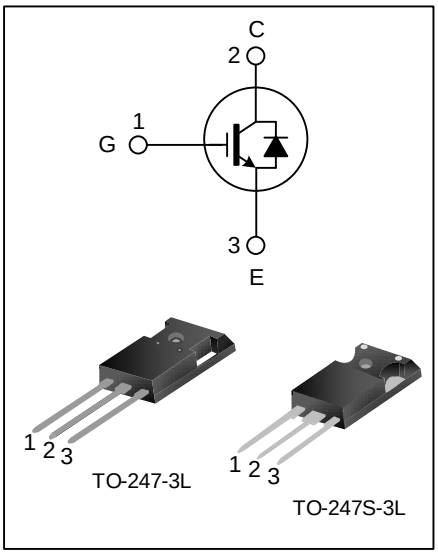
40A, 600V IGBT

DESCRIPTION

SGT40N60FD1P7(PS) using Punch Through IGBT technology, offer the optimum performance for induction Heating, UPS, SMPS and PFC application.



FEATURES

- 40A, 600V, $V_{CE(sat)}$ =1.8V@I_C=40A
- Low conduction loss
- Fast switching
- High input impedance

NOMENCLATURE

SGT 40 N 60 F D 1 P7

IGBT series

Current, 40: 40A

N : N-channel
NE : N-channel planner gate with ESD
T : Field Stop 3/4
U : Field Stop 4+
V : Field Stop 5
W: Field Stop 5+
Y : Field Stop5++
A : Field Stop 6

Voltage, 60: 600V
120: 1200V

Package
P7 : TO-247-3L
PS : TO-247S-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
Blank: single IGBT
C : Sic

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 frequency 10~60KHz
UF : Ultra fast switching，recommended frequency 40KHz~
I: Igniter

ORDERING INFORMATION

Part No.	Package	Marking	Hazardous Substance Control	Packing
SGT40N60FD1P7	TO-247-3L	40N60FD1	Halogen free	Tube
SGT40N60FD1PS	TO-247S-3L	40N60FD2	Pb free	Tube

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

Characteristics		Symbol	Ratings	Units
Collector - Emitter Voltage		V_{CE}	600	V
Gate - Emitter Voltage		V_{GE}	±20	V
Transient Gate - 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	
Pulsed Collector Current		I_{CM}	120	A
Maximum Power Dissipation (T_C=25°C)		P_{tot}	290	W
-Reduction per degree Celsius above 25°C			2.32	W/°C
Operating Junction Temperature		T_J	-55～+150	°C
Storage Temperature Range		T_{stg}	-55～+150	°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Ratings	Units
Thermal Resistance, Junction to Case (IGBT)	$R_{th(j-C)}$	0.52	°C/W
Thermal Resistance, Junction to Case (FRD)	$R_{th(j-C)}$	1.9	°C/W
Thermal Resistance, Junction to Ambient	$R_{th(j-a)}$	40	°C/W

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

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Units
Collector - Emitter Breakdown Voltage	$V_{(BR)CES}$	V_{GE}=0V,I_C=100uA	600	--	--	V
Zero Gate Voltage Collector Current	I_{CES}	V_{CE}=600V,V_{GE}=0V	--	--	200	uA
Gate-emitter Leakage Current	I_{GES}	V_{GE}=20V,V_{CE}=0V	--	--	±500	nA
Gate-emitter Threshold Voltage	$V_{GE(th)}$	I_C=250uA,V_{CE}=V_{GE}	4.0	5.0	6.5	V
Collector - Emitter Saturation Voltage	V_{CEsat}	I_C=40A,V_{GE}=15V,T_J=25°C	--	1.8	2.7	V
		I_C=40A,V_{GE}=15V,T_J=125°C	--	2.5	--	V
Input Capacitance	C_{ies}	V_{CE}=30V	--	1850	--	pF
Output Capacitance	C_{oes}	V_{GE}=0V	--	190	--	
Reverse Transfer Capacitance	C_{res}	f=1MHz	--	50	--	
Turn-On Delay Time	$T_{d(on)}$	V_{CE}=400V I_C=40A R_g=10Ω V_{GE}=15V Inductive Load,	--	16	--	ns
Rise Time	T_r		--	88	--	
Turn-Off Delay Time	$T_{d(off)}$		--	110	--	
Fall Time	T_f		--	96	--	
Turn-On Energy	E_{on}		--	1.8	--	mJ
Turn-Off Energy	E_{off}		--	0.8	--	
Total Switching Energy	E_{st}		--	2.6	--	
Total Gate Charge	Q_g	V_{CE} = 300V, I_C=40A, V_{GE} = 15V	--	100	--	nC
Gate to Emitter Charge	Q_{ge}		--	11	--	
Gate to Collector Charge	Q_{gc}		--	52	--	

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

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Units
Diode Forward Voltage	V_F	I_F = 20A T_J=25°C	--	1.9	2.6	V
		I_F = 20A T_J=125°C	--	1.5	--	
Diode Reverse Recovery Time	T_{rr}	I_{ES}=20A, dI_{ES}/dt=200A/μs	--	32	--	ns
Diode Reverse Recovery Charge	Q_{rr}	I_{ES}=20A, dI_{ES}/dt=200A/μs	--	74	--	nC

TYPICAL CHARACTERISTIC CURVE

Figure 1. Typical output characteristics

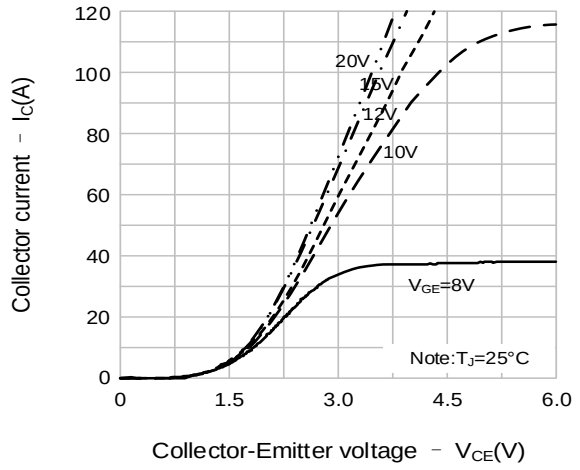


Figure 2. Typical output characteristics

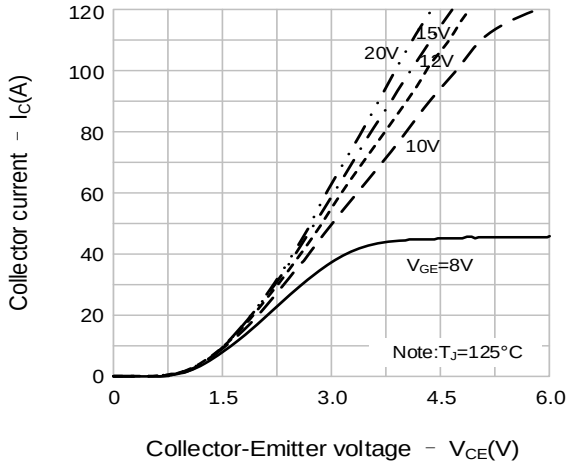


Figure 3. Typical saturation voltage characteristics

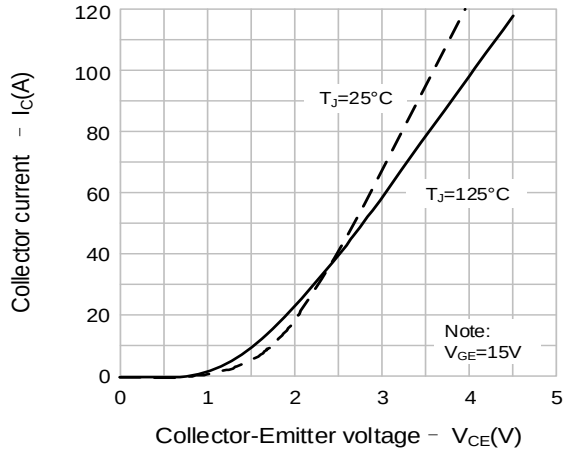


Figure 4. Transmission characteristic

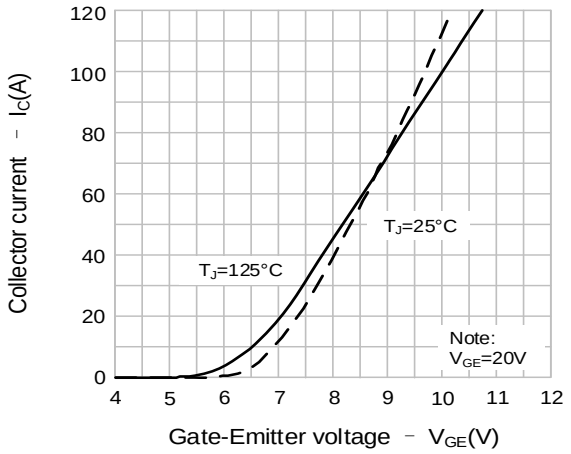


Figure 5. Saturation voltage vs. V_{GE}

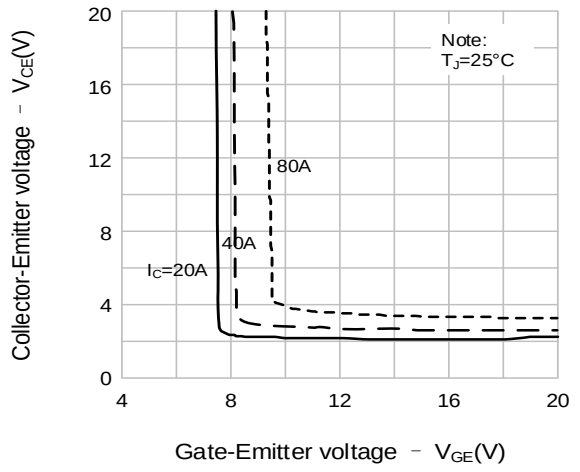
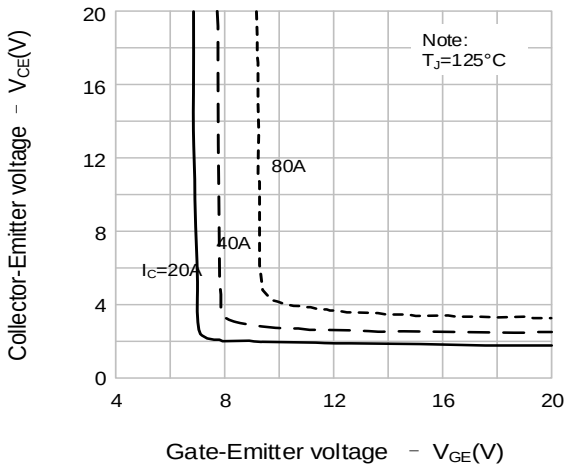


Figure 6. Saturation voltage vs. V_{GE}



TYPICAL CHARACTERISTIC CURVE (CONTINUED)

Figure 7. Capacitance characteristic

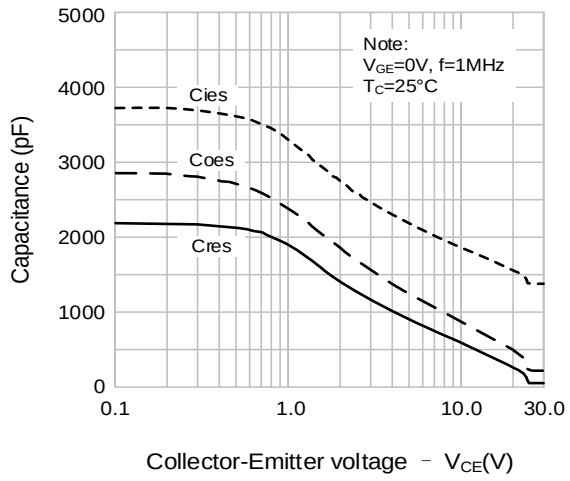


Figure 8. Gate charge characteritic

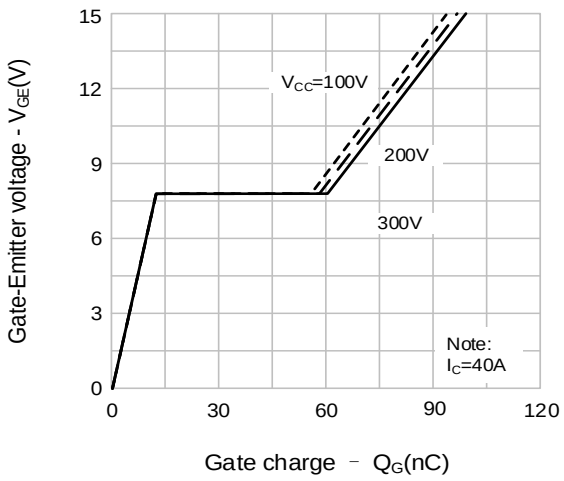


Figure 9. Turn-on characteristic vs. Gate resistance

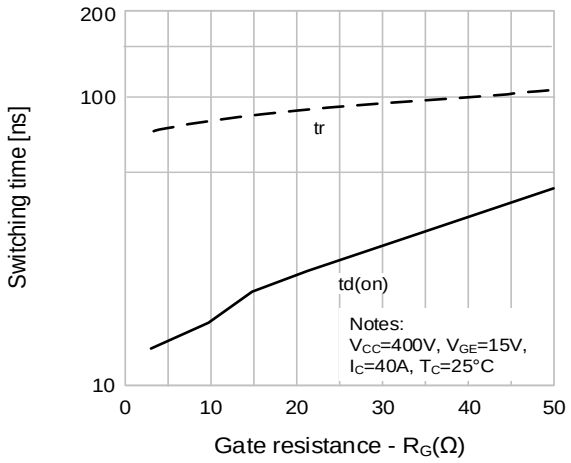


Figure 10. Turn-off characteristic vs. Gate resistance

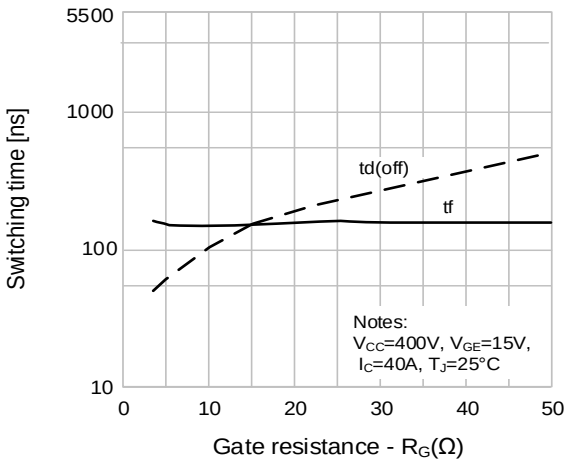


Figure 11. Switching loss vs. Gate resistance

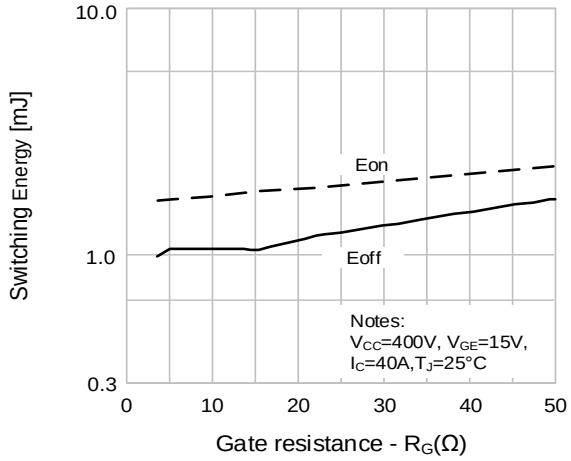
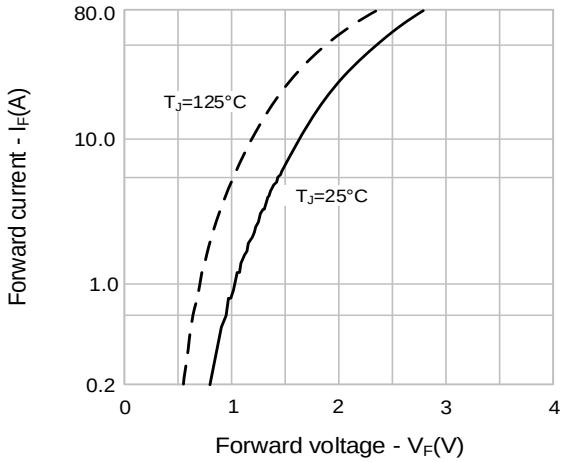


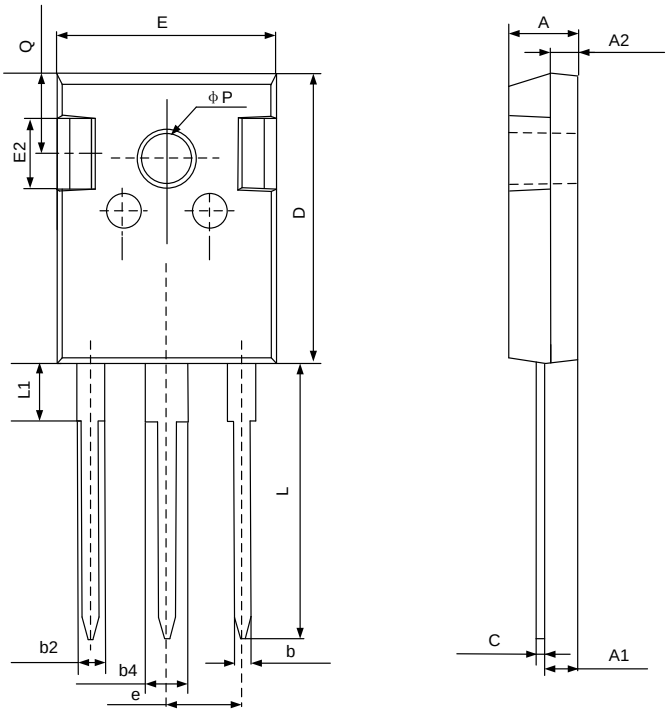
Figure 12. Forward characteristic



PACKAGE OUTLINE

TO-247-3L

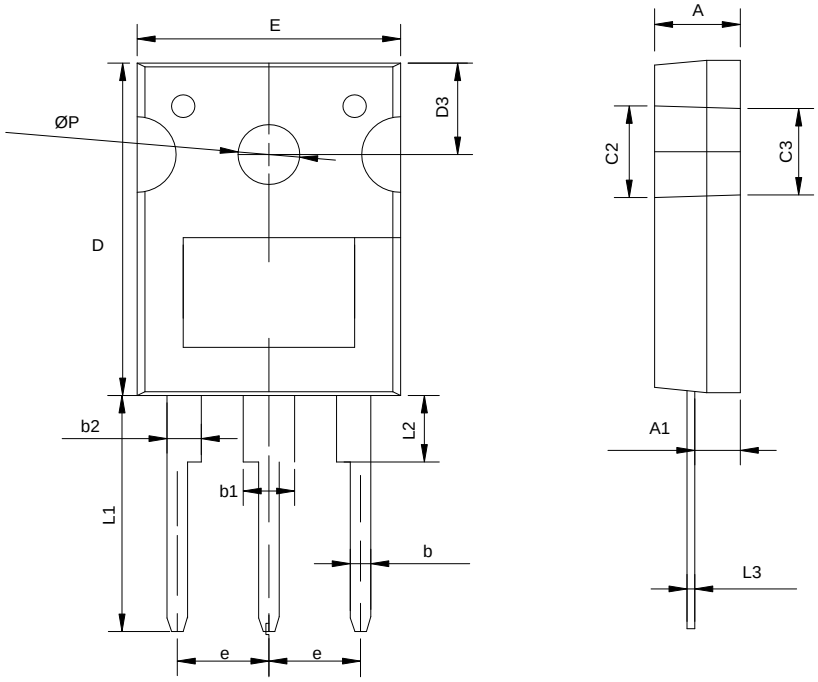
Unit: mm



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

TO-247S-3L

单 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

Important notice :

1. Silan reserves the right to make changes of this instruction without notice.
2. Customers should obtain the latest relevant information when purchasing and should verify whether such information is latest and complete. Please read this instruction and application manual and related materials carefully before using products, including the circuit operation precautions, etc.
3. The products belong to consumer electronic products. Silan does not give any warranties as to the suitability of the Silan's product for any specific use. The design intent, design definition and design of the product are not intended for application (the application stated in this instruction includes use, etc.) in transportation equipment, medical equipment, life-saving equipment, aerospace equipment, , non-civil equipment or non-civil use, etc. (the equipment stated in this instruction includes systems, devices, etc., all referred to as equipment).The product should not be used in any equipment or system whose manufacture, use or sale is prohibited under any applicable laws or regulations ("unintended use"). If the product is used for unintended use, therefore the full risks of such products application are borne by the customer and Silan assumes no liability for the product used for the unintended use. If the customer intends to use the Silan's product in a application where malfunction or failure can be reasonably be expected to result in personal injury, or serious property, or environment damage, the customer shall make adequate assessment, testing and verification, and Silan shall not be liable for such applications.
4. The application of the product described in this instruction, the application manual of the product and related materials is for illustrative purposes only, and Silan makes no warranty that such application can be used directly without further testing, verification or modification. Silan is not responsible for any assistance in product application or customers' product design. Customer shall be responsible for the application of Silan's products and the design, manufacture and use of customers' products using Silan's products (in this document, "use products", "apply Silan's products", "product application" and "customers' products using Silan's products" are synonymous). It is the sole responsibility of the customer to take the following actions: 1) Verify and determine whether Silan's products are suitable for the customers' applications and customers' products; 2) All applicable standards of the customers' industry shall be complied with and fully tested and verified when applying Silan's product or using Silan's product to develop and design customers' products; 3) Although Silan is constantly committed to improve product's quality and reliability, semiconductor products have possibility to malfunction or fail in various application environments. Customers are responsible for complying with safety standards and for providing adequate designs and safeguards for customers' products using Silan's product to minimize risks and avoid situations in which a malfunction or failure could cause bodily injury or damage to property; 4) When using the products, please do not exceed the maximum rating of the products, Stress above one or more limiting values will cause damage to the product and the equipment or affect the reliability to the equipment (customers' product); 5) Ensure customers' product using Silan's product are designed, manufactured and used in full compliance with all applicable standards, safety standards and other requirements of the customers' industry. The parameters stated in this instruction may and do vary in different applications, actual performance may vary over time. Customers must use the products within their effective static storage period, please contact Silan sales or Silan customer service support and sales management department if there is any questions about the effective static storage period, Silan does not assume any responsibility if the product has exceeded the static storage period when it is used.
5. Do not disassemble, reverse-engineer, alter, modify, decompile or copy product, without Silan's prior written consent.
6. Please identify Silan's trademark when purchasing our product. Please contact us if there is any question. Our products are not sold through TAOBAO or any other third-party e-commerce platforms. If customers purchase from such platforms, please contact us in writing before purchasing to confirm whether the product is authentic and original from Silan.
7. Please use and apply product in compliance with all applicable laws and regulations, including but not limited to trade control regulations etc. The product is civil electronic product, please do not use it in non-civil fields.
8. Product promotion is endless, our company will wholeheartedly provide customers with better products!
9. Website: http: //www.silan.com.cn

Part No.:	SGT40N60FD1P7(PS)	Document Type:	Datasheet
Copyright:	HANGZHOU SILAN MICROELECTRONICS CO.,LTD	Website:	http: //www.silan.com.cn

Rev.: 1.1

Revision History:

1. Add TO-247S-3L package、Update TO-247-3L package
2. Update nomenclature and parameter names
3. Update important notice

Rev.: 1.0

Revision History:

1. First release