

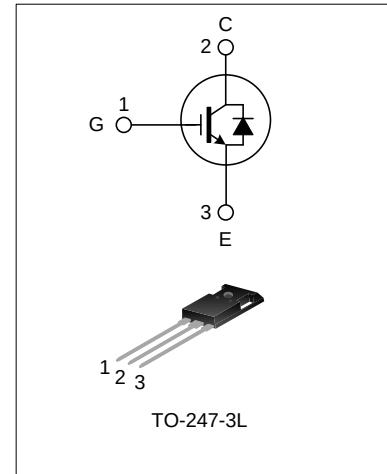
40A, 1200V IGBT

DESCRIPTION

The SGT40T120FD3P7 IGBT is fabricated using Silan 4rd generation of trench field stop technology, features low conduction loss and switching loss, positive temperature coefficient for easy parallel operation. This device is applicable to induction heating, UPS, SMPS, and PFC fields.

FEATURES

- ◆ 40A, 1200V, $V_{CE(sat)}(typ.)=2.3V@I_C=40A$
- ◆ Low conduction loss
- ◆ Ultra fast switching
- ◆ High breakdown voltage



NOMENCLATURE

SGT 40 T 120 F D 3 P7	
IGBT series	Package P7 : TO-247-3L
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	
X : Field Stop 7	
Voltage, 65: 650V	D : Packaged with fast recovery diode
120: 1200V	R : RC IGBT
	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~

ORDERING INFORMATION

Part No.	Package	Marking	Hazardous substance control	Packing
SGT40T120FD3P7	TO-247-3L	40T120FD3	Pb free	Tube

ABSOLUTE MAXIMUM RATINGS ($T_C = 25^{\circ}\text{C}$ unless otherwise noted)

Parameter		Symbol	Ratings	Units
Collector to Emitter Voltage		V _{CE}	1200	V
Gate to Emitter Voltage		V _{GE}	±20	V
Collector Current	T _C =25°C	I _C	80	A
	T _C =100°C		40	
Pulsed Collector Current		I _{CM}	120	A
Power Dissipation (T _C =25°C)		P _D	360	W
-Derate above 25°C			2.88	W/°C
Operating Junction Temperature		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)	$R_{\theta JC}$	0.26	$^{\circ}\text{C/W}$
Thermal Resistance, Junction to Case (FRD)	$R_{\theta JC}$	1.3	$^{\circ}\text{C/W}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	40	$^{\circ}\text{C/W}$

ELECTRICAL CHARACTERISTICS OF IGBT ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Test conditions	Min.	Typ.	Max.	Units
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	$V_{GE(th)}$	$I_C=1.0mA, V_{CE}=V_{GE}$	3.5	6.0	7.5	V
Collector to Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=40A, V_{GE}=15V$	--	2.3	2.8	V
		$I_C=40A, V_{GE}=15V, T_C=125^\circ\text{C}$	--	2.6	--	V
Input Capacitance	C_{ies}	$V_{CE}=30V$	--	5700	--	pF
Output Capacitance	C_{oes}	$V_{GE}=0V$	--	170	--	
Reverse Transfer Capacitance	C_{res}	$f=1MHz$	--	93	--	
Turn-On Delay Time	$T_{d(on)}$	$V_{CE}=600V$ $I_C=40A$ $R_g=10\Omega$	--	55	--	ns
Rise Time	T_r		--	125	--	
Turn-Off Delay Time	$T_{d(off)}$		--	240	--	
Fall Time	T_f		--	140	--	
Turn-On Switching Loss	E_{on}	$V_{GE}=15V$ Inductive Load	--	4.8	--	mJ
Turn-Off Switching Loss	E_{off}		--	1.5	--	
Total Switching Loss	E_{st}		--	6.3	--	
Total Gate Charge	Q_g	$V_{CE} = 600V, I_C=40A,$ $V_{GE} = 15V$	--	260	--	nC
Gate to Emitter Charge	Q_{ge}		--	60	--	
Gate to Collector Charge	Q_{gc}		--	132	--	

ELECTRICAL CHARACTERISTICS OF FRD ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Test conditions	Min.	Typ.	Max.	Units
Diode Forward Voltage	V_{fm}	$I_F=10A, T_C=25^\circ\text{C}$	--	2.5	3.1	V
		$I_F=10A, T_C=125^\circ\text{C}$	--	2.0	--	
Diode Reverse Recovery Time	T_{rr}	$I_{ES}=10A, dI_{ES}/dt = 200A/\mu s$	--	88	--	ns
Diode Reverse Recovery Charge	Q_{rr}	$I_{ES}=10A, dI_{ES}/dt = 200A/\mu s$	--	0.35	--	μC

TYPICAL CHARACTERISTICS CURVE

Figure 1. Typical output characteristics

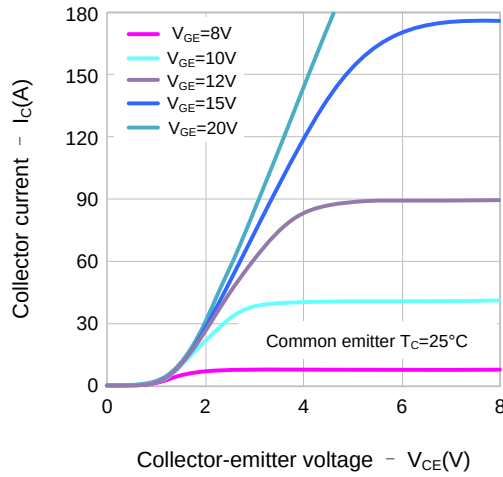


Figure 2. Typical output characteristics

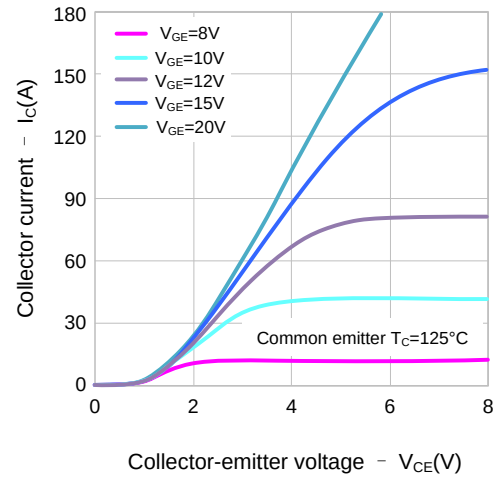


Figure 3. Typical saturation voltage characteristics

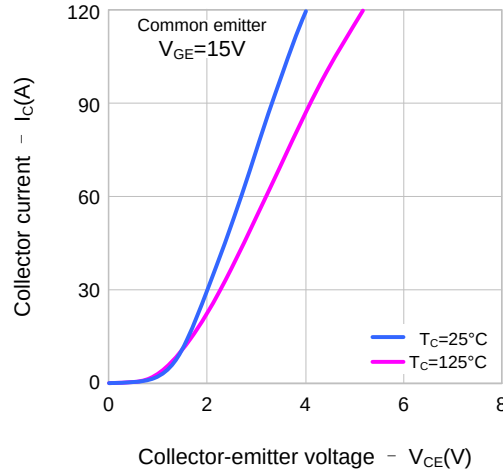


Figure 4. Transmission characteristics

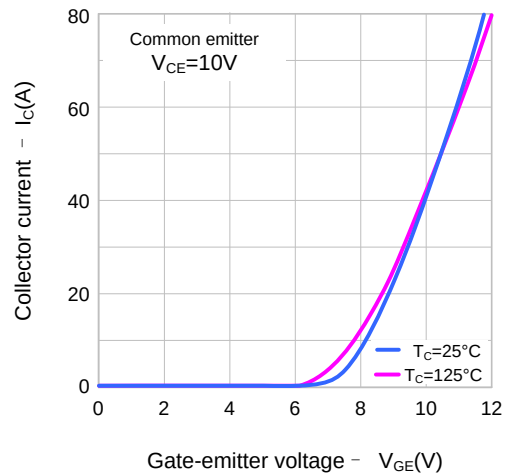


Figure 5. Saturation voltage vs. Gate-emitter voltage

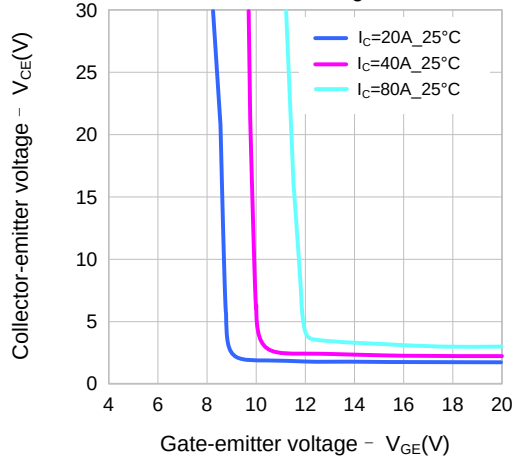
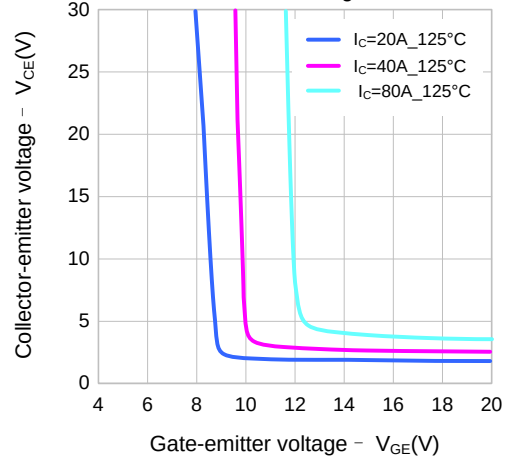


Figure 6. Saturation voltage vs. Gate-emitter voltage



TYPICAL CHARACTERISTICS CURVE(Continued)

Figure 7. Capacitance characteristics

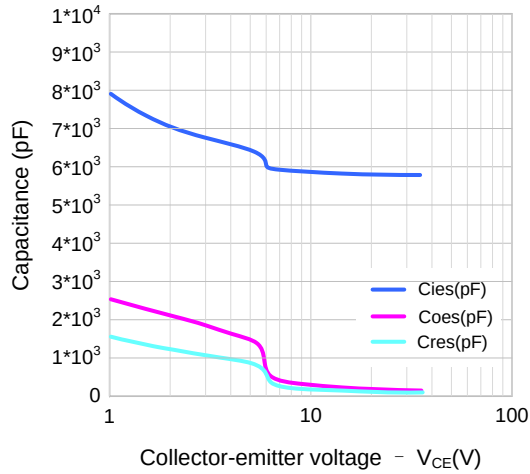


Figure 8. Gate charge characteristics

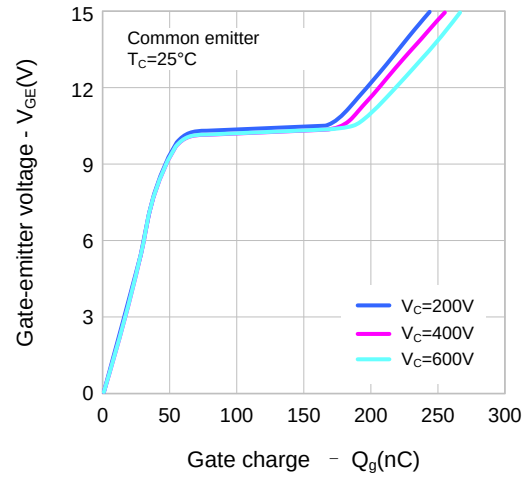


Figure 9. Turn-on characteristics vs. Gate resistance

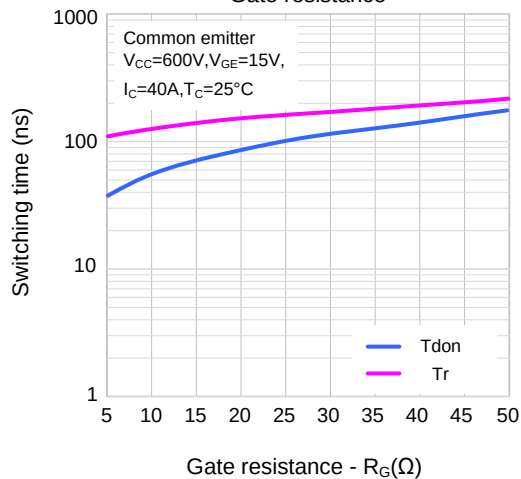


Figure 10. Turn-off characteristics vs. Gate resistance

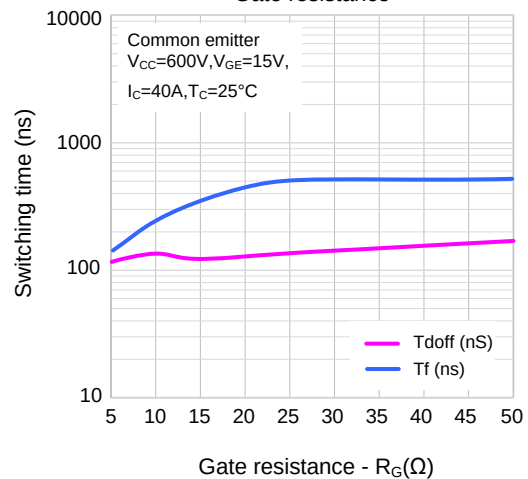


Figure 11. Switching loss vs. Gate resistance

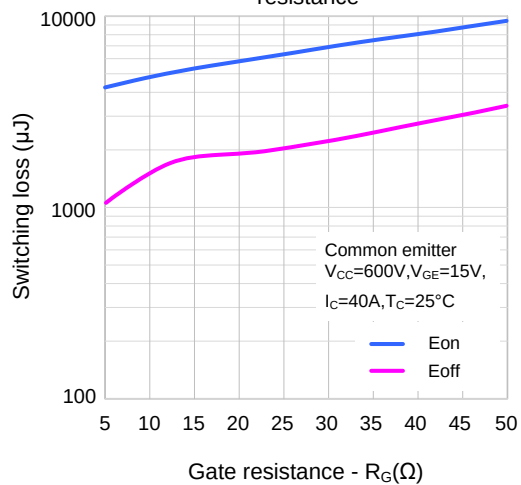
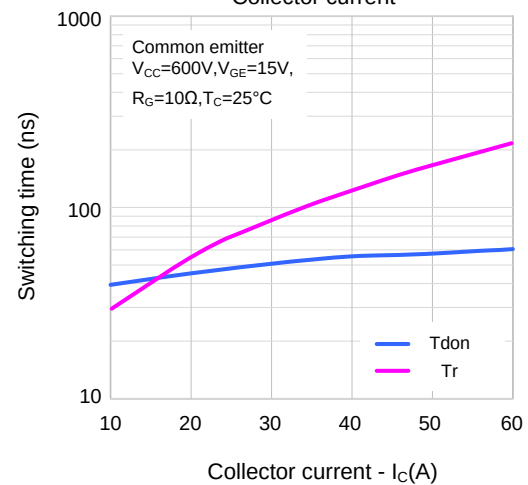
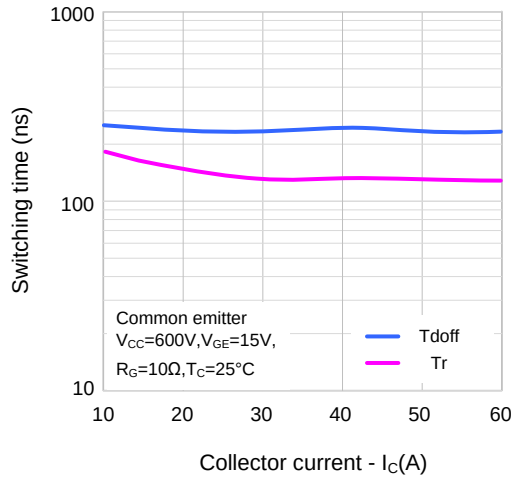


Figure 12. Turn-on characteristics vs. Collector current



TYPICAL CHARACTERISTICS CURVE(Continued)

Figure 13. Turn-off characteristics vs. Collector current



14. Switching loss vs. Collector current

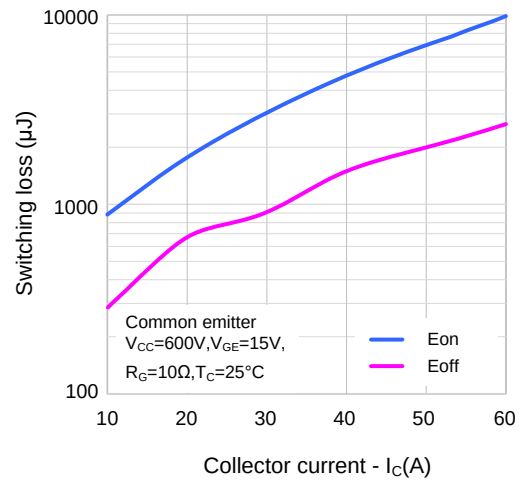


Figure 15. Forward characteristics

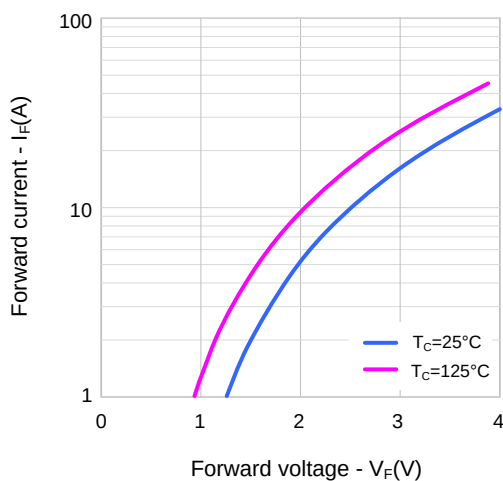


Figure 16. Reverse recovery time vs. Forward current

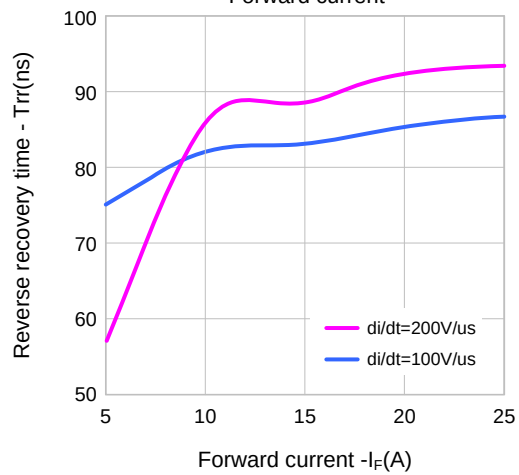
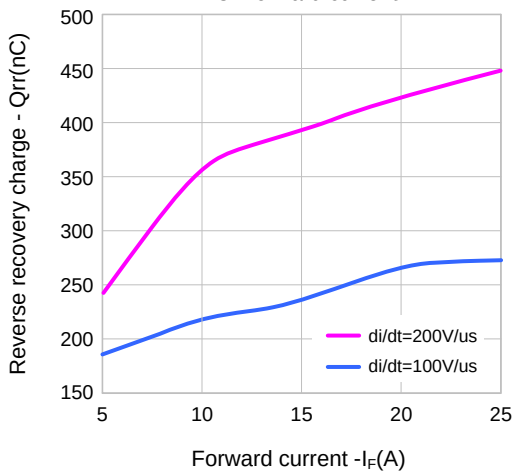


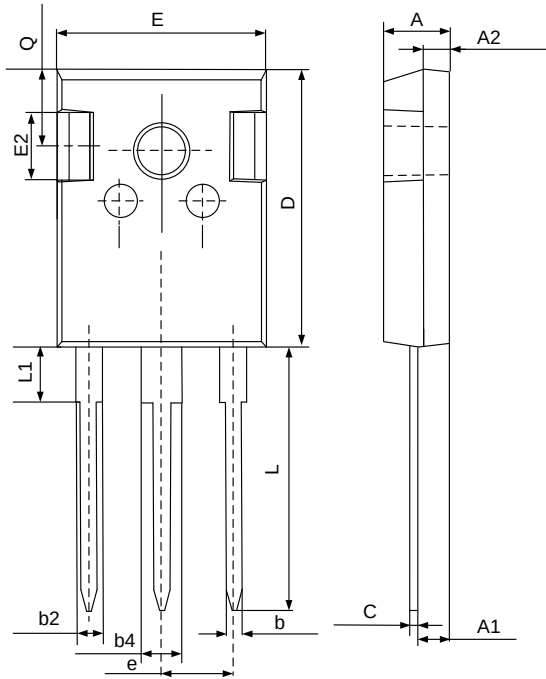
Figure 17. Reverse recovery charge vs. Forward current



PACKAGE OUTLINE

TO-247-3L

UNIT: mm



SYMBOL	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

Disclaimer :

- Silan reserves the right to make changes to the information herein for the improvement of the design and performance without prior notice! Customers should obtain the latest relevant information before placing orders and should verify that such information is complete and current.
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Rev.: 1.2

Revision History:

1. In figure 4, all transmission characteristics are changed to common emitter $V_{ce}=10V$
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Rev.: 1.1

Revision History:

1. Modify test conditions of G-E Threshold Voltage
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Rev.: 1.0

Revision History:

1. First release
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