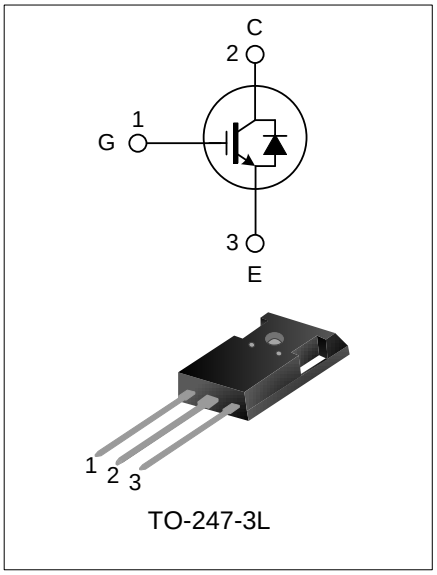
75A, 650V FIELD STOP IGBT

DESCRIPTION

The SGTP75V65FDB1P7 field stop IGBT adopts Silan Field Stop V technology, features low conduction loss and switching loss. This device is applicable to photovoltaic, UPS, SMPS, and PFC fields.



FEATURES

- 75A, 650V, $V_{CE(sat)(typ.)}$=1.65V@I_C=75A
- Low conduction loss
- Ultra-fast switching
- High input impedance
- $T_{Jmax.}$=175°C

NOMENCLATURE

SGT P 75 V 65 F D B 1 P7

- IGBT series
- Technical grade
- Current, 75: 75A
- 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 5+
  Y : Field Stop 5++
  A : Field Stop 6
- Voltage, 65: 650V
  120: 1200V
- L : Ultra low switching, recommended frequency ~2KHz
  Q : Low switching, recommended frequency2~20KHz
  S : Standard frequency, recommended frequency5~40KHz
  F : Fast switching, recommended frequency10~60KHz
  UF : Ultra fast switching, recommended frequency 40KHz~
  I : IGNITION
- D : Packaged with fast recovery diode
  R : RC IGBT
  Empty:Single IGBT chip
  C : SiC diode
- Blank: Standard diode
  M : Standard Diode, full range
  R : Rapid Diode
  B : Rapid Diode, full range
  S : Soft Diode, full range
- 1,2,3··· : Version No.
- Package
  P7 : TO-247-3L

ORDERING INFORMATION

Part No.	Package	Marking	Hazardous Substance Control	Packing Type
SGTP75V65FDB1P7	TO-247-3L	P75V65FDB1	Halogen free	Tube

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

Characteristics		Symbol	Ratings	Unit
Collector-emitter Voltage		V_{CE}	650	V
Gate-emitter Voltage		V_{GE}	±20	V
Transient Gate-Emitter Volatge (t_p≤10μs, D<0.010)		V_{GE}	±30	V
Collector Current	T_C=25°C	I_C	150	A
	T_C=100°C		75	
Pulsed Collector Current		I_{CM}	300	A
Diode Current	T_C=25°C	I_F	150	A
	T_C=100°C		75	
Pulsed Diode Current		I_{FM}	300	A
Power Dissipation (T_C=25°C)		P_{tot}	395	W
Operating Junction Temperature		T_J	-40~+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)	$R_{th(j-C)}$	--	--	--	0.38	°C/W
Thermal Resistance, Junction to Case (FRD)	$R_{th(j-C)}$	--	--	--	0.4	°C/W
Thermal Resistance, Junction to Ambient (IGBT)	$R_{th(j-a)}$	--	--	--	40	°C/W
Soldering Temperature (in line)	T_{sold}	15^{+2}_{-0} sec, 1time	--	--	260	°C

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

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Collector- emitter Breakdown Voltage	$V_{(BR)CES}$	V_{GE}=0V, I_C=250μA	650	--	--	V
Zero Gate Voltage Collector Current	I_{CES}	V_{CE}=650V, V_{GE}=0V	--	--	75	μA
Gate-emitter Leakage Current	I_{GES}	V_{GE}=20V, V_{CE}=0V	--	--	±100	nA
Gate-emitter Threshold Voltage	$V_{GE(th)}$	I_C=250μA, V_{CE}=V_{GE}	3.2	4.0	4.8	V
Collector-emitter Saturation Voltage	V_{CEsat}	I_C=75A, V_{GE}=15V, T_J=25°C	--	1.65	2.2	V
		I_C=75A, V_{GE}=15V, T_J=125°C	--	1.95	--	V
		I_C=75A, V_{GE}=15V, T_J=150°C	--	2.05	--	V
Input Capacitance	C_{ies}	V_{CE}=30V V_{GE}=0V f=1MHz	--	4829	--	pF
Output Capacitance	C_{oes}		--	132	--	
Reverse Transfer Capacitance	C_{res}		--	21	--	
Turn-on Delay Time	$T_{d(on)}$	V_{CE}=400V I_C=75A R_g=10Ω V_{GE}=15V inductive load T_J=25°C	--	39	--	ns
Rise Time	T_r		--	44	--	
Turn-off Delay Time	$T_{d(off)}$		--	186	--	
Fall Time	T_f		--	38	--	
Turn-on Energy	E_{on}		--	2.39	--	mJ
Turn-off Energy	E_{off}		--	0.90	--	
Total Switching Energy	E_{st}		--	3.29	--	
Turn-on Delay Time	$T_{d(on)}$	V_{CE}=400V I_C=37.5A R_g=10Ω V_{GE}=15V inductive load T_J=25°C	--	34	--	ns
Rise Time	T_r		--	26	--	
Turn-off Delay Time	$T_{d(off)}$		--	191	--	
Fall Time	T_f		--	39	--	
Turn-on Energy	E_{on}		--	0.65	--	mJ
Turn-off Energy	E_{off}		--	0.35	--	
Total Switching Energy	E_{st}		--	1.0	--	
Total Gate Charge	Q_g	V_{CE}=520V, I_C=75A, V_{GE}=15V	--	186	--	nC
Gate to Emitter Charge	Q_{ge}		--	38	--	
Gate to Collector Charge	Q_{gc}		--	50	--	

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

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Diode Forward Voltage	V_F	I_F=75A, T_J=25°C	--	1.55	1.9	V
		I_F=75A, T_J=150°C	--	1.45	--	
Diode Reverse Recovery Time	T_{rr}	I_{ES}=75A, dI_{ES}/dt=200A/μs, T_J=25°C	--	120	--	ns
Diode Reverse Recovery Charge	Q_{rr}		--	0.4	--	μC
Diode Reverse Recovery Current	Irrm		--	6.3	--	A

ELECTRICAL CHARACTERISTICS OF IGBT (UNLESS OTHERWISE NOTED, T_J=150°C)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Turn-on Delay Time	$T_{d(on)}$	V_{CE}=400V I_C=75A R_g=10Ω V_{GE}=15V inductive load T_J=150°C	--	51	--	ns
Rise Time	T_r		--	38	--	
Turn-off Delay Time	$T_{d(off)}$		--	217	--	
Fall Time	T_f		--	22	--	
Turn-on Energy	E_{on}		--	2.67	--	mJ
Turn-off Energy	E_{off}		--	1.52	--	
Total Switching Energy	E_{st}		--	4.19	--	
Turn-on Delay Time	$T_{d(on)}$	V_{CE}=400V I_C=37.5A R_g=10Ω V_{GE}=15V inductive load T_J=150°C	--	47	--	ns
Rise Time	T_r		--	20	--	
Turn-off Delay Time	$T_{d(off)}$		--	235	--	
Fall Time	T_f		--	20	--	
Turn-on Energy	E_{on}		--	0.62	--	mJ
Turn-off Energy	E_{off}		--	0.70	--	
Total Switching Energy	E_{st}		--	1.32	--	

ELECTRICAL CHARACTERISTICS OF FRD (UNLESS OTHERWISE NOTED, T_C=150°C)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Diode Reverse Recovery Time	T_{rr}	I_{ES}=75A, dI_{ES}/dt=200A/μs, T_J=150°C	--	141	--	ns
Diode Reverse Recovery Charge	Q_{rr}		--	2.8	--	μC
Diode Reverse Recovery Current	Irrm		--	17	--	A

TYPICAL CHARACTERISTICS

Figure 1. Typical Output Characteristics

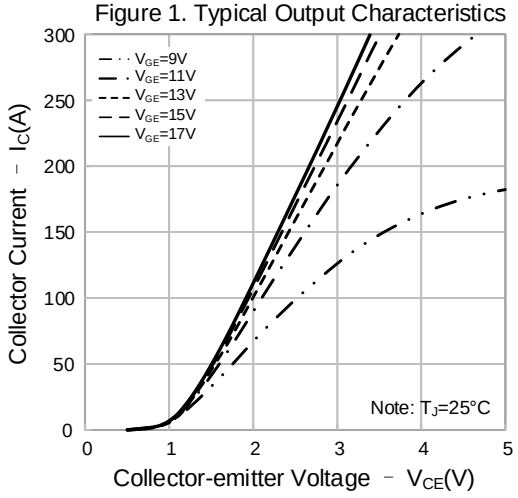


Figure 2. Typical Output Characteristics

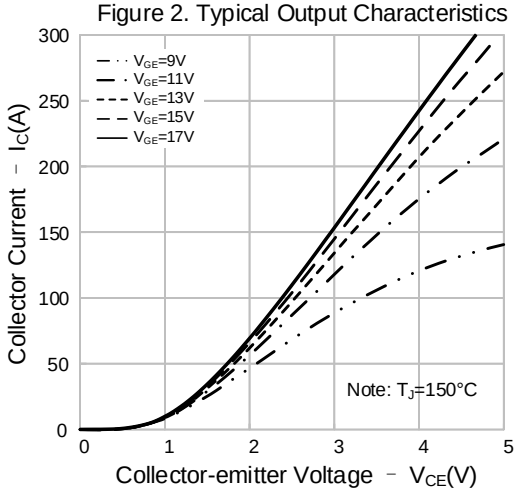


Figure 3. Typical Saturation Voltage Characteristics

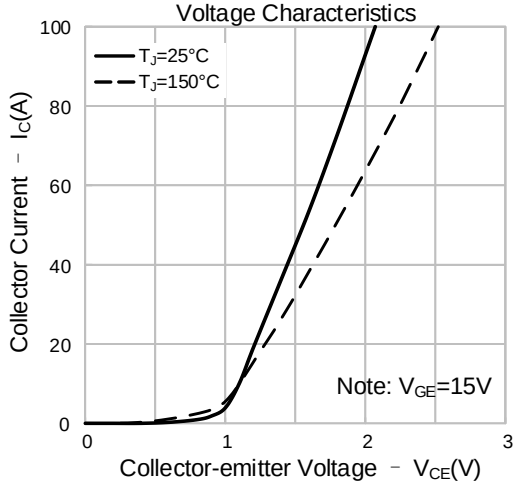


Figure 4. Transmission Characteristics

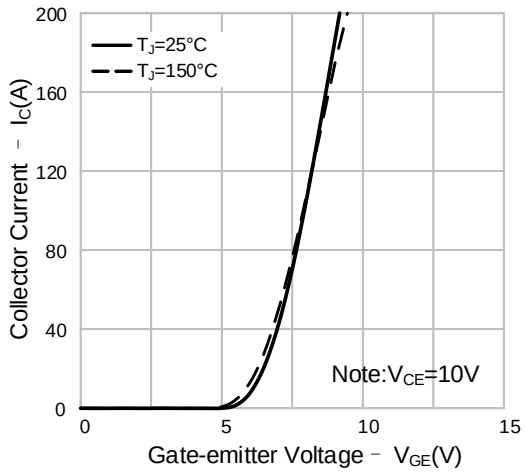


Figure 5. Saturation Voltage Drop vs. V_{GE}

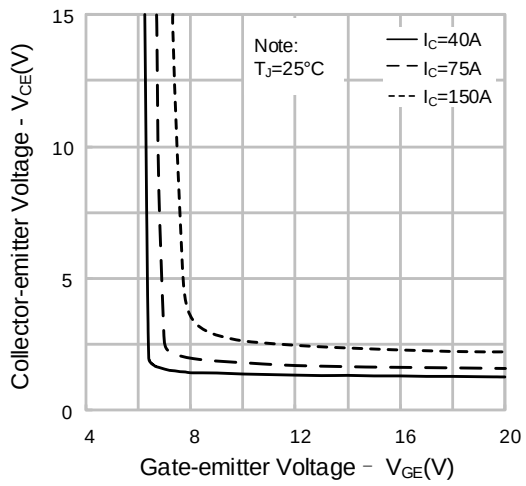
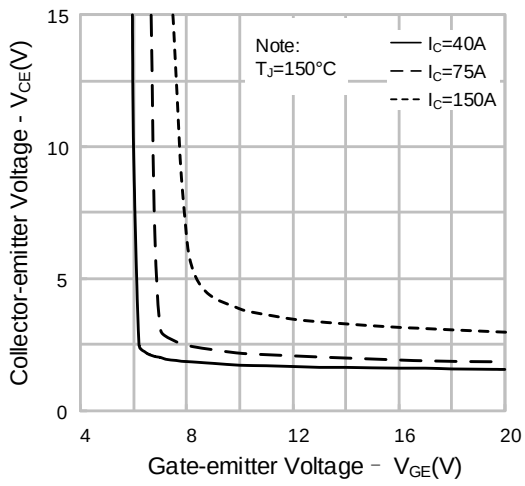


Figure 6. Saturation Voltage Drop vs. V_{GE}



TYPICAL CHARACTERISTICS (CONTINUED)

Figure 7. Saturation Voltage Drop vs. Temperature

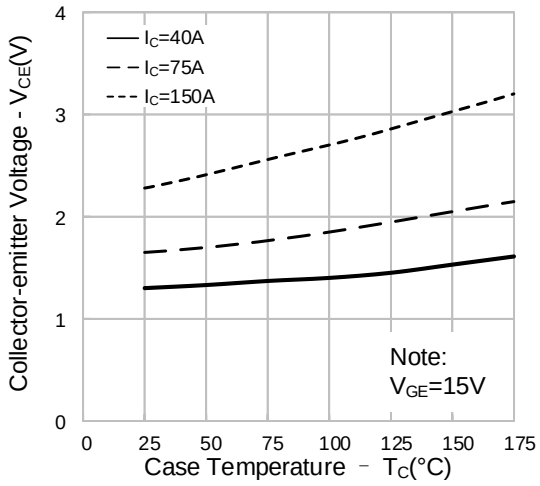


Figure 8. Capacitance Characteristics

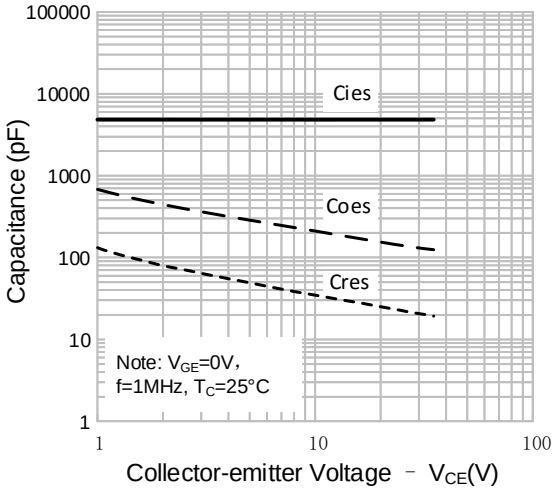


Figure 9. Gate Charge Characteristics

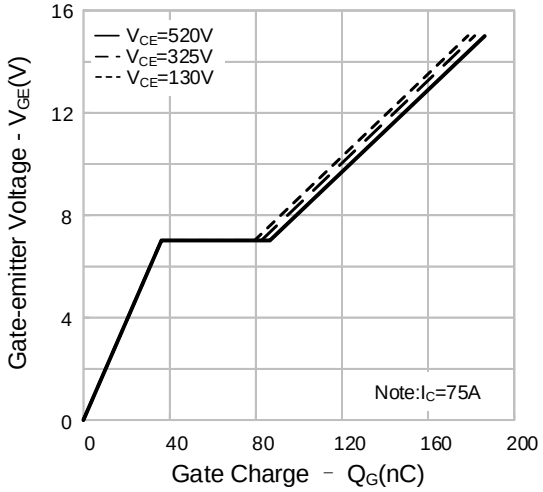


Figure 10. Forward Characteristics

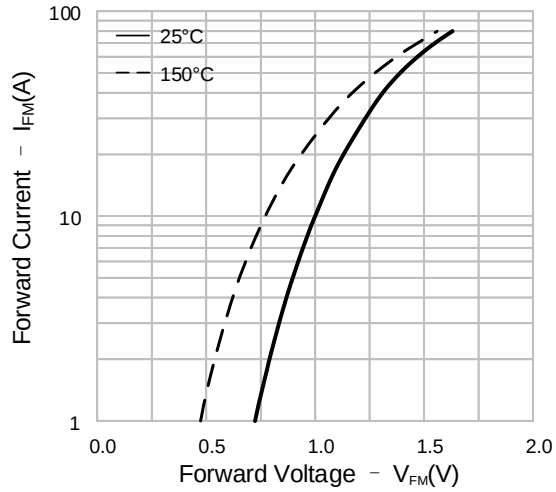


Figure 11. Turn-on Characteristics vs. Gate Resistance

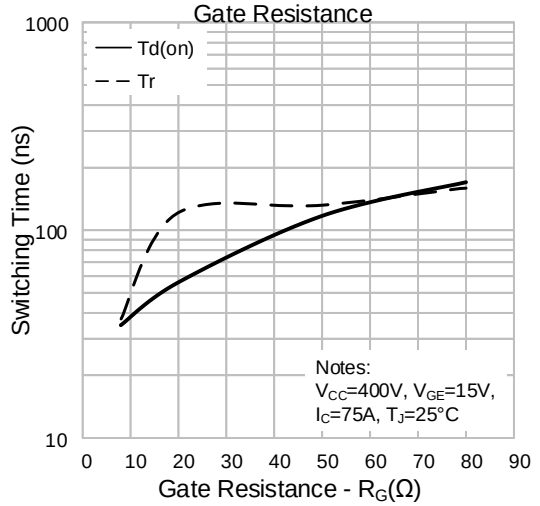
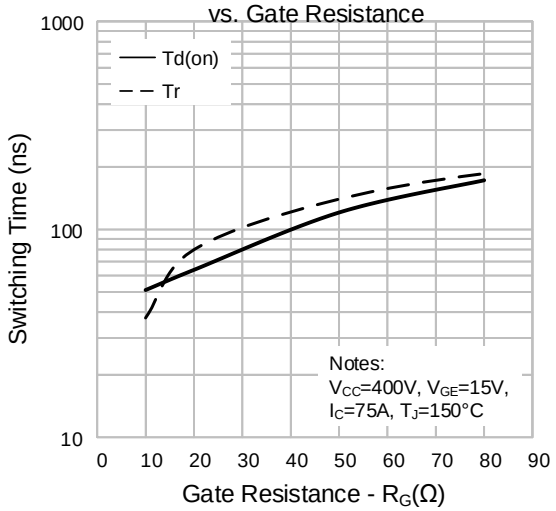


Figure 12. Turn-on Characteristics vs. Gate Resistance



TYPICAL CHARACTERISTICS (CONTINUED)

Figure 13. Turn-off Characteristics vs. Gate Resistance

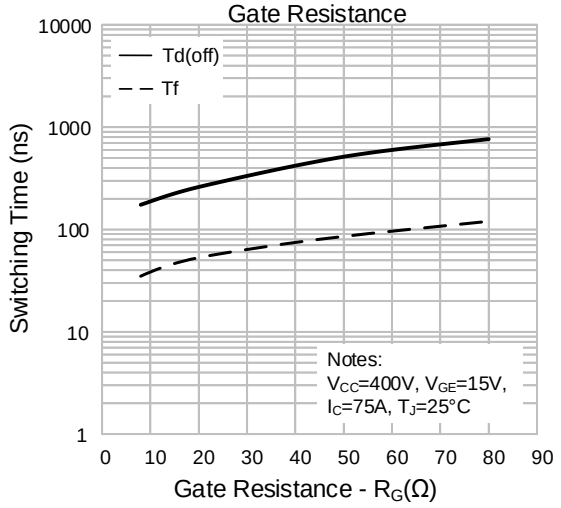


Figure 14. Turn-off Characteristics vs. Gate Resistance

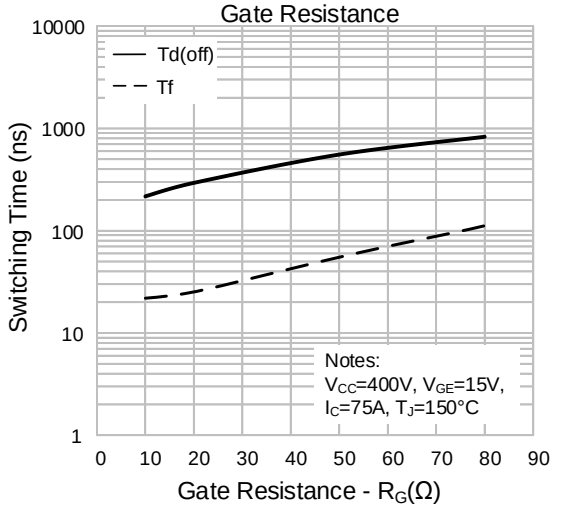


Figure 15. Switching Loss vs. Gate Resistance

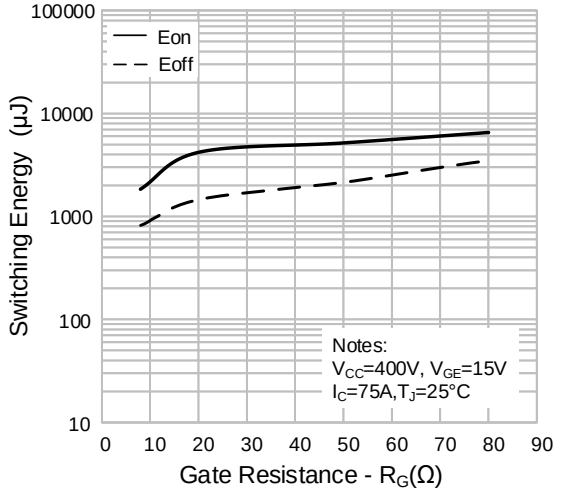


Figure 16. Switching Loss vs. Gate Resistance

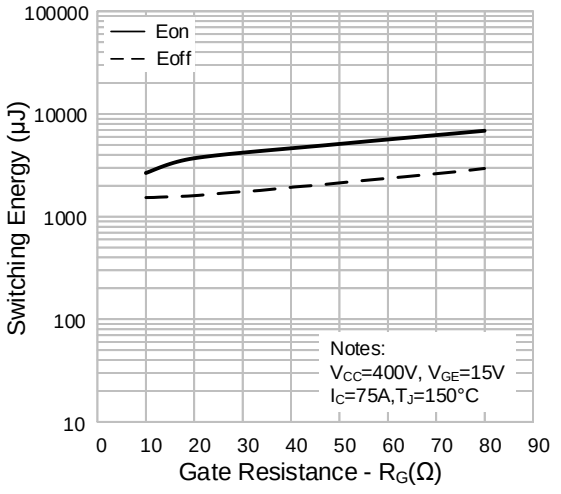


Figure 17. Turn-on Characteristics vs. Collector Current

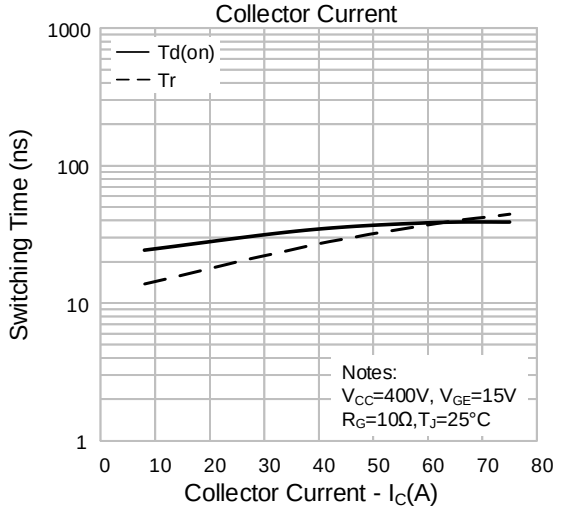
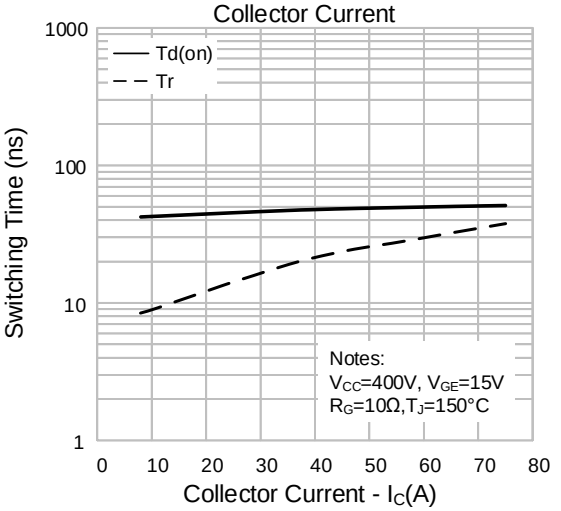


Figure 18. Turn-on Characteristics vs. Collector Current



TYPICAL CHARACTERISTICS (CONTINUED)

Figure 19. Turn-off Characteristics vs. Collector Current

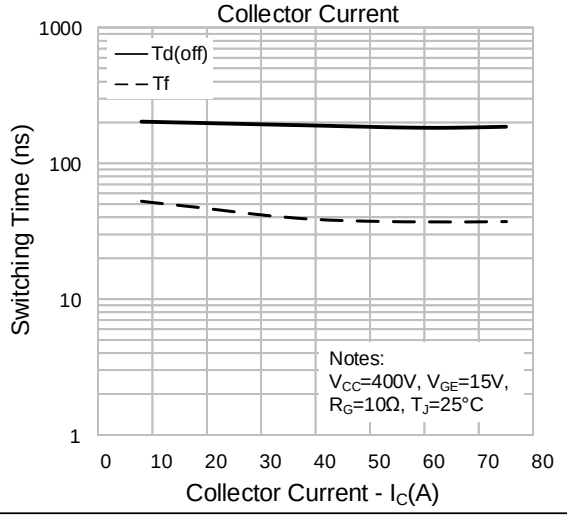


Figure 20. Turn-off Characteristics vs. Collector Current

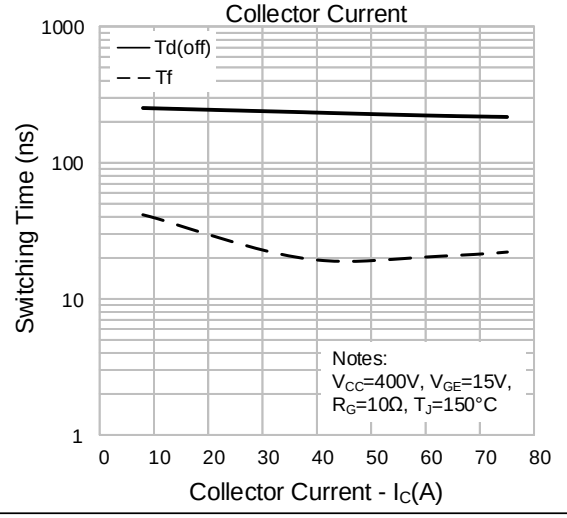


Figure 21. Switching Loss vs. Collector Current

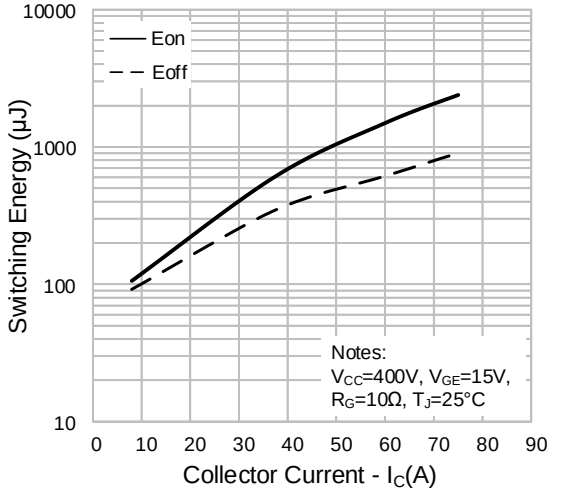


Figure 22. Switching Loss vs. Collector Current

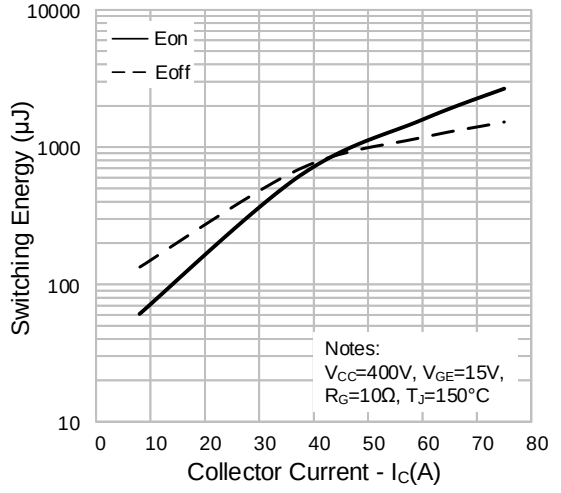


Figure 23. Reverse Recovery Time vs. Forward Current

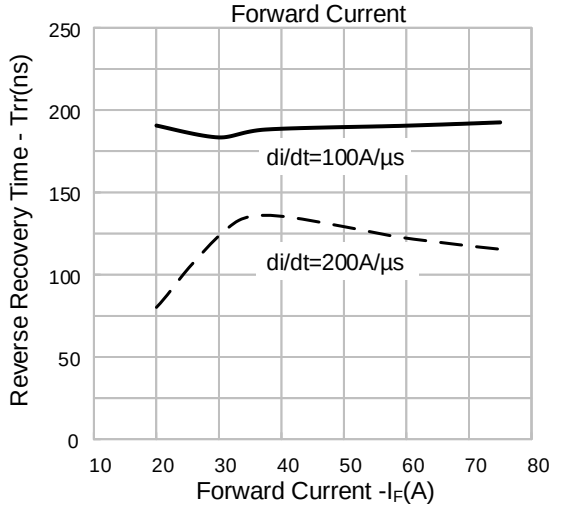
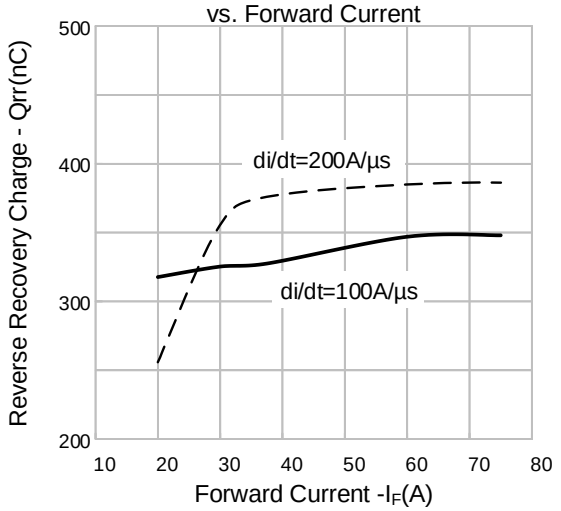


Figure 24. Reverse Recovery Charge vs. Forward Current



TYPICAL CHARACTERISTICS (CONTINUED)

Figure 25. Peak Reverse Recovery Current vs. Forward Current

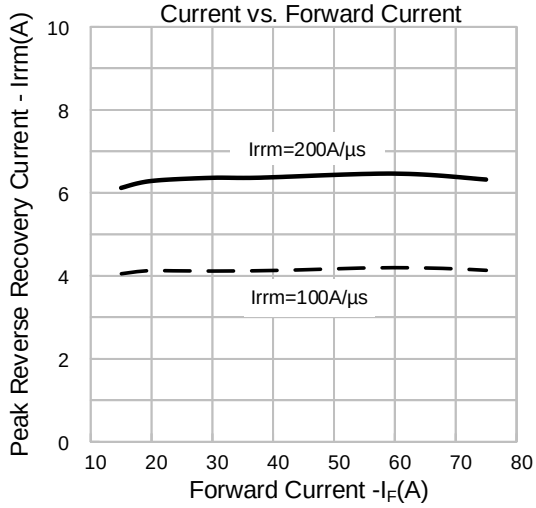


Figure 26. Tb Slope vs. Forward Current

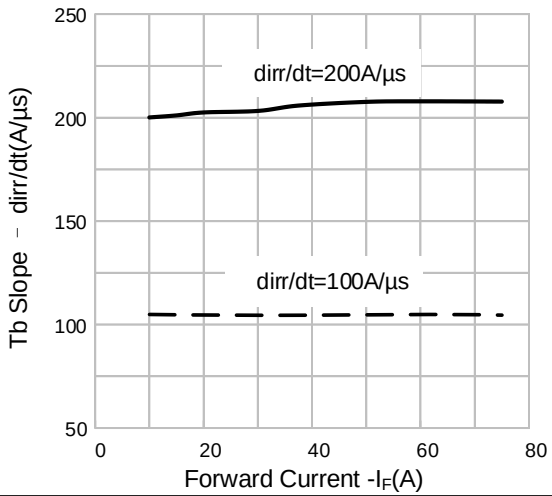


Figure 27. Max. Safe Operating Area

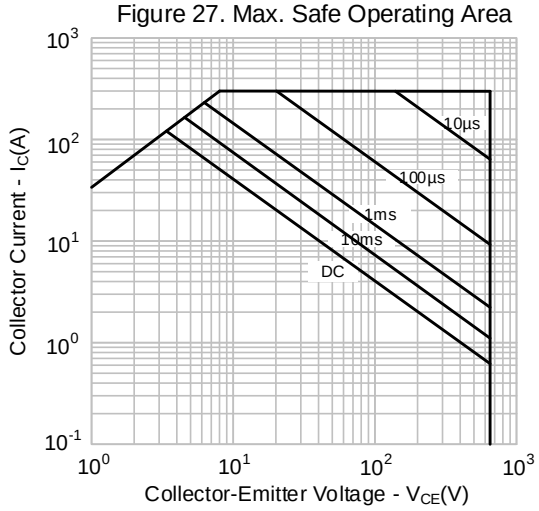


Figure 28. Transient Thermal Impedance vs. On-pulse Duration (IGBT)

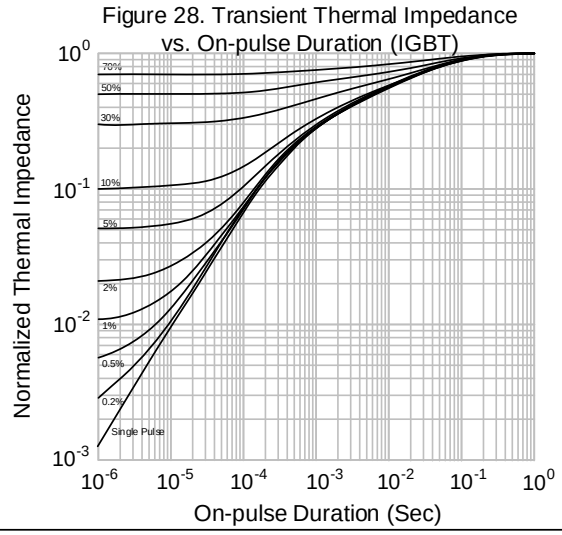
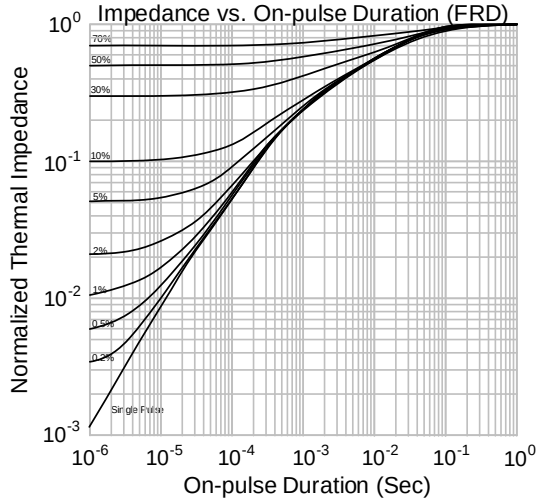
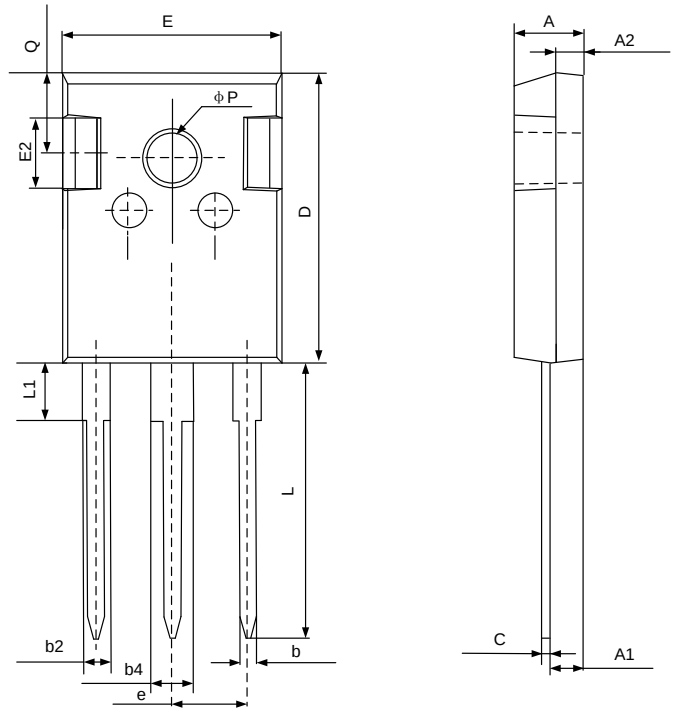


Figure 29. Transient Thermal Impedance vs. On-pulse Duration (FRD)



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

IGBT DEVICES OPERATE NOTES:

Electrostatic charges may exist in many things. Please take following preventive measures to prevent effectively the IGBT 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.

Important notice :

1. **Silan reserves the right to make changes of this instruction without notice.**
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Rev.: 1.3

Revision History:

1. Update nomenclature
2. Update parameter name

Rev.: 1.2

Revision History:

1. Update characteristics
2. Update the important notice

Rev.: 1.1

Revision History:

1. Modify P_D and $R_{\theta JC}$ and update corresponding typical characteristics
2. Update the important notice

Rev.: 1.0

Revision History:

1. First release