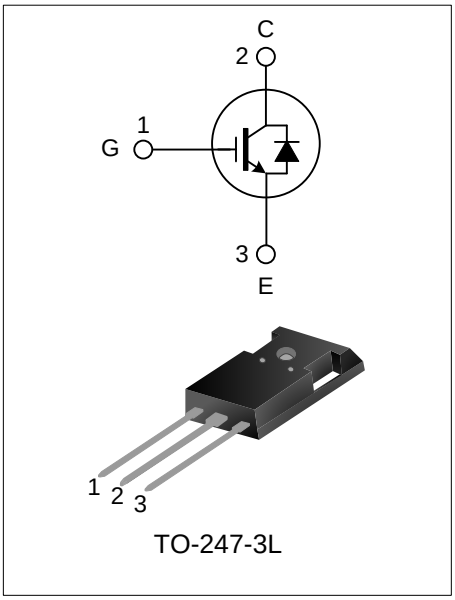
25A, 1200V FIELD STOP IGBT

DESCRIPTION

The SGT25U120FD1P7 field stop IGBT adopts Silan Trench Gate Field Stop IV+ technology, features low conduction loss and switching loss. This device is applicable to UPS, SMPS, and PFC fields.



FEATURES

- 25A, 1200V, $V_{CE(sat)(typ.)}$=2.2V@I_C=25A
- Low conduction loss
- Ultra-fast switching
- High breakdown voltage

NOMENCLATURE

SGT 25 U 120 F D 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
- 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 frequency 2~20KHz
  S : Standard frequency, recommended frequency 5~40KHz
  F : Fast switching, recommended frequency10~60KHz
  UF : Ultra fast switching, recommended frequency 40KHz~
- 1,2,3⋯ : Version No.
- Package
  P7 : TO-247-3L

ORDERING INFORMATION

Part No.	Package	Marking	Hazardous Substance Control	Packing Type
SGT25U120FD1P7	TO-247-3L	25U120FD1	Pb free	Tube

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

Characteristics		Symbol	Ratings	Unit
Collector to Emitter Voltage		V_{CE}	1200	V
Gate to Emitter Voltage		V_{GE}	±20	V
Transient Gate to Emitter Voltage (t_p≤10μs, D<0.010)		V_{GE}	±30	V
Collector Current	T_C=25°C	I_C	50	A
	T_C=100°C		25	
Pulsed Collector Current		I_{CM}	75	A
Diode Current	T_C=25°C	I_F	25	A
	T_C=100°C		12.5	
Pulsed Diode Current		I_{FM}	50	A
Power Dissipation (T_C=25°C)		P_D	278	W
Operating Junction Temperature		T_J	-55~+150	°C
Storage Temperature Range		T_{stg}	-55~+150	°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Ratings	Unit
Thermal Resistance, Junction to Case (IGBT)	$R_{\theta JC}$	0.45	°C/W
Thermal Resistance, Junction to Case (FRD)	$R_{\theta JC}$	1.4	°C/W
Thermal Resistance, Junction to Ambient (IGBT)	$R_{\theta JA}$	50	°C/W

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

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
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	--	--	10	μA
G-E Leakage Current	I_{GES}	V_{GE}=20V, V_{CE}=0V	--	--	±120	nA
G-E Threshold Voltage	$V_{GE(th)}$	I_C=250μA, V_{CE}=V_{GE}	4.7	--	7.8	V
Collector to Emitter Saturation Voltage	$V_{CE(sat)}$	I_C=25A, V_{GE}=15V, T_C=25°C	--	2.2	2.7	V
		I_C=25A, V_{GE}=15V, T_C=125°C	--	2.4	--	V
Input Capacitance	C_{ies}	V_{CE}=30V	--	2772	--	pF
Output Capacitance	C_{oes}	V_{GE}=0V	--	85	--	
Reverse Transfer Capacitance	C_{res}	f=1MHz	--	19	--	
Turn-On Delay Time	$T_{d(on)}$	V_{CE}=600V I_C=10A R_g=10Ω V_{GE}=15V inductive load	--	24	--	ns
Rise Time	T_r		--	30	--	
Turn-Off Delay Time	$T_{d(off)}$		--	64	--	
Fall Time	T_f		--	154	--	
Turn-On Switching Loss	E_{on}		--	0.86	--	mJ
Turn-Off Switching Loss	E_{off}		--	0.19	--	
Total Switching Loss	E_{st}		--	1.05	--	
Turn-On Delay Time	$T_{d(on)}$	V_{CE}=600V I_C=25A R_g=10Ω V_{GE}=15V inductive load	--	30	--	ns
Rise Time	T_r		--	77	--	
Turn-Off Delay Time	$T_{d(off)}$		--	68	--	
Fall Time	T_f		--	108	--	
Turn-On Switching Loss	E_{on}		--	2.3	--	mJ
Turn-Off Switching Loss	E_{off}		--	0.42	--	
Total Switching Loss	E_{st}		--	2.72	--	
Total Gate Charge	Q_g	V_{CE}=600V, I_C=25A, V_{GE}=15V	--	91	--	nC
Gate to Emitter Charge	Q_{ge}		--	31	--	
Gate to Collector Charge	Q_{gc}		--	30	--	

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

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Diode Forward Voltage	V_{FM}	I_F=12.5A, T_C=25°C	--	2.8	3.1	V
		I_F=12.5A, T_C=125°C	--	2.4	--	
Diode Reverse Recovery Time	T_{rr}	I_{EC}=10A, dI_{EC}/dt=200A/μs, T_C=25°C	--	67	--	ns
Diode Reverse Recovery Charge	Q_{rr}		--	331	--	nC

TYPICAL CHARACTERISTICS

Figure 1. Typical Output Characteristics

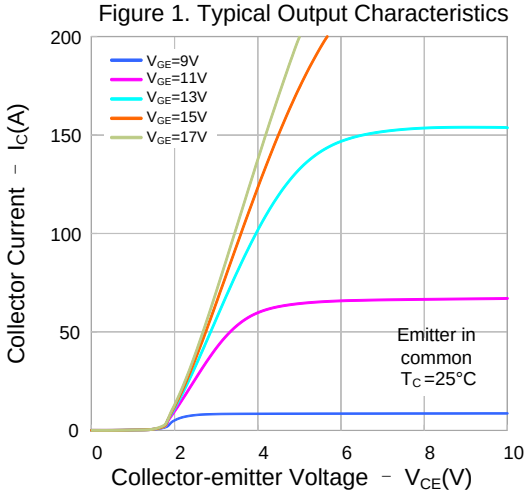


Figure 2. Typical Output Characteristics

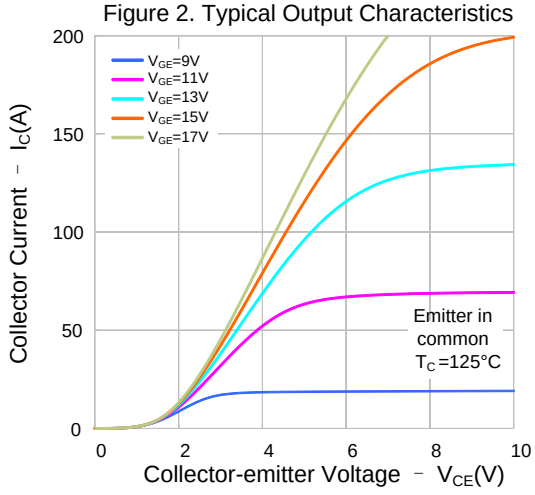


Figure 3. Typical Saturation Voltage Characteristics

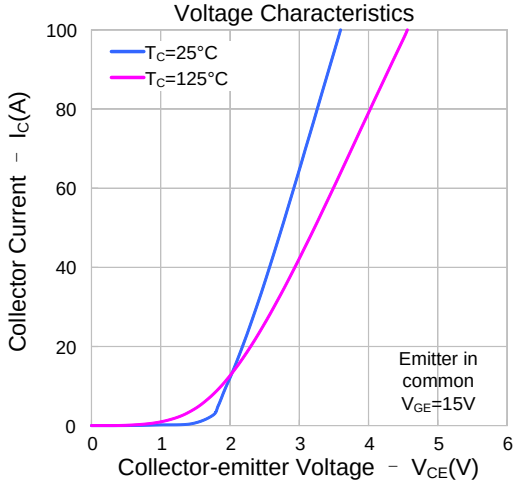


Figure 4. Transmission Characteristics

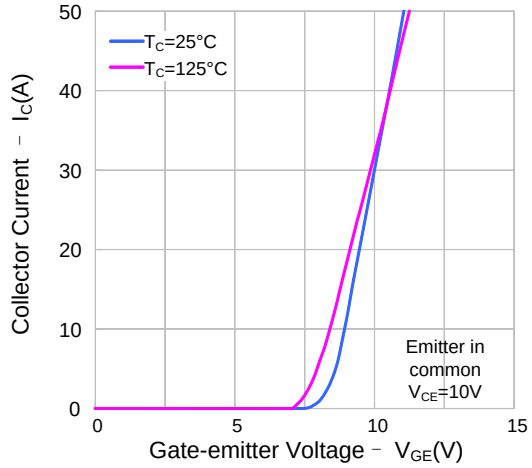


Figure 5. Saturation Voltage Drop vs. V_{GE}

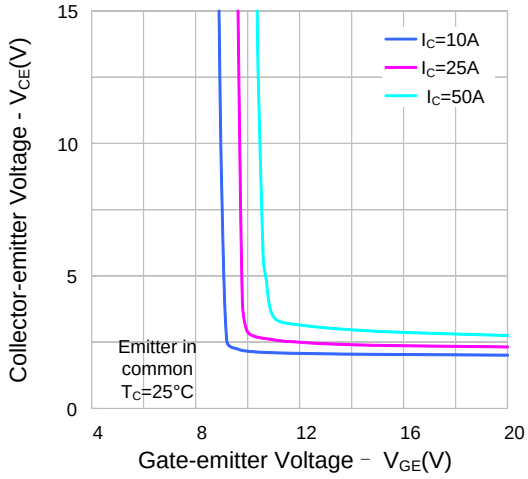
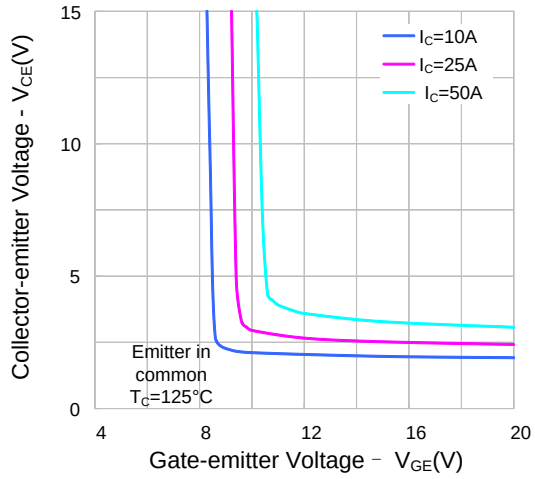


Figure 6. Saturation Voltage Drop vs. V_{GE}



TYPICAL CHARACTERISTICS (CONTINUED)

Figure 7. Saturation Voltage Drop vs. Temperature

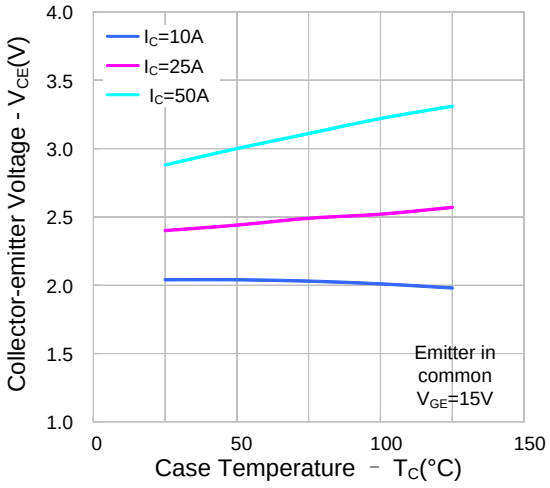


Figure 8. Capacitance Characteristics

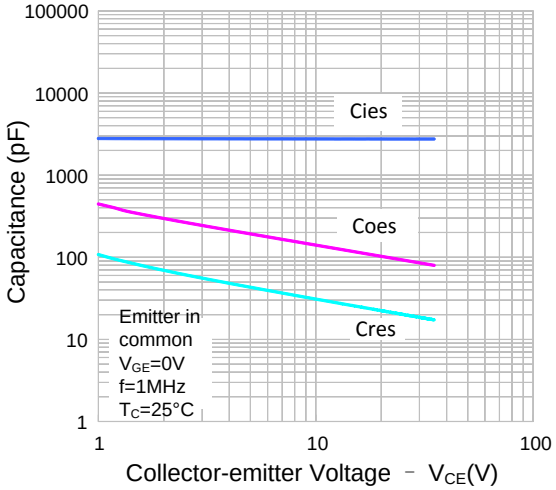


Figure 9. Gate Charge Characteristics

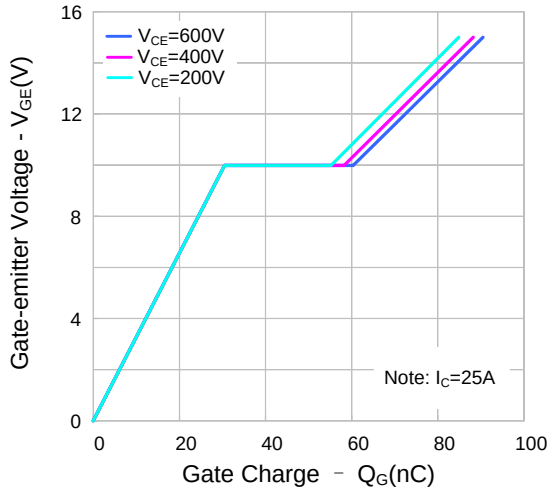


Figure 10. Turn-on Characteristics vs. Gate Resistance

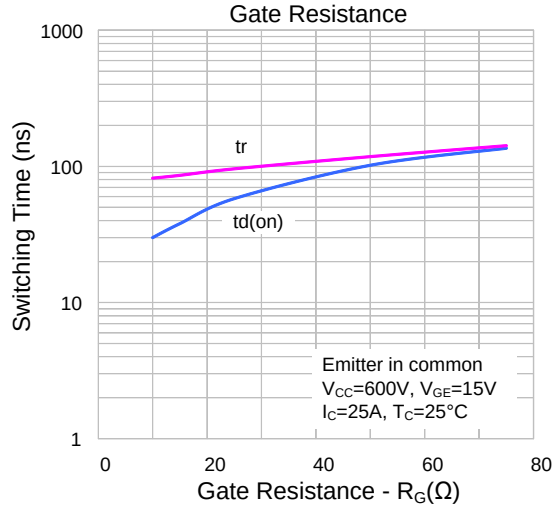


Figure 11. Turn-off Characteristics vs. Gate Resistance

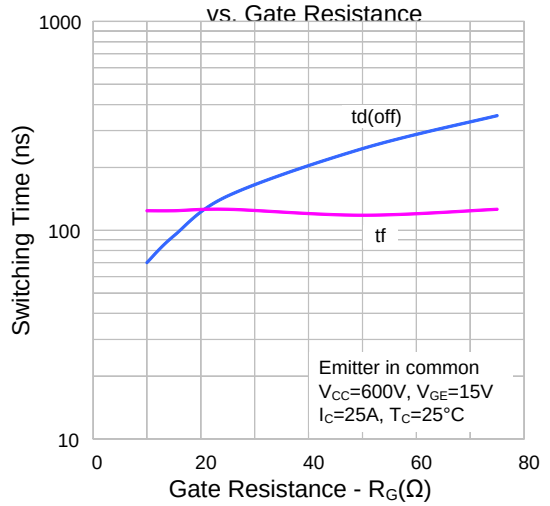
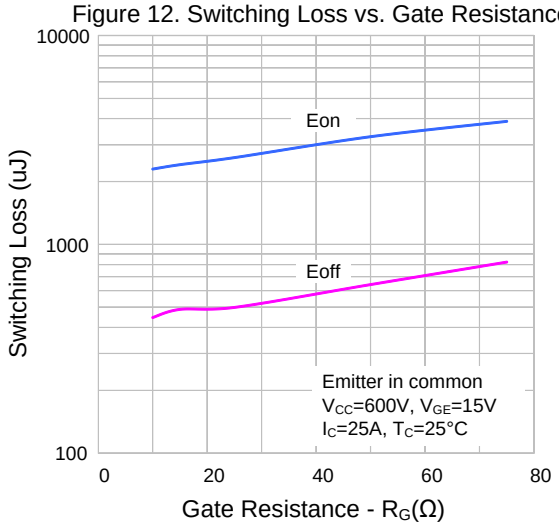


Figure 12. Switching Loss vs. Gate Resistance



TYPICAL CHARACTERISTICS (CONTINUED)

Figure 13. Turn-on Characteristics vs. Collector Current

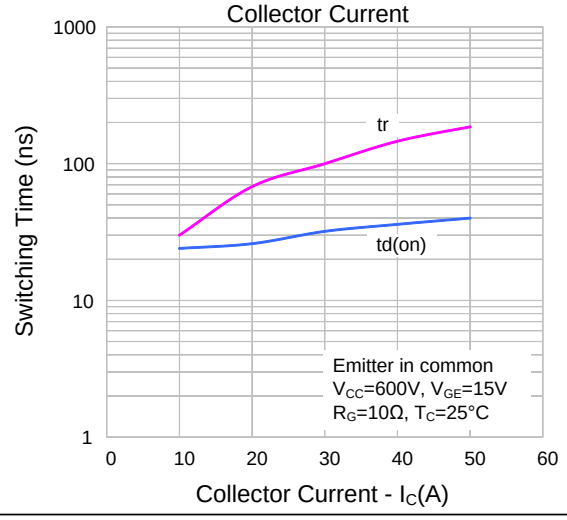


Figure 14. Turn-off Characteristics vs. Collector Current

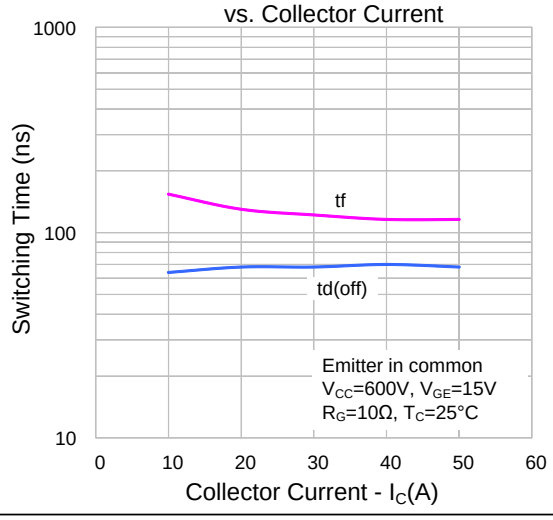


Figure 15. Switching Loss vs. Collector Current

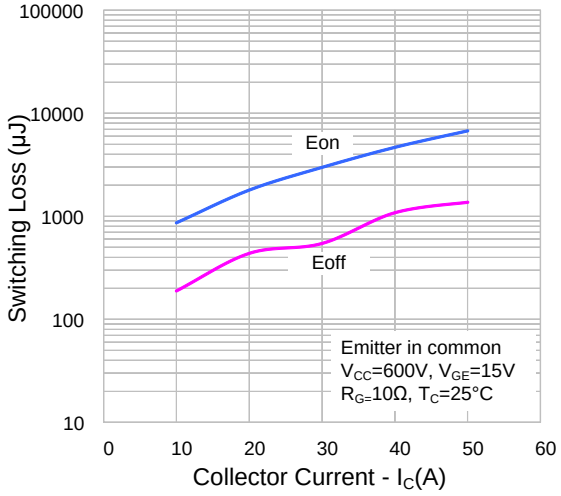


Figure 16. Forward Characteristics

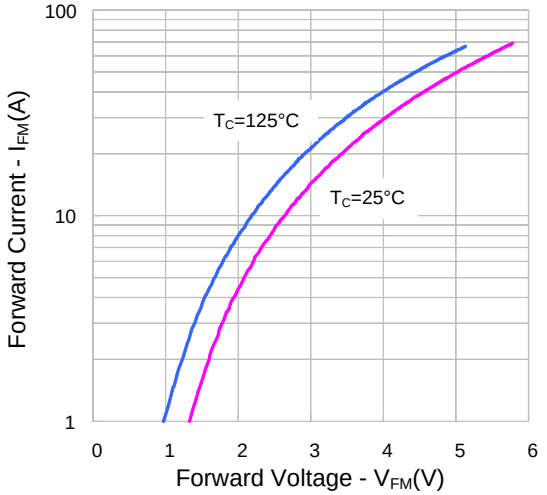


Figure 17. Reverse Recovery Time vs. Forward Current

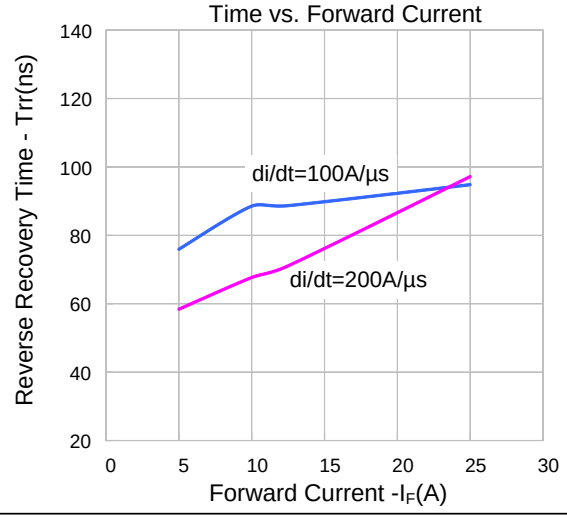
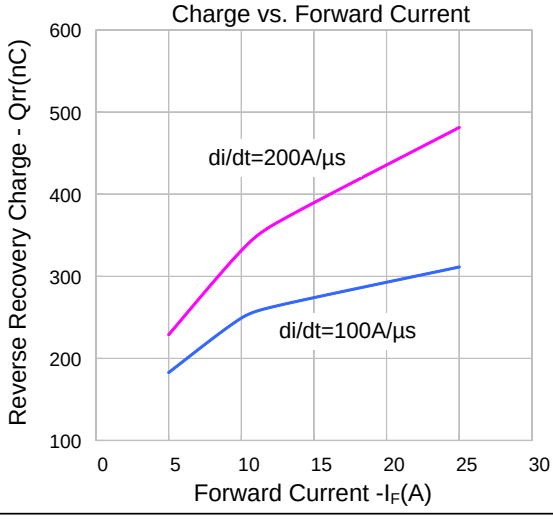


Figure 18. Reverse Recovery Charge vs. Forward Current



TYPICAL CHARACTERISTICS (CONTINUED)

Figure 19. Peak Reverse Recovery Current vs. Forward Current

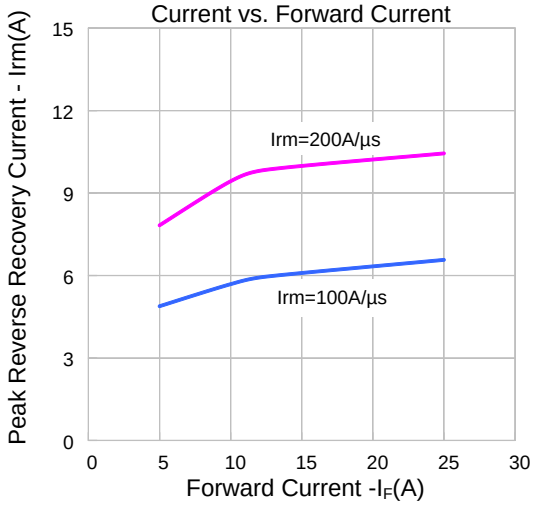


Figure 20. Tb Slope vs. Forward Current

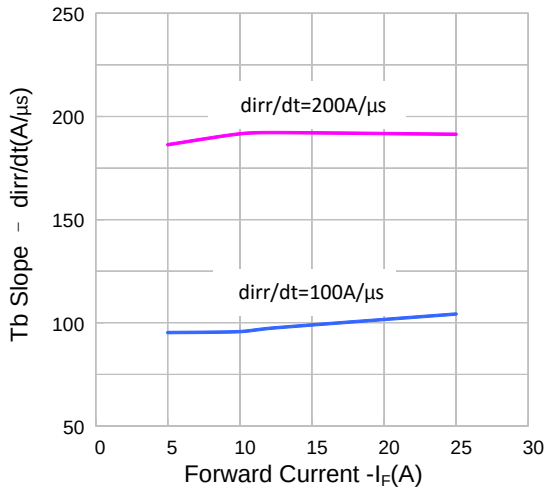


Figure 21. Max. Safe Operating Area

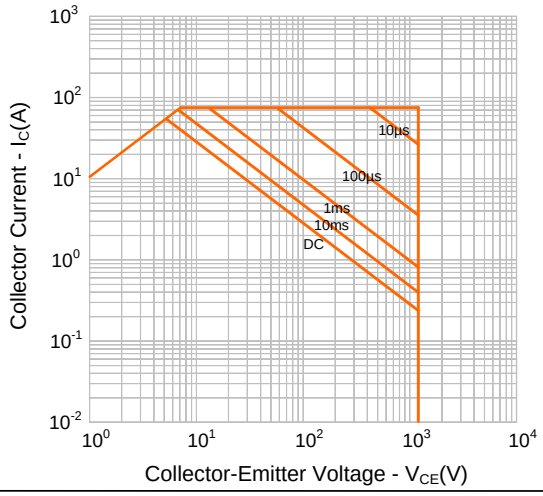


Figure 22. Transient Thermal Impedance vs. On-pulse Duration (IGBT)

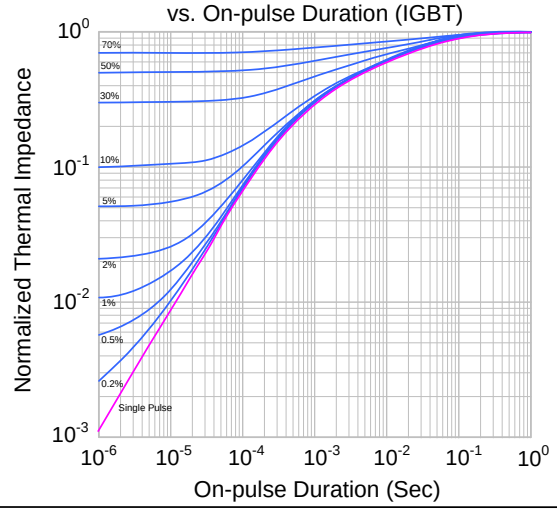
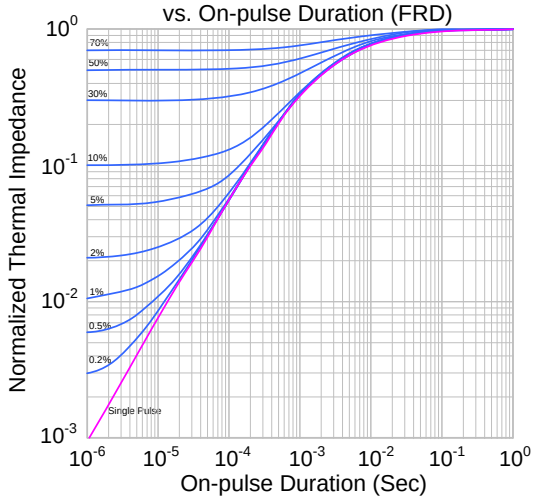
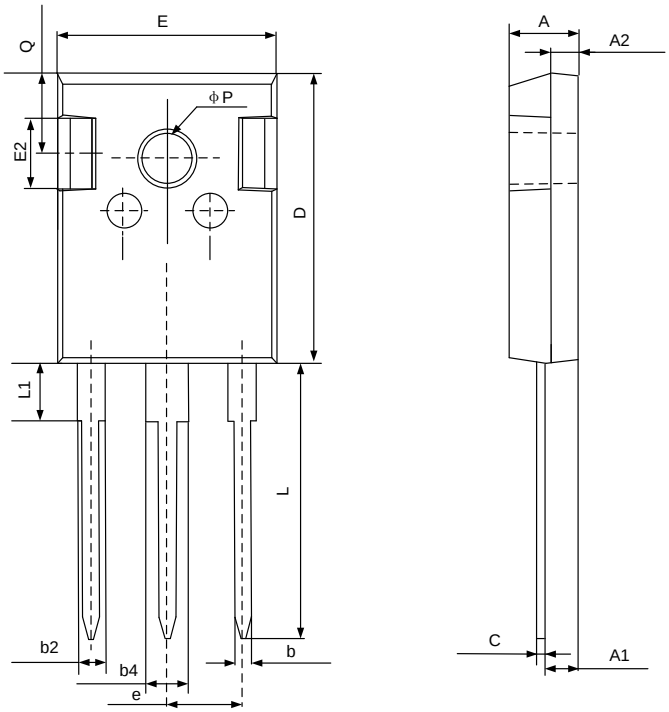


Figure 23. Transient Thermal Impedance vs. On-pulse Duration (FRD)



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

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.**
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Rev.: 1.1

Revision History:

1. Add V_{GE} and pulsed diode current

Rev.: 1.0

Revision History:

1. First release