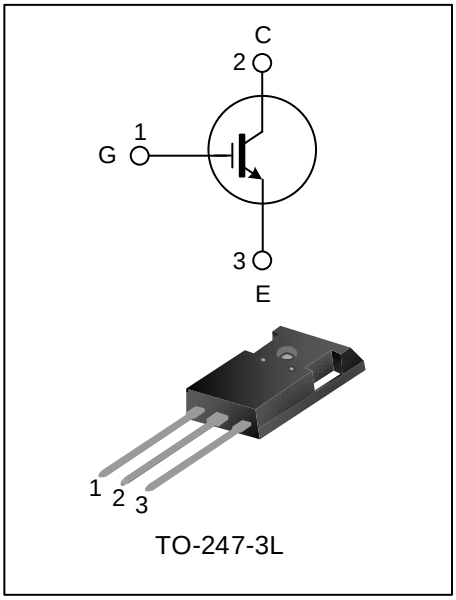
50A, 650V FIELD STOP IGBT

DESCRIPTION

The SGTP50V65UF1P7 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

- 50A, 650V, $V_{CE(sat)(typ.)}$=1.60V@I_C=50A
- Low conduction loss
- Ultra-fast switching
- High input impedance
- T_{Jmax}=175°C

NOMENCLATURE

SGT P 50 V 65 UF 1 P7

IGBT series
Industrial grade

Current, 50: 50A

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

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~

D : Packaged with fast recovery diode
R : RC IGBT

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
SGTP50V65UF1P7	TO-247-3L	P50V65UF1	Halogen free	Tube

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

Characteristics		Symbol	Ratings	Unit
Collector to Emitter Voltage		V_{CE}	650	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	100	A
	T_C=100°C		50	
Pulsed Collector Current		I_{CM}	150	A
Power Dissipation (T_C=25°C)		P_D	273	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)	$R_{\theta JC}$	--	--	--	0.55	°C/W
Thermal Resistance, Junction to Ambient (IGBT)	$R_{\theta JA}$	--	--	--	40	°C
Soldering Temperature (in line)	T_{sold}	15^{+2}_{-0} sec, 1time	--	--	260	°C

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=250μA	650	--	--	V
C-E Leakage Current	I_{CES}	V_{CE}=650V, V_{GE}=0V	--	--	40	μA
G-E Leakage Current	I_{GES}	V_{GE}=20V, V_{CE}=0V	--	--	±100	nA
G-E Threshold Voltage	$V_{GE(th)}$	I_C=250μA, V_{CE}=V_{GE}	3.2	4.1	5	V
Collector to Emitter Saturation Voltage	$V_{CE(sat)}$	I_C=50A, V_{GE}=15V, T_C=25°C	--	1.60	2.30	V
		I_C=50A, V_{GE}=15V, T_C=175°C	--	1.95	--	V
Input Capacitance	C_{ies}	V_{CE}=30V	--	3467	--	pF
Output Capacitance	C_{oes}	V_{GE}=0V	--	63	--	
Reverse Transfer Capacitance	C_{res}	f=1MHz	--	14	--	
Turn-On Delay Time	$T_{d(on)}$	V_{CE}=400V I_C=50A R_g=10Ω V_{GE}=15V inductive load	--	32	--	ns
Rise Time	T_r		--	43	--	
Turn-Off Delay Time	$T_{d(off)}$		--	146	--	
Fall Time	T_f		--	17	--	
Turn-On Switching Loss	E_{on}		--	0.39	--	mJ
Turn-Off Switching Loss	E_{off}		--	0.16	--	
Total Switching Loss	E_{st}		--	0.55	--	

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Turn-On Delay Time	$T_{d(on)}$	V_{CE}=400V I_C=25A R_g=10Ω V_{GE}=15V inductive load	--	30	--	ns
Rise Time	T_r		--	19	--	
Turn-Off Delay Time	$T_{d(off)}$		--	155	--	
Fall Time	T_f		--	16	--	
Turn-On Switching Loss	E_{on}		--	0.15	--	mJ
Turn-Off Switching Loss	E_{off}		--	0.08	--	
Total Switching Loss	E_{st}		--	0.23	--	
Total Gate Charge	Q_g	V_{CE}=520V, I_C=50A, V_{GE}=15V	--	131	--	nC
Gate to Emitter Charge	Q_{ge}		--	30	--	
Gate to Collector Charge	Q_{gc}		--	34	--	

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

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Turn-On Delay Time	$T_{d(on)}$	V_{CE}=400V I_C=50A R_g=10Ω V_{GE}=15V inductive load T_C=150°C	--	29	--	ns
Rise Time	T_r		--	38	--	
Turn-Off Delay Time	$T_{d(off)}$		--	178	--	
Fall Time	T_f		--	76	--	
Turn-On Switching Loss	E_{on}		--	0.56	--	mJ
Turn-Off Switching Loss	E_{off}		--	0.75	--	
Total Switching Loss	E_{st}		--	1.31	--	
Turn-On Delay Time	$T_{d(on)}$	V_{CE}=400V I_C=25A R_g=10Ω V_{GE}=15V inductive load T_C=150°C	--	30	--	ns
Rise Time	T_r		--	15	--	
Turn-Off Delay Time	$T_{d(off)}$		--	196	--	
Fall Time	T_f		--	75	--	
Turn-On Switching Loss	E_{on}		--	0.18	--	mJ
Turn-Off Switching Loss	E_{off}		--	0.40	--	
Total Switching Loss	E_{st}		--	0.58	--	

TYPICAL CHARACTERISTICS

Figure 1. Typical Output Characteristics

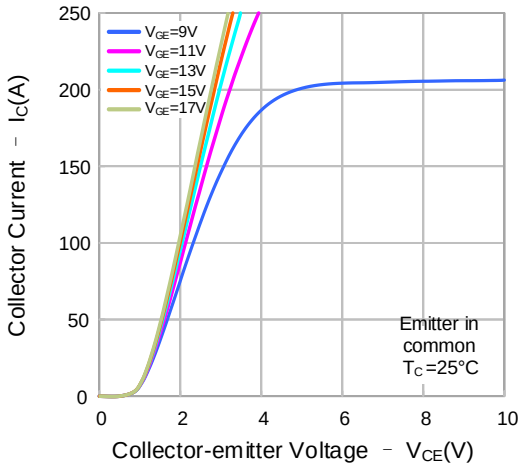


Figure 2. Typical Output Characteristics

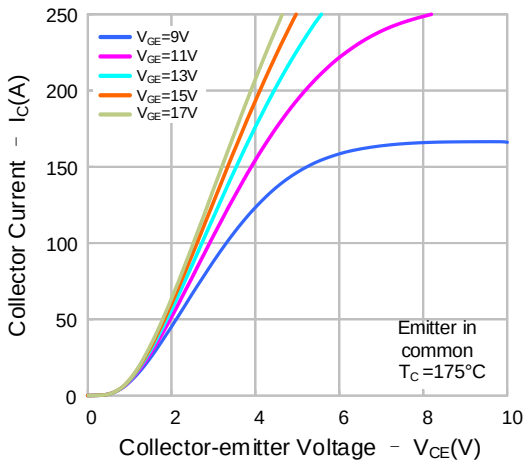


Figure 3. Typical Saturation Voltage Characteristics

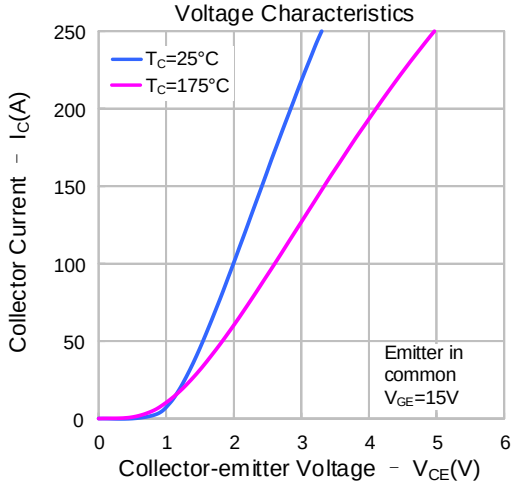


Figure 4. Transmission Characteristics

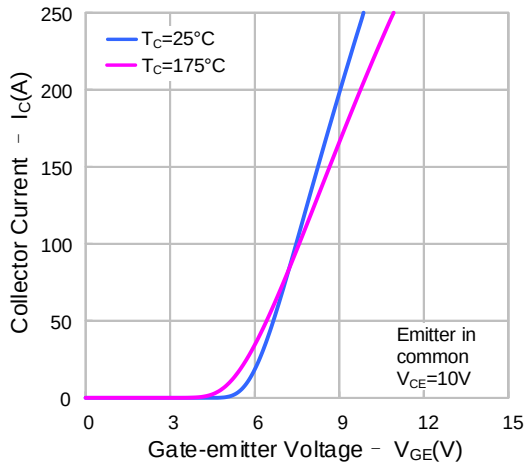


Figure 5. Saturation Voltage Drop vs. V_{GE}

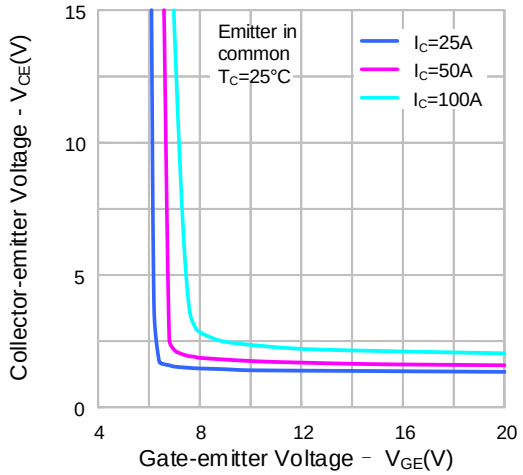
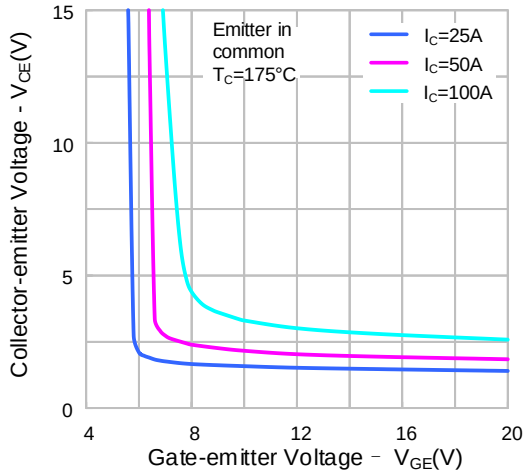


Figure 6. Saturation Voltage Drop vs. V_{GE}



TYPICAL CHARACTERISTICS (CONTINUED)

Figure 7. Saturation Voltage Drop vs. Temperature

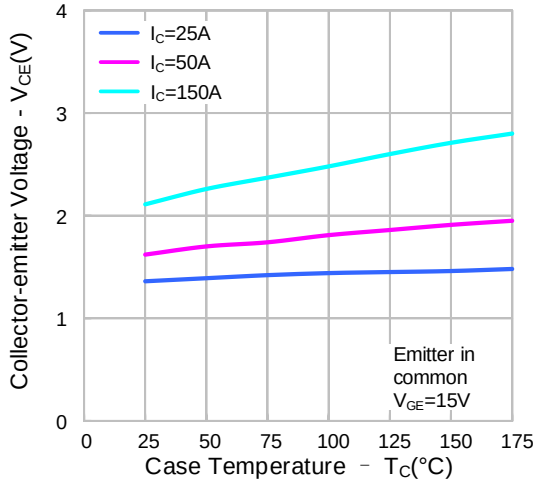


Figure 8. Capacitance Characteristics

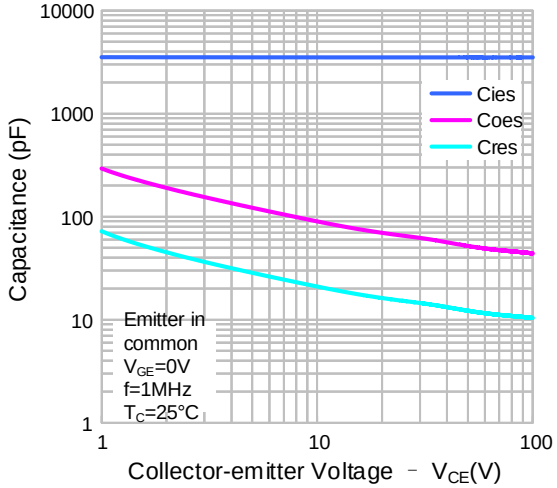


Figure 9. Gate Charge Characteristics

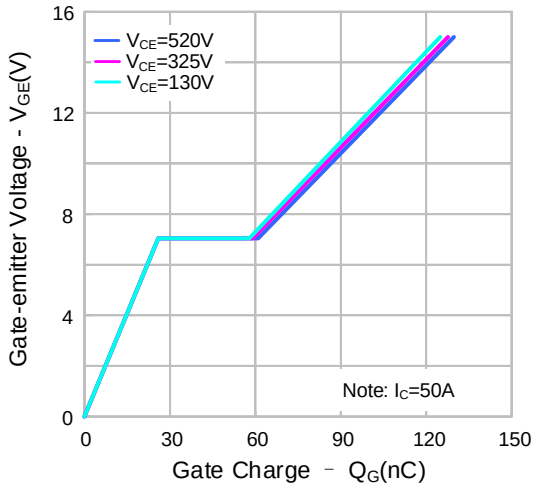


Figure 10. Turn-on Characteristics vs. Gate Resistance

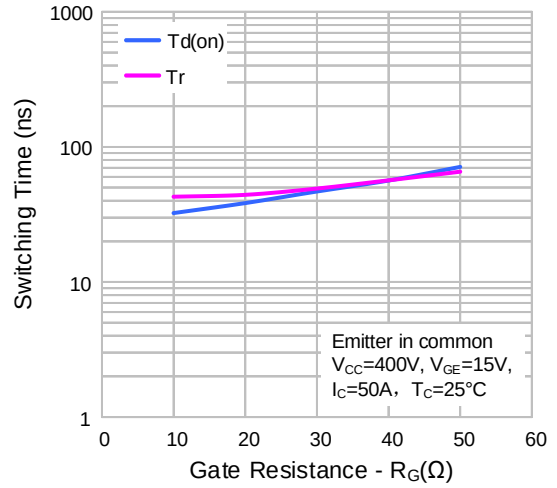


Figure 11. Turn-on Characteristics vs. Gate Resistance

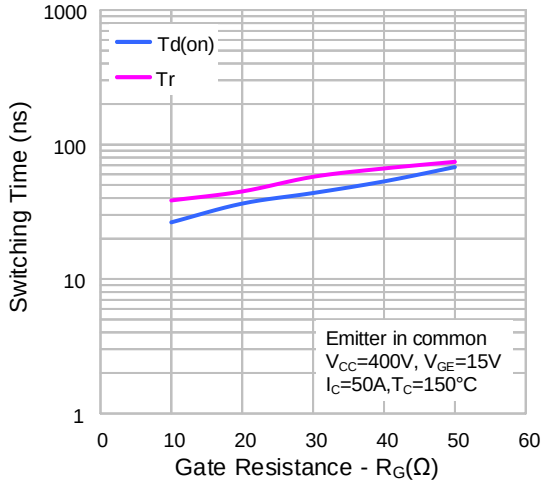
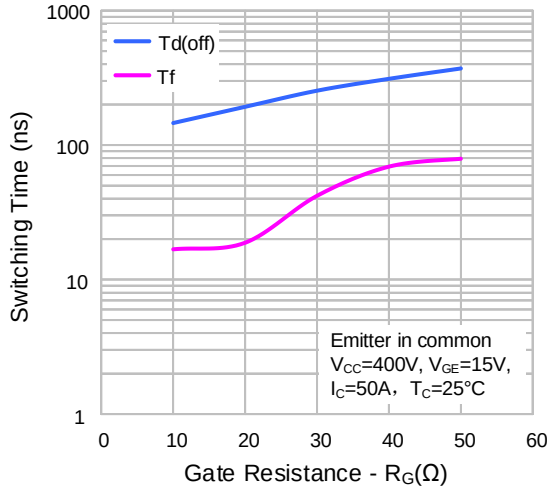


Figure 12. Turn-off Characteristics vs. Gate Resistance



TYPICAL CHARACTERISTICS (CONTINUED)

Figure 13. Turn-off Characteristics vs. Gate Resistance

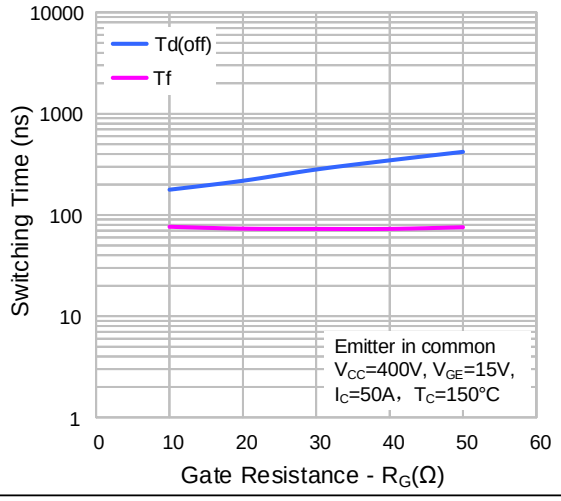


Figure 14. Switching Loss vs. Gate Resistance

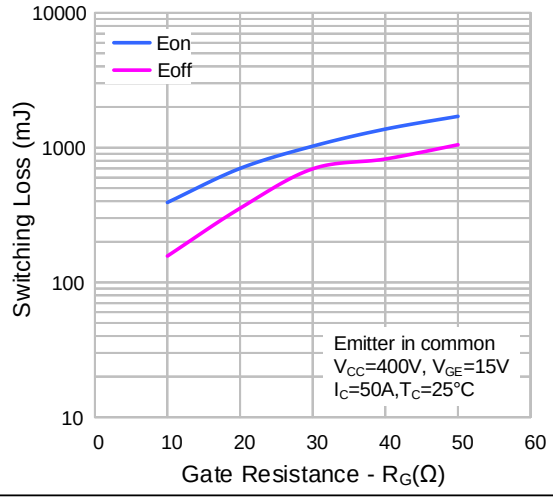


Figure 15. Switching Loss vs. Gate Resistance

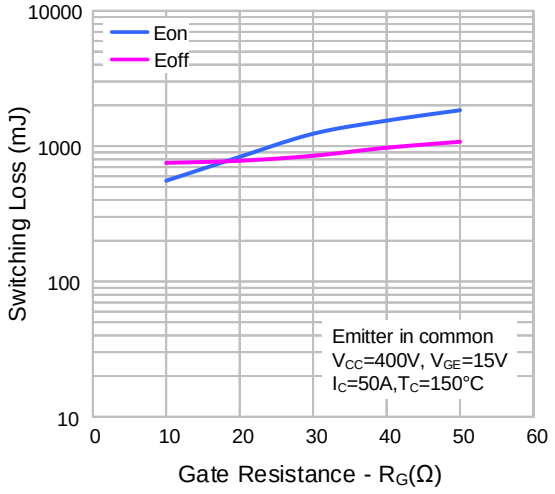


Figure 16. Turn-on Characteristics vs. Collector Current

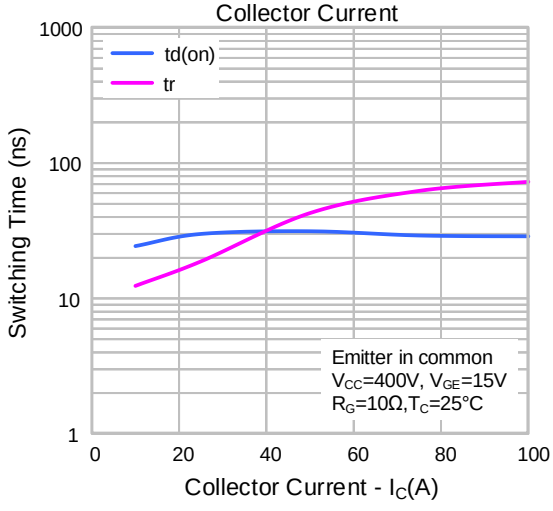


Figure 17. Turn-on Characteristics vs. Collector Current

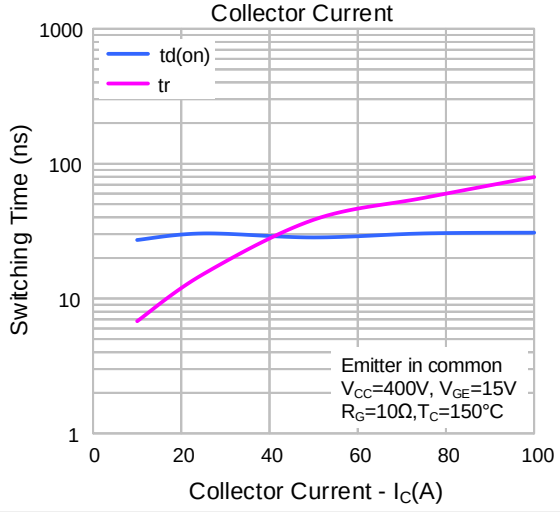
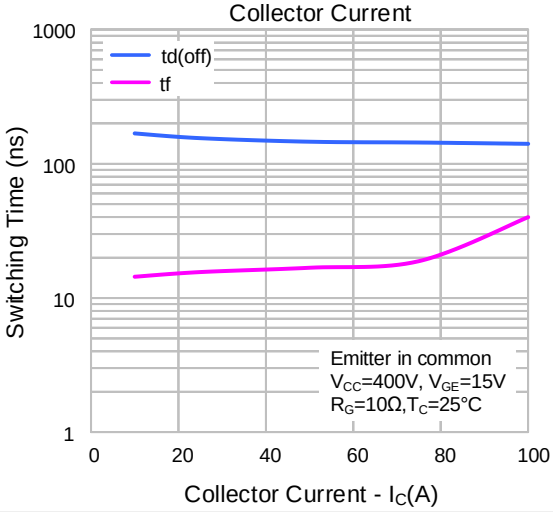


Figure 18. Turn-off Characteristics vs. Collector Current



TYPICAL CHARACTERISTICS (CONTINUED)

Figure 19. Turn-off Characteristics vs. Collector Current

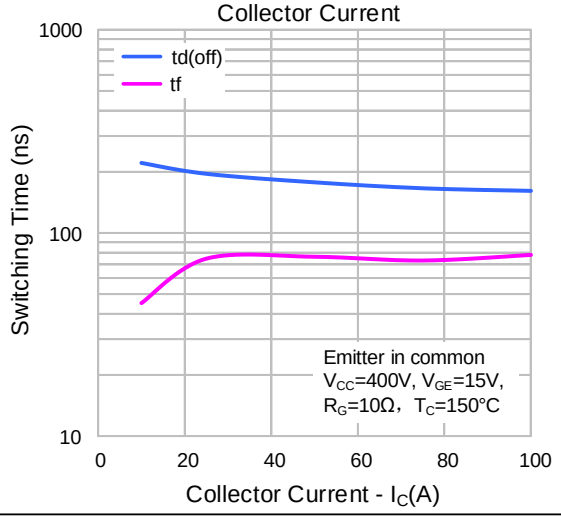


Figure 20. Switching Loss vs. Collector Current

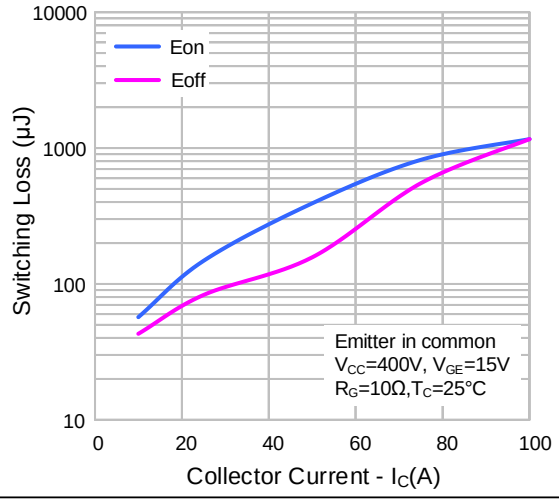


Figure 21. Switching Loss vs. Collector Current

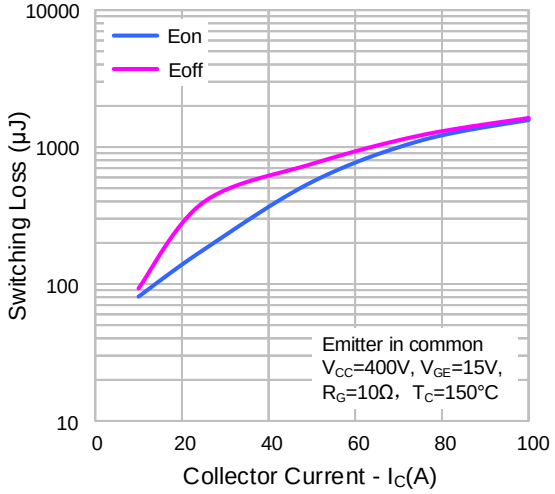


Figure 22. Max. Safe Operating Area

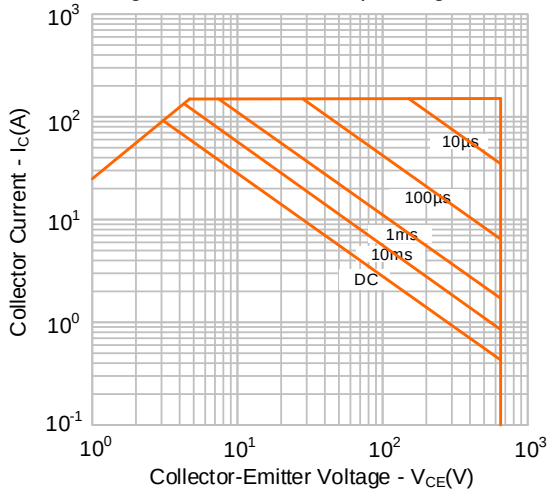
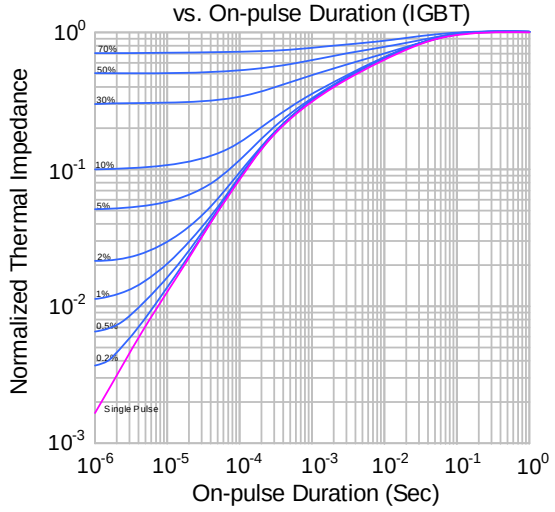
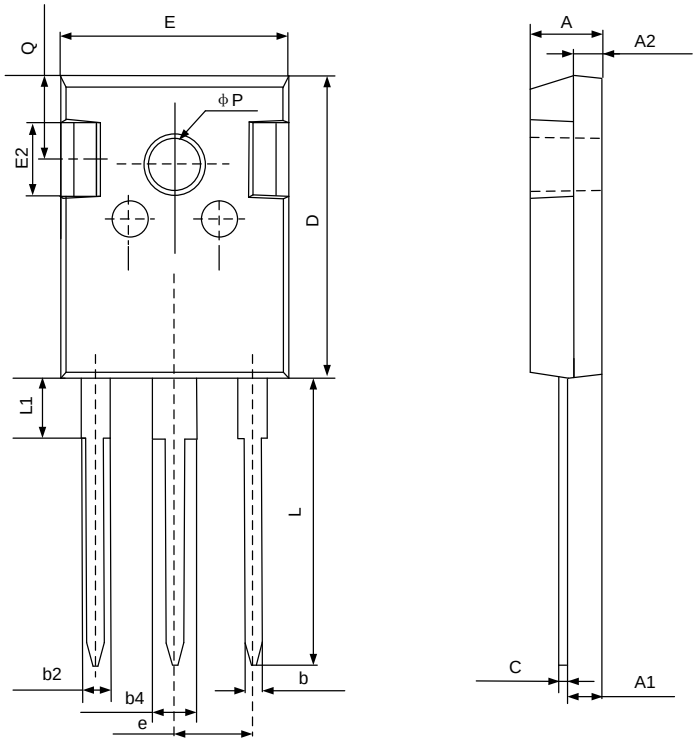


Figure 23. Transient Thermal Impedance vs. On-pulse Duration (IGBT)



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.: 1.0

Revision History:

1. First release