

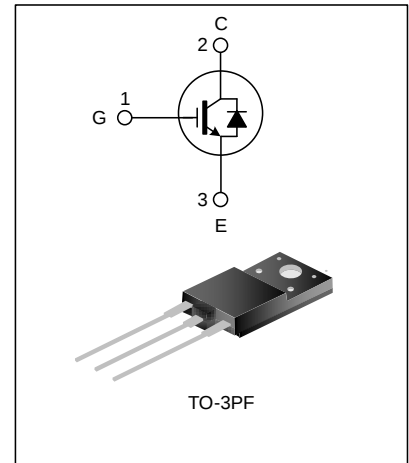
50A, 600V FIELD STOP IGBT

DESCRIPTION

The SGTP50V60FD2PF 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, 600V, $V_{CE(sat)(typ.)}=1.65V@I_C=50A$
- ◆ Low conduction loss
- ◆ Ultra-fast switching
- ◆ High input impedance
- ◆ $T_{Jmax}=175^{\circ}C$



NOMENCLATURE

SGT P 50 V 60 F D 2 PF	
IGBT series	Package
Industrial grade	PF : TO-3PF
Current, 75: 75A	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	D : Packaged with fast recovery diode
X : Field Stop 7	R : RC IGBT
Voltage, 65: 650V, 120: 1200V	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 Type
SGTP50V60FD2PF	TO-3PF	50V60FD2	Halogen free	Tube

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

Characteristics	Symbol	Ratings	Unit
Collector to Emitter Voltage	V _{CE}	600	V
Gate to Emitter Voltage	V _{GE}	±20	V
Transient Gate-Emitter Voltage (t _p ≤10μs, D<0.010)	V _{GE}	±30	V
Collector Current	I _C	T _C =25°C	A
		T _C =100°C	
Pulsed Collector Current	I _{CM}	150	A
Diode Current	I _F	T _C =25°C	A
		T _C =100°C	
Pulsed Diode Current	I _{FM}	15	A
Power Dissipation (T _C =25°C)	P _D	60	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 _{θJC}	--	--	--	2.5	°C/W
Thermal Resistance, Junction to Case (FRD)	R _{θJC}	--	--	--	5.3	°C/W
Thermal Resistance, Junction to Ambient (IGBT)	R _{θJA}	--	--	--	40	°C/W
Soldering temperature (in line)	T _{sold}	15 ⁺² ₋₀ sec, 1time	--	--	260	°C

ELECTRICAL CHARACTERISTICS OF IGBT (UNLESS OTHERWISE NOTED, $T_C=25^{\circ}\text{C}$)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Collector to Emitter Breakdown Voltage	BV_{CE}	$V_{GE}=0V, I_C=250\mu A$	600	--	--	V
C-E Leakage Current	I_{CES}	$V_{CE}=600V, V_{GE}=0V$	--	--	40	μA
G-E Leakage Current	I_{GES}	$V_{GE}=20V, V_{CE}=0V$	--	--	± 100	nA
G-E Threshold Voltage	$V_{GE(th)}$	$I_C=250\mu A, V_{CE}=V_{GE}$	3.2	4.0	5.0	V
Collector to Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=50A, V_{GE}=15V, T_C=25^{\circ}\text{C}$	--	1.65	2.3	V
		$I_C=50A, V_{GE}=15V, T_C=175^{\circ}\text{C}$	--	2.0	--	V
Input Capacitance	C_{ies}	$V_{CE}=30V$ $V_{GE}=0V$ $f=1\text{MHz}$	--	3500	--	pF
Output Capacitance	C_{oes}		--	63	--	
Reverse Transfer Capacitance	C_{res}		--	12	--	
Turn-On Delay Time	$T_{d(on)}$	$V_{CE}=400V$ $I_C=50A$ $R_g=10\Omega$ $V_{GE}=15V$ inductive load $T_C=25^{\circ}\text{C}$	--	21	--	ns
Rise Time	T_r		--	58	--	
Turn-Off Delay Time	$T_{d(off)}$		--	130	--	
Fall Time	T_f		--	42	--	
Turn-On Switching Loss	E_{on}	inductive load $T_C=25^{\circ}\text{C}$	--	1.55	--	mJ
Turn-Off Switching Loss	E_{off}		--	0.63	--	
Total Switching Loss	E_{st}		--	2.18	--	
Turn-On Delay Time	$T_{d(on)}$	$V_{CE}=400V$ $I_C=25A$ $R_g=10\Omega$ $V_{GE}=15V$ inductive load $T_C=25^{\circ}\text{C}$	--	16	--	ns
Rise Time	T_r		--	27	--	
Turn-Off Delay Time	$T_{d(off)}$		--	135	--	
Fall Time	T_f		--	11	--	
Turn-On Switching Loss	E_{on}	inductive load $T_C=25^{\circ}\text{C}$	--	0.59	--	mJ
Turn-Off Switching Loss	E_{off}		--	0.21	--	
Total Switching Loss	E_{st}		--	0.80	--	
Total Gate Charge	Q_g	$V_{CE}=480V, I_C=50A, V_{GE}=15V$	--	131	--	nC
Gate to Emitter Charge	Q_{ge}		--	29	--	
Gate to Collector Charge	Q_{gc}		--	33	--	

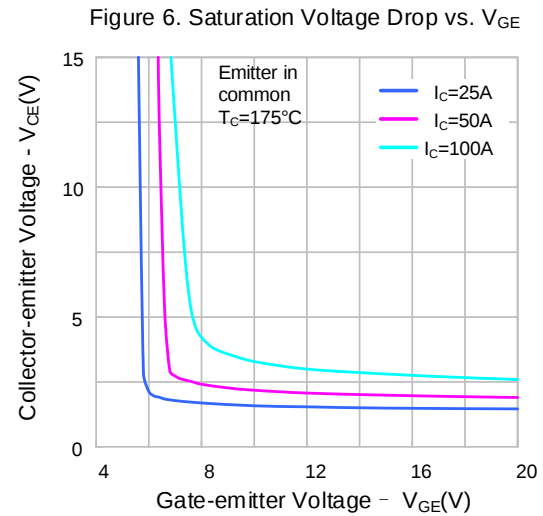
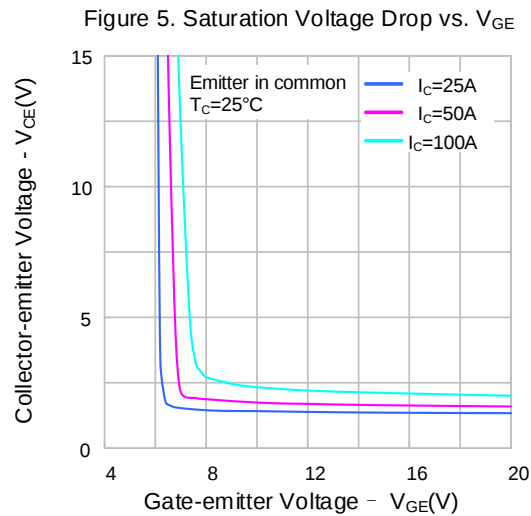
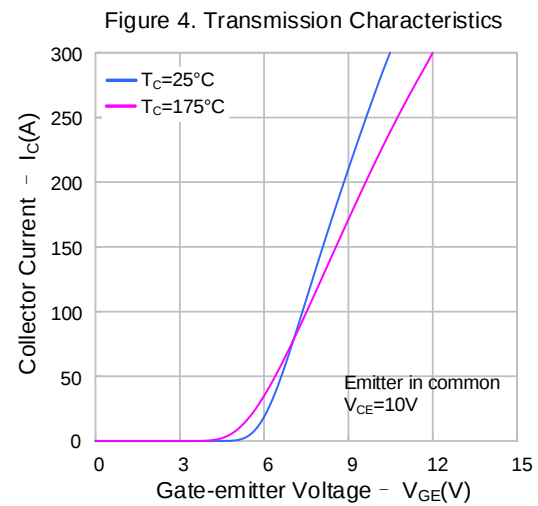
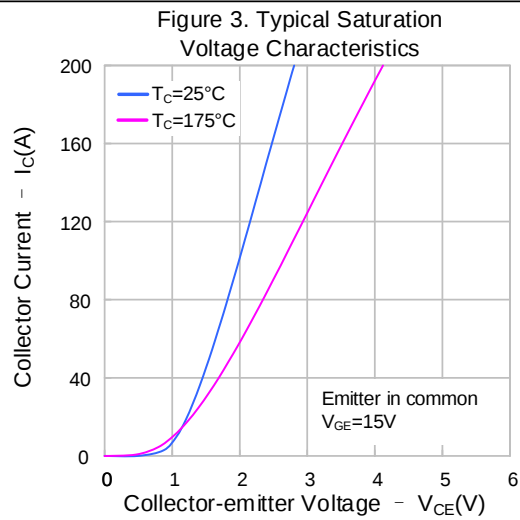
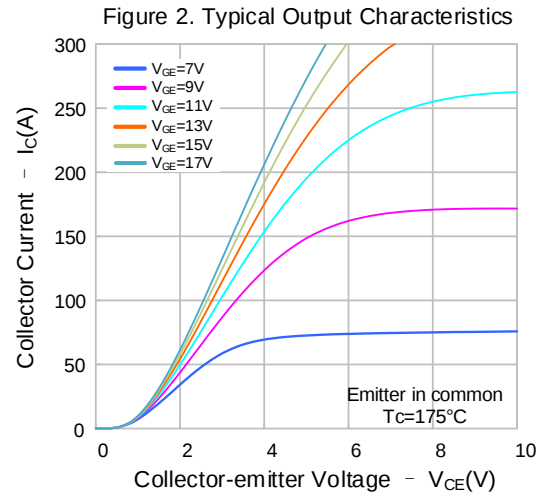
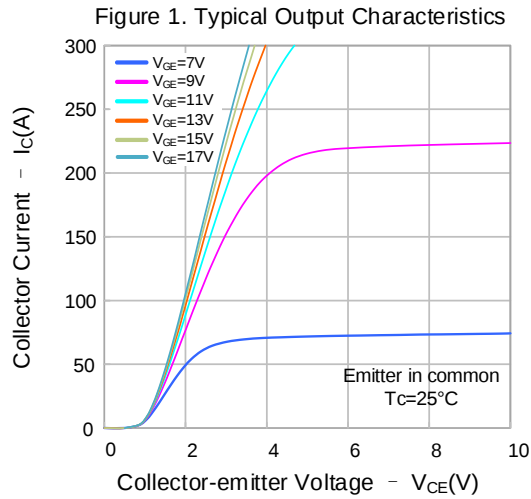
ELECTRICAL CHARACTERISTICS OF FRD (UNLESS OTHERWISE NOTED, $T_C=25^{\circ}\text{C}$)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Diode Forward Voltage	V_{FM}	$I_F=5A, T_C=25^{\circ}\text{C}$	--	1.4	2.0	V
		$I_F=5A, T_C=175^{\circ}\text{C}$	--	1.2	--	
Diode Reverse Recovery Time	T_{rr}	$I_{ES}=5A, di_{ES}/dt=100A/\mu s, V_R=50V,$ $T_C=25^{\circ}\text{C}$	--	39	--	ns
Diode Reverse Recovery Charge	Q_{rr}		--	50	--	nC
Diode Reverse Recovery Current	I_{rm}		--	2.4	--	A

ELECTRICAL CHARACTERISTICS OF IGBT (UNLESS OTHERWISE NOTED, $T_C=175^{\circ}\text{C}$)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Turn-On Delay Time	$T_{d(on)}$	$V_{CE}=400\text{V}$ $I_C=50\text{A}$ $R_g=10\Omega$ $V_{GE}=15\text{V}$ inductive load $T_C=175^{\circ}\text{C}$	--	21	--	ns
Rise Time	T_r		--	57	--	
Turn-Off Delay Time	$T_{d(off)}$		--	161	--	
Fall Time	T_f		--	38	--	
Turn-On Switching Loss	E_{on}	$V_{CE}=400\text{V}$ $I_C=25\text{A}$ $R_g=10\Omega$ $V_{GE}=15\text{V}$ inductive load $T_C=175^{\circ}\text{C}$	--	1.63	--	mJ
Turn-Off Switching Loss	E_{off}		--	0.77	--	
Total Switching Loss	E_{st}		--	2.40	--	
Turn-On Delay Time	$T_{d(on)}$	$V_{CE}=400\text{V}$ $I_C=25\text{A}$ $R_g=10\Omega$ $V_{GE}=15\text{V}$ inductive load $T_C=175^{\circ}\text{C}$	--	17	--	ns
Rise Time	T_r		--	26	--	
Turn-Off Delay Time	$T_{d(off)}$		--	182	--	
Fall Time	T_f		--	21	--	
Turn-On Switching Loss	E_{on}	$V_{CE}=400\text{V}$ $I_C=25\text{A}$ $R_g=10\Omega$ $V_{GE}=15\text{V}$ inductive load $T_C=175^{\circ}\text{C}$	--	0.63	--	mJ
Turn-Off Switching Loss	E_{off}		--	0.36	--	
Total Switching Loss	E_{st}		--	0.99	--	

TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS (CONTINUED)

Figure 7. Saturation Voltage Drop vs. Temperature

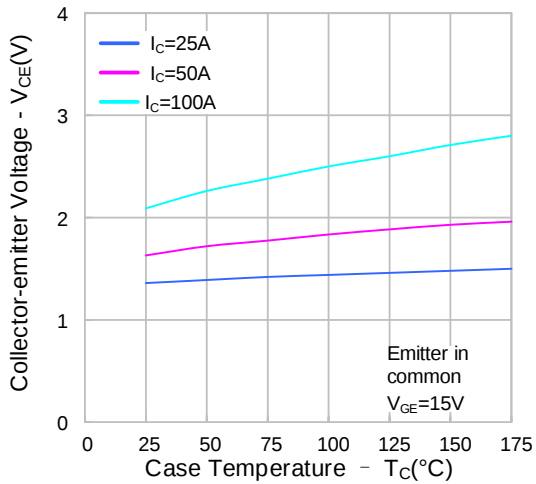


Figure 8. Capacitance Characteristics

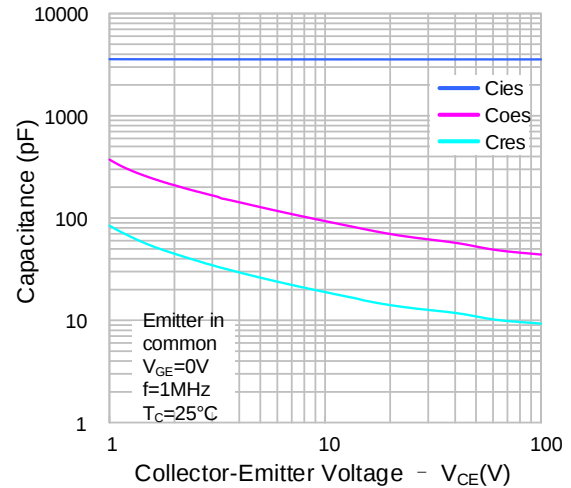


Figure 9. Gate Charge Characteristics

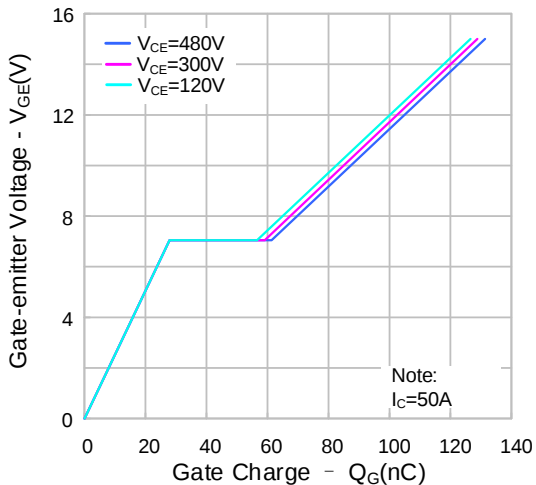


Figure 10. Forward Characteristics

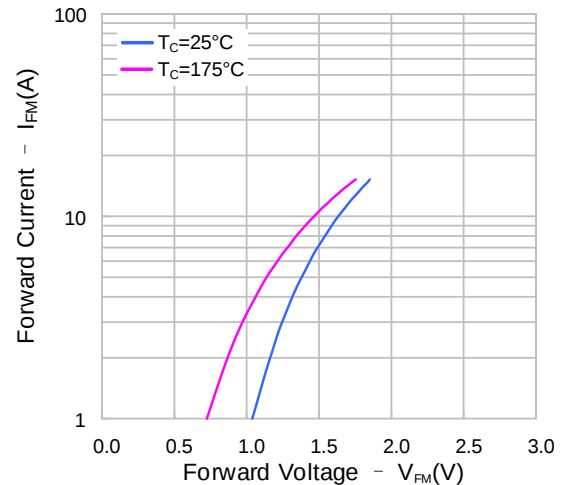


Figure 11. Turn-on Characteristics vs. Gate Resistance

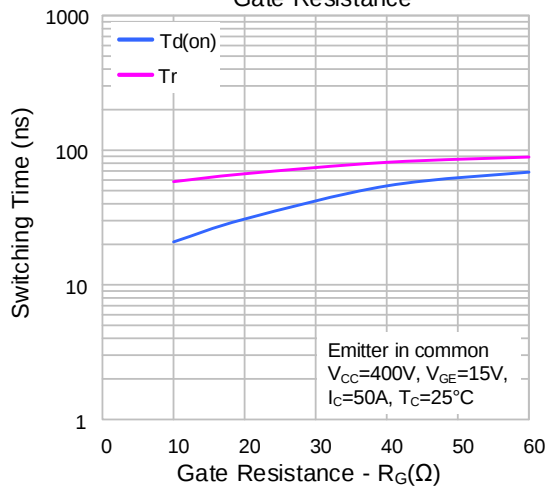
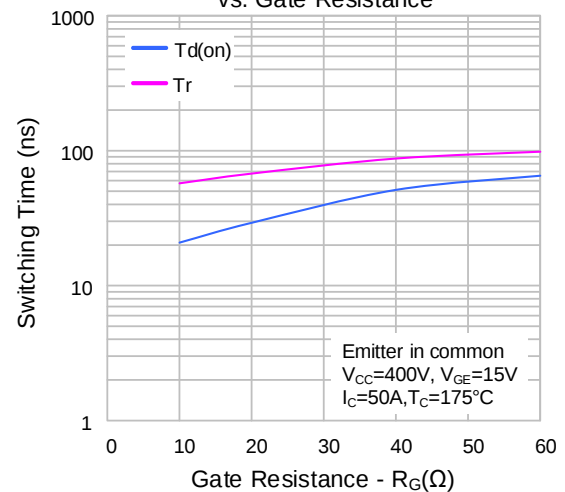
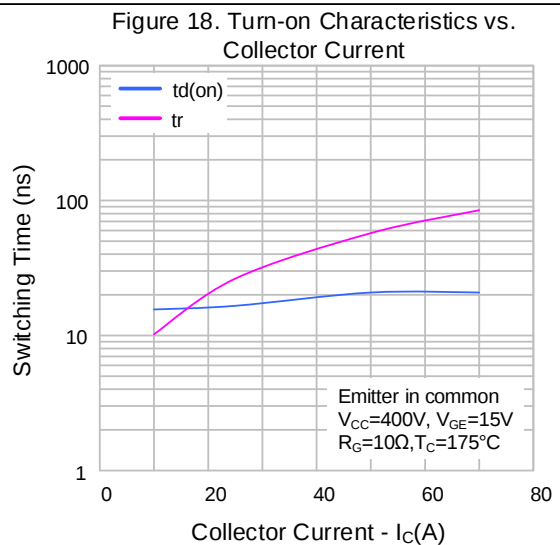
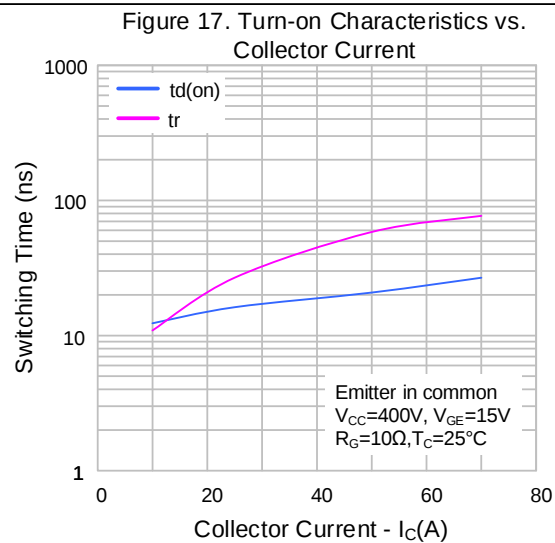
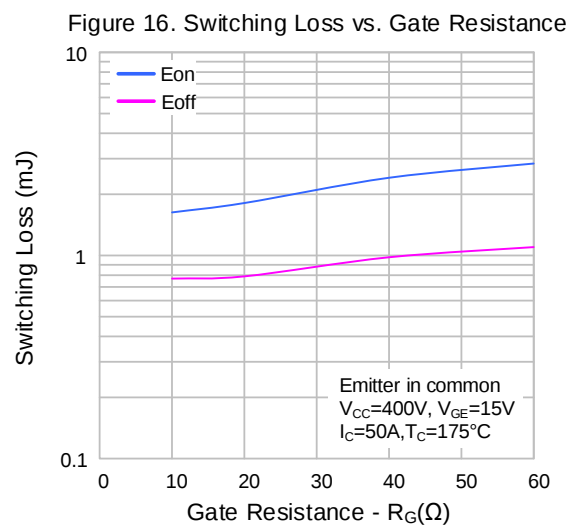
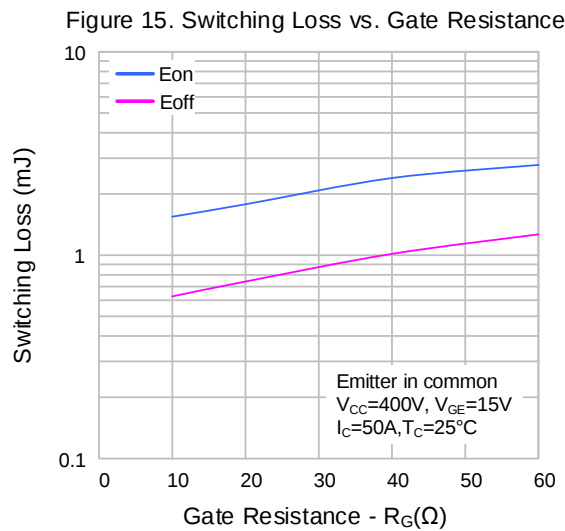
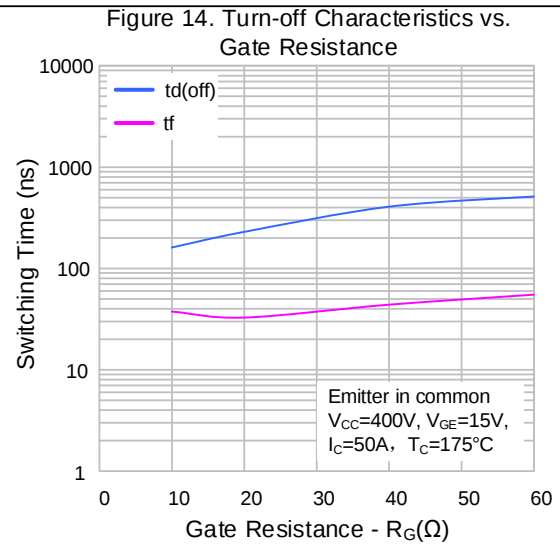
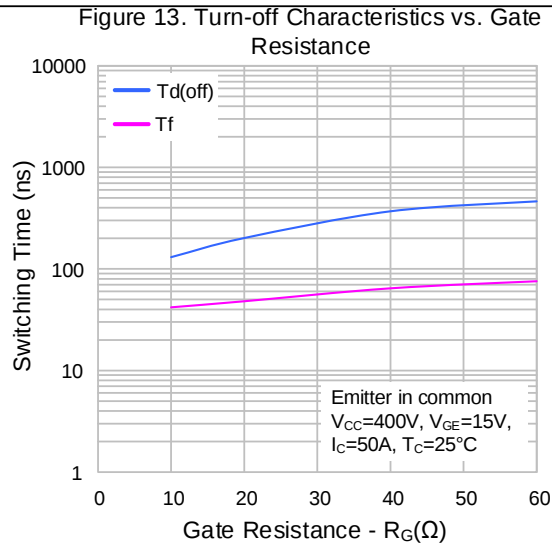


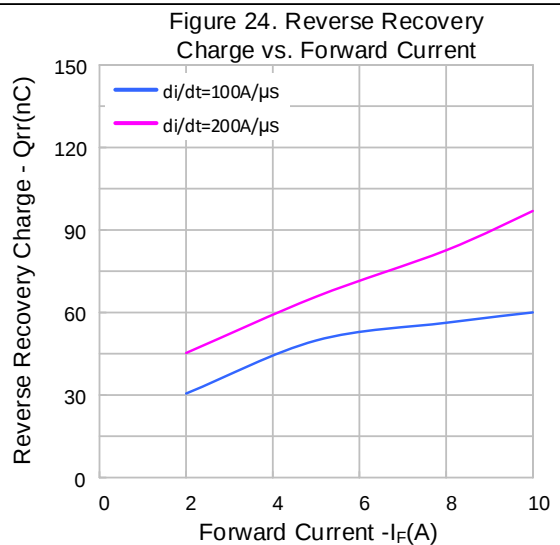
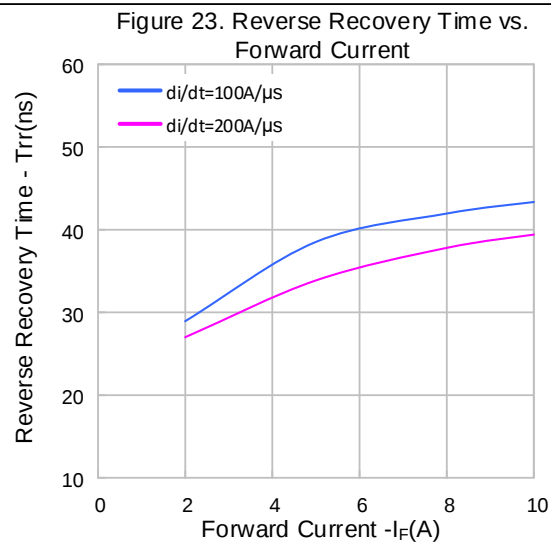
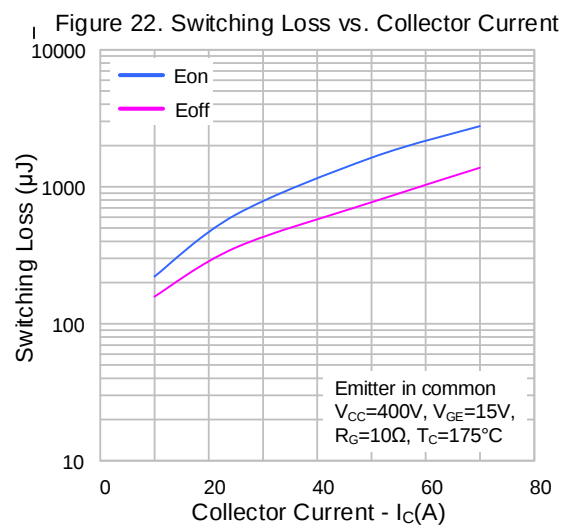
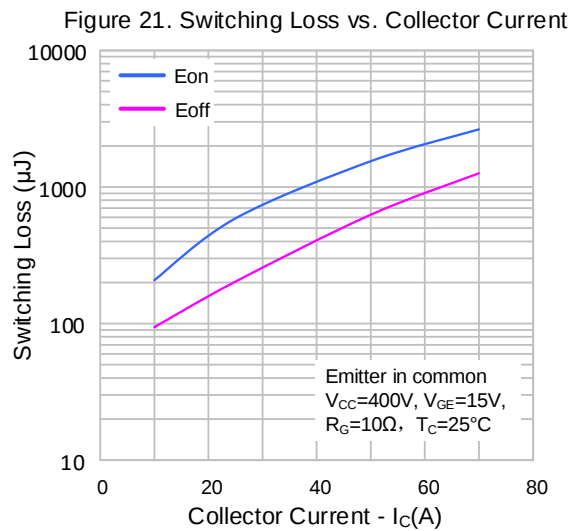
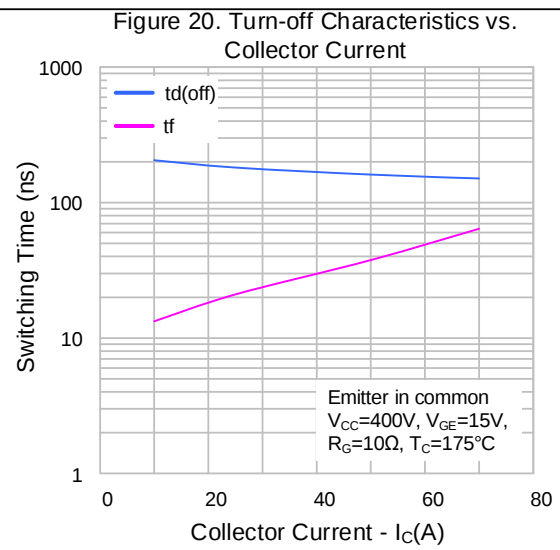
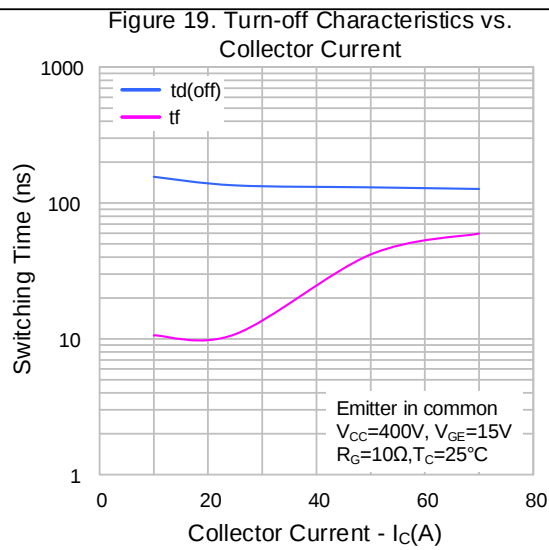
Figure 12. Turn-on Characteristics vs. Gate Resistance



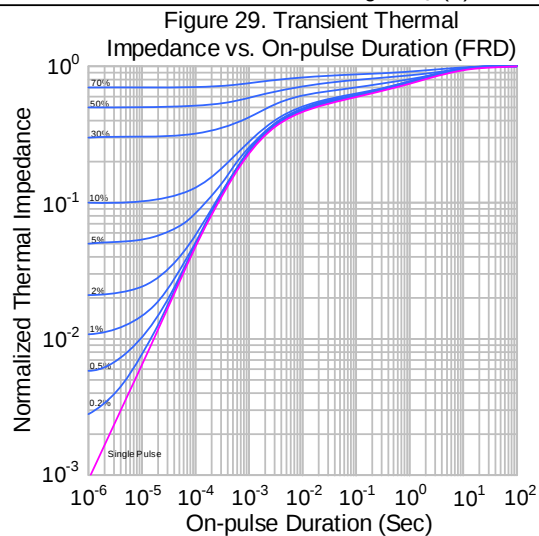
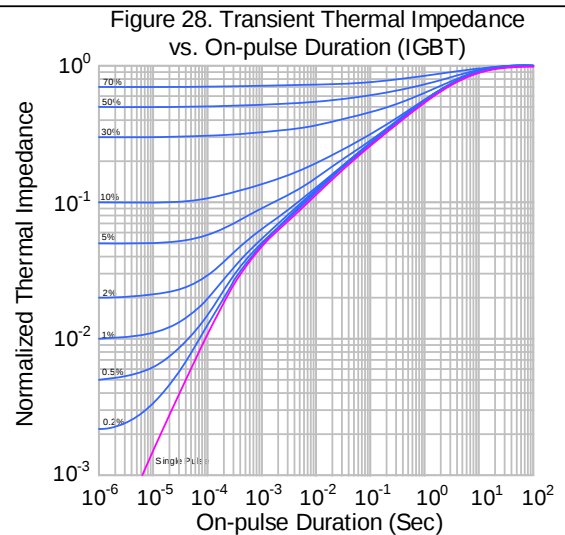
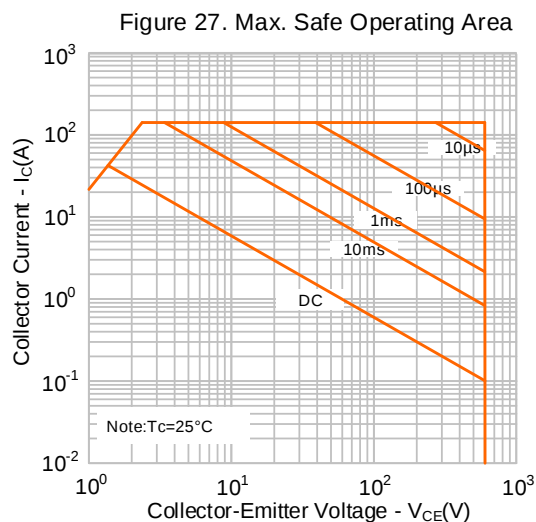
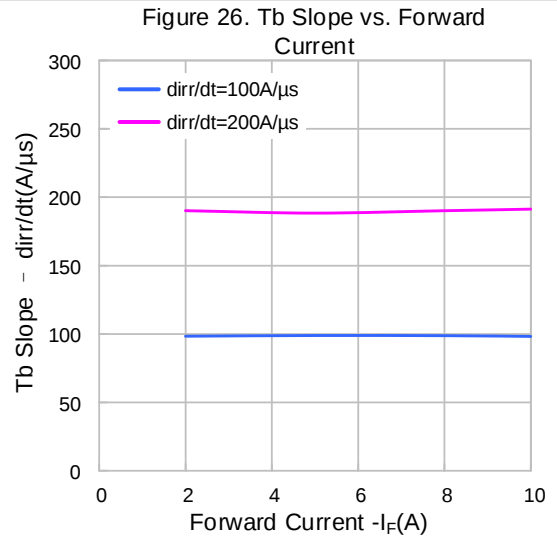
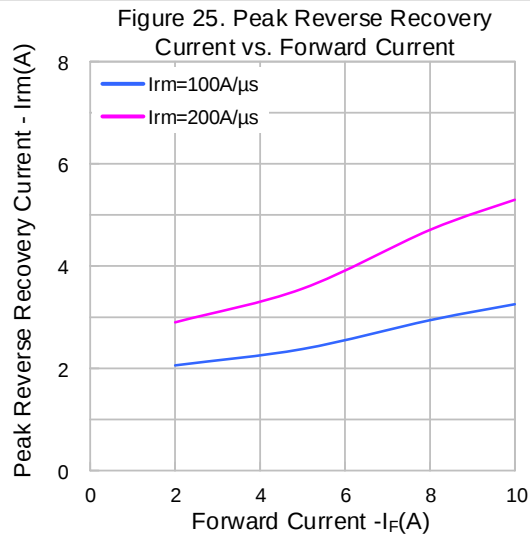
TYPICAL CHARACTERISTICS (CONTINUED)



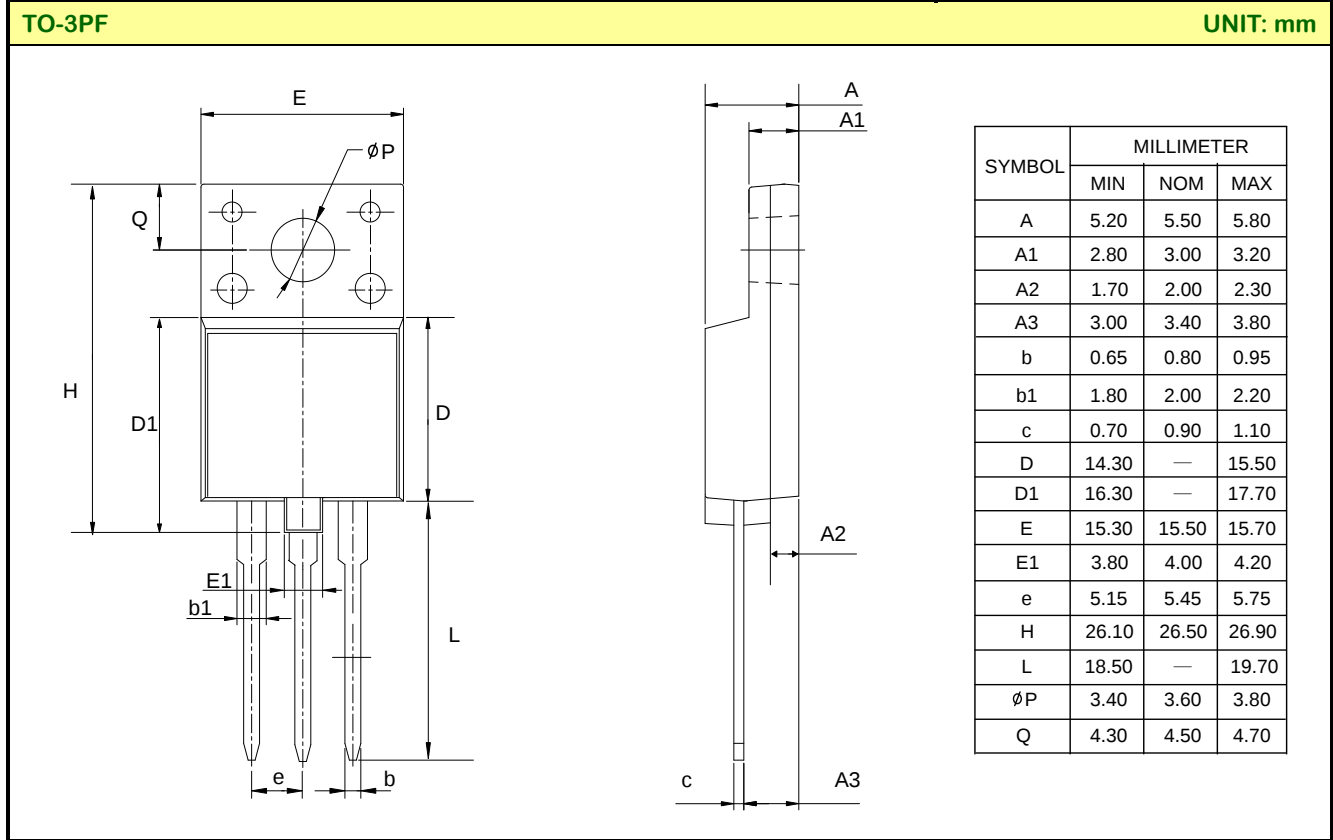
TYPICAL CHARACTERISTICS (CONTINUED)



TYPICAL CHARACTERISTICS (CONTINUED)



PACKAGE OUTLINE



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.
5. It is strongly recommended to identify the trademark when buying our products. Please contact us if there is any question.
6. Product promotion is endless, our company will wholeheartedly provide customers with better products!
7. Website: <http://www.silan.com.cn>

Part No.:	SGTP50V60FD2PF	Document Type:	Datasheet
Copyright:	HANGZHOU SILAN MICROELECTRONICS CO.,LTD	Website:	http://www.silan.com.cn

Rev.: 1.0

Revision History:

1. First release
