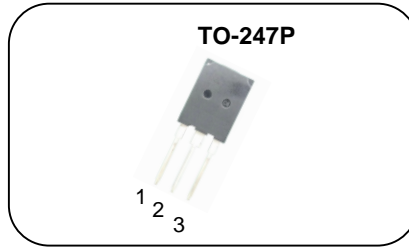


## Field Stop Trench TO-247P IGBT

### Features

- Field stop trench technology
- High speed switching
- Low saturation voltage:  
 $V_{CE(sat)}=2.1V @ I_C=75A$
- High input impedance
- Application: UPS, Solar Inverter, Welding Machine

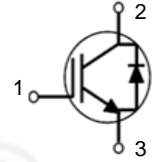


1. Gate 2. Collector 3. Emitter

$BV_{CES} : 1200V$

$I_C : 75A$

$V_{CE(sat)} : 2.1V$



### General Description

This device is used advanced field stop trench technology, which offer superior conduction and switching performances, and easy parallel operation with exceptional avalanche ruggedness. This device is designed for soft switching applications.



### Order Codes

Item	Sales Type	Marking	Package	Packaging
1	SW TP 75T120GFS	SW75T120GFS	TO-247P	TUBE

### Absolute maximum ratings

Symbol	Parameter	Value	Unit
$V_{CES}$	Collector to emitter voltage	1200	V
$V_{GES}$	Gate to emitter voltage	$\pm 20$	V
$I_C$	Continuous collector current (@ $T_C=25^\circ C$ )	150*	A
	Continuous collector current (@ $T_C=100^\circ C$ )	75*	A
$I_{CM}$	Pulsed collector current	300	A
$I_F$	Diode continuous forward current (@ $T_C=25^\circ C$ )	150	A
$P_D$	Total power dissipation (@ $T_C=25^\circ C$ )	600	W
	Total power dissipation (@ $T_C=100^\circ C$ )	300	W
$T_J$	Operating junction temperature	-55 ~ + 175	$^\circ C$
$T_{STG}$	storage temperature Range	-55 ~ + 150	$^\circ C$
$T_L$	Maximum lead temperature for soldering purpose, 1/8 from case for 5 seconds.	300	$^\circ C$

\*. Repetitive rating, Pulse width limited by max. junction temperature.

### Thermal characteristics

Symbol	Parameter	Value	Unit
$R_{thjc}$ (IGBT)	Thermal resistance, Junction to case	0.25	$^\circ C/W$
$R_{thjc}$ (Diode)	Thermal resistance, Junction to case	0.28	$^\circ C/W$
$R_{thja}$ (IGBT)	Thermal resistance, Junction to ambient	32	$^\circ C/W$

Electrical characteristic (  $T_C = 25^\circ\text{C}$  unless otherwise specified )

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit	
<b>Off characteristics</b>							
$BV_{CES}$	Collector to emitter breakdown voltage	$V_{GE}=0V, I_C=0.25mA$	1200			V	
$I_{CES}$	Collector cut-off current	$V_{CE}=V_{CES}, V_{GE}=0V$			1	mA	
$I_{GES}$	Gate to emitter leakage current, forward	$V_{GE}=20V, V_{CE}=0V$			200	nA	
	Gate to emitter leakage current, reverse	$V_{GE}=-20V, V_{CE}=0V$			-200	nA	
<b>On characteristics</b>							
$V_{GE(TH)}$	Gate threshold voltage	$V_{CE}=V_{GE}, I_C=2.6mA$	5.0		6.5	V	
$V_{CE(sat)}$	Collector to emitter saturation voltage	$I_C = 75A, V_{GE}= 15V, T_C=25^\circ\text{C}$		2.1	2.6	V	
		$I_C = 75A, V_{GE}= 15V, T_C=175^\circ\text{C}$		3.1		V	
<b>Dynamic characteristics</b>							
$C_{ies}$	Input capacitance	$V_{GE}=0V, V_{CE}=25V, f=1MHz$		8511		pF	
$C_{oes}$	Output capacitance			296			
$C_{res}$	Reverse transfer capacitance			146			
$t_{d(on)}$	Turn on delay time	$V_{CC}= 600V, I_C= 75A, R_G= 10\Omega, V_{GE}= 15V$		65		ns	
$t_r$	Rising time			183			
$t_{d(off)}$	Turn off delay time			348			
$t_f$	Fall time			119			
$E_{on}$	Turn-on switching loss			8.0			mJ
$E_{off}$	Turn-off switching loss			3.7			
$E_{is}$	Total switching loss		11.7				
$Q_g$	Total gate charge	$V_{CE}=960V, V_{GE}=15V, I_C=75A$		396		nC	
$Q_{ge}$	Gate-emitter charge			87			
$Q_{gc}$	Gate-collector charge			171			

### Emitter to Collector diode ratings characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_F$	Diode forward voltage	$I_F= 75A, T_C=25^\circ\text{C}$		2.03	2.4	V
		$I_F= 75A, T_C=175^\circ\text{C}$		1.62		V
$I_{rr}$	Diode peak reverse recovery current	$I_F=75A, di/dt = 320A/\mu s$		15		A
$T_{rr}$	Reverse recovery time			445		ns
$Q_{rr}$	Reverse recovery charge			2.6		$\mu\text{C}$

Fig. 1. Typical Output Characteristics( $T_j=25^\circ\text{C}$ )

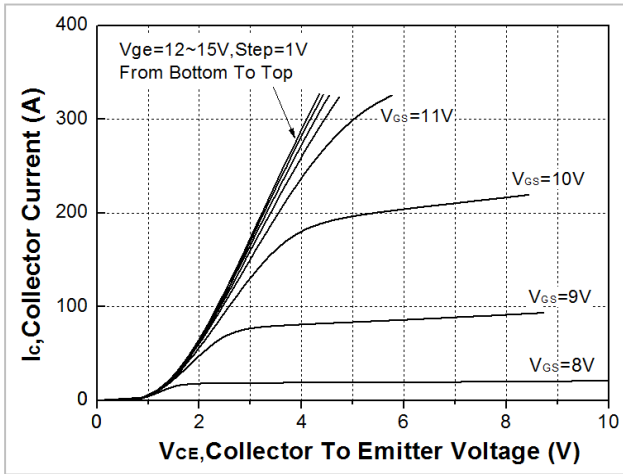


Fig. 2. Typical Output Characteristics( $T_j=150^\circ\text{C}$ )

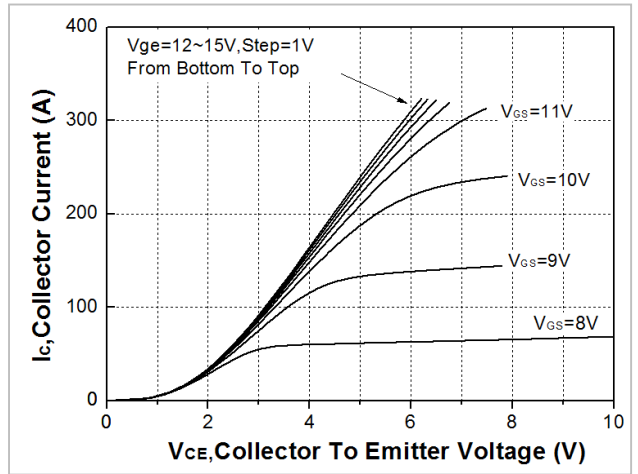


Fig. 3. Transfer Characteristics

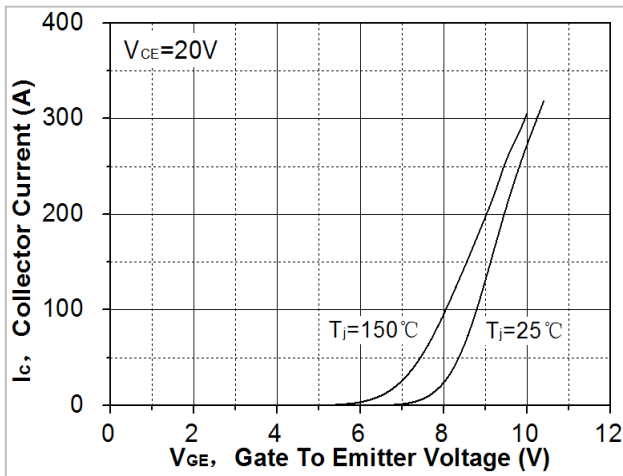


Fig. 4. Saturation Voltage vs. Case Temperature at Variant Current Level

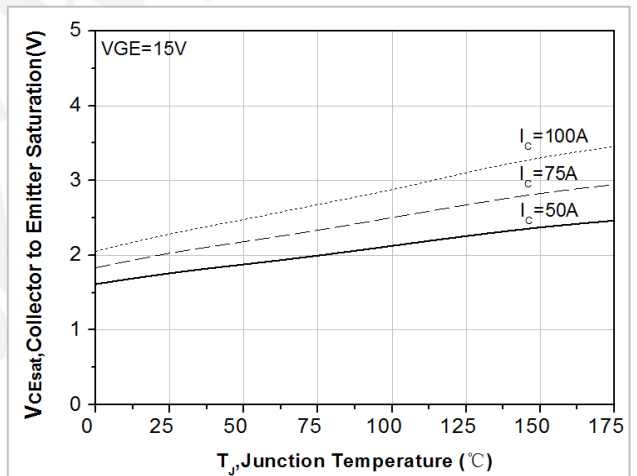


Fig. 5. Capacitance Characteristics

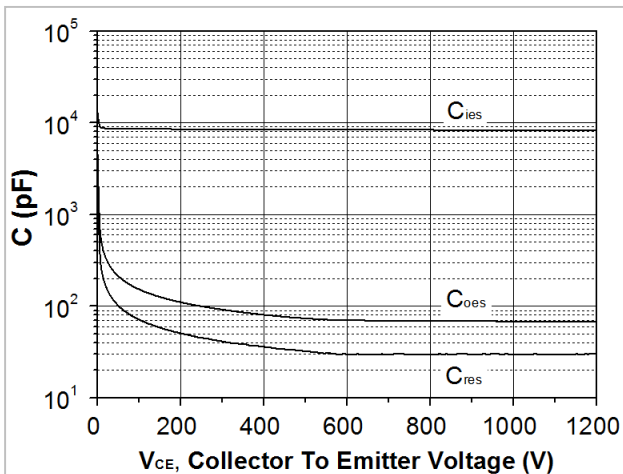


Fig. 6. Gate charge Characteristics

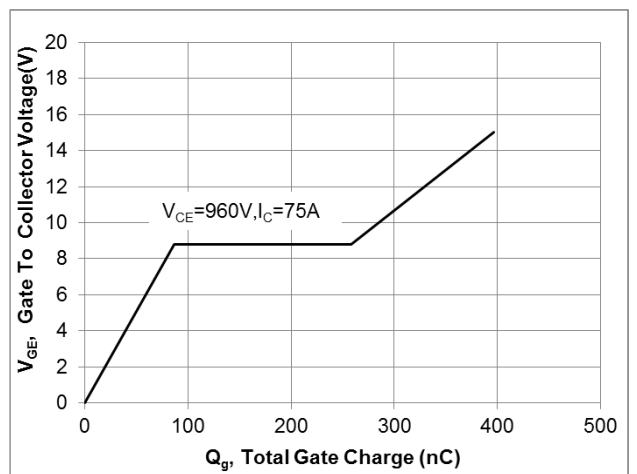


Fig. 7. Forward Characteristics

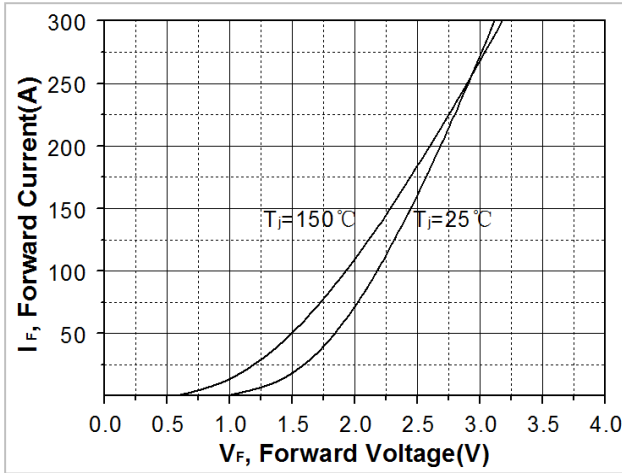


Fig. 8. Maximum safe operating area ( IGBT )

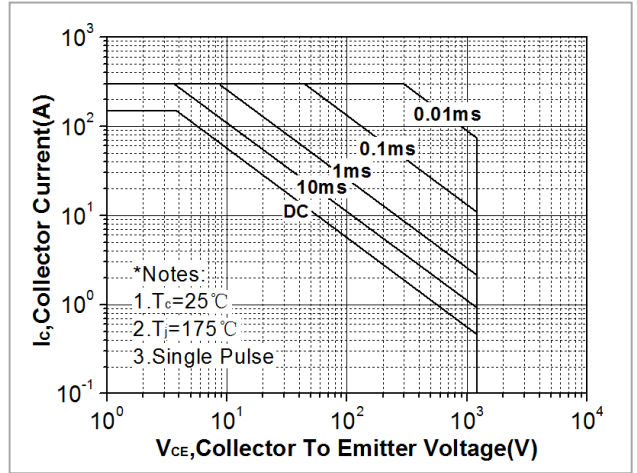


Fig. 9. Threshold Voltage vs. Case Temperature

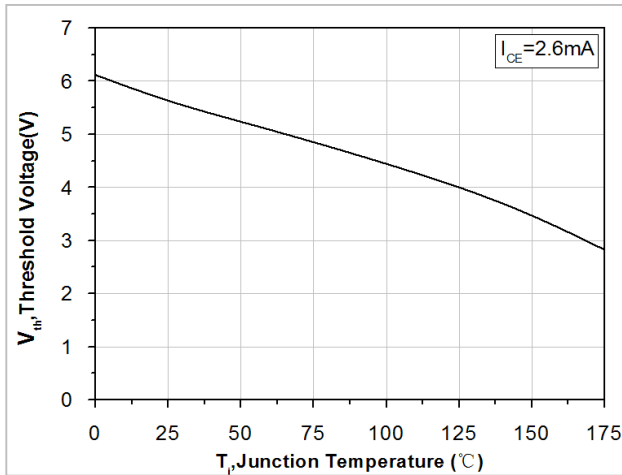


Fig. 10. Transient thermal response curve ( IGBT )

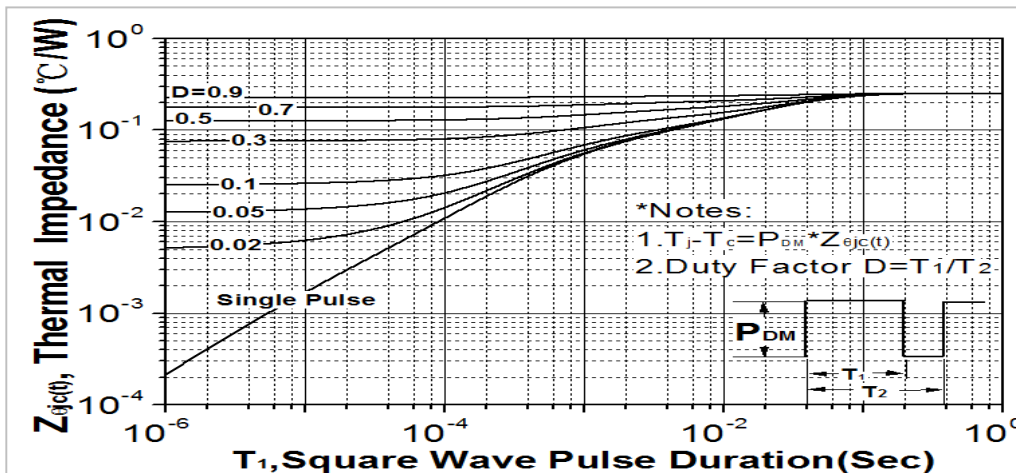


Fig. 11. Transient thermal response curve ( Diode )

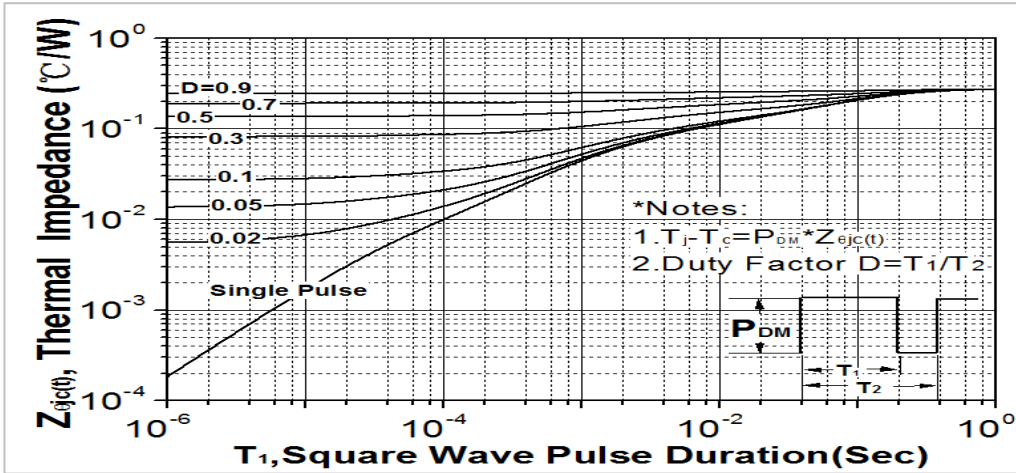


Fig. 12. Gate charge test circuit & waveform

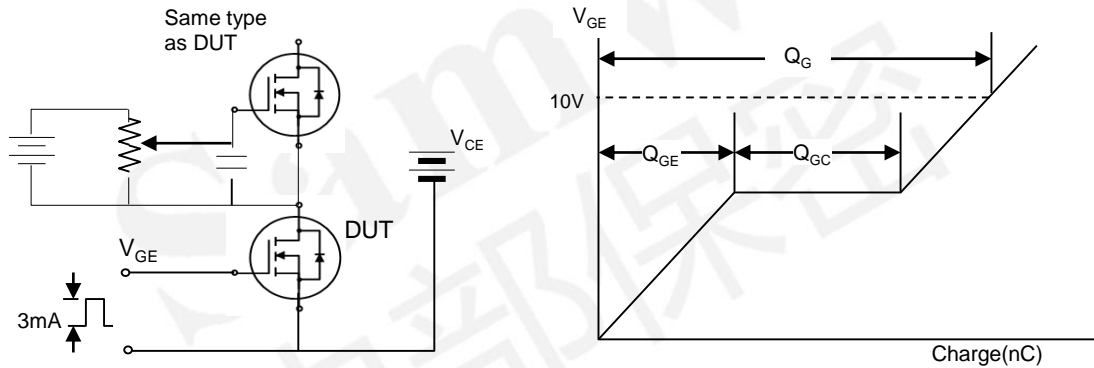


Fig. 13. Switching time test circuit & waveform

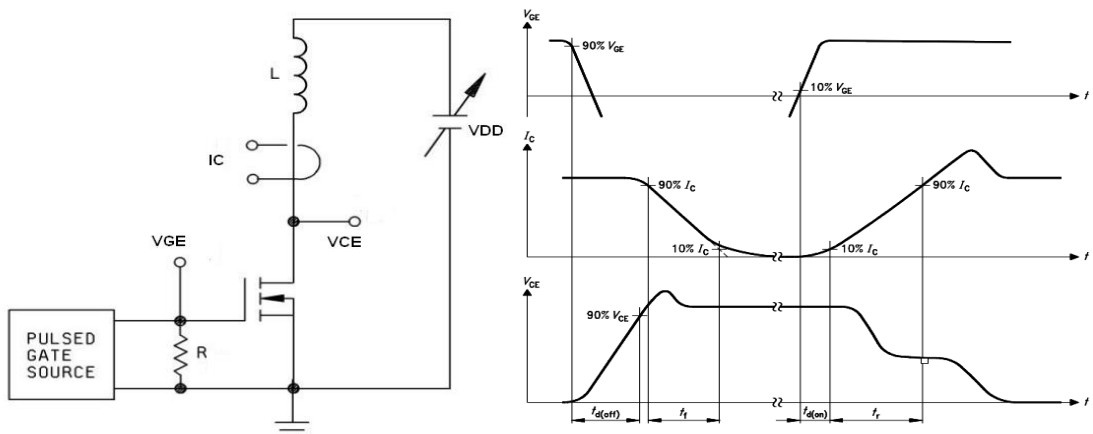
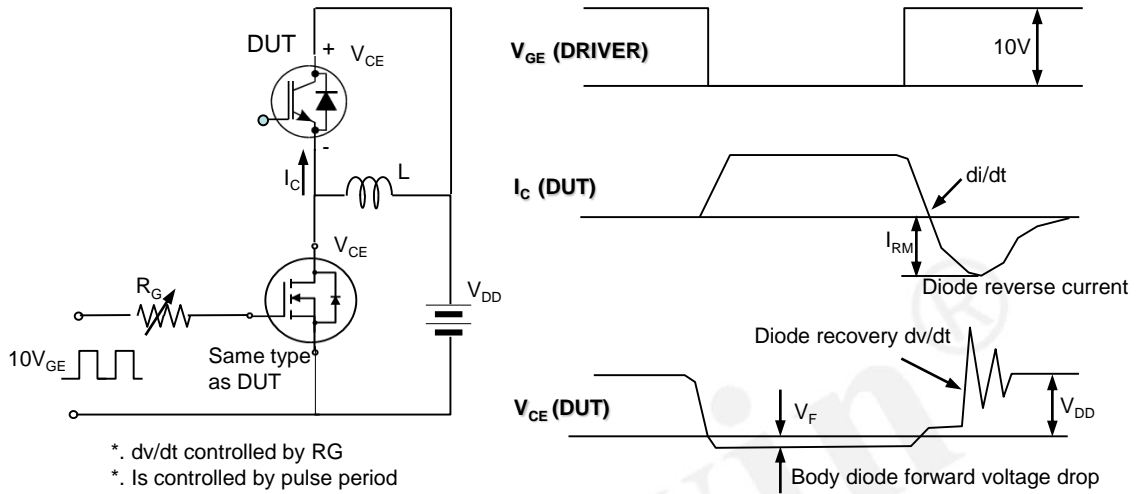



Fig. 14. Peak diode recovery dv/dt test circuit & waveform



## DISCLAIMER

\* All the data & curve in this document was tested in XI'AN SEMIPOWER TESTING & APPLICATION CENTER.

\* This product has passed the PCT,TC,HTRB,HTGB,HAST,PC and Solderdunk reliability testing.

\* Qualification standards can also be found on the Web site (<http://www.semipower.com.cn>) 

\* Suggestions for improvement are appreciated, Please send your suggestions to [samwin@samwinsemi.com](mailto:samwin@samwinsemi.com)