FAIRCHILD SEMICONDUCTOR®

June 2008

FJI5603D
NPN Silicon Transistor

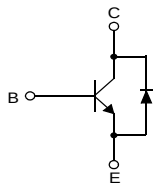
Applications

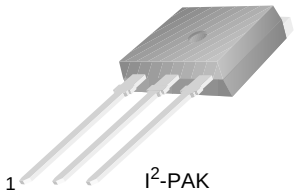
- High Voltage and High Speed Power Switch Application
- Electronic Ballast Application

Features

- Wide Safe Operating Area
- Small Variance in Storage Time
- Built-in Free Wheeling Diode

Equivalent Circuit





I^2-PAK

1.Base 2.Collector 3.Emitter

Absolute Maximum Ratings* T_a = 25°C unless otherwise noted

Symbol	Parameter	Ratings	Units
BV_{CBO}	Collector-Base Voltage	1600	V
BV_{CEO}	Collector-Emitter Voltage	800	V
BV_{EBO}	Emitter-Base Voltage	12	V
I_C	Collector Current(DC)	3	A
I_{CP}	Collector Current(Pulse)**	6	A
I_B	Base Current	2	A
I_{BP}	Base Current(Pulse)**	4	A
P_D	Power Dissipation(T_C=25°C)	100	W
T_J	Junction Temperature	150	°C
T_{STG}	Storage Junction Temperature Range	- 65 ~ +150	°C
EAS	Avalanche Energy(T_j=25°C, 8mH)	3.5	mJ

* These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

** Pulse Test : Pulse Width = 5ms, Duty Cycle ≤ 10%

Thermal Characteristics* T_a=25°C unless otherwise noted

Symbol	Parameter	Ratings	Units
$R_{\theta jc}$	Thermal Resistance, Junction to Case	1.25	°C/W
$R_{\theta ja}$	Thermal Resistance, Junction to Ambient	80	°C/W

* Device mounted on minimum pad size

Ordering Information

Part Number	Marking	Package	Packing Method	Remarks
FJI5603DTU	J5603D	I2PAK	TUBE	

Electrical Characteristics* T_a=25°C unless otherwise noted

Symbol	Parameter	Test Condition		Min.	Typ.	Max.	Units
BV_{CBO}	Collector-Base Breakdown Voltage	I_C=0.5mA, I_E=0		1600	1689		V
BV_{CEO}	Collector-Emitter Breakdown Voltage	I_C=5mA, I_B=0		800	870		V
BV_{EBO}	Emitter-Base Breakdown Voltage	I_E=0.5mA, I_C=0		12	14.8		V
I_{CES}	Collector Cut-off Current	V_{CES}=1600V, I_E=0	T_C=25°C		0.01	100	μA
			T_C=125°C			1000	
I_{CEO}	Collector Cut-off Current	V_{CE}=800V, V_{BE}=0	T_C=25°C		0.01	100	μA
			T_C=125°C			1000	
I_{EBO}	Emitter Cut-off Current	V_{EB}=12V, I_C=0			0.05	500	μA
h_{FE}	DC Current Gain	V_{CE}=3V, I_C=0.4A	T_C=25°C	20	29	35	
			T_C=125°C	6	15		
		V_{CE}=10V, I_C=5mA	T_C=25°C	20	43		
			T_C=125°C	20	46		
V_{CE}(sat)	Collector-Emitter Saturation Voltage	I_C=250mA, I_B=25mA	T_C=25°C		0.5	1.25	V
		I_C=500mA, I_B=50mA	T_C=25°C		1.5	2.5	V
		I_C=1A, I_B=0.2A	T_C=25°C		1.2	2.5	V
V_{BE}(sat)	Base-Emitter Saturation Voltage	I_C=500mA, I_B=50mA	T_C=25°C		0.74	1.2	V
			T_C=125°C		0.61	1.1	
		I_C=2A, I_B=0.4A	T_C=25°C		0.85	1.2	V
			T_C=125°C		0.74	1.1	
C_{ib}	Input Capacitance	V_{EB}=10V, I_C=0, f=1MHz			745	1000	pF
C_{ob}	Output Capacitance	V_{CB}=10V, I_E=0, f=1MHz			56	500	pF
f_T	Current Gain Bandwidth Product	I_C=0.1A,V_{CE}=10V			5		MHz
V_F	Diode Forward Voltage	I_F=0.4A			0.76	1.2	V
		I_F=1A			0.83	1.5	V

* Pulse Test: Pulse Widt=20μs, Duty Cycle≤10%

Electrical Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Condition	Min	Typ.	Max.	Units
RESISTIVE LOAD SWITCHING (D.C ≤ 10%, Pulse Width=20μs)						
t_{ON}	Turn On Time	I_C=0.3A, I_{B1}=50mA I_{B2}=150mA V_{CC}=125V R_L = 416Ω		400	600	ns
t_{STG}	Storage Time		1.9	2.1	2.3	μs
t_F	Fall Time			310	1000	ns
t_{ON}	Turn On Time	I_C=0.5A, I_{B1}=50mA, I_{B2}=250mA V_{CC}=125V, R_L = 250Ω		600	1100	ns
t_{STG}	Storage Time			1.3	1.5	μs
t_F	Fall Time			180	350	ns
INDUCTIVE LOAD SWITCHING (V_{CC}=15V)						
t_{STG}	Storage Time	I_C=0.3A, I_{B1}=50mAI_{B2}=150mA, Vz=300V, L_C=200H	0.8	-	1.2	μs
t_F	Fall Time			170	250	ns
t_C	Cross-over Time			180	250	ns
t_{STG}	Storage Time	I_C=0.5A, I_{B1}=50mA, I_{B2}=250mA, Vz=300V, L_C=200H	0.8	-	1.2	μs
t_F	Fall Time			140	175	ns
t_C	Cross-over Time			170	200	ns

Typical Characteristics

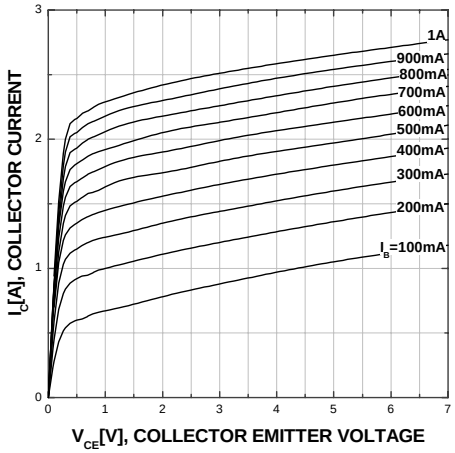


Figure 1. Static Characteristic

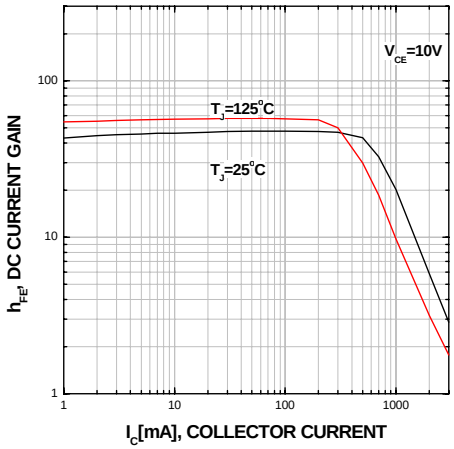


Figure 2. DC current Gain

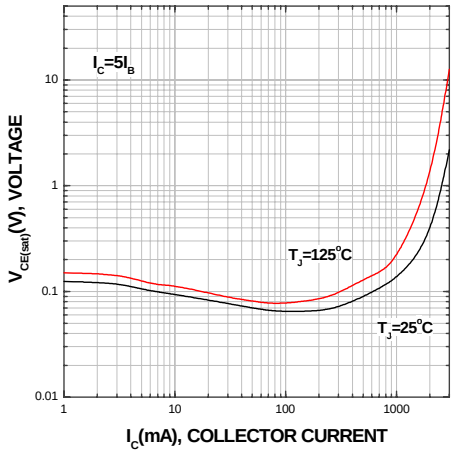


Figure 3. Collector-Emitter Saturation Voltage

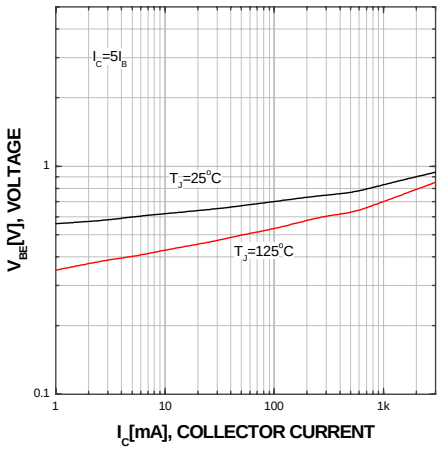


Figure 4. Base-Emitter Saturation Voltage

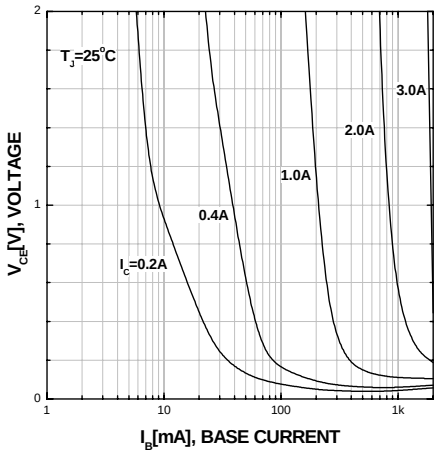


Figure 5. Typical Collector Saturation Voltage

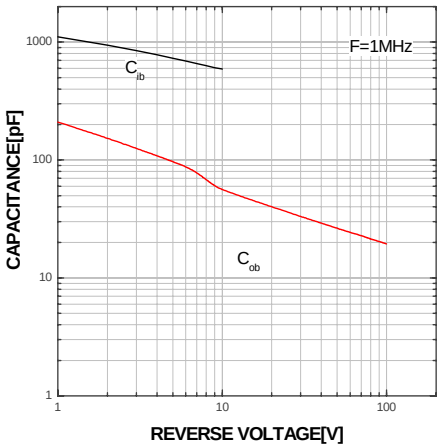


Figure 6. Capacitance

Typical Characteristics (Continued)

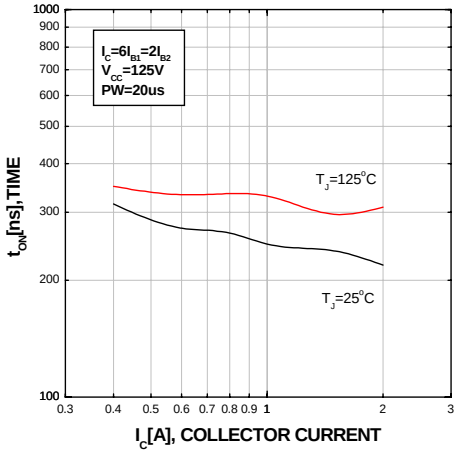


Figure 7. Resistive Switching Time, t_{on}

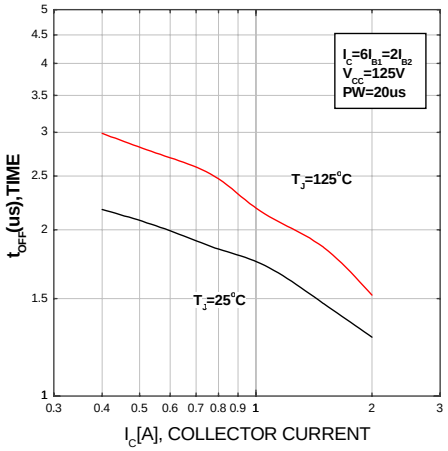


Figure 8. Resistive Switching Time, t_{off}

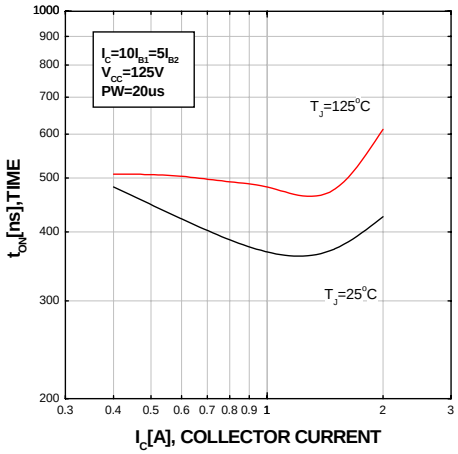


Figure 9. Resistive Switching Time, t_{on}

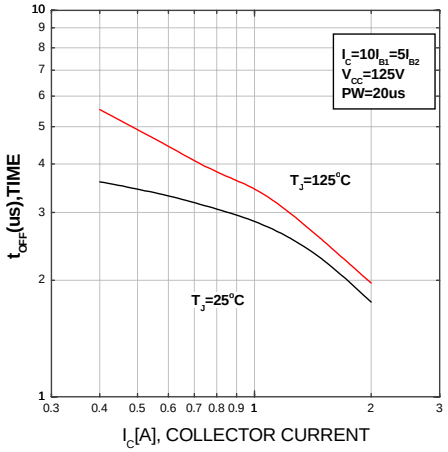


Figure 10. Resistive Switching Time, t_{off}

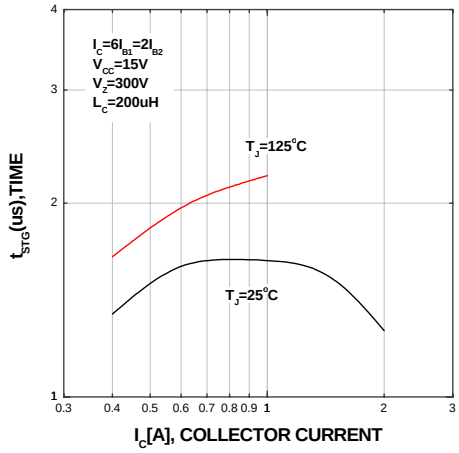


Figure 11. Inductive Switching Time, t_{STG}

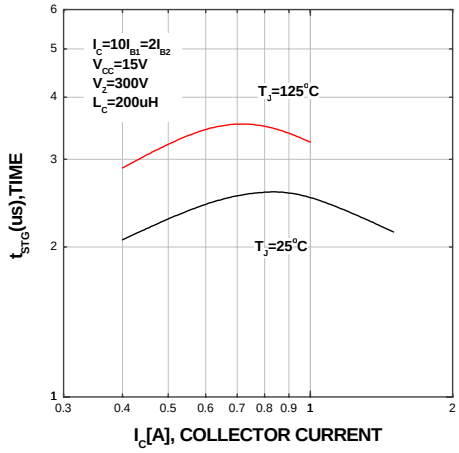


Figure 12. Inductive Switching Time, t_{STG}

Typical Characteristics (Continued)

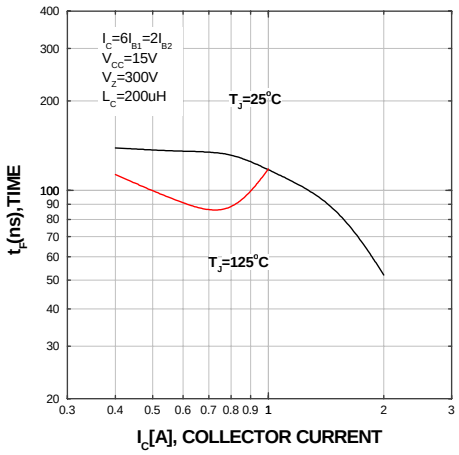


Figure 13. Inductive Switching Time, t_F

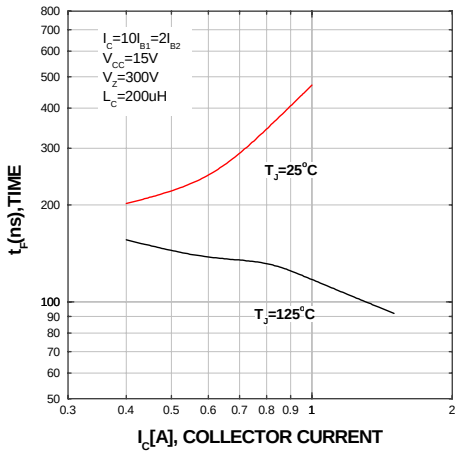


Figure 14. Inductive Switching Time, t_F

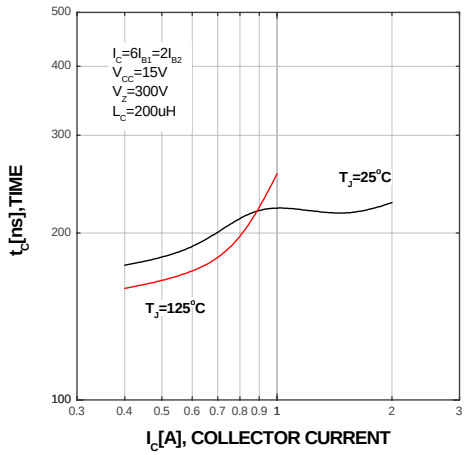


Figure 15. Inductive Switching Time, t_c

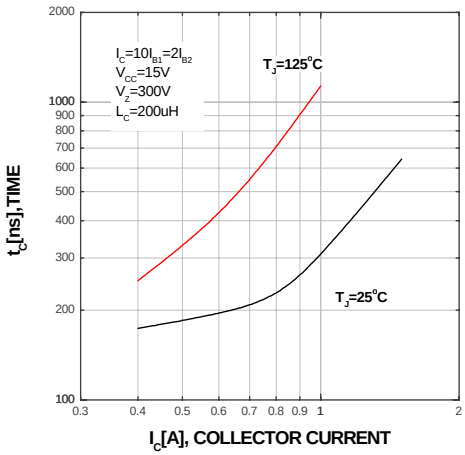


Figure 16. Inductive Switching Time, t_c

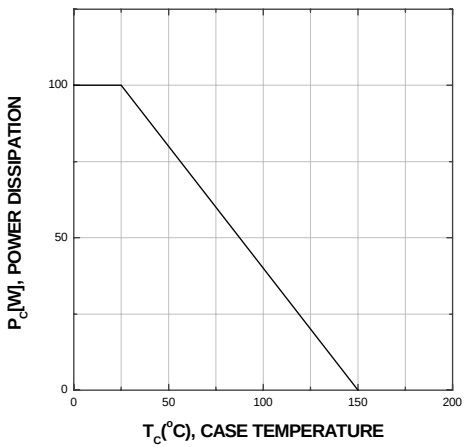


Figure 17. Power Derating

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FPS™		SuperSOT™-3	UniFET™
FRFET®	PDP-SPM™	SuperSOT™-6	VCX™
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PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
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