

# KSC5305DF

## NPN Silicon Transistor

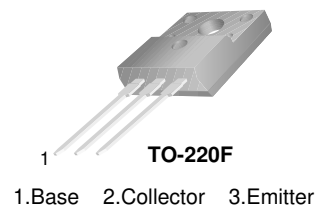
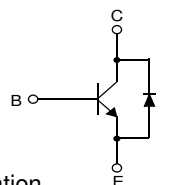
### Features

- High Voltage High Speed Power Switch

### Application

- Built-in Free-wheeling Diode makes efficient anti saturation operation
- Suitable for half bridge light ballast Applications
- No need to interest an  $h_{FE}$  value because of low variable storage-time spread even though corner spirit product
- Low base drive requirement

Equivalent Circuit



### Absolute Maximum Ratings $T_A=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Value	Units
$V_{CBO}$	Collector Base Voltage	800	V
$V_{CEO}$	Collector Emitter Voltage	400	V
$V_{EBO}$	Emitter Base Voltage	12	V
$I_C$	Collector Current (DC)	5	A
$I_{CP}$	*Collector Current (Pulse)	10	A
$I_B$	Base Current (DC)	2	A
$I_{BP}$	*Base Current (Pulse)	4	A
$P_C$	Power Dissipation ( $T_C=25^\circ\text{C}$ )	40	W
$T_J$	Junction Temperature	150	$^\circ\text{C}$
$T_{STG}$	Storage Temperature range	-65 to +150	$^\circ\text{C}$

### Thermal Characteristics

Symbol	Parameter	Rating	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	3.125	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	69.5	$^\circ\text{C}/\text{W}$

**Electrical Characteristics**  $T_A=25^\circ\text{C}$  unless otherwise noted

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
$BV_{CBO}$	Collector-Base Breakdown Voltage	$I_C=1\text{mA}, I_E=0$	800	-	-	V
$BV_{CEO}$	Collector-Emitter Breakdown Voltage	$I_C=5\text{mA}, I_B=0$	400	-	-	V
$BV_{EBO}$	Emitter Cut-off Current	$I_E=1\text{mA}, I_C=0$	12	-	-	V
$I_{CBO}$	Collector Cut-off Current	$V_{CB}=500\text{V}, I_E=0$	-	-	10	$\mu\text{A}$
$I_{EBO}$	Emitter Cut-off Current	$V_{EB} = 9\text{V}, I_C = 0$	-	-	10	$\mu\text{A}$
$h_{FE1}$ $h_{FE2}$	DC Current Gain	$V_{CE}=1\text{V}, I_C=0.8\text{A}$ $V_{CE}=1\text{V}, I_C=2\text{A}$	22 8	- -	- -	
$V_{CE}(\text{sat})$	Collector-Emitter Saturation Voltage	$I_C=0.8\text{A}, I_B=0.08\text{A}$ $I_C=2\text{A}, I_B=0.4\text{A}$	- -	- -	0.4 0.5	V V
$V_{BE}(\text{sat})$	Base-Emitter Saturation Voltage	$I_C=0.8\text{A}, I_B=0.08\text{A}$ $I_C=2\text{A}, I_B=0.4\text{A}$	- -	- -	1.0 1.0	V V
$C_{ob}$	Output Capacitance	$V_{CB} = 10\text{V}, f=1\text{MHz}$	-	-	75	pF
$t_{ON}$	Turn On Time	$V_{CC}=300\text{V}, I_C=2\text{A}$ $I_{B1} = 0.4\text{A}, I_{B2}=-1\text{A}$ $R_L = 150\Omega$	-	-	150	ns
$t_{STG}$	Storage Time		-	-	2	$\mu\text{s}$
$t_F$	Fall Time		-	-	0.2	$\mu\text{s}$
$t_{STG}$	Storage Time	$V_{CC}=15\text{V}, V_Z=300\text{V}$ $I_C = 2\text{A}, I_{B1} = 0.4\text{A}$ $I_{B2} = -0.4\text{A}, L_C=200\mu\text{H}$	-	-	2.25	$\mu\text{s}$
$t_F$	Fall Time		-	-	150	ns
$V_F$	Diode Forward Voltage	$I_F = 1\text{A}$ $I_F = 2\text{A}$	- -	- -	1.5 1.6	V V
$t_{rr}$	* Reverse recovery time ( $di/dt = 10\text{A}/\mu\text{s}$ )	$I_F = 0.4\text{A}$ $I_F = 1\text{A}$ $I_F = 2\text{A}$	- - -	800 1.4 1.9	- - -	ns $\mu\text{s}$ $\mu\text{s}$

\* Pulse Test : Pulse Width=5mS, Duty cycles  $\leq 10\%$

Typical Performance Characteristics

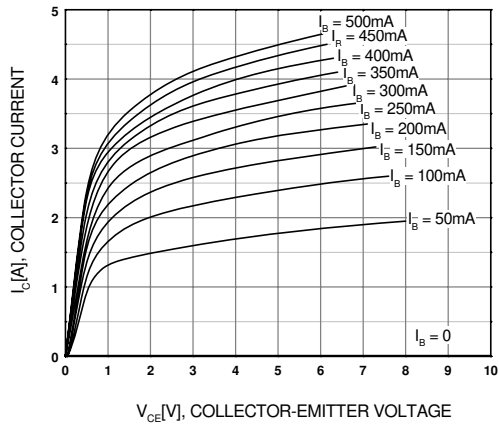


Figure 1. Static Characteristic

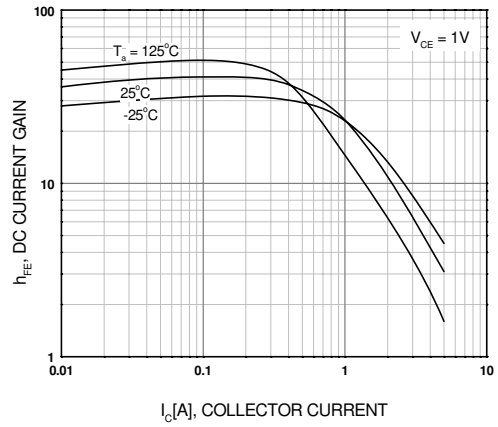


Figure 2. DC current Gain

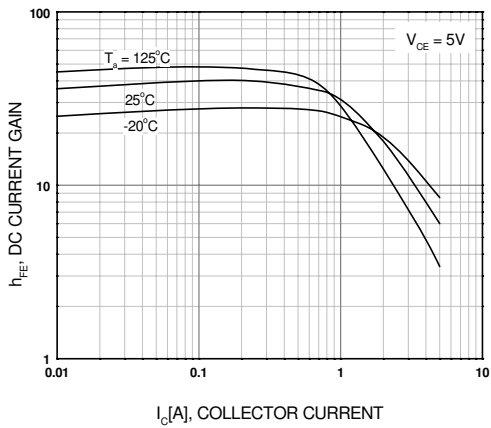


Figure 3. DC current Gain

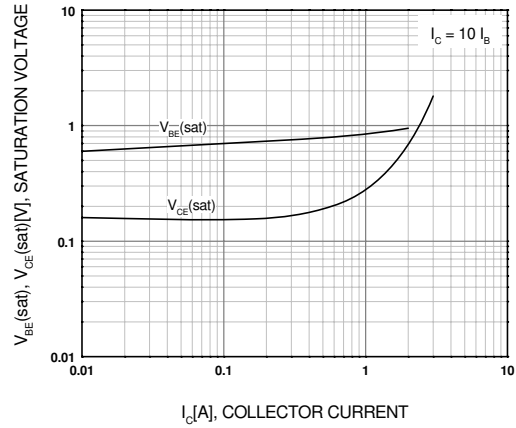


Figure 4. Collector-Emitter Saturation Voltage  
Base-Emitter Saturation Voltage

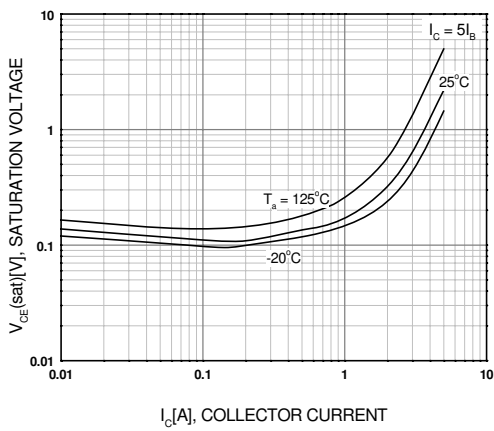


Figure 5. Collector-Emitter Saturation Voltage

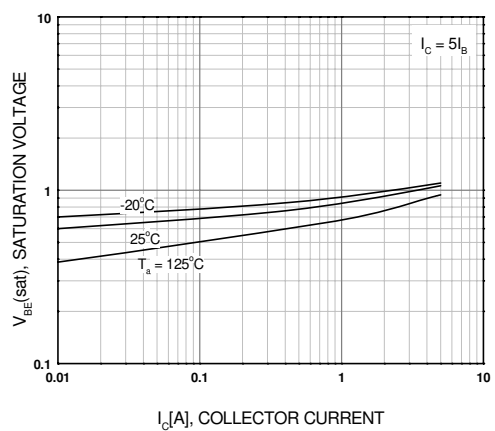
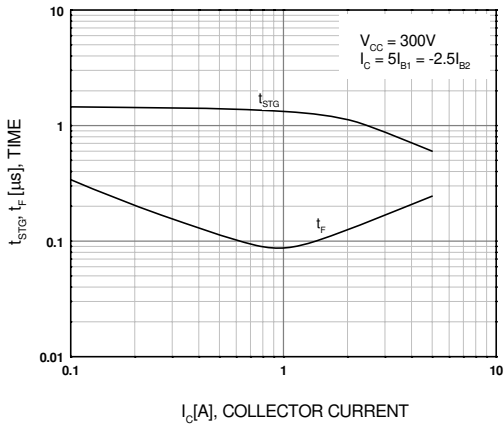
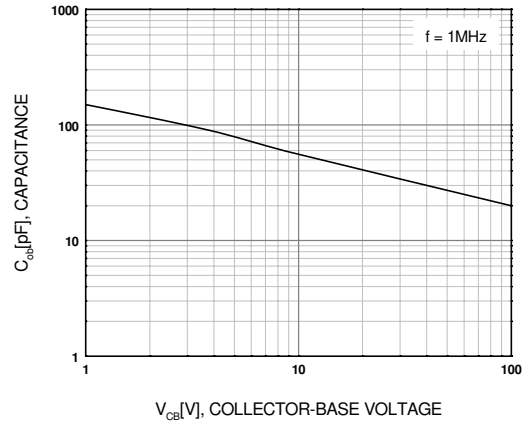


Figure 6. Base-Emitter Saturation Voltage

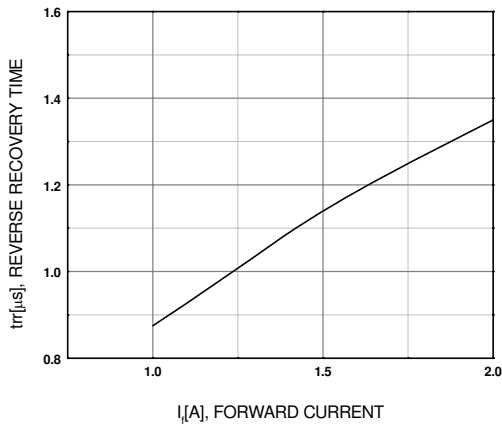
## Typical Performance Characteristics



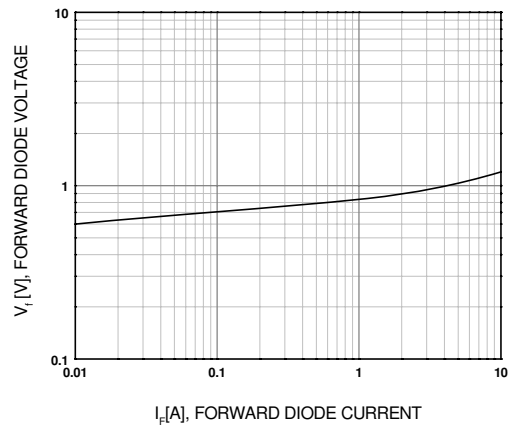
**Figure 7. Switching Time**



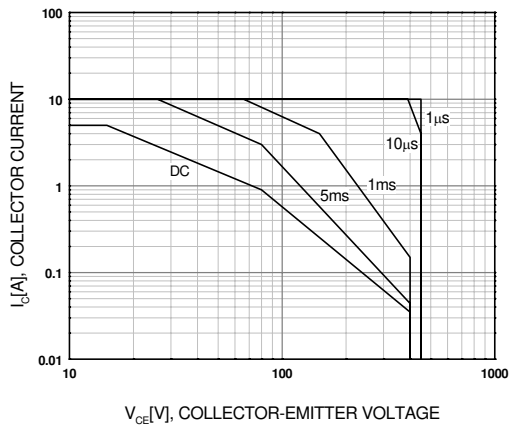
**Figure 8. Collector Output Capacitance**



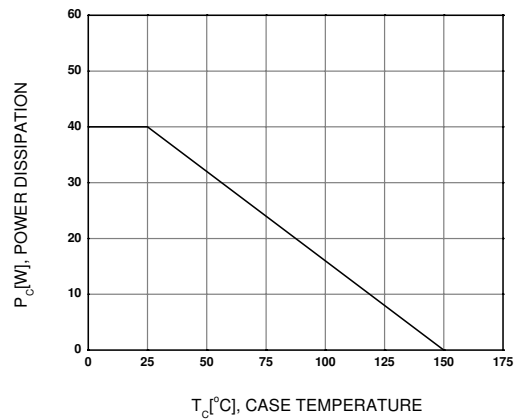
**Figure 9. Reverse Recovery Time**



**Figure 10. Forward Diode Voltage**



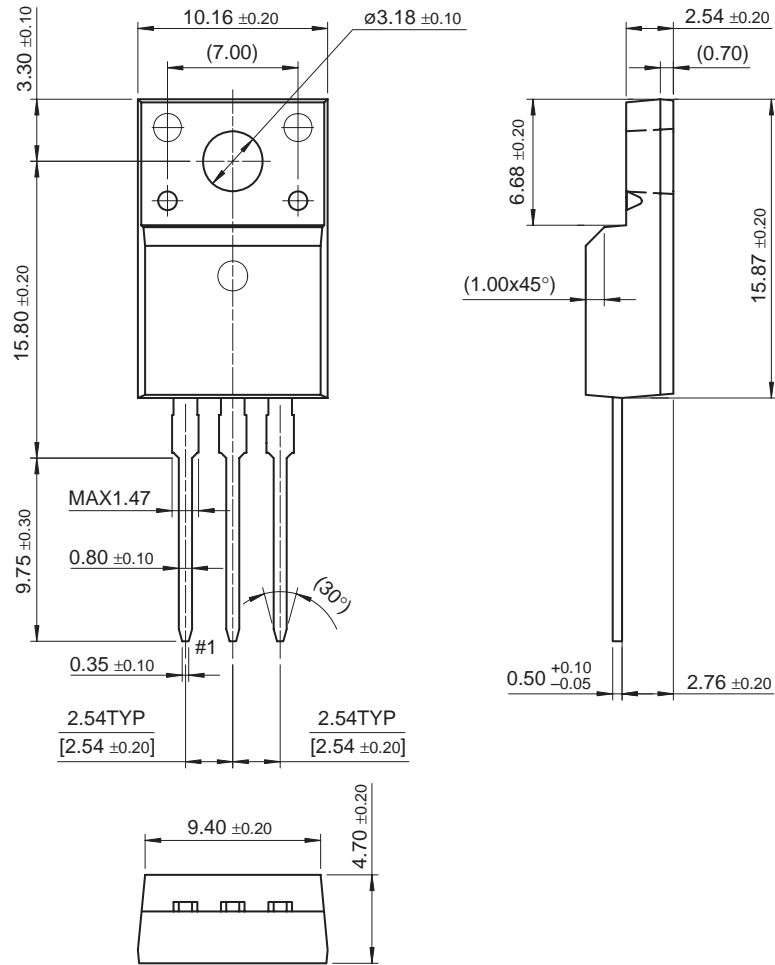
**Figure 11. Safe Operating Area**



**Figure 12. Power Derating**

Physical Dimension

TO-220F






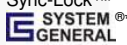


Dimensions in Millimeters



**TRADEMARKS**

The following includes registered and unregistered trademarks and service marks, owned by Fairchild Semiconductor and/or its global subsidiaries, and is not intended to be an exhaustive list of all such trademarks.

AccuPower™	FPS™	PowerTrench®	The Power Franchise®
Auto-SPM™	F-PFS™	PowerXS™	the power franchise™
Build it Now™	FRFET®	Programmable Active Droop™	TinyBoost™
CorePLUS™	Global Power Resource™	QFET®	TinyBuck™
CorePOWER™	Green FPS™	QS™	TinyCalc™
CROSSVOLT™	Green FPS™ e-Series™	Quiet Series™	TinyLogic®
CTL™	Gmax™	RapidConfigure™	TINYOPTO™
Current Transfer Logic™	GTO™		TinyPower™
EcoSPARK®	IntelliMAX™	Saving our world, 1mW/W/kW at a time™	TinyPwm™
EfficientMax™	ISOPLANAR™	SmartMax™	TinyWire™
EZSWITCH™*	MegaBuck™	SMART START™	TriFault Detect™
	MICROCOUPLER™	SPM®	TRUECURRENT™*
	MicroFET™	STEALTH™	µSerDes™
Fairchild®	MicroPak™	SuperFET™	
Fairchild Semiconductor®	MillerDrive™	SuperSOT™-3	UHC®
FACT Quiet Series™	MotionMax™	SuperSOT™-6	Ultra FRFET™
FACT®	Motion-SPM™	SuperSOT™-8	UniFET™
FAST®	OPTOLOGIC®	SupreMOS™	VCX™
FastvCore™	OPTOPLANAR®	SyncFET™	VisualMax™
FETBench™		Sync-Lock™	XS™
FlashWriter®*	PDP SPM™		
	Power-SPM™		

\* Trademarks of System General Corporation, used under license by Fairchild Semiconductor.

**DISCLAIMER**

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION, OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS. THESE SPECIFICATIONS DO NOT EXPAND THE TERMS OF FAIRCHILD'S WORLDWIDE TERMS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN, WHICH COVERS THESE PRODUCTS.

**LIFE SUPPORT POLICY**

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.
2. A critical component in any component of a life support, device, or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

**ANTI-COUNTERFEITING POLICY**

Fairchild Semiconductor Corporation's Anti-Counterfeiting Policy. Fairchild's Anti-Counterfeiting Policy is also stated on our external website, [www.fairchildsemi.com](http://www.fairchildsemi.com), under Sales Support.

Counterfeiting of semiconductor parts is a growing problem in the industry. All manufacturers of semiconductor products are experiencing counterfeiting of their parts. Customers who inadvertently purchase counterfeit parts experience many problems such as loss of brand reputation, substandard performance, failed applications, and increased cost of production and manufacturing delays. Fairchild is taking strong measures to protect ourselves and our customers from the proliferation of counterfeit parts. Fairchild strongly encourages customers to purchase Fairchild parts either directly from Fairchild or from Authorized Fairchild Distributors who are listed by country on our web page cited above. Products customers buy either from Fairchild directly or from Authorized Fairchild Distributors are genuine parts, have full traceability, meet Fairchild's quality standards for handling and storage and provide access to Fairchild's full range of up-to-date technical and product information. Fairchild and our Authorized Distributors will stand behind all warranties and will appropriately address any warranty issues that may arise. Fairchild will not provide any warranty coverage or other assistance for parts bought from Unauthorized Sources. Fairchild is committed to combat this global problem and encourage our customers to do their part in stopping this practice by buying direct or from authorized distributors.

**PRODUCT STATUS DEFINITIONS**

**Definition of Terms**

Datasheet Identification	Product Status	Definition
Advance Information	Formative / In Design	Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	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.
No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
Obsolete	Not In Production	Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.