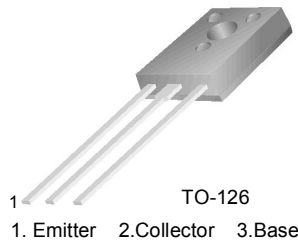


# KSE13003 NPN Silicon Transistor

## High Voltage Switch Mode Applications

- High Voltage Capability
- High Speed Switching
- Suitable for Switching Regulator and Motor Control



## Absolute Maximum Ratings\* T<sub>C</sub> = 25°C unless otherwise noted (notes\_1)

Symbol	Parameter	Value	Units
V <sub>CBO</sub>	Collector-Base Voltage	700	V
V <sub>CEO</sub>	Collector-Emitter Voltage	400	V
V <sub>EBO</sub>	Emitter-Base Voltage	9	V
I <sub>C</sub>	Collector Current (DC)	1.5	A
I <sub>CP</sub>	Collector Current (Pulse)	3	A
I <sub>B</sub>	Base Current	0.75	A
P <sub>C</sub>	Collector Dissipation (T <sub>C</sub> = 25°C)	20	W
T <sub>J</sub>	Junction Temperature	150	°C
T <sub>STG</sub>	Storage Temperature Range	-65 ~ 150	°C

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

NOTES\_1:

1) These ratings are based on a maximum junction temperature of 150°C.

2) These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

## h<sub>FE</sub> Classification

Classification	H1	H2	H3
h <sub>FE</sub> *	9 ~ 16	14 ~ 21	19 ~ 26

\* Test on V<sub>CE</sub> = 2V, I<sub>C</sub> = 0.5A.

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

Symbol	Parameter	Conditions	Min.	Typ.	Max	Units
$BV_{CEO}$	Collector-Emitter Breakdown Voltage	$I_C = 5\text{mA}, I_B = 0$	400			V
$I_{EBO}$	Emitter Cut-off Current	$V_{EB} = 9\text{V}, I_C = 0$			10	$\mu\text{A}$
$h_{FE}$	*DC Current Gain	$V_{CE} = 2\text{V}, I_C = 0.5\text{A}$ $V_{CE} = 2\text{V}, I_C = 1\text{A}$	8 5		40	
$V_{CE(sat)}$	*Collector Emitter Saturation Voltage	$I_C = 0.5\text{A}, I_B = 0.1\text{A}$ $I_C = 1\text{A}, I_B = 0.25\text{A}$ $I_C = 1.5\text{A}, I_B = 0.5\text{A}$			0.5 1 3	V V V
$V_{BE(sat)}$	*Base Emitter Saturation Voltage	$I_C = 0.5\text{A}, I_B = 0.1\text{A}$ $I_C = 1\text{A}, I_B = 0.25\text{A}$			1 1.2	V V
$C_{ob}$	Output Capacitance	$V_{CB} = 10\text{V}, f = 0.1\text{MHz}$		21		pF
$f_T$	Current Gain Bandwidth Product	$V_{CE} = 10\text{V}, I_C = 0.1\text{A}$	4			MHz
$t_{ON}$	Turn On Time	$V_{CC} = 125\text{V}, I_C = 1\text{A}$			1.1	ms
$t_{STG}$	Storage Time	$I_{B1} = 0.2\text{A}, I_{B2} = -0.2\text{A}$			4.0	ms
$t_F$	Fall Time	$R_L = 125\text{W}$			0.7	ms

\* Pulse Test: Pulse Width=5ms, Duty Cycle $\leq$ 10%**Package Marking and Ordering Information**

Device Item (notes_2)	Device Marking	Package	Packing Method	Remarks
KSE13003H1ASTU	1 E13003	TO-126	TUBE	
KSE13003H2ASTU	2 E13003	TO-126	TUBE	
KSE13003H3ASTU	3 E13003	TO-126	TUBE	

Notes\_2 :

1) The Affix "-H1/-H2/-H3" means the hFE classification.

2) The Suffix "-STU" means the TO126 short lead package and the Tube packing method, which can be on fairchildsemi website at <http://www.fairchildsemi.com>

## Typical Performance Characteristics

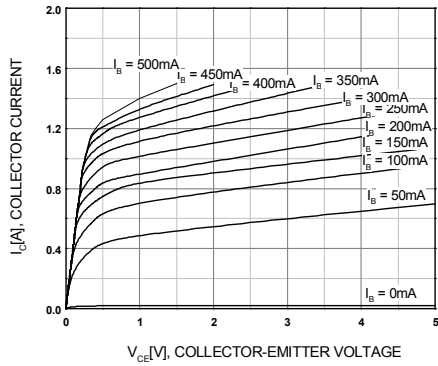


Figure 1. Static Characteristic

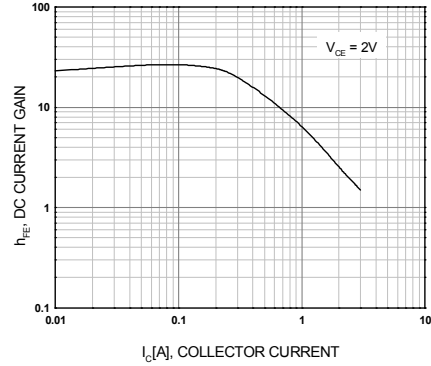


Figure 2. DC current Gain

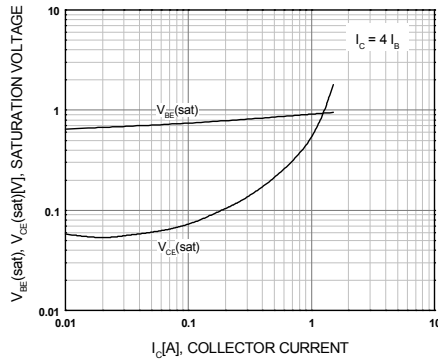


Figure 3. Base-Emitter Saturation Voltage  
Collector-Emitter Saturation Voltage

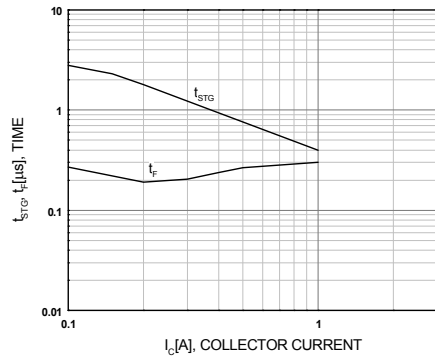


Figure 4. Switching Time

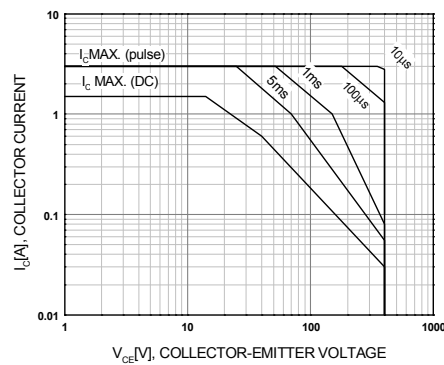


Figure 5. Safe Operating Area

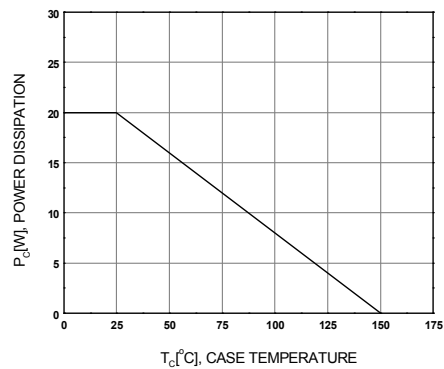


Figure 6. Power Derating



**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.

- |                                      |  |  |                                  |
|--------------------------------------|--|--|----------------------------------|
| ACE <sup>x</sup> <sup>®</sup>        | FPS <sup>™</sup>                             | PDP SPM <sup>™</sup>                         | The Power Franchise <sup>®</sup> |
| Build it Now <sup>™</sup>            | F-PFST <sup>™</sup>                          | Power-SPM <sup>™</sup>                       |                                  |
| CorePLUS <sup>™</sup>                | FRFET <sup>®</sup>                           | PowerTrench <sup>®</sup>                     | TinyBoost <sup>™</sup>           |
| CorePOWER <sup>™</sup>               | Global Power Resource <sup>SM</sup>          | Programmable Active Droop <sup>™</sup>       | TinyBuck <sup>™</sup>            |
| CROSSVOLT <sup>™</sup>               | Green FPS <sup>™</sup>                       | QFET <sup>®</sup>                            | TinyLogic <sup>®</sup>           |
| CTL <sup>™</sup>                     | Green FPS <sup>™</sup> e-Series <sup>™</sup> | QST <sup>™</sup>                             | TINYOPTO <sup>™</sup>            |
| Current Transfer Logic <sup>™</sup>  | GTO <sup>™</sup>                             | Quiet Series <sup>™</sup>                    | TinyPower <sup>™</sup>           |
| EcoSPARK <sup>®</sup>                | IntelliMAX <sup>™</sup>                      | RapidConfigure <sup>™</sup>                  | TinyPWM <sup>™</sup>             |
| EfficientMax <sup>™</sup>            | ISOPLANAR <sup>™</sup>                       | Saving our world, 1mW at a time <sup>™</sup> | TinyWire <sup>™</sup>            |
| EZSWITCH <sup>™</sup> *              | MegaBuck <sup>™</sup>                        | SmartMax <sup>™</sup>                        | μSerDes <sup>™</sup>             |
|                                      | MICROCOUPLER <sup>™</sup>                    | SMART START <sup>™</sup>                     |                                  |
|                                      | MicroFET <sup>™</sup>                        | SPM <sup>®</sup>                             | UHC <sup>®</sup>                 |
| Fairchild <sup>®</sup>               | MicroPak <sup>™</sup>                        | STEALTH <sup>™</sup>                         | Ultra FRFET <sup>™</sup>         |
| Fairchild Semiconductor <sup>®</sup> | MillerDrive <sup>™</sup>                     | SuperFET <sup>™</sup>                        | UniFET <sup>™</sup>              |
| FACT Quiet Series <sup>™</sup>       | MotionMax <sup>™</sup>                       | SuperSOT <sup>™</sup> -3                     | VCX <sup>™</sup>                 |
| FACT <sup>®</sup>                    | Motion-SPM <sup>™</sup>                      | SuperSOT <sup>™</sup> -6                     | VisualMax <sup>™</sup>           |
| FAST <sup>®</sup>                    | OPTOLOGIC <sup>®</sup>                       | SuperSOT <sup>™</sup> -8                     |                                  |
| FAST <sup>®</sup>                    | OPTOPLANAR <sup>®</sup>                      | SupreMOS <sup>™</sup>                        |                                  |
| FastvCore <sup>™</sup>               |  | SyncFET <sup>™</sup>                         |                                  |
| FlashWriter <sup>®</sup> *           |  |  |                                  |

\* EZSWITCH<sup>™</sup> and FlashWriter<sup>®</sup> are 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.

**PRODUCT STATUS DEFINITIONS**

**Definition of Terms**

Datasheet Identification	Product Status	Definition
Advance Information	Formative / 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.
No Identification Needed	Full Production	This 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	This datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.

Rev. 134