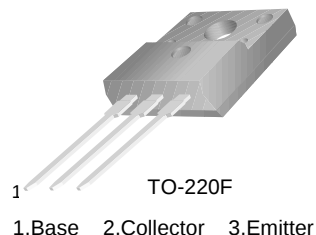


# KSE13005F

KSE13005F

## High Voltage Switch Mode Application

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



## NPN Silicon Transistor

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

| Symbol    | Parameter                                        | Value      | Units            |
|-----------|--------------------------------------------------|------------|------------------|
| $V_{CBO}$ | Collector-Base Voltage                           | 700        | V                |
| $V_{CEO}$ | Collector-Emitter Voltage                        | 400        | V                |
| $V_{EBO}$ | Emitter-Base Voltage                             | 9          | V                |
| $I_C$     | Collector Current (DC)                           | 4          | A                |
| $I_{CP}$  | Collector Current (Pulse)                        | 8          | A                |
| $I_B$     | Base Current                                     | 2          | A                |
| $P_C$     | Collector Dissipation ( $T_C=25^\circ\text{C}$ ) | 30         | W                |
| $T_J$     | Junction Temperature                             | 150        | $^\circ\text{C}$ |
| $T_{STG}$ | Storage Temperature                              | - 65 ~ 150 | $^\circ\text{C}$ |

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

| Symbol        | Parameter                             | Test Condition                                                                                                     | Min.    | Typ. | Max.            | Units         |
|---------------|---------------------------------------|--------------------------------------------------------------------------------------------------------------------|---------|------|-----------------|---------------|
| $BV_{CEO}$    | Collector-Base Breakdown Voltage      | $I_C = 10\text{mA}, I_B = 0$                                                                                       | 400     |      |                 | V             |
| $I_{EBO}$     | Emitter Cut-off Current               | $V_{EB} = 9\text{V}, I_C = 0$                                                                                      |         |      | 1               | mA            |
| $h_{FE}$      | *DC Current Gain                      | $V_{CE} = 5\text{V}, I_C = 1\text{A}$<br>$V_{CE} = 5\text{V}, I_C = 2\text{A}$                                     | 10<br>8 |      | 60<br>40        |               |
| $V_{CE(sat)}$ | *Collector-Emitter Saturation Voltage | $I_C = 1\text{A}, I_B = 0.2\text{A}$<br>$I_C = 2\text{A}, I_B = 0.5\text{A}$<br>$I_C = 4\text{A}, I_B = 1\text{A}$ |         |      | 0.5<br>0.6<br>1 | V<br>V<br>V   |
| $V_{BE(sat)}$ | *Base-Emitter Saturation Voltage      | $I_C = 1\text{A}, I_B = 0.2\text{A}$<br>$I_C = 2\text{A}, I_B = 0.5\text{A}$                                       |         |      | 1.2<br>1.6      | V<br>V        |
| $C_{ob}$      | Output Capacitance                    | $V_{CB} = 10\text{V}, f = 0.1\text{MHz}$                                                                           |         | 65   |                 | pF            |
| $f_T$         | Current Gain Bandwidth Product        | $V_{CE} = 10\text{V}, I_C = 0.5\text{A}$                                                                           | 4       |      |                 | MHz           |
| $t_{ON}$      | Turn On Time                          | $V_{CC} = 125\text{V}, I_C = 2\text{A}$<br>$I_{B1} = - I_{B2} = 0.4\text{A}$<br>$R_L = 125\Omega$                  |         |      | 0.8             | $\mu\text{s}$ |
| $t_{STG}$     | Storage Time                          |                                                                                                                    |         |      | 4               | $\mu\text{s}$ |
| $t_F$         | Fall Time                             |                                                                                                                    |         |      | 0.9             | $\mu\text{s}$ |

\* Pulse test:  $PW \leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$

## Typical Characteristics

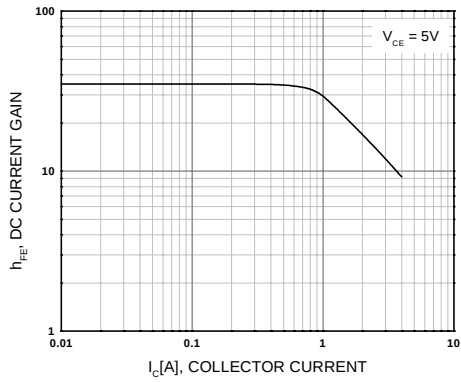


Figure 1. DC current Gain

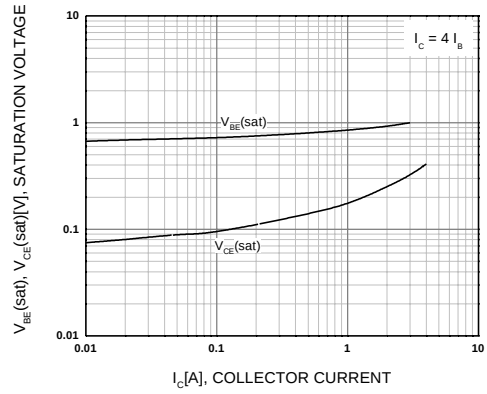


Figure 2. Base-Emitter Saturation Voltage  
Collector-Emitter Saturation Voltage

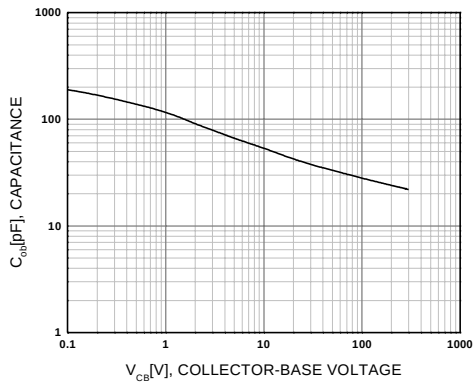


Figure 3. Collector Output Capacitance

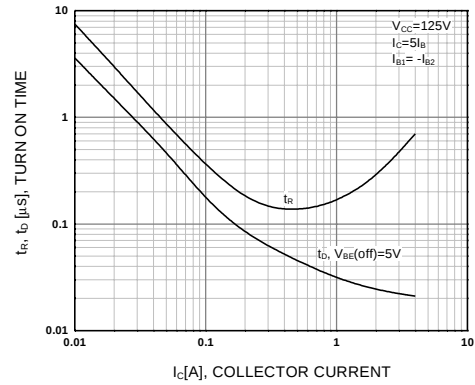


Figure 4. Turn On Time

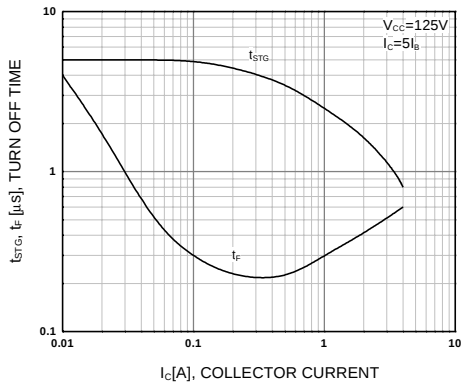


Figure 5. Turn Off Time

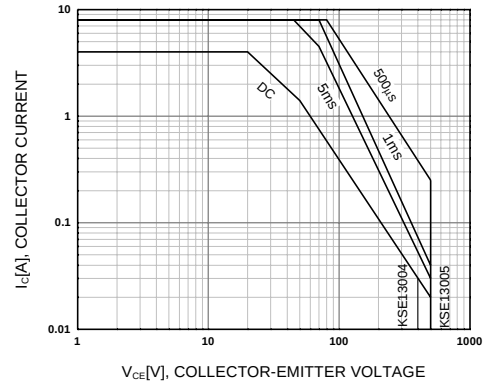
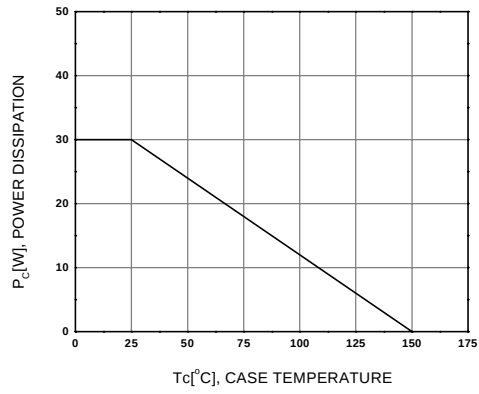


Figure 6. Safe Operating Area

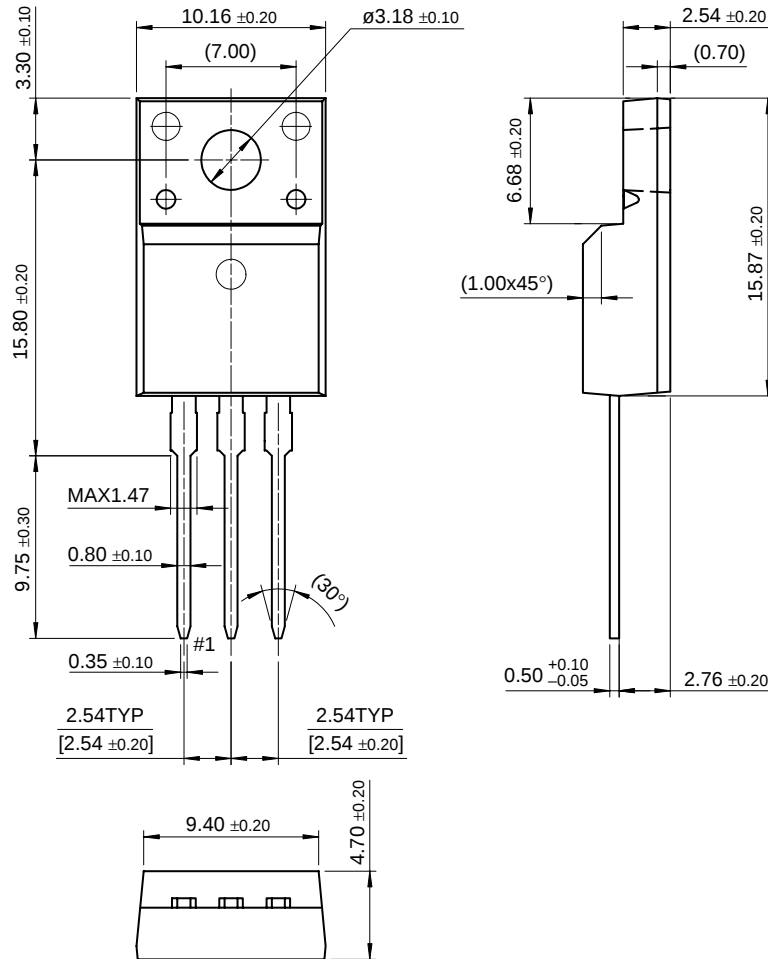
## Typical Characteristics (Continued)



**Figure 1. Power Derating**

# Package Dimensions

## TO-220F



Dimensions in Millimeters

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| DenseTrench™         | GTO™                | QFET™               | TinyLogic™  |
| DOME™                | HiSeC™              | QS™                 | UHC™        |
| EcoSPARK™            | ISOPPLANAR™         | QT Optoelectronics™ | UltraFET®   |
| E <sup>2</sup> CMOS™ | LittleFET™          | Quiet Series™       | VCX™        |
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