|  | 2SC4860 |
| :---: | :---: |
| SANTYO | UHF Converter, Local Oscillator Applications |

## Features

- High cutoff frequency : $\mathrm{f}_{\mathrm{T}}=6.5 \mathrm{GHz}$ typ.
- High gain : $|\mathrm{S} 21 \mathrm{e}|^{2}=11.5 \mathrm{~dB}$ typ $(\mathrm{f}=1 \mathrm{GHz})$.
- Small Cob : NF=0.65pF typ.


## Specifications

## Package Dimensions

unit:mm
2059B


## Absolute Maximum Ratings at $\mathbf{T a}=\mathbf{2 5}^{\circ} \mathbf{C}$

| Parameter | Symbol |  | Conditions | Ratings |
| :--- | :---: | :---: | ---: | ---: |
| Collector-to-Base Voltage | $\mathrm{V}_{\mathrm{CBO}}$ |  | Unit |  |
| Collector-to-Emitter Voltage | $\mathrm{V}_{\mathrm{CEO}}$ |  | V |  |
| Emitter-to-Base Voltage | $\mathrm{V}_{\text {EBO }}$ |  | 10 | V |
| Collector Current | $\mathrm{I}_{\mathrm{C}}$ |  | 2 | V |
| Collector Dissipation | $\mathrm{P}_{\mathrm{C}}$ |  | 30 | mA |
| Junction Temperature | Tj |  | 150 | mW |
| Storage Temperature | Tstg |  | ${ }^{\circ} \mathrm{C}$ |  |

## Electrical Characteristics at $\mathbf{T a}=\mathbf{2 5}{ }^{\circ} \mathrm{C}$

| Parameter | Symbol | Conditions | Ratings |  |  | Unit |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | min | typ | max |  |
| Collector Cutoff Current | ${ }^{\text {I CBO }}$ | $\mathrm{V}_{\mathrm{CB}}=10 \mathrm{~V}, \mathrm{I}_{\mathrm{E}}=0$ |  |  | 1.0 | $\mu \mathrm{A}$ |
| Emitter Cutoff Current | IEBO | $\mathrm{V}_{\mathrm{EB}}=1 \mathrm{~V}, \mathrm{I}_{\mathrm{C}}=0$ |  |  | 10 | $\mu \mathrm{A}$ |
| DC Current Gain | $\mathrm{h}_{\text {FE }}$ | $\mathrm{V}_{\mathrm{CE}}=5 \mathrm{~V}, \mathrm{I}_{\mathrm{C}}=5 \mathrm{~mA}$ | 60* |  | 270* |  |
| Gain-Bandwidth Product | $\mathrm{f}_{\mathrm{T}}$ | $\mathrm{V}_{\mathrm{CE}}=5 \mathrm{~V}, \mathrm{I}_{\mathrm{C}}=5 \mathrm{~mA}$ |  | 6.5 |  | GHz |
| Output Capacitance | Cob | $\mathrm{V}_{\mathrm{CB}}=10 \mathrm{~V}, \mathrm{f}=1 \mathrm{MHz}$ |  | 0.65 | 1.1 | pF |
| Forward Transfer Gain | \| S21e | ${ }^{2}$ | $\mathrm{V}_{\mathrm{CE}}=5 \mathrm{~V}, \mathrm{I}_{\mathrm{C}}=5 \mathrm{~mA}, \mathrm{f}=1 \mathrm{GHz}$ | 8 | 11.5 |  | dB |
| Noise Figure | NF | $\mathrm{V}_{\mathrm{CE}}=5 \mathrm{~V}, \mathrm{I}_{\mathrm{C}}=5 \mathrm{~mA}, \mathrm{f}=1 \mathrm{GHz}$ |  | 2.2 | 4.0 | dB |

* : The 2 SC 4860 is classified by $5 \mathrm{~mA} \mathrm{~h}_{\mathrm{FE}}$ as follows : | 60 | 3 | 120 | 90 | 4 | 180 | 135 | 5 | 270 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |

Marking : EN
$\mathrm{h}_{\mathrm{FE}}$ rank : $3,4,5$

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Cob - $V_{C B}$






## S parameter

S11e: $\mathrm{V}_{\mathrm{CE}}=5 \mathrm{~V}$
$f=200$ to $2000 \mathrm{MHz}(200 \mathrm{MHz}$ step $)$


S12e: $\mathrm{V}_{\mathrm{CE}}=5 \mathrm{~V}$
$\mathrm{f}=200$ to 2000 MHz ( 200 MHz step )


S21e: $\mathrm{V}_{\mathrm{CE}}=5 \mathrm{~V}$
$\mathrm{f}=200$ to $2000 \mathrm{MHz}(200 \mathrm{MHz}$ step $)$


S22e: $\mathrm{V}_{\mathrm{CE}}=5 \mathrm{~V}$
$\mathrm{f}=200$ to $2000 \mathrm{MHz}(200 \mathrm{MHz}$ step $)$


S parameter (Common emitter)
$\mathrm{V}_{\mathrm{CE}}=5 \mathrm{~V}, \mathrm{I}_{\mathrm{C}}=2 \mathrm{~mA}, \mathrm{Z}_{\mathrm{O}}=50 \Omega$

| Freq (MHz) | $\left\|\mathrm{S}_{11}\right\|$ | $\angle \mathrm{S}_{11}$ | $\left\|\mathrm{~S}_{21}\right\|$ | $\angle \mathrm{S}_{21}$ | $\left\|\mathrm{~S}_{12}\right\|$ | $\angle \mathrm{S}_{12}$ | $\left\|\mathrm{~S}_{22}\right\|$ | $\angle \mathrm{S}_{22}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 200 | 0.888 | -25.7 | 5.847 | 155.4 | 0.049 | 73.1 | 0.946 | -14.8 |
| 400 | 0.765 | -47.7 | 5.082 | 136.2 | 0.085 | 62.3 | 0.845 | -25.6 |
| 600 | 0.645 | -66.2 | 4.368 | 121.1 | 0.110 | 55.1 | 0.755 | -32.7 |
| 800 | 0.553 | -81.7 | 3.777 | 108.9 | 0.127 | 50.9 | 0.678 | -37.8 |
| 1000 | 0.475 | -95.5 | 3.281 | 98.5 | 0.141 | 47.8 | 0.625 | -42.0 |
| 1200 | 0.419 | -108.4 | 2.915 | 89.5 | 0.153 | 46.1 | 0.586 | -45.0 |
| 1400 | 0.367 | -120.1 | 2.593 | 81.5 | 0.162 | 45.3 | 0.553 | -48.0 |
| 1600 | 0.337 | -131.8 | 2.350 | 74.4 | 0.170 | 45.2 | 0.525 | -50.7 |
| 1800 | 0.312 | -141.7 | 2.141 | 69.2 | 0.180 | 45.5 | 0.501 | -53.8 |
| 2000 | 0.297 | -153.0 | 1.996 | 63.3 | 0.191 | 46.0 | 0.488 | -56.3 |

$\mathrm{V}_{\mathrm{CE}}=5 \mathrm{~V}, \mathrm{I}_{\mathrm{C}}=5 \mathrm{~mA}, \mathrm{Z}_{\mathrm{O}}=50 \Omega$

| Freq (MHz) | $\left\|\mathrm{S}_{11}\right\|$ | $\angle \mathrm{S}_{11}$ | $\left\|\mathrm{~S}_{21}\right\|$ | $\angle \mathrm{S}_{21}$ | $\left\|\mathrm{~S}_{12}\right\|$ | $\angle \mathrm{S}_{12}$ | $\left\|\mathrm{~S}_{22}\right\|$ | $\angle \mathrm{S}_{22}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 200 | 0.737 | -42.9 | 10.312 | 142.5 | 0.043 | 67.0 | 0.858 | -21.1 |
| 400 | 0.540 | -72.3 | 7.574 | 119.9 | 0.068 | 58.5 | 0.698 | -29.9 |
| 600 | 0.418 | -93.2 | 5.789 | 105.8 | 0.084 | 56.3 | 0.601 | -33.4 |
| 800 | 0.349 | -110.1 | 4.604 | 95.5 | 0.099 | 56.3 | 0.548 | -35.7 |
| 1000 | 0.299 | -125.4 | 3.885 | 87.1 | 0.114 | 56.6 | 0.518 | -38.0 |
| 1200 | 0.275 | -137.3 | 3.310 | 80.1 | 0.128 | 56.8 | 0.498 | -39.9 |
| 1400 | 0.257 | -149.9 | 2.906 | 73.6 | 0.142 | 57.2 | 0.480 | -42.3 |
| 1600 | 0.249 | -161.0 | 2.595 | 67.7 | 0.157 | 57.1 | 0.466 | -45.5 |
| 1800 | 0.246 | -170.2 | 2.346 | 63.6 | 0.172 | 57.1 | 0.450 | -48.5 |
| 2000 | 0.245 | 179.7 | 2.174 | 58.4 | 0.189 | 56.7 | 0.447 | -51.5 |

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