## Features

- Epitaxial Planar Die Construction
- Built-In Biasing Resistors
- Surface Mount Package Suited for Automated Assembly
- Totally Lead-Free \& Fully RoHS Compliant (Notes 1 \& 2)
- Halogen and Antimony-Free. "Green" Device (Note 3)
- For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative. https://www.diodes.com/quality/product-definitions/


## Mechanical Data

- Package: SOT363
- Package Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208e3)
- Weight: 0.006 grams (Approximate)

| Part Number | R1 Only |
| :---: | :---: |
| DCX143TU | $4.7 \mathrm{k} \Omega$ |
| DCX114TU | $10 \mathrm{k} \Omega$ |



Ordering Information (Notes 4,5)

| Product | Status | Compliance | Marking | Reel Size <br> (inches) | Tape Width <br> $(\mathbf{m m})$ | Quantity per <br> Reel |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| DCX124EU-7-F | Active | Standard | C17 | 7 | 8 | 3,000 |
| DCX124EUQ-7-F | NRND (Use ACX124EUQ) | Automotive | C17 | 7 | 8 | 3,000 |
| DCX124EUQ-13-F | NRND (Use ACX124EUQ) | Automotive | C17 | 13 | 8 | 10,000 |
| DCX124EUQ-13R-F | NRND (Use ACX124EUQ) | Automotive | C17 | 13 | 8 | 10,000 |
| DCX144EU-7-F | Active | Standard | C20 | 7 | 8 | 3,000 |
| DCX144EU-7R-F | Active | Standard | C20 | 7 | 8 | 3,000 |
| DCX144EUQ-7-F | Active | Automotive | C20 | 7 | 8 | 3,000 |
| DCX144EUQ-7R-F | Active | Automotive | C20 | 7 | 8 | 3,000 |
| DCX114YU-7-F | Active | Standard | C14 | 7 | 8 | 3,000 |
| DCX114YU-7R-F | Active | Standard | C14 | 7 | 8 | 3,000 |
| DCX114YUQ-7-F | NRND (Use ACX114YUQ) | Automotive | C14 | 7 | 8 | 3,000 |
| DCX114YUQ-13-F | NRND (Use ACX114YUQ) | Automotive | C14 | 13 | 8 | 10,000 |
| DCX114YUQ-13R-F | NRND (Use ACX114YUQ) | Automotive | C14 | 13 | 8 | 10,000 |
| DCX123JU-7-F | Active | Standard | C06 | 7 | 8 | 3,000 |
| DCX123JUQ-7-F | Active | Automotive | C06 | 7 | 8 | 3,000 |
| DCX114EU-7-F | Active | Standard | C13 | 7 | 8 | 3,000 |
| DCX114EU-13R-F | Active | Standard | C13 | 13 | 8 | 10,000 |

DCX (XXXX) U

Ordering Information (Notes 4,5) (continued)

| Product | Status | Compliance | Marking | Reel Size <br> (inches) | Tape Width <br> $(\mathbf{m m})$ | Quantity per <br> Reel |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| DCX114EUQ-7-F | NRND (Use ACX114EUQ) | Automotive | C13 | 7 | 8 | 3,000 |
| DCX114EUQ-13-F | NRND (Use ACX114EUQ) | Automotive | C13 | 13 | 8 | 10,000 |
| DCX114EUQ-13R-F | NRND (Use ACX114EUQ) | Automotive | C13 | 13 | 8 | 10,000 |
| DCX143TU-7-F | Active | Standard | C07 | 7 | 8 | 3,000 |
| DCX143EU-7-F | Active | Standard | C08 | 7 | 8 | 3,000 |
| DCX114TU-7-F | Active | Standard | C12 | 7 | 8 | 3,000 |
| DCX143ZU-7-F | Active | Standard | C02 | 7 | 8 | 3,000 |
| DCX115EU-7-F | Active | Standard | C01 | 7 | 8 | 3,000 |

Notes: 1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) \& 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain $<900 \mathrm{ppm}$ bromine, $<900 \mathrm{ppm}$ chlorine ( $<1500 \mathrm{ppm}$ total $\mathrm{Br}+\mathrm{Cl}$ ) and <1000ppm antimony compounds.
4. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.
5. NRND = Not Recommended for New Design.

## Marking Information

Date Code Key

| Year | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Code | H | I | J | K | L | M | N | O | P | R | S | T |
| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | O | N | D |

DCX (XXXX) U

Absolute Maximum Ratings NPN Section ( $@ T_{A}=+25^{\circ} \mathrm{C}$, unless otherwise specified.)

| Characteristic |  | Symbol | Value | Unit |
| :---: | :---: | :---: | :---: | :---: |
| Supply Voltage <Pin: (6) to (1)> |  | $\mathrm{V}_{\mathrm{CC}}$ | 50 | V |
| Input Voltage <br> <Pin: (2) to (1)> | DCX124EU <br> DCX144EU <br> DCX114YU <br> DCX123JU <br> DCX114EU <br> DCX143TU <br> DCX143EU <br> DCX114TU <br> DCX143ZU <br> DCX115EU | $\mathrm{V}_{\text {IN }}$ | $\begin{gathered} -10 \text { to }+40 \\ -10 \text { to }+40 \\ -6 \text { to }+40 \\ -5 \text { to }+12 \\ -10 \text { to }+40 \\ -5 \mathrm{~V} \text { Max } \\ -10 \text { to }+30 \\ -5 \mathrm{~V} \text { Max } \\ -10 \text { to }+30 \\ -10 \text { to }+40 \\ \hline \end{gathered}$ | V |
| Output Current | DCX124EU <br> DCX144EU <br> DCX114YU <br> DCX123JU <br> DCX114EU <br> DCX143TU <br> DCX143EU <br> DCX114TU <br> DCX143ZU <br> DCX115EU | lo | 30 <br> 30 <br> 70 <br> 100 <br> 50 <br> 100 <br> 100 <br> 100 <br> 100 <br> 20 <br> 100 | mA |
| Output Current |  | $\mathrm{I}_{\mathrm{C}}(\mathrm{Max})$ | 100 | mA |

Absolute Maximum Ratings PNP Section (@ $T_{A}=+25^{\circ} \mathrm{C}$, unless otherwise specified.)

| Characteristic |  | Symbol | Value | Unit |
| :---: | :---: | :---: | :---: | :---: |
| Supply Voltage <Pin: (4) to (3)> |  | $\mathrm{V}_{\mathrm{CC}}$ | 50 | V |
| Input Voltage <br> <Pin: (5) to (4)> | DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143TU DCX143EU DCX114TU DCX143ZU DCX115EU | VIN | $\begin{aligned} & \text { +10 to }-40 \\ & +10 \text { to }-40 \\ & +6 \text { to }-40 \\ & +5 \text { to }-12 \\ & +10 \text { to }-40 \\ & +5 \mathrm{~V} \text { Max } \\ & +10 \text { to }-30 \\ & +5 \mathrm{~V} \text { Max } \\ & +5 \text { to }-30 \\ & +10 \text { to }-40 \\ & \hline \end{aligned}$ | V |
| Output Current | DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143TU DCX143EU DCX114TU DCX143ZU DCX115EU | lo | $\begin{gathered} \hline-30 \\ -30 \\ -70 \\ -100 \\ -50 \\ -100 \\ -100 \\ -100 \\ -100 \\ -20 \end{gathered}$ | mA |
| Output Current |  | Ic (Max) | -100 | mA |

Thermal Characteristics $\left(@ T_{A}=+25^{\circ} \mathrm{C}\right.$, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
| :--- | :---: | :---: | :---: |
| Power Dissipation (Notes 6, 7) | $P_{D}$ | 200 | mW |
| Thermal Resistance, Junction to Ambient Air (Note 6) | $\mathrm{R}_{\theta J \mathrm{~A}}$ | 625 | ${ }^{\circ} \mathrm{C} / \mathrm{W}$ |
| Operating and Storage Temperature Range | $\mathrm{TJ}_{\mathrm{J}, \mathrm{TSTG}}$ | -55 to +150 | ${ }^{\circ} \mathrm{C}$ |

[^0]DCX (XXXX) U

Thermal Characteristics $\left(\mathrm{T}_{\mathrm{A}}=+25^{\circ} \mathrm{C}\right.$, unless otherwise specified.)


DCX (XXXX) U

Electrical Characteristics NPN Section (@ $T_{A}=+25^{\circ} \mathrm{C}$, unless otherwise specified.)

| Characteristic |  | Symbol | Min | Typ | Max | Unit | Test Condition |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| R1 Only (DCX143TU \& DCX114TU) |  |  |  |  |  |  |  |
| Collector-Base Breakdown Voltage |  | $\mathrm{BV}_{\text {CBO }}$ | 50 | - | - | V | $\mathrm{I}_{\mathrm{C}}=50 \mu \mathrm{~A}$ |
| Collector-Emitter Breakdown Voltage |  | BV ${ }_{\text {CEO }}$ | 50 | - | - | V | $\mathrm{IC}=1 \mathrm{~mA}$ |
| Emitter-Base Breakdown Voltage |  | $\mathrm{BV}_{\text {EBO }}$ | 5 | - | -- | V | $\mathrm{I}_{\mathrm{E}}=50 \mu \mathrm{~A}$ |
| Collector Cutoff Current |  | $\mathrm{I}_{\text {cbo }}$ | - | - | 0.5 | $\mu \mathrm{A}$ | $\mathrm{V}_{\mathrm{CB}}=50 \mathrm{~V}$ |
| Emitter Cutoff Current |  | $\mathrm{I}_{\text {EBO }}$ | - | - | 0.5 | $\mu \mathrm{A}$ | $\mathrm{V}_{\mathrm{EB}}=4 \mathrm{~V}$ |
| Collector-Emitter Saturation Voltage |  | $\mathrm{V}_{\text {CE(sat) }}$ | - | - | 0.3 | V | $\begin{array}{\|ll} \hline \mathrm{IC}_{\mathrm{C}} \mathrm{I}_{\mathrm{B}}=2.5 \mathrm{~mA} / 0.25 \mathrm{~mA} & \text { DCX143TU } \\ \mathrm{IC}_{\mathrm{C}} \mathrm{I}_{\mathrm{B}}=1 \mathrm{~mA} / 0.1 \mathrm{~mA} & \text { DCX114TU } \end{array}$ |
| DC Current Transfer Ratio |  | $\mathrm{h}_{\text {FE }}$ | 100 | 250 | 600 | - | $\mathrm{I}_{\mathrm{C}}=1 \mathrm{~mA}, \mathrm{~V}_{\mathrm{CE}}=5 \mathrm{~V}$ |
| Input Resistor ( $\mathrm{R}_{1}$ ) Tolerance |  | $\Delta \mathrm{R}_{1}$ | -30 | - | +30 | \% | - |
| Gain-Bandwidth Product |  | $\mathrm{f}_{\mathrm{T}}$ | - | 250 | - | MHz | $\mathrm{V}_{C E}=10 \mathrm{~V}, \mathrm{I}_{\mathrm{E}}=5 \mathrm{~mA}, \mathrm{f}=100 \mathrm{MHz}$ |
| R1/R2 Only |  |  |  |  |  |  |  |
| Input Voltage | DCX124EU | $\mathrm{V}_{1 \text { (off) }}$ | 0.5 | 1.1 | - | V |  |
|  | DCX144EU |  | 0.5 | 1.1 |  |  |  |
|  | DCX114YU |  | 0.3 | - |  |  |  |
|  | DCX123JU |  | 0.5 | - |  |  |  |
|  | DCX114EU |  | 0.5 | 1.1 |  |  | $V_{C C}=5 \mathrm{~V}, 1 \mathrm{l}=100 \mu \mathrm{~A}$ |
|  | DCX143EU |  | 0.5 | 1.16 |  |  |  |
|  | DCX143ZU |  | 0.5 | - |  |  |  |
|  | DCX115EU |  | 0.5 | - |  |  |  |
|  | DCX124EU | $\mathrm{V}_{\text {I(on) }}$ | - | 1.9 | 3.0 |  | V O $=0.3 \mathrm{~V}, \mathrm{l}_{\mathrm{O}}=5 \mathrm{~mA}$ |
|  | DCX144EU |  |  | 1.9 | 3.0 |  | $\mathrm{V}_{\mathrm{O}}=0.3 \mathrm{~V}, \mathrm{l}_{\mathrm{O}}=2 \mathrm{~mA}$ |
|  | DCX114YU |  |  | - | 1.4 |  | $\mathrm{V}_{\mathrm{O}}=0.3 \mathrm{~V}, \mathrm{l}_{\mathrm{O}}=1 \mathrm{~mA}$ |
|  | DCX123JU |  |  | - | 1.1 |  | $\mathrm{V}_{\mathrm{O}}=0.3 \mathrm{~V}, \mathrm{l}_{\mathrm{O}}=5 \mathrm{~mA}$ |
|  | DCX114EU |  |  | 1.9 | 3.0 |  | $\mathrm{V}_{\mathrm{O}}=0.3 \mathrm{~V}, \mathrm{l}_{\mathrm{O}}=10 \mathrm{~mA}$ |
|  | DCX143EU |  |  | 1.99 | 3.0 |  | $\mathrm{V}_{\mathrm{O}}=0.3 \mathrm{~V}, \mathrm{l}_{0}=20 \mathrm{~mA}$ |
|  | DCX143ZU |  |  | - | 1.3 |  | $\mathrm{V}_{\mathrm{O}}=0.3 \mathrm{~V}, \mathrm{l}_{\mathrm{O}}=5 \mathrm{~mA}$ |
|  | DCX115EU |  |  | - | 3 |  | $\mathrm{V}_{\mathrm{O}}=0.3 \mathrm{~V}, \mathrm{l}_{\mathrm{O}}=1 \mathrm{~mA}$ |
| Output Voltage | DCX124EU | $V_{\text {O(on) }}$ | - | 0.1 | 0.3 | V | $1 \mathrm{l} / \mathrm{l} \mid=10 \mathrm{~mA} / 0.5 \mathrm{~mA}$ |
|  | DCX144EU |  |  |  |  |  | $\mathrm{I}_{0} / \mathrm{I}_{1}=10 \mathrm{~mA} / 0.5 \mathrm{~mA}$ |
|  | DCX114YU |  |  |  |  |  | $1 \mathrm{O} / \mathrm{l}_{1}=5 \mathrm{~mA} / 0.25 \mathrm{~mA}$ |
|  | DCX123JU |  |  |  |  |  | $\mathrm{I}_{0} / \mathrm{I}_{\mathrm{l}}=5 \mathrm{~mA} / 0.25 \mathrm{~mA}$ |
|  | DCX114EU |  |  |  |  |  | $1 \mathrm{l} / \mathrm{l}_{1}=10 \mathrm{~mA} / 0.5 \mathrm{~mA}$ |
|  | DCX143EU |  |  |  |  |  | $\mathrm{I}_{0} / \mathrm{I}_{\mathrm{l}}=10 \mathrm{~mA} / 0.5 \mathrm{~mA}$ |
|  | DCX143ZU |  |  |  |  |  | $\mathrm{l} / \mathrm{l} \mathrm{l}=5 \mathrm{~mA} / 0.25 \mathrm{~mA}$ |
|  | DCX115EU |  |  |  |  |  | $\mathrm{I}_{\mathrm{O}} / \mathrm{I}_{1}=10 \mathrm{~mA} / 0.5 \mathrm{~mA}$ |
| Input Current | DCX124EU | 1 | - |  | 0.36 | mA | V I $=5 \mathrm{~V}$ |
|  | DCX144EU |  |  |  | 0.18 |  |  |
|  | DCX114YU |  |  |  | 0.88 |  |  |
|  | DCX123JU |  |  |  | 3.6 |  |  |
|  | DCX114EU |  |  |  | 0.88 |  |  |
|  | DCX143EU |  |  |  | 0.88 |  |  |
|  | DCX143ZU |  |  |  | 1.8 |  |  |
|  | DCX115EU |  |  |  | 0.15 |  |  |
| Output Current |  | $\mathrm{l}_{\text {(off) }}$ | - | - | 0.5 | $\mu \mathrm{A}$ | $\mathrm{V}_{\mathrm{CC}}=50 \mathrm{~V}, \mathrm{~V}_{1}=0 \mathrm{~V}$ |
| DC Current Gain | $\begin{array}{\|l\|} \hline \text { DCX124EU } \\ \text { DCX124EUQ } \end{array}$ | G\| | $\begin{aligned} & 56 \\ & 60 \end{aligned}$ | - | - | - | $\begin{aligned} & \mathrm{V}_{\mathrm{O}}=5 \mathrm{~V}, \mathrm{IO}=5 \mathrm{~mA} \\ & \mathrm{~V}_{\mathrm{O}}=5 \mathrm{~V}, \mathrm{I}_{\mathrm{O}}=5 \mathrm{~mA} \end{aligned}$ |
|  | DCX144EU |  | 68 |  |  |  | $\mathrm{V}_{\mathrm{O}}=5 \mathrm{~V}, \mathrm{l}_{0}=5 \mathrm{~mA}$ |
|  | $\begin{aligned} & \hline \text { DCX114YU } \\ & \text { DCX114YUQ } \end{aligned}$ |  | $\begin{aligned} & 68 \\ & 80 \\ & \hline \end{aligned}$ |  |  |  | $\begin{aligned} & \mathrm{V}_{\mathrm{O}}=5 \mathrm{~V}, \mathrm{I}_{\mathrm{O}}=10 \mathrm{~mA} \\ & \mathrm{~V}_{\mathrm{O}}=5 \mathrm{~V}, \mathrm{I}_{\mathrm{O}}=10 \mathrm{~mA} \\ & \hline \end{aligned}$ |
|  | DCX123JU |  | 80 |  |  |  | $\mathrm{V}_{\mathrm{O}}=5 \mathrm{~V}, \mathrm{I}_{\mathrm{O}}=10 \mathrm{~mA}$ |
|  | DCX114EU |  | 30 |  |  |  | $\mathrm{V}_{\mathrm{O}}=5 \mathrm{~V}, \mathrm{I}_{\mathrm{O}}=5 \mathrm{~mA}$ |
|  | DCX143EU |  | 50 |  |  |  | $\mathrm{V}_{\mathrm{O}}=5 \mathrm{~V}, \mathrm{l} \mathrm{O}=10 \mathrm{~mA}$ |
|  | DCX143ZU |  | 80 |  |  |  | $\mathrm{V}_{\mathrm{O}}=5 \mathrm{~V}, \mathrm{I}_{\mathrm{O}}=10 \mathrm{~mA}$ |
|  | DCX115EU |  | 82 |  |  |  | $\mathrm{V}_{\mathrm{O}}=5 \mathrm{~V}, \mathrm{l}_{\mathrm{O}}=5 \mathrm{~mA}$ |
| Input Resistor ( $\mathrm{R}_{1}$ ) Tolerance |  | $\Delta \mathrm{R}_{1}$ | -30 | - | +30 | \% | - |
| Resistance Ratio Tolerance |  | $\Delta \mathrm{R}_{2} / \mathrm{R}_{1}$ | -20 | - | +20 | \% | - |
| Gain-Bandwidth Product |  | $\mathrm{f}_{T}$ | - | 250 | - | MHz | $\mathrm{V}_{\mathrm{CE}}=10 \mathrm{~V}, \mathrm{I}_{\mathrm{E}}=5 \mathrm{~mA}, \mathrm{f}=100 \mathrm{MHz}$ |

DCX (XXXX) U

Electrical Characteristics PNP Section (@ $T_{A}=+25^{\circ} \mathrm{C}$, unless otherwise specified.)




Fig. 6 Typical Input Voltage vs. Collector Current

## Typical Curves - DCX123JU NPN Section $\left(@ T_{A}=+25^{\circ} \mathrm{C}\right.$, unless otherwise specified.)



Fig. 7 Typical $\mathrm{V}_{\mathrm{CE}(\text { sat })}$ vs. $\mathrm{I}_{\mathrm{C}}$


Fig. 9 Typical Output Capacitance


Fig. 11 Typical Input Voltage vs. Collector Current


Fig. 8 Typical DC Current Gain


Fig. 10 Typical Collector Current vs. Input Voltage

## Typical Curves - DCX143EU PNP Section ( $\mathrm{T}_{\mathrm{A}}=+25^{\circ} \mathrm{C}$, unless otherwise specified.)




## Typical Curves - DCX114TU PNP Section (@ $\mathrm{T}_{\mathrm{A}}=+25^{\circ} \mathrm{C}$, unless otherwise specified.)



Fig. 24 Typical $\mathrm{V}_{\mathrm{CE}(\text { sat })}$ vs. $\mathrm{I}_{\mathrm{C}}$


Fig. 26 Typical Output Capacitance


Fig. 28 Typical Input Voltage vs. Collector Current


Fig. 25 Typical DC Current Gain


Fig. 27 Typical Collector Current vs. Input Voltage

## Typical Curves - DCX114TU NPN Section (@ $\mathrm{T}_{\mathrm{A}}=+25^{\circ} \mathrm{C}$, unless otherwise specified.)



Fig. 29 Typical $\mathrm{V}_{\mathrm{CE}(\text { sat })}$ vs. $\mathrm{I}_{\mathrm{C}}$


Fig. 31 Typical Output Capacitance



Fig. 30 Typical DC Current Gain


Fig. 32 Typical Collector Current vs. Input Voltage

Fig. 33 Typical Input Voltage vs. Collector Current

DCX (XXXX) U

## Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.
SOT363


| SOT363 |  |  |  |
| :---: | :---: | :---: | :---: |
| Dim | Min | Max | Typ |
| A1 | 0.00 | 0.10 | 0.05 |
| A2 | 0.90 | 1.00 | 0.95 |
| b | 0.10 | 0.30 | 0.25 |
| c | 0.10 | 0.22 | 0.11 |
| D | 1.80 | 2.20 | 2.15 |
| E | 2.00 | 2.20 | 2.10 |
| E1 | 1.15 | 1.35 | 1.30 |
| e | 0.650 BSC |  |  |
| F | 0.40 | 0.45 | 0.425 |
| L | 0.25 | 0.40 | 0.30 |
| a | $0^{\circ}$ | $8^{\circ}$ | -- |
| All Dimensions in $\mathbf{~ m m}$ |  |  |  |

## Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.
SOT363


| Dimensions | Value <br> (in $\mathbf{~ m m}$ ) |
| :---: | :---: |
| $\mathbf{C}$ | 0.650 |
| $\mathbf{G}$ | 1.300 |
| $\mathbf{X}$ | 0.420 |
| $\mathbf{Y}$ | 0.600 |
| $\mathbf{Y 1}$ | 2.500 |

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[^0]:    Notes: 6. Mounted on FR-4 PC Board with minimum recommended pad layout.
    7. 150 mW per element must not be exceeded.

