

**NPN PRE-BIASED SMALL SIGNAL DUAL SURFACE MOUNT TRANSISTOR**
**Features**

- Epitaxial Planar Die Construction
- Complementary PNP Types Available (DDA)
- Built-In Biasing Resistors
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The DDC (XXXX) UQs are suitable for automotive applications requiring specific change control; these parts are AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**

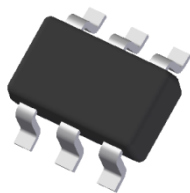
<https://www.diodes.com/quality/product-definitions/>

**Mechanical Data**

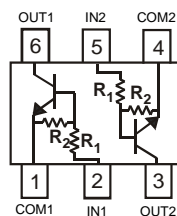
- Package: SOT363
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 @3
- Weight: 0.006 grams (Approximate)

Part Number	R1 (NOM)	R2 (NOM)
DDC124EU	22kΩ	22kΩ
DDC144EU	47kΩ	47kΩ
DDC114YU	10kΩ	47kΩ
DDC123JU	2.2kΩ	47kΩ
DDC114EU	10kΩ	10kΩ
DDC143XU	4.7kΩ	10kΩ
DDC143ZU	4.7kΩ	47kΩ
DDC115EU	100kΩ	100kΩ

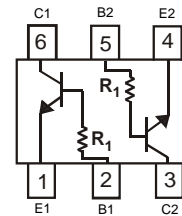
Part Number	R1 Only
DDC113TU	1kΩ
DDC143TU	4.7kΩ
DDC114TU	10kΩ

**SOT363**


Top View



R1, R2



R1 Only

Device Schematic

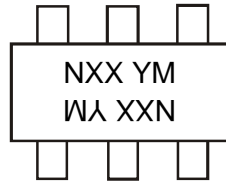
**Ordering Information** (Notes 4, 5)

Part Number	Status	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
DDC124EU-7-F	Active	N17	7	8	3,000
DDC124EUQ-7-F	NRND (Use <a href="#">ADC124EUQ</a> )	N17	7	8	3,000
DDC144EU-7-F	Active	N20	7	8	3,000
DDC114YU-7-F	Active	N14	7	8	3,000
DDC114YUQ-7-F	NRND (Use <a href="#">ADC114YUQ</a> )	N14	7	8	3,000
DDC114YUQ-13-F	NRND (Use <a href="#">ADC114YUQ</a> )	N14	13	8	10,000
DDC123JU-7-F	Active	N06	7	8	3,000
DDC114EU-7-F	Active	N13	7	8	3,000
DDC114EUQ-7-F	NRND (Use <a href="#">ADC114EUQ</a> )	N13	7	8	3,000
DDC114EUQ-13-F	NRND (Use <a href="#">ADC114EUQ</a> )	N13	13	8	10,000
DDC113TU-7-F	Active	N01	7	8	3,000
DDC143TU-7-F	Active	N07	7	8	3,000
DDC114TU-7-F	Active	N12	7	8	3,000
DDC114TUQ-7-F	Active	N12	7	8	3,000
DDC143XU-7	Active	N04	7	8	3,000
DDC143XU-13	Active	N04	13	8	10,000
DDC143ZU-7-F	Active	N03	7	8	3,000
DDC115EU-7-F	Active	N02	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 <900ppm bromine, <900ppm chlorine (<1500ppm total Br + 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

SOT363



NXX = Product Type Marking Code (See Ordering Information)  
 YM = Date Code Marking  
 Y or  $\bar{Y}$  = Year (ex: J = 2022)  
 M = Month (ex: 9 = September)

### Date Code Key

Year	2002	....	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Code	O	....	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

## Absolute Maximum Ratings (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Supply Voltage		$V_O$	50	V
Input Voltage	DDC124EU	$V_I$	-10 to +40	V
	DDC144EU		-10 to +40	
	DDC114YU		-6 to +40	
	DDC123JU		-5 to +12	
	DDC114EU		-10 to +40	
	DDC113TU		-5V max	
	DDC143TU		-5V max	
	DDC114TU		-5V max	
	DDC143XU		-7 to +20	
	DDC143ZU		-5 to +30	
	DDC115EU		-10 to +40	
Output Current	DDC124EU	$I_O$	30	mA
	DDC144EU		30	
	DDC114YU		70	
	DDC123JU		100	
	DDC114EU		50	
	DDC113TU		100	
	DDC143TU		100	
	DDC114TU		100	
	DDC143XU		100	
	DDC143ZU		100	
	DDC115EU		20	
Peak Output Current		$I_{CM}$	100	mA

## Thermal Characteristics (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Power Dissipation (Notes 6 & 7)	$P_D$	200	mW
Thermal Resistance, Junction to Ambient Air (Note 6)	$R_{\theta JA}$	625	$^\circ\text{C}/\text{W}$
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

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

### Electrical Characteristics (@ T<sub>A</sub> = +25°C, unless otherwise specified.)

For R1 Only Devices: DDC113TU & DDC143TU & DDC114TU

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV <sub>CBO</sub>	50	—	—	V	I <sub>C</sub> = 50μA
Collector-Emitter Breakdown Voltage	BV <sub>CEO</sub>	50	—	—	V	I <sub>C</sub> = 1mA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	5	—	—	V	I <sub>E</sub> = 50μA
Collector Cutoff Current	I <sub>CBO</sub>	—	—	0.5	μA	V <sub>CB</sub> = 50V
Emitter Cutoff Current	I <sub>EBO</sub>	—	—	0.5	μA	V <sub>EB</sub> = 4V
Collector-Emitter Saturation Voltage	V <sub>CE(sat)</sub>	—	—	0.3	V	I <sub>C</sub> /I <sub>B</sub> = 2.5mA / 0.25mA DDC143TU I <sub>C</sub> /I <sub>B</sub> = 1mA / 0.1mA DDC114TU I <sub>C</sub> /I <sub>B</sub> = 10mA / 1mA DDC113TU
DC Current Transfer Ratio	h <sub>FE</sub>	100	250	600	—	I <sub>C</sub> = 1mA, V <sub>CE</sub> = 5V
Input Resistor (R <sub>1</sub> ) Tolerance	ΔR <sub>1</sub>	-30	—	+30	%	—
Transition frequency (Note 8)	f <sub>T</sub>	—	250	—	MHz	V <sub>CE</sub> = 10V, I <sub>E</sub> = -5mA, f = 100MHz

### Electrical Characteristics (@ T<sub>A</sub> = +25°C, unless otherwise specified.)

For R1, R2 Devices: DDC124EU & DDC144EU & DDC114YU & DDC123JU & DDC114EU & DDC143ZU & DDC115EU

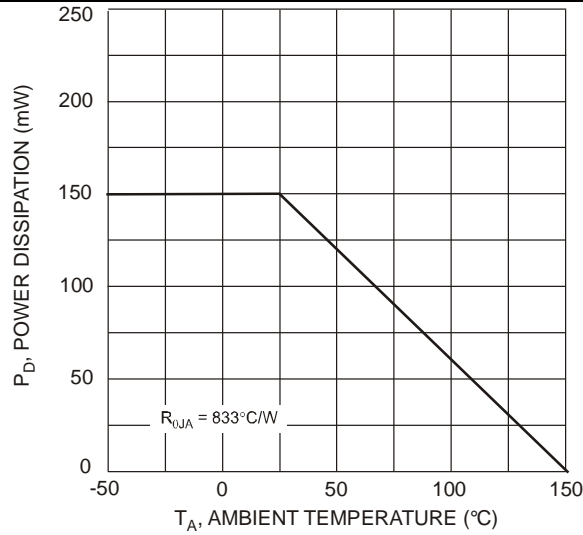
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Input Voltage	DDC124EU DDC144EU DDC114YU DDC123JU DDC114EU DDC143XU DDC143ZU DDC115EU	0.5 0.5 0.3 0.5 0.5 0.3 0.5 0.5	1.1 1.1 — — 1.1 — — —	—	V	V <sub>CC</sub> = 5V, I <sub>O</sub> = 100μA
	DDC124EU DDC144EU DDC114YU DDC123JU DDC114EU DDC143XU DDC143ZU DDC115EU	— — — — — — — —	1.9 1.9 — — 1.9 — — —	3.0 3.0 1.4 1.1 3.0 2.5 1.3 3		V <sub>O</sub> = 0.3V, I <sub>O</sub> = 5mA V <sub>O</sub> = 0.3V, I <sub>O</sub> = 2mA V <sub>O</sub> = 0.3V, I <sub>O</sub> = 1mA V <sub>O</sub> = 0.3V, I <sub>O</sub> = 5mA V <sub>O</sub> = 0.3V, I <sub>O</sub> = 10mA V <sub>O</sub> = 0.3V, I <sub>O</sub> = 20mA V <sub>O</sub> = 0.3V, I <sub>O</sub> = 5mA V <sub>O</sub> = 0.3V, I <sub>O</sub> = 1mA
Output Voltage	DDC124EU DDC144EU DDC114YU DDC123JU DDC114EU DDC143XU DDC143ZU DDC115EU	—	0.1	0.3	V	I <sub>O</sub> /I <sub>I</sub> = 10mA / 0.5mA I <sub>O</sub> /I <sub>I</sub> = 10mA / 0.5mA I <sub>O</sub> /I <sub>I</sub> = 5mA / 0.25mA I <sub>O</sub> /I <sub>I</sub> = 5mA / 0.25mA I <sub>O</sub> /I <sub>I</sub> = 10mA / 0.5mA I <sub>O</sub> /I <sub>I</sub> = 10mA / 0.5mA I <sub>O</sub> /I <sub>I</sub> = 5mA / 0.25mA I <sub>O</sub> /I <sub>I</sub> = 10mA / 0.5mA
Input Current	DDC124EU DDC144EU DDC114YU DDC123JU DDC114EU DDC143XU DDC143ZU DDC115EU	—	—	0.36 0.18 0.88 3.6 0.88 1.8 1.8 0.15	mA	V <sub>I</sub> = 5V
Output Current	I <sub>O(off)</sub>	—	—	0.5	μA	V <sub>CC</sub> = 50V, V <sub>I</sub> = 0V
DC Current Gain	DDC124EU DDC144EU DDC114YU DDC114YUQ DDC123JU DDC114EU DDC143XU DDC143ZU DDC115EU	56 68 68 80 80 30 30 80 82	—	—	—	V <sub>O</sub> = 5V, I <sub>O</sub> = 5mA V <sub>O</sub> = 5V, I <sub>O</sub> = 5mA V <sub>O</sub> = 5V, I <sub>O</sub> = 10mA V <sub>O</sub> = 5V, I <sub>O</sub> = 5mA V <sub>O</sub> = 5V, I <sub>O</sub> = 10mA V <sub>O</sub> = 5V, I <sub>O</sub> = 5mA V <sub>O</sub> = 5V, I <sub>O</sub> = 10mA V <sub>O</sub> = 5V, I <sub>O</sub> = 10mA V <sub>O</sub> = 5V, I <sub>O</sub> = 5mA
Input Resistor (R <sub>1</sub> ) Tolerance	ΔR <sub>1</sub>	-30	—	+30	%	—
Resistance Ratio Tolerance	Δ(R <sub>2</sub> /R <sub>1</sub> )	-20	—	+20	%	—
Transition frequency (Note 8)	f <sub>T</sub>	—	250	—	MHz	V <sub>CE</sub> = 10V, I <sub>E</sub> = 5mA, f = 100MHz

Note: 8. Transistor - for reference only.

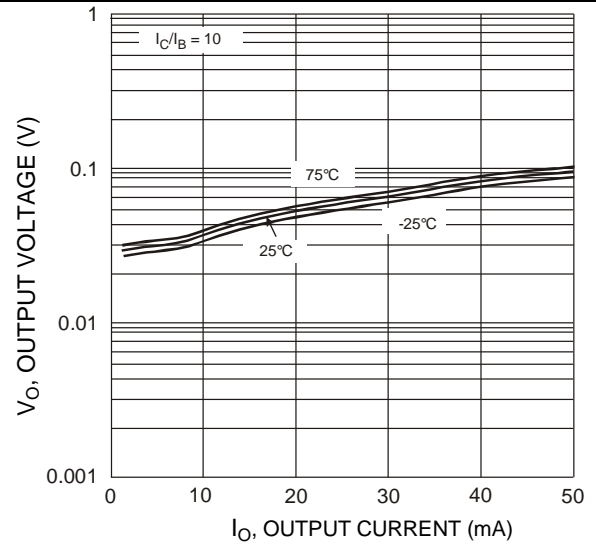
DDC(XXXX)U

Document number: DS30345 Rev. 20 - 2

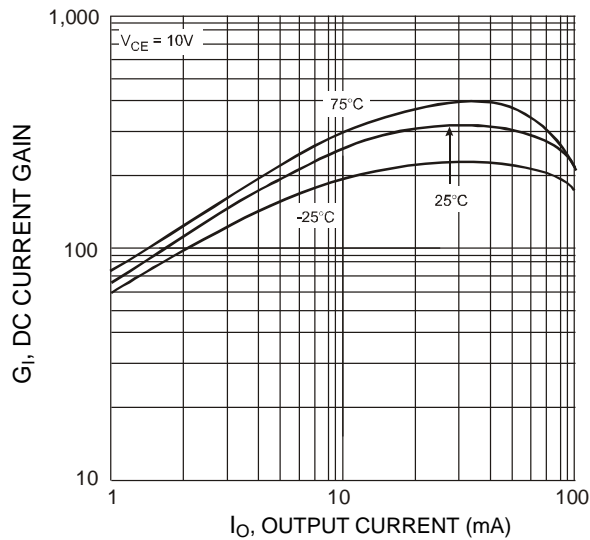
**Typical Curves – DDC123JU** (@  $T_A = +25^\circ\text{C}$ , unless otherwise specified.)



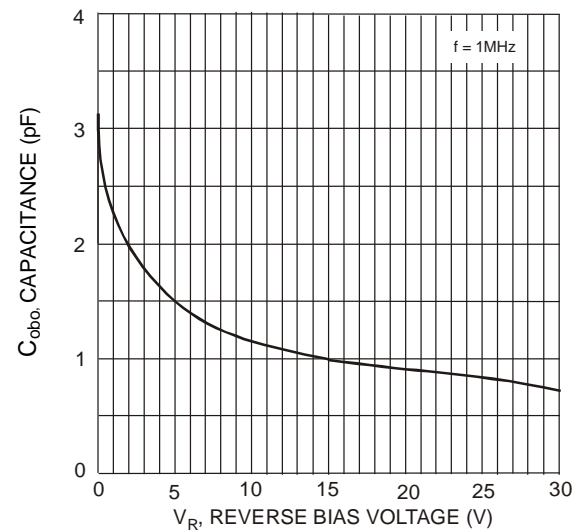
**$P_D \text{ v } T_A$**



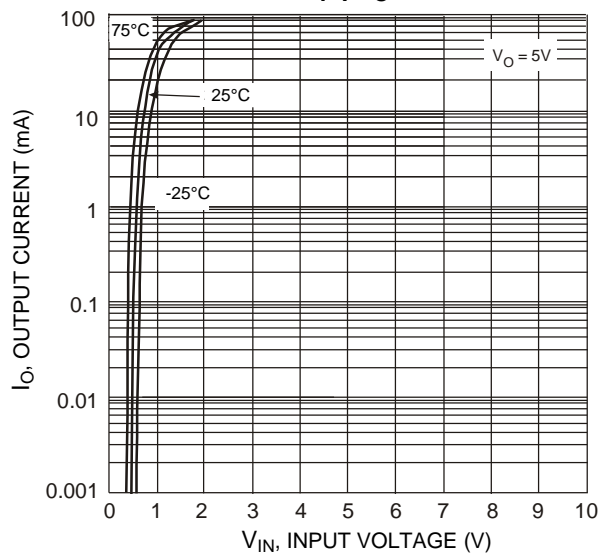
**$V_O \text{ v } I_O$**



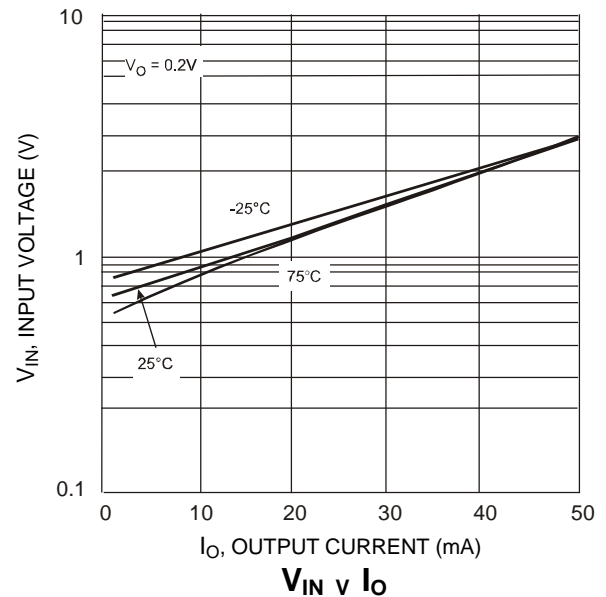
**$G_I \text{ v } I_O$**



**$C_{obo} \text{ v } V_R$**

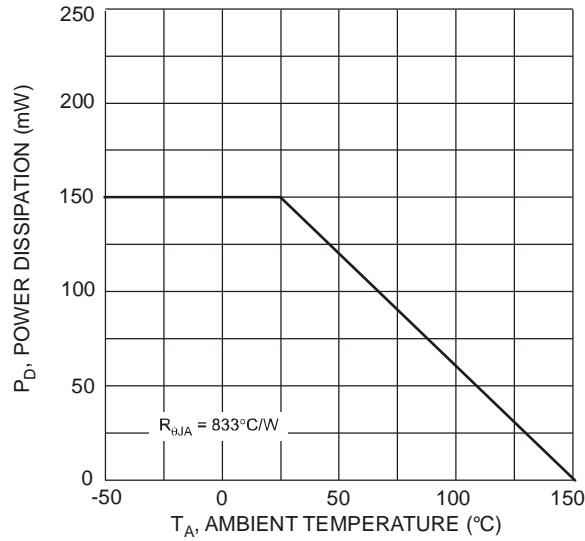


**$I_O \text{ v } V_{IN}$**

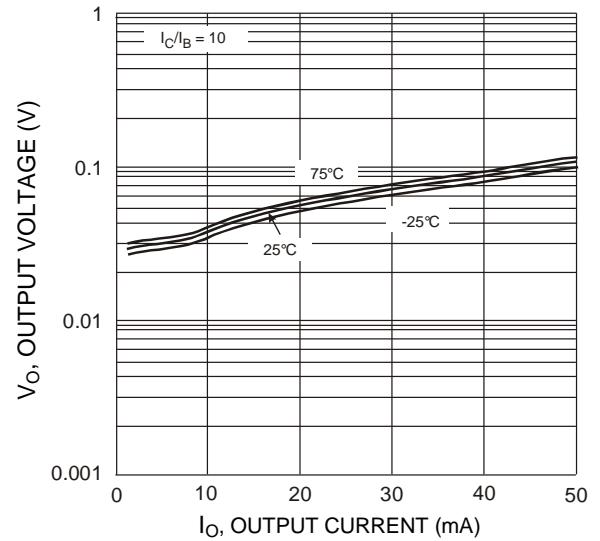


**$V_{IN} \text{ v } I_O$**

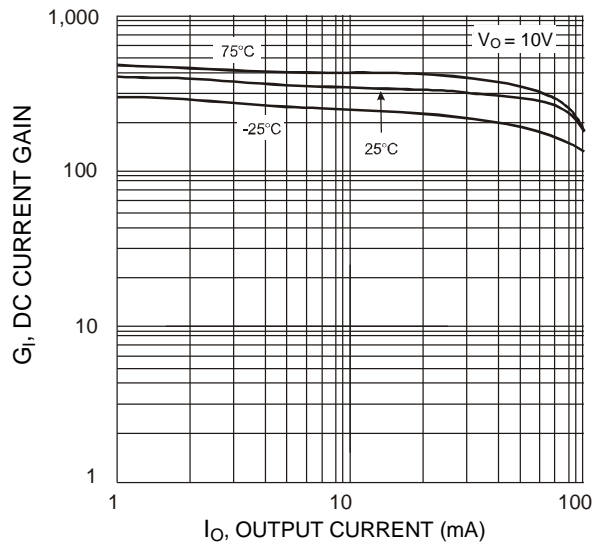
**Typical Curves – DDC114YU** (@  $T_A = +25^\circ\text{C}$ , unless otherwise specified.)



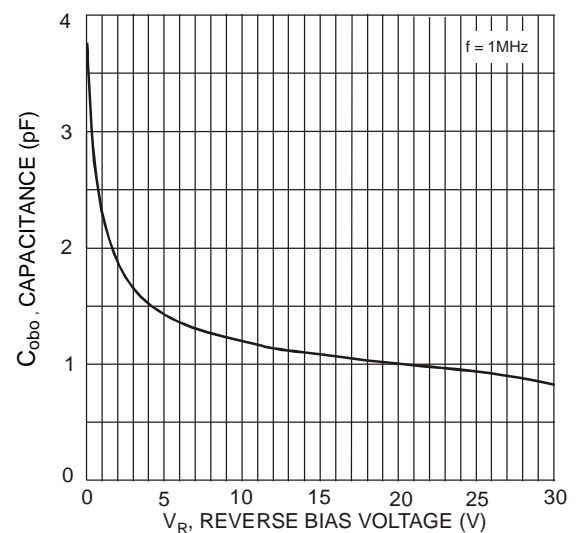
**$P_D \text{ v } T_A$**



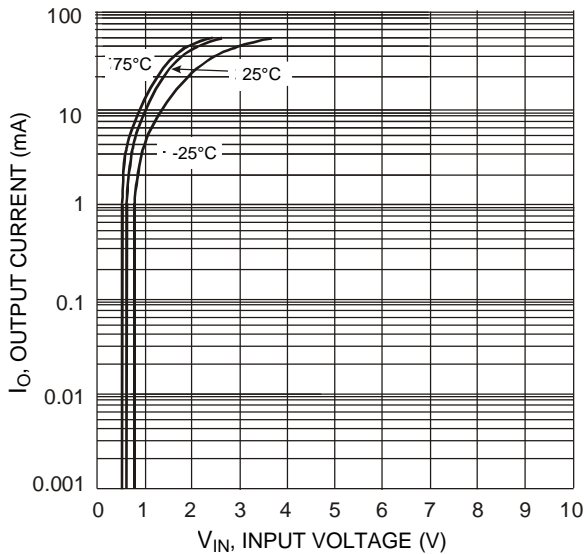
**$V_O \text{ v } I_O$**



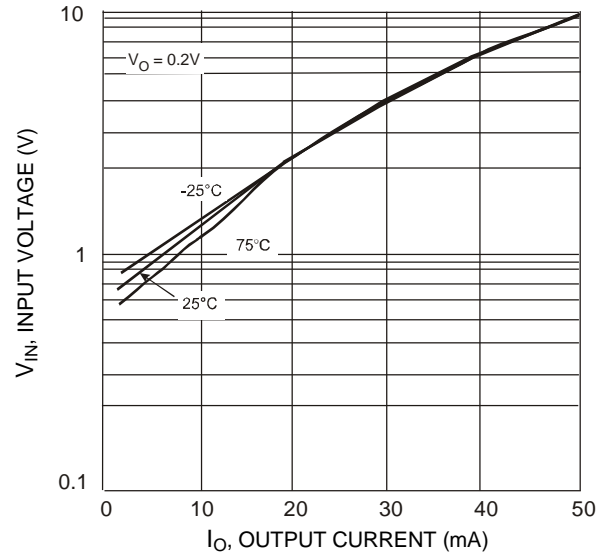
**$G_I \text{ v } I_O$**



**$C_{obo} \text{ v } V_R$**

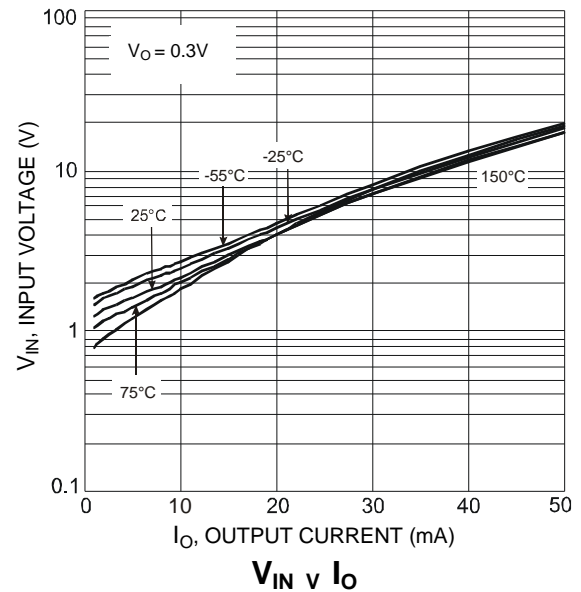
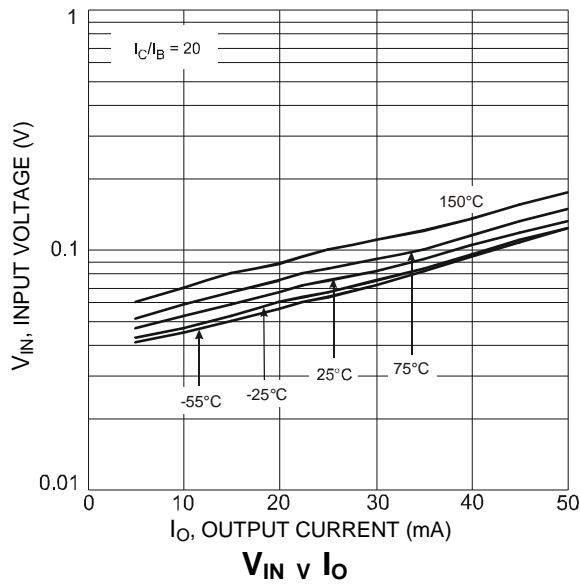
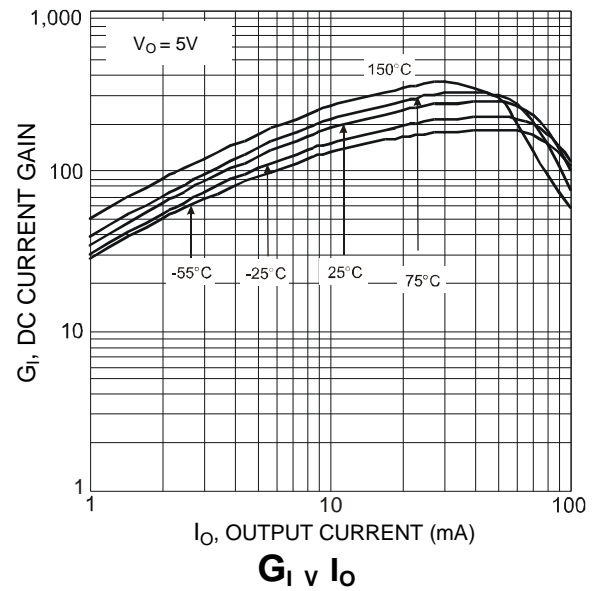
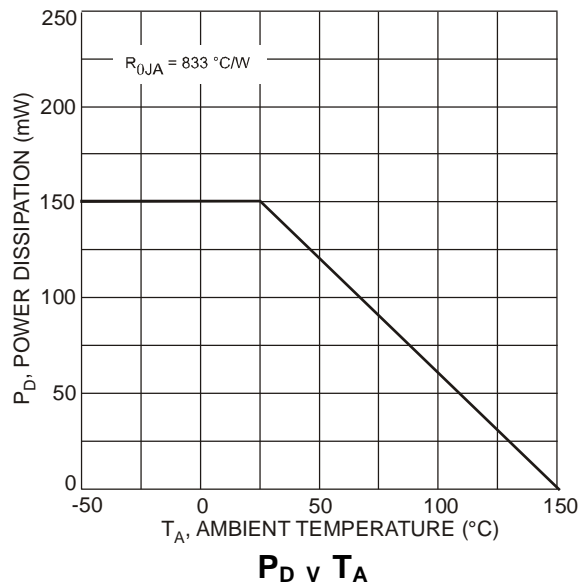


**$I_O \text{ v } V_{IN}$**



**$V_{IN} \text{ v } I_O$**

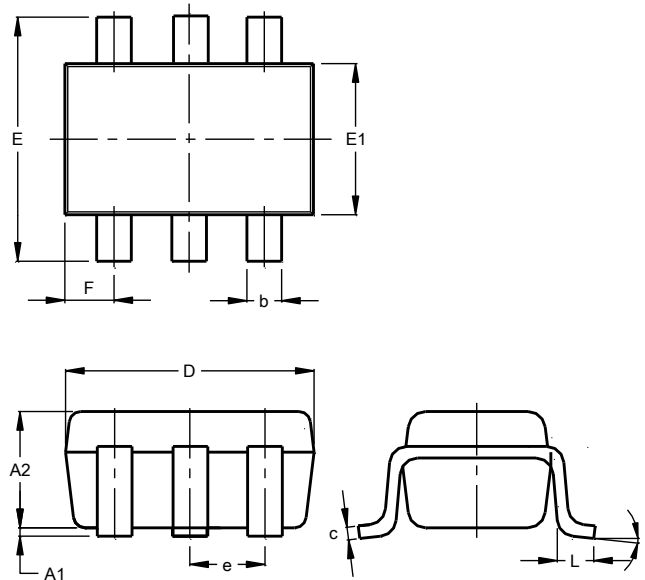
**Typical Curves – DDC124EU** (@  $T_A = +25^\circ\text{C}$ , unless otherwise specified.)



## Package Outline Dimensions

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

### SOT363

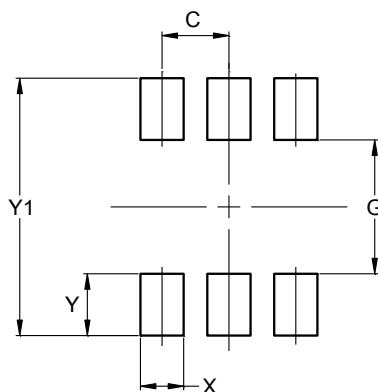


SOT363			
Dim	Min	Max	Typ
A1	0.00	0.10	0.05
A2	0.90	1.00	0.95
b	0.10	0.30	0.25
c	0.10	0.22	0.11
D	1.80	2.20	2.15
E	2.00	2.20	2.10
E1	1.15	1.35	1.30
e	0.650 BSC		
F	0.40	0.45	0.425
L	0.25	0.40	0.30
a	0°	8°	--
All Dimensions in mm			

## Suggested Pad Layout

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

### SOT363



Dimensions	Value (in mm)
C	0.650
G	1.300
X	0.420
Y	0.600
Y1	2.500

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